

Using the PFD Function in the HT49 MCU Series

D/N : HA0039E

Introduction

This application gives an introduction how to use the PFD function the HT49 MCU Series.

Each device in the HT49 series contains a PFD (Programmable Frequency Divider) function. The PFD output pin is shared with I/O pin PA3, the required function of which is chosen via a configuration option.

After the configuration options has been chosen to select the PFD function, setting bit PA3 to "0" using the CLR PA.3 instruction will activate the PFD output. Setting the PA3 bit to a "1" using the SET PA.3 instruction will turn off the PFD output and the PA3 output will remain at a low level. The clock source for the PFD output is the overflow signal of the timer/counter.

PA3	Function Description
0 (CLR PA.3)	PA3=PFD output
1 (SET PA.3)	PA3=0

PFD output frequency = $(1/2) \times (1/\text{timer overflow cycle})$

The maximum PFD output frequency can be obtained from the formula above. If the initial value of the timer/counter is 0FFH and if the clock source is the system clock of frequency 1000kHz, the PFD output frequency is 500kHz.

Using the PFD

The following example uses counter 1 as the PFD clock source.

Setting the Configuration Options

PFD output configuration: Enable PA3 as a PFD output

Choose crystal oscillator as the clock source: set RC/XTAL as XTAL

System frequency: 2000kHz

Counter 1 PFD output: set the TMR1 PFD Output as Enable

Software Description

The PFD output frequency is determined from the timer/counter overflow cycle, therefore different timer initial values will result in different PFD output frequencies.

Ex. To obtain a 10kHz square wave signal, use the following PFD frequency formula:

$$10000 = (1/2) \times (1/\text{counter overflow cycle})$$

Result: counter overflow cycle= 0.05ms

Timer/counter initial value = $256 - (0.00005 \times 2000000/4) = 231$ (Divide by 4 because the clock source of the counter is the instruction clock.)

Program List :

```
include ht49r50a-1.inc
;-----
code .section at 0 'code'
      org      00h
      jmp      start
;-----
start:
      clr      intc0
      clr      intc1
      mov     a,0a0h      ;timer/counter clock source is the
                        ;system clock/4
      mov     tmr1c,a     ;set the timer/counter to the time mode
      mov     a,(256-25)  ;set the counter initial value
      mov     tmr1,a
      clr     pa.3        ;open PFD output
      set     tmr1c.4     ;open timer/counter
      jmp     $
;-----
```

The result of the program is that a 10kHz square wave will be generated on pin PA.3.