Experiment No: 6

Title: 8051 – Interfacing with ADC

Class: T.E. **Year:** **Semester: Five**

Roll No.: **Name:**

Date of performance: **Date of Submission:**

Signature:

AIM: **8051 – Interfacing with ADC**

S/W AND H/W TOOLS: Keil IDE, 8051 kit, Flash Magic

THEORY: ADC0808

One of the most commonly used ADC is ADC0808. ADC 0808 is a Successive approximation type with 8 channels i.e. it can directly access 8 single-ended analog signals. The difference between ADC0804 and ADC0808 is the number of analog input signals. I mean, In ADC0804 we can give only one analog input. But in ADC0808 we can give 8 analog inputs. So if you want to interface more analog sensors, please select ADC0808.

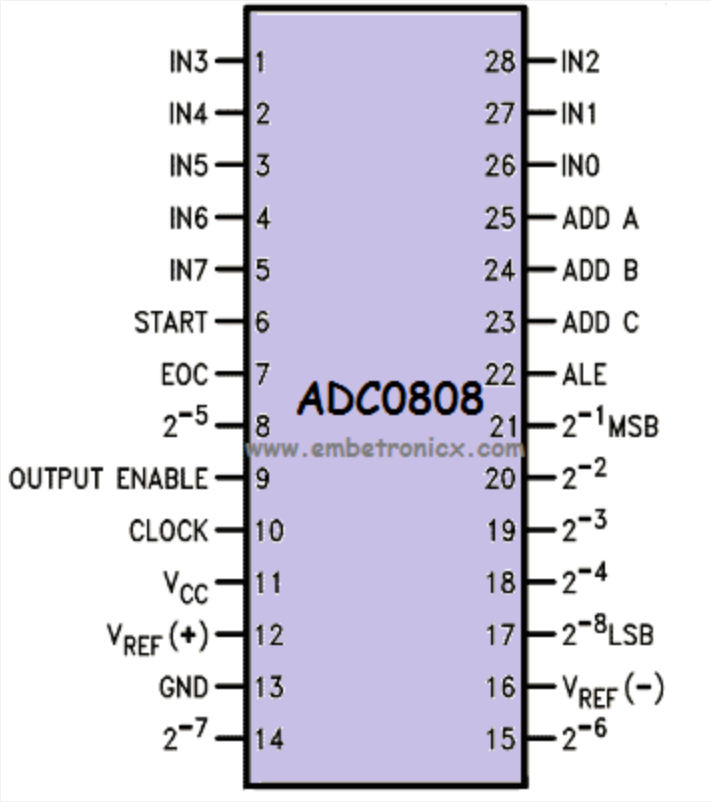
ADC0808 is an 8-bit **analog to digital converter** with eight input analog channels, i.e., it can take eight different analog inputs. The input which is to be converted to digital form can be selected by using three address lines. The voltage reference can be set using the Vref+ and Vref- pins. The step size is decided based on the set reference value. Step size is the change in analog input to cause a unit change in the output of ADC. The default step size is 19.53mV corresponding to 5V reference voltage. **ADC0808** needs an external clock to operate, unlike ADC0804 which has an internal clock. The ADC needs some specific control signals for its

operations like start conversion and brings data to output pins. When the conversion is complete the EOC pins go low to indicate the end of conversion and data ready to be picked up.

Features

- Easy interface to all microprocessors
- Operates ratio metrically or with 5 V DC or analog span adjusted voltage reference
- No zero or full-scale adjust required
- 8-channel multiplexer with address logic
- 0V to 5V input range with single 5V power supply
- Outputs meet TTL voltage level specifications
- Standard hermetic or molded 28-pin DIP package
- 28-pin molded chip carrier package

Pin Diagram



Pin Description

Pin No	Function	Name
1	Analog Input Pin 3	IN3
2	Analog Input Pin 4	IN4
3	Analog Input Pin 5	IN5
4	Analog Input Pin 6	IN6
5	Analog Input Pin 7	IN7
6	Start conversion; input pin; a low to high pulse is given	START
7	End of conversion; output pin; goes low when the conversion is over	EOC
8	Digital output bit	D3
9	Input pin; a low to high pulse brings data to output pins from the internal registers at end of conversion	Output Enable
10	Clock input; to provide external clock	Clock Input
11	Supply voltage; 5V	Vcc
12	Positive reference voltage	Vref+
13	Ground (0v)	GND
14	Digital output bit	D1
15	Digital output bit	D2

Pin No	Function	Name
16	Negative reference voltage	Vref-
17	Digital output bit	D0
18	Digital output bit	D4
19	Digital output bit	D5
20	Digital output bit	D6
21	Digital output bit	D7
22	Address latch enable; Input pin; low to high pulse is required to latch in the address	ALE
23	Address line C	Address C
24	Address line B	Address B
25	Address line A	Address A
26	Analog Input Pin 0	IN0
27	Analog Input Pin 1	IN1
28	Analog Input Pin 2	IN2

Selection of Channel

We can select any input channel by using the Address lines ADD A, ADD B and ADD C). We can select the input line IN0 by keeping all three address lines (ADD A, ADD B, and ADD C) Low. If we want to select input channel IN4 then we need to keep ADD A, ADD B low and ADD C high. For selecting all the other input channels, have a look on the given table:

ADC Channel Name	ADD C	ADD B	ADD A
IN0	LOW	LOW	LOW
IN1	LOW	LOW	HIGH
IN2	LOW	HIGH	LOW
IN3	LOW	HIGH	HIGH
IN4	HIGH	LOW	LOW
IN5	HIGH	LOW	HIGH
IN6	HIGH	HIGH	LOW
IN7	HIGH	HIGH	HIGH

Calculating Step Size

ADC 0808 is an 8 bit ADC i.e. it divides the voltage applied at Vref+ & Vref- into 28 i.e. 256 steps.

```
Step Size = (Vref+ - Vref-)/256
```

Suppose Vref+ is connected to Vcc i.e. 5V & Vref- is connected to the Gnd then the step size will be

```
Step size= (5 - 0)/256= 19.53 mv
```

How to use the ADC0808?

1. Start
2. Select the channel.
3. A Low – High transition on ALE to latch in the address.
4. A Low – High transition on Start to reset the ADC's SAR.
5. A High – Low transition on ALE.
6. A High – Low transition on start to start the conversion.
7. Wait for the End of cycle (EOC) pin to become high.
8. Make Output Enable pin High.
9. Take Data from the ADC's output
10. Make Output Enable pin Low.

11. Stop

ADC0808 interfacing with 8051

LCD:

- RS – P1.0
- RW – GND
- EN – P1.1
- LCD Data Lines – P1 LSB 4 bits

ADC:

- Output Enable – P2.0
- EOC – P2.1
- Start – P2.2
- Addr A – P2.4
- Addr B – P2.5
- Addr C – P2.6
- ALE – P2.7
- ADC Data lines – Po

INTERFACING DIAGRAM:

CONCLUSIONS: