

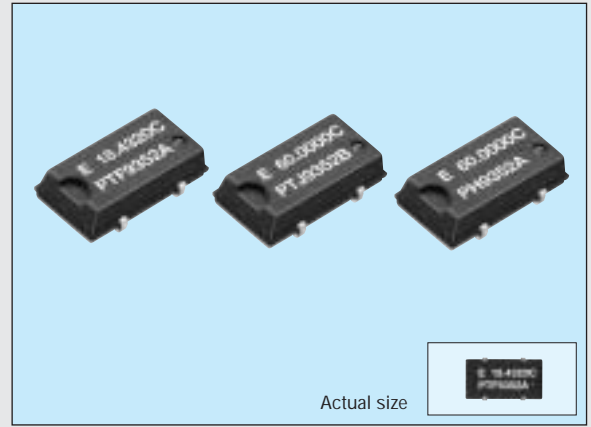
HIGH-FREQUENCY CRYSTAL OSCILLATOR

# SG-636 series

Product number (please refer to page 1)

**Q33636xxxxxx00**

- A small SMD that enables high-density mounting.
- A general-purpose device with builtin heat-resisting cylindrical AT-cut crystal and allowing almost the same temperature condition for soldering as SMD IC.
- Low current consumption by output enable function(OE) or standby function(ST).



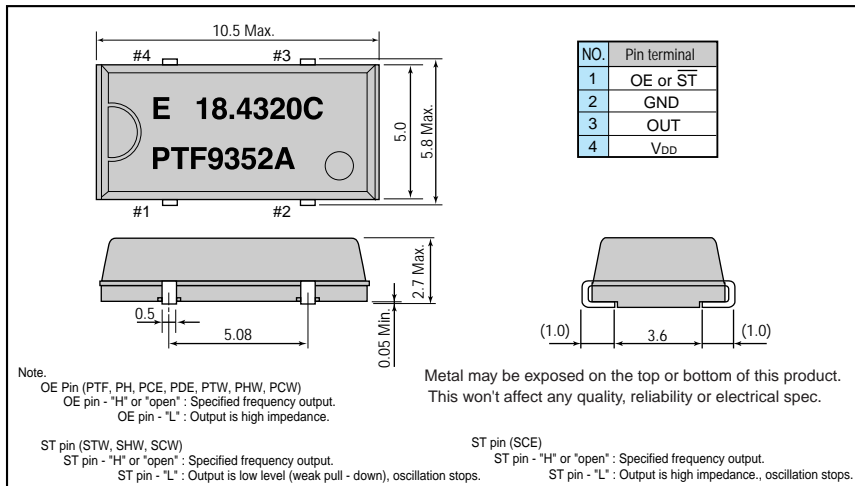
## Specifications (characteristics)

Item	Symbol	Specifications				Remarks
		SG-636PTF	SG-636PH	SG-636SCE/PCE	SG-636PDE	
Output frequency range	$f_0$	2.21675 MHz to 41.0000 MHz	41.0001 MHz to 70.0000 MHz	2.21675 MHz to 40.0000 MHz	2.21675MHz to 40.0000MHz	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	2.5 V $\pm$ 0.25 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				Refer to page 31. "Frequency range"
Frequency stability	$\Delta f/f_0$	C: $\pm 100 \times 10^{-6}$				
Current consumption	$I_{OP}$	17 mA Max.	35 mA Max.	9 mA Max.	5 mA Max.	No load condition
Output disable current	$I_{OE}$	10 mA Max.	20 mA Max.	5 mA Max.	3 mA Max.	OE=GND, $\overline{ST}$ =GND 2 $\mu$ A Max. (SCE)
Duty	CMOS level	40 % to 60 %		45 % to 55 %		CMOS load: 1/2 $V_{DD}$ level
	TTL level	45 % to 55 %		—		TTL load: 1.4 V level
Output voltage	$V_{OH}$	$V_{DD} - 0.4$ V Min.				$I_{OH} = 8$ mA (PTF) / -4 mA (PH / SCE / PCE / PDE)
	$V_{OL}$	0.4 V Max.				$I_{OL} = 16$ mA (PTF) / 4 mA (PH / SCE / PCE / PDE)
Output load condition (fan out)	CMOS level	$C_L$	50 pF Max. 20 pF Max. ( $\leq 55$ MHz) 15 pF Max. ( $> 55$ MHz)	30 pF Max.	15 pF Max.	
	TTL level	N	10 TTL Max. 5 LSTTL Max.	—		$C_L \leq 15$ pF
Output enable/disable input voltage	$V_{IH}$	2.0 V Min.		0.8 $V_{DD}$ Min.		OE, $\overline{ST}$ (SCE)
	$V_{IL}$	0.8 V Max.		0.2 $V_{DD}$ Max.		
Output rise time	CMOS level	$t_{rLH}$		5 ns Max.		CMOS load: 20 % $\rightarrow$ 80 % $V_{DD}$
	TTL level	7 ns Max.		—		TTL load: 0.4 V $\rightarrow$ 2.4 V
Output fall time	CMOS level	$t_{fHL}$		5 ns Max.		CMOS load: 80 % $\rightarrow$ 20 % $V_{DD}$
	TTL level	7 ns Max.		—		TTL load: 2.4 V $\rightarrow$ 0.4 V
Oscillation start up time	$t_{OSC}$	4 ms Max.	10 ms Max.	4 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 / 2.5 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 $m/s^2 \times 0.3$ ms $\times 1/2$ 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 required.

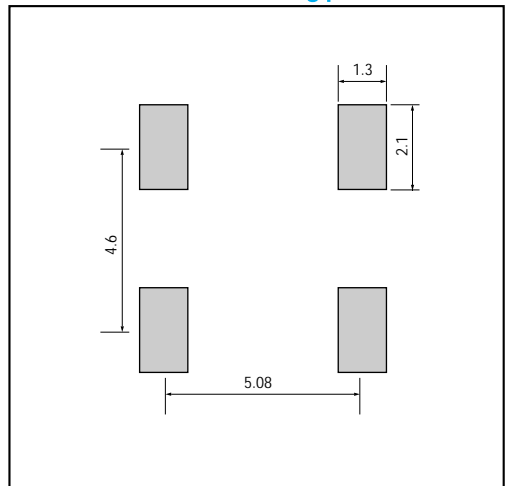
## External dimensions

(Unit: mm)



## Recommended soldering pattern

(Unit: mm)



## Specifications (characteristics)

Item	Symbol	Specifications			Remarks	
		SG-636PTG	SG-636PHG	SG-636PCG/SCG		
Output frequency range	$f_o$	2.21675 MHz to 33.0000 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	$V_{DD}$	4.5 V to 5.5 V	2.7 V to 3.6 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		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	
Current consumption	$I_{OP}$	25 mA Max.		12 mA Max.	No load condition	
Output disable current	$I_{OE}$	20 mA Max.		10 mA Max.	OE=GND (P*G)	
Standby current	$I_{ST}$	—		50 $\mu$ A Max.	$\overline{ST}$ =GND (SCG)	
Duty	CMOS level	$tw/t$	45 % to 55 %		50 % $V_{DD}$ , $CL = 25$ pF	
	TTL level	$tw/t$	40 % to 60 %	—	1.4 V Level, $CL = 25$ pF	
Output voltage	$V_{OH}$	2.4 V Min.	—	$V_{DD} - 0.4$ V Min.	$I_{OH} = -8$ mA	
	$V_{OL}$	—	$V_{DD} - 0.4$ V Max.	—	$I_{OH} = -16$ mA	
Output load condition (fan out)	$V_{OL}$	—	0.4 V Max.		$I_{OL} = 8$ mA	
	$V_{OL}$	0.4 V Max.	—		$I_{OL} = 16$ mA	
Output load condition (fan out)	$CL$	25 pF				
Output enable disable input voltage	CMOS level	$V_{IH}$	2.0 V Min.		OE, $\overline{ST}$	
	TTL level	$V_{IL}$	0.8 V Max.		OE, $\overline{ST}$	
Output rise time	CMOS level	$t_{TLH}$	—	3.4 ns Max.	4.0 ns Max.	20 % to 80 % $V_{DD}$ , $CL \leq 25$ pF
	TTL level	$t_{TLH}$	1.2 ns Max.	—	—	0.8 V to 2.0 V $CL \leq 25$ pF
Output fall time	CMOS level	$t_{THL}$	—	3.4 ns Max.	4.0 ns Max.	80 % to 20 % $V_{DD}$ $CL \leq 25$ pF
	TTL level	$t_{THL}$	1.2 ns Max.	—	—	2.0 V to 0.8 V $CL \leq 25$ 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, $V_{DD} = 5.0$ 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 <sup>2</sup> x 0.3 ms x 1/2 sine wave in 3 directions	

## Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		SG-636PTW/STW	SG-636PHW/SHW	SG-636PCW/SCW	
Output frequency range	$f_o$	32.0001 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	
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		Refer to page 31. "Frequency range"
Frequency stability	$\Delta f/f_o$	B : $\pm 50 \times 10^{-6}$ C : $\pm 100 \times 10^{-6}$			
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 $\mu$ A Max.		—	$\overline{ST}$ =GND(S*W)
Duty	$tw/t$	40 % to 60 %	—	—	TTL load : 1.4 V, $CL = \text{Max.}$
		45 % to 55 %	—	—	TTL load : 1.4 V, 5TTL + 15 pF, $f_o \leq 66.6667$ MHz
Output voltage	$V_{OH}$	—	40 % to 60 %	40 % to 60 %	CMOS load : 50% $V_{DD}$ , $CL = \text{Max.}$
	$V_{OL}$	—	45 % to 55%	—	CMOS load : 50% $V_{DD}$ , $CL = 25$ pF, $f_o \leq 66.6667$ MHz
Output load condition (fan out)	$CL$	15 pF	—	—	$I_{OH} = -16$ mA (*TW/HW)/-8 mA(*CW)
		5 TTL + 15 pF	—	—	$I_{OL} = 16$ mA (*TW/HW)/8 mA(*CW)
		25 pF	—	—	$f_o \leq 135$ MHz
		—	15 pF	15 pF	$f_o \leq 90$ MHz
Output rise time	$t_{TLH}$	—	3.0 ns Max.	—	$f_o \leq 66.6667$ MHz
		—	4.0 ns Max.	—	$f_o \leq 135$ MHz
		—	—	—	$f_o \leq 90$ MHz
		—	—	3.0 ns Max.	$f_o \leq 66.6667$ MHz
Output fall time	$t_{THL}$	2.0 ns Max.	—	—	TTL load : 2.0 V $\rightarrow$ 0.8 V, $CL = \text{Max.}$
		4.0 ns Max.	—	—	TTL load : 2.4 V $\rightarrow$ 0.4V, $CL = \text{Max.}$
		—	3.0 ns Max.	—	CMOS load : 80 % $\rightarrow$ 20 % $V_{DD}$ , $CL = 25$ pF
		—	4.0 ns Max.	—	CMOS load : 80 % $\rightarrow$ 20 % $V_{DD}$ , $CL = 50$ pF
Oscillation start up time	$t_{osc}$	—	—	3.0 ns Max.	CMOS load : 80 % $\rightarrow$ 20 % $V_{DD}$ , $CL = 15$ pF
		—	—	—	CMOS load : 80 % $\rightarrow$ 20 % $V_{DD}$ , $CL = 15$ pF
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.			$T_a = +25$ °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 <sup>2</sup> x 0.3 ms x 1/2 sine wave in 3 directions