

#### **Description**

The 8-bit timer/event counter (TM1) in the  $\mu$ PD7805x/ $\mu$ PD78005x subseries can be used as an interval timer, external event counter, or square-wave output.

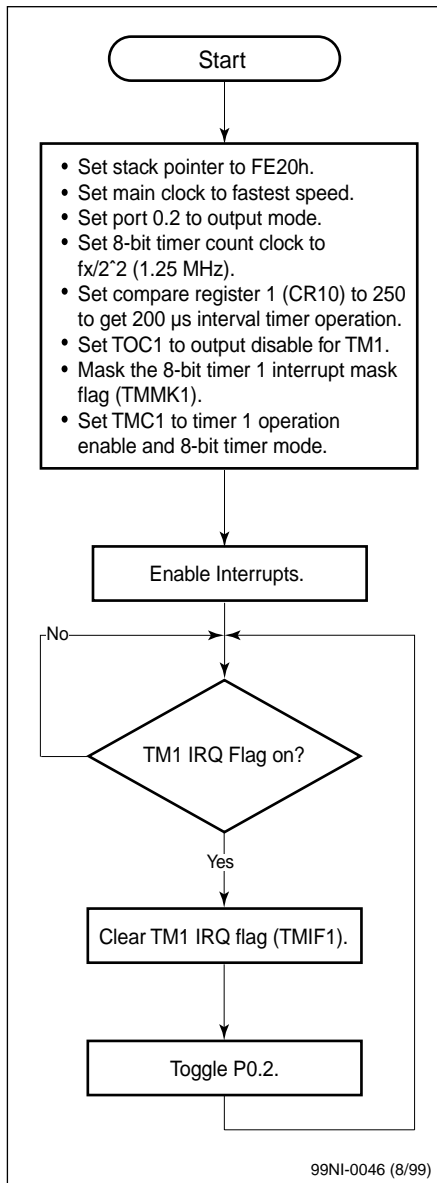
This program demonstrates how TM1 operates in interval timer mode. When the count value of TM1 matches the value set to the 8-bit compare register (CR10), the interrupt request flag (TMIF1) is set to 1 and counting continues with TM1 cleared to 0.

This program does not use an interrupt service routine. Instead, a loop polls the interrupt request flag (TMIF1) that toggles the port pin 0.2.

#### **Program Specifications**

- Interval time: 200  $\mu$ s
- Interrupt handling: polling the timer interrupt flag
- Pins used in program: P02/INTP2 (port pin toggles every 100  $\mu$ s)

Flowchart



### Assembly Language Program

```

;*****
; Date:      06/4/1999
;
; Parameters: - fastest CPU clock
;              (fx = 5.00 MHz; 1 CPU clock cycle = 200 ns)
;              - 200 ms interval time
;              - count clock is fx (1.25 MHz)
;              - interrupt polling method
;              - port 0.2 toggles every 200 µs
;*****

;=====
;=      Specify Interrupt Vectors      =
;=====

RES_VEC      CSEG AT 0000h              ; Set main program start vector
              DW      Start

;=====
;=      Main Program                    =
;=====

MAIN         CSEG
Start:       DI                          ; Disable interrupts
              MOVW   AX, #0FE20h         ; Load SP address
              MOVW   SP, AX              ; Set Stack Pointer
              MOV    OSMS,#01h           ; Don't use scaler
              MOV    PCC, #00h           ; Main system clock at fastest setting
              CLR1   P0.2                 ; Latch port 0.2 low
              CLR1   PM0.2                ; Set port 0.2 output mode
              MOV    TCL1,#07h            ; Select counter clock to fx (1.25 MHz)
              MOV    CR10,#250            ; Set Compare register to 250 for 200 µs interval
              MOV    TOC1,#00h            ; Disable output function
              MOV    TMC1,#01h            ; Set to TM1 operational enable and
              ; 8-bit timer mode
              SET1   TMMK1                ; Mask the 8-bit timer 1 interrupt bit
              EI                          ; Enable interrupts
Loop1:       BF     TMIF1,$$              ; Wait for TM1 IRQ flag on
              CLR1   TMIF1                ; Clear TM1 IRQ flag
              XOR    P0,#04h              ; Toggle port 0.2
              BR     $Loop1                ; Branch back to Loop1
              END

```

## C Language Program

```

/*****
; Date:          06/4/1999
;
; Parameters:   - fastest CPU clock
;                (fx = 5.00 MHz; 1 CPU clock cycle = 200 ns)
;                - 200 ms interval time
;                - count clock is fx (1.25 MHz)
;                - interrupt polling method
;                - port 0.2 toggles every 200 µs
; *****/

/* extension functions in K0/K0S compiler */
#pragma sfr /* key word to allow SFR names in C code */
#pragma EI /* key word for EI instruction in C code */

/*;=====
;=      Constants/Variables          =
;=====*/
#define TRUE      1
#define FALSE     0

/*=====
;=      Main Program                  =
;=====*/

void main(void)
{
    OSMS = 0x01;          /* Don't use scaler */
    PCC = 0x00;          /* Main system clock at fastest setting */
    P0.2 = 0;           /* Latch port 0.2 low */
    PM0.2 = 0;          /* Set port 0.2 Output mode */
    TCL1 = 0x07;        /* Select counter clock to fx(1.25 MHz) */
    CR10 = 250;         /* Set Compare register to 250 for 200 µs interval */
    TOC1 = 0x00;        /* Disable output function */
    TMC1 = 0x01;        /* Set TMC1 to TM1 operational enable and 8-bit timer mode */
    TMMK1 = 1;          /* Mask the 8-bit timer 1 interrupt mask bit */
    EI();               /* Enable interrupts */
    while( TRUE)        /* beginning of while loop */
    {
        while( !TMIF1); /* Wait for TM1 IRQ flag on */
        TMIF1 = 0;      /* Clear TM1 IRQ flag */
        P0 ^= 0x04;     /* toggle port 0.2 */
    }                  /* end of while(TRUE) */
}                      /* end of function main() */

```



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