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## EQUA73 Series Oscillator

Temperature Compensated Voltage Controlled Quartz Crystal Clock Oscillators TCVCXO LVCMOS (CMOS) 3.3Vdc 14-Pin DIP Metal Thru-Hole



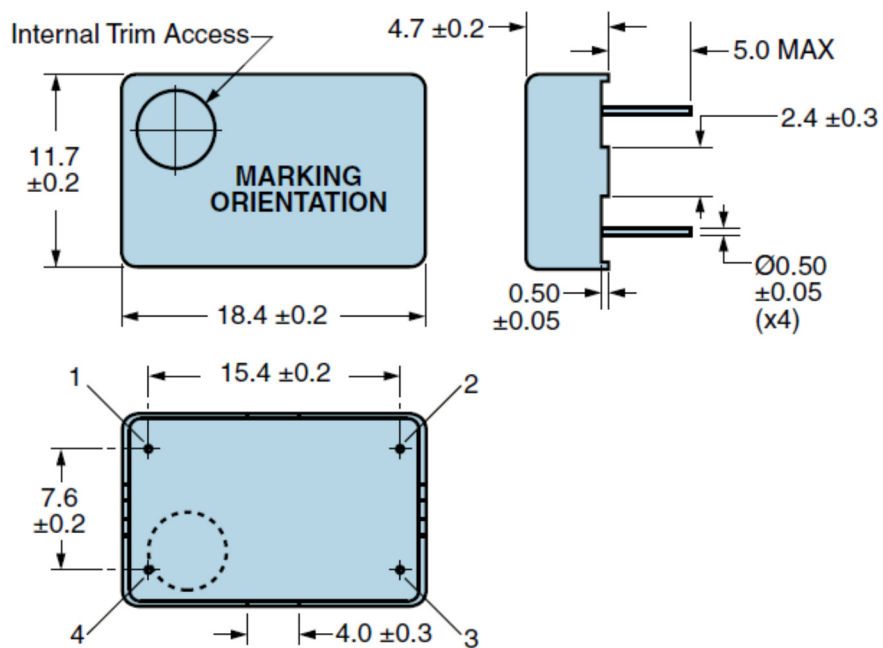
Revision A 09/20/2013

### Electrical Specifications

<b>Nominal Frequency</b>	1.544MHz to 155.520MHz <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 $V_C=1.5V$ $\pm 3.0\text{ppm}$ 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 $\pm 0.5\text{ppm}$ Maximum
<b>Frequency Stability vs. Frequency Tolerance</b>	At $25^\circ\text{C} \pm 2^\circ\text{C}$ , at $V_{DD}=3.3V_{DC}$ at $V_C=1.5V$ $\pm 1.0\text{ppm}$ Maximum
<b>Frequency Stability vs. Input Voltage</b>	$\pm 0.3\text{ppm}$ Maximum ( $\pm 5\%$ )
<b>Frequency Stability vs. Load</b>	$\pm 0.3\text{ppm}$ Maximum ( $\pm 2\text{pF}$ )
<b>Frequency Stability vs. Reflow</b>	$\pm 1.0\text{ppm}$ Maximum (at $25^\circ\text{C}$ , 1 hour after reflow, 1 times)
<b>Aging at <math>25^\circ\text{C}</math></b>	$\pm 1.0\text{ppm/Year}$ Maximum
<b>Operating Temperature Range</b>	$0^\circ\text{C}$ to $+50^\circ\text{C}$ $-10^\circ\text{C}$ to $+60^\circ\text{C}$ $-20^\circ\text{C}$ to $+70^\circ\text{C}$ $-30^\circ\text{C}$ to $+75^\circ\text{C}$ $-40^\circ\text{C}$ to $+85^\circ\text{C}$
<b>Supply Voltage</b>	$3.3V_{DC} \pm 5\%$
<b>Input Current</b>	10mA Maximum over Nominal Frequency of 1.544MHz to 10MHz 15mA Maximum over Nominal Frequency of 10.000001MHz to 30MHz 20mA Maximum over Nominal Frequency of 30.000001MHz to 50MHz 25mA Maximum over Nominal Frequency of 50.000001MHz to 77.76MHz 35mA Maximum over Nominal Frequency of 77.760001MHz to 155.52MHz
<b>Output Voltage Logic High (<math>V_{OH}</math>)</b>	90% of $V_{DD}$ Minimum $I_{OL}=-4\text{mA}$
<b>Output Voltage Logic Low (<math>V_{OL}</math>)</b>	10% of $V_{DD}$ Maximum $I_{OL}=+4\text{mA}$
<b>Duty Cycle</b>	Measured at 50% of waveform $50 \pm 10(\%)$
<b>Rise Time/Fall Time</b>	Measured at 20% to 80% of waveform 10nSec Maximum
<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>	±5ppm Minimum
<b>Linearity</b>	10% Maximum
<b>Transfer Function</b>	Positive Transfer Characteristic
<b>Internal Trim</b>	±3ppm Minimum (Top of Can)
<b>Modulation Bandwidth</b>	Measured at -3dB 10kHz Minimum
<b>Input Impedance</b>	50kOhms Minimum
<b>Phase Noise</b>	<p>Typical Values</p> <p><b>Offset over Nominal Frequency of 1.544MHz to 30MHz</b></p> <p>-96dBc/Hz at 10Hz Offset  -122dBc/Hz at 100Hz Offset  -138dBc/Hz at 1kHz Offset  -145dBc/Hz at 10kHz Offset  -150dBc/Hz at 100kHz Offset</p> <p><b>Offset over Nominal Frequency of 30.000001MHz to 77.76MHz</b></p> <p>-74dBc/Hz at 10Hz Offset  -105dBc/Hz at 100Hz Offset  -120dBc/Hz at 1kHz Offset  -124dBc/Hz at 10kHz Offset  -120dBc/Hz at 100kHz Offset</p> <p><b>Offset over Nominal Frequency of 77.760001MHz to 155.52MHz</b></p> <p>-68dBc/Hz at 10Hz Offset  -96dBc/Hz at 100Hz Offset  -110dBc/Hz at 1kHz Offset  -117dBc/Hz at 10kHz Offset  -112dBc/Hz at 100kHz Offset</p>
<b>Storage Temperature Range</b>	-40°C to +85°C

## Mechanical Dimensions



All Dimensions in Millimeters

Pin 1: Control Voltage

Pin 2: Case/Ground

Pin 3: Output

Pin 4: Supply Voltage

## Marking Specifications

Line 1: **ECLIPTEK**

Line 2: **XXXXXXM**

- XXXXXX = Nominal Frequency (5 Digits + Decimal)
- M = Nominal Frequency Unit of Measure (MHz)

Line 3: **XXXXX**

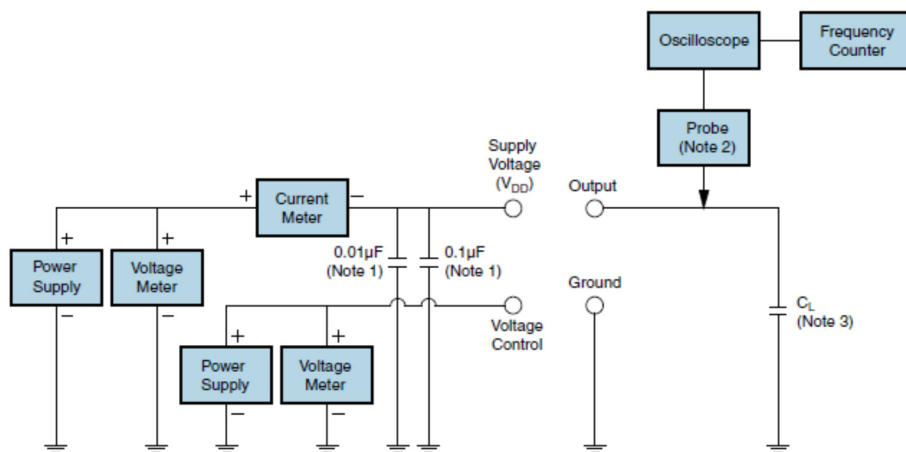
- XXXXX = Ecliptek Manufacturing Identifier

## Environmental and Mechanical Specifications

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<b>Fine Leak Test:</b>	MIL-STD-883, Method 1014 Condition A (Internal Crystal Only)
<b>Gross Leak Test:</b>	MIL-STD-883, Method 1014 Condition C (Internal Crystal Only)
<b>Lead Integrity:</b>	MIL-STD-883, Method 2004
<b>Mechanical Shock:</b>	MIL-STD-202, Method 213, Condition C
<b>Resistance to Soldering Heat:</b>	MIL-STD-202, Method 210
<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
<b>Vibration:</b>	MIL-STD-883, Method 2007, Condition A
<b>Thermal Resistance (<math>\theta_{JA}</math>):</b>	62°C/W (degrees Celsius per Watt)
<b>Thermal Resistance (<math>\theta_{JC}</math>):</b>	24°C/W (degrees Celsius per Watt)

## Test Circuit for Voltage Control Option

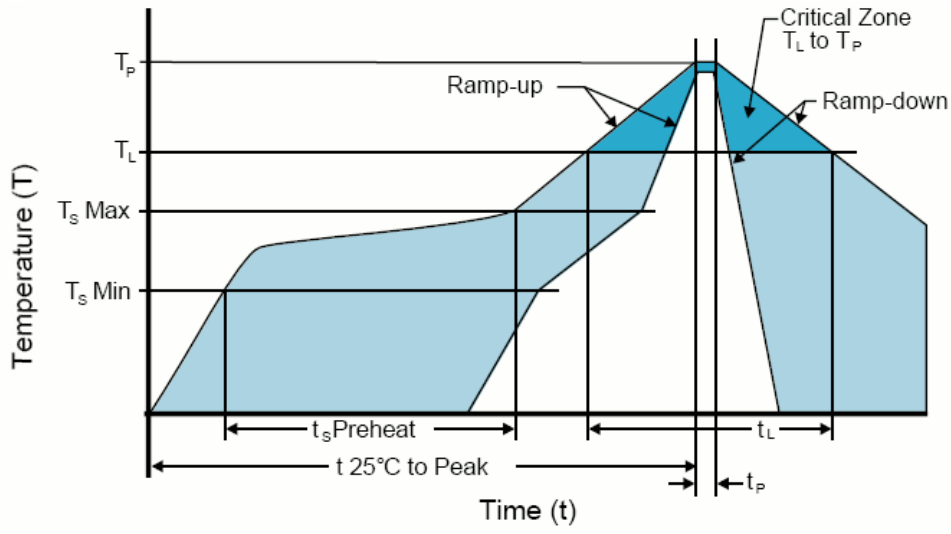


**Note 1:** An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

**Note 2:** A low capacitance ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>300\text{MHz}$ ) passive probe is recommended.

**Note 3:** Capacitance value  $C_L$  includes sum of all probe and fixture capacitance.

### Solder Reflow Profile



**Low Temperature Solder Bath (Wave Solder)**

**Note 1:** Device is non-hermetic; Post reflow aqueous wash is not recommended.

**Note 2:** Temperatures shown are applied to back of PCB board and device leads only.

<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> )	30 - 60 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>	245°C Maximum
<b>Target Peak Temperature (T<sub>P</sub> Target)</b>	245°C Maximum 1 Time / 235°C Maximum 2 Times
<b>Time within 5°C of actual peak (t<sub>p</sub>)</b>	5 seconds Maximum 1 Time / 15 seconds Maximum 2 Times
<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 device leads only. 260°C Maximum for 5 seconds Maximum, 2 times Maximum.

**Low Temperature Manual Soldering**

**Note:** Temperatures listed are applied to device leads only. 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 (1.544 to 155.52):**

*Some frequencies within this range may not be available*

**Operating Temperature Range:** 0°C to +50°C

**Frequency Stability:** ±3.0ppm Maximum

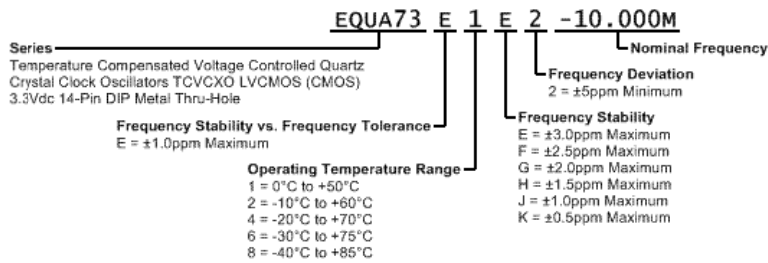
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## 2 - Next Page

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