NEC

8-Bit Timer 1 (TM1) in Square-Wave Output Mode

On-Chip Peripheral Program Example August 1999

Description

The 8-bit timer/event counter 1 (TM1) in the μPD7805x/μPD78005x subseries can be used as an interval timer, external event counter, or square-wave output.

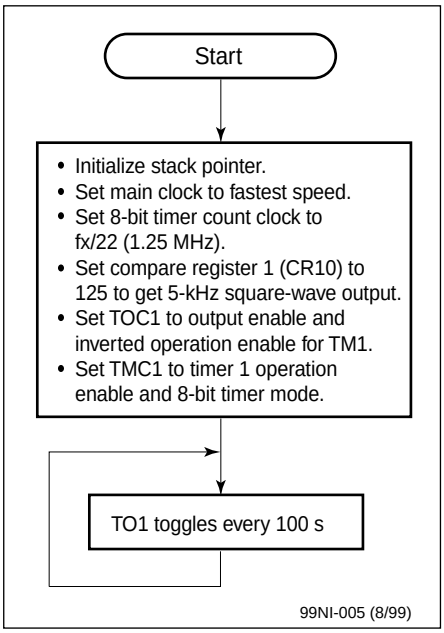
This program demonstrates how the 8-bit timer/event counter operates in square-wave output mode. When the count value of the 8-bit timer register (TM1) matches the value set to the 8-bit compare register (CR10), the timer output control (TO1/P31) toggles, an interrupt request signal (INTTM1) is generated (but not needed in this example program), and counting continues with the 8-bit timer register (TM1) cleared to 0.

This program uses the timer output (TO1/P31) and does not use the interrupt request.

Program Specifications

- Count clock frequency: 1.25 MHz at 5 MHz main system clock
- Square wave frequency: 5 kHz (200 μs period)
- Pins used in program: TO1/P31
- 5-kHz square-wave signal

Flowchart



Assembly Language Program

```
;*********************************************************************
; Date:       06/02/1999
;
; Parameters: - fastest CPU clock
;               (fx = 5.00MHz, 1 CPU clock cycle = 200 ns)
;             - count clock: fx(1.25 MHz)
;             - square wave frequency: 5 kHz(200 µs period)
;             - output port: TO1 (P31)
;*********************************************************************

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

RES_VEC      CSEG   AT 0000h     ; Set main program start vector
DWStart

;=======================================
;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   P3.1         ; Set port 3.1 latch (P31/TO1) output low
             CLR1   PM3.1        ; Set port 3.1 to output mode
             MOV    TCL1,#07h    ; Select counter clock to fx(1.25 MHz)
             MOV    CR10,#125    ; Set Compare register to 125 for
                                 ; 5 kHz (200 µs) square-wave output
             MOV    TOC1,#03h    ; TM1 output enable and inverted operation on TM1 enable
             MOV    TMC1,#01h    ; Set TM1 operational enable and 8-bit timer mode
Loop1:       BR     $Loop1       ; Endless loop
             END
```

C Language Program

```
/*****************************************************************
; Date:       06/02/1999
;
; Parameters: - fastest CPU clock
;               (fx=5.00MHz, 1 CPU clock cycle = 200 ns)
;             - count clock: fx(1.25 MHz)
;             - square wave frequency: 5 kHz(200 µs period)
;             - output port: TO1 (P31)
;*****************************************************************/
/* extension functions in K0/K0S compiler */
#pragma sfr               /* key word to allow SFR names 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 */
       P3.1 = 0;           /* Set port 3.1 latch (P31/TO1) output low */
       PM3.1 = 0;          /* Set port 3.1 to output mode */
       TCL1 = 0x07;        /* Select counter clock to fx(1.25 MHz) */
       CR10 = 125;         /* Set Compare register to 125 for
                              5 kHz (200 µs) square-wave output */
       TOC1 = 0x03;        /* TM1 output enable and inverted operation on TM1 enable */
       TMC1 = 0x01;        /* Set TM1 operational enable and 8-bit timer mode */
       while(TRUE);        /* Endless loop */
 }
```

NEC

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