

# MURATA PRODUCTS

## Lineup 2021



# 2021 MURATA PRODUCTS Lineup



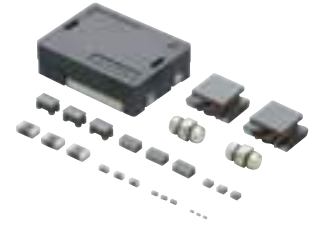
## Capacitors

|   |    |
|---|----|
| Ceramic Capacitors, Polymer Aluminum Electrolytic Capacitors            | 4  |
| Single-Layer Microchip Capacitors, Thin Film Circuit Substrates (RUSUB) | 32 |
| Variable Capacitors   | 36 |
| Silicon Capacitors  | 36 |
| Film Capacitors   | 42 |



## Noise Suppression Products/EMI Suppression Filters

|   |    |
|---|----|
| Chip Ferrite Bead                               | 43 |
| Application Specified Noise Filter              | 45 |
| LC Combined Filter                              | 46 |
| Common Mode Choke Coil/Common Mode Noise Filter | 47 |
| Block Type EMIFIL                               | 48 |
| Noise Suppression Filters (Lead Type), Others   | 49 |
| ESD Protection Devices                          | 49 |



## Inductors (Coils)

|                           |    |
|---------------------------|----|
| Inductors for Power Lines | 51 |
| RF Inductors              | 58 |
| General Circuit Inductors | 61 |
| Variable Inductors        | 62 |



## Resistors

|                        |    |
|------------------------|----|
| High Voltage Resistors | 64 |
|------------------------|----|



## Timing Devices

|                             |    |
|-----------------------------|----|
| MEMS Resonator              | 66 |
| Crystal Units               | 66 |
| Ceramic Resonators CERALOCK | 67 |



## Filters

|                                       |    |
|---------------------------------------|----|
| Crystal Filters                       | 69 |
| SAW Filters for Mobile Communications | 69 |
| Dielectric Filters GIGAFIL            | 70 |
| Chip Multilayer LC Filters            | 71 |



## RF Components

|          |    |                                 |    |
|----------|----|---------------------------------|----|
| Antennas | 72 | Chip Multilayer Hybrid Dividers | 73 |
| Baluns   | 72 | Chip Multilayer Diplexers       | 74 |
| Couplers | 73 | Microwave Connectors            | 74 |



## Sensors

|                                |    |                                   |    |
|--------------------------------|----|-----------------------------------|----|
| Pyroelectric Infrared Sensors  | 78 | Accelerometers                    | 78 |
| Ultrasonic Sensors             | 78 | Inclinometers                     | 78 |
| AMR Sensors (Magnetic Sensors) | 78 | Gyro Sensors                      | 78 |
| TMR Sensors (Magnetic Sensors) | 78 | Temperature Sensors (Thermistors) | 78 |





## Thermistors

|   |    |
|---|----|
| NTC Thermistors for Temperature Sensor/Temperature Compensation ..... | 80 |
| PTC Thermistors POSISTOR for Overheat Sensing .....                   | 82 |
| PTC Thermistors POSISTOR for Overcurrent Protection .....             | 82 |



## Power Devices

|                                       |    |
|---------------------------------------|----|
| DC-DC Converters .....                | 83 |
| Ballast Power Supplies .....          | 85 |
| Power supplies for LED lighting ..... | 85 |



## Batteries

|                              |    |                                    |    |
|------------------------------|----|------------------------------------|----|
| Laminated Type Lithium Ion   |    | FORTELION 24V Battery Module ..... | 90 |
| Secondary Batteries .....    | 86 | FORTELION Battery System .....     | 91 |
| Cylindrical Type Lithium Ion |    | Coin Manganese Dioxide             |    |
| Secondary Batteries .....    | 89 | Lithium Batteries .....            | 93 |
| Small Lithium ion            |    | Silver Oxide Batteries &           |    |
| Secondary Batteries .....    | 89 | Alkaline Manganese Batteries ..... | 96 |



## Sound Components (Buzzer)

|                                       |    |
|---------------------------------------|----|
| SMD Piezoelectric Sounders .....      | 98 |
| Pin Type Piezoelectric Sounders ..... | 99 |
| Piezoelectric Buzzers .....           | 99 |
| Piezoelectric Diaphragms .....        | 99 |



## Others

|                                      |     |                                   |     |
|--------------------------------------|-----|-----------------------------------|-----|
| Wireless Communication Modules ..... | 100 | Ozonizer Modules: Ionissimo ..... | 103 |
| Micromechatronics .....              | 101 | RFID Devices .....                | 104 |
| Ionizer Modules: Ionissimo .....     | 102 | Femtet, CAE Software .....        | 105 |



p2  
p43  
p50  
p64  
p65  
p69  
p72  
p76  
p80  
p83  
p86  
p98  
p100  
p107

## Application Guides

|  |     |   |     |
|--|-----|---|-----|
| <b>Communications equipment</b> .....  | 108 | <b>Healthcare &amp; medical</b> .....   | 142 |
| <ul style="list-style-type: none"> <li>● Baseband unit (BBU) DU / CU [p108]</li> <li>● Remote radio unit (RRU) mmWave band [p110]</li> <li>● Remote radio unit (RRU) less than sub-6GHz band [p112]</li> <li>● CPE (FWA device) [p114]</li> <li>● OLT (Optical line terminal) [p116]</li> <li>● ONU (Optical network units) [p117]</li> <li>● Core router [p118]</li> <li>● Home router [p119]</li> <li>● Switch [p120]</li> </ul> |     | <ul style="list-style-type: none"> <li>● Blood pressure monitor [p142]</li> <li>● Thermometer [p144]</li> <li>● Hearing aid [p145]</li> <li>● Blood glucose meter [p146]</li> <li>● Insulin pump [p147]</li> <li>● Skin patch [p148]</li> <li>● Diagnostic imaging apparatus [p149]</li> </ul>  |     |
| <b>Enterprise system</b> .....   | 121 | <b>Personal electronics</b> .....   | 150 |
| <ul style="list-style-type: none"> <li>● Server [p121]</li> <li>● Network switch [p122]</li> <li>● DCIM (Data center infrastructure management) [p123]</li> <li>● Hardware accelerator [p124]</li> <li>● Storage system [p125]</li> </ul>  |     | <ul style="list-style-type: none"> <li>● Smart phone [p150]</li> <li>● Smart watch / health tracker [p152]</li> <li>● AR / VR [p154]</li> <li>● True wireless stereo (non-medical use) [p156]</li> <li>● PC [p158]</li> <li>● Tablet PC [p160]</li> <li>● AI speaker [p162]</li> <li>● Vacuum cleaner [p163]</li> <li>● Air conditioner [p164]</li> <li>● Washing machine [p166]</li> <li>● Refrigerator [p167]</li> <li>● Air purifier [p168]</li> <li>● Microwave oven [p170]</li> <li>● IH rice cooker [p171]</li> </ul>   |     |
| <b>Industrial</b> .....  | 126 | <b>Mobility</b> .....   | 172 |
| <ul style="list-style-type: none"> <li>● PLC (Programmable logic controller) [p126]</li> <li>● AGV (Automatic guided vehicle) [p128]</li> <li>● Lighting [p129]</li> <li>● Thermostat [p130]</li> <li>● Security camera [p132]</li> <li>● HEMS (Home energy management system) [p134]</li> <li>● Entrance and exit management system [p136]</li> <li>● Human detection [p138]</li> <li>● Smart meter [p140]</li> </ul>             |     | <ul style="list-style-type: none"> <li>● Inverter [p172]</li> <li>● BMS (Battery management system) [p173]</li> <li>● OBC (On board charger) [p174]</li> <li>● DC-DC converter [p175]</li> <li>● Engine ECU [p176]</li> <li>● TCU (Telematics control unit) [p177]</li> <li>● IVI (In vehicle infotainment) [p178]</li> <li>● ADAS (Advanced driver assist system) [p180]</li> <li>● IPA (Intelligent parking assist) [p182]</li> <li>● Lidar [p183]</li> <li>● Radar [p184]</li> <li>● Front camera [p185]</li> <li>● Automotive lighting [p186]</li> <li>● EPS (Electric power steering) [p187]</li> <li>● PKE / TPMS [p188]</li> <li>● Gateway / in-vehicle LAN [p189]</li> <li>● Motorcycle [p190]</li> <li>● General Purpose [p192]</li> </ul> |     |
| Design Support Tool SimSurfing .....   | 194 |   |     |
| Index .....  | 195 |   |     |

# Capacitors

The most comprehensive product lineup in the industry, providing ideal solutions, responding to all possible requirements.

## Summary

Using Murata's unique ceramic material technology, we offer a wide lineup of products. Murata also offers technical support that includes design kits and a comprehensive set of software tools to simulate virtually any circuit condition, satisfying the demands of many applications. We are also expanding our lineup of products that use non-ceramic dielectric materials, such as silicon capacitors, to support various applications.

## Lineup

- Ceramic Capacitors (SMD, lead type)
- Polymer Aluminum Electrolytic Capacitors
- Single-Layer Microchip Capacitors
- Thin Film Circuit Substrates (RUSUB) ●Variable Capacitors
- Silicon Capacitors ●Film Capacitors



<https://www.murata.com/en-global/products/capacitor>



## Ceramic Capacitors

p4

Murata offers the No. 1 most abundant lineup in the industry, responding to all possible needs, and proposing ideal solutions.

## Polymer Aluminum Electrolytic Capacitors

These are high-capacity capacitors that are characterized by a low profile and low ESR. They handle the stabilization of voltage in circuits where serious voltage control is demanded, and contribute to the advanced features in customer products.



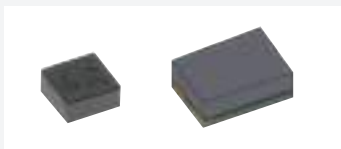
## Single-Layer Microchip Capacitors

p32

Simple single-layer structure provides very reliable performance and excellent frequency characteristics. A wide selection of sizes from 0.25mm square enables the miniaturization of the circuit and higher density.

## Thin Film Circuit Substrates (RUSUB)

RUSUB technology combines capacitor and thin film resistor in one chip. Custom specifications (dimensions, capacitance values, etc.) are also available upon request.



## Variable Capacitors

p36

Variable capacitors can carry out the variable of the capacitor by adjusting the tuning voltage. They are designed for frequency matching use for HF band (13.56MHz).





## Silicon Capacitors

p36

Murata High-Density Silicon Capacitors are based on a MOS Semiconductor technology and utilize a 3D structure that substantially increases their performance and enables compact design. Silicon Capacitors offer small size and low thickness, superior reliability, and stability over high temperatures and high frequencies. They are the ideal choice for all demanding markets, such as Networking (RF Power and Broadband), Medical (Implantable devices), Automotive, or High-Reliability applications. Murata can provide customized Silicon Capacitors or Integrated Passive Devices (IPDs) to optimize your design.



## Film Capacitors

p42

The FH series uses materials with high heat resistance. Therefore, it has a higher allowable ripple current under a higher temperature environment than conventional PP film capacitors.

This feature is more prominent in the high-frequency range. For example, when the ambient temperature is at 105°C, the PP film capacitors would be already at its limit for allowable ripple current, but because of the higher heat resistance of the FH series, the allowable ripple current can be increased drastically.

## WEB Product Search Engine

<https://www.murata.com/search/productsearch?cate=cgsubCeramicCapacitors>

You can search for products in a variety of ways, including part number, specifications, and lineup.

### 1 Search by Part Number

You can search for capacitors by specifying the alphanumeric characters in the part number. The packing codes shown contain the substitute character "#". If you enter the official packing code, part numbers that contain that packing code will be matched.



### 2 Search by Specifications

You can search for SMD or lead type capacitors by indicating specifications such as application, capacitance, rated voltage, or temperature characteristics. You can narrow your search by entering values of ranges, and by specifying product characteristics. The items for narrowing searches are linked, so specifying one condition causes selectable options for the other items to allow input only of conditions that match the relevant part numbers.

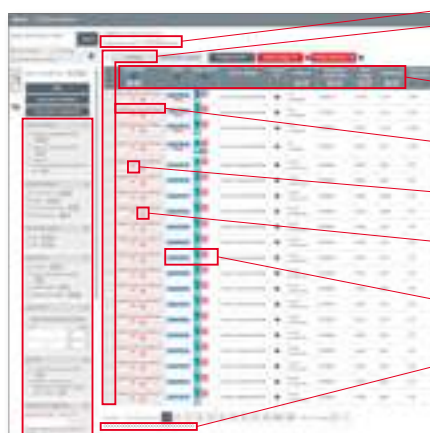


### 3 Search in the Lineups

You can search for capacitors by specifying the series lineup. You can also confirm items such as characteristics and applications on each series page.



## Search results



- Displays the number of hits for the current search conditions in real time.
- Compares the characteristics of the checked  part numbers.
- Click the ▲ mark for each item to switch between ascending and descending display.
- Click a product name to display a details page listing more in-depth information.
- You can download detailed spec sheets.
- For some products it is possible to request a free sample.
- Icons enable you to check the status and characteristics of products at a glance.
- You can confirm the current conditions for narrowing the search results.
- You narrow the search results to match the selected condition in real time.

## Ceramic Capacitors, Polymer Aluminum Electrolytic Capacitors

## Ceramic Capacitors, Polymer Aluminum Electrolytic Capacitors

## Icons

|   |   |
|---|---|
|    | For applications that do not require a particular reliability, such as general equipment.   |
|    | Infotainment for Automotive<br>Products for entertainment equipment like car navigation, car audio, and body control equipment like wipers and power windows.   |
|    | Powertrain/Safety for Automotive<br>Products used for applications (running, turning, stopping, and safety devices) that particularly concern human life, such as in devices for automotive.  |
|    | Medical-grade products for Implanted Medical Devices<br>These products are intended for use in implanted medical devices such as cardiac pacemakers, cochlear implants, insulin pumps, and gastric electrostimulators. They are suitable for use in non-critical circuits.*1<br>*1 Non-critical circuits<br>This term refers to circuits in implanted medical devices that are not directly linked to life support, i.e., circuits that will not directly endanger the life of the patient should the functionality of the device be reduced or halted by failure of the circuit. |
|    | AEC-Q200 compliant product  |
|  | Products that acquired safety standard certification IEC60384-14.   |
|  | Products that are based on the Electrical Appliance and Material Safety Law of Japan.   |
|  | Low dissipation for high frequency<br>By devising ceramic materials and electrode materials, low dissipation is achieved in frequency bands of VHF, UHF, and microwave or beyond.   |
|  | Low inductance<br>This capacitor is designed so that the parasitic inductance component (ESL) that the capacitor has on the high frequency side becomes lower.  |
|  | Product resistant to deflection cracking<br>This capacitor is designed to prevent failures as much as possible by short mode caused by cracking when there is board deflection.   |
|  | Product with solder cracking suppression<br>This capacitor is configured with metal terminals and leads connected to the chip. The metal terminals and leads relieve the stress from expansion and contraction of the solder, to suppress solder cracking.  |
|  | Product suitable for acoustic noise reduction and low distortion<br>This product suppresses acoustic noise, which occurs when a ceramic capacitor is used, by devising the materials and configuration.   |
|  | No DC bias characteristics<br>Polymer capacitor is no capacitance change with DC bias due to aluminum oxidized film for dielectric.   |
|  | Low-inductance product suitable for noise suppression<br>This product has extremely low ESL and is suitable for suppression of noise, including high frequencies.   |
|  | Product for bonding<br>Since gold is used for the external electrodes, the capacitor can be mounted by die bonding/wire bonding.  |
|  | Limited to Conductive Glue Mounting<br>Since silver palladium is used for the external electrodes, the capacitor can be mounted by conductive adhesive.   |

# Ceramic Capacitors, Polymer Aluminum Electrolytic Capacitors

## Product Lineup

| For general                              |             |   |  |
|--|-------------|---|--|
| General                                  | SMD         |   |  |
| Solder mounting                          |             |   |  |
| Chip type                                |             |   |  |
|  | <b>GRM</b>  |   | p6   |
|  | <b>GR3</b>  | Low acoustic noise                                  | High effective capacitance & high ripple current p8                    |
|  | <b>GRJ</b>  | Deflecting crack                                    | Soft termination p8  |
|  | <b>GR4</b>  |   | For information devices only p9  |
|  | <b>GJM</b>  | High Q  | p9   |
|  | <b>GQM</b>  | High Q  | p10  |
|  | <b>GA2</b>  | Japanese Safety Law                                 | Based on the Electrical Appliance and Material Safety Law of Japan p10 |
|  | <b>GA3</b>  | Safety standard                                     | p10  |
|  | <b>LLL</b>  | Low ESL   | LW reversed p11  |
|  | <b>LLA</b>  | Low ESL   | 8 terminals p12  |
|  | <b>LLM</b>  | Low ESL   | 10 terminals p12   |
|  | <b>LLR</b>  | Low ESL   | LW reversed controlled ESR p12   |
|  | <b>NFM</b>  | Low ESL EMI Filter                                  | 3 terminals p12  |
|  | <b>GJ4</b>  | Low acoustic noise                                  | Low distortion p13   |
| On interposer board                      |             |   |  |
|  | <b>ZRA</b>  | Low acoustic noise                                  | p13  |
|  | <b>ZRB</b>  | Low acoustic noise                                  | p13  |
| Metal terminal type                      |             |   |  |
|  | <b>KRM</b>  | Low acoustic noise Deflecting crack Soldering crack | p14  |
|  | <b>KR3</b>  | Low acoustic noise Deflecting crack Soldering crack | High effective capacitance & high ripple current p14                   |
| Resin molding SMD type                   |             |   |  |
|  | <b>DK1</b>  | Safety standard                                     | p30  |
| Polymer Aluminum Electrolytic Capacitors |             |   |  |
|  | <b>ECAS</b> | Low acoustic noise Deflecting crack Effective Cap   | p31  |
| Wire bonding mounting                    |             |   |  |
| Bonding                                  | Chip type   |   |  |
|  | <b>GMA</b>  | Microchip   | p14  |
|  | <b>GMD</b>  |   | p15  |
| Lead type                                |             |   |  |
| Solder mounting                          |             |   |  |
|  | <b>RDE</b>  | Low acoustic noise Deflecting crack Soldering crack | p24  |
|  | <b>DE1</b>  | Safety standard                                     | X1/Y1 Class certified product p26                                      |
|  | <b>DE2</b>  | Safety standard                                     | X1/Y2 Class certified product p27                                      |

| Infotainment for automotive |                 |                    |                 |
|-----------------------------|-----------------|--------------------|-----------------|
| Infotainment                | SMD             |                    |                 |
| AEC-Q200                    | Solder mounting |                    |                 |
| Chip type                   |                 |                    |                 |
|                             | <b>GRT</b>      |                    | p15             |
|                             | <b>NFM</b>      | Low ESL EMI Filter | 3 terminals p17 |

| Powertrain/Safety for automotive    |                 |   |  |
|-------------------------------------|-----------------|---|--|
| Powertrain                          | SMD             |   |  |
| AEC-Q200                            | Solder mounting |   |  |
| Chip type                           |                 |   |  |
|                                     | <b>GCM</b>      |   | p17  |
|                                     | <b>GC3</b>      | Low acoustic noise  | High effective capacitance & high ripple current p18             |
|                                     | <b>GCJ</b>      | Deflecting crack  | Soft termination p19   |
|                                     | <b>GCQ</b>      | High Q  | p20  |
|                                     | <b>GCD</b>      | Deflecting crack  | MLSC design p20  |
|                                     | <b>GCE</b>      | Deflecting crack  | Soft termination MLSC design p20                                 |
|                                     | <b>LLC</b>      | Low ESL   | LW reversed WEB p20  |
|                                     | <b>NFM</b>      | Low ESL EMI Filter  | 3 terminals p20  |
| Metal terminal type                 |                 |   |  |
|                                     | <b>KCM</b>      | Low acoustic noise Deflecting crack Soldering crack                 | p21  |
|                                     | <b>KC3</b>      | Low acoustic noise Deflecting crack Soldering crack                 | High effective capacitance & high ripple current p21             |
|                                     | <b>KCA</b>      | Safety standard Low acoustic noise Deflecting crack Soldering crack | p21  |
| Limited to Conductive Glue Mounting |                 |   |  |
| Limited to automotive               | Chip type       |   |  |
|                                     | <b>GCB</b>      | Deflecting crack Soldering crack                                    | Ni plating + Pd plating termination conductive glue mounting p22 |
|                                     | <b>GCG</b>      | Deflecting crack Soldering crack                                    | AgPd termination conductive glue mounting p22                    |
| Lead type                           |                 |   |  |
| Solder mounting                     |                 |   |  |
|                                     | <b>RCE</b>      | Low acoustic noise Deflecting crack Soldering crack                 | p28  |
|                                     | <b>RHE</b>      | Low acoustic noise Deflecting crack Soldering crack                 | 150°C operation leaded p29                                       |
|                                     | <b>RHS</b>      | Low acoustic noise Deflecting crack Soldering crack                 | 200°C operation leaded p30                                       |
|                                     | <b>DE6</b>      | Safety standard   | p30  |

| Medical-grade products for implanted medical devices |            |  |     |
|--|------------|--|-----|
| Medical Device                                       | SMD        |  |     |
| Solder mounting                                      |            |  |     |
| Chip type  |            |  |     |
|  | <b>GCH</b> |  | p23 |

# Ceramic capacitors SMD type For General Purpose

## Chip Multilayer Ceramic Capacitors for General Purpose



GRM

**Temperature Compensating Type**

General

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |      |      |       |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|------|------|-------|--------|---------|---------|---------|--------|-------|--|--|--|--|--|--|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ    | 1μ      | 10μ     | 100μ   | 1000μ |  |  |  |  |  |  |  |  |
| GRM01  | 0.25X0.125 <008004>            | 25                  | 0.20pF                |    |      |      | 100pF |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 16                  | 0.20pF                |    |      |      | 100pF |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
| GRM02  | 0.4X0.2 <01005>                | 50                  | 0.20pF                |    |      |      | 100pF |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 35                  |                       |    |      |      | 100pF |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 25                  | 0.20pF                |    |      |      |       | 220pF  |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 16                  | 0.20pF                |    |      |      |       | 220pF  |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 10                  |                       |    |      |      | 51pF  |        | 220pF   |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 6.3                 |                       |    |      |      | 51pF  |        | 220pF   |         |         |        |       |  |  |  |  |  |  |  |  |
| GRM03  | 0.6X0.3 <0201>                 | 100                 | 0.10pF                |    |      |      | 100pF |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 50                  | 0.10pF                |    |      |      |       | 1000pF |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 25                  | 0.10pF                |    |      |      |       | 1000pF |         |         |         |        |       |  |  |  |  |  |  |  |  |
| GRM15  | 1.0X0.5 <0402>                 | 100                 |                       |    |      |      | 120pF |        | 1000pF  |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 50                  |                       |    |      |      | 270pF |        | 8200pF  |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 35                  |                       |    |      |      |       |        | 10000pF |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 25                  |                       |    |      |      |       |        | 10000pF |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 10                  |                       |    |      |      |       |        | 2400pF  |         | 4700pF  |        |       |  |  |  |  |  |  |  |  |
| GRM18  | 1.6X0.8 <0603>                 | 250                 |                       |    | 10pF |      | 47pF  |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 100                 |                       |    |      |      |       | 1000pF |         | 3900pF  |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 50                  |                       |    |      |      |       | 1000pF |         | 10000pF |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 10                  |                       |    |      |      |       |        | 5600pF  |         | 33000pF |        |       |  |  |  |  |  |  |  |  |
|        |                                | 6.3                 |                       |    |      |      |       |        | 24000pF |         | 33000pF |        |       |  |  |  |  |  |  |  |  |
| GRM21  | 2.0X1.25 <0805>                | 630                 |                       |    | 10pF |      |       | 2200pF |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 250                 |                       |    | 10pF |      |       |        | 10000pF |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 200                 |                       |    | 10pF |      |       |        | 5600pF  |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 100                 |                       |    |      |      |       | 1000pF |         | 22000pF |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 50                  |                       |    |      |      |       |        | 2400pF  |         | 47000pF |        |       |  |  |  |  |  |  |  |  |
|        |                                | 10                  |                       |    |      |      |       |        |         | 33000pF |         | 0.10μF |       |  |  |  |  |  |  |  |  |
| GRM31  | 3.2X1.6 <1206>                 | 2000                |                       |    | 10pF |      | 68pF  |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 1000                |                       |    | 10pF |      |       | 1000pF |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 630                 |                       |    | 10pF |      |       |        | 10000pF |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 500                 |                       |    | 10pF |      |       |        | 4700pF  |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 250                 |                       |    |      |      |       |        | 6800pF  |         | 22000pF |        |       |  |  |  |  |  |  |  |  |
|        |                                | 200                 |                       |    |      |      |       |        | 6800pF  |         | 10000pF |        |       |  |  |  |  |  |  |  |  |
|        |                                | 100                 |                       |    |      |      |       |        | 4300pF  |         | 0.10μF  |        |       |  |  |  |  |  |  |  |  |
|        |                                | 50                  |                       |    |      |      |       |        |         | 11000pF |         | 0.22μF |       |  |  |  |  |  |  |  |  |
|        |                                | 25                  |                       |    |      |      |       |        |         |         | 0.15μF  | 0.22μF |       |  |  |  |  |  |  |  |  |
| GRM32  | 3.2X2.5 <1210>                 | 2000                |                       |    | 82pF |      | 220pF |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 1000                |                       |    |      |      |       | 1200pF |         | 2200pF  |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 630                 |                       |    |      |      |       |        | 1200pF  |         | 33000pF |        |       |  |  |  |  |  |  |  |  |
|        |                                | 500                 |                       |    |      |      |       |        | 1200pF  |         | 10000pF |        |       |  |  |  |  |  |  |  |  |
| GRM42  | 4.5X2.0 <1808>                 | 3150                |                       |    | 10pF |      | 100pF |        |         |         |         |        |       |  |  |  |  |  |  |  |  |
| GRM43  | 4.5X3.2 <1812>                 | 1000                |                       |    |      |      |       | 2700pF |         | 4700pF  |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 630                 |                       |    |      |      |       |        | 12000pF |         | 22000pF |        |       |  |  |  |  |  |  |  |  |
|        |                                | 500                 |                       |    |      |      |       |        | 12000pF |         | 22000pF |        |       |  |  |  |  |  |  |  |  |
| GRM55  | 5.7X5.0 <2220>                 | 1000                |                       |    |      |      |       | 5600pF |         | 10000pF |         |        |       |  |  |  |  |  |  |  |  |
|        |                                | 630                 |                       |    |      |      |       |        | 27000pF |         | 47000pF |        |       |  |  |  |  |  |  |  |  |
|        |                                | 500                 |                       |    |      |      |       |        | 27000pF |         | 47000pF |        |       |  |  |  |  |  |  |  |  |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

### High Dielectric Constant Type

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |         |         |      |         |        |       |       |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|-------|---------|---------|------|---------|--------|-------|-------|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p  | 1000p   | 10000p  | 0.1μ | 1μ      | 10μ    | 100μ  | 1000μ |  |  |
| GRM01  | 0.25X0.125 <008004>            | 10                  |                       |    |     | 100pF | 680pF   |         |      |         |        |       |       |  |  |
|        |                                | 6.3                 |                       |    |     |       | 1000pF  | 10000pF |      |         |        |       |       |  |  |
|        |                                | 4                   |                       |    |     |       | 3300pF  | 10000pF |      |         |        |       |       |  |  |
| GRM02  | 0.4X0.2 <01005>                | 16                  |                       |    |     | 56pF  | 10000pF |         |      |         |        |       |       |  |  |
|        |                                | 10                  |                       |    |     | 56pF  |         |         |      | 0.10μF  |        |       |       |  |  |
|        |                                | 6.3                 |                       |    |     |       | 680pF   |         |      |         | 0.47μF |       |       |  |  |
|        |                                | 4                   |                       |    |     |       |         | 15000pF |      |         | 0.47μF |       |       |  |  |
| GRM03  | 0.6X0.3 <0201>                 | 2.5                 |                       |    |     |       |         |         |      | 0.10μF  | 0.47μF |       |       |  |  |
|        |                                | 50                  |                       |    |     | 100pF | 1500pF  |         |      |         |        |       |       |  |  |
|        |                                | 35                  |                       |    |     |       |         |         |      |         | 0.10μF |       |       |  |  |
|        |                                | 25                  |                       |    |     | 100pF |         |         |      |         | 0.22μF |       |       |  |  |
|        |                                | 16                  |                       |    |     | 100pF |         |         |      |         | 2.2μF  |       |       |  |  |
|        |                                | 10                  |                       |    |     |       | 1000pF  |         |      |         | 2.2μF  |       |       |  |  |
|        |                                | 6.3                 |                       |    |     |       | 1200pF  |         |      |         | 4.7μF  |       |       |  |  |
| GRM15  | 1.0X0.5 <0402>                 | 4                   |                       |    |     |       |         |         |      | 12000pF | 4.7μF  |       |       |  |  |
|        |                                | 2.5                 |                       |    |     |       |         |         |      | 0.22μF  | 4.7μF  |       |       |  |  |
|        |                                | 100                 |                       |    |     | 220pF |         |         |      | 0.10μF  |        |       |       |  |  |
|        |                                | 50                  |                       |    |     |       | 2200pF  |         |      | 1.0μF   |        |       |       |  |  |
|        |                                | 35                  |                       |    |     |       |         |         |      | 0.22μF  | 2.2μF  |       |       |  |  |
|        |                                | 25                  |                       |    |     |       |         | 22000pF |      | 2.2μF   |        |       |       |  |  |
|        |                                | 16                  |                       |    |     |       |         | 22000pF |      | 2.2μF   |        |       |       |  |  |
|        |                                | 10                  |                       |    |     |       |         | 47000pF |      | 22μF    |        |       |       |  |  |
| GRM18  | 1.6X0.8 <0603>                 | 6.3                 |                       |    |     |       |         |         |      | 22000pF | 22μF   |       |       |  |  |
|        |                                | 4                   |                       |    |     |       |         |         |      | 0.47μF  | 22μF   |       |       |  |  |
|        |                                | 2.5                 |                       |    |     |       |         |         |      | 2.2μF   | 22μF   |       |       |  |  |
|        |                                | 100                 |                       |    |     |       | 10000pF |         |      | 0.10μF  |        |       |       |  |  |
|        |                                | 50                  |                       |    |     |       |         |         |      | 0.22μF  | 2.2μF  |       |       |  |  |
|        |                                | 35                  |                       |    |     |       |         |         |      | 0.47μF  | 10μF   |       |       |  |  |
|        |                                | 25                  |                       |    |     |       |         |         |      | 0.22μF  | 10μF   |       |       |  |  |
|        |                                | 16                  |                       |    |     |       |         |         |      | 0.47μF  | 10μF   |       |       |  |  |
| GRM21  | 2.0X1.25 <0805>                | 10                  |                       |    |     |       |         |         |      | 2.2μF   | 22μF   |       |       |  |  |
|        |                                | 6.3                 |                       |    |     |       |         |         |      | 2.2μF   | 47μF   |       |       |  |  |
|        |                                | 4                   |                       |    |     |       |         |         |      | 2.2μF   | 47μF   |       |       |  |  |
|        |                                | 2.5                 |                       |    |     |       |         |         |      |         | 10μF   | 47μF  |       |  |  |
|        |                                | 100                 |                       |    |     |       | 47000pF |         |      | 1.0μF   |        |       |       |  |  |
|        |                                | 50                  |                       |    |     |       |         |         |      | 0.47μF  | 10μF   |       |       |  |  |
|        |                                | 35                  |                       |    |     |       |         |         |      | 1.0μF   | 10μF   |       |       |  |  |
|        |                                | 25                  |                       |    |     |       |         |         |      | 2.2μF   | 22μF   |       |       |  |  |
| GRM31  | 3.2X1.6 <1206>                 | 16                  |                       |    |     |       |         |         |      | 4.7μF   | 22μF   |       |       |  |  |
|        |                                | 10                  |                       |    |     |       |         |         |      | 4.7μF   | 47μF   |       |       |  |  |
|        |                                | 6.3                 |                       |    |     |       |         |         |      |         | 10μF   | 100μF |       |  |  |
|        |                                | 4                   |                       |    |     |       |         |         |      |         | 22μF   | 100μF |       |  |  |
|        |                                | 2.5                 |                       |    |     |       |         |         |      |         | 47μF   | 100μF |       |  |  |
|        |                                | 100                 |                       |    |     |       |         |         |      |         | 4.7μF  |       |       |  |  |
|        |                                | 50                  |                       |    |     |       |         |         |      | 4.7μF   | 10μF   |       |       |  |  |
|        |                                | 35                  |                       |    |     |       |         |         |      |         | 10μF   |       |       |  |  |
| GRM32  | 3.2X2.5 <1210>                 | 25                  |                       |    |     |       |         |         |      | 10μF    | 22μF   |       |       |  |  |
|        |                                | 16                  |                       |    |     |       |         |         |      |         | 22μF   | 47μF  |       |  |  |
|        |                                | 10                  |                       |    |     |       |         |         |      |         | 22μF   | 100μF |       |  |  |
|        |                                | 6.3                 |                       |    |     |       |         |         |      |         | 22μF   | 220μF |       |  |  |
|        |                                | 4                   |                       |    |     |       |         |         |      |         | 22μF   | 220μF |       |  |  |
|        |                                | 2.5                 |                       |    |     |       |         |         |      |         |        | 220μF |       |  |  |
|        |                                | 100                 |                       |    |     |       |         |         |      |         | 10μF   |       |       |  |  |
|        |                                | 25                  |                       |    |     |       |         |         |      |         | 22μF   |       |       |  |  |


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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |         |         |        |     |       |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|---------|---------|--------|-----|-------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ     | 10μ | 100μ  | 1000μ |  |
| GRM32  | 3.2X2.5 <1210>                 | 10                  |                       |    |     |      |       |         |         |        |     | 47μF  | 100μF |  |
|        |                                | 6.3                 |                       |    |     |      |       |         |         |        |     | 47μF  | 220μF |  |
|        |                                | 4                   |                       |    |     |      |       |         |         |        |     | 100μF | 330μF |  |
|        |                                | 2.5                 |                       |    |     |      |       |         |         |        |     | 220μF | 330μF |  |
| GRM43  | 4.5X3.2 <1812>                 | 1250                |                       |    |     |      |       | 33000pF | 47000pF |        |     |       |       |  |
|        |                                | 1000                |                       |    |     |      |       | 33000pF | 0.10μF  |        |     |       |       |  |
|        |                                | 630                 |                       |    |     |      |       | 68000pF | 0.10μF  |        |     |       |       |  |
|        |                                | 500                 |                       |    |     |      |       |         | 0.15μF  | 0.22μF |     |       |       |  |
|        |                                | 250                 |                       |    |     |      |       |         | 0.15μF  | 0.47μF |     |       |       |  |
| GRM55  | 5.7X5.0 <2220>                 | 1250                |                       |    |     |      |       | 68000pF | 0.10μF  |        |     |       |       |  |
|        |                                | 1000                |                       |    |     |      |       | 68000pF | 0.22μF  |        |     |       |       |  |
|        |                                | 630                 |                       |    |     |      |       |         | 0.15μF  | 0.22μF |     |       |       |  |
|        |                                | 500                 |                       |    |     |      |       |         | 0.33μF  | 0.47μF |     |       |       |  |
|        |                                | 250                 |                       |    |     |      |       |         | 0.33μF  | 1.0μF  |     |       |       |  |
|        |                                | 200                 |                       |    |     |      |       |         | 0.33μF  | 1.0μF  |     |       |       |  |
| GRMJN  | 1.8X1.0 <0704>                 | 16                  |                       |    |     |      |       |         |         |        |     | 20μF  | 22μF  |  |
|        |                                | 6.3                 |                       |    |     |      |       |         |         |        |     | 43μF  |       |  |
| GRMMD  | 0.5X0.25 <015008>              | 6.3                 |                       |    |     |      |       |         |         |        |     |       | 1.0μF |  |


### High Effective Capacitance & High Ripple Current Chip Multilayer Ceramic Capacitors for General Purpose



General
Low acoustic noise

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |         |         |        |     |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|---------|---------|--------|-----|------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ     | 10μ | 100μ | 1000μ |  |
| GR321  | 2.0X1.25 <0805>                | 250                 |                       |    |     |      |       | 10000pF | 22000pF |        |     |      |       |  |
| GR331  | 3.2X1.6 <1206>                 | 630                 |                       |    |     |      |       | 10000pF | 15000pF |        |     |      |       |  |
|        |                                | 450                 |                       |    |     |      |       | 10000pF | 47000pF |        |     |      |       |  |
|        |                                | 250                 |                       |    |     |      |       | 33000pF | 68000pF |        |     |      |       |  |
| GR332  | 3.2X2.5 <1210>                 | 630                 |                       |    |     |      |       | 22000pF | 47000pF |        |     |      |       |  |
|        |                                | 450                 |                       |    |     |      |       | 68000pF | 0.10μF  |        |     |      |       |  |
|        |                                | 250                 |                       |    |     |      |       |         | 0.10μF  | 0.15μF |     |      |       |  |
| GR343  | 4.5X3.2 <1812>                 | 630                 |                       |    |     |      |       |         | 68000pF |        |     |      |       |  |
|        |                                | 450                 |                       |    |     |      |       |         | 0.15μF  |        |     |      |       |  |
|        |                                | 250                 |                       |    |     |      |       |         | 0.22μF  | 0.33μF |     |      |       |  |
| GR355  | 5.7X5.0 <2220>                 | 630                 |                       |    |     |      |       |         | 0.10μF  | 0.22μF |     |      |       |  |
|        |                                | 450                 |                       |    |     |      |       |         | 0.22μF  | 0.47μF |     |      |       |  |
|        |                                | 250                 |                       |    |     |      |       |         | 0.47μF  | 1.0μF  |     |      |       |  |

### Chip Multilayer Ceramic Capacitors with Soft Termination for General Purpose



General
Deflecting crack

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |     |      |       |      |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|-----|------|-------|------|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |      |
| GRJ03  | 0.6X0.3 <0201>                 | 10                  |                       |    |     |      |       |        |      |    |     |      | 1.0μF |      |
|        |                                | 6.3                 |                       |    |     |      |       |        |      |    |     |      | 1.0μF |      |
| GRJ15  | 1.0X0.5 <0402>                 | 6.3                 |                       |    |     |      |       |        |      |    |     |      | 10μF  |      |
| GRJ18  | 1.6X0.8 <0603>                 | 10                  |                       |    |     |      |       |        |      |    |     |      | 10μF  |      |
|        |                                | 6.3                 |                       |    |     |      |       |        |      |    |     |      | 4.7μF | 10μF |
| GRJ21  | 2.0X1.25 <0805>                | 100                 |                       |    |     |      |       |        |      |    |     |      | 1.0μF |      |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |         |         |        |      |       |       |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|---------|---------|--------|------|-------|-------|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ    | 1μ      | 10μ    | 100μ | 1000μ |       |  |  |
| GRJ21  | 2.0X1.25 <0805>                | 25                  |                       |    |     |      |       |        |         |         |        |      |       | 10μF  |  |  |
| GRJ31  | 3.2X1.6 <1206>                 | 100                 |                       |    |     |      |       |        |         |         |        |      |       | 4.7μF |  |  |
|        |                                | 50                  |                       |    |     |      |       |        |         |         |        |      |       | 4.7μF |  |  |
| GRJ32  | 3.2X2.5 <1210>                 | 25                  |                       |    |     |      |       |        |         |         |        |      |       | 22μF  |  |  |
|        |                                | 10                  |                       |    |     |      |       |        |         |         |        |      |       | 47μF  |  |  |
| GRJ43  | 4.5X3.2 <1812>                 | 1000                |                       |    |     |      |       |        | 33000pF | 47000pF |        |      |       |       |  |  |
|        |                                | 630                 |                       |    |     |      |       |        | 68000pF | 0.10μF  |        |      |       |       |  |  |
|        |                                | 250                 |                       |    |     |      |       |        |         | 0.15μF  | 0.47μF |      |       |       |  |  |
| GRJ55  | 5.7X5.0 <2220>                 | 1000                |                       |    |     |      |       |        | 68000pF | 0.10μF  |        |      |       |       |  |  |
|        |                                | 630                 |                       |    |     |      |       |        | 0.15μF  | 0.22μF  |        |      |       |       |  |  |
|        |                                | 250                 |                       |    |     |      |       |        |         | 0.33μF  | 1.0μF  |      |       |       |  |  |

### Chip Multilayer Ceramic Capacitors for Ethernet LAN and primary-secondary coupling of DC-DC converters

**GR4**

General

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |        |    |     |      |       |         |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|--------|----|-----|------|-------|---------|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ   | 1μ | 10μ | 100μ | 1000μ |         |  |  |
| GR442  | 4.5X2.0 <1808>                 | 2000                |                       |    |     |      | 100pF | 1500pF |        |    |     |      |       |         |  |  |
| GR443  | 4.5X3.2 <1812>                 | 2000                |                       |    |     |      |       | 1800pF | 4700pF |    |     |      |       |         |  |  |
| GR455  | 5.7X5.0 <2220>                 | 2000                |                       |    |     |      |       |        |        |    |     |      |       | 10000pF |  |  |

### Chip Multilayer Ceramic Capacitors for Splitter Circuit of G-Fast, xDSL

**GR4**

General

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |        |         |     |      |       |  |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|--------|---------|-----|------|-------|--|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ   | 1μ      | 10μ | 100μ | 1000μ |  |  |  |
| GR431  | 3.2X1.6 <1206>                 | 630                 |                       |    |     |      |       | 1000pF | 4700pF |         |     |      |       |  |  |  |
| GR432  | 3.2X2.5 <1210>                 | 630                 |                       |    |     |      |       |        | 5600pF | 15000pF |     |      |       |  |  |  |

### High Q Chip Multilayer Ceramic Capacitors for General Purpose (≤100Vdc)

**GJM**


General High Q

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |     |      |       |  |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|-----|------|-------|--|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |
| GJM02  | 0.4X0.2 <01005>                | 25                  | 0.20pF                |    |     |      |       |        |      |    |     |      |       |  |  |  |
|        |                                | 16                  | 0.20pF                |    |     |      |       |        |      |    |     |      |       |  |  |  |
| GJM03  | 0.6X0.3 <0201>                 | 100                 |                       |    |     |      |       |        |      |    |     |      |       |  |  |  |
|        |                                | 50                  | 0.30pF                |    |     |      |       |        |      |    |     |      |       |  |  |  |
|        |                                | 25                  | 0.20pF                |    |     |      |       |        |      |    |     |      |       |  |  |  |
|        |                                | 6.3                 |                       |    |     |      | 22pF  | 33pF   |      |    |     |      |       |  |  |  |
| GJM15  | 1.0X0.5 <0402>                 | 50                  | 0.10pF                |    |     |      |       |        |      |    |     |      |       |  |  |  |

Continued on the following page. ↗

## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors


## High Q Chip Multilayer Ceramic Capacitors for General Purpose (&gt;100Vdc)



**GQM** General High Q

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |       |     |      |       |        |      |    |     |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|-------|-----|------|-------|--------|------|----|-----|------|-------|--|
|        |                                |                     | 0.1p                  | 1p    | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |
| GQM15  | 1.0X0.5 <0402>                 | 200                 | 0.10pF                | 33pF  |     |      |       |        |      |    |     |      |       |  |
| GQM18  | 1.6X0.8 <0603>                 | 250                 | 0.10pF                | 100pF |     |      |       |        |      |    |     |      |       |  |
| GQM21  | 2.0X1.25 <0805>                | 500                 | 0.20pF                | 22pF  |     |      |       |        |      |    |     |      |       |  |
|        |                                | 250                 | 0.20pF                | 150pF |     |      |       |        |      |    |     |      |       |  |
| GQM22  | 2.8X2.8 <1111>                 | 500                 | 0.30pF                | 100pF |     |      |       |        |      |    |     |      |       |  |


## Based on the Electrical Appliance and Material Safety Law of Japan Chip Multilayer Ceramic Capacitors for General Purpose



**GA2** General Japanese Safety Law

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vac (r.m.s.)) | Capacitance Range (F) |    |     |      |        |         |      |        |     |      |       |  |
|--------|--------------------------------|------------------------------|-----------------------|----|-----|------|--------|---------|------|--------|-----|------|-------|--|
|        |                                |                              | 0.1p                  | 1p | 10p | 100p | 1000p  | 10000p  | 0.1μ | 1μ     | 10μ | 100μ | 1000μ |  |
| GA242  | 4.5X2.0 <1808>                 | 250                          |                       |    |     |      | 470pF  | 1000pF  |      |        |     |      |       |  |
| GA243  | 4.5X3.2 <1812>                 | 250                          |                       |    |     |      | 2200pF | 47000pF |      |        |     |      |       |  |
| GA255  | 5.7X5.0 <2220>                 | 250                          |                       |    |     |      |        |         |      | 0.10μF |     |      |       |  |


## Safety Standard Certified Chip Multilayer Ceramic Capacitors for General Purpose Type GB / IEC60384-14 Class X2



**GA3 Type GB** General Safety standard

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vac (r.m.s.)) | Capacitance Range (F) |    |     |      |       |         |         |    |     |      |       |  |
|--------|--------------------------------|------------------------------|-----------------------|----|-----|------|-------|---------|---------|----|-----|------|-------|--|
|        |                                |                              | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ | 10μ | 100μ | 1000μ |  |
| GA355  | 5.7X5.0 <2220>                 | 250                          |                       |    |     |      |       | 10000pF | 56000pF |    |     |      |       |  |

## Safety Standard Certified Chip Multilayer Ceramic Capacitors for General Purpose Type GD / UL60950-1



**GA3 Type GD** General Safety standard

**Temperature Compensating Type**

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vac (r.m.s.)) | Capacitance Range (F) |    |      |      |       |        |      |    |     |      |       |  |
|--------|--------------------------------|------------------------------|-----------------------|----|------|------|-------|--------|------|----|-----|------|-------|--|
|        |                                |                              | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |
| GA342  | 4.5X2.0 <1808>                 | 250                          |                       |    | 10pF | 82pF |       |        |      |    |     |      |       |  |

**High Dielectric Constant Type**

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vac (r.m.s.)) | Capacitance Range (F) |    |     |       |        |        |      |    |     |      |       |  |
|--------|--------------------------------|------------------------------|-----------------------|----|-----|-------|--------|--------|------|----|-----|------|-------|--|
|        |                                |                              | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |
| GA342  | 4.5X2.0 <1808>                 | 250                          |                       |    |     | 100pF | 1500pF |        |      |    |     |      |       |  |
| GA343  | 4.5X3.2 <1812>                 | 250                          |                       |    |     |       | 1800pF | 4700pF |      |    |     |      |       |  |

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Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

**Safety Standard Certified Chip Multilayer Ceramic Capacitors for General Purpose Type GF / IEC60384-14 Class X1/Y2 and UL60950-1**



GA3 Type GF

**Temperature Compensating Type**

General Safety standard

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage<br>(V <sub>ac</sub> (r.m.s.)) | Capacitance Range (F) |    |      |      |       |        |      |    |     |      |       |  |
|--------|--------------------------------|---|-----------------------|----|------|------|-------|--------|------|----|-----|------|-------|--|
|        |                                |   | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |
| GA342  | 4.5X2.0 <1808>                 | 250   |                       |    | 10pF | 82pF |       |        |      |    |     |      |       |  |

**High Dielectric Constant Type**

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage<br>(V <sub>ac</sub> (r.m.s.)) | Capacitance Range (F) |    |     |       |        |        |      |    |     |      |       |  |
|--------|--------------------------------|---|-----------------------|----|-----|-------|--------|--------|------|----|-----|------|-------|--|
|        |                                |   | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |
| GA342  | 4.5X2.0 <1808>                 | 250   |                       |    |     | 100pF | 1000pF |        |      |    |     |      |       |  |
| GA352  | 5.7X2.8 <2211>                 | 250   |                       |    |     | 100pF | 1500pF |        |      |    |     |      |       |  |
| GA355  | 5.7X5.0 <2220>                 | 250   |                       |    |     |       | 1800pF | 4700pF |      |    |     |      |       |  |

**LW Reversed Low ESL Chip Multilayer Ceramic Capacitors for General Purpose**



LLL


General Low ESL

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage<br>(V <sub>dC</sub> ) | Capacitance Range (F) |    |     |      |         |         |        |        |       |      |       |  |
|--------|--------------------------------|-------------------------------------|-----------------------|----|-----|------|---------|---------|--------|--------|-------|------|-------|--|
|        |                                |                                     | 0.1p                  | 1p | 10p | 100p | 1000p   | 10000p  | 0.1μ   | 1μ     | 10μ   | 100μ | 1000μ |  |
| LLL15  | 0.5X1.0 <0204>                 | 10                                  |                       |    |     |      |         |         |        | 0.10μF |       |      |       |  |
|        |                                | 6.3                                 |                       |    |     |      |         |         | 0.10μF | 0.22μF |       |      |       |  |
|        |                                | 4                                   |                       |    |     |      |         |         | 0.10μF | 1.0μF  |       |      |       |  |
|        |                                | 2.5                                 |                       |    |     |      |         |         | 0.10μF | 1.0μF  |       |      |       |  |
| LLL1U  | 0.6X1.0 <02404>                | 4                                   |                       |    |     |      |         |         |        |        | 4.3μF |      |       |  |
|        |                                | 2.5                                 |                       |    |     |      |         |         |        |        | 4.3μF |      |       |  |
| LLL18  | 0.8X1.6 <0306>                 | 50                                  |                       |    |     |      | 2200pF  | 4700pF  |        |        |       |      |       |  |
|        |                                | 25                                  |                       |    |     |      | 10000pF | 22000pF |        |        |       |      |       |  |
|        |                                | 16                                  |                       |    |     |      | 10000pF | 47000pF |        |        |       |      |       |  |
|        |                                | 10                                  |                       |    |     |      |         | 0.10μF  | 0.22μF |        |       |      |       |  |
|        |                                | 6.3                                 |                       |    |     |      |         |         | 0.22μF | 2.2μF  |       |      |       |  |
| LLL21  | 1.25X2.0 <0508>                | 50                                  |                       |    |     |      | 10000pF | 22000pF |        |        |       |      |       |  |
|        |                                | 25                                  |                       |    |     |      | 10000pF | 0.10μF  |        |        |       |      |       |  |
|        |                                | 16                                  |                       |    |     |      | 22000pF | 0.22μF  |        |        |       |      |       |  |
|        |                                | 10                                  |                       |    |     |      |         | 0.22μF  | 1.0μF  |        |       |      |       |  |
|        |                                | 6.3                                 |                       |    |     |      |         |         | 0.47μF | 1.0μF  |       |      |       |  |
| LLL31  | 1.6X3.2 <0612>                 | 50                                  |                       |    |     |      | 10000pF | 0.10μF  |        |        |       |      |       |  |
|        |                                | 25                                  |                       |    |     |      | 22000pF | 0.47μF  |        |        |       |      |       |  |
|        |                                | 16                                  |                       |    |     |      | 22000pF | 1.0μF   |        |        |       |      |       |  |
|        |                                | 10                                  |                       |    |     |      |         | 0.47μF  | 2.2μF  |        |       |      |       |  |
|        |                                | 6.3                                 |                       |    |     |      |         |         | 2.2μF  | 10μF   |       |      |       |  |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

## 8 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose

 **LLA** General Low ESL


| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |         |         |        |       |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|---------|---------|--------|-------|------|-------|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ     | 10μ   | 100μ | 1000μ |  |
| <b>LLA18</b> | 1.6X0.8 <0603>                 | 4                   |                       |    |     |      |       |         |         | 0.10μF | 2.2μF |      |       |  |
| <b>LLA21</b> | 2.0X1.25 <0805>                | 25                  |                       |    |     |      |       | 10000pF | 47000pF |        |       |      |       |  |
|              |                                | 16                  |                       |    |     |      |       |         | 47000pF | 0.22μF |       |      |       |  |
|              |                                | 10                  |                       |    |     |      |       |         | 47000pF | 0.47μF |       |      |       |  |
|              |                                | 6.3                 |                       |    |     |      |       |         |         | 0.22μF | 1.0μF |      |       |  |
|              |                                | 4                   |                       |    |     |      |       |         | 22000pF | 4.7μF  |       |      |       |  |

## 10 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose

 **LLM** General Low ESL


| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |         |         |        |        |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|---------|---------|--------|--------|------|-------|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ     | 10μ    | 100μ | 1000μ |  |
| <b>LLM21</b> | 2.0X1.25 <0805>                | 25                  |                       |    |     |      |       | 10000pF | 22000pF |        |        |      |       |  |
|              |                                | 16                  |                       |    |     |      |       |         | 47000pF | 0.10μF |        |      |       |  |
|              |                                | 6.3                 |                       |    |     |      |       |         |         | 0.22μF | 0.47μF |      |       |  |
|              |                                | 4                   |                       |    |     |      |       |         |         |        | 1.0μF  |      |       |  |

## LW Reversed Controlled ESR Low ESL Chip Multilayer Ceramic Capacitors for General Purpose

 **LLR** General Low ESL

| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | ESR (mΩ) |     |     |      | Capacitance Range |
|--------------|--------------------------------|---------------------|----------|-----|-----|------|-------------------|
|              |                                |                     | 100      | 220 | 470 | 1000 |                   |
| <b>LLR18</b> | 0.8X1.6 <0306>                 | 4                   |          |     |     |      | 1.0μF             |

## 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose

 **NFM** General Low ESL EMI Filter

| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |         |         |        |        |       |       |       |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|-------|---------|---------|--------|--------|-------|-------|-------|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p  | 1000p   | 10000p  | 0.1μ   | 1μ     | 10μ   | 100μ  | 1000μ |
| <b>NFM15</b> | 1.0X0.5 <0402>                 | 16                  |                       |    |     |       | 2200pF  | 47000pF |        |        |       |       |       |
|              |                                | 10                  |                       |    |     |       | 2200pF  | 0.22μF  |        |        |       |       |       |
|              |                                | 6.3                 |                       |    |     |       |         |         | 0.10μF | 1.0μF  |       |       |       |
|              |                                | 4                   |                       |    |     |       |         |         |        | 0.47μF | 14μF  |       |       |
|              |                                | 2.5                 |                       |    |     |       |         |         |        |        | 4.3μF | 9.1μF |       |
| <b>NFM18</b> | 1.6X0.8 <0603>                 | 16                  |                       |    |     | 100pF |         | 0.10μF  |        |        |       |       |       |
|              |                                | 10                  |                       |    |     |       |         |         |        | 2.2μF  |       |       |       |
|              |                                | 6.3                 |                       |    |     |       |         |         | 0.22μF | 10μF   |       |       |       |
| <b>NFM21</b> | 2.0X1.25 <0805>                | 50                  |                       |    |     | 220pF | 22000pF |         |        |        |       |       |       |
|              |                                | 25                  |                       |    |     |       |         |         |        | 0.10μF |       |       |       |
|              |                                | 16                  |                       |    |     |       |         |         |        | 0.22μF | 1.0μF |       |       |
|              |                                | 10                  |                       |    |     |       |         |         |        |        | 1.0μF | 4.7μF |       |
|              |                                | 6.3                 |                       |    |     |       |         |         |        |        | 2.2μF | 10μF  |       |


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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |       |         |         |        |       |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|-------|-------|---------|---------|--------|-------|------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p  | 1000p | 10000p  | 0.1μ    | 1μ     | 10μ   | 100μ | 1000μ |  |
| NFM3D  | 3.2X1.25 <1205>                | 50                  |                       |    |     | 220pF |       |         | 22000pF |        |       |      |       |  |
| NFM31  | 3.2X1.6 <1206>                 | 100                 |                       |    |     |       |       | 10000pF |         | 0.10μF |       |      |       |  |
|        |                                | 50                  |                       |    |     |       |       | 10000pF |         | 0.10μF |       |      |       |  |
| NFM41  | 4.5X1.6 <1806>                 | 6.3                 |                       |    |     |       |       |         |         |        |       | 27μF |       |  |
|        |                                | 100                 |                       |    |     | 470pF |       | 22000pF |         |        |       |      |       |  |
|        |                                | 50                  |                       |    |     |       |       |         |         |        | 1.5μF |      |       |  |
| NFMJM  | 1.2X0.9 <05035>                | 25                  |                       |    |     |       |       |         |         |        | 1.5μF |      |       |  |
|        |                                | 4                   |                       |    |     |       |       |         |         |        | 15μF  | 22μF |       |  |
|        |                                | 2.5                 |                       |    |     |       |       |         |         |        |       |      | 22μF  |  |


### Low Distortion Chip Multilayer Ceramic Capacitors for General Purpose



General
Low acoustic noise

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |        |        |     |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|--------|--------|-----|------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ   | 1μ     | 10μ | 100μ | 1000μ |  |
| GJ421  | 2.0X1.25 <0805>                | 25                  |                       |    |     |      |       |        | 0.10μF | 0.33μF |     |      |       |  |
| GJ431  | 3.2X1.6 <1206>                 | 100                 |                       |    |     |      |       |        | 0.10μF |        |     |      |       |  |
|        |                                | 25                  |                       |    |     |      |       |        | 0.47μF | 1.0μF  |     |      |       |  |


### Low Acoustic Noise Chip Multilayer Ceramic Capacitors on Interposer Board for General Purpose



General
Low acoustic noise

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |     |      |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|-----|------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| ZRA21  | 2.4X1.65 | 25                  |                       |    |     |      |       |        |      |    |     | 22μF |       |  |  |
|        |          | 16                  |                       |    |     |      |       |        |      |    |     | 22μF |       |  |  |
|        |          | 6.3                 |                       |    |     |      |       |        |      |    |     |      | 47μF  |  |  |
|        |          | 4                   |                       |    |     |      |       |        |      |    |     |      | 47μF  |  |  |

### Low Acoustic Noise Chip Multilayer Ceramic Capacitors on Interposer Board for General Purpose



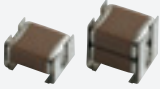
General
Low acoustic noise

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |       |       |       |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|-------|-------|-------|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ   | 100μ  | 1000μ |  |  |
| ZRB15  | 1.0X0.5 <0402>                 | 25                  |                       |    |     |      |       |        |      |    | 2.2μF |       |       |  |  |
|        |                                | 16                  |                       |    |     |      |       |        |      |    | 2.2μF |       |       |  |  |
|        |                                | 10                  |                       |    |     |      |       |        |      |    | 2.2μF | 10μF  |       |  |  |
|        |                                | 6.3                 |                       |    |     |      |       |        |      |    |       | 4.7μF | 10μF  |  |  |
| ZRB18  | 1.6X0.8 <0603>                 | 35                  |                       |    |     |      |       |        |      |    | 4.7μF |       |       |  |  |
|        |                                | 25                  |                       |    |     |      |       |        |      |    | 4.7μF | 10μF  |       |  |  |
|        |                                | 16                  |                       |    |     |      |       |        |      |    |       | 10μF  |       |  |  |
|        |                                | 10                  |                       |    |     |      |       |        |      |    | 10μF  | 22μF  |       |  |  |
|        |                                | 6.3                 |                       |    |     |      |       |        |      |    | 10μF  | 47μF  |       |  |  |
|        |                                | 4                   |                       |    |     |      |       |        |      |    |       |       | 22μF  |  |  |

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Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose



KRM

Temperature Compensating Type

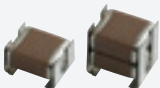
- General
- Deflecting crack
- Soldering crack
- Low acoustic noise

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |         |         |     |      |       |  |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|---------|---------|-----|------|-------|--|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ    | 1μ      | 10μ | 100μ | 1000μ |  |  |  |
| KRM55  | 6.1X5.1  | 1250                |                       |    |     |      |       |        | 8200pF  | 10000pF |     |      |       |  |  |  |
|        |          | 1000                |                       |    |     |      |       |        | 8200pF  | 20000pF |     |      |       |  |  |  |
|        |          | 630                 |                       |    |     |      |       |        | 15000pF | 94000pF |     |      |       |  |  |  |

High Dielectric Constant Type

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |         |        |        |       |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|------|---------|--------|--------|-------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ      | 10μ    | 100μ   | 1000μ |       |  |  |
| KRM21  | 2.2X1.25 | 25                  |                       |    |     |      |       |        |      |         |        | 10μF   | 22μF  |       |  |  |
|        |          | 16                  |                       |    |     |      |       |        |      |         |        |        | 10μF  |       |  |  |
| KRM31  | 3.5X1.7  | 100                 |                       |    |     |      |       |        |      |         |        | 1.0μF  |       |       |  |  |
|        |          | 50                  |                       |    |     |      |       |        |      |         |        | 4.7μF  |       |       |  |  |
|        |          | 35                  |                       |    |     |      |       |        |      |         |        |        | 10μF  |       |  |  |
|        |          | 25                  |                       |    |     |      |       |        |      |         |        |        | 10μF  |       |  |  |
| KRM55  | 6.1X5.3  | 1000                |                       |    |     |      |       |        |      | 68000pF | 0.22μF |        |       |       |  |  |
|        |          | 630                 |                       |    |     |      |       |        |      | 0.15μF  | 0.47μF |        |       |       |  |  |
| KRM55  | 6.1X5.3  | 450                 |                       |    |     |      |       |        |      |         | 0.33μF | 1.0μF  |       |       |  |  |
|        |          | 250                 |                       |    |     |      |       |        |      |         |        | 0.68μF | 2.2μF |       |  |  |
|        |          | 100                 |                       |    |     |      |       |        |      |         |        |        | 4.7μF | 22μF  |  |  |
|        |          | 63                  |                       |    |     |      |       |        |      |         |        |        | 4.7μF | 22μF  |  |  |
|        |          | 50                  |                       |    |     |      |       |        |      |         |        |        | 4.7μF | 33μF  |  |  |
|        |          | 35                  |                       |    |     |      |       |        |      |         |        |        | 10μF  | 47μF  |  |  |
|        |          | 25                  |                       |    |     |      |       |        |      |         |        |        | 15μF  | 100μF |  |  |

High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose



KR3

- General
- Deflecting crack
- Soldering crack
- Low acoustic noise

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |        |        |        |       |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|--------|--------|--------|-------|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ    | 100μ   | 1000μ  |       |  |
| KR355  | 6.1X5.3  | 630                 |                       |    |     |      |       |        |      |    | 0.10μF | 0.56μF |        |       |  |
|        |          | 450                 |                       |    |     |      |       |        |      |    |        | 0.22μF | 1.2μF  |       |  |
|        |          | 250                 |                       |    |     |      |       |        |      |    |        |        | 0.47μF | 2.2μF |  |

Wire Bonding Mount Multilayer Microchip Capacitors for General Purpose



GMA

- General
- Bonding


| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |         |    |         |      |       |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|---------|----|---------|------|-------|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ    | 1μ | 10μ     | 100μ | 1000μ |  |  |
| GMA0D  | 0.38X0.38 <015015>             | 6.3                 |                       |    |     |      |       |        |         |    | 10000pF |      |       |  |  |
|        |                                | 10                  |                       |    |     |      |       | 820pF  | 10000pF |    |         |      |       |  |  |

Continued on the following page.


## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |        |         |         |         |        |     |      |       |
|--------|--------------------------------|---------------------|-----------------------|----|-----|--------|---------|---------|---------|--------|-----|------|-------|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p   | 1000p   | 10000p  | 0.1μ    | 1μ     | 10μ | 100μ | 1000μ |
| GMA05  | 0.5X0.5 <0202>                 | 100                 |                       |    |     | 100pF  | 1000pF  |         |         |        |     |      |       |
|        |                                | 50                  |                       |    |     | 100pF  | 1000pF  |         |         |        |     |      |       |
|        |                                | 25                  |                       |    |     |        | 1500pF  | 4700pF  |         |        |     |      |       |
|        |                                | 16                  |                       |    |     | 430pF  | 4700pF  |         |         |        |     |      |       |
|        |                                | 10                  |                       |    |     |        |         | 6800pF  | 22000pF |        |     |      |       |
|        |                                | 6.3                 |                       |    |     |        |         |         | 6800pF  | 0.10μF |     |      |       |
| GMA08  | 0.8X0.8 <0303>                 | 100                 |                       |    |     | 330pF  | 6800pF  |         |         |        |     |      |       |
|        |                                | 50                  |                       |    |     | 330pF  | 6800pF  |         |         |        |     |      |       |
|        |                                | 25                  |                       |    |     |        | 10000pF | 22000pF |         |        |     |      |       |
|        |                                | 16                  |                       |    |     | 1000pF | 22000pF |         |         |        |     |      |       |
|        |                                | 10                  |                       |    |     |        |         | 33000pF | 0.10μF  |        |     |      |       |
|        |                                | 6.3                 |                       |    |     |        |         |         | 33000pF | 0.47μF |     |      |       |

### Wire Bonding/AuSn Soldering Mount Chip Multilayer Ceramic Capacitors for General Purpose




**GMD**




| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |        |         |         |        |        |      |       |
|--------|--------------------------------|---------------------|-----------------------|----|-----|-------|--------|---------|---------|--------|--------|------|-------|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p  | 0.1μ    | 1μ     | 10μ    | 100μ | 1000μ |
| GMD03  | 0.6X0.3 <0201>                 | 25                  |                       |    |     | 100pF | 1500pF |         |         |        |        |      |       |
|        |                                | 16                  |                       |    |     |       | 1800pF | 3300pF  |         |        |        |      |       |
|        |                                | 10                  |                       |    |     |       | 3900pF | 10000pF |         |        |        |      |       |
|        |                                | 6.3                 |                       |    |     |       |        |         | 56000pF | 0.10μF |        |      |       |
| GMD15  | 1.0X0.5 <0402>                 | 50                  |                       |    |     | 220pF | 4700pF |         |         |        |        |      |       |
|        |                                | 25                  |                       |    |     |       | 5600pF | 47000pF |         |        |        |      |       |
|        |                                | 16                  |                       |    |     |       |        |         | 56000pF | 0.10μF |        |      |       |
|        |                                | 10                  |                       |    |     |       |        |         |         | 0.12μF | 0.47μF |      |       |
|        | 6.3                            |                     |                       |    |     |       |        |         |         | 1.0μF  |        |      |       |

## Ceramic capacitors SMD type For Automotive

### AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment



**GRT**



**Temperature Compensating Type**

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |        |        |         |         |    |     |      |       |
|--------|--------------------------------|---------------------|-----------------------|----|-----|--------|--------|---------|---------|----|-----|------|-------|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p   | 1000p  | 10000p  | 0.1μ    | 1μ | 10μ | 100μ | 1000μ |
| GRT03  | 0.6X0.3 <0201>                 | 100                 | 0.10pF                |    |     |        | 100pF  |         |         |    |     |      |       |
|        |                                | 50                  | 0.10pF                |    |     |        | 220pF  |         |         |    |     |      |       |
|        |                                | 25                  | 0.10pF                |    |     |        |        | 1000pF  |         |    |     |      |       |
| GRT15  | 1.0X0.5 <0402>                 | 100                 |                       |    |     | 0.20pF | 100pF  |         |         |    |     |      |       |
|        |                                | 50                  |                       |    |     | 0.11pF |        | 1000pF  |         |    |     |      |       |
|        |                                | 25                  |                       |    |     | 10pF   |        | 1000pF  |         |    |     |      |       |
| GRT18  | 1.6X0.8 <0603>                 | 100                 |                       |    |     |        | 120pF  | 1500pF  |         |    |     |      |       |
|        |                                | 50                  |                       |    |     |        | 1200pF | 10000pF |         |    |     |      |       |
|        |                                | 25                  |                       |    |     |        | 1200pF | 10000pF |         |    |     |      |       |
| GRT21  | 2.0X1.25 <0805>                | 100                 |                       |    |     |        | 1800pF | 3300pF  |         |    |     |      |       |
|        |                                | 50                  |                       |    |     |        |        | 18000pF | 22000pF |    |     |      |       |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors


| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |        |        |         |        |        |      |       |  |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|--------|--------|---------|--------|--------|------|-------|--|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p  | 10000p | 0.1μ    | 1μ     | 10μ    | 100μ | 1000μ |  |  |
| GRT21  | 2.0X1.25 <0805>                | 25                  |                       |    |     |      | 1800pF | 2200pF |         |        |        |      |       |  |  |
| GRT31  | 3.2X1.6 <1206>                 | 100                 |                       |    |     |      |        | 3900pF |         | 0.10μF |        |      |       |  |  |
|        |                                | 50                  |                       |    |     |      |        |        | 56000pF | 0.10μF |        |      |       |  |  |
|        |                                | 25                  |                       |    |     |      |        |        |         | 0.10μF | 0.12μF |      |       |  |  |
|        |                                | 16                  |                       |    |     |      |        |        |         |        | 0.12μF |      |       |  |  |




### High Dielectric Constant Type

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |        |         |         |         |       |       |       |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|-------|--------|---------|---------|---------|-------|-------|-------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p  | 0.1μ    | 1μ      | 10μ   | 100μ  | 1000μ |       |  |
| GRT03  | 0.6X0.3 <0201>                 | 35                  |                       |    |     |       |        |         |         | 0.10μF  |       |       |       |       |  |
|        |                                | 25                  |                       |    |     | 100pF |        |         |         | 0.10μF  |       |       |       |       |  |
|        |                                | 16                  |                       |    |     |       |        | 10000pF |         | 0.10μF  |       |       |       |       |  |
|        |                                | 10                  |                       |    |     |       | 1500pF |         |         | 1.0μF   |       |       |       |       |  |
|        |                                | 6.3                 |                       |    |     |       |        | 2200pF  |         | 1.0μF   |       |       |       |       |  |
|        |                                | 4                   |                       |    |     |       |        |         | 68000pF | 1.0μF   |       |       |       |       |  |
|        |                                | 2.5                 |                       |    |     |       |        |         |         |         | 1.0μF |       |       |       |  |
| GRT15  | 1.0X0.5 <0402>                 | 50                  |                       |    |     | 220pF |        |         | 0.10μF  |         |       |       |       |       |  |
|        |                                | 35                  |                       |    |     |       |        |         | 0.22μF  | 1.0μF   |       |       |       |       |  |
|        |                                | 25                  |                       |    |     |       |        | 5600pF  |         | 2.2μF   |       |       |       |       |  |
|        |                                | 16                  |                       |    |     |       |        | 10000pF |         | 2.2μF   |       |       |       |       |  |
|        |                                | 10                  |                       |    |     |       |        |         | 0.22μF  | 4.7μF   |       |       |       |       |  |
|        |                                | 6.3                 |                       |    |     |       |        |         | 22000pF | 4.7μF   |       |       |       |       |  |
|        |                                | 4                   |                       |    |     |       |        |         |         | 0.22μF  | 4.7μF |       |       |       |  |
|        |                                | 2.5                 |                       |    |     |       |        |         |         |         |       | 10μF  |       |       |  |
| GRT18  | 1.6X0.8 <0603>                 | 100                 |                       |    |     |       | 3300pF | 10000pF |         |         |       |       |       |       |  |
|        |                                | 50                  |                       |    |     |       |        |         | 1.0μF   | 2.2μF   |       |       |       |       |  |
|        |                                | 35                  |                       |    |     |       |        |         |         | 1.0μF   | 4.7μF |       |       |       |  |
|        |                                | 25                  |                       |    |     |       |        |         |         | 0.15μF  | 10μF  |       |       |       |  |
|        |                                | 16                  |                       |    |     |       |        |         |         | 0.33μF  | 10μF  |       |       |       |  |
|        |                                | 10                  |                       |    |     |       |        |         |         |         | 10μF  | 22μF  |       |       |  |
|        |                                | 6.3                 |                       |    |     |       |        |         |         |         | 10μF  | 22μF  |       |       |  |
|        |                                | 4                   |                       |    |     |       |        |         |         |         | 1.0μF | 22μF  |       |       |  |
|        |                                | 2.5                 |                       |    |     |       |        |         |         |         |       |       | 22μF  |       |  |
| GRT21  | 2.0X1.25 <0805>                | 100                 |                       |    |     |       |        |         |         | 47000pF |       |       |       |       |  |
|        |                                | 50                  |                       |    |     |       |        |         |         | 0.47μF  | 4.7μF |       |       |       |  |
|        |                                | 35                  |                       |    |     |       |        |         |         |         | 4.7μF |       |       |       |  |
|        |                                | 25                  |                       |    |     |       |        |         |         |         | 2.2μF | 22μF  |       |       |  |
|        |                                | 16                  |                       |    |     |       |        |         |         |         | 2.2μF | 22μF  |       |       |  |
|        |                                | 10                  |                       |    |     |       |        |         |         |         | 3.3μF | 22μF  |       |       |  |
|        |                                | 6.3                 |                       |    |     |       |        |         |         |         | 3.3μF | 47μF  |       |       |  |
|        |                                | 4                   |                       |    |     |       |        |         |         |         |       |       | 47μF  |       |  |
|        |                                | 2.5                 |                       |    |     |       |        |         |         |         |       |       | 47μF  |       |  |
| GRT31  | 3.2X1.6 <1206>                 | 50                  |                       |    |     |       |        |         |         | 1.0μF   | 10μF  |       |       |       |  |
|        |                                | 35                  |                       |    |     |       |        |         |         |         |       | 10μF  |       |       |  |
|        |                                | 25                  |                       |    |     |       |        |         |         |         | 1.5μF | 10μF  |       |       |  |
|        |                                | 16                  |                       |    |     |       |        |         |         |         | 1.5μF | 22μF  |       |       |  |
|        |                                | 10                  |                       |    |     |       |        |         |         |         |       |       | 47μF  |       |  |
|        |                                | 6.3                 |                       |    |     |       |        |         |         |         |       | 15μF  | 47μF  |       |  |
| GRT32  | 3.2X2.5 <1210>                 | 50                  |                       |    |     |       |        |         |         | 3.3μF   | 4.7μF |       |       |       |  |
|        |                                | 25                  |                       |    |     |       |        |         |         |         |       | 6.8μF |       |       |  |
|        |                                | 16                  |                       |    |     |       |        |         |         |         |       |       | 47μF  |       |  |
|        |                                | 10                  |                       |    |     |       |        |         |         |         |       |       | 47μF  |       |  |
|        |                                | 6.3                 |                       |    |     |       |        |         |         |         |       |       | 33μF  | 100μF |  |
|        |                                | 4                   |                       |    |     |       |        |         |         |         |       |       |       | 100μF |  |

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## AEC-Q200 Compliant 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Infotainment





| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |      |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|------|------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ  | 100μ | 1000μ |  |
| NFM15  | 1.0X0.5 <0402>                 | 4                   |                       |    |     |      |       |        |      |    | 10μF |      |       |  |
| NFM18  | 1.6X0.8 <0603>                 | 4                   |                       |    |     |      |       |        |      |    |      | 10μF |       |  |

## Chip Multilayer Ceramic Capacitors for Automotive



### Temperature Compensating Type

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |      |      |        |         |         |         |     |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|------|------|--------|---------|---------|---------|-----|------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p  | 100p | 1000p  | 10000p  | 0.1μ    | 1μ      | 10μ | 100μ | 1000μ |  |
| GCM03  | 0.6X0.3 <0201>                 | 50                  | 0.10pF                |    |      |      | 100pF  |         |         |         |     |      |       |  |
|        |                                | 25                  | 0.10pF                |    |      |      | 100pF  |         |         |         |     |      |       |  |
| GCM15  | 1.0X0.5 <0402>                 | 50                  | 0.10pF                |    |      |      |        | 1000pF  |         |         |     |      |       |  |
| GCM18  | 1.6X0.8 <0603>                 | 100                 | 0.47pF                |    |      |      |        |         | 10000pF |         |     |      |       |  |
|        |                                | 80                  |                       |    |      |      | 1600pF |         | 3900pF  |         |     |      |       |  |
|        |                                | 63                  |                       |    |      |      | 1600pF |         | 3900pF  |         |     |      |       |  |
|        |                                | 50                  |                       |    |      |      | 1000pF |         | 10000pF |         |     |      |       |  |
| GCM21  | 2.0X1.25 <0805>                | 630                 |                       |    | 10pF |      |        |         | 2200pF  |         |     |      |       |  |
|        |                                | 250                 |                       |    | 10pF |      |        |         |         | 10000pF |     |      |       |  |
|        |                                | 100                 |                       |    |      |      | 1000pF |         | 3300pF  |         |     |      |       |  |
|        |                                | 80                  |                       |    |      |      | 4300pF |         | 22000pF |         |     |      |       |  |
| GCM31  | 3.2X1.6 <1206>                 | 1000                |                       |    | 10pF |      |        |         | 1000pF  |         |     |      |       |  |
|        |                                | 630                 |                       |    | 10pF |      |        |         |         | 10000pF |     |      |       |  |
|        |                                | 250                 |                       |    |      |      | 6800pF |         | 22000pF |         |     |      |       |  |
|        |                                | 100                 |                       |    |      |      | 1600pF |         | 0.10μF  |         |     |      |       |  |
| GCM32  | 3.2X2.5 <1210>                 | 1000                |                       |    |      |      |        | 1200pF  |         | 2200pF  |     |      |       |  |
|        |                                | 630                 |                       |    |      |      |        | 1200pF  |         | 33000pF |     |      |       |  |
|        |                                | 1000                |                       |    |      |      |        | 2700pF  |         | 4700pF  |     |      |       |  |
|        |                                | 630                 |                       |    |      |      |        | 12000pF |         | 22000pF |     |      |       |  |
| GCM55  | 5.7X5.0 <2220>                 | 1000                |                       |    |      |      |        | 5600pF  |         | 10000pF |     |      |       |  |
|        |                                | 630                 |                       |    |      |      |        | 27000pF |         | 47000pF |     |      |       |  |

### High Dielectric Constant Type

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |         |        |        |        |         |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|-------|---------|--------|--------|--------|---------|------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p  | 1000p   | 10000p | 0.1μ   | 1μ     | 10μ     | 100μ | 1000μ |  |
| GCM03  | 0.6X0.3 <0201>                 | 25                  |                       |    |     | 100pF |         |        |        | 3300pF |         |      |       |  |
|        |                                | 16                  |                       |    |     | 330pF |         |        |        | 3300pF |         |      |       |  |
|        |                                | 10                  |                       |    |     |       | 1200pF  |        |        |        | 10000pF |      |       |  |
| GCM15  | 1.0X0.5 <0402>                 | 100                 |                       |    |     | 220pF |         |        |        | 4700pF |         |      |       |  |
|        |                                | 50                  |                       |    |     | 220pF |         |        |        | 0.10μF |         |      |       |  |
|        |                                | 25                  |                       |    |     |       | 4700pF  |        |        |        | 0.10μF  |      |       |  |
|        |                                | 16                  |                       |    |     |       | 15000pF |        |        |        | 0.22μF  |      |       |  |
| GCM18  | 1.6X0.8 <0603>                 | 100                 |                       |    |     |       |         |        | 1000pF |        | 22000pF |      |       |  |
|        |                                | 50                  |                       |    |     |       |         |        | 1000pF |        | 0.22μF  |      |       |  |


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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |     |     |      |       |         |         |        |        |       |       |       |
|--------|--------------------------------|---------------------|-----------------------|-----|-----|------|-------|---------|---------|--------|--------|-------|-------|-------|
|        |                                |                     | 0.1p                  | 1p  | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ     | 10μ    | 100μ  | 1000μ |       |
| GCM18  | 1.6X0.8 <0603>                 | 25                  |                       |     |     |      |       |         | 68000pF |        | 1.0μF  |       |       |       |
|        |                                | 16                  |                       |     |     |      |       |         | 0.12μF  |        | 1.0μF  |       |       |       |
|        |                                | 6.3                 |                       |     |     |      |       |         |         |        | 2.2μF  |       | 10μF  |       |
|        |                                | 4                   |                       |     |     |      |       |         |         |        |        |       | 10μF  |       |
| GCM21  | 2.0X1.25 <0805>                | 100                 |                       |     |     |      |       | 10000pF |         | 1.0μF  |        |       |       |       |
|        |                                | 50                  |                       |     |     |      |       | 10000pF |         | 1.0μF  |        |       |       |       |
|        |                                | 35                  |                       |     |     |      |       |         |         | 0.68μF |        | 4.7μF |       |       |
|        |                                | 25                  |                       |     |     |      |       |         |         | 0.15μF |        | 4.7μF |       |       |
|        |                                | 16                  |                       |     |     |      |       |         |         | 0.27μF |        | 10μF  |       |       |
|        |                                | 10                  |                       |     |     |      |       |         |         |        | 2.2μF  |       | 10μF  |       |
|        |                                | 6.3                 |                       |     |     |      |       |         |         |        |        |       | 10μF  |       |
|        |                                | GCM31               | 3.2X1.6 <1206>        | 100 |     |      |       |         |         |        | 0.22μF |       | 2.2μF |       |
| 50     |                                |                     |                       |     |     |      |       |         | 0.22μF  |        | 4.7μF  |       |       |       |
| 35     |                                |                     |                       |     |     |      |       |         |         |        | 10μF   |       |       |       |
| 25     |                                |                     |                       |     |     |      |       |         | 0.47μF  |        | 10μF   |       |       |       |
| 16     |                                |                     |                       |     |     |      |       |         |         | 4.7μF  | 10μF   |       |       |       |
| 10     |                                |                     |                       |     |     |      |       |         |         |        |        | 22μF  |       |       |
| 6.3    |                                |                     |                       |     |     |      |       |         |         |        |        | 22μF  |       |       |
| GCM32  | 3.2X2.5 <1210>                 | 100                 |                       |     |     |      |       |         |         |        |        | 4.7μF |       |       |
|        |                                | 50                  |                       |     |     |      |       |         |         |        | 4.7μF  | 10μF  |       |       |
|        |                                | 35                  |                       |     |     |      |       |         |         |        |        |       | 10μF  |       |
|        |                                | 25                  |                       |     |     |      |       |         |         |        | 10μF   | 22μF  |       |       |
|        |                                | 16                  |                       |     |     |      |       |         |         |        |        |       | 22μF  |       |
|        |                                | 10                  |                       |     |     |      |       |         |         |        | 10μF   | 47μF  |       |       |
|        |                                | 6.3                 |                       |     |     |      |       |         |         |        |        |       | 47μF  |       |
|        |                                | 2.5                 |                       |     |     |      |       |         |         |        |        |       |       | 100μF |

### High Effective Capacitance & High Ripple Current Chip Multilayer Ceramic Capacitors for Automotive



| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |         |         |         |         |        |        |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|---------|---------|---------|---------|--------|--------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ      | 10μ     | 100μ   | 1000μ  |  |
| GC321  | 2.0X1.25 <0805>                | 250                 |                       |    |     |      |       | 10000pF |         | 22000pF |         |        |        |  |
| GC331  | 3.2X1.6 <1206>                 | 630                 |                       |    |     |      |       | 10000pF |         | 15000pF |         |        |        |  |
|        |                                | 450                 |                       |    |     |      |       | 10000pF |         | 47000pF |         |        |        |  |
| GC332  | 3.2X2.5 <1210>                 | 250                 |                       |    |     |      |       | 33000pF |         | 68000pF |         |        |        |  |
|        |                                | 630                 |                       |    |     |      |       | 22000pF |         | 47000pF |         |        |        |  |
|        |                                | 450                 |                       |    |     |      |       |         | 68000pF |         | 0.10μF  |        |        |  |
| GC343  | 4.5X3.2 <1812>                 | 250                 |                       |    |     |      |       |         |         | 0.10μF  |         | 0.15μF |        |  |
|        |                                | 630                 |                       |    |     |      |       |         |         |         | 68000pF |        |        |  |
|        |                                | 450                 |                       |    |     |      |       |         |         |         |         | 0.15μF |        |  |
| GC355  | 5.7X5.0 <2220>                 | 250                 |                       |    |     |      |       |         |         | 0.22μF  |         | 0.33μF |        |  |
|        |                                | 630                 |                       |    |     |      |       |         |         | 0.10μF  |         | 0.22μF |        |  |
|        |                                | 450                 |                       |    |     |      |       |         |         |         | 0.22μF  |        | 0.47μF |  |
|        |                                | 250                 |                       |    |     |      |       |         |         | 0.47μF  |         | 1.0μF  |        |  |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

### Soft Termination Chip Multilayer Ceramic Capacitors for Automotive







| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |        |        |         |         |     |      |         |         |         |        |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|------|--------|--------|---------|---------|-----|------|---------|---------|---------|--------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p  | 10000p | 0.1μ    | 1μ      | 10μ | 100μ | 1000μ   |         |         |        |       |  |
| GCJ18  | 1.6X0.8 <0603>                 | 100                 |                       |    |     |      | 1000pF |        |         |         |     |      |         | 0.10μF  |         |        |       |  |
|        |                                | 50                  |                       |    |     |      | 1000pF |        |         |         |     |      |         | 0.22μF  |         |        |       |  |
|        |                                | 35                  |                       |    |     |      |        |        | 33000pF |         |     |      |         |         | 68000pF |        |       |  |
|        |                                | 25                  |                       |    |     |      | 1000pF |        |         |         |     |      |         |         | 1.0μF   |        |       |  |
|        |                                | 16                  |                       |    |     |      |        |        |         | 27000pF |     |      |         |         | 0.47μF  |        |       |  |
|        |                                | 10                  |                       |    |     |      |        |        |         |         |     |      |         |         | 0.22μF  |        |       |  |
|        |                                | 6.3                 |                       |    |     |      |        |        |         |         |     |      |         |         | 2.2μF   |        | 4.7μF |  |
| GCJ21  | 2.0X1.25 <0805>                | 250                 |                       |    |     |      | 1000pF |        |         |         |     |      |         | 22000pF |         |        |       |  |
|        |                                | 100                 |                       |    |     |      |        |        | 27000pF |         |     |      |         | 1.0μF   |         |        |       |  |
|        |                                | 50                  |                       |    |     |      |        |        |         | 82000pF |     |      |         | 1.0μF   |         |        |       |  |
|        |                                | 35                  |                       |    |     |      |        |        |         |         |     |      | 0.12μF  |         | 0.47μF  |        |       |  |
|        |                                | 25                  |                       |    |     |      |        |        |         |         |     |      | 0.12μF  |         | 2.2μF   |        |       |  |
|        |                                | 16                  |                       |    |     |      |        |        |         |         |     |      |         | 0.27μF  |         | 4.7μF  |       |  |
|        |                                | 10                  |                       |    |     |      |        |        |         |         |     |      |         |         | 2.2μF   |        | 10μF  |  |
| GCJ31  | 3.2X1.6 <1206>                 | 1000                |                       |    |     |      | 1000pF |        |         |         |     |      |         | 10000pF |         |        |       |  |
|        |                                | 630                 |                       |    |     |      | 1000pF |        |         |         |     |      |         | 22000pF |         |        |       |  |
|        |                                | 250                 |                       |    |     |      |        |        | 15000pF |         |     |      |         | 0.10μF  |         |        |       |  |
|        |                                | 100                 |                       |    |     |      |        |        |         |         |     |      |         | 0.15μF  |         | 2.2μF  |       |  |
|        |                                | 50                  |                       |    |     |      |        |        |         |         |     |      |         | 0.47μF  |         | 4.7μF  |       |  |
|        |                                | 35                  |                       |    |     |      |        |        |         |         |     |      |         | 0.47μF  |         | 10μF   |       |  |
|        |                                | 25                  |                       |    |     |      |        |        |         |         |     |      |         | 2.2μF   |         | 10μF   |       |  |
|        |                                | 16                  |                       |    |     |      |        |        |         |         |     |      |         | 1.5μF   |         | 10μF   |       |  |
|        |                                | 10                  |                       |    |     |      |        |        |         |         |     |      |         |         | 6.8μF   |        | 22μF  |  |
| GCJ32  | 3.2X2.5 <1210>                 | 1000                |                       |    |     |      |        |        | 15000pF |         |     |      |         | 22000pF |         |        |       |  |
|        |                                | 630                 |                       |    |     |      |        |        | 6800pF  |         |     |      |         | 47000pF |         |        |       |  |
|        |                                | 250                 |                       |    |     |      |        |        |         | 68000pF |     |      |         | 0.22μF  |         |        |       |  |
|        |                                | 100                 |                       |    |     |      |        |        |         |         |     |      |         | 2.2μF   |         | 4.7μF  |       |  |
|        |                                | 50                  |                       |    |     |      |        |        |         |         |     |      |         | 4.7μF   |         | 10μF   |       |  |
|        |                                | 25                  |                       |    |     |      |        |        |         |         |     |      |         | 4.7μF   |         | 22μF   |       |  |
|        |                                | 16                  |                       |    |     |      |        |        |         |         |     |      |         | 6.8μF   |         | 22μF   |       |  |
| GCJ43  | 4.5X3.2 <1812>                 | 1000                |                       |    |     |      |        |        |         |         |     |      | 33000pF |         | 47000pF |        |       |  |
|        |                                | 630                 |                       |    |     |      |        |        |         |         |     |      | 33000pF |         | 0.10μF  |        |       |  |
|        |                                | 250                 |                       |    |     |      |        |        |         |         |     |      |         | 0.15μF  |         | 0.47μF |       |  |
| GCJ55  | 5.7X5.0 <2220>                 | 1000                |                       |    |     |      |        |        |         |         |     |      | 68000pF |         | 0.10μF  |        |       |  |
|        |                                | 630                 |                       |    |     |      |        |        |         |         |     |      |         | 0.10μF  |         | 0.22μF |       |  |
|        |                                | 250                 |                       |    |     |      |        |        |         |         |     |      |         |         | 0.33μF  |        | 1.0μF |  |

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Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

High Q Chip Multilayer Ceramic Capacitors for Automotive

 **GCQ** Power-train  AEC-Q200  High Q 





| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |      |     |      |       |  |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|-------|--------|------|------|-----|------|-------|--|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ   | 10μ | 100μ | 1000μ |  |  |
| <b>GCQ15</b> | 1.0X0.5 <0402>                 | 50                  | 0.10pF                |    |     |      |       |        |      | 47pF |     |      |       |  |  |

MLSC Design Chip Multilayer Ceramic Capacitors for Automotive

 **GCD** Power-train  AEC-Q200  Deflecting crack 






| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |         |         |         |    |     |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|---------|---------|---------|----|-----|------|-------|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p   | 10000p  | 0.1μ    | 1μ | 10μ | 100μ | 1000μ |  |
| <b>GCD18</b> | 1.6X0.8 <0603>                 | 100                 |                       |    |     |      | 1000pF  | 22000pF |         |    |     |      |       |  |
|              |                                | 50                  |                       |    |     |      | 1000pF  | 22000pF |         |    |     |      |       |  |
|              |                                | 25                  |                       |    |     |      | 27000pF |         | 47000pF |    |     |      |       |  |
| <b>GCD21</b> | 2.0X1.25 <0805>                | 100                 |                       |    |     |      | 27000pF |         | 0.10μF  |    |     |      |       |  |
|              |                                | 50                  |                       |    |     |      | 27000pF |         | 0.10μF  |    |     |      |       |  |
|              |                                | 16                  |                       |    |     |      |         |         | 0.47μF  |    |     |      |       |  |

Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive

 **GCE** Power-train  AEC-Q200  Deflecting crack 

| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |         |         |         |    |     |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|---------|---------|---------|----|-----|------|-------|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p   | 10000p  | 0.1μ    | 1μ | 10μ | 100μ | 1000μ |  |
| <b>GCE18</b> | 1.6X0.8 <0603>                 | 100                 |                       |    |     |      | 1000pF  | 22000pF |         |    |     |      |       |  |
|              |                                | 50                  |                       |    |     |      | 1000pF  | 22000pF |         |    |     |      |       |  |
|              |                                | 25                  |                       |    |     |      | 27000pF |         | 47000pF |    |     |      |       |  |
| <b>GCE21</b> | 2.0X1.25 <0805>                | 100                 |                       |    |     |      | 27000pF |         | 0.10μF  |    |     |      |       |  |
|              |                                | 50                  |                       |    |     |      | 27000pF |         | 0.10μF  |    |     |      |       |  |

3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive

 **NFM** Power-train  AEC-Q200  Low ESL  EMI Filter 

| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |         |        |        |    |        |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|---------|--------|--------|----|--------|------|-------|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p   | 10000p | 0.1μ   | 1μ | 10μ    | 100μ | 1000μ |  |
| <b>NFM15</b> | 1.0X0.5 <0402>                 | 4                   |                       |    |     |      |         |        |        |    | 1.0μF  |      |       |  |
| <b>NFM18</b> | 1.6X0.8 <0603>                 | 16                  |                       |    |     |      |         |        |        |    | 1.0μF  |      |       |  |
|              |                                | 6.3                 |                       |    |     |      |         |        |        |    | 1.0μF  |      |       |  |
|              |                                | 4                   |                       |    |     |      |         |        |        |    |        |      | 10μF  |  |
| <b>NFM21</b> | 2.0X1.25 <0805>                | 50                  | 220pF                 |    |     |      | 22000pF |        |        |    |        |      |       |  |
|              |                                | 16                  |                       |    |     |      |         |        | 1.0μF  |    |        |      |       |  |
|              |                                | 10                  |                       |    |     |      |         |        | 0.10μF |    | 0.47μF |      |       |  |
| <b>NFM31</b> | 3.2X1.6 <1206>                 | 100                 |                       |    |     |      | 10000pF |        |        |    |        |      |       |  |
|              |                                | 50                  |                       |    |     |      | 10000pF |        | 0.10μF |    |        |      |       |  |

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### Metal Terminal Type Multilayer Ceramic Capacitors for Automotive



KCM

#### Temperature Compensating Type



| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |         |         |     |      |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|---------|---------|-----|------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ    | 1μ      | 10μ | 100μ | 1000μ |  |  |
| KCM55  | 6.1X5.1  | 1000                |                       |    |     |      |       |        | 8200pF  | 20000pF |     |      |       |  |  |
|        |          | 630                 |                       |    |     |      |       |        | 15000pF | 94000pF |     |      |       |  |  |

#### High Dielectric Constant Type

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |     |       |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|-----|-------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ  | 1000μ |  |  |
| KCM55  | 6.1X5.3  | 100                 |                       |    |     |      |       |        |      |    |     | 4.7μF | 22μF  |  |  |
|        |          | 63                  |                       |    |     |      |       |        |      |    |     | 4.7μF | 22μF  |  |  |
|        |          | 50                  |                       |    |     |      |       |        |      |    |     | 4.7μF | 33μF  |  |  |
|        |          | 35                  |                       |    |     |      |       |        |      |    |     | 10μF  | 47μF  |  |  |
|        |          | 25                  |                       |    |     |      |       |        |      |    |     | 15μF  | 100μF |  |  |

### High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for Automotive



KC3



| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |        |       |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|--------|-------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ    | 100μ  | 1000μ |  |  |
| KC355  | 6.1X5.3  | 630                 |                       |    |     |      |       |        |      |    | 0.10μF | 1.2μF |       |  |  |
|        |          | 450                 |                       |    |     |      |       |        |      |    | 0.22μF | 2.2μF |       |  |  |
|        |          | 250                 |                       |    |     |      |       |        |      |    | 0.47μF | 2.2μF |       |  |  |

### Safety Standard Certified Metal Terminal Type Multilayer Ceramic Capacitors for Automotive



KCA




| Series | LXW (mm) | Rated Voltage (Vac (r.m.s.)) | Capacitance Range (F) |    |     |       |       |        |         |    |     |      |       |  |  |
|--------|----------|------------------------------|-----------------------|----|-----|-------|-------|--------|---------|----|-----|------|-------|--|--|
|        |          |                              | 0.1p                  | 1p | 10p | 100p  | 1000p | 10000p | 0.1μ    | 1μ | 10μ | 100μ | 1000μ |  |  |
| KCA55  | 6.1X5.1  | 250                          |                       |    |     | 100pF |       |        | 10000pF |    |     |      |       |  |  |






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Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

**Ni Plating + Pd Plating termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive**

**GCB**















| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |        |         |        |    |     |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|--------|---------|--------|----|-----|------|-------|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p  | 10000p  | 0.1μ   | 1μ | 10μ | 100μ | 1000μ |  |
| <b>GCB15</b> | 1.0X0.5 <0402>                 | 100                 |                       |    |     |      | 1000pF | 10000pF |        |    |     |      |       |  |
|              |                                | 50                  |                       |    |     |      | 1000pF | 47000pF |        |    |     |      |       |  |
|              |                                | 25                  |                       |    |     |      |        | 6800pF  | 0.10μF |    |     |      |       |  |
|              |                                | 16                  |                       |    |     |      |        | 15000pF | 0.10μF |    |     |      |       |  |

**AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive**

**GCG**



**Temperature Compensating Type**

| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |      |      |      |        |        |         |    |     |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|------|------|------|--------|--------|---------|----|-----|------|-------|--|
|              |                                |                     | 0.1p                  | 1p   | 10p  | 100p | 1000p  | 10000p | 0.1μ    | 1μ | 10μ | 100μ | 1000μ |  |
| <b>GCG15</b> | 1.0X0.5 <0402>                 | 50                  |                       | 10pF |      |      |        | 470pF  |         |    |     |      |       |  |
| <b>GCG18</b> | 1.6X0.8 <0603>                 | 100                 |                       |      | 10pF |      |        |        | 10000pF |    |     |      |       |  |
|              |                                | 50                  |                       |      | 10pF |      |        |        | 2200pF  |    |     |      |       |  |
| <b>GCG21</b> | 2.0X1.25 <0805>                | 50                  |                       |      |      |      | 1000pF |        | 10000pF |    |     |      |       |  |

**High Dielectric Constant Type**

| Series       | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |        |        |         |        |       |      |       |  |
|--------------|--------------------------------|---------------------|-----------------------|----|-----|------|--------|--------|---------|--------|-------|------|-------|--|
|              |                                |                     | 0.1p                  | 1p | 10p | 100p | 1000p  | 10000p | 0.1μ    | 1μ     | 10μ   | 100μ | 1000μ |  |
| <b>GCG15</b> | 1.0X0.5 <0402>                 | 50                  |                       |    |     |      | 220pF  | 4700pF |         |        |       |      |       |  |
|              |                                | 25                  |                       |    |     |      |        | 5600pF | 10000pF |        |       |      |       |  |
|              |                                | 16                  |                       |    |     |      |        |        | 15000pF | 0.10μF |       |      |       |  |
| <b>GCG18</b> | 1.6X0.8 <0603>                 | 100                 |                       |    |     |      | 1000pF |        | 0.10μF  |        |       |      |       |  |
|              |                                | 50                  |                       |    |     |      | 1000pF |        | 0.22μF  |        |       |      |       |  |
|              |                                | 25                  |                       |    |     |      |        |        | 0.12μF  | 0.47μF |       |      |       |  |
|              |                                | 16                  |                       |    |     |      |        |        | 0.15μF  | 1.0μF  |       |      |       |  |
|              |                                | 10                  |                       |    |     |      |        |        |         |        | 2.2μF |      |       |  |
| <b>GCG21</b> | 2.0X1.25 <0805>                | 50                  |                       |    |     |      |        |        | 0.15μF  | 1.0μF  |       |      |       |  |
|              |                                | 35                  |                       |    |     |      |        |        | 0.68μF  | 1.0μF  |       |      |       |  |
|              |                                | 25                  |                       |    |     |      |        |        | 0.27μF  | 1.0μF  |       |      |       |  |
|              |                                | 16                  |                       |    |     |      |        |        | 0.33μF  | 4.7μF  |       |      |       |  |
|              |                                | 10                  |                       |    |     |      |        |        |         |        | 10μF  |      |       |  |
| <b>GCG31</b> | 3.2X1.6 <1206>                 | 50                  |                       |    |     |      |        |        | 0.22μF  | 0.33μF |       |      |       |  |
|              |                                | 25                  |                       |    |     |      |        |        | 1.0μF   | 4.7μF  |       |      |       |  |
|              |                                | 16                  |                       |    |     |      |        |        | 0.68μF  | 4.7μF  |       |      |       |  |
|              |                                | 6.3                 |                       |    |     |      |        |        |         |        | 22μF  |      |       |  |
| <b>GCG32</b> | 3.2X2.5 <1210>                 | 50                  |                       |    |     |      |        |        |         |        | 10μF  |      |       |  |
|              |                                | 35                  |                       |    |     |      |        |        |         |        | 10μF  |      |       |  |
|              |                                | 25                  |                       |    |     |      |        |        |         |        | 10μF  | 22μF |       |  |
|              |                                | 16                  |                       |    |     |      |        |        |         |        | 6.8μF | 10μF |       |  |
|              |                                | 6.3                 |                       |    |     |      |        |        |         |        |       |      | 47μF  |  |

Continued on the following page. ↗



# Ceramic capacitors SMD type For Medical Devices

Chip Multilayer Ceramic Capacitors for Implantable Medical devices  
(Non Life support circuit)



GCH

Medical Device

## Temperature Compensating Type

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |       |     |      |         |         |      |    |     |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|-------|-----|------|---------|---------|------|----|-----|------|-------|--|
|        |                                |                     | 0.1p                  | 1p    | 10p | 100p | 1000p   | 10000p  | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |
| GCH15  | 1.0X0.5 <0402>                 | 50                  |                       | 1.0pF |     |      |         | 1000pF  |      |    |     |      |       |  |
| GCH18  | 1.6X0.8 <0603>                 | 100                 |                       | 1.0pF |     |      |         | 1500pF  |      |    |     |      |       |  |
|        |                                | 50                  |                       |       |     |      | 1500pF  | 3300pF  |      |    |     |      |       |  |
| GCH21  | 2.0X1.25 <0805>                | 630                 |                       | 10pF  |     |      |         | 2200pF  |      |    |     |      |       |  |
|        |                                | 100                 |                       |       |     |      | 2200pF  | 3300pF  |      |    |     |      |       |  |
|        |                                | 50                  |                       |       |     |      | 4700pF  | 22000pF |      |    |     |      |       |  |
| GCH31  | 3.2X1.6 <1206>                 | 100                 |                       |       |     |      | 4700pF  | 10000pF |      |    |     |      |       |  |
|        |                                | 50                  |                       |       |     |      | 33000pF | 0.10μF  |      |    |     |      |       |  |

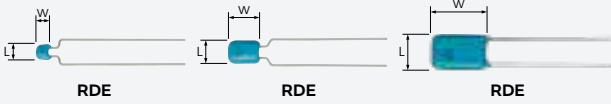
## High Dielectric Constant Type

| Series | LXW (mm)<br><Size Code (inch)> | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |         |         |        |       |       |      |       |  |
|--------|--------------------------------|---------------------|-----------------------|----|-----|-------|---------|---------|--------|-------|-------|------|-------|--|
|        |                                |                     | 0.1p                  | 1p | 10p | 100p  | 1000p   | 10000p  | 0.1μ   | 1μ    | 10μ   | 100μ | 1000μ |  |
| GCH03  | 0.6X0.3 <0201>                 | 25                  |                       |    |     |       | 1000pF  |         |        |       |       |      |       |  |
| GCH15  | 1.0X0.5 <0402>                 | 100                 |                       |    |     | 220pF | 4700pF  |         |        |       |       |      |       |  |
|        |                                | 50                  |                       |    |     | 220pF | 0.10μF  |         |        |       |       |      |       |  |
|        |                                | 25                  |                       |    |     |       | 10000pF | 47000pF |        |       |       |      |       |  |
|        |                                | 16                  |                       |    |     |       |         | 47000pF | 0.22μF |       |       |      |       |  |
|        |                                | 10                  |                       |    |     |       |         |         | 0.10μF | 1.0μF |       |      |       |  |
| GCH18  | 1.6X0.8 <0603>                 | 100                 |                       |    |     |       | 10000pF | 22000pF |        |       |       |      |       |  |
|        |                                | 50                  |                       |    |     |       | 3300pF  | 0.22μF  |        |       |       |      |       |  |
|        |                                | 25                  |                       |    |     |       |         | 0.10μF  | 1.0μF  |       |       |      |       |  |
|        |                                | 16                  |                       |    |     |       |         |         | 0.47μF | 4.7μF |       |      |       |  |
|        |                                | 10                  |                       |    |     |       |         |         |        | 2.2μF |       |      |       |  |
|        |                                | 6.3                 |                       |    |     |       |         |         |        | 2.2μF |       |      |       |  |
| GCH21  | 2.0X1.25 <0805>                | 100                 |                       |    |     |       | 47000pF | 1.0μF   |        |       |       |      |       |  |
|        |                                | 50                  |                       |    |     |       |         | 0.47μF  | 1.0μF  |       |       |      |       |  |
|        |                                | 35                  |                       |    |     |       |         |         | 1.0μF  | 4.7μF |       |      |       |  |
|        |                                | 25                  |                       |    |     |       |         |         | 2.2μF  | 4.7μF |       |      |       |  |
|        |                                | 16                  |                       |    |     |       |         |         | 2.2μF  | 4.7μF |       |      |       |  |
|        |                                | 10                  |                       |    |     |       |         |         |        | 4.7μF | 10μF  |      |       |  |
|        |                                | 6.3                 |                       |    |     |       |         |         |        |       | 10μF  |      |       |  |
| GCH31  | 3.2X1.6 <1206>                 | 100                 |                       |    |     |       |         |         | 0.22μF |       |       |      |       |  |
|        |                                | 50                  |                       |    |     |       |         |         |        | 2.2μF |       |      |       |  |
|        |                                | 16                  |                       |    |     |       |         |         |        |       | 10μF  |      |       |  |
| GCH32  | 3.2X2.5 <1210>                 | 50                  |                       |    |     |       |         |         |        |       | 4.7μF |      |       |  |
|        |                                | 10                  |                       |    |     |       |         |         |        |       |       | 22μF |       |  |
|        |                                | 6.3                 |                       |    |     |       |         |         |        |       |       | 47μF |       |  |

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# Ceramic capacitors lead type For General Purpose

## Leaded MLCC for General Purpose



General Deflecting crack Soldering crack Low acoustic noise

### Temperature Compensating Type

| Series   | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |       |         |         |         |         |      |    |     |      |       |  |
|----------|----------|---------------------|-----------------------|-------|---------|---------|---------|---------|------|----|-----|------|-------|--|
|          |          |                     | 0.1p                  | 1p    | 10p     | 100p    | 1000p   | 10000p  | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |
| RDE5C    | 4.0X3.5  | 100                 |                       | 1.0pF | 1500pF  |         |         |         |      |    |     |      |       |  |
|          |          | 50                  |                       | 1.0pF | 3900pF  |         |         |         |      |    |     |      |       |  |
|          | 4.5X3.5  | 630                 |                       |       | 10pF    | 2200pF  |         |         |      |    |     |      |       |  |
|          |          | 250                 |                       |       | 10pF    | 10000pF |         |         |      |    |     |      |       |  |
|          |          | 100                 |                       |       |         |         | 1800pF  | 3300pF  |      |    |     |      |       |  |
|          | 5.0X3.5  | 50                  |                       |       |         |         | 4700pF  | 22000pF |      |    |     |      |       |  |
|          |          | 100                 |                       | 1.0pF | 3300pF  |         |         |         |      |    |     |      |       |  |
|          | 5.5X4.0  | 1000                |                       |       | 10pF    | 1000pF  |         |         |      |    |     |      |       |  |
|          |          |                     |                       |       | 10pF    | 4700pF  |         |         |      |    |     |      |       |  |
|          |          | 630                 |                       | 10pF  | 22000pF |         |         |         |      |    |     |      |       |  |
|          |          | 250                 |                       |       |         |         | 3900pF  | 22000pF |      |    |     |      |       |  |
|          | RDE7U    | 4.5X3.5             | 250                   |       |         |         | 100pF   | 4700pF  |      |    |     |      |       |  |
|          |          |                     |                       |       |         | 10pF    | 1000pF  |         |      |    |     |      |       |  |
| 5.5X4.0  |          | 1000                |                       |       | 10pF    | 4700pF  |         |         |      |    |     |      |       |  |
|          |          | 630                 |                       |       | 10pF    | 22000pF |         |         |      |    |     |      |       |  |
|          |          | 250                 |                       |       |         |         | 6800pF  | 22000pF |      |    |     |      |       |  |
| 5.5X5.0  |          | 1000                |                       |       |         |         | 1500pF  | 2200pF  |      |    |     |      |       |  |
|          |          | 630                 |                       |       |         |         | 6800pF  | 10000pF |      |    |     |      |       |  |
| 7.5X5.5  |          | 250                 |                       |       |         |         | 33000pF | 47000pF |      |    |     |      |       |  |
|          |          | 1000                |                       |       |         |         | 3300pF  | 4700pF  |      |    |     |      |       |  |
| 7.5X8.0  |          | 1000                |                       |       |         |         | 15000pF | 22000pF |      |    |     |      |       |  |
|          |          |                     |                       |       |         |         | 6800pF  | 10000pF |      |    |     |      |       |  |
| 7.7X13.0 |          | 1000                |                       |       |         |         | 33000pF | 47000pF |      |    |     |      |       |  |
|          | 630      |                     |                       |       |         |         |         | 20000pF |      |    |     |      |       |  |
|          | 630      |                     |                       |       |         |         |         | 94000pF |      |    |     |      |       |  |

### High Dielectric Constant Type

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |         |         |        |       |       |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|---------|---------|--------|-------|-------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p  | 0.1μ    | 1μ     | 10μ   | 100μ  | 1000μ |  |  |
| RDEC7  | 4.0X3.5  | 25                  |                       |    |     |      |       |         |         | 0.22μF | 1.0μF |       |       |  |  |
|        |          |                     |                       |    |     |      |       |         |         |        |       | 1.0μF |       |  |  |
|        | 4.5X3.5  | 50                  |                       |    |     |      |       |         |         |        |       | 2.2μF |       |  |  |
|        |          | 25                  |                       |    |     |      |       |         |         |        |       | 1.0μF |       |  |  |
|        | 5.0X3.5  | 50                  |                       |    |     |      |       |         |         |        |       | 1.0μF |       |  |  |
|        |          | 25                  |                       |    |     |      |       |         |         | 0.22μF | 2.2μF |       |       |  |  |
|        | 5.5X4.0  | 50                  |                       |    |     |      |       |         |         |        |       | 4.7μF |       |  |  |
|        |          | 25                  |                       |    |     |      |       |         |         |        |       | 4.7μF | 10μF  |  |  |
|        | 5.5X5.0  | 100                 |                       |    |     |      |       |         |         |        | 1.5μF | 2.2μF |       |  |  |
|        |          |                     |                       |    |     |      |       |         |         |        |       |       | 10μF  |  |  |
|        |          | 50                  |                       |    |     |      |       |         |         |        |       |       | 22μF  |  |  |
|        | 5.5X7.5  | 100                 |                       |    |     |      |       |         |         |        |       |       | 4.7μF |  |  |
|        |          |                     |                       |    |     |      |       |         |         |        |       |       | 22μF  |  |  |
| 50     |          |                     |                       |    |     |      |       |         |         |        |       |       | 47μF  |  |  |
| RDED7  | 5.5X4.0  | 630                 |                       |    |     |      |       | 10000pF | 15000pF |        |       |       |       |  |  |
|        |          | 450                 |                       |    |     |      |       | 10000pF | 47000pF |        |       |       |       |  |  |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

| Series   | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |        |       |        |         |         |         |       |       |  |
|----------|----------|---------------------|-----------------------|----|-----|--------|-------|--------|---------|---------|---------|-------|-------|--|
|          |          |                     | 0.1p                  | 1p | 10p | 100p   | 1000p | 10000p | 0.1μ    | 1μ      | 10μ     | 100μ  | 1000μ |  |
| RDED7    | 5.5X4.0  | 250                 |                       |    |     |        |       |        | 33000pF | 68000pF |         |       |       |  |
|          |          | 630                 |                       |    |     |        |       |        | 22000pF | 47000pF |         |       |       |  |
|          | 5.5X5.0  | 450                 |                       |    |     |        |       |        | 68000pF | 0.10μF  |         |       |       |  |
|          |          | 250                 |                       |    |     |        |       |        | 0.10μF  | 0.15μF  |         |       |       |  |
|          | 7.5X5.5  | 630                 |                       |    |     |        |       |        | 68000pF |         |         |       |       |  |
|          |          | 450                 |                       |    |     |        |       |        |         | 0.15μF  |         |       |       |  |
|          | 7.5X7.5  | 250                 |                       |    |     |        |       |        | 0.22μF  | 0.33μF  |         |       |       |  |
|          |          | 450                 |                       |    |     |        |       |        | 0.22μF  | 0.56μF  |         |       |       |  |
|          | 7.5X8.0  | 250                 |                       |    |     |        |       |        | 0.47μF  | 1.0μF   |         |       |       |  |
|          |          | 630                 |                       |    |     |        |       |        | 0.10μF  | 0.27μF  |         |       |       |  |
| 7.7X12.5 | 450      |                     |                       |    |     |        |       |        | 1.0μF   | 1.2μF   |         |       |       |  |
|          | 250      |                     |                       |    |     |        |       |        |         | 2.2μF   |         |       |       |  |
| 7.7X13.0 | 630      |                     |                       |    |     |        |       | 0.47μF | 0.56μF  |         |         |       |       |  |
| RDER7    | 4.0X3.5  | 100                 |                       |    |     | 220pF  |       |        |         | 22000pF |         |       |       |  |
|          |          | 50                  |                       |    |     | 220pF  |       |        |         | 0.10μF  |         |       |       |  |
|          |          | 25                  |                       |    |     |        |       |        |         | 0.10μF  |         |       |       |  |
|          | 4.5X3.5  | 500                 |                       |    |     | 1000pF |       |        |         | 10000pF |         |       |       |  |
|          |          | 250                 |                       |    |     | 1000pF |       |        |         | 22000pF |         |       |       |  |
|          |          | 100                 |                       |    |     |        |       |        |         | 33000pF | 0.47μF  |       |       |  |
|          | 5.0X3.5  | 50                  |                       |    |     |        |       |        |         | 0.15μF  | 0.47μF  |       |       |  |
|          |          | 100                 |                       |    |     | 220pF  |       |        |         | 220pF   | 0.47μF  |       |       |  |
|          |          | 50                  |                       |    |     | 220pF  |       |        |         | 220pF   | 0.47μF  |       |       |  |
|          | 5.5X4.0  | 25                  |                       |    |     |        |       |        |         |         | 0.10μF  |       |       |  |
|          |          | 1000                |                       |    |     | 470pF  |       |        |         | 10000pF |         |       |       |  |
|          |          | 630                 |                       |    |     | 1000pF |       |        |         | 22000pF |         |       |       |  |
|          | 5.5X5.0  | 500                 |                       |    |     |        |       |        |         | 15000pF | 47000pF |       |       |  |
|          |          | 250                 |                       |    |     |        |       |        |         | 33000pF | 0.10μF  |       |       |  |
|          |          | 100                 |                       |    |     |        |       |        |         | 0.15μF  | 1.0μF   |       |       |  |
|          |          | 50                  |                       |    |     |        |       |        |         | 0.68μF  | 2.2μF   |       |       |  |
|          |          | 1000                |                       |    |     |        |       |        |         | 15000pF | 22000pF |       |       |  |
|          | 7.5X5.5  | 630                 |                       |    |     |        |       |        |         | 33000pF | 47000pF |       |       |  |
|          |          | 500                 |                       |    |     |        |       |        |         | 68000pF | 0.10μF  |       |       |  |
|          |          | 250                 |                       |    |     |        |       |        |         | 0.15μF  | 0.22μF  |       |       |  |
|          |          | 50                  |                       |    |     |        |       |        |         |         |         | 3.3μF |       |  |
|          | 7.5X7.5  | 1000                |                       |    |     |        |       |        |         | 33000pF | 47000pF |       |       |  |
|          |          | 630                 |                       |    |     |        |       |        |         | 68000pF | 0.10μF  |       |       |  |
|          |          | 500                 |                       |    |     |        |       |        |         | 0.15μF  | 0.22μF  |       |       |  |
|          | 7.5X8.0  | 250                 |                       |    |     |        |       |        |         | 0.33μF  | 0.47μF  |       |       |  |
|          |          | 500                 |                       |    |     |        |       |        |         | 0.33μF  | 0.47μF  |       |       |  |
|          |          | 250                 |                       |    |     |        |       |        |         | 0.68μF  | 1.0μF   |       |       |  |
|          | 7.7X12.5 | 1000                |                       |    |     |        |       |        |         | 68000pF | 0.10μF  |       |       |  |
|          |          | 630                 |                       |    |     |        |       |        |         | 0.15μF  | 0.22μF  |       |       |  |
|          | 7.7X13.0 | 500                 |                       |    |     |        |       |        |         | 0.68μF  | 1.0μF   |       |       |  |
| 250      |          |                     |                       |    |     |        |       |        |         |         | 2.2μF   |       |       |  |
| 7.7X13.0 | 1000     |                     |                       |    |     |        |       |        |         | 0.22μF  |         |       |       |  |
|          | 630      |                     |                       |    |     |        |       |        |         | 0.47μF  |         |       |       |  |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

## Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose Type RA [500Vac (r.m.s.) product] / IEC60384-14 Class X1/Y1



DE1 Type RA

### Temperature Compensating Type



| Series | Rated Voltage                            | D (mm)     | Capacitance Range (F) |    |      |      |       |        |      |    |     |      |       |  |  |  |  |
|--------|--|------------|-----------------------|----|------|------|-------|--------|------|----|-----|------|-------|--|--|--|--|
|        |  |            | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |  |
| DE11X  | X1: 500Vac (r.m.s.), Y1: 500Vac (r.m.s.) | 6.0 to 9.0 |                       |    | 10pF | 68pF |       |        |      |    |     |      |       |  |  |  |  |

### High Dielectric Constant Type

| Series | Rated Voltage                            | D (mm)      | Capacitance Range (F) |    |     |       |        |        |      |    |     |      |       |  |  |  |  |
|--------|--|-------------|-----------------------|----|-----|-------|--------|--------|------|----|-----|------|-------|--|--|--|--|
|        |  |             | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |  |
| DE1B3  | X1: 500Vac (r.m.s.), Y1: 500Vac (r.m.s.) | 6.0 to 9.0  |                       |    |     | 100pF | 680pF  |        |      |    |     |      |       |  |  |  |  |
| DE1E3  | X1: 500Vac (r.m.s.), Y1: 500Vac (r.m.s.) | 8.0 to 14.0 |                       |    |     |       | 1000pF | 4700pF |      |    |     |      |       |  |  |  |  |

## Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose Type RA [250Vac, 300Vac rated] / IEC60384-14 Class X1/Y1



DE1 Type RA

### Temperature Compensating Type



| Series | Rated Voltage                            | D (mm)     | Capacitance Range (F) |    |      |      |       |        |      |    |     |      |       |  |  |  |  |
|--------|--|------------|-----------------------|----|------|------|-------|--------|------|----|-----|------|-------|--|--|--|--|
|        |  |            | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |  |
| DE11X  | X1: 440Vac (r.m.s.), Y1: 300Vac (r.m.s.) | 6.0 to 8.0 |                       |    | 10pF | 68pF |       |        |      |    |     |      |       |  |  |  |  |
|        | X1: 440Vac (r.m.s.), Y1: 250Vac (r.m.s.) | 6.0 to 8.0 |                       |    | 10pF | 68pF |       |        |      |    |     |      |       |  |  |  |  |

### High Dielectric Constant Type

| Series | Rated Voltage                            | D (mm)      | Capacitance Range (F) |    |     |       |        |        |      |    |     |      |       |  |  |  |  |
|--------|--|-------------|-----------------------|----|-----|-------|--------|--------|------|----|-----|------|-------|--|--|--|--|
|        |  |             | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |  |
| DE1B3  | X1: 440Vac (r.m.s.), Y1: 300Vac (r.m.s.) | 6.0 to 8.0  |                       |    |     | 100pF | 680pF  |        |      |    |     |      |       |  |  |  |  |
|        | X1: 440Vac (r.m.s.), Y1: 250Vac (r.m.s.) | 6.0 to 8.0  |                       |    |     | 100pF | 680pF  |        |      |    |     |      |       |  |  |  |  |
| DE1E3  | X1: 440Vac (r.m.s.), Y1: 300Vac (r.m.s.) | 7.0 to 12.0 |                       |    |     |       | 1000pF | 4700pF |      |    |     |      |       |  |  |  |  |
|        | X1: 440Vac (r.m.s.), Y1: 250Vac (r.m.s.) | 7.0 to 12.0 |                       |    |     |       | 1000pF | 4700pF |      |    |     |      |       |  |  |  |  |

## Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose Type RB [X1:760Vac(r.m.s.)product] / IEC60384-14 Class X1/Y1



DE1 Type RB

### Temperature Compensating Type



| Series | Rated Voltage                            | D (mm)     | Capacitance Range (F) |    |      |      |       |        |      |    |     |      |       |  |  |  |  |
|--------|--|------------|-----------------------|----|------|------|-------|--------|------|----|-----|------|-------|--|--|--|--|
|        |  |            | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |  |
| DE11X  | X1: 760Vac (r.m.s.), Y1: 500Vac (r.m.s.) | 6.0 to 9.0 |                       |    | 10pF | 68pF |       |        |      |    |     |      |       |  |  |  |  |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

### High Dielectric Constant Type

| Series | Rated Voltage                            | D (mm)      | Capacitance Range (F) |    |     |        |        |        |      |    |     |      |       |  |  |
|--------|--|-------------|-----------------------|----|-----|--------|--------|--------|------|----|-----|------|-------|--|--|
|        |  |             | 0.1p                  | 1p | 10p | 100p   | 1000p  | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| DE1B3  | X1: 760Vac (r.m.s.), Y1: 500Vac (r.m.s.) | 6.0 to 9.0  |                       |    |     | 100pF  | 680pF  |        |      |    |     |      |       |  |  |
| DE1E3  | X1: 760Vac (r.m.s.), Y1: 500Vac (r.m.s.) | 8.0 to 14.0 |                       |    |     | 1000pF | 4700pF |        |      |    |     |      |       |  |  |

### Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose Type SA [400Vac (r.m.s.) product] / IEC60384-14 Class X1/Y2



DE2 Type SA



### Temperature Compensating Type

| Series | Rated Voltage                            | D (mm)     | Capacitance Range (F) |    |      |      |       |        |      |    |     |      |       |  |  |
|--------|--|------------|-----------------------|----|------|------|-------|--------|------|----|-----|------|-------|--|--|
|        |  |            | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| DE21X  | X1: 440Vac (r.m.s.), Y2: 400Vac (r.m.s.) | 6.0 to 9.0 |                       |    | 10pF | 68pF |       |        |      |    |     |      |       |  |  |

### High Dielectric Constant Type

| Series | Rated Voltage                            | D (mm)      | Capacitance Range (F) |    |     |        |         |        |      |    |     |      |       |  |  |
|--------|--|-------------|-----------------------|----|-----|--------|---------|--------|------|----|-----|------|-------|--|--|
|        |  |             | 0.1p                  | 1p | 10p | 100p   | 1000p   | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| DE2B3  | X1: 440Vac (r.m.s.), Y2: 400Vac (r.m.s.) | 6.0 to 8.0  |                       |    |     | 100pF  | 680pF   |        |      |    |     |      |       |  |  |
| DE2E3  | X1: 440Vac (r.m.s.), Y2: 400Vac (r.m.s.) | 7.0 to 17.0 |                       |    |     | 1000pF | 10000pF |        |      |    |     |      |       |  |  |

### Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose Type SA [250Vac, 300Vac rated] / IEC60384-14 Class X1/Y2



DE2 Type SA



### Temperature Compensating Type

| Series | Rated Voltage                            | D (mm)     | Capacitance Range (F) |    |      |      |       |        |      |    |     |      |       |  |  |
|--------|--|------------|-----------------------|----|------|------|-------|--------|------|----|-----|------|-------|--|--|
|        |  |            | 0.1p                  | 1p | 10p  | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| DE21X  | X1: 300Vac (r.m.s.), Y2: 300Vac (r.m.s.) | 6.0 to 8.0 |                       |    | 10pF | 68pF |       |        |      |    |     |      |       |  |  |
|        | X1: 300Vac (r.m.s.), Y2: 250Vac (r.m.s.) | 6.0 to 8.0 |                       |    | 10pF | 68pF |       |        |      |    |     |      |       |  |  |

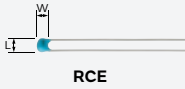
### High Dielectric Constant Type

| Series | Rated Voltage                            | D (mm)      | Capacitance Range (F) |    |     |        |         |        |      |    |     |      |       |  |  |
|--------|--|-------------|-----------------------|----|-----|--------|---------|--------|------|----|-----|------|-------|--|--|
|        |  |             | 0.1p                  | 1p | 10p | 100p   | 1000p   | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| DE2B3  | X1: 300Vac (r.m.s.), Y2: 300Vac (r.m.s.) | 6.0 to 7.0  |                       |    |     | 100pF  | 680pF   |        |      |    |     |      |       |  |  |
|        | X1: 300Vac (r.m.s.), Y2: 250Vac (r.m.s.) | 6.0 to 7.0  |                       |    |     | 100pF  | 680pF   |        |      |    |     |      |       |  |  |
| DE2E3  | X1: 300Vac (r.m.s.), Y2: 300Vac (r.m.s.) | 6.0 to 15.0 |                       |    |     | 1000pF | 10000pF |        |      |    |     |      |       |  |  |
|        | X1: 300Vac (r.m.s.), Y2: 250Vac (r.m.s.) | 6.0 to 15.0 |                       |    |     | 1000pF | 10000pF |        |      |    |     |      |       |  |  |

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# Ceramic capacitors lead type For Automotive

## Leaded MLCC for Automotive



RCE

### Temperature Compensating Type



| Series   | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |       |       |      |         |         |         |         |     |      |       |  |
|----------|----------|---------------------|-----------------------|-------|-------|------|---------|---------|---------|---------|-----|------|-------|--|
|          |          |                     | 0.1p                  | 1p    | 10p   | 100p | 1000p   | 10000p  | 0.1μ    | 1μ      | 10μ | 100μ | 1000μ |  |
| RCE5C    | 3.6X3.5  | 100                 |                       | 1.0pF |       |      |         |         |         | 1500pF  |     |      |       |  |
|          |          | 50                  |                       | 1.0pF |       |      |         |         |         | 3900pF  |     |      |       |  |
|          | 4.0X3.5  | 630                 |                       |       | 10pF  |      |         |         |         | 2200pF  |     |      |       |  |
|          |          | 250                 |                       |       | 10pF  |      |         |         |         | 10000pF |     |      |       |  |
|          |          | 100                 |                       |       |       |      |         |         | 1800pF  | 3300pF  |     |      |       |  |
|          |          | 50                  |                       |       |       |      |         |         | 4700pF  | 22000pF |     |      |       |  |
|          | 5.5X4.0  | 1000                |                       |       | 10pF  |      |         |         |         | 1000pF  |     |      |       |  |
|          |          | 630                 |                       |       | 10pF  |      |         |         |         | 4700pF  |     |      |       |  |
|          |          | 250                 |                       |       | 10pF  |      |         |         |         | 22000pF |     |      |       |  |
|          |          | 100                 |                       |       |       |      |         |         | 3900pF  | 10000pF |     |      |       |  |
| RCE7U    | 4.0X3.5  | 250                 |                       |       | 100pF |      |         |         | 4700pF  |         |     |      |       |  |
|          |          |                     |                       |       |       |      |         |         |         |         |     |      |       |  |
|          | 5.5X4.0  | 1000                |                       |       | 10pF  |      |         |         | 1000pF  |         |     |      |       |  |
|          |          | 630                 |                       |       | 10pF  |      |         |         | 4700pF  |         |     |      |       |  |
|          |          | 250                 |                       |       |       |      |         |         | 6800pF  | 10000pF |     |      |       |  |
|          | 5.5X5.0  | 1000                |                       |       |       |      |         | 1500pF  | 2200pF  |         |     |      |       |  |
|          |          | 630                 |                       |       |       |      |         | 6800pF  | 10000pF |         |     |      |       |  |
|          | 7.5X5.5  | 1000                |                       |       |       |      |         | 3300pF  | 4700pF  |         |     |      |       |  |
|          |          | 630                 |                       |       |       |      |         | 15000pF | 22000pF |         |     |      |       |  |
|          | 7.5X8.0  | 1000                |                       |       |       |      |         | 6800pF  | 10000pF |         |     |      |       |  |
| 630      |          |                     |                       |       |       |      | 33000pF | 47000pF |         |         |     |      |       |  |
| 7.7X13.0 | 1000     |                     |                       |       |       |      |         | 20000pF |         |         |     |      |       |  |
|          | 630      |                     |                       |       |       |      |         |         | 94000pF |         |     |      |       |  |

### High Dielectric Constant Type

| Series  | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |        |       |        |         |        |        |       |       |  |
|---------|----------|---------------------|-----------------------|----|-----|--------|-------|--------|---------|--------|--------|-------|-------|--|
|         |          |                     | 0.1p                  | 1p | 10p | 100p   | 1000p | 10000p | 0.1μ    | 1μ     | 10μ    | 100μ  | 1000μ |  |
| RCEC7   | 4.0X3.5  | 50                  |                       |    |     |        |       |        |         |        | 1.0μF  |       |       |  |
|         | 5.5X4.0  | 50                  |                       |    |     |        |       |        |         |        |        | 4.7μF |       |  |
|         | 5.5X5.0  | 100                 |                       |    |     |        |       |        |         |        | 1.5μF  | 2.2μF |       |  |
|         |          | 50                  |                       |    |     |        |       |        |         |        |        |       | 10μF  |  |
|         | 5.5X7.5  | 100                 |                       |    |     |        |       |        |         |        |        |       | 4.7μF |  |
| 50      |          |                     |                       |    |     |        |       |        |         |        |        |       | 22μF  |  |
| RCER7   | 3.6X3.5  | 100                 |                       |    |     | 220pF  |       |        | 22000pF |        |        |       |       |  |
|         |          | 50                  |                       |    |     | 220pF  |       |        | 0.10μF  |        |        |       |       |  |
|         |          | 25                  |                       |    |     |        |       |        | 0.10μF  | 0.22μF |        |       |       |  |
|         | 4.0X3.5  | 250                 |                       |    |     | 1000pF |       |        | 22000pF |        |        |       |       |  |
|         |          | 100                 |                       |    |     |        |       |        | 33000pF | 0.33μF |        |       |       |  |
|         |          | 50                  |                       |    |     |        |       |        |         | 0.15μF | 0.47μF |       |       |  |
|         | 5.5X4.0  | 25                  |                       |    |     |        |       |        |         | 0.33μF | 1.0μF  |       |       |  |
|         |          | 1000                |                       |    |     | 1000pF |       |        | 10000pF |        |        |       |       |  |
|         |          | 630                 |                       |    |     | 1000pF |       |        | 22000pF |        |        |       |       |  |
|         |          | 250                 |                       |    |     |        |       |        | 33000pF | 0.10μF |        |       |       |  |
| 5.5X4.0 | 100      |                     |                       |    |     |        |       |        | 0.15μF  | 1.0μF  |        |       |       |  |
|         | 50       |                     |                       |    |     |        |       |        |         | 0.68μF | 2.2μF  |       |       |  |
|         | 25       |                     |                       |    |     |        |       |        |         |        |        | 1.5μF | 4.7μF |  |
|         |          |                     |                       |    |     |        |       |        |         |        |        |       |       |  |

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## Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

| Series   | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |         |         |        |       |       |        |        |  |
|----------|----------|---------------------|-----------------------|----|-----|------|-------|--------|---------|---------|--------|-------|-------|--------|--------|--|
|          |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ    | 1μ      | 10μ    | 100μ  | 1000μ |        |        |  |
| RCER7    | 5.5X5.0  | 1000                |                       |    |     |      |       |        | 15000pF | 22000pF |        |       |       |        |        |  |
|          |          | 630                 |                       |    |     |      |       |        | 33000pF | 47000pF |        |       |       |        |        |  |
|          |          | 250                 |                       |    |     |      |       |        |         | 0.15μF  | 0.22μF |       |       |        |        |  |
|          |          | 50                  |                       |    |     |      |       |        |         |         |        | 3.3μF | 4.7μF |        |        |  |
|          |          | 25                  |                       |    |     |      |       |        |         |         |        |       |       | 10μF   |        |  |
|          | 5.5X7.5  | 50                  |                       |    |     |      |       |        |         |         |        |       |       | 10μF   |        |  |
|          |          | 25                  |                       |    |     |      |       |        |         |         |        |       |       |        | 22μF   |  |
|          | 7.5X5.5  | 1000                |                       |    |     |      |       |        | 33000pF | 47000pF |        |       |       |        |        |  |
|          |          | 630                 |                       |    |     |      |       |        | 68000pF | 0.10μF  |        |       |       |        |        |  |
|          |          | 250                 |                       |    |     |      |       |        |         | 0.33μF  | 0.47μF |       |       |        |        |  |
|          | 7.5X7.5  | 250                 |                       |    |     |      |       |        |         | 0.68μF  | 1.0μF  |       |       |        |        |  |
|          | 7.5X8.0  | 1000                |                       |    |     |      |       |        | 68000pF | 0.10μF  |        |       |       |        |        |  |
|          |          | 630                 |                       |    |     |      |       |        |         | 0.15μF  | 0.22μF |       |       |        |        |  |
|          | 7.7X12.5 | 250                 |                       |    |     |      |       |        |         |         |        |       |       | 2.2μF  |        |  |
| 7.7X13.0 | 1000     |                     |                       |    |     |      |       |        |         |         |        |       |       | 0.22μF |        |  |
|          | 630      |                     |                       |    |     |      |       |        |         |         |        |       |       |        | 0.47μF |  |

### 150°C Operation Leaded MLCC for Automotive



RHE

#### Temperature Compensating Type



| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |        |         |      |    |     |      |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|-------|--------|---------|------|----|-----|------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p  | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| RHE5G  | 3.6X3.5  | 100                 |                       |    |     | 100pF | 1500pF |         |      |    |     |      |       |  |  |
|        |          | 50                  |                       |    |     | 100pF | 3900pF |         |      |    |     |      |       |  |  |
|        | 4.0X3.5  | 100                 |                       |    |     |       | 1800pF | 3300pF  |      |    |     |      |       |  |  |
|        |          | 50                  |                       |    |     |       | 4700pF | 10000pF |      |    |     |      |       |  |  |

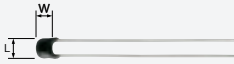
#### High Dielectric Constant Type

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |         |         |        |        |       |       |       |  |  |
|--------|----------|---------------------|-----------------------|----|-----|-------|---------|---------|--------|--------|-------|-------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p  | 1000p   | 10000p  | 0.1μ   | 1μ     | 10μ   | 100μ  | 1000μ |  |  |
| RHEL8  | 3.6X3.5  | 100                 |                       |    |     | 220pF | 22000pF |         |        |        |       |       |       |  |  |
|        |          | 50                  |                       |    |     | 220pF | 0.10μF  |         |        |        |       |       |       |  |  |
|        |          | 25                  |                       |    |     |       |         |         | 0.10μF | 0.22μF |       |       |       |  |  |
|        | 4.0X3.5  | 100                 |                       |    |     |       |         | 33000pF | 0.10μF |        |       |       |       |  |  |
|        |          | 50                  |                       |    |     |       |         |         | 0.15μF | 0.33μF |       |       |       |  |  |
|        |          | 25                  |                       |    |     |       |         |         | 0.33μF | 1.0μF  |       |       |       |  |  |
|        | 5.5X4.0  | 100                 |                       |    |     |       |         |         | 0.15μF | 0.22μF |       |       |       |  |  |
|        |          | 50                  |                       |    |     |       |         |         |        | 0.47μF | 2.2μF |       |       |  |  |
|        |          | 25                  |                       |    |     |       |         |         |        |        | 1.5μF | 4.7μF |       |  |  |
|        | 5.5X5.0  | 50                  |                       |    |     |       |         |         |        |        | 3.3μF | 4.7μF |       |  |  |
|        |          | 25                  |                       |    |     |       |         |         |        |        |       |       | 10μF  |  |  |
|        | 5.5X7.5  | 50                  |                       |    |     |       |         |         |        |        |       |       | 10μF  |  |  |
| 25     |          |                     |                       |    |     |       |         |         |        |        |       |       | 22μF  |  |  |

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Ceramic Capacitor, Polymer Aluminum Electrolytic Capacitors

200°C Operation Leaded MLCC for Automotive



RHS

Temperature Compensating Type



| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |       |        |         |      |    |     |      |       |  |  |  |
|--------|----------|---------------------|-----------------------|----|-----|-------|--------|---------|------|----|-----|------|-------|--|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p  | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |
| RHS7G  | 3.9X3.5  | 100                 |                       |    |     | 100pF | 1500pF |         |      |    |     |      |       |  |  |  |
|        | 4.2X3.5  | 100                 |                       |    |     |       | 1800pF | 3300pF  |      |    |     |      |       |  |  |  |
| RHS7J  |          | 200                 |                       |    |     | 100pF | 4700pF |         |      |    |     |      |       |  |  |  |
|        | 5.5X4.0  | 500                 |                       |    |     | 100pF | 4700pF |         |      |    |     |      |       |  |  |  |
|        |          | 200                 |                       |    |     |       | 6800pF | 10000pF |      |    |     |      |       |  |  |  |

High Dielectric Constant Type

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |        |         |        |        |     |      |       |  |  |  |
|--------|----------|---------------------|-----------------------|----|-----|------|--------|---------|--------|--------|-----|------|-------|--|--|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p  | 10000p  | 0.1μ   | 1μ     | 10μ | 100μ | 1000μ |  |  |  |
| RHSQ9  | 3.9X3.5  | 100                 |                       |    |     |      | 4700pF | 22000pF |        |        |     |      |       |  |  |  |
|        | 4.2X3.5  | 100                 |                       |    |     |      |        | 33000pF | 0.10μF |        |     |      |       |  |  |  |
|        | 5.5X4.0  | 100                 |                       |    |     |      |        |         | 0.15μF | 0.22μF |     |      |       |  |  |  |

Safety Standard Certified Lead Type Disc Ceramic Capacitors for Automotive



DE6



| Series | Rated Voltage                            | D (mm)      | Capacitance Range (F) |    |     |      |        |        |      |    |     |      |       |  |  |  |
|--------|--|-------------|-----------------------|----|-----|------|--------|--------|------|----|-----|------|-------|--|--|--|
|        |  |             | 0.1p                  | 1p | 10p | 100p | 1000p  | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |
| DE6E3  | X1: 440Vac (r.m.s.), Y2: 300Vac (r.m.s.) | 7.0 to 12.0 |                       |    |     |      | 1000pF | 4700pF |      |    |     |      |       |  |  |  |

Resin Molding SMD Type Ceramic Capacitors

Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose



DK1

Temperature Compensating Type



| Series | Rated Voltage                            | LXW (mm) | Capacitance Range (F) |    |     |      |       |        |      |    |     |      |       |  |  |  |
|--------|--|----------|-----------------------|----|-----|------|-------|--------|------|----|-----|------|-------|--|--|--|
|        |  |          | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |
| DK11X  | X1: 440Vac (r.m.s.), Y1: 300Vac (r.m.s.) | 11.4X6.0 |                       |    |     | 10pF | 47pF  |        |      |    |     |      |       |  |  |  |
|        | X1: 440Vac (r.m.s.), Y1: 250Vac (r.m.s.) | 11.4X6.0 |                       |    |     | 10pF | 47pF  |        |      |    |     |      |       |  |  |  |


High Dielectric Constant Type

| Series | Rated Voltage                            | LXW (mm) | Capacitance Range (F) |    |     |       |        |        |      |    |     |      |       |  |  |  |
|--------|--|----------|-----------------------|----|-----|-------|--------|--------|------|----|-----|------|-------|--|--|--|
|        |  |          | 0.1p                  | 1p | 10p | 100p  | 1000p  | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |  |
| DK1B3  | X1: 440Vac (r.m.s.), Y1: 300Vac (r.m.s.) | 11.4X6.0 |                       |    |     | 100pF | 680pF  |        |      |    |     |      |       |  |  |  |
|        | X1: 440Vac (r.m.s.), Y1: 250Vac (r.m.s.) | 11.4X6.0 |                       |    |     | 100pF | 680pF  |        |      |    |     |      |       |  |  |  |
| DK1E3  | X1: 440Vac (r.m.s.), Y1: 300Vac (r.m.s.) | 11.4X6.0 |                       |    |     |       | 1000pF | 1500pF |      |    |     |      |       |  |  |  |
|        | X1: 440Vac (r.m.s.), Y1: 250Vac (r.m.s.) | 11.4X6.0 |                       |    |     |       | 1000pF | 1500pF |      |    |     |      |       |  |  |  |

Continued on the following page. ↗



# Polymer Aluminum Electrolytic Capacitors

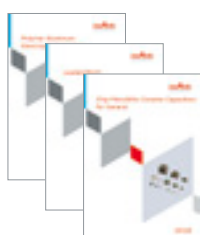


General
Deflecting crack
Low acoustic noise
Effective Cap

| Series | LXW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |     |      |       |        |      |    |      |       |       |       |       |  |
|--------|----------|---------------------|-----------------------|----|-----|------|-------|--------|------|----|------|-------|-------|-------|-------|--|
|        |          |                     | 0.1p                  | 1p | 10p | 100p | 1000p | 10000p | 0.1μ | 1μ | 10μ  | 100μ  | 1000μ |       |       |  |
| ECAS   | 7.3X4.3  | 25                  |                       |    |     |      |       |        |      |    | 10μF | 33μF  |       |       |       |  |
|        |          | 20                  |                       |    |     |      |       |        |      |    |      | 33μF  | 47μF  |       |       |  |
|        |          | 16                  |                       |    |     |      |       |        |      |    |      | 6.8μF | 68μF  |       |       |  |
|        |          | 10                  |                       |    |     |      |       |        |      |    |      | 10μF  | 150μF |       |       |  |
|        |          | 6.3                 |                       |    |     |      |       |        |      |    |      | 10μF  | 330μF |       |       |  |
|        |          | 4                   |                       |    |     |      |       |        |      |    |      |       | 68μF  | 330μF |       |  |
|        |          | 2.5                 |                       |    |     |      |       |        |      |    |      |       |       | 330μF | 470μF |  |
|        |          | 2                   |                       |    |     |      |       |        |      |    |      |       |       | 100μF | 470μF |  |

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- Chip Multilayer Ceramic Capacitors for General Cat. No. C02E
- Chip Multilayer Ceramic Capacitors for Automotive Cat. No. C03E
- Lead Type Disc Ceramic Capacitors (Safety Standard Certified, DC2k to DC6.3kV)
- Resin Molding SMD Type Ceramic Capacitors (Safety Standard Certified) Cat. No. C85E
- Polymer Aluminum Electrolytic Capacitors Cat. No. C90E
- Leaded MLCC Cat. No. C49E

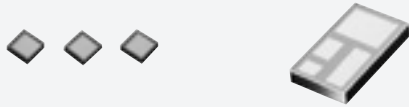
## Single-Layer Microchip Capacitors, Thin Film Circuit Substrates (RUSUB)

## Single-Layer Microchip Capacitors, Thin Film Circuit Substrates (RUSUB)

## Single-Layer Microchip Capacitors

Very reliable performance and excellent frequency characteristics

## Temperature Compensating Type

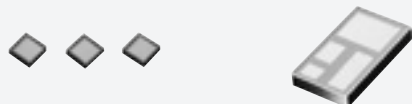


| Capacitance Change (Temperature Range) | Series    | Size (mm) | Rated Voltage (Vdc) | Capacitance Range at 25°C (pF) |     |    |     |            | Operating Temperature Range (°C) |
|--|-----------|-----------|---------------------|--------------------------------|-----|----|-----|------------|----------------------------------|
|  |           |           |                     | 0.1                            | 1   | 10 | 100 | 1000       |                                  |
| 0±30ppm/°C (-25 to 85°C)               | CLB0A     | 0.25X0.25 | 100                 | 0.1                            |     |    |     |            | -55 to 125                       |
|  | CLB0C     | 0.35X0.25 | 100                 | 0.2                            |     |    |     |            | -55 to 125                       |
|  | CLB0D     | 0.38X0.38 | 100                 | 0.2                            | 0.4 |    |     |            | -55 to 125                       |
|  | CLB05     | 0.50X0.50 | 100                 | 0.3                            | 0.6 |    |     |            | -55 to 125                       |
|  | CLB0E     | 0.55X0.38 | 100                 | 0.5                            | 0.6 |    |     |            | -55 to 125                       |
|  | CLB0F     | 0.64X0.64 | 100                 | 0.6                            | 1.0 |    |     |            | -55 to 125                       |
|  | CLB0G     | 0.70X0.50 | 100                 | 0.7                            | 1.0 |    |     |            | -55 to 125                       |
|  | CLB0H     | 0.71X0.38 | 100                 | 0.7                            | 0.8 |    |     |            | -55 to 125                       |
|  | CLB0J     | 0.76X0.76 | 100                 | 0.9                            | 1.3 |    |     |            | -55 to 125                       |
|  | CLB09     | 0.90X0.90 | 100                 | 1.0                            | 1.8 |    |     |            | -55 to 125                       |
|  | CLB1A     | 1.00X0.64 | 100                 | 1.1                            | 1.6 |    |     |            | -55 to 125                       |
|  | CLB1B     | 1.09X0.76 | 100                 | 1.5                            | 2.0 |    |     |            | -55 to 125                       |
|  | CLB1C     | 1.27X1.27 | 100                 | 2.2                            | 3.6 |    |     |            | -55 to 125                       |
|  | CLB1E     | 1.49X0.90 | 100                 | 2.0                            | 2.7 |    |     |            | -55 to 125                       |
|  | CLB1G     | 1.73X1.27 | 100                 | 3.9                            | 4.7 |    |     |            | -55 to 125                       |
|  | CLB1H     | 1.78X1.78 | 100                 | 3.9                            | 6.8 |    |     |            | -55 to 125                       |
|  | CLB2C     | 2.19X1.27 | 100                 | 5.1                            |     |    |     |            | -55 to 125                       |
|  | CLB2E     | 2.29X2.29 | 100                 | 6.2                            | 10  |    |     |            | -55 to 125                       |
| CLB2L                                  | 2.95X1.78 | 100       | 7.5                 | 10                             |     |    |     | -55 to 125 |                                  |
| CLB3G                                  | 3.71X2.29 | 100       | 11                  | 16                             |     |    |     | -55 to 125 |                                  |
| -750±60ppm/°C (-25 to 85°C)            | CLB0A     | 0.25X0.25 | 100                 | 0.3                            | 0.7 |    |     |            | -55 to 125                       |
|  | CLB0B     | 0.30X0.25 | 100                 | 0.8                            |     |    |     |            | -55 to 125                       |
|  | CLB0C     | 0.35X0.25 | 100                 | 0.9                            |     |    |     |            | -55 to 125                       |
|  | CLB0D     | 0.38X0.38 | 100                 | 0.9                            | 1.6 |    |     |            | -55 to 125                       |
|  | CLB05     | 0.50X0.50 | 100                 | 1.0                            | 2.4 |    |     |            | -55 to 125                       |
|  | CLB0E     | 0.55X0.38 | 100                 | 1.8                            | 2.4 |    |     |            | -55 to 125                       |
|  | CLB0F     | 0.64X0.64 | 100                 | 2.0                            | 4.3 |    |     |            | -55 to 125                       |
|  | CLB0G     | 0.70X0.50 | 100                 | 2.7                            | 3.0 |    |     |            | -55 to 125                       |
|  | CLB0H     | 0.71X0.38 | 100                 | 2.7                            |     |    |     |            | -55 to 125                       |
|  | CLB0J     | 0.76X0.76 | 100                 | 3.0                            | 6.2 |    |     |            | -55 to 125                       |
|  | CLB09     | 0.90X0.90 | 100                 | 3.3                            | 6.8 |    |     |            | -55 to 125                       |
|  | CLB1A     | 1.00X0.64 | 100                 | 4.7                            | 6.2 |    |     |            | -55 to 125                       |
|  | CLB1B     | 1.09X0.76 | 100                 | 6.8                            | 7.5 |    |     |            | -55 to 125                       |
|  | CLB1C     | 1.27X1.27 | 100                 | 7.5                            | 15  |    |     |            | -55 to 125                       |
|  | CLB1E     | 1.49X0.90 | 100                 | 7.5                            | 9.1 |    |     |            | -55 to 125                       |
| CLB1H                                  | 1.78X1.78 | 100       | 13                  | 15                             |     |    |     | -55 to 125 |                                  |
| CLB2E                                  | 2.29X2.29 | 100       | 20                  |                                |     |    |     | -55 to 125 |                                  |

All Single Layer Microchip Capacitors are produced after receiving an order.

## Single-Layer Microchip Capacitors, Thin Film Circuit Substrates (RUSUB)

### High Dielectric Constant Type



| Capacitance Change (Temperature Range) | Series    | Size (mm) | Rated Voltage (Vdc) | Capacitance Range at 25°C (pF) |     |     |     |      | Operating Temperature Range (°C) |            |
|--|-----------|-----------|---------------------|--------------------------------|-----|-----|-----|------|----------------------------------|------------|
|  |           |           |                     | 0.1                            | 1   | 10  | 100 | 1000 |                                  |            |
| ±10%<br>(-25 to 85°C)                  | CLBOA     | 0.25X0.25 | 100                 |                                |     | 5.6 | 12  |      |                                  | -55 to 125 |
|  | CLBOB     | 0.30X0.25 | 100                 |                                |     | 13  | 15  |      |                                  | -55 to 125 |
|  | CLBOC     | 0.35X0.25 | 100                 |                                |     | 16  | 18  |      |                                  | -55 to 125 |
|  | CLBOD     | 0.38X0.38 | 100                 |                                |     | 18  | 30  |      |                                  | -55 to 125 |
|  | CLB05     | 0.50X0.50 | 100                 |                                |     | 22  | 43  |      |                                  | -55 to 125 |
|  | CLBOE     | 0.55X0.38 | 100                 |                                |     | 33  | 43  |      |                                  | -55 to 125 |
|  | CLBOF     | 0.64X0.64 | 100                 |                                |     | 43  | 75  |      |                                  | -55 to 125 |
|  | CLBOG     | 0.70X0.50 | 100                 |                                |     | 47  | 68  |      |                                  | -55 to 125 |
|  | CLBOH     | 0.71X0.38 | 100                 |                                |     | 47  | 56  |      |                                  | -55 to 125 |
|  | CLBOJ     | 0.76X0.76 | 100                 |                                |     | 68  | 110 |      |                                  | -55 to 125 |
|  | CLB09     | 0.90X0.90 | 100                 |                                |     | 68  | 130 |      |                                  | -55 to 125 |
|  | CLB1A     | 1.00X0.64 | 100                 |                                |     | 82  | 120 |      |                                  | -55 to 125 |
|  | CLB1C     | 1.27X1.27 | 100                 |                                |     |     | 160 | 200  |                                  | -55 to 125 |
|  | CLB1E     | 1.49X0.90 | 100                 |                                |     |     | 150 | 160  |                                  | -55 to 125 |
|  | CLB1G     | 1.73X1.27 | 100                 |                                |     |     |     | 300  |                                  | -55 to 125 |
|  | CLB1H     | 1.78X1.78 | 100                 |                                |     |     |     | 300  | 430                              | -55 to 125 |
| CLB2E                                  | 2.29X2.29 | 100       |                     |                                |     |     | 470 | 620  | -55 to 125                       |            |
| +30, -80%<br>(-25 to 85°C)             | CLBOA     | 0.25X0.25 | 100                 |                                |     | 27  | 33  |      |                                  | -55 to 125 |
|  | CLBOB     | 0.30X0.25 | 100                 |                                |     | 36  | 39  |      |                                  | -55 to 125 |
|  | CLBOC     | 0.35X0.25 | 100                 |                                |     | 43  | 51  |      |                                  | -55 to 125 |
|  | CLBOD     | 0.38X0.38 | 100                 |                                |     | 62  | 82  |      |                                  | -55 to 125 |
|  | CLB05     | 0.50X0.50 | 100                 |                                |     | 75  | 130 |      |                                  | -55 to 125 |
|  | CLBOE     | 0.55X0.38 | 100                 |                                |     | 91  | 120 |      |                                  | -55 to 125 |
|  | CLBOF     | 0.64X0.64 | 100                 |                                |     | 130 | 220 |      |                                  | -55 to 125 |
|  | CLBOG     | 0.70X0.50 | 100                 |                                |     | 150 | 200 |      |                                  | -55 to 125 |
|  | CLBOH     | 0.71X0.38 | 100                 |                                |     | 130 | 150 |      |                                  | -55 to 125 |
|  | CLBOJ     | 0.76X0.76 | 100                 |                                |     | 200 | 300 |      |                                  | -55 to 125 |
|  | CLB09     | 0.90X0.90 | 100                 |                                |     | 200 | 390 |      |                                  | -55 to 125 |
| CLB1A                                  | 1.00X0.64 | 100       |                     |                                | 240 | 360 |     |      | -55 to 125                       |            |
| +30, -90%<br>(-25 to 85°C)             | CLBOA     | 0.25X0.25 | 100                 |                                |     | 36  | 56  |      |                                  | -55 to 125 |
|  | CLBOD     | 0.38X0.38 | 100                 |                                |     | 91  | 150 |      |                                  | -55 to 125 |
|  | CLB05     | 0.50X0.50 | 100                 |                                |     | 130 | 220 |      |                                  | -55 to 125 |
|  | CLBOF     | 0.64X0.64 | 100                 |                                |     | 220 | 390 |      |                                  | -55 to 125 |
|  | CLBOJ     | 0.76X0.76 | 100                 |                                |     | 330 | 560 |      |                                  | -55 to 125 |
| CLB09                                  | 0.90X0.90 | 100       |                     |                                | 390 | 680 |     |      | -55 to 125                       |            |

All Single Layer Microchip Capacitors are produced after receiving an order.

## Single-Layer Microchip Capacitors, Thin Film Circuit Substrates (RUSUB)

## Thin Film Circuit Substrates (RUSUB)

Customizable capacitors for impedance matching for RF power amplifiers and decoupling for optical communication devices.

### ■ Features

- Single-layer structure enhances self-resonant frequency, which allows stable operation even at a high frequency range.
- RUSUB technology achieves miniaturization of the device by combining a single-layer capacitor and a thin film resistor. In addition, it contributes to attenuation of unnecessary noise.
- By utilizing Au electrodes, die bonding with AuSn and wire bonding with gold wire are possible.
- A wide selection of substrate materials meets customers' requirements. (Please refer to the following table.)

| Function           | Dielectric Constant ( $\epsilon_r$ ) *1 | Size min. (mm) (LxWxT) *2 | Temperature Characteristics of Capacitance (ppm/°C) *3 | Through Hole | TaN Resistance | L/S min. ( $\mu\text{m}$ ) *4            | Coefficient of Thermal Expansion (ppm/°C) *1 | Temperature Conductivity (ppm/(m.°C)) *1 |
|--------------------|---|---------------------------|--|--------------|----------------|--|--|--|
| Impedance Matching | 9                                       | 0.25X0.25X0.10            | -  | ○            | ○              | 30/30<br>(Au thickness 4 $\mu\text{m}$ ) | 4.6  | 200.0                                    |
|                    | 10                                      | 0.25X0.25X0.20            | -  | ○            | ○              |  | 7.0  | 33.5                                     |
|                    | 39                                      | 0.25X0.25X0.10            | 0 $\pm$ 30   | ×            | ○              |  | 6.6  | 1.9                                      |
|                    | 90                                      | 0.25X0.25X0.10            | -330 $\pm$ 120   | ×            | ○              |  | 9.2  | 2.3                                      |
|                    | 150                                     | 0.25X0.25X0.10            | -750 $\pm$ 120   | ×            | ○              |  | 11.7   | 2.0                                      |
|                    | 250                                     | 0.25X0.25X0.10            | -750 $\pm$ 600   | ×            | ○              |  | 12.2   | 4.0                                      |
| Decoupling         | 3000                                    | 0.25X0.25X0.10            | $\pm$ 10%  | ×            | ○              | 50/50<br>(Au thickness 8 $\mu\text{m}$ ) | 10.7   | 2.5                                      |
|                    | 10000                                   | 0.25X0.25X0.10            | +30, -80%  | ×            | ×              |  | 10.5   | 1.6                                      |
|                    | 15000                                   | 0.25X0.25X0.10            | +30, -90%  | ×            | ×              |  | 14.0   | 2.4                                      |
|                    | 30000                                   | 0.25X0.25X0.25            | $\pm$ 25%  | ×            | ○              |  | 11.2   | 7.35                                     |

\*1 : Typical value

\*2 : L = length, W = width, T = thickness

\*3 : Temperature Range: -25 to 85°C, Reference Temperature: 25°C

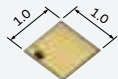
\*4 : L = line, S = space

## Single-Layer Microchip Capacitors, Thin Film Circuit Substrates (RUSUB)

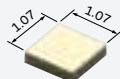
Thirteen types of standard products suitable for decoupling are also available.



RUCYT101 Series



RUCYT201 Series



RUCQD Series

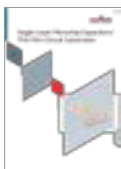
(in mm)

| Part Number        | Size (mm)<br>(LxWxT) | Capacitor           |   |                      | Resistor          |   |
|--------------------|----------------------|---------------------|---|----------------------|-------------------|---|
|                    |                      | Capacitance<br>(pF) | Temperature<br>Characteristics of<br>Capacitance<br>(-25 to 85°C) | Rated Voltage<br>(V) | Resistance<br>(Ω) | Temperature<br>Coefficient of<br>Resistance<br>(ppm/°C) |
| RUCYT101K00009GNTC | 1.0X0.5X0.11         | 100                 | ±10%  | 100                  | 50±20%            | -70±50  |
| RUCYT101K00011GNTC | 1.0X0.5X0.11         | 100                 |   |                      | 100±20%           |   |
| RUCYT101K00012GNTC | 1.0X0.5X0.11         | 100                 |   |                      | 200±20%           |   |
| RUCYT201K00010GNTC | 1.0X1.0X0.12         | 200                 |   |                      | 50±20%            |   |
| RUCYT201K00013GNTC | 1.0X1.0X0.12         | 200                 |   |                      | 100±20%           |   |
| RUCYT201K00014GNTC | 1.0X1.0X0.12         | 200                 |   |                      | 200±20%           |   |
| RUCQD101RCC007GNTC | 0.34X0.34X0.25       | 100                 | ±25%  | 65                   | -                 | -   |
| RUCQD431RCC001GNZB | 0.70X0.70X0.25       | 430                 |   |                      |                   |   |
| RUCQD471RCC002GNZB | 0.73X0.73X0.25       | 470                 |   |                      |                   |   |
| RUCQD511RCC003GNZB | 0.76X0.76X0.25       | 510                 |   |                      |                   |   |
| RUCQD561RCC004GNZB | 0.80X0.80X0.25       | 560                 |   |                      |                   |   |
| RUCQD102RCC008GNZB | 1.07X1.07X0.25       | 1000                |   |                      |                   |   |
| RUCQD201ZCC005GNZB | 1.10X0.60X0.25       | 200×4               |   |                      |                   |   |

\*Several samples for impedance matching are also available for your evaluation. Please find the details at the following link: <https://www.murata.com/en-global/products/capacitor/rusub/matching>

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



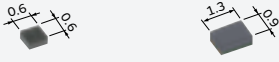
• Single-Layer Microchip Capacitors/Thin Film Circuit Substrates

Cat. No. C01E

# Variable Capacitors

Variable capacitors can carry out the variable of the capacitor by adjusting the tuning voltage. They are designed for frequency matching use for HF band (13.56MHz).

## LXRW\_V Series



| Series | LxW (mm) | Rated Voltage (Vdc) | Capacitance Range (F) |    |      |       |       |        |      |    |     |      |       |  |  |
|--------|----------|---------------------|-----------------------|----|------|-------|-------|--------|------|----|-----|------|-------|--|--|
|        |          |                     | 0.1p                  | 1p | 10p  | 100p  | 1000p | 10000p | 0.1μ | 1μ | 10μ | 100μ | 1000μ |  |  |
| LXRW0Y | 0.6X0.6  | CSP                 |                       |    | 33pF | 200pF |       |        |      |    |     |      |       |  |  |
| LXRW19 | 1.3X0.9  | DFN                 |                       |    | 33pF | 200pF |       |        |      |    |     |      |       |  |  |

# Silicon Capacitors

Murata High-Density Silicon Capacitors are based on a MOS Semiconductor technology and utilize a 3D structure that substantially increases their performance and enables compact design. Silicon Capacitors offer small size and low thickness, superior reliability, and stability over high temperatures and high frequencies. They are the ideal choice for all demanding markets, such as Networking (RF Power and Broadband), Medical (Implantable devices), Automotive, or High-Reliability applications. Murata can provide customized Silicon Capacitors or Integrated Passive Devices (IPDs) to optimize your design.

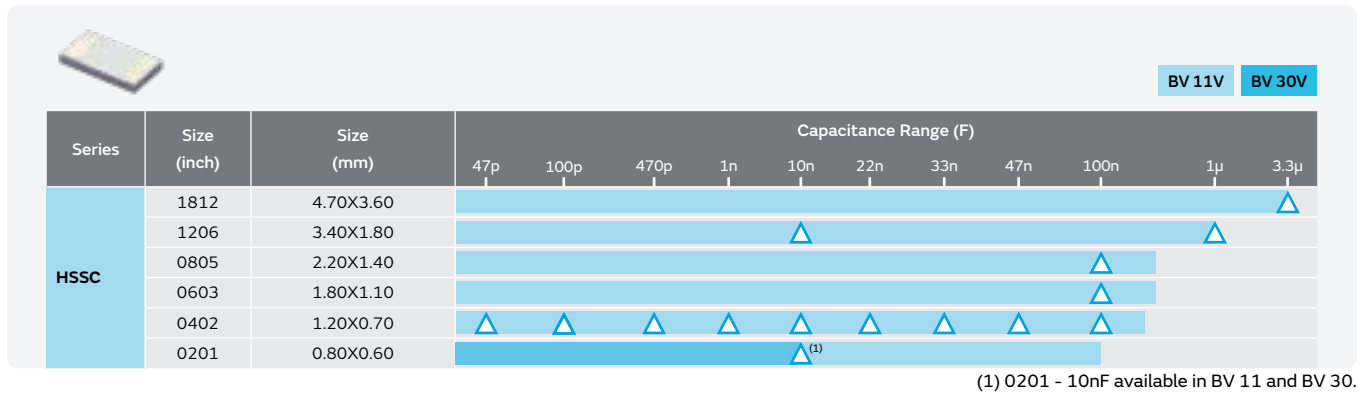
## Product Lineup

|                                   | Thickness | Standard (150°C)         | High temp.   | Operating Frequency  |
|-----------------------------------|-----------|--------------------------|--|--|
| Solder Mounting                   | 100μm     | LPSC<br>R All            |  | XBSC (100GHz+)<br>UBSC (60GHz+)<br>BBSC (40GHz)<br>ULSC (20GHz)<br>UBDC (60GHz+) |
|                                   | 400μm     | HSSC<br>All              | HTSC (200°C)<br>XTSC (250°C)<br>H                      | B<br>p38, 39   |
| Wire-bonding vertical             | 100μm     | WLSC<br>P A B            |  | UWSC (26GHz+)<br>(down to 10pH)<br>B P   |
|                                   | 250μm     | WBSC<br>P A B            | WTSC (200°C)<br>WXSC (250°C)<br>A P H                  | p40  |
| Wire-bonding /Embedded horizontal | 100μm     | EMSC<br>All<br>MGSC<br>M |  | UBEC (60GHz+)<br>BBEC (40GHz)<br>ULEC (20GHz)<br>B                               |
|                                   | 250μm     |                          | ETSC (200°C)<br>EXSC (250°C)<br>H<br>ATSC (200°C)<br>A | p39<br>p38, 41   |

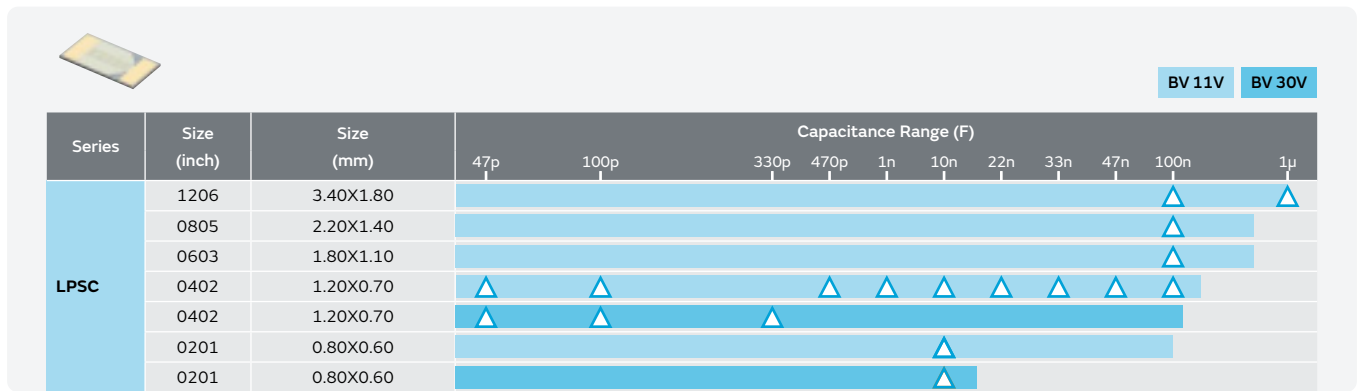
**Target application**

- A Automotive
- H High Reliability
- B BroadBand
- M Medical
- All All applications
- P Power Amp for RF
- R RFID

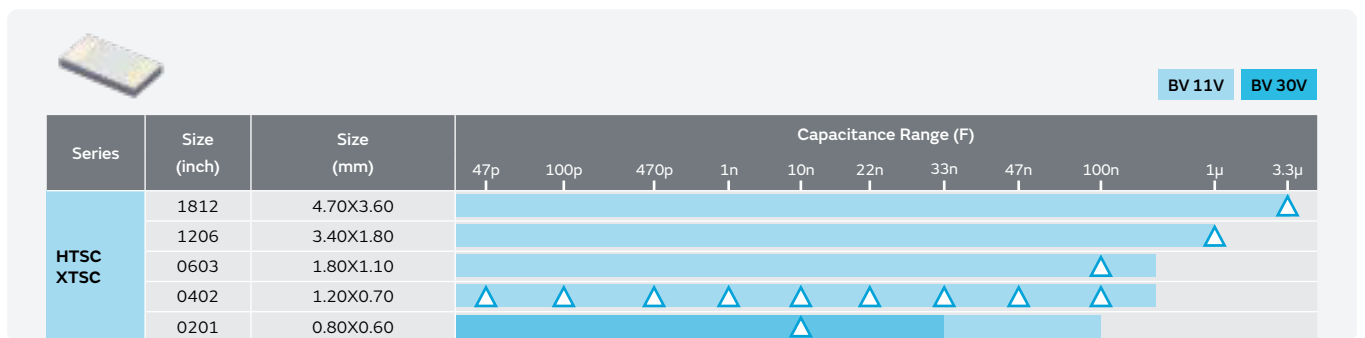
### High stability and reliability Si capacitors (HSSC)



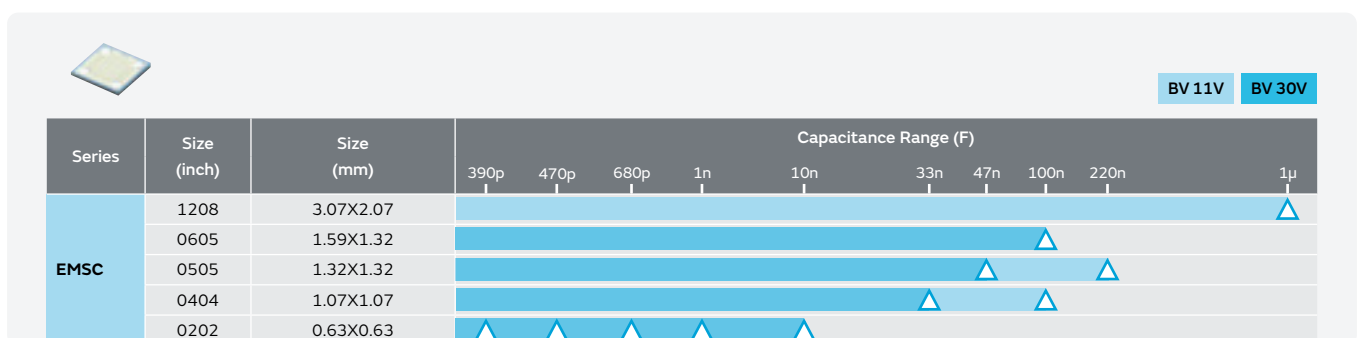
### Low-profile Si capacitors down to 100μm (LPSC)



### Xtreme temperature Si capacitors up to 250°C (HTSC/XTSC)



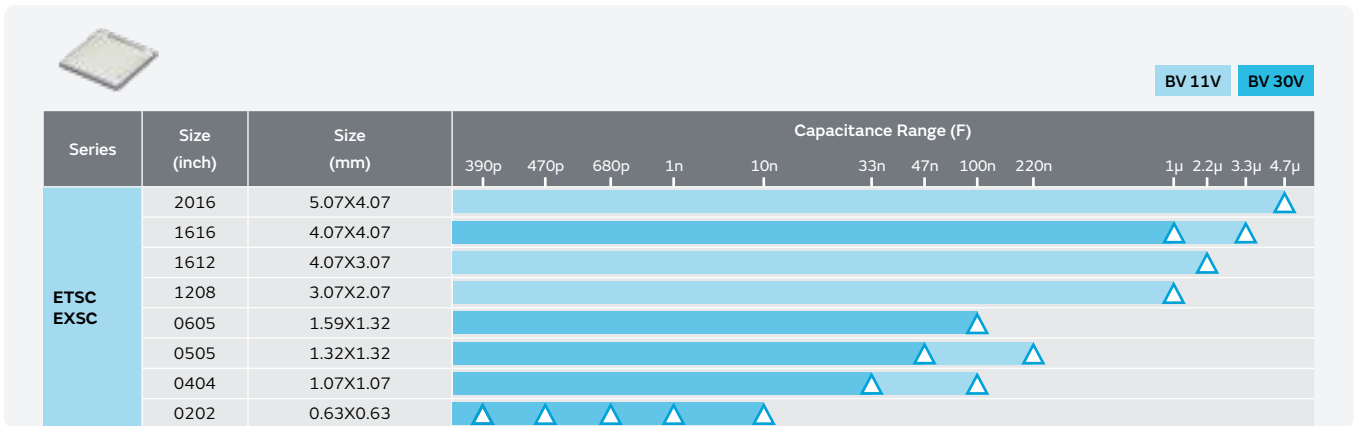
### Wire-bondable or embedded low-profile Si capacitors down to 100μm (EMSC)



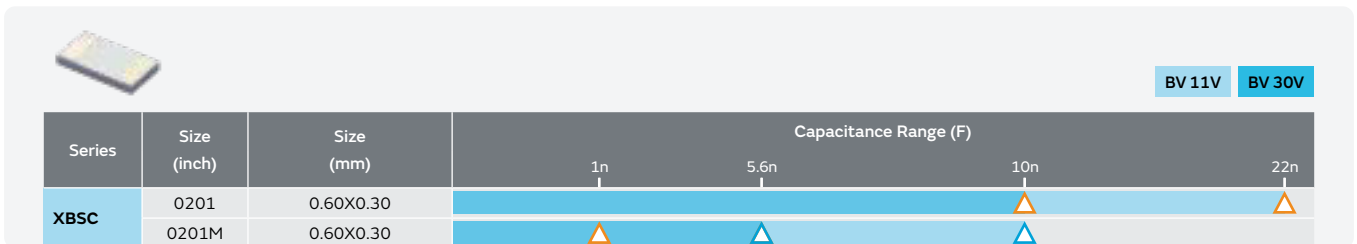
△ Available parts. For other values, contact your Murata sales representative.   ◻ Under development.

## Silicon Capacitors

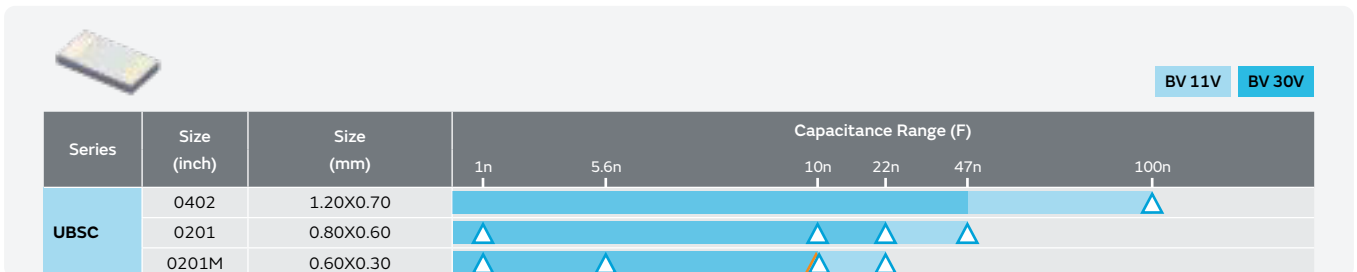
### Extreme temperature wire-bondable Si capacitors up to 250°C (ETSC/EXSC)



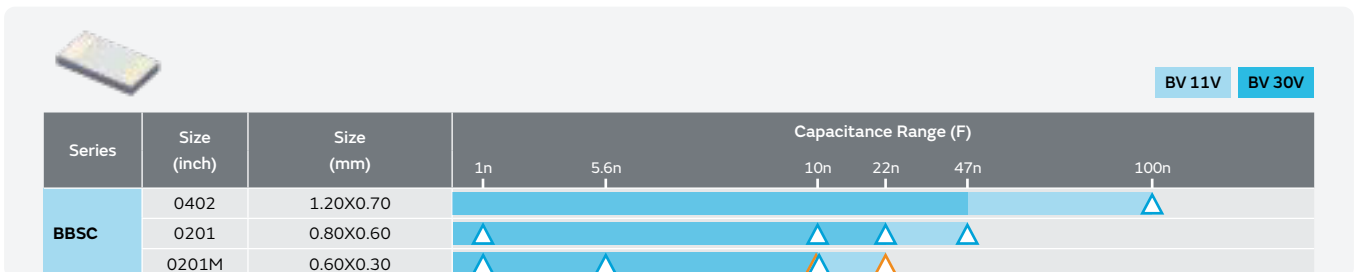
### Ultra broadband surface mounted Si capacitor up to 100GHz+ (XBSC)



### Ultra broadband surface mounted Si capacitors up to 60GHz+ (UBSC)



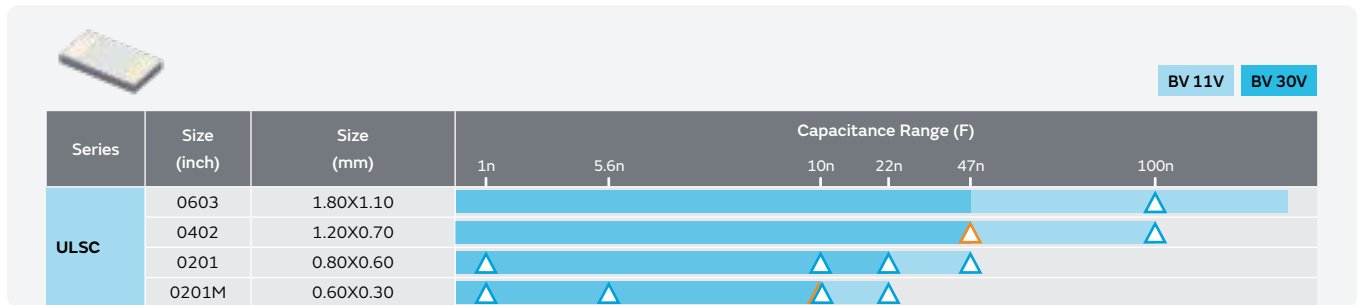
### Ultra broadband surface mounted Si capacitors up to 40GHz (BBSC)



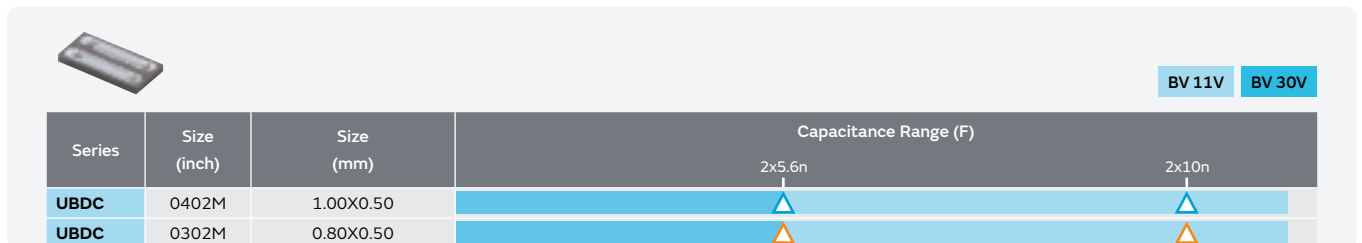
△ Available parts. For other values, contact your Murata sales representative. ▽ Under development.



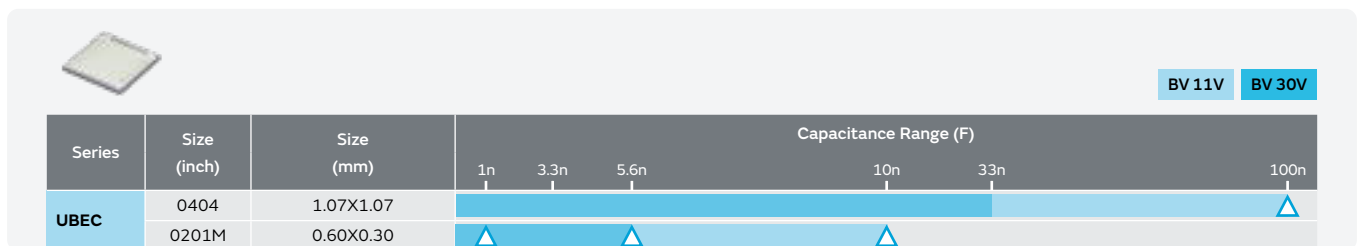
### Ultra broadband surface mounted Si capacitors up to 20GHz (ULSC)



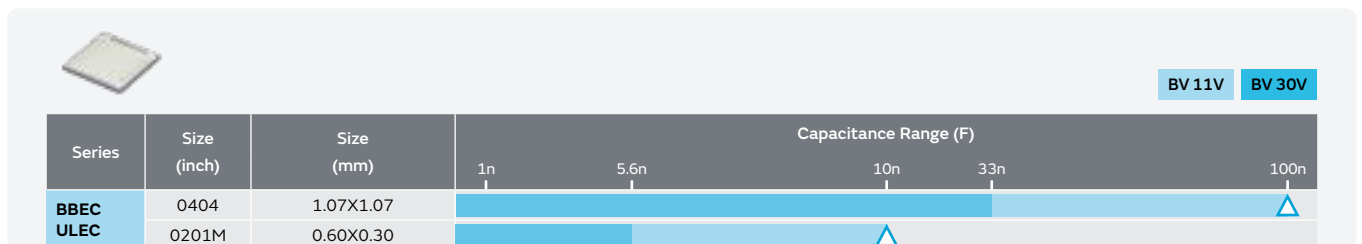
### Ultra Broadband surface mounted differential Si capacitors pairs up to 60GHz+ (UBDC)



### Ultra broadband wire-bondable embedded Si capacitors up to 60GHz+ (UBEC)



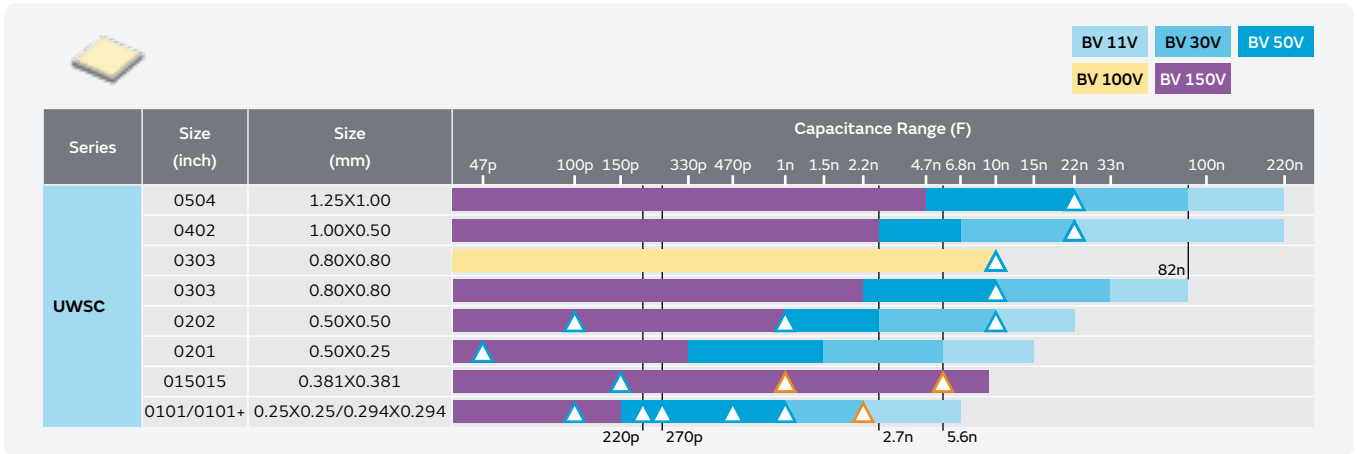
### Ultra broadband wire-bondable embedded Si capacitors up to 40/20GHz (BBEC/ULEC)



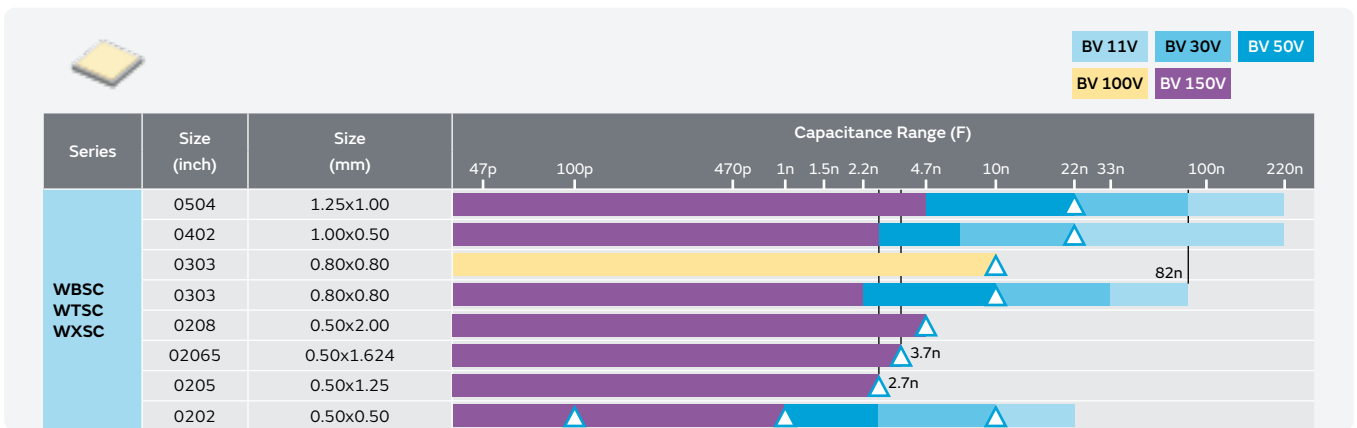
△ Available parts. For other values, contact your Murata sales representative. ▽ Under development.

## Silicon Capacitors

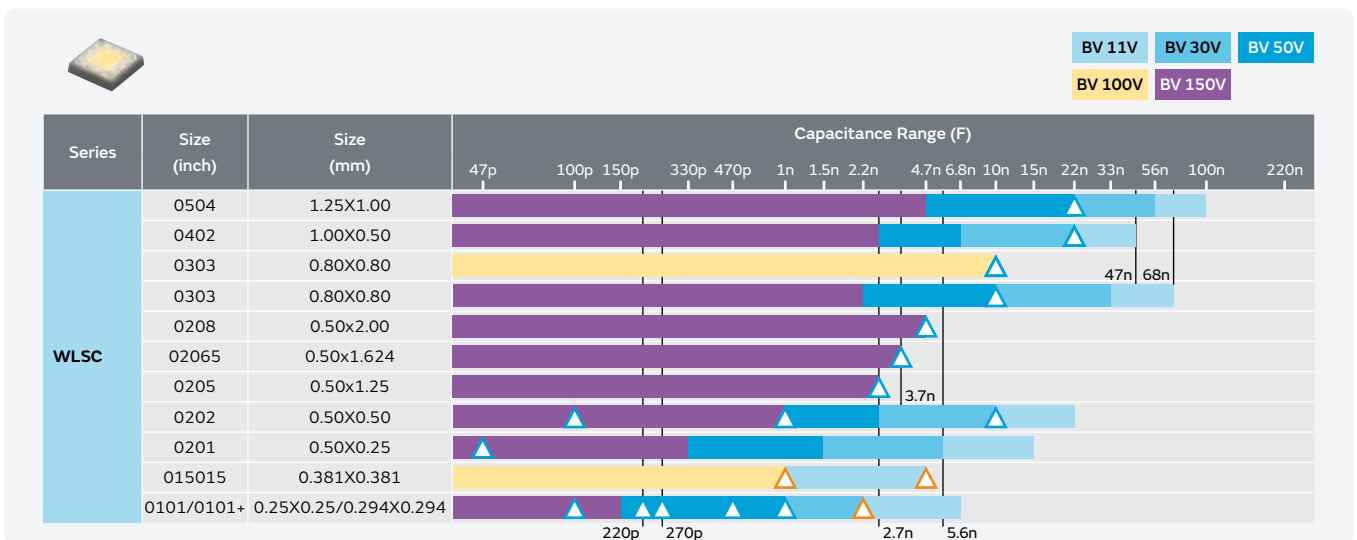
### Ultra large-band wire-bondable vertical Si capacitors up to 26GHz+ (UWSC)



### Wire-bondable vertical Si capacitors up to 250°C (WBSC/WTSC/WXSC)

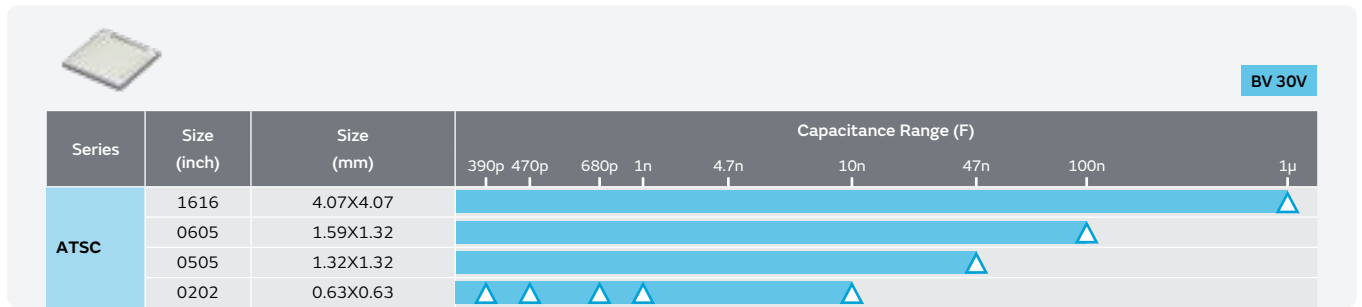


### Wire-bondable vertical low-profile Si capacitors down to 100µm (WLSC)

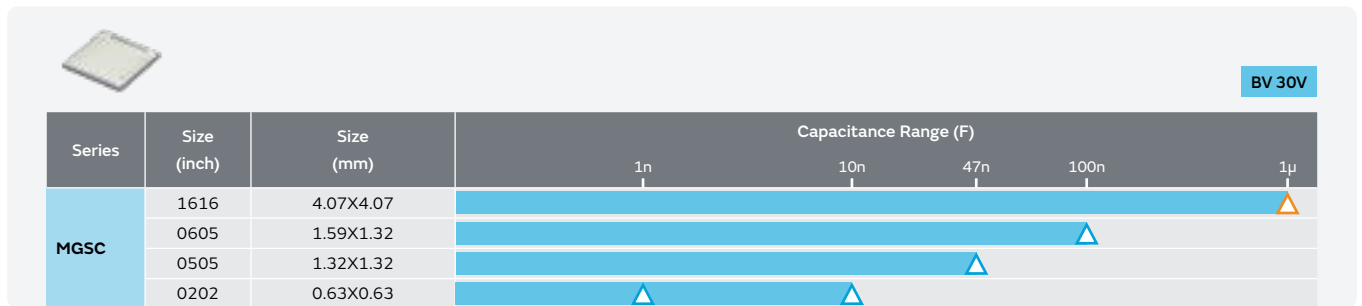


△ Available parts. For other values, contact your Murata sales representative. ▽ Under development.

### Automotive high temperature Si capacitors up to 200°C (ATSC)



### Medical grade Si capacitors (MGSC)



△ Available parts. For other values, contact your Murata sales representative. ▽ Under development.

# Film Capacitors

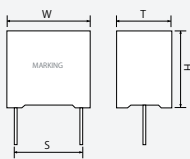
The FH series uses materials with high heat resistance. Therefore, it has a higher allowable ripple current under a higher temperature environment than conventional PP film capacitors.

This feature is more prominent in the high-frequency range. For example, when the ambient temperature is at 105°C, the PP film capacitors would be already at its limit for allowable ripple current, but because of the higher heat resistance of the FH series, the allowable ripple current can be increased drastically.



## Specifications

| Items               | Basic Specifications  |
|---------------------|-----------------------|
| Rated Capacitance   | 10,15,20 $\mu$ F      |
| Rated Voltage       | 500V                  |
| Operational Life    | 125°C/500V 2000h      |
| Biased Humidity     | 85°C/85%RH/500V 1000h |
| Temperature Cycling | -40~+125°C/1000cycles |



## Dimensions

| Part Number | Capacitance | Dimensions (mm) |      |      |      |
|-------------|-------------|-----------------|------|------|------|
|             |             | W               | H    | T    | S    |
| FHA50Y206KS | 20 $\mu$ F  | 33.0            | 37.0 | 18.0 | 30.0 |
| FHA50Y156KS | 15 $\mu$ F  | 33.0            | 35.5 | 14.5 | 30.0 |
| FHA50Y106KS | 10 $\mu$ F  |                 |      |      |      |

# Noise Suppression Products/ EMI Suppression Filters

Broad lineup of Noise Suppression Products and EMI Suppression Filters

## Summary

Using Murata's ceramic processing technology and unique materials, we offer a variety of Noise Suppression Products and EMI Suppression Filters.

## Lineup

- EMI (chip and lead type)
- Noise Suppression Products for Automotive
- ESD Protection Devices



<https://www.murata.com/en-global/products/emc>

## Chip Ferrite Bead

|                           |  | Series                         | Size Code<br>inch (mm)        | Max. Rated<br>Current (mA) | Impedance at 100MHz<br>(Rated Current) |                |
|---------------------------|--|--------------------------------|-------------------------------|----------------------------|--|----------------|
| For General<br>Band Noise | Universal Type<br>[ Power Lines/Signal Lines ] | BLM02AX                        | 01005 (0402)                  | 750                        | 10Ω to 330Ω (0.15A to 0.75A)           |                |
|                           |  | BLM03AX                        | 0201 (0603)                   | 1000                       | 10Ω to 1000Ω (0.2A to 1A)              |                |
|                           |  | BLM15AX                        | 0402 (1005)                   | 1740                       | 10Ω to 1000Ω (0.35A to 1.74A)          |                |
|                           | Signal Lines<br>Type                           | For General<br>Signal Lines    | BLM03AG                       | 0201 (0603)                | -                                      | 10Ω to 1000Ω   |
|                           |  |                                | BLM15AG                       | 0402 (1005)                | -                                      | 10Ω to 1000Ω   |
|                           |  |                                | BLM18AG                       | 0603 (1608)                | -                                      | 120Ω to 1000Ω  |
|                           |  |                                | BLM18TG                       | 0603 (1608)                | -                                      | 120Ω to 1000Ω  |
|                           |  |                                | BLM21AG                       | 0805 (2012)                | -                                      | 120Ω to 1000Ω  |
|                           |  |                                | BLA2AA<br>(4 circuits array)  | 0804 (2010)                | -                                      | 120Ω to 1000Ω  |
|                           |  |                                | BLA31AG<br>(4 circuits array) | 1206 (3216)                | -                                      | 30Ω to 1000Ω   |
|                           |  |                                | BLM02BX*                      | 01005 (0402)               | -                                      | 120Ω to 240Ω   |
|                           |  |                                | BLM02BB/BC                    | 01005 (0402)               | -                                      | 10Ω to 100Ω    |
|                           |  |                                | BLM03BX                       | 0201 (0603)                | -                                      | 1000Ω to 1800Ω |
|                           |  | For High Speed<br>Signal Lines | BLM03BB/BC/BD                 | 0201 (0603)                | -                                      | 10Ω to 600Ω    |
|                           |  |                                | BLM15BA/BB/BC/BD              | 0402 (1005)                | -                                      | 5Ω to 1800Ω    |
|                           |  |                                | BLM15BX                       | 0402 (1005)                | -                                      | 75Ω to 1800Ω   |
|                           |  |                                | BLM18BA/BB/BD                 | 0603 (1608)                | -                                      | 5Ω to 2500Ω    |
|                           |  |                                | BLM21BB/BD                    | 0805 (2012)                | -                                      | 5Ω to 2700Ω    |
|                           |  |                                | BLA2AB<br>(4 circuits array)  | 0804 (2010)                | -                                      | 10Ω to 1000Ω   |
|                           |  |                                | BLA31BD<br>(4 circuits array) | 1206 (3216)                | -                                      | 120Ω to 1000Ω  |
|                           | For Digital<br>Interface<br>Lines              | BLM18RK                        | 0603 (1608)                   | -                          | 120Ω to 1000Ω                          |                |
|                           |  | BLM21RK                        | 0805 (2012)                   | -                          | 120Ω to 1000Ω                          |                |

\* The derating of rated current is required for some items according to the operating temperature.

For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

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


## Chip Ferrite Bead






|                           |  | Series  | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Impedance at 100MHz<br>(Rated Current) |   |              |
|---------------------------|--|---|------------------------|----------------------------|--|---|--------------|
| For General<br>Band Noise | Power Lines Type                               | <b>BLM02KX*</b>                                 | 01005 (0402)           | 1500                       | 10Ω to 18Ω (1.2A to 1.5A)              |   |              |
|                           |  | <b>BLM02PX*</b>                                 | 01005 (0402)           | 1100                       | 10Ω to 60Ω (0.5A to 1.1A)              |   |              |
|                           |  | <b>BLM03PX*</b>                                 | 0201 (0603)            | 1800                       | 22Ω to 120Ω (0.9A to 1.8A)             |   |              |
|                           |  | <b>BLM03PG</b>                                  | 0201 (0603)            | 900                        | 22Ω to 33Ω (0.75A to 0.9A)             |   |              |
|                           |  | <b>BLM15KD*</b>                                 | 0402 (1005)            | 3800                       | 20Ω to 120Ω (1.5A to 3.8A)             |   |              |
|                           |  | <b>BLM15PX*</b>                                 | 0402 (1005)            | 3000                       | 33Ω to 600Ω (0.9A to 3A)               |   |              |
|                           |  | <b>BLM15PD*</b>                                 | 0402 (1005)            | 2200                       | 30Ω to 120Ω (1.3A to 2.2A)             |   |              |
|                           |  | <b>BLM15PG</b>                                  | 0402 (1005)            | 1000                       | 10Ω (1A)                               |   |              |
|                           |  | <b>BLM18SN*/SP*</b><br>(Low DC Resistance Type) | 0603 (1608)            | 8000                       | 22Ω to 1000Ω (1.2A to 8A)              |   |              |
|                           |  | <b>BLM18SG*/SD*</b><br>(Low DC Resistance Type) | 0603 (1608)            | 6000                       | 22Ω to 330Ω (1.5A to 6A)               |   |              |
|                           |  | <b>BLM18KG*</b><br>(Low DC Resistance Type)     | 0603 (1608)            | 6000                       | 26Ω to 1000Ω (1A to 6A)                |   |              |
|                           |  | <b>BLM18PG*</b>                                 | 0603 (1608)            | 3000                       | 30Ω to 470Ω (1A to 3A)                 |   |              |
|                           |  | <b>BLM21SN*/SP*</b><br>(Low DC Resistance Type) | 0805 (2012)            | 8500                       | 30Ω to 1000Ω (1.6A to 8.5A)            |   |              |
|                           |  | <b>BLM21PG*</b>                                 | 0805 (2012)            | 6000                       | 22Ω to 330Ω (1.5A to 6A)               |   |              |
|                           |  | <b>BLM31SN*</b><br>(Low DC Resistance Type)     | 1206 (3216)            | 12000                      | 50Ω (12A)                              |   |              |
|                           |  | <b>BLM31KN*</b>                                 | 1206 (3216)            | 6000                       | 120Ω to 1000Ω (2A to 6A)               |   |              |
|                           |  | <b>BLM31PG*</b>                                 | 1206 (3216)            | 6000                       | 33Ω to 600Ω (1.5A to 6A)               |   |              |
|                           |  | <b>BLM41PG*</b>                                 | 1806 (4516)            | 6000                       | 60Ω to 1000Ω (1.5A to 6A)              |   |              |
| For GHz<br>Band Noise     | Universal Type<br>[ Power Lines/Signal Lines ] | <b>BLM03EB*</b>                                 | 0201 (0603)            | 600                        | 25Ω to 50Ω (0.4A to 0.6A)              |   |              |
|                           |  | <b>BLM15EG*</b>                                 | 0402 (1005)            | 1500                       | 120Ω to 220Ω (0.7A to 1.5A)            |   |              |
|                           |  | <b>BLM15EX*</b>                                 | 0402 (1005)            | 1800                       | 120Ω to 470Ω (0.95A to 1.8A)           |   |              |
|                           |  | <b>BLM18EG*</b>                                 | 0603 (1608)            | 2000                       | 100Ω to 600Ω (0.5A to 2A)              |   |              |
|                           |  | <b>BLM18HE*</b>                                 | 0603 (1608)            | 800                        | 600Ω to 1500Ω (0.5A to 0.8A)           |   |              |
|                           | Signal Lines Type                              | <b>BLM03HG</b>                                  | 0201 (0603)            | -                          | 600Ω to 1200Ω                          |   |              |
|                           |  | <b>BLM03HD</b>                                  | 0201 (0603)            | -                          | 330Ω to 1800Ω                          |   |              |
|                           |  | <b>BLM03HB</b>                                  | 0201 (0603)            | -                          | 190Ω to 400Ω                           |   |              |
|                           |  | <b>BLM15HG</b>                                  | 0402 (1005)            | -                          | 600Ω to 1000Ω                          |   |              |
|                           |  | <b>BLM15HD</b>                                  | 0402 (1005)            | -                          | 600Ω to 1800Ω                          |   |              |
|                           |  | <b>BLM15HB</b>                                  | 0402 (1005)            | -                          | 120Ω to 220Ω                           |   |              |
|                           |  | <b>BLM18HG</b>                                  | 0603 (1608)            | -                          | 470Ω to 1000Ω                          |   |              |
|                           |  | <b>BLM18HD</b>                                  | 0603 (1608)            | -                          | 470Ω to 1000Ω                          |   |              |
|                           |  | <b>BLM18HB</b>                                  | 0603 (1608)            | -                          | 120Ω to 330Ω                           |   |              |
|                           |  | <b>BLM18HK</b>                                  | 0603 (1608)            | -                          | 330Ω to 1000Ω                          |   |              |
|                           |  | For High-GHz<br>Band Noise                      | Signal Lines Type      | <b>BLM15GG</b>             | 0402 (1005)                            | - | 220Ω to 470Ω |
|                           |  |   |                        | <b>BLM15GA</b>             | 0402 (1005)                            | - | 75Ω          |
|                           |  |   |                        | <b>BLM18GG</b>             | 0603 (1608)                            | - | 470Ω         |
| Power Lines Type          | <b>BLM18DN*</b>                                |   | 0603 (1608)            | 1400                       | 150Ω to 600Ω (0.7A to 1.4A)            |   |              |


|                           |  | Series          | Size Code<br>inch (mm) | Max. Rated<br>Current (A) | Impedance at 100MHz<br>(Rated Current) |
|---------------------------|--|-----------------|------------------------|---------------------------|--|
| For General<br>Band Noise | Large Current Type<br>Power Lines Type | <b>BLT5BPT*</b> | 2020 (5050)            | 11                        | 68Ω (11A)                              |





\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."



# Application Specified Noise Filter

|                 | Series  | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Impedance<br>at 900MHz | Impedance<br>at 1.7GHz |
|-----------------|---|------------------------|----------------------------|------------------------|------------------------|
| For Audio Lines |  <b>NFZ03SG_10</b> | 0201 (0603)            | 305                        | 330Ω to 1600Ω          | 400Ω to 1200Ω          |
|                 |  <b>NFZ15SG_10</b> | 0402 (1005)            | 500                        | 770Ω to 4600Ω          | 900Ω to 1800Ω          |
|                 |  <b>NFZ15SG_11</b> | 0402 (1005)            | 1100                       | 100Ω to 330Ω           | 160Ω to 540Ω           |


|                 | Series   | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Impedance<br>at 100MHz | Impedance<br>at 900MHz |
|-----------------|--|------------------------|----------------------------|------------------------|------------------------|
| For Audio Lines |  <b>NFZ15SF_10</b>  | 0402 (1005)            | -                          | 1000Ω                  | -                      |
|                 |  <b>NFZ15SR_10</b>  | 0402 (1005)            | -                          | 200Ω to 500Ω           | 1500Ω to 3500Ω         |
|                 |  <b>NFZ18SM_10*</b> | 0603 (1608)            | -                          | 120Ω to 700Ω           | -                      |
|                 |  <b>NFZ2MSM_10</b>  | 0806 (2016)            | -                          | 100Ω to 600Ω           | -                      |
|                 |  <b>NFZ32SW_10</b>  | 1210 (3225)            | -                          | 300Ω to 900Ω           | -                      |

|                 | Series   | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Impedance at 10MHz |
|-----------------|--|------------------------|----------------------------|--------------------|
| For Audio Lines |  <b>NFZ2MSD_10*</b> | 0806 (2016)            | -                          | 15Ω to 130Ω        |

|                             | Series   | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Impedance at 1MHz |
|-----------------------------|--|------------------------|----------------------------|-------------------|
| For LED Lighting Equipments |  <b>NFZ5BBW_LN10*</b> | 2020 (5050)            | 4000                       | 2.9Ω to 140Ω      |
|                             |  <b>NFZ2HBM_10</b>    | 1008 (2520)            | 1200                       | 1.5Ω to 60Ω       |
|                             |  <b>NFZ32BW_10*</b>   | 1210 (3225)            | 2550                       | 3.6Ω to 880Ω      |
|                             |  <b>NFZ32BW_11*</b>   | 1210 (3225)            | 2900                       | 3.3Ω to 150Ω      |

|                                   | Series  | Size Code<br>inch (mm) | Max. Rated<br>Current (A) | Impedance at 700MHz |
|-----------------------------------|---|------------------------|---------------------------|---------------------|
| Frequency Specified Noise Filters |  <b>BLF02JD*</b> | 01005 (0402)           | -                         | 360Ω to 470Ω        |
|                                   |  <b>BLF02GD</b>  | 01005 (0402)           | -                         | 1600Ω               |
|                                   |  <b>BLF03JD*</b> | 0201 (0603)            | -                         | 420Ω                |




|                                   | Series  | Size Code<br>inch (mm) | Max. Rated<br>Current (A) | Impedance at 2.4GHz |
|-----------------------------------|---|------------------------|---------------------------|---------------------|
| Frequency Specified Noise Filters |  <b>BLF02RD*</b> | 01005 (0402)           | -                         | 330Ω to 470Ω        |

|                                   | Series  | Size Code<br>inch (mm) | Max. Rated<br>Current (A) | Impedance at 5GHz |
|-----------------------------------|---|------------------------|---------------------------|-------------------|
| Frequency Specified Noise Filters |  <b>BLF03VK*</b> | 0201 (0603)            | 1.2                       | 60Ω to 220Ω       |








\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."



Continued on the following page. ↗

## Application Specified Noise Filter, LC Combined Filter

|                           |                  | Series  | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Impedance at 100MHz<br>(Rated Current) |
|---------------------------|------------------|---|------------------------|----------------------------|--|
| For General<br>Band Noise | Power Lines Type |  <b>BLE18PS*</b> | 0603 (1608)            | 8000                       | 8.5Ω (8A)                              |
|                           |                  |  <b>BLE18PK*</b> | 0603 (1608)            | 6000                       | 10Ω to 16Ω (5A to 6A)                  |
|                           |                  |  <b>BLE32PN</b>  | 1210 (3225)            | 10000                      | 26Ω to 30Ω (10A)                       |

## LC Combined Filter


























|                   |  | Series   | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Nominal Cut-off Frequency |
|-------------------|--|--|------------------------|----------------------------|---------------------------|
| Signal Lines Type |  |  <b>NFL18ST</b>                       | 0603 (1608)            | -                          | 50MHz to 500MHz           |
|                   |  |  <b>NFL18SP</b>                       | 0603 (1608)            | -                          | 150MHz to 500MHz          |
|                   |  |  <b>NFL21SP</b>                       | 0805 (2012)            | -                          | 10MHz to 500MHz           |
|                   |  |  <b>NFA18SL</b><br>(4 circuits array) | 0603 (1608)            | -                          | 50MHz to 480MHz           |
|                   |  |  <b>NFA18SD</b><br>(4 circuits array) | 0603 (1608)            | -                          | 180MHz to 200MHz          |
|                   |  |  <b>NFA21SL</b><br>(4 circuits array) | 0805 (2012)            | -                          | 50MHz to 330MHz           |
|                   |  |  <b>NFW31SP</b>                      | 1206 (3216)            | -                          | 10MHz to 500MHz           |



|  |  | Series   | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Capacitance    |
|--|--|--|------------------------|----------------------------|----------------|
| Universal Type<br>[ Power Lines/Signal Lines ] |  |  <b>NFE31PT</b> | 1206 (3216)            | 6000                       | 22pF to 2200pF |
|  |  |  <b>NFE61PT</b> | 2706 (6816)            | 2000                       | 33pF to 4700pF |


\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."



# Common Mode Choke Coil/Common Mode Noise Filter














|  |   | Series   | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Common Mode Impedance<br>at 100MHz |
|--|---|--|------------------------|----------------------------|------------------------------------|
| Signal Lines Type  | For Audio Lines   |  <b>DLM11GN</b>                       | 0504 (1210)            | -                          | 600Ω                               |
|  | For Ultra-High-Speed<br>Signal Lines  |  <b>NFGONCN</b><br>(3 Lines)          | 03025 (0806)           | -                          | 25Ω                                |
|  |   |  <b>NFGOQHB</b>                       | 025020 (0605)          | -                          | (5Ω) to (15Ω)                      |
|  |   |  <b>DLMOQSN</b>                       | 025020 (0605)          | -                          | 50Ω to 90Ω                         |
|  |   |  <b>DLMOQSB</b>                       | 025020 (0605)          | -                          | 12Ω to 35Ω                         |
|  |   |  <b>DLMONSN</b>                       | 03025 (0806)           | -                          | 50Ω to 90Ω                         |
|  |   |  <b>DLMONSM</b>                       | 03025 (0806)           | -                          | 90Ω                                |
|  |   |  <b>DLMONSB</b>                       | 03025 (0806)           | -                          | 12Ω to 28Ω                         |
|  |   |  <b>DLM11SN</b>                       | 0504 (1210)            | -                          | 45Ω to 90Ω                         |
|  |   |  <b>DLP11SN</b>                       | 0504 (1210)            | -                          | 67Ω to 330Ω                        |
|  |   |  <b>DLP11SA</b>                       | 0504 (1210)            | -                          | 35Ω to 90Ω                         |
|  |   |  <b>DLP11RN</b>                       | 0504 (1210)            | -                          | 45Ω                                |
|  |   |  <b>DLP11RB</b>                       | 0504 (1210)            | -                          | 15Ω to 40Ω                         |
|  |   |  <b>DLP11TB</b>                       | 0504 (1210)            | -                          | 80Ω                                |
|  |   |  <b>DLP31SN</b>                       | 1206 (3216)            | -                          | 120Ω to 550Ω                       |
|  |   |  <b>DLP1NDN</b><br>(2 circuits array) | 05025 (1506)           | -                          | 35Ω to 90Ω                         |
|  |   |  <b>DLP2ADA</b><br>(2 circuits array) | 0804 (2010)            | -                          | 35Ω to 90Ω                         |
|  |   |  <b>DLP2ADN</b><br>(2 circuits array) | 0804 (2010)            | -                          | 67Ω to 280Ω                        |
|  |   |  <b>DLP31DN</b><br>(2 circuits array) | 1206 (3216)            | -                          | 90Ω to 440Ω                        |
|  |   |  <b>DLW21S</b>                        | 0805 (2012)            | -                          | 67Ω to 920Ω                        |
|  |   |  <b>DLW21H</b>                       | 0805 (2012)            | -                          | 67Ω to 180Ω                        |
|  |  <b>DLW31S</b> | 1206 (3216)  | -                      | 90Ω to 2200Ω               |                                    |
|  | Universal Type<br>[ Power Lines/Signal Lines ]  |  <b>DLW44S*</b>                     | 1515 (4040)            | 3100                       | (100Ω) to (2400Ω)                  |
|  <b>DLW5AH/DLW5BS*</b>  |   | 2014 / 2020<br>(5036) / (5050)   | 5000                   | (190Ω) to (4000Ω)          |                                    |
|  <b>DLW5AT*/DLW5BT*</b> |   | 2014 / 2020<br>(5036) / (5050)   | 6000                   | (50Ω) to (2700Ω)           |                                    |

|  |   | Series      | Size Code<br>inch (mm) | Max. Rated<br>Current (A) | Common Mode Impedance<br>at 10MHz |
|--|---|-------------|------------------------|---------------------------|-----------------------------------|
| Large Current Type<br>for Automotive Available |  <b>PLT5BPH*</b> | 2020 (5050) | 5.6                    | 100Ω to 500Ω              |                                   |
|  |  <b>PLT10HH*</b> | -           | 18                     | 45Ω to 1000Ω              |                                   |

|  |   | Series      | Size Code<br>inch (mm) | Max. Rated<br>Current (mA) | Common Mode Impedance<br>at 100MHz |
|--|---|-------------|------------------------|----------------------------|------------------------------------|
| Large Current Type<br>for Automotive Available |  <b>UCMH0907</b> | 3527 (9070) | 5000                   | (700Ω)                     |                                    |




\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

## Block Type EMIFIL

|                  |           | Series   | Height (mm) | Rated Voltage (Vdc) | Rated Current (A) |
|------------------|-----------|--|-------------|---------------------|-------------------|
| Power Lines Type | SMD Type  |  <b>BNX022*</b>   | 3.1         | 50                  | 20                |
|                  |           |  <b>BNX023*</b>   | 3.1         | 100                 | 20                |
|                  |           |  <b>BNX024*</b>   | 3.5         | 50                  | 20                |
|                  |           |  <b>BNX025*</b>   | 3.5         | 25                  | 20                |
|                  |           |  <b>BNX026*</b>   | 3.5         | 50                  | 20                |
|                  |           |  <b>BNX027*</b>   | 3.5         | 16                  | 20                |
|                  |           |  <b>BNX028*</b>   | 3.5         | 16                  | 20                |
|                  |           |  <b>BNX029*</b>   | 3.5         | 6.3                 | 20                |
|                  | Lead Type |  <b>BNX002</b>   | 12.5 max.   | 50                  | 10                |
|                  |           |  <b>BNX003</b>  | 12.5 max.   | 150                 | 10                |
|                  |           |  <b>BNX005</b>  | 13.0 max.   | 50                  | 15                |
|                  |           |  <b>BNX012*</b> | 8.5 max.    | 50                  | 15                |
|                  |           |  <b>BNX016*</b> | 8.5 max.    | 25                  | 15                |

\* The derating of rated current is required for some items according to the operating temperature.  
For automotive grade products, please refer to the catalog C51E, "EMI Suppression Filters (for DC)/Chip Inductors for Automotive."

# Noise Suppression Filters (Lead Type), Others

|                         | Series  |   |
|-------------------------|---|---|
| Lead Type EMIFIL        | <br>DSS1   |   |
| Common Mode Choke Coils | <br>PLT09H | <br>PLT10HN* |

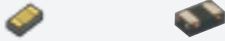
\* The derating of rated current is required for some items according to the operating temperature.

## ESD Protection Devices

Support ESD protection for various kinds of electronic devices.

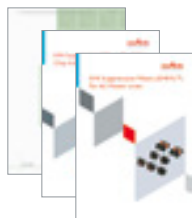
### Silicon ESD Protection Devices LXES\_T Series

Applying accumulated design technology for excellent ESD suppression performance.



#### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- EMI Suppression Filters (for DC)/Chip Inductors for Automotive Cat. No. C51E
- Noise Suppression by EMIFIL Digital Equipment Application Manual Cat. No. C33E
- Noise Suppression by EMIFIL Application Guide Application Manual Cat. No. C35E
- Application Manual for Power Supply Noise Suppression and Decoupling for Digital ICs Cat. No. C39E

# Inductors (Coils)

Broad Lineup of Chip Inductors and Power Inductors

## Summary

Murata's chip inductors are optimally designed, making full use of multiple construction techniques, such as the multilayer construction technique, film construction technique, and the wire wound construction technique according to the application. We offer an extensive lineup of inductors for power supplies to high frequency.

In addition, newly adopted metal alloy material has extended the power inductor lineup.

## Lineup

- Inductors for Power Lines
- RF Inductors
- General Circuit Inductors
- Variable Inductors



## Online design support tool: SimSurfing

You can view inductor characteristics and select appropriate power inductors for DC-DC converters

The screenshot displays the SimSurfing software interface. At the top, it says 'Design Support Software "SimSurfing"'. Below this, there are several tabs: 'Multilayer Ceramic Capacitors', 'Wire-wound Capacitors', 'Lead-type Ceramic Capacitors', 'Resonating QMS Type Ceramic Capacitors', and 'Polymer Capacitors'. The 'Power Inductor' tab is selected. A red arrow points from this tab to the 'DC-DC Converter Design Support Tool' in the 'Selection Tool' section. Below the 'Selection Tool' is a detailed table of inductor specifications and a graph showing inductor characteristics.

| Part Number | Inductance | DC Resistance | Q Factor | Self-Resonant Frequency | Temperature Coefficient | Application |
|-------------|------------|---------------|----------|-------------------------|-------------------------|-------------|
| 06032210000 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210001 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210002 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210003 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210004 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210005 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210006 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210007 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210008 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210009 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |
| 06032210010 | 22 nH      | 0.015 Ω       | 100      | 100 MHz                 | ±100 ppm/°C             | RF          |

<https://ds.murata.co.jp/simsurfing/>

# Inductors for Power Lines

## Main Type:

- Wound Metal Alloy
- Multilayer Type
- Wound Ferrite Core



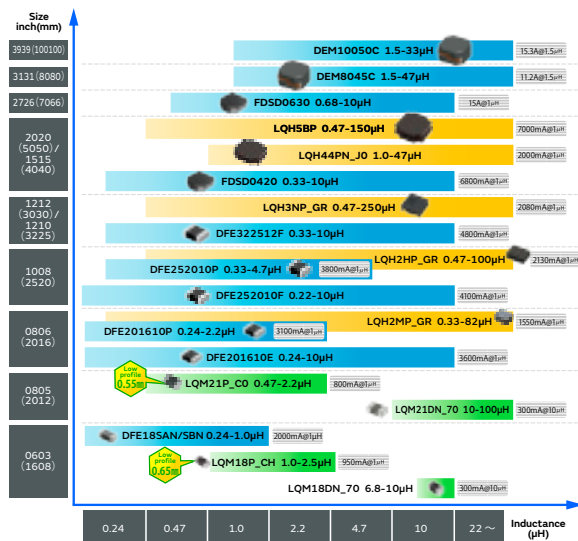
Inductors (Coils)

We have an extensive lineup of inductors covering a wide range of sizes from 1.6 mm x 0.8 mm to 12 mm square, which are manufactured using multiple techniques that include metal alloy wire wound construction technique and ferrite multilayer technique. We offer the optimum inductors for a wide range of applications including wearable devices, smartphones, medical applications, industrial electronics, and on board devices.

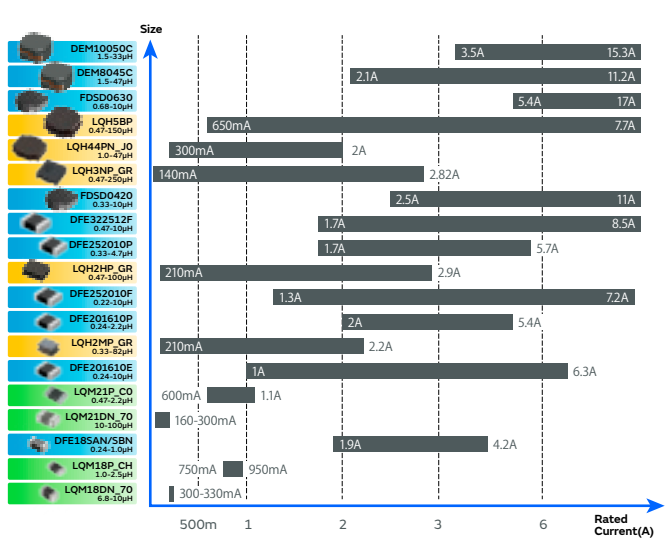
| Structure          | Description  | Series                         |
|--------------------|--|--------------------------------|
| Wound Metal Alloy  | Supports high current by using metal materials in which magnetic saturation does not occur so easily. This product can be used for a wide range of high current power circuits from smart phones to industrial electronics and automotive device applications. | DFEC/DFES series<br>FSD series |
| Multilayer Type    | The features of this product is its small size and low profile. For example, 2012 or smaller footprint and 0.6mm height. This is ideal for low power circuits, including wearable devices and smartphones.   | LQM series                     |
| Wound Ferrite Core | A feature of this product is the extensive lineup which supports an inductance of 100 uH or more. It is suitable for step-up power supply circuits in backlights, and choke applications.  | LQH series<br>DEM series       |

### Recommended Lineup (General)

List of inductance values

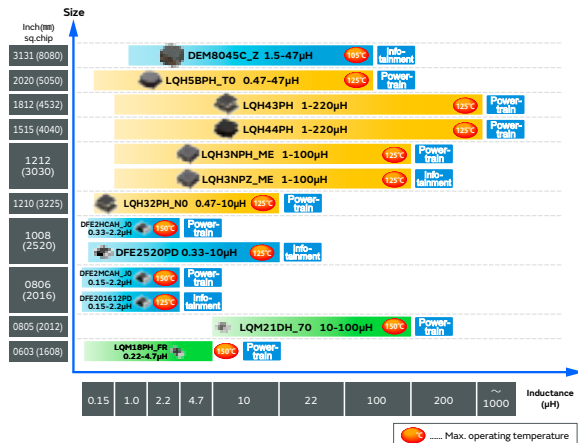


List of rated current values

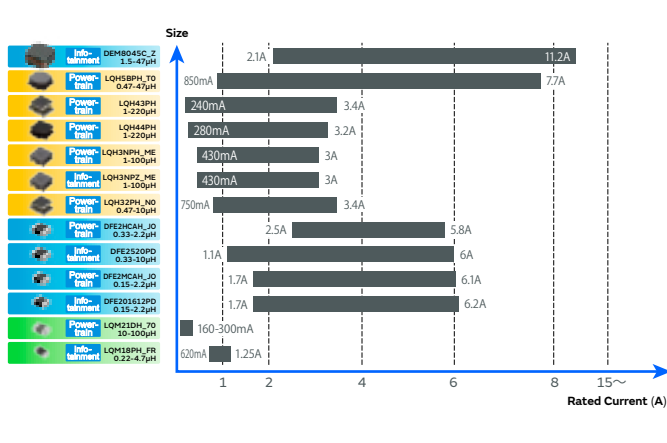


### Recommended Lineup (For Automotive)











List of inductance values












List of rated current values



**For Power Circuits (For General)**

| Structure             | Size Code<br>inch (mm) | Short Series Name/View   | Series   | Thickness<br>(mm/max.)   | Inductance Range | Rated Current Range |
|-----------------------|------------------------|--|--|--|------------------|---------------------|
| Wound<br>Metal Alloy  | 0603 (1608)            | DFE18SAN   |  DFE18SAN_E0  | 0.8  | 240nH to 1µH     | 2A to 4.2A          |
|                       |                        |  | DFE18SAN_G0  | 1.0  | 240nH to 1µH     | 2.1A to 4.9A        |
| DFE18SBN              |                        |  DFE18SBN_E0  | 0.8  | 1µH  | 1.9A             |                     |
| LQM18DN               |                        |  LQM18DN_70   | 0.95   | 6.8µH to 10µH  | 300mA to 330mA   |                     |
| Multilayer Type       |                        | LQM18PN  |  LQM18PN_B0   | 0.4  | 1.5µH            | 600mA               |
|                       |                        |  | LQM18PN_C0   | 0.55   | 470nH to 2.2µH   | 700mA to 850mA      |
|                       |                        |  | LQM18PN_D0   | 0.75   | 2.5µH            | 700mA               |
|                       |                        |  | LQM18PN_DH   | 0.75   | 2.2µH            | 650mA               |
|                       |                        |  | LQM18PN_F0   | 0.95   | 1µH              | 600mA               |
|                       |                        |  | LQM18PN_FH   | 0.95   | 470nH to 2.2µH   | 700mA to 1.4A       |
|                       | LQM18PN_FR             |  | 0.95   | 220nH to 4.7µH   | 620mA to 1.25A   |                     |
|                       | LQM18PN_GH             |  | 1.0  | 1µH to 3.3µH   | 1.05A            |                     |
| LQM18PW_CH            | 0.65                   | 1µH to 2.5µH   | 750mA to 950mA   |  |                  |                     |
| Wound<br>Metal Alloy  | 0805 (2012)            | DFE2012  |  DFE201210U  | 1.0  | 240nH to 2.2µH   | 2A to 6.5A          |
| Multilayer Type       |                        | LQM21PN  |  LQM21PN_C0 | 0.55   | 470nH to 2.2µH   | 600mA to 1.1A       |
|                       |                        |  | LQM21PN_CA   | 0.65   | 2.2µH            | 1.05A               |
|                       |                        |  | LQM21PN_CH   | 0.55   | 470nH to 2.2µH   | 1.05A to 1.6A       |
|                       |                        |  | LQM21PN_EH   | 0.8  | 240nH to 2.2µH   | 1.1A to 2.8A        |
|                       |                        |  | LQM21PN_G0   | 1.0  | 470nH to 3.3µH   | 800mA to 1.3A       |
|                       |                        |  | LQM21PN_GC   | 1.0  | 1µH to 2.2µH     | 800mA to 900mA      |
|                       |                        |  | LQM21PN_GH   | 1.0  | 470nH to 4.7µH   | 1A to 2.4A          |
|                       |                        |  | LQM21PN_GR   | 1.0  | 1µH to 4.7µH     | 800mA to 1.3A       |
| LQM21PN_GS            |                        | 1.0  | 2.2µH to 4.7µH   | 750mA to 950mA   |                  |                     |
| Wound<br>Metal Alloy  | 0806 (2016)            | DFE2016  |  DFE201610C | 1.0  | 560nH to 2.2µH   | 1.5A to 2.8A        |
|                       |                        |  | DFE201610E   | 1.0  | 240nH to 10µH    | 1A to 6.3A          |
|                       |                        |  | DFE201610P   | 1.0  | 240nH to 2.2µH   | 2A to 5.4A          |
|                       |                        |  | DFE201612C   | 1.2  | 470nH to 2.2µH   | 1.6A to 3.4A        |
|                       |                        |  | DFE201612E   | 1.2  | 240nH to 4.7µH   | 1.8A to 6.6A        |
|                       |                        |  | DFE201612P   | 1.2  | 240nH to 2.2µH   | 2.1A to 6.5A        |
| Wound<br>Ferrite Core | LQH2MCN                |  LQH2MCN_02 | 0.95   | 1µH to 82µH  | 90mA to 485mA    |                     |
|                       |                        | LQH2MCN_52   | 0.7  | 1µH to 22µH  | 130mA to 595mA   |                     |
| LQH2MPN               |                        |  LQH2MPN_GR | 0.95   | 330nH to 82µH  | 210mA to 2.2A    |                     |
|                       |                        | Multilayer Type  | LQM2MPN  |  LQM2MPN_DH | 0.7              | 2.2µH               |
| LQM2MPN_EH            | 0.8                    |  |  | 240nH to 2.2µH   | 1.1A to 4.1A     |                     |
| LQM2MPN_G0            | 1.0                    |  |  | 470nH to 4.7µH   | 1.1A to 1.6A     |                     |
| LQM2MPN_GH            | 1.0                    |  |  | 160nH to 2.2µH   | 1.3A to 5A       |                     |







































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| Structure             | Size Code<br>inch (mm) | Short Series Name/View  | Series     | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |               |
|-----------------------|------------------------|---|------------|------------------------|------------------|---------------------|---------------|
| Wound<br>Metal Alloy  | 1008 (2520)            |    | DFE252007F | 0.7                    | 470nH to 4.7µH   | 1.2A to 3.3A        |               |
|                       |                        |   | DFE252008C | 0.8                    | 470nH to 4.7µH   | 1.1A to 3A          |               |
|                       |                        |   | DFE252008U | 0.8                    | 470nH to 10µH    | 1A to 4.5A          |               |
|                       |                        |   | DFE252010C | 1.0                    | 470nH to 10µH    | 1A to 3.5A          |               |
|                       |                        |   | DFE252010F | 1.0                    | 220nH to 10µH    | 1.7A to 7.2A        |               |
|                       |                        |   | DFE252010P | 1.0                    | 330nH to 4.7µH   | 1.7A to 5.7A        |               |
|                       |                        |   | DFE252012C | 1.2                    | 470nH to 10µH    | 1A to 3.8A          |               |
|                       |                        |   | DFE252012F | 1.2                    | 330nH to 10µH    | 1.4A to 7.6A        |               |
|                       |                        |   | DFE252012P | 1.2                    | 330nH to 4.7µH   | 2A to 6.6A          |               |
| Wound<br>Ferrite Core | 1008 (2520)            |    | LQH2HPN_DR | 0.6                    | 470nH to 22µH    | 270mA to 1.67A      |               |
|                       |                        |   | LQH2HPN_GR | 1.0                    | 470nH to 100µH   | 210mA to 2.9A       |               |
|                       |                        |   | LQH2HPN_JR | 1.2                    | 470nH to 22µH    | 540mA to 3.5A       |               |
| Multilayer Type       | 1008 (2520)            |  | LQM2HPN_CH | 0.55                   | 240nH to 2.2µH   | 850mA to 2.55A      |               |
|                       |                        |   | LQM2HPN_E0 | 0.8                    | 560nH            | 1.5A                |               |
|                       |                        |   | LQM2HPN_EH | 0.8                    | 240nH to 2.2µH   | 1.3A to 4.5A        |               |
|                       |                        |   | LQM2HPN_GO | 1.0                    | 470nH to 4.7µH   | 1.1A to 1.8A        |               |
|                       |                        |   | LQM2HPN_GC | 1.0                    | 1µH to 4.7µH     | 800mA to 1.5A       |               |
|                       |                        |   | LQM2HPN_GH | 1.0                    | 240nH to 2.2µH   | 1.5A to 5A          |               |
|                       |                        |   | LQM2HPN_GS | 1.0                    | 2.2µH to 4.7µH   | 1A to 1.1A          |               |
|                       |                        |   | LQM2HPN_J0 | 1.2                    | 1µH to 3.3µH     | 1A to 1.5A          |               |
|                       |                        |   | LQM2HPN_JH | 1.2                    | 470nH to 2.2µH   | 1.5A to 3.2A        |               |
| Wound<br>Ferrite Core | 3mm square             |  | DEM2812C   | 1.2                    | 470nH to 12µH    | 760mA to 3.1A       |               |
|                       |                        |   | DEM2815C   | 1.5                    | 470nH to 15µH    | 800mA to 3.9A       |               |
|                       |                        |   | DEM2818C   | 1.8                    | 470nH to 12µH    | 1A to 4.7A          |               |
|                       |                        |   | DEM3512C   | 1.2                    | 680nH to 22µH    | 530mA to 2.5A       |               |
|                       |                        |   | DEM3518C   | 1.8                    | 560nH to 22µH    | 880mA to 3.4A       |               |
|                       |                        |  | LQH3NPN_GR | 1.0                    | 470nH to 250µH   | 140mA to 2.82A      |               |
|                       |                        |   | LQH3NPN_JR | 1.2                    | 680nH to 47µH    | 570mA to 2.86A      |               |
|                       |                        |   | LQH3NPN_ME | 1.5                    | 1µH to 100µH     | 430mA to 3A         |               |
|                       |                        |   | LQH3NPN_ME | 1.5                    | 1µH to 100µH     | 430mA to 3A         |               |
| Multilayer Type       | 1206 (3216)            |  | LQM31PN    | LQM31PN_00             | 0.95             | 470nH to 4.7µH      | 700mA to 1.4A |
| Wound<br>Metal Alloy  | 1210 (3225)            |  | DFE322510C | 1.0                    | 470nH to 10µH    | 1A to 3.8A          |               |
|                       |                        |   | DFE322512C | 1.2                    | 470nH to 10µH    | 1.2A to 4.7A        |               |
|                       |                        |   | DFE322512F | 1.2                    | 330nH to 10µH    | 1.7A to 8.5A        |               |
| Wound<br>Ferrite Core | 1210 (3225)            |  | LQH32PB_N0 | 1.7                    | 470nH to 120µH   | 200mA to 3.4A       |               |
|                       |                        |   | LQH32PB_NC | 1.7                    | 470nH to 22µH    | 650mA to 4.4A       |               |
|                       |                        |   | LQH32PN_N0 | 1.7                    | 470nH to 120µH   | 200mA to 3.4A       |               |
|                       |                        |   | LQH32PN_NC | 1.7                    | 470nH to 22µH    | 650mA to 4.4A       |               |
| Multilayer Type       | 1210 (3225)            |  | LQM32PN_GO | 1.0                    | 1µH              | 1.8A                |               |
|                       |                        |   | LQM32PN_GC | 1.0                    | 1µH              | 2.2A                |               |

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## Inductors for Power Lines

| Structure  | Size Code<br>inch (mm)   | Short Series Name/View | Series   | Thickness<br>(mm/max.)   | Inductance Range | Rated Current Range |                |
|--|--|------------------------|--|--|------------------|---------------------|----------------|
| Wound<br>Metal Alloy   | 4mm square   | FDSD04                 |  FDSD0412       | 1.2  | 330nH to 4.7µH   | 2.5A to 7.5A        |                |
|  |  |                        |  FDSD0415       | 1.5  | 220nH to 4.7µH   | 2.9A to 12A         |                |
|  |  |                        |  FDSD0420       | 2.0  | 330nH to 10µH    | 2.5A to 11A         |                |
|  |  |                        |  FDSD0420W      | 2.0  | 15µH to 22µH     | 1.5A to 1.9A        |                |
| Wound<br>Ferrite Core  |  | LQH44PN                |  LQH44PN_J0     | 1.2  | 1µH to 47µH      | 380mA to 2A         |                |
|  |  |                        |  LQH44PN_P0     | 1.8  | 1µH to 22µH      | 800mA to 2.95A      |                |
|  |  |                        |  LQH43P         | 2.8  | 1µH to 220µH     | 240mA to 3.4A       |                |
|  |  |                        |  LQH43PN_26     | 2.8  | 1µH to 220µH     | 240mA to 3.4A       |                |
| Wound<br>Ferrite Core  |  | 5mm square             | LQH5BP   |  LQH5BPB_T0 | 2.2              | 470nH to 22µH       | 1.4A to 7.7A   |
|  |  |                        |  |  LQH5BPN_38 | 4.0              | 1µH to 150µH        | 650mA to 7A    |
|  |  |                        |  |  LQH5BPN_T0 | 2.2              | 470nH to 22µH       | 1.4A to 7.7A   |
|  |  |                        | D52LC/D53LC  |  D52LC      | 2.0              | 1.2µH to 100µH      | 260mA to 2.44A |
|  |  D53LC      |                        |  | 3.0  | 1.1µH to 220µH   | 350mA to 3.87A      |                |
|  | Wound<br>Metal Alloy   |                        | FDSD05   |  FDSD0512 | 1.2              | 1µH to 6.8µH        | 2.3A to 6.1A   |
|  FDSD0515 |  | 1.5                    |  | 1µH to 4.7µH   | 3.2A to 7A       |                     |                |
|  FDSD0518 |  | 1.8                    |  | 680nH to 10µH  | 2.7A to 9A       |                     |                |
| Wound<br>Ferrite Core  | 6 to 9mm<br>square   | DG60                   |  DG6028C      | 2.8  | 1µH to 22µH      | 1.7A to 5.8A        |                |
|  |  |                        |  DG6045C      | 4.5  | 1µH to 100µH     | 900mA to 9.5A       |                |
|  |  |                        |  DG6050C      | 5.0  | 1.2µH to 100µH   | 1.2A to 9.8A        |                |
|  |  | D63                    |  D63LCB       | 3.0  | 1µH to 150µH     | 440mA to 4.52A      |                |
|  |  | DS75LC                 |  DS75LC       | 5.0  | 1µH to 470µH     | 430mA to 9.2A       |                |
|  |  | DEM80                  |  DEM8030C     | 3.0  | 2.2µH to 47µH    | 1.3A to 6.2A        |                |
|  |  |                        |  DEM8040C     | 4.0  | 1.5µH to 33µH    | 2.4A to 10A         |                |
|  |  |                        |  DEM8045C     | 4.5  | 1.5µH to 47µH    | 2.1A to 11.2A       |                |
|  |  | DG80                   |  DG8040C      | 4.0  | 1µH to 100µH     | 1.3A to 10.4A       |                |
|  |  | Wound<br>Metal Alloy   | FCUL05   |  FCUL0530 | 3.0              | 360nH to 470nH      | 16A to 18A     |
|  FDSD06   | 3.0  |                        |  | 680nH to 10µH  | 5.4A to 17A      |                     |                |
| FCUL06   |  FCUL0624 |                        |  | 2.4  | 220nH to 470nH   | 17A to 24A          |                |
|  |  FCUL0630 |                        |  | 3.0  | 120nH to 680nH   | 15A to 32A          |                |
| Wound<br>Ferrite Core  | 10mm square<br>and over  | DEM10050               |  DEM10050C    | 5.0  | 1.5µH to 33µH    | 3.5A to 15.3A       |                |
|  |  |                        |  DEM10050C_DD | 5.0  | 1.5µH to 33µH    | 3.5A to 15.3A       |                |
|  |  | DS10/DS12              |  DS104C2      | 4.8  | 1.1µH to 120µH   | 970mA to 11.7A      |                |
|  |  |                        |  DS106C2      | 6.8  | 1.2µH to 330µH   | 690mA to 12A        |                |
|  |  |                        |  DS126C2      | 6.8  | 1.7µH to 680µH   | 580mA to 11.8A      |                |
|  |  | Wound<br>Metal Alloy   | FDA10/FDA12  |  FDA1055  | 5.5              | 560nH to 5.6µH      | 8A to 27.7A    |
|  FDA1254  | 5.4  |                        |  | 680nH to 8µH   | 9.1A to 29.1A    |                     |                |
| FCUL10   |  FCUL1040 | 4.0                    | 180nH to 420nH   | 34A to 53A   |                  |                     |                |
|  |  FCUL1060 | 6.0                    | 360nH to 560nH   | 34A to 41A   |                  |                     |                |












## For Choke Circuits (For General)

| Structure          | Size Code<br>inch (mm) | Short Series Name/View  | Series     | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|--------------------|------------------------|---|------------|------------------------|------------------|---------------------|
| Wound Ferrite Core | 0402 (1005)            | LQW15DN    | LQW15DN_00 | 0.7                    | 10µH to 15µH     | 100mA to 120mA      |
|                    | 0603 (1608)            | LQM18FN    | LQM18FN_00 | 0.9                    | 1µH to 10µH      | 50mA to 150mA       |
| Multilayer Type    | 0805 (2012)            | LQM21DN    | LQM21DN_00 | 1.05                   | 1µH to 47µH      | 7mA to 60mA         |
|                    |                        |   | LQM21DN_70 | 1.45                   | 10µH to 100µH    | 160mA to 300mA      |
|                    |                        | LQM21FN    | LQM21FN_00 | 1.45                   | 1µH to 47µH      | 7mA to 220mA        |
|                    |                        |   | LQM21FN_80 | 1.45                   | 4.7µH to 10µH    | 100mA to 120mA      |
| Wound Ferrite Core | 1206 (3216)            | LQH31CN    | LQH31CN_03 | 2.0                    | 120nH to 100µH   | 80mA to 970mA       |
|                    | 1210 (3225)            | LQH32CN    | LQH32CN_23 | 2.2                    | 1µH to 560µH     | 60mA to 800mA       |
|                    |                        |   | LQH32CN_33 | 2.2                    | 150nH to 10µH    | 450mA to 1.45A      |
|                    |                        | LQH32DN    | LQH32DN_23 | 2.2                    | 1µH to 560µH     | 60mA to 800mA       |
|                    |                        |   | LQH32DN_53 | 1.7                    | 1µH to 100µH     | 100mA to 1A         |
|                    | 4mm square             | LQH43CN    | LQH43CN_03 | 2.8                    | 1µH to 470µH     | 90mA to 1.08A       |
|                    | LQH43CN_33             |   | 2.8        | 560nH to 3.9µH         | 1.6A to 2.95A    |                     |
|                    | 5mm square             | LQH55DN  | LQH55DN_03 | 5.0                    | 120nH to 10mH    | 50mA to 6A          |
|                    | 6 to 9mm square        | LQH66SN  | LQH66SN_03 | 5.0                    | 270nH to 10mH    | 50mA to 6A          |


**For Power Circuits (Infotainment)**

| Structure          | Size Code<br>inch (mm) | Short Series Name/View | Series       | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|--------------------|------------------------|------------------------|--------------|------------------------|------------------|---------------------|
| Multilayer Type    | 0603 (1608)            | LQM18PZ                | LQM18PZ_CH   | 0.6                    | 1µH to 2.5µH     | 750mA to 950mA      |
|                    |                        |                        | LQM18PZ_DH   | 0.75                   | 2.2µH            | 650mA               |
|                    |                        |                        | LQM18PZ_FH   | 0.95                   | 2.2µH            | 700mA               |
|                    | 0805 (2012)            | LQM21PZ                | LQM21PZ_C0   | 0.55                   | 470nH to 2.2µH   | 600mA to 1.1A       |
|                    |                        |                        | LQM21PZ_G0   | 1.0                    | 470nH to 3.3µH   | 800mA to 1.3A       |
|                    |                        |                        | LQM21PZ_GC   | 1.0                    | 1µH to 2.2µH     | 800mA to 900mA      |
|                    |                        |                        | LQM21PZ_GR   | 1.0                    | 1µH to 4.7µH     | 800mA to 1.3A       |
| Multilayer Type    | 0806 (2016)            | DFE2016                | DFE201612P_D | 1.2                    | 150nH to 2.2µH   | 1.7A to 6.2A        |
|                    |                        | LQH2MPZ                | LQH2MPZ_GR   | 0.95                   | 330nH to 82µH    | 210mA to 2.2A       |
|                    |                        | LQM2MPZ                | LQM2MPZ_G0   | 1.0                    | 470nH to 4.7µH   | 1.1A to 1.6A        |
|                    |                        |                        | LQM2MPZ_JH   | 1.2                    | 100nH            | 4A                  |
| Wound Ferrite Core |                        | LQH2HPZ                | LQH2HPZ_DR   | 0.6                    | 470nH to 22µH    | 270mA to 1.67A      |
|                    |                        |                        | LQH2HPZ_GR   | 1.0                    | 470nH to 22µH    | 460mA to 2.9A       |
|                    |                        |                        | LQH2HPZ_JR   | 1.2                    | 470nH to 22µH    | 540mA to 3.5A       |
| Multilayer Type    | 1008 (2520)            | LQM2HPZ                | LQM2HPZ_E0   | 0.8                    | 560nH            | 1.5A                |
|                    |                        |                        | LQM2HPZ_G0   | 1.0                    | 470nH to 4.7µH   | 1.1A to 1.8A        |
|                    |                        |                        | LQM2HPZ_GC   | 1.0                    | 1µH to 4.7µH     | 800mA to 1.5A       |
|                    |                        |                        | LQM2HPZ_GS   | 1.0                    | 2.2µH to 4.7µH   | 1A to 1.1A          |
|                    |                        |                        | LQM2HPZ_J0   | 1.2                    | 1µH to 3.3µH     | 1A to 1.5A          |
| Wound Metal Alloy  |                        | DFE2520                | DFE252012P_D | 1.2                    | 330nH to 10µH    | 1.1A to 6A          |
| Wound Ferrite Core | 3mm square             | LQH3NPZ                | LQH3NPZ_GR   | 1.0                    | 470nH to 47µH    | 460mA to 2.82A      |
|                    |                        |                        | LQH3NPZ_JR   | 1.2                    | 680nH to 47µH    | 570mA to 2.86A      |
|                    |                        |                        | LQH3NPZ_ME   | 1.5                    | 1µH to 100µH     | 430mA to 3A         |
| Wound Metal Alloy  |                        | DFE3225                | DFE322520F_D | 2.0                    | 1µH to 4.7µH     | 3.4A to 7.5A        |
| Wound Ferrite Core | 1210 (3225)            | LQH32PZ                | LQH32PZ_N0   | 1.7                    | 470nH to 120µH   | 200mA to 3.4A       |
|                    |                        |                        | LQH32PZ_NC   | 1.7                    | 470nH to 22µH    | 650mA to 4.4A       |
|                    | 4mm square             | LQH43PZ                | LQH43PZ_26   | 2.8                    | 1µH to 220µH     | 240mA to 3.4A       |
|                    | 5mm square             | LQH5BPZ                | LQH5BPZ_T0   | 2.2                    | 470nH to 22µH    | 1.4A to 7.7A        |
|                    | 6 to 9mm square        | DEM80                  | DEM8045C_Z   | 4.5                    | 1.5µH to 47µH    | 2.1A to 11.2A       |


## For Power Circuits (Powertrain)

| Structure             | Size Code<br>inch (mm) | Short Series Name/View   | Series  | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|-----------------------|------------------------|--|---|------------------------|------------------|---------------------|
| Multilayer Type       | 0603 (1608)            | LQM18PH   | LQM18PH_FR  | 0.95                   | 220nH to 4.7µH   | 620mA to 1.25A      |
|                       | 0805 (2012)            | LQM21PH   | LQM21PH_GO  | 1.0                    | 0.47µH to 0.54µH | 1.3A                |
|                       |                        |  | LQM21PH_GC  | 1.0                    | 1.0µH to 2.2µH   | 800mA to 1A         |
| Wound<br>Metal Alloy  | 0806 (2016)            | DFE2MCAH  | DFE2MCAH_J0   | 1.2                    | 0.15µH to 2.2µH  | 1.7A to 6.1A        |
|                       | 1008 (2520)            | DFE2HCAH  | DFE2HCAH_J0   | 1.2                    | 330nH to 2.2µH   | 2.5A to 5.8A        |
| Wound<br>Ferrite Core | 1212 (3030)            | LQH3NPH   | LQH3NPH_ME  | 1.5                    | 1µH to 100µH     | 430mA to 3A         |
|                       | 1210 (3225)            | LQH32PH   | LQH32PH_N0  | 1.7                    | 470nH to 10µH    | 750mA to 3.4A       |
|                       |                        |  | LQH32PH_NC  | 1.7                    | 470nH to 22µH    | 650mA to 4.4A       |
|                       | 4mm square             | LQH44PH   | LQH44PH_PR  | 1.8                    | 1µH to 220µH     | 330mA to 4.3A       |
|                       |                        |  | LQH43PH  | LQH43PH_26             | 2.8              | 1µH to 220µH        |
|                       | 5mm square             | LQH5BPH   | LQH5BPH_T0  | 2.2                    | 0.47µH to 47µH   | 850mA to 7.7A       |

## For Choke Circuits (Infotainment)

| Structure             | Size Code<br>inch (mm) | Short Series Name/View   | Series     | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|-----------------------|------------------------|--|------------|------------------------|------------------|---------------------|
| Wound<br>Ferrite Core | 1210 (3225)            | LQH32D  | LQH32DZ_23 | 2.2                    | 1µH to 470µH     | 60mA to 800mA       |
|                       |                        |  | LQH32DZ_53 | 1.7                    | 1µH to 100µH     | 100mA to 1A         |

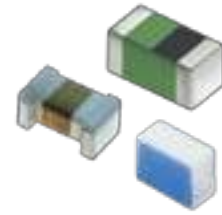
## For Choke Circuits (Powertrain)

| Structure             | Size Code<br>inch (mm) | Short Series Name/View  | Series     | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|-----------------------|------------------------|---|------------|------------------------|------------------|---------------------|
| Multilayer Type       | 0805 (2012)            | LQM21DH  | LQM21DH_70 | 1.45                   | 10µH to 100µH    | 160mA to 300mA      |
| Wound<br>Ferrite Core | 1210 (3225)            | LQH32C   | LQH32CH_23 | 2.2                    | 1µH to 22µH      | 250mA to 800mA      |
|                       |                        |   | LQH32CH_33 | 2.2                    | 150nH to 10µH    | 450mA to 1.45A      |
|                       |                        |   | LQH32CH_53 | 1.7                    | 1µH to 22µH      | 250mA to 1A         |
|                       |                        | LQW32F   | LQW32FT_0H | 2.5                    | 10µH to 47µH     | 500mA to 700mA      |

# RF Inductors

## Main Type:

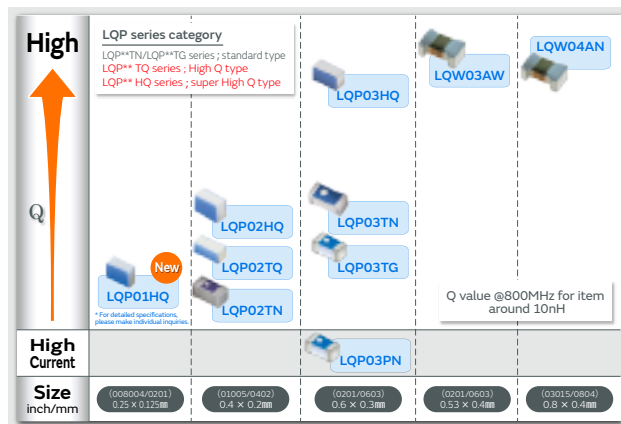
- Film Type ▪ Wire Wound Type ▪ Multilayer Type



An RF inductor is used for matching applications and choke applications in the RF section which has wireless communication functions. By using three characteristic methods, you can select the optimum series for the intended application. For a smartphone or a module film type LQP series which is compact and also has high Q characteristics is optimum. For an RF inductor of size 1005 mm or more, the high Q wound type LQW series which has a large rated current value is recommended for use in a base station or STB. While the multilayer LQG series has a good balance between cost and performance, it is recommended for a wide range of automotive applications, based on our market achievements over many years. Products that are suitable for choke circuits using magnetic materials, such as the LQW\_CN series, LQW\_H series and other series are also available for power lines. You can select the optimum series from our lineup, based on either the intended application or the relationship between the size and Q characteristics.

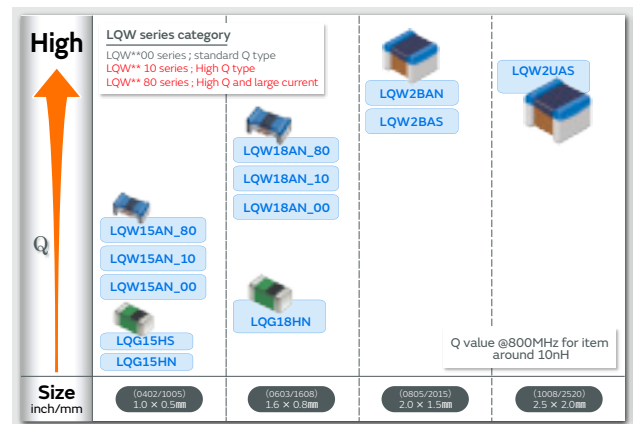
### General (0.8×0.4 mm or less)

Lineup list



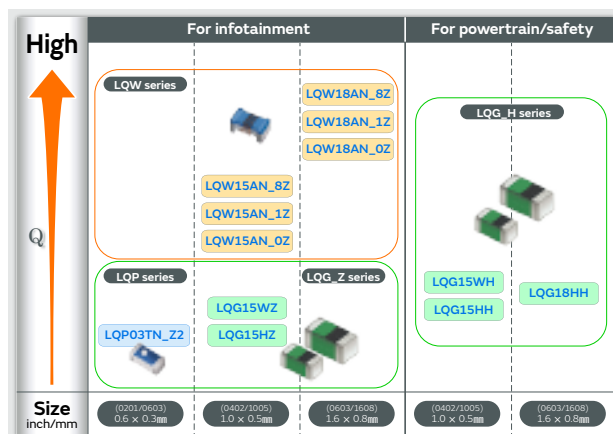
### General (1.0×0.5 mm or more)

Lineup list















### For Automotive











Lineup list




## RF Circuits (0.8 x 0.4 mm or less)

| Structure                     | Size Code<br>inch (mm) | Short Series Name/View | Series   | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|-------------------------------|------------------------|------------------------|--|------------------------|------------------|---------------------|
| Wound<br>non-magnetic<br>type | 0201 (0603)            | LQW03A                 |  LQW03AW_00 | 0.45                   | 1nH to 15.5nH    | 230mA to 900mA      |
|                               | 03019 (0805)           | LQW04A                 |  LQW04AN_00 | 0.45                   | 0.8nH to 33nH    | 140mA to 1.8A       |
|                               |                        |                        |  LQW04AN_10 | 0.45                   | 36nH to 56nH     | 180mA to 200mA      |
|                               |                        |                        |  LQW04AN_20 | 0.45                   | 36nH to 56nH     | 120mA to 155mA      |
| Film type                     | 008004 (0201)          | LQP01                  |  LQP01HQ    | 0.213                  | 0.3nH to 2.7nH   | 200mA to 500mA      |
|                               | 01005 (0402)           | LQP02                  |  LQP02HQ_02 | 0.32                   | 0.2nH to 56nH    | 100mA to 1A         |
|                               |                        |                        |  LQP02TQ_02 | 0.22                   | 0.2nH to 22nH    | 120mA to 990mA      |
|                               |                        |                        |  LQP02TN_02 | 0.22                   | 0.2nH to 39nH    | 90mA to 320mA       |
|                               | 0201 (0603)            | LQP03                  |  LQP03HQ_02 | 0.42                   | 0.5nH to 470nH   | 50mA to 1.1A        |
|                               |                        |                        |  LQP03TN_02 | 0.33                   | 0.6nH to 270nH   | 60mA to 850mA       |
|                               |                        |                        |  LQP03TG_02 | 0.33                   | 0.1nH to 120nH   | 80mA to 850mA       |
|                               |                        |                        |  LQP03PN_02 | 0.33                   | 2.2nH to 4.7nH   | 900mA to 1.4A       |




## RF Circuits (1.0 x 0.5 mm or more)

| Structure                     | Size Code<br>inch (mm) | Short Series Name/View | Series   | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|-------------------------------|------------------------|------------------------|--|------------------------|------------------|---------------------|
| Wound<br>non-magnetic<br>type | 0402 (1005)            | LQW15A                 |  LQW15AN_00 | 0.6                    | 1.5nH to 120nH   | 110mA to 1A         |
|                               |                        |                        |  LQW15AN_10 | 0.6                    | 1.3nH to 8.4nH   | 640mA to 1.2A       |
|                               |                        |                        |  LQW15AN_80 | 0.6                    | 1.3nH to 75nH    | 320mA to 3.15A      |
|                               |                        |                        |  LQW15AW_80 | 0.66                   | 51nH to 220nH    | 220mA to 480mA      |
|                               | 0603 (1608)            | LQW18A                 |  LQW18AN_00 | 1.0                    | 2.2nH to 470nH   | 75mA to 850mA       |
|                               |                        |                        |  LQW18AN_10 | 1.0                    | 2.2nH to 33nH    | 550mA to 1.4A       |
|                               |                        |                        |  LQW18AN_80 | 1.0                    | 2.2nH to 390nH   | 190mA to 3.2A       |
|                               |                        |                        |  LQW18AS_00 | 1.0                    | 1.2nH to 390nH   | 100mA to 700mA      |
|                               | 0806 (2016)            | LQW2B                  |  LQW18AS_0C | 1.0                    | 1.6nH to 390nH   | 100mA to 700mA      |
|                               |                        |                        |  LQW2BAN_00 | 1.52                   | 3.2nH to 200nH   | 750mA to 3.8A       |
|                               |                        |                        |  LQW2BAS_00 | 1.52                   | 2.7nH to 1μH     | 170mA to 910mA      |
|                               |                        |                        |  LQW2BHN_03 | 1.78                   | 3.3nH to 470nH   | 160mA to 1.32A      |
|                               | 1008 (2520)            | LQW2U                  |  LQW2BHN_13 | 1.78                   | 2.7nH to 27nH    | 900mA to 1.9A       |
|                               |                        |                        |  LQW2UAS_00 | 2.03                   | 12nH to 4.7μH    | 260mA to 1A         |
|                               |                        |                        |  LQW2UAS_0C | 2.03                   | 12nH to 8.2μH    | 170mA to 1A         |
|                               | 1206 (3216)            | LQW31H                 |  LQW31HN_03 | 2.0                    | 8.8nH to 100nH   | 230mA to 750mA      |
| Multilayer Type               | 0402 (1005)            | LQG15H                 |  LQG15HN_02 | 0.55                   | 1nH to 120nH     | 150mA to 1A         |
|                               |                        |                        |  LQG15HS_02 | 0.55                   | 1nH to 270nH     | 110mA to 1A         |
|                               | 0603 (1608)            | LQG18H                 |  LQG18HN_00 | 0.95                   | 1.2nH to 100nH   | 350mA to 1.1A       |






### For Choke/Tuner Circuits (1.0 x 0.5 mm or more)

| Structure               | Size Code inch (mm) | Short Series Name/View | Series   | Thickness (mm/max.) | Inductance Range | Rated Current Range |
|-------------------------|---------------------|------------------------|--|---------------------|------------------|---------------------|
| Wound Ferrite Core type | 0402 (1005)         | LQW15C                 |  LQW15CN_00 | 0.6                 | 18nH to 200nH    | 390mA to 1.4A       |
|                         |                     |                        | LQW15CN_10   | 0.6                 | 20nH to 3.3µH    | 130mA to 2.2A       |
|                         | 0402 (1005)         | LQW15D                 |  LQW15DN_00 | 0.7                 | 10µH to 15µH     | 100mA to 120mA      |
|                         | 0603 (1608)         | LQW18C                 |  LQW18CN_00 | 0.95                | 4.9nH to 650nH   | 430mA to 2.6A       |
|                         | 0805 (2012)         | LQW21H                 |  LQW21HN_00 | 1.0                 | 470nH to 2.2µH   | 75mA to 160mA       |
|                         | 1206 (3216)         | LQH31H                 |  LQH31HN_03 | 2.0                 | 54nH to 880nH    | 180mA to 920mA      |




### For Choke/Tuner Circuits (Infotainment)

| Structure               | Size Code inch (mm) | Short Series Name/View | Series  | Thickness (mm/max.) | Inductance Range | Rated Current Range |
|-------------------------|---------------------|------------------------|---|---------------------|------------------|---------------------|
| Wound Ferrite Core type | 0402 (1005)         | LQW15C                 |  LQW15CN_OZ  | 0.6                 | 18nH to 200nH    | 390mA to 1.4A       |
|                         |                     |                        | LQW15CN_1Z  | 0.6                 | 20nH to 560nH    | 300mA to 2.2A       |
|                         | 0603 (1608)         | LQW18C                 |  LQW18CN_OZ  | 0.95                | 4.9nH to 650nH   | 430mA to 2.6A       |
|                         | 1206 (3216)         | LQH31H                 |  LQH31HZ_03 | 2.0                 | 54nH to 880nH    | 180mA to 920mA      |


### For RF Circuits (Infotainment)

| Structure               | Size Code inch (mm) | Short Series Name/View | Series   | Thickness (mm/max.) | Inductance Range | Rated Current Range |
|-------------------------|---------------------|------------------------|--|---------------------|------------------|---------------------|
| Wound non-magnetic type | 0402 (1005)         | LQW15A                 |  LQW15AN_OZ | 0.6                 | 1.5nH to 120nH   | 110mA to 1A         |
|                         |                     |                        | LQW15AN_1Z   | 0.6                 | 1.3nH to 8.4nH   | 640mA to 1.2A       |
|                         |                     |                        | LQW15AN_8Z   | 0.6                 | 1.3nH to 75nH    | 320mA to 3.15A      |
|                         | 0603 (1608)         | LQW18A                 |  LQW18AN_OZ | 1.0                 | 2.2nH to 470nH   | 75mA to 850mA       |
|                         |                     |                        | LQW18AN_1Z   | 1.0                 | 2.2nH to 33nH    | 550mA to 1.4A       |
|                         |                     |                        | LQW18AN_8Z   | 1.0                 | 2.2nH to 390nH   | 190mA to 3.2A       |
|                         |                     | LQW18AS_OZ             | 1.0  | 1.6nH to 390nH      | 100mA to 700mA   |                     |
| Film type               | 0201 (0603)         | LQP03T                 |  LQP03TN_Z2 | 0.33                | 0.6nH to 120nH   | 80mA to 850mA       |
| Multilayer Type         | 0402 (1005)         | LQG15H                 |  LQG15HZ_02 | 0.55                | 1nH to 270nH     | 110mA to 1A         |
|                         |                     | LQG15W                 |  LQG15WZ_02 | 0.6                 | 0.7nH to 150nH   | 110mA to 1.2A       |

### For RF Circuits (Powertrain)

| Structure       | Size Code inch (mm) | Short Series Name/View | Series   | Thickness (mm/max.) | Inductance Range | Rated Current Range |
|-----------------|---------------------|------------------------|--|---------------------|------------------|---------------------|
| Multilayer Type | 0402 (1005)         | LQG15H                 |  LQG15HH_02 | 0.55                | 1nH to 270nH     | 110mA to 1A         |
|                 |                     | LQG15W                 |  LQG15WH_02 | 0.6                 | 0.7nH to 150nH   | 110mA to 1.2A       |
|                 | 0603 (1608)         | LQG18H                 |  LQG18HH_00 | 0.95                | 1.2nH to 270nH   | 200mA to 1.1A       |

**LC trap filter**

| Part number   | Impedance (Ω Typ.) |            |            | Insertion Loss Characteristic (dB Typ.) |            |            | DC Resistance Max.(Ω) | Rated Current (mA) | Self Resonant Frequency (GHz Typ.) |
|---|--------------------|------------|------------|---|------------|------------|-----------------------|--------------------|------------------------------------|
|   | at 2.40GHz         | at 2.44GHz | at 2.50GHz | at 2.40GHz                              | at 2.44GHz | at 2.50GHz |                       |                    |                                    |
| LQZ02HQ242A02  | 460                | 600        | 345        | 15.0                                    | 15.7       | 13.0       | 0.55                  | 200                | 2.44                               |

Inductors (Coils)

# General Circuit Inductors











Main Type:

- Multilayer Type
- Wire-wound Type
- 2in1 Type






We have an extensive lineup of general purpose inductors for a variety of circuits. You can select an inductor to match your particular application. Wire-wound type LQH\_M, LQH\_N series are suitable for large inductance, multilayer type LQM\_M, LQM\_N series are suitable for small size. In addition, we have the 2-in-1 type HEAWS series inductors for digital audio amplifiers.


## General Purpose (For General)

| Structure               | Size Code inch (mm) | Short Series Name/View   | Series     | Thickness (mm/max.) | Inductance Range | Rated Current Range |
|-------------------------|---------------------|--|------------|---------------------|------------------|---------------------|
| Wound Ferrite Core type | 0402 (1005)         | LQW15CA   | LQW15CA_00 | 0.66                | 22nH to 2μH      | 130mA to 1.3A       |
|                         | 0603 (1608)         | LQW18CA   | LQW18CA_00 | 0.95                | 32nH to 580nH    | 450mA to 2.2A       |
|                         | 1206 (3216)         | LQH31MN   | LQH31MN_03 | 2.0                 | 150nH to 100μH   | 45mA to 250mA       |
|                         | 1210 (3225)         | LQH32MN   | LQH32MN_23 | 2.2                 | 1μH to 560μH     | 40mA to 445mA       |
|                         | 4mm square          | LQH44NN   | LQH44NN_03 | 4.5                 | 510nH to 470μH   | 145mA to 4.5A       |
|                         |                     | LQH43M/N  | LQH43MN_03 | 2.8                 | 1μH to 1.5mH     | 40mA to 500mA       |
|                         |                     | LQH43NN_03   | 2.8        | 1μH to 2.4mH        | 25mA to 500mA    |                     |
| Multilayer Type         | 0402 (1005)         | LQB15NN   | LQB15NN_10 | 0.55                | 220nH to 560nH   | 300mA to 380mA      |
|                         | 0603 (1608)         | LQB18NN   | LQB18NN_10 | 0.95                | 220nH to 560nH   | 300mA to 450mA      |
|                         |                     | LQM18JN   | LQM18JN_00 | 0.65                | 100nH to 160nH   | 550mA to 650mA      |
|                         | 0805 (2012)         | LQM18NN   | LQM18NN_00 | 0.95                | 47nH to 2.2μH    | 15mA to 50mA        |
|                         |                     | LQM21NN   | LQM21NN_10 | 1.05                | 100nH to 4.7μH   | 30mA to 250mA       |

## General Purpose (For Automotive Infotainment)

| Structure               | Size Code inch (mm)  | Short Series Name/View  | Series     | Thickness (mm/max.) | Inductance Range | Rated Current Range |
|-------------------------|----------------------|---|------------|---------------------|------------------|---------------------|
| Wound Ferrite Core type | 1210 (3225)          | LQH32NZ  | LQH32NZ_23 | 2.2                 | 1μH to 470μH     | 45mA to 445mA       |
|                         | 4mm square           | LQH43NZ  | LQH43NZ_03 | 2.8                 | 1μH to 2.4mH     | 25mA to 500mA       |
| 2in1 Type               | 10mm square and over | HEAWS    | HEAWS      | 10.0                | 3.3μH to 10μH    | 5A to 8A            |

## General Purpose (For Automotive Powertrain)

| Structure               | Size Code<br>inch (mm) | Short Series Name/View  | Series     | Thickness<br>(mm/max.) | Inductance Range | Rated Current Range |
|-------------------------|------------------------|---|------------|------------------------|------------------|---------------------|
| Wound Ferrite Core type | 1210 (3225)            | LQH32NH  | LQH32NH_23 | 2.2                    | 1µH to 560µH     | 40mA to 780mA       |
|                         | 4mm square             | LQH43NH  | LQH43NH_03 | 2.8                    | 1µH to 2.2mH     | 30mA to 1.3A        |

## Variable Inductors

Variable inductor products are coil products that allow the inductance to be easily varied by changing the position of the ferrite core in a threaded structure. The interior is covered by a metal case that is magnetically shielded, while a resin molded structure protects the windings with a high degree of reliability.



### 5CCEG

6.5×5.9×6.0(H) mm MAX.

Supported inductance range: 0.05 to 2.7µH

#### Features

- High reliability that conforms to automotive standards
- Operating temperature range: -40°C to +85°C

#### Applications

- Ideal for use as RF matching transformers for car tuners



### FSDVA

5.8×5.8×5.5(H) mm MAX.




Supported inductance range:

0.1 to 52mH(1 to 7 mH for corner sensor applications)

#### Features



- Resistant to mechanical stress
- Operating temperature range:  
Up to 20 mH (-40°C to +105°C)  
20 mH or more (-40°C to +85°C)
- High reliability that conforms to automotive standards
- Lead coplanarity guaranteed within 0.1 mm

### 5CCEG Series

| Winding Connection<br>(Bottom View)   | Part Number        | Test Frequency<br>(MHz) | Resonance Capacitor Range<br>(pF) | Unloaded Q |
|---|--------------------|-------------------------|-----------------------------------|------------|
|  | #A1313B-0029GGH=P3 | 100                     | 11.4+3/-3%                        | 72+/-20%   |
|  | #A1313B-0030GRG=P3 | 100                     | 11.4+5/-2%                        | 61+/-20%   |
|   | #A1313B-0031GRG=P3 | 100                     | 11.4+2/-4%                        | 54+/-20%   |
|  | #A1313B-0032GGH=P3 | 100                     | 11.7+3/-3%                        | 72+/-20%   |

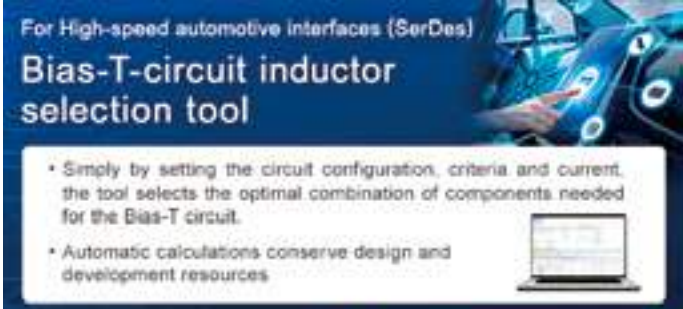


**FSDVA Series**

| Winding Connection (Bottom View)  | Part Number               | Test Frequency (kHz) | Inductance Range (mH) | Unloaded Q |
|---|---------------------------|----------------------|-----------------------|------------|
|  | <b>N1342JC-0143UG=P3</b>  | 252                  | 4.4±3%                | 25 min.    |
|  | <b>N1342LE-0144BQE=P3</b> | 252                  | 2.5±5%                | 25 min.    |


**Bias-T Inductor Design Support Tool**

To use this tool, go to <https://ds.murata.co.jp/bist/?lcid=en-us>



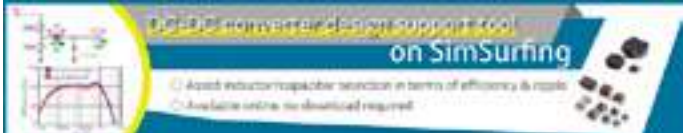
**Noise Filter Design Support Tool**

To use this tool, go to <https://ds.murata.co.jp/nfst/>



**DC-DC Converter Design Support Tool**

To use this tool, go to <https://ds.murata.co.jp/mpst/>



**Detailed Catalogs**

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- Chip Inductors (Chip Coils) Cat. No. O05E
- EMI Suppression Filters (for DC)/Chip Inductors for Automotive Cat. No. C51E

# Resistors

Full lineup for various applications

## Summary

Using Murata's ceramic processing technology and unique materials, we offer a series of resistor products.

## Lineup

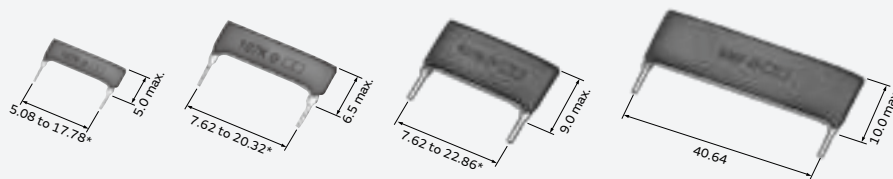
- High Voltage Resistors



<https://www.murata.com/en-global/products/resistor>

## High Voltage Resistors

Featuring thick-film resistors, the Murata MHR series of high-voltage resistors is available in compact and thin SIP packages. Variants with small deviations are also available on request.



MHR03 Series

MHR04 Series

MHR06 Series

MHR0844 Series

(in mm)

\*The terminal pitch is an integral multiple of 2.54mm.

| Series  | Resistance (min.) (MΩ) | Resistance (max.) (MΩ) | Maximum Operating Voltage (Single Use) (kV) | Maximum Operating Voltage (Molded Use) (kV) | Rated Power (W) |
|---------|------------------------|------------------------|---|---|-----------------|
| MHR03   | 1                      | 1000 to 2000           | 2 to 8                                      | 3 to 14                                     | 0.3 to 1.0      |
| MHR04   | 1                      | 1000 to 2000           | 3.5 to 10                                   | 10 to 18                                    | 0.6 to 1.7      |
| MHR06   | 1                      | 1000 to 10000          | 3.5 to 10                                   | 10 to 20                                    | 0.8 to 1.6      |
| MHR0844 | 1                      | 2000                   | 20  | 35  | 2.5             |

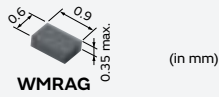
Resistance 2 element type is also available.  
For resistance value and ratio, please contact us.



# MEMS Resonator

The ultra small-sized and highly reliable resonator is realized with Murata's MEMS technology. The small size makes the resonator suitable for a variety of applications such as miniature IoT devices, wireless modules, medical devices, and industrial equipment. The resonator package is silicon based with low form factor which enables embedding with IC in over molded packages.

## For Consumer/Industrial



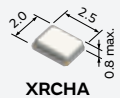
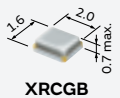
| Series | Frequency (kHz) | Frequency Tolerance (ppm) | Operating Temperature Range (°C) |
|--------|-----------------|---------------------------|----------------------------------|
| WMRAG  | 32.768          | ±20                       | -40 to 125                       |

Timing Devices

# Crystal Units

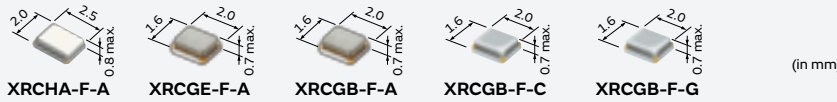
Crystal Units utilize highly accurate frequency-based high-grade quartz crystal elements. We offer a wide lineup of Crystal Units using Murata's proven package technology for small digital devices, automotive, etc.

## For Consumer/Industrial



| Series    | Type    | Seal  | Frequency (MHz) |         | Frequency Tolerance (ppm) | Frequency Shift by Temperature (ppm max.) | Operating Temperature Range (°C) |
|-----------|---------|-------|-----------------|---------|---------------------------|---|----------------------------------|
|           |         |       | 0               | 60      |                           |   |                                  |
| XRCGB-F-S | HCR2016 | Resin | 24.0000         |         | ±8                        | ±12                                       | -30 to 85                        |
|           |         |       | 26.0000         | 40.0000 | ±10                       | ±10                                       | -30 to 85                        |
| XRCGB-F-P | HCR2016 | Resin | 16.0000         | 38.4000 | ±20                       | ±20                                       | -30 to 85                        |
| XRCGB-F-M | HCR2016 | Resin | 16.0000         | 32.0000 | ±30                       | ±40                                       | -30 to 85                        |
| XRCGB-F-L | HCR2016 | Resin | 16.0000         | 50.0000 | ±100                      | ±50                                       | -30 to 85                        |
| XRCHA-F-L | HCR2520 | Resin | 16.0000         | 20.0000 | ±100                      | ±100                                      | -30 to 85                        |

### For Automotive Applications

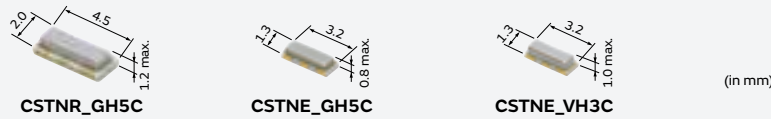


| Series    | Type    | Seal  | Frequency (MHz) |    |         |    |    |    |    | Frequency Tolerance (ppm) |    |    |    | Frequency Shift by Temperature (ppm max.) | Operating Temperature Range (°C) |            |            |
|-----------|---------|-------|-----------------|----|---------|----|----|----|----|---------------------------|----|----|----|---|----------------------------------|------------|------------|
|           |         |       | 0               | 10 | 20      | 30 | 40 | 50 | 60 | 0                         | 20 | 40 | 60 |   |                                  | 80         | 100        |
| XRCHA-F-A | HCR2520 | Resin | 16.0000         |    | 24.0000 |    |    |    |    |                           |    |    |    | ±100                                      | ±100                             | -40 to 125 |            |
| XRCGE-F-A | HCR2016 | Resin | 20.0000         |    | 23.9999 |    |    |    |    |                           |    |    |    | ±30                                       | ±45                              | -40 to 125 |            |
|           |         |       | 24.0000         |    | 27.6000 |    |    |    |    |                           |    |    |    |   | ±15                              | ±35        | -40 to 125 |
| XRCGB-F-A | HCR2016 | Resin | 30.0000         |    | 40.0000 |    |    |    |    |                           |    |    |    | ±30                                       | ±45                              | -40 to 125 |            |
|           |         |       | 24.0000         |    | 29.9999 |    |    |    |    |                           |    |    |    |   | ±30                              | ±35        | -40 to 125 |
| XRCGB-F-C | HCR2016 | Resin | 24.0000         |    | 27.6000 |    |    |    |    |                           |    |    |    | ±20                                       | ±20                              | -30 to 85  |            |
| XRCGB-F-G | HCR2016 | Resin | 24.0000         |    | 48.0000 |    |    |    |    |                           |    |    |    | ±30±45                                    | ±100                             | ±50        | -40 to 85  |

## Ceramic Resonators CERALOCK

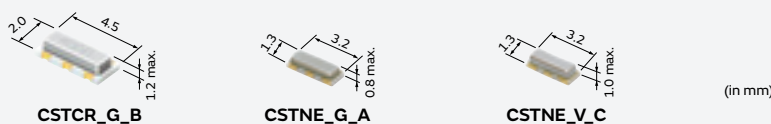
Wide product lineup of SMD and lead type versions for automotive and consumer applications.

### MHz Chip Type for Automotive (Tight Frequency Tolerance)



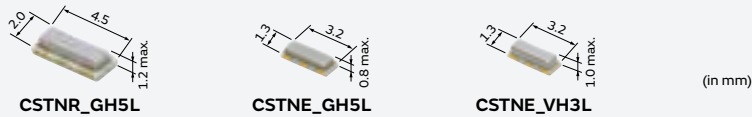
| Series     | Frequency (MHz) |    |       |    |    |    |    | Frequency Tolerance (%) |   | Frequency Shift by Temperature (% max.) | Operating Temperature Range (°C) |            |
|------------|-----------------|----|-------|----|----|----|----|-------------------------|---|---|----------------------------------|------------|
|            | 0               | 10 | 20    | 30 | 40 | 50 | 60 | 70                      | 0 |   |                                  | 1          |
| CSTNR_GH5C | 4.00            |    | 7.99  |    |    |    |    |                         |   | ±0.07                                   | ±0.13                            | -40 to 125 |
| CSTNE_GH5C | 8.00            |    | 13.99 |    |    |    |    |                         |   | ±0.07                                   | ±0.13                            | -40 to 125 |
| CSTNE_VH3C | 14.00           |    | 20.00 |    |    |    |    |                         |   | ±0.07                                   | ±0.13                            | -40 to 125 |

### MHz Chip Type for Automotive (Standard Frequency Tolerance)



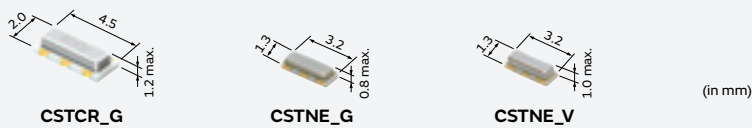
| Series    | Frequency (MHz) |    |       |    |    |    |    | Frequency Tolerance (%) |   | Frequency Shift by Temperature (% max.) | Operating Temperature Range (°C) |            |
|-----------|-----------------|----|-------|----|----|----|----|-------------------------|---|---|----------------------------------|------------|
|           | 0               | 10 | 20    | 30 | 40 | 50 | 60 | 70                      | 0 |   |                                  | 1          |
| CSTCR_G_B | 4.00            |    | 7.99  |    |    |    |    |                         |   | ±0.5                                    | ±0.15                            | -40 to 125 |
| CSTNE_G_A | 8.00            |    | 13.99 |    |    |    |    |                         |   | ±0.5                                    | ±0.20                            | -40 to 125 |
| CSTNE_V_C | 14.00           |    | 20.00 |    |    |    |    |                         |   | ±0.5                                    | ±0.15                            | -40 to 125 |

### MHz Chip Type for Consumer Electronics (Tight Frequency Tolerance)



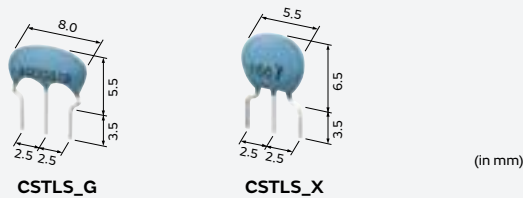
| Series     | Frequency (MHz) |      |       |       |    |    |    | Frequency Tolerance (%) |       | Frequency Shift by Temperature (% max.) | Operating Temperature Range (°C) |           |
|------------|-----------------|------|-------|-------|----|----|----|-------------------------|-------|---|----------------------------------|-----------|
|            | 0               | 10   | 20    | 30    | 40 | 50 | 60 | 70                      | 0     |   |                                  | 1         |
| CSTNR_GH5L | 4.00            | 7.99 |       |       |    |    |    |                         | ±0.07 |   | ±0.11                            | -20 to 85 |
| CSTNE_GH5L |                 | 8.00 | 13.99 |       |    |    |    |                         | ±0.07 |   | ±0.11                            | -40 to 85 |
| CSTNE_VH3L |                 |      | 14.00 | 20.00 |    |    |    |                         | ±0.07 |   | ±0.11                            | -40 to 85 |

### MHz Chip Type for Consumer Electronics (Standard Frequency Tolerance)



| Series  | Frequency (MHz) |      |       |       |    |    |    | Frequency Tolerance (%) |      | Frequency Shift by Temperature (% max.) | Operating Temperature Range (°C) |           |
|---------|-----------------|------|-------|-------|----|----|----|-------------------------|------|---|----------------------------------|-----------|
|         | 0               | 10   | 20    | 30    | 40 | 50 | 60 | 70                      | 0    |   |                                  | 1         |
| CSTCR_G | 4.00            | 7.99 |       |       |    |    |    |                         | ±0.5 |   | ±0.20                            | -20 to 80 |
| CSTNE_G |                 | 8.00 | 13.99 |       |    |    |    |                         | ±0.5 |   | ±0.20                            | -40 to 85 |
| CSTNE_V |                 |      | 14.00 | 20.00 |    |    |    |                         | ±0.5 |   | ±0.30                            | -40 to 85 |

### MHz Lead Type for Consumer Electronics (Standard Frequency Tolerance)



| Series  | Frequency (MHz) |       |       |       |    |    |    | Frequency Tolerance (%) |      | Frequency Shift by Temperature (% max.) | Operating Temperature Range (°C)   |           |
|---------|-----------------|-------|-------|-------|----|----|----|-------------------------|------|---|------------------------------------|-----------|
|         | 0               | 10    | 20    | 30    | 40 | 50 | 60 | 70                      | 0    |   |                                    | 1         |
| CSTLS_G | 3.40            | 10.00 |       |       |    |    |    |                         | ±0.5 |   | ±0.20 (15pF)<br>-0.40/+0.20 (47pF) | -20 to 80 |
| CSTLS_X |                 |       | 16.00 | 70.00 |    |    |    |                         | ±0.5 |   | ±0.20                              | -20 to 80 |

# Filters

Broad lineup of Filters for video, audio, RF/Local, Duplexers, and Filters for IF

## Summary

Using Murata's ceramic processing technology and unique materials, we offer miniaturized filters with excellent properties for advanced digital audio/visual systems and communication equipment.

## Lineup

- Crystal Filters
- SAW Filters for Mobile Communications
- Dielectric Filters GIGAFIL
- Chip Multilayer LC Filters



<https://www.murata.com/en-global/products/filter>

## Crystal Filters

Our original wafer-thin technology has made it possible to make highly reliable filters in various applications such as radio communication worldwide.

**XDCAF / XDCAG / XDCAH Series**  
(in mm)

| Series       | Type    | Frequency Range (MHz)                                    | Number of Poles |
|--------------|---------|--|-----------------|
| <b>XDCAF</b> | TM7050F | 20 to 80<br>[Fundamental]<br>70 to 150<br>[3rd overtone] | 2               |
| <b>XDCAG</b> | TM7050G |  | 4               |
| <b>XDCAH</b> | TM7050H |  | 4               |
| <b>XDCAE</b> | TM7050E |  | 4               |

**XDCAE Series**  
(in mm)

\*Please be sure to consult with our sales representative or engineer if you require other center frequency.

## SAW Filters for Mobile Communications

### SAW Duplexers

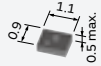
Low loss, high attenuation performance, small size, highly selective pass band, chip size package



## RF Filters

Low loss, high attenuation performance, small size, highly selective pass band, chip size package

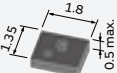
### Single Filter



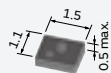
SAFFB Series

(in mm)

### Dual Filter



SAWEN Series



SAWFD Series

(in mm)

SAW Filters and SAW Duplexers may be used only in the following equipment:

Mobile phones, cordless telephones (except automobile telephone), smartphones, tablet PC, PC (including laptop/netPC), game machines, cameras (except for business use and for security), STB, electronic dictionaries, and digital audio instruments. Please contact us for other usages.

## Dielectric Filters GIGAFIL

This is a high frequency dielectric filter for Wi-Fi routers, accespoints, for example.

It employs a unique plate construction which enables the filter to be compact and have a low profile.



DFCT Series

| RF Filter | Series      | Frequency Range (MHz) |      |      |      |      |      |      | Number of Resonators | Input Power Range |
|-----------|-------------|-----------------------|------|------|------|------|------|------|----------------------|-------------------|
|           |             | 100                   | 1000 | 2000 | 3000 | 4000 | 5000 | 6000 |                      |                   |
|           | <b>DFCT</b> |                       |      | 2000 |      |      |      | 6000 | 2 to 6               | 1W*               |

\*Power depends upon specifications.



# Chip Multilayer LC Filters

Ultra-small and low-profile filters based on ceramic multilayer technology.

## Band Pass Filters

**LFB15 Series** (0.5, 1.0, 0.4 max.)  
**LFB18 Series** (0.8, 1.6, 0.7 max.)  
**LFB21 Series** (1.25, 2.0, 1.05 max.)  
**LFB2H Series** (2.0, 2.5, 1.0 max.)  
**LFB31 Series** (1.6, 3.2, 1.3 max.)

(in mm)

## Low Pass Filters

**LFL15 Series** (0.5, 1.0, 0.4 max.)  
**LFL18 Series** (0.8, 1.6, 0.7 max.)  
**LFL21 Series** (1.25, 2.0, 1.05 max.)

(in mm)

Filters

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- Ceramic Filters (CERAFIL)/Crystal Filters
- Ceramic Filters (CERAFIL) Application Manual

Cat. No. P51E  
Cat. No. P11E

# RF Components

Broad lineup of RF Components for RF/Local circuits in communications equipment

## Summary

To enhance the technical advantages of communication equipment, Murata offers miniaturized, sophisticated components to meet the demands of many applications.

## Lineup

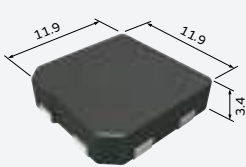
- Antennas
- Baluns (Chip Multilayer and Wire Wound/Film type)
- Couplers (Chip Multilayer) ●Chip Multilayer Hybrid Dividers
- Chip Multilayer Diplexers
- Microwave Connectors



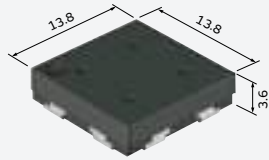
## Antennas

### Antenna Coils

Rx 3D-ANT



SA3D12 Series



SA3D14 Series

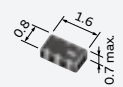
(in mm)

| Series |   | Inductance (mH) | Q (Reference) |
|--------|---|-----------------|---------------|
| SA3D12 | X | 1.0 to 6.3      | 20            |
|        | Y | 1.0 to 6.3      | 20            |
|        | Z | 1.0 to 9.0      | 20            |
| SA3D14 | X | 1.0 to 6.3      | 20            |
|        | Y | 1.0 to 6.3      | 20            |
|        | Z | 1.0 to 9.0      | 20            |

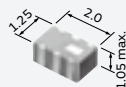
## Baluns

SMD baluns constructed with a copper conductor and ceramic material. Ideal for high-frequency applications. Small-size and low-loss baluns can be customized for balance impedance of 50Ω to 200Ω.

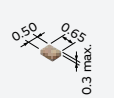
### Chip Multilayer Type



LDB18 Series



LDB21 Series



LDM0Q Series



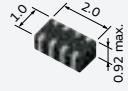
LDM15 Series



LDM18 Series

(in mm)

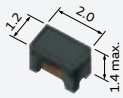
### Film Type



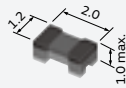
DXP2AB Series

(in mm)

### Wire Wound Type



DXW21B Series



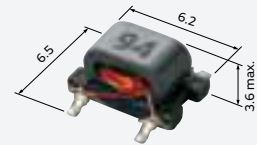
DXW21H Series



B4F Series



B5F Series



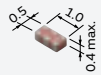
B5FL Series

(in mm)

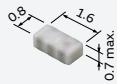
## Couplers

An ultra-small, low-profile directional coupler based on ceramic multilayer technology. This coupler achieves ultra-small size, low insertion loss, and high isolation.

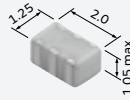
### Chip Multilayer Type



LDC15 Series  
LDJ15 Series



LDC18 Series  
LDJ18 Series



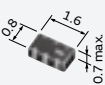
LDC21 Series  
LDJ21 Series

(in mm)

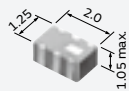
\*It is available with Integrated LPF for LDC21 Series.

## Chip Multilayer Hybrid Dividers

Power divider with a multilayer low pass filter in an ultra-compact package.



LDD18 Series

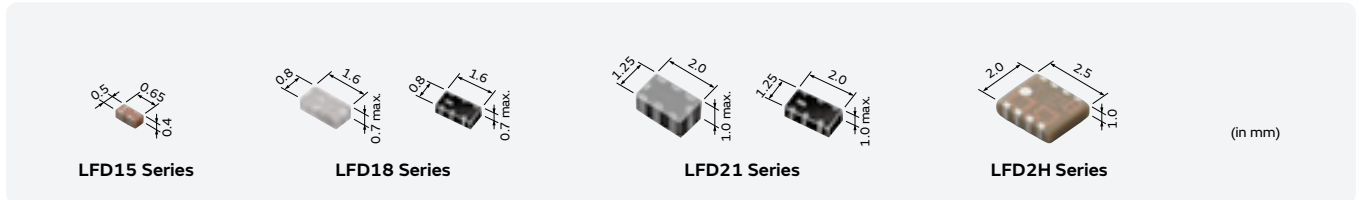


LDD21 Series

(in mm)

# Chip Multilayer Diplexers

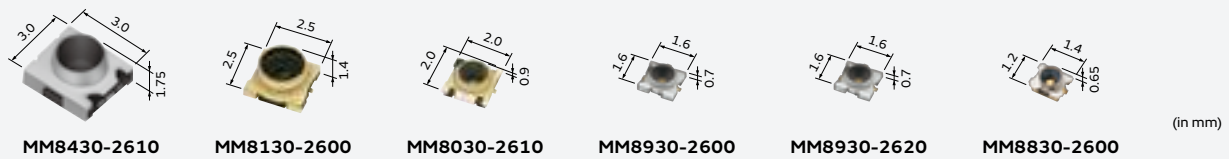
A diplexer branching low and high band.  
Suitable for band-switching for dual-band system.



# Microwave Connectors

## Microwave Coaxial Connectors with Switch

The coaxial connector with switch is very useful for the measurement of characteristics in communication devices such as mobile terminals and microwave circuits.

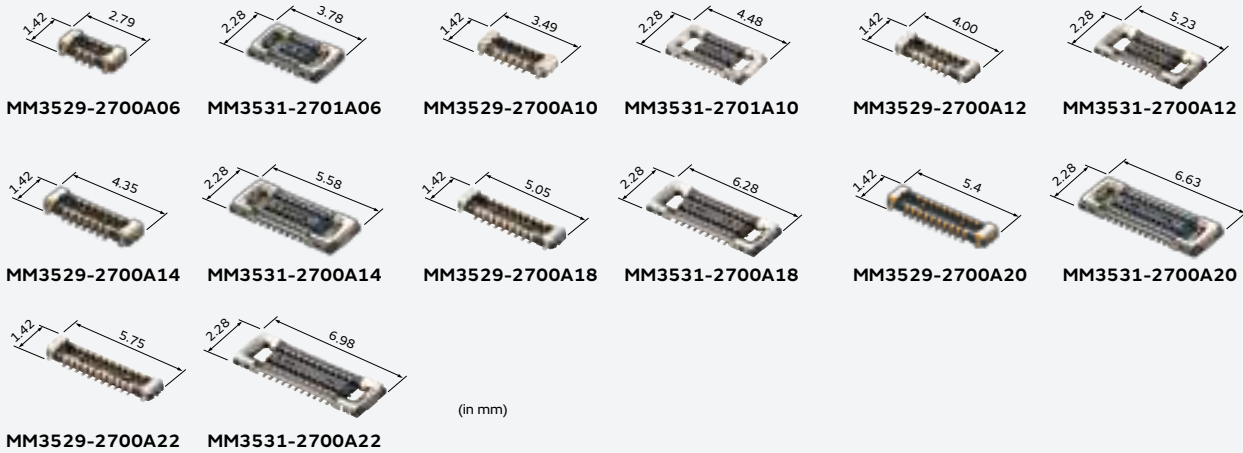


| Type     | Receptacle Part Number | Frequency Rating (GHz) | Voltage Standing Wave Ratio   | Standard Measurement Probe Part Number   |
|----------|------------------------|------------------------|---|--|
| SWD      | <b>MM8430-2610</b>     | up to 6                | 1.2 max. (DC to 3GHz)<br>1.3 max. (3GHz to 6GHz)  | <b>MM126320</b><br><b>MXHS83QE3000</b>   |
| SWF      | <b>MM8130-2600</b>     | up to 6                | 1.2 max. (DC to 3GHz)<br>1.3 max. (3GHz to 6GHz)  |  |
| SWG      | <b>MM8030-2610</b>     | up to 11               | 1.2 max. (DC to 3GHz)<br>1.3 max. (3GHz to 6GHz)<br>1.5 max. (6GHz to 11GHz)                          | <b>MM126330</b><br><b>MXHQ87WJ3000</b>   |
| SWH      | <b>MM8930-2600</b>     | up to 12               | 1.1 max.(DC to 3GHz)<br>1.2 max.(3GHz to 6GHz)<br>1.3 max. (6GHz to 9GHz)<br>1.6 max. (9GHz to 12GHz) | <b>MM126515</b><br><b>MXHQ87PA3000</b>   |
| SWH-2Way | <b>MM8930-2620</b>     | up to 12               | 1.2 max.(DC to 3GHz)<br>1.2 max.(3GHz to 6GHz)<br>1.4 max. (6GHz to 9GHz)<br>1.6 max. (9GHz to 12GHz) | <b>RF: MM126526</b><br><b>ANT: MM126517</b><br><b>RF: MXHQ87PN3000</b><br><b>ANT: MXHQ87PP3000</b> |
| SWJ      | <b>MM8830-2600</b>     | up to 9                | 1.2 max. (DC to 8GHz)<br>1.3 max. (8GHz to 9GHz)  | <b>MXFQB1PY1000</b><br><b>MXHQ87PK3000</b>   |

Nominal Impedance: 50Ω ; Rated Voltage: 30Vrms ; Temperature Range: -40 to 85°C

## Microwave Multi Line Connectors

Multi line connectors transmit signals from board to board. The connectors can transmit not only digital signals but also RF signals.



| Type  | Receptacle Part Number | Plug Receptacle Part Number | Mating Height (mm) | Pitch (mm) | Frequency Rating (GHz) | Voltage Standing Wave Ratio |
|-------|------------------------|-----------------------------|--------------------|------------|------------------------|-----------------------------|
| MLF06 | MM3529-2700A06         | MM3531-2701A06              | 0.6 typ            | 0.35 typ   | up to 20               | 1.2 max. (DC to 3GHz)       |
| MLF10 | MM3529-2700A10         | MM3531-2701A10              |                    |            |                        | 1.2 max. (3GHz to 6GHz)     |
| MLF12 | MM3529-2700A12         | MM3531-2700A12              |                    |            |                        | 1.3 max. (6GHz to 9GHz)     |
| MLF14 | MM3529-2700A14         | MM3531-2700A14              |                    |            |                        | 1.3 max. (9GHz to 12GHz)    |
| MLF18 | MM3529-2700A18         | MM3531-2700A18              |                    |            |                        | 1.35 max. (12GHz to 15GHz)  |
| MLF20 | MM3529-2700A20         | MM3531-2700A20              |                    |            |                        | 1.5 max. (15GHz to 18GHz)   |
| MLF22 | MM3529-2700A22         | MM3531-2700A22              |                    |            |                        | 1.65 max. (18GHz to 20GHz)  |

Nominal Impedance: 50Ω ; Rated Voltage: 30Vrms ; Temperature Range: -40 to 85°C

### Detailed Catalogs

For more details, please refer to our printed catalog and the PDF catalog on our website.



• Microwave Connectors

Cat. No. O30E

# Sensors

## Summary

Murata pursued sensing functions making full use of MEMS and processing technology, and magnetoresistive elements including ceramic material technology in order to develop highly efficient and highly reliable devices, modules, and systems.

A lineup of various sensors respond to the sensing needs of various applications for automobile, wearable, medical care, and health care.

## Lineup

- Infrared Sensors
- Ultrasonic Sensors
- AMR Sensors (Magnetic Sensors)
- TMR Sensors (Magnetic Sensors)
- Accelerometers
- Inclinometers
- Gyro Sensors
- Temperature Sensors (Thermistors)



<https://www.murata.com/en-global/products/sensor>

## Sensor Guide (Select by Method/Principle)



### Temperature

Thermistors: The resistance changes with the temperature.



### Infrared

Pyroelectric infrared sensors: The sensor reacts to the infrared radiation emitted from the human body to output an electric charge.



IRA Series

For more details on Thermistors, please refer to p. 80

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



- MEMS Sensors & Sensing Elements
- NTC Thermistors
- POSISTOR for Circuit Protection
- NTC/PTC Thermistors for Automotive

- Cat. No. S47E
- Cat. No. R44E
- Cat. No. R90E
- Cat. No. R03E



## Distance

Ultrasonic sensors: The sensor sends and receives ultrasonic waves in order to detect distances from the state of the reflected wave.



MA300D1-1  
(for Dual Use)



MA40S4R (for Receiver)  
MA40S4S (for Transmitter)



MA58MF14-7N  
(for Dual Use)



MA40H1S-R  
(for Dual Use)

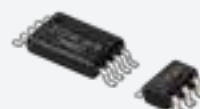


## Magnetic/ Open and Shut

Magnetic switches: This switch switches built-in ICs when the magneto-resistive element detects the magnetic proximity.



MR Series



CT Series



## Inertial force

Accelerometers: This sensor detects the acceleration from the change of the capacitance that occurs in the 3DMEMS element.



SCA Series

Inclinometers: This sensor detects the gravitational acceleration of the Earth to calculate the angle of gradient.
















SCA Series  
SCL Series

Gyro sensors: This sensor detects the angular velocity from the change in the capacitance that occurs in the 3DMEMS element.



SCC Series  
SCR Series

# Lineup

| Detection      | Murata's Sensors                       |   |  | Applications |       |         |                      |                |                        |         |                       |         |     |                           |   |
|----------------|--|---|--|--------------|-------|---------|----------------------|----------------|------------------------|---------|-----------------------|---------|-----|---------------------------|---|
|                | Products                               | Series or Main Part Number                          | Dimensions (mm)  | AV Equipment |       |         |                      |                | Communications Devices |         |                       |         |     |                           |   |
|                |  |   |  | TV           | Audio | DVD, CD | Digital Video Camera | Digital Camera | PC                     | Scanner | Multifunction Machine | Printer | FAX | Electronic Bulletin Board |   |
| Infrared       | Pyroelectric Infrared Sensors          | IRA Series  |  $\varnothing 9.2$ H4.7   | ●            | ●     | ●       |                      |                | ●                      | ●       | ●                     | ●       | ●   | ●                         |   |
| Ultrasonic     | Open Structure Type Ultrasonic Sensors | MA40S4R (for Receiver)<br>MA40S4S (for Transmitter) |  $\varnothing 9.9$ H7.1   |              |       |         |                      |                |                        |         |                       |         |     |                           | ● |
|                |  | MA40H1S-R (SMD/for Dual Use)                        |  5.2X5.2X1.15   | ●            |       |         |                      |                | ●                      |         | ●                     |         |     |                           |   |
|                | Drip-proof Type Ultrasonic Sensors     | MA58MF14-7N (for Dual Use)                          |  $\varnothing 14.0$ H9.0   |              |       |         |                      |                |                        |         |                       |         |     |                           |   |
|                | High Frequency Type Ultrasonic Sensors | MA300D1-1 (for Dual Use)                            |  $\varnothing 9.9$ H7.3   |              |       |         |                      |                |                        | ●       | ●                     | ●       |     |                           |   |
| Magnetic       | AMR Sensors (Magnetic Sensors)         | MR Series   |  MRMS201A-001: 2.8X2.9X1.1<br>MRMS501A-001: 1.45X1.45X0.55                            |              |       | ●       | ●                    | ●              | ●                      |         |                       |         |     |                           |   |
|                | TMR Sensors (Magnetic Sensors)         | CT Series   |  CT100: 1.5X1.5X0.45<br>CT310: 2.0X2.0X0.45   |              |       |         |                      |                |                        |         |                       |         |     |                           |   |
| Acceleration   | Accelerometers                         | SCA Series  |  7.6X8.6X3.3  |              |       |         |                      |                |                        |         |                       |         |     |                           |   |
|                | Inclinometers                          | SCA Series<br>SCL Series                            |  7.6X8.6X3.3  |              |       |         |                      |                |                        |         |                       | ●       |     |                           |   |
| Angle Velocity | Gyro Sensors                           | SCC Series<br>SCR Series                            |  12.1X15.0X4.35   |              |       |         |                      |                |                        |         |                       |         |     |                           |   |
| Temperature    | NTC Thermistors                        | Chip Type NC_ Series                                |  NCP02: 0.4X0.2X0.2<br>NCP03: 0.6X0.3X0.3<br>NC_15: 1.0X0.5X0.5<br>NC_18: 1.6X0.8X0.8 | ●            | ●     | ●       | ●                    | ●              | ●                      | ●       | ●                     | ●       | ●   | ●                         | ● |
|                |  | Lead Type NX Series                                 |  NXF: $\varnothing 1.2$ L25 to 150<br>NXR: $\varnothing 4.0$ L10 to 40                | ●            | ●     | ●       | ●                    | ●              | ●                      | ●       | ●                     | ●       | ●   | ●                         | ● |
|                | PTC Thermistors<br>POSISTOR            | Chip Type PR_ Series                                |  PRF15: 1.0X0.5X0.5<br>PRF18: 1.6X0.8X0.8<br>PRF21: 2.0X1.25X0.9                      | ●            | ●     | ●       | ●                    | ●              | ●                      | ●       | ●                     | ●       | ●   | ●                         | ● |



|  |  | Applications     |                      |                 |                         |            |         |                 |          |              |   |          |                 |                |                        |                            |                   |                 |                |                                  |                 | Wearable     |         |                 |                   |                        |                |                    |       |  |          |
|--|--|------------------|----------------------|-----------------|-------------------------|------------|---------|-----------------|----------|--------------|---|----------|-----------------|----------------|------------------------|----------------------------|-------------------|-----------------|----------------|----------------------------------|-----------------|--------------|---------|-----------------|-------------------|------------------------|----------------|--------------------|-------|--|----------|
|  |  | Home Electronics |                      |                 |                         |            |         |                 |          |              |   | Security |                 |                | Car Electronics        |                            |                   | Toy             |                | Others                           |                 |              |         |                 |                   |                        |                |                    |       |  |          |
|  |  | Refrigerator     | Electric Rice-cooker | Air Conditioner | Air Purification System | Humidifier | Cleaner | Laundry Machine | Food Fan | Water Heater | Toilet Seats with a Warm-water Shower Feature | Lighting | Security Camera | Security Light | Indoor Security Sensor | Intrusion Detection Sensor | Navigation System | Climate Control | Parking Assist | Radio Control (Attitude Control) | Game Controller | Machine Tool | ATM, CD | Vending Machine | Amusement Machine | Construction Machinery | Farm Machinery | Railroad Equipment | Motor | Murata's Sensors                       | Products |
|  |  | ●                | ●                    | ●               | ●                       |            |         |                 |          |              | ●   | ●        | ●               | ●              | ●                      |                            |                   |                 |                |                                  |                 |              | ●       | ●               | ●                 |                        |                |                    |       | Pyroelectric Infrared Sensors          |          |
|  |  | ●                |                      | ●               |                         | ●          |         |                 |          |              | ●   | ●        | ●               | ●              | ●                      |                            |                   |                 |                |                                  |                 |              | ●       | ●               | ●                 |                        |                |                    |       | Open Structure Type Ultrasonic Sensors |          |
|  |  | ●                |                      | ●               |                         | ●          |         |                 |          |              | ●   | ●        | ●               | ●              | ●                      |                            |                   |                 |                |                                  |                 |              | ●       | ●               | ●                 |                        |                |                    |       | High Frequency Type Ultrasonic Sensors |          |
|  |  |                  |                      |                 |                         |            |         |                 |          |              |   |          |                 |                |                        |                            |                   |                 | ●              |                                  |                 |              |         |                 |                   |                        |                |                    |       | Drip-proof Type Ultrasonic Sensors     |          |
|  |  |                  |                      |                 |                         |            |         |                 |          |              |   |          |                 |                |                        |                            |                   |                 |                |                                  |                 |              | ●       |                 |                   |                        |                |                    |       | High Frequency Type Ultrasonic Sensors |          |
|  |  | ●                | ●                    | ●               | ●                       | ●          | ●       | ●               | ●        | ●            | ●   |          |                 |                | ●                      |                            |                   |                 |                |                                  |                 | ●            | ●       | ●               | ●                 |                        |                |                    |       | AMR Sensors (Magnetic Sensors)         |          |
|  |  |                  |                      |                 |                         |            |         |                 |          |              |   |          |                 |                |                        |                            |                   |                 |                |                                  |                 |              |         |                 |                   |                        | ●              |                    |       | TMR Sensors (Magnetic Sensors)         |          |
|  |  |                  |                      |                 |                         |            |         |                 |          |              |   |          |                 |                |                        |                            |                   |                 |                |                                  |                 | ●            |         | ●               | ●                 | ●                      |                |                    |       | Accelerometers                         |          |
|  |  |                  |                      |                 |                         |            |         |                 |          |              |   |          |                 |                |                        |                            |                   |                 |                |                                  |                 | ●            |         |                 | ●                 | ●                      |                |                    |       | Inclinometers                          |          |
|  |  |                  |                      |                 |                         |            |         |                 |          |              |   |          |                 |                |                        |                            | ●                 |                 |                |                                  |                 | ●            |         | ●               | ●                 | ●                      |                |                    |       | Gyro Sensors                           |          |
|  |  |                  | ●                    | ●               | ●                       | ●          | ●       | ●               | ●        | ●            | ●   |          |                 |                |                        |                            | ●                 | ●               | ●              | ●                                | ●               | ●            | ●       |                 | ●                 |                        |                |                    |       | NTC Thermistors                        |          |
|  |  | ●                | ●                    | ●               | ●                       | ●          | ●       | ●               | ●        | ●            | ●   | ●        | ●               | ●              | ●                      | ●                          | ●                 | ●               | ●              | ●                                | ●               | ●            | ●       | ●               | ●                 | ●                      |                |                    |       | NTC Thermistors                        |          |
|  |  | ●                | ●                    | ●               | ●                       | ●          | ●       | ●               | ●        | ●            | ●   |          |                 |                |                        |                            | ●                 | ●               | ●              |                                  | ●               |              |         | ●               |                   |                        |                |                    |       | PTC Thermistors POSISTOR               |          |

Sensors

# Thermistors

Facilitate your designs and products utilizing our thermal design and thermistor products.

## Summary

Murata's semi-conductive ceramics and electrode printing technologies, such as PTC and NTC Thermistors, provide vital protection and sensing within electronic equipment. Simulation software tools are also available for your convenience.

## Lineup

- NTC Thermistors for temperature sensor/compensation, and automotive
- PTC Thermistors POSISTOR for overheat sensing, overcurrent protection, and automotive



<https://www.murata.com/en-global/products/thermistor>

## NTC Thermistors for Temperature Sensor/ Temperature Compensation

### Chip Type

Chip NTC Thermistors have Ni barrier terminations, provide excellent solderability, and offer high stability in harsh environments due to their unique inner construction.



NCP02 Series



NCP03 Series



NCP15 Series  
NCU15 Series



NCP18 Series  
NCU18 Series

(in mm)

| Series | Size Code<br>inch (mm) | Resistance<br>(25°C)<br>(Ω) | B-Constant<br>(25-50°C)<br>(K) | Maximum Operating<br>Current for Sensor<br>(25°C) (mA) | Maximum<br>Voltage<br>(V) | Typical Dissipation<br>Constant (25°C)<br>(mW/°C) | Operating<br>Temperature<br>Range (°C) |
|--------|------------------------|-----------------------------|--------------------------------|--|---------------------------|---|--|
| NCP02  | 01005 (0402)           | 10k to 470k                 | 3380 to 4250                   | 0.015 to 0.100   | 5                         | 1   | -40 to 125                             |
| NCP03  | 0201 (0603)            | 1.0k to 470k                | 3380 to 4485                   | 0.015 to 0.316   | 5                         | 1   | -40 to 125                             |
| NCP15  | 0402 (1005)            | 220 to 470k                 | 3380 to 4500                   | 0.015 to 0.674   | 5                         | 1   | -40 to 125                             |
| NCU15  | 0402 (1005)            | 10k to 470k                 | 3380 to 4500                   | 0.032 to 0.100   | 5                         | 1   | -40 to 125                             |
| NCP18  | 0603 (1608)            | 220 to 470k                 | 3380 to 4500                   | 0.015 to 0.674   | 5                         | 1   | -40 to 125                             |
| NCU18  | 0605 (1608)            | 10k to 470k                 | 3380 to 4500                   | 0.015 to 0.100   | 5                         | 1   | -40 to 125                             |

Maximum Operating Current for Sensor raises the Thermistor's temperature by 0.1°C.  
There are also items for automotive applications in the NCP/NCU Series.

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.

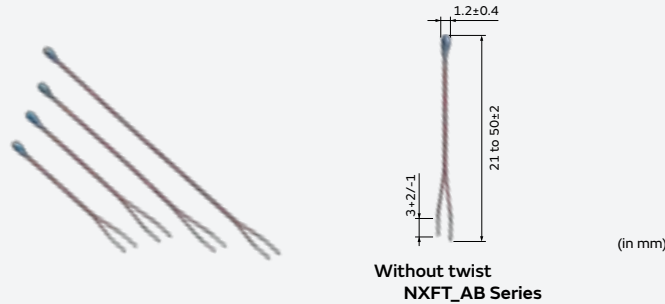


- NTC Thermistors
- POSISTOR for Circuit Protection
- NTC/PTC Thermistors for Automotive

Cat. No. R44E  
Cat. No. R90E  
Cat. No. R03E

## Thermo String Type

Small flexible lead type NTC Thermistors with a small head and a thin lead wire.

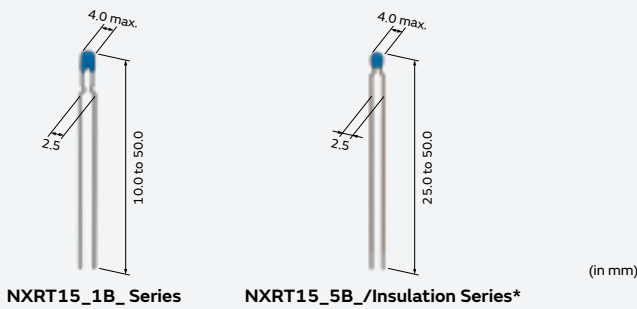


| Series   | Resistance (25°C) (Ω) | B-Constant (25-50°C) (K) | Maximum Operating Current for Sensor (25°C) (mA) | Thermal Time Constant (25°C) (s) | Full Length (mm) | Operating Temperature Range (°C) |
|--|-----------------------|--------------------------|--|----------------------------------|------------------|----------------------------------|
| <b>NXFT15_AB_</b><br>(Nickel Cooper wire type) | 3k to 100k            | 3380 to 4250             | 0.024 to 0.14                                    | 3                                | 21 to 50         | -40 to 125                       |

Maximum Operating Current for Sensor raises the Thermistor's temperature by 0.1°C.  
There are also items for automotive applications in the NXF Series.

## Lead Type

This product is a thermistor for normal temperature level sensors having self-subsistence due to strong lead strength based on chip NTC.



| Series                             | Resistance (25°C) (Ω) | B-Constant (25-50°C) (K) | Maximum Operating Current for Sensor (25°C) (mA) | Thermal Time Constant (25°C) (s) | Full Length (mm) | Operating Temperature Range (°C) |
|------------------------------------|-----------------------|--------------------------|--|----------------------------------|------------------|----------------------------------|
| <b>NXRT15_1B_</b>                  | 2k to 100k            | 3380 to 4250             | 0.04 to 0.27                                     | 4                                | 10 to 50         | -40 to 125                       |
| <b>NXRT15_5B_</b><br>(Insulation*) | 2k to 100k            | 3380 to 4250             | 0.05 to 0.36                                     | 4                                | 25 to 50         | -40 to 125                       |

Maximum Operating Current for Sensor raises the Thermistor's temperature by 0.1°C.  
There are also items for automotive applications in the NXR Series.

\*Insulation: Lead wire insulation type.

# PTC Thermistors POSISTOR for Overheat Sensing

## Chip Type

For overheat sensing for power transistors, power diodes, and power ICs in hybrid circuits.



| Series | Sensing Temperature Range (°C) |    |    |    |     |     |     |     |     |     | Sensing Temperature Tolerance (°C) | Maximum Voltage (V) | Size Code inch (mm) |
|--------|--------------------------------|----|----|----|-----|-----|-----|-----|-----|-----|------------------------------------|---------------------|---------------------|
|        | 60                             | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |                                    |                     |                     |
| PRF15  | ●                              | ●  | ●  | ●  | ●   | ●   | ●   | ●   | ●   | ●   | ±3/±5                              | 32                  | 0402 (1005)         |
| PRF18  | ●                              | ●  | ●  | ●  | ●   | ●   | ●   | ●   | ●   | ●   | ±3/±5                              | 32                  | 0603 (1608)         |
| PRF21  |                                |    | ●  | ●  | ●   | ●   | ●   | ●   | ●   | ●   | ±5                                 | 32                  | 0805 (2012)         |

There are also items for automotive applications in the PRF Series.

# PTC Thermistors POSISTOR for Overcurrent Protection

## Chip Type

Overcurrent Protection device with resettable function suitable for current-limiting resistors.



| Series | Maximum Voltage (V) | Hold Current (60°C) (mA) | Trip Current (-20°C) (mA) | Maximum Current (mA) | Resistance (Ω) | Size Code inch (mm) |
|--------|---------------------|--------------------------|---------------------------|----------------------|----------------|---------------------|
| PRG03  | 13                  | 8                        | 46                        | 93                   | 180            | 0201 (0603)         |

| Series | Maximum Voltage (V) | Hold Current (60°C) (mA) | Trip Current (-10°C) (mA) | Maximum Current (A) | Resistance (25°C) (Ω) | Size Code inch (mm) |
|--------|---------------------|--------------------------|---------------------------|---------------------|-----------------------|---------------------|
| PRG15  | 6 to 30             | 17 to 88                 | 65 to 318                 | 0.6 to 3.5          | 2.2 to 68             | 0402 (1005)         |
| PRG18  | 6 to 30             | 7 to 220                 | 25 to 850                 | 0.06 to 7.5         | 1.0 to 470            | 0603 (1608)         |
| PRG21  | 6 to 32             | 30 to 500                | 110 to 2000               | 0.59 to 37          | 0.2 to 42             | 0805 (2012)         |

Maximum Current shows typical transformer capacities that can be used. There are also items for automotive applications in the PRG Series.

# Power Devices

Eco-friendly and high-quality power devices

## Summary

To meet consumer needs Murata offers power supply products and energy devices that can be used with a variety of equipment, such as video equipment, household information appliances, and communication/transfer equipment. Murata provides standard and customized products using highly reliable. Murata makes components utilizing advanced design and high-density packaging technology.

## Lineup

- DC-DC Converters
- Ballast Power Supplies
- Power supplies for LED lighting




<https://www.murata.com/en-global/products/power>

## DC-DC Converters


DC-DC converters are vital to the demands of electronic equipment.

Murata offers DC-DC converters that set the standard for miniaturization, low-profile, high-efficiency, power-saving and low-noise power supplies. Murata also provides standard products and customized products, ultra-low-profile products, and products for FPGAs.

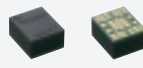
### Non-isolated Type




MYMGK00504ERSR  
MYMGK1R804ERSR




MYMGK00506ERSR  
MYMGK1R806FRSR




MYMGK1R820ERSR  
MYMGK1R820FRSR




MYSGK1R830FRSR  
MYSGK4R030ERSR




MYLSM00502ERPL




MYSGK02506BRSR




MYMGA5R04RELA5RA




MYMGC series




OKL-T/20 series  
OKL2-T/20 series




OKL-T/12 series  
OKL2-T/12 series




OKL-T/3 series  
OKL2-T/3 series




OKL-T/6 series  
OKL2-T/6 series



MYSSM02406BEPL



MYUSP3R303FMP



MYMGM1R816ELA5RA  
MYMGM1R824ELA5RA

| Part number      | Output Current (A) | Input Voltage (V) | Output Voltage (V) | Efficiency (%) | I2C or PMBus  | Package | Size (mm) |      |     |
|------------------|--------------------|-------------------|--------------------|----------------|---------------|---------|-----------|------|-----|
|                  |                    |                   |                    |                |               |         | W         | L    | T   |
| MYLSM00502ERPL   | 2.5                | 4.5 to 17         | 1 to 5.25          | 88             | Not available | SMD     | 7.9       | 7.9  | 2.3 |
| MYMGK1R804FRSR   | 4                  | 4.5 to 8          | 0.7 to 1.8         | 93             | Not available | SMD     | 7.5       | 9.0  | 5.0 |
| MYMGK00504ERSR   | 4                  | 8 to 15           | 0.7 to 5           | 96.1           | Not available | SMD     | 7.5       | 9.0  | 5.0 |
| MYMGK1R806FRSR   | 6                  | 4.5 to 8          | 0.7 to 1.8         | 90.4           | Not available | SMD     | 7.5       | 9.0  | 5.0 |
| MYMGK00506ERSR   | 6                  | 8 to 15           | 0.7 to 5           | 95.4           | Not available | SMD     | 7.5       | 9.0  | 5.0 |
| MYMGK1R812FRSR   | 12                 | 4.5 to 8          | 0.7 to 1.8         | 92             | Not available | SMD     | 9.0       | 10.5 | 5.6 |
| MYMGK1R812ERSR   | 12                 | 8 to 15           | 0.7 to 1.8         | 90.4           | Not available | SMD     | 9.0       | 10.5 | 5.6 |
| MYMGM1R816ELA5RA | 16                 | 7.5 to 15         | 0.7 to 1.8         | 91.8           | PMBus         | SMD     | 9.0       | 10.5 | 5.0 |

These are just a few examples of our large assortment of power products.

Continued on the following page. ↗

## DC-DC Converters

| Part number                    | Output Current (A)              | Input Voltage (V) | Output Voltage (V)                | Efficiency (%) | I2C or PMBus  | Package | Size (mm) |       |      |
|--------------------------------|---------------------------------|-------------------|-----------------------------------|----------------|---------------|---------|-----------|-------|------|
|                                |                                 |                   |                                   |                |               |         | W         | L     | T    |
| MYMGK1R820FRSR                 | 20                              | 4.5 to 8          | 0.7 to 1.8                        | 89.2           | Not available | SMD     | 9.0       | 10.5  | 5.6  |
| MYMGK1R820ERSR                 | 20                              | 8 to 15           | 0.7 to 1.8                        | 87.8           | Not available | SMD     | 9.0       | 10.5  | 5.6  |
| MYMG1R824ELA5RA                | 24                              | 7.5 to 15         | 0.7 to 1.8                        | 89.2           | PMBus         | SMD     | 9.0       | 10.5  | 5.0  |
| MYSYGK1R830FRSR                | 30                              | 4.5 to 15         | 0.7 to 1.8                        | 89.7           | Not available | SMD     | 14.0      | 11.0  | 8.3  |
| MYSYGK4R030ERSR                | 30                              | 4.5 to 15         | 0.7 to 4                          | 94.4           | Not available | SMD     | 14.0      | 11.0  | 8.3  |
| MYSYGK02506BRSR                | 6                               | 13.5 to 42        | 5 to 25                           | 98             | Not available | SMD     | 14.7      | 16.3  | 7.5  |
| MYMGA5R04RELA5RA               | 4                               | 8.0 to 16.0       | 3.3 to 5                          | 94             | Not available | SMD     | 9.0       | 10.5  | 5.5  |
| MYMGC0R88RFLF2RV               | 8                               | 3.3 to 5.5        | 0.85                              | 81             | I2C           | SMD     | 11.9      | 15.0  | 2.4  |
| MYMGC1R83BFPF2RV (Quad output) | 3.2<br>0.5<br>0.5<br>1.5<br>2.5 | 3.3 to 5.5        | 0.85<br>0.85<br>1.2<br>1.8<br>1.2 | 81             | I2C           | SMD     | 11.9      | 15.0  | 2.4  |
| MYMGC3R32EFPF2RV (Quad output) | 1<br>2<br>1.5                   | 4.3 to 5.5        | 1.8<br>3.3<br>2.5                 | 91             | I2C           | SMD     | 11.9      | 15.0  | 2.4  |
| OKL-T/3-W12                    | 3                               | 4.5 to 14         | 0.591 to 5.5                      | 93             | Not available | SMD     | 12.2      | 12.2  | 6.2  |
| OKL-T/6-W12                    | 6                               | 4.5 to 14         | 0.591 to 5.5                      | 93             | Not available | SMD     | 12.2      | 12.2  | 7.2  |
| OKL2-T/12-W12                  | 12                              | 4.5 to 14         | 0.69 to 5.5                       | 95             | Not available | SMD     | 20.32     | 11.43 | 8.55 |
| OKL2-T/20-W12                  | 20                              | 4.5 to 14         | 0.69 to 5.5                       | 94             | Not available | SMD     | 33.02     | 13.46 | 8.7  |
| MYSSM01206BEPL                 | 6                               | 17 to 40          | 5 to 12                           | 95             | Not available | SMD     | 30.2      | 20.9  | 8.3  |
| MYSSM02406BEPL                 | 6                               | 30.5 to 40        | 12 to 24                          | 98             | Not available | SMD     | 30.2      | 20.9  | 8.3  |
| MYSDM1R512EENL (Dual output)   | 13<br>1.2                       | 10.2 to 15.8      | 0.9 to 1.25<br>0.9 to 1.5         | 81             | Not available | SMD     | 30.2      | 20.9  | 7.0  |
| MYSTM3R32EEEPL (Triple output) | 1.5<br>1.5<br>2.5               | 10.2 to 15.8      | 1.8<br>1.23 to 1.8<br>3.3         | 84             | Not available | SMD     | 30.2      | 20.9  | 7.0  |
| MYUSP3R303FMP                  | 3                               | 3 to 5.5          | 0.7 to 3.3                        | 94             | Not available | SMD     | 11.0      | 8.5   | 5.6  |

These are just a few examples of our large assortment of power products.

## Isolated DC-DC Converter for PoE



MYBSP0055AABFT  
MYBSP0122BABFT



MYBSP0055AABF  
MYBSP0122BABF



MYBSP00502ABF  
MYBSP01201ABF



MYBTA00512ABT



MYBSC0128CAZT



MYBSS054R6EBF

| Part number    | Output Power (W) | Input Voltage (V) | Output Voltage (V) | Efficiency (%) | PoE controller | Package | Size (mm) |      |       |
|----------------|------------------|-------------------|--------------------|----------------|----------------|---------|-----------|------|-------|
|                |                  |                   |                    |                |                |         | W         | L    | T     |
| MYBSP00502ABF  | 10               | 37 to 57          | 5                  | 80             | Available      | SMD     | 26.0      | 14.8 | 6.2   |
| MYBSP01201ABF  | 12               | 37 to 57          | 12                 | 84             | Available      | SMD     | 26.0      | 14.8 | 6.2   |
| MYBSP0055AABF  | 25.5             | 42.5 to 57        | 5                  | 90.5           | Available      | SMD     | 35.5      | 22.4 | 10.55 |
| MYBSP0122BABF  | 25.5             | 42.5 to 57        | 12                 | 92.5           | Available      | SMD     | 35.5      | 22.4 | 10.55 |
| MYBSP0055AABFT | 25.5             | 37 to 57          | 5                  | 90.5           | Available      | SMD     | 35.5      | 22.4 | 10.55 |
| MYBSP0122BABFT | 25.5             | 37 to 57          | 12                 | 92.5           | Available      | SMD     | 35.5      | 22.4 | 10.55 |

Continued on the following page. ↗

## DC-DC Converters, Ballast Power Supplies, Power supplies for LED lighting

| Part number   | Output Power (W) | Input Voltage (V) | Output Voltage (V) | Efficiency (%) | PoE controller | Package | Size (mm) |       |      |
|---------------|------------------|-------------------|--------------------|----------------|----------------|---------|-----------|-------|------|
|               |                  |                   |                    |                |                |         | W         | L     | T    |
| MYBTA00512ABT | 60               | 36 to 75          | 5                  | 92             | Not available  | SMD     | 23.36     | 19.05 | 12.7 |
| MYBSC0128CAZT | 100              | 36 to 75          | 12                 | 92.5           | Not available  | Insert  | 33.0      | 23.2  | 9.32 |
| MYBSS054R6EBF | 30               | 10.8 to 27        | 54                 | 90             | Not available  | SMD     | 35.5      | 22.4  | 8.9  |

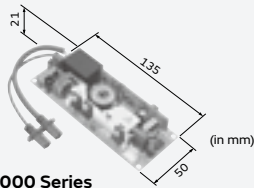
### Isolated Type



| Part number    | Output Power (W) | Input Voltage (V) | Output Voltage (V) | Efficiency (%) | Footprint (Brick) | Package | Size (mm) |       |      |
|----------------|------------------|-------------------|--------------------|----------------|-------------------|---------|-----------|-------|------|
|                |                  |                   |                    |                |                   |         | W         | L     | T    |
| MYBEA01212AZT  | 140              | 36 to 75          | 12                 | 92.5           | 1/8               | Insert  | 58.4      | 22.8  | 8.46 |
| MYBEA01212AZTB | 140              | 36 to 75          | 12                 | 92.5           | 1/8               | Insert  | 58.4      | 22.8  | 11.3 |
| MYBEA01210CZT  | 120              | 18 to 36          | 12                 | 93             | 1/8               | Insert  | 58.4      | 22.8  | 8.46 |
| MYBEA01210CZTB | 120              | 18 to 36          | 12                 | 93             | 1/8               | Insert  | 58.4      | 22.8  | 11.3 |
| MYBEB01212AZTB | 100              | 36 to 75          | 12                 | 91.5           | 1/8               | Insert  | 58        | 22.8  | 12.2 |
| MYBTA00512ABT  | 60               | 36 to 75          | 5                  | 92             | 1/32              | SMD     | 23.36     | 19.05 | 12.7 |
| MYBSC0128CAZT  | 100              | 36 to 75          | 12                 | 92.5           | 1/16              | Insert  | 33.0      | 23.2  | 9.32 |

These are just a few examples of our large assortment of power products.

## Ballast Power Supplies



MPL3000 Series

| Series  | Applications | Input Voltage $V_{in}$ | Output Power | Other Specification                  |
|---------|--------------|------------------------|--------------|--------------------------------------|
| MPL3000 | Projector    | 320 to 420V DC         | 550W         | For extra-high pressure mercury lamp |

For more details on our products, please contact us.

## Power supplies for LED lighting



LED Lighting

| Type      | Input Voltage    | Output Voltage | Output Current (Max) | Number of Outputs | Safety Standard              | Dimming       |
|-----------|------------------|----------------|----------------------|-------------------|------------------------------|---------------|
| MPA1948   | 90 to 267V AC    | 30 to 50V      | 300 to 720mA         | 1ch               | PSE, EN61347-1, EN61347-2-13 | DALI, PWM     |
| MPA1954   | 90 to 267V AC    | 30 to 56V      | 270 to 600mA         | 1ch               | PSE, EN61347-1, EN61347-2-13 | -             |
| MPA1960   | 90 to 267V AC    | 30 to 60V      | 1000 to 1400mA       | 1ch               | PSE                          | DALI, PWM     |
| MPA1968   | 90 to 267V AC    | 30 to 50V      | 750 to 1050mA        | 1ch               | PSE                          | DALI, PWM     |
| MPL0039   | 45.6 to 50.4V DC | 8 to 40V       | 450 to 900mA         | 2ch               | -                            | Radio control |
| MPL0076DD | 90 to 267V AC    | 10 to 50V      | 350 to 720mA         | 1ch               | PSE                          | DALI          |

For more details on our products, please contact us.

For Ionizer Modules, please refer to p. 102.

# Batteries

Battery solutions for energy storage systems and various small devices

## Summary

Murata offers battery solutions for a wide range of applications from IoT & wearable devices to energy storage systems for enterprise and household use.

## Lineup

- Laminated Type Lithium Ion Secondary Batteries
- Cylindrical Type Lithium Ion Secondary Batteries
- Small Lithium ion secondary batteries
- FORTELION 24V Battery Module
- FORTELION Battery System
- Micro Batteries



## Laminated Type Lithium Ion Secondary Batteries

Laminated type lithium ion secondary battery has laminate film for packaging. These batteries are known for their excellent safety, thinner form factors, and size flexibility.



### Standard Long Life

| Model Name   | Nominal Voltage (V) | Minimum Capacity (mAh) | Thickness (mm) | Width (mm) | Height (mm) | Weight (g) | Charging Voltage (V) | Chemical System (LCO, NCM, NCA) |
|--------------|---------------------|------------------------|----------------|------------|-------------|------------|----------------------|---------------------------------|
| US253450A10S | 3.7                 | 425                    | 2.53           | 34         | 50.5        | 8.7        | 4.2                  | LCO                             |
| US373651A10S | 3.7                 | 765                    | 3.63           | 36         | 51.2        | 14.2       | 4.2                  | LCO                             |
| US394549A10S | 3.7                 | 1,045                  | 3.87           | 44.1       | 48.2        | 18.9       | 4.2                  | LCO                             |
| US634038A10S | 3.7                 | 1,110                  | 6.3            | 39.32      | 37.85       | 19.6       | 4.2                  | LCO                             |
| US354775A10S | 3.7                 | 1,420                  | 3.5            | 47         | 75          | 27         | 4.2                  | LCO                             |
| US454261A8TS | 3.7                 | 1,530                  | 4.6            | 42         | 61.5        | 26.8       | 4.2                  | LCO                             |
| US525354A10S | 3.7                 | 1,830                  | 5.25           | 53.15      | 54.3        | 33.8       | 4.2                  | LCO                             |
| US505456A10S | 3.7                 | 1,880                  | 5.05           | 53.5       | 56.4        | 34.5       | 4.2                  | LCO                             |
| US374981K6S  | 3.7                 | 1,950                  | 3.65           | 49         | 81          | 33.9       | 4.2                  | LCO                             |
| US673864K6S  | 3.7                 | 2,010                  | 6.65           | 38         | 64          | 36.5       | 4.2                  | LCO                             |
| US2764A0K6S  | 3.7                 | 2,040                  | 2.65           | 64.1       | 99.5        | 37.9       | 4.2                  | LCO                             |
| US595676K5S  | 3.7                 | 3,020                  | 5.85           | 55.9       | 75.5        | 55.5       | 4.2                  | LCO                             |
| US486588K5S  | 3.7                 | 3,360                  | 4.8            | 65         | 88          | 62         | 4.2                  | LCO                             |
| US616484K6S  | 3.7                 | 4,040                  | 6.1            | 64         | 84          | 74.4       | 4.2                  | LCO                             |
| US31A0B8A10S | 3.7                 | 4,750                  | 3.03           | 99.5       | 118         | 91.5       | 4.2                  | LCO                             |
| US666588K6S  | 3.7                 | 4,800                  | 6.55           | 65         | 88          | 88.4       | 4.2                  | LCO                             |

Continued on the following page. ↗



## High Voltage High Capacity

| Model Name   | Nominal Voltage (V) | Minimum Capacity (mAh) | Thickness (mm) | Width (mm) | Height (mm) | Weight (g) | Charging Voltage (V) | Chemical System (LCO, NCM, NCA) |
|--------------|---------------------|------------------------|----------------|------------|-------------|------------|----------------------|---------------------------------|
| US476483BH9  | 3.83                | 4,010                  | 4.63           | 63.9       | 82.45       | 58.3       | 4.4                  | LCO                             |
| US426487CH9P | 3.85                | 3,920                  | 4.12           | 63.48      | 86.2        | 51.9       | 4.43                 | LCO                             |
| US525775CH9P | 3.85                | 3,720                  | 5.1            | 56.53      | 74.3        | 48.5       | 4.43                 | LCO                             |
| US2980F9H2   | 3.8                 | 4,670                  | 2.81           | 79.8       | 159         | 87         | 4.35                 | LCO                             |
| US275361H5   | 3.8                 | 1,040                  | 2.65           | 53         | 60.5        | 18.1       | 4.35                 | LCO                             |
| US4032B3BH5  | 3.8                 | 1,900                  | 3.92           | 31.9       | 113         | 33         | 4.35                 | LCO                             |
| US325991H5   | 3.8                 | 2,410                  | 3.18           | 58.7       | 90.5        | 40.4       | 4.35                 | LCO                             |
| US456067H5   | 3.8                 | 2,590                  | 4.45           | 59.73      | 66.92       | 42.8       | 4.35                 | LCO                             |
| US395189BH7  | 3.8                 | 2,630                  | 3.83           | 50.78      | 88.45       | 40.9       | 4.35                 | LCO                             |
| US414499BH7  | 3.8                 | 2,630                  | 4.02           | 43.08      | 98.95       | 41         | 4.35                 | LCO                             |
| US415085BH7  | 3.8                 | 2,690                  | 4.1            | 49.78      | 84.64       | 41.7       | 4.35                 | LCO                             |
| US455676H5   | 3.8                 | 2,710                  | 4.41           | 55.3       | 76          | 43.4       | 4.35                 | LCO                             |
| US395292H5   | 3.8                 | 2,790                  | 3.89           | 52         | 91.5        | 43.8       | 4.35                 | LCO                             |
| US515569H5   | 3.8                 | 2,790                  | 5.09           | 54.16      | 68.7        | 44.4       | 4.35                 | LCO                             |
| US495473BH7  | 3.8                 | 2,980                  | 4.9            | 53.78      | 72.6        | 46.9       | 4.35                 | LCO                             |
| US445977H5   | 3.8                 | 3,000                  | 4.31           | 58.3       | 76.8        | 46.9       | 4.35                 | LCO                             |
| US416775H5   | 3.8                 | 3,010                  | 4.08           | 66.5       | 74.2        | 48.5       | 4.35                 | LCO                             |
| US436177H5   | 3.8                 | 3,020                  | 4.21           | 60.9       | 76.7        | 46.3       | 4.35                 | LCO                             |
| US525077BH7P | 3.8                 | 3,120                  | 5.17           | 49.28      | 76.45       | 48         | 4.35                 | LCO                             |
| US396479H5   | 3.8                 | 3,050                  | 3.9            | 63         | 78.7        | 46.7       | 4.35                 | LCO                             |
| US504588H5   | 3.8                 | 3,050                  | 4.91           | 43.8       | 88          | 46.1       | 4.35                 | LCO                             |
| US366685BH7  | 3.8                 | 3,090                  | 3.57           | 65.2       | 84.9        | 47.2       | 4.35                 | LCO                             |
| US495577BH7  | 3.8                 | 3,130                  | 4.81           | 54.78      | 76.35       | 49.1       | 4.35                 | LCO                             |
| US446770H7   | 3.8                 | 3,170                  | 4.4            | 66.55      | 69.1        | 52.8       | 4.35                 | LCO                             |
| US396283BH7  | 3.8                 | 3,160                  | 3.84           | 61.8       | 82.8        | 47.2       | 4.35                 | LCO                             |
| US416189H2   | 3.8                 | 3,200                  | 4.12           | 60.9       | 89          | 52.4       | 4.35                 | LCO                             |
| US269099H5   | 3.8                 | 3,310                  | 2.57           | 89.9       | 99          | 55.3       | 4.35                 | LCO                             |
| US526367BH7  | 3.8                 | 3,325                  | 5.17           | 62.68      | 66.65       | 55.4       | 4.35                 | LCO                             |
| US496178H5   | 3.8                 | 3,400                  | 4.83           | 60.9       | 77.85       | 55.6       | 4.35                 | LCO                             |
| US386587BH7  | 3.8                 | 3,485                  | 3.75           | 64.95      | 86.96       | 51.5       | 4.35                 | LCO                             |
| US289490BH7  | 3.8                 | 3,510                  | 2.8            | 94         | 90          | 56.2       | 4.35                 | LCO                             |
| US456386H5   | 3.8                 | 3,540                  | 4.5            | 62.2       | 85.02       | 61         | 4.35                 | LCO                             |
| US485490H5K  | 3.8                 | 3,570                  | 4.8            | 54         | 90          | 56.4       | 4.35                 | LCO                             |
| US406787BH7  | 3.8                 | 3,720                  | 3.98           | 66.4       | 86.5        | 55         | 4.35                 | LCO                             |
| US446484BH7  | 3.8                 | 3,720                  | 4.32           | 63.6       | 83.4        | 56.7       | 4.35                 | LCO                             |
| US486588H3K  | 3.8                 | 3,760                  | 4.8            | 65         | 88          | 63         | 4.35                 | LCO                             |
| US508168H5K  | 3.8                 | 4,110                  | 5              | 81         | 67.6        | 66.9       | 4.35                 | LCO                             |
| US3978A4H5K  | 3.8                 | 4,720                  | 3.9            | 77.4       | 103.5       | 78         | 4.35                 | LCO                             |
| US25A2F2H3   | 3.8                 | 5,180                  | 2.5            | 102.15     | 151.8       | 86.2       | 4.35                 | LCO                             |

Continued on the following page. ↗

## Laminated Type Lithium Ion Secondary Batteries

### Small Cell Wearable

| Model Name   | Nominal Voltage (V) | Minimum Capacity (mAh) | Thickness (mm) | Width (mm) | Height (mm) | Weight (g) | Charging Voltage (V) | Chemical System (LCO, NCM, NCA) |
|--------------|---------------------|------------------------|----------------|------------|-------------|------------|----------------------|---------------------------------|
| US491222A10S | 3.7                 | 81                     | 4.9            | 11.8       | 22          | 2.1        | 4.2                  | LCO                             |
| US80285A10S  | 3.7                 | 121                    | 7.63           | 7.93       | 28.5        | 2.6        | 4.2                  | LCO                             |
| US501424A10S | 3.7                 | 126                    | 5.05           | 13.8       | 24          | 3          | 4.2                  | LCO                             |
| US321741A10S | 3.7                 | 180                    | 3.2            | 16.5       | 40.5        | 4.2        | 4.2                  | LCO                             |
| US302135H5   | 3.8                 | 215                    | 3              | 20.2       | 35          | 4.2        | 4.35                 | LCO                             |
| US322830A10S | 3.7                 | 235                    | 3.22           | 28         | 30          | 5          | 4.2                  | LCO                             |
| US552131A10S | 3.7                 | 320                    | 5.5            | 21.11      | 30.75       | 6.5        | 4.2                  | LCO                             |
| US97500A10S  | 3.7                 | 392                    | 9.6            | 9.9        | 50          | 7.8        | 4.2                  | LCO                             |

### Camera & Game

| Model Name  | Nominal Voltage (V) | Minimum Capacity (mAh) | Thickness (mm) | Width (mm) | Height (mm) | Weight (g) | Charging Voltage (V) | Chemical System (LCO, NCM, NCA) |
|-------------|---------------------|------------------------|----------------|------------|-------------|------------|----------------------|---------------------------------|
| US773038A12 | 3.7                 | 1,030                  | 7.62           | 29.3       | 37.7        | 17.5       | 4.2                  | LCO                             |
| US533144N2S | 3.6                 | 880                    | 5.3            | 30.2       | 43.9        | 14.7       | 4.2                  | NCA                             |
| US783038E1S | 3.65                | 960                    | 7.77           | 29.4       | 37.35       | 17         | 4.2                  | NCM                             |
| US613143N2Y | 3.6                 | 1,080                  | 6.1            | 30.9       | 43          | 17.9       | 4.2                  | NCA                             |
| US523350N2Y | 3.6                 | 1,185                  | 5.2            | 33         | 50          | 19.6       | 4.2                  | NCA                             |

# Cylindrical Type Lithium Ion Secondary Batteries

Cylindrical type lithium ion batteries are packaged in metal cans. These batteries can be used at high rate and maintain high capacity.

| Model                                     | Nominal Capacity (mAh) | Positive Electrode Material | Negative Electrode Material | Nominal (Rated) Voltage (V) | Weight (g) | Diameter (mm) | Height (mm) | Continuous Max Discharge Current (A) | Features            |
|---|------------------------|-----------------------------|-----------------------------|-----------------------------|------------|---------------|-------------|--------------------------------------|---------------------|
| <b>US14500FT1</b><br>(Under development)  | 530                    | LFP                         | Gr                          | 3.2                         | 17.6       | φ 14          | 49          | 5                                    | life, safety, small |
| <b>US18650VTC4</b>                        | 2,100                  | NCM                         | Gr                          | 3.6                         | 45         | φ 18          | 65          | 30                                   | power               |
| <b>US18650VTC4A</b>                       | 2,100                  | NCM                         | Gr                          | 3.7                         | 46.8       | φ 18          | 65          | 35                                   | power               |
| <b>US18650VTC5</b>                        | 2,600                  | NCA                         | Gr                          | 3.6                         | 44.3       | φ 18          | 65          | 30                                   | power               |
| <b>US18650VTC5A</b>                       | 2,600                  | NCA                         | Gr, SiO                     | 3.6                         | 47.1       | φ 18          | 65          | 35                                   | power               |
| <b>US18650VTC5D</b>                       | 2,800                  | NCA                         | Gr, SiO                     | 3.6                         | 46.7       | φ 18          | 65          | 35                                   | power               |
| <b>US18650VTC6</b>                        | 3,120                  | NCA                         | Gr, SiO                     | 3.6                         | 46.6       | φ 18          | 65          | 30                                   | power               |
| <b>US18650VC7</b>                         | 3,500                  | NCA                         | Gr, SiO                     | 3.6                         | 47.2       | φ 18          | 65          | 8                                    | runtime             |
| <b>US18650FTC1</b>                        | 1,100                  | LFP                         | Gr                          | 3.2                         | 38.8       | φ 18          | 65          | 20                                   | life, safety        |
| <b>US18650FTC2</b><br>(Under development) | 1,450                  | LFP                         | Gr                          | 3.2                         | 40         | φ 18          | 65          | 20                                   | life, safety        |
| <b>US21700VTC6A</b>                       | 4,100                  | NCA                         | Gr, SiO                     | 3.6                         | 67.5       | φ 21          | 70          | 40                                   | power               |
| <b>US26650FTC1A</b>                       | 3,000                  | LFP                         | Gr                          | 3.2                         | 84         | φ 26          | 66          | 25                                   | life, safety        |

# Small Lithium ion Secondary Batteries

Murata's Small Lithium ion secondary batteries (CT04120) are rechargeable batteries which can be charged-discharged at high rate, used safely.

| Part Number             | Nominal Voltage | Charge Voltage | Cut-off Voltage | Nominal Capacity | Max. Discharge Current | ESR@ 1kHz | Operating Temperature Range | Size       |
|-------------------------|-----------------|----------------|-----------------|------------------|------------------------|-----------|-----------------------------|------------|
| <b>BACT04120P003V01</b> | 2.3V            | 2.7V           | 1.8V            | 3mAh             | 30mA (10C)             | 1000mΩ    | -20°C to 70°C               | φ 4mm×12mm |

# FORTELION 24V Battery Module



Murata's FORTELION 24V Battery Module is built with olivine-type lithium ion iron phosphate secondary batteries (FORTELION), which are known for their longevity, safety, and fast-charging capability.

Murata's FORTELION 24V Battery Module is capable of monitoring each Battery Module's Voltage, Current, Temperature & Capacity Value through CAN communication.

It is possible to customize voltage and capacity in order to meet the requirements of wide range of applications including Robot, AGV, E-Cart, Forklift, etc.

## Separate type

| Items                                   | Specifications   |
|---|--|
| Model Name                              | LIPY032WWPCSY6(Battery Module)<br>LIA1020WWPACSY6(BMU) |
| System configuration                    | Battery Module+BMU                                     |
| Nominal Voltage / Capacity (per module) | 25.6V / 24Ah / 614Wh                                   |
| Max Discharge Current                   | 50A / 40A / 30A<br>(5sec / 25sec / cont.)              |
| Max Charge Current                      | 24A (1C)   |
| Module Max Configuration                | 2s10p  |
| Battery Communication I/F               | CAN Bus<br>(Murata original format)                    |
| Dust and Water proof                    | Not supported  |
| Safety regulation                       | IEC62133<br>CE (EMC, RoHS)                             |
| Dimension (module)                      | 259(L) x 71(W) x 245(H) (mm)                           |
| Weight (module)                         | 7.3kg (Module)   |

## All-in-one type

| Items                                   | Specifications   |
|---|--|
| Model Name                              | LIPY041WWPCSY6   |
| System configuration                    | All-in-one<br>(BMU function is included)                             |
| Nominal Voltage / Capacity (one module) | 25.6V / 21Ah / 537Wh   |
| Max Discharge Current                   | 100A / 80A / 60A<br>(5sec / 25sec / cont.)                           |
| Max Charge Current                      | 42A (2C)   |
| Module Max Configuration                | 2s10p  |
| Battery Communication I/F               | CAN Bus, U-art<br>(Murata original format)                           |
| Dust and Water proof                    | IP54 rating  |
| Safety regulation                       | IEC/UL62133, IEC62619<br>UL2271 (Light EV battery)<br>CE (EMC, RoHS) |
| Dimension                               | 195(L) x 132(W) x 180(H) (mm)  |
| Weight                                  | 6.5kg  |

# FORTELION Battery System

Possible to customize capacity in order to meet wide usage

## FORTELION High Output Battery Module

This energy storage module utilizes FORTELION olivine type lithium iron phosphate lithium ion secondary batteries. A high-input, high-output energy storage module capable of 200A continuous discharge (6C equivalent) and 100A continuous charge (3C equivalent), it is ideal for applications requiring high input and high output, such as countermeasures to deal with momentary voltage drops during natural disasters, backup systems, and stabilization of renewable energy sources.



(Excluding terminal)  
**MPRMH1701**  
26kg

| Model Name       | Rated Capacity | Nominal Voltage | Maximum Discharge Current | Maximum Charge Current | Operating Temperature Range | Safety Standard |
|------------------|----------------|-----------------|---------------------------|------------------------|-----------------------------|-----------------|
| <b>MPRMH1701</b> | 1.75kWh        | 51.2V           | 200A                      | 100A                   | -20 to 50°C                 | UL1973          |

## FORTELION 2.1kWh Battery Module

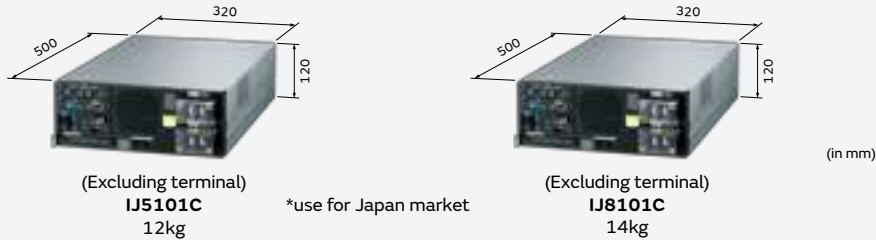


(Excluding terminal)  
**IJ1101M**  
27kg

| Model Name     | Nominal Capacity   | Rated Capacity     | Nominal Voltage | Maximum Discharge Current | Charge Voltage | Maximum Charge Current | Safety Standard                |
|----------------|--------------------|--------------------|-----------------|---------------------------|----------------|------------------------|--------------------------------|
| <b>IJ1101M</b> | 2.1kWh<br>(42.0Ah) | 2.0kWh<br>(39.5Ah) | 51.2V           | 50A                       | 56.0V          | 40A                    | UL 1973<br>FCC Part 15 Class B |

Storage Temperature: -20 to 45°C (Recommended room temperature)  
 Operating Ambient Temperature: Discharge: -20 to 40°C (Discharge current ≤ 50.0A)  
 40 to 50°C (Discharge current ≤ 40.0A)  
 Charge: 10 to 45°C (Charge current ≤ 40.0A)  
 0 to 10°C (Charge current ≤ 12.0A)

## Battery Management Unit (BMU)



| Model Name     | Operating Voltage | Operating Current | Communication Interface | Configuration  | Safety Standard   |
|----------------|-------------------|-------------------|-------------------------|--|---|
| <b>IJ5101C</b> | 60 to 420V        | 0 to 100A         | RS232C/RS485C           | Series: to 7 series<br>Mix Combination: to 6 series and to 2 parallels<br>Maximum module connections: 32 modules | -   |
| <b>IJ8101C</b> | 300 to 1000V      | 0 to 100A         | RS232C/RS485C           | Series: to 16 series<br>Mix Combination: to 16 series and to 2 parallels   | UL 1973<br>FCC Part 15 Class B<br>*It is certificated along with IJ1101M.<br>*UL 1973 is certified for maximum of 90 A. |

Storage Temperature: -20 to 65°C (Recommended room temperature)  
 Operating Ambient Temperature: -20 to 50°C (Recommended room temperature)

## BMU-HUB



| Model Name     | Operating Voltage  | Purpose                                       | Configuration   | Safety Standard                         |
|----------------|--------------------|---|---|---|
| <b>IJ1101K</b> | DC12V, DC24 to 60V | Interface unit to connect IJ8101C for utility | Parallel: to 64BMU<br>Maximum module connections: 64X32=2048 modules (maximum 4.3MWh) | EU EMC Directive<br>FCC Part 15 Class B |

Storage Temperature: -20 to 65°C (Storage and use at room temperature is recommended)  
 Operating Ambient Temperature: -20 to 60°C (Storage and use at room temperature is recommended)

## Cable

| Model Name        | Type                              | Specification |
|-------------------|-----------------------------------|---------------|
| <b>IJT-102F</b>   | Communication Cable 20cm          | RS485         |
| <b>IJT-103F</b>   | Communication Cable 30cm          | RS485         |
| <b>IJT-115F</b>   | Communication Cable 150cm         | RS485         |
| <b>IJT-130F</b>   | Communication Cable 300cm         | RS485         |
| <b>IJD-103F/R</b> | Thicker Power Cable 30cm (red)    | AWG4          |
| <b>IJD-103F/B</b> | Thicker Power Cable 30cm (black)  | AWG4          |
| <b>IJD-110F/R</b> | Thicker Power Cable 100cm (red)   | AWG4          |
| <b>IJD-110F/B</b> | Thicker Power Cable 100cm (black) | AWG4          |

# Coin Manganese Dioxide Lithium Batteries

Coin manganese dioxide lithium batteries are small-sized primary batteries for various applications such as TPMS (Tire Pressure Monitoring System) or smart entry systems for automobile, IoT devices, and backup power source for memory.



## Standard

A lineup of 11 models is offered from small size and thin models to high-capacity models.

| Model  | Electrical Characteristics |                        |                                 | Dimensions    |             |            | Operating Temperature Range (°C) |
|--------|----------------------------|------------------------|---------------------------------|---------------|-------------|------------|----------------------------------|
|        | Nominal Voltage (V)        | Nominal Capacity (mAh) | Standard Discharge Current (mA) | Diameter (mm) | Height (mm) | Weight (g) |                                  |
| CR1216 | 3                          | 30                     | 0.1                             | 12.5          | 1.6         | 0.67       | -30 to 70                        |
| CR1220 | 3                          | 40                     | 0.1                             | 12.5          | 2.0         | 0.77       | -30 to 70                        |
| CR1616 | 3                          | 60                     | 0.1                             | 16.0          | 1.6         | 1.1        | -30 to 70                        |
| CR1620 | 3                          | 80                     | 0.1                             | 16.0          | 2.0         | 1.3        | -30 to 70                        |
| CR1632 | 3                          | 140                    | 0.2                             | 16.0          | 3.2         | 1.9        | -30 to 70                        |
| CR2016 | 3                          | 90                     | 0.1                             | 20.0          | 1.6         | 1.8        | -30 to 70                        |
| CR2025 | 3                          | 160                    | 0.2                             | 20.0          | 2.5         | 2.6        | -30 to 70                        |
| CR2032 | 3                          | 220                    | 0.2                             | 20.0          | 3.2         | 3.1        | -30 to 70                        |
| CR2430 | 3                          | 300                    | 0.2                             | 24.5          | 3.0         | 4.4        | -30 to 70                        |
| CR2450 | 3                          | 610                    | 0.2                             | 24.5          | 5.0         | 6.5        | -30 to 70                        |

Nominal capacity indicates duration until discharge voltage drops down to 2.0V when discharged at nominal discharge current at 23°C. Data is not guaranteed, and is provided for reference purposes only.

## Heat-resistant

Ideal for devices used in severe operating temperature environments including automobiles and FA, etc.

| Model   | Electrical Characteristics |                        |   | Dimensions    |             |            | Operating Temperature Range (°C) |
|---------|----------------------------|------------------------|---|---------------|-------------|------------|----------------------------------|
|         | Nominal Voltage (V)        | Nominal Capacity (mAh) | Recommended Continuous Discharge Current (mA) | Diameter (mm) | Height (mm) | Weight (g) |                                  |
| CR2032W | 3                          | 210                    | ≤1  | 20.0          | 3.2         | 3.1        | -40 to 125                       |
| CR2050W | 3                          | 345                    | ≤1  | 20.0          | 5.0         | 4.2        | -40 to 125                       |
| CR2450W | 3                          | 550                    | ≤1  | 24.5          | 5.0         | 6.7        | -40 to 125                       |
| CR2477W | 3                          | 1000                   | ≤1  | 24.5          | 7.7         | 11         | -40 to 125                       |

Data is not guaranteed, and is provided for reference purposes only.

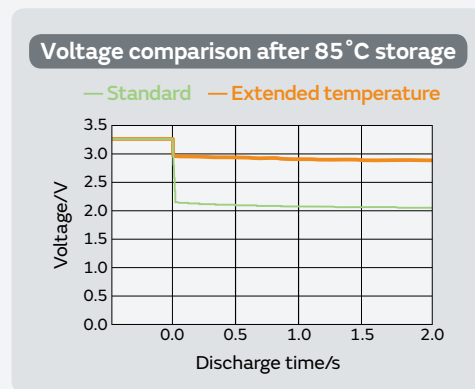
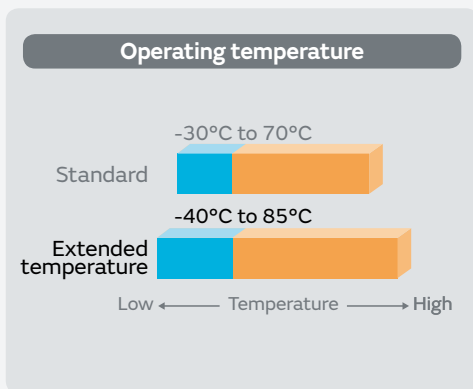
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## Extended Temperature

Designed for automotive devices and outdoor IoT systems, including smart meters and FA control systems. Recommended as an alternative smaller and thinner solution to conventional cylindrical lithium batteries.

| Model   | Electrical Characteristics |                        |   |  | Dimensions    |             |            | Operating Temperature Range (°C) |
|---------|----------------------------|------------------------|---|--|---------------|-------------|------------|----------------------------------|
|         | Nominal Voltage (V)        | Nominal Capacity (mAh) | Recommended Continuous Discharge Current (mA) | Maximum pulse discharge current*1 (mA) | Diameter (mm) | Height (mm) | Weight (g) |                                  |
| CR2032X | 3.0                        | 220                    | ≤1  | 30                                     | 20.0          | 3.2         | 3.0        | -40 to 85                        |
| CR2450X | 3.0                        | 600                    | ≤1  | 30                                     | 24.5          | 5.0         | 6.2        | -40 to 85                        |
| CR2477X | 3.0                        | 1000                   | ≤1  | 30                                     | 24.5          | 7.7         | 9.5        | -40 to 85                        |
| CR3677X | 3.0                        | 2000                   | ≤1  | 80                                     | 36.5          | 7.7         | 20         | -40 to 85                        |

\*1 Current for maintaining minimum 2V voltage with pulsed discharge of 3 seconds and 50% nominal capacity discharged (ambient temperature 23°C). Data is not guaranteed, and is provided for reference purposes only.

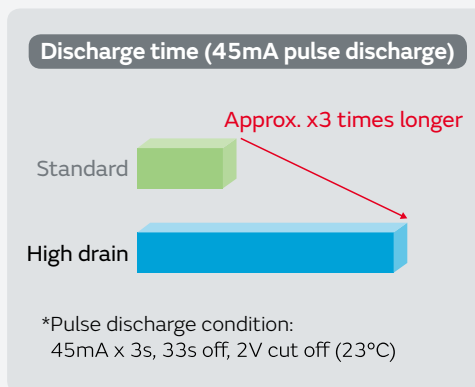
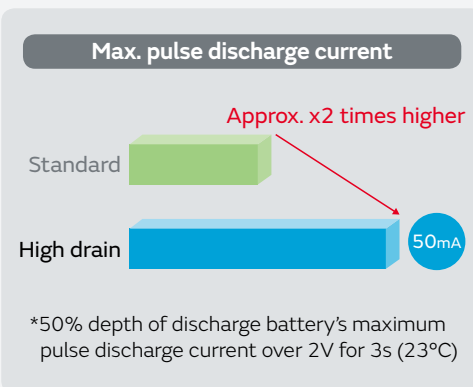


## High Drain

Ideal for tracking devices for logistics and asset management by adopting Low Power Wide Area (LPWA) networks such as LoRa and SIGFOX as well as for outdoor infrastructures, FA control systems, and environment monitoring sensors.

| Model   | Electrical Characteristics |                        |   |  | Dimensions    |             |            | Operating Temperature Range (°C) |
|---------|----------------------------|------------------------|---|--|---------------|-------------|------------|----------------------------------|
|         | Nominal Voltage (V)        | Nominal Capacity (mAh) | Recommended Continuous Discharge Current (mA) | Maximum pulse discharge current*1 (mA) | Diameter (mm) | Height (mm) | Weight (g) |                                  |
| CR2032R | 3.0                        | 200                    | ≤3  | 50                                     | 20.0          | 3.2         | 3.0        | -30 to 70                        |
| CR2450R | 3.0                        | 500                    | ≤3  | 50                                     | 24.5          | 5.0         | 6.2        | -30 to 70                        |


































\*1 Current for maintaining minimum 2V voltage with pulsed discharge of 3 seconds and 50% nominal capacity discharged (ambient temperature 23°C). Data is not guaranteed, and is provided for reference purposes only.



Continued on the following page. ↗



**Tab-welder**

| Mounting Direction   |                                | H   |  | V   | M   |  |
|----------------------|--------------------------------|---|--|---|---|--|
|                      |                                |                |  |                  |                |  |
| Tab Specification    | Shape                          | E   |  | O   | E   | P  |
|                      | Width of Negative Tab Tip (mm) | 0.75  | 0.75   | 1.8   | 0.75  | 2.0  |
|                      | Width of Positive Tab Tip (mm) | 0.75X2  | 0.75X2   | 2.8   | 0.75X2  | 2.0  |
|                      | Pitch (mm)                     | 17.8  | 20.5   | 20.5  | N/A   | N/A  |
| Standard             | CR2032                         | CR2032-HE8<br> | CR2032-HE1<br>    | CR2032-HO6<br>    | CR2032-VE3<br> |  |
|                      | CR2430                         | CR2430-HE1<br> | CR2430-HE2<br>    | CR2430-HO1<br>    | CR2430-VE1<br> |  |
|                      | CR2450                         | CR2450-HE5<br> | CR2450-HE6<br>    | CR2450-HO5<br>    | CR2450-VE6<br> |  |
| Extended Temperature | CR2032X                        |   | CR2032X-HE1<br> | CR2032X-HO6<br> |   |  |
|                      | CR2450X                        |   | CR2450X-HE6<br> | CR2450X-HO5<br> |   |  |
|                      | CR2477X                        |   | CR2477X-HE2<br> | CR2477X-HO4<br> |   |  |
| Heat-resistant       | CR2032W                        |   | CR2032W-HE1<br> | CR2032W-HO6<br> |   |  |
|                      | CR2050W                        |   |  |   |   | CR2050W-MP6<br> |
|                      | CR2450W                        |   | CR2450W-HE6<br> | CR2450W-HO5<br> |   | CR2450W-MP1<br> |
|                      | CR2477W                        |   | CR2477W-HE2<br> | CR2477W-HO4<br> |   |  |
| High Drain           | CR2032R                        |   | CR2032R-HE1<br> | CR2032R-HO6<br> |   |  |
|                      | CR2450R                        |   | CR2450R-HE6<br> | CR2450R-HO5<br> |   |  |

For tab shapes or specifications not included in the above list, please consult your sales representative.

# Silver Oxide Batteries & Alkaline Manganese Batteries

## Standard Silver Oxide Batteries

Silver oxide batteries are small-sized primary batteries with high capacity and stable discharge characteristics. They are suitable for medical devices and precision instruments. All models are 100% made in Japan, and environmentally friendly (0% mercury).



| Model  | Electrical Characteristics |                        | Dimensions    |             |            | Operating Temperature Range (°C) |
|--------|----------------------------|------------------------|---------------|-------------|------------|----------------------------------|
|        | Nominal Voltage (V)        | Nominal Capacity (mAh) | Diameter (mm) | Height (mm) | Weight (g) |                                  |
| SR621  | 1.55                       | 20                     | 6.8           | 2.15        | 0.32       | -10 to 60                        |
| SR626  | 1.55                       | 28                     | 6.8           | 2.60        | 0.40       | -10 to 60                        |
| SR721  | 1.55                       | 29                     | 7.9           | 2.10        | 0.42       | -10 to 60                        |
| SR726  | 1.55                       | 35                     | 7.9           | 2.60        | 0.50       | -10 to 60                        |
| SR41   | 1.55                       | 45                     | 7.9           | 3.60        | 0.65       | -10 to 60                        |
| SR48   | 1.55                       | 75                     | 7.9           | 5.40        | 1.2        | -10 to 60                        |
| SR920  | 1.55                       | 40                     | 9.5           | 2.05        | 0.59       | -10 to 60                        |
| SR927  | 1.55                       | 60                     | 9.5           | 2.70        | 0.79       | -10 to 60                        |
| SR936  | 1.55                       | 75                     | 9.5           | 3.60        | 1.1        | -10 to 60                        |
| SR1120 | 1.55                       | 60                     | 11.6          | 2.05        | 0.92       | -10 to 60                        |
| SR1130 | 1.55                       | 85                     | 11.6          | 3.05        | 1.4        | -10 to 60                        |
| SR43   | 1.55                       | 110                    | 11.6          | 4.20        | 1.8        | -10 to 60                        |

Data is not guaranteed, and is provided for reference purposes only. Please contact us for other models.

## Standard Alkaline Manganese Batteries

Alkaline manganese batteries are small-sized primary batteries with high performance. They are suitable for various applications such as toys, medical devices and health appliances. All models are 100% made in Japan, and environmentally friendly (0% mercury).

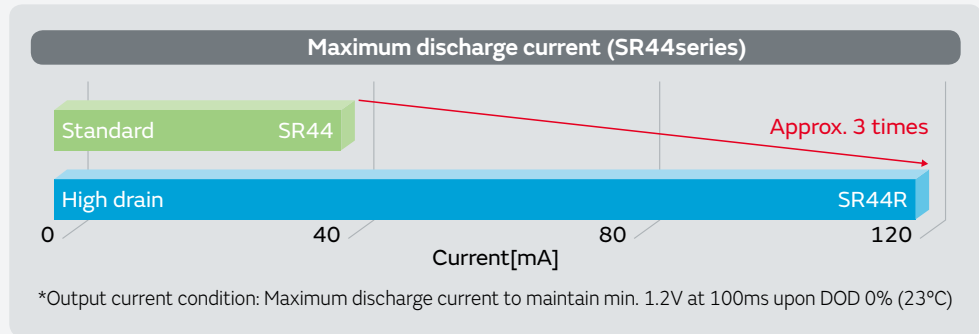


| Model  | Electrical Characteristics |                        | Dimensions    |             |            | Operating Temperature Range (°C) |
|--------|----------------------------|------------------------|---------------|-------------|------------|----------------------------------|
|        | Nominal Voltage (V)        | Nominal Capacity (mAh) | Diameter (mm) | Height (mm) | Weight (g) |                                  |
| LR41   | 1.5                        | 45                     | 7.9           | 3.60        | 0.57       | -10 to 60                        |
| LR1130 | 1.5                        | 70                     | 11.6          | 3.05        | 1.2        | -10 to 60                        |
| LR43   | 1.5                        | 110                    | 11.6          | 4.20        | 1.6        | -10 to 60                        |
| LR44   | 1.5                        | 120                    | 11.6          | 5.40        | 2.0        | -10 to 60                        |

Data is not guaranteed, and is provided for reference purposes only. Please contact us for other models.

## High Drain Silver Oxide Batteries (SR) & Alkaline Manganese Batteries (LR)

High drain SR/LR batteries are ideal for high-performance medical devices that require large current loads for communication, lighting, camera, mechanical driving, etc.



| Model                      | Electrical Characteristics |                        | Dimensions    |             |            | Operating Temperature Range (°C) |
|----------------------------|----------------------------|------------------------|---------------|-------------|------------|----------------------------------|
|                            | Nominal Voltage (V)        | Nominal Capacity (mAh) | Diameter (mm) | Height (mm) | Weight (g) |                                  |
| SR927R (Under development) | 1.55                       | 45                     | 9.5           | 2.7         | 0.7        | -10 to 60                        |
| SR44R                      | 1.55                       | 150                    | 11.6          | 5.4         | 2.2        | -10 to 60                        |
| LR44R                      | 1.50                       | 150                    | 11.6          | 5.4         | 2.0        | -10 to 60                        |

Data is not guaranteed, and is provided for reference purposes only.

# Sound Components (Buzzer)

Piezoelectric ceramic materials that expand and shrink by applying voltage are used in piezoelectric sound components.

## Summary

Using Murata's unique ceramic material, we offer a variety of piezoelectric sound components.

## Lineup

- SMD Piezoelectric Sounders
- Pin Type Piezoelectric Sounders
- Piezoelectric Buzzers
- Piezoelectric Diaphragms



<https://www.murata.com/en-global/products/sound>

## SMD Piezoelectric Sounders

Low power consumption, lightweight.

Optimized for small devices such as blood glucose meters, clinical thermometers, photoflashes for cameras, and portable terminals.

Applicable for automotive usage based on our design and manufacturing technology.



| Applications   | Mounting Type         | Drive Type     | Main Part Number  | Sound Pressure Level (typ.) | Measurement Condition of Sound Pressure Level |
|----------------|-----------------------|----------------|-------------------|-----------------------------|---|
| For Automotive | Surface Mounting Type | External Drive | PKMCS1818E20A0-R1 | 100dB                       | 12Vo-p, 2.0kHz, square wave, 10cm             |
|                |                       |                | PKLCS1212E20A0-R1 | 76dB                        | ±1.5Vo-p, 2.0kHz, square wave, 10cm           |
|                |                       |                | PKLCS1212E24A0-R1 | 80dB                        | ±1.5Vo-p, 2.4kHz, square wave, 10cm           |
|                |                       |                | PKLCS1212E40A1-R1 | 84dB                        | ±1.5Vo-p, 4.0kHz, square wave, 10cm           |
| For Consumer   |                       |                | PKLCS1212E2000-R1 | 76dB                        | ±1.5Vo-p, 2.0kHz, square wave, 10cm           |
|                |                       |                | PKLCS1212E2400-R1 | 80dB                        | ±1.5Vo-p, 2.4kHz, square wave, 10cm           |
|                |                       |                | PKLCS1212E4001-R1 | 84dB                        | ±1.5Vo-p, 4.0kHz, square wave, 10cm           |
|                |                       |                | PKMCS0909E4000-R1 | 72dB                        | ±1.5Vo-p, 4.0kHz, square wave, 10cm           |
|                |                       |                | PKMCS0909E48H0-R1 | 75dB                        | ±2.5Vo-p, 4.8kHz, square wave, 10cm           |

### Detailed Catalogs

For more details, please refer to our printed catalogs and the PDF catalogs on our website.



• Piezoelectric Sound Components

Cat. No. P37E

## Pin Type Piezoelectric Sounders

Low power consumption, lightweight.

These products are optimized for operation confirmation sounds and warning sounds in household appliances such as air conditioners, washers, and refrigerators.

(in mm)

| Packaging | Mounting Type | Drive Type     | Main Part Number        | Sound Pressure Level (typ.) | Measurement Condition of Sound Pressure Level |
|-----------|---------------|----------------|-------------------------|-----------------------------|---|
| Taping    | Pin Type      | External Drive | <b>PKM13EPYH4000-A0</b> | 78dB                        | ±1.5Vo-p, 4.0kHz, square wave, 10cm           |
| Bulk      |               |                | <b>PKM13EPYH4002-B0</b> | 78dB                        | ±1.5Vo-p, 4.0kHz, square wave, 10cm           |
|           |               |                | <b>PKM17EPP-2002-B0</b> | 79dB                        | 3.0Vo-p, 2.0kHz, square wave, 10cm            |
|           |               |                | <b>PKM22EPPH2001-B0</b> | 79dB                        | ±1.5Vo-p, 2.0kHz, square wave, 10cm           |
|           |               |                | <b>PKM22EPPH4007-B0</b> | 92dB                        | ±1.5Vo-p, 4.0kHz, square wave, 10cm           |

## Piezoelectric Buzzers

This is a unified piezoelectric sounder connected to a built-in self-drive circuit, and it easily generates sound with only a DC power supply.

Suitable for gas detector alarms/burglar alarms/home-electronic appliances.

(in mm)

| Mounting Type | Drive Type | Main Part Number        | Sound Pressure Level (min.) | Measurement Condition of Sound Pressure Level |
|---------------|------------|-------------------------|-----------------------------|---|
| Pin Type      | Self Drive | <b>PKB24SPCH3601-B0</b> | 90dB                        | 12Vdc, 10cm                                   |

## Piezoelectric Diaphragms

Low power consumption, lightweight.

Suitable for clocks/calculators/digital cameras/burglar alarms, and various alarms.

| Drive Type     | Main Part Number | Plate Size (øD) |
|----------------|------------------|-----------------|
| External Drive | <b>7BB-12-9</b>  | ø12.0mm         |
|                | <b>7BB-15-6</b>  | ø15.0mm         |
|                | <b>7BB-20-6</b>  | ø20.0mm         |
|                | <b>7BB-27-4</b>  | ø27.0mm         |

□: Indicates Metal Plate Diameter and Resonant Frequency Type.

# Wireless Communication Modules

Available for a wide range of applications such as automotive, mobile computing devices, and household appliances.

## Wi-Fi Modules/ Bluetooth® · Wi-Fi Combo Modules



### ■ Features

Compact, highly efficient, and flexible custom-made correspondence

### ■ Applications

Mobile phones, automotive, tablet PC, POS, HT, electric equipment, smart grid, etc.

## Bluetooth® Modules/ Bluetooth® Low Energy Modules



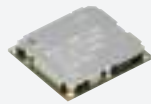
### ■ Features

Compact, highly efficient, and flexible custom-made correspondence

### ■ Applications

Mobile phones, automotive, PMP, POS, HT, healthcare, wireless remote control, etc.

## Low Power Wide Area Network (LPWAN) Wireless Module



### ■ Features

LPWA Wireless Technology-Low-Power consumption, wide area coverage, enables IoT applications. Compact, high efficient, support various communication standards.

### ■ Applications

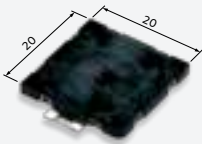
Positioning Tracking, Smart Houses, Agriculture, Healthcare/Medical, Industrial, Logistics, Utilities (Water, Gas Metering), etc.

## Microblowers

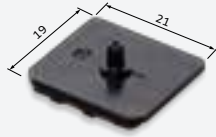
Tiny air blowers/pumps without a motor

### Features

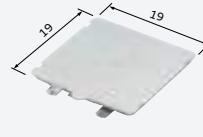
The structure is designed to operate as a blower and pump by applying the ultrasonic vibrations of the ceramic as the drive source. This is achieved in an extremely compact, thin, and silent device with a high flow rate.



MZB1001T02



MZB3004T04



MZB3005T06



MZB4001T05

(in mm)

| Part Number                 | MZB1001T02                                     | MZB3004T04                                    | MZB3005T06             | MZB4001T05                             |
|-----------------------------|--|---|------------------------|--|
| Size                        | 20(W) x 20(L) x 1.85(H)<br>(Nozzle Height 1.6) | 21(W) x 19(L) x 3.4(H)<br>(Nozzle Height 4.5) | 19(W) x 19(L) x 2.3(H) | Φ28 x 5(H)<br>(Each Nozzle Length 6.5) |
| Flow rate (@0kPa)           | 1.2L/min (@21Vdc)                              | 0.2L/min (@18Vdc)                             | 0.2L/min (@18Vdc)      | 1.3L/min (@28Vdc)                      |
| Pressure (@0L/min)          | 2.5kPa (@21Vdc)                                | 60kPa (@19.5Vdc)                              | 60kPa (@19.5Vdc)       | -20kPa (@28Vdc)                        |
| Resonance frequency         | 26kHz  | 23kHz   | 23kHz                  | 21kHz                                  |
| Input Voltage (*1)          | 11.5Vdc to 21Vdc                               | 8Vdc to 19.5Vdc (*2)                          | 8Vdc to 19.5Vdc (*2)   | 20Vdc to 28Vdc                         |
| Operating Temperature range | 0°C to 70°C                                    | 0°C to 45°C (*3)(*4)                          | 0°C to 45°C (*3)(*4)   | 5°C to 50°C (*3)(*5)                   |

\*The above value shows typical characteristics.

(\*1) A drive circuit is required for the operation. Driving circuits are not common. The voltage is the voltage applied to them.

(\*2) Only when the back pressure condition is 10kPa or more; it can be driven with a voltage of 18Vdc or more.

(\*3) When operated continuously, sufficient performance may not be demonstrated due to the generation of heat.

(\*4) Please use in environments where the temperature of the metal surface (marking surface) is 60°C or less.

(\*5) Please use in environments where the temperature of the resin surface is 60°C or less.

- The microblower cannot be used for automobile applications (including accessories). Please refrain from use for automobile applications.
- If the microblower is used for medical applications, Murata requires a special contract to cover the use in the medical application to be agreed upon before the start of mass production.
- Please contact us for other details.

### Application Examples

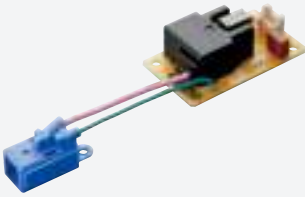
Aroma diffuser, gas/breath suction equipment, blood pressure measuring, breast pump, liquid transfer equipment by air pressure

# Ionizer Modules: Ionissimo

High-concentration ion, compact design, ozone control

Ionissimo is an ionizer module with unprecedented compactness and high efficiency, capable of generating a large number of ions owing to Murata's own high-voltage technology and structural design. The ion generator is connected to the driving power supply for modularization and ease of incorporating into equipment.

## MHM Series



### Features

- A large number of ions will be created by the original structure.
- Compact equipment may be designed due to small ionizer element and driving power supply.
- Ozone amounts may be optimized for specific applications by controlling the generation of ozone without changing the number of ions.

### Applications

Air conditioner, air purifier, static eliminator, vacuum cleaner, etc.

| Items  | MHM305 Type            | MHM314 Type            | MHM306 Type            | MHM400 Type            | MHM402 Type             | MHM403 Type         |
|--|------------------------|------------------------|------------------------|------------------------|-------------------------|---------------------|
| Input Voltage (VDC)                            | 12.0<br>(10.8 to 13.2) | 12.0<br>(10.8 to 13.2) | 12.0<br>(10.8 to 13.2) | 12.0<br>(10.8 to 13.2) | -                       | -                   |
| Input Voltage (VAC)                            | -                      | -                      | -                      | -                      | 220/240<br>(210 to 250) | 100<br>(85 to 110)  |
| Power (W typ.)                                 | 0.4                    | 0.9                    | 0.6                    | 0.6                    | 0.4                     | -                   |
| Ion Polarity                                   | Negative               | Negative               | Negative               | Positive               | Negative                | Positive & Negative |
| Initial value of Ion amount (pcs/cc typ.) (*1) | 5,000,000              | 8,000,000              | 5,000,000              | 5,000,000              | 4,000,000               | -                   |
| Initial value of Ozone amount (mg/H)           | <0.15                  | <0.15                  | 0.6 typ.               | <0.15                  | 0.4 typ.                | -                   |
| Operating Temp. (°C)                           | -10 to 50              | -10 to 50              | -10 to 50              | -10 to 50              | -10 to 50               | -10 to 50           |
| Operating Humidity (%RH) (*2)                  | 20 to 80               | 20 to 80               | 20 to 80               | 20 to 80               | 20 to 80                | 20 to 80            |

(\*1) Measuring distance : 20cm

(\*2) No dew deposit

View a demonstration video of Ionissimo Ionizer Modules on our website.



# Ozonizer Modules: Ionissimo

By using low-temperature co-fired ceramic substrate (LTCC) for the discharger ozone will be generated stably.

## MHM Series



### ■ Features

- Stable ozone generation.
- MHM501 type can be used under high humidity conditions.
- Small size

### ■ Applications

Refrigerator, vacuum cleaner, dishwasher, clothes washer, etc.

| Items   | MHM500 Type         | MHM501 Type         | MHM502 Type         | MHM503 Type         |
|---|---------------------|---------------------|---------------------|---------------------|
| Input Voltage (VDC)   | 12.0 (10.8 to 13.2) | 12.0 (10.8 to 13.2) | 12.0 (10.8 to 13.2) | 12.0 (10.8 to 13.2) |
| Power (W) (*1)  | 2.0                 | 2.4                 | 4.6                 | 1.5                 |
| Ozone Level (mg/H typ.) (*1)                                | 3.5 typ.            | 3 typ.              | 45 typ.             | 2 typ.              |
| Max Duty (%)  | 30                  | 30                  | 100 (*3)            | 10 (*4)             |
| Operating Temp. (°C)  | -10 to 50           | -10 to 50           | 5 to 60             | -10 to 50           |
| Operating Temp (%RH) (*2)<br>High-voltage power supply area | 20 to 80            | 20 to 80            | 20 to 80            | 20 to 80            |
| Operating Humidity (%RH) (*2)<br>Ozone generator area       | 20 to 80            | 20 to 95            | 20 to 90            | 20 to 95            |
| Ozone generator area<br>Supports high humidity              | -                   | ○                   | ○                   | ○                   |

(\*1) measurement result at Duty: 100%

(\*2) No dew deposit

(\*3) 100% Operation Only



(\*4) The duty can be up to 15%.at Ta: 45°C

View a demonstration video of Ionissimo Ozonizer Modules on our website.

# RFID Devices






RFID for transferring identification data by wireless communication. The state-of-the-art technology allows IC tags to be attached to places where traditional barcode and QR code technology could suffer from aging. Murata offers a comprehensive range of items required to introduce RFID, from IC tags to high-quality antennas, reader/writers, and software applications. With the complete kits from Murata, RFID is seamlessly and reliably implemented.

## HF band RFID tag

| Part number     | LXMS33HCNG-134  | LXMS33HCNK-171  |
|-----------------|---|---|
| Application     | Small product management  |   |
| Appearance      |  |  |
| RFID standard   | ISO15693<br>NFC Forum Type5   | ISO14443 TypeA<br>NFC Forum Type2   |
| Frequency       | 13.56MHz  |   |
| IC              | NXP ICODE SLIX  | NXP NTAG210   |
| UID memory      | 64bit   |   |
| NDEF memory     | 896bit  | 384bit  |
| Size(L x W x H) | 3.2 x 3.2 x 0.7 mm  | 3.2 x 3.2 x 0.75 mm   |
| Read range*     | 20mm  | 15mm  |

\*Reference

## UHF band RFID tag

| Part number     | LXMSJZNCMD-217  | LXMSJZNCMF-210  | LXMS21ACMF-218  | LXMS21ACMD-220   | LXTBKZMCMG-010  |
|-----------------|---|---|---|--|---|
| Application     | Small product management  |   | Electronic equipment management   |  | Metal product management  |
| Appearance      |  |  |  |  |  |
| RFID standard   | ISO18000-63 and<br>EPC Global Gen2v2  |   |   |  |   |
| Frequency       | 865-928MHz  |   |   |  | 865-928MHz  |
| IC              | Impinj Monza 4QT  | Impinj Monza R6   | Impinj Monza R6   | Impinj Monza 4QT   | Impinj Monza R6P  |
| UID memory      | 128bit  | 96bit   | 96bit   | 128bit   | 128bit  |
| NDEF memory     | 512bit  | NA  | NA  | 512bit   | 32bit   |
| Size(L x W x H) | 1.2 x 1.2 x 0.55 mm   |   | 2.0 x 1.2 x 0.5 mm  |  | 6 x 2.0 x 2.3mm   |
| Read range*     | 10mm  |   | 9m  | 7m   | 1.5m  |

\*Reference

Note: Monza is a registered trademark of USA-based Impinj, Inc. in the United States and/or in other countries.

Note: ICODE and NTAG are registered trademarks of USA-based NXP Semiconductors N.V. in the United States and/or in other countries.

# Femtet, CAE Software

User-Friendly Simulation Software Tailored for a Wide Range of Engineering Challenges

Femtet is a Multiphysics CAE software with multiple functionalities developed by Murata Manufacturing Co, Ltd.

## Features

### Femtet

Femtet is simulation software based on the finite element method. Its easy operation and comprehensive functionality make stress-free analysis environment possible.

### Eight Solvers and Multiphysics

Solves eight major physical phenomena and multiphysics.

### Efficient Designing

Capable of batch processing and parametric analysis that are essential for tuning and optimization of design.

VBA macro function is available to realize optimum design.

### Comprehensive Functionalities

Equipped with comprehensive modules needed for modeling (CAD), meshing, simulations, and results display, it supports cost-effective simulation activities.

### Database Management

Manages databases of materials, boundary conditions, body attributes, and models.

The database can be shared and used among a group of users.

### CAD Translator

Lets you use the CAD data on hand right away by supporting various kinds of CAD formats to import and export.

## Examples

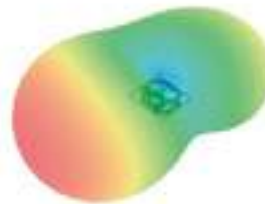
Mechanical Stress



Thermal Conductivity



Electromagnetic Waves



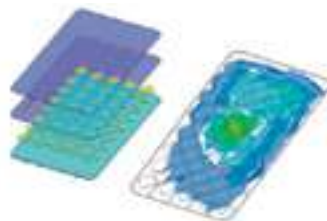
Magnetic Fields



Fluid



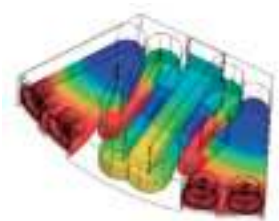
Electric Fields



Piezoelectricity



Acoustic Waves



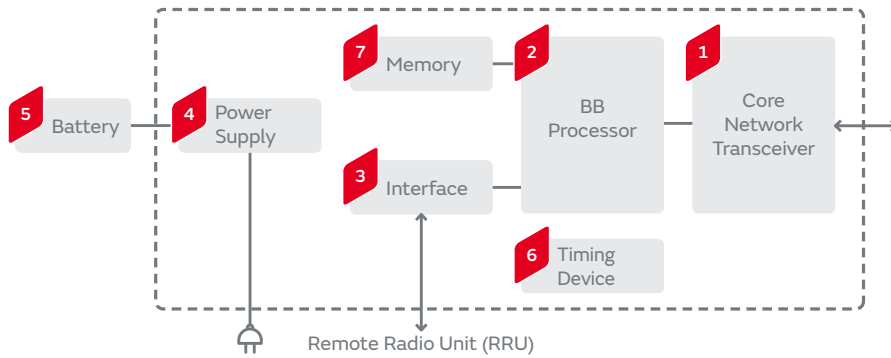
Others

# Memo

# Application Guides



# Baseband unit (BBU) DU / CU



## 1 Core Network Transceiver

Wire Bonding Mount Multilayer  
Microchip Capacitors for General Purpose  
GMA Series



Silicon Capacitors



Wire Bonding/AuSn Soldering Mount Chip Multilayer  
Ceramic Capacitors for General Purpose  
GMD Series



Chip Inductors (Chip Coils)  
FCUL/FDSD Series



Single-Layer  
Microchip Capacitors  
CLB Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



Thin Film Circuit Substrates (RUSUB)  
RU Series



Thermistors  
NCU Series



## 2 BB Processor

Chip Ferrite Beads  
BLM Series



Chip Ferrite Beads  
BLE Series



3 Terminals Low ESL Chip Multilayer  
Ceramic Capacitors for General Purpose  
NFM Series



Thermistors  
NCU Series



## 3 Interface

Low ESL Chip Multilayer Ceramic  
Capacitors for General Purpose  
LLL/LLA/LLM Series














Silicon ESD Protection Devices  
LXES\*\*T Series






Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



**4 Power Supply**


|   |   |   |   |
|---|---|---|---|
| <p>Isolated DC-DC Converters<br/>MYB Series</p>    | <p>Non-Isolated DC-DC Converters<br/>MYMGK/MYSGK/OKL/MYLSM Series</p>    | <p>Isolated DC-DC Converters<br/>DSE/DAE/DCE/DSQ/DAQ/DCQ series</p>   | <p>AC-DC Converter<br/>1U Front End<br/>D1U Series</p>     |
| <p>Metal Terminal Type Multilayer<br/>Ceramic Capacitors for General Purpose<br/>KRM Series</p>  | <p>Polymer Aluminum Electrolytic Capacitors<br/>ECAS Series</p>    | <p>Thermistors<br/>PRF/NCU Series</p>    | <p>Chip Inductors (Chip Coils)<br/>LQM/LQH/DFE Series</p>  |
| <p>Isolated DC-DC Converters for PoE+PD<br/>MYBSP Series</p>                                     | <p>Safety Standard Certified Resin Molding SMD Type<br/>Ceramic Capacitors for General Purpose<br/>DK1 Series</p>  | <p>Safety Standard Certified Lead Type<br/>Disc Ceramic Capacitors for General Purpose<br/>DE1/DE2 Series</p>  |   |

**5 Battery**

|   |   |   |
|---|---|---|
| <p>FORTELION High Output Battery Module<br/>MPRMH1701</p>  | <p>FORTELION 2.1kWh Battery Module System<br/>IJ1101M/IJ8101C/IJ1101k</p>  | <p>Cylindrical Type Lithium Ion<br/>Secondary Batteries</p>  |
|---|---|---|


**6 Timing Device**

Crystal Units  
XRC Series



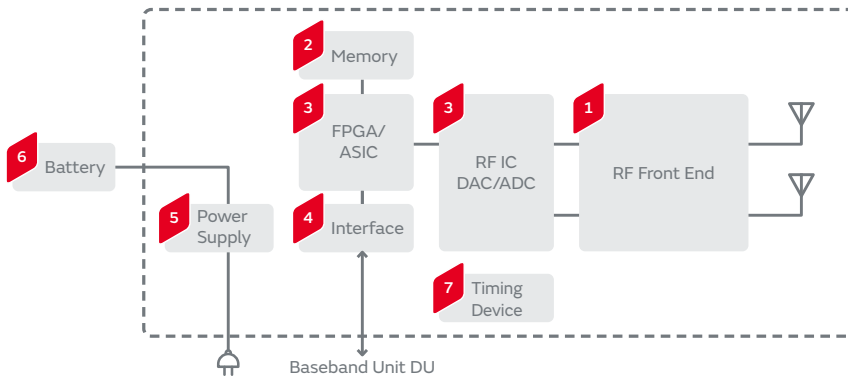
**7 Memory**

Chip Ferrite Beads  
BLM Series



|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Remote radio unit (RRU) mmWave band



## 1 RF Front End

Silicon ESD Protection Devices  
LXES\*\*T Series



Thermistors  
NCU Series



Chip Inductors (Chip Coils)  
LQW/LQP/LQG Series



Silicon Capacitors



## 2 Memory

Chip Ferrite Beads  
BLM Series



## 3 RF IC/DAC/ADC, FPGA/ASIC

Chip Ferrite Beads  
BLM Series



3 Terminals Low ESL Chip Multilayer  
Ceramic Capacitors for General Purpose  
NFM Series



Chip Ferrite Beads  
BLE Series



Thermistors  
NCU Series



## 4 Interface

Low ESL Chip Multilayer Ceramic  
Capacitors for General Purpose  
LLL/LLA/LLM Series



Silicon ESD Protection Devices  
LXES\*\*T Series



Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



## 5 Power Supply

Isolated DC-DC Converters  
MYB Series



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/OKL/MYLSM Series



Isolated DC-DC Converters  
DSE/DAE/DCE/DSQ/  
DAQ/DCQ series



Metal Terminal Type Multilayer  
Ceramic Capacitors for General Purpose  
KRM Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Thermistors  
PRF/NCU Series





**6 Battery**

FORTELION High Output Battery Module MPRMH1701



FORTELION 2.1kWh Battery Module System IJ1101M/IJ8101C/IJ1101k



Cylindrical Type Lithium Ion Secondary Batteries



**7 Timing Device**

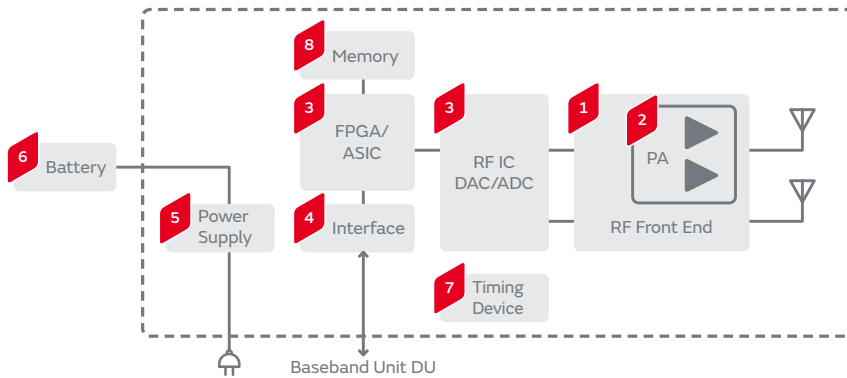
Crystal Units XRC Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Remote radio unit (RRU) less than sub-6GHz band



## 1 RF Front End

Chip Multilayer Diplexers  
LFD Series



Chip Multilayer LC Filters  
LF Series



Chip Multilayer Hybrid Baluns  
LDB/LDM Series



Chip Multilayer Hybrid Couplers  
LDC/LDJ Series



SAW Filters  
SAF Series



SAW Duplexers  
SAY Series



Chip Inductors (Chip Coils)  
LQW/LQP/LQG Series



Thermistors  
NCU Series



## 2 PA

Chip Inductors (Chip Coils)  
LQW/LQP/LQG Series



Silicon Capacitors



Single-Layer  
Microchip Capacitors  
CLB Series



Thin Film Circuit  
Substrates (RUSUB)  
RU Series



High Q Chip Multilayer Ceramic Capacitors  
for General Purpose  
GQM/GJM Series



Thermistors  
NCU Series



## 3 RF IC/DAC/ADC, FPGA/ASIC

Chip Ferrite Beads  
BLM Series



3 Terminals Low ESL  
Chip Multilayer Ceramic Capacitors  
for General Purpose  
NFM Series



Thermistors  
NCU Series



Chip Ferrite Beads  
BLE Series



**4 Interface**

Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
LLL/LLA/LLM Series



Silicon ESD Protection Devices  
LXES\*\*T Series



Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



**5 Power Supply**

Isolated DC-DC Converters  
MYB Series



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/OKL/MYLSM Series



Metal Terminal Type Multilayer  
Ceramic Capacitors for General Purpose  
KRM Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Chip Inductors (Chip Coils)  
FCUL/FDSD Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



Thermistors  
PRF/NCU Series



**6 Battery**

FORTELION High Output Battery Module  
MPRMH1701



FORTELION 2.1kWh Battery Module System  
IJ1101M/IJ8101C/IJ1101k



Cylindrical Type Lithium Ion Secondary Batteries



**7 Timing Device**

Crystal Units  
XRC Series



**8 Memory**

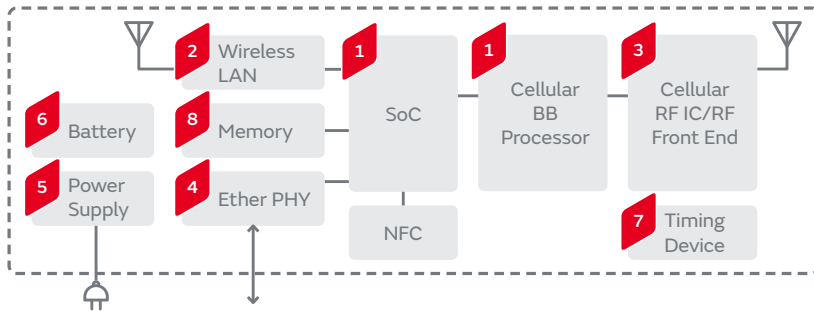
Chip Ferrite Beads  
BLM Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# CPE (FWA device)



## 1 SoC/Cellular BB Processor

Thermistors  
NCP/NCU Series



## 2 Wireless LAN

Wi-Fi Modules



SAW Filters  
SAF Series



Chip Multilayer LC Filters  
LF Series



Chip Multilayer Hybrid Baluns  
LDB/LDM Series



Chip Multilayer Diplexers  
LFD Series



Chip Multilayer Hybrid Couplers  
LDC/LDJ Series



Microwave Coaxial  
Connectors with Switch



Microwave Multi Line  
Connectors



## 3 Cellular RF IC/RF Front End

Chip Multilayer Diplexers  
LFD Series



SAW Duplexers  
SAY Series



SAW Filters  
SAF Series



Chip Multilayer LC Filters  
LF Series



Chip Multilayer Hybrid Baluns  
LDB/LDM Series



Chip Multilayer Hybrid Dividers  
LDD Series



Chip Multilayer Hybrid Couplers  
LDC/LDJ Series



Microwave Coaxial  
Connectors with Switch



Microwave Multi Line  
Connectors



## 4 Ether PHY

Low ESL Chip Multilayer Ceramic  
Capacitors for General Purpose  
LLL/LLA/LLM Series










Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



Silicon ESD Protection Devices  
LXES\*\*T Series



**5 Power Supply**

|   |   |   |   |
|---|---|---|---|
| <p>Low Acoustic Noise Chip Multilayer Ceramic Capacitors on Interposer Board for General Purpose<br/>ZRB Series</p>  | <p>Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose<br/>KRM Series</p>  | <p>Polymer Aluminum Electrolytic Capacitors<br/>ECAS Series</p>  | <p>Chip Inductors (Chip Coils)<br/>FCUL/FDSD Series</p>  |
| <p>Chip Inductors (Chip Coils)<br/>LQM/LQH/DFE Series</p>    | <p>Thermistors<br/>NCP/NCU/PRF Series</p>    | <p>Isolated DC-DC Converters for PoE+PD<br/>MYBSP Series</p>     |   |


**6 Battery**

Thermistors  
NCP/NCU/PRF Series




**7 Timing Device**

Crystal Units  
XRC Series



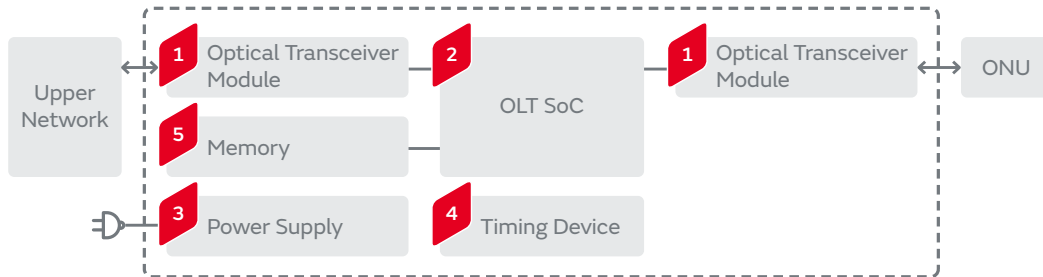
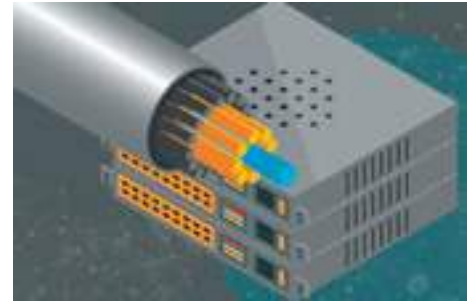
**8 Memory**

Chip Ferrite Beads  
BLM Series



|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# OLT (Optical line terminal)



## 1 Optical Transceiver Module

Wire Bonding Mount Multilayer  
Microchip Capacitors for General Purpose  
GMA Series



Thin Film Circuit Substrates (RUSUB)  
RU Series



Wire Bonding/AuSn Soldering Mount Chip Multilayer  
Ceramic Capacitors for General Purpose  
GMD Series



Silicon Capacitors



Chip Inductors (Chip Coils)  
LQW/LQP/LQG Series



Single-Layer Microchip Capacitors  
CLB Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



## 2 OLT SoC

Thermistors  
NCP/NCU Series



Chip Ferrite Beads  
BLM Series



## 4 Timing Device

Crystal Units  
XRC Series



## 5 Memory

Chip Ferrite Beads  
BLM Series



## 3 Power Supply

Isolated DC-DC Converters  
MYB Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/OKL/MYLSM Series



Thermistors  
NCP/NCU/PRF Series



Isolated DC-DC Converters for PoE+PD  
MYBSP Series



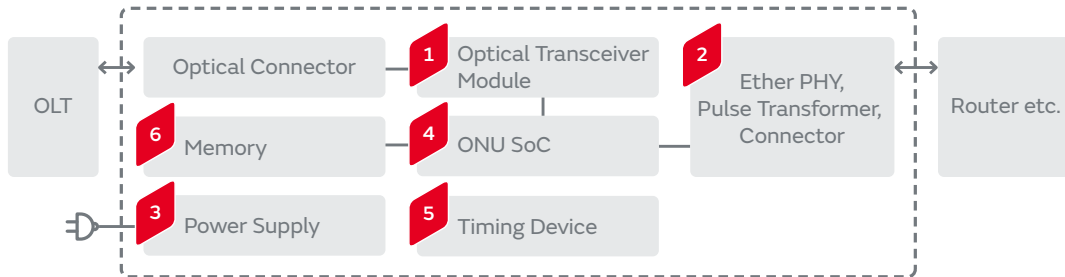
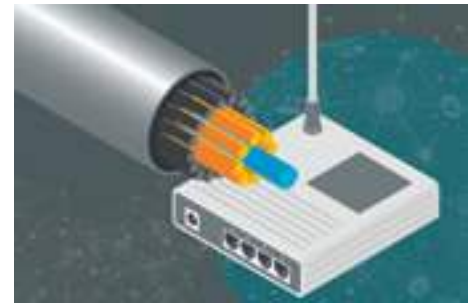
Silicon ESD Protection Devices  
LXES\*\*T Series



### General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# ONU (Optical network units)



## 1 Optical Transceiver Module

|  |  |
|--|--|
| Wire Bonding Mount Multilayer Microchip Capacitors for General Purpose<br>GMA Series | Wire Bonding/AuSn Soldering Mount Chip Multilayer Ceramic Capacitors for General Purpose<br>GMD Series |
| Single-Layer Microchip Capacitors<br>CLB Series                                      | Thin Film Circuit Substrates (RUSUB)<br>RU Series  |
| Thermistors<br>NCP/NCU Series  | Chip Inductors (Chip Coils)<br>LQW/LQP/LQG Series  |
|  | Silicon Capacitors   |
|  | Chip Inductors (Chip Coils)<br>LQM/LQH/DFE Series  |

## 3 Power Supply

|  |   |
|--|---|
| Isolated DC-DC Converters<br>MYB Series              | Non-Isolated DC-DC Converters<br>MYMGK/MYSGK/OKL/MYLSM Series |
| Isolated DC-DC Converters for PoE+PD<br>MYBSP Series | Polymer Aluminum Electrolytic Capacitors<br>ECAS Series       |
| Thermistors<br>NCP/NCU/PRF Series                    | Silicon ESD Protection Devices<br>LXES**T Series              |

## 2 Ether PHY, Pulse Transformer, Connector

|  |   |  |
|--|---|--|
| Low ESL Chip Multilayer Ceramic Capacitors for General Purpose<br>LLL/LLA/LLM Series | Chip Common Mode Choke Coils/ Common Mode Noise Filters<br>DLW/NFG/DLM Series | Silicon ESD Protection Devices<br>LXES**T Series |
|--|---|--|

## 4 ONU SoC

|                               |                                  |
|-------------------------------|----------------------------------|
| Thermistors<br>NCP/NCU Series | Chip Ferrite Beads<br>BLM Series |
|-------------------------------|----------------------------------|

## 5 Timing Device

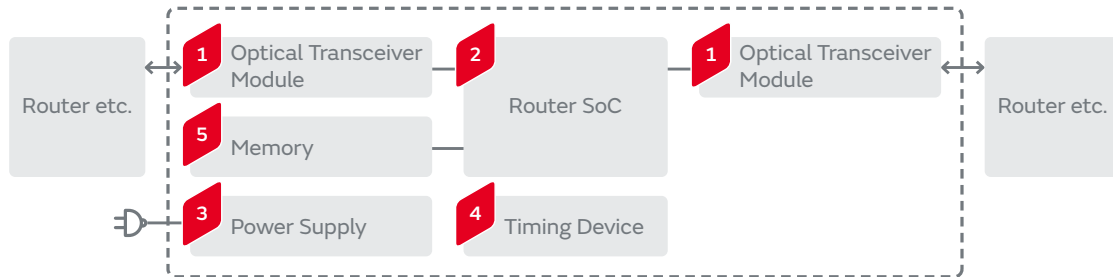
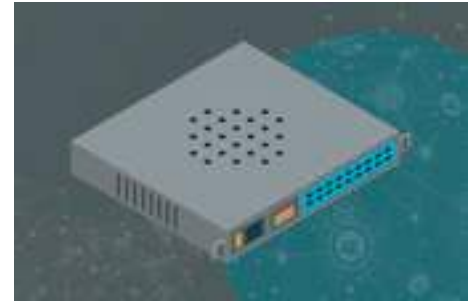
|                             |
|-----------------------------|
| Crystal Units<br>XRC Series |
|-----------------------------|

## 6 Memory

|                                  |
|----------------------------------|
| Chip Ferrite Beads<br>BLM Series |
|----------------------------------|

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Core router



## 1 Optical Transceiver Module

Wire Bonding Mount Multilayer Microchip Capacitors for General Purpose  
GMA Series



Thin Film Circuit Substrates (RUSUB)  
RU Series



Wire Bonding/AuSn Soldering Mount Chip Multilayer Ceramic Capacitors for General Purpose  
GMD Series



Silicon Capacitors



Chip Inductors (Chip Coils)  
LQW/LQP/LQG Series



Single-Layer Microchip Capacitors  
CLB Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



## 2 Router SoC

Chip Ferrite Beads  
BLM Series



Thermistors  
NCP/NCU Series



## 4 Timing Device

Crystal Units  
XRC Series



## 5 Memory

Chip Ferrite Beads  
BLM Series



## 3 Power Supply

Isolated DC-DC Converters  
MYB Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/OKL/MYLSM Series



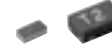
Thermistors  
NCP/NCU/PRF Series



Isolated DC-DC Converters for PoE+PD  
MYBSP Series



Silicon ESD Protection Devices  
LXES\*\*T Series

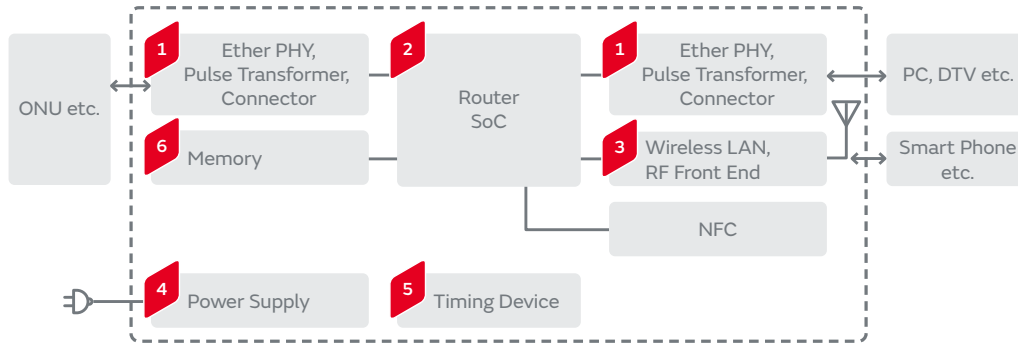


General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |



# Home router



## 1 Ether PHY, Pulse Transformer, Connector

- Low ESL Chip Multilayer Ceramic Capacitors for General Purpose LLL/LLA/LLM Series
- Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series
- Silicon ESD Protection Devices LXES\*\*T Series
- Silicon Capacitors

## 2 Router SoC

- Chip Ferrite Beads BLM Series
- Thermistors NCP/NCU Series

## 3 Wireless LAN, RF Front End

- Microwave Coaxial Connectors with Switch
- Chip Multilayer Diplexers LFD Series
- Chip Multilayer Hybrid Couplers LDC/LDJ Series
- Chip Multilayer LC Filters LF Series
- Chip Multilayer Hybrid Baluns LDB/LDM Series

## 4 Power Supply

- Isolated DC-DC Converters MYB Series
- Non-Isolated DC-DC Converters MYMGK/MYSGK/OKL/MYLSM Series
- Isolated DC-DC Converters for PoE+PD MYBSP Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Thermistors NCP/NCU/PRF Series
- Silicon ESD Protection Devices LXES\*\*T Series
- Chip Inductors (Chip Coils) LQM/LQH/DFE Series

## 5 Timing Device

- Crystal Units XRC Series

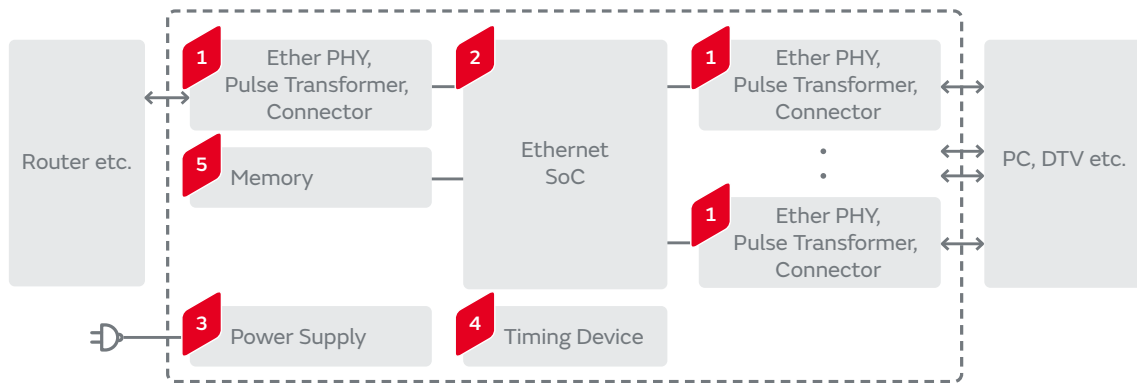
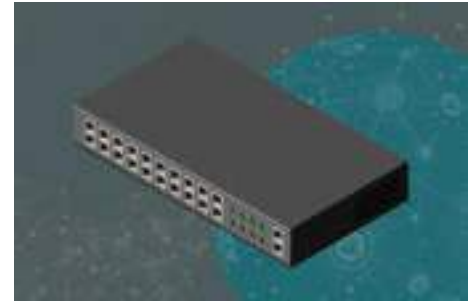
## 6 Memory

- Chip Ferrite Beads BLM Series

General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Switch



## 1 Ether PHY, Pulse Transformer, Connector

Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
LLL/LLA/LLM Series



Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



Silicon ESD Protection Devices  
LXES\*\*T Series



Silicon Capacitors



## 2 Ethernet SoC

Chip Ferrite Beads  
BLM Series



Thermistors  
NCP/NCU Series



## 3 Power Supply

Isolated DC-DC Converters  
MYB Series



Isolated DC-DC Converters for PoE+PD  
MYBSP Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Thermistors  
NCP/NCU/PRF Series



Silicon ESD Protection Devices  
LXES\*\*T Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



Non-Isolated DC-DC Converters  
MYMGK Series



Non-Isolated DC-DC Converters  
MYMGK Series



Non-Isolated DC-DC Converters  
MYTN Series



## 4 Timing Device

Crystal Units  
XRC Series



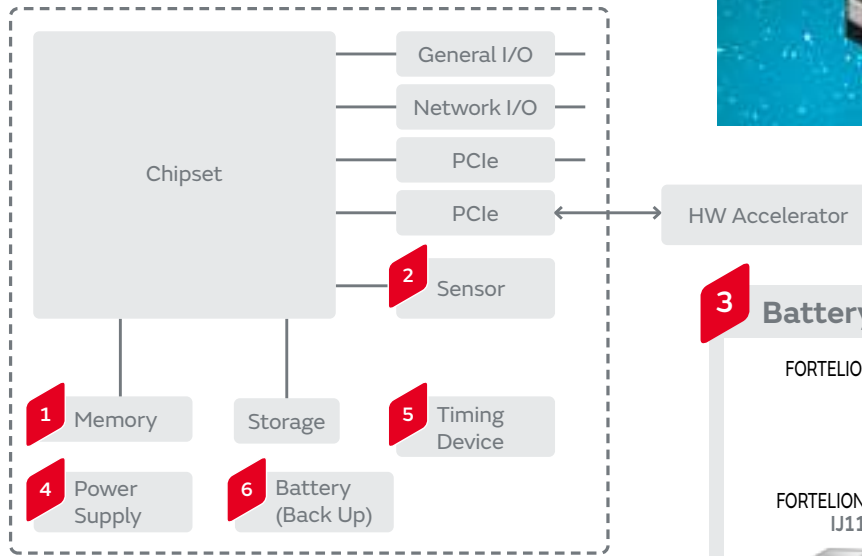
## 5 Memory

Chip Ferrite Beads  
BLM Series



|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Server



**3 Battery (Back up)**

FORTELION High Output Battery Module  
MPRMH1701

FORTELION 2.1kWh Battery Module System  
IJ1101M/IJ8101C/IJ1101k

Cylindrical Type Lithium Ion  
Secondary Batteries

**1 Memory**

Chip Ferrite Beads  
BLM Series

**2 Sensor**

Thermistors  
NCU/PRF/NXF/NXR Series

**4 Power Supply**

Polymer Aluminum Electrolytic Capacitors ECAS Series  
Non-Isolated DC-DC Converters MYMGK Series  
Non-Isolated DC-DC Converters MYMGM Series  
Non-Isolated DC-DC Converters MYTN Series  
Isolated DC-DC Converters DRE/RBS/DRQ Series

AC-DC Converter 1U Front End D1U Series  
Silicon ESD Protection Devices LXES\*\*T Series  
Chip Inductors (Chip Coils) FCUL/FDA Series  
Thermistors PRF/NCU Series

\*Centralized power supply systems  
<https://www.murata.com/en-global/products/power/open-compute>

**5 Timing Device**

MEMS Resonators  
WMRAG Series

Crystal Units  
XRC Series

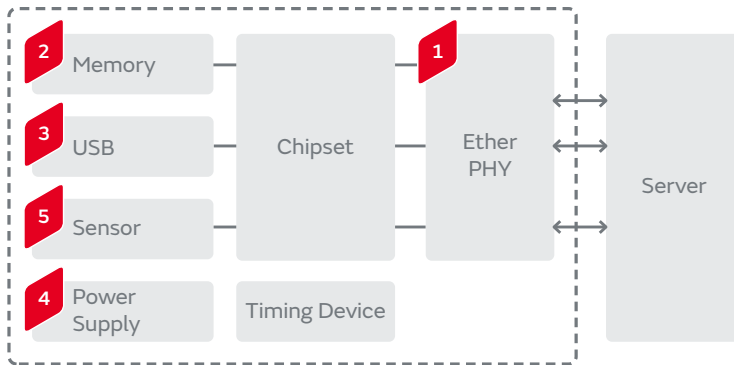
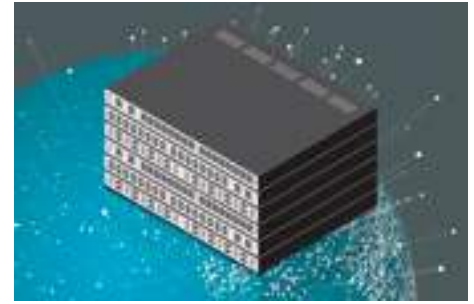
**6 Battery (Back up)**

Coin Manganese Dioxide Lithium Batteries  
Heat-resistant Type/  
Extended Temperature Type

Cylindrical Type Lithium Ion  
Secondary Batteries

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Network switch



## 1 Ether PHY

Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
LLL/LLA/LLM Series



Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



Silicon ESD Protection Devices  
LXES\*\*T Series



Silicon Capacitors



## 2 Memory

Chip Ferrite Beads  
BLM Series



## 3 USB

Chip Common Mode  
Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



## 4 Power Supply

Isolated  
DC-DC Converters  
MYB Series



Non-Isolated DC-DC Converters  
MYMGK Series



Non-Isolated DC-DC Converters  
MYMGM Series



Non-Isolated DC-DC Converters  
MYTN Series



Isolated DC-DC Converters  
DRE/RBS/DRQ Series



AC-DC Converter 1U Front End  
D1U Series



Isolated DC-DC Converters for PoE+PD  
MYBSP Series



## 5 Sensor

Thermistors  
NCU/PRF/NXF/NXR Series



Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Thermistors  
PRF/NCU Series



Silicon ESD Protection Devices  
LXES\*\*T Series



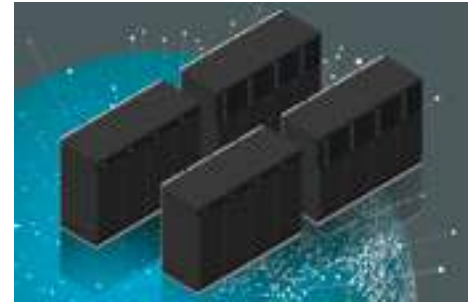
### General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |





# DCIM (Data center infrastructure management)

**1** Environmental Monitoring

- Air Conditioner
- Security
- Controller
- Gateway

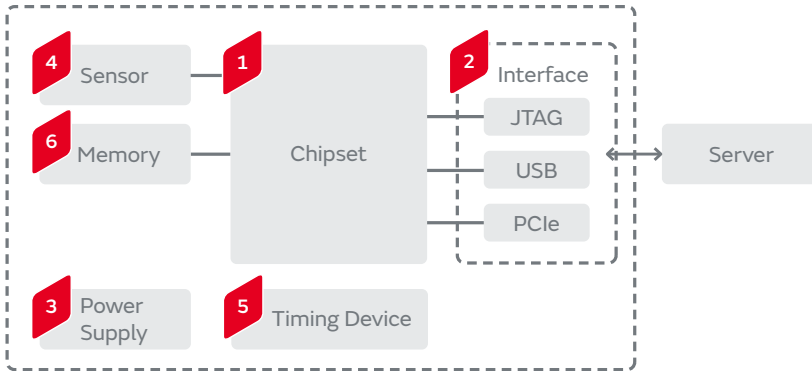
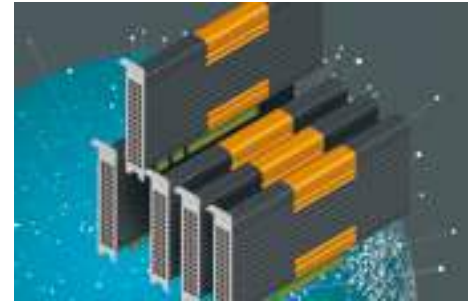


**1** Environmental Monitoring

|  |   |   |   |
|--|---|---|---|
| <p>Wi-Fi Modules</p>  | <p>LPWA Modules</p>  | <p>Magnetic Sensors (TMR Sensors)<br/>CT Series</p>  | <p>Thermistors<br/>NCU Series</p>  |
|--|---|---|---|

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Hardware accelerator



## 1 Chipset

3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
NFM Series



Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
LLL/LLA/LLM Series



## 2 Interface

Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



## 3 Power Supply

Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
LLL/LLA/LLM Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



Large-current Common Mode Choke Coils  
PLT10/PLT5B/DLW5A/DLW5B/UCMH Series



Thermistors  
PRF/NCU Series



Non-Isolated DC-DC Converters  
MYMGK Series



Non-Isolated DC-DC Converters  
MYMGM Series



Non-Isolated DC-DC Converters  
MYTN Series



## 4 Sensor

Thermistors  
NCU/PRF/NXF/NXR Series



## 5 Timing Device

MEMS Resonators  
WMRAG Series



Crystal Units  
XRC Series



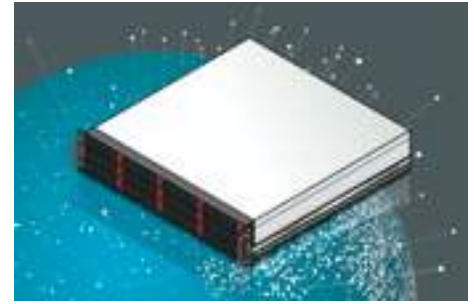
## 6 Memory

Chip Ferrite Beads  
BLM Series



|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Storage system



## 1 Interface

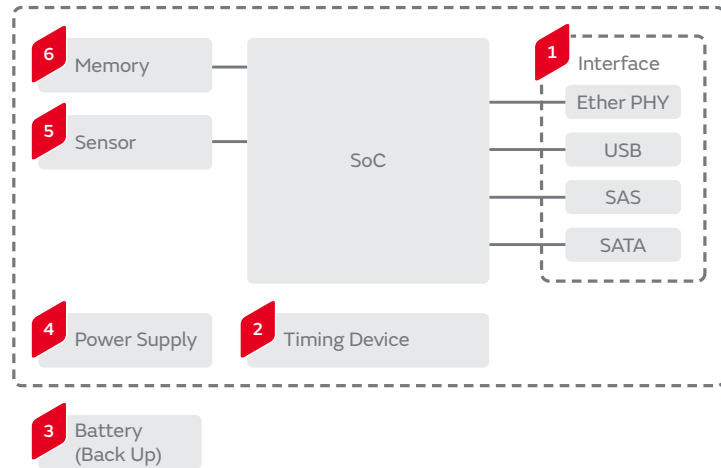
Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
LLL/LLA/LLM Series



Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series



Silicon ESD Protection Devices  
LXES\*\*T Series



## 2 Timing Device

Crystal Units  
XRC Series



## 3 Battery (Back up)

FORTELION High Output Battery Module  
MPRMH1701



FORTELION 2.1kWh Battery Module System  
IJ1101M/IJ8101C/IJ1101k



Cylindrical Type Lithium Ion  
Secondary Batteries



## 4 Power Supply

Polymer Aluminum Electrolytic Capacitors  
ECAS Series



Low ESL Chip Multilayer Ceramic  
Capacitors for General Purpose  
LLL/LLA/LLM Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



Thermistors  
PRF/NCU Series



Isolated DC-DC Converters  
DRE/RBS/DRQ Series



AC-DC Converter  
1U Front End  
D1U Series



Silicon ESD Protection Devices  
LXES\*\*T Series



## 5 Sensor

Thermistors  
NCU/PRF/NXF/NXR Series



## 6 Memory

Chip Ferrite Beads  
BLM Series

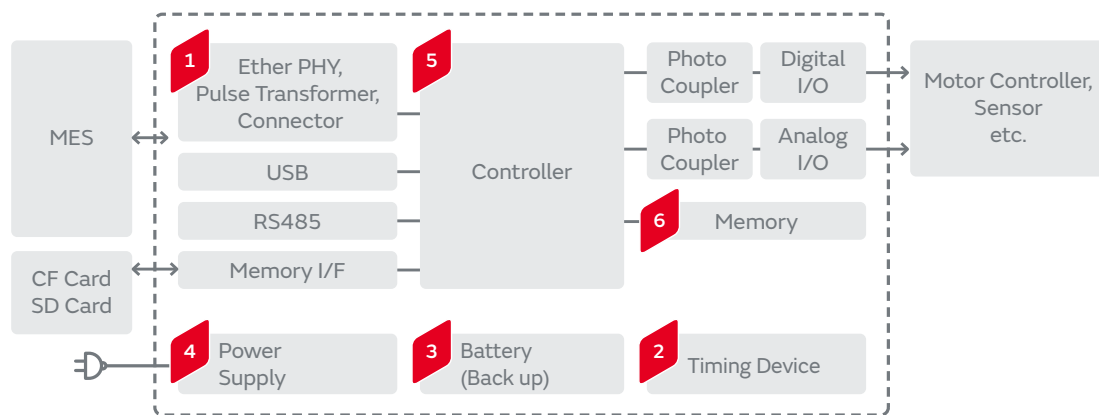
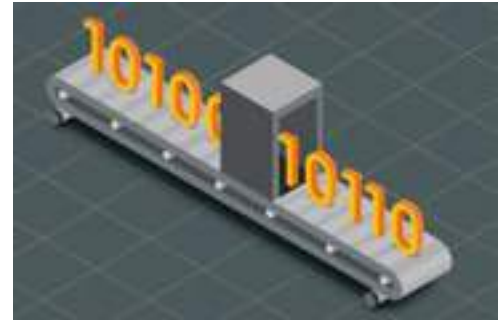


General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |



# PLC (Programmable logic controller)



**1 Ether PHY, Pulse Transformer, Connector**

|  |   |  |
|--|---|--|
| <p>Low ESL Chip Multilayer Ceramic Capacitors for General Purpose<br/>LLL/LLA/LLM Series</p> | <p>Chip Common Mode Choke Coils/<br/>Common Mode Noise Filters<br/>DLW/NFG/DLM Series</p> | <p>Silicon ESD Protection Devices<br/>LXES**T Series</p> |
|--|---|--|

**3 Battery (Back Up)**

Coin Manganese Dioxide  
Lithium Batteries  
Heat-resistant Type/  
Extended Temperature Type

**2 Timing Device**

Crystal Units  
XRC Series

Ceramic Resonators CERALOCK  
CST Series

MEMS Resonators  
WMRAG Series

**4 Power Supply**

|   |   |  |   |
|---|---|--|---|
| <p>Isolated DC-DC Converters<br/>MYB Series</p>                     | <p>Non-Isolated DC-DC Converters<br/>MYMGK/MYSGK/OKL/MYLSM Series</p> | <p>Isolated DC-DC Converters for PoE+PD<br/>MYBSP Series</p> |   |
| <p>Polymer Aluminum<br/>Electrolytic Capacitors<br/>ECAS Series</p> | <p>Thermistors<br/>NCP/NCU/PRF Series</p>                             | <p>Silicon ESD Protection Devices<br/>LXES**T Series</p>     | <p>Chip Inductors (Chip Coils)<br/>LQM/LQH/DFE Series</p> |



**5 Controller**

Chip Ferrite Beads  
BLM Series



Thermistors  
NCP/NCU Series



**6 Memory**

Chip Ferrite Beads  
BLM Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# AGV (Automatic guided vehicle)



## 1 Timing Device

Crystal Units  
XRC Series



MEMS Resonators  
WMRAG Series



## 2 Wireless LAN Module

Microwave Coaxial  
Connectors with Switch



Chip Multilayer Diplexers  
LFD Series



Chip Multilayer  
Hybrid Couplers  
LDC/LDJ Series



Chip Multilayer LC Filters  
LF Series

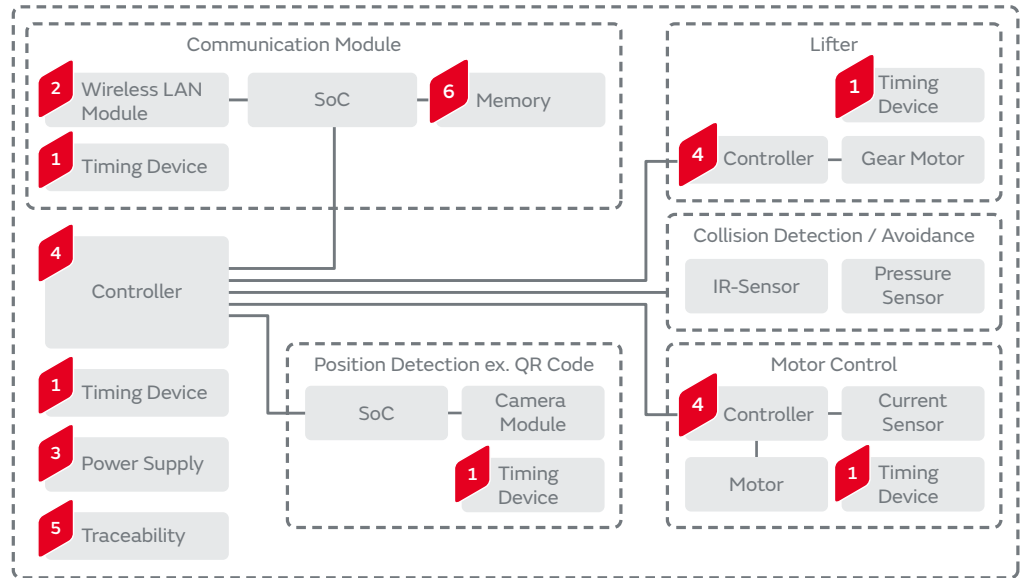


Chip Multilayer  
Hybrid Baluns  
LDB/LDM Series



## 5 Traceability

RFID Tag  
LXMS/LXTB Series



## 3 Power Supply

Isolated DC-DC Converters  
MYB Series



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/  
OKL/MYLSM Series



Isolated DC-DC Converters  
for PoE+PD  
MYBSP Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Thermistors  
NCP/NCU/PRF Series



Silicon ESD Protection Devices  
LXES\*\*T Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series



FORTELION 24V  
Battery Module



FORTELION High Output  
Battery Module  
MPRMH1701



FORTELION 2.1kWh Battery Module System  
IJ1101M/IJ8101C/IJ1101k



Cylindrical Type Lithium Ion  
Secondary Batteries



## 4 Controller

Chip Ferrite Beads  
BLM Series



Thermistors  
NCP/NCU Series



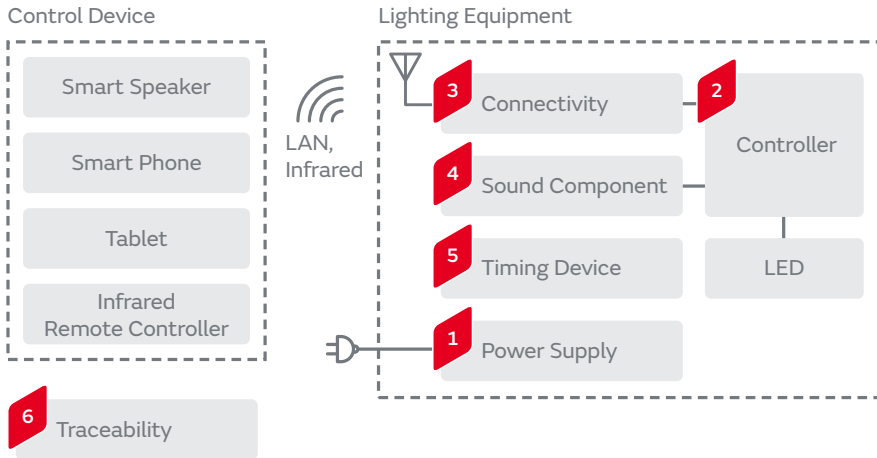
## 6 Memory

Chip Ferrite Beads  
BLM Series



|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Lighting



**1 Power Supply**

Ballast for LED Lighting

**2 Controller**

- Chip Multilayer Ceramic Capacitors for General Purpose GR/GA Series
- Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose DK1 Series
- Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose DE1/DE2 Series
- Thermistors NCP/PRF/PRG Series

**3 Connectivity**

- Wi-Fi Modules
- LPWA Modules
- Microwave Coaxial Connectors with Switch

**4 Sound Component**

Piezoelectric Sounders PKLCS/PKMCS Series

**5 Timing Device**

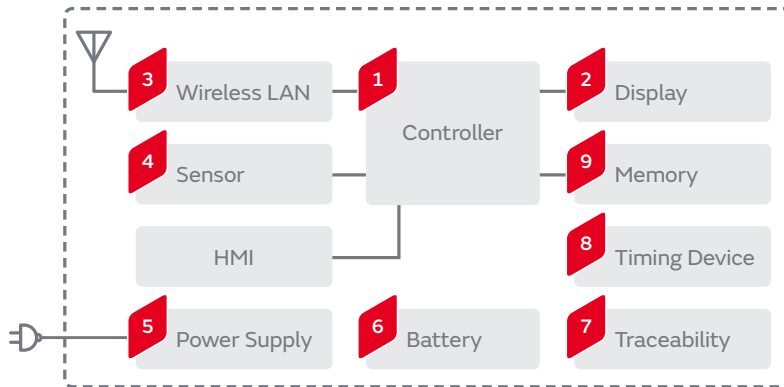
- Crystal Units XRC Series
- MEMS Resonators WMRAG Series
- Ceramic Resonators CERALOCK CST Series

**6 Traceability**

RFID Tag LXMS/LXTB Series

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Thermostat



## 1 Controller

Low ESL Chip Multilayer Ceramic Capacitors for General Purpose LLL/LLA/LLM Series



Thermistors NCP/PRF Series



## 3 Wireless LAN

Bluetooth® Modules



LPWA Modules



Wi-Fi Modules



Chip Inductors (Chip Coils) LQM/LQH/LQB Series



Microwave Coaxial Connectors with Switch



## 2 Display

Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose KRM Series



Polymer Aluminum Electrolytic Capacitors ECAS Series



Piezoelectric Sounders PKMCS/PKLCs/PKM Series



Thermistors NCP/PRF Series



## 4 Sensor

Thermistors NCP/PRF/PRG Series



## 5 Power Supply

Chip Multilayer Ceramic Capacitors for General Purpose GR/GA Series



Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose DK1 Series



Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose DE1/DE2 Series



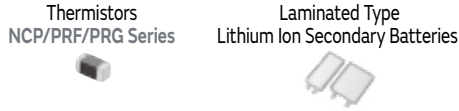
Thermistors NCP/PRF/PRG Series



Polymer Aluminum Electrolytic Capacitors ECAS Series



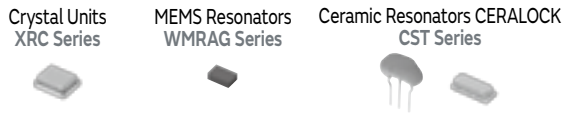
**6 Battery**



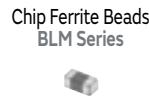
**7 Traceability**



**8 Timing Device**



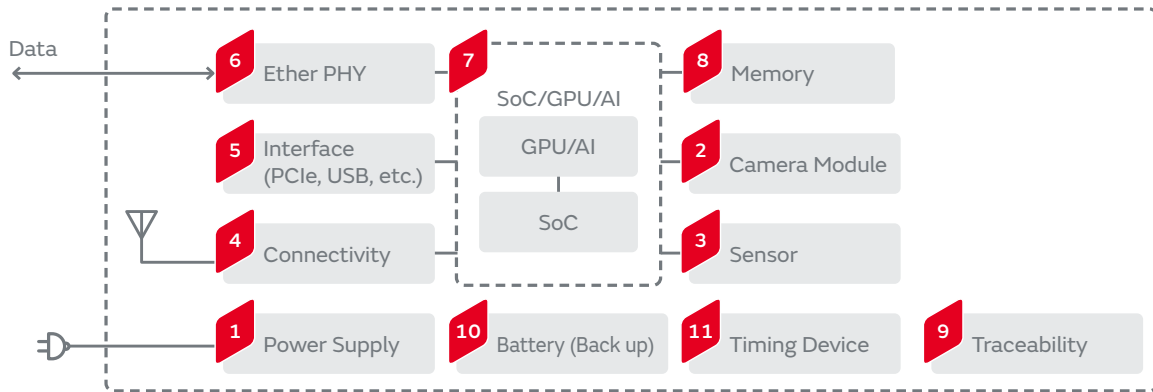
**9 Memory**



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Security camera



## 1 Power Supply

Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose KRM Series



Polymer Aluminum Electrolytic Capacitors ECAS Series



Power Inductors LQH/DFE Series



Thermistors NCP/NCU/PRF Series



Laminated Type Lithium Ion Secondary Batteries



Isolated DC-DC Converters for PoE+PD MYBSP Series



Silicon ESD Protection Devices LXES\*\*T Series



## 2 Camera Module

Chip Ferrite Beads BLM Series



Thermistors NCP/NCU Series



## 3 Sensor

Pyroelectric Infrared Sensors IRA-S Series



Ultrasonic Sensors MA40 Series



Low Acoustic Noise Chip Multilayer Ceramic Capacitors on Interposer Board for General Purpose ZRB Series



Thermistors NCP/NCU Series



## 4 Connectivity

Wi-Fi Modules



Chip Inductors (Chip Coils) LQW/LQP/LQG Series



Chip Multilayer LC Filters LF Series



Chip Multilayer Diplexers LFD Series



Chip Multilayer Hybrid Baluns LDB/LDM Series



Chip Multilayer Hybrid Couplers LDC/LDJ Series



LPWA Modules





**5 Interface (PCIe, USB, etc.)**

- Low ESL Chip Multilayer Ceramic Capacitors for General Purpose LLL/LLA/LLM Series 
- Silicon ESD Protection Devices LXES\*\*T Series 
- Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series 


**6 Ether PHY**

- Low ESL Chip Multilayer Ceramic Capacitors for General Purpose LLL/LLA/LLM Series 
- Silicon ESD Protection Devices LXES\*\*T Series 
- Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series 

**7 SoC/GPU/AI**

- 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose NFM Series 
- Thermistors NCP/NCU Series 

**8 Memory**

- Chip Ferrite Beads BLM Series 




**9 Traceability**

- RFID Tag LXMS/LXTB Series 

**10 Battery (Back Up)**

- Coin Manganese Dioxide Lithium Batteries Standard Type/Heat-resistant Type 

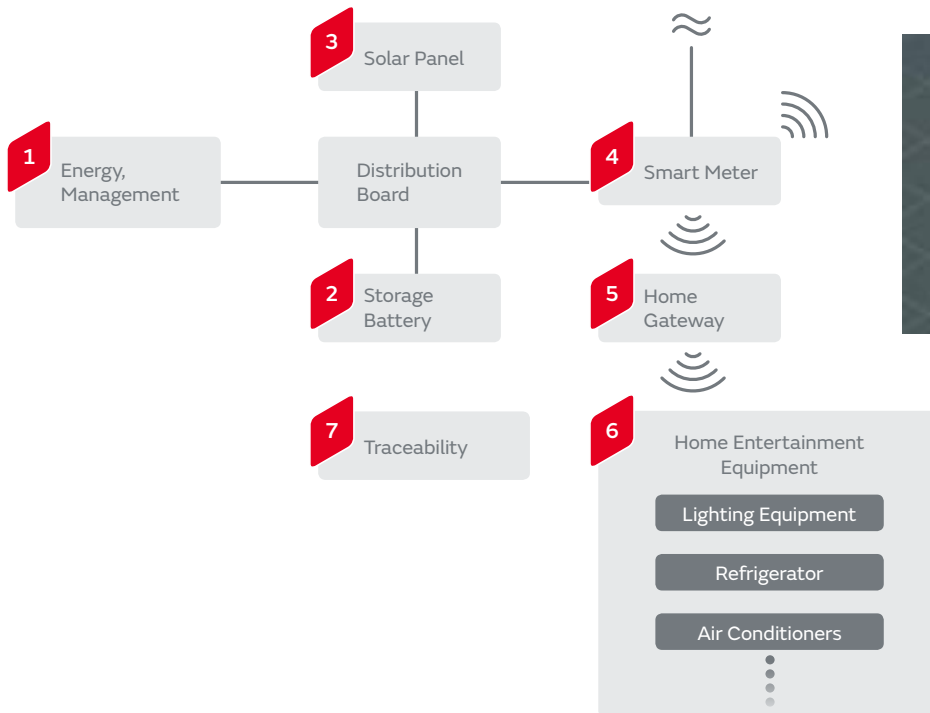
**11 Timing Device**

- MEMS Resonators WMRAG Series 
- Crystal Units XRC Series 
- Ceramic Resonators CERALOCK CST Series 

General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# HEMS (Home energy management system)



**1 Energy, Management**

Crystal Units  
XRC Series

**2 Storage Battery**

|   |   |
|---|---|
| <p>Thermistors<br/>PRF/PRG/NCU Series</p>   | <p>Isolated DC-DC Converters<br/>MYB Series</p>   |
| <p>Non-Isolated DC-DC Converters<br/>MYMGK/MYSGK/OKL/MYLSM Series</p>   | <p>Chip Multilayer Ceramic Capacitors for General Purpose<br/>GR/GA Series</p>                                |
| <p>Safety Standard Certified Resin Molding<br/>SMD Type Ceramic Capacitors for General Purpose<br/>DK1 Series</p> | <p>Safety Standard Certified Lead Type Disc<br/>Ceramic Capacitors for General Purpose<br/>DE1/DE2 Series</p> |
| <p>FORTELION 2.1kWh Battery Module System<br/>IJ1101M/IJ8101C/IJ1101k</p>   | <p>Cylindrical Type Lithium Ion<br/>Secondary Batteries</p>   |

**3 Solar Panel**














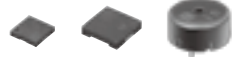


Isolated DC-DC Converters  
MYB Series

Non-Isolated DC-DC Converters  
MYMGK/MYSGK/OKL/MYLSM Series








Chip Multilayer Ceramic Capacitors for General Purpose  
GR/GA Series












**4 Smart Meter**

|   |   |  |   |   |
|---|---|--|---|---|
| <p>Chip Multilayer LC Filters<br/>LF Series</p>                        | <p>Chip Multilayer Hybrid Baluns<br/>LDB/LDM Series</p>    | <p>Wi-Fi Modules</p>    | <p>LPWA Modules</p>                                | <p>Isolated DC-DC Converters<br/>MYB Series</p>  |
| <p>Non-Isolated DC-DC Converters<br/>MYMGK/MYSGK/OKL/MYLSM Series</p>  | <p>Isolated DC-DC Converters for PoE + PD<br/>MYBSP Series</p>   | <p>Chip Multilayer Ceramic Capacitors for Ethernet LAN and Primary - Secondary Coupling of DC-DC Converters<br/>GR4 Series</p>  |   |   |
| <p>MEMS Resonators<br/>WMRAG Series</p>                                | <p>Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose<br/>DK1 Series</p>  | <p>Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose<br/>DE1/DE2 Series</p>                        | <p>Ceramic Resonators CERALOCK<br/>CST Series</p>  |   |
| <p>Crystal Units<br/>XRC Series</p>                                    | <p>Piezoelectric Sounders<br/>PKMCS/PKLCs/PKM Series</p>   | <p>Coin Manganese Dioxide Lithium Batteries<br/>Heat-resistant Type/Extended Temperature Type</p>                                | <p>Microwave Coaxial Connectors with Switch</p>    |   |

**5 Home Gateway**

|  |   |   |   |
|--|---|---|---|
| <p>Wi-Fi Modules</p>    | <p>Bluetooth® Modules</p>            | <p>LPWA Modules</p>                      | <p>Microwave Coaxial Connectors with Switch</p>  |
| <p>Isolated DC-DC Converters for PoE + PD<br/>MYBSP Series</p>  | <p>Crystal Units<br/>XRC Series</p>  | <p>MEMS Resonators<br/>WMRAG Series</p>  |   |

**6 Home Entertainment Equipment**

|   |   |   |
|---|---|---|
| <p>Bluetooth® Modules</p>                        | <p>Wi-Fi Modules</p>   | <p>LPWA Modules</p>  |
| <p>Ultrasonic Sensors<br/>MA40 Series</p>        | <p>Magnetic Sensors (AMR Sensors)<br/>MR Series</p>                    |   |
| <p>Isolated DC-DC Converters<br/>MYB Series</p>  | <p>Non-Isolated DC-DC Converters<br/>MYMGK/MYSGK/OKL/MYLSM Series</p>  |   |
| <p>Crystal Units<br/>XRC Series</p>              | <p>MEMS Resonators<br/>WMRAG Series</p>                                |   |

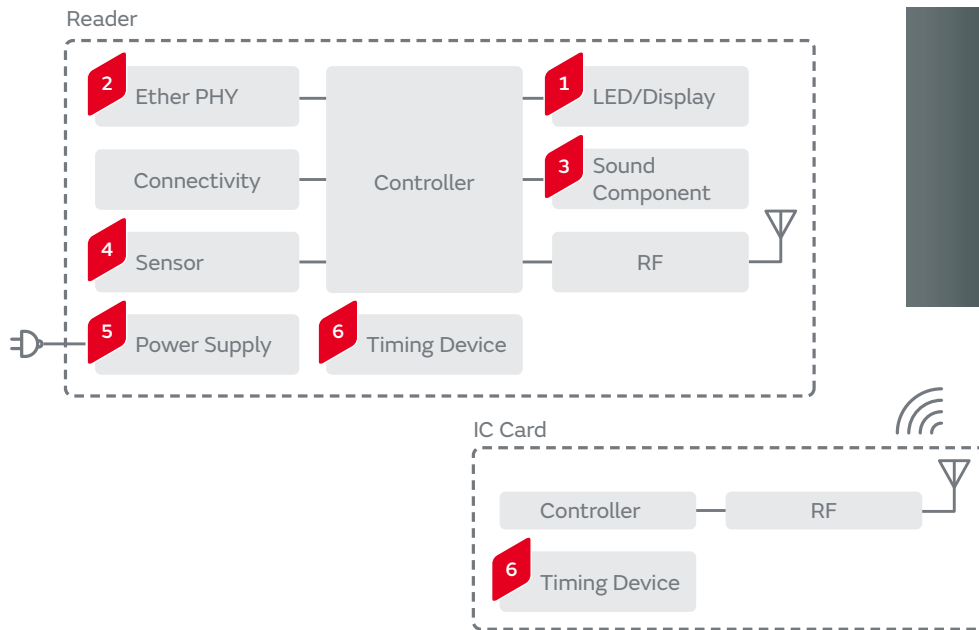
**7 Traceability**

RFID Tag  
LXMS/LXTB Series



|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Entrance and exit management system



**1 LED/Display**

|  |                                       |
|--|---------------------------------------|
| <p>Silicon ESD Protection Devices<br/>LXES**T Series</p> | <p>Thermistors<br/>NCP/PRF Series</p> |
|--|---------------------------------------|

**2 Ether PHY**

|  |                                   |
|--|-----------------------------------|
| <p>Silicon ESD Protection Devices<br/>LXES**T Series</p> | <p>Thermistors<br/>PRG Series</p> |
|--|-----------------------------------|

**3 Sound Component**

Piezoelectric Sounders  
PKMCS/PKLCS/PKM Series

**4 Sensor**

|   |   |   |
|---|---|---|
| <p>Ultrasonic Sensors<br/>MA40 Series</p> | <p>Magnetic Sensors (AMR Sensors)<br/>MR Series</p> | <p>Pyroelectric Infrared Sensors<br/>IRA-S Series</p> |
|---|---|---|

**5 Power Supply**

Polymer Aluminum Electrolytic Capacitors ECAS Series



Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose KRM Series



Non-Isolated DC-DC Converters MYMGK/MYSGK/OKL/MYLS M Series



Isolated DC-DC Converters for PoE + PD MYBSP Series



Thermistors NCP/PRF Series



Chip Multilayer Ceramic Capacitors for General Purpose GR/GA Series



Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose DK1 Series



Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose DE1/DE2 Series



**6 Timing Device**

Crystal Units XRC Series



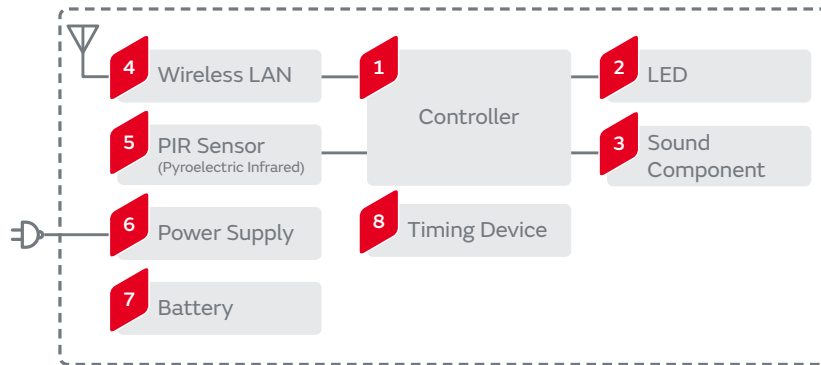
Ceramic Resonators CERALOCK CST Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Human detection



## 1 Controller

Low ESL Chip Multilayer Ceramic Capacitors for General Purpose  
LLL/LLA/LLM Series



Thermistors  
NCP/PRF Series



## 2 LED

Chip Multilayer Ceramic Capacitors for General Purpose  
GR/GA Series



Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose  
DK1 Series



Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose  
DE1/DE2 Series



Thermistors  
NCP/PRF/PRG Series



## 3 Sound Component

Piezoelectric Sounders  
PKMCS/PKLCS/PKM Series



## 4 Wireless LAN

Wi-Fi Modules



Chip Inductors (Chip Coils)  
LQW/LQP/LQG Series



## 5 PIR Sensor (Pyroelectric Infrared)


Pyroelectric Infrared Sensors  
IRA-S Series





Ultrasonic Sensors  
MA40 Series





**6 Power Supply**


Chip Multilayer Ceramic Capacitors for General Purpose GR/GA Series 


Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose DK1 Series 

Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose DE1/DE2 Series 


Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/DLM Series 


Thermistors NCP/PRF/PRG Series 

Polymer Aluminum Electrolytic Capacitors ECAS Series 


Isolated DC-DC Converters for PoE + PD MYBSP Series 


**7 Battery**

Coin Manganese Dioxide Lithium Batteries Standard Type 

Thermistors NCP/PRF/PRG Series 

**8 Timing Device**

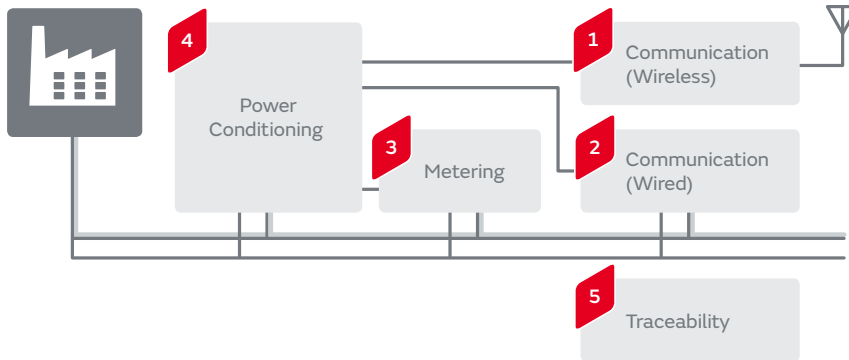
Crystal Units XRC Series 

Ceramic Resonators CERALOCK CST Series 

General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Smart meter



## 1 Communication (Wireless)

|   |                                     |   |   |   |
|---|-------------------------------------|---|---|---|
| <p>Wi-Fi Modules</p>                          | <p>LPWA Modules</p>                 | <p>Chip Multilayer LC Filters<br/>LF Series</p>           | <p>Chip Multilayer Hybrid Baluns<br/>LDB/LDM Series</p> | <p>Microwave Coaxial<br/>Connectors with Switch</p> |
| <p>Thermistors<br/>NCP/PRF/PRG/NCU Series</p> | <p>Crystal Units<br/>XRC Series</p> | <p>Chip Inductors (Chip Coils)<br/>LQW/LQP/LQG Series</p> | <p>MEMS Resonators<br/>WMRAG Series</p>                 |   |

## 2 Communication (Wired)

|   |   |
|---|---|
| <p>Chip Multilayer Ceramic Capacitors<br/>for General Purpose<br/>GR/GA Series</p>                            | <p>Safety Standard Certified Resin Molding<br/>SMD Type Ceramic Capacitors for General Purpose<br/>DK1 Series</p> |
| <p>Safety Standard Certified Lead Type Disc<br/>Ceramic Capacitors for General Purpose<br/>DE1/DE2 Series</p> | <p>Leaded MLCC<br/>for General Purpose<br/>RDE Series</p>   |
| <p>Thermistors<br/>NCP/PRF/PRG/NCU Series</p>   | <p>Ceramic Resonators CERALOCK<br/>CST Series</p>   |
| <p>Crystal Units<br/>XRC Series</p>   | <p>Silicon ESD Protection Devices<br/>LXES**T Series</p>  |

## 3 Metering

|   |   |
|---|---|
| <p>Chip Common Mode Choke Coils/<br/>Common Mode Noise Filters<br/>DLW/DLM Series</p> | <p>Thermistors<br/>NCP/PRF/PRG/NCU Series</p>           |
| <p>Ceramic Resonators CERALOCK<br/>CST Series</p>                                     | <p>Crystal Units<br/>XRC Series</p>                     |
| <p>Piezoelectric Sounders<br/>PKMCS/PKLCs/PKM Series</p>                              | <p>Magnetic Sensors<br/>(AMR Sensors)<br/>MR Series</p> |
| <p>MEMS Resonators<br/>WMRAG Series</p>   |   |

**4 Power Conditioning**

Non-Isolated DC-DC Converters  
MYMGK/MYSGK/  
OKL/MYSLM Series



Isolated DC-DC Converters  
for PoE + PD  
MYBSP Series



Chip Multilayer  
Ceramic Capacitors  
for General Purpose  
GR/GA Series



Safety Standard Certified Resin  
Molding SMD Type Ceramic  
Capacitors for General Purpose  
DK1 Series



Safety Standard Certified Lead Type Disc  
Ceramic Capacitors for General Purpose  
DE1/DE2 Series



Leaded MLCC  
for General Purpose  
RDE Series



Power Inductors  
LQH Series



Thermistors  
NCP/PRF/PRG/NCU Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Coin Manganese Dioxide Lithium Batteries  
Heat-resistant Type/Extended Temperature Type



**5 Traceability**

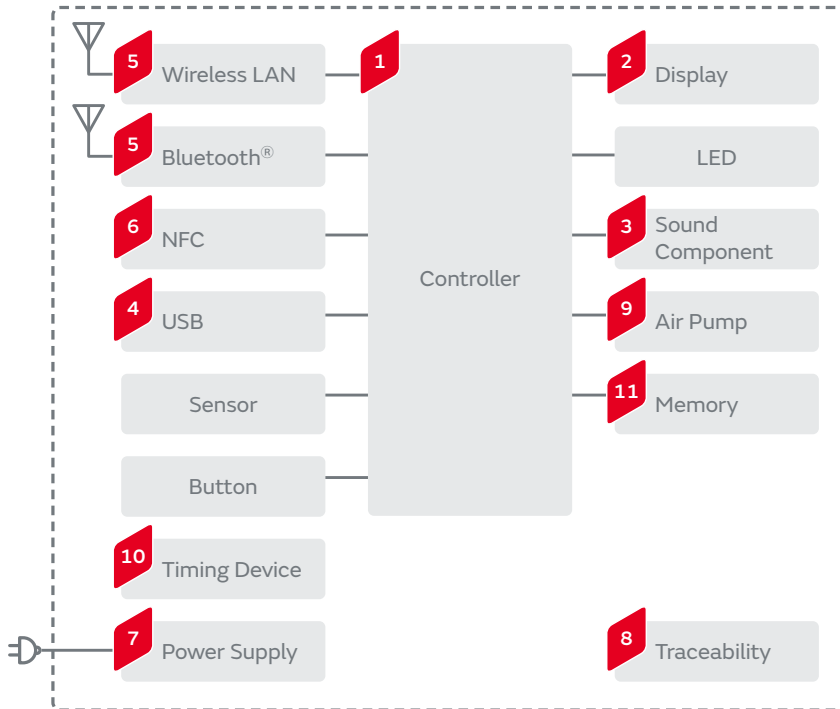
RFID Tag  
LXMS/LXTB Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Blood pressure monitor



### 1 Controller

|                                  |                           |                               |
|----------------------------------|---------------------------|-------------------------------|
| Chip Ferrite Beads<br>BLM Series | Thermistors<br>NCP Series | Thermistors<br>NCP/NXR Series |
|                                  |                           |                               |

### 2 Display

|  |                                  |                           |
|--|----------------------------------|---------------------------|
| 3 Terminals Low ESL Chip<br>Multilayer Ceramic Capacitors<br>for General Purpose<br>NFM Series | Chip Ferrite Beads<br>BLM Series | Thermistors<br>NCP Series |
|  |                                  |                           |

### 3 Sound Component

Piezoelectric Sounders  
PKMCS/PKLCs/PKM Series

### 4 USB

|  |                           |
|--|---------------------------|
| Silicon ESD Protection Devices<br>LXES**T Series | Thermistors<br>PRG Series |
|  |                           |

### 6 NFC

|                                  |   |
|----------------------------------|---|
| Chip Ferrite Beads<br>BLM Series | Chip Inductors (Chip Coils)<br>LQW18C/LQM18J Series |
|                                  |   |

### 5 Wireless LAN, Bluetooth®

|  |  |               |                           |
|--|--|---------------|---------------------------|
| Silicon ESD Protection Devices<br>LXES**T Series | Bluetooth® Smart Modules<br>LBCA/LBMA Series | Wi-Fi Modules | Thermistors<br>PRG Series |
|  |  |               |                           |



**7 Power Supply**

Thermistors  
NCP Series



Thermistors  
PRF/PRG Series



Coin Manganese Dioxide  
Lithium Batteries  
Standard Type



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



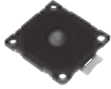
**8 Traceability**

RFID Tag  
LXMS/LXTB Series



**9 Air Pump**

Microblowers



**10 Timing Device**

MEMS Resonators  
WMRAG Series



Crystal Units  
XRC Series



Ceramic Resonators  
CERALOCK  
CST Series



**11 Memory**

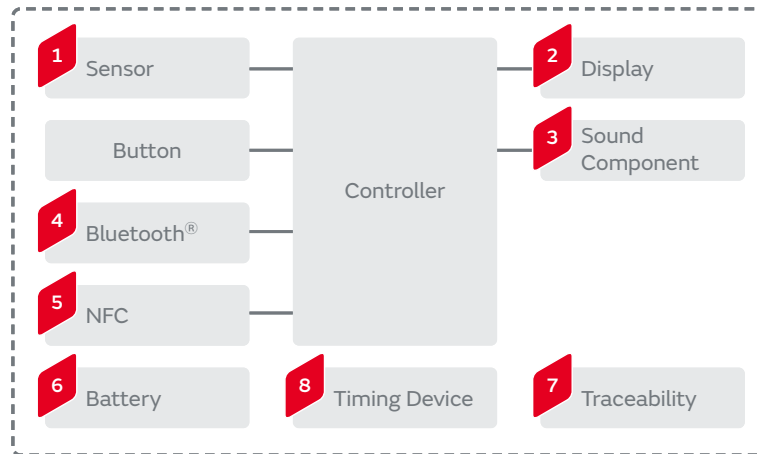
Chip Ferrite Beads  
BLM Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Thermometer

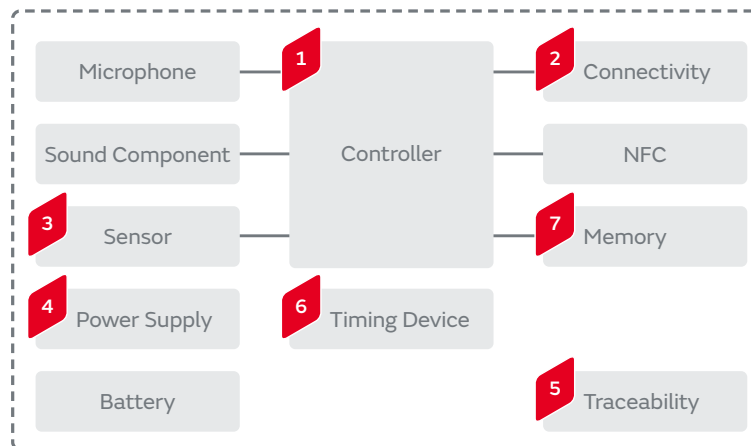


|   |   |  |   |
|---|---|--|---|
| <b>1 Sensor</b><br>Thermistors<br>NXF Series<br>                                  | <b>2 Display</b><br>Thermistors<br>NCP Series<br>         | <b>3 Sound Component</b><br>Piezoelectric Sounders<br>PKLCS/PKMCS Series<br> | <b>4 Bluetooth®</b><br>Bluetooth® Smart Modules<br>LBCA/LBMA Series<br> |
| <b>5 NFC</b><br>Chip Ferrite Beads<br>BLM Series<br>                              |   | Chip Inductors (Chip Coils)<br>LQW18C/LQM18J Series<br>                      |   |
| <b>6 Battery</b><br>Coin Manganese Dioxide Lithium Batteries<br>Standard Type<br> |   | Alkaline Manganese Batteries<br>   |   |
| <b>7 Traceability</b><br>RFID Tag<br>LXMS/LXTB Series<br>                         | <b>8 Timing Device</b><br>Crystal Units<br>XRC Series<br> |  |   |
| Ceramic Resonators CERALOCK<br>CST Series<br>                                     |   |  |   |

General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Hearing aid



## 1 Controller

Thermistors  
NCP Series



## 2 Connectivity

Bluetooth® Modules



Wi-Fi Modules



Thermistors  
NCP Series



Chip Multilayer LC Filters  
LF Series



## 3 Sensor

Thermistors  
NCP Series



## 4 Power Supply

Thermistors  
NCP Series



## 5 Traceability

RFID Tag  
LXMS/LXTB Series



## 6 Timing Device

MEMS Resonators  
WMRAG Series



Crystal Units  
XRC Series



## 7 Memory

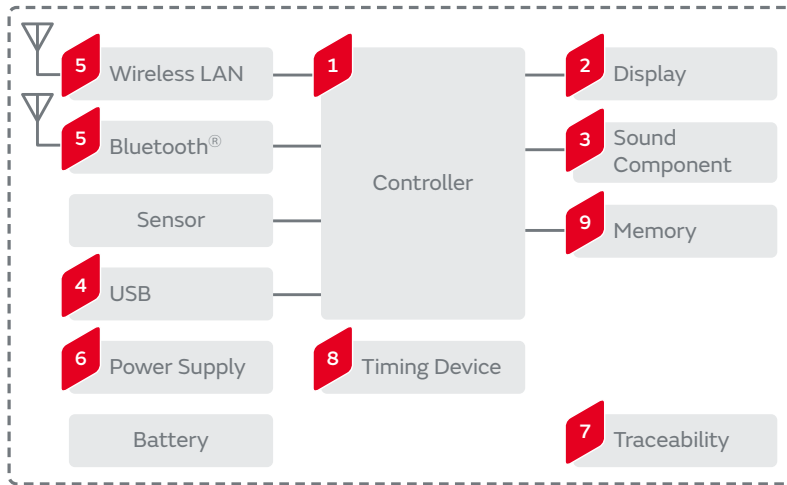
Chip Ferrite Beads  
BLM Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Blood glucose meter



### 3 Sound Component

Piezoelectric Sounders  
PKLCS/PKMCS Series

### 4 USB

Thermistors  
PRG Series

Silicon ESD Protection Devices  
LXES\*\*T Series

### 1 Controller

Chip Ferrite Beads  
BLM Series

Thermistors  
NCP Series

### 2 Display

3 Terminals Low ESL Chip  
Multilayer Ceramic Capacitors for General Purpose  
NFM Series

Chip Ferrite Beads  
BLM Series

### 5 Wireless LAN, Bluetooth®

Bluetooth® Smart Modules  
LBCA/LBMA Series

Wi-Fi Modules

Thermistors  
NCP Series

### 6 Power Supply

Coin Manganese Dioxide  
Lithium Batteries  
Standard Type

Thermistors  
NCP Series

Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series

### 7 Traceability

RFID Tag  
LXMS/LXTB Series

### 8 Timing Device

MEMS Resonators  
WMRAG Series

Crystal Units  
XRC Series

Ceramic Resonators CERALOCK  
CST Series

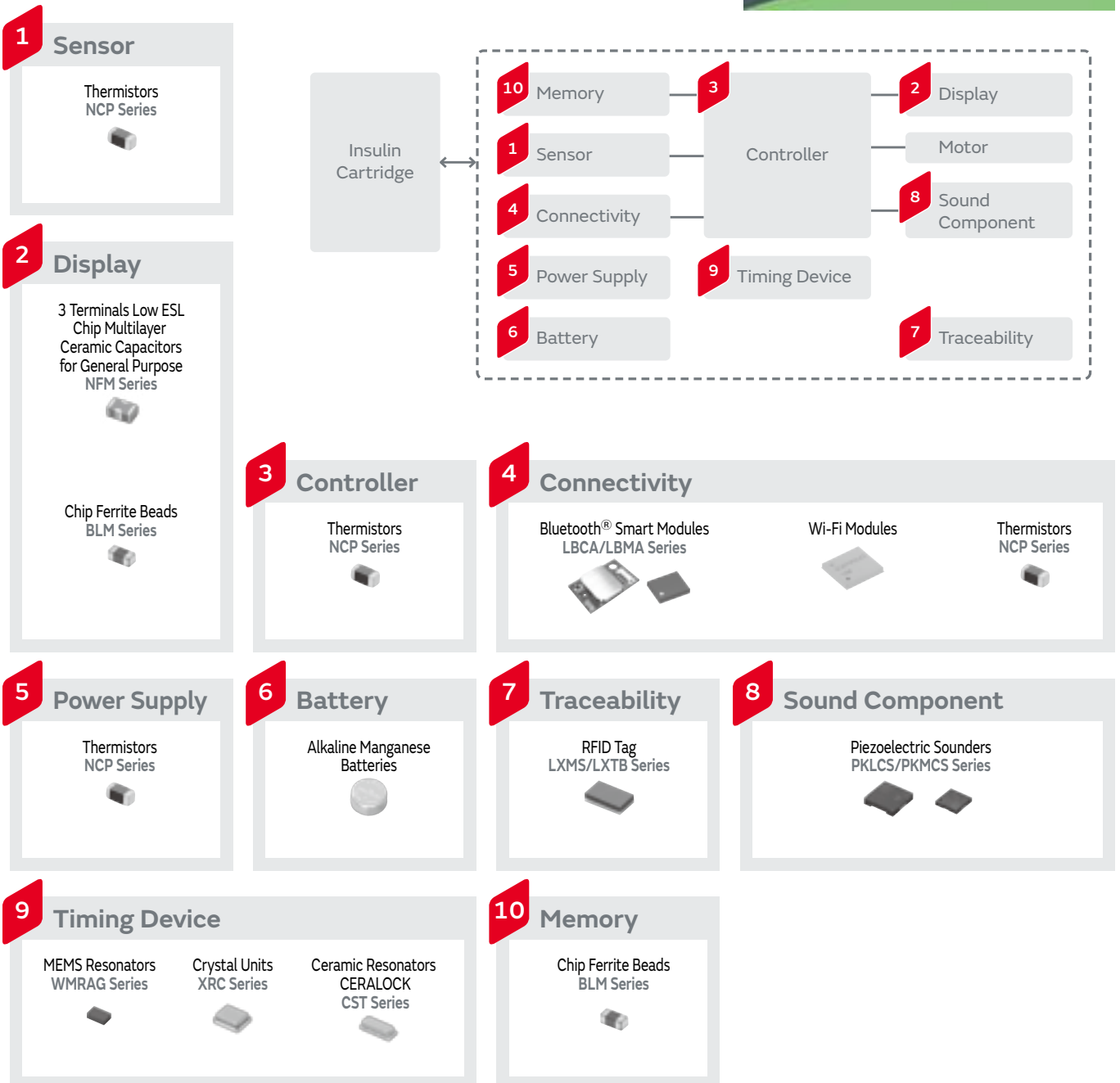
### 9 Memory

Chip Ferrite Beads  
BLM Series

General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Insulin pump



**1 Sensor**

Thermistors  
NCP Series

**2 Display**

3 Terminals Low ESL  
Chip Multilayer  
Ceramic Capacitors  
for General Purpose  
NFM Series

Chip Ferrite Beads  
BLM Series

**3 Controller**

Thermistors  
NCP Series

**4 Connectivity**

Bluetooth® Smart Modules  
LBCA/LBMA Series

Wi-Fi Modules

Thermistors  
NCP Series

**5 Power Supply**

Thermistors  
NCP Series

**6 Battery**

Alkaline Manganese  
Batteries

**7 Traceability**

RFID Tag  
LXMS/LXTB Series

**8 Sound Component**

Piezoelectric Sounders  
PKLCS/PKMCS Series

**9 Timing Device**

MEMS Resonators  
WMRAG Series

Crystal Units  
XRC Series

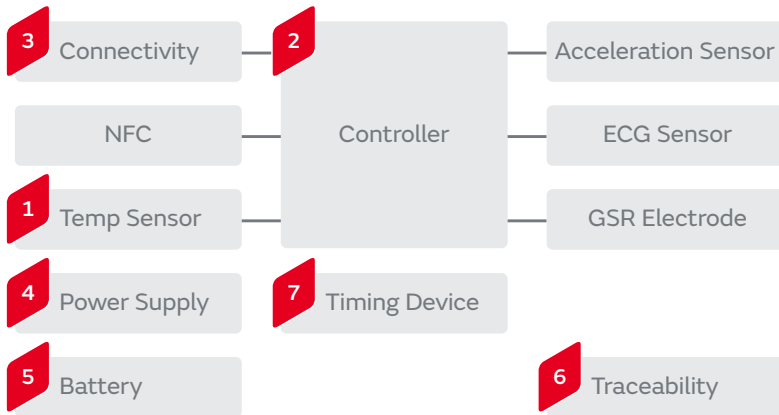
Ceramic Resonators  
CERALOCK  
CST Series

**10 Memory**

Chip Ferrite Beads  
BLM Series

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

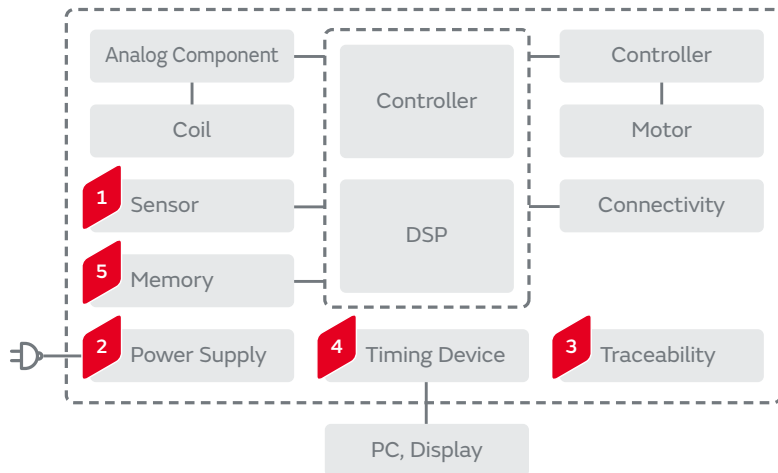
# Skin patch



|   |  |   |  |  |
|---|--|---|--|--|
| <b>1 Temp Sensor</b><br>Thermistors<br>NCP/NXF Series<br> | <b>2 Controller</b><br>Thermistors<br>NCP Series<br>                                 | <b>3 Connectivity</b><br>Bluetooth® Smart Modules<br>LBCA/LBMA Series<br>Wi-Fi Modules<br>Thermistors<br>NCP Series<br> |  |  |
| <b>4 Power Supply</b><br>Thermistors<br>NCP Series<br>    | <b>5 Battery</b><br>Coin Manganese Dioxide<br>Lithium Batteries<br>Standard Type<br> | <b>6 Traceability</b><br>RFID Tag<br>LXMS/LXTB Series<br>   | <b>7 Timing Device</b><br>MEMS Resonators<br>WMRAG Series<br>Crystal Units<br>XRC Series<br> |  |

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Diagnostic imaging apparatus



## 1 Sensor

Thermistors  
NCP/PRF Series



## 3 Traceability

RFID Tag  
LXMS/LXTB Series



## 2 Power Supply

Isolated DC-DC Converters  
MYB Series



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/  
OKL/MYLSM Series



Metal Terminal Type  
Multilayer Ceramic Capacitors  
for General Purpose  
KRM Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Chip Multilayer Ceramic Capacitors  
for General Purpose  
GR/GA Series



Safety Standard Certified Resin Molding SMD Type Ceramic  
Capacitors for General Purpose  
DK1 Series



Safety Standard Certified Lead Type  
Disc Ceramic Capacitors for General Purpose  
DE1/DE2 Series



Thermistors  
NCP/PRF Series



High Voltage Resistors  
MHR Series



## 4 Timing Device

Crystal Units  
XRC Series



Ceramic Resonators CERALOCK  
CST Series



## 5 Memory

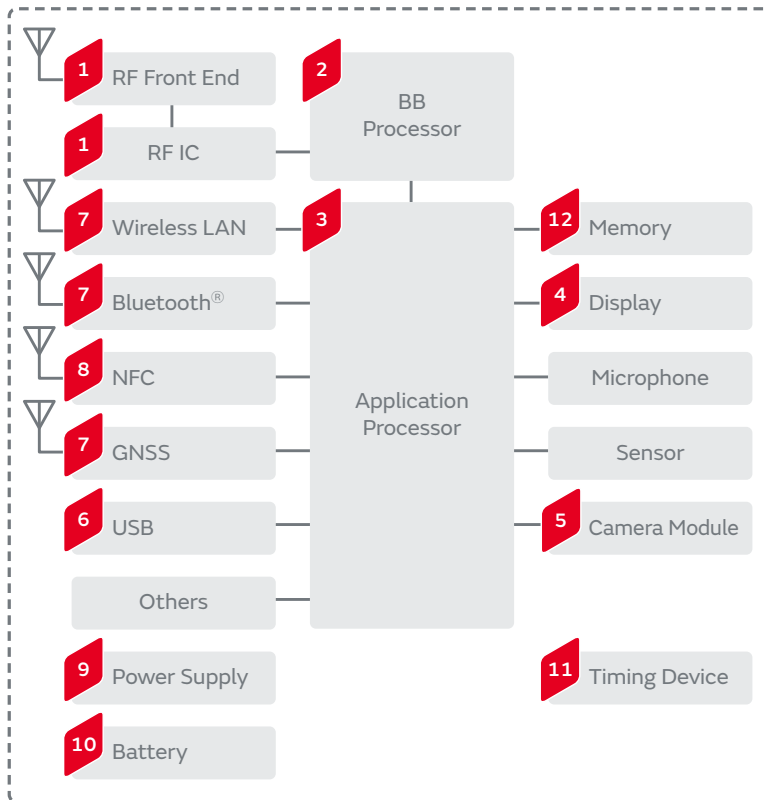
Chip Ferrite Beads  
BLM Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Smart phone



## 1 RF Front End, RF IC

|   |   |
|---|---|
| SAW Duplexers<br>SAY Series<br>                             | SAW Filters<br>SAF Series<br>                     |
| Chip Multilayer LC Filters<br>LF Series<br>                 | Chip Multilayer Diplexers<br>LFD Series<br>       |
| Chip Multilayer Hybrid Baluns<br>LDB/LDM Series<br>         | Chip Multilayer Hybrid Dividers<br>LDD Series<br> |
| Chip Multilayer Hybrid Couplers<br>LDC/LDJ Series<br>       | Microwave Coaxial<br>Connectors with Switch<br>   |
| Microwave Multi Line<br>Connectors<br>                      | Chip Inductors (Chip Coils)<br>LQW/LQP Series<br> |
| Band-Selectable<br>Phase Adjustment Device<br>(B-SPADE)<br> | Thermistors<br>NCP/PRF Series<br>                 |

## 2 BB Processor

|  |
|--|
| 3 Terminals Low ESL Chip<br>Multilayer Ceramic Capacitors<br>for General Purpose<br>NFM Series<br> |
| Chip Common Mode Choke Coils/<br>Common Mode Noise Filters<br>DLW/DLM Series<br>                   |
| Frequency Specified Noise Filters<br>BLF Series<br>  |
| Chip LC Trap Filters<br>LQZ02HQ Series<br>   |
| Thermistors<br>NCP/PRF Series<br>  |

## 3 Application Processor

|  |
|--|
| Chip Ferrite Beads<br>BLM Series<br>   |
| 3 Terminals Low ESL Chip<br>Multilayer Ceramic Capacitors<br>for General Purpose<br>NFM Series<br> |
| Thermistors<br>NCP/PRF Series<br>  |

## 4 Display

|  |                                   |
|--|-----------------------------------|
| EMI Suppression Filters EMIFIL<br>NFA Series<br>                                 |                                   |
| Chip Common Mode Choke Coils/<br>Common Mode Noise Filters<br>DLW/DLM Series<br> |                                   |
| Silicon ESD<br>Protection Devices<br>LXES**T Series<br>                          | Thermistors<br>NCP/PRF Series<br> |


## 5 Camera Module

|   |                                      |  |                                   |
|---|--------------------------------------|--|-----------------------------------|
| Chip Multilayer Ceramic Capacitors<br>for Camera Flash Circuit Only<br>GR7 Series<br> | Chip Ferrite Beads<br>BLM Series<br> | Silicon ESD Protection Devices<br>LXES**T Series<br> | Thermistors<br>NCP/PRF Series<br> |
|---|--------------------------------------|--|-----------------------------------|




6 USB


Chip Common Mode Choke Coils/  
Common Mode Noise Filters  
DLW/NFG/DLM Series




Chip Ferrite Beads  
BLM Series



Silicon ESD  
Protection Devices  
LXES\*\*T Series




Thermistors  
NCP/PRF Series




7 Wireless LAN, Bluetooth®, GNSS


Chip Multilayer Diplexers  
LFD Series




Chip Multilayer Hybrid Couplers  
LDC/LDJ Series




Bluetooth® Modules




Wi-Fi Modules




Bluetooth® - Wi-Fi  
Combo Modules




SAW Filters  
SAF Series




Chip Multilayer LC Filters  
LF Series




Chip Multilayer Hybrid Baluns  
LDB/LDM Series




Microwave Coaxial  
Connectors with Switch



Microwave Multi Line  
Connectors




Thermistors  
NCP/PRF Series




8 NFC


Chip Ferrite Beads  
BLM Series



Chip Inductors (Chip Coils)  
LQW18C/LQM18J Series




Variable Capacitors  
LXRW Series




9 Power Supply


Low Acoustic Noise Chip Multilayer  
Ceramic Capacitors on Interposer  
Board for General Purpose  
ZRB Series




Metal Terminal Type  
Multilayer Ceramic Capacitors  
for General Purpose  
KRM Series




Thermistors  
NCP/PRF Series




Chip Multilayer  
Ceramic Capacitors  
for General Purpose  
GR/GA Series




Safety Standard Certified Resin  
Molding SMD Type Ceramic  
Capacitors for General Purpose  
DK1 Series



Safety Standard Certified Lead Type Disc  
Ceramic Capacitors for General Purpose  
DE1/DE2 Series



Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series




10 Battery

Thermistors  
NCP/PRF/PRG Series




11 Timing Device

MEMS Resonators  
WMRAG Series




Crystal Units  
XRC Series



12 Memory

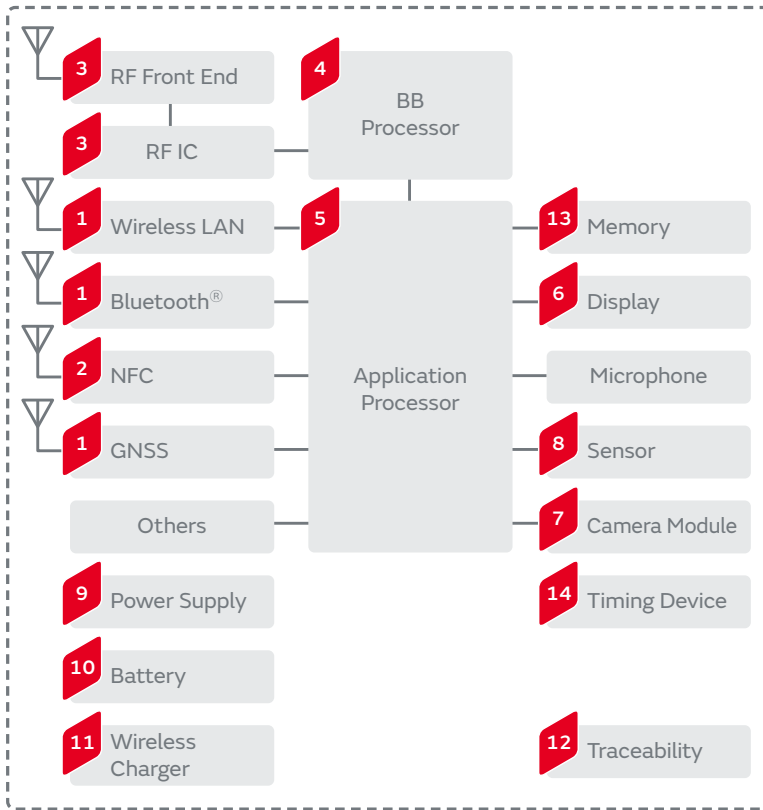
Chip Ferrite Beads  
BLM Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Smart watch / health tracker



## 1 Wireless LAN, Bluetooth®, GNSS

|  |  |  |  |   |                                     |                           |
|--|--|--|--|---|-------------------------------------|---------------------------|
| Chip Common Mode Choke Coils/<br>Common Mode Noise Filters<br>DLW/NFG/DLM Series | Silicon ESD Protection Devices<br>LXES**T Series   | Thermistors<br>NCP/PRF Series              | Bluetooth® Modules                                   | Wi-Fi Modules                               | Bluetooth® - Wi-Fi<br>Combo Modules | SAW Filters<br>SAF Series |
| Chip Multilayer<br>LC Filters<br>LF Series                                       | Chip Multilayer<br>Hybrid Baluns<br>LDB/LDM Series | Chip Multilayer<br>Diplexers<br>LFD Series | Chip Multilayer<br>Hybrid Couplers<br>LDC/LDJ Series | Microwave Coaxial<br>Connectors with Switch | Microwave Multi Line<br>Connectors  |                           |

## 2 NFC

Chip Inductors (Chip Coils)  
LQW18C/LQM18J Series

Variable Capacitors  
LXRW Series

## 3 RF Front End, RF IC

|   |   |  |   |
|---|---|--|---|
| Chip Multilayer Diplexers<br>LFD Series         | SAW Duplexers<br>SAY Series                   | SAW Filters<br>SAF Series                            | Chip Multilayer LC Filters<br>LF Series |
| Chip Multilayer Hybrid Baluns<br>LDB/LDM Series | Chip Multilayer Hybrid Dividers<br>LDD Series | Chip Multilayer Hybrid Couplers<br>LDC/LDJ Series    |   |
| Microwave Coaxial<br>Connectors with Switch     | Microwave Multi Line<br>Connectors            | Band-Selectable Phase Adjustment Device<br>(B-SPADE) | Thermistors<br>NCP/PRF Series           |

**4 BB Processor**

Thermistors  
NCP/PRF Series



**5 Application Processor**

Thermistors  
NCP/PRF Series



**6 Display**

Silicon ESD Protection Devices  
LXES\*\*T Series



Thermistors  
NCP/PRF Series



Piezoelectric Sounders  
PKLCS/PKMCS Series



**7 Camera Module**

Chip Multilayer Ceramic Capacitors  
for Camera Flash Circuit Only  
GR7 Series



Silicon ESD Protection Devices  
LXES\*\*T Series



Thermistors  
NCP/PRF Series



**8 Sensor**

Thermistors  
NCP/PRF Series



**9 Power Supply**

Low Acoustic Noise  
Chip Multilayer Ceramic Capacitors  
on Interposer Board  
for General Purpose  
ZRB Series



Metal Terminal Type  
Multilayer Ceramic Capacitors  
for General Purpose  
KRM Series



Thermistors  
NCP Series



**10 Battery**

Coin Manganese Dioxide Lithium Batteries  
Standard Type



Laminated Type  
Lithium Ion Secondary Batteries



Thermistors  
NCP/PRF/PRG Series



**11 Wireless Charger**

LW Reversed Low ESL Chip  
Multilayer Ceramic Capacitors  
for General Purpose  
LLL Series



Thermistors  
NCP/PRF Series



**12 Traceability**

RFID Tag  
LXMS/LXTB Series



**13 Memory**

Chip Ferrite Beads  
BLM Series



**14 Timing Device**

MEMS Resonators  
WMRAG Series



Crystal Units  
XRC Series



Ceramic Resonators CERALOCK  
CST Series



General Purpose

Chip Multilayer Ceramic Capacitors for General Purpose

High Q Chip Multilayer Ceramic Capacitors for General Purpose

Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose

3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose

Polymer Aluminum Electrolytic Capacitors

Chip Inductors (Chip Coils)

Chip Inductors (Chip Coils)

Chip Ferrite Beads

Feed Through Chip EMI Filters

Chip Common Mode Choke Coils/Common Mode Noise Filters

Piezoelectric Sounders

Coin Manganese Dioxide Lithium Batteries

GRM Series

GQM / GJM Series

GRJ Series

NFM Series

ECAS Series

LQW/LQP/LQG Series

LQM/LQH/DFE Series

BLM/NFZ Series

NFE Series

DLW/DLM Series

PKLCS/PKMCS Series

Standard Type

High Frequency Filter Circuit/Coupling/Decoupling/For Step-up

High Frequency Filter Circuit

Coupling/Decoupling/For Step-up

Noise Suppression/Decoupling

Smoothing /Transient Backup

High Frequency Circuit-Impedance Matching /Resonance

Voltage Conversion

Noise Suppression

Noise Suppression

Noise Suppression

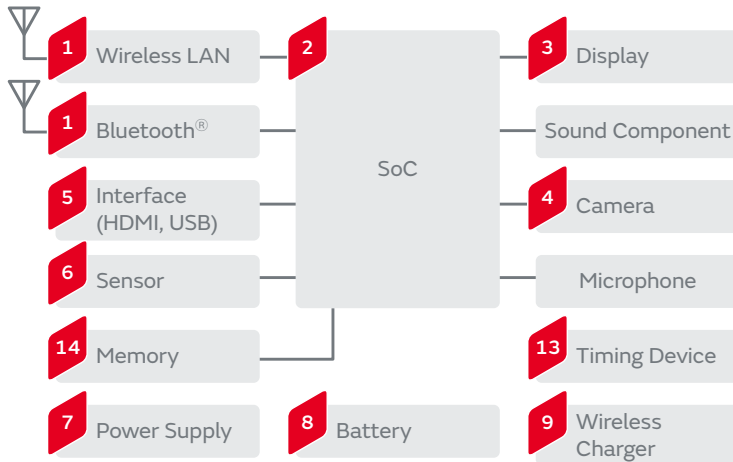
Sound Component

Battery Backup

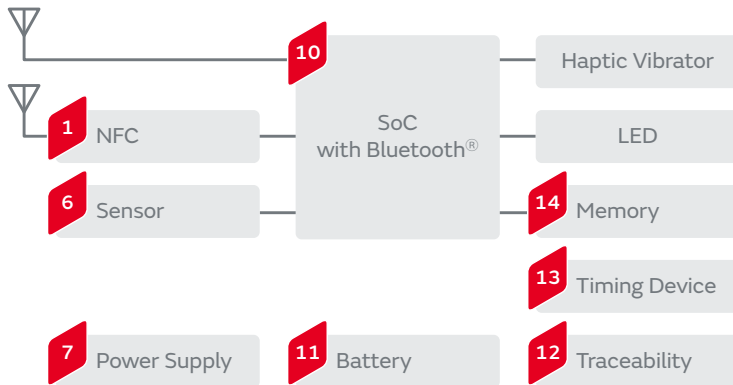
# AR / VR



AR/VR Device



VR Controller



### 1 Wireless LAN, Bluetooth®, NFC

|  |                                      |  |
|--|--------------------------------------|--|
| Bluetooth® Modules                           | Wi-Fi Modules                        | Bluetooth® - Wi-Fi Combo Modules               |
| SAW Filters SAF Series                       | Chip Multilayer LC Filters LF Series |  |
| Chip Multilayer Hybrid Baluns LDB/LDM Series | Chip Multilayer Diplexers LFD Series | Chip Multilayer Hybrid Couplers LDC/LDJ Series |
| Microwave Coaxial Connectors with Switch     | Microwave Multi Line Connectors      | Thermistors NCP/PRF Series                     |

### 2 SoC

|                            |                               |
|----------------------------|-------------------------------|
| Thermistors NCP/PRF Series | Chip Ferrite Beads BLM Series |
|----------------------------|-------------------------------|

### 3 Display

|   |
|---|
| Silicon ESD Protection Devices LXES**T Series |
| Thermistors NCP Series                        |

### 4 Camera

|   |  |
|---|--|
| Chip Multilayer Ceramic Capacitors for Camera Flash Circuit Only GR7 Series | Silicon ESD Protection Devices LXES**T Series                              |
| Thermistors NCP Series  | Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series |

### 5 Interface (HDMI, USB)

|  |                        |
|--|------------------------|
| Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series |                        |
| Silicon ESD Protection Devices LXES**T Series                              | Thermistors NCP Series |

### 6 Sensor

|                        |
|------------------------|
| Thermistors NCP Series |
|------------------------|

### 7 Power Supply

|  |  |  |                            |
|--|--|--|----------------------------|
| Low Acoustic Noise Chip Multilayer Ceramic Capacitors on Interposer Board for General Purpose ZRB Series | Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose KRM Series | Polymer Aluminum Electrolytic Capacitors ECAS Series | Thermistors NCP/PRF Series |
|--|--|--|----------------------------|

**8 Battery**

Laminated Type Lithium Ion Secondary Batteries



**9 Wireless Charger**

LW Reversed Low ESL Chip Multilayer Ceramic Capacitors for General Purpose LLL Series



Thermistors NCP/PRF Series



**10 SoC with Bluetooth®**

RF Inductors LQP02HQ/LQW15AN Series



Microwave Coaxial Connectors with Switch



Microwave Multi Line Connectors



Chip Multilayer LC Filters LF Series



Chip Multilayer Hybrid Baluns LDB/LDM Series



Chip Multilayer Diplexers LFD Series



Chip Multilayer Hybrid Couplers LDC/LDJ Series



Chip LC Trap Filters LQZ02HQ Series



Frequency Specified Noise Filters BLF02RD Series



**11 Battery**

Coin Manganese Dioxide Lithium Batteries Standard Type



Thermistors NCP/PRF/PRG Series



**12 Traceability**

RFID Tag LXMS/LXTB Series



**13 Timing Device**

MEMS Resonators WMRAG Series



Crystal Units XRC Series



Ceramic Resonators CERALOCK CST Series



**14 Memory**

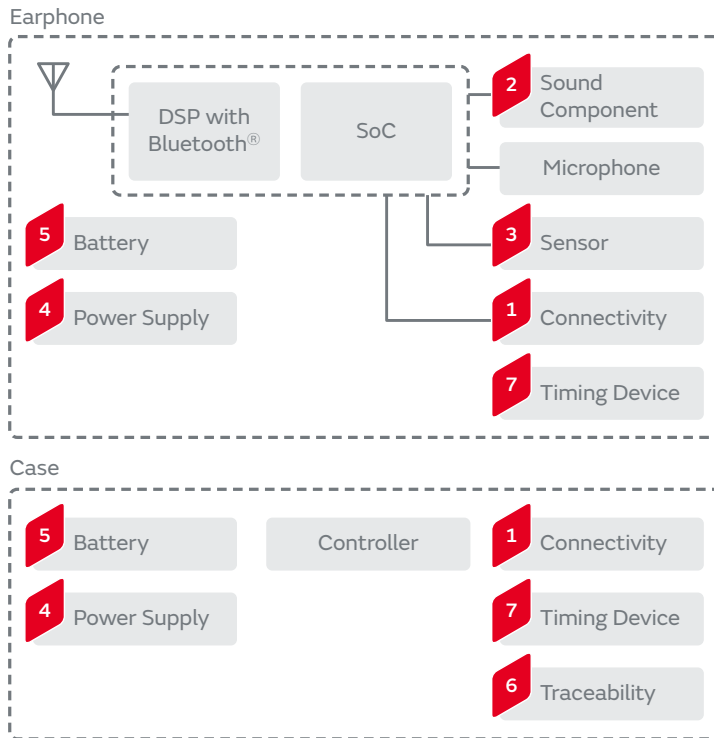
Chip Ferrite Beads BLM Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# True wireless stereo (non-medical use)



## 1 Connectivity

RF Inductors  
LQP02HQ/LQW15AN Series



Microwave Coaxial  
Connectors with Switch



Chip Multilayer LC Filters  
LF Series



Chip Multilayer Hybrid Baluns  
LDB/LDM Series



Chip Multilayer Diplexers  
LFD Series



Chip Multilayer Hybrid Couplers  
LDC/LDJ Series



Chip LC Trap Filters  
LQZ02HQ Series



Frequency Specified Noise Filters  
BLF02RD Series



## 2 Sound Component

Chip LC Trap Filters  
LQZ02HQ Series



Frequency Specified Noise Filters  
BLF02 Series



**3 Sensor**

Thermistors  
NCP03 Series



**4 Power Supply**

Power Inductors  
DFE18SAN Series



**5 Battery**

Thermistors  
NCP03 Series



**6 Traceability**

RFID Tag  
LXMS/LXTB Series



**7 Timing Device**

MEMS Resonators  
WMRAG Series



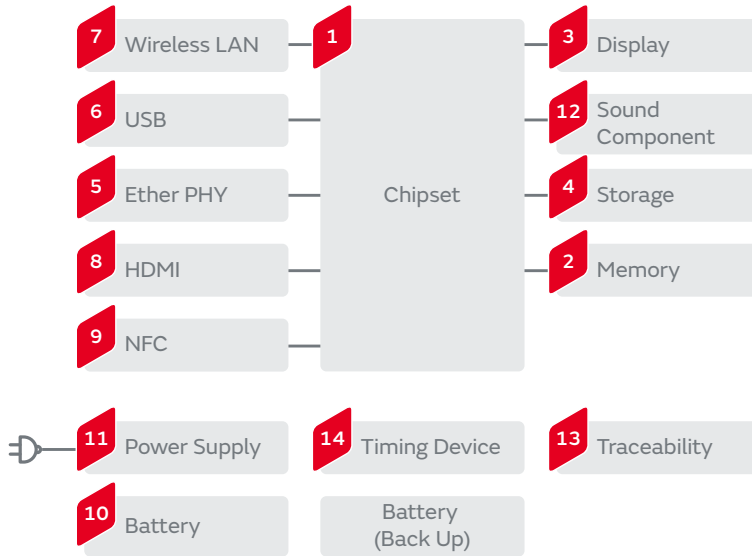
Crystal Units  
XRC Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# PC



### 1 Chipset

- Low ESL Chip Multilayer Ceramic Capacitors for General Purpose LLL/LLA/LLM Series
- Chip Ferrite Beads BLM Series
- 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose NFM Series
- Thermistors NCP/PRF Series

### 2 Memory

- Chip Ferrite Beads BLM Series

### 3 Display

- Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose KRM Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Thermistors PRF/PRG Series
- Ultrasonic Sensors MA40 Series

### 4 Storage

- Thermistors NCP Series
- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Actuators
- Thermistors NCP/PRF Series

### 5 Ether PHY

- Silicon ESD Protection Devices LXES\*\*T Series
- Thermistors NCP/PRF Series
- Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series

### 6 USB

- Polymer Aluminum Electrolytic Capacitors ECAS Series
- Chip Ferrite Beads BLM Series
- Thermistors PRG Series
- Silicon ESD Protection Devices LXES\*\*T Series

### 7 Wireless LAN

- Bluetooth® Modules
- Wi-Fi Modules
- Bluetooth® - Wi-Fi Combo Modules
- SAW Filters SAF Series
- Chip Multilayer LC Filters LF Series
- Chip Multilayer Hybrid Baluns LDB/LDM Series
- Chip Multilayer Diplexers LFD Series
- Chip Multilayer Hybrid Couplers LDC/LDJ Series
- Microwave Coaxial Connectors with Switch
- Microwave Multi Line Connectors



**8 HDMI**

Silicon ESD Protection Devices  
LXES\*\*T Series



Thermistors  
PRG Series



**9 NFC**

Chip Ferrite Beads  
BLM Series



Chip Inductors (Chip Coils)  
LQW18C/LQM18J Series



Variable Capacitors  
LXRW Series



**10 Battery**

Thermistors  
NXR/PRF/PRG Series



Laminated Type  
Lithium Ion Secondary Batteries



**11 Power Supply**

Non-Isolated DC-DC Converters  
MYMGK/MYSGK/  
OKL/MYLSM Series



Power Inductors  
LQH Series



Chip Multilayer Ceramic Capacitors for Ethernet LAN  
and Primary-secondary Coupling of DC-DC converters  
GR4 Series



Metal Terminal Type Multilayer  
Ceramic Capacitors  
for General Purpose  
KRM Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Low Acoustic Noise Chip Multilayer  
Ceramic Capacitors on Interposer  
Board for General Purpose  
ZRB Series



Thermistors  
NCP/PRF Series



Chip Multilayer Ceramic  
Capacitors for General Purpose  
GR/GA Series



Safety Standard Certified  
Resin Molding SMD Type  
Ceramic Capacitors for General Purpose  
DK1 Series



Safety Standard Certified  
Lead Type Disc Ceramic Capacitors  
for General Purpose  
DE1/DE2 Series



**12 Sound Component**

Silicon ESD  
Protection Devices  
LXES\*\*T Series



Ultrasonic Sensors  
MA40 Series



**13 Traceability**

RFID Tag  
LXMS/LXTB Series



**14 Timing Device**

MEMS Resonators  
WMRAG Series



Crystal Units  
XRC Series



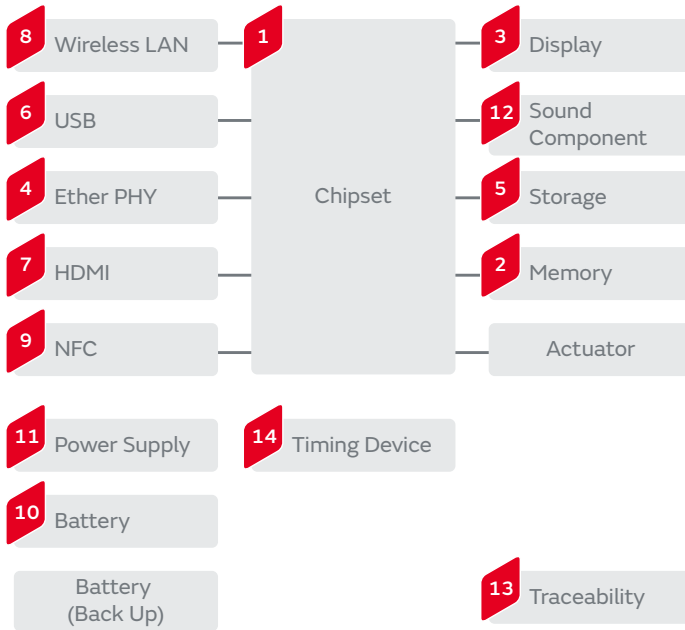
Ceramic Resonators  
CERALOCK  
CST Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Tablet PC



|   |   |   |
|---|---|---|
| <p><b>1 Chipset</b></p> <ul style="list-style-type: none"> <li>Low ESL Chip Multilayer Ceramic Capacitors for General Purpose LLL/LLA/LLM Series</li> <li>Chip Ferrite Beads BLM Series</li> <li>3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose NFM Series</li> <li>Thermistors NCP/PRF Series</li> </ul> | <p><b>2 Memory</b></p> <ul style="list-style-type: none"> <li>Chip Ferrite Beads BLM Series</li> </ul>  |   |
| <p><b>3 Display</b></p> <ul style="list-style-type: none"> <li>Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose KRM Series</li> <li>Polymer Aluminum Electrolytic Capacitors ECAS Series</li> <li>Power Inductors LQH Series</li> <li>Thermistors PRF/PRG Series</li> </ul>                                      | <p><b>4 Ether PHY</b></p> <ul style="list-style-type: none"> <li>Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series</li> <li>Silicon ESD Protection Devices LXES**T Series</li> <li>Thermistors NCP/PRF Series</li> </ul> | <p><b>5 Storage</b></p> <ul style="list-style-type: none"> <li>Polymer Aluminum Electrolytic Capacitors ECAS Series</li> <li>Actuators</li> <li>Thermistors NCP/PRF Series</li> </ul> |
| <p><b>6 USB</b></p> <ul style="list-style-type: none"> <li>Polymer Aluminum Electrolytic Capacitors ECAS Series</li> <li>Chip Common Mode Choke Coils/ Common Mode Noise Filters DLW/NFG/DLM Series</li> <li>Silicon ESD Protection Devices LXES**T Series</li> <li>Thermistors PRG Series</li> </ul>                                 |   | <p><b>7 HDMI</b></p> <ul style="list-style-type: none"> <li>Silicon ESD Protection Devices LXES**T Series</li> <li>Thermistors PRG Series</li> </ul>                                  |

**8** Wireless LAN

Bluetooth® Modules



SAW Filters  
SAF Series



Chip Multilayer Diplexers  
LFD Series



Microwave Multi Line  
Connectors



Wi-Fi Modules



Chip Multilayer LC Filters  
LF Series



Chip Multilayer Hybrid Couplers  
LDC/LDJ Series



Bluetooth® - Wi-Fi Combo Modules



Chip Multilayer Hybrid Baluns  
LDB/LDM Series



Microwave Coaxial  
Connectors with Switch



**9** NFC

Chip Ferrite Beads  
BLM Series



Chip Inductors (Chip Coils)  
LQW18C/LQM18J Series



Variable Capacitors  
LXRW Series



**10** Battery

Thermistors  
NXR/PRF/PRG Series



Laminated Type Lithium Ion  
Secondary Batteries



**11** Power Supply

Metal Terminal Type Multilayer  
Ceramic Capacitors for General Purpose  
KRM Series



Polymer Aluminum  
Electrolytic Capacitors  
ECAS Series



Low Acoustic Noise Chip Multilayer Ceramic Capacitors  
on Interposer Board for General Purpose  
ZRB Series



Chip Multilayer Ceramic Capacitors  
for General Purpose  
GR/GA Series



Safety Standard Certified Resin Molding SMD Type  
Ceramic Capacitors for General Purpose  
DK1 Series



Safety Standard Certified Lead Type  
Disc Ceramic Capacitors for General Purpose  
DE1/DE2 Series



Thermistors  
NCP/PRF Series



**12** Sound Component

Silicon ESD Protection Devices  
LXES\*\*T Series



**13** Traceability

RFID Tag  
LXMS/LXTB Series



**14** Timing Device

MEMS Resonators  
WMRAG Series



Crystal Units  
XRC Series



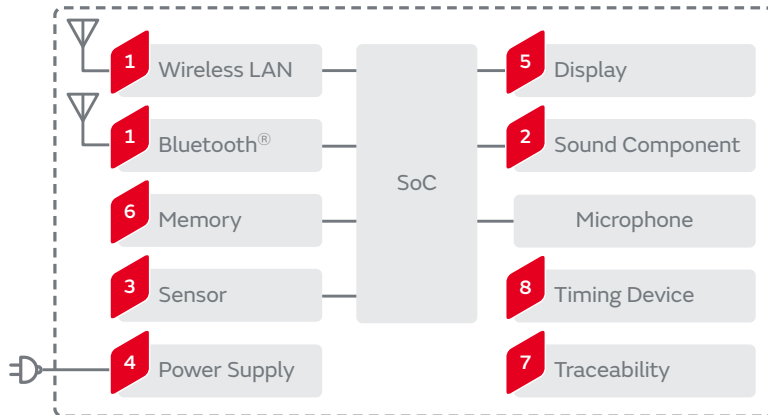
Ceramic Resonators CERALOCK  
CST Series



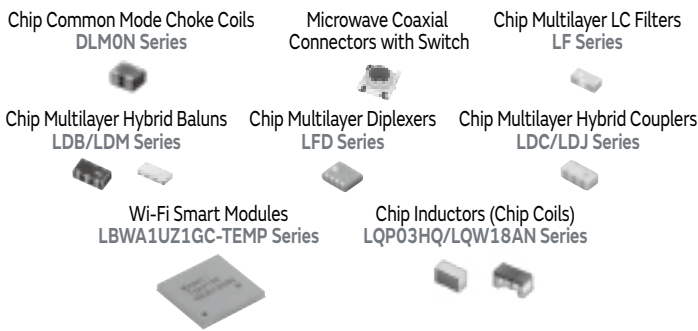
General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

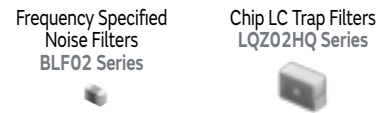
# AI speaker



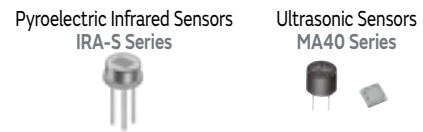
## 1 Wireless LAN, Bluetooth®



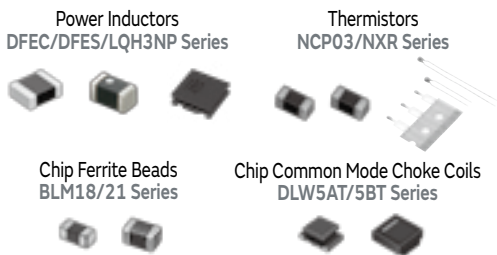
## 2 Sound Component



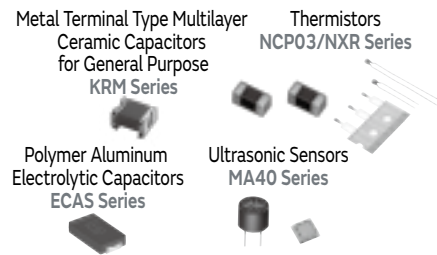
## 3 Sensor



## 4 Power Supply



## 5 Display



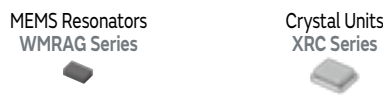
## 6 Memory



## 7 Traceability

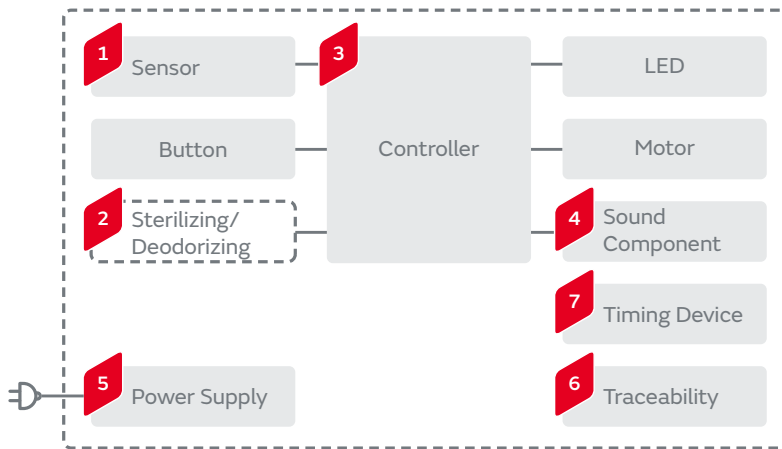


## 8 Timing Device



|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Vacuum cleaner



## 1 Sensor

Ultrasonic Sensors  
MA40 Series

Thermistors  
NCP Series

Magnetic Sensors  
(AMR Sensors)  
MR Series



## 2 Sterilizing/Deodorizing

Ionizer Modules Ionissimo  
MHM300 Series

Ozonizer Modules Ionissimo  
MHM500 Series

High Voltage Resistors  
MHR Series



## 3 Controller

Thermistors  
NCP/NXP/PRF Series



## 5 Power Supply

Chip Multilayer  
Ceramic Capacitors  
for General Purpose  
GR/GA Series

Safety Standard Certified  
Resin Molding SMD Type  
Ceramic Capacitors  
for General Purpose  
DK1 Series



Safety Standard Certified  
Lead Type Disc  
Ceramic Capacitors  
for General Purpose  
DE1/DE2 Series



Cylindrical Type  
Lithium Ion  
Secondary Batteries



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/  
OKL/MYLSM Series



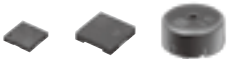
## 6 Traceability

RFID Tag  
LXMS/LXTB Series



## 4 Sound Component

Piezoelectric Sounders  
PKMCS/PKLCs/PKM Series



## 7 Timing Device

Crystal Units  
XRC Series



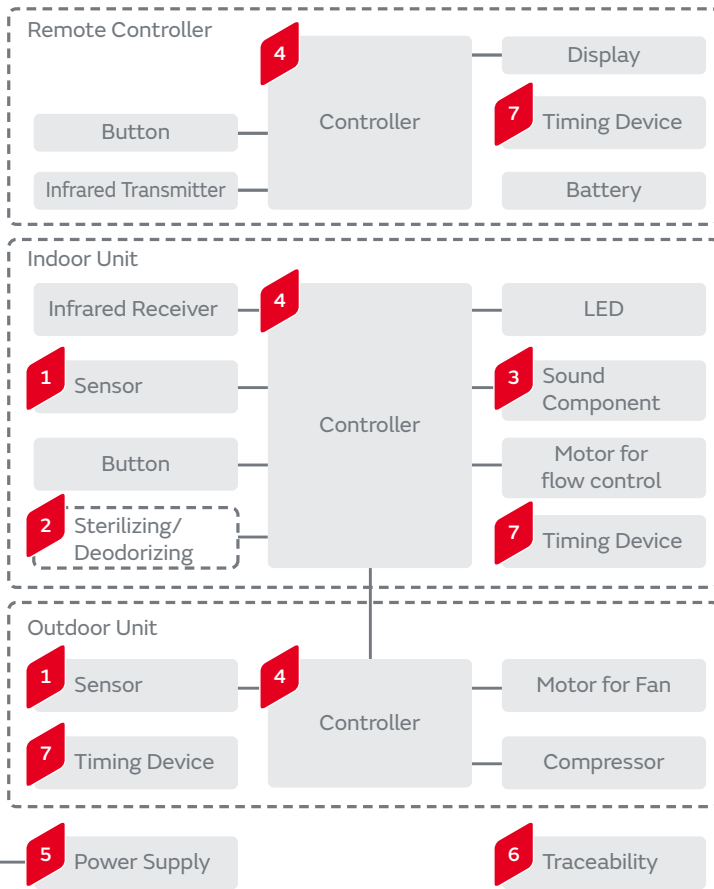
Ceramic Resonators  
CERALOCK  
CST Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Air conditioner



## 1 Sensor

|  |  |
|--|--|
| <p><b>Ultrasonic Sensors</b><br/>MA40 Series</p>           | <p><b>Thermistors</b><br/>NCP/NXR/PRF Series</p>             |
| <p><b>Magnetic Sensors (AMR Sensors)</b><br/>MR Series</p> | <p><b>Pyroelectric Infrared Sensors</b><br/>IRA-S Series</p> |

## 2 Sterilizing/Deodorizing

|   |  |   |
|---|--|---|
| <p><b>Ionizer Modules Ionissimo</b><br/>MHM300 Series</p> | <p><b>Ozonizer Modules Ionissimo</b><br/>MHM500 Series</p> | <p><b>High Voltage Resistors</b><br/>MHR Series</p> |
|---|--|---|

## 3 Sound Component

**Piezoelectric Sounders**  
PKMCS/PKLCs/PKM Series

## 4 Controller

**Thermistors**  
NCP/NXR/PRF Series

**5 Power Supply**

Chip Multilayer Ceramic Capacitors for General Purpose  
GR/GA Series



Safety Standard Certified Resin Molding  
SMD Type Ceramic Capacitors for General Purpose  
DK1 Series



Safety Standard Certified Lead Type Disc  
Ceramic Capacitors for General Purpose  
DE1/DE2 Series



Non-Isolated DC-DC Converters  
MYMGK/MYSGK/  
OKL/MYLSM Series



**6 Traceability**

RFID Tag  
LXMS/LXTB Series



**7 Timing Device**

Crystal Units  
XRC Series



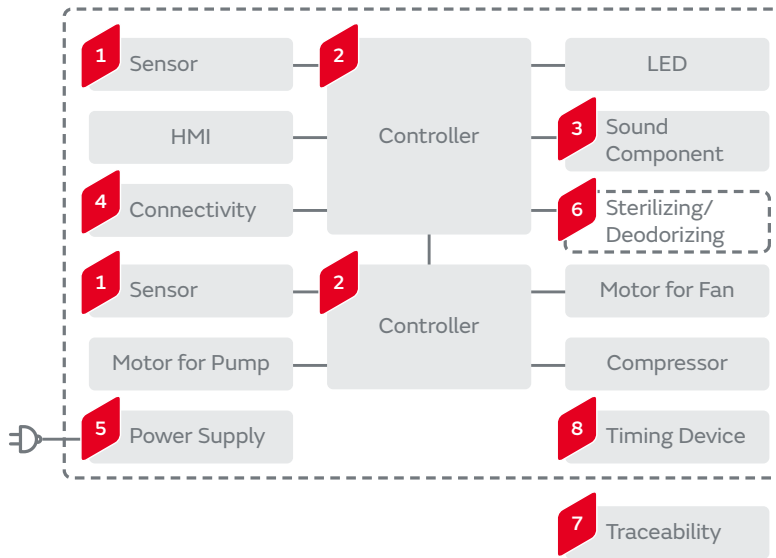
Ceramic Resonators CERALOCK  
CST Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Washing machine



**1 Sensor**

Thermistors  
NCP/NXR/PRF Series

Magnetic Sensors  
(AMR Sensors)  
MR Series

**2 Controller**

Thermistors  
NCP/NXR/PRF Series

**3 Sound Component**

Piezoelectric Sounders  
PKMCS/PKLS/PKM Series

**4 Connectivity**

Bluetooth®  
Modules

Wi-Fi  
Modules

LPWA  
Modules

Microwave Coaxial  
Connectors with Switch

**5 Power Supply**

Chip Multilayer  
Ceramic Capacitors  
for General Purpose  
GR/GA Series

Safety Standard Certified  
Resin Molding SMD Type  
Ceramic Capacitors  
for General Purpose  
DK1 Series

Safety Standard Certified Lead  
Type Disc Ceramic Capacitors  
for General Purpose  
DE1/DE2 Series

Non-Isolated DC-DC Converters  
MYMGK/MYSGK/  
OKL/MYLSM Series

**6 Sterilizing/Deodorizing**

Ozonizer Modules  
Ionissimo  
MHM500 Series

High Voltage  
Resistors  
MHR Series

**7 Traceability**

RFID Tag  
LXMS/LXTB Series

**8 Timing Device**

Crystal Units  
XRC Series

Ceramic Resonators CERALOCK  
CST Series

**General Purpose**

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

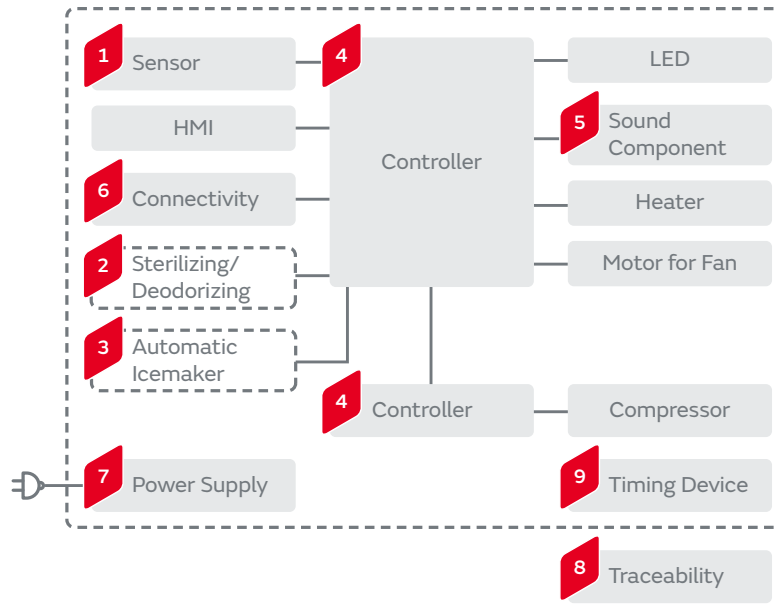


# Refrigerator



**1 Sensor**

- Thermistors  
NCP/NXR/PRF Series
- Magnetic Sensors (AMR Sensors)  
MR Series
- Pyroelectric Infrared Sensors  
IRA-S Series
- Ultrasonic Sensors  
MA40 Series



**2 Sterilizing/Deodorizing**

- Ozonizer Modules  
Ionissimo  
MHM500 Series
- High Voltage Resistors  
MHR Series
- Microblowers

**3 Automatic Icemaker**

- Microblowers

**4 Controller**

- Thermistors  
NCP/NXR/PRF Series

**5 Sound Component**

- Piezoelectric Sounders  
PKMCS/PKLCs/PKM Series

**6 Connectivity**

- Bluetooth® Modules
- Wi-Fi Modules
- LPWA Modules
- Microwave Coaxial Connectors with Switch

**7 Power Supply**

- Chip Multilayer Ceramic Capacitors for General Purpose  
GR/GA Series
- Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose  
DK1 Series
- Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose  
DE1/DE2 Series
- Non-Isolated DC-DC Converters  
MYMGK/MYSGK/OKL/MYLSM Series

**8 Traceability**

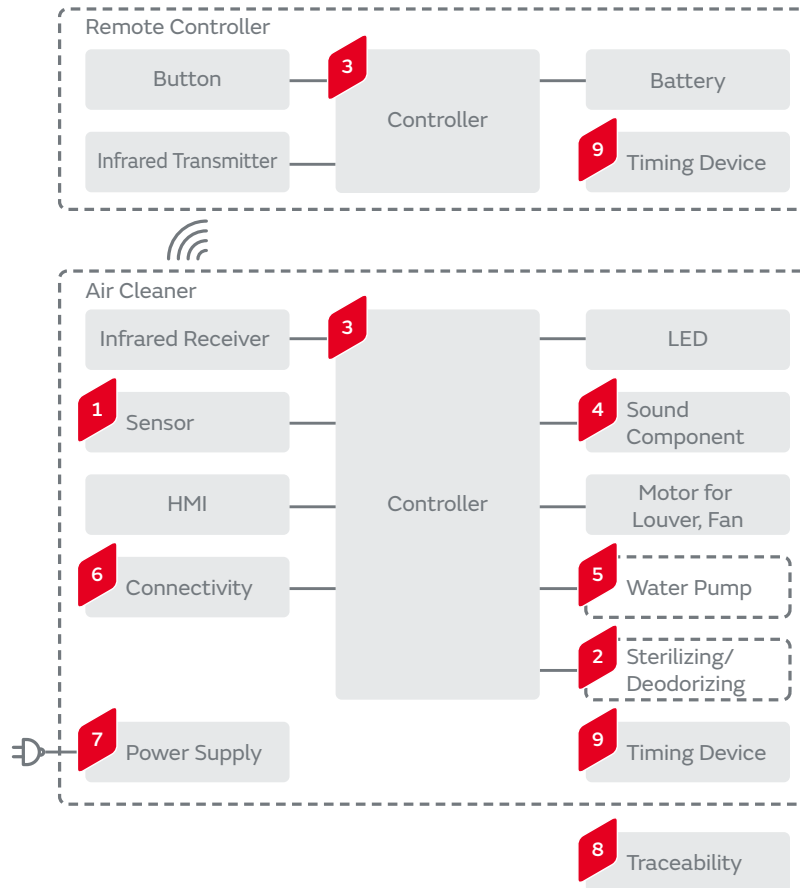
- RFID Tag  
LXMS/LXTB Series

**9 Timing Device**

- Crystal Units  
XRC Series
- Ceramic Resonators  
CERALOCK  
CST Series

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Air purifier



### 1 Sensor

|   |   |   |   |
|---|---|---|---|
| <p>Ultrasonic Sensors<br/>MA40 Series</p> | <p>Thermistors<br/>NCP/NXR/PRF Series</p> | <p>Magnetic Sensors<br/>(AMR Sensors)<br/>MR Series</p> | <p>Pyroelectric Infrared Sensors<br/>IRA-S Series</p> |
|---|---|---|---|

### 3 Controller

Thermistors  
NCP/NXR/PRF Series

### 2 Sterilizing/Deodorizing

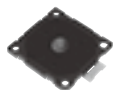
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|--|---|--|
| <p>Ionizer Modules Ionissimo<br/>MHM300 Series</p> | <p>Ozonizer Modules Ionissimo<br/>MHM500 Series</p> | <p>High Voltage Resistors<br/>MHR Series</p> |
|--|---|--|

### 4 Sound Component

Piezoelectric Sounders  
PKMCS/PKLCs/PKM Series

**5 Water Pump**

Microblowers



**6 Connectivity**

Bluetooth® Modules



Wi-Fi Modules



LPWA Modules



Microwave Coaxial Connectors with Switch



**7 Power Supply**

Chip Multilayer Ceramic Capacitors for General Purpose  
GR/GA Series



Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose  
DE1/DE2 Series



Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose  
DK1 Series



Non-Isolated DC-DC Converters MYMGK/MYSGK/OKL/MYLSM Series



**8 Traceability**

RFID Tag LXMS/LXTB Series



**9 Timing Device**

Crystal Units XRC Series



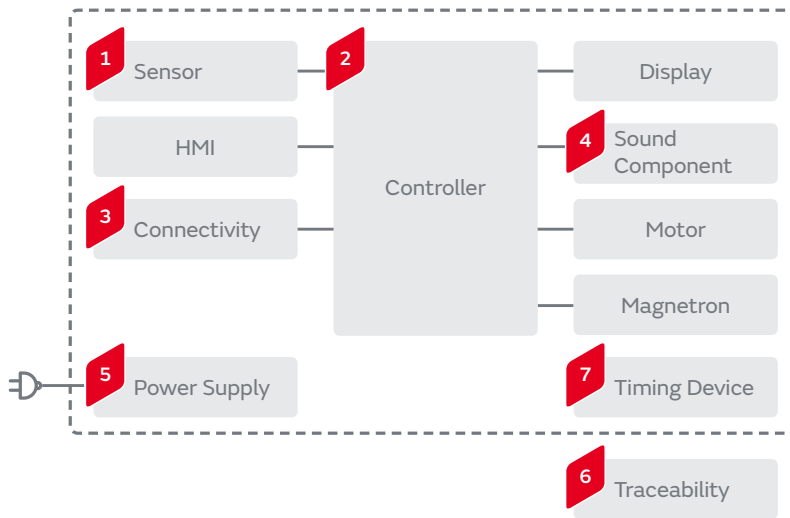
Ceramic Resonators CERALOCK CST Series



General Purpose

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# Microwave oven



### 1 Sensor

Thermistors NCP/NXR/PRF Series  
Magnetic Sensors (AMR Sensors) MR Series

### 2 Controller

Thermistors NCP/NXR/PRF Series

### 3 Connectivity

Bluetooth® Modules  
Wi-Fi Modules  
LPWA Modules  
Microwave Coaxial Connectors with Switch

### 4 Sound Component

Piezoelectric Sounders PKMCS/PKLCs/PKM Series

### 5 Power Supply

Chip Multilayer Ceramic Capacitors for General Purpose GR/GA Series  
Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose DK1 Series  
Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose DE1/DE2 Series  
Non-Isolated DC-DC Converters MYMGK/MYSGK/OKL/MYLSM Series

### 6 Traceability

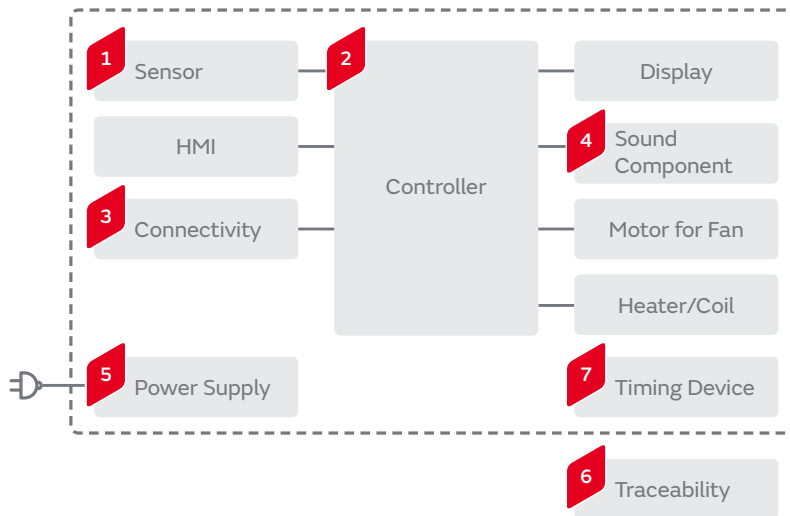
RFID Tag LXMS/LXTB Series

### 7 Timing Device

Crystal Units XRC Series  
Ceramic Resonators CERALOCK CST Series

|  |                    |   |
|--|--------------------|---|
| Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
| High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
| Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
| Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
| Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
| Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
| Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
| Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
| Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
| Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
| Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |

# IH rice cooker



### 1 Sensor

Thermistors NCP/NXR/PRF Series    Magnetic Sensors (AMR Sensors) MR Series

### 2 Controller

Thermistors NCP/NXR/PRF Series

### 3 Connectivity

Bluetooth® Modules    Wi-Fi Modules    LPWA Modules    Microwave Coaxial Connectors with Switch

### 4 Sound Component

Piezoelectric Sounders PKMCS/PKLCs/PKM Series

### 5 Power Supply

Chip Multilayer Ceramic Capacitors for General Purpose GR/GA Series    Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose DK1 Series    Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose DE1/DE2 Series    Non-Isolated DC-DC Converters MYMGK/MYSGK/OKL/MYLSM Series

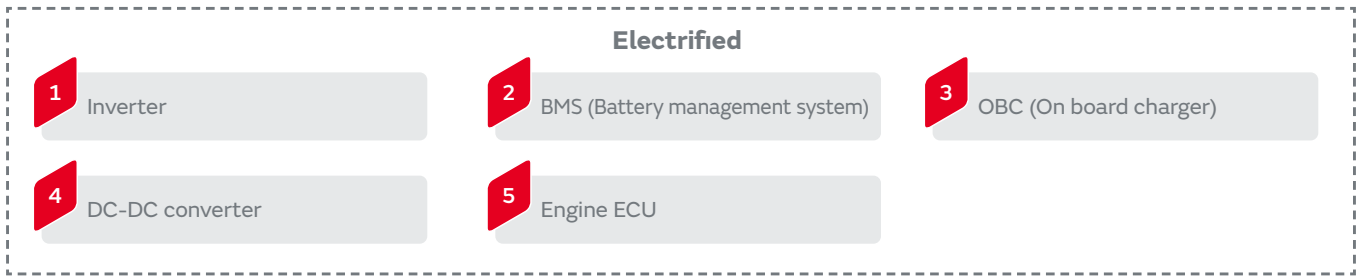
### 6 Traceability

RFID Tag LXMS/LXTB Series

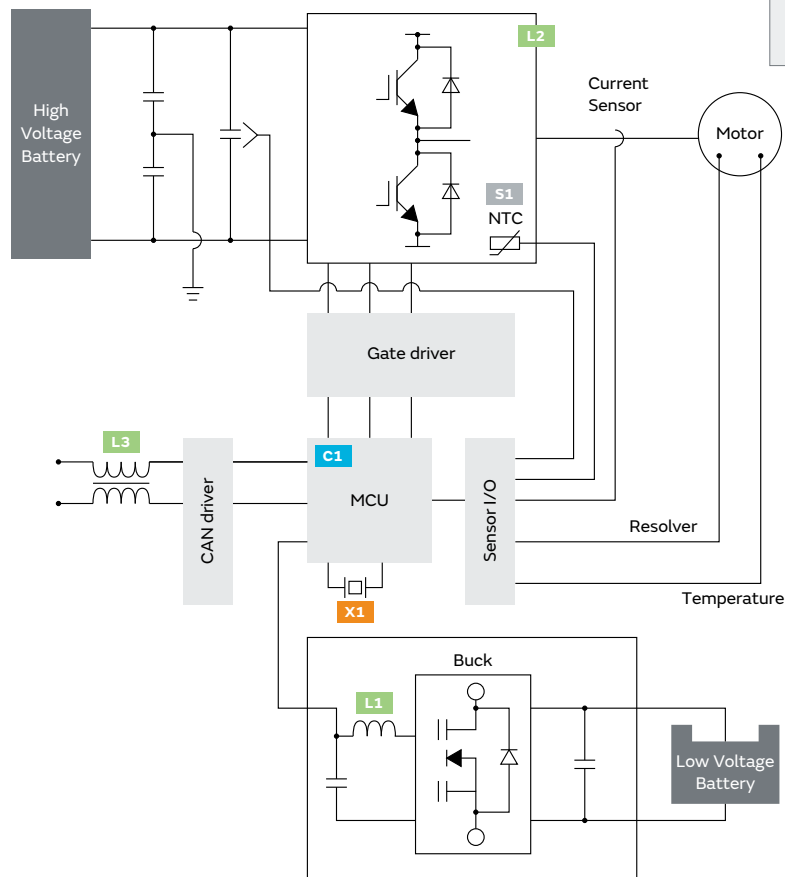
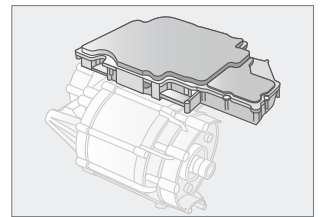
### 7 Timing Device

MEMS Resonators WMRAG Series    Crystal Units XRC Series    Ceramic Resonators CERALOCK CST Series

|                 |  |                    |   |
|-----------------|--|--------------------|---|
| General Purpose | Chip Multilayer Ceramic Capacitors for General Purpose                     | GRM Series         | High Frequency Filter Circuit/Coupling/Decoupling/For Step-up |
|                 | High Q Chip Multilayer Ceramic Capacitors for General Purpose              | GQM / GJM Series   | High Frequency Filter Circuit                                 |
|                 | Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose    | GRJ Series         | Coupling/Decoupling/For Step-up                               |
|                 | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose | NFM Series         | Noise Suppression/Decoupling                                  |
|                 | Polymer Aluminum Electrolytic Capacitors                                   | ECAS Series        | Smoothing /Transient Backup                                   |
|                 | Chip Inductors (Chip Coils)  | LQW/LQP/LQG Series | High Frequency Circuit-Impedance Matching /Resonance          |
|                 | Chip Inductors (Chip Coils)  | LQM/LQH/DFE Series | Voltage Conversion  |
|                 | Chip Ferrite Beads   | BLM/NFZ Series     | Noise Suppression   |
|                 | Feed Through Chip EMI Filters  | NFE Series         | Noise Suppression   |
|                 | Chip Common Mode Choke Coils/Common Mode Noise Filters                     | DLW/DLM Series     | Noise Suppression   |
|                 | Piezoelectric Sounders   | PKLCS/PKMCS Series | Sound Component   |
|                 | Coin Manganese Dioxide Lithium Batteries                                   | Standard Type      | Battery Backup  |



# 1 Inverter



**MCU**

**C1** Chip Multilayer Ceramic Capacitors for Automotive GCM Series

**DC-DC**

**L1** Power Inductors LQH/DFE Series

**IGBT**

**L2** Chip Ferrite Beads BLM Series

**S1** Thermistors NCU Series

**CAN**

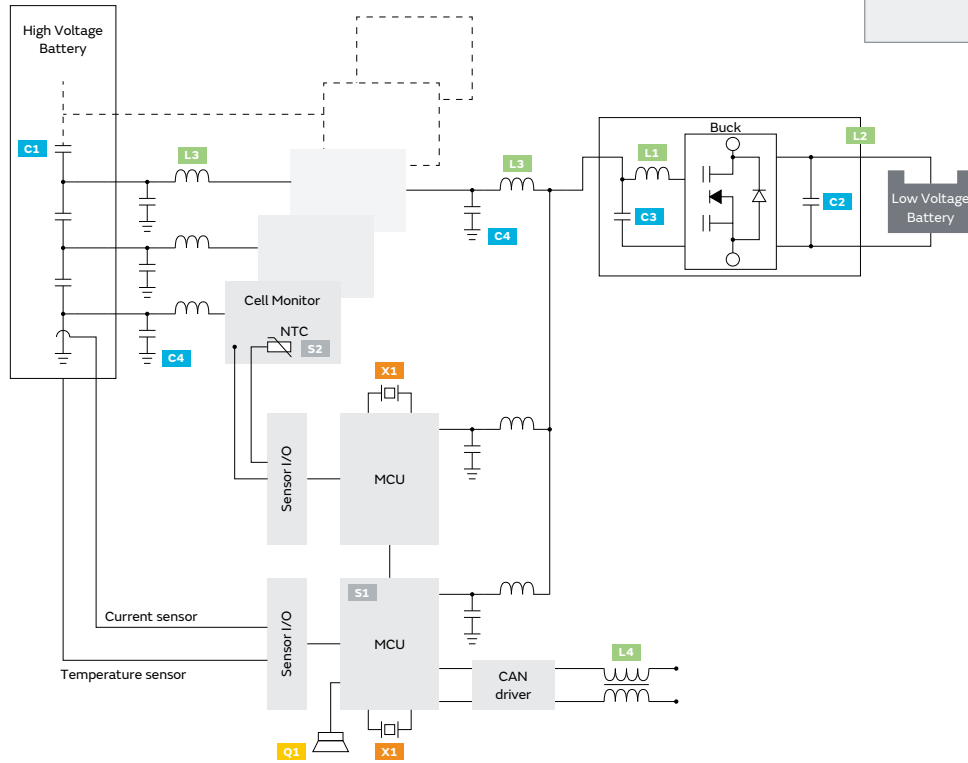
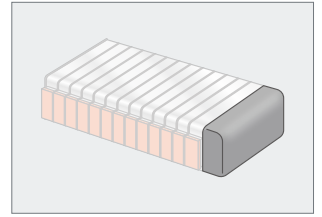
**L3** Chip Common Mode Choke Coils DLW32SH Series

**L3** Chip Common Mode Choke Coils DLW43SH Series

**Timing Device**

**X1** Ceramic Resonators CERALOCK CST Series

# 2 BMS (Battery management system)



| MCU |  |
|-----|--|
| S1  | Thermistors<br>NCU Series                    |
| Q1  | Piezoelectric Sounders<br>PKLCS/PKMCS Series |

| Cell Monitor |   |
|--------------|---|
| C4           | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                  |
| C4           | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series |
| C4           | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series   |
| L3           | Chip Ferrite Beads<br>BLM Series  |
| S2           | Thermistors<br>NCU Series   |

| Battery |   |
|---------|---|
| C1      | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                  |
| C1      | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series |
| C1      | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series   |

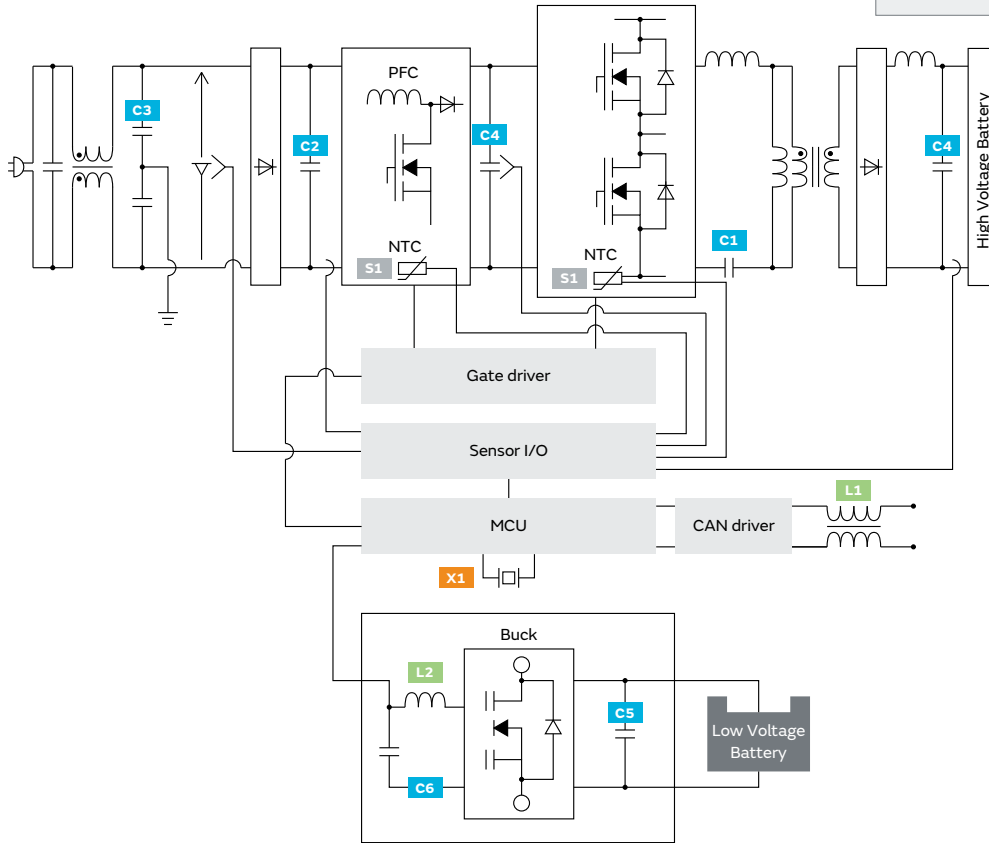
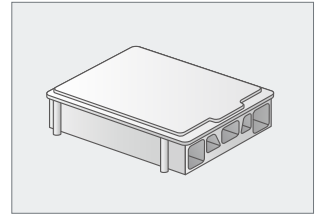
| DC-DC |   |
|-------|---|
| C2    | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series |
| C2    | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series   |
| C3    | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                  |
| C2    | MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCD Series      |

| DC-DC |   |
|-------|---|
| C3    | Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCE Series |
| L1    | Power Inductors<br>LQH/DFE Series   |
| L2    | Large-current Common Mode Choke Coils<br>PLT10HH/PLT5BP Series                            |
| L2    | Chip Common Mode Choke Coils<br>DLW Series  |

| CAN |  |
|-----|--|
| L4  | Chip Common Mode Choke Coils<br>DLW32SH Series |
| L4  | Chip Common Mode Choke Coils<br>DLW43SH Series |

| Timing Device |  |
|---------------|--|
| X1            | Ceramic Resonators<br>CERALOCK<br>CST Series |

# 3 OBC (On board charger)



| Filter    |  |
|-----------|--|
| <b>C1</b> | Chip Multilayer Ceramic Capacitors for Automotive GCM Series   |
| <b>C1</b> | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series  |
| <b>C2</b> | High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KC3 Series |

| AC-DC     |   |
|-----------|---|
| <b>C3</b> | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series                           |
| <b>C3</b> | Safety Standard Certified Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCA Series |
| <b>C3</b> | Safety Standard Certified Lead Type Disc Ceramic Capacitors for Automotive DE6 Series                 |

| Smoothing |  |
|-----------|--|
| <b>C4</b> | High Temperature Film Capacitors for Automotive FH Series  |
| <b>C4</b> | High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KC3 Series |

| DC-DC     |   |
|-----------|---|
| <b>C5</b> | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series |
| <b>C5</b> | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series   |
| <b>L2</b> | Power Inductors LQH/DFE Series  |
| <b>C6</b> | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                  |

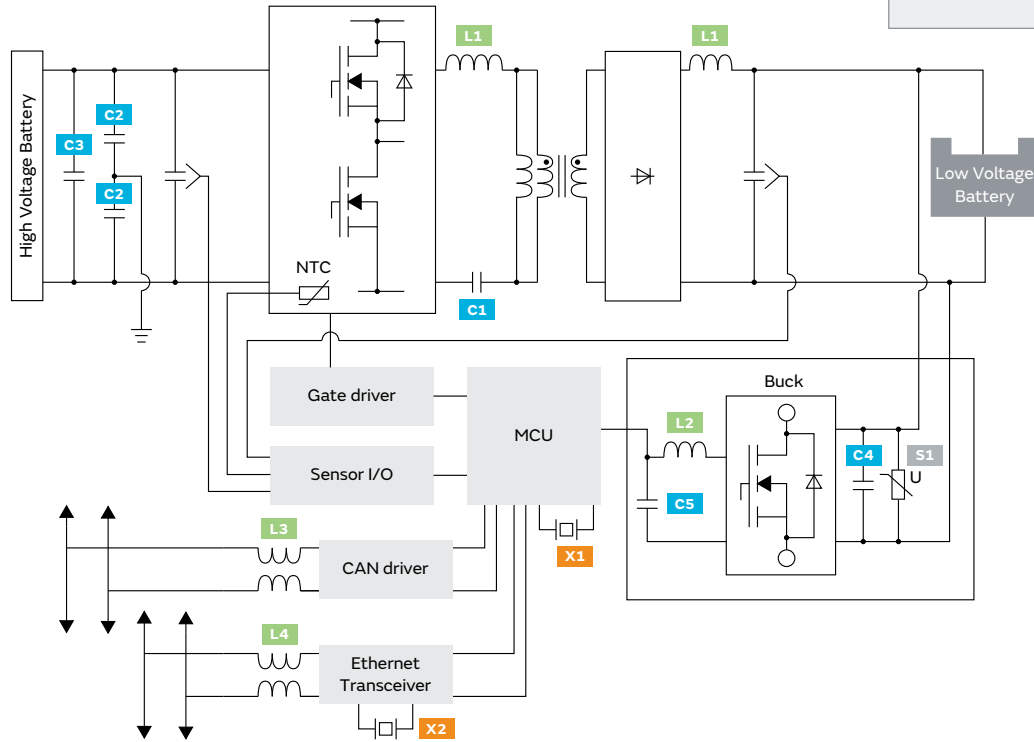
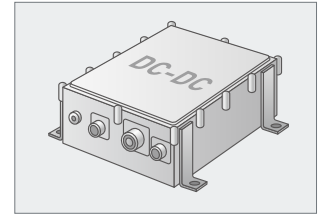
| CAN       |   |
|-----------|---|
| <b>L1</b> | Chip Common Mode Choke Coils DLW32SH Series |
| <b>L1</b> | Chip Common Mode Choke Coils DLW43SH Series |

| PFC       |                        |
|-----------|------------------------|
| <b>S1</b> | Thermistors NCU Series |

| Timing Device |  |
|---------------|--|
| <b>X1</b>     | Ceramic Resonators CERALOCK CST Series |



# 4 DC-DC converter



| Power line |  |
|------------|--|
| <b>C1</b>  | High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KC3 Series |
| <b>C3</b>  | High Temperature Film Capacitors for Automotive FH Series  |
| <b>C3</b>  | Safety Standard Certified Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCA Series                                  |
| <b>C2</b>  | Safety Standard Certified Lead Type Disc Ceramic Capacitors for Automotive DE6 Series  |
| <b>L1</b>  | Chip Ferrite Beads BLM Series  |
| <b>L1</b>  | Power Inductors LQH/DFE Series   |

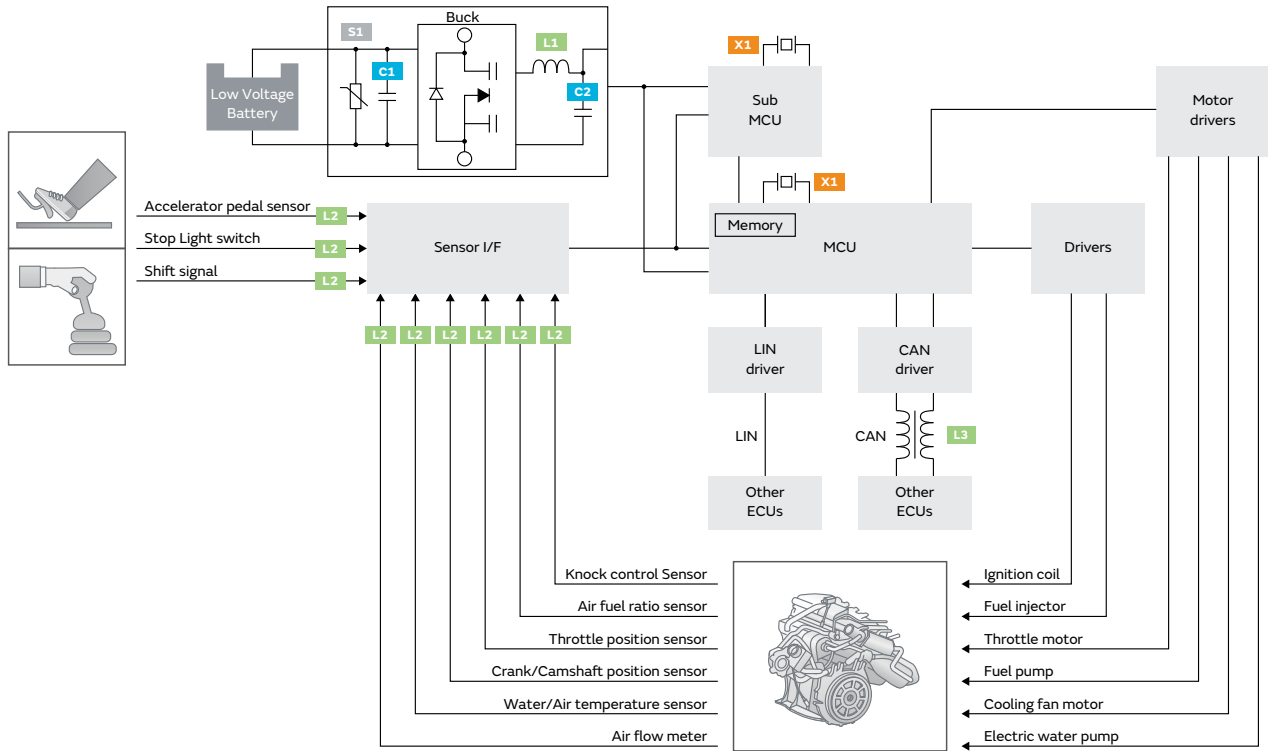
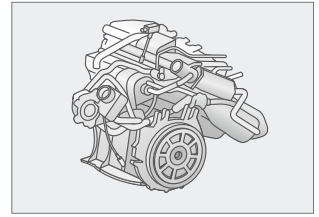
| MCU/Sub MCU |  |
|-------------|--|
| <b>X1</b>   | Ceramic Resonators CERALOCK CST Series |
| <b>X1</b>   | Crystal Units XRC Series               |

| CAN       |   |
|-----------|---|
| <b>L3</b> | Chip Common Mode Choke Coils DLW32SH Series |
| <b>L3</b> | Chip Common Mode Choke Coils DLW43SH Series |

| Ethernet  |   |
|-----------|---|
| <b>L4</b> | Chip Common Mode Choke Coils DLW32MH Series |
| <b>L4</b> | Chip Common Mode Choke Coils DLW43MH Series |
| <b>X2</b> | Crystal Units XRC Series                    |

| DC-DC     |   |
|-----------|---|
| <b>C4</b> | Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCE Series |
| <b>C4</b> | MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCD Series                  |
| <b>C4</b> | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series             |
| <b>C4</b> | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series               |
| <b>C5</b> | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                              |
| <b>S1</b> | Thermistors NCU Series  |
| <b>L2</b> | Power Inductors LQH/DFE Series  |

# 5 Engine ECU



| DC-DC     |   |
|-----------|---|
| <b>C1</b> | MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCD Series                  |
| <b>C1</b> | Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCE Series |
| <b>C1</b> | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series             |
| <b>C1</b> | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series               |
| <b>L1</b> | Chip Ferrite Beads BLM Series   |
| <b>L1</b> | Power Inductors LQH/DFE Series  |

| DC-DC     |  |
|-----------|--|
| <b>C2</b> | Chip Multilayer Ceramic Capacitors for Automotive GCM Series |
| <b>S1</b> | Thermistors NCU Series                                       |

| Signal Line |                               |
|-------------|-------------------------------|
| <b>L2</b>   | Chip Ferrite Beads BLM Series |

| MCU/Sub MCU |  |
|-------------|--|
| <b>X1</b>   | Ceramic Resonators CERALOCK CST Series |
| <b>X1</b>   | Crystal Units XRC Series               |

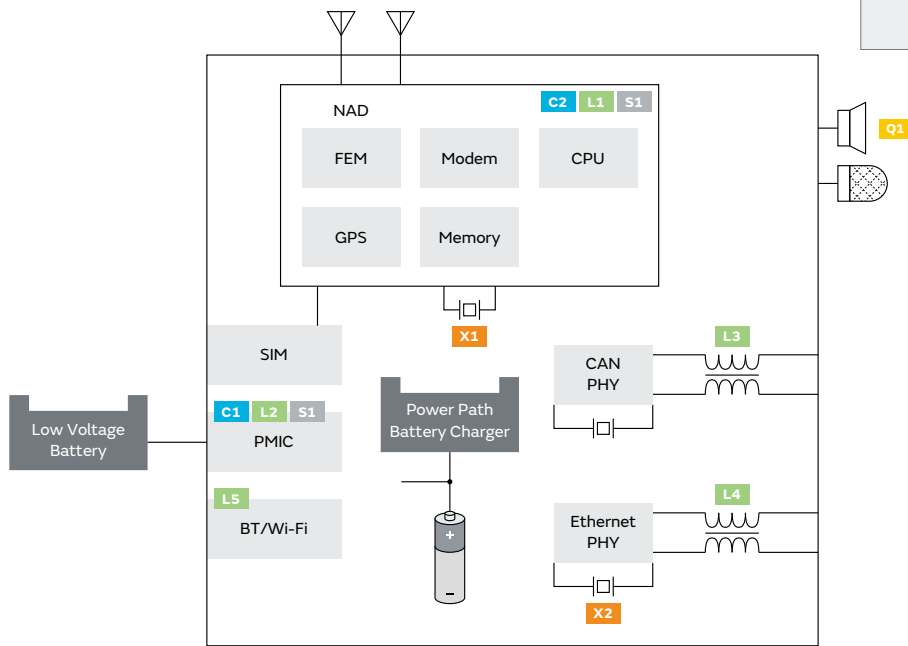
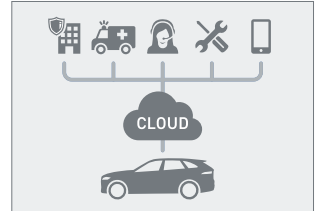
| CAN       |   |
|-----------|---|
| <b>L3</b> | Chip Common Mode Choke Coils DLW32SH Series |
| <b>L3</b> | Chip Common Mode Choke Coils DLW43SH Series |

Connected

1 TCU (Telematics control unit)

2 IVI (In vehicle infotainment)

# 1 TCU (Telematics control unit)



| PMIC |   |
|------|---|
| C1   | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series                         |
| C1   | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series                           |
| C1   | Chip Multilayer Ceramic Capacitors for Automotive GCM Series  |
| C1   | AEC-Q200 Compliant 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Infotainment NFM Series |
| L2   | Chip Inductors (Chip Coils) LQM/LQH/DFE Series  |
| L2   | Chip Ferrite Beads BLM Series   |
| S1   | Thermistors NCU Series  |

| BT/Wi-Fi |  |
|----------|--|
| L5       | Chip Inductors (Chip Coils) LQW/LQP/LQG Series |

| NAD |   |
|-----|---|
| C2  | AEC-Q200 Compliant 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Infotainment NFM Series |
| C2  | Chip Multilayer Ceramic Capacitors for Automotive GCM Series  |
| L1  | Chip Inductors (Chip Coils) LQW/LQP/LQG Series  |
| S1  | Thermistors NCU Series  |
| Q1  | Piezoelectric Sounders PKLCS/PKMCS Series   |

| CAN |   |
|-----|---|
| L3  | Chip Common Mode Choke Coils DLW32SH Series |
| L3  | Chip Common Mode Choke Coils DLW43SH Series |

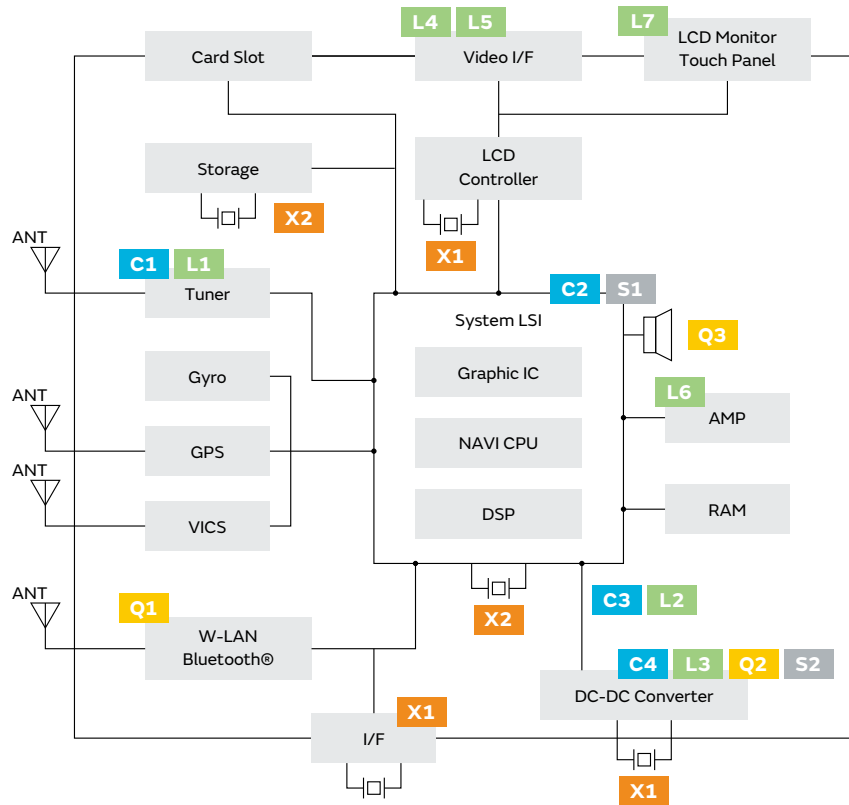
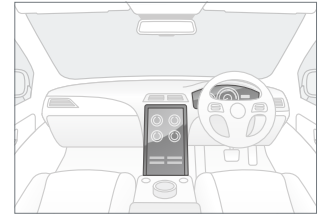
  

| Ethernet |   |
|----------|---|
| L4       | Chip Common Mode Choke Coils DLW32MH Series |
| L4       | Chip Common Mode Choke Coils DLW43MH Series |

| Timing Device |  |
|---------------|--|
| X1            | Ceramic Resonators CERALOCK CST Series |
| X2            | Crystal Units XRC Series               |



# 2 IVI (In vehicle infotainment)



| Tuner     |   |
|-----------|---|
| <b>C1</b> | High Q Chip Multilayer Ceramic Capacitors for Automotive GCQ Series |
| <b>L1</b> | Chip Inductors (Chip Coils) LQW/LQP/LQG Series                      |
| <b>L1</b> | Variable inductors 5CCEG Series                                     |



| Video I/F |  |
|-----------|--|
| <b>L4</b> | Chip Common Mode Choke Coils DLW21SZ Series      |
| <b>L4</b> | Chip Inductors (Chip Coils) LQW18C/LQM18J Series |
| <b>L4</b> | Chip Inductors (Chip Coils) LQW32FT Series       |
| <b>L4</b> | Chip Inductors (Chip Coils) LQH Series           |
| <b>L5</b> | Chip Common Mode Choke Coils DLW32MH Series      |
| <b>L5</b> | Chip Common Mode Choke Coils DLW43MH Series      |


| System LSI |   |
|------------|---|
| <b>C2</b>  | AEC-Q200 Compliant 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Infotainment NFM Series |
| <b>C2</b>  | AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment GRT Series                     |
| <b>S1</b>  | Thermistors NCU Series  |
| <b>Q1</b>  | Piezoelectric Sounders PKLCS/PKMCS Series   |


| AMP |  |
|-----|--|
| L6  | Power Inductors<br>LQH/DEM/DFE Series   |
| L6  | Large-current Common Mode Choke Coils<br>PLT10/PLT5B/DLW5A/<br>DLW5B/UCMH Series  |

| DC-DC Converter |   |
|-----------------|---|
| C4              | AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment GRT Series                      |
| C4              | AEC-Q200 Compliant 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Infotainment NFM Series  |
| C4              | Polymer Aluminum Electrolytic Capacitors ECAS Series   |
| L3              | Large-current Common Mode Choke Coils<br>PLT10/PLT5B/DLW5A/<br>DLW5B/UCMH Series                       |
| L3              | Chip Ferrite Beads BLM Series    |
| S2              | Thermistors NCU Series   |
| Q2              | Non-Isolated DC-DC Converters<br>MYMGK/MYSGK/OKL/<br>MYLSM Series                                    |

| Secondary |   |
|-----------|---|
| C3        | AEC-Q200 Compliant 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Infotainment NFM Series  |
| C3        | AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment GRT Series                      |
| C3        | Polymer Aluminum Electrolytic Capacitors ECAS Series   |
| L2        | Chip Inductors (Chip Coils)<br>LQM/LQH/DFE Series    |
| L2        | Chip Ferrite Beads BLM Series    |

| Timing Device |  |
|---------------|--|
| X1            | Ceramic Resonators<br>CERALOCK<br>CST Series  |
| X2            | Crystal Units<br>XRC Series                   |

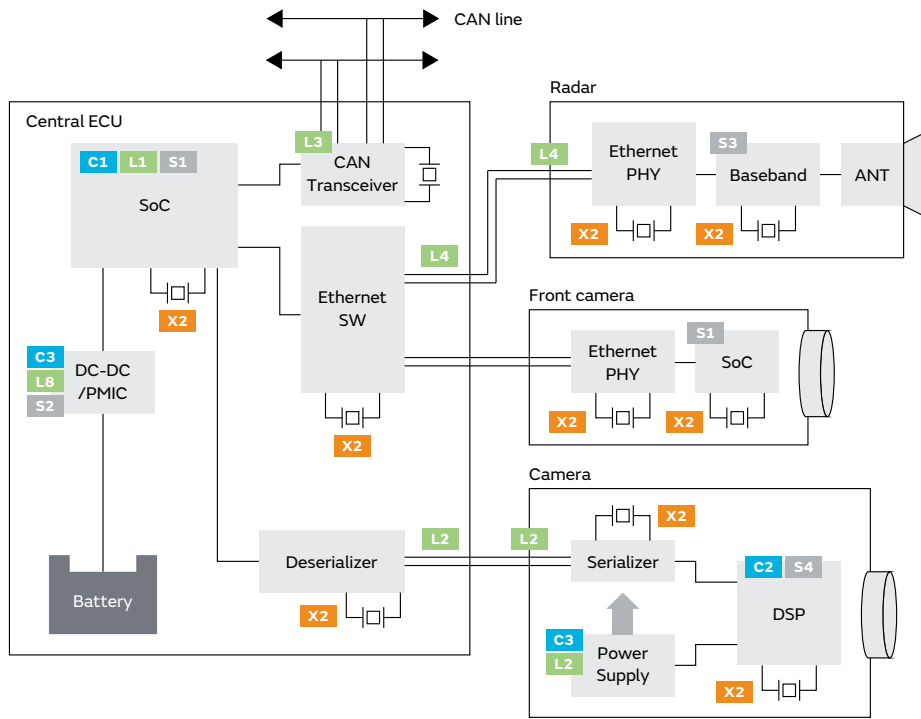
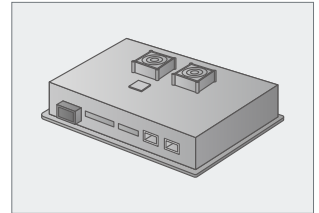
| Connectivity |   |
|--------------|---|
| Q3           | Bluetooth® - Wi-Fi<br>Combo Modules  |

| LCD Monitor Touch Panel |   |
|-------------------------|---|
| L7                      | LC combined filters<br>NFL Series  |

AD & ADAS

- 1 ADAS (Advanced driver assist system)
- 2 IPA (Intelligent parking assist)
- 3 Lidar
- 4 Radar
- 5 Front camera









# 1 ADAS (Advanced driver assist system)






| SoC       |  |
|-----------|--|
| <b>C1</b> | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series |
| <b>C1</b> | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                     |
| <b>L1</b> | Chip Ferrite Beads BLM Series  |
| <b>S1</b> | Thermistors NCU Series   |

| DC-DC/PMIC |  |
|------------|--|
| <b>C3</b>  | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series    |
| <b>C3</b>  | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series      |
| <b>C3</b>  | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                     |
| <b>C3</b>  | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series |





| DC-DC/PMIC |                                |
|------------|--------------------------------|
| <b>L8</b>  | Power Inductors LQH/DFE Series |
| <b>S2</b>  | Thermistors NCU Series         |



| Power Supply |  |  |
|--------------|--|--|
| C3           | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series    |   |
| C3           | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series      |   |
| C3           | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                     |   |
| C3           | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series |   |
| L2           | Chip Ferrite Beads BLM Series  |   |
| L2           | Chip Inductors (Chip Coils) LQW18C/LQM18J Series                                 |   |
| L2           | Chip Inductors (Chip Coils) LQW32FT Series                                       |   |
| L2           | Chip Inductors (Chip Coils) LQH Series   |  |



| Baseband |                        |   |
|----------|------------------------|---|
| S3       | Thermistors NCU Series |  |

| Timing Device |  |   |
|---------------|--|---|
| X1            | Ceramic Resonators CERALOCK CST Series |  |
| X2            | Crystal Units XRC Series               |  |

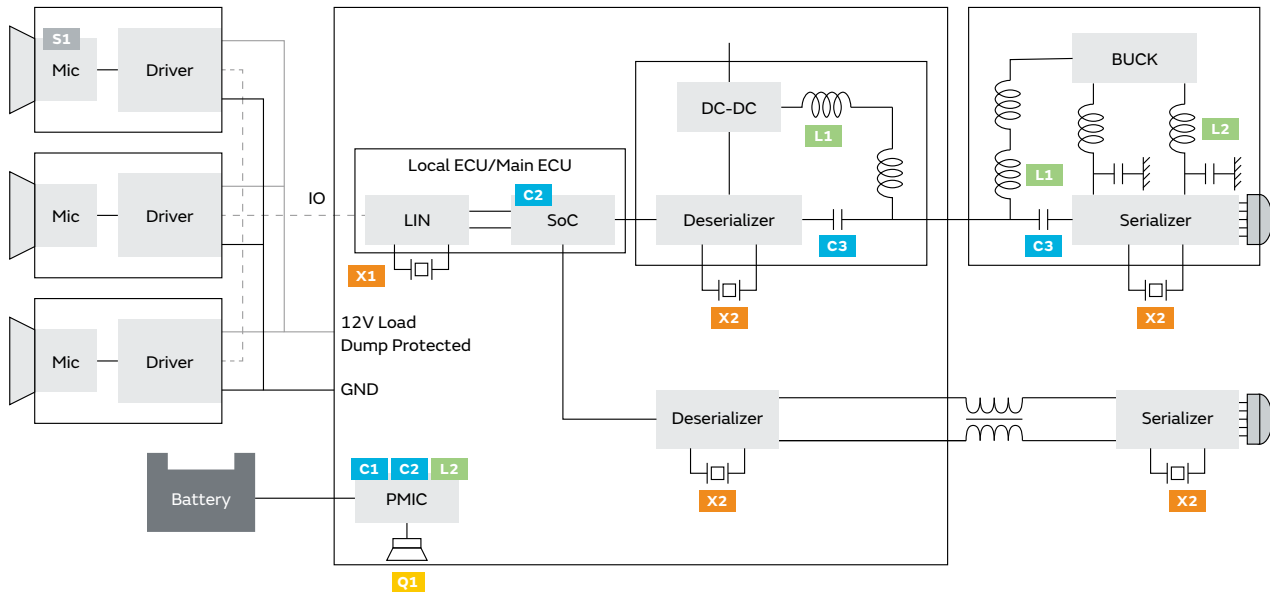
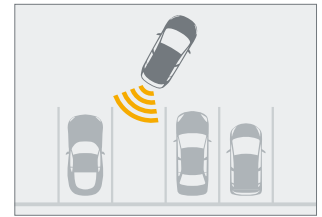
| DSP |   |   |
|-----|---|---|
| C2  | AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment GRT Series |  |
| C2  | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series  |  |
| S4  | Thermistors NCU Series  |  |

| SerDes |  |   |
|--------|--|---|
| L2     | Chip Ferrite Beads BLM Series                    |  |
| L2     | Chip Inductors (Chip Coils) LQW18C/LQM18J Series |  |
| L2     | Chip Inductors (Chip Coils) LQW32FT Series       |  |
| L2     | Chip Inductors (Chip Coils) LQH Series           |  |

| CAN Transceiver |   |   |
|-----------------|---|---|
| L3              | Chip Common Mode Choke Coils DLW32SH Series |  |
| L3              | Chip Common Mode Choke Coils DLW43SH Series |  |

| Ethernet |   |   |
|----------|---|---|
| L4       | Chip Common Mode Choke Coils DLW32MH Series |  |
| L4       | Chip Common Mode Choke Coils DLW43MH Series |  |

# 2 IPA (Intelligent parking assist)



| Mic |                                |
|-----|--------------------------------|
| S1  | Ultrasonic Sensors MA58 Series |

| PMIC |  |
|------|--|
| C1   | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series    |
| C1   | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series      |
| C1   | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                     |
| C2   | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series |
| L2   | Chip Inductors (Chip Coils) LQM/LQH/DFE Series                                   |
| Q1   | Piezoelectric Sounders PKLCS/PKMCS Series  |

| SoC |  |
|-----|--|
| C2  | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series |
| C2  | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                     |

| PoC |  |
|-----|--|
| C3  | Chip Multilayer Ceramic Capacitors for Automotive GCM Series |
| L1  | Chip Ferrite Beads BLM Series                                |
| L1  | Chip Inductors (Chip Coils) LQW18C/LQM18J Series             |
| L1  | Chip Inductors (Chip Coils) LQW32FT Series                   |
| L1  | Chip Inductors (Chip Coils) LQH Series                       |

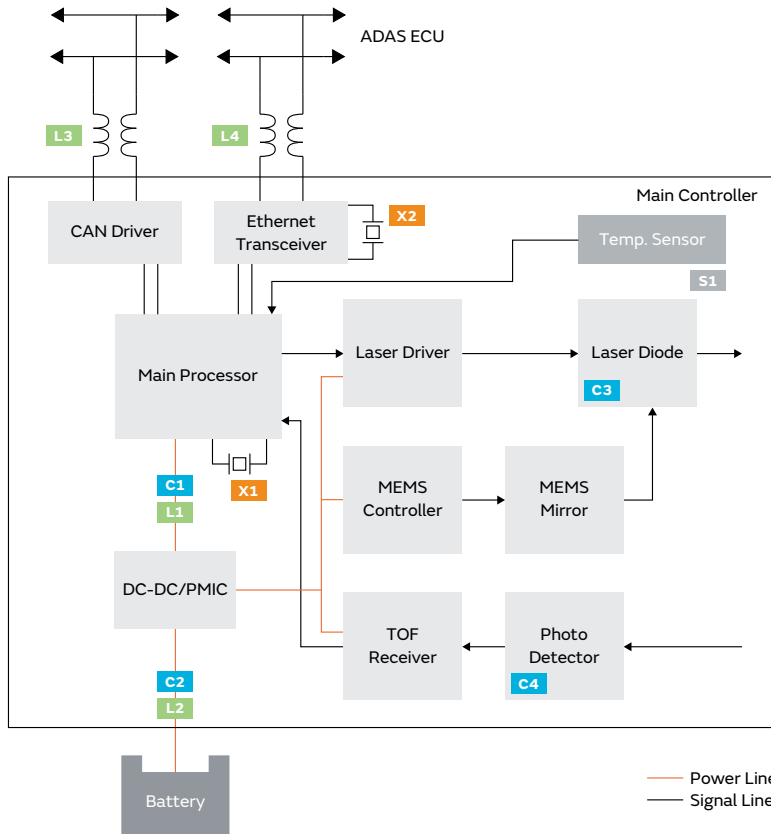
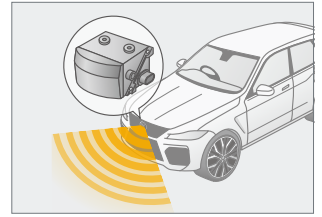
| DC-DC |  |
|-------|--|
| L2    | Chip Inductors (Chip Coils) LQM/LQH/DFE Series |

| Timing Device |  |
|---------------|--|
| X1            | Ceramic Resonators CERALOCK CST Series |
| X2            | Crystal Units XRC Series               |



# 3 Lidar



| Main Processor |  |
|----------------|--|
| <b>X1</b>      | Ceramic Resonators<br>CERALOCK<br>CST Series |
| <b>X1</b>      | Crystal Units<br>XRC Series                  |

| DC-DC/PMIC |  |
|------------|--|
| <b>C1</b>  | 3 Terminals Low ESL Chip Multilayer<br>Ceramic Capacitors for Automotive<br>NFM Series |
| <b>C1</b>  | Chip Multilayer Ceramic<br>Capacitors for Automotive<br>GCM Series                     |
| <b>L1</b>  | Chip Inductors<br>(Chip Coils)<br>LQM/LQH/DFE Series                                   |

| Battery Line |  |
|--------------|--|
| <b>C2</b>    | MLSC Design Chip Multilayer<br>Ceramic Capacitors for Automotive<br>GCD Series                     |
| <b>C2</b>    | Soft Termination MLSC Design<br>Chip Multilayer Ceramic<br>Capacitors for Automotive<br>GCE Series |
| <b>C2</b>    | Soft Termination Chip Multilayer<br>Ceramic Capacitors for Automotive<br>GCJ Series                |
| <b>C2</b>    | Metal Terminal Type Multilayer<br>Ceramic Capacitors for Automotive<br>KCM Series                  |
| <b>C2</b>    | Chip Multilayer Ceramic<br>Capacitors for Automotive<br>GCM Series                                 |
| <b>L2</b>    | Large-current Common<br>Mode Choke Coils<br>PLT10HH/PLT5BP Series                                  |

| Battery Line |   |
|--------------|---|
| <b>L2</b>    | Chip Common Mode<br>Choke Coils<br>DLW Series |
| <b>L2</b>    | Chip Ferrite Beads<br>BLM Series              |

| Temperature Control |                           |
|---------------------|---------------------------|
| <b>S1</b>           | Thermistors<br>NCU Series |

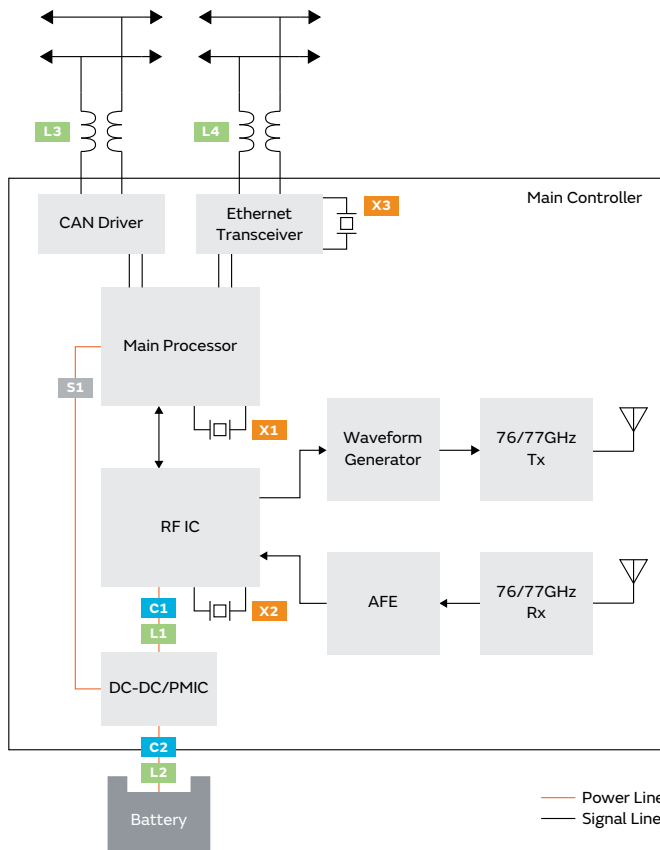
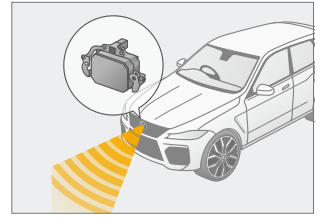
| Gate Driver |  |
|-------------|--|
| <b>C3</b>   | 3 Terminals Low ESL Chip Multilayer<br>Ceramic Capacitors for Automotive<br>NFM Series |
| <b>C3</b>   | Silicon Capacitors   |

| APD Bias Cap. |   |
|---------------|---|
| <b>C4</b>     | Chip Multilayer Ceramic<br>Capacitors for Automotive<br>GCM Series                  |
| <b>C4</b>     | Soft Termination Chip Multilayer<br>Ceramic Capacitors for Automotive<br>GCJ Series |

| CAN       |   |
|-----------|---|
| <b>L3</b> | Chip Common Mode<br>Choke Coils<br>DLW32SH Series |
| <b>L3</b> | Chip Common Mode<br>Choke Coils<br>DLW43SH Series |

| Ethernet  |   |
|-----------|---|
| <b>L4</b> | Chip Common Mode<br>Choke Coils<br>DLW32MH Series |
| <b>L4</b> | Chip Common Mode<br>Choke Coils<br>DLW43MH Series |
| <b>X2</b> | Crystal Units<br>XRC Series                       |

# 4 Radar



| Battery Line |  |  |
|--------------|--|--|
| L2           | Chip Common Mode Choke Coils<br>DLW Series |  |
| L2           | Chip Ferrite Beads<br>BLM Series           |  |

| Temperature Control |                           |  |
|---------------------|---------------------------|--|
| S1                  | Thermistors<br>NCU Series |  |

| RFIC |                             |  |
|------|-----------------------------|--|
| X2   | Crystal Units<br>XRC Series |  |

| CAN |  |  |
|-----|--|--|
| L3  | Chip Common Mode Choke Coils<br>DLW32SH Series |  |
| L3  | Chip Common Mode Choke Coils<br>DLW43SH Series |  |

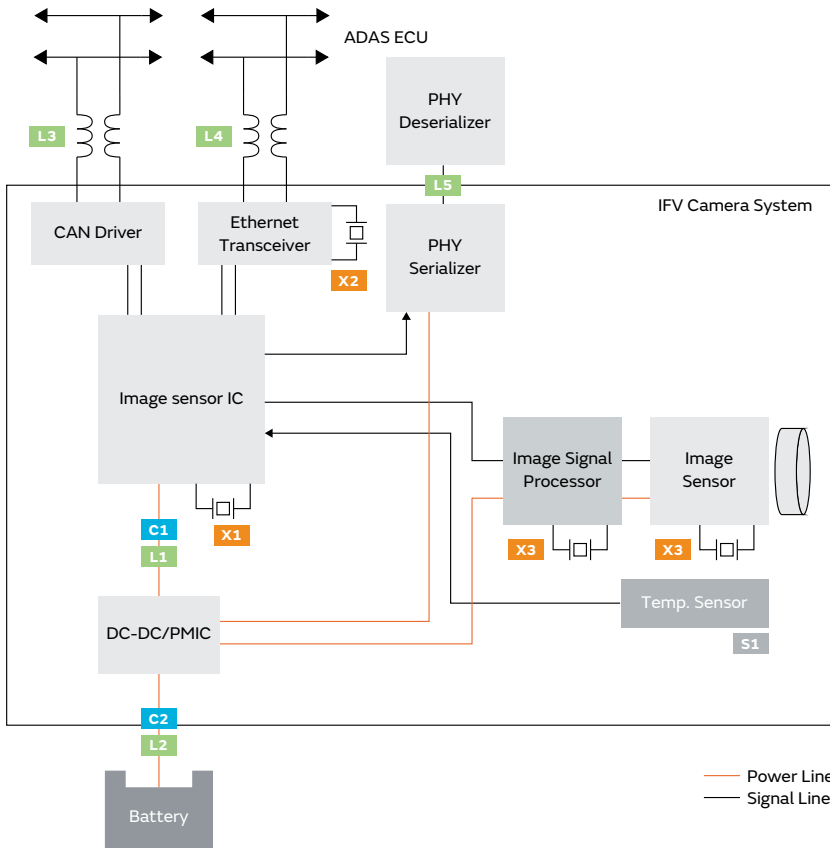
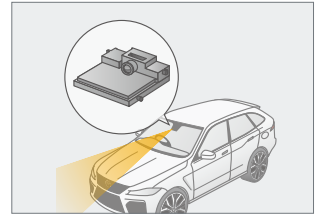
| Ethernet |  |  |
|----------|--|--|
| L3       | Chip Common Mode Choke Coils<br>DLW32MH Series |  |
| L3       | Chip Common Mode Choke Coils<br>DLW43MH Series |  |
| X3       | Crystal Units<br>XRC Series                    |  |

| Main Processor |  |  |
|----------------|--|--|
| X1             | Ceramic Resonators<br>CERALOCK<br>CST Series |  |
| X1             | Crystal Units<br>XRC Series                  |  |

| DC-DC/PMIC |   |  |
|------------|---|--|
| C1         | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive<br>NFM Series |  |
| C1         | Chip Multilayer Ceramic Capacitors for Automotive<br>GCM Series                     |  |
| L1         | Chip Inductors (Chip Coils)<br>LQM/LQH/DFE Series                                   |  |

| Battery Line |  |  |
|--------------|--|--|
| C2           | MLSC Design Chip Multilayer Ceramic Capacitors for Automotive<br>GCD Series                  |  |
| C2           | Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive<br>GCE Series |  |
| C2           | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive<br>GCJ Series             |  |
| C2           | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive<br>KCM Series               |  |
| C2           | Chip Multilayer Ceramic Capacitors for Automotive<br>GCM Series                              |  |
| L2           | Large-current Common Mode Choke Coils<br>PLT10HH/PLT5BP Series                               |  |

# 5 Front camera



| Image sensor IC |                             |
|-----------------|-----------------------------|
| X1              | Crystal Units<br>XRC Series |

| DC-DC/PMIC |  |
|------------|--|
| C1         | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series |
| C1         | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                     |
| L1         | Chip Inductors (Chip Coils)<br>LQM/LQH/DFE Series                                |

| Battery Line |   |
|--------------|---|
| C2           | MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCD Series                  |
| C2           | Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive GCE Series |
| C2           | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series             |
| C2           | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series               |
| C2           | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                              |

| Battery Line |  |
|--------------|--|
| L2           | Large-current Common Mode Choke Coils<br>PLT10HH/PLT5BP Series |
| L2           | Chip Common Mode Choke Coils<br>DLW Series                     |
| L2           | Chip Ferrite Beads<br>BLM Series                               |

| Power over Coax |   |
|-----------------|---|
| L5              | Chip Inductors (Chip Coils)<br>LQW Series |

| Temperature Control |                           |
|---------------------|---------------------------|
| S1                  | Thermistors<br>NCU Series |

| Image Sensor/ISP |                             |
|------------------|-----------------------------|
| X3               | Crystal Units<br>XRC Series |

| CAN |  |
|-----|--|
| L3  | Chip Common Mode Choke Coils<br>DLW32SH Series |
| L3  | Chip Common Mode Choke Coils<br>DLW43SH Series |

| Ethernet |  |
|----------|--|
| L4       | Chip Common Mode Choke Coils<br>DLW32MH Series |
| L4       | Chip Common Mode Choke Coils<br>DLW43MH Series |
| X2       | Crystal Units<br>XRC Series                    |

Other

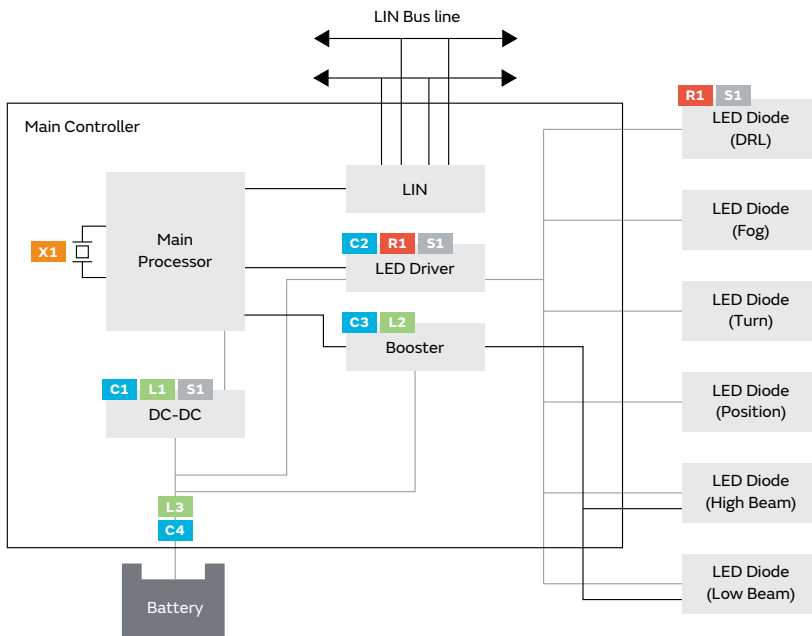
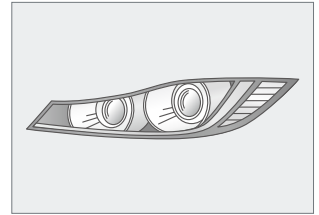
1 Automotive lighting

2 EPS (Electric power steering)

3 PKE / TPMS

4 Gateway / in-vehicle LAN

# 1 Automotive lighting



| Booster |  |
|---------|--|
| C3      | Chip Multilayer Ceramic Capacitors for Automotive GCM Series |
| L2      | Power Inductors LQH Series                                   |

| LED Diode (DRL) |                            |
|-----------------|----------------------------|
| R1              | Thermistors PRF/PRG Series |
| S1              | Thermistors NCU Series     |

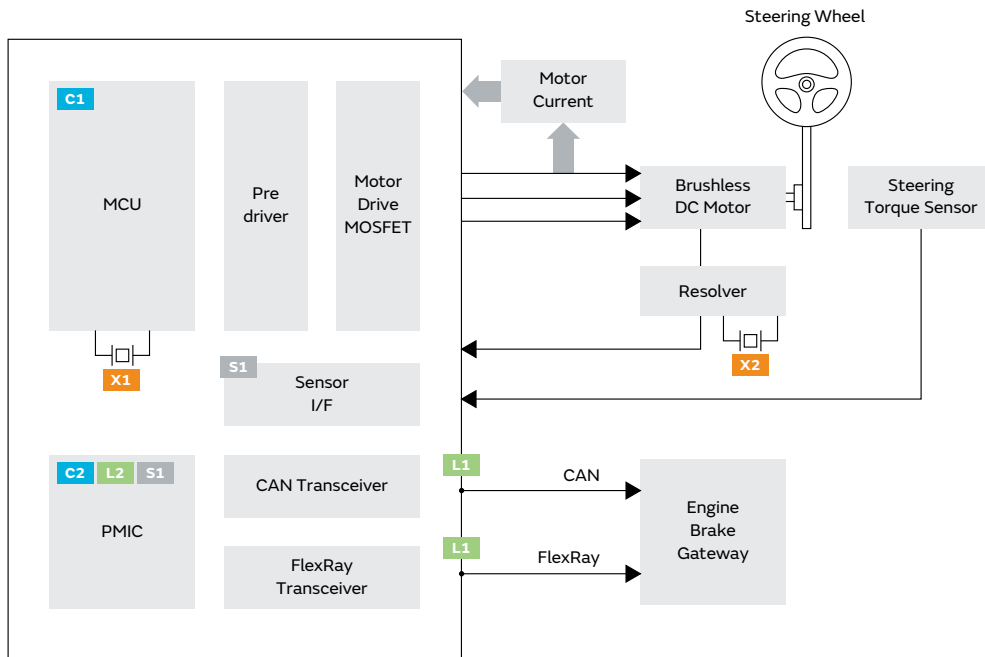
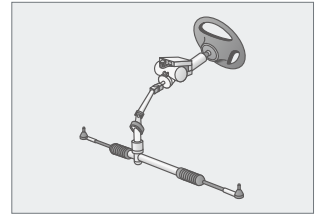
| Primary |   |
|---------|---|
| C4      | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series |
| L3      | Chip Ferrite Beads BLM Series   |
| L3      | Large-current Common Mode Choke Coils PLT10HH/PLT5BP Series                 |
| L3      | Chip Common Mode Choke Coils DLW Series                                     |

| Timing Device |  |
|---------------|--|
| X1            | Ceramic Resonators CERALOCK CST Series |

| DC-DC |   |
|-------|---|
| C1    | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series |
| C1    | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series   |
| C1    | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                  |
| L1    | Power Inductors LQH Series  |
| S1    | Thermistors NCU Series  |

| LED Driver |   |
|------------|---|
| C2         | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                |
| C2         | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series |
| R1         | Thermistors PRF/PRG Series  |
| S1         | Thermistors NCU Series  |

# 2 EPS (Electric power steering)



**MCU**

**C1** Chip Multilayer Ceramic Capacitors for Automotive GCM Series

**Timing Device**

**X1** Ceramic Resonators CERALOCK CST Series

**X1** Crystal Units XRC Series

**X2** Ceramic Resonators CERALOCK CST Series

**PMIC**

**C2** Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series

**C2** Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series

**C2** Chip Multilayer Ceramic Capacitors for Automotive GCM Series

**L2** Chip Ferrite Beads BLM Series

**S1** Thermistors NCU Series

**PHY**

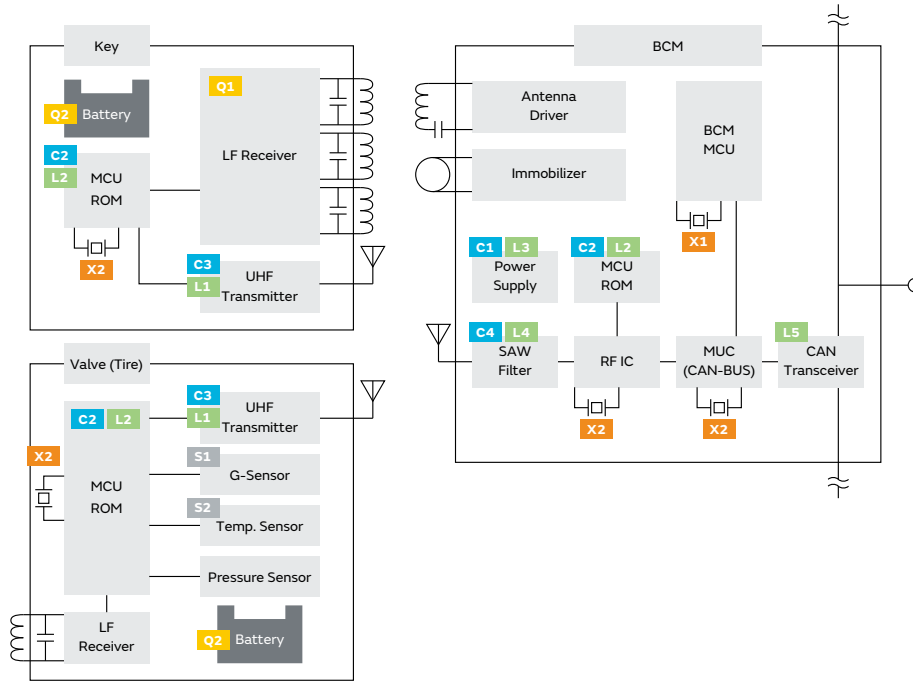
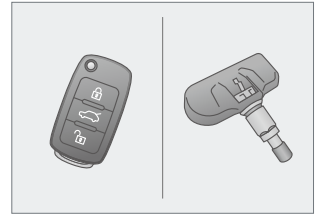
**L1** Chip Common Mode Choke Coils DLW32SH Series

**L1** Chip Common Mode Choke Coils DLW43SH Series

**Sensor I/F**

**S1** Thermistors NCU Series

# 3 PKE / TPMS



**LF Receiver**

**Q1** Antenna Coil  
SA3D12/SA3D14 Series

**UHF Transmitter**

**C3** High Q Chip Multilayer Ceramic Capacitors for Automotive GCQ Series

**L1** Chip Inductors (Chip Coils)  
LQW/LQP/LQG/LQB Series

**MCU ROM**

**L2** Chip Inductors (Chip Coils)  
LQW/LQP/LQG/LQB Series

**C2** Chip Multilayer Ceramic Capacitors for Automotive GCM Series

**G-Sensor**

**S1** Chip Multilayer Ceramic Capacitors for Automotive GCM Series

**Temp. Sensor**

**S2** Thermistors  
NCU Series

**Power Supply**

**C1** Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series

**C1** Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series

**C1** Chip Multilayer Ceramic Capacitors for Automotive GCM Series

**L3** Chip Inductors (Chip Coils)  
LQM/LQH/DFE Series

**L3** Chip Ferrite Beads  
BLM Series

**SAW Filter**

**C4** High Q Chip Multilayer Ceramic Capacitors for Automotive GCQ Series

**L4** Chip Inductors (Chip Coils)  
LQW/LQP/LQG/LQB Series

**CAN Transceiver**

**L5** Chip Common Mode Choke Coils  
DLW32SH Series

**L5** Chip Common Mode Choke Coils  
DLW43SH Series

**Timing Device**

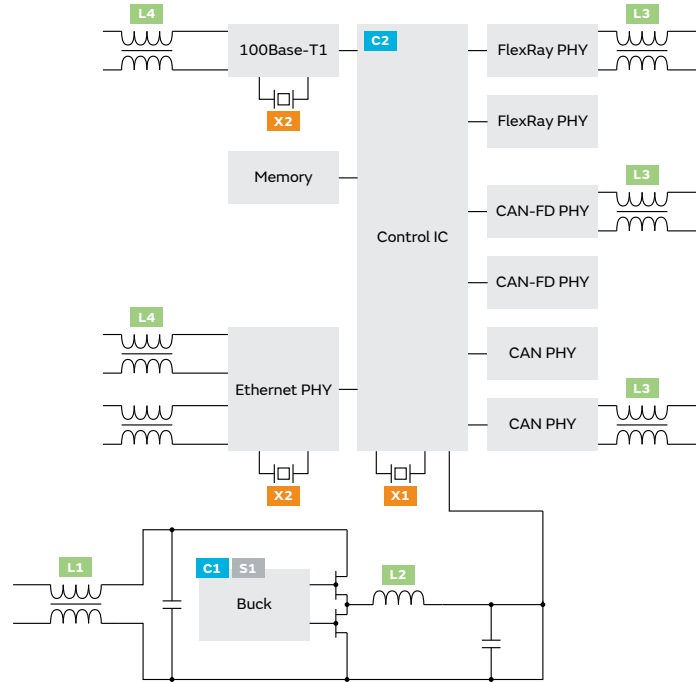
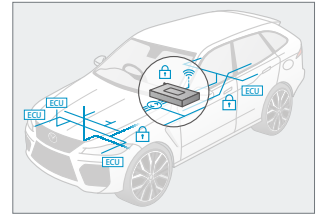
**X1** Ceramic Resonators  
CERALOCK  
CST Series

**X2** Crystal Units  
XRC Series

**Battery**

**Q2** Coin Manganese Dioxide  
Lithium Batteries  
Heat-resistant Type/  
Extended Temperature Type

# 4 Gateway / in-vehicle LAN



| DC-DC     |   |
|-----------|---|
| <b>C1</b> | Soft Termination Chip Multilayer Ceramic Capacitors for Automotive GCJ Series |
| <b>C1</b> | Metal Terminal Type Multilayer Ceramic Capacitors for Automotive KCM Series   |
| <b>C1</b> | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                  |
| <b>L1</b> | Large-current Common Mode Choke Coils PLT10HH/PLT5BP Series                   |
| <b>L1</b> | Chip Common Mode Choke Coils DLW Series                                       |
| <b>L2</b> | Chip Inductors (Chip Coils) LQM/LQH/DFE Series                                |
| <b>S1</b> | Thermistors NCU Series  |

| Control IC |  |
|------------|--|
| <b>C2</b>  | Chip Multilayer Ceramic Capacitors for Automotive GCM Series                     |
| <b>C2</b>  | 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive NFM Series |

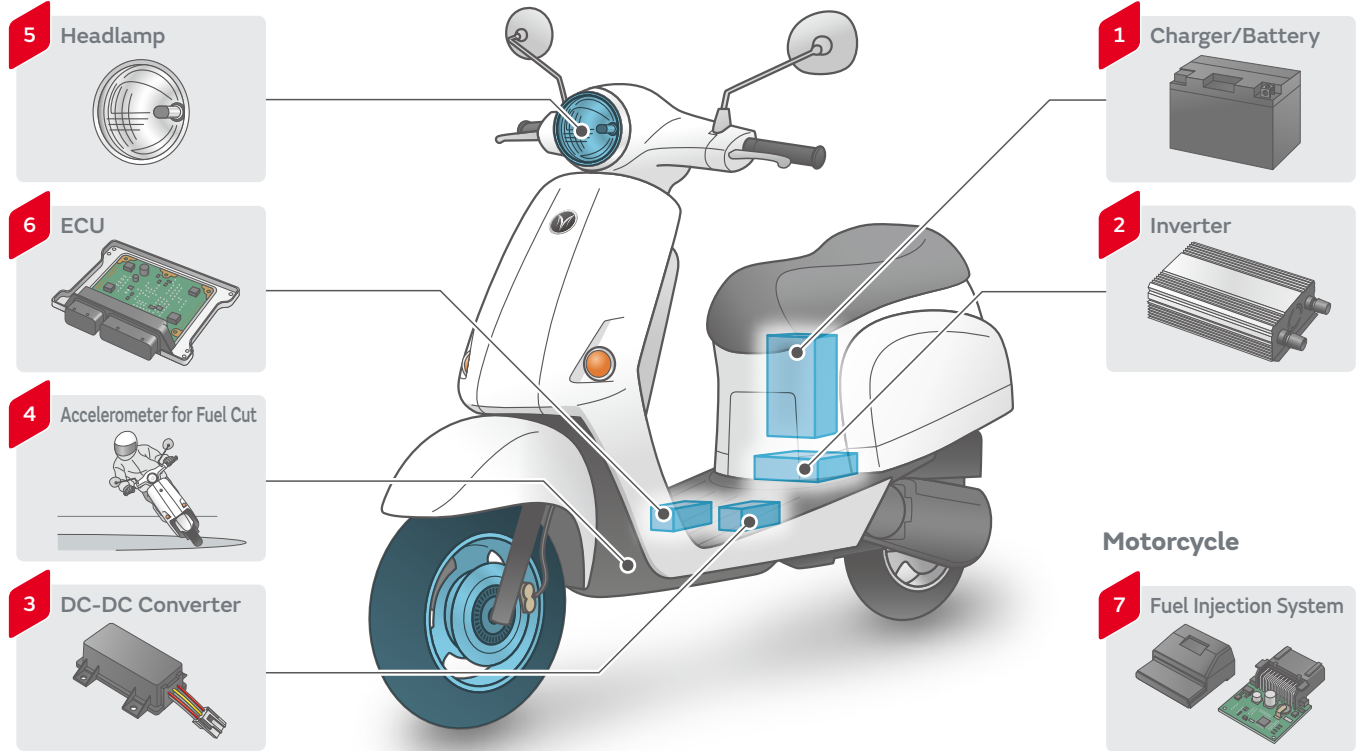
| FlexRay/CAN/CAN-FD |   |
|--------------------|---|
| <b>L3</b>          | Chip Common Mode Choke Coils DLW32SH Series |
| <b>L3</b>          | Chip Common Mode Choke Coils DLW43SH Series |

| OBC/Ethernet |   |
|--------------|---|
| <b>L4</b>    | Chip Common Mode Choke Coils DLW32MH Series |
| <b>L4</b>    | Chip Common Mode Choke Coils DLW43MH Series |

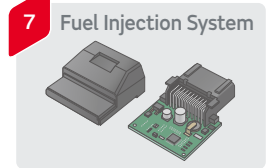
| Timing Device |  |
|---------------|--|
| <b>X1</b>     | Ceramic Resonators CERALOCK CST Series |
| <b>X2</b>     | Crystal Units XRC Series               |

# Motorcycle

## E-Motorcycle



## Motorcycle



### 1 Charger/Battery













|  |   |  |  |   |
|--|---|--|--|---|
| <p>Metal Terminal Type Multilayer Ceramic Capacitors for Automotive<br/>KCM Series</p> | <p>Chip Multilayer Ceramic Capacitors for Automotive<br/>GCM Series</p> | <p>Soft Termination Chip Multilayer Ceramic Capacitors for Automotive<br/>GCJ Series</p> | <p>Safety Standard Certified Lead Type Disc Ceramic Capacitors for Automotive<br/>DE6 Series</p> | <p>Ceramic Resonators<br/>CERALOCK CST Series</p> |
| <p>Crystal Units<br/>XRC Series</p>  | <p>Large-current Common Mode Choke Coils<br/>PLT10HH/PLT5BP Series</p>  | <p>Thermistors<br/>PRF/NCU Series</p>  | <p>High Reliability Chip Ferrite Beads<br/>BLM_SH1/BH1/TH1/JH1 Series</p>                        |   |

### 2 Inverter


|   |  |   |  |                                       |
|---|--|---|--|---------------------------------------|
| <p>Chip Multilayer Ceramic Capacitors for Automotive<br/>GCM Series</p> | <p>Soft Termination Chip Multilayer Ceramic Capacitors for Automotive<br/>GCJ Series</p> | <p>AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCG Series</p> | <p>Ni Plating + Pd Plating Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCB Series</p> | <p>Crystal Units<br/>XRC Series</p>   |
| <p>150°C/ 200°C Operation Leaded MLCC for Automotive<br/>RH Series</p>  | <p>Large-current Common Mode Choke Coils<br/>PLT10HH/PLT5BP Series</p>                   | <p>Ceramic Resonators<br/>CERALOCK CST Series</p>   | <p>High Reliability Chip Ferrite Beads<br/>BLM_SH1/BH1/TH1/JH1 Series</p>  | <p>Thermistors<br/>PRF/NCU Series</p> |









**3 DC-DC converter**

|  |  |  |  |   |
|--|--|--|--|---|
| <p>Non-Isolated DC-DC Converters<br/>MYPMA Series</p>   | <p>Metal Terminal Type Multilayer Ceramic Capacitors for Automotive<br/>KCM Series</p>  | <p>Soft Termination Chip Multilayer Ceramic Capacitors for Automotive<br/>GCJ Series</p>  | <p>Chip Multilayer Ceramic Capacitors for Automotive<br/>GCM Series</p>  | <p>AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCG Series</p>  |
| <p>Ni Plating + Pd Plating Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCB Series</p>  | <p>Ceramic Resonators<br/>CERALOCK CST Series</p>                                       | <p>High Reliability Chip Ferrite Beads<br/>BLM_SH1/BH1/TH1/JH1 Series</p>                 | <p>Thermistors<br/>PRF/NCU Series</p>                                     | <p>Large-current Common Mode Choke Coils<br/>PLT10HH/PLT5BP Series</p>   |
|  |  |  |  | <p>Crystal Units<br/>XRC Series</p>    |
|  |  |  |  | <p>Chip Inductors (Chip Coils)<br/>LQM/LQH/DFE Series</p>    |






**4 Accelerometer for Fuel Cut**

|   |  |   |   |   |  |
|---|--|---|---|---|--|
| <p>Accelerometers<br/>SCA Series</p>   | <p>Gyro Sensors<br/>SCC Series</p>    | <p>Chip Multilayer Ceramic Capacitors for Automotive<br/>GCM Series</p>  | <p>Ceramic Resonators<br/>CERALOCK CST Series</p>  | <p>Metal Terminal Type Multilayer Ceramic Capacitors for Automotive<br/>KCM Series</p>  | <p>Soft Termination Chip Multilayer Ceramic Capacitors for Automotive<br/>GCJ Series</p>  |
| <p>AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCG Series</p>  | <p>Ni Plating + Pd Plating Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCB Series</p>  | <p>Crystal Units<br/>XRC Series</p>                                     | <p>Thermistors<br/>NCU Series</p>               | <p>High Reliability Chip Ferrite Beads<br/>BLM_SH1/BH1/TH1/JH1 Series</p>             |  |










**5 Headlamp**

|   |   |  |
|---|---|--|
| <p>Chip Multilayer Ceramic Capacitors for Automotive<br/>GCM Series</p>  | <p>Ceramic Resonators<br/>CERALOCK CST Series</p>                          | <p>Soft Termination Chip Multilayer Ceramic Capacitors for Automotive<br/>GCJ Series</p>  |
| <p>Crystal Units<br/>XRC Series</p>                                      | <p>High Reliability Chip Ferrite Beads<br/>BLM_SH1/BH1/TH1/JH1 Series</p>  | <p>Thermistors<br/>NCU/PRG Series</p>   |

**6 ECU**

|   |  |   |
|---|--|---|
| <p>Chip Ferrite Beads<br/>BLM Series</p>           | <p>Power Inductor<br/>LQH/DFE Series</p>  | <p>Thermistors<br/>PRF/NCU Series</p>  |
| <p>Ceramic Resonators<br/>CERALOCK CST Series</p>  | <p>Crystal Units<br/>XRC Series</p>       |   |

**7 Fuel Injection ECU**

|   |   |  |   |  |
|---|---|--|---|--|
| <p>Metal Terminal Type Multilayer Ceramic Capacitors for Automotive<br/>KCM Series</p>                             | <p>Chip Multilayer Ceramic Capacitors for Automotive<br/>GCM Series</p>  | <p>Soft Termination Chip Multilayer Ceramic Capacitors for Automotive<br/>GCJ Series</p>  | <p>Ceramic Resonators<br/>CERALOCK CST Series</p>  | <p>Ni Plating + Pd Plating Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCB Series</p>  |
| <p>AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive<br/>GCG Series</p>  | <p>Thermistors<br/>NXF/NXR Series</p>                                    | <p>High Reliability Chip Ferrite Beads<br/>BLM_SH1/BH1/TH1/JH1 Series</p>                 | <p>Crystal Units<br/>XRC Series</p>                |  |

# General Purpose

General Purpose

|   |                    |                                 |       |       |       |       |                   |
|---|--------------------|---------------------------------|-------|-------|-------|-------|-------------------|
| AEC-Q 200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment                     | GRT Series         | Coupling/Decoupling             |       |       |       |       | 125°C             |
| Chip Multilayer Ceramic Capacitors for Automotive   | GCM Series         | Coupling/Decoupling             |       |       |       |       | 125°C 150°C       |
| Soft Termination Chip Multilayer Ceramic Capacitors for Automotive                          | GCJ Series         | Coupling/Decoupling/For Step-up |       |       |       |       | 125°C 150°C       |
| High Q Chip Multilayer Ceramic Capacitors for Automotive                                    | GCQ Series         | High Frequency Filter Circuit   |       |       |       |       | 125°C             |
| MLSC Design Chip Multilayer Ceramic Capacitors for Automotive                               | GCD Series         | Coupling/Decoupling/For Step-up |       |       |       |       | 125°C             |
| Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive              | GCE Series         | Coupling/Decoupling/For Step-up |       |       |       |       | 125°C             |
| 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive                       | NFM Series         | Noise Suppression/Decoupling    |       |       |       |       | 125°C             |
| AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive | GCG Series         | Coupling/Decoupling/For Step-up |       |       |       |       | 125°C 150°C       |
| Leaded MLCC for Automotive  | RCE Series         | Noise Suppression/Decoupling    |       |       |       |       | 125°C             |
| 150°C/200°C Operation Leaded MLCC for Automotive  | RH Series          | Noise Suppression/Decoupling    | 125°C | 150°C | 175°C | 200°C |                   |
| Polymer Aluminum Electrolytic Capacitors  | ECAS Series        | Smoothing /Transient Backup     |       |       |       |       | 105°C 125°C       |
| Chip Ferrite Beads  | BLM Series         | Noise Suppression               |       |       |       |       | 125°C 150°C 175°C |
| Chip Ferrite Beads  | NFZ Series         | Noise Suppression               |       |       |       |       | 105°C 125°C       |
| EMI Suppression Filters EMIFIL  | NFL Series         | Noise Suppression               |       |       |       |       | 125°C             |
| EMI Suppression Filters EMIFIL  | NFE Series         | Noise Suppression               |       |       |       |       | 125°C             |
| Chip Inductors (Chip Coils)   | LQM/LQH/DFE Series | Voltage Conversion              | 85°C  | 105°C | 125°C | 150°C |                   |
| Chip Inductors (Chip Coils)   | LQW Series         | Matching/High Frequency Choke   |       |       |       |       | 125°C             |
| Piezoelectric Sounders  | PKLCS/PKMCS Series | Sound Component                 |       |       |       |       | 125°C             |

# Memo

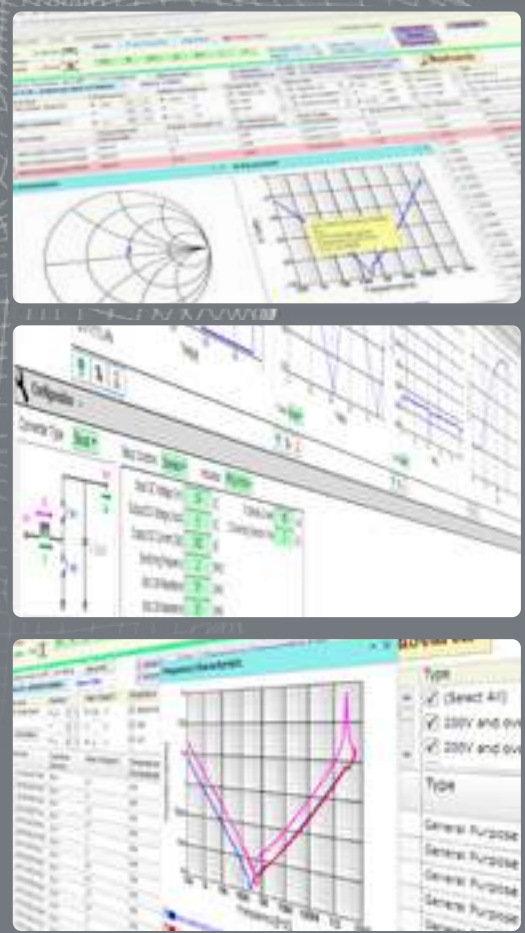
## SimSurfing

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design



**SimSurfing** is a web application which allows circuit designers to see our components' characteristics data, and to select the one that best suits the requirement.

- View and download data**  
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- Simulate circuit conditions**  
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- Compare characteristics**  
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INNOVATOR IN ELECTRONICS  
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Jan.6,2021

# Index

|          |  |          |   |          |  |
|----------|--|----------|---|----------|--|
| <b>B</b> | <b>B4F</b> Baluns..... 73  | <b>G</b> | <b>GJ4</b> Low Distortion Chip Multilayer Ceramic Capacitors for General Purpose..... 13  | <b>M</b> | <b>MHM</b> Ozonizer Modules Ionissimo..... 103   |
|          | <b>B5F</b> Baluns..... 73  |          | <b>GJM</b> High Q Chip Multilayer Ceramic Capacitors for General Purpose ( $\leq 100Vdc$ )..... 9   |          | <b>MHR</b> High Voltage Resistors..... 64  |
|          | <b>BLA</b> Chip Ferrite Bead..... 43   |          | <b>GMA</b> Wire Bonding Mount Multilayer Microchip Capacitors for General Purpose..... 14   |          | <b>MM</b> Microwave Connectors..... 74   |
|          | <b>BLE</b> Application Specified Noise Filter..... 46  |          | <b>GMD</b> Wire Bonding/AuSn Soldering Mount Chip Multilayer Ceramic Capacitors for General Purpose..... 15   |          | <b>MP</b> FORTELION Battery System..... 91   |
|          | <b>BLF</b> Frequency Specified Filter..... 45  |          | <b>GQM</b> High Q Chip Multilayer Ceramic Capacitors for General Purpose ( $> 100Vdc$ )..... 10   |          | <b>MPA</b> Power supplies for LED lighting..... 85   |
|          | <b>BLM</b> Chip Ferrite Bead..... 43   |          | <b>GR3</b> High Effective Capacitance & High Ripple Current Chip Multilayer Ceramic Capacitors for General Purpose..... 8                           |          | <b>MPL</b> Ballast Power Supplies, Power supplies for LED lighting..... 85                                       |
|          | <b>BLT</b> Chip Ferrite Bead..... 44   |          | <b>GR4</b> Chip Multilayer Ceramic Capacitors for Ethernet LAN and primary-secondary coupling of DC-DC converters..... 9                            |          | <b>MR</b> AMR Sensors (Magnetic Sensors)..... 78   |
|          | <b>BN</b> Block Type EMIFIL..... 48  |          | <b>GR4</b> Chip Multilayer Ceramic Capacitors for Splitter Circuit of G-Fast, xDSL..... 9   |          | <b>MY</b> DC-DC Converters..... 83   |
| <b>C</b> | <b>CL</b> Single-Layer Microchip Capacitors..... 32  |          | <b>GRJ</b> Soft Termination Chip Multilayer Ceramic Capacitors for General Purpose..... 8   |          | <b>MZB</b> Microblowers..... 101   |
|          | <b>CR</b> Coin Manganese Dioxide Lithium Batteries..... 93   |          | <b>GRM</b> Chip Multilayer Ceramic Capacitors for General Purpose..... 6  | <b>N</b> | <b>NC</b> NTC Thermistors..... 78, 80  |
|          | <b>CS</b> Ceramic Resonators CERALOCK..... 67  |          | <b>GRT</b> AEC-Q200 Compliant Chip Multilayer Ceramic Capacitors for Infotainment..... 15   |          | <b>NF</b> Application Specified Noise Filter, LC Combined Filter, Common Mode Noise Filter..... 45, 46, 47       |
|          | <b>CT</b> TMR Sensors (Magnetic Sensors)..... 78   | <b>H</b> | <b>HEAWS</b> Inductors (Coils)..... 61  |          | <b>NFM</b> 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose..... 12                    |
|          | <b>CT</b> Small Lithium ion Secondary Batteries... 89  |          |   |          | <b>NFM</b> 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Infotainment... 17                         |
| <b>D</b> | <b>D5</b> Inductors (Coils)..... 54  |          |   |          | <b>NFM</b> 3 Terminals Low ESL Chip Multilayer Ceramic Capacitors for Automotive..... 20                         |
|          | <b>D6</b> Inductors (Coils)..... 54  | <b>I</b> | <b>IJ</b> FORTELION Battery System..... 91  | <b>O</b> | <b>NX</b> NTC Thermistors..... 78, 81  |
|          | <b>DE1</b> Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose / IEC60384-14 Class X1/Y1... 26                   |          | <b>IR</b> Pyroelectric Infrared Sensors..... 78   |          | <b>OK</b> DC-DC Converters..... 84   |
|          | <b>DE2</b> Safety Standard Certified Lead Type Disc Ceramic Capacitors for General Purpose / IEC60384-14 Class X1/Y2... 27                   | <b>K</b> |   | <b>P</b> | <b>PKB</b> Piezoelectric Buzzers..... 99   |
|          | <b>DE6</b> Safety Standard Certified Lead Type Disc Ceramic Capacitors for Automotive..... 30  |          | <b>KC3</b> High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for Automotive..... 21      |          | <b>PKL</b> Piezoelectric Sounders..... 98  |
|          | <b>DEM</b> Inductors (Coils)..... 53   |          | <b>KCA</b> Safety Standard Certified Metal Terminal Type Multilayer Ceramic Capacitors for Automotive..... 21                                       |          | <b>PKM</b> Piezoelectric Sounders..... 98, 99  |
|          | <b>DF</b> Dielectric Filters GIGAFIL..... 70   |          | <b>KCM</b> Metal Terminal Type Multilayer Ceramic Capacitors for Automotive..... 21   |          | <b>PLT</b> Common Mode Choke Coil..... 47, 49  |
|          | <b>DFE</b> Inductors (Coils)..... 52   |          | <b>KR3</b> High Effective Capacitance & High Allowable Ripple Current Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose..... 14 |          | <b>PR</b> PTC Thermistors POSISTOR..... 78, 82   |
|          | <b>DG</b> Inductors (Coils)..... 54  |          | <b>KRM</b> Metal Terminal Type Multilayer Ceramic Capacitors for General Purpose..... 14  | <b>R</b> | <b>RCE</b> Leaded MLCC for Automotive..... 28  |
|          | <b>DK1</b> Safety Standard Certified Resin Molding SMD Type Ceramic Capacitors for General Purpose..... 30                                   |          |   |          | <b>RDE</b> Leaded MLCC for General Purpose..... 24   |
|          | <b>DL</b> Common Mode Choke Coil..... 47   |          | <b>L</b>  |          | <b>RHE</b> 150°C Operation Leaded MLCC for Automotive..... 29  |
|          | <b>DS</b> Noise Suppression Filters (Lead Type)... 49  |          | <b>LDB</b> Baluns..... 72   |          | <b>RHS</b> 200°C Operation Leaded MLCC for Automotive..... 30  |
|          | <b>DS1</b> Inductors (Coils)..... 54   |          | <b>LDC</b> Couplers..... 73   |          | <b>RU</b> Thin Film Circuit Substrates (RUSUB) ... 34  |
|          | <b>DS7</b> Inductors (Coils)..... 54   |          | <b>LDD</b> Chip Multilayer Hybrid Dividers..... 73  | <b>S</b> | <b>SA3</b> Antenna Coils..... 72   |
|          | <b>DXP</b> Baluns..... 73  |          | <b>LDJ</b> Couplers..... 73   |          | <b>SAF</b> SAW Filters for Mobile Communications..... 70   |
|          | <b>DXW</b> Baluns..... 73  |          | <b>LDM</b> Baluns..... 72   |          | <b>SAW</b> SAW Filters for Mobile Communications..... 70   |
| <b>E</b> | <b>ECAS</b> Polymer Aluminum Electrolytic Capacitors..... 31   |          | <b>LFB</b> Chip Multilayer LC Filters..... 71   |          | <b>SAY</b> SAW Filters for Mobile Communications..... 69   |
| <b>F</b> | <b>FC</b> Inductors (Coils)..... 54  |          | <b>LFD</b> Chip Multilayer Diplexers..... 74  |          | <b>SCA</b> Accelerometers..... 78  |
|          | <b>FD</b> Inductors (Coils)..... 54  |          | <b>LFL</b> Chip Multilayer LC Filters..... 71   |          | <b>SCA</b> Inclinometers..... 78   |
|          | <b>FHA</b> Film Capacitors..... 42   |          | <b>LFI</b> FORTELION 24V Battery Module..... 90   |          | <b>SCC</b> Gyro Sensors..... 78  |
|          | <b>FSDVA</b> Inductors (Coils)..... 62   |          | <b>LLA</b> 8 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose..... 12   |          | <b>SCR</b> Inclinometers..... 78   |
| <b>G</b> | <b>GA2</b> Based on the Electrical Appliance and Material Safety Law of Japan Chip Multilayer Ceramic Capacitors for General Purpose..... 10 |          | <b>LLL</b> LW Reversed Low ESL Chip Multilayer Ceramic Capacitors for General Purpose..... 11   |          | <b>SCR</b> Gyro Sensors..... 78  |
|          | <b>GA3</b> Safety Standard Certified Chip Multilayer Ceramic Capacitors for General Purpose..... 10  |          | <b>LLM</b> 10 Terminals Low ESL Chip Multilayer Ceramic Capacitors for General Purpose..... 12  |          | <b>SR</b> Standard Silver Oxide Batteries, High Drain Silver Oxide Batteries..... 96, 97                         |
|          | <b>GC3</b> High Effective Capacitance & High Ripple Current Chip Multilayer Ceramic Capacitors for Automotive..... 18                        |          | <b>LLR</b> LW Reversed Controlled ESR Low ESL Chip Multilayer Ceramic Capacitors for General Purpose..... 12  | <b>U</b> | <b>UCMH</b> Common Mode Choke Coil..... 47   |
|          | <b>GCB</b> Ni Plating + Pd Plating termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive..... 22            |          | <b>LQ</b> Inductors (Coils)..... 52, 59, 61   |          | <b>US</b> Laminated Type Lithium Ion Secondary Batteries..... 86   |
|          | <b>GCD</b> MLSC Design Chip Multilayer Ceramic Capacitors for Automotive..... 20   |          | <b>LR</b> Standard Alkaline Manganese Batteries, High Drain Alkaline Manganese Batteries..... 97  |          | <b>US</b> Cylindrical Type Lithium Ion Secondary Batteries..... 89   |
|          | <b>GCE</b> Soft Termination MLSC Design Chip Multilayer Ceramic Capacitors for Automotive..... 20  |          | <b>LXMS</b> RFID tag..... 104   | <b>W</b> | <b>WM</b> MEMS Resonator..... 66   |
|          | <b>GCG</b> AgPd Termination Conductive Glue Mounting Chip Multilayer Ceramic Capacitors for Automotive..... 22                               |          | <b>LXRW</b> Variable Capacitors..... 36   | <b>X</b> | <b>XD</b> Crystal Filters..... 69  |
|          | <b>GCH</b> Chip Multilayer Ceramic Capacitors for Implantable Medical devices (Non Life support circuit)..... 23                             |          | <b>LXTB</b> RFID tag..... 104   |          | <b>XR</b> Crystal Units..... 66  |
|          | <b>GCI</b> Soft Termination Chip Multilayer Ceramic Capacitors for Automotive..... 19  | <b>M</b> | <b>MA</b> Ultrasonic Sensors..... 78  | <b>Z</b> | <b>ZRA</b> Low Acoustic Noise Chip Multilayer Ceramic Capacitors on Interposer Board for General Purpose..... 13 |
|          | <b>GCM</b> Chip Multilayer Ceramic Capacitors for Automotive..... 17   |          | <b>MHM</b> Ionizer Modules Ionissimo..... 102   |          | <b>ZRB</b> Low Acoustic Noise Chip Multilayer Ceramic Capacitors on Interposer Board for General Purpose..... 13 |
|          | <b>GCQ</b> High Q Chip Multilayer Ceramic Capacitors for Automotive..... 20  |          |   |          | <b>5CCEG</b> Inductors (Coils)..... 62   |



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