



Home Products Quick Quote My Parts List Site Map Contact Us

## EQUG33 Series Oscillator

Temperature Compensated Voltage Controlled Quartz Crystal Clock Oscillators TCVCXO LVPECL (PECL) 3.3Vdc 6 Pad 2.5mm x 3.2mm Ceramic Surface Mount (SMD)



Revision A 09/09/2015

### Electrical Specifications

<b>Nominal Frequency</b>	10.000MHz to 625.000MHz <i>Some frequencies within this range may not be available.</i>
<b>Frequency Stability</b>	Inclusive of Operating Temperature Range, at $V_{DD}=3.3V_{DC}$ , at $V_C=1.5V_{DC}$ $\pm 5.0$ ppm Maximum $\pm 3.0$ ppm Maximum $\pm 2.5$ ppm Maximum $\pm 2.0$ ppm Maximum $\pm 1.5$ ppm Maximum $\pm 1.0$ ppm Maximum
<b>Frequency Stability vs. Frequency Tolerance</b>	At $25^{\circ}C \pm 2^{\circ}C$ , at $V_{DD}=3.3V_{DC}$ , at $V_C=1.5V_{DC} \pm 0.1V_{DC}$ , Pre-Reflow $\pm 2.0$ ppm Maximum $\pm 1.5$ ppm Maximum $\pm 1.0$ ppm Maximum
<b>Frequency Stability vs. Input Voltage</b>	$\pm 0.2$ ppm Maximum ( $\pm 5\%$ )
<b>Frequency Stability vs. Load</b>	$\pm 0.2$ ppm Maximum ( $\pm 2$ pF)
<b>Frequency Stability vs. Reflow</b>	$\pm 1.0$ ppm Maximum (at $25^{\circ}C$ , 24 hours after reflow, 1 time)
<b>Frequency Stability vs. Aging</b>	$\pm 1$ ppm/Year Maximum (at $25^{\circ}C$ )
<b>Operating Temperature Range</b>	$0^{\circ}C$ to $+50^{\circ}C$ $-10^{\circ}C$ to $+60^{\circ}C$ $0^{\circ}C$ to $+70^{\circ}C$ $-20^{\circ}C$ to $+70^{\circ}C$ $-30^{\circ}C$ to $+60^{\circ}C$ $-30^{\circ}C$ to $+75^{\circ}C$ $-30^{\circ}C$ to $+85^{\circ}C$ $-40^{\circ}C$ to $+85^{\circ}C$
<b>Supply Voltage</b>	$3.3V_{DC} \pm 5\%$
<b>Input Current</b>	75mA Maximum
<b>Output Voltage Logic High (Voh)</b>	$V_{DD}-1.025V_{DC}$ Minimum, $2.4V_{DC}$ Typical, $V_{DD}-0.6V_{DC}$ Maximum
<b>Output Voltage Logic Low (Vol)</b>	$V_{DD}-1.85V_{DC}$ Minimum, $1.6V_{DC}$ Typical, $V_{DD}-1.62V_{DC}$ Maximum
<b>Rise/Fall Time</b>	Measured at 10% to 90% of Waveform 300pSec Maximum
<b>Duty Cycle</b>	Measured at 50% of Waveform $50 \pm 5(\%)$
<b>Load Drive Capability</b>	50 Ohms into $V_{DD}-2V_{DC}$
<b>Output Logic Type</b>	LVPECL

<b>Control Voltage</b>	1.5V <sub>DC</sub> ±1.0V <sub>DC</sub>
<b>Frequency Deviation</b>	±8ppm Minimum
<b>Linearity</b>	10% Maximum
<b>Transfer Function</b>	Positive Transfer Characteristic
<b>Modulation Bandwidth</b>	Measured at -3dB 10kHz Minimum
<b>Input Impedance</b>	1MOhms Minimum
<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 <sub>DD</sub> Minimum or No Connect to Enable Output and Complementary Output
<b>Output Control Input Voltage Logic Low (Vil)</b>	10% of V <sub>DD</sub> 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) 18mA 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>	30pSec Maximum
<b>Start Up Time</b>	10mSec Maximum
<b>Storage Temperature Range</b>	-55°C to +125°C

## 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

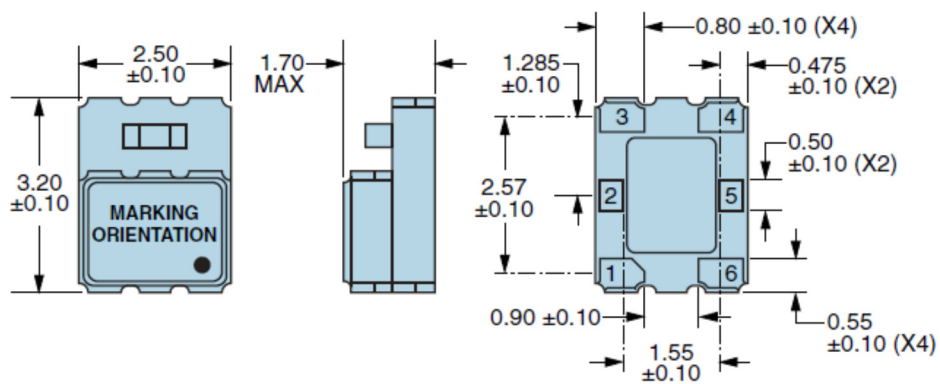
## RMS Phase Jitter

---

### 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



**Terminal Plating Thickness:** Gold (0.3 to 1.0 $\mu$ m) over Nickel (1.27 to 8.89 $\mu$ m).

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

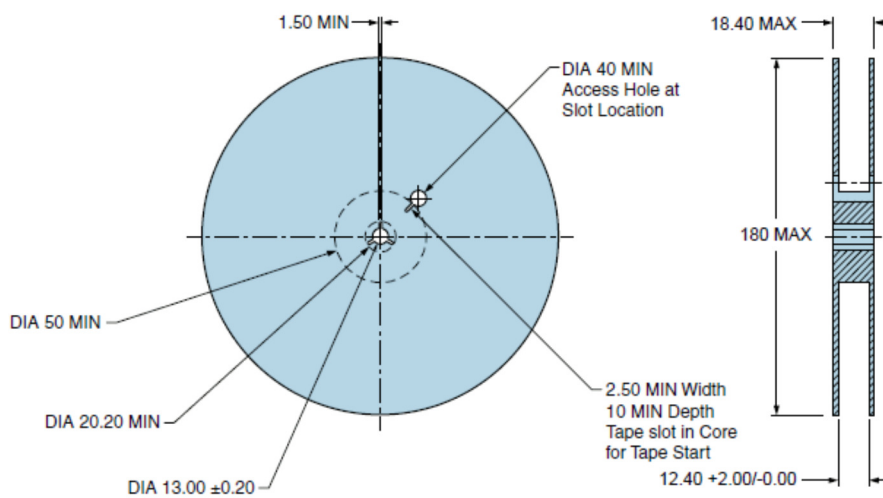
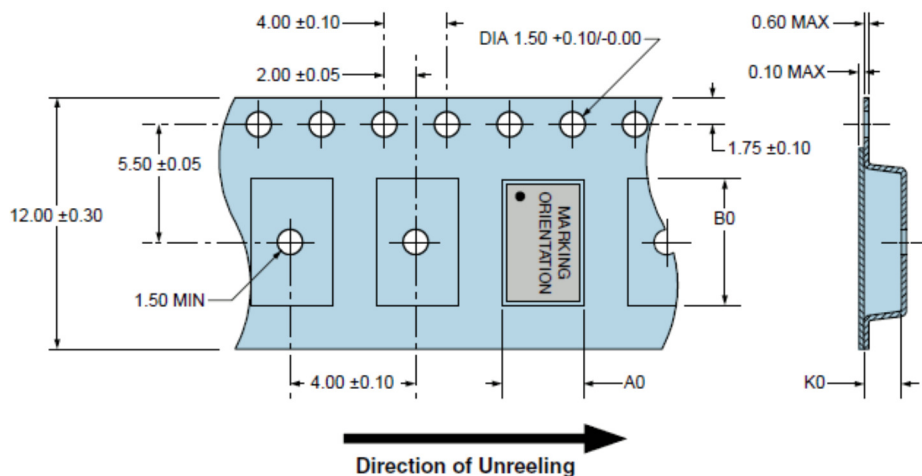
- Line 1: **EXXXXXX**
- E = Ecliptek Designator
  - XXXXXX = Nominal Frequency in MHz (5 digits + Decimal)
- Line 2: **XXXXXX**
- XXXXXX = Ecliptek Manufacturing Identifier

## Environmental and Mechanical Specifications

---

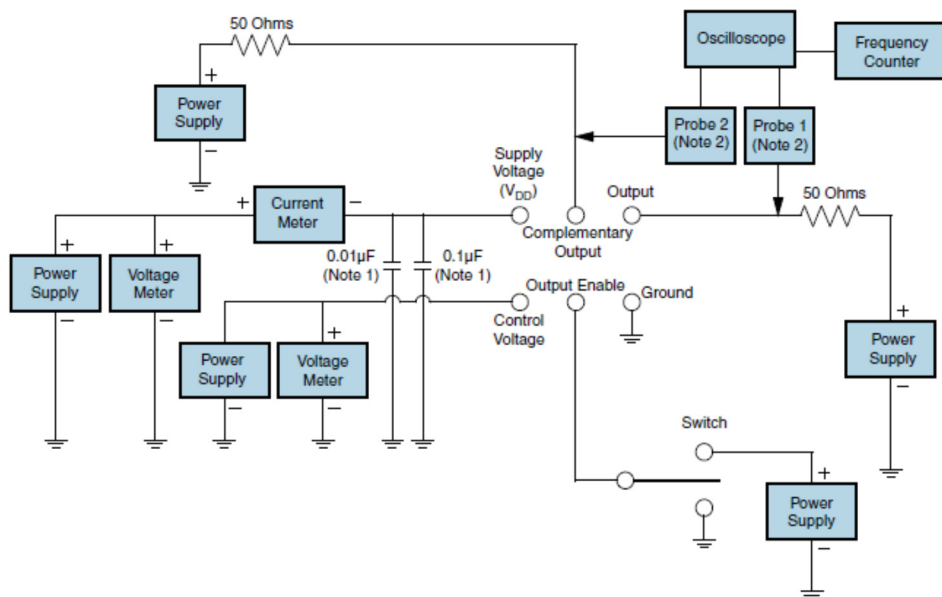
<b>ESD Susceptibility</b>	MIL-STD-883, Method 3015, Class 1, HBM: 1500V
<b>Fine Leak Test</b>	MIL-STD-883, Method 1014, Condition A
<b>Flammability</b>	UL94-V0
<b>Gross Leak Test</b>	MIL-STD-883, Method 1014, Condition C
<b>Mechanical Shock</b>	MIL-STD-883, Method 2002, Condition B
<b>Moisture Resistance</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
<b>Thermal Resistance (<math>\theta_{JA}</math>)</b>	45°C/W (degrees Celsius per Watt)
<b>Thermal Resistance (<math>\theta_{JC}</math>)</b>	19°C/W (degrees Celsius per Watt)

### Tape & Reel Dimensions



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

## Test Circuit for PECL Output



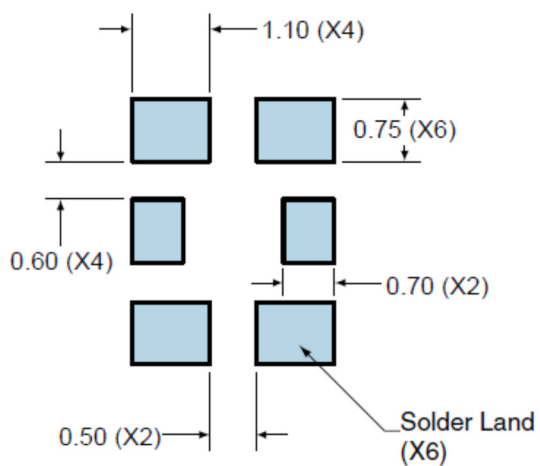
**Note 1:** An external 0.01µF ceramic bypass capacitor in parallel with a 0.1µF high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

**Note 2:** A low input 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.

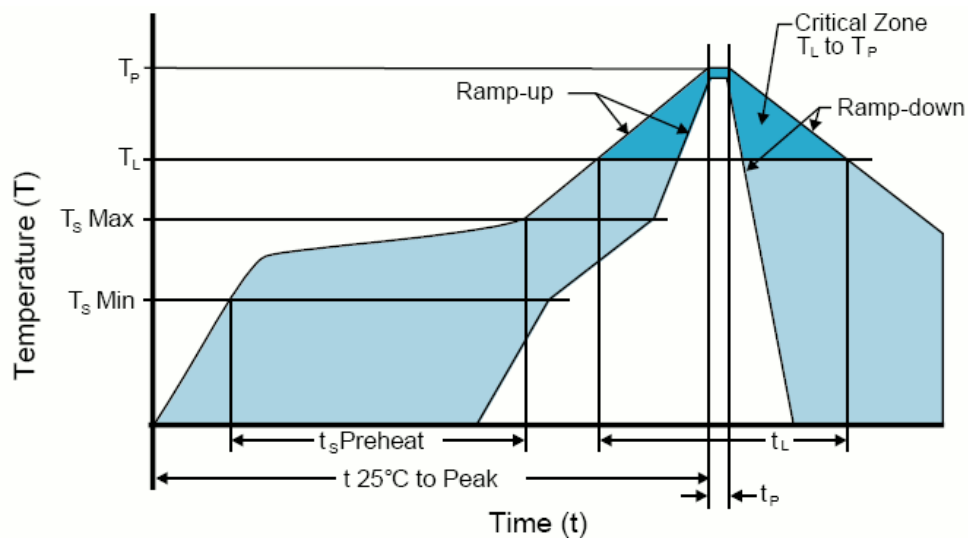
### Recommended Solder Pad Dimensions

---



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><math>T_s</math> MAX to <math>T_L</math> (Ramp-up Rate)</b>	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum ( $T_s$ MIN)	150°C
- Temperature Typical ( $T_s$ TYP)	175°C
- Temperature Maximum ( $T_s$ MAX)	200°C
- Time ( $t_s$ )	60 - 180 Seconds
<b>Ramp-up Rate (<math>T_L</math> to <math>T_p</math>)</b>	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature ( $T_L$ )	217°C
- Time ( $t_L$ )	60 - 150 Seconds
<b>Peak Temperature (<math>T_p</math>)</b>	260°C Maximum for 10 Seconds Maximum
<b>Target Peak Temperature (<math>T_p</math> Target)</b>	250°C +0/-5°C
<b>Time within 5°C of actual peak (<math>t_p</math>)</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.

**T<sub>S</sub> MAX to T<sub>L</sub> (Ramp-up Rate)** 5°C/Second Maximum

**Preheat**

- **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

**Ramp-up Rate (T<sub>L</sub> to T<sub>p</sub>)** 5°C/Second Maximum

**Time Maintained Above:**

- **Temperature (T<sub>L</sub>)** 150°C

- **Time (t<sub>L</sub>)** 200 Seconds Maximum

**Peak Temperature (T<sub>p</sub>)** 240°C Maximum

**Target Peak Temperature (T<sub>p</sub> Target)** 240°C Maximum 2 Times / 230°C Maximum 1 Time

**Time within 5°C of actual peak (t<sub>p</sub>)** 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

**High Temperature Manual Soldering**

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

**Low Temperature Manual Soldering**

**Note:** Temperatures shown 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*

**Frequency Stability vs. Frequency Tolerance:**

**Operating Temperature Range:**

**Frequency Stability:**

**Packaging Options:**

[→ Next](#)

## 2 - Next Page

Access these Part Number specific resources and tools

[PDF P/N Specific Data Sheet](#)

[Automated Quick Quote](#)

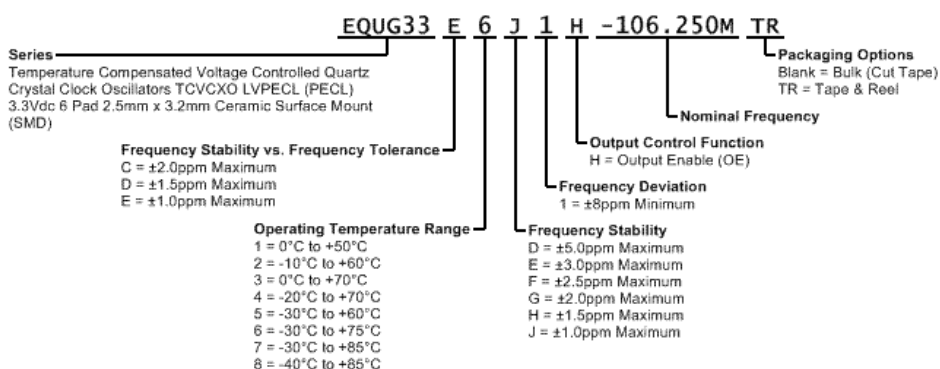
[Request Sample](#)

[IPC Download IPC-1752](#)

[My Parts List ?](#)

[My Part Number ?](#)

## Part Numbering Guide



### TOOLS

[Quick Quote](#)  
[SmartSearch](#)  
[Compliance Documents](#)  
[Chipset Cross Reference](#)  
[Competitor Cross Reference](#)

### PRODUCT

[Crystals](#)  
[Oscillators](#)  
[Part Search](#)  
[REACH Resources](#)  
[RoHS Resources](#)  
[End of Life](#)

### ECLIPTEK

[Authorized Distributors](#)  
[Contact](#)  
[About](#)  
[News](#)  
[Our Quality](#)  
[ISO9001](#)  
[Feedback](#)

### TERMS

[Privacy Policy](#)  
[Terms of Sale](#)  
[Legal](#)