

# E13C5C2F-156.250M TR

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Dec 1, 2017)


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## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) LVPECL (PECL) 3.3Vdc 6 Pad 3.2mm x 5.0mm Ceramic Surface Mount (SMD) 156.250MHz  $\pm 100$ ppm over 0°C to +70°C

## ELECTRICAL SPECIFICATIONS

|                                       |                                                                                                                                                                                                                                                             |
|---------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                     | 156.250MHz                                                                                                                                                                                                                                                  |
| Frequency Tolerance/Stability         | $\pm 100$ ppm Maximum over 0°C to +70°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) |
| Supply Voltage                        | 3.3Vdc $\pm 5\%$                                                                                                                                                                                                                                            |
| Input Current                         | 75mA Maximum                                                                                                                                                                                                                                                |
| Output Voltage Logic High (Voh)       | Vdd-1.025Vdc Minimum, 2.35Vdc Typical, Vdd-0.88Vdc Maximum                                                                                                                                                                                                  |
| Output Voltage Logic Low (Vol)        | Vdd-1.81Vdc Minimum, 1.60Vdc Typical, Vdd-1.62Vdc Maximum                                                                                                                                                                                                   |
| Rise/Fall Time                        | 300pSec Typical, 700pSec Maximum (Measured at 20% to 80% of Waveform)                                                                                                                                                                                       |
| Duty Cycle                            | 50 $\pm 5\%$ (Measured at 50% of Waveform)                                                                                                                                                                                                                  |
| Load Drive Capability                 | 50 Ohms into Vdd-2.0Vdc                                                                                                                                                                                                                                     |
| Output Logic Type                     | LVPECL                                                                                                                                                                                                                                                      |
| Phase Noise                           | -60dBc/Hz at 10Hz Offset, -95dBc/Hz at 100Hz Offset, -125dBc/Hz at 1kHz Offset, -143dBc/Hz at 10kHz Offset, -145dBc/Hz at 100kHz Offset, -145dBc/Hz at 1MHz Offset, -146dBc/Hz at 10MHz Offset (All Values are Typical)                                     |
| Logic Control / Additional Output     | Tri-State and Complementary Output                                                                                                                                                                                                                          |
| Tri-State Input Voltage (Vih and Vil) | Vih of 70% of Vdd Minimum or No Connect to Enable Output and Complementary Output, Vil of 30% of Vdd Maximum to Disable High Impedance Output and Complementary Output                                                                                      |
| Standby Current                       | 30 $\mu$ A Maximum (Without Load)                                                                                                                                                                                                                           |
| RMS Phase Jitter                      | 0.4pSec Typical, 1pSec Maximum (Fj=12kHz to 20MHz; Random)                                                                                                                                                                                                  |
| Start Up Time                         | 10mSec Maximum                                                                                                                                                                                                                                              |
| Storage Temperature Range             | -55°C to +125°C                                                                                                                                                                                                                                             |

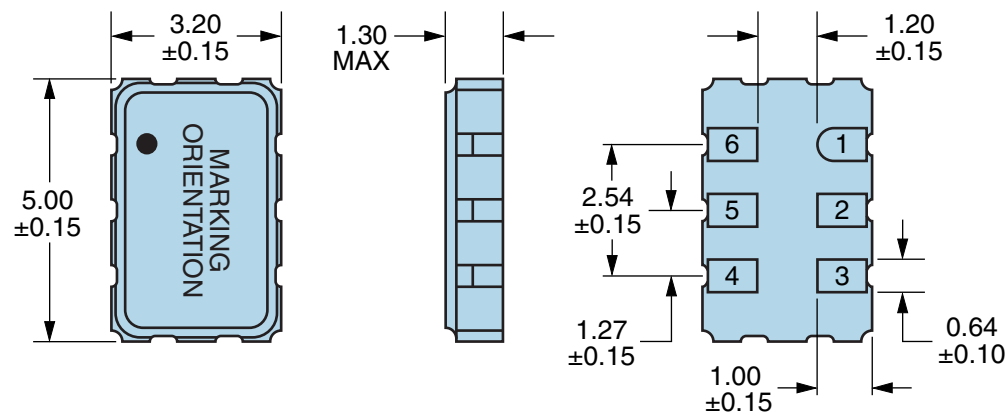
## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                              |                                               |
|------------------------------|-----------------------------------------------|
| ESD Susceptibility           | MIL-STD-883, Method 3015, Class 1, HBM: 1500V |
| Fine Leak Test               | MIL-STD-883, Method 1014, Condition A         |
| Flammability                 | UL94-V0                                       |
| Gross Leak Test              | MIL-STD-883, Method 1014, Condition C         |
| Mechanical Shock             | MIL-STD-883, Method 2002, Condition B         |
| Moisture Resistance          | MIL-STD-883, Method 1004                      |
| Moisture Sensitivity         | J-STD-020, MSL 1                              |
| Resistance to Soldering Heat | MIL-STD-202, Method 210, Condition K          |
| Resistance to Solvents       | MIL-STD-202, Method 215                       |
| Solderability                | MIL-STD-883, Method 2003                      |
| Temperature Cycling          | MIL-STD-883, Method 1010, Condition B         |
| Vibration                    | MIL-STD-883, Method 2007, Condition A         |

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MECHANICAL DIMENSIONS (all dimensions in millimeters)

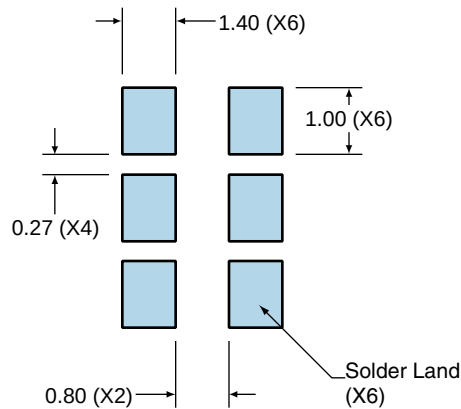


| PIN | CONNECTION           |
|-----|----------------------|
| 1   | Tri-State            |
| 2   | No Connect           |
| 3   | Case/Ground          |
| 4   | Output               |
| 5   | Complementary Output |
| 6   | Supply Voltage       |

| LINE | MARKING                                                          |
|------|------------------------------------------------------------------|
| 1    | <b>E156.25</b><br><i>E=Ecliptek Designator</i>                   |
| 2    | <b>XXXXXX</b><br><i>XXXXXX=Ecliptek Manufacturing Identifier</i> |

Suggested Solder Pad Layout

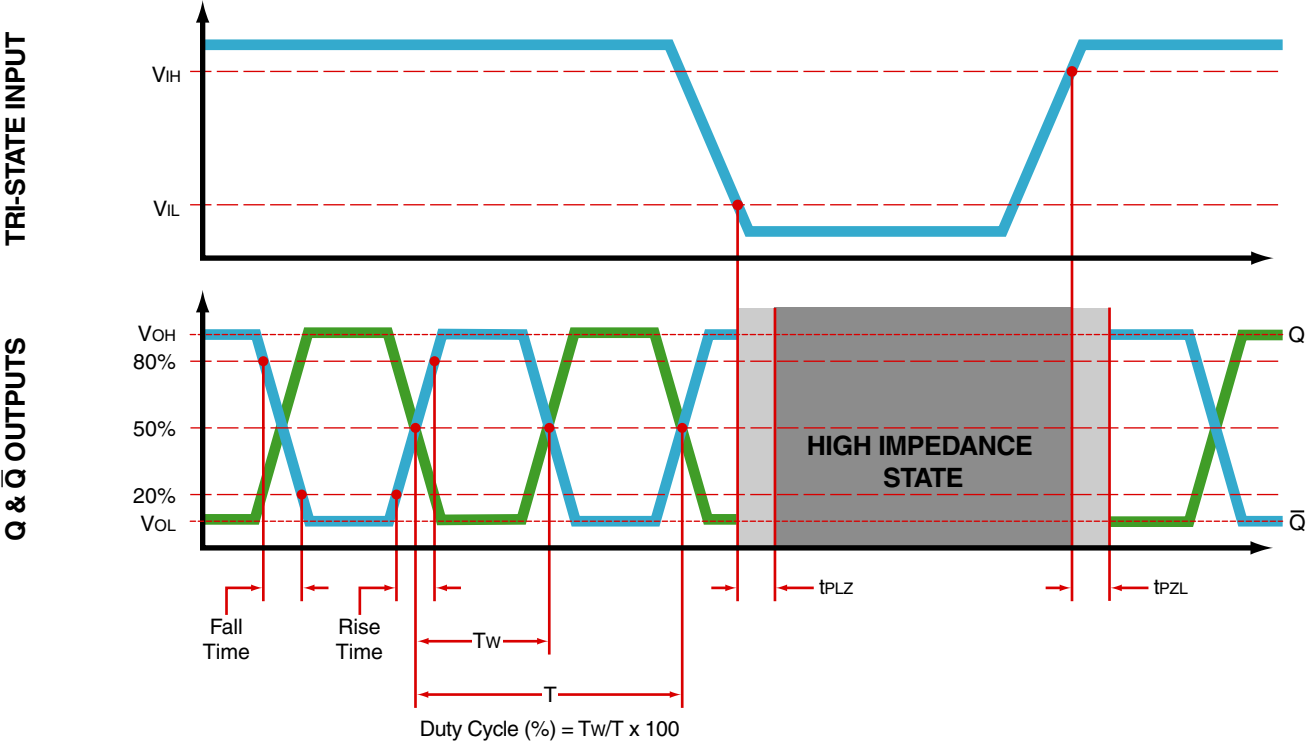
All Dimensions in Millimeters



All Tolerances are ±0.1

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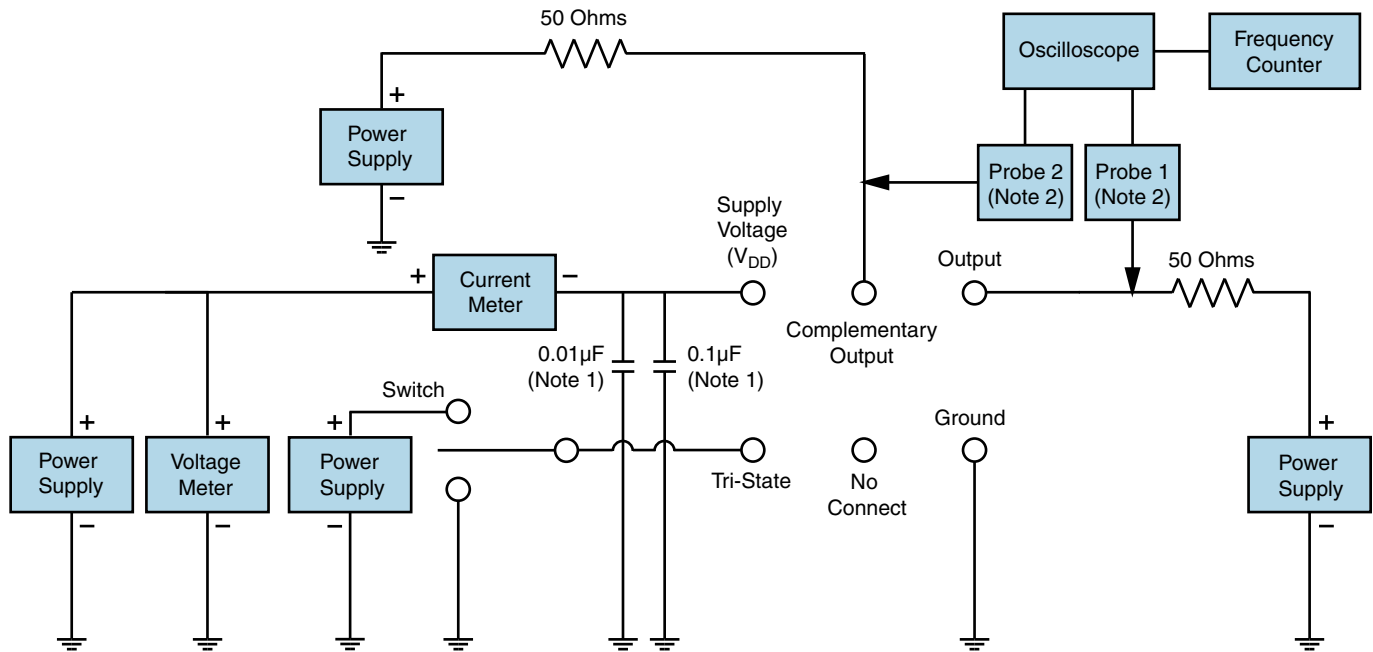
## OUTPUT WAVEFORM & TIMING DIAGRAM



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## Test Circuit for Tri-State and Complementary Output



Note 1: An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

Note 2: A low capacitance ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>500\text{MHz}$ ) passive probe is recommended.

Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.

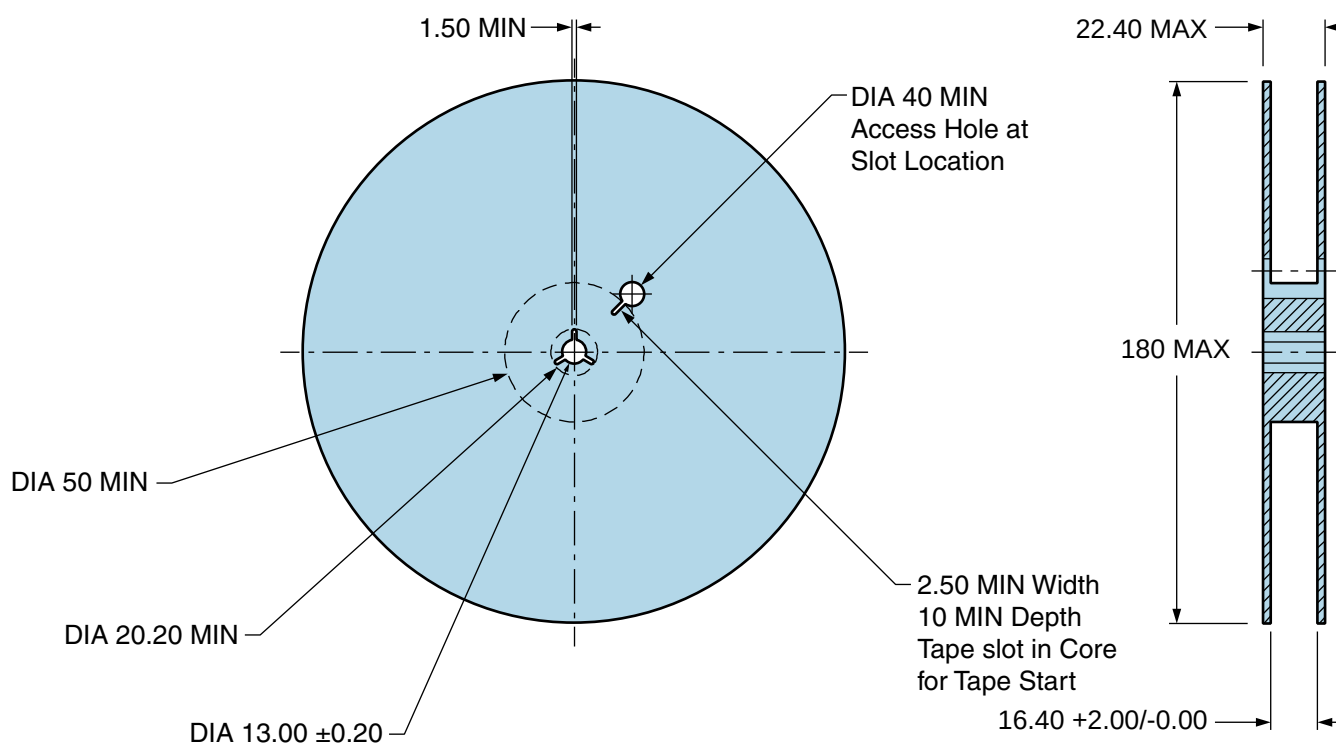
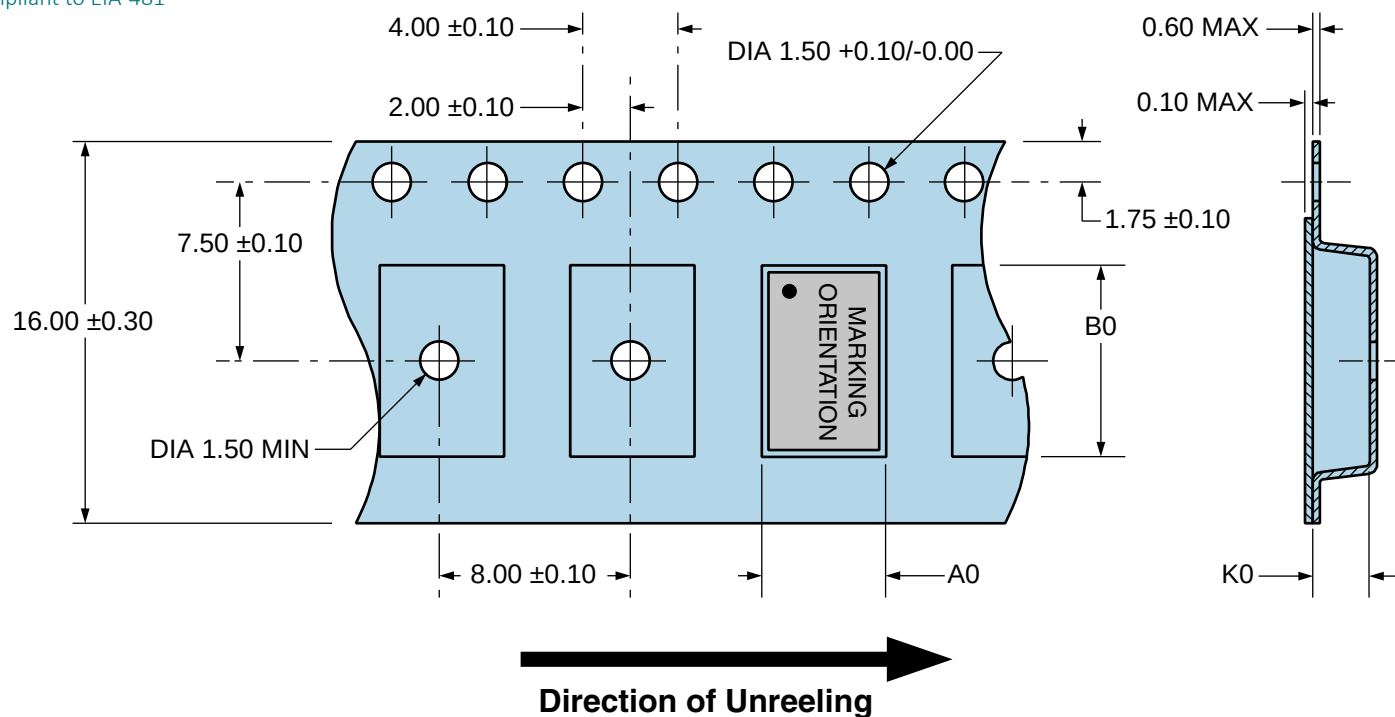
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## Tape & Reel Dimensions

Quantity Per Reel: 1,000 units

All Dimensions in Millimeters

Compliant to EIA-481



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Recommended Solder Reflow Methods



High Temperature Infrared/Convection

|                                                                        |                                                   |
|------------------------------------------------------------------------|---------------------------------------------------|
| <b><math>T_s \text{ MAX}</math> to <math>T_L</math> (Ramp-up Rate)</b> | 3°C/Second Maximum                                |
| <b>Preheat</b>                                                         |                                                   |
| - Temperature Minimum ( $T_s \text{ MIN}$ )                            | 150°C                                             |
| - Temperature Typical ( $T_s \text{ TYP}$ )                            | 175°C                                             |
| - Temperature Maximum ( $T_s \text{ MAX}$ )                            | 200°C                                             |
| - Time ( $t_s \text{ MIN}$ )                                           | 60 - 180 Seconds                                  |
| <b>Ramp-up Rate (<math>T_L</math> to <math>T_P</math>)</b>             | 3°C/Second Maximum                                |
| <b>Time Maintained Above:</b>                                          |                                                   |
| - Temperature ( $T_L$ )                                                | 217°C                                             |
| - Time ( $t_L$ )                                                       | 60 - 150 Seconds                                  |
| <b>Peak Temperature (<math>T_P</math>)</b>                             | 260°C Maximum for 10 Seconds Maximum              |
| <b>Target Peak Temperature (<math>T_P \text{ Target}</math>)</b>       | 250°C +0/-5°C                                     |
| <b>Time within 5°C of actual peak (<math>t_P</math>)</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                                           |
| <b>Additional Notes</b>                                                | Temperatures shown are applied to body of device. |

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Recommended Solder Reflow Methods



Low Temperature Infrared/Convection 240°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)               | 240°C Maximum                                          |
| Target Peak Temperature (TP Target) | 240°C Maximum 2 Times / 230°C Maximum 1 Time           |
| Time within 5°C of actual peak (tP) | 10 Seconds Maximum 2 Times / 80 Seconds Maximum 1 Time |
| 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.      |

Low Temperature Manual Soldering

185°C Maximum for 10 Seconds Maximum, 2 times Maximum. (Temperatures shown are applied to body of device.)

High Temperature Manual Soldering

260°C Maximum for 5 Seconds Maximum, 2 times Maximum. (Temperatures shown are applied to body of device.)