

LOW-JITTER SAW OSCILLATOR (SPSO)

OUTPUT : LV-PECL, LVDS, HCSSL



Product Number
 EG-2121CA: Q3805CAx0xxxx00
 : X1M000101xxxx00
 EG-2102CA: Q3806CA00xxxx00
 : X1M000091xxxx00

EG-2121CA
EG-2102CA



- Frequency range : 53.125 MHz to 700 MHz
- Supply voltage : 2.5 V ... EG-2121CA
3.3 V ... EG-2102CA
- Output : LV-PECL or LVDS or HCSSL
- 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-2121CA		EG-2102CA		Conditions / Remarks
		LV-PECL				
Output frequency range	f _o	53.125 MHz to 500 MHz		100 MHz to 700 MHz		Please contact us about available frequencies.
Supply voltage	V _{CC}	2.5 V ± 0.125 V		3.3 V ± 0.3 V		
Storage temperature	T _{stg}	-40 C to +100 C				Storage as single product.
Operating temperature	T _{use}	P: 0 C to +70 C, R: -5 C to +85 C, S: -20 C to +70 C				
Frequency tolerance	f _{tol}	G: ± 50 × 10 ⁻⁶ , H: ± 100 × 10 ⁻⁶				
Current consumption	I _{CC}	80 mA Max.		100 mA Max.		OE=V _{CC} , L ECL=50 Ω
Disable current	I _{dis}	20 mA Max.		32 mA Max.		OE=GND
Symmetry	SYM	P: 40 % to 60 % (f _o > 350 MHz)		P: 45 % to 55 %		at outputs crossing point
		P: 45 % to 55 % (f _o ≤ 350 MHz)				
		D: 48 % to 52 % (f _o ≤ 175 MHz)				
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.		
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	t _r / t _f	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}	0.8 ps Max.				f _o < 100 MHz
		0.5 ps Max.				100 MHz ≤ f _o < 200 MHz
		0.3 ps Max.				200 MHz ≤ f _o
Frequency aging	f _{aging}	± 10 × 10 ⁻⁶ / year Max.				+25 C, First year, V _{CC} =2.5 V, 3.3 V

► LVDS Output

Item	Symbol	EG-2121CA		EG-2102CA		Conditions / Remarks
		LVDS				
Output frequency range	f _o	53.125 MHz to 700 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}	-40 C to +100 C				Storage as single product.
Operating temperature	T _{use}	P: 0 C to +70 C, R: -5 C to +85 C, S: -20 C to +70 C				
Frequency tolerance	f _{tol}	G: ± 50 × 10 ⁻⁶ , H: ± 100 × 10 ⁻⁶				
Current consumption	I _{CC}	30 mA Max.		45 mA Max.		OE=V _{CC} , L LVDS= 100 Ω
Disable current	I _{dis}	20 mA Max.		30 mA Max.		OE=GND
Symmetry	SYM	L: 40 % to 60 % (f _o > 350 MHz)		L: 40 % to 60 % (f _o > 350 MHz)		at outputs crossing point
		L: 45 % to 55 % (f _o ≤ 350 MHz)				
		V: 48 % to 52 % (f _o ≤ 175 MHz)				
Output voltage	V _{OD}	350 mV Typ. 247 mV to 454 mV				DC characteristics
	dV _{OD}	50 mV Max.				
	V _{OS}	1.25 V Typ. 1.125 V to 1.375 V				
	dV _{OS}	150 mV Max.				
Output load condition (LVDS)	L _{LVDS}	100 Ω				Connected between OUT to $\overline{\text{OUT}}$
Input voltage	V _{IH}	70 % V _{CC} Min.				OE terminal
	V _{IL}	30 % V _{CC} Max.				
Rise time / Fall time	t _r / t _f	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}	0.8 ps Max.				f _o < 100 MHz
		0.5 ps Max.				100 MHz ≤ f _o < 200 MHz
		0.3 ps Max.				200 MHz ≤ f _o
Frequency aging	f _{aging}	± 10 × 10 ⁻⁶ / year Max.				+25 C, First year, V _{CC} =2.5 V, 3.3 V

► HCSL Output

Item	Symbol	EG-2121CA		EG-2102CA		Conditions / Remarks
		HCSL				
Output frequency range	fo	100 MHz to 350 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}	-40 °C to +125 °C				Storage as single product.
Operating temperature	T _{use}	P: 0 °C to +70 °C, R: -5 °C to +85 °C, S: -20 °C to +70 °C				
Frequency tolerance	f _{tol}	G: ±50 × 10 ⁻⁶ , H: ±100 × 10 ⁻⁶				at outputs crossing point
Current consumption	I _{CC}	80 mA Max.		85 mA Max.		
Disable current	I _{dis}	20 mA Max.		35 mA Max.		OE=GND
Symmetry	SYM	45 % to 55 %				DC characteristics
Output Voltage	V _{OH} V _{OL}	0.75 V Typ. -0.3 V Typ.				
Output load condition (HCSL)	L _{HCSL}	50 Ω				Terminated to GND
Input voltage	V _{IH} V _{IL}	70 % V _{CC} Min. 30 % V _{CC} Max.				OE terminal
Rise time / Fall time	t _r / t _f	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}	0.8 ps Max.				Offset frequency: 12 kHz to 20 MHz
		0.5 ps Max.				
		0.3 ps Max.				
Frequency aging *2	f _{aging}	± 10 × 10 ⁻⁶ / year Max.				+25 °C, First year, V _{CC} =2.5 V, 3.3 V

Product Name EG-2121 CA 250.00000MHz P G P A

(Standard form)

- ① Model ② Package type ③ Frequency
 ④ Output/Symmetry ⑤ Frequency tolerance ⑥ Operating temperature
 ⑦ Frequency aging (A*1: Frequency tolerance include aging, N*2: Frequency tolerance exclude aging)

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

*2 This includes initial frequency tolerance, temperature variation, supply voltage change, and reflow drift(except aging).

(⑤⑥⑦): GRA, GSA are not available)

(⑤⑥): As for LV-PECL and LVDS output, for 53.125 MHz ≤ fo < 100 MHz only HP is available)

④ Symbol	Output	Symmetry	
		EG-2121CA	EG-2102CA
P	LV-PECL	40 % to 60 % (fo > 350 MHz)	45 % to 55 %
		45 % to 55 % (fo ≤ 350 MHz)	
D	LV-PECL	48 % to 52 % (fo ≤ 175 MHz)	
L	LVDS	40 % to 60 % (fo > 350 MHz)	45 % to 55 % (fo ≤ 350 MHz)
		45 % to 55 % (fo ≤ 350 MHz)	
V	LVDS	48 % to 52 % (fo ≤ 175 MHz)	
H	HCSL	45 % to 55 %	

⑤ Frequency tolerance	
G	±50 × 10 ⁻⁶
H	±100 × 10 ⁻⁶

⑥ Operating temperature	
P	0 °C to +70 °C
R	-5 °C to +85 °C
S	-20 °C to +70 °C

Table 2 Jitter

Item	Symbol	Specifications	Remarks
Jitter *	t _{DJ}	0.2 ps Typ.	Deterministic Jitter
	t _{RJ}	3 ps Typ.	Random Jitter
	t _{RMS}	3 ps Typ.	σ (RMS of total distribution)
	t _{p-p}	25 ps Typ.	Peak to Peak
	t _{acc}	4 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. : Differential LV-PECL, LVDS output

* Based on SIA-3100C signal integrity analyzer made from WAVECREST. : HCSL output

External dimensions

(Unit:mm)

Pin	Connection
1	OE
2	N.C.
3	GND
4	OUT
5	OUT
6	V _{CC}

#3 is connected to the cover.

OE pin = HIGH : Specified frequency output.
 OE pin = LOW : Output is high impedance

Footprint (Recommended)

(Unit:mm)

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 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.

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► 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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