

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

**RX-4035 SA/LC**

- Built-in 32.768 kHz crystal unit : Frequency adjusted for high accuracy. ( $\pm 5 \times 10^{-6}$  /  $T_a = +25^\circ\text{C}$ )
- 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  $V_{BAT}$ .



Product Number (Please contact us)  
 RX-4035SA: X1B000192xxxx00  
 RX-4035LC: X1B000202xxxx00



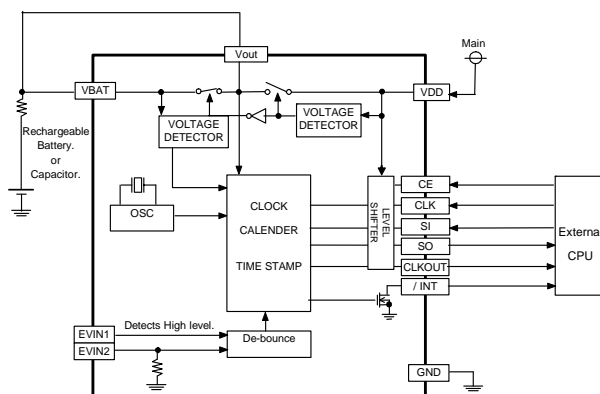
Actual size

RX-4035SA

RX-4035LC



**Block diagram**



**Overview**

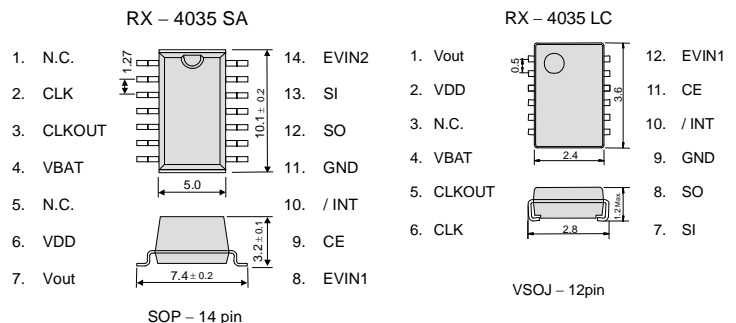
- **The event detection and Timestamp function**  
 Dual event detection terminals.  
 Selectable de-bounce period 35ms or 2s.  
 Available event detection interrupt output.
- **Power switching functions.**
  - When  $V_{DD}$  is less than 2.4V, an internal source is switched to  $V_{BAT}$ .
  - Note: 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     | 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                 | $\Delta f/f$ | $T_a = +25^\circ\text{C}$<br>$V_{BAT} = 3.0\text{ V}$                | B: $5 \pm 23$ <sup>*1)</sup><br>AA: $5 \pm 5$ <sup>*2)</sup><br>AC: $0 \pm 5$ <sup>*2)</sup> | $\times 10^{-6}$ |
| Oscillation start-up time           | tSTA         | $T_a = +25^\circ\text{C}$<br>$V_{DD} = 3.0\text{ V}$                 | 1 Max.   | s                |
| Frequency / voltage characteristics | f/V          | $T_a = +25^\circ\text{C}$<br>$V_{DD} = 2.4\text{ V to }5.5\text{ V}$ | $\pm 1$ Max.   | $\times 10^{-6}$ |

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

**Current consumption characteristics**

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

| Item                | Symbol | Conditions  | Min. | Typ. | Max. | Unit          |
|---------------------|--------|---|------|------|------|---------------|
| Current Consumption | IBAT   | RX-4035SA<br>$V_{BAT} = 3.0\text{ V}, V_{DD} = 0.0\text{ V}$<br>$CE = 0\text{ V}, CLKOUT = \text{open}$ | -    | 350  | 1200 | nA            |
|                     |        | RX-4035LC<br>$V_{BAT} = 3.0\text{ V}, V_{DD} = 0.0\text{ V}$<br>$CE = 0\text{ V}, CLKOUT = \text{open}$ | -    | 400  | -    | -             |
|                     | IDD    | $V_{DD} = 3.0\text{ V}$<br>$CE = 0\text{ V}$<br>$CLKOUT = \text{open}$                                  | -    | 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 |
|---------------------------------------|--------|------------|-------|------|-------|------|
| VBAT detect voltage                   | 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.

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### ► Explanation of the mark that are using it for the catalog

|   |   |
|---|---|
|  | ► Pb free.  |
|  | ► Complies with EU RoHS directive.<br>*About the products without the Pb-free mark.<br>Contains Pb in products exempted by EU RoHS directive.<br>(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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