

To our customers,

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Renesas Electronics Corporation

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## 7544 Group

### Timer A Operation (Event Counter Mode)

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#### **1. Abstract**

The following article introduces and shows an application example of event counter mode of timer A.

#### **2. Introduction**

The explanation of this issue is applied to the following condition:

Applicable MCU: 7544 Group

3. Contents

**Outline:** The frequency of the pulse which is input to the P0<sub>0</sub>/CNTR<sub>1</sub> pin (“H” active) is measured by the number of events in a certain period.

**Specifications:** The count source of timer A is input from the P0<sub>0</sub>/CNTR<sub>1</sub> pin, and the timer A starts counting the count source. Clock ( $f(X_{IN}) = 8 \text{ MHz}$ ) is divided by timer X to detect 1 ms. The frequency of the pulse input to the P0<sub>0</sub>/CNTR<sub>1</sub> pin is calculated by the number of events counted within 1 ms.

Operation clock:  $f(X_{IN}) = 8 \text{ MHz}$ , high-speed mode

3.1 Example of Measurement Method of Frequency

Figure 1 shows an example of measurement method of frequency.

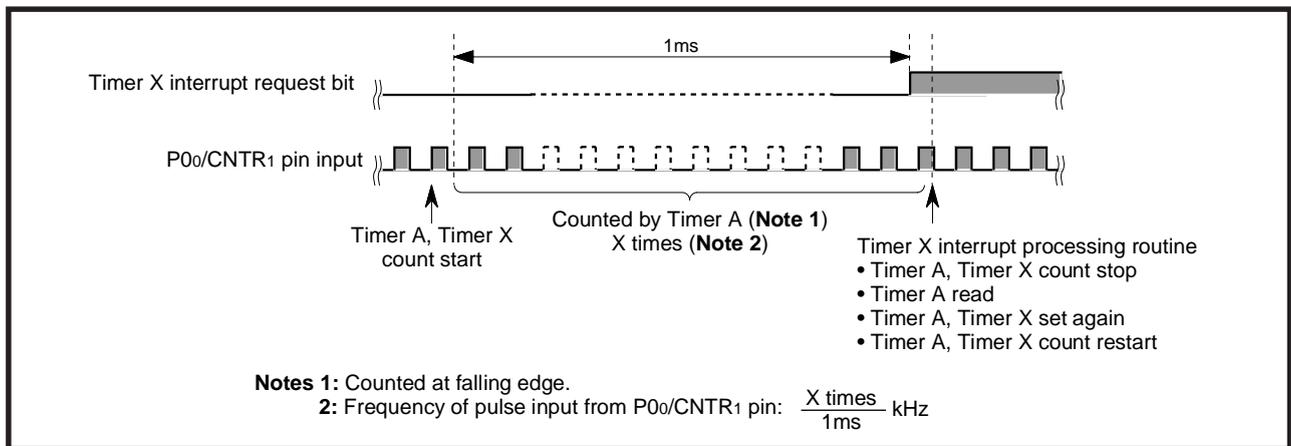


Figure 1 Example of measurement method of frequency

3.2 Example of Control Procedure

Figure 2 shows an example of control procedure.

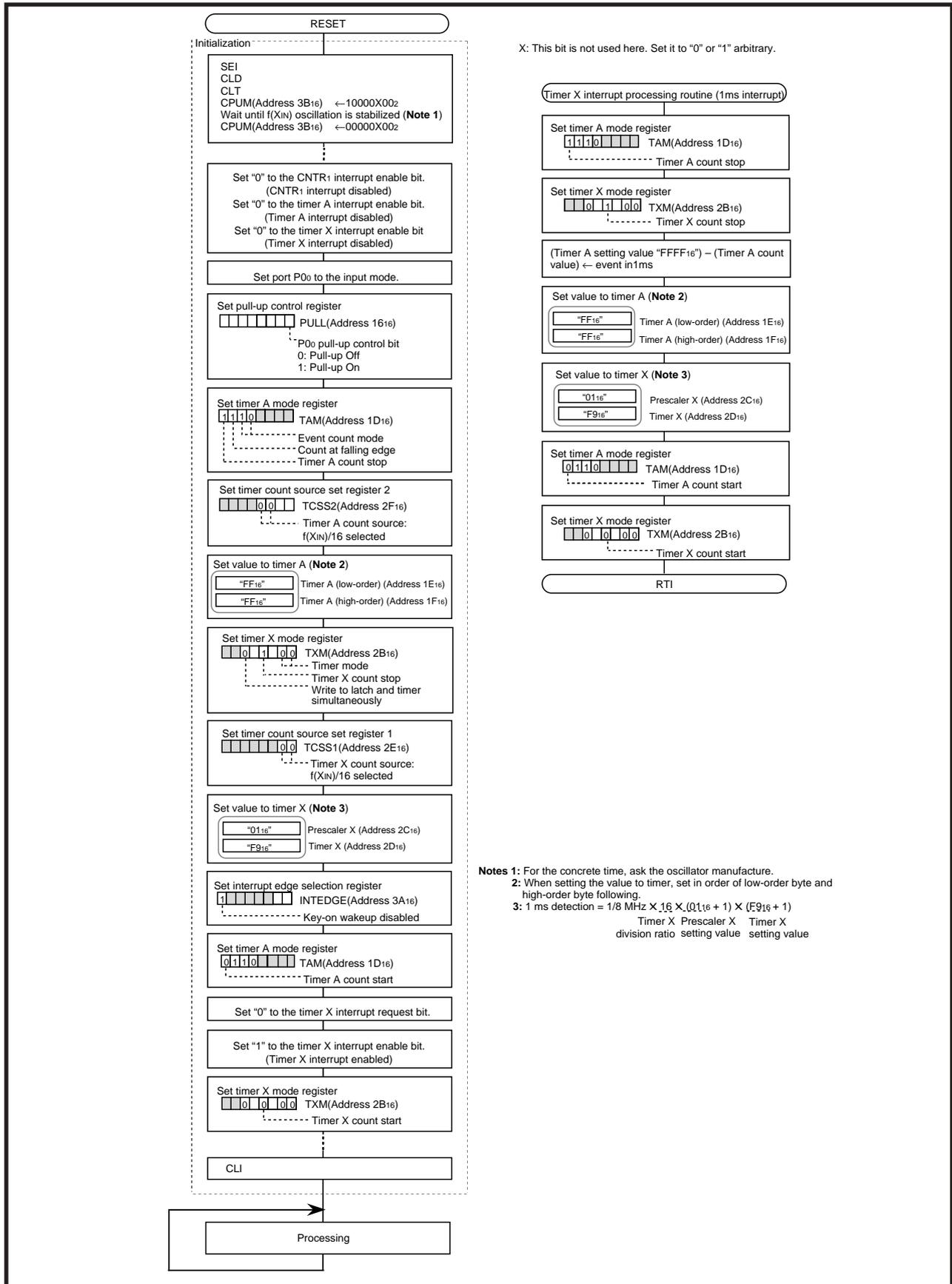


Figure 2 Example of control procedure

#### 4. Sample Programming Code

[Reset Start ••• Main Routine Process]

```

RESET:
    SEI                ; Interrupt disable
    CLD
    CLT
;
    LDX #$FF          ; Set stack bottom
    TXS
;
    LDM #%10000000,CPUM ; Set CPU mode register
;
; Wait f(XIN) oscillation stabilizing time
;
    LDM #%00000000,CPUM ; Set CPU mode register
;
    LDA #0
    LDX #>RAM_top
RAM_clear: STA $00,X
    INX
    BNE RAM_clear
;
    CLB 6,ICON1       ; CNTR1 interrupt control disable
    CLB 2,ICON2       ; TimerA interrupt control disable
    CLB 7,ICON1       ; TimerX interrupt control disable
;
    LDM #%00000000,P0D ; Set Port P0 direction register
;
    CLB 0,PULL        ; Port P00 Pull_up off
;
    LDM #%11100000,TAM ; Set Timer A mode register
;
    LDM #%00000000,TCSS2 ; Set Timer count source set register 2
;
    LDM #$FF,TAL      ; Set Timer A (low-order)
    LDM #$FF,TAH      ; Set Timer A (high-order)
;
    LDM #%00001000,TXM ; set timer X mode register
    LDM #%00000000,TCSS1 ; Set Timer count source set register 1
;
    LDM #$01,PREX     ; Set Prescaler X
    LDM #$F9,TX       ; Set Timer X
;
    LDM #%10000000,INTEDGE ; Set Interrupt edge selection register
;
    LDM #%01100000,TAM ; Set Timer A mode register
;
    CLB 7,IREQ1       ; TimerX interrupt request clear
;
    SEB 7,ICON1       ; TimerX interrupt enable
;
    LDM #%00000000,TXM ; Set Timer X mode register
;
    CLI
;
__MAIN:
    BRA __MAIN
;

```

Figure 3 Sample Programming Code (1)

[Timer X Interrupt Process]

```

__int_TimerX:
    CLD
    CLT
    PHA
;
    SEB 7,TAM           ; stop timer A count
    SEB 3,TXM           ; stop timer X count
;
    SEC
    LDA #$FF
    SBC TAL
    STA RESULT+0
    LDA #$FF
    SBC TAH
    STA RESULT+1
;
    LDM #$FF,TAL
    LDM #$FF,TAH
;
    LDM #$01,PREX       ; Set Prescaler X
    LDM #$F9,TX         ; Set Timer X
;
    CLB 7,TAM           ; start timer A count
    CLB 3,TXM           ; start timer X count
;
    PLA
    RTI
;

```

Figure 4 Sample Programming Code (2)

## 5. Reference

Data Sheet  
7544 Group Data sheet  
7544 Group Data sheet (QzROM Version)

Before using this manual, please visit our website to verify that this is the most updated document available.

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REVISION HISTORY	7544 Group Timer A Operation (Event Counter Mode)
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Rev.	Date	Description	
		Page	Summary
1.00	Apr 01, 2003	-	First Edition issued
2.00	Nov 12, 2004	4-5	Sample Programming Code added.

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