

FEATURES

- UL60950 recognised
- Single isolated output
- 1kVDC isolation
- Efficiency up to 87%
- Wide temperature performance at full 1 watt load, -40°C to 85°C
- Power density 2.62W/cm³
- 3.3V, 5V & 12V inputs
- 3.3V, 5V, 12V & 15V outputs
- Custom solutions available
- PCB mounting
- Footprint reduction of over 26% from previous generations of 1W DC-DC's

DESCRIPTION

The MEU1 series is a new range of ultra miniature through hole 1W DC-DC converters, available in a ZIP style pinout. The MEU1 series offers 1W of available output power over the industrial temperature range of -40°C to 85°C. They are ideally suited for providing local supplies on control system boards.

With the added benefit of 1kVDC galvanic isolation to reduce switching noise and allows the device to be configured to provide an isolated negative rail in systems where only positive rails exist.

SELECTION GUIDE

| Order Code | Nominal Input Voltage | Output Voltage | Output Current | Load Regulation (Typ.) | Load Regulation (Max.) | Ripple & Noise (Typ.) | Ripple & Noise (Max.) | Input Current at Rated Load | Efficiency (Min.) | Efficiency (Typ.) | Isolation Capacitance (Typ.) | MTTF ¹ | Recommended Alternative |
|--------------------|---|----------------|----------------|------------------------|------------------------|-----------------------|-----------------------|-----------------------------|-------------------|-------------------|------------------------------|-------------------|-------------------------|
| | V | V | mA | % | % | mVp-p | mVp-p | mA | % | % | pF | kHrs | |
| | Recommended In Production | | | | | | | | | | | | |
| MEU1S0303ZC | 3.3 | 3.3 | 303 | 11 | 14 | 27 | 50 | 385 | 73 | 76 | 28 | 3084 | |
| MEU1S0505ZC | 5 | 5 | 200 | 7 | 9 | 19 | 45 | 244 | 78 | 81 | 34 | 3354 | |
| MEU1S1212ZC | 12 | 12 | 83 | 5 | 7 | 15 | 40 | 100 | 82 | 86 | 91 | 2438 | |
| | To be discontinued | | | | | | | | | | | | |
| MEU1S0305ZC | 3.3 | 5 | 200 | 9 | 12 | 21 | 45 | 373 | 76 | 79 | 30 | 3125 | MEE1S0305SC |
| MEU1S0512ZC | 5 | 12 | 83 | 8 | 10 | 17 | 40 | 239 | 78 | 83 | 45 | 3317 | MEE1S0512SC |
| MEU1S0515ZC | 5 | 15 | 67 | 6 | 8 | 12 | 35 | 239 | 78 | 83 | 39 | 2600 | NME0515SC |
| MEU1S1205ZC | 12 | 5 | 200 | 5 | 7 | 21 | 45 | 100 | 79 | 83 | 43 | 3742 | MEE1S1205SC |
| | Discontinued | | | | | | | | | | | | |
| MEU1S0309ZC | 3.3 | 9 | 111 | 10 | 13 | 16 | 40 | 376 | 75 | 79 | 34 | 3960 | NTE0309MC |
| MEU1S0312ZC | 3.3 | 12 | 83 | 9 | 12 | 15 | 40 | 369 | 77 | 81 | 40 | 3343 | Contact Murata |
| MEU1S0315ZC | 3.3 | 15 | 67 | 8 | 10 | 14 | 40 | 371 | 77 | 81 | 33 | 3140 | Contact Murata |
| MEU1S0503ZC | 5 | 3.3 | 303 | 9 | 12 | 26 | 50 | 249 | 74 | 77 | 29 | 2762 | NTE0503MC |
| MEU1S0509ZC | 5 | 9 | 111 | 9 | 12 | 17 | 40 | 245 | 77 | 81 | 47 | 2952 | NTE0509MC |
| MEU1S1209ZC | 12 | 9 | 111 | 6 | 9 | 17 | 40 | 100 | 80 | 84 | 71 | 2732 | NTE1209MC |
| MEU1S1215ZC | 12 | 15 | 67 | 4 | 6 | 15 | 40 | 100 | 84 | 87 | 91 | 2980 | NTE1215MC |

INPUT CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|--------------------------|--|------|------|------|--------|
| Voltage range | Continuous operation, 3.3V input types | 2.97 | 3.3 | 3.63 | V |
| | Continuous operation, 5V input types | 4.5 | 5.0 | 5.5 | |
| | Continuous operation, 12V input types | 10.8 | 12.0 | 13.2 | |
| Reflected ripple current | 3.3V & 5V Input types | | 3 | 15 | mA p-p |
| | 12V Input types | | 5 | 15 | |

OUTPUT CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|----------------------------|---|-----------------|------|------|-------|
| Rated Power | T _A = -40°C to 85°C | | | 1.0 | W |
| Voltage Set Point Accuracy | See tolerance envelope | | | | |
| Line regulation | High V _{IN} to low V _{IN} | 0303 | 1.0 | 1.25 | %/% |
| | | All other types | 1.0 | 1.2 | |

ISOLATION CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|------------------------|---------------------------|------|------|------|-------|
| Isolation test voltage | Flash tested for 1 second | 1000 | | | VDC |
| Resistance | Viso = 1000VDC | 10 | | | GΩ |

GENERAL CHARACTERISTICS

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---------------------|------------|------|------|------|-------|
| Switching frequency | | | 85 | | kHz |



For full details go to www.murata.com/en-global/products/power/rohs



1. Calculated using MIL-HDBK-217F FN2 with nominal input voltage at full load.

All specifications typical at T_A = 25°C, nominal input voltage and rated output current unless otherwise specified.

| TEMPERATURE CHARACTERISTICS | | | | | |
|--------------------------------|---------------------|------|------|------|-------|
| Parameter | Conditions | Min. | Typ. | Max. | Units |
| Specification | All output types | -40 | | 85 | °C |
| Storage | | -50 | | 125 | |
| Case Temperature above ambient | MEU1S03 | | | 30 | |
| | All other types | | | 25 | |
| Cooling | Free air convection | | | | |

| ABSOLUTE MAXIMUM RATINGS | |
|---|--|
| Lead temperature 1.5mm from case for 10 seconds | 260°C |
| Wave Solder | Wave Solder profile not to exceed the profile recommended in IEC 61760-1 Section 6.1.3. Please refer to application notes for further information. |
| Input voltage V_{IN} , MEU1S03 types | 5.5V |
| Input voltage V_{IN} , MEU1S05 types | 7V |
| Input voltage V_{IN} , MEU1S12 types | 15V |

TECHNICAL NOTES

ISOLATION VOLTAGE

'Hi Pot Test', 'Flash Tested', 'Withstand Voltage', 'Proof Voltage', 'Dielectric Withstand Voltage' & 'Isolation Test Voltage' are all terms that relate to the same thing, a test voltage, applied for a specified time, across a component designed to provide electrical isolation, to verify the integrity of that isolation.

Murata Power Solutions MEU1 series of DC-DC converters are all 100% production tested at their stated isolation voltage. This is 1kVDC for 1 second.

A question commonly asked is, "What is the continuous voltage that can be applied across the part in normal operation?"

The MEU1 has been recognised by Underwriters Laboratory for functional insulation, both input and output should normally be maintained within SELV limits i.e. less than 42.4V peak, or 60VDC. The isolation test voltage represents a measure of immunity to transient voltages and the part should never be used as an element of a safety isolation system. The part could be expected to function correctly with several hundred volts offset applied continuously across the isolation barrier; but then the circuitry on both sides of the barrier must be regarded as operating at an unsafe voltage and further isolation/insulation systems must form a barrier between these circuits and any user-accessible circuitry according to safety standard requirements.

REPEATED HIGH-VOLTAGE ISOLATION TESTING

It is well known that repeated high-voltage isolation testing of a barrier component can actually degrade isolation capability, to a lesser or greater degree depending on materials, construction and environment. The MEU1 series has toroidal isolation transformers, with no additional insulation between primary and secondary windings of enamelled wire. While parts can be expected to withstand several times the stated test voltage, the isolation capability does depend on the wire insulation. Any material, including this enamel (typically polyurethane) is susceptible to eventual chemical degradation when subject to very high applied voltages thus implying that the number of tests should be strictly limited. We therefore strongly advise against repeated high voltage isolation testing, but if it is absolutely required, that the voltage be reduced by 20% from specified test voltage.

This consideration equally applies to agency recognised parts rated for better than functional isolation where the wire enamel insulation is always supplemented by a further insulation system of physical spacing or barriers.

SAFETY APPROVAL

The MEU1 series has been recognised by Underwriters Laboratory (UL) to UL 60950 for functional insulation, file number E151252 applies. The MEU1 Series of converters are not internally fused so to meet the requirements of UL 60950 an anti-surge input line fuse should always be used with ratings as defined below.

MEU1S03xxxC: 0.50A

MEU1S05xxxC: 0.50A

MEU1S12xxxC: 0.25A

All fuses should be UL approved and rated to at least the maximum allowable DC input voltage.

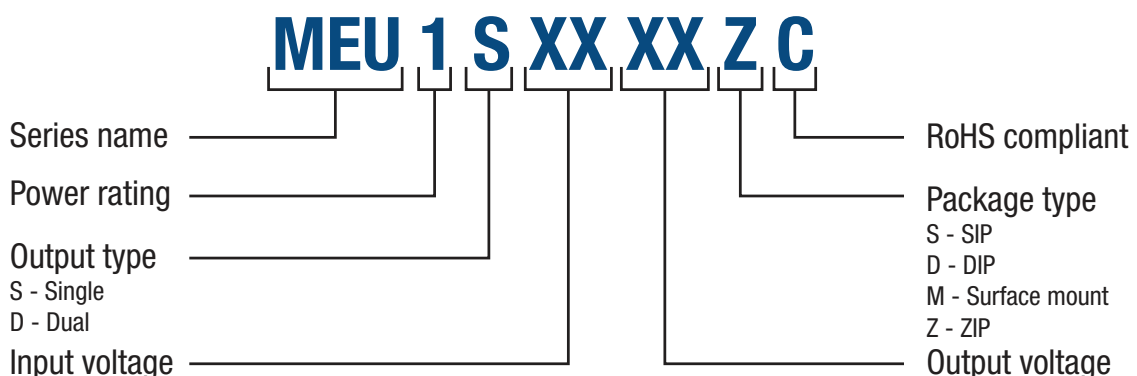
RoHS COMPLIANCE INFORMATION



This series is compatible with RoHS soldering systems with a peak wave solder temperature of 260°C for 10 seconds. Please refer to [application notes](#) for further information. The pin termination finish is Tin Plate, Hot Dipped over Matte Tin with Nickel Preplate. This series are backward compatible with Sn/Pb soldering systems.

For further information, please visit www.murata-ps.com/rohs

PART NUMBER STRUCTURE



CHARACTERISATION TEST METHODS

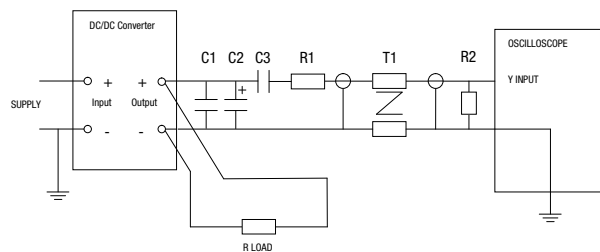
Ripple & Noise Characterisation Method

Ripple and noise measurements are performed with the following test configuration.

| | |
|-------|--|
| C1 | 1µF X7R multilayer ceramic capacitor, voltage rating to be a minimum of 3 times the output voltage of the DC-DC converter |
| C2 | 10µF tantalum capacitor, voltage rating to be a minimum of 1.5 times the output voltage of the DC-DC converter with an ESR of less than 100mΩ at 100 kHz |
| C3 | 100nF multilayer ceramic capacitor, general purpose |
| R1 | 450Ω resistor, carbon film, ±1% tolerance |
| R2 | 50Ω BNC termination |
| T1 | 3T of the coax cable through a ferrite toroid |
| RLOAD | Resistive load to the maximum power rating of the DC-DC converter. Connections should be made via twisted wires |

Measured values are multiplied by 10 to obtain the specified values.

Differential Mode Noise Test Schematic



APPLICATION NOTES

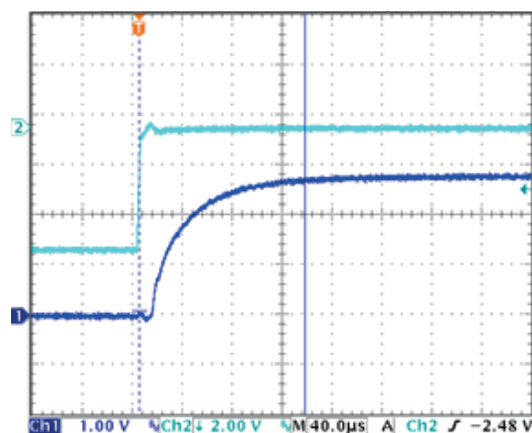
Minimum Load

The minimum load to meet datasheet specification is 10% of the full rated load across the specified input voltage range. Lower than 10% minimum loading will result in an increase in output voltage, which may rise to typically 1.25 times the specified output voltage if the output load falls to less than 5%.

Capacitive loading and start up

Typical start up times for this series, with a typical input voltage rise time of 2.2µs and output capacitance of 10µF, are shown in the table below. The product series will start into a capacitance of 47µF with an increased start time, however, the maximum recommended output capacitance is 10µF.

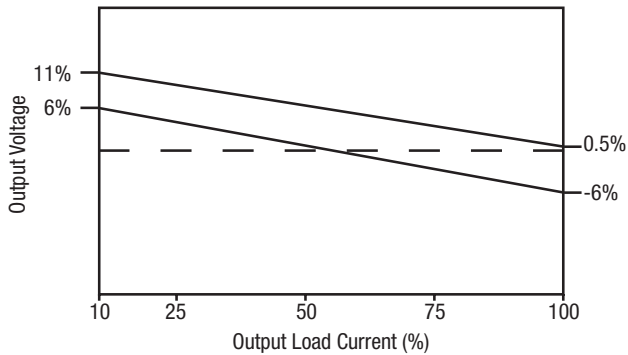
| | Start-up time | |
|-------------|---------------|--|
| | µs | |
| MEU1S0303ZC | 140 | |
| MEU1S0305ZC | 280 | |
| MEU1S0309ZC | 1050 | |
| MEU1S0312ZC | 1930 | |
| MEU1S0315ZC | 2790 | |
| MEU1S0503ZC | 110 | |
| MEU1S0505ZC | 200 | |
| MEU1S0509ZC | 490 | |
| MEU1S0512ZC | 880 | |
| MEU1S0515ZC | 1400 | |
| MEU1S1205ZC | 140 | |
| MEU1S1209ZC | 240 | |
| MEU1S1212ZC | 400 | |
| MEU1S1215ZC | 600 | |



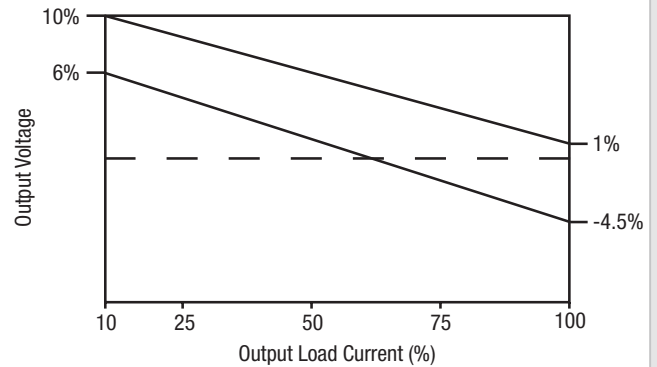
TOLERANCE ENVELOPES

The voltage tolerance envelopes show typical load regulation characteristics for this product series. The tolerance envelope is the maximum output voltage variation due to changes in output loading and set point accuracy.

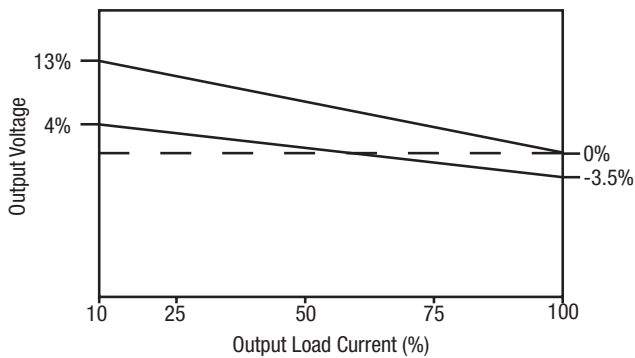
MEU1S0303ZC



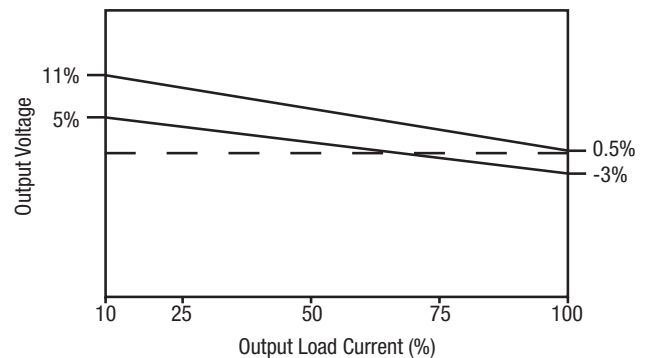
MEU1S0305ZC



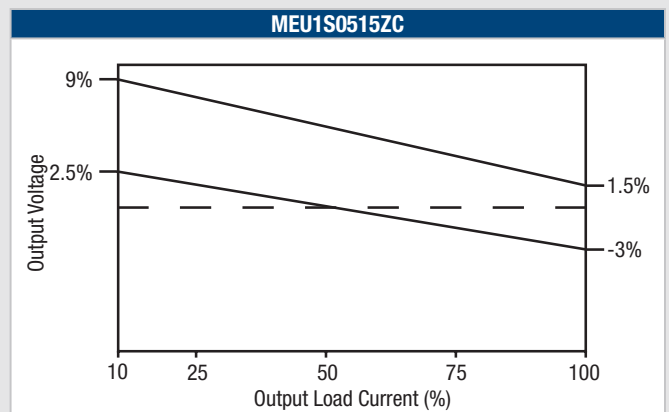
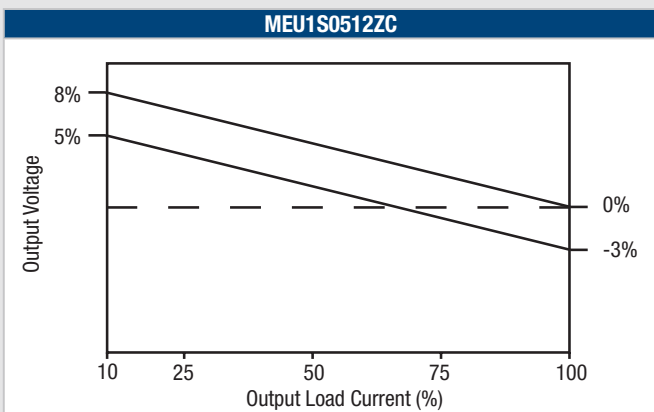
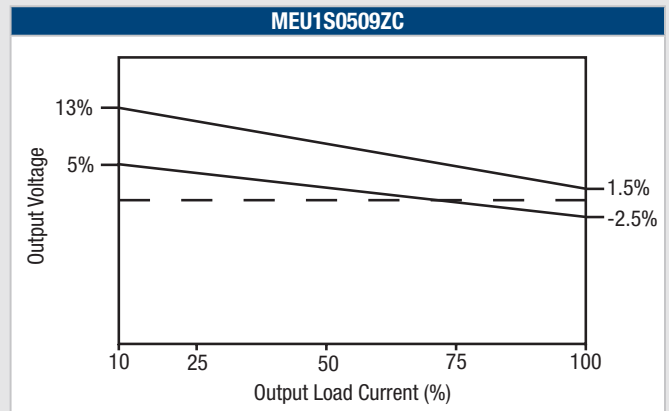
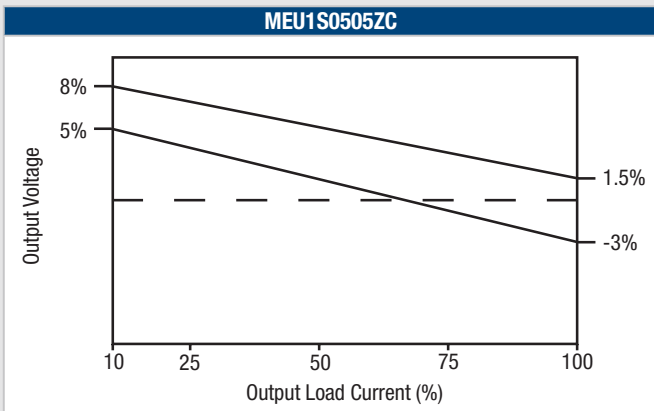
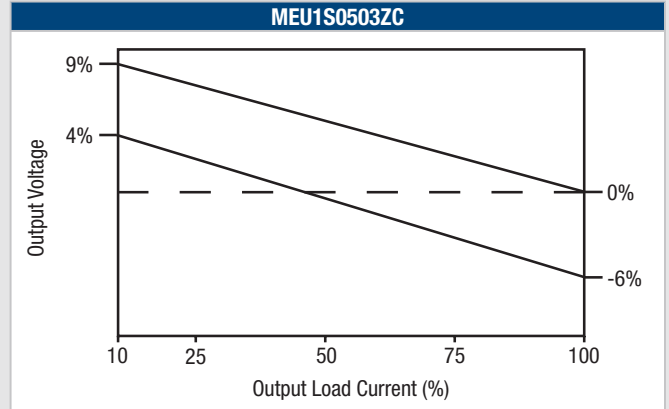
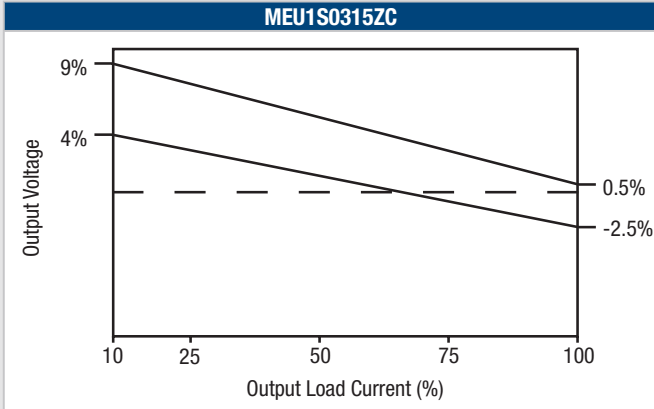
MEU1S0309ZC



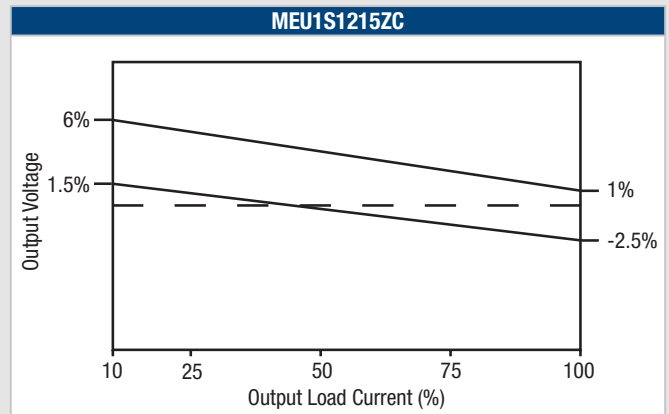
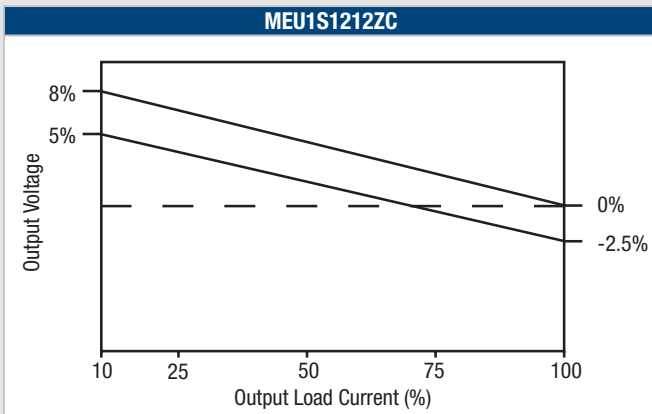
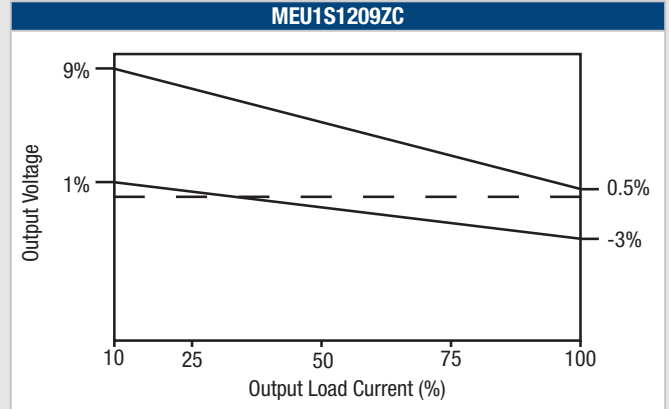
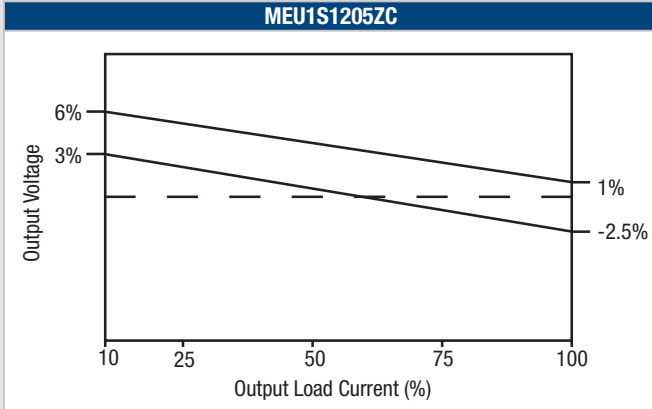
MEU1S0312ZC



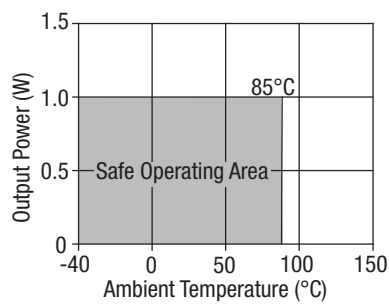
TOLERANCE ENVELOPES (Continued)



TOLERANCE ENVELOPES (Continued)

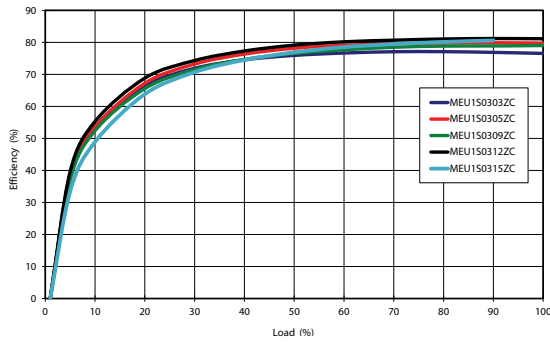


TEMPERATURE DERATING GRAPH

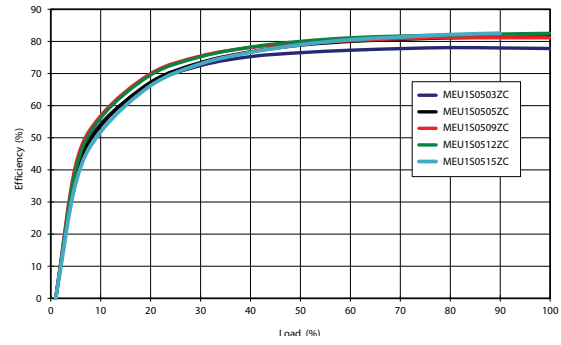


EFFICIENCY VS LOAD

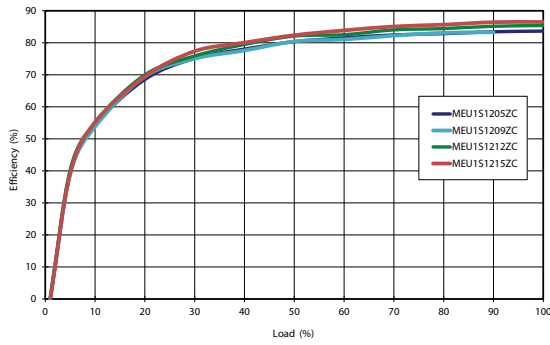
3.3V Input



5V Input

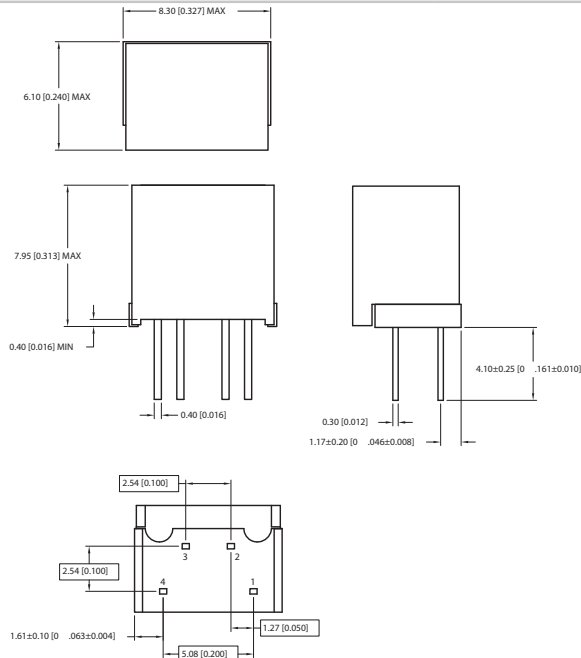


12V Input



PACKAGE SPECIFICATIONS

Mechanical Dimensions



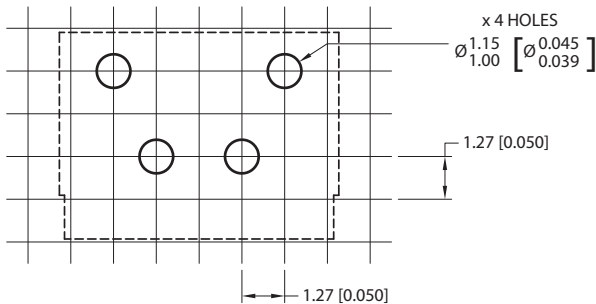
All dimensions in mm ±0.25mm (inches ±0.01). All pins on a 2.54 (0.1) pitch and within ± 0.25 (0.01) of true position.

Weight: 0.77g

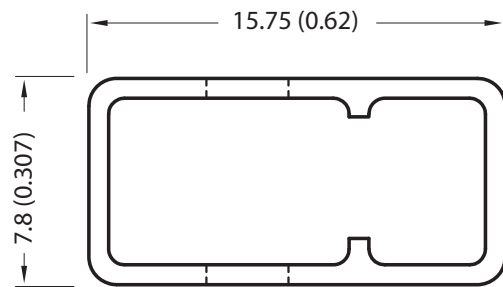
Pin connection - 4 PIN ZIP

| Pin | Function |
|-----|----------|
| 1 | -VIN |
| 2 | +VIN |
| 3 | -VOUT |
| 4 | +VOUT |

Recommended Footprint Details



Tube Outline Dimensions



Unless otherwise stated all dimensions in mm (inches) ±0.5mm.
 Tube length (4 Pin) : 520mm ±2mm (20.47).

Tube Quantity : 60

DISCLAIMER

Unless otherwise stated in the datasheet, all products are designed for standard commercial and industrial applications and NOT for safety-critical and/or life-critical applications.

Particularly for safety-critical and/or life-critical applications, i.e. applications that may directly endanger or cause the loss of life, inflict bodily harm and/or loss or severe damage to equipment/property, and severely harm the environment, a prior explicit written approval from Murata is strictly required. Any use of Murata standard products for any safety-critical, life-critical or any related applications without any prior explicit written approval from Murata shall be deemed unauthorised use.

These applications include but are not limited to:

- Aircraft equipment
- Aerospace equipment
- Undersea equipment
- Power plant control equipment
- Medical equipment
- Transportation equipment (automobiles, trains, ships, etc.)
- Traffic signal equipment
- Disaster prevention / crime prevention equipment
- Data Processing equipment

Murata makes no express or implied warranty, representation, or guarantee of suitability, fitness for any particular use/purpose and/or compatibility with any application or device of the buyer, nor does Murata assume any liability whatsoever arising out of unauthorised use of any Murata product for the application of the buyer. The suitability, fitness for any particular use/purpose and/or compatibility of Murata product with any application or device of the buyer remain to be the responsibility and liability of the buyer.

Buyer represents and agrees that it has all the necessary expertise to create and implement safeguards that anticipate dangerous consequences of failures, monitor failures and their consequences, lessen the likelihood of failures that might cause harm, and take appropriate remedial actions. Buyer will fully indemnify and hold Murata, its affiliated companies, and its representatives harmless against any damages arising out of unauthorised use of any Murata products in any safety-critical and/or life-critical applications.

Remark: Murata in this section refers to Murata Manufacturing Company and its affiliated companies worldwide including, but not limited to, Murata Power Solutions.



This product is subject to the following [operating requirements](#) and the [Life and Safety Critical Application Sales Policy](#):

Refer to: <https://www.murata.com/en-eu/products/power/requirements>

Murata Power Solutions (Milton Keynes) Ltd. makes no representation that the use of its products in the circuits described herein, or the use of other technical information contained herein, will not infringe upon existing or future patent rights. The descriptions contained herein do not imply the granting of licenses to make, use, or sell equipment constructed in accordance therewith. Specifications are subject to change without notice.

© 2022 Murata Power Solutions (Milton Keynes) Ltd.