

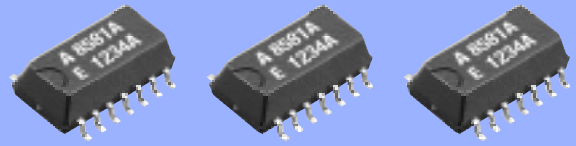
**For Automotive**  
**I<sup>2</sup>C-Bus INTERFACE REAL TIME CLOCK MODULE**



**RA - 8581 SA**

- Built-in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : I<sup>2</sup>C-Bus Interface (400 kHz)
- Operating voltage range : 1.8 V to 5.5 V
- Wide Timekeeper voltage range : 1.6 V to 5.5 V
- Low backup current : 0.45 μA / 3 V (Typ.)
- 32.768 kHz frequency output function : C-MOS output With Control Pin
- The various functions include full calendar, alarm, timer.

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

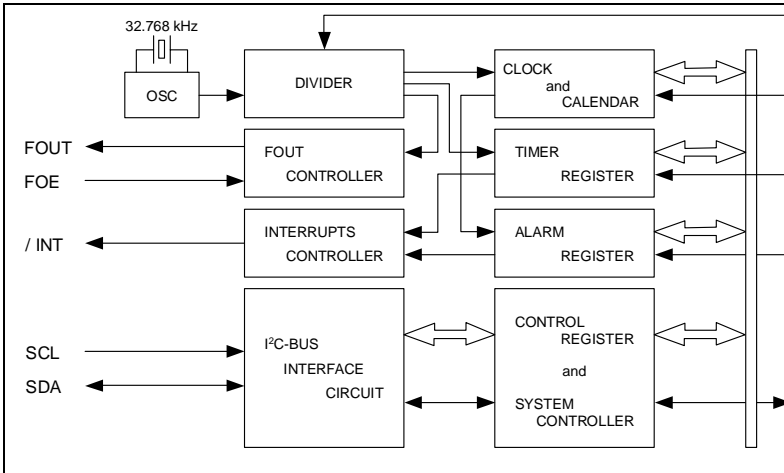


Actual size



**Block diagram**

**Overview**



**Interface Type**

- I<sup>2</sup>C hi-speed bus specifications. (400 kHz)
- \* I<sup>2</sup>C-Bus slave address : read A3h and write A2h

**32.768 kHz frequency output function**

- FOUT pin output (C-MOS output), CL=30 pF
- 32.768 kHz clock frequency output. (Duty 50 ±5%)

**Timer function**

- Timer interrupt function can be set up between 1/4096 second and 4095 minutes.
- It is recorded automatic to TF-bit at the time of event occurrence, and possible to output with /TIRQ pin output (N-ch open-drain output).

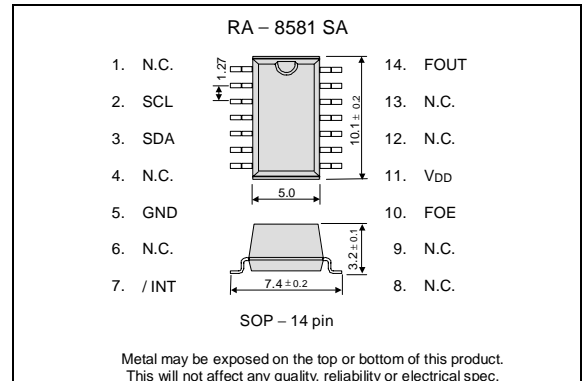
**Interrupt function**

- Alarm interrupt function, Time update interrupt function.

**Pin Function**

**Terminal connection / External dimensions (Unit:mm)**

Signal Name	Input / Output	Function						
SCL	Input	Serial clock input pin						
SDA	Bi-directional	Data input and output pin						
FOUT	Output	FOUT pin outputs the reference clock signal at 32.768 kHz. FOE pin inputs the FOUT output control.						
FOE	Input	<table border="1"> <thead> <tr> <th>FOE pin input</th> <th>FOUT pin output</th> </tr> </thead> <tbody> <tr> <td>HIGH</td> <td>Output ( C-MOS )</td> </tr> <tr> <td>LOW</td> <td>OFF ( LOW )</td> </tr> </tbody> </table>	FOE pin input	FOUT pin output	HIGH	Output ( C-MOS )	LOW	OFF ( LOW )
FOE pin input	FOUT pin output							
HIGH	Output ( C-MOS )							
LOW	OFF ( LOW )							
/INT	Output	Interrupt output ( N-ch open drain )						
VDD	—	Connected to a positive power supply.						
GND	—	Connected to a ground.						



**Specifications (characteristics)**

\* Refer to application manual for details.

**Recommended Operating Conditions**

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Power voltage	VDD	—	1.8	3.0	5.5	V
Clock voltage	VCLK	—	1.6	3.0	5.5	V
Operating temperature	TOPR	—	-40	+25	+85	°C

**Frequency characteristics**

Item	Symbol	Condition	Rating	Unit
Frequency tolerance	Δ f / f	Ta = +25 °C VDD = 3.0 V	5 ± 23 *	× 10 <sup>-6</sup>
FOUT output Duty	tw / t	Ta = -40 °C to +85 °C VDD = 2.4 V to 5.5 V	50 ± 5	%

\* Equivalent to 1 minute of monthly deviation

**DC characteristics**

Ta = -40 °C to +85 °C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Current Consumption	IBK	fSCL = 0 Hz FOE = GND FOUT ; Output OFF ( LOW )	VDD = 5 V	0.65	1.2	μA
			VDD = 3 V	0.45	0.8	
Current Consumption	I32k	fSCL = 0 Hz FOE = VDD FOUT ; 32.768 kHz Output ON CL = 30 pF	VDD = 5 V	8.0	20.0	μA
			VDD = 3 V	5.0	12.0	

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Quartz devices have become crucial in the network environment where products are increasingly intended for broadband, ubiquitous applications and where various types of terminals can transfer information almost immediately via LAN and WAN on a global scale. Epson Toyocom Corporation addresses every single aspect within a network environment. The new corporation offers “Digital Convergence” solutions to problems arising with products for consumer use, such as, core network systems and automotive systems.

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