

## REGULATORY COMPLIANCE



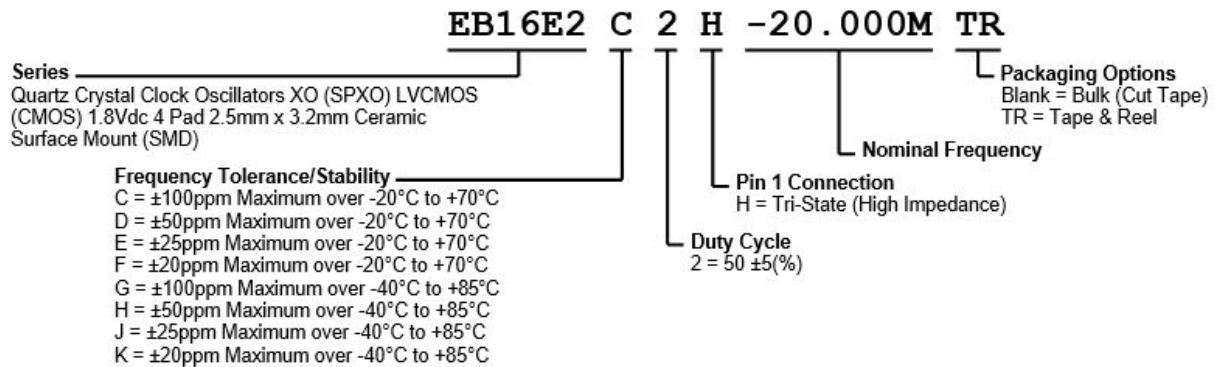
## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) LVCMOS (CMOS) 1.8Vdc 4 Pad 2.5mm x 3.2mm Ceramic Surface Mount (SMD)

## ELECTRICAL SPECIFICATIONS

|                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|---------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                                 | 1.024MHz to 66.6666MHz                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Frequency Tolerance/Stability                     | Inclusive of all conditions: Calibration Tolerance at 25°C, Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, First Year Aging at 25°C, Shock, and Vibration<br>$\pm 100\text{ppm}$ Maximum over -20°C to +70°C<br>$\pm 50\text{ppm}$ Maximum over -20°C to +70°C<br>$\pm 25\text{ppm}$ Maximum over -20°C to +70°C<br>$\pm 20\text{ppm}$ Maximum over -20°C to +70°C<br>$\pm 100\text{ppm}$ Maximum over -40°C to +85°C<br>$\pm 50\text{ppm}$ Maximum over -40°C to +85°C<br>$\pm 25\text{ppm}$ Maximum over -40°C to +85°C<br>$\pm 20\text{ppm}$ Maximum over -40°C to +85°C |
| Supply Voltage                                    | 1.8Vdc $\pm 5\%$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
| Input Current                                     | 3mA Maximum over Nominal Frequency of 1.024MHz to 9.999999MHz<br>4mA Maximum over Nominal Frequency of 10MHz to 39.999999MHz<br>5mA Maximum over Nominal Frequency of 40MHz to 50MHz<br>6mA Maximum over Nominal Frequency of 50.000001MHz to 66.6666MHz                                                                                                                                                                                                                                                                                                                                                                          |
| Output Voltage Logic High ( $V_{OH}$ )            | $I_{OH} = -4\text{mA}$<br>90% of Vdd Minimum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Output Voltage Logic Low ( $V_{OL}$ )             | $I_{OL} = +4\text{mA}$<br>10% of Vdd Maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Rise/Fall Time                                    | Measured at 20% to 80% of waveform<br>5nSec Maximum over Nominal Frequency of 1.024MHz to 24MHz<br>4nSec Maximum over Nominal Frequency of 24.000001MHz to 50MHz<br>3nSec Maximum over Nominal Frequency of 50.000001MHz to 66.6666MHz                                                                                                                                                                                                                                                                                                                                                                                            |
| Duty Cycle                                        | Measured at 50% of Waveform<br>50 $\pm 5\%$                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Load Drive Capability                             | 15pF Maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Output Logic Type                                 | CMOS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| Logic Control / Additional Output                 | Tri-State (High Impedance)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Tri-State Input Voltage ( $V_{IH}$ and $V_{IL}$ ) | 80% of Vdd Minimum or No Connect to Enable Output, 20% of Vdd Maximum to Disable Output (High Impedance)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| Standby Current                                   | Disabled Output: High Impedance<br>10 $\mu\text{A}$ Maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| RMS Phase Jitter                                  | $F_j = 12\text{kHz}$ to 20MHz<br>1pSec Maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Start Up Time                                     | 10mSec Maximum                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Storage Temperature Range                         | -55°C to +125°C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

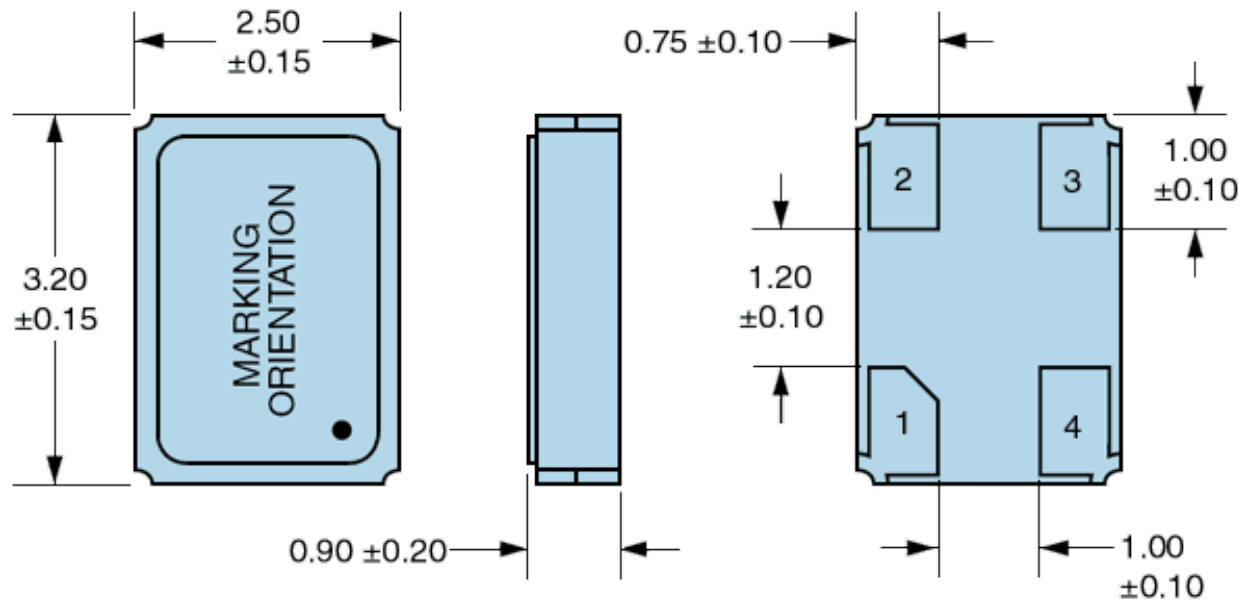
## PART NUMBERING GUIDE



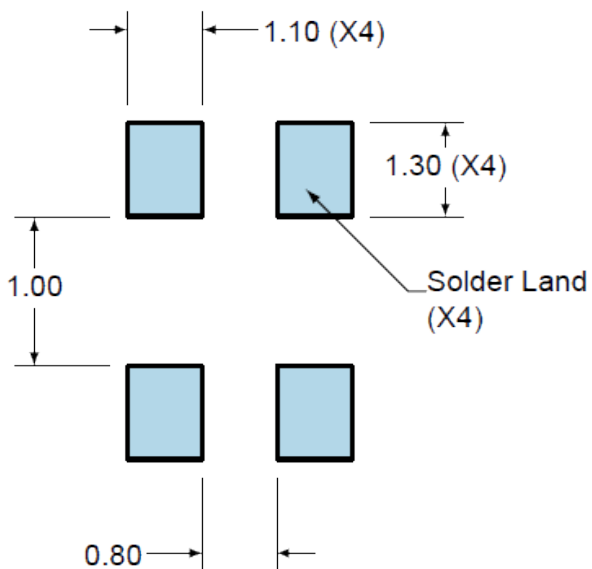
## ENVIRONMENTAL &amp; MECHANICAL SPECIFICATIONS

|                                     |                                               |
|-------------------------------------|-----------------------------------------------|
| <b>ESD Susceptibility</b>           | MIL-STD-883, Method 3015, Class 1, HBM: 1500V |
| <b>Fine Leak Test</b>               | MIL-STD-883, Method 1014, Condition A         |
| <b>Flammability</b>                 | UL94-V0                                       |
| <b>Gross Leak Test</b>              | MIL-STD-883, Method 1014, Condition C         |
| <b>Mechanical Shock</b>             | MIL-STD-883, Method 2002, Condition B         |
| <b>Moisture Resistance</b>          | MIL-STD-883, Method 1004                      |
| <b>Moisture Sensitivity</b>         | J-STD-020, MSL 1                              |
| <b>Resistance to Soldering Heat</b> | MIL-STD-202, Method 210, Condition K          |
| <b>Resistance to Solvents</b>       | MIL-STD-202, Method 215                       |
| <b>Solderability</b>                | MIL-STD-883, Method 2003                      |
| <b>Temperature Cycling</b>          | MIL-STD-883, Method 1010, Condition B         |
| <b>Vibration</b>                    | MIL-STD-883, Method 2007, Condition A         |

## MECHANICAL DIMENSIONS



## SUGGESTED SOLDER PAD LAYOUT

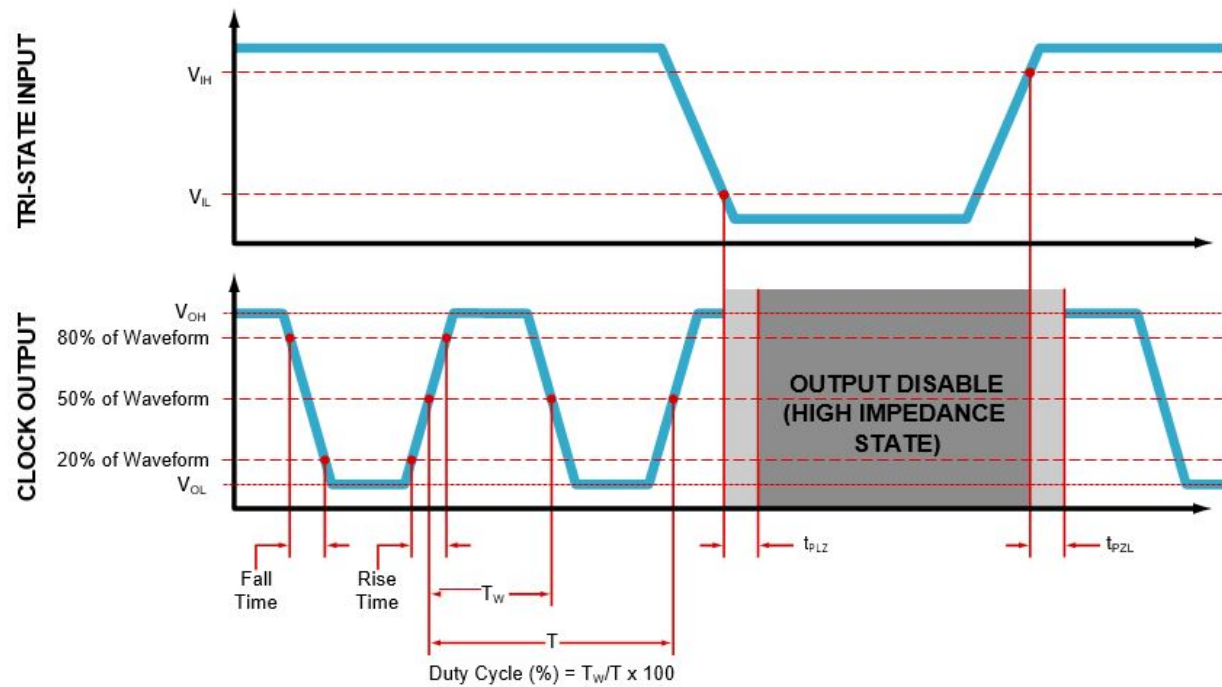


| PIN | CONNECTION     |
|-----|----------------|
| 1   | Tri-State      |
| 2   | Case/Ground    |
| 3   | Output         |
| 4   | Supply Voltage |

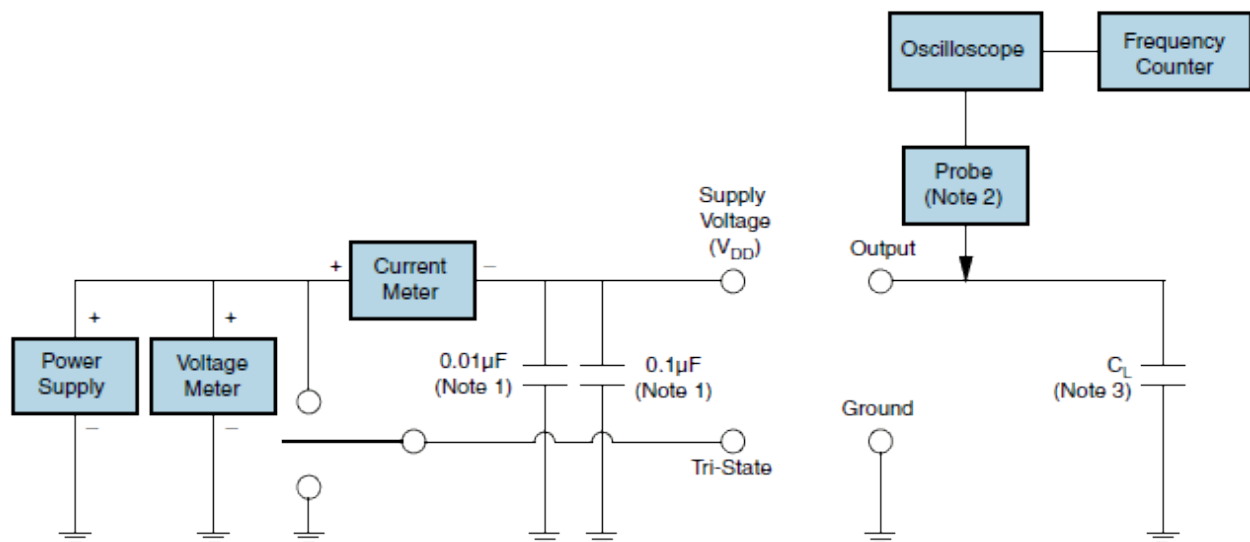
All Tolerances are  $\pm 0.1$

**All Dimensions in Millimeters**

## OUTPUT WAVEFORM & TIMING DIAGRAM



## TEST CIRCUIT FOR CMOS OUTPUT



**Note 1:** An external 0.1µF low frequency tantalum bypass capacitor in parallel with a 0.01µF high frequency ceramic bypass Capacitor close to the package ground and  $V_{DD}$  pin is required.

**Note 2:** A low input capacitance (<12pF), 10X Attenuation Factor, High Impedance (>10Mohms), and High bandwidth (>300MHz) Passive probe is recommended.

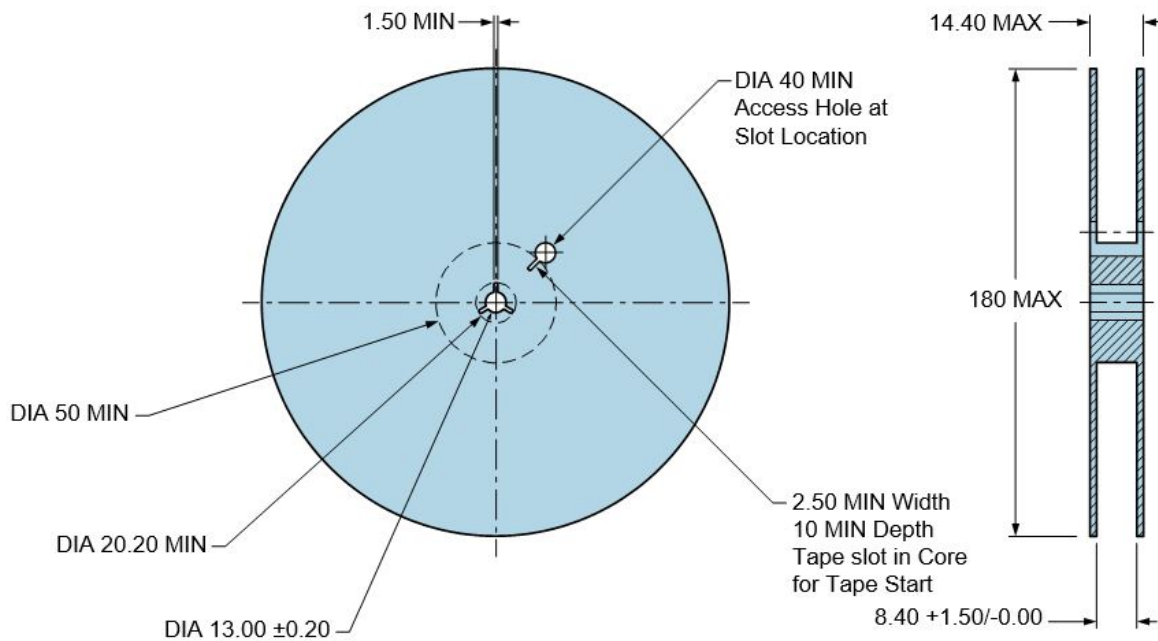
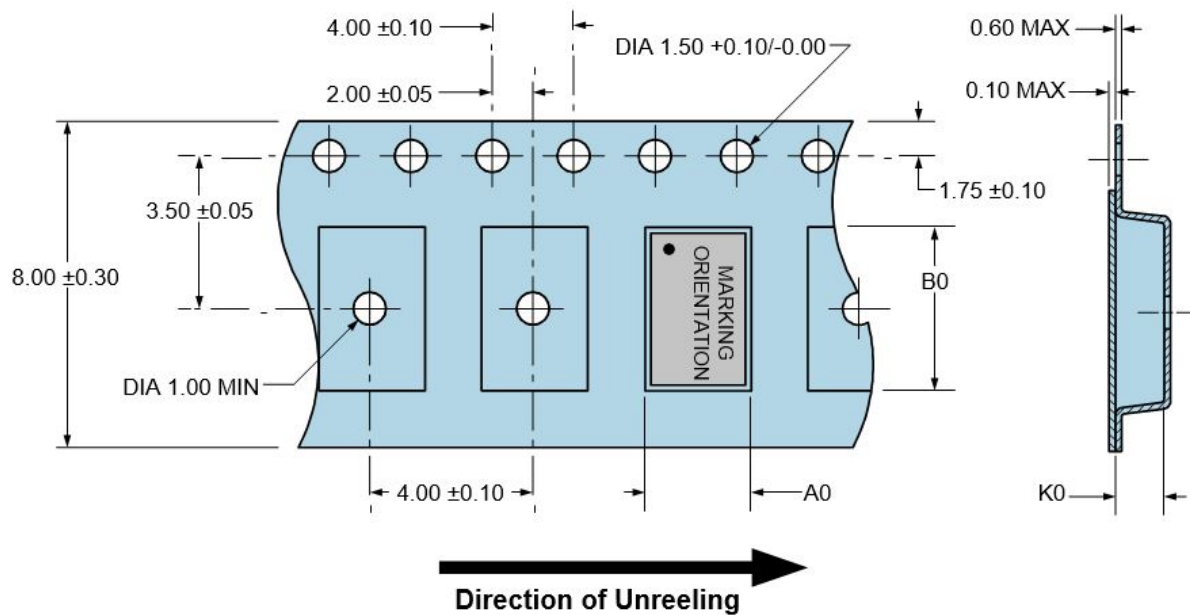
**Note 3:** Capacitance value  $C_L$  includes sum of all probe and fixture capacitance. See applicable specification sheet for 'Load Drive Capability'.

## TAPE & REEL DIMENSIONS

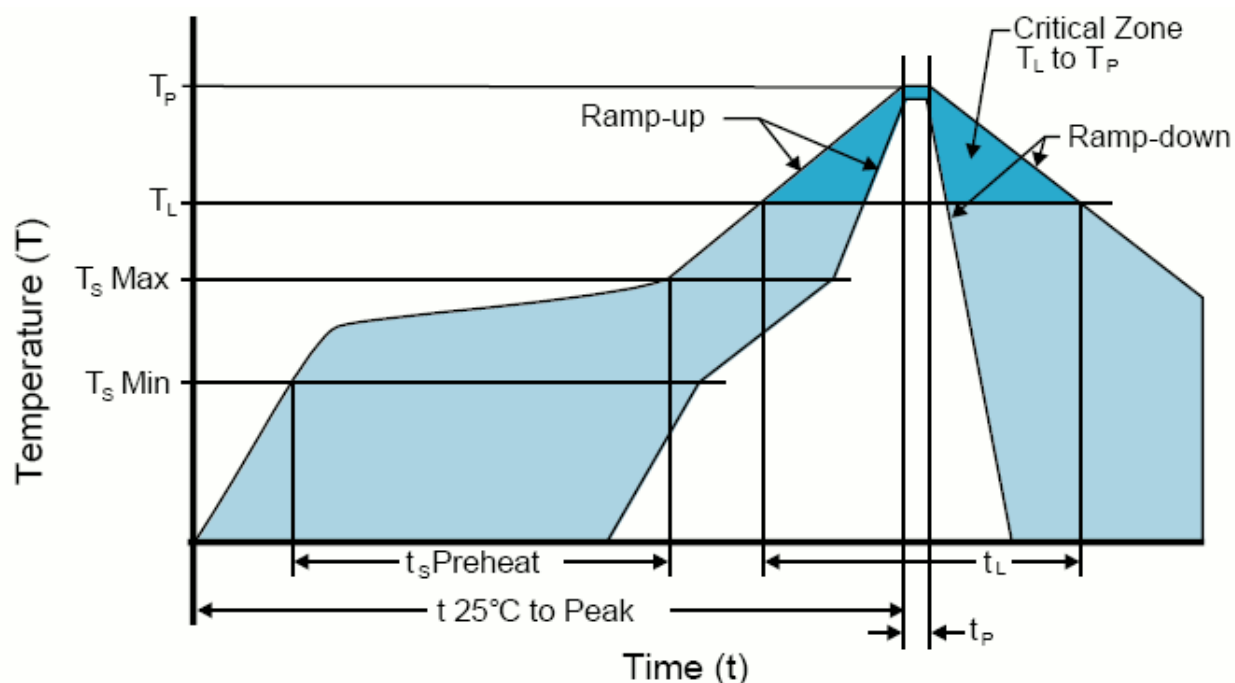
Quantity per Reel: 1000 Units

All Dimensions in Millimeters

Compliant to EIA-481



## RECOMMENDED SOLDER REFLOW METHOD



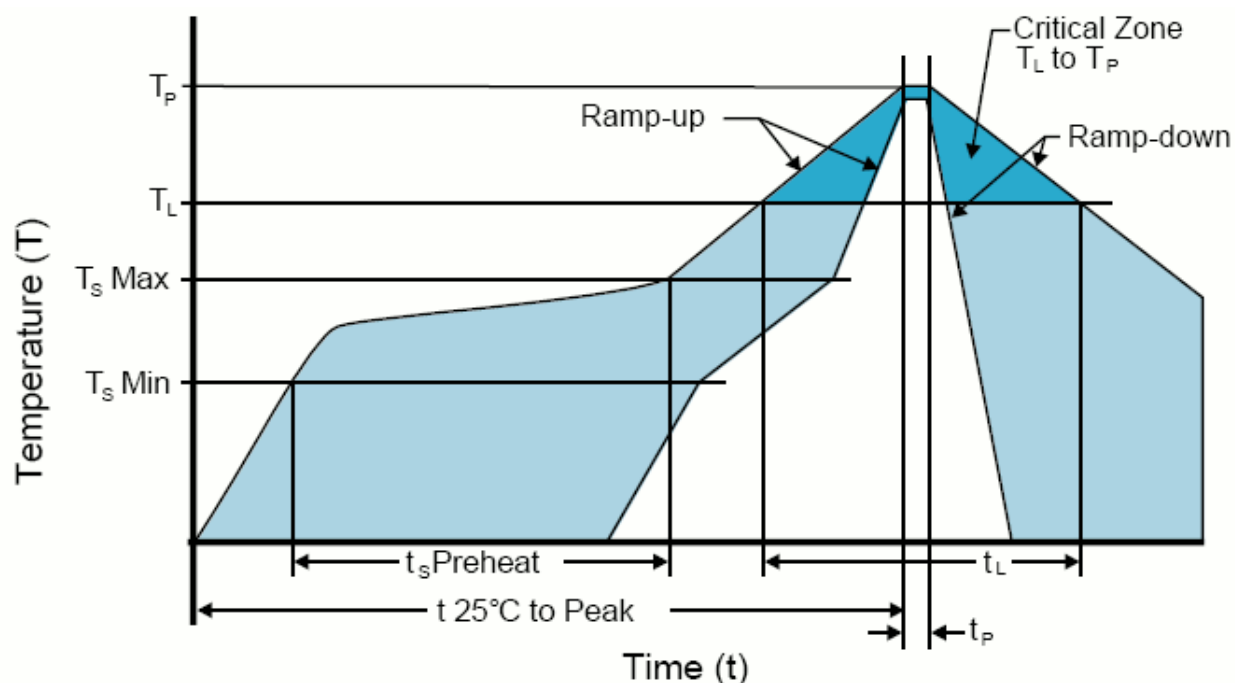
## HIGH TEMPERATURE INFRARED/CONVECTION

|                                                     |                                                   |
|-----------------------------------------------------|---------------------------------------------------|
| T <sub>s</sub> MAX to T <sub>L</sub> (Ramp-up Rate) | 3°C/Second Maximum                                |
| Preheat                                             |                                                   |
| - Temperature Minimum (T <sub>s</sub> MIN)          | 150°C                                             |
| - Temperature Typical (T <sub>s</sub> TYP)          | 175°C                                             |
| - Temperature Maximum (T <sub>s</sub> MAX)          | 200°C                                             |
| - Time (t <sub>s</sub> )                            | 60 - 180 Seconds                                  |
| Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )    | 3°C/Second Maximum                                |
| Time Maintained Above:                              |                                                   |
| - Temperature (T <sub>L</sub> )                     | 217°C                                             |
| - Time (t <sub>L</sub> )                            | 60 - 150 Seconds                                  |
| Peak Temperature (T <sub>P</sub> )                  | 260°C Maximum for 10 Seconds Maximum              |
| Target Peak Temperature (T <sub>P</sub> Target)     | 250°C +0/-5°C                                     |
| Time within 5°C of actual peak (t <sub>p</sub> )    | 20 - 40 Seconds                                   |
| Ramp-down Rate                                      | 6°C/Second Maximum                                |
| Time 25°C to Peak Temperature (t)                   | 8 Minutes Maximum                                 |
| Moisture Sensitivity Level                          | Level 1                                           |
| Additional Notes                                    | Temperatures shown are applied to body of device. |

## High Temperature Manual Soldering

260°C Maximum for 5 Seconds Maximum, 2 times Maximum. (Temperatures shown are applied to body of device.)

## RECOMMENDED SOLDER REFLOW METHOD



## LOW TEMPERATURE INFRARED/CONVECTION

|                                                                |                                                        |
|----------------------------------------------------------------|--------------------------------------------------------|
| <b><math>T_s</math> MAX to <math>T_L</math> (Ramp-up Rate)</b> | 5°C/Second Maximum                                     |
| <b>Preheat</b>                                                 |                                                        |
| - Temperature Minimum ( $T_s$ MIN)                             | N/A                                                    |
| - Temperature Typical ( $T_s$ TYP)                             | 150°C                                                  |
| - Temperature Maximum ( $T_s$ MAX)                             | N/A                                                    |
| - Time ( $t_s$ )                                               | 60 - 120 Seconds                                       |
| <b>Ramp-up Rate (<math>T_L</math> to <math>T_P</math>)</b>     | 5°C/Second Maximum                                     |
| <b>Time Maintained Above:</b>                                  |                                                        |
| - Temperature ( $T_L$ )                                        | 150°C                                                  |
| - Time ( $t_L$ )                                               | 200 Seconds Maximum                                    |
| <b>Peak Temperature (<math>T_P</math>)</b>                     | 240°C Maximum                                          |
| <b>Target Peak Temperature (<math>T_P</math> Target)</b>       | 240°C Maximum 2 Times / 230°C Maximum 1 Time           |
| <b>Time within 5°C of actual peak (<math>t_P</math>)</b>       | 10 Seconds Maximum 2 Times / 80 Seconds Maximum 1 Time |
| <b>Ramp-down Rate</b>                                          | 5°C/Second Maximum                                     |
| <b>Time 25°C to Peak Temperature (t)</b>                       | N/A                                                    |
| <b>Moisture Sensitivity Level</b>                              | Level 1                                                |
| <b>Additional Notes</b>                                        | Temperatures shown are applied to body of device.      |

## Low Temperature Manual Soldering

185°C Maximum for 10 Seconds Maximum, 2 times Maximum. (Temperatures shown are applied to body of device.)



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