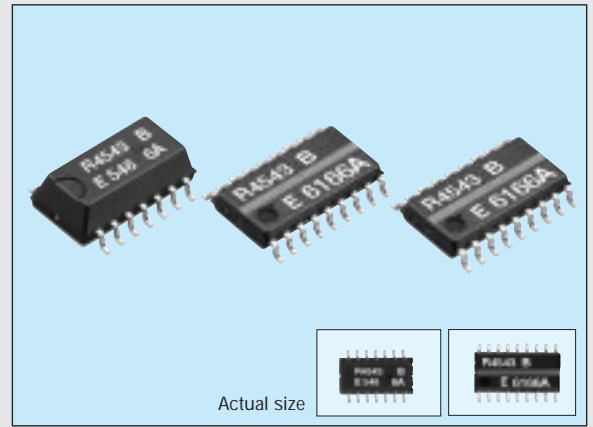


SERIAL-INTERFACE REAL TIME CLOCK MODULE

# 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	$\Delta f/f_0$	$T_a=25^\circ C, V_{DD}=5V$	$5 \pm 23$	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 $5.5V$	$\pm 2$	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

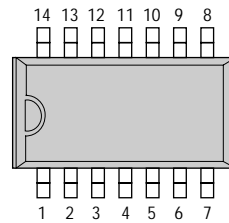
### DC characteristics

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

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
"H" input voltage	$V_{IH}$	WR, DATA, CE, CLK, $F_{OE}, F_{SEL}$ 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	$\mu A$	
"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	$\mu A$	
	$I_{OZL}$	$V_{OUT}=0V$					
Supply detection voltage	$V_{DT}$	—	1.4	1.7	2.0	V	
Output load conditions	CL	$F_{OUT}$ pin	30 pF(max.)	—	—	V	
	N						
Current consumption	1	$I_{DD1}$	$V_{DD}=5.0V$	CE="L", $F_{OE}$ ="L" $F_{SEL}$ ="H"	1.5	3.0	$\mu A$
	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	$I_{DD6}$	$V_{DD}=2.0V$		No load on the $F_{OUT}$ pin	1.5	

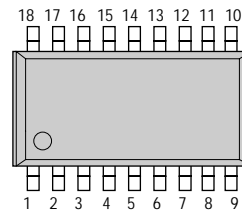
## Terminal connection

### 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

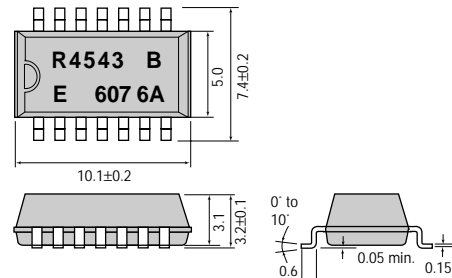
### RTC-4543SB



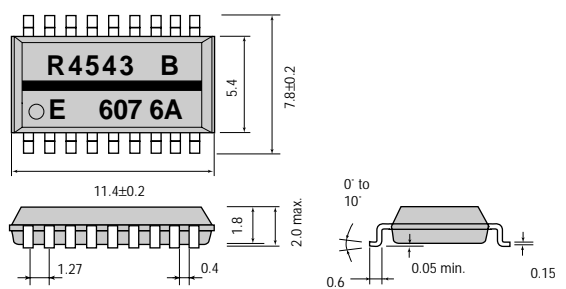
## External dimensions

(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

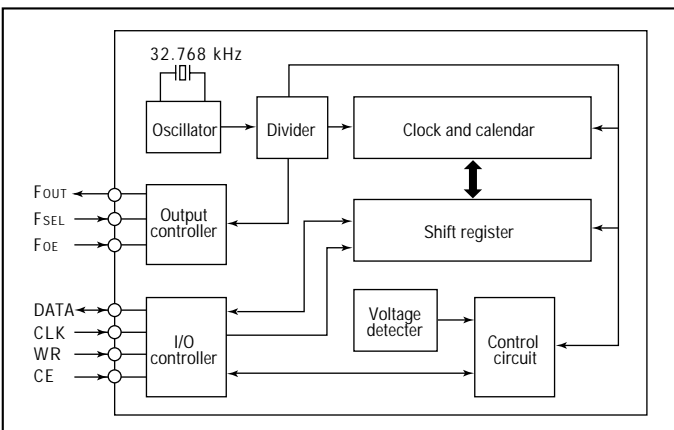
FDT bit: Supply voltage detection bit. TM bit: Test bit always set this bit to "0".

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 <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>					
CE enable time	t <sub>CE</sub>		0.9		0.9	s
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	ns
Clock input fall time	t <sub>f1</sub>					
Four rise time	t <sub>r2</sub>	CL= 30pF	100		200	
Four fall time	t <sub>f2</sub>					
Disable time	t <sub>Zx</sub>					
Enable time	t <sub>Zx</sub>					
Four duty ratio	Duty	40	60	40	60	%
Wait time	t <sub>rcv</sub>	0.95		1.9		μs

Block diagram



Timing chart

