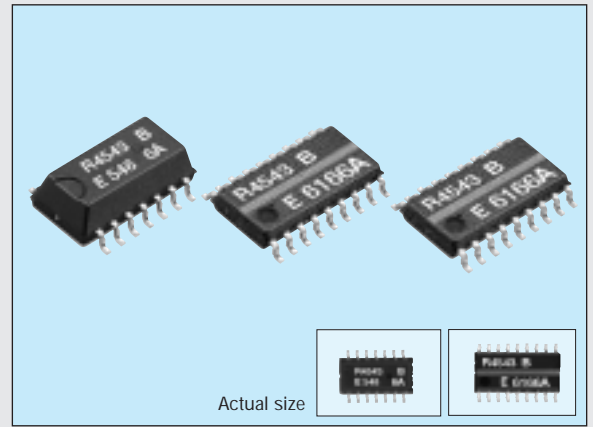


SERIAL-INTERFACE REAL TIME CLOCK MODULE

RTC-4543SA/SB

- Built-in crystal unit allows adjustment-free efficient operation.
- Automatic leap year correction.
- Output selectable between 32.768 KHz/1 Hz.
- Operating voltage range: 2.5V to 5.5V.
- Supply voltage detection voltage: $1.7 \pm 0.3V$.
- Low current consumption: $1.0 \mu A/2.0V$ (Max.)



Specifications (characteristics)

Absolute Max. rating

| Item | Symbol | Condition | Min. | Max. | Unit |
|----------------------|-----------|---------------|------|--------------|------|
| Power source voltage | V_{DD} | V_{DD} -GND | -0.3 | 7.0 | V |
| Input voltage | V_{IN} | — | | $V_{DD}+0.3$ | |
| Output voltage | V_{OUT} | | | | |
| Storage temperature | T_{STG} | | -55 | +125 | °C |

Operating range

| Item | Symbol | Condition | Min. | Max. | Unit |
|-----------------------|-----------|-----------|------|------|------|
| Operating voltage | V_{DD} | — | 2.5 | 5.5 | V |
| Date holding voltage | V_{CLK} | | 1.4 | | |
| Operating temperature | T_{OPR} | | -40 | +85 | °C |

Frequency characteristics

| Item | Symbol | Condition | Range | Unit |
|---------------------------------------|----------------|--|------------|----------|
| Frequency tolerance | $\Delta f/f_0$ | $T_a=25^\circ C, V_{DD}=5V$ | 5 ± 23 | ppm |
| Frequency temperature characteristics | T_{OP} | -10 to $+70^\circ C$ | +10/-120 | |
| Frequency voltage characteristics | f_v | $T_a=25^\circ C, V_{DD}=2.0$ to $5.5V$ | ± 2 | ppm/V |
| Oscillation start time | t_{OSC} | $T_a=25^\circ C, V_{DD}=2.5V$ | 3 | s |
| Aging | f_a | First year $T_a=25^\circ C, V_{DD}=5V$ | ± 5 | ppm/year |

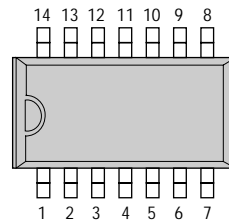
DC characteristics

($V_{DD}=5V \pm 0.5V, T_a=-40$ to $85^\circ C$)

| Item | Symbol | Condition | Min. | Typ. | Max. | Unit | |
|--------------------------|-----------|---|----------------------|---|------|---------|---------|
| "H" input voltage | V_{IH} | WR, DATA, CE, CLK, F_{OE}, F_{SEL} pins | $0.8V_{DD}$ | — | — | V | |
| "L" input voltage | V_{IL} | | $0.2V_{DD}$ | | | | |
| Input off-leak current | I_{OFF} | WR, CE, CLK, F_{OE}, F_{SEL} pins | — | — | 0.5 | μA | |
| "H" output voltage | V_{OH1} | $V_{DD}=5.0V$ | $I_{OH}=-1.0$ mA | 4.5 | — | V | |
| | V_{OH2} | $V_{DD}=3.0V$ | DATA, F_{OUT} pins | 2.5 | | | |
| "L" output voltage | V_{OL1} | $V_{DD}=5.0V$ | $I_{OH}=1.0$ mA | — | 0.5 | V | |
| | V_{OL2} | $V_{DD}=3.0V$ | DATA, F_{OUT} pins | — | 0.8 | | |
| Output leak current | I_{OZH} | $V_{OUT}=5.5V$ | DATA, F_{OUT} pins | -1.0 | 1.0 | μA | |
| | I_{OZL} | $V_{OUT}=0V$ | | | | | |
| Supply detection voltage | V_{DT} | — | 1.4 | 1.7 | 2.0 | V | |
| Output load conditions | CL | F_{OUT} pin | 30 pF(max.) | — | — | V | |
| | N | | | | | | 2LS-TTL |
| Current consumption | 1 | I_{DD1} | $V_{DD}=5.0V$ | CE="L", F_{OE} ="L" F_{SEL} ="H" | 1.5 | 3.0 | μA |
| | 2 | I_{DD2} | $V_{DD}=3.0V$ | | 1.0 | 2.0 | |
| | 3 | I_{DD3} | $V_{DD}=2.0V$ | | 0.5 | 1.0 | |
| | 4 | I_{DD4} | $V_{DD}=5.0V$ | | 4.0 | 10.0 | |
| | 5 | I_{DD5} | $V_{DD}=3.0V$ | | 2.5 | 6.5 | |
| | 6 | I_{DD6} | $V_{DD}=2.0V$ | | 1.5 | 4.0 | |

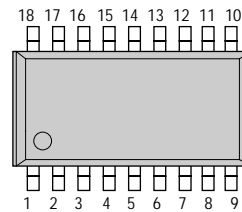
Terminal connection

RTC-4543SA



| No. | 4543SA | 4543SB |
|-----|-----------|-----------|
| 1 | GND | N.C |
| 2 | N.C | N.C |
| 3 | CE | N.C |
| 4 | F_{SEL} | N.C |
| 5 | WR | F_{OE} |
| 6 | F_{OE} | WR |
| 7 | N.C | F_{SEL} |
| 8 | N.C | CE |
| 9 | V_{DD} | GND |
| 10 | CLK | F_{OUT} |
| 11 | DATA | DATA |
| 12 | N.C | CLK |
| 13 | N.C | N.C |
| 14 | F_{OUT} | V_{DD} |
| 15 | — | N.C |
| 16 | — | N.C |
| 17 | — | N.C |
| 18 | — | N.C |

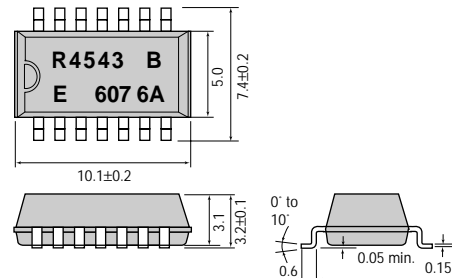
RTC-4543SB



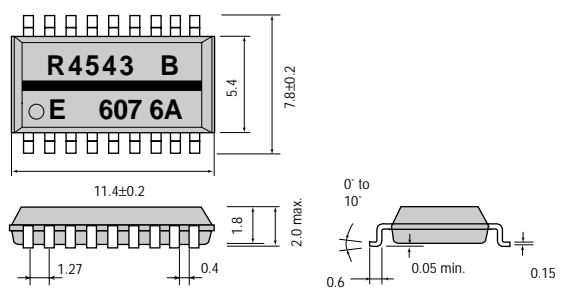
External dimensions

(Unit: mm)

RTC-4543SA (SOP 14-pin)



RTC-4543SB (SOP 18-pin)



Register table

| | MSB | | | | | | | |
|--------------------------|------|-------|-------|-------|------|------|------|------|
| Seconds (0 to 59) | FDT | s 40 | s 20 | s 10 | s 8 | s 4 | s 2 | s 1 |
| Minutes (0 to 59) | * | mi 40 | mi 20 | mi 10 | mi 8 | mi 4 | mi 2 | mi 1 |
| Hour (0 to 23) | * | * | h 20 | h 10 | h 8 | h 4 | h 2 | h 1 |
| Day of the week (1 to 7) | | | | | * | w 4 | w 2 | w 1 |
| Day (1 to 31) | * | * | d 20 | d 10 | d 8 | d 4 | d 2 | d 1 |
| Month (1 to 12) | TM | * | * | mo 10 | mo 8 | mo 4 | mo 2 | mo 1 |
| year (0 to 99) | y 80 | y 40 | y 20 | y 10 | y 8 | y 4 | y 2 | y 1 |

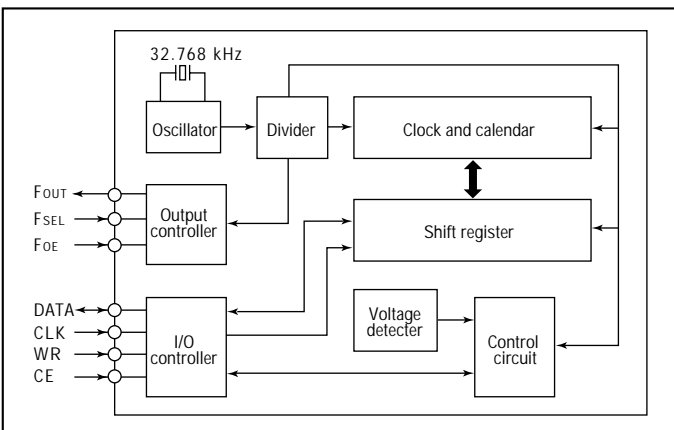
FDT bit: Supply voltage detection bit. TM bit: Test bit always set this bit to "0".

Switching characteristics

(Ta=-40 to +85°C, CL=30 pF)

| Item | Symbol | VDD= 5V± 10% | | VDD= 3V± 10% | | Unit |
|---------------------------|-------------------|--------------|------|--------------|------|------|
| | | Min. | Max. | Min. | Max. | |
| CLK clock cycle | t _{CLK} | 0.75 | 7800 | 1.5 | 7800 | μs |
| CLK high pulse width | t _{CLKH} | 0.375 | 3900 | 0.75 | 3900 | |
| CLK low pulse width | t _{CLKL} | | | | | |
| CE setup time | t _{CEs} | | | | | |
| CE hold time | t _{CEH} | | | | | |
| CE enable time | t _{CE} | | 0.9 | | 0.9 | s |
| Write data setup time | t _{SD} | 0.1 | | 0.2 | | μs |
| Write data hold time | t _{HD} | | | 0.1 | | |
| WR setup time | t _{WRS} | 100 | | 100 | | ns |
| WR hold time | t _{WRH} | | | | | |
| DATA output delay time | t _{DATA} | | 0.2 | | 0.4 | μs |
| DATA output floating time | t _{DZ} | | 0.1 | | 0.2 | |
| Clock input rise time | t _{r1} | | 50 | | 100 | ns |
| Clock input fall time | t _{f1} | | | | | |
| Four rise time | t _{r2} | CL= 30pF | 100 | | 200 | |
| Four fall time | t _{f2} | | | | | |
| Disable time | t _{Zx} | | | | | |
| Enable time | t _{Zx} | | | | | |
| Four duty ratio | Duty | 40 | 60 | 40 | 60 | % |
| Wait time | t _{rcv} | 0.95 | | 1.9 | | μs |

Block diagram



Timing chart

