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## EQUA35 Series Oscillator

Temperature Compensated Voltage Controlled Quartz Crystal Clock Oscillators TCVCXO LVCMOS (CMOS) 3.0Vdc 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 200.000MHz <i>Some frequencies within this range may not be available.</i>
<b>Frequency Stability</b>	Inclusive of Operating Temperature Range, at $V_{DD}=3.0V_{DC}$ , at $V_C=1.5V_{DC}$ $\pm 5.0\text{ppm}$ Maximum $\pm 3.0\text{ppm}$ Maximum $\pm 2.5\text{ppm}$ Maximum $\pm 2.0\text{ppm}$ Maximum $\pm 1.5\text{ppm}$ Maximum $\pm 1.0\text{ppm}$ Maximum
<b>Frequency Stability vs. Frequency Tolerance</b>	At $25^\circ\text{C} \pm 2^\circ\text{C}$ , at $V_{DD}=3.0V_{DC}$ , at $V_C=1.5V_{DC} \pm 0.1V_{DC}$ , Pre-Reflow $\pm 2.0\text{ppm}$ Maximum $\pm 1.5\text{ppm}$ Maximum $\pm 1.0\text{ppm}$ Maximum
<b>Frequency Stability vs. Input Voltage</b>	$\pm 0.2\text{ppm}$ Maximum ( $\pm 5\%$ )
<b>Frequency Stability vs. Load</b>	$\pm 0.2\text{ppm}$ Maximum ( $\pm 2\text{pF}$ )
<b>Frequency Stability vs. Reflow</b>	$\pm 1.0\text{ppm}$ Maximum (at $25^\circ\text{C}$ , 24 hours after reflow, 1 time)
<b>Frequency Stability vs. Aging</b>	$\pm 1\text{ppm/Year}$ Maximum (at $25^\circ\text{C}$ )
<b>Operating Temperature Range</b>	$0^\circ\text{C}$ to $+50^\circ\text{C}$ $-10^\circ\text{C}$ to $+60^\circ\text{C}$ $0^\circ\text{C}$ to $+70^\circ\text{C}$ $-20^\circ\text{C}$ to $+70^\circ\text{C}$ $-30^\circ\text{C}$ to $+60^\circ\text{C}$ $-30^\circ\text{C}$ to $+75^\circ\text{C}$ $-30^\circ\text{C}$ to $+85^\circ\text{C}$ $-40^\circ\text{C}$ to $+85^\circ\text{C}$
<b>Supply Voltage</b>	$3.0V_{DC} \pm 5\%$
<b>Input Current</b>	Unloaded 20mA Maximum over Nominal Frequency of 10MHz to 50MHz 25mA Maximum over Nominal Frequency of 50.000001MHz to 100MHz 30mA Maximum over Nominal Frequency of 100.000001MHz to 200MHz
<b>Output Voltage Logic High (Voh)</b>	$I_{OH} = -4\text{mA}$ 90% of $V_{DD}$ Minimum
<b>Output Voltage Logic Low (Vol)</b>	$I_{OL} = +4\text{mA}$ 10% of $V_{DD}$ Maximum
<b>Rise/Fall Time</b>	Measured at 10% to 90% of Waveform 3nSec Maximum

<b>Duty Cycle</b>	Measured at 50% of Waveform 50 ±5(%)
<b>Load Drive Capability</b>	15pF Maximum
<b>Output Logic Type</b>	CMOS
<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
<b>Output Control Input Voltage Logic Low (Vil)</b>	10% of V <sub>DD</sub> Maximum to Disable 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>	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 200MHz**

<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

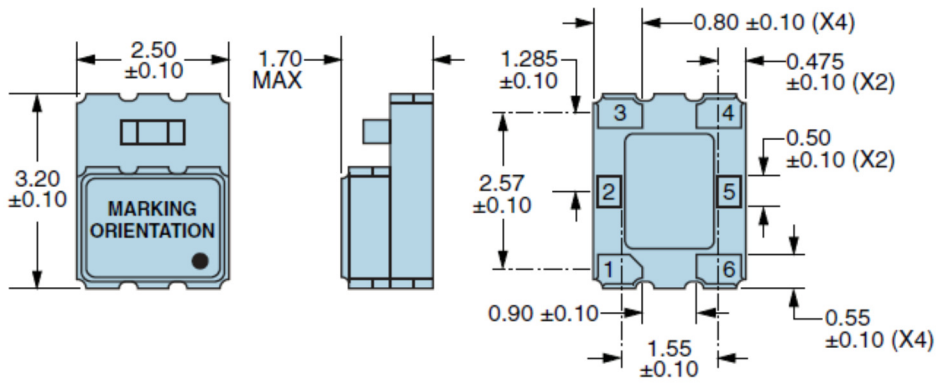
## RMS Phase Jitter

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### 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 200MHz	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: Do Not Connect

Pin 6: Supply Voltage

## Marking Specifications

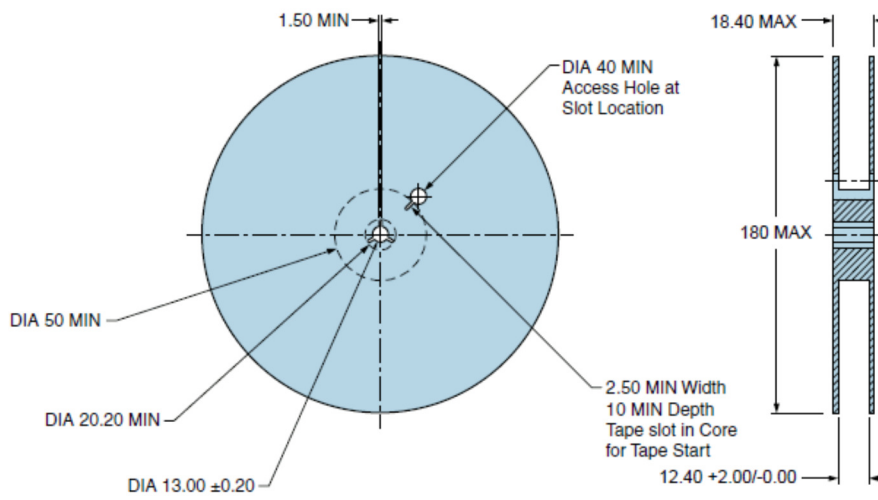
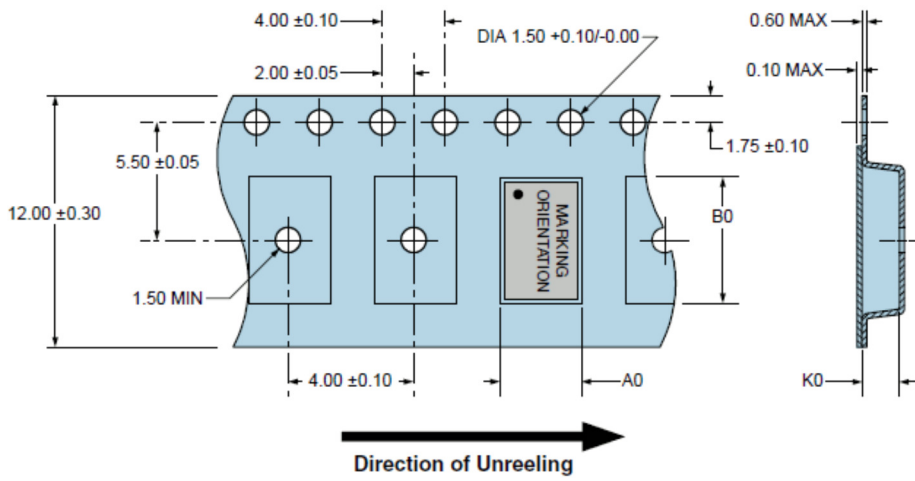
- Line 1: **EXXXXXX**
- E = Ecliptek Designator
  - XXXXXX = Nominal Frequency in MHz (5 digits + Decimal)
- Line 2: **XXXXXX**
- XXXXXX = Ecliptek Manufacturing Identifier

## Environmental and Mechanical Specifications

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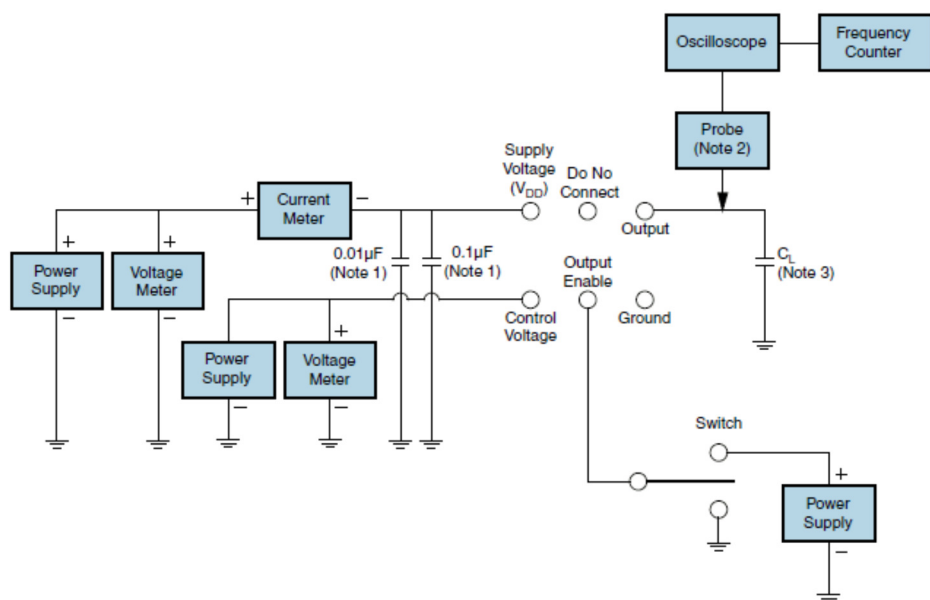
<b>ESD Susceptibility</b>	MIL-STD-883, Method 3015, Class 1, HBM: 1500V
<b>Fine Leak Test</b>	MIL-STD-883, Method 1014, Condition A
<b>Flammability</b>	UL94-V0
<b>Gross Leak Test</b>	MIL-STD-883, Method 1014, Condition C
<b>Mechanical Shock</b>	MIL-STD-883, Method 2002, Condition B
<b>Moisture Resistance</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>	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 CMOS Output



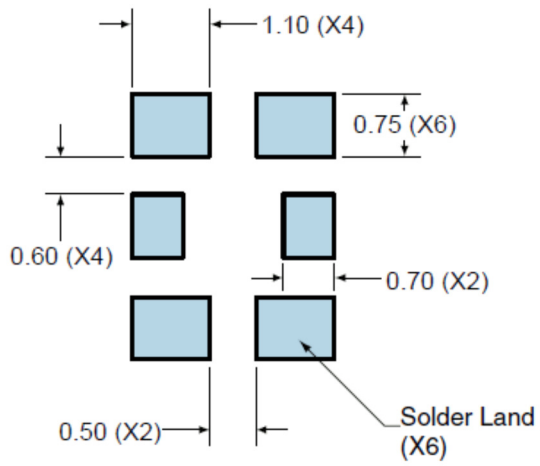
**Note 1:** An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

**Note 2:** A low 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.

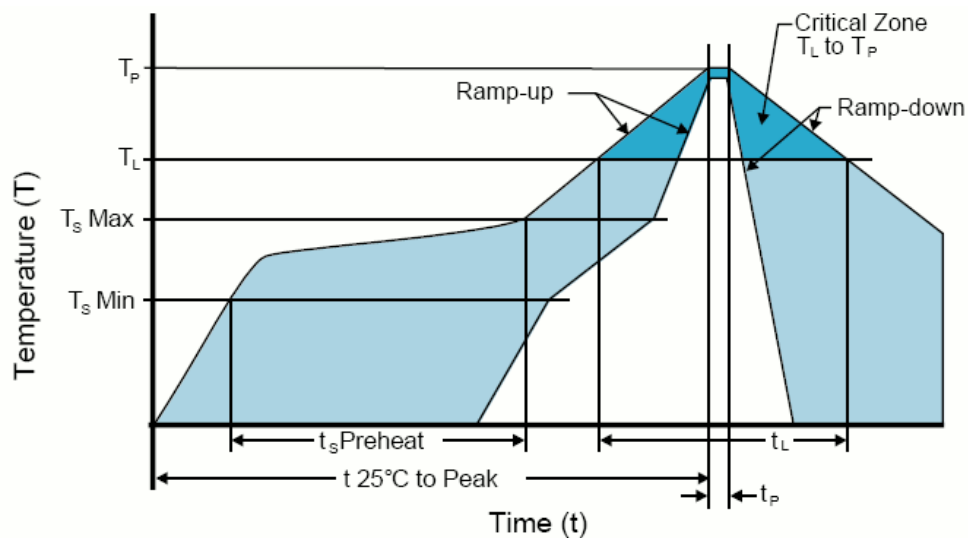
### Recommended Solder Pad Dimensions

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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><math>T_s \text{ MAX}</math> to <math>T_L</math> (Ramp-up Rate)</b>	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum ( $T_s \text{ MIN}$ )	150°C
- Temperature Typical ( $T_s \text{ TYP}$ )	175°C
- Temperature Maximum ( $T_s \text{ MAX}$ )	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 \text{ Target}</math>)</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.

**$T_S$  MAX to  $T_L$  (Ramp-up Rate)** 5°C/Second Maximum

**Preheat**

- **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

**Ramp-up Rate ( $T_L$  to  $T_p$ )** 5°C/Second Maximum

**Time Maintained Above:**

- **Temperature ( $T_L$ )** 150°C

- **Time ( $t_L$ )** 200 Seconds Maximum

**Peak Temperature ( $T_p$ )** 240°C Maximum

**Target Peak Temperature ( $T_p$  Target)** 240°C Maximum 2 Times / 230°C Maximum 1 Time

**Time within 5°C of actual peak ( $t_p$ )** 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 200):**   
*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](#)

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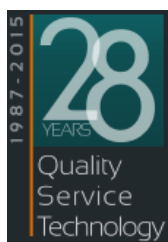
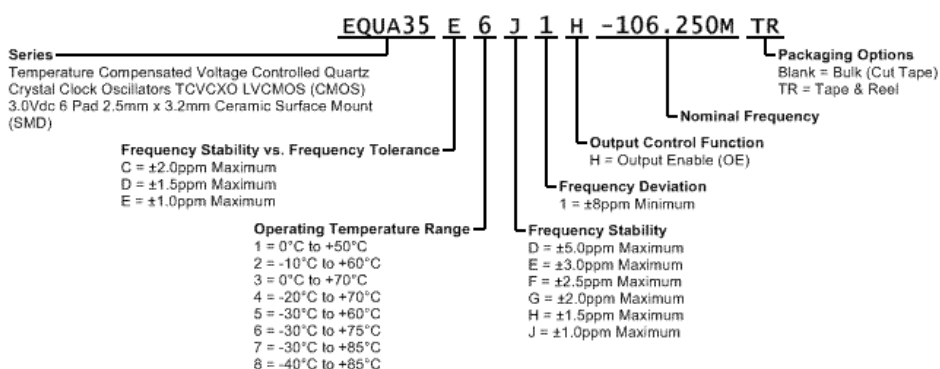
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