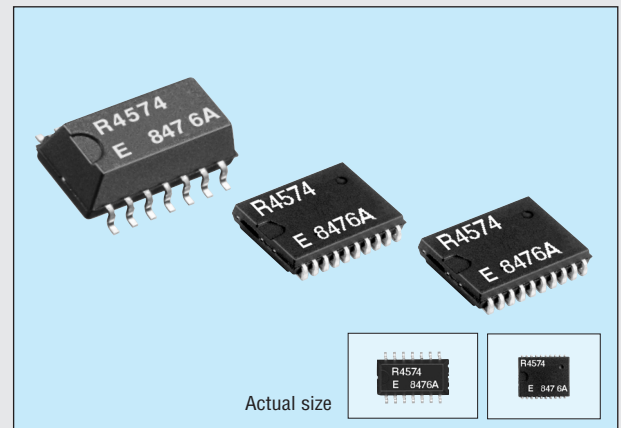


SERIAL RTC MODULE WITH ALARM AND TIMER FUNCTIONS

RTC-4574SA/JE

- Built-in crystal unit allows adjustment-free efficient operation.
- Serial interface which can be controlled by three signal lines.
- Alarm interrupt function for day of week, day, hour, and minute.
- Regular cycle interrupt function which can be set up between 1/4096 second and 255 minutes.
- Dedicated interrupt output of the two systems (alarm and regular cycle) which allows software masking.
- Ability to detect stopping of oscillation and time update.
- Automatic adjustment for leap year.
- Wide range of interface voltage between 1.6 and 5.5 V.
- Wide range of clock voltage between 1.6 and 5.5 V.
- Low power consumption at 0.5 μ A/3 V. (Typ.)
- Available in two small packages: SOP14-pin and VSOJ20-pin. This is mostly suited for high density mounting.



Specifications (characteristics)

Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V_{DD}	—	-0.3	+7.0	V
Input voltage	V_{IN}	Input Pin	GND-0.3	$V_{DD}+0.3$ V	
Output voltage	V_{OUT1}	TIRQ, AIRQ		+8.0	
	V_{OUT2}	FOUT, DATA		$V_{DD}+0.3$ V	
Storage temperature	T_{STG}	—	-55	+125	°C

Operating range

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

Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency tolerance	$\Delta f/f_0$	$T_a=+25^\circ\text{C}$, $V_{DD}=3$ V	5 ± 23	$\times 10^{-6}$
Frequency temperature characteristics	T_{OP}	$T_a=-10^\circ\text{C}$ to $+70^\circ\text{C}$, Reference at $+25^\circ\text{C}$	+10 -120	
Frequency voltage characteristics	f_V	$T_a=+25^\circ\text{C}$, $V_{DD}=1.6$ to 5.5 V	± 2	$\times 10^{-6}/\text{V}$
Oscillation start up time	t_{STA}	$T_a=+25^\circ\text{C}$, $V_{DD}=1.6$ V	3	s
Aging	f_a	$T_a=+25^\circ\text{C}$, $V_{DD}=3$ V	± 5	$\times 10^{-6}/\text{year}$

*Equivalent to 1 minute of monthly deviation

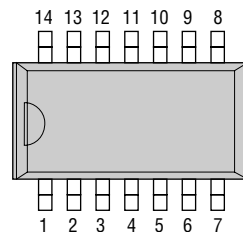
DC characteristics

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

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Input voltage	V _{IH}	CE ₀ , CE ₁ , CLK, DATA, FCON 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 ₁ , CLK, FCON pins	-0.5		0.5	μA	
Pulldown R1	R _{DWN1}	V _{DD} =5 V	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	4.5	—	5.0	V
	V _{OH2}	V _{DD} =3 V	DATA, FOUT pins	2.0		3.0	
	V _{OH3}		I _{OH} =-100μA DATA, FOUT pins	2.9			
Output voltage 2	V _{OL1}	V _{DD} =5 V	I _{OL} =1 mA	GND	—	GND+0.5	
	V _{OL2}	V _{DD} =3 V	DATA, FOUT pins			GND+0.8	
	V _{OL3}		I _{OL} =-100μA DATA, FOUT pins			GND+0.1	
	V _{OL4}	V _{DD} =5 V	I _{OL} =1 mA			GND+0.25	
	V _{OL5}	V _{DD} =3 V	AIRQ, TIRQ pins			GND+0.4	
Leakage current	I _{OZ}	V _O =GND or V _{DD} , DATA, AIRQ, 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	DATA, AIRQ, TIRQ pins	—	0.5		1.0

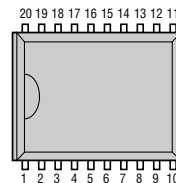
Terminal connection

RTC-4574SA



No.	4574SA	4574JE
1	GND	V _{DD}
2	FOUT	FOUT
3	N.C	CE ₀
4	N.C	AIRQ
5	N.C	TIRQ
6	N.C	CLK
7	V _{DD}	DATA
8	CE ₀	CE ₁
9	AIRQ	FCON
10	TIRQ	GND
11	CLK	N.C
12	DATA	N.C
13	CE ₁	N.C
14	FCON	N.C
15		N.C
16		N.C
17		N.C
18		N.C
19		N.C
20		N.C

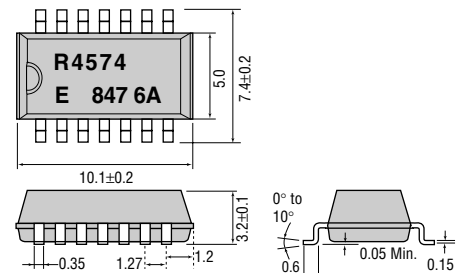
RTC-4574JE



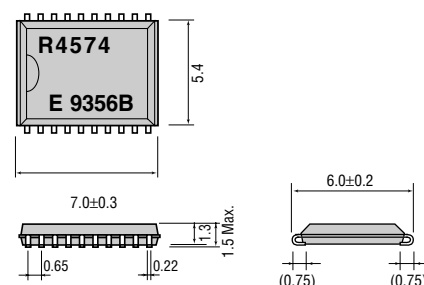
External dimensions

(Unit: mm)

RTC-4574SA (SOP 14-pin)



RTC-4574JE (VSOJ 20-pin)



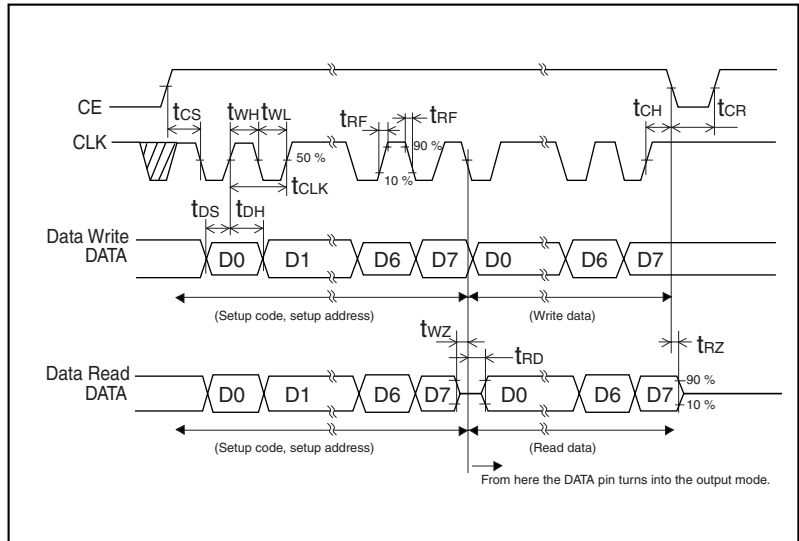
Register table

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	0	Hour20	Hour10	Hour8	Hour4	Hour2	Hour1
3	Week	fr	W7	W6	W5	W4	W3	W2	W1
4	Day	fr	0	Day20	Day10	Day8	Day4	Day2	Day1
5	Month	fr	0	0	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	*	FD4	FD3	*	FD2	FD1	FD0
C	Timer interrupt control	TE	*	TD1	TD0	*	*	*	*
D	Count Down Timer	Timer128	Timer64	Timer32	Timer16	Timer8	Timer4	Timer2	Timer1
E	Control 1	0	0	0	TI/TP	AF	TF	AIE	TIE
F	Control 2	0	TEST	STOP	RESET	HOLD	0	0	0

0 : Always set this bit to "0".

Switching characteristics (GND=0 V, Ta=-40 °C to +85 °C) Timing chart

Item	Symbol	Control	V _{DD} =3.0 V ±10 %		V _{DD} =5.0 V ±10 %		Unit
			Min.	Max.	Min.	Max.	
CLK clock cycle	t _{CLK}		800		350		ns
CLK H Pulse Width	t _{WH}						
CLK L Pulse Width	t _{WL}						
CE setup time	t _{CS}		400		175		
CE hold time	t _{CH}						
CE recovery time	t _{CR}		600		300		
Write data setup time	t _{DS}		100		50		
Write data hold time	t _{DH}		80				
Write data disable delay time	t _{DZ}		0		0		
Read data delay time	t _{RD}	C _L =50 pF		300		120	
Output disable time	t _{RZ}	C _L =50 pF R _L =10 kΩ		200		100	ms
Rise and fall time	t _{RF}			100		50	
FOUT duty ratio (32.768 kHz output)	Duty		35	65	40	60	
Oscillation stop defection time	t _{OSC}		10		10		



Block diagram

