

**REAL TIME CLOCK MODULE (SPI-Bus)**  
High-Stability Frequency with Built in Timestamp and Power Switching



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

**RX-4035SA / LC**

- Built-in 32.768 kHz crystal unit : Frequency adjusted for high accuracy. ( $\pm 5 \times 10^{-6} / T_a = +25 \text{ }^\circ\text{C}$ )
- 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  $V_{DD}$  deteriorates than 2.4V, internal source is switched to  $V_{BAT}$ .

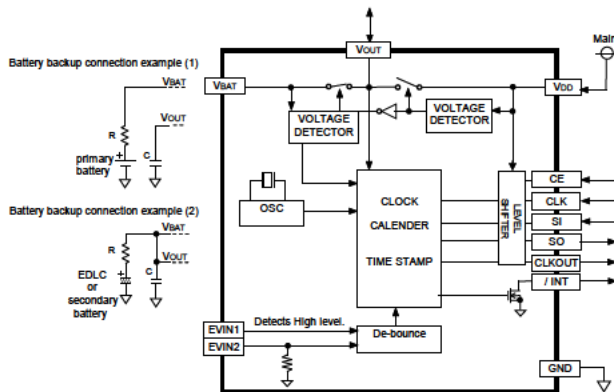


RX-4035SA



RX-4035LC

**Block diagram**



**Overview**

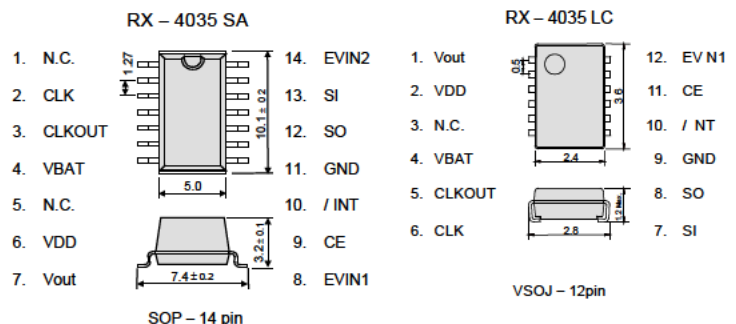
- **The event detection and Timestamp function**  
Dual event detection terminals.  
Selectable de-bounce time 35ms or 2s.  
Available event detection interrupt output.
- **Power switching functions.**
  - An external diode is unnecessary to have a reverse current prevention switch built-in in the VBAT side to connect a primary cell to.
  - When  $V_{DD}$  is less than 2.4V, an internal source is switched to  $V_{BAT}$ .
  - Note: When the supply from  $V_{BAT}$ , 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  $V_{DD}$ .

**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)



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.

\*Stop using the glue  
 Any glue must never use it after soldering LC-package to a circuit board. This product has glass on the back side of a package. When glue invasions between circuit board side and glass side, then glass cracks by thermal expansion of glue. In this case a crystal oscillation stops. Consider glue abolition or glue do not touch to LC-package

**Specifications (characteristics)**

\* Refer to application manual for details.

■ Recommended Operating Conditions

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Operating voltage	$V_{ACCESS}$	$V_{DD}$	2.4	3.0	5.5	V
Time keeping voltage	$V_{CLK}$	$V_{BAT}$	1.0	3.0	5.5	V
Operating temperature	$T_{OPR}$	—	-40	+25	+85	$^\circ\text{C}$
Storage temperature	$T_{STG}$	—	-55	—	+125	$^\circ\text{C}$

■ Frequency characteristics

Item	Symbol	Conditions	Rating	Unit
Frequency tolerance	$\Delta f / f$	$T_a = +25^\circ\text{C}$ $V_{BAT} = 3.0\text{V}$	B: $5 \pm 23$ *1) AA: $5 \pm 5$ *2) AC: $0 \pm 5$ *2)	$\times 10^{-6}$
Oscillation start-up time	$t_{STA}$	$T_a = +25^\circ\text{C}$ $V_{DD} = 3.0\text{V}$	1 Max.	s
Frequency / voltage characteristics	$f / V$	$T_a = +25^\circ\text{C}$ $V_{DD} = 2.4\text{V to } 5.5\text{V}$	$\pm 1$ Max.	$\times 10^{-6}$

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

■ Current consumption characteristics

$T_a = -40^\circ\text{C to } +85^\circ\text{C}$

tem	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Consumption	$I_{BAT}$	RX-4035SA $V_{BAT} = 3.0\text{V}, V_{DD} = 0.0\text{V}$ $CE = 0\text{V}, CLKOUT = \text{open}$	-	350	1200	nA
	$I_{DD}$	RX-4035LC $V_{BAT} = 3.0\text{V}, V_{DD} = 0.0\text{V}$ $CE = 0\text{V}, CLKOUT = \text{open}$	-	400	—	nA
		$V_{DD} = 3.0\text{V}$ $CE = 0\text{V}$ $CLKOUT = \text{open}$	-	1.40	2.50	$\mu\text{A}$

■ Power supply detection voltage

$T_a = -40^\circ\text{C to } +85^\circ\text{C}$

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Voltage of low battery detection	$V_{Low}$	-	1.10	1.25	1.40	V
Power switching voltage ( $V_{DD}$ to $V_{BAT}$ )	$V_{D2B}$	$+25^\circ\text{C}$	2.328	2.40	2.472	V