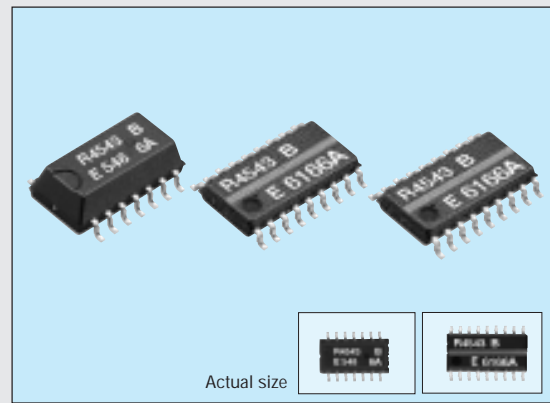


SERIAL-INTERFACE REAL TIME CLOCK MODULE

# 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	$V_{DD}$	$V_{DD}-GND$		7.0	
Input voltage	$V_{IN}$		-0.3	$V_{DD}+0.3$	V
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		V
Operating temperature	$T_{OPR}$		-40	+85	°C

### Frequency characteristics

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

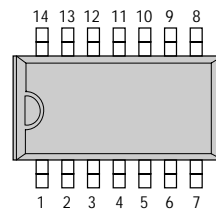
### DC characteristics

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

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
"H" input voltage	$V_{IH}$	WR, DATA, CE, CLK, F <sub>OE</sub> , F <sub>SEL</sub> pins	$0.8V_{DD}$		—	V
"L" input voltage	$V_{IL}$		—		$0.2V_{DD}$	V
Input off-leak current	$I_{OFF}$	WR, CE, CLK, F <sub>OE</sub> , F <sub>SEL</sub> pins			0.5	μA
"H" output voltage	$V_{OH1}$ $V_{OH2}$	$V_{DD}=5.0V$ $V_{DD}=3.0V$	$I_{OH}=-1.0$ mA	4.5 2.5	—	V
"L" output voltage	$V_{OL1}$ $V_{OL2}$	$V_{DD}=5.0V$ $V_{DD}=3.0V$	$I_{OL}=1.0$ mA	—	0.5 0.8	V
Output leak current	$I_{OZH}$ $I_{OZL}$	$V_{OUT}=5.5V$ $V_{OUT}=0V$	DATA, F <sub>OUT</sub> pins	-1.0	1.0	μA
Supply detection voltage	$V_{DT}$	—	1.4	1.7	2.0	V
Output load conditions	$C_L$ N	F <sub>OUT</sub> pin		30 pF(max.)		V
Current consumption	1	$I_{DD1}$ $V_{DD}=5.0V$	CE="L", F <sub>OE</sub> ="L" F <sub>SEL</sub> ="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	$I_{DD4}$ $V_{DD}=5.0V$	CE="L", F <sub>OE</sub> ="H" F <sub>SEL</sub> ="L"	4.0	10.0	
	5	$I_{DD5}$ $V_{DD}=3.0V$		2.5	6.5	
	6	$I_{DD6}$ $V_{DD}=2.0V$	No load on the F <sub>OUT</sub> pin	1.5	4.0	

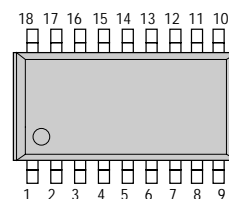
## Terminal connection

### RTC-4543SA



No.	4543SA	4543SB
1	GND	N.C
2	N.C	N.C
3	CE	N.C
4	FSEL	N.C
5	WR	F <sub>OE</sub>
6	F <sub>OE</sub>	WR
7	N.C	FSEL
8	N.C	CE
9	$V_{DD}$	GND
10	CLK	F <sub>OUT</sub>
11	DATA	DATA
12	N.C	CLK
13	N.C	N.C
14	F <sub>OUT</sub>	$V_{DD}$
15	—	N.C
16	—	N.C
17	—	N.C
18	—	N.C

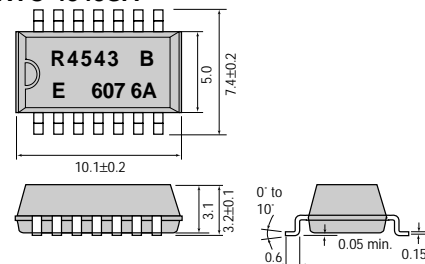
### RTC-4543SB



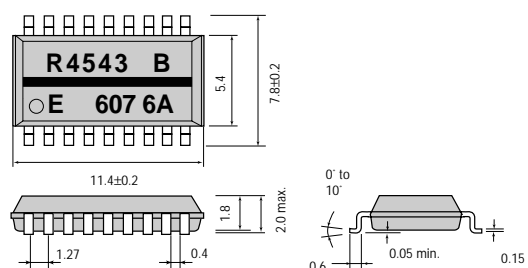
## External dimensions

(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

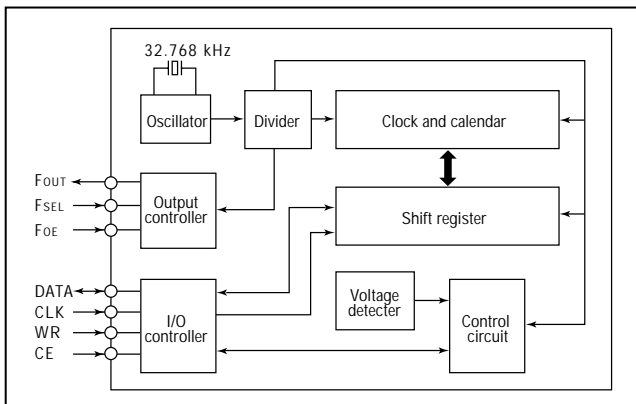
FDT bit: Supply voltage detection bit. TM bit: Test bit always set this bit to "0".

Switching characteristics

(Ta=-40 to +85°C, CL=30 pF)

Item	Symbol	V <sub>DD</sub> = 5V± 10%		V <sub>DD</sub> = 3V± 10%		Unit	
		Min.	Max.	Min.	Max.		
CLK clock cycle	t <sub>CLK</sub>	0.75	7800	1.5	7800	μs	
CLK high pulse width	t <sub>CLKH</sub>	0.375	3900	0.75	3900		
CLK low pulse width	t <sub>CLKL</sub>						
CE setup time	t <sub>CES</sub>						
CE hold time	t <sub>CEH</sub>	—	—	—	—	s	
CE enable time	t <sub>CE</sub>	—	0.9	—	0.9		
Write data setup time	t <sub>SD</sub>	0.1	—	0.2	—	μs	
Write data hold time	t <sub>HD</sub>			0.1	—		
WR setup time	t <sub>WRS</sub>	100	—	100	—	ns	
WR hold time	t <sub>WRH</sub>						
DATA output delay time	t <sub>DATA</sub>	—	0.2	—	0.4	μs	
DATA output floating time	t <sub>DZ</sub>				0.1		0.2
Clock input rise time	t <sub>r1</sub>				50		100
Clock input fall time	t <sub>f1</sub>	—	—	—	—	ns	
F <sub>OUT</sub> rise time	t <sub>r2</sub>	100	200				
F <sub>OUT</sub> fall time							
Disable time	t <sub>xz</sub>	—	—				
Enable time	t <sub>zx</sub>						
F <sub>OUT</sub> duty ratio	Duty	40	60	40	60	%	
Wait time	t <sub>rcv</sub>	0.95	—	1.9	—	μs	

Block diagram



Timing chart

