REGULATORY COMPLIANCE

Lead Free COMPLIANT

EU RoHS 2011/65 + 2015/863 COMPLIANT

China RoHS COMPLIANT

REACH SVHC COMPLIANT

DRC CONFLICT FREE

ITEM DESCRIPTION

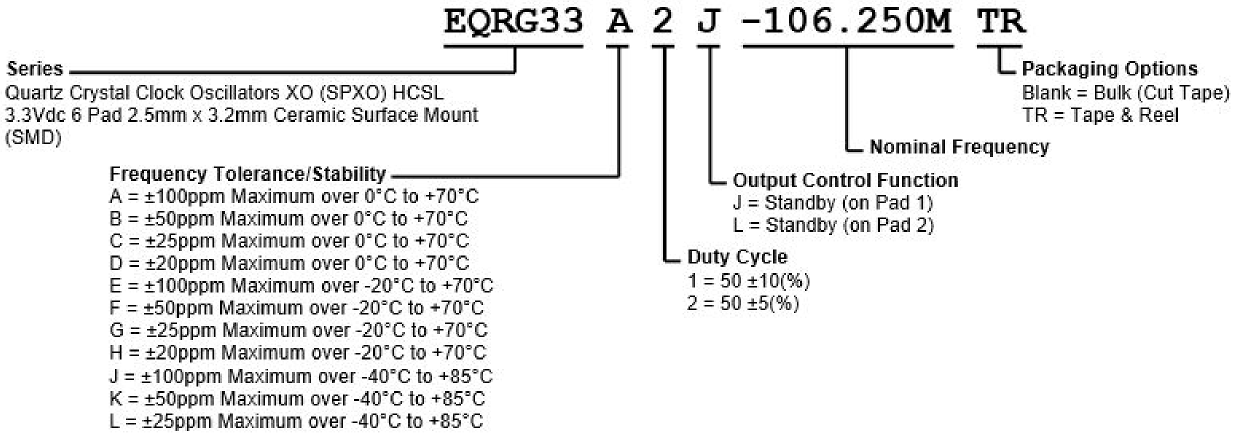
Quartz Crystal Clock Oscillators XO (SPXO) HCSL 3.3Vdc 6 Pad 2.5mm x 3.2mm Ceramic Surface Mount (SMD)

ELECTRICAL SPECIFICATIONS

Nominal Frequency	62.5MHz to 164MHz
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 ±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
Aging at 25°C	±3ppm Maximum First Year
Supply Voltage	3.3Vdc ±5%
Input Current	Without Load 30mA Maximum
Output Voltage Logic High (V_{Oh})	600mVdc Minimum, 740mVdc Typical, 850mVdc Maximum
Output Voltage Logic Low (V_{Ol})	-150mVdc Minimum, 0mVdc Typical, 150mVdc Maximum
Rise/Fall Time	Measured at 0.175Vdc to 0.525Vdc of waveform 500pSec Maximum
Duty Cycle	Measured at 50% of Waveform 50 ±10(%) 50 ±5(%)
Output Swing (dVOpp)	650mV Minimum, 740mV Typical, 850mV Maximum
Load Drive Capability	Between Output and Ground 50 Ohms
Output Logic Type	HCSL
Phase Noise	All Values are Typical -50dBc/Hz at 10Hz Offset -82dBc/Hz at 100Hz Offset -116dBc/Hz at 1kHz Offset -138dBc/Hz at 10kHz Offset -144dBc/Hz at 100kHz Offset -149dBc/Hz at 1MHz Offset -155dBc/Hz at 10MHz Offset -155dBc/Hz at 20MHz Offset
Output Control Function	Standby (on Pad 1) Standby (on Pad 2)
Output Control Input Voltage Logic High (Vih)	70% of Vdd Minimum or No Connect to Enable Output and Complementary Output
Output Control Input Voltage Logic Low (Vil)	30% of Vdd Maximum to Disable Output and Complementary Output (High Impedance)
Standby Output Enable Time	10mSec Maximum
Standby Output Disable Time	200nSec Maximum

Standby Current	Without Load 10µA Maximum
RMS Phase Jitter	Fj=12kHz to 20MHz (Random) 450fSec Maximum over Nominal Frequency of 62.5MHz to 99.999999MHz 200fSec Maximum over Nominal Frequency of 100MHz to 164MHz
Period Jitter (Deterministic)	0.2pSec Typical
Period Jitter (Random)	1.0pSec Typical
Period Jitter (One Sigma)	1.5pSec Typical
Period Jitter (tp-p)	40pSec Maximum
Start Up Time	10mSec Maximum
Storage Temperature Range	-55°C to +125°C

PART NUMBERING GUIDE



EQRG33 A 2 J -106.250M TR

Series
Quartz Crystal Clock Oscillators XO (SPXO) HCSL
3.3Vdc 6 Pad 2.5mm x 3.2mm Ceramic Surface Mount
(SMD)

Frequency Tolerance/Stability
A = ±100ppm Maximum over 0°C to +70°C
B = ±50ppm Maximum over 0°C to +70°C
C = ±25ppm Maximum over 0°C to +70°C
D = ±20ppm Maximum over 0°C to +70°C
E = ±100ppm Maximum over -20°C to +70°C
F = ±50ppm Maximum over -20°C to +70°C
G = ±25ppm Maximum over -20°C to +70°C
H = ±20ppm Maximum over -20°C to +70°C
J = ±100ppm Maximum over -40°C to +85°C
K = ±50ppm Maximum over -40°C to +85°C
L = ±25ppm Maximum over -40°C to +85°C

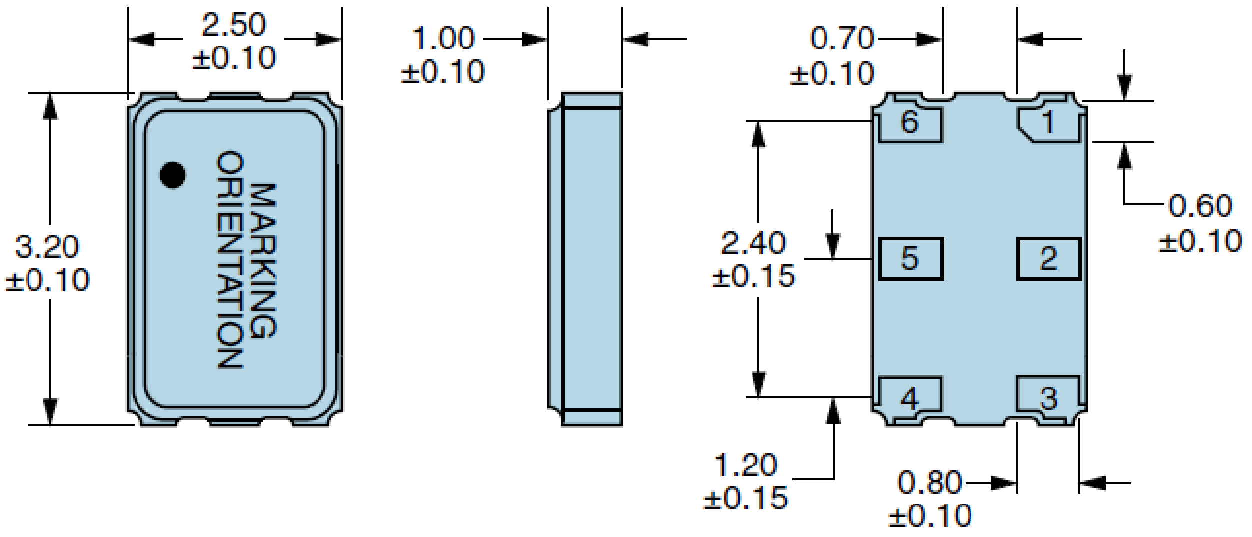
Duty Cycle
1 = 50 ±10(%)
2 = 50 ±5(%)

Output Control Function
J = Standby (on Pad 1)
L = Standby (on Pad 2)

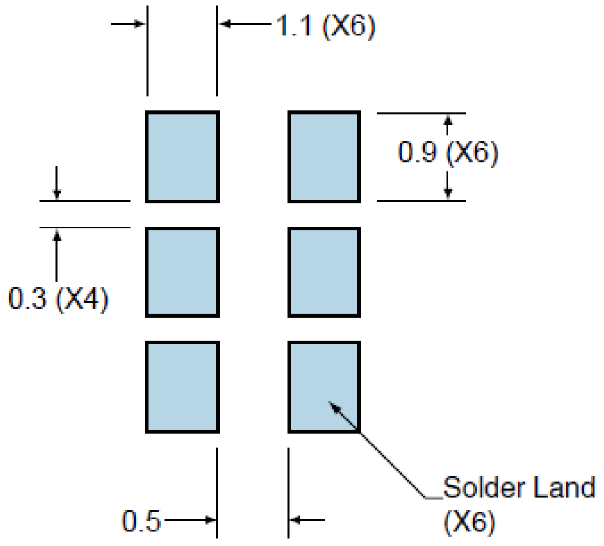
Nominal Frequency

Packaging Options
Blank = Bulk (Cut Tape)
TR = Tape & Reel

MECHANICAL DIMENSIONS



SUGGESTED SOLDER PAD LAYOUT

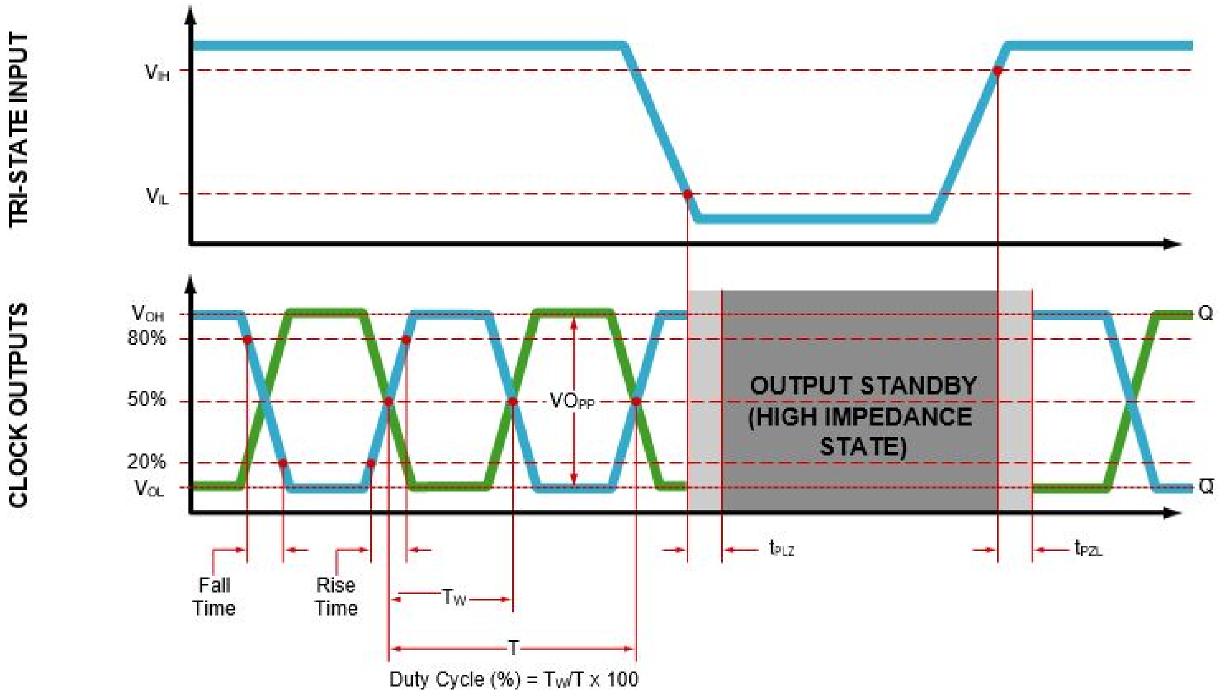


PIN	CONNECTION
1	No Connect Or Standby
2	No Connect Or Standby
3	Case/Ground
4	Output
5	Complementary Output
6	Supply Voltage

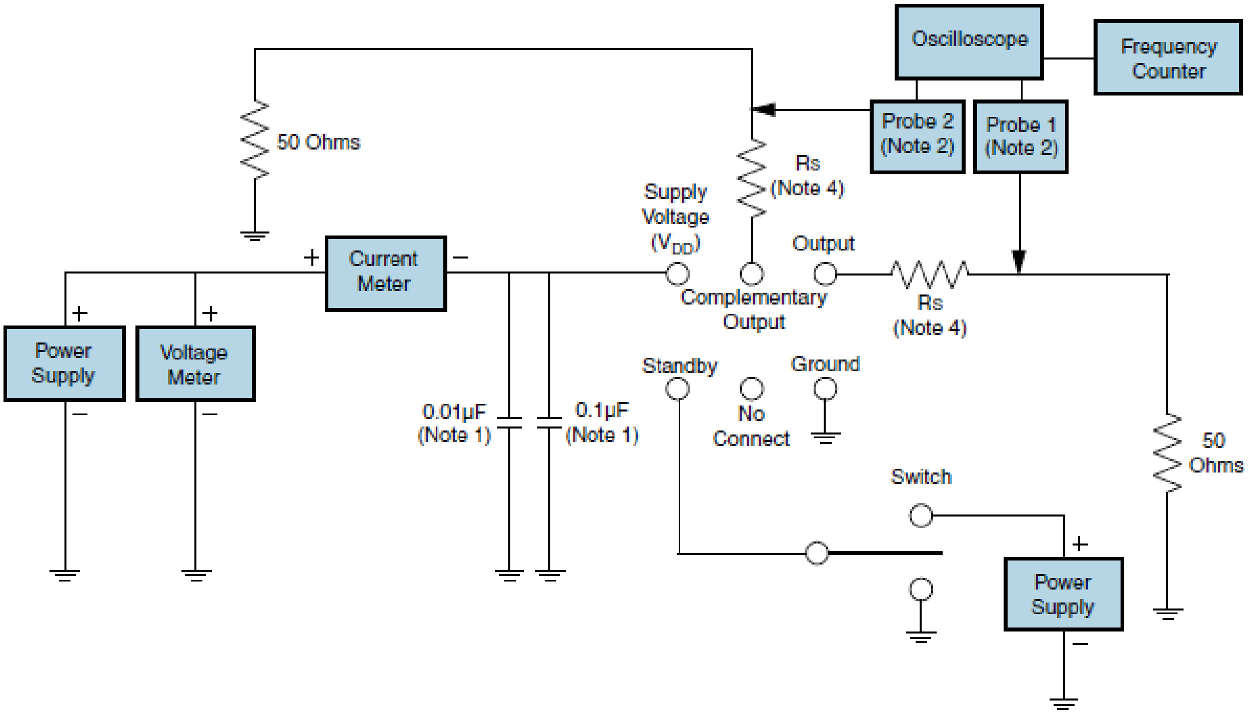
All Tolerances are ±0.1

All Dimensions in Millimeters

OUTPUT WAVEFORM & TIMING DIAGRAM

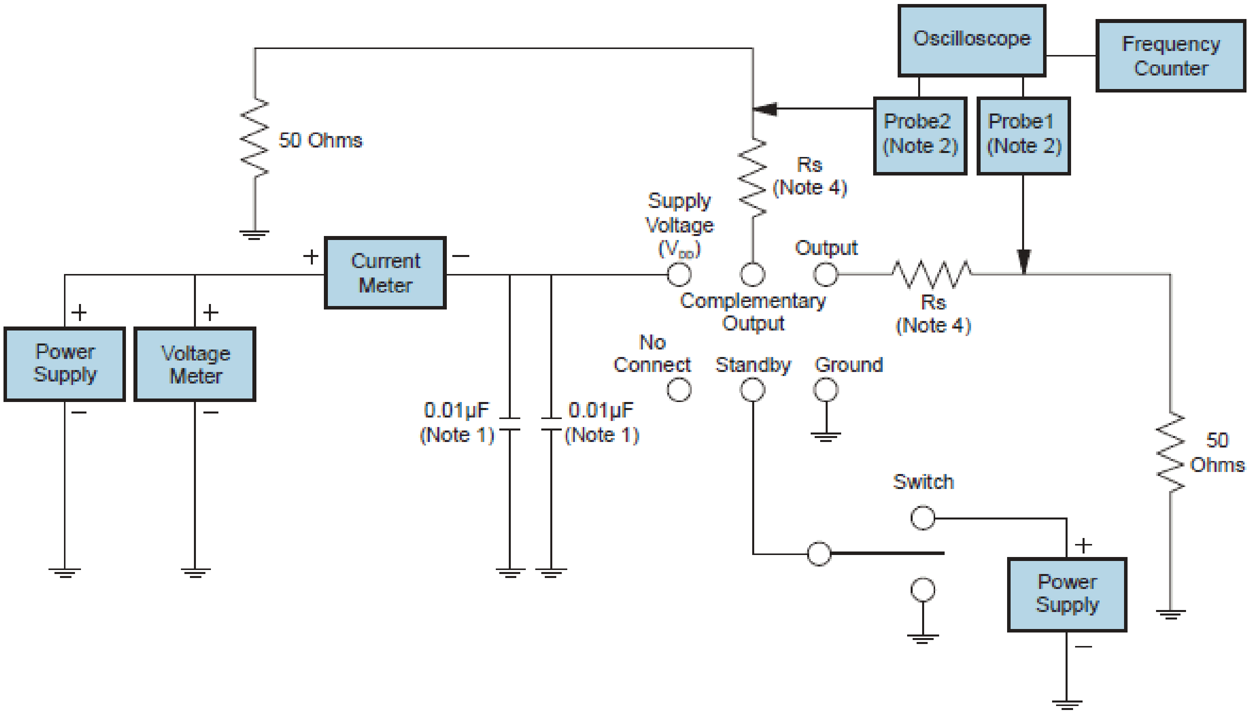


TEST CIRCUIT FOR STANDBY (PAD 1) AND COMPLEMENTARY OUTPUT



Note 1: An external 0.01µF ceramic bypass capacitor in parallel with a 0.1µF high frequency ceramic bypass capacitor close to (Less than 2mm) the package ground and supply voltage pin is required.
Note 2: A low capacitance (<12pF), 10X Attentuation Factor, High Impedance (>10Mohms), and High bandwidth (>500MHz) Passive probe is recommended.
Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.
Note 4: A 10 ohm to 33 ohm series resistor is required to limit overshoot. Rs value is circuit layout dependant.

TEST CIRCUIT FOR STANDBY (PAD 2) AND COMPLEMENTARY OUTPUT



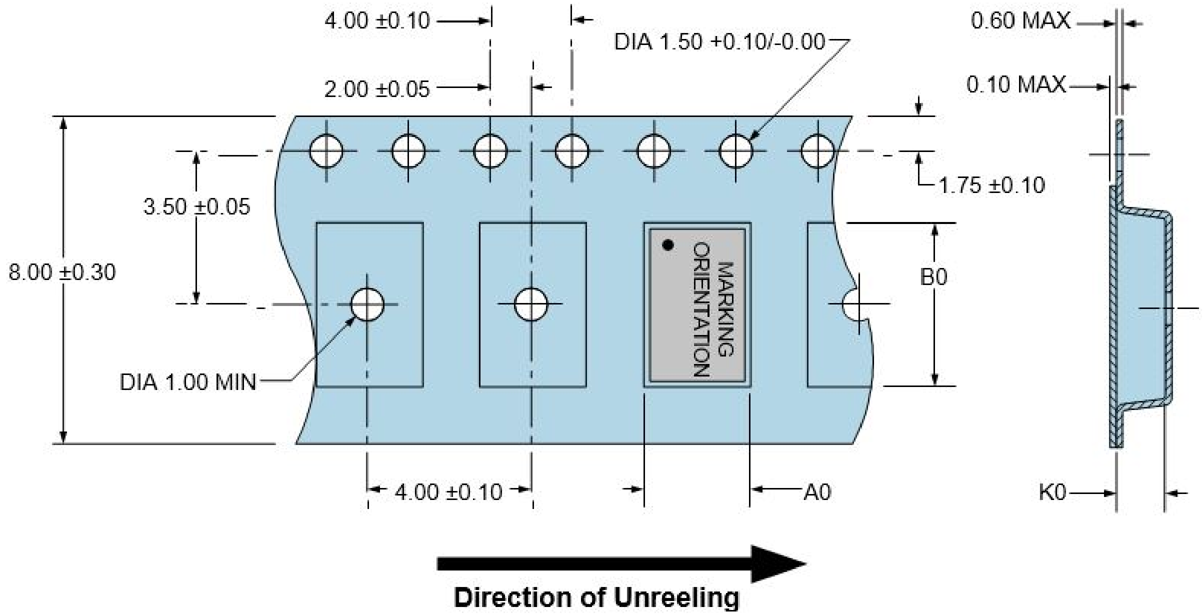
Note 1: An external 0.01µF ceramic bypass capacitor in parallel with a 0.1µF high frequency ceramic bypass capacitor close to (Less than 2mm) the package ground and supply voltage pin is required.
Note 2: A low capacitance (<12pF), 10X Attentuation Factor, High Impedance (>10Mohms), and High bandwidth (>500MHz) Passive probe is recommended.
Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.
Note 4: A 10 ohm to 33 ohm series resistor is required to limit overshoot. Rs value is circuit layout dependant.

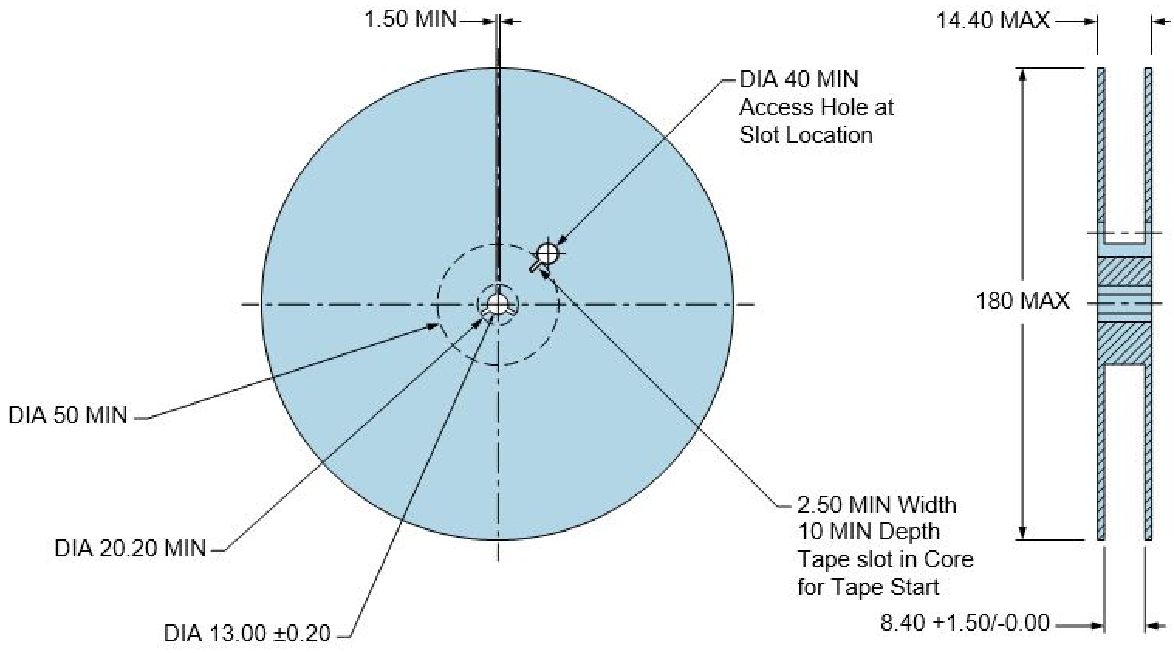
TAPE & REEL DIMENSIONS

Quantity per Reel: 1000 Units

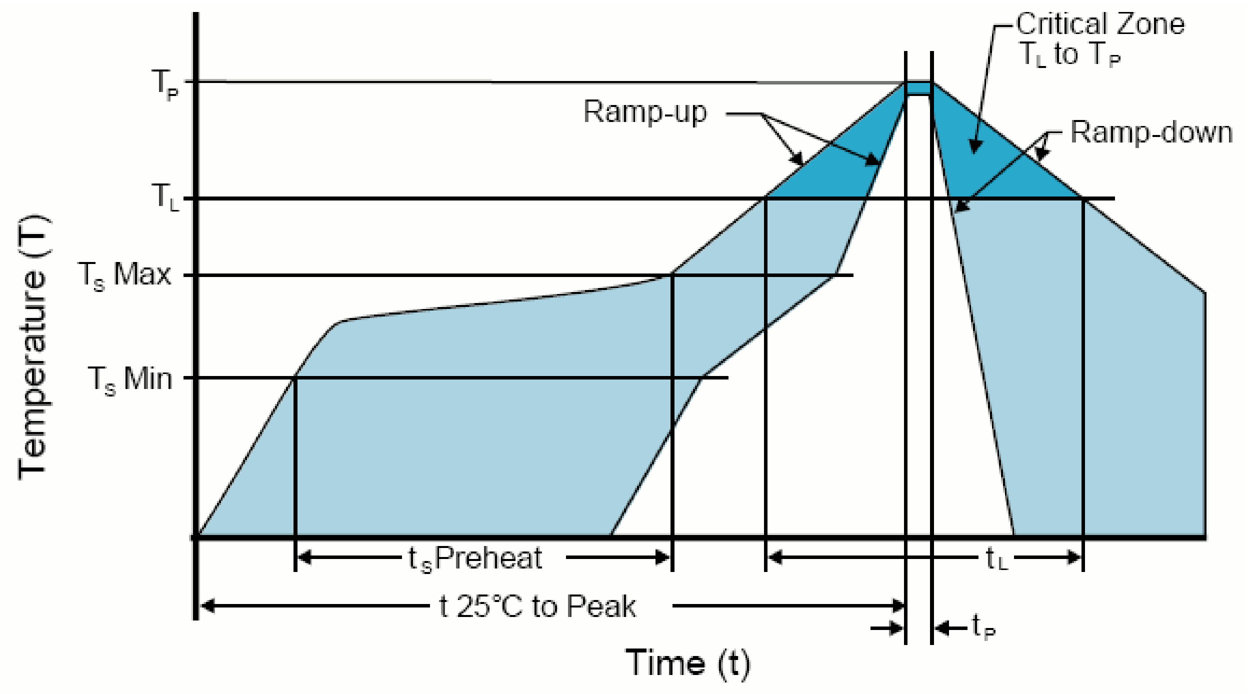
All Dimensions in Millimeters

Compliant to EIA-481





RECOMMENDED SOLDER REFLOW METHOD

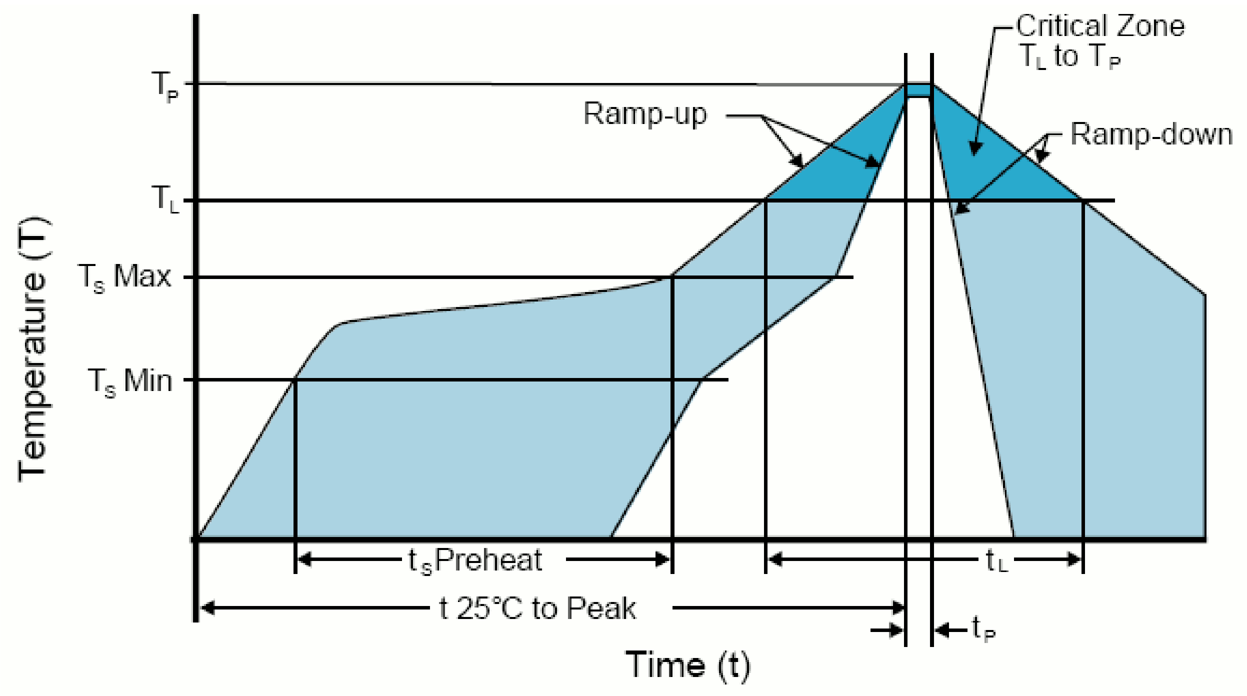


HIGH TEMPERATURE INFRARED/CONVECTION	
T_S MAX to T_L (Ramp-up Rate)	3°C/Second Maximum
Preheat **- Temperature Minimum (T_S MIN)** **- Temperature Typical (T_S TYP)** **- Temperature Maximum(T_S MAX)** **- Time (t_S)**	150°C 175°C 200°C 60 - 180 Seconds
Ramp-up Rate (T_L to T_P)	3°C/Second Maximum
Time Maintained Above: **- Temperature (T_L)** **- Time (t_L)**	217°C 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 **- Temperature Minimum (T_S MIN)** **- Temperature Typical (T_S TYP)** **- Temperature Maximum(T_S MAX)** **- Time (t_s)**	 N/A 150°C N/A 60 - 120 Seconds
Ramp-up Rate (T_L to T_P)	5°C/Second Maximum
Time Maintained Above: **- Temperature (T_L)** **- Time (t_L)**	 150°C 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.)