



10 DOF IMU Sensor (D) User Manual

OVERVIEW

10 DOF IMU Sensor (D) features the low power ICM20948 onboard, it is good at motion monitoring, as well as detecting/measuring the position, height, and temperature.

This tiny module would be helpful for making your own copter or balancing robot, provides great man-machine interaction.

SPECIFICATIONS

- Power: 3.3V~5V (internal voltage regulation with low dropout)
- Accelerometer
 - Resolution: 16 bit
 - Measurement range (configurable): ± 2 , ± 4 , ± 8 , $\pm 16g$
 - Operating current: 68.9uA
- Gyroscope
 - Resolution: 16 bit
 - Measurement range (configurable): ± 250 , ± 500 , ± 1000 , $\pm 2000^\circ/\text{sec}$
 - Operating current: 1.23mA
- Compass/Magnetometer
 - Resolution: 16 bit
 - Measurement range: $\pm 4900\mu\text{T}$

- Operating current: 90uA
- Barometric pressure sensor
 - Barometric resolution: 0.0016hPa
 - Temperature resolution: 0.01°C
 - Measurement range: 300~1100hPa (altitude: +9000m ~ -500m)
 - Barometric relative accuracy (700hPa~900hPa, 25°C~40°C): ±0.12hPa (±1m)
 - Operating current (1Hz update rate, ultra-low power mode): 2.8uA

INTERFACES

PIN	SYMBOL	DESCRIPTION
1	VCC	3.3V/5V
2	GND	Ground
3	SDA	I2C data pin
4	SCL	I2C clock pin
5	INT	ICM20948 interrupt
6	FSYNC	ICM20948 frame sync signal

DEMO CODES

We provide three demo code for this module, which used for STM32, Raspberry Pi and Arduino UNO separately.

STM32

The development board used herein is Waveshare Open103V.

1. Download demo code to Open103V (keil project)
2. Connect UART module to Open103V and connect to PC, connect 10 DOF IMU Sensor (D) to I2C-2 interface of Open103V(Note that Vcc to 3.3V, GND to GNDm SCL to PB10, SDA to PA11 and FSYNC to NC).
3. Serial port setting:

波特率	115200
数据位	8
停止位	1
奇偶校	无

After running the codes, data are printed to serial as below:

```

////////////////////////////////////
Roll: -0.46 Pitch: -1.65 Yaw: 38.08

Acceleration: X: -471 Y: -114 Z: 15824

Gyroscope: X: 3 Y: 0 Z: -12

/-----/

Magnetic: X: 105 Y: 80 Z: -159

Angle: 37.3

/-----/

Pressure: 1003.90 Altitude: 24.95

Temperature: 27.3

```

Unit of paratemeters:

Roll, Pitch, Yaw, Magnetic, Angle : degree (°).

Acceleration: LSB

Gyroscope: LSB

Pressure : hPa

Altitude: m

Temperature: °C

ARDUINO

The development board used herein is UNO PLUS

Connection:

Sensor	UNO PLUS
VCC	3V3/5V
GND	GND
SDA	SDA
SCL	SCL

Connect sensor to UNO PLUS, download the demo code to the board. Open serial monitor of Arduino, then you can see that data of sensor are printed

RASPBERRY PI

Libraries install:

Before you using the code, you need to install wiringpi libraries. Please power on your Raspberry Pi and open the Terminal. Network is required:

```
git clone git://git.drogon.net/wiringPi
```

```
cd wiringpi  
  
sudo ./build
```

Connection:

Sensor	Raspberry Pi
VCC	3V3/5V
GND	GND
SDA	SDA
SCL	SCL

Expected Result:

Copy the raspberrypi demo code to /home/pi/ of Raspberry Pi, enter the folder and execute commands below to compile and run the code:

```
make  
  
sudo ./ 10Dof-D_Demo
```

The data of sensor are printed to terminal.