

# EP1345PD-4.500M

**Lead Free****COMPLIANT****EU RoHS**

2011/65

**COMPLIANT****REACH****SVHC 144**

Jun 20, 2013

**COMPLIANT**

## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) LVCMOS (CMOS) 3.3Vdc 14 Pin DIP Metal Thru-Hole 4.500MHz  $\pm 50$ ppm -20°C to +70°C

## ELECTRICAL SPECIFICATIONS

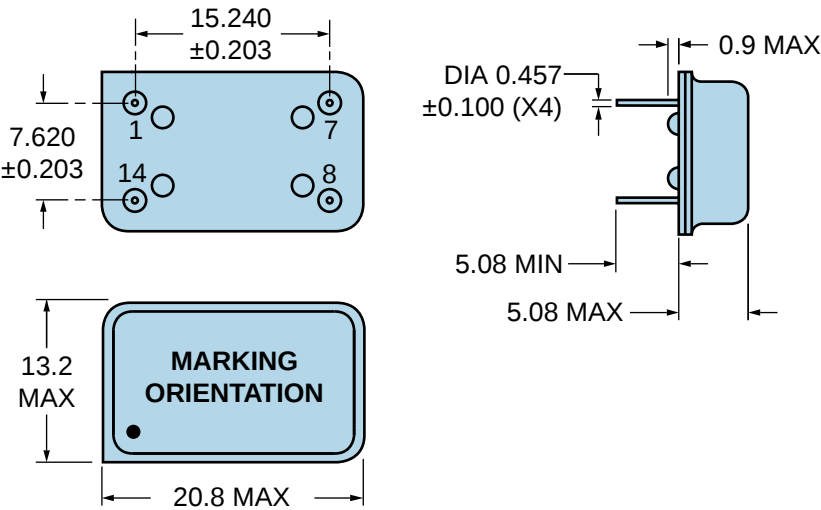
|                                          |                                                                                                                                                                                                                                        |
|------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Nominal Frequency</b>                 | 4.500MHz                                                                                                                                                                                                                               |
| <b>Frequency Tolerance/Stability</b>     | $\pm 50$ 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) |
| <b>Aging at 25°C</b>                     | $\pm 5$ ppm/year Maximum                                                                                                                                                                                                               |
| <b>Operating Temperature Range</b>       | -20°C to +70°C                                                                                                                                                                                                                         |
| <b>Supply Voltage</b>                    | 3.3Vdc $\pm 10\%$                                                                                                                                                                                                                      |
| <b>Input Current</b>                     | 28mA Maximum (Unloaded)                                                                                                                                                                                                                |
| <b>Output Voltage Logic High (Voh)</b>   | Vdd-0.4Vdc Minimum (IOH = -8mA)                                                                                                                                                                                                        |
| <b>Output Voltage Logic Low (Vol)</b>    | 0.4Vdc Maximum (IOL = +8mA)                                                                                                                                                                                                            |
| <b>Rise/Fall Time</b>                    | 4nSec Maximum (Measured at 20% to 80% of waveform)                                                                                                                                                                                     |
| <b>Duty Cycle</b>                        | 50 $\pm 10\%$ (Measured at 50% of waveform)                                                                                                                                                                                            |
| <b>Load Drive Capability</b>             | 30pF Maximum                                                                                                                                                                                                                           |
| <b>Output Logic Type</b>                 | CMOS                                                                                                                                                                                                                                   |
| <b>Pin 1 Connection</b>                  | Power Down (Disable Output: Logic Low)                                                                                                                                                                                                 |
| <b>Pin 1 Input Voltage (Vih and Vil)</b> | 70% of Vdd Minimum to enable output, 20% of Vdd Maximum to disable output, No Connect to enable output.                                                                                                                                |
| <b>Disable Current</b>                   | 16mA Maximum (Pin 1 = Ground)                                                                                                                                                                                                          |
| <b>Standby Current</b>                   | 20 $\mu$ A Maximum (Pin 1 = Ground)                                                                                                                                                                                                    |
| <b>Peak to Peak Jitter (tPK)</b>         | 500pSec Maximum, 100pSec Typical                                                                                                                                                                                                       |
| <b>RMS Period Jitter (tRMS)</b>          | 50pSec Maximum, 15pSec Typical                                                                                                                                                                                                         |
| <b>Start Up Time</b>                     | 10mSec Maximum                                                                                                                                                                                                                         |
| <b>Storage Temperature Range</b>         | -55°C to +125°C                                                                                                                                                                                                                        |

## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                                     |                                       |
|-------------------------------------|---------------------------------------|
| <b>Fine Leak Test</b>               | MIL-STD-883, Method 1014, Condition A |
| <b>Gross Leak Test</b>              | MIL-STD-883, Method 1014, Condition C |
| <b>Lead Integrity</b>               | MIL-STD-883, Method 2004              |
| <b>Mechanical Shock</b>             | MIL-STD-202, Method 213, Condition C  |
| <b>Resistance to Soldering Heat</b> | MIL-STD-202, Method 210               |
| <b>Resistance to Solvents</b>       | MIL-STD-202, Method 215               |
| <b>Solderability</b>                | MIL-STD-883, Method 2003              |
| <b>Temperature Cycling</b>          | MIL-STD-883, Method 1010              |
| <b>Vibration</b>                    | MIL-STD-883, Method 2007, Condition A |

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## MECHANICAL DIMENSIONS (all dimensions in millimeters)

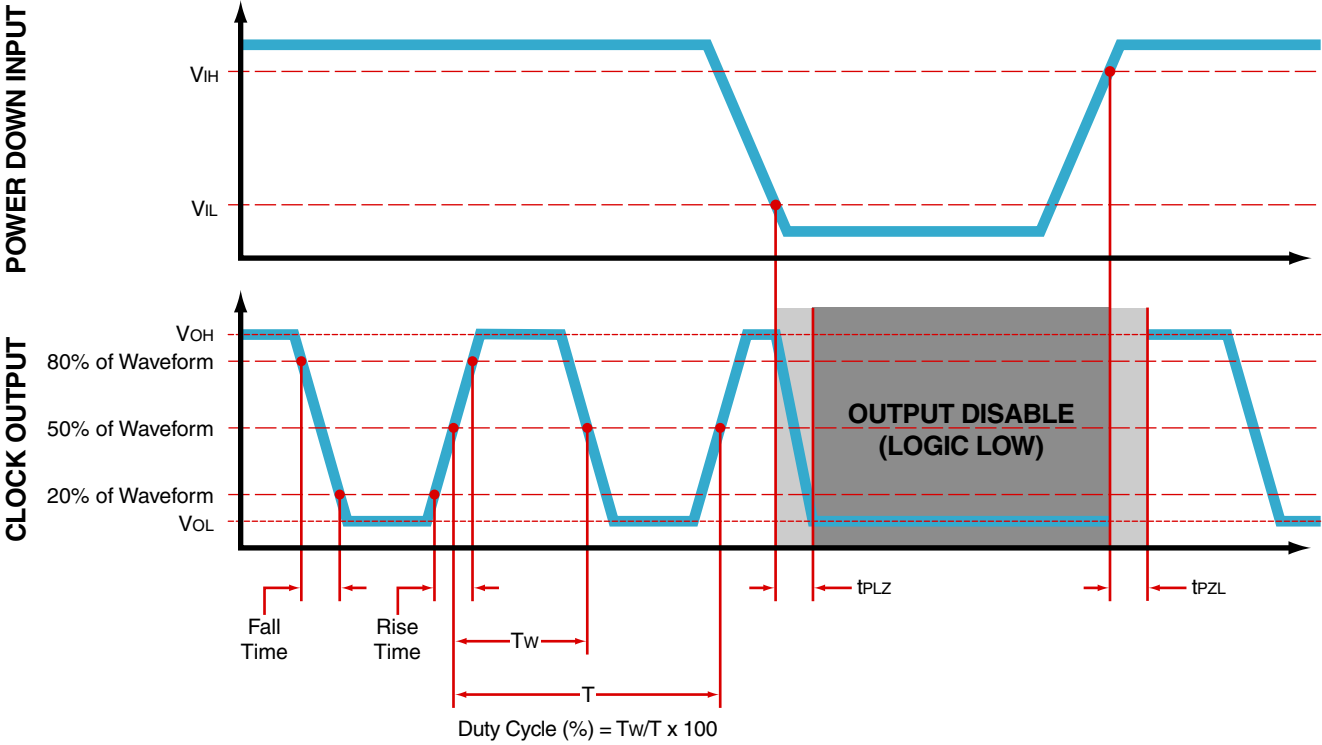


| PIN | CONNECTION             |
|-----|------------------------|
| 1   | Power Down (Logic Low) |
| 7   | Ground/Case Ground     |
| 8   | Output                 |
| 14  | Supply Voltage         |

| LINE | MARKING                                                                                     |
|------|---------------------------------------------------------------------------------------------|
| 1    | ECLIPTEK                                                                                    |
| 2    | EP13PD<br>EP13=Product Series                                                               |
| 3    | 4.5000M                                                                                     |
| 4    | XXYYZZ<br>XX=Ecliptek Manufacturing Code<br>Y=Last Digit of the Year<br>ZZ=Week of the Year |

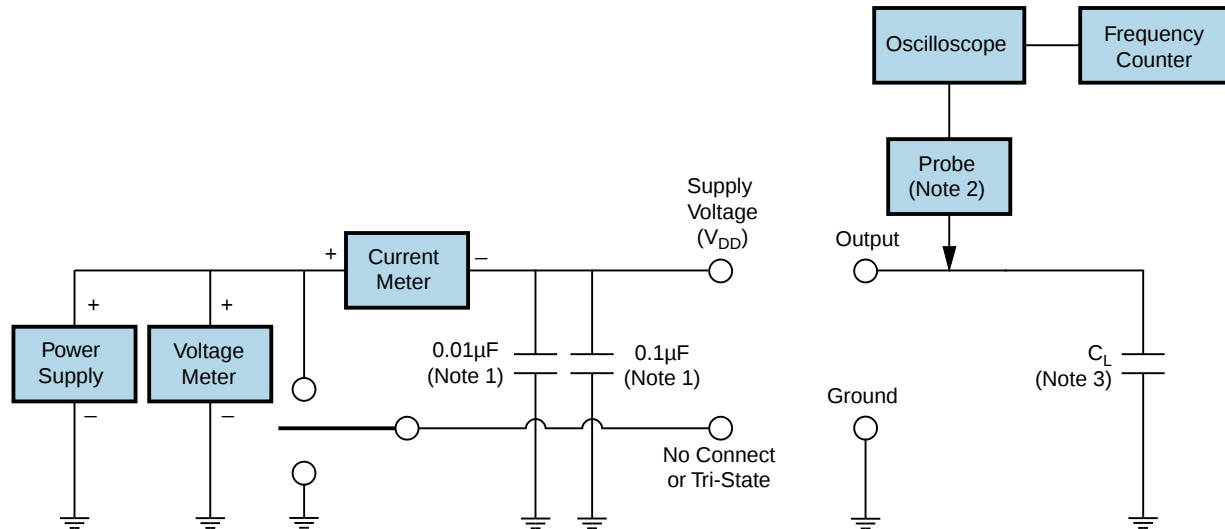
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OUTPUT WAVEFORM & TIMING DIAGRAM



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## Test Circuit for CMOS Output



Note 1: An external 0.1µF low frequency tantalum bypass capacitor in parallel with a 0.01µF high frequency ceramic bypass capacitor close to the package ground and  $V_{DD}$  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.

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Recommended Solder Reflow Methods

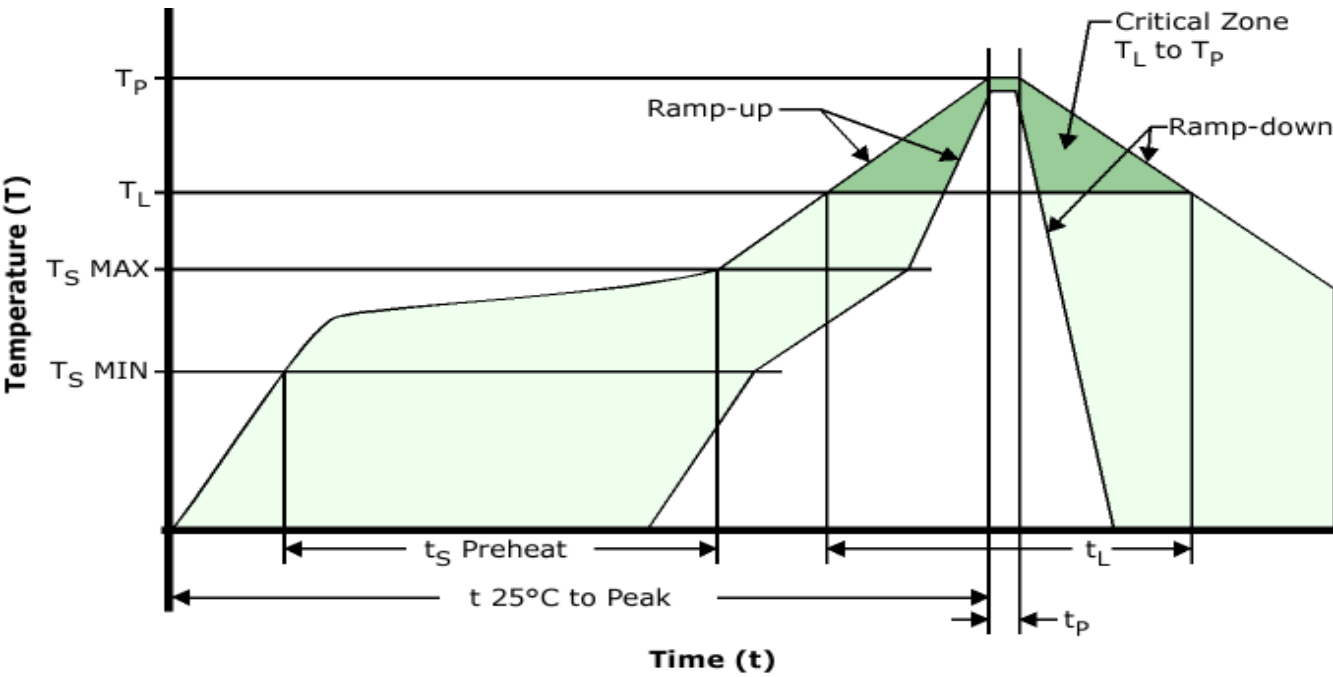


High Temperature Solder Bath (Wave Solder)

|                                     |                                                                                                                                          |
|-------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 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                                                                                                                                  |
| Additional Notes                    | Temperatures shown are applied to back of PCB board and device leads only. Do not use this method for product with the Gull Wing option. |

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Recommended Solder Reflow Methods

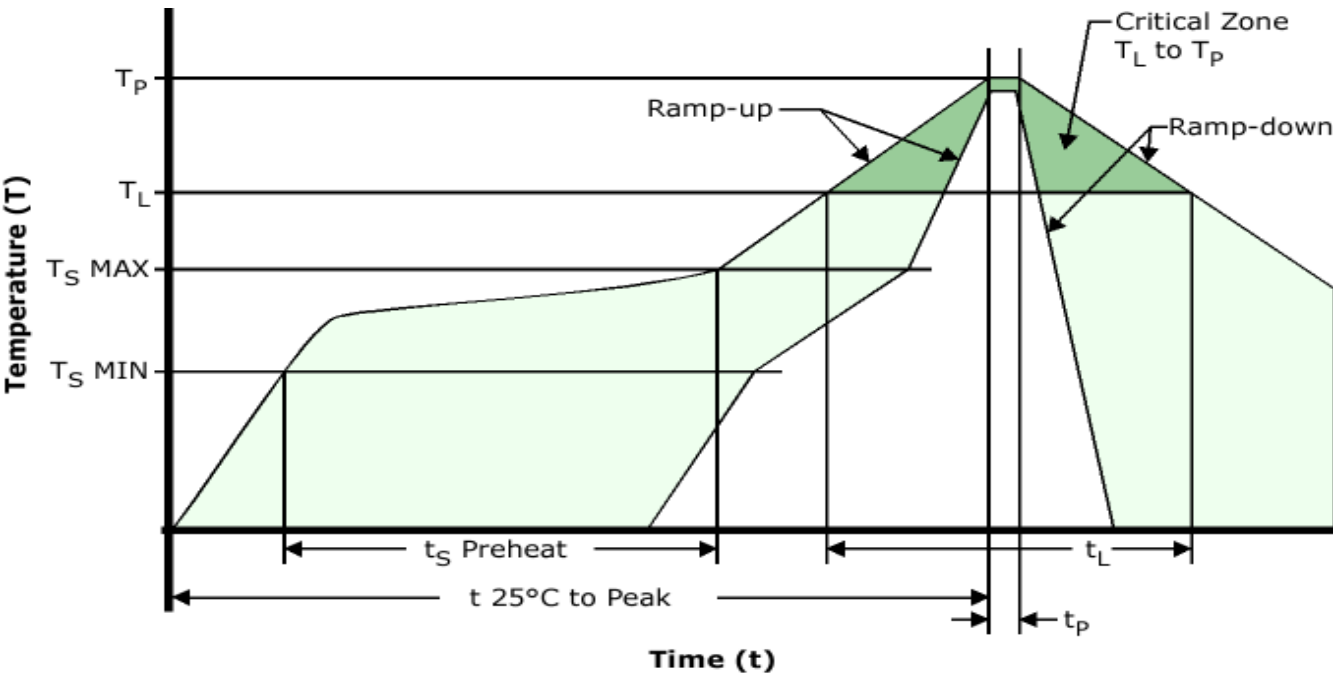


Low Temperature Infrared/Convection 185°C

|                                     |                                                                                                               |
|-------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 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                                                                                                       |
| Additional Notes                    | Temperatures shown are applied to body of device. Use this method only for product with the Gull Wing option. |

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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                                                                                                                                  |
| Additional Notes                    | Temperatures shown are applied to back of PCB board and device leads only. Do not use this method for product with the Gull Wing option. |

Low Temperature Manual Soldering

185°C Maximum for 10 Seconds Maximum, 2 times Maximum. (Temperatures listed are applied to device leads only. This method can be utilized with both Gull Wing and Non-Gull Wing devices.)

High Temperature Manual Soldering

260°C Maximum for 5 Seconds Maximum, 2 times Maximum. (Temperatures listed are applied to device leads only. This method can be utilized with both Gull Wing and Non-Gull Wing devices.)