4-bit REAL TIME CLOCK MODULE

RTC-62421/62423

- Built-in crystal unit allows adjustment-free efficient operation.
- Low standby voltage and current consumption (1.8μA at 2V).
- Wide range of operating temperature (from -40°C to +85°C).
- 24H/12H changeable and leap year automatically adjustable (gregorian calendar).
- Similar mounting method (RTC-62423) to that used for universal type SMD IC.
- Pins and functions are compatible with the MSM6242 series.

Actual size
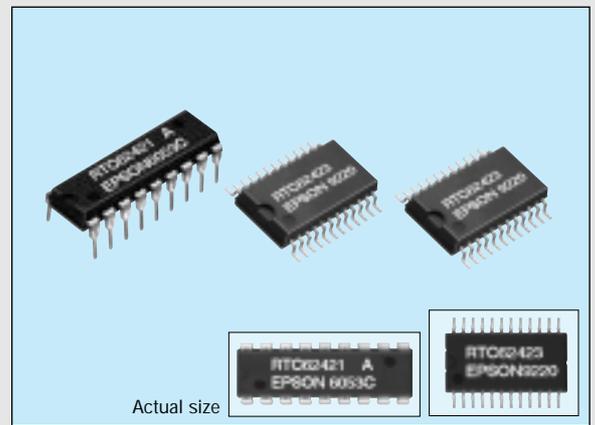
■ Specifications (characteristics)

■ Absolute Max. rating

Item	Symbol	Condition	Specifications	Unit
Power source voltage	V_{DD}	Ta=25°C	-0.3 to 7.0	V
Input and output voltage	$V_{I/O}$		-0.3 to V_{DD}+0.3	
Storage temperature	T_{STG}	RTC-62421	-55 to +85	°C
		RTC-62423	-55 to +125	
Soldering condition	T_{SOL}	RTC-62421	Under 260°C within 10 sec. (lead part) (package should be less than 150°C)	
		RTC-62423	Twice at under 260°C within 10 sec. or under 230°C within 3 min.	

■ Operating range

Item	Symbol	Condition	Specifications	Unit
Operating voltage	V_{DD}		4.5 to 5.5	V
Operating temperature	T_{OPR}		-40 to +85	°C
Data holding voltage	V_{DH}		2.0 to 5.5	V
CS₁ data holding time	t_{CDR}	Refer to the data holding timing	2.0 min.	μs
Operation restoring time	t_R			

■ Frequency characteristics and current consumption characteristics

Item	Symbol	Condition		Specifications	Unit
Frequency tolerance	Δf/fo	Ta=25°C V_{DD}=5V	62421 A	±10	ppm
			62421 B	±50	
			62423 A	±20	
			62423	±50	
Frequency temperature characteristics		-10 to +70°C (25°C reference temperature)		+10/-120	
		-40 to +85°C (25°C reference temperature)		+10/-220	
Aging	fa	V_{DD}=5V, Ta=25°C, first year		±5 max.	ppm/y
Shock resistance	S.R.	Three drops on a hard board from 75 cm or 3000G x 0.3ms x 1/2 sine wave x 3 directions		±10 max.	ppm
Current consumption	I_{DD1}	CS₁=0V	V_{DD}=5V	30 max.	μA
	I_{DD2}		V_{DD}=2V	1.8 max.	

■ Electrical characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Applicable terminal
"H" input voltage (1)	V_{IH1}	—	2.2		—	V	All inputs other than CS₁
"L" input voltage (1)	V_{IL1}				0.8		
Input leak current (1)	I_{LK1}	V_1=V_{DD}/0V	—	—	1/-1	μA	Input other than D₀ to D₃
Input leak current (2)	I_{LK2}				10/-10		
"L" output voltage (1)	V_{OL1}	I_{OL}=2.5mA			0.4	V	D₀ to D₃
"H" output voltage	V_{OH}	I_{OH}=-400μA	2.4		—		
"L" output voltage (2)	V_{OL2}	I_{OL}=2.5mA			0.4		STD.P
OFF leak current	I_{OFFLK}	V_1=V_{DD}/0V	—		10	μA	
Input capacity	C_1	Input frequency 1 MHz		5		pF	
"H" input voltage (2)	V_{IH2}	V_{DD}=2 to 5.5V	4/5 V_{DD}		—	V	CS₁
"L" input voltage (2)	V_{IL2}		—		1/5 V_{DD}		

■ Terminal connection

● RTC-62421

18 17 16 15 14 13 12 11 10

1 2 3 4 5 6 7 8 9

● RTC-62423

24 23 22 21 20 19 18 17 16 15 14 13

1 2 3 4 5 6 7 8 9 10 11 12
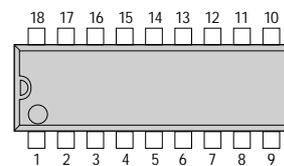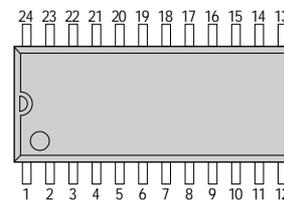
No.	62421	No.	62423
1	STD. P	1	STD. P
2	$\overline{CS_0}$	2	$\overline{CS_0}$
3	ALE	3	NC
4	A₀	4	ALE
5	A₁	5	A₀
6	A₂	6	NC
7	A₃	7	A₁
8	RD	8	NC
9	GND	9	A₂
10	$\overline{WR}$	10	A₃
11	D₃	11	RD
12	D₂	12	GND
13	D₁	13	$\overline{WR}$
14	D₀	14	D₃
15	CS₁	15	D₂
16	(V_{DD})	16	D₁
17	(V_{DD})	17	NC
18	V_{DD}	18	NC
		19	D₀
		20	CS₁
		21	NC
		22	(V_{DD})
		23	(V_{DD})
		24	V_{DD}

- (V_{DD}) and V_{DD} are to have the same level of voltage. Do not connect it to any external terminals.
- NC is not connected internally.

■ External dimensions

(Unit: mm)

● RTC-62421

23.1 max.

6.8

RTC62421   A
EPSON 6053 C

4.2 max.   0.2 min.   3.3 min.

7.62   0.25   90° to 105°

● RTC-62423

16.3 max.

RTC62423   A
EPSON 9220

7.9   12.2 max.

0.05 min.   2.8 max.   0.3   2.5   0° to 10°   1.0   0.2
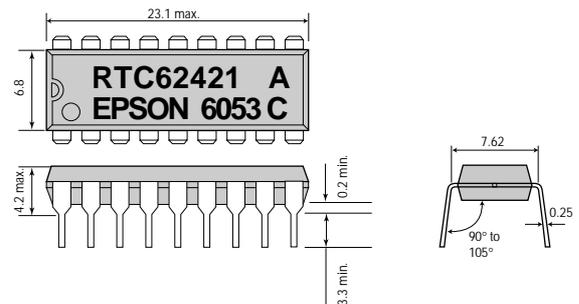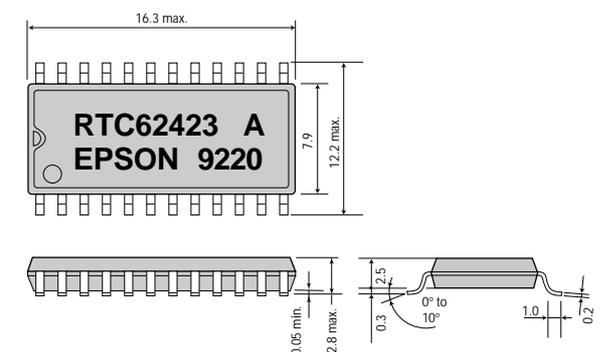
■ Data holding timing
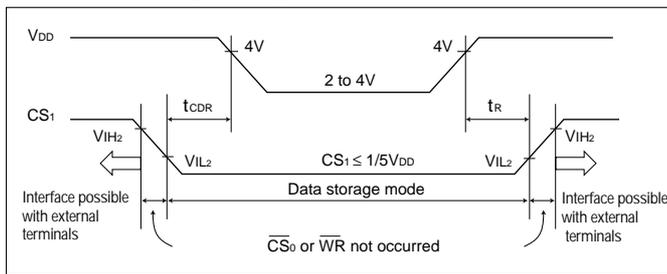
■ Register table

Address	A_3	A_2	A_1	A_0	Name of register	D_3	D_2	D_1	D_0	Count	Note
0	0	0	0	0	S_1	s_8	s_4	s_2	s_1	0 to 9	1 - sec. digit register
1	0	0	0	1	S_{10}	*	s_{40}	s_{20}	s_{10}	0 to 5	10 - sec. digit register
2	0	0	1	0	MI_1	mi_8	mi_4	mi_2	mi_1	0 to 9	1 - min. digit register
3	0	0	1	1	MI_{10}	*	mi_{40}	mi_{20}	mi_{10}	0 to 5	10 - min. digit register
4	0	1	0	0	H_1	h_8	h_4	h_2	h_1	0 to 9	1 - hour digit register
5	0	1	0	1	H_{10}	*	PM/AM	h_{20}	H_{10}	0 to 2 or 0 to 1	10 - hour digit register
6	0	1	1	0	D_1	d_8	d_4	d_2	d_1	0 to 9	1 - day digit register
7	0	1	1	1	D_{10}		*	d_{20}	d_{10}	0 to 3	10 - day digit register
8	1	0	0	0	MO_1	mo_8	mo_4	mo_2	mo_1	0 to 9	1 - month digit register
9	1	0	0	1	MO_{10}		*		mo_{10}	0 to 1	10 - month digit register
A	1	0	1	0	Y_1	y_8	y_4	y_2	y_1	0 to 9	1 - year digit register
B	1	0	1	1	Y_{10}	y_{80}	y_{40}	y_{20}	y_{10}		10 - year digit register
C	1	1	0	0	W	*	w_4	w_2	w_1	0 to 6	Week register
D	1	1	0	1	C_D	30 sec. ADJ	IRQ FLAG	BUSY	HOLD		Control register D
E	1	1	1	0	C_E	t_1	t_0	ITRPT /STND	MASK		Control register E
F	1	1	1	1	C_F	TEST	24/12	STOP	RESET		Control register F

● Supplement

0="L" level. 1="H" level

	PM/AM	24/12	ITRPT/STND
1	PM	24	ITRPT
0	AM	12	STND

Bit name	Description
* mark	Writable. Recognized as 0 while in read mode.
BUSY	Read only (effective only when HOLD=1)
IRQ FLAG	Enter "0" only when clearing interruption. Enter "1" otherwise.
24H/12H	Set able only when RESET=1
TEST	For our company's testing. TEST should be "0" in normal use.

Note: Do not enter erroneous data for clock. This may result in time keeping error.

■ Block diagram
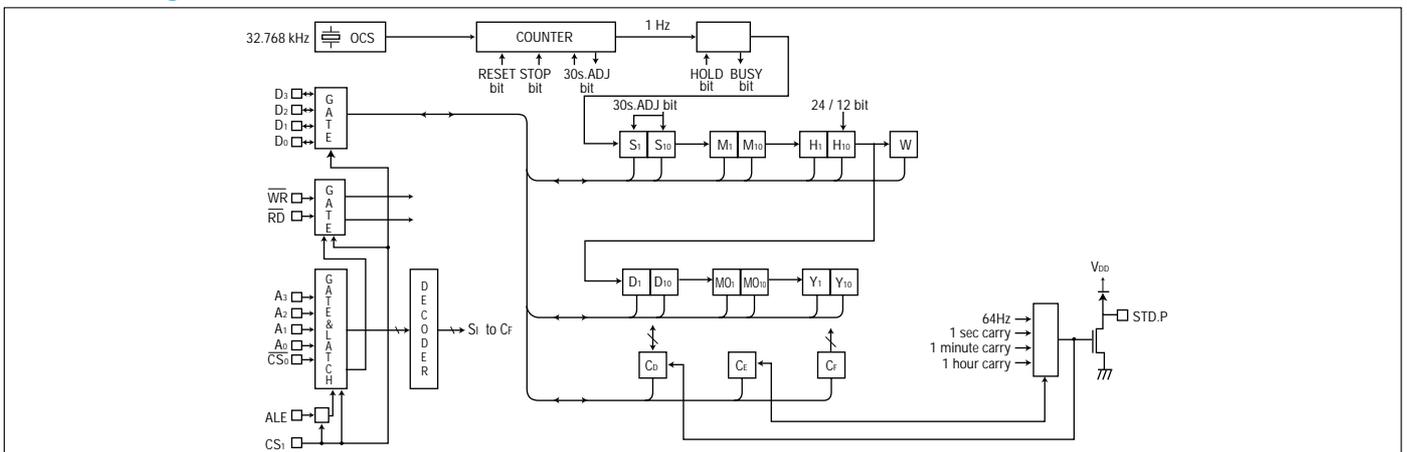
■ Switching characteristics （V_{DD} = 5V ± 0.5V, Ta = - 40 to + 85℃）

（ALE = While in use）

Item	Symbol	Condition	Min.	Max.	Unit
CS_1 setup time	t_{CIS}	—	1000	—	ns
CS_1 hold time	t_{CIH}		1000		
Address setup time	t_{AS}		25		
Address hold time	t_{AH}		25		
ALE pulse width	t_{AW}		40		
ALE before WRITE	t_{ALW}		10		
ALE before READ	t_{ALR}		10		
ALE after WRITE	t_{WAL}		20		
ALE after READ	t_{RAL}		10		
WRITE pulse width	t_{WW}		120		
$\overline{RD}$ to data	t_{RD}	C_L=150pF		120	
DATA hold	t_{DR}		0	45	
DATA setup time	t_{DS}	—	100		
DATA hold time	t_{DH}		10	—	
$\overline{RD}/\overline{WR}$ recovery time	t_{RCV}		60		

■ Write mode
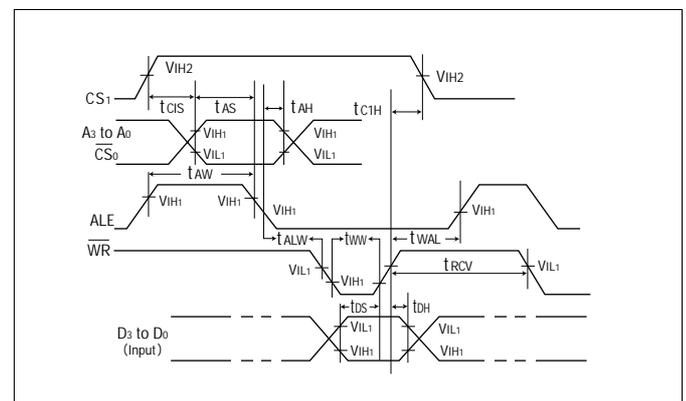
■ Read mode
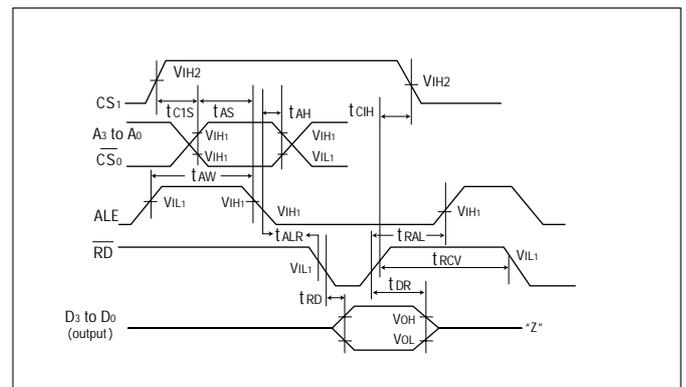
EPSON

SEIKO EPSON CORPORATION

Electronics Device & Components Marketing Div.

3F OD Bldg.421-8 Hino,Hino-shi,Tokyo,191-8501

<u>Dec.28,1998</u>

<u>Re :The Year 2000 Readiness Disclosure for Real Time Clock Module</u>

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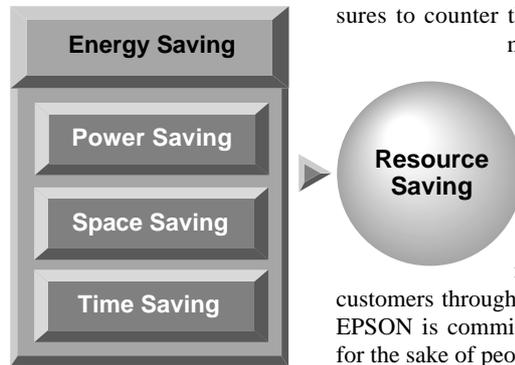
Our concept of Energy Saving technology conserves resources by blending the essence of these three efficiency technologies. The essence of these technologies is represented in each of the products that we provide to our customers.

In the industrial sector, leading priorities include measures to counter the greenhouse effect by reducing CO_2, 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.

Energy Saving

Power Saving

Space Saving

Time Saving

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.