Frequently Asked Questions

Rev C

For Series: EPSA12 EPSA13 EPSA22 EPSA23

1. What is an Ecliptek EPSA series spread spectrum clock oscillator?

A spread spectrum clock oscillator is an oscillator that has the output frequency intentionally modulated in order to reduce the EMI on the output signal. These EPSA series of oscillators are devices where the output frequency is primarily controlled by an internal quartz bulk acoustic wave (BAW) crystal resonator and an integrated complementary metal-oxide-semiconductor logic (CMOS) oscillator circuit. Utilizing a proprietary crystal resonator design and exclusive oscillator design techniques, these series of oscillators are programmed to a specified frequency prior to shipment to the customer

2. What are the typical oscillator customer circuit applications for the EPSA series oscillators?

Spread Spectrum oscillators can be used in many of the following applications:

1. Copiers, FAX Machines
2. Set-top boxes, Scanners, Printers
3. LCD Displays
4. Computers: Graphic Cards, Interface Controllers and PCI, CPU and Memory Buses
5. Modems, Set-top Boxes, Games

3. What commercial benefits do these product series offer?

The EPSA series of oscillators have very short lead times with cost effective pricing.

4. What technical benefits do these product series offer?

The Ecliptek EPSA series of spread spectrum oscillators offer:

- Output frequencies from 2.000MHz to 200.000MHz
- Supply Voltages of 2.5Vdc and 3.3Vdc
- High speed LVCMOS output
- Ceramic SMD packaging
- In factory (at Ecliptek)programming of the oscillator for improved delivery
- Tri-state(High Impedance) or Power Down (High Impedance) options
- Linear, 32 kHz modulation profile
- Programmable spread spectrum output with spread percentages of +/-0.25% to +/-2.0% center spread and -0.5% to -4.0% down spread
- Improved frequency temperature stability through the use of a quartz crystal resonator
- Excellent cycle to cycle period jitter noise performance
- Industrial operating temperature range standard
- Two low profile ceramic MSL1 rated SMD packages
- RoHS Compliant (Pb-free) with high temperature 260C reflow capability

5. What output frequencies can I obtain for these series?

The EPSA series of products feature frequencies ranging from 2.000MHz to 200.000MHz at 3.3Vdc operation and from 2.000MHz to 166.000MHz at 2.5Vdc operation. Any frequency in this range can be ordered, with up to six significant digits (i.e. 100.123456MHz).

6. What are the input voltage (power supply) options for these series?

These product series are offered with a supply voltage of 2.5Vdc ±5%.or 3.3Vdc ±10%.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on a series to see supply voltage specifications

7. What is the input current for these product series?

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

8. How do I specify the overall frequency stability of an Ecliptek EPSA oscillator?

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 and Vibration

9. What are the operating temperature range options for these series?

The EPSA series offer an industrial temperature range of -40C to +85C.

10. What is the frequency stability I can obtain for these oscillators?

Ecliptek offers a ±50ppm frequency stability option (over the extended commercial or industrial operating temperature range).

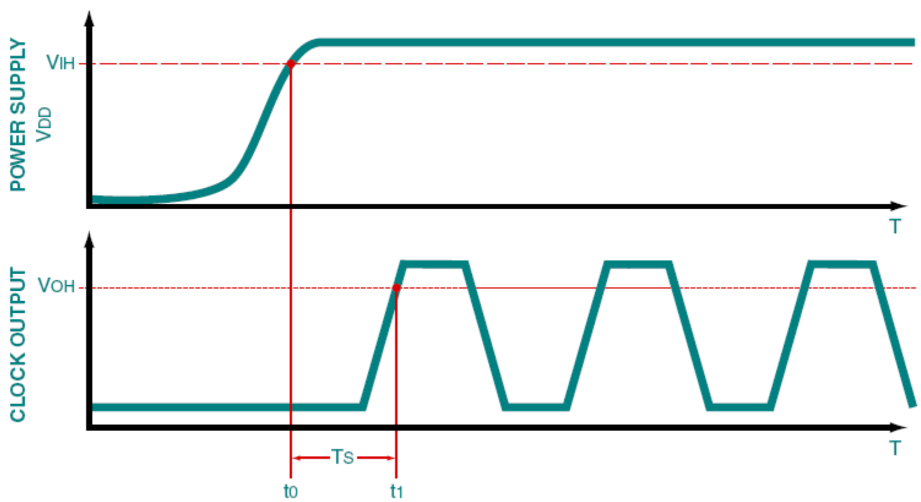
11. What is oscillator aging and what are the aging specifications for these oscillator series?

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 ±1.0ppm over the following year, logarithmically declining each year thereafter. As shown on the respective series datasheet, Ecliptek specifies the aging parameter of the device inclusive of the overall oscillator operating conditions.

12. What is the start-up time for these series?

As shown in the figure below, start-up time (T_S) is defined as the time from when the power supply reaches its specified V_{IH} value to the time 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



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. For these series, characterization test data indicates that the start-up time is typically around 2 to 3mS. The maximum start-up time specification for these series can be found on the series datasheet.

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

Ecliptek offers these product series with a low voltage high speed CMOS driver that enables the output signal to swing from ground to V_{DD}. The oscillator output topology is designed so as to optimize circuit load matching and signal performance. Signal integrity is optimized when the low impedance output of the oscillator is driving a high impedance-low capacitance input. The output load specification is listed on the applicable datasheet. If a customer requires a different load from that specified on the datasheet), please contact Ecliptek with your custom requirements.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on a series to see the output load

14. Is tight duty cycle (Symmetry) available for these series?

The duty cycle specification is listed on the applicable data sheet. Tight duty cycle (45% minimum, 55% maximum) is available for these product series.

15. What is peak to peak and rms period jitter and what is cycle to cycle period jitter?

Period jitter is the measure in the time domain and is specified in picoseconds (pS). Peak to Peak and rms period jitter are commonly specified for non-modulated clock oscillators and are defined over a number of cycles. Due to the output frequency modulation, only cycle to cycle period jitter is specified on spread spectrum clock oscillators. Cycle to Cycle period jitter is measured in the time domain and is defined as the worst case clock period deviation of adjacent cycles.

16. What are the cycle to cycle period jitter characteristics for the EPSA series oscillators?

Because the modulation frequency is substantially slower than the output frequency, the spread spectrum modulation has very little impact upon the cycle to cycle or short term jitter. Ecliptek uses a proprietary design, exclusive processing methods, and a unique ASIC output driver circuit enabling EPSA series oscillators to have exceptionally low cycle to cycle period jitter. The cycle to cycle period jitter parameter can be found on the applicable EPSA series specification sheet.

17. What are the differences between the tri-state and power down options?

These product series offer two different output logic control function options to facilitate the customer's use of in-process assembly testing or for the use of multiple clocks. The EPSA oscillator contains programmable power down (PD) and tri-state (TS) options for power management.

If the power down function (PD) is selected, all active circuitry within the oscillator is shut down when the voltage at the control pin (pad 1) is set to a logic low state. In this condition, the output signal is three-stated (tri-state high impedance) and the input current on the power supply line is negligible (standby current specification of 10µA).

If the tri-state (TS) option is selected, the output is three-stated (tri-state) when the voltage at the control pin (pad 1) is set to a logic low state. In this condition, the oscillator and PLL continue to operate and the output is three-stated (tri-state high impedance) and the input current on the power supply line is only slightly decreased from normal operating current.

18. Can I obtain a non-tri-state or non-power down EPSA series oscillator?

These product series do not offer a 'No Connect' option for pad 1. Only the power down (PD) and tri-state (TS) options are available. However, the customer can use the EPSA oscillator as a non-tri-state oscillator by setting the control voltage on pad 1 to either no connect or logic high. The oscillator has an internal pull up resistor on pin 1 (100k ohms typical).

19. Do the EPSA series oscillators offer a complementary output option?

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 of the oscillator is in a logic high state, the complementary output pad of the oscillator is in a logic low state. Complementary outputs, commonly found on LVPECL and LVDS oscillators, are not available with the EPSA series. The EPSA series are single-ended oscillators.

20. What are the different package size options for these series?

The EPSA oscillator series are currently offered in a 5mm x 7mm and 3.2mm x 5.0mm ceramic four pad SMD package. The table below outlines the series product offerings and their respective package dimensions.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on a series to see package dimensions

21. What are the construction characteristics for this series?

This product series consists of a single ASIC and a fundamental mode BAW quartz crystal resonator mounted inside a hermetically sealed ceramic leadless SMD package. The leadless SMD package has gold plated contact I/O pads (Ni/Pd/Au metallization) and a seam sealed metal cover that is case grounded for improved EMI performance. This assembly configuration results in good thermal performance, high reliability, and low lead inductance.

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

It is recommended that the customer use the test fixture configuration specified by Ecliptek. Please see the below table for the applicable EPSA series test circuit diagrams.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on a series to see recommended electrical test fixture

23. Can I obtain frequencies outside the published frequency range?

This series of products features frequencies ranging from 2MHz to 200MHz. Please contact the factory for frequencies outside of this range.

24. Can I use the EPSA series oscillator to drive my downstream PLL?

Most PLL's are designed to work properly when driven by both modulated and un-modulated clocks. However, one should take extra precautions in circuit design and implementation when using a spread spectrum clock due to PLL tracking rates, loop bandwidths, response times, and jitter performance.

25. What is EMI and why is it important?

EMI is short for Electromagnetic Interference. EMI is defined as a naturally occurring phenomena when the electromagnetic field of one device disrupts, impedes, or degrades the electromagnetic field of another device by coming into proximity with it. Electromagnetic Interferences (EMI) can cause two or more electronic devices to interfere with each other and affect their performance and operation. For example, when you are using your cordless phone or laptop computer, you do not want it to interfere with your television reception.

26. Do crystal oscillators emit EMI?

Frequency sources such as quartz crystal oscillators, phase lock loop (PLL) synthesizers, and other types of clock signal generation schemes are a major source of EMI in electronic circuits. Therefore, EMI reduction is a major concern for designers of electronic products utilizing these clock schemes.

27. How do I reduce EMI without using a spread spectrum clock oscillator?

Conventional methods of EMI reduction include multiple ground and power planes, discrete component filtering and enclosure shielding. These methods are commonly practiced and can have substantial cost impact to the overall product. An alternative to some of these EMI reduction techniques is the implementation of a spread spectrum clock oscillator. The use of such an oscillator can significantly improve EMI and reduce overall product cost.

28. How is EMI emitted in a standard non-spread spectrum clock oscillator?

Non modulated oscillators generate an output signal at their intended output frequency. There is a large amount of radiated electromagnetic emission at this fundamental frequency and its harmonics. These oscillators also generate electric signals at frequencies slightly lower and higher than the intended output. These additional signals radiate electromagnetic waves over a frequency spectrum. The range of the frequency spectrum is dependent upon the mechanical and electrical design of the oscillator, power supply regulation, output termination, and printed circuit board (PCB) layout.

29. What is the measurement parameter for EMI?

EMI is a measurement of radiated energy from a frequency source and is typically measured in dBmV/m (decibel-volts per meter) at a given frequency. This parameter is larger for higher amounts of radiated energy. Thus, the more energy emitted from a frequency source, the larger the resulting electric field and EMI.

30. When discussing EMI, what are peak emissions and average emissions?

As mentioned above, a non-spread spectrum oscillator has radiated emissions over a given frequency spectrum. Thus, when defining the frequency spectrum, one wants to distinguish between the peak electromagnetic emissions and the average electromagnetic emissions. The average emission is defined as the average dBmV/m level over a given frequency spectrum of an oscillator output signal. Peak emission is defined as the maximum dBmV/m level at any frequency over a given frequency spectrum of an oscillator output signal.

31. Is EMI regulated by the FCC?

Electromagnetic Interference (EMI) is subject to very strict regulations by the US Federal Communications Commission (FCC) and other international regulatory bodies whose goal is to limit the amount of EMI electronic devices emit and to prevent damage to the human body and interference between electronic devices.

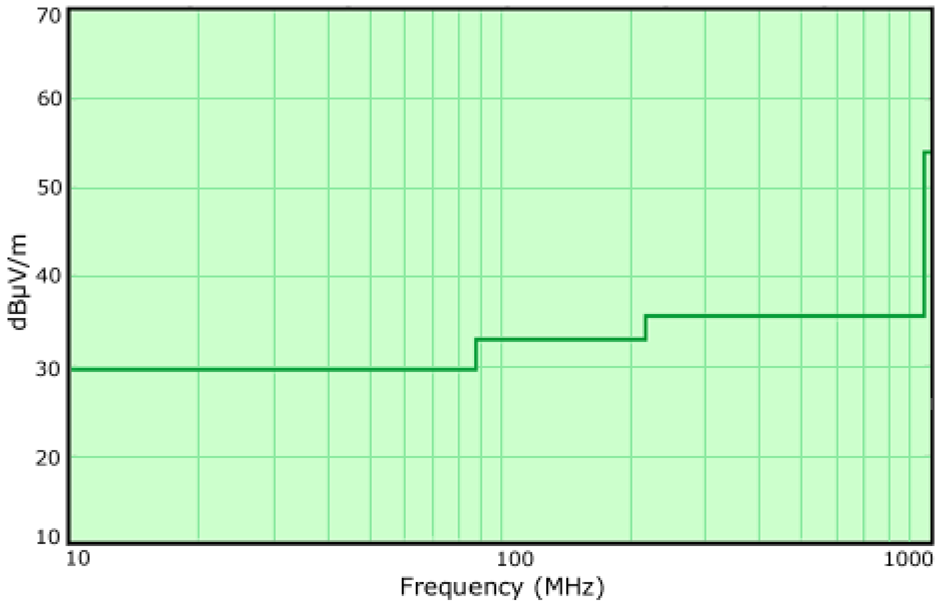
32. What are the different FCC class regulations?

The FCC's Class A regulations apply to industrial applications and the Class B regulations apply to residential or consumer applications. Computer and peripheral hardware applications typically are concerned with compliance to Class B regulations.

33. What are the FCC emission standards for EMI regulation?

Today, FCC regulations are primarily concerned with peak emissions at any given frequency, not the average emissions over a given frequency spectrum. Thus, a circuit designer should focus their EMI design efforts on reducing the peak emissions at any given frequency within the frequency spectrum, not the overall average emissions within the spectrum. Figure 2 shows a FCC Class B plot of power (dBμV/m) versus frequency (MHz) for the peak emission requirements (at 10 meters).

Figure 2: FCC Class B Peak Emissions



34. What is a spread spectrum crystal oscillator and when is it best to use it?

A spread spectrum crystal clock oscillator is an oscillator that has the output frequency intentionally modulated in order to reduce the EMI on the output signal. Spread spectrum clock oscillators are best used in applications that require a reduction of EMI emissions in order to pass the FCC EMI regulations. Additionally, using a spread spectrum clock oscillator reduces the EMI at the clock source, rather than at locations later down in the clock stream. By reducing the EMI at the clock source, supplemental shielding enclosures and/or filtering components may not be required, reducing overall system costs and improving overall EMI performance.

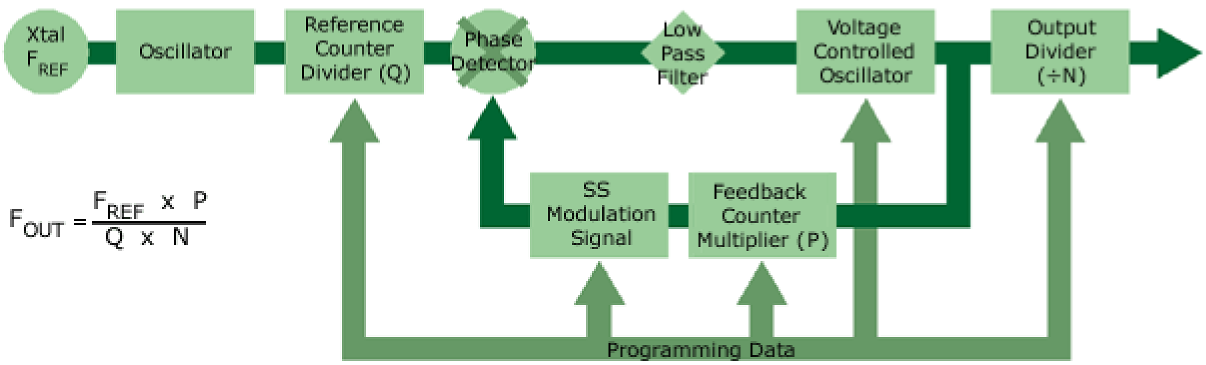
35. What is the purpose of modulating the output signal of a spread spectrum crystal clock oscillator?

By modulating the output signal, the EMI on the output signal is spread over a larger frequency spectrum. The total amount of energy is still present, but the spreading of the output power over the frequency band results in a reduction of EMI at any one frequency. As mentioned above, regulatory bodies like the FCC have maximum limits for peak EMI emissions (emissions at any one frequency within the spectrum). Thus, a crystal clock oscillator can be used to pass FCC regulatory EMI test requirements by reducing EMI peak emissions.

36. What is the EPSA series oscillator theory of operation?

An EPSA series oscillator consists of a quartz crystal BAW resonator and a programmable integrated circuit. The memory contains programmable functions that control the operating characteristics of the device (i.e. output frequency, modulation frequency, output frequency spread spectrum percentage, power down and tri-state). At the heart of an EPSA series oscillator is a programmable high resolution PLL (Phase Locked Loop as shown in Figure 3). The PLL consists of a reference counter divider, a feedback counter multiplier, spread spectrum modulation signal, and an output divider. Utilizing a proprietary design and an exclusive programming methodology, the EPSA series oscillators are programmed at the factory with specific values that define the operating characteristics of the oscillator.

Figure 3: PLL Block Diagram

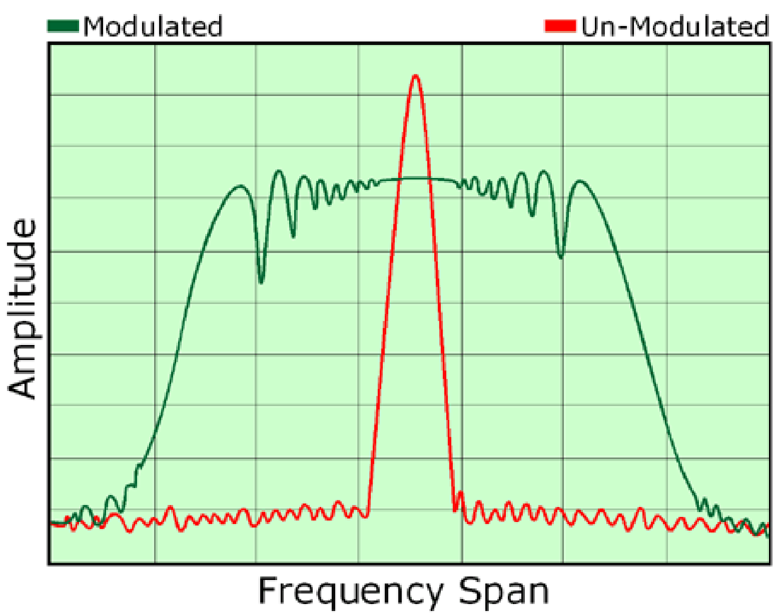


$$F_{OUT} = \frac{F_{REF} \times P}{Q \times N}$$

37. How does the spread spectrum EPSA clock oscillator modulation scheme work to reduce EMI?

Figure 4 below shows a plot of output amplitude versus frequency for a modulated and un-modulated center spread spectrum clock oscillator. As you can see from the figure, there is a large difference between the frequency span and the amplitude for a given modulated and un-modulated spread spectrum clock oscillator. By modulating the output frequency over a frequency spectrum, a reduction in output amplitude can be achieved. This reduction in output amplitude correlates with a reduction in radiated energy (EMI).

Figure 4: EMI Reduction Plot



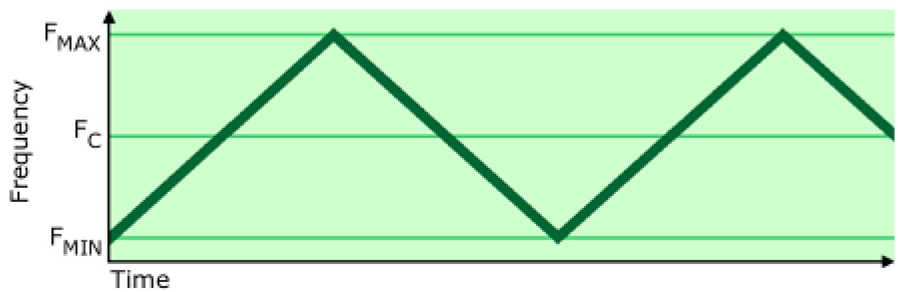
38. What are the significant factors that effect the reduction of peak EMI?

There are two major factors that significantly affect the amount of peak EMI reduction for a spread spectrum clock oscillator: Output Frequency Modulation Width and Frequency Modulation Profile.

39. What is output frequency modulation width (or spread percentage)?

Figure 5 below shows a plot of output frequency versus time for an output of a linear (triangular) modulated spread spectrum clock oscillator. As you can see from the figure, the output frequency has a minimum (FMIN), center (Fc), and maximum (FMAX) frequency. The output frequency is swept linearly though a range of frequencies rather than being held at one constant frequency. This 'range' parameter is often called output modulation width, output frequency spectrum, or frequency spread percentage. The maximum and minimum output frequencies are often stated as a percentage (%) with respect to the center frequency. The Ecliptek EPSA series oscillators offer a range of programmable output frequency modulation widths from 0.5% to 4.0% (FMAX minus FMIN). The wider the modulation frequency spread percentage, the larger the bandwidth of frequencies over which the energy is distributed, and therefore the more EMI peak reduction.

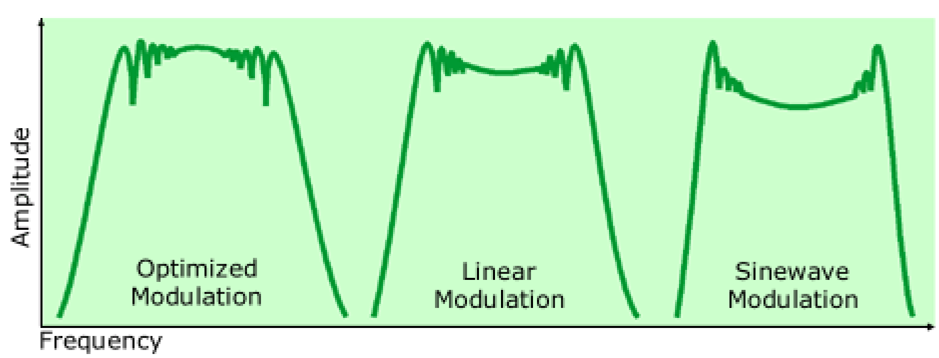
Figure 5: Output Frequency Modulation Width



40. What are the different frequency modulation profiles?

There are three major types of frequency modulation profiles: Sinewave, Linear (or triangle), and Non-linear (or optimized). Each of these three modulation profiles result in different EMI reduction performance. An example of each modulation profile and the resultant output is shown in Figure 6 below. The sinewave modulation profile is not typically used in spread spectrum clocks due to its large edge peaking. The most popular modulation scheme is the linear modulation profile. This profile reduces edge peaking producing an efficient EMI reduction profile.

Figure 6: Frequency Modulation Profile and Resultant Frequency Spectra



41. What is the frequency modulation profile used by Ecliptek EPSA series oscillators?

All Ecliptek EPSA series spread spectrum oscillators use the linear modulation profile.

42. Why is the Frequency Modulation Profile important?

Since the frequency modulation width is fixed and independent of the frequency modulation profile, the total radiated EMI is spread over the frequency modulation width. The goal of a spread spectrum oscillator is to spread the EMI energy evenly over the frequency modulation width, so as to eliminate any peaks or troughs.

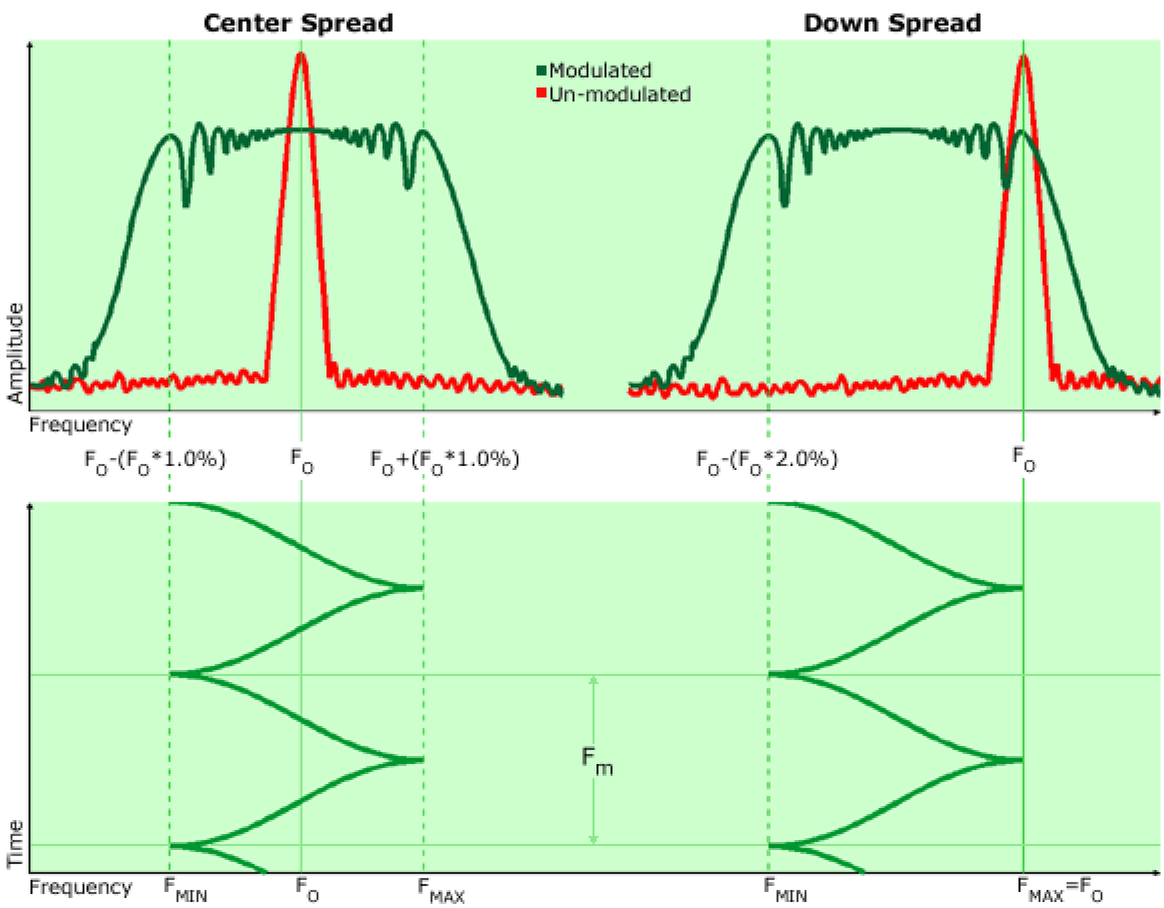
43. What is the output frequency modulation for the EPSA series oscillators?

As shown in Figure 5, output frequency modulation (Fm) is defined as the inverse of the modulation period. This product series has an output frequency modulation, often called sweep rate, specification of 32 kHz typical.

44. What are the different output frequency modulation options?

Ecliptek offers two output frequency modulation options: Center Spread and Down Spread. Figure 8 below shows an example of these two options.

Figure 8: Center and Down Spread Options



45. What is center spread modulation?

The instantaneous output center frequency (Fc) is approximately the midpoint of the minimum frequency and the maximum frequency. The instantaneous output frequency will therefore always vary between F_{MIN} and F_{MAX}. The instantaneous minimum (F_{MIN}) and maximum (F_{MAX}) output frequencies are stated as a percentage (%) with respect to the center frequency. In Figure 8 above, the center spread diagram provides an example of a device with a +/-1.0% center spread percentage. In this example, if F_O were 100MHz, typical frequencies for F_{MIN}, F_C and F_{MAX} would be 99MHz, 100MHz, and 101MHz, respectively.

46. What is down spread modulation and when is it used?

When a system can not tolerate an operating frequency higher than the nominal frequency (often called over-clocking), then a down spread option should be considered. In Figure 8 above, the down spread diagram provides an example of a device with a -2.0% down spread percentage. For this example, if a customer was concerned about over-clocking and had a maximum operating frequency requirement of 100MHz (F_O), typical frequencies for F_{MIN} and F_{MAX} would be 98MHz and 100MHz, respectively. For a down spread device, the maximum instantaneous output frequency (F_{MAX}) is limited to the nominal frequency (F_O).

47. Are there any disadvantages of using down spread modulation with an over-clocking application?

The disadvantage of down spread modulation is that the average output frequency will be lower than the nominal output frequency. Thus, there is a trade-off between average output frequency, maximum over-clocking and maximum frequency modulation amplitude.

48. Does Ecliptek offer an asymmetric (or down center) spread?

An asymmetric spread is defined as setting the output frequency half way point between the maximum down spread frequency and the center spread frequency. Asymmetric spreading is often used when over-clocking is a concern. The Ecliptek EPSA series do not offer an asymmetric spread option. However, carefully selecting the proper center frequency and spread percentage can often accomplish the same design goals.

49. How much EMI reduction can be achieved using an Ecliptek spread spectrum crystal clock oscillator?

Utilizing a proprietary design and an exclusive programming methodology, the EPSA series oscillators can achieve significant reductions in output EMI emissions. The output frequency, spread percentage, and the measurement harmonic frequency are all variables that determine the EMI reduction. Please contact the Ecliptek Global Customer Support Team for typical Ecliptek EPSA series EMI characterization data.

50. What are the instrument and test conditions used to measure the percent spread spectrum spread and EMI reduction?

Ecliptek utilizes a modulation domain analyzer to measure the center and down spread spectrum frequency percentage and a spectrum analyzer for measuring the reduction in output power.

51. What are the packaging options for the Ecliptek EPSA oscillator product series?

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.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on a series to see recommended packaging methods

52. Are these product series compatible with my existing 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.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on a series to see recommended solder reflow methods

53. 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.

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

For RoHS compliant product, a RoHS product certification letter can be obtained directly from our website by using our Ecliptek RoHS Certification Letter Generator.

55. 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.

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

The customer should layout their PCB to include proper connections for the tri-state control input function (pad 1). See the below table for the recommended solder pad layout.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

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

57. How do I cross the Ecliptek EPSA series oscillator from a competitor's part number?

Please see the Ecliptek Competitor Part Number Crosser.

58. What reliability information is available for this product series?

Failure in Time (FIT) and Mean Time To Failure (MTTF) reliability data is available on the Ecliptek website. You can find the data on our Qualification and Reliability page in the Tools and Resources section of our website. You can also find qualification and reliability data for most of our series specifications at the bottom of each specifications web page under the "Other Resources" section.

59. Who do I contact if I have additional technical questions about the use of the Ecliptek EPSA products?

The Engineering staff at Ecliptek can provide applications engineering support or answer customer technical questions.

60. How do I order an oscillator that has "custom" requirements not specified on the standard Ecliptek EPSA oscillator series specification sheets?

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. Upon review, you will be contacted by our Ecliptek Global Customer Support team or Engineering team.

61. 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 below.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on a series to open the PDF datasheet

62. 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.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

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

63. 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.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

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

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

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

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

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

65. Is thermal resistance information available for these product series?

θJA and θJC values are available for these product series. Please see the Oscillator Thermal Resistance FAQ for complete details.

66. Are IBIS models available for these product series?

IBIS modeling information is available for some of these product series as provided in the below table.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

Table: Click on the series to open the IBIS Model document

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

As shown on the applicable datasheet, these series of product have 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. See the respective datasheet for marking content as outlined in the table below.

Supply Voltage (V_{DC})	Package Dimensions (all dimensions in millimeters)	
	5 x 7	3.2 x 5
2.5	EPSA12	EPSA22
3.3	EPSA13	EPSA23

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

68. 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.

69. Is Ecliptek ISO 9000 Certified?

Yes, Ecliptek is certified to ISO 9001.