



## 4-bit REAL TIME CLOCK MODULE

## RTC-7301SF / DG

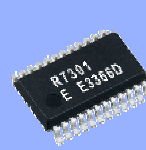
- Built-in crystal unit 32.768 kHz with frequency adjusted
- Frequency selectable clock output (32.768 kHz to 1/30 Hz)
- Built-in 30 second adjustment function, digital pace adjustment function (Max. adjustment:  $\pm 192 \times 10^{-6}$ )
- Built-in alarm and timer interrupt functions.
- Built-in semiconductor temperature sensor (Voltage output:  $-7.8 \text{ mV} / ^\circ\text{C}$ , RTC-7301SF)
- Operating voltage range: 2.4 V to 5.5 V, time keeping voltage range: 1.6 V to 5.5 V
- Low current consumption (0.6  $\mu\text{A}$  / 3 V Typ.)
- High speed parallel interface compatible with SRAM



Product Number (Please contact us)

RTC-7301SF : Q42730181000200

RTC-7301DG : Q42730111000200

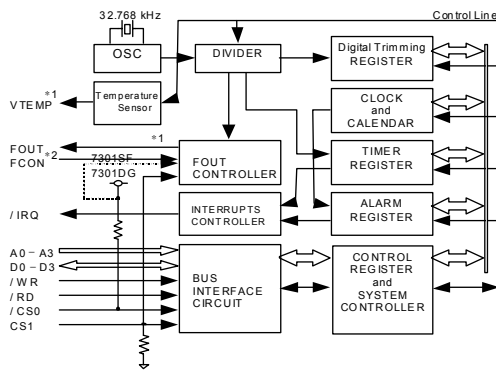


RTC-7301SF

RTC-7301DG



## Block diagram



This is a block diagram for RTC-7301SF.

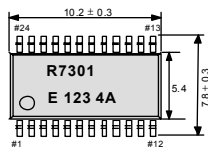
Be aware that RTC-7301DG differs according to the following 2 points.

- \*1) The VTEMP output is not connected to an external pin.
- \*2) The FCON input pin is not connected to an external pin, but is fixed at "H" internally.

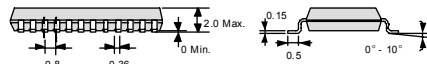
## External dimensions/Terminal connection

(Unit:mm)

## ● RTC-7301SF (SSOP 24-pin)

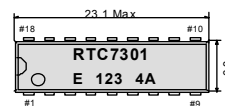


No.	Pin terminal	No.	Pin terminal
1	/CS0	24	VDD
2	FCON	23	(VDD)
3	FOUT	22	(VDD)
4	VTEMP	21	(VDD)
5	(VDD)	20	(VDD)
6	/IRO	19	(VDD)
7	A0	18	CS1
8	A1	17	D0
9	A2	16	D1
10	A3	15	D2
11	/RD	14	D3
12	GND	13	/WR

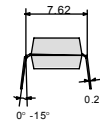
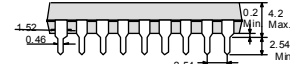


Metal may be exposed on the top or bottom of this product. This will not affect any quality, reliability or electrical spec.

## ● RTC-7301DG (DIP 18-pin)



No.	Pin terminal	No.	Pin terminal
1	/CS0	18	VDD
2	FOUT	17	(VDD)
3	/IRO	16	(VDD)
4	A0	15	CS1
5	A1	14	D0
6	A2	13	D1
7	A3	12	D2
8	/RD	11	D3
9	GND	10	/WR



## Specifications (characteristics)

\*Refer to application manual for details.

## ■ Absolute Max. rating

GND=0 V

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	VDD	VDD to GND	-0.3	+7.0	
Input voltage	VIN	Input terminal, Do to D3 pins	GND-0.3	VDD+0.3	V
Output voltage(1)	VOUT1	/IRQ pin		+8.0	
Output voltage(2)	VOUT2	FOUT, D0-D3, VTEMP pin		VDD+0.3	
Storage temperature	TSTG	Stored as bare product after unpacking	-55	+125	°C

## ■ Operating range

GND = 0 V

Item	Symbol	Condition	Min.	Max.	Unit
Power voltage	VDD	—	2.4	5.5	V
Clock voltage	VCLK	—	1.6	5.5	V
Operating temperature	TOFR	No condensation	-40	+85	°C

## ■ Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency precision	$\Delta f/f$	Ta=+25 °C, VDD=3.0 V	B: $5 \pm 23$ (±1)	$\times 10^{-6}$
Oscillation Start up time	tSTA	Ta=+25 °C, VDD=2.4 V	3.0 Max.	s
Frequency temperature characteristics	TOF	Ta=-10 °C to +70 °C VDD=3.0 V, +25 °C	+10 / -120	$\times 10^{-6}$
Frequency voltage characteristics	f/V	Ta=+25 °C, VDD=1.6 V to 5.5 V	$\pm 2.0$ Max.	$\times 10^{-6}/V$
Aging	fa	Ta=+25 °C, VDD=3.0 V First year	$\pm 5.0$ Max.	$\times 10^{-6}/\text{year}$

(\*1) Please ask tighter tolerance

## ■ DC characteristics

(GND=0 V, VDD=1.6 V to 5.5 V, Ta=-40 °C to +85 °C)

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Current consumption (When non-accessed) FOUT = Output OFF VTEMP = Output OFF	Idd1	/CS0, /RD, /WR = VDD A0-A3, CS1 = GND D0-D3, /IRQ = Hi-z FOUT = Hi-z(OFF) VTEMP = Hi-z(OFF)	VDD=5 V	1.0	2.0	$\mu\text{A}$
	Idd2		VDD=3 V	0.6	1.0	

Note) There is no VTEMP pin on the RTC-7301DG so standards for the VTEMP pin within the conditions described above do not apply.

## ■ Temperature sensor characteristics

GND=0 V, Ta=-40 °C to +85 °C

Item	Symbol	Condition	Min.	Typ.	Max.	Unit
Temperature output voltage	VTEMP	Ta=+25 °C, GND based output voltage VTEMP pins, VDD=2.7 V to 5.5 V		1.470		V
Output precision	TACR	Ta=+25 °C, VDD=2.7 V to 5.5 V			$\pm 5.0$	°C
Temperature sensitivity	VSE	-40 °C $\leq$ Ta $\leq$ +85 °C, VDD=2.7 V to 5.5 V	-7.3	-7.8	-8.3	mV/°C
Linearity	$\Delta\text{NL}$	-40 °C $\leq$ Ta $\leq$ +85 °C, VDD=2.7 V to 5.5 V			$\pm 2.0$	%
Temperature detection range	TSOP	$\Delta\text{NL} \leq \pm 2.0 \%$ , VDD=2.7 V to 5.5 V	-40		+85	°C
Output resistance	Ro	Ta=25 °C, VTEMP pins, VDD=2.7 V to 5.5 V GND standard and VDD standard		1.0	3.0	k $\Omega$
Load condition	CL	VDD=2.7 V to 5.5 V			100	pF
	RL	VDD=2.7 V to 5.5 V	500			k $\Omega$
Response time	tRSP	VDD=3.3 V CL=50 pF, RL=500 k $\Omega$ , Max. $\pm 1$ °C			200	$\mu\text{s}$

Note) There is no temperature sensor function on the RTC-7301DG.

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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.



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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.

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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.

## WORKING FOR HIGH QUALITY

In order to 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.

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ISO/TS 16949 is a global standard based on QS-9000, a severe standard corresponding to the requirements from the automobile industry.

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

	► Pb free.
	► 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.)
	► The products have been designed for high reliability applications such as Automotive.

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/ traffic control equipment / and others requiring equivalent reliability.
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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.

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