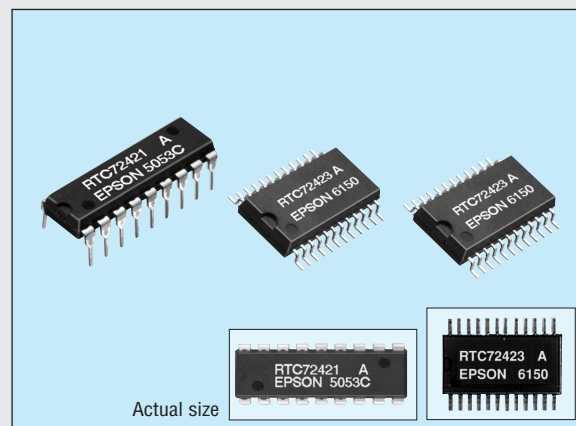


4-bit REAL TIME CLOCK MODULE

RTC-72421/72423

- Built-in crystal unit allows adjustment-free efficient operation.
- ALE input terminal available for 8048, 8051, and 8085 series.
- 12/24 h clock switchover function and automatic leap year setting.
- Interrupt masking.
- 30 second adjustment function.
- Low current consumption and features a backup function.



Specifications (characteristics)

Absolute Max. rating

Item	Symbol	Condition	Specifications	Unit
Power source voltage	V_{DD}	$T_a=+25\text{ }^{\circ}\text{C}$	-0.3 to 7.0	V
Input and output voltage	V_{IO}	$T_a=+25\text{ }^{\circ}\text{C}$	GND -0.3 to $V_{DD}+0.3$	
Storage temperature	T_{STG}	RTC-72421	-55 to +85	$^{\circ}\text{C}$
		RTC-72423	-55 to +125	
Soldering condition	T_{SOL}	RTC-72421	Under +260 $^{\circ}\text{C}$ within 10 s (lead part) (package should be less than +150 $^{\circ}\text{C}$)	
		RTC-72423	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}	RTC-72421	-10 to 70	$^{\circ}\text{C}$
		RTC-72423	-40 to 85	
Data holding voltage	V_{DH}		2.0 to 5.5	V
CSI 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

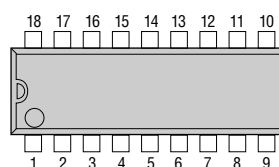
Item	Symbol	Condition		Specifications	Unit
Frequency tolerance	$\Delta f/f_0$	$T_a=+25\text{ }^{\circ}\text{C}$ $V_{DD}=5\text{ V}$	72421 A	± 10	$\times 10^{-6}$
			72421 B	± 50	
			72423 A	± 20	
			72423	± 50	
Frequency temperature characteristics		$-10\text{ }^{\circ}\text{C}$ to $+70\text{ }^{\circ}\text{C}$ ($+25\text{ }^{\circ}\text{C}$ reference temperature)		$+10/-120$	
Aging	f_a	$V_{DD}=5\text{ V}$, $T_a=+25\text{ }^{\circ}\text{C}$, first year		$\pm 5\text{ Max.}$	$\times 10^{6}/\text{year}$
Shock resistance	S.R.	Three drops on a hard board from 750 mm or 29400 m/s ² x 0.3 ms x 1/2 sine wave x 3 directions		$\pm 10\text{ Max.}$	$\times 10^{-6}$
Current consumption	I_{DD1}	$CS_1=0\text{ V}$ Exclude input/ output current	$V_{DD}=5\text{ V}$	10 Max.	μA
	I_{DD2}		$V_{DD}=2\text{ V}$	5 Max.	

DC characteristics

Item	Symbol	Condition	Min.	Typ.	Max.	Unit	Applicable terminal
"H" input voltage (1)	V_{IH1}	—	2.2		—	V	All inputs other than CS_1
"L" input voltage (1)	V_{IL1}				0.8		
Input leak current (1)	I_{LK1}	$V_1=V_{DD}/0\text{ V}$	—		± 1	μA	Input other than D_0 to D_3
Input leak current (2)	I_{LK2}				± 10		
"L" output voltage (1)	V_{OL1}	$I_{OL}=2.5\text{ mA}$	2.4		0.4	V	D_0 to D_3
"H" output voltage	V_{OH}	$I_{OH}=-400\text{ }\mu\text{A}$			—		
"L" output voltage (2)	V_{OL2}	$I_{OL}=2.5\text{ mA}$	—		0.4	μA	STD.P
Off leak current	I_{OFFLK}	$V_1=V_{DD}/0\text{ V}$			10		
Input capacity	C_1	Input frequency 1 MHz	10		—	pF	Input other than D_0 to D_3
			20				
"H" input voltage (2)	V_{IH2}	$V_{DD}=2$ to 5.5 V	$4/5 V_{DD}$	—		V	CS_1
"L" input voltage (2)	V_{IL2}		—				

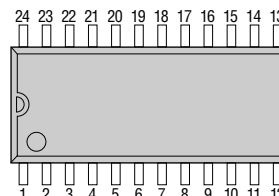
Terminal connection

● RTC-72421



No.	72421	No.	72423
1	STD.P	1	STD.P
2	CS_2	2	CS_2
3	ALE	3	NC
4	A_0	4	ALE
5	A_1	5	A_0
6	A_2	6	NC
7	A_3	7	A_1
8	RD	8	NC
9	GND	9	A_2
10	WR	10	A_3
11	D_3	11	RD
12	D_2	12	GND
13	D_1	13	WR
14	D_0	14	D_3
15	CS_1	15	D_2
16	(VDD)	16	D_1
17	(VDD)	17	NC
18	VDD	18	NC
		19	D_0
		20	CS_1
		21	NC
		22	(VDD)
		23	(VDD)
		24	VDD

● RTC-72423

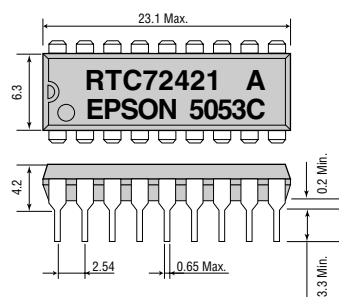


- (VDD) and V_{DD} are to have the same level of voltage. Do not connect it to any external terminals.
- NC is not connected internally.

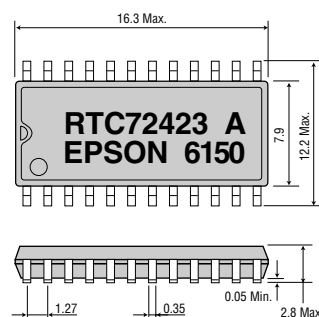
External dimensions

(Unit: mm)

● RTC-72421



● RTC-72423



Register table

Address	A ₃	A ₂	A ₁	A ₀	Register	Data				Count Value	Remarks
						D ₃	D ₂	D ₁	D ₀		
0	0	0	0	0	S ₁	S ₈	S ₄	S ₂	S ₁	0 to 9	1- second digit register
1	0	0	0	1	S ₁₀	*	S ₄₀	S ₂₀	S ₁₀	0 to 5	10- second digit register
2	0	0	1	0	MI ₁	mi ₈	mi ₄	mi ₂	mi ₁	0 to 9	1- minute digit register
3	0	0	1	1	MI ₁₀	*	mi ₄₀	mi ₂₀	mi ₁₀	0 to 5	10- minute 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	PM/AM, 10- hours 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	RegD	30 sec. ADJ.	IRQ FLAG	BUSY	HOLD	—	Control Register D
E	1	1	1	0	RegE	t ₁	t ₀	ITRPT/STND	MASK		Control Register E
F	1	1	1	1	RegF	TEST	24/12	STOP	REST		Control Register F

0="L" level, 1="H" level, REST = RESET ITRPT/STND=INTERRUPT/STANDARD

- 1) Bit * does not exist.
- 2) Please mask AM/PM bit with 10's of hours operations.
- 3) Busy is read only. IRQ can only. IRQ can only be set low ("0").

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

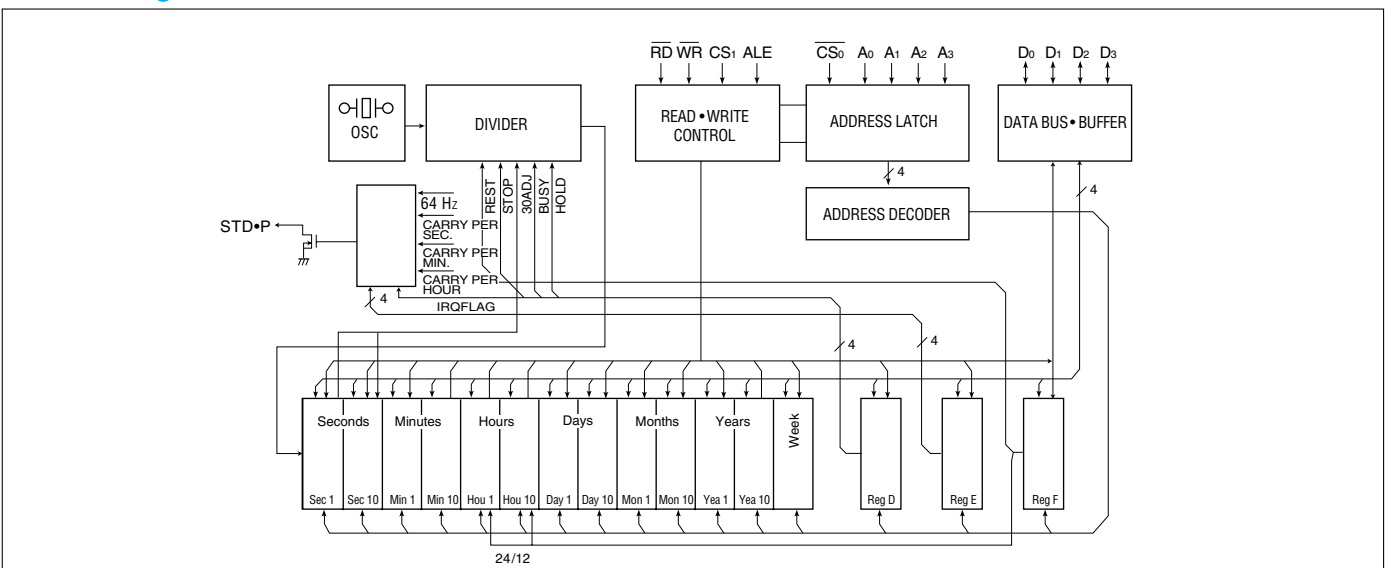
- 5) TEST bit should be "0".

Switching characteristics (with ALE)

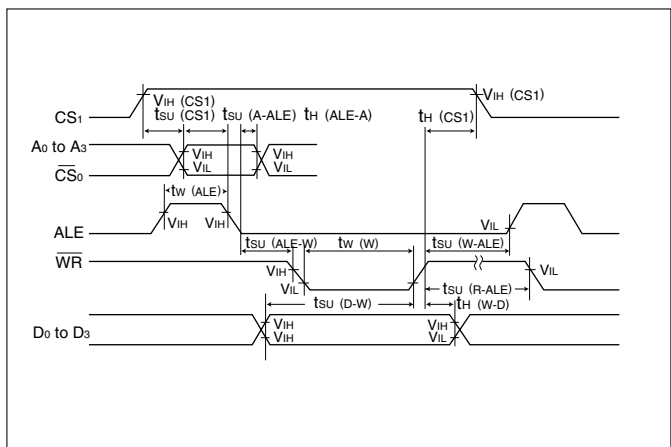
(Please connect ALE to V_{DD} if the microprocessor does not have an ALE output.)
(V_{DD} = 5 V ± 0.5 V)

Item	Symbol	Condition	Min.	Max.	Unit
CS ₁ setup time	t _{SU} (CS ₁)		1000		ns
Address setup time before ALE	t _{SU} (A-ALE)		50		
Address hold time after ALE	t _H (ALE-A)		50		
ALE pulse width	t _W (ALE)		80		
ALE setup time before WRITE	t _{SU} (ALE-W)		0		
ALE setup time before READ	t _{SU} (ALE-R)		0		
ALE setup time after WRITE	t _{SU} (W-ALE)		50		
ALE setup time after READ	t _{SU} (R-ALE)		50		
WRITE pulse width	t _W (W)		120		
DATA delay time after READ	t _{PZV} (R-Q)	C _L =150 pF	—	120	
DATA Hold time after READ	t _{PVZ} (R-Q)		0	70	
DATA setup time before WRITE	t _{SU} (D-W)		80		
DATA hold time after WRITE	t _H (W-D)		10		
CS ₁ hold time	t _H (CS ₁)		1000		
READ/WRITE recovery time	t _{REC} (R/W)		200		

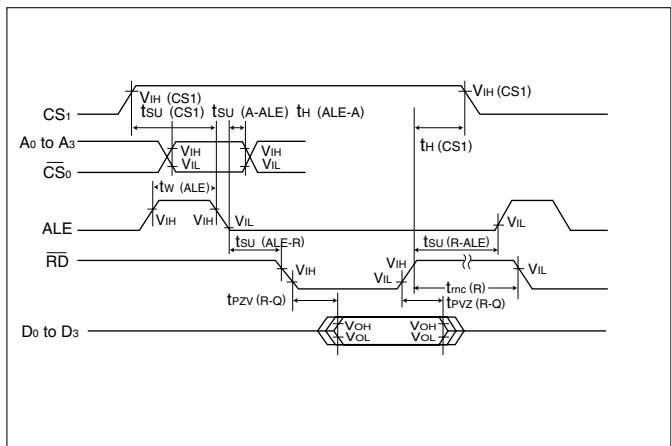
Block diagram



Write mode (with ALE)



Read mode (with ALE)



Data holding timing

