## REGULATORY COMPLIANCE

Lead Free COMPLIANT | EU RoHS 2011/65 + 2015/863 COMPLIANT | China RoHS COMPLIANT | REACH SVHC COMPLIANT | DRC CONFLICT FREE

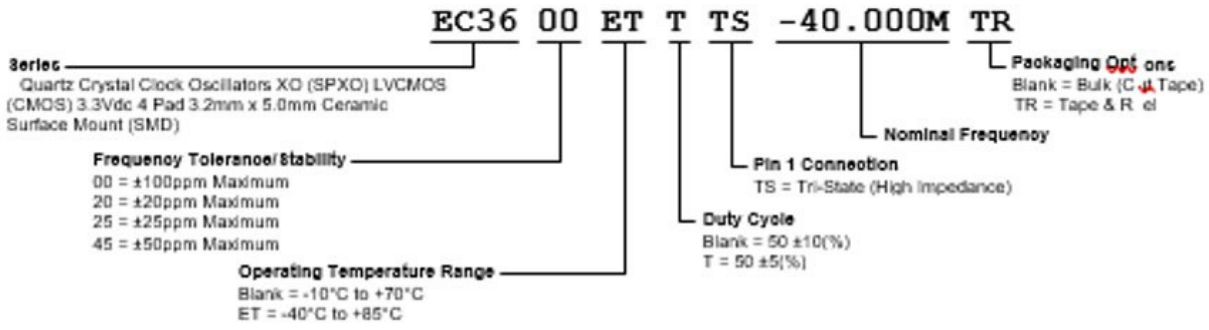
## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) LVCMOS (CMOS) 3.3Vdc 4 Pad 3.2mm x 5.0mm Ceramic Surface Mount (SMD)

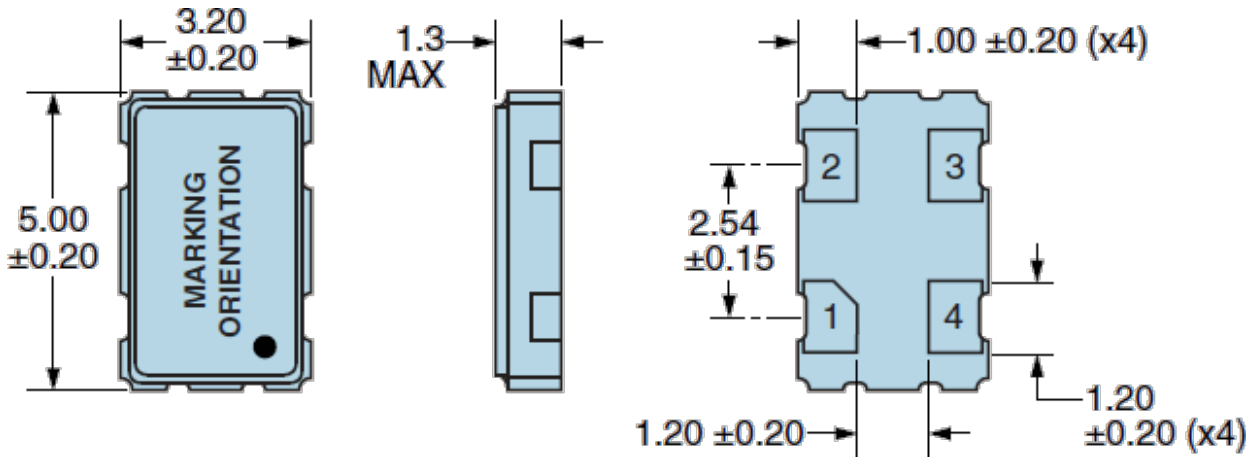
## ELECTRICAL SPECIFICATIONS

| | |
|---|---|
| **Nominal Frequency** | 1MHz to 170MHz |
| **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>±100ppm Maximum<br>±20ppm Maximum<br>±25ppm Maximum<br>±50ppm Maximum |
| **Operating Temperature Range** | -10°C to +70°C<br>-40°C to +85°C |
| **Supply Voltage** | 3.3Vdc ±10% |
| **Input Current** | 8mA Maximum over Nominal Frequency of 1MHz to 9.999999MHz<br>10mA Maximum over Nominal Frequency of 10MHz to 34.999999MHz<br>25mA Maximum over Nominal Frequency of 35MHz to 49.999999MHz<br>35mA Maximum over Nominal Frequency of 50MHz to 70MHz<br>40mA Maximum over Nominal Frequency of 70.000001MHz to 125MHz<br>50mA Maximum over Nominal Frequency of 125.000001MHz to 170MHz |
| **Output Voltage Logic High ($V_{Oh}$)** | IOH = -4mA<br>90% of Vdd Minimum |
| **Output Voltage Logic Low ($V_{Ol}$)** | IOL = +4mA<br>10% of Vdd Maximum |
| **Rise/Fall Time** | Measured at 20% to 80% of waveform<br>6nSec Maximum over Nominal Frequency of 1MHz to 39.999999MHz<br>4nSec Maximum over Nominal Frequency of 40MHz to 79.999999MHz<br>3nSec Maximum over Nominal Frequency of 80MHz to 100MHz<br>2nSec Maximum over Nominal Frequency of 100.000001MHz to 170MHz |
| **Duty Cycle** | Measured at 50% of waveform<br>50 ±10(%)<br>50 ±5(%) |
| **Load Drive Capability** | 15pF Maximum |
| **Output Logic Type** | CMOS |
| **Pin 1 Connection** | Tri-State (High Impedance) |
| **Tri-State Input Voltage (Vih and Vil)** | 90% of Vdd Minimum or No Connect to Enable Output,<br>10% of Vdd Maximum to Disable Output (High Impedance) |
| **Standby Current** | Disabled Output: High Impedance<br>10µA Maximum |
| **RMS Phase Jitter** | 12kHz to 20MHz offset frequency<br>1pSec Maximum |
| **Start Up Time** | 10mSec Maximum |
| **Storage Temperature Range** | -55°C to +125°C |

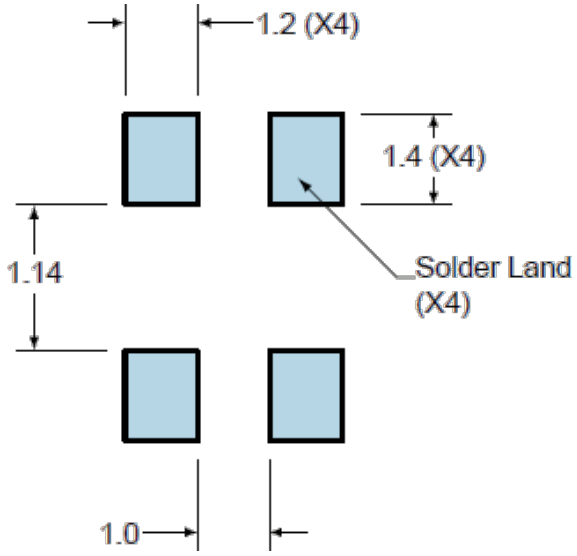
## PART NUMBERING GUIDE



## MECHANICAL DIMENSIONS




## SUGGESTED SOLDER PAD LAYOUT

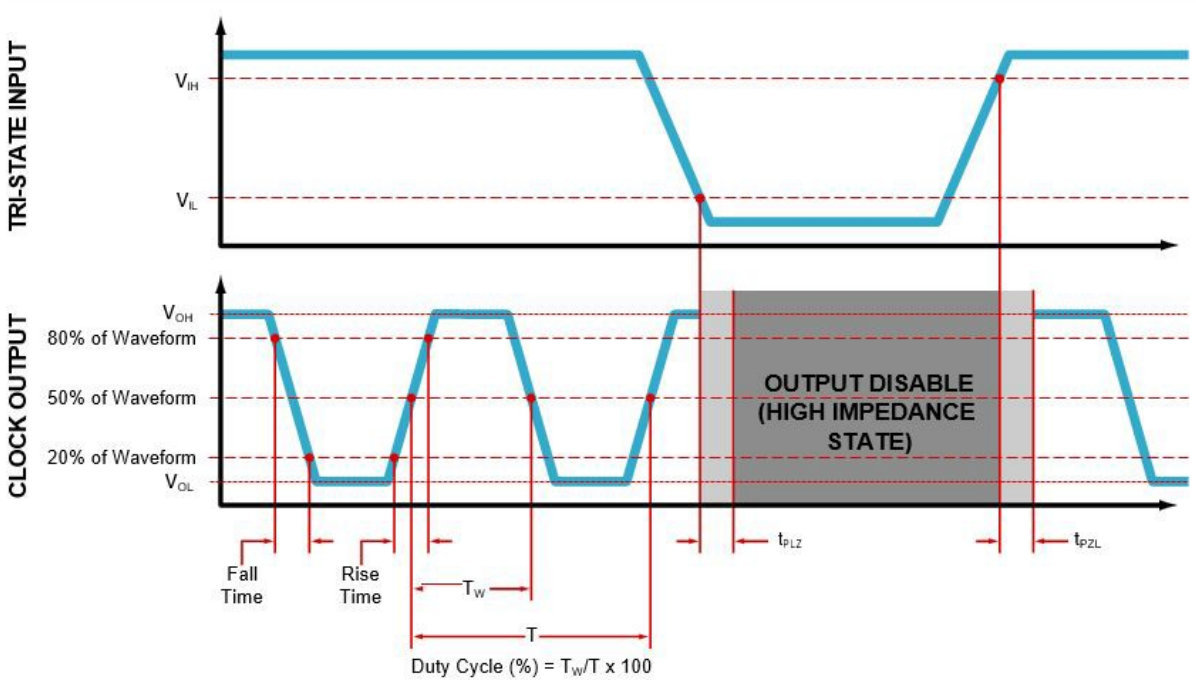



| PIN | CONNECTION |
|---|---|
| 1 | Tri-State |
| 2 | Ground |
| 3 | Output |
| 4 | Supply Voltage |

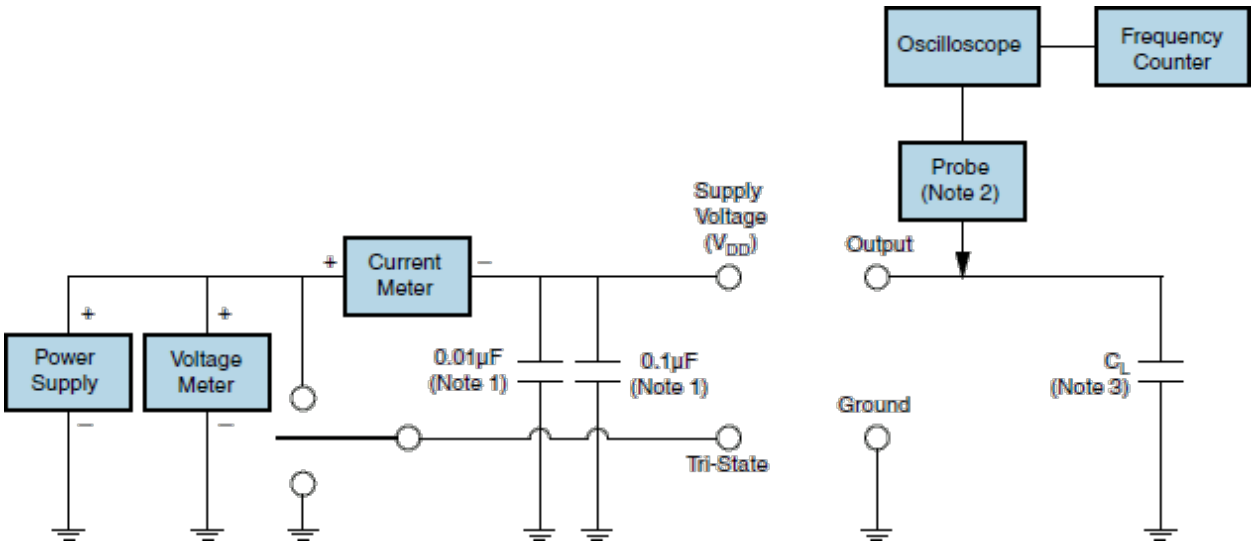
All Tolerances are ±0.1

**All Dimensions in Millimeters**

## OUTPUT WAVEFORM & TIMING DIAGRAM



## TEST CIRCUIT FOR CMOS OUTPUT



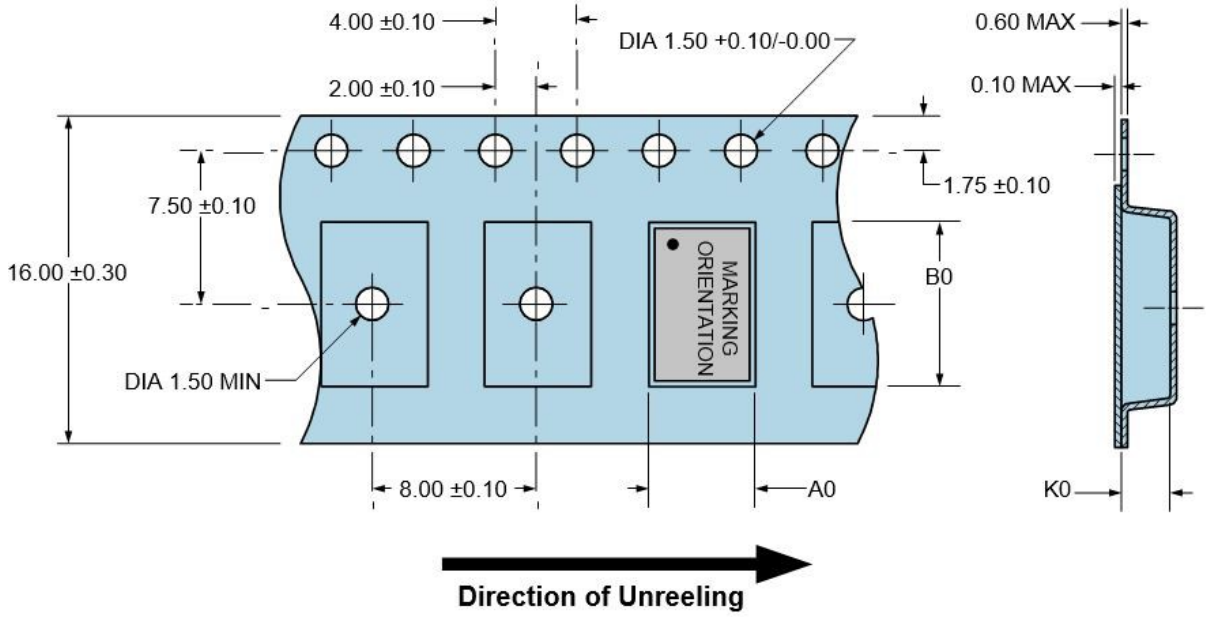

**Note 1:** An external 0.1µF low frequency tantalum bypass capacitor in parallel with a 0.01µF high frequency ceramic bypass Capacitor close to the package ground and supply voltage pin is required.
**Note 2:** A low input capacitance (<12pF), 10X Attentuation Factor, High Impedance (>10Mohms), and 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'.

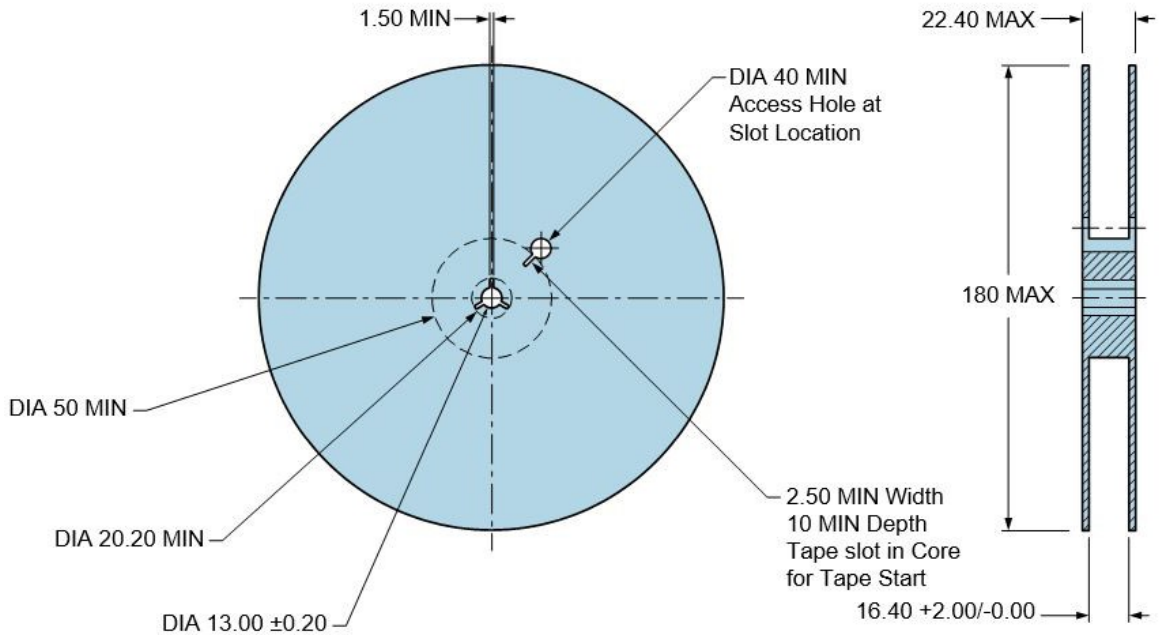
## TAPE & REEL DIMENSIONS

Quantity per Reel: 1000 Units

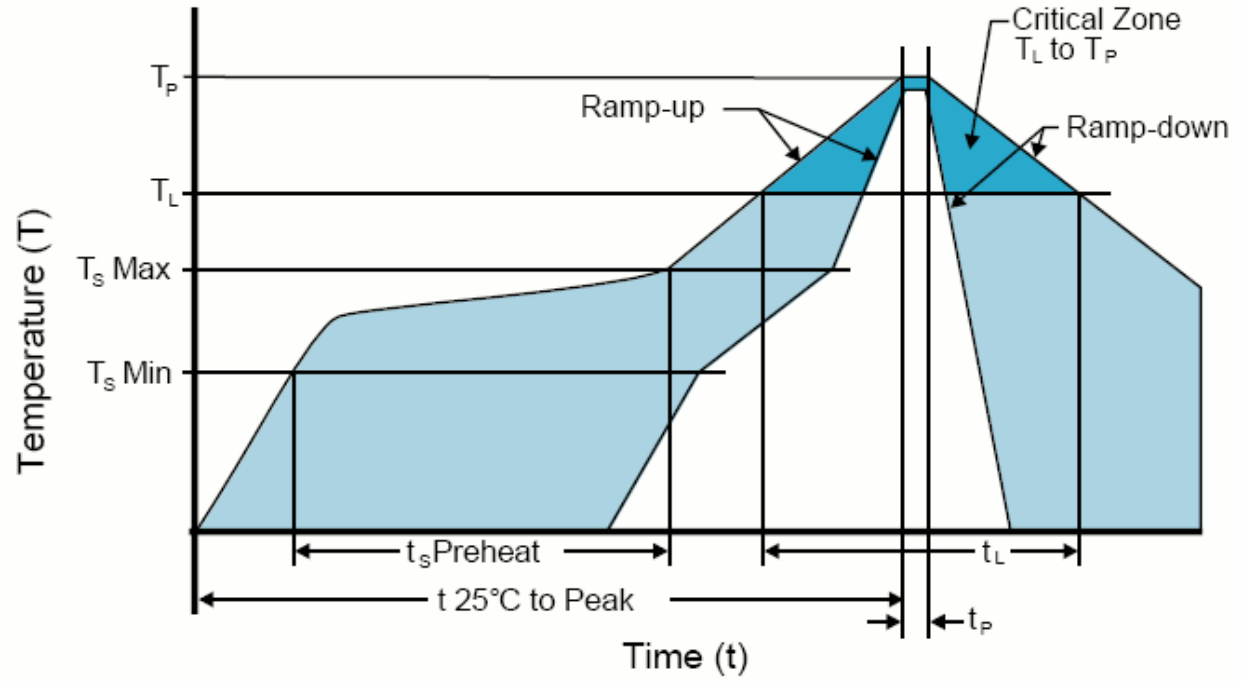
All Dimensions in Millimeters

Compliant to EIA-481



## RECOMMENDED SOLDER REFLOW METHOD

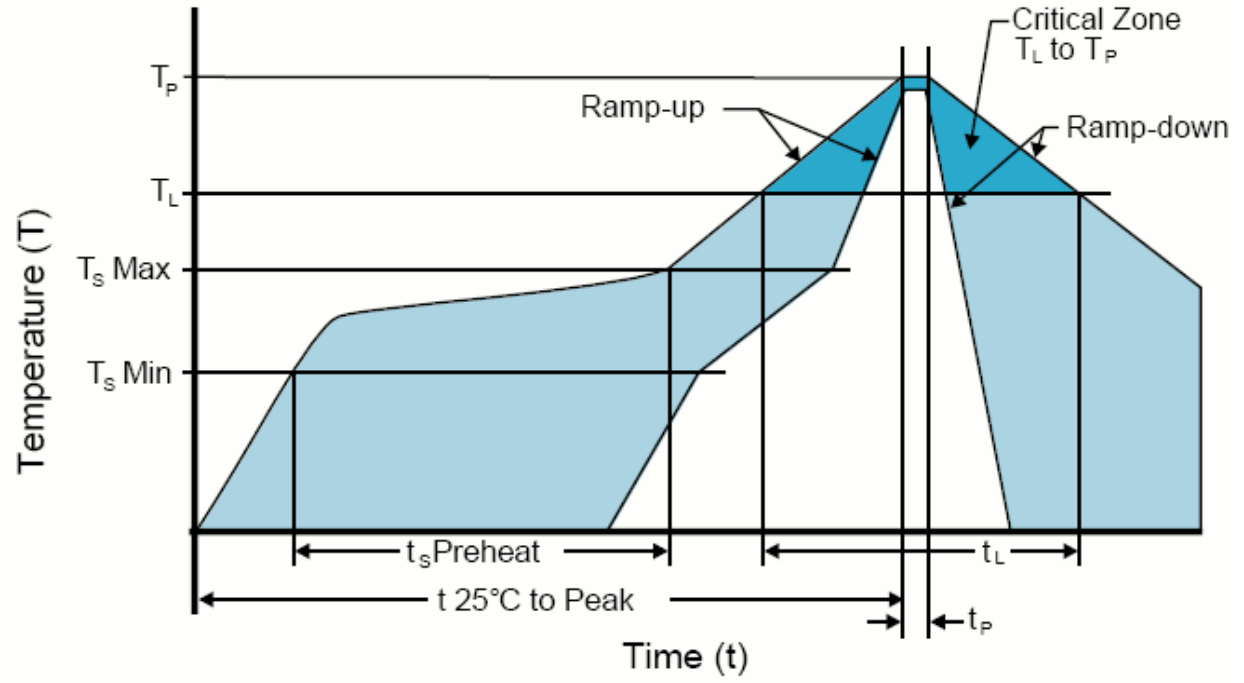



| HIGH TEMPERATURE INFRARED/CONVECTION | |
|---|---|
| **$T_S$ MAX to $T_L$ (Ramp-up Rate)** | 3°C/Second Maximum |
| **Preheat**<br>**- Temperature Minimum ($T_S$ MIN)**<br>**- Temperature Typical ($T_S$ TYP)**<br>**- Temperature Maximum($T_S$ MAX)**<br>**- Time ($t_S$)** | <br>150°C<br>175°C<br>200°C<br>60 - 180 Seconds |
| **Ramp-up Rate ($T_L$ to $T_P$)** | 3°C/Second Maximum |
| **Time Maintained Above:**<br>**- Temperature ($T_L$)**<br>**- Time ($t_L$)** | <br>217°C<br>60 - 150 Seconds |
| **Peak Temperature ($T_P$)** | 260°C Maximum for 10 Seconds Maximum |
| **Target Peak Temperature($T_P$ Target)** | 250°C +0/-5°C |
| **Time within 5°C of actual peak ($t_p$)** | 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 | |
|---|---|
| **$T_S$ MAX to $T_L$ (Ramp-up Rate)** | 5°C/Second Maximum |
| **Preheat**<br>**- Temperature Minimum ($T_s$ MIN)**<br>**- Temperature Typical ($T_s$ TYP)**<br>**- Temperature Maximum($T_s$ MAX)**<br>**- Time ($t_s$)** | <br>N/A<br>150°C<br>N/A<br>60 - 120 Seconds |
| **Ramp-up Rate ($T_L$ to $T_P$)** | 5°C/Second Maximum |
| **Time Maintained Above:**<br>**- Temperature ($T_L$)**<br>**- Time ($t_L$)** | <br>150°C<br>200 Seconds Maximum |
| **Peak Temperature ($T_P$)** | 240°C Maximum |
| **Target Peak Temperature ($T_P$ Target)** | 240°C Maximum 2 Times / 230˚C Maximum 1 Time |
| **Time within 5°C of actual peak ($t_p$)** | 10 Seconds Maximum 2 Times / 80 Seconds Maximum 1 Time |
| **Ramp-down Rate** | 5°C/Second Maximum |
| **Time 25°C to Peak Temperature (t)** | N/A |
| **Moisture Sensitivity Level** | Level 1 |
| **Additional Notes** | 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.)