

**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>	V <sub>CC</sub> -1.81 V to V <sub>CC</sub> -1.62 V				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)	
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.    : 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 <sub>CC</sub>

#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<sub>CC</sub> - 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 ).

NOTICE : PLEASE READ CAREFULLY BELOW BEFORE THE USE OF THIS DOCUMENT ©Seiko Epson Corporation 2020

- The content of this document is subject to change without notice. Before purchasing or using Epson products, please contact with sales representative of Seiko Epson Corporation ("Epson") for the latest information and be always sure to check the latest information published on Epson's official web sites and resources.
- This document may not be copied, reproduced, or used for any other purposes, in whole or in part, without Epson's prior consent.
- Information provided in this document including, but not limited to application circuits, programs and usage, is for reference purpose only. Epson makes no guarantees against any infringements or damages to any third parties' intellectual property rights or any other rights resulting from the information. This document does not grant you any licenses, any intellectual property rights or any other rights with respect to Epson products owned by Epson or any third parties.
- Using Epson products, you shall be responsible for safe design in your products; that is, your hardware, software, and/or systems shall be designed enough to prevent any critical harm or damages to life, health or property, even if any malfunction or failure might be caused by Epson products. In designing your products with Epson products, please be sure to check and comply with the latest information regarding Epson products (including, but not limited to this document, specifications, data sheets, manuals, and Epson's web site). Using technical contents such as product data, graphic and chart, and technical information, including programs, algorithms and application circuit examples under this document, you shall evaluate your products thoroughly both in stand-alone basis and within your overall systems. You shall be solely responsible for deciding whether to adopt/use Epson products with your products.
- Epson has prepared this document carefully to be accurate and dependable, but Epson does not guarantee that the information is always accurate and complete. Epson assumes no responsibility for any damages you incurred due to any misinformation in this document.
- No dismantling, analysis, reverse engineering, modification, alteration, adaptation, reproduction, etc., of Epson products is allowed.
- Epson products have been designed, developed and manufactured to be used in general electronic applications and specifically designated applications ("Anticipated Purpose"). Epson products are NOT intended for any use beyond the Anticipated Purpose that requires particular quality or extremely high reliability in order to refrain from causing any malfunction or failure leading to critical harm to life and health, serious property damage, or severe impact on society, including, but not limited to listed below ("Specific Purpose"). Therefore, you are strongly advised to use Epson products only for the Anticipated Purpose. Should you desire to purchase and use Epson products for Specific Purpose, Epson makes no warranty and disclaims with respect to Epson products, whether express or implied, including without limitation any implied warranty of merchantability or fitness for any Specific Purpose. Please be sure to contact our sales representative in advance, if you desire Epson products for Specific Purpose:  
Space equipment (artificial satellites, rockets, etc.)/ Transportation vehicles and their control equipment (automobiles, aircraft, trains, ships, etc.) / Medical equipment/ Relay equipment to be placed on sea floor/ Power station control equipment / Disaster or crime prevention equipment/Traffic control equipment/ Financial equipment  
Other applications requiring similar levels of reliability as the above
- Epson products listed in this document and our associated technologies shall not be used in any equipment or systems that laws and regulations in Japan or any other countries prohibit to manufacture, use or sell. Furthermore, Epson products and our associated technologies shall not be used for the purposes of military weapons development (e.g. mass destruction weapons), military use, or any other military applications. If exporting Epson products or our associated technologies, please be sure to comply with the Foreign Exchange and Foreign Trade Control Act in Japan, Export Administration Regulations in the U.S.A (EAR) and other export-related laws and regulations in Japan and any other countries and to follow their required procedures.
- Epson assumes no responsibility for any damages (whether direct or indirect) caused by or in relation with your non-compliance with the terms and conditions in this document or for any damages (whether direct or indirect) incurred by any third party that you give, transfer or assign Epson products.
- For more details or other concerns about this document, please contact our sales representative.
- Company names and product names listed in this document are trademarks or registered trademarks of their respective companies.