

## 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

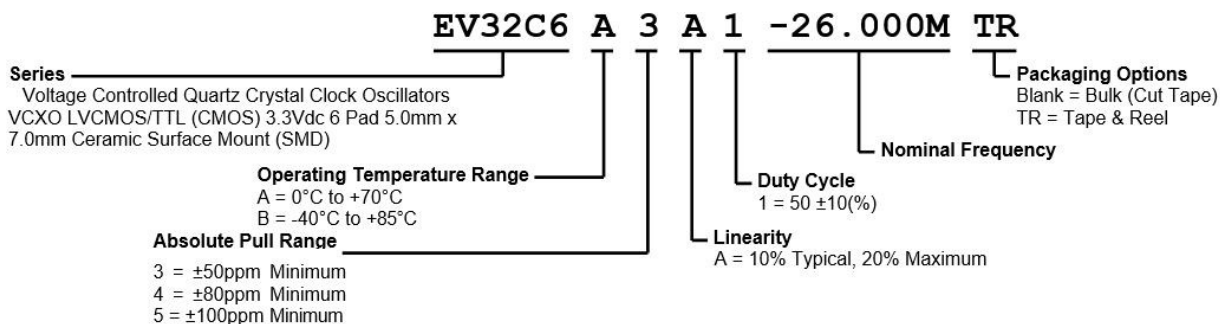
Voltage Controlled Quartz Crystal Clock Oscillators VCXO LVCMOS/TTL (CMOS) 3.3Vdc 6 Pad 5.0mm x 7.0mm Ceramic Surface Mount (SMD)

## ELECTRICAL SPECIFICATIONS

<b>Nominal Frequency</b>	1.544MHz to 77.76MHz
<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, Shock, and Vibration. ±50ppm Maximum
<b>Aging at 25°C</b>	±2ppm/First Year Typical, ±10ppm/10 Years Maximum
<b>Operating Temperature Range</b>	0°C to +70°C -40°C to +85°C
<b>Supply Voltage</b>	3.3Vdc ±10%
<b>Input Current</b>	15mA Maximum
<b>Output Voltage Logic High (V<sub>OH</sub>)</b>	I <sub>OH</sub> = -4mA 90% of V <sub>DD</sub> Minimum
<b>Output Voltage Logic Low (V<sub>OL</sub>)</b>	I <sub>OL</sub> = +4mA 10% of V <sub>DD</sub> Maximum
<b>Rise/Fall Time</b>	Measured at 20% to 80% of Waveform 5nSec Maximum
<b>Duty Cycle</b>	Measured at 50% of Waveform 50 ±10(%)
<b>Load Drive Capability</b>	10TTL Load or 30pF LVCMOS Load Maximum over Nominal Frequency of 1.544MHz to 12.288MHz 15pF LVCMOS Load Maximum over Nominal Frequency of 12.288001MHz to 77.76MHz
<b>Output Logic Type</b>	CMOS
<b>Absolute Pull Range</b>	Inclusive of all conditions: Calibration Tolerance at 25°C, Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, Shock, Vibration, and Aging over the Control Voltage (V <sub>c</sub> ). ±50ppm Minimum ±80ppm Minimum (Only available over Nominal Frequency range of 1.544MHz to 51.84MHz) ±100ppm Minimum (Only available over Nominal Frequency range of 1.544MHz to 36MHz)
<b>Control Voltage</b>	Test Condition for APR 0.3Vdc to 3.0Vdc
<b>Control Voltage Range</b>	0.0Vdc to V <sub>DD</sub>
<b>Linearity</b>	10% Typical, 20% Maximum
<b>Transfer Function</b>	Positive Transfer Characteristic
<b>Modulation Bandwidth</b>	Measured at -3dB, V <sub>c</sub> = 1.65Vdc 10kHz Minimum
<b>Input Impedance</b>	50kOhms Minimum
<b>Input Leakage Current</b>	10µA Maximum
<b>Phase Noise</b>	All Values are Typical -70dBc/Hz at offset of 10Hz -100dBc/Hz at offset of 100Hz -130dBc/Hz at offset of 1kHz -147dBc/Hz at offset of 10kHz -152dBc/Hz at offset of 100kHz -155dBc/Hz at offset of 1MHz
<b>Tri-State Input Voltage (V<sub>IH</sub> and V<sub>IL</sub>)</b>	90% of V <sub>DD</sub> Minimum or No Connect to Enable Output, 10% of V <sub>DD</sub> Maximum to Disable Output (High Impedance)
<b>RMS Phase Jitter</b>	F <sub>j</sub> = 12kHz to 20MHz; Random 1pSec Maximum

<b>Start Up Time</b>	10mSec Maximum
<b>Storage Temperature Range</b>	-55°C to +125°C

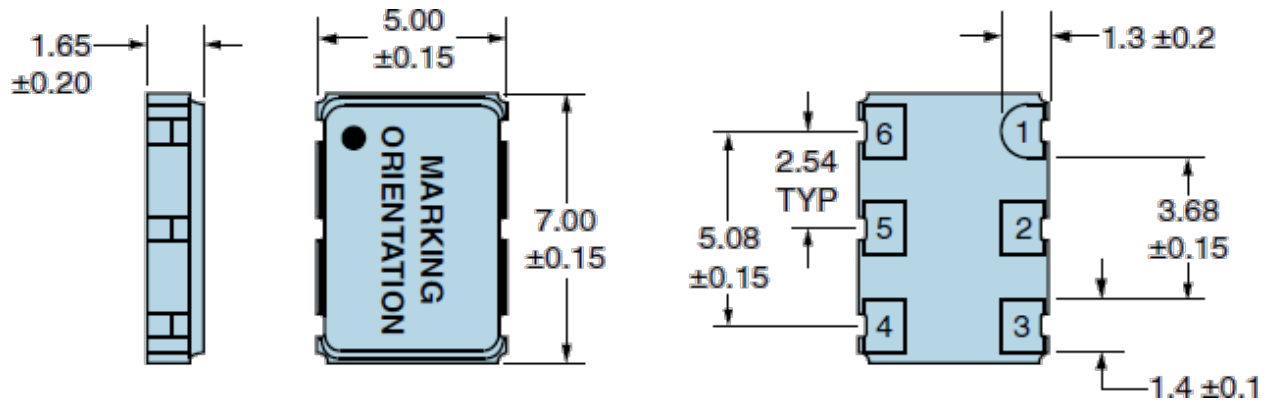
## PART NUMBERING GUIDE



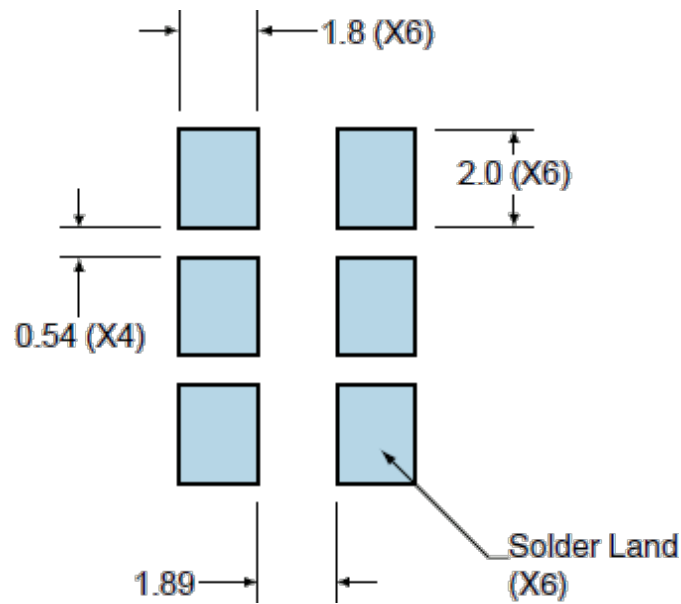
## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

<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**

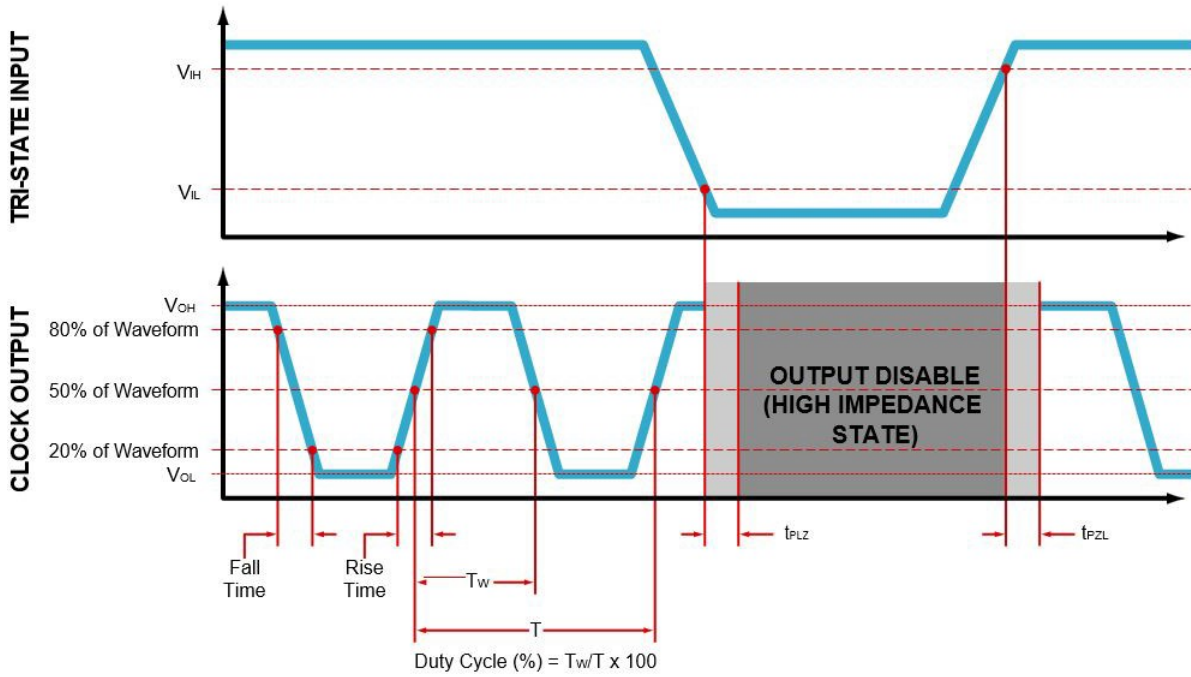


PIN	CONNECTION
1	Control Voltage
2	Tri-State
3	Case Ground
4	Output
5	No Connect
6	Supply Voltage

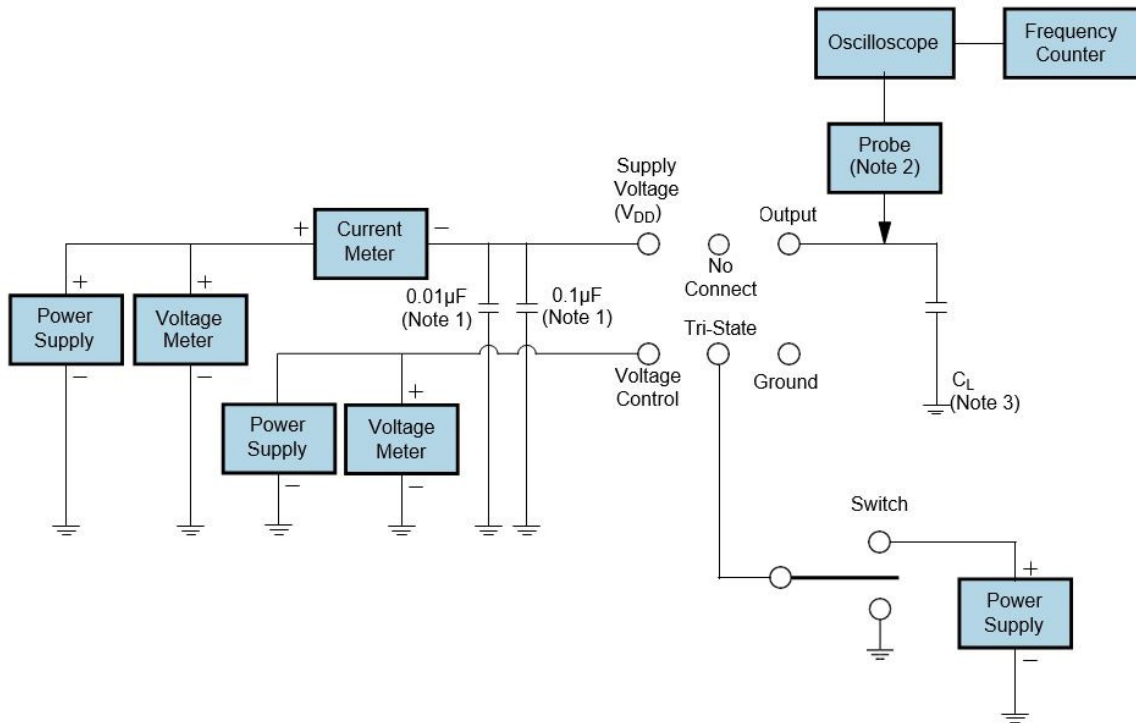
All Tolerances are  $\pm 0.1$

**All Dimensions in Millimeters**

OUTPUT WAVEFORM & TIMING DIAGRAM



## TEST CIRCUIT FOR CMOS OUTPUT



**Note 1:** An external  $0.01\mu\text{F}$  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.

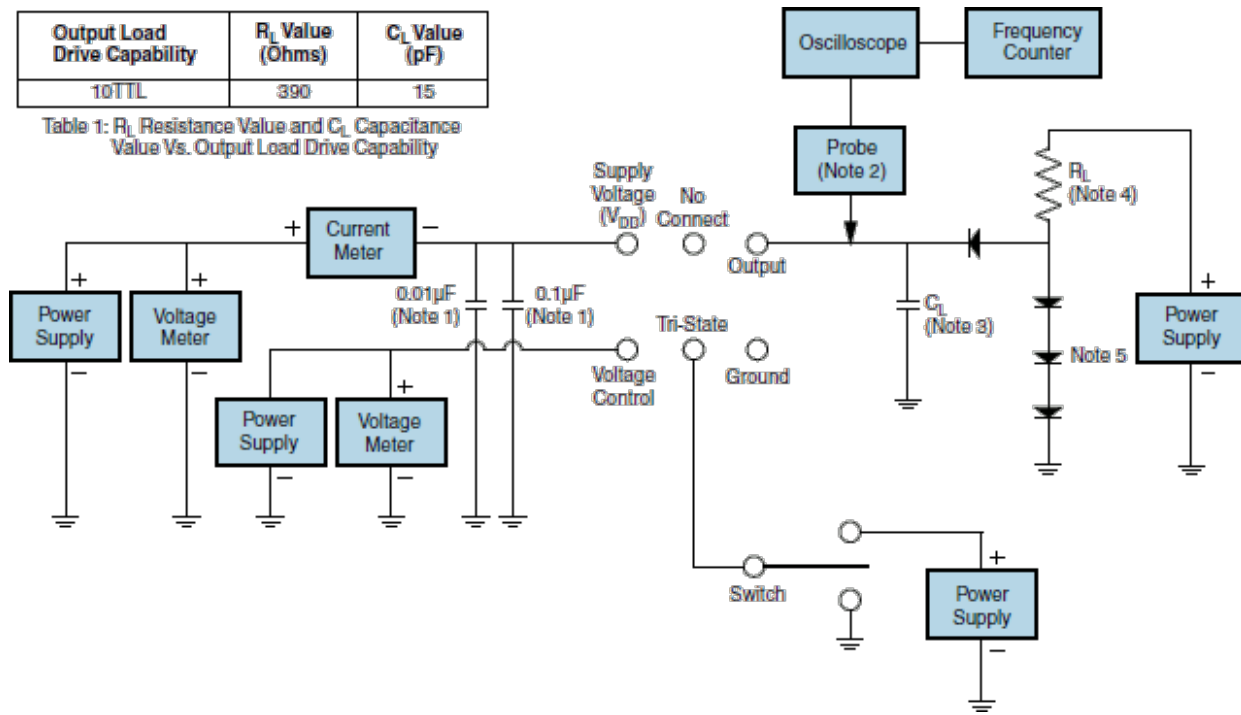
**Note 2:** A low capacitance ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>300\text{MHz}$ ) passive Probe is recommended.

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

TEST CIRCUIT FOR TTL OUTPUT

Output Load Drive Capability	$R_L$ Value (Ohms)	$C_L$ Value (pF)
10TTL	390	15

Table 1:  $R_L$  Resistance Value and  $C_L$  Capacitance Value Vs. Output Load Drive Capability



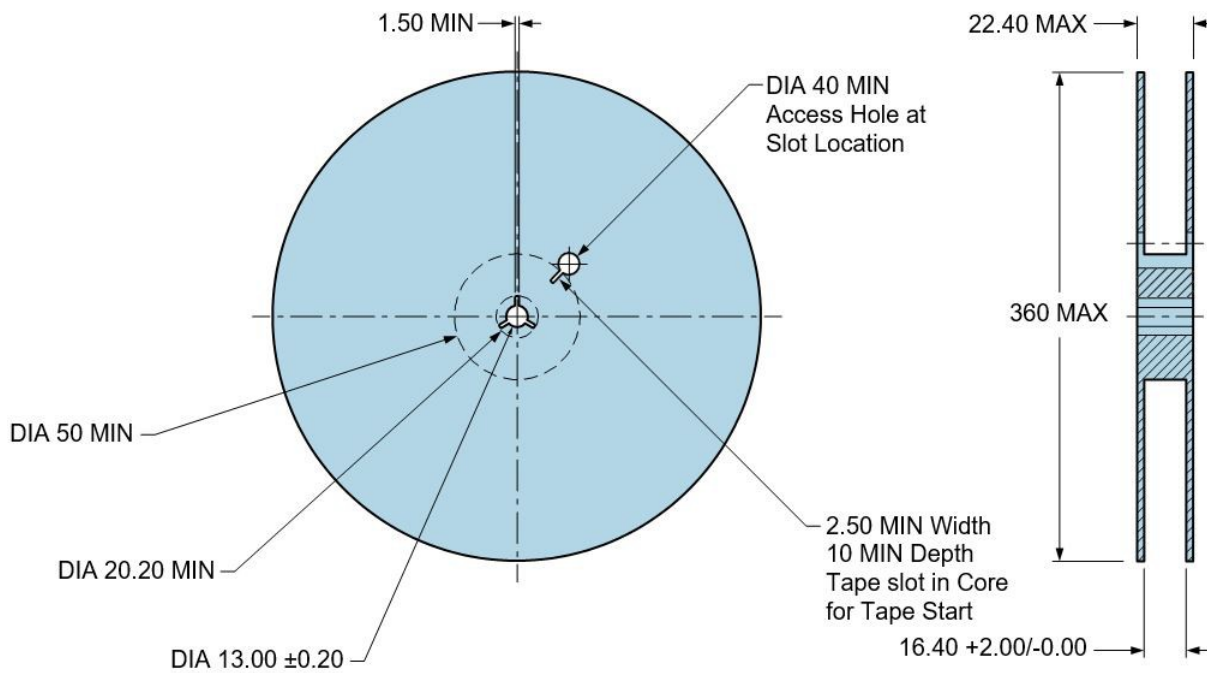
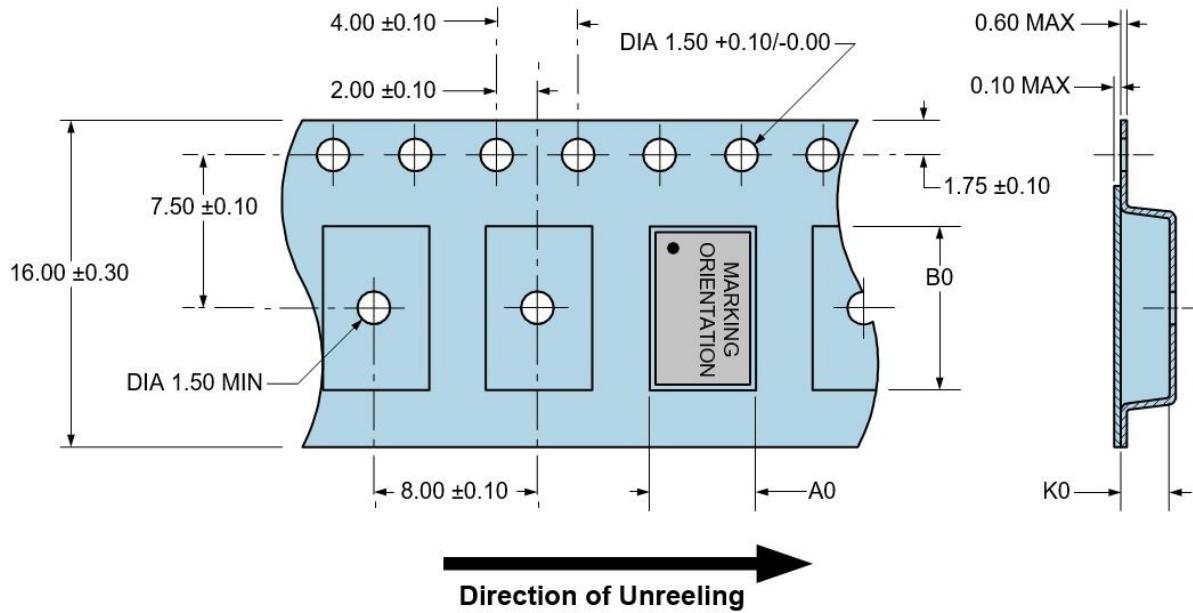
- Note 1:** An external 0.01 $\mu$ F ceramic bypass capacitor in parallel with a 0.1 $\mu$ F high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.
- Note 2:** A low capacitance (<12pF), 10X attenuation factor, high impedance (>10Mohms), and high bandwidth (>300MHz) passive Probe is recommended.
- Note 3:** Capacitance value  $C_L$  includes sum of all probe and fixture capacitance.
- Note 4:** Resistance value  $R_L$  is shown in Table 1. See applicable specification sheet for 'Load Drive Capability'.
- Note 5:** All diodes are MMBD7000, MMBD914, or equivalent.

**TAPE & REEL DIMENSIONS**

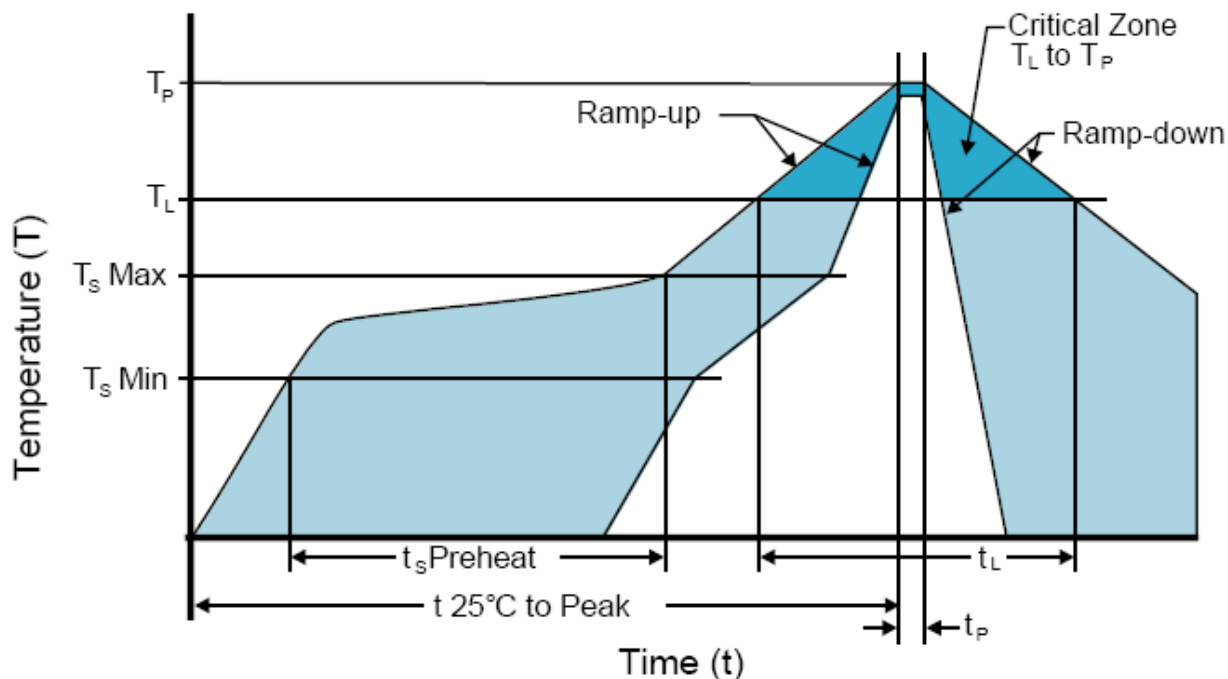
Quantity per Reel: 1,000 Units

All Dimensions in Millimeters

Compliant to EIA-481



**RECOMMENDED SOLDER REFLOW METHOD**



**HIGH TEMPERATURE INFRARED/CONVECTION**

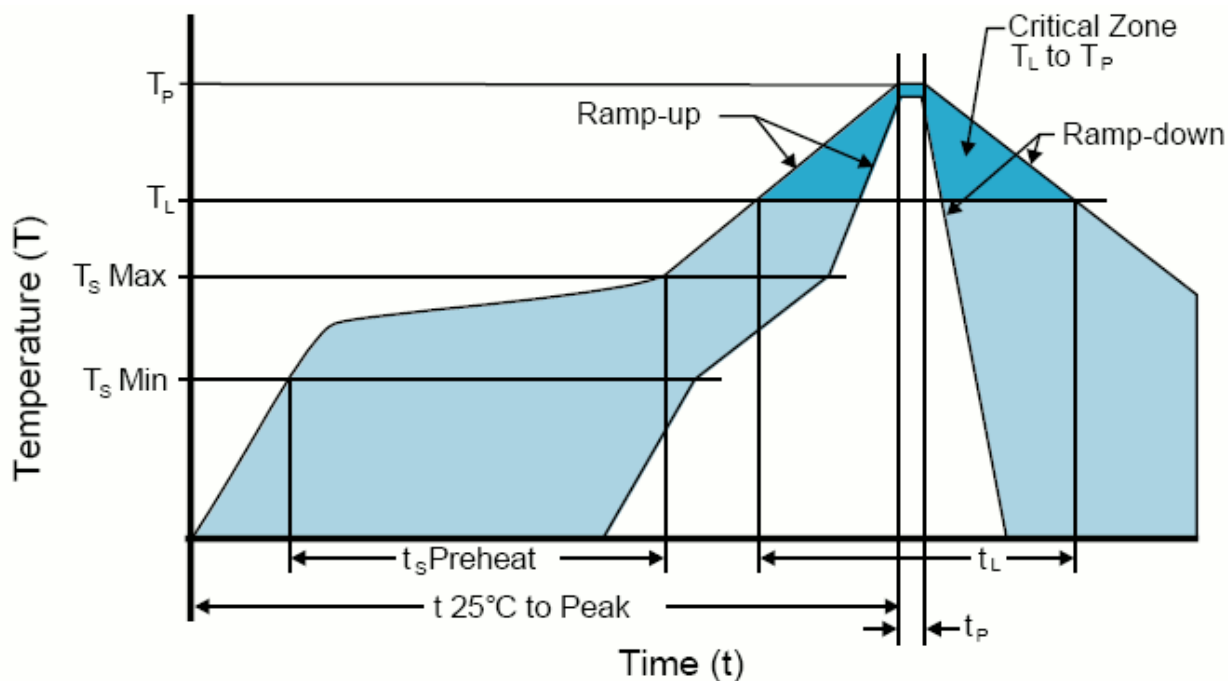
<b>T<sub>s</sub> MAX to T<sub>L</sub> (Ramp-up Rate)</b>	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum (T <sub>s</sub> MIN)	150°C
- Temperature Typical (T <sub>s</sub> TYP)	175°C
- Temperature Maximum(T <sub>s</sub> MAX)	200°C
- Time (t <sub>s</sub> MIN)	60 - 180 Seconds
<b>Ramp-up Rate (T<sub>L</sub> to T<sub>P</sub>)</b>	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature (T <sub>L</sub> )	217°C
- Time (t <sub>L</sub> )	60 - 150 Seconds
<b>Peak Temperature (T<sub>P</sub>)</b>	260°C Maximum for 10 Seconds Maximum
<b>Target Peak Temperature(T<sub>P</sub> Target)</b>	250°C +0/-5°C
<b>Time within 5°C of actual peak (t<sub>p</sub>)</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.)

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