



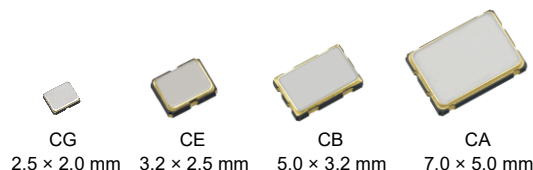
CRYSTAL OSCILLATOR (Programmable) SPREAD SPECTRUM OUTPUT: CMOS

SG-9101 series

- 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"



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



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		T _{stg}	-40 °C to +125 °C				Storage as single product.						
Operating temperature		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	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]						
							Rise/Fall time		V _{CC}	*A	*B	*C	*D
							Default (f _o > 40 MHz), Fast		I _{OH}	-2.5	-3.5	-4.0	-5.0
		V _{OL}	10 % V _{CC} Max.				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
Output load condition		L _{CMOS}	15 pF 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						
Input voltage		V _{IH}	70 % V _{CC} Min.				OE or 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)		tstp_oe	1 μs Max.				Measured from the time OE or ST pin crosses 30 % V _{CC}						
Output disable time (ST)		tstp_st											
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 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						

^{*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 ④ ⑤ ⑥ ⑦ ⑧ ⑨ ⑩

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

② Package 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

④ Spread type	
C	Center spread
D	Down spread

⑤ Spread 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 %

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

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

⑥ Function	
P	Output enable
S	Standby

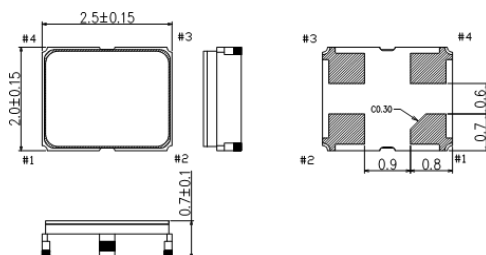
⑩ Rise/Fall time	
A	Default
B	Fast
C	Slow

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

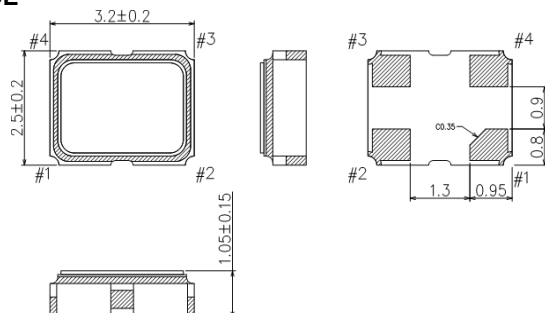
External dimensions

(Unit: mm)

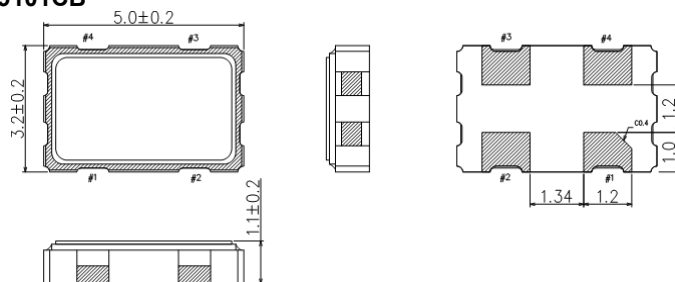
SG-9101CG



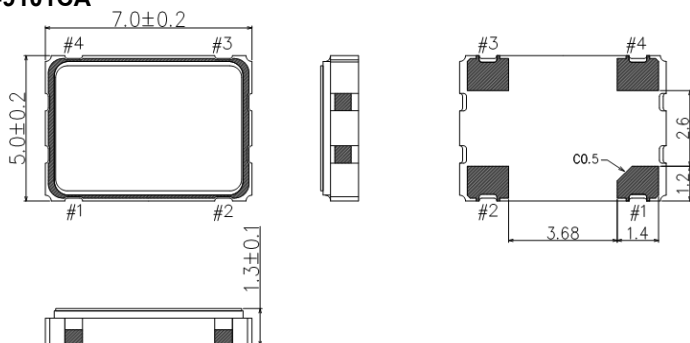
SG-9101CE



SG-9101CB



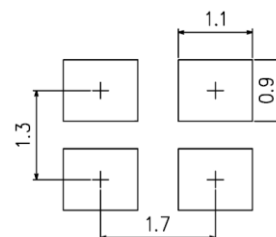
SG-9101CA



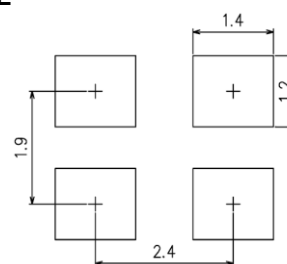
Footprint (Recommended)

(Unit: mm)

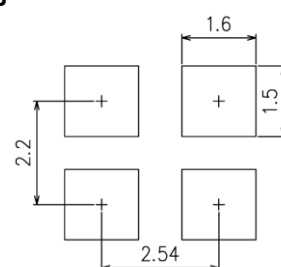
SG-9101CG



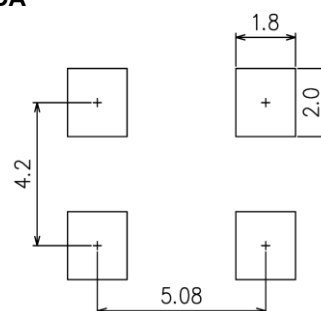
SG-9101CE



SG-9101CB



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

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	► 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.)
	► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
	► Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).

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