LOW-JITTER SAW OSCILLATOR (SPSO)
OUTPUT : LV-PECL, LVDS, HCSL

Pb Free RoHS Compliant

Product Number
X1M0001x1xxxx00

EG-4121CA
EG-4101CA

- Frequency range : 100 MHz to 700 MHz
- Supply voltage : 2.5 V ··· EG-4121CA
  3.3 V ··· EG-4101CA
- Output : LV-PECL or LVDS or HCSL
- Function : Output enable (OE)
- External dimensions : 7.0 × 5.0 × 1.2 mm

- Very low jitter and low phase noise by SAW unit.

Specifications (characteristics)

►Differential LV-PECL Output

Item	Symbol	EG-4121CA P / EG-4101CA P (LV-PECL)		Conditions / Remarks	
Output frequency range	fo	100 MHz to 700 MHz		Please contact us about available frequencies.	
Supply voltage	V_{CC}	2.5 V ± 0.125 V	3.3 V ± 0.33 V		
Storage temperature	T_stg	-55 C to +125 C		Storage as single product.	
Operating temperature	T_use	W:-40 C to +85 C			
Frequency tolerance	f_tol	G: ± 50 × 10^{-6}			
Current consumption	I_{CC}	60 mA Max.		OE=V_{CC}, L_ECL =50 Ω	
Disable current	I_dis	2 mA Max.		OE=GND	
Symmetry	SYM	45 % to 55 %		at outputs crossing point	
Output voltage	V_{OH}	1.55 V Typ.	2.35 V Typ.	DC characteristics	
		V_{CC}-1.025 V to V_{CC}-0.88 V			
	V_{OL}	0.8 V Typ.	1.6 V Typ.		
		V_{CC}-1.81 V to V_{CC}-1.62 V			
Output load condition (ECL)	L_ECL	50 Ω		Terminated to V_{CC} -2.0 V	
Input voltage	V_{IH}	70 % V_{CC} Min.		OE terminal	
	V_{IL}	30 % V_{CC} Max.			
Rise time / Fall time	tr / tf	400 ps Max.		Between 20 % and 80 % of (V_{OH}-V_{OL})	
Start-up time	t_str	10 ms Max.		Time at minimum supply voltage to be 0 s	
Phase Jitter	t_{PJ}	0.23 ps Max.		100 MHz ≤ fo < 150 MHz	Offset frequency: 12 kHz to 20 MHz
		0.22 ps Max.		150 MHz ≤ fo < 200 MHz	
		0.21 ps Max.		200 MHz ≤ fo < 300 MHz	
		0.18 ps Max.		300 MHz ≤ fo < 400 MHz	
		0.16 ps Max.		400 MHz ≤ fo < 500 MHz	
		0.14 ps Max.		500 MHz ≤ fo < 600 MHz	
		0.10 ps Max.		600 MHz ≤ fo ≤ 700 MHz	

►LVDS Output

Item	Symbol	EG-4121CA L / EG-4101CA L (LVDS)		Conditions / Remarks	
Output frequency range	fo	100 MHz to 700 MHz		Please contact us about available frequencies.	
Supply voltage	V_{CC}	2.5 V ± 0.125 V	3.3 V ± 0.33 V		
Storage temperature	T_stg	-55 C to +125 C		Storage as single product.	
Operating temperature	T_use	W:-40 C to +85 C			
Frequency tolerance	f_tol	G: ± 50 × 10^{-6}			
Current consumption	I_{CC}	30 mA Max		OE=V_{CC}, L_LVDS=100 Ω	
Disable current	I_dis	15 mA Max		OE=GND	
Symmetry	SYM	45 % to 55 %		at outputs crossing point	
Output voltage	V_{OD}	350 mV Typ. 247 mV to 454 mV		V_{OD1}, V_{OD2}	DC characteristics
	dV_{OD}	50 mV Max.		dV_{OD} = | V_{OD1}-V_{OD2} |	
	V_{OS}	1.25 V Typ. 1.125 V to 1.375 V		V_{OS1}, V_{OS2}	
	dV_{OS}	150 mV Max.		dV_{OS} = | V_{OS1}-V_{OS2} |	
Output load condition (LVDS)	L_LVDS	100 Ω		Connected between OUT to $\overline{OUT}$	
Input voltage	V_{IH}	70 % V_{CC} Min.		OE terminal	
	V_{IL}	30 % V_{CC} Max.			
Rise time / Fall time	tr / tf	400 ps Max.		Between 20 % and 80 % of Differential Output Peak to Peak voltage.	
Start-up time	t_str	10 ms Max.		Time at minimum supply voltage to be 0 s	
Phase Jitter	t_{PJ}	0.27 ps Max.		100 MHz ≤ fo < 150 MHz	Offset frequency: 12 kHz to 20 MHz
		0.24 ps Max.		150 MHz ≤ fo < 200 MHz	
		0.23 ps Max.		200 MHz ≤ fo < 300 MHz	
		0.19 ps Max.		300 MHz ≤ fo < 400 MHz	
		0.16 ps Max.		400 MHz ≤ fo < 500 MHz	
		0.14 ps Max.		500 MHz ≤ fo < 600 MHz	
		0.10 ps Max.		600 MHz ≤ fo ≤ 700 MHz	

►HCSL Output

Item	Symbol	EG-4121CA H	EG-4101CA H	Conditions / Remarks
		HCSL		
Output frequency range	fo	100 MHz to 200 MHz		Please contact us about available frequencies.
Supply voltage	V_{CC}	2.5 V ± 0.125 V	3.3 V ± 0.3 V	
Storage temperature	T_stg	-55 C to +125 C		Storage as single product.
Operating temperature	T_use	W:-40 C to +85 C		
Frequency tolerance	f_tol	G: ± 50 × 10^{-6}		
Current consumption	I_{CC}	35 mA Max.		OE=V_{CC}, L_HCSL=50 Ω
Disable current	I_dis	15 mA Max.		OE=GND
Symmetry	SYM	45 % to 55 %		at outputs crossing point
Output Voltage	V_{OH}	0.75 V Typ.		DC characteristics
	V_{OL}	-0.3 V Typ.		
Output load condition (HCSL)	L_HCSL	50 Ω		Terminated to GND
Input voltage	V_{IH}	70 % V_{CC} Min.		OE terminal
	V_{IL}	30 % V_{CC} Max.		
Rise time / Fall time	tr / tf	500 ps Max.		Between 0.175 V and 0.525 V of output
Start-up time	t_str	10 ms Max.		Time at minimum supply voltage to be 0 s
Phase Jitter	t_{PJ}	0.3 ps Max.	fo ≤ 160 MHz	Offset frequency: 12 kHz to 20 MHz
		0.4 ps Max.	160 MHz < fo ≤ 175 MHz	
		0.2 ps Max.	fo >175 MHz	

Product Name (Standard form): EG-4121 CA 250.000000MHz P G W A
① ② ③ ④⑤⑥⑦

①Model ②Package type ③Frequency
④Output(P:LV-PECL, L:LVDS, H: HCSL)
⑤Frequency tolerance ⑥Operating temperature
⑦Frequency aging (A*1: Frequency tolerance include aging)

⑤Frequency tolerance	
G	±50 × 10^{-6}

⑥Operating temp.	
W	-40 °C to +85 °C

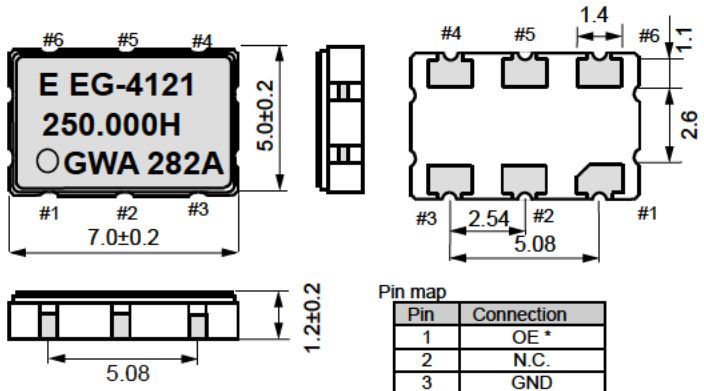
*1 This includes initial frequency tolerance, temperature variation, supply voltage change, reflow drift, and aging(+25 C,10 years).

Table 2 Jitter

Item	Symbol	Specifications	Remarks
Jitter *	t_{DJ}	0.3 ps Typ.	Deterministic Jitter
	t_{RJ}	2 ps Typ.	Random Jitter
	t_{RMS}	2 ps Typ.	σ (RMS of total distribution)
	t_{p-p}	20 ps Typ.	Peak to Peak
	t_{acc}	3 ps Typ.	Accumulated Jitter(σ) n=2 to 50 000 cycles

* Tested using a DTS-2075 Digital timing system made by WAVECREST with jitter analysis software VISI6. : LV-PECL, LVDS output
* Based on SIA-3100C signal integrity analyzer made from WAVECREST. : HCSL output

External dimensions (Unit:mm)



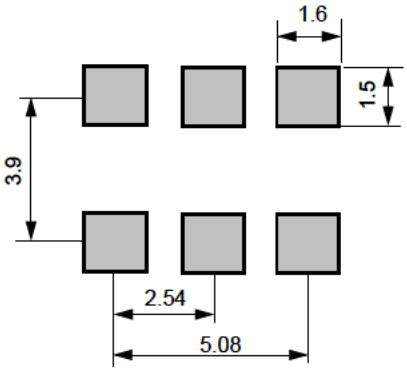
Pin map

Pin	Connection
1	OE *
2	N.C.
3	GND
4	OUT
5	$\overline{OUT}$
6	V_{CC}

OE pin = HIGH : Specified frequency output.
OE pin = LOW : Output is high impedance
#3 is connected to the cover.

*) Standby function is built-in
(Only LV-PECL output model).

Footprint (Recommended) (Unit:mm)



To maintain stable operation, provide a 0.01 µF to 0.1 µF 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 IATF 16949 certification that is requested strongly by major automotive manufacturers as standard.

IATF 16949 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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