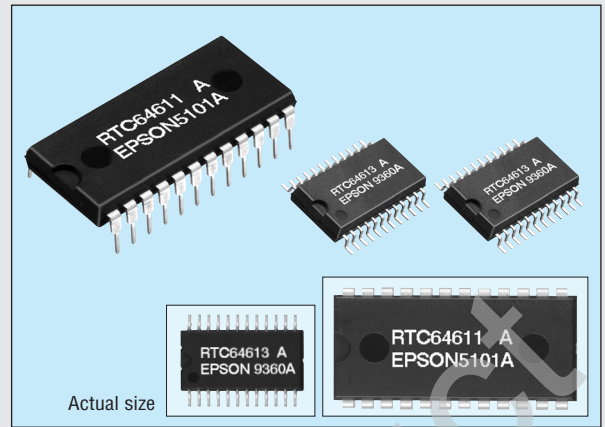


8-bit REAL TIME CLOCK MODULE

# 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 <sub>DD</sub>	Ta=+25 °C	-0.5 to 7.0	V
Input voltage	V <sub>IN</sub>		-0.5 to V <sub>DD</sub> +0.3	
Storage temperature	T <sub>STG</sub>	RTC-64611	-55 to +85	°C
		RTC-64613	-55 to +125	
Soldering condition	T <sub>SOL</sub>	RTC-64611	Under +260 °C within 10 s (lead part) (package should be less than +150 °C)	
		RTC-64613	Twice at under +260 °C within 10 s or under +230 °C within 3 min.	

### Operating range

Item	Symbol	Condition	Specifications	Unit
Operating voltage	V <sub>DD</sub>	—	4.5 to 5.5	V
Operating temperature	T <sub>OPR</sub>	—	-20 to +75	°C
Data holding voltage	V <sub>DH</sub>	CS ≥ V <sub>DD</sub> - 0.2 V	2.0 to 4.5	V
CS data holding time	t <sub>CDR</sub>	—	0 Min.	ns
Operation restoring time	t <sub>R</sub>	—	t <sub>RC</sub> (85 ns)	

### Frequency characteristics and current consumption characteristics

Item	Symbol	Condition	Specifications	Unit	
Frequency tolerance	Δf/fo	Ta=+25 °C	64611 A	+15/-5(5±10)	x 10 <sup>-6</sup>
			64611 B	+55/-45(5±50)	
		V <sub>DD</sub> =5 V	64613 A	+25/-15(5±20)	
			64613	+55/-45(5±50)	
Frequency temperature characteristics		-10 to +70 °C (+25 °C reference temperature)	+10/-120		
		-20 to +75 °C (+25 °C reference temperature)	+10/-220		
Aging	fa	V <sub>DD</sub> =5 V, Ta=+25 °C, first year	±5 Max.	x 10 <sup>3</sup> /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.	x 10 <sup>-6</sup>	
Current consumption	I <sub>DD1</sub>	No load	V <sub>DD</sub> =5 V	mA	
	I <sub>DD2</sub>	CS ≥ 1.8 V	V <sub>DD</sub> =2 V	μA	

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

### DC characteristics

(Ta = -20 to +75 °C)

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

### Terminal connection

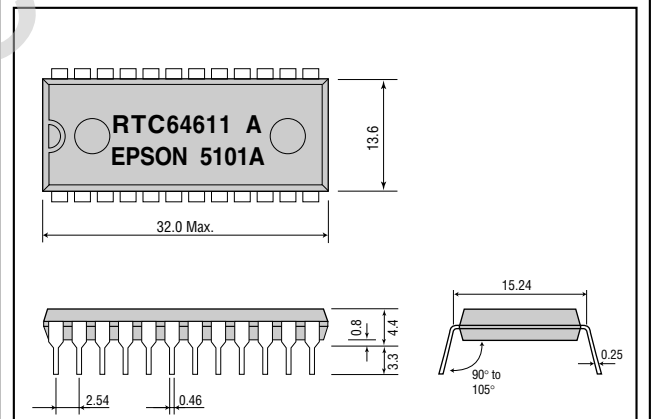
No.	Pin terminal	No.	Pin terminal
1	GND	13	I/O <sub>3</sub>
2	H-START/STOP	14	I/O <sub>4</sub>
3	I <sup>RD</sup>	15	I/O <sub>5</sub>
4	1Hz	16	I/O <sub>6</sub>
5	A <sub>3</sub>	17	I/O <sub>7</sub>
6	A <sub>2</sub>	18	CS
7	A <sub>1</sub>	19	OE
8	A <sub>0</sub>	20	WE
9	I/O <sub>1</sub>	21	NC
10	I/O <sub>2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

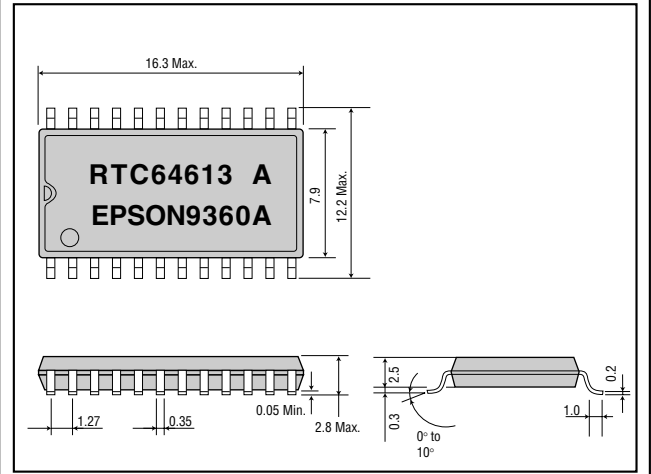
### External dimensions

(Unit: mm)

#### • RTC-64611



#### • RTC-64613



Register table

Address	Data								Remarks
	b7	b6	b5	b4	b3	b2	b1	b0	
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	

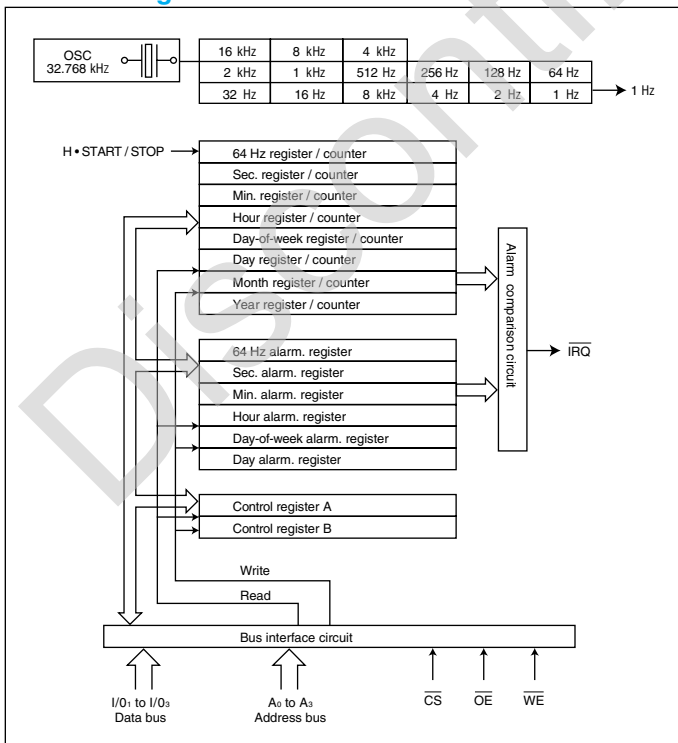
\*1 Be sure to enter "0" to TEST bit.

Supplement

Bit name	Description
* mark	Empty bit and unwritable Recognized as "0" while reading
10-hour digit (b5)	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



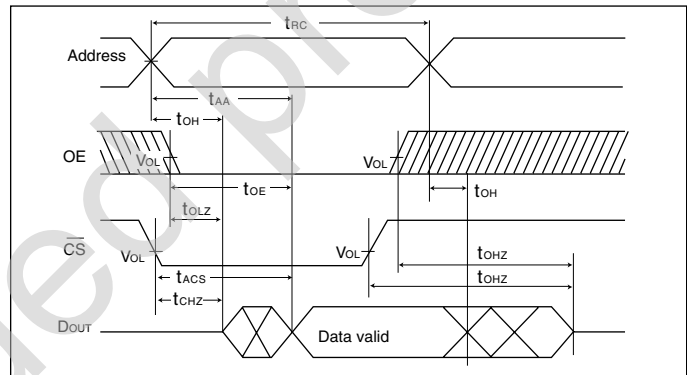
Switching characteristic

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>CW</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	—	

