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

Diodes Incorporated

No.2, Ziqiang 5th Rd., Zhongli Industrial Park,
Zhongli Dist., Taoyuan City 32063, Taiwan (R.O.C.)
TEL: 886-3-451-8888
FAX: 886-3-461-3865
https://www.diodes.com

*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	

TYPE G9 SMD CRYSTAL

G93270003

VER. C 28-Jan-19

ELECTRICAL SPECIFICATIONS

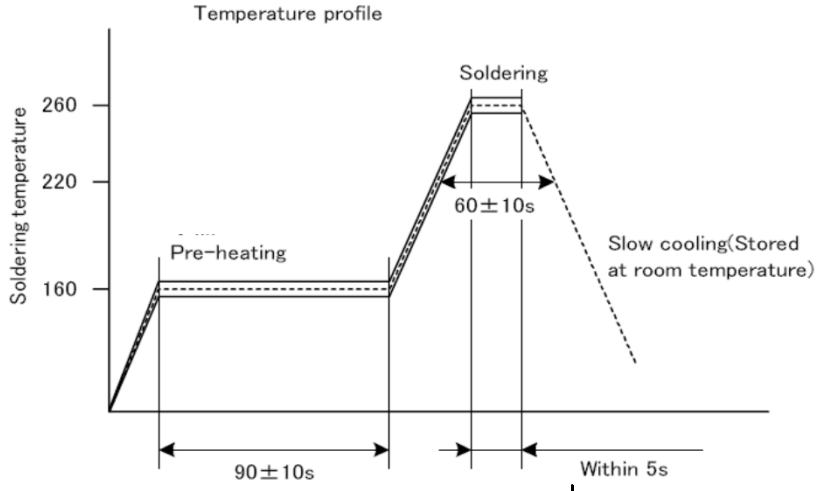
SRe Part Number : G93270003

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.

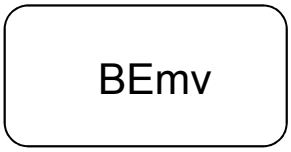
Reliability (Mechanical and environmental performances)

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. • Frequency change: Within ±5ppm • 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
• Equivalent series resistance(E.S.R) change: Within 5kΩ
• 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
• Equivalent series resistance(E.S.R) change: Within 5kΩ
• 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>

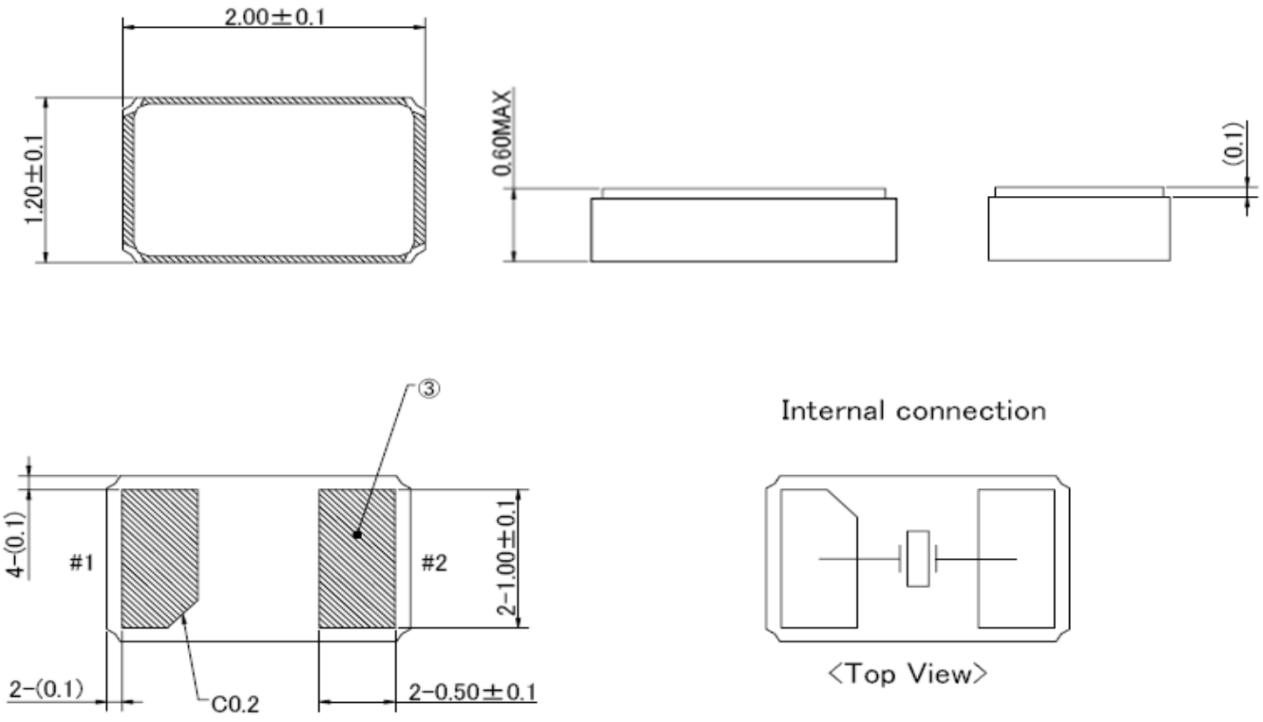
13	Resistance to soldering heat	Reflow soldering method  Peak temperature: 260±5℃ for within 5seconds. Soldering temperature: 220℃ or higher for 60±10 seconds. Pre-heating temperature: 160±10℃ for 90±10 seconds. Quartz crystal units which is put on PCB shall be through reflow soldering furnace twice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

Marking

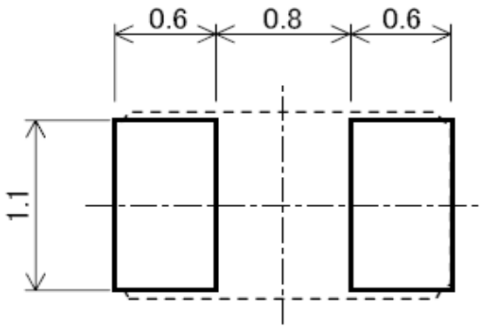


B	E	m	v
Frequency Code	CL Code	Date Code	Factory Code

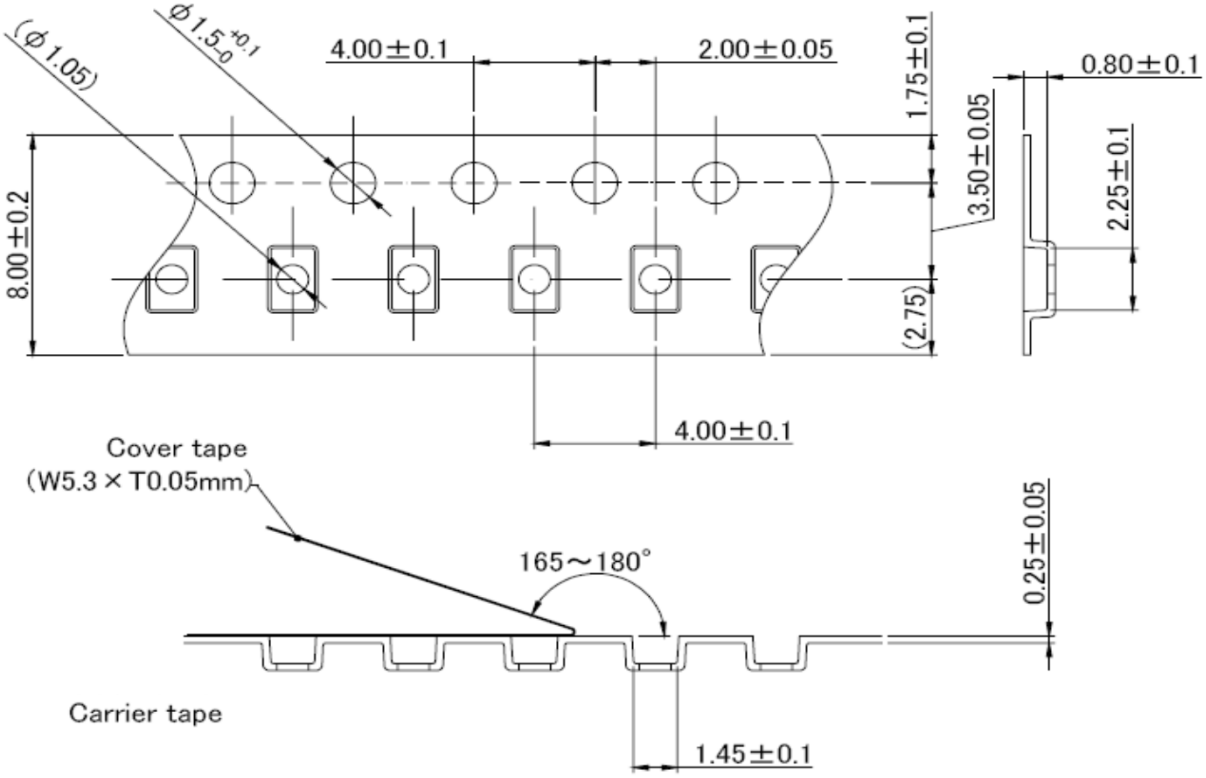
Dimensions (Units: mm)



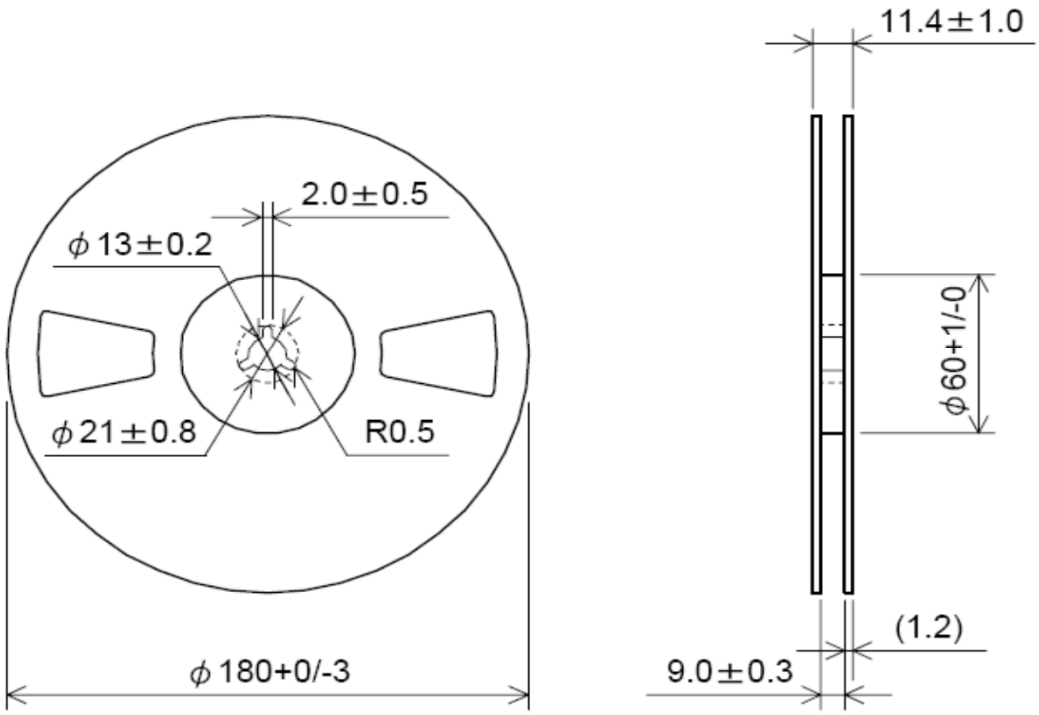
Land dimensions(unit: mm)



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