SOJ HIGH-FREQUENCY CRYSTAL OSCILLATOR

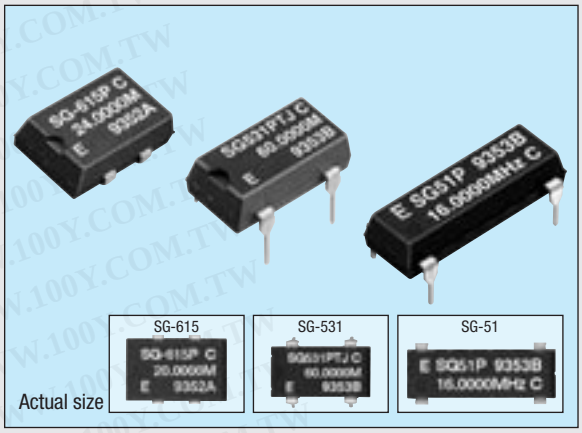
SG-615 / 531 / 51 series

Product number (please refer to page 2)

Q33615xxxxxxx00

Q32531xxxxxxx00 **Q32510xxxxxxx00**

- High-density mounting-type SMD.
- Cylindrical AT crystal unit builtin, thus assuring high reliability.
- Low current consumption by output enable function (OE) or standby function (ST).
- Pin compatible with full-size metal can. (SG-51 series)
- Pin compatible with half-size metal can. (SG-531 series)
- Available for lead (Pb)-free soldering. • Available for lead (Pb)-free terminal.



Specifications (characteristics)

Item		Symbol	Specifications			Remarks
			SG-615P SG-531P SG-51P	SG-615PTJ SG-531PTJ SG-51PTJ	SG-615PH SG-531PH SG-51PH	
Output frequency range		fo	1.0250 MHz to 26.0000 MHz	26.0001 MHz to 66.6667 MHz		Refer to Operating condition and Frequency range
Power source voltage	Max. supply voltage	VDD-GND	-0.3 V to +7.0 V		-0.5 V to +7.0 V	
	Operating voltage	VDD	5.0 V±0.5 V			
Temperature range	Storage temperature	TSTG	-55 °C to +125 °C			Stored as bare product after unpacking
	Operating temperature	TOPR	-20 °C to +70 °C (-40 °C to +85 °C)			Refer to Operating condition and Frequency range
Frequency stability		Δf/fo	B: ±50 x 10^{-6} C: ±100 x 10^{-6}			Refer to Operating condition and Frequency range
Current consumption		Iop	23 mA Max.	35 mA Max.		No load condition
Output disable current		IOE	12 mA Max.	28 mA Max.	20 mA Max.	OE = GND
Duty		tw/ t	40 % to 60 %	–	40 % to 60 %	CMOS load: 1/2 VDD
			45 % to 55 %		–	TTL load: 1.4 V
Output voltage		VOH	VDD -0.4 V Min.	2.4 V Min.	VDD -0.4 V Min.	IOH = -400 µA (P,PTJ) / -4 mA (PH)
		VOL		0.4 V Max.		IOL = 16 mA (P) / 8 mA (PTJ) / 4 mA (PH)
Output load condition (fan out)		CL	50 pF Max.	–	50 pF Max.	
		N	10 TTL Max.	5 TTL Max.	–	CL ≤ 15 pF
Output enable / disable input voltage		VIH	2.0 V Min.	3.5 V Min.	2.0 V Min.	IIH = 1 µA Max. (OE = VDD)
		VIL	0.8 V Max.	1.5 V Max.	0.8 V Max.	IIL = -100 µA Min. (OE = GND) , PTJ : IIL = -500 µA Min. (OE = GND)
Output rise time		tR	8 ns Max.	–	7 ns Max.	CMOS load: 20 % → 80 % VDD
				5 ns Max.	–	TTL load: 0.4 V → 2.4 V
Output fall time		tF	8 ns Max.	–	7 ns Max.	CMOS load: 80 % → 20 % VDD
				5 ns Max.	–	TTL load: 2.4 V → 0.4 V
Oscillation start up time		tOSC	4 ms Max.	10 ms Max.		Time at 4.5 V to be 0 s
Aging		fa	±5 x 10^{-6} / year Max.			Ta = +25 °C, VDD = 5 V, first year
Shock resistance		S.R.	±20 x 10^{-6} Max.			Three drops on a hard board from 750 mm or excitation test with 29400 m/s² x 0.3 ms x 1/2sine wave in 3 directions

Note: • Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.
• External by-pass capacitor is recommended.

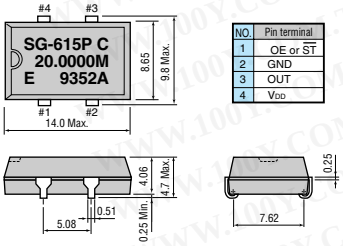
Operating condition and frequency range

Operating Voltage	Frequency stability(Operating temperature)	1 MHz	50 MHz	100 MHz	150 MHz
5 V±0.5 V	B: ±50 x 10^{-6} (-20 °C to +70 °C)	1.025	26	55	135
		SG-615/531/51P	SG-615/531/51PTJ/PH	SG-615/531PTW/STW/PHW/SHW	
	C: ±100 x 10^{-6} (-20 °C to +70 °C)	1.025	26	66.6667	135
		SG-615/531/51P	SG-615/531/51PTJ/PH	SG-615/531PTW/STW/PHW/SHW	
3.3 V±0.3 V	B: ±50 x 10^{-6} C: ±100 x 10^{-6} (-20 °C to +70 °C) M: ±100 x 10^{-6} (-40 °C to +85 °C)	1.5	26	66.6667	135
		SG-615/531PCG/SCG	SG-615PCN	SG-615/531PCW/SCW	

External dimensions

(Unit: mm)

SG-615 series

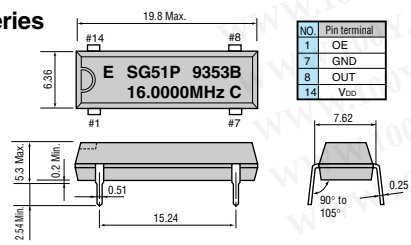


NO.	Pin terminal
1	OE or ST
2	GND
3	OUT
4	VDD

Note.
OE Pin (P, PTJ, PH, PTW, PHW, PCW, PCN)
OE pin - "H" or "open" : Specified frequency output.
OE pin - "L" : Output is high impedance.

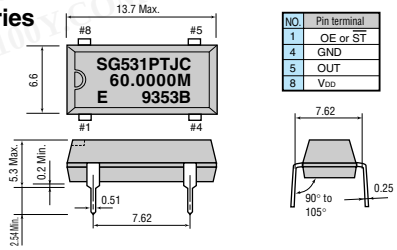
ST pin (STW, SHW, SCW)
ST pin - "H" or "open" : Specified frequency output.
ST pin - "L" : Output is low level (weak pull - down), oscillation stops.

SG-51 series



NO.	Pin terminal
1	OE
7	GND
8	OUT
14	VDD

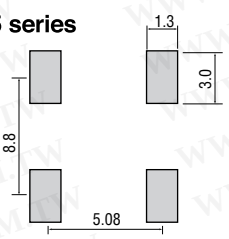
SG-531 series



NO.	Pin terminal
1	OE or ST
4	GND
5	OUT
8	VDD

Recommended soldering pattern (Unit: mm)

SG-615 series



■ Specifications (characteristics)

Item		Symbol	Specifications			Remarks
			SG-615PCG SG-531PCG	SG-615SCG SG-531SCG	SG-615PCN	
Nominal frequency range		fo	1.5000 MHz to 26.0000 MHz		26.0001 MHz to 66.6667 MHz	Refer to Operating condition and Frequency range
Power source voltage	Max. supply voltage	VDD-GND	-0.5 V to +7.0 V			
	Operating voltage	VDD	2.7 V to 3.6 V		3.0 V to 3.6 V	
Temperature range	Storage temperature	TSTG	-55 ºC to +125 ºC			Stored as bare product after unpacking
	Operating temperature	TOPR	-40 ºC to +85 ºC			Refer to Operating condition and Frequency range
Frequency stability		Δf/fo	B : ±50 x 10^{-6} C : ±100 x 10^{-6}			-20 °C to +70 °C
			M : ±100 x 10^{-6}			-40 °C to +85 °C
Current consumption		IOP	12 mA Max.		30 mA Max.	No load condition
Output disable current		IOE	10 mA Max.	–	15 mA Max.	OE = GND (PCG / PCN)
Standby current		IST	–	50 µA Max.	–	ST = GND (SCG)
Duty		tw/ t	45 % to 55 %			50 % VDD, CL = Max.
Output voltage		VOH	VDD -0.4 V Min.		2.2 V Min.	IOH = -8 mA
Output load condition		VOL	0.4 V Max.		0.4 V Max.	IOL = 8 mA
		CL	25 pF		15 pF	
Output enable / disable input voltage		VIH	0.7 VDD Min.		0.7 VDD Min.	OE, ST
		VIL	0.2 VDD Max.		0.3 VDD Max.	OE, ST
Output rise time		tR	4.0 ns Max.		7 ns Max.	20 % → 80 % VDD, CL ≤ Max.
Output fall time		tF	4.0 ns Max.		7 ns Max.	80 % → 20 % VDD, CL ≤ Max.
Oscillation start up time		tOSC	12 ms Max.		10 ms Max.	Time at minimum operating voltage to be 0 s
Aging		fa	±5 x 10^{-6} / year Max.			Ta = +25 ºC, VDD = 3.3 V First year
Shock resistance		S.R.	±20 x 10^{-6} Max.			Three drops on a hard board from 750 mm or excitation test with 29400 m/s² x 0.3 ms x 1/2sine wave in 3 directions

■ Specifications (characteristics)

Item		Symbol	Specifications			Remarks
			SG-615PTW / STW SG-531PTW / STW	SG-615PHW / SHW SG531PHW / SHW	SG-615PCW / SCW SG-531PCW / SCW	
Nominal frequency range		fo	55.0001 MHz to 135.0000 MHz		26.0001 MHz to 135.0000 MHz	Refer to Operating condition and Frequency range
Power source voltage	Max. supply voltage	VDD-GND	-0.5 V to +7.0 V			
	Operating voltage	VDD	5.0 V ± 0.5 V		3.3 V ± 0.3 V	
Temperature range	Storage temperature	TSTG	-55 ºC to +100 ºC			Stored as bare product after unpacking
	Operating temperature	TOPR	-20 ºC to +70 ºC		-40 ºC to +85 ºC	Refer to Operating condition and Frequency range
Frequency stability		Δf/fo	B : ±50 x 10^{-6} C : ±100 x 10^{-6}			-20 °C to +70 °C
			–		M : ±100 x 10^{-6}	-40 °C to +85 °C
Current consumption		IOP	45 mA Max.		28 mA Max.	No load condition
Output disable current		IOE	30 mA Max.		16 mA Max.	OE = GND (P*W)
Standby current		IST	50 µA Max.			ST = GND (S*W)
Duty		tw/ t	40 % to 60 % 45 % to 55 %	– –	– –	TTL load : 1.4 V, CL = Max. TTL load : 1.4 V, 5TTL + 15 pF, fo ≤ 66.6667 MHz
			– – –	40 % to 60 % 45 % to 55% –	40 % to 60 % – 45 % to 55 %	CMOS load : 50% VDD, CL = Max. CMOS load : 50% VDD, CL = 25 pF, fo ≤ 66.6667 MHz CMOS load : 50% VDD, CL = 25 pF, fo ≤ 40.0 MHz
Output voltage		VOH	VDD -0.4 V Min.			IOH = -16 mA (*TW / *HW) / -8 mA (*CW)
		VOL	0.4 V Max.			IOL = 16 mA (*TW / *HW) / 8 mA (*CW)
Output load condition		CL	15 pF 5 TTL + 15 pF 25 pF	– – –	– – –	fo ≤ 135 MHz fo ≤ 90 MHz fo ≤ 66.6667 MHz
			– – – –	15 pF 25 pF 50 pF –	15 pF – – 30 pF	fo ≤ 135 MHz fo ≤ 125 MHz fo ≤ 66.6667MHz fo ≤ 40.0 MHz
Output enable / disable input voltage		VIH	2.0 V Min.		0.7 VDD Min.	OE, ST
		VIL	0.8 V Max.		0.2 VDD Max.	OE, ST
Output rise time		tR	2.0 ns Max. 4.0 ns Max.	– –	– –	TTL load: 0.8 V → 2.0 V, CL = Max. TTL load: 0.4 V → 2.4 V, CL = Max.
			– – –	3.0 ns Max. – 4.0 ns Max.	– 3.0 ns Max. 4.0 ns Max.	CMOS load: 80 % → 20 % VDD, CL = 25 pF CMOS load: 80 % → 20 % VDD, CL = 15 pF CMOS load: 80 % → 20 % VDD, CL = Max.
Output fall time		tF	2.0 ns Max. 4.0 ns Max.	– –	– –	TTL load: 2.0 V → 0.8 V, CL = Max. TTL load: 2.4 V → 0.4 V, CL = Max.
			– – –	3.0 ns Max. – 4.0 ns Max.	– 3.0 ns Max. 4.0 ns Max.	CMOS load: 80 % → 20 % VDD, CL = 25 pF CMOS load: 80 % → 20 % VDD, CL = 15 pF CMOS load: 80 % → 20 % VDD, CL = Max.
Oscillation start up time		tOSC	10 ms Max.			Time at minimum operating voltage to be 0 s
Aging		fa	±5 x 10^{-6} / year Max.			Ta = +25 ºC, VDD = 5.0 V / 3.3 V, First year
Shock resistance		S.R.	±20 x 10^{-6} Max.			Three drops on a hard board from 750 mm or excitation test with 29400 m/s² x 0.3 ms x 1/2sine wave in 3 directions

ENERGY SAVING EPSON

EPSON offers effective savings to its customers through a wide range of electronic devices, such as semiconductors, liquid crystal display (LCD) modules, and crystal devices. These savings are achieved through a sophisticated melding of three different efficiency technologies.

Power saving technology provides low power consumption at low voltages.

Space saving technology provides further reductions in product size and weight through super-precise processing and high-density assembly technology.

Time saving technology shortens the time required for design and development on the customer side and shortens delivery times.

Our concept of Energy Saving technology conserves resources by blending the essence of these three efficiency technologies. The essence of these technologies is represented in each of the products that we provide to our customers.

In the industrial sector, leading priorities include measures to counter the greenhouse effect by reducing CO2, measures to preserve the global environment, and the development of energy-efficient products. Environmental problems are of global concern, and although the contribution of energy-saving technology developed by EPSON may appear insignificant, we seek to contribute to the development of energy-saving products by our customers through the utilization of our electronic devices. EPSON is committed to the conservation of energy, both for the sake of people and of the planet on which we live.

WORKING WITH ENVIRONMENTAL ISSUES

In 1988, Seiko Epson led in working to abolish CFCs, and perfect abolition of those ozone layer-destroying substances was achieved in 1992. In 1998, the 10th year of start of the CFC-free activity, Seiko Epson set this year as the "Second Environmental Benchmark Year" and established a new corporate General Environmental Policy. Seiko Epson is tackling with environmental issues comprehensively.

At the end of Fiscal 1988, Seiko Epson succeeded in abolishing chloric solvents doubted to be harmful to human body. In fiscal 1999, Seiko Epson started the activity with a goal of abolishing lead solder pointed out possibility of enironmental pollutant.

Promotion of Environment Management System conforming to International Standard

To strengthen management for environmental activities, Seiko Epson Group aims at acquisition of the ISO14001 certification for Japanese and abroad main business bases (including affiliates) for manufacturing, sales, software development and others.

As of May 25 , 2001, planned 68 bases of all manufacturing bases and some non-manufacturing bases have acquired the certification.

Co-existence Mark

The environmental mark symbolizing Epson's basic stance of "Co-existence with Nature".
The design incorporates a fish, flower, and water, representing mutually supportive co-existence.

ISO14000 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

Seiko-Epson quickly began working to acquire company-wide ISO9000 series certification, and has acquired ISO9001 or ISO9002 certification with all targeted products manufactured in Japanese and overseas plants.

The Quartz Device Operations Division (Ina Japan, EPM and SZE) have acquired QS-9000 certification, which are of higher level.

QS-9000:
This is an enhanced standard for quality assurance systems formulated by leading U.S. automobile manufacturers based on the international ISO 9000 series.