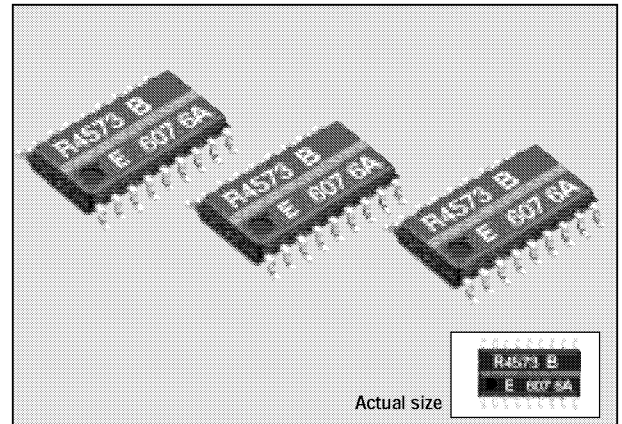


SERIAL INTERFACE RTC WITH AN ALARM TIMER

RTC-4573

- Built-in crystal unit allows adjustment-free efficient operation.
- 2.0mm 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 μ A/3V 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		$V_{DD}+0.3V$	
Output voltage	V_{OUT1}	$\overline{TIRQ}, \overline{AIRQ}$		+8.0	
	V_{OUT2}	$F_{OUT}, DATA$		$V_{DD}+0.3V$	
Storage temperature	T_{STG}	Stored without tape & reel	-55	+125	$^{\circ}C$
Soldering conditions	T_{SOL}		Twice at under 260 $^{\circ}C$ within 10 sec. or under 230 $^{\circ}C$ 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	$^{\circ}C$

■ Frequency characteristics

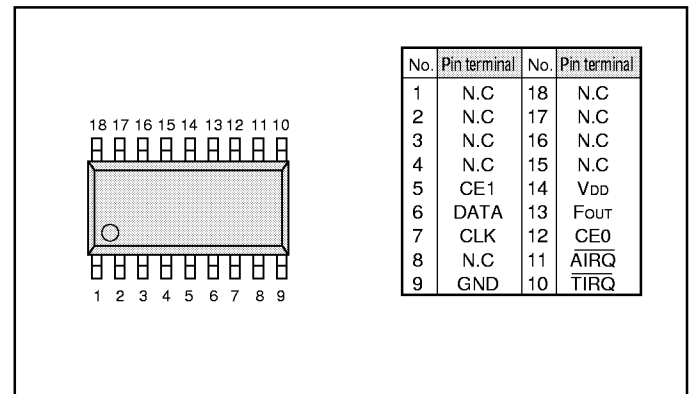
Item	Symbol	Condition	Range	Unit
Frequency tolerance	$\Delta f/f_0$	$T_a=25^{\circ}C, V_{DD}=3V$	5 ± 23	ppm
Frequency temperature characteristics	T_{op}	$T_a=-10$ to $70^{\circ}C$, Reference at $25^{\circ}C$	+10 -120	
Frequency voltage characteristics	f_v	$T_a=25^{\circ}C, V_{DD}=1.6$ to $5.5V$	± 2	ppm/V
Oscillation start up time	t_{STA}	$T_a=25^{\circ}C, V_{DD}=1.6V$	3	s
Aging	f_a	$T_a=25^{\circ}C, V_{DD}=3V$, first year	± 5	ppm/year

■ DC characteristics

(V_{DD}=1.6 to 5.5V, T_a=-40 to +85 $^{\circ}C$)

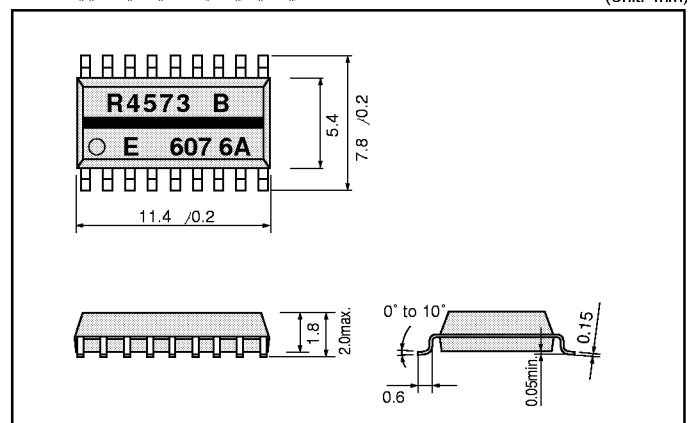
Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Input voltage	V_{IH}	CE_0, CE_1 CLK, DATA pins	$0.8V_{DD}$	—	V_{DD}	V
	V_{IL}		0	—	$0.2V_{DD}$	
Input leakage current	I_{LK}	$V_I=GND$ or V_{DD} CE_0, CE_1 , CLK pins	-0.5	—	0.5	μA
Pulldown R1	R_{DWN1}	$V_{DD}=5V$ CE_0, CE_1 pins	75	150	300	k Ω
Pulldown R2	R_{DWN2}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

■ Terminal connection



■ External dimensions

(Unit: mm)



Register table

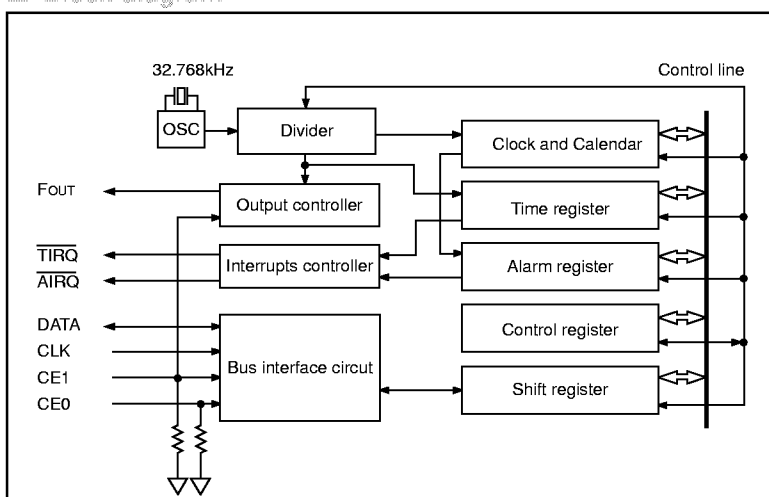
Address	Register symbol	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Sec	fos	S40	S20	S10	S8	S4	S2	S1
1	Min	fr	Min40	Min20	Min10	Min8	Min4	Min2	Min1
2	Hour	fr	*	Hour20	Hour10	Hour8	Hour4	Hour2	Hour1
3	Week	fr	W7	W6	W5	W4	W3	W2	W1
4	Day	fr	*	Day20	Day10	Day8	Day4	Day2	Day1
5	Month	fr	*	*	Month10	Month8	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	F _{OUT} 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

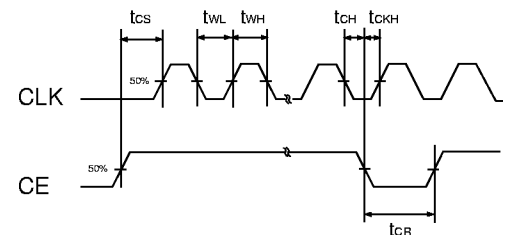
C_L=50pF, T_a=-40°C to 85°C

Item	Symbol	V _{DD} =3.0±10%		V _{DD} =5.0±10%		Unit
		Min.	Max.	Min.	Max.	
CLK clock cycle	t _{CLK}	1200	—	600	—	ns
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		
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 (32.768KHz output)	Duty	35	65	40	60	%

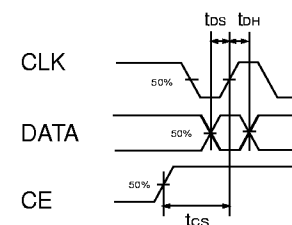
Block diagram



Timing chart



Write mode



Read mode

