SiTime

THE PRECISION TIMING COMPANY

MEMS Timing Solutions for

Aerospace & Defense

Endura™ Ruggedized Timing Solutions
Guaranteed Performance in the Harshest Environments

- Best Resistance to Shock
  - 30,000 *g* Operational
  - 70,000 *g* (100 *kg* Future) Survivability
- Best Resistance to Vibration
  - 0.01 to 0.004 ppb/g
- Tightest Frequency Stability Over Temperature
  - ±1 ppb OCXO
  - ±5 ppb TCXO

"MEMS Timing doesn't just outperform quartz—it's enabling things that are new and could never be done before."

—Chief, Time and Frequency Division, NIST

Endura Oscillators | OCXOs | 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 shock and vibration.

Application Circuits

Local oscillator

Reference clock

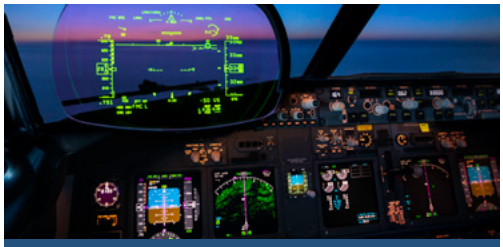
Time keeping

Time synchronization

Time transfer

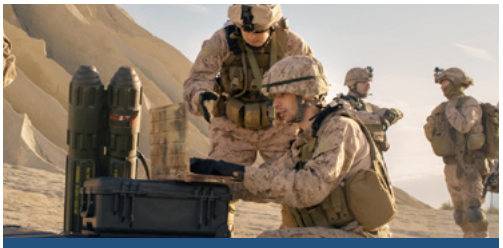
Digital system clocking

PRECISION GNSS TIMING



AVIONICS & NAVIGATION SYSTEMS

UAVs AND VTOL



TACTICAL COMMUNICATIONS

SATCOM RECEIVERS

LAUNCHERS

Endura Performance for Tough Environments

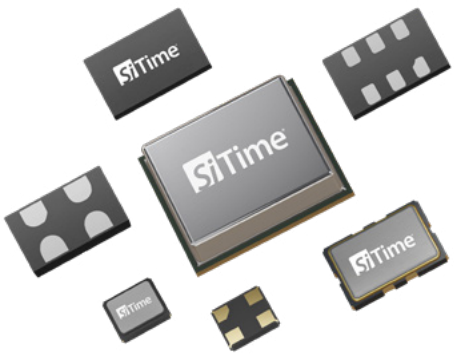
- ±1 ppb Endura OCXO consumes less than 420 mW power in 9 x 7 mm package (63 mm^2 footprint)
- ±5 ppb Endura Super-TCXOs™ replace fragile and bulky quartz OCXOs
- As low as 0.3 ppb/°C dF/dT over temperature range with TCXO
- As low as ±150 ppb aging over 20 years with TCXO
- Low sensitivity to power supply noise and EMI

Higher System Performance

- Simplifies design and layout
- Eliminates vibration damping designs
- Reduces system size and power
- Minimizes GNSS jamming/spoofing
- Enables GNSS receivers to acquire satellite lock faster and maintain lock longer
- Survives higher level of shock
- Eliminates need for external temperature and vibration compensation

Endura Quality and Reliability at COTS Pricing Level

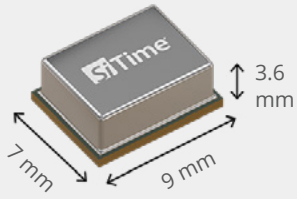
- Qualification IAW JESD47, JESD22, MIL-STD-883 and MIL-STD-202
- Less than 1 DPPM quality level
- Statistical process control and 6-sigma datasheet limits
- Endura process flow increases reliability
- >2 Billion hours MTBF



Best Ruggedized Holdover Solution

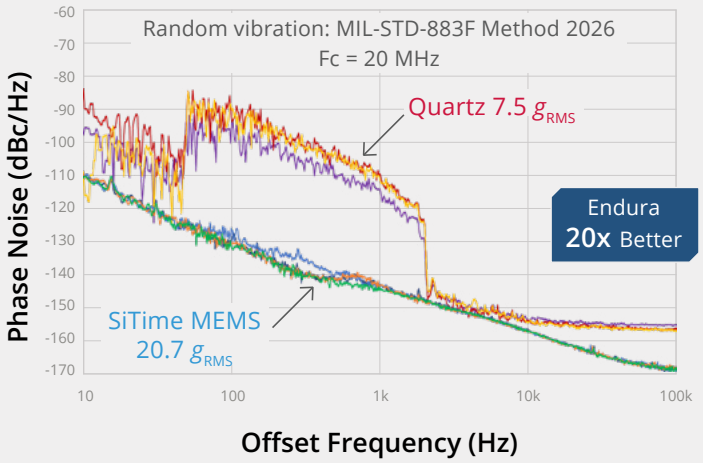
SiT7101 OCXO

- ±1 ppb frequency stability over -40 to 95°C
- 0.1 to 0.01 ppb/g *g*-sensitivity
- 5E-12 ADEV
- 0.1 ppb/day aging
- <1.5 µs time error after 12-hr holdover
- 420 mW steady-state power

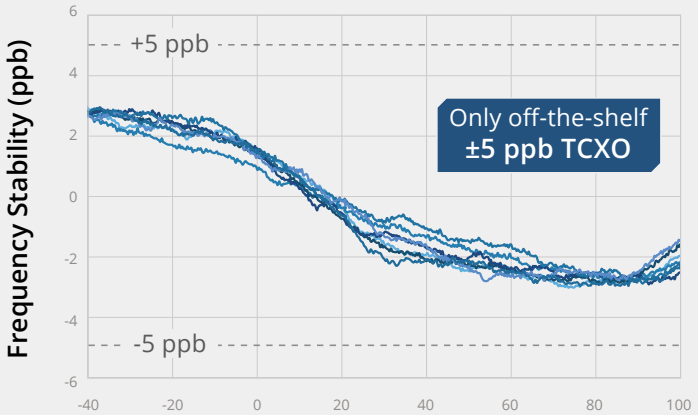


Weight 0.35 g

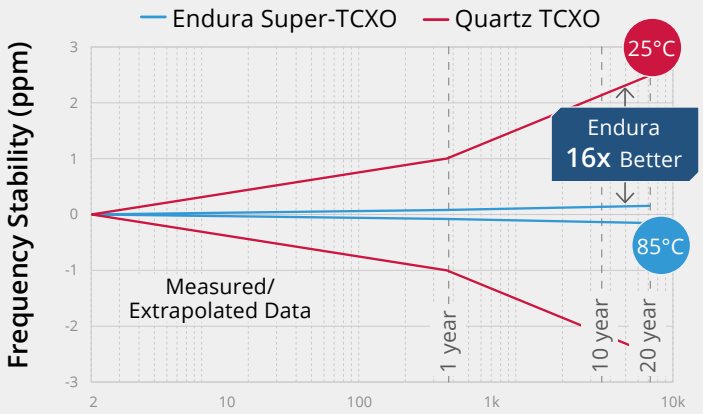
Best Phase Noise Under Random Vibration



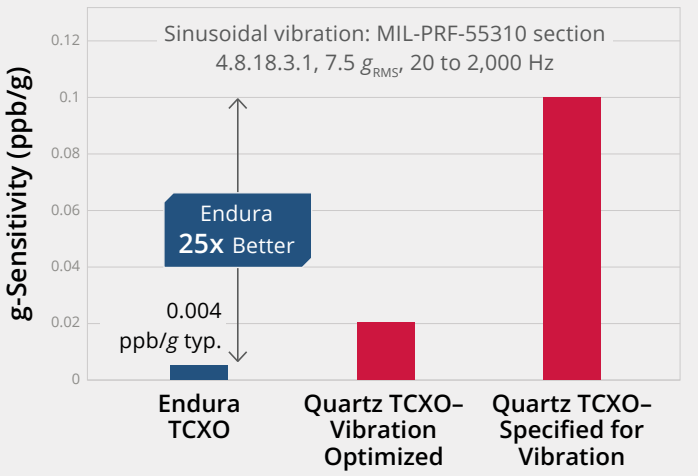
SiT5543 – Best TCXO Frequency Stability



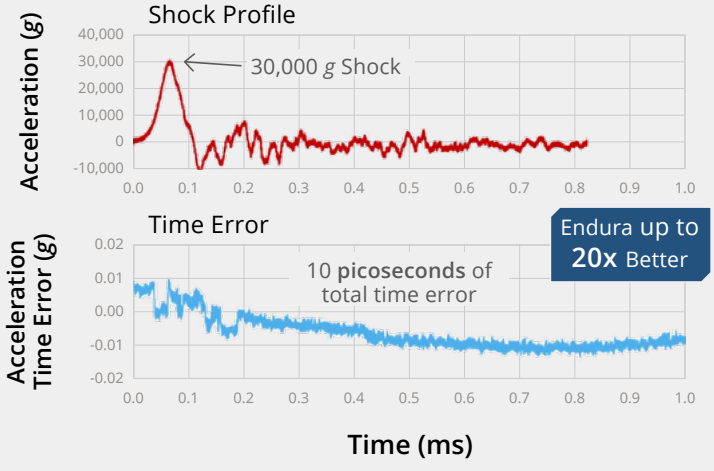
Best Aging



Best Frequency Stability under Vibration



Best Shock Survivability



SiTime Base Part No.	Output Frequency	Frequency Stability	Temperature Range (°C)	Supply Volt. (V)	Packages (mm x mm)	Output Logic	Features
OCXOs | 0.01 ppb/*g* | 5E-12 ADEV							
SiT7101	10 to 250 MHz	±1 to ±5 ppb	-40 to 95	3.3	9.0 x 7.0	LVCMOS, Regulated Out, Clipped Sine	I²C & SPI frequency pull
Super-TCXOs | ±6.25 to ±3200 ppm pull range | 5 ppt resolution frequency control | Better reliability | 0.004 ppb/*g* acceleration sensitivity							
ENDR-TTT*	1 to 105 MHz	±50 to ±500 ppb	-55 to +125	1.8, 2.5, 2.8, 3.0, 3.3	5.0 x 3.2 Ceramic	LVCMOS, Regulated Out, Clipped Sine	0.004 ppb/*g* acceleration sensitivity, >100 kg shock survivability
SiT7201/02	1 to 220 MHz	±100 to ±250 ppb	-40 to +105	1.8, 2.5, 2.8, 3.0, 3.3	5.0 x 3.2 Ceramic	LVCMOS, Regulated Out, Clipped Sine	Digital frequency tuning through I²C or SPI, ±100 fs phase jitter & low g-sensitivity 0.01 ppb/*g*
SiT5146/47	1 to 220 MHz	±0.5, ±1, ±2.5 ppm	-55 to +105	2.5, 2.8, 3.0, 3.3	5.0 x 3.2 Ceramic	LVCMOS, Clipped Sine	0.009 ppb/*g* max, I²C & SPI programmable
SiT5348/49	1 to 220 MHz	±0.05 ppm	-40 to 105	2.5, 2.8, 3.0, 3.3	5.0 x 3.2 Ceramic	LVCMOS, Clipped Sine	0.009 ppb/*g* max, I²C & SPI programmable
SiT5346/47	1 to 220 MHz	±0.1, ±0.2, ±0.25 ppm	-40 to 105	2.5, 2.8, 3.0, 3.3	5.0 x 3.2 Ceramic	LVCMOS, Clipped Sine	0.009 ppb/*g* max, I²C & SPI programmable
Single-Ended Oscillators | Better reliability | Pin-compatible footprints							
SiT7601	4 to 125 MHz	±30 to ±50 ppm	-55 to 125	1.5, 1.8, 2.5, 3.3	2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5	LVCMOS	>100,000+ *g* shock, 70 *g* RMS vibration
SiT8944/45	1 to 137 MHz	±20, ±25 ±30, ±50 ppm	-40 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	LVCMOS	0.1 ppb/*g*, 1.3 ps RMS phase jitter
Differential Low-Jitter Oscillators | Better reliability | 0.2 ps/mV power supply noise rejection (PSNR)							
SiT9356/57	1 to 990 MHz	±20 to ±50 ppm	-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, HCSL, Low-power HCSL, FlexSwing	0.04 ppb/*g*, 150 fs RMS phase jitter

*Contact SiTime for datasheet