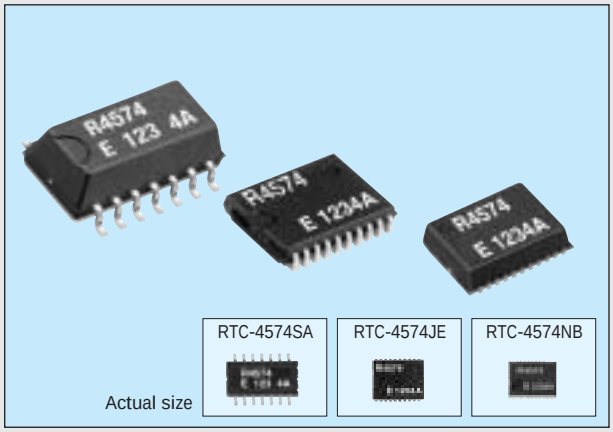
SERIAL REAL TIME CLOCK MODULE

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 µA/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}	$\overline{TIRQ}$,$\overline{AIRQ}$		+8.0	
	V_{OUT2}	F_{OUT},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	Δf/fo	Ta=+25 °C, V_{DD}=3 V	5±23*	x 10^{-6}
Oscillation start up time	t_{STA}	Ta=+25 °C,V_{DD}=1.6 V	3 Max.	s
Frequency temperature characteristics	T_{op}	Ta=-10 °C to +70 °C, Reference at +25 °C	+10 -120	x 10^{-6}
Frequency voltage characteristics	f/V	Ta=+25 °C,V_{DD}=1.6 to 5.5 V	±2	x 10^{-6}/ V
Aging	fa	Ta=+25 °C, V_{DD}=3 V	±5	x 10^{-6}/year

* Please ask tighter tolerance.

DC characteristics

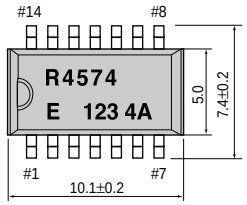
(GND=0 V, V_{DD}=1.6 V to 5.5 V,Ta=-40 °C to +85 °C)

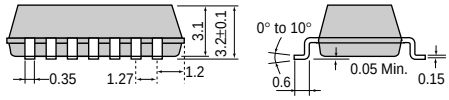
Item	Symbol	Condition		Min.	Typ.	Max.	Unit
Standby current 1	I_{DD1}	V_{DD}=5 V	CE_0,CE_1=GND DATA , AIRQ, TIRQ V_{DD}	—	1.0	2.0	µA
Standby current 2	I_{DD2}	V_{DD}=3 V			0.5	1.0	
Input voltage	V_{IH}	CE_0,CE_1,CLK, DATA,F_{CON} pins		0.8V_{DD}	—	V_{DD}+0.3	V
	V_{IL}			GND-0.3		0.2V_{DD}	
Input leakage current	I_{LK}	V_{IN}=GND or V_{DD} CE_1, CLK F_{CON} pins		-0.5		0.5	µA
Pulldown R1	R_{DWN1}	V_{DD}=5 V	CE_0 pins V_{IN}=V_{DD}	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_{OH3}		I_{OH}=-100 µA DATA,F_{OUT} pins	2.9			
Output voltage 2	V_{OL1}	V_{DD}=5 V	I_{OL}=1 mA DATA,F_{OUT} pins	GND		GND+0.5	
	V_{OL2}	V_{DD}=3 V				GND+0.8	
	V_{OL3}		I_{OL}=100 µA DATA,F_{OUT} pins			GND+0.1	
	V_{OL4}	V_{DD}=5 V	I_{OL}=1 mA AIRQ, TIRQ pins			GND+0.25	
	V_{OL5}	V_{DD}=3 V				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)

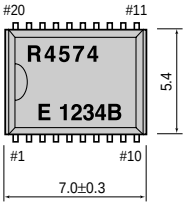
RTC-4574SA (SOP 14-pin)

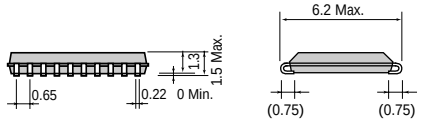




No.	Pin terminal	No.	Pin terminal
1	GND	14	F_{CON}
2	F_{OUT}	13	CE_1
3	N.C	12	DATA
4	N.C	11	CLK
5	N.C	10	$\overline{TIRQ}$
6	N.C	9	$\overline{AIRQ}$
7	V_{DD}	8	CE_0

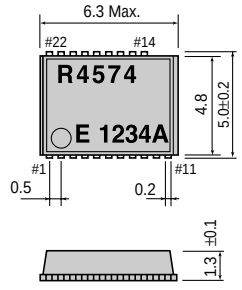
RTC-4574JE (VSOJ 20-pin)





No.	Pin terminal	No.	Pin terminal
1	V_{DD}	20	N.C
2	F_{OUT}	19	N.C
3	CE_0	18	N.C
4	$\overline{AIRQ}$	17	N.C
5	$\overline{TIRQ}$	16	N.C
6	CLK	15	N.C
7	DATA	14	N.C
8	CE_1	13	N.C
9	F_{CON}	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	F_{CON}	21	N.C
3	N.C	20	N.C
4	CE_1	19	N.C
5	DATA	18	N.C
6	CLK	17	N.C
7	$\overline{TIRQ}$	16	N.C
8	$\overline{AIRQ}$	15	N.C
9	CE_0	14	N.C
10	F_{OUT}	(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	*	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	0	0	0	TI/TP	AF	TF	AIE	TIE
F	Control 2	0	TEST	STOP	RESET	HOLD	0	0	0

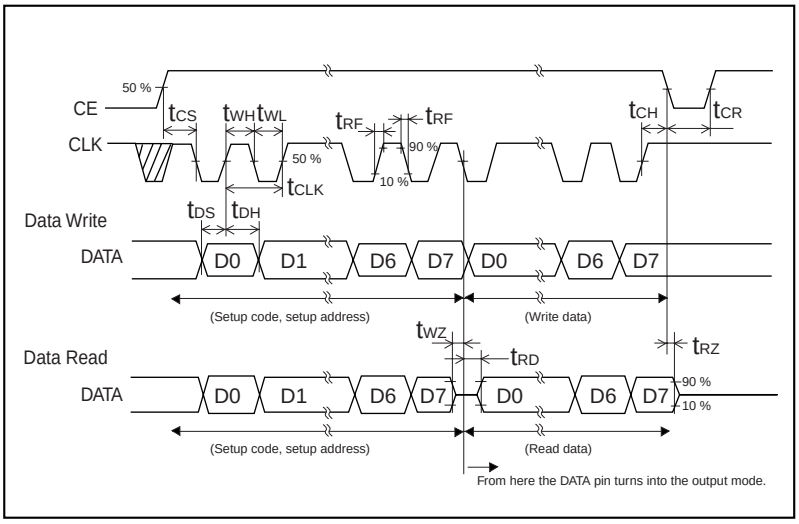
0 : Always set this bit to"0".

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

Timing chart



Block diagram