

**CRYSTAL OSCILLATOR (SPXO)
FOR AUTOMOTIVE**
32.768 kHz



Product Number
SG-3031CMA : X1B000401A00116

SG-3031CMA



- Built-in 32.768 kHz crystal unit allows adjustment-free efficient operation.
- Operation temperature -40 °C to +105 °C
- Use of CMOS IC enables reduction of current consumption.
- V_{IO} controls swing amplitude.
- AEC-Q100 compliant

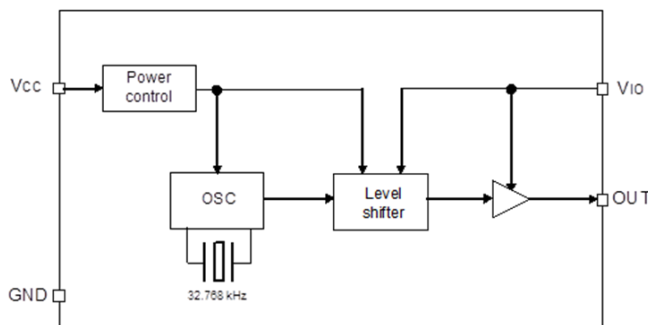
- Applications
Infotainment and communication devices, Body (ECU*)
Clock for Time counting and Sleep function. *ECU: Electronic control unit

Specifications (characteristics)

Item	Symbol	Specifications	Remarks
Output frequency range	f_o	32.768 kHz	
Supply voltage	V_{CC}	1.2 V to 5.5 V	
Interface power supply voltage	V_{IO}	1.2 V to 5.5 V	$V_{CC} < 1.5$ V, $V_{IO} = V_{CC}$
Storage temperature range	T_{stg}	-55 °C to +125 °C	Store as bare product after unpacking
Operating temperature range	T_{use}	-40 °C to +105 °C	
Frequency tolerance	f_{tol}	$+5 \pm 23 \times 10^{-6}$	+25 °C, $V_{CC} = 3.3$ V
Frequency temperature coefficient	f_o -Tc	-120×10^{-6} to $+10 \times 10^{-6}$	-20 °C to +70 °C ($V_{CC} = 3.3$ V +25 °C is reference)
		-240×10^{-6} to $+10 \times 10^{-6}$	-40 °C to +85 °C ($V_{CC} = 3.3$ V +25 °C is reference)
		-420×10^{-6} to $+10 \times 10^{-6}$	-40 °C to +105 °C ($V_{CC} = 3.3$ V +25 °C is reference)
Frequency voltage coefficient	f_o - V_{CC}	$\pm 1 \times 10^{-6}$ / V Max.	$V_{CC} = 1.5$ V to 5.5 V
		$\pm 5 \times 10^{-6}$ / V Max.	$V_{CC} = 1.2$ V to 1.5 V
Current consumption (V_{CC} Pin)	I_{CC}	0.30 μ A Typ. / 0.65 μ A Max.	$V_{CC} = 1.2$ V to 5.5 V
Current consumption (V_{CC} + V_{IO} Pin)	$I_{CC}+I_{IO}$	0.38 μ A Typ.	$V_{CC} = V_{IO} = 1.2$ V, No load condition
		0.65 μ A Typ. / 1.3 μ A Max. (+105 °C)	$V_{CC} = V_{IO} = 3.3$ V, No load condition
Symmetry	SYM	45 % to 55 %	1/2 V_{CC} (V_{IO}) level, 1.5 V to 5.5 V
		40 % to 60 %	1/2 V_{CC} (V_{IO}) level, $V_{CC} < 1.5$ V
Output voltage	V_{OH} / V_{OL}	$V_{IO} - 0.4$ V Min. / 0.4 V Max.	$I_{OH} = -0.4$ mA / $I_{OL} = 0.4$ mA, $V_{IO} = 1.5$ V to 5.5 V
		$V_{IO} - 0.2$ V Min. / 0.2 V Max.	$I_{OH} = -0.1$ mA / $I_{OL} = 0.1$ mA, $V_{IO} = 1.2$ V to 1.5 V
Output load condition (CMOS)	L_{CMOS}	15 pF Max.	CMOS load
Rise time / Fall time	t_r/t_f	200 ns Max.	20 % V_{IO} to 80 % V_{IO} level, $V_{IO} = 1.2$ V to 5.5 V
		100 ns Max.	20 % V_{IO} to 80 % V_{IO} level, $V_{IO} = 1.8$ V to 5.5 V
Start-up time	t_{str}	0.15 s Typ. / 0.45 s Max.	$V_{CC} = 1.5$ V to 5.5 V
		1.0 s Max.	$V_{CC} = 1.2$ V to 1.5 V
Frequency aging	f_{age}	$\pm 5 \times 10^{-6}$ / year Max.	+25 °C, $V_{CC} = 3.3$ V, First year

Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.

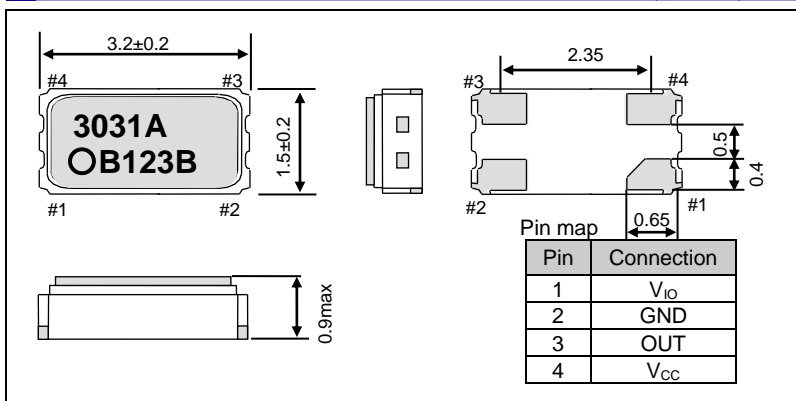
Block diagram



V_{IO} is a power supply pin for OUT output and can also be used as an OE pin. Set V_{IO} to 0 V when setting Disable.
 V_{CC} is a power supply pin for operating the 32.768 kHz oscillation.
 Power consumption can be minimized by minimizing the applied voltage of both power supplies. However, when $V_{CC} < 1.5$ V, $V_{IO} = V_{CC}$.

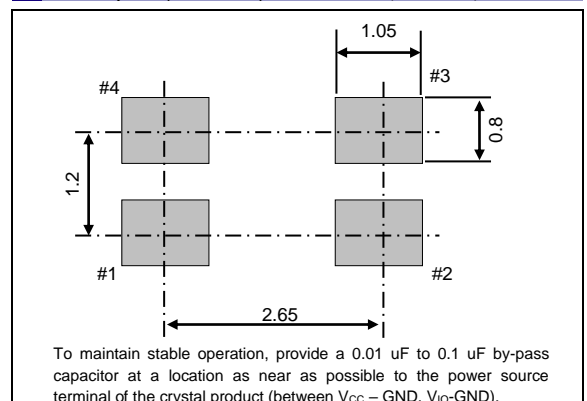
External dimension

(Unit:mm)



Footprint(ference)

(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.

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.

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IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

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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.
	► Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).

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