

## REGULATORY COMPLIANCE

|  |  |  |  |  |
|--|--|--|--|--|
|  <b>Lead Free</b><br>COMPLIANT |  <b>EU RoHS</b><br>2011/65 +<br>2015/863<br>COMPLIANT |  <b>China RoHS</b><br>COMPLIANT |  <b>REACH</b><br><b>SVHC</b><br>COMPLIANT |  <b>DRC</b><br><b>CONFLICT</b><br><b>FREE</b> |
|--|--|--|--|--|

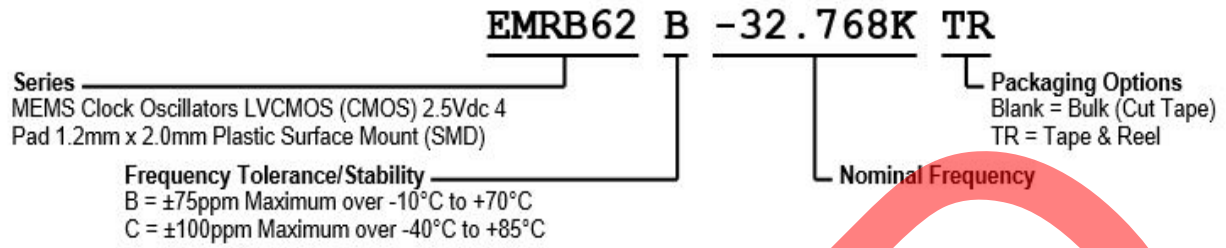
## ITEM DESCRIPTION

MEMS Clock Oscillators LVCMOS (CMOS) 2.5Vdc 4 Pad 1.2mm x 2.0mm Plastic Surface Mount (SMD)

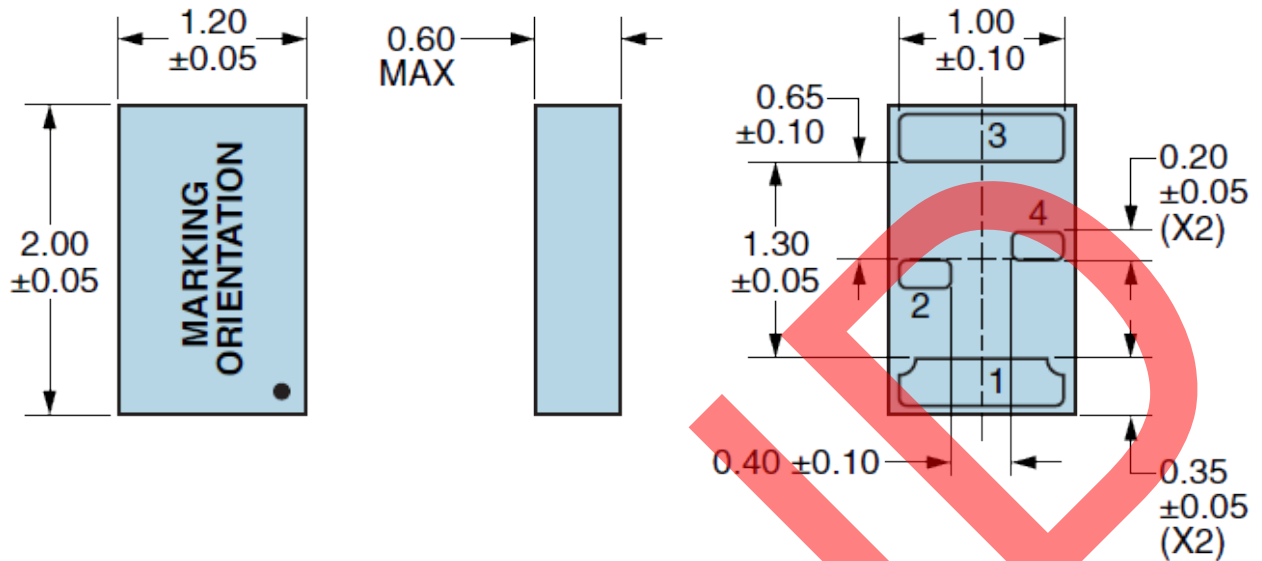
## ELECTRICAL SPECIFICATIONS

|   |   |
|---|---|
| <b>Nominal Frequency</b>                          | 32.768kHz   |
| <b>Frequency Tolerance/Stability</b>              | Inclusive of all conditions: Calibration Tolerance at 25°C, Frequency Stability over the Operating Temperature Range, Supply Voltage Change, and Output Load Change<br>±75ppm Maximum over -10°C to +70°C<br>±100ppm Maximum over -40°C to +85°C        |
| <b>Frequency Tolerance</b>                        | Measured at 25°C ±2°C, at Vdd=2.5Vdc, Post Reflow<br>±20ppm Maximum   |
| <b>Aging at 25°C</b>                              | ±1ppm Maximum First Year  |
| <b>Supply Voltage</b>                             | 2.5Vdc ±10%   |
| <b>Input Current</b>                              | No Load, Nominal Vdd<br>1.0µA Typical (at 25°C), 2.2µA Maximum at Frequency Tolerance/Stability of ±100ppm Maximum over -40°C to +85°C<br>1.0µA Typical (at 25°C), 1.9µA Maximum at Frequency Tolerance/Stability of ±75ppm Maximum over -10°C to +70°C |
| <b>Output Voltage Logic High (V<sub>OH</sub>)</b> | I <sub>OH</sub> = -10µA<br>90% of Vdd Minimum   |
| <b>Output Voltage Logic Low (V<sub>OL</sub>)</b>  | I <sub>OL</sub> = +10µA<br>10% of Vdd Maximum   |
| <b>Rise/Fall Time</b>                             | Measured from 10% to 90% of waveform<br>100nSec Typical, 200nSec Maximum  |
| <b>Duty Cycle</b>                                 | Measured at 50% of waveform<br>50 ±2(%)   |
| <b>Load Drive Capability</b>                      | 15pF Maximum  |
| <b>Output Logic Type</b>                          | CMOS  |
| <b>Period Jitter (RMS)</b>                        | Measured at 25°C<br>35nSec Typical  |
| <b>Power Supply Ramp</b>                          | Measured at 0Vdc to 90% of Vdd<br>100mSec Maximum   |
| <b>Start Up Time</b>                              | Measured at Nominal Vdd<br>180mSec Typical, 500mSec Maximum at Frequency Tolerance/Stability of ±100ppm Maximum over -40°C to +85°C<br>180mSec Typical, 450mSec Maximum at Frequency Tolerance/Stability of ±75ppm Maximum over -10°C to +70°C          |
| <b>Storage Temperature Range</b>                  | -55°C to +125°C   |

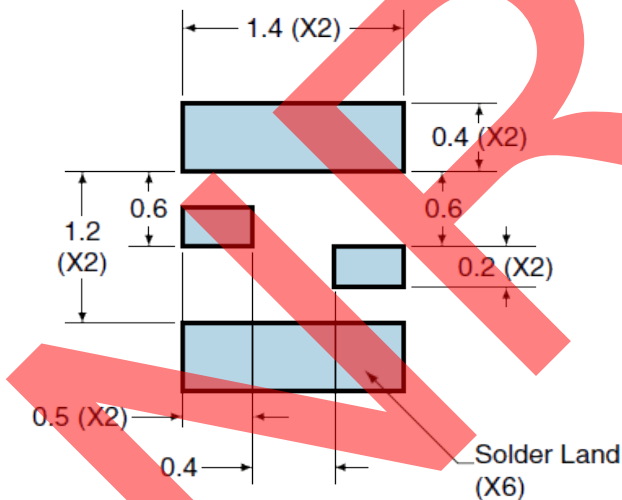
## PART NUMBERING GUIDE



**MECHANICAL DIMENSIONS**



**SUGGESTED SOLDER PAD LAYOUT**

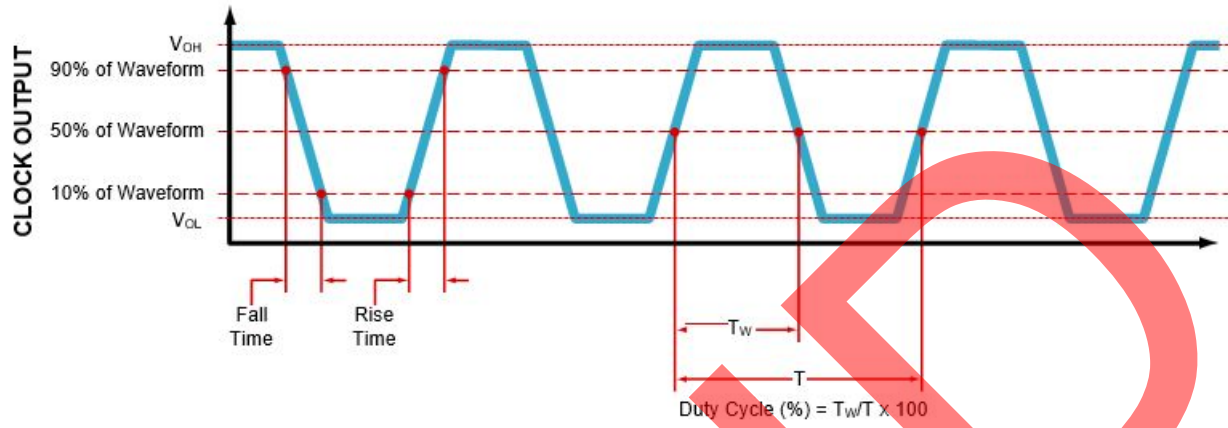


| PIN | CONNECTION     |
|-----|----------------|
| 1   | No Connect     |
| 2   | Ground         |
| 3   | Output         |
| 4   | Supply Voltage |

All Tolerances are  $\pm 0.1$

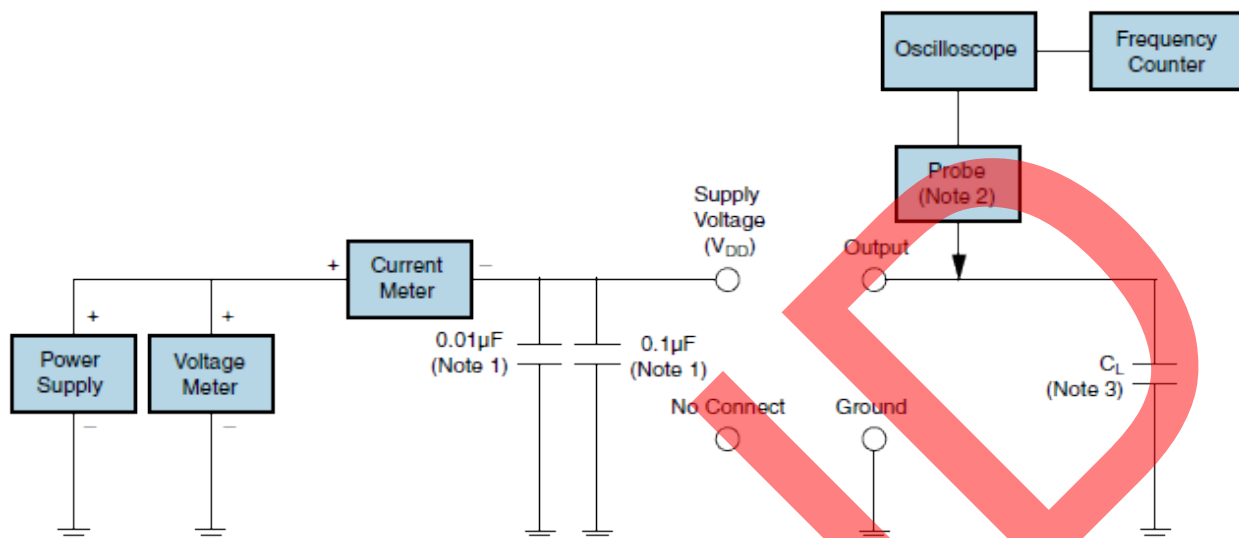
**All Dimensions in Millimeters**

OUTPUT WAVEFORM & TIMING DIAGRAM



MRN

## 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 input capacitance ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>300\text{MHz}$ ) Passive probe is recommended.

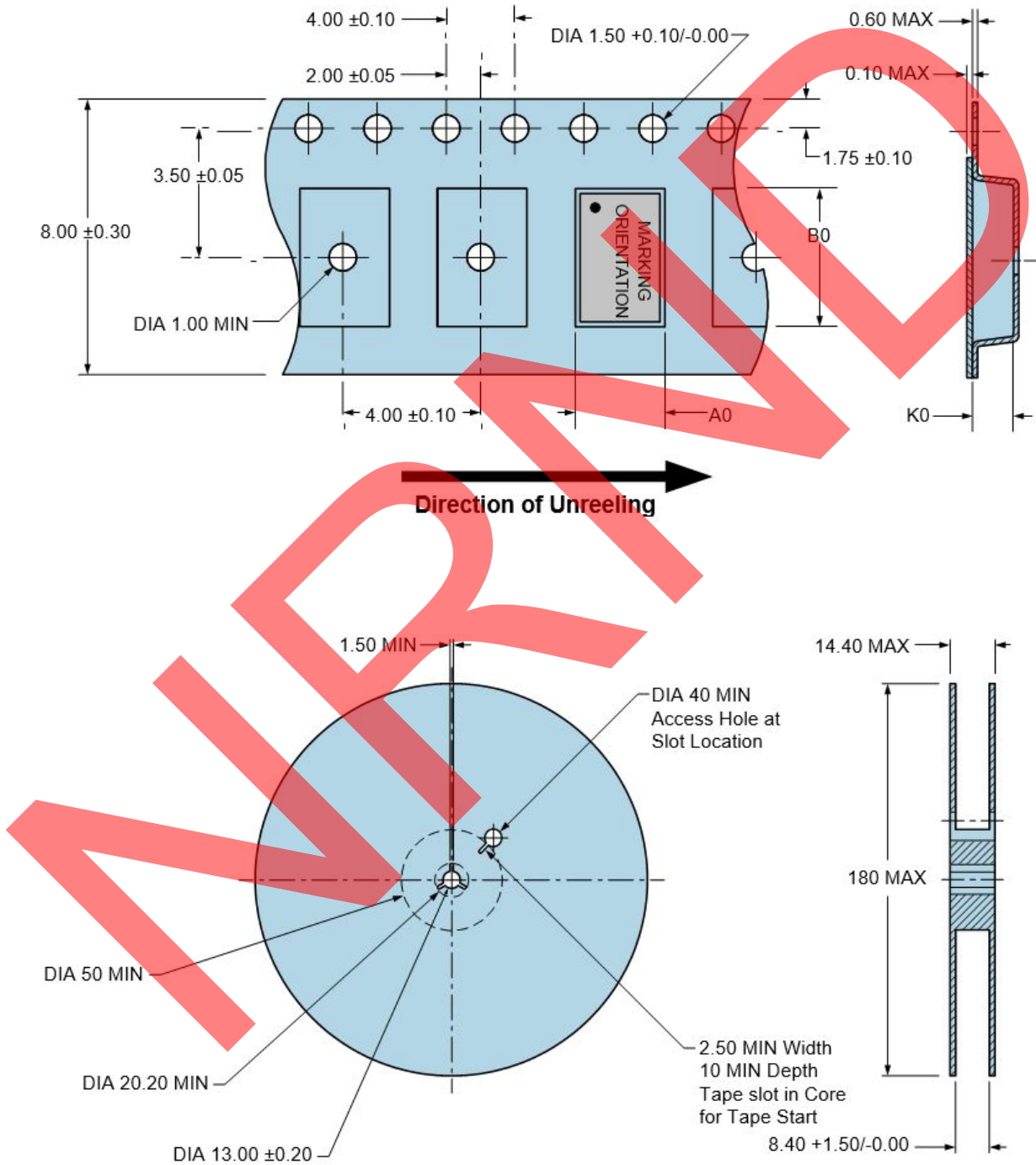
**Note 3:** Capacitance value  $C_L$  includes sum of all probe and fixture capacitance. See applicable specification sheet for 'Load Drive Capability'.

**TAPE & REEL DIMENSIONS**

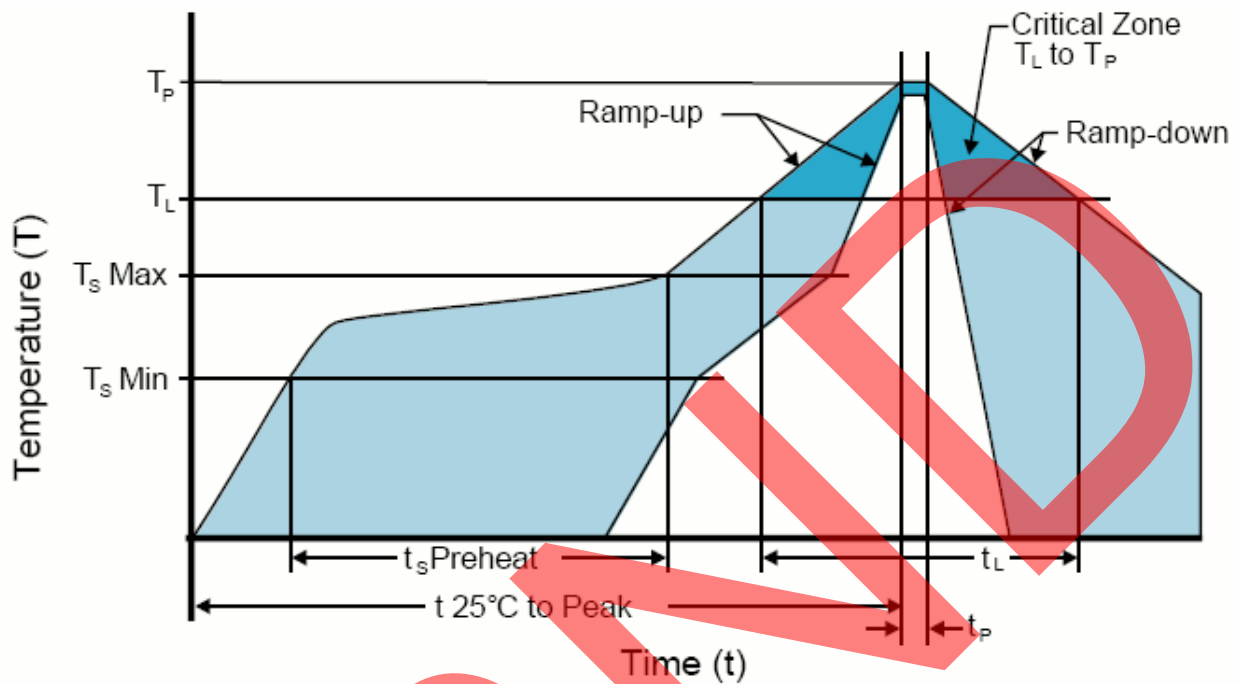
Quantity per Reel: 3000 Units

All Dimensions in Millimeters

Compliant to EIA-481



RECOMMENDED SOLDER REFLOW METHOD



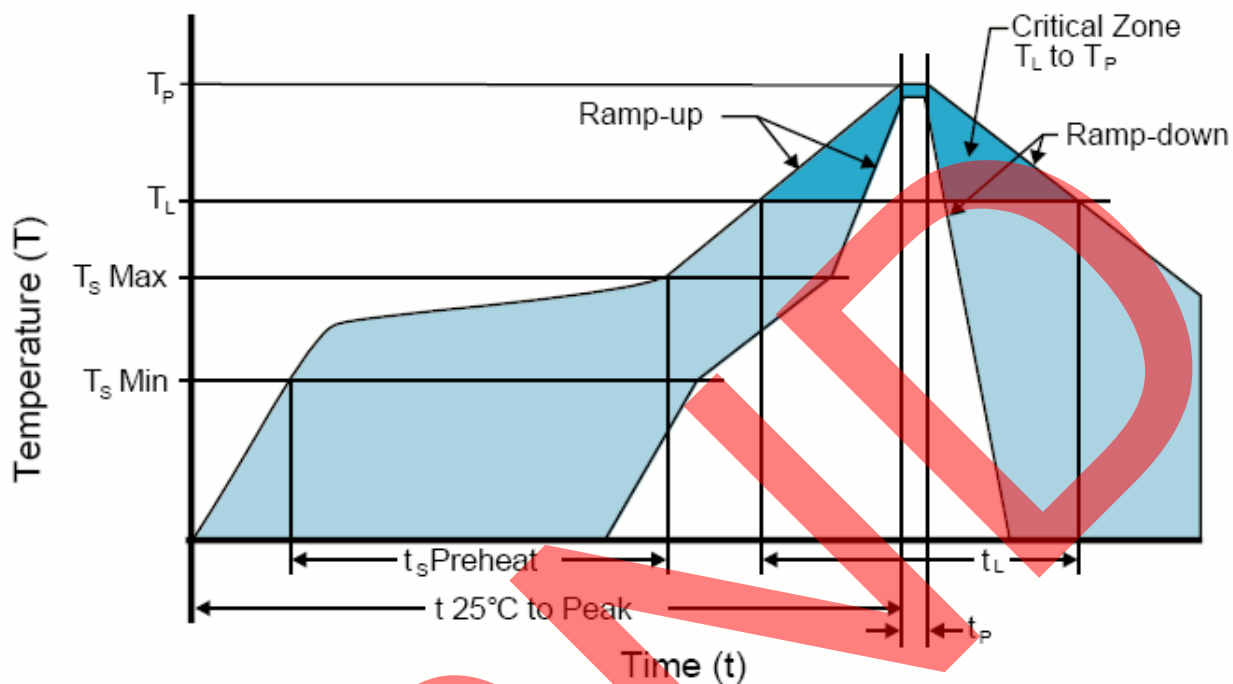
**HIGH TEMPERATURE INFRARED/CONVECTION**

|   |   |
|---|---|
| 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> )                              | 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> )                            | 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 1 Time           |
| 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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