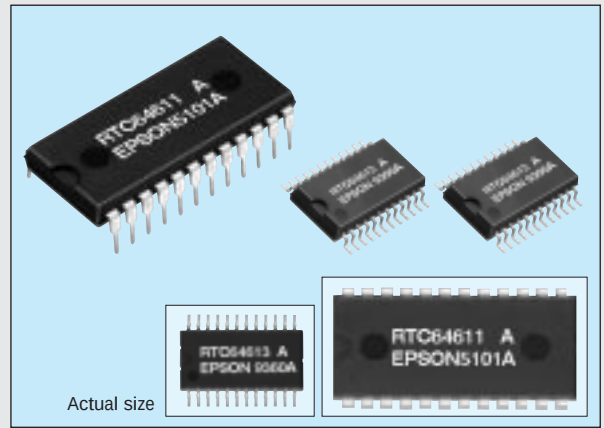


8-bit REAL TIME CLOCK MODULE

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}	$T_a=25^\circ\text{C}$	-0.5 to 7.0	V
Input voltage	V_{IN}		-0.5 to $V_{DD}+0.3$	V
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°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	$^\circ\text{C}$
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	$\Delta f/f_0$	$T_a=25^\circ\text{C}$	64611 A	ppm
		$V_{DD}=5\text{V}$	64611 B	
			64613 A	
			64613	
Frequency temperature characteristics		-10 to +70 $^\circ\text{C}$ (25 $^\circ\text{C}$ reference temperature)	+10/-120	ppm
		-20 to +75 $^\circ\text{C}$ (25 $^\circ\text{C}$ reference temperature)	+10/-220	
Aging	f_a	$V_{DD}=5\text{V}$, $T_a=25^\circ\text{C}$, 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	$V_{DD}=5\text{V}$	mA
	I_{DD2}	$\overline{CS} \geq 1.8\text{V}$	$V_{DD}=2\text{V}$	

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

■ DC characteristics

($V_{DD} = 5\text{V} \pm 0.5\text{V}$, $T_a = -20$ to +75 $^\circ\text{C}$)

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	V
Input leak current	I_{IN}			± 2		± 2	μA
Three-state leak current	I_{TSL}		—	± 10		± 10	
Output leak current	I_{LOH}						V
"H" output voltage (except for 1 Hz, IRQ)	V_{OH}	$I_{OH}=-1\text{mA}$	2.4	—	—	—	
"L" output voltage	V_{OL}	$I_{OL}=2.1\text{mA}$		0.4		—	V
Input capacity	C_{IN}	$V_{IN}=0\text{V}$, $T_a=25^\circ\text{C}$	—	12.5			pF
Output capacity	C_{OUT}	$f=1.0\text{MHz}$					

■ Terminal connection

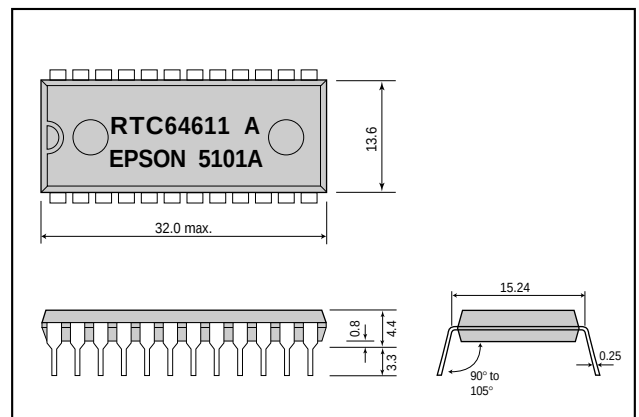
No.	Pin terminal	No.	Pin terminal
1	GND	13	I/O ₄
2	H-START/STOP	14	I/O ₅
3	IRQ	15	I/O ₆
4	1Hz	16	I/O ₇
5	A ₃	17	I/O ₈
6	A ₂	18	$\overline{CS}$
7	A ₁	19	OE
8	A ₀	20	WE
9	I/O ₁	21	NC
10	I/O ₂	22	(V _{DD})
11	I/O ₃	23	(V _{DD})
12	GND	24	V _{DD}

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

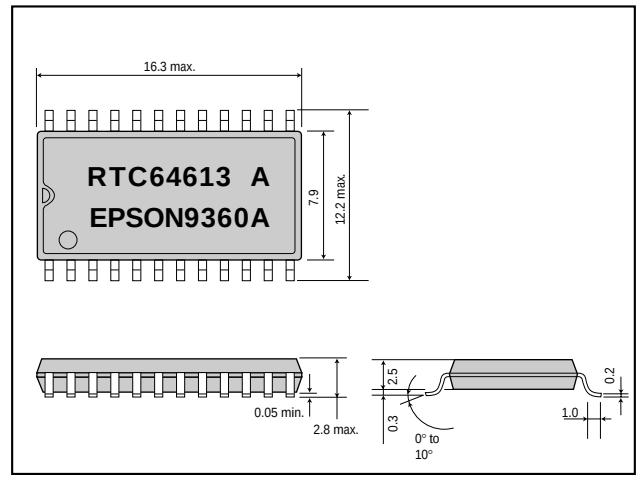
■ External dimensions

(Unit: mm)

● RTC-64611



● RTC-64613



Register table

Address	Data								Remarks	
	b ₇	b ₆	b ₅	b ₄	b ₃	b ₂	b ₁	b ₀		
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		

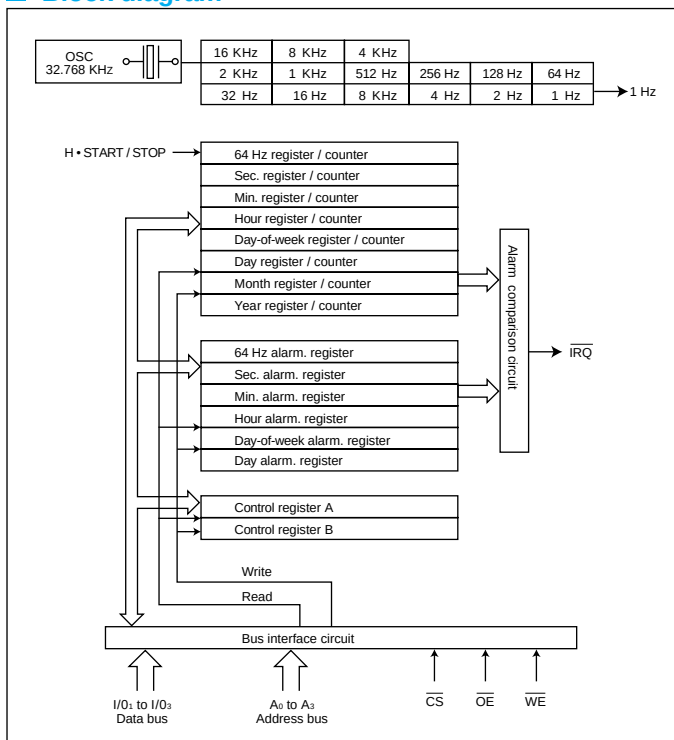
*1 Be sure to enter "0" to TEST bit.

Supplement

Bit name	Description
* mark	Empty bit and unwritable Recognized as "0" while reading
10-hour digit (b ₅)	Only for 24H 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



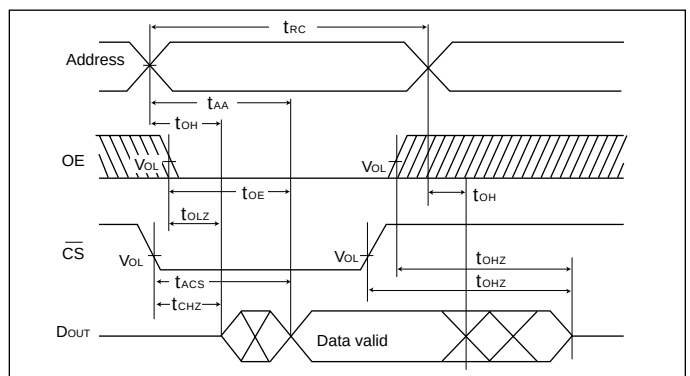
Switching characteristic

Measuring condition

- Input pulse level: 0.8 to 2.4V
- 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}	5	—	
Output enable / output set time	t _{OLZ}	—	—	
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	—	
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	
WE output set time	t _{OW}	5	—	

