

Precision Timing in Servo Drives

Precision control in automation — whether in medical robotics, factory automation, textile manufacturing, printing, or autonomous vehicles — has experienced explosive growth over the past decade. Irrespective of the type of motor and application, achieving a high level of precision of multiple variables such as torque, position, speed, and angle have necessitated the use of oscillators instead of crystals to achieve the required precision in these applications.

Key Considerations

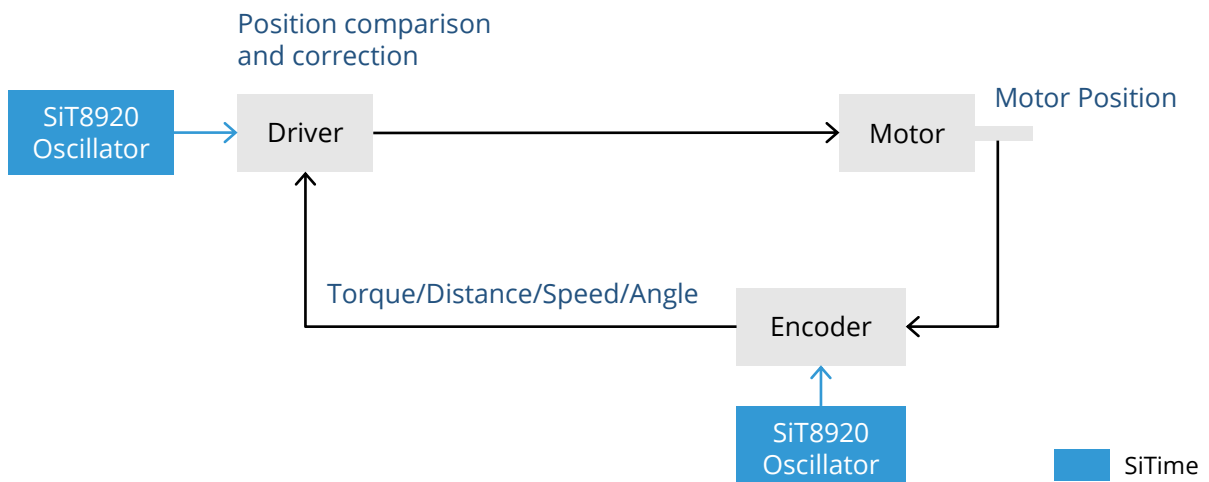
- Hermiticity
- Permeability
- SNR
- Vibration
- EMI

Encoders have traditionally used crystals in the measurement of speed, torque, and position. To control multiple variables in high precision motors, drivers must continuously receive input from the encoders and instantly take corrective action through feedback to the motors. As motor manufacturers strive to improve precision with faster response, they have begun to implement drivers alongside each motor. This subjects drivers to higher vibration and shock, requiring robust components that can meet design considerations.

SiTime oscillators are robust and can withstand the continuous vibration and shock from motors and the environments in which they are used. Besides enabling good SNR (signal-to-noise ratio), SiTime oscillators offer strong protection against moisture permeability and the ingress of chemical and gas particulates. In addition, they offer the following benefits.

- Wide operating temperature
- Temperature stability
- Small size

Block Diagram



Featured products – please refer to [SiTime.com](https://www.sitime.com) or [contact us](#) for more options.

Type	Product	Frequency	Key Features	Key Values
MHz Oscillator	SiT8920	1 to 110 MHz	<ul style="list-style-type: none"> 2.0 x 1.6 mm package -55°C to 125°C operating temperature 	<ul style="list-style-type: none"> Small device size High reliability Resilient to electromagnetic Interference, ideal for high-current environments
Spread Spectrum Oscillator	SiT9025	1 to 150 MHz	<ul style="list-style-type: none"> -55°C to 125°C operating temperature Spread spectrum 	<ul style="list-style-type: none"> System EMI reduction up to 17 dB High reliability Resilient to electromagnetic Interference, ideal for high-current environments
32.768 kHz Oscillator	SiT1811	32.768 kHz	<ul style="list-style-type: none"> ±20, ±50, ±100 ppm 1.14 to 3.63 V supply < 490 nA consumption Up to -40°C to +105°C 1.2 x 1.1 mm < 115 ms startup time 	<ul style="list-style-type: none"> Excellent stability Low power Small footprint Faster startup time than 32.768 kHz tuning-fork crystal enables faster system startup

SiTime advantages:

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

- Up to 50x better reliability than quartz oscillators
- Up to 10x better resilience to shock, vibration and electromagnetic interference, due to the smaller size (0.4 x 0.4 mm) and lower mass of MEMS resonators compared to crystals
- SiT9025 EMI reduction features: spread spectrum and configurable rise/fall times
- Factory programmable to any frequency within range
- No activity dips or cold start issues



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