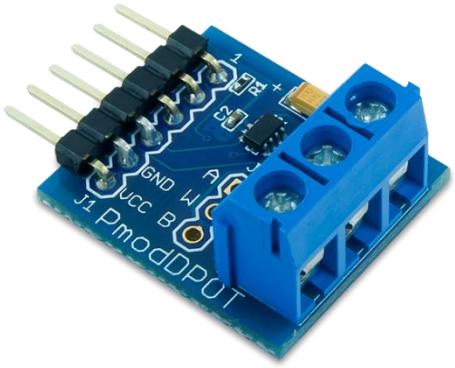
1300 Henley Court
Pullman, WA 99163
509.334.6306
www.digilentinc.com

PmodDPOT™ Reference Manual

Revised April 8, 2016
This manual applies to the PmodDPOT rev. A

Overview

The Digilent PmodDPOT is a digital potentiometer allowing users to set a desired resistance anywhere from 60 to a nominal 10 kΩ.



The PmodDPOT.

Features include:

- Digital potentiometer with 8-bit resolution
- Select desired resistance from 60 Ω to 10 kΩ
- Small PCB size for flexible designs 0.9“ × 0.8” (2.3 cm × 2.0 cm)
- 6-pin Pmod port with SPI interface
- Follows Digilent Interface Specification Type 2

1 Functional Description

The PmodDPOT utilizes Analog Devices AD5160 to digitally set a desired resistance between two terminals. With 256 possible step values, a resistance between 60 Ω and 9961 Ω can be programmed. The wiper terminal has an internal resistance of 60 Ω.

2 Interfacing with the Pmod

The PmodDPOT communicates with the host board via the SPI protocol. By bringing the Chip Select (CS) line low, users may then provide 8-bits of data on the falling Serial Clock (SCLK) edge in SPI Mode 0. Once the 8 bits of data have been transferred, the rising edge of the CS line loads the data into the internal register DAC, whereupon the resistance between terminals is set.

The PmodDPOT can be utilized in two different styles: a rheostat where users set a desired resistance between one outside terminal and the wiper terminal or in a voltage divider mode where the two outside terminals are powered at set voltages and a ratio of resistance is specified.

Equations for the programmable resistance values and output voltages are provided from the AD5160 datasheet below:

$$R_{WB}(D) = \frac{D}{256} \times R_{AB} + R_W$$

Here, R_{AB} represents the nominal resistance of 10 kΩ and R_W is the wiper terminal resistance of 60 Ω.

$$R_{WA}(D) = \frac{256 - D}{256} \times R_{AB} + R_W$$

Here, R_{AB} represents the nominal resistance of 10 kΩ and R_W is the wiper terminal resistance of 60 Ω.

$$V_W(D) = \frac{R_{WB}(D)}{256} V_A + \frac{R_{WA}(D)}{256} V_B$$

Here, R_{WA} and R_{WB} are the resistances calculated in the two above equations and VA and VB are the voltages applied at terminals A and B, respectively.

Care must be taken to ensure that current flow between the wiper terminal and either terminal A or B must be limited to a pulsed ±20mA or a continuous 4.7mA so that the power dissipation capabilities of the on-board chip is not exceeded.

2.1 Pinout Description Table

Pin	Signal	Description
1	~CS	Chip Select
2	MOSI	Master-In-Slave-Out
3	(NC)	Not Connected
4	SCLK	Serial Clock
5	GND	Power Supply Ground
6	VCC	Power Supply (3.3V/5V)

Any external power applied to the PmodDPOT must be within 2.7V and 5.5V; however, it is recommended that Pmod is operated at 3.3V. Users must also ensure that any voltage applied to the outside terminals is between GND and VCC.

3 Physical Dimensions

The pins on the pin header are spaced 100 mil apart. The PCB is 0.9 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.