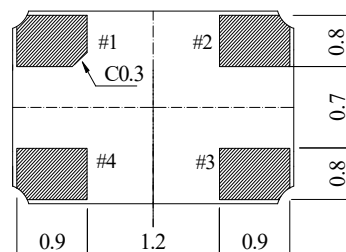
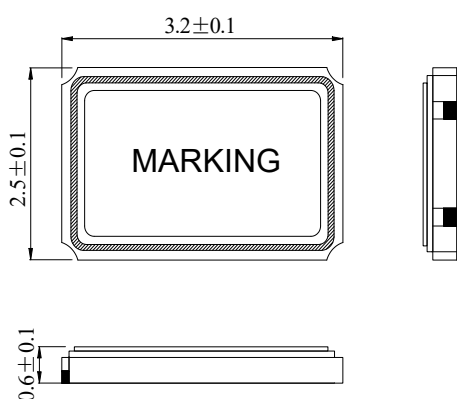


1. QUARTZ CRYSTAL UNIT SPECIFICATION

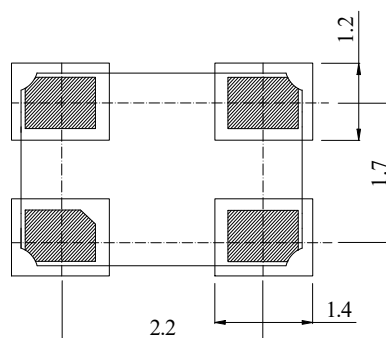
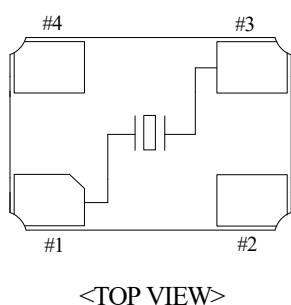
No	Parameter	Symb.	Electrical Specification				Remark
			Min.	Type	Max.	Unit	
1.1	Holder type	-	SMD3225			-	-
1.2	Nominal Frequency	F0	12.000			MHz	-
1.3	Oscillation Mode	-	Fundamental			-	AT
1.4	Load Capacitance	CL		20		pF	-
1.5	Frequency Tolerance	FL	-20		+20	ppm	at +25℃
1.6	Frequency Stability	TC	-20		+20	ppm	-40℃~+85℃
1.7	Operating Temperature	T _{OPR}	-40		+85	℃	-
1.8	Storage Temperature	T _{STG}	-55		+125	℃	-
1.9	Drive Level	DL		100	300	μW	-
1.10	Equivalent Resistance	RR			60	Ω	-
1.11	Max RR in designated area	RLD2			60	Ω	-
1.12	Shunt Capacitance	C0			2.0	pF	-
1.13	Insulation Resistance	IR	500			MΩ	at DC 100V
1.14	Parasitic Attenuation	SPDB			-3	dB	F0±500KHz
1.15	Aging	Fa	-3		+3	ppm	+25℃ 1 st Year
1.16	Moisture Sensitivity Level	MSL	Level 1			-	
1.17	Measuring instrument		S&A 250B			-	
Unless otherwise specified, the standard range of atmospheric conditions for making measurement and tests are as follow: Ambient temperature : 25±5℃ Relative humidity : 40%~70%							

2. Marking & Dimensions

(UNIT: mm)



Marking #2, #4 is connected with metal cap of top.



Recommended Solder Pad Layout:

*Marking should be printed as following:

Logo, Nominal Frequency

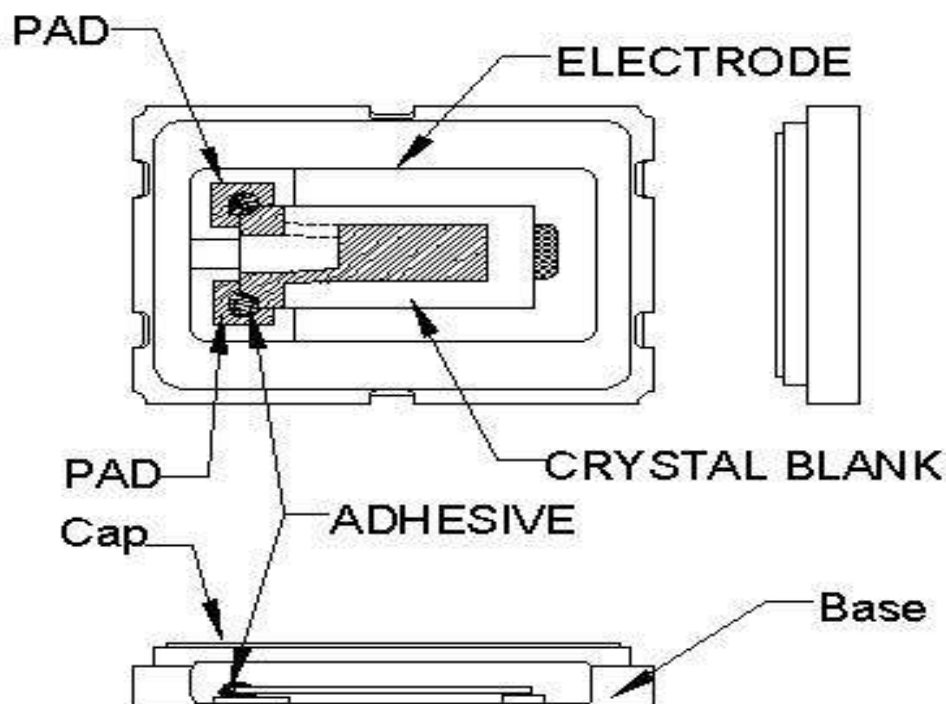
Nominal frequency = 3 number after decimal point Max.

(ex. 12.000 MHz → 12.000)

Pin	Connection
#1	IN/OUT
#2	GND
#3	IN/OUT
#4	GND

Marking: Laser marking

3. Structure illustration

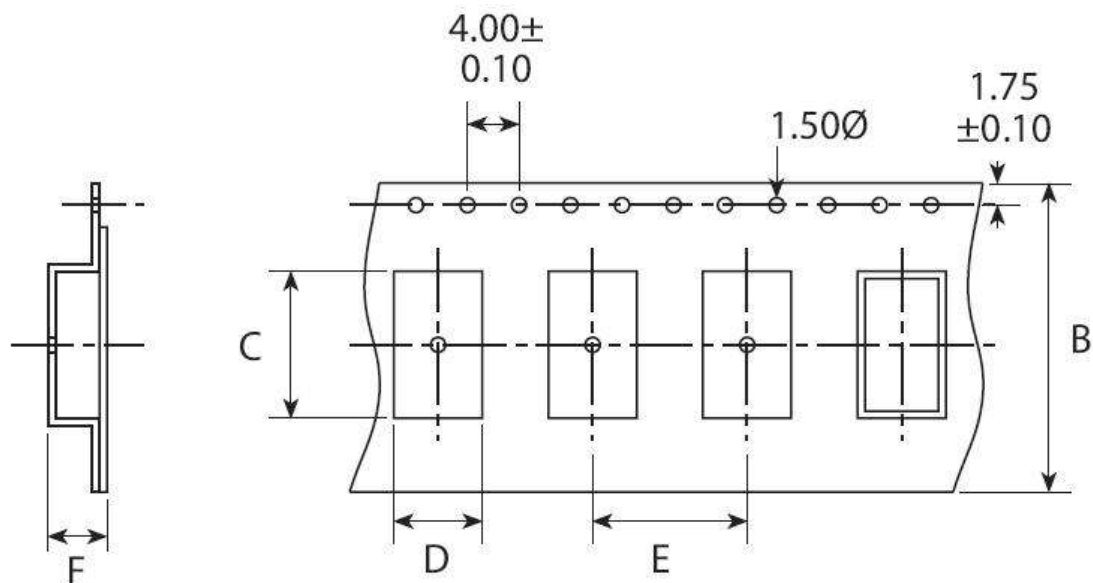


Reference drawing

(1) Base:
Alumina Ceramic (Al_2O_3)
Metallized Pad: W
Ni Plating
Au Plating
(2) Cap:
Fe-Ni
(3) Crystal Enclosure Seal:
Seal Seam
(4) Crystal Blank
Rectangular At-Cut Quartz Crystal Blank
(5) Adhesive
Silver Conductive Polyimide Resin
(6) Electrode
Ag
(7) PAD
Alumina Ceramic (W. Ni. Au)

4. Emboss Carrier Tape & Reel

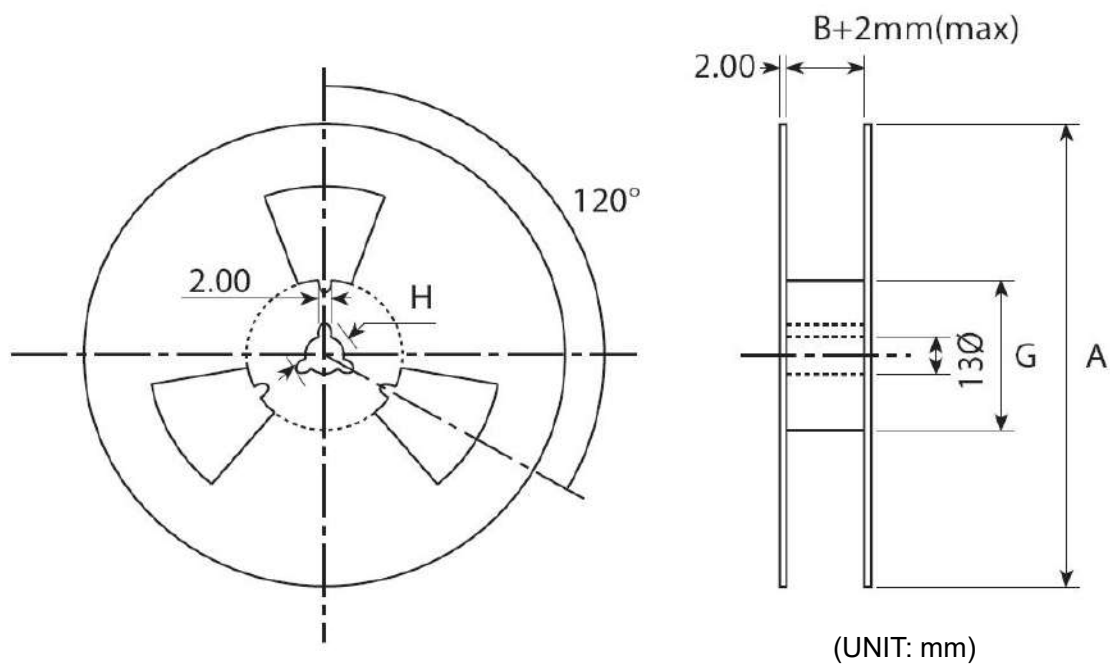
a.) Dimensions of Carrier Tape



	A	B	C	D	E	F	G
SMD3225	178±2.0	8.0±0.3	3.5±0.1	2.8±0.1	4.0±0.1	1.4±0.1	60.5±1.0

b.) Dimensions of Reel

(UNIT: mm)



(UNIT: mm)

c.) Storage condition

Temperature: +40deg.C Max.
 Relative Humidity: 80% Max.

d.) Standard packing quantity

3,000PCS / REEL

e.) Material of the tape

Material(Carrier tape) : Black conductive PS
 Material (Cover tape) : Clear PE
 Material (Reel) : PS

f.) Label contents

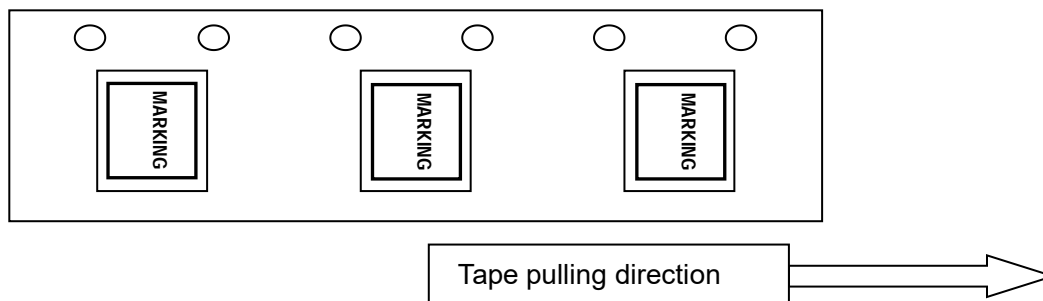
- .The type of product
- .Our specification No.
- .Your Part No.
- .Lot No.
- .Nominal Frequency
- .Quantity
- .Our Company Name

Sticks label for every reel.

INSPECTION RECORDS	
PO NO.:	
CUSTOMER P/N:	
LOT NO.:	
PACKAGE:	
FREQUENCY:	
REMARKS:	
QUANTITY:	

g.) Taping method

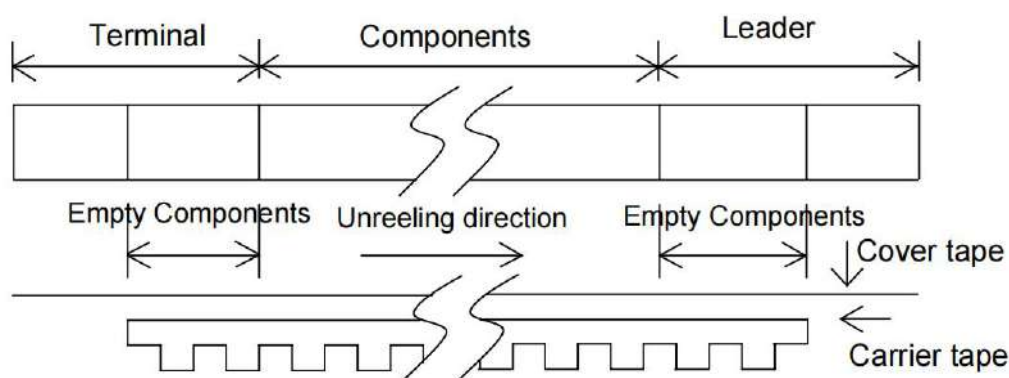
Taping shall be placed in tapes in such manner as to assure that marking of the components is visible as per Fig.1



Note: Crystal resonator belongs to non-directional passive components which doesn't have positive and negative poles. So it won't cause effect on usage even been reversed taped on the carrier.

h.) Taping dimension

Leader	Cover-tape	The length of cover-tape in the leader is more than 400 mm including empty embossed area.
	Carrier-tape	After all products were packaged, must remain more than twenty pieces or 400 mm empty area, which should be sealed by cover-tape.
Terminal	Cover-tape	The tip of cover-tape shall be fixed temporary by paper tape and roll around the core of reel one round.
	Carrier-tape	The empty embossed area which are sealed by top cover-tape must remain more the 40 mm.



i.) Joint of tape

The carrier-tape and top cover-tape should not be jointed.

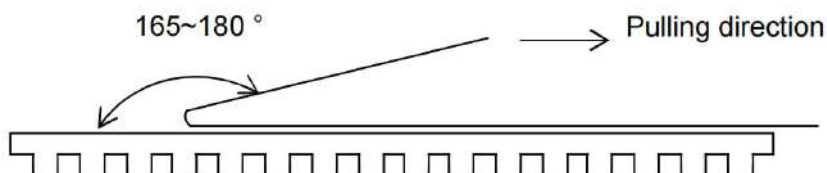
j.) Release strength of cover tape

It has to between 0.1N to 0.7N under following condition.

Pulling direction 165° to 180°

Speed 300mm/min.

Otherwise unless specified.



Other standards shall be based on JIS C 0806-1990.

5. Mechanical Reliability

*Measurement shall be carried out after letting it alone in the room temperature for 1 hour.

	Item	Conditions	Specifications
5.1	Drop	Fall freely from 100 cm of height 3 times on a firm wood	MIL-STD-202F-203B
5.2	Mechanical Shock	Device are shocked to half sine wave (1000 G) three mutually perpendicular axes each 3 times.	MIL-STD-202F
5.3	Vibration	(1)Vibration Frequency: 10~55Hz (2)Cycle: 1 to 2 Min. (3)Full Cycle: 1.5mm P-P. (4)Direction: X.Y.Z (5)Time: 2 Hours / Each Direction	MIL-STD-883E
5.4	Substrate Bending	Mount the specimen on substrate. Apply the following pressure Direction: see Fig -1 Speed: 0.5 mm/sec Hours: 5 ± 1 sec Amount of substrate: 3 mm Max.	Without mechanical damage such as breaks. Without electrode peeling. Electrical characteristics shall be satisfied.
5.5	Adhesion	Mount the specimen on substrate. Apply the following pressure Direction: see Fig -2 Weight: 10N Hours: 10 ± 1 sec	
5.6	Body strength	Mount the specimen on substrate. Apply the following pressure Direction: see Fig -3 Weight: 10N Hours: 10 ± 1 sec	
5.7	Seal	Fine Leak: 4.5kgf/cm ² 2hours 1×10 ⁻⁹ Pa.m ³ /sec Gross Leak: 4.5kgf/cm ² 2hours 1.5×10 ⁻⁵ Pa.m ³ /sec	MIL-STD-883E

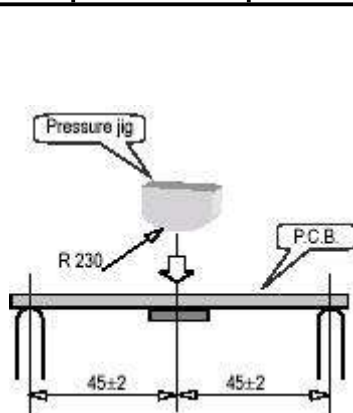


Fig-1

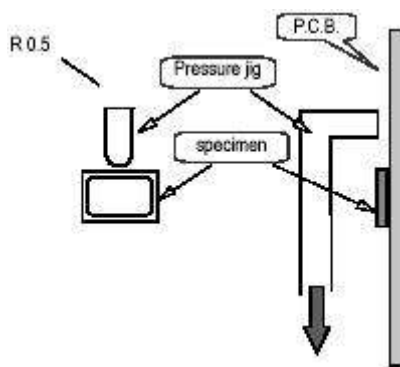


Fig-2

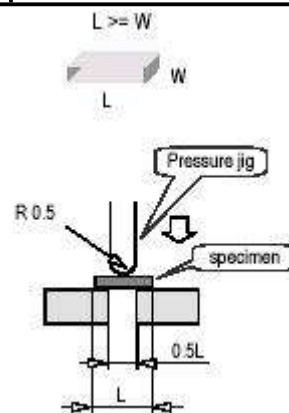
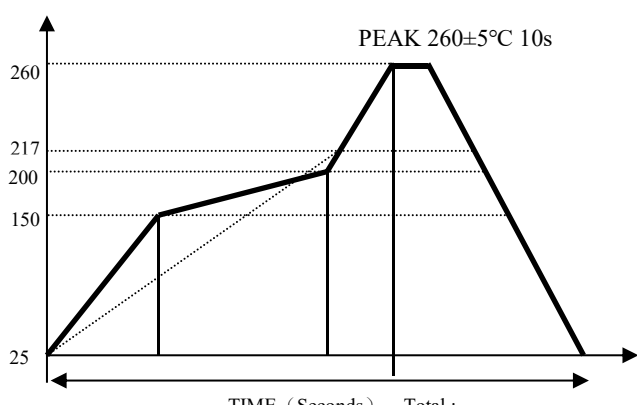


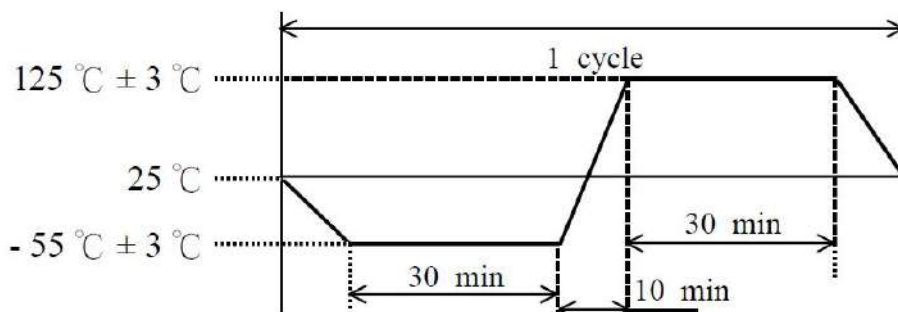
Fig-3

5.8	Solder ability	Pre-heat temperature : $+150\pm 10^{\circ}\text{C}$ Pre-heat time : 60~120s When the temperature of the specimen is reached at $+215\pm 3^{\circ}\text{C}$, it shall be left for $30\pm 1\text{sec}$. Peak temperature $240\pm 5^{\circ}\text{C}$ Material: Pb-free (Sn-3.0Ag-0.5Cu) Flux : Rosin resin methyl alcohol solvent (1:4) The electrodes should be covered by a new solder at least 90% of immersed area.	MIL-STD-883E 2003												
5.9	Resistance to Soldering Heat	Run in Reflow Reflow soldering shall be allowed Only two(2) time. Available for Lead Free Soldering  <table border="1"> <tbody> <tr> <td>(1)</td><td>Preheat</td><td>160~180 deg.C</td><td>120sec.</td></tr> <tr> <td>(2)</td><td>Primary heat</td><td>220 deg.C</td><td>60sec.</td></tr> <tr> <td>(3)</td><td>Peak</td><td>260 deg.C</td><td>10sec. Max.</td></tr> </tbody> </table>	(1)	Preheat	160~180 deg.C	120sec.	(2)	Primary heat	220 deg.C	60sec.	(3)	Peak	260 deg.C	10sec. Max.	MIL-STD-202F
(1)	Preheat	160~180 deg.C	120sec.												
(2)	Primary heat	220 deg.C	60sec.												
(3)	Peak	260 deg.C	10sec. Max.												

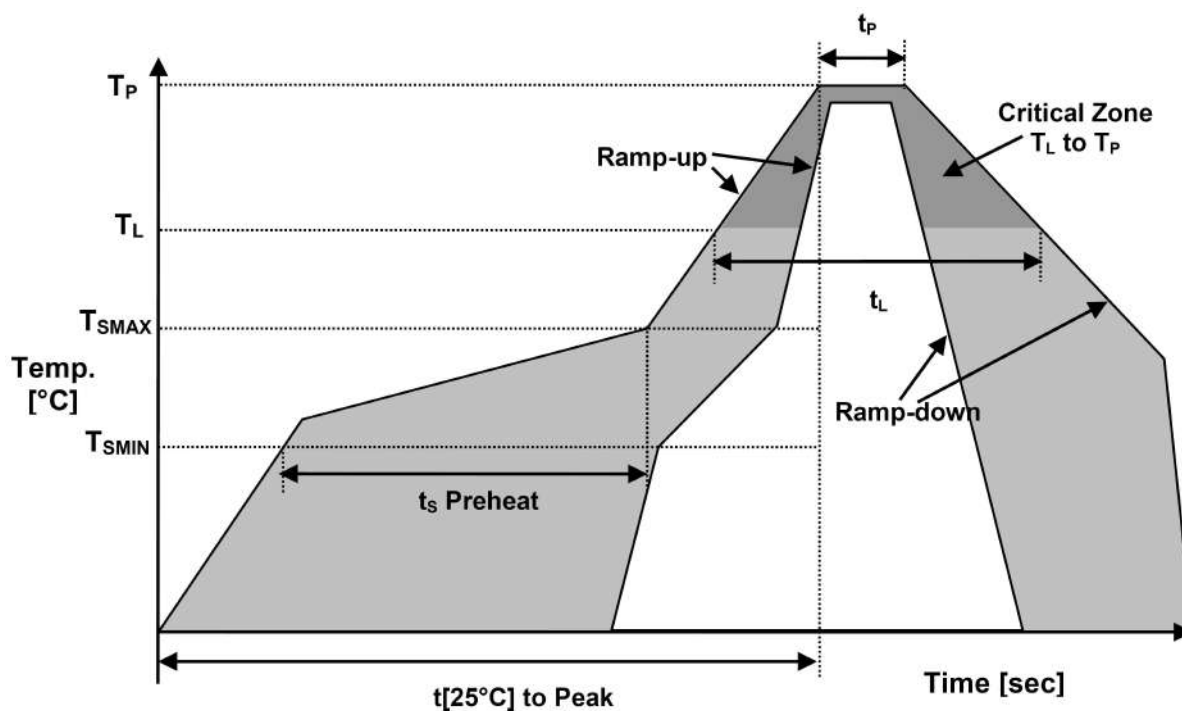
6. Environmental Reliability

*Measurement shall be carried out after letting it alone in the room temperature for 1 hour.

	Item	Conditions	Specifications
6.1	Humidity	+85°C±2°C, RH 80~85%, Duration of 500 hours. The units are then allowed to stand for approx 2 hours in room temperature before checking	MIL-STD-202F
6.2	Storage in Low Temperature	Temperature: -40±2°C , Duration of 500 hours. The units are then allowed to stand at room temperature for approx 2 hours before checking.	MIL-STD-883E
6.3	Storage in High Temperature	Temperature: +85°C±2°C, Duration of 500 hours. The units are then allowed to stand at room temperature for approx 2 hours before checking.	MIL-STD-883E
6.4	Thermal Shock	Temperature 1: -55°C±5°C Temperature 2: 125°C±5°C Temperature change between T1 and T2 at soonest Run 100 cycles, maintain T1 and T2 30minutes each in one cycle (Refer to Fig-4)	MIL-STD-883E



7. Recommended Solder Reflow Profile



Temperature Min Preheat	T _{SMIN}	150°C
Temperature Max Preheat	T _{SMAX}	175°C
Time (T _{SMIN} to T _{SMAX})	t _s	60-120 sec
Temperature	T _L	217°C
Peak Temperature	T _P	260°C
Ramp-up rate	R _{UP}	3°C/sec max.
Ramp-down rate	R _{DOWN}	6°C/sec max.
Time within 5°C of Peak Temperature	t _p	10 sec max.
Time t[25°C] to Peak Temperature	t[25°C] to Peak	360 sec max.
Time	t _L	60 sec max.