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April 1st, 2010
Renesas Electronics Corporation

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M16C/80 Group

Operation of Timer A (timer mode, pulse output function)

1.0 Abstract

In timer mode, choose functions from those listed in Table 1. Operations of the circled items are described below.

Table 1. Chosed functions

Item	Set-up	
Count source	O	Internal count source(f1 / f8 / f32 / fc32)
Pulse output function		No pulses output
	O	Pulses output
Gate function	O	No gate function
		Performs count only for the period in which the TAIIN pin is at "L" level
		Performs count only for the period in which the TAIIN pin is at "H" level

2.0 Introduction

Operation (1) Setting the count start flag to "1" causes the counter to perform a down count on the count source.

(2) If an underflow occurs, the content of the reload register is reloaded and the count continues. At this time, the timer Ai interrupt request bit goes to "1". Also, the output polarity of the TAIOUT pin reverses.

(3) Setting the count start flag to "0" causes the counter to hold its value and to stop. Also, the TAIOUT pin outputs an "L" level.

Note

- When using pulse output, select TAIOUT output function with the function select register A and B.
- When setting the function select registers A, B, and C, sets the function select registers B and/or C first, and then sets the function select register A.

Figure 1 shows the operation timing

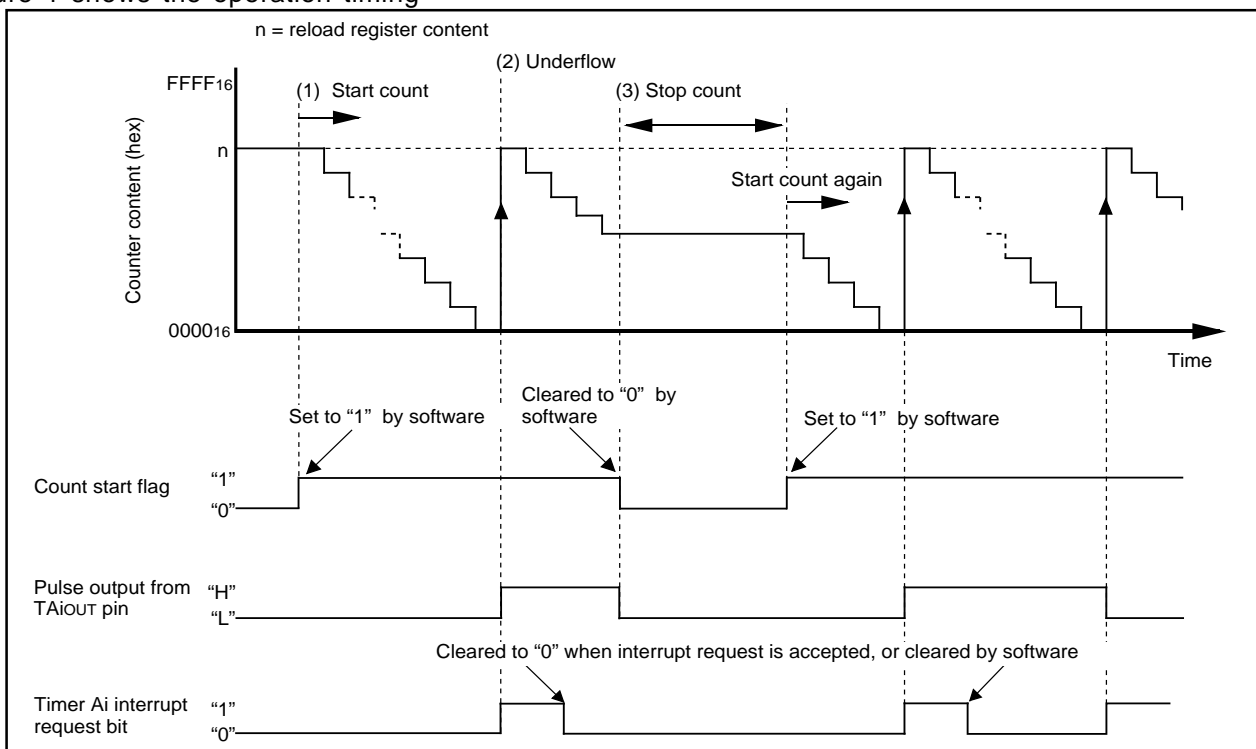
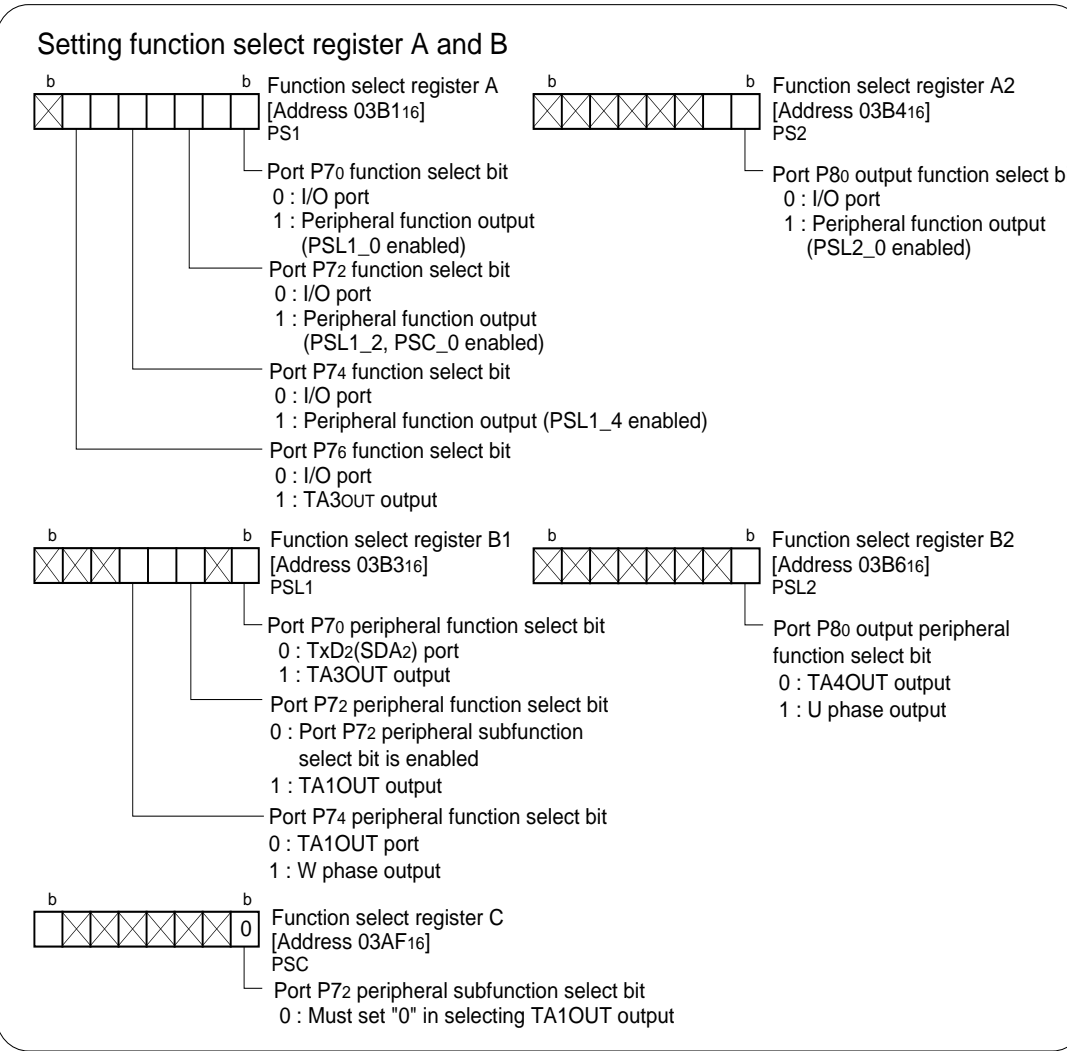
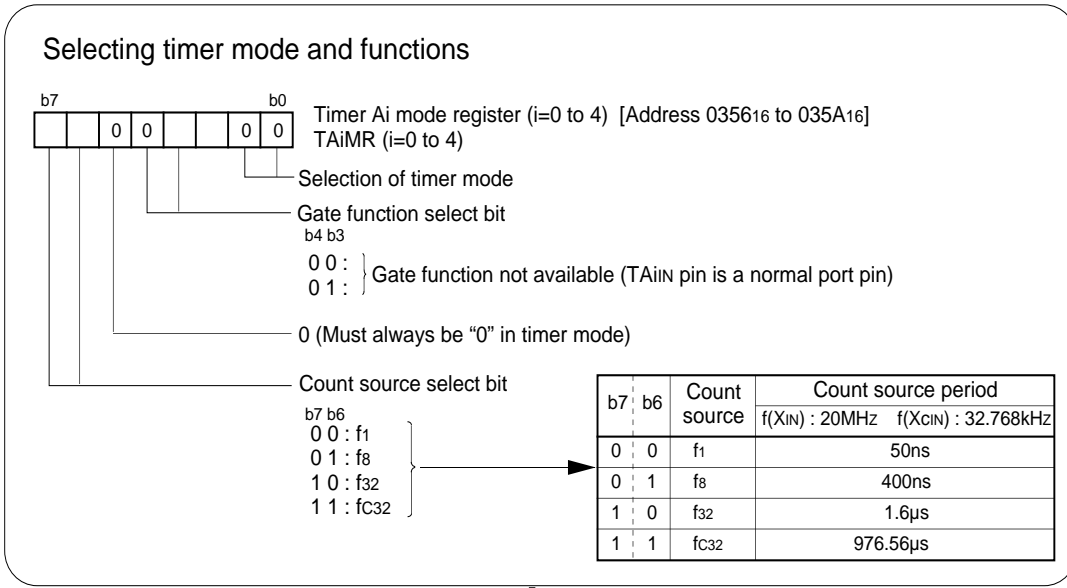


Figure 1. Operation timing of timer mode, pulse output function

3.0 Set-up procedure

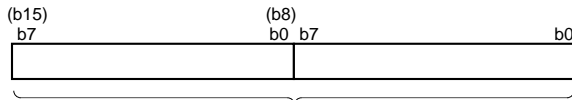


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Setting divide ratio



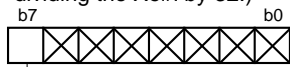
Timer A0 register [Address 0347₁₆, 0346₁₆] TA0
 Timer A1 register [Address 0349₁₆, 0348₁₆] TA1
 Timer A2 register [Address 034B₁₆, 034A₁₆] TA2
 Timer A3 register [Address 034D₁₆, 034C₁₆] TA3
 Timer A4 register [Address 034F₁₆, 034E₁₆] TA4

Can be set to 0000₁₆ to FFFF₁₆



Setting clock prescaler reset flag

(This function is effective when fc32 is selected as the count source. Reset the prescaler for generating fc32 by dividing the XCIN by 32.)

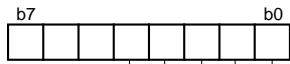


Clock prescaler reset flag [Address 0341₁₆] CPSRF

Clock prescaler reset flag
 0 : No effect
 1 : Prescaler is reset (When read, the value is "0")



Setting count start flag



Count start flag [Address 0340₁₆] TABSR

Timer A0 count start flag
 Timer A1 count start flag
 Timer A2 count start flag
 Timer A3 count start flag
 Timer A4 count start flag



Start count

4.0 Programming Code

```

;*****
;
; M16C/80 Program Collection
;
; FILE NAME : rjj05b0124_src.a30
; CPU      : M16C/80 Group
; FUNCTION : Operation of Timer A
;           (timer mode, pulse output function)
; HISTORY  : 2003.06.16 Ver 1.00
;
; Copyright(C)2003, Renesas Technology Corp.
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; All rights reserved.
;
;*****
;*****
;      Include
;*****
        .LIST      OFF          ;Stops outputting lines to the assembler list file
        .INCLUDE   sfr80100.inc ;Reads the file that defined SFR
        .LIST      ON          ;Starts outputting lines to the assembler list file
;
;*****
;      Symbol definition
;*****
ROM_TOP      .EQU    0FFC000H ;Start address of ROM
FIXED_VECT_TOP .EQU  0FFFFDCH ;Start address of fixed vector
;
;*****
;      Program area
;*****
;=====
;      Start up
;=====
        .SECTION   PROGRAM, CODE ;Declares section name and section type
        .ORG      ROM_TOP       ;Declares start address

RESET:
; Sets Processor mode, System clock and Main clock division
MOV.B   #03H, prcr ;Removes protect
MOV.B   #10000000B, pm0 ; Single-chip mode
MOV.B   #11000000B, pm1 ; Flash memory version
MOV.B   #00001000B, cm0 ; Xcin-Xcout High
MOV.B   #00100000B, cm1 ; Xin-Xout High
MOV.B   #00010010B, mcd ; No division mode
MOV.B   #00H, prcr ;Protects all registers
;

```

```

;=====
;   TimerA (timer mode,pulse output function selected)
;=====
;   ; Selecting timer mode and functions
MOV.B   #01000000B, talmr
;       |||||++-----;Selection of timer mode
;       |||||+-----;This bit is invalid in M16C/80 series
;       |||++-----;Gate function select bit
;       |||          (00 or 01:Gate function not available)
;       ||+-----;Must always be "0" in timer mode
;       ++-----;Count source (01:f8)
;   ; Setting function select register A and B (Setting pulse output function)
BSET    ps11_2      ;Port P72 peripheral function select bit (TA1OUT output)
BCLR    psc_0       ;Must set "0" in selecting TA1OUT output
BSET    ps1_2       ;Port P72 function select bit (peripheral function output)
;   ; Setting divide ratio
MOV.W   #2500-1, tal ;(1msec @20MHz, f8)
;   ; Setting clock prescaler reset flag
;   ; (This function is effective when fC32 is selected as the count source)
MOV.B   #00000000B, cpsrf
;       +-----;Clock prescaler reset flag (0:No effect)
;   ; Setting count start flag
MOV.B   #00000010B, tabsr
;       +-----;TimerA1 count start flag
;
MAIN:
    JMP     MAIN
;
;=====
;   Dummy interrupt processing program
;=====
dummy:
    REIT
;
;*****
;   Setting of fixed vector
;*****
.SECTION    F_VECT, ROMDATA
.ORG       FIXED_VECT_TOP
;
.LWORD     dummy ;Undefined instruction
.LWORD     dummy ;Overflow
.LWORD     dummy ;BRK instruction execution
.LWORD     dummy ;Address match
.LWORD     dummy ;
.LWORD     dummy ;Watchdog timer
.LWORD     dummy ;
.LWORD     dummy ;NMI
.LWORD     RESET ;Reset
;
.END

```

5.0 Reference**Renesas Technology Corporation Semiconductor Home page**<http://www.renesas.com/>**Technical Support**E-mail: support_apl@renesas.com**Data Sheet**

M16C/80 group Rev. E3

(Use the latest version on the Home page: <http://www.renesas.com/>)**User's Manual**

M16C/80 group Rev. B

(Use the latest version on the Home page: <http://www.renesas.com/>)

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