

Precision Timing in Open Architectures in Aerospace-Defense

Time reference and timing distribution are critical for implementation of open system architectures. Timing is invisible and can be fragile in tough battlefield conditions.

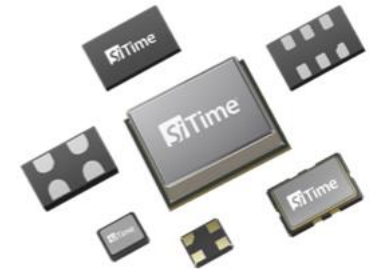
This is where SiTime Endura™ ruggedized COTS MEMS oscillators, TCXOs and OCXOs excel. They are a low SWaP solution with extremely low sensitivity to vibration and shock and address the wide range of applications in MOSA/SOSA/CMOSS.

Key Considerations

- Size, Weight and Power
- Frequency Stability
- Holdover
- Robustness
- Reliability

Endura™ Ruggedized MEMS TCXO & OCXO for Precision Systems

- $< \pm 1E-9$ OCXO frequency stability over -40 to $95^{\circ}C$ in $9 \times 7 \times 3.6 \text{ mm}^3$ package with $< 420 \text{ mW}$ power consumption
- Low vibration sensitivity $< 1E-11/g$
- $< 1 \mu\text{sec}$ time error after 24-hour in holdover
- Allan Deviation $< 5E-12$ from 1 to 1000 s
- Low broadband phase noise $< 170 \text{ dBc/Hz}$
- High shock survivability $> 30,000 \text{ g}$
- High performance Super-TCXOs® replace OCXO



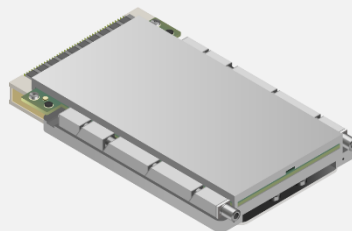
Open Architecture Applications

Radial Clock Card

- GPS disciplined oscillator (GPSDO)
- Assured Positioning, Navigation, and Timing (A-PNT) module or PNT module

Payload Card

- Software defined radios (SDR)
- Communications (COMM)
- Electronic warfare (EW)
- Signals intelligence (SIGINT)
- Up/down converters
- Graphics processing units (GPU)
- Single board computers
- Storage cards



Open VPX card

Switch Card

- Ethernet switches

Robust, Reliable Off-The-Shelf MEMS Oscillators

- Manufactured with high volume, industry standard, semiconductor processes
- > 2 -Billion-hour MTBF, over 3 billion units shipped
- < 12 weeks lead time for production volume and < 4 weeks lead time for samples
- Factory configurable designs enable frequency options from 1 MHz to 900 MHz

[Learn more about how low SWaP MEMS OCXOs prolong holdover in A-PNT—even in rough environments](#)

Endura Product Availability

SiTime Endura oscillators, TCXOs and OCXOs are manufactured on high-volume production lines and are available with 12-week lead times and shorter lead times for samples.

SiTime builds an inventory of programmable parts that are factory-programmed to the customer's selected configuration to fulfill orders, enabling a wide variety of custom frequencies and configuration options with no NRE and short lead time.

Endura ruggedized oscillators are 100% screened over temperature with power cycling at multiple temperature points, to ensure high quality and reliability. SiTime warranties Endura products in aerospace and defense applications.

Endura Base Part Number	Output Frequency (MHz)	Stability Over Temperature Range	Temp. Range (°C)	Allan Deviation	Jitter / Phase Noise $f_c=10$ MHz (dBc/Hz)	Package (mm)	g-sensitivity
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OCXOs | I2C and SPI frequency pull option | LVCMOS or Clipped Sine | 2.5 V, 3.3 V supply voltage | 420 mW steady-state power

SiT7111	10 to 60	±1E-9	-40 to 95	1 s: 5E-12 10 s: 5E-12 100 s: 5E-12	1 Hz: -91 10 Hz: -118 100 Hz: -138 1 kHz: -145 10 kHz: -158 100 kHz: -175	9.0 x 7.0 x 3.6	1E-11/g
SiT7112	60 to 220						
SiT7101	10 to 60	±3E-9, ±5E-9					
SiT7102	60 to 220						

Low Phase Noise Super-TCXOs | I2C and SPI frequency pull option | LVCMOS or Clipped Sine

SiT7201	10 to 60	±100E-9, ±250E-9	-40 to 105	10 s: 1E-11	1 Hz: -90 10 Hz: -119 100 Hz: -141 1 kHz: -151 10 kHz: -165 100 kHz: -176	5.0 x 3.5 CER	1E-11/g
SiT7202	60 to 220						

Ultra-low Stability Super-TCXOs | Voltage control or I2C frequency pull option | LVCMOS or Clipped Sine | 2.5 V, 3.3 V supply voltage

SiT5543	1 to 60	±5E-9	-40 to 95	10 s: 1.5E-11	1 Hz: -80 10 Hz: -108 100 Hz: -127 1 kHz: -148 10 kHz: -154 100 kHz: -154	7.0 x 5.0 CER	1E-11/g
SiT5541	1 to 60	±10E-9, ±20E-9	-40 to 105				

Super-TCXOs | Voltage control or I2C frequency pull option | LVCMOS or Clipped Sine | 2.5 V, 3.3 V supply voltage

SiT5348	1 to 60	±50E-9	-40 to 105	10 s: 1.5E-11	1 Hz: -80 10 Hz: -108 100 Hz: -127 1 kHz: -148 10 kHz: -154 100 kHz: -154	5.0 x 3.2 CER	9E-12/g
SiT5349	60 to 220						
SiT5346	1 to 60	±100E-9, ±250E-9					
SiT5347	60 to 220						

32 kHz TCXO | 1.8 V to 3.3 V supply voltage

SiT7910	32 kHz	±100E-9	-55 to 105	10 s: 5E-8	2.1 ns _{RMS} IPJ	2.5 x 2.0 CER	2E-8/g
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Low Jitter Differential Oscillators | LVPECL, LVDS, HCSL, Low-power HCSL and FlexSwing™ signaling options

SiT9551	25 to 644 select frequencies	±20, ±30, ±50 ppm	-55 to 125	N/A	70 fs IPJ	2.0 x 1.6, 2.5 x 2.0, 3.2 x 2.5 QFN	4E-11/g
SiT9356/57	1 to 220, 220 to 920				150 fs IPJ		

Low g-sensitivity Oscillator | LVCMOS or LVTTTL output | Programmable Drive Strength | 1.8 V to 3.3 V output voltage

SiT8944/45	1 to 137	±20, ±25, ±30, ±50 ppm	-55 to 125	N/A	1 ps IPJ	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 QFN	1E-10/g
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