

Precision Timing in GNSS Receivers

For more than 250 years, accurate time keeping has been essential in determining an observer's exact position, the key element of navigation. With today's global navigation satellite systems (GNSS), the need for precise timekeeping remains.

A GNSS receiver needs exact timekeeping to fast lock to satellite signal and local oscillator stability for accurate positioning and time synchronization, even during weak satellite signal acquisition and under dynamic operating environments.

Key Considerations

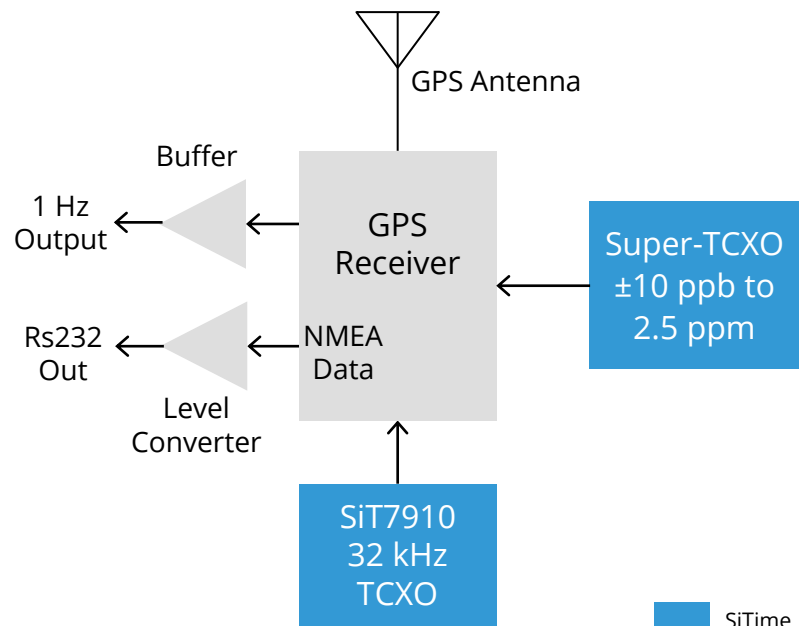
- Stability over temperature
- Operational robustness under shock and vibration
- High reliability
- Survivability under harsh conditions

Endura™ MEMS COTS ruggedized Super-TCXOs™ are precision timing solutions with exceptional dynamic performance and rich features. By combining tight frequency stability and low phase noise, SiTime Super-TCXOs replace legacy quartz OCXOs while increasing reliability, lowering power, and reducing size.

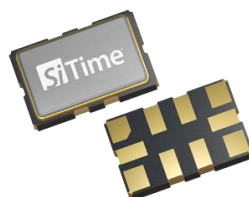
Endura silicon MEMS-based devices deliver the lowest acceleration sensitivity, best shock and vibration survivability, high-reliability (>2.2 billion hours MTBF), and superior dynamic performance under vibrations, thermal gradients, and power supply noise. Endura Super-TCXOs are available with voltage control as well as I2C and SPI digital control for in-system frequency tuning.

Higher System Performance

- Reduces satellite lock loss instances
- Locks to satellite signal faster
- Increases resistance to jamming
- Maintains performance in dynamic environments
- Eliminates need for external temperature compensation



[Watch Endura MEMS Super TCXO in a real-life positioning application in this video](#)



Endura Timing Solutions

Endura products can be factory-programmed to a wide combination of frequency, output and supply voltage, eliminating the long lead times and customization costs associated with quartz products. All Endura oscillators are 100% screened through the SiTime Endura process flow to provide high reliability at COTS pricing level.

Type	Product	Frequency	Key Features	Key Values
Super-TCXO	SiT5541	1 to 60 MHz	<ul style="list-style-type: none"> ±10 ppb stability 0.3 ppb/°C dF/dT 0.01 ppb/g acceleration sensitivity ±150 ppb 20-yr aging @ 85°C -40°C to 105°C 7.0 x 5.0 mm ceramic package 	<ul style="list-style-type: none"> Best frequency vs. temperature stability in TCXO in the market Extremely stable under shock and vibration No change in phase noise under vibrations Minimizes link drops due to shock, vibration, or temperature change I²C/SPI digital control available to speed design
	SiT5346	1 to 60 MHz	<ul style="list-style-type: none"> ±0.1 to ±0.25 ppm stability ±1 ppb/°C 0.009 ppb/g acceleration sensitivity 	<ul style="list-style-type: none"> Extremely stable under shock and vibration No change in phase noise under vibrations Minimizes link drops due to shock, vibration, or temperature change Voltage control option I²C/SPI digital control available to speed design
	SiT5347	60 to 220 MHz	<ul style="list-style-type: none"> ±0.4 ppm 20-yr aging @ 85°C -40°C to 105°C 5.0 x 3.2 mm ceramic package 	
	SiT5348	1 to 60 MHz	<ul style="list-style-type: none"> ±50 ppb stability ±1 ppb/°C 	
	SiT5349	60 to 220 MHz	<ul style="list-style-type: none"> 0.009 ppb/g frequency stability -40°C to 105°C 	
32.768 kHz TCXO	SiT7910	32.768 kHz	<ul style="list-style-type: none"> ±0.2 ppm stability -55°C to 105°C 5 µA current consumption 3.5 ppm 20 year aging @ 85°C 2.5 x 2.0 mm ceramic package 	<ul style="list-style-type: none"> Unique combination of low power and frequency stability – only possible with MEMS! Enables fast GNSS signal acquisition without compromising power



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