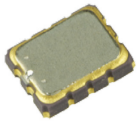
REAL TIME CLOCK MODULE (SPI-Bus)

Built-in 32.768 kHz-DTCXO, +105°C operating temperature,
Low current consumption, Built-in power supply switching circuit and
Time stamp function up to 32 records

RX4901CE

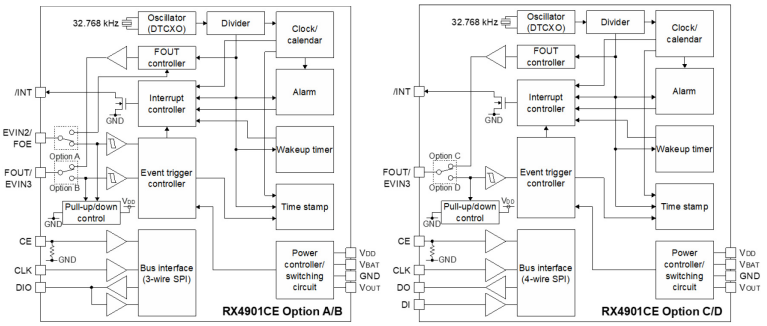
- Built in frequency adjusted 32.768 kHz crystal unit and DTCXO
- Interface Type : 3 wire / 4 wire SPI-Bus
- Current consumption : 240 nA / 3 V (Typ.)
- Auto power switching function : Automatically switches to backup power supply by monitoring the V_{DD} / V_{BAT} voltage
- Time stamp function : Maximum 32 time stamps
- Interrupt output : Wake up every hour or every minute or every second
- Alarm interruption : Day, date, hour, minute, second
- Auto repeat wakeup timer interruption
- Self-monitoring interruption : Crystal oscillation stop, V_{BAT} low, V_{DD} low

Product Number (2,000 pcs / Reel)
RX4901CE XS A0 : X1B000471000115
RX4901CE XB A0 : X1B000471000215
RX4901CE XS B0 : X1B000471000315
RX4901CE XB B0 : X1B000471000415
RX4901CE XS C0 : X1B000471000515
RX4901CE XB C0 : X1B000471000615
RX4901CE XS D0 : X1B000471000715
RX4901CE XB D0 : X1B000471000815



RX4901CE
(3.2 × 2.5 mm, t = 1.0 mm Max.)

Block diagram



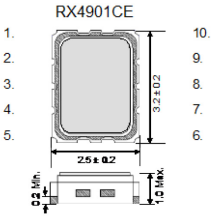
Overview

- Interface type : 3 wire / 4 wire SPI-Bus
- High stability
  XS : ±3.0 x 10^{-6} / -40 °C to +85 °C (Monthly rate: ±8 seconds)
  : ±5.0 x 10^{-6} / +85 °C to +105 °C (Monthly rate: ±13.2 seconds)
  XB : ±5.0 x 10^{-6} / -40 °C to +85 °C (Monthly rate: ±13.2 seconds)
  : ±8.0 x 10^{-6} / +85 °C to +105 °C (Monthly rate: ±21 seconds)
- Time stamp function
  Trigger source: External event (EVIN) input, voltage drop/oscillation stop status detected, command input from the host
  Record data: 1/1024 seconds to 1 second, seconds, minutes, hours, days, months, years
  Number of recordable events: Maximum 32 events
- Backup power supply switching function
  The V_{DD} and V_{BAT} voltages are monitored to switch between Normal mode (V_{DD} operation) and Backup mode (V_{BAT} operation).
- Clock output (FOUT)
  Selectable from 32.768 kHz, 1024 Hz and 1 Hz outputs
  Output can be controlled by a register or FOE input (selectable with a register).

Pin Function

Signal Name	I / O	Function
EVIN1,2,3	Input	External event input pins. Detectable even in Backup mode. Pull-up and pull-down is configurable by the resisters
CE	Input	Slave select input pin A pull-down resistor (Typ. 300 kΩ) is included
CLK	Input	Serial clock input pin
DI	Input	Serial data input pin (4 wire)
DO	Output	Serial data Output pin (4 wire)
DIO	Input / Output	Serial data input/output pin (3 wire)
FOUT	Output	Frequency output pin (CMOS). 32.768 kHz (default), 1024 Hz or 1 Hz clock output is selectable. This pin can be switched to the wakeup timer interrupt output (CMOS)
/INT	Output	Interrupt output pin (N-ch. open drain). The wakeup timer, time update, alarm, and/or event detection interrupt signals can be selected to output from this pin. When two or more signals are selected, they are NORed before being output. This pin is effective even in Backup mode.
V_{DD}	-	Power-supply pin
V_{OUT}	-	Internal operating voltage output pin Connect a 1.0 µF bypass capacitor to this pin.
V_{BAT}	-	Backup power supply pin Connect a backup power supply such as a large-size capacitor, secondary battery, or primary battery. The operating power voltage is supplied from this pin to the internal circuits in Backup mode.
GND	-	Ground pin

Terminal connection / External dimensions (Unit: mm)



Pin	Connection			
	Opt. A	Opt. B	Opt. C	Opt. D
	3 wire		4 wire	
1	V_{DD}			
2	V_{OUT}			
3	V_{BAT}			
4	FOUT	EVIN3	FOUT	EVIN3
5	CLK			
6	CE			
7	DIO		DO	
8	/INT			
9	GND			
10	EVIN2		DI	

Specifications (characteristics)

∗ Refer to application manual for details

■ Recommended Operating Conditions

Item	Symbol	Condition	Min.	Typ.	Max.	unit
Operating voltage	V_{DD}	-	1.6	3.0	5.5	V
Clock supply voltage	V_{CLK}	-	1.1	3.0	5.5	V
Operating Temperature	Ta	-	-40	+25	+105	°C
V_{DD} detection voltage	-V_{DET1}	V_{DD}, Fall	1.35	1.45	1.55	V

■ Frequency Characteristics

Item	Symbol	Condition		Min.	Typ.	Max.	unit
Frequency tolerance	Δf / f	XS	Ta = -40 to +85 °C	-3	-	+3	× 10^{-6}
			Ta = +85 to +105 °C	-5	-	+5	
		XB	Ta = -40 to +85 °C	-5	-	+5	
			Ta = +85 to +105 °C	-8	-	+8	
start-up time	tSTA	Ta = +25 °C, V_{DD} = 1.6 V ~ 5.5 V		-	0.5	1.0	s

■ Current consumption

Ta = -40 °C to +105 °C

Item	Symbol	Condition	Min.	Typ.	Max.	unit
I_{DD}	I_{BAT}	V_{BAT} = 3.0 V, /INT= Hi-Z, FOUT: Output OFF (Hi-Z), Temperature compensation interval: 2 s, FSEL1= FSEL0 = 1, INIEN = 1, CHGEN = 0, CE = L	-	240	1500	nA
	I_{32k}	V_{DD} = 3.0 V, /INT= Hi-Z, FOUT: 32 kHz output, C_L = 0 pF, Temperature compensation interval: 2 s, FSEL1 = FSEL0 = 0, INIEN = 1, CHGEN = 0, CE = L	-	1.0	3.0	µA

■ Option

I/F	Option	EVIN pin Number	/INTpin Number	FOUT	Number of time stamps recorded by EVIN terminal trigge	
					FIFO Mode	Direct Mode
SPI 3 wire	A	1	1	Yes	32 times	12 times
	B	2	1	-	32 times	22 times
SPI 4 wire	C	0	1	Yes	0 time	0 time
	D	1	1	-	32 times	10 times

Product name

RX4901CE XS A0
① ② ③

① Model CE type package 3.2 x 2.5 x 1.0 mm
② Frequency tolerance
XS: ±3.0 x 10^{-6} / -40 ºC to +85 ºC (Monthly rate: ±8 seconds)
±5.0 x 10^{-6} / +85 ºC to +105 ºC (Monthly rate: ±13.2 seconds)
XB: ±5.0 x 10^{-6} / -40 ºC to +85 ºC (Monthly rate: ±13.2 seconds)
±8.0 x 10^{-6} / +85 ºC to +105 ºC (Monthly rate: ±21 seconds)
③ Pin Option
A: Option A
B: Option B
C: Option C
D: Option D

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).