

# Silicon Oscillator Solutions Guide

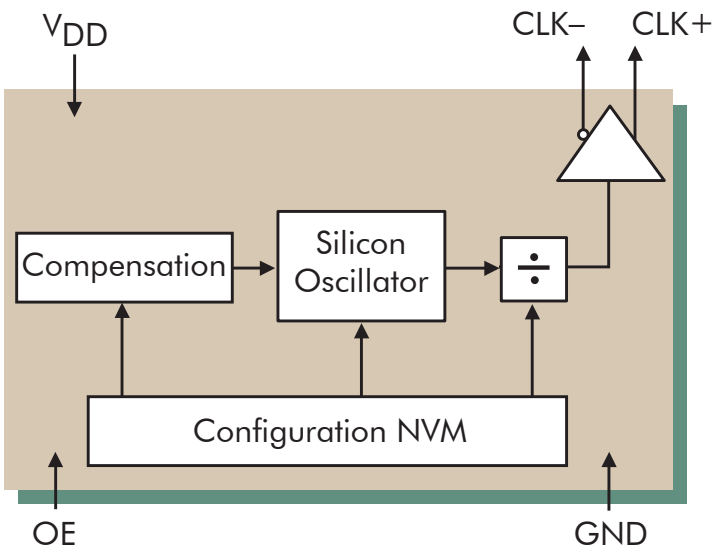
INDUSTRY'S HIGHEST STABILITY, ALL-SILICON OSCILLATOR



## DESCRIPTION

The Si500 silicon oscillator utilizes Silicon Labs' ultra stable silicon oscillator technology to provide an all silicon solution capable of replacing quartz-based oscillators in high-volume, cost-sensitive applications. Unlike a traditional XO that requires a unique quartz crystal resonator to generate each frequency, the Si500 uses a flexible silicon architecture capable of providing any frequency from 0.9 to 200 MHz. The Si500 uses proprietary compensation circuitry to provide overall stability comparable to fixed frequency crystal-based oscillators. The frequency, output format, supply voltage, output slew rate, and OE function are factory programmed at time of shipment, eliminating long lead times typically associated with custom frequency oscillators.

## Si500 BLOCK DIAGRAM



## FEATURES

- Quartz-free, all silicon oscillator
- Generates any frequency from 0.9 to 200 MHz
- Low jitter: 1.5 ps RMS phase jitter, 2 ps RMS period jitter (max)
- Wide selection of output formats: CMOS, LVPECL, LVDS, HCSSL, SSTL
- Driver stopped, tristate, and power down options available on OE pin
- Footprint compatible with 3.2 x 5.0 mm layout
- Small package: 3.2 x 4.0 mm DFN
- 0 to +70 °C operating temperature range
- Low voltage operation: 3.3, 2.5 and 1.8 V
- Low core power: 8 mA

## APPLICATIONS

- Replaces crystal oscillators (XO)
- Clock source for serial links: SATA, PCI Express and USB
- Digital still cameras
- Printers
- Hard disk drives
- Portable multi-media devices
- LCD displays
- Servers/workstations
- Industrial control
- White goods
- Instrumentation

## Built to order samples

Silicon Labs offers an easy-to-use web utility to custom configure the right XO/VCXO for your application.

[www.silabs.com/BuyXO](http://www.silabs.com/BuyXO)

## SOLUTIONS GUIDE

SUPPORTS ANY FREQUENCY  
FROM 0.9 TO 200 MHz  
IN A SINGLE FOOTPRINT



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## INDUSTRY'S HIGHEST STABILITY, ALL-SILICON OSCILLATOR

### Unmatched Performance

Based on a low phase noise silicon oscillator architecture and compensation circuitry, the Si500 provides a new level of performance and flexibility. The device is factory-programmable during production test to generate any frequency from 0.9 to 200 MHz. Each device is individually calibrated to meet  $\pm 150$  ppm total stability, inclusive of 25 °C initial frequency accuracy, operating temperature range, supply voltage change, output load change, first year aging at 25 °C, shock and vibration. Utilizing Silicon Labs' ultra low jitter clock technology, the Si500 delivers jitter performance of 1.5 ps RMS phase jitter, rivaling the best quartz-based oscillators and providing significantly better performance than MEMS-based solutions.

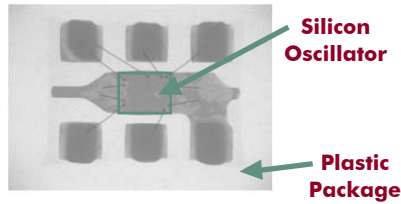
### Highest Reliability

The Si500 provides superior reliability than quartz oscillators, which use a mechanical resonator that vibrates at the desired frequency, making the device susceptible to shock and vibration. Since the Si500 has no moving parts, it is not susceptible to shock and vibration effects. In addition, the Si500 provides superior reliability at start up and during long-term operation.

### Short Lead Times

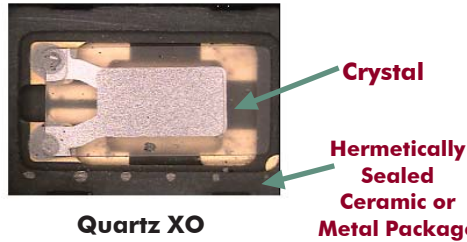
The Si500 dramatically simplifies the XO supply chain by leveraging standard, high-volume IC manufacturing technology, enabling 2 week lead times for samples and 4-6 weeks for production orders for both standard and custom frequency oscillators.

### Immunity to Shock and Vibration Improves Reliability



Si500 Silicon XO

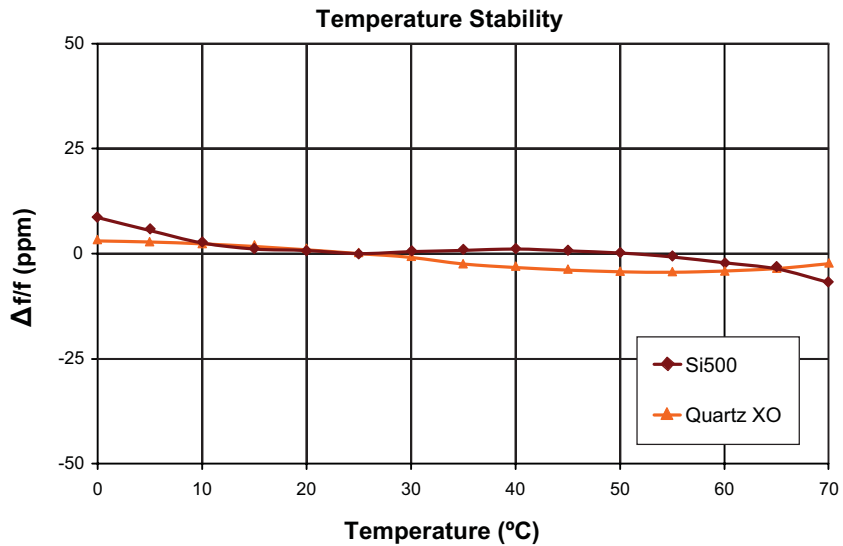
- No moving parts
- Highly immune to shock and vibration
- Plastic IC packaging does not require hermetic seal, not susceptible to contamination
- Reliable startup/operation



Quartz XO

- Relies on mechanical resonator for oscillation
- Sensitive to shock and vibration
- Requires hermetic assembly to prevent crystal contamination from affecting device performance

### Temperature Stability Matches Quartz-Based Oscillators



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### Silicon Oscillator Product Matrix

Part Number	Type	Frequency	Stability (ppm)*	Output Format	Package
Si500S	XO	0.9 to 200	$\pm 150$	CMOS, SSTL	3.2 x 4 mm 4 pad
Si500D	XO	0.9 to 200	$\pm 150$	LVPECL, LVDS, HCSL, dual output CMOS, diff CMOS, dual output SSTL, diff SSTL	3.2 x 4 mm 6 pad

\*Inclusive of: initial frequency accuracy at 25 °C, operating temperature range, supply voltage change, output load change, first year aging at 25 °C, 260 °C reflow, shock and vibration