Acbotics Research

AcSense-OEM

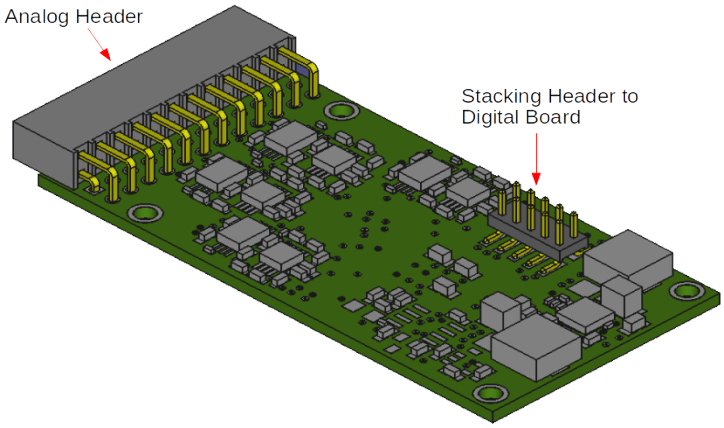
Product Description: The AcSense is the Acbotics Research, LLC integrated solution for applications requiring digital recording or Ethernet streaming of both analog and digital sensors. The analog to digital conversion system (AcSense-ADM) provides 8 channel synchronous, 16 bit data acquisition at up to 52 kS/s/ch; A2D boards may be stacked to provide additional channels. The digital board (AcSense-Digital) provides additional onboard temperature/pressure, IMU, along with the ability to add sensors to streaming or logging via I2C, UART, SPI, and 12 bit ADC. An interface board (AcSense-IB) is used to provide signal conditioning prior to the AcSense-ADM.

The AcSense-OEM is bare-board, including three components: an AcSense-Digital board, one or more AcSense-ADM boards, and a matched number of AcSense-IB boards.

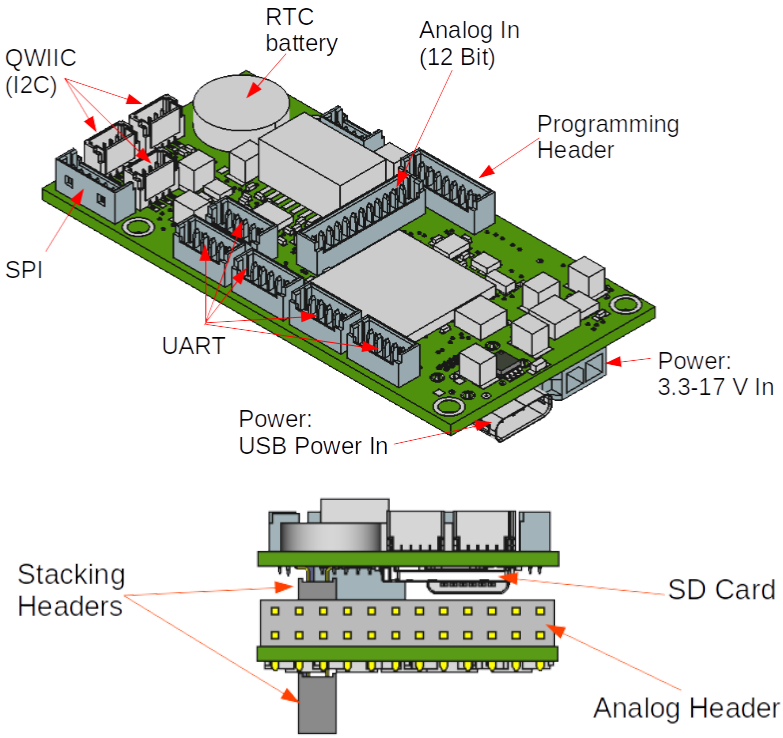
General Properties		**Notes**
Input Voltage	5V	Power connector or micro-USB
Typical power draw	1W	*8ch A2D recording, eth streaming. Lower power without eth streaming.
Stack Dimensions	1.25” x 2.5” x 0.75”	For 1x A2D and Digital board stack; connectors on short ends of boards
Temperature	-20 C to 50 C active -40 C to 70 C storage	Predicted
AcSense-ADM A2D Board Characteristics		
Bit depth	16 bit	
Channels	8	May be stacked
Sampling	Synchronous	
Input type per channel	High impedance	See AcSense-IB options below for in-line input board options
Sample Rate	52 kS/s/ch max	
Sync	Sync header available	
Input Range	+/-2.5 V standard P2P	Resistor adjustable down to 0.5 V P2P
AcSense-ADM Digital Board Characteristics		
Microcontroller	PIC32 supporting A2D, I2C, UART, SPI, and	https://www.digikey.com/en/products/detail/microchip-technology/PIC32MZ1064DAA288-I-4J/7354743

AcSense-ADM A2D 16 bit digital in	(As above)	(Number of channels from stacking of A2D boards limited by streaming/recording capabilities of microcontroller)
Analog in	10x single/5x differential 12 bit, up to 3.125 MS/s	Example applications:
microSD card	Slot located short end of the board, up to 256 Gb supported	* For high analog sample rates, user must select between micro-SD logging and Ethernet streaming
Ethernet	100 Mb Ethernet data streaming	4-pin picoblade connector, compatible with SwitchBlox architecture https://botblox.io/products/small-ethernet-switch * For high analog sample rates, user must select between micro-SD logging and Ethernet streaming
I2C	3x independent I2C busses	QWIIC connectors, compatible with https://www.sparkfun.com/qwiic
SPI	1x SPI bus + SPI bus that goes to the AcSense-ADM	6-pin pico-blade connector
UART	5x 3.3V TTL UART 5-wire	5-pin pico-blade connectors
CAN	1x with Expansion Board INSTEAD of 1 of the UART connectors [untested]	5-pin pico-blade connectors -> Expansion board
Clock	Expansion board required	Note: RTC on the PIC32 does not function per manufacturer data sheet; a supplemental RTC or GPS-RTC may be easily added with an I2C bus.
Board Temperature/Pressure		https://www.digikey.com/en/products/detail/te-connectivity-measurement-specialties/MS560702BA03-50/4700931
On-board accelerometer	3-axis accelerometer, 3-axis gyro PN: ICM-42670-P	https://www.digikey.com/en/products/detail/tdk-invensense/ICM-42670-P/14319524
Programming	Programmed via	

	on-board header	



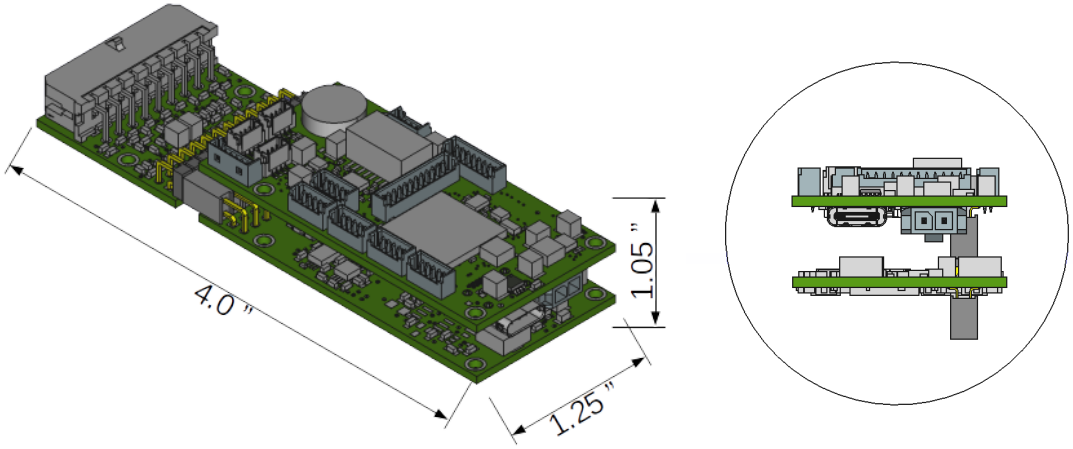
AcSense-ADM-A2D: Analog header to connect to AcSense-IB-XXX; stacking header to connect to AcSense-ADM-Digital. Powered from stacking header.



AcSense-ADM-Digital: See data sheet and drawing for interfaces/connections.

8-Channel Stacking with Hydrophone Current Mode Input Board: AcSense-IB-8HC is the AcSense-ADM compatible input board for 8 current mode hydrophone inputs with bandpass

filtering; shown here mated to the AcSense-ADM to form an assembly, AcSense-ADM-IB-8HC. Image to the right shows fit of 8ch assembly in 2” diameter tube. NOTE: height **includes** bottom header on bottom AcSense-ADM-A2D; this part comes populated on the standard board but may be removed if unused.



16-channel stacking example: The header system on the A2D board makes it possible to stack multiple A2D boards with a single digital board; identical or different AcSense-IB boards may be used for input into the two A2D systems. Image to the right shows fit of 16ch assembly in 2” diameter tube. NOTE: height **includes** bottom header on bottom AcSense-ADM-A2D; this part comes populated on the standard board but may be removed if unused.