

# EQRF22K2H-19.450M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Jul 16, 2019)



◀ Click badges to download compliance docs

Regulatory Compliance standards are subject to updates by governing bodies. Click the badges to download the latest compliance docs for this part number directly from Ecliptek.



## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) LVDS (DS) 2.5Vdc 6 Pad 3.2mm x 5.0mm Ceramic Surface Mount (SMD) 19.450MHz  $\pm 50$ ppm over -40°C to +85°C

## ELECTRICAL SPECIFICATIONS

Nominal Frequency	19.450MHz
Frequency Tolerance/Stability	$\pm 50$ 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 and Output Load Change)
Aging at 25°C	$\pm 2$ ppm Maximum First Year, $\pm 10$ ppm/10 Years Maximum
Supply Voltage	2.5Vdc $\pm 5\%$
Input Current	25mA Maximum
Output Voltage Logic High (Voh)	1.425Vdc Typical
Output Voltage Logic Low (Vol)	1.075Vdc Typical
Differential Output Error (dVod)	50mVdc Maximum
Differential Output Voltage (Vod)	200mVdc Minimum, 350mVdc Typical, 454mVdc Maximum
Offset Voltage (Vos)	1.125V Minimum, 1.250V Typical, 1.375V Maximum
Rise/Fall Time	500pSec Maximum (Measured at 20% to 80% of Waveform)
Duty Cycle	50 $\pm 5$ (%) (Measured at 50% of Waveform)
Offset Error (dVos)	50mVdc Maximum
Load Drive Capability	100 Ohms Between Output and Complementary Output
Output Logic Type	LVDS
Phase Noise	-64dBc/Hz at 10Hz offset; -96dBc/Hz at 100Hz offset; -124dBc/Hz at 1kHz offset; -131dBc/Hz at 10kHz offset; -132dBc/Hz at 100kHz offset; -149dBc/Hz at 1MHz offset; -157dBc/Hz at 10MHz offset; -159dBc/Hz at 20MHz offset (All Values are Typical)
Output Control Function	Output Enable (OE)
Output Control Input Voltage Logic High (Vih)	90% of Vdd Minimum or No Connect to Enable Output and Complementary Output
Output Control Input Voltage Logic Low (Vil)	10% of Vdd Maximum to Disable Output and Complementary Output (High Impedance)
Output Enable Time	100nSec Maximum
Output Disable Time	50nSec Maximum
Output Enable Current	15mA Maximum (Without Load (Pin 1 = Ground))
RMS Phase Jitter	1.5pSec Maximum (Fj=12kHz to 20MHz (Random))
Period Jitter (Deterministic)	0.2pSec Typical
Period Jitter (Random)	2pSec Typical
Period Jitter (RMS)	3pSec Maximum
Period Jitter (pk-pk)	25pSec Maximum
Start Up Time	10mSec Maximum
Storage Temperature Range	-55°C to +125°C

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## 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	Output Enable (OE)
2	Do Not Connect
3	Case/Ground
4	Output
5	Complementary Output
6	Supply Voltage

LINE	MARKING
1	<b>E19.450</b> <i>E=Ecliptek Designator</i>
2	<b>XXXXX</b> <i>XXXXX=Ecliptek Manufacturing Identifier</i>

### Suggested Solder Pad Layout

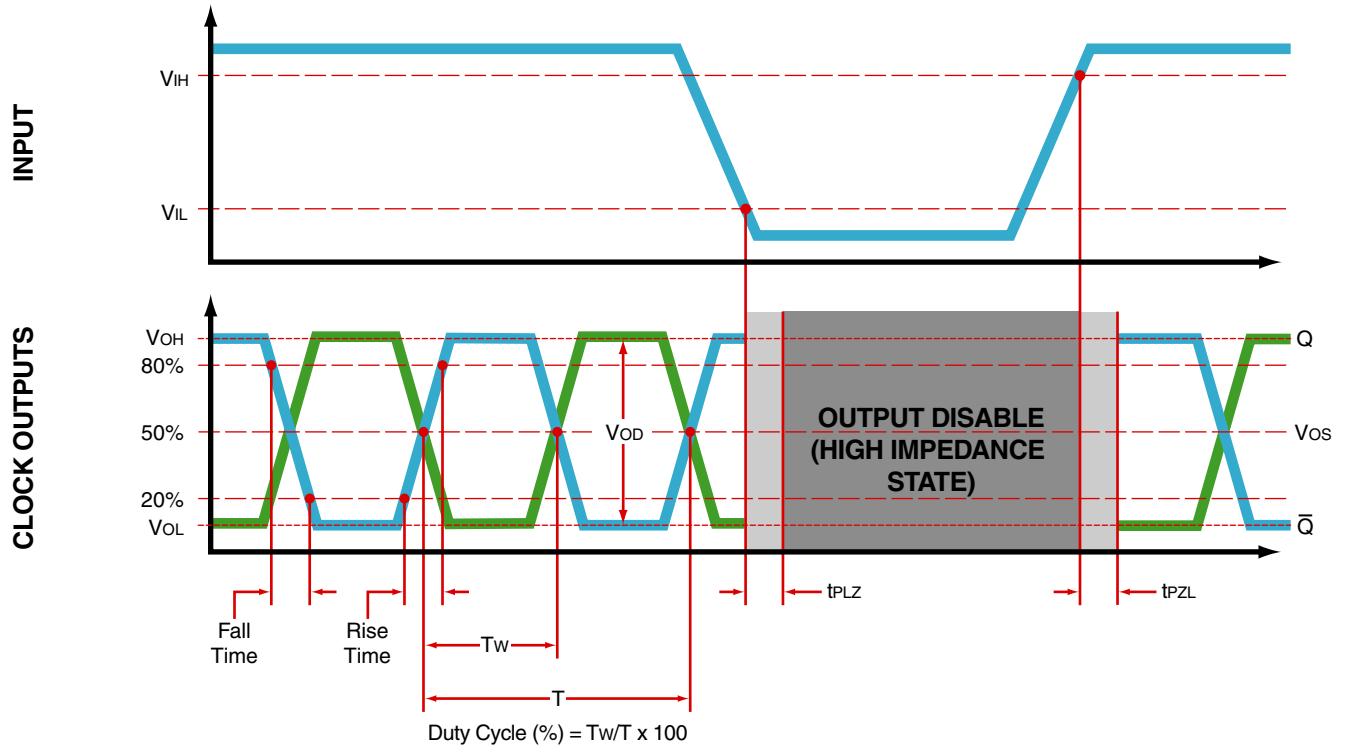
All Dimensions in Millimeters



All Tolerances are ±0.1

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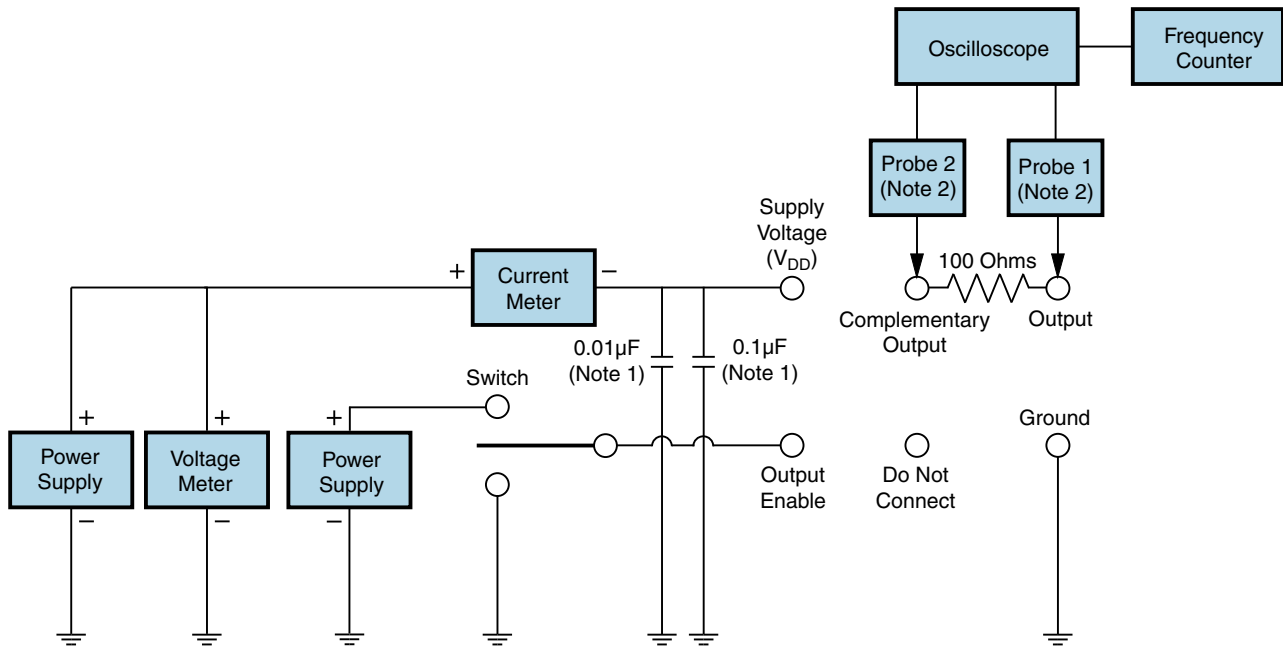
## OUTPUT WAVEFORM & TIMING DIAGRAM



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## Test Circuit for LVDS 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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## 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
<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

$T_s$ 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
<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.)