

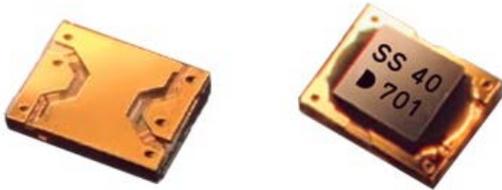


Ark Series



Ark.3G

DX Series; World's Smallest Crystal Resonator
DS Series; World's Smallest Crystal Oscillator



Ark.4G

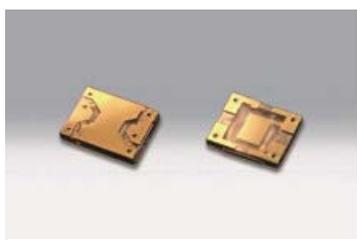
DX Series; Low Cost Small Crystal Resonator



Ark.5G

DC Series; OCXO with built-in Ark.3G

About Arkh.3G



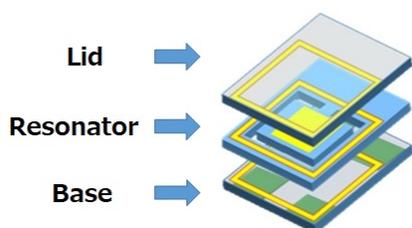
Crystal Resonator
1.0×0.8×0.13mm



Crystal Oscillator
1.0×0.8×0.24mm

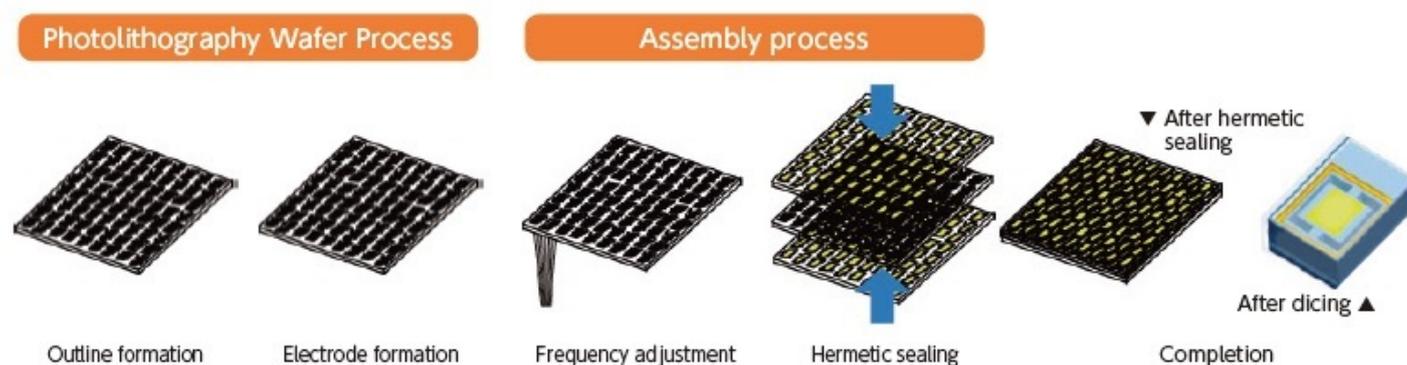
The brand name "Arkh" is from arkhitekton, the ancient Greek from which architecture is derived. The Arkh.3G is a quartz crystal device that uses a completely novel third-generation (3G) structure. The implication of the use of architecture instead of the simpler structure represents our desire to express that the product is based on a more definite strategy and concept than before.

Structure of the Arkh.3G



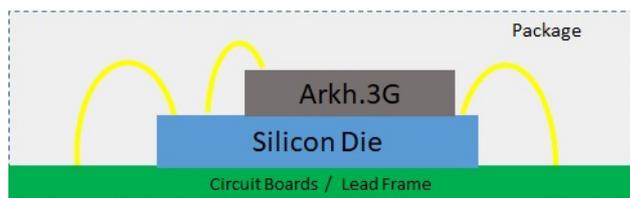
In the conventional structure, a quartz crystal element is held in a ceramic package by means of a conductive adhesive. In contrast, the Arkh.3G is arranged in a three-layer structure consisting of a lid, resonator, and base, the host of which is quartz crystal.

Manufacturing Process of the Arkh.3G



With the outlines of the resonator and other parts having been formed by a photolithographic process, three quartz crystal wafers are bonded and diced into a waferlevel package. Thus the holder and resonator parts are formed into an integrated structure without the use of a conductive adhesive. This design has solved the challenges that the conventional structure needed to meet for product size reduction, namely, improved accuracy in conductive adhesive application and the provision of a margin for ensuring a quartz crystal element mounting location. Additionally, it is possible to reduce quality risks by carrying out processes ranging from wafer cleaning to bonding in a vacuum environment.

About Mounting and Usage of the Arkh.3G



The Arkh.3G can be soldered to circuit boards with a pick-and-place machine in the conventional manner. It can also be built into an IC package or used for wire bonding or molding.

* As with conventional products, the Arkh.3G is subject to resonance fracture or damage, depending on conditions such as ultrasonic cleaning and molding pressure. Therefore, it is necessary to check the Arkh.3G in advance under your particular operating conditions.

Applications

- Ideal for and modules requiring thinness such as SiP, and embedding IC packages.
Height : Crystal Resonator 0.13mm max.
Crystal Oscillator 0.24mm max.
Differential Output Crystal Oscillator 0.26mm max.
- Allowing for high-density mounting of wearable devices as the world's smallest crystal oscillator.
- Contributes to miniaturization of optical network equipment.

Standard Specification

DX1008JS (Crystal Resonator)

Size (mm)	1.0×0.8×0.13 max.		
Frequency Range	48MHz	52MHz/ 80MHz/ 96MHz	120MHz
Series Resistance	100Ω max.	60Ω max.	40Ω max.
Overtone Order	Fundamental		
Drive Level	10μW (100μW max.)		
Frequency Tolerance	±20×10 ⁻⁶ (at 25°C)		±100×10 ⁻⁶ (at 25°C)
Frequency Characteristics over Temperature	±30×10 ⁻⁶ / -30 to +85°C (Ref. to 25°C)		
Features	ultra-small and low profile		

DS1008JN/ DS1008JS (Crystal Oscillator)

Model	DS1008JN		DS1008JS	
Size (mm)	1.0×0.8×0.24 max.			
Frequency Range	1 to 100MHz			
Supply Voltage	+0.9V/ +1.2V/ +1.3V/ +1.5V		+1.8V/ +2.5V/ +2.8V/ +3.0V/ +3.3V	
Output Specification	CMOS			
Frequency Tolerance	±20×10 ⁻⁶	±50×10 ⁻⁶	±20×10 ⁻⁶	±50×10 ⁻⁶
Operating Temperature Range	-30 to +85°C	-40 to +125°C	-30 to +85°C	-40 to +125°C
Features	ultra-small, low profile and low voltage		ultra-small and low profile	

DS1008JC/ DS1008JD/ DS1008JJ/ DS1008JK (Differential Output Crystal Oscillators)

M o d e l	DS1008JC	DS1008JD	DS1008JJ	DS1008JK
S i z e (m m)	1.0×0.8×0.26 max.			
F r e q u e n c y R a n g e	156.25MHz			
S u p p l y V o l t a g e	+3.3V	+2.5V/ +3.3V		
O u t p u t S p e c i f i c a t i o n	HD-LVDS	HCSL	LVDS	LV-PECL
F r e q u e n c y T o l e r a n c e	$\pm 50 \times 10^{-6} / \pm 100 \times 10^{-6}$			
O p e r a t i n g T e m p e r a t u r e R a n g e	-40 to +85°C			
F e a t u r e s	ultra-small, low profile and differential output			

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[·DX1008JS \(Crystal Resonator\)](#)

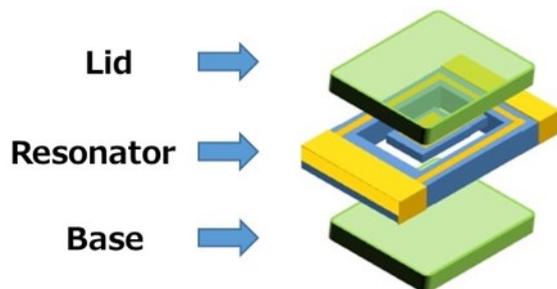
[·DS1008JN \(Crystal Oscillator\)](#)

[·DS1008JS \(Crystal Oscillator\)](#)

[·DS1008JC/ DS1008JD/ DS1008JJ/ DS1008JK \(Differential Output Crystal Oscillators\)](#)

About Arkh.4G

With the dissemination of IoT and the growth of the data storage market, the role of timing devices is becoming increasingly important. The demand for crystal timing devices, in particular, is expected to grow drastically because of their superiority in noise performance, costs, and availability. Moreover, there are increasing demands for small and thin products targeting wireless earbuds and other miniature devices that require high-density implementation. On the other hand, due to the surge in direct material costs and requirement for new investments, the costs of 1.2×1.0 mm or smaller products tend to rise.



Structure of the Arkh.4G



Crystal Resonator
1.2×1.0×0.25mm

Under these circumstances, while inheriting the basic technology of the “Arkh.3G Series”, we have reduced costs by cutting down on the direct material expenses and streamlining the production process through the replacement of the upper and lower layers, or the two layers other than the oscillating layer, of the three-layer crystal wafer bonded structure with organic films. We will also focus our efforts on process development to expand the frequency range covered by the device and further reduce costs by increasing the wafer diameter, aiming towards releasing a crystal device with the world’s lowest cost.

Applications

·Ideal for small consumer devices such as earbuds and tags that require small size and low cost.

Standard Specification

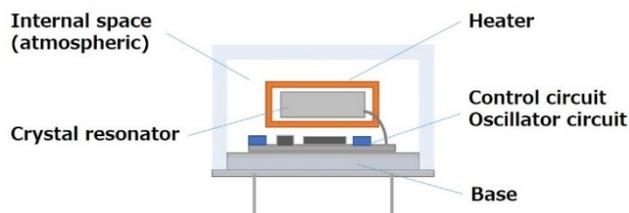
DX1210FS (Crystal Resonator)

Size (mm)	1.2×1.0×0.25 max.
Frequency Range	40MHz/ 48MHz/ 50MHz/ 52MHz/ 64MHz etc. *32MHz under development
Series Resistance	80Ω max. (@48MHz)
Overtone Order	Fundamental
Drive Level	10μW
Frequency Tolerance	±40×10 ⁻⁶
Operating Temperature Range	-30 to +85℃
Features	Low-cost small crystal resonator using organic film

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[·DX1210FS \(Crystal Resonator\)](#)

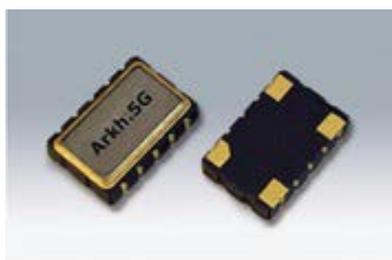
About Arkh.5G



Internal structure of OCXO
(conventional product)

In general, OCXOs achieve a high level of stability by maintaining the temperature of its crystal oscillator constant to minimize the effects of the temperature characteristics. Conventional OCXOs have a large core, which is an oscillator circuit containing a crystal oscillator, with the corresponding amount of heat capacity and heat dissipation, consuming a significant amount of power consumption. In addition, conventional OCXOs are

assembled manually due to their complicated structures and large numbers of components, which raises production costs, making them unsuitable for mass production.



OCXO

7.3×4.9×2.0mm

To resolve this drawback, we have introduced a proprietary OCXO structure, with the core built on an ultra-small Arkh.3G (oscillator), which has led us to the success of developing a compact and high-performance OCXO. The core of the conventional product is generally under atmospheric pressure. But the new core structure is maintained in a vacuum, which eliminates the effects of thermal convection. The development of the small core translates into further downsizing, to 5.0×3.2mm for example. Moreover, a multi-layered package will improve thermal insulation with the dimensions maintained the same or slightly larger, which achieves precision enhancement while preventing an increase in size. We are also planning to

expand our product lineup.

Our new OCXO is sealed in a ceramic package, which has been widely used because of its simple structure. This design facilitates assembling on a fully automatic production line, which will enable us to supply a large number of OCXOs at low prices to the base station market, which is expected to grow rapidly.

Applications

- Ideal for 5G base stations and servers that require small size, low current consumption, and low cost.

Standard Specification

DC7050AS (OCXO)

Size (mm)	7.3×4.9×2.0 max.
Frequency Range	5 to 100MHz
Supply Voltage	+3.3V
Frequency Characteristics over Temperature	$\pm 30 \times 10^{-9}$ max.
Operating Temperature Range	-40 to +85°C
Features	OCXO using Arkh.3G oscillator in the core

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[·DC7050AS \(OCXO\)](#)