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Renesas Electronics Corporation

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M16C/62A Group

Solution for External Interrupt Pins Shortage

1.0 Abstract

The following are solution for external interrupt pins shortage.
Use the following peripheral function:

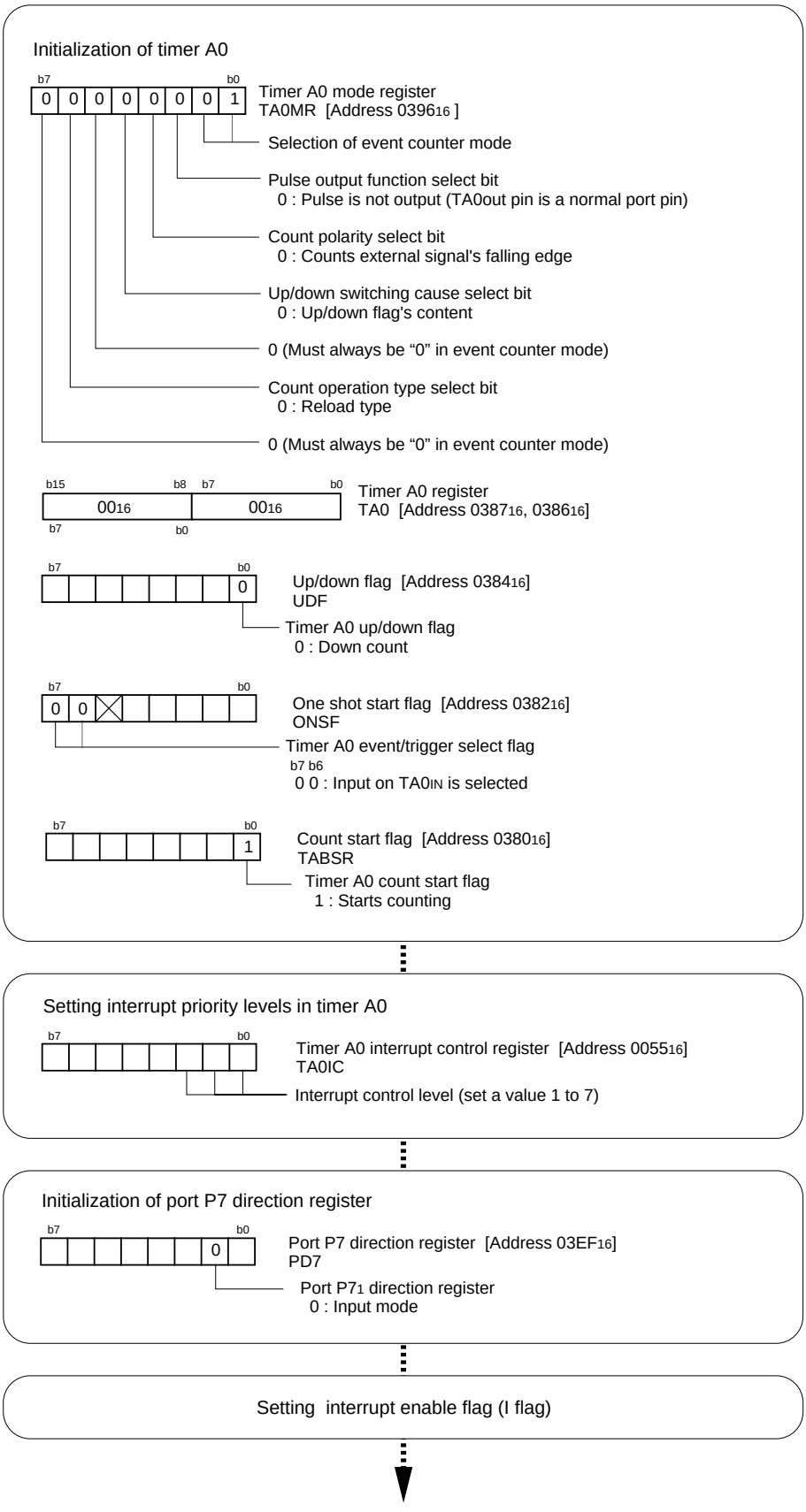
- Event counter mode of timer A

2.0 Introduction

Specifications (1) Inputting a falling edge to the $TA0_{IN}$ pin generates a timer A0 interrupt.

Operation
(1) Set timer A0 to event counter mode, set timer to “0”, and set interrupt priority levels in timer A0.
(2) Inputting a falling edge to the $TA0_{IN}$ pin generates a timer A0 interrupt.

3.0 Set-up procedure



4.0 Programming Code

```
;*****************************************************************************
;
;   M16C/62A Program Collection
;
;   FILE NAME : rjj05b0073_src.a30
;   CPU       : M16C/62A Group
;   FUNCTION  : Timer A Applications
;               (Solution for External Interrupt Pins Shortage)
;   HISTORY   : 2003.05.16  Ver 1.00
;
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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
;*****************************************************************************
RAM_TOP         .EQU    00400H      ;Start address of RAM
RAM_END         .EQU    00FFFH      ;End address of RAM
ROM_TOP         .EQU    0F8000H     ;Start address of ROM
VECT_TOP        .EQU    0FFE00H     ;Start address of variable vector
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:
        LDC      #RAM_END+1, ISP    ;Sets initial value in stack pointer
;
        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
;
        LDINTB   #VECT_TOP          ;Sets initial value in interrupt table register.
;
```

```
;=========================================================================
;       TimerA (solution for external interrupt pins shortage)
;=========================================================================
        FCLR     I                 ;Disable interrupts
        MOV.B    #00000001B, ta0mr ;TimerA0 mode register
;                 ||||||++---------;Selection of event counter mode
;                 |||||+-----------;Pulse is not output (0:TA0OUT pin is a normal port pin)
;                 ||||+------------;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)
;                 +----------------;Must always be "0" in event counter mode
        MOV.W    #0000H, ta0       ;TomerA0 register
        MOV.B    #00000000B, udf   ;Up/down flag
;                        +---------;TimerA0 up/down flag (0:Down count)
        MOV.B    #00000000B, onsf  ;One shot start flag
;                 ++---------------;Timer A0 event/trigger select flag
;                                   (00:Input on TA0IN is selected)
        MOV.B    #00000001B, tabsr ;Count start flag
;                        +---------;TimerA0 count start flag (1:Starts counting)
        MOV.B    #00000001B, ta0ic ;Setting interrupt priority levels in timerA0
;                      +++---------;Interrupt control level (set a value 1 to 7)
        BCLR     pd7_1             ;Port P71 direction register (0:Input mode)
;
        FSET     I                 ;Set Interrupt enable flag
;
MAIN:
        ; Inputting a falling edge to the TA0in pin
        ; generates a timer A0 interrupt
        JMP      MAIN
;
;=========================================================================
;       Interrupt program
;=========================================================================
INT_TA0:
        REIT
;
;=========================================================================
;       Dummy interrupt processing program
;=========================================================================
dummy:
        REIT
;
;*************************************************************************************
;       Setting of variable vector table
;*************************************************************************************
        .SECTION    VECT, ROMDATA
        .ORG        VECT_TOP+(21*4)
;
        .LWORD    INT_TA0      ;TA0 interrupt vector
        .LWORD    dummy        ;TA1 interrupt vector
        .LWORD    dummy        ;TA2 interrupt vector
        .LWORD    dummy        ;TA3 interrupt vector
        .LWORD    dummy        ;TA4 interrupt vector
;
```

```
;*******************************************************************************
;       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
(Use the latest version on the Home page: http://www.renesas.com/)

User's Manual

M16C/62A group Rev. 1.0
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