

SEED TECHNOLOGY INC (SEEEDUINO)

Grove - I2C 3-axis Accelerometer

Model: SEN21853P

Introduction

This 3-axis Accelerometer module is based on [MMA7660FC](#) with Digital Output [I2C](#). This Module can be used for sensing data changes, product orientation, and gesture detection through an interrupt pin (INT). It is a low power, low profile capacitive MEMS sensor that you can easily install onto your robot or airplane model to help them adjust their posture or anywhere you want to measure the acceleration.



Features

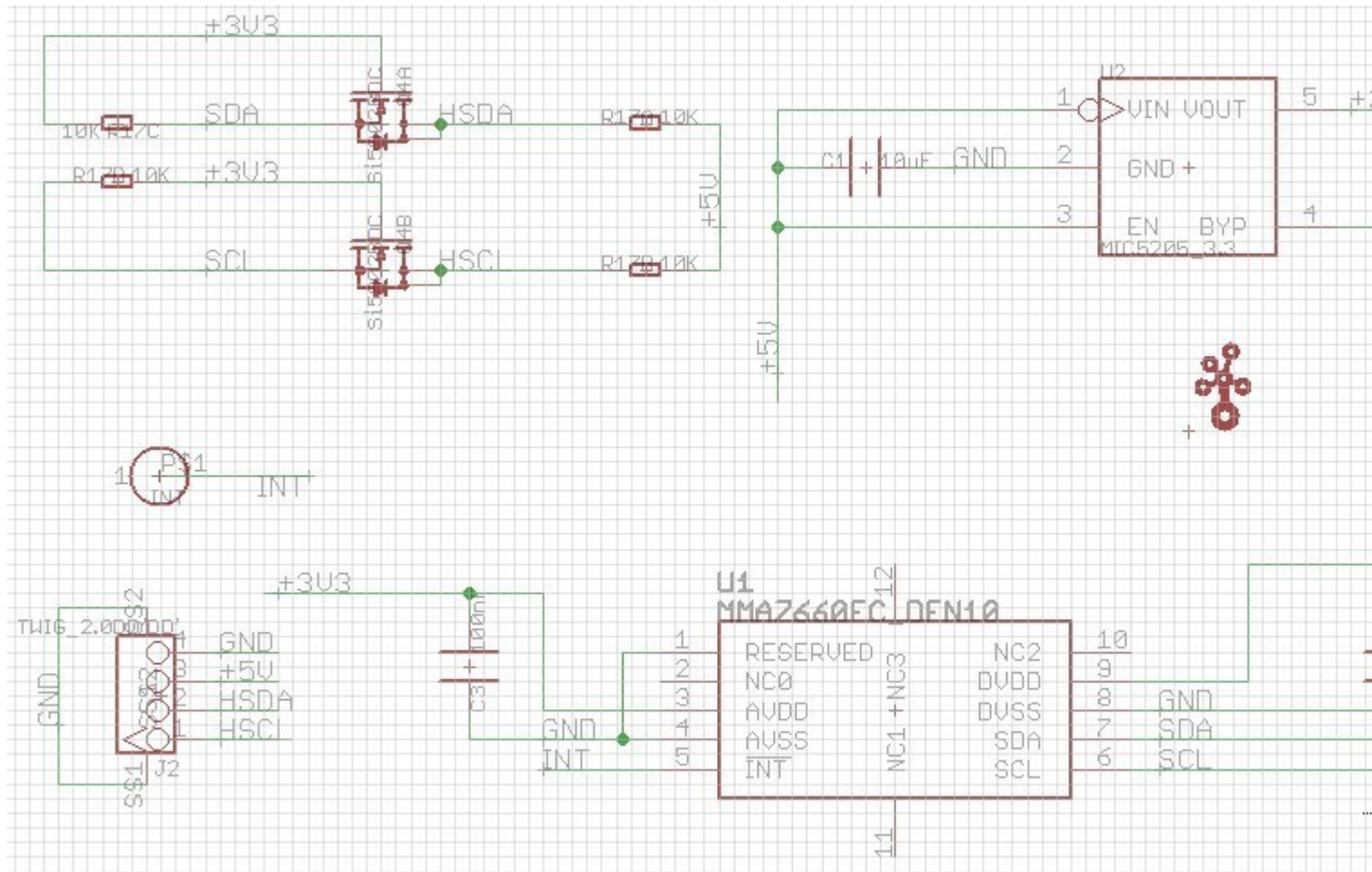
- Grove compatible interface
- 3 axis motion/orientation sensing
- Digital Output (I2C)
- 10,000 g shock survival
- RoHS/WEEE lead-free compliant
- Excellent temperature stability

Application Ideas

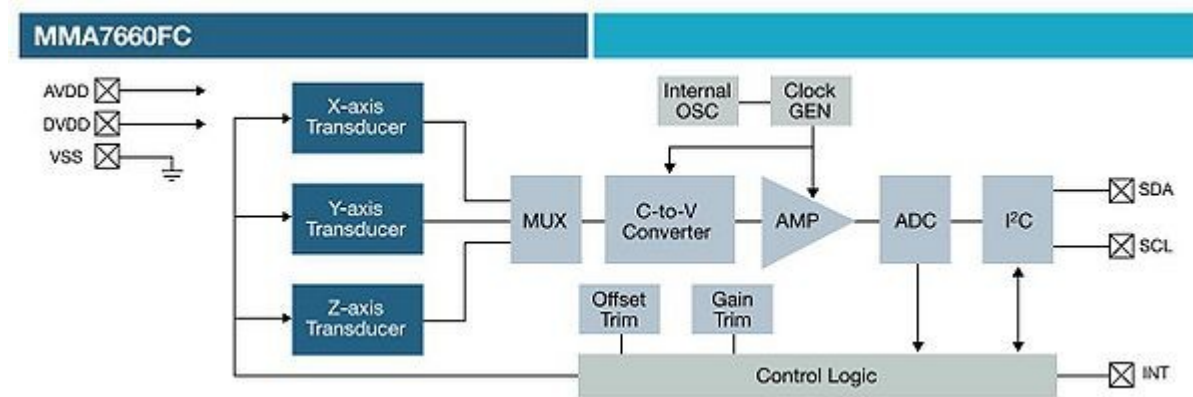
- Motion Detection
- Digital Still Camera: Image Stability
- Mobile Phone/ PMP/PDA: Orientation Detection (Portrait/Landscape), Image Stability, Text Scroll, Motion Dialing, Tap to Mute

Cautions

The warnings and wrong operations possible cause dangerous.



Block diagram of MMA7660FC

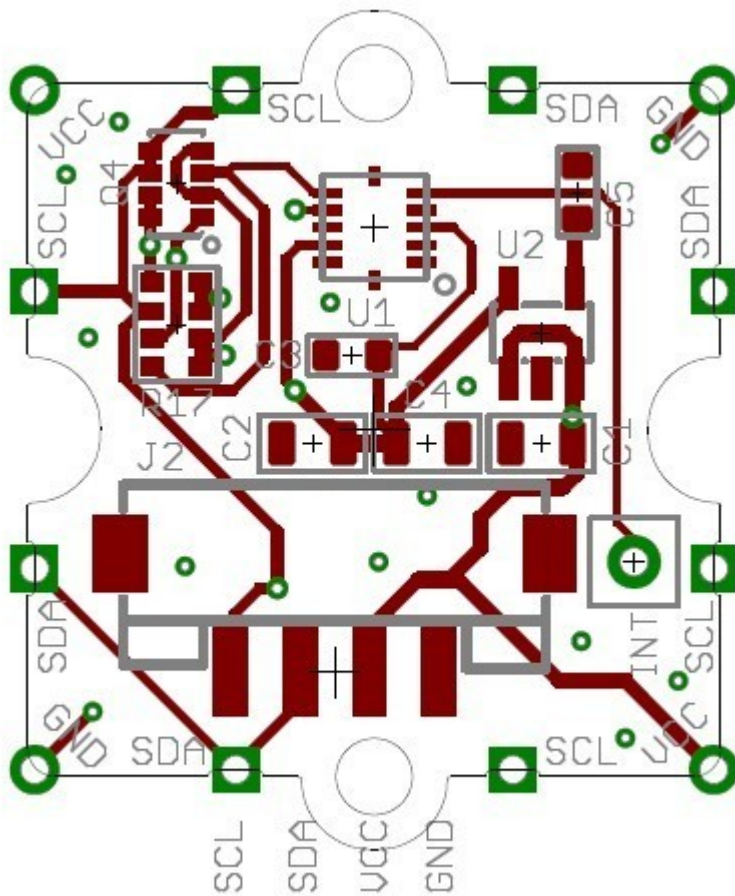


Specifications

- Working voltage: 3V- 5V
- Recommended Working voltage: 5V
- Off Mode Current: 0.4 μ A
- Standby Mode Current: 2 μ A
- Active Mode Current: 47 μ A at 1 ODR
- Range: \pm 1.5g
- Sensitivity: 21 LSB/g
- Weight: 2g

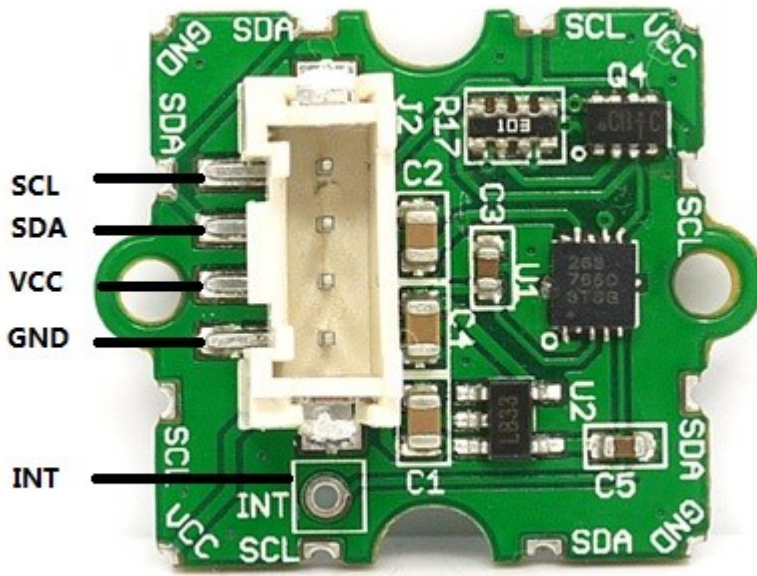
Pin definition and Rating

Pad Type	Pin Status	Description
GND	Input	Ground port
INT	Output	Interrupt/Data Ready
SDA	Input and Output	I2C Serial Data
SCL	Input	I2C Serial Clock
VCC	Input	Designed for 5V(+)supply using IC MIC5205_3.3 for Bluetooth module power supply

Mechanic Dimensions

2cm X 2cm

Hardware installation



Just Connect this module to the I2C connector of the [base shield](#) via 4-pin Grove cable.
The INT pin has to be led out by customers themselves if customers want to use the interrupt pin of MMA7660FC.

User Register Summary

Address	Name	Definition	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
\$00	XOUT	6-bit output value X	-	Alert	XOUT[5]	XOUT[4]	XOUT[3]	XOUT[2]	XOUT[1]	XOUT[0]
\$01	YOUT	6-bit output value Y	-	Alert	YOUT[5]	YOUT[4]	YOUT[3]	YOUT[2]	YOUT[1]	YOUT[0]
\$02	ZOUT	6-bit output value Z	-	Alert	ZOUT[5]	ZOUT[4]	ZOUT[3]	ZOUT[2]	ZOUT[1]	ZOUT[0]
\$03	TILT	Tilt Status	Shake	Alert	Tap	PoLa[2]	PoLa[1]	PoLa[0]	BaFro[1]	BaFro[0]
\$04	SRST	Sampling Rate Status	0	0	0	0	0	0	AWSRS	AMSRS
\$05	SPCNT	Sleep Count	SC[7]	SC[6]	SC[5]	SC[4]	SC[3]	SC[2]	SC[1]	SC[0]
\$06	INTSU	Interrupt Setup	SHINTX	SHINTY	SHINTZ	GINT	ASINT	PDINT	PLINT	FBINT
\$07	MODE	Mode	IAH	IPP	SCPS	ASE	AWE	TON	-	MODE
\$08	SR	Auto-Wake/Sleep and Portrait/Landscape samples per seconds and Debounce Filter	FILT[2]	FILT[1]	FILT[0]	AWSR[1]	AWSR[0]	AMSR[2]	AMSR[1]	AMSR[0]
\$09	PDET	Tap Detection	ZDA	YDA	XDA	PDTH[4]	PDTH[3]	PDTH[2]	PDTH[1]	PDTH[0]
\$0A	PD	Tap Debounce Count	PD[7]	PD[6]	PD[5]	PD[4]	PD[3]	PD[2]	PD[1]	PD[0]
\$0B-\$1F	Factory	Reserved	-	-	-	-	-	-	-	-

NOTE: To write to the registers the MODE bit in the MODE (0x07) register must be set to 0, Setting the device in Standby Mode.

For more information please refer to [Datasheet of MMA7660FC](#).

Modes Of Operation

Measurement and Power Mode	I2C Bus	DVDD	AVDD	Function
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Комплекующие для робототехники	Роботы для сборки	Собрать робота своими руками		
Power Down Mode	DVDD is down, so I2C bus cannot be used for other devices(MMA7660FC damps I2C bus to DVDD pin)	Off	Off	MMA7660FC is powered down in both supplies. I2C activity is unavailable on bus.
		Off	On	MMA7660FC is powered down in digital supply but not analog supply. I2C activity is unavailable on bus. AVDD power cycling requires 50 msec.
Off Mode	MMA7660FC will not respond, but I2C bus can be used for other devices(MMA7660FC does not load I2C bus).	On	Off	MMA7660FC is powered down in analog supply but not digital supply. I2C activity is ignored.
Standby Mode	MMA7660FC will respond to I2C bus.	On	On	MMA7660FC is powered down in both supplies, so registers can be accessed normally to set MMA7660FC to Active Mode when desired. MMA7660FC's sensor measurement system in idle.
Active Mode Auto-Sleep Auto-Wake	MMA7660FC will respond to I2C bus.	On	On	MMA7660FC is able to operate sensor measurement system at user programmable samples per second and run all of the digital analysis functions. Tap detection operates in Active Mode and Auto-Sleep, but not Auto-Wake.

Programming

The program below shows the basic using of Accelerometer module. In this program, Seeduino receive Acceleration from Accelerometer module via I2C bus, and then sent these data to PC via UART.

```
#include <Wire.h>

#define MMA7660addr 0x4c
#define MMA7660_X 0x00
#define MMA7660_Y 0x01
#define MMA7660_Z 0x02
#define MMA7660_TILT 0x03
#define MMA7660_SRST 0x04
#define MMA7660_SPCNT 0x05
#define MMA7660_INTSU 0x06
#define MMA7660_MODE 0x07
#define MMA7660_SR 0x08
#define MMA7660_PDET 0x09
#define MMA7660_PD 0x0A

class Acceleration
{
public:
char x;
char y;
char z;
};

void mma7660_init(void)
{
Wire.begin();
Wire.beginTransmission( MMA7660addr);
Wire.send(MMA7660_MODE);
Wire.send(0x00);
Wire.endTransmission();

Wire.beginTransmission( MMA7660addr);
```



```
Wire.send(MMA7660_SR);
Wire.send(0x07); // Samples/Second Active and Auto-Sleep Mode
Wire.endTransmission();

Wire.beginTransmission( MMA7660addr);
Wire.send(MMA7660_MODE);
Wire.send(0x01); //active mode
Wire.endTransmission();

}

void setup()
{
  mma7660_init(); // join i2c bus (address optional for master)
  Serial.begin(9600); // start serial for output
}

void Ecom()
{
  unsigned char val[3];
  int count = 0;
  val[0] = val[1] = val[2] = 64;
  Wire.requestFrom(0x4c, 3); // request 3 bytes from slave device 0x4c

  while(Wire.available())
  {
    if(count < 3)
      while ( val[count] > 63 ) // reload the damn thing it is bad
      {
        val[count] = Wire.receive();
      }
    count++;
  }

  // transform the 7 bit signed number into an 8 bit signed number.
  Acceleration ret;

  ret.x = ((char) (val[0]<<2))/4;
  ret.y = ((char) (val[1]<<2))/4;
  ret.z = ((char) (val[2]<<2))/4;
  Serial.print("x = ");
  Serial.println(ret.x,DEC); // print the reading

  Serial.print("y = ");
  Serial.println(ret.y,DEC); // print the reading

  Serial.print("z = ");
  Serial.println(ret.z,DEC); // print the reading
}

char reading = 0;

void loop()
{
  Ecom();

  Serial.println("*****");
  delay(500);
}
```

Комплекующие для робототехники Роботы для сборки Собрать робота своими руками
 You would see the results which indicates the posture of the module via a UART terminal, and these results varies with the module's movement and posture.

```

COM1
=====
z = 21
=====
x = 2
y = -1
z = 21
=====
x = 0
y = 0
z = 20
=====
x = 0
y = 0
z = 20
=====
x = 1
y = -2
z = 21
=====
x = 1
y = -2
z = 21
=====
x = 1
y = -1
z = 20
=====
x = 1
y = -1
z = 20
=====
    
```

Support

If you have questions or other better design ideas, you can go to our [forum](#) or [wish](#) to discuss.

Version Tracker

Revision	Descriptions	Release Date
Electronic brick - 3-Axis Accelerometer Module v0.9b	Initial public release	Jul 27, 2010
Grove - I2C 3-axis Accelerometer V1.0b	Reversion content: <ol style="list-style-type: none"> 1. change Electronic Brick to Grove 2. Add a voltage converting circuit(MIC5205_3.3) <ul style="list-style-type: none"> o from 5V to 3.3V 3. Add a Signal level converting circuit <ul style="list-style-type: none"> o from 5V to 3.3V 4. changed to 4pin Grove , the Input Voltage is 5V 	Jul 27, 2010

Resources

[Datasheet of MMA7660FC.](#)

[Grove - I2C 3-axis Accelerometer V1.0 eagle file](#)

And users can buy the old version [Electronic brick - 3-Axis Accelerometer Module](#) at :

http://www.seeedstudio.com/depot/electronic-brick-3axis-accelerometer-module-p-679.html?cPath=48_52

See Also

- [GROVE - Starter Bundle](#)
- [2-axis compass Module](#)
- [Grove - 3-axis Compass](#)
- [Grove - 3-axis Gyro](#)
- [Grove - Water Sensor](#)
- [Grove - Light Sensor](#)
- [Grove - Touch Sensor](#)
- [Grove - Temperature and Humidity Sensor](#)
- [Grove - Magnetic Switch](#)
- [Grove - Alcohol Sensor](#)
- [Grove – OLED Display 128*64](#)
- [Grove - Serial LCD](#)
- [Grove - RTC](#)
- [Grove - Electricity Sensor](#)
- [Grove - Sound Sensor](#)

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