

## **CRYSTAL OSCILLATOR**

PROGRAMMABLE OUTPUT : CMOS

# SG-8002 series

•Frequency range : 1 MHz to 125 MHz •Supply voltage : 3.0 V / 3.3 V / 5.0 V

Function : Output enable(OE) or Standby(ST)

•Short mass production lead time by PLL technology.

•SG-Writer available to purchase,

please contact Epson or local sales representative.



## Specifications (characteristics)

Item	Symbol	Specifications *2			Conditions / Remarks	
item	Symbol	PT / ST	PH/SH	PC / SC	Conditions / Remarks	
		1 MHz to 125 MHz		_	Vcc = 4.5 V to 5.5 V	
Output frequency range	fo		<del>-</del>		Vcc = 3.0 V to 3.6 V	
		_	_		Vcc = 2.7 V to 3.6 V	
Supply voltage	Vcc		/ to 5.5 V	2.7 V to 3.6 V		
			o +125 °C (SG-800		Storage as single product.	
Storage temperature	T_stg		°C to +100 °C (SG			
			°C to +125 °C (SG	,		
Operating temperature*1	T_use		C to +70 °C / -40 °C			
Frequency tolerance	f tol		: ±50 × 10 <sup>-6</sup> , C: ±100		-20 °C to +70 °C	
l requericy tolerance	1_101		100 × 10 <sup>-6</sup>	M: $\pm 100 \times 10^{-6}$	-40 °C to +85 °C (except SG-8002JC) *3	
			(. (SG-8002CE)			
Current consumption	Icc	45 mA Max.		28 mA Max.	No load condition, Max. frequency	
			A/JC/JA/DC)			
Output disable current	I_dis	30 r	mA Max.	16 mA Max.	OE=GND (PT.PH,PC)	
Stand-by current	I_std		50 μA Max.		ST =GND (ST,SH,SC)	
	SYM	40 % to 60 % 45 % to 55 %			TTL load: 1.4 V, Max. load condition	
Symmetry *1				<del></del>		
^		— 40 % to 60 %			CMOS load:50 % Vcc level, Max. load condition	
		— 45 % to 55 %				
Output voltage	Voн		Vcc -0.4 V Min.		Iон=-16 mA (PT,ST,PH,SH ) , -8 mA (PC,SC)	
Calput Voltage	Vol		0.4 V Max.		IOL=16 mA (PT,ST,PH,SH) , 8 mA (PC,SC)	
Output load condition	L_TTL	5 TTL Max. —		_	Max. frequency and Max. Supply voltage (SG-8002CE / CA / JA / DC )	
(TTL) *1		5 TTL Max. —			f <sub>0</sub> ≤ 90 MHz and Max. Supply voltage (SG-8002JC)	
Output load condition	L_CMOS	15 pF Max.			Max. frequency and Max. Supply voltage (SG-8002CE / JC)	
(CMOS) *1		15 pF Max.	25 pF Max	15 pF Max.	Max. frequency and Max. Supply voltage (SG-8002CA / JA / DC )	
Input voltage	ViH	2.0 V Min.		70 % Vcc Min.	OE terminal or ST terminal	
input voltage	VIL	0.8 V Max.		20 % Vcc Max.	OE terminar of ST terminar	
Rise / Fall time *1	tr/ tf	4 ns Max.			TTL load: 0.4 V to 2.4 V level	
NISE / FAII WITH "T					CMOS load: 20 % Vcc to 80 % Vcc level	
Start-up time	t_str		10 ms Max.		Time at minimum supply voltage to be 0 s	
Frequency aging	f_aging		±5 × 10 <sup>-6</sup> / year M	ax.	+25 °C, Vcc=5.0 V/ 3.3 V (PC,SC) First year	

<sup>\*1</sup> Please refer to "Outline specifications" page for information regarding; operating temperature, available frequencies, symmetry, output load conditions and rise/fall time.

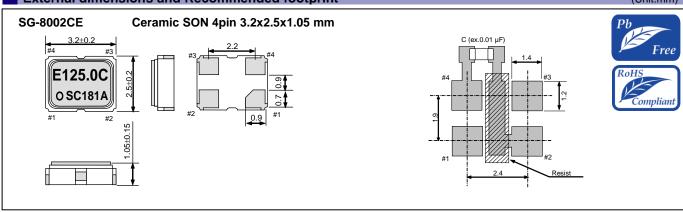
<sup>\*2</sup> Please refer to "Jitter specifications and characteristics chart" page for PLL-PLL connection & Jitter specification.

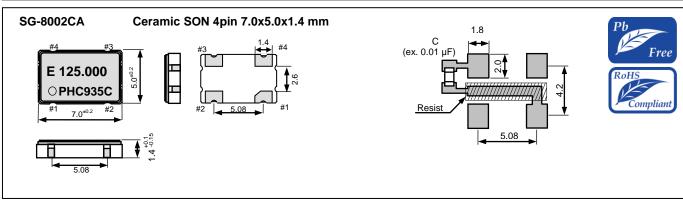
<sup>\*3</sup> Please refer to "Outline specifications" for availability of tolerance "M". A "Frequency checking" program on the Seiko Epson website is also available.

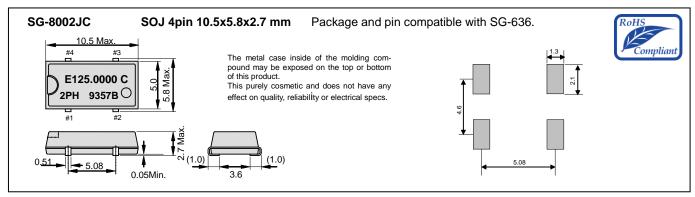


## External dimensions and Recommended footprint

(Unit:mm)







Note.

OE Pin (PT, PH, PC)

OE Pin = "H" or "open": Specified frequency output.

OE Pin = "L": Output is high impedance.

ST Pin (ST, SH, SC)

ST Pin = "H" or "open": Specified frequency output.

ST Pin = "L": Output is low level (weak pull - down), oscillation stops.

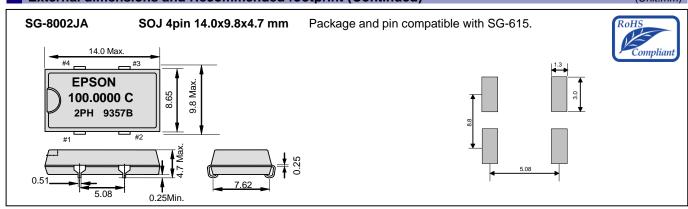
Pin map

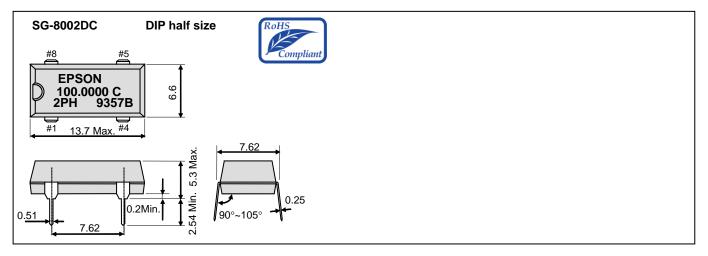
ПППар					
Pin	Connection				
1	OE or ST				
2	GND				
3	OUT				
4	Vcc				

To maintain stable operation, provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc - GND).

## External dimensions and Recommended footprint (Continued)

(Unit:mm)





Note.

OE Pin (PT, PH, PC)

OE Pin = "H" or "open": Specified frequency output.

OE Pin = "L": Output is high impedance.

 $\overline{\text{ST}}$  Pin (ST, SH, SC)

 $\overline{\text{ST}}$  Pin = "H" or "open": Specified frequency output.

ST Pin = "L": Output is low level (weak pull - down), oscillation stops.

Pin map

Connection Pin OE or  $\overline{\rm ST}$ 1 GND OUT 4 Vcc

Pin map: SG-8002DC
Pin Connection

	Commodian
1	OE or ST
4	GND
5	OUT
8	Vcc

To maintain stable operation, provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc - GND).

## Products number

(Please contact us for each product.)

SG-8002CE: Q3321CExxxxxx00 SG-8002CA: Q3309CAx0xxxx00 SG-8002JA: Q3306JAx2xxxx00

SG-8002JC: SG-8002DC: Q3307JCx2xxxx00 Q3204DCx2xxxx00



## SG-8002 Series Outline of specifications

Mod	el	Supply volt- age	Operating temperature	Output load condition	Symmetry	Output rise time / Output fall time
	PT/ST	4.5 V to	-20 °C to +70 °C -40 °C to +85 °C	5TTL+15pF	40 % to 60 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤125 MHz) 45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤66.7 MHz) 45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤27.0 MHz)	2.0 ns Max. (0.8 V to 2.0 V,L_TTL=Max.) 4.0 ns Max. (0.4 V to 2.4 V,L_TTL=Max.)
SG-8002CE	PH/SH	5.5 V	-20 °C to +70 °C -40 °C to +85 °C	15 pF (f0≤125 MHz) 25 pF (f0≤100 MHz) 25 pF (f0≤27 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz) 45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤66.7 MHz) 45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤27.0 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS=Max.)
	PC/SC	3.0 V to 3.6 V 2.7 V to 3.6 V		15 pF	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz) 45 % to 55 % (50 % VCC, L_CMOS=15 pF, f0≤40 MHz) 40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤66.7 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS=Max.)
	PT/ST		-20 °C to +70 °C	5TTL+15pF (f0≤125 MHz) 25 pF (f0≤66.7 MHz)	↑ (1.4 V, L_CMOS=25 pF, f0≤66.7 MHz) 45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, f0≤66.7 MHz)	2.0 ns Max. (0.8 V to 2.0 V,L_CMOS or L_TTL=Max.) 4.0 ns Max. (0.4 V to 2.4 V,L_CMOS or L_TTL=Max.)
SG-8002CA		4.5 V to 5.5 V	-40 °C to +85 °C	5 TTL+15 pF (f0≤40 MHz) 15 pF (f0≤55 MHz)	45 % to 55 % (1.4 V, L_CMOS=15 pF, 105=35.0 MHz) 45 % to 55 % (1.4 V, L_TTL=5 TTL+15 pF, 105=40.0 MHz) 40 % to 60 % (50 % VCC, L CMOS=25 pF, 105=125 MHz)	
SG-8002JA	PH/SH		-20 °C to +70 °C	25 pF (f0≤125 MHz) 50 pF (f0≤66.7 MHz)	↑ (50 % VCC, L_CMOS=50 pF, f0≤66.7 MHz) 45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤66.7 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS≤25pF) 4.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS=Max.)
SG-8002DC	SG-8002DC		-40 °C to +85 °C	15 pF (f0≤55 MHz) 25 pF (f0≤40 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤55.0 MHz) 45 % to 55 % (50 % VCC, L_MOS=25 pF, f0≤40.0 MHz)	4.0 113 IMAX. (20 /6 VOO to 00 /6 VOO,E_OIMOG=IMAX.)
	PC/SC	3.0 V to 3.6 V 2.7 V to 3.6 V	-40 °C to +85 °C	15 pF 30 pF (f0≤40 MHz) 15 pF	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz) 45 % to 55 % (50 % VCC, L_CMOS=30 pF, f0≤40 MHz) 40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤66.7 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS≤15pF) 4.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS=Max.)
	PT/ST	4.5 V to	-20 °C to +70 °C	5TTL+15 pF (f0≤90 MHz) 15 pF (f0≤125 MHz) 25 pF (f0≤66.7 MHz)	40 % to 60 % (1.4 V,L_CMOS=15 pF, f0≤125 MHz)  ↑ (1.4 V,L_TTL=5 TTL+15 pF, f0≤90.0 MHz)  ↑ (1.4 V,L_CMOS=25 pF, f0≤66.7 MHz)  45 % to 55 % (1.4 V,L_TTL=5 TTL+15 pF, f0≤66.7 MHz)	2.0 ns Max. (0.8 V to 2.0 V,L_CMOS or L_TTL=Max.) 4.0 ns Max. (0.4 V to 2.4 V,L_CMOS or L_TTL=Max.)
SG-8002JC	PH/SH	5.5 V	-20 0 10 +70 0	15 pF (f0≤125 MHz) 25 pF (f0≤90 MHz) 50 pF (f0≤66.7 MHz)	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz)  ↑ (50 % VCC, L_CMOS=25 pF, f0≤50 MHz)  ↑ (50 % VCC, L_CMOS=50 pF, f0≤50 MHz)  45 % to 55 % (50 % VCC, L_CMOS=25 pF, f0≤60.7 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS≤25pF) 4.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS=Max.)
	PC/SC	3.0 V to 3.6 V 2.7 V to 3.6 V	-20 °C to +70 °C	15 pF 30 pF (f0≤40 MHz) 15 pF	40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤125 MHz) 45 % to 55 % (50 % VCC, L_CMOS=30 pF, f0≤40 MHz) 40 % to 60 % (50 % VCC, L_CMOS=15 pF, f0≤66.7 MHz)	3.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS≤15pF) 4.0 ns Max. (20 % VCC to 80 % VCC,L_CMOS=Max.)

Product Name (Standard form)

 $\begin{array}{c|c} \underline{\text{SG-8002 CE}} & \underline{\text{125.000000MHz}} & \underline{\text{S C C}} \\ \hline 0 & \overline{\text{②}} & \overline{\text{③}} & \overline{\text{④}} \\ \hline \end{array}$ 

①Model ②Package type ③Frequency

④Function (P: Output enable, S:Standby)

© Supply voltage © Frequency tolerance / Operating temperature \*As per table below.

	Supply voltage			®Frequency tolerance / Operating temperature		
	T,H	5.0 V Typ.		В	±50 × 10 <sup>-6</sup> / -20 to +70°C	
	C 3.0 / 3.3 V Typ.			С	$\pm 100 \times 10^{-6}$ / -20 to +70°C	
,				M	$\pm 100 \times 10^{-6}$ / -40 to +85°C	

## ► TABLE OF FREQUENCY RANGE\*

Model(①, ②)	Function, Supply voltage(4), 6)	Supply voltage(⑤)	Frequency(3)	Frequency tolerance / Operating Temperature(⑥)	
	PT/ ST	45)/4-55)/	1.0 MHz to 125 MHz	B,C	
SG-8002CE	PH/ SH	4.5 V to 5.5 V	1.0 MHz to 27 MHz	M	
3G-8002CE	PC/SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz	B C M	
	PC/SC	2.7 V to 3.6 V	1.0 MHz to 66.7 MHz	B,C,M	
CC 0000CA	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz	B,C	
SG-8002CA SG-8002JA SG-8002DC	PH/ SH		1.0 MHz to 55 MHz	M	
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz	B,C,M	
	PC/ 3C	2.7 V to 3.6 V	1.0 MHz to 66.7 MHz		
SG-8002JC	PT/ ST	4.5 V to 5.5 V	1.0 MHz to 125 MHz	B,C	
	PH/ SH	4.5 V 10 5.5 V	1.0 1011 12 10 123 1011 12	В,С	
	PC/ SC	3.0 V to 3.6 V	1.0 MHz to 125 MHz	B,C	
	F 0/ 30	2.7 V to 3.6 V	1.0 MHz to 66.7 MHz	В,О	



#### SG-8002 series Jitter specifications and characteristics chart

## **■PLL-PLL** connection

The SG-8002 series contains a PLL circuit and there are a few cases where the jitter value may be increased when this product is connected to another PLL oscillator (cascading connection). We do not recommend this series for analog video clock use and telecommunication synchronization. Please check in advance if the SG-8002 series jitter is acceptable to your application. (Jitter specification of the SG-8002 series is max.250 ps/CL=15 pF)

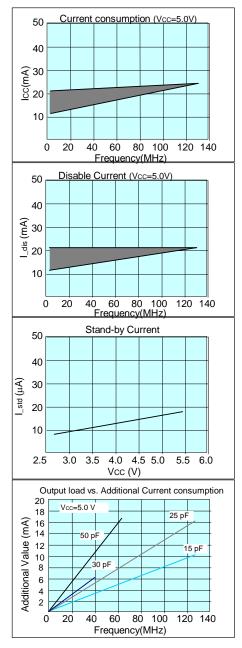
**Jitter Specifications** 

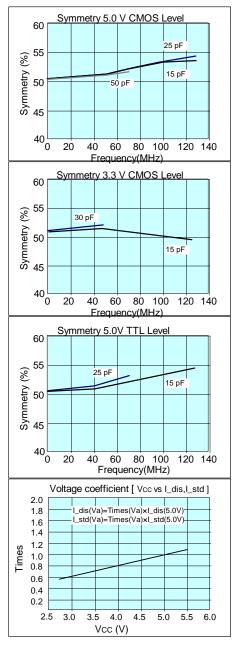
Model	Supply Voltage	Jitter Item	Specifications	Remarks
PT / PH ST / SH	5.0 V ±0.5 V	Cycle to cycle	150 ps Max.	33 MHz $\leq$ f <sub>0</sub> $\leq$ 125 MHz, L_CMOS=15 pF
			200 ps Max.	1.0 MHz $\leq$ f <sub>0</sub> $<$ 33 MHz, L_CMOS=15 pF
		Peak to peak	200 ps Max.	33 MHz $\leq$ f <sub>0</sub> $\leq$ 125 MHz, L_CMOS=15 pF
			250 ps Max.	1.0 MHz $\leq$ f <sub>0</sub> $<$ 33 MHz, L_CMOS=15 pF
SC / PC	3.3 V ±0.3 V	Cycle to cycle	200 ps Max.	1.0 MHz $\leq f_0 \leq$ 125 MHz, L_CMOS=15 pF
		Peak to peak	250 ps Max.	1.0 MHz $\leq f_0 \leq$ 125 MHz, L_CMOS=15 pF

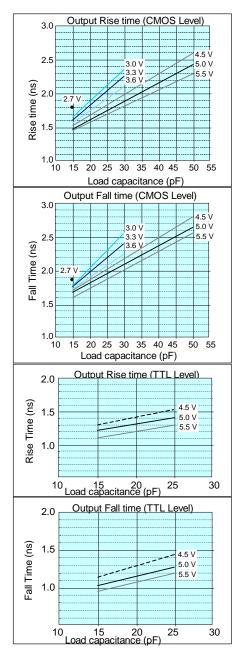
## ■Remarks on noise management for power supply line

It is not recommended to insert filters or other devices in the power supply line as a counter measure for EMI noise reduction. This may cause high-frequency impedance of the power supply line and negatively affect stable oscillation. When using this measure please evaluate the circuitry and device behavior in the circuit to verify and effects on oscillation. Start up time (0 % Vcc to 90 % Vcc) of power source should be more than 150 µs.

## **■SG-8002** series Characteristics chart







# 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 ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

ISO/TS16949 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.
  - \*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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