

## 1. QUARTZ CRYSTAL UNIT SPECIFICATION

| Parameter                         | Sign             | Specification                            |
|-----------------------------------|------------------|------------------------------------------|
| 1.1 Nominal Frequency :           | F0               | 32.000MHz                                |
| 1.2 Holder type :                 | -                | FTX211S (SMD2016 SEAM TYPE)              |
| 1.3 Mode of oscillation :         | -                | Fundamental                              |
| 1.4 Frequency tolerance :         | FL               | ±10ppm at 25°C±3°C                       |
| 1.5 Equivalent resistance :       | RR               | 60ohms max.                              |
| 1.6 Operating temperature range : | T <sub>OPR</sub> | -20°C To +70°C                           |
| 1.7 Storage temperature range :   | T <sub>STG</sub> | -55°C To +125°C                          |
| 1.8 Frequency Stability :         | TC               | ±10ppm at -20°C To +70°C                 |
| 1.9 Loading capacitance :         | CL               | 6pF                                      |
| 1.10 Drive level :                | DL               | 10 uW Typical, 100uW max.                |
| 1.11 Shunt Capacitance :          | C0               | 2.0pF max.                               |
| 1.12 Insulation resistance :      | -                | More than 500MΩ at DC 100V               |
| 1.13 Circuit :                    | -                | Measured in HP/E5100A,S&A 250B           |
| 1.14 Aging :                      | Fa               | ±3 ppm max. (+25°C 1 <sup>st</sup> Year) |
| 1.15 Dimensions and marking :     |                  | Refer to page.2                          |
| 1.16 Emboss carrier tape & reel : |                  | Refer to page.4 and page.5               |
| 1.17 Note :                       |                  |                                          |

### Standard atmospheric conditions

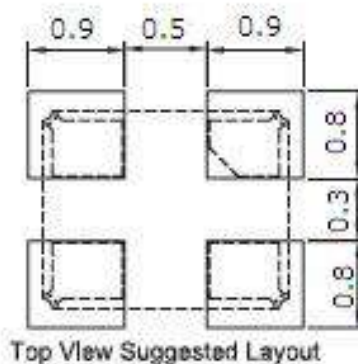
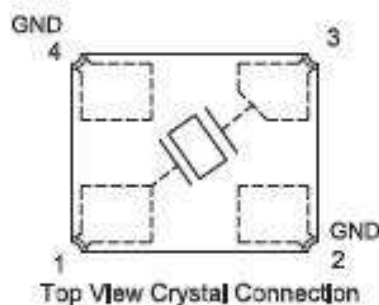
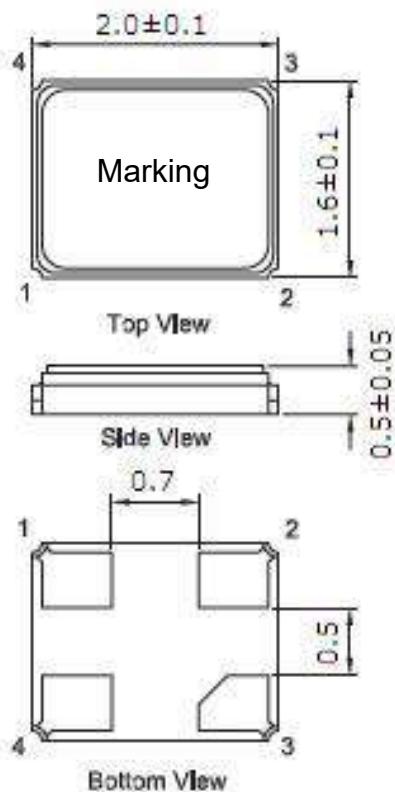
Unless otherwise specified, the standard range of atmospheric conditions for making measurement and tests are as follow:

Ambient temperature : 25±3°C

Relative humidity : 40%~70%

## 2. FTX211S MARKING & DIMENSIONS

(UNIT: mm)



#2, #4 are connected with metal cap of top.

Recommended Solder Pad Layout:

\*Marking should be printed as following:

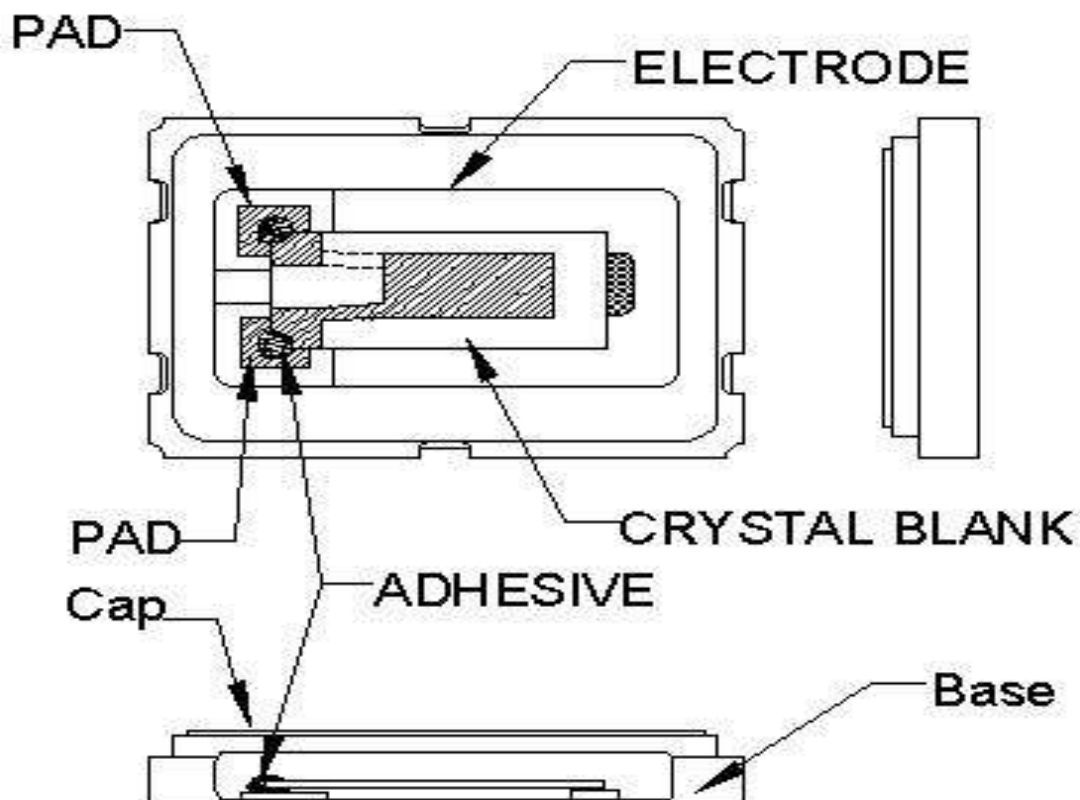
Logo, Nominal Frequency

\*Nominal frequency = 3 number after decimal point

MAX.( ex. 12.000 MHz → 12.000 )

Marking: Laser marking

### 3. INSIDE STRUCTURE

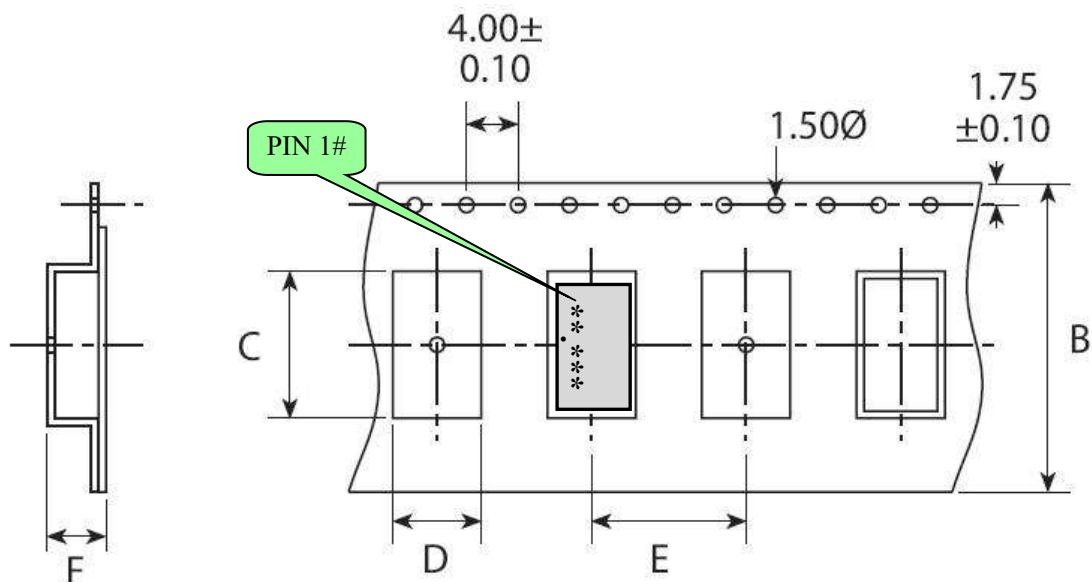


Reference drawing

|                             |                                                                                                    |
|-----------------------------|----------------------------------------------------------------------------------------------------|
| Base:                       | Alumina Ceramic (Al <sub>2</sub> O <sub>3</sub> )<br>Metallized Pad: W<br>Ni Plating<br>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. FTX211S EMBOSS CARRIER TAPE & REEL

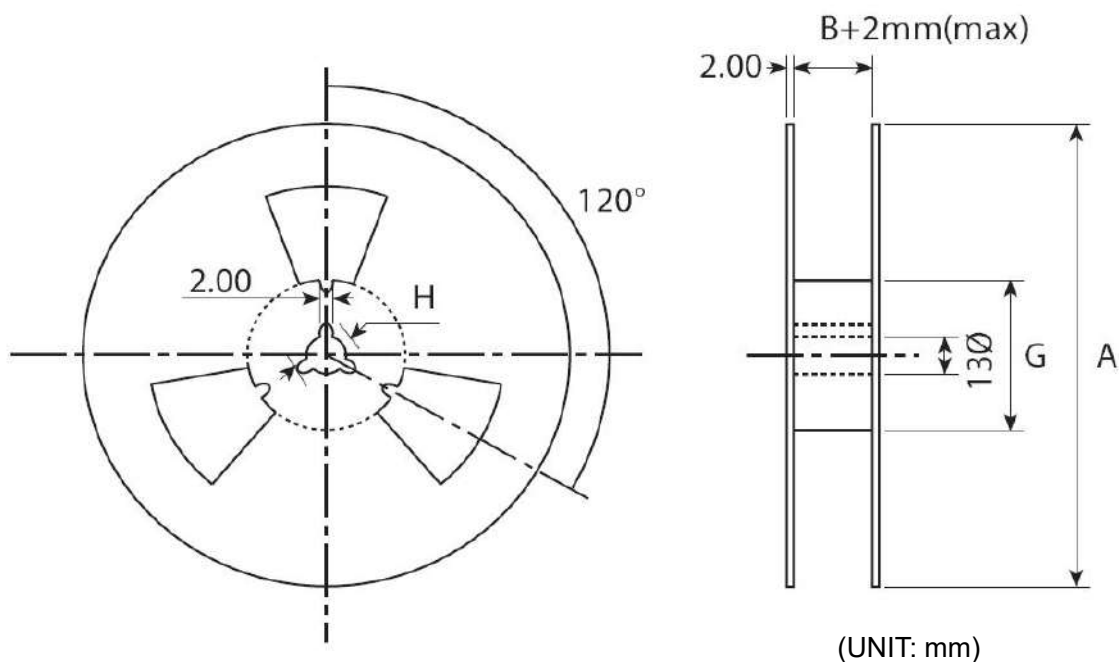
### a.) Dimensions of Carrier Tape



|         | A       | B       | C         | D         | E       | F       | G        |
|---------|---------|---------|-----------|-----------|---------|---------|----------|
| SMD2016 | 178±2.0 | 8.0±0.3 | 2.25±0.05 | 1.85±0.05 | 4.0±0.1 | 1.0±0.1 | 60.5±1.0 |

(UNIT: mm)

### 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

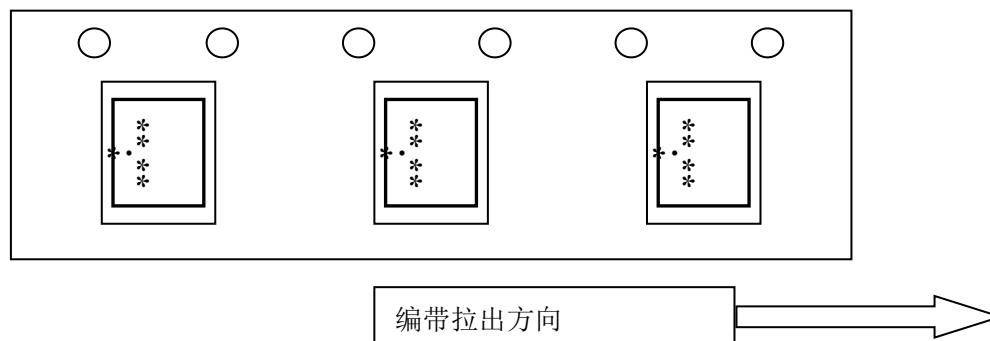
.Our Company Name

Sticks label for every reel.

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

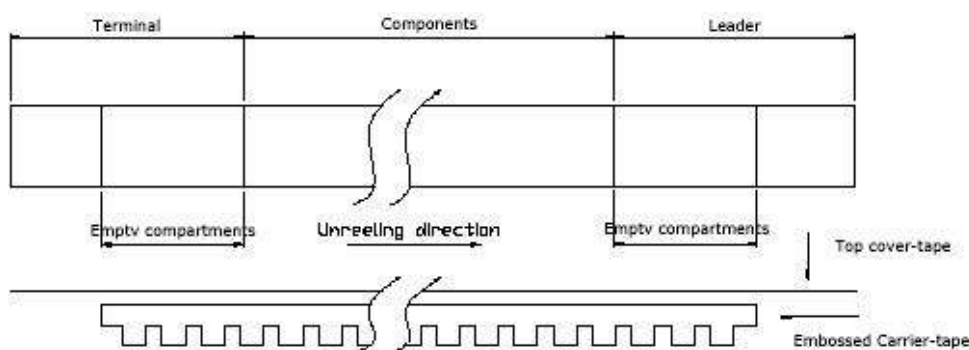
g.) Taping method

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



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.

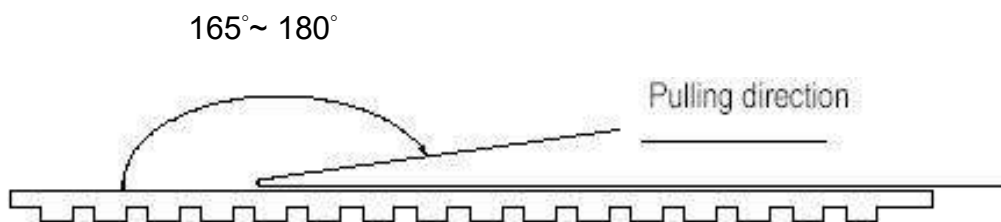
j.) Release strength of cover tape

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

Pulling direction  $165^{\circ}$  to  $180^{\circ}$

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<br>(2)Cycle: 1 to 2 Min.<br>(3)Full Cycle: 1.5mm P-P.<br>(4)Direction: X.Y.Z<br>(5)Time: 2 Hours / Each Direction                           | MIL-STD-883E                                                                                                                      |
| 5.4 | Substrate Bending | Mount the specimen on substrate.<br>Apply the following pressure<br>Direction: see Fig –1<br>Speed: 0.5 mm/sec<br>Hours: 5 ± 1 sec<br>Amount of substrate: 3 mm Max.        | Without mechanical damage such as breaks.<br><br>Without electrode peeling.<br><br>Electrical characteristics shall be satisfied. |
| 5.5 | Adhesion          | Mount the specimen on substrate.<br>Apply the following pressure<br>Direction: see Fig –2<br>Weight: 10N<br>Hours: 10 ± 1 sec                                               |                                                                                                                                   |
| 5.6 | Body strength     | Mount the specimen on substrate.<br>Apply the following pressure<br>Direction: see Fig –3<br>Weight: 10N<br>Hours: 10 ± 1 sec                                               |                                                                                                                                   |
| 5.7 | Seal              | Fine Leak: 4.5kgf/cm <sup>2</sup> 2hours 1×10 <sup>-9</sup> Pa.m <sup>3</sup> /sec<br>Gross Leak: 4.5kgf/cm <sup>2</sup> 2hours 1.5×10 <sup>-5</sup> Pa.m <sup>3</sup> /sec | MIL-STD-883E                                                                                                                      |

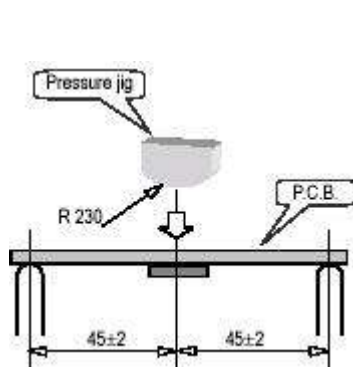


Fig-1

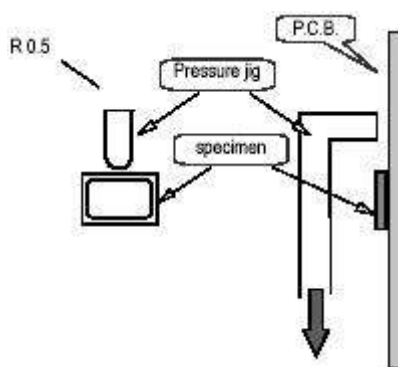


Fig-2

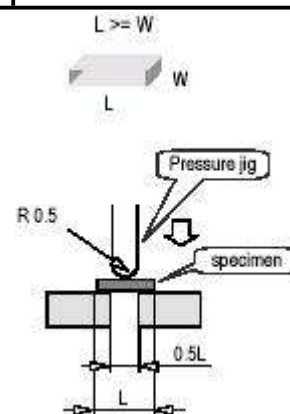
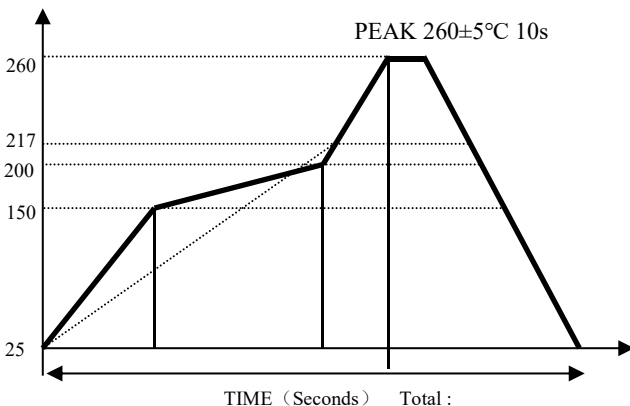
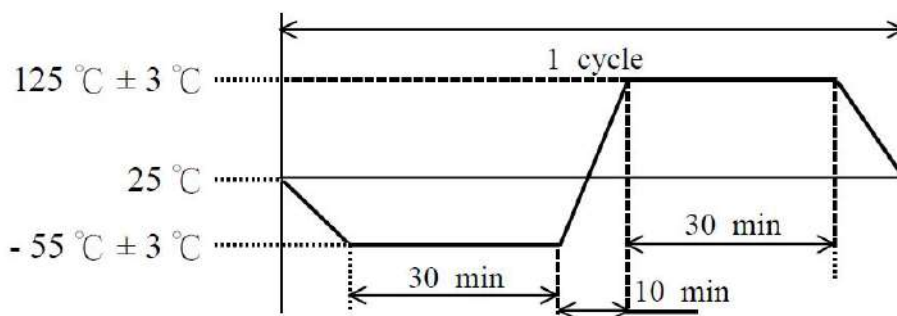


Fig-3

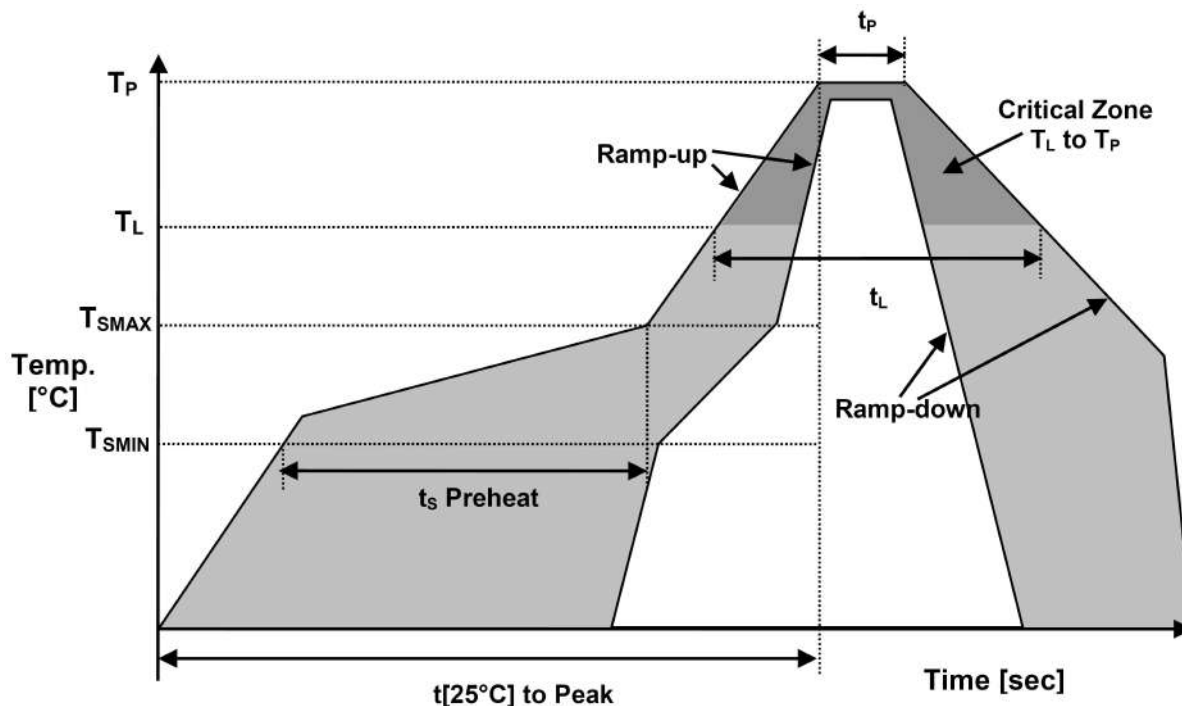
|     |                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                   |         |               |         |     |              |           |        |     |      |           |             |              |
|-----|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|---------|---------------|---------|-----|--------------|-----------|--------|-----|------|-----------|-------------|--------------|
| 5.8 | Solder ability               | <p>Pre-heat temperature : <math>+150\pm 10^{\circ}\text{C}</math><br/> Pre-heat time : 60~120s<br/> When the temperature of the specimen is reached at <math>+215\pm 3^{\circ}\text{C}</math>, it shall be left for <math>30\pm 1\text{sec}</math>.<br/> Peak temperature <math>240\pm 5^{\circ}\text{C}</math><br/> Material: Pb-free (Sn-3.0Ag-0.5Cu)<br/> Flux : Rosin resin methyl alcohol solvent (1:4)<br/> The electrodes should be covered by a new solder at least 90% of immersed area.</p>                                                                                                   | MIL-STD-883E 2003 |         |               |         |     |              |           |        |     |      |           |             |              |
| 5.9 | Resistance to Soldering Heat | <p>Run in Reflow<br/> Reflow soldering shall be allowed<br/> Only two(2) time.</p> <p><b>Available for Lead Free Soldering</b></p>  <p>PEAK <math>260\pm 5^{\circ}\text{C}</math> 10s</p> <p>TIME (Seconds) Total :</p> <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 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.<br>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 ,<br>Duration of 500 hours.<br>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,<br>Duration of 500 hours.<br>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<br>Temperature 2: 125°C±5°C<br>Temperature change between T1 and T2 at soonest<br>Run 100 cycles, maintain T1 and T2 30minutes each in one cycle<br>(Refer to Fig-4) | MIL-STD-883E   |



## 7. Recommended Solder Reflow Profile



|                                                |                   |              |
|------------------------------------------------|-------------------|--------------|
| Temperature Min Preheat                        | T <sub>SMIN</sub> | 150°C        |
| Temperature Max Preheat                        | T <sub>SMAX</sub> | 175°C        |
| Time (T <sub>SMIN</sub> to T <sub>SMAX</sub> ) | t <sub>s</sub>    | 60-180 sec.  |
| Temperature                                    | T <sub>L</sub>    | 217°C        |
| Peak Temperature                               | T <sub>P</sub>    | 260°C        |
| Ramp-up rate                                   | R <sub>UP</sub>   | 3°C/sec max. |
| Ramp-down rate                                 | R <sub>DOWN</sub> | 6°C/sec max. |
| Time within 5°C of Peak Temperature            | t <sub>p</sub>    | 10 sec max.  |
| Time t[25°C] to Peak Temperature               | t[25°C] to Peak   | 480 sec max. |
| Time                                           | t <sub>L</sub>    | 60-150 sec.  |