REAL TIME CLOCK MODULE (SPI & I²C-Bus)
Power Switching and Low current consumption
RX6110 SA

NEW

- Built in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : SPI & I²C -Bus
- Operating voltage range : 1.6 V to 5.5 V
- Wide Timekeeper voltage range : 1.1 V to 5.5 V
- Low backup current : 130 nA / 3 V (Typ.)
- Built-in user RAM : 128 bit (8 bit × 16, SRAM)
- Auto power switching functions : When V_{DD} deteriorates than 1.6V, internal source is switched to V_{BAT}.
- The various functions include full calendar, alarm, timer.

Epson is prepared Linux driver for this product.
(http://www5.epsondevice.com/en/quartz/tech/linux_for_rtc/index.html)

The registered trademark Linux® is used pursuant to a sublicense from LMI(Linux Mark Institute)
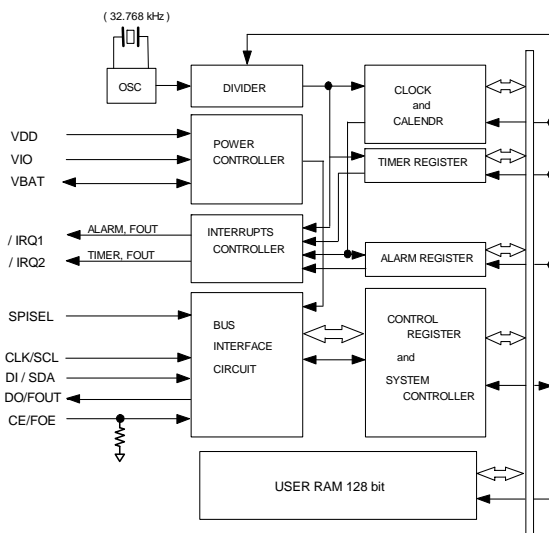The I²C-Bus is a trademark of NXP Semiconductors

RoHS Compliant

Product Number (Please contact us)
RX6110SA : X1B000232xxxx00

R6110
E 1234A

Actual size

R6110
E 1234A

Block diagram

(32.768 kHz)

OSC — DIVIDER — CLOCK and CALENDR
VDD, VIO, VBAT — POWER CONTROLLER — TIMER REGISTER
/ IRQ1 (ALARM, FOUT), / IRQ2 (TIMER, FOUT) — INTERRUPTS CONTROLLER — ALARM REGISTER
SPISEL, CLK/SCL, DI / SDA, DO/FOUT, CE/FOE — BUS INTERFACE CIRCUIT — CONTROL REGISTER and SYSTEM CONTROLLER
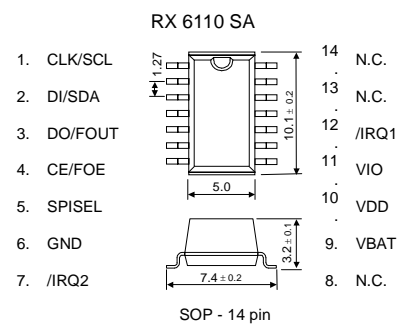USER RAM 128 bit

Overview

- Interface type.
  - SPI-Bus and I²C-Bus interface.
  - By a terminal, a switchover of the interface is possible.
- Built-in auto power switching function
  - When V_{DD} deteriorates, internal source is switched to V_{BAT}.
- Frequency output function
  - 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 output.
- User RAM
  - 128 bit (8 bit x 16, SRAM)

Pin Function

Signal Name	Input/Output	Function
SPISEL	Input	The interface select pin. SPI is chosen at a "H" level (V_{IO} voltage) / I²C is chosen at a "L" level (GND voltage).
CE/FOE	Input	SPI: Should be held high to allow access to the CPU. Incorporates a pull-down resistor. I²C: It is an input pin for controlling the DO/FOUT output. When the frequency output from a DO/FOUT pin does not need, CE/FOE pin must be connected to GND.
CLK/SCL	Input	This is a shift clock input pin for serial data transmission.
DI/SDA	Input / Output	SPI: This is the data input pin for serial data transfer. I²C: This is the data input/output pin for serial data transfer.
DO/FOUT	Output	SPI: This is the data output pin for serial data transfer. I²C: This is the C-MOS output pin with output control provided via the CE/FOE pin. (frequency selection: 32.768 kHz / 1024 Hz / 1Hz / Hi-z)
/ IRQ1	Output	This pin outputs interrupt signals ("L" level) for alarm, timer, time update, and FOUT. This is an N-ch open-drain output. This pin can output even a backup mode.
/ IRQ2	Output	This pin outputs interrupt signals ("L" level) for timer and FOUT. This is an C-MOS output. This pin becomes Hi-z in less than V_{DD}=1.6V.
V_{DD}	–	This is a power-supply pin. It can impress the voltage unlike V_{IO}.
V_{IO}	–	This pin is a power supply for input and the output and input / output pins. Connected to a positive power supply.
V_{BAT}	–	Connect a secondary battery or capacitor for backup power supply. If a backup power supply is not present, this pin connect to V_{DD}
GND	–	Connected to a ground.

Terminal connection / External dimensions (Unit:mm)

RX 6110 SA

1. CLK/SCL
2. DI/SDA
3. DO/FOUT
4. CE/FOE
5. SPISEL
6. GND
7. /IRQ2

14. N.C.
13. N.C.
12. /IRQ1
11. VIO
10. VDD
9. VBAT
8. N.C.

SOP - 14 pin

1.27, 10.1 ± 0.2, 5.0, 3.2 ± 0.1, 7.4 ± 0.2

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	$\Delta f / f$	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	1 Max.	s

* Equivalent to 1 minute of monthly deviation (excluding offset.)

■ Current consumption characteristics

Ta = -40 °C to +85 °C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
Current Consumption	I_{BK}	V_{BAT} = 3.0 V, Input pins are "L" ,V_{DD} = 0 V, DO/FOUT=OFF, fCLK = 0 Hz, /IRQ1,2 = OFF, TSEL2="1" It include an OFF leak current of SW between the power supply (V_{BAT}-V_{DD})	-	130	250	nA
	I_{32k}	V_{DD} = 3.0 V, fCLK = 0 Hz, SPISEL=VIO, /IRQ1,2 = OFF, CE/FOE = VIO, DO/FOUT : 32.768 kHz ON , CL = 0 pF	-	1.5	2.1	µA

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 ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

> ISO/TS16949 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**

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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.
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