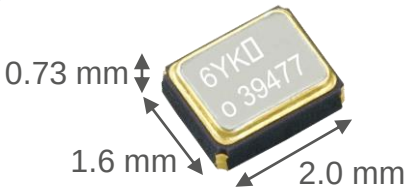
Epson Timing Devices

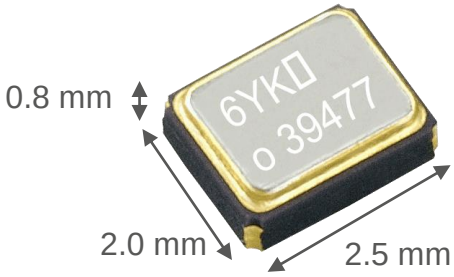
LOW PHASE NOISE M-SERIES TCXOS

Low Phase Noise. Tight Stability. Superior Aging.

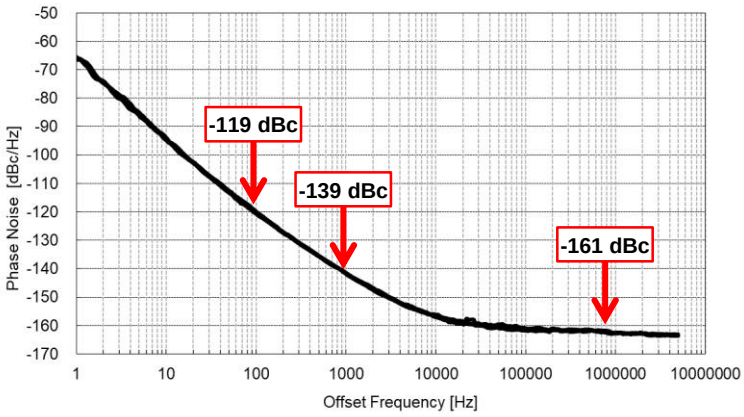


Epson TG2016 & TG2520SMN TCXO

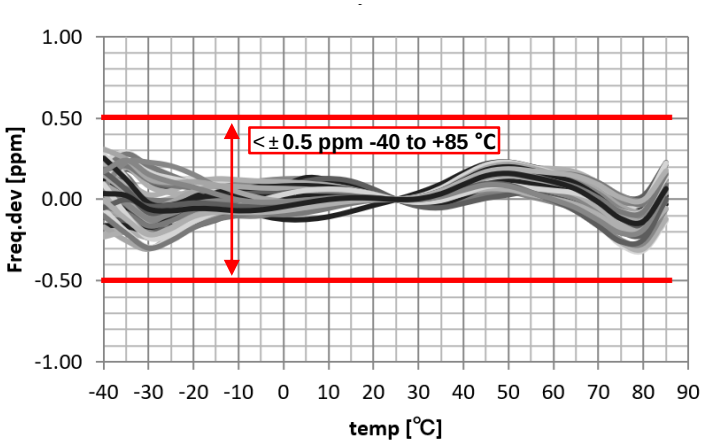
- **Low Noise Floor**: -161 dBc/Hz @ 26 MHz
- **Wide Frequency Range:** 10 MHz - 55 MHz
- **Freq. Stability:** < ±0.5 ppm
- **Temperature Range:** -40 °C to +85 °C
- **Aging:** < ±0.5 ppm/year (12MHz-20MHz, 24M-40MHz)
- **Supply Voltage:** 1.7 V to 3.63 V
- **Output:** Clipped Sine Wave



Phase Noise (typ.) at 26 MHz



Freq. Stability vs. Temperature at 26 MHz



Designed for wireless applications such as Wi-Fi, GPS, cellular, LPWA for IoT, and 2-way radio, Epson's M-series TCXOs deliver superior performance to enable stable and reliable communications.

M-series TCXOs use an Epson-developed and fabricated IC and MHz crystal. The MHz crystal is produced with a photolithographic process to deliver consistent performance and high stability. The IC features Epson's 3rd generation temperature compensation technology. This technology results in improved phase noise, frequency stability over temperature, and aging.

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EPSON M-SERIES TCXOS

Epson's M-series TCXOs achieve very low phase noise, tight frequency stability, and superior aging over the industrial temperature range. Epson's M-series TCXOs are available in industry-standard miniature sizes covering common frequencies for wireless applications including Wi-Fi, GPS, cellular, LPWA for IoT, and 2-way radio.

ADVANTAGES

- Epson MHz crystal + IC
- Low Phase Noise
- Tight temperature stability over industrial range
- Superior aging
- Wide frequency range
- Small Sizes
- Standard frequencies

Epson 3rd Generation TCXO IC

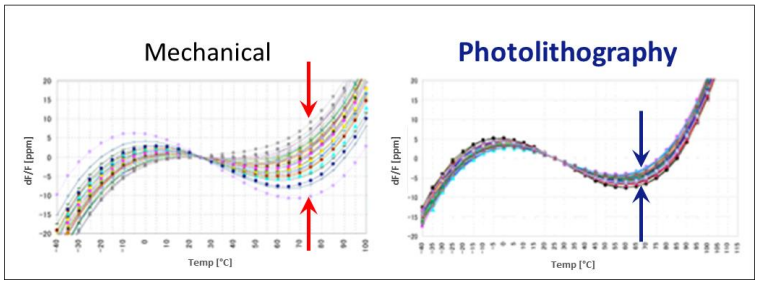
M-series TCXOs feature Epson's 3rd generation temperature-compensation technology with Epson's proprietary fitting-error reduction algorithm, developed in Epson's internal IC technology. These advances enable tight temperature stability, low power consumption, and low noise floor.

Photolithographic Crystal Processing for Consistent Manufacturing

Most TCXOs use mechanical or beveled crystal processing. With this technique, crystals are cut from a wafer using a mechanical saw and shaped in a tumbler. Due to randomness of this process, such crystals have poor control of shape and dimension. As a result, they have large variations of frequency vs. Temperature which must be compensated by the TCXO.

Epson uses photolithographic crystal processing to achieve superior process control. Like a silicon wafer, crystals are cut using HydroFluoric acid (HF). As a result, photolithographic crystals achieve better control of size and shape, more consistent frequency vs. Temperature, and better ESR and Q. As a result, Epson's TCXOs have less part-to-part variation and achieve better phase noise.

Mechanical vs. Photolithograph Temperature Characteristics (typ) at 26 MHz)



Phase Noise vs Competitor (Condition: 26MHz 25 °C Measured with the same instrument **)**

Product Phase Noise [dBc/Hz]	TG2016SMN TG2520SMN	Competitor A	Competitor B	Competitor C	Competitor D
Offset 1Hz	-65	-64	-67	-64	-65
10Hz	-96	-98	-97	-93	-93
100Hz	-120	-119	-120	-119	-118
1kHz	-142	-139	-141	-140	-138
10kHz	-158	152	-156	-155	-151
100kHz	-160	-153	-159	-158	-153
1MHz	-161	-153	-159	-159	-155

Configuration & Options

Product	Size (mm x mm x mm)	Supply Voltage	Voltage Control Option	Stability -40 to +85 °C	Standard Frequencies
TG2016SMN	2.0 x 1.6 x 0.73	1.8, 2.8, 3.0, 3.3 V	Yes	±0.5 or ±2.0 ppm	16, 16.368, 16.369, 19.2, 20, 24, 25, 26, 27, 27.6, 30, 32, 38.4, 40, 48, 50, 52MHz
TG2520SMN	2.5 x 2.0 x 0.8				

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