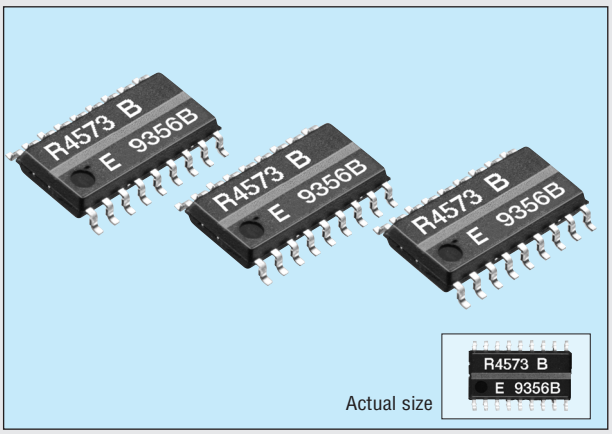
SERIAL INTERFACE RTC WITH AN ALARM TIMER

RTC-4573SB

- Built-in crystal unit allows adjustment-free efficient operation.
- 2.0 mm thickness featuring high-density mounting.
- Using a serial interface, controllable only three signal lines.
- Alarm interruption of sec. to month and day of week possible.
- Interval timer interrupt function that can be set with an interval ranging from 1/4096 of a second to 255 minutes.
- Automatic leap year correction.
- Similar mounting method to that used for universal type SMD IC.
- Low current consumption. (0.5 µA/3 V Typ.)



Specifications (characteristics)

Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V_{DD}	V_{DD}-GND	-0.3	+7.0	V
Input voltage	V_{IN}	Input Pin		V_{DD}+0.3 V	
Output voltage	V_{OUT1}	$\overline{TIRQ}$,$\overline{AIRQ}$		+8.0	
	V_{OUT2}	F_{OUT},DATA		V_{DD}+0.3 V	
Storage temperature	T_{STG}	Stored without tape & reel	-55	+125	°C
Soldering conditions	T_{SOL}		Twice at under +260 °C within 10 s or under +230 °C within 3 min.		

Operating range

Item	Symbol	Condition	Min.	Max.	Unit
Operating voltage	V_{DD}	—	1.6	5.5	V
Operating temperature	T_{OPR}		-40	+85	°C

Frequency characteristics

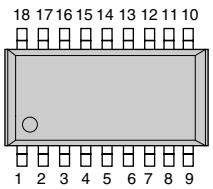
Item	Symbol	Condition	Range	Unit
Frequency tolerance	Δf/fo	Ta=+25 °C, V_{DD}=3 V	5±23	x 10^{-6}
Frequency temperature characteristics	T_{op}	Ta=-10 °C to +70 °C, Reference at +25 °C	+10 -120	
Frequency voltage characteristics	fv	Ta=+25 °C,V_{DD}=1.6 to 5.5 V	±2	x 10^{-6}/V
Oscillation start up time	t_{STA}	Ta=+25 °C,V_{DD}=1.6 V	3	s
Aging	fa	Ta=+25 °C, V_{DD}=3 V, first year	±5	x 10^{-6}/year

DC characteristics

(V_{DD}=1.6 to 5.5 V,Ta=-40 to +85 °C)

Item	Symbol	Condition		Min.	Typ.	Max.	Unit
Input voltage	V_{IH}	CE_0,CE_1 CLK,DATA pins		0.8V_{DD}	—	V_{DD}	V
	V_{IL}			0	—	0.2V_{DD}	
Input leakage current	I_{LK}	V_I=GND or V_{DD} DATA, CLK pins		-0.5	—	0.5	µA
Pulldown R1	R_{DWN1}	V_{DD}=5 V	CE_0,CE_1 pins	75	150	300	kΩ
Pulldown R2	R_{DWN2}	V_{DD}=3 V		150	300	600	
Output voltage 1	V_{OH1}	V_{DD}=5 V	I_{OH}=-1 mA DATA,F_{OUT} pins	4.5	—	5.0	V
	V_{OH2}	V_{DD}=3 V		2.0	—	3.0	
	V_{OL1}	V_{DD}=5 V	I_{OH}=1 mA DATA,F_{OUT} pins			GND+0.5	
	V_{OL2}	V_{DD}=3 V			—	GND+0.8	
Output voltage 2	V_{OL3}	V_{DD}=5 V	I_{OL}=1 mA $\overline{AIRQ}$, $\overline{TIRQ}$ pins		—	GND+0.25	
	V_{OL4}	V_{DD}=3 V		—		GND+0.4	
Leakage current	I_{OZ}	V_O=GND or V_{DD}, DATA , $\overline{AIRQ}$, $\overline{TIRQ}$ pins		-0.5		0.5	µA
Standby current 1	I_{DD1}	V_{DD}=5 V	CE_0,CE_1=GND		1.0	2.0	
Standby current 2	I_{DD2}	V_{DD}=3 V			0.5	1.0	

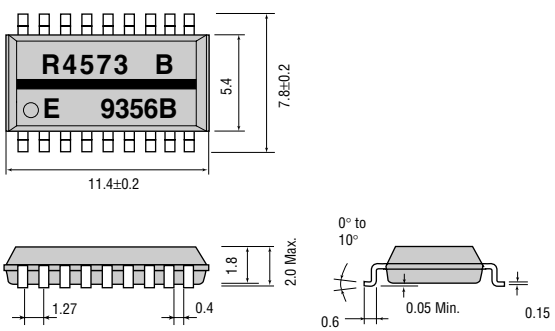
Terminal connection



No.	Pin terminal	No.	Pin terminal
1	N.C	18	N.C
2	N.C	17	N.C
3	N.C	16	N.C
4	N.C	15	N.C
5	CE1	14	V_{DD}
6	DATA	13	F_{OUT}
7	CLK	12	CE0
8	N.C	11	$\overline{AIRQ}$
9	GND	10	$\overline{TIRQ}$

External dimensions

(Unit: mm)



Register table

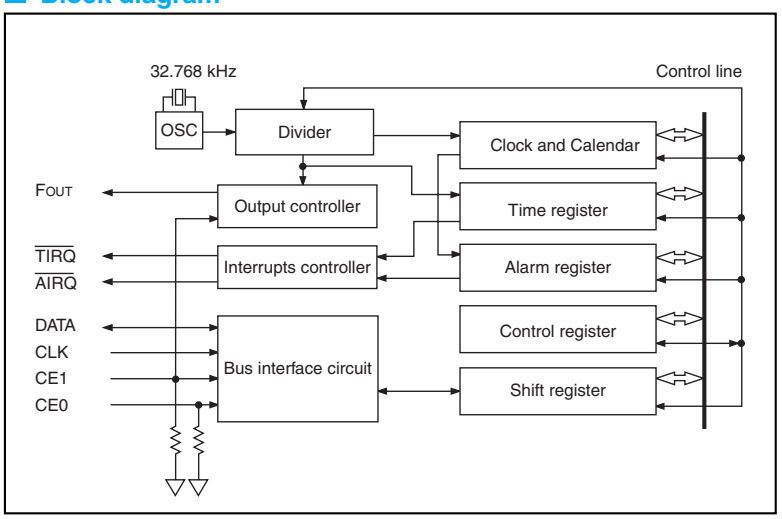
Address	Register symbol	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Sec	fos	S40	S20	S10	S8	S4	S2	S1
1	Min	fr	Min40	Min20	Min10	Min8	Min4	Min2	Min1
2	Hour	fr	*	Hour20	Hour10	Hour8	Hour4	Hour2	Hour1
3	Week	fr	W7	W6	W5	W4	W3	W2	W1
4	Day	fr	*	Day20	Day10	Day8	Day4	Day2	Day1
5	Month	fr	*	*	Month10	Month8	Month4	Month2	Month1
6	Year	Year80	Year40	Year20	Year10	Year8	Year4	Year2	Year1
7	Minutes Alarm	AE	A-Min40	A-Min20	A-Min10	A-Min8	A-Min4	A-Min2	A-Min1
8	Hours Alarm	AE	*	A-Hr20	A-Hr10	A-Hr8	A-Hr4	A-Hr2	A-Hr1
9	Week Alarm	AE	A-W7	A-W6	A-W5	A-W4	A-W3	A-W2	A-W1
A	Day Alarm	AE	*	A-Day20	A-Day10	A-Day8	A-Day4	A-Day2	A-Day1
B	FOUT control	FE	*	FD_4	FD_3	*	FD_2	FD_1	FD_0
C	Timer interrupt control	TE	*	TD_1	TD_0	*	*	*	*
D	Count Down Timer	Timer128	Timer64	Timer32	Timer16	Timer8	Timer4	Timer2	Timer1
E	Control 1	*	*	*	TI/TP	AF	TF	AIE	TIE
F	Control 2	*	TEST	STOP	RESET	HOLD	*	*	*

Switching characteristics

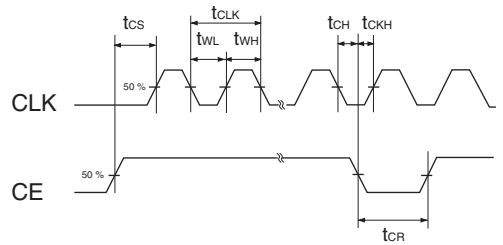
(GND=0 V,Ta=-40 °C to +85 °C)

Item	Symbol	V_{DD}=3.0 V±10 %		V_{DD}=5.0 V±10 %		Unit
		Min.	Max.	Min.	Max.	
CLK clock cycle	t_{CLK}	1200		600		
CLK H Pulse Width	t_{WH}	600		300		
CLK L Pulse Width	t_{WL}					
CE setup time	t_{CS}	300	—	150	—	
CE hold time	t_{CH}	400		200		
CE recovery time	t_{CR}	600		300		ns
CLK hold time	t_{CKH}	100		50		
Write data setup time	t_{DS}					
Write data hold time	t_{DH}					
Read data delay time	t_{RD}	0	400	0	200	
Read data disable delay time	t_{RZ}	—	200	—	100	
Rise and fall time	t_{RF}		40		20	
FOUT duty ratio (32.768 kHz output)	Duty	35	65	40	60	%

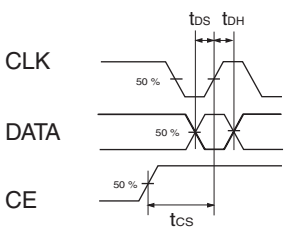
Block diagram



Timing chart



Write mode



Read mode