

# EH1400SJETTTS-24.000M TR [Click part number to visit Part Number Details page](#)

## REGULATORY COMPLIANCE (Data Sheet downloaded on Jul 17, 2018)



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## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) HCMOS/TTL (CMOS) 5.0Vdc J-Lead 9.8mm x 14.0mm Plastic Surface Mount (SMD) 24.000MHz  $\pm 100$ ppm -40°C to +85°C

## ELECTRICAL SPECIFICATIONS

|                                       |                                                                                                                                                                                                                                         |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                     | 24.000MHz                                                                                                                                                                                                                               |
| 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           | -40°C to +85°C                                                                                                                                                                                                                          |
| Supply Voltage                        | 5.0Vdc $\pm 10\%$                                                                                                                                                                                                                       |
| Input Current                         | 50mA Maximum (No Load)                                                                                                                                                                                                                  |
| Output Voltage Logic High (Voh)       | 2.4Vdc Minimum with TTL Load, Vdd-0.4Vdc Minimum with HCMOS Load, IOH = -16mA                                                                                                                                                           |
| Output Voltage Logic Low (Vol)        | 0.4Vdc Maximum with TTL Load, 0.5Vdc Maximum with HCMOS Load, IOL = +16mA                                                                                                                                                               |
| Rise/Fall Time                        | 6nSec Maximum (Measured at 0.8Vdc to 2.0Vdc with TTL Load; Measured at 20% to 80% of waveform with HCMOS Load)                                                                                                                          |
| Duty Cycle                            | 50 $\pm 5\%$ (Measured at 50% of waveform with TTL Load or with HCMOS Load)                                                                                                                                                             |
| Load Drive Capability                 | 10TTL Load or 50pF HCMOS Load Maximum                                                                                                                                                                                                   |
| Output Logic Type                     | CMOS                                                                                                                                                                                                                                    |
| Pin 1 Connection                      | Tri-State (Disabled Output: High Impedance)                                                                                                                                                                                             |
| Tri-State Input Voltage (Vih and Vil) | +2.2Vdc Minimum to enable output, +0.8Vdc Maximum to disable output (High Impedance), No Connect to enable output.                                                                                                                      |
| Absolute Clock Jitter                 | $\pm 250$ pSec Maximum, $\pm 100$ pSec Typical                                                                                                                                                                                          |
| One Sigma Clock Period Jitter         | $\pm 50$ pSec Maximum, $\pm 30$ pSec Typical                                                                                                                                                                                            |
| Start Up Time                         | 10mSec Maximum                                                                                                                                                                                                                          |
| Storage Temperature Range             | -55°C to +125°C                                                                                                                                                                                                                         |

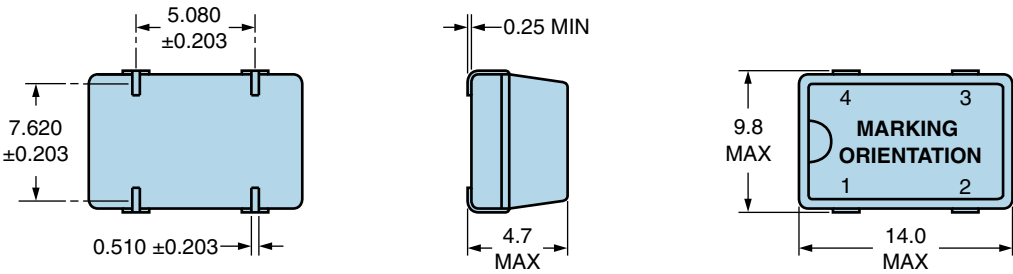
## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                              |                                                               |
|------------------------------|---------------------------------------------------------------|
| ESD Susceptibility           | MIL-STD-883, Method 3015, Class 1, HBM: 1500V                 |
| Fine Leak Test               | MIL-STD-883, Method 1014, Condition A (Internal Crystal Only) |
| Flammability                 | UL94-V0                                                       |
| Gross Leak Test              | MIL-STD-883, Method 1014, Condition C (Internal Crystal Only) |
| Mechanical Shock             | MIL-STD-202, Method 213, Condition C                          |
| Moisture Resistance          | MIL-STD-883, Method 1004                                      |
| 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)

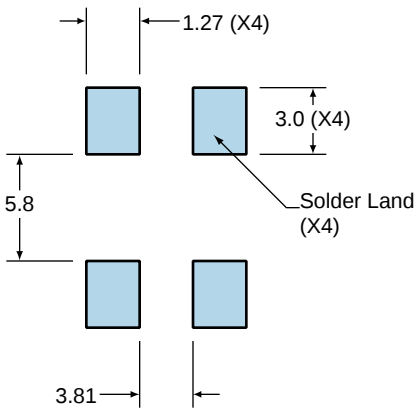


| PIN | CONNECTION                 |
|-----|----------------------------|
| 1   | Tri-State (High Impedance) |
| 2   | Ground                     |
| 3   | Output                     |
| 4   | Supply Voltage             |

| LINE | MARKING                                               |
|------|-------------------------------------------------------|
| 1    | ECLIPTEK                                              |
| 2    | 24.000M                                               |
| 3    | XXXXXX<br>XXXXXX=Ecliptek<br>Manufacturing Identifier |

Suggested Solder Pad Layout

All Dimensions in Millimeters



All Tolerances are ±0.1

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OUTPUT WAVEFORM & TIMING DIAGRAM



**Test Circuit for CMOS Output**

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

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

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

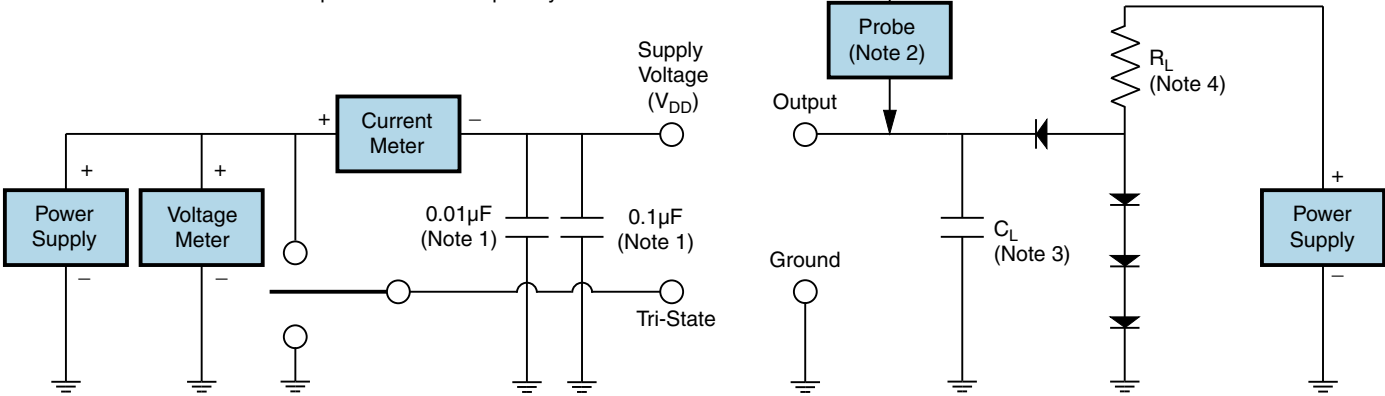
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Test Circuit for TTL Output

| Output Load Drive Capability | R <sub>L</sub> Value (Ohms) | C <sub>L</sub> Value (pF) |
|------------------------------|-----------------------------|---------------------------|
| 10TTL                        | 390                         | 15                        |
| 5TTL                         | 780                         | 15                        |

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



- Note 1: An external 0.01µF 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<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.

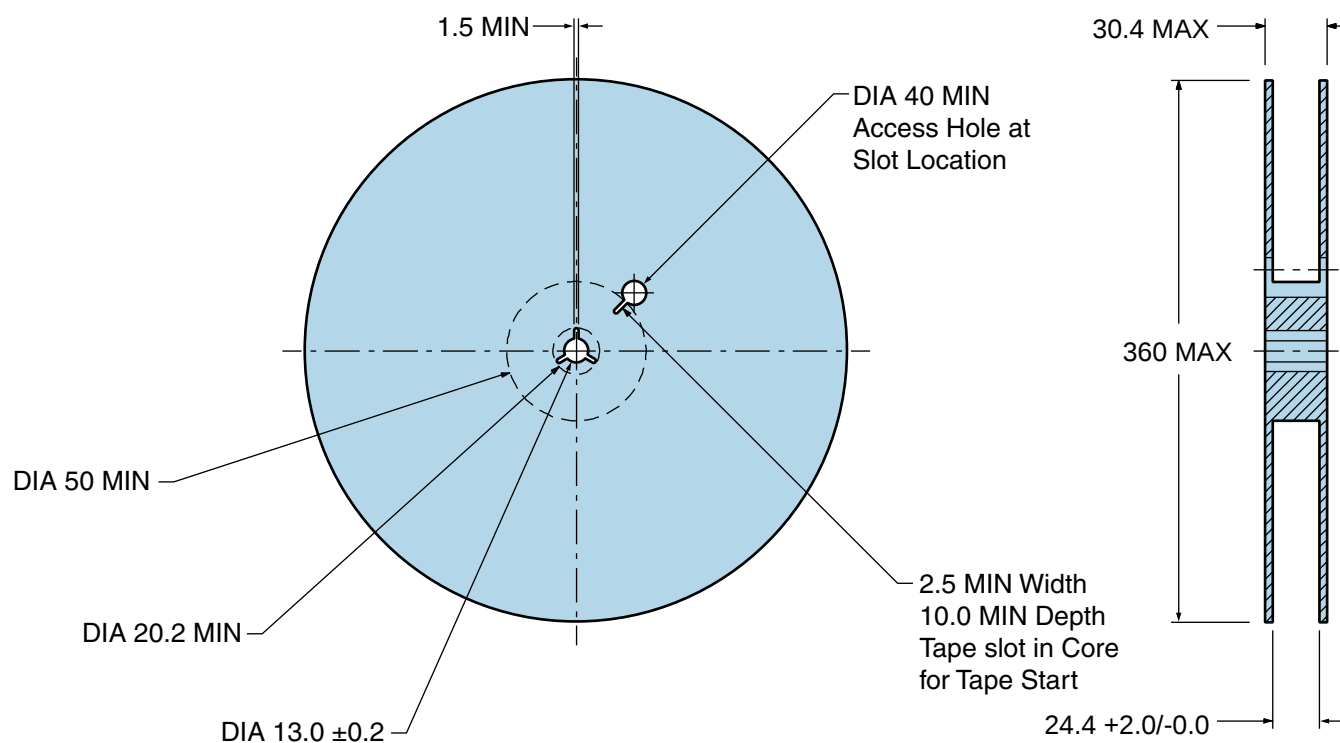
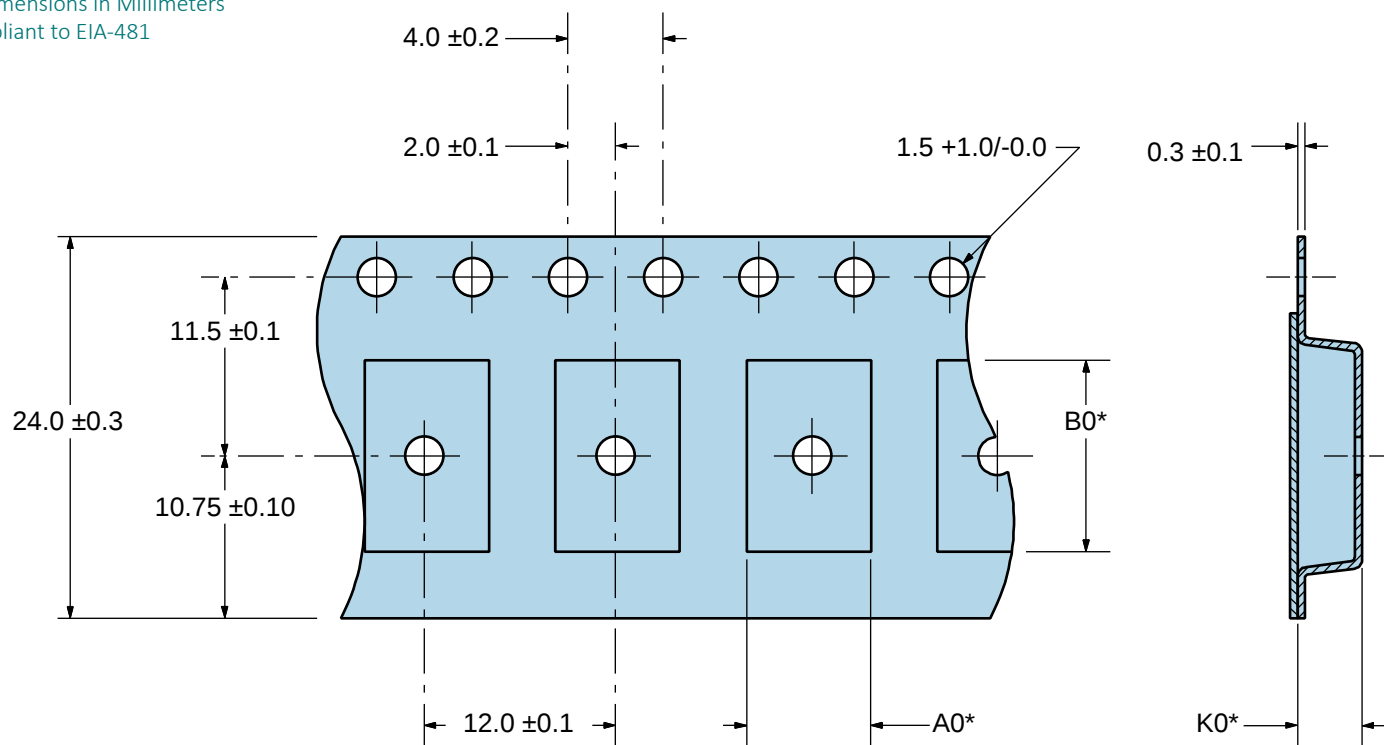
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## Tape & Reel Dimensions

Quantity Per Reel: 500 units

All Dimensions in Millimeters

Compliant to EIA-481



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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                                                |

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.