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April 1st, 2010
Renesas Electronics Corporation

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Introduction
The RTC clock output function is used to output a clock pulse from the RTC divided clock output pin (TMOW).

Target Device
H8/38076R

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1. Specifications

The RTC clock output function is used to output a clock pulse from the RTC divided clock output pin (TMOW), as shown in figure 1.

![TMOW pin output example](image)

**Figure 1** Example of RTC Clock Output
2. Functions Used

2.1 Functions

In this sample task, the RTC clock output function is used to output a clock pulse from TMOW. A block diagram of the RTC is shown in figure 2. The block diagram of RCT clock output is explained below.

- System clock (\(\phi\))
  The reference clock for operating the CPU and peripheral function modules (in this sample task, 10 MHz)
- Prescaler S (PSS)
  A 13-bit counter with \(\phi\) as input, incremented every cycle
- Clock source select register (RTCCSR)
  RTCCSR selects the clock source. Clocks obtained by dividing the system clock by 32, 16, 8, and 4 are output in the active mode and sleep mode.
- Port mode register 3 (PMR3)
  Controls switching of port 3 functions.

![Figure 2 Block Diagram of RTC Clock Output](Image)

2.2 Assignment of Functions

Table 1 shows the assignment of functions in this sample task. RTC clock output is performed using functions assigned as shown in table 1.

<table>
<thead>
<tr>
<th>Elements</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>RTCCSR</td>
<td>Selects (\phi/4) as clock to be output from TMOW pin.</td>
</tr>
<tr>
<td>PMR3</td>
<td>Sets P30/SCK32/TMOW pin to TMOW pin function.</td>
</tr>
</tbody>
</table>
3. Principles of Operation

The principles of operation of this sample task are illustrated below. By means of the hardware and software processing shown in figure 3, a clock pulse is output from TMOW using the RTC clock output function.

<table>
<thead>
<tr>
<th>Software Processing</th>
<th>Hardware Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Set ( \phi/4 ) as clock to be output</td>
<td></td>
</tr>
<tr>
<td>(2) Set TMOW to 1</td>
<td></td>
</tr>
<tr>
<td>(1) Set TMOW to 1, then output set clock from TMOW pin</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 3  Principles of Operation**
4. **Description of Software**

4.1 **Modules**

Table 2 shows the modules used in this sample task.

<table>
<thead>
<tr>
<th>Function Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>main</td>
<td>Sets φ/4 as clock to be output from TMOW pin, sets TMOW pin function, and outputs RTC clock.</td>
</tr>
</tbody>
</table>

4.2 **Arguments**

No arguments are used in this sample task.

4.3 **Internal Registers Used**

The internal registers used in this sample task are shown below.

- **RTCCSR** Clock source select register
  
<table>
<thead>
<tr>
<th>Bit</th>
<th>Bit Name</th>
<th>Set Value</th>
<th>R/W</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>RCS6</td>
<td>0</td>
<td>R/W</td>
<td>Clock output select</td>
</tr>
<tr>
<td>5</td>
<td>RCS5</td>
<td>0</td>
<td>R/W</td>
<td>Selects clock to be output from TMOW pin when the TMOW bit of PMR3 is set to 1.</td>
</tr>
<tr>
<td>4</td>
<td>SUB32K</td>
<td>0</td>
<td>R/W</td>
<td></td>
</tr>
</tbody>
</table>

  000: φ/4
  010: φ/8
  100: φ/16
  110: φ/32
  xx1: φW

  Note: x: Don't care

- **PMR3** Port mode register 3
  
<table>
<thead>
<tr>
<th>Bit</th>
<th>Bit Name</th>
<th>Set Value</th>
<th>R/W</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>TMOW</td>
<td>1</td>
<td>R/W</td>
<td>P30/SCK32/TMOW pin function switching</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Sets whether P30/SCK32/TMOW pin is to be used as P30/SCK32 pin or as TMOW pin.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0: Functions as P30/SCK32 I/O pin</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1: Functions as TMOW output pin</td>
</tr>
</tbody>
</table>

4.4 **RAM Usage**

No RAM is used in this sample task.
5. Flowcharts

5.1 main

- **main**

```
main

SP = H'FF80 ----------- Initialize stack pointer

set_ccr(H'80) ----------- CCR I-bit = 1 (interrupts disabled)

RTCCSR = H'08 ----------- Set of φ/4 as the clockoutput from TMOW pin

TMOW = 1 ----------- Set P30/SCK32/TMOW pin as TMOW output pin
```

- **Link Address Specifications**

<table>
<thead>
<tr>
<th>Section Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>CV1</td>
<td>H'0000</td>
</tr>
<tr>
<td>P</td>
<td>H'0100</td>
</tr>
</tbody>
</table>
## Revision Record

<table>
<thead>
<tr>
<th>Rev.</th>
<th>Date</th>
<th>Page</th>
<th>Summary</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.00</td>
<td>Sep.16.04</td>
<td>----</td>
<td>First edition issued</td>
</tr>
</tbody>
</table>
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