

DIGILENT PmodACL2 3-Axis MEMS Accelerometer Owner's Manual

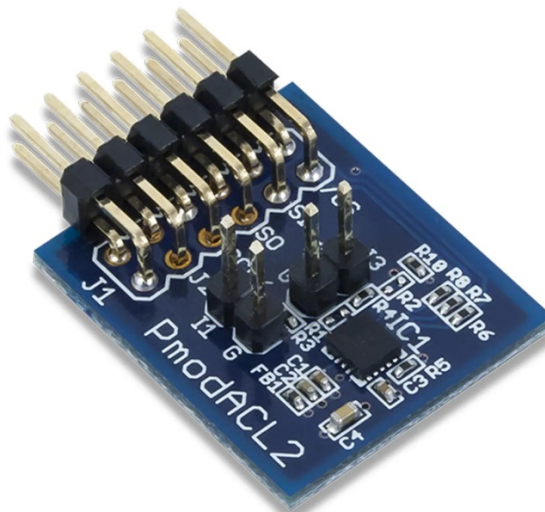
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DIGILENT PmodACL2 3-Axis MEMS Accelerometer



PmodACL2™ Reference Manual

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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 through its inactivity monitoring.

Product Features

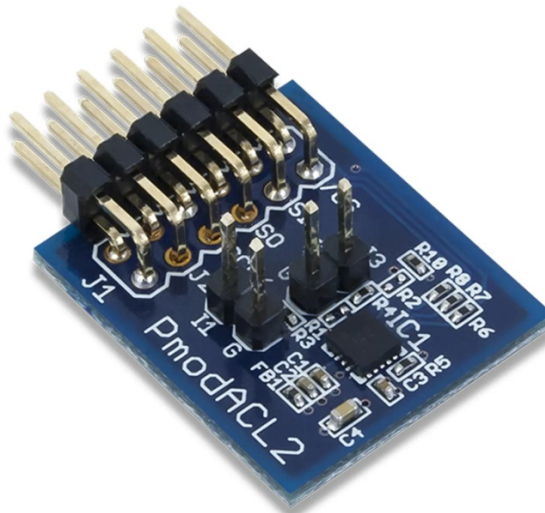
- 3-axis MEMS accelerometer
- Up to 12 bits of resolution per axis
- User-selectable resolution
- Activity/inactivity monitoring
- Low current consumption

Product Usage Instructions

1. Connect the PmodACL2 to your microcontroller or development board using the SPI protocol.
2. Power on the PmodACL2 and your microcontroller/development board.
3. To read the acceleration data, send the appropriate commands to the PmodACL2 via SPI.
4. The PmodACL2 provides up to 12 bits of resolution for each axis of acceleration. Use the user-selectable resolution feature to configure the desired resolution.
5. To detect external triggers, enable the single or double-tap detection feature on the PmodACL2.
6. To save power, utilize the inactivity monitoring feature of the PmodACL2.
7. Refer to the PmodACL2 Reference Manual for detailed information on the SPI commands and configuration options.

Overview

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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 $<2 \mu\text{A}$ at 100Hz
- Free-fall detection
- Small PCB size for flexible designs 1.0 in \times 0.8 in (2.5 cm \times 2.0 cm)
- Follows Digilent Pmod Interface Specification Type 2A
- Library and example code available in resource center

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.

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 yaxis 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									
b 7	b 6	b 5	b 4	b 3	b 2	b 1	L S B	SX			S X	S X	S X	M S B	b 1 0	b 9	b 8	

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.

Pinout Description Table

Pinout Table of the PmodACL2											
Connector J1						Connector J2					
P i n	Sig nal	Descriptio n		P i n	Sig nal	Descriptio n	Pi n	Sig nal	Descriptio n		
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	CLK	Serial clock		10	NC	Not connected	Pi n	Sig nal	Descriptio n		
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.


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.

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Documents / Resources

	<p>DIGILENT PmodACL2 3-Axis MEMS Accelerometer [pdf] Owner's Manual</p> <p>PmodACL2 3-Axis MEMS Accelerometer, PmodACL2, 3-Axis MEMS Accelerometer, MEMS Accelerometer, Accelerometer</p>
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References

- [DIGILENT “Start Smart, Build Brilliant.”](#)