

1. QUARTZ CRYSTAL UNIT SPECIFICATION

1.1 Nominal Frequency :	40.000MHz
1.2 Holder type :	FTX221S (SMD2520 SEAM)
1.3 Mode of oscillation:	Fundamental
1.4 Frequency tolerance:	$\pm 7\text{ppm}$ at $25^{\circ}\text{C} \pm 3^{\circ}\text{C}$
1.5 Equivalent resistance:	30ohms max.
1.6 Operable temperature range:	-20°C To $+70^{\circ}\text{C}$
1.7 Storage temperature range:	-55°C To $+125^{\circ}\text{C}$
1.8 Frequency Stability:	$\pm 7\text{ppm}$ at -20°C To $+70^{\circ}\text{C}$
1.9 Loading capacitance (CL) :	12pF
1.10 Drive level:	10 uW Typical (100uW max.)
1.11 Shunt Capacitance:	2.0pF max.
1.12 Insulation resistance :	More than 500M Ω at DC 100V
1.13 Circuit:	Measured in HP/E5100A,S&A 250B
1.14 Aging:	$\pm 3\text{ ppm max.}$ (+25 $^{\circ}\text{C}$ 1 st Year)
1.15 Dimensions and marking	Refer to page.3
1.16 Emboss carrier tape & reel	Refer to page.5 and page.6
1.17 Note:	

Standard atmospheric conditions

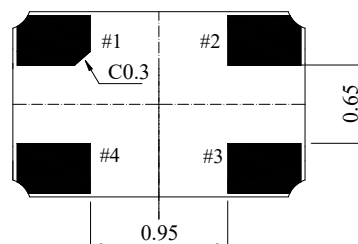
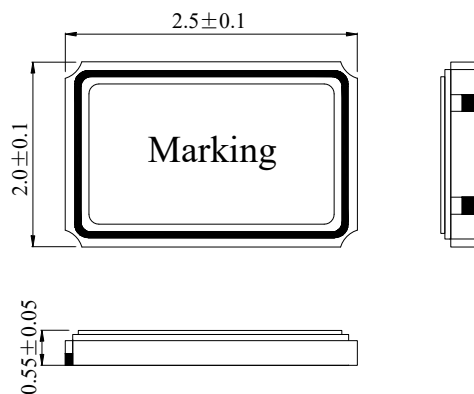
Unless otherwise specified, the standard range of atmospheric conditions for making measurement and tests are as follow:

Ambient temperature : $25 \pm 3^{\circ}\text{C}$

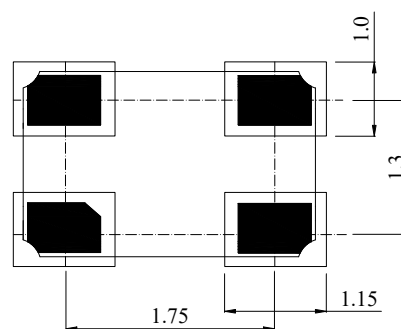
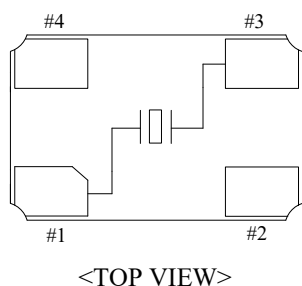
Relative humidity : 40%~70%

2. FTX221S 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

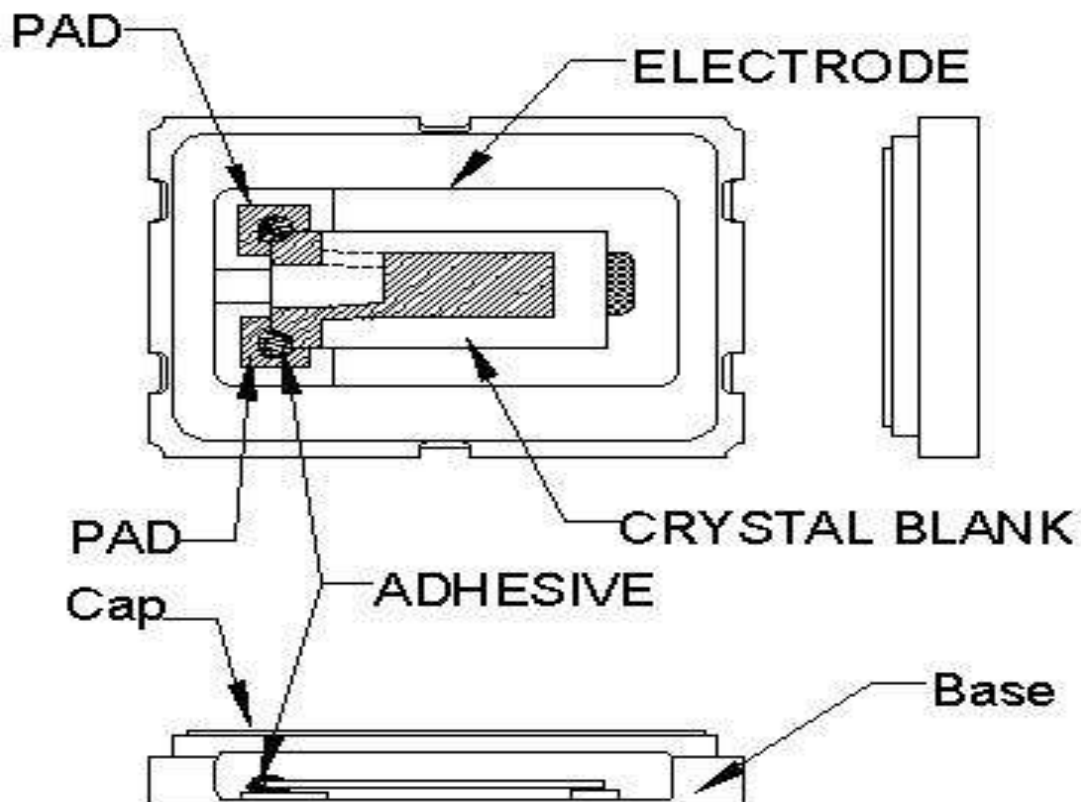
*Manufacturing Logo: FT

*Nominal frequency = 1 number after decimal point MAX.

(ex. 12.000 MHz → 12.0)

Marking: Laser marking

3. INSIDE STRUCTURE



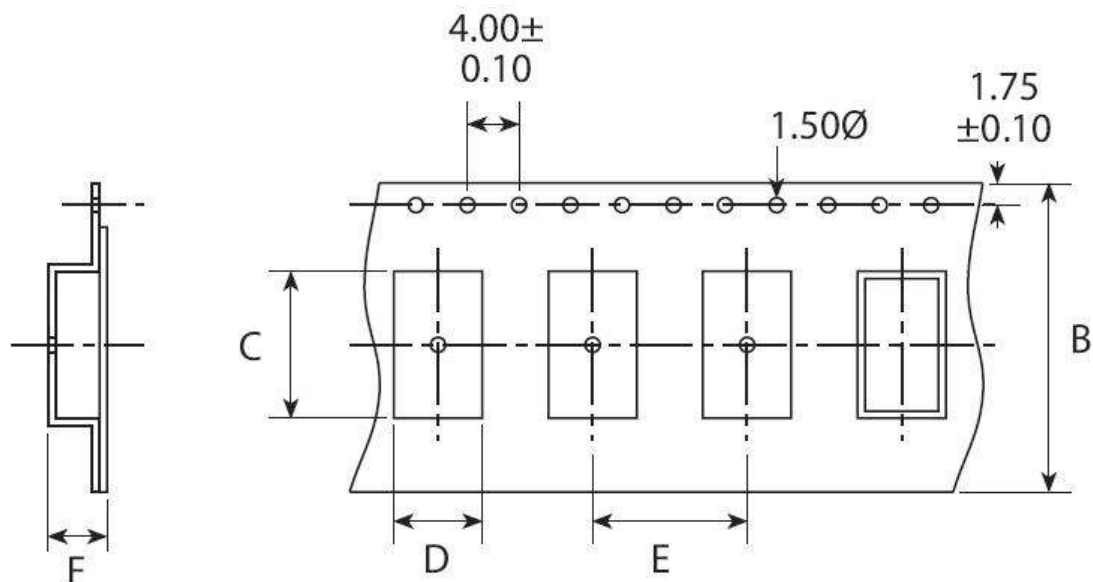
Reference drawing

Base:
Alumina Ceramic (Al_2O_3)
Metallized Pad: W
Ni Plating
Au Plating
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. FTX221S EMBOSS CARRIER TAPE & REEL

a.) Dimensions of Carrier Tape

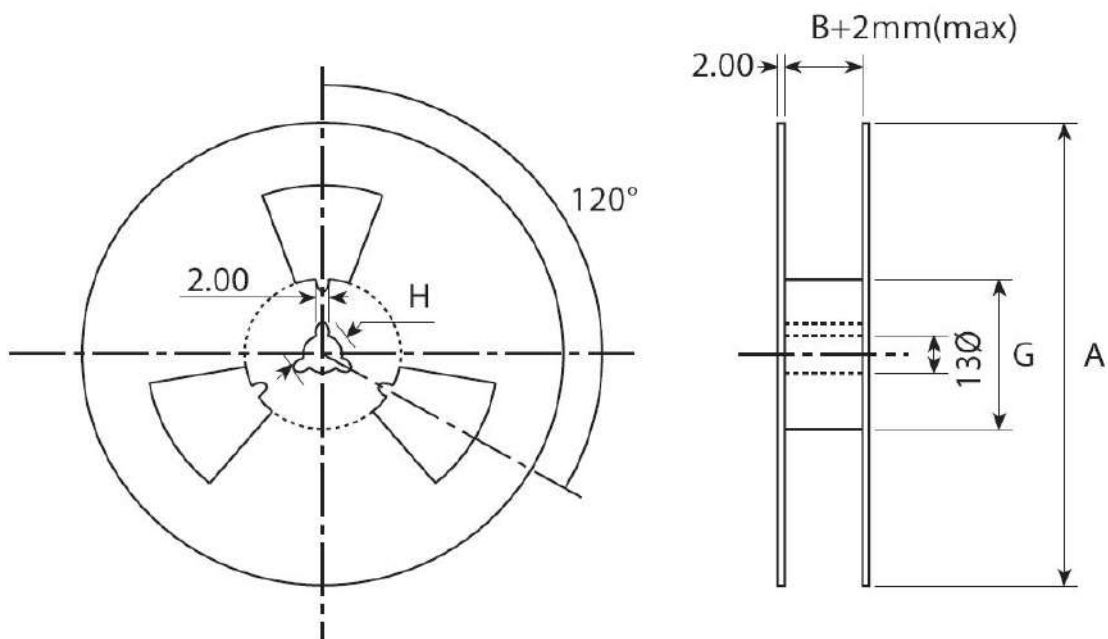
(UNIT: mm)



	A	B	C	D	E	F	G
SMD2520	178 ± 2.0	8.0 ± 0.3	2.8 ± 0.1	2.3 ± 0.1	4.0 ± 0.1	1.2 ± 0.1	60.5 ± 1.0

b.) Dimensions of Reel

(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

Tape	Material
Carrier tape	A – PET
Top tape	Polyester

f.) Label contents

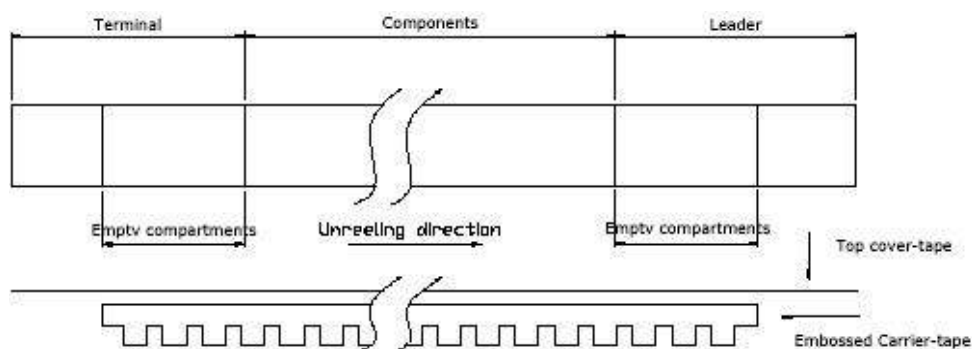
- .The type of product
- .Our specification No.
- .Your Part No.
- .Lot No.
- .Nominal Frequency
- .Quantity
- .Our Company Name

Sticks label for every reel.

PART NUMBER	
PO NO	
PR. NO:	
HOLDER TYPE	
FREQUENCY	
REMAKS	
QUANTITY	

g.) 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.



h.) Joint of tape

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

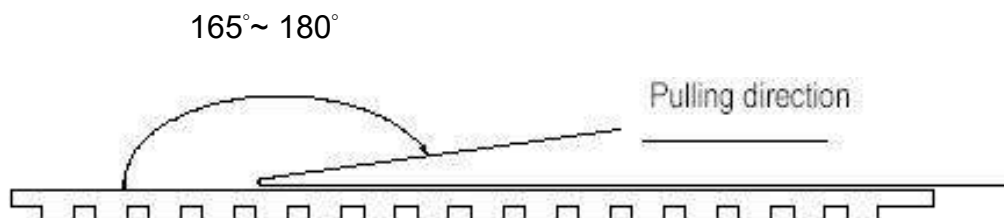
i.) Release strength of cover tape

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 Endurance: Provided that 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

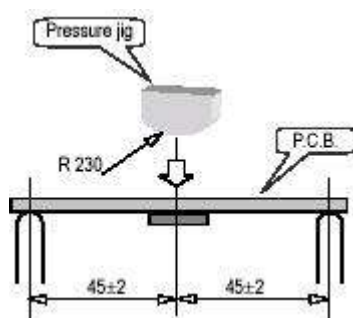


Fig-1

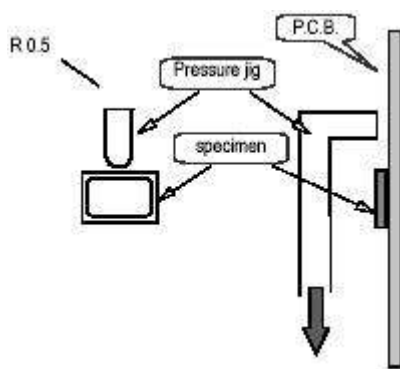


Fig-2

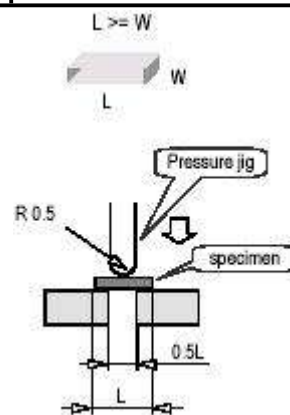
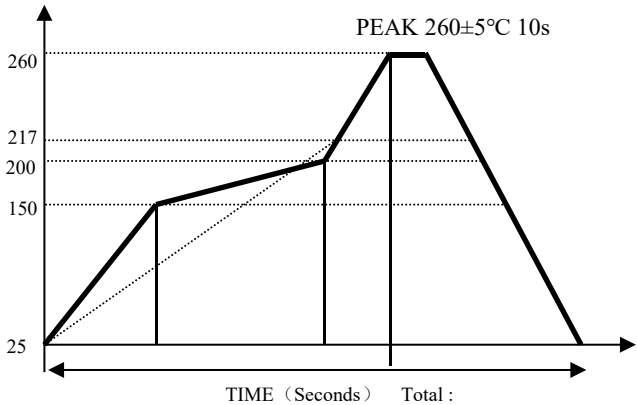
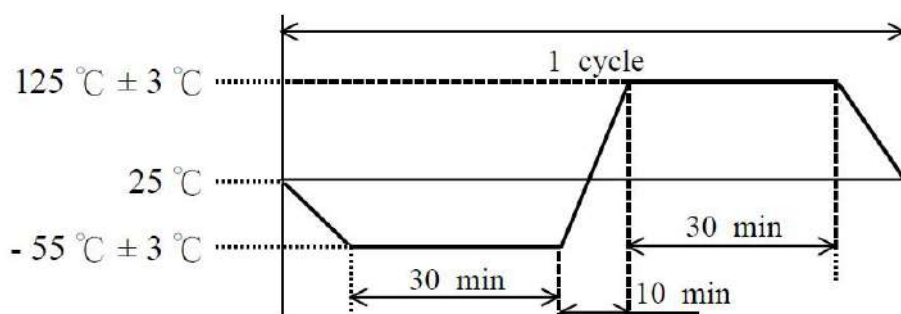


Fig-3

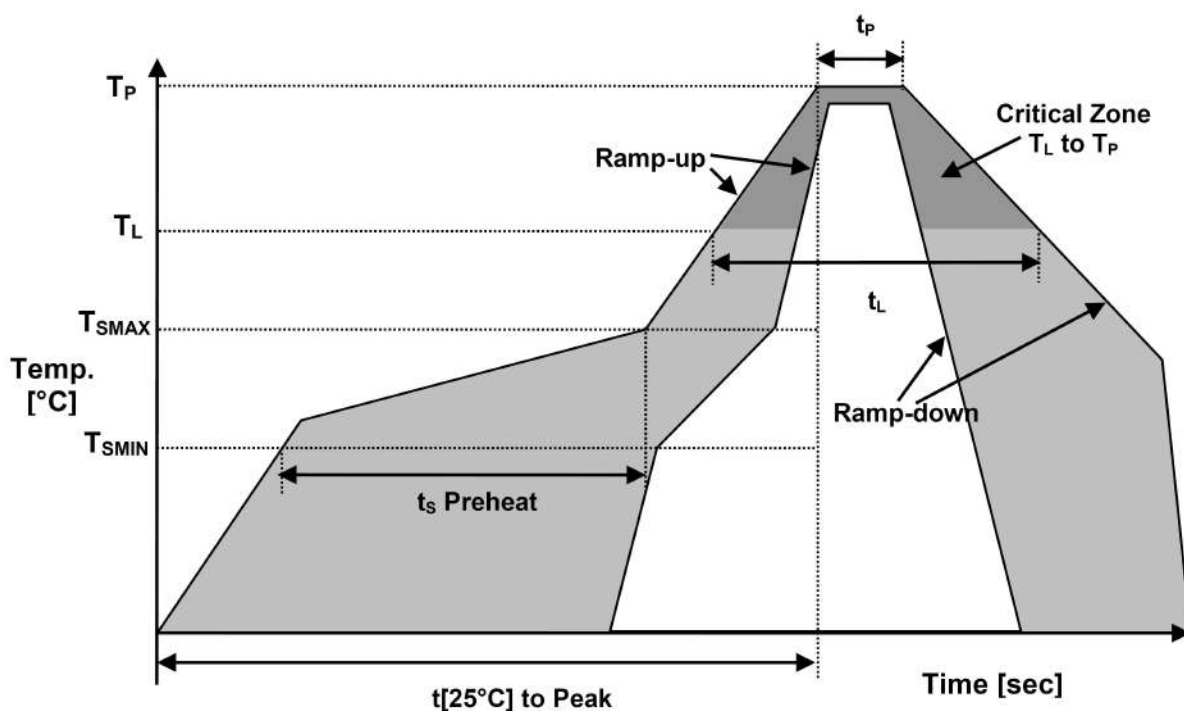
5.8	Solder ability	Pre-heat temperature : $+150\pm 10^{\circ}\text{C}$ Pre-heat time : 60~120s When the temperature of the specimen is reached at $+215\pm 3^{\circ}\text{C}$, it shall be left for $30\pm 1\text{sec.}$ Peak temperature $240\pm 5^{\circ}\text{C}$ Material: Pb-free (Sn-3.0Ag-0.5Cu) Flux : 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
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(2)	Primary heat	220 deg.C	60sec.												
(3)	Peak	260 deg.C	10sec. Max.												

6. Environmental Endurance: Provided that measurement shall be carried out after letting it alone in the room temperature for 1 hour.

	Item	Conditions	Specifications
6.1	Humidity	+60°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	60-180 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 $t[25^\circ\text{C}]$ to Peak Temperature	$t[25^\circ\text{C}] \text{ to Peak}$	480 sec max.
Time	t_L	60-150 sec.