

**EB13E2H2H-14.7456M TR** [Click part number to visit Part Number Details page](#)
**REGULATORY COMPLIANCE** (Data Sheet downloaded on May 13, 2020)

**ITEM DESCRIPTION**

Quartz Crystal Clock Oscillators XO (SPXO) LVCMOS (CMOS) 3.3Vdc 4 Pad 2.5mm x 3.2mm Ceramic Surface Mount (SMD) 14.7456MHz  $\pm 50$ ppm over -40°C to +85°C

**ELECTRICAL SPECIFICATIONS**

|  |  |
|--|--|
| <b>Nominal Frequency</b>                     | 14.7456MHz   |
| <b>Frequency Tolerance/Stability</b>         | $\pm 50$ ppm Maximum over -40°C to +85°C (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>Supply Voltage</b>                        | 3.3Vdc $\pm 5\%$   |
| <b>Input Current</b>                         | 4mA Maximum  |
| <b>Output Voltage Logic High (Voh)</b>       | 90% of Vdd Minimum (IOH= -4mA)   |
| <b>Output Voltage Logic Low (Vol)</b>        | 10% of Vdd Maximum (IOL= +4mA)   |
| <b>Rise/Fall Time</b>                        | 5nSec Maximum (Measured at 20% to 80% of waveform)   |
| <b>Duty Cycle</b>                            | 50 $\pm 5$ (%) (Measured at 50% of waveform)   |
| <b>Load Drive Capability</b>                 | 15pF Maximum   |
| <b>Output Logic Type</b>                     | CMOS   |
| <b>Pin 1 Connection</b>                      | Tri-State (High Impedance)   |
| <b>Tri-State Input Voltage (Vih and Vil)</b> | 80% of Vdd Minimum or No Connect to Enable Output, 20% of Vdd Maximum to Disable Output (High Impedance)   |
| <b>Standby Current</b>                       | 10 $\mu$ A Maximum (Disabled Output: High Impedance)   |
| <b>RMS Phase Jitter</b>                      | 1pSec Maximum (Fj = 12kHz to 20MHz)  |
| <b>Start Up Time</b>                         | 10mSec Maximum   |
| <b>Storage Temperature Range</b>             | -55°C to +125°C  |

**ENVIRONMENTAL & MECHANICAL SPECIFICATIONS**

|                                     |   |
|-------------------------------------|---|
| <b>ESD Susceptibility</b>           | MIL-STD-883, Method 3015, Class 1, HBM: 1500V |
| <b>Fine Leak Test</b>               | MIL-STD-883, Method 1014, Condition A         |
| <b>Flammability</b>                 | UL94-V0                                       |
| <b>Gross Leak Test</b>              | MIL-STD-883, Method 1014, Condition C         |
| <b>Mechanical Shock</b>             | MIL-STD-883, Method 2002, Condition B         |
| <b>Moisture Resistance</b>          | MIL-STD-883, Method 1004                      |
| <b>Moisture Sensitivity</b>         | J-STD-020, MSL 1                              |
| <b>Resistance to Soldering Heat</b> | MIL-STD-202, Method 210, Condition K          |
| <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, Condition B         |
| <b>Vibration</b>                    | MIL-STD-883, Method 2007, Condition A         |

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### MECHANICAL DIMENSIONS (all dimensions in millimeters)



| PIN | CONNECTION     |
|-----|----------------|
| 1   | Tri-State      |
| 2   | Case/Ground    |
| 3   | Output         |
| 4   | Supply Voltage |

| LINE | MARKING   |
|------|---|
| 1    | <b>E14.7</b><br>E=Ecliptek Designator                   |
| 2    | <b>XXXXX</b><br>XXXXX=Ecliptek Manufacturing Identifier |

### Suggested Solder Pad Layout

All Dimensions in Millimeters



All Tolerances are  $\pm 0.1$

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**OUTPUT WAVEFORM & TIMING DIAGRAM**



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**Test Circuit for CMOS Output**


Note 1: An external 0.01µF ceramic bypass capacitor in parallel with a 0.1µF high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage 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 Infrared/Convection**

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

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## Recommended Solder Reflow Methods



### Low Temperature Infrared/Convection 240°C

|  |  |
|--|--|
| $T_s$ MAX to $T_L$ (Ramp-up Rate)                          | 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>                 | 240°C Maximum  |
| <b>Target Peak Temperature (<math>T_P</math> Target)</b>   | 240°C Maximum 2 Times / 230°C Maximum 1 Time           |
| <b>Time within 5°C of actual peak (<math>t_p</math>)</b>   | 10 Seconds Maximum 2 Times / 80 Seconds Maximum 1 Time |
| <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.