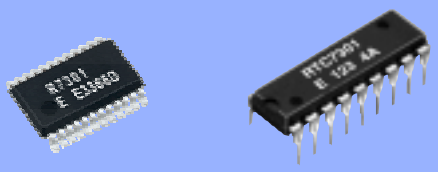
4-bit REAL TIME CLOCK MODULE

RTC-7301SF/DG

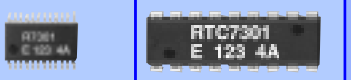
- Built-in crystal unit 32.768 kHz with frequency adjusted
- Frequency selectable clock output (32.768 kHz to 1/30 Hz)
- Built-in 30 second adjustment function, digital pace adjustment function (Max. adjustment: ±192 × 10^{-6})
- Built-in alarm and timer interrupt functions.
- Built-in semiconductor 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

RoHS Compliant

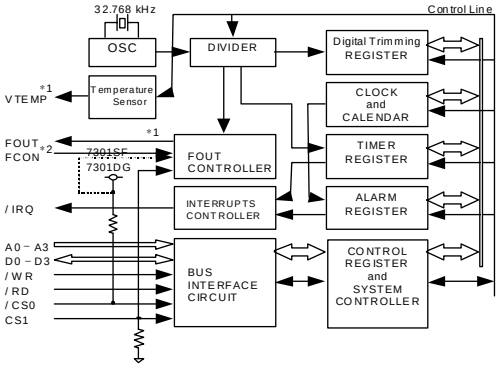
Product Number (Please contact us)
RTC-7301SF : Q42730181000200
RTC-7301DG : Q42730111000200



RTC-7301SF RTC-7301DG



Block diagram



This is a block diagram for RTC-7301SF.

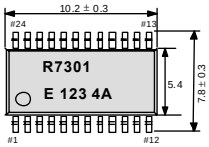
Be aware that RTC-7301DG differs according to the following 2 points.

*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.

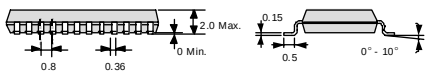
External dimensions/Terminal connection

(Unit:mm)

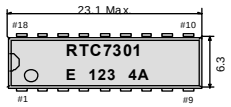
● RTC-7301SF (SSOP 24-pin)



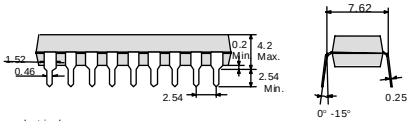
No.	Pin terminal	No.	Pin terminal
1	/CS0	24	V_{DD}
2	FCON	23	(V_{DD})
3	FOUT	22	(V_{DD})
4	VTEMP	21	(V_{DD})
5	(V_{DD})	20	(V_{DD})
6	/IRQ	19	(V_{DD})
7	A^0	18	CS^1
8	A^1	17	D^0
9	A^2	16	D^1
10	A^3	15	D^2
11	/RD	14	D^3
12	GND	13	/WR



● RTC-7301DG (DIP 18-pin)



No.	Pin terminal	No.	Pin terminal
1	/CS0	18	V_{DD}
2	FOUT	17	(V_{DD})
3	/IRQ	16	(V_{DD})
4	A^0	15	CS^1
5	A^1	14	D^0
6	A^2	13	D^1
7	A^3	12	D^2
8	/RD	11	D^3
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	V_{DD}	V_{DD} to GND	-0.3	+7.0	V
Input voltage	V_{IN}	Input terminal, D_0 to D_3 pins	GND-0.3	V_{DD}+0.3	
Output voltage(1)	V_{OUT1}	/IRQ pin		+8.0	
Output voltage(2)	V_{OUT2}	FOUT,D_0-D_3,VTEMP pin		V_{DD}+0.3	
Storage temperature	T_{STG}	Stored as bare product after unpacking	-55	+125	°C

■Operating range

GND = 0 V

Item	Symbol	Condition	Min.	Max.	Unit
Power voltage	V_{DD}	—	2.4	5.5	V
Clock voltage	V_{CLK}	—	1.6		
Operating temperature	T_{OPR}	No condensation	-40	+85	°C

■Frequency characteristics

Item	Symbol	Condition	Range	Unit
Frequency precision	Δf /f	Ta=+25 °C,V_{DD}=3.0 V	B:5±23 (*1)	×10^{-6}
Oscillation Start up time	t_{STA}	Ta=+25 °C,V_{DD}=2.4 V	3.0 Max.	s
Frequency temperature characteristics	T_{OP}	Ta=-10 °C to +70 °C V_{DD}=3.0 V ,+25 °C	+10 / -120	×10^{-6}
Frequency voltage characteristics	f/V	Ta=+25 °C, V_{DD}=1.6 V to 5.5 V	±2.0 Max.	×10^{-6}/V
Aging	fa	Ta=+25 °C, V_{DD}=3.0 V First year	±5.0 Max.	×10^{-6}/year

(*1) Please ask tighter tolerance

■DC characteristics

(GND=0 V,V_{DD}=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	I_{DD1}	/CS_0,/RD,/WR=V_{DD} A_0-A_3,CS_1=GND D_0-D_3,/IRQ=Hi-z FOUT=Hi-z(OFF) VTEMP=Hi-z(OFF)	V_{DD}=5 V	—	1.0	2.0	µA
	I_{DD2}		V_{DD}=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,V_{DD}=2.7 V to 5.5 V		1.470		V
Output precision	T_{ACR}	Ta=+25 °C,V_{DD}=2.7 V to 5.5 V			±5.0	°C
Temperature sensitivity	V_{SE}	-40 °C≤Ta≤+85 °C,V_{DD}=2.7 V to 5.5 V	-7.3	-7.8	-8.3	mV/ °C
Linearity	ΔNL	-40 °C≤Ta≤+85 °C,V_{DD}=2.7 V to 5.5 V			±2.0	%
Temperature detection range	T_{SOP}	ΔNL≤ ±2.0 %,V_{DD}=2.7 V to 5.5 V	-40		+85	°C
Output resistance	R_0	Ta=25 °C,VTEMP pins,V_{DD}=2.7 V to 5.5 V GND standard and V_{DD} standard		1.0	3.0	kΩ
Load condition	C_L	V_{DD}=2.7 V to 5.5 V			100	pF
	R_L	V_{DD}=2.7 V to 5.5 V	500			kΩ
Response time	t_{RSP}	V_{DD}=3.3 V C_L=50 pF, R_L=500 kΩ, Max. ±1 °C			200	µs

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

“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.

QMEMS

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.
In the future, new group companies will be expected to acquire the certification around the third year of operations.

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.

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.

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

Pb Free	**►Pb free.** **►Complies with EU RoHS directive.**
RoHS Compliant	**►Pb free terminal designed. Contains Pb in products exempted by RoHS directive.** **(Contains Pb in sealing glass, high melting temperature type solder or other.)** **►Complies with EU RoHS directive.**
For Automotive	**►The products have been designed for high reliability applications such as Automotive.**

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  / Medical instruments to sustain life / Submarine transmitters / Power stations and related / Fire work equipment and security equipment
  / 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.