A Product Line of
Diodes Incorporated

# SPECIFICATION FOR APPROVAL

| | |
|---|---|
| CUSTOMER | |
| NOMINAL FREQUENCY | 32.768 KHz |
| PRODUCT TYPE | **TYPE G9 SMD CRYSTAL** |
| SPEC. NO. ( P/N ) | G93270003 |
| CUSTOMER P/N | |
| ISSUE DATE | Jan.28,2019 |
| VERSION | C |

| APPROVED | PREPARED | QA |
|---|---|---|
| Brenda | Claire | Jenny Yang |


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*Pb-free
*RoHS Compliant
*HF-Halogen Free
*REACH Compliant

## VERSION HISTORY

| Version No. | Version Date | Description | Notes |
|---|---|---|---|
| A | Sep.12,2012 | Initial Release | |
| B | Apr.1,2014 | Revised to RoHS Compliant | |
| C | Jan.28,2019 | Updated logo | |
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# TYPE G9 SMD CRYSTAL

## *G93270003*

VER. C 28-Jan-19

## ELECTRICAL SPECIFICATIONS

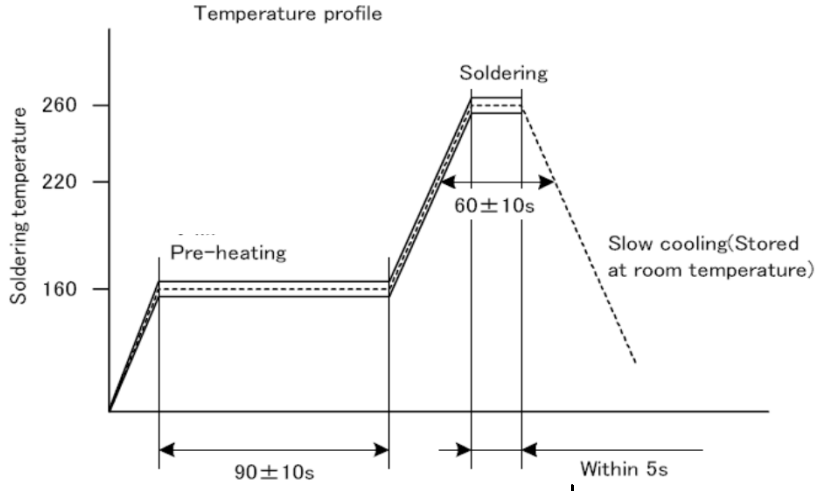
## SRe Part Number : G93270003

| Parameters | Symbol | Specifications | Units | Notes |
|---|---|---|---|---|
| Nominal Frequency | Fn | 32.768 | KHz | |
| Frequency Tolerance | FT | ± 10 | ppm | at 25°C ± 5°C |
| Load Capacitance | CL | 12.5 | pF | Typ. |
| Drive Level | DL | 0.1 / 0.5 | μW | Typ. / Max. |
| Equivalent Series Resistance | ESR | 90 | KΩ | Max. |
| Temperature Coefficient | K | -0.03 | ppm/°C$^2$ | Typ. |
| Operating Temperature Range | TR | -40 to +85 | °C | |
| Shunt Capacitance | C0 | 7 | pF | Max. |
| Storage Temperature Range | | -55 to +85 | °C | |
| Aging | | ± 3 | ppm | Max 1st year |
| Insulation Resistance | | 500 | MΩ | Min. |

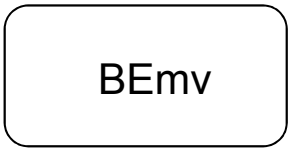
### Reliability ( Mechanical and environmental performances )

| No. | Test Items | Conditions | Requirements |
|---|---|---|---|
| 1 | Bending test | Apply pressure in the direction of the arrow at a rate of about 0.5mm/s until bent width reaches 5mm, and hold for 30 seconds. | • Without mechanical damage such as breaks and satisfy sealing specification.<br>• Frequency change: Within ±5ppm<br>• Equivalent series resistance(E.S.R) change: Within 5kΩ |
| 2 | Shear test | A static load of 20N(2.04kgf) using a R0.5 scratch tool, shall be applied on the core of the component and in the direction of the arrow and held for 5 seconds. | |
| 3 | Core body strength | A static load of 10N(1.02kgf) using a R0.5 pressure rod shall be applied to the center in the direction of the arrow and held for 10 seconds. | |
| 4 | Vibration | Endurance conditioning by a frequency sweep shall be made. The entire frequency range, from 10Hz to 55Hz and return to 10Hz, shall be transversed in 1 minute. Amplitude (total excursion) ：1.5mm, This motion shall be applied for a period of 2 hours in each of 3 mutually perpendicular axes (a total of 6 hours). For other procedures, refer to JIS C 60068-2-6. | |
| 5 | Shock | Peak acceleration：9810m/s2，Duration of the pulse：1ms, Three successive shock shall be applied 3 times perpendicular axes. For other procedures, refer to JIS C 60068-2-27. | |

<table>
<tr><td>6</td><td>Cold</td><td>Quartz crystal units shall be stored in the -40±3℃ atmosphere for 1000 hours. Other procedures conform to JIS C 60068-2-1.</td><td rowspan="4">• Frequency change: Within ±5ppm<br>• Equivalent series resistance(E.S.R) change: Within 5kΩ<br>• After conditioning, quartz crystal units shall be subjected to standard atmospheric conditions for 1 hour, and measured.</td></tr>
<tr><td>7</td><td>Dry heat</td><td>Quartz crystal units shall be stored in the 100±2℃ atmosphere for 100 hours. Other procedures conform to JIS C 60068-2-2.</td></tr>
<tr><td>8</td><td>Damp heat</td><td>Quartz crystal units shall be stored in the 40±2℃ atmosphere with 90 to 95% relative humidity for 1000 hours. Other procedures conform to JIS C 60068-2-3.</td></tr>
<tr><td>9</td><td>Change of temperature</td><td>Quartz crystal units shall be subjected successively 100 cycles of temperature change shown below. Other procedures conform to JIS C 0025.
<table>
<tr><th></th><th>Temperature</th><th>Duration</th></tr>
<tr><td>1</td><td>-40±3℃</td><td>30min.</td></tr>
<tr><td>2</td><td>Normal temperature</td><td>Within 30 sec.</td></tr>
<tr><td>3</td><td>100±2℃</td><td>30min.</td></tr>
<tr><td>4</td><td>Normal temperature</td><td>Within 30 sec.</td></tr>
</table></td></tr>
<tr><td rowspan="3">10</td><td rowspan="3">Sealing</td><td>Both the test methods specified below shall be applied.</td><td></td></tr>
<tr><td>Quartz crystal units shall be soaked in 90℃ or higher temperature hot water for 5 minutes.</td><td>• Without repetitive leaking bubbles from quartz crystal units.</td></tr>
<tr><td>Quartz crystal units shall be tested by Mass spectrometric leakage detector to measure the leakage rate of helium gas.</td><td>• 1×10-9 Pa·m3/s or less</td></tr>
<tr><td>11</td><td>Aging</td><td>Quartz crystal units shall be stored in the 85±3℃ atmosphere for 720±12 hours.</td><td>• Frequency change: Within ±5ppm<br>• Equivalent series resistance(E.S.R) change: Within 5kΩ<br>• After conditioning, quartz crystal units shall be subjected to standard atmospheric conditions for 1 hour, and measured.</td></tr>
<tr><td>12</td><td>Solder-ability</td><td>Terminals coated with flux shall be immersed in the solder bath for 3.5±0.5 seconds.
<table>
<tr><th></th><th>Items</th><th>Conditions</th></tr>
<tr><td>1</td><td>Solder</td><td>Sn-3.0Ag-0.5Cu</td></tr>
<tr><td>2</td><td>Flux</td><td>Approximately 25wt% methanol(JIS K 8891) solution of resin(JIS K 5902).</td></tr>
<tr><td>3</td><td>Solder temperature</td><td>255±5℃</td></tr>
</table></td><td>• Minimum 95% of immersed terminal shall be covered with new uniform solder.</td></tr>
</table>

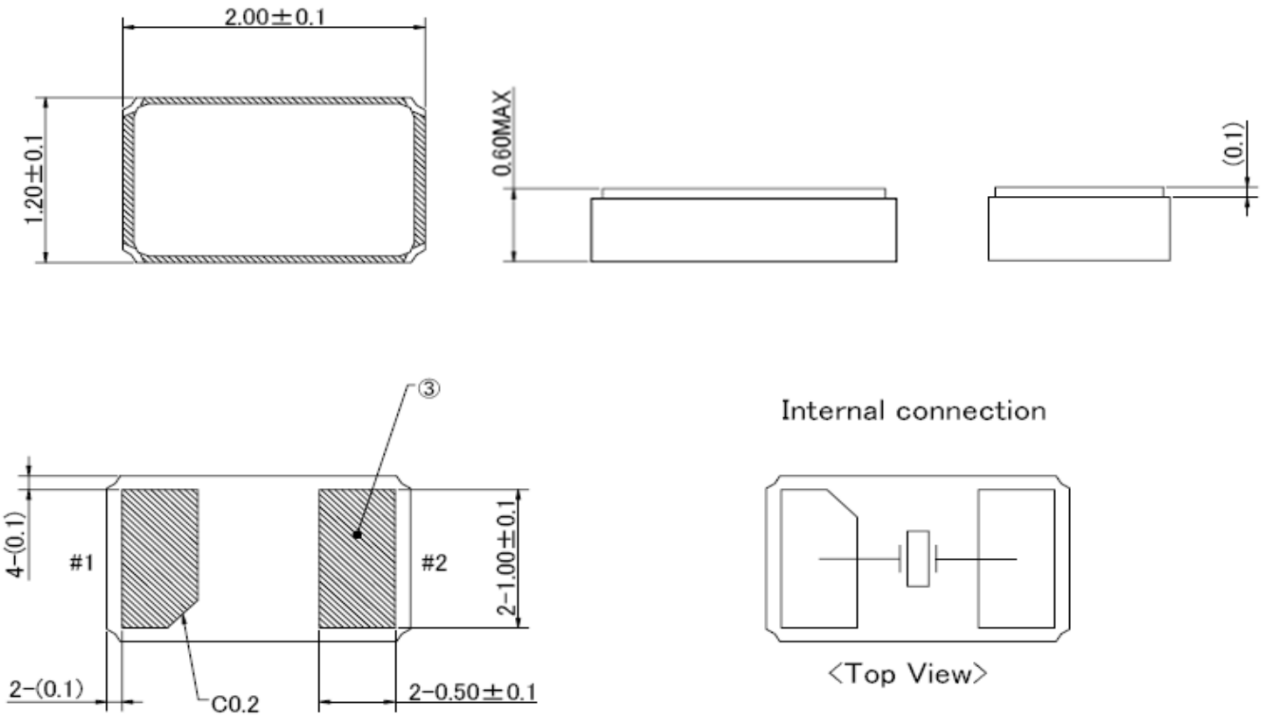
| | | | |
|---|---|---|---|
| 13 | Resistance to soldering heat | Reflow soldering method<br>  <br><br>Peak temperature: 260±5℃ for within 5seconds.<br>Soldering temperature: 220℃ or higher for 60±10 seconds.<br>Pre-heating temperature: 160±10℃ for 90±10 seconds.<br>Quartz crystal units which is put on PCB shall be through reflow soldering furnace twice with the condition shown above. | • Frequency change: Within ±5ppm<br>• Equivalent series resistance (E.S.R) change: Within 10kΩ<br>• After conditioning, quartz crystal units shall be subjected to standard atmospheric conditions for 1 hour, and measured.<br>• Without distinct deformation in appearance. |
| | | Soldering iron method<br>Terminals shall be applied 400±10℃ soldering iron heat for 3.5±0.5 seconds twice. | • Frequency change: Within ±5ppm<br>• Equivalent series resistance(E.S.R) change: Within 5kΩ<br>• After conditioning, quartz crystal units shall be subjected to standard atmospheric conditions for 1 hour, and measured.<br>• Without distinct deformation in appearance. |
| 14 | Solubility to resistance | Soak cleaning<br>Quartz crystal units shall be soaked in isopropyl alcohol at normal temperature for 90 seconds. | • Without mechanical damage such as breaks and satisfy sealing specification.<br>• Frequency change: Within ±5ppm<br>• Equivalent series resistance(E.S.R) change: Within 5kΩ<br>• Without distinct deformation in appearance.<br>• Marking shall be legible. |

## Marking

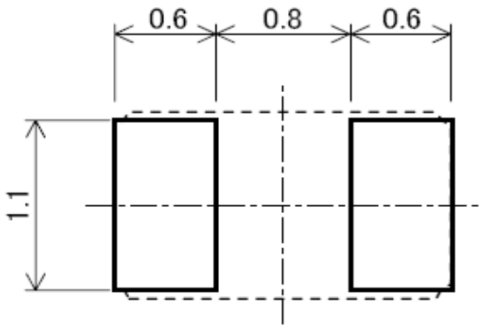



| B | E | m | v |
|---|---|---|---|
| Frequency Code | CL Code | Date Code | Factory Code |

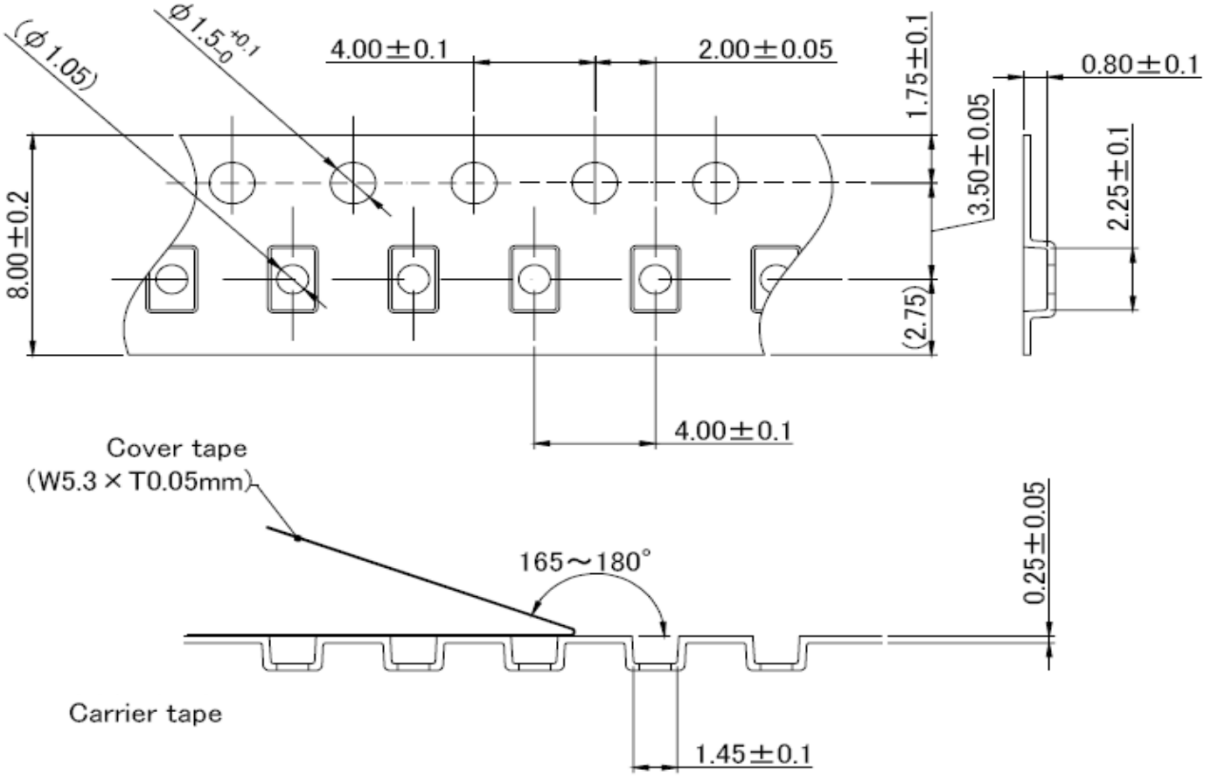
## Dimensions (Units: mm)



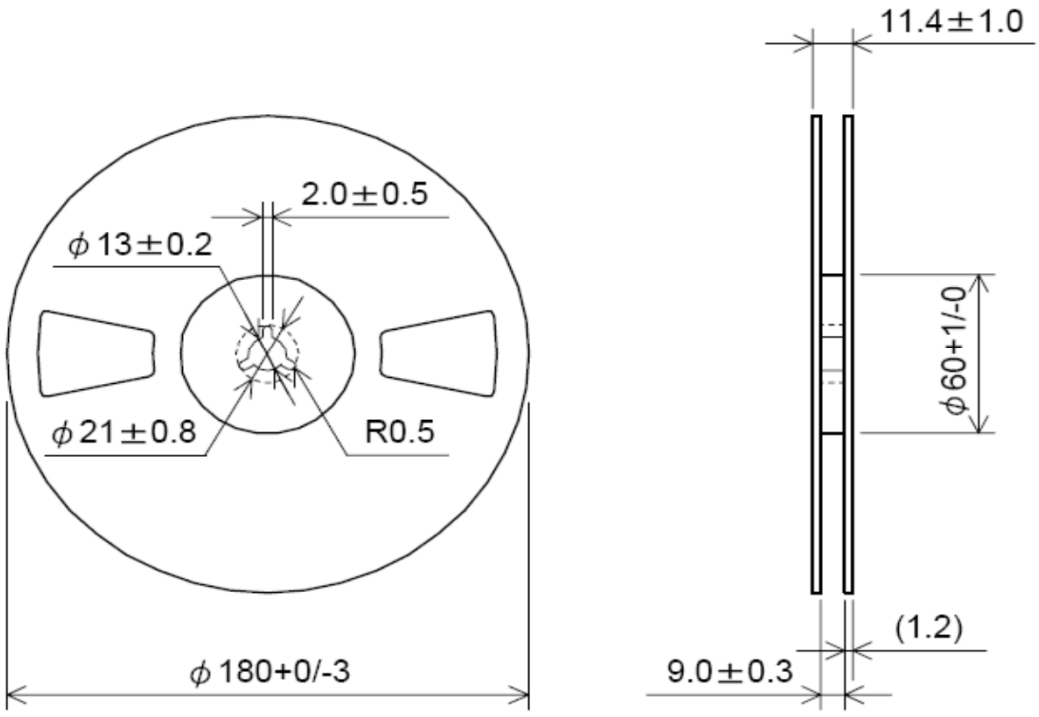

## Land dimensions(unit: mm)



## TAPING


(φ1.05)
φ1.5+0.1-0
4.00±0.1
2.00±0.05
1.75±0.1
0.80±0.1
3.50±0.05
2.25±0.1
8.00±0.2
(2.75)
4.00±0.1
Cover tape
(W5.3×T0.05mm)
165～180°
0.25±0.05
Carrier tape
1.45±0.1

## REEL


11.4±1.0
2.0±0.5
φ13±0.2
φ60+1/-0
φ21±0.8
R0.5
(1.2)
φ180+0/-3
9.0±0.3