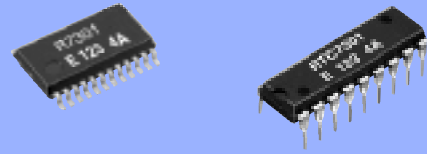


4-bit REAL TIME CLOCK MODULE

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



Actual size

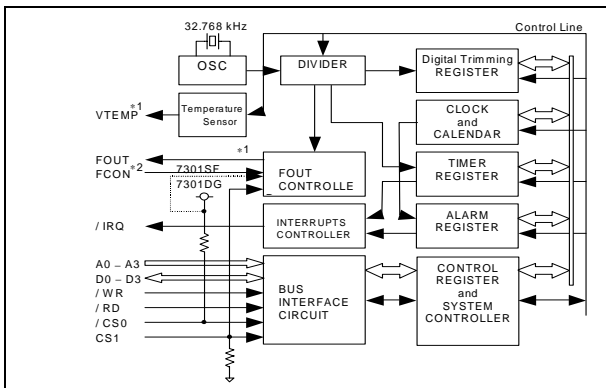
RTC-7301SF



RTC-7301DG



Block diagram



This is a block diagram for RTC-7301SF.

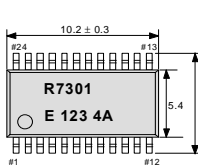
Be aware that RTC-7301DG differs according to the following 2 points.

- *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

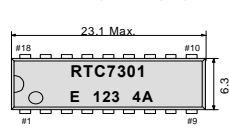
(Unit:mm)

● RTC-7301SF (SSOP 24-pin)

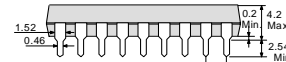
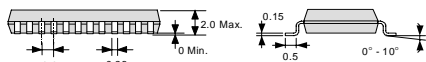


| No. | Pin terminal | No. | Pin terminal |
|-----|--------------|-----|--------------|
| 1 | /CS0 | 24 | VDD |
| 2 | FCON | 23 | (VDD) |
| 3 | FOUT | 22 | (VDD) |
| 4 | VTEMP | 21 | (VDD) |
| 5 | (VDD) | 20 | (VDD) |
| 6 | /IRQ | 19 | (VDD) |
| 7 | A3 | 18 | CS1 |
| 8 | A1 | 17 | D0 |
| 9 | A2 | 16 | 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 | V _{DD} | V _{DD} to GND | -0.3 | +7.0 | |
| Input voltage | V _{IN} | Input terminal, Do to D3 pins | GND-0.3 | V _{DD} +0.3 | V |
| Output voltage(1) | V _{OUT1} | /IRQ pin | | +8.0 | |
| Output voltage(2) | V _{OUT2} | FOUT, D0-D3, VTEMP pin | | V _{DD} +0.3 | |
| Storage temperature | T _{STG} | 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 | I _{DD1} | /CS0, /RD, /WR = VDD A0-A3, CS1 = GND D0-D3, /IRQ = Hi-Z FOUT = Hi-Z (OFF) VTEMP = Hi-Z (OFF) | | 1.0 | 2.0 | μ A |
| | I _{DD2} | 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 | 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 | $\Delta f / f$ | Ta = +25 °C, VDD = 3.0 V | B: $5 \pm 23^{(*)1}$ | $\times 10^{-6}$ |
| Oscillation Start up time | t _{STA} | Ta = +25 °C, VDD = 2.4 V | 3.0 Max. | s |
| Frequency temperature characteristics | T _{OP} | 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 | V _{TEMP} | Ta = +25 °C, GND based output voltage VTEMP pins, VDD = 2.7 V to 5.5 V | | 1.470 | | V |
| Output precision | T _{ACR} | Ta = +25 °C, VDD = 2.7 V to 5.5 V | | | ± 5.0 | °C |
| Temperature sensitivity | V _{SE} | -40 °C \leq Ta \leq +85 °C, VDD = 2.7 V to 5.5 V | -7.3 | -7.8 | -8.3 | mV / °C |
| Linearity | ΔNL | -40 °C \leq Ta \leq +85 °C, VDD = 2.7 V to 5.5 V | | | ± 2.0 | % |
| Temperature detection range | T _{SOP} | $\Delta NL \leq \pm 2.0\%$, VDD = 2.7 V to 5.5 V | -40 | | +85 | °C |
| Output resistance | R _O | 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 | t _{RSP} | 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.

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