Mr. Timothy Mooney
Office of Exporter Services
Regulatory Policy Division
Bureau of Industry & Security
Dept. of Commerce,
1401 Constitution Ave., NW, Room 2705
Washington, DC 20230

February 7, 2011

ATTN: Notice of Inquiry - CCL

Vectron International would like to thank the BIS for allowing it to offer its input in response to the *Federal Register* ANPRM (15CFR Part 774, Docket No. 101112562-0577-01) soliciting industry comment and advice for making the CCL a positive list.

Vectron's input relates to crystals and crystal-based oscillators which are frequency control products intended to function as a clock and timing source. Currently references to these types of products do occur in the CCL such as:

- **3A001.b.10. Oscillators** or oscillator assemblies
- **3A001.c.1. Surface acoustic wave** and surface skimming (shallow bulk) acoustic wave devices
- **3A001.c.2**. **Bulk (volume) acoustic wave devices** that permit the direct processing of signals at frequencies exceeding 6 GHz

As a Frequency Control Product intended for clock/data timing in an electrical circuit, an oscillator can be and has been used in various civil as well as end-item defense articles covered under multiple potential USML categories such as IV, VII, VIII, XI, XV. Since the current USML list is design-intent in its focus and not a "positive" list, Vectron has had to submit several CJ requests for jurisdictional clarification for its oscillator commodities. These are commodities with functionality and purpose identical for commercial and military applications. Two initial CJ rulings for Vectron's oscillators that are marketed for military and space applications, determined the oscillators to be subject to Department. of Commerce control (CJ 251-05, CJ 228-05). However, two CJ decisions from DDTC ruled Vectron oscillators, exported for commercial satellite use to be covered under USML Category XV(e) even though the oscillators employ the same design and manufacturing technology as utilized in the commercial equivalents (CJ 644-09, CJ 025-10).

Vectron is providing its input as applicable in order to provide your CCL revision team certain positive parameters to provide our industry much greater clarity as to appropriate controls. As a generic frequency control product that provides a "timing" or "clock" function in many electronic circuitry in industrial, military/space and civil applications, Vectron believes <u>oscillators do not serve an inherently "military" function</u>. However certain functional

characteristics and capabilities may be viewed as key "differentiators" required for non-civil use environment, and to this extent, an appropriate place for such items may be on the CCL. Vectron is concurrently providing its comments to the ANPRM for the Department. of State (22CFR Part 121, RIN 1400-AC78, Public Notice : 7257)

Description of Crystal and Crystal-based Oscillator Commodities:

Vectron's crystals and crystal-based oscillator product are frequency control products that function as clock/data timing devices in electronic circuitry. As a generic frequency control source they can be used in a variety of applications both commercial and military. Crystal based oscillators can include various types depending on the stability of the nominal output frequency during operation and can include:

Fixed Frequency Oscillators (XO): XO's provide a fixed frequency output over stated operating conditions.
Voltage Controlled oscillators (VCXO): VCXOs allow some adjustment of the output frequency by means of a control voltage
Temperature Compensated Oscillators (TCXO):TCXOs are compensated for temperature and provide tight control of the output frequency over the operating temperature range within a few ppm of the nominal frequency.
Oven-controlled Oscillators (OCXO): OCXOs are precision devices that provide the tightest control of the output frequency typically at the ppb (part per billion) stability. This is accomplished by using a heater circuitry to control the temperature of the internal crystal.

Rationale for listing crystals and crystal oscillators on the proposed "positive" "tiered" list:

- Crystal oscillators are frequency control product used predominantly in commercial telecommunications applications but also find use in various industrial, test instrumentation and military/space applications. When use for military and space applications however, the design and manufacturing assembly process for the oscillator is identical to that used in civil applications. Therefore the oscillators designed and sold for military and space use are not in any way "specifically modified or designed" for that purpose, except for additional post-production screening and testing (Class B or Class S level screening) that may be required to assure their suitability for those applications.
- Vectron has approved CJ's that ruled military and space hybrid clock oscillators as EAR-controlled (CJ 251-05, CJ 228-05).
- When intended for space applications, oscillators may internally employ radiation-hardened IC devices procured by Vectron from IC manufacturers, but the radiation tolerance levels are under the limits for the five characteristics as specified per ITAR 121.1, Category XV(d).
- In the current USML category XV(e), while certain components have been explicitly excluded and identified as controlled under EAR[1], there is no explicit reference to

[1] Category XV(e) enumerates many space-qualified electronic components that are controlled not on the USML but under EAR: space-qualified Traveling Wave Tubes, microwave solid state amplifiers, microwave assemblies, traveling wave tube amplifiers, photovoltaic arrays, tape recorders, data recorders, telecommunications systems, equipment and components not designed or modified for satellite uses, focal plane arrays, laser radar or LIDAR equipment.

oscillators, leaving its jurisdictional status unclear. The CJ 228-05 ruled Vectron hybrid oscillators exported for space use are EAR-controlled but other types of oscillators used in commercial telecommunication applications and other civil uses were ruled as ITAR-controlled (CJ 644-09, CJ 025-10). Vectron believes that oscillators, based on the intended function and design and manufacturing technology utilized, do not provide a unique, critical or substantial military function and thus should be controlled on the CCL unless designed with certain functional attributes that may be required for military (e.g. "ruggedized") uses. In this response to the ANPRM, Vectron has attempted to identify such special characteristics that should result in their placement on a positive, tiered list (proposed under T3 EAR) per the guidelines recommended in the ANPRM.
Further, as EAR-controlled items, the CCL would appear to provide the control flexibility offered by the CCL for classification, end-use and end-user/destinations for national security and mitigation of diversion risks.

- Crystals and crystal-based oscillators are manufactured and available from several foreign sources (non-U.S. aligned or adherent countries).
  Offerings from these foreign sources, deemed comparable in performance to those offered by Vectron, are summarized in the table below.

Table 1

	Product Types				
Source	Crystals	Crystal oscillator (XO)	Crystal oscillator (VCXO)	Crystal oscillator (TCXO)	Crystal oscillator (OCXO)
Vectron International	X	X	X	X	X
China (Tai Tien Electronics) : http://www.taitien.com.tw	X	X	X	X	X
China (KQT) http://www.kqt.cn	X	X	X	X	
China (54th Institute aka Hebei Yuandong Comm.) http:// www.hebyd.cn	X	X	X	X	X
Chinese Taipei (TXC) http://www.txc.com.tw	X	X	X	X	X
Russia (Morion) http://www/morion.com.ru/	X	X	X	X	X
Magic Crystal, Ltd. http://www.magicxtal.com/en/	X	X	X	X	X
India (Andhra Electronics Ltd.) http://www/andhraelec.com	X	X	X	X	X
India (Centum)	X	X	X	X	X

http://www.centumindia.com/centumrakon					

Web pages listing product offerings with functional capabilities from the sources listed are also being provided in Vectron's submittal.

Vectron's Proposal for A Positive List of Crystals and Crystal-based Oscillators per the Steps & Guidelines in the Commerce ANPRM

A.
(most likely category: 3A001.b.xxx or a new category under 3A001)

- (EAR T3)Crystals and crystal-based oscillators and assemblies specially designed to operate under severe environments of space or military that include one or more of these performance capabilities:
    - Employing surface acoustic wave devices or Bulk-acoustic wave devices or that exceed the frequency limits of 3A001.c.1.a or 3A001.c.2 respectively
    - Designed for meeting the rugged environments of space launch or for military end-use, capable of surviving 5000G or higher along all three axes
    - With frequency stability under vibration ("G-sensitivity") characteristics that meet or exceed 0.1 ppb/G along three mutually perpendicular axes when intended for military use.
    - Designed for surviving vibration levels exceeding 30 g rms along all three directions
    - With phase noise performance (as defined in 3A001.b.10) meeting or better than a floor threshold of -175 dBc/Hz at all offset frequencies over 10 Hz to 500 Hz
    - Assembled with radiation hardened devices with radiation tolerance levels that meet or exceed the levels identified per ITAR Category XV(d)

B. Test, Inspection and Production Equipment

N/A

C. Materials

(EAR T3) Specially designed or processed crystals or assembly methods to result in high shock and vibration tolerant crystals and oscillators as outlined in A.

D. Software

N/A

E. Technology

(EAR T3)Technology for the design, production and testing of oscillators as outlined in A.

Conclusion

The newly structured CCL with three tiers of controls is very well suited for reexamining crystal oscillators and sorting out those which, according the positive technical criteria (as described above), would logically fit under a Tier 3 description. Vectron International is a leading designer and manufacturer of these products and has the expertise to assist the USG team tasked with rewriting the current CCL. We look forward to working with you and trust that our positive list rewrite suggestions for crystal oscillators will advance your overall objective of converting the CCL into a control list that gives clear definition and description to our industry on how U.S. export controls will apply once these changes are adopted. Thank you for the opportunity to offer our advice and suggestions. If you have any questions or comment, please contact :

Ram J. Arvikar, Tel: 603-577-6860; Email: rarvikar@vectron.com

Sincerely,

Ram J. Arvikar
Dir. Global Quality & Compliance
Vectron International
267 Lowell Road, Hudson, NH 03051
Tel: 603-577-6860
Email: rarvikar@vectron.com

Attachments Following: Web-sits/pages with brief information about the foreign sources and their advertised capability for the design and manufacture of crystals and oscillator products

Information about Morion (Russia) & its crystals and oscillator products

MORION Inc.
SAINT-PETERSBURG

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Company profile

Morion, Inc. is well-known both in Russia and as a worldwide designer and manufacturer of quartz frequency control products (FCP) - quartz oscillators, filters and crystals dedicated for various applications such as telecommunications, navigation, test & measurement, digital broadcasting, search and rescue systems, etc.

As of today Morion is equipped with state-of-the-art production and testing equipment and has the most advanced in the field technologies.

Over 75 years of experience and high level expertise of employees allowed Morion to become a premier producer in Russia and one of the worldwide leading manufacturers of high end quartz products. Morion holds a lot of patents for many original concepts in FCP field.

Morion supports and continuously improves quality control system based on Russian Space and military standards as well as international standards. Since 1999 Morion is an ISO-9001 certified company being recertified in accordance with ISO-9001:2000 back in the year 2003.

Precision quartz oscillators manufactured by Morion are certified for use in programs of The Russian Federal Space Agency. Thanks to highly qualified personnel, effectively operating quality control system and technology excellence Morion successfully supplies products not only in Russia and CIS, but also to the markets of the USA, Canada, Germany, the UK, France, Italy, Switzerland, Korea, China, Japan, Malaysia and many other countries. In 2007 Morion received a 1st grade award from the Government of St. Petersburg for achievements on the field of the export of the products. Morion is named «The Best Exporter in year 2007».

Trade mark of Morion is registered in many countries: the USA, Korea, China, countries of EU.

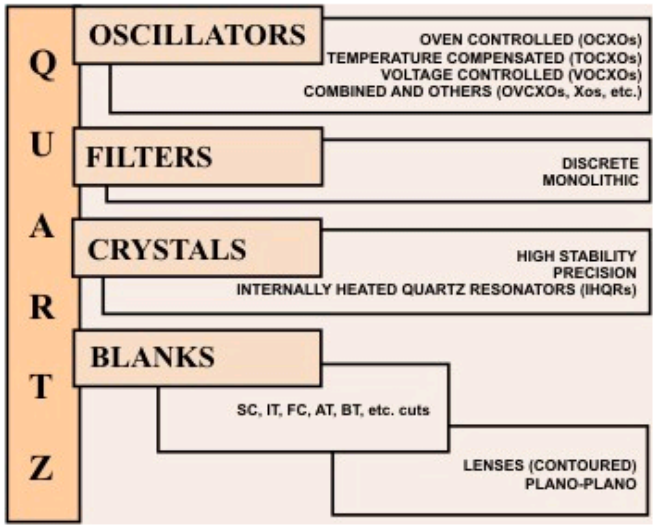
Morion, Inc. in figures:

- Production facilities area - about **27 000 square meters**
- Number of employees - about **500** people including about **100** engineers, **16** PhDs and **1** Doctor;
- Structure - 4 Scientific Production Departments (SPD) engaged in design and manufacturing of:
  - SPD-1 - precision quartz oscillators,
  - SPD-2 - quartz filters and crystals,
  - SPD-3 - quartz blanks,
  - SPD-5 - tools and specially designed production and test equipment.
- Product portfolio: about **65%** are precision quartz oscillators; about **35%** are quartz filters, crystals, standard oscillators, quartz blanks;
- International relationships: about **50%** of products are being exported to more than **36** countries;
- Extensive participation in space programs - more than **2 000** units working in Space;
- Product quality record (year 2007): reject rates during production at customer side: **0,127%**. Filed returns - **0%**.

Internet 100%

Morion

Main activity of Morion is development and volume production of the following products:



The whole production process from a quartz blank to a finished quartz oscillator takes place at one facility. Morion is a unique company with an advantage of all critical processes taking place in-house. It's one of the reasons that allowed Morion to become a reliable supplier successfully participating in long term and high volume projects.

Here are the examples of such projects:

- International space search and rescue system COSPAS/SARSAT;
- Spacecraft "Buran" and heavy-lift booster "Energia";
- International Space station "Alfa";
- International Space project "Sea Launch";
- GPS/GLONASS;
- Base stations for the following communication standards: GSM, CDMA, WCDMA, TD-SCDMA, WiBro, WiMaX;
- International Space program "Mars-Odyssey";
- Digital broadcasting systems in Korea, Germany, Italy and Russia.

In 2001 the equipment created by our company was used in NASA's project "Mars Odyssey 2001", an expedition of interplanetary automatic station to Mars.

In fact, currently Morion holds worldwide acknowledged legacy in the field of high end quartz products for frequency control and selection, famous for significant achievements in the field of development and production of precision low noise quartz oscillators, complicated multi-pole filters and precision crystals.

In the year 2001, the annual "C.B. Sawyer Award" was granted to president of Morion, Inc., Dr. Yakov L. Vorokhovsky "...for outstanding entrepreneurship in leading Morion, Inc. to become a world class company and for the years dedicated to the quartz industry...". This award is the highest award in quartz industry.

Internet 100%

Morion

MORION Inc.
SAINT-PETERSBURG

YOUR BEST CHOICE IN FREQUENCY CONTROL PRODUCTS

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Morion, Inc. produces the following types of quartz oscillators

Oven Controlled Oscillators (OCXOs & DOCXOs):

details

Temperature Compensated Oscillators (TCXOs):

details

Voltage Controlled and Simple Oscillators (VCXOs & XOs):

details

Quartz filters

details

Quartz crystals

details

Quartz Blanks

details

Telecom test equipment

details

NEWS

Morion Inc., on international exhibition « Electronica 2010».
27.04.2010

ABOUT US

Morion, Inc. is well-known both in Russia and as a worldwide designer and manufacturer of quartz frequency control products (FCP) - quartz oscillators, filters

http://www.morion.com.ru/eng/oscillators/ocxo/33/ Internet 100%

Magic Xtal Ltd.

ONLY MAGIC TECHNOLOGIES!

News

- Temperature stability of MXOC series has been improved essentially to 1 ppb within (-10 +60) °C and to 3 ppb within (- 40 +85)°C range. Previously such stability was achievable with double-oven OCXOs only.
- Have been developed and put into production new generation of vacuum sealed miniature OCXOs of MXO37 series. The renewed technology provides superb temperature stability (to 10ppb in -40+85°C range) at same ultra small sizes and power consumption.

Scientific activity

Magic Crystal is participant of recent European Frequency and Time Forums and IEEE International Frequency Control Symposium:

- 2006 "20TH European Frequency and Time Forum", Braunsweig, Germany. Title of the report: ""Influence of Resonator Factors on Phase-Noise of OCXOs".

:: More ::

- 2004 "18TH European Frequency and Time Forum", University of Surrey Guildford, UK. Title of the report: "Study of phisical causes of intermodulation distortion in HFF cristal resonators"

ABOUT US

Magic Xtal Ltd. is focusing its main efforts on development and fabrication of all kind advanced OCXOs. The company was founded in 2001 year for development and fabrication of advanced OCXOs, SC-cut resonators and inverted-meza HFF crystals. Nowadays **Magic** is supplier of state-of the art frequency control products to dozens customers in Russia and troughout the world.

Staff of the **Magic Xtal** comprises about 60 workers, mostly with high education and strong experience in the industry. The Research & Development group consists of 6 engineers with Ph.D. and Master degrees in the field.

Production facilities of **Magic Xtal** occupying above 1000 m2 area are equipped with modern machines and instrumentations providing for full range technologies - from crystal blanks fabrication through automated tests of complete quartz resonators and oscillators.

Done Internet 100%

Magic Xtal Ltd.

ONLY MAGIC TECHNOLOGIES!

PRODUCTS

Magic Xtal Ltd. focuses main efforts on development and production of wide range of advanced Oven Controlled Crystal Oscillators (OCXO). Involving unique technologies, highly-qualified staff and full-scale production facilities we have been developing and manufacturing unsurpassed OCXO designs accommodating most extraordinary customers' requirements. "Hot spots" of Magic's products are the vacuum-sealed OCXOs of **MXO37** series with smallest in the world sizes and power consumption, ultra-stable miniature double-oven OCXO of **MXODE** series providing $5x10^{-11}$ temperature stability, and $1.5x10^{-8}$/year aging, as well as high frequency low phase-noise **MXOH** series with as low as -170dBc/Hz noise floor and 10ppb temperature instability.

ULTRA-STABLE OCXOS OF SERIES ÌÕÎD

These OCXOs utilize the double-oven technology providing very high frequency versus temperature stability. Packaged in standard "europack" case and consuming only 1.5W power the **MXODE** parts provide up to ±0.05ppb temperature stability at $2x10^{-12}$/1s Allan variance and $1.5x10^{-8}$/year aging (for 10MHz operational frequency).

The **MXODR** model combines advantages of the double-oven and internal heated resonator (IHR) technologies resulting in smallest in the world sizes (to 5ccm) and less than 1W power consumption whereas providing to $2x10^{-10}$ temperature stability and $3x10^{-8}$/year aging.

The **MXODE** and **MXODR** series are produced for for 5 — 100MHz range and are excellent for application as Rb reference replacement, in Stratum II clocks, instrumentation, and other systems where ultimate performance is a must.

MXODE	MXODR

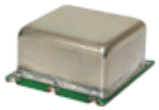
Internet 100%

Magic Crystal Ltd., Russia

HIGH STABILITY OCXOS OF SERIES ÌÕÎC

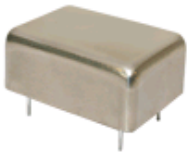
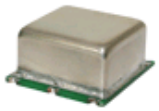
New! ***Essentially improved temperature stability of OCXOs of this family – see below***

The OCXOs of **MXOC** series are intended for wide range applications where high frequency stability and low phase-noise level along with small sizes are major requirements. Temperature stability of these devices reaches **1 ppb** in the range (-10 +60)° C, and **3 ppb** in (-40 +85)°C, phase-noise level - -105dBc/Hz @ 1Hz and -168 dBc/Hz @ 10kHz, aging – 1.5x10-8/year. The MXOC series is implemented in a variety of small cases including SMD version and covers 2-250MHz operational frequency range (for above 30MHz the built-in multiplication circuitry is utilized).

MXOCE	MXOCI	MXOCS	MXOCR
			
36x27x12mm	25x25x12,7mm	25x22x10,8mm SMD version	20x20x11,7mm

LOW PHASE-NOISE HIGH FREQUENCY OCXOS OF SERIES ÌÕÎÍ

The OCXOs of series **ÌÕÎÍ** operate at 30-120MHz fundamental frequencies providing extremely low phase noise (to -155dBc/Hz @ 1kHz and -170dBc/Hz @ 10kHz) and phase jitter (both random and deterministic). Excellent phase-noise properties of these OCXOs are combined with high temperature stability (to 10ppb) and low aging (to 1ppb/day). The **ÌÕÎÍ** series is implemented in a variety of small packages including SMD versions. It is excellent solution for different synthesizers, microwave and UHF systems.

MXOÍE	MXOÍI	MXOÍS	MXOHR
			
36x27x12mm	25x25x12,7mm	25x22x10,8mm SMD version	20x20x11,7mm

ULTRA MINIATURE LOW POWER VACUUM OCXOs OF SERIES ÌÕÎ37

The design of the **MXO37** OCXO series is grounded on the internally heated resonator technology (IHR) where the crystal plate is heated inside the TO-8 vacuum holder with a micro-oven system. Integration of whole micro-oven system with the crystal plate inside the vacuum holder resulted in radical reduction of the OCXO volume (to 1.5cm^3), power consumption (to 120mW), and warm-up time (to 15s). Despite extremely small sizes the **MXO37** series exhibits high temperature stability (to 5ppb) and low phase-noise level (to -170dBc/Hz) being properties of high-end OCXOs.

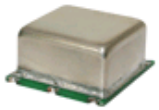
The **MXO37/8** series operates at 5-50MHz fundamental frequencies and being DIP8 compatible in sizes and pins-out is smallest in the world high-end OCXO - a perfect solution for a variety of portable and/or battered applications.

Internet 100%

Magic Crystals. Ltd., Russia

LOW PHASE-NOISE HIGH FREQUENCY OCXOS OF SERIES ÌÕÎÍ

The OCXOs of series **ÌÕÎÍ** operate at 30-120MHz fundamental frequencies providing extremely low phase noise (to -155dBc/Hz @ 1kHz and -170dBc/Hz @ 10kHz) and phase jitter (both random and deterministic). Excellent phase-noise properties of these OCXOs are combined with high temperature stability (to 10ppb) and low aging (to 1ppb/day). The **ÌÕÎÍ** series is implemented in a variety of small packages including SMD versions. It is excellent solution for different synthesizers, microwave and UHF systems.

MXOÍE	MXOÍI	MXOÍS	MXOHR
			
36x27x12mm	25x25x12,7mm	25x22x10,8mm SMD version	20x20x11,7mm

ULTRA MINIATURE LOW POWER VACUUM OCXOs OF SERIES ÌÕÎ37

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The **MXO37/8** series operates at 5-50MHz fundamental frequencies and being DIP8 compatible in sizes and pins-out is smallest in the world high-end OCXO - a perfect solution for a variety of portable and/or battered applications.

The **MXO37/14** series exhibits the same frequency stability, power consumption and warm-up time as **MXO37/8** series but has DIP14 compatible sizes and pins-out along with extended to 250MHz operational frequency range owing to application of built-in multiplication circuitry.

The **MXO37/14H** is a low phase-noise version of **MXO37/14** series operating at up to 120 MHz without multiplication with -170dBc/Hz noise floor and very low phase jitter..

The **MXO37/8**, **MXO37/14** and **MXO37/14H** oscillators are available in through-hole or SM versions as well as in hermetically sealed packages - **MXO37/R** and **MXO37H/R** models.

Series MXO37	MXO37/8	MXO37/8S	MXO37/14	MXO37/14S	ÌÕÎ37/R
Series MXO37H/14			MXO37H/14	MXO37H/14S	MXO37H/R
Packaging view	15x15x10mm 	15x15x10mm 	15x20x10mm 	15x20x10mm 	20ð20ð12,6mm

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Information about TaiTien (Taiwan & China) Electronics & its crystals and oscillator products

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About TAITIEN

- Company Overview
- Management Philosophy
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Company Overview

TAITIEN, a quartz frequency control component manufacturer, (former Tai Tien Electronic Co., Ltd, established in 1976) was established in March 2000. Our main products include X'TAL, OSC, VCXO, TCXO, and is the only manufacturer in Taiwan that provides the technique of OCXO. Our complete product line enables one stop shopping service.

TAITIEN is based in Taiwan and has manufacturing sites in United States and China. Operation and sales sites are located in Taiwan, United States, Europe and China. Our customers come from various fields including automotive, consumer electronics, information technology and telecommunications.

TAITIEN focuses on innovation and invests heavily in research & development. Over these years, the company patented quartz-manufacturing technologies. Today, TAITIEN is the leader in quartz industry and continues to develop new technologies through extensive research.

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▲TOP

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TAITIEN Electronics

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- Crystal Oscillator
- VCXO
- VCTCXO / TCXO
- OCXO

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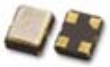
2010.10.22
Taitien's Inverted Mesa Technology Enable High-Frequency Crystal Oscilla...

2010.08.30
High Precision TCXOs Enable Femtocell Technology

2010.08.12
Low Noise Small Form Factor VCXOs for High Frequency Applications

Product

Programmable XO
Fast delivery at any frequency
PY type 2.5x2.0mm



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(Headquarter) 5F., No. 76, Po Ai Road, Taipei 100, Taiwan, R.O.C. | E-mail: sales@taitien.com.tw | TEL:+886-2-2381-1183 | FAX: +886-2-2361-7529
(Sales Office) No. 5, Shutan Street., Shulin City, Taipei 238, Taiwan, R.O.C. | TEL: +886-2-2686-1287 | FAX: +886-2-2681-9610

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- Crystal Oscillator
- VCXO
- VCTCXO / TCXO
- OCXO
- Other Products

Products

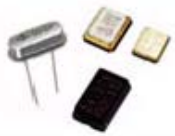
OCXO
Frequency Stability: 0.06~200ppb

VCTCXO/TCXO
Frequency Stability: 0.1~2ppm

VCXO
Frequency Stability: 25~100ppm

Crystal Oscillator
Frequency Stability: 25~100ppm

Crystal Unit
Frequency Stability: 10~100ppm



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TAITIEN ELECTRONICS CO., LTD.
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(Headquarter) 5F., No. 76, Po Ai Road, Taipei 100, Taiwan, R.O.C. | E-mail: sales@taitien.com.tw | TEL:+886-2-2381-1183 | FAX: +886-2-2361-7529
(Sales Office) No. 5, Shutan Street., Shulin City, Taipei 238, Taiwan, R.O.C. | TEL: +886-2-2686-1287 | FAX: +886-2-2681-9610

Information about Andhra Electronics (India) & its crystals and oscillator products

Andhra Electronics Limited

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About Us

Andhra Electronics Limited manufactures frequency control products for telecommunication, military and space applications since 1977.

We have a design and manufacturing facility consisting of a fully integrated crystal manufacturing plant for high stability, low aging and perturbation free crystals and a state of the art crystal oscillator lab.

All our 125 employees are dedicated to the concept of Total Quality Management and strive to delight the customer.

R.F and Microwave Products

- Band Pass Filtes
- Cavity Filters
- Crystal Filters
- Local Oscillator
- Low Noise Amplifier
- Frequency Synthesizer
- Low Pass Filters

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Andhra Electronics (India)

Andhra Electronics Limited

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Frequency Control

SEARCH

Frequency Control

- Quartz Crystals
- Crystal Oscillators
- TCXOs
- VCXOs
- OCXOs
- Rubidium Clocks

R.F and Microwave Products

- Band Pass Filtes
- Cavity Filters
- Crystal Filters
- Local Oscillator
- Low Noise Amplifier
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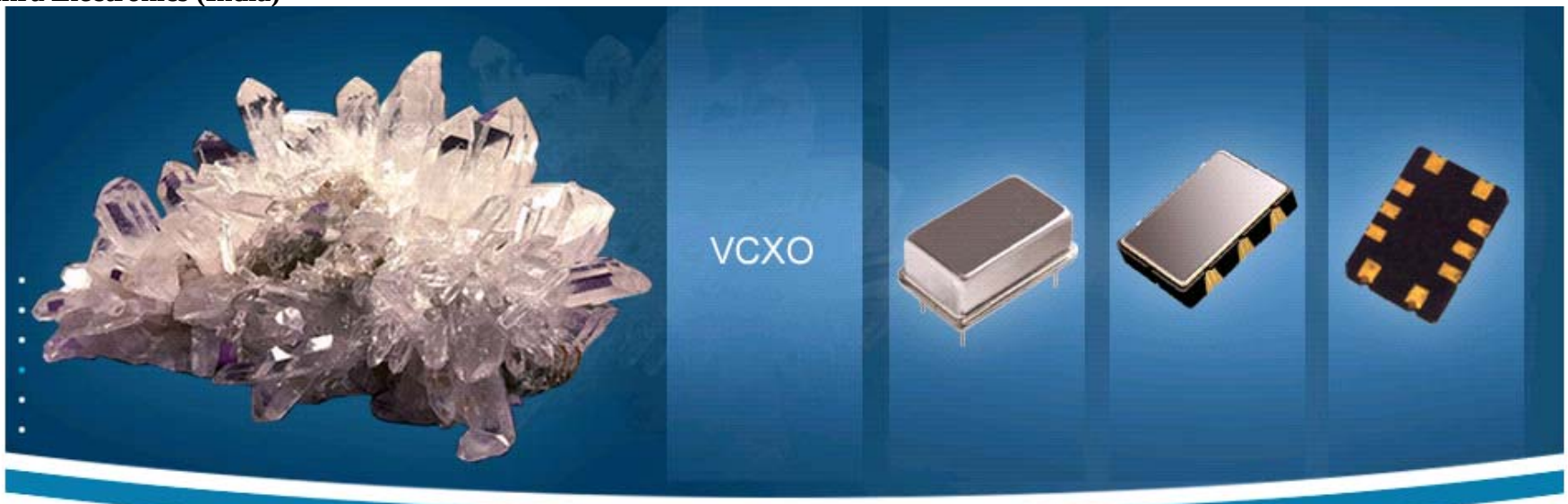
Andhra Electronics (India)



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Mil Grade Products

Andhra Electronics Offers Screened Oscillators manufactured and tested as per Mil standard MIL-PRF-55310 (Class 'B' & Class 'S')

Following can be Offered:

- 100% Screening and Lot acceptance as per customer requirements
- Internal visual inspection as per Mil Standard 883 - Method 2017
- Stabilization bake Mil Standard 883 - Method 1008
- Temperature Cycling as per Mil Standard 883 – Method 1010
- Constant Acceleration as per Mil Standard 883 – Method 2001
- Fine & Gross Leak as per Mil Standard 883 – Method 1014
- Burn in as per Mil-PRF-55310
- Vibration as per Mil Standard 202, Method 204
- Shock as per Mil Standard 202, Method 213
- Thermal Shock MIL Standard 883 - Method 1011
- Final Electrical Tests

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Information about TXC (Taiwan)& its crystals and oscillator products

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- Worldwide Locations
- Enterprise vision
- Corporate Identity
- Award & Certification
- Publication
- News/Activities

Company Introduction

TXC Corporation, founded in 1983, is a leading professional frequency control product manufacturer. We have devoted to the research, design, manufacture, and sale of Dual-Inline-Package (DIP) and Surface Mount Device (SMD) quartz crystal products. TXC now specializes in five categories of products such as high quality Quartz Unit Crystal, Automotive Crystal, Crystal Oscillator (CXO), Surface Acoustic Wave (SAW) Filter, and Timing Module (TM). Our goal is to add value to our customers by providing a complete solution of frequency devices and modules, design-in service to fully satisfy various needs of the esteemed customers. We believe based upon the competence of cost effectiveness, quality, lead-time, and customer service TXC will go beyond customers' expectation. TXC has now been highly recognized as the first-class crystal provider by our customers and TXC Corporation will continue striving for excellence not to meet but to exceed the most rigid customers' standards.

Founded: December, 1983

The Amount of Capital: 28.73 Billion

Main Business: Professional Frequency control product manufacturer

Products: Crystals, Automotive Crystals, Crystal Oscillators, SAW Devices,Timing Module

Headquarter：Taipei, Taiwan

Ping-Cheng Factory：Taoyuan, Taiwan

Ningbo Factory：Zhejiang, China

Headquarter

Ping-Cheng Factory

Ningbo Factory

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TXC (Taiwan)

TXC 台灣晶技 TXC CORPORATION

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Products

- Product Info
  - Crystals
  - Automotive Crystals
  - Oscillators
  - SAW Devices
  - Timing Modules
- Sample Request

Product Info

Crystals

Quartz crystals are passive electronics components which are primarily used as resonators from sub-MHz to up to a few hundred MHz's with high stability and Q (quality factor). Quartz crystals are key piezoelectric components in electronic frequency generation and control devices/subsystems for signal timing and synchronization. Applications include military, instrumentation, telecommunication, computer, medical, consumer, and automotive devices MORE

Automotive Crystals

With unique internal structure designs, unlike the common crystal units, automotive crystals emerged from our strict quality control system with stable performance. To comply with the wide temperature range reliability requirements for the automotive-electronics industry so to achieve the ultimate goal of "zero defect"..... MORE

Oscillators

Crystal oscillators are active electronics components which can generate high stable frequency clock signal in the ppm (part per million) level. A crystal oscillator in general consists of a quartz crystal resonator, an IC and some additional passive components. There are different kinds of crystal oscillators for many applications, including CXO (Clock Crystal Oscillator), VCXO (Voltage-Controlled Crystal Oscillator), TCXO (Temperature-Compensated Crystal Oscillator), OCXO (Oven-Controlled Crystal Oscillator), and MCXO (Microcomputer-Compensated Crystal Oscillator), etc ..... MORE

SAW Devices

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Information about Centum India & its crystals and oscillator products

CENTUM

Teamwork, Technology, Trust

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DEFENCE, SPACE & AEROSPACE

Utilizing the long historical experience and knowledge that the Centum Group has within the high reliability markets, Centum Rakon provides advanced crystal oscillator solutions into the Defense, Space and Aerospace markets. Its leading edge design and manufacturing experience is fully certified to the highest MIL and Space standards. Our products are certified are approved for use by the Indian Space Research Organisation, ISRO.

Centum Group | Centum EMS | Centum Electronics | Centum Industries

Communications and Mobile

Centum Rakon dominates the global communications market with leading edge solutions that uniquely address the stringent needs of reliability, speed and technology. Ultra Stable Temperature Controlled Crystal Oscillators (TCXOs) push the boundaries of conventional performance limits.

Products

- Simple Packaged Crystal Oscillators - SPXO
- Voltage Controlled Crystal Oscillators - VCXO and VCTCXO
- Temperature Controlled Crystal Oscillators - TCXO
- Oven Controlled Crystal Oscillators - OCXO

PRODUCT BROCHURE

PRODUCT SAFETY DATA SHEET

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Information about Communication, Telemetry Inst. (54 th Institute, China) & its crystals and oscillator products

新远通信有限公司
XINYUAN COMMUNICATIONS CO.,LTD.

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1/5/2011 Wed

Welcome to XINYUAN SatCom !

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  - » Airborne Station
  - » Integrated System
  - » Security Station
- Products
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  - » Wireless Access
  - » Network Monitor and Control
- Services
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- Job Opportunities
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Brief Introduction

The 54-th Research Institute, directly under CETC, established in the early 1950s, is an earliest and largest research institute engaged in communications and telemetry technology in China, a state-authorized Class A electronic engineering design unit .

The Institute is located in Shijiazhuang, Hebei Province, 1 km in area, composed of seven research departments, three central labs, five workshops, and four state-level or ministry-level R&D centers, owning advanced CAD developing and designing environment, perfect quality-ensuring system, good routine test conditions, well test measures and abundant technical information data.

The Institute is mainly engaged in the research of communications, telemetry and control technology, with strong power in communication networking, large integrated system engineering design and equipment development and production, including satellite communication, tropo communication, mobile communication, microwave relay communication, HF and UHF communication, ISDN and program-controlled switching, broadcast and TV, office automation, antenna, servo system, tracking, measure, reconnaissance and countermeasure, remote control, telemetry, remote sensing, network management and monitor, wireless access, expressway traffic control, electric network automation, system integration and design, and more.

We, the Satellite Communication, Broadcast and TV Research Department of the Institute, are one of oldest units in research of satellite communication system and equipment in china, covering FDMA, CDMA, TDMA, satellite TV, conference TV and digital video remote monitoring, being a unit which integrates system design, equipment development and production and project implementation. In recent 30 years, we have

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54th Institute (China)

HeBei YuanDong Communication System Engineering Co.,Ltd.

YU@NDONG

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Company product

- Time-Frequency Components
- Power automation
- System Integration
- Antenna and servo

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中华人民共和国信息产业部

中华人民共和国建设部

ERI 国家发展和改革委员会能源研究所

国防科学技术工业委员会

Time-Frequency Overview

Time-Frequency, founded in 1950s, has become recognized outstanding ability to produce piezoelectric devices and components. Our area of expertise include quartz crystal resonator, AT cut and SC cut high precision Oven Controlled Oscillator (OCXO), high-grade Voltage Controlled Oscillators (VCXO) and Temperature Compensated Oscillator (TCXO). Our products are widely applied to military, Tele-communication equipments and electronic equipments. .....more

Products Show

ISO9001:2000 & ISO14001:2004 Certified and ROHS compliant

---------More pictures and products specifications

Typical Customer

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54th Institute (China)

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Company product

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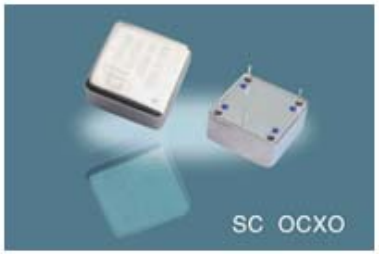
友情链接
LINK

中华人民共和国信息产业部

中华人民共和国建设部

ERI 国家发展和改革委员会能源研究所

国防科学技术工业



Products SO9000: 2000, ISO14000 & ROHS compliant, and in accordance with EU directives ROHS environmental standards.

Products specifications:

VC14DIPSERIES Voltage Controlled Crystal Oscillator	VCFSMDSERISES Oven Controlled Crystal Oscillator
TC36SERIES Temperature Compensated Crystal Oscillator	TC20SERIES Temperature Compensated Crystal Oscillator
TC14SERIES Temperature Compensated Crystal Oscillator	OC50 SERIES Oven Controlled Crystal Oscillator
OC38SERIES Oven Controlled Crystal Oscillator	OC36SERIES Oven Controlled Crystal Oscillator
OC25SERISES Oven Controlled Crystal Oscillator	OC20SERIES Oven Controlled Crystal Oscillator
OC14SERIES Oven Controlled Crystal Oscillator	

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