



## REAL TIME CLOCK MODULE (SPI-Bus)

Built-in SRAM

## RX - 4581 NB

- Built in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : 4-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 : 0.4  $\mu$ A / 3 V ( Typ. )
- Built-in SRAM : Built-in 128 bit ( 8 bit  $\times$  16 ) RAM.
- 32.768 kHz frequency output function : C-MOS output With Control Pin
- The various functions include full calendar, alarm, timer.



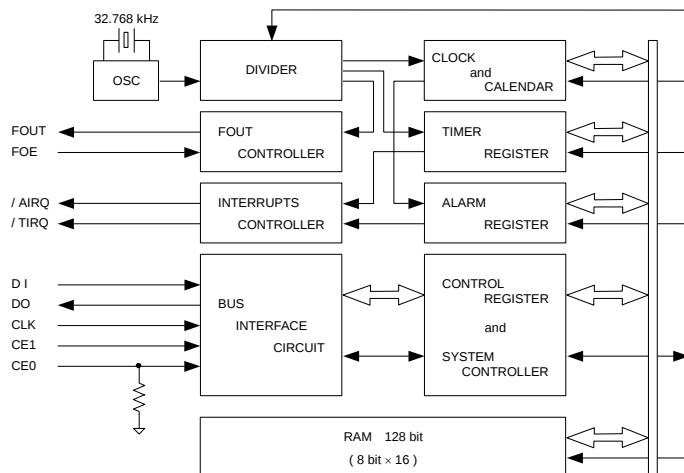
Product Number (Please contact us)  
RX-4581NB : Q41458192000200



Actual size



## Block diagram



## Overview

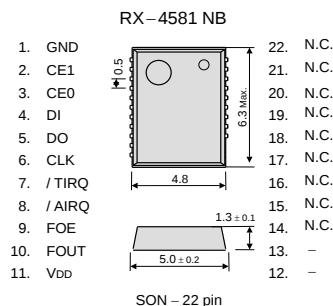
- Built-in SRAM
  - Include 128 bit ( 8 bit  $\times$  16 ) RAM.
- Interface Type
  - Serial interface in 4 lines form.
  - It is possible to make it to 3 lines by wired-OR connecting DI and DO pins.
- 32.768 kHz frequency output function
  - FOUT pin output (C-MOS output), CL=30 pF
  - FOE pin enables output on/off control.
- Timer function
  - Timer function can be set up between 1/4096 second and 4095 minutes.
  - It is recorded automatic to TF-bit at the time of event occurrence, and possible to output with /TIRQ pin output (open-drain output).
- Interrupt function
  - Alarm interrupt function, and timer interrupt function.

## Pin Function

| Signal Name | Input/Output | Function                                                                                                             |
|-------------|--------------|----------------------------------------------------------------------------------------------------------------------|
| CE0         | Input        | The chip enabled input pin 0. ( It has a built -in pull-down resistance )                                            |
| CE1         | Input        | The chip enabled input pin 1. ( It does not have a built -in pull-down resistance )                                  |
| 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       | This pin outputs the reference clock signal at 32.768 kHz ( CMOS output ). High impedance at the time of output off. |
| FOE         | 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)



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    | —          | 1.6  | 3.0  | 5.5  | V    |
| Clock voltage         | VCLK   | —          | 1.6  | 3.0  | 5.5  | V    |
| Operating temperature | TOPR   | —          | -40  | +25  | +85  | °C   |

## Frequency characteristics

| Item                      | Symbol       | Conditions                 | Rating          | Unit             |
|---------------------------|--------------|----------------------------|-----------------|------------------|
| Frequency tolerance       | $\Delta f/f$ | Ta = +25 °C<br>VDD = 3.0 V | B: 5 $\pm$ 23 * | $\times 10^{-6}$ |
| Oscillation start-up time | tSTA         | Ta = +25 °C<br>VDD = 3.0 V | 3 Max.          | s                |

\* Please ask for tighter tolerance. (Equivalent to 1 minute of monthly deviation)

## Current consumption characteristics

Ta = -40 °C to +85 °C

| Item                | Symbol | Conditions                                   | Min.      | Typ. | Max. | Unit         |
|---------------------|--------|----------------------------------------------|-----------|------|------|--------------|
| Current Consumption | IBK    | CE0, CE1 = GND<br>FOE = GND                  | VDD = 5 V | -    | 0.6  | 1.2 $\mu$ A  |
|                     |        | FOUT ; output OFF ( Hi - z )                 | VDD = 3 V | -    | 0.4  | 0.8 $\mu$ A  |
|                     | I32k   | CE0, CE1 = GND<br>FOE = VDD                  | VDD = 5 V | -    | 8.0  | 20.0 $\mu$ A |
|                     |        | FOUT ;<br>32.768 kHz output ON<br>CL = 30 pF | VDD = 3 V | -    | 5.0  | 12.0 $\mu$ A |