

Introduction

The TDAxis12 is an angle measurement module around the three main axes x y z. This module combines the output of 12 sensor axes. These sensors include: 6-axis gyroscope (2 different gyros), 3-axis accelerometer, 3-axis compass. All calculation operations related to the output angles are done with a Cortex M0+ processor and the angle values are provided to the user in a ready form with a high update rate (about 500Hz).

Power supply requirements are flexible, you can feed between 3.3 - 5v and the module draws a nominal 25mA of current. Serial UART TX or I2C interfaces can be used for get values simultaneously. But configuration is only possible through I2C.

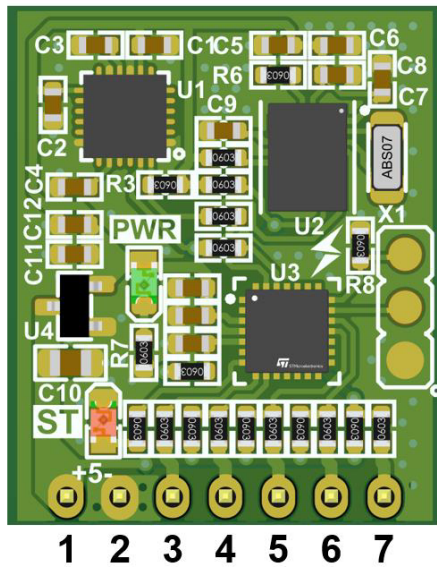
Power supply note

If you use 3.3V voltage to supply TDAxis12, you should note that noisy supplies that are derived from a switch mode source can affect the TDAxis12 , please make sure the supply is from a good clean source for the best results. If you are not sure of the cleanliness of your power supply, we recommend that you use a voltage of 4.5 ~ 5.0 volts.

Overview of outputs

- Yaw (rotation around the z axis): +- 180.00
- Pitch (rotation around the y axis): +- 90.00
- Roll (rotation around the x axis): +- 90.00
- Raw sensor data outputs: 3x16bit for each of the gyroscope and accelerometer

Pinout



Top View



Bottom View

- 1) +5V (VCC)
- 2) GND
- 3) TX
- 4) RX (Not used)
- 5) SCL (Pulled up with 10k Ω in module)
- 6) SDA (Pulled up with 10k Ω in module)
- 7) CAL/INT (Pulled up with 10k Ω in module)

PWR LED

This LED will turn on when power is connected to the module.

ST LED

This LED is constantly on when the output data is ready, during startup or calibrating, this LED is off or flashing.

Serial UART communication

The data of the calculated angles are permanently sent as a string through the TX pin. As long as new data is being sent via TX. CAL/INT Pin will be reset state. An example of the output string when the angles are as follows:

Z: 175.3

Y: -45.0

X: 30.6

String: #175.3,-45.0,30.6;

The output baud rate can be changed through the I2C and UART_BAUD register (address 0x02). By default, the output baud rate is 115200 bps. If the baud rate is decreased. The output data rate is reduced through UART.

I2C communication

All data output and settings are available via I2C. The maximum I2C clock can be 400 KHz. It is possible to connect 3.3 or 5 V micro controllers (STM32, Arduino, ...) directly without using the logic level converter circuit.

At startup, you can read the value of the WHO_AM_I (Address 0x00) register to ensure that the connection to the module is established. The read value should be equal to 0x12 (Hex) or 18 (Decimal).

The total data of the calculated angles Z_ANGLE, Y_ANGLE and X_ANGLE have been multiplied by 100. After receiving through I2C, the accuracy of two decimal digits can be reached by dividing the value by 100.0 .

CAL/INT Pin

It is used for two purposes at the same time. One to enter calibration mode, and one to generate a concurrent output interrupt to new data on the TX pin.

Calibration

TDAxis12 calibration is very simple, just enter the calibrate mode and hold the module on a flat and motionless surface for a few seconds until the ST LED is flashing.

Entering the calibration mode is possible in two ways:

- 1) Connect the CAL/INT pin to GND for ~2 seconds
- 2) Write the value 0xCC (Hex) on the CALIBRATION register (address 0x03).

By doing one of the above methods, when the ST LED starts flashing, do not move the module until the flashing stops after a few seconds. Now the output data can be used!

After installing this module on the device, it is enough to do this once and it is not necessary to calibrate every time the sensor is turned on.

Startup Time

After connecting the power, it takes 2 seconds for the output data to be usable. Meanwhile, ST LED remains off.

Changing the I2C Bus Address

To change the I2C address of the TDAxis12 you must have only one module on the bus and write your new 8Bit address on SLAVE_ADDRESS register.

TDAxis12 I2C Registers address map

Name	Type	Address		Default	Comment
		Hex	Decimal		
WHO_AM_I	R	0x00	0	0x12	Who I am ID
SLAVE_ADDRESS	R/W	0x01	1	0x20	Device slave address
UART_BAUD	R/W	0x02	2	0x06	UART baud rate
CALIBRATION	W	0x03	3	-	Set 0xCC value one time to this address for start Calibration
Z_ANGLE_H	R	0x04	4	Output	Z axis angle (x100)
Z_ANGLE_L	R	0x05	5	Output	
Y_ANGLE_H	R	0x06	6	Output	Y axis angle (x100)
Y_ANGLE_L	R	0x07	7	Output	
X_ANGLE_H	R	0x08	8	Output	X axis angle (x100)
X_ANGLE_L	R	0x09	9	Output	
Z_GYRO_H	R	0x0A	10	Output	Gyroscope raw data output registers
Z_GYRO_L	R	0x0B	11	Output	
Y_GYRO_H	R	0x0C	12	Output	
Y_GYRO_L	R	0x0D	13	Output	
X_GYRO_H	R	0x0E	14	Output	
X_GYRO_L	R	0x0F	15	Output	
Z_ACC_H	R	0x10	16	Output	Accelerometer raw data output registers
Z_ACC_L	R	0x11	17	Output	
Y_ACC_H	R	0x12	18	Output	
Y_ACC_L	R	0x13	19	Output	
X_ACC_H	R	0x14	20	Output	
X_ACC_L	R	0x15	21	Output	

- **R: Read only**
- **W: Write Only**
- **R/W: Read/Write**

Baud rate selection table (UART_BAUD Register)

Value (Hex)	Baudrate	Unit
0x00	9600	BPS
0x01	14400	
0x02	19200	
0x03	38400	
0x04	56000	
0x05	57600	
0x06 (Default)	115200	
0x07	128000	
0x08	256000	

Board dimensions:

