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April 1st, 2010
Renesas Electronics Corporation

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M16C/62A Group

Operation of Timer B (timer mode)

1.0 Abstract

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

Table 1. Choosed functions

Item	Set-up	
Count source	**O**	Internal count source (f_1 / f_8 / f_{32} / fc_{32})

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 counter continues counting. At this time, the timer Bi interrupt request bit goes to “1”.

(3) Setting the count start flag to “0” causes the counter to hold its value and to stop.

Figure 1 shows the operation timing

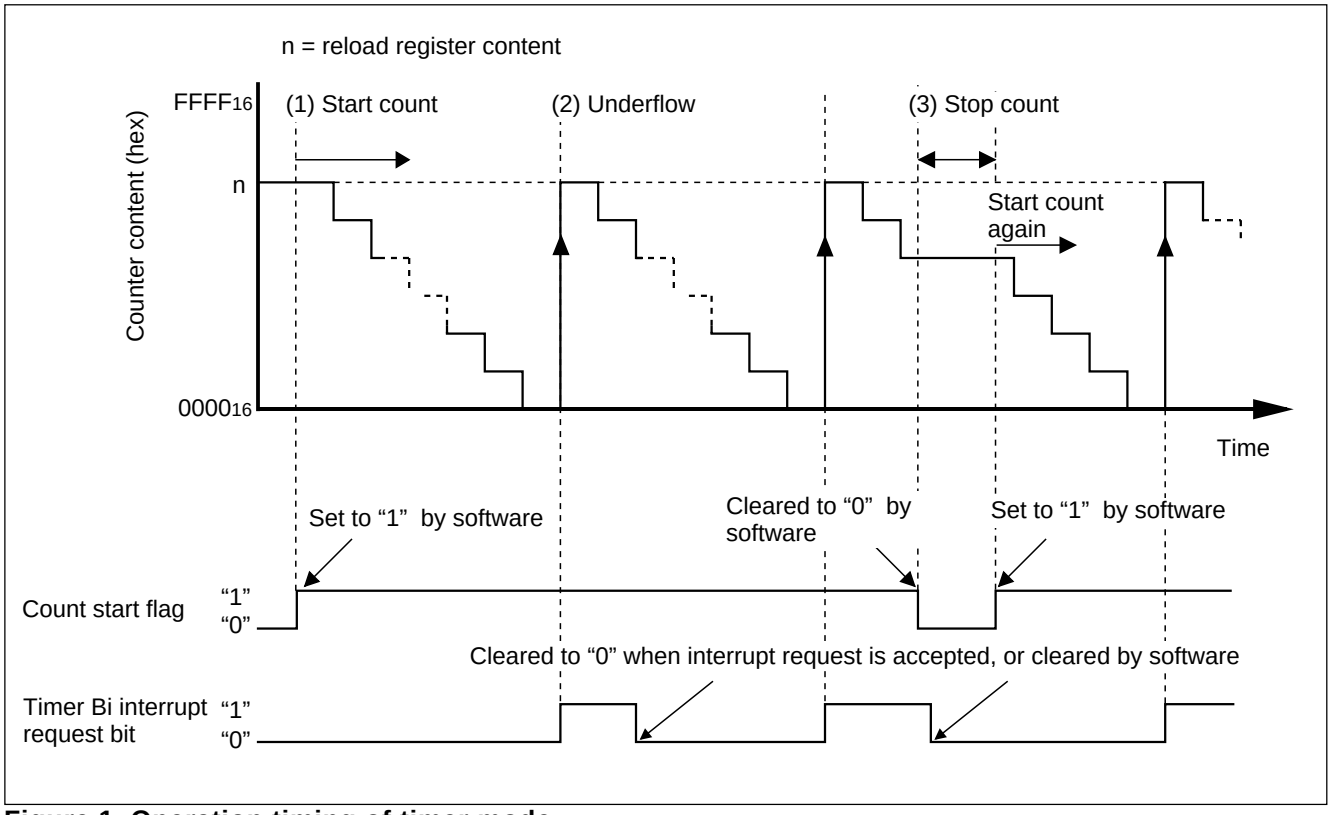
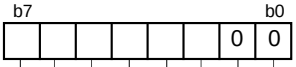


Figure 1. Operation timing of timer mode

3.0 Set-up procedure

Selecting timer mode and functions



Timer Bi mode register (i=0 to 5) [Address 039B16 to 039D16, 035B16 to 035D16]
TBiMR (i=0 to 5)

Selection of timer mode

Invalid in timer mode
Can be “0” or “1”

Fixed to “0” in timer mode (i = 0, 3)
In an attempt to write to this bit, write “0” (i = 1, 2, 4, 5)

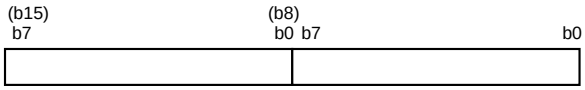
Invalid in timer mode

Count source select bit

b7 b6
0 0 : f_1
0 1 : f_8
1 0 : f_{32}
1 1 : f_{C32}

b7	b6	Count source	Count source period f(XIN) : 16MHz f(XCIN) : 32.768kHz
0	0	f_1	62.5ns
0	1	f_8	500ns
1	0	f_{32}	2µs
1	1	f_{C32}	976.56µs

Setting counter value

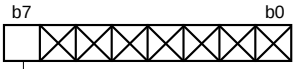


Timer B0 register [Address 039116, 039016] TB0
Timer B1 register [Address 039316, 039216] TB1
Timer B2 register [Address 039516, 039416] TB2
Timer B3 register [Address 035116, 035016] TB3
Timer B4 register [Address 035316, 035216] TB4
Timer B5 register [Address 035516, 035416] TB5

Can be set to 000016 to FFFF16

Setting clock prescaler reset flag

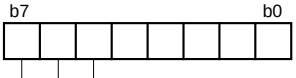
(This function is effective when f_{C32} is selected as the count source. Reset the prescaler for generating f_{C32} by dividing the XCIN by 32.)



Clock prescaler reset flag [Address 038116]
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 038016]
TABSR

Timer B0 count start flag
Timer B1 count start flag
Timer B2 count start flag

Timer B3,4,5 count start flag
[Address 034016]
TBSR

Timer B3 count start flag
Timer B4 count start flag
Timer B5 count start flag

Start count

4.0 Programming Code

```
;***********************************************************************************
;
;   M16C/62A Program Collection
;
;   FILE NAME : rjj05b0041_src.a30
;   CPU       : M16C/62A Group
;   FUNCTION  : Operation of Timer B
;               (timer mode)
;   HISTORY   : 2003.05.16  Ver 1.00
;
;   Copyright(C)2003, Renesas Technology Corp.
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;
;***********************************************************************************
;***********************************************************************************
;       Include
;***********************************************************************************
        .LIST       OFF             ;Stops outputting lines to the assembler list file
        .INCLUDE    sfr62a.inc      ;Reads the file that defined SFR
        .LIST       ON              ;Starts outputting lines to the assembler list file
;
;***********************************************************************************
;       Symbol definition
;***********************************************************************************
ROM_TOP         .EQU    0F8000H     ;Start address of ROM
FIXED_VECT_TOP  .EQU    0FFFDCH     ;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:
        MOV.B    #03H, prcr         ;Removes protect
                                    ;Set processor mode registers 0 and 1
        MOV.B    #00000000B, pm0    ; Single-chip mode
        MOV.B    #00000000B, pm1    ; No expansion, No wait
                                    ;Set system clock control registers 0 and 1
        MOV.B    #00001000B, cm0    ; Xcin-Xcout High
        MOV.B    #00100000B, cm1    ; Xin-Xout High, Main clock is No divison
        MOV.B    #00H, prcr         ;Protects all registers
;
```

```
;======================================================================
;       TimerB (timer mode)
;======================================================================
        MOV.B    #01000000B, tb0mr ;Selecting timer mode and functions
;                 ||||||++---------;Selection of timer mode
;                 ||||++-----------;Invalid in timer mode
;                 |||+-------------;Fixed to "0" in timer mode
;                 ||+--------------;Invalid in timer mode
;                 ++---------------;Count source (01:f8)
        MOV.W    #2000-1, tb0      ;Setting counter value (1msec @16MHz, f8)
        MOV.B    #00000000B, cpsrf ;Setting clock prescaler reset flag
;                 +----------------;Clock prescaler reset flag (0:No effect)
        MOV.B    #00100000B, tabsr ;Setting count start flag
;                   +--------------;TimerB0 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 interrupt vector
        .LWORD    dummy    ;Overflow (INT0 instruction) interrupt vector
        .LWORD    dummy    ;BRK instruction interrupt vector
        .LWORD    dummy    ;Address match interrupt vector
        .LWORD    dummy    ;Single-step interrupt vector
        .LWORD    dummy    ;Watchdog timer interrupt vector
        .LWORD    dummy    ;DBC interrupt vector
        .LWORD    dummy    ;NMI interrupt vector
        .LWORD    RESET    ;Sets reset vector
;
        .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/62A group Rev. C.1
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User's Manual

M16C/62A group Rev. 1.0
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