

I2C-BUS INTERFACE REAL TIME CLOCK MODULE

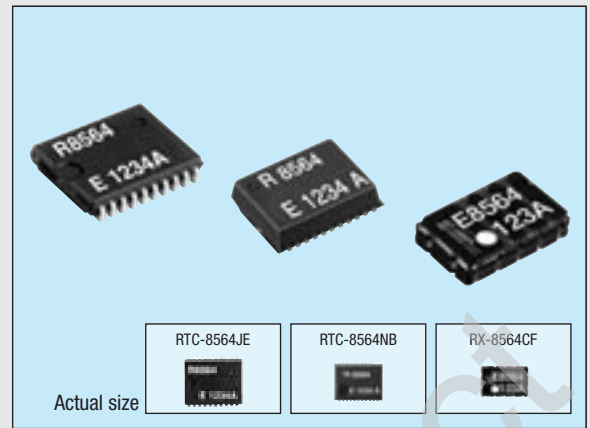
# RTC-8564JE / NB RX-8564CF

Product number (please refer to page 5)

**Q4185647x000100**  
**Q418564Ax000100**

**Q4185649x0000200**

- 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.
- 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. (RTC-8564JE / NB : -20 °C to +70 °C / RX-8564CF: +25 °C)
- Low power consumption at 275 nA / 3.0 V. (Typ.)
- Available for lead (Pb) - free soldering.
- Lead (Pb) - free terminal (RX-8564CF), Available for lead (Pb) - free terminal. (RTC-8564JE / NB)



The details are mentioned in the application manual.

<http://www.epsondevice.com>

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

## ■ Specifications (characteristics)

### ■ Absolute Max. rating

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	V <sub>DD</sub>	V <sub>DD</sub> to GND	-0.5	+6.5	V
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>	—			
Storage temperature	T <sub>STG</sub>	Stored as bare product after unpacking	-55	+125	°C

### ■ Operating range

Item	Symbol	Condition	Min.	Max.	Unit
Power voltage	V <sub>DD</sub>	I <sup>2</sup> C-BUS access at 400 kHz	1.8	5.5	V
Clock voltage	V <sub>CLK</sub>	—	V <sub>LOW</sub>		
Operating temperature	T <sub>OPR</sub>	No condensation	-40	+85	°C

### ■ Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency tolerance	$\Delta f/f$	T <sub>a</sub> = +25 °C, V <sub>DD</sub> = 3.0 V	B: 5 ±23*	x 10 <sup>-6</sup>
Oscillation start up time	t <sub>STA</sub>	T <sub>a</sub> = +25 °C, V <sub>DD</sub> = 1.8 V	3 Max.	s
Frequency temperature characteristics	T <sub>OP</sub>	Reference at +25 °C, T <sub>a</sub> = -10 °C to +70 °C, V <sub>DD</sub> = 3.0 V	+10 -120	x 10 <sup>-6</sup>
Frequency voltage characteristics	f/V	RTC-8564JE / NB RX-8564CF T <sub>a</sub> = +25 °C, V <sub>DD</sub> = 1.0 V to 5.5 V	±2 Max.	x 10 <sup>-6</sup> / V
Aging	f <sub>a</sub>	T <sub>a</sub> = +25 °C, V <sub>DD</sub> = 3.0 V	±5	x 10 <sup>-6</sup> / year

\* Please ask tighter tolerance

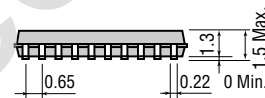
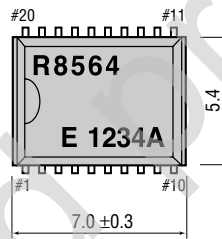
### ■ DC characteristics (GND = 0 V, V<sub>DD</sub> = 1.8 V to 5.5 V, T<sub>a</sub> = -40 °C to +85 °C)

Item	Pin	Symbol	Condition	Min.	Typ.	Max.	Unit
Power current (not during access) (CLKOUT = 0 Hz)	-	I <sub>DD</sub>	f <sub>SCL</sub> = 0 Hz, V <sub>DD</sub> = 5.0 V	-	0.33	0.80	μA
Power current (not during access) (CLKOUT = 32.768 kHz)			f <sub>SCL</sub> = 0 Hz, V <sub>DD</sub> = 3.0 V		0.275	0.70	
			f <sub>SCL</sub> = 0 Hz, V <sub>DD</sub> = 2.0 V		0.25	0.65	
		I <sub>DD32k</sub>	f <sub>SCL</sub> = 0 Hz, V <sub>DD</sub> = 5.0 V	2.5	3.4	μA	
			f <sub>SCL</sub> = 0 Hz, V <sub>DD</sub> = 3.0 V	1.5	2.2		
			f <sub>SCL</sub> = 0 Hz, V <sub>DD</sub> = 2.0 V	1.1	1.6		
"L" input voltage		V <sub>IL</sub>	—	-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	V
"L" output current	SDA	I <sub>OL</sub>	V <sub>OL</sub> = 0.4 V, V <sub>DD</sub> = 5 V	-3	-	-	mA
"L" output current	INT	I <sub>OL</sub>					
		I <sub>OL</sub>					
"H" output current	CLKOUT	I <sub>OH</sub>					
Low voltage detection RTC-8564JE / NB	-	V <sub>LOW</sub>	T <sub>a</sub> = -40 °C to +85 °C	-	0.9	1.1	V
Low voltage detection RX-8564CF			T <sub>a</sub> = -20 °C to +70 °C			1.0	
			T <sub>a</sub> = -40 °C to +85 °C			1.2	
			T <sub>a</sub> = +25 °C		1.0		

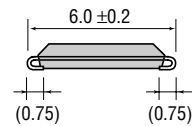
## ■ External dimensions / Terminal connection

(Unit: mm)

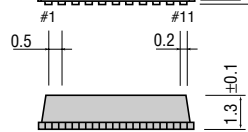
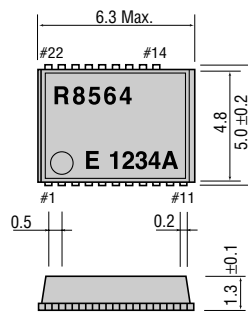
### ● RTC-8564JE (VSOJ 20-pin)



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 <sub>DD</sub>	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	INT	11	N.C



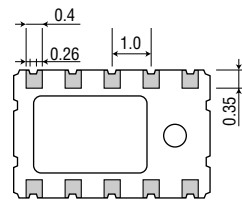
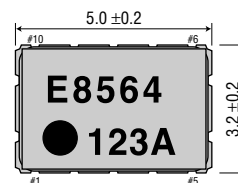
### ● RTC-8564NB (SON 22-pin)



No.	Pin terminal	No.	Pin terminal
1	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 <sub>DD</sub>	15	N.C
9	CLKOE	14	N.C
10	N.C	13	—
11	N.C	12	—



### ● RX-8564CF (SON 10-pin)



No.	Pin terminal	No.	Pin terminal
1	V <sub>DD</sub>	10	CLKOE
2	CLKOUT	9	N.C
3	N.C	8	N.C
4	SCL	7	INT
5	SDA	6	GND

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

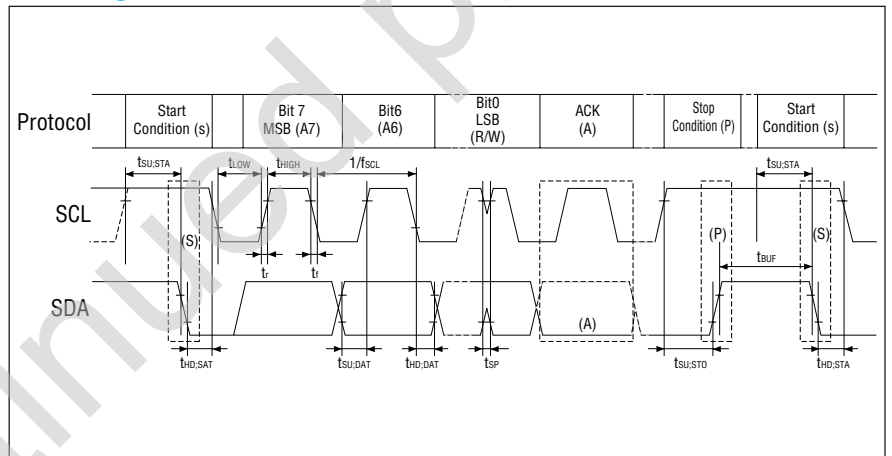
■ Register table

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

■ AC characteristics (V<sub>DD</sub> = 1.8 V 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>SP</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>	1.3	-	
SCL "H" time	t <sub>HIGH</sub>	0.6	-	μs
SCL and SDA rise time	t <sub>r</sub>	-	0.3	
SCL and SDA fall time	t <sub>f</sub>	-	-	ns
Data set-up time	t <sub>SU; DAT</sub>	100	-	
Data hold time	t <sub>HD; DAT</sub>	0	-	μs
Stop condition set-up time	t <sub>SU; STO</sub>	0.6	-	

■ Timing chart



■ Block diagram

