SOJ HIGH-FREQUENCY CRYSTAL OSCILLATOR

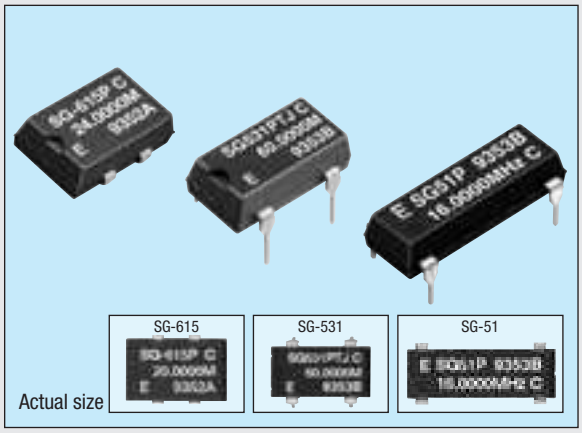
SG-615 / 531 / 51 series

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 ($\overline{ST}$).
- 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/s^2 x 0.3 ms x 1/2sine wave in 3 directions

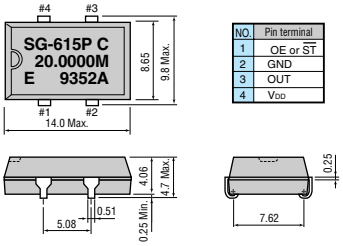
Note: • Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.
• External by-pass capacitor is recommended.

■ 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

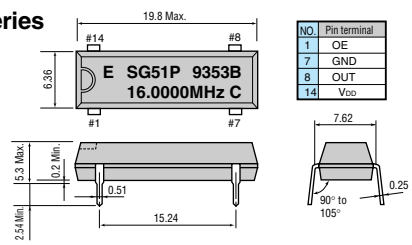


NO.	Pin terminal
1	OE or $\overline{ST}$
2	GND
3	OUT
4	VDD

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.

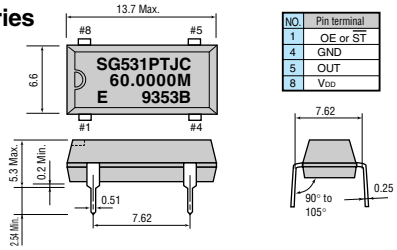
ST pin (STW, SHW, SCW)
ST pin - "H" or "open" : Specified frequency output.
ST pin - "L" : Output is low level (weak pull - down), oscillation stops.

● SG-51 series



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

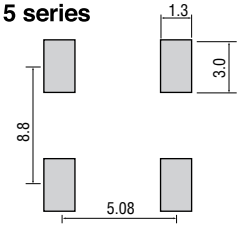
● SG-531 series



NO.	Pin terminal
1	OE or $\overline{ST}$
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