

# 七段顯示器

## 一、類型

以線路構造而言，可分成共陽極與共陰極兩種

### 1、共陽極(Common Anode)七段顯示器

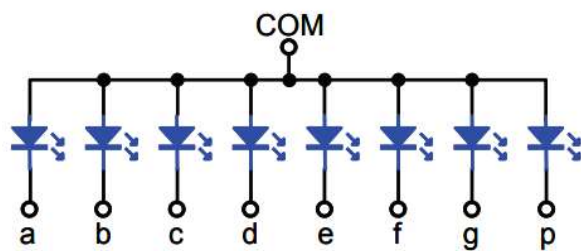
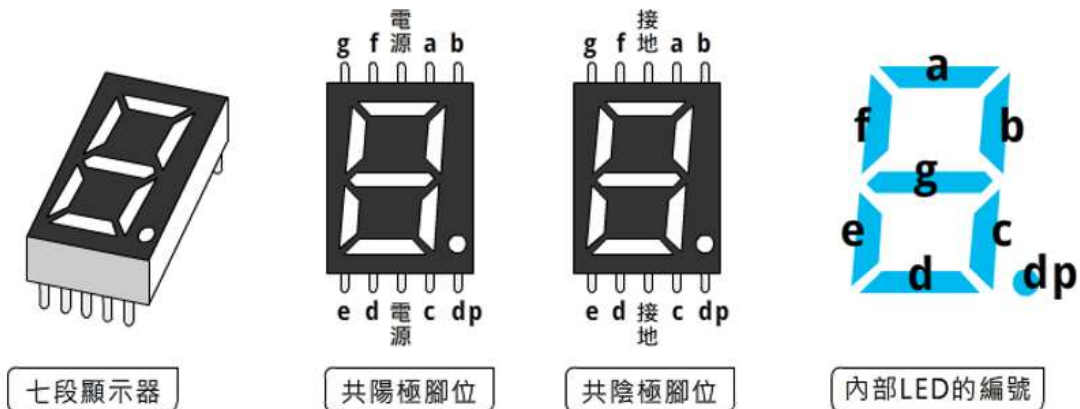
- (1) LED 的陽極接在一起，並接到+Vcc 端
- (2) 控制電位為低電位 0 時，則 LED 發亮

### 2、共陰極(Common Cathode)七段顯示器

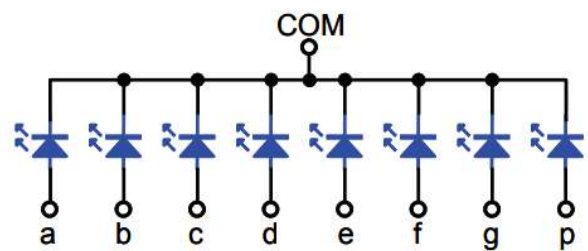
- (1) LED 的陰極接在一起，並接到接地端
- (2) 控制電位為高電位 1 時，則 LED 發亮

## 二、構造與腳位編號

(一)圖示:



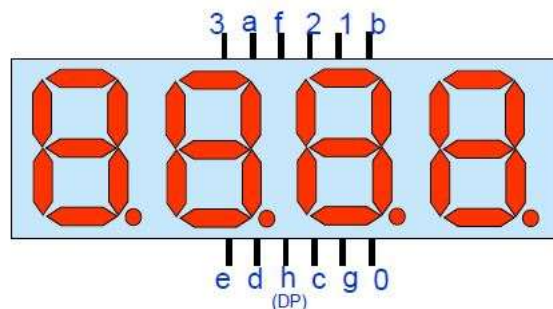
(a) 共陽極結構



(b) 共陰極結構

1、【缺點】若同時需要使用多顆七段顯示器，將會佔用大量的 I/O 腳位

2、【改善】四合一七段顯示器



### 三、數字編碼

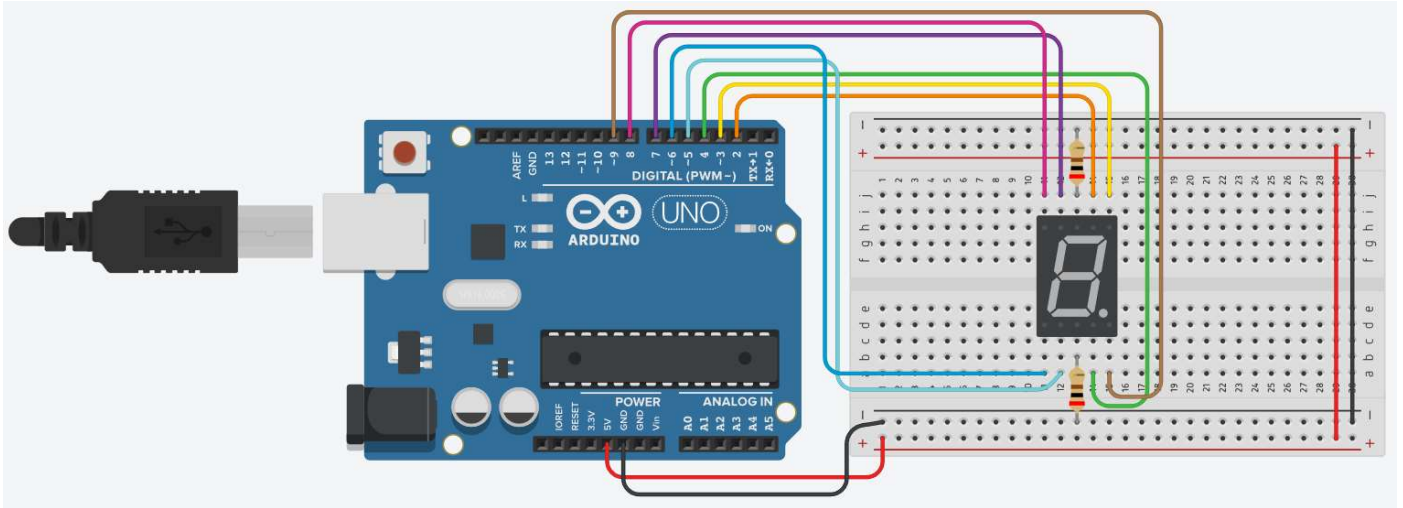
共陽極七段顯示器數字 0~9 字型碼

| 字型                                                                                | p | g | f | e | d | c | b | a | 字型                                                                                | p | g | f | e | d | c | b | a |
|-----------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|-----------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|
|  | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 |  | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
|  | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 1 |  | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
|  | 1 | 0 | 1 | 0 | 0 | 1 | 0 | 0 |  | 1 | 1 | 1 | 1 | 1 | 0 | 0 | 0 |
|  | 1 | 0 | 1 | 1 | 0 | 0 | 0 | 0 |  | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | 1 | 0 | 0 | 1 | 1 | 0 | 0 | 1 |  | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 |

共陰極七段顯示器 0~9 字型碼

| 字型                                                                                  | p | g | f | e | d | c | b | a | 字型                                                                                  | p | g | f | e | d | c | b | a |
|-------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|-------------------------------------------------------------------------------------|---|---|---|---|---|---|---|---|
|  | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |  | 0 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
|  | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |  | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
|  | 0 | 1 | 0 | 1 | 1 | 0 | 1 | 1 |  | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 1 |
|  | 0 | 1 | 0 | 0 | 1 | 1 | 1 | 1 |  | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
|  | 0 | 1 | 1 | 0 | 0 | 1 | 1 | 0 |  | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 1 |

#### 四、實作電路



#### 七段顯示器製作倒數功能

```
void setup() {  
  pinMode(2, OUTPUT);  
  pinMode(3, OUTPUT);  
  pinMode(4, OUTPUT);  
  pinMode(5, OUTPUT);  
  pinMode(6, OUTPUT);  
  pinMode(7, OUTPUT);  
  pinMode(8, OUTPUT);  
  pinMode(9, OUTPUT);  
  digitalWrite(9, 0); // 關閉小數點  
}  
  
void loop() {  
  // 顯示數字 '9'  
  digitalWrite(2, 1);  
  digitalWrite(3, 1);  
  digitalWrite(4, 1);  
  digitalWrite(5, 0);  
  digitalWrite(6, 0);
```

```
digitalWrite(7, 1);
digitalWrite(8, 1);
delay(1000);
// 顯示數字 '8'
digitalWrite(2, 1);
digitalWrite(3, 1);
digitalWrite(4, 1);
digitalWrite(5, 1);
digitalWrite(6, 1);
digitalWrite(7, 1);
digitalWrite(8, 1);
delay(1000);
// 顯示數字 '7'
digitalWrite(2, 1);
digitalWrite(3, 1);
digitalWrite(4, 1);
digitalWrite(5, 0);
digitalWrite(6, 0);
digitalWrite(7, 0);
digitalWrite(8, 0);
delay(1000);
// 顯示數字 '6'
digitalWrite(2, 1);
digitalWrite(3, 0);
digitalWrite(4, 1);
digitalWrite(5, 1);
digitalWrite(6, 1);
digitalWrite(7, 1);
digitalWrite(8, 1);
delay(1000);
```

```
// 顯示數字 '5'
digitalWrite(2, 1);
digitalWrite(3, 0);
digitalWrite(4, 1);
digitalWrite(5, 1);
digitalWrite(6, 0);
digitalWrite(7, 1);
digitalWrite(8, 1);
delay(1000);
// 顯示數字 '4'
digitalWrite(2, 0);
digitalWrite(3, 1);
digitalWrite(4, 1);
digitalWrite(5, 0);
digitalWrite(6, 0);
digitalWrite(7, 1);
digitalWrite(8, 1);
delay(1000);
// 顯示數字 '3'
digitalWrite(2, 1);
digitalWrite(3, 1);
digitalWrite(4, 1);
digitalWrite(5, 1);
digitalWrite(6, 0);
digitalWrite(7, 0);
digitalWrite(8, 1);
delay(1000);
// 顯示數字 '2'
digitalWrite(2, 1);
digitalWrite(3, 1);
```

```
digitalWrite(4, 0);  
digitalWrite(5, 1);  
digitalWrite(6, 1);  
digitalWrite(7, 0);  
digitalWrite(8, 1);  
delay(1000);  
// 顯示數字 '1'  
digitalWrite(2, 0);  
digitalWrite(3, 1);  
digitalWrite(4, 1);  
digitalWrite(5, 0);  
digitalWrite(6, 0);  
digitalWrite(7, 0);  
digitalWrite(8, 0);  
delay(1000);  
// 顯示數字 '0'  
digitalWrite(2, 1);  
digitalWrite(3, 1);  
digitalWrite(4, 1);  
digitalWrite(5, 1);  
digitalWrite(6, 1);  
digitalWrite(7, 1);  
digitalWrite(8, 0);  
// 暫停 4 秒鐘  
delay(4000);  
}
```

## 七段顯示器製作倒數功能 (簡化程式版)

```
// define the LED digit patters, from 0 - 9
// 1 = LED on, 0 = LED off, in this order:
// Arduino pin: 2,3,4,5,6,7,8 (Mapping a,b,c,d,e,f,g of Seven-Segment LED)
byte seven_seg_digits[10][7] = {
    { 1,1,1,1,1,1,0 }, // = 0
    { 0,1,1,0,0,0,0 }, // = 1
    { 1,1,0,1,1,0,1 }, // = 2
    { 1,1,1,1,0,0,1 }, // = 3
    { 0,1,1,0,0,1,1 }, // = 4
    { 1,0,1,1,0,1,1 }, // = 5
    { 1,0,1,1,1,1,1 }, // = 6
    { 1,1,1,0,0,0,0 }, // = 7
    { 1,1,1,1,1,1,1 }, // = 8
    { 1,1,1,0,0,1,1 }  // = 9
};

void setup() {
    pinMode(2, OUTPUT);
    pinMode(3, OUTPUT);
    pinMode(4, OUTPUT);
    pinMode(5, OUTPUT);
    pinMode(6, OUTPUT);
    pinMode(7, OUTPUT);
    pinMode(8, OUTPUT);
    pinMode(9, OUTPUT);
    digitalWrite(9, 0); // 關閉小數點
}

// 在七段顯示器上顯示指定的一個數字
```

```
void sevenSegWrite(byte digit) {  
    byte pin = 2;  
    for (byte seg = 0; seg < 7; ++seg) {  
        digitalWrite(pin, seven_seg_digits[digit][seg]);  
        ++pin;  
    }  
}  
  
void loop() {  
    for (byte digit = 10; digit > 0; --digit) {  
        delay(1000);  
        sevenSegWrite(digit - 1);  
    }  
  
    // 暫停 4 秒鐘  
    delay(4000);  
}
```