Military & Space Products

Frequency Control Solutions for High Reliability, Defense, Security and Aerospace Applications

- QPL Clocks
- XO's
- VCXO's
- TCXO's
- OCXO/EMXO's
- VCSO's
- Frequency Translation
- SAW Filters
- Crystal Filters
- QPL & Precision Crystals

Communications-Ground Terminals-Manpack Radios-Radar-Detection-Imagery-Sensors-IFF-Jam

Jamming-Anti Jam-Positioning-Telemetry-Missile Guidance-Fire Control-Satellite-Communication

"Supplier of Choice"

VECTRON INTERNATIONAL
A DOVER COMPANY

www.vectron.com

VECTRON'S HERITAGE

VI's heritage of providing frequency control solutions for the Military and Space markets spans over four decades. Our engineering and manufacturing expertise have positioned VI as a leading, preferred supplier to both the Military and Space markets. Partial lists of the programs which VI has been an integral part of are listed below.

1960's Apollo, Explorer, GRC-106, Gemini, Intelsat, Mariner, OGO, Pioneer, Ranger, Saturn, Surveyor, Tiros

1970's GOES, DSCS, FLTSATCOM, GPS, MARISAT, Nimbus, Viking, Voyager

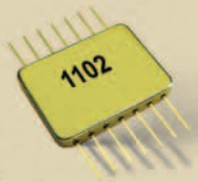
1980's EA-6B, AEGIS, Canadarm, Copperhead, Galileo, Havequick, Hellfire, Latrin, LEASAT, Magellan, MILSTAR, Navstar, NSCAT, Navy5", Patriot, SDI, Space Shuttle, TDRSS 1-7, USAF- GPS, Vinson, Zenith

1990's AEHFS, AITG, ARC1, B1B, Cassini-Huygens, Centaur, Chinastar, DS1-SDST, Echostar, Euro-fighter, F-18C, F22, GE90/CF34, Globalstar, GOESHPS105B, Hubble Space Telescope, Insat-2C & 2E, JSOW, Longbow, M1A2/BFV, Mars, Climate Orbitor, Mars Global, Surveyor, Mars Observer, Mars Pathfinder, Mars Polar Lander, MCP, MILSTAR, Near Earth Asteroid, PAC-3, Rendezvous, Sea Winds, Sincgars, Skynet, SLAM-ER, Space Station, Standard Missile, UHF Follow-on, WITS, WRTTM

2000's Advanced EHF, ACSS, ALR-67, ALQ-156, Astrolink, ATV Space Station, Bowman, Brimstone, C4ISR, Cobra Judy, Columbus, E2C, EELV, EOS, F-16 Anti-Skid, F-16 Radar, F/A-18, F22, Insat-3A/3B/3C/3E, IDECM, IMU, Leo 1, Longbow, JDAM, JSF, JTRS, LINK 11, Mars Odyssey, Mars Spirit, MTSAT, Messenger, New Horizons, Orb Comm/FUSE, Orbview 3/4, NSSN Submarine, Panamsat, SDB, SBIRS, SBIRS High, SIRTF, SGST, Spaceway, STEREO, Tactical Terminal, Tactical Tomahawk, Tomahawk (TLAM), WCMD, WIN-T

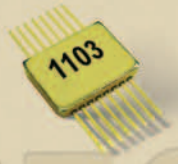
Clock Oscillators (XO/SO's)

1102/1108



- Frequency: 350 kHz to 100 MHz
- Outputs: ACMOS, TTL
- Package: 0.79" x 0.59" x 0.14"
- 14 Lead Flatpack
- Radiation Tolerant to 100 krad(Si) Optional
- Ruggedized Design

1103/1109



- Frequency: 350 kHz to 100 MHz
- Outputs: ACMOS, TTL
- Package: 0.505" x 0.385" x 0.118"
- 16 Lead Flatpack
- Radiation Tolerant to 100 krad(Si) Optional
- Ruggedized Design

1104/1110

- Frequency: 350 kHz to 100 MHz
- Outputs: ACMOS, TTL
- Package: 0.65" x 0.65" x 0.15"
- 20 Lead Flatpack
- Radiation Tolerant to 100 krad(Si) Optional
- Ruggedized Design

1105/1111

- Frequency: 350 kHz to 100 MHz
- Outputs: ACMOS, TTL
- Package: 0.887" x 0.54" x 0.2"
- 14 pin DIP
- Radiation Tolerant to 100 krad(Si) Optional
- Ruggedized Design

1113/1114

- Frequency: 350 kHz to 100 MHz
- Outputs: ACMOS, TTL
- Package: 0.48" x 0.48" x 0.117"
- 40 Pad LCC
- Available with 20 leads as a 1106/1112
- Radiation Tolerant to 100 krad(Si) Optional
- Ruggedized Design

1115

- Frequency : 350 kHz to 100 MHz
- Outputs: ACMOS
- Package: 0.51" x 0.51" x 0.2"
- 4 Pin Half DIP

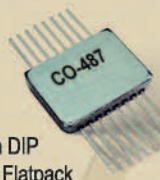
C1250/1118

- Frequency: 1 MHz to 800 MHz
- Outputs: ACMOS, TTL, LVPECL, LVDS
- Package: 5.0 x 7.0 x 2.0 mm
- AT Strip Crystal
- -55˚C to +125˚C Operating Temperature Available

C1300/1116/1117

- Frequency: 350 kHz to 800 MHz
- Outputs: ACMOS, TTL, LVPECL, LVDS
- Package: 9.0 x 14.0 x 3.68 mm
- Ruggedized Design
- -55˚C to +125˚C Operating Temperature Available
- Radiation Tolerant to 100 krad(Si) Optional

CO-484/487



- Frequncy: 4 MHz to 500 MHz
- Output: Sinewave
- Package: CO-484; 0.98" x 0.8" x 0.2" 16 pin DIP
  CO-487; 1.0" x 1.0" x 0.17" 16 Lead Flatpack
- -55˚C to +125˚C Operating Temperature Available.

CO-233FW/CO-285W

- Frequency: 4 MHz to 500 MHz
- Output: Sinewave
- Package: 2.0" x 2.0" x 0.75" / 1.59" x 1.0" x 0.5"
- SMA Connectorized Output
- Low Phase Noise Option
- -55˚C to +125˚C Operating Temperature Available

CO-286W

- Frequency: 500.0 MHz to 1300 MHz
- Output: Sinewave
- Package: 2.0" x 1.0" x 0.5"
- SMA Connectorized or PCB Mounting Options
- Low Phase Noise Option
- -55˚C to +125˚C Operating Temperature Available

SO-502

- Frequency: 500 MHz to 1350 MHz
- Outputs: Sinewave, PECL
- Package: 9.0 x 14.0 x 3.68 mm, Ceramic SMD
- Utilizes VI's own High Quality SAW Resonators
- Low Phase Noise Design

QPL Clocks

MIL-PRF-55310

- Slash Sheets: /09, /10, /16, /19, /20, /21, /26, /27, /28, /30
- Outputs: CMOS,TTL
- Custom variations available via VI's general spec OS-68338, see next page

For more details visit www.vectron.com

Hi-Rel General Specification

OS-68338

VI's general spec for Hi-Rel clocks is available in the absence of a customer generated SCD. OS-68338 defines the design, assembly and functional evaluation for a variety of TTL and ACMOS clocks with the package options previously listed as 11XX.

Key elements and options include:

- Package Type
- Output Waveform
- Component Reliability Level
- Swept Quartz
- Radiation Tolerance
- Screening Levels
- QCI Requirements
- Specification online via VI's Military & Space Link

VCXO's/VCSO's

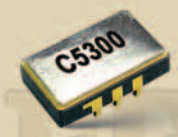
C1794

- Frequency: 375 kHz to 40 MHz
- Output: CMOS
- Package: 0.515" x 0.815" x 0.39"
- Radiation Tolerant to 100 krad(Si) Optional

C5250

- Frequency: 1 MHz to 800 MHz
- Outputs: ACMOS, TTL, LVPECL, LVDS
- Package: 5.0 x 7.0 x 2.0 mm, SMD
- Low Jitter

C5300/5116



- Frequency: 1 MHz to 800 MHz
- Outputs: ACMOS, TTL, LVPECL, LVDS
- Package: 9.0 x 14.0 x 3.68 mm, SMD
- Low Jitter
- Ruggedized Design
- Radiation Tolerant Optional

VS-502

- Frequency: 500 MHz to 1350 MHz
- Outputs: Sinewave, PECL
- Package: 9.0 x 14.0 x 3.68 mm, SMD
- ±50 ppm Minimum Absolute Pull Range
- Low Phase Noise Design

QPL Crystals

MIL-PRF-3098

*VI is qualified to offer an array of crystals per Mil-PRF-3098 over a frequency range of 1.342 MHz to 125 MHz. A comprehensive list is available on our website. **www.vectron.com**

Precision Quartz Crystal

SC/IT/AT-cut OCXO Crystals

- HC-37: 4.5 to 20 MHz, 3rd Overtone
- HC-40: 4.5 to 12 MHz, 3rd Overtone
- HC-43: 9 to 30 MHz, 3rd Overtone (Available in SMD Version)
- Aging: HC-40/HC-37 <30 ppb/year, HC-43 <100 ppb/year
- Options: G-Sensitivity as Low as $3x10^{-11}$ (QRM), Low Phase Noise

SC/IT/AT-cut Precision Crystals

- HC-43: 2.9 to 300 MHz, Fund/3rd/5th/7th/9th
- HC-37: 2.5 to 100 MHz, Fund/3rd/5th
- HC-45: 10 to 300 MHz, Fund/3rd/5th/7th/9th
- HC-36 & 47: 2 to 165 MHz, Fund/3rd/5th
- HC-40: 2.5 to 100 MHz, Fund/3rd
- SM1: 7 to 160 MHz, Fund/3rd/5th

Hi Reliability and Space Application Crystals

- Frequency: 2 to 260 MHz
- Overtones: 3rd/5th/7th/9th
- Mil Specs: Extensive Range of CR Certificates
- Packages: HC-35, HC-37, HC-36, HC-40, HC-43, SM1
- Full Screening and Testing to Custom Requirements

Discrete & Monolithic Crystal Filters

Custom Designs

- Frequency: 2 kHz to 280 MHz
- Bandwidth: 200 Hz to 500 kHz
- Poles: Up to 16
- Bandpass, Bandstop & Asymmetrical Type
- Linear Phase (Bessel, Gaussian) Designs
- Custom Packaging and Impedance Matching Options

Monolithic Crystal Filters

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

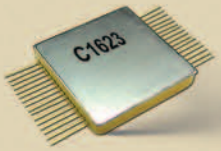
Custom Module Capabilites

VI has the Engineering and Manufacturing capabilities to vertically integrate our oscillator, crystal and filter components into higher level modules for timing or frequency control. These solutions could include custom packaging, vibration isolation, phase locked loops, phase locked oscillators or multiple outputs.

SUPPLIER C

TCXO's

623/1623



- Frequency: 375 kHz to 100 MHz
- Outputs: TTL, CMOS
- Package: 1" x 1" x 0.2", 32 pin Flatpack
- Smallest Hi-Rel TCXO
- Lowest Frequency Range
- 3.3V available in 1623
- Rugged Construction for Severe Random Vibration/Shock
- Radiation Tolerant to 100 krad(Si) Optional

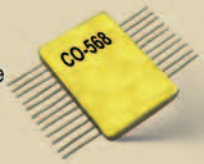
CO-566/929/930

- Frequency: 5 MHz to 225 MHz
- Outputs: TTL, CMOS, PECL, ECL, Sinewave
- Package: 0.8" x 1.4" x 0.2", 24 pin DDIP
- Radiation Tolerant to 100 krad(Si) Optional

CO-567

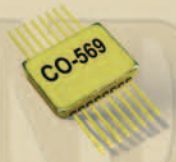
- Frequency: 5 MHz to 200 MHz
- Outputs: TTL, CMOS, Sinewave
- Package: 0.8" x 1.4" x 0.41", 24 pin DDIP
- Lowest Aging (0.5 ppm/yr)
- Radiation Tolerant to 100 krad(Si) Optional

CO-568



- Frequency: 5 MHz to 425 MHz
- Outputs: TTL, CMOS, PECL, ECL, Sinewave
- Package: 1" x 1.4" x 0.3", 24 pin Flatpack
- Highest Frequency
- Radiation Tolerant to 100 krad(Si) Optional

CO-569



- Frequency: 5 MHz to 100 MHz
- Outputs: TTL, CMOS, PECL, Sinewave
- Package: 1" x 1" x 0.25", 16 pin Flatpack
- Smallest Package
- Radiation Tolerant to 100 krad(Si) Optional

TC-350

- Frequency: 1 MHz to 77.76 MHz
- Output: TTL, HCMOS
- Package: 0.9" x 0.7" x 0.15", SMD
- Small and Rugged Package

TC-140

- Frequency: 0.5 MHz to 180 MHz
- Outputs: TTL, CMOS, Sinewave
- Package: 1.53" x 1.53" x 0.53"
- Low Aging
- Low Phase Noise Capability
- Mechanical Frequency Adjust Option

OCXO's/EMXO's

EX-380/381/384/385

- Frequency: 10 to 80 MHz
- Outputs: HCMOS (380/385), PECL/LVDS (384), Sinewave (381)
- Package: 0.5" x 0.8" x 0.3" (Pkg height varies by output type)
- Fast Warm-up, Low Power Consumption, Low G-sensitivity

EX-240/245

- Frequency: 10 MHz to 20 MHz
- Output: HCMOS, Sinewave
- Package: 0.93" x 1.03" x 0.35"
- Tight Temperature Stability: ±10 ppb over 0°C to +50°C
- Radiation Tolerant to 100 krad(Si) ***EX-245 only***

C4993

- Frequency: 1 MHz to 100 MHz
- Outputs: TTL, CMOS, Sinewave
- Package: 2" x 3" x 1" (excluding connectors)
- Chassis Mount, SMA Option Available
- Radiation Tolerant to 100 krad(Si) Optional

C4998

- Frequency: 10 MHz to 20 MHz
- Ouput: Sinewave
- Package: 1.5" x 1.5" x 0.65"
- Low Phase Noise, Ruggedized Construction

CO-724/725

- Frequency: 25 MHz to 400 MHz
- Outputs: TTL, CMOS, Sinewave, PECL
- Package: 2" x 2" x 1" to 1.25"
- Low Phase Noise and Low Aging Options

Custom OCXO Capabilities

- G-Sensitivity as low as $3x10^{-11}$, Low Phase Noise

Hi-Rel General Specifications for OCXO's

OS-80001

VI's general spec for Hi-Rel OCXO's is available in the absence of a customer generated SCD. OS-80001 defines the design, assembly and functional evaluation for a variety of output types and mechanical configurations. Key elements and options include:

- Mechanical Configuration
- Output Waveform
- Component Reliability Level
- Swept Quartz
- Radiation Tolerance
- Screening Levels
- QCI Requirements
- Specifications online via VI's Military & Space Link

OF CHOICE

Frequency Translation

CD-700

- Industry's Smallest Quartz-based CDR
- CDR, FX and CS Functionality up to 78 MHz
- Supply: 3.3 Vdc or 5 Vdc
- PLL with Quartz Stabilized VCXO
- Tri-State Output
- 0/70°C or -40/85°C Temperature Range
- Package: 5.0 x 7.5 x 2.0 mm, SMD

FX-700

- Industry's Smallest Quartz-based PLL
- Frequency Translator to 78 MHz
- Supply: 3.3 Vdc or 5 Vdc
- 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
- Package: 5.0 x 7.5 x 2.0 mm, SMD

FX-424

- New and Improved to FX-100 Series
- Input Frequency: 8 kHz to 170 MHz
- Output Frequency:: 1.544 MHz to 850 MHz
- Accepts up to 4 Externally-Muxed Clock Inputs
- Supply: 3.3 Vdc
- Jitter Generation: OC-192 Compliant
- Jitter Transfer: Per GR-253-CORE
- Output: CMOS, PECL, or LVDS
- Package: 13.7 x 20.3 x 5.1 mm, SMD

SAW Filters

Navigation

- Frequency: 1237, 1575.42, 1590 MHz
- Bandwidth: 2.4, 20, 40 MHz
- Low Loss: <2 dB
- Low Ripple: <0.3 dB
- Balanced, Unbalanced and Mixed Mode
- Package: Miniature SMD (3 x 3 and 2.5 x 2 mm)

RF Filters

- Frequency: 800 MHz to 2700 MHz
- Bandwidth: 0.2 to 85 MHz
- Custom Designs
- High Input Power Handling: >25 dBm
- Balanced, Unbalanced and Mixed Mode
- Package: Miniature SMD (3 x 3 and 2.5 x 2 mm)

In-House Test Capabilities

	Mil-STD-202		Mil-STD-883	
Test	Method	Test Condition	Method	Test Condition
Salt Atmosphere	101	A,B	1009	A,B,C,D
Temperature Cycling			1010	A,B,C
Humidity	103	A,B		
Immersion (Seal)	104	A,B,C	1002	A,B,C
Barometric Pressure	105	A,B,C		
Moisture Resistance	106		1004	
Thermal Shock	107	All	1011	All
Life	108	A,B,C,D	1005	
Seal	112	All	1014	A,C
Vibration, Sine	204	All	2007	
Solderability w/Steam Aging	208		2003	
Radiographic (X-ray)	209		2012	
Resistance to Soldering Heat	210			
Terminal Strength	211	A,B,C		
Acceleration	212	A,B,C	2001	A,B,C,D,E,F
Shock	213	All	2002	
Vibration, Random	214	All		
Die Shear Testing			2019	
PIND (Particle Impact Noise Det)			2020	A,B
Wirebond Pull Testing			2023,2011	
Aging	*As Required*		*As Required*	
G-Sensitivity	*As Required*		*As Required*	
Phase Noise Under Vibration	*As Required*		*As Required*	
Thermal Vacuum Test over Temperature	*As Required*		*As Required*	

Add'l Test Capabilities

- Element Evaluation - Outside Lab
- DPA (Destructive Physical Analysis) - Outside Lab
- Internal Water Vapor Testing - Outside Lab
- Pyrotechnic Shock - Outside Lab
- RGA (Residual Gas Analysis) - Outside Lab

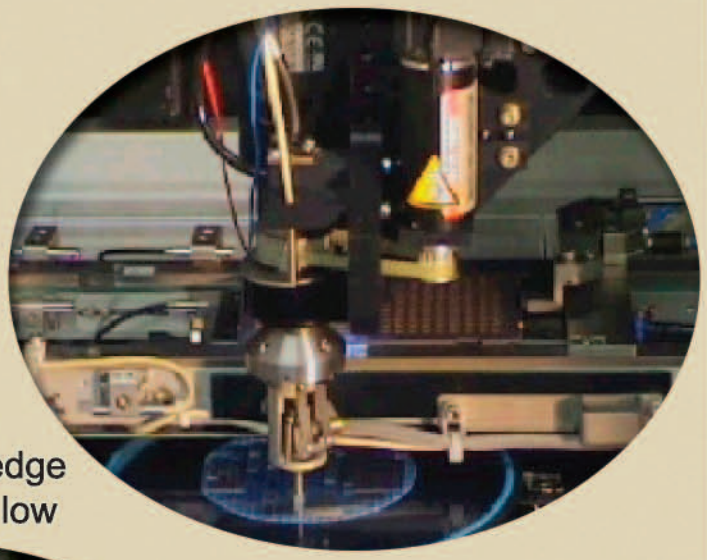
Add'l Capabilities

- Classified (Security Levels) Order Processing & Controls
- Customized Environmental Testing
- Long Term Aging Predictions
- PID (Process Identification Document)
- Pre-Cap and Final Source Inspection
- Program Management
- Qualification Testing
- Radiation Tolerant Components/Design
- Reliability Predictions
- Swept Quartz
- Traceability

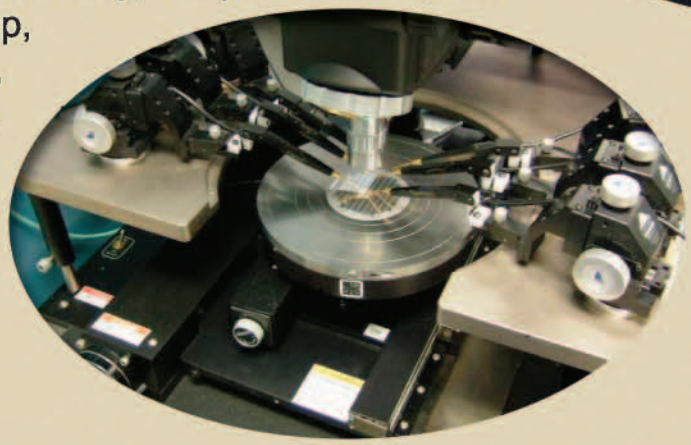
For more details visit www.vectron.com

VECTRON'S ENGINEERING TECHNOLOGY AND MANUFACTURING EXPERTISE

TECHNOLOGY



Vectron International is well known for its technical capabilities in crystal oscillator, quartz resonator and SAW Filter design. Core technologies and capabilities within VI support the development of higher frequency products, lower cost designs and product miniaturization as well as advanced solutions. Our technology and engineering expertise translate to leading edge products for low G-sensitivity, low phase noise, low power, quick warm-up, miniature packaging, rugged construction, wide pullability and tight linearity.



MANUFACTURING EXPERTISE

VI's facilities contain the state of the art equipment used in oscillator and SAW Filter manufacturing. This includes discrete crystal technology highlighted by precision SC cut and High Frequency Fundamental crystals to class 100 clean room facilities in the manufacture of leading edge clock and temperature compensated crystal oscillators for hi-reliability and space solutions.

Vectron International Locations

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Mount Holly Springs
PA 17065
Tel: 1-717-486-3411
Fax: 1-717-486-5920

VI NORWALK
166 Glover Avenue
Norwalk, CT 06856
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Fax: 1-203-849-1423

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Cincinnati, OH 45232
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Fax: 1-513-542-5146

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Fax: 86 21 5048 1881

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