

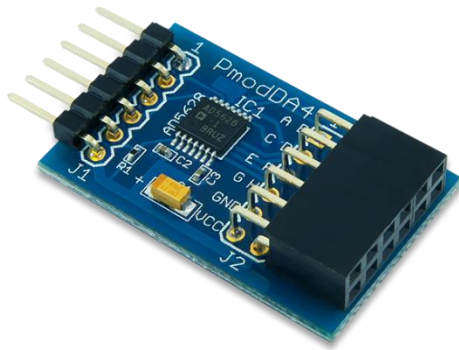
Pmod DA4™ Reference Manual

Revised November 28, 2016

This manual applies to the Pmod DA4 rev. B

Overview

The Digilent Pmod DA4 is an octal, 12-bit digital-to-analog converter module.



The Pmod DA4.

Features include:

- Eight channel, 12-bit DAC
- Capable of eight simultaneous outputs
- High-speed DSP compatible
- Power-down function capability
- Low power consumption
- Small PCB size for flexible designs 1.2" × 0.8" (3.0 cm × 2.0 cm)
- 6-pin Pmod connector with SPI interface
- Follows [Digilent Interface Specification](#) Type 2
- Example code available in [resource center](#)

1 Functional Description

The Pmod DA4 utilizes [Analog Devices AD5628-1](#) to provide a signal DAC capable of 8 simultaneous output channels. With its internal reference voltage of 1.25V and a gain of 2, a resolution of approximately 1 mV can be achieved.

2 Interfacing with the Pmod

The Pmod DA4 communicates with the host board via the SPI protocol. By driving the Chip Select (CS) line to a logic level low voltage, users may send a series of 32 bits of information with the data clocked into the appropriate register on the falling edge of the Serial Clock (SCLK). Once the 32nd bit of information has been clocked in, the command that was sent in the data stream is executed.

An example data stream of how the 32 bits are to be sent to the module is provided below from the [AD5628 datasheet](#).

| DB31 (MSB) | | | | Command Bits | | | | Address Bits | | | |
|------------|-----|----|----|--------------|----|----|----|--------------|----|----|----|
| X | X | X | X | C3 | C2 | C1 | C0 | A3 | A2 | A1 | A0 |
| Data Bits | | | | | | | | | | | |
| D11 | D10 | D9 | D8 | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
| DB0 (LSB) | | | | | | | | | | | |
| X | X | X | X | X | X | X | X | X | X | X | X |

Table 1. Example data stream from the AD5628 datasheet.

Users should note that the Pmod DA4 by default attempts to use an external reference voltage. However, as there is no external reference voltage provided on the Pmod, users must write to the register to program the chip to use its internal reference voltage of 1.25V. The data stream required to change this is provided below:

| Internal REF Register (DB0) | Action |
|-----------------------------|-------------------------|
| 0 | Reference off (default) |
| 1 | Reference on |

Table 2. Internal reference register from the AD5628 datasheet (table 10).

| DB31 to DB28 | DB27 | DB26 | DB25 | DB24 | |
|---------------------------------------|------|-------------------------|------|-------------|-----------------------|
| X | 1 | 0 | 0 | 0 | |
| Don't Cares | | Command bits (C3 to C0) | | | |
| DB23 | DB22 | DB21 | DB20 | DB19 to DB1 | DB0 |
| X | X | X | X | X | 1/0 |
| Address bits (A3 to A0) - don't cares | | | | Don't cares | Internal REF register |

Table 3. 32-bit input shift register contents for reference set-up command from the AD5628 datasheet (table 11).

The various commands and addresses available for the on-board AD5628 can be found on page 22 of its [datasheet](#).

2.1 Pinout Description Table

| Pin | Signal | Description |
|-----|--------|------------------------|
| 1 | ~CS | Chip Select |
| 2 | MOSI | Master-Out-Slave-In |
| 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 Pmod DA4 must be within 2.7V and 5.5V; however, it is recommended that Pmod is operated at 3.3V.

3 Physical Dimensions

The pins on the pin header are spaced 100 mil apart. The PCB is 1.2 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.