

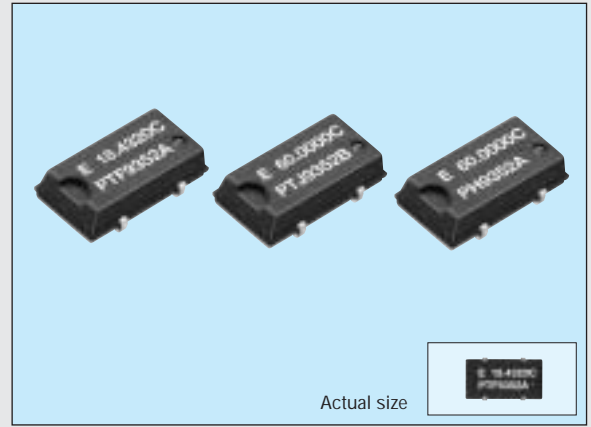
HIGH-FREQUENCY CRYSTAL OSCILLATOR

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).



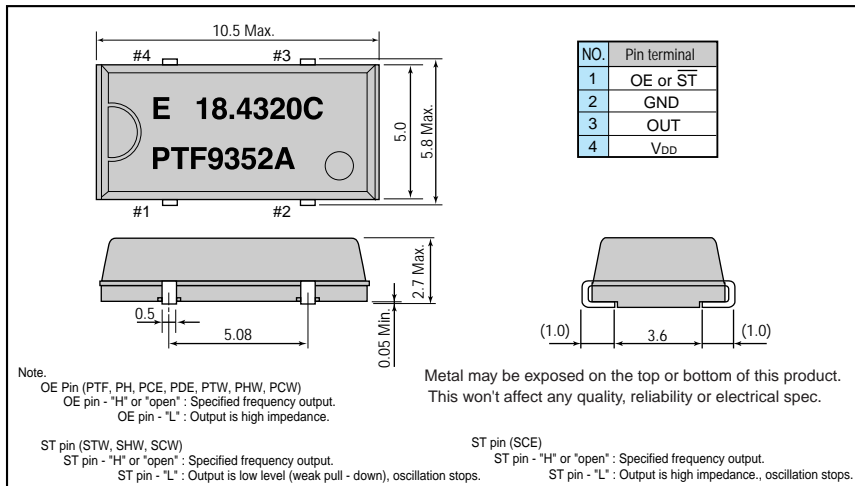
Specifications (characteristics)

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 μ 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. (≤ 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_{TLH}		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_{THL}		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.

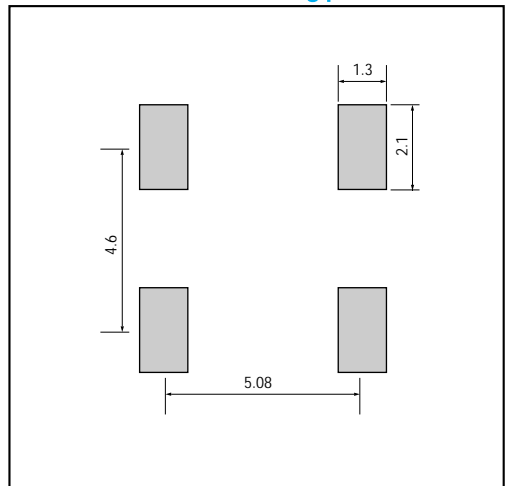
External dimensions

(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 μ 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 ² 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 μ 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
		—	—	—	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 ² x 0.3 ms x 1/2 sine wave in 3 directions