



## CRYSTAL OSCILLATOR (SPXO)

OUTPUT : CMOS, TTL

# SG-645 / SG-636 series

- Frequency range : 2.21675 MHz to 135 MHz
- Supply voltage : 2.5 V Typ. / 3.3 V Typ. / 5.0 V Typ.
- Function : Output enable(OE) or Standby( $\overline{ST}$ )
- External dimensions : 7.1 × 5.1 × 1.5 mm (t: Max.)...SG-645  
10.5 × 5.8 × 2.7 mm (t: Max.)...SG-636



Product Number (please contact us)

SG-645 : Q33645xx2xxxx00

SG-636 : Q33636xx2xxxx00



Actual size

SG-645 series



SG-636 series



### Specifications (characteristics)

Item	Symbol	Specifications			Conditions / Remarks
		SG-636 PTF	SG-636 PCE SG-636 SCE	SG-636 PDE	
Output frequency range	$f_o$	2.21675 MHz to 41.000 MHz	2.21675 MHz to 40.000 MHz	2.21675 MHz to 40.000 MHz	Please contact us about available frequencies.
Supply voltage	$V_{cc}$	5.0 V $\pm$ 0.5 V	3.3 V $\pm$ 0.3 V	2.5 V $\pm$ 0.25 V	
Storage temperature	$T_{stg}$	-55 °C to +100 °C			Storage as single product.
Operating temperature	$T_{use}$	-20 °C to +70 °C			
Frequency tolerance	$f_{tol}$	C: $\pm$ 100 $\times$ 10 <sup>-6</sup>			-20 °C to +70 °C
Current consumption	$I_{cc}$	17 mA Max.	9 mA Max.	5 mA Max.	No load condition
Disable current	$I_{dis}$	10 mA Max.	5 mA Max.	3 mA Max.	OE=GND
Stand-by current	$I_{std}$	—	2 $\mu$ A Max.	—	$\overline{ST}$ =GND(SCE)
Symmetry	SYM	40 % to 60 %	45 % to 55 %		CMOS load:50 % $V_{cc}$ level
		45 % to 55 %	—		TTL load: 1.4 V level
Output voltage	$V_{OH}$	$V_{cc}$ -0.4 V Min.			$I_{OH}$ =-8 mA(PTF) / -4 mA(SCE,PCE) / -3.2 mA(PDE)
	$V_{OL}$	0.4 V Max.			$I_{OL}$ =16 mA(PTF) / 4 mA(SCE,PCE) / 3.2 mA(PDE)
Output load condition (TTL)	$L_{TTL}$	10 TTL Max.	—		$L_{CMOS} \leq 15$ pF
Output load condition (CMOS)	$L_{CMOS}$	50 pF Max.	30 pF Max.	15 pF Max.	
Input voltage	$V_{IH}$	2.0 V Min.	80 % $V_{cc}$ Min.		OE Terminal or $\overline{ST}$ Terminal (SCE)
	$V_{IL}$	0.8 V Max.	20 % $V_{cc}$ Max.		
Rise time / Fall time	$t_r / t_f$	7 ns Max.	5 ns Max.		CMOS load:20 % $V_{cc}$ to 80 % $V_{cc}$ level
		5 ns Max.	—		TTL load:0.4 V to 2.4 V level
Start-up time	$t_{str}$	4 ms Max.	4 ms Max.		Time at minimum supply voltage to be 0 s
Frequency aging	$f_{aging}$	$\pm 5 \times 10^{-6}$ / year Max.			+25 °C, $V_{cc}$ =5.0 V/3.3 V/2.5 V, First year

### Specifications (characteristics)

Item	Symbol	Specifications			Conditions / Remarks
		SG-636 PTG	SG-636 PHG	SG-636 PCG SG-636 SCG	
Output frequency range	$f_o$	2.21675 MHz to 33.000 MHz *1			Please contact us about available frequencies.
Supply voltage	$V_{cc}$	4.5 V to 5.5 V	2.7 V to 3.6 V		
Storage temperature	$T_{stg}$	-55 °C to +100 °C			Storage as single product.
Operating temperature	$T_{use}$	-20 °C to +70 °C			
Frequency tolerance	$f_{tol}$	B: $\pm$ 50 $\times$ 10 <sup>-6</sup> C: $\pm$ 100 $\times$ 10 <sup>-6</sup>			-20 °C to +70 °C
Current consumption	$I_{cc}$	25 mA Max.	12 mA Max.		No load condition
Disable current	$I_{dis}$	20 mA Max.	10 mA Max.		OE=GND (PTG,PHG,PCG)
Stand-by current	$I_{std}$	—	50 $\mu$ A Max.		$\overline{ST}$ =GND (SCG)
Symmetry	SYM	—	45 % to 55 %		50 % $V_{cc}$ level, $L_{CMOS}$ =25 pF
		40 % to 60 %	—		1.4 V level, $L_{CMOS}$ =25 pF
Output voltage	$V_{OH}$	2.4 V Min.	—	$V_{cc}$ -0.4 V Min.	$I_{OH}$ =-8 mA
	$V_{OL}$	—	$V_{cc}$ -0.4 V Min.	—	$I_{OH}$ =-16 mA
Output load condition	$L_{CMOS}$	—	0.4 V Max.		$I_{OL}$ =8 mA
		25 pF Max.	—		$I_{OL}$ =16 mA
Input voltage	$V_{IH}$	2.0 V Min.	70 % $V_{cc}$ Min.		OE Terminal or $\overline{ST}$ Terminal
	$V_{IL}$	0.8 V Max.	20 % $V_{cc}$ Max.		
Rise time / Fall time	$t_r / t_f$	—	3.4 ns Max.	4 ns Max.	20 % $V_{cc}$ to 80 % $V_{cc}$ level, $L_{CMOS} \leq 25$ pF
		2.4 ns Max.	—		TTL load:0.4 V to 2.4 V level, $L_{CMOS} \leq 25$ pF
Start-up time	$t_{str}$	12 ms Max.			t=0 at 90 % $V_{cc}$
Frequency aging	$f_{aging}$	$\pm 5 \times 10^{-6}$ / year Max.			+25 °C, $V_{cc}$ =5.0 V/ 3.3 V, First year

\*1 4.1250 MHz <  $f_o$  < 4.4336 MHz, 8.2500 MHz <  $f_o$  < 8.8672 MHz, 16.500 MHz <  $f_o$  < 17.7344 MHz : Unavailable



## Specifications (characteristics)

Item	Symbol	Specifications			Conditions / Remarks
		SG-636 PTW / STW SG-645 PTW / STW	SG-636 PHW / SHW SG-645 PHW / SHW	SG-636 PCW / SCW SG-645 PCW / SCW	
Output frequency range	$f_0$	32.001 MHz to 135.000 MHz			Please contact us about available frequencies.
Supply voltage	$V_{cc}$	5.0 V $\pm$ 0.5 V		3.3 V $\pm$ 0.3 V	
Storage temperature	$T_{stg}$	SG-636***: -55 °C to +100 °C / SG-645***: -55 °C to +125 °C			Storage as single product.
Operating temperature	$T_{use}$	-20 °C to +70 °C			
Frequency tolerance	$f_{tol}$	—		M: $\pm 100 \times 10^{-6}$	SG-645PCW / SCW Only
		B: $\pm 50 \times 10^{-6}$ C <sup>2</sup> : $\pm 100 \times 10^{-6}$		—	-20 °C to +70 °C
		—		—	-40 °C to +85 °C : SG-645PCW / SCW Only
Current consumption	$I_{cc}$	45 mA Max.		28 mA Max.	No load condition ( Max. frequency range )
Disable current	$I_{dis}$	30 mA Max.		16 mA Max.	OE=GND (PTW,PHW,PCW)
Stand-by current	$I_{std}$	—		50 $\mu$ A Max.	ST=GND (STW,SHW,SCW)
Symmetry	SYM	—		40 % to 60 %	50 % $V_{cc}$ level, L_CMOS=Max.
		40 % to 60 %		—	1.4 V level, L_CMOS=Max.
Output voltage	$V_{OH}$	—			$I_{OH}$ =-16 mA (PTW , STW , PHW , SHW)
	$V_{OL}$	V <sub>cc</sub> -0.4 V Min.			-8 mA (PCW , SCW)
		0.4 V Max.			$I_{OL}$ = 16 mA (PTW , STW , PHW , SHW)
		—			8 mA (PCW , SCW)
Output load condition (TTL)	$L_{TTL}$	5 TTL Max.	—	—	$f_0 \leq 90$ MHz, Max. Supply voltage.
Output load condition (CMOS)	$L_{CMOS}$	15 pF Max.			Max.frequency, Max.Supply voltage.
Input voltage	$V_{IH}$	2.0 V Min.		70 % $V_{cc}$ Min.	OE Terminal or ST Terminal
	$V_{IL}$	0.8 V Max.		20 % $V_{cc}$ Max.	
Rise time / Fall time	$t_r / t_f$	—		4 ns Max.	20 % $V_{cc}$ to 80 % $V_{cc}$ level, $L_{CMOS} \leq$ Max.
		4 ns Max.	—	—	0.4 V to 2.4 V level
Start-up time	$t_{str}$	10 ms Max.			Time at minimum supply voltage to be 0 s
Frequency aging	$f_{aging}$	$\pm 5 \times 10^{-6}$ / year Max.			+25 °C, $V_{cc}$ =5.0 V / 3.3 V, First year

\*2 SG-636 series "C" tolerance : 40 MHz <  $f_0$   $\leq$  135 MHz

Product Name **SG-645 P T W 135.000000MHz B**  
 (Standard form) ① ②③ ④ ⑤  
 ① Model ② Function (P: Output enable, S: Standby)  
 ③ Supply voltage ④ Frequency  
 ⑤ Frequency tolerance

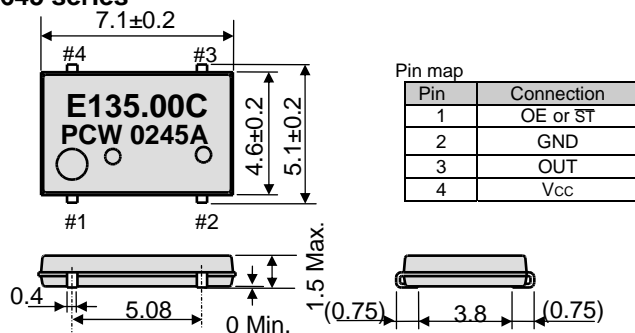
③ Supply voltage	
D	2.5 V Typ.
C	3.3 V Typ.
T,H	5.0 V Typ.

⑤ Frequency tolerance	
B	$\pm 50 \times 10^{-6}$ / -20 to +70 °C
C	$\pm 100 \times 10^{-6}$ / -20 to +70 °C
M	$\pm 100 \times 10^{-6}$ / -40 to +85 °C

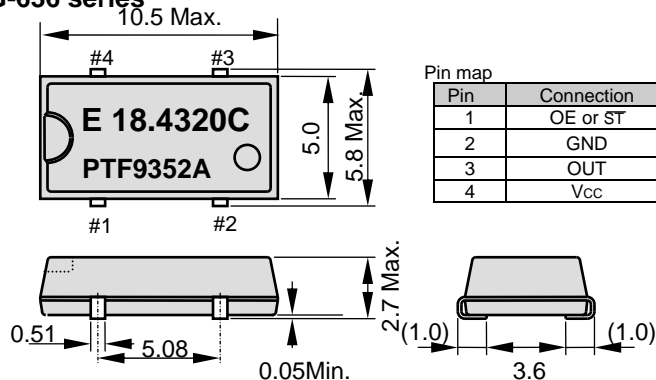
## External dimensions

(Unit:mm)

## ● SG-645 series



## ● SG-636 series



The metal case inside of the molding compound may be exposed on the top or bottom of this product. This purely cosmetic and does not have any effect on quality, reliability or electrical specs.

Note.

OE pin (PTF,PCE,PDE,PTW,PHW,PCW,PTG,PHG,PCG)  
 OE pin = "H" or "open" : Specified frequency output.  
 OE pin = "L" : Output is high impedance.

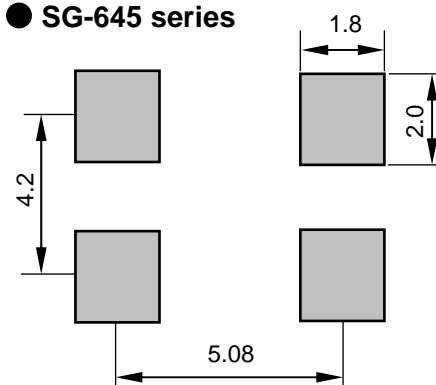
ST pin (STW, SHW, SCW, SCG)  
 ST pin = "H" or "open" : Specified frequency output.  
 ST pin = "L" : Output is low level (weak pull - down), oscillation stops.

ST pin (SCE)  
 ST pin = "H" or "open" : Specified frequency output.  
 ST pin = "L" : Output is low level, oscillation stops.

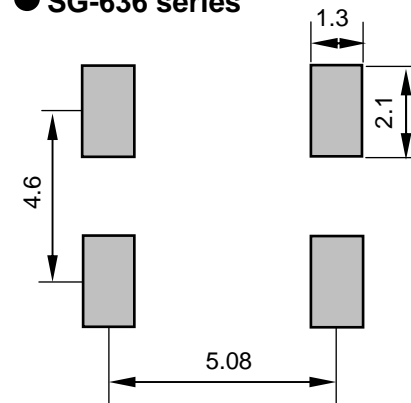
## Footprint (Recommended)

(Unit:mm)

## ● SG-645 series



## ● SG-636 series



To maintain stable operation, provide a 0.01 $\mu$ F to 0.1 $\mu$ F by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between  $V_{cc}$  - GND).

## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Seiko Epson, all environmental initiatives operate under the Plan-Do-Check-Action (PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.





## WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs,

Seiko Epson made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

ISO/TS16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

### ► Explanation of the mark that are using it for the catalog

	► Pb free.
	► Complies with EU RoHS directive. *About the products without the Pb-free mark. Contains Pb in products exempted by EU RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)
	► Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
	► Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc.)

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