Frequently Asked Questions

Rev A

For Series:	ES54K2

1. What is this oscillator series?

This series oscillator is called a temperature compensated crystal oscillator (TCXO). It utilizes an oscillator where the clipped sinewave output frequency is primarily controlled by an internal quartz bulk acoustic wave (BAW) crystal resonator and temperature sensitive oscillator compensation circuitry resulting in low temperature stabilities. Utilizing a proprietary crystal resonator design and exclusive oscillator design techniques, this series of oscillators is calibrated to a specified frequency prior to shipment to the customer.

2. How does this series of oscillator work?

A TCXO is a quartz crystal controlled oscillator where the output frequency of the device is being controlled by a quartz crystal resonator and temperature sensitive oscillator control circuitry. This circuitry is used to compensate for the frequency temperature characteristics inherent in a quartz crystal resonator. TCXO circuitry consists of five key operational components: 1). An on-board power supply regulator to minimize supply voltage variation effects; 2). A precision quartz crystal resonator designed for superior temperature and aging performance; 3). A low power oscillator design with AGC for reduced crystal drive current and improved aging; 4). An advanced temperature sensor and frequency compensation network used to minimize oscillator frequency-temperature sensitivity; and 5). An output buffer gate used to reduce the effects of external circuit load changes.

3. What are the typical customer circuit applications for this oscillator series?

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

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

4. What are the typical applications and end item products for this series?

Here is a list of the common applications and products:

- Test and Measurement Equipment
- Industrial Automation, Instrumentation and Control
- Navigation (GPS) and Stratum 3
- Wireless Handheld and Handset Devices
- Wireless Base Stations and Radio Communications
- High-end Multimedia and Broadband Access
- Mobile Phones and PDAs

- WLAN and WiMax

5. What technical benefits does this product series offer?

This series of crystal oscillator offers:

- Improved frequency stability through the use of a bulk acoustic wave (BAW) quartz crystal resonator
- Use of a fundamental mode oscillator application specific integrated circuit (ASIC) design
- A voltage control function with linear frequency deviation
- Clipped sinewave output with controlled rise and fall times
- Superior phase noise performance
- Industry standard moisture sensitivity level 1 (MSL1) rated SMD packages
- RoHS Compliant (Pb-free) with high temperature 260°C reflow capability

6. What are the construction characteristics of this product series?

This product series consists of a single ASIC and a fundamental mode BAW quartz crystal packaged inside a hermetically sealed ceramic leadless SMD package. The leadless SMD package has gold plated contact I/O pads. The package has a seam sealed metal cover that is case grounded for improved EMI performance.

7. What is the input supply voltage for this product series?

The nominal supply voltage and tolerance is provided on the datasheet.

8. What are the input current specifications for this product series?

The input current specification is listed in milliamps as a maximum value and is provided on the datasheet.

9. What are the frequency stability and operating temperature range options for this product series?

The available operating temperature range and frequency stability options can be found on the series datasheet.

10. What are the control voltage range and control voltage for this series TCVCXO?

A TCXO with a voltage control option, called a TCVCXO, combines the frequency pullability of a VCXO with the temperature stability of a TCXO. This oscillator series offers a voltage control option. The control voltage range (V_{CR}) is the minimum and maximum voltage that can be applied to the voltage control pad of the oscillator. The control voltage range is $0.0V_{DC}$ to V_{DD} (Supply Voltage) for this product series. The control voltage (V_C) is the voltage applied to the voltage control pad of the oscillator for the measurement of the frequency deviation test condition. The control voltage is listed on the series datasheet.

11. What is the frequency deviation for this product series?

The frequency deviation or pullability of a TCVCXO refers to the amount of frequency change (in ppm) with respect to a change in the control voltage (V_C). The frequency deviation can be found on the series datasheet.

12. How do I specify the overall frequency stability for this product series?

Ecliptek defines the frequency stability performance of the device inclusive of specific oscillator operating conditions. This is often called the "Exclusive Method". Ecliptek specifies the following parameters for this series of product:

- Calibration Frequency Tolerance at 25°C
- Frequency Stability over Operating Temperature Range
- Supply Voltage
- Output Load
- First Year Aging at 25°C
- 260°C Reflow

13. What is oscillator aging and what are the aging specifications for this product series?

Aging is the systematic change in frequency with time due to internal changes in the crystal and/or oscillator. Aging is often expressed as a maximum value in parts per million per year [ppm/year]. The rate of aging is logarithmic in nature. The following factors effect oscillator aging: adsorption and desorption of contamination on the surfaces of the quartz, stress relief of the mounting and bonding structures, material outgassing, and seal integrity. The oscillator aging specification is listed on the datasheet.

14. What are the phase noise characteristics for this product series?

Phase noise is a measure in the frequency domain and is specified in decibels at various offset points from the carrier (-dBc/Hz). Ecliptek uses a proprietary design, exclusive processing methods and a unique ASIC output driver circuit enabling this product series to have exceptionally low phase noise. The phase noise parameter can be found on the datasheet.

15. Is tight duty cycle (symmetry) available for this product series?

Duty cycle is not specified for this product series as the output is a clipped sinewave signal.

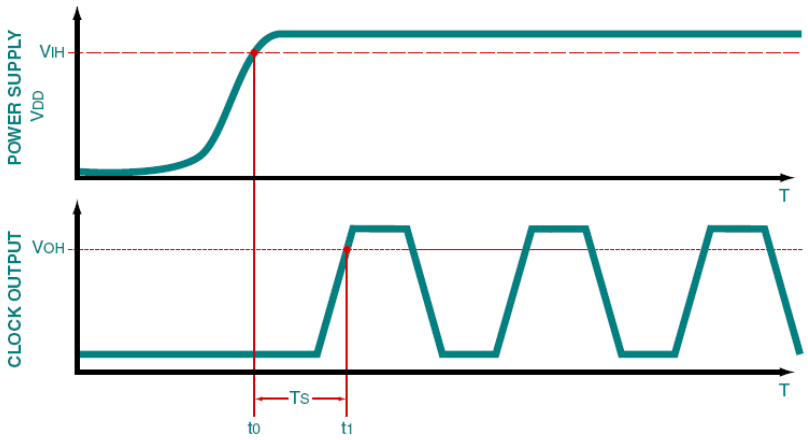
16. What is the transfer function for this product series?

Often called slope, the transfer function of a TCVCXO is the direction the frequency changes with respect to the control voltage. Positive slope means the output frequency increases with an increase in control voltage. Negative slope means that the output frequency is increasing with decreasing control voltage. The transfer function for this product series is positive.

17. Is start-up time specified for this product series?

As shown in the figure below, start-up time is defined as the time (t_0) from when the power supply reaches its specified V_{IH} value to the time (t_1) the oscillator output signal amplitude reaches its steady state V_{OH} output logic high level and the output is within the specified frequency tolerance.

Figure: Oscillator Start-up Timing Diagram



In order to ensure proper start-up, the power supply start-up should have an exponential curve typical of a capacitive charge of a linear voltage ramp. The maximum start-up time specification can be found on the datasheet.

18. How do I electrically test this product series at my facility?

The recommended electrical test fixture can be found on the datasheet.

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

If the part number is specified with the TR packaging option, oscillator products are delivered to the customer in EIA481 compliant tape and reel packaging. Without the TR option, products are delivered to the customer in bulk packaging as specified on the datasheet.

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

This product series is capable of withstanding industry standard high temperature (260°C, 10 seconds) convection reflow processes and is rated MSL1 per J-STD-020. The suggested solder reflow diagram is provided on the datasheet.

21. Is this product series RoHS compliant and Pb-free?

This product is RoHS compliant and Pb-free as defined in the Ecliptek RoHS Compliant (Pb-free) Roadmap.

22. How can I obtain a RoHS compliant (Pb-free) certification for this product series?

A RoHS and Pb-free 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. How do I layout my printed circuit board for this product series?

A suggested solder pad layout is provided on the datasheet. The customer should layout their PCB to include proper connections for the voltage control input function, if applicable.

25. 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.

26. How do I order an oscillator that has custom requirements not specified on the standard oscillator series specification sheet?

Please contact the Ecliptek Global Customer Support team for additional support or questions regarding your oscillator requirements.

27. 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.

28. 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.

29. Is thermal resistance information available for this product series?

θ_{JA} and θ_{JC} values are available for this product series. This information is provided in the Oscillator Thermal Resistance FAQ.

30. What is the marking scheme for this product series?

As shown on the datasheet, this series of product has marking content on the top of the part. This marking consists of a pad one (1) locator dot and additional lines of alpha numeric marking. The datasheet provides the marking content.

31. 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.

32. 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 Ecliptek's 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.

33. Is Ecliptek ISO 9000 Certified?

Yes, Ecliptek is certified to ISO 9001.

34. 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.