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April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

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M32C/84, 85, 86, 87, 88 Group

Timer A Operation in Event Counter Mode (Reload Type)

1. Abstract

The timer counts an external signal (input from the TAIIN pin) or other timer's overflow/underflow. When the reload type is selected for timer count operation, the counter reloads a reload register value if an underflow or overflow occurs.

2. Introduction

The application example described in this document is applied to the following MCUs and parameter(s):

MCUs: M32C/84 Group
M32C/85 Group
M32C/86 Group
M32C/87 Group
M32C/88 Group

This program can be used with other M16C Family MCUs which have the same special function registers (SFRs) as the above MCUs. Check the manual for any additions and modifications to functions. Careful evaluation is recommended before using this application note.

3. Application Example

This section describes how to count the falling edges of the TAIiN pin and generate an interrupt request every 1,000 counts.

3.1 Example Description

- (1) Setting the TAIiS bit in the TABSR register to 1 (count started) causes the counter to count the falling edges of the count source.
- (2) If an underflow occurs, the counter reloads the content of the reload register and continues counting. At the same time, the IR bit in the TAIiC register is set to 1 (interrupt requested).
- (3) If increment and/or decrement are switched during count operation, the switch takes effect from the next effective edge of the count source.
- (4) Setting the TAIiS bit to 0 (count stopped) causes the counter to hold its count value and to stop.
- (5) If an overflow occurs, the counter reloads the content of the reload register and continues counting. At the same time, the IR bit is set to 1 (interrupt requested).

Figure 1 shows the Timer Mode Operation When Reload Type Selected.

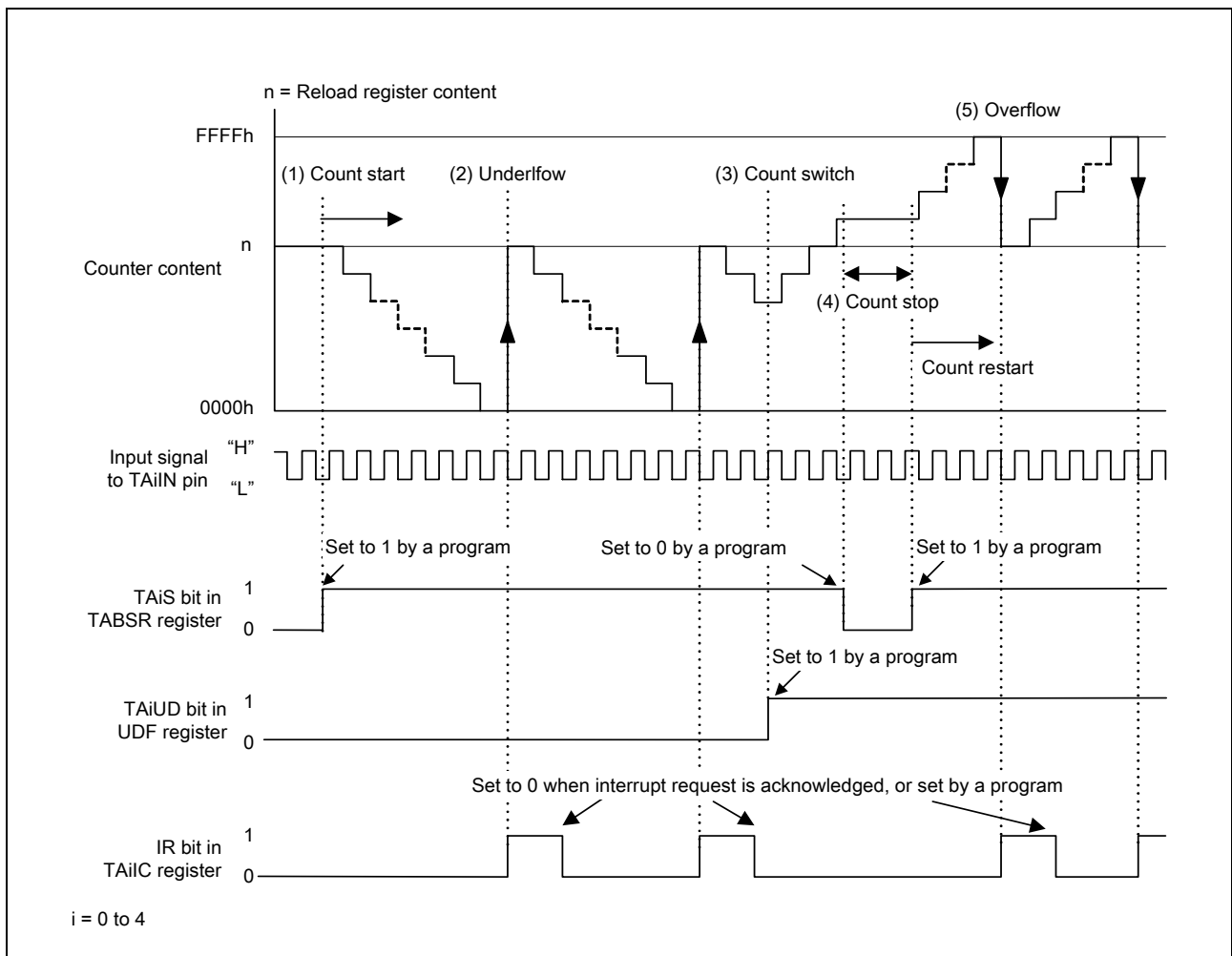


Figure 1 Timer Mode Operation When Reload Type Selected

3.2 Setup

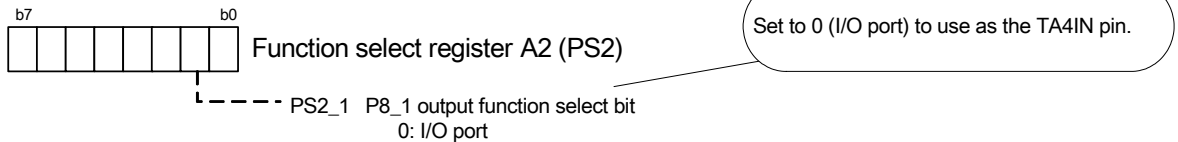
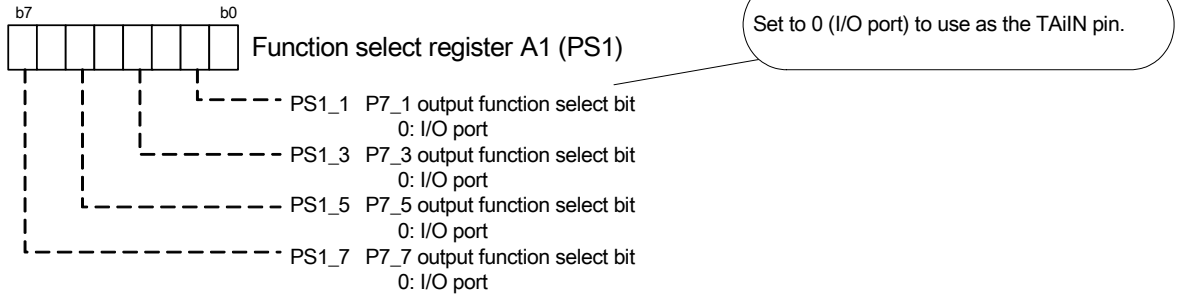
This section shows the setting steps and values to perform the application example described in

3.1. Example Description.

Refer to the each MCUs Hardware Manual for details of individual registers.

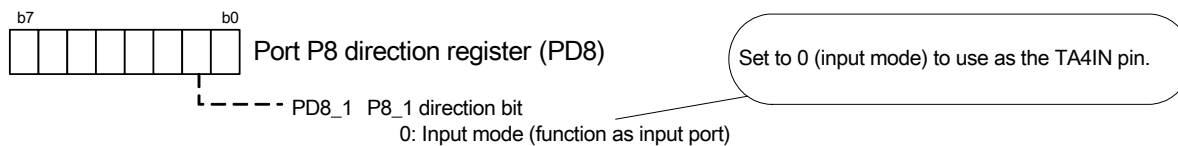
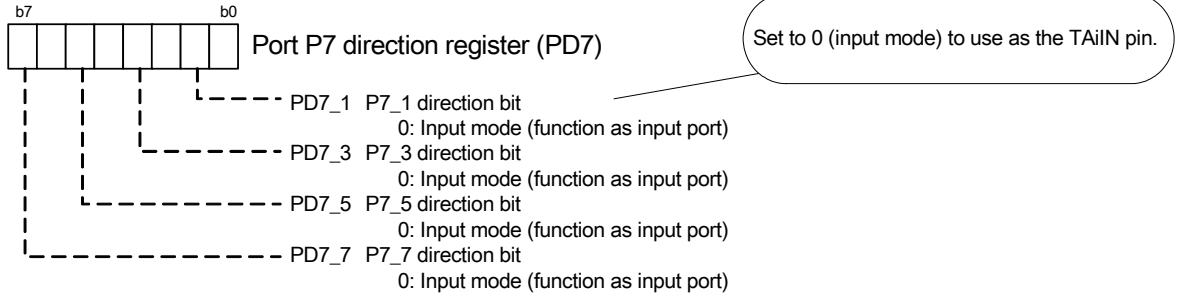
(1) Set the function select registers

The TAIIN pins are assigned to P7_1 (TA0IN), P7_3 (TA1IN), P7_5 (TA2IN), P7_7 (TA3IN), and P8_1 (TA4IN).
 Select I/O ports using the function select registers.

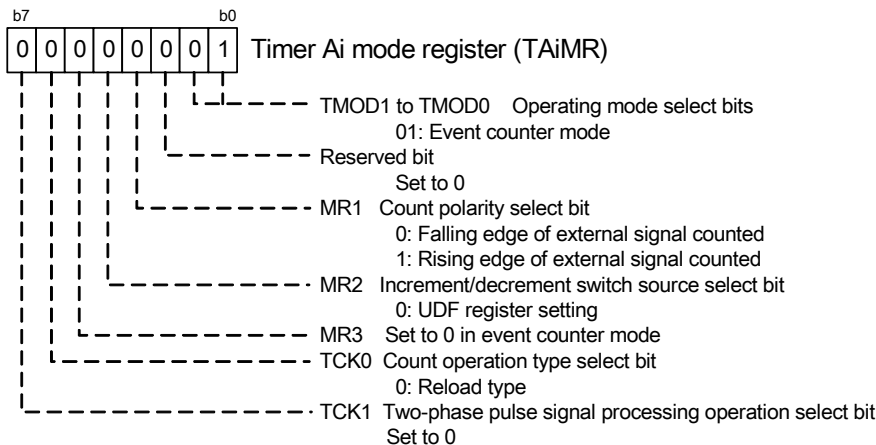


(2) Set the port P7 register and the port P8 direction register

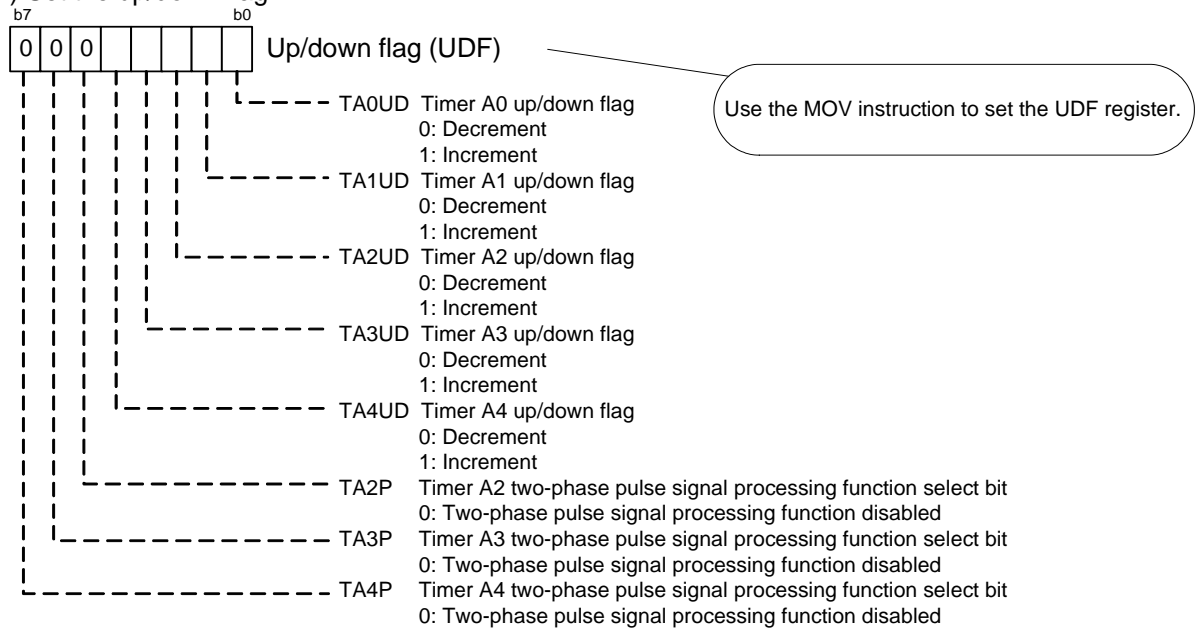
Set the pin to use as the TAIIN pin to an input port.



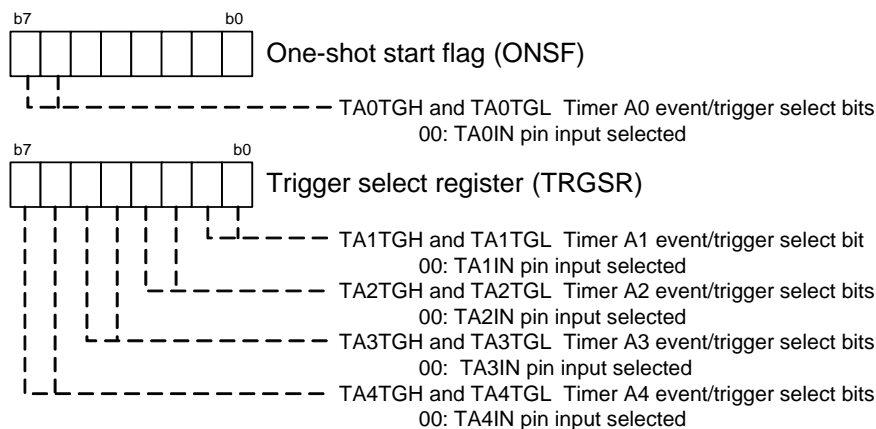
(3) Set the timer Ai mode register (i = 0 to 4)



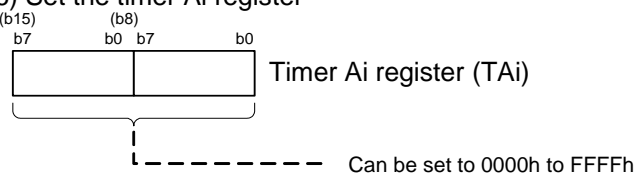
(4) Set the up/down flag



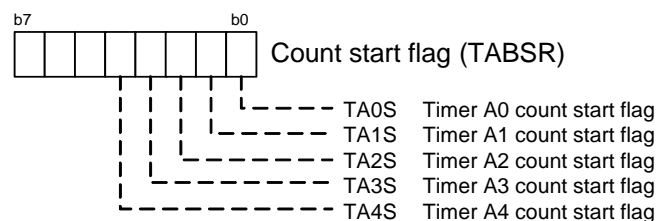
(5) Set the one-shot start flag and the trigger select register



(6) Set the timer Ai register



(7) Set the count start flag



4. Sample Programming Code

A sample program can be downloaded from the Renesas Technology website.
For download, click “Application Notes” in the left-hand side menu of the M16C Family page.

5. Reference Documents

Hardware Manuals

M32C/84 Group Hardware Manual

M32C/85 Group Hardware Manual

M32C/86 Group Hardware Manual

M32C/87 Group Hardware Manual

M32C/88 Group Hardware Manual

The latest version can be downloaded from the Renesas Technology website.

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REVISION HISTORY	M32C/84, 85, 86, 87, 88 Group Timer A Operation in Event Counter Mode (Reload Type)
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Rev.	Date	Description	
		Page	Summary
1.00	Sep.10, 2006	-	First Edition issued

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