

The Vectron Family Tree



Vectron Frequency Control University



Vectron International offers its FCU to provide both commercial and military personnel with a comprehensive overview of the manufacturing process and basic design information for crystals, crystal oscillators (XO, VCXO, TCXO, OCXO, EMXO, VCXO), crystal filters, SAW filters, and oscillator based modules. As the focus is product training, we will use our frequency control components for training examples where necessary, though there will be no sales pitch for Vectron products. These classes have been attended by both technical and non-technical personnel with excellent results. The training session is free and you will be provided with all reference material required. Vectron covers your hotel accommodations and meals. You are responsible for transportation to the training location as well as to and from the hotel to Vectron. Sessions are held several times per year and they alternate between our Mt. Holly Springs, PA and our Hudson, NH facilities. To get more information on our FCU, log onto our web site at www.vectron.com and click on Vectron FCU.

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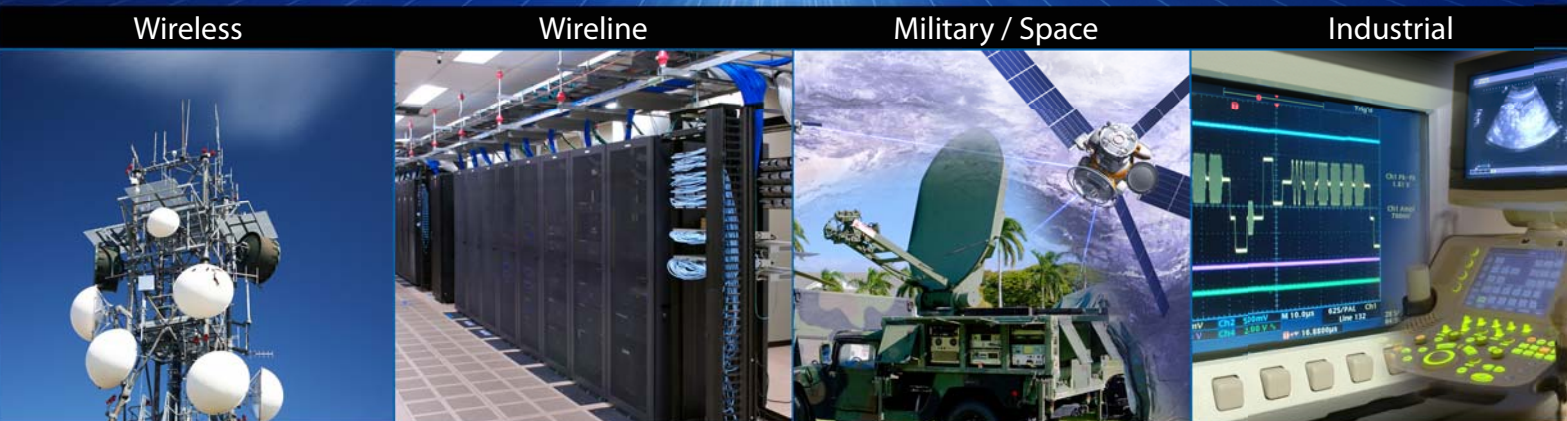
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Helping Customers Innovate, Improve & Grow



Helping Customers Innovate, Improve & Grow



Precision Frequency Control and Timing Solutions

- Oven Controlled Crystal Oscillators (OCXO)
- Evacuated Miniature Crystal Oscillators (EMXO)
- Temperature Compensated Crystal Oscillators (TCXO)
- Voltage Controlled SAW Oscillators (VCXO)
- Voltage Controlled Crystal Oscillators (VCXO)
- Frequency Translators / Jitter Attenuators (FX / CS / CDR)
- SAW Filters
- Clock Oscillators (XO)
- Precision Timing Solutions
- High Temperature Electronics (HTE)

About Vectron International

Vectron International is a world leader in the design, manufacture and marketing of Frequency Control, Sensor, and Hybrid Product solutions using the very latest techniques in both bulk acoustic wave (BAW) and surface acoustic wave (SAW) based designs from DC to microwave frequencies. Products include crystals and crystal oscillators, frequency translators, clock and data recovery products, SAW filters and components used in telecommunications, data communications, frequency synthesizers, timing, navigation, military, aerospace and instrumentation systems.

Headquartered in Hudson, NH and with operating facilities and sales offices in North America, Europe and Asia, Vectron International is well known for its technical capabilities in both crystal oscillator and SAW filter design. The innovation and capability provided by the company reflects the trend towards higher frequencies, low cost designs and miniaturization, as well as more technologically sophisticated integrated solutions. Some of the key technologies offered include: ASIC Design, Surface Mount Technology, Ceramic Packaging, Hybrid Manufacturing to class "S", High Frequency Fundamental (HFF) Crystal design and Space Component Capability.

Our facilities contain state of the art equipment. From discrete crystal technology highlighted by the advanced manufacture of High Frequency Fundamental and SC cut crystals...to class 100 and class 10,000 clean room facilities in the manufacture of leading edge ceramic packaged VCXOs, timing recovery and clock recovery units and SAW based filters...to state of the art testing capabilities including a dedicated facility for space component manufacture.

Vectron is both a product manufacturer and a solutions provider, leading with its unique technology but always prepared to design and engineer custom solutions where required. Vectron's core competency combines its classic crystal and SAW technology with sophisticated integrated circuits and advanced packaging. Aside from these great innovative capabilities, Vectron strives to be extremely flexible and focused on service, responding quickly and professionally **Helping Customers Innovate, Improve and Grow** their business.

Vectron's Quality Policy

Vectron is and will remain a world-class supplier to its global market and will apply innovative, forward-looking, ethical principles in complying with the requirements of that market. We are totally committed to recognizing the needs of our customers, and responding to those needs with superior quality, service, responsiveness and specification compliance.

All of our employees are dedicated to these principles with total customer satisfaction and continual improvement as their constant goal.

Our Commitment to Quality

The company's quality assurance systems are geared towards customer service, from initial customer contact through product development to delivery of product and after sales support. All Vectron International facilities have a fully documented and implemented Quality Management System certified to the international ISO 9001 standard. Continuous improvement is the foundation of Vectron International's working philosophy which is managed through deployment of Lean manufacturing principles, 5S planning and Six Sigma initiatives.

Commitment to Business Integrity, Social Responsibility, Environment, Health & Safety

Emerging Electronic Industry business standards continue to focus on business integrity, social responsibility, environment and health & safety compliance. Vectron has a documented Code of Conduct that defines how company and its employees manage the business with integrity and comply with all laws and regulations dealing with employment and wage practices, labor practices, import/export trade regulations, environment and health & safety regulations.

With its key locations registered to the ISO14001 Environmental Management standard, Vectron is committed to the protection of the environment and conservation of natural resources. Vectron facilities fully comply with all required environmental regulations and laws, and review compliance on a regular basis. All of Vectron's manufacturing operations are free of ozone-depleting substances, as well as where applicable; the products are free of any hazardous substances that are stipulated or prohibited from use by customer requirements and/or international regulations, such as RoHS and REACH.

Conservation of global resources and pollution prevention is a high priority in our operations which is exemplified by site-specific practices which may include among others, recycling and use of recycled products.

Clock / XO Solutions

VC-820

- Output: CMOS
- Frequency: Up to 133 MHz
- Package: 3.2 x 2.5 x 1.2 mm
- Power Supply: 1.8, 2.5 or 3.3 V
- Enable/Disable for board test and debug
- -10/70°C or -40/85°C or -55/125°C operating temperature
- Low Jitter

VM-822

- Output: HCML, LVDS, LVPECL
- Frequency: 10 to 460 MHz
- Package: 3.2 x 2.5 x 0.85 mm
- Power Supply: 2.25 to 3.6 V
- Enable / Disable
- Excellent ± 10 ppm temperature stability
- -20/70°C or -40/105°C operating temperature
- Compact QFN Package
- Peak to Peak period jitter <35ps
- Low Power

VCC1

- Output: CMOS
- Frequency: 1.024 to 190 MHz
- Package: 5 x 7 x 1.8 mm
- Power Supply: 1.8, 2.5, 3.3 or 5.0 V
- Output Disable feature
- Excellent ± 20 ppm temperature stability
- -10/70°C or -40/85°C or -55/125°C operating temperature
- Fundamental Oscillator design with low jitter performance

VC-709

- Output: LVPECL, LVDS, HCML
- Frequency: 10 to 200 MHz
- Package: 5 x 7 x 1.8 mm
- Power Supply: 2.5 or 3.3 V
- Typically 0.1 ps rms jitter, 12 kHz - 20 MHz
- -10/70°C or -40/85°C operation
- Fundamental Oscillator design with low jitter performance

VC-708

- Output: LVPECL, LVDS
- Frequency: 20 to 200 MHz
- Package: 5 x 7 x 1.8 mm
- Power Supply: 2.5 or 3.3 V
- 50fs RMS jitter typical, 12 kHz - 20 MHz
- -10/70°C or -40/85°C operation
- Ultra Low jitter performance, fundamental or 3rd OT crystal design
- Differential Output

PS-702

- Output: LVPECL, LVDS
- Frequency: 150 MHz to 1 GHz
- Package: 5 x 7 x 2 mm
- Power Supply: 3.3 V
- ASIC Technology for ultra-low jitter
- 0.100 ps-rms typical across 12 kHz to 20 MHz
- 0.120 ps-rms typical across 50 kHz to 80 MHz
- Output disable feature
- Improved temperature stability over standard SAW XO

VCXO Solutions

VV-800 (Formerly VVC4)

- Output: CMOS
- Frequency: 1.544 to 77.76 MHz
- Package: 3.2 x 5 x 1.2 mm
- Power Supply: 3.3 or 5.0 V
- Fundamental crystal design with low jitter performance
- Output Disable feature
- Excellent ± 20 ppm temperature stability
- -10/70°C or -40/85°C operating temperature

VV-701

- Output: CMOS
- Frequency: 1.544 to 122.08 MHz
- Package: 5 x 7.5 x 1.8 mm
- Power Supply: 3.3 or 5.0 V
- Fundamental crystal design with low jitter performance
- Output Disable feature
- Excellent ± 20 ppm temperature stability
- 0/70°C or -40/85°C operating temperature

VX-705

- Output: CMOS, PECL
- Frequency: 77.76 to 160 MHz
- Package: 5 x 7 x 1.8 mm
- Power Supply: 3.3 V
- Quick turn delivery
- Low jitter, sub 1ps performance
- Output disable feature
- Excellent ± 20 ppm temperature stability
- 0/70°C or -40/85°C operating temperature

VX-700

- Output: LVPECL
- Frequency: 77.76 to 200 MHz
- Package: 5 x 7.5 x 1.8 mm
- Power Supply: 3.3 V
- Fundamental VCXO with no subharmonics or spurs
- Low Jitter, sub 1ps performance
- Output Disable feature
- Excellent ± 20 ppm temperature stability
- 0/70°C or -40/85°C operating temperature

VX-501

- Output: HCMOS, PECL, LVDS, LVPECL, Sinewave
- Frequency: 1 to 1040 MHz
- Package: 14.5 x 9.5 x 5.9 mm or height option 2.8 mm
- Power Supply: 3.3 or 5.0 V
- AT-Cut Crystal
- Surface Mount FR4 based package
- Reflow process compatible
- Low phase noise
- Tight stabilities

VX-508

- Output: HCMOS, LVCMOS
- Frequency: 10 to 120 MHz
- Package: 9 x 14 x 5.9 mm
- Power Supply: 3.3 or 5.0 V
- Low G-sensitivity
- High shock resistant
- Vibration hardened
- Random vibration according to MIL-STD-202G, Method 214A; Condition II-D 0.1 g/2Hz / 30 grms

VCXO Solutions

VS-705

- Output: LVPECL or LVDS
- Frequency: 122.88 to 1 GHz
- Package: 5 x 7.5 x 2.5 mm
- Power Supply: 2.5 or 3.3 V
- 5th Generation ASIC technology for ultra-low jitter performance
- 120 fs-rms (f_N = 622.08 MHz, 12 kHz to 20 MHz)
- 105 fs-rms (f_N = 622.08 MHz, 50 kHz to 80 MHz)
- Spurious suppression, 90 dBc typical
- Tri-State output select (OD, OS, OE)
- Replacement to VS-700

VS-709

- Output: LVPECL, LVDS
- Frequency: 155.52 to 983.04 MHz
- Package: 5 x 7 x 1.8 mm
- Power Supply: 2.5 or 3.3 V
- Dual Frequency VCXO
- 120 fs-rms (f_N = 622.08 MHz, 12 kHz to 20 MHz)
- 105 fs-rms (f_N = 622.08 MHz, 50 kHz to 80 MHz)
- Tri-State frequency select (F1, OD, F2)
- Replacement to VS-751

VS-702

- Output: LVPECL, LVDS
- Frequency: 150 MHz to 1 GHz
- Package: 5 x 7 x 2 mm
- Power Supply: 3.3 V
- 0.100 ps-rms typical across 12 kHz to 20 MHz
- 0.120 ps-rms typical across 50 kHz to 80 MHz
- APR up to ± 100 ppm
- Improved temperature stability over standard VCXO
- 75 fs-rms (f_N=614.4 MHz, 1 kHz to 40 MHz)

VS-401

- Output: Sinewave ≥ 5 dBm
- Frequency: 1.3 to 2.0 GHz
- Package: 13 x 20 mm
- Power Supply: 5.0 V
- Ultra-Low jitter for 100G optical systems
- 8 fs-rms (f_N=1.75 GHz, 12 kHz to 20 MHz)
- Operating temperature: -20° to +85°C

Module Solutions

MD-010 Disciplined Oscillator Module

- Can discipline to 1PPS / GPS input
- 1pps and 10MHz output signals standard
- Embedded precision oscillator
- Serial communications interface standard
- Selectable 1PPS Auxiliary Input

Integrated Timing Module

- Accepts 2 reference inputs
- Supports free-run, holdover and lock modes
- Generates 3 output frequencies
- Standard size: 38 x 38 x 8 mm
- Customized solutions available

TCXO Solutions

VT-840

- Output: Clipped Sine Wave
- Frequency: 8 to 52 MHz
- Package: 2.5 x 2.0 x 0.9 mm
- Power Supply: 1.8, 2.8, 3.0 or 3.3 V
- Temperature Stability: -30°C to +85°C; ± 0.5 ppm
- Fundamental crystal design
- Optional VCXO function available
- Gold over nickel contact pads
- GPS quality performance

VT-803

- Output: CMOS, Clipped Sine Wave
- Frequency: 10 to 52 MHz
- Package: 5 x 3.2 x 1.5 mm
- Power Supply: 2.8, 3.0, 3.3 or 5.0 V
- Temperature Stability: -10°C to +70°C; ± 0.1 ppm, -40 to +85°C; ± 0.2 ppm
- Fundamental crystal design
- Optional VCXO function available
- Gold over nickel contact pads
- Hermetically sealed ceramic SMD package

VT-700

- Output: Clipped Sine Wave, CMOS
- Frequency: 10 to 50 MHz
- Package: 5 x 7 x 2 mm
- Power Supply: 2.8, 3.0, 3.3 or 5.0 V
- Temperature Stability: -40°C to +85°C; ± 1.0 ppm
- Fundamental crystal design
- Optional VCXO function available
- Gold over nickel contact pads

TX-703/TX-704

- Output: Clipped Sine Wave, CMOS
- Frequency: 6.4 to 35 MHz
- Package: 5 x 7 x 1.8 mm
- Power Supply: 3.3 V
- Temperature Stability: -40°C to +85°C; ± 0.28 ppm
- EFC option
- 100% RoHS compliant
- Standard frequencies: 10, 12.8, 19.2, 19.44, 20, 20.48, 26 MHz

TX-500

- Output: HCMOS, Clipped Sine Wave, PECL, LVDS
- Frequency: 6.4 to 160 MHz
- Package: 9.5 x 14.4 x 5.9 mm
- Power Supply: 3.3 or 5.0 V
- Temperature Stability: -40°C to +85°C; ± 0.28 ppm
- EFC standard
- Low phase noise option
- Low profile

TX-502

- Output: HCMOS
- Frequency: 5 to 15 MHz
- Package: 9.5 x 14.4 x 5.9 mm
- Power Supply: 3.3 or 5.0 V
- Temperature Stability: -20°C to +70°C; ± 70 ppb
- Current Consumption: <12mA
- Standard frequencies: 10, 12.8, 13, 19.2, 20, 26 MHz
- OCXO replacement with low power consumption

OCXO/EMXO Solutions

EX-420

- Output: HCMOS, Sinewave
- Frequency: 10 to 30 MHz
- Package: 13 x 13 mm, low profile 7.6 mm height
- Power Supply: 3.3 or 5.0 V
- Low Power: 0.3W steady state
- Fast warm-up: <1 minute
- Ideal for high stability battery operated equipment

OX-501 / OX-503

- Output: HCMOS
- Frequency: 10 to 40 MHz / 10 to 54 MHz
- Package: 9.5 x 14.4 x 6.2 mm / 9.5 x 14.4 x 9.9 mm
- Power Supply: 3.3 V
- Temperature Stability: -40°C to 85°C; ± 20 ppb / -40 to +85°C; ± 25 ppb
- AT-cut aging / SC-cut aging
- mini OCXO with high stability

OX-400

- Output: HCMOS
- Frequency: 10 to 160 MHz
- Package: 13 x 20 x 8.5 mm
- 4 Pin Dip
- Power Supply: 3.3 or 5.0 V
- Temperature Stability: -20°C to 70°C; ± 10 ppb
- TCXO replacement for better short term stability

OX-200

- Output: HCMOS, Sinewave
- Frequency: 10 to 100 MHz
- Package: 25.4 x 25.4 x 10.4 mm
- Supply: 3.3, 5.0 or 12.0 V
- Temperature Stability: -20°C to 70°C; ± 5 ppb
- Low aging option
- Low profile

OX-170 / DX-170

- Output: HCMOS, Sinewave
- Frequency: 5 to 40 / 20 MHz
- Package: 38 x 27 x 12.2 mm, Eurocase
- Power Supply: 3.3, 5.0 or 12.0 V / 5.0 & 12.0 V
- Temperature Stability: -20°C to 70°C; ± 5 ppb / ± 0.4 ppb
- Excellent temperature stability
- Ultra-high stability

MX-041

- Output: HCMOS, Sinewave
- Frequency: 5 to 15 MHz
- Package: 50 x 50 x 14.55 mm
- Power Supply: 5V or 12V
- Excellent Temperature Stability: 0°C to 70°C; ± 0.2 ppb or -40 to +85°C; ± 0.5 ppb
- 4 watts during warm up / 2 watts during steady state
- 50% reduction in power vs traditional OCXOs
- ADEV performance of 3e-12@1 sec and long term aging of 10ppb per year

FX/CS/CDR Solutions

CD-700

- Output: CMOS
- CDR, FX and CS Functionality up to 78 MHz
- Package: 5 x 7.5 x 2 mm
- Power Supply: 3.3 or 5.0 V
- Industry's smallest quartz-based CDR
- PLL with quartz stabilized VCXO
- Tri-State output
- 0/70°C or -40/85°C temperature range
- Jitter Attenuation, Frequency Translation, Clock Recovery
- Versatile PLL
- New improved version; 10 dBc lower phase noise floor

FX-700

- Output: CMOS
- Output Frequency: 1 to 78 MHz
- Package: 5 x 7.5 x 2 mm
- Power Supply: 3.3 or 5.0 V
- Industry's smallest quartz-based PLL
- External loop filter components required
- Capable of locking to an 8 kHz Pulse/BITS clock
- Tri-State output allows on board testing
- Absolute Pull Range performance to ± 100 ppm
- Jitter Attenuation, Frequency Translation

FX-703 (Next Generation FX-702)

- Output: LVPECL or LVDS
- Output Frequency: 125 to 800 MHz
- Package: 5 x 7.5 x 2.5 mm
- Power Supply: 3.3 V
- CMOS based PLL for ultra-low jitter
- VCXO / LVDS / LVPECL inputs compatible
- Jitter Attenuation, Frequency Translation
- Additional internal dividers
- Improved jitter/phase noise performance

FX-500

- Output: CMOS
- Output Frequency: 1 to 78 MHz
- Package: 9 x 14 x 4.5 mm, J-Lead
- Power Supply: 3.3 or 5.0 V
- Capable of locking to an 8 kHz Pulse/BITS clock
- Tri-State output allows on board testing
- Advanced custom ASIC technology
- Absolute Pull Range performance to ± 100 ppm
- Jitter Attenuation, Frequency Translation

FX-401

- Output: HCMOS, PECL, LVDS
- Input Frequency: 1 MHz to 300 MHz
- Frequency: 10 to 700 MHz
- Package: 13 x 19.9 x 5.9 mm
- Power Supply: 3.3 V
- Built in PLL circuit
- Low phase noise
- Reflow process compatible
- Jitter Attenuation

FX-402

- Output: CMOS, PECL, LVDS
- Input Frequency: 8 kHz to 170 MHz
- Output Frequency: 1.544 MHz to 1 GHz
- Package: 13.7 x 20.3 x 5.1 mm
- Power Supply: 3.3 V
- New and Improved to FX-100 series
- Accepts up to 4 externally-mixed clock inputs
- Jitter Generation: OC-192 compliant
- Jitter Transfer: Per GR-253-CORE
- Jitter Attenuation

SAW Filter Solutions

High Performance Telecom

- Frequency: 70 MHz to 2.6 GHz
- Standard / Custom Filters for GSM, TDMA, EDGE, CDMA, W-CDMA, UMTS and 4G-LTE
- Custom Frequencies Available
- Low Loss, Wide Bandwidth
- Low Temperature Coefficient of Frequency
- Package: Optimized SMD and PIN

RF Filters

- Frequency: 800 MHz to 2.7 GHz
- Bandwidth: 0.2 to 85 MHz
- Custom Designs
- High Input Power Handling: >25 dBm
- Balanced, Unbalanced and Mixed Mode
- Package: Miniature SMD (3x3 and 2.5x2 mm)

Military & Space

- Frequency: 35.42, 70, 465 MHz and others
- Frequency: 32.768 kHz to 40 MHz (higher frequency option is available)
- Low Loss: <10 dB depends on BW
- Balanced or Unbalanced or Mixed Mode
- Package: Small SMD (3x3 and 13x6 mm LCC)
- SPACE: TFS35A, TFS70BA, TFS70BC, TFS465G and others
- MILITARY: Many Custom Designs

Navigation (GPS/GIS)

- Frequency: 1227, 1237, 1575.42, 1590 MHz
- Bandwidth: 0.2 MHz to 100 MHz
- Low Loss: <2 dB
- Low Ripple: <0.3 dB
- Balanced, Unbalanced and Mixed Mode
- Package: Miniature SMD (3x3 and 2.5x2 mm)

ISM Band Filters & Resonators

- Frequency: 433.92, 315, 868, 915 MHz
- Bandwidth: 0.1 to 2 MHz
- Custom Frequencies Available
- Low Loss: <2 dB
- High Input Power Handling: >25 dBm
- Low Temperature Coefficient of Frequency
- Package: Small SMD (3.8x3.8 and 3x3 mm)

Monolithic Crystal Filters

- Frequency: 1 to 200 MHz
- Bandwidth: 0.2 kHz to 20 kHz
- Poles: Up to 12
- High Selectivity
- High Frequency Stability
- Internal Matching Available

High Temperature Electronics Solutions

VX-400

- Output: HCMOS/ACMOS
- Frequency: 10 to 30 MHz
- Package: 0.8 x 0.5 x 0.2 inches
- Standard 4 pin DIP package
- Power Supply: 3.3 or 5.0 V
- Continuous operating temperature range -55°C to 180°C
- Low jitter and phase noise
- Compliant crystal mount for high shock & vibration
- Contact factory for custom requirement

PX-420

- Output: HCMOS/ACMOS
- Frequency: 32.768 kHz to 40 MHz (higher frequency option is available)
- Package: 0.5 x 0.5 x 0.2 inches
- Standard 4 pin 1/2 DIP package
- Power Supply: 1.8V, 2.5V, 3.3 or 5.0 V
- Continuous operating temperature range -55°C to 230°C
- Low jitter and phase noise
- Compliant crystal mount for high shock & vibration
- Contact factory for custom requirement

PX-570

- Output: HCMOS/ACMOS
- Frequency: 32.768 kHz to 40 MHz (higher frequency option is available)
- Package: 7.8 x 8.5 x 3.3 mm, ceramic leaded package
- Power Supply: 1.8V, 2.5V, 3.3 or 5.0 V
- Continuous operating temperature range -55°C to 230°C
- Low jitter and phase noise
- Compliant crystal mount for high shock & vibration
- RoHS Compliant
- Contact factory for custom requirement

PX-702

- Output: HCMOS/ACMOS
- Frequency: 32.768 kHz to 40 MHz (higher frequency option is available)
- Package: 5 x 7 x 1.8 mm
- Power Supply: 1.8V, 2.5V, 3.3 or 5.0 V
- Continuous operating temperature range -55°C to 230°C
- Product is free of lead and compliant to EC RoHS directive
- Design for high shock & vibration
- Contact factory for custom requirement

Hi-Temp Modules

- 10+ years custom design & manufacturing experience for Oil/Gas Downhole applications up to 250°C operating temperature
- Flexible manufacturing for small to high volume in multiple factories
- Hybrid layout design and manufacturing
- Hermetically sealed metal and ceramic packaging
- Knowledge on component procurement
- In-house environmental screening capability

Hi-Temp Packaged Crystals

- Frequency from 3 to 200 MHz
- Operating temperature range up to 250°C
- AT, SC, FC, AC and IT-Cut resonator design & fabrication
- All standard cold weld and resistance weld crystal holders
- 8x8mm & 6x3.5mm SMD ceramic packages are available
- Special shock and vibration capability available
- Low aging
- Low phase noise
- Contact factory for custom requirement