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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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## R32C/100 Series

### Delayed One-shot Output

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#### 1. Abstract

While timers A0 and A1 are connected, after inputting an external trigger and a specified time has elapsed, a pulse is output only once. The peripheral functions described in this document are as follows:

- Timer A0 (one-shot timer mode)
- Timer A1 (one-shot timer mode)

#### 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

#### 3.1 Specifications

- (1) Set timer A0 to one-shot timer mode where an external input (rising edge) is used as a trigger. Set timer A1 to one-shot timer mode where timer A0 underflow is used as a trigger. Select TA1OUT output as the output function of P7\_2.
- (2) Set 1 ms between inputting an external trigger to timer A0 and outputting a pulse. Set the timer output high level width for timer A1 to 50  $\mu$ s.
- (3) Connect a 16 MHz oscillator to XIN. **Table 3.1** lists the setting frequencies for each clock in the sample program.

The sample program's setting frequencies for individual clocks are shown in the following table.

**Table 3.1 Individual Clock Setting Frequencies**

Clock	Frequency
Main clock (XIN)	16 MHz
PLL clock	100 MHz
Base clock	50 MHz
CPU clock	50 MHz
Peripheral bus clock	25 MHz
Peripheral function clock source	25 MHz

#### 3.2 Operation

- (1) The count for timers A0 and A1 is enabled by setting bits TA0S and TA1S in the TABSR register to 1 (count started).
- (2) When a falling edge is input to the TA0IN pin, the timer A0 counter decrements count source f1.
- (3) When the timer A0 counter value becomes 0000h, the value from the reload register is reloaded, and the count is stopped. At this time, the IR bit in the TA0IC register becomes 1 (interrupt requested).
- (4) When the timer A0 counter value becomes 0000h, the timer A1 counter starts counting. At the same time, TA1OUT pin output becomes high.
- (5) When the timer A1 counter value becomes 0000h, TA1OUT pin output becomes low, the counter reloads the value from the reload register, and the count stops. At the same time, the IR bit in the TA1IC register becomes 1 (interrupt requested).

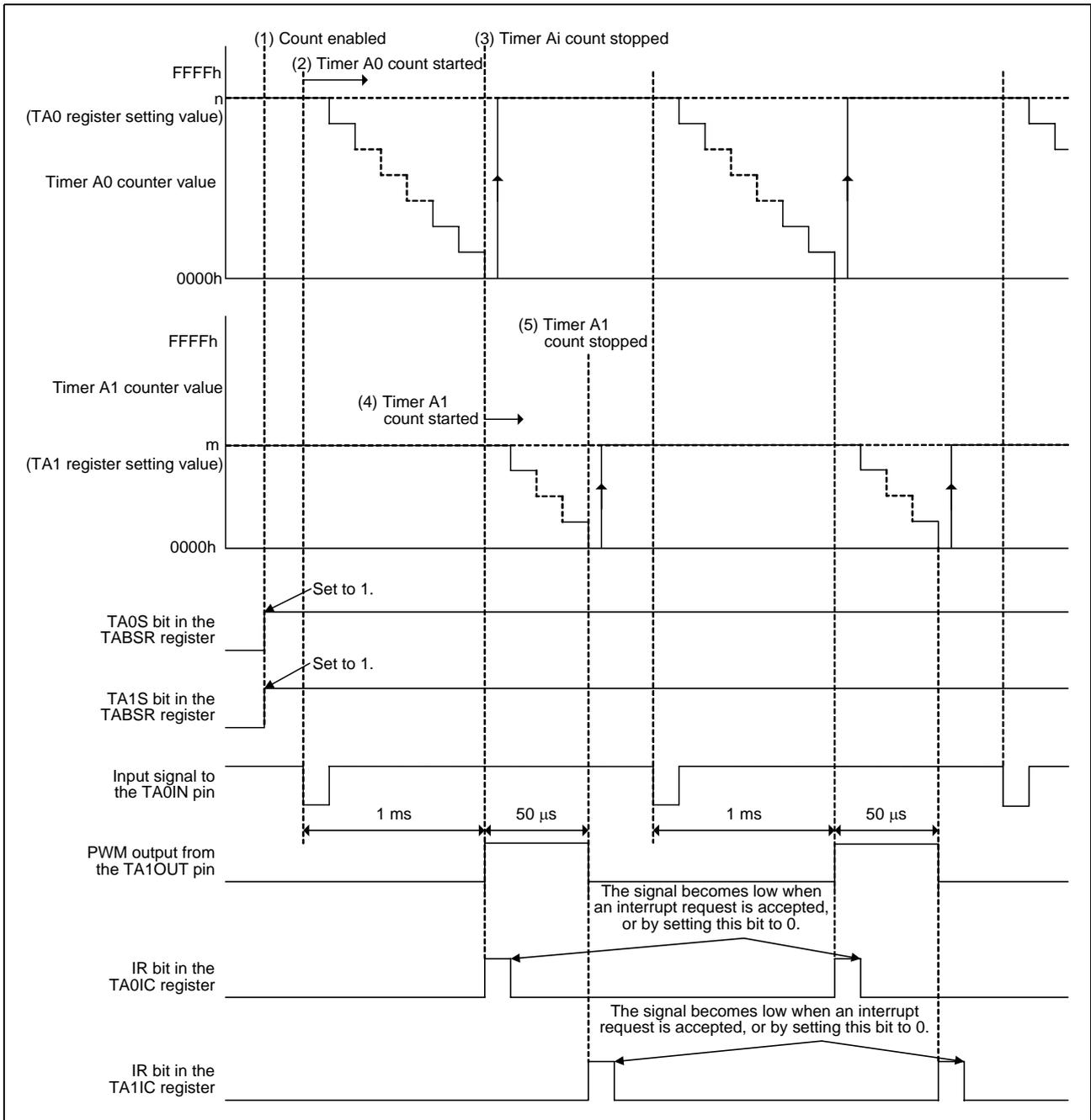


Figure 3.1 Operation Timing for the Example Application

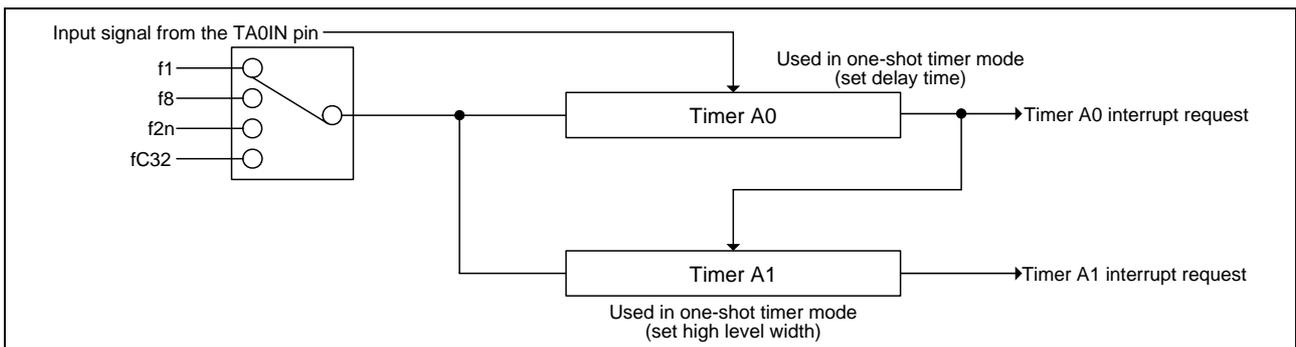
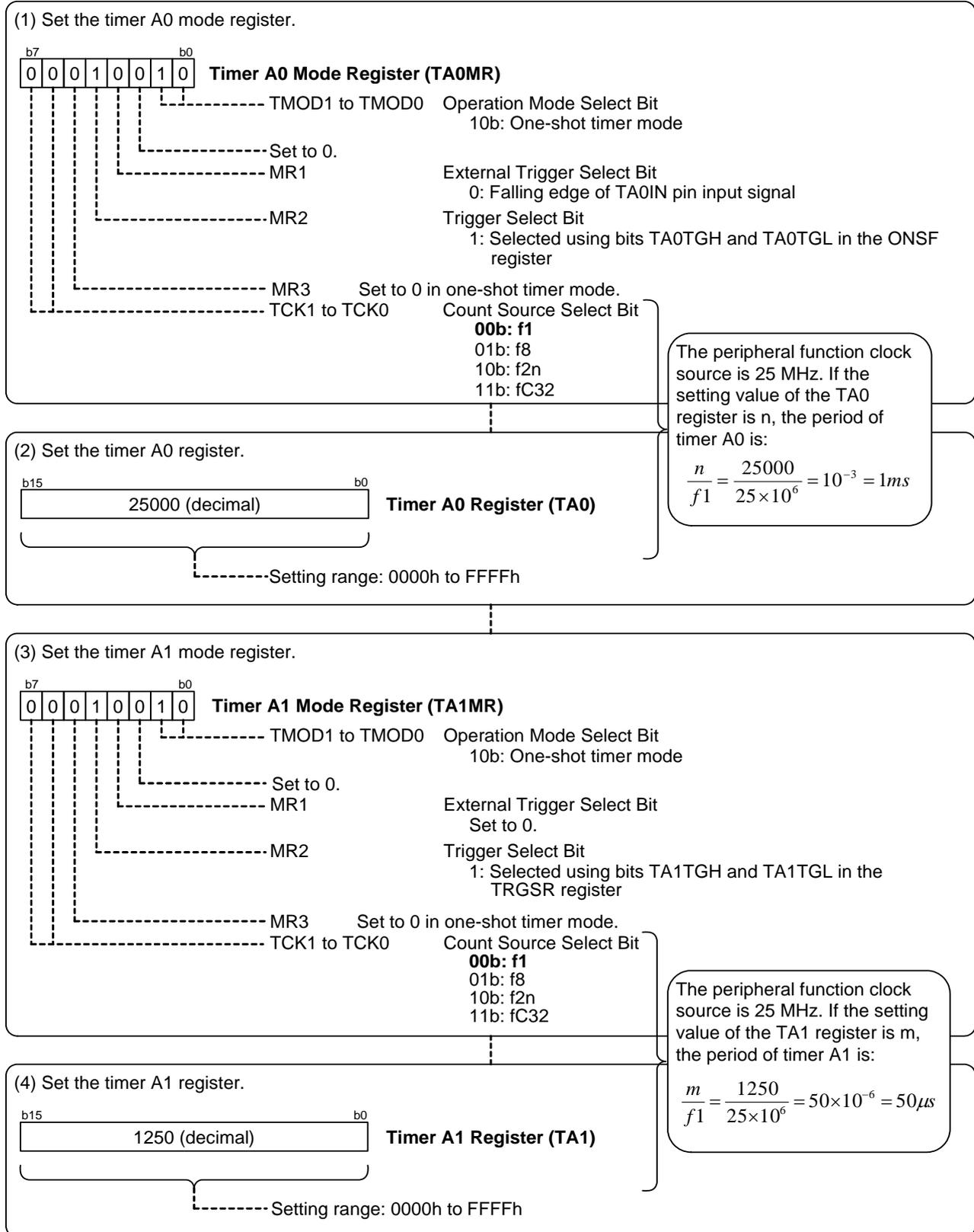


Figure 3.2 Timer Connections

### 3.3 Setting

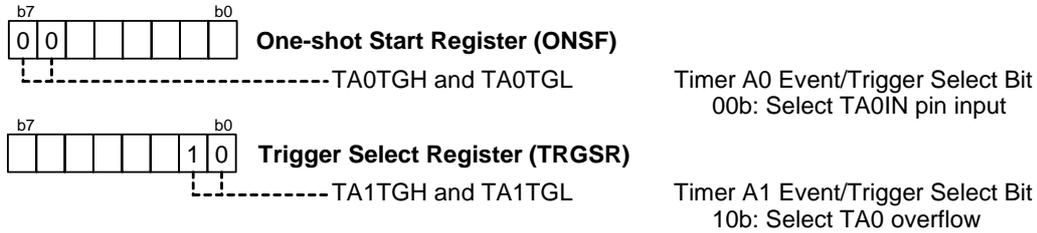
This section shows the procedures and values to set the example in chapter 3. “Application Example”. Refer to individual MCU hardware manuals for details on individual registers.



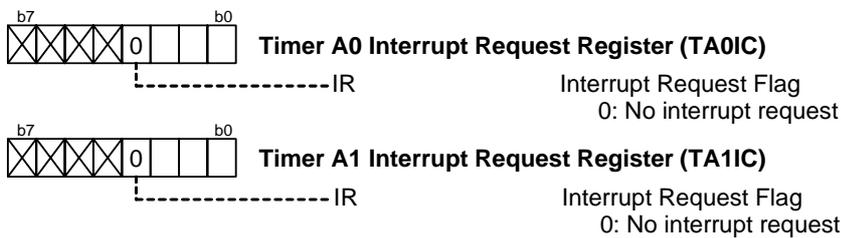
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(5) Set the one-shot start register and trigger select register.

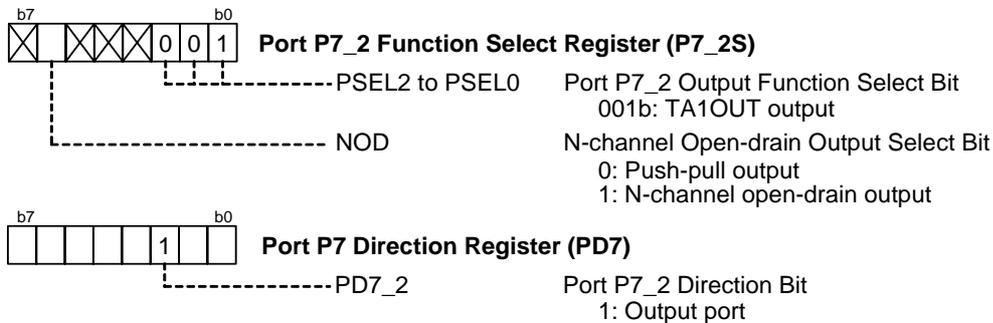


(6) Clear the interrupt request bit.

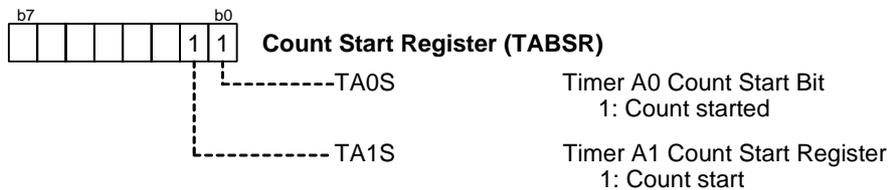


When bits TMOD1 to TMOD0 in the TA0MR and TA1MR registers are changed to 10b (one-shot timer mode), the IR bit sometimes becomes 1 (interrupt requested). Set bits TMOD1 to TMOD0 before clearing the IR bit.

(7) Set the TA1OUT output.



(8) Set the count 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

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

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<b>REVISION HISTORY</b>	<b>Delayed One-shot Output</b>
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Rev.	Date	Description	
		Page	Summary
1.00	Mar. 5, 2010	—	Initial release

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