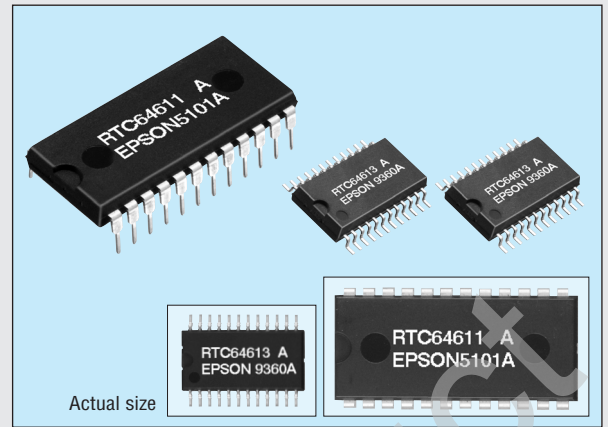


8-bit REAL TIME CLOCK MODULE

# RTC-64611/64613

- Built-in crystal unit allows adjustment-free efficient operation.
- 8-bit data bus and high speed access (85 ns Max.).
- Provided with the same interface as S-RAM and battery backup function.
- Interruption of alarm of sec. to day and day of week and carry interruption.
- Reference signal selectable in a range of 1 Hz to 64 Hz (binary).
- Leap year automatically adjustable (gregorian calendar).
- With 1 Hz output terminal.
- Provided with START/STOP, 30 second adjust function.
- RTC-64613 uses a similar mounting method to that of a normal SMD IC.



## Specifications (characteristics)

### Absolute Max. rating

Item	Symbol	Condition	Specifications	Unit
Power source voltage	$V_{DD}$	$T_a = +25\text{ }^\circ\text{C}$	-0.5 to 7.0	V
Input voltage	$V_{IN}$		-0.5 to $V_{DD} + 0.3$	
Storage temperature	$T_{STG}$	RTC-64611	-55 to +85	$^\circ\text{C}$
		RTC-64613	-55 to +125	
Soldering condition	$T_{SOL}$	RTC-64611	Under +260 $^\circ\text{C}$ within 10 s (lead part) (package should be less than +150 $^\circ\text{C}$ )	
		RTC-64613	Twice at under +260 $^\circ\text{C}$ within 10 s or under +230 $^\circ\text{C}$ within 3 min.	

### Operating range

Item	Symbol	Condition	Specifications	Unit
Operating voltage	$V_{DD}$	—	4.5 to 5.5	V
Operating temperature	$T_{OPR}$	—	-20 to +75	$^\circ\text{C}$
Data holding voltage	$V_{DH}$	$\overline{CS} \geq V_{DD} - 0.2\text{ V}$	2.0 to 4.5	V
CS data holding time	$t_{CDR}$	—	0 Min.	ns
Operation restoring time	$t_R$	—	$t_{RC}$ (85 ns)	

### Frequency characteristics and current consumption characteristics

Item	Symbol	Condition	Specifications	Unit	
Frequency tolerance	$\Delta f/f_0$	$T_a = +25\text{ }^\circ\text{C}$	64611 A	+15/-5(5±10)	$\times 10^{-6}$
			64611 B	+55/-45(5±50)	
		$V_{DD} = 5\text{ V}$	64613 A	+25/-15(5±20)	
			64613	+55/-45(5±50)	
Frequency temperature characteristics		-10 to +70 $^\circ\text{C}$ (+25 $^\circ\text{C}$ reference temperature)	+10/-120		
		-20 to +75 $^\circ\text{C}$ (+25 $^\circ\text{C}$ reference temperature)	+10/-220		
Aging	$f_a$	$V_{DD} = 5\text{ V}$ , $T_a = +25\text{ }^\circ\text{C}$ , first year	±5 Max.	$\times 10^6/\text{year}$	
Shock resistance	S.R.	Three drops on a hard board from 750 mm (or 29400 m/s <sup>2</sup> x 0.3 ms x 1/2 sine wave x 3 directions)	±10 Max.	$\times 10^{-6}$	
Current consumption	$I_{DD1}$	No load	$V_{DD} = 5\text{ V}$	mA	
	$I_{DD2}$	$\overline{CS} \geq 1.8\text{ V}$	$V_{DD} = 2\text{ V}$	μA	

Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.

### DC characteristics

( $T_a = -20\text{ to } +75\text{ }^\circ\text{C}$ )

Item	Symbol	Condition	$V_{DD} = 5\text{ V} \pm 10\%$		$V_{DD} = 2\text{ V}$		Unit
			Min.	Max.	Min.	Max.	
"H" input voltage	$V_{IH}$		2.2	$V_{DD}$	$V_{DD} - 0.2$	$V_{DD}$	V
"L" input voltage	$V_{IL}$		-0.3	0.8	-0.3	0.2	
Input leak current	$I_{IN}$			±2		±2	μA
Three-state leak current	$I_{TSL}$		—			±10	
Output leak current	$I_{LOH}$					±10	
"H" output voltage (except for 1 Hz, I <sub>RD</sub> )	$V_{OH}$	$I_{OH} = -1\text{ mA}$	2.4	—	—	—	V
"L" output voltage	$V_{OL}$	$I_{OL} = 2.1\text{ mA}$	—	0.4	—	—	
Input capacity	$C_{IN}$	$V_{IN} = 0\text{ V}$ $T_a = +25\text{ }^\circ\text{C}$ $f = 1.0\text{ MHz}$	—	12.5	—	—	pF
Output capacity	$C_{OUT}$						

## Terminal connection

No.	Pin terminal	No.	Pin terminal
1	GND	13	I/O <sub>s</sub>
2	H-START/STOP	14	I/O <sub>s</sub>
3	I <sub>RD</sub>	15	I/O <sub>s</sub>
4	1Hz	16	I/O <sub>s</sub>
5	A <sub>3</sub>	17	I/O <sub>s</sub>
6	A <sub>2</sub>	18	CS
7	A <sub>1</sub>	19	OE
8	A <sub>0</sub>	20	WE
9	I/O <sub>1</sub>	21	NC
10	I/O <sub>2</sub>	22	(V <sub>DD</sub> )
11	I/O <sub>3</sub>	23	(V <sub>DD</sub> )
12	GND	24	V <sub>DD</sub>

• (V<sub>DD</sub>) is to be same level as V<sub>DD</sub>. Do not connect it to any external terminals.  
• NC is not connected internally.

## External dimensions

(Unit: mm)

### • RTC-64611

Dimensions: 32.0 Max. (width), 13.6 (height), 15.24 (lead length), 0.8 (lead thickness), 4.4 (lead height), 2.54 (lead pitch), 0.46 (lead width).

### • RTC-64613

Dimensions: 16.3 Max. (width), 7.9 (height), 12.2 Max. (lead length), 0.3 (lead thickness), 2.5 (lead height), 1.0 (lead width), 0.2 (lead width), 1.27 (lead pitch), 0.35 (lead width), 0.05 Min. (lead width), 2.8 Max. (lead length).

Register table

Address	Data								Remarks	
	b <sub>7</sub>	b <sub>6</sub>	b <sub>5</sub>	b <sub>4</sub>	b <sub>3</sub>	b <sub>2</sub>	b <sub>1</sub>	b <sub>0</sub>		
0		1 Hz	2 Hz	4 Hz	8 Hz	16 Hz	32 Hz	64 Hz	Counter	
1	*	10-sec. digit			1-sec. digit					
2		10-min. digit			1-min. digit					
3	*	10-hour digit			1-hour digit					
4		*			Day-of-week digit					
5	*	10-day digit			1-day digit					
6		*			10-month digit	1-month digit				
7		10-year digit			1-year digit					
8	ENB	1 Hz	2 Hz	4 Hz	8 Hz	16 Hz	32 Hz	64 Hz	Alarm register	
9		10-sec. digit			1-sec. digit					
A		10-min. digit			1-min. digit					
B		*	10-hour digit			1-hour digit				
C			*			Day-of-week digit				
D		*	10-day digit			1-day digit				
E	Carry flag	*		Carry interruption enable	Alarm interruption enable	*		Alarm flag	Control register	
F	RAM7	RAM6	RAM5	RAM4	TEST <sup>*1</sup>	30-sec. adjustment	RESET	S.START /STOP		

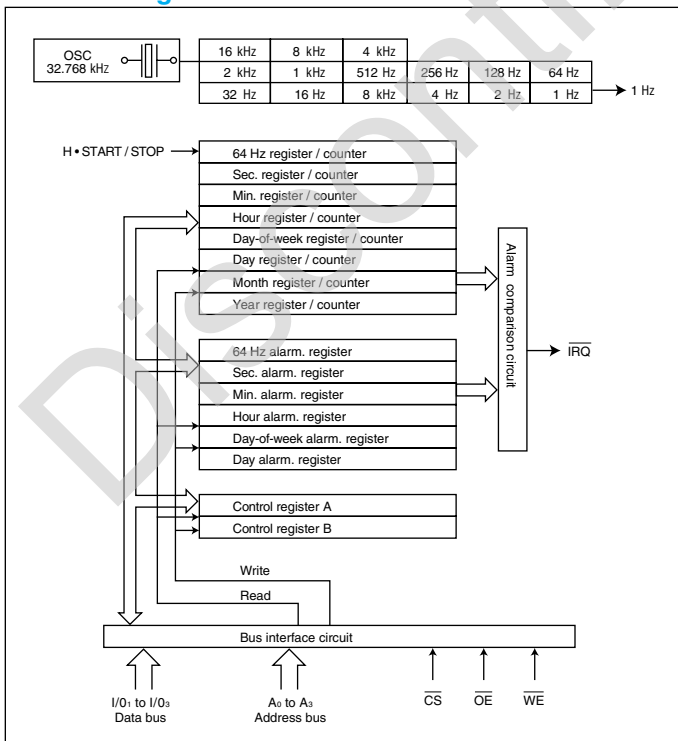
\*1 Be sure to enter "0" to TEST bit.

Supplement

Bit name	Description
* mark	Empty bit and unwritable Recognized as "0" while reading
10-hour digit (b <sub>5</sub> )	Only for 24 h mode
Under-sec. counter	Read only (unwritable) Used as binary code data
Under-sec. alarm register	Used as binary code data
Sec.to year	Both counter and alarm register use BCD code
Day of week	Coded data is used EX: 0...Sunday 1...Monday 2...Tuesday 3...Wednesday 4...Thursday 5...Friday 6...Saturday

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

Block diagram



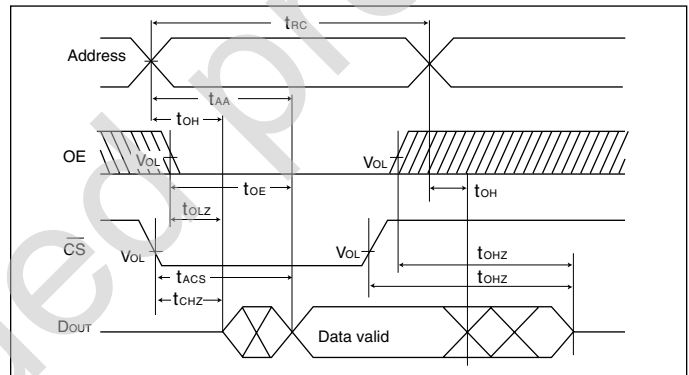
Switching characteristic

Measuring condition

- Input pulse level: 0.8 to 2.4 V
- Input rise time, fall time: 5 ns
- IN/OUT timing pulse level: 1.5 V
- Out put load: 1 TTL Gate +100 pF

Read mode

Item	Symbol	Min.	Max.	Unit
Read cycle time	t <sub>RC</sub>	85	—	ns
Address access time	t <sub>AA</sub>	—	85	
Chip select access time	t <sub>ACS</sub>	—	—	
Output enable access time	t <sub>OE</sub>	—	45	
Output hold time	t <sub>OH</sub>	10	—	
Chip select / output set time	t <sub>OLZ</sub>	5	—	
Output enable / output set time	t <sub>OLZ</sub>	5	—	
Chip deselect / output floating	t <sub>CHZ</sub>	0	35	
Output disable / output floating	t <sub>OHZ</sub>	0	35	



Write mode

Item	Symbol	Min.	Max.	Unit
Write cycle time	t <sub>WC</sub>	85	—	ns
Chip select time	t <sub>WC</sub>	75	—	
Address valid time	t <sub>AW</sub>	—	—	
Address setup time	t <sub>AS</sub>	0	—	
Write pulse time	t <sub>WP</sub>	60	—	
Address holding time	t <sub>WR</sub>	10	—	
WE output floating	t <sub>WHZ</sub>	0	35	
Input data set time	t <sub>DW</sub>	40	—	
Input data hold time	t <sub>DH</sub>	—	—	
Output disable / output floating	t <sub>OHZ</sub>	0	35	
WE output set time	t <sub>OW</sub>	5	—	

