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PmodACL2™ Reference Manual

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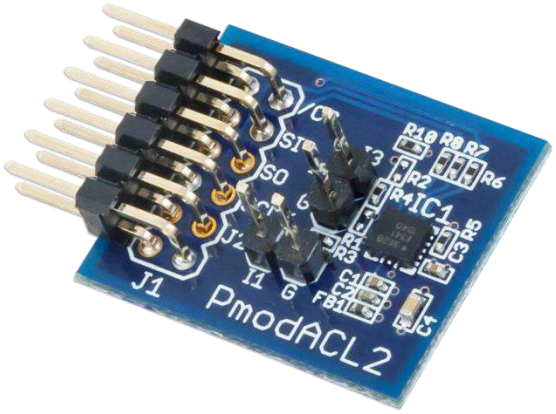
This manual applies to the PmodACL2 rev. A

Overview

The PmodACL2 is a 3-axis MEMS accelerometer powered by the Analog Devices ADXL362. By communicating with the chip via the SPI protocol, users may receive up to 12 bits of resolution for each axis of acceleration. Additionally, this module offers external trigger sensing through single or double-tap detection as well as power saving features though its inactivity monitoring.



The PmodACL2.

Features include:

- 3-axis MEMS accelerometer
- Up to 12 bits of resolution per axis
- User-selectable resolution
- Activity/inactivity monitoring
- Low current consumption at <2 µA at 100Hz
- Free-fall detection
- Small PCB size for flexible designs 1.0 in × 0.8 in (2.5 cm × 2.0 cm)
- Follows Digilent Pmod Interface Specification Type 2A
- Library and example code available in resource center

1 Functional Description

The PmodACL2 utilizes Analog Devices ADXL362 to provide MEMS acceleration data to the system board. With its deep 512-sample FIFO buffer, users are able to view a long string of events prior to a triggered interrupt or simply be able to have the system board access acceleration data when the user finds it most convenient.

2 Interfacing with the Pmod

The PmodACL2 communicates with the host board via the SPI protocol. To read from the on-board data registers, the Chip Select line must first be pulled low and then send a command byte to read from the data registers (0x0B). The desired address byte must be sent next, and then the desired byte is received with the MSB first on the falling

clock edge. Because the address pointer auto-increments to the next address byte, it is possible to read multiple bytes consecutively by continuing to pulse the Serial Clock line. An example set of commands to read from the y-axis register is given below:

Command Read								First Y-axis Address							
0	0	0	0	1	0	1	1	0	0	0	0	1	0	1	0

LSB Byte of Y-axis Data								MSB Byte of Y-axis Data							
b7	b6	b5	b4	b3	b2	b1	LSB	SX	SX	SX	SX	MSB	b10	b9	b8

Note: *Each SX bit is the same value as the most significant bit of the y-axis data.*

To read from the FIFO buffer, a command byte to write to a data register (0x0A) must first be sent so that we can configure the FIFO Control register (address 0x28) to indicate that we want the FIFO buffer to store data. After the ADXL362 has been configured to use the FIFO buffer, a command byte to read from the FIFO buffer (0x0D) must first be sent, then followed by pairs of data bytes containing which axis is being measured as well as the acceleration data. An example set of commands to read from the FIFO buffer is given below:

Command Read								FIFO Control Register Address								Command FIFO Read							
0	0	0	0	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	1

LSB Byte of Axis Data								MSB Byte of Axis Data							
b7	b6	b5	b4	b3	b2	b1	LSB	b15	b14	SX	SX	MSB	b10	b9	b8

Note: *Each SX bit is the same value as the most significant bit of the y-axis data. b15 and b14 represent which axis the incoming data represents.*

2.1 Pinout Description Table

Pinout Table of the PmodACL2

Connector J1								Connector J2		
Pin	Signal	Description		Pin	Signal	Description		Pin	Signal	Description
1	~CS	Chip select		7	INT2	Interrupt Two		1	INT1	Interrupt One
2	MOSI	Master Out Slave In		8	INT1	Interrupt One		2	G	Power Supply Ground
3	MISO	Master In Slave Out		9	NC	Not connected		Connector J3		
4	SCLK	Serial clock		10	NC	Not connected		Pin	Signal	Description
5	GND	Power supply ground		11	GND	Power supply ground		1	INT2	Interrupt Two
6	VCC	Power supply (3.3V)		12	VCC	Power supply (3.3V)		2	G	Power Supply Ground

The PmodACL2 also has two programmable interrupt pins available for use. Both of these pins can be set to trigger an interrupt upon multiple different triggers including activity/inactivity (to help reduce system power), when the FIFO buffer is filled to a desired level, when data is ready to be retrieved, and other triggers.

Any external power applied to the PmodACL2 must be within 1.6V and 3.5V. Consequently, with Digilent system boards, this Pmod must be run off of a 3.3V rail.

3 Physical Dimensions

The pins on the pin header are spaced 100 mil apart. The PCB is 0.95 inches long on the sides parallel to the pins on the pin header and 0.8 inches long on the sides perpendicular to the pin header.