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April 1st, 2010
Renesas Electronics Corporation

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38C2 Group

Timer Y Operation (Real Time Port Control: Stepping Motor Control)

1. Abstract

The following article introduces and shows an example of how to use the Timer Y Operation (Real Time Port Control: Stepping Motor Control) on the 38C2 group device.

2. Introduction

The explanation of this issue is applied to the following condition:
Applicable MCU: 38C2 Group
Oscillation frequency: 8MHz

In this sample program, the bit of the function which is not used may be operated on account of bit arrangement of SFR. Please set these setting values according to the use situation of a user system.

3. Contents

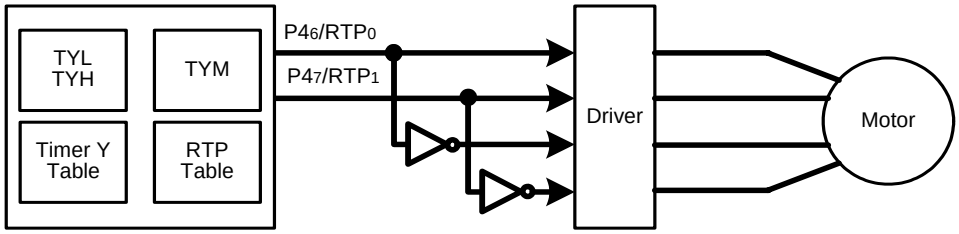
3.1 Stepping Motor Control

Outline: The rotation of stepping motor is controlled by using the real time port.

Specifications:

- Motor is controlled by using the real time ports RTP0, RTP1.
- The count source is the clock which f(XIN)=8MHz is divided by 16.
- Timer Y set value (RTP output time) and the output value of a real time port are updated within the timer Y interrupt routine. Each value is set from each table.

Figure 3.1 shows the Connection, Timer Y Set Value Table and RTP Output Value Table Example; Figure 3.2 shows the RTP Output Example; Figure 3.3 shows the Relevant Registers Setting; Figure 3.4 shows the Control Procedure.



Timer Y set value table example

RTP output time	Timer Y set value
T0(8ms)	0F9F16
T1(7ms)	0DAB16
T2(6ms)	0BB716
T3(5ms)	09C316
T4(4ms)	07CF16
T5(3ms)	05DB16
T6(2ms)	03E716
T7(1ms)	01F316

RTP output value table example

RTP output pattern	RTP output value	
	RTP1	RTP0
(0)	0	1
(1)	1	1
(2)	1	0
(3)	0	0

RTP: Real time port

Figure 3.1 Connection, Timer Y Set Value Table and RTP Output Value Table Example

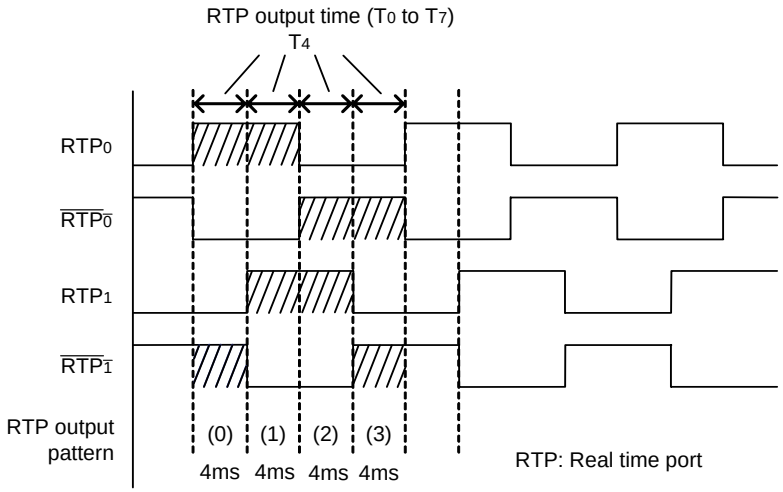


Figure 3.2 RTP Output Example

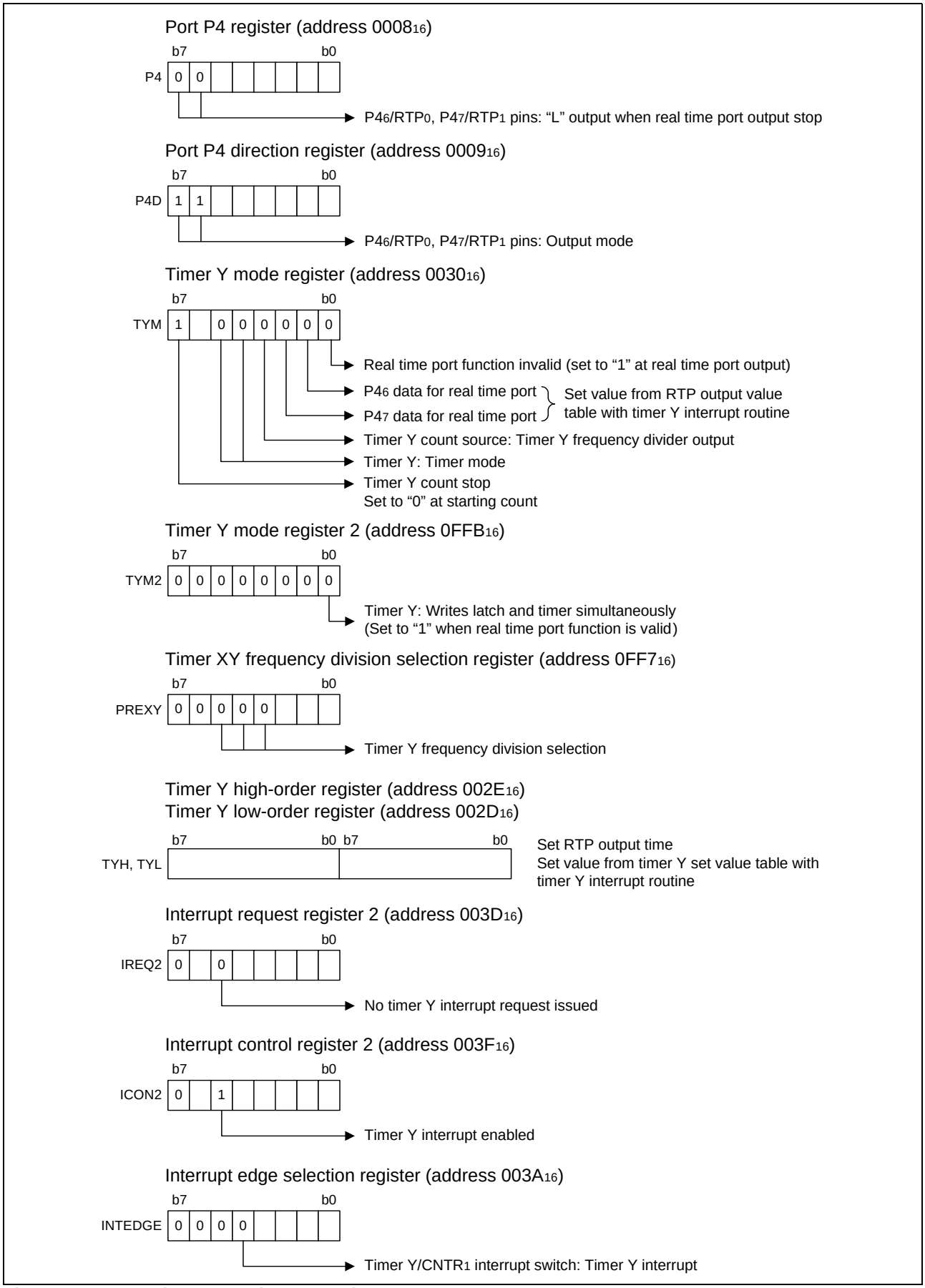


Figure 3.3 Relevant Registers Setting

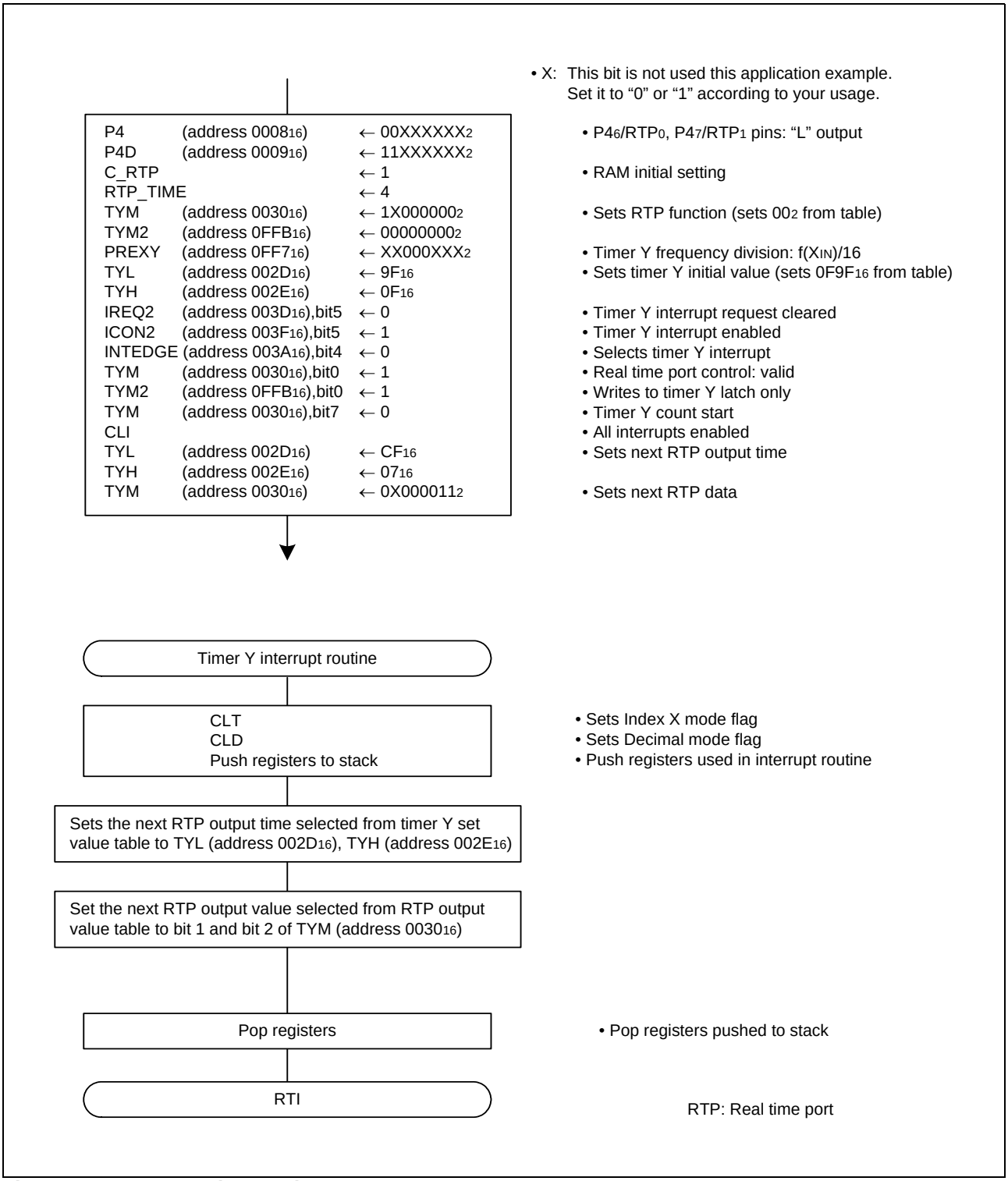


Figure 3.4 Control Procedure

4. Sample Programming Code

```
[Setting of control register]
    LDM #%00000000,P4          ;Set Port P4 register
    LDM #%11000000,P4D         ;Set Port P4 direction register
;                              ;
    LDM #1,C_RTP               ;Set Initial data
    LDM #4,RTP_TIME            ;
    LDM #%10000000,TYM         ;Set Timer Y mode register
    LDA #%00000000
    STA TYM2                   ;Set Timer Y mode register2
    LDA #%00000000
    STA PREXY                  ;Set Timer XY frequency division selection
    LDA __TBL_RTP_timerY+0
    STA TYL                    ;Set Timer Y(low)
    LDA __TBL_RTP_timerY+1
    STA TYH                    ;Set Timer Y(high)
;
    LDM #%00000000,IREQ2       ;Timer Y interrupt request clear
    LDM #%00100000,ICON2       ;Timer Y interrupt enable
    CLB 4,INTEDGE              ;Select interrupt Timer Y
    SEB 0,TYM
    LDA #%00000001
    STA TYM2
    CLB 7,TYM                  ;Timer Y count start
    CLI                        ;interrupt enable
;       ;
    LDA __TBL_RTP_timerY+8     ;Set Timer Y(low)
    STA TYL
    LDA __TBL_RTP_timerY+9     ;Set Timer Y(high)
    STA TYH
    LDA TYM
    AND #%11111001
    ORA __TBL_RTP_outptn
    STA TYM                    ;Set Timer Y mode register
;

[Timer Y interrupt processing]
__INT_timerY:
    CLT
    CLD
    PHA
    TXA
    PHA
;
    LDX C_RTP
    LDA TYM
    AND #%11111001
    ORA __TBL_RTP_outptn,X
    STA TYM                    ;Set Timer Y mode register
    INX
    TXA
    AND #3
    STA C_RTP
;
```

```
    LDA RTP_TIME
    ASL A
    TAX
    LDA __TBL_RTP_timerY,X
    STA TYL                     ;Set Timer Y(low)
    LDA __TBL_RTP_timerY+1,X
    STA TYH                     ;Set Timer Y(high)
;
    PLA
    TAX
    PLA
    RTI
;
[Timer Y set value table]
__TBL_RTP_timerY:
    .word 0F9Fh                 ;T0(8ms)
    .word 0DABh                 ;T1(7ms)
    .word 0BB7h                 ;T2(6ms)
    .word 09C3h                 ;T3(5ms)
    .word 07CFh                 ;T4(4ms)
    .word 05DBh                 ;T5(3ms)
    .word 03E7h                 ;T6(2ms)
    .word 01F3h                 ;T7(1ms)
;                               ;
[RTP output table]
__TBL_RTP_outptn:
    .byte 00000000b             ;
    .byte 00000010b             ;
    .byte 00000100b             ;
    .byte 00000110b             ;
;                               ;
```

5. Reference

Renesas Technology Corporation Semiconductor Home Page
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Data Sheet
38C2 Group (A version) Data sheet
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REVISION HISTORY	38C2 Group Timer Y Operation (Real Time Port Control: Stepping Motor Control)

Rev.	Date	Description	
		Page	Summary
1.00	Sep 25, 2004	–	First Edition issued

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