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Renesas Electronics Corporation

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7544 Group

Timer X Operation (Timer Mode)

1. Abstract

The following article introduces and shows an application example of timer mode of timer X.

2. Introduction

The explanation of this issue is applied to the following condition:
Applicable MCU: 7544 Group

3. Contents

Outline: The input clock is divided by the timer so that the clock is counted up every 250 ms intervals.

Specifications: •The f(X_{IN}) = 4.19 MHz (2^{22} Hz) is divided by timer X.
•The clock is counted up in the timer X interrupt processing routine (timer X interrupt occurs every 250 ms).
• Operation clock: f(X_{IN}) = 4.19 MHz, high-speed mode

3.1 Connection of Timer and Setting of Division Ratio

Figure 1 shows the connection of timer and setting of division ratio.

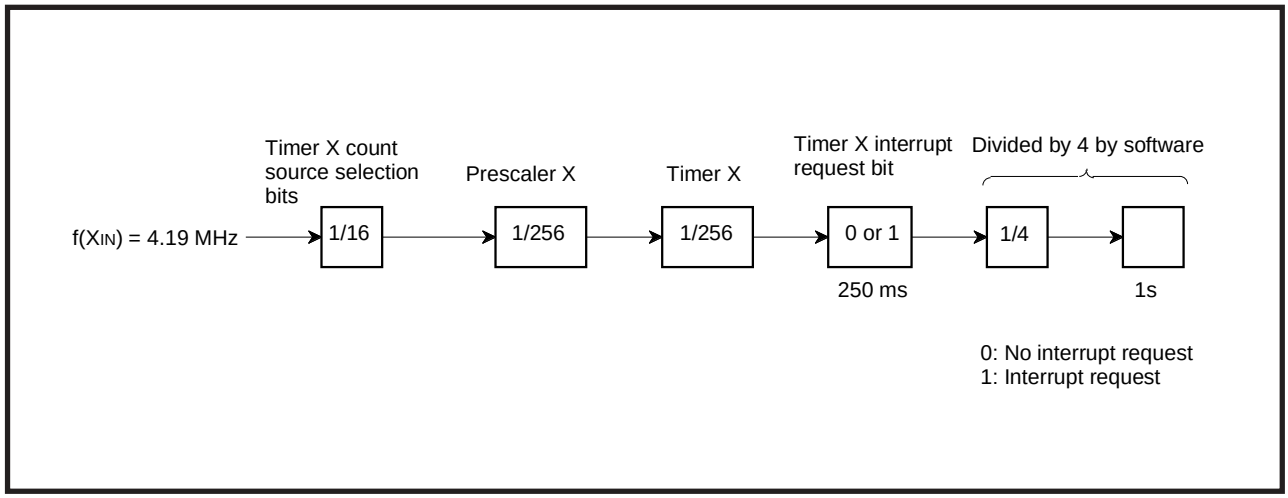

Figure 1 Connection of timer and setting of division ratio

3.2 Example of Control Procedure

Figure 2 shows an example of control procedure.

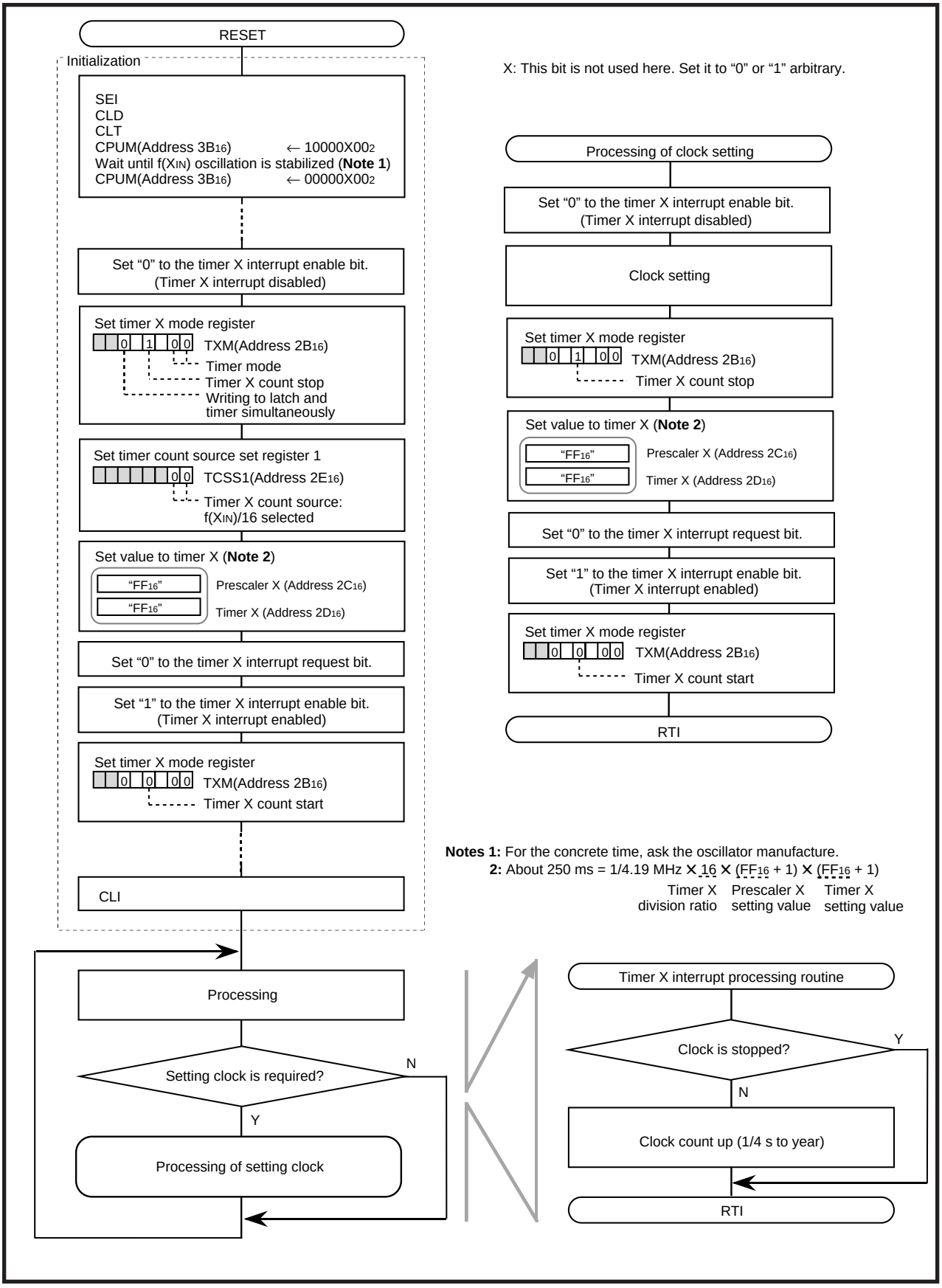

Figure 2 Example of control procedure

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  $00,X
          INX
          BNE  RAM_clear
;
          CLB  7,ICON1            ; TimerX interrupt disable
;
          LDM  #%00001000,TXM     ; Set Timer X mode register
;
          LDM  #%00000000,TCSS1   ; Set Timer count source set register 1
;
          LDM  #$FF,PREX          ; Set Prescaler X
          LDM  #$FF,TX            ; Set Timer X
;
          CLB  7,IREQ1            ; TimerX interrupt request clear
;
          SEB  7,ICON1            ; TimerX interrupt control enable
;
          CLB  3,TXM              ; start timer X count
;
          SEB  f_REQ_SET
          SEB  f_STOP_CLOCK

          CLI
;
__MAIN:

          BBC  f_REQ_SET,__MAIN
;
          JSR  SET_CLOCK

          BRA  __MAIN
;
```

Figure 3 Sample Programming Code (1)

```
[Clock Setting Process]

SET_CLOCK:
          CLB  7,ICON1            ; TimerX interrupt disable
;
          LDM  #0,hour            ; set clock [0:00]
          LDM  #0,minute
          LDM  #0,second
          LDM  #0,BASE_250ms
;
          CLB  f_REQ_SET
          CLB  f_STOP_CLOCK
;
          SEB  3,TXM              ; stop timer X count
;
          LDM  #$FF,PREX          ; Set Prescaler X
          LDM  #$FF,TX            ; Set Timer X
;
          CLB  7,IREQ1            ; TimerX interrupt request clear
          SEB  7,ICON1            ; TimerX interrupt control enable
;
          CLB  3,TXM              ; start timer X count
;
          RTS
;
```

Figure 4 Sample Programming Code (2)

[Timer X Interrupt Process]

```
__int_TimerX:
          CLD
          CLT
          PHA
;
          BBS  f_STOP_CLOCK,__int_TimerX_RT
;
          CLC                       ;Base  timer  countup
          LDA  BASE_250ms
          ADC  #1
          STA  BASE_250ms
          CMP  #4
          BCC  __int_TimerX_RT
          LDM  #0,BASE_250ms
;
          CLC                       ;Sec  timer  countup
          LDA  second
          ADC  #1
          STA  second
          CMP  #60
          BCC  __int_TimerX_RT
          LDM  #0,second
;
          CLC                       ;Min  timer  countup
          LDA  minute
          ADC  #1
          STA  minute
          CMP  #60
          BCC  __int_TimerX_RT
          LDM #0,minute
;
          CLC                       ;Hour  timer  countup
          LDA  hour
          ADC  #1
          STA  hour
          CMP  #24
          BCC  __int_TimerX_RT
          LDM  #0,hour
;
__int_TimerX_RT:
          PLA
          RTI
;
```

Figure 5 Sample Programming Code (3)

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 X Operation (Timer Mode)

Rev.	Date	Description	
		Page	Summary
1.00	Apr 01, 2003	-	First Edition issued
2.00	Nov 12, 2004	4-6	Sample Programming Code added.

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