

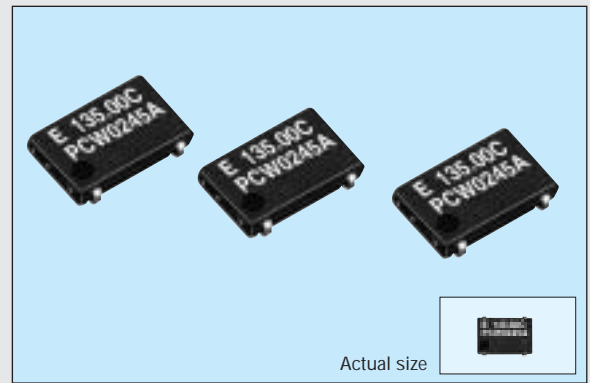
SOJ HIGH-FREQUENCY CRYSTAL OSCILLATOR

SG-645 series

Product number (Please refer to P1)

Q33645xxxxxx00

- Reflowable and high-density mounting-type SMD.
- Operable 3.3 V or 5.0 V.
- Output frequency from 2.5 MHz to 135 MHz.
- Output enable (OE:P type) or Standby (ST:S Type) function allow more low current consumption.



Specifications (characteristics)

Item	Symbol	Specifications			Remarks	
		SG-645PTG	SG-645PHG	SG-645PCG/SCG		
Output frequency range	f ₀	2.5000 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 +125 °C		Stored as bare product after unpacking	
	Operating temperature	T _{OPR}	-40 °C to +85 °C		Refer to page 31. "Frequency range"	
Frequency stability	Δf/f ₀	B : ±50 x 10 ⁻⁶ C : ±100 x 10 ⁻⁶			-20 °C to +70 °C	
		M : ±100 x 10 ⁻⁶			-40 °C to +85 °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 μA 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 Min.	—	I _{OH} = -16 mA	
Output load condition (fan out)	CL	0.4 V Max.	0.4 V Max.		I _{OL} = 8 mA	
		—	—		I _{OL} = 16 mA	
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 ≤ 25 pF
	TTL level		1.2 ns Max.	—	—	0.8 V to 2.0 V CL ≤ 25 pF
Output fall time	CMOS level	t _{THL}	—	3.4 ns Max.	4.0 ns Max.	80 % to 20 % V _{DD} CL ≤ 25 pF
	TTL level		1.2 ns Max.	—	—	2.0 V to 0.8 V CL ≤ 25 pF
	TTL level	2.4 ns Max.	—	—	2.4 V to 0.4 V CL ≤ 25 pF	
Oscillation start up time	t _{osc}	12 ms Max.			Time at minimum operating voltage to be 0 s	
Aging	fa	±5 x 10 ⁻⁶ Max.			T _a =+25 °C, V _{DD} = 5.5 V / 3.3 V, First year	
Shock resistance	S.R.	±20 x 10 ⁻⁶			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	

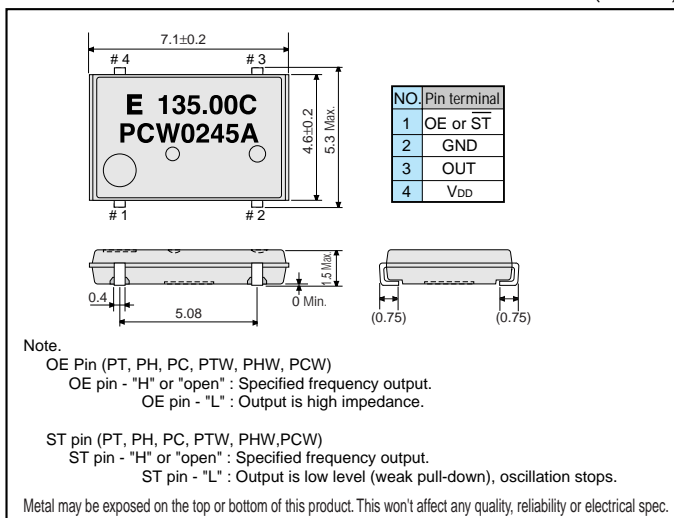
Note: • Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.
• External by-pass capacitor is recommended.

Standard output frequency

2.5	3.375	3.75	5.0	6.75	7.5	10.0	13.5	15.0	20.0	27.0	30.0
2.8125	3.579545	3.84	5.625	7.15909	7.68	11.25	14.31818	15.36	22.5	28.63636	30.72
3.072	3.6864	4.0	6.144	7.3728	8.0	12.288	14.7456	16.0	24.576	29.4912	32.0
3.125	3.6873625	4.096	6.25	7.374725	8.192	12.5	14.74945	16.384	25.0	29.4989	32.768

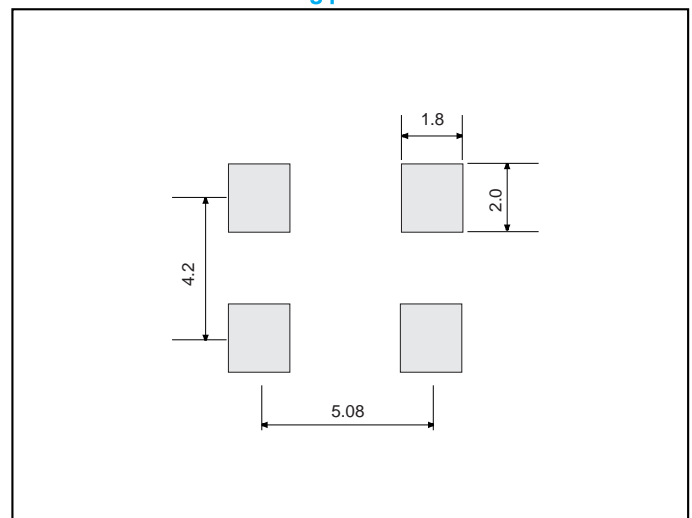
External dimensions

(Unit: mm)



Recommended soldering pattern

(Unit: mm)



■ Specifications (characteristics)

Item	Symbol	Specifications			Remarks	
		SG-645PTW / STW	SG-645PHW / SHW	SG-645PCW / 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}	4.5 V to 5.5 V	3.0 V to 3.6 V		
Temperature range	Storage temperature	T_{STG}	-55 °C to +125 °C		Stored as bare product after unpacking	
	Operating temperature	T_{OPR}	-20 °C to +70 °C	-40 °C to +85 °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	
			—	M : $\pm 100 \times 10^{-6}$	-40 °C to +85 °C	
Current consumption	I_{OP}	45 mA Max.		28 mA Max.	No load condition ($f_o = 135$ MHz)	
Output disable current	I_{OE}	30 mA Max.		16 mA Max.	OE=GND (P*W), $f_o = 135$ MHz	
Standby Current	I_{ST}	50 μ A Max.			ST=GND (S*W)	
Duty	tw/t	—	40 % to 60 %	—	50 % V_{DD} , CL = Max.	
		—	45 % to 55 %	—	50 % V_{DD} , CL = 25 pF ($f_o \leq 66.6667$ MHz)	
		40 % to 60 %	—	—	1.4 V, CL = Max.	
		45 % to 55 %	—	—	1.4 V, 5TTL +15 pF ($f_o \leq 66.6667$ MHz)	
Output voltage	V_{OH}	$V_{DD} - 0.4$ V		$V_{DD} - 0.4$ V	$I_{OH} = -16$ mA(*TW / *HW) $I_{OH} = -8$ mA(*CW)	
	V_{OL}	0.4 V		0.4 V	$I_{OL} = 16$ mA(*TW / *HW) $I_{OL} = 8$ mA(*CW)	
Output load condition (fan out)	CL	15 pF	—	—	($f_o \leq 135$ MHz)	
		5 TTL + 15 pF	—	—	($f_o \leq 90$ MHz)	
		25 pF	—	—	($f_o \leq 66.6667$ MHz)	
		—	15 pF	—	($f_o \leq 135$ MHz)	
		—	25 pF	—	($f_o \leq 90$ MHz)	
Output enable disable input voltage	V_{IH}	2.0 V Max.		70 % V_{DD}	OE or \overline{ST}	
	V_{IL}	0.8 V Max.		20 % V_{DD}		
Output rise time	CMOS level	t_{TLH}	—	4.0 ns	3.0 ns	20 % to 80 % V_{DD} CL = Max.
	TTL level		2.0 ns	—	—	20 % to 80 % V_{DD} CL \leq 25 pF
Output fall time	CMOS level	t_{THL}	—	4.0 ns	3.0 ns	0.8 V to 2.0 V CL = Max.
	TTL level		2.0 ns	—	—	0.4 V to 2.4 V CL = Max.
Oscillation start up time	t_{OSC}		10 ms Max.			
Aging	f_a	$\pm 5 \times 10^{-6}$ / year Max.			$T_a = +25$ °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	