

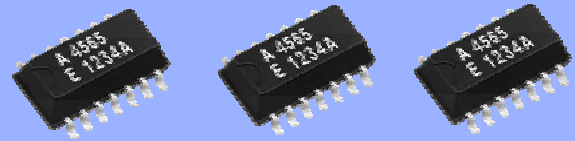
For Automotive  
SERIAL INTERFACE REAL TIME CLOCK MODULE



Product Number (Please contact us)  
RA-4565SA : Q41A46550xxxx00

# RA - 4565 SA

- 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 Timekeeper voltage range : 1.5 V to 5.5 V  
T<sub>a</sub> = -40 °C to +125 °C
- Extended operating temperature range: -40 °C to +125 °C
- 32.768 kHz frequency output function : Open drain output  
with Control Pin
- 32.768 kHz Clock/calendar function, auto leap year correction function, alarm interrupt function, etc.
- Conforms to AEC-Q200



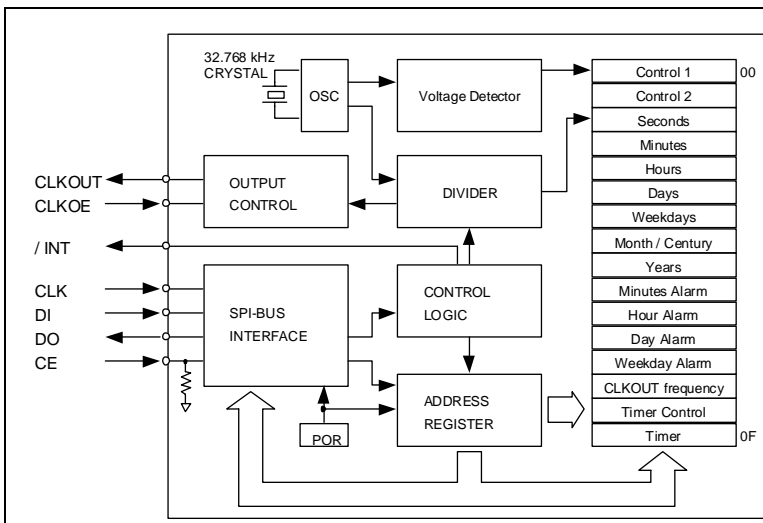
Actual size



**NEW**

## Block diagram

## Overview



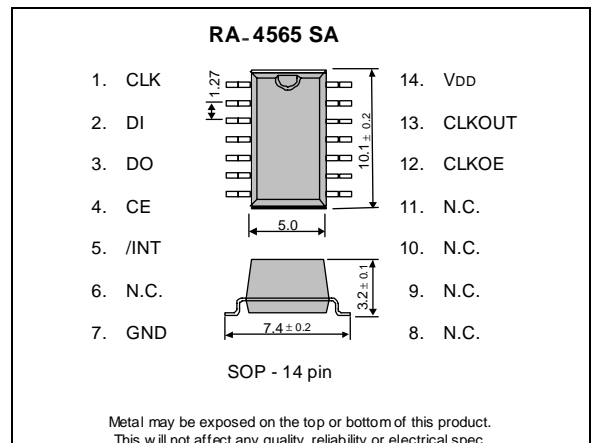
- **Wide operating temperature range**
  - -40 °C to +125 °C
- **Clacking-status detection function**
  - It can judge the validity of data after backup operation return by a status of VL-bit.
- **32.768 kHz frequency output function**
  - CLKOUT pin output (Open Drain output)
  - Output frequency can 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.
  - Alarm function can be set to day of week, day, hour, or minute.

## Pin Function

## Terminal connection / External dimensions

(Unit:mm)

Terminal	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



Metal may be exposed on the top or bottom of this product.  
This will not affect any quality, reliability or electrical spec.

## Specifications (characteristics)

\* Refer to application manual for details.

### Recommended Operating Conditions

Item	Svmbol	Conditions	Min.	Tvd.	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

### Frequency characteristics

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

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

### Current consumption under backup mode.

Item	Svmbol	Conditions	Min.	Tvd.	Max.	unit
Standby current.	IBK	fSCL = 0 Hz CLKOE = "L"	+125 °C	1.0	2.0	μA
		VDD = 5 V				
		fSCL = 0 Hz CLKOE = "L"	+125 °C	0.8	1.6	
		VDD = 3 V				

# “QMEMS” EPSON TOYOCOM

In order to meet customer needs in a rapidly advancing digital, broadband and ubiquitous society, we are committed to offering products that are one step ahead of the market and a rank above the rest in quality. To achieve our goals, we follow a “3D (three device) strategy” designed to drive both horizontal and vertical growth. We will to grow our three device categories of “Timing Devices”, “Sensing Devices” and “Optical Devices”, and expand vertical growth through a combination of products from these categories.

A Quartz MEMS is any high added value quartz device that exploits the characteristics of quartz crystal material but that is produced using MEMS (micro-electro-mechanical system) processing technology.

Market needs are advancing faster than previously imagined toward smaller, more stable crystal products, but we will stay ahead of the curve by rolling out products that exceed market speed and quality requirements. We want to further accelerate the 3D strategy by QMEMS.

Quartz devices have become crucial in the network environment where products are increasingly intended for broadband, ubiquitous applications and where various types of terminals can transfer information almost immediately via LAN and WAN on a global scale. Epson Toyocom Corporation addresses every single aspect within a network environment. The new corporation offers “Digital Convergence” solutions to problems arising with products for consumer use, such as, core network systems and automotive systems.



## PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Epson Toyocom, 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.

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

All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification. In the future, new group companies will be expected to acquire the certification around the third year of operations.

## WORKING FOR HIGH QUALITY

In order to provide high quality and reliable products and services than meet customer needs, Epson Toyocom 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.

QS-9000 is an enhanced standard for quality assurance systems formulated by leading U.S. automobile manufacturers based on the international ISO 9000 series.

ISO/TS 16949 is a global standard based on QS-9000, a severe standard corresponding to the requirements from the automobile industry.

### ► Explanation of the mark that are using it for the catalog

	<ul style="list-style-type: none"> <li>► Pb free.</li> <li>► Complies with EU RoHS directive.</li> </ul>
	<ul style="list-style-type: none"> <li>► Pb free terminal designed. Contains Pb in products exempted by RoHS directive. (Contains Pb in sealing glass, high melting temperature type solder or other.)</li> <li>► Complies with EU RoHS directive.</li> </ul>
	<ul style="list-style-type: none"> <li>► The products have been designed for high reliability applications such as Automotive.</li> </ul>

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  - / 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.
- In this new crystal master for Epson Toyocom, product codes and markings will remain as previously identified prior to the merger. Due to the on-going strategy of gradual unification of part numbers, please review product codes and markings, as they will change during the course of the coming months.

We apologize for the inconvenience, but we will eventually have a unified part numbering system for Epson Toyocom that will be user friendly.