

**REAL TIME CLOCK MODULE (SPI-Bus)**  
**For Automotive**  
**Extended operating temperature range (+125°C)**



Product Number  
**RA-4565SA : Q41A46552xxxx00**

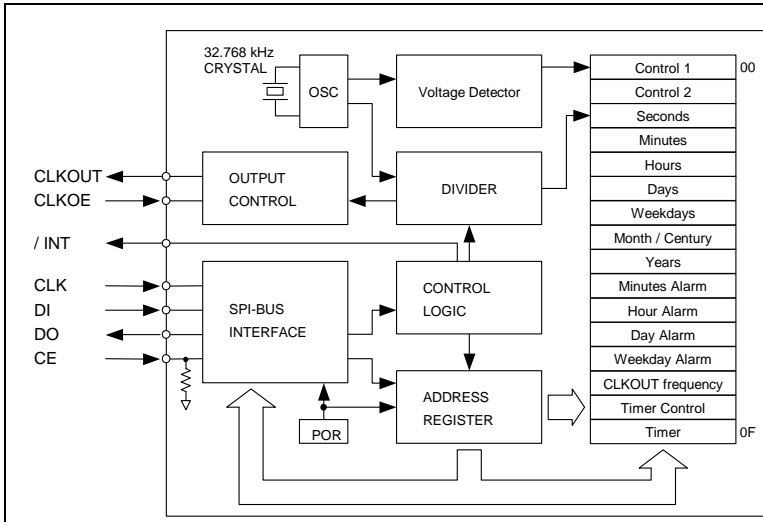
**RA-4565SA**

- Built in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : 4-wire serial interface
- Wide operating voltage range : 1.6 V to 5.5 V
- Wide voltage for long time keeping. : 1.5 V to 5.5 V
- Extended operating temperature range: -40 °C to +125 °C
- 32.768 kHz Clock/calendar function, auto leap year correction function,
- Applications : Car audio, Car navigation system, Clock, ECU sub clock
- AEC-Q200 compliant



**Block diagram**

**Overview**

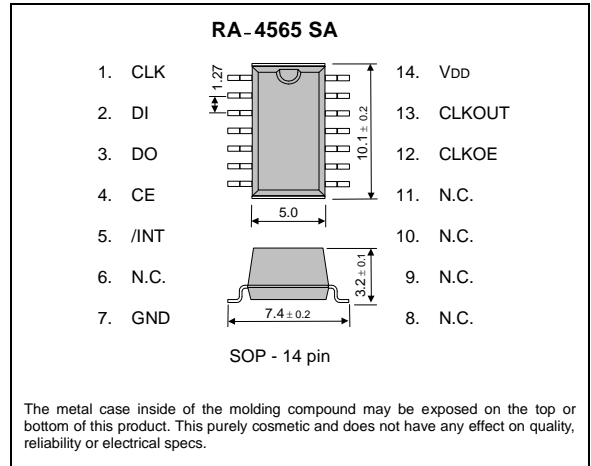


- **Wide operating temperature range**
  - -40 °C to +125 °C
- **Clacking-status detection function**
  - It can judge the validity of data after backup operation return by a status of VL-bit.
- **32.768 kHz frequency output function**
  - CLKOUT pin output (Open Drain output )
  - Output frequency can be selected as 32.768 kHz, 1024 Hz, 32 Hz, or 1 Hz.
- **The various interrupt function**
  - Timer function can be set up between 1/4096 second and 255 minutes.

**Pin Function**

**Terminal connection / External dimensions (Unit:mm)**

Signal Name	Directions	Functions
CE	Input	Chip enabled input.
CLK	Input	Serial clock input.
DI	Input	Data input.
DO	Output	Data output.
CLKOUT	Output	The CLKOUT pin is a clock output ( open drain output ) pin with control output. ( Output frequency can be selected as 32.768 kHz, 1024 Hz, 32 Hz, or 1 Hz. )
CLKOE	Input	The CLKOE pin is an input pin used to control the output mode of the CLKOUT output pin. During the initial power-on (when power is applied from 0 V ), if the CLKOE input pin is at high level ( = H ), the power-on reset function selects 32.768 kHz as the frequency.
/INT	Output	Interrupts output by Alarm and Timer events. ( Open drain output )
VDD	-	VDD
GND	-	GND



**Specifications (characteristics)**

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

■ Recommended Operating Conditions

Item	Symbol	Conditions	Min.	Typ.	Max.	unit
Operating voltage	VDD	-	1.6	3.0	5.5	V
Timekeeper voltage	VCLK	-	1.5	3.0	5.5	V
Operating temperature	TOPR	-	-40	+25	+125	°C

■ Current consumption under backup mode.

Item	Symbol	Conditions	Min.	Typ.	Max.	unit	
Standby current.	IBK	fSCL = 0 Hz CLKOE = "L" VDD = 5 V	+125 °C	-	1.0	2.0	μA
			-40 to +85 °C	-	0.6	1.2	
		fSCL = 0 Hz CLKOE = "L" VDD = 3 V	+125 °C	-	0.8	1.6	μA
			-40 to +85 °C	-	0.5	1.0	

■ Frequency characteristics

Item	Symbol	Conditions	Rating	unit
Frequency stability	$\Delta f / f$	Ta = +25 °C VDD = 3.0 V	B: 5 ± 23 *1	× 10 <sup>-6</sup>
Oscillation start up time	tSTA	Ta = +25 °C VDD = 1.6 V	1.5 Max.	s
		Ta = -40 °C to +125 °C VDD = 3.0 V	3.0 Max.	s

\*1) Equivalent to ±1 minutes of monthly deviation.

## 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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	► 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 ).

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