



A²B[®] - I²S MODULE LOCAL POWERED APPLICATIONS



A²B[®] - I²S MODULE PHANTOM (BUS) POWERED APPLICATIONS

SUPPORTS ANALOG DEVICES



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CLOCKWORKS

Signal Processing

A²B - I²S MODULE

OEM STYLE FOR USER DEFINED A²B CONNECTOR

Summary

- Off the shelf module for A²B[®] interfacing to I²S and I²C devices
- Based on Analog Devices newest AD2428 A²B device
- OEM style has two 4 pin headers for A²B bus to allow use of your own interconnect system
- Fully supported by ADI's SigmaStudio[™] tools A²B extensions
- Available in OEM quantities for system developers needing off-the-shelf solution for A²B applications
- 0.1" (2.54 mm) connector pitch for easy mating to development hardware
- Full access to all AD2428 digital I/O pins to allow A²B master or A²B slave mode operation
- Provides phantom power for downstream A²B slaves
- Selectable I/O voltage (3.3 or 1.8V)
- Compact 63 x 40 mm (2.5" x 1.6") module
- Pin compatible with other Clockworks A²B modules

Introduction

Analog Devices' A²B system allows up to thirty two 24 bit 48 kHz data (audio) channels to be carried bidirectionally over twisted pair wire between multiple nodes. Supporting up to 15 meters of cable between nodes it provides a low cost way to expand audio and signal processing systems.

Clockwork's A²B module provides an off the shelf solution to developers and OEMs needing a way to develop and ship products that include A²B but don't want to delay their projects working out their own A²B designs.

The module has two 12 pin and two 4 pin .1" (2.54 mm) spaced headers to allow for easy mating with standard development PCBs.

Module details

There are two 12 pin single row .1" (2.54 mm) connectors (male pins) on the bottom side of the module. They mate with standard single row header sockets such as Samtec's SSW-112-01-F-S. These carry power and all of the AD2428's digital I/O.

Two additional 4 pin .1" (2.54 mm) connectors carry the up and down stream A²B ports.

The module can be powered with a supply in the 5V to 9V range; the lower voltage will limit the number of phantom powered slaves as each slave drops about 0.5V and the AD2428 needs greater than 4V to operate (9V max).

Four 3mm mounting holes are provided, please see the last page for detailed dimensions.

Module I²S output lines are series terminated on the module. A buffer should be added at the connector on your main board if the trace length for the BLCK and SYNC lines will exceed

Pinout – A Connector

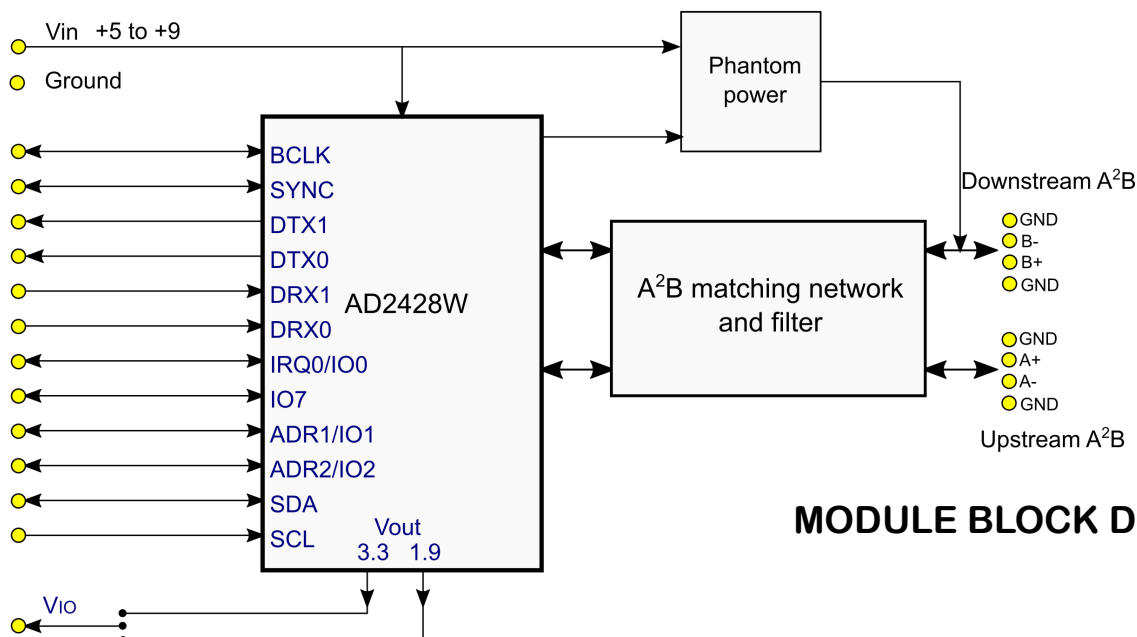
J1 on PCB label.

Pin	Name	Notes
1	IOVDD	Jumper selects between AD2428 internal regulator voltages, default is 3.3V (1.8V optional)
2	GND	
3	ADR2	AD2428 ADR2/IO2, 10K pulldown
4	ADR1	AD2428 ADR1/IO1, 10K pulldown
5	IRQ	AD2428 IRQ/IO0
6	GND	
7	SDA	I2C data
8	SCL	I2C clock
9	GND	
10,11	Vxx	Power 5-8V suggested range, 4V min, 9V max.
12	GND	

Pinout – B Connector

J2 on PCB label.

Pin	Name	Notes
1	GND	
2	BCLK	AD2428 bit clock (output as slave)
3	GND	
4	SYNC	AD2428 frame sync (output as slave)
5	GND	
6	DTX0	AD2428 DTX0/IO3, 10K pulldown (output)
7	DTX1	AD2428 DTX1/IO4, 10K pulldown (output)
8	GND	
9	DRX0	AD2428 DRX0/IO5
10	DRX1	AD2428 DRX1/IO6
11	GND	
12	IO7	AD2428 IO7



MODULE BLOCK DIAGRAM

around 2" (5 cm). Long I²S lines may also create EMI and proper high speed digital design techniques must be followed for all I²S lines.

OEM A²B module versions

This board is available in two versions, one for use with local power, and the other for A²B bus (phantom) power. ADI's A²B documentation explains this in detail, but the major difference is the removal of the 100uF capacitor on input power and the removal of the capacitive ID circuit on the A port that the upstream node can probe to see if the node is locally powered (and therefor leave phantom power off).

Converting a locally powered module to phantom powered is simple since just two components can be removed to make the change. Going from a phantom powered to locally powered node is more complex since multiple SMT components will need to be added.

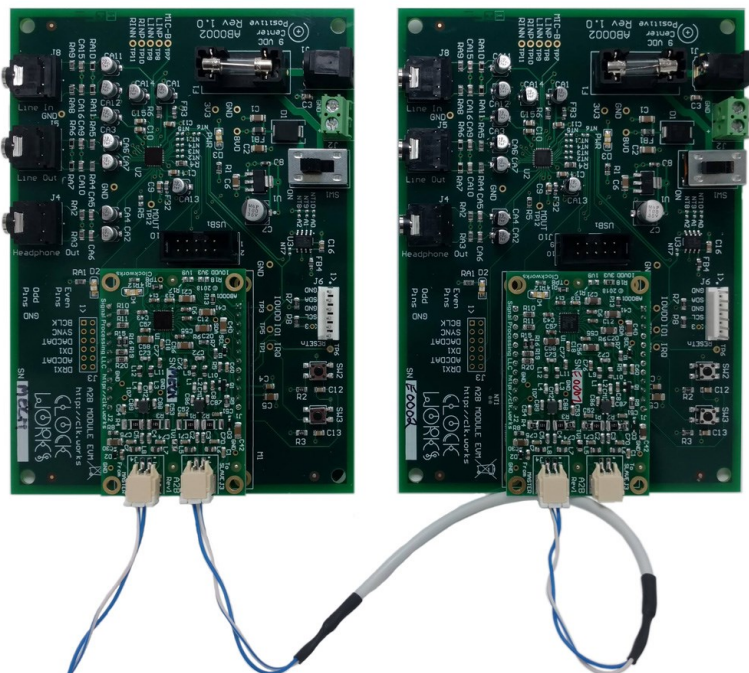
The I/O voltage is set to 3.3V by default. If ordered with AB0105 4 channel mic board then the A²B module is set to 1.8V.

Development

Clockworks EVMA2B01/2 EVM kits, which include the A²B module version with the DuraClik connectors (pictured below) are the simplest general purpose development solutions. The AB0003 OEM version in this datasheet can be mated with the AB0106 generic I/O slave node module or the AB0108 /AB0110 generic I/O master node module for development. The AB0106 module comes in the 2 versions: Locally powered slave, and Phantom powered slave. The AB0108 and AB0110, as a master node, is only locally powered. The AB0108 uses an external BCLK and SYNC, the AB0110 generates these signals.

Software support

ADI provides both the SigmaStudio A²B add-ons and an A²B software stack for the AD2428. Both of those work out-of-the-box with the Clockworks modules, though for a master node an I²C connection to the USBi emulator is required.



Analog Devices' A²B system operates as a daisy chain. One connector is the upstream side that ultimately connects to the first (master) device. The second connector connects downstream towards the last (slave) device in the daisy chain. Up to 9 modules may be daisy chained with up to 15m between nodes and total wire length of 40m.

Clockworks' A²B modules can operate as master (first) or a slave node device. For development outside of your own system Clockworks standard module + EVM can be used. The EVM can be ordered as a slave device for use with A²B masters such as the Analog Devices SHARC® Audio Module or EVAL-AD2428WD1BZ A2B master evaluation kit, or ordered configured for operation as an A²B master for use with any A²B slave.

Ordering information

For OEM quantities of modules please contact Clockworks for price and lead time. EVM kits and small quantities of modules are normally available from stock.

The EVM kit documentation package includes the A²B module and EVM User Guide. Design information for the AB0106 , AB0108, and AB0110 modules - schematic (pdf, Altium), layout (Altium), BOM and gerbers are available for download. A .STEP file for the A²B module is included to facilitate design of your own carrier board.

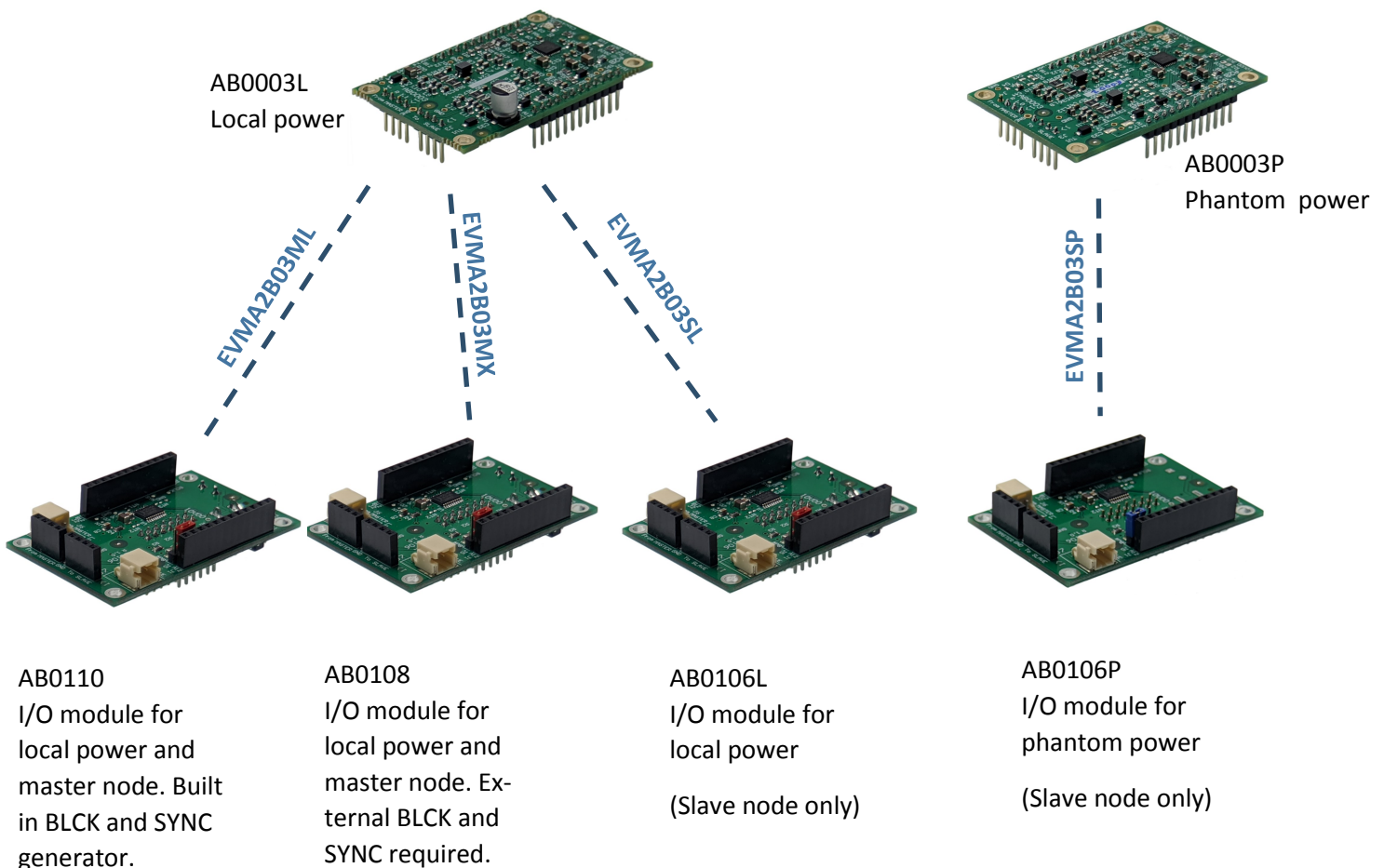
SigmaStudio examples are included for demonstrating EVM operation.

The EVM in a master configuration requires the Analog Devices USBi to operate the AD2428.

SigmaStudio is available directly from Analog Devices at no charge, along with the A²B software add-ons.

There are four possible EVM configurations using the AB0003P/L and AB00106P/L, AB0108, or AB0110 modules, which take on different part numbers when configured for local or phantom power. The decision tree for a particular EVM choice depends on how you intend to emulate your final system. Clockworks would be happy to offer suggestions for which configuration(s) will meet your needs. Alternately the user manual provides a lot more details.

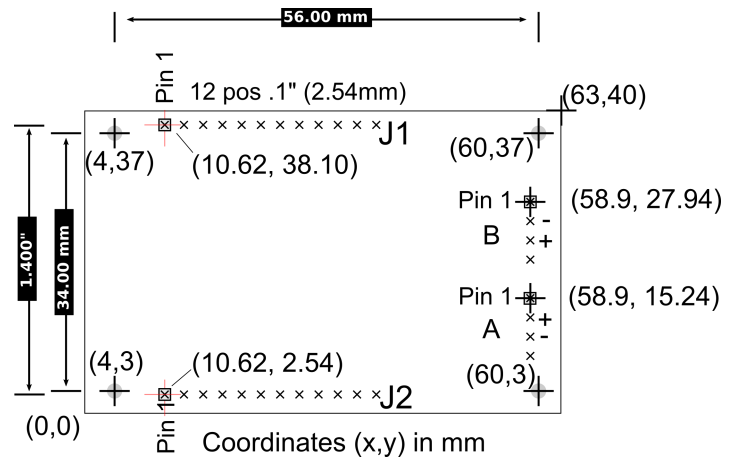
There is a fifth configuration using the Clockworks quad module carrier, that configuration has its own datasheet.



Order codes: modules

A2B03L-S	OEM A ² B to I ² S module, single. Local power (AB0003L)
A2B03L-V	5 pack OEM A ² B to I ² S modules.
A2B03L-XX	20 pack OEM A ² B to I ² S modules.
A2B03P-S	OEM A ² B to I ² S module, single. Phantom power (AB0003P)
A2B03P-V	5 pack OEM A ² B to I ² S module. Phantom power
A2B03P-XX	20 pack OEM A ² B to I ² S module. Phantom power

Modules are RoHS compliant.



A²B Module dimensions. Mounting holes are 3mm.

Order codes: modules in EVM configuration

EVMA2B03SP	Slave mode, phantom powered EVM kit with AB0003P and AB0106P boards, 1m A ² B cable, documentation package.
EVMA2B03SL-NA	Slave mode, locally powered EVM kit with AB0003L and AB0106L boards, 1m A ² B cable, 9V supply with universal AC input supply (NEMA 1-15 blade), documentation package.
EVMA2B03SL-INT	As above but with universal AC input supply multi-blade kit (NA, EU, UK, AUS, CN)
EVMA2B03MX-NA	Master mode, locally powered, external clock EVM kit with AB0003L and AB0108 boards, 1m A ² B cable, 9V supply with universal AC input supply (NEMA 1-15 blade), documentation package.
EVMA2B03MX-INT	As above but with universal AC input supply multi-blade kit (NA, EU, UK, AUS, CN)
EVMA2B03ML-NA	Master mode, locally powered, local clock EVM kit with AB0003L and AB0108 boards, 1m A ² B cable, 9V supply with universal AC input supply (NEMA 1-15 blade), documentation package.
EVMA2B03ML-INT	As above but with universal AC input supply multi-blade kit (NA, EU, UK, AUS, CN)

Module summary specification

The module data pins for inputs are directly connected to the AD2428 and for outputs (BCLK, SYNC, DTX0, DTX1) through a 33 ohm series resistor.

DTX0, DTX1, ADR1, and ADR2 have a 10 k pulldown.

The B port pinout's LVDS polarity is swapped relative to the A port. If your custom connector/cables are not crossover style then your connectorization must account for the polarity swap.

Phantom power is sourced on the positive pin and returned on negative pin.

The AD2428 has a maximum input of 9V. There is a Schottky diode in series with the Vxx connector pin.

Module power consumption should be calculated using the AD2428 datasheet procedure plus 1.6mA for the LED.

Also available

AB0109 Quad OEM module carrier. This board allows up to 4 modules to be plugged in. It's a great way for developers to have multiple nodes without lots of little boards flopping around. For more information please see the Clockworks website.