REAL TIME CLOCK MODULE (I²C-Bus)
Low current consumption
RX8010SJ

RoHS Compliant

Product Number
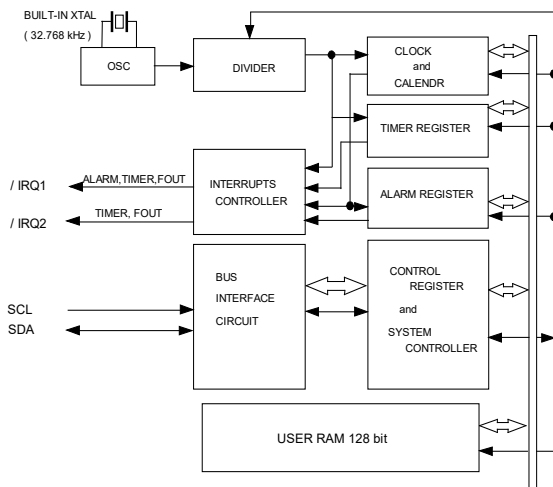**RX8010SJ : X1B000242000100**

R8010 E 1234A

- Built in frequency adjusted 32.768 kHz crystal unit.
- Interface Type   **:** I²C-Bus interface (400 kHz)
- Operating voltage range **:** 1.6 V to 5.5 V
- Wide voltage for time keeping. **:** 1.1 V to 5.5 V
- Low backup current   **:** 160 nA / 3 V (Typ.)
- Frequency output function **:** C-MOS or Open-Drain output
- Built-in user RAM   **:** 128 bit (8 bit x 16, SRAM)
- The various functions include full calendar, alarm, timer, etc.
- This product is conform to industrial standard SOP8 package, and it can be mounted to the common land pattern.

Epson prepared Linux driver for development.
(http://www5.epsondevice.com/en/information/support/linux_rtc/)

The registered trademark Linux® is used pursuant to a sublicense from LMI(Linux Mark Institute)

The I²C-Bus is a trademark of NXP Semiconductors

Block diagram

BUILT-IN XTAL
(32.768 kHz)

OSC → DIVIDER → CLOCK and CALENDR

TIMER REGISTER

/ IRQ1 — ALARM,TIMER,FOUT — INTERRUPTS CONTROLLER

ALARM REGISTER

/ IRQ2 — TIMER, FOUT

SCL — BUS INTERFACE CIRCUIT — CONTROL REGISTER and SYSTEM CONTROLLER
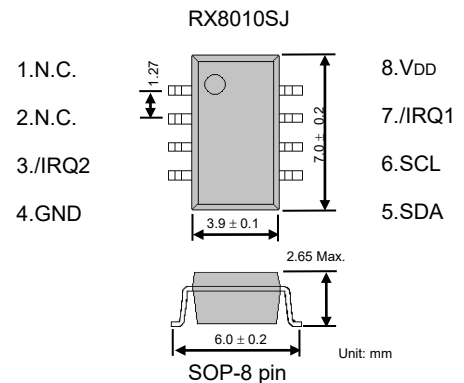
SDA

USER RAM 128 bit

Overview

- **Interface Type**
  - I²C-Bus high-speed bus specifications. (400 kHz)

- **Frequency output function**
  - It may select a CMOS or open drain output
  - Output frequency can be selected as 32.768kHz, 1024Hz, 1Hz.

- **Timer function**
  - Timer function can be set up between 1/4096 second and 65535 hours.
  - Timing period are 1hour, 1min, 64Hz, 4096Hz.
  - It is recorded automatic to TF-bit at the time of event occurrence, and possible to output with /IRQ1 or /IRQ2 pin.

- **Alarm function**
  - Alarm function can be set to day of week, day, hour, and minute.
  - It is recorded automatic to AF-bit at the time of event occurrence, and possible to output with /IRQ1 pin.

- **User RAM**
  - 128 bit (8 bit x 16, SRAM)

Pin Function

Signal Name	Input / Output	Function
SCL	Input	This is a shift clock input pin for serial data transmission.
SDA	Input/Output	This is the data input/output pin for serial data transfer.
/ IRQ1	Output	This pin outputs interrupt signals ("L" level) for alarm, timer, time update, and 32.768kHz. This is an N-ch open-drain output.
/ IRQ2	Output	This pin outputs interrupt signals ("L" level) for timer and FOUT. This is a C-MOS output.
V$_{DD}$	Supply	This is a power-supply pin.
GND	Supply	This pin is connected to a ground.

Terminal connection / External dimensions   (Unit:mm)

RX8010SJ

1.N.C.   8.V$_{DD}$
2.N.C.   7./IRQ1
3./IRQ2   6.SCL
4.GND   5.SDA

1.27
7.0 ± 0.2
3.9 ± 0.1
2.65 Max.
6.0 ± 0.2
Unit: mm

SOP-8 pin

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.

Specifications (characteristics)

∗ **Refer to application manual for details.**

■ Recommended Operating Conditions

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power voltage	V$_{DD}$	—	1.6	3.0	5.5	V
Clock voltage	V$_{CLK}$	—	1.1	3.0	5.5	V
Operating temperature	T$_{OPR}$	—	-40	+25	+85	°C

■ Frequency characteristics

Item	Symbol	Conditions	Rating	Unit
Frequency tolerance	Δf / f	Ta = +25 °C, V$_{DD}$ = 3.0 V	B: 5 ± 23 *	× 10^{-6}
Oscillation Start-up time	t$_{STA}$	Ta = +25 °C, V$_{DD}$ = 1.6 V ~ 5.5 V	1 Max.	s
		Ta = -40 °C to +85 °C, V$_{DD}$ = 1.6V ~ 5.5V	3 Max.	s

*Equivalent to ±1 minute of monthly deviation

■ Current consumption characteristics   Ta = -40 °C to +85 °C

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit
Current Consumption	I$_{BK}$	Input pins are "L" fCLK = 0 Hz, /IRQ1,2 = OFF TSEL2="1"	V$_{DD}$ = 5 V	-	-	350	nA
			V$_{DD}$ = 3 V	-	160	320	
	I$_{32k}$	fCLK = 0 Hz, /IRQ1: 32.768 kHz ON, /IRQ2: OFF	V$_{DD}$ = 5 V	-	0.60	1.10	µA
			V$_{DD}$ = 3 V	-	0.52	0.90	

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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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> IATF 16949 is the international standard that added the sector-specific supplemental requirements for automotive industry based on ISO9001.

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	  *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).

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