MEMS Timing Solutions

Oscilloscopes & Spectrum Analyzers

Precision Timing in Oscilloscopes & Spectrum Analyzers

Instrumentation devices, specifically oscilloscopes and spectrum analyzers, require accurate and robust reference timing. In addition, some instrumentation devices are networked and require precision timing to connect to the network and send data to and from the cloud.

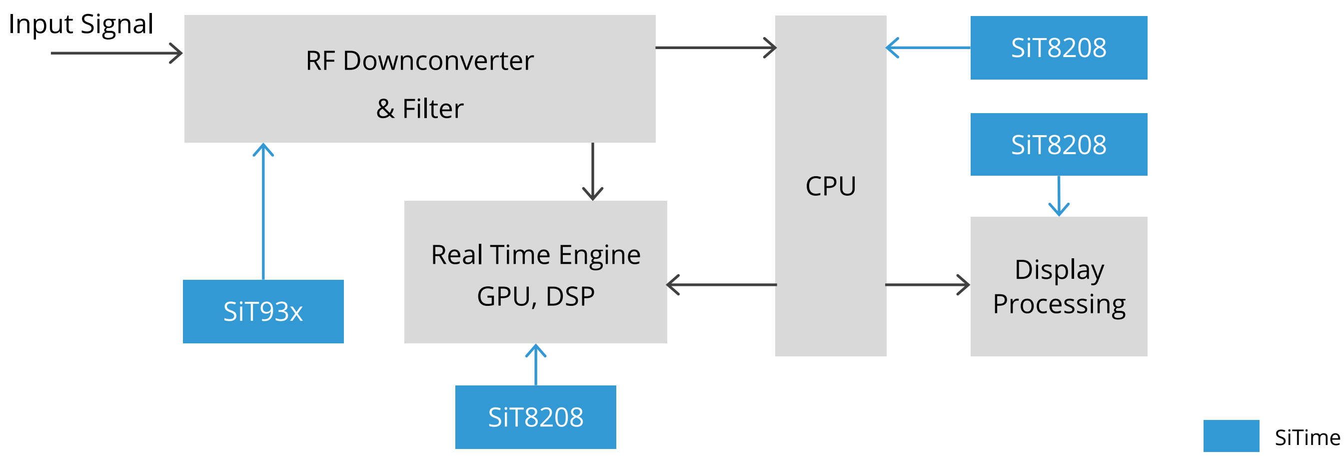
The term spectrum and signal analyzers are used interchangeably but perform a critical function in analyzing frequencies to determine strength of a frequency and frequencies causing noise or interference.

Key Considerations

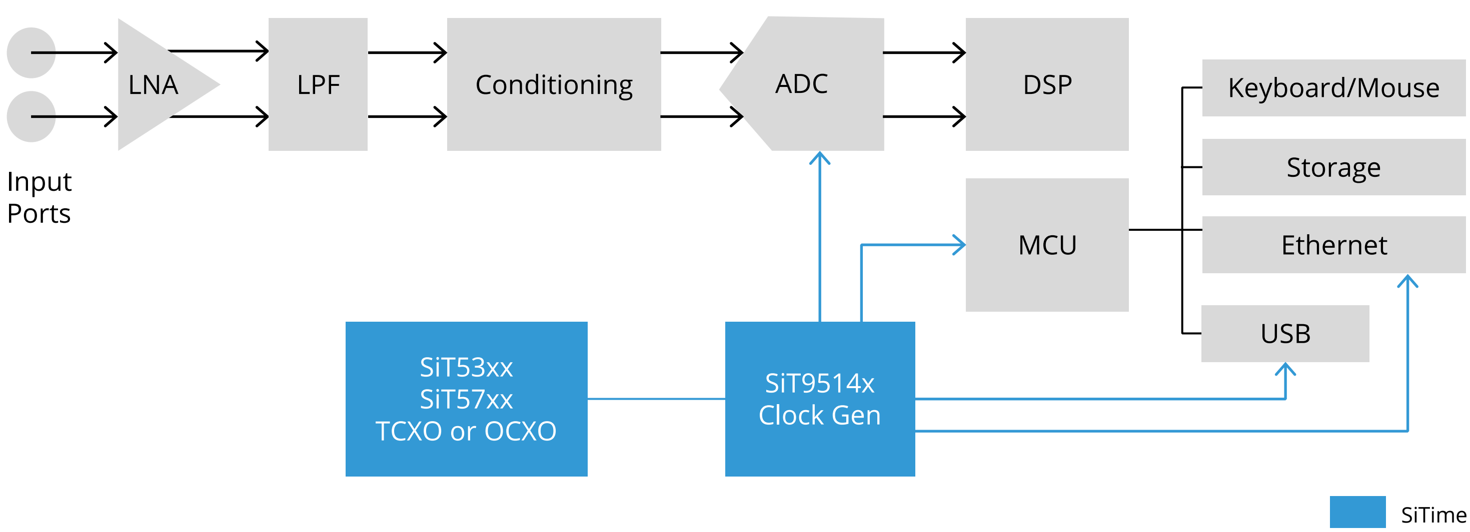
- Frequency stability
- Wide temp range
- EMI resilience
- Form factor for handheld and portable devices

Oscilloscopes and spectrum analyzers cater to different needs; the former to measure voltage or current and the latter to tune base stations to improve signal-to-noise ratio (SNR), or in labs to determine EMI.

Typical Vector Signal Analyzer Block Diagram



Digital Oscilloscope Block Diagram



Example Use Cases

While oscilloscopes are primarily used in labs by engineers to measure voltage, spectrum and vector signal analyzers have a wide range of uses. In telecom, portable or handheld analyzers can be used by field personnel to tune base stations to improve signal-to-noise ratio (SNR), or in labs to determine EMI. Other use cases are shown in the table on the right.

Segment	Application
• Medical	• Spectral Analysis to determine chemical composition
• Telecom	• Interference monitoring
• Defense	• Anti-drone systems
• Automotive	• V2X calibration
• Energy & Power	• Interference monitoring

Networked analyzers typically do not have a display and are used for geographically distributed spectrum monitoring. Whether these are used as networked or standalone, spectrum / vector signal analyzers perform a critical function in defense for detecting RF intrusion at secure facilities, for identifying frequencies in anti-drone warfare systems and in telecom to monitor interference in licensed spectral bands.

SiTime advantages

SiTime devices offer the following advantages over quartz crystals, which are particularly important for Industrial applications:

- Factory programmable to any frequency
- Frequency stability as low as < ± 0.1 ppm over -40 to +105°C temperature range
- EMI reduction features
- Higher reliability than quartz
- No activity dip or cold start issues

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Featured products

Type	Product	Frequency	Key Features	Key Values
Single ended oscillator	SiT8208	1 to 80 MHz	• Low jitter < 0.5 ps RMS[1] • ±10 ppm to 50 ppm frequency stability • Any frequency output • FlexEdge™ configurable output drive strength • 1.8 V, 2.5 V, 3.3 V	• Better frequency and jitter margin enhance system stability and robustness • Easy availability of any device configuration • Minimizes EMI from the oscillator
	SiT8209	80 to 220 MHz		
Differential oscillator	SiT9366	1 to 220 MHz	• Low jitter 0.23 ps RMS[1] • LVPECL, LVDS, HCSL • 2.5 to 3.3 V • -40°C to 105°C • 3.2 x 2.5 mm package	• Meets demanding jitter requirements • Small PCB footprint, easier layout • Easy design due to flexibility • MEMS reliability
	SiT9367	220 MHz to 725 MHz		
DCXO	SiT3921	1 to 220 MHz	• Digital frequency control • 1 ppb resolution	• Eliminates need for external DAC to control a VCXO • Better accuracy, lower noise due to digital control
	SiT3922	220 to 625 MHz		
Super-TCXO	SiT5356	1 to 60 MHz	• Low jitter: 0.31 ps RMS[1] • ±0.1 ppm stability • 1 ppb/°C • -40°C to 105°C	• Minimizes link drops due to shock, vibration, or temperature change
	SiT5357	60 to 220 MHz		
OCXO	SiT57xx	1 to 60 MHz	• ±0.005 ppm stability • -40°C to +85°C	• I^2C digital frequency tuning eliminates board noise • 10 times better dynamic stability (150 ppt/°C ΔF/ΔT), resistant to airflow and thermal shock
Clock Generator	SiT9514x	8 kHz to 2.1 GHz	• up to 11 outputs • 125 fs RMS[1] phase jitter	• Integration and performance

[1] 12 kHz to 20 MHz integration range

Learn more about Industrial solutions from SiTime

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