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April 1st, 2010
Renesas Electronics Corporation

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7544 Group

I/O Port (Key-on Wake-up)

1. Abstract

The following article introduces and shows an application example of key-on wake up of I/O port (key input interrupt).

2. Introduction

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

Applicable MCU: 7544 Group

3. Contents

3.1 Application Example of Key-on Wake Up (1)

Outline: The built-in pull-up resistor is used.

Specifications: System is returned from the wait mode when the key-on wakeup interrupt occurs

by input of the falling edge to port P0i.

Note: Only the falling edge is active for the key-on wakeup interrupt.

Figure 1 shows an example of application circuit, and Figure 2 shows an example of control procedure.

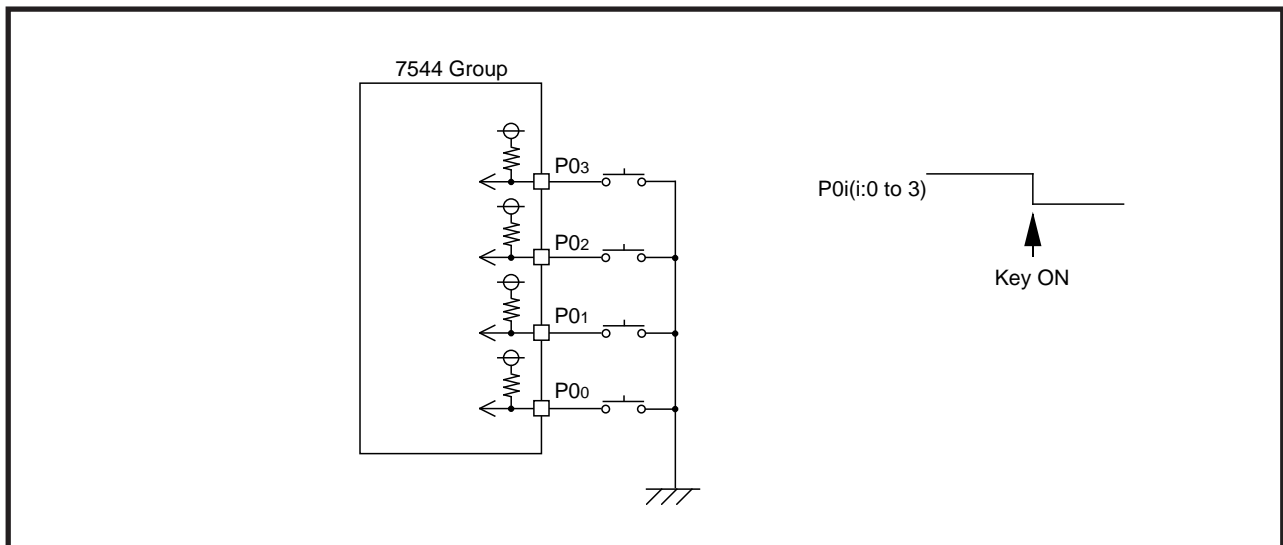


Figure 1 Example of application circuit

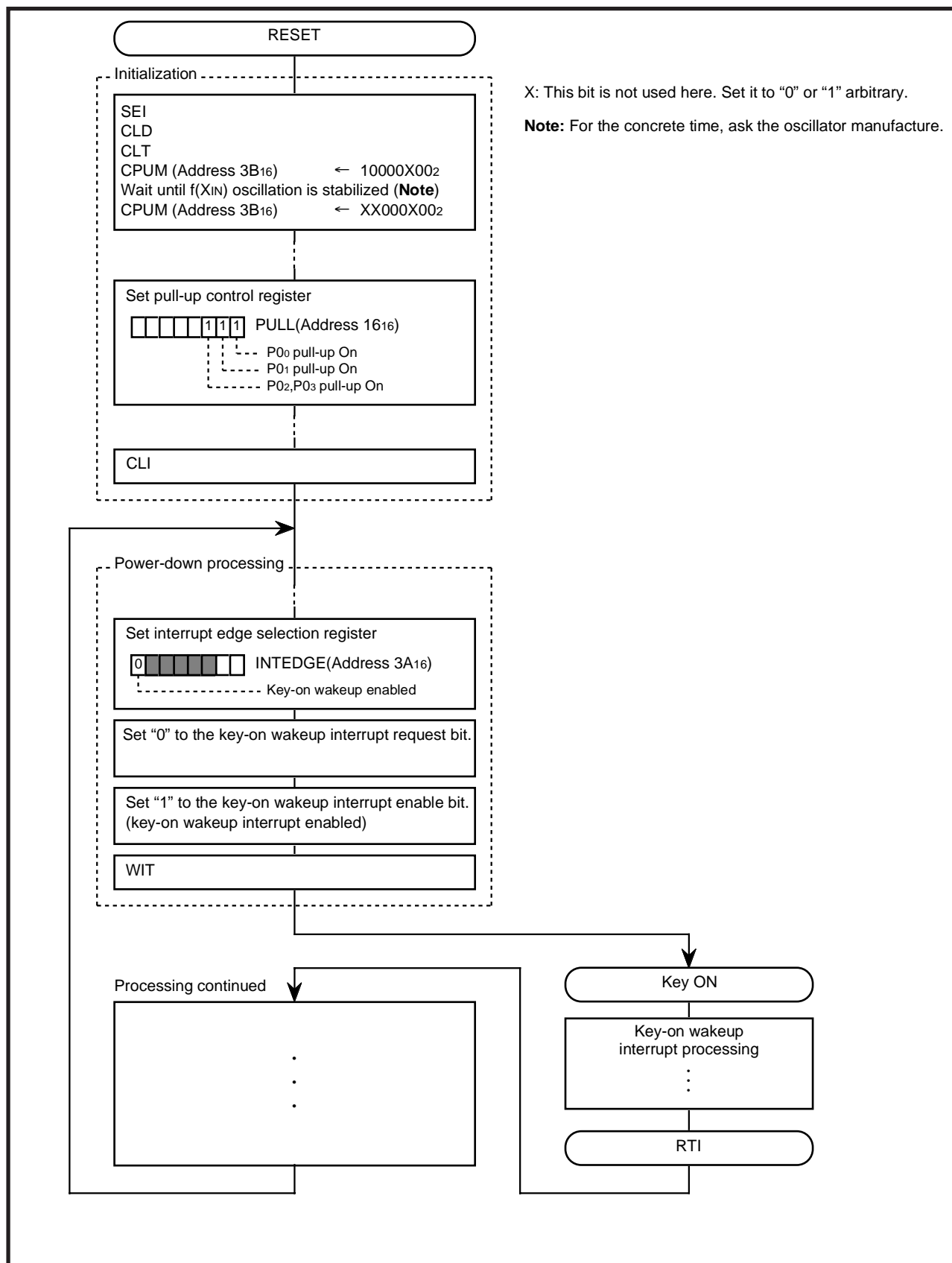


Figure 2 Example of control procedure (1)

3.2 Application Example of Key-on Wake Up (2)

Outline: The key-on wakeup interrupt is used as the normal external interrupt.

Specifications: The key-on wakeup interrupt occurs by input of the falling edge to port P0i.
If necessary, the built-in pull-up resistor is used.

Note: Only the falling edge is active for the key-on wakeup interrupt.

Figure 3 shows an example of control procedure.

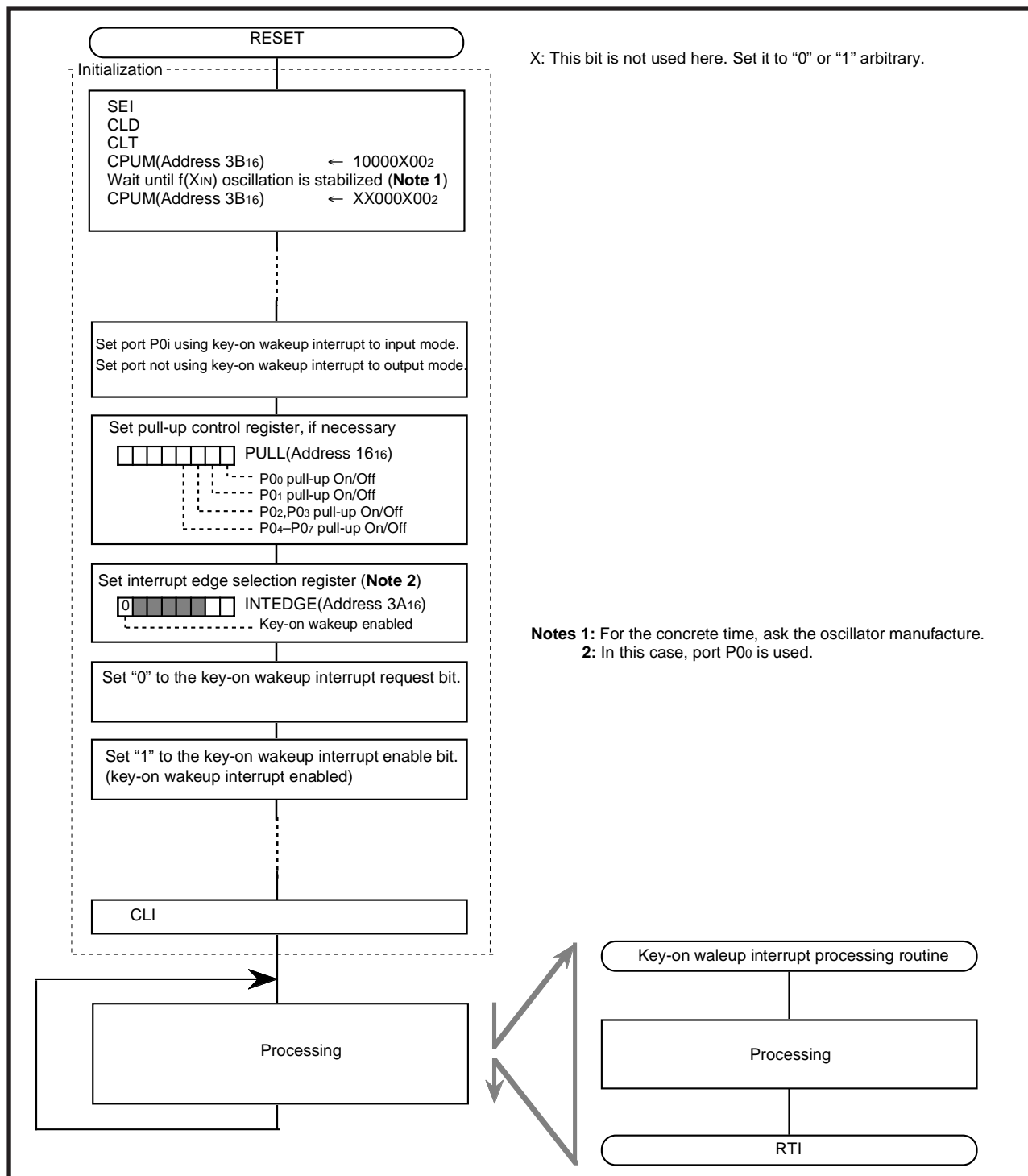


Figure 3 Example of control procedure (2)

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
;
    LDM    #%00000111,PULL            ; set P0_0 to P0_3 pins pull-up
;
    CLI                                ; enable interrupt
;
__MAIN:
    CLB    7,INTEDGE                  ; disable key on wake-up interrupt
    CLB    4,IREQ1                    ; clear key on wake-up interrupt request
    SEB    4,ICON1                    ; enable key on wake-up interrupt
    WIT                                ; enter wait mode

__MAIN_00:
    BBC    KEY_ON_FLAG,__MAIN
;
; Key processing
;
    BRA    __MAIN
;

```

[KEY Interrupt Process]

```

__KEY:
    CLD
    CLT
    PHA
;
    LDA    P0                        ; read Port P0 register
    AND    #%00001111
    CMP    #%00001111
    BNE    KEY_01                    ; key input? -> yes
    CLB    KEY_ON_FLAG                ; key on flag clear
    BRA    __KEY_02
;
__KEY_01:
    STA    KEY_CODE
    SEB    KEY_ON_FLAG                ; set Key on flag
;
__KEY_02:
;
    PLA
    RTI
;

```

Figure 4 Sample Programming Code for Application Example of Key-on Wakeup (1)

[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
;
    LDM  #00000000,P0
    LDM  #11110000,P0D                ; set P0 direction register
                                        ; use P0_0 to P0_3 pins key on wake-up interrupt
    LDM  #00000111,PULL               ; set P0_0 to P0_3 pins pull-up
    CLB  7,INTEDGE                    ; enable P0_0 key on wake-up
    CLB  4,IREQ1                      ; clear key on wake-up interrupt request
    SEB  4,ICON1                      ; enable key on wake-up interrupt
;
    CLI                                ; enable interrupt

; -----
__MAIN:
;
; process
;
    BRA  __MAIN

[KEY Interrupt Process]
__KEY:
    CLD
    CLT
    PHA
;
    LDA  P0                          ; read Port P0 register
    AND  #00001111
    CMP  #00001111
    BNE  __KEY_01                    ; key input? -> yes
    CLB  KEY_ON_FLAG                 ; key on flag clear
    BRA  __KEY_02
;
__KEY_01:
    STA  KEY_CODE
    SEB  KEY_ON_FLAG                ; set Key on flag
;
__KEY_02:
;
    PLA
    RTI
;

```

Figure 5 Sample Programming Code for Application Example of Key-on Wakeup (2)

5. Reference

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

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REVISION HISTORY	7544 Group I/O Port (Key-on Wake-up)
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Rev.	Date	Description	
		Page	Summary
1.00	Apr 01, 2003	-	First Edition issued
2.00	Nov 12, 2004	5-6	Sample Programming Code added.

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