

August 3, 2020
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**Development of the industry's first^{(*)1} compact,
high-frequency temperature-compensated crystal oscillator**

Nihon Dempa Kogyo Co., Ltd. has developed a low phase-noise TCXO (temperature-compensated crystal oscillator) that is 1.6 x 1.2 x 0.45mm-sized and is compatible with the industry's first high-frequency, and reduces the degradation of phase noise, resulting in the industry's highest level of -160dBc/ Hz@100kHz offset^{(*)2}. Sample shipments will start from September 2020.

Rapid growth in 5G and Beyond 5G, as well as in 6G and other mobile high-speed communications, next-generation Wi-Fi and other wireless stations that will be developed in the future, is anticipating a tighter spectrum in the future, so the promotion of the efficient use of radio waves is urgently needed. One solution to this problem is the establishment of technology for the effective use of radio waves in the high frequency band.

In order to support high frequency band wireless communication, it is necessary to increase the multiplication number of the frequency generated by the reference oscillation source inside the communication device. However, as the multiplication number increases, the noise component increases, resulting in reception sensitivity deterioration or communication efficiency deterioration due to the deterioration of the modulation accuracy (deviation between the phase and amplitude of the signal).

As one of the countermeasures, the multiplication factor is reduced by increasing the frequency of the reference oscillator inside the device, which leads to the maintenance and improvement of radio properties. Therefore, it is anticipated that the demand for high-frequency low-phase noise TCXO will increase from customers for 5G smartphone applications and other applications in the future.

Last year, we announced a compact temperature-compensated crystal oscillator with an output of up to 52MHz, which possesses the industry's highest phase noise characteristics. While maintaining its characteristics, we have worked to increase the frequency to 104MHz, which is twice the frequency.

We have recently developed the industry's first high-frequency, low-phase noise TCXO by using high-Q synthetic quartz crystals^{(*)3} developed at high quality, optimizing crystal resonator designs through photolithography processes, and reducing noise in oscillator circuits that are compatible with high frequencies.

- **Floor noise** -160 dBc/Hz @100 kHz offset^{(*)2}
- **Phase jitter**^{(*)4} 110fs @12kHz to 20MHz

We plan to use this technology to gradually expand our product lineup to other sizes.

(*1) In July 2020, our investigation

(*2) Oscillation frequency: 76.8MHz, Temperature: +25°C

(*3) A crystal resonator represents the degree of sharpness of the resonance. A larger (higher) value means that the vibration is more stable.

(*4) This refers to the time-axis deviation or fluctuation that occurs in a waveform when transmitting a digital signal.

[Product Appearance]



[Sample / Mass production]

Sample shipments are scheduled for September 2020, and mass production is scheduled for March 2021.

[Specifications / Characteristics]

Model name	NT1612AJA
Dimensions	1.6 x 1.2 x 0.45mm

ELECTRICAL CHARACTERISTICS

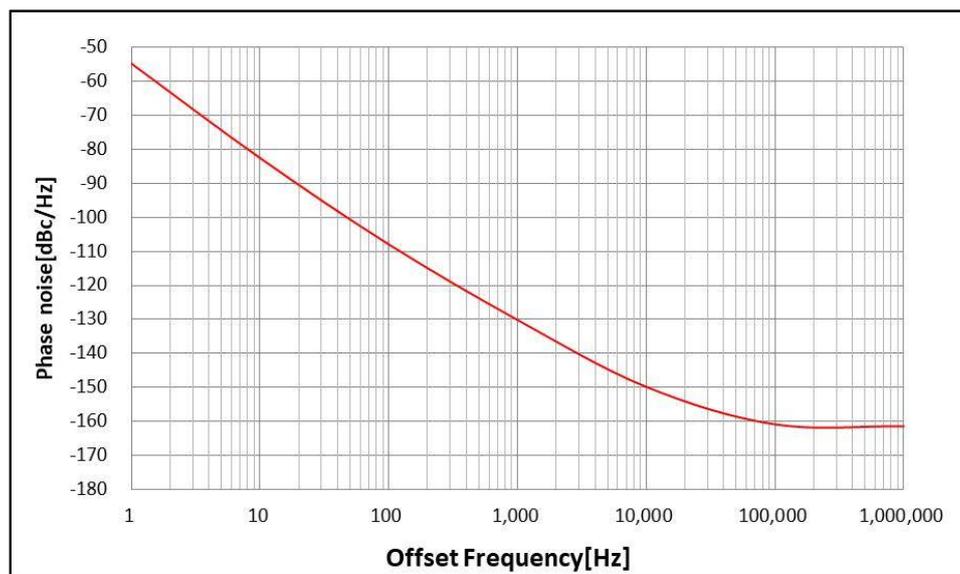
Nominal Frequency	24MHz to 104MHz
Standard Frequency	76.8MHz
Supply Voltage (Vcc)	+1.8V +/- 5% ^(Note 1)
Load Impedance	10kΩ//10pF
Operating Temperature Range	-30 deg.C to +85 deg.C
Current Consumption	Max. 5.0mA /76.8MHz (Enable)
	Max. 5.0uA /76.8MHz (Disable)
Output Voltage	Min. 0.8 V(p-p) (DC Coupling ^(Note 2))
Frequency Temperature Characteristics	Max. +/- 0.5 × 10 ⁻⁶
Long-term Frequency Stability	Max. +/- 2.0 × 10 ⁻⁶ /year (at +25°C)

(Note 1) DC+1.7V to +3.6V are available.

(Note 2) The DC cut capacitor is not built in. Connect the capacitor (1,000pF) in series with the oscillator output line.

[Example of Phase Noise Characteristic Data]

Condition: Nominal frequency 76.8MHz, temperature +25 deg.C



For more information on the product, please contact:

[Contact Info]

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