

**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 <sub>o</sub>	53.125 MHz to 500 MHz		100 MHz to 700 MHz		Please contact us about available frequencies.	
Supply voltage	V <sub>CC</sub>	2.5 V ± 0.125 V		3.3 V ± 0.3 V			
Storage temperature	T <sub>stg</sub>	-40 C to +100 C				Storage as single product.	
Operating temperature	T <sub>use</sub>	P: 0 C to +70 C, R: -5 C to +85 C, S: -20 C to +70 C					
Frequency tolerance	f <sub>tol</sub>	G: ± 50 × 10 <sup>-6</sup> , H: ± 100 × 10 <sup>-6</sup>					
Current consumption	I <sub>CC</sub>	80 mA Max.		100 mA Max.		OE=V <sub>CC</sub> , L ECL=50 Ω	
Disable current	I <sub>dis</sub>	20 mA Max.		32 mA Max.		OE=GND	
Symmetry	SYM	P: 40 % to 60 % (f <sub>o</sub> > 350 MHz)		P: 45 % to 55 %		at outputs crossing point	
		P: 45 % to 55 % (f <sub>o</sub> ≤ 350 MHz)					
		D: 48 % to 52 % (f <sub>o</sub> ≤ 175 MHz)					
Output voltage	V <sub>OH</sub>	1.55 V Typ.		2.35 V Typ.		DC characteristics	
	V <sub>CC</sub> -1.025 V to V <sub>CC</sub> -0.88 V						
	V <sub>OL</sub>	0.8 V Typ.		1.6 V Typ.			
Output load condition (ECL)	L <sub>ECL</sub>	50 Ω				Terminated to V <sub>CC</sub> -2.0 V	
Input voltage	V <sub>IH</sub>	70 % V <sub>CC</sub> Min.				OE terminal	
	V <sub>IL</sub>	30 % V <sub>CC</sub> Max.					
Rise time / Fall time	t <sub>r</sub> / t <sub>f</sub>	400 ps Max.				Between 20 % and 80 % of (V <sub>OH</sub> -V <sub>OL</sub> )	
Start-up time	t <sub>str</sub>	10 ms Max.				Time at minimum supply voltage to be 0 s	
Phase Jitter	t <sub>pj</sub>	0.8 ps Max.				f <sub>o</sub> < 100 MHz	Offset frequency: 12 kHz to 20 MHz
		0.5 ps Max.				100 MHz ≤ f <sub>o</sub> < 200 MHz	
		0.3 ps Max.				200 MHz ≤ f <sub>o</sub>	
Frequency aging	f <sub>aging</sub>	± 10 × 10 <sup>-6</sup> / year Max.				+25 C, First year, V <sub>CC</sub> =2.5 V, 3.3 V	

► LVDS Output

Item	Symbol	EG-2121CA		EG-2102CA		Conditions / Remarks	
		LVDS					
Output frequency range	f <sub>o</sub>	53.125 MHz to 700 MHz				Please contact us about available frequencies.	
Supply voltage	V <sub>CC</sub>	2.5 V ± 0.125 V		3.3 V ± 0.3 V			
Storage temperature	T <sub>stg</sub>	-40 C to +100 C				Storage as single product.	
Operating temperature	T <sub>use</sub>	P: 0 C to +70 C, R: -5 C to +85 C, S: -20 C to +70 C					
Frequency tolerance	f <sub>tol</sub>	G: ± 50 × 10 <sup>-6</sup> , H: ± 100 × 10 <sup>-6</sup>					
Current consumption	I <sub>CC</sub>	30 mA Max.		45 mA Max.		OE=V <sub>CC</sub> , L LVDS= 100 Ω	
Disable current	I <sub>dis</sub>	20 mA Max.		30 mA Max.		OE=GND	
Symmetry	SYM	L: 40 % to 60 % (f <sub>o</sub> > 350 MHz)		L: 40 % to 60 % (f <sub>o</sub> > 350 MHz)		at outputs crossing point	
		L: 45 % to 55 % (f <sub>o</sub> ≤ 350 MHz)					
		V: 48 % to 52 % (f <sub>o</sub> ≤ 175 MHz)					
Output voltage	V <sub>OD</sub>	350 mV Typ. 247 mV to 454 mV				DC characteristics	
	dV <sub>OD</sub>	50 mV Max.					
	V <sub>OS</sub>	1.25 V Typ. 1.125 V to 1.375 V					
	dV <sub>OS</sub>	150 mV Max.					
Output load condition (LVDS)	L <sub>LVDS</sub>	100 Ω				Connected between OUT to $\overline{\text{OUT}}$	
Input voltage	V <sub>IH</sub>	70 % V <sub>CC</sub> Min.				OE terminal	
	V <sub>IL</sub>	30 % V <sub>CC</sub> Max.					
Rise time / Fall time	t <sub>r</sub> / t <sub>f</sub>	400 ps Max.				Between 20 % and 80 % of Differential Output Peak to Peak voltage	
Start-up time	t <sub>str</sub>	10 ms Max.				Time at minimum supply voltage to be 0 s	
Phase Jitter	t <sub>pj</sub>	0.8 ps Max.				f <sub>o</sub> < 100 MHz	Offset frequency: 12 kHz to 20 MHz
		0.5 ps Max.				100 MHz ≤ f <sub>o</sub> < 200 MHz	
		0.3 ps Max.				200 MHz ≤ f <sub>o</sub>	
Frequency aging	f <sub>aging</sub>	± 10 × 10 <sup>-6</sup> / year Max.				+25 C, First year, V <sub>CC</sub> =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 <sub>CC</sub>	2.5 V ± 0.125 V		3.3 V ± 0.3 V		
Storage temperature	T <sub>stg</sub>	-40 °C to +125 °C				Storage as single product.
Operating temperature	T <sub>use</sub>	P: 0 °C to +70 °C, R: -5 °C to +85 °C, S: -20 °C to +70 °C				
Frequency tolerance	f <sub>tol</sub>	G: ±50 × 10 <sup>-6</sup> , H: ±100 × 10 <sup>-6</sup>				
Current consumption	I <sub>CC</sub>	80 mA Max.		85 mA Max.		OE=V <sub>CC</sub> , L HCSL=50 Ω
Disable current	I <sub>dis</sub>	20 mA Max.		35 mA Max.		OE=GND
Symmetry	SYM	45 % to 55 %				at outputs crossing point
Output Voltage	V <sub>OH</sub>	0.75 V Typ.				DC characteristics
	V <sub>OL</sub>	-0.3 V Typ.				
Output load condition (HCSL)	L HCSL	50 Ω				Terminated to GND
Input voltage	V <sub>IH</sub>	70 % V <sub>CC</sub> Min.				OE terminal
	V <sub>IL</sub>	30 % V <sub>CC</sub> Max.				
Rise time / Fall time	t <sub>r</sub> / t <sub>f</sub>	500 ps Max.				Between 0.175 V and 0.525 V of output
Start-up time	t <sub>str</sub>	10 ms Max.				Time at minimum supply voltage to be 0 s
Phase Jitter	t <sub>pj</sub>	0.8 ps Max.				Offset frequency: 12 kHz to 20 MHz
		0.5 ps Max.				
		0.3 ps Max.				
Frequency aging *2	f <sub>aging</sub>	± 10 × 10 <sup>-6</sup> / year Max.				+25 °C, First year, V <sub>CC</sub> =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)	48 % to 52 %(fo ≤ 350 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 <sup>-6</sup>
H	±100 × 10 <sup>-6</sup>

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 <sub>DJ</sub>	0.2 ps Typ.	Deterministic Jitter
	t <sub>RJ</sub>	3 ps Typ.	Random Jitter
	t <sub>RMS</sub>	3 ps Typ.	σ (RMS of total distribution)
	t <sub>p-p</sub>	25 ps Typ.	Peak to Peak
	t <sub>acc</sub>	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.

\* Based on SIA-3100C signal integrity analyzer made from WAVECREST.

○ : Differential LV-PECL, LVDS output  
 □ : HCSL output

External dimensions

(Unit:mm)



Footprint (Recommended)

(Unit:mm)



## 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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	► 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.
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