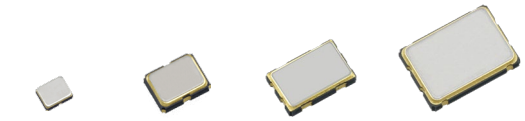
CRYSTAL OSCILLATOR (Programmable)
SPREAD SPECTRUM
OUTPUT: CMOS
SG-9101 series

Pb Free / RoHS Compliant

Product Number
SG-9101CA: X1G005301xxxx00
SG-9101CB: X1G005311xxxx00
SG-9101CE: X1G005321xxxx00
SG-9101CG: X1G005291xxxx00

- Frequency range : 0.67 MHz to 170 MHz (1 ppm Step)
- Supply voltage : 1.62 V to 3.63 V
- Function : Output enable (OE) or Standby ($\overline{ST}$)
- Configurable spread spectrum settings:
  2 kinds of spread type, 6 kinds of spread width
  4 kinds of modulation frequency, 3 kinds of spread profile
- PLL technology to enable short lead time
- Available field oscillator programmer "SG-Writer II"



CG 2.5 × 2.0 mm | CE 3.2 × 2.5 mm | CB 5.0 × 3.2 mm | CA 7.0 × 5.0 mm

Specifications (characteristics)

Item	Symbol	Specifications				Conditions/Remarks	
Supply voltage	V_{CC}	1.80 V Typ.		2.50 V Typ.	3.30 V Typ.	-	
		1.62 V to 1.98 V	1.98 V to 2.20 V	2.20 V to 2.80 V	2.70 V to 3.63 V		
Output frequency range	f_O	0.67 MHz to 170 MHz					
Storage temperature range	T_stg	-40 °C to +125 °C				Storage as single product.	
Operating temperature range	T_use	-40 °C to +85 °C					
		-40 °C to +105 °C					
Frequency tolerance*1	f_tol	±50 × 10^{-6}				Average frequency of 1s gate time.	
Current consumption	I_{CC}	3.4 mA Max.	3.5 mA Max.	3.6 mA Max.	3.7 mA Max.	T_use = +105 °C	No load, f_O = 20 MHz
		2.9 mA Typ.		3.0 mA Typ.	3.2 mA Typ.	T_use = +25 °C	
		5.7 mA Max.	6.0 mA Max.	6.9 mA Max.	8.3 mA Max.	T_use = +105 °C	No load, f_O = 170 MHz
		4.9 mA Typ.		5.9 mA Typ.	7.0 mA Typ.	T_use = +25 °C	
Output disable current	I_dis	3.4 mA Max.	3.4 mA Max.	3.5 mA Max.	3.7 mA Max.	OE = GND, f_O = 170 MHz	
Standby current	I_std	0.9 µA Max.	1.0 µA Max.	1.5 µA Max.	2.5 µA Max.	T_use = +105 °C	$\overline{ST}$ = GND
		0.3 µA Typ.	0.4 µA Typ.	0.5 µA Typ.	1.1 µA Typ.	T_use = +25 °C	
Symmetry	SYM	45 % to 55 %				50 % V_{CC} Level	
Output voltage (DC characteristics)	V_{OH}	90 % V_{CC} Min.				I_{OH}/I_{OL} Conditions [mA]	
	V_{OL}	10 % V_{CC} Max.				*A : 1.62 V to 1.98 V, *B : 1.98 V to 2.20 V, *C : 2.20 V to 2.80 V, *D : 2.70 V to 3.63 V	
Output load condition	L_CMOS	15 pF Max.				-	
Input voltage	V_{IH}	70 % V_{CC} Min.				OE or $\overline{ST}$	
	V_{IL}	30 % V_{CC} Max.					
Rise time /Fall time Default	tr/tf	3.0 ns Max.				f_O > 40 MHz	20 % - 80 % V_{CC}, L_CMOS = 15 pF
		6.0 ns Max.				f_O ≤ 40 MHz	
Fast		3.0 ns Max.				f_O = 0.67 MHz to 170 MHz	
Slow		10.0 ns Max.				f_O = 0.67 MHz to 20 MHz	
Output disable time (OE) Output disable time (ST)	tstp_oe tstp_st	1 µs Max.				Measured from the time OE or $\overline{ST}$ pin crosses 30 % V_{CC}	
Output enable time (OE)	tsta_oe	1 µs Max.				Measured from the time OE pin crosses 70 % V_{CC}	
Output enable time (ST)	tsta_st	3 ms Max.				Measured from the time $\overline{ST}$ pin crosses 70 % V_{CC}	
Start-up time	t_str	3 ms Max.				Measured from the time V_{CC} reaches its rated minimum value, 1.62 V	
Frequency aging	f_age	This is included in frequency tolerance specification.				+25 °C, first year	

I_{OH}/I_{OL} Conditions [mA]

Rise/Fall time	Vcc	*A	*B	*C	*D
Default (f_O > 40 MHz), Fast	I_{OH}	-2.5	-3.5	-4.0	-5.0
	I_{OL}	2.5	3.5	4.0	5.0
Default (f_O ≤ 40 MHz)	I_{OH}	-1.5	-2.0	-2.5	-3.0
	I_{OL}	1.5	2.0	2.5	3.0
Slow	I_{OH}	-1.0	-1.5	-2.0	-2.5
	I_{OL}	1.0	1.5	2.0	2.5

*1 Frequency tolerance includes initial frequency tolerance, frequency / temperature characteristics, frequency / voltage coefficient, frequency / load coefficient and frequency aging (+25 °C, 1 year).

Pin description

Pin	Name	I/O type	Function	
1	OE	Input	Output enable	High*2: Specified frequency output from OUT pin Low: Out pin is low (weak pull down), only output driver is disabled.
	$\overline{ST}$	Input	Standby	High*2: Specified frequency output from OUT pin Low: Out pin is low (weak pull down), Device goes to standby mode. Supply current reduces to the least as I_std.
2	GND	Power	Ground	
3	OUT	Output	Clock output	
4	V_{CC}	Power	Power supply	

*2 Please do not use the OE/$\overline{ST}$ terminal in the open state.

Product Name

SG-9101CG 170.000000MHz C 20 P H A A A
① ② ③ ④⑤⑥⑦⑧⑨⑩

①Model ②Package type ③Frequency
④Spread type ⑤Spread width
⑥Function ⑦Operating temperature
⑧Modulation frequency ⑨Spread profile
⑩Rise/Fall time

②Package type	
CG	2.5 mm × 2.0 mm
CE	3.2 mm × 2.5 mm
CB	5.0 mm × 3.2 mm
CA	7.0 mm × 5.0 mm

④Spread type	
C	Center spread
D	Down spread

⑤Spread width		
	Center spread	Down spread
02	±0.25 %	
05	±0.5 %	-0.5 %
07	±0.75 %	
10	±1.0 %	-1.0 %
15	±1.5 %	-1.5 %
20	±2.0 %	-2.0 %
30		-3.0 %
40		-4.0 %

⑥Function	
P	Output enable
S	Standby

⑦Operating temperature	
G	-40 °C to +85 °C
H	-40 °C to +105 °C

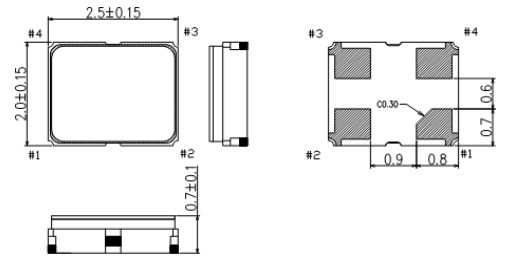
⑧Modulation frequency	
A	25.4 kHz (Default)
B	12.7 kHz
C	8.5 kHz
D	6.3 kHz

⑨Spread profile	
A	Hershey-kiss (Default)
B	Sine-wave
C	Triangle

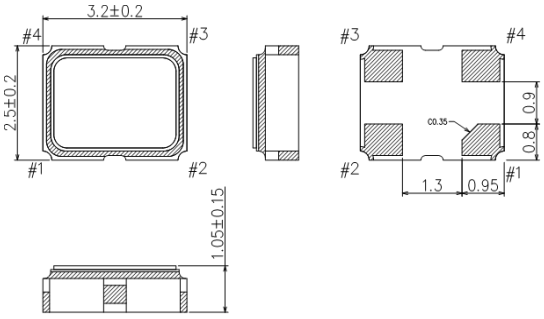
⑩Rise/Fall time	
A	Default
B	Fast
C	Slow

External dimensions (Unit: mm)

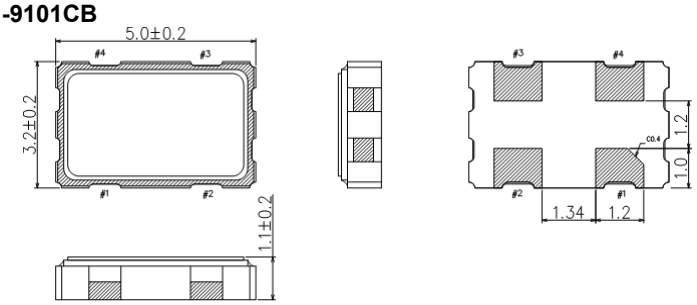
SG-9101CG



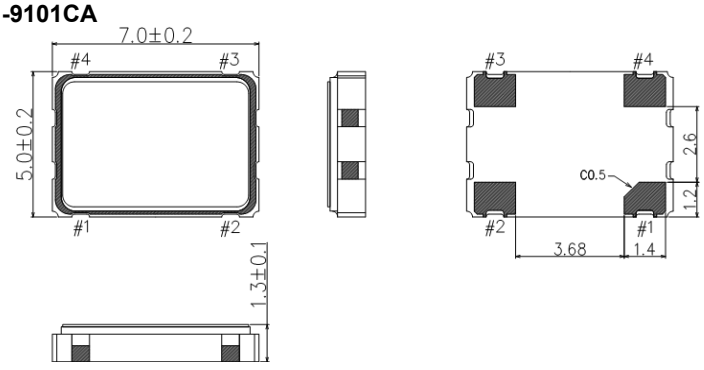
SG-9101CE



SG-9101CB

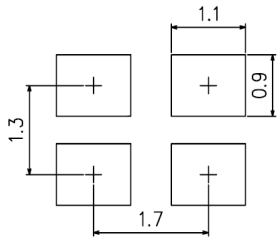


SG-9101CA

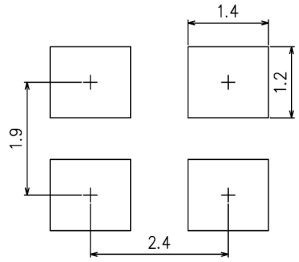


Footprint (Recommended) (Unit: mm)

SG-9101CG



SG-9101CE



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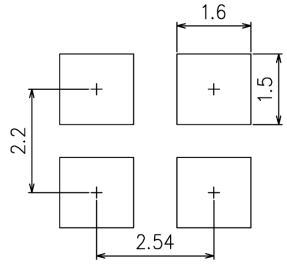
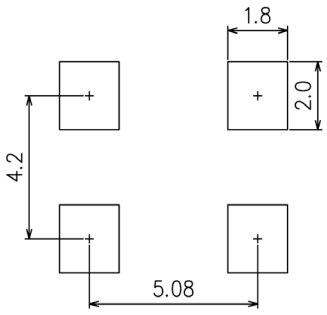


SG-9101CA



■Notes:
In order to achieve optimum jitter performance, the 0.1 µF capacitor between V_{CC} and GND should be placed. It is also recommended that the capacitors are placed on the device side of the PCB, as close to the device as possible and connected together with short wiring pattern.

PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs, Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired IATF 16949 certification that is requested strongly by major automotive manufacturers as standard.

IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

►Explanation of the mark that are using it for the catalog

Pb Free	►Pb free.
RoHS Compliant	►Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)
For Automotive	►Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
Automotive Safety	►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).