

微處理機與介面技術

Lab3-ADC

ADC - Analog-to-Digital Converter

- ADC pins: ADC0~7 (GPA0~7)
- 12 bits resolution with 8 input channels
- Operation mode:
 - Single mode
 - Single-cycle scan mode
 - Continuous scan mode

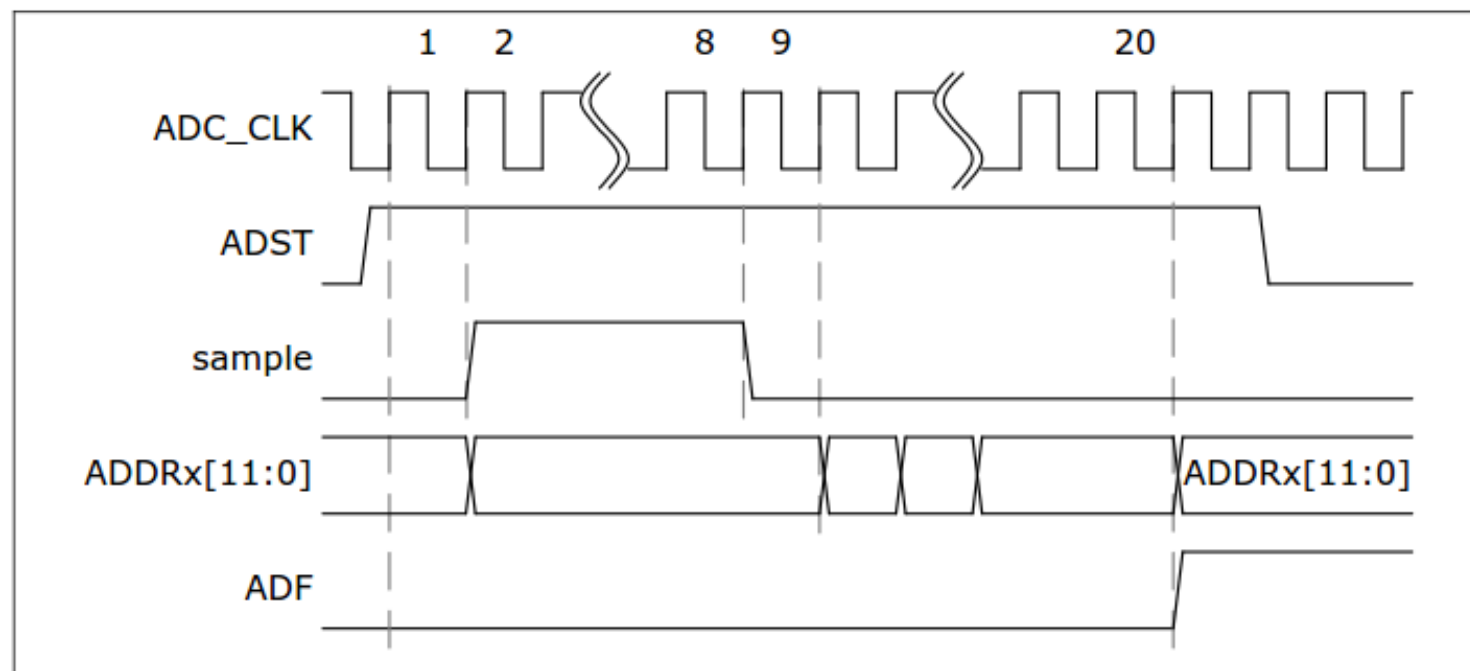


Figure 5-101 Single Mode Conversion Timing Diagram

ADC register configuration

- Enable & Select ADC clock source(in SYSinit)
- Configure ADC modules(in SYSinit)
- Set the ADC operation mode (ADCR.ADMD & ADEN)
- Select ADC channels (ADCHER)
- Enable ADC interrupt (ADCR.ADIE)(or just use polling)
- Start A/D Conversion (ADCR.ADST)

A/D Control Register (ADCR)

Register	Offset	R/W	Description	Reset Value
ADCR	ADC_BA+0x20	R/W	ADC Control Register	0x0000_0000

31	30	29	28	27	26	25	24
DMOF	Reserved						
23	22	21	20	19	18	17	16
Reserved							
15	14	13	12	11	10	9	8
Reserved				ADST	DIFFEN	PTEN	TRGEN
7	6	5	4	3	2	1	0
TRGCOND		TRGS		ADMD		ADIE	ADEN

[3:2]

ADMD

A/D Converter Operation Mode

00 = Single conversion

01 = Reserved

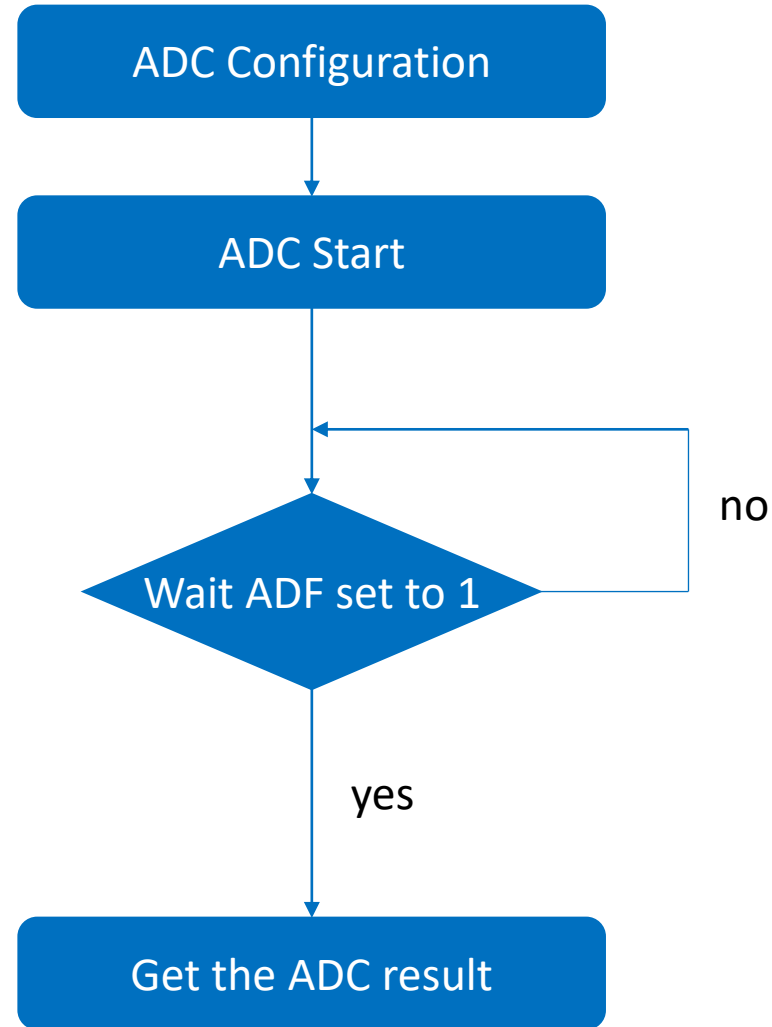
10 = Single-cycle scan

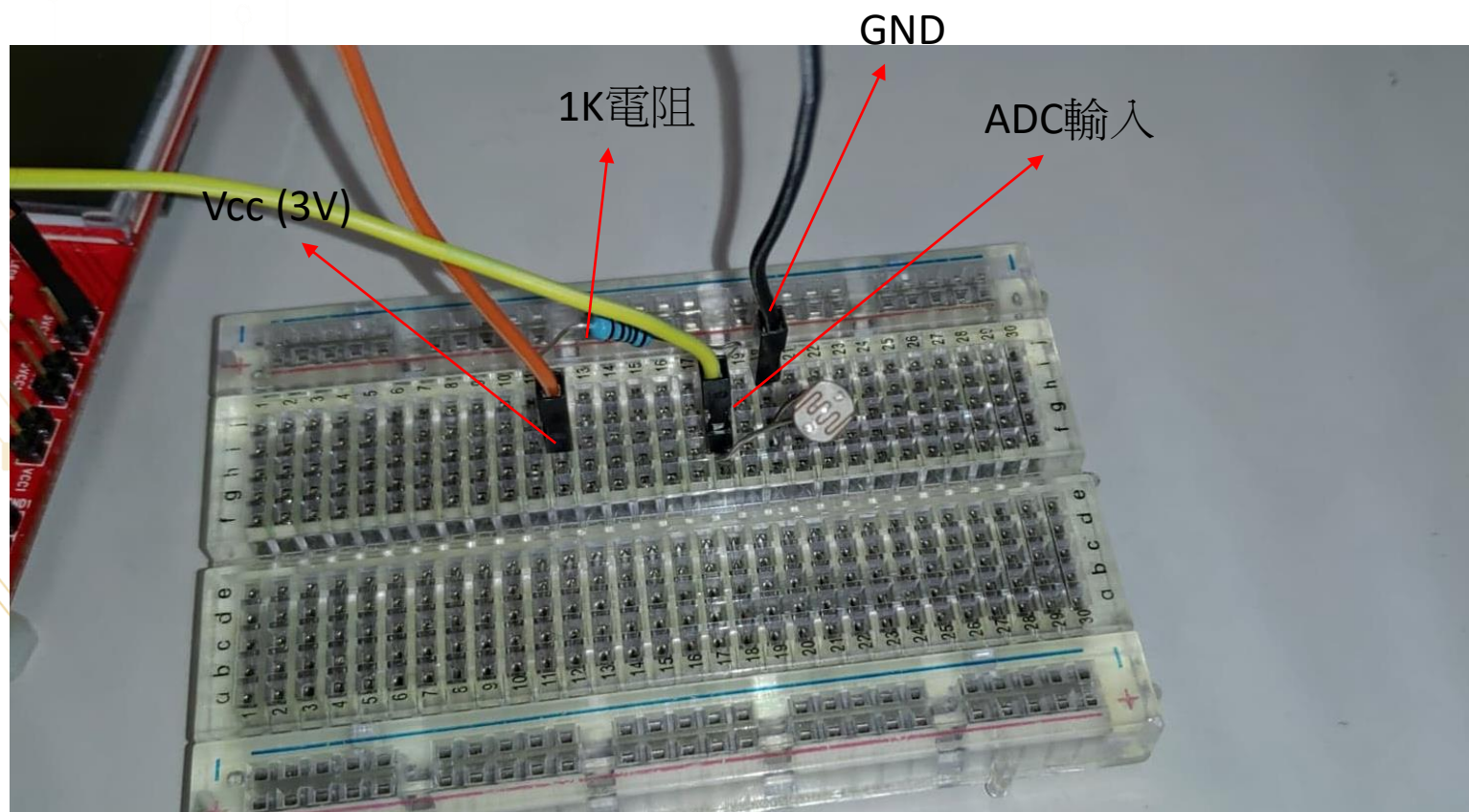
11 = Continuous scan

When changing the operation mode, software should disable ADST bit firstly.

ADC operation

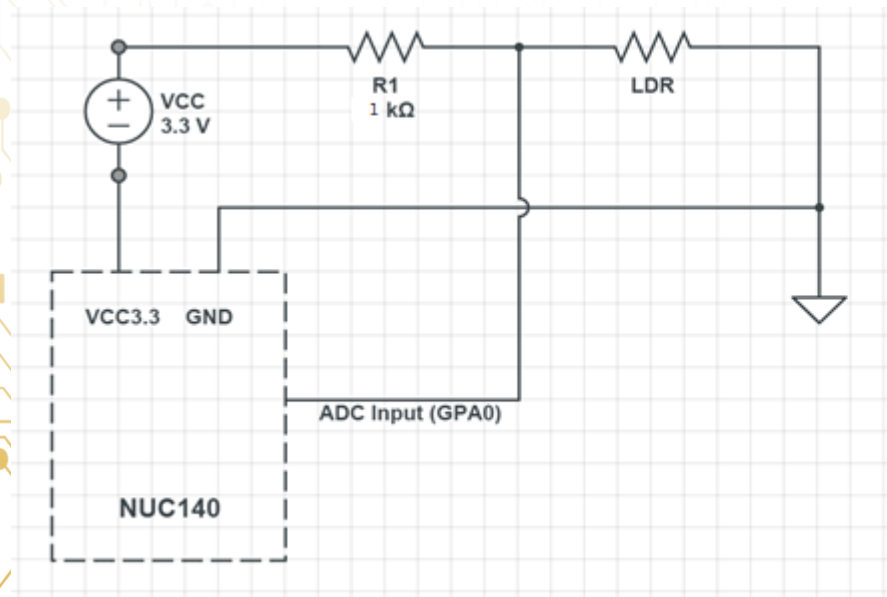
- ADC→ADCR.ADST
 - A/D Conversion Start bit
 - Set 1 to start the conversion
- ADC→ADSR.ADF
 - A/D Conversion End Flag
 - Set to 1 at the end of conversion
 - Write 1 to clear this flag





Basic

- 將LDR收到的ADC數值用putty印出來
- Putty 印出的頻率大概0.5~1ms

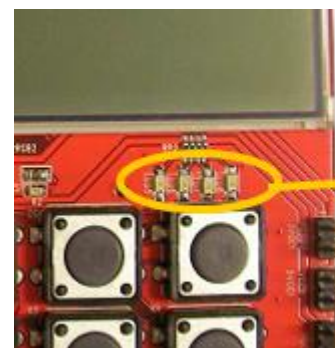


COM4 - PuTTY

```
sult of channel 1: 81  
sult of channel 1: 78  
sult of channel 1: 78  
sult of channel 1: 79  
sult of channel 1: 77  
sult of channel 1: 80  
sult of channel 1: 81  
sult of channel 1: 77  
sult of channel 1: 80  
sult of channel 1: 80
```


Bonus

- 用收到光敏電阻的數值閃爍LED
 - Value low → blink frequency low
 - Value high → blink frequency high



LEDs GPC12,13,14,15

- LED Blink
 - LED1 on → delay → LED1 off → delay →
 - LED2 on → delay → LED2 off → delay →
 - LED3 on → delay → LED3 off → delay →
 - LED4 on → delay → LED4 off → delay

- DEMO 範例影片 : <https://goo.gl/RYAVps>

Tips

- 範例程式: `ADC_SingleMode`
 - 裡面有single end/differential input兩種, 只要看single end就好
- 不需要每次ADC都重新做一次configuration
請寫成一個`ADC_Init`之類的function
- `ADF Flag` 可以用polling或是interrupt方式處理都可以
請記得每次做完ADC之後要將flag清除

Demo

- Place: 創新大樓515 找助教 林子華(進門最後一排最裡面)
- Demo Time: (二)(三)下午三點~五點
- Report deadline: 10/30(五)
- Report title format: LABx_ID_Name
- Demo必須在Report deadline前完成
- Demo前須先上傳程式碼(上傳main所在的.c檔即可)

Graded

- Basic : 70%
- Bonus : 15%
- Report & Code : 15%