

# Using the RTC in the HT49 MCU Series

D/N : HA0024E

## Introduction

The HT49R50A-1 Series provides a real-time clock, RTC, whose function is to generate an internal periodic interrupt signal. The internal clock source  $f_s$  can originate from three different sources, either from WDT, RTC or system clock divided by 4 (instruction clock), the choice of which is determined by the clock source configuration option. If the internal clock source  $f_s$  is from the WDT or RTC, the real-time clock still remains operational even when the microcontroller is in the HALT state; its overflow frequency ranges from  $f_s/2^8$  to  $f_s/2^{15}$ . The clock source is further divided to give longer time-out values. The division ratio can be selected by writing data to the RTCC register to yield various time-out periods. The RTC time-out signal can also be applied to be a clock source of the Timer/Event Counter 0 to obtain longer time-out periods. If an RTC time-out occurs, a related interrupt request flag is set. But if the RTC is enabled and the stack is not full, the program will branch to address 18H to execute an interrupt subroutine.

RT2	RT1	RT0	RTC Frequency	Clock Source				
				WDT(12kHz)	RTC(32.768kHz)	System Clock/4		
						1MHz/4	2MHz/4	3MHz/4
0	0	0	$f_s/2^8$	46.8750Hz	128Hz	976.5625Hz	1953.1250Hz	3906.2500Hz
0	0	1	$f_s/2^9$	23.4375Hz	64Hz	488.2813Hz	976.5625Hz	1953.1250Hz
0	1	0	$f_s/2^{10}$	11.7188Hz	32Hz	244.1406Hz	488.1406Hz	976.5625Hz
0	1	1	$f_s/2^{11}$	5.8594Hz	16Hz	122.0703Hz	244.0703Hz	488.1406Hz
1	0	0	$f_s/2^{12}$	2.9297Hz	8Hz	61.0352Hz	122.0703Hz	244.0703Hz
1	0	1	$f_s/2^{13}$	1.4648Hz	4Hz	30.5176Hz	61.0352Hz	122.0703Hz
1	1	0	$f_s/2^{14}$	0.7324Hz	2Hz	15.2588Hz	30.5176Hz	61.0352Hz
1	1	1	$f_s/2^{15}$	0.3662Hz	1Hz	7.6294Hz	15.2588Hz	15.2588Hz

**Note:**  $f_s$  = Clock source

On the table, RT0, RT1, RT2 are bits 0, 1 2 of the RTCC (09H) control register

## Program Example

Program description: This program is to generate a skinny light function, each time there's an RTC interrupt, an LED subsequently lights up.

- Options

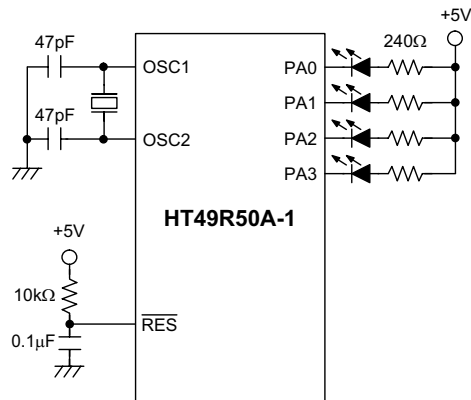
Clock Source: Select WDT clock source

- Program explanation

The overflow frequency is  $\text{clock}/2^{15}$  or  $f_S/2^{15}$ .

Since this program has not changed the RTCC register value, therefore the overflow period is  $T=1/(32768/2^{15})=1\text{sec}$

## Application Circuit



```

;-----
;FILE NAME : RTC.ASM
;Author : 阮欽
;Purpose : Demonstrate how to use the HT49 Series RTC function
; ; ;
;-----
include ht49r50a-1.inc
code      .section at 0h 'code'
          org      00h
          jmp      start
          org      18h
          jmp      rtc          ;RTC interrupt service subroutine
;-----
          org      20h
start :
          mov      a,77h
          mov      pa,a          ;initial Port A
          set      intc0.0        ;enable Global interrupt
          set      intc1.2        ;enable real time clock interrupt

```

```
        jmp    $           ;wait interrupt
rtc:
        rl    pa           ;Port A contents shift left
        reti
        ;-----
        end
        ;-----
```