

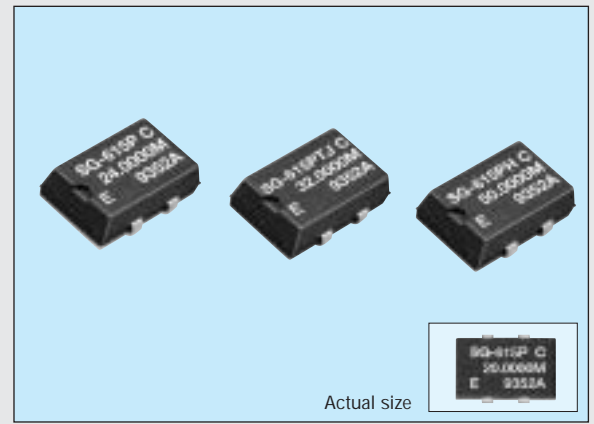
SOJ HIGH-FREQUENCY CRYSTAL OSCILLATOR

SG-615 series

Product number (Please refer to P1)

Q33615xxxxxx00

- High-density mounting-type SMD.
- A general-purpose SMD with heat-resisting cylindrical AT-cut crystal unit and allowing almost the same soldering temperature as SMD IC.
- Cylindrical AT crystal unit builtin, thus assuring high reliability.
- Low current consumption by output enable function(OE) or standby function(ST).



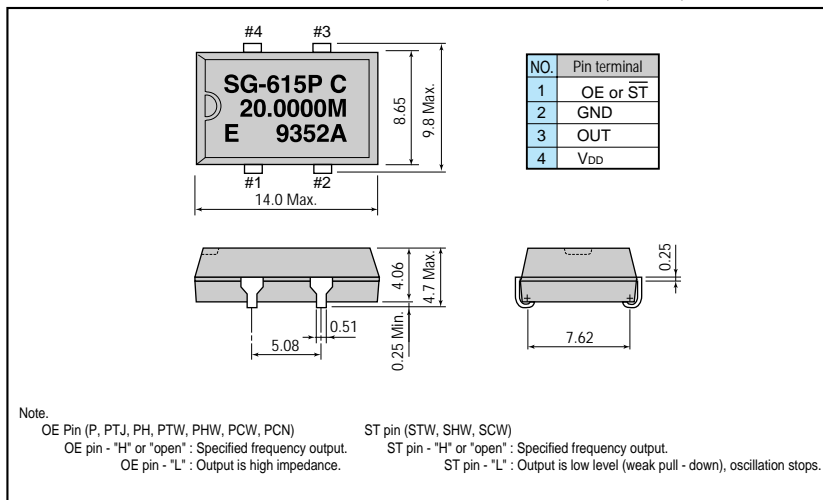
Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		SG-615P	SG-615PTJ	SG-615PH	
Output frequency range	f_0	1.0250 MHz to 26.0000 MHz	26.0001 MHz to 66.6667 MHz		Refer to page 31. "Frequency range"
Power source voltage	Max. supply voltage	V_{DD-GND}	-0.3 V to +7.0 V		
	Operating voltage	V_{DD}	5.0 V \pm 0.5 V		
Temperature range	Storage temperature	T_{STG}	-55 °C to +125 °C		Stored as bare product after unpacking
	Operating temperature	T_{OPR}	-20 °C to +70 °C (-40 °C to +85 °C)		Refer to page 31. "Frequency range"
Frequency stability	$\Delta f/f_0$		B: $\pm 50 \times 10^{-6}$ C: $\pm 100 \times 10^{-6}$		B type is possible up to 55 MHz
Current consumption	I_{OP}	23 mA Max.	35 mA Max.		No load condition
Output disable current	I_{OE}	12 mA Max.	28 mA Max.	20 mA Max.	OE=GND
Duty	t_w/t	40 % to 60 %		40 % to 60 %	CMOS load: 1/2 V_{DD}
		45 % to 55 %		—	TTL load: 1.4 V
Output voltage	V_{OH}	$V_{DD} - 0.4$ V Min.	2.4 V Min.	$V_{DD} - 0.4$ V Min.	$I_{OH} = -400 \mu A$ (P,PTJ) / -4 mA (PH)
	V_{OL}	—	0.4 V Max.	—	$I_{OL} = 16$ mA (P) / 8mA (PTJ) / 4 mA (PH)
Output load condition (fan out)	C_L	50 pF Max.	—	50 pF Max.	$C_L \leq 15$ pF
	N	10 TTL Max.	5 TTL Max.	—	
Output enable/disable input voltage	V_{IH}	2.0 V Min.	3.5 V Min.	2.0 V Min.	$I_{IH} = 1 \mu A$ Max. (OE= V_{DD})
	V_{IL}	0.8 V Max.	1.5 V Max.	0.8 V Max.	$I_{IL} = -100 \mu A$ Min. (OE=GND), PTJ: $I_{IL} = -500 \mu A$ Min. (OE=GND)
Output rise time	t_{TLH}	8 ns Max.	—	7 ns Max.	CMOS load: 20 % \rightarrow 80 % V_{DD} TTL load: 0.4 V \rightarrow 2.4 V
Output fall time	t_{THL}	8 ns Max.	5 ns Max.	—	CMOS load: 80 % \rightarrow 20 % V_{DD} TTL load: 2.4 V \rightarrow 0.4 V
		—	5 ns Max.	7 ns Max.	
Oscillation start up time	t_{OSC}	4 ms Max.	10 ms Max.		Time at 4.5 V to be 0 s
Aging	f_a	—	$\pm 5 \times 10^{-6}$ /year Max.		$T_a = +25$ °C, $V_{DD} = 5$ V, first year
Shock resistance	S.R.	—	$\pm 20 \times 10^{-6}$ 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.

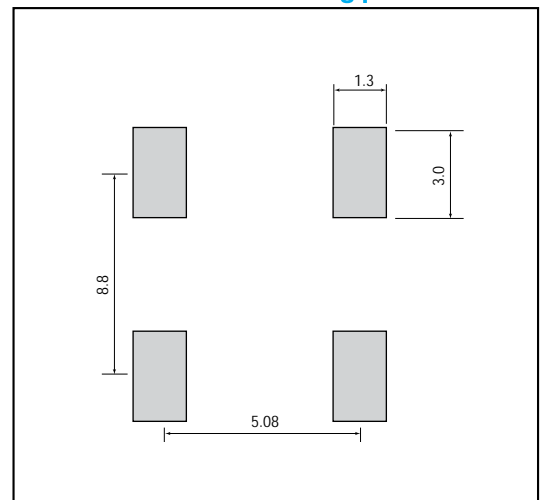
External dimensions

(Unit: mm)



Recommended soldering pattern

(Unit: mm)



Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		SG-615PCG	SG-615SCG	SG-615PCN	
Output frequency range	f_o	1.5000 MHz to 26.0000 MHz		26.0001 MHz to 66.6667 MHz	Refer to page 31. "Frequency range"
Power source voltage	Max. supply voltage	V_{DD-GND} -0.5 V to +7.0 V			
	Operating voltage	V_{DD} 2.7 V to 3.6 V		3.0 V to 3.6 V	
Temperature range	Storage temperature	T_{STG} -55 °C to +125 °C			Stored as bare product after unpacking
	Operating temperature	T_{OPR} -40 °C to +85 °C			Refer to page 31. "Frequency range"
Frequency stability	$\Delta f/f_o$	B : $\pm 50 \times 10^{-6}$ C : $\pm 100 \times 10^{-6}$			-20 °C to +70 °C
		M : $\pm 100 \times 10^{-6}$			-40 °C to +85 °C
Current consumption	I_{OP}	12 mA Max.		30 mA Max.	No load condition
Output disable current	I_{OE}	10 mA Max.	—	15 mA Max.	OE=GND (PCG/PCN)
Standby current	I_{ST}	—	50 μ A Max.	—	ST=GND (SCG)
Duty	tw/t	45 % to 55 %			50 % V_{DD} , CL = Max.
Output voltage	V_{OH}	$V_{DD} - 0.4$ V Min.		2.2 V Min.	$I_{OH} = -8$ mA
Output load condition (fan out)	V_{OL}	0.4 V Max.		0.4 V Max.	$I_{OL} = 8$ mA
	CL	25 pF		15 pF	
Output enable	V_{IH}	70 % V_{DD} Min.		70 % V_{DD} Min.	OE, \overline{ST}
disable input voltage	V_{IL}	20 % V_{DD} Max.		30 % V_{DD} Max.	OE, \overline{ST}
Output rise time	t_{TLH}	4.0 ns Max.		7 ns	20 % to 80 % V_{DD} , CL \leq Max.
Output fall time	t_{THL}	4.0 ns Max.		7 ns	80 % to 20 % V_{DD} CL \leq Max.
Oscillation start up time	t_{OSC}	12 ms Max.		10 ms Max.	Time at minimum operating voltage to be 0 s
Aging	f_a	$\pm 5 \times 10^{-6}$ / year Max.			$T_a = +25$ °C, $V_{DD} = 3.3$ V First year
Shock resistance	S.R.	$\pm 20 \times 10^{-6}$ Max.			Three drops on a hard board from 750 mm or excitation test with 29400 m/s ² x 0.3 ms x 1/2 sine wave in 3 directions

Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		SG-615PTW/STW	SG-615PHW/SHW	SG-615PCW/SCW	
Output frequency range	f_o	55.0001 MHz to 135.0000 MHz		26.0001 MHz to 135.0000 MHz	Refer to page 31. "Frequency range"
Power source voltage	Max. supply voltage	V_{DD-GND} -0.5 V to +7.0 V			
	Operating voltage	V_{DD} 5.0 V \pm 0.5 V		3.3 V \pm 0.3 V	Stored as bare product after unpacking
Temperature range	Storage temperature	T_{STG} -55 °C to +100 °C			Refer to page 31. "Frequency range"
	Operating temperature	T_{OPR} -20 °C to +70 °C		-40 °C to +85 °C	
Frequency stability	$\Delta f/f_o$	B : $\pm 50 \times 10^{-6}$ C : $\pm 100 \times 10^{-6}$			-20 °C to +70 °C
		—			M : $\pm 100 \times 10^{-6}$
Current consumption	I_{OP}	45 mA Max.		28 mA Max.	No load condition
Output disable current	I_{OE}	30 mA Max.		16 mA Max.	OE=GND(P*W)
Standby current	I_{ST}	50 μ A Max.			\overline{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, $f_o \leq 66.6667$ MHz
		—	40 % to 60 %	40 % to 60 %	CMOS load : 50% V_{DD} , CL = Max.
		—	45 % to 55 %	—	CMOS load : 50% V_{DD} , CL = 25 pF, $f_o \leq 66.6667$ MHz
Output voltage	V_{OH}	—		45 % to 55 %	CMOS load : 50% V_{DD} , CL = 25 pF, $f_o \leq 40.0$ MHz
		—		—	—
		—		—	—
		—		—	—
Output load condition (fan out)	CL	15 pF	—	—	$f_o \leq 135$ MHz
		5 TTL + 15 pF	—	—	$f_o \leq 90$ MHz
Output enable disable input voltage	V_{IH}	—		—	$f_o \leq 66.6667$ MHz
		—		15 pF	$f_o \leq 135$ MHz
		—		25 pF	$f_o \leq 125$ MHz
		—		50 pF	$f_o \leq 66.6667$ MHz
Output rise time	t_{TLH}	—		30 pF	$f_o \leq 40.0$ MHz
		—		—	—
Output fall time	t_{THL}	2.0 V Min.		0.7 V_{DD} Min.	OE, \overline{ST}
		0.8 V Max.		0.2 V_{DD} Max.	OE, \overline{ST}
Output rise time	t_{TLH}	2.0 ns Max.	—	—	TTL load : 0.8 V \rightarrow 2.0 V, CL = Max.
		4.0 ns Max.	—	—	TTL load : 0.4 V \rightarrow 2.4 V, CL = Max.
		—	3.0 ns Max.	—	CMOS load : 20 % \rightarrow 80 % V_{DD} , CL = 25 pF
		—	—	3.0 ns Max.	CMOS load : 20 % \rightarrow 80 % V_{DD} , CL = 15 pF
Output fall time	t_{THL}	—	4.0 ns Max.	4.0 ns Max.	CMOS load : 20 % \rightarrow 80 % V_{DD} , CL = Max.
		—	—	—	—
		—	—	—	—
		—	—	—	—
Oscillation start up time	t_{OSC}	10 ms Max.		10 ms Max.	Time at minimum operating voltage to be 0 s
Aging	f_a	$\pm 5 \times 10^{-6}$ / year Max.			$T_a = +25$ °C, $V_{DD} = 5.0$ V / 3.3 V, First year
Shock resistance	S.R.	$\pm 20 \times 10^{-6}$ Max.			Three drops on a hard board from 750 mm or excitation test with 29400 m/s ² x 0.3 ms x 1/2 sine wave in 3 directions