

# EP1100TPDL-1.501M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on May 8, 2016)


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## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) HCMOS/TTL (CMOS) 5.0Vdc 14 Pin DIP Metal Thru-Hole 1.501MHz  $\pm 100$ ppm -20°C to +70°C

## ELECTRICAL SPECIFICATIONS

|                                   |                                                                                                                                                                                                                                         |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                 | 1.501MHz                                                                                                                                                                                                                                |
| Frequency Tolerance/Stability     | $\pm 100$ 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 (Disable Output: Logic Low)                                                                                                                                                                                                  |
| Pin 1 Input Voltage (Vih and Vil) | +2.0Vdc Minimum to enable output, +0.8Vdc 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)



| LINE | MARKING                                                                                        |
|------|------------------------------------------------------------------------------------------------|
| 1    | ECLIPTEK                                                                                       |
| 2    | EP11PD<br>EP11=Product Series                                                                  |
| 3    | 1.5010M                                                                                        |
| 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 TTL Output

| Output Load Drive Capability | R <sub>L</sub> Value (Ohms) | C <sub>L</sub> Value (pF) |
|------------------------------|-----------------------------|---------------------------|
| 10TTL                        | 390                         | 15                        |
| 5TTL                         | 780                         | 15                        |
| 2TTL                         | 1100                        | 6                         |
| 10LSTTL                      | 2000                        | 15                        |
| 1TTL                         | 2200                        | 3                         |

Table 1: R<sub>L</sub> Resistance Value and C<sub>L</sub> Capacitance Value Vs. Output Load Drive Capability



- 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<sub>DD</sub> 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<sub>L</sub> includes sum of all probe and fixture capacitance.
- Note 4: Resistance value R<sub>L</sub> is shown in Table 1. See applicable specification sheet for 'Load Drive Capability'.
- Note 5: All diodes are MM74VHC00, MM74VHC14, or equivalent.

**EP1100TPDL-1.501M** [Click part number to visit Part Number Details page](#)**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                                                                                                                                  |
| 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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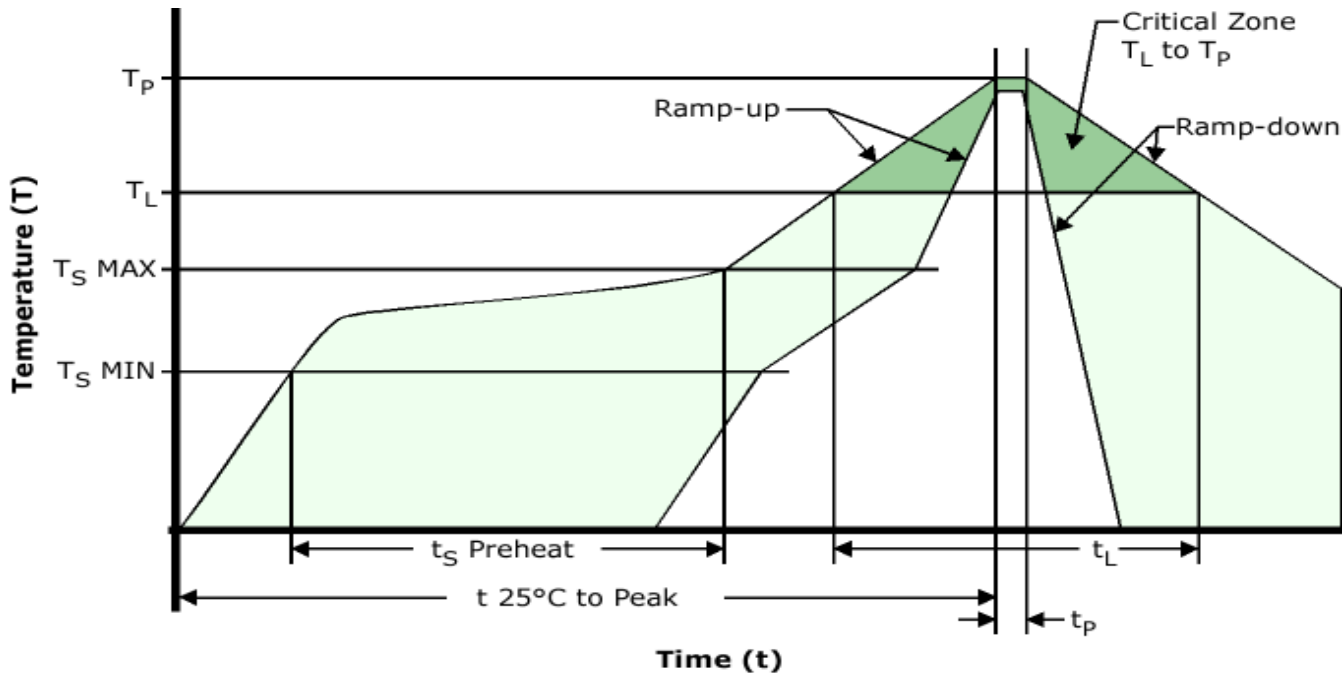
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Recommended Solder Reflow Methods



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. |

**EP1100TPDL-1.501M** [Click part number to visit Part Number Details page](#)**Recommended Solder Reflow Methods****Low Temperature Solder Bath (Wave Solder)**

|                                                     |                                                                                                                                          |
|-----------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| 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> MIN)                         | 30 - 60 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> )                  | 245°C Maximum                                                                                                                            |
| Target Peak Temperature (T <sub>P</sub> Target)     | 245°C Maximum 1 Time / 235°C Maximum 2 Times                                                                                             |
| Time within 5°C of actual peak (t <sub>p</sub> )    | 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.)