

Features

Supports the SensL ArrayJ-60035-4P-PCB
2x2 array of 6mm SiPMs

“HFC” variant: Horizontal coaxial connectors on the
front (array) side of the board

MCX, LEMO, SMA, and SMB supported

Individual transimpedance amplifier per SiPM

- Wideband DC-coupled signal path
- 500Ω transimpedance gain standard
- Other gains optional

Sums four SiPM signals

- Gain adjustment potentiometer
- Offset adjustment potentiometer
- DC or AC coupling selection jumper
- Output polarity selection jumper

Connects to the optional AiT Amplifier Board Power
Supply (model ABPS)

Pin receptacles for low-profile array attachment

Four mounting holes for #4 or M3 hardware

Part Number

AB4HFC-ARRAY4P-Gxxx

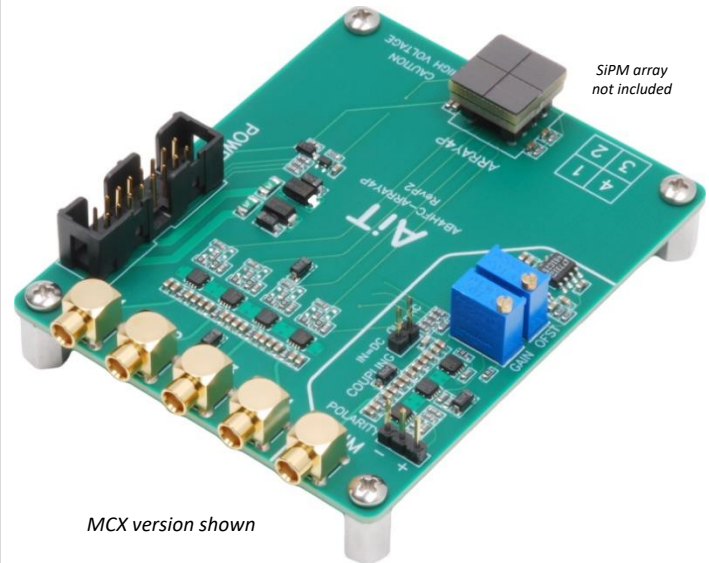
AB4HFC: C = connector type

- M = MCX
- A = SMA
- B = SMB
- L = LEMO EPL.00.250.NTN

Gxxx: Transimpedance gain in ohms
500Ω standard if omitted

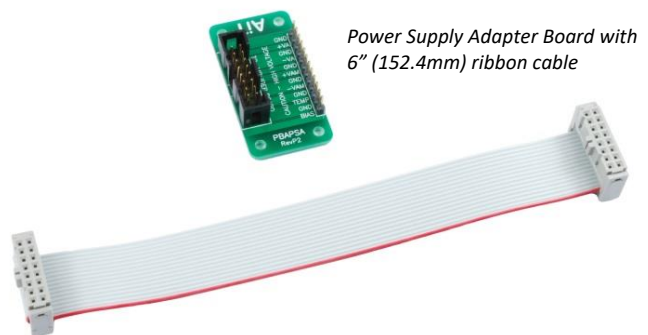
Example: AB4HFL-ARRAY4P

LEMO connectors, 500Ω gain

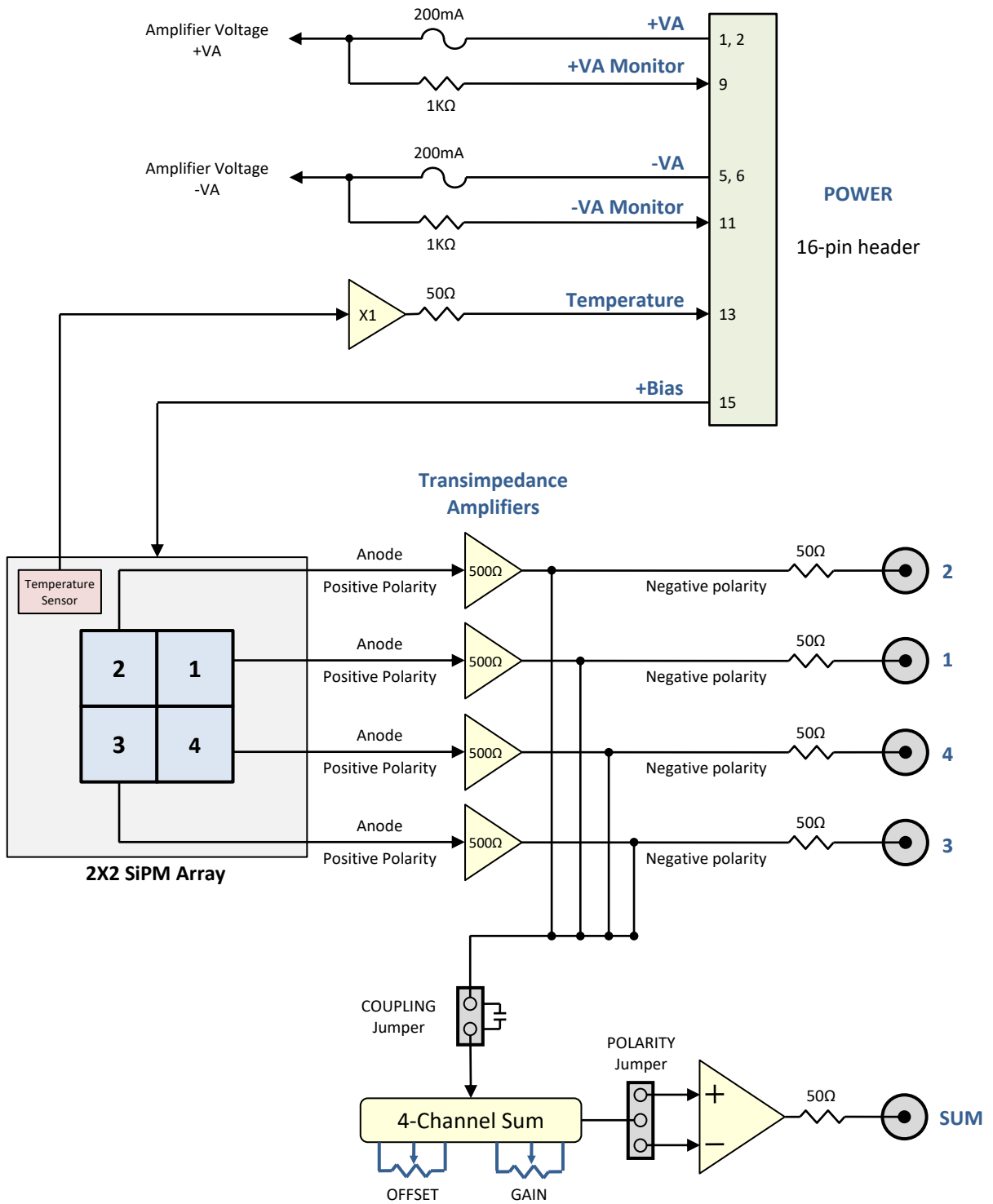


Accessories Included

- 16-conductor ribbon cable assembly, 6" (152mm) length
- Power supply adapter/breakout board
- Four threaded standoffs with #4-40 screws



Architecture



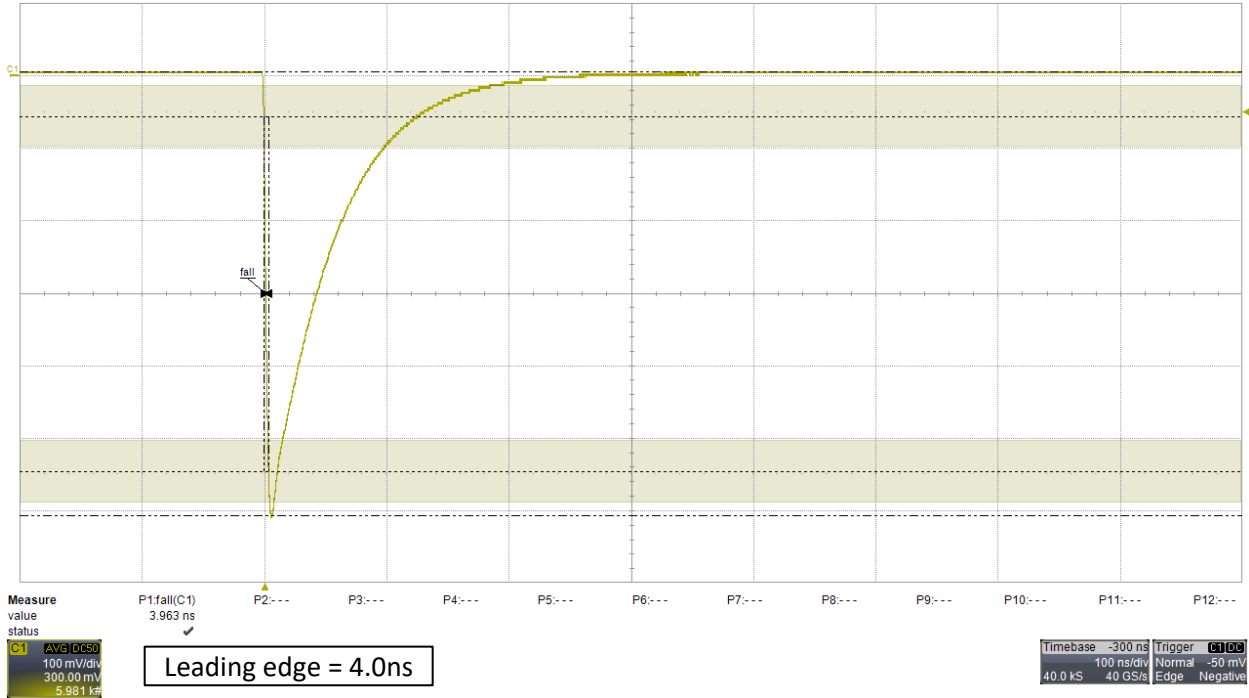
Specifications

| | |
|---------------------------|--|
| Amplifier Voltage | $\pm VA = \pm 2.5V \rightarrow \pm 5.5V$ DC |
| Current | $\pm 100mA$ at $\pm 5.0V$ (I_q , no load) |
| Current limit | 200mA resettable fuses $\pm 5.6V$ Zener diode clamp Reverse voltage protection |
| Bias Voltage | +29V typical (refer to SiPM data) |
| Voltage clamp | 47V Zener diode 500mW maximum |
| Signal Amplifiers | |
| Gain | 500 Ω transimpedance gain |
| Output polarity | negative |
| Coupling | DC |
| Output impedance | 50 Ω |
| Output current | 100mA maximum |
| Output voltage range | $\pm 3.4V$ maximum ($\pm 1.7V$ into 50 Ω) with $VA = \pm 5.0V$ |
| Signal Sum | |
| Gain adjustment | $x0 \rightarrow x2$, referred to one output channel 25-turn potentiometer |
| Input offset adjustment | $\pm 250mV$ at sum gain = 1 25-turn potentiometer |
| Output polarity | Positive or negative, jumper selectable |
| Coupling | AC or DC, jumper selectable |
| AC coupling time constant | 2.1 μs , $\pm 5\%$ |
| Output impedance | 50 Ω |
| Output current | 100mA maximum |
| Output voltage range | $\pm 3.4V$ maximum ($\pm 1.7V$ into 50 Ω) with $VA = \pm 5.0V$ |
| Temperature Sensor | |
| Output voltage | 500mV + 10mV per $^{\circ}C$ |
| Accuracy | $\pm 0.5^{\circ}C$ |
| Output current | 10mA |
| Output impedance | 50 Ω |
| Connectors | |
| POWER | 16-pin shrouded vertical header, 0.100" pin pitch |
| Signal | MCX, SMA, SMB, LEMO options |

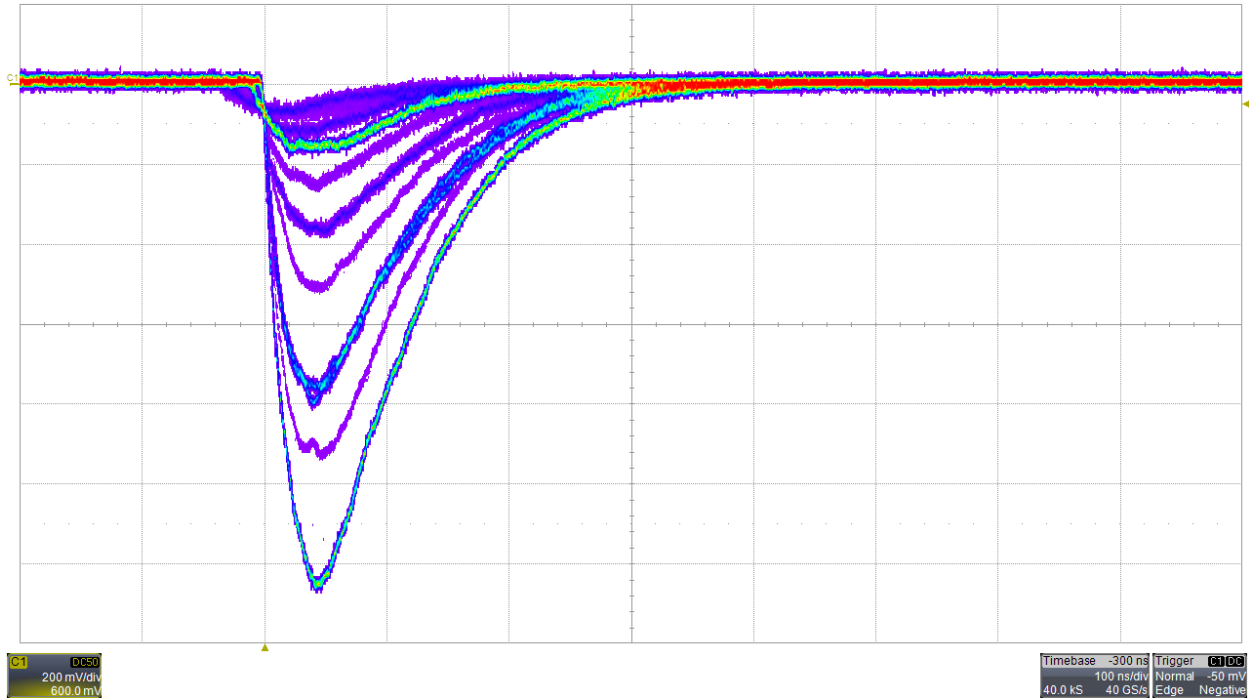
Typical Signals

Array = ArrayJ-60035-4P-PCB

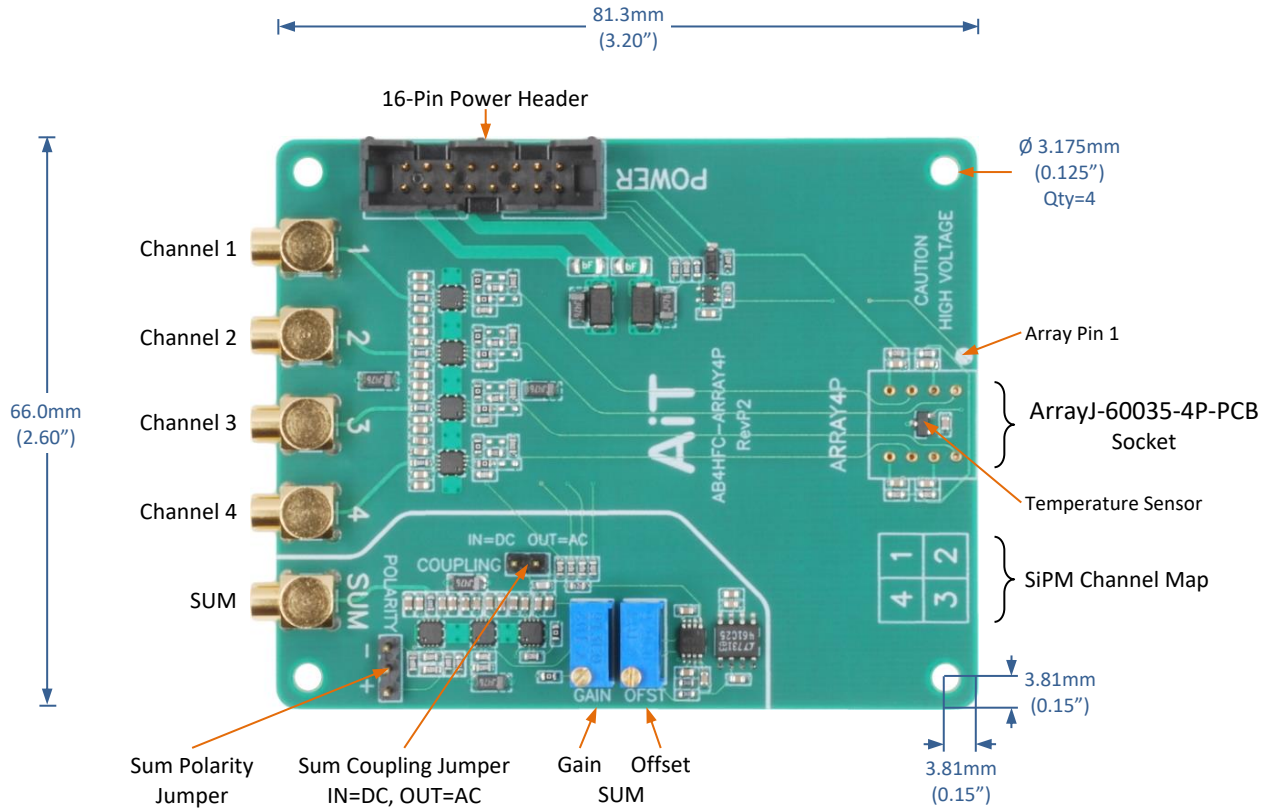
Source = Laser; Channel 3; Bias = +27V; averaged signal



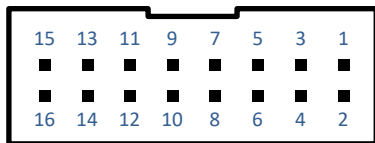
Source = LYSO Emission; Channel 3; Bias = +27V; persistence display



Mechanical



POWER Connector



| Pin | Function | Pin | Function |
|-----|-------------|-----|----------|
| 1 | +VA | 2 | +VA |
| 3 | Ground | 4 | Ground |
| 5 | -VA | 6 | -VA |
| 7 | Ground | 8 | Ground |
| 9 | +VA Monitor | 10 | Ground |
| 11 | -VA Monitor | 12 | Ground |
| 13 | Temperature | 14 | Ground |
| 15 | Bias | 16 | Ground |

Operation

Typical Setup Procedure

1. Always handle the amplifier board with bias voltage off and amplifier voltage off
2. Configure the sum coupling jumper and sum polarity jumper
DC coupling is recommended for most applications
3. Connect an oscilloscope to the SUM output and one or more SiPM output signals
4. Apply the amplifier voltage and bias voltage
 - a. Adjust the bias voltage until SiPM signals are present
 - b. SiPM signal polarity is negative

Sum Coupling Jumper

DC coupling is selected when the jumper is installed. AC coupling is selected when the jumper is removed. DC coupling is recommended for most applications.

Sum Polarity Jumper

Placing the jumper in the “- / center” (negative) position will select negative output signal polarity. Placing the jumper in the “+ / center” (positive) position will select positive output signal polarity.

System Assembly Guidelines

High Voltage

This device must be used only by personnel trained and qualified in safe handling, installation, and operation of high voltage equipment. Any optional enclosure provided does not protect against high voltage exposure.

During operation, high voltage will normally be present in the following components:

- Amplifier board, especially the POWER connector
- SiPM array connector

Caution: This device does not limit bias current. Take precautions to limit bias current to prevent equipment damage and personnel injury.

Installation

This device is intended for benchtop usage or incorporated into another system or product. The circuit board may be installed using standard #4 or M3 hardware. Allow for adequate ventilation space around the board.

Safety Information



WARNING – High Voltage

- High voltage may be present during operation
- High voltage stored on capacitors may be present after power is removed
- Improper handling may result in personnel injury or equipment damage

This high-voltage device must be used only by personnel trained and qualified in safe handling, installation, and operation of high-voltage equipment.



CAUTION – Electrostatic Discharge (ESD) Sensitivity

The circuit board can be damaged by electrostatic discharge. Observe precautions for handling electrostatic sensitive devices. Handle only at static-safe workstations.

High-Gain Photodetectors

High-gain photodetectors such as silicon photomultipliers may conduct damaging currents if exposed to high optical signal levels while the bias voltage is applied, or if the bias voltage exceeds the recommended operating range. These devices must be operated only in low-light conditions, and only within the manufacturer's recommended bias voltage range.

Handling and Disassembly

This product may be provided with a protective enclosure. Disassembled enclosure components and circuit boards may contain sharp edges. Take appropriate safety precautions while assembling or disassembling the enclosure and handling disassembled components.

Indoor Use Only

Do not operate this product in a wet or damp environment. Do not operate in an explosive atmosphere.

Use of this product, and AiT Instruments' liability related to use of this product, is further governed by AiT Instruments' standard terms and conditions of sale, which were provided upon purchase of this product.