

# Frequently Asked Questions

Rev B

For Series:	<a href="#">EN13C7</a> <a href="#">EN15C7</a>
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**1. What are the Ecliptek EN13C7 and EN15C7 series oscillators?**

The EN13C7 and EN15C7 series of oscillators are devices where the output frequency is primarily controlled by an internal quartz crystal resonator and an integrated high speed steering logic (HCSL) oscillator circuit. Utilizing a proprietary crystal resonator design and exclusive oscillator design techniques, these series of oscillators are calibrated to a specified frequency prior to shipment to the customer.

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**2. What are the typical oscillator customer circuit applications for these series?**

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

- Clock Recovery
- Phase-Locked Loop and Frequency Synthesis
- Digital Switching Networks
- Synthesizer or System Reference
- Clock Distribution
- Clock Translation and Multiplexing

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**3. What are the typical applications and end item products for these series?**

Here is a list of the common applications and products:

- PCI Express
- Gigabit Ethernet
- Fiber Channel
- SATA/SAS
- FBDIMM
- DDR
- Routers, Servers, Hubs
- Network Switches
- SONET/ATM/SDH System Equipment
- High Resolution Video

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**4. What commercial benefits do these product series offer?**

These series of oscillators have industry standard lead times with cost effective pricing.

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**5. What technical benefits do these product series offer?**

These series of crystal oscillators offer:

- Improved frequency stability through the use of a bulk acoustic wave (BAW) crystal resonator
- Third Overtone Mode ASIC design, no internal PLL
- Output frequencies up to 125.000MHz
- Supply voltage operation at 2.5V<sub>DC</sub> or at 3.3V<sub>DC</sub>
- ±20ppm, ±25ppm, ±50ppm, or ±100ppm maximum frequency stability options
- Commercial and industrial operating temperature range options
- Tight duty cycle of 50% ±5%
- Superior period jitter and phase noise performance
- Tri-state high impedance output
- High speed HCSL output with fast rise and fall times
- Industry standard 5mm x 7mm six pad SMD package
- Low profile ceramic MSL1 rated SMD packages
- RoHS Compliant (Pb-free) with high temperature 260°C reflow capability

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**6. What output frequencies can I obtain for these product series?**

These series features frequencies of 100.000MHz and 125.000MHz. Please [consult the factory](#) with your custom frequency requirements

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**7. What are the package dimensions for these product series?**

These series of oscillators are offered in an industry standard ceramic six pad 5mm x 7mm SMD package. The table below outlines the series product offerings.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see package dimensions**

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**8. What are the construction characteristics for these product series?**

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

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**9. What is the input voltage for these product series?**

These product series offers operation at 2.5V<sub>DC</sub> ±5% ([EN15C7](#)) and 3.3V<sub>DC</sub> ±5% ([EN13C7](#)).

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**10. What is the input current for these product series?**

The input current specification is listed in milliamps as a maximum value on the datasheet. These current ratings are for oscillators with the output load termination current excluded.

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**11. What are the frequency stability and operating temperature range options for these product series?**

Ecliptek offers ±20ppm, ±25ppm, ±50ppm or ±100ppm frequency stability options for these product series. These frequency stability options apply to a 0°C to +70°C commercial operating temperature range or a -40°C to +85°C industrial operating temperature range.

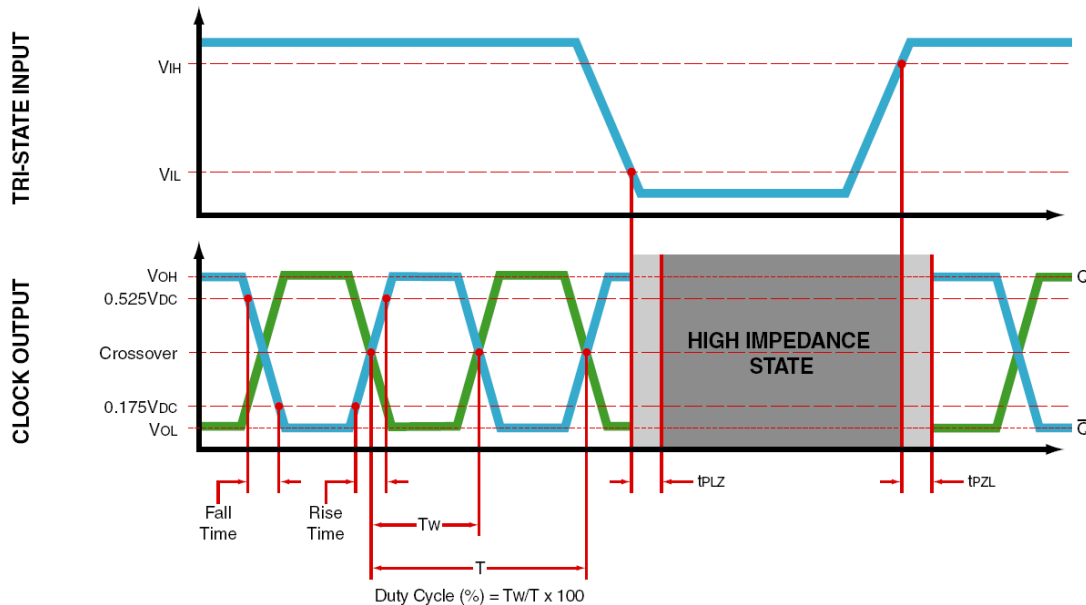
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**12. Do these series offer a tri-state output?**

These product series offer a tri-state output function to facilitate the customer's use of in-process assembly testing or for the use of multiple clocks. These product series feature a tri-state output control option on pad one (1) or on pad two (2). The output is three-stated (tri-state condition) when the voltage at the control pad is set to a logic low state. In this condition (Figure 1), the oscillator continues to operate, but the output pad is now in a high impedance state. If the voltage at the control pad is set to no connect or a logic high state, the output is enabled (clocking). Note: The oscillator has an internal pull up resistor on the control pad. The table below outlines the tri-state input control pad for each series.

Series	Logic Control/ Additional Output	Tri-State Function	No Connect
<a href="#">EN15C7</a>	Option F	Pad 1	Pad 2
	Option H	Pad 2	Pad 1
<a href="#">EN13C7</a>	Option F	Pad 1	Pad 2
	Option H	Pad 2	Pad 1

**Table: Click on the series to see the part numbering guide**



**Figure 1: Enable/Disable Timing Diagram**

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**13. Do these series offer a stand-by function?**

These oscillator series also contain a stand-by function for power management. All active circuitry within the oscillator is shut down when the voltage at the control pad is set to a logic low state. In this condition, the output signal is three-stated (tri-state). The oscillator output gate becomes high impedance and the oscillator input current on the power supply line is negligible. The maximum stand-by current is listed on the series datasheet.

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**14. What is the function of the complementary output (pad 5)?**

The term complementary output, often called a differential pair, is when one output signal is the logical opposite (complement) of the other output signal. Thus, when the output pad (4) of the oscillator is in a logic high state, the complementary output pad (5) of the oscillator is in a logic low state.

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**15. Can I obtain a non-tri-state function for these product series?**

These series of products only offer a tri-state option on pad 1 or pad 2 of the oscillator. The customer can use these oscillator series as a non-tri-state oscillator by setting the voltage on tri-state control pad to either no connect or logic high. The oscillator has an internal pull up resistor on tri-state control pad.

Series	Logic Control/ Additional Output	Tri-State Function	No Connect
<a href="#">EN15C7</a>	Option F	Pad 1	Pad 2
	Option H	Pad 2	Pad 1
<a href="#">EN13C7</a>	Option F	Pad 1	Pad 2
	Option H	Pad 2	Pad 1

**Table: Click on the series to see the part numbering guide**

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**16. How do I specify the overall frequency stability for these product series?**

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

- 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
- Shock
- Vibration

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**17. What is oscillator aging and what are the aging specifications for these 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. At a rated operating temperature of 25°C, these series of products typically age at a rate of less than ±3.0ppm over the first year, and less than ±0.1ppm over the following year, logarithmically declining each year thereafter.

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**18. What are the period jitter characteristics for these product series?**

Jitter is a time domain measurement and is typically specified in picoseconds (pSec). Ecliptek uses a proprietary oscillator design, exclusive processing methods, and a unique output driver circuit enabling these oscillator series to have exceptionally low period jitter. The various period jitter parameters for these series can be found on the series datasheets.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see the electrical specifications**

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**19. What are the rms phase jitter and phase noise characteristics for these product series?**

RMS Period Jitter is a time domain measurement and is specified in picoseconds (pSec) as a maximum value. Phase noise is a measure in the frequency domain and is specified in decibels at various offset points from the carrier (-dBc/Hz). Phase jitter, (often called offset jitter) is derived from the phase noise measurement of the spectral density over a given offset bandwidth. Ecliptek uses a proprietary design, exclusive processing methods, and a unique ASIC output driver circuit enabling these product series to have exceptionally low phase jitter and phase noise. The rms phase jitter and phase noise parameters can be found on the series datasheets.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see the electrical specifications**

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**20. Is tight duty cycle (symmetry) available for these product series?**

Tight duty cycle (45% minimum, 55% maximum) is standard for these product series and is measured at the crossover point of the output and complementary output signals.

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**21. What are the output and output load characteristics for these product series?**

Ecliptek offers these product series with a high-speed current steering logic (HCSL) output. The oscillator output topology utilizes a constant current source that allows the end user to configure their output termination so as to configure circuit load matching and signal performance. Signal integrity is optimized when the low impedance source-terminated outputs of the oscillator are driving a 50 ohm transmission line. Thus, Ecliptek specifies a load termination of 50 ohms between the output and ground (as well as 50 ohms between the complementary output



and ground). This configuration assures that any signal being reflected from the load will be absorbed by the source. The table below outlines the output load for these series. If a customer requires a different load from that specified on the datasheet, please [consult the factory](#) with your custom requirements.

Series	Package Type	Supply Voltage	Output Pad 4	Output Pad 5
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>	50 ohms to ground	50 ohms to ground
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>	50 ohms to ground	50 ohms to ground

**Table: Click on the series to see the electrical specifications**

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**22. Is start-up time specified for these product series?**

Start-up time for these series can be found on the series datasheet and is defined as the time from when the power supply reaches its specified value to the time the oscillator output signal amplitude reaches its steady state voltage output logic high level and the output is within the specified frequency tolerance. For these series, characterization test data indicates that the start-up time is typically around 2 to 4mS.

Note: 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. If you have a special voltage start-up profile (i.e. odd ramp steps or shapes), [please contact Ecliptek](#) to discuss possible oscillator performance issues.

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**23. How do I electrically test these product series at my facility?**

See the below table for the recommended electrical test fixture.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see recommended electrical test fixture**

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**24. Are these product series compatible with my existing assembly process equipment?**

If the part number is specified with the TR packaging option (tape and reel packaging), oscillator products are delivered to the customer in EIA481A compliant tape and reel packaging. Without the TR option, products are delivered to the customer in bulk packaging (ESD protective bag). See the table below for the carrier tape and reel dimensions.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see recommended packaging methods**

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**25. Are these product series compatible with my existing assembly reflow processes?**

These product series are capable of withstanding industry standard high temperature (260°C, 10 seconds) convection reflow processes and are rated MSL1 per J-STD-020. See the below table for the recommended solder reflow diagram.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see recommended solder reflow methods**

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**26. Are these product series RoHS compliant and Pb-free?**

These products are RoHS compliant and Pb-free as defined in the [Ecliptek RoHS Compliant \(Pb-free\) Roadmap](#).

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**27. How can I obtain a RoHS compliant (Pb-free) certification for these 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](#).

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**28. Is RoHS and RoHS (Pb-free) material declaration data available for customer review?**

Ecliptek can provide [Material Declaration](#) data in compliance with IPC-1752 to assist customers with their RoHS Compliance (Pb-free) requirements.

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**29. How do I layout my printed circuit board for these product series?**

If applicable, the customer should layout their PCB to include proper connections for the tri-state control input function. See the below table for the recommended solder pad layout.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table:** Click on the series to see recommended solder pad layout diagram

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**30. How do I cross these product series with a competitor part number?**

Please see the [Ecliptek Cross Reference by Competitor Part Number](#).

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**31. What information is needed to obtain a quote for these product series?**

Obtaining a quote on-line is simple. Fill in the required information in the part number constructor for the specific series that you would like to order. This part number will define the specifications you desire. After you construct a part number, you can request a quote or check stock by following the prompts on our website.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table:** Click on a series to go to part number constructor

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**32. How do I obtain a PDF copy of the product series specification data sheet?**

You can go to the specific series you desire now by selecting a link from the table below.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table:** Click on the series to open the PDF datasheet

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**33. How do I obtain a PDF copy of the specification data sheet for a specific part number?**

Simply complete the required information in the part number constructor for the specific series that you would like to order. After you construct the part number, you will be prompted with an icon labeled "View Datasheet". Click on this icon and you can download and save a PDF copy of the specific Ecliptek part number you created.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see the part number constructor**

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

The [Engineering staff](#) at Ecliptek can provide applications engineering support or answer customer technical questions.

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

Complete the Ecliptek [Custom Oscillator Request Form](#) from our website. From this page you will be able to enter custom specifications that are unavailable from the standard part number constructor forms. These parameters will be sent to our Engineering team where they will be evaluated. Upon review, you will be contacted by our Sales or Engineering team.

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**36. What are the environmental and mechanical specifications for these product series?**

The environmental and mechanical specifications for these product series is listed on the specification datasheet and is outlined in the table below.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to see the mechanical and environmental specifications**

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**37. What reliability information is available for these product series?**

Failure in Time (FIT) and Mean Time To Failure (MTTF) reliability data is available for these product series as provided in the below table.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to open the Qualification and Reliability Report in PDF**

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**38. Is thermal resistance information available for these product series?**

$\theta_{JA}$  and  $\theta_{JC}$  values are available for these product series. Please see the [Oscillator Thermal Resistance](#) information provided.

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**39. Are IBIS models available for these product series?**

There is no IBIS model available for these product series. Please contact the [Engineering Staff](#) at Ecliptek for applications engineering support or for assistance with customer technical questions.

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**40. What is the marking scheme for these product series?**

As shown on the series datasheets, these series of products have marking content on the top of the part. The marking consists of a pad one (1) locator dot and additional lines of alpha numeric marking. See the datasheets for marking content.

Series	Package Type	Supply Voltage
<a href="#">EN15C7</a>	5mm x 7mm	2.5V <sub>DC</sub>
<a href="#">EN13C7</a>	5mm x 7mm	3.3V <sub>DC</sub>

**Table: Click on the series to go to the marking content**

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**41. 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.

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

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

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