

Development of Differential Output Crystal Oscillators Realizing World-class Low-phase Jitter/Low-phase Noise

DAISHINKU CORP. (President: Minoru Iizuka) is pleased to announce that we have developed differential output crystal oscillators*¹ (DS2016A/DS2520A/DS3225A series) which realize world-class low-phase jitter*²/low-phase noise.*³

In recent years, in line with the rapid spread of generative AI, the communication traffic between data centers has been increasing due to diversification of Internet services as a result of expansion of cloud services and advancement of IoT. An accurate signal source is essential to process large amounts of data at high speeds and improve communication quality. Quartz crystal devices, which serve as the signal sources, are required to suppress signal fluctuations, which are known as phase jitter/phase noise, and generate high frequencies.

This new differential output crystal oscillators realize world-class low-phase jitter (36 fs typ. at 156.25 MHz, LVDS, conventional products: 70 fs typ.) and contribute to improving the quality of large-capacity, high-speed communication. The frequencies of the products will be expanded up to 400 MHz to meet future needs for even higher frequencies. The products are designed to meet the demand for large-capacity/high-speed communication, which has been increasingly transformed by AI technology.

This products incorporate Arkh series crystal resonators, which are derived from a photolithographic process*⁴ and are effective at generating high frequencies. While their appearance is the same as that of conventional products with a ceramic package, these products incorporate crystal resonators that have been inspected, eliminating defects attributed to resonators. Because no adhesives are used inside the resonators, the products ensure excellent reliability, including aging characteristics. The use of inspected crystal resonators enables assembly at any production sites around the world, making the products outstanding from the viewpoint of BCP as well. The Arkh series crystal resonators feature the WLP (Wafer Level Package) structure, in which three quartz crystal wafers are bonded. The use of larger quartz crystal wafers leads to increased output per unit area. This means that the fixed costs per product can be significantly reduced. In response to the demand for crystal oscillators, which is expected to increase rapidly in the future, a stable supply can be ensured without expanding the floor space, such as building new plants, realizing excellent cost performance.

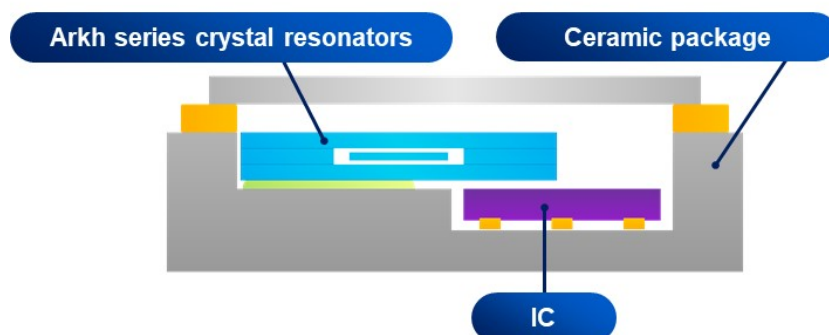
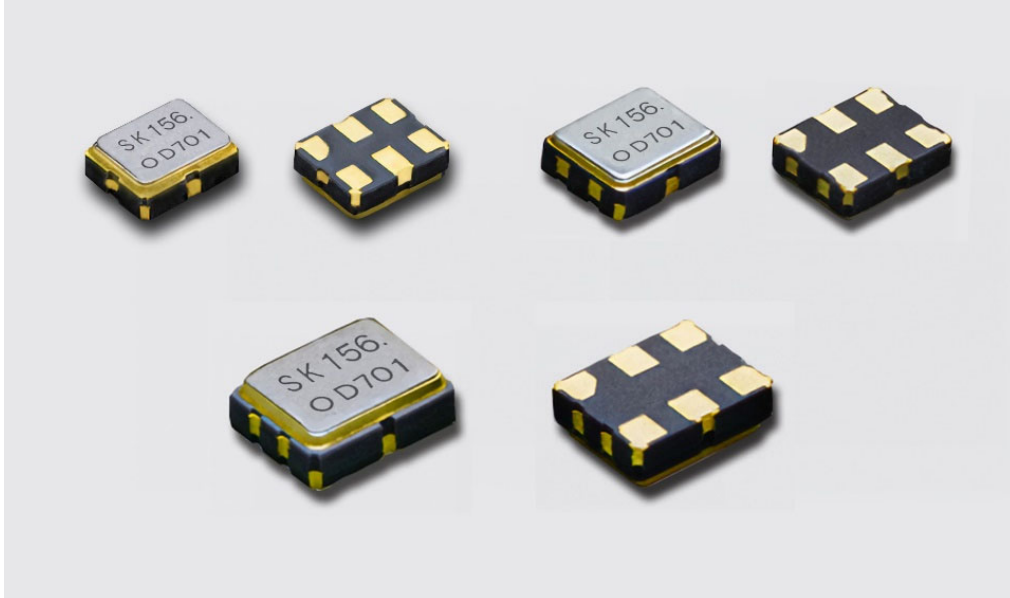


Figure 1: Structure of the Arkh.2G series

We aim to expand Arkh.2G to all crystal oscillators, including differential output crystal oscillators, as a series and achieve fully automated production. Also, we will also endeavor to expand its product lineup, which meets the needs of various markets, thereby creating new value of quartz crystal devices.

[Product Appearance]



[Applications]

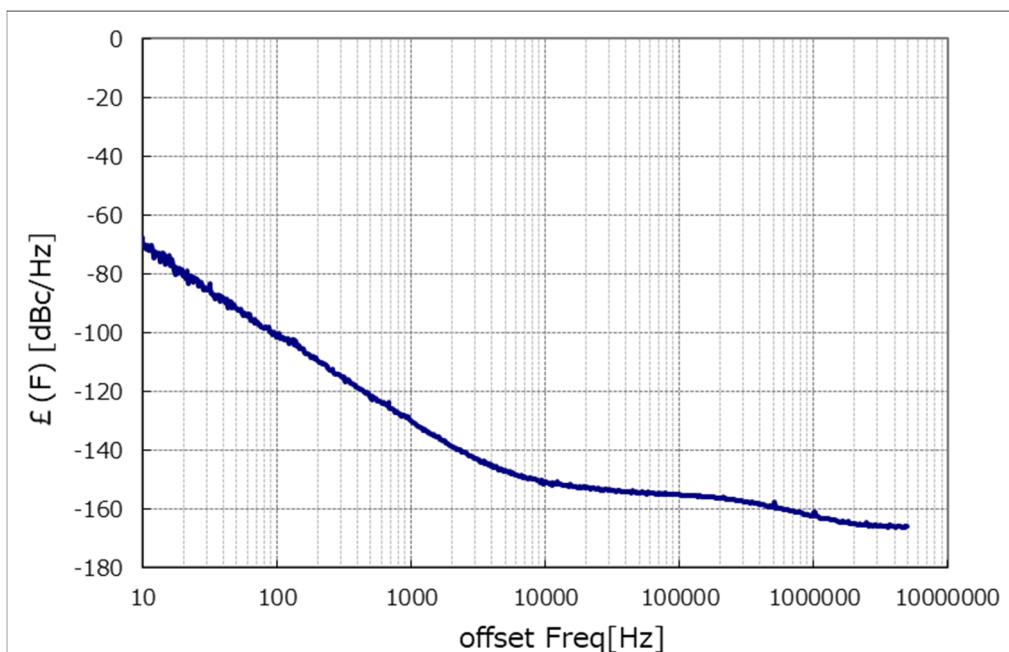
AI servers, Optical transceivers, Automotive Ethernet, Optical transmission devices, 5G base stations, etc.

[Features]

Supports three types of differential signals (HCSL, LVDS, and LV-PECL)

World-class low-phase jitter: 36 fs typ. at 156.25 MHz, LVDS

World-class low-phase noise: $f_0 = 156.25$ MHz, $V_{cc} = 3.3$ V, LVDS output



[Schedule of Sample Shipment/mass Production]

Sample shipment: from October 2024 / Mass production: from April 2025

[Product Characteristics]

Type	DS2016AK DS2520AK DS3225AK	DS2016AJ DS2520AJ DS3225AJ	DS2016AD DS2520AD DS3225AD
Size	2.0×1.6×0.7mm 2.5×2.0×0.85mm 3.2×2.5×1.1mm		
Output specification	LV-PECL	LVDS	HCSL
Output frequency range	Standard frequency 100, 125, 156.25MHz		
Supply voltage	+2.5V/+3.3V	+1.8V/+2.5V/+3.3V	
Frequency tolerance/ Operating temperature range	±50×10 ⁻⁶ max./-40 to +85°C, -40 to +105°C ±100×10 ⁻⁶ max./-40 to +85°C, -40 to +105°C, -40 to +125°C		
Phase jitter @fo=156.25MHz	- 48fs typ. @Vcc=+3.3V	50fs typ. @Vcc=+1.8V 36fs typ. @Vcc=+3.3V	52fs typ.@Vcc=+1.8V 42fs typ. @Vcc=+3.3V

Please contact us for other specifications.

<Terminology>

*1) Differential output crystal oscillator:

A crystal oscillator that outputs two differential signals (signals with inverted current directions) to remove common mode noise (common noise components)

*2) Phase jitter:

A phenomenon in which the phase of signal pulse waveforms moves back and forth from its ideal position. Frequency fluctuations of the phase in time over 10 Hz are called jitter.

*3) Phase noise:

A generic term for unwanted emission of energy around the nominal frequency generated by a crystal oscillator

*4) Photolithographic process:

To process quartz crystal blanks from quartz crystal wafers using photolithography and etching technologies. The process, which enables microprocessing compared to machining, is essential to miniaturize quartz crystal devices and generate higher frequencies.