

# Frequently Asked Questions

Rev A

For Series:	E4WC
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## 1. What is a quartz crystal?

An electronic component, consisting of a resonator plate with electrodes and a hermetically sealed package with suitable mounting structures, used in frequency control applications. Synthetic quartz crystals are hexagonal mono-crystals composed of Silicon and Oxygen ( $\text{SiO}_2$ ) and are cultured in autoclaves under high pressure and temperature. Quartz crystals exhibit piezoelectric properties and can be used to stabilize the frequency of an oscillator circuit. Utilizing a proprietary crystal resonator design and exclusive processing techniques, this series of crystals is calibrated to a specified nominal frequency prior to shipment to the customer.

## 2. What are the typical customer circuit applications for this product series?

This crystal series can be used in any of the following applications:

- Phase-Locked Loop and Frequency Synthesis
- Synthesizer or System Reference

## 3. What are the typical applications and end item products for this product series?

Here is a list of the common applications and products:

- Scanners, Printers, Modems
- LCD Displays and HDTV
- Interface Controllers
- Medical Equipment
- PDAs and Portable Media Players
- Digital Cameras and Gaming Products
- Notebook Computers
- Video Cameras and Video Recorders
- Portable Devices
- Computer Peripherals and Networking Products

## 4. What technical benefits does this product series offer?

This crystal series offers:

- Improved frequency stability through the use of a quartz tuning fork resonator
- Fundamental mode oscillation with parabolic temperature coefficient
- Parallel resonance operation
- Industry standard moisture sensitivity level 1 (MSL1) rated through-hole package
- RoHS Compliant

**5. What is the nominal frequency for this product series?**

The nominal frequency is the specified reference or center frequency of the crystal, expressed in kilohertz (kHz). This frequency is the desired frequency for which the crystal is designed and manufactured. The nominal frequency can be found on the datasheet.

**6. What is the frequency tolerance for this product series?**

The frequency tolerance is the amount of frequency deviation from the specified nominal frequency at room temperature (25°C). This term is expressed as a minimum and maximum percent (%) or parts per million (ppm). The frequency tolerance specification can be found on the datasheet.

**7. What is the frequency stability for this product series?**

The frequency stability is the amount of frequency deviation from the ambient temperature frequency over the specified operating temperature range. This term, expressed as a maximum value, is defined by a temperature coefficient as a change in frequency divided by the change in temperature squared [ ppm / (°C)<sup>2</sup> ]. The frequency versus temperature curve of this product series displays a decrease in frequency as the temperature goes above or below the turnover temperature. This results in a turn over temperature at the vertex of the parabolic curve. The frequency stability and turn over temperature specifications can be found on the datasheet.

**8. What is the operating temperature range for this product series?**

The operating temperature range is the minimum and maximum temperatures that a device can be exposed to during oscillation. Over this temperature range, all device specified operating parameters are guaranteed. The operating temperature range can be found on the datasheet.

**9. What is the storage temperature range for this product series?**

Storage temperature range is the minimum and maximum temperatures that the device can be stored or exposed to when in a non-oscillation state. After exposing or storing the device at any temperature over this range, all of the specifications are guaranteed over the operating temperature range. Exceeding the storage temperature range may result in device failure or internal component damage. The storage temperature range can be found on the datasheet.

**10. What is the mode of operation for this product series?**

This product series uses a tuning fork resonator designed to vibrate on its fundamental mode. The mode of operation can be found on the datasheet.

**11. What is the load capacitance for this product series?**

The load capacitance, specified in picofarads (pF), is the amount of capacitance presented to the crystal. The parallel load resonant frequency ( $F_L$ ) is a function of the load capacitance. The parallel resonant load capacitance specification can be found on the datasheet.

**12. What is the equivalent series resistance (ESR) specification for this product series?**

ESR is the resistive element, measured in ohms as a maximum value, of a crystal device. The ESR specification can be found on the datasheet.

**13. What is the shunt capacitance specification for this product series?**

Shunt capacitance is the static capacitance between the crystal terminals. Measured in picofarads (pF) and specified as a maximum value, the shunt capacitance specification can be found on the datasheet.

**14. What is the motional capacitance for this product series?**

The motional capacitance is the equivalent electrostatic capacitance component in a crystal unit, measured in femtofarads (fF). The motional capacitance specification can be found on the datasheet.

**15. What is the drive level specification for this product series?**

Drive level is a function of the driving or excitation current flowing through the crystal and is the amount of power dissipation in the crystal, expressed in microwatts as a maximum value. The drive level specification can be found on the datasheet.

**16. What is the aging specification for this product series?**

Crystal aging is the systematic change in frequency with time due to internal changes in the quartz crystal resonator. Aging is often expressed as a maximum value in parts per million per year (ppm/year). The crystal aging specification can be found on the datasheet.

**17. What are the construction characteristics of this product series?**

This product series consists of a fundamental mode quartz tuning fork resonator mounted inside a hermetically sealed package.

**18. What is the insulation resistance specification for this product series?**

The insulation resistance is the minimum value in ohms, between the leads of the crystal and between the crystal leads and the base. The insulation resistance specification for this product series can be found on the datasheet.

**19. Is this product series compatible with my existing assembly process equipment?**

A tape and reel (TR) packaging option is not available for this product series. Bulk products are delivered to the customer in packaging as specified on the datasheet.

**20. Is this product series compatible with my existing reflow processes?**

The suggested solder reflow diagram is provided on the datasheet.

**21. Is this product series RoHS compliant?**

This product is RoHS compliant as defined in the [Ecliptek RoHS Compliant \(Pb-free\) Roadmap](#).

**22. How can I obtain a RoHS compliant certification for this product series?**

A RoHS product certification letter can be obtained directly from our website by using the [Ecliptek RoHS/Pb-Free Certification Letter Generator](#).

**23. Is an IPC-1752 material declaration available for customer review?**

Ecliptek can provide a [Material Declaration](#) in compliance with IPC-1752 to assist customers with their material compliance requirements.

**24. Who do I contact if I have additional technical questions about the use of this product series?**

The [Global Customer Support](#) team at Ecliptek can provide applications engineering support or answer customer technical questions.

**25. How do I order a crystal that has custom requirements not specified on the crystal series specification sheet?**

Please contact the Ecliptek [Global Customer Support](#) team for additional support or questions regarding your crystal requirements.

**26. What are the environmental and mechanical specifications for this product series?**

The environmental and mechanical specifications for this product series are listed on the datasheet.

**27. What reliability information is available for this product series?**

Failure in Time (FIT) and Mean Time to Failure (MTTF) reliability data is available for this product series within the product series qualification and reliability report found on the series home page.

**28. What is the marking scheme for this product series?**

This series of product has marking content on the top of the part. The datasheet provides the marking content.

**29. Can I identify the Ecliptek part number or specification based upon the markings on top of the part?**

In order to protect our customer's intellectual property, the Ecliptek part marking does not identify the Ecliptek part number or specifications.

**30. Where can I get the information regarding discontinued or End of Life (EOL) products?**

Any Ecliptek part number currently under an End of Life statement will be identified as EOL on an Ecliptek quotation, along with a link to the EOL statement. This information can also be found on the [End of Life Statements for Discontinued and Obsolete Products](#) section of our website.

**31. Is Ecliptek ISO 9000 Certified?**

Yes, Ecliptek is certified to [ISO 9001](#).

**32. How can I obtain a REACH compliance statement for this product series?**

A Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH) compliance statement can be obtained directly from our website by using the [Ecliptek REACH Compliance Resources](#) page of our website.