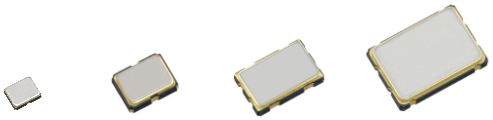
# CRYSTAL OSCILLATOR (Programmable)
# SPREAD SPECTRUM
# OUTPUT: CMOS
# SG-9101 series

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 | 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 | $\overline{ST}$ = 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 |
| Default | | 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<br>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<br>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

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 |

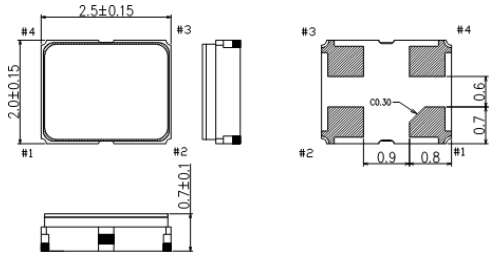
| ⑧Modulation frequency | |
|---|---|
| A | 25.4 kHz (Default) |
| B | 12.7 kHz |
| C | 8.5 kHz |
| D | 6.3 kHz |

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

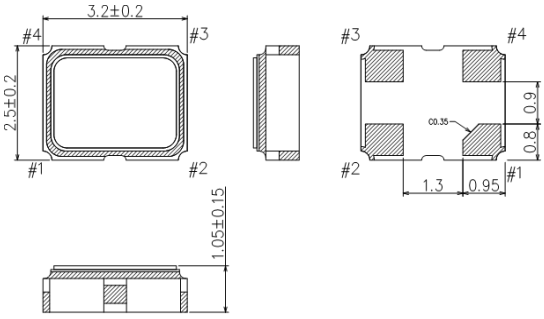
| ⑩Rise/Fall time | |
|---|---|
| A | Default |
| B | Fast |
| C | Slow |

## External dimensions (Unit: mm)

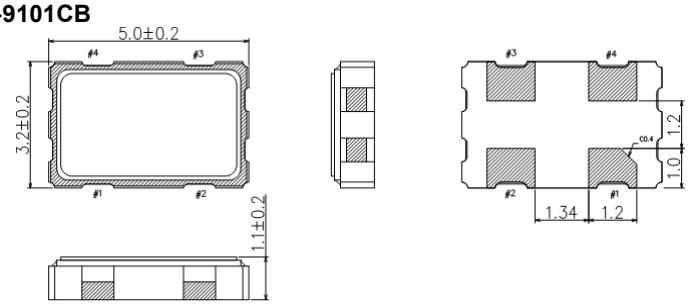
### SG-9101CG



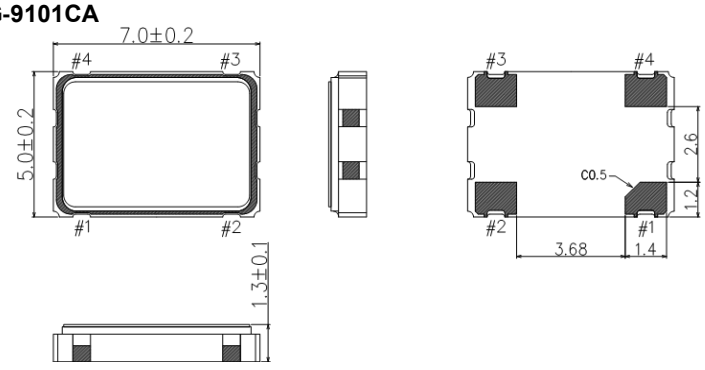

### SG-9101CE




### SG-9101CB

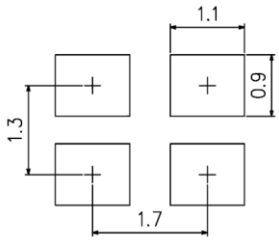



### SG-9101CA

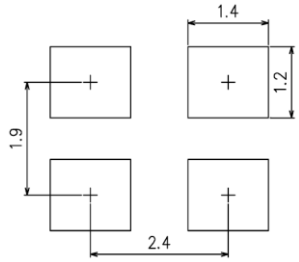



## Footprint (Recommended) (Unit: mm)

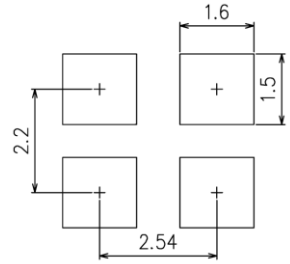
### SG-9101CG



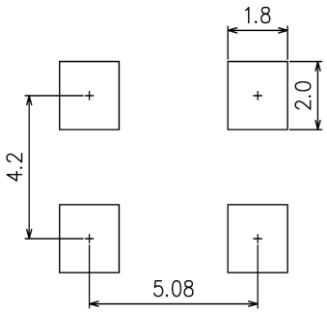

### SG-9101CE




### 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

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.

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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. |
|   | ►Complies with EU RoHS directive.<br>*About the products without the Pb-free mark.<br>Contains Pb in products exempted by EU RoHS directive.<br>(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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