

**EP1145HSTSC-2.4576M**
[Click part number to visit Part Number Details page](#)
**REGULATORY COMPLIANCE** (Data Sheet downloaded on Apr 22, 2018)
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**ITEM DESCRIPTION**

Quartz Crystal Clock Oscillators XO (SPXO) HCMOS/TTL (CMOS) 5.0Vdc 8 Pin DIP Metal Thru-Hole 2.4576MHz  $\pm 50$ ppm -20°C to +70°C

**ELECTRICAL SPECIFICATIONS**

|                                   |                                                                                                                                                                                                                                        |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                 | 2.4576MHz                                                                                                                                                                                                                              |
| 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)   | Vdd-0.4Vdc Minimum (IOH=-16mA)                                                                                                                                                                                                         |
| Output Voltage Logic Low (Vol)    | 0.4Vdc Maximum (IOL=+16mA)                                                                                                                                                                                                             |
| Rise/Fall Time                    | 4nSec Maximum (Measured at 20% to 80% of waveform)                                                                                                                                                                                     |
| Duty Cycle                        | 50 $\pm 10\%$ (Measured at 1.4Vdc with TTL Load; Measured at 50% of waveform with HCMOS Load)                                                                                                                                          |
| Load Drive Capability             | 50pF HCMOS Load Maximum                                                                                                                                                                                                                |
| Output Logic Type                 | CMOS                                                                                                                                                                                                                                   |
| Pin 1 Connection                  | Tri-State (Disabled Output: High Impedance)                                                                                                                                                                                            |
| 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                                                                                                                                                                                                                        |

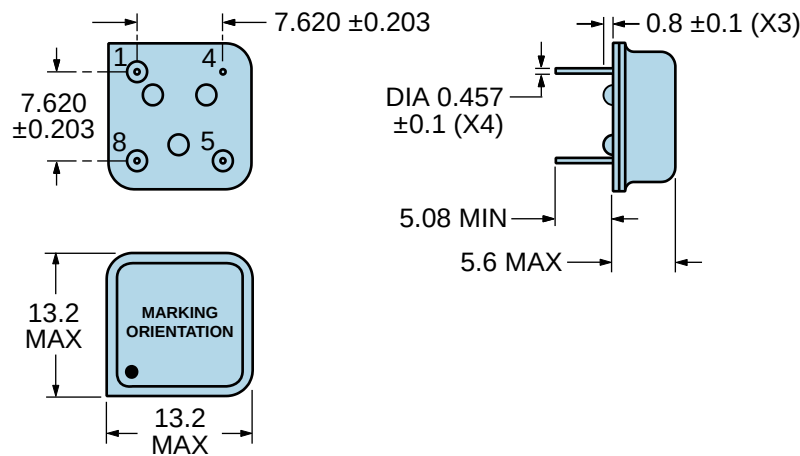
**ENVIRONMENTAL & MECHANICAL SPECIFICATIONS**

|                              |                                       |
|------------------------------|---------------------------------------|
| 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)



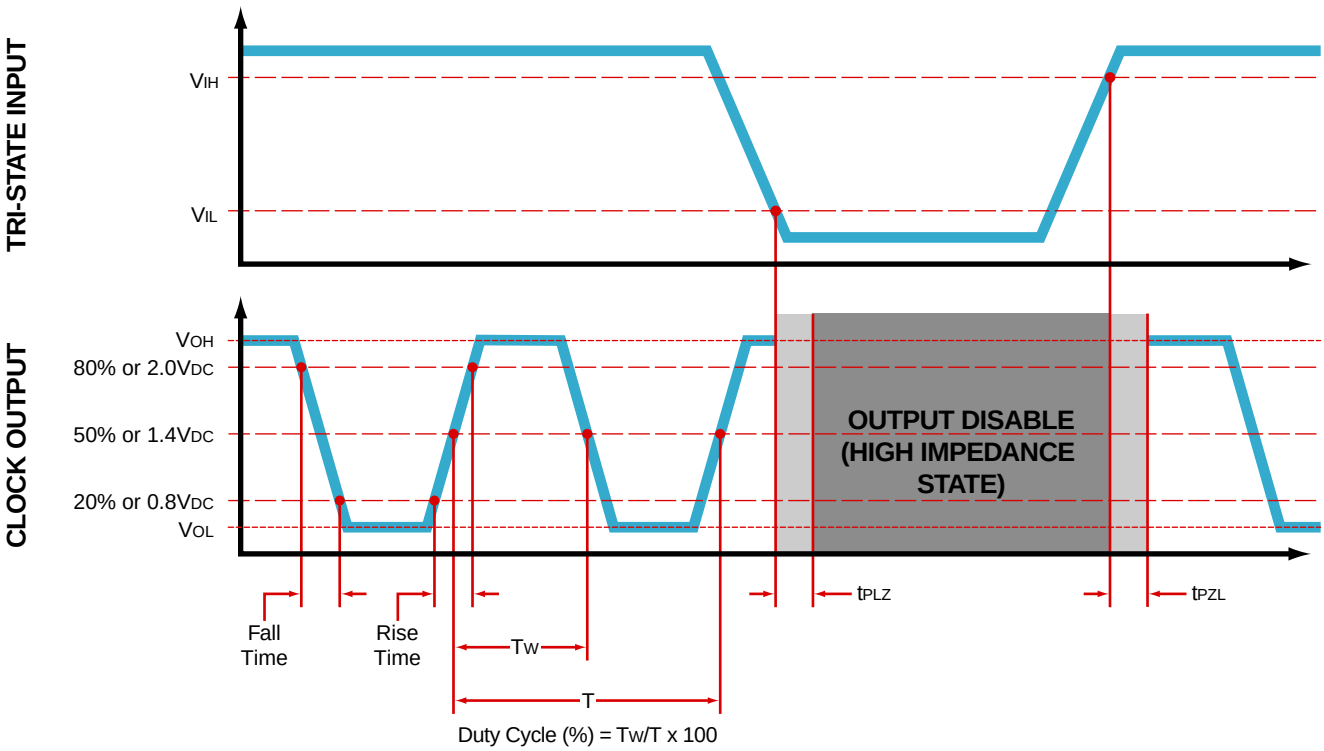
| PIN | CONNECTION                 |
|-----|----------------------------|
| 1   | Tri-State (High Impedance) |
| 4   | Case/Ground                |
| 5   | Output                     |
| 8   | Supply Voltage             |

| LINE | MARKING                                                                                    |
|------|--------------------------------------------------------------------------------------------|
| 1    | ECLIPTEK                                                                                   |
| 2    | EP11TS<br>EP11=Product Series                                                              |
| 3    | 2.4576M                                                                                    |
| 4    | XXYZZ<br>XX=Ecliptek Manufacturing Code<br>Y=Last Digit of the Year<br>ZZ=Week of the Year |

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OUTPUT WAVEFORM & TIMING DIAGRAM

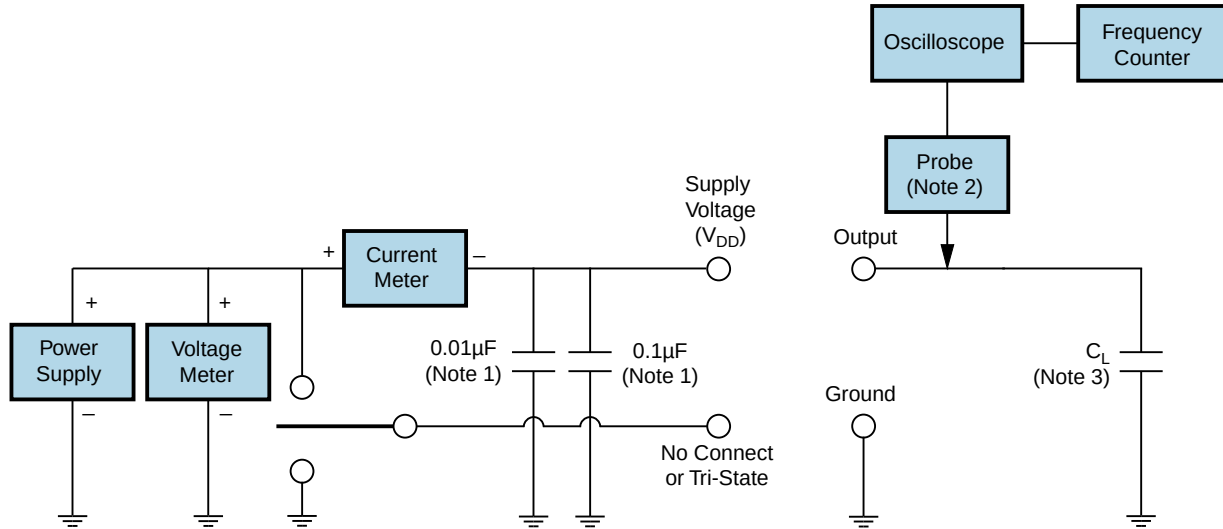




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## Test Circuit for CMOS Output



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.

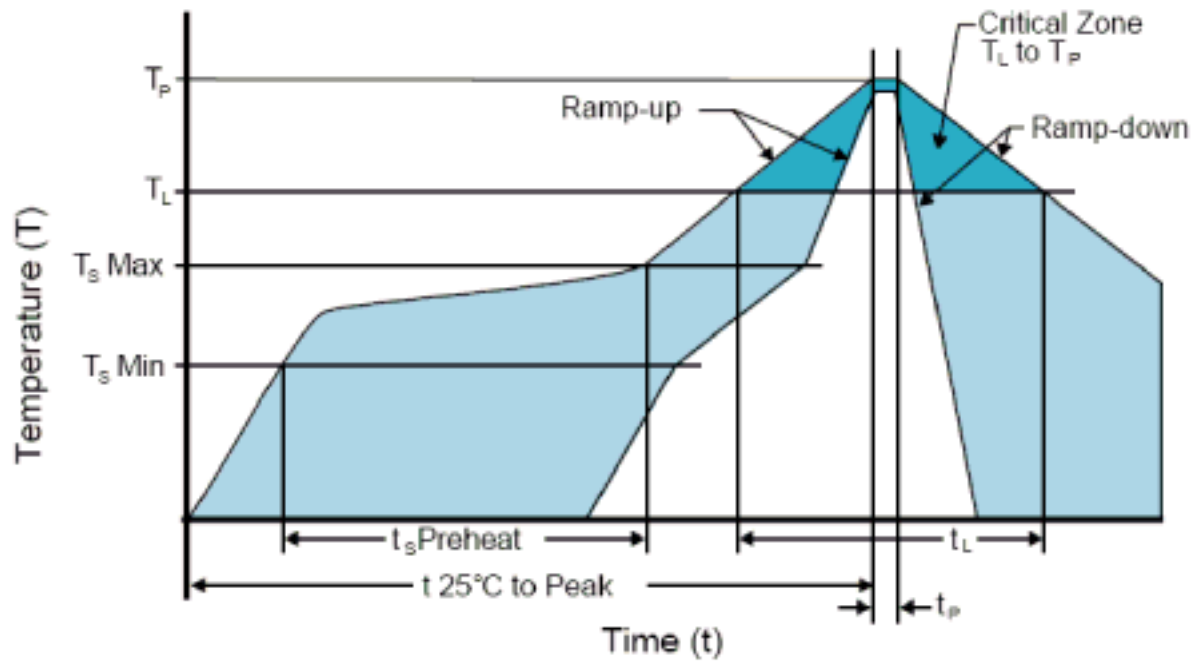
Note 2: A low capacitance ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>300\text{MHz}$ ) passive probe is recommended.

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

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Recommended Solder Reflow Methods



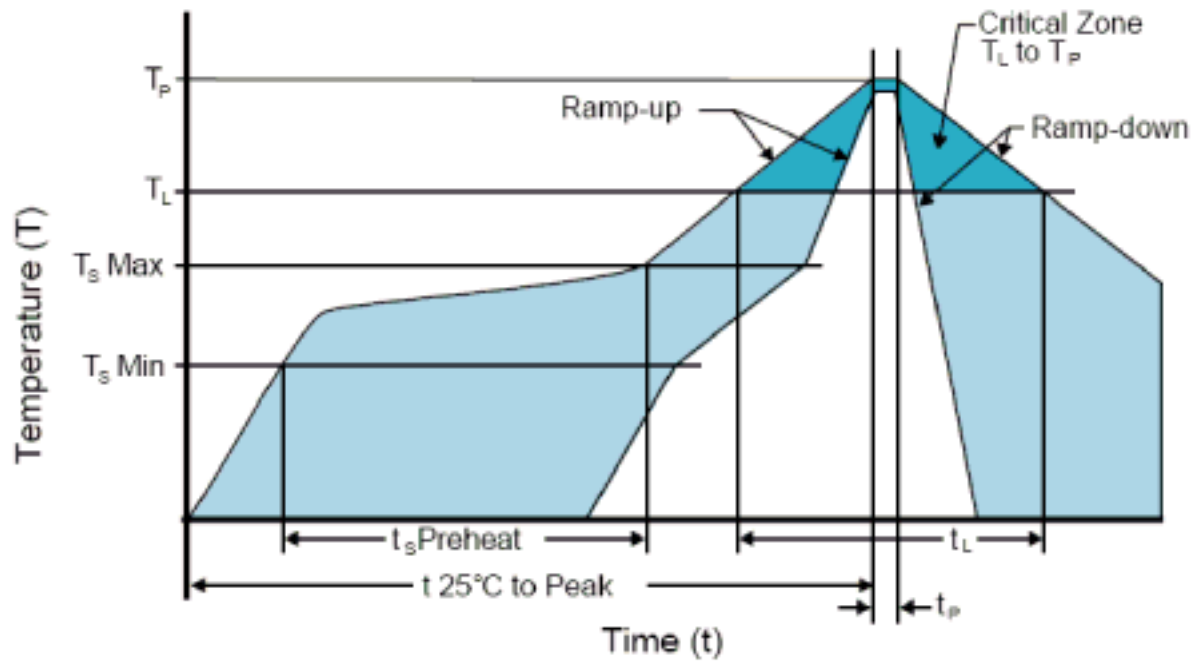
High Temperature Solder Bath (Wave Solder)

|                                     |                                      |
|-------------------------------------|--------------------------------------|
| 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



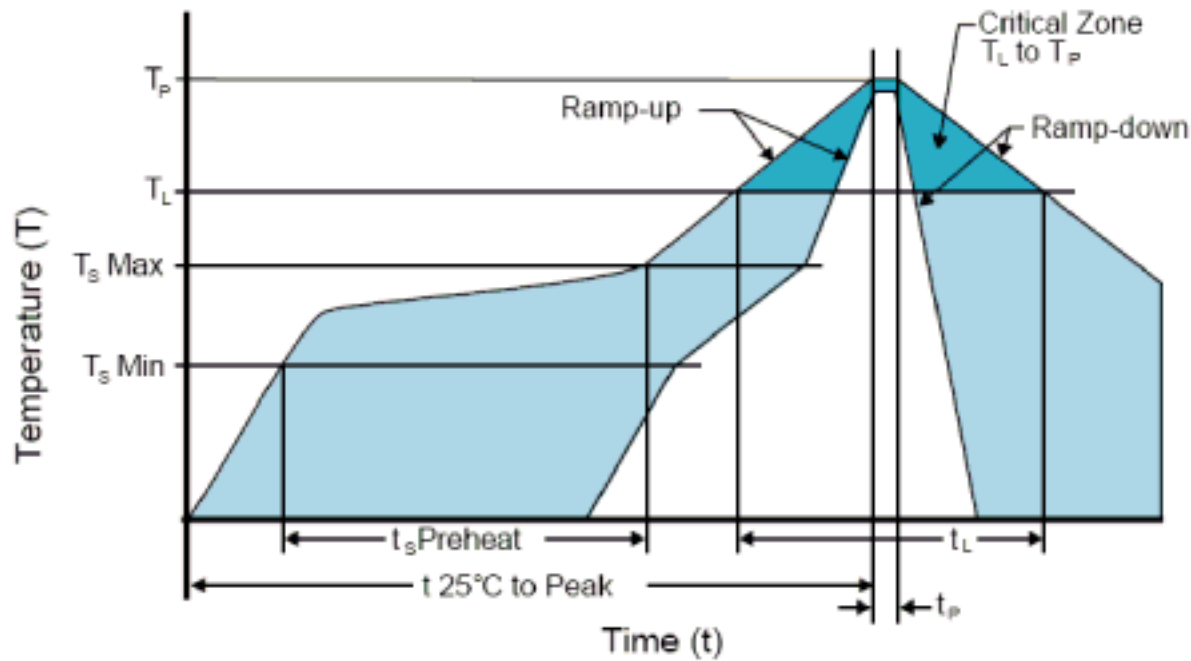
Low Temperature Infrared/Convection 185°C

|                                                                |                     |                            |
|----------------------------------------------------------------|---------------------|----------------------------|
| <b><math>T_s</math> MAX to <math>T_L</math> (Ramp-up Rate)</b> |                     | 5°C/Second Maximum         |
| <b>Preheat</b>                                                 |                     |                            |
| - 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    |                            |
| <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°C               |                            |
| - Time ( $t_L$ )                                               | 200 Seconds Maximum |                            |
| <b>Peak Temperature (<math>T_P</math>)</b>                     |                     | 185°C Maximum              |
| <b>Target Peak Temperature (<math>T_P</math> Target)</b>       |                     | 185°C Maximum 2 Times      |
| <b>Time within 5°C of actual peak (<math>t_P</math>)</b>       |                     | 10 Seconds Maximum 2 Times |
| <b>Ramp-down Rate</b>                                          |                     | 5°C/Second Maximum         |
| <b>Time 25°C to Peak Temperature (t)</b>                       |                     | N/A                        |
| <b>Moisture Sensitivity Level</b>                              |                     | Level 1                    |

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Recommended Solder Reflow Methods



Low Temperature Solder Bath (Wave Solder)

|                                                                        |                                                       |
|------------------------------------------------------------------------|-------------------------------------------------------|
| <b><math>T_S \text{ MAX}</math> to <math>T_L</math> (Ramp-up Rate)</b> | 5°C/Second Maximum                                    |
| <b>Preheat</b>                                                         |                                                       |
| - Temperature Minimum ( $T_S \text{ MIN}$ )                            | N/A                                                   |
| - Temperature Typical ( $T_S \text{ TYP}$ )                            | 150°C                                                 |
| - Temperature Maximum ( $T_S \text{ MAX}$ )                            | N/A                                                   |
| - Time ( $t_S \text{ MIN}$ )                                           | 30 - 60 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°C                                                 |
| - Time ( $t_L$ )                                                       | 200 Seconds Maximum                                   |
| <b>Peak Temperature (<math>T_P</math>)</b>                             | 245°C Maximum                                         |
| <b>Target Peak Temperature (<math>T_P \text{ Target}</math>)</b>       | 245°C Maximum 1 Time / 235°C Maximum 2 Times          |
| <b>Time within 5°C of actual peak (<math>t_P</math>)</b>               | 5 Seconds Maximum 1 Time / 15 Seconds Maximum 2 Times |
| <b>Ramp-down Rate</b>                                                  | 5°C/Second Maximum                                    |
| <b>Time 25°C to Peak Temperature (t)</b>                               | N/A                                                   |
| <b>Moisture Sensitivity Level</b>                                      | 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.