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Nihon Dempa Kogyo Co., Ltd.
Representative Director and President
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Developed the world's smallest 1.2×1.0mm size tuning fork type quartz crystal unit
for pacemakers with MRI-compatible

Nihon Dempa Kogyo Co., Ltd. has developed the world's smallest class ^(*) 1.2×1.0mm-sized tuning fork type quartz crystal unit for use in MRI-compatible pacemakers, and has begun sample shipments since January 2021.

In recent years, the demand for pacemakers has been increasing year by year with the aging society, but one of the issues is that people who have pacemaker implantation cannot undergo MRI examinations. This is because the ferromagnetic materials contained in the pacemaker components may be affected by magnetic fields and cause abnormal operation.

To solve this problem, we have been studying the reduction of ferromagnetic materials contained in the tuning fork type quartz crystal unit, one of the components, and have succeeded in developing a tuning fork type quartz crystal unit for pacemakers that can accommodate such MRI inspections.

Commercially available conventional tuning fork type quartz crystal unit use materials that contain a large amount of magnetic materials (metal covers), but we have replaced them with ceramic material covers that contain a small amount of magnetic materials, and have developed packaging methods that differ from conventional products to minimize the effects of magnetic fields and ensure quality that satisfies the standard for medical devices.

Pacemaker equipment has also evolved. Conventional products use a body implanted into the human body to connect the lead wires (electrodes) to the heart. However, the development of the direct implantable leadless type has greatly reduced the size. The components used in pacemakers are also required to be miniaturized, and in order to meet this need, we have developed and marketed the world's smallest 1.2 x 1.0mm size tuning fork type quartz crystal unit in addition to the 2.0 x 1.2mm size (NX2012VA) and 3.2 x 1.5mm size (NX3215VA) products.

In order to realize the world's smallest tuning fork type quartz crystal unit with fewer ferromagnetic materials, we have realized this product with ultra-compact size and high reliability by utilizing FEM analysis ^{(*)2} simulation on the quartz crystal element mounted in the package (housing) and applying high-definition processing technology using photolithography method.

We will continue to contribute to the realization of a safe, secure and comfortable society through our quartz device and crystal application equipment businesses.

(*1) Jan. 2021, our survey

(*2) FEM analysis is a finite element method (Finite Element Method) which is a numerical analysis method (simulation method) for differential-equation approximate solutions that are difficult to solve analytically.

[Sample] Sample shipment started in January 2021

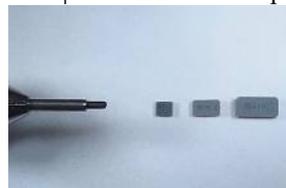
[Product name] NX1210VA

[Outline Photo]

Developed product



Comparison of size with 0.5mmφ lead mechanical pencil



(1.2×1.0mm, 2.0×1.2mm, 3.2×1.5mm from the left)

MRI-compatible product (3.2 × 1.5mm size)



【 Product characteristic】

Product Name	NX1210VA
Product Size	1.2 × 1.0 × 0.45mm
Nominal Frequency	32.768kHz
Frequency Tolerance (+25°C+/-3°C)	+/-20×10 ⁻⁶
Operating Temperature Range	-40 to +85°C
Equivalent Series Resistance	90kΩMax.
Load Capacity	12.5pF
Turning point Temperature	+25°C+/-5°C
Temperature Coefficient	-0.04×10 ⁻⁶ /°C ² Max.

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