REAL TIME CLOCK MODULE (SPI-Bus)

High-Stability Frequency with Built in Timestamp and Power Switching

RX-4035SA / LC

RoHS Compliant

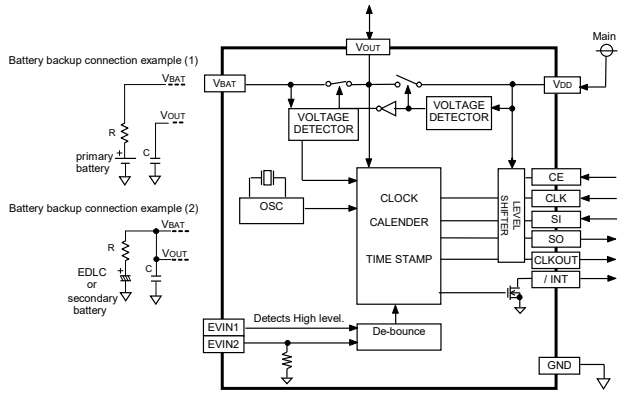
Product Number
RX-4035SA B: X1B000192000100
RX-4035SA AC: X1B000192000200
RX-4035SA AA: X1B000192000300
RX-4035LC B: X1B000202000100
RX-4035LC AC: X1B000202000200
RX-4035LC AA: X1B000202000300

- Built-in 32.768 kHz crystal unit : Frequency adjusted for high accuracy. (± 5 ×10^{-6} / Ta = +25 °C)
- Interface Type : SPI-Bus (1MHz)
- Operating voltage range : 2.4 V to 5.5 V
- Timekeeping voltage range : 1.0 V to 5.5 V
- Low backup current : 350 nA (SA) 400 nA (LC) / 3 V (Typ.)
- Event detection and Time stamp : One-shot full timestamp and interrupt.
- Dual event detection ports : Each terminal has a de-bounce circuit.
- Auto power switching functions : When VDD deteriorates than 2.4V, internal source is switched to VBAT.

RX-4035SA

RX-4035LC

Block diagram



Overview

- **The event detection and Timestamp function**
  Dual event detection terminals.
  Selectable de-bounce time 35ms or 2s.
  Available event detection interrupt output.

- **Power switching functions.**
  - An external diode is unnecessary to have a reverse current prevention switch built-in in the VBAT side to connect a primary cell to.
  - When VDD is less than 2.4V, an internal source is switched to VBAT.
  - Note: When the supply from VBAT, SPI interface are disabled.

- **Alarm, Periodic interrupt, 32.768kHz clock output.**
  - Available monthly-alarm and weekly-alarm.
  - Interrupt period are selectable from 2Hz to Monthly.
  - CLKOUT outputs 32.768kHz clock powered by VDD.

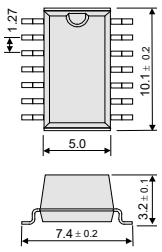
Pin function

Signal Name	Input / Output	Function
VBAT	—	Power supply for backup.
Vout	Output	Switched power out. (maximum output current 20mA)
CE	Input	SPI chip enable.
CLK	Input	SPI serial clock.
SO	Output	SPI data out.
SI	Input	SPI data in.
GND	—	Ground
EVIN1	Input	Event detection input 1
EVIN2	Input	Event detection input 2
/ INT	Output	Interrupt out.
CLKOUT	Output	32.768kHz output. (CMOS. Can not inhibit.)
N.C.	—	Do not connect.
VDD	—	Main power supply.

Terminal connection / External dimensions (Unit:mm)

RX – 4035 SA

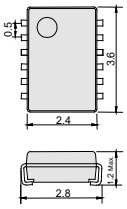
1.	N.C.	14.	EVIN2
2.	CLK	13.	SI
3.	CLKOUT	12.	SO
4.	VBAT	11.	GND
5.	N.C.	10.	/ INT
6.	VDD	9.	CE
7.	Vout	8.	EVIN1



SOP – 14 pin

RX – 4035 LC

1.	Vout	12.	EVIN1
2.	VDD	11.	CE
3.	N.C.	10.	/ INT
4.	VBAT	9.	GND
5.	CLKOUT	8.	SO
6.	CLK	7.	SI



VSOJ – 12pin

The metal case inside of the molding compound may be exposed on the top or bottom of this product.
This purely cosmetic and does not have any effect on quality, reliability or electrical specs.

Prohibition of use of glue after a mount of a product
An LC package product cannot use glue and resin coating.
When such a processing is necessary, please examine a CE package product.

Specifications (characteristics)

＊ Refer to application manual for details.

■ Recommended Operating Conditions

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating voltage	VACCESS	VDD	2.4	3.0	5.5	V
Time keeping voltage	VCLK	VBAT	1.0	3.0	5.5	V
Operating temperature	TOPR	—	-40	+25	+85	°C
Storage temperature	TSTG	—	-55	—	+125	°C

■ Frequency characteristics

Item	Symbol	Conditions	Rating	Unit
Frequency tolerance	Δ f / f	Ta = +25°C VBAT = 3.0 V	B: 5 ± 23 *1) AA: 5 ± 5 *2) AC: 0 ± 5 *2)	× 10^{-6}
Oscillation start-up time	tSTA	Ta = +25 °C VDD = 3.0 V	1 Max.	s
Frequency / voltage characteristics	f / V	Ta = +25 °C VDD = 2.4 V to 5.5 V	± 1 Max.	× 10^{-6}

*1) Equivalent to ±1 minute of monthly deviation (excluding offset.)
*2) Equivalent to ±13 seconds of monthly deviation (excluding offset.)

■ Current consumption characteristics

Ta = -40 °C to +85 °C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Consumption	IBAT	RX-4035SA VBAT = 3.0V, VDD = 0.0V CE = 0V, CLKOUT = open	-	350	1200	nA
		RX-4035LC VBAT = 3.0V, VDD = 0.0V CE = 0V, CLKOUT = open		400		
	IDD	VDD = 3.0V CE = 0V CLKOUT = open	-	1.40	2.50	µA

■ Power supply detection voltage

Ta = -40 °C to +85 °C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Voltage of low battery detection	VLOW	-	1.10	1.25	1.40	V
Power switching voltage (VDD to VBAT)	VD2B	+25 °C	2.328	2.40	2.472	V

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).