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## PmodJSTK™ Reference Manual

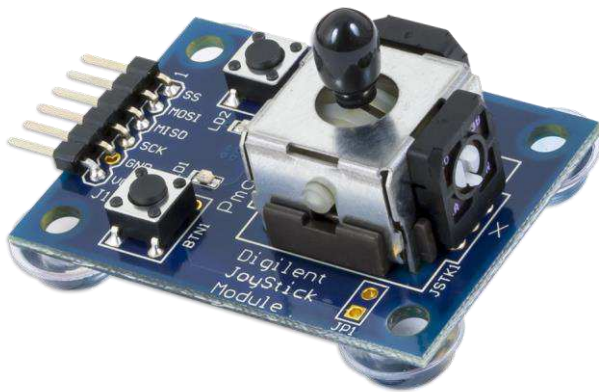
Revised May 24, 2016

This manual applies to the PmodJSTK rev. C

### Overview

The PmodJSTK is designed to be a versatile peripheral module that can be used in a wide variety of projects. It contains a resistive twin axis joystick that includes a center push button along with two additional push buttons. The PmodJSTK also has two programmable LEDs located on the board that can provide additional information to the user.

The PmodJSTK is ideally suited for Digilent microcontroller or FPGA based projects that require proportional control from the user, such as robotic applications.



The PmodJSTK.

Features include:

- 2-axis resistive joystick with central push button
- Two additional user push buttons
- Two user indicator LEDs
- Small PCB size for flexible designs 1.8" × 1.3" (4.6 cm × 3.3 cm)
- 6-pin Pmod connector with SPI interface
- Follows [Digilent Pmod Interface Specification](#) Type 2
- Library and example code available in [resource center](#)

## 1 Functional Descriptions

The PmodJSTK uses an [Atmel® ATtiny24 microcontroller](#) in a MLF20 package to collect information about its peripherals. The twin axis joystick uses two potentiometers to measure the current position in the x and y coordinate directions and stores the information in two 10-bit values ranging from 0 to 1023.

## 2 Interfacing with the Pmod

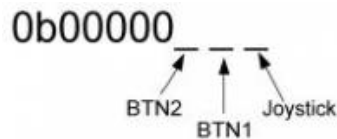
The PmodJSTK communicates with the host board via the SPI communication protocol in 5 byte chunks. The first four bytes correspond to the two 10-bit values representing the X and Y coordinate directions and the last byte

indicates the status of the three push buttons. Details on the organization of these bytes are provided a little further down in this document.

The PmodJSTK will send its total of 23 bits of information to the system board through 40 clock cycles. The first two bytes received will consist of the 10-bit position of the potentiometer in the x-direction (with the Pmod arranged so that the pin header is facing "up"). The lower 8 bits of this 10-bit value will arrive MSB in the first byte and the remaining two MSB of the 10-bit value will arrive as the last two bits in the second byte.

Similarly, the 10-bit position of the potentiometer in the y-direction (with the Pmod arranged so that the pin header is facing "up"). The lower 8 bits of this 10-bit value will arrive MSB in the third byte and the remaining two MSB of the 10-bit value will arrive as the last two bits in the fourth byte.

The three bits representing the three push buttons arrive as the last three bits in the fifth byte where a '1' indicates that the button is pressed and a '0' indicates that the button is not being pressed. The organization of the button bits (as labeled on the silk screen of the Pmod) are arranged as follows in the fifth byte.

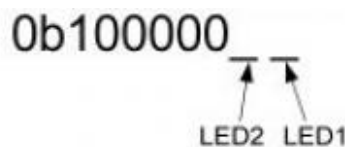


The overall order of bytes that will be sent by the PmodJSTK to the system board will be as follows:

1	2	3	4	5
X (low)	X (high)	Y (low)	Y (high)	Buttons

Table 1. Byte order sent by the PmodJSTK to the system board.

As per the SPI protocol, the system board also needs to send five bytes of information to the Pmod. The first byte will contain information indicating if the two on-board LEDs should be turned on or off with the remaining four bytes ignored by the PmodJSTK. The last two bits of the first byte sent indicate the status LED2 and LED1, respectively.



A pinout table for the PmodJSTK is provided below:

Pin	Signal	Description
1	~CS	Chip Select (active low)
2	MOSI	Master-Out-Slave-In
3	MISO	Master-In-Slave-Out
4	SCK	Serial Clock
5	GND	Power Supply Ground
6	VCC	Power Supply (3.3V/5V)

Table 2. Pin descriptions for the PmodJSTK.

Any external power applied to the PmodJSTK must be within 2.7V and 5.5V; however, it is recommended that the Pmod is operated at 3.3V.



### 3 Physical Dimensions

The pins on the pin header are spaced 100 mil apart. The PCB is 1.8 inches long on the sides parallel to the pins on the pin header and 1.3 inches long on the sides perpendicular to the pin header.

### 4 Additional Information

For the most up-to-date reference material, visit Diligent's Wiki at [reference.digilentinc.com](https://reference.digilentinc.com). The schematics of the PmodJSTK are available [here](#). Additional information about the Atmel ATtiny24 can be found at [atmel.com](https://atmel.com).

Example code demonstrating how to get information from the PmodJSTK can be found [here](#).

If you have any questions or comments about the PmodJSTK, feel free to post them under the appropriate section ("Add-on Boards") of the [Diligent Forum](#).