RoHS Compliant

# 4-bit REAL TIME CLOCK MODULE

RTC - 7301SF / DG

- Built-in crystal oscillator 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 mV / °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 µA / 3 V Typ.)
- High speed parallel interface compatible with SRAM

Actual size

RTC-7301SF	RTC-7301DG
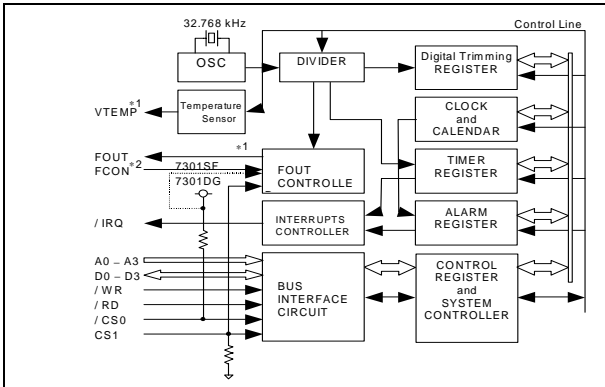
■ Block diagram

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	/IRQ	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

● RTC-7301DG (DIP 18-pin)

No.	Pin terminal	No.	Pin terminal
1	/CS0	18	VDD
2	FOUT	17	(VDD)
3	/IRQ	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

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.

■Absolute Max. rating   GND=0 V

Item	Symbol	Condition	Min.	Max.	Unit
Supply voltage	VDD	VDD to GND	-0.3	+7.0	V
Input voltage	VIN	Input terminal, D0 to D3 pins	GND-0.3	VDD+0.3	
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		
Operating temperature	TOPR	No condensation	-40	+85	°C

■Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency precision	Δf /f	Ta=+25 °C,VDD=3.0 V	B:5+23[*1]	$\times 10^{-6}$
Oscillation Start up time	tSTA	Ta=+25 °C,VDD=2.4 V	3.0 Max.	s
Frequency temperature characteristics	TOP	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	±2.0 Max.	$\times 10^{-6}$/V
Aging	fa	Ta=+25 °C, VDD=3.0 V First year	±5.0 Max.	$\times 10^{-6}$/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	µA
	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			±5.0	°C
Temperature sensitivity	VSE	-40 °C≤Ta≤+85 °C,VDD=2.7 V to 5.5 V	-7.3	-7.8	-8.3	mV/ °C
Linearity	ΔNL	-40 °C≤Ta≤+85 °C,VDD=2.7 V to 5.5 V			±2.0	%
Temperature detection range	TSOP	ΔNL≤ ±2.0 %,VDD=2.7 V to 5.5 V	-40		+85	°C
Output resistance	R0	Ta=25 °C,VTEMP pins ,VDD=2.7 V to 5.5 V GND standard and VDD standard		1.0	3.0	kΩ
Load condition	CL	VDD=2.7 V to 5.5 V			100	pF
	RL	VDD=2.7 V to 5.5 V	500			kΩ
Response time	tRSP	VDD=3.3 V CL=50 pF, RL=500 kΩ, Max. ±1 °C			200	µs

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

"3D STRATEGY" 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.

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.
All of our major manufacturing and non-manufacturing sites, in Japan and overseas, completed the acquisition of ISO 14001 certification.
In the future, new group companies will be expected to acquire the certification around the third year of operations.

> 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

Epson Toyocom quickly began working to acquire company-wide ISO 9000 series certification, and has acquired ISO 9001 or ISO 9002 certification for all targeted products manufactured in Japanese and overseas plants.
Epson Toyocom has acquired QS-9000 certification, which is of a higher level.
Also, TS 16949 certification, which is also of a higher level, has been acquired.

> QS-9000 is an enhanced standard for quality assurance systems formulated by leading U.S.automobile manufacturers based on the international ISO 9000 series.

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

Notice