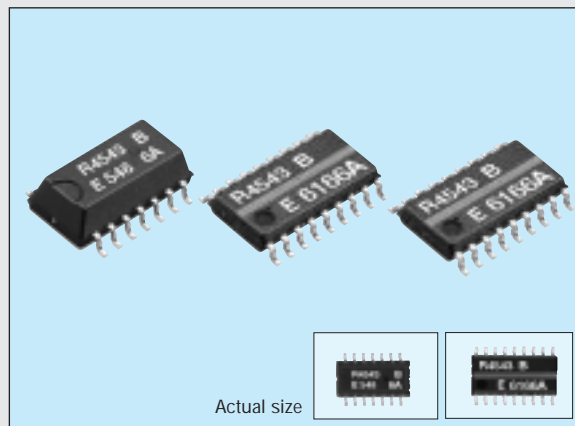


SERIAL-INTERFACE REAL TIME CLOCK MODULE

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

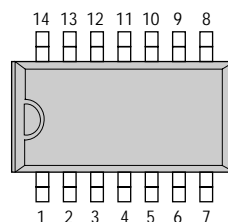
DC characteristics

($V_{DD}=5V \pm 0.5V, T_a=-40$ 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						
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}	$V_{DD}=2.0V$		No load on the F_{OUT} pin	1.5	

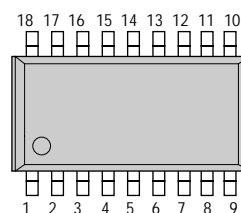
Terminal connection

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

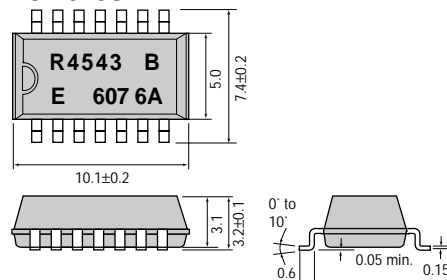
RTC-4543SB



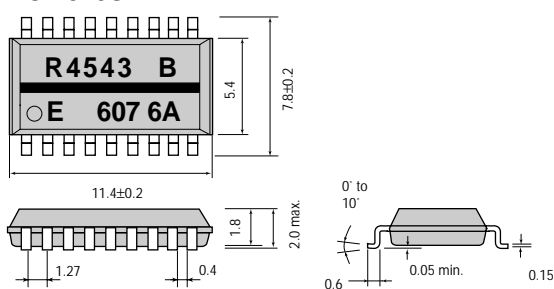
External dimensions

(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

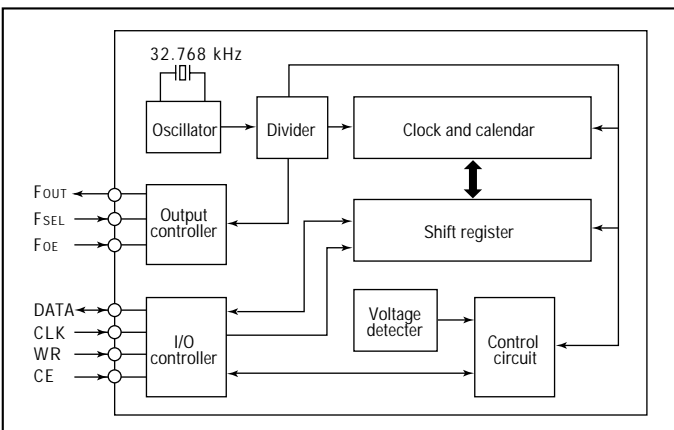
FDT bit: Supply voltage detection bit. TM bit: Test bit always set this bit to "0".

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 _{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

