CRYSTAL OSCILLATOR

LOW-JITTER SAW OSCILLATOR

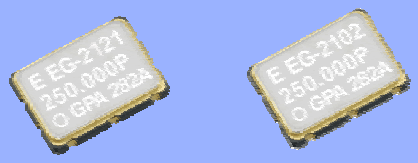
EG - 2121 / 2102CA series

- Frequency range : 53.125 MHz to 700 MHz
- Supply voltage : 2.5 V (EG-2121CA)
  3.3 V (EG-2102CA)
- Output : Differential LV-PECL or LVDS or HCSL
- Function : Output enable(OE)
- External dimensions : 7.0 × 5.0 × 1.2 t (mm) Typ.

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

Pb Free RoHS Compliant

Product Number (please contact us)
EG-2121CA: Q3805CAx0xxxx00
: X1M000101xxxx00
EG-2102CA: Q3806CA00xxxx00
: X1M000091xxxx00



Actual size

EG-2121CA	EG-2102CA
	

Specifications (characteristics)

►Differential LV-PECL Output

Item		Symbol	EG-2121CA	EG-2102CA	Remarks
			Differential LV-PECL		
Output frequency range		f_0	53.125 MHz to 500 MHz	100 MHz to 700 MHz	Please contact us for inquiries regarding available frequencies.
Supply voltage		V_{CC}	2.5 V ±0.125 V	3.3 V ±0.3 V	
Temperature range	Storage temperature	T_stg	-40 °C to +100 °C		Store as bare product after unpacking
	Operating temperature	T_use	P:0 °C to +70 °C ,R:-5 °C to +85 °C ,S:-20 °C to +70 °C		Please contact us for inquiries about S spec.
Frequency tolerance *1		f_tol	G: ± 50 × 10^{-6} ,H: ±100 × 10^{-6}		P:0 °C to +70 °C,R:-5 °C to +85 °C,S:-20 °C to +70 °C
Current consumption		I_{CC}	80 mA Max.	100 mA Max.	OE=V_{CC},R_L=50 Ω or 100 Ω
Disable current		I_dis	20 mA Max.	32 mA Max	OE=GND
Symmetry		SYM	P:40 % to 60 % (f_0 > 350 MHz)	P:45 % to 55 %	at outputs crossing point
			P:45 % to 55 % (f_0 ≤ 350 MHz)		
			D:48 % to 52 % (f_0 ≤ 175 MHz)	D:48 % to 52 % (f_0 ≤ 350 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.	
			V_{CC}-1.81 V to V_{CC}-1.62 V		
Output load condition		L_PECL	50 Ω		Terminated to V_{CC} -2.0 V
Output enable input voltage		V_{IH}	70 % V_{CC} Min.		OE terminal
Output disable input voltage		V_{IL}	30 % V_{CC} Max.		OE terminal
Rise time / Fall time		t_r / t_f	400 ps Max.		Between 20% V_{CC} and80%of (V_{OH}-V_{OL}) Between 20 %and 80 %of Differential Output peek to peek voltage
Start-up time		t_str	10 ms Max.		Time at minimum supply voltage to be 0 s
Phase Jitter		t_{PJ}	0.05 × 10^{-3} UI Typ.		Offset frequency: 12 kHz to 20 MHz
			1 ps Max.		
Frequency aging *2		f_aging	± 10 × 10^{-6} / year Max.		+25 °C,First year,V_{CC}=2.5 V,3.3 V

*1 As per below table 1.
*2 Except: ***A

►LVDS Output

Item		Symbol	EG-2121CA	EG-2102CA	Remarks
			LVDS		
Output frequency range		f_0	53.125 MHz to 700 MHz		Please contact us for inquiries regarding available frequencies.
Supply voltage		V_{CC}	2.5 V ±0.125 V	3.3 V ±0.3 V	
Temperature range	Storage temperature	T_stg	-40 °C to +100 °C		Store as bare product after unpacking
	Operating temperature	T_use	P:0 °C to +70 °C ,R:-5 °C to +85 °C ,S:-20 °C to +70 °C		Please contact us for inquiries about S spec.
Frequency tolerance *1		f_tol	G: ± 50 × 10^{-6} ,H: ±100 × 10^{-6}		P:0 °C to +70 °C,R:-5 °C to +85 °C,S:-20 °C to +70 °C
Current consumption		I_{CC}	30 mA Max	45 mA Max.	OE=V_{CC},R_L=50 Ω or 100 Ω
Disable current		I_dis	20 mA Max	30 mA Max.	OE=GND
Symmetry		SYM	L:40 % to 60 % (f_0 > 350 MHz)	L:40 % to 60 % (f_0 > 350 MHz)	at outputs crossing point
			L:45 % to 55 % (f_0 ≤ 350 MHz)	L:45 % to 55 % (f_0 ≤ 350 MHz)	
			V:48 % to 52 % (f_0 ≤ 175 MHz)	V:48 % to 52 % (f_0 ≤ 175 MHz)	
Output voltage		V_{OD}	350 mV Typ. 247 mV to 454 mV		Differential output, DC characteristics
		ΔV_{OD}	50 mV		Output change, DC characteristics
		V_{OS}	1.25 V Typ. 1.125 V to 1.375 V		Offset, DC characteristics
		ΔV_{OS}	150 mV		Offset change, DC characteristics
Output load condition		L_LVDS	100 Ω		Connected between OUT to $\overline{OUT}$
Output enable input voltage		V_{IH}	70 % V_{CC} Min.		OE terminal
Output disable input voltage		V_{IL}	30 % V_{CC} Max.		OE terminal
Rise time / Fall time		t_r / t_f	400 ps Max.		Between 20% V_{CC} and80%of (V_{OH}-V_{OL}) Between 20 %and 80 %of Differential Output peek to peek voltage
Start-up time		t_str	10 ms Max.		Time at minimum supply voltage to be 0 s
Phase Jitter		t_{PJ}	0.05 × 10^{-3} UI Typ.		Offset frequency: 12 kHz to 20 MHz
			1 ps Max.		
Frequency aging *2		f_aging	± 10 × 10^{-6} / year Max.		+25 °C,First year,V_{CC}=2.5 V,3.3 V

*1 As per below table 1.
*2 Except: ***A

▶HCSL Output

Item		Symbol	EG-2121CA	EG-2102CA	Remarks
			HCSL		
Output frequency range		f_0	100 MHz to 350 MHz		Please contact us for inquiries regarding available frequencies.
Supply voltage		Vcc	2.5 V ±0.125 V	3.3 V ±0.3 V	
Temperature range	Storage temperature	T_stg	-40 °C to +125 °C		Store as bare product after unpacking
	Operating temperature	T_use	P:0 °C to +70 °C ,R:-5 °C to +85 °C ,S:-20 °C to +70 °C		
Frequency tolerance *1		f_tol	G: ± 50 × 10^{-6} ,H: ±100 × 10^{-6}		
Current consumption		Icc	80 mA Max.	85 mA Max.	OE=Vcc,L_HCSL=50 Ω
Disable current		I_dis	20 mA Max.	35 mA Max	OE=GND
Symmetry		SYM	45 % to 55 %		at outputs crossing point
High output voltage		VOH	0.75 V Typ.		DC characteristics
Low output Voltage		VOL	-0.3 V Typ.		
Output load condition		L_HCSL	50 Ω		Terminated to GND
Output enable input voltage		VIH	70 % Vcc Min.		OE terminal
Output disable input voltage		VIL	30 % Vcc 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}	0.05 × 10^{-3} UI Typ.		Offset frequency: 12 kHz to 20 MHz
			1 ps Max.		
Frequency aging *2		f_aging	± 10 × 10^{-6} / year Max.		+25 °C,First year,Vcc=2.5 V,3.3 V

*1 As per below table 1.
*2 Except: ***A

Table 1 Frequency tolerance and aging

		P:Differential LV-PECL		D: Differential LV-PECL		L:LVDS		V:LVDS		H:HCSL	
Frequency range	EG-2121CA	All range		f_0 ≤ 175 MHz		All range		f_0 ≤ 175 MHz		All range	
	EG-2102CA			f_0 ≤ 350 MHz							
Details of frequency tolerance		A *3	N *4	A *3	N *4	A *3	N *4	A *3	N *4	A *3	N *4
Frequency tolerance	HP: ±100 × 10^{-6} (0°C to +70°C)	PHPA	PHPN	DHPA	DHPN	LHPA	LHPN	VHPA	VHPN	HHPA	HHPN
	HR: ±100 × 10^{-6} (-5°C to +85°C)	PHRA*5	PHRN*5	DHRA*5	DHRN*5	LHRA*5	LHRN*5	VHRA*5	VHRN*5	HHRA	HHRN
	GP: ±50 × 10^{-6} (0°C to +70°C)	PGPA*5	PGPN*5	DGPA*5	DGPN*5	LGPA*5	LGPN*5	VGPA*5	VGPN*5	HGPA	HGPN
	GR: ±50 × 10^{-6} (-5°C to +85°C)	—	PGRN*5	—	DGRN*5	—	LGRN*5	—	VGRN*5	—	HGRN
	HS: ±100 × 10^{-6} (-20°C to +70°C)	PHSA*5	PHSN*5	DHSA*5	DHSN*5	LHSA*5	LHSN*5	VHSA*5	VHSN*5	HHSA	HHSN
	GS: ±50 × 10^{-6} (-20°C to +70°C)	—	PGSN*5	—	DGSN*5	—	LGSN*5	—	VGSN*5	—	HGSN

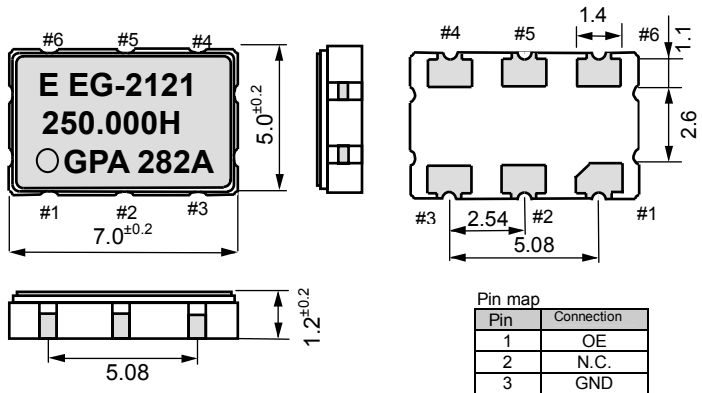
*3 This includes initial frequency tolerance, temperature variation, supply voltage variation, reflow drift, and aging(+25 °C,10 years).
*4 This includes initial frequency tolerance, temperature variation, supply voltage variation, and reflow drift(except aging).
*5 53.125 MHz ≤ f0 < 100 MHz : Unavailable.

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 50000 cycles

* Based on DTS-2075 Digital timing system made from 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)

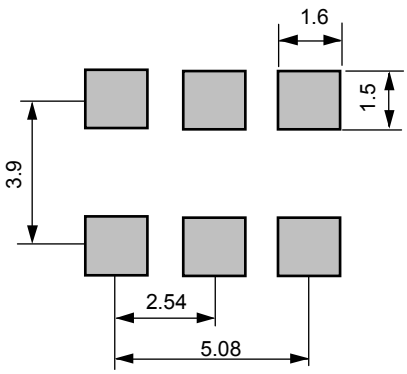


Pin map

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

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

Footprint (Recommended) (Unit:mm)



To maintain stable operation, provide by-pass capacitor with more than 0.1 µF at a location as near as possible to the power source terminal of the crystal products (between Vcc - GND).

“QMEMS” EPSON TOYOCOM

In order to meet customer needs in a rapidly advancing digital, broadband and ubiquitous society, we are committed to offering products that are one step ahead of the market and a rank above the rest in quality. To achieve our goals, we follow a “3D (three device) strategy” designed to drive both horizontal and vertical growth. We will to grow our three device categories of “Timing Devices”, ”Sensing Devices” and “Optical Devices”, and expand vertical growth through a combination of products from these categories.

A Quartz MEMS is any high added value quartz device that exploits the characteristics of quartz crystal material but that is produced using MEMS (micro-electro-mechanical system) processing technology.

Market needs are advancing faster than previously imagined toward smaller, more stable crystal products, but we will stay ahead of the curve by rolling out products that exceed market speed and quality requirements. We want to further accelerate the 3D strategy by QMEMS.

Quartz devices have become crucial in the network environment where products are increasingly intended for broadband, ubiquitous applications and where various types of terminals can transfer information almost immediately via LAN and WAN on a global scale. Epson Toyocom Corporation addresses every single aspect within a network environment. The new corporation offers “Digital Convergence” solutions to problems arising with products for consumer use, such as, core network systems and automotive systems.

PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Epson Toyocom, 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.

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.

All of our major manufacturing and non-manufacturing sites,in Japan and overseas, completed the acquisition of ISO 14001 certification.

WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs,
Epson Toyocom made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

ISO/TS 16949 is a global standard based on QS-9001, a severe standard corresponding to the requirements from the automobile industry.

►Explanation of the mark that are using it for the catalog

Pb Free	**►Pb free.**
RoHS Compliant	**►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.)**
For Automotive	**►The products have been designed for high reliability applications such as Automotive.**

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  / traffic control equipment / and others requiring equivalent reliability.
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  Due to the on-going strategy of gradual unification of part numbers, please review product codes and markings, as they will change during the course of the coming months.

  We apologize for the inconvenience, but we will eventually have a unified part numbering system for Epson Toyocom that will be user friendly.