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) Standby($\overline{ST}$)
- Thickness : SG-645:1.5 mm Max.
  SG-636:2.7 mm Max.

RoHS Compliant

Actual size

SG-645 series	SG-636 series
	

Specifications (characteristics)

Item		Symbol	Specifications				Remarks
			SG-636 PTF	SG-636 PH	SG-636 PCE SG-636 SCE	SG-636 PDE	
Output frequency range		f_0	2.21675 MHz to 41.000 MHz	41.001 MHz to 70.000 MHz	2.21675 MHz to 40.000 MHz	2.21675 MHz to 40.000 MHz	
Supply voltage		Vcc	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(osc)	C: ±100 × 10^{-6}				-20 °C to +70 °C
Current consumption		Icc	17 mA Max.	35 mA Max.	9 mA Max.	5 mA Max.	No load condition
Output disable current		I_dis	10 mA Max.	20 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 % Vcc level
			45 % to 55 %	—			TTL load: 1.4 V level
High output voltage		VOH	Vcc-0.4 V Min.				IOH=-8 mA(PTF)/-4 mA(PH,SCE,PCE), /-3.2 mA(PDE)
Low output voltage		VOL	0.4 V Max.				IOL=16 mA(PTF)/4mA(PH,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.	20 pF Max.(≤55 MHz) 15 pF Max.(>55 MHz)	30 pF Max.	15 pF Max.	
Output enable / disable input voltage		VIH	2.0 V Min.		80 % Vcc Min.		OE Terminal, $\overline{ST}$ Terminal (SCE)
		VIL	0.8 V Max.		20 % Vcc Max.		
Output rise and fall time		tr / tf	7 ns Max.	5 ns Max.			CMOS load:20 % Vcc to 80 % Vcc level
			5 ns Max.	—			TTL load:0.4 V to 2.4 V level
Oscillation start up time		tosc	4 ms Max.	10 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, Vcc=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		Vcc	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(osc)	B: ±50 × 10^{-6} C: ±100 × 10^{-6}			-20 °C to +70 °C
Current consumption		Icc	25 mA Max.		12 mA Max.	No load condition
Output disable current		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 % Vcc level, L_CMOS=25 pF
			40 % to 60 %	—		1.4 V level, L_CMOS=25 pF
High output voltage		VOH	2.4 V Min.	—	Vcc-0.4 V Min.	IOH=-8 mA
			—	Vcc-0.4 V Min.	—	IOH=-16 mA
Low output voltage		VOL	—		0.4 V Max.	IOL=8 mA
			0.4 V Max.		—	IOL=16 mA
Output load condition		L_CMOS	25 pF Max.			
Output enable / disable input voltage		VIH	2.0 V Min.		70 % Vcc Min.	OE Terminal , $\overline{ST}$ Terminal
		VIL	0.8 V Max.		20 % Vcc Max.	
Output rise and fall time		tr / tf	—	3.4 ns Max.	4 ns Max.	20 % Vcc to 80 % Vcc level, L_CMOS ≤ 25 pF
			2.4 ns Max.	—		TTL load:0.4 V to 2.4 V level, L_CMOS ≤ 25 pF
Oscillation start up time		tosc	12 ms Max.			t=0 at 90 % Vcc
Frequency aging		f_aging	±5 × 10^{-6} / year Max.			+25 °C, Vcc=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

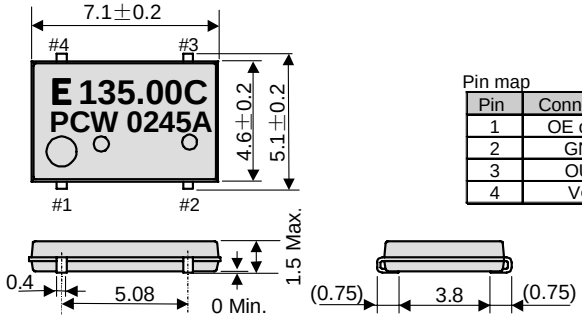
Specifications (characteristics)

Item		Symbol	Specifications			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			
Supply voltage		V_{CC}	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(osc)	B: $\pm50 \times 10^{-6}$ C: $\pm100 \times 10^{-6}$			-20 °C to +70 °C *1
			—		M: $\pm50 \times 10^{-6}$	-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)
Output disable current		I_dis	30 mA Max.		16 mA Max.	OE=GND (PTW,PHW,PCW)
Stand-by current		I_std	50 µA Max.			$\overline{ST}$ =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.
High output voltage		V_{OH}	V_{CC}-0.4 V Min.			I_{OH}=-16 mA(PTW , STW , PHW , SHW) /-8 mA(PCW , SCW)
Low output voltage		V_{OL}	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≤ 90 MHz, Max.Supply voltage.
Output load condition (CMOS)		L_CMOS	15 pF Max.			Max.frequency, Max.Supply voltage.
Output enable / disable input voltage		V_{IH}	2.0 V Min.		70 % V_{CC} Min.	OE Terminal , $\overline{ST}$ Terminal
		V_{IL}	0.8 V Max.		20 % V_{CC} Max.	
Output rise and fall time		t_r / t_f	—	4 ns Max.		20 % V_{CC} to 80 % V_{CC} level, L_CMOS ≤ Max.
			4 ns Max.	—	—	0.4 V to 2.4 V level
Oscillation start up time		t_{OSC}	10 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, First year

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

External dimensions (Unit:mm)

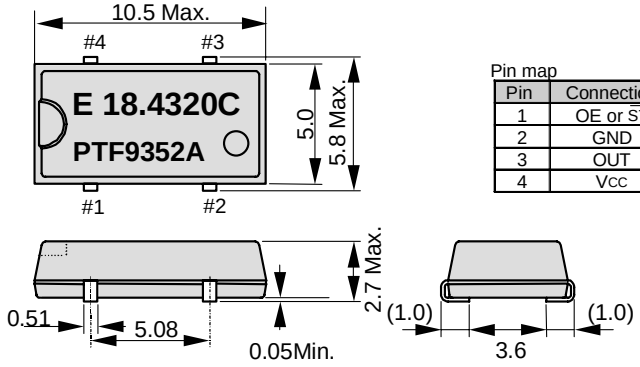
SG-645 series



Pin map

Pin	Connection
1	OE or $\overline{ST}$
2	GND
3	OUT
4	V_{CC}

SG-636 series



Pin map

Pin	Connection
1	OE or $\overline{ST}$
2	GND
3	OUT
4	V_{CC}

Metal may be exposed on the top or bottom of this product.
This will not affect any quality, reliability or electrical spec.

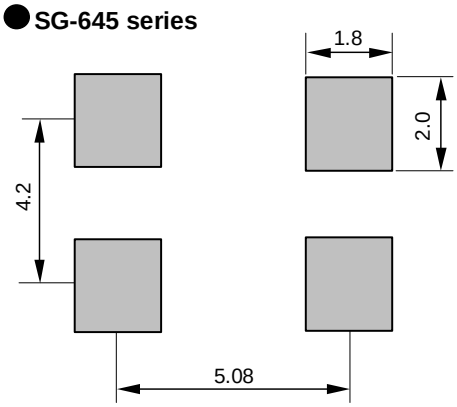
Note.
OE pin (PTF,PH,PCE,PDE,PTW,PHW,PCW,PTG,PHG,PCG)
OE pin = "H" or "open" : Specified frequency output.
OE pin = "L" : Output is high impedance.

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

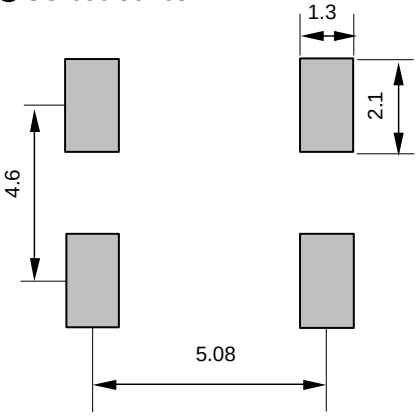
$\overline{ST}$ pin (SCE)
$\overline{ST}$ pin = "H" or "open" : Specified frequency output.
$\overline{ST}$ pin = "L" : Output is low level ,oscillation stops.

Footprint (Recommended) (Unit:mm)

SG-645 series



SG-636 series



“Quartz + MEMS” 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.

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.
In the future, new group companies will be expected to acquire the certification around the third year of operations.

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.

QS-9000 is an enhanced standard for quality assurance systems formulated by leading U.S.automobile manufacturers based on the international ISO 9000 series.

ISO/TS 16949 is a global standard based on QS-9000, a severe standard corresponding to the requirements from the automobile industry.

Notice