

# CRYSTAL PRODUCTS

Issued 2023

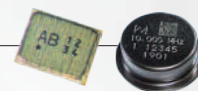
Tuning Fork Crystal Units  
(kHz range)



Crystal Unit with built-in temperature sensor  
(MHz range)



Crystal Unit  
(MHz range)



SPXO



TCXO



VCXO



OCXO



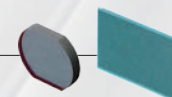
Frequency Synthesizer



Millimeter-wave converter



Optical Component



QCM Sensor



Ultrasound Probe  
(Transducer)



SAW Devices












This catalog shows products and specifications of our main range.  
Please contact our sales representatives or visit our website (<https://www.ndk.com/>) with your inquiries.



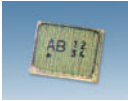



### ■ Tuning Fork Crystal Units (kHz range)

<b>NX1610SA</b> (1.6×1.0×0.45mm) <b>NX2012SA</b> (2.0×1.2×0.55mm) <b>NX3215SA</b> (3.2×1.5×0.8mm)  	  	<b>Ultra compact size tuning fork crystal unit (kHz range)</b> Nominal Frequency : 32.768kHz Frequency Tolerance : $\pm 20 \times 10^{-6}$ Operating Temperature Range : -40 to +85°C
<b>NX2012SA</b> (2.0×1.2×0.55mm) <b>NX3215SA</b> (3.2×1.5×0.8mm)   	 	<b>Compact size tuning fork crystal unit (kHz range) for Automotive</b> Nominal Frequency : 32.768kHz Frequency Tolerance : $\pm 20 \times 10^{-6}$ Operating Temperature Range : -40 to +125°C Conforms to AEC-Q200
<b>NX3215SD</b> (3.2×1.5×0.8mm)   		<b>Compact size tuning fork crystal unit (kHz range) for Automotive. Enhanced products of solder cracking resistance.</b> Nominal Frequency : 32.768kHz Frequency Tolerance : $\pm 20 \times 10^{-6}$ Operating Temperature Range : -40 to +125°C Conforms to AEC-Q200
<b>NX1610SE</b> (1.6×1.0×0.45mm) <b>NX2012SE</b> (2.0×1.2×0.55mm) <b>NX3215SE</b> (3.2×1.5×0.8mm)  	  	<b>Ultra compact size tuning fork crystal unit (kHz range) with low ESR (Equivalent Series Resistance)</b> Nominal Frequency : 32.768kHz Frequency Tolerance : $\pm 20 \times 10^{-6}$ Operating Temperature Range : -40 to +85°C
<b>NX2012SF</b>  (2.0×1.2×0.55mm) <b>NX3215SF</b> (3.2×1.5×0.8mm)  	 	<b>Compact size tuning fork crystal unit (kHz range) for specially controlled medical devices class 3</b> Nominal Frequency : 32.768kHz Frequency Tolerance : $\pm 20 \times 10^{-6}$ Operating Temperature Range : -40 to +125°C

### ■ Crystal Unit with built-in temperature sensor (MHz range)



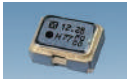






<b>NX1612SD</b> (1.6×1.2×0.65mm)  		<b>Ultra compact size crystal unit with built-in thermistor</b> Nominal Frequency Range : 26 to 76.8MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 12 \times 10^{-6}$ / -30 to +85°C
<b>NX2016SF</b> (2.0×1.6×0.65mm)  		<b>Compact size crystal unit with built-in thermistor</b> Nominal Frequency Range : 19.2 to 55.2MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 12 \times 10^{-6}$ / -30 to +85°C
<b>NX2016SF</b> (2.0×1.6×0.65mm)   		<b>Compact size crystal unit with built-in thermistor for Automotive</b> Nominal Frequency Range : 19.2 to 55.2MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 25 \times 10^{-6}$ / -40 to +105°C Conforms to AEC-Q200

### ■ Crystal Unit (MHz range)

<b>NX1008AA</b> (1.0×0.8×0.25mm)  		<b>Ultra compact size crystal unit (1.0×0.8mm)</b> Nominal Frequency Range : 32 to 80MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 10 \times 10^{-6}$ / -30 to +85°C (32 to 60MHz) $\pm 15 \times 10^{-6}$ / -30 to +85°C (60 to 80MHz)
<b>NX1210AB</b> (1.2×1.0×0.25mm)  		<b>Ultra compact size crystal unit (1.2×1.0mm)</b> Nominal Frequency Range : 26 to 52MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 15 \times 10^{-6}$ / -30 to +85°C











<b>NX1612SA</b> (1.6×1.2×0.3mm)  		<b>Ultra compact size crystal unit (1.6×1.2mm)</b> Nominal Frequency Range : 24 to 80MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 15 \times 10^{-6}$ / -30 to +85°C
<b>NX2016SA</b> (2.0×1.6×0.45mm)  		<b>Compact size crystal unit (2.0×1.6mm)</b> Nominal Frequency Range : 16 to 80MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 25 \times 10^{-6}$ / -40 to +85°C
<b>NX2520SA</b> (2.5×2.0×0.5mm)  		<b>Compact size crystal unit (2.5×2.0mm)</b> Nominal Frequency Range : 16 to 80MHz Frequency Tolerance : $\pm 15 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 25 \times 10^{-6}$ / -40 to +85°C
<b>NX1612SA</b> (1.6×1.2×0.3mm)   		<b>Ultra compact size crystal unit (1.6×1.2mm) for Automotive</b> Nominal Frequency Range : 24 to 80MHz Frequency Tolerance : $\pm 15 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 50 \times 10^{-6}$ / -40 to +125°C Conforms to AEC-Q200
<b>NX2016GC</b> (2.0×1.6×0.70mm)  		<b>Compact size crystal unit (2.0×1.6mm) for Automotive</b> Nominal Frequency Range : 16 to 54MHz Frequency Tolerance : $\pm 50 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 150 \times 10^{-6}$ / -40 to +150°C Conforms to AEC-Q200
<b>NX2016SA</b> (2.0×1.6×0.45mm)   		<b>Compact size crystal unit (2.0×1.6mm) for Automotive</b> Nominal Frequency Range : 16 to 80MHz Frequency Tolerance : $\pm 15 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 50 \times 10^{-6}$ / -40 to +125°C Conforms to AEC-Q200
<b>NX3225GA</b> (3.2×2.5×0.75mm)  		<b>Crystal unit for Automotive (Excellent environment-resistant performance)</b> Nominal Frequency Range : 9.8 to 50MHz Frequency Tolerance : $\pm 50 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 150 \times 10^{-6}$ / -40 to +150°C Conforms to AEC-Q200
<b>NX3225GB</b> (3.2×2.5×0.75mm)  		<b>Crystal unit for Automotive (High resistance to solder cracking)</b> Nominal Frequency Range : 12 to 50MHz Frequency Tolerance : $\pm 50 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 150 \times 10^{-6}$ / -40 to +150°C Conforms to AEC-Q200
<b>NX3225SA</b> (3.2×2.5×0.55mm)   		<b>Compact size crystal unit (3.2×2.5mm) for Automotive</b> Nominal Frequency Range : 12 to 50MHz Frequency Tolerance : $\pm 15 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 50 \times 10^{-6}$ / -40 to +125°C Conforms to AEC-Q200
<b>RC-8</b> (φ15.60×4.80mm) 		<b>High reliability crystal unit for OCXO with excellent frequency stability</b> <b>HC-37/U equivalent low profile</b> Nominal Frequency Range : 5 to 20MHz Frequency Tolerance : $\pm 3 \times 10^{-6}$ Operating Temperature Range : -40 to +120°C
<b>NC-18C</b> (11.45×5.00×13.46mm) 		<b>High reliability crystal unit for OCXO with excellent frequency stability</b> <b>HC-43/U equivalent</b> Nominal Frequency Range : 10 to 20MHz Frequency Tolerance : $\pm 3 \times 10^{-6}$ Operating Temperature Range : -40 to +120°C

## ■ Simple Packaged Crystal Oscillator (SPXO)



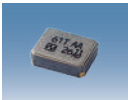











<b>NZ1612SH / MHz</b> (1.6×1.2×0.6mm) <b>NZ2016SH / MHz</b> (2.0×1.6×0.7mm) <b>NZ2520SH / MHz</b> (2.5×2.0×0.9mm)  	  	<b>Supports a wide temperature range from -40 to +125°C Clock Oscillator</b> Nominal Frequency Range : 2.0 to 80MHz (NZ1612SH) 1.5 to 80MHz (NZ2016SH) 1.5 to 170MHz (NZ2520SH) Output Specification : CMOS Supply Voltage [V <sub>CC</sub> ] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : $\pm 100 \times 10^{-6}$ / -40 to +125°C
<b>NT2016SE</b> (2.0×1.6×0.8mm) <b>NT2520SE</b> (2.5×2.0×0.9mm)  	 	<b>High precision type Clock Oscillator</b> Nominal Frequency Range : 10 to 52MHz Output Specification : CMOS Supply Voltage [V <sub>CC</sub> ] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : $\pm 10 \times 10^{-6}$ / -40 to +105°C

<b>NZ1612SHB / kHz</b> (1.6×1.2×0.6mm) <b>NZ2016SHB / kHz</b> (2.0×1.6×0.7mm) <b>NZ2520SHB / kHz</b> (2.5×2.0×0.9mm)  	  	<b>Low current consumption and wide temperature range from -40 to +125°C Clock Oscillator</b> Nominal Frequency : 32.768kHz Output Specification : CMOS Supply Voltage [V <sub>CC</sub> ] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : $\pm 100 \times 10^{-6}$ / -40 to +125°C Current Consumption (During Operation) : Max. 32 $\mu$ A
<b>NZ2016SHA / MHz / kHz</b> (2.0×1.6×0.7mm) <b>NZ2520SHA / MHz / kHz</b> (2.5×2.0×0.9mm)   	 	<b>High quality and high reliability design for Automotive safety Clock Oscillator</b> Nominal Frequency Range : 1.5 to 80MHz 32.768kHz (NZ2016SHA) 1.5 to 125MHz 32.768kHz (NZ2520SHA) Output Specification : CMOS Supply Voltage [V <sub>CC</sub> ] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : $\pm 100 \times 10^{-6}$ / -40 to +125°C Conforms to AEC-Q100/200
<b>NZ2520SEB / MHz</b> (2.5×2.0×0.9mm)  		<b>High precision type Clock Oscillator</b> Nominal Frequency Range : 1.5 to 32MHz Output Specification : CMOS Supply Voltage [V <sub>CC</sub> ] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : $\pm 25 \times 10^{-6}$ / -40 to +85°C
<b>NZ2520SDA / MHz</b> (2.5×2.0×0.9mm)  		<b>Ultra low phase noise type, ultra low phase jitter type Clock Oscillator</b> Nominal Frequency Range : 20 to 50MHz Output Specification : CMOS Phase Noise (22.5792MHz) : Typ. -169dBc / Hz at 100kHz, +3.3V, +25°C Supply Voltage [V <sub>CC</sub> ] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : $\pm 50 \times 10^{-6}$ / -40 to +85°C
<b>NP2520SA NEW</b> (2.5×2.0×0.8mm) <b>NP2520SAB NEW</b> (2.5×2.0×0.8mm)  		<b>Differential output SPXO</b> Nominal Frequency Range : 100 to 170MHz Output Specification : LVPECL Supply Voltage [V <sub>CC</sub> ] : +2.5V, +3.3V Overall Frequency Tolerance : Max. $\pm 50 \times 10^{-6}$ / -40 to +85°C Phase Jitter : Typ. 68fs (SA) Typ. 40fs (SAB) (Offset Frequency : 12kHz to 20MHz) @156.25MHz
<b>NP3225SAA NEW</b> (3.2×2.5×0.9mm) <b>NP3225SBA NEW</b> (3.2×2.5×0.9mm) <b>NP3225SCA NEW</b> (3.2×2.5×0.9mm)   		<b>Differential output SPXO for Automotive</b> Nominal Frequency Range : 100 to 170MHz Output Specification : LVPECL (SAA) LVDS (SBA) HCSL (SCA) Supply Voltage [V <sub>CC</sub> ] : +2.5V to +3.3V (SBA) +3.3V (SAA, SCA) Overall Frequency Tolerance : Max. $\pm 50 \times 10^{-6}$ / -40 to +105°C Phase Jitter : Typ. 90fs @156.25MHz (SAA) Typ. 90fs @150MHz (SBA) Typ. 100fs @156.25MHz (SCA) (Offset Frequency : 12kHz to 20MHz)
<b>NP5032S[ ]</b> (5.0×3.2×1.2mm) <b>NP7050S[ ]</b> (7.0×5.0×1.6mm)  	 	<b>Multi mode crystal oscillator (Available for customizing specifications by frequency selection function)</b> Nominal Frequency Range : 15 to 2100MHz Frequency Selection Function : Single, Dual, Quad, Any Rate Output Specification : CMOS, LVPECL, LVDS, CML, HCSL Supply Voltage [V <sub>CC</sub> ] : +1.8V, +2.5V, +3.3V Overall Frequency Tolerance : Max. $\pm 10 \times 10^{-6}$ / -40 to +85°C (Narrow Tolerance) Max. $\pm 50 \times 10^{-6}$ / -40 to +85°C (Standard) Phase Jitter : Typ. 130fs rms (@622.08MHz)



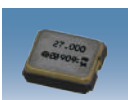






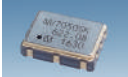
## ■ Temperature Compensated Crystal Oscillator (TCXO)

<b>NT1612SA</b> (1.6×1.2×0.55mm) <b>NT2016SA</b> (2.0×1.6×0.8mm) <b>NT2520SB</b> (2.5×2.0×0.9mm)  	  	<b>TCXO for high precision GPS</b> Nominal Frequency Range : 26 to 52MHz Supply Voltage [V <sub>CC</sub> ] : +1.8V, +3.3V Frequency / Temperature Characteristics : Max. $\pm 0.5 \times 10^{-6}$ / -30 to +85°C
<b>NT2016SE</b> (2.0×1.6×0.8mm) <b>NT2520SE</b> (2.5×2.0×0.9mm)   	 	<b>Supports a wide temperature range from -40 to +105°C for Automotive (TCXO)</b> Nominal Frequency Range : 10 to 52MHz Supply Voltage [V <sub>CC</sub> ] : +1.8V, +3.3V Frequency / Temperature Characteristics : Max. $\pm 0.5 \times 10^{-6}$ / -40 to +105°C Conforms to AEC-Q100/200











<b>NT2016SJA</b> (2.0×1.6×0.8mm)  		<b>Low phase noise characteristics and stand-by function (TCXO)</b> Nominal Frequency Range : 16 to 76.8MHz Supply Voltage [V <sub>cc</sub> ] : +1.8V, +3.3V Frequency / Temperature Characteristics : Max. $\pm 0.5 \times 10^{-6}$ / -30 to +85°C
<b>NT2016SHC</b>  (2.0×1.6×0.8mm) <b>NT2520SHC</b>  (2.5×2.0×0.9mm)   	 	<b>Supports high temperature range from -40 to +125°C for Automotive and stand-by function (TCXO)</b> Nominal Frequency Range : 26 to 100MHz Supply Voltage [V <sub>cc</sub> ] : +1.8V, +3.3V Frequency / Temperature Characteristics : Max. $\pm 3 \times 10^{-6}$ / -40 to +125°C Conforms to AEC-Q100/200
<b>NT5032BB</b> (5.0×3.2×1.8mm) <b>NT7050BB</b> (7.0×5.0×2.0mm)  	 	<b>High Precision TCXO for 5G and Stratum 3</b> Nominal Frequency Range : 10 to 40MHz Supply Voltage [V <sub>cc</sub> ] : +3.3V Frequency / Temperature Characteristics : Max. $\pm 0.1 \times 10^{-6}$ / -40 to +105°C Current Consumption : Max. 10mA With Enable / Disable (Stand-by) function.



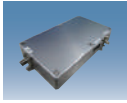
## ■ Voltage Controlled Crystal Oscillator (VCXO)

<b>NV2520SA</b> (2.5×2.0×0.9mm)  		<b>Compact size VCXO</b> Nominal Frequency Range : 11 to 40MHz Overall Frequency Tolerance : Max. $\pm 50 \times 10^{-6}$ / -40 to +85°C Frequency Control Range / Control Voltage : Min. $\pm 100 \times 10^{-6}$ / +1.65±1.65V
<b>NV5032SC</b> (5.0×3.2×1.2mm)  		<b>VCXO for communication equipment and base station</b> Nominal Frequency : 122.88MHz Supply Voltage [V <sub>cc</sub> ] : +3.3V Overall Frequency Tolerance : Max. $\pm 50 \times 10^{-6}$ / -40 to +85°C Frequency Control Range / Control Voltage : Min. $\pm 100 \times 10^{-6}$ / +1.65±1.65V
<b>NV5032S[ ]</b> (5.0×3.2×1.2mm) <b>NV7050S[ ]</b> (7.0×5.0×1.6mm)  	 	<b>Multi mode crystal oscillator (Available for customizing specifications by frequency selection function)</b> Nominal Frequency Range : 15 to 2100MHz Frequency Selection Function : Single, Dual, Quad, Any Rate Output Specification : LVPECL, LVDS, CML, HCSL Supply Voltage [V <sub>cc</sub> ] : +1.8V, +2.5V, +3.3V Overall Frequency Tolerance : Max. $\pm 10 \times 10^{-6}$ / -40 to +85°C (Narrow Tolerance) Max. $\pm 50 \times 10^{-6}$ / -40 to +85°C (Standard) Selection of Frequency Control Range : Min. $\pm 50 \times 10^{-6}$ to Min. $\pm 250 \times 10^{-6}$ Phase Jitter : Typ. 130fs rms (@622.08MHz)





## ■ Oven Controlled Crystal Oscillator (OCXO)

<b>NH7050SA</b> (7.0×5.0×3.3mm) 		<b>Ultra small size OCXO (7×5mm)</b> Nominal Frequency : 10,20,30,72,38.88MHz Supply Voltage [V <sub>cc</sub> ] : +3.3V Frequency / Temperature Characteristics : Max. $\pm 20 \times 10^{-9}$ / -40 to +95°C Power Consumption : at stable Max. 0.6W Long-term Frequency Stability : Max. $300 \times 10^{-9}$ / year
<b>NH25M22WG</b> (25.4×22×11mm) 		<b>Supports wide temperature range OCXO (-40 to +85°C)</b> Nominal Frequency : 10MHz Supply Voltage [V <sub>cc</sub> ] : +3.3V Frequency / Temperature Characteristics : Max. $\pm 10 \times 10^{-9}$ / -40 to +85°C Power Consumption : at stable Max. 1.3W Long-term Frequency Stability : Max. $50 \times 10^{-9}$ / year Low Near-carrier Phase Noise Characteristics : -100dBc / Hz at 1Hz offset
<b>NH26M26LC</b> (26×26×12.5mm) 		<b>Low phase noise and high stability OCXO</b> Nominal Frequency : 10MHz Supply Voltage [V <sub>cc</sub> ] : +5.0V Frequency / Temperature Characteristics : Max. $\pm 3 \times 10^{-9}$ / -40 to +85°C Power Consumption : at stable Max. 2.0W Long-term Frequency Stability : Max. $50 \times 10^{-9}$ / year Low Near-carrier Phase Noise Characteristics : -100dBc / Hz at 1Hz offset
<b>NH37M28LP</b> (36×27×19mm) 		<b>Low phase noise make this product ideal for high sound quality audio equipment (OCXO)</b> Ultra Low Phase Noise : Typ. -171dBc/Hz @100kHz offset Bipolar driver output that can drive CMOS-IC directly Frequency : 45.1582MHz (CD sound source system) and 49.152MHz (DVD sound source system)



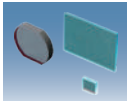


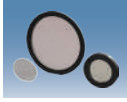


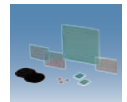
## ■ Frequency Synthesizer

<b>S6R6G6R6GA</b> (140×70×22mm) 		<b>For commercial radio equipment, microwave radio link, and digital radio</b> Frequency Range : 6570.50 to 6589.75MHz Frequency Setting Resolution : 125kHz step Frequency Stability : Depends on External Reference Signal Within $\pm 5 \times 10^{-6}$ / 10 years (Internal TCXO Stability) SSB Phase Noise : Max. -47dBc (Integrated value of 1kHz to 2MHz)
<b>S010G010GA</b> (110×60×22mm) 		<b>For local oscillator for microwave radios reference signal of radar system or measurement equipment</b> Frequency Range : 4GHz to 10GHz Frequency Setting Resolution : 1MHz step Frequency Stability : Depends on External Reference Signal Max. $\pm 3 \times 10^{-6}$ / 10 years (Internal TCXO Stability) Spurious Non-harmonics : Max. -60dBc SSB Phase Noise : Typ. -80dBc / Hz at 1kHz (@4GHz) We offer custom design services that match required specifications and applications, even more radar system, etc., by setting with frequency ranges, high-speed frequency switching, low phase noise etc.



## ■ Millimeter-wave converter

<b>C057G064GB</b> (138×138×214mm) 		<b>For measurement of in-vehicle millimeter-wave radar, motion sensor, industrial sensor.</b> RF Input Frequency Range : 57GHz to 64GHz IF Output Frequency Range : 1GHz to 8GHz Local Frequency : 56GHz Local Signal Phase Noise Max. -110dBc/Hz at 1MHz Conversion Gain : 26dB±1.5dB (Room Temp.)
<b>C076G081GB</b> (138×138×214mm) 		<b>For measurement of in-vehicle millimeter-wave radar</b> RF Input Frequency Range : 76GHz to 81GHz IF Output Frequency Range : 2GHz to 7GHz Local Frequency : 74GHz Local Signal Phase Noise Max. -114dBc/Hz at 1MHz Conversion Gain : 10dB±1.5dB (Room Temp.)

## ■ Optical Component

<b>Optical Low-pass Filter</b>  		An optical low pass filter is used to eliminate false signal that causes color Moiré fringes and false color. You can choose also LiNbO3 wafer other than quartz to reduce total thickness of filter. Additionally, NDK can take care of the bonding with filter glasses and processing of coating, side edge black coating, adhesion of the frame.
<b>Crystal Wavelength Plate</b>  		According to your request regarding wavelength and phase accuracy, dependence of phase accuracy (temperature, incidence angle, wavelength) , you can choose from 3 different waveplate types; Compound zero-order type, Multiple-order type, True zero-order. In addition, Air-gap type which are used High purity quartz crystal and Optical contact type without glue are available as for high-power laser application. Filter up to 4 inch is available, taking advantage of the strength of crystal growth in-house.
<b>Optical filter</b>  		NDK can provide any designed optical filter by combining the various wafer line-ups and technologies of coating, bonding, inspection method. It is also available as sensor cover glass or optical window to adjust the optical characteristics. Wafer : Quartz, Sapphire, Synthetic Quartz Glass, Optical Glass, Absorption Glass (UV, IR, ND) , etc. Coating technology : UVIR-cut, AR, ND, Band-pass coating, conductive coating, water-repellent coating, etc.

## ■ QCM Sensor

<b>NAPiCOS <sup>(*)</sup> series / NAPiCOS Lite &amp; NAPiCOS Auto</b>		<b>NAPiCOS series / NAPiCOS Lite &amp; NAPiCOS Auto</b> NAPiCOS Lite & NAPiCOS Auto with QCM technology base can be used for real time monitoring for Immuno-reaction, Protein binding, DNA binding, etc. <sup>(*)</sup> NAPiCOS is a coined word created by NDK, combining the words "nano", "pico" and "sensor"
<b>Twin-QCM system</b>		<b>Twin-QCM System / Outgas sensor "Twin CQCM &amp; TQCM"</b> <b>(Cryogenic and Thermoelectric QCM* sensors)</b> It can be used for outgassing and environmental monitoring of various materials by performing precise temperature control and capturing mass changes due to substance attachment and detachment to the crystal sensor as frequency changes. *QCM : Quartz Crystal Microbalance

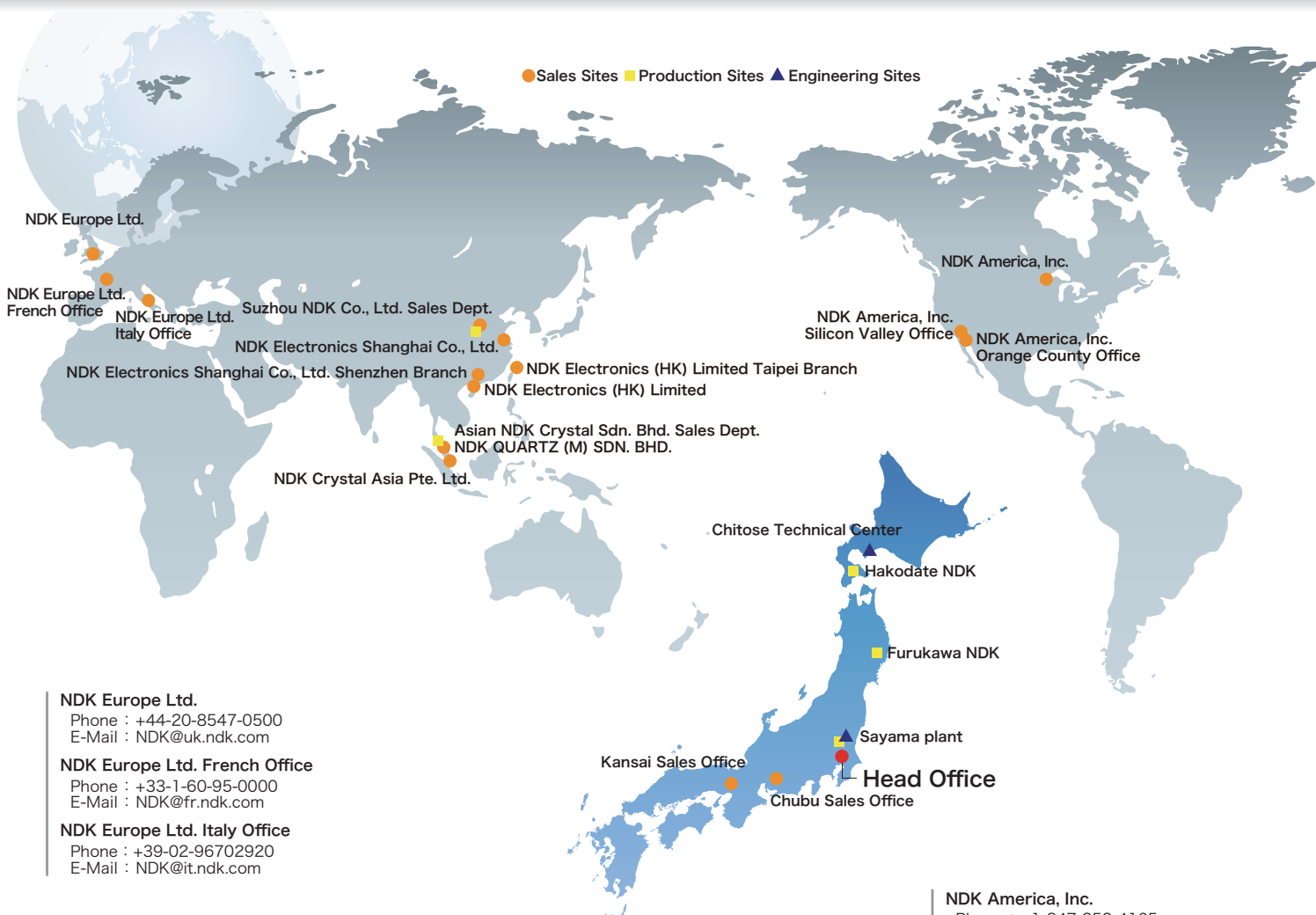
## ■ Ultrasound Probe (Transducer)

<b>Product for 2D imaging &amp; 3D imaging</b> 		<b>NDK has a probe line up for each application and can produce customer's designed products</b> *Customers can decide a specification (frequency, element pitch and element number etc.) *NDK can design an outer shape as per customer's request Moreover, the attestation of "ISO13485:2016" that is International Standard of the quality management system in medical devices acquired, and we will deliver secure, safe and high-quality product for medical devices.
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## SAW Devices (NDK SAW devices product)

<b>WFB69A0866CF</b> (3.0×3.0×1.25mm)  		<b>For short range wireless Saw filter</b> Nominal Frequency : 866.5MHz Insertion Attenuation : Max. 2.5dB Pass Bandwidth : ±3.5MHz Operating Temperature Range : -30 to +80°C Terminating Impedance : 50 Ω
<b>WF998C0915CE</b> (3.0×3.0×1.25mm)  		<b>For short range wireless Saw filter</b> Nominal Frequency : 915MHz Insertion Attenuation : Max. 2.5dB Pass Bandwidth : ±13MHz Operating Temperature Range : -30 to +80°C Terminating Impedance : 50 Ω
<b>WFC11B0922CG</b> (3.0×3.0×1.05mm)  		<b>For short range wireless Saw filter</b> Nominal Frequency : 922.5MHz Insertion Attenuation : Max. 3.5dB Pass Bandwidth : ±2MHz Operating Temperature Range : -20 to +85°C Terminating Impedance : 50 Ω
<b>WFD79C0925FG</b> (1.4×1.1×0.5mm)  		<b>For short range wireless Saw filter</b> Nominal Frequency : 925.8MHz Insertion Attenuation : Max. 3.0dB Pass Bandwidth : Min. 4.6MHz Operating Temperature Range : -25 to +75°C Terminating Impedance : 50 Ω
<b>WFC93B0429CL</b> (3.0×3.0×1.05mm)  		<b>For specified low power radio Saw filter</b> Nominal Frequency : 429.42MHz Insertion Attenuation : Max. 3.5dB Pass Bandwidth : ±0.5MHz Operating Temperature Range : -20 to +70°C Terminating Impedance : 50 Ω
<b>WFC30B0924FF</b> (1.4×1.1×0.5mm)  		<b>For specified low power radio Saw filter</b> Nominal Frequency : 924MHz Insertion Attenuation : Max. 3.2dB Pass Bandwidth : 8MHz Operating Temperature Range : -40 to +85°C Terminating Impedance : 50 Ω
<b>WFG63D0315CG</b> (3.0×3.0×1.05mm)   		<b>For RKE (Remote keyless entry system) Saw filter</b> Nominal Frequency : 315MHz Insertion Attenuation : Max. 2.0dB Pass Bandwidth : 1MHz Operating Temperature Range : -40 to +105°C Terminating Impedance : 50 Ω Conforms to AEC-Q200
<b>WFC75C1472CE</b> (3.0×3.0×1.05mm)   		<b>For Automotive Satellite radio Saw filter</b> Nominal Frequency : 1472MHz Insertion Attenuation : Max. 3.2dB Pass Bandwidth : 40MHz Operating Temperature Range : -40 to +125°C Terminating Impedance : 50 Ω Conforms to AEC-Q200
<b>WFF93A1582UE</b> (1.4×1.1×0.6mm)   		<b>For Automotive GPS / GLONASS / BEIDOU.</b> Nominal Frequency : 1582.355MHz Insertion Attenuation : Max. 2.0dB Pass Bandwidth : 46.61MHz Operating Temperature Range : -40 to +85°C Terminating Impedance : 50 Ω Conforms to AEC-Q200

# Group Networks



## NDK Europe Ltd.

Phone : +44-20-8547-0500  
E-Mail : NDK@uk.ndk.com

## NDK Europe Ltd. French Office

Phone : +33-1-60-95-0000  
E-Mail : NDK@fr.ndk.com

## NDK Europe Ltd. Italy Office

Phone : +39-02-96702920  
E-Mail : NDK@it.ndk.com

## Asian NDK Crystal Sdn. Bhd. Sales Dept

Phone : +60-3-5192-3360  
E-Mail : ndks@sin.ndk.com

## NDK Crystal Asia Pte. Ltd.

Phone : +65-6298-9878  
E-Mail : ndks@sin.ndk.com

## Suzhou NDK Co., Ltd. Sales Dept.

Phone : +86-5126-8252071  
E-Mail : ndkchina-m@sh.ndk.com

## NDK Electronics (HK) Limited

Phone : +852-2956 3181  
E-Mail : sznnew@ndk.com

## NDK Electronics (HK) Limited Taipei Branch

Phone : +886-2-2555-0232  
E-Mail : sales@tp.ndk.com

## NDK Electronics Shanghai Co., Ltd.

Phone : +86-21-6278-5115  
E-Mail : ndkchina-m@sh.ndk.com

## NDK Electronics Shanghai Co., Ltd. Shenzhen Branch

Phone : +86-755-22182269  
E-Mail : ndkchina-m@sh.ndk.com

## NDK America, Inc.

Phone : +1-847-852-4165  
E-Mail : sales@ndkxtal.com

## NDK America, Inc. Silicon Valley Office

Phone : +1-408-428-0800  
E-Mail : sales@ndkxtal.com

## NDK America, Inc. Orange County Office

Phone : +1-949-444-3882  
E-Mail : sales@ndkxtal.com

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## NIHON DEMPA KOGYO CO.,LTD.

### Head Office

Merkmal Keio Sasazuka Bldg.,  
1-47-1, Sasazuka, Shibuya-ku,  
Tokyo 151-8569, Japan  
Phone : 81-3-5453-6711  
FAX : 81-3-5453-6733

### More Information

<https://www.ndk.com/en/>

