



## MEMS Timing Solutions for **Aerospace & Defense**

### Endura™ COTS Ruggedized Timing Solutions

- Best-in-class acceleration sensitivity
- High shock and vibration survivability
- Better dynamic performance in harsh environments
- Higher reliability

Engineered for the  
world's toughest  
applications

Endura Oscillators | Super-TCXOs | VCXOs | DCXOs

Timing devices are critical to the performance of aerospace and military equipment that operates in dynamic environments. SiTime Endura ruggedized timing solutions are specifically engineered and qualified for tough operating conditions – providing best-in-class stability and reliability over a wide temperature range and under severe vibration.

Application Circuits

- Local oscillator
- Reference clock
- Time keeping
- Time synchronization
- Time transfer
- Digital system clocking



PRECISION GNSS TIMING



AVIONICS & NAVIGATION SYSTEMS



UAVs AND VTOL



FIELD COMMUNICATIONS



SATCOM RECEIVERS



LAUNCHERS

Endura Performance for Tough Environments

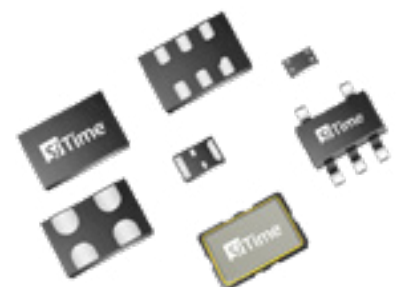
- $\pm 10$  ppb Endura Super-TCXOs™ replace fragile and bulky quartz OXOs
- As low as 0.3 ppb/°C dF/dT over temperature range with TCXO
- Up to -55°C to 125°C operating temperature
- Ultra-low acceleration sensitivity and high shock survivability
- As low as  $\pm 150$  ppb aging over 20 years with TCXO
- Low sensitivity to power supply noise and EMI
- Smallest industry-standard packages
- Programmable frequency eliminates NRE for custom parts

Higher System Performance

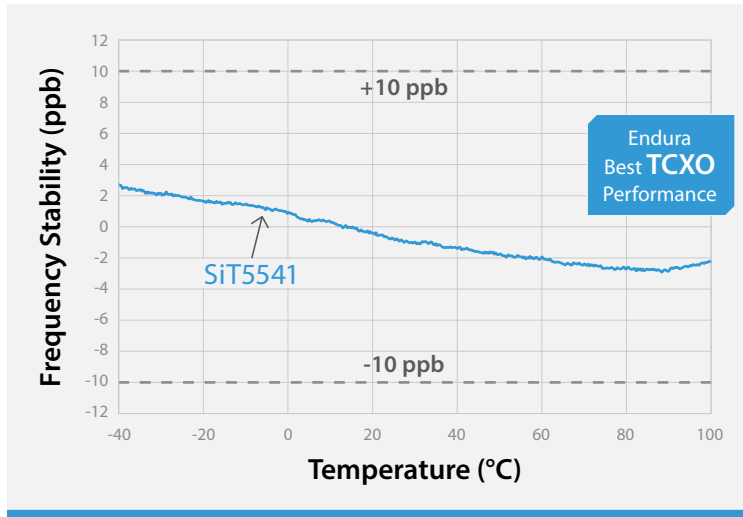
- Simplifies design and layout
- Eliminates vibration damping designs
- Reduces system size
- Lowers bit error rate
- Enables GNSS receivers to acquire satellite lock faster and maintain lock longer
- Survives higher level of shock
- Eliminates need for external temperature compensation

Endura Quality and Reliability at COTS Pricing Level

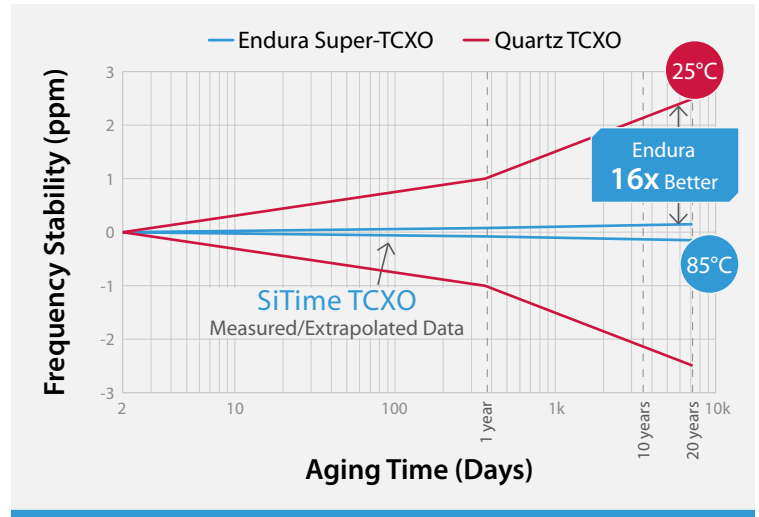
- Qualification IAW JESD47, JESD22, MIL-STD-883 and MIL-STD-202
- Less than 1 DPPM quality level
- Statistical process control and 6-sigma datasheet limits
- Endura process flow



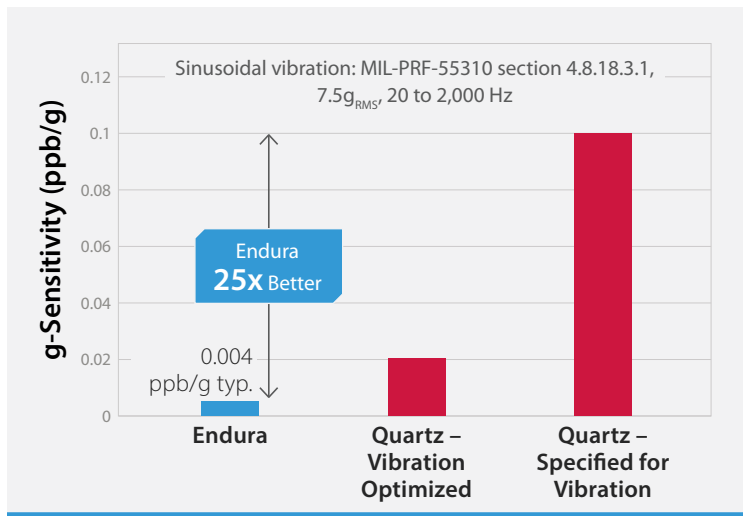
Best Frequency Stability over Temperature



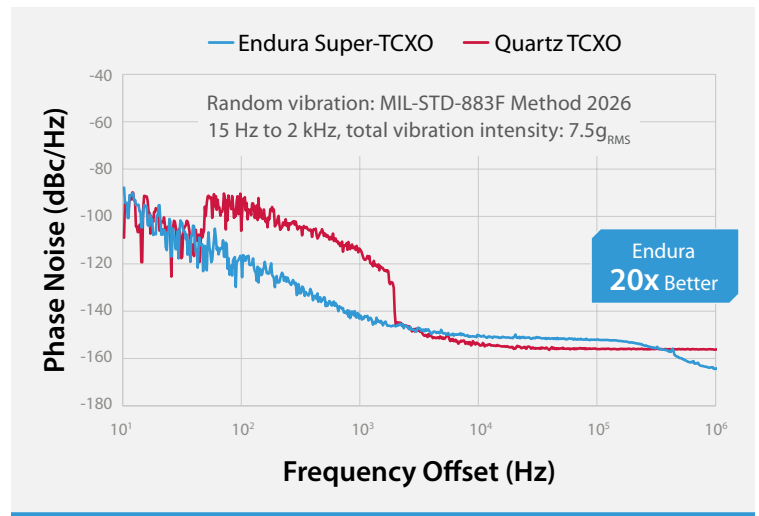
Best Aging



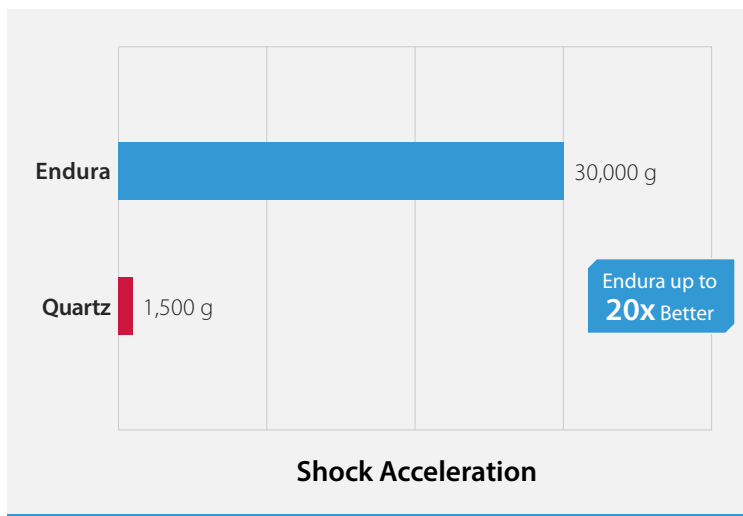
Best Frequency Stability under Vibration



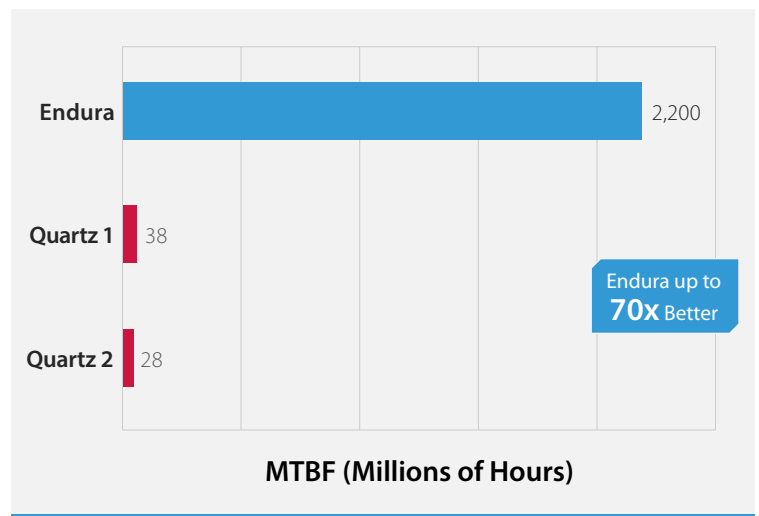
Best Phase Noise under Random Vibration



Best Shock Survivability



Best Reliability



SiTime Base Part No.	Output Frequency	Frequency Stability (ppm)	Temperature Range (°C)	Supply Volt. (V)	Packages (mm x mm)	Output Logic	Features
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**TCXOs** |  $\pm 6.25$  to  $\pm 3200$  ppm pull range | 5 ppt resolution frequency control | Better reliability | 0.004 ppb/g acceleration sensitivity

SiT5541	1 MHz to 60 MHz	$\pm 0.010$	-40 to 105	2.5, 2.8, 3.0, 3.3	7.0 x 5.0 Ceramic	LVC MOS, Clipped Sinewave	0.01 ppb/g max, I2C programmable
SiT5348/49	1 MHz to 220 MHz	$\pm 0.05$	-40 to 105	2.5, 2.8, 3.0, 3.3	5.0 x 3.2 Ceramic	LVC MOS, Clipped Sinewave	0.009 ppb/g max, I2C and SPI programmable
SiT5346/47		$\pm 0.1, \pm 0.2, \pm 0.25$					
SiT5146/47		$\pm 0.5, \pm 1, \pm 2.5$					

**DIFFERENTIAL LOW-JITTER OSCILLATORS** | Better reliability | 0.2 ps/mV power supply noise rejection (PSNR)

SiT9551	25 MHz to 644 MHz	$\pm 20, \pm 50$	-55 to 125	1.71 to 3.63	2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5	LVPECL, LVDS, HC SL, Low-power HC SL, FlexSwing	0.04 ppb/g, 70 fs RMS phase jitter
SiT9346/47	1 MHz to 725 MHz	$\pm 10, \pm 20, \pm 25, \pm 50$	-40 to 105	2.5 to 3.3	3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0	LVPECL, LVDS, HC SL	0.1 ppb/g, 210 fs RMS phase jitter
SiT9356/57	1 MHz to 220 MHz, 220 MHz to 920 MHz	$\pm 20, \pm 50$	-55 to 125	1.71 to 3.63	2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5	LVPECL, LVDS, HC SL, Low-power HC SL, FlexSwing	0.04 ppb/g, 150 fs RMS phase jitter

**SINGLE-ENDED OSCILLATORS** | Better reliability | Pin-compatible footprints

SiT8944	1 MHz to 110 MHz	$\pm 20, \pm 25, \pm 30, \pm 50$	-55 to 125	1.8, 2.5 to 3.3	2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0	LVC MOS	0.1 ppb/g, 1.3 ps RMS phase jitter
SiT8945	115 MHz to 137 MHz						
SiT9045	1 MHz to 150 MHz	$\pm 20, \pm 25, \pm 50$	-55 to 125	1.8, 2.5 to 3.3	2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5	LVC MOS	0.1 ppb/g, Smallest spread spectrum oscillator
SiT2044	1 MHz to 110 MHz	$\pm 20, \pm 25, \pm 30, \pm 50$	-55 to 125	1.8, 2.5 to 3.3	SOT23-5: 2.9 x 2.8	LVC MOS	0.1 ppb/g, 8 output drive strength options
SiT2045	115 MHz to 137 MHz						

**VXOs** |  $\pm 25$  to  $\pm 3200$  ppm pull range, <1% linearity | Better reliability

SiT3342/43	1 MHz to 725 MHz	$\pm 15, \pm 25, \pm 30, \pm 50$	-40 to 105	2.5 to 3.3	3.2 x 2.5, 5.0 x 3.2, 7.0 x 5.0	LVPECL, LVDS, HC SL	0.21 ps RMS phase jitter
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**DCXOs (In-System Programmable)** | Digital pull for lowest noise | Up to  $\pm 1600$  ppm pull range, 5 ppt pull resolution, <1% linearity

SiT3541/42	1 MHz to 725 MHz	$\pm 20, \pm 25, \pm 50$	-40 to 105	2.5 to 3.3	5.0 x 3.2	LVPECL, LVDS, HC SL	I2C programmable, 0.21 ps RMS phase jitter
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**32 kHz TCXO** | Industry-best stability | 6.0  $\mu$ A, 30x lower power than quartz

SiT7910	32.768 kHz	$\pm 0.1, \pm 0.2$	-40 to 85, -55 to 105	1.62 to 3.63	2.5 x 2.0	LVC MOS	$\pm 5$ ppm 20-yr aging 2 ns RMS phase jitter
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