

## REGULATORY COMPLIANCE

 <p><b>Lead Free</b> COMPLIANT</p>	 <p><b>EU RoHS</b> 2011/65 + 2015/863 COMPLIANT</p>	 <p><b>China RoHS</b> COMPLIANT</p>	 <p><b>REACH</b> SVHC COMPLIANT</p>	 <p><b>DRC</b> CONFLICT FREE</p>
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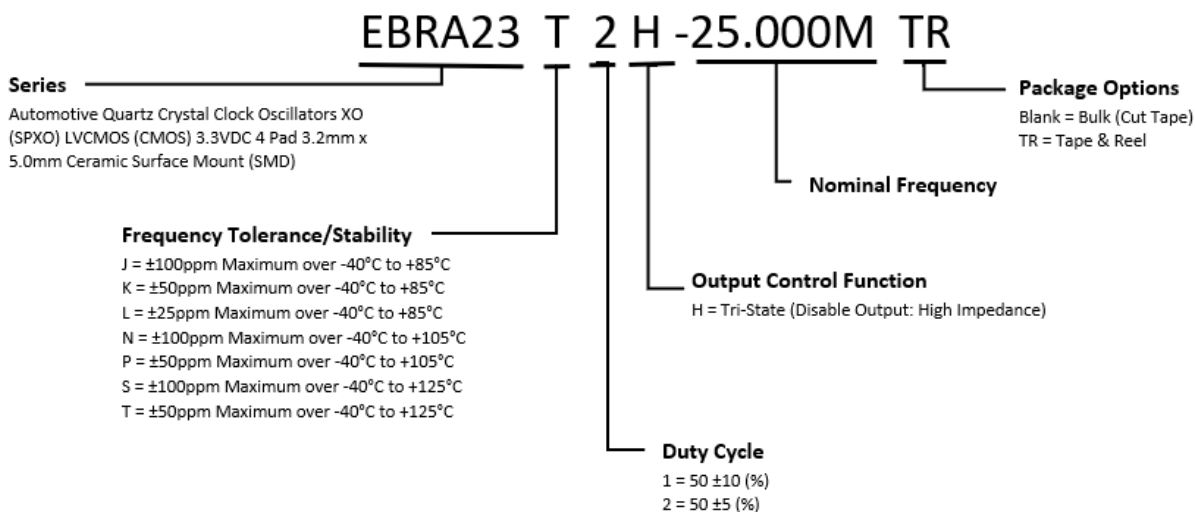
## ITEM DESCRIPTION

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

## ELECTRICAL SPECIFICATIONS

<b>Nominal Frequency</b>	1.000MHz to 156.250MHz
<b>Frequency Tolerance/Stability</b>	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 $+125^{\circ}\text{C}$
<b>Aging at 25°C</b>	$\pm 3\text{ppm/year}$ Maximum
<b>Supply Voltage</b>	3.3Vdc $\pm 10\%$
<b>Input Current</b>	Unloaded 10mA Maximum (1 to 60MHz) 25mA Maximum (60.001 to 156.250MHz)
<b>Output Voltage Logic High (Voh)</b>	IOH = -4mA 90% of Vdd Minimum
<b>Output Voltage Logic Low (Vol)</b>	IOL = +4mA 10% of Vdd Maximum
<b>Rise/Fall Time</b>	Measured at 20% to 80% of Waveform 6nSec Maximum
<b>Duty Cycle</b>	Measured at 50% of Waveform 50 $\pm 10(\%)$ 50 $\pm 5(\%)$
<b>Load Drive Capability</b>	15pF Maximum
<b>Output Logic Type</b>	CMOS
<b>Pin 1 Connection</b>	Tri-State (High Impedance)
<b>Output Control Input Voltage Logic High (Vih)</b>	70% of Vdd Minimum or No Connect to Enable Output
<b>Output Control Input Voltage Logic Low (Vil)</b>	30% of Vdd Maximum to Disable Output (High Impedance)
<b>Standby Current</b>	Without Load 10 $\mu\text{A}$ Maximum
<b>Period Jitter (RMS)</b>	5pSec Maximum
<b>Period Jitter (pk-pk)</b>	30pSec Maximum
<b>Start Up Time</b>	10mSec Maximum
<b>Storage Temperature Range</b>	$-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$

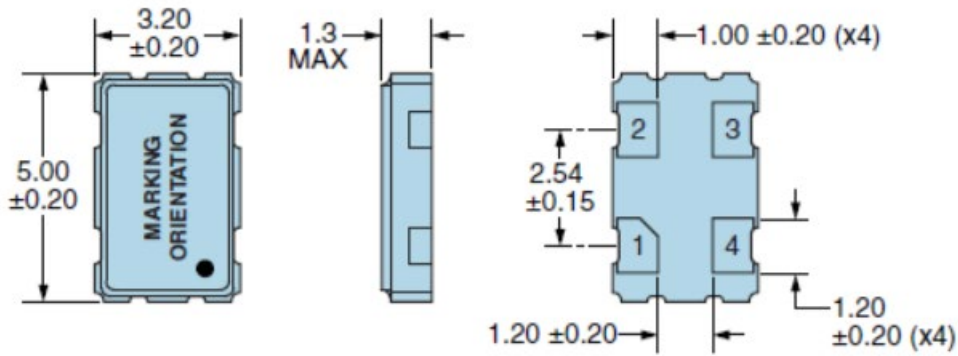
## PART NUMBERING GUIDE



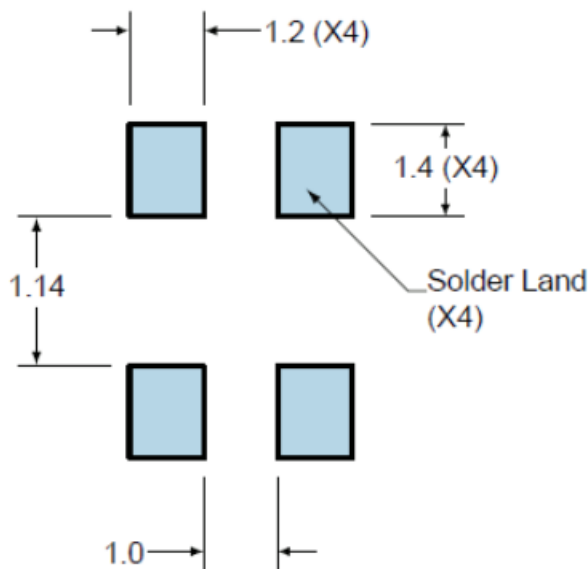
## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

<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**

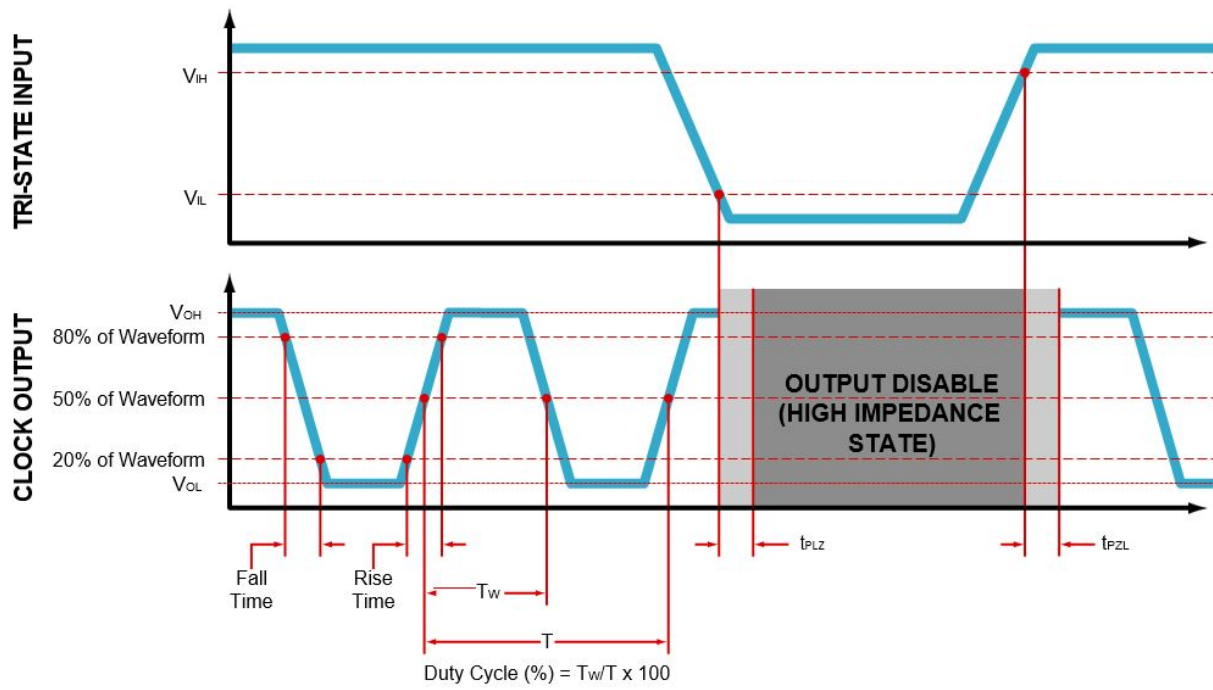


PIN	CONNECTION
1	Tri-State
2	Case/Ground
3	Output
4	Supply Voltage

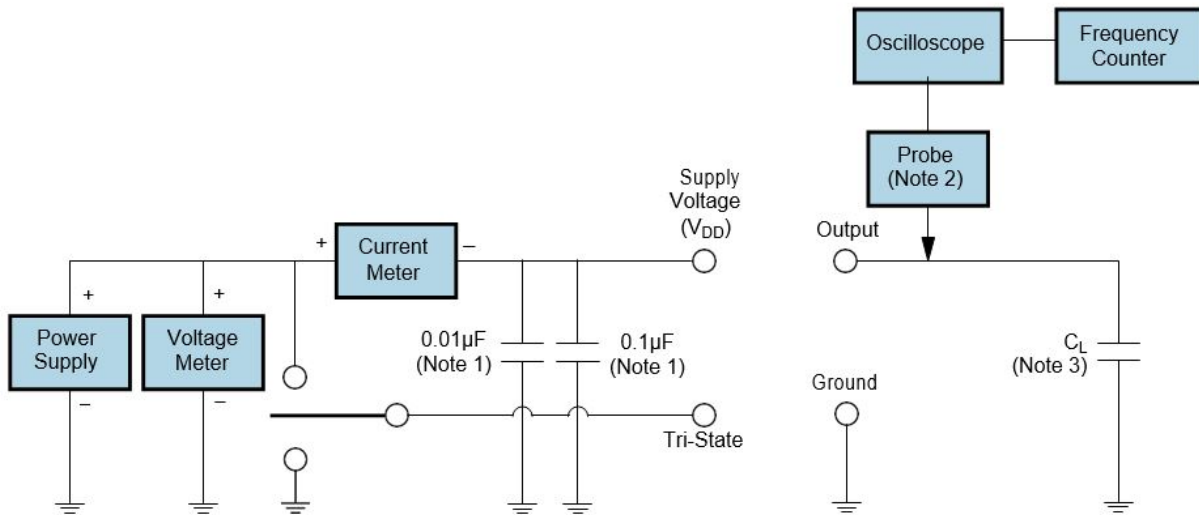
All Tolerances are  $\pm 0.1$

**All Dimensions in Millimeters**

OUTPUT WAVEFORM & TIMING DIAGRAM



## TEST CIRCUIT FOR CMOS OUTPUT



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

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

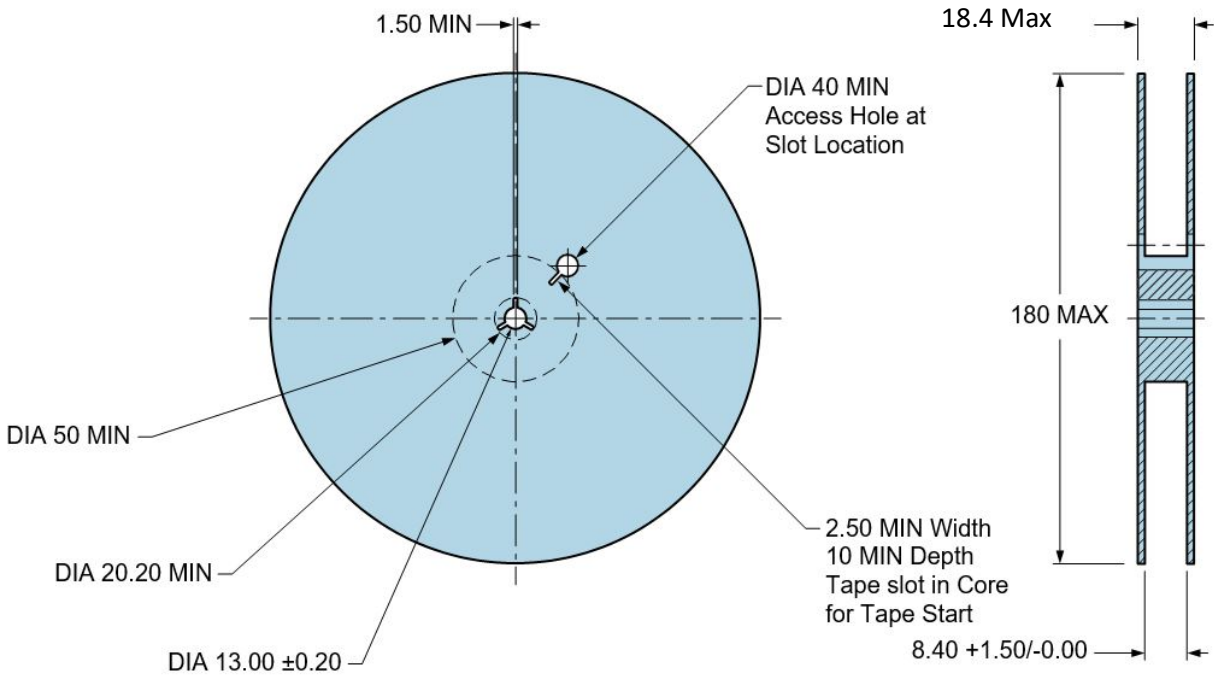
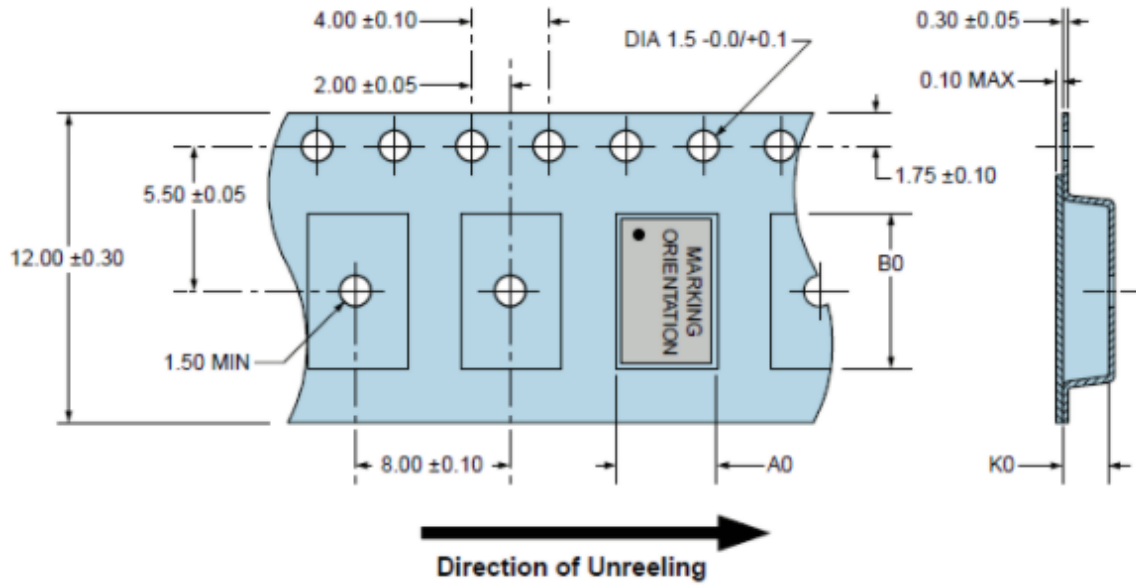
**Note 3:** Capacitance value C<sub>L</sub> includes sum of all probe and fixture capacitance.

## TAPE & REEL DIMENSIONS

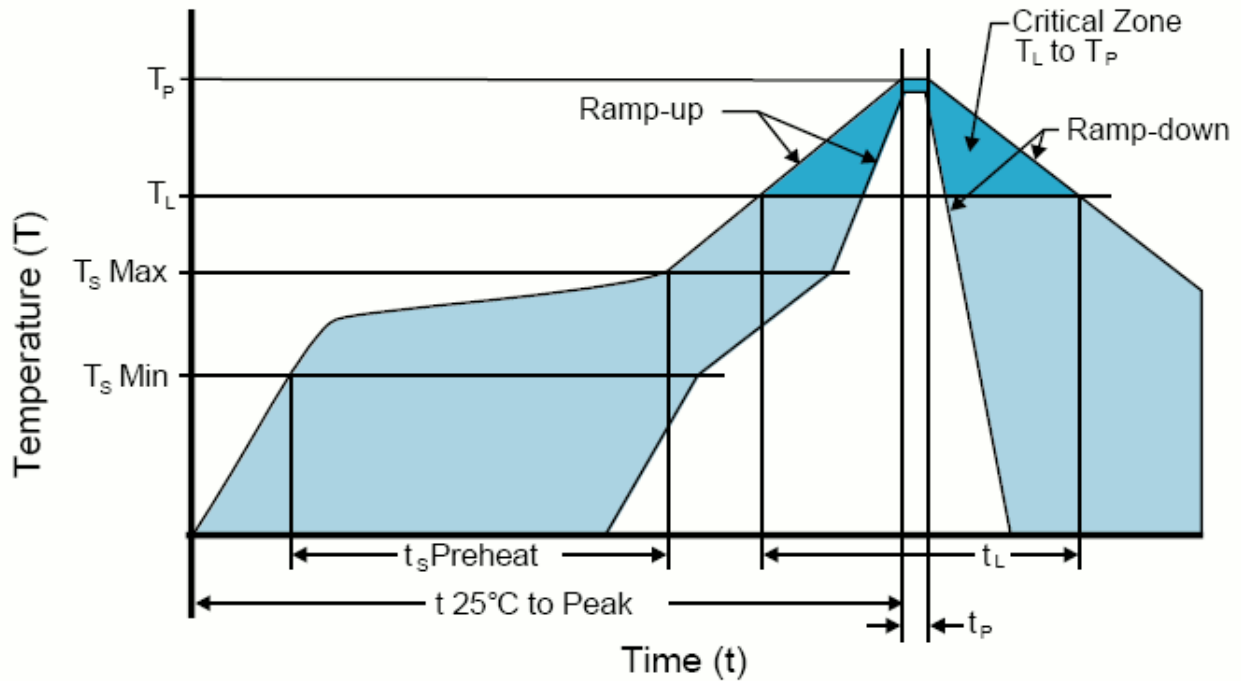
Quantity per Reel: 3,000 Units

All Dimensions in Millimeters

Compliant to EIA-481



RECOMMENDED SOLDER REFLOW METHOD



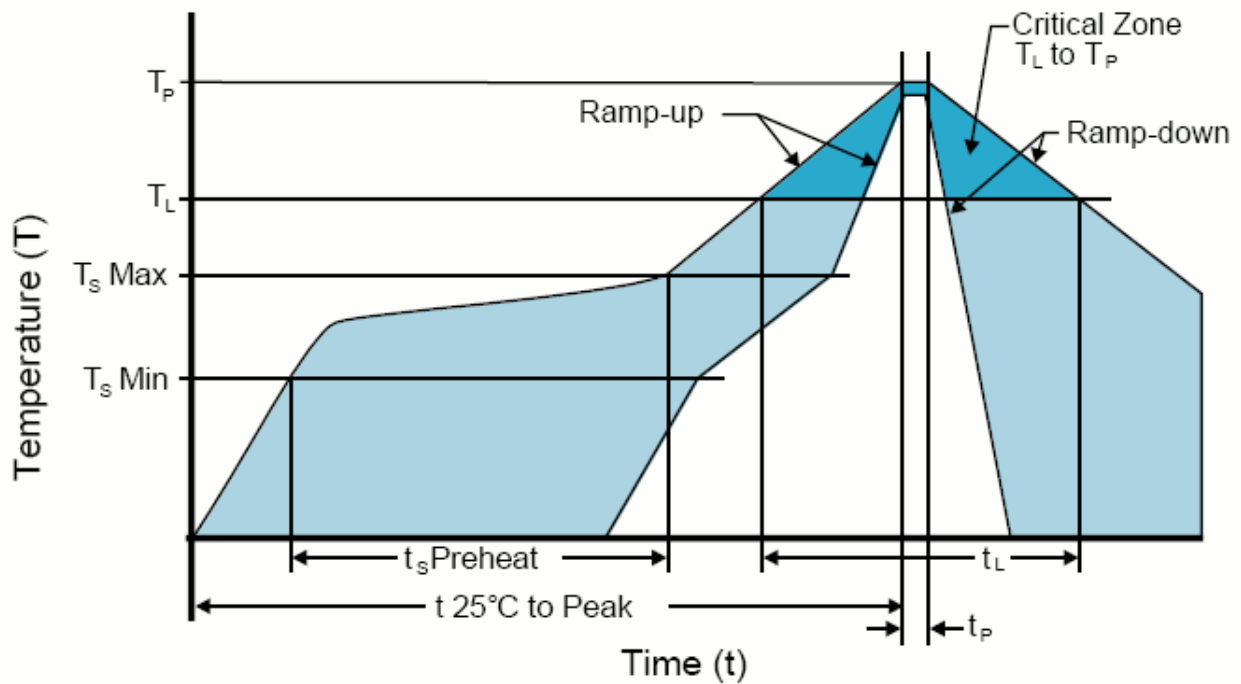
**HIGH TEMPERATURE INFRARED/CONVECTION**

T <sub>S</sub> MAX to T <sub>L</sub> (Ramp-up Rate)	3°C/Second Maximum
<b>Preheat</b>	
- 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> MIN)	60 - 180 Seconds
Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- 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**

T <sub>S</sub> MAX to T <sub>L</sub> (Ramp-up Rate)	5°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum (T <sub>S</sub> MIN)	N/A
- Temperature Typical (T <sub>S</sub> TYP)	150°C
- Temperature Maximum(T <sub>S</sub> MAX)	N/A
- Time (t <sub>s</sub> MIN)	60 - 120 Seconds
Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )	5°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature (T <sub>L</sub> )	150°C
- Time (t <sub>L</sub> )	200 Seconds Maximum
Peak Temperature (T <sub>P</sub> )	240°C Maximum
Target Peak Temperature(T <sub>P</sub> Target)	240°C Maximum 2 Times/230°C Maximum 1Time
Time within 5°C of actual peak (t <sub>P</sub> )	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.)



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