CRYSTAL OSCILLATOR (SPXO)

32.768 kHz

Product Number
SG-3031CM : X1B000391000116

SG-3031CM

- 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.

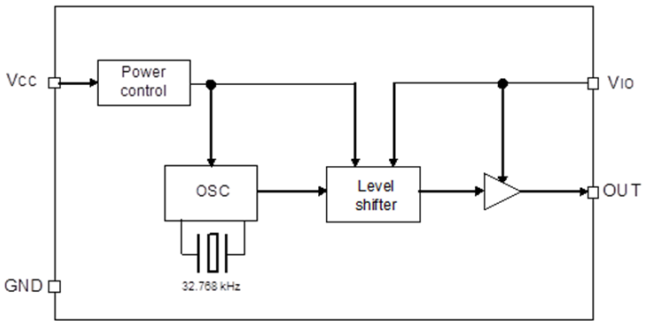
- Applications
  Industrial, Security, Smart Meter,
  Clock for Time counting and Sleep function

Specifications (characteristics)

Item	Symbol	Specifications	Remarks
Output frequency range	fo	32.768 kHz	
Supply voltage	V_{CC}	1.2 V to 5.5 V	V_{CC} < 1.5 V, V_{IO} = V_{CC}
Interface power supply voltage	V_{IO}	1.2 V to 5.5 V	
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 ± 23 × 10^{-6}	+25 °C, V_{CC} = 3.3 V
Frequency temperature coefficient	fo-Tc	-120 × 10^{-6} to +10 × 10^{-6}	-20 °C to +70 °C (V_{CC} = 3.3 V, +25 °C is reference)
		-240 × 10^{-6} to +10 × 10^{-6}	-40 °C to +85 °C (V_{CC} = 3.3 V, +25 °C is reference)
		-420 × 10^{-6} to +10 × 10^{-6}	-40 °C to +105 °C (V_{CC} = 3.3 V, +25 °C is reference)
Frequency voltage coefficient	fo-V_{CC}	±1 × 10^{-6} / V Max.	V_{CC} = 1.5 V to 5.5 V
		±5 × 10^{-6} / V Max.	V_{CC} = 1.2 V to 1.5 V
Current consumption (V_{CC} Pin)	I_{CC}	0.30 µA Typ. / 0.65 µA Max.	V_{CC} = 1.2 V to 5.5 V
Current consumption (V_{CC}+V_{IO} Pin)	I_{CC}+I_{IO}	0.38 µA Typ.	V_{CC} = V_{IO} = 1.2 V, No load condition
		0.65 µA Typ. / 1.3 µA Max. (+105 °C)	V_{CC} = V_{IO} = 3.3 V, No load condition
Symmetry	SYM	45 % to 55 %	1/2V_{CC}(V_{IO}) level, 1.5 V to 5.5 V
		40 % to 60 %	1/2V_{CC}(V_{IO}) level, V_{CC} < 1.5 V
Output voltage	V_{OH} / V_{OL}	V_{IO} - 0.4V Min. / 0.4V Max.	I_{OH} = -0.4mA / I_{OL} = 0.4mA, V_{IO} = 1.5 V to 5.5 V
		V_{IO} - 0.2V Min. / 0.2V Max.	I_{OH} = -0.1mA / I_{OL} = 0.1mA, V_{IO} = 1.2 V to 1.5 V
Output load condition (CMOS)	L_CMOS	15 pF Max.	CMOS load
Rise time / Fall time	tr/tf	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	±5 × 10^{-6} / year Max.	+25 °C, V_{CC} = 3.3 V, First year

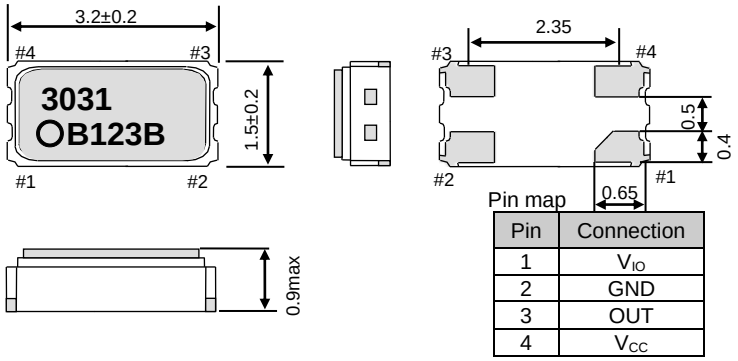
Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.

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}.

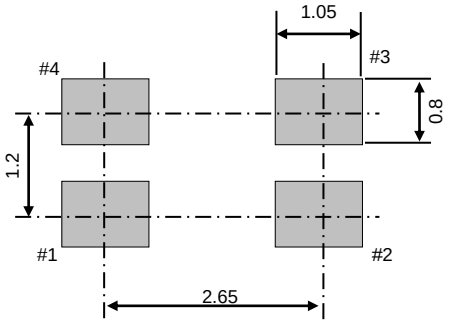
External dimension (Unit:mm)



Pin map

Pin	Connection
1	V_{IO}
2	GND
3	OUT
4	V_{CC}

Footprint(rference) (Unit:mm)



To maintain stable operation, provide a 0.01 uF to 0.1 uF by-pass capacitor at a location as near as possible to the power source terminal of the crystal product (between V_{CC} – GND, V_{IO}-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	►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	►Designed for automotive applications such as Car Multimedia, Body Electronics, Remote Keyless Entry etc.
Automotive Safety	►Designed for automotive applications related to driving safety (Engine Control Unit, Air Bag, ESC etc).