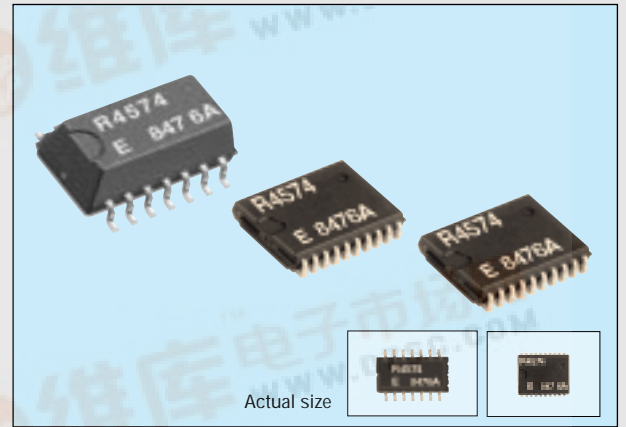


SERIAL RTC MODULE WITH ALARM AND TIMER FUNCTIONS

# 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 5.5V.
- Wide range of clock voltage between 1.6 and 5.5V.
- Low power consumption at 0.5µA/3V. (Typ.)
- Available in two small packages: SOP14-pin and VSOJ20-pin. This is mostly suited for high density mounting.



Actual size

### Specifications (characteristics)

#### Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V <sub>DD</sub>	—	-0.3	+7.0	V
Input voltage	V <sub>IN</sub>	Input Pin		V <sub>DD</sub> +0.3V	
Output voltage	V <sub>OUT1</sub> V <sub>OUT2</sub>	T <sub>IRQ</sub> , A <sub>IRQ</sub> F <sub>OUT</sub> , DATA	GND-0.3	+8.0 V <sub>DD</sub> +0.3V	
Storage temperature	T <sub>STG</sub>	—	-55	+125	°C

#### Operating range

Item	Symbol	Condition	Min.	Max.	Unit
Power voltage	V <sub>DD</sub>	—	1.6	5.5	V
Clock voltage	V <sub>CLK</sub>				
Operating temperature	V <sub>OPR</sub>				
			-40	+85	°C

#### Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency tolerance	Δf/f <sub>0</sub>	T <sub>a</sub> =25°C, V <sub>DD</sub> =3V	5±23	ppm
Frequency temperature characteristics	T <sub>OP</sub>	T <sub>a</sub> =-10 to +70°C, Reference at 25°C	+10 -120	
Frequency voltage characteristics	f <sub>V</sub>	T <sub>a</sub> =25°C, V <sub>DD</sub> =1.6 to 5.5V	±2	ppm/V
Oscillation start up time	t <sub>STA</sub>	T <sub>a</sub> =25°C, V <sub>DD</sub> =1.6 V	3	s
Aging	f <sub>a</sub>	T <sub>a</sub> =25°C, V <sub>DD</sub> =3V	±5	ppm/year

\*Equivalent to 1 minute of monthly deviation

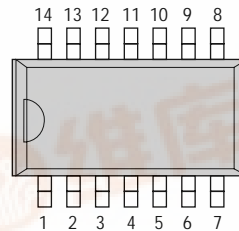
#### DC characteristics

(V<sub>DD</sub>=1.6 to 5.5V, T<sub>a</sub>=-40 to +85°C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	
Input voltage	V <sub>IH</sub>	CE <sub>0</sub> , CE <sub>1</sub> , CLK, DATA, F <sub>CON</sub> pins	0.8V <sub>DD</sub>		V <sub>DD</sub>	V	
	V <sub>IL</sub>		0		0.2V <sub>DD</sub>		
Input leakage current	I <sub>LK</sub>	V <sub>I</sub> =GND or V <sub>DD</sub> CE <sub>0</sub> , CE <sub>1</sub> , CLK, F <sub>CON</sub> pins	-0.5		0.5	µA	
Pulldown R1	R <sub>DWN1</sub>	V <sub>DD</sub> =5V CE <sub>0</sub> pins	75	150	300	kΩ	
Pulldown R2	R <sub>DWN2</sub>	V <sub>DD</sub> =3V V <sub>I</sub> =V <sub>DD</sub>	150	300	600		
Output voltage 1	V <sub>OH1</sub>	V <sub>DD</sub> =5V I <sub>OH</sub> =-1mA DATA, F <sub>OUT</sub> pins	4.5		5.0	V	
	V <sub>OH2</sub>		2.0				
	V <sub>OH3</sub>		V <sub>DD</sub> =3V I <sub>OH</sub> =-100µA DATA, F <sub>OUT</sub> pins	2.9			3.0
Output voltage 2	V <sub>OL1</sub>	V <sub>DD</sub> =5V I <sub>OH</sub> =-1mA DATA, F <sub>OUT</sub> pins	GND		GND+0.5	V	
	V <sub>OL2</sub>				GND+0.8		
	V <sub>OL3</sub>			V <sub>DD</sub> =3V I <sub>OH</sub> =-100µA DATA, F <sub>OUT</sub> pins			GND+0.1
	V <sub>OL4</sub>			V <sub>DD</sub> =5V I <sub>OH</sub> =-1mA A <sub>IRQ</sub> , T <sub>IRQ</sub> pins			GND+0.25
	V <sub>OL5</sub>			V <sub>DD</sub> =3V			GND+0.4
Leakage current	I <sub>OZ</sub>	V <sub>O</sub> =GND or V <sub>DD</sub> , DATA, A <sub>IRQ</sub> , T <sub>IRQ</sub> pins	-0.5		0.5	µA	
Standby current 1	I <sub>DB1</sub>	V <sub>DD</sub> =5V CE <sub>0</sub> , CE <sub>1</sub> =GND		1.0	2.0	µA	
Standby current 2	I <sub>DB2</sub>	V <sub>DD</sub> =3V DATA, A <sub>IRQ</sub> , T <sub>IRQ</sub> pins		0.5	1.0		

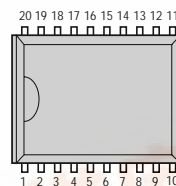
### Terminal connection

#### RTC-4574SA



No.	4574SA	4574JE
1	GND	V <sub>DD</sub>
2	F <sub>OUT</sub>	F <sub>OUT</sub>
3	N.C	CE <sub>0</sub>
4	N.C	A <sub>IRQ</sub>
5	N.C	T <sub>IRQ</sub>
6	N.C	CLK
7	V <sub>DD</sub>	DATA
8	CE <sub>0</sub>	CE <sub>1</sub>
9	A <sub>IRQ</sub>	F <sub>CON</sub>
10	T <sub>IRQ</sub>	GND
11	CLK	N.C
12	DATA	N.C
13	CE <sub>1</sub>	N.C
14	F <sub>CON</sub>	N.C
15		N.C
16		N.C
17		N.C
18		N.C
19		N.C
20		N.C

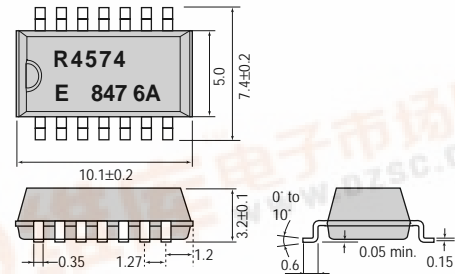
#### RTC-4574JE



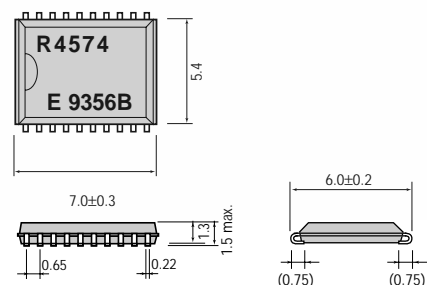
### External dimensions

(Unit: mm)

#### RTC-4574SA (SOP 14-pin)



#### RTC-4574JE (VSOJ 20-pin)



Register table

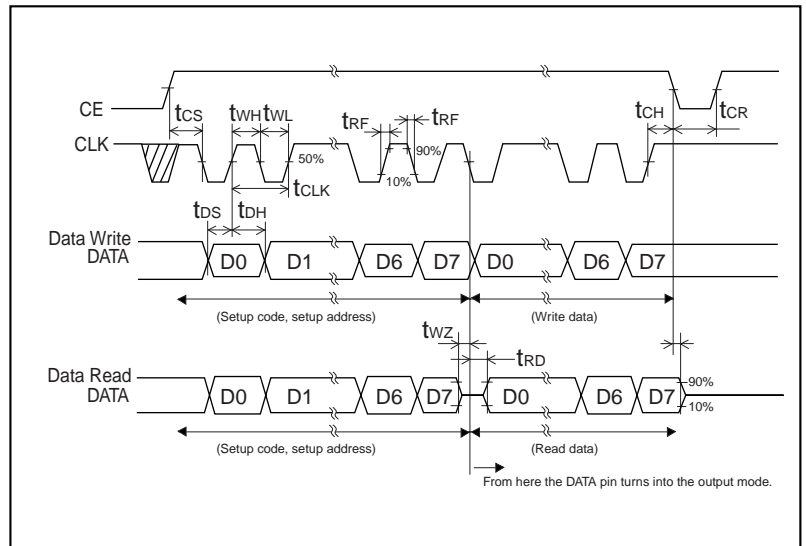
Address	Register symbol	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Sec	fos	S40	S20	S10	S8	S4	S2	S1
1	Min	fr	Min40	Min20	Min10	Min8	Min4	Min2	Min1
2	Hour	fr	0	Hour20	Hour10	Hour8	Hour4	Hour2	Hour1
3	Week	fr	W7	W6	W5	W4	W3	W2	W1
4	Day	fr	0	Day20	Day10	Day8	Day4	Day2	Day1
5	Month	fr	0	0	Month10	Month8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

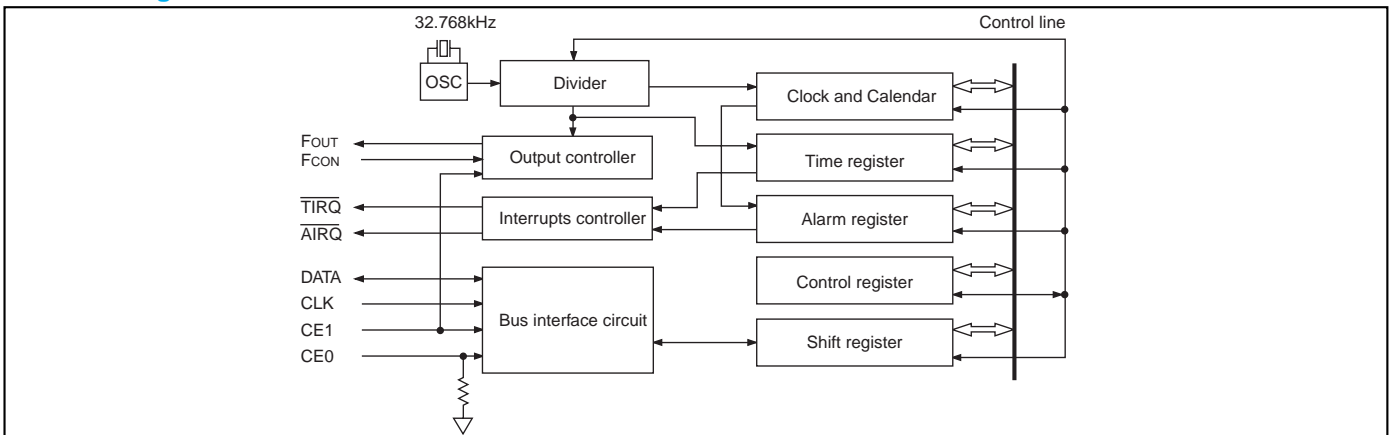
Switching characteristics (GND=0V, Ta=-40°C to +85°C)

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

Timing chart



Block diagram



# EPSON

SEIKO EPSON CORPORATION  
Electronics Device & Components Marketing Div.  
3F OD Bldg.421-8 Hino,Hino-shi,Tokyo,191-8501

Dec.28,1998

## Re :The Year 2000 Readiness Disclosure for Real Time Clock Module

Dear valued customer:

This letter is to inform you of the operation of our Real Time Clock Module (RTC) products with respect to so-called year 2000 issue. Please refer to the following information. In addition, information concerning Year 2000 readiness disclosed herein constitutes a Year 2000 Readiness Disclosure as that term is defined in the Year 2000 Information and Readiness Disclosure Act, U.S. P.L. 105-271. Nothing in this disclosure shall be deemed to amend the terms of any contract or warranty unless otherwise expressly agreed by Seiko Epson Corporation.

1. Our RTC products do not have counters of the four-digit year.
2. In other words, there are two categories regarding the counter construction.  
A: Year counter consists of the bottom two digits of the four-digit year .(RTC shown in appendix A) or  
B: Year counter consists of one digit and it is available with zero to three (ie,0,1,2,3)  
(RTC shown in appendix B)  
This counter is incremented every year (it will go to 0 after 3).  
Initial setting of the year counter is required as follows;  
Leap year ; set "0" to the year counter  
Leap year +1 ; set "1"  
Leap year +2 ; set "2"  
Year before leap year ; set "3"
3. The years having multiples of four or having 00 are recognized as a leap year. (RTC shown in appendix A )
4. The years having 0 in the year counter are recognized as a leap year.(RTC shown in appendix B)
5. For your information, year 2000 is a leap year, however, 1900 or 2100 is not a leap year. (Usually, multiples of a hundred is not a leap year, but a leap year comes every 400 years.) In terms of a leap year recognition, our RTC Products will work correctly until 2099.

You are requested to prepare for so-called year 2000 issue by yourself in conjunction with the above RTC Products. You need to make or modify your own program algorithm accordingly based on the above information. If you do not, the above RTC Products may not work appropriately.

If you have any questions regarding this matter, please contact a nearest sales office or representatives

### Appendix A

RTC45xx,RTC58xxx,RTC62xxx,RTC63xxx,RTC64xxx,RTC65xxx,RTC72xxx series and  
RTC8563

### Appendix B

RTC-8583,RTC8593

Sincerely yours,

Y2K project  
Electronics Device & Components Marketing Div.

# THE CRYSTALMASTER



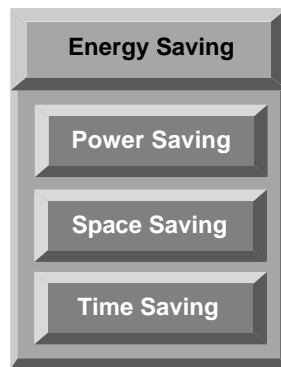
## ENERGY SAVING EPSON

EPSON offers effective savings to its customers through a wide range of electronic devices, such as semiconductors, liquid crystal display (LCD) modules, and crystal devices. These savings are achieved through a sophisticated melding of three different efficiency technologies.

Power saving technology provides low power consumption at low voltages.

Space saving technology provides further reductions in product size and weight through super-precise processing and high-density assembly technology.

Time saving technology shortens the time required for design and development on the customer side and shortens delivery times.



Our concept of Energy Saving technology conserves resources by blending the essence of these three efficiency technologies. The essence of these technologies is represented in each of the products that we provide to our customers.

In the industrial sector, leading priorities include measures to counter the greenhouse effect by reducing CO<sub>2</sub>, measures to preserve the global environment, and the development of energy-efficient products. Environmental problems are of global concern, and although the contribution of energy-saving technology developed by EPSON may appear insignificant, we seek to contribute to the development of energy-saving products by our customers through the utilization of our electronic devices. EPSON is committed to the conservation of energy, both for the sake of people and of the planet on which we live.

Resource Saving



**SEIKO EPSON CORP. QUARTZ DEVICE DIVISION acquired ISO9001 and ISO14001 certification by B.V.Q.I. (Bureau Veritas Quality International) .**

**ISO9001 in October, 1992.**

**ISO14001 in November, 1997.**

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