

# EP1145HSTPDL-1.502M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Aug 28, 2016)


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## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) HCMOS/TTL (CMOS) 5.0Vdc 8 Pin DIP Metal Thru-Hole 1.502MHz  $\pm 50$ ppm -20°C to +70°C

## ELECTRICAL SPECIFICATIONS

|                                   |                                                                                                                                                                                                                                        |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                 | 1.502MHz                                                                                                                                                                                                                               |
| 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, First Year Aging at 25°C, Shock, and Vibration) |
| Aging at 25°C                     | $\pm 5$ ppm/year Maximum                                                                                                                                                                                                               |
| Operating Temperature Range       | -20°C to +70°C                                                                                                                                                                                                                         |
| Supply Voltage                    | 5.0Vdc $\pm 10\%$                                                                                                                                                                                                                      |
| Input Current                     | 45mA Maximum (Unloaded)                                                                                                                                                                                                                |
| Output Voltage Logic High (Voh)   | 2.4Vdc Minimum (IOH=-16mA)                                                                                                                                                                                                             |
| Output Voltage Logic Low (Vol)    | 0.4Vdc Maximum (IOL=+16mA)                                                                                                                                                                                                             |
| Rise/Fall Time                    | 4nSec Maximum (Measured at 0.8Vdc to 2.0Vdc)                                                                                                                                                                                           |
| Duty Cycle                        | 50 $\pm 5\%$ (Measured at 1.4Vdc with TTL Load; Measured at 50% of waveform with HCMOS Load)                                                                                                                                           |
| Load Drive Capability             | 10TTL Load Maximum                                                                                                                                                                                                                     |
| Output Logic Type                 | TTL                                                                                                                                                                                                                                    |
| Pin 1 Connection                  | Power Down (Disabled Output: Logic Low)                                                                                                                                                                                                |
| Pin 1 Input Voltage (Vih and Vil) | +2.0Vdc Minimum to enable output, +0.8Vdc Maximum to disable output, No Connect to enable output.                                                                                                                                      |
| Disable Current                   | 30mA Maximum (Pin 1 = Ground)                                                                                                                                                                                                          |
| Standby Current                   | 50 $\mu$ A Maximum (Pin 1 = Ground)                                                                                                                                                                                                    |
| Peak to Peak Jitter (tPK)         | 500pSec Maximum, 90pSec Typical                                                                                                                                                                                                        |
| RMS Period Jitter (tRMS)          | 50pSec Maximum, 13pSec Typical                                                                                                                                                                                                         |
| Start Up Time                     | 10mSec Maximum                                                                                                                                                                                                                         |
| Storage Temperature Range         | -55°C to +125°C                                                                                                                                                                                                                        |

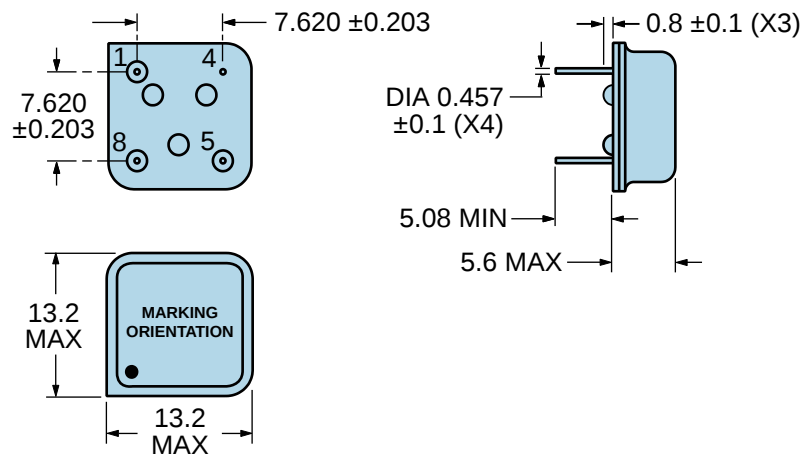
## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                              |                                       |
|------------------------------|---------------------------------------|
| Fine Leak Test               | MIL-STD-883, Method 1014, Condition A |
| Gross Leak Test              | MIL-STD-883, Method 1014, Condition C |
| Lead Integrity               | MIL-STD-883, Method 2004              |
| 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)



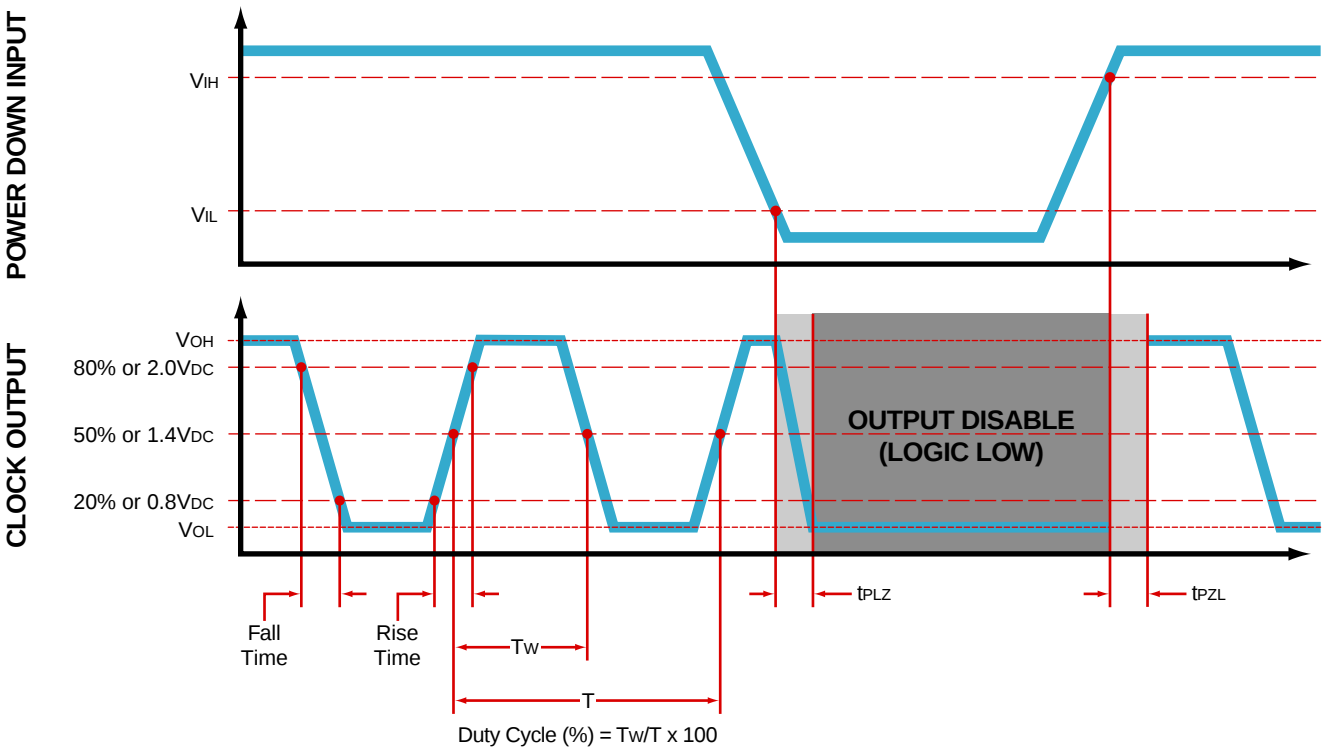
| PIN | CONNECTION             |
|-----|------------------------|
| 1   | Power Down (Logic Low) |
| 4   | Case/Ground            |
| 5   | Output                 |
| 8   | Supply Voltage         |

| LINE | MARKING                                                                                        |
|------|------------------------------------------------------------------------------------------------|
| 1    | ECLIPTEK                                                                                       |
| 2    | EP11PD<br>EP11=Product Series                                                                  |
| 3    | 1.5020M                                                                                        |
| 4    | XXYYZZ<br>XX=Ecliptek Manufacturing<br>Code<br>Y=Last Digit of the Year<br>ZZ=Week of the Year |

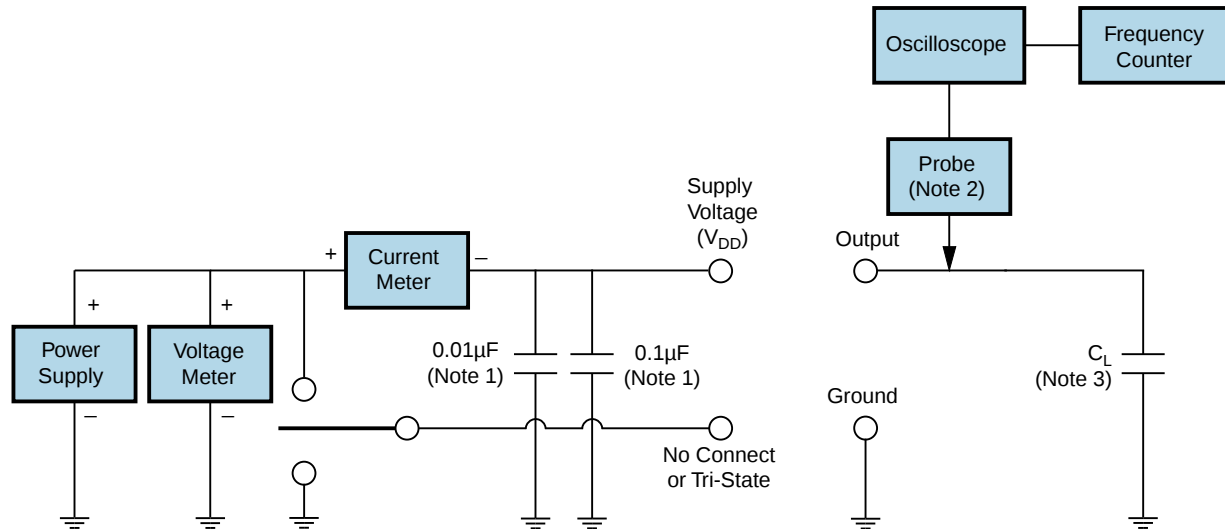
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OUTPUT WAVEFORM & TIMING DIAGRAM





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**Test Circuit for CMOS Output**

Note 1: An external  $0.1\mu\text{F}$  low frequency tantalum bypass capacitor in parallel with a  $0.01\mu\text{F}$  high frequency ceramic bypass capacitor close to the package ground and  $V_{DD}$  pin is required.

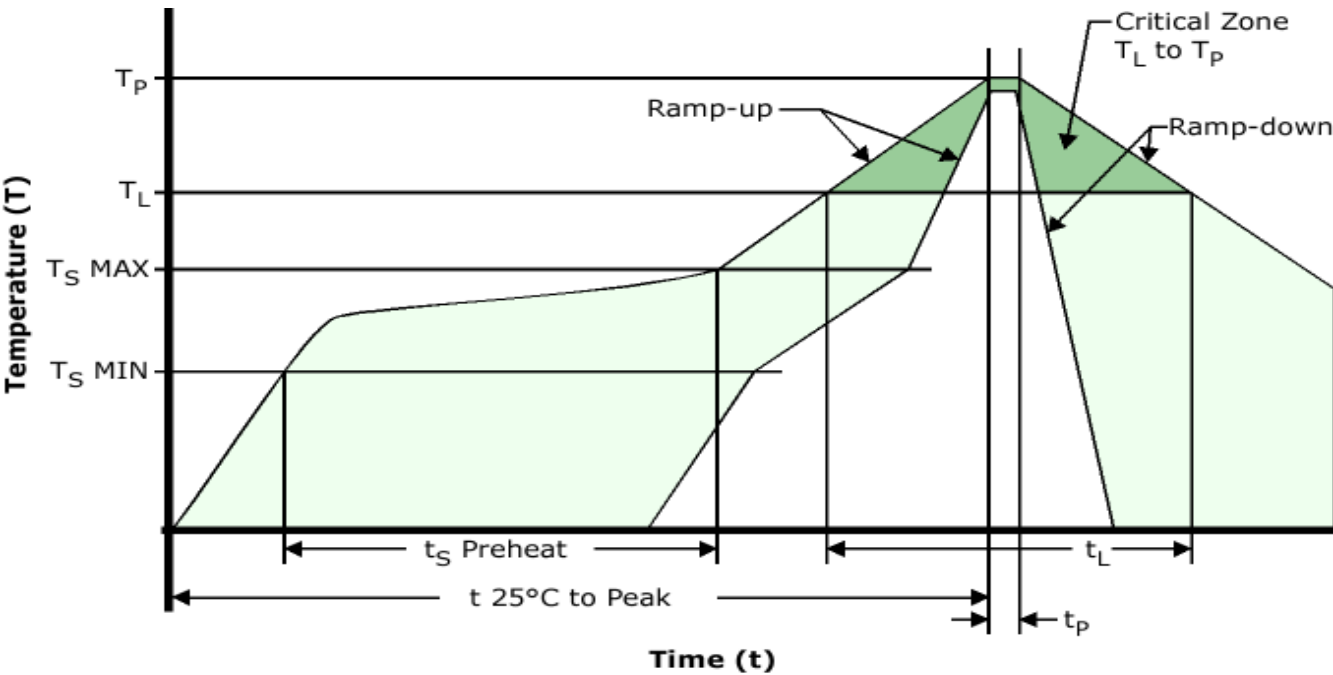
Note 2: A low capacitance ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>300\text{MHz}$ ) passive probe is recommended.

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

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Recommended Solder Reflow Methods



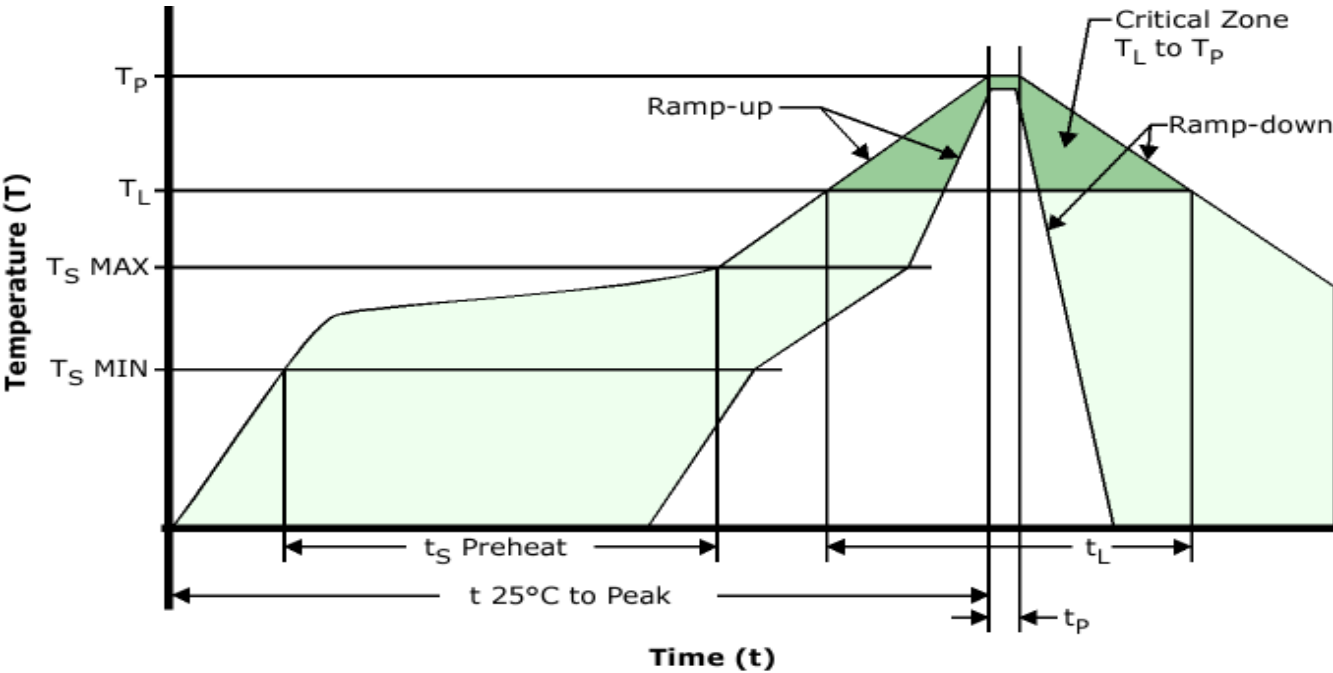
High Temperature Solder Bath (Wave Solder)

|                                     |                                      |
|-------------------------------------|--------------------------------------|
| Ts MAX to Tl (Ramp-up Rate)         | 3°C/Second Maximum                   |
| Preheat                             |                                      |
| - Temperature Minimum (Ts MIN)      | 150°C                                |
| - Temperature Typical (Ts TYP)      | 175°C                                |
| - Temperature Maximum (Ts MAX)      | 200°C                                |
| - Time (ts MIN)                     | 60 - 180 Seconds                     |
| Ramp-up Rate (Tl to Tp)             | 3°C/Second Maximum                   |
| Time Maintained Above:              |                                      |
| - Temperature (Tl)                  | 217°C                                |
| - Time (tL)                         | 60 - 150 Seconds                     |
| Peak Temperature (Tp)               | 260°C Maximum for 10 Seconds Maximum |
| Target Peak Temperature (Tp Target) | 250°C +0/-5°C                        |
| Time within 5°C of actual peak (tp) | 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



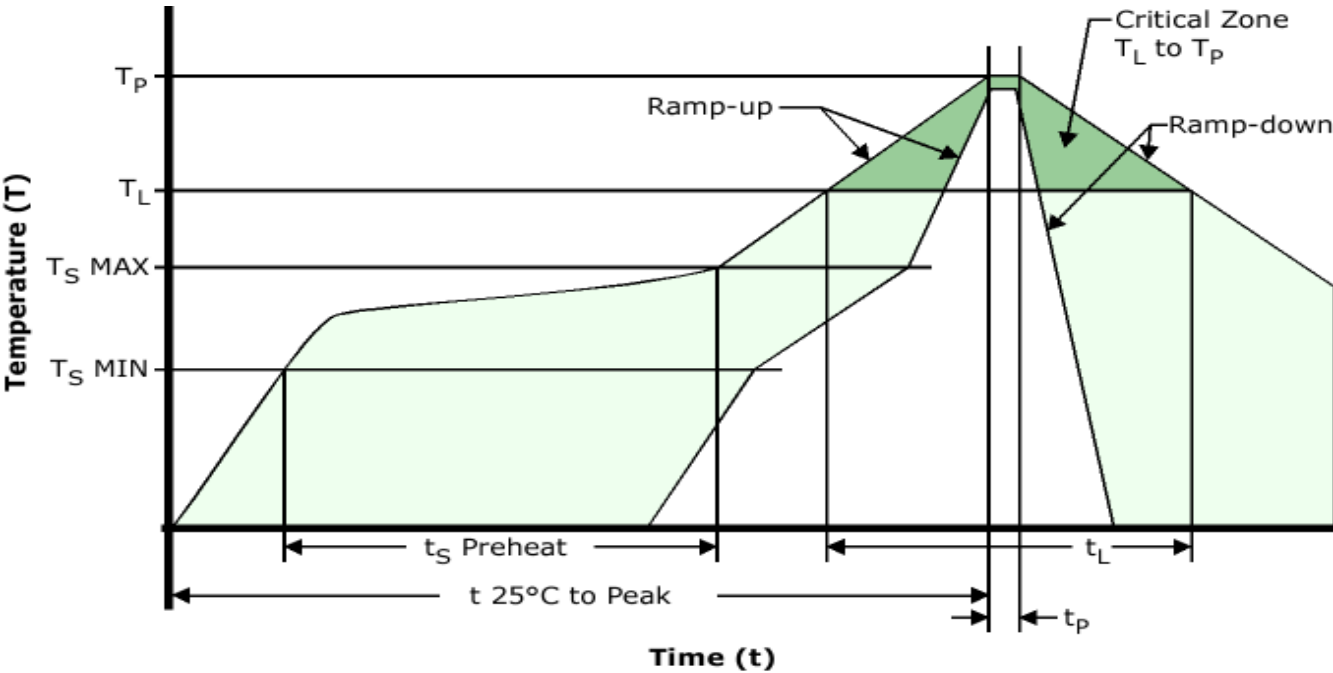
Low Temperature Infrared/Convection 185°C

|                                     |                     |                            |
|-------------------------------------|---------------------|----------------------------|
| 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)               |                     | 185°C Maximum              |
| Target Peak Temperature (Tp Target) |                     | 185°C Maximum 2 Times      |
| Time within 5°C of actual peak (tp) |                     | 10 Seconds Maximum 2 Times |
| Ramp-down Rate                      |                     | 5°C/Second Maximum         |
| Time 25°C to Peak Temperature (t)   |                     | N/A                        |
| Moisture Sensitivity Level          |                     | Level 1                    |

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Recommended Solder Reflow Methods



Low Temperature Solder Bath (Wave Solder)

|                                     |                                                       |
|-------------------------------------|-------------------------------------------------------|
| 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)                     | 30 - 60 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)               | 245°C Maximum                                         |
| Target Peak Temperature (Tp Target) | 245°C Maximum 1 Time / 235°C Maximum 2 Times          |
| Time within 5°C of actual peak (tp) | 5 Seconds Maximum 1 Time / 15 Seconds Maximum 2 Times |
| 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.