

## REGULATORY COMPLIANCE



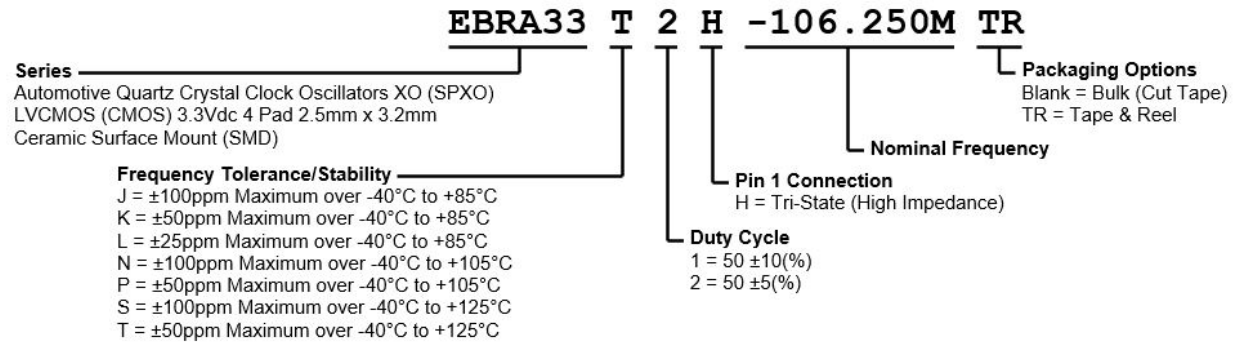
## ITEM DESCRIPTION

Automotive Grade Quartz Crystal Clock Oscillators XO (SPXO) LVCMOS (CMOS) 3.3Vdc 4 Pad 2.5mm x 3.2mm Ceramic Surface Mount (SMD)

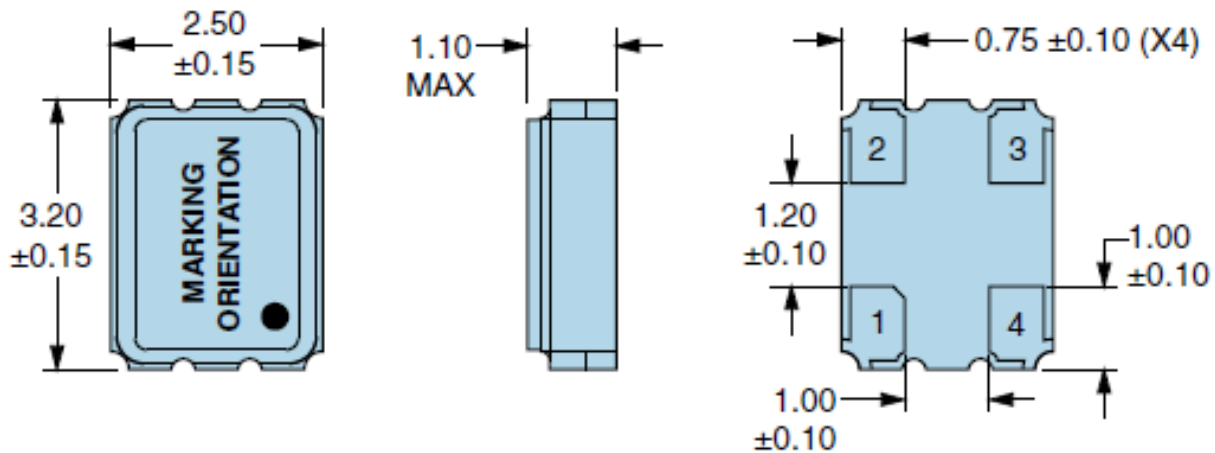
## ELECTRICAL SPECIFICATIONS

Nominal Frequency	1MHz to 156.25MHz
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, and First Year Aging at 25°C $\pm 100\text{ppm}$ Maximum over $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $\pm 50\text{ppm}$ Maximum over $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $\pm 25\text{ppm}$ Maximum over $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ $\pm 100\text{ppm}$ Maximum over $-40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ $\pm 50\text{ppm}$ Maximum over $-40^{\circ}\text{C}$ to $+105^{\circ}\text{C}$ $\pm 100\text{ppm}$ Maximum over $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ $\pm 50\text{ppm}$ Maximum over $-40^{\circ}\text{C}$ to $+125^{\circ}\text{C}$
Aging at 25°C	$\pm 3\text{ppm/year}$ Maximum
Supply Voltage	3.3Vdc $\pm 10\%$
Input Current	Unloaded 10mA Maximum
Output Voltage Logic High (Voh)	IOH = -4mA 90% of Vdd Minimum
Output Voltage Logic Low (Vol)	IOL = +4mA 10% of Vdd Maximum
Rise/Fall Time	Measured at 20% to 80% of Waveform 6nSec Maximum
Duty Cycle	Measured at 50% of Waveform 50 $\pm 10(\%)$ 50 $\pm 5(\%)$
Load Drive Capability	15pF Maximum
Output Logic Type	CMOS
Pin 1 Connection	Tri-State (High Impedance)
Output Control Input Voltage Logic High (Vih)	70% of Vdd Minimum or No Connect to Enable Output
Output Control Input Voltage Logic Low (Vil)	30% of Vdd Maximum to Disable Output (High Impedance)
Standby Current	Without Load 10 $\mu\text{A}$ Maximum
Period Jitter (RMS)	5pSec Maximum
Period Jitter (pk-pk)	30pSec Maximum
Start Up Time	10mSec Maximum
Storage Temperature Range	$-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$

## PART NUMBERING GUIDE



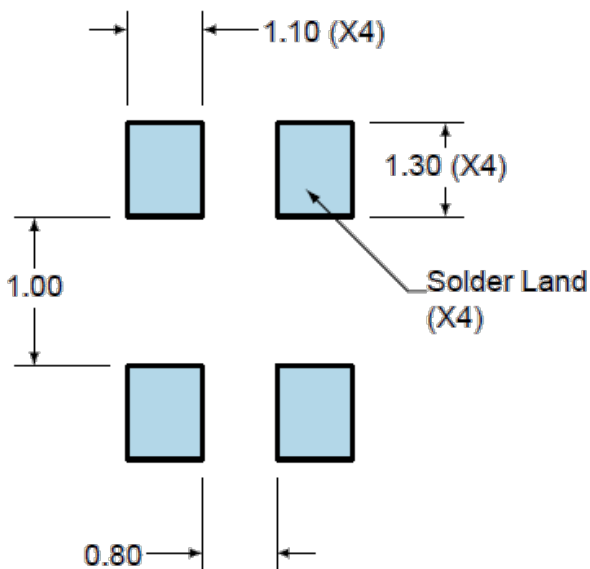
## MECHANICAL DIMENSIONS



Seam Sealed

Terminal Plating Thickness: Gold (0.3 to 1.0µm) over Nickel (1.27 to 8.89µm).

## SUGGESTED SOLDER PAD LAYOUT

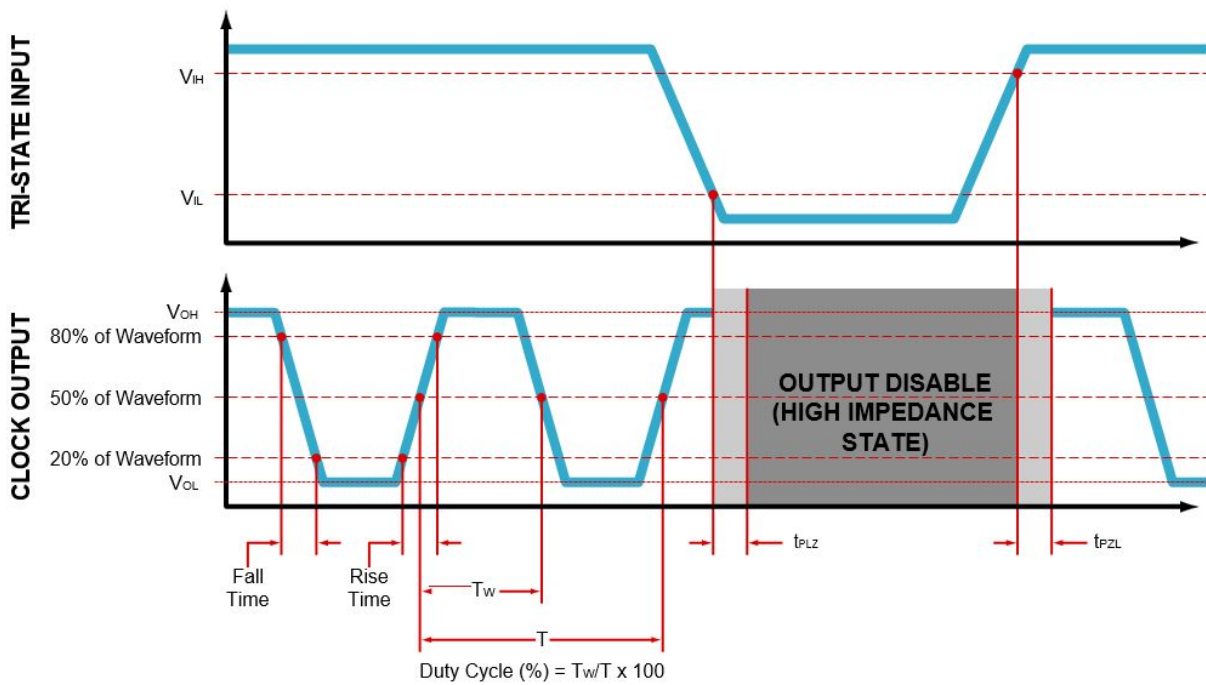


PIN	CONNECTION
1	Tri-State
2	Case/Ground
3	Output
4	Supply Voltage

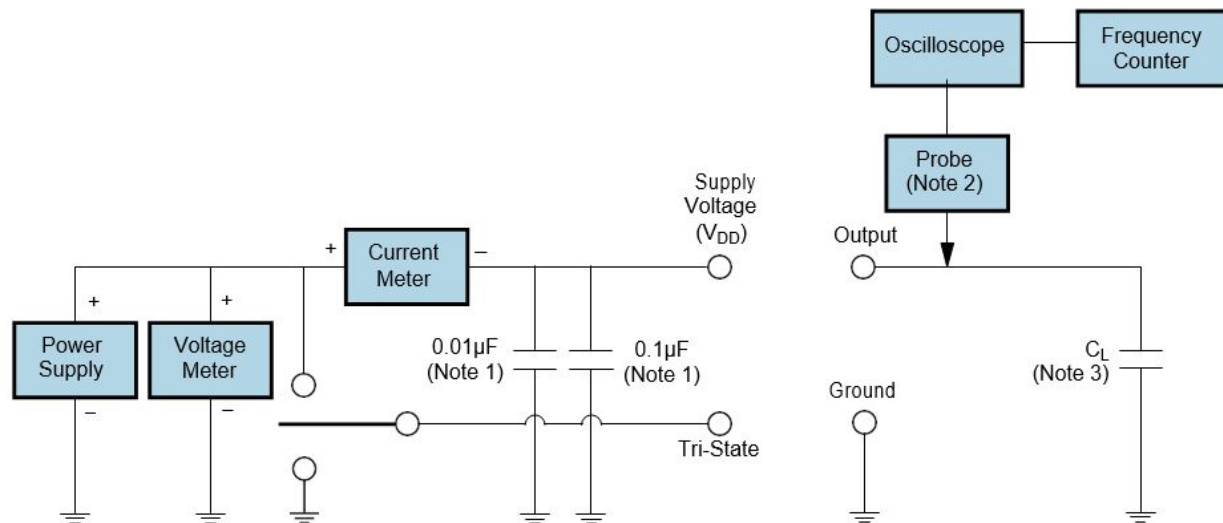
All Tolerances are  $\pm 0.1$ 

All Dimensions in Millimeters

## OUTPUT WAVEFORM &amp; TIMING DIAGRAM



## TEST CIRCUIT FOR CMOS OUTPUT



**Note 1:** An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

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

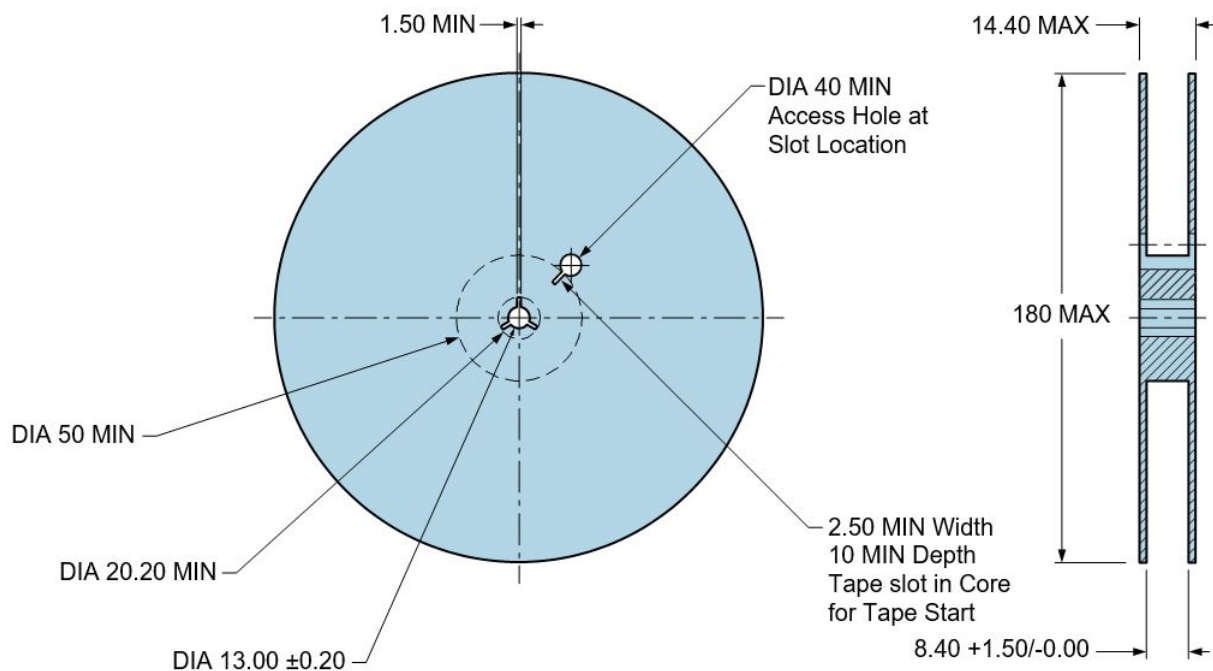
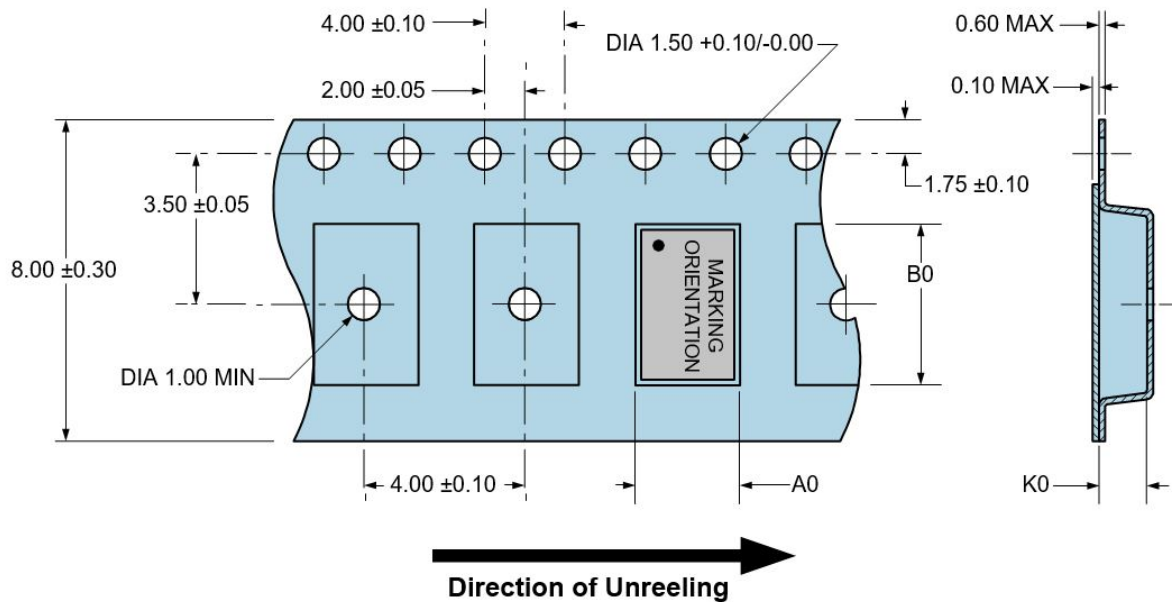
**Note 3:** Capacitance value  $C_L$  includes sum of all probe and fixture capacitance.

## TAPE & REEL DIMENSIONS

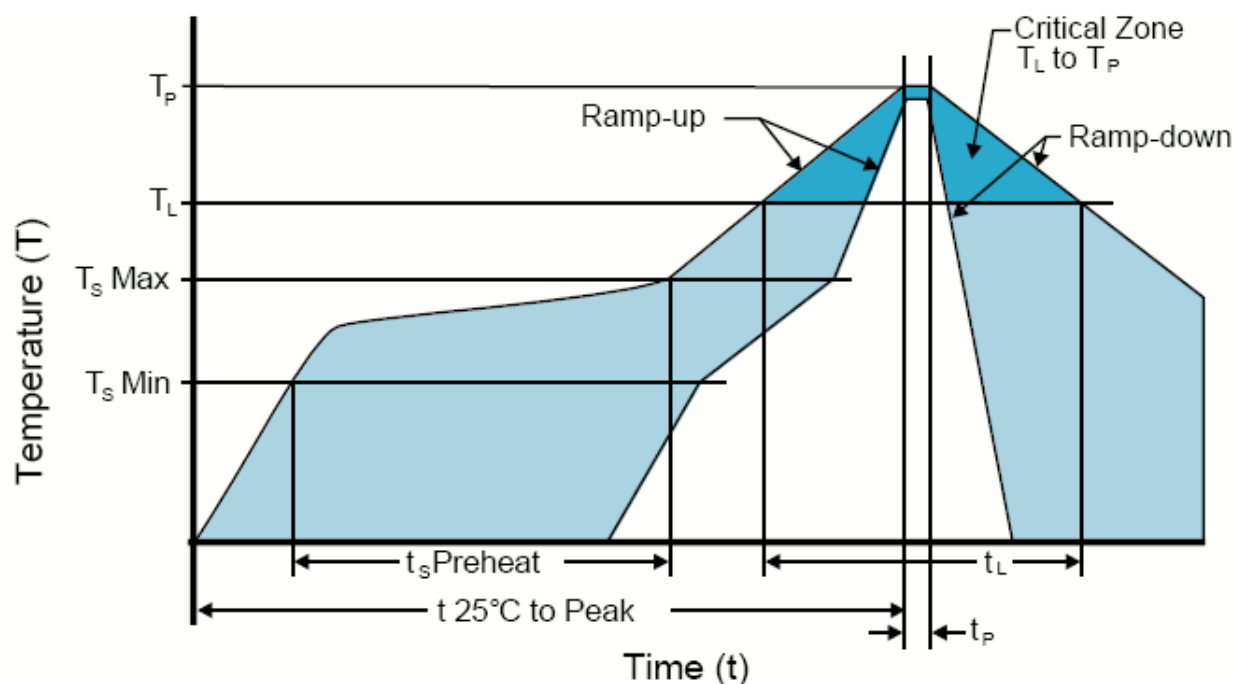
Quantity per Reel: 3,000 Units

All Dimensions in Millimeters

Compliant to EIA-481



## RECOMMENDED SOLDER REFLOW METHOD



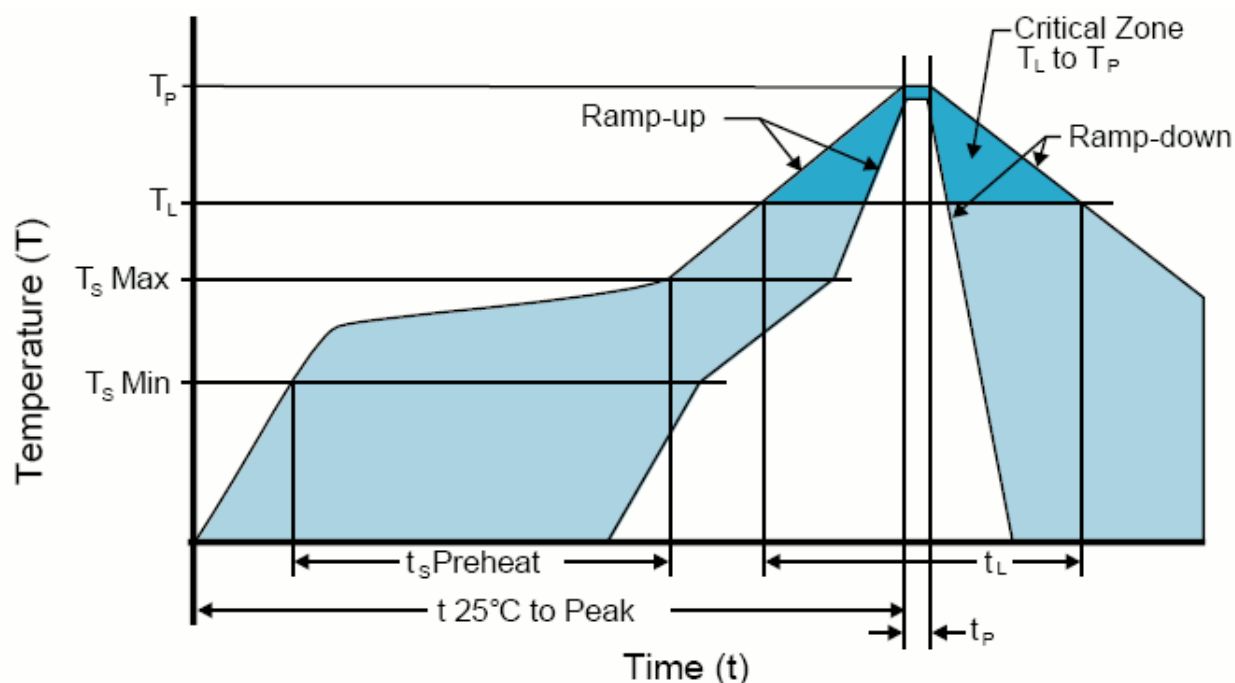
## HIGH TEMPERATURE INFRARED/CONVECTION

<b><math>T_s</math> MAX to <math>T_L</math> (Ramp-up Rate)</b>	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum ( $T_s$ MIN)	150°C
- Temperature Typical ( $T_s$ TYP)	175°C
- Temperature Maximum ( $T_s$ MAX)	200°C
- Time ( $t_s$ MIN)	60 - 180 Seconds
<b>Ramp-up Rate (<math>T_L</math> to <math>T_P</math>)</b>	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature ( $T_L$ )	217°C
- Time ( $t_L$ )	60 - 150 Seconds
<b>Peak Temperature (<math>T_P</math>)</b>	260°C Maximum for 10 Seconds Maximum
<b>Target Peak Temperature (<math>T_P</math> Target)</b>	250°C +0/-5°C
<b>Time within 5°C of actual peak (<math>t_P</math>)</b>	20 - 40 Seconds
<b>Ramp-down Rate</b>	6°C/Second Maximum
<b>Time 25°C to Peak Temperature (t)</b>	8 Minutes Maximum
<b>Moisture Sensitivity Level</b>	Level 1
<b>Additional Notes</b>	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 ( $t_s$ MIN)	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.)