

PROGRAMMABLE XO

CARDINAL COMPONENTS NEW LINE OF CERAMIC PACKAGE PROGRAMMABLE CRYSTAL OSCILLATORS SERIES ARE FEATURE RICH DEVICES SUITABLE FOR A WIDE RANGE OF APPLICATIONS.

FEATURES INCLUDE:

- < 1 week DELIVERY
- -40° C ~85° C
- LVCMOS: 1-160MHZ ; DIFFERENTIAL: 10-1500MHZ

Introduction

The Programmable crystal oscillators from Cardinal components have established themselves as a new leader in the market. The programmable product series boasts several strengths, including good jitter performance, tight stability, and a high frequency range. These oscillators are available in multiple package sizes to suit various design requirements.

Crystal oscillator designs employ different approaches, each with its own advantages and disadvantages. Oscillators with Fundamental vibration mode are well-suited for jitter-sensitive designs, but they face limitations in reaching higher frequencies due to the thickness of the crystal. On the other hand, Third overtone mode oscillators offer better frequency stability and high frequency options, but they require a longer lead time to develop frequencies that are not yet available.

Phase Lock Loop (PLL) technology offers more flexibility in terms of availability of new frequencies and reduced lead times. However, the PLL's jitter performance may not meet strict phase noise requirements.

To support fast-paced board design, Cardinal components has introduced the Programmable Crystal Oscillator series. These oscillators can provide higher frequency options with comparable jitter performance and reduced manufacturing time.

What is Programmable Crystal Oscillator

The Programmable Crystal Oscillator is designed using state-of-the-art PLL technology, making it highly versatile. It can provide a wide range of frequencies and good jitter performance, making it suitable for a variety of applications that require precise timing.

This crystal oscillator is particularly versatile, as it can be configured to meet specific customer requirements. After being configured, the oscillator undergoes thorough performance testing and verification before it is delivered to the customer. Compared to traditional crystal oscillator manufacturing processes, the Programmable crystal oscillator design significantly reduces the time to market, making it a faster option compared to using a fixed frequency oscillator.

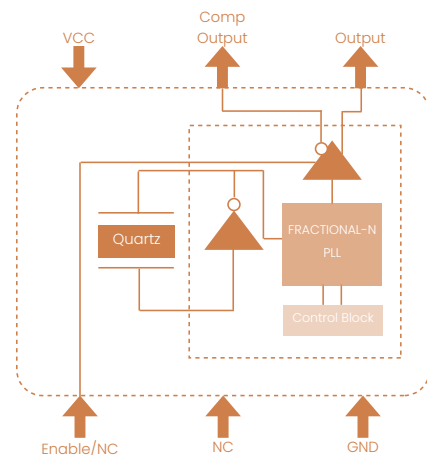


Figure 1: Configurable Crystal Oscillator Architecture

Key benefits of the configurable crystal oscillator are as follows,

1 Product Lead Time – within a week

Cardinal Components offers a customizable solution for customers seeking Programmable Crystal Oscillators. Our semi-finished product can be tailored to meet specific requirements, such as output logic, frequency, stability, and phase jitter. Samples and production quantities can be obtained quickly through our US facility, with the final product undergoing thorough verification and testing before delivery.

By incorporating the customer's specifications into the semi-finished product, we greatly reduce product development cycle times. Our efficient approach enables customers to receive their customized crystal oscillator within a week, a significant improvement compared to traditional product lead times. Cardinal Components is proud of its exceptional customer service and quick turnaround times, making us a reliable source for foreseeable run rates within just a few days.

2 Flexible, Robust frequency output

Cardinal Components Programmable Crystal Oscillator has a frequency range of 1MHz to 200MHz for LVCMOS output and 10MHz to 1500MHz for differential outputs such as LVDS and LVPECL. Higher frequencies may enhance the overall system performance and potentially reduce costs in various ways,

- It's always preferable to have a fully verified higher frequency clock reference for a system instead of a lower frequency clock due to the uncertainty of the timing handler's capability from the system chipset.
- A programmable crystal oscillator has the capability of reaching frequencies up to 200MHz for LVCMOS and up to 1500MHz for LVPECL/LVDS.
- Programmable Crystal Oscillator is a faster alternative to fundamental and third overtone type crystal oscillators, providing better control and cost structures. It offers a quick turn option for timely delivery and efficient customization to meet specific customer requirements.

3 Flexible voltage supply (Range from 1.8V to 3.3V)

In many systems, the supply voltage can be complicated, as different generations and functions of ICs may require different supply voltages. It's normal to have multiple voltage supplies in a single system. Fortunately, Cardinal Components Programmable crystal oscillator design has excellent voltage supply tolerance, making it a suitable solution for various systems. For LVCMOS type, the power rail can tolerate voltages ranging from 1.8V to 3.3V, while for Differential type, it can tolerate voltages from 2.5V to 3.3V. This flexible voltage supply design matches the majority of system voltage requirements, reducing the complexity of the system power design and cost.

4 Good phase jitter (As low as 1.0ps)

Cardinal Components Programmable products utilize the latest generation of PLL (Phase-Locked Loop) technology, which provides a significant improvement in phase noise performance, particularly in high-frequency applications. This level of performance is generally sufficient for most applications.

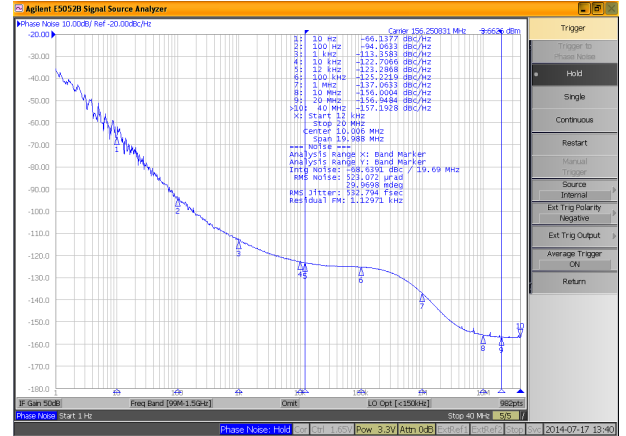


Figure 3: Differential Type @ 125.00MHz. Phase Jitter ~ 532fs

5 Variety of packages and compatibility to common crystal oscillator package

Cardinal Components offers five different packages for LVCMOS output, which include sizes of 2.0 x 1.6mm, 2.5 x 2.0mm, 3.2 x 2.5mm, 5.0 x 3.2mm, and 7.0 x 5.0mm. In addition, there are three different packages for Differential output, with sizes of 3.2 x 2.5mm, 5.0 x 3.2mm, and 7.0 x 5.0mm. All of these packages are pin and land-pattern-compatible with the traditional crystal oscillator package, making it easy to integrate into existing systems.

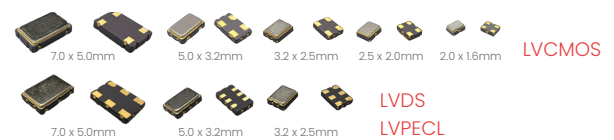


Figure 5. Package line up

6 Tight frequency stability and wide operation temperature range support

Cardinal Components offers three options for frequency stability support, which include ± 20 ppm, ± 25 ppm, and ± 50 ppm. Additionally, there are three options for operational temperature range: standard (-10°C to $+70^{\circ}\text{C}$), commercial (-20°C to $+70^{\circ}\text{C}$), and extended (-40°C to $+85^{\circ}\text{C}$). Choosing the appropriate combination of frequency stability

Summary

Cardinal Components Programmable Crystal Oscillator is a cutting-edge Frequency Control Product that significantly reduces the time to market for applications. Its flexible frequency output, wide supply voltage range, tight frequency stability, wide operating temperature range, and excellent phase jitter features make it an ideal choice for a wide range of applications.

Product Series Line Up

Product Series	Output Logic	Frequency Range	I _{dd} max (mA)	VDD (V)	Integrated Phase Jitter (typ)(12kHz to 20MHz)	Package Size (mm)
CPPYC2	LVC MOS	1.0 to 160MHz	1.8V: 25mA 2.5V: 35mA 3.3V: 35mA	1.8V* 2.5V 3.3V	1.0ps	2.0 x 1.6
CPPYC25	LVC MOS	1.0 to 160MHz	1.8V: 25mA 2.5V: 35mA 3.3V: 35mA	1.8V* 2.5V 3.3V	1.0ps	2.5 x 2.0
CPPYC3	LVC MOS	1.0 to 160MHz	1.8V: 25mA 2.5V: 35mA 3.3V: 35mA	1.8V* 2.5V 3.3V	1.0ps	3.2 x 2.5
CPPYC5	LVC MOS	1.0 to 160MHz	1.8V: 25mA 2.5V: 35mA 3.3V: 35mA	1.8V* 2.5V 3.3V	1.0ps	5.0 x 3.2
CPPYC7	LVC MOS	1.0 to 160MHz	1.8V: 25mA 2.5V: 35mA 3.3V: 35mA	1.8V* 2.5V 3.3V	1.0ps	7.0 x 5.0
CJAE3	LVPECL	10 to 1500MHz	2.5V: 54mA 3.3V: 54mA	2.5V 3.3V	1.0ps	3.2 x 2.5
CJAE5	LVPECL	10 to 1500MHz	2.5V: 54mA 3.3V: 54mA	2.5V 3.3V	1.0ps	5.0 x 3.2
CJAE7	LVPECL	10 to 1500MHz	2.5V: 54mA 3.3V: 54mA	2.5V 3.3V	1.0ps	7.0 x 5.0
CJAL3	LVDS	10 to 1500MHz	2.5V: 40mA 3.3V: 50mA	2.5V 3.3V	1.0ps	3.2 x 2.5
CJAL5	LVDS	10 to 1500MHz	2.5V: 40mA 3.3V: 50mA	2.5V 3.3V	1.0ps	5.0 x 3.2
CJAL7	LVDS	10 to 1500MHz	2.5V: 40mA 3.3V: 50mA	2.5V 3.3V	1.0ps	7.0 x 5.0

*Note: 125MHz is the max frequency limit for 1.8V operation

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