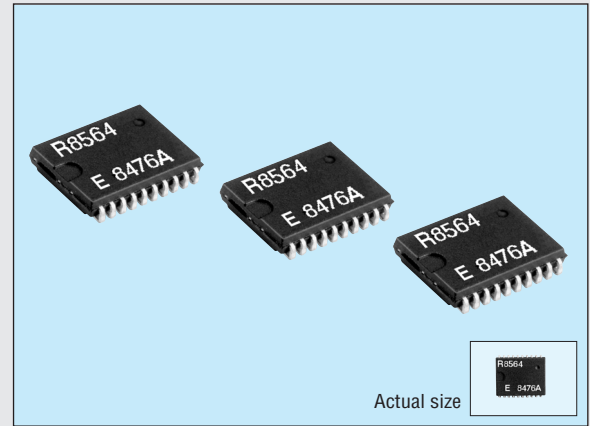


I<sup>2</sup> C-BUS INTERFACE REAL TIME CLOCK MODULE

# RTC-8564JE

- Built-in crystal unit allows adjustment-free efficient operation.
- Compliant with I<sup>2</sup>C high-speed bus specifications. (400 kHz)
- Equipped with alarm, timer, and frequency output (32.768 kHz, 1024 Hz, 32 Hz, 1 Hz) features.
- Inclusion of century bit to enable correct date even after year 2000
- Operating in wide voltage range from 1.8 to 5.5 V, and in wide range of clock voltage from 1.2 to 5.5 V.
- Low power consumption at 275 nA/3.0 V. (Typ.)



■ Specifications (characteristics)

■ Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V <sub>DD</sub>	Between V <sub>DD</sub> and GND	-0.5	+6.5	V
	I <sub>DD</sub>	V <sub>DD</sub> pin	-50	50	mA
Input voltage	V <sub>i</sub>	Input pin	GND-0.5	V <sub>DD</sub> +0.5	V
Output voltage	V <sub>o</sub>	INT pins			
DC Input current	I <sub>i</sub>	—	-10	10	mA
DC Output current	I <sub>o</sub>	—	-10	10	mA
Storage temperature Range	T <sub>STG</sub>	As single part	-55	+125	°C

■ Operating range

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage range	V <sub>DD</sub>	I <sup>2</sup> C-BUS access at 400 kHz	1.8	5.5	V
Clock voltage range					
Operating temperature range	T <sub>OPR</sub>	—	-40	+85	°C

■ Frequency characteristics

Item	Symbol	Condition	Max.	Unit
Frequency precision	Δf/f <sub>0</sub>	T <sub>a</sub> =+25 °C, V <sub>DD</sub> =3.0 V	5±23	× 10 <sup>-6</sup>
Frequency temperature characteristics	T <sub>OP</sub>	T <sub>a</sub> =+25 °C, -10 to +70 °C, V <sub>DD</sub> =3.0 V	+10 -120	
Frequency voltage characteristics	f <sub>v</sub>	T <sub>a</sub> =+25 °C, V <sub>DD</sub> =1.2 V to 5.5 V	±2	× 10 <sup>-6</sup> /V
Oscillation start-up time	t <sub>STA</sub>	T <sub>a</sub> =+25 °C, V <sub>DD</sub> =1.8 V	3	s
Aging	f <sub>a</sub>	T <sub>a</sub> =+25 °C, V <sub>DD</sub> =3.0 V	±5	× 10 <sup>9</sup> /year

■ DC characteristics

(V<sub>DD</sub>=1.8 to 5.5 V, T<sub>a</sub>=-40 to +85 °C)

Item	Pin	Symbol	Condition	Min.	Typ.	Max.	Unit				
Power current (during access)	—	I <sub>DDO</sub>	f <sub>SCL</sub> =400 kHz	—	—	800	μA				
			f <sub>SCL</sub> =100 kHz			200					
Power current (not during access)	—	I <sub>DD</sub>	f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =5.0 V	—	—	0.33	μA				
			f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =3.0 V			0.275					
		f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =2.0 V	0.25								
		f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =2.0 V	0.65								
“L” input voltage	—	V <sub>IL</sub>	—	GND-0.5	—	0.3×V <sub>DD</sub>	V				
						“H” input voltage		V <sub>IH</sub>	—	0.7×V <sub>DD</sub>	V <sub>DD</sub> +0.5
“L” output current	—	I <sub>OL</sub> (INT)	V <sub>OL</sub> =0.4 V, V <sub>DD</sub> =5 V	-1	—	—					
							CLKOUT	I <sub>OL</sub> (CLKOUT)	—	—	—
“H” output current	—	I <sub>OH</sub> (CLKOUT)	—	—	—	1	μA				
						Leakage current		I <sub>LO</sub>	V <sub>O</sub> =V <sub>DD</sub> or GND	-1	1
Low voltage detection	—	V <sub>LOW</sub>	T <sub>a</sub> =-40 °C to +85 °C	—	0.9	1.1	V				
			T <sub>a</sub> =-20 °C to +70 °C			0.9		1.0			

The I<sup>2</sup>C-Bus is a trademark of Philips Electronics N.V.

■ Terminal connection

No.	Pin terminal
1	N.C
2	N.C
3	CLKOE
4	V <sub>DD</sub>
5	CLKOUT
6	SCL
7	SDA
8	(GND)
9	GND
10	INT
11	N.C
12	N.C
13	N.C
14	N.C
15	N.C
16	N.C
17	N.C
18	N.C
19	N.C
20	N.C

■ External dimensions

(Unit: mm)

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	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 40	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

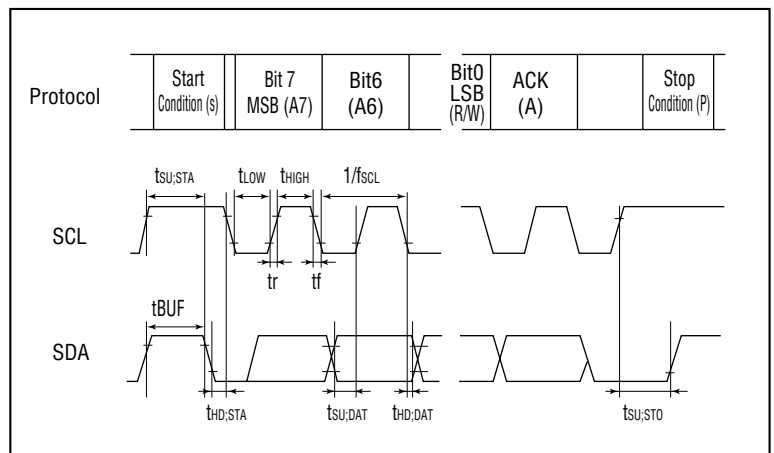
0 : Always set this bit to "0".

Switching characteristics

(V<sub>DD</sub>=1.8 to 5.5 V, T<sub>a</sub>=-40 °C to +85 °C)

Item	Symbol	Min.	Max.	Unit
SCL clock frequency	f <sub>SCL</sub>	—	400	kHz
Tolerance spike time on bus	t <sub>SW</sub>	—	50	ns
Start condition set-up time	t <sub>SU;STA</sub>	0.6	—	μs
Start condition Hold time	t <sub>HD;STA</sub>			
SCL "L" time	t <sub>LOW</sub>			
SCL "H" time	t <sub>HIGH</sub>	0.3	—	μs
SCL and SDA rise time	t <sub>r</sub>			
SCL and SDA fall time	t <sub>f</sub>	—	0.3	μs
Date set-up time	t <sub>SU;DAT</sub>	100	—	ns
Date hold time	t <sub>HD;DAT</sub>	0	—	ns
Stop condition set-up time	t <sub>SU;STO</sub>	4.0	—	μs

Timing chart



Block diagram

