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## EQVE22 Series Oscillator

Voltage Controlled Quartz Crystal Clock Oscillators VCXO LVDS (DS) 2.5Vdc 6 Pad 3.2mm x 5.0mm Ceramic Surface Mount (SMD)



Revision A 01/16/2015

### Electrical Specifications

<b>Nominal Frequency</b>	10.000MHz to 625.000MHz <i>Some frequencies within this range may not be available.</i>
<b>Frequency Tolerance/Stability</b>	Inclusive of all conditions: Calibration Tolerance (at 25°C), Frequency Stability over the Operating Temperature Range, Supply Voltage Change and Output Load Change ±50ppm Maximum
<b>Operating Temperature Range</b>	0°C to +70°C -20°C to +70°C -40°C to +85°C
<b>Aging at 25°C</b>	±2ppm Maximum First Year, ±10ppm/10 Years Maximum
<b>Supply Voltage</b>	2.5V <sub>DC</sub> ±5%
<b>Input Current</b>	25mA Maximum
<b>Output Voltage Logic High (V<sub>OH</sub>)</b>	1.425V <sub>DC</sub> Typical
<b>Output Voltage Logic Low (V<sub>OL</sub>)</b>	1.075V <sub>DC</sub> Typical
<b>Differential Output Error (dV<sub>od</sub>)</b>	50mV <sub>DC</sub> Maximum
<b>Differential Output Voltage (V<sub>od</sub>)</b>	200mV <sub>DC</sub> Minimum, 350mV <sub>DC</sub> Typical, 454mV <sub>DC</sub> Maximum
<b>Offset Voltage (V<sub>os</sub>)</b>	1.125V Minimum, 1.250V Typical, 1.375V Maximum
<b>Duty Cycle</b>	Measured at 50% of Waveform 50 ±10(%) 50 ±5(%)
<b>Rise Time/Fall Time</b>	Measured at 20% to 80% of Waveform 500pSec Maximum
<b>Offset Error (dV<sub>os</sub>)</b>	50mV <sub>DC</sub> Maximum
<b>Load Drive Capability</b>	100 Ohms Between Output and Complementary Output
<b>Output Logic Type</b>	LVDS
<b>Absolute Pull Range</b>	Inclusive of all conditions: Calibration Tolerance (at 25°C), Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, Shock, Vibration, and 10 Year Aging over the Control Voltage (V <sub>c</sub> ) ±30ppm Minimum ±50ppm Minimum
<b>Control Voltage</b>	Test Condition for APR 0.2V <sub>DC</sub> to 2.3V <sub>DC</sub>
<b>Control Voltage Range</b>	0.0V <sub>DC</sub> to V <sub>DD</sub> +0.25V <sub>DC</sub>

<b>Linearity</b>	5% Typical, 10% Maximum
<b>Transfer Function</b>	Positive Transfer Characteristic
<b>Modulation Bandwidth</b>	Measured at -3dB, $V_c = 1.25V_{DC}$ 10kHz Minimum
<b>Input Impedance</b>	500kOhms Minimum
<b>Input Leakage Current</b>	10 $\mu$ A Maximum
<b>Phase Noise</b>	<a href="#">Click to Open Phase Noise Table</a>
<b>Output Control Function</b>	Output Enable (OE)
<b>Output Control Input Voltage Logic High (Vih)</b>	90% of $V_{DD}$ Minimum or No Connect to Enable Output and Complementary Output
<b>Output Control Input Voltage Logic Low (Vil)</b>	10% of $V_{DD}$ Maximum to Disable Output and Complementary Output (High Impedance)
<b>Output Enable Time</b>	100nSec Maximum
<b>Output Disable Time</b>	50nSec Maximum
<b>Output Enable Current</b>	Without Load (Pin 2 = Ground) 15mA Maximum
<b>RMS Phase Jitter</b>	<a href="#">Click to Open RMS Phase Jitter Table</a>
<b>Period Jitter (Deterministic)</b>	0.2pSec Typical
<b>Period Jitter (Random)</b>	2pSec Typical
<b>Period Jitter (RMS)</b>	3pSec Maximum
<b>Period Jitter (pk-pk)</b>	25pSec Maximum
<b>Storage Temperature Range</b>	-55°C to +125°C
<b>Start Up Time</b>	10mSec Maximum

## Phase Noise

All Values are Typical

**Nominal Frequency: 10MHz to 50MHz**

<i>Offset</i>	<i>Phase Noise</i>
10Hz	-64dBc/Hz
100Hz	-96dBc/Hz
1kHz	-124dBc/Hz
10kHz	-131dBc/Hz
100kHz	-132dBc/Hz
1MHz	-149dBc/Hz
10MHz	-157dBc/Hz
20MHz	-159dBc/Hz

**Nominal Frequency: 50.000001MHz to 100MHz**

<i>Offset</i>	<i>Phase Noise</i>
10Hz	-58dBc/Hz
100Hz	-90dBc/Hz
1kHz	-118dBc/Hz
10kHz	-125dBc/Hz
100kHz	-126dBc/Hz
1MHz	-145dBc/Hz
10MHz	-155dBc/Hz
20MHz	-157dBc/Hz

**Nominal Frequency: 100.000001MHz to 156.249999MHz**

<i>Offset</i>	<i>Phase Noise</i>
10Hz	-57dBc/Hz
100Hz	-86dBc/Hz
1kHz	-114dBc/Hz
10kHz	-121dBc/Hz
100kHz	-122dBc/Hz
1MHz	-141dBc/Hz
10MHz	-151dBc/Hz
20MHz	-153dBc/Hz

**Nominal Frequency: 156.25MHz to 212.5MHz**

<i>Offset</i>	<i>Phase Noise</i>
10Hz	-58dBc/Hz
100Hz	-86dBc/Hz
1kHz	-110dBc/Hz
10kHz	-116dBc/Hz
100kHz	-117dBc/Hz
1MHz	-136dBc/Hz
10MHz	-146dBc/Hz
20MHz	-148dBc/Hz

**Nominal Frequency: 212.500001MHz to 500MHz**

<i>Offset</i>	<i>Phase Noise</i>
10Hz	-56dBc/Hz
100Hz	-95dBc/Hz
1kHz	-100dBc/Hz

10kHz	-106dBc/Hz
100kHz	-107dBc/Hz
1MHz	-126dBc/Hz
10MHz	-136dBc/Hz
20MHz	-137dBc/Hz

**Nominal Frequency: 500.000001MHz to 625MHz**

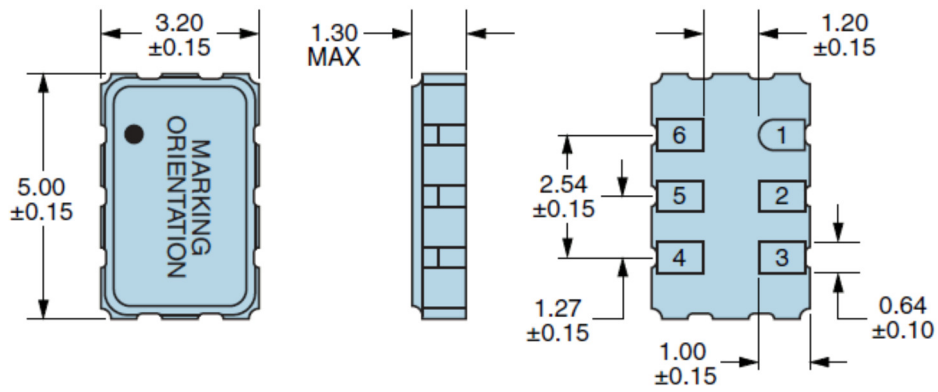
<i>Offset</i>	<i>Phase Noise</i>
10Hz	-54dBc/Hz
100Hz	-84dBc/Hz
1kHz	-97dBc/Hz
10kHz	-104dBc/Hz
100kHz	-105dBc/Hz
1MHz	-124dBc/Hz
10MHz	-134dBc/Hz
20MHz	-136dBc/Hz

## RMS Phase Jitter

**Fj=12kHz to 20MHz (Random)**

<i>Nominal Frequency Range</i>	<i>RMS Phase Jitter</i>
10MHz to 50MHz	1.5pSec Maximum
50.000001MHz to 100MHz	1.4pSec Maximum
100.000001MHz to 625MHz	1.3pSec Maximum

## Mechanical Dimensions



All Dimensions in Millimeters

Pin 1: Control Voltage

Pin 2: Output Enable (OE)

Pin 3: Case/Ground

Pin 4: Output

Pin 5: Complementary Output

Pin 6: Supply Voltage

## Marking Specifications

Line 1:

**XXXXXX**

- E = Ecliptek Designator
- XXXXXX = Nominal Frequency in MHz (5 Digits + Decimal)

Line 2:

**XXXXX**

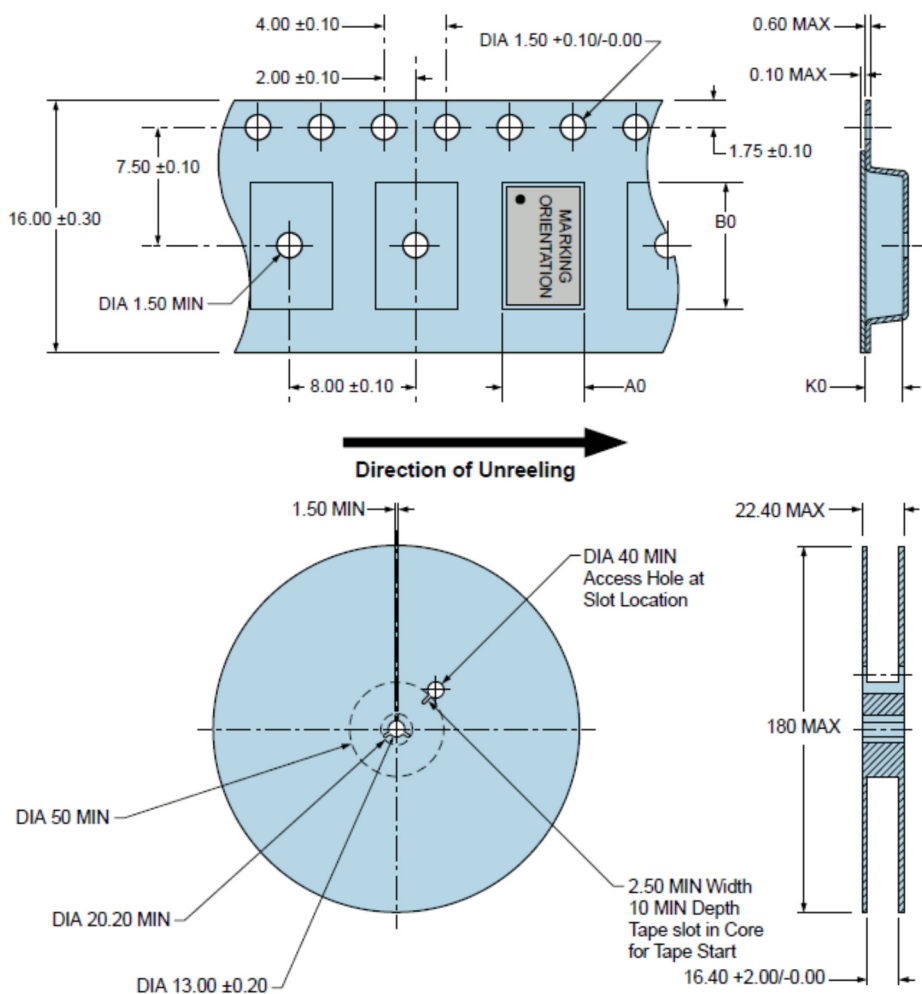
- XXXXX = Ecliptek Manufacturing Identifier

## Environmental and Mechanical Specifications

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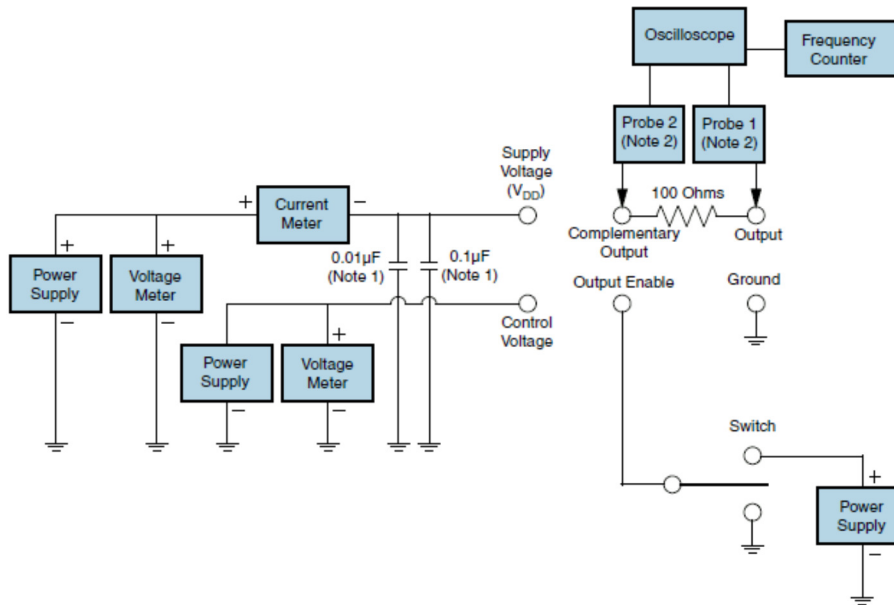
<b>ESD Susceptibility</b>	MIL-STD-883, Method 3015, Class 1, HBM: 1500V
<b>Fine Leak Test</b>	MIL-STD-883, Method 1014, Condition A
<b>Flammability</b>	UL94-V0
<b>Gross Leak Test</b>	MIL-STD-883, Method 1014, Condition C
<b>Mechanical Shock</b>	MIL-STD-883, Method 2002, Condition B
<b>Moisture Resistance</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
<b>Thermal Resistance (<math>\theta_{JA}</math>)</b>	42°C/W (degrees Celsius per Watt)
<b>Thermal Resistance (<math>\theta_{JC}</math>)</b>	15°C/W (degrees Celsius per Watt)

### Tape & Reel Dimensions



1000 pieces per reel  
 Compliant to EIA-481  
 All Dimensions in Millimeters

## Test Circuit for LVDS Output



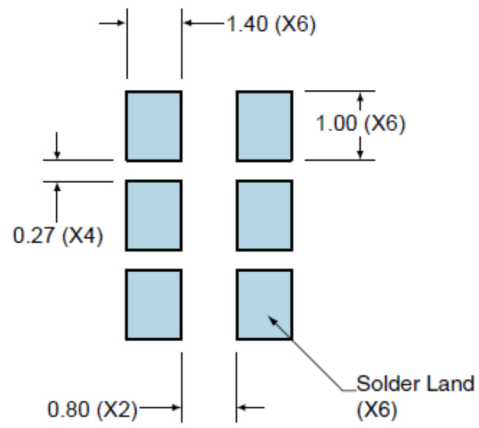
**Note 1:** An external 0.01μF ceramic bypass capacitor in parallel with a 0.1μF high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

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

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

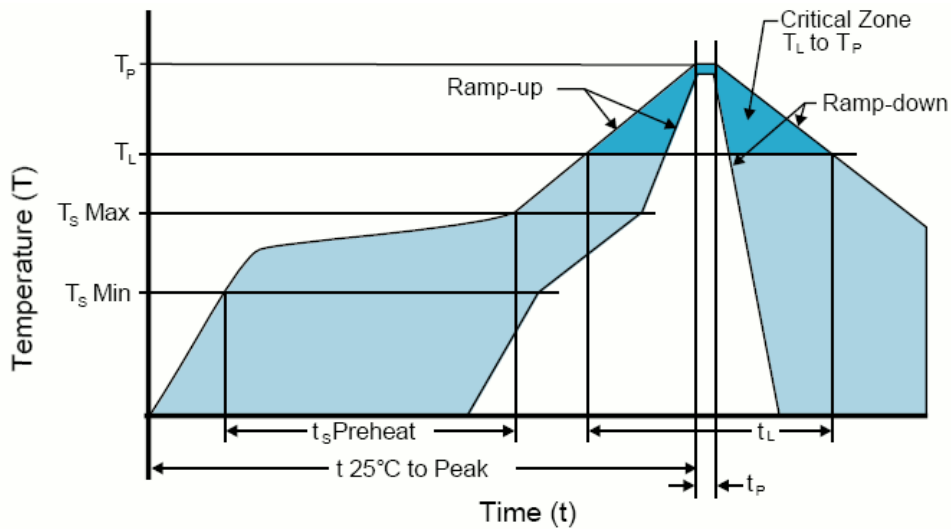
## Recommended Solder Pad Dimensions

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Tolerances =  $\pm 0.1$   
All Dimensions in Millimeters

## Solder Reflow Profile



### High Temperature Infrared/Convection

**Note:** Temperatures shown are applied to body of device.

<b>T<sub>S</sub> MAX to T<sub>L</sub> (Ramp-up Rate)</b>	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum (T <sub>S</sub> MIN)	150°C
- Temperature Typical (T <sub>S</sub> TYP)	175°C
- Temperature Maximum (T <sub>S</sub> MAX)	200°C
- Time (t <sub>s</sub> )	60 - 180 Seconds
<b>Ramp-up Rate (T<sub>L</sub> to T<sub>P</sub>)</b>	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature (T <sub>L</sub> )	217°C
- Time (t <sub>L</sub> )	60 - 150 Seconds
<b>Peak Temperature (T<sub>P</sub>)</b>	260°C Maximum for 10 Seconds Maximum
<b>Target Peak Temperature (T<sub>P</sub> Target)</b>	250°C +0/-5°C
<b>Time within 5°C of actual peak (t<sub>p</sub>)</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

**Low Temperature Infrared/Convection 240°C**

**Note:** Temperatures shown are applied to body of device.

<b>T<sub>S</sub> MAX to T<sub>L</sub> (Ramp-up Rate)</b>	5°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum (T <sub>S</sub> MIN)	N/A
- Temperature Typical (T <sub>S</sub> TYP)	150°C
- Temperature Maximum (T <sub>S</sub> MAX)	N/A
- Time (t <sub>S</sub> )	60 - 120 Seconds
<b>Ramp-up Rate (T<sub>L</sub> to T<sub>P</sub>)</b>	5°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature (T <sub>L</sub> )	150°C
- Time (t <sub>L</sub> )	200 Seconds Maximum
<b>Peak Temperature (T<sub>P</sub>)</b>	240°C Maximum
<b>Target Peak Temperature (T<sub>P</sub> Target)</b>	240°C Maximum 2 Times / 230°C Maximum 1 Time
<b>Time within 5°C of actual peak (t<sub>p</sub>)</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

**High Temperature Manual Soldering**

**Note:** Temperatures listed are applied to body of device.  
260°C Maximum for 5 Seconds Maximum, 2 times Maximum.

**Low Temperature Manual Soldering**

**Note:** Temperatures listed are applied to body of device.  
185°C Maximum for 10 Seconds Maximum, 2 times Maximum.

### 1 - Build A Part Number

Select the parameters that meet your requirements and then click Next

**Frequency in Megahertz (10 to 625):**   
*Some frequencies within this range may not be available*

**Operating Temperature Range:**  0°C to +70°C

**Absolute Pull Range:**  ±30ppm Minimum

**Duty Cycle:**  50 ±10(%)

**Packaging Options:**  Tape & Reel

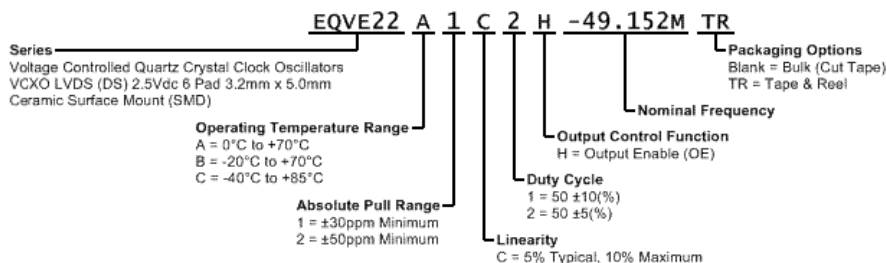


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