MEMS Timing Solutions

# Infotainment / Cluster

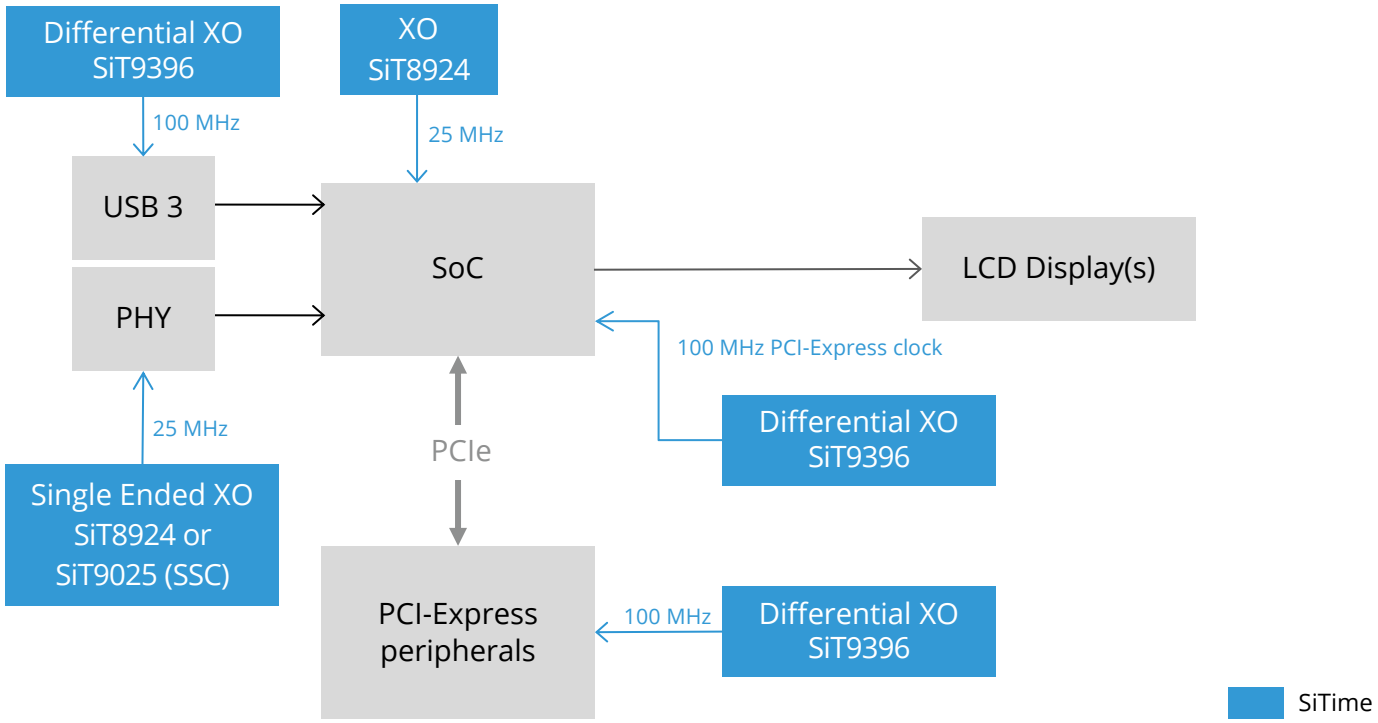
## Precision Timing in Infotainment

Infotainment/cluster systems present information and entertainment to the driver and passengers. Modern vehicles tend to integrate infotainment (central console), dashboard, and other functions such as advanced driver assistance systems (ADAS).

## Key Considerations

- Reliability, Functional Safety
- Low jitter
- High temperature
- Fast system start-up
- EMI

## Block Diagram




Infotainment/cluster relies on exchanging information. Commonly used interfaces are Ethernet, multi-Gigabit Ethernet, and PCI-Express. All these interfaces require clocks.

- PCI-Express is widely used for on-board, device-to-device data exchange. This requires 100-MHz differential clocks, possibly with spread spectrum to reduce EMI emissions.
- Multi-GB Ethernet for board-to-board communications require 156.25-MHz differential, low jitter clocks.

LCD displays are essential for presenting information. They usually require a data stream from the SoC clocked at a certain frequency, set by construction of the display. Some SoCs generate the desired frequency internally, while others require an external clock. Programmability and configurability of the frequency allows using several kinds of LCD displays with the same infotainment/cluster hardware.

In some cases, GNSS and V2X communication are part of an infotainment/cluster system.

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Featured products – please refer to the Selector Guide for more options

| Type | Product | Frequency | Key Features | Key Values |
|---|---|---|---|---|
| Single-ended oscillator | SiT8924 | 1 to 110 MHz | • Up to -55°C to +125°C<br>• ±20 ppm stability<br>• 2016, 2520, 3225 packages | • High reliability<br>• Extended temperature range<br>• EMI reduction features<br>• Small footprint<br>• Low power<br>• Low jitter enables highest speed links |
| | SiT9025 | 1 to 150 MHz | • Up to -55°C to +125°C<br>• Spread spectrum<br>• Configurable rise / fall times<br>• 2016, 2520, 3225 packages | |
| | SiT1625 | 44 standard frequencies<br>incl. 27 MHz (SiT1625C) for FPD-Link IV Infotainment | • -40°C to +125°C<br>• ±25, ±30, ±50 ppm stability<br>• 1612, 2016, 2520, 3225 packages<br>• 500 fs RMS jitter[1]<br>• 2.3 mA typ. current consumption | |
| Differential oscillator | SiT9396 | 1 to 220 MHz | • Low jitter: < 150 fs RMS[1]<br>• ±30 ppm or ±50 ppm stability<br>• LVPECL, LVDS, HCSL, Low-power HCSL, FlexSwing™<br>• -40°C to +125°C<br>• 2016, 2520, 3225 packages | • High reliability<br>• Low jitter<br>• Enables interfaces with demanding jitter requirements, such as PCI-Express and 10 GB Ethernet |
| | SiT9397 | 220 to 920 MHz | | |
| Super-TCXO<br>DCXO/ VCXO | SiT5386 | 1 to 60 MHz | • 1 to 220 MHz<br>• ±0.1, ±0.2, ±0.25 ppm stability<br>• ±1 ppb/°C frequency slope<br>• -40°C to 105°C<br>• Low jitter: 0.31 ps RMS[1]<br>• Optional voltage or digital frequency control | • High accuracy<br>• Excellent frequency stability even with fast temperature gradients<br>• No GNSS signal loss or V2X disconnect, as the MEMS resonator is not subject to "micro-jump" like crystal oscillators |
| | SiT5387 | 60 to 220 MHz | | |

[1] 12 kHz to 20 MHz integration range

**Key concerns of designers:**

- Reliability
- Functional safety
- High temperature requirements
- Fast system startup time required (usually < 100 ms)
- EMI

**SiTime advantages:**

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

- Up to 50x better reliability: Apart from reducing the amount of field failures, better reliability translates into a lower FIT rate. This provides better Hardware Safety metrics in an FMEDA, the quantitative analysis required as part of a Functional Safety assessment.
- Up to 100x 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.
- Better frequency stability (down to ±100 ppb) and frequency response to temperature changes dF/dT (down to < 3.5 ppb/°C). These characteristics provide better locking to GNSS and V2X, and reduced connection drops.
- SiT9025 features EMI reduction features: spread spectrum and configurable rise/fall times



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