REAL TIME CLOCK MODULE (SPI-Bus)
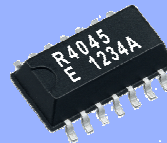### High-Stability Frequency

RX - 4045 SA / NB

RoHS Compliant

Product Number (Please contact us)
RX-4045SA AA : Q41404552000100
RX-4045SA AC : Q41404551000200
**RX-4045NB AA: Q41404592000100**
RX-4045NB AC: Q41404592000200

- Built-in 32.768 kHz crystal unit：Frequency adjusted for high accuracy.
  ($\pm 5 \times 10^{-6}$ / Ta = +25 °C)
- Interface Type   : 4-wire serial interface
- Operating voltage range   : 1.7 V to 5.5 V
- Wide Timekeeper voltage range : 1.15 V to 5.5 V
- Various detection Functions   : Oscillation stop detection function etc.
- Low backup current   : 0.48 µA / 3 V (Typ.)
- 32.768 kHz clock frequency output : N-ch open drain output
- Function of time and calendar, the various detection function, and interrupt function etc.

Actual size

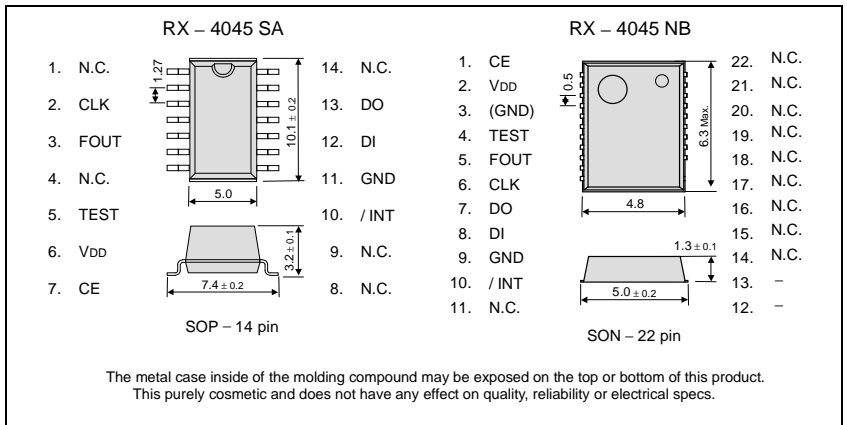| RX-4045SA	RX-4045NB
R4045 E 1234A	*R4045 E 1234A

Block diagram
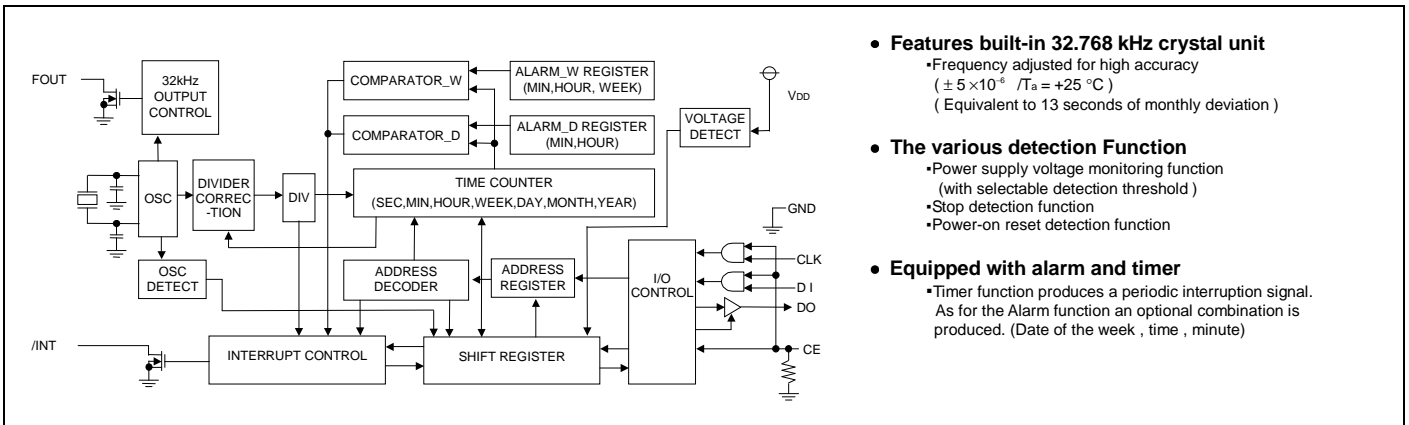
Overview

- **Features built-in 32.768 kHz crystal unit**
  - Frequency adjusted for high accuracy
    ($\pm 5 \times 10^{-6}$ /Ta = +25 °C)
    (Equivalent to 13 seconds of monthly deviation)

- **The various detection Function**
  - Power supply voltage monitoring function
    (with selectable detection threshold)
  - Stop detection function
  - Power-on reset detection function

- **Equipped with alarm and timer**
  - Timer function produces a periodic interruption signal.
    As for the Alarm function an optional combination is produced. (Date of the week , time , minute)

Pin function

Signal Name	Input / Output	Function
CE	Input	The chip enabled input pin. (built -in pull-down resistance) At the " H " level, access becomes possible.
CLK	Input	The shift clock input pin for serial data transfer.
DI	Input	The data input pin for serial data transfer.
DO	Output	The data output pin for serial data transfer.
FOUT	Output	32.768 kHz clock output pin with the output control function (N-ch open drain) High impedance at the time of output off.
/ INT	Output	Interrupt output (N-ch open drain)
TEST	—	∗ Used by the manufacturer for testing. (Do not connect externally.)
VDD	—	Connected to a positive power supply.
GND	—	Connected to a ground.

Terminal connection / External dimensions   (Unit:mm)

RX – 4045 SA

1. N.C.	14. N.C.
2. CLK	13. DO
3. FOUT	12. DI
4. N.C.	11. GND
5. TEST	10. / INT
6. VDD	9. N.C.
7. CE	8. N.C.

SOP – 14 pin

RX – 4045 NB

1. CE	22. N.C.
2. VDD	21. N.C.
3. (GND)	20. N.C.
4. TEST	19. N.C.
5. FOUT	18. N.C.
6. CLK	17. N.C.
7. DO	16. N.C.
8. DI	15. N.C.
9. GND	14. N.C.
10. / INT	13. –
11. N.C.	12. –

SON – 22 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	VDD	—	1.7	3.0	5.5	V
Clock voltage	VCLK	—	1.15	3.0	5.5	V
Operating temperature	TOPR	—	-40	+25	+85	°C

■ Frequency characteristics

Item	Symbol	Conditions	Rating	Unit
Frequency tolerance	Δf / f	Ta = +25℃ VDD = 3.0 V	AA: 5 ± 5 [*1] AC: 0 ± 5 [*2]	×10⁻⁶
Oscillation start-up time	tSTA	Ta = +25 ℃ VDD = 2.0 V	1 Max.	s
Frequency / voltage characteristics	f / V	Ta = +25 ℃ VDD = 2.0 V to 5.5 V	± 1 Max.	×10⁻⁶

[*1] [*2]   Equivalent to 13 seconds of monthly deviation (excluding offset.)

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

Item	Symbol	Conditions		Min.	Typ.	Max.	Unit
Current Consumption	IBK	CE = GND FOUT ;output OFF (Hi-z)	VDD = 5 V	-	0.60	1.80	µA
			VDD = 3 V	-	0.48	1.20	
	I32k	CE = GND FOUT ;32.768 kHz output ON	VDD = 3 V	-	0.65	2.00	µA

■ Power supply detection voltage   Ta = -30 °C to +70 °C

Item	Symbol	Conditions	Min.	Typ.	Max.	Unit
High-voltage mode	VDETH	VDD pin	1.90	2.10	2.30	V
Low-voltage mode	VDETL	VDD pin	1.15	1.30	1.45	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.

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**

Pb Free	►Pb free.

RoHS Compliant	►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.)

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).

Notice

- This material is subject to change without notice.
- Any part of this material may not be reproduced or duplicated in any form or any means without the written permission of Seiko Epson.
- The information about applied data, circuitry, software, usage, etc. written in this material is intended for reference only. Seiko Epson does not assume any liability for the occurrence of customer damage or infringing on any patent or copyright of a third party. This material does not authorize the licensing for any patent or intellectual copyrights.
- When exporting the products or technology described in this material, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
- You are requested not to use the products (and any technical information furnished, if any) for the development and/or manufacture of weapon of mass destruction or for other military purposes. You are also requested that you would not make the products available to any third party who may use the products for such prohibited purposes.
- These products are intended for general use in electronic equipment. When using them in specific applications that require extremely high reliability, such as the applications stated below, you must obtain permission from Seiko Epson in advance.
  / Space equipment (artificial satellites, rockets, etc.) / Transportation vehicles and related (automobiles, aircraft, trains, vessels, etc.) / Medical instruments to sustain life / Submarine transmitters / Power stations and related / Fire work equipment and security equipment / traffic control equipment / and others requiring equivalent reliability.

- All brands or product names mentioned herein are trademarks and/or registered trademarks of their respective.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

[Epson](#):
  [RX-4045SA:AA3](#)