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R32C/100 Series

Timer A Operation in One-shot Timer Mode

1. Abstract

In one-shot timer mode, a timer operates once for each trigger. When a trigger is generated, output from the TAiOUT pin (i = 0 to 4) becomes high, and the timer starts decrementing. When the counter value reaches 0000h, output from the TAiOUT pin becomes low, and the timer stops decrementing. At the same time, an interrupt request is generated.

2. Introduction

The application described in this document applies to the following MCU:

- MCU: R32C/118 Group

This program can be used with other R32C/100 Series MCUs which have the same special function registers (SFRs) as the R32C/118 Group. Check the manual for any additions or modifications to functions. Careful evaluation is recommended before using this application note.

3. Application Example

This section describes how to use count source f8, and at an arbitrary timing (set the TAiOS bit (i = 0 to 4) to 1), output a high level signal from the TAiOUT pin for 1 ms.

3.1 Explanation

(1) After setting the TAiS bit in the TABSR register to 1 (count started), when setting the TAiOS bit in the ONSF register to 1 (timer started), the counter decrements the count source. At the same time, output from the TAiOUT pin becomes high.

(2) When the counter value reaches 0000h, output from the TAiOUT pin becomes low, the counter reloads the value from the reload register, and the count stops. At the same time, the IR bit in the TAiIC register becomes 1 (interrupt requested).

(3) When setting the TAiOS bit to 1 mid-count, the value from the reload register is reloaded during the next count source input, and the count continues.

(4) When setting the TAiS bit to 0 (count stopped), the counter stops the count, the value from the reload register is reloaded, and output from the TAiOUT pin becomes low. At the same time, the IR bit becomes 1 (interrupt requested).

The diagram below shows operation in one-shot timer mode.

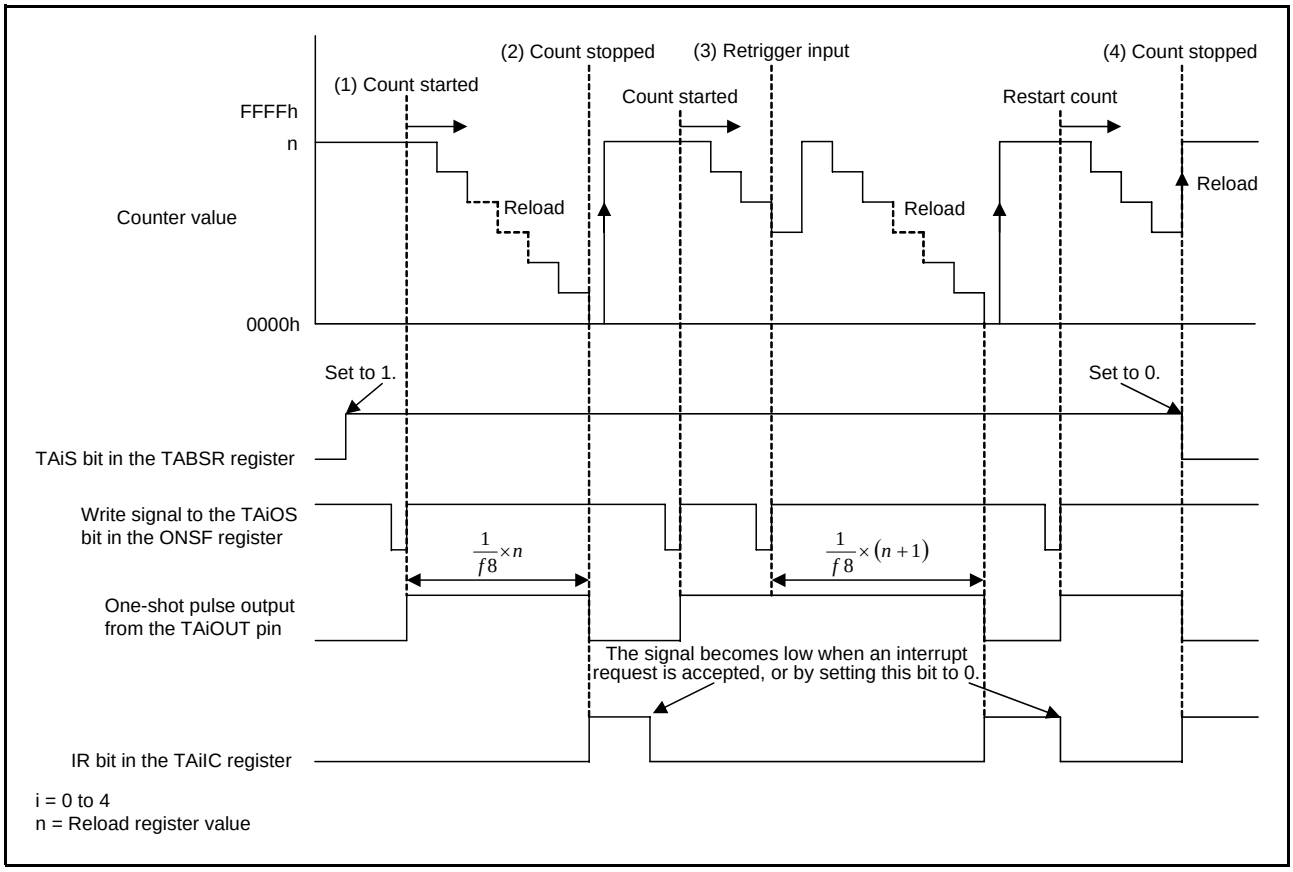
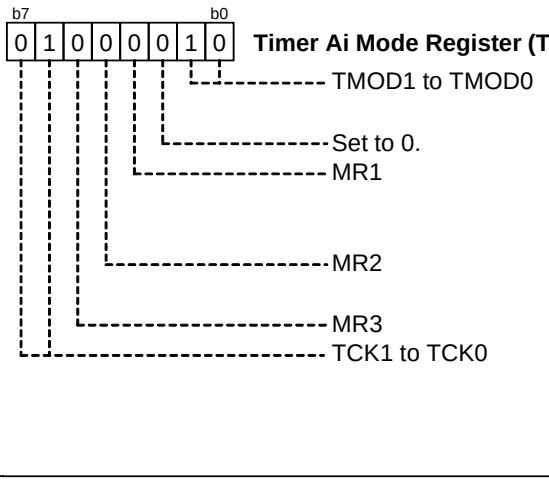


Figure 3.1 Operation in One-shot Timer Mode

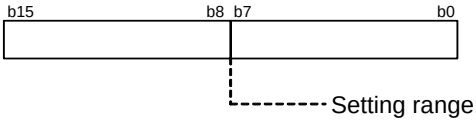
3.2 Setting

This section shows the procedures and values to set the example in section **3.1 "Explanation"**. Refer to individual MCU hardware manuals for details on individual registers.

(1) Set the timer Ai mode register (i = 0 to 4).

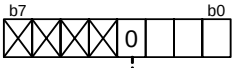


(2) Set the timer Ai register.



When setting this register to 0000h, the counter does not start, and a TAi interrupt request is not generated.

(3) Clear the interrupt request flag.



IR — Interrupt Request Flag
0: No interrupt requested

When rewriting bits TMOD1 to TMOD0 in the TAiMR register to 10b (one-shot timer mode), the IR bit may become 1 (interrupt requested). Set bits TMOD1 to TMOD0 before clearing the IR bit.

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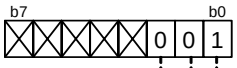
(4) Set TAiOUT output (i = 0 to 4). The timer A output pins are assigned to P3_0 (TA0OUT), P3_2 (TA1OUT), P3_4 (TA2OUT), P3_1 (TA3OUT), and P3_6 (TA4OUT). When outputting a timer, set the output function select bits in the function select register to 001b (timer output), and the direction bits in the direction register to 1 (output port).



Port P3_j Function Select Register (P3_jS) (j = 0, 1, 2, 4, 6)

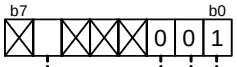
PSEL2 to PSEL0	Port P3_j Output Function Select Bit 001b: Timer output

Port P3 Direction Register (PD3)

PD3_0	Port P3_0 Direction Bit 1: Output port
PD3_1	Port P3_1 Direction Bit 1: Output port
PD3_2	Port P3_2 Direction Bit 1: Output port
PD3_4	Port P3_4 Direction Bit 1: Output port
PD3_6	Port P3_6 Direction Bit 1: Output port

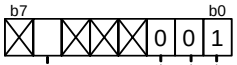
When Using P7 and P8 for TAiOUT Output

Timer A output pins can also be assigned to P7_0 (TA0OUT), P7_2 (TA1OUT), P7_4 (TA2OUT), P7_6 (TA3OUT), and P8_0 (TA4OUT). When outputting a timer, set the output function select bit in the function select register to 001b (timer output), and the direction bits in the direction register to 1 (output port).



Port P7_k Function Select Register (P7_kS) (k = 0, 2, 4, 6)

PSEL2 to PSEL0	Port P7_k Output Function Select Bit 001b: Timer output
NOD	N-channel Open-drain Output Select Bit 0: Push-pull output 1: N-channel open-drain output

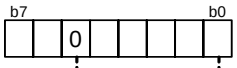


Port P8_0 Function Select Register (P8_0S)

PSEL2 to PSEL0	Port P8_0 Output Function Select Bit 001b: Timer output
NOD	N-channel Open-drain Output Select Bit 0: Push-pull output 1: N-channel open-drain output

Port P7 Direction Register (PD7)

PD7_0	Port P7_0 Direction Bit 1: Output port
PD7_2	Port P7_2 Direction Bit 1: Output port
PD7_4	Port P7_4 Direction Bit 1: Output port
PD7_6	Port P7_6 Direction Bit 1: Output port



Port P8 Direction Register (PD8)

PD8_0	Port P8_0 Direction Bit 1: Output port
Set to 0.	

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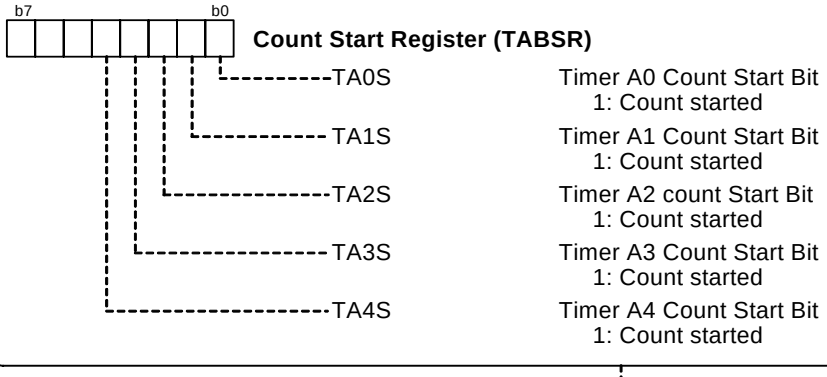
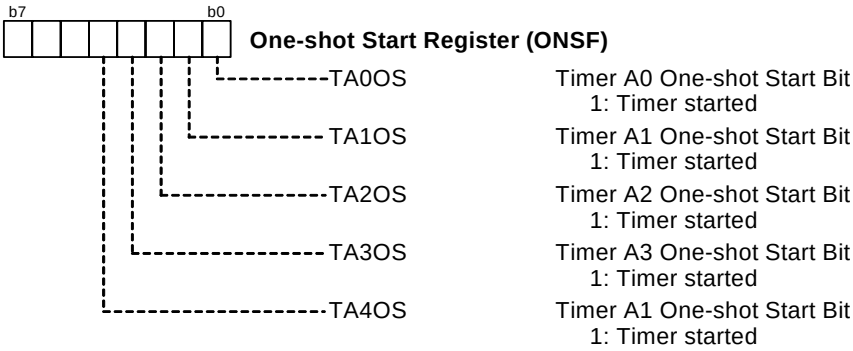
(5) Set the count start register.



(6) Set the one-shot start register.



4. Sample Program

A sample program can be downloaded from the Renesas Technology website.

5. Reference Documents

Hardware Manual
R32C/118 Group Hardware Manual Rev. 1.00
The latest version can be downloaded from the Renesas Technology website.

Technical Update/Technical News
The latest information can be downloaded from the Renesas Technology website.

C Compiler Manual
R32C/100 Series C Compiler Package Ver. 1.02 Compiler User's Manual Rev. 1.00
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REVISION HISTORY	Timer A Operation in One-shot Timer Mode

Rev.	Date	Description	
		Page	Summary
1.00	Mar. 5, 2010	—	Initial release

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