PRECISION QUARTZ

FREQUENCY CONTROL SOLUTIONS

Shortform Oscillator Catalog

OCXO/TCXO Edition

GREENRAY

About Greenray Industries

Greenray Industries, Inc. is a leading manufacturer of precision crystal oscillators.

Since 1961, Greenray has provided innovative, high performance frequency control solutions for the military, aerospace, communications and instrumentation markets.

Greenray's product capabilities include OCXOs, TCXOs, VCXOs and clock oscillators designed for demanding applications from 1Hz to 1GHz. Our state-of-the-art design, assembly and test operations enhance our ability to provide superior frequency control components, expert application support and extraordinary customer service.

Design, testing and production is carried out at our facility in Mechanicsburg, Pennsylvania, and our quality management system is certified to the ISO 9001:2008 standard.

Greenray's engineering focus is on tight frequency stabilities and low phase noise. Based on extensive experience with the defense and aerospace industries, our oscillators are optimized for long-term performance under the acceleration, shock and vibration conditions encountered in mobile and airborne applications. In addition, we offer custom build and small volume production capabilities.

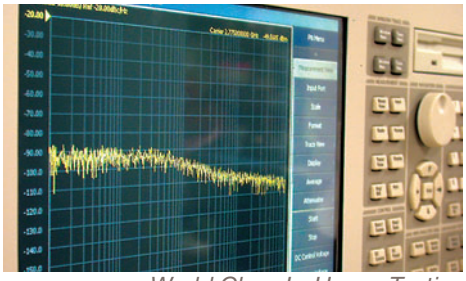
Greenray product features include:

- *OCXO frequency stability to ±0.005ppm*
- *TCXO frequency stability to ±0.04ppm*
- *VCXO frequency pull to ±1000ppm*
- *Temperature range of -55°C to +125°C*
- *Sine wave, CMOS, ECL, PECL & TTL outputs*
- *RoHS Compliant*

CAD/CAM

Greenray's extensive in-house electrical and environmental test capabilities include:

- *Aging*
- *Sine Vibration*
- *Mechanical Shock*
- *Acceleration*
- *Temperature Cycle*
- *Stabilization Bake*
- *Temperature Shock*
- *Fine/Gross Leak*
- *Random Vibration*
- *Temperature*
- *Resistance to Solvents*
- *Solderability*



World Class In-House Testing

Automated Test Systems

Certified System ISO 9001 QMI-SAI Global

OCXOs

Greenray precision oscillators offer exceptional frequency stability, vibration, shock, and acceleration sensitivity performance.

Greenray OCXOs are preferred for demanding communications, military, and aerospace applications, and are optimized for low phase noise, tight stability over temperature, and long-term performance. Greenray oscillators deliver performance and reliability for wired and wireless communications, GPS, SATCOM, and instrumentation applications, as well as for emerging technologies like WiMAX and Femtocell.

YH**1420**

Frequency 10 - 100 MHz
Attributes Small Size
Low Phase Noise
Best Stability $\pm 5 \times 10^{-8}$
Output CMOS, Sine wave
Size 20.32 x 12.70 x 9.14 mm
0.8 x 0.5 x 0.36 in., DIP

YH**1440**

Frequency 10 - 100 MHz
Attributes SMT Pkg.
Low Phase Noise
Best Stability $\pm 5 \times 10^{-8}$
Output CMOS, Sine wave
Size 25.4 x 22.10 x 11.43 mm
1.0 x 0.87 x 0.45 in., SMT

YH**1600**

Frequency 10 - 100 MHz
Attributes Vib. Compensation
Ultra-low g-Sensitivity
Best Stability $\pm 5 \times 10^{-10}$
Output CMOS, Sine wave
Size 38.10 x 38.10 x 19.05 mm
1.5 x 1.5 x 0.75 in.

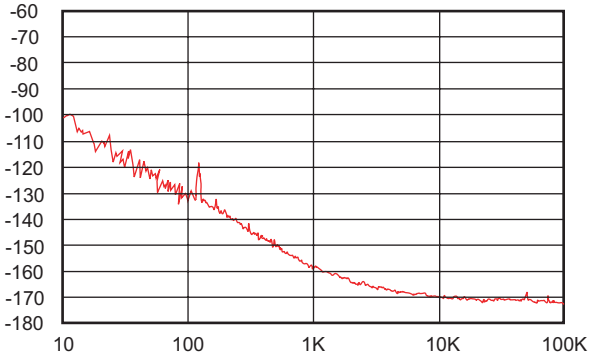
YH**1322**

Frequency 10 - 120 MHz
Attributes Ultra-low
Phase Noise
Best Stability $\pm 5 \times 10^{-9}$
Output Sine wave
Size 50.80 x 50.80 x 19.05 mm
2.0 x 2.0 x 0.75 in., SMA

YH**1460**

Frequency 10 - 100 MHz
Attributes Tight Stability
Low Phase Noise
Best Stability $\pm 5 \times 10^{-9}$
Output CMOS, Sine wave
Size 25.40 x 25.40 x 13.46 mm
1.0 x 1.0 x 0.53 in.

PHASE NOISE
113MHz OCXO YH1322 Series



L(f) [dBc/Hz] vs f [Hz]

YH**1300**

Frequency 10 - 50 MHz
Attributes Small Size
Ultra-low g-Sensitivity
Best Stability $\pm 1 \times 10^{-7}$
Output CMOS, Sine wave
Size 20.32 x 12.70 x 9.14 mm
0.8 x 0.5 x 0.36 in., DIP

ZYH**1002**

Frequency 10 - 50 MHz
Attributes Low Input Power
Best Stability $\pm 5 \times 10^{-8}$
Output CMOS, Clipped Sine
Size 20.32 x 12.70 x 9.14 mm
0.8 x 0.5 x 0.36 in., DIP

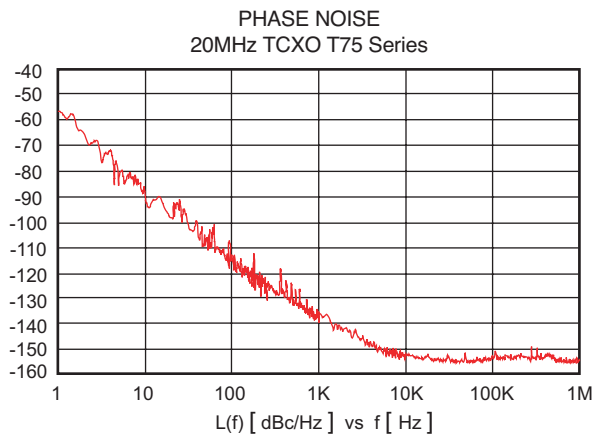
YH**1310**

Frequency 10 - 100 MHz
Attributes Tight Stability
Low Phase Noise
Best Stability $\pm 1 \times 10^{-8}$
Output CMOS, Sine wave
Size 35.56 x 25.40 x 12.70 mm
1.4 x 1.0 x 0.50 in., DIP

For more OCXO information visit
www.greenrayindustries.com/ocxo.html

Greenray's comprehensive range of TCXO products for communications, instrumentation, and military applications feature temperature stability performance of 1ppm or less and are available from 1Hz to 1GHz.

Greenray TCXOs are available in a variety of package configurations including miniature DIP, ceramic, SMT, MIL-spec, and industry-standard sizes. Greenray's stringent materials, assembly, test, and quality assurance protocols satisfy the rigorous requirements of defense contractors and commercial customers alike.



T1300

Frequency 10 - 50 MHz
Attributes Hermetic Pkg.
Ultra-low g-Sensitivity
Best Stability ±0.3 ppm
Output CMOS, Sine wave
Size 20.32 x 12.70 x 9.14mm
0.8 x 0.5 x 0.36 in., DIP

T1215

Frequency 10 - 800 MHz
Attributes Hermetic Pkg.
Best Stability ±0.3 ppm
Output CMOS, Clipped Sine, LVPECL
Size 9.0 x 7.0 x 2.8 mm
0.35 x 0.28 x 0.11 in., SMT

T121

Frequency 50 - 100 MHz
Attributes High Shock & Vib.
Low g-Sensitivity
Best Stability ±0.5 ppm
Output Sine wave
Size 17.27 x 17.27 x 5.08 mm
0.68 x 0.68 x 0.2 in., SMT

ZT600

Frequency 10 - 500 MHz
Attributes Low Phase Noise
High Frequency
Best Stability ±0.3 ppm
Output CMOS, Sine wave
Size 29.21 x 25.4 x 5.08 mm
1.15 x 1.0 x 0.2 in., SMT

T124

Frequency 650 Hz - 1.25 MHz
Attributes Low Frequency
Tight Stability
Best Stability ±0.3 ppm
Output CMOS
Size 17.27 x 17.27 x 5.08 mm
0.68 x 0.68 x 0.2 in., SMT

ZT610

Frequency 10 - 50 MHz
Attributes Ultra-low
Phase Noise
Best Stability ±1.0 ppm
Output CMOS, Sine wave
Size 20.32 x 12.70 x 9.14 mm
0.8 x 0.5 x 0.36 in., DIP

T90

Frequency 10 - 50 MHz
Attributes Low Phase Noise
High Shock & Vibration
Best Stability ±0.3 ppm
Output CMOS, Clipped Sine
Size 9.0 x 7.0 x 3.9 mm
0.35 x 0.28 x 0.15 in., SMT

T75

Frequency 10 - 50 MHz
Attributes Tight Stability
High Shock & Vibration
Best Stability ±0.3 ppm
Output CMOS, Clipped Sine
Size 7.0 x 5.0 x 2.5 mm
0.28 x 0.20 x 0.10 in., SMT

T53

Frequency 10 - 50 MHz
Attributes Tight Stability
High Shock & Vibration
Best Stability ±0.3 ppm
Output CMOS, Clipped Sine
Size 5.0 x 3.0 x 2.2 mm
0.20 x 0.12 x 0.09 in., SMT

T1185

Frequency 100 - 800 MHz
Attributes V. High Frequency
Best Stability ±0.3 ppm
Output LVPECL
Size 9.0 x 14.0 x 5.1 mm
0.35 x 0.55 x 0.20 in., SMT

For more TCXO information visit
www.greenrayindustries.com/tcxo.html

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Military, Aerospace & Defense

For nearly 50 years, Greenray Industries has supported the military and defense markets with high performance, precision oscillators. Our engineering experience and manufacturing expertise have helped make Greenray a key supplier on many military programs, providing cost-efficient, leading-edge solutions combined with a long-term service commitment.

Greenray frequency control devices support key applications including Smart Munitions, Missile Guidance, Airborne Communications, Airborne Instrumentation, Portable Communications and Equipment, Radar, Satellite Communications, Telemetry, GPS, Jammers, Detection and Identification.

Mobile Communications

Greenray Specialized MIL Capabilities include:

- *Testing and processes per MIL-PRF-55310*
- *Screening*
- *MIL parts construction*
- *IPC-A-610 trained operators*
- *In-house qualification testing*
- *Reliability calculations*
- *Phase Noise vs. Vibration Test*

Patriot Missile System

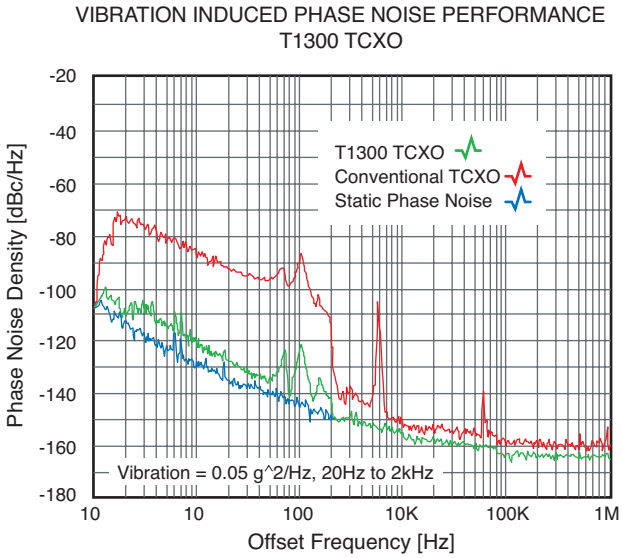
Greenray qualified MIL Programs include:

- *Patriot*
- *WIN-T*
- *Apache*
- *CSEL*
- *Falcon II & III*
- *NLOS*
- *F-16*
- *JTRS*
- *Harrier*
- *Raptor*
- *AEGIS*
- *ERGM*

Projectile Electronics

Greenray is focused on the manufacture of very rugged TCXO and OCXO products designed to withstand the most severe environmental requirements associated with military applications including MIL-PRF-55310, MIL-STD-202, MIL-STD-883, MIL-E-5400, and MIL-M-38510.

For example, utilizing our in-house vibration test lab, we have developed superior oscillator performance under dynamic operating conditions, including phase noise during vibration, as can be seen in the T1300 TCXO graph to the right.



Greenray Industries
Mechanicsburg, Pennsylvania

Greenray Industries' synergetic relationship with sister companies Statek Corporation (www.statek.com) and Advanced Technical Ceramics Company (www.adtechceramics.com), both leaders in their respective industries, affords Greenray's customers leading-edge innovation and world-class manufacturing – all from a single source.

Statek Corporation
Orange, California

AdTech Ceramics
Chattanooga, Tennessee

GREENRAY

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