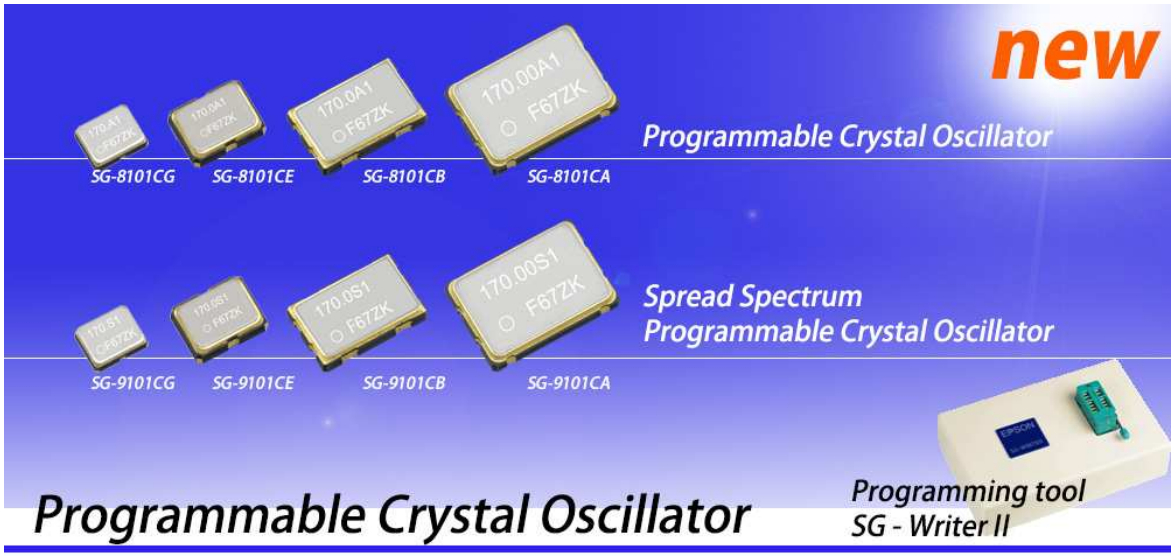
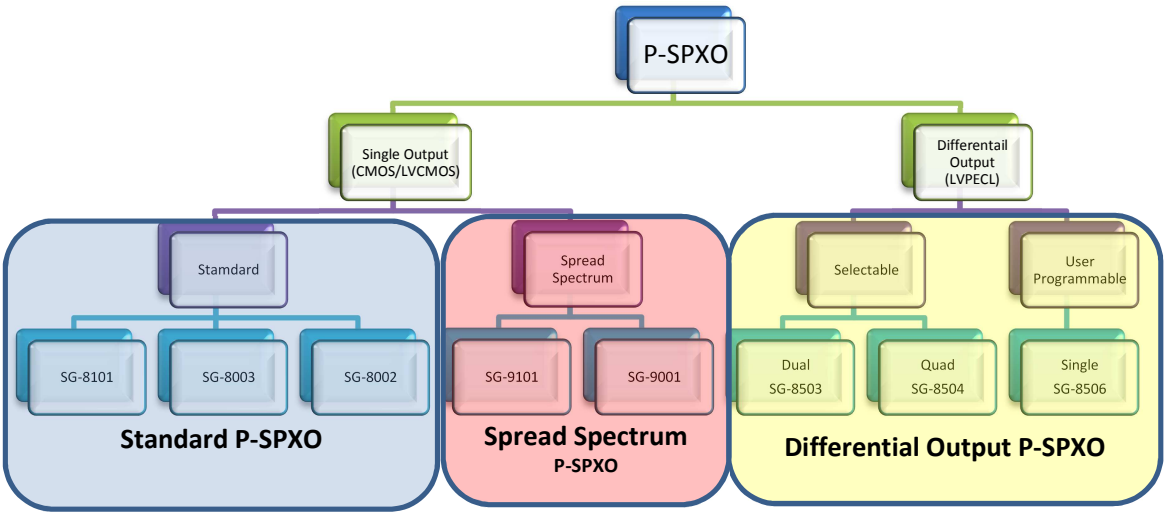
Epson's Programmable Simple Packaged Crystal Oscillators (P-SPXO)



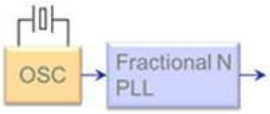
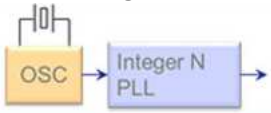
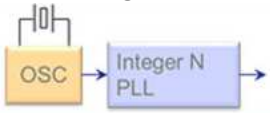
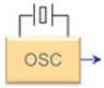
In today's fast-paced development environment, programmable oscillators provide flexibility for board-level designs. With 24-hour delivery, programmable oscillators are ideal for supporting standard and non-standard frequencies and quick frequency experiments for rapid prototyping.

Epson was the very first company to introduce programmable oscillator technology. Because of this history, Epson has the capability to support 24-hour lead time for both prototypes and pre-production runs. Prototypes can easily be converted to pin-compatible Epson fixed-frequency oscillators for production volumes.

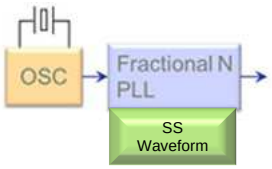
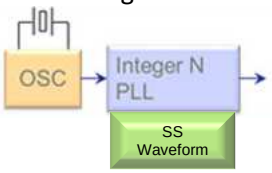
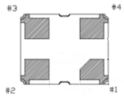


Epson provides standard CMOS output as well as differential output LVPECL. In addition, Epson has series of spread spectrum programmable SPXO to help improve EMI/EMC. Each of Epson's programmable blanks can be programmed with our SG-Writer-II programming tool and appropriate IC adaptors for quick turn prototypes or production builds.

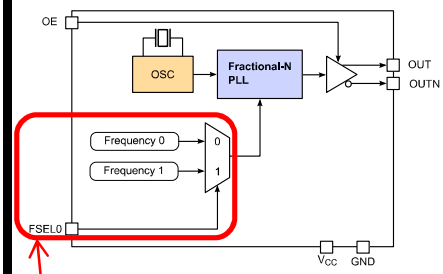
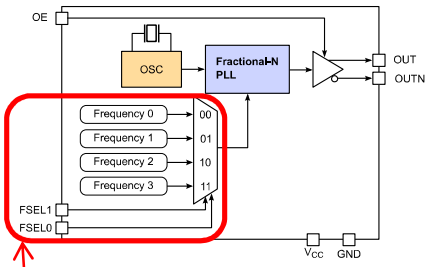
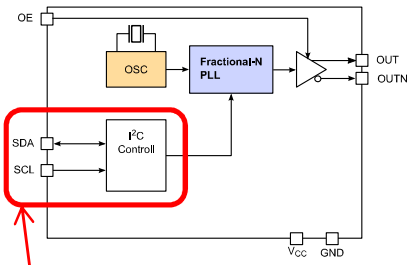
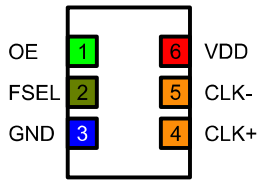
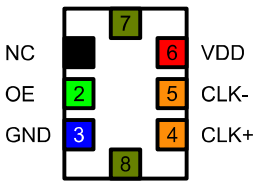
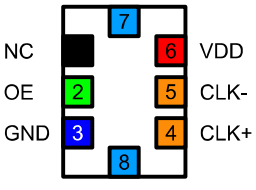
Standard CMOS P-SPXO

	P-SPXO (Programmable)			SPXO (Fixed Frequency) Comparison Purposes Only
Series	SG-8101 (High Performance)	SG-8003 (Cost Effective)	SG-8002 (Legacy - 5V, Large Package)	Various
PLL Technology	**Fractional-N**  Able to output frequency which multiply by fractional number	**Integer-N**  Able to output frequency which multiply by integer number	**Integer-N**  Able to output frequency which multiply by integer number	**Crystal XO**  Frequency limited to crystal manufacturing
Frequency Range	Any Frequency Synthesis **0.67MHz to 170MHz**	1MHz to 166MHz	1MHz to 125MHz	Fixed Frequency
Frequency Tolerance	**±15ppm, ±20ppm**, ±50ppm	±50ppm, ±100ppm	±50ppm, ±100ppm	Varies (From ±15ppm up to ±100ppm)
Temperature Range	-40°C to +85°C **-40°C to +105°C**	-20°C to +70°C -40°C to +85°C	-20°C to +70°C -40°C to +85°C	Varies (from -40°C, up to 105°C)
Function	Programmable (Enable or Standby)	Programmable (Enable or Standby)	Programmable (Enable or Standby)	Fixed (Enable or Standby)
Power Supply Voltage	1.8V, 2.5V, 3.3V	1.8V, 2.5V, 3.3V	3.3V, 5V	Varies (1.8V to 5V)
Power Supply Current	**3.1mA to 7.6mA** (max)	3.5mA to 15mA (max)	28mA to 45mA (max)	Varies (from 1mA up to 50mA)
Symmetry (Duty Cycle)	45%/55%	45%/55%	40%/60%	45%/55% or 40%/60%
Rise/Fall Time (Max)	Default: 3.0ns (>40MHz), 6.0ns (<40MHz); Fast: 3.0ns (0.67MHz to 170MHz); Slow: 10.0ns (0.67MHz to 20MHz)	5.0ns (1MHz to 80MHz) 2.5ns (80MHz to 166MHz)	4.0ns (TTL) 3.0ns (CMOS)	Varies
Internal Crystal Frequency	26MHz	Varies	Varies	Same as Output Fixed Frequency
RMS Phase Jitter (12kHz to 20MHz)	**<50ps typ**	<250ps typ	>250ps typ	Varies (As low as ~1ps typ)
Output Type	LVCMOS	LVCMOS	LVCMOS/CMOS/TTL	Varies (LVCMOS, CMOS, TTL, etc.)
Package (Standard 4 pin packages)			Pin 1: OE or ST; Pin 2: GND; Pin 3: OUT; Pin 4: V_{CC}	
CG: 2.5x2.0mm	Yes	Yes	-	SG-210
CE: 3.2x2.5mm	Yes	Yes	Yes	SG-310
CB/LB: 5.0x3.2mm	Yes	Yes	Yes	SG5032C
CA: 7.0x5.0mm	Yes	Yes	Yes	SG7050C
JF: 7.0x5.0mm	-	Yes	-	SG7050C
JC: 10.5x5.8mm	-	-	Yes	SG-636
JA: 14x9.8mm	-	-	Yes	SG-615
DC: 13.7x7.6mm (Half DIP Package)	-	-	Yes	SG-531
DB: 19.8x7.6mm (Full DIP Package)	-	-	Yes	SG-51
Remarks	Use for quick turn prototypes and/or mass production			Use for mass productions

Spread Spectrum CMOS P-SPXO

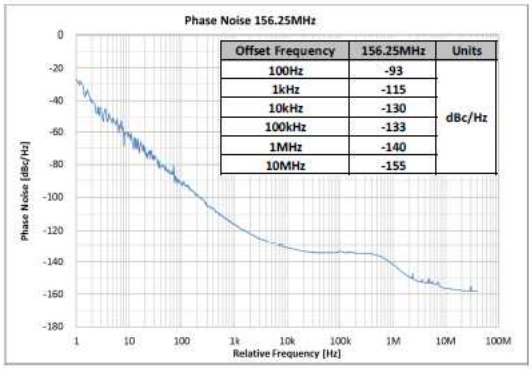
Series	SG-9101 (New)	SG-9001
PLL Technology	Fractional-N  Able to output frequency which multiply by fractional number	Integer-N  Able to output frequency which multiply by integer number
Spread Spectrum Profile	Programmable (Hersey-Kiss, Sine-wave, Triangle)	Fixed (Hersey-Kiss)
Modulation Frequency	Programmable (25.4kHz, 6.3kHz, 8.5kHz, 12.7kHz)	Fixed (25.4kHz)
Modulation Spread	Center Spread (±0.25% to ±2%) or Down Spread (-0.5% to -4%)	Center Spread (±0.25% to ±2%) or Down Spread (-0.5% to -4%)
Frequency Range	Any Frequency Synthesis 0.67MHz to 170MHz	10MHz to 166MHz (JC, CA) 10MHz to 135MHz (LB)
Temperature Range	-40°C to +85°C -40°C to +105°C	-20°C to +70°C
Function	Programmable (Enable or Standby)	Fixed (Output Enable)
Power Supply Voltage	1.8V, 2.5V, 3.3V	3.3V
Power Supply Current	2.9mA to 7.8mA (max)	<30mA (max)
Symmetry (Duty Cycle)	45%/55%	45%/55%
Rise/Fall Time (max)	Default: 3.0ns (>40MHz); 6.0ns (<40MHz) Fast: 3.0ns (0.67MHz to 170MHz) Slow: 10.0ns (0.67MHz to 20MHz)	2.7ns
Internal Crystal Frequency	26MHz	Varies
Output Type	LVCMOS	LVCMOS
Package (Standard 4 pin packages)	 Pin / Name: 1 OE or ST; 2 GND; 3 OUT; 4 V_{CC} CA Package Only: Pin / Connection: 1 OE; 2 SSON; 3 GND; 4 OUT; 5 N.C.; 6 Vcc	
CG: 2.5x2.0mm	Yes	-
CE: 3.2x2.5mm	Yes	-
CB/LB: 5.0x3.2mm	Yes	Yes
CA: 7.0x5.0mm	Yes	Yes (6pin – SS On/Off)
JC: 10.5x5.8mm	-	Yes
Remarks	Spread Spectrum Profile are Programmable	Fixed Spread Spectrum Profile **Not** programmable via SG-Writer-II

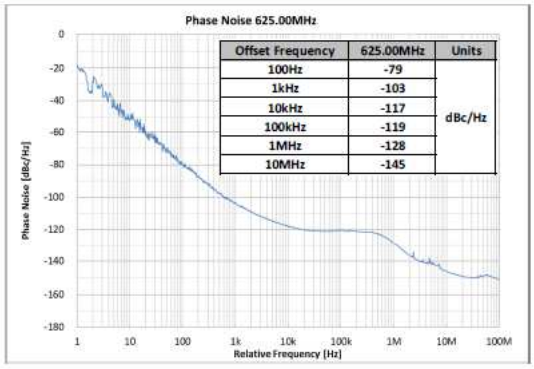
Low Jitter Differential Output (LVPECL) P-SPXO

Series	SG-8503 (New)	SG-8504 (New)	SG-8506 (New)
PLL Technology	**Fractional-N**  Able to output frequency which multiply by fractional number	**Fractional-N**  Able to output frequency which multiply by fractional number	**Fractional-N**  Able to output frequency which multiply by fractional number
Frequency Option	**Selectable** Dual User Specified Frequencies	**Selectable** Quad User Specified Frequencies	**User Programmable** – (I^2C)
Frequency Range	Any Frequency Synthesis 50MHz to 800MHz	Any Frequency Synthesis 50MHz to 800MHz	Any Frequency Synthesis 50MHz to 800MHz
Frequency Tolerance (Aging Included)	±31.5ppm ±50ppm	±31.5ppm ±50ppm	±31.5ppm ±50ppm
Temperature Range	-40°C to +85°C	-40°C to +85°C	-40°C to +85°C
Power Supply Voltage	2.5V, 3.3V	2.5V, 3.3V	2.5V, 3.3V
Power Supply Current	90mA (max)	90mA (max)	90mA (max)
Symmetry (Duty Cycle)	45%/55%	45%/55%	45%/55%
Rise/Fall Time	400ps (max)	400ps (max)	400ps (max)
Internal Crystal Frequency	114.1444MHz	114.1444MHz	114.1444MHz
RMS Phase Jitter (12kHz to 20MHz)	<0.31ps typ	<0.31ps typ	<0.31ps typ
Output Type	LVPECL	LVPECL	LVPECL
Package (CA: 7.0x5.0mm)	 6-pin	FSEL1  FSEL0 8-pin	SDA  SCL 8-pin
Remarks	Dual - Selectable	Quad - Selectable	User Programmable

Low Jitter Differential Output (LVPECL) P-SPXO

Phase Noise





Phase Jitter

	Offset Frequency	100.00 MHz	125.00 MHz	156.25 MHz	250.00 MHz	312.50 MHz	500.00 MHz	625.00 MHz
Phase jitter *2 Typ.	12 kHz to 20 MHz	0.31 ps	0.30 ps	0.26 ps	0.26 ps	0.29 ps	0.28 ps	0.29 ps

*2 In order to achieve optimum jitter performance, it is recommended that the capacitor (0.1 µF + 10 µF) between V_{CC} and GND pin should be placed as close to the V_{CC} pin as possible.

Fixed Frequency Alternatives					
P-SPXO	SPXO		SPSO (SAW XO)		
	Standard	Low Jitter	VCC	Low Jitter	High Stability Low Jitter
SG-8503 ** SG-8504* ** SG-8506* **	SG7050EAN	SG7050EEN	2.5V	XG-2121	EG-4121
			3.3V	XG-2102	EG-4101

*Note: Enable pin not compatible
**Note: Frequency Selectable/User programmable function not application

Evaluation Boards
SG-8506CA-EVB
VG7050EAN-EVB
VG7050ECN-EVB

Customer can set target frequencies via I^2C interface and evaluate the device with these evaluation boards. Accompanying software writes target frequency register value on device.

Evaluation Board for User Programmable Devices (I^2C Interface)

Features

- PC USB connection to evaluation board
- Device evaluation by register setting through I^2C Bus
- Targets register calculation by inputting frequency value into accompanying software
- Power supply (+2.5 V or +3.3 V) available through USB connection

EPSON
EXCEED YOUR VISION

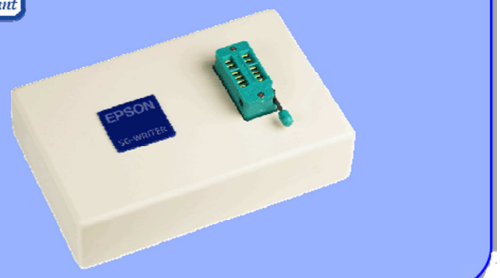
Programming tool for Programmable Crystal Oscillator

SG - Writer Ⅱ

- Programming tool for programmable oscillator: SG-8101, SG-8002, SG-8003, SG-9101, SG-8503, SG-8504 and SG-8506 series (Blank sample).
- Able to program required frequency at customer side
- External power supply by USB cable.
- Available PC OS: Windows 10 etc,
- Small body and easy carry.

RoHS Compliant

Product Number
Q91PR20W1102000



	IC Sockets		Blank Samples	
Package Size	Models	Part Number	Model	Part Number
CG: 2.5x2.0mm	SG-8003CG, SG-8101CG, SG-9101CG	Q91PR10W00024	SG-8003CG (1.8V)	X1G0039910001
			SG-8003CG (2.5V-3.3V)	X1G0039910002
			SG-8101CG	X1G0051810001
			SG-9101CG	X1G0052910001
CE: 3.2x2.5mm	SG-8003CE, SG-8101CE, SG-9101CE	Q91PR10W00018	SG-8003CE (1.8V)	Q33519E000001
			SG-8003CE (2.5V-3.3V)	Q33519E000002
			SG-8101CE	X1G0052110001
			SG-9101CE	X1G0053210001
	SG-8002CE	Q91PR10W00010	SG-8002CE	Q3321CE000001
CB/LB: 5.0x3.2mm	SG-8101CB, SG-9101CB	Q91PR10W00025	SG-8101CB	X1G0052010001
			SG-9101CB	X1G0053110001
	SG-8003LB	Q91PR10W00019	SG-8003LB (1.8V)	X1G0033010001
			SG-8003LB (2.5V-3.3V)	X1G0033010002
	SG-8002LB	Q91PR10W00011	SG-8002LB	Q3323LB010002
CA/JF: 7.0x5.0mm	SG-8003CA, SG-8101CA, SG-9101CA	Q91PR10W00021	SG-8003CA (1.8V)	X1G0032310001
			SG-8003CA (2.5V-3.3V)	X1G0032310002
			SG-8101CA	X1G0051910001
			SG-9101CA	X1G0053010001
	SG-8002CA	Q91PR10W00005	SG-8002CA	Q3309CA000002
	SG-8003JF	Q91PR10W00020	SG-8003JF (1.8V)	X1G0030220001
			SG-8003JF (2.5V-3.3V)	X1G0030220002
	SG-8503CA	Q91PR10W00026	SG-8503CA	X1G0050111001
	SG-8504CA	Q91PR10W00027	SG-8504CA	X1G0050211001
	SG-8506CA	Q91PR10W00028	SG-8506CA	X1G0050311001
JC: 10.5x5.8mm	SG-8002JC	Q91PR10W00004	SG-8002JC	Q3307JC010002
JA: 14x9.8mm	SG-8002JA	Q91PR10W00003	SG-8002JA	Q3306JA010002 (Sn/Bi) Q3306JA020002 (Sn only)
DC: 13.7x7.6mm	Not Required (Insert device directly into SG-Writer-II)		SG-8002DC	Q3204DC010002
DB: 19.8x7.6	Not Required (Insert device directly into SG-Writer-II)		SG-8002DB	Q3203DB010002