

SERIAL REAL TIME CLOCK MODULE

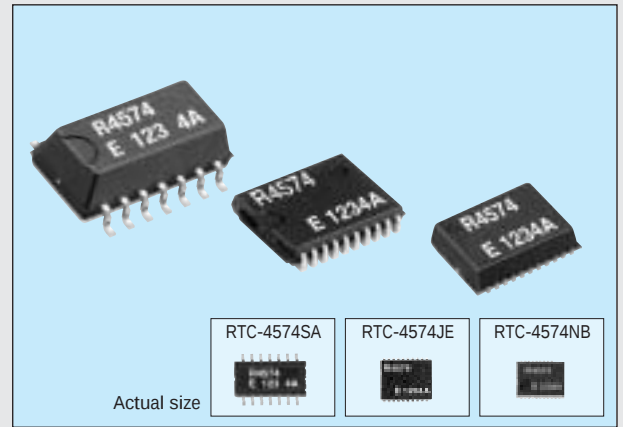
RTC-4574SA/JE/NB

Product number (please refer to page 2)

Q4145745x000200 Q4145747x000100

Q4145749xxxxx00

- 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.
- Timer 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 and clock voltage between 1.6 V and 5.5 V.
- Low power consumption at 0.5 μ A/3 V. (Typ.)



The details are mentioned in the application manual.

<http://www.epsondevice.com>

■ Specifications (characteristics)

■ Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V_{DD}	V_{DD} to GND	-0.3	+7.0	V
Input voltage	V_{IN}	Input Pin	GND-0.3	$V_{DD}+0.3$	
Output voltage	V_{OUT1} V_{OUT2}	TIRQ, AIRQ FOUT, DATA		$V_{DD}+0.3$	
Storage temperature	T_{STG}	Stored as bare product after unpacking	-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}	No condensation	-40	+85	°C

■ Frequency characteristics

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

* Please ask tighter tolerance.

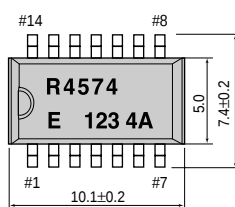
■ DC characteristics (GND=0 V, $V_{DD}=1.6\text{ V}$ to 5.5 V , $T_a=-40^\circ\text{C}$ to $+85^\circ\text{C}$)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Standby current 1	I _{DD1}	V _{DD} =5 V CE ₀ , CE ₁ =GND DATA, AIRQ, TIRQ V _{DD}	—	1.0	2.0	μA
Standby current 2	I _{DD2}	V _{DD} =3 V		0.5	1.0	
Input voltage	V _{IH}	CE ₀ , CE ₁ , CLK, DATA, FCON pins	0.8V _{DD}	—	V _{DD} +0.3	V
	V _{IL}		GND-0.3		0.2V _{DD}	
Input leakage current	I _{LK}	V _{IN} =GND or V _{DD} CE ₁ , CLK FCON pins	-0.5			0.5
Pulldown R1	R _{DWN1}	V _{DD} =5 V CE ₀ pins	75	150	300	kΩ
Pulldown R2	R _{DWN2}	V _{DD} =3 V V _{IN} =V _{DD}	150	300	600	
Output voltage 1	V _{OH1}	V _{DD} =5 V I _{OH} =-1 mA	4.5	—	5.0	V
	V _{OH2}	DATA, FOUT pins	2.0		3.0	
	V _{OH3}	V _{DD} =3 V I _{OH} =-100 μA DATA, FOUT pins	2.9			
Output voltage 2	V _{OL1}	V _{DD} =5 V I _{OL} =1 mA	GND		GND+0.5	
	V _{OL2}	DATA, FOUT pins			GND+0.8	
	V _{OL3}	V _{DD} =3 V I _{OL} =100 μA 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		
Output leakage current	I _{OZ}	V _{OUT} =GND or V _{DD} , DATA, AIRQ, TIRQ pins	-0.5		0.5	μA

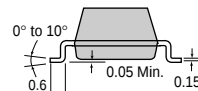
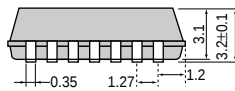
■ External dimensions/Terminal connection

(Unit: mm)

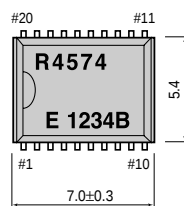
● RTC-4574SA (SOP 14-pin)



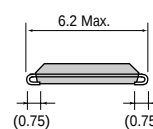
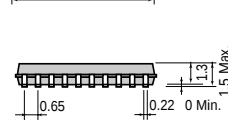
No.	Pin terminal	No.	Pin terminal
1	GND	14	FCON
2	FOUT	13	CE1
3	N.C	12	DATA
4	N.C	11	CLK
5	N.C	10	TIRQ
6	N.C	9	AIRQ
7	V_{DD}	8	CE0



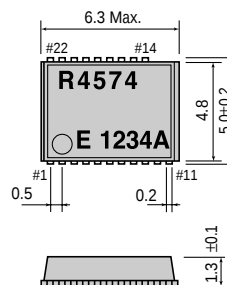
● RTC-4574JE (VSQJ 20-pin)



No.	Pin terminal	No.	Pin terminal
1	V_{DD}	20	N.C
2	FOUT	19	N.C
3	CE0	18	N.C
4	AIRQ	17	N.C
5	TIRQ	16	N.C
6	CLK	15	N.C
7	DATA	14	N.C
8	CE1	13	N.C
9	FCON	12	N.C
10	GND	11	N.C



● RTC-4574NB (SON 22-pin)



No.	Pin terminal	No.	Pin terminal
1	GND	22	N.C
2	FCON	21	N.C
3	N.C	20	N.C
4	CE1	19	N.C
5	DATA	18	N.C
6	CLK	17	N.C
7	TIRQ	16	N.C
8	AIRQ	15	N.C
9	CE0	14	N.C
10	FOUT	(13)	-
11	V_{DD}	(12)	-

Metal may be exposed on the top or bottom of this product. This won't affect any quality, reliability or electrical spec.

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	Day of Week	fr	W6	W5	W4	W3	W2	W1	W0
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-W6	A-W5	A-W4	A-W3	A-W2	A-W1	A-W0
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

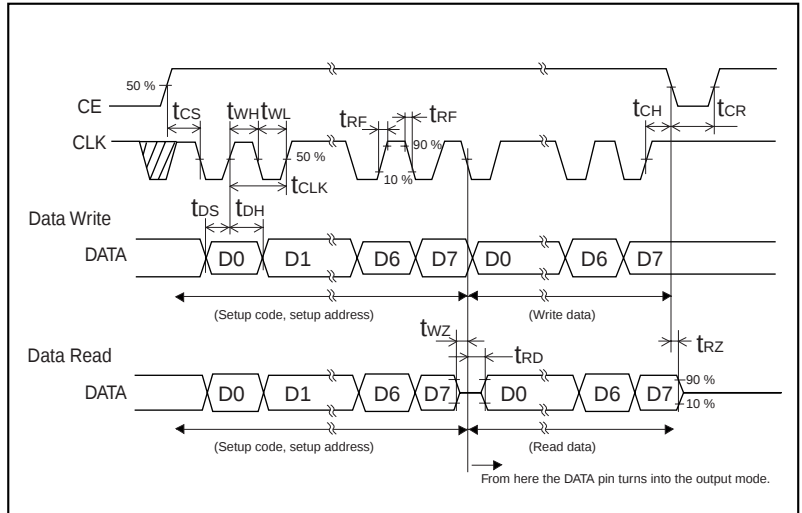
0 : Always set this bit to "0".

AC characteristics

(GND=0 V, Ta=-40 °C to +85 °C)

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}		400		175		
CLK L Pulse Width	t _{WL}						
CE setup time	t _{CS}						
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				
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		
Rise and fall time	t _{RF}		100		50		
FOUT duty ratio (32.768 kHz output)	Duty	—	35	65	40	60	%

Timing chart



Block diagram

