RoHS Compliant

CRYSTAL OSCILLATOR
SPXO

SG‑645 / SG‑636 series

- Frequency range : 2.21675 MHz to 135 MHz
- Supply voltage : 2.5 V / 3.3 V / 5.0 V
- 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

Actual size

SG-645 series | SG-636 series

■ Specifications (characteristics)

Item		Symbol	Specifications			Remarks
			SG-636 PTF	SG-636 PCE SG-636 SCE	SG-636 PDE	
Output frequency range		f_0	2.21675 MHz to 41.000 MHz	2.21675 MHz to 40.000 MHz	2.21675 MHz to 40.000 MHz	
Supply voltage		V_{CC}	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			Store as bare product after unpacking
	Operating temperature	T_use	-20 °C to +70 °C			
Frequency tolerance		f_tol	C: ±100 × 10⁻⁶			-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 μA 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
High output voltage		V_{OH}	V_{CC}-0.4 V Min.			I_{OH}=-8 mA(PTF)/-4 mA(SCE,PCE), /-3.2 mA(PDE)
Low output voltage		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 ≤ 15 pF
Output load condition (CMOS)		L_CMOS	50 pF Max.	30 pF Max.	15 pF Max.	
Output enable / disable 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	±5 × 10⁻⁶ / year Max.			+25 °C, V_{CC}=5.0 V/3.3 V/2.5 V, First year

■ Specifications (characteristics)

Item		Symbol	Specifications			Remarks
			SG-636 PTG	SG-636 PHG	SG-636 PCG SG-636 SCG	
Output frequency range		f_0	2.21675 MHz to 33.000 MHz *1			
Supply voltage		V_{CC}	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			Store as bare product after unpacking
	Operating temperature	T_use	-20 °C to +70 °C			
Frequency tolerance		f_tol	B: ±50 × 10⁻⁶ C: ±100 × 10⁻⁶			-20 °C to +70 °C
Current consumption		I_{CC}	25 mA Max.		12 mA Max.	No load condition
Disable curren		I_dis	20 mA Max.		10 mA Max.	OE=GND (PTG,PHG,PCG)
Stand-by current		I_std	—		50 μA 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
High output voltage		V_{OH}	2.4 V Min.	—	V_{CC}-0.4 V Min.	I_{OH}=-8 mA
			—	V_{CC}-0.4 V Min.	—	I_{OH}=-16 mA
Low output voltage		V_{OL}			0.4 V Max.	I_{OL}=8 mA
			0.4 V Max.		—	I_{OL}=16 mA
Output load condition		L_CMOS	25 pF Max.			
Output enable / disable 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 ≤ 25 pF
			2.4 ns Max.			TTL load:0.4 V to 2.4 V level, L_CMOS ≤ 25 pF
Start-up time		t_str	12 ms Max.			t=0 at 90 % V_{CC}
Frequency aging		f_aging	±5 × 10⁻⁶ / year Max.			+25 °C, V_{CC}=5.0 V/ 3.3 V, First year

*1 4.1250 MHz < f_0 < 4.4336 MHz, 8.2500 MHz < f_0 < 8.8672 MHz, 16.500 MHz < f_0 < 17.7344 MHz : Unavailable
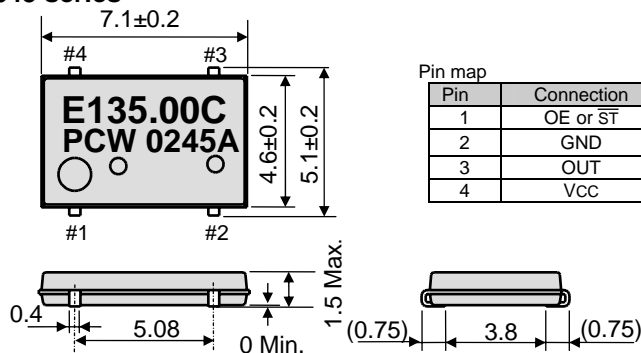
Specifications (characteristics)

Item		Symbol	Specifications SG-636 PTW / STW SG-645 PTW / STW	SG-636 PHW / SHW SG-645 PHW / SHW	SG-636 PCW / SCW SG-645 PCW / SCW	Remarks
Output frequency range		f_0	32.001 MHz to 135.000 MHz			
Supply voltage		Vcc	5.0 V ±0.5 V		3.3 V ±0.3 V	
Temperature range	Storage temperature	T_stg	SG-636P**:-55 °C to +100 °C / SG-645P**:-55 °C to +125 °C			Store as bare product after unpacking
	Operating temperature	T_use	-20 °C to +70 °C			
					-40 °C to +85 °C	SG-645PCW / SCW Only
Frequency tolerance		f_tol	B: ±50 × 10⁻⁶ C: ±100 × 10⁻⁶			-20 °C to +70 °C *1
			—		M: ±100 × 10⁻⁶	-40 °C to +85 °C : SG-645PCW / SCW Only
Current consumption		Icc	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 µA Max.			S̄T̄ =GND (STW,SHW,SCW)
Symmetry		SYM	—	40 % to 60 %		50 % Vcc level, L_CMOS=Max.
			40 % to 60 %	—		1.4 V level, L_CMOS=Max.
High output voltage		VOH	Vcc-0.4 V Min.			IOH=-16 mA(PTW , STW , PHW , SHW) /-8 mA(PCW , SCW)
Low output voltage		VOL	0.4 V Max.			IOL= 16 mA(PTW , STW , PHW , SHW) / 8 mA(PCW , SCW)
Output load condition (TTL)		L_TTL	5 TTL Max.	—	—	fo≤ 90 MHz, Max.Supply voltage.
Output load condition (CMOS)		L_CMOS	15 pF Max.			Max.frequency, Max.Supply voltage.
Output enable / disable input voltage		VIH	2.0 V Min.		70 % Vcc Min.	OE Terminal or S̄T̄ Terminal
		VIL	0.8 V Max.		20 % Vcc Max.	
Rise time / Fall time		tr / tf	—	4 ns Max.		20 % Vcc to 80 % Vcc level, L_CMOS ≤ 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	±5 × 10⁻⁶ / year Max.			+25 °C, Vcc=5.0 V / 3.3 V, First year

*1 SG-636 series "C" tolerance : 40 MHz<f_0≤135 MHz

External dimensions   (Unit:mm)

● **SG-645 series**

7.1±0.2

E135.00C
PCW 0245A

4.6±0.2 / 5.1±0.2

0.4   5.08   1.5 Max.   0 Min.

(0.75)   3.8   (0.75)

Pin map

Pin	Connection
1	OE or S̄T̄
2	GND
3	OUT
4	VCC

● **SG-636 series**

10.5 Max.

E 18.4320C
PTF9352A

5.0 / 5.8 Max.

0.51   5.08   2.7 Max.   0.05Min.

(1.0)   3.6   (1.0)

Pin map

Pin	Connection
1	OE or S̄T̄
2	GND
3	OUT
4	VCC
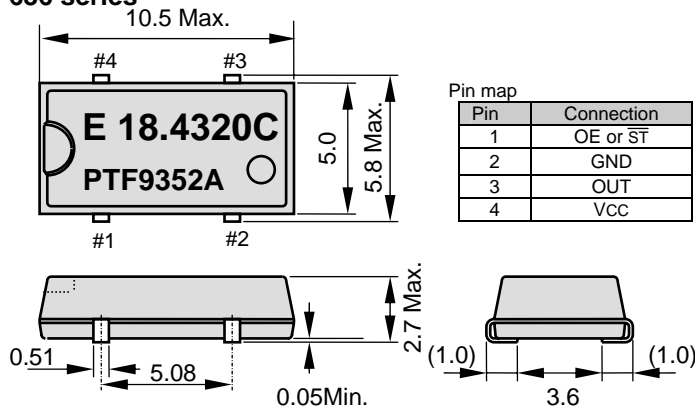
Metal may be exposed on the top or bottom of this product.
This will not affect any quality, reliability or electrical spec.

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.

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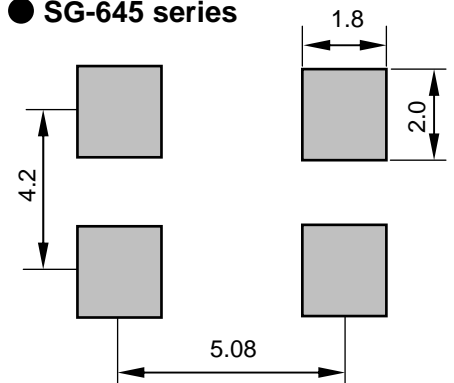S̄T̄ pin = "L" : Output is low level (weak pull - down),oscillation stops.

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

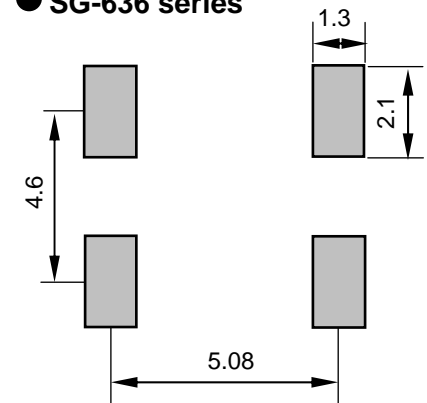## Footprint (Recommended)   (Unit:mm)

● **SG-645 series**

1.8 / 2.0 / 4.2 / 5.08

● **SG-636 series**

1.3 / 2.1 / 4.6 / 5.08

To maintain stable operation, provide a 0.01uF to 0.1uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between Vcc - GND).

"QMEMS" EPSON TOYOCOM

In order to meet customer needs in a rapidly advancing digital, broadband and ubiquitous society, we are committed to offering products that are one step ahead of the market and a rank above the rest in quality. To achieve our goals, we follow a "3D (three device) strategy" designed to drive both horizontal and vertical growth. We will to grow our three device categories of "Timing Devices", "Sensing Devices" and "Optical Devices", and expand vertical growth through a combination of products from these categories.

A Quartz MEMS is any high added value quartz device that exploits the characteristics of quartz crystal material but that is produced using MEMS (micro-electro-mechanical system) processing technology.

Market needs are advancing faster than previously imagined toward smaller, more stable crystal products, but we will stay ahead of the curve by rolling out products that exceed market speed and quality requirements. We want to further accelerate the 3D strategy by QMEMS.

Quartz devices have become crucial in the network environment where products are increasingly intended for broadband, ubiquitous applications and where various types of terminals can transfer information almost immediately via LAN and WAN on a global scale. Epson Toyocom Corporation addresses every single aspect within a network environment. The new corporation offers "Digital Convergence" solutions to problems arising with products for consumer use, such as, core network systems and automotive systems.

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PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Epson Toyocom, 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,

Epson Toyocom 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	►Pb free.

RoHS Compliant	►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.)

For Automotive	►The products have been designed for high reliability applications such as Automotive.

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