國立中正大學
National Chung Cheng University

微處理機與介面技術

Lab3 -ADC

www.neatlab.tw
neat Laboratory
CCU@Taiwan 中正大學

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

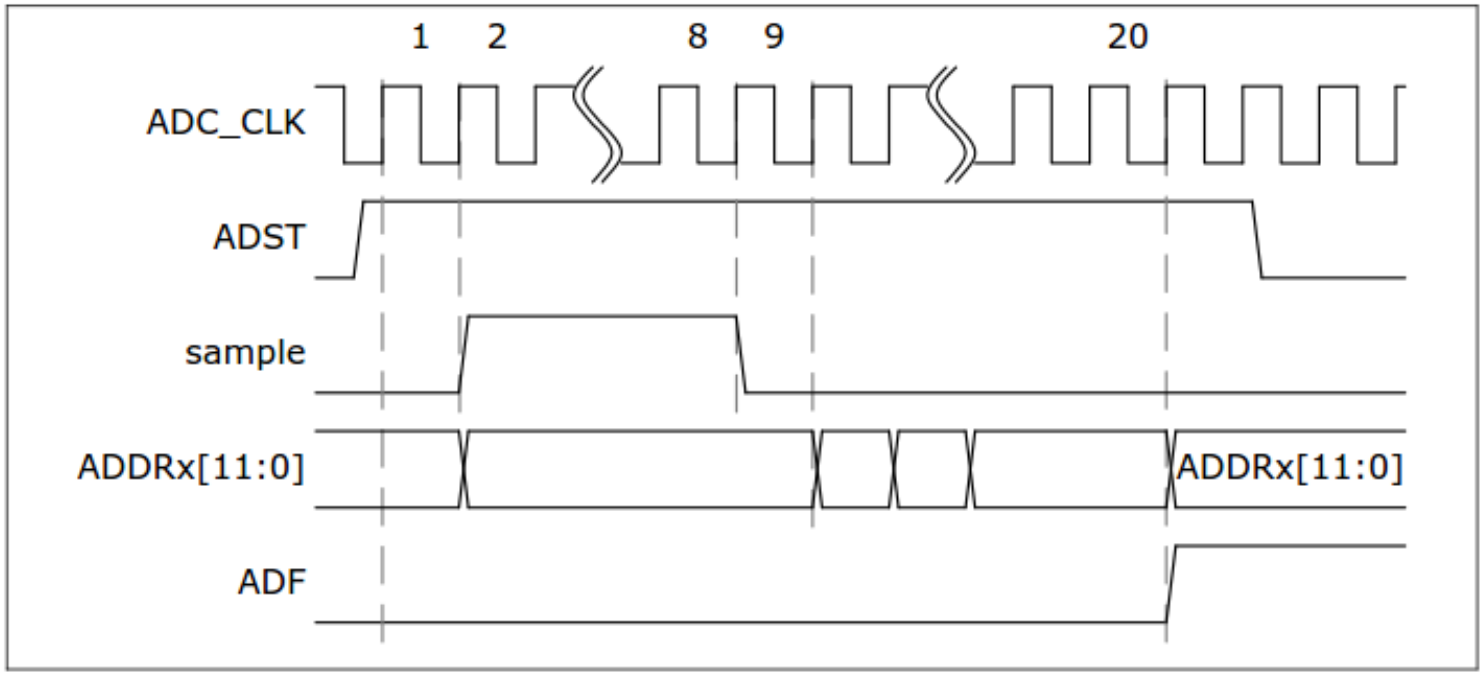


Figure 5-101 Single Mode Conversion Timing Diagram

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)

[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 register configuration

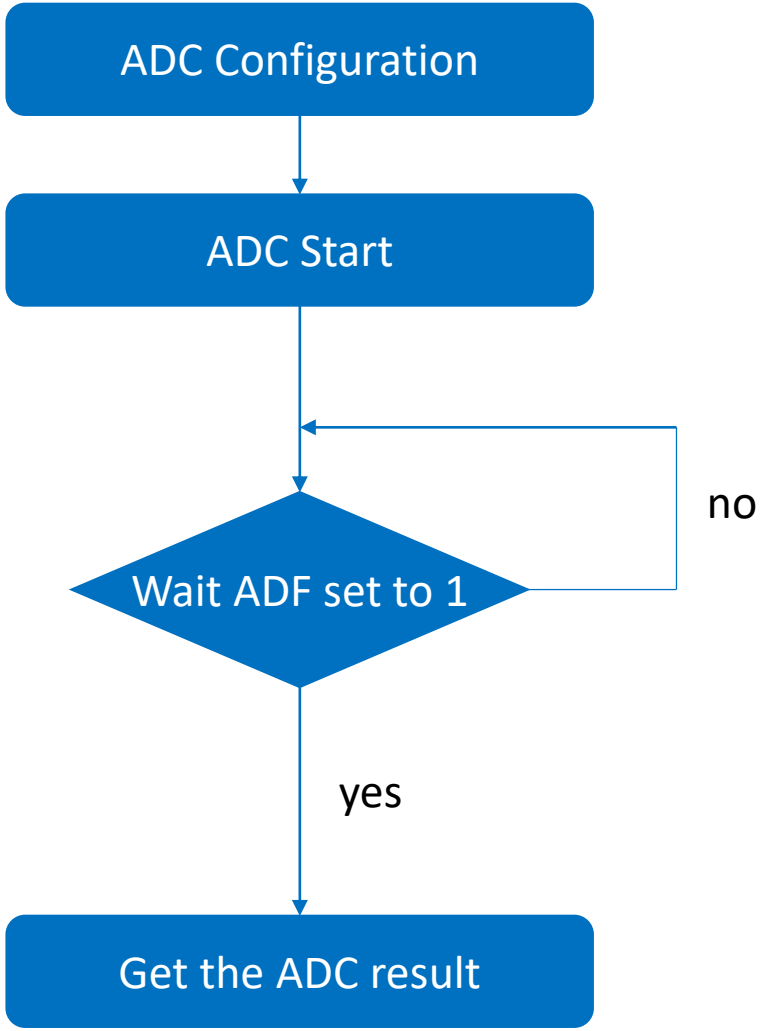
A/D Control Register (ADCR)

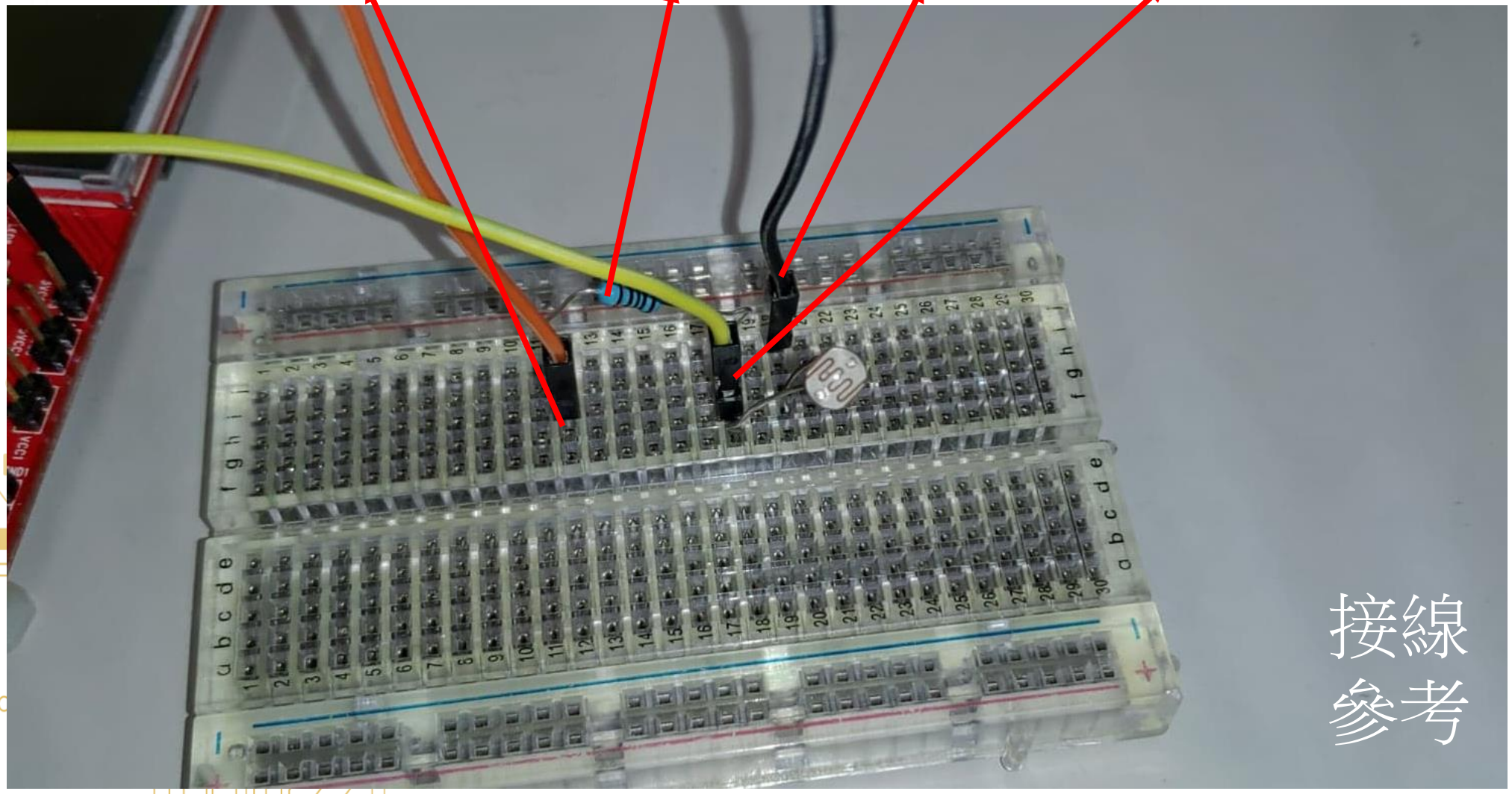
Register	Offset	R/W	Description	Reset Value
ADCR	ADC_BA+0x20	R/W	ADC Control Register	0x0000_0000

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

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

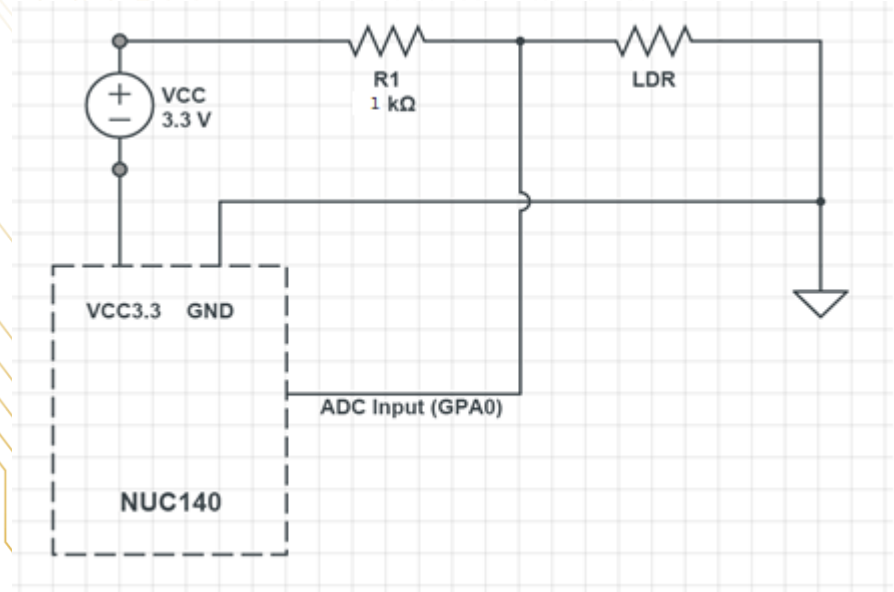


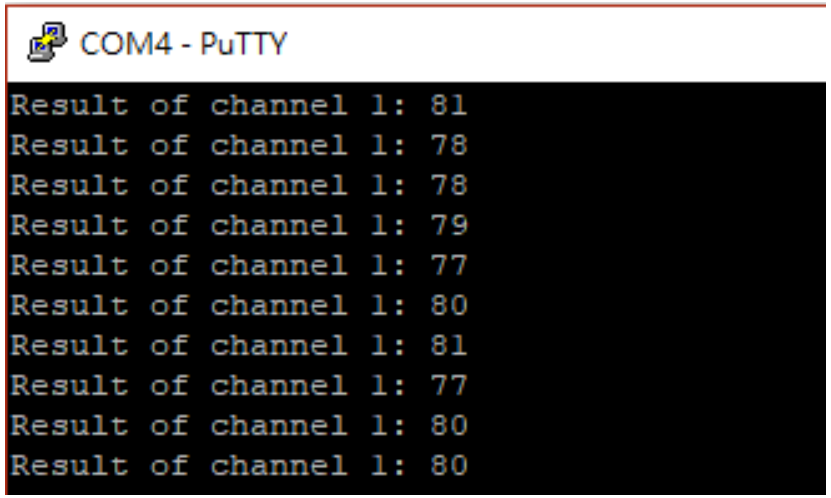


接線參考

Basic

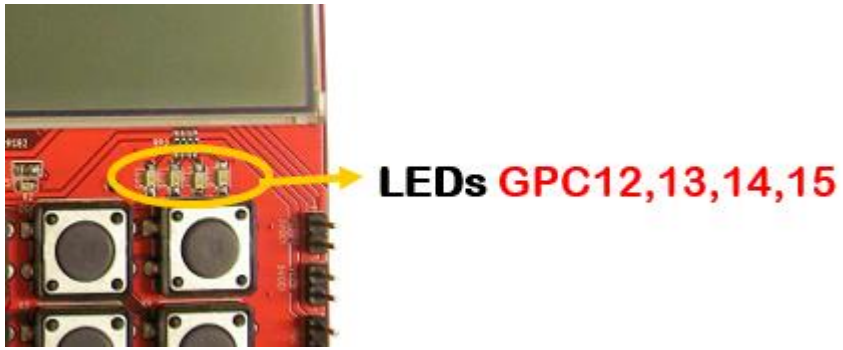
- 將LDR收到的ADC數值用putty印出來
- Putty 印出的頻率大概0.5~1ms





Bonus

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



- 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://reurl.cc/l5NAY9

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 宋皓天
- Demo Time: (二)(三)下午四點~五點
- Report deadline: 11/05(五)
- Report title format: LABx_ID_Name.pdf

- 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%