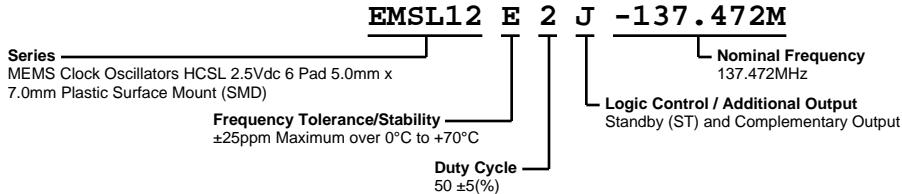


# EMSL12E2J-137.472M



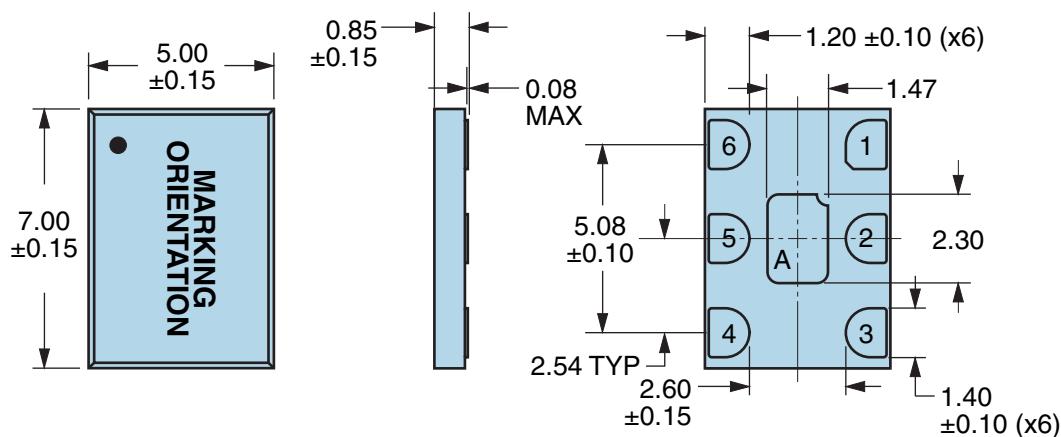
## ELECTRICAL SPECIFICATIONS

Nominal Frequency	137.472MHz
Frequency Tolerance/Stability	±25ppm Maximum over 0°C to +70°C (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, Reflow, Shock, and Vibration)
Aging at 25°C	±1ppm First Year Maximum
Supply Voltage	+2.5Vdc ±0.125Vdc
Input Current	65mA Maximum (Excluding Load Termination Current)
Output Voltage Logic High (V <sub>oh</sub> )	600mVdc Minimum, 750mVdc Typical, 950mVdc Maximum
Output Voltage Logic Low (V <sub>ol</sub> )	0mVdc Minimum, 25mVdc Typical, 50mVdc Maximum
Rise/Fall Time	300pSec Typical, 350pSec Maximum (Measured over 20% to 80% of waveform)
Duty Cycle	50 ±5(%) (Measured at 50% of waveform)
Output Swing (V <sub>Opp</sub> )	600mVdc Minimum, 750mVdc Typical, 950mVdc Maximum
Load Drive Capability	50 Ohms to Ground (Output and Complementary Output)
Output Logic Type	HCSL
Logic Control / Additional Output	Standby (ST) and Complementary Output
Output Control Input Voltage	V <sub>ih</sub> of 70% of V <sub>dd</sub> Minimum or No Connect to Enable Output and Complementary Output, V <sub>il</sub> of 30% of V <sub>dd</sub> Maximum to Disable Output and Complementary Output (High Impedance)
Standby Current	30µA Maximum (Without Load)
Period Jitter (Deterministic)	0.2pSec Typical
Period Jitter (Random)	2.0pSec Typical
Period Jitter (RMS)	1.5pSec Typical, 3.0pSec Maximum
Period Jitter (pk-pk)	20pSec Typical, 25pSec Maximum
Period Jitter (Cycle to Cycle)	10pSec Typical
RMS Phase Jitter (F <sub>j</sub> = 637kHz to 10MHz; Random)	1.6pSec Typical
RMS Phase Jitter (F <sub>j</sub> = 1.5MHz to 22MHz; Random)	0.6pSec Typical
RMS Phase Jitter (F <sub>j</sub> = 1.875MHz to 20MHz; Random)	0.5pSec Typical
Start Up Time	10mSec Maximum
Storage Temperature Range	-55°C to +125°C

## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

ESD Susceptibility	MIL-STD-883, Method 3015, Class 2, HBM 2000V
Flammability	UL94-V0
Mechanical Shock	MIL-STD-883, Method 2002, Condition G, 30,000G
Moisture Resistance	MIL-STD-883, Method 1004
Moisture Sensitivity Level	J-STD-020, MSL 1
Resistance to Soldering Heat	MIL-STD-202, Method 210, Condition K
Resistance to Solvents	MIL-STD-202, Method 215
Solderability	MIL-STD-883, Method 2003 (Six I/O Pads on bottom of package only)
Temperature Cycling	MIL-STD-883, Method 1010, Condition B
Thermal Shock	MIL-STD-883, Method 1011, Condition B
Vibration	MIL-STD-883, Method 2007, Condition A, 20G

## MECHANICAL DIMENSIONS (all dimensions in millimeters)



PIN	CONNECTION
1	Standby (ST)
2	No Connect
3	Case Ground
4	Output
5	Complementary Output
6	Supply Voltage

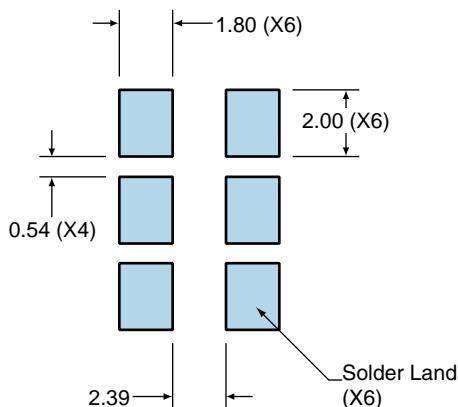
  

LINE	MARKING
1	XXXX or XXXXX XXXX or XXXXX=Ecliptek Manufacturing Identifier

Note A: Center paddle is connected internally to oscillator ground (Pad 3).

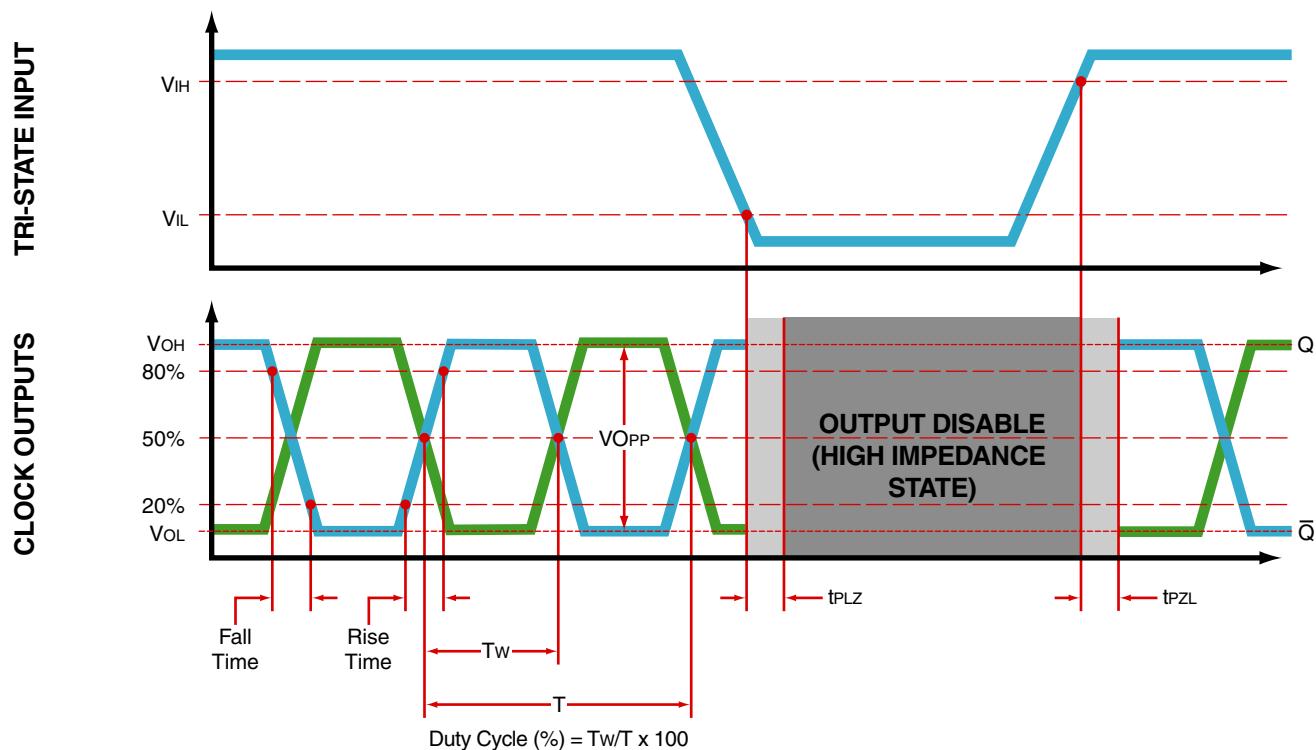
## Suggested Solder Pad Layout

All Dimensions in Millimeters

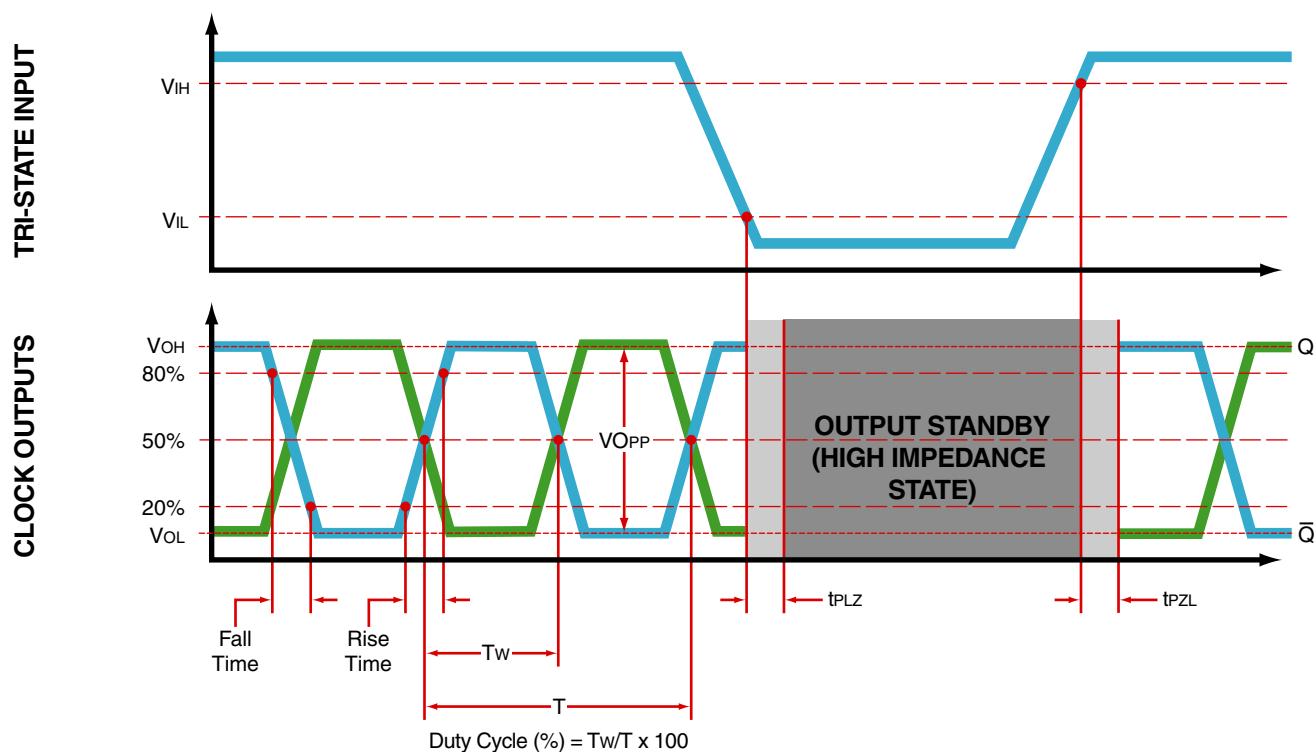


All Tolerances are  $\pm 0.1$

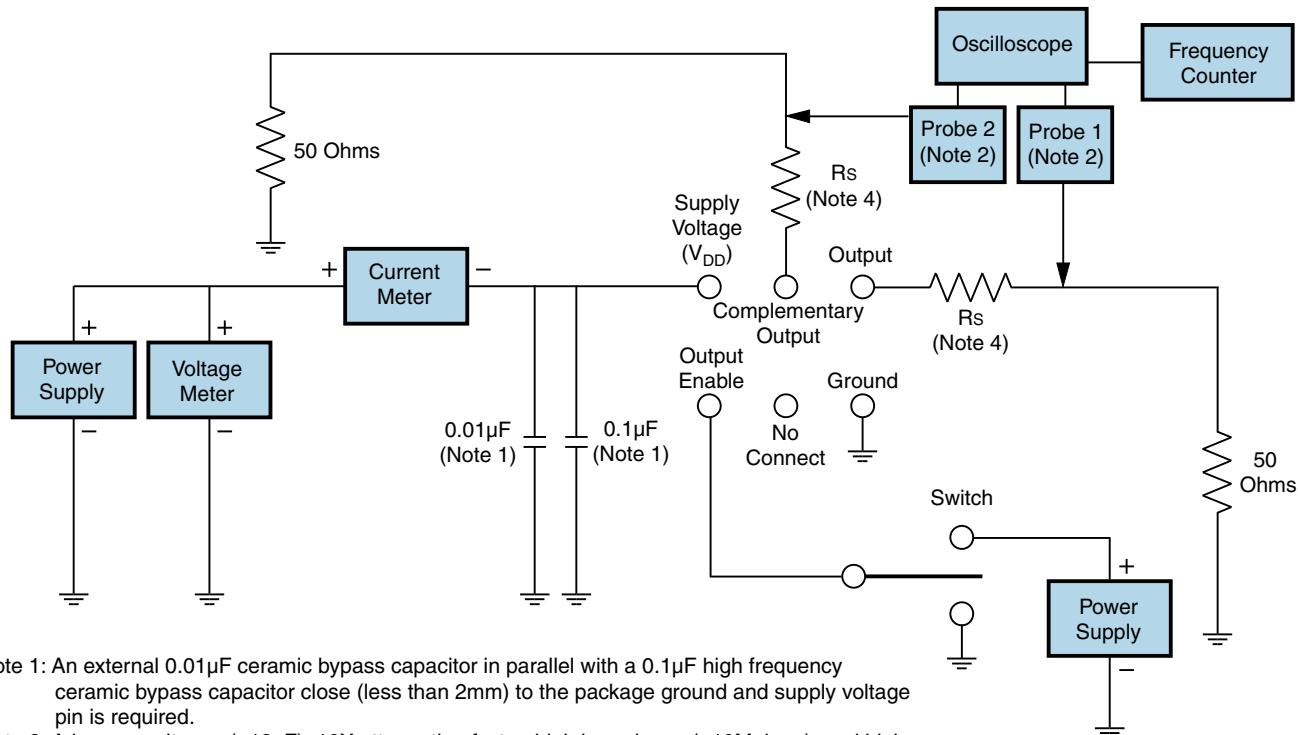
## OUTPUT WAVEFORM & TIMING DIAGRAM



## OUTPUT WAVEFORM & TIMING DIAGRAM



## Test Circuit for Output Enable and Complementary Output



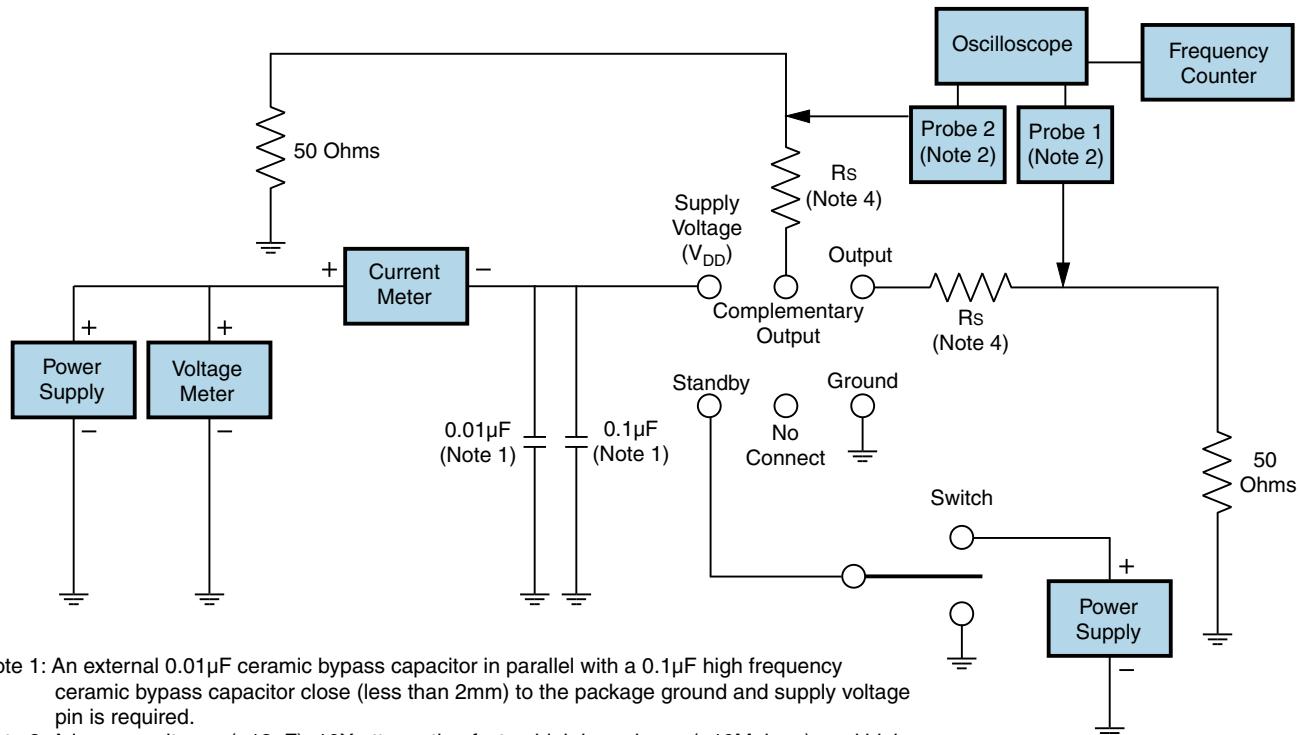
Note 1: An external 0.01 $\mu$ F ceramic bypass capacitor in parallel with a 0.1 $\mu$ F high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

Note 2: A low capacitance (<12pF), 10X attenuation factor, high impedance (>10Mohms), and high bandwidth (>500MHz) passive probe is recommended.

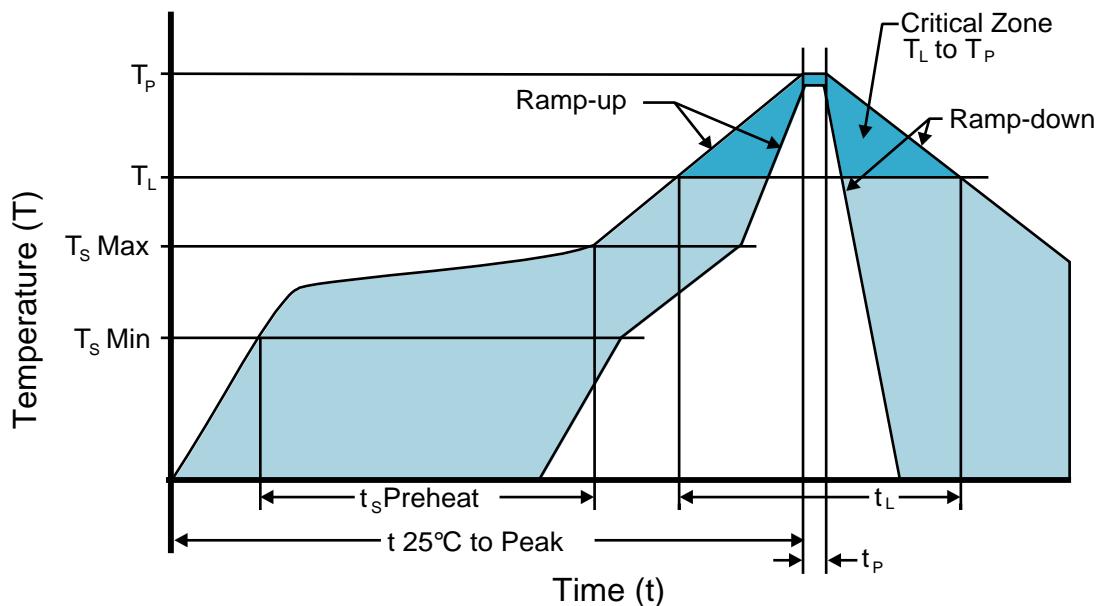
Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.

Note 4: A 10 ohm to 33 ohm series resistor is required to limit overshoot.  $R_s$  value is circuit layout dependant.

## Test Circuit for Standby and Complementary Output



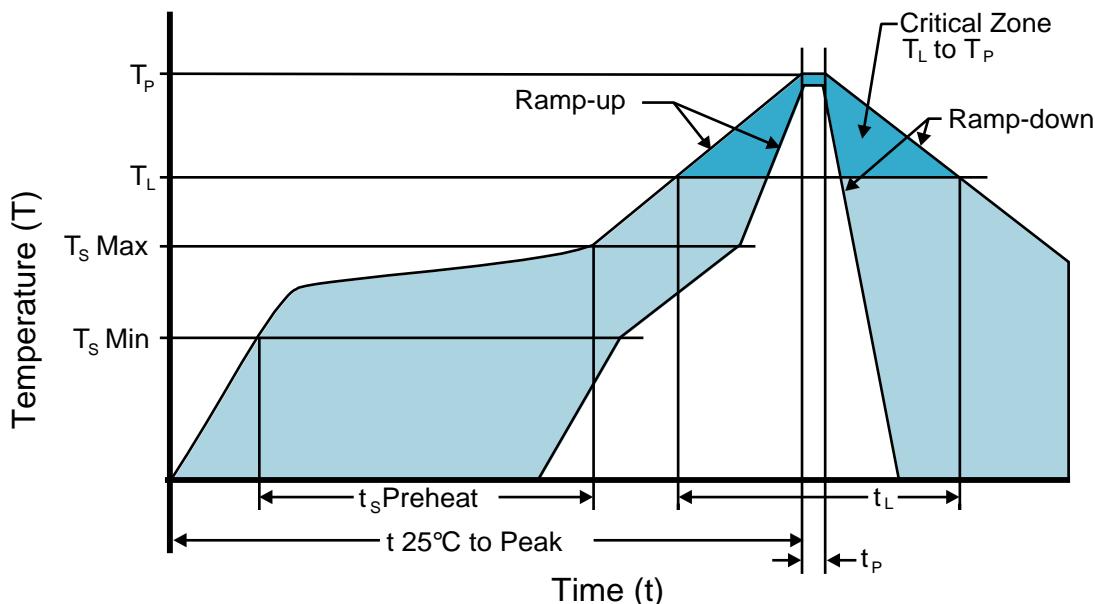
## Recommended Solder Reflow Methods



### 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

## Recommended Solder Reflow Methods



### Low Temperature Infrared/Convection $240^\circ\text{C}$

$T_s \text{ MAX to } T_l$ (Ramp-up Rate)	5°C/second Maximum
<b>Preheat</b>	
- Temperature Minimum ( $T_s \text{ MIN}$ )	N/A
- Temperature Typical ( $T_s \text{ TYP}$ )	$150^\circ\text{C}$
- Temperature Maximum ( $T_s \text{ MAX}$ )	N/A
- Time ( $t_s \text{ MIN}$ )	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 ( $T_l$ )	$150^\circ\text{C}$
- Time ( $t_l$ )	200 Seconds Maximum
<b>Peak Temperature (<math>T_p</math>)</b>	$240^\circ\text{C}$ Maximum
<b>Target Peak Temperature (<math>T_p</math> Target)</b>	$240^\circ\text{C}$ Maximum 2 Times / $230^\circ\text{C}$ Maximum 1 Time
<b>Time within <math>5^\circ\text{C}</math> 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 <math>25^\circ\text{C}</math> to Peak Temperature (t)</b>	N/A
<b>Moisture Sensitivity Level</b>	Level 1

### Low Temperature Manual Soldering

$185^\circ\text{C}$  Maximum for 10 seconds Maximum, 2 times Maximum.

### High Temperature Manual Soldering

$260^\circ\text{C}$  Maximum for 5 seconds Maximum, 2 times Maximum.