

## 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.**

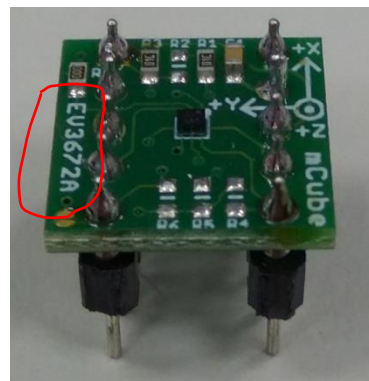
## MC3672 FEATURES

### Range, Sampling & Power

- $\pm 2, 4, 8, 12$  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  $\mu\text{A}$  Sniff current @ 6Hz
- Separate or combined sniff/wake
- Ultra-Low Power with 32 sample FIFO
  - 0.9  $\mu\text{A}$  typical current @ 25Hz
  - 1.6  $\mu\text{A}$  typical current @ 50Hz
  - 2.8  $\mu\text{A}$  typical current @ 100Hz
  - 36  $\mu\text{A}$  typical current @ 1300Hz

### Simple System Integration

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

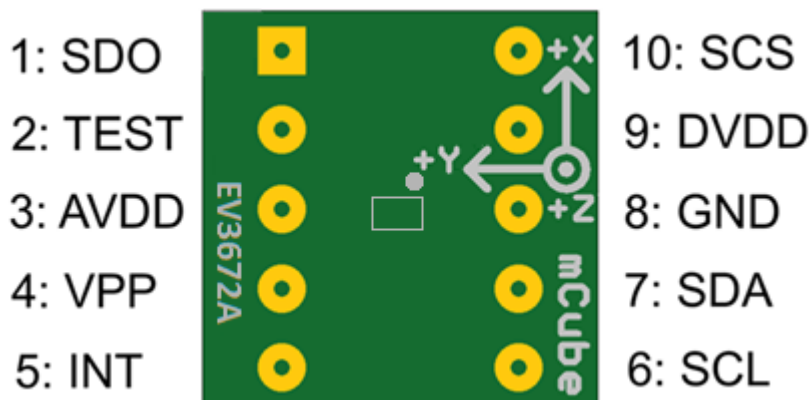


# TABLE OF CONTENTS

1	General Operation .....	3
2	Assembly and Test .....	5
3	Demo .....	6
4	Library Reference .....	9
5	Downloads .....	10
6	Schematics .....	11
7	Fabrication print .....	12
8	Revision History .....	13
9	Legal .....	14

# 1 GENERAL OPERATION

## 1.1 PINOUTS



## 1.2 POWER PINS

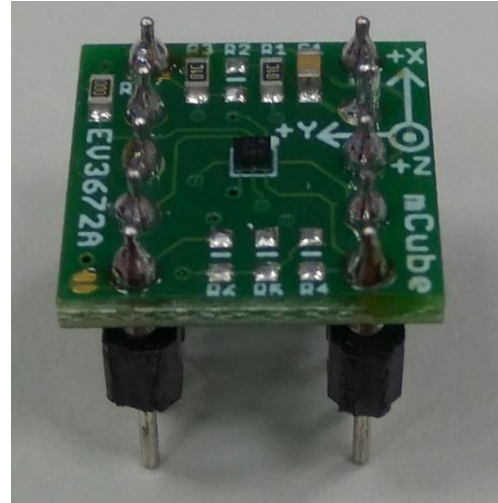
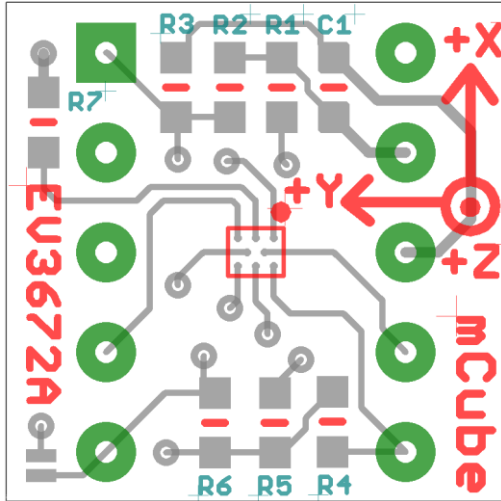
**DVDD** – 3.3V Power Supply Input

**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.



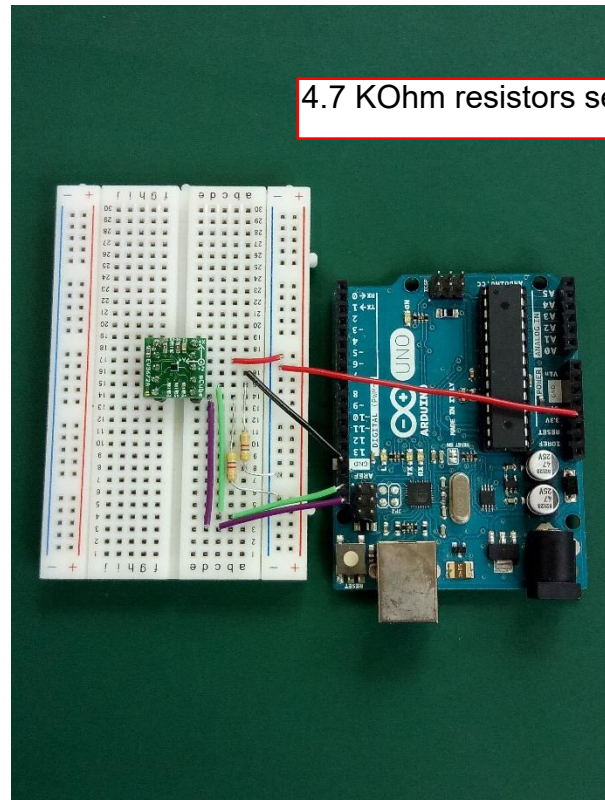
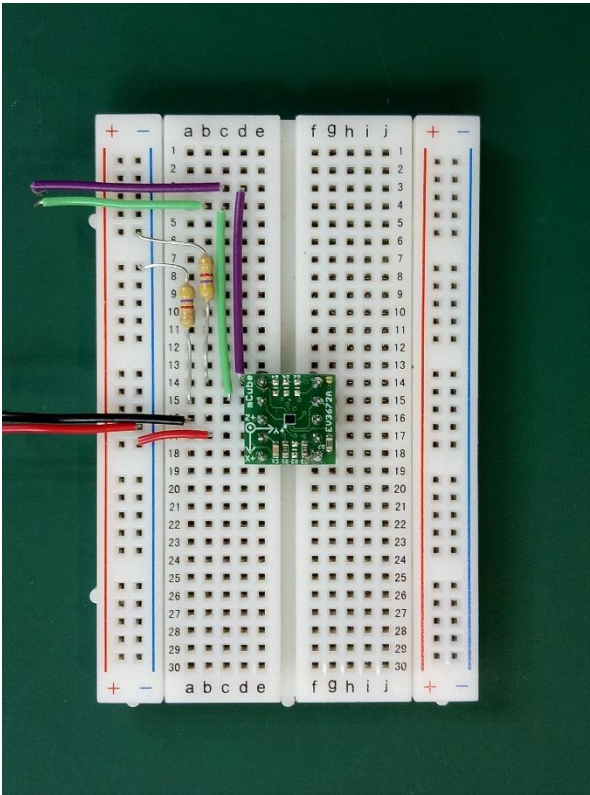
**R4, R5:** If using I2C and I2C pull-up resistors are needed for your application then install ~4.7K $\Omega$  resistors into R4 (SCL clock pin) and R5 (SDA data pin) which are not installed by factory default. In addition, besides soldering resistors on R4/R5, you can add axial lead 4.7K ohm resistors 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](https://github.com/mcubemems/Accelerometer_MC3672)

mcubemems / Accelerometer\_MC3672

Unwatch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Projects 0 Wiki Pulse Graphs Settings

No description or website provided. — Edit

13 commits 1 branch 0 releases 1 contributor BSD-3-Clause

Branch: master New pull request

Create new file Upload files Find file Clone or download

cphuangf committed on GitHub Delete MC3672.ino

examples/MC3672_demo	Delete MC3672.ino	
.gitattributes	Added .gitattributes & .gitignore files	
.gitignore	Added .gitattributes & .gitignore files	
MC3672.cpp	Update MC3672.cpp	3 hours ago
MC3672.h	Update MC3672.h	3 hours ago
README.md	Update README.md	3 hours ago
library.properties	first commit	4 hours ago
license.txt	first commit	4 hours ago

Clone with HTTPS Use SSH

Use Git or checkout with SVN using the web URL.

[https://github.com/mcubemems/Accelerometer\\_MC3672](https://github.com/mcubemems/Accelerometer_MC3672)

Open in Desktop Download ZIP

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.

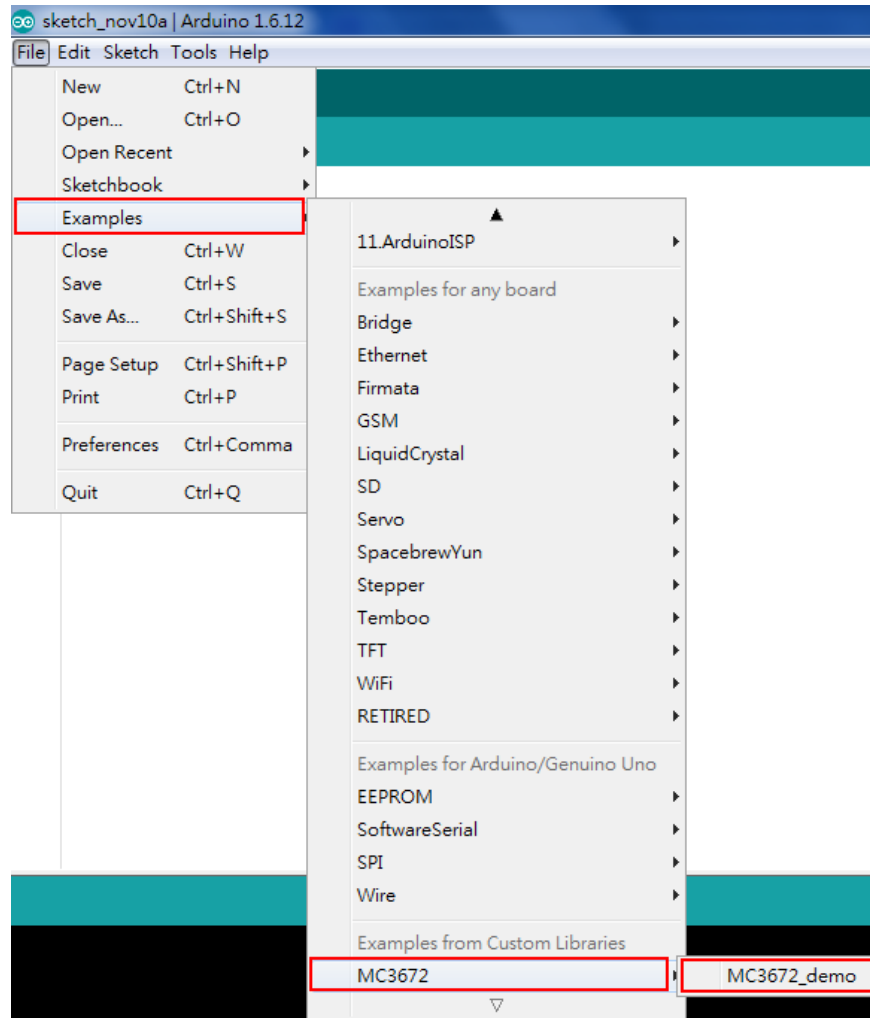
You may need to create the library subfolder if it is your first library. Then just restart the IDE.

An excellent tutorial on Arduino library installation is located at:

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

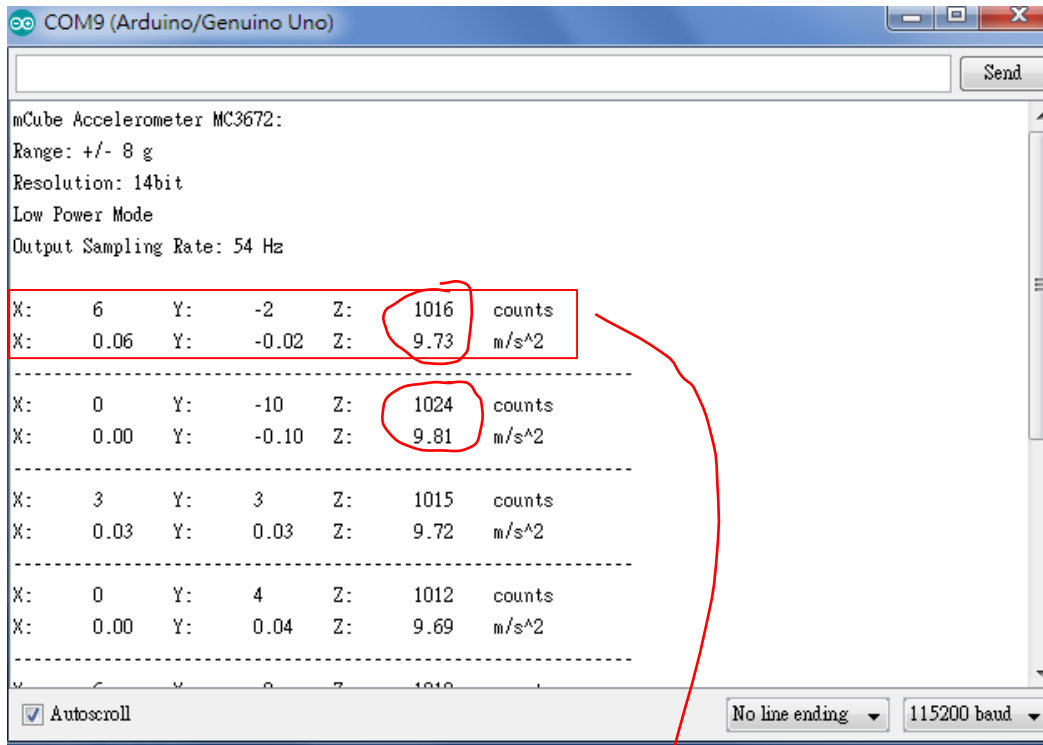
### 3.2 LOAD THE DEMO

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.

14-bit --> 16384. Range is [-8g,+8g] which is a 16g wide interval. Thus  $1g = 16384/16 = 1024$ . If we consider  $1g=9.81m/s^2$  then 1016 corresponds to  $1016/1024 * 9.81 = 9.73$



## 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  $\pm 2g$ ,  $\pm 4g$ ,  $\pm 8g$  or  $\pm 16g$  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  $\pm 2g$ , | 1 for  $\pm 4g$ , | 2 for  $\pm 8g$  | 3 for  $\pm 16g$ .

### 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/>

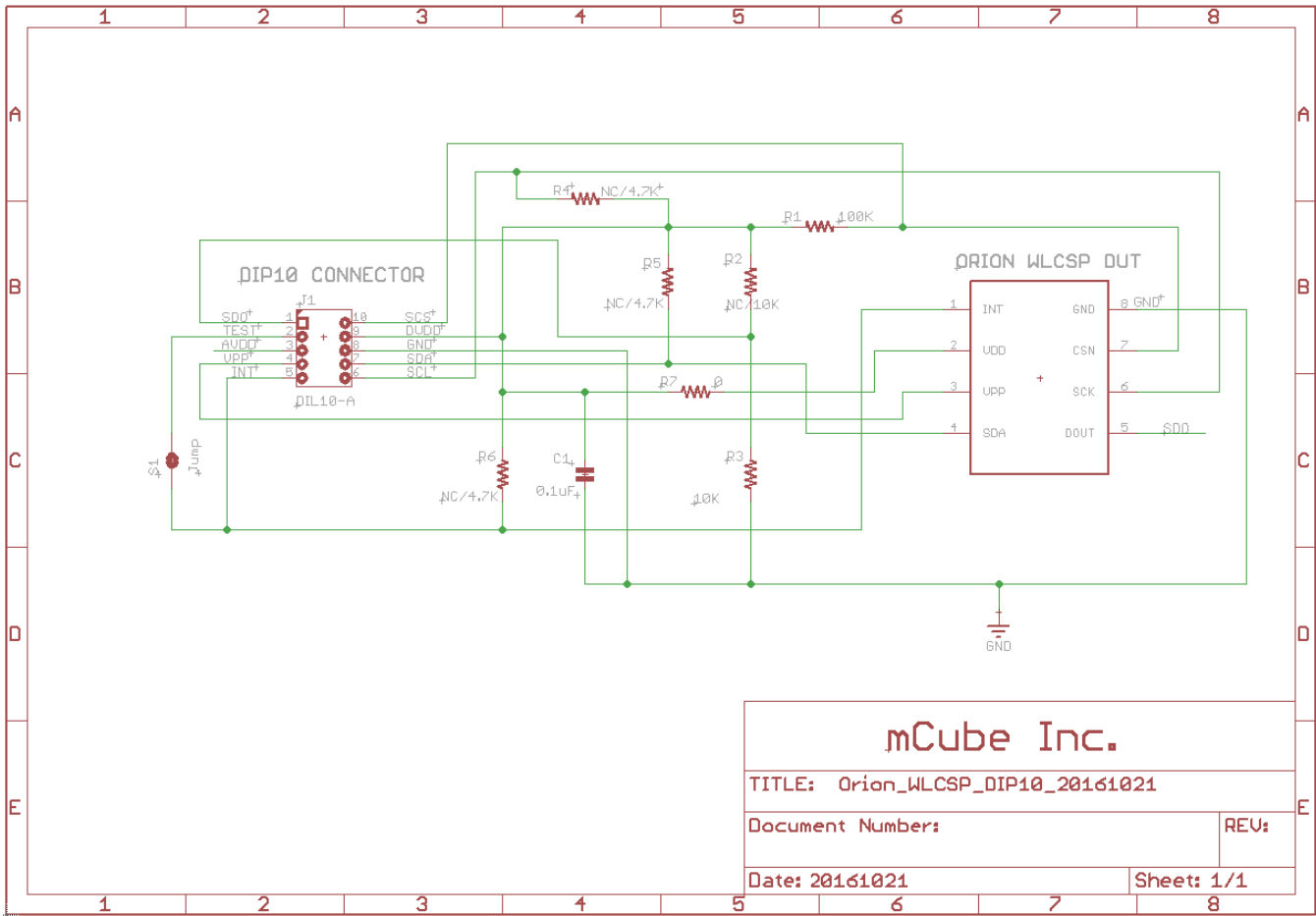
### 5.2 MC3672 DRIVER AT GITHUB

[https://github.com/mcubemems/Accelerometer\\_MC3672](https://github.com/mcubemems/Accelerometer_MC3672)

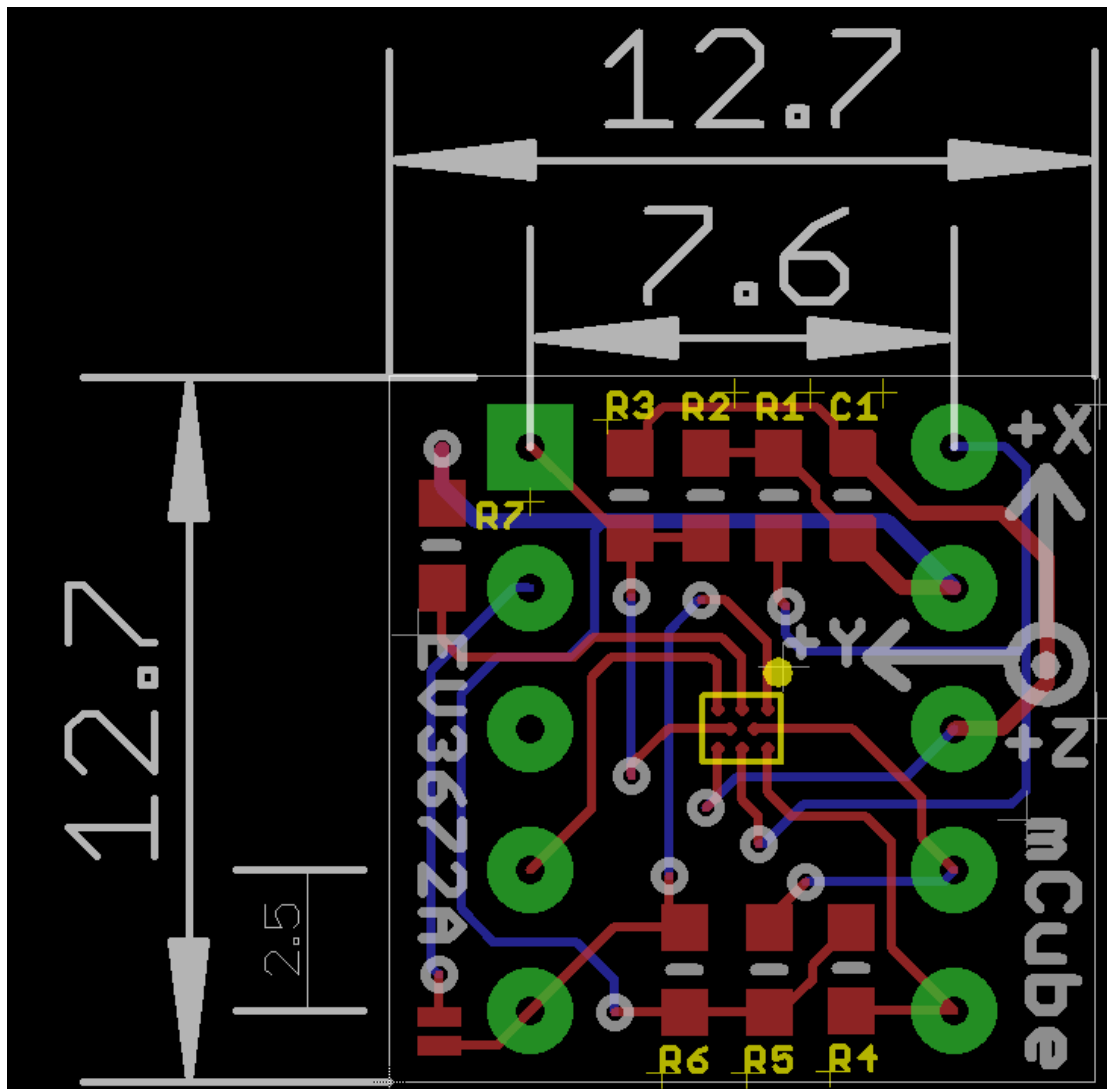
### 5.3 ALL OTHER MCUBE DOCUMENTATION

<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.

## 9 LEGAL

1. M-CUBE reserves the right to make corrections, modifications, enhancements, improvements and other changes to its products and to this document at any time and discontinue any product without notice. The information contained in this document has been carefully checked and is believed to be accurate. However, M-CUBE shall assume no responsibilities for inaccuracies and make no commitment to update or to keep current the information contained in this document.
2. M-CUBE products are designed only for commercial and normal industrial applications and are not suitable for other purposes, such as: medical life support equipment; nuclear facilities; critical care equipment; military / aerospace; automotive; security or any other applications, the failure of which could lead to death, personal injury or environmental or property damage. Use of the products in unsuitable applications are at the customer's own risk and expense.
3. M-CUBE shall assume no liability for incidental, consequential or special damages or injury that may result from misapplication or improper use of operation of the product.
4. No license, express or implied, by estoppel or otherwise, to any intellectual property rights of M-CUBE or any third party is granted under this document.
5. M-CUBE makes no warranty or representation of non-infringement of intellectual property rights of any third party with respect to the products. M-CUBE specifically excludes any liability to the customers or any third party regarding infringement of any intellectual property rights, including the patent, copyright, trademark or trade secret rights of any third party, relating to any combination, machine, or process in which the M-CUBE products are used.
6. Examples of use described herein are provided solely to guide use of M-CUBE products and merely indicate targeted characteristics, performance and applications of products. M-CUBE shall assume no responsibility for any intellectual property claims or other problems that may result from applications based on the examples described herein
7. Information described in this document including parameters, application circuits and its constants and calculation formulas, programs and control procedures are provided for the purpose of explaining typical operation and usage. "Typical" parameters that may be provided in M-CUBE data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters including "Typicals," must be validated for each customer application by customer's technical experts. In no event shall the information described be regarded as a guarantee of conditions or characteristics of the products. Therefore, the customer should evaluate the design sufficiently as whole system under the consideration of various external or environmental conditions and determine their application at the customer's own risk. M-CUBE shall assume no responsibility or liability for claims, damages, costs and expenses caused by the customer or any third party, owing to the use of the above information.



is a trademark of M-CUBE, Inc.

M-CUBE and the M-CUBE logo are trademarks of M-CUBE, Inc.,

All other product or service names are the property of their respective owners.

© M-CUBE, Inc. 2016. All rights reserved.