

## REGULATORY COMPLIANCE

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

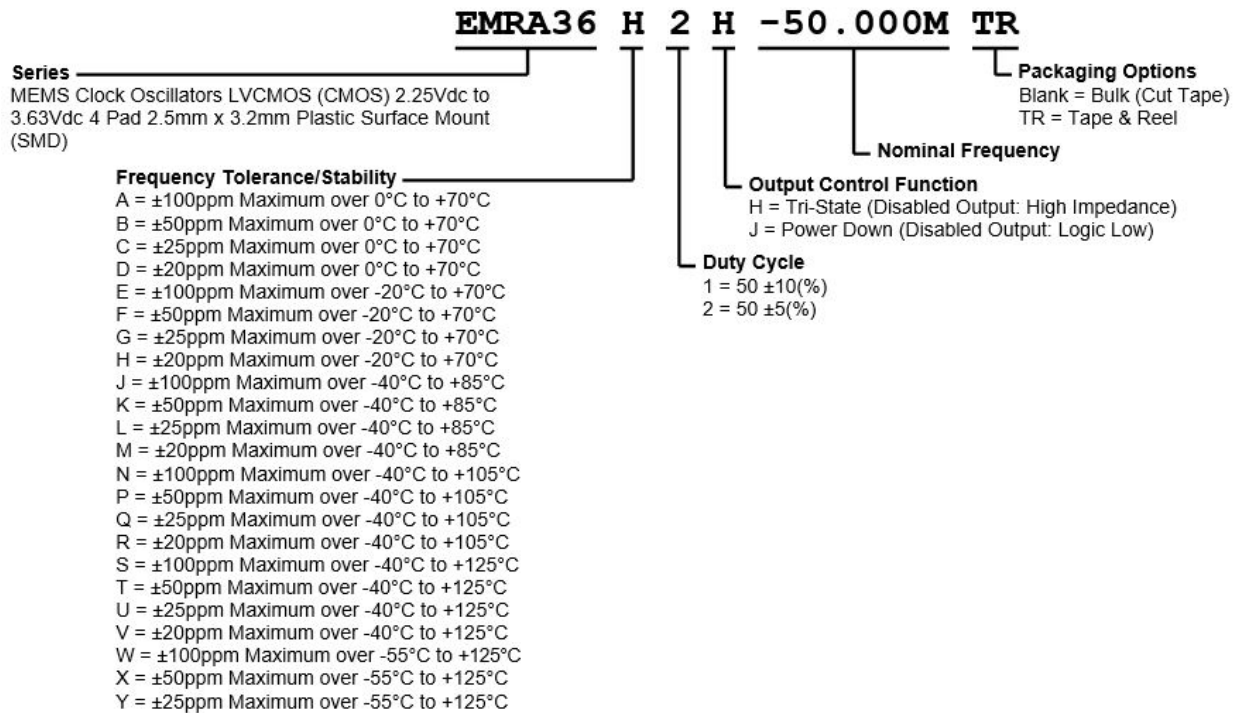
MEMS Clock Oscillators LVCMOS (CMOS) 2.25Vdc to 3.63Vdc 4 Pad 2.5mm x 3.2mm Plastic Surface Mount (SMD)

## ELECTRICAL SPECIFICATIONS

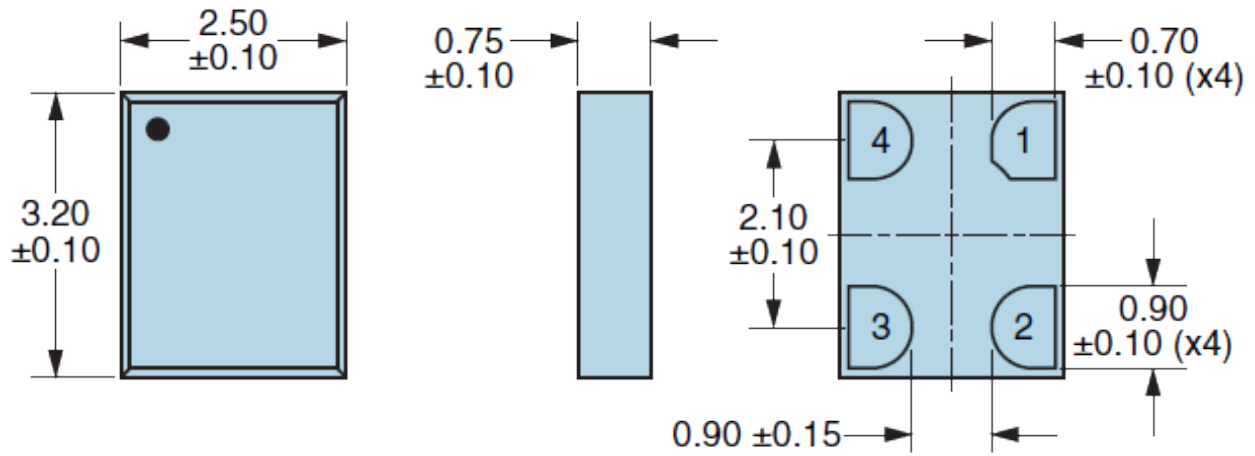
<b>Nominal Frequency</b>	1MHz to 137MHz
<b>Frequency Tolerance/Stability</b>	<p>Inclusive of all conditions: Calibration Tolerance at 25°C, Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, and First Year Aging at 25°C</p> <p>±100ppm Maximum over 0°C to +70°C          ±50ppm Maximum over 0°C to +70°C          ±25ppm Maximum over 0°C to +70°C          ±20ppm Maximum over 0°C to +70°C          ±100ppm Maximum over -20°C to +70°C          ±50ppm Maximum over -20°C to +70°C          ±25ppm Maximum over -20°C to +70°C          ±20ppm Maximum over -20°C to +70°C          ±100ppm Maximum over -40°C to +85°C          ±50ppm Maximum over -40°C to +85°C          ±25ppm Maximum over -40°C to +85°C          ±20ppm Maximum over -40°C to +85°C          ±100ppm Maximum over -40°C to +105°C          ±50ppm Maximum over -40°C to +105°C          ±25ppm Maximum over -40°C to +105°C          ±20ppm Maximum over -40°C to +105°C          ±100ppm Maximum over -40°C to +125°C          ±50ppm Maximum over -40°C to +125°C          ±25ppm Maximum over -40°C to +125°C          ±20ppm Maximum over -40°C to +125°C          ±100ppm Maximum over -55°C to +125°C          ±50ppm Maximum over -55°C to +125°C          ±25ppm Maximum over -55°C to +125°C</p>
<b>Aging at 25°C</b>	±1.5ppm Maximum First Year
<b>Supply Voltage</b>	2.25Vdc to 3.63Vdc
<b>Input Current</b>	<p>No Load</p> <p>5mA Maximum over Nominal Frequency of 1MHz to 20MHz</p> <p>6mA Maximum over Nominal Frequency of 20.000001MHz to 50MHz</p> <p>7mA Maximum over Nominal Frequency of 50.000001MHz to 80MHz</p> <p>9mA Maximum over Nominal Frequency of 80.000001MHz to 137MHz</p>
<b>Output Voltage Logic High (V<sub>OH</sub>)</b>	<p>I<sub>OH</sub> = -4mA</p> <p>90% of V<sub>DD</sub> Minimum</p>
<b>Output Voltage Logic Low (V<sub>OL</sub>)</b>	<p>I<sub>OL</sub> = +4mA</p> <p>10% of V<sub>DD</sub> Maximum</p>
<b>Rise/Fall Time</b>	<p>Measured from 20% to 80% of waveform</p> <p>1.2nSec Typical, 3nSec Maximum</p>
<b>Duty Cycle</b>	<p>Measured at 50% of waveform</p> <p>50 ±10(%)</p> <p>50 ±5(%)</p>
<b>Load Drive Capability</b>	15pF Maximum
<b>Output Logic Type</b>	CMOS
<b>Output Control Function</b>	<p>Tri-State (Disabled Output: High Impedance)</p> <p>Power Down (Disabled Output: Logic Low)</p>
<b>Output Control Input Voltage Logic High (V<sub>IH</sub>)</b>	70% of V <sub>DD</sub> Minimum or No Connect to Enable Output

<b>Output Control Input Voltage Logic Low (Vil)</b>	30% of Vdd Maximum to Disable Output
<b>Power Down Output Enable Time</b>	5mSec Maximum (Disabled Output: Logic Low)
<b>Tri-State Output Enable Time</b>	150nSec Maximum (Disabled Output: High Impedance)
<b>Power Down Output Disable Time</b>	150nSec Maximum (Disabled Output: Logic Low)
<b>Tri-State Output Disable Time</b>	150nSec Maximum (Disabled Output: High Impedance)
<b>Standby Current</b>	5µA Maximum (Disabled Output: Logic Low)
<b>Period Jitter (RMS)</b>	2pSec Typical, 4pSec Maximum
<b>RMS Phase Jitter (Fj = 900kHz to 7.5MHz; Random)</b>	0.5pSec Typical, 1pSec Maximum
<b>RMS Phase Jitter (Fj = 12kHz to 20MHz; Random)</b>	1.5pSec Typical, 3pSec Maximum
<b>Start Up Time</b>	5mSec Maximum
<b>Storage Temperature Range</b>	-65°C to +150°C

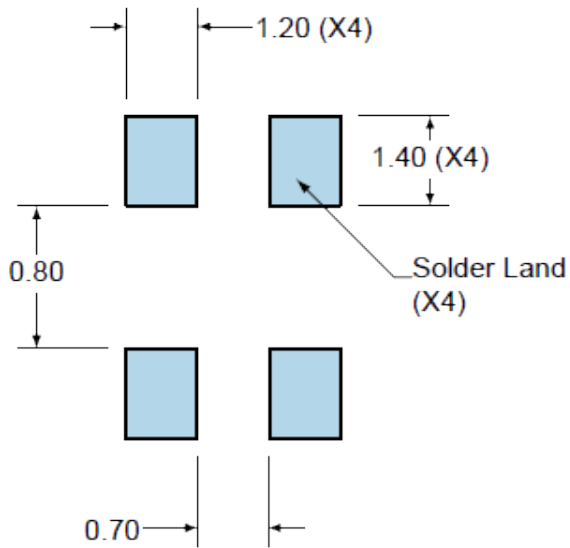
## PART NUMBERING GUIDE



**MECHANICAL DIMENSIONS**



**SUGGESTED SOLDER PAD LAYOUT**

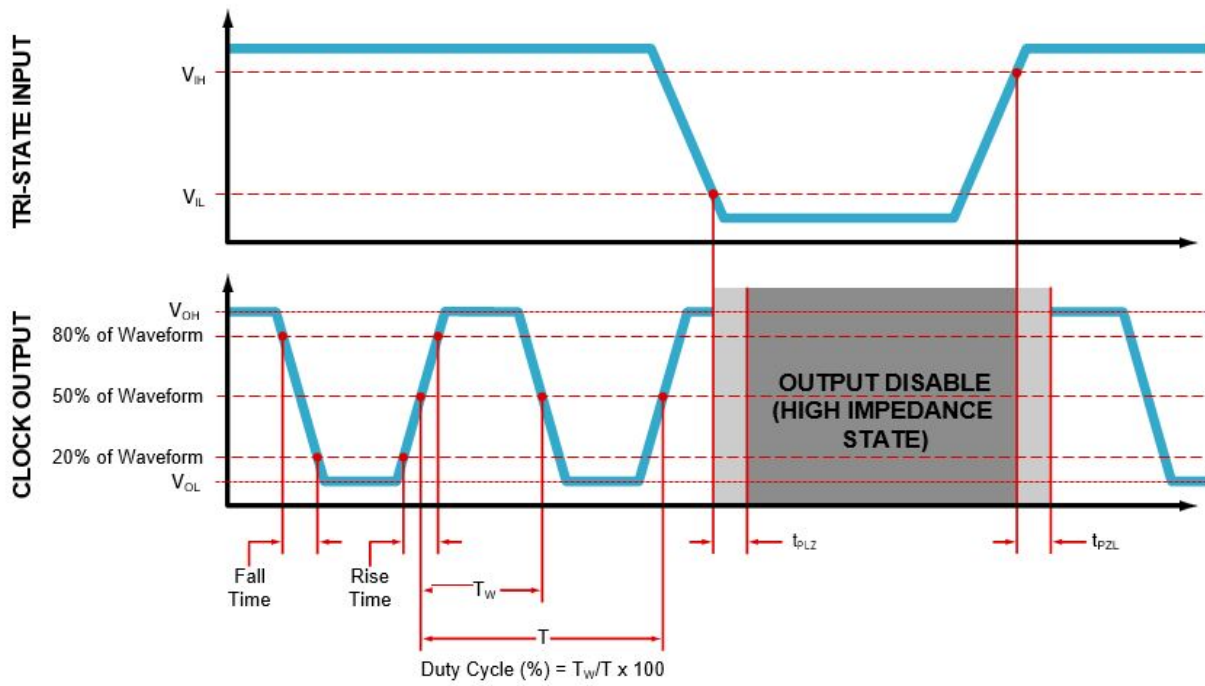


PIN	CONNECTION
1	Power Down Or Tri-State
2	Ground
3	Output
4	Supply Voltage

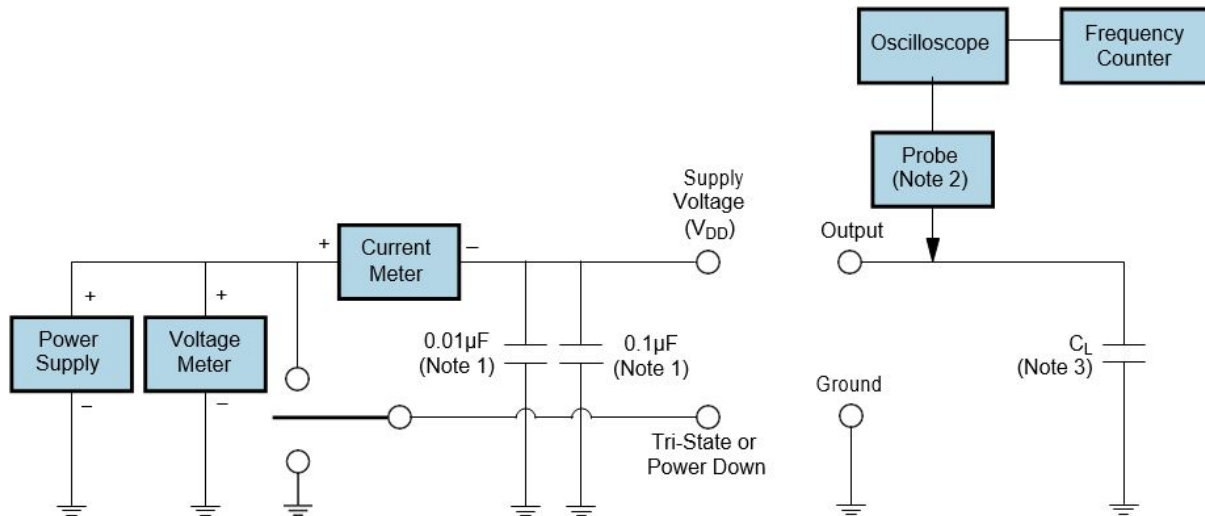
All Tolerances are  $\pm 0.1$

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

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

## TAPE & REEL DIMENSIONS

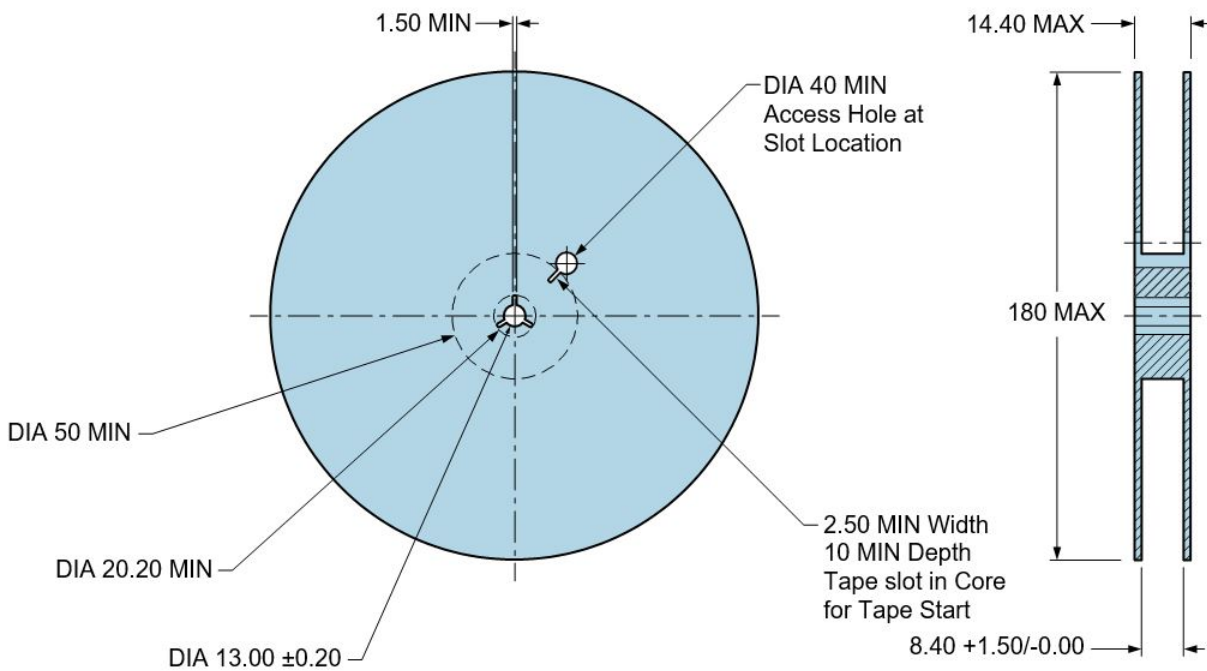
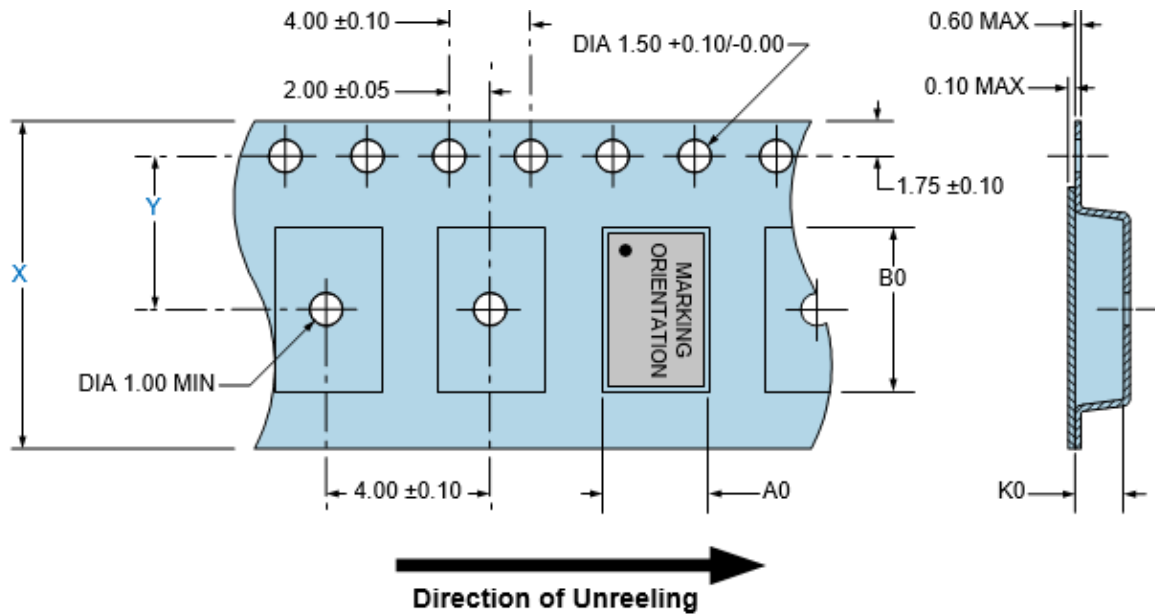
Quantity per Reel: 1,000 Units

All Dimensions in Millimeters

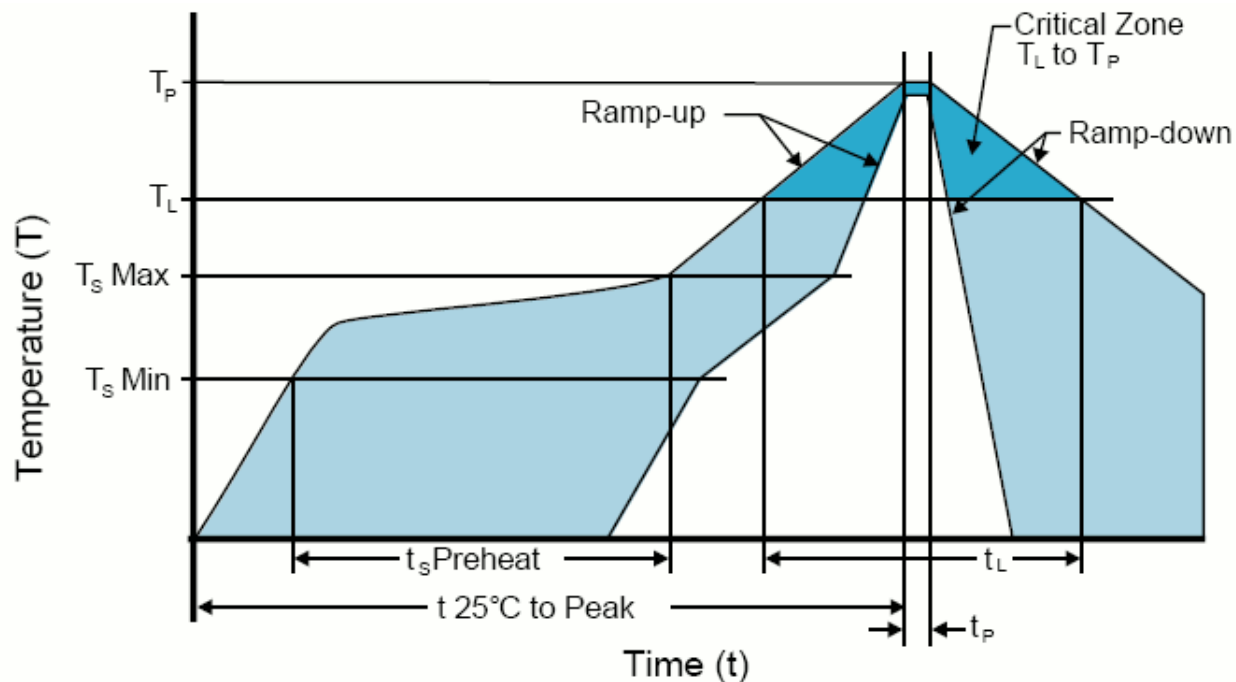
Compliant to EIA-481

X = 8.00 ±0.30 or 12 ±0.30

Y = 3.50 ±0.05 or 5.5 ±0.05



## RECOMMENDED SOLDER REFLOW METHOD



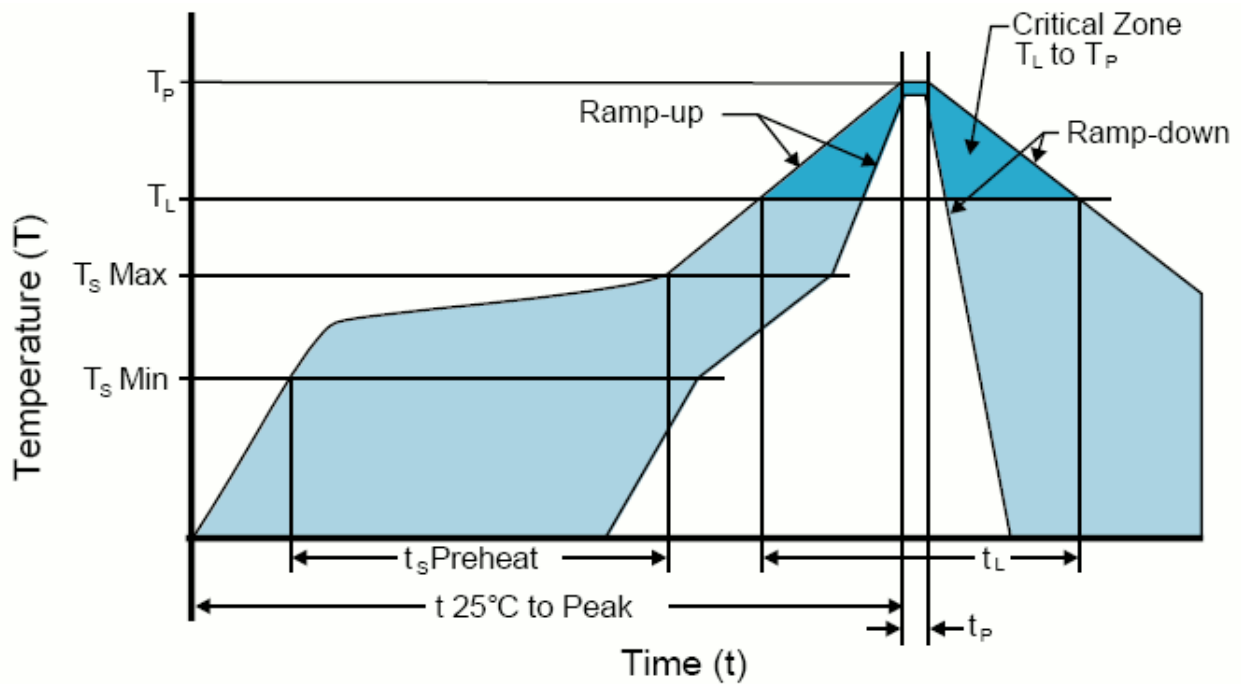
## HIGH TEMPERATURE INFRARED/CONVECTION

<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**

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.)