For Automotive

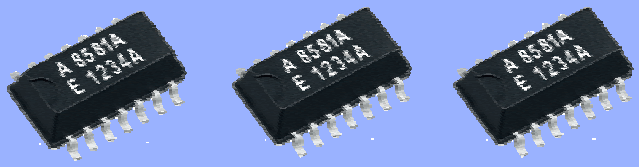
I²C-Bus INTERFACE REAL TIME CLOCK MODULE

RA - 8581 SA

- Built-in frequency adjusted 32.768 kHz crystal unit.
- Interface Type : I²C-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.
- Conforms to AEC-Q200

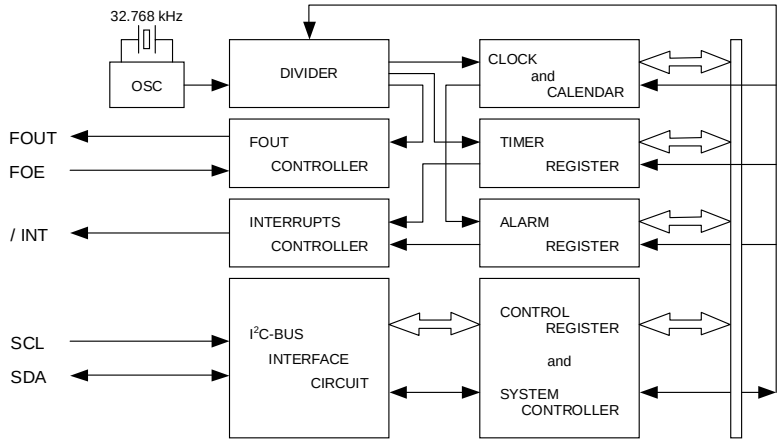
* The I²C-Bus is a trademark of NXP Semiconductors

Product Number (Please contact us)
RA-8581SA : Q41A88151xxxx00



Actual size

Block diagram



Overview

- **Interface Type**
  - I²C-Bus interface. (Hi-speed bus specifications 400 kHz)
  - * I²C-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

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	
/INT	Output	Interrupt output (N-ch open drain)
VDD	—	Connected to a positive power supply.
GND	—	Connected to a ground.

FOE pin input	FOUT pin output	
HIGH	Output	(C-MOS)
LOW	OFF	(LOW)

Terminal connection / External dimensions (Unit:mm)

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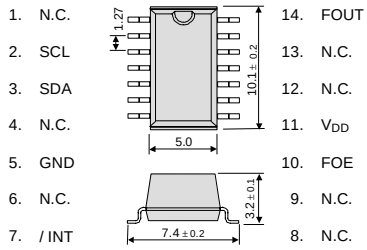

SOP – 14 pin

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

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	Δf / f	Ta = +25 °C VDD = 3.0 V	5 ± 23 *	× 10⁻⁶
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

■ Current consumption 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	
	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	

“QMEMS” EPSON TOYOCOM

In order to meet customer needs in a rapidly advancing digital, broadband and ubiquitous society, we are committed to offering products that are one step ahead of the market and a rank above the rest in quality. To achieve our goals, we follow a “3D (three device) strategy” designed to drive both horizontal and vertical growth. We will to grow our three device categories of “Timing Devices”, ”Sensing Devices” and “Optical Devices”, and expand vertical growth through a combination of products from these categories.
A Quartz MEMS is any high added value quartz device that exploits the characteristics of quartz crystal material but that is produced using MEMS (micro-electro-mechanical system) processing technology.
Market needs are advancing faster than previously imagined toward smaller, more stable crystal products, but we will stay ahead of the curve by rolling out products that exceed market speed and quality requirements. We want to further accelerate the 3D strategy by QMEMS.

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.

PROMOTION OF ENVIRONMENTAL MANAGEMENT SYSTEM CONFORMING TO INTERNATIONAL STANDARDS

At Epson Toyocom, all environmental initiatives operate under the Plan-Do-Check-Action(PDCA) cycle designed to achieve continuous improvements. The environmental management system (EMS) operates under the ISO 14001 environmental management standard.

ISO 14000 is an international standard for environmental management that was established by the International Standards Organization in 1996 against the background of growing concern regarding global warming, destruction of the ozone layer, and global deforestation.

All of our major manufacturing and non-manufacturing sites,in Japan and overseas, completed the acquisition of ISO 14001 certification.

WORKING FOR HIGH QUALITY

In order provide high quality and reliable products and services than meet customer needs,
Epson Toyocom made early efforts towards obtaining ISO9000 series certification and has acquired ISO9001 for all business establishments in Japan and abroad. We have also acquired ISO/TS 16949 certification that is requested strongly by major automotive manufacturers as standard.

ISO/TS 16949 is a global standard based on QS-9001, a severe standard corresponding to the requirements from the automobile industry.

►Explanation of the mark that are using it for the catalog

Pb Free	**►Pb free.**
RoHS Compliant	**►Complies with EU RoHS directive.** ***About the products without the Pb-free mark.** **Contains Pb in products exempted by EU RoHS directive.** **(Contains Pb in sealing glass, high melting temperature type solder or other.)**
For Automotive	**►The products have been designed for high reliability applications such as Automotive.**

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  / traffic control equipment / and others requiring equivalent reliability.
- In this new crystal master for Epson Toyocom, product codes and markings will remain as previously identified prior to the merger.
  Due to the on-going strategy of gradual unification of part numbers, please review product codes and markings, as they will change during the course of the coming months.

  We apologize for the inconvenience, but we will eventually have a unified part numbering system for Epson Toyocom that will be user friendly.