

## EPSON TIMING DEVICES

EXTENDED TEMPERATURE RANGE  
& HIGH-STABILITY SG-8101 & SG-9101

# PROGRAMMABLE OSCILLATORS

with SPREAD-SPECTRUM CAPABILITY

### SG-8101 & SG-9101 P-SPXOs

- **Frequency Range:** 0.67 MHz - 170 MHz
- **Temperature Range:** -40 °C to +85 °C, -40 °C to +105 °C
- **Tight Stability:** ±15 ppm, ±20 ppm, or ±50 ppm including aging
- **Supply Voltage:** 1.8V, 2.5V, 3.3V (1.62V - 3.63V)
- **Low Power:** 3.2 mA – 8.1 mA maximum
- **Single-Ended Output:** LVCMOS
- **Programmable Rise/Fall Time**
- **Output Enable (OE) or Standby (ST)**
- **Programmable Spread Spectrum Modulation:** (SG-9101 only) down or center spread, 3 profiles, 4 modulation frequencies, 6 modulation widths
- **Four Package Sizes:** 7 x 5, 5 x 3.2, 3.2 x 2.5, 2.5 x 2.0



## FAST-TURN PROTOTYPES



To support rapid product development, Epson's programmable oscillators can be ordered with 24-hour turnaround from distributors or you can program blanks yourself using Epson's SG-Writer II.

Epson's SG-8101 offers extended temperature range, the industry's tightest stability, and programmable rise/fall time. To help solve EMI problems, the SG-9101 adds programmable spread spectrum modulation. For production, you can order programmable oscillators in volume or convert to a pin-compatible Epson fixed-frequency oscillator.

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# EPSON SG-8101 & SG-9101 P-SPXOs **NEW**

Epson pioneered programmable oscillators in 1977. By delivering 24-hour custom frequencies, Epson programmable oscillators revolutionized the world of frequency control and enabled rapid product development.

Epson's latest programmable oscillators, the SG-8101 & SG-9101 offer extended Temperature range (to 105 °C), tight stability (as low as  $\pm 15$  ppm, including aging), and programmable output rise & fall times. These 5<sup>th</sup> generation devices are also lower power than the previous generation. To diagnose and solve EMI problems, SG-9101 adds spread spectrum modulation with many options to assist in troubleshooting.

## Fast-Turn Prototypes

Distributors can program SG-8101 & SG-9101 oscillators with 24-hour turnaround or you can program in your own lab with Epson's SG-Writer II and blanks. Easy-to-use software can be downloaded from Epson's website.

## How It Works

Epson's SG-8101 uses an AT fundamental crystal with a fractional-n PLL to synthesize any frequency between 0.67 and 170 MHz with 1 ppm resolution. Frequencies are set using OTP (one-time programming). To achieve tight frequency tolerance over a wide temperature range ( $\pm 15$  ppm -40 +85 °C or  $\pm 20$  ppm -40 +105 °C), the oscillator senses temperature and adjusts frequency using a varactor to adjust the capacitive load on the crystal.

## Ordering Options

Epson's SG-8101 & SG-9101 oscillators are available in 4 package sizes from 2.5 x 2.0 to 7.0 x 5.0. The size must be selected at the time of ordering.

Size (mm x mm)	Programmable (P-SPXO)	Fixed Frequency (SPXO)
2.5 x 2.0	SG-8101CG	SG-210
3.2 x 2.5	SG-8101CE	SG-310
5.0 x 3.2	SG-8101CB	SG5032C
7.0 x 5.0	SG-8101CA	SG7050C

## Convert to Epson Fixed-Frequency Oscillators for Production

Programmable oscillators are ideal for prototyping. Programmable oscillators can be used in production or converted to pin-compatible Epson fixed-frequency oscillators.

All other parameters can be programmed either at the time of ordering or with an Epson SG-Writer II.

## Programming Options (SG-8101 & SG-9101)

Programming options include frequency stability, pin 1 function (output enable or standby), and rise/fall time (fast, normal, slow).

Frequency Stability	Pin 1 Function	Frequency Range	Rise/Fall Time (typical @ 3.3V, C <sub>L</sub> = 5 pF)		
			Slow	Normal	Fast
$\pm 15$ ppm -40 +85 °C	Output Enable	0.67 – 20 MHz	0.9 ns	0.7 ns	0.25 ns
$\pm 20$ ppm -40 +105 °C	Standby	20 – 40 MHz		0.7 ns	0.25 ns
$\pm 50$ ppm -40 +105 °C		40 – 170 MHz		0.25 ns	0.25 ns

## Solve EMI Problems with Spread-Spectrum Technology

Epson's SG-9101 can reduce EMI (electromagnetic interference) by modulating the clock to spread spectral energy. Epson's SG-9101 is the industry's only programmable oscillator with programmable spread spectrum modulation. For maximum flexibility to diagnose and solve EMI problems, modulation frequency, modulation profile, modulation type (center or down spread), and modulation spread are all programmable.

## Spread-Spectrum Programming Options (SG-9101 only)

Modulation Frequency	Modulation Profile	Modulation	Spread				
			Center Spread	Down Spread	±0.25%	±0.5%	±0.75%
25.4 kHz	Hershey Kiss		±0.25%	±0.5%	±0.75%	±1%	±1.5%
12.7 kHz	Sine Wave		±0.25%	±0.5%	±0.75%	±1%	±1.5%
8.5 kHz	Triangle		±0.25%	±0.5%	±0.75%	±1%	±1.5%
6.3 kHz			±0.25%	±0.5%	±0.75%	±1%	±1.5%



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