

## 7544 Group

### Timer X Operation (Pulse Output Mode)

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#### 1. Abstract

The following article introduces and shows an application example of pulse output 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 pulse output mode of timer X is used for a piezoelectric buzzer output.

**Specifications:** The rectangular waveform which is clock  $f(X_{IN}) = 4 \text{ MHz}$  divided up to 4 kHz is output from the P14/CNTR<sub>0</sub> pin.

The level of the P14/CNTR<sub>0</sub> pin is fixed to "H" while a piezoelectric buzzer output is stopped.

Operation clock:  $f(X_{IN}) = 4 \text{ MHz}$ , double-speed mode

### 3.1 Example of Peripheral Circuit

Figure 1 shows an example of a peripheral circuit.

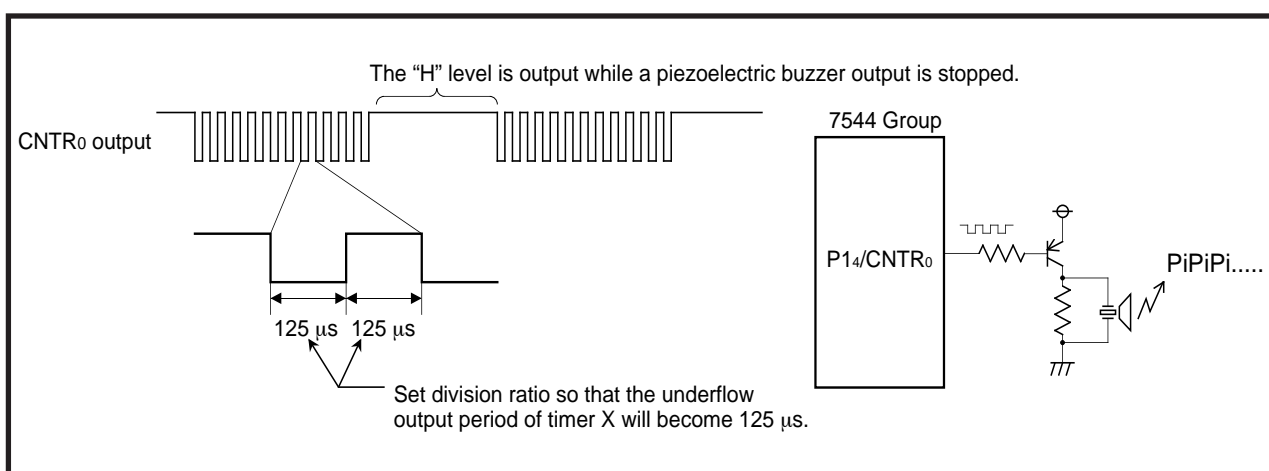


Figure 1 Example of peripheral circuit

### 3.2 Connection of Timer and Setting of Division Ratio

Figure 2 shows the connection of timer and setting of the division ratio.

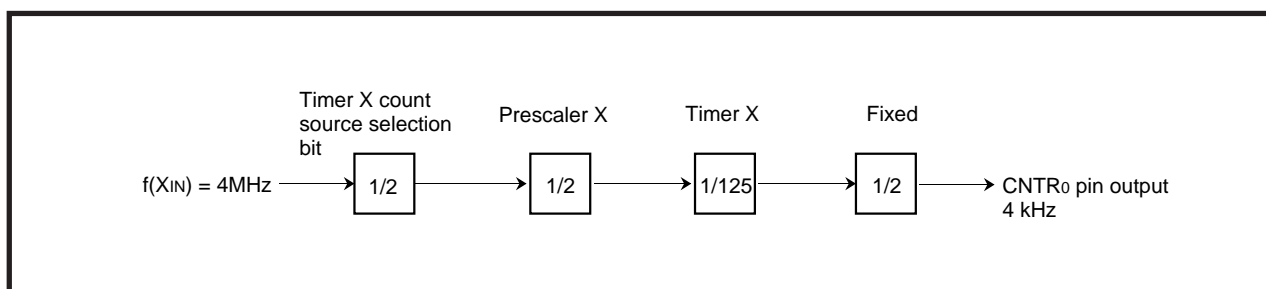


Figure 2 Connection of timer and setting of division ratio

### 3.3 Example of Control Procedure

Figure 3 shows an example of control procedure.

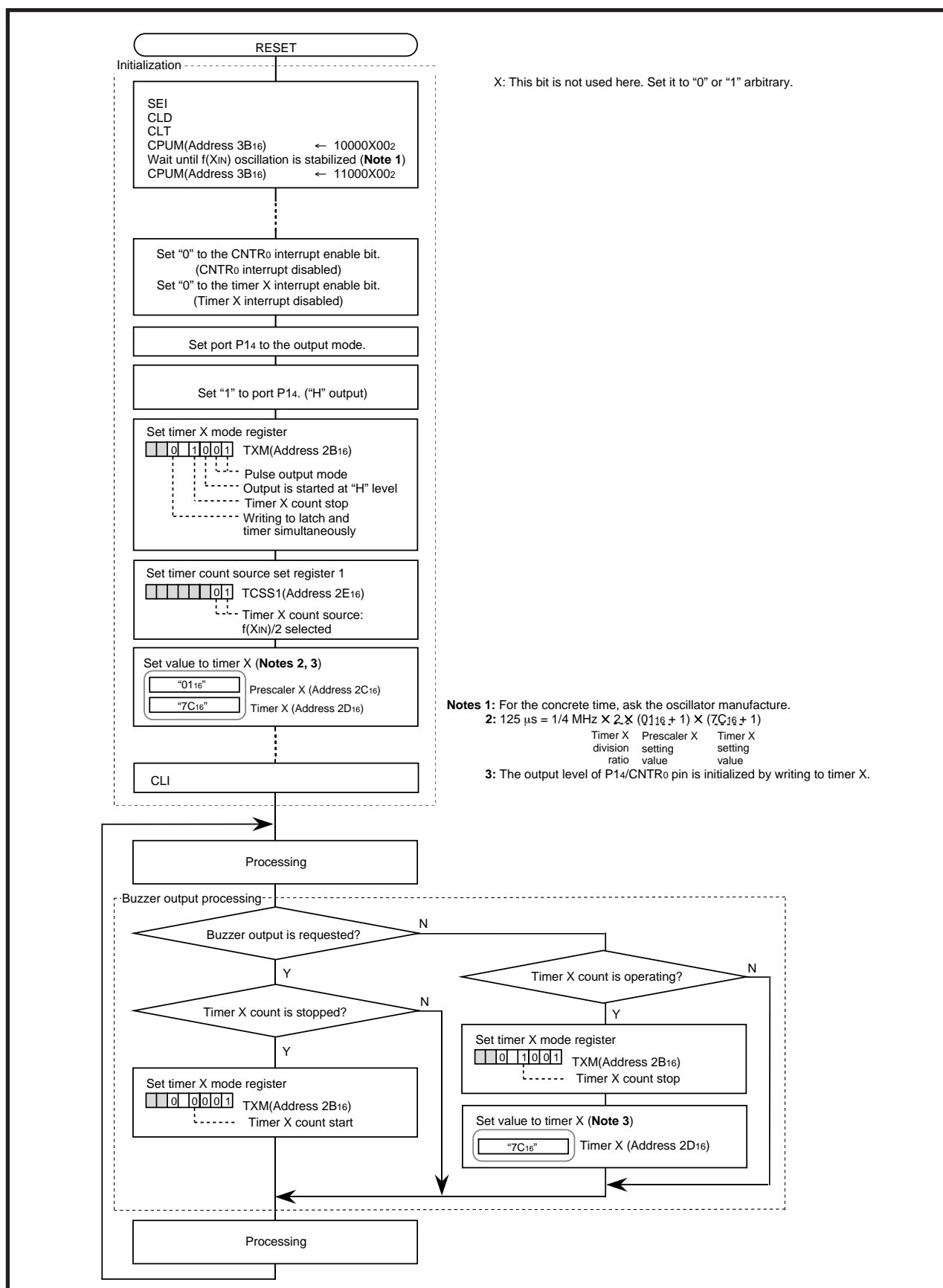


Figure 3 Example of control procedure

## 4. Sample Programming Code

[Reset Start •• Main Routine Process]

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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 #11000000,CPUM      ; Set CPU mode register
;
    LDA #0
    LDX #>RAM_top
RAM_clear: STA $00,X
    INX
    BNE RAM_clear

;
    CLB 5,ICON1              ; CNTR0 interrupt disable
    CLB 7,ICON1              ; TimerX interrupt disable
;
    LDM #00010000,P1D
    SEB P1_4

;
    LDM #00001001,TXM        ; Set Timer X mode register
;
    LDM #00000001,TCSS1      ; select timer X count source : f(Xin)/2
;
    LDM #$01,PREX            ; Set Prescaler X
    LDM #$7C,TX              ; Set Timer X
;

__MAIN:
    BBS f_REQ_BUZZ,__MAIN_00
    BBS 3,TXM,__MAIN_10
    SEB 3,TXM                ; stop timer X count
    LDM #$01,PREX            ; Set Prescaler X
    LDM #$7C,TX              ; Set Timer X
    BRA __MAIN_10

;
__MAIN_00:
    BBC 3,TXM,__MAIN_10
    CLB 3,TXM                ; start timer X count
;
__MAIN_10:
    ;
    ; process
    ;
    BRA __MAIN
;

```

## 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 (Pulse Output Mode)
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		Page	Summary
1.00	Apr 01, 2003	-	First Edition issued
2.00	Nov 12, 2004	4	Sample Programming Code added.

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