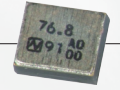


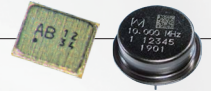
Crystal Unit  
(32.768kHz)



Crystal Unit  
with built in thermistor



Crystal Unit  
(MHz, PIN Type)



SPXO



TCXO



VCXO



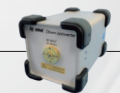
OCXO



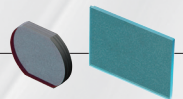
Frequency Synthesizer



Millimeter-wave converter



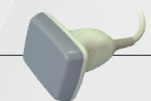
Optical Component



QCM Sensor



Ultrasonic Probe  
(Transducer)



SAW Devices








# CRYSTAL PRODUCTS

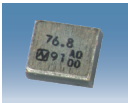
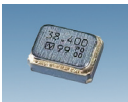


Issued 2022

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.


**Crystal Unit (32.768kHz)**

<p><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)</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)  <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)  <b>NX2012SE</b> (2.0×1.2×0.55mm)  <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> <span style="color: red;">NEW</span> (2.0×1.2×0.55mm)  <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 thermistor**


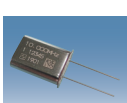
<p><b>NX1210AC</b> (1.2×1.0×0.55mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Ultra compact size crystal unit with built-in thermistor</b>                  Nominal Frequency Range : 38.4 to 96MHz                  Frequency Tolerance : <math>\pm 12 \times 10^{-6}</math>                  Frequency Temperature Characteristics : <math>\pm 12 \times 10^{-6}</math> / -30 to +85°C</p>
<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 76.8MHz                  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)**

<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 80MHz                  Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math>                  Frequency / Temperature Characteristics : <math>\pm 10 \times 10^{-6}</math> / -30 to +85°C (32 to 60MHz)  <math>\pm 15 \times 10^{-6}</math> / -30 to +85°C (60 to 80MHz)</p>
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<p><b>NX1210AB</b> (1.2×1.0×0.25mm)</p> <p>RoHS Compliant</p> <p>Pb free</p>		<p><b>Ultra compact size crystal unit (1.2×1.0mm)</b> Nominal Frequency Range : 26 to 52MHz Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 15 \times 10^{-6}</math> / -30 to +85°C</p>
<p><b>NX1612SA</b> (1.6×1.2×0.3mm)</p> <p>RoHS Compliant</p> <p>Pb free</p>		<p><b>Ultra compact size crystal unit (1.6×1.2mm)</b> Nominal Frequency Range : 24 to 80MHz Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 15 \times 10^{-6}</math> / -30 to +85°C</p>
<p><b>NX2016SA</b> (2.0×1.6×0.45mm)</p> <p>RoHS Compliant</p> <p>Pb free</p>		<p><b>Compact size crystal unit (2.0×1.6mm)</b> Nominal Frequency Range : 16 to 80MHz Frequency Tolerance : <math>\pm 10 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 25 \times 10^{-6}</math> / -40 to +85°C</p>
<p><b>NX2520SA</b> (2.5×2.0×0.5mm)</p> <p>RoHS Compliant</p> <p>Pb free</p>		<p><b>Compact size crystal unit (2.5×2.0mm)</b> Nominal Frequency Range : 16 to 80MHz Frequency Tolerance : <math>\pm 15 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 25 \times 10^{-6}</math> / -40 to +85°C</p>
<p><b>NX1612SA</b> (1.6×1.2×0.3mm)</p> <p>RoHS Compliant</p> <p>Pb free</p> <p>AEC Q200</p>		<p><b>Ultra compact size crystal unit (1.6×1.2mm) for Automotive</b> Nominal Frequency Range : 24 to 80MHz Frequency Tolerance : <math>\pm 15 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 50 \times 10^{-6}</math> / -40 to +125°C Conforms to AEC-Q200</p>
<p><b>NX2016GC</b> (2.0×1.6×0.70mm)</p> <p>RoHS Compliant</p> <p>AEC Q200</p>		<p><b>Compact size crystal unit (2.0×1.6mm) for Automotive</b> Nominal Frequency Range : 16 to 54MHz Frequency Tolerance : <math>\pm 50 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 150 \times 10^{-6}</math> / -40 to +150°C Conforms to AEC-Q200</p>
<p><b>NX2016SA</b> (2.0×1.6×0.45mm)</p> <p>RoHS Compliant</p> <p>Pb free</p> <p>AEC Q200</p>		<p><b>Compact size crystal unit (2.0×1.6mm) for Automotive</b> Nominal Frequency Range : 16 to 80MHz Frequency Tolerance : <math>\pm 15 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 50 \times 10^{-6}</math> / -40 to +125°C Conforms to AEC-Q200</p>
<p><b>NX3225GA</b> (3.2×2.5×0.75mm)</p> <p>RoHS Compliant</p> <p>AEC Q200</p>		<p><b>Crystal unit for Automotive (Excellent environment-resistant performance)</b> Nominal Frequency Range : 9.8 to 50MHz Frequency Tolerance : <math>\pm 50 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 150 \times 10^{-6}</math> / -40 to +150°C Conforms to AEC-Q200</p>
<p><b>NX3225GB</b> (3.2×2.5×0.75mm)</p> <p>RoHS Compliant</p> <p>AEC Q200</p>		<p><b>Crystal unit for Automotive (High resistance to solder cracking)</b> Nominal Frequency Range : 12 to 50MHz Frequency Tolerance : <math>\pm 50 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 150 \times 10^{-6}</math> / -40 to +150°C Conforms to AEC-Q200</p>
<p><b>NX3225SA</b> (3.2×2.5×0.55mm)</p> <p>RoHS Compliant</p> <p>Pb free</p> <p>AEC Q200</p>		<p><b>Compact size crystal unit (3.2×2.5mm) for Automotive</b> Nominal Frequency Range : 12 to 50MHz Frequency Tolerance : <math>\pm 15 \times 10^{-6}</math> Frequency / Temperature Characteristics : <math>\pm 50 \times 10^{-6}</math> / -40 to +125°C Conforms to AEC-Q200</p>

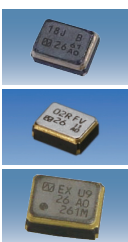
## ■ Crystal Unit (PIN Type)

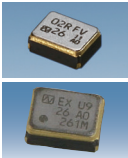
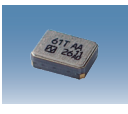

<p><b>RC-8</b> (<math>\phi</math>15.60×4.80mm)</p> <p>RoHS Compliant</p>		<p><b>High reliability crystal unit for OCXO with excellent frequency stability</b> <b>HC-37/U equivalent low profile</b> Nominal Frequency Range : 5 to 20MHz Frequency Tolerance : <math>\pm 3 \times 10^{-6}</math> Operating Temperature Range : -40 to +120°C</p>
<p><b>NC-18C</b> (11.45×5.00×13.46mm)</p> <p>RoHS Compliant</p>		<p><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 : <math>\pm 3 \times 10^{-6}</math> Operating Temperature Range : -40 to +120°C</p>

## Simple Packaged Crystal Oscillator (SPXO)


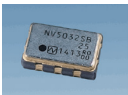

<p><b>NZ1612SH / MHz</b> (1.6×1.2×0.6mm)</p> <p><b>NZ2016SH / MHz</b> (2.0×1.6×0.7mm)</p> <p><b>NZ2520SH / MHz</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Supports a wide temperature range from -40 to +125°C</b> Nominal Frequency Range : 2.0 to 80MHz (NZ1612SH) Output Specification : CMOS 1.5 to 80MHz (NZ2016SH) 1.5 to 170MHz (NZ2520SH)</p> <p>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</p>
<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</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 : ±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</b> Nominal Frequency Range : 1.5 to 80MHz 32.768kHz (NZ2016SHA) Output Specification : CMOS 1.5 to 125MHz 32.768kHz (NZ2520SHA)</p> <p>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>NZ2520SEB / MHz</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>High precision type</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 : ±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</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 : ±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> 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 +85°C Phase Jitter : Typ. 68fs (SA) Typ. 40fs (SAB) (Offset Frequency : 12kHz to 20MHz) @156.25MHz</p>
<p><b>NP3225SA</b> (3.2×2.5×0.9mm)</p> <p><b>NP3225SAB</b> (3.2×2.5×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Differential output SPXO</b> Nominal Frequency Range : 100 to 220MHz (SA) Output Specification : LVPECL 100 to 170MHz (SAB)</p> <p>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. 90fs (SA) Typ. 42fs (SAB) (Offset Frequency : 12kHz to 20MHz) @156.25MHz</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 (Crystal oscillator providing frequency selection function and allowing customization of specifications)</b> Nominal Frequency Range : 15 to 2100MHz Frequency Selection Function : Single, Dual, Quad, Any Rate Output Specification : CMOS, LVPECL, LVDS, CML, HCSSL Supply Voltage [V<sub>cc</sub>] : +1.8V, +2.5V, +3.3V Operating Temperature Range : -40 to +85°C Phase Jitter : Typ. 130fs rms (@622.08MHz)</p>

## Temperature Compensated Crystal Oscillator (TCXO)


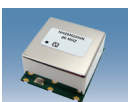
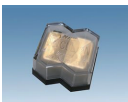

<p><b>NT1612SA</b> (1.6×1.2×0.55mm)</p> <p><b>NT2016SA</b> (2.0×1.6×0.8mm)</p> <p><b>NT2520SB</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>TCXO for high precision GPS (TCXO)</b> Nominal Frequency Range : 26 to 52MHz Supply Voltage [V<sub>cc</sub>] : +1.8V Frequency / Temperature Characteristics : Max. ±0.5×10<sup>-6</sup> / -30 to +85°C</p>
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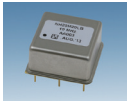
<p><b>NT2016SE</b> (2.0×1.6×0.8mm)</p> <p><b>NT2520SE</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free AEC Q100 Q200</p>		<p><b>Supports a wide temperature range from -40 to +105°C for Automotive (TCXO)</b> Nominal Frequency Range : 10 to 52MHz Supply Voltage [V<sub>cc</sub>] : +1.8V Frequency / Temperature Characteristics : Max. ±0.5×10<sup>-6</sup> / -40 to +105°C Conforms to AEC-Q100/200</p>
<p><b>NT2016SJB</b> (2.0×1.6×0.8mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Ultra-low phase noise characteristics and stand-by function TCXO for audio equipment (TCXO)</b> Nominal Frequency Range : 16 to 76.8MHz Supply Voltage [V<sub>cc</sub>] : +1.8V Frequency / Temperature Characteristics : Max. ±0.5×10<sup>-6</sup> / -30 to +85°C</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 (TCXO)</b> Nominal Frequency Range : 10 to 40MHz Supply Voltage [V<sub>cc</sub>] : +3.3V Frequency / Temperature Characteristics : Max. ±0.1×10<sup>-6</sup> / -40 to +105°C Current Consumption : Max. 10mA With Enable / Disable (Stand-by) function.</p>

### ■ Voltage Controlled Crystal Oscillator (VCXO)


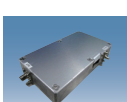
<p><b>NV2520SA</b> (2.5×2.0×0.9mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>Compact size VCXO (VCXO)</b> Nominal Frequency Range : 11 to 40MHz Overall Frequency Tolerance : Max. ±50×10<sup>-6</sup> / -40 to +85°C Frequency Control Range / Control Voltage : Min. ±100×10<sup>-6</sup> / +1.65±1.65V</p>
<p><b>NV5032SC</b> <b>NEW</b> (5.0×3.2×1.2mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>VCXO for communication equipment and base station (VCXO)</b> Nominal Frequency : 122.88MHz Supply Voltage [V<sub>cc</sub>] : +3.3V Overall Frequency Tolerance : Max. ±50×10<sup>-6</sup> / -40 to +85°C Frequency Control Range / Control Voltage : Min. ±100×10<sup>-6</sup> / +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 (crystal oscillator providing frequency selection function and allowing customization of specifications)</b> Nominal Frequency Range : 15 to 2100MHz Frequency Selection Function : Single, Dual, Quad, Any Rate Output Specification : CMOS, LVPECL, LVDS, CML, HCSSL Supply Voltage [V<sub>cc</sub>] : +1.8V, +2.5V, +3.3V Operating Temperature Range : -40 to +85°C Selection of Frequency Control Range : Min. ±50×10<sup>-6</sup> to Min. ±250×10<sup>-6</sup> Phase Jitter : Typ. 130fs rms (@622.08MHz)</p>

### ■ Oven Controlled Crystal Oscillator (OCXO)



<p><b>NH7050SA</b> <b>NEW</b> (7.0×5.0×3.3mm)</p> <p>RoHS Compliant</p>		<p><b>Ultra small size OCXO (7×5mm OCXO)</b> Nominal Frequency : 10,20,30,72,38.88MHz Supply Voltage [V<sub>cc</sub>] : +3.3V Frequency / Temperature Characteristics : Max. ±20×10<sup>-9</sup> / -40 to +95°C Power Consumption : at stable Max. 0.6W Long-term Frequency Stability : Max. 300×10<sup>-9</sup> / year</p>
<p><b>NH25M22WK</b> (25.4×22×11mm)</p> <p>RoHS Compliant</p>		<p><b>Supports wide temperature range OCXO (-40 to +85°C) (OCXO)</b> Nominal Frequency : 20MHz Supply Voltage [V<sub>cc</sub>] : +3.3V Frequency / Temperature Characteristics : Max. ±10×10<sup>-9</sup> / -40 to +85°C Power Consumption : at stable Max. 1.3W Long-term Frequency Stability : Max. 50×10<sup>-9</sup> / year Low Near-carrier Phase Noise Characteristics : -100dBc / Hz at 1Hz offset</p>
<p><b>NH25M22TE</b> (25.4×22×12.1mm)</p> <p>RoHS Compliant</p>		<p><b>Low phase noise and high stability OCXO (OCXO)</b> Nominal Frequency : 10MHz Supply Voltage [V<sub>cc</sub>] : +3.3V Frequency / Temperature Characteristics : Max. ±3×10<sup>-9</sup> / -40 to +85°C Power Consumption : at stable Max. 2.0W Long-term Frequency Stability : Max. 50×10<sup>-9</sup> / year Low Near-carrier Phase Noise Characteristics : -100dBc / Hz at 1Hz offset</p>
<p><b>NH47M47LA</b> (DuCULoN®) (47.2×47×28.5mm)</p> <p>RoHS Compliant</p>		<p><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)</p>
<p><b>NH9070WB</b> (9.5×7.3×4.1mm)</p> <p>RoHS Compliant</p>		<p><b>Ultra small size OCXO (9×7mm Twin-OCXO)</b> Nominal Frequency Range : 5 to 40MHz Supply Voltage [V<sub>cc</sub>] : +3.3V Frequency / Temperature Characteristics : Max. ±10×10<sup>-9</sup> / -40 to +85°C Power Consumption : at stable Max. 0.5W Long-term Frequency Stability : Max. 300×10<sup>-9</sup> / year Excellent Phase Noise Characteristics (20MHz) : -148dBc / Hz at 1kHz offset 14×9mm OCXO and a footprint compatible NH9070WA is also available.</p>
<p><b>NH14M09TA</b> (14.3×9.4×6.5mm)</p> <p>RoHS Compliant</p>		<p><b>High precision small size OCXO (Twin-OCXO)</b> Nominal Frequency Range : 5 to 40MHz Supply Voltage [V<sub>cc</sub>] : +3.3V Frequency / Temperature Characteristics : Max. ±10×10<sup>-9</sup> / -40 to +85°C Power Consumption : at stable Max. 1.0W</p>

<b>NH20M20LB</b> (21.5×21.5×11mm)		<b>High precision OCXO (Twin-OCXO)</b> Product Shape : Pin type Nominal Frequency Range : 5 to 40MHz    Supply Voltage [V <sub>CC</sub> ] : +3.3V Frequency / Temperature Characteristics : Max. $\pm 3 \times 10^{-9}$ / -40 to +85°C Power Consumption : at stable Max. 1.2W
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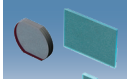


### Frequency Synthesizer

<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)



### Millimeter-wave converter

<b>C057G064GB</b> NEW (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> NEW (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> RoHS Compliant Pb free		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> NEW RoHS Compliant Pb free		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> NEW RoHS Compliant Pb free		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. (*1) 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" (Cryogenic and Thermoelectric QCM sensors for QTGA*)</b> Quartz crystal sensor captures outgas, measures the total amounts, and analyzer can identify the type of absorbed substance. *QTGA : QCM Thermo-Gravimetric Analysis

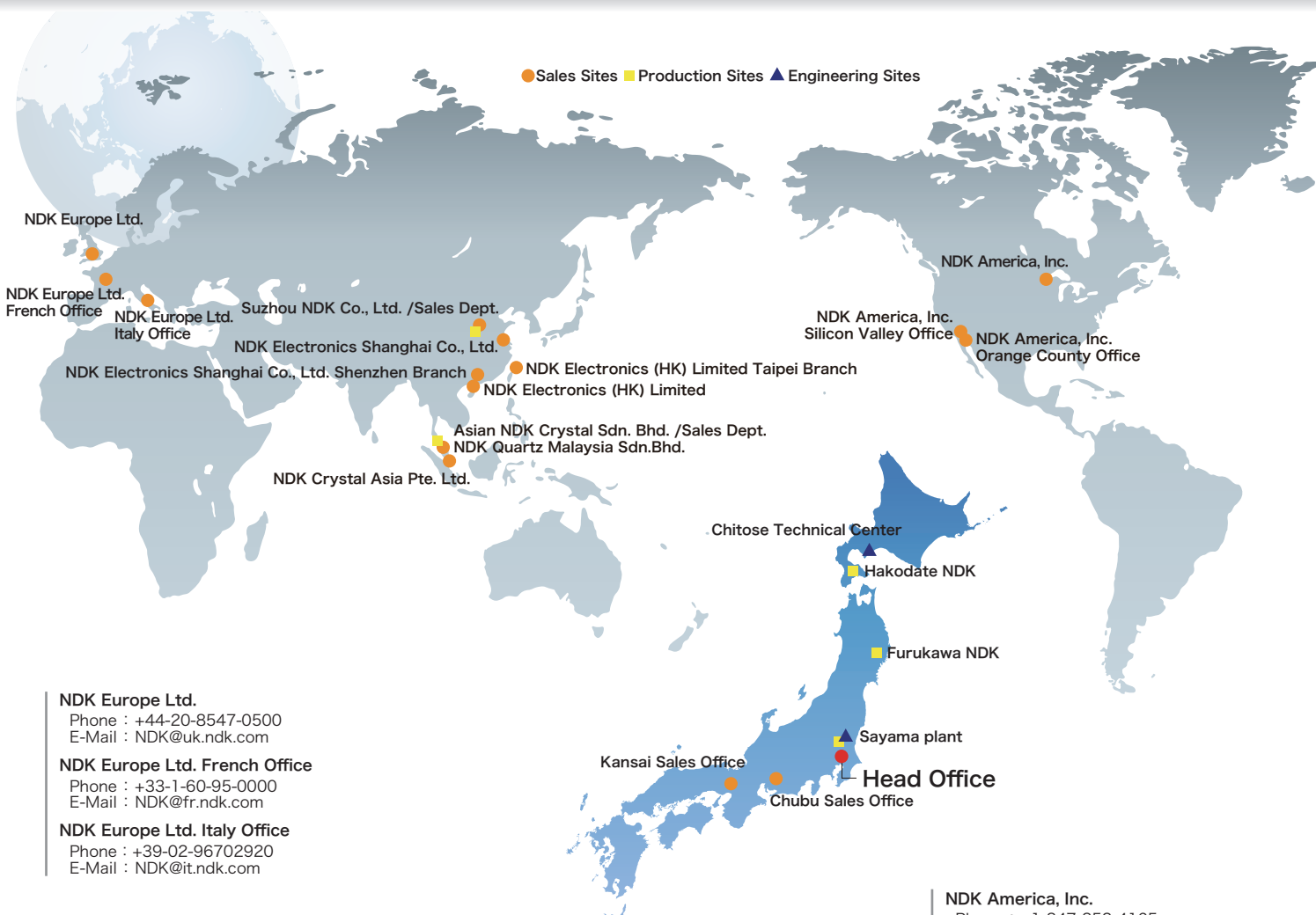
### Ultrasonic Probe (Transducer)

<b>Product for 2D imaging &amp; 3D imaging</b> NDK has a medical manufacturing license. (License number : 118200519)		<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)

<p><b>WFB40F2535CE</b> (3.0×3.0×1.25mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>For base station RF</b> Nominal Frequency : 2535MHz Insertion Attenuation : Max. 3.3dB Pass Bandwidth : Min. 70MHz Operating Temperature Range : -30 to +85°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 land mobile radio system</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>WFC93B0429CL</b> (3.0×3.0×1.05mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>For specified low power radio</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</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>WFD79C0925FG</b> (1.4×1.1×0.5mm)</p> <p>RoHS Compliant Pb free</p>		<p><b>For short range wireless</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>WFG63D0315CG</b> (3.0×3.0×1.05mm)</p> <p>RoHS Compliant Pb free AEC Q200</p>		<p><b>For Automotive RKE (Remote keyless entry system)</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</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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