

REAL TIME CLOCK MODULE (SPI & I²C-Bus)

Power Switching and Low current consumption

RX6110SA

- Built in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : SPI & I²C -Bus
- Operating voltage range : 1.6 V to 5.5 V
- The wide voltage for time keeping : 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 VDD deteriorates than 1.6V, internal source is switched to VBAT.

• The various functions include full calendar, alarm, timer.
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)

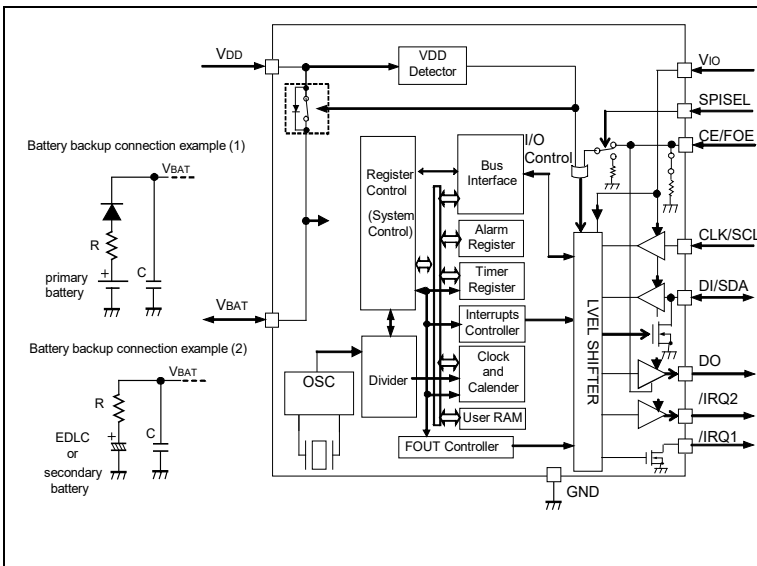


Product Number
RX6110SA B : X1B000232000100



Block diagram

Overview



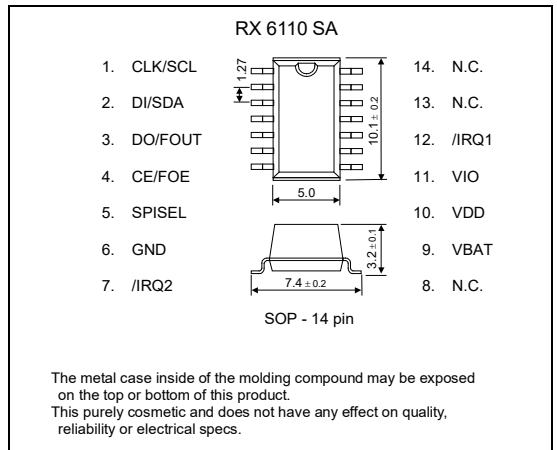
- Interface type.
 - SPI-Bus and I²C-Bus interface.
 - By a terminal, a switchover of the interface is possible.
- Built-in auto power switching function
 - To efficiently charge from VDD to backup battery (Secondary battery, Large capacitor) connected to VBAT is possible. Detects VDD voltage drop (VDET-) and automatically switches to the backup battery.
- Frequency output function
 - Output frequency is selectable from 32.768kHz, 1024Hz, 1Hz.
- Timer function
 - Timer function is selectable in 1/4096 second from 65535 hours.
- Timer source clock 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 alarm occurrence, and possible to output with /IRQ1 pin output.
- User RAM
 - 128 bit (8 bit x 16, SRAM)

Pin Function

Terminal connection / External dimensions

(Unit:mm)

Signal Name	Input/Output	Function
SPISEL	Input	The interface select pin. SPI is chosen at a "H" level (V _{IO} voltage) / I ² C 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. I ² C: 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. I ² C: 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. I ² C: 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.
VDD	-	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.
VBAT	-	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.



Specifications (characteristics)

* Refer to application manual for details.

■ Recommended Operating Conditions

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

■ Frequency characteristics

Item	Symbol	Conditions	Rating	Unit
Frequency tolerance	$\Delta f / f$	T _a = +25 °C VDD = 3.0 V	B: 5 ± 23 *1	× 10 ⁻⁶
Oscillation start-up time	t _{STA}	T _a = +25 °C VDD = 1.6 V	1 Max.	s

■ Current consumption characteristics (T_a = -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, f _{CLK} = 0 Hz, /IRQ1,2 = OFF, TSEL2="1" It include an OFF leak current of SW between the power supply (VBAT-VDD)	-	130	250	nA
	I _{32k}	VDD = 3.0 V f _{CLK} = 0 Hz, /IRQ1,2 = OFF, CE/FOE = VIO, DO/FOUT : 32.768 kHz ON, CL = 0 pF	-	1.5	2.1	μA

*1) Equivalent to ±1 minute of monthly deviation (excluding offset.) / Standard product

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.
	► 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.)
	► 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).

NOTICE : PLEASE READ CAREFULLY BELOW BEFORE THE USE OF THIS DOCUMENT ©Seiko Epson Corporation 2020

- The content of this document is subject to change without notice. Before purchasing or using Epson products, please contact with sales representative of Seiko Epson Corporation ("Epson") for the latest information and be always sure to check the latest information published on Epson's official web sites and resources.
- This document may not be copied, reproduced, or used for any other purposes, in whole or in part, without Epson's prior consent.
- Information provided in this document including, but not limited to application circuits, programs and usage, is for reference purpose only. Epson makes no guarantees against any infringements or damages to any third parties' intellectual property rights or any other rights resulting from the information. This document does not grant you any licenses, any intellectual property rights or any other rights with respect to Epson products owned by Epson or any third parties.
- Using Epson products, you shall be responsible for safe design in your products; that is, your hardware, software, and/or systems shall be designed enough to prevent any critical harm or damages to life, health or property, even if any malfunction or failure might be caused by Epson products. In designing your products with Epson products, please be sure to check and comply with the latest information regarding Epson products (including, but not limited to this document, specifications, data sheets, manuals, and Epson's web site). Using technical contents such as product data, graphic and chart, and technical information, including programs, algorithms and application circuit examples under this document, you shall evaluate your products thoroughly both in stand-alone basis and within your overall systems. You shall be solely responsible for deciding whether to adopt/use Epson products with your products.
- Epson has prepared this document carefully to be accurate and dependable, but Epson does not guarantee that the information is always accurate and complete. Epson assumes no responsibility for any damages you incurred due to any misinformation in this document.
- No dismantling, analysis, reverse engineering, modification, alteration, adaptation, reproduction, etc., of Epson products is allowed.
- Epson products have been designed, developed and manufactured to be used in general electronic applications and specifically designated applications ("Anticipated Purpose"). Epson products are NOT intended for any use beyond the Anticipated Purpose that requires particular quality or extremely high reliability in order to refrain from causing any malfunction or failure leading to critical harm to life and health, serious property damage, or severe impact on society, including, but not limited to listed below ("Specific Purpose"). Therefore, you are strongly advised to use Epson products only for the Anticipated Purpose. Should you desire to purchase and use Epson products for Specific Purpose, Epson makes no warranty and disclaims with respect to Epson products, whether express or implied, including without limitation any implied warranty of merchantability or fitness for any Specific Purpose. Please be sure to contact our sales representative in advance, if you desire Epson products for Specific Purpose:
Space equipment (artificial satellites, rockets, etc.)/ Transportation vehicles and their control equipment (automobiles, aircraft, trains, ships, etc.) / Medical equipment/ Relay equipment to be placed on sea floor/ Power station control equipment / Disaster or crime prevention equipment/Traffic control equipment/ Financial equipment
Other applications requiring similar levels of reliability as the above
- Epson products listed in this document and our associated technologies shall not be used in any equipment or systems that laws and regulations in Japan or any other countries prohibit to manufacture, use or sell. Furthermore, Epson products and our associated technologies shall not be used for the purposes of military weapons development (e.g. mass destruction weapons), military use, or any other military applications. If exporting Epson products or our associated technologies, please be sure to comply with the Foreign Exchange and Foreign Trade Control Act in Japan, Export Administration Regulations in the U.S.A (EAR) and other export-related laws and regulations in Japan and any other countries and to follow their required procedures.
- Epson assumes no responsibility for any damages (whether direct or indirect) caused by or in relation with your non-compliance with the terms and conditions in this document or for any damages (whether direct or indirect) incurred by any third party that you give, transfer or assign Epson products.
- For more details or other concerns about this document, please contact our sales representative.
- Company names and product names listed in this document are trademarks or registered trademarks of their respective companies.