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April 1st, 2010
Renesas Electronics Corporation

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M16C/80 Group

Operation of Timer A (event counter mode, reload type)

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		Item	Set-up	
Count source	○	Input signal to TAI _{IN} (counting falling edges)	Pulse output function	○	No pulses output
		Input signal to TAI _{IN} (counting rising edges)	Count operation type	○	Reload type
					Free-run type
		Timer overflow (TB2/TA _j overflow)	Factor for switching between up and down	○	Content of up/down flag
					Input signal to TAI _{OUT}

Note: $j = i - 1$, but $j = 4$ when $i = 0$.

2.0 Introduction

- Operation
- (1) Setting the count start flag to "1" causes the counter to count the falling edges of 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".
 - (3) If switching from an up count to a down count or vice versa while a count is in progress, the switch takes effect from the next effective edge of the count source.
 - (4) Setting the count start flag to "0" causes the counter to hold its value and to stop.
 - (5) If an overflow 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".

Note

- When not using pulse output, do not select TAI_{OUT} output function with the function select register A and B.

Figure 1 shows the operation timing

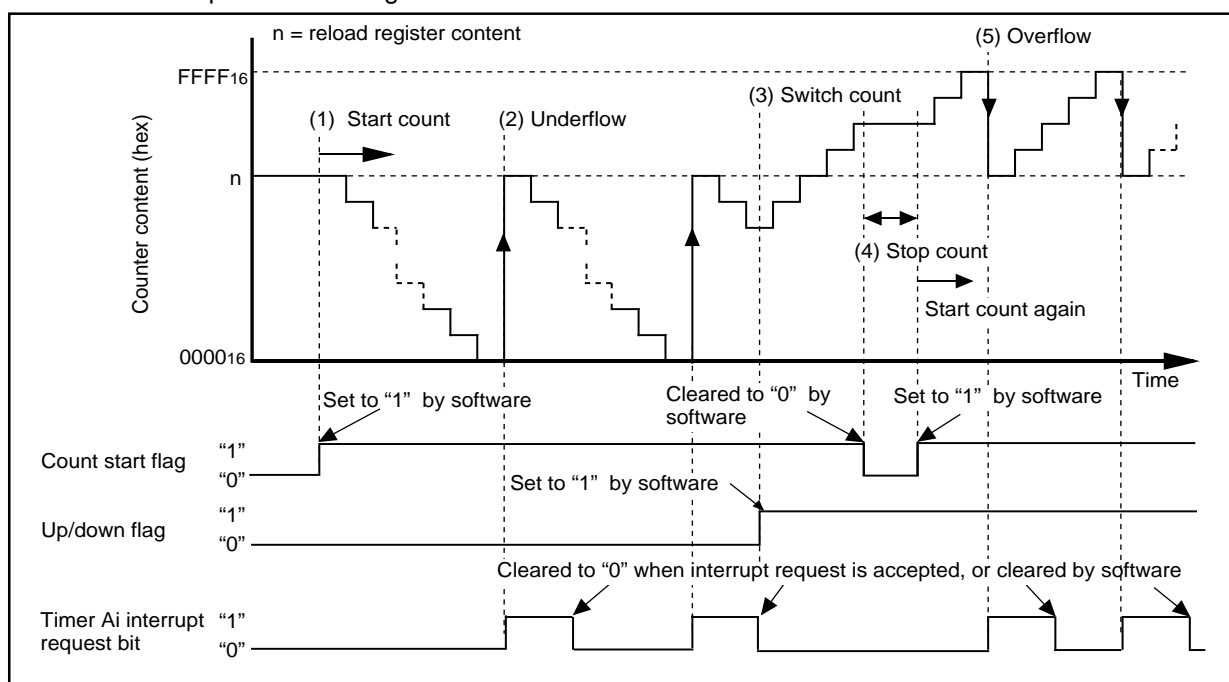
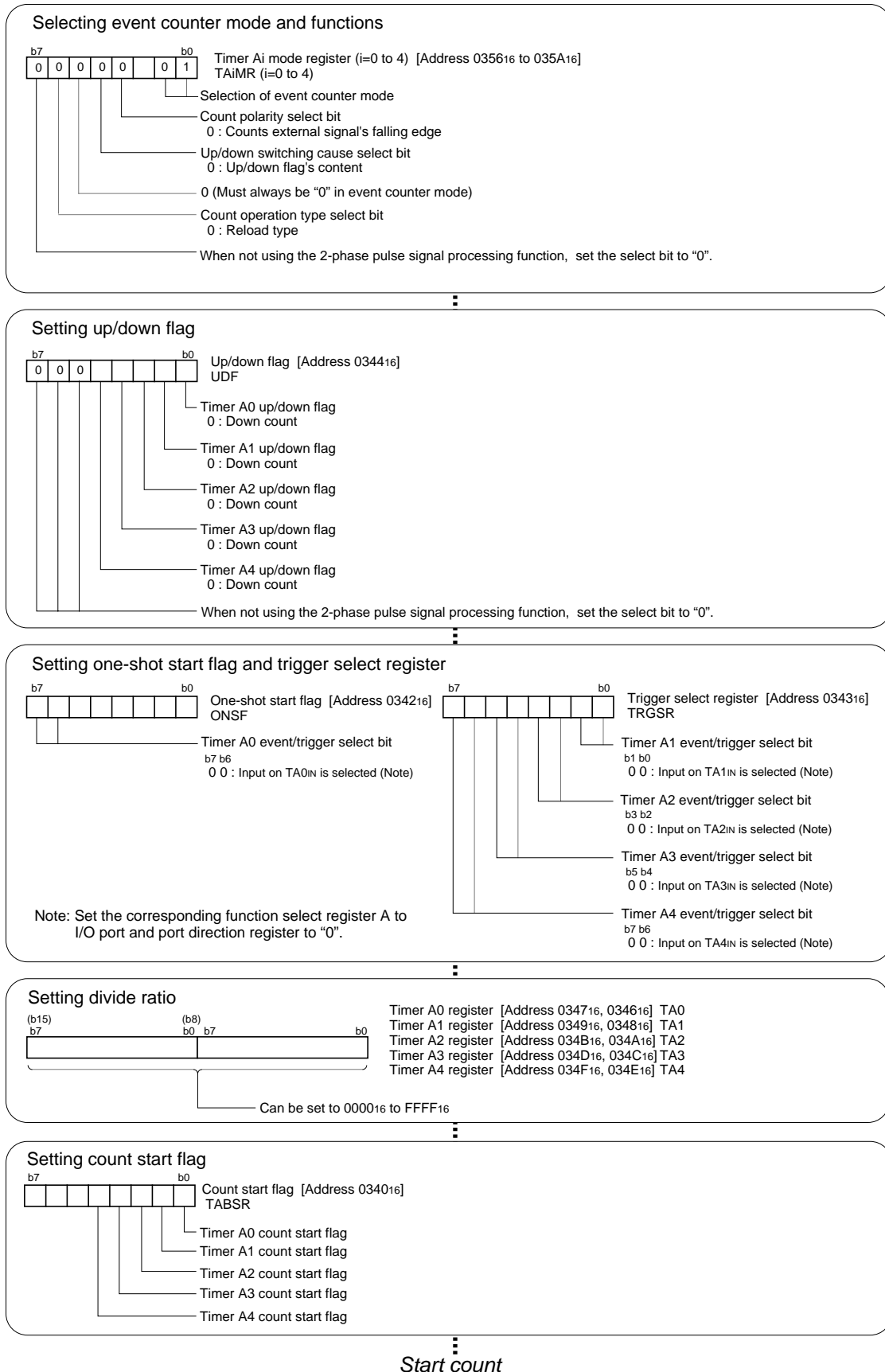


Figure 1. Operation timing of event counter mode, reload type

3.0 Set-up procedure



4.0 Programming Code

```

;*****
;
; M16C/80 Program Collection
;
; FILE NAME : rjj05b0125_src.a30
; CPU      : M16C/80 Group
; FUNCTION  : Operation of Timer A
;           : (event counter mode, reload type)
; HISTORY   : 2003.06.16 Ver 1.00
;
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;
;*****
;*****
;      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
C_CNT_TA_EV  .EQU    (08000H-1H);Counter value on event counter mode (down count)
;
;*****
;      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 (event counter mode, reload type selected)
;
=====
; Setting event counter mode and functions
MOV.B   #00000001B, ta0mr
;
;   ||| ||| |++-----; Selection of event counter mode
;   ||| ||| |+-----; This bit is invalid in M16C/80 series
;   ||| ||| +-----; Count polarity select bit
;   ||| |||           (0:Counts external signal's falling edge)
;   ||| +-----; Up/down switching cause select bit (0:Up/down flag's content)
;   |+-----; Must always be "0" in event counter mode
;   +-----; Count operation type select bit (0:Reload type)
;
;   +-----; When not using the 2-phase pulse signal processing function,
;           set the select bit to "0"
;
; Setting up/down flag
MOV.B   #00000000B, udf
;
;   |||   +-----; TimerA0 up/down flag (0:Down count)
;   +++-----; When not using the 2-phase pulse signal processing function,
;           set the select bit to "0"
;
; Setting one-shot start flag and trigger select register
MOV.B   #00000000B, onsf
;
;   +-----; Timer A0 event/trigger select bit
;           (00:Input on TA0IN is selected) (Note)
; (Note) Set the corresponding function select register A to I/O port
; and port direction register to "0"
BCLR    pd7_1           ;Port P71 direction register
BCLR    psl_1           ;Port P71 is I/O port
; Setting divide ratio
MOV.W   #C_CNT_TA_EV, ta0
; Setting counter start flag
MOV.B   #00000001B, tabsr
;
;   +-----; Timer A0 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

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Technical Support

E-mail: support_apl@renesas.com

Data Sheet

M16C/80 group Rev. E3

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M16C/80 group Rev. B

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