

# CRYSTAL PRODUCTS

Issued 2024

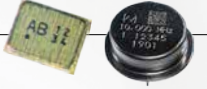
Tuning Fork Crystal Units  
(kHz range)



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



Crystal Unit  
(MHz range)



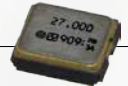
SPXO



TCXO



VCXO



OCXO



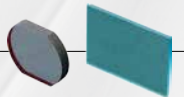
Frequency Synthesizer



Millimeter-wave converter



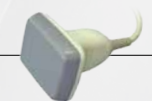
Optical Component



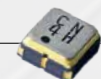
QCM Sensor



Ultrasound Probe  
(Transducer)



SAW Devices

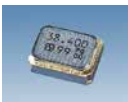
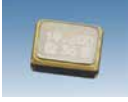
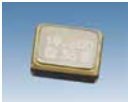


This catalog shows products and specifications of our main range.  
 Please contact our sales representatives or visit our website (<https://www.ndk.com/>) with your inquiries.

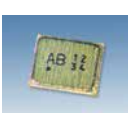

**■ Tuning Fork Crystal Units (kHz range)**



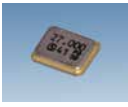









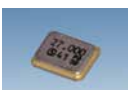


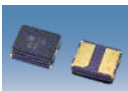












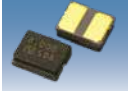



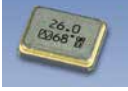



<p><b>NX1610SA</b> (1.6×1.0×0.45mm)</p> <p><b>NX2012SA</b> (2.0×1.2×0.55mm)</p> <p><b>NX3215SA</b> (3.2×1.5×0.8mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Ultra compact size tuning fork crystal unit (kHz range)</b>                  Nominal Frequency : 32.768kHz                  Frequency Tolerance :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

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









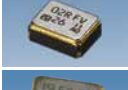

<p><b>NX1612SD</b> (1.6×1.2×0.65mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Ultra compact size crystal unit with built-in thermistor</b>                  Nominal Frequency Range : 26 to 160MHz                  Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 12 \times 10^{-6}</math> / -30 to +85°C</p>
<p><b>NX2016SF</b> (2.0×1.6×0.65mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Compact size crystal unit with built-in thermistor</b>                  Nominal Frequency Range : 19.2 to 55.2MHz                  Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 12 \times 10^{-6}</math> / -30 to +85°C</p>
<p><b>NX2016SF</b> (2.0×1.6×0.65mm)</p> <p>RoHS Compliant Pb free AEC Q200</p>		<p><b>Compact size crystal unit with built-in thermistor for Automotive</b>                  Nominal Frequency Range : 19.2 to 55.2MHz                  Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 25 \times 10^{-6}</math> / -40 to +105°C                  Conforms to AEC-Q200</p>

**■ Crystal Unit (MHz range)**

<p><b>NX1008AA</b> (1.0×0.8×0.25mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Ultra compact size crystal unit (1.0×0.8mm)</b>                  Nominal Frequency Range : 32 to 64MHz                  Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 10 \times 10^{-6}</math> / -30 to +85°C                  Nominal Frequency Range : 64 to 160MHz                  Frequency Tolerance : <math>\pm 15 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 12 \times 10^{-6}</math> / -30 to +85°C</p>
<p><b>NX1210AB</b> (1.2×1.0×0.25mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Ultra compact size crystal unit (1.2×1.0mm)</b>                  Nominal Frequency Range : 24 to 64MHz                  Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 10 \times 10^{-6}</math> / -30 to +85°C                  Nominal Frequency Range : 64 to 160MHz                  Frequency Tolerance : <math>\pm 15 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 12 \times 10^{-6}</math> / -30 to +85°C</p>


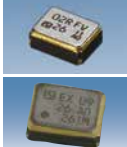
<b>NX1612SA</b> (1.6×1.2×0.3mm)  		<b>Ultra compact size crystal unit (1.6×1.2mm)</b> Nominal Frequency Range : 24 to 64MHz Frequency Tolerance : $\pm 10 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 10 \times 10^{-6}$ / -30 to +85°C Nominal Frequency Range : 64 to 160MHz Frequency Tolerance : $\pm 15 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 12 \times 10^{-6}$ / -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 (NRND)</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 62.4MHz 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 62.4MHz Frequency Tolerance : $\pm 50 \times 10^{-6}$ Frequency / Temperature Characteristics : $\pm 150 \times 10^{-6}$ / -40 to +150°C Conforms to AEC-Q200
<b>NX3225GD</b> (3.2×2.5×0.8mm)  		<b>Crystal unit for Automotive (Low Frequency, High resistance to solder cracking)</b> Nominal Frequency Range : 8 to 12MHz 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 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>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

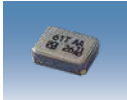
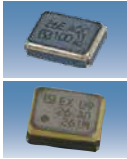

### ■ Simple Packaged Crystal Oscillator (SPXO)

<b>Support to 125°C</b> <b>NZ1612SH / MHz</b> (1.6×1.2×0.6mm) <b>NZ2016SH / NZ2016SEB / MHz</b> (2.0×1.6×0.7mm) <b>NZ2520SH / NZ2520SEB / 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 : 7.5 to 80MHz (NZ1612SH) 6.5 to 160MHz (NZ2016SH) 1.5 to 6.5MHz (NZ2016SEB) 5.5 to 160MHz (NZ2520SH) 1.5 to 5.5MHz (NZ2520SEB) 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>NT2016SEA</b> (2.0×1.6×0.8mm) <b>NT2520SEA</b> (2.5×2.0×0.9mm)   	 	<b>High precision type Clock Oscillator for Automotive</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 Conforms to AEC-Q100/200

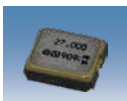
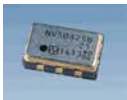

<p><b>NZ1612SHB / kHz</b> (1.6×1.2×0.6mm)</p> <p><b>NZ2016SHB / kHz</b> (2.0×1.6×0.7mm)</p> <p><b>NZ2520SHB / kHz</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Low current consumption and wide temperature range from -40 to +125°C Clock Oscillator</b></p> <p>Nominal Frequency : 32.768kHz Output Specification : CMOS Supply Voltage [V<sub>CC</sub>] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : ±100×10<sup>-6</sup> / -40 to +125°C Current Consumption (During Operation) : Max. 32μA</p>
<p><b>NZ2016SHA / MHz / kHz</b> (2.0×1.6×0.7mm)</p> <p><b>NZ2520SHA / MHz / kHz</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free AEC Q100 Q200</p>		<p><b>High quality and high reliability design for Automotive safety Clock Oscillator</b></p> <p>Nominal Frequency Range : 6.5 to 160MHz 32.768kHz (NZ2016SHA) 5.5 to 160MHz 32.768kHz (NZ2520SHA)</p> <p>Output Specification : CMOS Supply Voltage [V<sub>CC</sub>] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : ±100×10<sup>-6</sup> / -40 to +125°C Conforms to AEC-Q100/200</p>
<p><b>Support to ±25ppm</b></p> <p><b>NZ2520SEB / MHz</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>High precision type Clock Oscillator</b></p> <p>Nominal Frequency Range : 1.5 to 80MHz Output Specification : CMOS Supply Voltage [V<sub>CC</sub>] : +1.8V, +2.5V, +3.0V, +3.3V Overall Frequency Tolerance : ±25×10<sup>-6</sup> / -40 to +85°C</p>
<p><b>NZ2520SDA / MHz</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Ultra low phase noise type, ultra low phase jitter type Clock Oscillator</b></p> <p>Nominal Frequency Range : 20 to 54MHz 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 : ±50×10<sup>-6</sup> / -40 to +85°C</p>
<p><b>NP2520SA NEW</b> (2.5×2.0×0.8mm)</p> <p><b>NP2520SAB NEW</b> (2.5×2.0×0.8mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Differential output SPXO</b></p> <p>Nominal Frequency Range : 100 to 170MHz Output Specification : LVPECL Supply Voltage [V<sub>CC</sub>] : +2.5V, +3.3V Overall Frequency Tolerance : Max. ±50×10<sup>-6</sup> / -40 to +105°C Phase Jitter : Typ. 68fs (SA) Typ. 40fs (SAB) (Offset Frequency : 12kHz to 20MHz) @156.25MHz</p>
<p><b>NP3225SAA NEW</b> (3.2×2.5×0.9mm)</p> <p><b>NP3225SBA NEW</b> (3.2×2.5×0.9mm)</p> <p><b>NP3225SCA NEW</b> (3.2×2.5×0.9mm)</p> <p>RoHS Compliant Pb free AEC Q100 Q200</p>		<p><b>Differential output SPXO for Automotive</b></p> <p>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. ±50×10<sup>-6</sup> / -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)</p>
<p><b>NP5032S[ ]</b> (5.0×3.2×1.2mm)</p> <p><b>NP7050S[ ]</b> (7.0×5.0×1.6mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Multi mode crystal oscillator (Available for customizing specifications by frequency selection function)</b></p> <p>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. ±10×10<sup>-6</sup> / -40 to +85°C (Narrow Tolerance) Max. ±50×10<sup>-6</sup> / -40 to +85°C (Standard)</p>

### ■ Temperature Compensated Crystal Oscillator (TCXO)

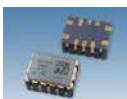


<p><b>NT1612SA</b> (1.6×1.2×0.55mm)</p> <p><b>NT2016SA</b> (2.0×1.6×0.8mm)</p> <p><b>NT2520SB</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>TCXO for high precision GPS</b></p> <p>Nominal Frequency Range : 26 to 52MHz Supply Voltage [V<sub>CC</sub>] : +1.8V, +3.3V Frequency / Temperature Characteristics : Max. ±0.5×10<sup>-6</sup> / -30 to +85°C</p>
<p><b>NT2016SE</b> (2.0×1.6×0.8mm)</p> <p><b>NT2520SE</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free AEC Q100 Q200</p>		<p><b>Supports a wide temperature range from -40 to +105°C for Automotive (TCXO)</b></p> <p>Nominal Frequency Range : 10 to 52MHz Supply Voltage [V<sub>CC</sub>] : +1.8V, +3.3V Frequency / Temperature Characteristics : Max. ±0.5×10<sup>-6</sup> / -40 to +105°C Conforms to AEC-Q100/200</p>

<p><b>NT2016SJA</b> (2.0×1.6×0.8mm)</p> <p>RoHS Compliant Pb free</p>		<p><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. <math>\pm 0.5 \times 10^{-6}</math> / -30 to +85°C</p>
<p><b>NT2016SHC</b> (2.0×1.6×0.8mm)</p> <p><b>NT2520SHC</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free AEC Q100 Q200</p>		<p><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. <math>\pm 3 \times 10^{-6}</math> / -40 to +125°C Conforms to AEC-Q100/200</p>
<p><b>NT5032BB</b> (5.0×3.2×1.8mm)</p> <p><b>NT7050BB</b> (7.0×5.0×2.0mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>High Precision TCXO for 5G and Stratum 3</b> Nominal Frequency Range : 10 to 56MHz Supply Voltage [V<sub>CC</sub>] : +3.3V Frequency / Temperature Characteristics : Max. <math>\pm 0.1 \times 10^{-6}</math> / -40 to +105°C Current Consumption : Max. 10mA With Enable / Disable (Stand-by) function.</p>




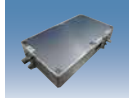
### ■ Voltage Controlled Crystal Oscillator (VCXO)

<p><b>NV2520SA</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Compact size VCXO</b> Nominal Frequency Range : 11 to 40MHz Output Specification : CMOS Overall Frequency Tolerance : Max. <math>\pm 50 \times 10^{-6}</math> / -40 to +85°C Frequency Control Range / Control Voltage : Min. <math>\pm 100 \times 10^{-6}</math> / +1.65±1.65V</p>
<p><b>NV5032SC</b> (5.0×3.2×1.2mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>VCXO for communication equipment and base station</b> Nominal Frequency : 122.88MHz Output Specification : LVPECL Supply Voltage [V<sub>CC</sub>] : +3.3V Overall Frequency Tolerance : Max. <math>\pm 50 \times 10^{-6}</math> / -40 to +105°C Frequency Control Range / Control Voltage : Min. <math>\pm 100 \times 10^{-6}</math> / +1.65±1.65V</p>
<p><b>NV5032S[ ]</b> (5.0×3.2×1.2mm)</p> <p><b>NV7050S[ ]</b> (7.0×5.0×1.6mm)</p> <p>RoHS Compliant Pb free</p>		<p><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, HCSSL Supply Voltage [V<sub>CC</sub>] : +1.8V, +2.5V, +3.3V Overall Frequency Tolerance : Max. <math>\pm 10 \times 10^{-6}</math> / -40 to +85°C (Narrow Tolerance) Max. <math>\pm 50 \times 10^{-6}</math> / -40 to +85°C (Standard) Selection of Frequency Control Range : Min. <math>\pm 50 \times 10^{-6}</math> to Min. <math>\pm 250 \times 10^{-6}</math></p>





### ■ Oven Controlled Crystal Oscillator (OCXO)

<p><b>NH7050SA</b> (7.0×5.0×3.3mm)</p> <p>RoHS Compliant</p>		<p><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. <math>\pm 20 \times 10^{-9}</math> / -40 to +95°C Power Consumption : at stable Max. 0.6W Long-term Frequency Stability : Max. <math>300 \times 10^{-9}</math> / year</p>
<p><b>NH25M22WG</b> (25.4×22×11mm)</p> <p>RoHS Compliant</p>		<p><b>Supports a wide temperature range OCXO (-40 to +85°C)</b> Nominal Frequency : 10MHz Supply Voltage [V<sub>CC</sub>] : +3.3V Frequency / Temperature Characteristics : Max. <math>\pm 10 \times 10^{-9}</math> / -40 to +85°C Power Consumption : at stable Max. 1.3W Long-term Frequency Stability : Max. <math>50 \times 10^{-9}</math> / year Low Near-carrier Phase Noise Characteristics : -100dBc / Hz at 1Hz offset</p>
<p><b>NH26M26LC</b> (26×26×12.5mm)</p> <p>RoHS Compliant</p>		<p><b>Low phase noise and high stability OCXO</b> Nominal Frequency : 10MHz Supply Voltage [V<sub>CC</sub>] : +5.0V Frequency / Temperature Characteristics : Max. <math>\pm 10 \times 10^{-9}</math> / -40 to +85°C Power Consumption : at stable Max. 1.3W Long-term Frequency Stability : Max. <math>50 \times 10^{-9}</math> / year Low Near-carrier Phase Noise Characteristics : -100dBc / Hz at 1Hz offset</p>



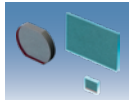





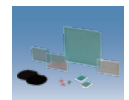
## ■ Frequency Synthesizer

<p><b>S6R6G6R6GA</b> (140×70×22mm)</p> <p></p>		<p><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                                                  Max. <math>\pm 5 \times 10^{-6}</math> / 10 years (Internal TCXO Stability)                  SSB Phase Noise : Max. -47dBc (Integrated value of 1kHz to 2MHz)</p>
<p><b>S010G010GA</b> (110×60×22mm)</p> <p></p>		<p><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. <math>\pm 3 \times 10^{-6}</math> / 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.</p>



## ■ Millimeter-wave converter

<p><b>C057G064GB</b> (138×138×214mm)</p> <p></p>		<p><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.)</p>
<p><b>C076G081GB</b> (138×138×214mm)</p> <p></p>		<p><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.)</p>

## ■ Optical Component

<p><b>Optical Low-pass Filter</b></p> <p> </p>		<p>An optical low pass filter is used to eliminate false signal that causes color Moiré fringes and false colors. You can choose also LiNbO3 wafer other than quartz to reduce total thickness of the filter. Additionally, NDK can take care of the bonding with filter glasses and processing of coating, side edge black coating, and adhesion of the frame.</p>
<p><b>Crystal Wavelength Plate</b></p> <p> </p>		<p>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 type. 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.</p>
<p><b>Optical filter</b></p> <p> </p>		<p>NDK can provide any designed optical filter by combining the various wafer line-ups and technologies of coating, bonding, inspection method. Radiation-resistant quartz crystal filters are also available for use in nuclear power generation and space environments. Wafer: Quartz, Sapphire, Synthetic Quartz Glass, Optical Glass, Absorption Glass (UV, IR, ND) Coating technology : UVIR-cut, AR, ND, Band-pass coating, conductive coating (ITO), water-repellent coating</p>

## ■ QCM Sensor










<p><b>NAPiCOS <sup>(*)</sup> series / NAPiCOS Lite &amp; NAPiCOS Auto</b></p>		<p><b>NAPiCOS series / NAPiCOS Lite &amp; NAPiCOS Auto</b>                  NAPiCOS Lite &amp; NAPiCOS Auto with QCM technology base can be used for real time monitoring for Immuno-reaction, Protein binding, DNA binding, etc.                  (*) NAPiCOS is a coined word created by NDK, combining the words "nano", "pico" and "sensor"</p>
<p><b>Twin-QCM system</b></p>		<p><b>Twin-QCM System / Outgas sensor / Process Monitor</b>                  It can be used for outgas measurement of various materials, environmental monitor, and real-time process monitor for semiconductor manufacturing equipment by monitoring the frequency (mass) change caused by absorption and desorption of substances to the crystal sensor with precise temperature control.                  *QCM : Quartz Crystal Microbalance</p>

## ■ Ultrasound Probe (Transducer)

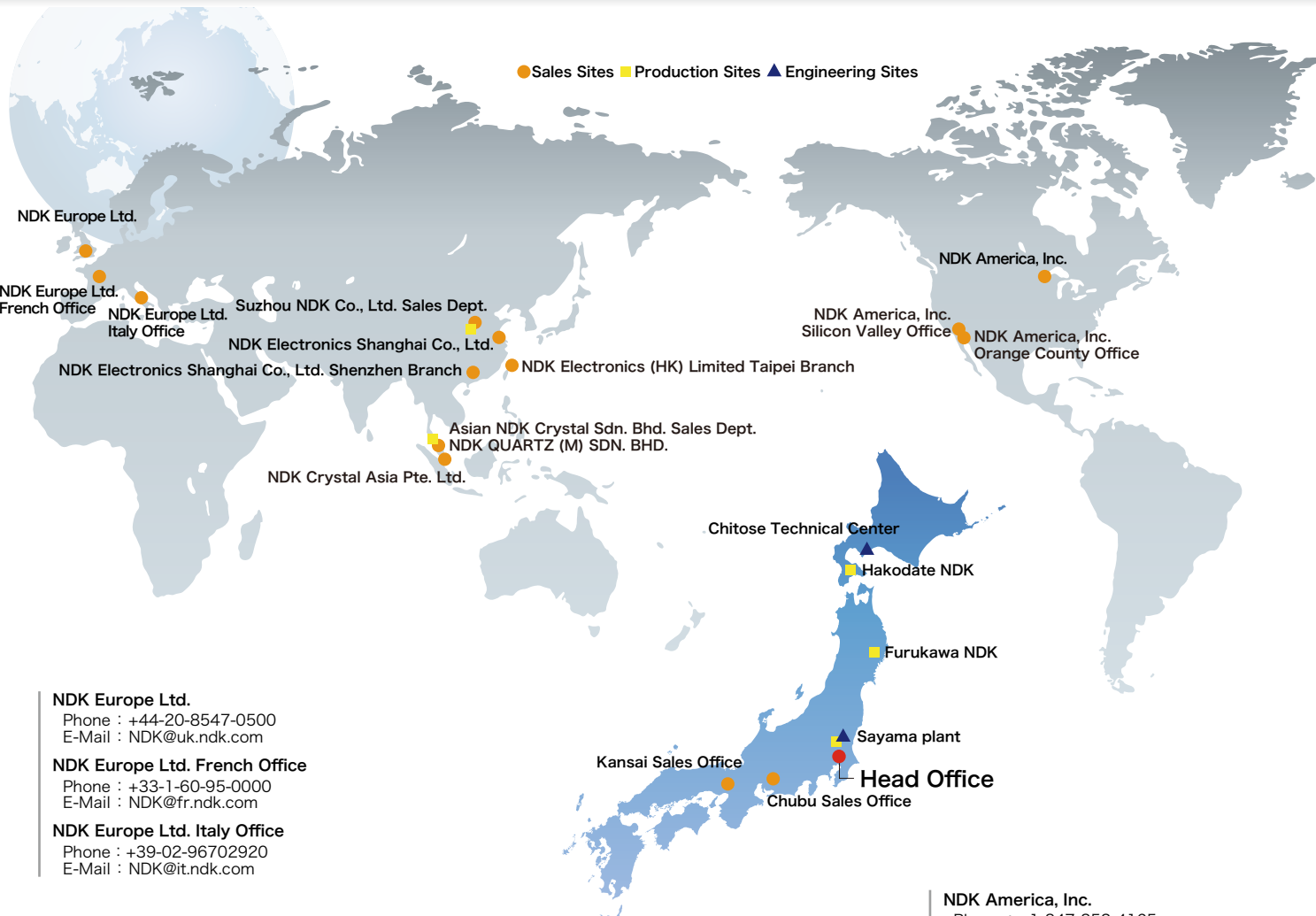
<p><b>Product for 2D imaging &amp; 3D imaging</b></p> <p></p>		<p><b>NDK has a probe line up for each application and can produce customer's designed products</b>                  *Customers can decide a specification (frequency, element pitch and element number etc.)                  *NDK can design 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.</p>
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■ SAW Devices (Manufactured by NDK SAW devices Co., Ltd.)

More information : <https://www.sitorf.com/en/index.html>

<p><b>WFB69A0866CF</b> (3.0×3.0×1.25mm)</p> <p>RoHS Compliant Pb free</p>		<p><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</p>
<p><b>WF998C0915CE</b> (3.0×3.0×1.25mm)</p> <p>RoHS Compliant Pb free</p>		<p><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</p>
<p><b>WFC11B0922CG</b> (3.0×3.0×1.05mm)</p> <p>RoHS Compliant Pb free</p>		<p><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</p>
<p><b>WFD79C0925FG</b> (1.4×1.1×0.5mm)</p> <p>RoHS Compliant Pb free</p>		<p><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</p>
<p><b>WFC93B0429CL</b> (3.0×3.0×1.05mm)</p> <p>RoHS Compliant Pb free</p>		<p><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</p>
<p><b>WFC30B0924FF</b> (1.4×1.1×0.5mm)</p> <p>RoHS Compliant Pb free</p>		<p><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</p>
<p><b>WFG63D0315CG</b> (3.0×3.0×1.05mm)</p> <p>RoHS Compliant Pb free AEC Q200</p>		<p><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</p>
<p><b>WFC75C1472CE</b> (3.0×3.0×1.05mm)</p> <p>RoHS Compliant Pb free AEC Q200</p>		<p><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</p>
<p><b>WFF93A1582UE</b> (1.4×1.1×0.6mm)</p> <p>RoHS Compliant Pb free AEC Q200</p>		<p><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</p>

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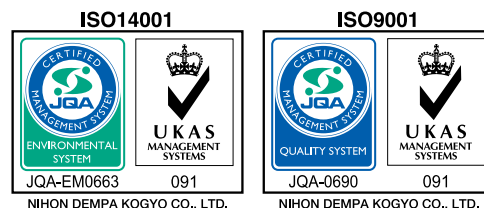
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