

## REGULATORY COMPLIANCE

 <b>Lead Free</b> COMPLIANT	 <b>EU RoHS</b> 2011/65 + 2015/863 COMPLIANT	 <b>China RoHS</b> COMPLIANT	 <b>REACH</b> <b>SVHC</b> COMPLIANT	 <b>DRC</b> <b>CONFLICT</b> <b>FREE</b>
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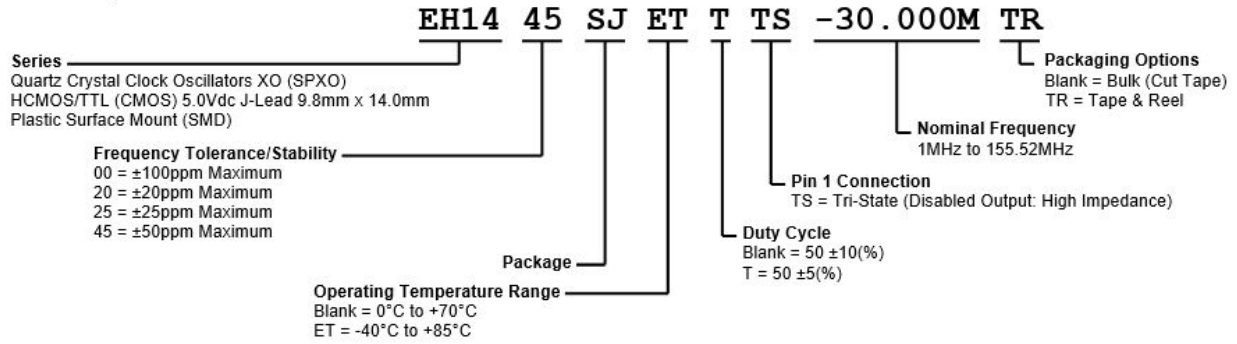
## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) HCMOS/TTL (CMOS) 5.0Vdc J-Lead 9.8mm x 14.0mm Plastic Surface Mount (SMD)

## ELECTRICAL SPECIFICATIONS

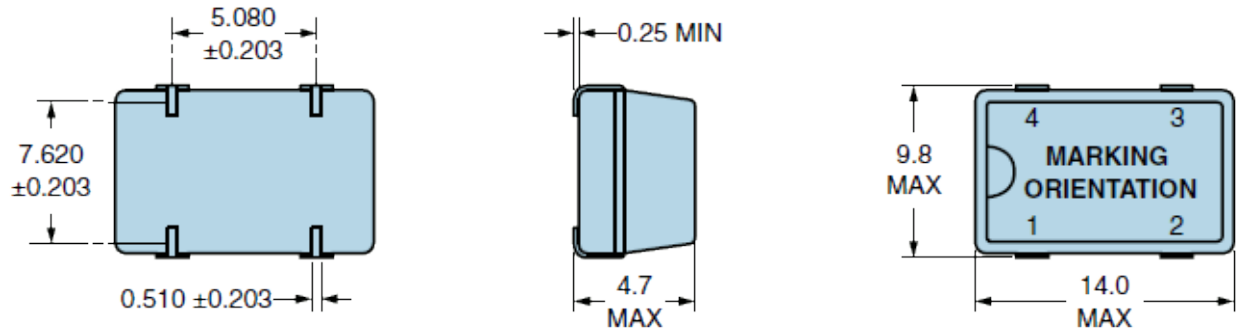
<b>Nominal Frequency</b>	1MHz to 155.52MHz
<b>Frequency Tolerance/Stability</b>	Inclusive of all conditions: Calibration Tolerance at 25°C, Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, First Year Aging at 25°C, Shock, and Vibration ±100ppm Maximum ±20ppm Maximum ±25ppm Maximum ±50ppm Maximum
<b>Aging at 25°C</b>	±5ppm/Year Maximum
<b>Operating Temperature Range</b>	0°C to +70°C -40°C to +85°C
<b>Supply Voltage</b>	5.0Vdc ±10%
<b>Input Current</b>	No Load 50mA Maximum
<b>Output Voltage Logic High (VOH)</b>	2.4Vdc Minimum with TTL Load, Vdd-0.4Vdc Minimum with HCMOS Load, IOH = -16mA
<b>Output Voltage Logic Low (VOL)</b>	0.4Vdc Maximum with TTL Load, 0.5Vdc Maximum with HCMOS Load, IOL = +16mA
<b>Rise/Fall Time</b>	Measured at 0.8Vdc to 2.0Vdc with TTL Load; Measured at 20% to 80% of waveform with HCMOS Load 6nSec Maximum over Nominal Frequency of 1MHz to 70MHz 4nSec Maximum over Nominal Frequency of 70.000001MHz to 155.52MHz
<b>Duty Cycle</b>	50 ±10% (Measured at 1.4Vdc with TTL Load or at 50% of waveform with HCMOS Load over Nominal Frequency range of 1MHz to 70MHz; Measured at 50% of waveform over Nominal Frequency range of 70.000001MHz to 155.52MHz) 50 ±5% (Measured at 50% of waveform with TTL Load or with HCMOS Load)
<b>Load Drive Capability</b>	10TTL Load or 50pF HCMOS Load Maximum over Nominal Frequency of 1MHz to 70MHz 5TTL Load or 15pF HCMOS Load Maximum over Nominal Frequency of 70.000001MHz to 155.52MHz
<b>Output Logic Type</b>	CMOS
<b>Pin 1 Connection</b>	Tri-State (Disabled Output: High Impedance)
<b>Tri-State Input Voltage (Vih and Vil)</b>	+2.2Vdc Minimum to enable output, +0.8Vdc Maximum to disable output (High Impedance), No Connect to enable output.
<b>Absolute Clock Jitter</b>	±250pSec Maximum, ±100pSec Typical
<b>One Sigma Clock Period Jitter</b>	±50pSec Maximum, ±30pSec Typical
<b>Start Up Time</b>	10mSec Maximum
<b>Storage Temperature Range</b>	-55°C to +125°C

## PART NUMBERING GUIDE

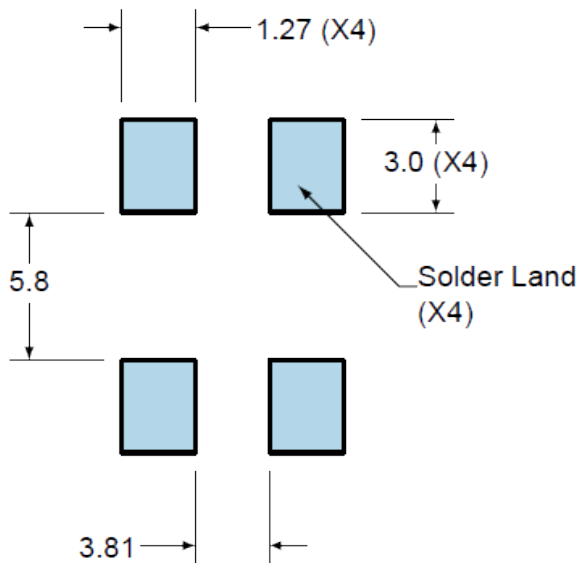


# EH14 Series

## MECHANICAL DIMENSIONS



## SUGGESTED SOLDER PAD LAYOUT

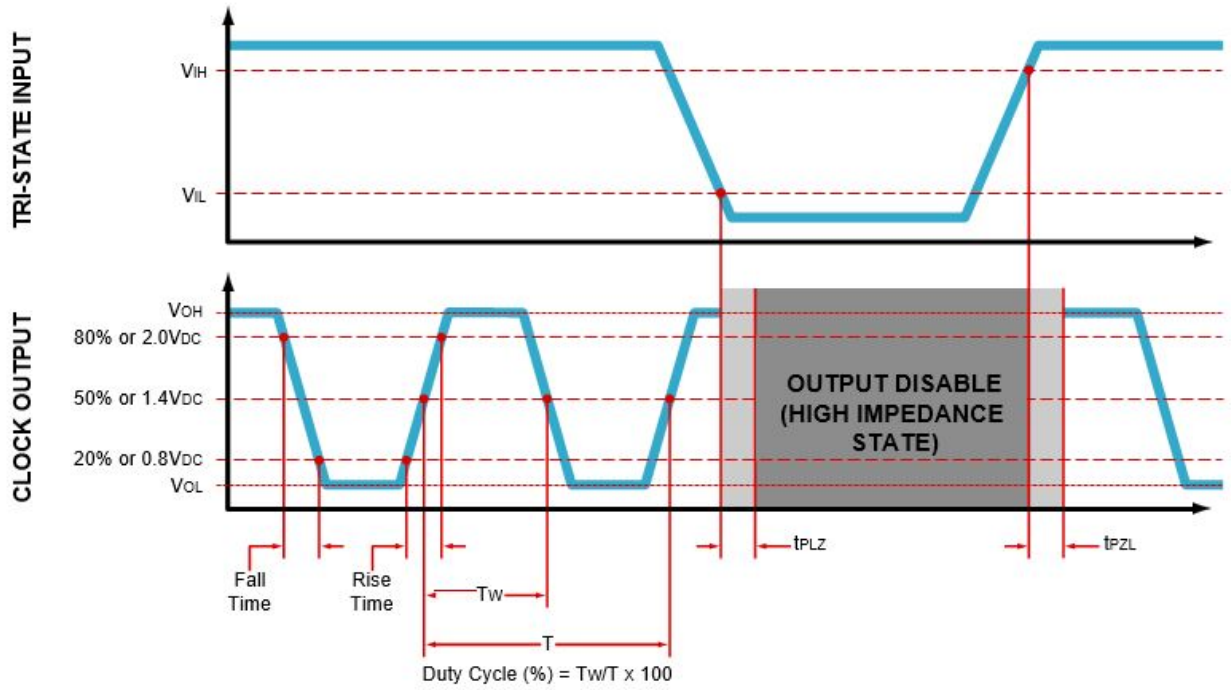


PIN	CONNECTION
1	Tri-State
2	Ground
3	Output
4	Supply Voltage

All Tolerances are  $\pm 0.1$

**All Dimensions in Millimeters**

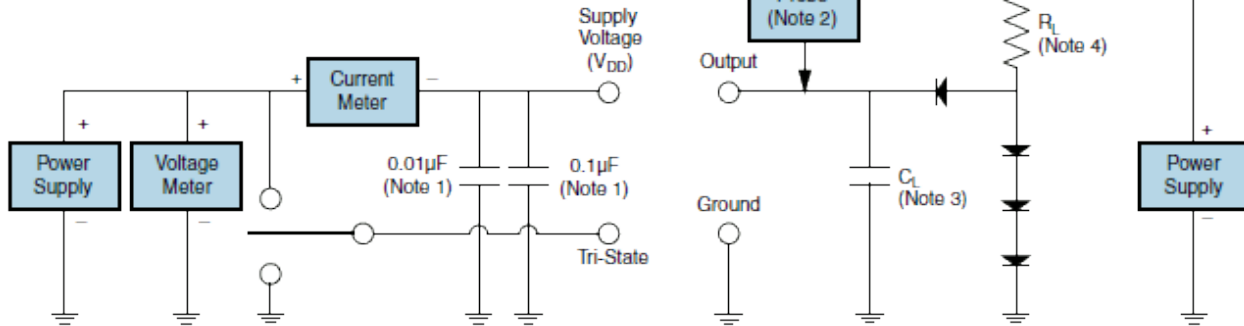
OUTPUT WAVEFORM & TIMING DIAGRAM



## TEST CIRCUIT FOR TTL OUTPUT

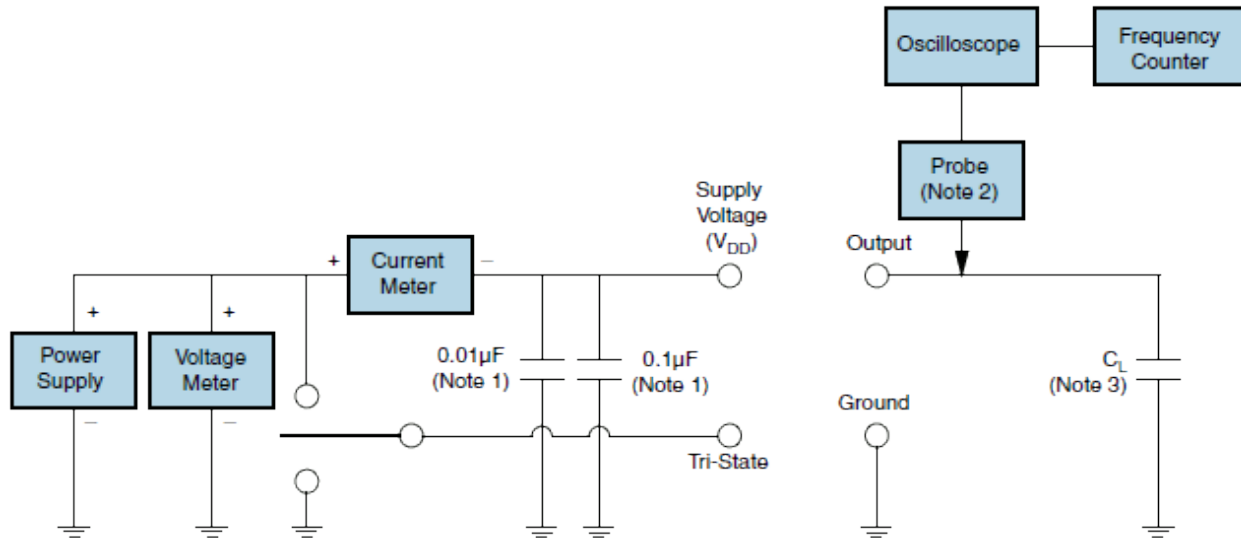
Output Load Drive Capability	$R_L$ Value (Ohms)	$C_L$ Value (pF)
10TTL	390	15
5TTL	780	15

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



- 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 input 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.
- Note 4:** Resistance value  $R_L$  is shown in Table I. See applicable specification sheet for “Load Drive Capability”.
- Note 5:** All diodes are MMBD7000, MMBD914, or equivalent.

## 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 pin is required.

**Note 2:** A low input capacitance ( $<12\text{pF}$ ), 10X Attenuation Factor, High Impedance ( $>10\text{Mohms}$ ), and High bandwidth ( $>300\text{MHz}$ ) Passive probe is recommended.

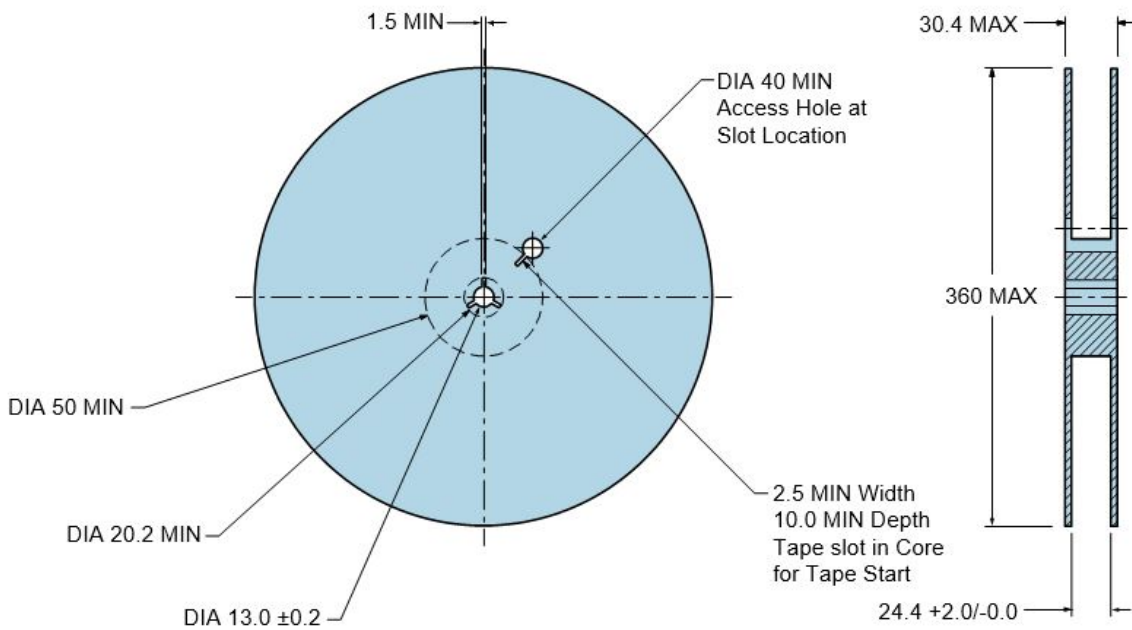
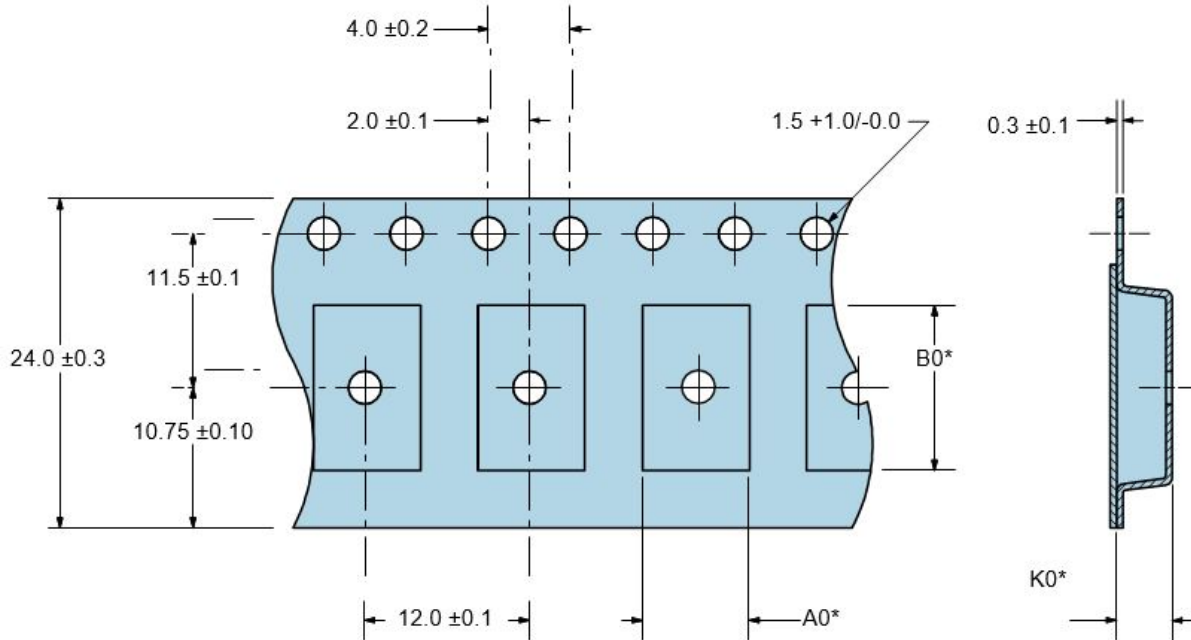
**Note 3:** Capacitance value includes sum of all probe and fixture capacitance. See applicable specification sheet for 'Load Drive Capability'.

## TAPE & REEL DIMENSIONS

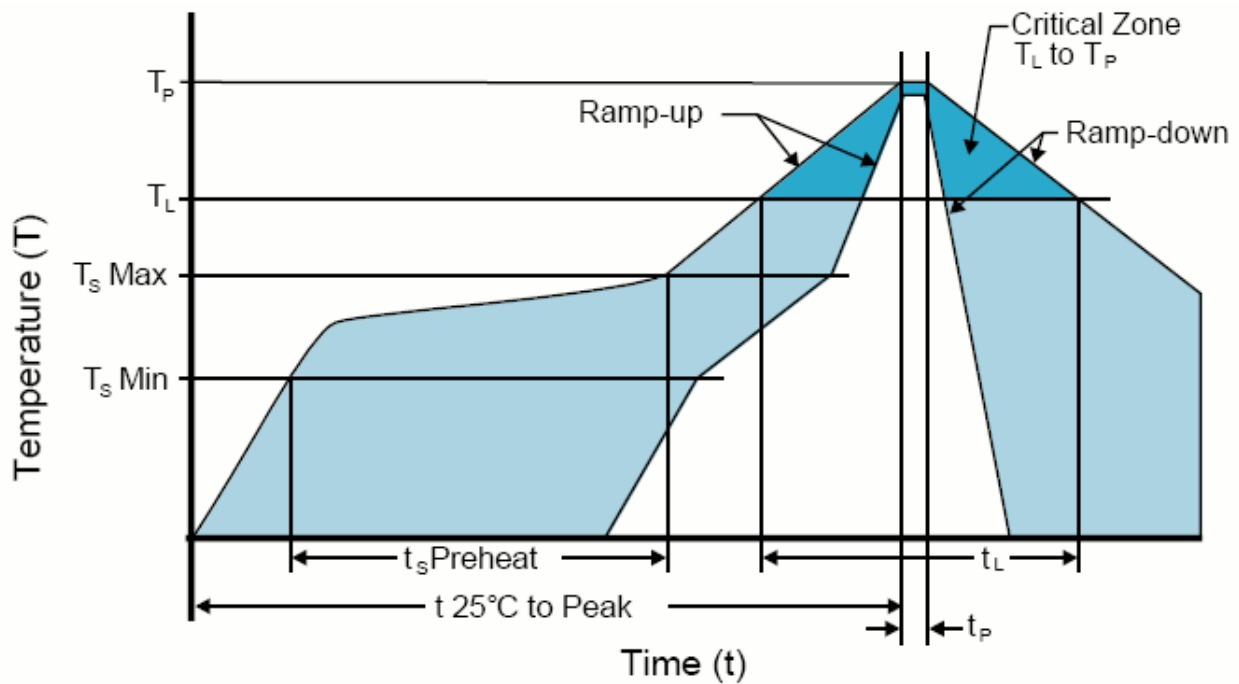
Quantity per Reel: 500 Units

All Dimensions in Millimeters

Compliant to EIA-481



## RECOMMENDED SOLDER REFLOW METHOD



### LOW TEMPERATURE INFRARED/CONVECTION

<b><math>T_S</math> MAX to <math>T_L</math> (Ramp-up Rate)</b>	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 ( $t_s$ )	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
<b>Additional Notes</b>	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.)