

## Description

The AD2428\_proto is a simple, low-cost introduction to Analog Devices' A<sup>2</sup>B interface offered by while(1)\_engineering. Using the AD2428, this board provides access to ports A and B on an A<sup>2</sup>B bus while allowing the user to connect to the device over I<sup>2</sup>S and I<sup>2</sup>C interfaces with flexibility in controlling GPIO pins from the AD2428 microchip itself.

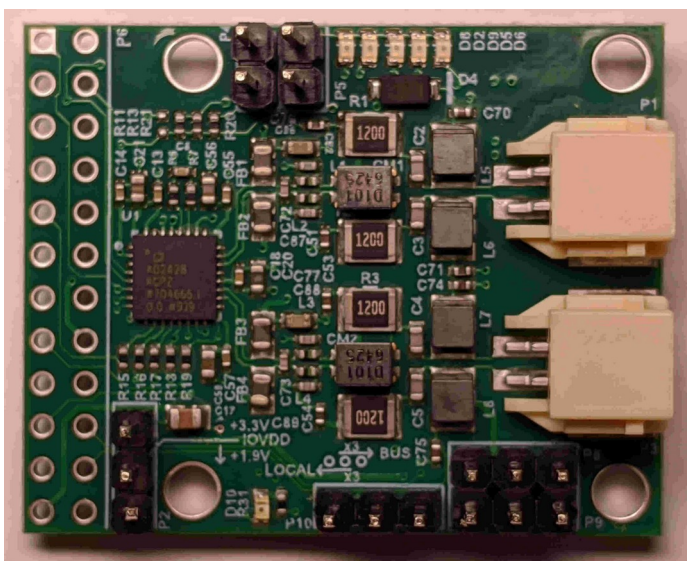
Catering to the flexibility of the A<sup>2</sup>B interface, the AD2428\_proto can be configured in local powered or bus powered applications by settings various jumpers on the board. Using the de-facto Molex Dura-Click connectors, the AD2428\_mini can interface to a variety of existing solutions provided by Analog Devices and other third parties. The flexibility to switch between different I/O levels can also be set through a jumper configuration where a QWIIC interface connector provides an I<sup>2</sup>C interface with convenience to connect to a variety of peripherals with many options provided by third-parties. Additionally, a 2Mb EEPROM is present on the board with the option of an opto-isolated enable circuit.

With it's small form factor and ease-of-use, the AD2428\_proto board is a perfect solution for users ranging from an introduction to the A<sup>2</sup>B protocol to seasoned developers needing a quick tool for their application development and debug.

## Applications

- Application development and debug
- In-vehicle testing and diagnostics
- Test and measurement

*A<sup>2</sup>B is a registered trademark of Analog Devices Incorporated*



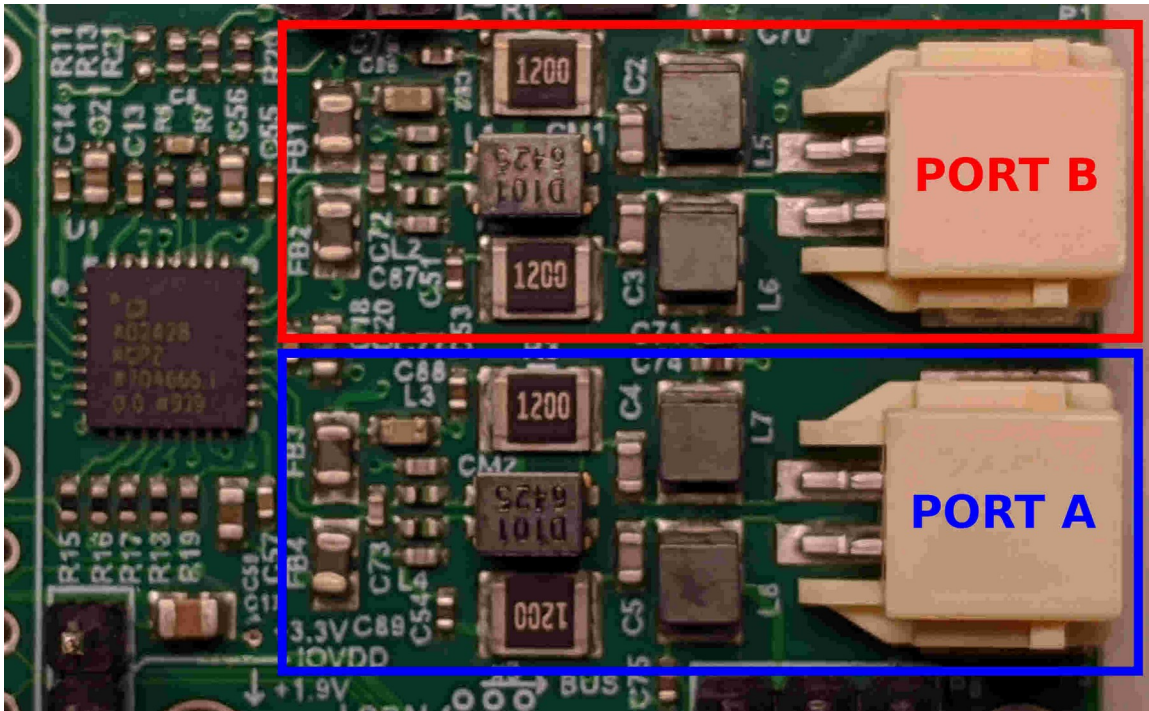
## Features

- Port A & Port B A<sup>2</sup>B interfaces
- I<sup>2</sup>S & I<sup>2</sup>C interfaces
- Configurable Local or Bus powered
- Configurable logic-levels
- GPIO LEDs and expansion headers
- 2Mb EEPROM memory
- Optional opto-isolated enable circuit  
*available upon request at additional cost*

## Operation

### A<sup>2</sup>B Interface

This AD2428\_proto breaks out ports A and B of the AD2428 to Molex Dura-Click connectors. Below is the pinout for the interface:



#### Port B

BN

BP

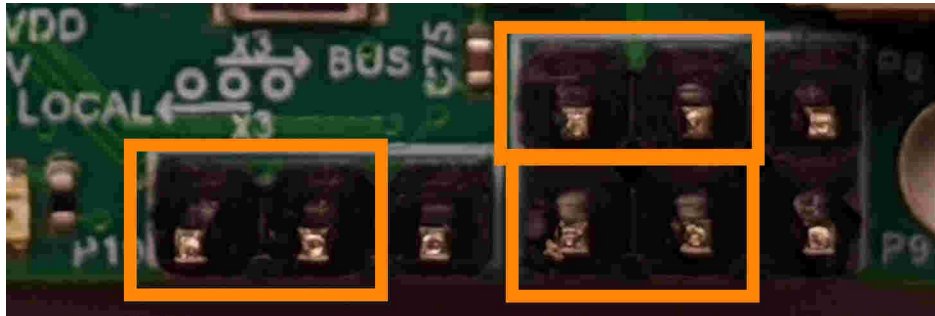
#### Port A

AP

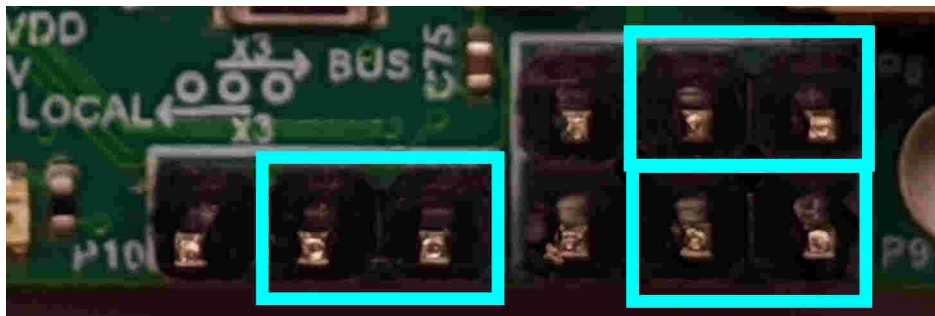
AN

## Local Powered / Bus Powered

The AD2428\_proto has the ability to be powered from a local power source, or take power from the A<sup>2</sup>B bus. To do this, three jumpers (P8, P9, and P10, standard IDC 100-mil pitch) need to be set to allow these configurations. These configurations are used to change the termination on the slave interface as well as route the power to the appropriate devices.



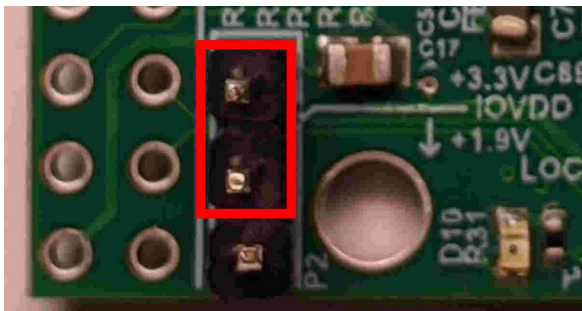
Local powered configuration jumper settings



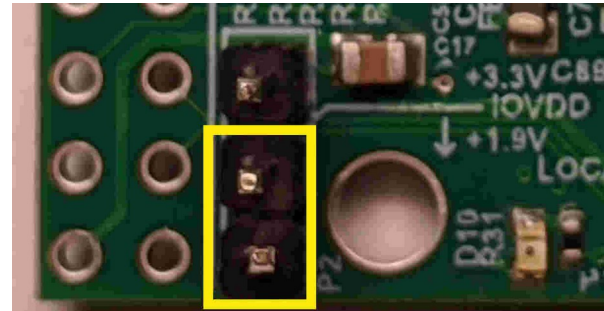
Bus powered configuration jumper settings

## I/O Level Set

The AD2428\_proto can be configured for +3.3V or +1.9V logic levels. This is done by setting the jumper P2 (standard IDC 100-mil pitch).



+3.3V I/O Level Configuration

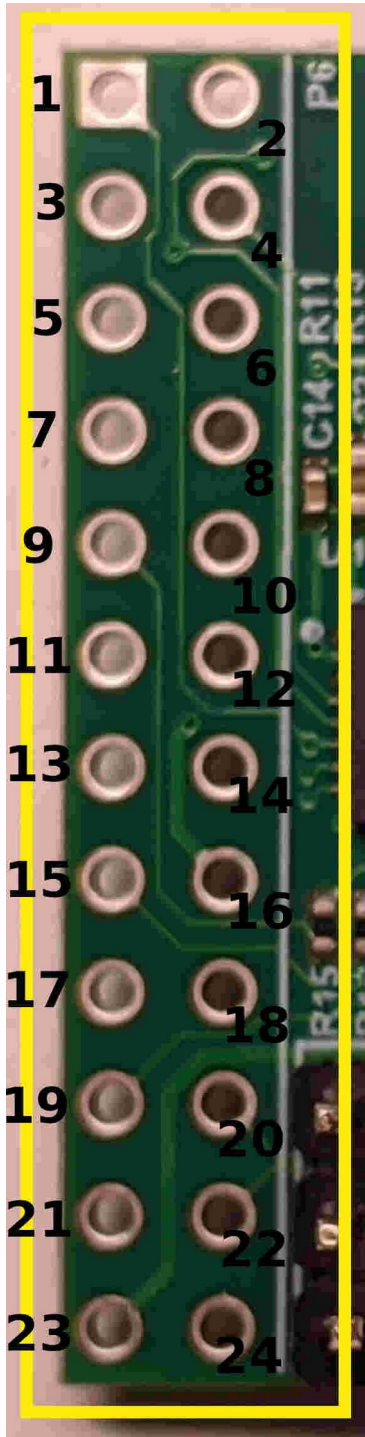


+1.9V I/O Level Configuration



## I<sup>2</sup>S Interface

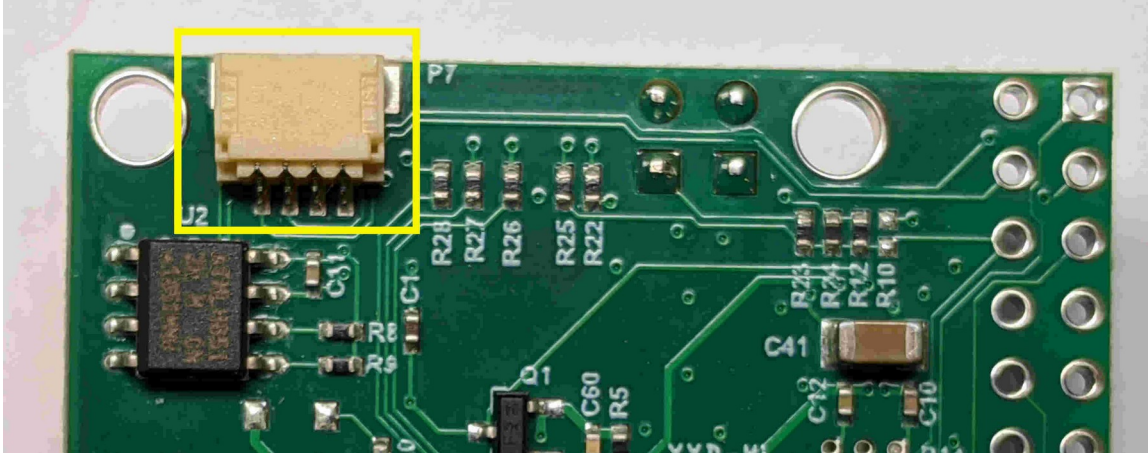
P6 is an unpopulated 24-pin header (standard IDC with 100-mil pitch) used for breaking out the I<sup>2</sup>S signals along with I<sup>2</sup>C and power. This header was left unpopulated to allow the user flexibility for soldering in a header facing upwards, downwards, or solder wires directly to the board. Pin 1 on the PCB is designated by the square pad on the board with pin out listed below.



| Pin | Description  |
|-----|--|
| 1   | <b>AD2428_INT</b> : IO0 from the AD2428. Also used as interrupt                            |
| 2   | <b>VREG</b> : Output from the local regulator when locally powered (+8.5V typ.)            |
| 3   | <b>I2C_SDA</b> : I2C data  |
| 4   | <b>I2C_SCL</b> : I2C clock   |
| 5   | <b>AD2428_IO1</b> : IO1 from the AD2428. Also used as ADR1 for AD2428 I2C address          |
| 6   | <b>AD2428_IO2</b> : IO2 from the AD2428. Also used as ADR1 for AD2428 I2C address          |
| 7   | <b>GND</b> : Ground  |
| 8   | <b>GND</b> : Ground  |
| 9   | <b>AD2428_BCLK</b> : Bit clock from the AD2428   |
| 10  | <b>AD2428_SYNC</b> : Sync signal from AD2428   |
| 11  | <b>AD2428_DTX0</b> : IO3 from AD2428. Also used as DTX0                                    |
| 12  | <b>AD2428_DTX1</b> : IO4 from AD2428. Also used as DTX1                                    |
| 13  | <b>AD2428_DRX0</b> : IO5 from AD2428. Also used as DRX0                                    |
| 14  | <b>AD2428_DRX1</b> : IO6 from AD2428. Also used as DRX1                                    |
| 15  | <b>AD2428_IO7</b> : IO7 from the AD2428  |
| 16  | <b>VOUT2 +3.3V</b> : Output from AD2428 internal +3.3V regulator                           |
| 17  | <b>VOUT2 +3.3V</b> : Output from AD2428 internal +3.3V regulator                           |
| 18  | <b>VOUT1 +1.9V</b> : Output from AD2428 internal +1.9V regulator                           |
| 19  | <b>REG_EN</b> : Enable for local regulator when locally powered (+1V threshold, VBAT max.) |
| 20  | <b>OPTO_EN</b> : Enable from opto-isolator when option is populated                        |
| 21  | <b>GND</b> : Ground  |
| 22  | <b>AN</b> : Negative terminal of Port A (can be used as feedback)                          |
| 23  | <b>VBAT</b> : Input voltage when locally powered (+12V typ. +42V max.)                     |
| 24  | <b>GND</b> : Ground  |
|     | <i>all data lines referenced to I/O voltage jumper setting unless otherwise noted</i>      |

## I<sup>2</sup>C Interface

The I<sup>2</sup>C bus on the AD2428\_proto can be accessed in two ways; from the I<sup>2</sup>S interface connector (see I<sup>2</sup>S interface section) or from the QWIIC connector (P7) on the bottom of the board. The QWIIC connect system allows for a variety of devices to interface to the AD2428\_proto from 3<sup>rd</sup> party providers. Also located on the I<sup>2</sup>C bus is a 2Mb EEPROM.



The following memory locations are configured on the AD2428\_mini board:

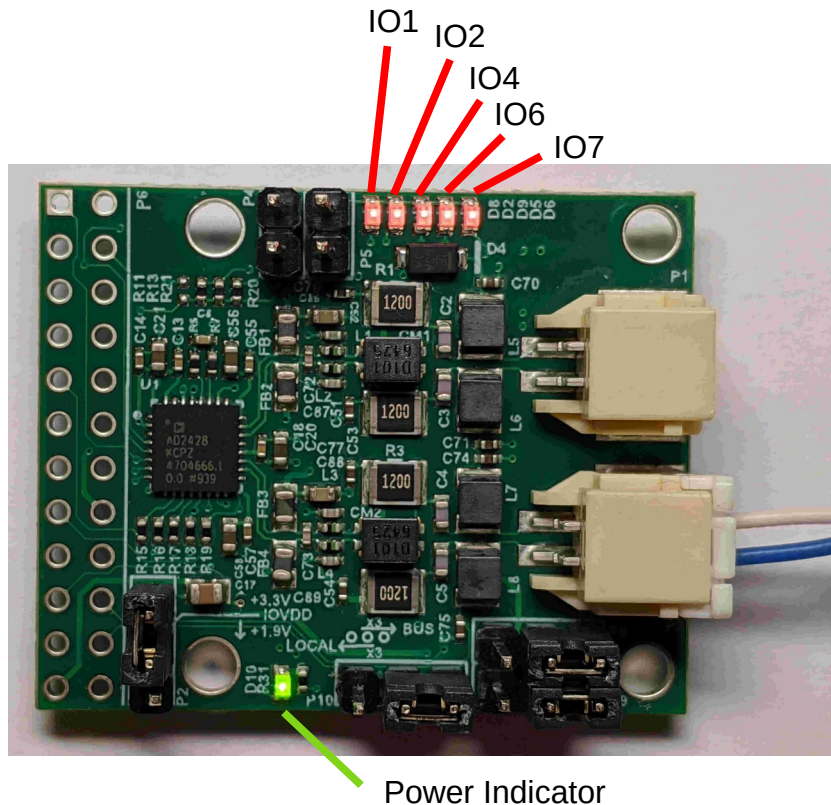
| 8-bit Hex Address | Device          |
|-------------------|-----------------|
| 0xA0              | AT24CM02-SSHM-T |
| 0x50              | AD2428          |

## Opto-Isolated Enable

An opto-isolated enable circuit can be added to the AD2428\_proto. Please contact while(1)\_engineering for more details.

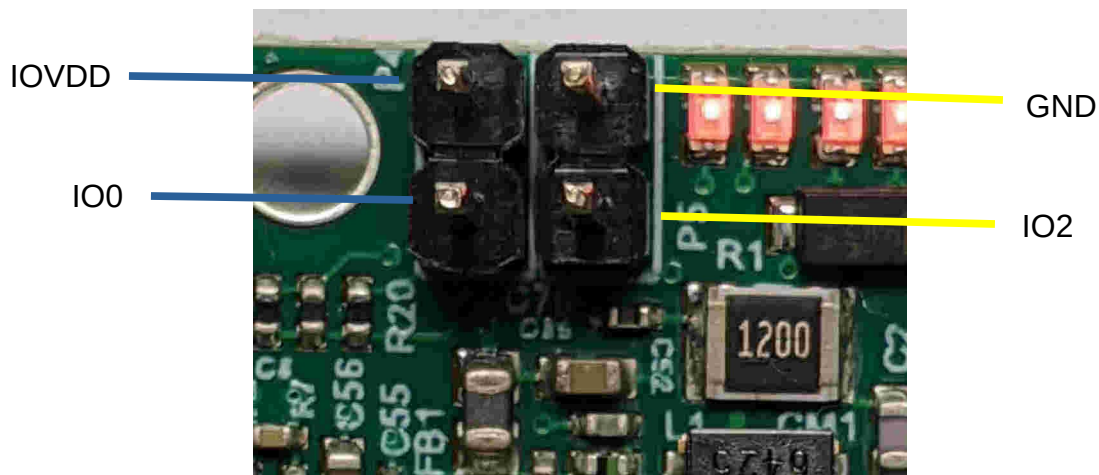
## GPIO & LEDs

Located on the AD2428\_proto is a single green LED used to indicate power entry into the board either from local or bus power. Five red LEDs are present on the board connected to various GPIOs of the AD2428 and can be configured to a variety of different settings.



Power Indicator

In addition to the LEDs, two GPIOs were brought out to external headers for user expandability. IO0 was brought out to P4 with IOVDD while IO2 was brought out to P5 with GND.

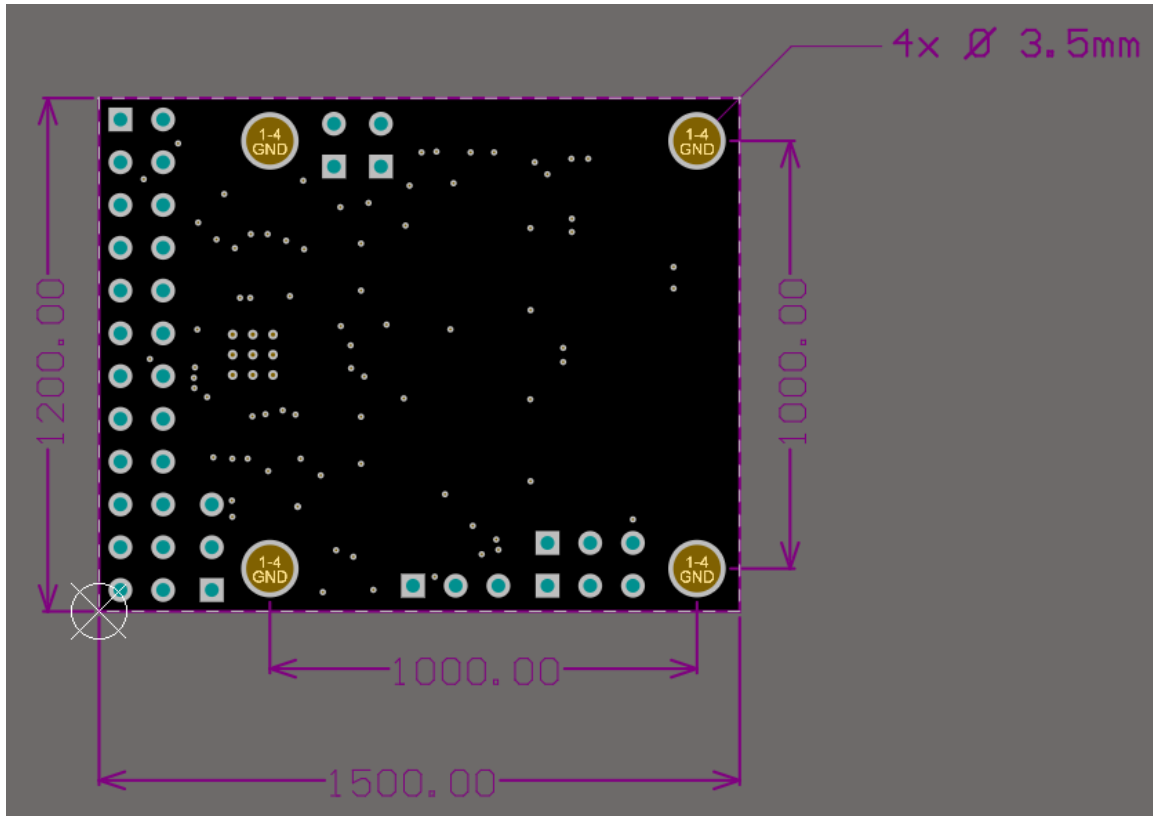


## Application Circuits

- 2428\_proto (master) to 2428\_proto (slave)
- ADUSB2Z (programmer) to ADAU1452 DSP (master) to 2428\_proto (slave)
- Raspberry Pi (I<sup>2</sup>S) to 2428\_proto

## Mechanical

The AD2428\_proto measures 1.5" x 1.2" with four mechanical mounting holes centered about 1". These mounting holes are connected to ground with 3.5mm diameter thus allowing a M3 screw to be used for mounting.





## Revisions

- rev0.....5/16/20  
- Initial draft
- rev1.....1/17/22  
- Changed AD2428\_mini to AD2428\_proto to avoid confusing with ADI mini series  
- Changed 'IO0' to 'IO1' in 'GPIO & LED' image