



# For Automotive SERIAL-INTERFACE REAL TIME CLOCK MODULE



Product Number (Please contact us)  
RA-4574SA : Q41A47451xxxx00

## RA - 4574 SA

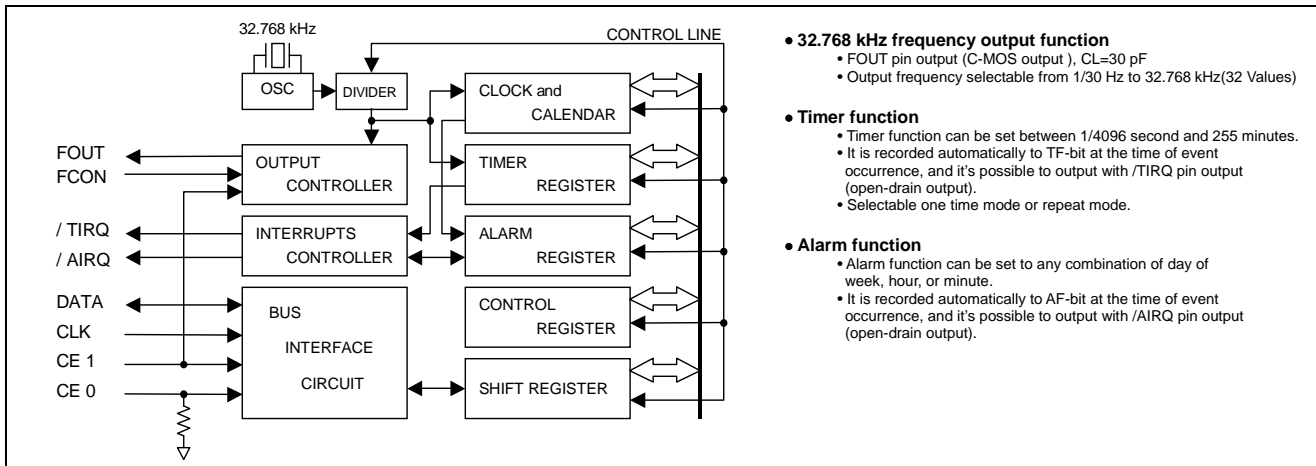
- Built in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : 3-wire serial interface
- Operating voltage range : 1.6 V to 5.5 V
- Wide Timekeeper voltage range : 1.6 V to 5.5 V
- Low backup current : 0.5  $\mu$ A / 3 V (Typ.)
- 32.768 kHz frequency output function : C-MOS output With Control Pin
- The various functions include full calendar, alarm, timer.
- Conforms to AEC-Q200



Actual size



### Block diagram



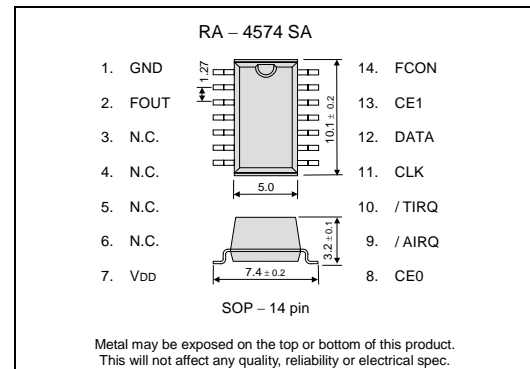
### Overview

- **32.768 kHz frequency output function**
  - FOUT pin output (C-MOS output), CL=30 pF
  - Output frequency selectable from 1/30 Hz to 32.768 kHz (32 Values)
- **Timer function**
  - Timer function can be set between 1/4096 second and 255 minutes.
  - It is recorded automatically to TF-bit at the time of event occurrence, and it's possible to output with /TIRQ pin output (open-drain output).
  - Selectable one time mode or repeat mode.
- **Alarm function**
  - Alarm function can be set to any combination of day of week, hour, or minute.
  - It is recorded automatically to AF-bit at the time of event occurrence, and it's possible to output with /AIRQ pin output (open-drain output).

### Pin Function

| Signal Name | Input / Output | Function  |
|-------------|----------------|---|
| CE0         | Input          | The chip enabled input pin 0. (Built-in pull-down resistance)<br>When both CE0 and CE1 pins are at the "H" level, access to this Real time clock module becomes possible. |
| CE1         | Input          | The chip enabled input pin 1.<br>When the CE1 pin is at the HIGH level, the FOUT pin is in the output state.  |
| CLK         | Input          | The shift clock input pin for serial data transfer.   |
| DATA        | Bi-directional | The data input / output pin for serial data transfer.   |
| FOUT        | Output         | This pin outputs the reference clock signal at 32.768 kHz ( C-MOS output ).<br>High impedance at the time of output off.  |
| FCON        | Input          | The input pin for the FOUT output control.  |
| / AIRQ      | Output         | The open drain output pin for alarm and time update interrupts.   |
| / TIRQ      | Output         | The open drain output pin for timer interrupt.  |
| VDD         | —              | Connected to a positive power supply.   |
| GND         | —              | Connected to a ground.  |

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



### Specifications (characteristics)

\* Refer to application manual for details.

#### Recommended Operating Conditions

| Item                  | Symbol           | Condition | Min. | Typ. | Max. | Unit |
|-----------------------|------------------|-----------|------|------|------|------|
| Power voltage         | VDD              | —         | 1.6  | 3.0  | 5.5  | V    |
| Clock voltage         | VCLK             | —         | 1.6  | 3.0  | 5.5  | V    |
| Operating temperature | T <sub>OPR</sub> | —         | -40  | +25  | +85  | °C   |

#### Frequency characteristics

| Item                      | Symbol           | Condition                              | Rating   | Unit               |
|---------------------------|------------------|--|----------|--------------------|
| Frequency tolerance       | $\Delta f / f$   | T <sub>a</sub> = +25 °C<br>VDD = 3.0 V | 5 ± 23 * | × 10 <sup>-6</sup> |
| Oscillation start-up time | t <sub>STA</sub> | T <sub>a</sub> = +25 °C<br>VDD = 1.6 V | 3 Max.   | s                  |

\* Equivalent to 1 minute of monthly deviation

#### Current consumption characteristics

T<sub>a</sub> = -40 °C to +85 °C

| Item                | Symbol           | Condition  | Min.      | Typ. | Max. | Unit    |
|---------------------|------------------|--|-----------|------|------|---------|
| Current Consumption | I <sub>BK</sub>  | CE0, CE1 = GND<br>FOUT ; Output OFF<br>(Hi - z)                        | VDD = 5 V | 1.0  | 2.0  | $\mu$ A |
|                     |                  |  | VDD = 3 V | 0.5  | 1.0  |         |
| Current Consumption | I <sub>32k</sub> | CE0 = GND<br>CE1 = VDD<br>FOUT ;<br>32.768 kHz output ON<br>CL = 30 pF | VDD = 5 V | 8.0  | 20.0 | $\mu$ A |
|                     |                  |  | VDD = 3 V | 5.0  | 12.0 |         |