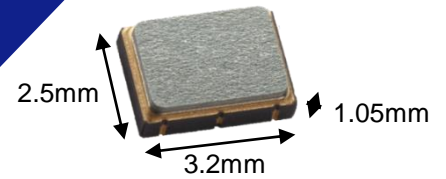
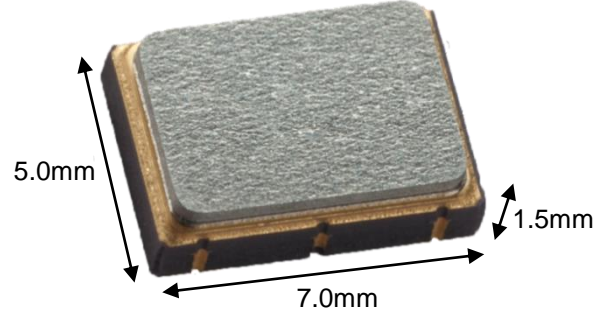


ULTRA LOW-JITTER E-SERIES SPXO

SG3225EEN
SG3225VEN

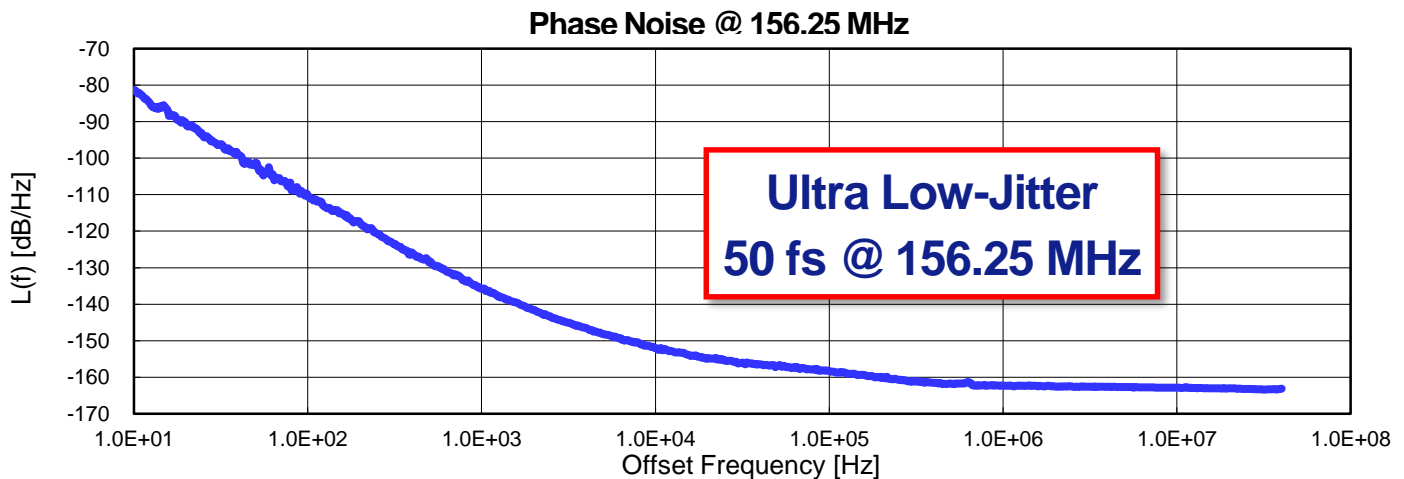


SG7050EEN
SG7050VEN



Epson E-series SPXO

- **Ultra Low-Jitter:** 20 fs rms 12 kHz – 20 MHz @ 500 MHz
50 fs rms 12 kHz – 20 MHz @ 156.25 MHz
- **Frequency Range:** 25 - 500 MHz
- **Tight Stability:** ± 25 ppm -40 to +85 °C, ± 50 ppm -40 to +85 °C, or ± 50 ppm -40 to +105 °C
- **Differential Outputs:** LV-PECL or LVDS
- **High temperature:** up to +105° C
- **Available in Two Sizes:** Very Small (3.2 x 2.5) and Industry Standard (7 x 5)



Designed for high-performance networking applications, Epson's E-series SPXO has ultra low-jitter to deliver wide-open eye diagrams for high-speed (40, 100, 200, and 400 Gbps) optical and electrical interfaces.

Tight stability provides margin to networking specifications and a wide temperature range enables outdoor equipment and equipment without fans. A tiny package helps cramped designs. Fundamental-mode oscillation makes Epson's E-series SPXO dependable and low power.

Epson E-Series SPXO

Epson's E-series SPXO provides ultra low-jitter and tight stability in a small package and is suitable for networking applications with very high data rates.

Low Jitter:

To achieve ultra low-jitter – 50 fs rms jitter @ 156.25 MHz – Epson's E-series SPXO uses an HFF (high-frequency fundamental) crystal and a unique low-noise oscillator IC designed and fabricated by Epson. Its excellent jitter performance enables superior eye diagrams for high-speed electrical and optical interfaces. To ensure consistent performance for complex designs, Epson E-series SPXO includes an LDO (low drop-out) voltage regulator to protect the clock from power supply noise.

Fundamental Crystal Advantages:

Epson's E-series SPXO uses HFF (high-frequency fundamental) crystals to combine the dependable oscillation of fundamental crystals with the high frequency of 3rd overtones. Epson uses a photolithographic MEMS etching process to fabricate an inverted mesa with excellent process control and achieve high frequency with good mechanical characteristics.

Because Epson HFF crystals oscillate in the fundamental mode, they do not suffer from mode jumping or cold start problems common to 3rd overtone designs.

Compared to PLL-based oscillators, fundamental oscillators dissipate less power and do not generate reference and mixing spurs.

Small Size:

Epson E-series SPXO is available in two package sizes:

- Very small 3.2 mm x 2.5 mm
- Industry standard 7 mm x 5 mm.

The 3.2 mm x 2.5 mm package is 77% smaller than the 7 x 5 package and enables ultra-dense line cards and optical modules

Stability:

Epson E-series SPXO provides tight frequency stability and wide temperature range, enabling operation in outdoor equipment. Manufacturing calibration ensures tight stability and margin to Ethernet specifications. Epson E-series SPXO is available in three grades:

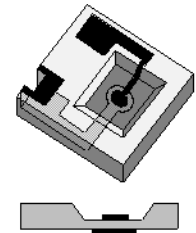
- ± 25 ppm from -40 to +85 °C ($f < 200$ MHz),
- ± 50 ppm from -40 to +105 °C ($f < 200$ MHz)
- ± 50 ppm from -40 to +85 °C ($200 \text{ MHz} < f < 500 \text{ MHz}$)

Low Power:

Epson E-series SPXO operates with +2.5V or +3.3V supply voltage. Because there is no PLL, supply current is low, 50 mA for LV-PECL and 15 mA for LVDS.

ADVANTAGES

- Ultra low-jitter
- Tight stability
- Extended operating temperature range
- Small size
- Dependable operation
- Low power
- LV-PECL or LVDS outputs



Epson HFF Technology

Product	Size (mm x mm x mm)	Outputs	I _{DD} @ 2.5 or 3.3V	Frequency	Jitter @ 156.25 MHz	Jitter @ 500 MHz
SG7050EEN	7.0 x 5.0 x 1.5	LV-PECL	50 mA typ., < 65 mA max	25-500 MHz	50 fs	20 fs
SG3225EEN	3.2 x 2.5 x 1.05	LV-PECL	50 mA typ., < 65 mA max	25-500 MHz	50 fs	20 fs
SG7050VEN	7.0 x 5.0 x 1.5	LVDS	15 mA typ., < 25 mA max	25-500 MHz	60 fs	33 fs
SG3225VEN	3.2 x 2.5 x 1.05	LVDS	15 mA typ., < 25 mA max	25-500 MHz	60 fs	33 fs