### SOJ HIGH-FREQUENCY CRYSTAL OSCILLATOR

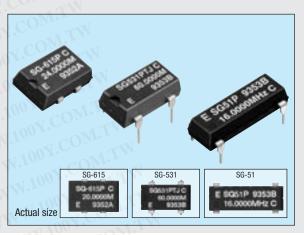
## SG-615 / 531 / 51 series

Product number (please refer to page 2)

### Q33615xxxxxxxx00 Q32531xxxxxxx00

### **Q32510** x x x x x x x 0 0

- 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)

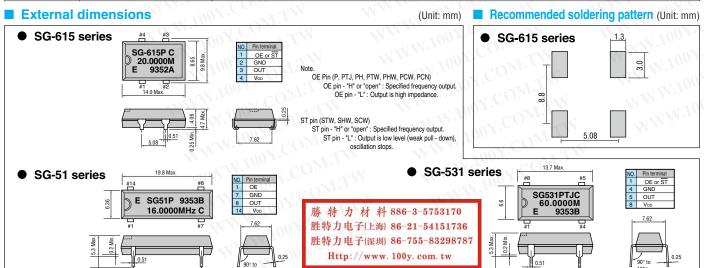
Item		Symbol	MAN COL	Specifications	Domarko		
			SG-615P SG-531P SG-51P	SG-615PTJ SG-531PTJ SG-51PTJ	SG-615PH SG-531PH SG-51PH	Remarks	
Output frequency range		fo 💉	1.0250 MHz to 26.0000 MHz 26.0001 MHz to 66.6667 MHz		Refer to Operating condition and Frequency range		
	ax. supply voltage	VDD-GND	-0.3 V to +7.0 V -0.5 V to +7.0 V		COMP		
voltage 0	perating voltage	VDD	5.0 V±0.5 V		Y. TIN		
Temperature Storage temperature range Operating temperature		Тѕтс	-55 °C to +125 °C		Stored as bare product after unpacking		
		Topr	-20	°C to +70 °C (-40 °C to +8	Refer to Operating condition and Frequency range		
Frequency stability		Δf/f0	В	: ±50 x 10 <sup>-6</sup> C: ±100 x 10	Refer to Operating condition and Frequency range		
Current consumption		lop	23 mA Max.	35 mA Max.		No load condition	
Output disable current		loe	12 mA Max.	28 mA Max.	20 mA Max.	OE = GND	
Duty		1 /1	40 % to 60 %	- 101 <del>4</del> 1.1	40 % to 60 %	CMOS load: 1/2 VDD	
		tw/ t	45 % to 55 %		TTL load: 1.4 V		
Output voltage		Vон	VDD -0.4 V Min.	2.4 V Min.	VDD -0.4 V Min.	$IOH = -400  \mu A  (P,PTJ) / -4  mA  (PH)$	
		Vol	AL WILLIAM	0.4 V Max.		IoL = 16 mA (P) / 8 mA (PTJ) / 4 mA (PH)	
Output load condition (fan out)		CL	50 pF Max.	COMP.	50 pF Max.	N. T. COT	
		N	10 TTL Max.	5 TTL Max.	M - M	CL ≤ 15 pF	
Output enable / disable input voltage		VIH	2.0 V Min.	3.5 V Min.	2.0 V Min.	IIH = 1 $\mu$ A 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	
			o lis iviax.	5 ns Max.		TTL load: 0.4 V → 2.4 V	
Output fall time	- av C	CV CV	O no Mou	1. Co.	7 ns Max.	CMOS load: 80 % → 20 % VDD	
	V 100 P	tr 8 ns Max.	5 ns Max.	1	TTL load: 2.4 V → 0.4 V		
Oscillation start up time	e	tosc	4 ms Max. 10 ms Max.		Time at 4.5 V to be 0 s		
Aging	N. Ino	fa	±5 x 10 <sup>-6</sup> / year Max.		$Ta = +25 ^{\circ}C$ , $VDD = 5 ^{\circ}V$ , first year		
Shock resistance	W.100Y	S.R.	TW W	±20 x 10 <sup>-6</sup> Max.	OM.TW	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
	B: ±50 x 10 <sup>-6</sup> ( -20 °C to +70 °C)	1.025 SG-615/531/51P	26 55   SG-615/531/51PTJ/PH	SG-615/531PTW/ST	TW/PHW/SHW	135	1007
	C: ±100 x 10 <sup>-6</sup> ( -20 °C to +70 °C)	1.025 SG-615/531/51P	26 66.6667 SG-615/531/51PTJ/PH	SG-615/531PTW/ST	rw/phw/shw	135	1100Y.
	B: ±50 x 10 <sup>-6</sup> C: ±100 x 10 <sup>-6</sup>	1.5	26 66.6667	O.Y.Co.	WI	135	N 100Y.C
3.3 V±0.3 V	( -20 °C to +70 °C) M: ±100 x 10 <sup>6</sup> ( -40 °C to +85 °C)	SG-615/531PCG/SC	SG-615PCN	SG-615/531PCW/SCW	VI.TW		



### **■** Specifications (characteristics)

			-11711				
Ite	m	Symbol	SG-615PCG SG-531PCG	SG-615SCG SG-531SCG	SG-615PCN	Remarks	
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 Max. supply voltage voltage Operating voltage		VDD-GND	-0.5 V to +7.0 V		no. COM.	-1	
		VDD	2.7 V to 3.6 V		3.0 V to 3.6 V	N	
Temperature	Storage temperature	Тѕтс	COM	-55 °C to +125 °C	To COMP.	Stored as bare product after unpacking	
range Operating temperature		TOPR	Y.C. TW	-40 °C to +85 °C	1100 Y.	Refer to Operating condition and Frequency range	
Frequency stability		Δf/fo	B: ±50 x 10 <sup>-6</sup> C: ±100 x 10 <sup>-6</sup>		0-6	-20 °C to +70 °C	
		Δ1/10	OY.	M: ±100 x 10 <sup>-6</sup>	x 100 1.	-40 °C to +85 °C	
Current consumption		IOP	12 mA Max.		30 mA Max.	No load condition	
Output disable current		loe	10 mA Max.	-	15 mA Max.	OE = GND (PCG / PCN)	
Standby current		İST	W.En.	50 μA Max.	ATT. CO	$\overline{ST} = GND (SCG)$	
Duty		tw/ t	100 - COM	45 % to 55 %	M. Jus	50 % VDD, CL = Max.	
Output voltage		Vон	VDD -0.4 V Min.		2.2 V Min.	Iон = -8 mA	
Output load condition		Vol	0.4 V Max.		0.4 V Max.	IoL = 8 mA	
		CL	25 pF		15 pF	MITH	
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		tr	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	OM:II	fa	100	±5 x 10 <sup>-6</sup> / year Max.	100	Ta = +25 °C, $VDD = 3.3$ V First year	
Shock resistance	COM.TW	S.R.	NW 100Y	±20 x 10 <sup>-6</sup> Max.	WWW.10	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)

ltem CO			- TN 100	Specifications	In COM.			
		Symbol	SG-615PTW / STW         SG-615PHW / SHW         SG-615PCW / SCW           SG-531PTW / STW         SG531PHW / SHW         SG-531PCW / SCW		Remarks			
Nominal frequency range		fo			26.0001 MHz to 135.0000 MHz	Refer to Operating condition and Frequency range		
Power source	Max. supply voltage	VDD-GND	-0.5 V to +7.0 V		Wire in	W. CO.		
voltage	Operating voltage	VDD	$5.0 \text{ V} \pm 0.5 \text{ V}$		$3.3 \text{ V} \pm 0.3 \text{ V}$	11 100 CON.		
Temperature Storage temperature range Operating temperature Frequency stability		Tstg	-55 °C to +100 °C		IVI IVI	Stored as bare product after unpackin		
		TOPR	-20 °C to +70 °C -40		-40 °C to +85 °C	Refer to Operating condition and Frequency range		
		A £ /£.	B: ±50 x 10 <sup>-6</sup> C: ±100 x 10 <sup>-6</sup>		0-6	-20 °C to +70 °C		
		∆f/fo		11.100 COV	-40 °C to +85 °C			
Current consumpti	ion	lop	45 mA Max. 28 m		28 mA Max.	No load condition		
Output disable cur	rent	loe	30 mA Max.		16 mA Max.	OE = GND (P*W)		
Standby current	1001.6	Ist	M. M.	50 μA Max.	MITH	$\overline{ST} = GND (S*W)$		
Duty		COM	40 % to 60 % 45 % to 55 %	MW00 Y.C.	N.TÝ	TTL load : 1.4 V, $CL = Max$ . TTL load : 1.4 V, $5TTL + 15 pF$ , $fo \le 66.6667 MHz$		
		tw/ t	LTW -	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		
	NY 101	Vон	Mir	VDD -0.4 V Min.	COMP.	Iон = -16 mA (*TW / *HW) / -8 mA (*CW)		
Output voltage		Vol	0.4 V Max.		THE	IoL = 16 mA (*TW / *HW) / 8 mA (*CW)		
Output load condition		100Y.C	15 pF 5 TTL + 15 pF 25 pF	MAEN TO	Y.COMP.TW	fo ≤ 135 MHz fo ≤ 90 MHz fo ≤ 66.6667 MHz		
		1 CL	CONT.TW	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		
Dutput enable / dis	sable input voltage	VIL 4	0.8 V Max.		0.2 Vdd Max.	OE, ST		
Output rise time		MM	2.0 ns Max. 4.0 ns Max.	- MM	100 £ CON	TTL load: $0.8 \text{ V} \rightarrow 2.0 \text{ V}$ , CL = Max. TTL load: $0.4 \text{ V} \rightarrow 2.4 \text{ V}$ , CL = Max.		
		tr	1007.COM.T	3.0 ns Max. - 4.0 ns Max.	3.0 ns Max. 4.0 ns Max.	CMOS load: 80 % $\rightarrow$ 20 % Vpd, CL = 25 pF CMOS load: 80 % $\rightarrow$ 20 % Vpd, CL = 15 pF CMOS load: 80 % $\rightarrow$ 20 % Vpd, CL = Max.		
Output fall time		WW	2.0 ns Max. 4.0 ns Max.	TW = V	WW TOOX.CO	TTL load: $2.0 \text{ V} \rightarrow 0.8 \text{ V}$ , CL = Max. TTL load: $2.4 \text{ V} \rightarrow 0.4 \text{ V}$ , CL = Max.		
		t <sub>E</sub>	AM:10 2 X:CO	3.0 ns Max. - 4.0 ns Max.	- 3.0 ns Max. 4.0 ns Max.	CMOS load: 80 % $\rightarrow$ 20 % Vpp, CL = 25 pF CMOS load: 80 % $\rightarrow$ 20 % Vpp, CL = 15 pF CMOS load: 80 % $\rightarrow$ 20 % Vpp, CL = Max.		
Oscillation start up time		tosc	10 ms Max.		Time at minimum operating voltage to be 0 s			
Aging		fa 🕥	M. TOOLE	±5 x 10 <sup>-6</sup> / year Max.	1100	$Ta = +25 ^{\circ}\text{C}$ , $VDD = 5.0 \text{V} / 3.3 \text{V}$ , First year		
Shock resistance		S.R.	MAN TOO X.C	±20 x 10 <sup>-6</sup> Max.	MMMir	Three drops on a hard board from 750 mm or excitation test with 29400 m/s <sup>2</sup> x 0.3 ms x 1/2sine wave in 3 directions		

勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-54151736 胜特力电子(深圳) 86-755-83298787 Http://www.100y.com.tw

### THE CRYSTALMASTER

勝 特 力 材 料 886-3-5753170 胜特力电子(上海) 86-21-54151736 胜特力电子(深圳) 86-755-83298787 Http://www.100y.com.tw



# 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.

### **NOTICE**

- •The material is subject to change without notice.
- Any part of this material may not be reproduced or duplicated in any form or any means without the written permission of Seiko Epson.
- •The information, applied circuit, program, using way etc., written in this material is just for reference. Seiko Epson does not assume any liability for the occurrence of infringing any patent or copyright of third party. This material does not authorize the licence for any patent or intellectual property rights.
- •Any product described in this material may contain technology or the subject relating to strategic products under the control of the Foreign Exchange and Foreign Trade Law of Japan and may require an export licence from the Ministry of International Trade and industry or other approval from another government agency.
- •The products (except for some product for automotive applications) listed up on this material are designed to be used with ordinary electronic equipment (OA equipment, AV equipment, communications equipment, measuring instruments etc). Seiko Epson does not assume any liability for the case using the products with the application required high reliability or safety extremely (such as aerospace equipment etc). When intending to use any our product with automotive application and the other application than ordinary electronic equipments as above, please contact our sales representatives in advance.