PMD-ARD-INT-LCZ Hardware User Guide

FEATURES

- 4-Pmod connector communication
  - SPI × 2
  - I^2C × 1
  - SPI/UART × 1 (jumper configurable)
- On board I^2C pull-up resistors for high load devices (jumper configurable)

GENERAL DESCRIPTION

The Arduino interface is found on many development platforms and is used in many prototype designs. The Pmod™ standard is a 6- , 8- , or 12-pin standard that carries GPIO and/or serial communication protocols. The PMD-ARD-INT-LCZ, a low-cost interposer, enables four Pmod modules to interface with the EVAL-AD5592R-PMDZ, EVAL-AD5593R-PMDZ, or EVAL-AD5770R-PMDZ evaluation boards or any equivalent Arduino MCU boards. Additionally, there is a connection matrix that allows external signals from any microcontroller to connect to the four Pmod ports. Out of the four Pmod ports, two ports are configured as SPI Pmod, one is configured as I^2C Pmod, and the remaining port can be configured as either SPI or UART Pmod.

EVALUATION BOARD PHOTO

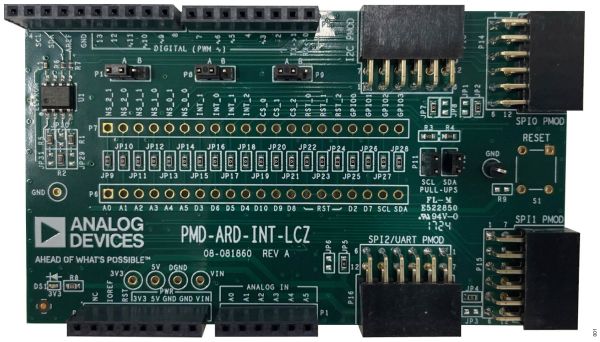

Figure 1. Evaluation Board Photo

TABLE OF CONTENTS

REVISION HISTORY

9/2024—Revision 0: Initial Version

ADAPTER BOARD HARDWARE

Figure 2 shows the allocation of the four Pmod connectors and the connection matrix in the central part of the board, for more detailed information about the matrix connection see the Changing the Arduino GPIO Assignments section.

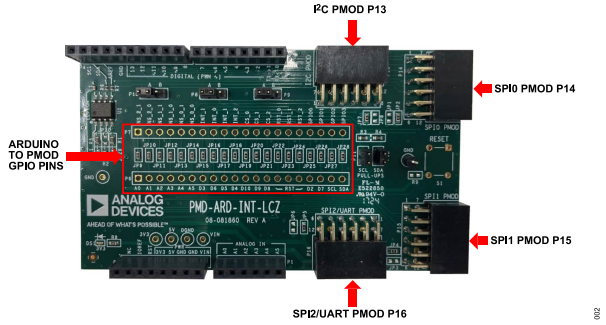

Figure 2. PMD-ARD-INT-LCZ Connectors

SPI PMOD CONNECTORS (P11, P12, AND P16)

The Pmod ports (P14, P15, and P16) follow the expanded SPI interface. P15 and P14 are dedicated SPI ports while P16 can be configured to either expanded SPI or expanded UART. Table 1 provides the signal pin assignment for connectors P11, P12, and P16.

To configure P16 as expanded SPI, set the shunt connectors, P8, P9, and P10, in position A as shown in Table 4.

Table 1. SPI Pmod Connectors P11, P12, and P16 Pinout

Pin No.	P14: SPI 0	P15: SPI 1	P16: SPI 2
1	D10 ($\overline{CS}$)	D9 ($\overline{CS}$)	D8 ($\overline{CS}$)
2	D11 (MOSI)	D11 (MOSI)	D11 (MOSI)
3	D12 (MISO)	D12 (MISO)	D12 (MISO)
4	D13 (SCK)	D13 (SCK)	D13 (SCK)
5	GND	GND	GND
6	VCC	VCC	VCC
7	D6 (GPIO/INT)	D5 (GPIO/INT)	D4 (GPIO/INT)
8	RST	RST	RST
9	A5 (GPIO)	A3 (GPIO)	A1 (GPIO)
10	A4 (GPIO)	A2 (GPIO)	A0 (GPIO)
11	GND	GND	GND
12	VCC	VCC	VCC

I²C PMOD CONNECTOR (P13)

Pmod devices that use the I²C interface should be connected to the 2 × 6 female header, P13. Table 2 lists the default Arduino Uno signals pin assignments for the P13 connector.

Table 2. I²C Pmod Connector P13 Pinout

Pin No.	P13: I²C
1	D3 (GPIO/INT)
2	RST
3	D19 (SCL)
4	D18 (SDA)
5	GND
6	VCC
7	D2
8	D7
9	D19 (SCL)
10	D18 (SDA)
11	GND
12	VCC

Pull-up resistors (4.7 kΩ) for the SCL and SDA lines are also provided. By default, jumper shunts are inserted on P11 and P12 to use the pull-up resistors.

Figure 3. Selectable I²C Pull-Up Resistors

ADAPTER BOARD HARDWARE

UART/SPI PMOD CONNECTOR (P16)

The Pmod port (P16) can be reconfigured between an expanded SPI and expanded UART. To configure P16 as expanded UART, set the shunt connectors P8, P9, and P10 in position B.

Table 3. SPI/UART Pmod Connector P16 Pinout

Pin No.	P16: UART
1	D8 ($\overline{CS}$)
2	D1 (RX)
3	D0 (TX)
4	D2
5	GND
6	VCC
7	D4 (GPIO/INT)
8	RST
9	A1 (GPIO)
10	A0 (GPIO)
11	GND
12	VCC

Table 4 shows the positions of shunts P8, P9, and P10 in order to select between expanded SPI or expanded UART.

Table 4. Link Configuration for SPI or UART Connection

Link	SPI2	UART
P8	A	B
P9	A	B
P10	A	B

PMOD VCC VOLTAGE SELECTION

Following the Pmod standard, Pin 6 and Pin 12 of the 4 Pmod connectors are assigned by default to the 3.3 V supply from the Arduino P2 connector. The PMD-ARD-INT-LCZ provides a series of resistor jumpers to select whether 3.3 V (by default) or 5 V from the Arduino P2 connector is used. Table 5 shows the resistor jumper name, the position, the applied voltage on the jumper, and the Pmod to which the signal is routed.

Table 5. Selection Jumper for VCC Pmod Pins

Link No.	Position	Selectable Voltage	PMOD Connector
JP1	Not inserted	5 V	P14 (SPI0)
JP2	Inserted	3.3 V	P14 (SPI0)
JP3	Not inserted	5 V	P15 (SPI1)
JP4	Inserted	3.3 V	P15 (SPI1)
JP5	Included	3.3 V	P16 (SPI2/UART)
JP6	Not inserted	5 V	P16 (SPI2/UART)
JP7	Inserted	3.3 V	P13 (I^2C)
JP8	Not inserted	5 V	P13 (I^2C)

ADAPTER BOARD HARDWARE

SUMMARY OF SIGNAL MAPPING BETWEEN ARDUINO AND PMOD

Table 6 provides an overview of all signals originating from the Arduino shield to the Pmod connectors P13, P14, P15, and P16.

Table 6. Signal Mapping Recap Between Arduino Uno and PMD-ARD-INT-LCZ

Arduino Uno Shield (SDP-K1)		SPI0-PMOD (P14)		SPI1-PMOD (P15)		SPI2/UART-PMOD (P16)		I2C-PMOD (P13)	
Pin Number	**Signal Name**	**Pin Number**	**Signal Name**	**Pin Number**	**Signal Name**	**Pin Number**	**Signal Name**	**Pin Number**	**Signal Name**
P1.1	A0					10	NS_2_1		
P1.2	A1					9	NS_2_0		
P1.3	A2			10	NS_1_1				
P1.4	A3			9	NS_1_0				
P1.5	A4	10	NS_0_1						
P1.6	A5	9	NS_0_0						
P2.2	IOREF_ARD								
P2.3	RST_ARD	8	RST_0	8	RST_1	8	RST_2		
P2.4	3V3_ARD	6 and 12	VPMOD_SPI0	6 and 12	VPMOD_SPI1	6 and 12	VPMOD_SPI2	6 and 12	VPMOD_I2C
P2.5	5V_ARD	6 and 12	VPMOD_SPI0	6 and 12	VPMOD_SPI1	6 and 12	VPMOD_SPI2	6 and 12	VPMOD_I2C
P2.6 and P2.7	GND	5 and 11	GND	5 and 11	GND	5 and 11	GND	5 and 11	GND
P2.8	VIN								
P4.1	D8					1	CS_2		
P4.2	D9			1	CS_1				
P4.3	D10	1	CS_0						
P4.4	MOSI_ARD	2	MOSI_ARD	2	MOSI_ARD	2	MOSI_ARD, selectable between MOSI_ARD or TX_ARD through jumper P8		
P4.5	MISO_ARD	3	MISO_ARD	3	MISO_ARD	3	MISO_ARD, selectable between MISO_ARD or RX_ARD through jumper P9		
P4.6	SCK_ARD	4	SCK_ARD	4	SCK_ARD	4	SCK_ARD, selectable between SCK_ARD or D2 signal through jumper P10		
P4.7	GND								
P4.8									
P4.9	SDA_ARD							4	SDA_ARD, optional on-board 4.7 K pullup with jumper P12
								10	GPIO3
P4.10	SCL_ARD							3	SCL_ARD, optional on-board 4.7 K pullup with jumper P11
								9	GPIO2
P5.1	RX_ARD					3	RX_ARD, selectable between MISO_ARD or RX_ARD through jumper P9		

ADAPTER BOARD HARDWARE

Table 6. Signal Mapping Recap Between Arduino Uno and PMD-ARD-INT-LCZ (Continued)

Arduino Uno Shield (SDP-K1)		SPI0-PMOD (P14)		SPI1-PMOD (P15)		SPI2/UART-PMOD (P16)		I2C-PMOD (P13)	
Pin Number	**Signal Name**	**Pin Number**	**Signal Name**	**Pin Number**	**Signal Name**	**Pin Number**	**Signal Name**	**Pin Number**	**Signal Name**
P5.2	TX_ARD					2	TX_ARD, selectable between MOSI_ARD or TX_ARD through jumper P8		
P5.3	D2							7	GPIO0
P5.4	D3							1	INT_I
P5.5	D4					7	INT_2		
P5.6	D5			7	INT_1				
P5.7	D6	7	INT_0						
P5.8	D7							8	GPIO1

CHANGING THE ARDUINO GPIO ASSIGNMENTS

The PMD-ARD-INT-LCZ maps all the signal pins of the Arduino Uno to the pin matrix, P6 and P7. The adapter board is designed so that all of these input/output (I/O) signals pass through the rows of test points and solder jumpers at the center. This way, if a different set of GPIO pin assignments is needed (or desired), the default connections can be changed simply by removing the appropriate solder jumper(s) and then placing a wire between the desired test points. Refer to Figure 4 and Table 7 below for the signal names available on each test point.

Arduino Uno GPIO signals are connected to P6 while P7 connects to the Pmod peripheral connectors P13, P14, P15, and P16.

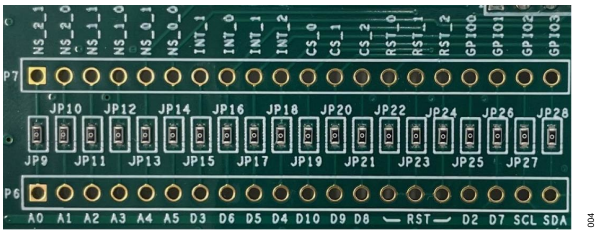

Figure 4. Matrix Connection

Table 7. Pin Mapping Between the Arduino Uno (P6) and the Pmod Matrix Test Points

Arduino Uno Signal (P6)	Jumper	PMD-ARD-INT-LCZ Signal (P7)
A0	JP9	NS_2_1
A1	JP10	NS_2_0
A2	JP11	NS_1_1
A3	JP12	NS_1_0
A4	JP13	NS_0_1
A5	JP14	NS_0_0
D3	JP15	INT_I
D6	JP16	INT_0
D5	JP17	INT_1
D4	JP18	INT_2
D10	JP19	CS_0
D9	JP20	CS_1
D8	JP21	CS_2
RST_ARD	JP22	RST_0
RST_ARD	JP23	RST_1
RST_ARD	JP24	RST_2
D2	JP25	GPIO0
D7	JP26	GPIO1
SCL_ARD	JP27	GPIO2
SDA_ARD	JP28	GPIO3

NOTES

ESD Caution
ESD (electrostatic discharge) sensitive device. Charged devices and circuit boards can discharge without detection. Although this product features patented or proprietary protection circuitry, damage may occur on devices subjected to high energy ESD. Therefore, proper ESD precautions should be taken to avoid performance degradation or loss of functionality.

Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Analog Devices Inc.:

PMD-ARD-INT-LCZ