GENERAL DESCRIPTION

The MC3672 is an ultra-low power, low noise, integrated digital output 3-axis accelerometer with a feature set optimized for wearables and consumer product motion sensing. Applications include wearable consumer products, IoT devices, user interface control, gaming motion input, electronic compass tilt compensation for cell phones, game controllers, remote controls and portable media products.

The EVA3672A is a prebuilt circuit board with MC3672 WLCSP 3-axes sensor. The MC3672 has internal sample rate from 14 to 1300 samples / second and measures acceleration with a wide usage range, from +/-2g up to +/-16g, and 6-bit to 14-bit high precision ADC output, which is easy to fit on top of the microcontroller, such as an Arduino. The accelerometer communicates via I2C and gives out motion detection or sample acquisition conditions to trigger an interrupt toward a MCU.

The sensor data is easily readable by connecting DVDD to 3.3V, GND to ground, and SCL/SDA pins to your Arduino I2C clock and data pin respectively. Download the MC3672 library from GitHub onto the board, run the example sketch, and then sensor data shortly comes out in raw data count and SI unit accelerometer measurements. An easy-to-use demonstration on EVA3672A using the Arduino platform is included in this document.

MC3672 FEATURES

Range, Sampling & Power

- ±2,4,8,12 or 16g ranges
- 8, 10 or 12-bit resolution with FIFO
  - 14-bit single samples
- Sample rate 14 - 1300 samples/sec
- Sample trigger via internal oscillator, clock pin or software command
- Sniff and Wake modes
- 0.4 µA Sniff current @ 6Hz
- Separate or combined sniff/wake
- Ultra-Low Power with 32 sample FIFO
  - 0.9 µA typical current @ 25Hz
  - 1.6 µA typical current @ 50Hz
  - 2.8 µA typical current @ 100Hz
  - 36 µA typical current @ 1300Hz

Simple System Integration

- I2C interface, up to 1 MHz
- SPI Interface, up to 4 MHz
- 1.29 × 1.09 × 0.742 mm 8-pin WLCSP package
- Single-chip 3D silicon MEMS
- Low noise to 2.3mg RMS

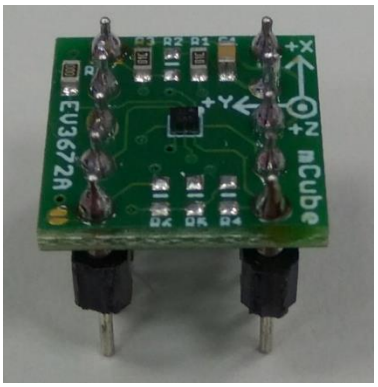
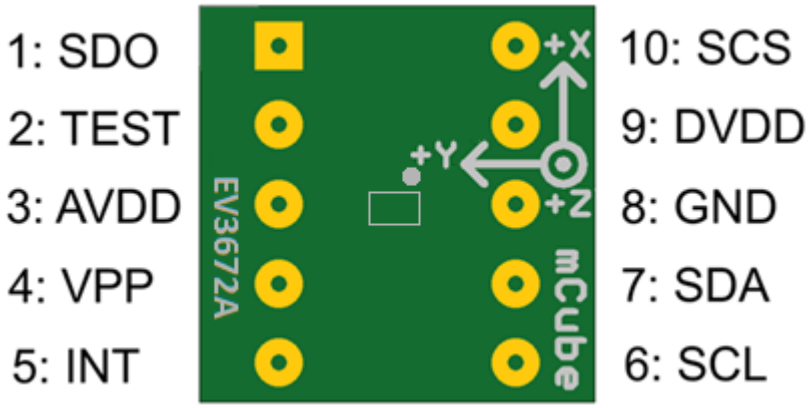


TABLE OF CONTENTS

1 GENERAL OPERATION

1.1 PINOUTS



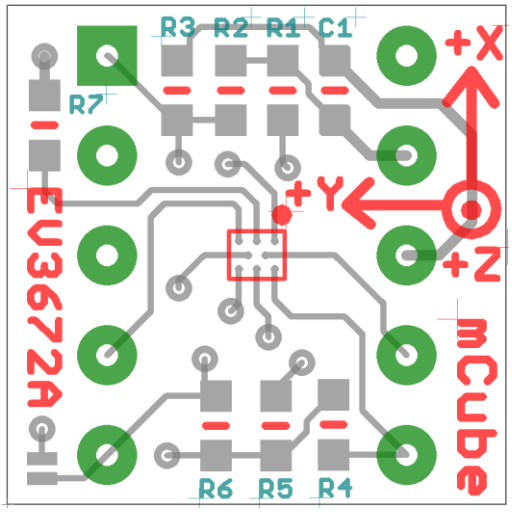
1.2 POWER PINS

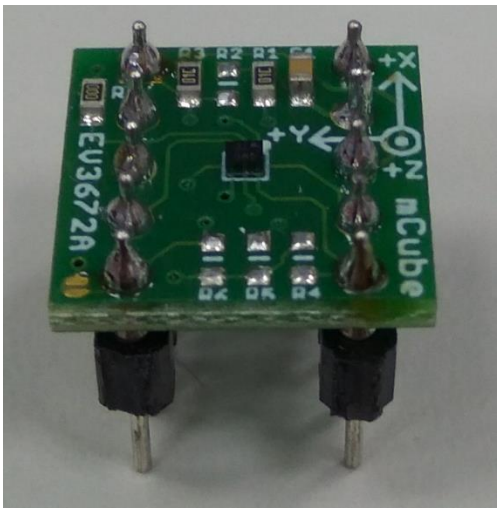
DVDD – 3.3V Power Supply Input
GND – Ground Pin for Power and Logic

1.3 I2C PINS

Connect the **SCL** (I2C clock pin) to your microcontroller's I2C clock line. This pin can be used with **3V** logic. A **4.7K** pull-up resistor is required for this pin. Simply, add a **4.7K** pull-up resistor on **R4** to make the I2C clock signal works normally.

Connect the **SDA** (I2C data pin) to your microcontroller's I2C data line. This pin can be used with **3V** logic. A **4.7K** pull-up resistor is required for this pin. Simply, add a **4.7K** pull-up resistor on **R5** to ensure functionality of the I2C data signal.





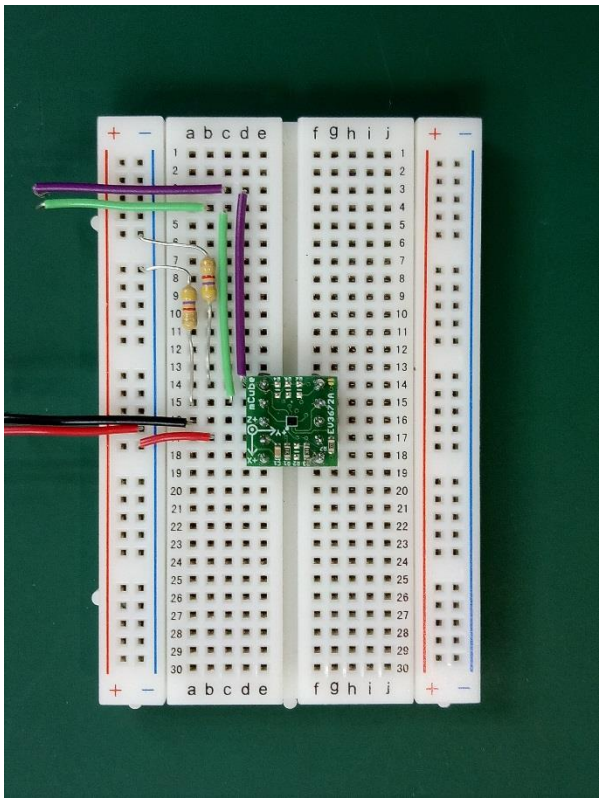
R4, R5: If using I2C and I2C pull-up resistors are needed for your application then install~4.7KΩ resistors into R4 (SCL clock pin) and R5 (SDA data pin) which are not installed by factory default. In addition, besides soldering resisters on R4/R5, you can add axial lead 4.7K ohm resistors to the SDA and SCL pin respectively. It will work the same either way.

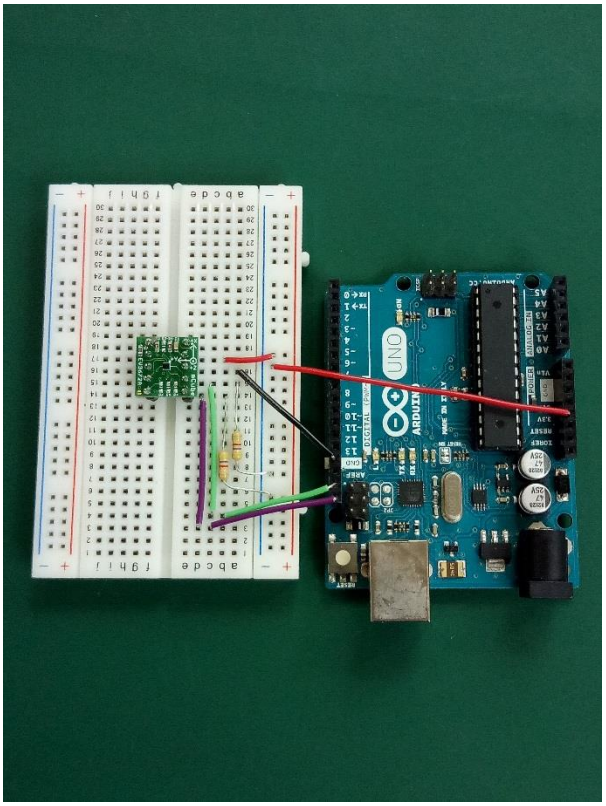
NOTE: DO NOT install more than one setup pull-up resistors per I2C bus.

1.4 INTERRUPT PINS

INT - HW interrupt signal pin. This pin will be triggered by the device when data is ready to read, or a motion event is detected by the accelerometer. (Not currently supported in the library for the interrupt pin, so please check the datasheet for the I2C commands toward related registers).

2 ASSEMBLY AND TEST





The EV3672A evaluation board can be easily wired to any microcontroller. This example shows a typical Arduino platform. For other microcontrollers, be sure it has I2C with repeated-start support, then port the code. Please refer to the illustration below to connect the related pins.

- Connect **DVDD** to the power supply, **3.3V**.
  (Providing higher voltage, like 5V may damage the sensor.)
- Connect **GND** to common power/data ground.
- Connect the **SCL** pin to the I2C clock **SCL** pin on your Arduino.
- Connect the **SDA** pin to the I2C data **SDA** pin on your Arduino.

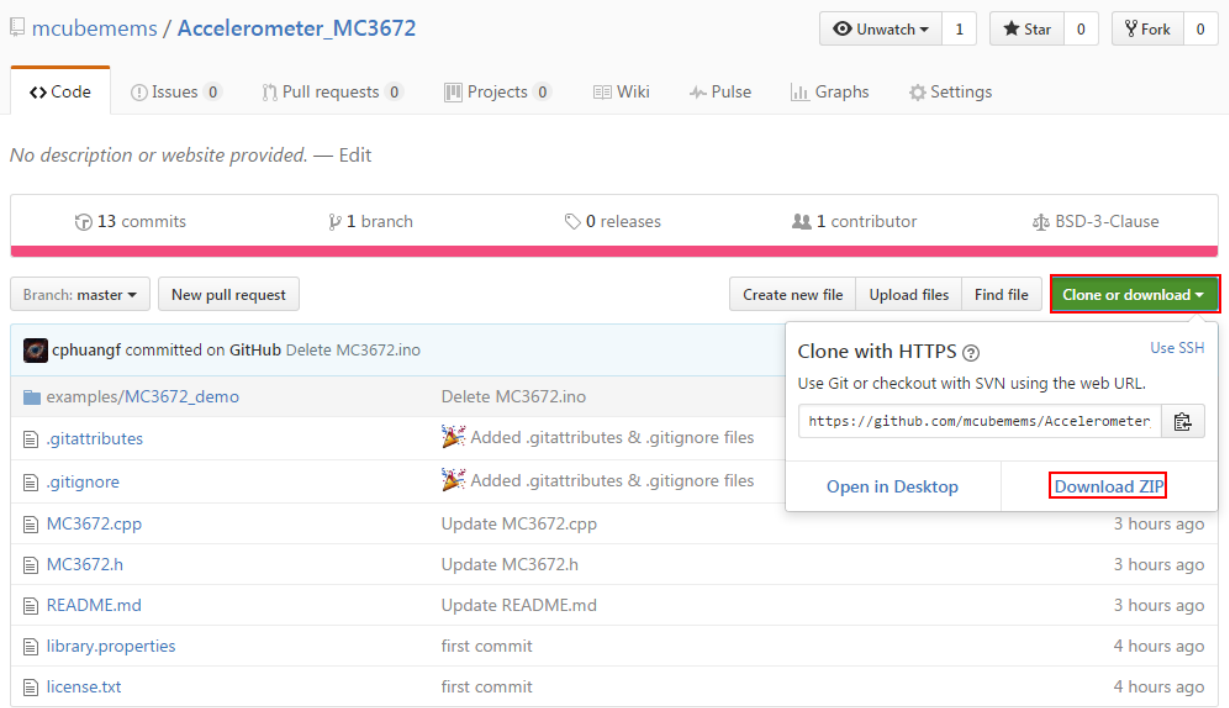
The MC3672 has a default I2C address of 0x4C and it can be changed to 0x6C by tying the DOUT pin to VDD.

3 DEMO

3.1 DOWNLOAD THE DRIVER FROM GITHUB

To begin reading sensor data, you will need to download the MC3672 Library from the GitHub repository. Do this by visiting the GitHub repository and manually downloading or simply click this button the attached URL to download the zip file.

https://github.com/mcubemems/Accelerometer_MC3672



Rename the uncompressed folder **Accelerometer_MC3672** and check that the Accelerometer_MC3672 folder contains **MC3672.cpp** and **MC3672.h**

Place the Accelerometer_MC3672 library folder to your **Arduino_sketch_folder/libraries/** folder.

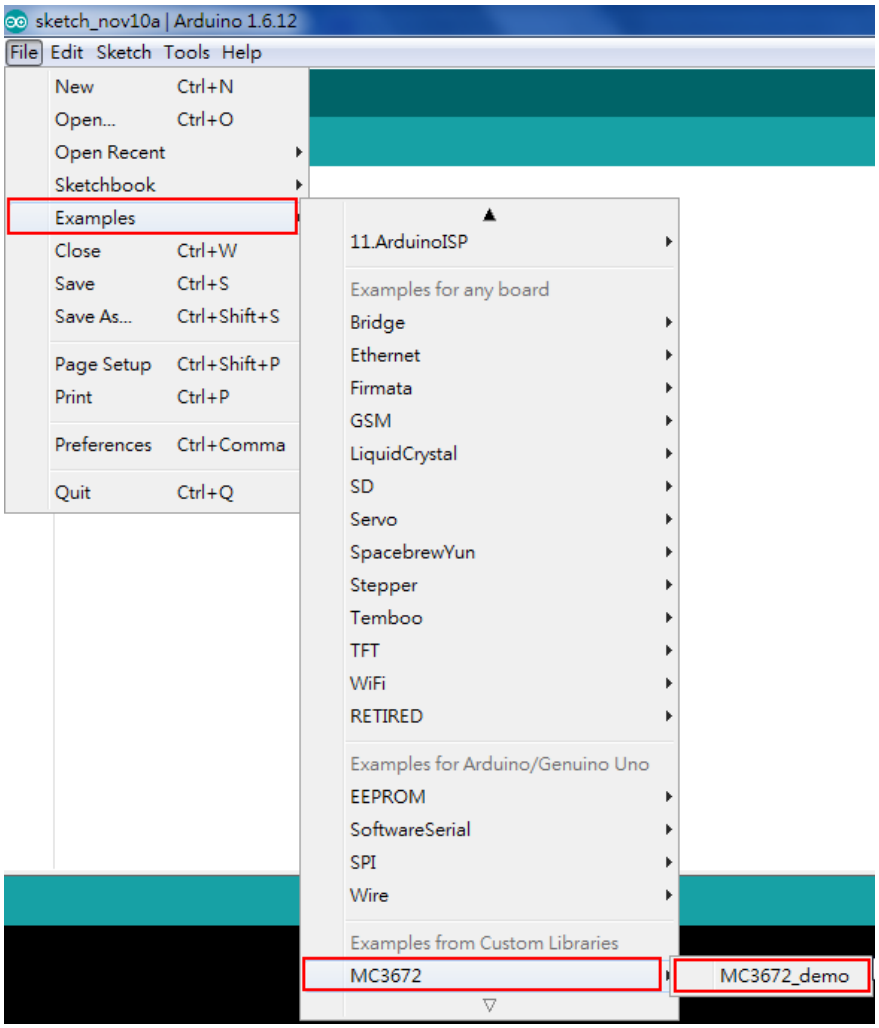
You may need to create the library subfolder if it is your first library. Then just restart the IDE.

An excellent tutorial on Arduino library installation is located at:

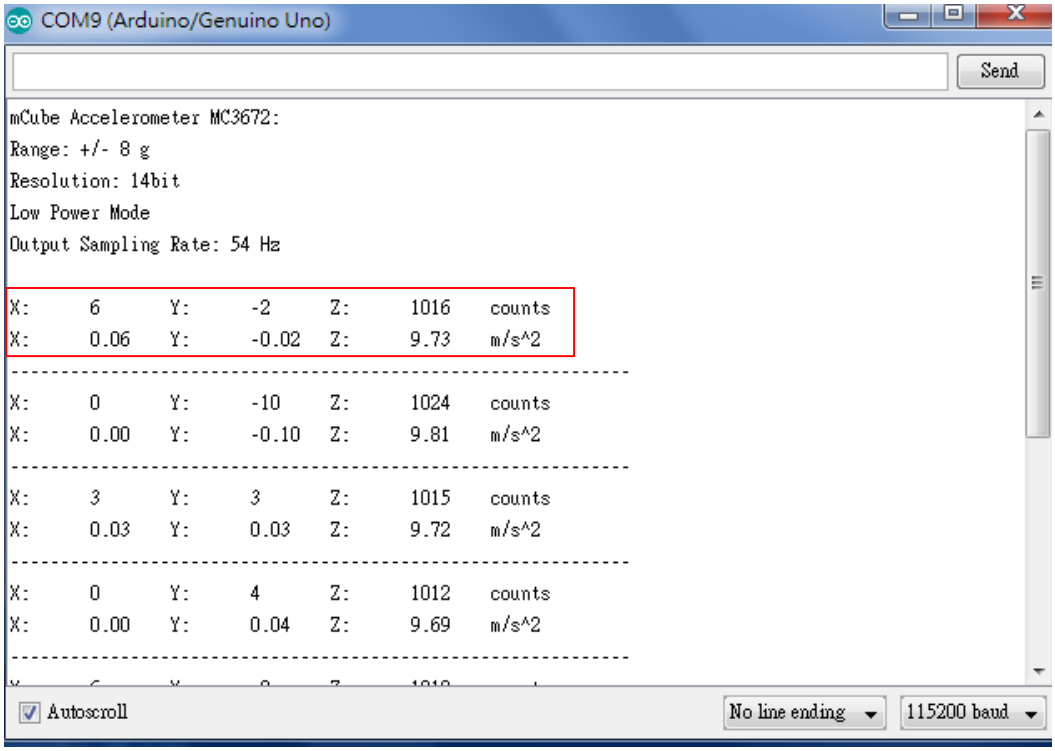
http://learn.adafruit.com/adafruit-all-about-arduino-libraries-install-use

3.2 LOAD THE DEMO

Open up File->Examples->MC3672-> MC3672demo and upload to your Arduino while it is wired to the sensor.



Now open up the serial terminal window at 115,200 baud rate speed to begin the test.



You will see the output from the serial terminal showing the current range scale and resolution of the sensor in the first three lines followed by two lines of output sensor data at some output data rate which depict “raw count" data for line 1: X: 6 Y: -2 Z: 1016 with 8G range, 14bit ADC resolution. Line 2 indicates the SI units for measuring acceleration as X: 0.06 m/s^2 Y: -0.02 m/s^2 Z: 9.73 m/s^2.

4 LIBRARY REFERENCE

4.1 CREATE MCUBE_MC3672 OBJECT

You can create the MCUBE_MC3672 object with:

```
MC3672 MC3672_acc = MC3672();
```

4.2 INITIALIZE AND CONFIGURE SENSOR

Initialize and configure the sensor with:

```
MC3672_acc.start();
```

4.3 SET RANGE

Set the accelerometer max range to ±2g, ±4g, ±8g or ±16g with:

```
MC3672_acc.SetRangeCtrl(MC3672_RANGE_2G);
MC3672_acc.SetRangeCtrl(MC3672_RANGE_4G);
MC3672_acc.SetRangeCtrl(MC3672_RANGE_8G);
MC3672_acc.SetRangeCtrl(MC3672_RANGE_16G);
```

4.4 READ RANGE

Read the current range with:

```
MC3672_acc.GetRangeCtrl();
```

This returns: 0 for ±2g, | 1 for ±4g, | 2 for ±8g | 3 for ±16g.

4.5 READ RESOLUTION

Read the current resolution with:

```
MC3672_acc.GetResolutionCtrl();
```

This returns: 0 for 6-bit | 1 for 7-bit | 2 for 8-bit | 3 for 10-bit | 4 for 12-bit | 5 for 14-bit

4.6 READ RAW COUNT DATA

Read the raw count data and SI unit measurement with:

```
MC3672_acc.readRawAccel();
```

5 DOWNLOADS

5.1 MC3672 ACCELEROMETER DATASHEET

http://www.mcubemems.com/product/mc3672-3-axis-accelerometer/

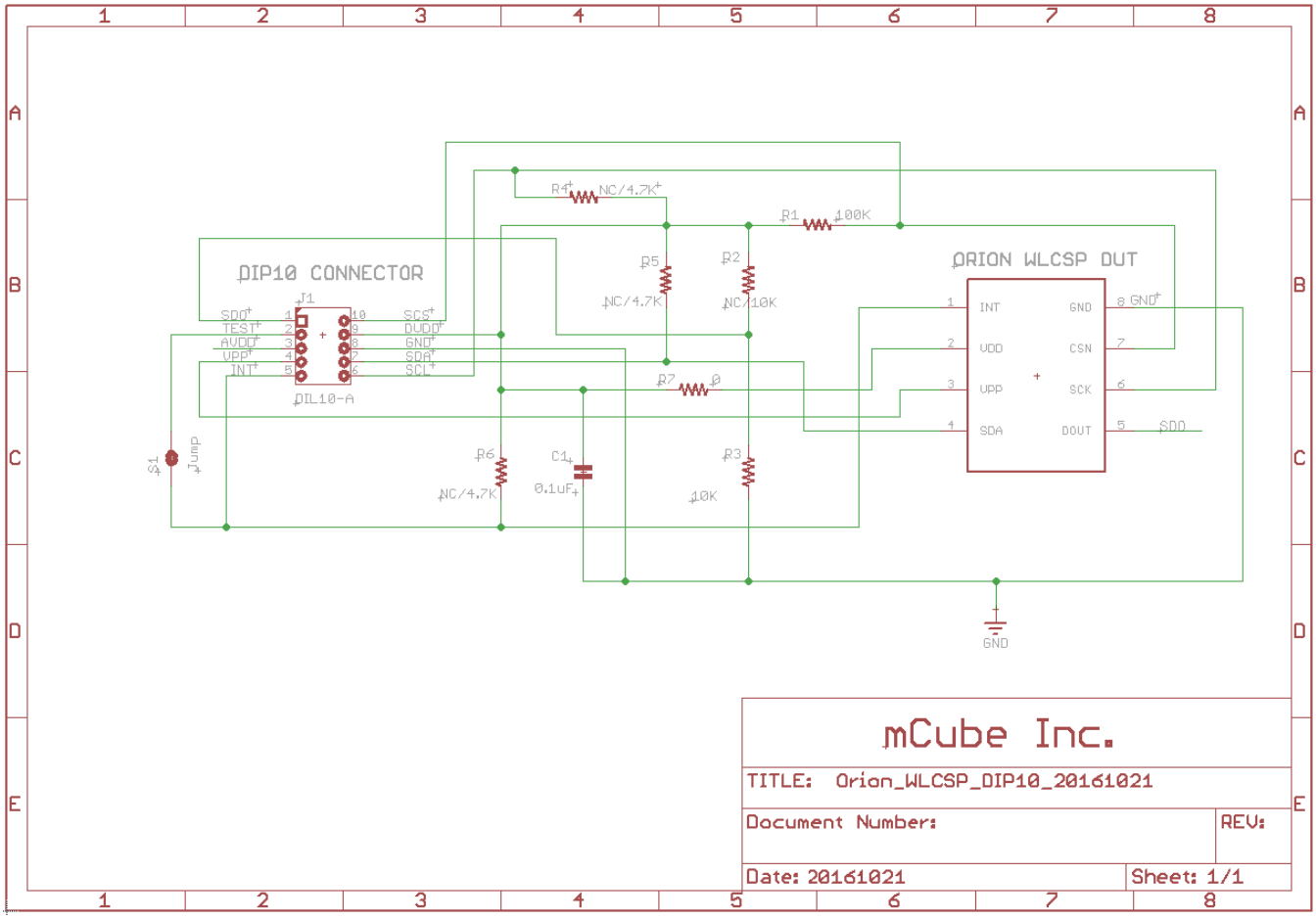
5.2 MC3672 DRIVER AT GITHUB

https://github.com/mcubemems/Accelerometer_MC3672

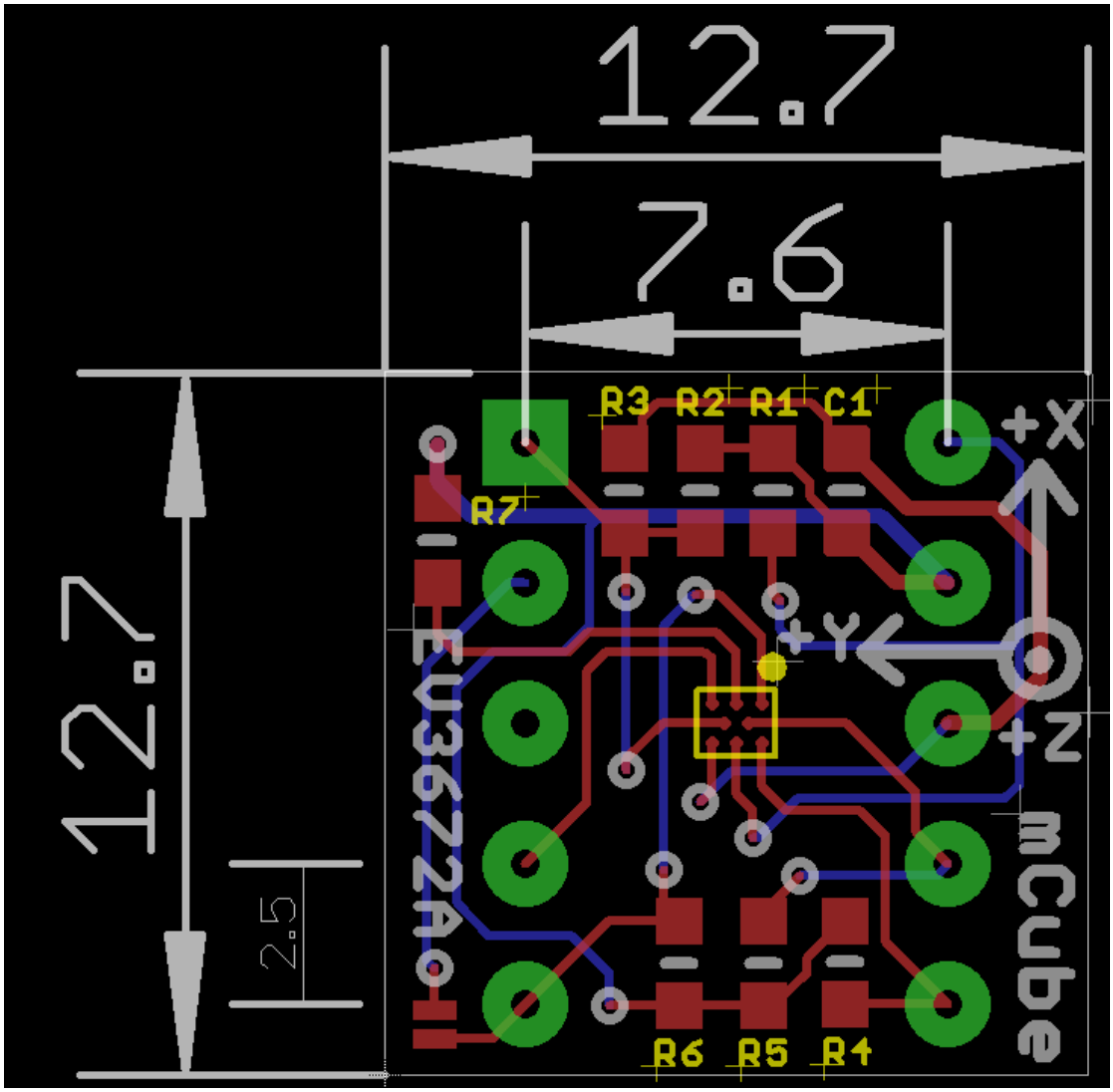
5.3 ALL OTHER MCUBE DOCUMENTATION

http://www.mcubemems.com/resources-support/resources/

6 SCHEMATICS



7 FABRICATION PRINT



8 REVISION HISTORY

Date	Revision	Description
2016-12-12	APS-045-0019v1.0	First release.

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