



For Automotive SERIAL INTERFACE REAL TIME CLOCK MODULE



Product Number (Please contact us)
RA-4565SA : Q41A46550xxx00

RA - 4565 SA

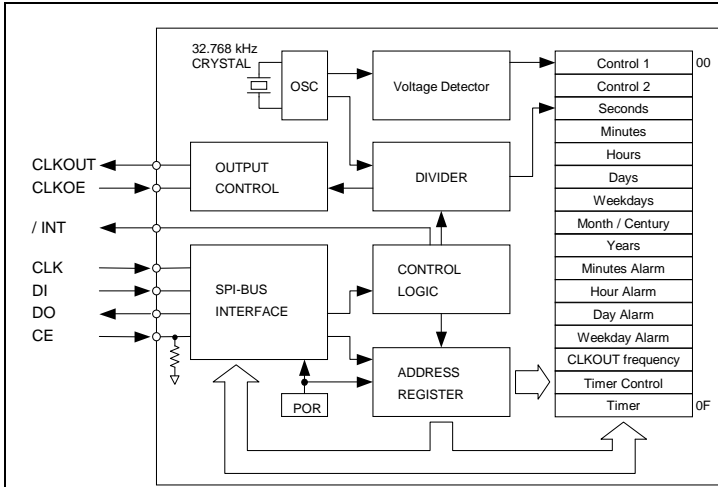
- Built in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : 4-wire serial interface
- Wide operating voltage range : 1.6 V to 5.5 V
- Wide Timekeeper voltage range : 1.5 V to 5.5 V
- Extended operating temperature range: -40 °C to +125 °C
- 32.768 kHz frequency output function : Open drain 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



Block diagram



Overview

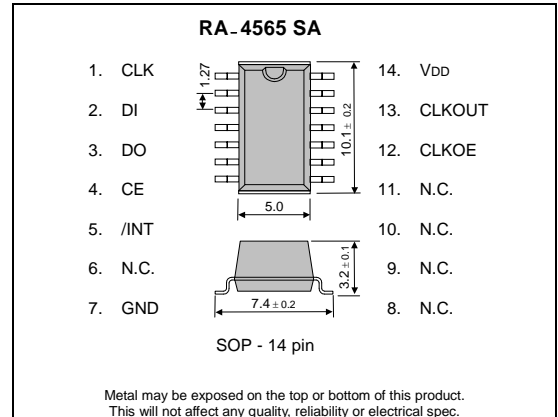
- **Wide operating temperature range**
 - -40 °C to +125 °C
- **Cllocking-status detection function**
 - It can judge the validity of data after backup operation return by a status of VL-bit.
- **32.768 kHz frequency output function**
 - CLKOUT pin output (Open Drain output)
 - Output frequency can be 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 | 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 |

Terminal connection / External dimensions

(Unit:mm)



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 |

Frequency characteristics

| Item | Symbol | Conditions | Rating | unit |
|---------------------------|----------------|---------------------------------------|-----------|--------------------|
| Frequency stability | $\Delta f / f$ | Ta = +25 °C VDD = 3.0 V | 5 ± 23 *1 | × 10 ⁻⁶ |
| 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.

Current consumption under backup mode.

| Item | Symbol | Conditions | Min. | Typ. | Max. | unit |
|------------------|-----------------|---|---------------|------|------|------|
| Standby current. | I _{BK} | 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 | |