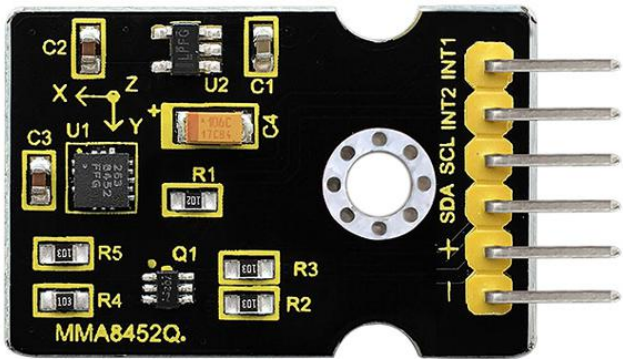
ADXL345 Three Axis Acceleration Module



Introduction

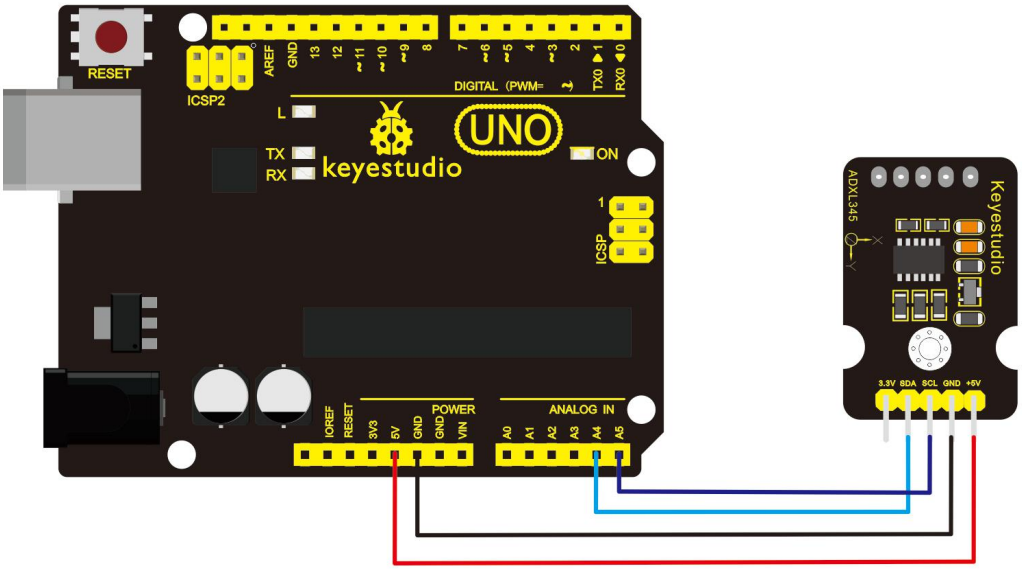
The ADXL345 is a small, thin, low power, 3-axis MEMS accelerometer with high resolution (13-bit) measurement at up to +-16 g. Digital output data is formatted as 16-bit twos complement and is accessible through either a SPI (3- or 4-wire) or I2C digital interface.

The ADXL345 is well suited to measure the static acceleration of gravity in tilt-sensing applications, as well as dynamic acceleration resulting from motion or shock. Its high resolution (4 mg/LSB) enables measurement of inclination changes less than 1.0 degrees.

Specification

- 2.0-3.6VDC Supply Voltage
- Ultra Low Power: 40uA in measurement mode, 0.1uA in standby@ 2.5V
- Tap/Double Tap Detection
- Free-Fall Detection
- SPI and I2C interface

Connection Diagram



Sample Code

The circuit connection is follows:

- VCC: 5V
- GND: ground

- SCL: UNO A5
- SDA: UNO A4

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```
#include <Wire.h>
// Registers for ADXL345
#define ADXL345_ADDRESS (0xA6 >> 1)    // address for device is 8 bit
but shift to the
                                                // right by 1 bit to make it 7 bit
because the
                                                // wire library only takes in 7
bit addresses
#define ADXL345_REGISTER_XLSB (0x32)

int accelerometer_data[3];
// void because this only tells the cip to send data to its output register
// writes data to the slave's buffer
void i2c_write(int address, byte reg, byte data) {

   // Send output register address
   Wire.beginTransmission(address);
```

```
    // Connect to device
    Wire.write(reg);
    // Send data
    Wire.write(data); //low byte
    Wire.endTransmission();
}

// void because using pointers
// microcontroller reads data from the sensor's input register
void i2c_read(int address, byte reg, int count, byte* data) {
    // Used to read the number of data received
    int i = 0;
    // Send input register address
    Wire.beginTransmission(address);
    // Connect to device
    Wire.write(reg);
    Wire.endTransmission();

    // Connect to device
    Wire.beginTransmission(address);
    // Request data from slave
```

```
  // Count stands for number of bytes to request
  Wire.requestFrom(address, count);
  while(Wire.available()) // slave may send less than requested
  {
    char c = Wire.read(); // receive a byte as character
    data[i] = c;
    i++;
  }
  Wire.endTransmission();
}

void init_adxl345() {
  byte data = 0;

  i2c_write(ADXL345_ADDRESS, 0x31, 0x0B);     // 13-bit mode  +_
16g
  i2c_write(ADXL345_ADDRESS, 0x2D, 0x08);     // Power register


  i2c_write(ADXL345_ADDRESS, 0x1E, 0x00);     // x
  i2c_write(ADXL345_ADDRESS, 0x1F, 0x00);     // Y
```

```
    i2c_write(ADXL345_ADDRESS, 0x20, 0x05);      // Z


    // Check to see if it worked!
    i2c_read(ADXL345_ADDRESS, 0X00, 1, &data);
    if(data==0xE5)
        Serial.println("it work Success");
    else
        Serial.println("it work Fail");
}


void read_adxl345() {
    byte bytes[6];
    memset(bytes,0,6);


    // Read 6 bytes from the ADXL345
    i2c_read(ADXL345_ADDRESS, ADXL345_REGISTER_XLSB, 6,
bytes);
    // Unpack data
    for (int i=0;i<3;++i) {
        accelerometer_data[i] = (int)bytes[2*i] + (((int)bytes[2*i + 1]) << 8);
    }
```

```
}
// initialise and start everything
void setup() {
   Wire.begin();
   Serial.begin(9600);
   for(int i=0; i<3; ++i) {
      accelerometer_data[i]    = 0;
   }
   init_adxl345();
}



void loop() {
   read_adxl345();
   Serial.print("ACCEL: ");
   Serial.print(float(accelerometer_data[0])*3.9/1000);//3.9mg/LSB scale
factor in 13-bit mode
   Serial.print("\t");
   Serial.print(float(accelerometer_data[1])*3.9/1000);


   Serial.print("\t");
```

```
    Serial.print(float(accelerometer_data[2])*3.9/1000);
    Serial.print("\n");
    delay(100);
}
```

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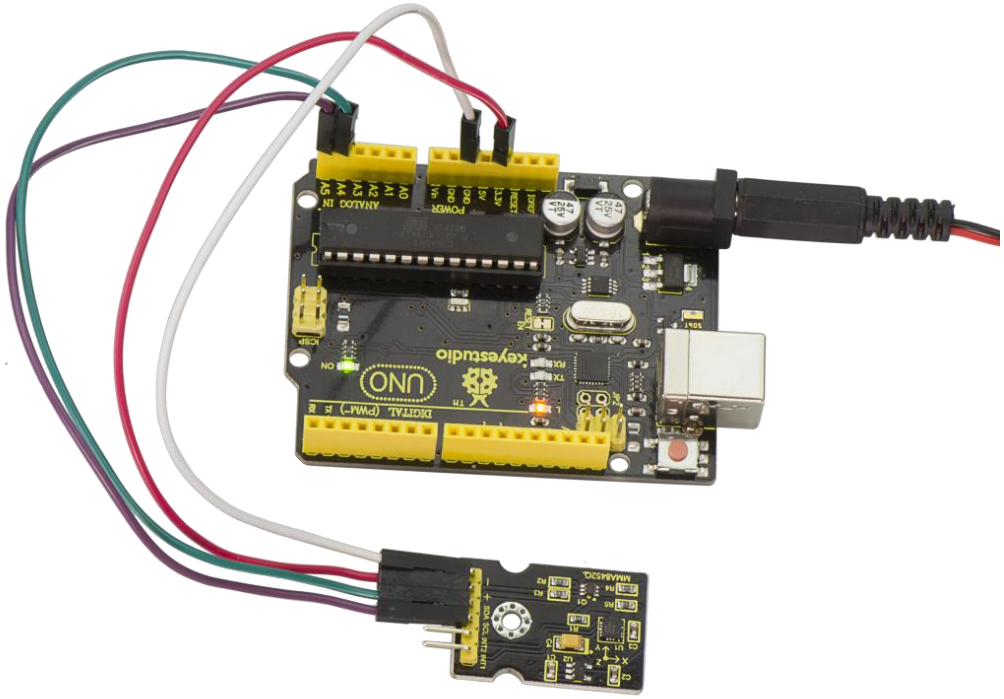
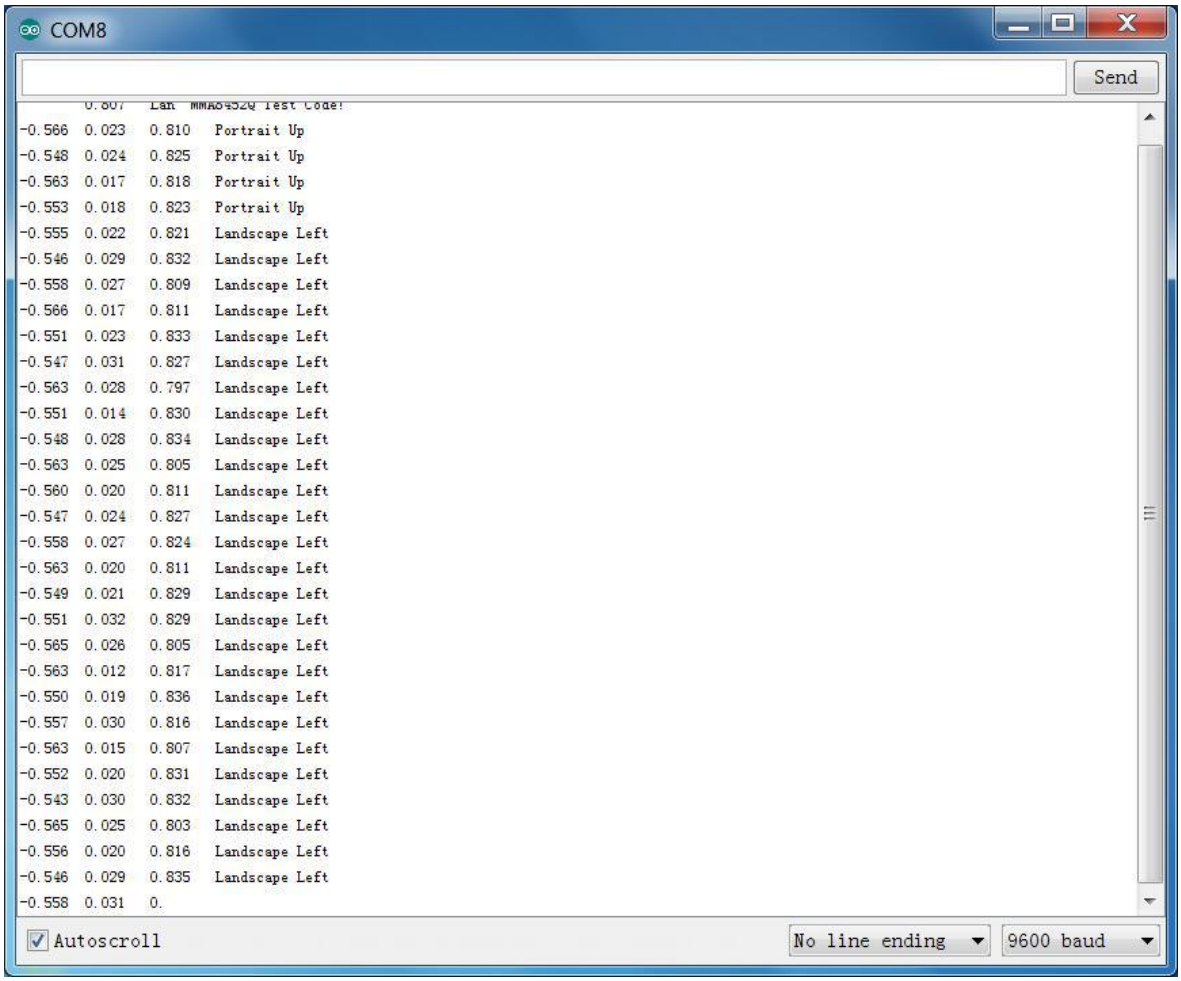
Example Result



Wiring as the above diagram and power on, then upload the code and open the serial monitor, it will display the triaxial acceleration of sensor and its status, as the graph shown below.


COM8
Send
0.807 Lan MMA8452Q Test Code!
-0.566 0.023 0.810 Portrait Up
-0.548 0.024 0.825 Portrait Up
-0.563 0.017 0.818 Portrait Up
-0.553 0.018 0.823 Portrait Up
-0.555 0.022 0.821 Landscape Left
-0.546 0.029 0.832 Landscape Left
-0.558 0.027 0.809 Landscape Left
-0.566 0.017 0.811 Landscape Left
-0.551 0.023 0.833 Landscape Left
-0.547 0.031 0.827 Landscape Left
-0.563 0.028 0.797 Landscape Left
-0.551 0.014 0.830 Landscape Left
-0.548 0.028 0.834 Landscape Left
-0.563 0.025 0.805 Landscape Left
-0.560 0.020 0.811 Landscape Left
-0.547 0.024 0.827 Landscape Left
-0.558 0.027 0.824 Landscape Left
-0.563 0.020 0.811 Landscape Left
-0.549 0.021 0.829 Landscape Left
-0.551 0.032 0.829 Landscape Left
-0.565 0.026 0.805 Landscape Left
-0.563 0.012 0.817 Landscape Left
-0.550 0.019 0.836 Landscape Left
-0.557 0.030 0.816 Landscape Left
-0.563 0.015 0.807 Landscape Left
-0.552 0.020 0.831 Landscape Left
-0.543 0.030 0.832 Landscape Left
-0.565 0.025 0.803 Landscape Left
-0.556 0.020 0.816 Landscape Left
-0.546 0.029 0.835 Landscape Left
-0.558 0.031 0.
Autoscroll
No line ending
9600 baud