

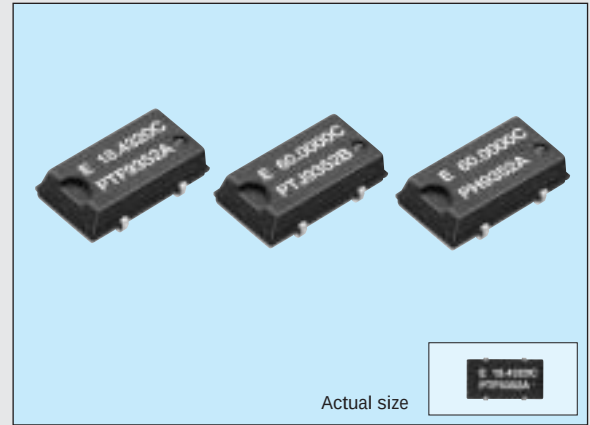
HIGH-FREQUENCY CRYSTAL OSCILLATOR

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).



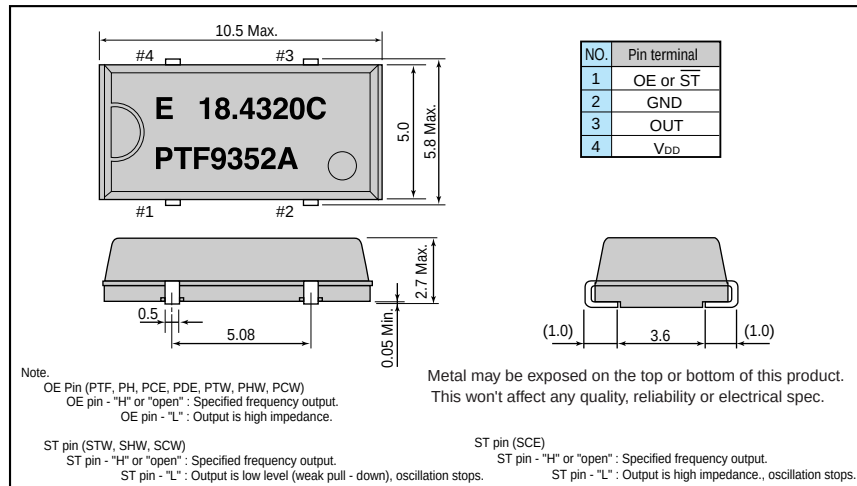
Specifications (characteristics)

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 ±0.5 V		3.3 V ±0.3 V	2.5 V ±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		Δf/f ₀	C: ±100 x 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 μA Max.(SCE)
Duty	CMOS level	t _w /t	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 ≤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}	7 ns Max.	5 ns Max.			CMOS load: 20 %→80 % V _{DD}
	TTL level		5 ns Max.	—			TTL load: 0.4 V→2.4 V
Output fall time	CMOS level	t _{THL}	7 ns Max.	5 ns Max.			CMOS load: 80 %→20 % V _{DD}
	TTL level		5 ns Max.	—			TTL load: 2.4 V→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	±5 x 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.	±20 x 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 required.

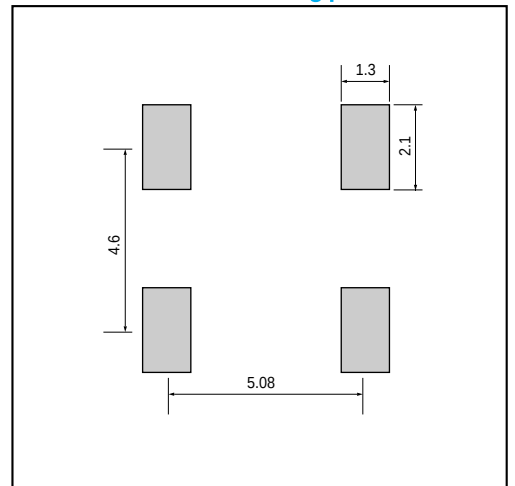
External dimensions

(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.	ST=GND (SCG)
Duty	CMOS level	tw/t	—	45 % to 55 %		50 % V_{DD} , CL = 25 pF
	TTL level		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
			0.4 V Max.	0.4 V Max.	—	$I_{OL} = 8$ mA
			—	—	—	$I_{OL} = 16$ mA
Output load condition (fan out)		CL	25 pF			
Output enable disable input voltage	CMOS level	V_{IH}	2.0 V Min.		70 % V_{DD} Min.	OE, ST
	TTL level	V_{IL}	0.8 V Max.		20 % V_{DD} Max.	OE, 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		1.2 ns Max. 2.4 ns Max.	—	—	0.8 V to 2.0 V CL $\leq$ 25 pF 0.4 V to 2.4 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		1.2 ns Max. 2.4 ns Max.	—	—	2.0 V to 0.8 V CL $\leq$ 25 pF 2.4 V to 0.4 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.			Ta=+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 ± 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			Refer to page 31. "Frequency range"
Frequency stability		Δf/f ₀	B : ±50 x 10 ⁻⁶ C : ±100 x 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 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, f _o ≤ 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 ≤ 66.6667 MHz	
Output voltage	V _{OH}	V _{DD} -0.4 V Min.			I _{OH} = -16 mA (*TW/HW)/-8 mA(*CW)	
	V _{OL}	0.4 V Max.			I _{OL} = 16 mA (*TW/HW)/8 mA(*CW)	
Output load condition (fan out)	CL	15 pF	—	—	f _o ≤ 135 MHz	
		5 TTL + 15 pF	—	—	f _o ≤ 90 MHz	
		25 pF	—	—	f _o ≤ 66.6667 MHz	
		—	15 pF	15 pF	f _o ≤ 135 MHz	
		—	25 pF	—	f _o ≤ 90 MHz	
		—	50 pF	—	f _o ≤ 66.6667MHz	
Output enable disable input voltage	V _{IH}	2.0 V Min.			70 % V _{DD} Min.	OE,ST
	V _{IL}	0.8 V Max.			20 % V _{DD} Max.	OE,ST
Output rise time	t _{TLH}	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: 20 %→80 % V _{DD} , CL= 25 pF	
		—	4.0 ns Max.	—	CMOS load: 20 %→80 % V _{DD} , CL= 50 pF	
Output fall time	t _{THL}	—	—	3.0 ns Max.	CMOS load: 20 %→80 % V _{DD} , CL= 15 pF	
		2.0 ns Max.	—	—	TTL load: 2.0 V→0.8 V, CL = Max.	
		4.0 ns Max.	—	—	TTL load: 2.4 V→0.4V, CL = Max.	
		—	3.0 ns Max.	—	CMOS load: 80 %→20 % V _{DD} , CL= 25 pF	
		—	4.0 ns Max.	—	CMOS load: 80 %→20 % V _{DD} , CL= 50 pF	
Oscillation start up time	t _{OSC}	10 ms Max.			Time at minimum operating voltage to be 0 s	
Aging		fa	±5 x 10 ⁻⁶ /year Max.		Ta=+25 °C, V _{DD} =5.0 V / 3.3 V, first year	
Shock resistance		S.R.	±20 x 10 ⁻⁶ Max.			Three drops on a hard board from 750 mm or excitation test with 29400 m/s2 x 0.3 ms x 1/2 sine wave in 3 directions