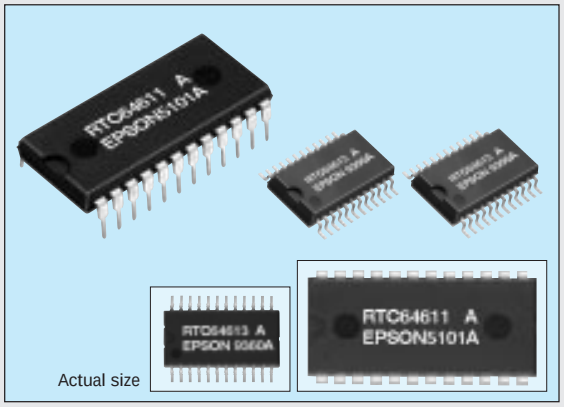
8-bit REAL TIME CLOCK MODULE

RTC-64611/64613

- Builtin crystal unit allows adjustment-free efficient operation.
- 8-bit data bus and high speed access (85 nsec. 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}	Ta=25˚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	˚C
		RTC-64613	-55 to +125	
Soldering condition	T_{SOL}	RTC-64611	Under 260˚C within 10 sec. (lead part) (package should be less than 150˚C)	
		RTC-64613	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}		-20 to + 75	˚C
Data holding voltage	V_{DH}	$\overline{CS} \geq V_{DD}$ - 0.2V	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	Δf/fo	Ta=25˚C V_{DD}=5V	64611 A	+15/-5(5±10)	ppm
			64611 B	+55/-45(5±50)	
			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_{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}	No load	V_{DD}=5V	2 max.	mA
	I_{DD2}	$\overline{CS} \geq$ 1.8V	V_{DD}=2V		μA

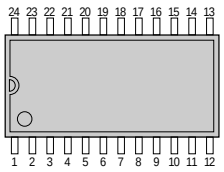
Unless otherwise stated, characteristics (specifications) shown in the above table are based on the rated operating temperature and voltage condition.

DC characteristics

(V_{DD} = 5V ± 0.5V, Ta = -20 to + 75˚C)

Item	Symbol	Condition	V_{DD}= 5V±10%		V_{DD}= 2V		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		±10	
Output leak current	I_{LOH}						
"H" output voltage (except for 1 Hz, $\overline{IRQ}$)	V_{OH}	I_{OH}=-1mA	2.4	—	—	—	V
"L" output voltage	V_{OL}	I_{OL}=2.1mA	—	0.4		—	
Input capacity	C_{IN}	V_{IN}=0V Ta=25˚C f=1.0 MHz		12.5			pF
Output capacity	C_{OUT}						

Terminal connection



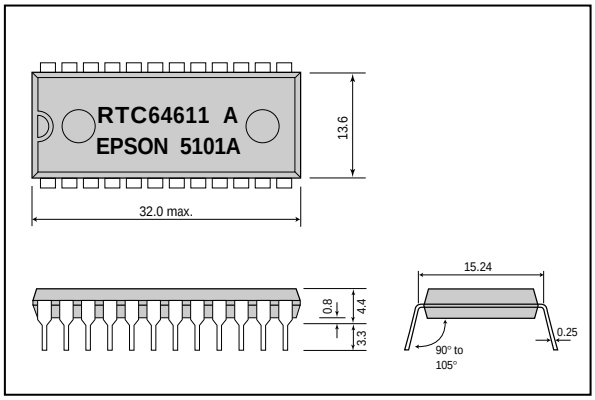
No.	Pin terminal	No.	Pin terminal
1	GND	13	I/O_4
2	H-START/STOP	14	I/O_5
3	$\overline{IRQ}$	15	I/O_6
4	1Hz	16	I/O_7
5	A_3	17	I/O_8
6	A_2	18	$\overline{CS}$
7	A_1	19	$\overline{OE}$
8	A_0	20	$\overline{WE}$
9	I/O_1	21	NC
10	I/O_2	22	(V_{DD})
11	I/O_3	23	(V_{DD})
12	GND	24	V_{DD}

- (V_{DD}) is to be same level as V_{DD}. Do not connect it to any external terminals.
- NC is not connected internally.

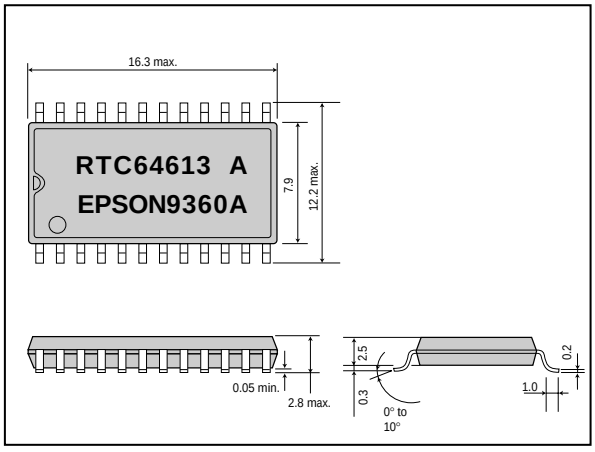
External dimensions

(Unit: mm)

RTC-64611



RTC-64613



Register table

Address	Data b7	b6	b5	b4	b3	b2	b1	b0	Remarks
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 *1	30-sec. adjustment	RESET	S.START /STOP	

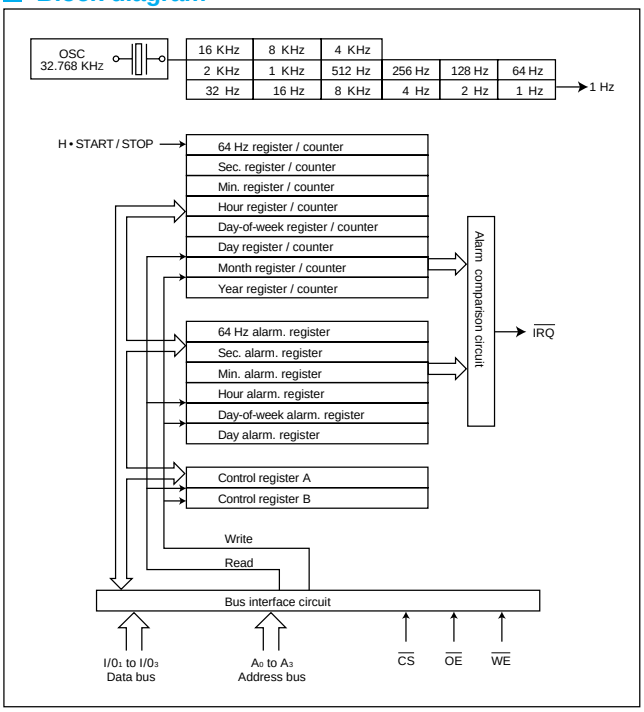
*1 Be sure to enter "O" to TEST bit.

Supplement

Bit name	Description
* mark	Empty bit and unwriteable Recognized as "0" while reading
10-hour digit (b_5)	Only for 24H mode
Under-sec. counter	Read only (unwriteable) 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



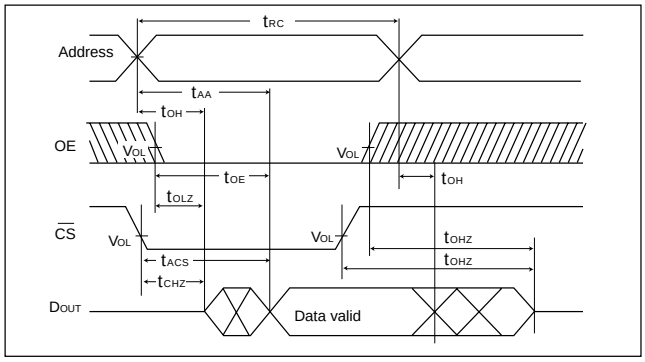
Switching characteristic

Measuring condition

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

Read mode

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



Write mode

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