

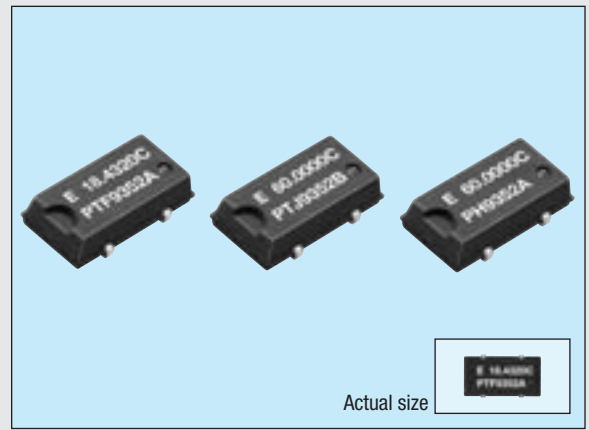
HIGH-FREQUENCY CRYSTAL OSCILLATOR

# SG-636 series

Product number (please refer to page 2)

**Q33636xxxxxx00**

- A small SMD that enables high-density mounting.
- Low current consumption by output enable function(OE) or standby function(ST).
- Available for lead (Pb)-free soldering.
- Available for lead (Pb)-free terminal.



## Specifications (characteristics)

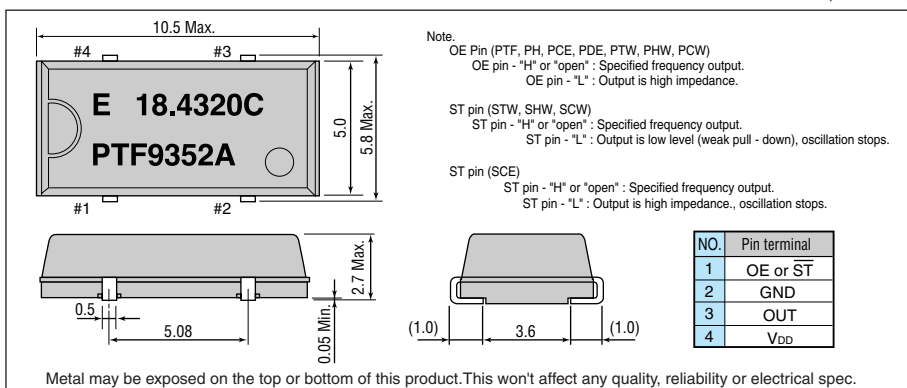
Item	Symbol	Specifications				Remarks
		SG-636PTF	SG-636PH	SG-636PCE / SCE	SG-636PDE	
Output frequency range	f <sub>o</sub>	2.21675 MHz to 41.0000 MHz	41.0001 MHz to 70.0000 MHz	2.21675 MHz to 40.0000 MHz	2.21675 MHz to 40.0000 MHz	Refer to Operating condition and Frequency range
Power source voltage	Max. supply voltage	VDD-GND				
	Operating voltage	5.0 V ±0.5 V		3.3 V ±0.3 V		
Temperature range	Storage temperature	-55 °C to +100 °C				Stored as bare product after unpacking
	Operating temperature	-20 °C to +70 °C				
Frequency stability	Δf/f <sub>o</sub>	C: ±100 x 10 <sup>-6</sup>				
Current consumption	I <sub>op</sub>	17 mA Max.	35 mA Max.	9 mA Max.	5 mA Max.	No load condition
Output disable current	I <sub>OE</sub>	10 mA Max.	20 mA Max.	5 mA Max.	3 mA Max.	OE = GND, ST = GND 2 μA Max. (SCE)
Duty	CMOS level	40 % to 60 %		45 % to 55 %		CMOS load : 1/2 V <sub>DD</sub> level
	TTL level	45 % to 55 %		-		TTL load : 1.4 V level
Output voltage	V <sub>OH</sub>	V <sub>DD</sub> -0.4 V Min.				I <sub>OH</sub> = -8 mA (PTF) / -4 mA (PH / SCE / PCE / PDE)
	V <sub>OL</sub>	0.4 V Max.				I <sub>OL</sub> = 16 mA (PTF) / 4 mA (PH / SCE / PCE / PDE)
Output load condition (fan out)	CMOS level	CL	50 pF Max. 20 pF Max. (≤ 55 MHz) 15 pF Max. (> 55 MHz)	30 pF Max.	15 pF Max.	C <sub>L</sub> ≤ 15 pF
	TTL level	N	10 TTL Max. 5 LSTTL Max.	-		
Output enable disable input voltage	V <sub>IH</sub>	2.0 V Min.		0.8 V <sub>DD</sub> Min.		OE, ST (SCE)
	V <sub>IL</sub>	0.8 V Max.		0.2 V <sub>DD</sub> Max.		
Output rise time	CMOS level	t <sub>r</sub>	7 ns Max.	5 ns Max.		CMOS load : 20 % → 80 % V <sub>DD</sub>
	TTL level	t <sub>r</sub>	5 ns Max.	-		TTL load : 0.4 V → 2.4 V
Output fall time	CMOS level	t <sub>f</sub>	7 ns Max.	5 ns Max.		CMOS load : 80 % → 20 % V <sub>DD</sub>
	TTL level	t <sub>f</sub>	5 ns Max.	-		TTL load : 2.4 V → 0.4 V
Oscillation start up time	t <sub>osc</sub>	4 ms Max.	10 ms Max.	4 ms Max.		Time at minimum operating voltage to be 0 s
Aging	f <sub>a</sub>	±5 x 10 <sup>-6</sup> / year Max.				T <sub>a</sub> = +25 °C, V <sub>DD</sub> = 5.0 V / 3.3 / 2.5 V, First year
Shock resistance	S.R.	±20 x 10 <sup>-6</sup> 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 1/2sine 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 required.

## Operating condition and frequency range

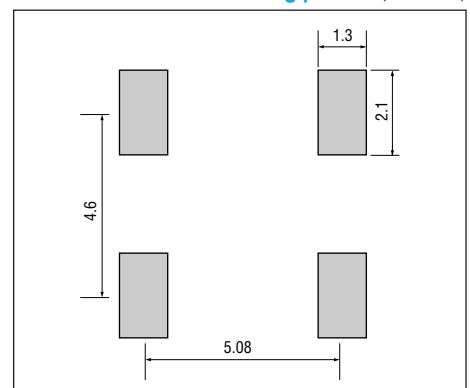
Operating Voltage	Frequency stability(Operating temperature)	1 MHz	50 MHz	100 MHz	135 MHz
5 V±0.5 V	B: ±50 x 10 <sup>-6</sup> (-20 °C to +70 °C)	2.21675 SG-636PTG/PHG	33 SG-636PTW/STW/PHW/SHW		135
	C: ±100 x 10 <sup>-6</sup> (-20 °C to +70 °C)	2.21675 SG-636PTF SG-636PTG/PHG	33 41 SG-636PH	70 SG-636PTW/STW/PHW/SHW	135
3.3 V±0.3 V	B: ±50 x 10 <sup>-6</sup> (-20 °C to +70 °C)	2.21675 SG-636PCG/SCG	33 SG-636PCW/SCW		135
	C: ±100 x 10 <sup>-6</sup> (-20 °C to +70 °C)	2.21675 SG-636PCE/SCE SG-636PCG/SCG	33 40 SG-636PCW/SCW		135
2.5 V±0.25 V	C: ±100 x 10 <sup>-6</sup> (-20 °C to +70 °C)	2.21675 SG-636PDE	40		

## 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	fo	2.21675 MHz to 33.0000 MHz *1			Refer to Operating condition and Frequency range	
Power source voltage	Max. supply voltage	V <sub>DD</sub> -GND -0.5 V to +7.0 V				
	Operating voltage	V <sub>DD</sub>	4.5 V to 5.5 V	2.7 V to 3.6 V		
Temperature range	Storage temperature	T <sub>STG</sub> -55 °C to +100 °C			Stored as bare product after unpacking	
	Operating temperature	T <sub>OPR</sub> -20 °C to +70 °C			Refer to Operating condition and Frequency range	
Frequency stability	Δf/fo	B : ±50 x 10 <sup>-6</sup> C : ±100 x 10 <sup>-6</sup>			-20 °C to +70 °C	
Current consumption	I <sub>OP</sub>	25 mA Max.		12 mA Max.	No load condition	
Output disable current	I <sub>OE</sub>	20 mA Max.		10 mA Max.	OE = GND (P*G)	
Standby current	I <sub>ST</sub>	-		50 μA Max.	ST = GND (SCG)	
Duty	CMOS level	-			50 % V <sub>DD</sub> , CL = 25 pF	
	TTL level	40 % to 60 %	-		1.4 V Level, CL = 25 pF	
Output voltage	V <sub>OH</sub>	2.4 V Min.	-	V <sub>DD</sub> -0.4 V Min.	I <sub>OH</sub> = -8 mA I <sub>OH</sub> = -16 mA	
	V <sub>OL</sub>	-	0.4 V Max.		I <sub>OL</sub> = 8 mA I <sub>OL</sub> = 16 mA	
Output load condition (fan out)	CL	25 pF				
Output enable disable input voltage	CMOS level	V <sub>IH</sub> 2.0 V Min.		0.7 V <sub>DD</sub> Min.	OE, ST	
	TTL level	V <sub>IL</sub> 0.8 V Max.		0.2 V <sub>DD</sub> Max.	OE, ST	
Output rise time	CMOS level	-		3.4 ns Max.	4.0 ns Max.	-20 % → 80 % V <sub>DD</sub> , CL ≤ 25 pF
	TTL level	1.2 ns Max. 2.4 ns Max.	-		-	0.8 V → 2.0 V CL ≤ 25 pF 0.4 V → 2.4 V CL ≤ 25 pF
Output fall time	CMOS level	-		3.4 ns Max.	4.0 ns Max.	80 % → 20 % V <sub>DD</sub> CL ≤ 25 pF
	TTL level	1.2 ns Max. 2.4 ns Max.	-		-	2.0 V → 0.8 V CL ≤ 25 pF 2.4 V → 0.4 V CL ≤ 25 pF
Oscillation start up time	t <sub>OSC</sub>	12 ms Max.			Time at minimum operating voltage to be 0 s	
Aging	fa	±5 x 10 <sup>-6</sup> / year Max.			Ta = +25 °C, V <sub>DD</sub> = 5.0 V / 3.3 V, First year	
Shock resistance	S.R.	±20 x 10 <sup>-6</sup> 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 1/2sine wave in 3 directions	

\*1) 4.1250 MHz < fo < 4.4336 MHz, 8.2500 MHz < fo < 8.8672 MHz, 16.5000 MHz < fo < 17.7344 MHz : Unavailable

## ■ Specifications (characteristics)

Item	Symbol	Specifications			Remarks
		SG-636PTW / STW	SG-636PHW / SHW	SG-636PCW / SCW	
Output frequency range	fo	32.0001 MHz to 135.0000 MHz			Refer to Operating condition and Frequency range
Power source voltage	Max. supply voltage	V <sub>DD</sub> -GND -0.5 V to +7.0 V			
	Operating voltage	V <sub>DD</sub>	5.0 V ± 0.5 V	3.3 V ± 0.3 V	
Temperature range	Storage temperature	T <sub>STG</sub> -55 °C to +100 °C			Stored as bare product after unpacking
	Operating temperature	T <sub>OPR</sub> -20 °C to +70 °C			Refer to Operating condition and Frequency range
Frequency stability	Δf/fo	B : ±50 x 10 <sup>-6</sup> C : ±100 x 10 <sup>-6</sup>			
Current consumption	I <sub>OP</sub>	45 mA Max.		28 mA Max.	No load condition
Output disable current	I <sub>OE</sub>	30 mA Max.		16 mA Max.	OE = GND (P*W)
Standby current	I <sub>ST</sub>	50 μA Max.			ST = GND (S*W)
Duty	tw/ t	40 % to 60 % 45 % to 55 %	-		TTL load : 1.4 V, CL = Max. TTL load : 1.4 V, 5TTL + 15 pF, fo ≤ 66.6667 MHz
		-	40 % to 60 % 45 % to 55 %	40 % to 60 %	CMOS load : 50% V <sub>DD</sub> , CL = Max. CMOS load : 50% V <sub>DD</sub> , CL = 25 pF, fo ≤ 66.6667 MHz
Output voltage	V <sub>OH</sub>	V <sub>DD</sub> -0.4 V Min.			I <sub>OH</sub> = -16 mA (*TW / *HW) / -8 mA (*CW)
	V <sub>OL</sub>	0.4 V Max.			I <sub>OL</sub> = 16 mA (*TW / *HW) / 8 mA (*CW)
Output load condition (fan out)	CL	15 pF 5 TTL + 15 pF 25 pF	-		fo ≤ 135 MHz fo ≤ 90 MHz fo ≤ 66.6667 MHz
		-	15 pF	15 pF	fo ≤ 135 MHz fo ≤ 90 MHz fo ≤ 66.6667 MHz
		-	25 pF	-	
		-	50 pF	-	
Output enable disable input voltage	V <sub>IH</sub>	2.0 V Min.		0.7 V <sub>DD</sub> Min.	OE, ST
	V <sub>IL</sub>	0.8 V Max.		0.2 V <sub>DD</sub> Max.	OE, ST
Output rise time	tr	2.0 ns Max. 4.0 ns Max.	-		TTL load: 0.8 V → 2.0 V, CL = Max. TTL load: 0.4 V → 2.4 V, CL = Max.
		-	3.0 ns Max. 4.0 ns Max.	-	CMOS load: 20 % → 80 % V <sub>DD</sub> , CL = 25 pF CMOS load: 20 % → 80 % V <sub>DD</sub> , CL = 50 pF
		-	-	3.0 ns Max.	CMOS load: 20 % → 80 % V <sub>DD</sub> , CL = 15 pF
		-	-	-	
Output fall time	tf	2.0 ns Max. 4.0 ns Max.	-		TTL load: 2.0 V → 0.8 V, CL = Max. TTL load: 2.4 V → 0.4 V, CL = Max.
		-	3.0 ns Max. 4.0 ns Max.	-	CMOS load: 80 % → 20 % V <sub>DD</sub> , CL = 25 pF CMOS load: 80 % → 20 % V <sub>DD</sub> , CL = 50 pF
		-	-	3.0 ns Max.	CMOS load: 80 % → 20 % V <sub>DD</sub> , CL = 15 pF
		-	-	-	
Oscillation start up time	t <sub>OSC</sub>	10 ms Max.			Time at minimum operating voltage to be 0 s
Aging	fa	±5 x 10 <sup>-6</sup> / year Max.			Ta = +25 °C, V <sub>DD</sub> = 5.0 V / 3.3 V, first year
Shock resistance	S.R.	±20 x 10 <sup>-6</sup> 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 1/2sine wave in 3 directions