雲林科技大學
資訊工程系所

電流感測器

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中 華 民 國 113 年 4 月12日

電流感測器(ACS712)實作

1. Data sheet 簡介

ASC712 由精確、低偏移、線性霍爾電路組成 與位於表面附近的銅傳導路徑。 流經此銅導體的施加電流路徑產生磁場，霍爾 IC 將其轉換為 比例電壓。 透過以下方式優化設備精度 磁訊號非常接近霍爾感測器。

ALLEGRO microsystems

ACS712

Fully Integrated, Hall-Effect-Based Linear Current Sensor IC with 2.4 kV_{RMS} Isolation and a Low-Resistance Current Conductor

FEATURES AND BENEFITS

- Low-noise analog signal path
- Device bandwidth is set via the new FILTER pin
- 5 µs output rise time in response to step input current
- 80 kHz bandwidth
- Total output error 1.5% at T_A = 25°C
- Small footprint, low-profile SOIC-8 package
- 1.2 mΩ internal conductor resistance
- 2.4 kV_{RMS} minimum isolation voltage from pins 1-4 to pins 5-8
- 5.0 V, single supply operation
- 66 to 185 mV/A output sensitivity
- Output voltage proportional to AC or DC currents
- Factory-trimmed for accuracy
- Extremely stable output offset voltage
- Nearly zero magnetic hysteresis
- Ratiometric output from supply voltage

TÜV America
Certificate Number:
U8V 15 05 54214 038
CB 13 06 54214 026

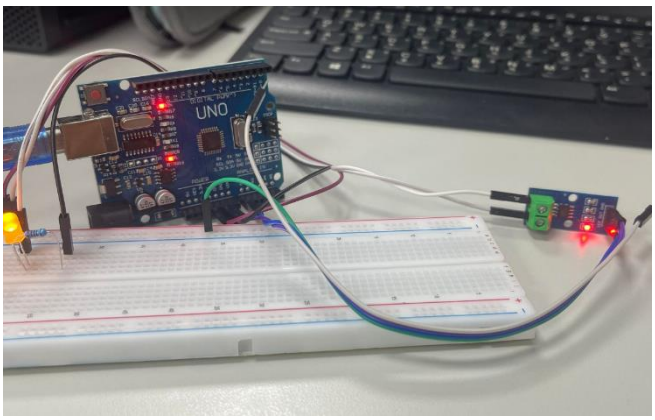
DESCRIPTION

The Allegro™ ACS712 provides economical and precise solutions for AC or DC current sensing in industrial, commercial, and communications systems. The device package allows for easy implementation by the customer. Typical applications include motor control, load detection and management, switch-mode power supplies, and overcurrent fault protection. The device is not intended for automotive applications.

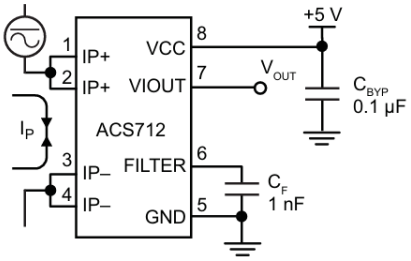
The device consists of a precise, low-offset, linear Hall circuit with a copper conduction path located near the surface of the die. Applied current flowing through this copper conduction path generates a magnetic field which the Hall IC converts into a proportional voltage. Device accuracy is optimized through the close proximity of the magnetic signal to the Hall transducer. A precise, proportional voltage is provided by the low-offset, chopper-stabilized BiCMOS Hall IC, which is programmed for accuracy after packaging.

The output of the device has a positive slope (>$V_{IOUT(Q)}$) when an increasing current flows through the primary copper

2. 接線圖 & Datasheet



Typical Application

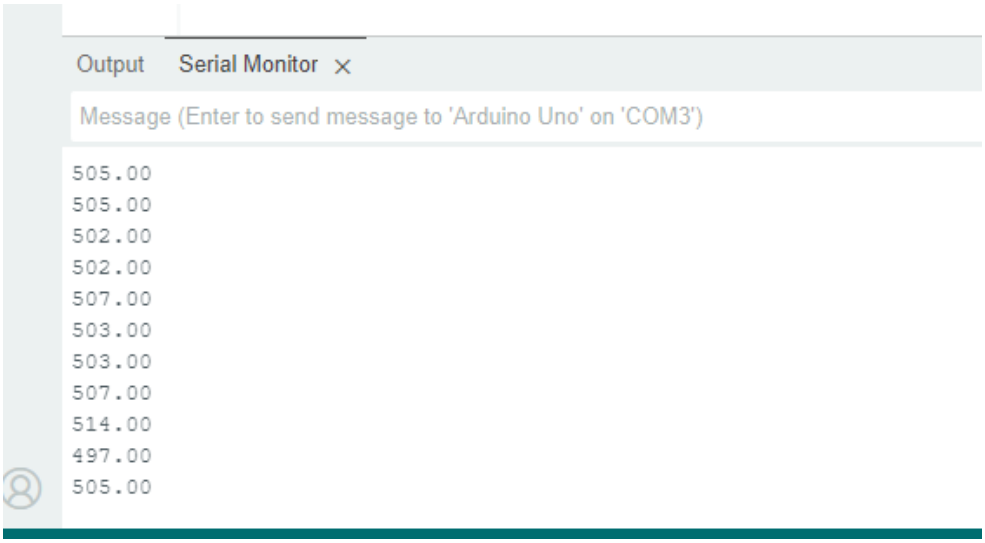


Application 1. The ACS712 outputs an analog signal, V_{OUT}.

3. 程式碼:

```
double Vout=0;
void setup() {
  // put your setup code here, to run once:
  Serial.begin(9600);
}

void loop() {
  // put your main code here, to run repeatedly:
  Vout=((analogRead(A0)));
  delay(1000);
  Serial.println(Vout);
}
```

4. 結果



電壓感測器(Voltage Sensor)實作

1. 簡介:

Voltage Sensor 電壓傳感器基於電阻分壓原理所設計，能使端子介面輸入的電壓縮小 5 倍，Arduino 類比輸入電壓最大為 5V，那麼電壓檢測模組的輸入電壓則不能大於 5Vx5=25V

電壓傳感器規格：

電壓輸入範圍：DC 0 ~ 25V

電壓檢測範圍：DC0.02445V ~ 25V

電壓類比解析度：0.00489V

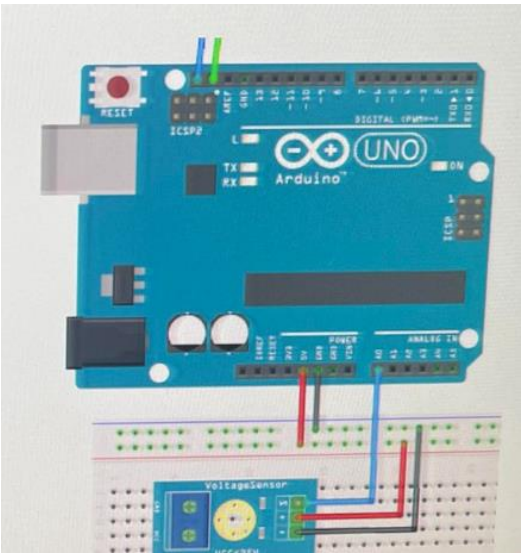
DC 輸入介面：端子正極接 VCC，負極接 GND

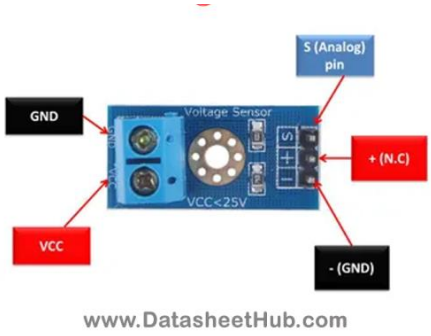
2. 程式碼:

```
int analoginput = A0;
float Votiage_out =0.0;
float Votiage_in=0.0;
float R1=30000.0;
float R2=7500.0;
int value=0;
void setup() {
// put your setup code here, to run once:
pinMode(analoginput,INPUT);

Serial.begin(9600);
Serial.println("DC VOLTMETER");
}
```

```
void loop() {
// put your main code here, to run repeatedly:
value=analogRead(analoginput);
Votiage_out=(value*5.0)/1024;
Votiage_in=Votiage_out/(R2/(R1+R2));

Serial.print("INPUT V= ");
Serial.println(Votiage_in,2);
delay(500);

}
```

3. 接線圖 & Datasheet

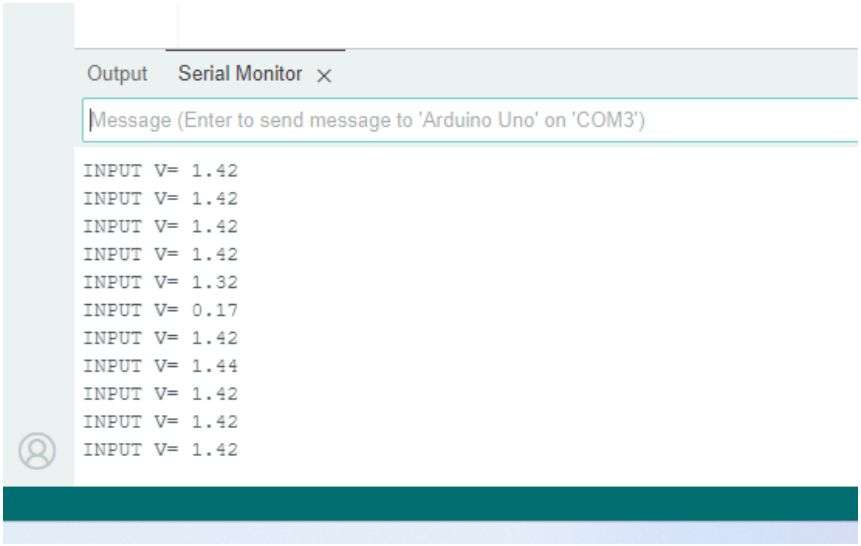




www.DatasheetHub.com

Pin Name	Description
VCC	The positive terminal of the External voltage source (0-25V)
GND	The negative terminal of the External voltage source
S	Analog pin connected to Analog pin of Arduino
+	Not Connected
–	Ground Pin connected to GND of Arduino

4. 結果:



心得感想:

1. ACS712 電流感測器：

ACS712 是一種常見的電流感測器，用於測量直流或交流電路中的電流。

- 工作原理：ACS712 使用霍爾效應感測電流。當電流通過感測器時，霍爾元件會產生一個電壓輸出，這個輸出電壓與通過感測器的電流成正比。
- 應用：ACS712 常用於電子裝置的電流監控、電池充放電監控、電動車控制等領域。

2. 電壓感測器：

電壓感測器用於測量電路中的電壓，並將其轉換為可讀的電壓值。

- 壓敏電阻：壓敏電阻是一種基於電阻值隨著電壓變化的元件，通常用於檢測環境中的壓力或力量變化。
- 分壓器：分壓器是一種電路，通常由兩個電阻組成，用於將高電壓分壓為低電壓，以便於測量。
- 模擬感測器：一些模擬感測器，如 LM35 溫度感測器，可以輸出電壓信號，其電壓值與測量的溫度成比例。
- 電壓模組：這些模組通常集成了感測器元件和信號處理電

路，可輸出穩定的模擬或數位電壓信號，便於 Arduino 或其他微控制器進行讀取和處理。