

SOJ HIGH-FREQUENCY CRYSTAL OSCILLATOR

# SG-615 / 531 / 51 series

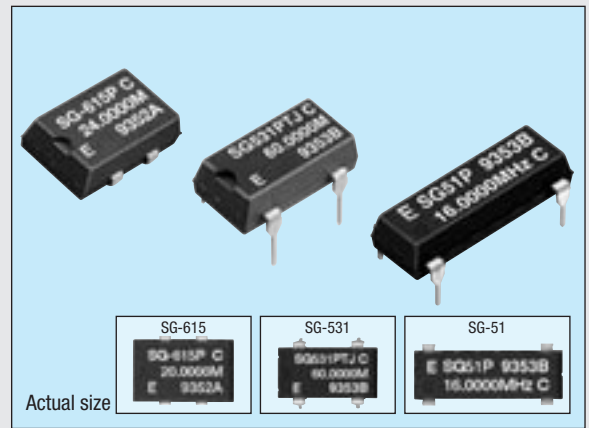
Product number (please refer to page 2)

**Q33615XXXXXXXX00**

**Q32531XXXXXXXX00**

**Q32510XXXXXXXX00**

- High-density mounting-type SMD.
- Cylindrical AT crystal unit built-in, 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.



## 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	f <sub>o</sub>	1.0250 MHz to 26.0000 MHz	26.0001 MHz to 66.6667 MHz	66.6667 MHz to 135.0000 MHz	Refer to Operating condition and Frequency range
Power source voltage	Max. supply voltage	-0.3 V to +7.0 V			-0.5 V to +7.0 V
	Operating voltage	5.0 V±0.5 V			
Temperature range	Storage temperature	-55 °C to +125 °C			Stored as bare product after unpacking
	Operating temperature	-20 °C to +70 °C (-40 °C to +85 °C)			Refer to Operating condition and Frequency range
Frequency stability	Δf/f <sub>o</sub>	B: ±50 x 10 <sup>-6</sup> C: ±100 x 10 <sup>-6</sup>			Refer to Operating condition and Frequency range
Current consumption	I <sub>op</sub>	23 mA Max.	35 mA Max.		No load condition
Output disable current	I <sub>oe</sub>	12 mA Max.	28 mA Max.	20 mA Max.	OE = GND
Duty	t <sub>w</sub> / t	40 % to 60 %	-		CMOS load: 1/2 V <sub>DD</sub>
		45 % to 55 %		-	
Output voltage	V <sub>OH</sub>	V <sub>DD</sub> -0.4 V Min.	2.4 V Min.	V <sub>DD</sub> -0.4 V Min.	I <sub>OH</sub> = -400 μA (P,PTJ) / -4 mA (PH)
	V <sub>OL</sub>	0.4 V Max.		I <sub>OL</sub> = 16 mA (P) / 8 mA (PTJ) / 4 mA (PH)	
Output load condition (fan out)	CL	50 pF Max.	-		C <sub>L</sub> ≤ 15 pF
	N	10 TTL Max.	5 TTL Max.	-	
Output enable / disable input voltage	V <sub>IH</sub>	2.0 V Min.	3.5 V Min.	2.0 V Min.	I <sub>IH</sub> = 1 μA Max. (OE = V <sub>DD</sub> )
	V <sub>IL</sub>	0.8 V Max.	1.5 V Max.	0.8 V Max.	I <sub>IL</sub> = -100 μA Min. (OE = GND), PTJ: I <sub>IL</sub> = -500 μA Min. (OE = GND)
Output rise time	t <sub>r</sub>	8 ns Max.	-		CMOS load: 20 % → 80 % V <sub>DD</sub>
		5 ns Max.		-	
Output fall time	t <sub>f</sub>	8 ns Max.	-		CMOS load: 80 % → 20 % V <sub>DD</sub>
		5 ns Max.		-	
Oscillation start up time	t <sub>osc</sub>	4 ms Max.	10 ms Max.		Time at 4.5 V to be 0 s
Aging	f <sub>a</sub>	±5 x 10 <sup>-6</sup> / year Max.			T <sub>a</sub> = +25 °C, V <sub>DD</sub> = 5 V, first year
Shock resistance	S.R.	±20 x 10 <sup>-6</sup> Max.			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

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 <sup>-6</sup> (-20 °C to +70 °C)	1.025 SG-615/531/51P	26 SG-615/531/51PTJ/PH	55 SG-615/531PTW/STW/PHW/SHW	135
	C: ±100 x 10 <sup>-6</sup> (-20 °C to +70 °C)	1.025 SG-615/531/51P	26 SG-615/531/51PTJ/PH	66.6667 SG-615/531PTW/STW/PHW/SHW	135
3.3 V±0.3 V	B: ±50 x 10 <sup>-6</sup> C: ±100 x 10 <sup>-6</sup> M: ±100 x 10 <sup>-6</sup> (-40 °C to +85 °C)	1.5 SG-615/531PCG/SCG	26 SG-615PCN	66.6667 SG-615/531PCW/SCW	135

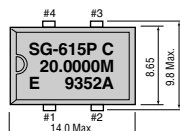
## External dimensions

(Unit: mm)

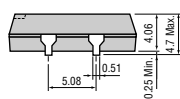
## Recommended soldering pattern

(Unit: mm)

### SG-615 series



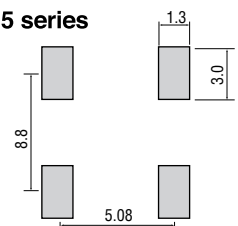
NO.	Pin terminal
1	OE or ST
2	GND
3	OUT
4	V <sub>DD</sub>



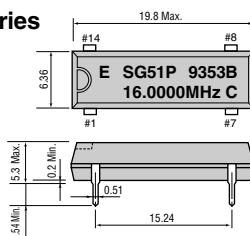
Note.  
OE Pin (P, PTJ, PH, PTW, PHW, PCW, PCN)  
OE pin - "H" or "open": Specified frequency output.  
OE pin - "L": Output is high impedance.

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.

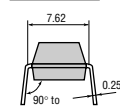
### SG-615 series



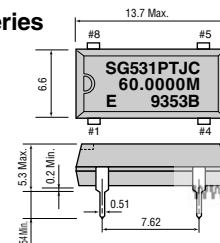
### SG-51 series



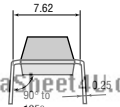
NO.	Pin terminal
1	OE
7	GND
8	OUT
14	V <sub>DD</sub>



### SG-531 series



NO.	Pin terminal
1	OE or ST
4	GND
5	OUT
8	V <sub>DD</sub>



### ■ 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 °C to +125 °C	Stored as bare product after unpacking
	Operating temperature	TOPR		-40 °C to +85 °C	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>			-20 °C to +70 °C
		M : ±100 x 10 <sup>-6</sup>			-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
	VoL	0.4 V Max.		0.4 V Max.	IoL = 8 mA
Output load condition	CL	25 pF		15 pF	
	VIH	0.7 VDD Min.		0.7 VDD Min.	OE, ST
Output enable / disable input voltage	VIL	0.2 VDD Max.		0.3 VDD Max.	OE, ST
	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 <sup>-6</sup> / year Max.		–	Ta = +25 °C, VDD = 3.3 V First year
Shock resistance	S.R.	±20 x 10 <sup>-6</sup> Max.		–	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

### ■ 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 °C to +100 °C	Stored as bare product after unpacking
	Operating temperature	TOPR		-20 °C to +70 °C	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>			-20 °C to +70 °C
		–			M : ±100 x 10 <sup>-6</sup>
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 %	–	–	TTL load : 1.4 V, CL = Max.
		45 % to 55 %	–	–	TTL load : 1.4 V, 5TTL + 15 pF, fo ≤ 66.6667 MHz
		–	40 % to 60 %	40 % to 60 %	CMOS load : 50% VDD, CL = Max.
		–	45 % to 55 %	–	CMOS load : 50% VDD, CL = 25 pF, fo ≤ 66.6667 MHz
Output voltage	VoH	–		–	CMOS load : 50% VDD, CL = 25 pF, fo ≤ 40.0 MHz
		–		–	–
		–		–	–
		–		–	–
Output load condition	CL	VDD -0.4 V Min.		–	IoH = -16 mA (*TW / *HW) / -8 mA (*CW)
		0.4 V Max.		–	IoL = 16 mA (*TW / *HW) / 8 mA (*CW)
Output enable / disable input voltage	VIL	15 pF	–	–	fo ≤ 135 MHz
		5 TTL + 15 pF	–	–	fo ≤ 90 MHz
		25 pF	–	–	fo ≤ 66.6667 MHz
		–	15 pF	15 pF	fo ≤ 135 MHz
Output rise time	tr	–	25 pF	–	fo ≤ 125 MHz
		–	50 pF	–	fo ≤ 66.6667MHz
		–	–	30 pF	fo ≤ 40.0 MHz
		–	–	–	–
Output fall time	tf	2.0 V Min.		0.7 VDD Min.	OE, ST
		0.8 V Max.		0.2 VDD Max.	OE, ST
Output rise time	tr	2.0 ns Max.	–	–	TTL load: 0.8 V → 2.0 V, CL = Max.
		4.0 ns Max.	–	–	TTL load: 0.4 V → 2.4 V, CL = Max.
		–	3.0 ns Max.	–	CMOS load: 80 % → 20 % VDD, CL = 25 pF
		–	–	3.0 ns Max.	CMOS load: 80 % → 20 % VDD, CL = 15 pF
Output fall time	tf	–	4.0 ns Max.	4.0 ns Max.	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 <sup>-6</sup> / year Max.		–	Ta = +25 °C, VDD = 5.0 V / 3.3 V, First year
Shock resistance	S.R.	±20 x 10 <sup>-6</sup> Max.		–	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