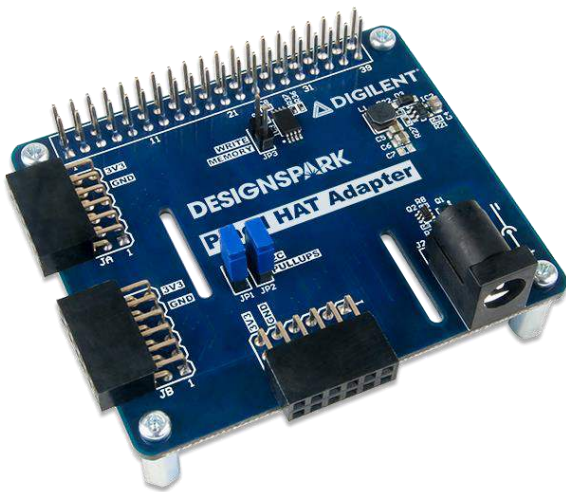


## Pmod™ HAT Adapter Reference Manual

This manual applies to the Pmod HAT Adapter Rev. B

### Overview

The Pmod HAT Adapter makes it easy to connect Digilent Pmods to a Raspberry Pi. It supports plug-and-play functionality, only requiring that the host Raspberry Pi be booted with the Pmod HAT attached. The Pmod HAT has three 2×6 Digilent Pmod ports and provides access to additional I/O available via the Raspberry Pi 40-pin GPIO connector. The Pmod HAT Adapter comes with example Python libraries hosted on DesignSpark. See the Software Support section below for more information.



The Pmod HAT Adapter  
[RS Stock No 1448419](#)

Features include:

- Provides access to full line of Digilent Pmod peripheral modules.
- Enables use of up to three Pmods at a time.
- Supports SPI, UART, I2C, and GPIO connections.
- Optionally powered through a 5V barrel jack.
- Follows Raspberry Pi HAT specification. See the [Raspberry Pi HAT Introduction](#) for more details.

The Pmod HAT Adapter is compatible with all Raspberry Pi boards that use the 40-pin GPIO connector:

- Raspberry Pi Model A+
- Raspberry Pi Model B+
- Raspberry Pi 2 B
- Raspberry Pi 3 B
- Raspberry Pi Zero W
- Raspberry Pi Zero

# 1 Functional Description

## 1.1 Connectors and Jumpers

**40 Pin Raspberry Pi GPIO Connector (J1):** This connector is used to attach the Pmod HAT to the host Raspberry Pi and provide access to each of the connector pins. Most of these 40 pins are shared with the Pmod ports. The Pmod ports are not intended to be used simultaneously with an additional HAT. However, five GPIO pins (22-25 and 27) are unused by the Pmod HAT Adapter. These pins are available for use by other HATs or as user GPIO. Pmod port pins are connected to the 40-pin GPIO connector as seen in the Pinout Table Appendix.

**External Power Jack (J2):** This connector can be used to provide power to the Pmod HAT adapter and the attached Raspberry Pi. See the **Power** section below for more information.

**Pmod Port JA:** The first of the three 2×6 Pmod host ports, this port supports SPI and GPIO Pmods.

**Pmod Port JB:** The second of the three 2×6 Pmod host ports, this port supports SPI and GPIO Pmods, as well as 6-pin I2C Pmods on the bottom row.

**Pmod Port JC:** The third of the three 2×6 Pmod host ports, this port supports UART and GPIO Pmods.

**Jumpers JP1 & JP2:** These jumpers enable pullup resistors for the Pmod Port JB I2C pins when shorted.

**Jumper JP3:** This jumper enables writing to the onboard EEPROM containing the device tree fragment and other information used to configure the Raspberry Pi OS and drivers. *Shorting this jumper is for advanced use only.* See the [Raspberry Pi HAT Introduction](#) for more details.

## 1.2 Power

The Pmod HAT Adapter can be powered either from the Raspberry Pi through the 40-pin GPIO connector's two 5V pins, or from an external 5V supply through the power jack. If an external supply is used, it must be able to provide 1.3 Amps of current. In addition, each Pmod GPIO pin can supply at most 16mA of current.

### Important!

Make sure to **never** connect both the Pmod HAT Adapter and Raspberry Pi's power supplies at the same time. When changing power supplies, make sure to first fully disconnect the original supply

# 2 Software Support

RS Components has produced the DesignSpark Pmod Library which can be used with a Raspberry Pi to control Pmods through the Pmod HAT Adapter using the Python programming language. Documentation and downloads for this library can be found at the following locations:

- Python library at [Python.org](https://python.org).
- Documentation and installation instructions on [Readthedocs.io](https://readthedocs.io).
- Source code at [Github.com](https://github.com).
- [RS Components Stock No 1448419](#)

## Appendix: Pinout Tables

### Raspberry Pi 40-Pin Connector Pinout

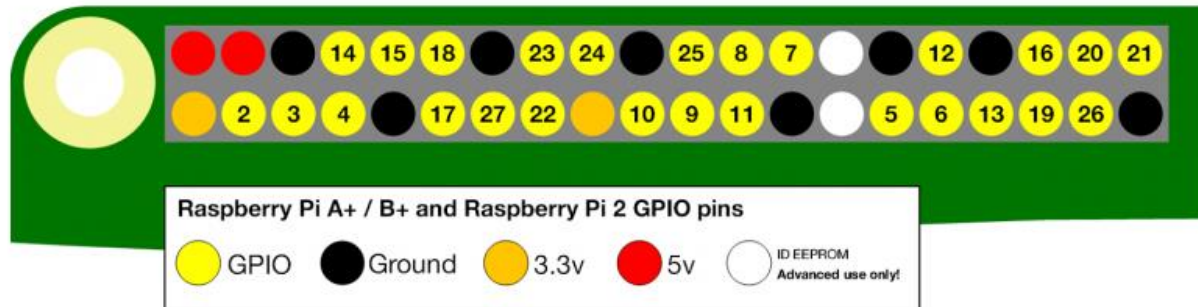


Image Courtesy of the [Raspberry Pi Foundation](https://www.raspberrypi.org/) licensed under CC BY-SA.

Bottom Row			Top Row		
40-Pin GPIO Connector Pin #	40-Pin GPIO Connector Pin Name	Pmod Pin	40-Pin GPIO Connector Pin #	40-Pin GPIO Connector Pin Name	Pmod Pin
1	3V3	N/C	2	5V	N/C
3	GPIO02	JB10	4	5V	N/C
5	GPIO03	JB9	6	GND	GND
7	GPIO04	JC7	8	GPIO14	JC2
9	GND	GND	10	GPIO15	JC3
11	GPIO17	JC4	12	GPIO18	JA10
13	GPIO27	N/C	14	GND	GND
15	GPIO22	N/C	16	GPIO23	N/C
17	3V3	N/C	18	GPIO24	N/C
19	GPIO10	JB2	20	GND	GND
21	GPIO09	JB3	22	GPIO25	N/C
23	GPIO11	JB4	24	GPIO08	JA1
25	GND	GND	26	GPIO07	JB1
27	ID EEPROM	N/C	28	ID EEPROM	N/C
29	GPIO05	JC9	30	GND	GND
31	GPIO06	JC10	32	GPIO12	JC8
33	GPIO13	JB8	34	GND	GND
35	GPIO19	JA7	36	GPIO16	JC1
37	GPIO26	JB7	38	GPIO20	JA9
39	GND	GND	40	GPIO21	JA8

## Pmod Pinout Table

JA		
Pmod Pin #	40-Pin GPIO Connector Pin #	40-Pin GPIO Connector Pin Name
1	24	SPIO_CE0/GPIO08
2	19	SPIO_MOSI/GPIO10
3	21	SPIO_MISO/GPIO09
4	23	SPIO_CLK/GPIO11
7	35	PCM_FS/GPIO19/PWM1
8	40	PCM_DOUT/GPIO21/GPCLK1
9	38	PCM_DIN/GPIO20/GPCLK0
10	12	PCM_CLK/GPIO18/PWM0

JB		
Pmod Pin #	40-pin GPIO Connector Pin #	40-Pin GPIO Connector Pin Name
1	26	SPIO_CE1/GPIO07
2	19	SPIO_MOSI/GPIO10
3	21	SPIO_MISO/GPIO09
4	23	SPIO_CLK/GPIO11
7	37	GPIO26
8	33	PWM1/GPIO13
9	5	SCL1/GPIO03*
10	3	SDA1/GPIO02*

JC		
Pmod Pin #	40-Pin GPIO Connector Pin #	40-Pin GPIO Connector Pin Name
1	36	CTS0/GPIO16
2	8	TXD0/GPIO14
3	10	RXD0/GPIO15
4	11	RTS0/GPIO17
7	7	GPCLK0/GPIO04
8	32	PWM0/GPIO12
9	29	GPCLK1/GPIO05
10	31	GPCLK2/GPIO06

\* Pullup resistors for pins SCL1 and SDA1 can be enabled by shorting jumpers JP1 and JP2, respectively.

Pins #5 and #11 of each Pmod port are tied to Ground. Pins #6 and #12 of each Pmod port are tied to the HAT Adapter's 3V3 rail.