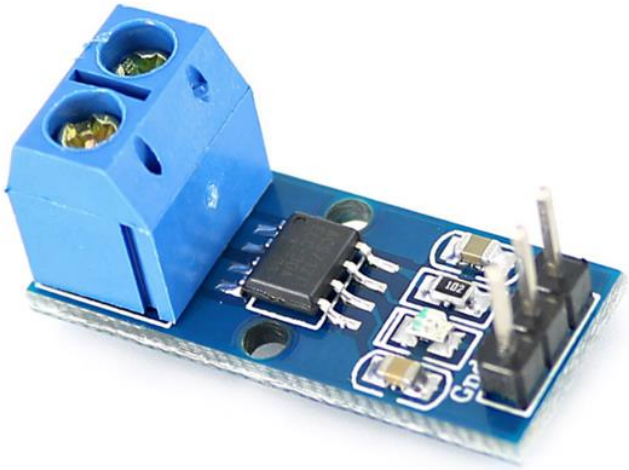
User Guide

ACS712 Hall Current Sensor Module

This is highly accurate sensor module to measure current from 5A to 30A. ACS712 current sensor module operates from 5V and outputs analog voltage proportional to current measured on the sensing terminals. You can simple use a microcontroller ADC, i.e. Arduino A0~A5 to read the values.



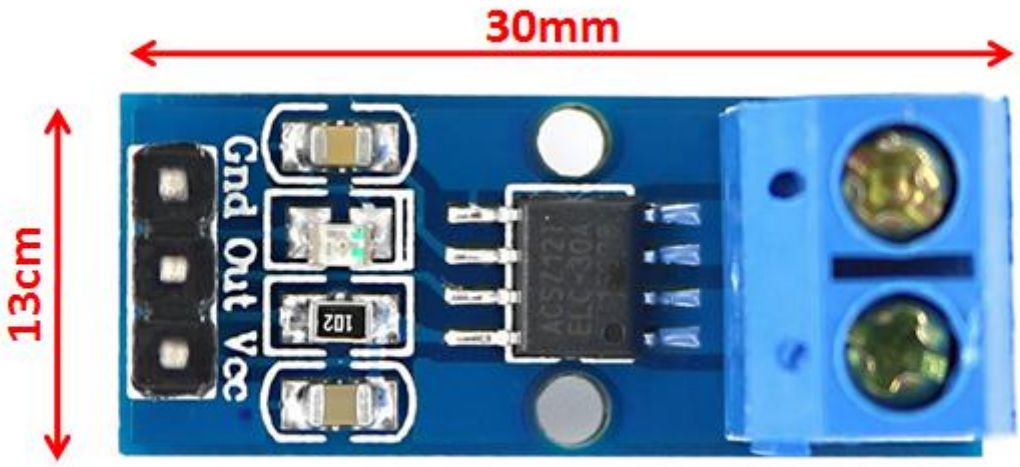
SKU: SSR1010

Brief Data:

- Sensitivity: 66~185 mV/A.
- Operating Voltage: 5.0Vdc.
- Output voltage proportional to AC or DC currents.
- Factory-trimmed for accuracy.
- Extremely stable output offset voltage.
- Low-noise analog signal path.
- Total output error 1.5% at TA = 25°C.
- 1.2 mΩ internal conductor resistance.
- 2.1 kVRMS minimum isolation voltage.

Mechanical Dimension:

Unit: mm



ACS712 Module Pin Outs and Connections:

The picture below identifies the pin outs for the ACS172 Modules.

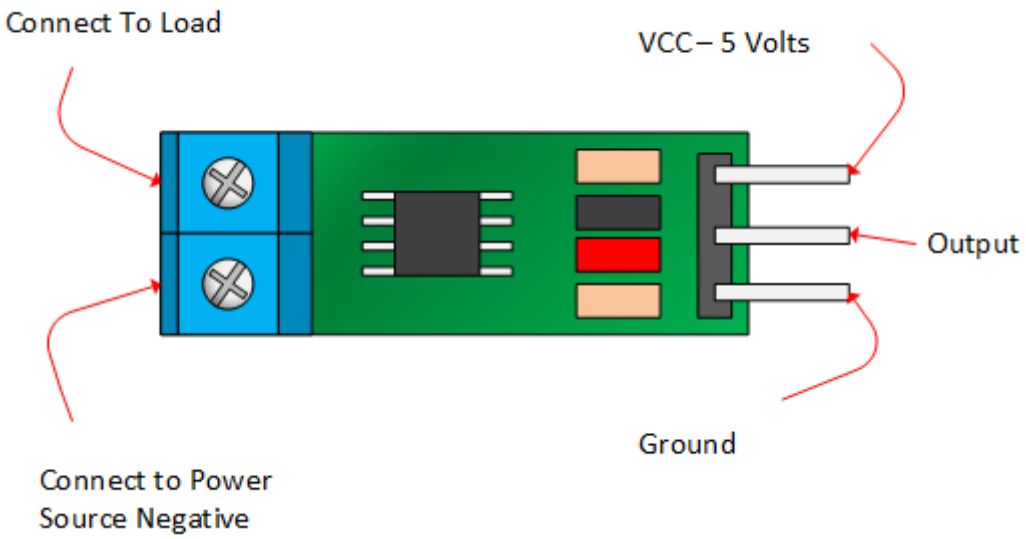


Figure-1

Pay attention to the polarity at the load end of the device. If you are connected as illustrated below, the output will raise. If you connect it opposite of this picture, the output will decrease from the 2.5 volt offset.

This module is primarily designed for use with micro-controllers like the Arduino. In such applications, the connections would be as picture below:

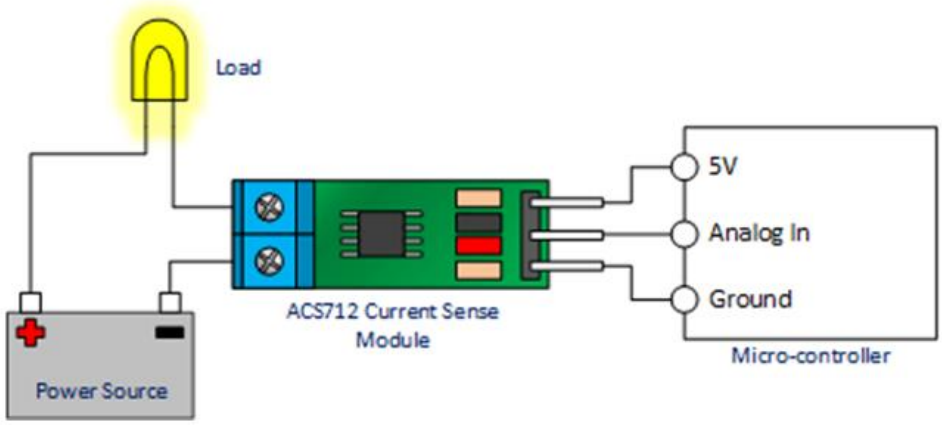


Figure-2

If the light bulb shown in the picture above were disconnected, the output of the ACS712 module would be 2.500 volts. Once connected, the output would be scaled to the current drawn through the bulb. If this were a 5 Amp module and the light bulb pulled 1 Amp, the output of the module would be 2.685 volts. Now imagine the battery polarity reversed. Using the same 5A module, the output would be 2.315 volts.

IMPORTANT NOTE: This device is a Hall Effect transducer. It should not be used near significant magnetic fields.

Sensor Specifications:

	5A Module	20A Module	30A Module
Supply Voltage (VCC)	5Vdc Nominal	5Vdc Nominal	5Vdc Nominal
Measurement Range	-5 to +5 Amps	-20 to +20 Amps	-30 to +30 Amps
Voltage at 0A	VCC/2 (nominally 2.5Vdc)	VCC/2 (nominally 2.5Vdc)	VCC/2 (nominally 2.5Vdc)
Scale Factor	185 mV per Amp	100 mV per Amp	66 mV per Amp
Chip	ACS712ELC-05A	ACS712ELC-10A	ACS712ELC-30A

Module Sensor Internal Construction:

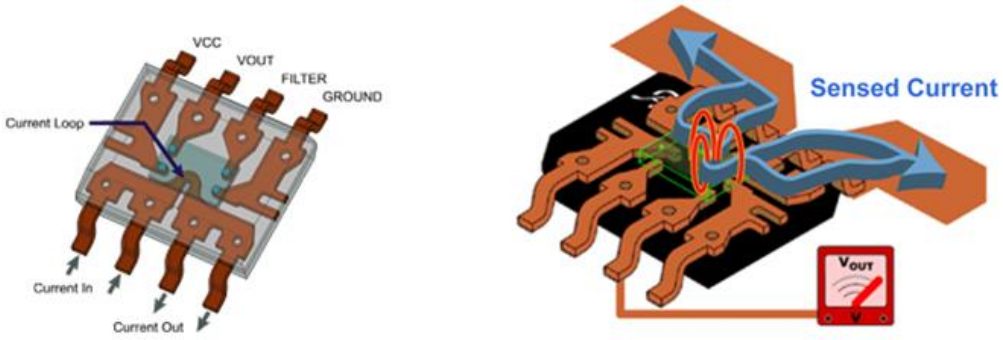


Figure-3

Arduino Application Schematic Example:

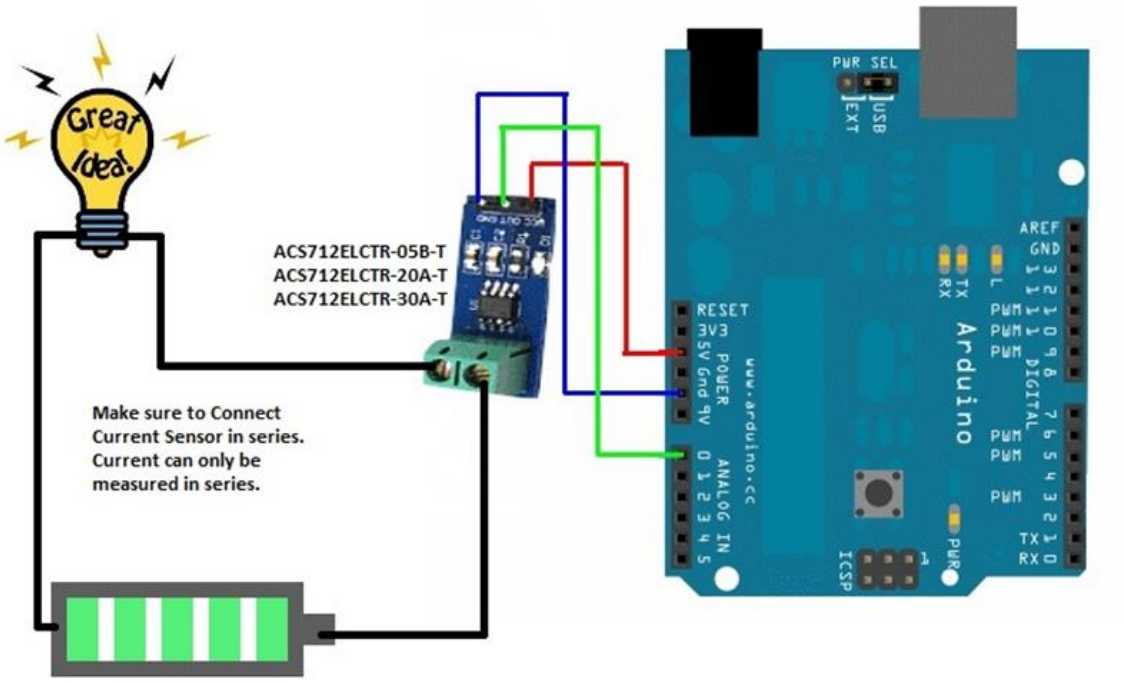


Figure-4

Arduino Sketch:

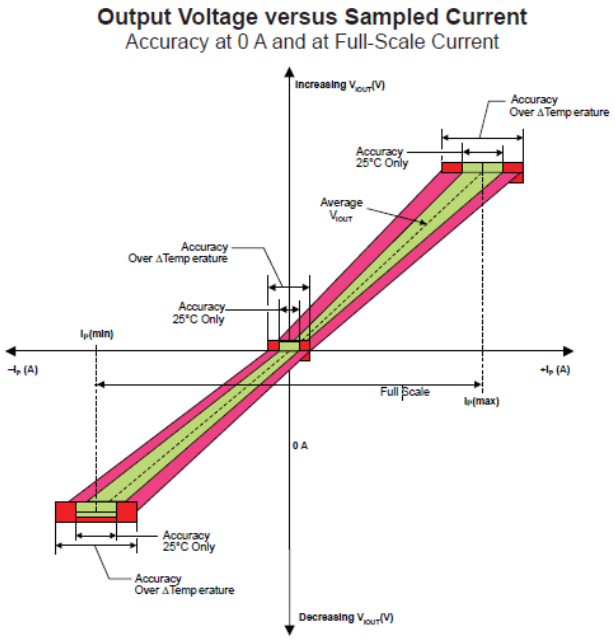
Copy and paste the below Arduino sketch into IDE and upload to Arduino Uno board:

```
/*=============================================================================
// Author : Handson Technology
// Project : Arduino Uno
// Description : ACS712_30A Hall Current Sensor Module
// Source-Code : ACS712T.ino
// Version: V1.0 July 2017
//============================================================================= */


void setup() {
  Serial.begin(9600); //Start Serial Monitor to display current read value on Serial
monitor
}

void loop() {
unsigned int x=0;
float AcsValue=0.0,Samples=0.0,AvgAcs=0.0,AcsValueF=0.0;

  for (int x = 0; x < 150; x++){ //Get 150 samples
  AcsValue = analogRead(A0);     //Read current sensor values
  Samples = Samples + AcsValue;  //Add samples together
  delay (3); // let ADC settle before next sample 3ms
}
AvgAcs=Samples/150.0;//Taking Average of Samples

//((AvgAcs * (5.0 / 1024.0)) is converting the read voltage in 0-5 volts
//2.5 is offset (assumed that Arduino is working on 5v so the Vout at no current comes
//out to be 2.5 which is offset. If your Arduino is working on different voltage then
//you must change the offset according to the input voltage)
//0.066v(66mV) is rise in output voltage when 1A current flows at input

AcsValueF = (2.5 - (AvgAcs * (5.0 / 1024.0)) )/0.066;

Serial.println(AcsValueF);//Print the read current on Serial monitor
delay(50);
}
```

Open up the Serial Monitor with baud of 9600, the sensor data will be printed out on screen and update continuously.

No Load (0-A) Off-Set Calibration:

ACS712T Current Sensor Module is able to measure current both in positive and negative polarity, refer to the chart below:



When there is no current flowing thru the sensor input measuring terminal, there is offset output voltage of (Vcc/2) V from the sensor. Vcc is the supply voltage to the sensor module. If the sensor module is supply from Arduino board +5V on-board supply, the offset voltage will be 5/2= 2.5V. The actual measured current value will need to added or subtracted from this offset voltage, depending on the polarity of the load current.

The below procedure listed how to do the offset calibration in order for Arduino to read the sensor output and display the correct current with high accuracy.

1. Measure the actual +5V supply on the Arduino board using multi-meter. In author's case, it measured at 5.12V, 2-decimal point accuracy. This is the actual voltage supply to sensor board. The offset voltage in this case is 5.12/2=2.56V.
2. Plug in this offset voltage of 2.56V into Arduino Sketch:

   AcsValueF = (2.56 - (AvgAcs * (5.12 / 1024.0)))/0.066;

3. Compile and upload the sketch to Arduino board. Open the Serial Monitor and observed the measure value. If the reading is not at 0.00A, fine tuning the offset voltage will help. If the reading is at + side, reduce the offset voltage, may be in 3-decimal point! If the reading is at – negative side, try increase the offset voltage.

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