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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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## 38C2 Group

### Timer 1 Operation (Timer Mode: Measurement of 1 second)

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#### 1. Abstract

The following article introduces and shows an example of how to use the Timer 1 Operation (Timer Mode: Measurement of 1 second) on the 38C2 group device.

#### 2. Introduction

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

Applicable MCU: 38C2 Group

Oscillation frequency: 32.768kHz

In this sample program, the bit of the function which is not used may be operated on account of bit arrangement of SFR. Please set these setting values according to the use situation of a user system.

3. Contents

3.1 Measurement of 1 second

Outline: The clock is divided by the timer so that the clock can count up at 1-second intervals.

Specifications:

- The clock  $f(XCIN) = 32.768\text{kHz}$  is divided by the timer 1.
- The number of interrupt is counted up in the timer 1 interrupt routine which occurs at 7.8125ms intervals (1-second counter).
- Main routine examines the 1-second counter. If the counter reaches 1 second, the main routine updates the clock counter.

Figure 3.1 shows the Timers Connection and Division Ratios; Figure 3.2 shows the Relevant Registers Setting; Figure 3.3 shows the Control Procedure.

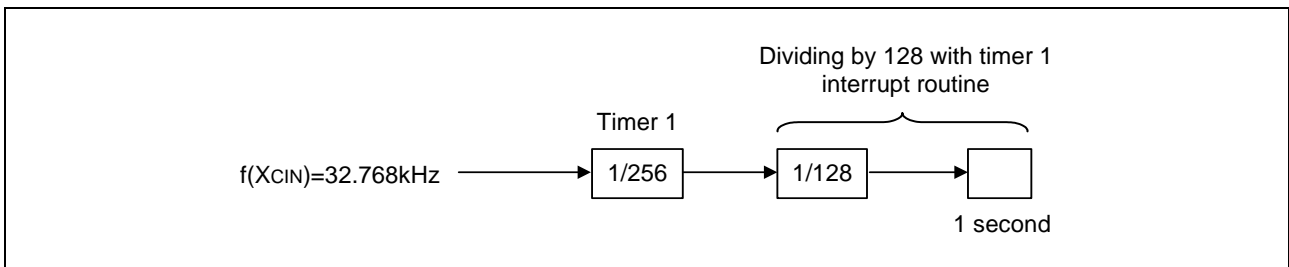


Figure 3.1 Timers Connection and Division Ratios

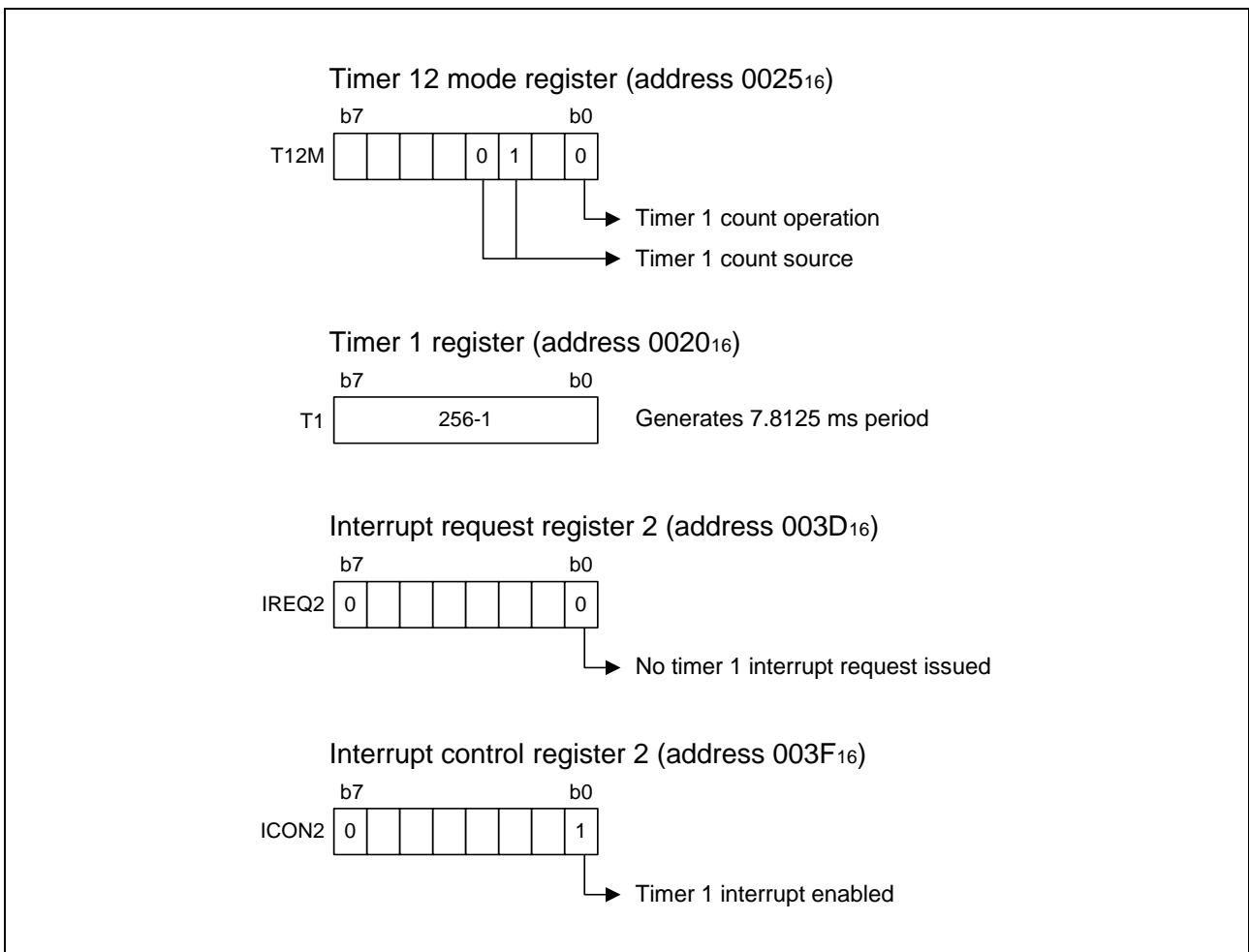


Figure 3.2 Relevant Registers Setting

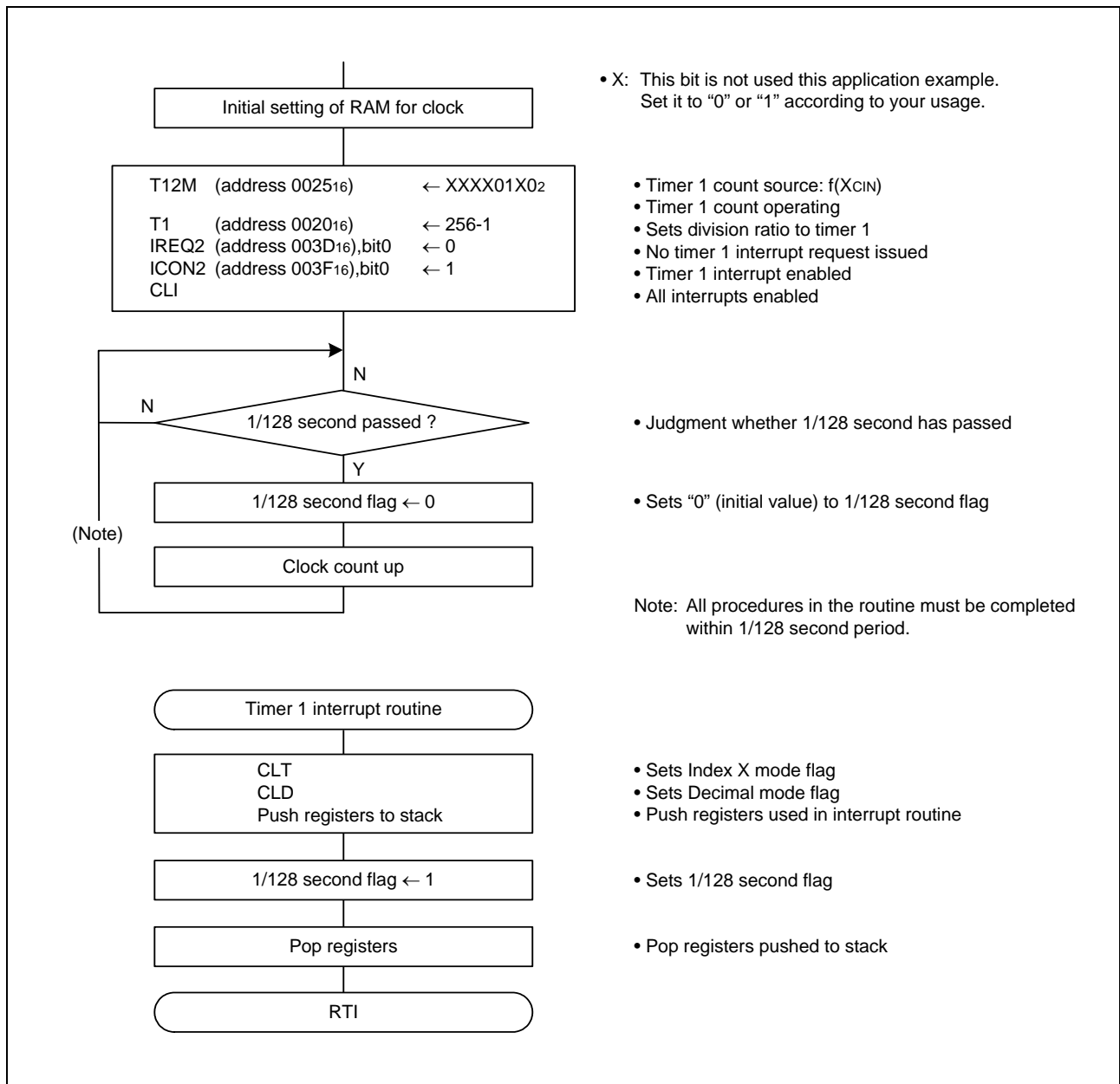


Figure 3.3 Control Procedure

#### 4. Sample Programming Code

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[Initial setting of RAM for clock]
LDA #0
STA C_BASE           ;Set BASE counter
STA C_SEC           ;Set 1sec. counter
STA C_MIN           ;Set 1min. counter
STA C_HOUR          ;Set 1hour counter
SEB F_CLOCKup       ;Set 1/128 sec FLAG

[Setting of control register]
LDM #00000100,T12M   ;Set Timer 12 mode register
LDM #256-1,T1        ;Set Timer 1
LDM #00000000,IREQ2  ;Timer1 interrupt request clear
LDM #00000001,ICON2  ;Timer1 interrupt enable
CLI                  ;interrupt enable

[Main routine]
__MAIN:
BBC F_CLOCup,__MAIN ;Clock Up?
CLB F_CLOCup        ;Clear 1/128 sec FLAG
INC C_BASE          ;increment BASE counter

LDA C_BASE
CMP #128            ;1sec?
BNE __MAIN         ;no >>
;
LDM #0,C_BASE
INC C_SEC           ;increment 1sec.counter
LDA C_SEC
CMP #60            ;1min?
BCC __MAIN         ;no >>
;
LDM #0,C_SEC
INC C_MIN           ;increment 1min.counter
LDA C_MIN
CMP #60            ;1hour?
BCC __MAIN         ;no >>
;
LDM #0,C_MIN
INC C_HOUR          ;increment 1hour counter
LDA C_HOUR
CMP #24            ;1day?
BCC __MAIN         ;no >>
;
LDM #0,C_HOUR
BRA __MAIN

[Timer 1 interrupt processing]
__INT_timer1:
CLT
CLD
;
SEB F_CLOCKon       ;SET 1/128 sec FLAG
;
__INT_t1_E:
RTI
    
```

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## 5. Reference

Renesas Technology Corporation Semiconductor Home Page  
<http://www.renesas.com>

E-mail Support  
E-mail: [support\\_apl@renesas.com](mailto:support_apl@renesas.com)

Data Sheet  
38C2 Group (A version) Data sheet  
(Use the latest version on the home page: <http://www.renesas.com>)

REVISION HISTORY	38C2 Group Timer 1 Operation (Timer Mode: Measurement of 1 second)
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Rev.	Date	Description	
		Page	Summary
1.00	Sep 25, 2004	-	First Edition issued



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