



# High-Stability I<sup>2</sup>C-Bus INTERFACE REAL TIME CLOCK MODULE

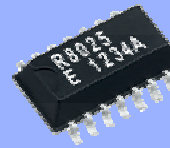
## RX - 8025 SA / NB

- Built-in 32.768 kHz crystal unit : Frequency adjusted for high accuracy ( $\pm 5 \times 10^{-6}$  /  $T_a = +25^\circ\text{C}$ )
- Interface Type : I<sup>2</sup>C-Bus Interface (400 kHz)
- Operating voltage range: 1.70 V to 5.5 V
- Wide Timekeeper voltage range : 1.15 V to 5.5 V
- Various detection Functions : Ex. Oscillation stop detection function
- Low backup current : 0.48  $\mu\text{A}$  / 3 V (Typ.)
- 32.768 kHz frequency output function : C-MOS output With Control Pin
- The various functions include full calendar, alarm, timer.

\* The I<sup>2</sup>C-Bus is a trademark of NXP Semiconductors



Product Number (Please contact us)  
RX-8025SA : Q41802551xxxx00  
RX-8025NB : Q41802591xxxx00



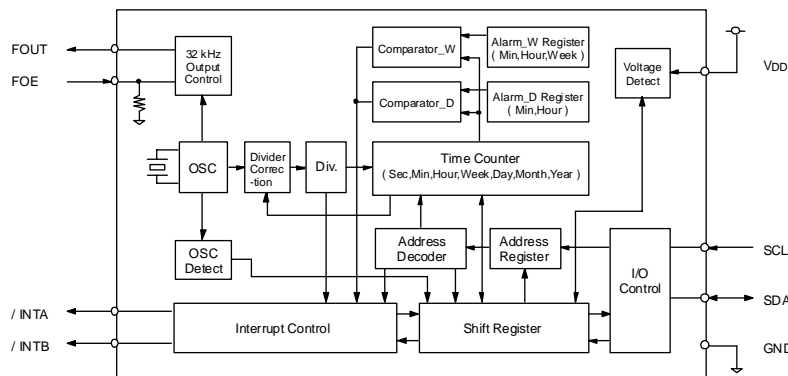
Actual size

RX-8025SA

RX-8025NB



### Block diagram



### Overview

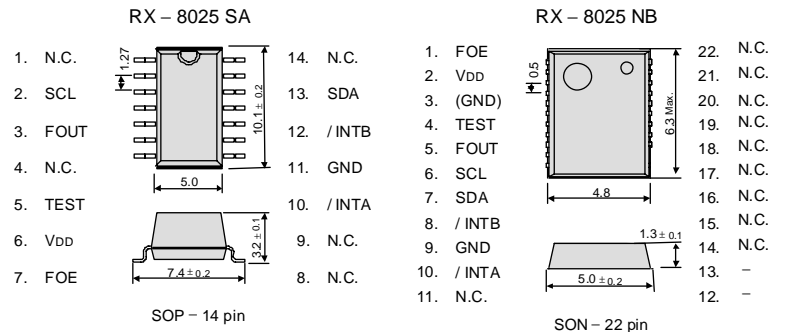
- **Features built-in 32.768 kHz crystal unit**
  - Frequency adjusted for high accuracy ( $\pm 5 \times 10^{-6}$  /  $T_a = +25^\circ\text{C}$ ) (Equivalent to 13 seconds of monthly deviation)
- **The various detection function**
  - Power supply voltage monitoring function (with selectable detection threshold)
  - Stop detection function
  - Power-on reset detection function
- **Alarm function and Timer function**
  - Timer function produces a periodic interruption signal. As for the Alarm function an optional combination is produced. (Date of the week, time, minute)

### Pin Function

| Signal Name | Input / output | Function  |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
|-------------|----------------|---|-------------|------------|------------|-------------|---|---|---|-----------|---|---|---|------------|---|---|------------|---|---|------------|---|---|----------|
| SCL         | Input          | Serial clock input pin  |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| SDA         | Bi-directional | Data input and output pin   |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| FOUT        | Output         | 32.768 kHz clock output pin with the output control function. (C-MOS)   |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| FOE         | Input          | <table><tr><th>FOE input</th><th>/CLEN1 bit</th><th>/CLEN2 bit</th><th>FOUT output</th></tr><tr><td>L</td><td>X</td><td>X</td><td>OFF (LOW)</td></tr><tr><td rowspan="4">H</td><td>0</td><td>0</td><td>32.768 kHz</td></tr><tr><td>0</td><td>1</td><td>32.768 kHz</td></tr><tr><td>1</td><td>0</td><td>32.768 kHz</td></tr><tr><td>1</td><td>1</td><td>OFF(LOW)</td></tr></table> | FOE input   | /CLEN1 bit | /CLEN2 bit | FOUT output | L | X | X | OFF (LOW) | H | 0 | 0 | 32.768 kHz | 0 | 1 | 32.768 kHz | 1 | 0 | 32.768 kHz | 1 | 1 | OFF(LOW) |
| FOE input   | /CLEN1 bit     | /CLEN2 bit  | FOUT output |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| L           | X              | X   | OFF (LOW)   |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| H           | 0              | 0   | 32.768 kHz  |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
|             | 0              | 1   | 32.768 kHz  |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
|             | 1              | 0   | 32.768 kHz  |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
|             | 1              | 1   | OFF(LOW)    |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| / INTA      | Output         | Interrupt output A pin ( N-ch open drain )  |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| / INTB      | Output         | Interrupt output B pin ( N-ch open drain )  |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| TEST        | —              | * Used by the manufacture for testing.<br>( Do not connect externally.)   |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| Vdd         | —              | Connected to a positive power supply.   |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |
| GND         | —              | Connected to a ground.  |             |            |            |             |   |   |   |           |   |   |   |            |   |   |            |   |   |            |   |   |          |

### Terminal connection / External dimensions

(Unit:mm)



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                  | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-----------------------|--------|-----------|------|------|------|------|
| Power voltage         | VDD    | —         | 1.7  | 3.0  | 5.5  | V    |
| Clock voltage         | VCLK   | —         | 1.15 | 3.0  | 5.5  | V    |
| Operating temperature | TOPR   | —         | -40  | +25  | +85  | °C   |

#### Frequency characteristics

| Item                              | Symbol           | Condition   | Range  | Unit             |
|-----------------------------------|------------------|---|--|------------------|
| Frequency tolerance               | $\Delta f / f$   | $T_a = +25^\circ\text{C}$<br>$V_{DD} = 3.0\text{ V}$                  | AA: $5 \pm 5$ <sup>(*)</sup><br>AC: $0 \pm 5$ <sup>(*)</sup> | $\times 10^{-6}$ |
| Oscillation start-up time         | t <sub>STA</sub> | $T_a = +25^\circ\text{C}$<br>$V_{DD} = 2.0\text{ V}$                  | 1 Max.   | s                |
| Frequency voltage characteristics | f / V            | $T_a = +25^\circ\text{C}$<br>$V_{DD} = 2.0\text{ V to } 5.5\text{ V}$ | $\pm 1$ Max.   | $\times 10^{-6}$ |

\*1) \*2) Equivalent to 13 seconds of monthly deviation (excluding offset).

#### Current consumption characteristics

 $T_a = -40^\circ\text{C to } +85^\circ\text{C}$ 

| Item                | Symbol           | Condition  | Min.                    | Typ. | Max. | Unit          |
|---------------------|------------------|--|-------------------------|------|------|---------------|
| Current Consumption | I <sub>BK</sub>  | f <sub>SCL</sub> = 0Hz<br>FOE = GND<br>FOUT ; output OFF (LOW)                                       | V <sub>DD</sub> = 5 V   | 0.60 | 1.80 | $\mu\text{A}$ |
|                     | I <sub>32k</sub> | f <sub>SCL</sub> = 0Hz<br>V <sub>DD</sub> , FOE = 5.5 V<br>FOUT ; output ON (Output=OPEN; CL = 0 pF) | V <sub>DD</sub> = 5.5 V | 3.0  | 6.5  | $\mu\text{A}$ |

#### Power supply detection voltage

 $T_a = -30^\circ\text{C to } +70^\circ\text{C}$ 

| Item              | Symbol | Condition | Min. | Typ. | Max. | Unit |
|-------------------|--------|-----------|------|------|------|------|
| High-voltage mode | VDETH  | VDD pin   | 1.90 | 2.10 | 2.30 | V    |
| Low-voltage mode  | VDETL  | VDD pin   | 1.15 | 1.30 | 1.45 | V    |

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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.

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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.

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.

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

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|   |  |
|---|--|
|  | <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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- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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