
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 $f(X_{IN}) = 4.19 \text{ MHz}$ (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: $f(X_{IN}) = 4.19 \text{ MHz}$, 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.

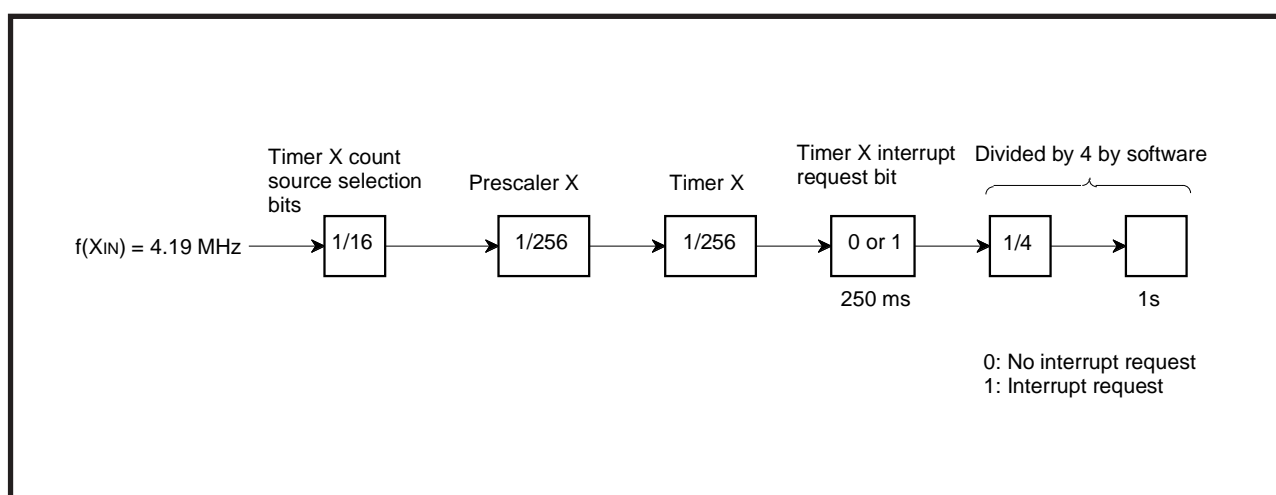


Figure 1 Connection of timer and setting of division ratio

3.2 Example of Control Procedure

Figure 2 shows an example of control procedure.

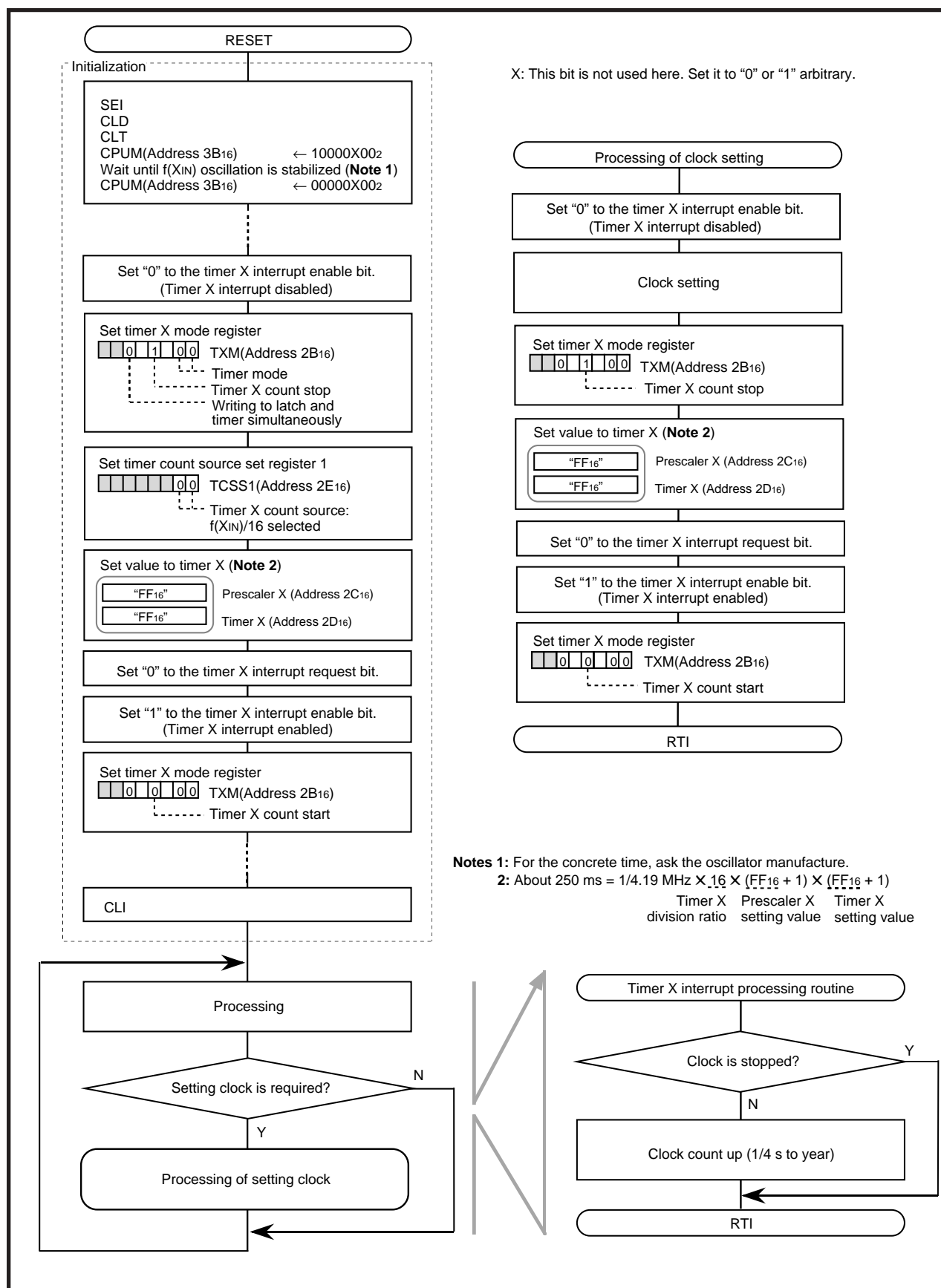


Figure 2 Example of control procedure

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,PRESX          ; 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)

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REVISION HISTORY	7544 Group Timer X Operation (Timer Mode)
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		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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