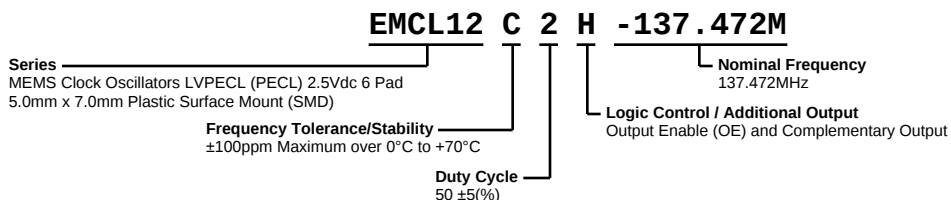


# EMCL12C2H-137.472M



## ELECTRICAL SPECIFICATIONS

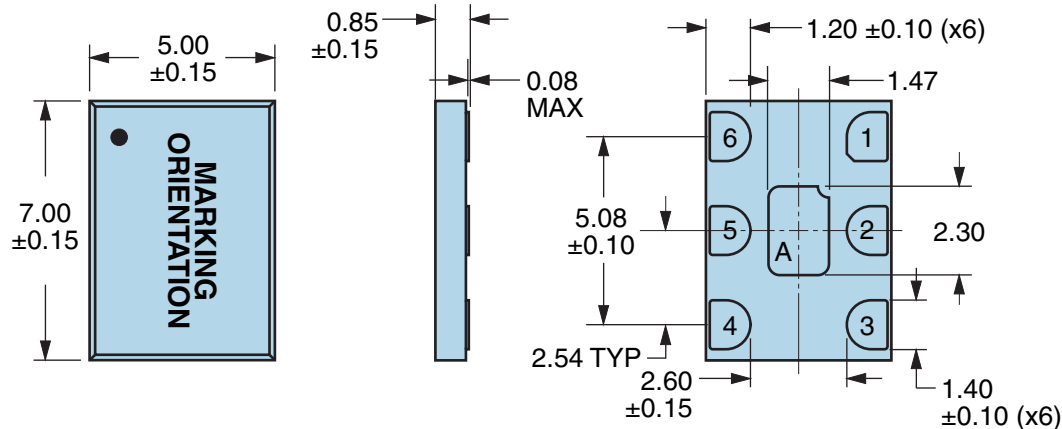
|                                                   |                                                                                                                                                                                                                                                                                                                                           |
|---------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                                 | 137.472MHz                                                                                                                                                                                                                                                                                                                                |
| Frequency Tolerance/Stability                     | $\pm 100\text{ppm}$ Maximum over $0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ (Inclusive of all conditions: Calibration Tolerance at $25^{\circ}\text{C}$ , Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, First Year Aging at $25^{\circ}\text{C}$ , Reflow, Shock, and Vibration) |
| Aging at $25^{\circ}\text{C}$                     | $\pm 1\text{ppm}$ First Year Maximum                                                                                                                                                                                                                                                                                                      |
| Supply Voltage                                    | $+2.5\text{Vdc} \pm 0.125\text{Vdc}$                                                                                                                                                                                                                                                                                                      |
| Input Current                                     | 75mA Maximum (Excluding Load Termination Current)                                                                                                                                                                                                                                                                                         |
| Output Voltage Logic High (Voh)                   | Vdd-1.10Vdc Minimum, 1.60Vdc Typical, Vdd-0.70Vdc Maximum                                                                                                                                                                                                                                                                                 |
| Output Voltage Logic Low (Vol)                    | Vdd-2.0Vdc Minimum, 0.80Vdc Typical, Vdd-1.40Vdc Maximum                                                                                                                                                                                                                                                                                  |
| Rise/Fall Time                                    | 150pSec Typical, 300pSec Maximum (Measured over 20% to 80% of waveform)                                                                                                                                                                                                                                                                   |
| Duty Cycle                                        | $50 \pm 5(\%)$ (Measured at 50% of waveform)                                                                                                                                                                                                                                                                                              |
| Output Swing (VOpp)                               | 600mVdc Minimum, 800mVdc Typical, 1000mVdc Maximum                                                                                                                                                                                                                                                                                        |
| Load Drive Capability                             | 50 Ohms into Vdd-2.0Vdc                                                                                                                                                                                                                                                                                                                   |
| Output Logic Type                                 | LVPECL                                                                                                                                                                                                                                                                                                                                    |
| Logic Control / Additional Output                 | Output Enable (OE) and Complementary Output                                                                                                                                                                                                                                                                                               |
| Output Control Input Voltage                      | Vih of 70% of Vdd Minimum or No Connect to Enable Output and Complementary Output, Vil of 30% of Vdd Maximum to Disable Output and Complementary Output (High Impedance)                                                                                                                                                                  |
| Output Enable Current                             | 70mA 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                                                                                                                                                                                                                                                                                                            |
| RMS Phase Jitter (Fj = 637kHz to 10MHz; Random)   | 1.6pSec Typical                                                                                                                                                                                                                                                                                                                           |
| RMS Phase Jitter (Fj = 1MHz to 20MHz; Random)     | 1.0pSec Typical                                                                                                                                                                                                                                                                                                                           |
| RMS Phase Jitter (Fj = 1.875MHz to 20MHz; Random) | 0.5pSec Typical                                                                                                                                                                                                                                                                                                                           |
| Start Up Time                                     | 10mSec Maximum                                                                                                                                                                                                                                                                                                                            |
| Storage Temperature Range                         | $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$                                                                                                                                                                                                                                                                                           |

## 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                        |

# EMCL12C2H-137.472M

## MECHANICAL DIMENSIONS (all dimensions in millimeters)



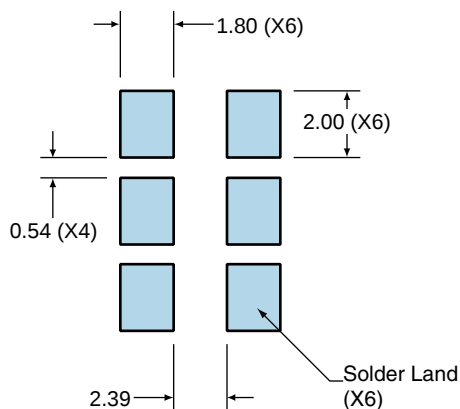
| PIN | CONNECTION           |
|-----|----------------------|
| 1   | Output Enable (OE)   |
| 2   | No Connect           |
| 3   | Case Ground          |
| 4   | Output               |
| 5   | Complementary Output |
| 6   | Supply Voltage       |

| LINE | MARKING                                                             |
|------|---------------------------------------------------------------------|
| 1    | XXXX or XXXXX<br>XXXX or XXXXX=Ecliptek<br>Manufacturing Identifier |

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

## Suggested Solder Pad Layout

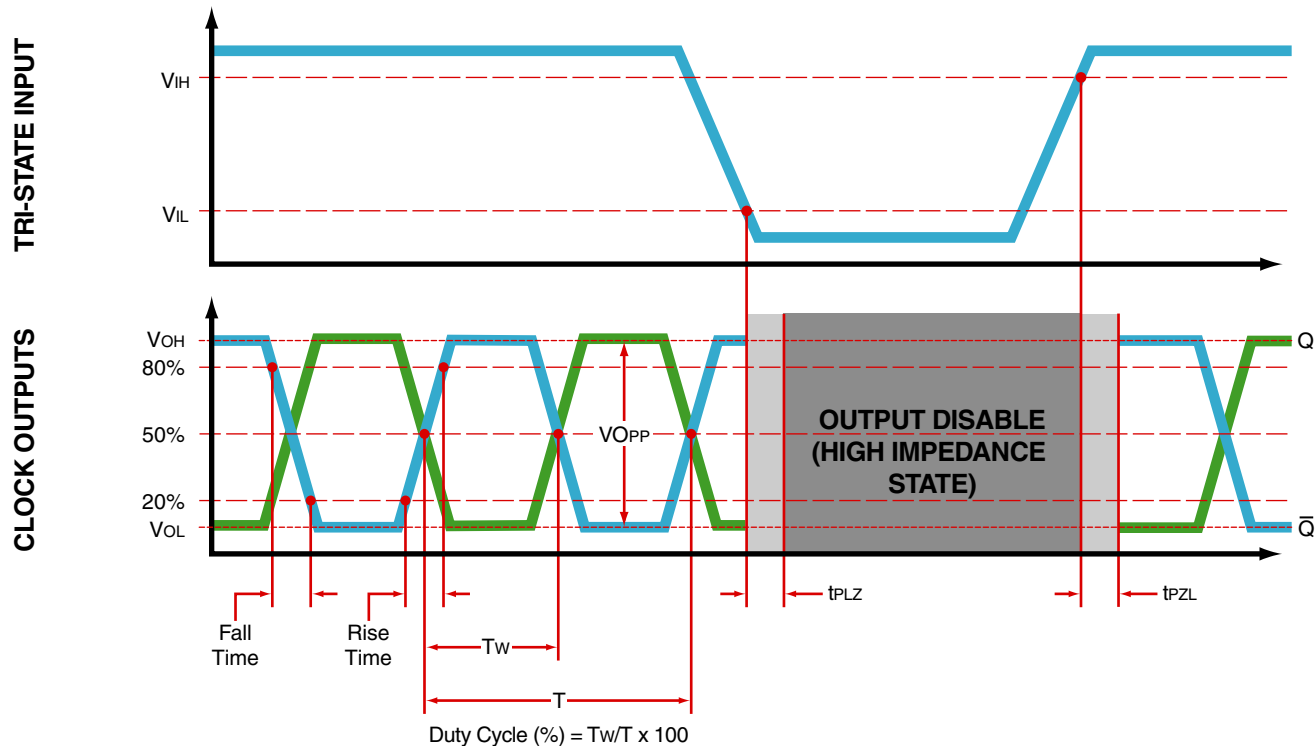
All Dimensions in Millimeters



All Tolerances are  $\pm 0.1$

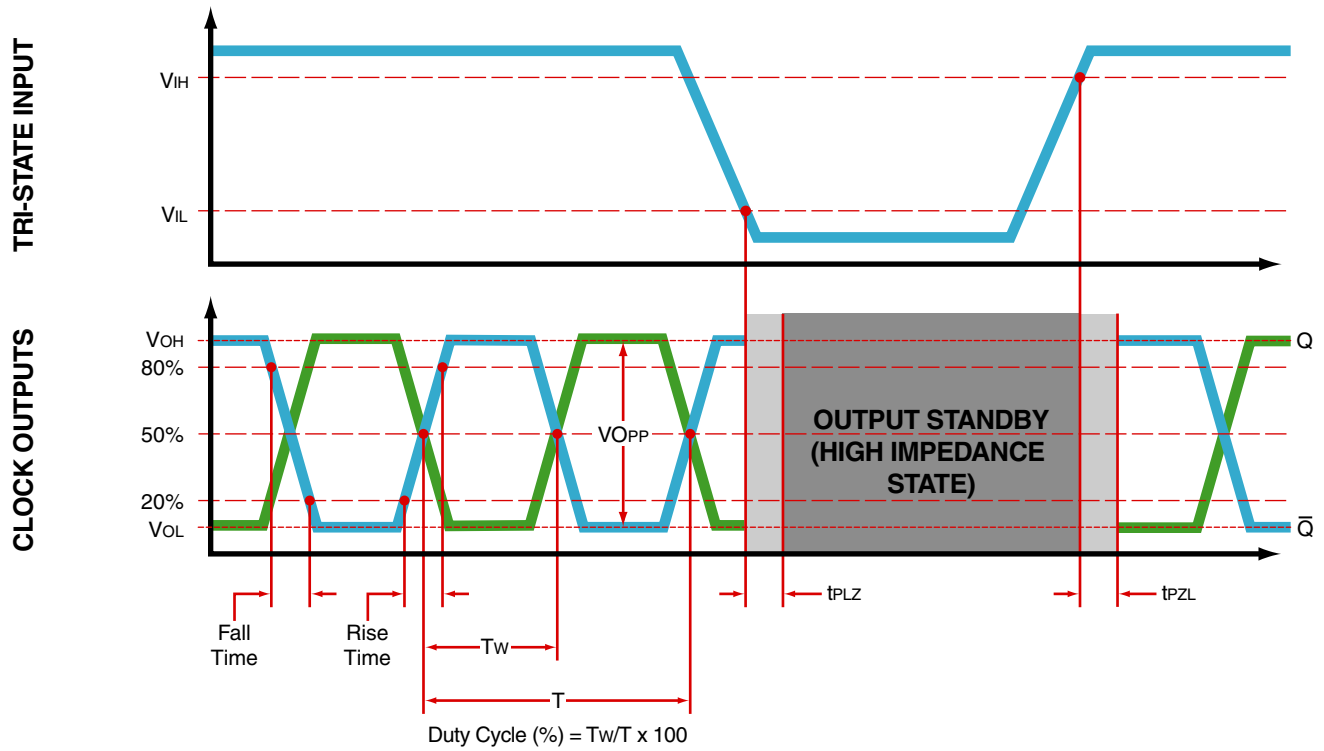
# EMCL12C2H-137.472M

## OUTPUT WAVEFORM & TIMING DIAGRAM



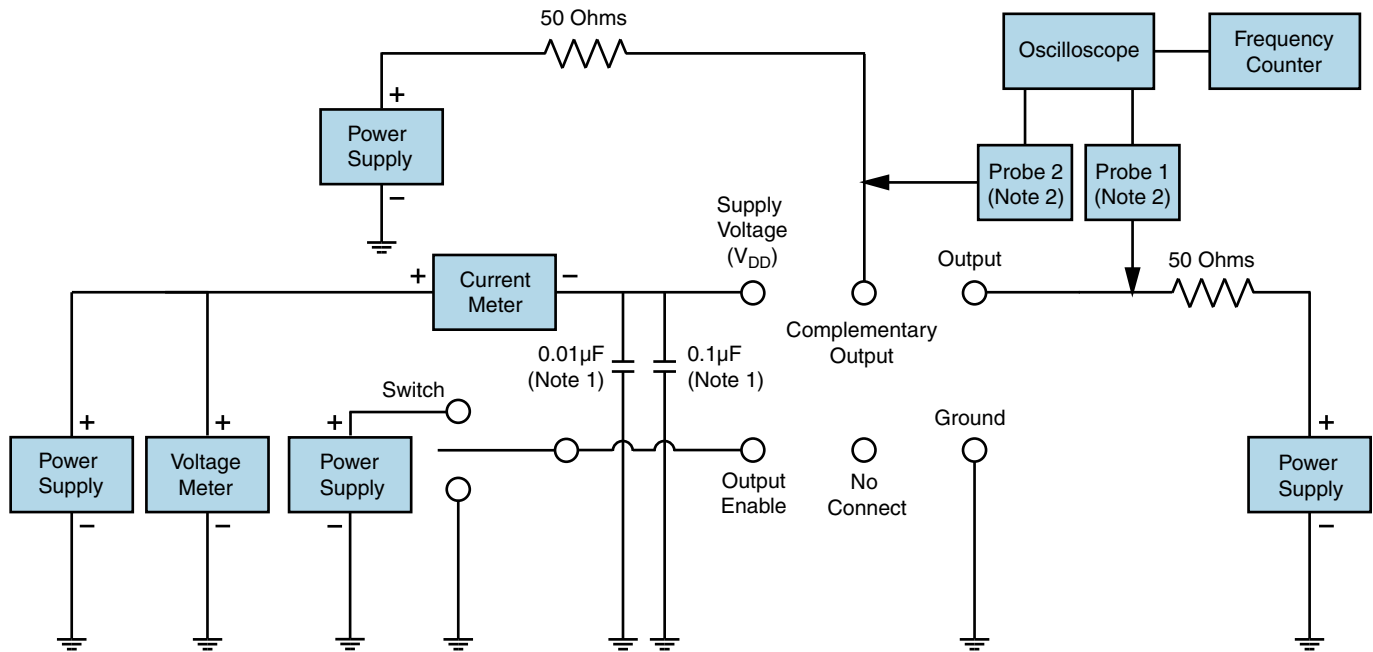
# EMCL12C2H-137.472M

## OUTPUT WAVEFORM & TIMING DIAGRAM



# EMCL12C2H-137.472M

## Test Circuit for Output Enable and Complementary Output



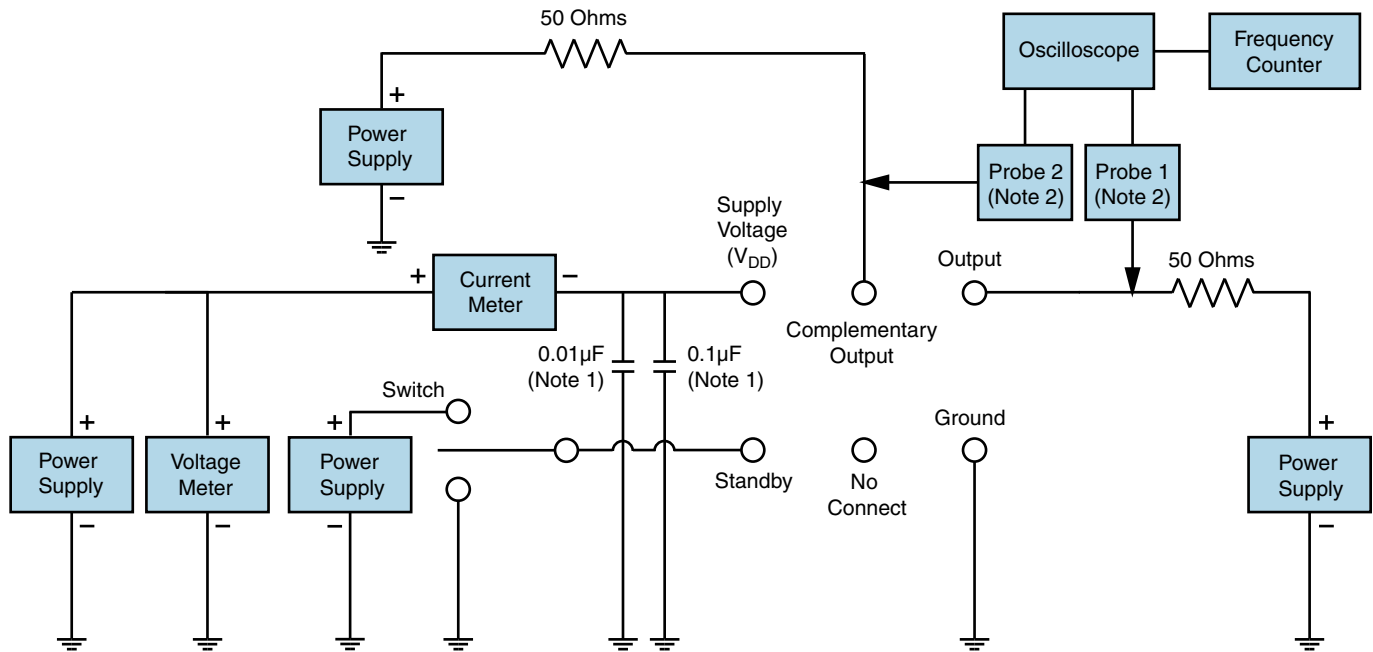
Note 1: An external 0.01µF ceramic bypass capacitor in parallel with a 0.1µF high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

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

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

# EMCL12C2H-137.472M

## Test Circuit for Standby and Complementary Output

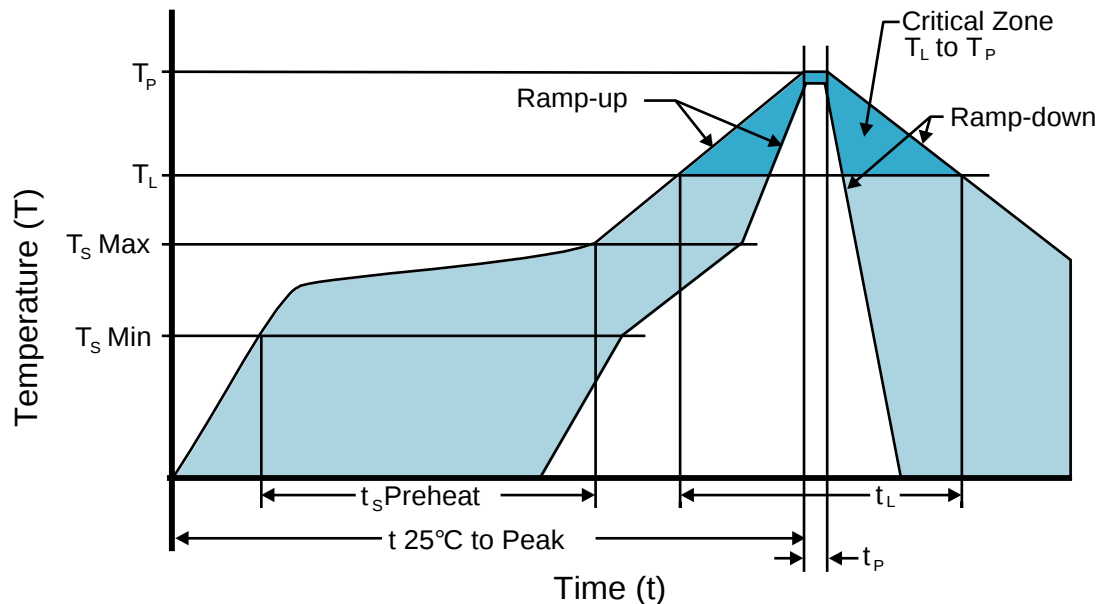


Note 1: An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

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

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

## Recommended Solder Reflow Methods



### High Temperature Infrared/Convection

|                                          |                    |
|------------------------------------------|--------------------|
| $T_s \text{ MAX to } T_L$ (Ramp-up Rate) | 3°C/second Maximum |
|------------------------------------------|--------------------|

#### Preheat

|                                             |                  |
|---------------------------------------------|------------------|
| - Temperature Minimum ( $T_s \text{ MIN}$ ) | 150°C            |
| - Temperature Typical ( $T_s \text{ TYP}$ ) | 175°C            |
| - Temperature Maximum ( $T_s \text{ MAX}$ ) | 200°C            |
| - Time ( $t_s \text{ MIN}$ )                | 60 - 180 Seconds |

|                                 |                    |
|---------------------------------|--------------------|
| Ramp-up Rate ( $T_L$ to $T_p$ ) | 3°C/second Maximum |
|---------------------------------|--------------------|

#### Time Maintained Above:

|                         |                  |
|-------------------------|------------------|
| - Temperature ( $T_L$ ) | 217°C            |
| - Time ( $t_L$ )        | 60 - 150 Seconds |

|                            |                                      |
|----------------------------|--------------------------------------|
| Peak Temperature ( $T_p$ ) | 260°C Maximum for 10 Seconds Maximum |
|----------------------------|--------------------------------------|

|                                                  |               |
|--------------------------------------------------|---------------|
| Target Peak Temperature ( $T_p \text{ Target}$ ) | 250°C +0/-5°C |
|--------------------------------------------------|---------------|

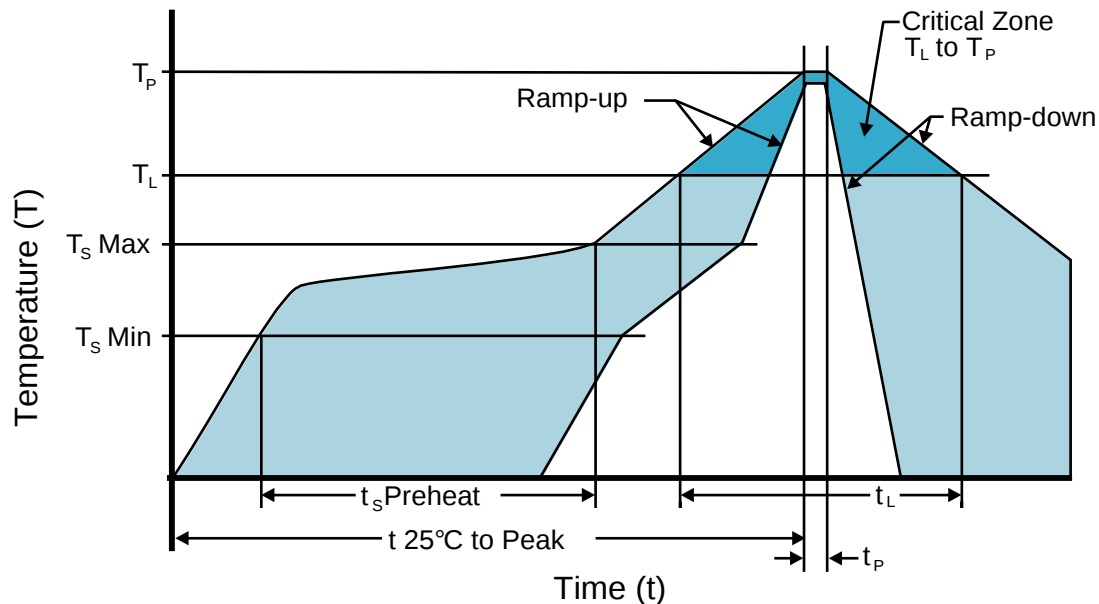
|                                          |                 |
|------------------------------------------|-----------------|
| Time within 5°C of actual peak ( $t_p$ ) | 20 - 40 seconds |
|------------------------------------------|-----------------|

|                |                    |
|----------------|--------------------|
| Ramp-down Rate | 6°C/second Maximum |
|----------------|--------------------|

|                                   |                   |
|-----------------------------------|-------------------|
| Time 25°C to Peak Temperature (t) | 8 minutes Maximum |
|-----------------------------------|-------------------|

|                            |         |
|----------------------------|---------|
| Moisture Sensitivity Level | Level 1 |
|----------------------------|---------|

## Recommended Solder Reflow Methods



### Low Temperature Infrared/Convection 240°C

**$T_S$  MAX to  $T_L$  (Ramp-up Rate)** 5°C/second Maximum

#### Preheat

- Temperature Minimum ( $T_S$  MIN) N/A
- Temperature Typical ( $T_S$  TYP) 150°C
- Temperature Maximum ( $T_S$  MAX) N/A
- Time ( $t_s$  MIN) 60 - 120 Seconds

**Ramp-up Rate ( $T_L$  to  $T_P$ )** 5°C/second Maximum

#### Time Maintained Above:

- Temperature ( $T_L$ ) 150°C
- Time ( $t_L$ ) 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

### Low Temperature Manual Soldering

185°C Maximum for 10 seconds Maximum, 2 times Maximum.

### High Temperature Manual Soldering

260°C Maximum for 5 seconds Maximum, 2 times Maximum.