RV-2123-C2
Real-Time Clock Module with SPI-Bus

DIMENSIONS

Package:

Recommended Solder Pad:

All dimensions in mm typical

APPLICATIONS

IoT
Metering
Industrial
Portables
Automotive
Health Care

DESCRIPTION

The RV-2123-C2 is a SMT Real-Time Clock Module that incorporates an integrated CMOS circuit together with an XTAL. It operates under vacuum in a hermetically sealed ceramic package with glass lid.

FEATURES

- Low power consumption: 130 nA @ 3 V.
- Wide operating voltage range: 1.1 V to 5.5 V.
- Time accuracy: ±20 ppm @ 25°C.
- Operating temperature range: -40 to +85°C.
- User programmable offset value.
- Oscillator stop detection.
- Provides year, month, weekday, date, hours, minutes and seconds.
- Automatic leap year calculation: 2000 to 2099.
- Timer and Alarm functions.
- Clock output frequencies: 32.768 kHz to 1 Hz.
- SPI-bus interface: 4-wire, 8 MHz.
- 100% Pb-free, RoHS-compliant.
- Automotive qualification according to AEC-Q200 available.

BLOCK DIAGRAM

OSCIILATOR

32.768kHz

INTERRUPT

POWER-ON

RESET

BUS TIMEOUT

SPI- 4wire

INTERFACE

OFFSET FUNCTION

00

OFFSET

TIMER FUNCTION

0E

Timer / CLKOUT Control

0F

Countdown Timer

CONTROL

00

Control 1

01

Control / Status 2

TIME

02

OS / Seconds

03

Minutes

04

Hours

05

Date

06

Weekday

07

Month

08

Year

ALARM FUNCTION

09

Minutes Alarm

0A

Hours Alarm

0B

Date Alarm

0C

Weekday Alarm
**ELECTRICAL CHARACTERISTICS AT 25°C**

More detailed information can be found in the Application Manual.

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Condition</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>$V_{DD}$</td>
<td>SPI-bus active</td>
<td>1.6</td>
<td>5.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$V_{DD}$</td>
<td>Time keeping</td>
<td>1.1</td>
<td>5.5</td>
<td>V</td>
<td></td>
</tr>
<tr>
<td>$I_{DDO}$</td>
<td>SPI-bus inactive, $V_{DD} = 3$ V</td>
<td>130</td>
<td>180</td>
<td>nA</td>
<td></td>
</tr>
<tr>
<td>F$_{CLKOUT}$</td>
<td>Programmable</td>
<td>32768 to 1</td>
<td>Hz</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta F/F$</td>
<td>@ 25°C</td>
<td>±10 / ±20</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\Delta F/F$</td>
<td>@ 25°C</td>
<td>±3</td>
<td>ppm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1) Tighter frequency tolerances on request.

**ENVIRONMENTAL CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Conditions</th>
<th>Max. Dev.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage temp. range</td>
<td>–55 to +125°C</td>
</tr>
<tr>
<td>TA Operating temperature range</td>
<td>–40 to +85°C</td>
</tr>
<tr>
<td>Shock resistance</td>
<td>$\Delta F/F$ 5000 g, 0.3 ms, $\frac{1}{2}$ sine ±5 ppm</td>
</tr>
<tr>
<td>Vibration resistance</td>
<td>$\Delta F/F$ 20 g / 10–2000 Hz ±5 ppm</td>
</tr>
</tbody>
</table>

**TERMINATIONS AND PROCESSING**

<table>
<thead>
<tr>
<th>Package</th>
<th>Termination</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>SON-10</td>
<td>Au flashed pads</td>
<td>IPC/JEDEC J-STD-020C</td>
</tr>
</tbody>
</table>

**FREQUENCY TEMPERATURE CHARACTERISTICS**

- $T_0 = 25°C ±5°C$
- $-0.035(T-T_0)^2$ ppm ±10% for $T = 20°C$
- Tuning Fork Crystal

**PIN CONNECTIONS TOP VIEW**

<table>
<thead>
<tr>
<th>Pin</th>
<th>Connection</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>$V_{DD}$ Power Supply Voltage</td>
</tr>
<tr>
<td>2</td>
<td>CLKOUT Clock Output</td>
</tr>
<tr>
<td>3</td>
<td>SCL Serial Clock Input</td>
</tr>
<tr>
<td>4</td>
<td>SCI Serial Data Input</td>
</tr>
<tr>
<td>5</td>
<td>SDO Serial Data Output</td>
</tr>
<tr>
<td>6</td>
<td>$V_{SS}$ Ground</td>
</tr>
<tr>
<td>7</td>
<td>CE Chip Enable</td>
</tr>
<tr>
<td>8</td>
<td>INT Interrupt Output</td>
</tr>
<tr>
<td>9</td>
<td>NC Not connected</td>
</tr>
<tr>
<td>10</td>
<td>CLKOE Clock Output Enable</td>
</tr>
</tbody>
</table>

**ORDERING INFORMATION**

- **RTC module**
- **Product type**: RV - 2123 - C2
- **Qualification**: QC = Commercial Grade (Standard) QA = Automotive Grade AEC-Q200
- **Temperature range**: TA = –40 to +85°C (Standard)

A unique part number will be generated for each product specification, i.e:

- 20xxxx-MG01: 1'000 pcs (in 12 mm tape on 7" reel)
- 20xxxx-PG05: 5'000 pcs (in 12 mm tape on 13" reel)

All specifications subject to change without notice.

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