

# EV31C6A3A1-24.576M TR

Lead Free



COMPLIANT



## ITEM DESCRIPTION

Voltage Controlled Quartz Crystal Clock Oscillators VCXO HCMOS/TTL (CMOS) 5.0Vdc 6 Pad 5.0mm x 7.0mm Ceramic Surface Mount (SMD) 24.576MHz  $\pm 50$ ppm Maximum 0°C to +70°C  $\pm 50$ ppm Minimum 10% Typical, 20% Maximum

## ELECTRICAL SPECIFICATIONS

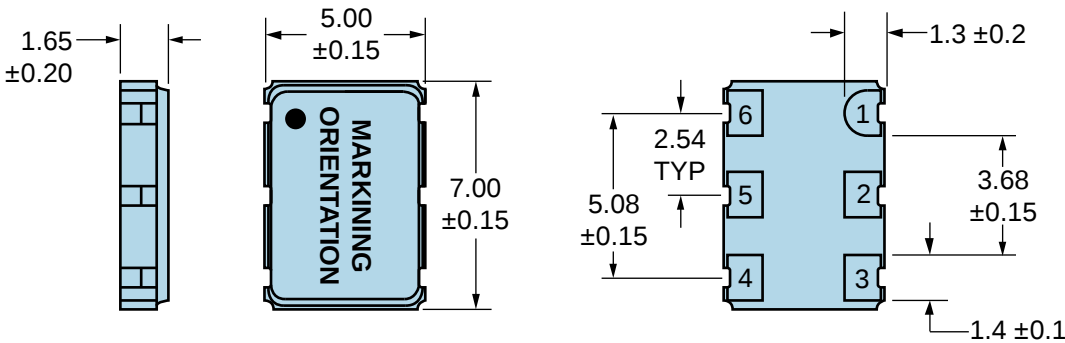
|                                       |                                                                                                                                                                                                                                                    |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                     | 24.576MHz                                                                                                                                                                                                                                          |
| Frequency Tolerance/Stability         | $\pm 50$ ppm Maximum (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.)                                      |
| Aging at 40°C                         | $\pm 2$ ppm/First year typical, $\pm 10$ ppm/10 Years Maximum                                                                                                                                                                                      |
| Operating Temperature Range           | 0°C to +70°C                                                                                                                                                                                                                                       |
| Supply Voltage                        | 5.0Vdc $\pm 10\%$                                                                                                                                                                                                                                  |
| Input Current                         | 25mA Maximum                                                                                                                                                                                                                                       |
| Output Voltage Logic High (Voh)       | 90% of Vdd Minimum (IOH = -4mA)                                                                                                                                                                                                                    |
| Output Voltage Logic Low (Vol)        | 10% of Vdd Maximum (IOL = +4mA)                                                                                                                                                                                                                    |
| Rise/Fall Time                        | 5nSec Maximum (Measured at 0.4Vdc to 2.4Vdc with TTL Load; Measured at 20% to 80% of waveform with HCMOS Load)                                                                                                                                     |
| Duty Cycle                            | 50 $\pm 5\%$ Typical, 50 $\pm 10\%$ (Measured at 1.4Vdc with TTL Load; Measured at 50% of waveform with HCMOS Load)                                                                                                                                |
| Load Drive Capability                 | 10TTL Load or 30pF HCMOS Load Maximum                                                                                                                                                                                                              |
| Output Logic Type                     | CMOS                                                                                                                                                                                                                                               |
| Absolute Pull Range                   | $\pm 50$ ppm Minimum (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 (Vc).) |
| Control Voltage                       | 0.5Vdc to 4.5Vdc (Test Condition for Absolute Pull Range)                                                                                                                                                                                          |
| Control Voltage Range                 | 0.0Vdc to Vdd                                                                                                                                                                                                                                      |
| Linearity                             | 10% Typical, 20% Maximum                                                                                                                                                                                                                           |
| Transfer Function                     | Positive Transfer Characteristic                                                                                                                                                                                                                   |
| Modulation Bandwidth                  | 10kHz Minimum (Measured at -3dB, Vc = 2.5Vdc)                                                                                                                                                                                                      |
| Input Impedance                       | 50kOhms Minimum                                                                                                                                                                                                                                    |
| Input Leakage Current                 | 10 $\mu$ A Maximum                                                                                                                                                                                                                                 |
| Phase Noise                           | -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, and -155dBc/Hz at offset of 1MHz (Typical values at Fo = 27MHz)                           |
| Tri-State Input Voltage (Vih and Vil) | +0.9Vdd Minimum to Enable Output; +0.1Vdd Maximum to Disable Output (High Impedance); No Connect to Enable Output.                                                                                                                                 |
| RMS Phase Jitter                      | 1pSec Maximum (Fj = 12kHz to 20MHz)                                                                                                                                                                                                                |
| Start Up Time                         | 10mSec Maximum                                                                                                                                                                                                                                     |
| Storage Temperature Range             | -55°C to +125°C                                                                                                                                                                                                                                    |

## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                              |                                      |
|------------------------------|--------------------------------------|
| Fine Leak Test               | MIL-STD-883, Method 1014 Condition A |
| Gross Leak Test              | MIL-STD-883, Method 1014 Condition C |
| Mechanical Shock             | MIL-STD-202, Method 213 Condition C  |
| Resistance to Soldering Heat | MIL-STD-202, Method 210              |
| Resistance to Solvents       | MIL-STD-202, Method 215              |
| Solderability                | MIL-STD-883, Method 2003             |
| Temperature Cycling          | MIL-STD-883, Method 1010             |
| Vibration                    | MIL-STD-883, Method 2007 Condition A |

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MECHANICAL DIMENSIONS (all dimensions in millimeters)

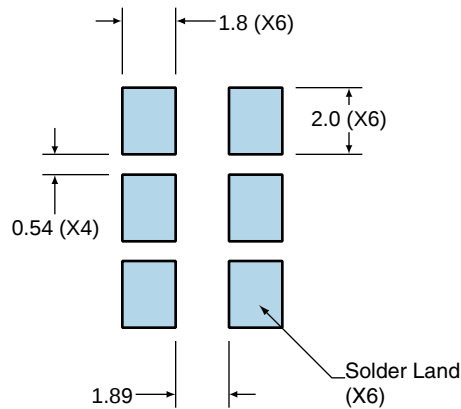


| PIN | CONNECTION      |
|-----|-----------------|
| 1   | Voltage Control |
| 2   | Tri-State       |
| 3   | Case Ground     |
| 4   | Output          |
| 5   | No Connect      |
| 6   | Supply Voltage  |

| LINE | MARKING                                                                             |
|------|-------------------------------------------------------------------------------------|
| 1    | ECLIPTEK                                                                            |
| 2    | 24.576M                                                                             |
| 3    | XXYYZZ<br>XX=Ecliptek Manufacturing Code<br>Y=Last Digit of Year<br>ZZ=Week of Year |

Suggested Solder Pad Layout

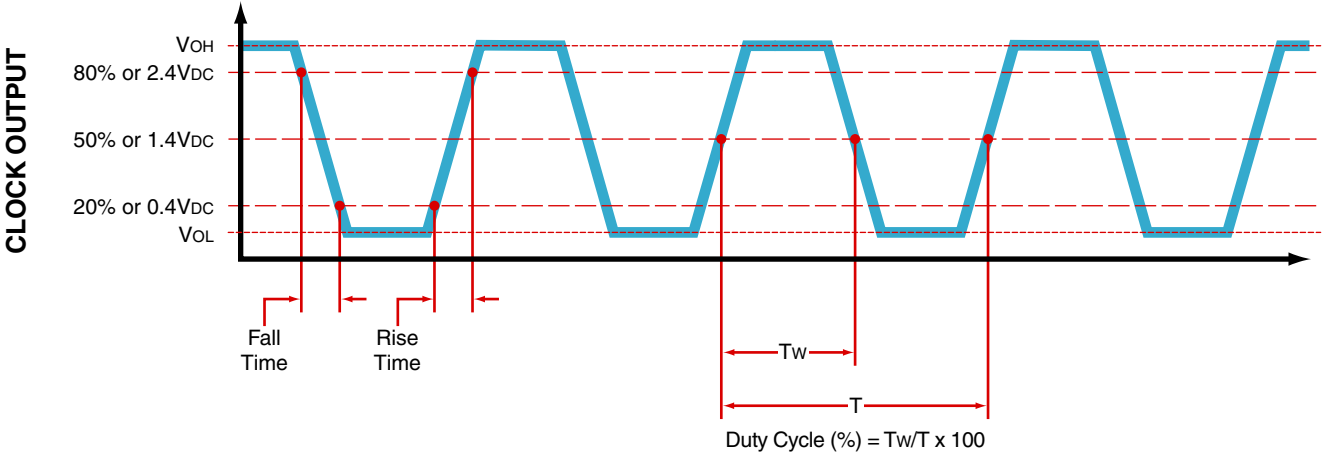
All Dimensions in Millimeters



All Tolerances are ±0.1

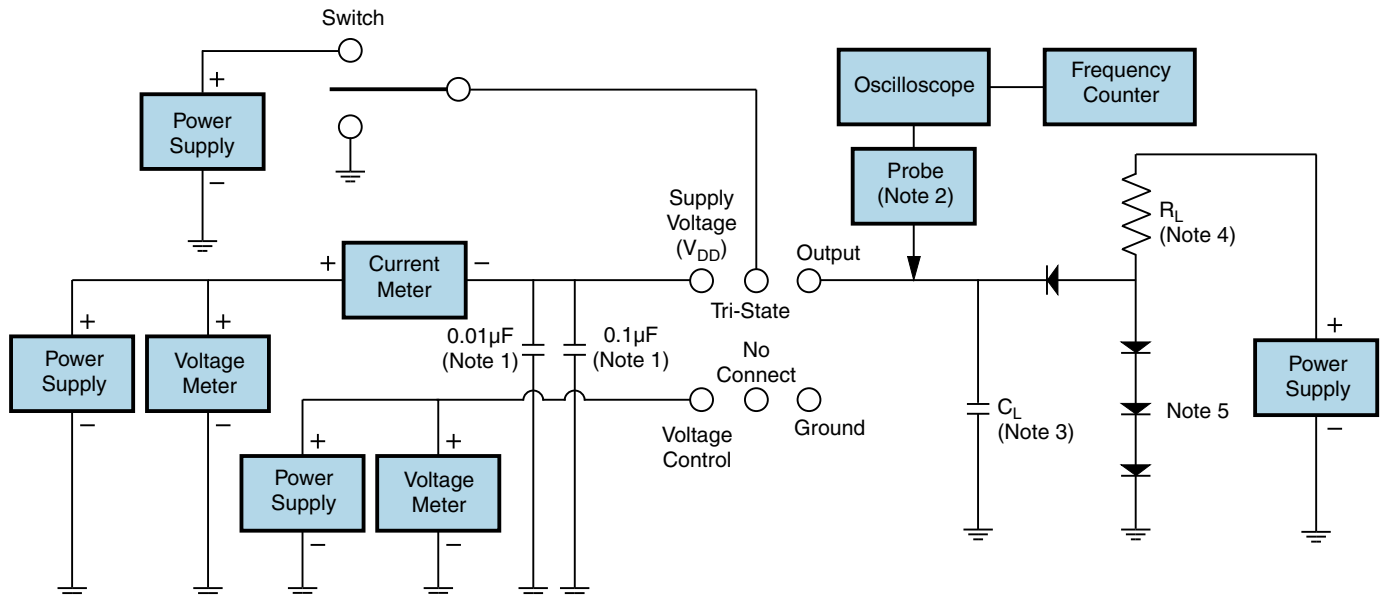
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OUTPUT WAVEFORM





## Test Circuit for TTL 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 (>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'.

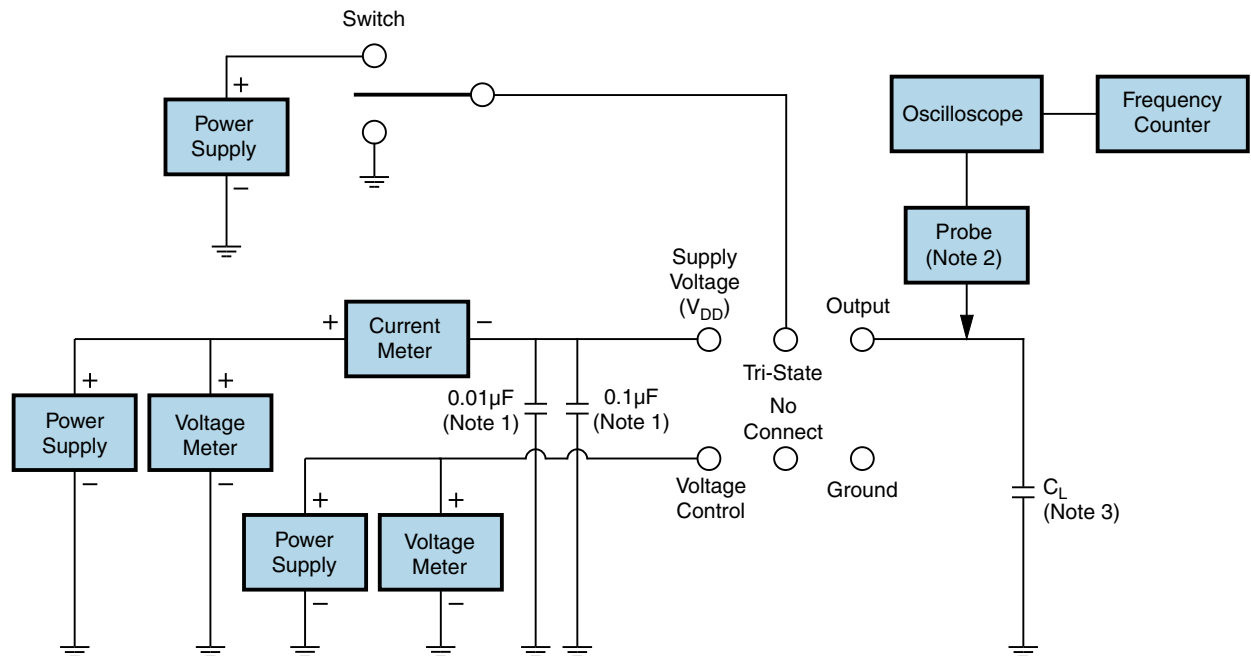
Note 5: All diodes are MMBD7000, MMBD914, or equivalent.

| Output Load<br>Drive Capability | R <sub>L</sub> Value<br>(Ohms) | C <sub>L</sub> Value<br>(pF) |
|---------------------------------|--------------------------------|------------------------------|
| 10TTL                           | 390                            | 15                           |

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

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## Test Circuit for CMOS 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 ( $>10M\Omega$ ), and high bandwidth ( $>300MHz$ ) passive probe is recommended.

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

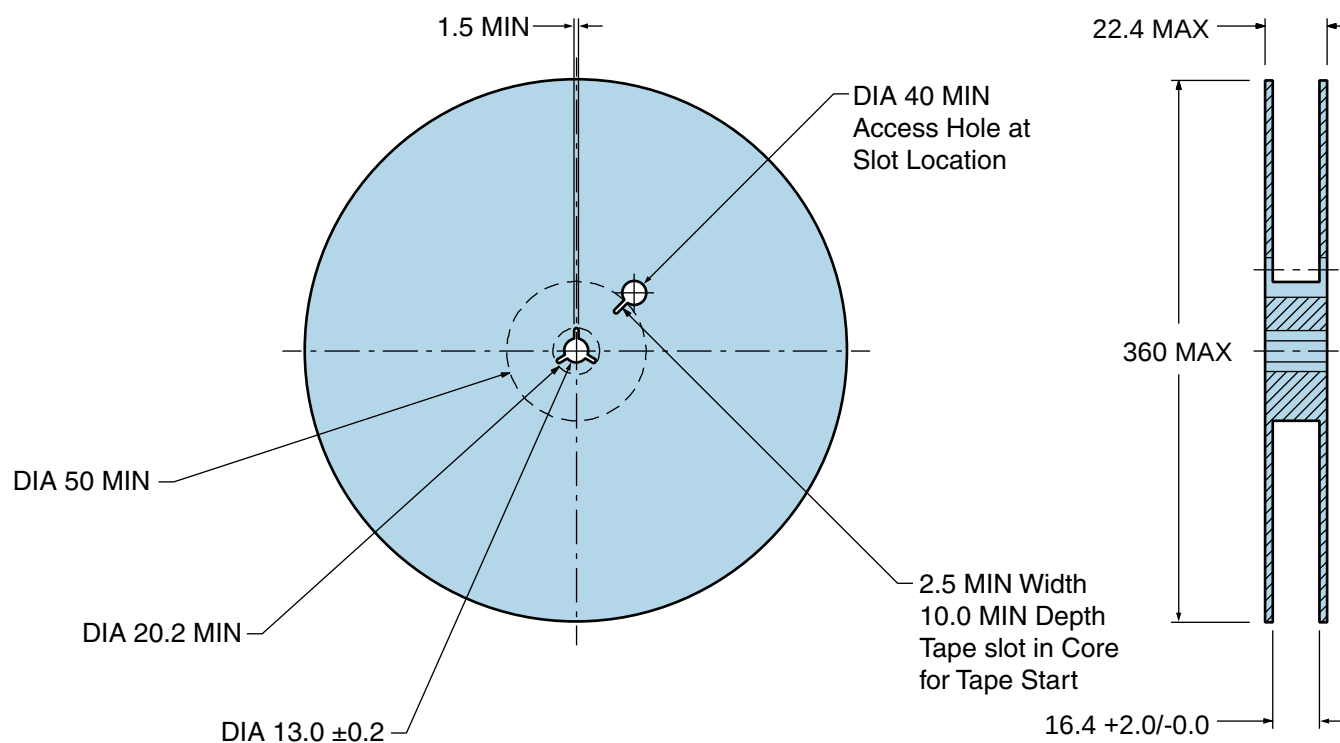
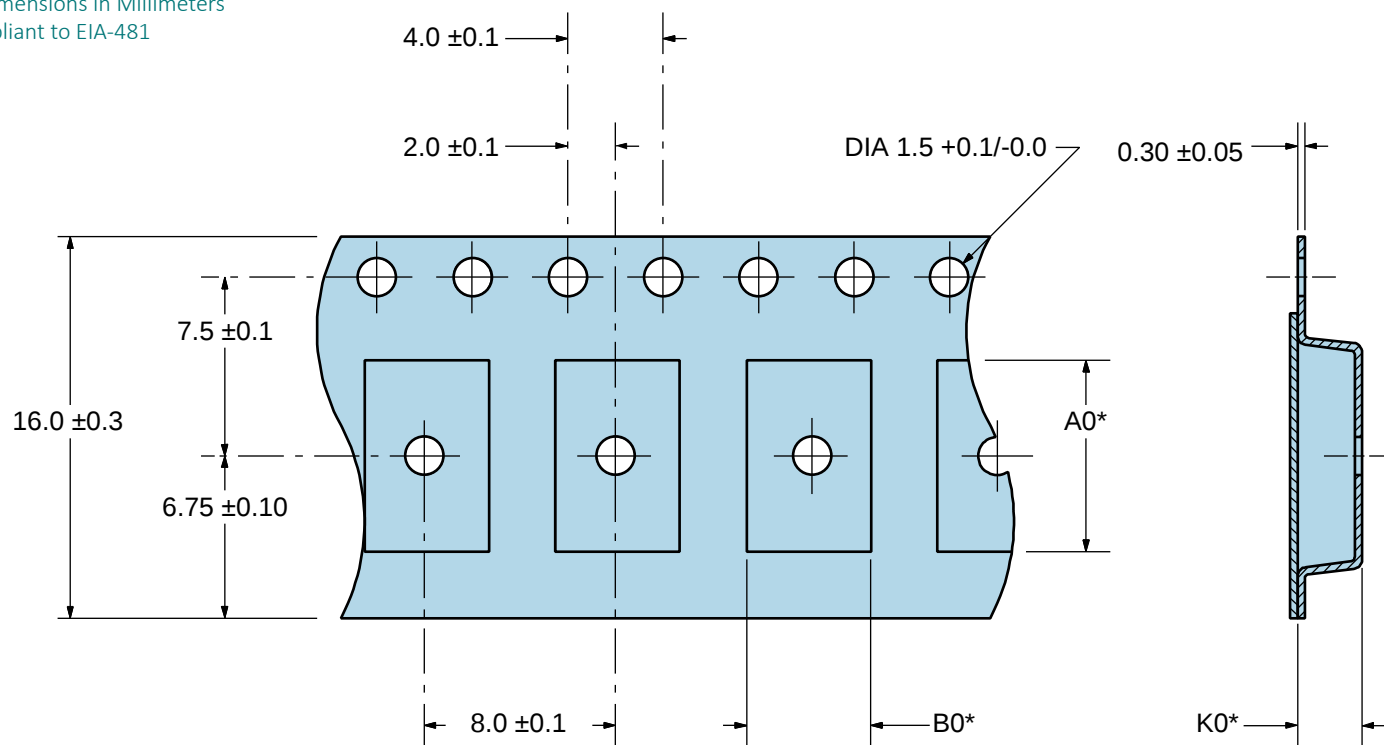
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## Tape & Reel Dimensions

Quantity Per Reel: 1,000 units

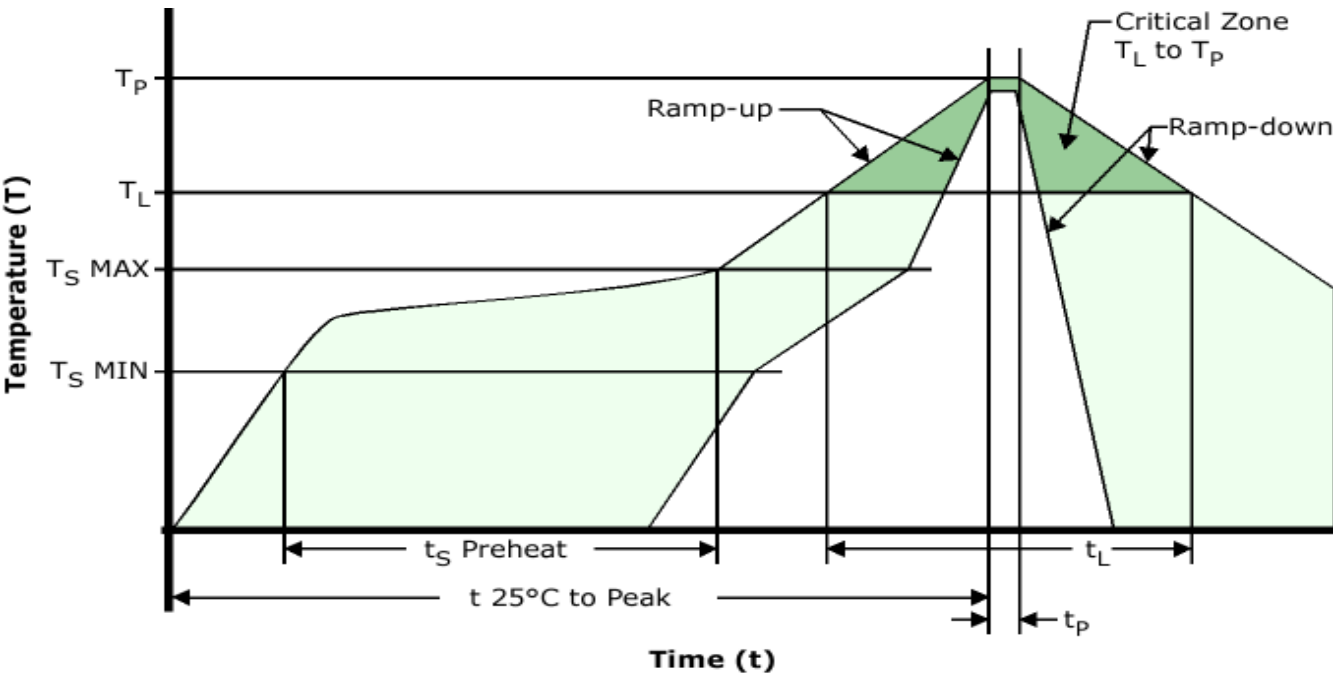
All Dimensions in Millimeters

Compliant to EIA-481



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Recommended Solder Reflow Methods

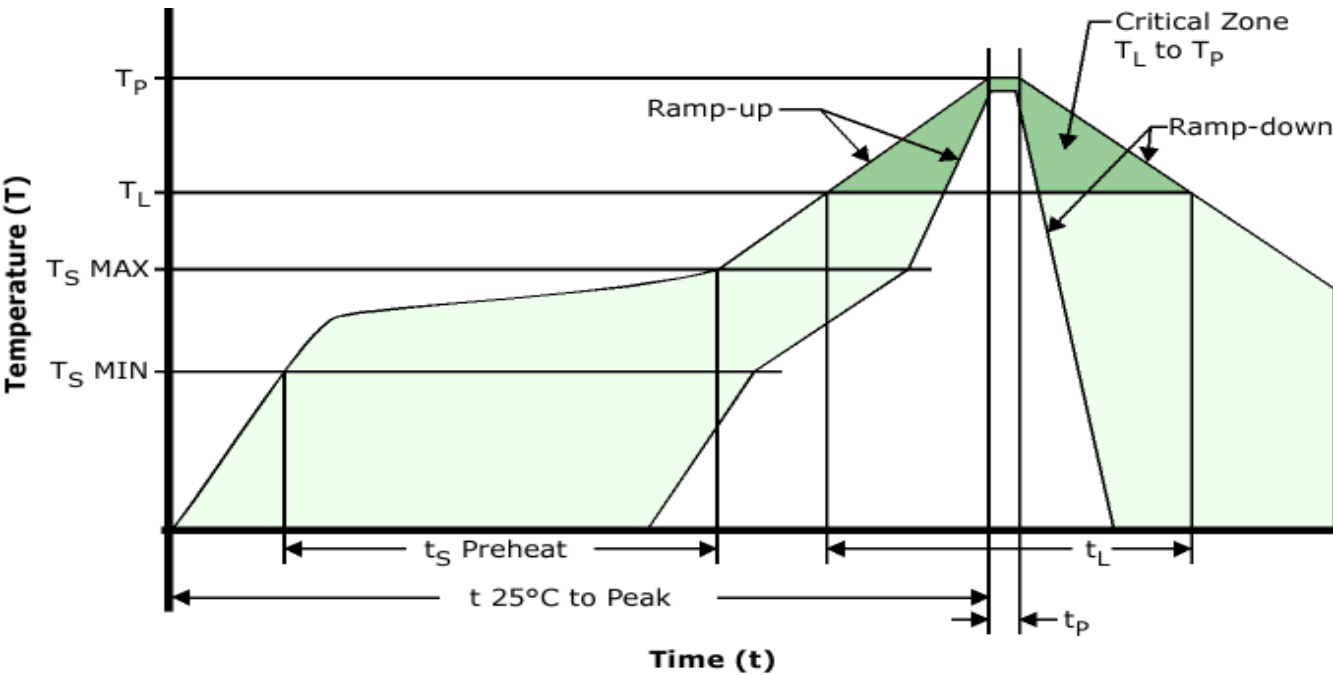


High Temperature Infrared/Convection

|                                                     |                                      |
|-----------------------------------------------------|--------------------------------------|
| T <sub>S</sub> MAX to T <sub>L</sub> (Ramp-up Rate) | 3°C/Second Maximum                   |
| Preheat                                             |                                      |
| - 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                   |
| Time Maintained Above:                              |                                      |
| - 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                              |

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Recommended Solder Reflow Methods



Low Temperature Infrared/Convection 240°C

|                                     |                                                        |
|-------------------------------------|--------------------------------------------------------|
| Ts MAX to Tl (Ramp-up Rate)         | 5°C/Second Maximum                                     |
| Preheat                             |                                                        |
| - Temperature Minimum (Ts MIN)      | N/A                                                    |
| - Temperature Typical (Ts TYP)      | 150°C                                                  |
| - Temperature Maximum (Ts MAX)      | N/A                                                    |
| - Time (ts MIN)                     | 60 - 120 Seconds                                       |
| Ramp-up Rate (Tl to Tp)             | 5°C/Second Maximum                                     |
| Time Maintained Above:              |                                                        |
| - Temperature (Tl)                  | 150°C                                                  |
| - Time (tL)                         | 200 Seconds Maximum                                    |
| Peak Temperature (Tp)               | 240°C Maximum                                          |
| Target Peak Temperature (Tp Target) | 240°C Maximum 2 Times / 230°C Maximum 1 Time           |
| Time within 5°C of actual peak (tp) | 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.