I² C-BUS INTERFACE REAL TIME CLOCK MODULE

RTC-8564JE/NB

Product number (please refer to page 2)

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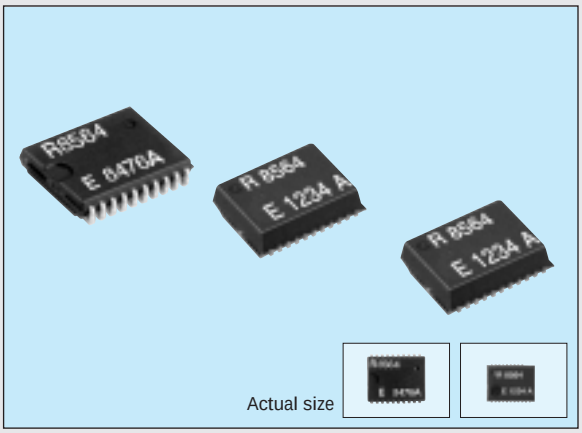
Q4185649000020 0



- Built-in crystal unit allows adjustment-free efficient operation.
- Compliant with I²C high-speed bus specifications. (400 kHz)
- Equipped with alarm, timer, and frequency output (32.768 kHz, 1024 Hz,32 Hz,1 Hz) features.
- Operating in wide voltage range from 1.8 V to 5.5 V, and in wide range of clock voltage from 1.0 V to 5.5 V.(-20 °C to +70 °C)
- Low power consumption at 275 nA/3.0 V. (Typ.)

The details are mentioned in the application manual.

http://www.epsondevice.com

The I²C-Bus is a trademark of Philips Electronics N.V.

Specifications (characteristics)

Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V_{DD}	Between V_{DD} and GND	-0.5	+6.5	V
	I_{DD}	V_{DD} pin	-50	50	mA
Input voltage	Vi	Input pin	GND-0.5	V_{DD}+0.5	V
Output voltage	Vo	$\overline{INT}$ pins			
DC Input current	Ii	—	-10	10	mA
DC Output current	Io				
Storage temperature Range	T_{STG}	Stored as bare product after unpacking	-55	+125	°C

Operating range

Item	Symbol	Condition	Min.	Max.	Unit
Power voltage	V_{DD}	I²C-BUS access at 400 kHz	1.8	5.5	V
Clock voltage	V_{CLK}	—	V_{LOW}		
Operating temperature range	T_{OPR}	No condensation	-40	+85	°C

Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency tolerance	Δf/fo	Ta=+25 °C, V_{DD}=3.0 V	5±23*	× 10^{-6}
Oscillation start-up time	t_{STA}	Ta=+25 °C, V_{DD}=1.8 V	3 Max.	s
Frequency temperature characteristics	T_{op}	Ta=+25°C, -10 °C to +70 °C, V_{DD}=3.0 V	+10 -120	× 10^{-6}
Frequency voltage characteristics	f/v	Ta=+25 °C, V_{DD}=1.2 V to 5.5 V	±2	× 10^{-6}/V
Aging	fa	Ta=+25 °C, V_{DD}=3.0 V	±5	× 10^{-6}/year

* Please ask tighter tolerance

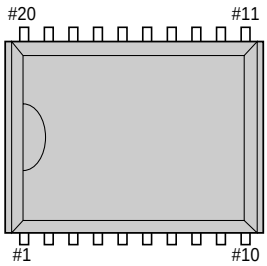
DC characteristics

(GND=0 V, V_{DD}=1.8 V to 5.5 V, Ta=-40 °C to +85 °C)

Item	Pin	Symbol	Condition	Min.	Typ.	Max.	Unit
Power current (during access)	—	I_{DD0}	f_{SCL}=400 kHz		—	800	µA
			f_{SCL}=100 kHz			200	
Power current (not during access) (CLKOUT=0 Hz)		I_{DD}	f_{SCL}=0 Hz, V_{DD}=5.0 V	—	0.33	0.80	
			f_{SCL}=0 Hz, V_{DD}=3.0 V		0.275	0.70	
			f_{SCL}=0 Hz, V_{DD}=2.0 V		0.25	0.65	
Power current (not during access) (CLKOUT=32.768 kHz)		I_{DD32k}	f_{SCL}=0 Hz, V_{DD}=5.0 V		2.5	3.4	
			f_{SCL}=0 Hz, V_{DD}=3.0 V		1.5	2.2	
			f_{SCL}=0 Hz, V_{DD}=2.0 V		1.1	1.6	
"L" input voltage		V_{IL}	—	-0.5		0.3xV_{DD}	V
"H" input voltage		V_{IH}		0.7xV_{DD}		V_{DD}+0.5	
"L" output current	SDA	I_{OL}	V_{OL}=0.4 V, V_{DD}=5 V	-3	—	—	mA
"L" output current	$\overline{INT}$	I_{OL}		-1			
	CLKOUT	I_{OL}					
"H" output current		I_{OH}		—		1	
Leakage current	—	I_{LO}	V_O=V_{DD} or GND	-1		1	µA
Low voltage detection		V_{LOW}	Ta=-40 °C to +85 °C	—	0.9	1.1	V
			Ta=-20 °C to +70 °C		0.9	1.0	

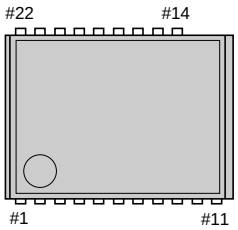
Terminal connection

● **RTC-8564JE**



No.	Pin terminal	No.	Pin terminal
1	N.C	20	N.C
2	N.C	19	N.C
3	CLKOE	18	N.C
4	V_{DD}	17	N.C
5	CLKOUT	16	N.C
6	SCL	15	N.C
7	SDA	14	N.C
8	(GND)	13	N.C
9	GND	12	N.C
10	$\overline{INT}$	11	N.C

● **RTC-8564NB**

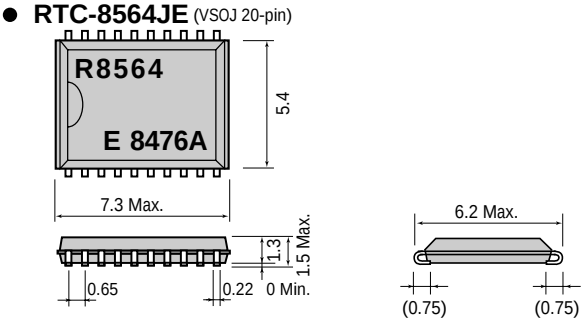


No.	Pin terminal	No.	Pin terminal
1	$\overline{INT}$	22	N.C
2	GND	21	N.C
3	(GND)	20	N.C
4	N.C	19	N.C
5	SDA	18	N.C
6	SCL	17	N.C
7	CLKOUT	16	N.C
8	V_{DD}	15	N.C
9	CLKOE	14	N.C
10	N.C	13	—
11	N.C	12	—

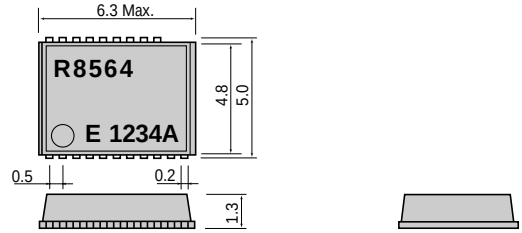
External dimensions

(Unit: mm)

● **RTC-8564JE** (VSOJ 20-pin)



● **RTC-8564NB** (SON 22-pin)



Metal may be exposed on the top or bottom of this product. This won't affect any quality, reliability or electrical spec.

Register table

Address	Register symbol	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Control 1	TEST	0	STOP	0	TEST	0	0	0
1	Control 2	0	0	0	TI/TP	AF	TF	AIE	TIE
2	Sec	VL	S 40	S 20	S 10	S 8	S 4	S 2	S 1
3	Min	*	Min 40	Min 20	Min 10	Min 8	Min 4	Min 2	Min 1
4	Hour	*	*	Hour 20	Hour 10	Hour 8	Hour 4	Hour 2	Hour 1
5	Day	*	*	Day 20	Day 10	Day 8	Day 4	Day 2	Day 1
6	Day of Week	*	*	*	*	*	W 4	W 2	W 1
7	Month/Century	C	*	*	Month 10	Month 8	Month 4	Month 2	Month 1
8	Year	Year 80	Year 40	Year 20	Year 10	Year 8	Year 4	Year 2	Year 1
9	Minutes Alarm	AE	A-Min 40	A-Min 20	A-Min 10	A-Min 8	A-Min 4	A-Min 2	A-Min 1
A	Hours Alarm	AE	*	A-Hr 20	A-Hr 10	A-Hr 8	A-Hr 4	A-Hr 2	A-Hr 1
B	Day Alarm	AE	*	A-Day 20	A-Day 10	A-Day 8	A-Day 4	A-Day 2	A-Day 1
C	Week Alarm	AE	*	*	*	*	A-W 4	A-W 2	A-W 1
D	CLKOUT frequency	FE	*	*	*	*	*	FD1	FD0
E	Timer control	TE	*	*	*	*	*	TD1	TD0
F	Timer	128	64	32	16	8	4	2	1

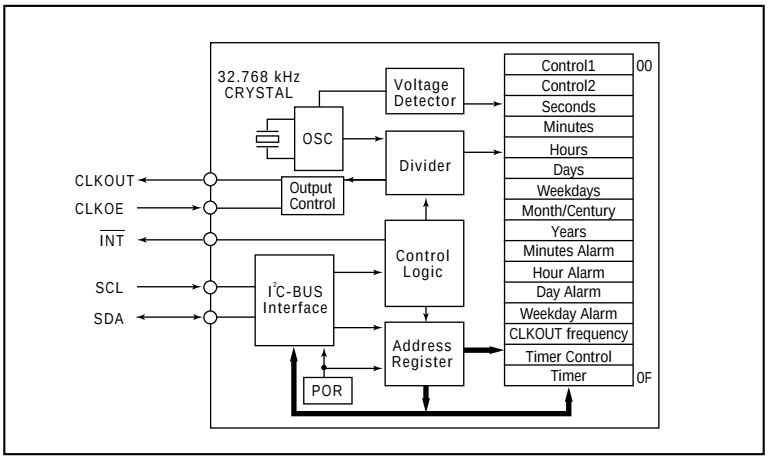
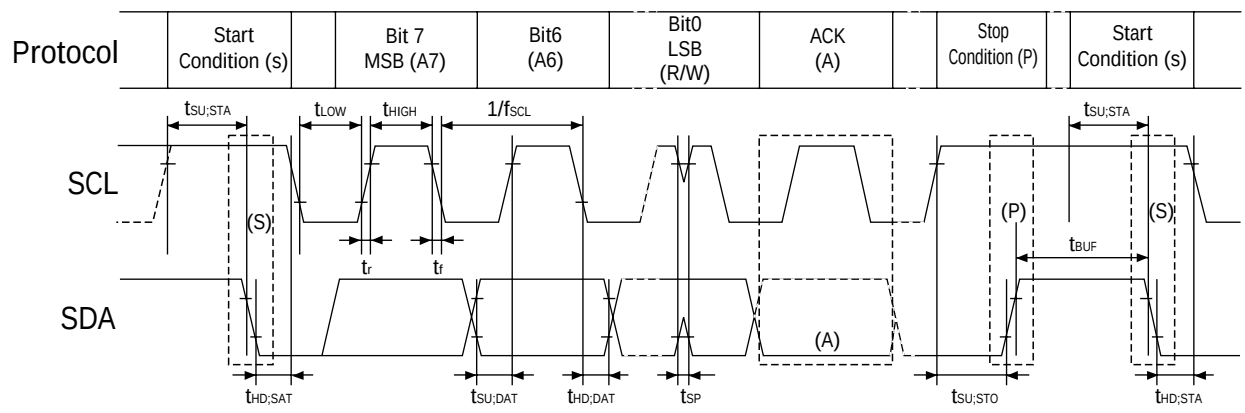
0 : Always set this bit to“0”.

AC characteristics

(V_{DD}=1.8 V to 5.5 V, Ta=-40 ˚C to +85 ˚C)

Item	Symbol	Min.	Max.	Unit
SCL clock frequency	f_{SCL}	—	400	kHz
Tolerance spike time on bus	t_{SW}		50	ns
Start condition set-up time	$t_{SU;STA}$	0.6	—	µs
Start condition Hold time	$t_{HD;STA}$			
SCL “L” time	t_{LOW}	1.3		
SCL “H” time	t_{HIGH}	0.6		
SCL and SDA rise time	t_r	—	0.3	
SCL and SDA fall time	t_f			
Date set-up time	$t_{SU;DAT}$	100	—	ns
Date hold time	$t_{HD;DAT}$	0		
Stop condition set-up time	$t_{SU;STO}$	4.0		µs

Block diagram



Timing chart