

Features

Connects to one Hamamatsu S13361-6XXXNE 6mm 2x2 MPPC array with connector

“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

Sum of four SiPM signals

Gain adjustment potentiometer

Offset adjustment potentiometer

DC or AC coupling 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-Gxxx

AB4HFC: C = connector type

M = MCX

A = SMA

B = SMB

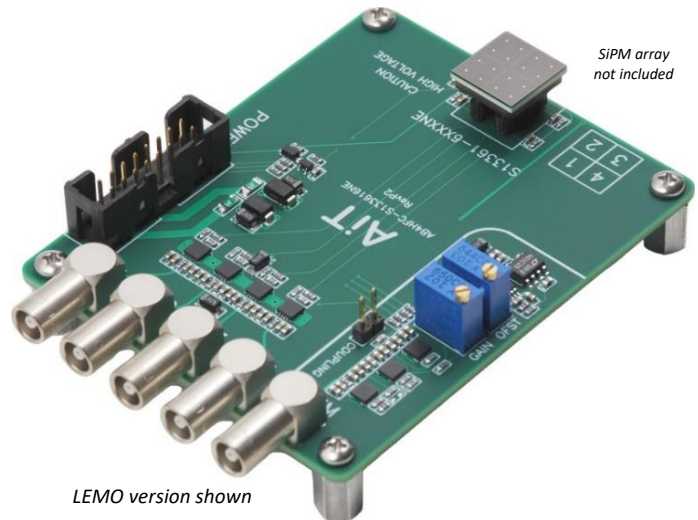
L = LEMO EPL.00.250.NTN

Gxxx: Transimpedance gain in ohms

500Ω standard if omitted

Example: AB4HFL

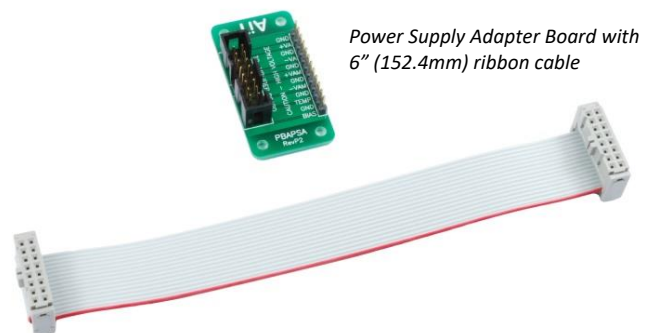
LEMO connectors, 500Ω gain



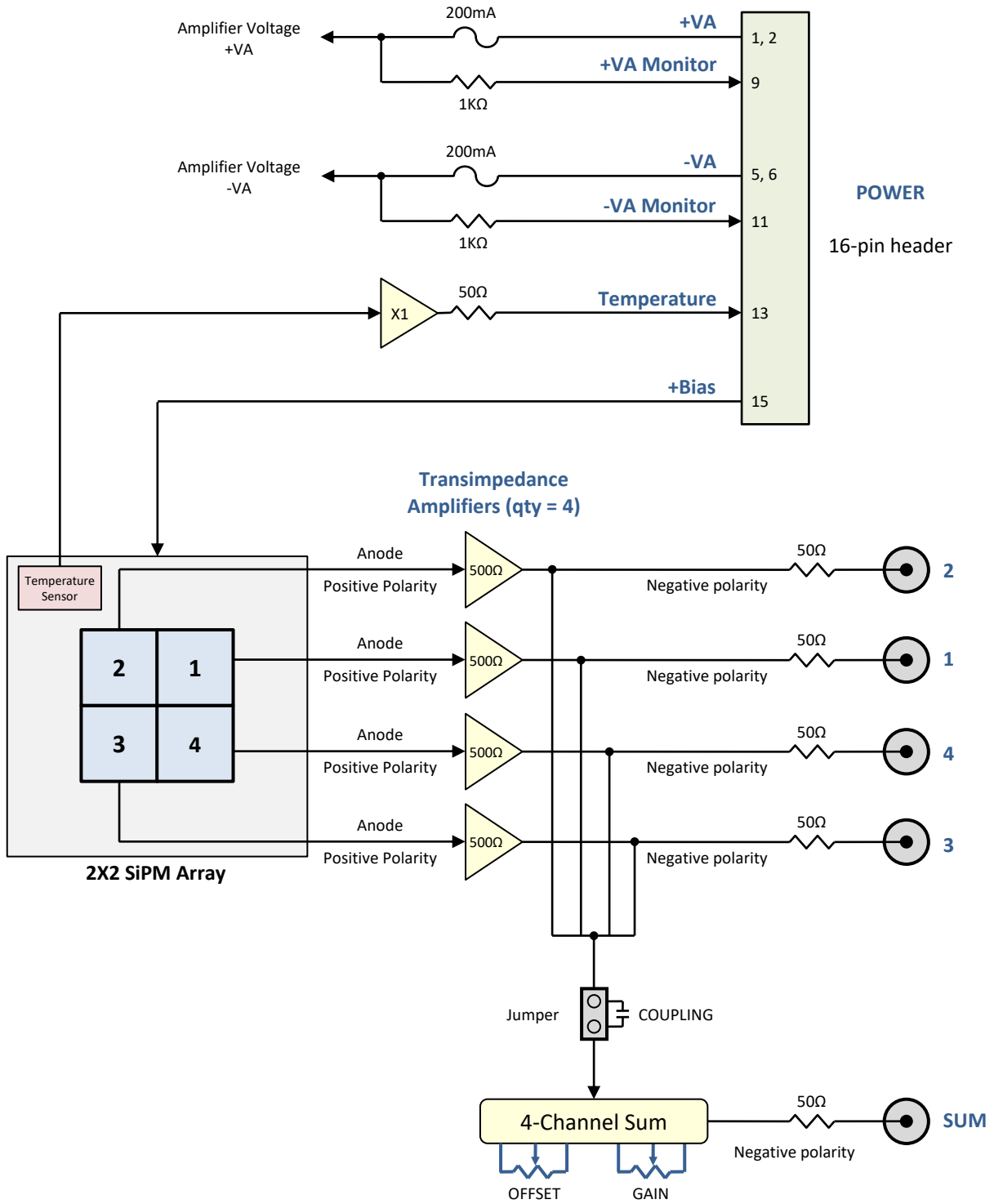
LEMO version shown

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	0.2A resettable fuses
Voltage clamp	$\pm 5.6V$ Zener diode
Bias Voltage	+56V typical (refer to SiPM data)
Voltage clamp	68V Zener diode 375mW maximum
Signal Amplifiers	
Gain	500 Ω transimpedance gain
Input polarity	positive
Output polarity	negative
Output voltage saturation	-3.8V (-1.9V into 50 Ω)
Output current	100mA maximum
Output impedance	50 Ω
Signal Sum	
Output polarity	negative
Gain adjustment	x0 \rightarrow x4, referred to one output channel 25-turn potentiometer
Input offset adjustment	$\pm 250mV$ at sum gain = 1 (into 50 Ω) 25-turn potentiometer Sum gain adjusted to match one output channel
Coupling	AC or DC, jumper selectable AC coupling time constant = 2.1 μs , $\pm 5\%$
Output voltage saturation	-3.8V (-1.9V into 50 Ω)
Output current	100mA maximum
Output impedance	50 Ω
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

Operation

Typical Setup Procedure

1. Always handle the amplifier board with bias voltage off and amplifier voltage off
2. Configure the sum coupling 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 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 high-rate signals. AC coupling is recommended for low-rate signals.

High Voltage

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

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

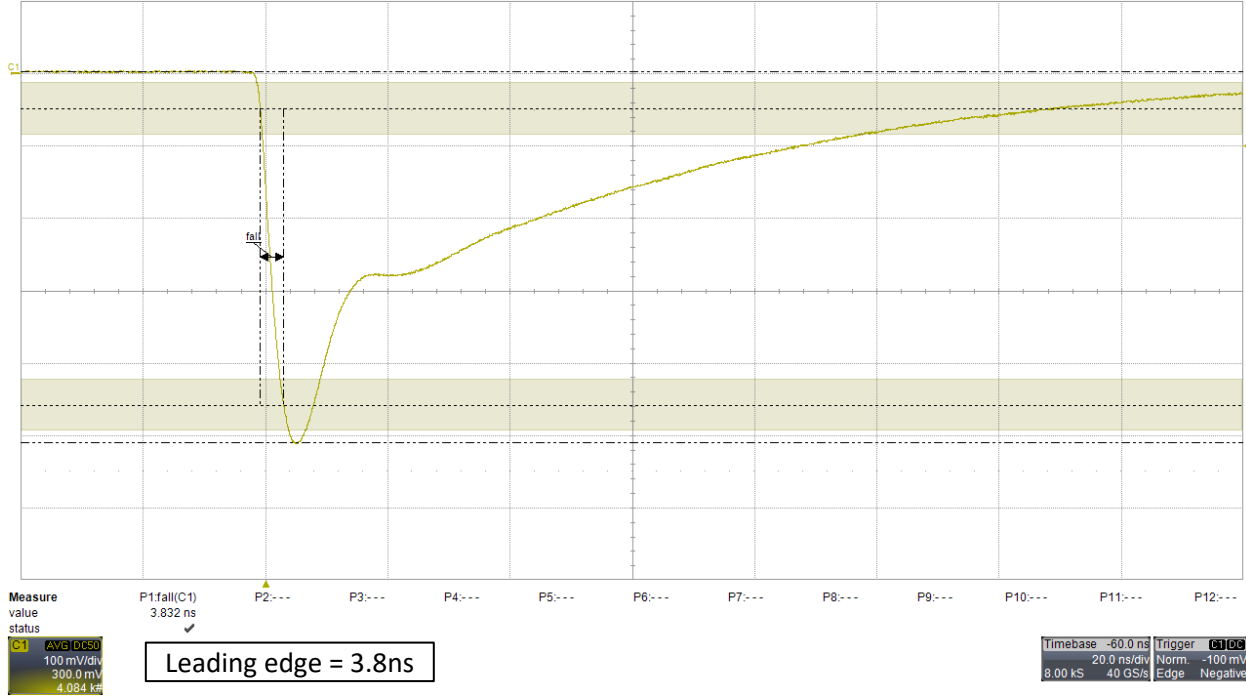
Installation

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.

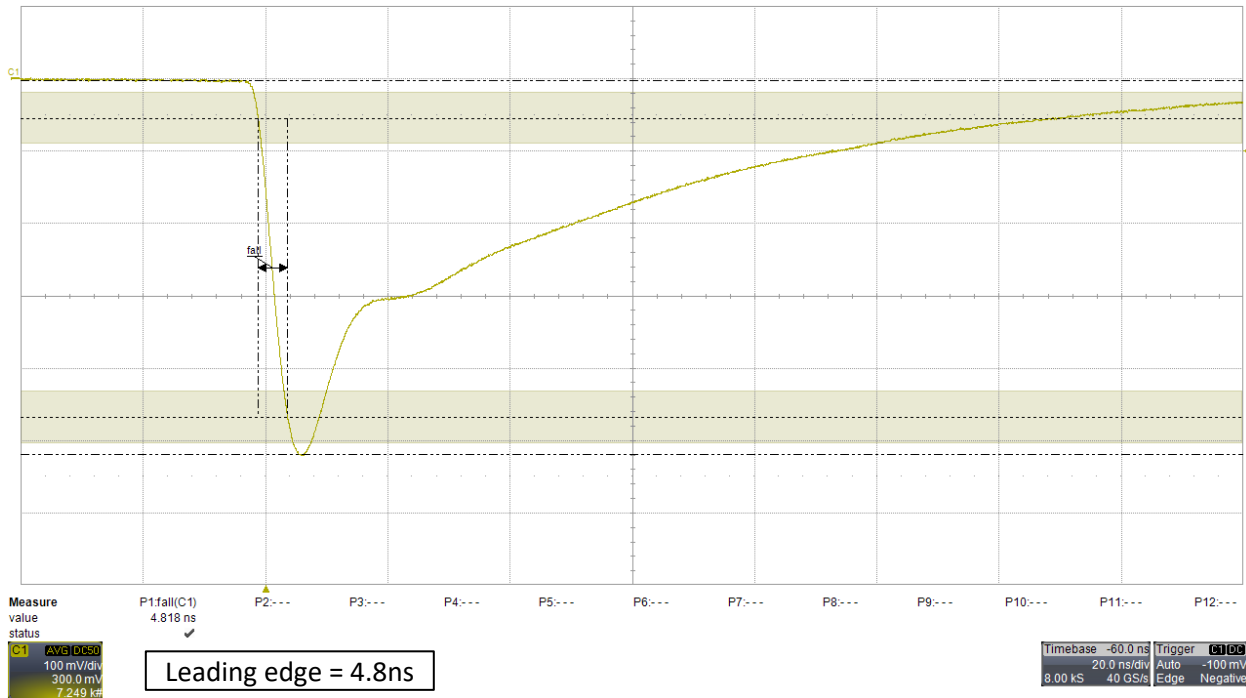
Typical Signals

Array = S13361-6391, Source = Laser

Single channel output; Bias = +55V



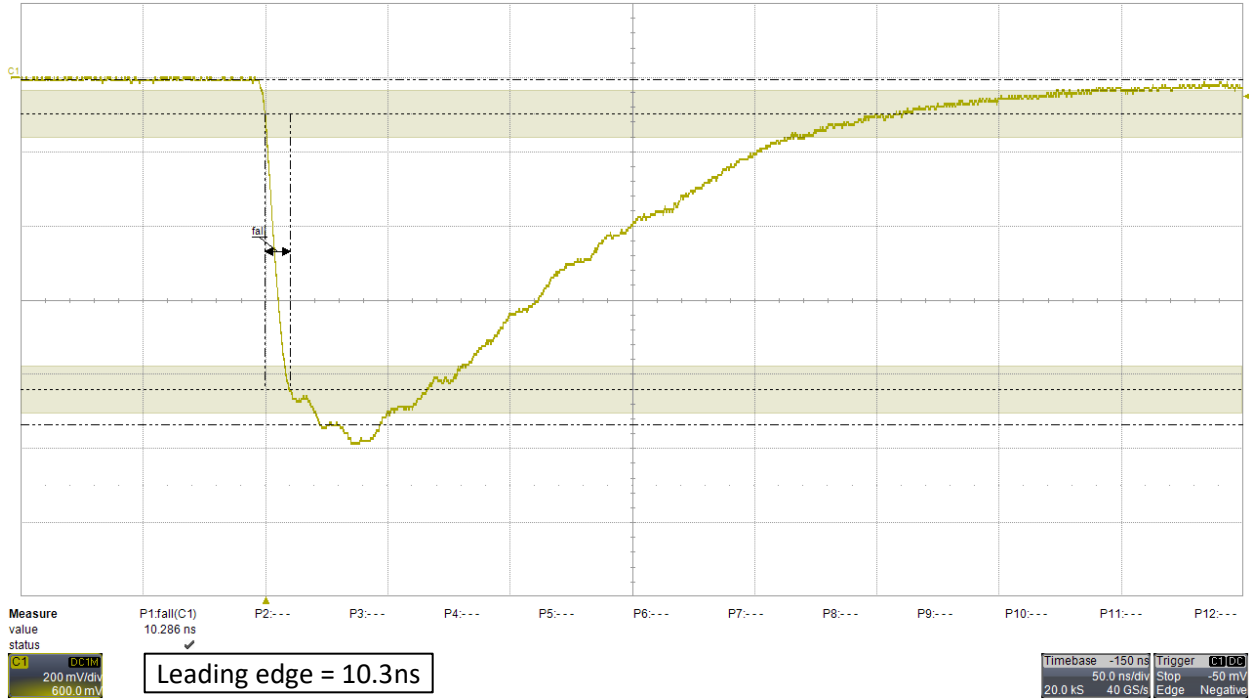
Sum output; Bias = +55V



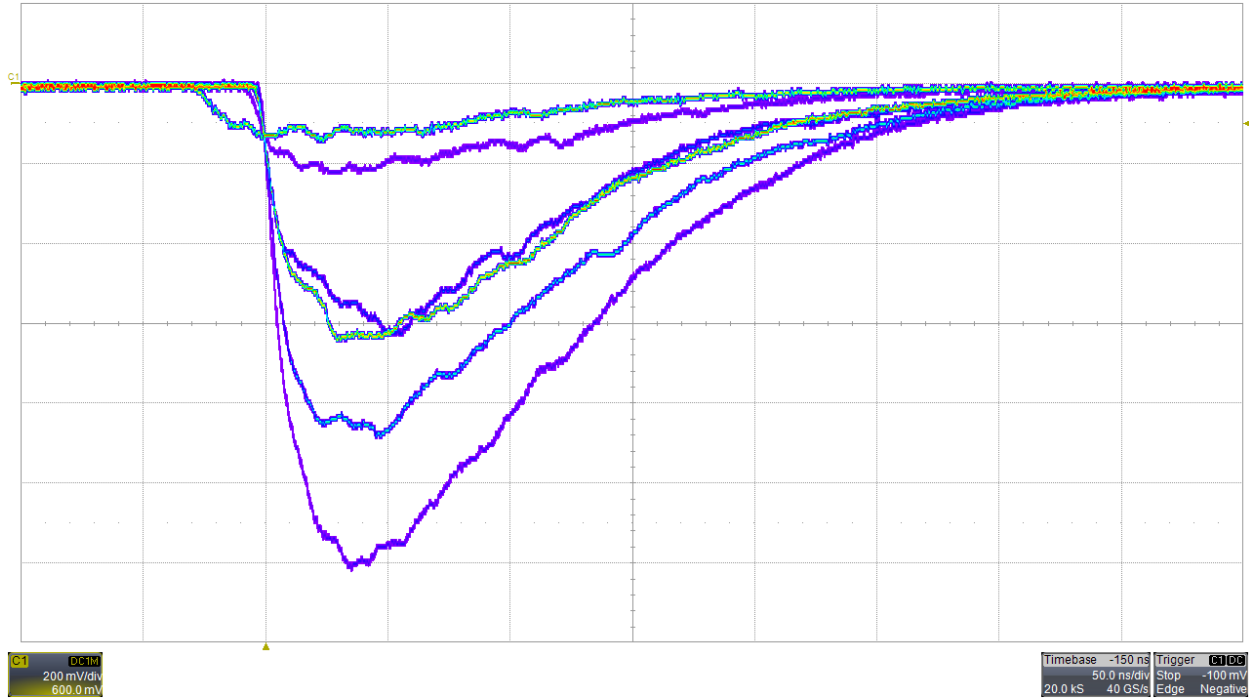
Typical Signals

Array = S13361-6391, Source = LYSO Emission

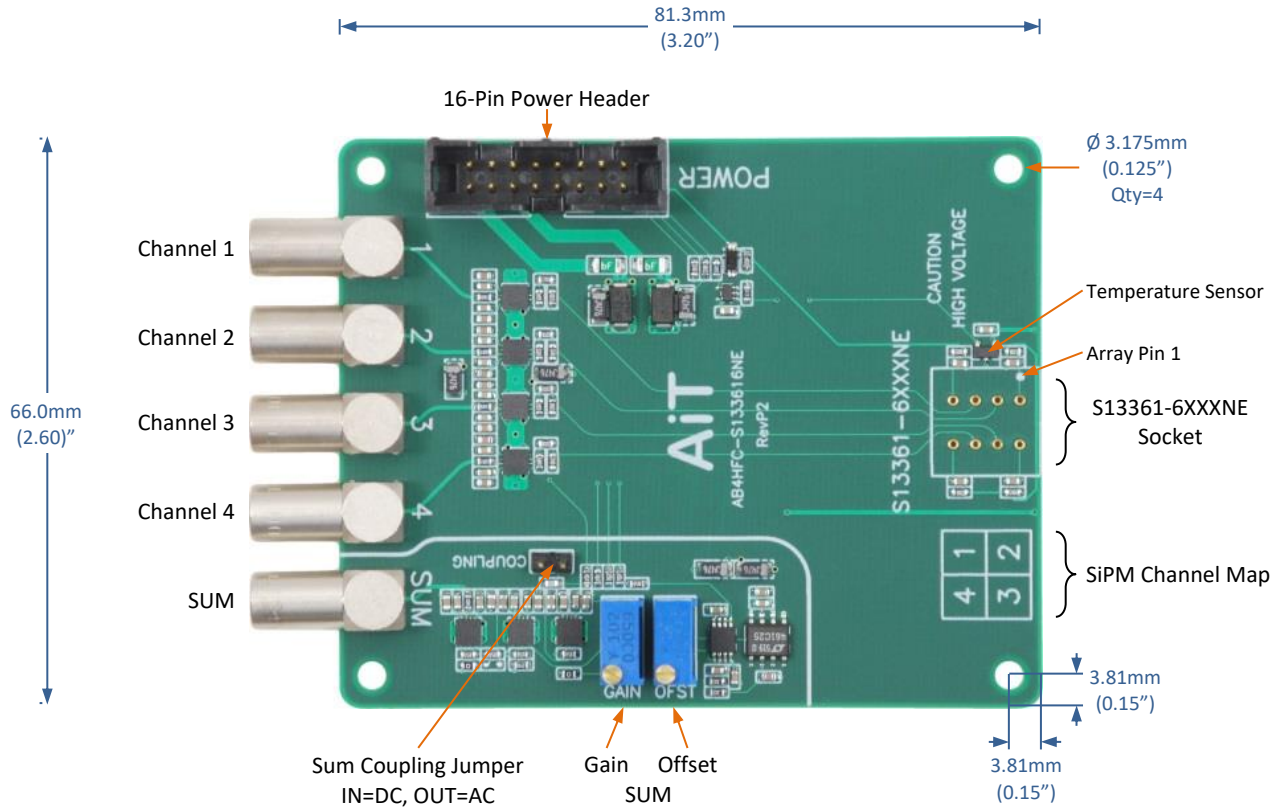
Single channel output; Bias = +55V; 50Ω termination; single pulse display



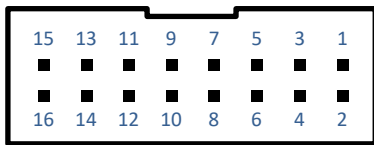
Single channel output; Bias = +55V; 50Ω termination; persistence display



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

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.