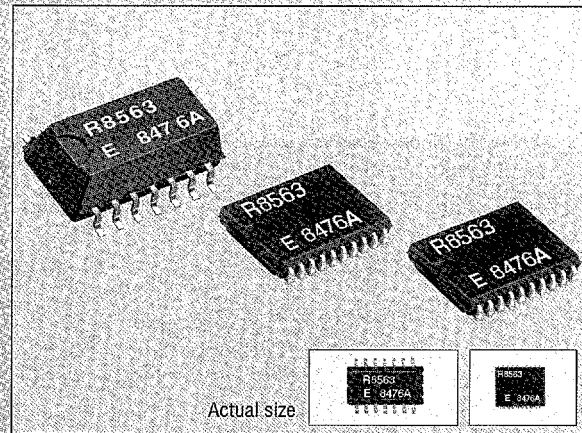


I<sup>2</sup>C-BUS INTERFACE REAL TIME CLOCK MODULE

# RTC-8563SA/JE

- Built-in crystal oscillator running at 32.768KHz.
- Compliant with I<sup>2</sup>C high-speed bus specifications. (400KHz)
- Equipped with alarm, timer, and frequency output (32.768KHz, 1024Hz, 32Hz, 1Hz) features.
- Inclusion of century bit to enable correct date even after year 2000
- Operating in wide voltage range from 1.8 to 5.5V, and in wide range of clock voltage from 1.2 to 5.5V.
- Low power consumption at 250nA/2.0V. (Typ.)
- Available in small package (SA:SOP14-pin) and thin package (JE:VSOJ20-pin)



Actual size

## 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>	CLKOUT, 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			V <sub>Low</sub>		
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> =3.0V	5±23	ppm
Frequency temperature characteristics	T <sub>OP</sub>	T <sub>a</sub> =+25°C, -10 to +70°C, V <sub>DD</sub> =3.0V	+10 -120	
Frequency voltage characteristics	f <sub>V</sub>	T <sub>a</sub> =+25°C, V <sub>DD</sub> =1.2V to 5.5V	±2	ppm/V
Oscillation start-up time	t <sub>STA</sub>	T <sub>a</sub> =+25°C, V <sub>DD</sub> =1.8V	3	S
Aging	f <sub>A</sub>	T <sub>a</sub> =+25°C, V <sub>DD</sub> =3.0V	±5	ppm/year

### DC characteristics

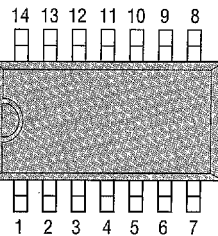
If not specifically indicated, V<sub>DD</sub>=1.8 to 5.5V, T<sub>a</sub>=-40 to +85°C

Item	Pin	Symbol	Condition	Min.	Typ.	Max.	Unit
Power current (during access)	—	I <sub>DD0</sub>	f <sub>SCL</sub> =400 KHz f <sub>SCL</sub> =100 KHz	—	—	800 200	μA
		I <sub>DD</sub>	f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =5.0V f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =3.0V f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =2.0V	—	0.35 0.30 0.25	0.85 0.75 0.70	
Power current (not during access)	—	I <sub>DD32k</sub>	f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =5.0V f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =3.0V f <sub>SCL</sub> =0 Hz, V <sub>DD</sub> =2.0V	—	0.85 0.55 0.45	1.80 1.20 1.00	μA
		V <sub>IL</sub>	—	GND	—	0.3×V <sub>DD</sub>	
"H" input voltage	—	V <sub>IH</sub>	—	0.7×V <sub>DD</sub>	—	V <sub>DD</sub>	V
"L" output voltage	SDA	I <sub>OL</sub> (SDA)	—	-3	—	—	mA
"L" output current	INT	I <sub>OL</sub> (INT)	V <sub>OL</sub> =0.4V, V <sub>DD</sub> =5V	—	—	—	
	—	CLKOUT	I <sub>OL</sub> (CLKOUT)	—	-1	—	—
Leakage current	—	I <sub>LO</sub>	V <sub>O</sub> =V <sub>DD</sub> or GND	—	—	1	μA
Low voltage detection	—	V <sub>Low</sub>	—	—	1.0	1.2	V

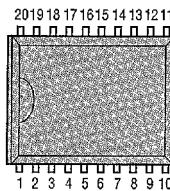
The I<sup>2</sup>C-Bus is a trademark of Philips Electronics N.V.

### Terminal connection

#### RTC-8563SA



#### RTC-8563JE

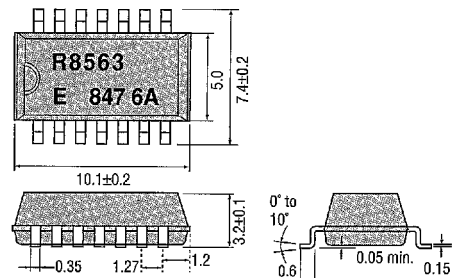


No.	8563SA	8563JE
1	N.C.	N.C.
2	SCL	N.C.
3	SDA	N.C.
4	N.C.	V <sub>DD</sub>
5	GND	CLKOUT
6	N.C.	SCL
7	INT	SDA
8	N.C. (GND)	
9	N.C.	GND
10	N.C.	INT
11	V <sub>DD</sub>	N.C.
12	N.C.	N.C.
13	N.C.	N.C.
14	CLKOUT	N.C.
15		N.C.
16		N.C.
17		N.C.
18		N.C.
19		N.C.
20		N.C.

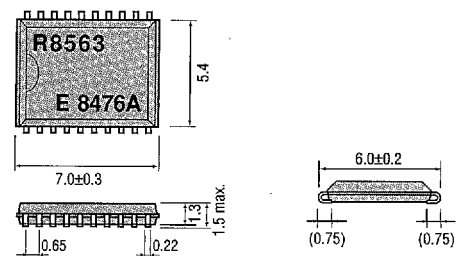
### External dimensions

(Unit: mm)

#### RTC-8563SA (SOP 14-pin)



#### RTC-8563JE (VSOJ 20-pin)



Register table

Address	Register symbol	bit 7	bit 6	bit 5	bit 4	bit 3	bit 2	bit 1	bit 0
0	Control1	TEST	0	STOP	0	TEST	0	0	0
1	Control2	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

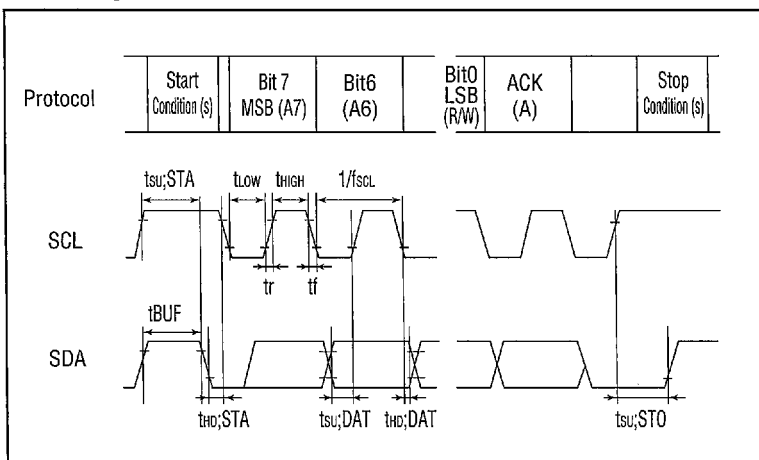
0 : Always set this bit to "0".

Switching characteristics

If not specifically indicated, V<sub>DD</sub>=1.8 to 5.5V, T<sub>A</sub>=-40 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</sub> ; STA	0.6	—	μs
Start condition Hold time	t <sub>hd</sub> ; STA			
SCL "L" time	t <sub>LOW</sub>	1.3	—	μs
SCL "H" time	t <sub>HIGH</sub>	0.6		
SCL and SDA rise time	t <sub>r</sub>	—	0.3	μs
SCL and SDA fall time	t <sub>f</sub>			
Date set-up time	t <sub>su</sub> ; DAT	100	—	ns
Date hold time	t <sub>hd</sub> ; DAT	0		
Stop condition set-up time	t <sub>su</sub> ; STO	4.0	—	μs

Timing chart



Block diagram

