



Crystal oscillator

SEIKO EPSON CORPORATION

CRYSTAL OSCILLATOR (Programmable)  
OUTPUT: CMOS



Product Number  
X1G005171xxxx00

# SG-8101CGA

- 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 (ST)
- Frequency tolerance, operating temperature:
  - ±15 ppm (-40 °C to +85 °C)
  - ±20 ppm (-40 °C to +105 °C)
  - ±50 ppm (-40 °C to +125 °C)
  - ±100 ppm (-40 °C to +125 °C)
- Package : 2.5 x 2.0 (mm)
- PLL technology to enable short lead time
- AEC-Q100 compliant



## Specifications (characteristics)

Item	Symbol	Specifications	Conditions/Remarks																																							
Supply voltage	V <sub>CC</sub>	1.80 V Typ. 1.62 V to 1.98 V   1.98 V to 2.20 V   2.50 V Typ.   2.20 V to 2.80 V   3.30 V Typ.   2.70 V to 3.63 V																																								
Output frequency range	f <sub>o</sub>	0.67 MHz to 170 MHz																																								
Storage temperature	T <sub>stg</sub>	-40 °C to +125 °C	Storage as single product.																																							
Operating temperature	T <sub>use</sub>	-40 °C to +85 °C -40 °C to +105 °C -40 °C to +125 °C																																								
Frequency tolerance*1	f <sub>tol</sub>	B : ±15 × 10 <sup>-6</sup> C : ±20 × 10 <sup>-6</sup> J : ±50 × 10 <sup>-6</sup> L : ±100 × 10 <sup>-6</sup>	T <sub>use</sub> = -40 °C to +85 °C T <sub>use</sub> = -40 °C to +105 °C T <sub>use</sub> = -40 °C to +125 °C T <sub>use</sub> = -40 °C to +125 °C																																							
Current consumption	I <sub>CC</sub>	3.3 mA Max.   3.4 mA Max.   3.5 mA Max.   3.6 mA Max. 3.2 mA Max.   3.3 mA Max.   3.4 mA Max.   3.5 mA Max. 2.7 mA Typ.   2.9 mA Typ.   3.0 mA Typ. 5.6 mA Max.   5.9 mA Max.   6.8 mA Max.   8.2 mA Max. 5.5 mA Max.   5.8 mA Max.   6.7 mA Max.   8.1 mA Max. 4.7 mA Typ.   5.7 mA Typ.   6.8 mA Typ.	T <sub>use</sub> = +125 °C T <sub>use</sub> = +105 °C T <sub>use</sub> = +25 °C T <sub>use</sub> = +125 °C T <sub>use</sub> = +105 °C T <sub>use</sub> = +25 °C No load, f <sub>o</sub> = 20 MHz No load, f <sub>o</sub> = 170 MHz																																							
Output disable current	I <sub>dis</sub>	3.3 mA Max.   3.4 mA Max.   3.4 mA Max.   3.6 mA Max. 3.2 mA Max.   3.3 mA Max.   3.3 mA Max.   3.5 mA Max.	T <sub>use</sub> = +125 °C T <sub>use</sub> = +105 °C OE = GND, f <sub>o</sub> = 170 MHz																																							
Standby current	I <sub>std</sub>	2.3 µA Max.   2.5 µA Max.   3.0 µA Max.   4.2 µA Max. 0.9 µA Max.   1.0 µA Max.   1.5 µA Max.   2.5 µA Max. 0.3 µA Typ.   0.4 µA Typ.   0.5 µA Typ.   1.1 µA Typ.	T <sub>use</sub> = +125 °C T <sub>use</sub> = +105 °C T <sub>use</sub> = +25 °C ST = GND																																							
Symmetry	SYM	45 % to 55 %	50 % V <sub>CC</sub> Level																																							
Output voltage (DC characteristics)	V <sub>OH</sub> V <sub>OL</sub>	90 % V <sub>CC</sub> Min. 10 % V <sub>CC</sub> Max.	I <sub>OH</sub> /I <sub>OL</sub> Conditions [mA] <table border="1"> <thead> <tr> <th>Rise/Fall time selection</th> <th>V<sub>CC</sub></th> <th>*A</th> <th>*B</th> <th>*C</th> <th>*D</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Default (f<sub>o</sub> &gt; 40 MHz), Fast</td> <td>I<sub>OH</sub></td> <td>-2.5</td> <td>-3.5</td> <td>-4.0</td> <td>-5.0</td> </tr> <tr> <td>I<sub>OL</sub></td> <td>2.5</td> <td>3.5</td> <td>4.0</td> <td>5.0</td> </tr> <tr> <td rowspan="2">Default (f<sub>o</sub> ≤ 40 MHz)</td> <td>I<sub>OH</sub></td> <td>-1.5</td> <td>-2.0</td> <td>-2.5</td> <td>-3.0</td> </tr> <tr> <td>I<sub>OL</sub></td> <td>1.5</td> <td>2.0</td> <td>2.5</td> <td>3.0</td> </tr> <tr> <td rowspan="2">Slow</td> <td>I<sub>OH</sub></td> <td>-1.0</td> <td>-1.5</td> <td>-2.0</td> <td>-2.5</td> </tr> <tr> <td>I<sub>OL</sub></td> <td>1.0</td> <td>1.5</td> <td>2.0</td> <td>2.5</td> </tr> </tbody> </table> *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	Rise/Fall time selection	V <sub>CC</sub>	*A	*B	*C	*D	Default (f <sub>o</sub> > 40 MHz), Fast	I <sub>OH</sub>	-2.5	-3.5	-4.0	-5.0	I <sub>OL</sub>	2.5	3.5	4.0	5.0	Default (f <sub>o</sub> ≤ 40 MHz)	I <sub>OH</sub>	-1.5	-2.0	-2.5	-3.0	I <sub>OL</sub>	1.5	2.0	2.5	3.0	Slow	I <sub>OH</sub>	-1.0	-1.5	-2.0	-2.5	I <sub>OL</sub>	1.0	1.5	2.0	2.5
Rise/Fall time selection	V <sub>CC</sub>	*A	*B	*C	*D																																					
Default (f <sub>o</sub> > 40 MHz), Fast	I <sub>OH</sub>	-2.5	-3.5	-4.0	-5.0																																					
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	I <sub>OL</sub>	1.0	1.5	2.0	2.5																																					
Output load condition	L <sub>CMOS</sub>	15 pF Max.																																								
Input voltage	V <sub>IH</sub> V <sub>IL</sub>	70 % V <sub>CC</sub> Min. 30 % V <sub>CC</sub> Max.	OE or ST																																							
Rise and Fall time	tr/tf	3.0 ns Max. 6.0 ns Max. 3.0 ns Max. 10.0 ns Max.	f <sub>o</sub> > 40 MHz f <sub>o</sub> ≤ 40 MHz f <sub>o</sub> = 0.67 MHz to 170 MHz f <sub>o</sub> = 0.67 MHz to 20 MHz 20 % - 80 % V <sub>CC</sub> , L <sub>CMOS</sub> = 15 pF																																							
Disable Time	t <sub>stp</sub>	1 µs Max.	Measured from the time OE or ST pin crosses 30 % V <sub>CC</sub>																																							
Enable Time	t <sub>sta</sub>	1 µs Max.	Measured from the time OE pin crosses 70 % V <sub>CC</sub>																																							
Resume Time	t <sub>res</sub>	3 ms Max.	Measured from the time ST pin crosses 70 % V <sub>CC</sub>																																							
Start-up time	t <sub>str</sub>	3 ms Max.	Measured from the time V <sub>CC</sub> reaches its rated minimum value, 1.62 V																																							
Frequency aging	f <sub>aging</sub>	This is included in frequency tolerance specification.	+25 °C, first year																																							

\*1 Frequency tolerance includes initial frequency tolerance, temperature variation, supply voltage variation, reflow drift, load drift and aging (+25 °C, 1 year).

## Pin description

Pin	Name	I/O type	Function
1	OE	Input	Output enable High: Specified frequency output from OUT pin Low: Out pin is low (weak pull down), only output driver is disabled.
	ST	Input	Standby High: 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 <sub>std</sub> .
2	GND	Power	Ground
3	OUT	Output	Clock output
4	V <sub>CC</sub>	Power	Power supply



Crystal oscillator

SEIKO EPSON CORPORATION

Product Name

SG-8101CGA 170.000000MHz T C H P A  
 ① ② ③ ④⑤⑥⑦⑧

② Package type	CG 2.5 mm x 2.0 mm
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⑤⑥	⑤ Frequency tolerance	⑥ Operating temperature
BG	B: $15 \times 10^{-6}$	G: -40 °C to +85 °C
CH	C: $20 \times 10^{-6}$	H: -40 °C to +105 °C
JJ	J: $50 \times 10^{-6}$	J: -40 °C to +125 °C
LJ	L: $100 \times 10^{-6}$	

⑦ Function
P Output Enable
S Standby

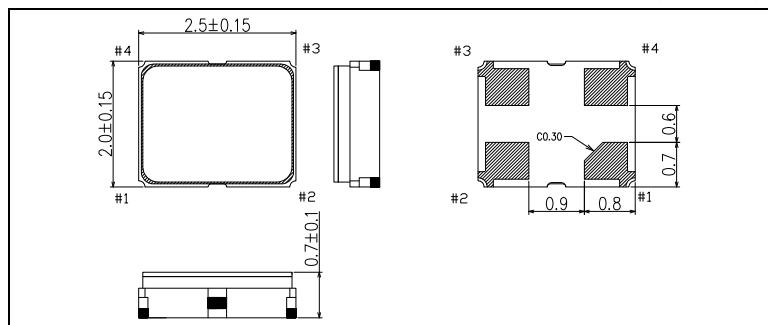
④ Supply voltage
T 1.8 V to 3.3 V Typ.

⑧ Rise/Fall time
A Default
B Fast
C* Slow

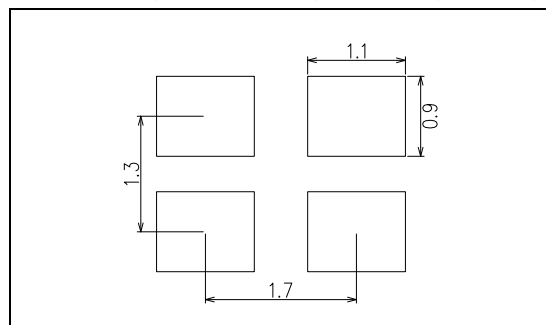
- ① Model, ② Package type,
- ③ Frequency, ④ Supply voltage,
- ⑤ Frequency tolerance, ⑥ Operating temperature,
- ⑦ Function, ⑧ Rise/Fall time

\* Available only when fo ≤ 20 MHz

External dimensions (Unit: mm)



Footprint (Recommended) (Unit: mm)



Notes:

In order to achieve optimum jitter performance, the 0.1 μF capacitor between V<sub>CC</sub> 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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	► 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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