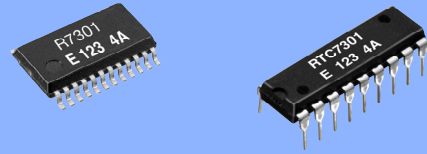


4-bit REAL TIME CLOCK MODULE

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 μ A / 3 V Typ.)
- High speed parallel interface compatible with SRAM
- Lead(Pb)-free : Contains high melting temperature type solder (Pb85 %) exempted by RoHS directive.



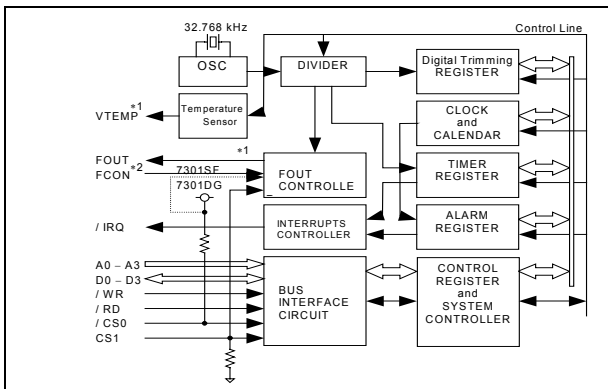
Actual size

RTC-7301SF

RTC-7301DG



Block diagram



This is a block diagram for RTC-7301SF.

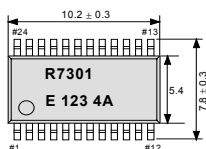
Be aware that RTC-7301DG differs according to the following 2 points.

- *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

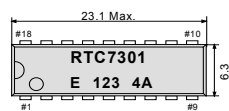
(Unit:mm)

● RTC-7301SF (SSOP 24-pin)

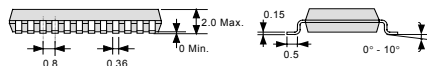


| No. | Pin terminal | No. | Pin terminal |
|-----|--------------|-----|--------------|
| 1 | /CS0 | 24 | VDD |
| 2 | FCON | 23 | (VDD) |
| 3 | FOUT | 22 | (VDD) |
| 4 | VTEMP | 21 | (VDD) |
| 5 | (VDD) | 20 | (VDD) |
| 6 | /IRQ | 19 | (VDD) |
| 7 | A0 | 18 | CS1 |
| 8 | A1 | 17 | D0 |
| 9 | A2 | 16 | 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 | |
| Input voltage | VIN | Input terminal, D0 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 |

■ 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 | μ A |
| | | 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.

■ Operating range

GND = 0 V

| Item | Symbol | Condition | Min. | Max. | Unit |
|-----------------------|--------|-----------------|------|------|------|
| Power voltage | VDD | — | 2.4 | 5.5 | V |
| Clock voltage | VCLK | — | 1.6 | — | V |
| Operating temperature | TOPR | 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±23 (⁶¹) | $\times 10^{-6}$ |
| 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

■ 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 | $\Delta NL \leq \pm 2.0 \%$, 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 | k Ω |
| Load condition | CL | VDD=2.7 V to 5.5 V | | | 100 | pF |
| | RL | VDD=2.7 V to 5.5 V | | 500 | | k Ω |
| Response time | trSP | VDD=3.3 V CL=50 pF, RL=500 k Ω , Max. ±1 °C | | | 200 | μ s |

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