To our customers,

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April 1st, 2010
Renesas Electronics Corporation

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1.0 Abstract
In timer mode, choose functions from those listed in Table 1. Operations of the circled items are described below.

<table>
<thead>
<tr>
<th>Item</th>
<th>Set-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>Count source</td>
<td>O Internal count source(f1 / fs / f32 / fc32)</td>
</tr>
<tr>
<td>Pulse output function</td>
<td>O No pulses output</td>
</tr>
<tr>
<td>Gate function</td>
<td>O No gate function</td>
</tr>
<tr>
<td></td>
<td>Performs count only for the period in which the TAiIN pin is at “L” level</td>
</tr>
<tr>
<td></td>
<td>Performs count only for the period in which the TAiIN pin is at “H” level</td>
</tr>
</tbody>
</table>

Figure 1 shows the operation timing.
3.0 Set-up procedure

Selecting timer mode and functions

<table>
<thead>
<tr>
<th>b7 b6 b5 b4 b3 b2 b1 b0</th>
<th>Count source</th>
<th>Count source period</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>$f(XIN)$</td>
<td>20 MHz</td>
</tr>
<tr>
<td>0</td>
<td>$f(XCIN)$</td>
<td>32.768 kHz</td>
</tr>
<tr>
<td>0 1</td>
<td>$f_1$</td>
<td>50 ns</td>
</tr>
<tr>
<td>0 1</td>
<td>$f_2$</td>
<td>400 ns</td>
</tr>
<tr>
<td>1 0</td>
<td>$f_32$</td>
<td>1.6 µs</td>
</tr>
<tr>
<td>1 1</td>
<td>$f_{C32}$</td>
<td>976.56 µs</td>
</tr>
</tbody>
</table>

Gate function select bit
- 1 1 : Timer counts only when $TA^IN$ pin is held “H” (Note)
- 0 (Must always be “0” in timer mode)

Count source select bit
- 0 0 : $f_1$
- 0 1 : $f_2$
- 1 0 : $f_{32}$
- 1 1 : $f_{C32}$

Note: Set the corresponding function select register $A_i$ to I/O port and port direction register to “0”.

Setting divide ratio

Setting clock prescaler reset flag

This function is effective when $f_{C32}$ is selected as the count source. Reset the prescaler for generating $f_{C32}$ by dividing the $X_{CIN}$ by 32.

Setting count start flag

Start count
4.0 Programming Code

;**************************************************************************************
; M16C/80 Program Collection
;
; FILE NAME : rj05b0123_src.a30
; CPU : M16C/80 Group
; FUNCTION : Operation of Timer A
; (timer mode, gate function)
; HISTORY : 2003.06.16  Ver 1.00
;
; Copyright(C)2003, Renesas Technology Corp.
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;
;**************************************************************************************

; Include
;**************************************************************************************

.LIST OFF ;Stops outputting lines to the assembler list file
.INCLUDE sfr80100.inc ;Reads the file that defined SFR
.LIST ON ;Starts outputting lines to the assembler list file

;**************************************************************************************

Symbol definition

;**************************************************************************************

ROM_TOP .EQU 0FFC000H ;Start address of ROM
FIXED_VECT_TOP .EQU 0FFFFDCH ;Start address of fixed vector

;**************************************************************************************

Program area

;**************************************************************************************

Start up

;**************************************************************************************

.RESET:

; Sets Processor mode, System clock and Main clock division
MOV.B #03H, prcr ;Removes protect
MOV.B #10000000B, pm0 ; Single-chip mode
MOV.B #11000000B, pm1 ; Flash memory version
MOV.B #00001000B, cm0 ; Xcin-Xcout High
MOV.B #00100000B, cm1 ; Xin-Xout High
MOV.B #00010010B, mcd ; No division mode
MOV.B #00H, prcr ; Protects all registers

;
Operation of Timer A (timer mode, gate function)

;-------------------------------------------------------------------------------
; TimerA (timer mode, gate function selected)
;-------------------------------------------------------------------------------

; Selecting timer mode and functions
MOV.B  #01011000B, ta1mr
;          ||||++---------;Selection of timer mode
;          |||||+-----------;This bit is invalid in M16C/80 series
;          |||||+------------;Gate function select bit
;          |||||               (1;Timer counts only when TAiIN pin is held "H") (Note)
;          ||||+--------------;Must always be "0" in timer mode
;          ||+---------------;Count source (01:f8)
; (Note) Sets the corresponding function select register A to I/O port and
; port direction register to "0"
BCLR   pd7_3          ;Port P73 direction register
BCLR   psl_3          ;Port P73 is I/O port
; Setting divide ratio
MOV.W   #2500-1, ta1  ;(1msec @20MHz, f8)
; Setting clock prescaler reset flag
; (This function is effective when fC32 is selected as the count source)
MOV.B   #00000000B, cpsrf
;          +----------------;Clock prescaler reset flag (0:No effect)
; Setting count start flag
MOV.B   #00000010B, tabsr
;          +----------;Timer A1 count start flag

MAIN:
    JMP   MAIN
;
;-------------------------------------------------------------------------------
; Dummy interrupt processing program
;-------------------------------------------------------------------------------
dummy: REIT
;
;-------------------------------------------------------------------------------
; Setting of fixed vector
;-------------------------------------------------------------------------------

.SECT    F_VECT, ROMDATA
.ORG     FIXED_VECT_TOP

.LWORD    dummy    ;Undefined instruction
.LWORD    dummy    ;Overflow
.LWORD    dummy    ;BRK instruction execution
.LWORD    dummy    ;Address match
.LWORD    dummy    ;
.LWORD    dummy    ;Watchdog timer
.LWORD    dummy    ;
.LWORD    dummy    ;NMI
.LWORD    RESET    ;Reset

.END
5.0 Reference
Renesas Technology Corporation Semiconductor Home page
http://www.renesas.com/

Technical Support
E-mail: support_apl@renesas.com

Data Sheet
M16C/80 group Rev. E3
(Use the latest version on the Home page: http://www.renesas.com/)

User's Manual
M16C/80 group Rev. B
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