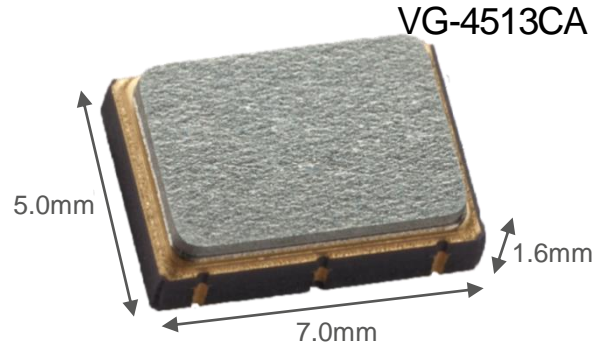
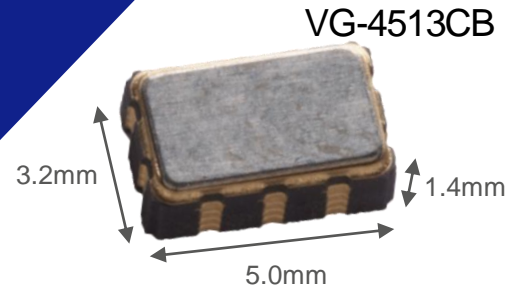


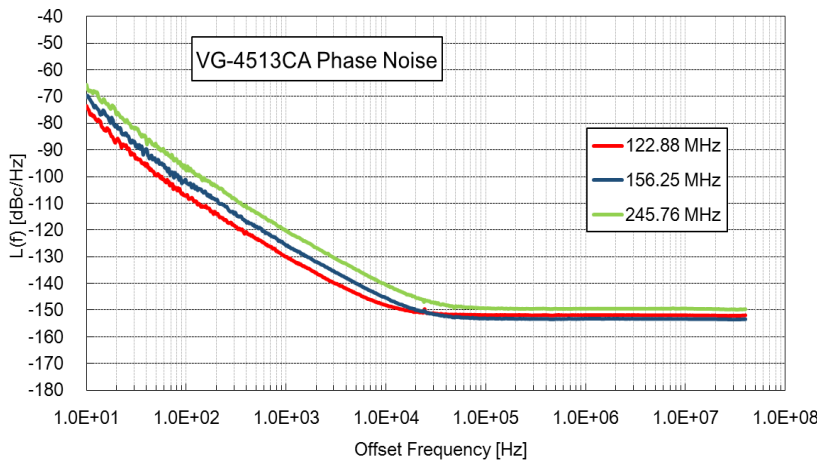
LOW PHASE NOISE VG-4513CA/CB HFF VCXO



Epson VG-4513CA/CB VCXO

Major features

- **Frequency Range:** 100-250 MHz
- **Ultra Low-Jitter:** 135 fs rms 12 kHz – 20 MHz @ 245.76 MHz
- **Excellent Vibration Resistance:** 1.6 ppb/G @ 20-200 Hz
- **Dependable Operation from HFF (High-Frequency Fundamental) Crystal**



Phase Noise Data

Offset Frequency	Carrier (Oscillator) Frequency		
	122.88 MHz	156.25 MHz	245.76 MHz
10 Hz	-74 dBc/Hz	-70 dBc/Hz	-66 dBc/Hz
100 Hz	-107 dBc/Hz	-102 dBc/Hz	-98 dBc/Hz
1 kHz	-130 dBc/Hz	-126 dBc/Hz	-120 dBc/Hz
10 kHz	-148 dBc/Hz	-146 dBc/Hz	-141 dBc/Hz
100 kHz	-152 dBc/Hz	-153 dBc/Hz	-149 dBc/Hz
1 MHz	-152 dBc/Hz	-153 dBc/Hz	-150 dBc/Hz
10 MHz	-152 dBc/Hz	-153 dBc/Hz	-149 dBc/Hz
40 MHz	-152 dBc/Hz	-153 dBc/Hz	-150 dBc/Hz

Designed for wireless infrastructure and high-performance networking applications, Epson's VG-4513CA/CB VCXO achieves best-in-class phase noise and vibration resistance. HFF (high-frequency fundamental) technology enables leading edge performance and telecom-quality dependability.

Epson's VG-4513CA/CB VCXO is suitable for cellular base stations, μ W & mmW radios, OTN and datacenter switches, optical interconnect, and cable head-end equipment and is recommended by all major radio reference designs.

Epson VG-4513CA/CB HFF VCXO

Epson's VG-4513CA/CB provides very low phase noise and excellent vibration resistance using HFF technology to achieve dependable operation at high frequencies.

Low Phase Noise

To achieve very low phase noise, Epson's VG-4513CA/CB VCXO uses an HFF (high-frequency fundamental) crystal and a unique low-noise oscillator IC designed and fabricated by Epson. Their excellent jitter performance enables superior eye diagrams and I-Q constellations for high-speed electrical, optical, and RF interfaces. Using a fundamental crystal allows Epson VG-4513CA/CB VCXO to avoid problems caused by 3rd overtone crystals and harmonic oscillators.

Fundamental Crystal Dependability

Epson's VG-4513CA/CB VCXO uses an HFF (high-frequency fundamental) crystal 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, activity dip, and cold start problems common to 3rd overtone designs. Because the resonant area of an HFF crystal is much larger than for a 3rd overtone, HFF oscillators are far less affected by particle defect problems which cause oscillator failures in 3rd overtone designs.

Unlike frequency multiplier designs, fundamental oscillators do not generate sub-harmonic spurs which cause DJ (deterministic jitter).

Excellent Vibration Resistance

Environmental factors such as wind load on antenna towers and vibration transmitted from railroad tracks can degrade radio link performance for base stations and microwave backhaul. Vibration-induced microphonics can affect eye diagram performance in high-speed optical links. Epson's HFF crystal and mount technology deliver 10-20 dB better vibration resistance than competing designs.

Epson's HFF crystal is much thicker than a 3rd overtone crystal. The HFF frame acts as a stiffener, increasing the modulus of rigidity, which protects the resonant structure from low-frequency vibration. Epson's unique high shear modulus mount further protects the resonator from vibration.

Ordering Options

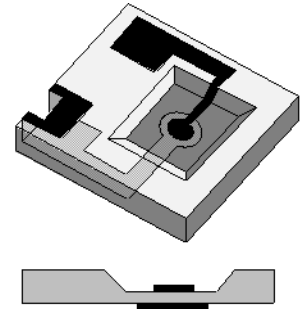
Epson's VG-4513CA/CB VCXO can be ordered with five options:

- **Frequency:** 100-500 MHz
- **Package Size:** 7.0 mm x 5.0 mm x 1.6 mm (CA) or 5.0 mm x 3.2 mm x 1.4 mm (CB)
- **Temperature Range:** -40 to +85 °C, -20 to +70 °C, or 0 to +70 °C
- **APR (Absolute Pull Range):** ±30 ppm, ±50 ppm, and ±100 ppm
- **OE (Output Enable) Polarity:** active high or active low

Product	Size (mm x mm x mm)	Outputs	I _{DD} @ 3.3V	Frequency	Vibration Resistance	Resonator Type
VG-4513CA	7.0 x 5.0 x 1.6	LV-PECL	< 65 mA max	100-250 MHz	1.6 ppb/G	High-Frequency Fundamental
VG-4513CB	5.0 x 3.2 x 1.3	LV-PECL	< 65 mA max	100-250 MHz	1.6 ppb/G	High-Frequency Fundamental

ADVANTAGES

- Low phase noise
- High frequency
- Small size
- Dependable operation
- Excellent vibration resistance
- Low power



Epson HFF Technology