

# PmodGYRO™ Reference Manual

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Note: This document applies to Rev. A of the board.



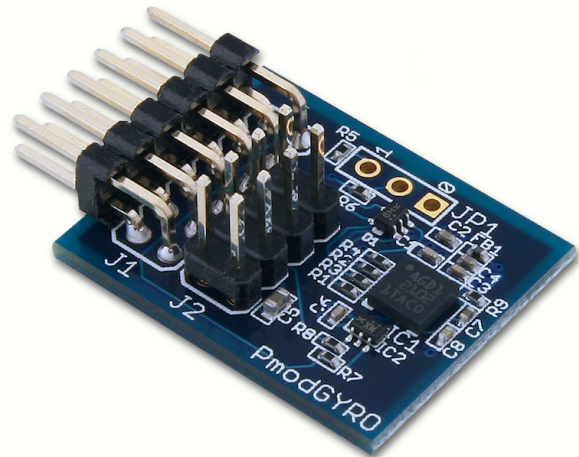
1300 NE Henley Court, Suite 3  
Pullman, WA 99163  
(509) 334 6306 Voice | (509) 334 6300 Fax

## Overview

The PmodGYRO is a peripheral module featuring the STMicroelectronics® L3G4200D MEMS motion sensor. The L3G4200D provides a three-axis digital output gyroscope with built in temperature sensor.

Features include:

- Standard SPI and I<sup>2</sup>C™ interface
- 250/500/2000dps Selectable Resolutions
- Two customizable interrupt pins
- Power-down and Sleep Mode
- User configurable signal filtering



## Functional Description

The PmodGYRO uses a standard 12-pin connection and communicates via SPI or I<sup>2</sup>C, defaulting to I<sup>2</sup>C communication. A pull-up resistor on the CS line keeps the device in I<sup>2</sup>C mode unless the CS line is driven low by the master device

### Interface

When communicating with the device the master must provide a register address and a flag specifying whether the subsequent action is a read or write. The actual transfer of data follows this command. Through this method, the user can either configure the device by writing to specific control registers within the device, or read back data from separate read-only registers.

Two interrupts directly map to pins available to the user on connector J1 of the PmodGYRO. The configuration of INT1, present on pin 7 of J1, is entirely user customizable. The main use of INT1 stems from high and low events on the three axes about which the gyroscope measures angular speed. By default, the INT1

is disabled. The second interrupt, INT2, is primarily used for data ready and FIFO interrupts and maps to pin 8 on J1.

For more information about the control registers, data collection, and interrupt settings available for user configuration, see the data sheet for the L3G4200D on the STMicroelectronics® website.

### SPI Communication

The SPI interface uses three or four signal lines for communication depending on the current configuration of the device. These are Chip Select (CS), Serial Data In (SDI) or simply Serial Data (SDA) in 3-wire SPI mode, Serial Data Out (SDO), and Serial Clock (SCL). The PmodGYRO defaults to the 4-wire operating mode. In order to use the 3-wire mode, a control register must be written to. For more detailed SPI communication, refer to the device data sheet.

## I<sup>2</sup>C Communication

The I<sup>2</sup>C standard uses two signal lines, I<sup>2</sup>C data (SDA) and serial clock (SCL). The device supports both standard, 100 kHz, and fast, 400 kHz, serial clocks. In accordance with I<sup>2</sup>C protocol, the L3G4200D has a device specific 7-bit address used by the serial master to communicate with multiple devices on a data bus. The device uses the address 110100xb, where pin 3 on J1 (SDO/SA0) defines the least-significant-bit (LSB). By default, the LSB of the address will be '1' due to a pull-up resistor on JP1 as shown by the schematic available on the Digilent website. While the default value is '1', by simply connecting pin 3 on J1 to the ground rail the user can change the LSB to a '0'. This user selectable bit enables two PmodGYROs to be used on the same I<sup>2</sup>C bus. The data sheet for the L3G4200D contains further device specific I<sup>2</sup>C information.

Connector J1 – SPI Communications		
Pin	Signal	Description
1	CS	Chip Select
2	SDA/SDI/ SDO	Serial Data In
3	SDO/SA0	Serial Data Out/LSB of I <sup>2</sup> C Device Address
4	SCL/SPC	Serial Clock
5	GND	Power Supply Ground
6	VCC	Power Supply (3.3V)
7	INT1	Programmable Interrupt
8	INT2	Data Ready/FIFO Interrupt
9	NC	Not Connected
10	NC	Not Connected
11	GND	Power Supply Ground
12	VCC	Power Supply (3.3V)
Connector J2 – I <sup>2</sup> C Communication		
Pin	Signal	Description
1 & 2	SCL/SPC	Serial Clock
3 & 4	SDA/SDI/ SDO	Serial Data
5 & 6	GND	Power Supply Ground
7 & 8	VCC	Power Supply (3.3V)