

FULL-SIZE DIP HIGH-FREQUENCY CRYSTAL OSCILLATOR

SG-51 series

HALF-SIZE DIP HIGH-FREQUENCY CRYSTAL OSCILLATOR

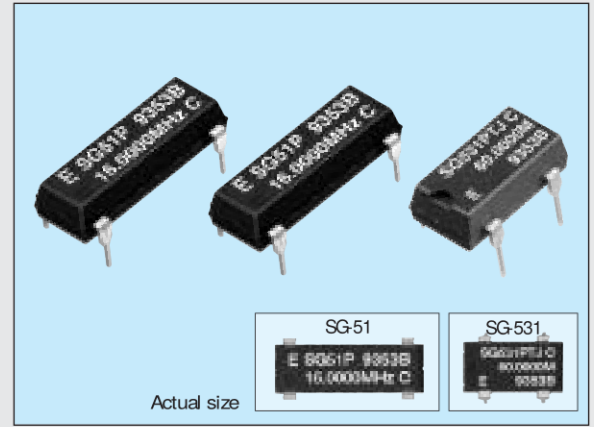
SG-531 series

Product number (please refer to page 1)

Q32510xxxxxx00

Q32531xxxxxx00

- Pin compatible with full-size metal can. (SG-51 series)
- Pin compatible with half-size metal can. (SG-531 series)
- Cylindrical AT-cut crystal unit builtin, thus assuring high reliability.
- Use of CMOS IC enables reduction of current consumption.



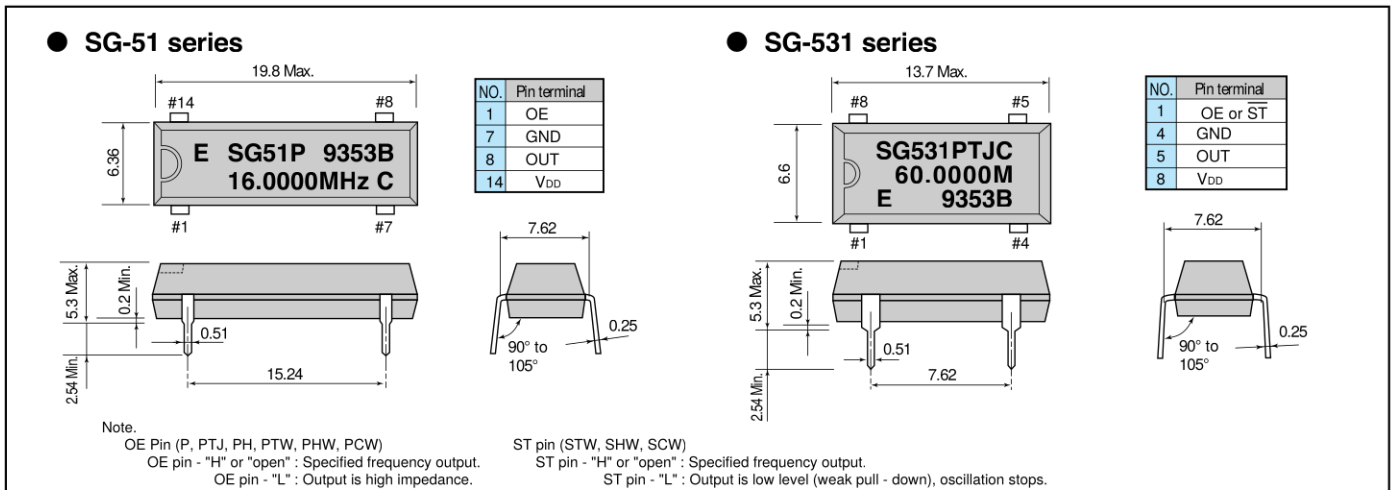
Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		SG-51P/531P	SG-51PTJ/531PTJ	SG-51PH/531PH	
Output frequency range	f_o	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	-0.5 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	$\Delta f/f_o$		B: $\pm 50 \times 10^{-6}$ C: $\pm 100 \times 10^{-6}$		B type is possible up to 55.0 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	CMOS level	t_w/t	40 % to 60 %	40 % to 60 %	1/2 V_{DD} level
	TTL level		45 % to 55 %		1.4 V level
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) / 8 mA (PTJ) / 4mA (PH)
Output load condition (fan out)	CMOS	Q_L	50 pF Max.	50 pF Max.	
	TTL	N	10 TTL Max.	5 TTL Max.	$Q_L \leq 15$ pF
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	CMOS level	t_{rUH}	8 ns Max.	7 ns Max.	CMOS load: 20 % \rightarrow 80 % V_{DD}
	TTL level		5 ns Max.	—	TTL load: 0.4 V \rightarrow 2.4 V
Output fall time	CMOS level	t_{fHL}	8 ns Max.	7 ns Max.	CMOS load: 80 % \rightarrow 20 % V_{DD}
	TTL level		5 ns Max.	—	TTL load: 2.4 V \rightarrow 0.4 V
Oscillation start up time	t_{OSC}	4 ms Max.	10 ms Max.		More than for 1 ms until $V_{DD} = 0$ V \rightarrow 4.5 V 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 1/2 sine 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)



Specifications (characteristics)

Item	Symbol	Specifications		Remarks
		SG-531POG	SG-531SOG	
Output frequency range	f_o	1.5000 MHz to 26.0000 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} 2.7 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.		No load condition
Output disable current	I_{OE}	10 mA Max.	—	OE=GND (POG)
Standby current	I_{ST}	—	50 μ A Max.	ST=GND (SOG)
Duty	tw/t	45 % to 55 %		50 % V_{DD} , $C_L = 25$ pF
Output voltage	V_{OH}	$V_{DD} - 0.4$ V Min.		$I_{OH} = -8$ mA
	V_{OL}	0.4 V Max.		$I_{OL} = 8$ mA
Output load condition (fan out)	C_L	25 pF		
Output enable disable input voltage	V_{IH}	70 % V_{DD} Min.		OE, ST
	V_{IL}	20 % V_{DD} Max.		OE, ST
Output rise time	t_{rHL}	4.0 ns Max.		20 % to 80 % V_{DD} , $C_L \leq 25$ pF
Output fall time	t_{fHL}	4.0 ns Max.		80 % to 20 % V_{DD} , $C_L \leq 25$ pF
Oscillation start up time	t_{OSC}	12 ms Max.		Time at minimum operating voltage to be 0 s
Aging	fa	$\pm 5 \times 10^{-6}$ / 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-531PTW/STW	SG-531PHW/SHW	SG-531PCW/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 ± 0.5 V		3.3 V ± 0.3 V	
Temperature range	Storage temperature	T_{STG} -55 °C to +100 °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	$\Delta f/f_o$	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.		—	ST=GND (S*W)
Duty	tw/t	40 % to 60 %	—	—	TTL load : 1.4 V, $C_L = \text{Max.}$
		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} , $C_L = \text{Max.}$
		—	45 % to 55 %	—	CMOS load : 50% V_{DD} , $C_L = 25$ pF, $f_o \leq 66.6667$ MHz
Output voltage	V_{OH}	$V_{DD} - 0.4$ V Min.			$I_{OH} = -16$ mA (*/W/*/W)/-8 mA (*/CW)
	V_{OL}	0.4 V Max.			$I_{OL} = 16$ mA (*/W/*/W)/8 mA (*/CW)
Output load condition (fan out)	C_L	15 pF	—	—	$f_o \leq 135$ MHz
		5 TTL + 15 pF	—	—	$f_o \leq 90$ MHz
		25 pF	—	—	$f_o \leq 66.6667$ MHz
		—	15 pF	15 pF	$f_o \leq 135$ MHz
		—	25 pF	—	$f_o \leq 125$ MHz
Output enable disable input voltage	V_{IH}	2.0 V Min.		0.7 V_{DD} Min.	OE, ST
	V_{IL}	0.8 V Max.		0.2 V_{DD} Max.	OE, ST
Output rise time	t_{rHL}	2.0 ns Max.	—	—	TTL load: 0.8 V \rightarrow 2.0 V, $C_L = \text{Max.}$
		4.0 ns Max.	—	—	TTL load: 0.4 V \rightarrow 2.4 V, $C_L = \text{Max.}$
		—	3.0 ns Max.	—	CMOS load: 20 % \rightarrow 80 % V_{DD} , $C_L = 25$ pF
		—	—	3.0 ns Max.	CMOS load: 20 % \rightarrow 80 % V_{DD} , $C_L = 15$ pF
Output fall time	t_{fHL}	—	4.0 ns Max.	4.0 ns Max.	CMOS load: 20 % \rightarrow 80 % V_{DD} , $C_L = \text{Max.}$
		2.0 ns Max.	—	—	TTL load: 2.0 V \rightarrow 0.8 V, $C_L = \text{Max.}$
		4.0 ns Max.	—	—	TTL load: 2.4 V \rightarrow 0.4 V, $C_L = \text{Max.}$
		—	3.0 ns Max.	—	CMOS load: 80 % \rightarrow 20 % V_{DD} , $C_L = 25$ pF
Oscillation start up time	t_{OSC}	10 ms Max.		4.0 ns Max.	CMOS load: 80 % \rightarrow 20 % V_{DD} , $C_L = 15$ pF
		—		—	CMOS load: 80 % \rightarrow 20 % V_{DD} , $C_L = \text{Max.}$
Aging	fa	$\pm 5 \times 10^{-6}$ / year Max.		—	Time at minimum operating voltage to be 0 s
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