PiGo™

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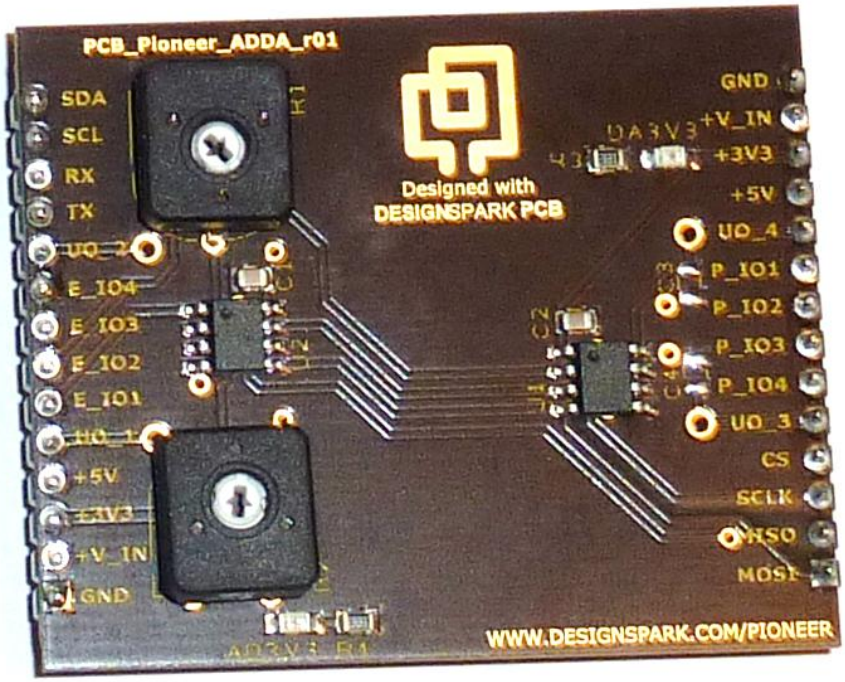
Modular Expansion System for Raspberry Pi

A/D & D/A (ADDA) module

User manual



Overview

PiGo A/D & D/A (ADDA) module is a module that can be attached to any of the PiGo module sockets (A, B, C or D). The module contains two-channel A/D and D/A converters. A/D converter is used to convert the analog voltage into digital value, while the D/A converts in the opposite – converting the digital value to analog voltage. Both converters are connected to the SPI bus and have separate chip select signals via External GPIO pins.

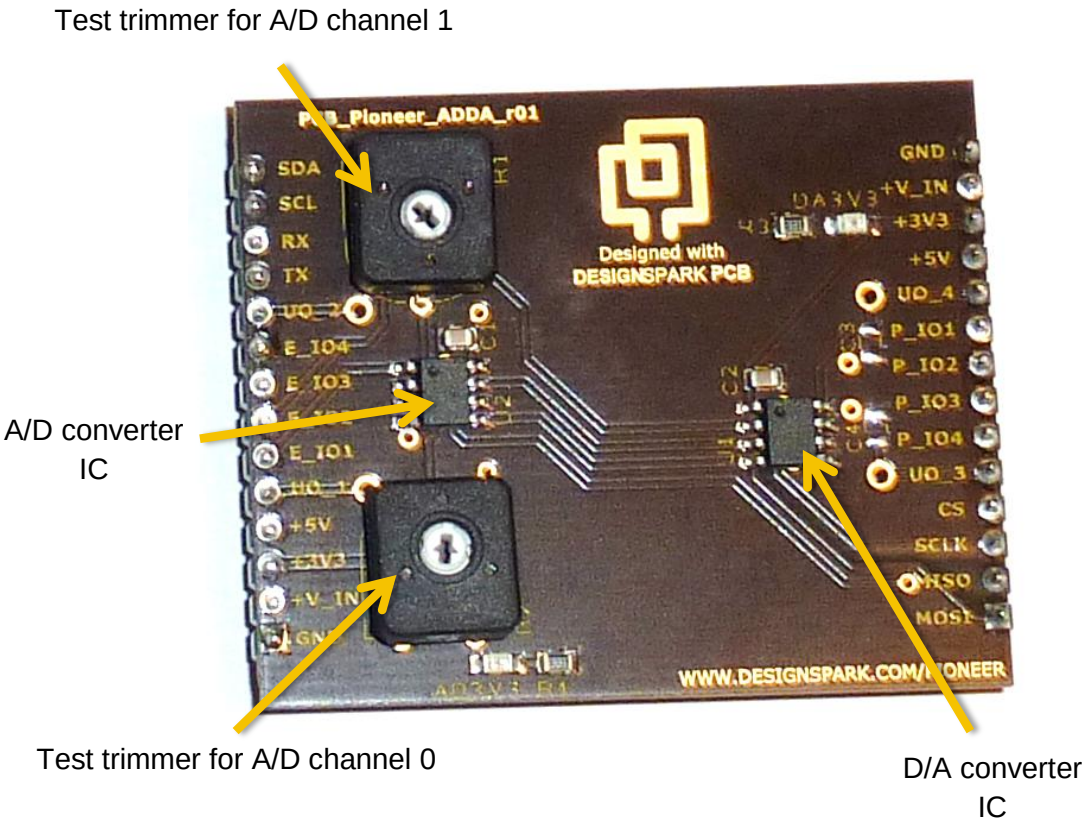
Both input channels for A/D converter and output channels of the D/A converter are connected to the User IO connector and can be accessed via screw terminals for the given module socket on the PiGo base board.

PiGo ADDA module also contains two test trimmers for the A/D converter. Input voltage on channels 0 and 1 of the A/D can be adjusted by turning the trimmer.

Note: when external voltage is to be measured, (remove) desolder the trimmers.

Architecture and physical specification

PiGo ADDA module layout



Electrical specifications

PiGo ADDA module is powered from 3.3 V power supply, provided by the PiGo base board.

The following table shows basic parameters of the A/D and D/A converter ICs used. For more details, users should study the datasheets of each device.

A/D converter (MCP3002)

Input range	0 – 3.3 V
Resolution	10-bit (1024 step)
Offset error	±1.5 LSB
Gain error	±1 LSB

D/A converter (MCP4812)

Output range	0 – 2.048 V
Resolution	10-bit (1024 step)

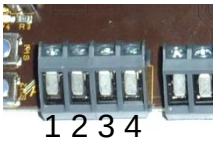
Module connectors

PiGo A/D & D/A (ADDA) module can be attached to any of the PiGo module sockets (A, B, C or D). It has the following connections:

Left socket			Right socket
Pi_{SDA}	NC	Power Supply ground	GND
Pi_{SCL}	NC	NC	V_{IN}
Pi_{RX}	NC	3.3 V power supply	$V_{3.3\ V}$
Pi_{TX}	NC	NC	$V_{5\ V}$
$U_{IO2A/B/C/D}$	A/D channel 0 input	D/A channel B output	$U_{IO3A/B/C/D}$
EXT10/12/14/16	NC	NC	$P_{IO1A/B/C/D}$
EXT9/11/13/15	NC	NC	$P_{IO2A/B/C/D}$
EXT2/4/6/8	D/A chip select	NC	$P_{IO3A/B/C/D}$
EXT1/3/5/7	A/D chip select	NC	$P_{IO4A/B/C/D}$
$U_{IO1A/B/C/D}$	A/D channel 1 input	D/A channel A output	$U_{IO4A/B/C/D}$
$V_{5\ V}$	NC	NC	$CS_{A/B/C/D}$
$V_{3.3\ V}$	Same as $V_{3.3}$ V right	SPI SCLK	Pi_{SCLK}
V_{IN}	NC	SPI MISO	Pi_{MISO}
GND	Same as GND right	SPI MOSI	Pi_{MOSI}

Note: NC stands for Not Connected – this signal is not used by the module.

When the module in inserted in one of the sockets on the PiGo base board, A/D and D/A channels are available on the User IO connector (see image and table below).



Pin	Function
1	A/D channel 1 input
2	A/D channel 0 input
3	D/A channel B output
4	D/A channel A output

Module usage

PiGo ADDA module can be accessed using the ModuleADDA class from the PiGo Python library.

Function and description	**ModuleADDA** – Initialize PiGo ADDA module class
Arguments	**PiGoBoardObject**: reference to the PiGo board object **SocketID**: Socket on the PiGo base board, where the ADDA module is attached to
Returns	Instance of the ADDA module class

Example	`brd = PiGoBoard()`
	`# ADDA module is connected to socket 'A'`
	`adda = ModuleADDA(brd, "A")`

Function and description	**getAD** – Read A/D value on the selected channel
Arguments	**channel**: A/D channel (0 or 1)
Returns	Converted value (0 to 1023)

Example	`brd = PiGoBoard()`
	`# ADDA module is connected to socket 'A'`
	`adda = ModuleADDA(brd, "A")`
	`print("A/D 0: " + "%0.3f"%(3.3*adda.getAD(0)/1023))`

Function and description	**setDA** – Set the D/A value on the selected channel
Arguments	**channel**: D/A channel (0 for channel A, 1 for channel B) **value**: D/A channel value (0 to 1023)
Returns	None

Example	`brd = PiGoBoard()`
	`# ADDA module is connected to socket 'A'`
	`adda = ModuleADDA(brd, "A")`
	`outVoltage = 1.5 # 1.5 V`
	`adda.setDA(0, 1024 * outVoltage / 2.048)`

Frequently asked questions

None yet

Module schematics