

EH2545TTS-28.000M
[Click part number to visit Part Number Details page](#)
REGULATORY COMPLIANCE (Data Sheet downloaded on Sep 8, 2018)
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**ITEM DESCRIPTION**

Quartz Crystal Clock Oscillators XO (SPXO) HCMOS/TTL (CMOS) 5.0Vdc 4 Pad 5.0mm x 7.0mm Ceramic Surface Mount (SMD) 28.000MHz ± 50 ppm 0°C to +70°C

ELECTRICAL SPECIFICATIONS

Nominal Frequency	28.000MHz
Frequency Tolerance/Stability	± 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)
Aging at 25°C	± 5 ppm/year Maximum
Operating Temperature Range	0°C to +70°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 ± 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 (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	± 250 pSec Maximum, ± 100 pSec Typical
One Sigma Clock Period Jitter	± 50 pSec Maximum, ± 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
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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Technical drawings of the marking orientation and dimensions of the device.

The top drawing shows the front view of the device with the text "MARKING ORIENTATION" and a small circular marking. Dimensions are provided for the width (7.00 ±0.15) and height (5.00 ±0.15).

The bottom drawing shows the side view of the device. Dimensions are provided for the thickness (1.60 ±0.20) and the width of the marking area (1.4 ±0.1).

The right drawing shows the top view of the device with four numbered markings (1, 2, 3, 4) indicating the orientation. Dimensions are provided for the width (5.08 ±0.15), the height of the marking area (2.20 ±0.15), the width of the marking area (1.4 ±0.2), and the width of the device (3.68 ±0.15).

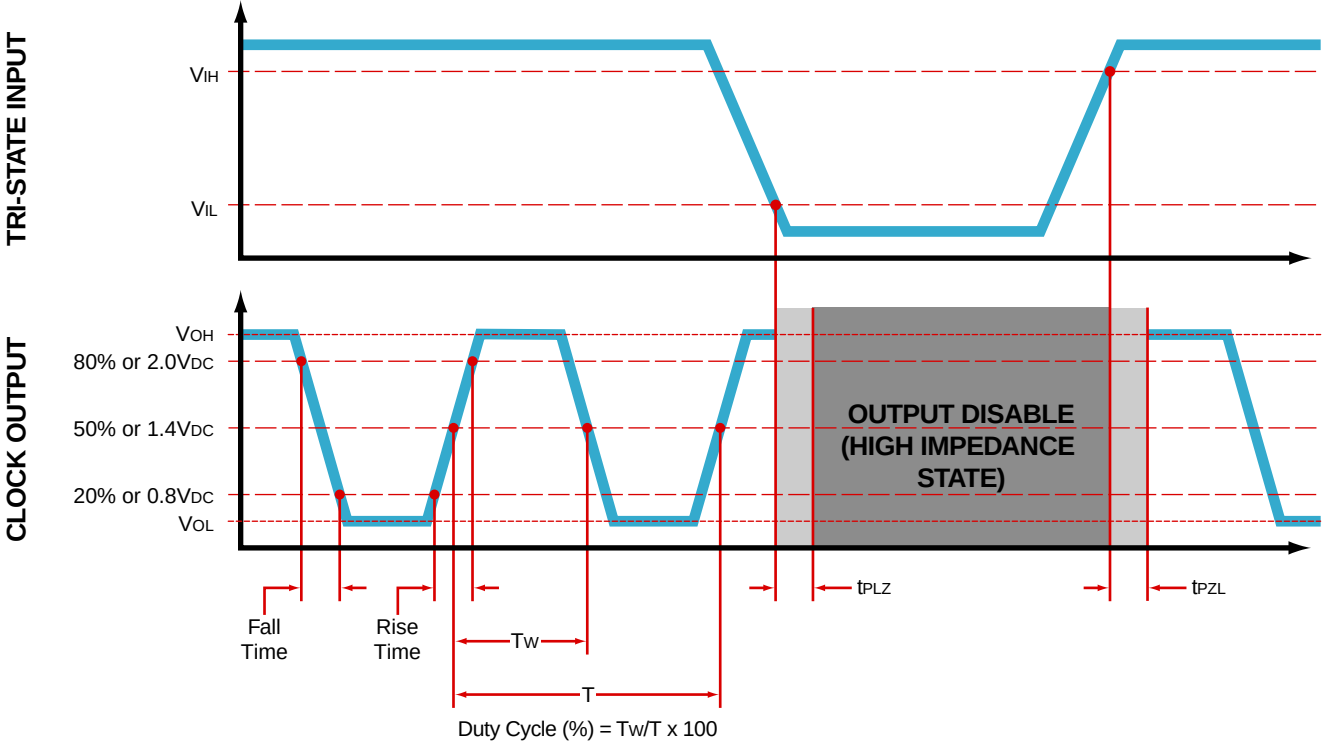
LINE	MARKING
1	ECLIPTEK
2	28.000M
3	XXXXXX XXXXXX=Ecliptek Manufacturing Identifier

1-800-ECLIPTEK or 714.433.1200

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OUTPUT WAVEFORM & TIMING DIAGRAM



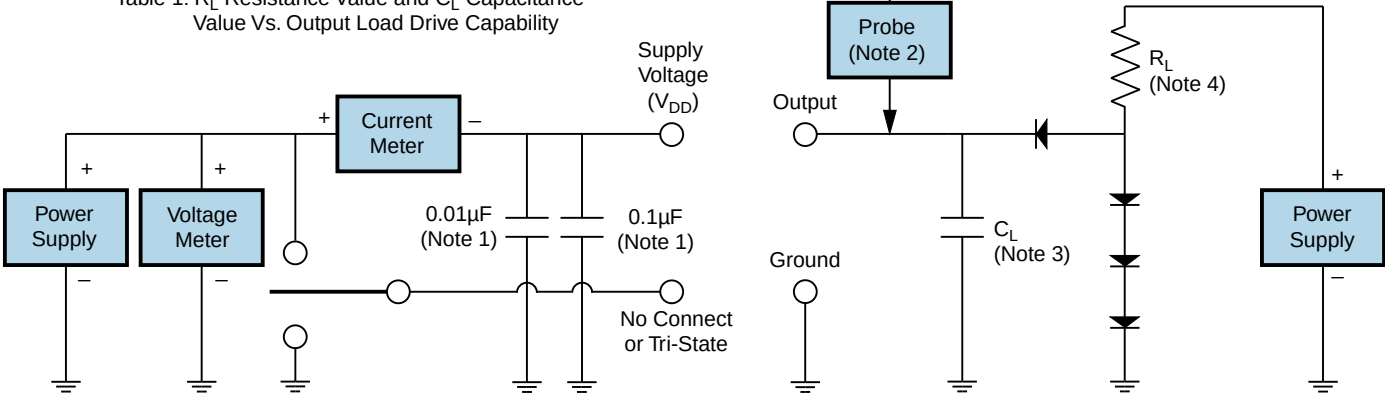
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Test Circuit for TTL Output

Output Load Drive Capability	R _L Value (Ohms)	C _L Value (pF)
10TTL	390	15
5TTL	780	15
2TTL	1100	6
10LSTTL	2000	15
1TTL	2200	3

Table 1: R_L Resistance Value and C_L Capacitance Value Vs. Output Load Drive Capability

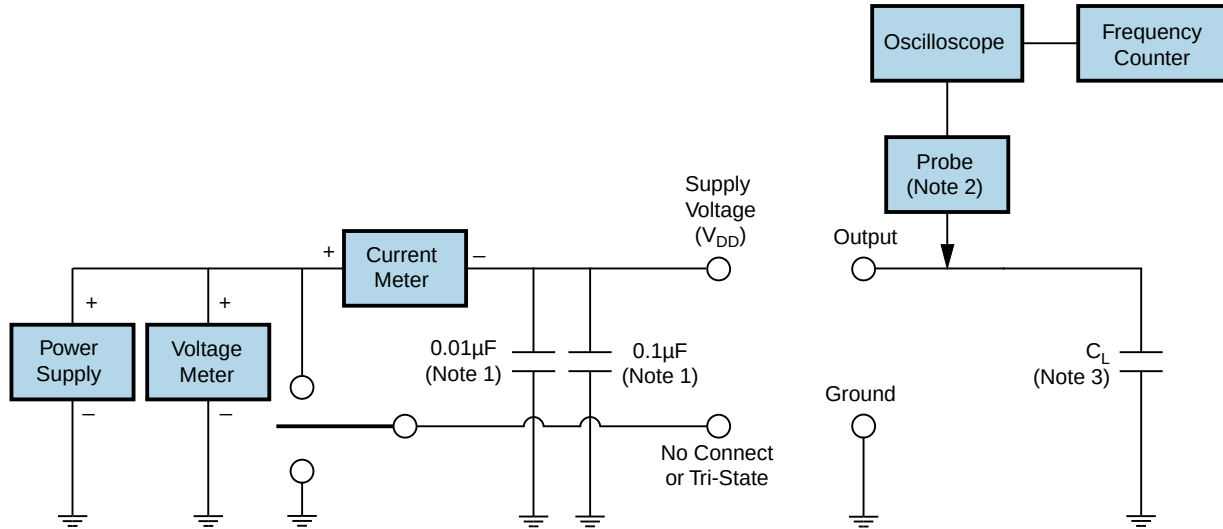


- Note 1: An external 0.1μF low frequency tantalum bypass capacitor in parallel with a 0.01μF high frequency ceramic bypass capacitor close to the package ground and V_{DD} pin is required.
- Note 2: A low capacitance (<12pF), 10X attenuation factor, high impedance (>10Mohms), and high bandwidth (>300MHz) passive probe is recommended.
- Note 3: Capacitance value C_L includes sum of all probe and fixture capacitance.
- Note 4: Resistance value R_L 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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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 Infrared/Convection

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 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.)