



greenrayindustries.com

# Newsletter: January 2014

## New Product Release



Greenray Industries' new T52 temperature compensated crystal oscillator (TCXO) features a rugged, 5 x 3mm ceramic package and a high performance crystal, and is designed for applications that place a premium on portability AND performance under adverse conditions. The T52 offers Temperature Stability to  $\pm 0.1$  ppm (-20 to +70°C), g-Sensitivity of  $\leq 2.5 \times 10^{-9}$ /g (low g-Sensitivity Option LG =  $\leq 2.5 \times 10^{-9}$ /g), and Aging is  $< 1.0$ ppm/year. Output is CMOS (C option) or Clipped Sine (S option). Supply Voltage is +3.0VDC, +3.3VDC, or +5.0VDC, and Supply Current is  $< 6$ mA for CMOS and  $< 3$ mA for Sine output. Electronic frequency control (EFC) is provided for precise tuning or phase locking applications. Environmentals are as follows - Vibration: per MIL-STD-202G, Meth 214, Cond I-F Shock: per MIL-STD-202G, Meth 213, Cond D Shock levels are available to 50,000g. Please contact the factory for information about the availability of higher levels. Click the link to see the spec: [T52 Series Spec](#)

Greenray Industries would like to announce the release of our T1238 precision TCXO. The T1238 series is a Stratum 3 compliant precision TCXO that can be used for Wireline and Wireless Communications including Small Cell, Ethernet and 1588 Synchronization requirements. The T1238 offers superior temperature and long term stability in a small 5x7mm SMT RoHS compliant package. Frequencies are available between 10MHz and 40MHz.



## Greenray News



Throughout 2013 Greenray worked to upgrade our Quality Management System to AS9100C. Late last year Greenray took part in our Final Stage 2 Audit to become registered for AS9100C. This took a lot of patience, participation, cooperation, and effort from everyone here at Greenray and as of January 14, 2014 we received our certification. Now Greenray has a dual registration for both ISO 9001:2008 and AS9100C.

## Greenray Upgrades

As of Jan 3 2014 Greenray has begun using its newly purchased MyData Pick and Place Machine the 100XLe-10 with a placement rate of 16,000 chips per hour. The purchase of this new machine was a strategic move to increase our internal automated building capabilities and to partner with a company that has thrived in the low volume high mix market. This new machine will provide us with the ability for faster changeovers, higher throughput, assembling complex parts, and using smaller components such as 0201s and even 01005s that can reduce the size of our oscillators.



## Engineering Talk

Trim effect is a skewing of the frequency versus temperature characteristic of an oscillator, which occurs when its frequency is pulled (trimmed) away from nominal. Depending on oscillator design, trim effect can degrade the temperature stability from hundreds of ppb to several ppm. Greenray Industries has been developing a new compensation technique which utilizes an artificial neural network. The patent pending technology provides superior curve fitting, which allows for TCXOs to be compensated to stabilities of less than +/-50ppb over -40 to +85 °C, including trim effect. The adaptive nature of the artificial neural network also allows for the compensation of trim effect whereas almost all other TCXOs in the marketplace do not address the issue. If you have further interest please email [asmith@greenrayindustries.com](mailto:asmith@greenrayindustries.com).

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