

Summary

Features

- Connects to one 16-channel SiPM base
- Wideband DC-coupled signal path
- Buffers 16 SiPM signals for use with an oscilloscope or ADC
- Sums 16 SiPM signals with gain and offset adjust, for use by a system trigger
- Requires external amplifier voltage and external bias voltage

Standard accessories

- 26-conductor micro-pitch cable assembly, 3ft. length
- 6 threaded standoffs with 6 #4-40 screws

SiPM signals

- 16 buffered SiPM signals
- 1 sum of 16 SiPM signals

Controls

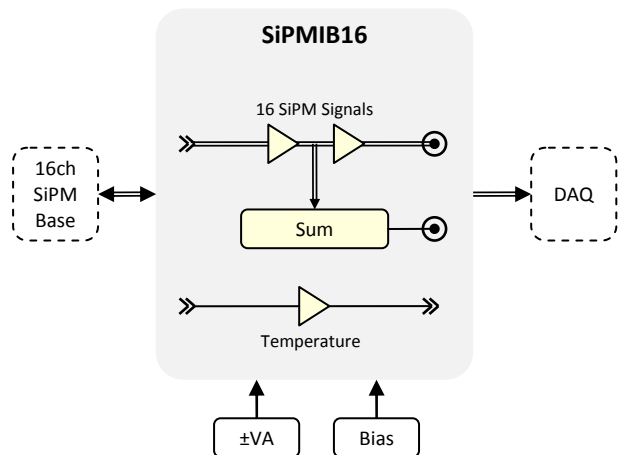
- Analog sum gain & offset; DC or AC coupling

Monitor signals

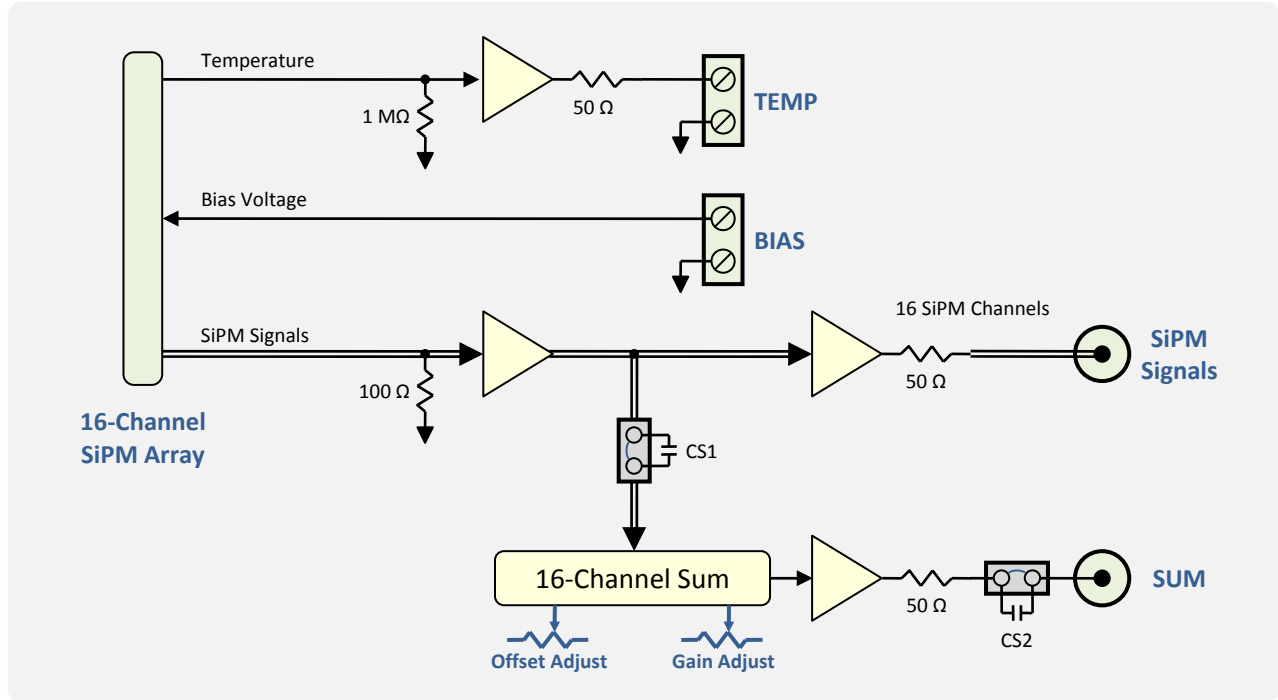
- SiPM Base temperature


Base signals

- 16 SiPM signals
- Bias voltage
- Amplifier power
- Base temperature

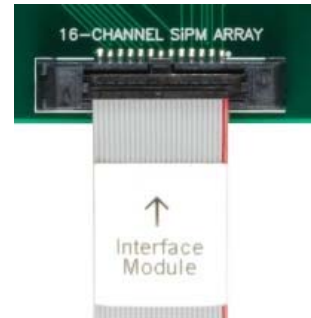
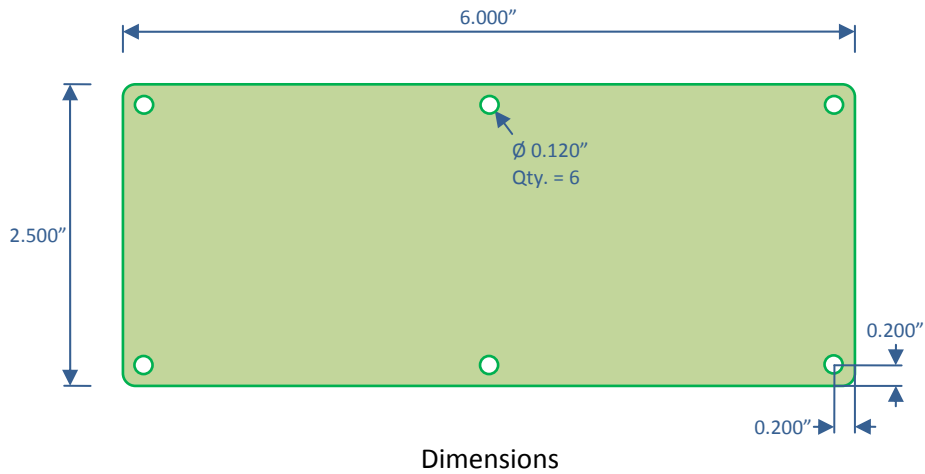


Architecture



 = Jumper

Mechanical

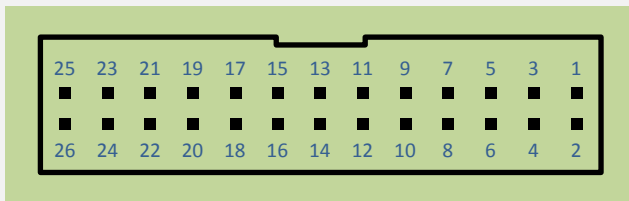


FFSD cable connection to latch-eject header

SiPM Array Connector

16-Channel SiPM Array

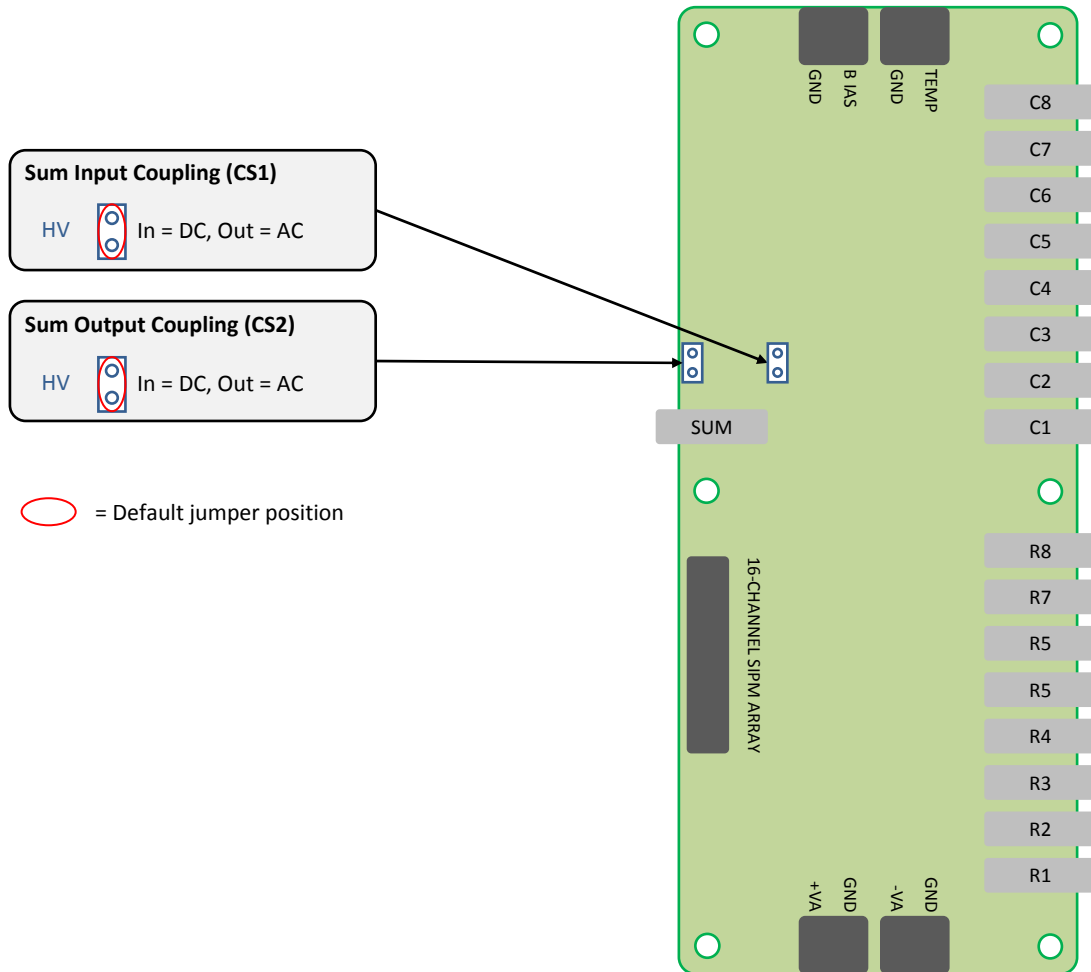
26-pin 0.050" latch-eject header



PCB Top View

Pin	Function	Pin	Function
1	R1	2	Temperature
3	R2	4	GND
5	R4	6	R3
7	R5	8	GND
9	R6	10	R7
11	R8	12	-VA
13	C1	14	GND
15	C2	16	+VA
17	C4	18	C3
19	C5	20	GND
21	C6	22	C7
23	C8	24	GND
25	Bias	26	GND

Jumpers, Connector Assignments



Operation

Typical Setup for Normal Operation

1. Connect the Base with the Interface Board power off
2. Optionally connect an oscilloscope to the SUM output and one or more SiPM signals
3. Power the Interface Board
4. With SiPM signals present, adjust the external SiPM bias voltage, *SUM Offset*, and *SUM Gain* as needed
 - a. Adjust external SiPM bias until SiPM signals appear, typically at 50 μ A-150 μ A bias current
 - b. Adjust the *SUM Offset* until the SUM signal baseline is zero
 - c. Adjust the *SUM Gain* to the desired level
 - d. After adjusting *SUM Gain*, adjust *SUM Offset* as needed
5. Changes in bias voltage may require offset adjustment
6. The SUM signal may be used to trigger an oscilloscope, discriminator, or data acquisition system
7. Two SUM coupling jumpers (CS1, CS2) are used to AC or DC couple the sum. DC coupling is selected when the jumper is installed. AC coupling is selected when the jumper is removed.
 - a. CS1 couples the input of the sum circuit. AC coupling allows use of the *SUM Offset* potentiometer
 - b. CS2 couples the output of the sum circuit. AC coupling disables the use of the *SUM Offset* potentiometer. The *SUM Offset* should be adjusted to prevent amplifier saturation. CS1 may also be used to AC couple the sum circuit input.

Input Power Requirements

- The interface board requires external amplifier voltage and bias voltage
- Normal amplifier voltage is $\pm 5.0V$ (provides $\pm 4.3V$ base amplifier voltage)
- Low-power amplifier voltage is $\pm 3.5V$ (provides $\pm 2.8V$ base amplifier voltage)
- Green LEDs labeled +VA and -VA indicate amplifier voltage
- Amplifier voltage inputs have reverse polarity protection, resettable fuses for short-circuit current protection, and over-voltage protection

Bias Voltage

- The bias voltage input is protected against voltages exceeding $\pm 78V$ by a Zener diode. Excessive bias voltages may damage the Zener diode.
- **WARNING:** This device does not limit bias current. Take precautions to limit bias current to prevent equipment damage and personnel injury.

Temperature Monitor

- The base temperature is buffered for external use

System Assembly Guidelines

SiPM Cable Assembly

The SiPM micro-pitch cable connector must be inserted firmly into the header. Correct orientation results in the cable exiting directly away from the Interface Board without interference, and the red index conductor is located on the right side of the connector as seen when facing the back of the unit.

High Voltage

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

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

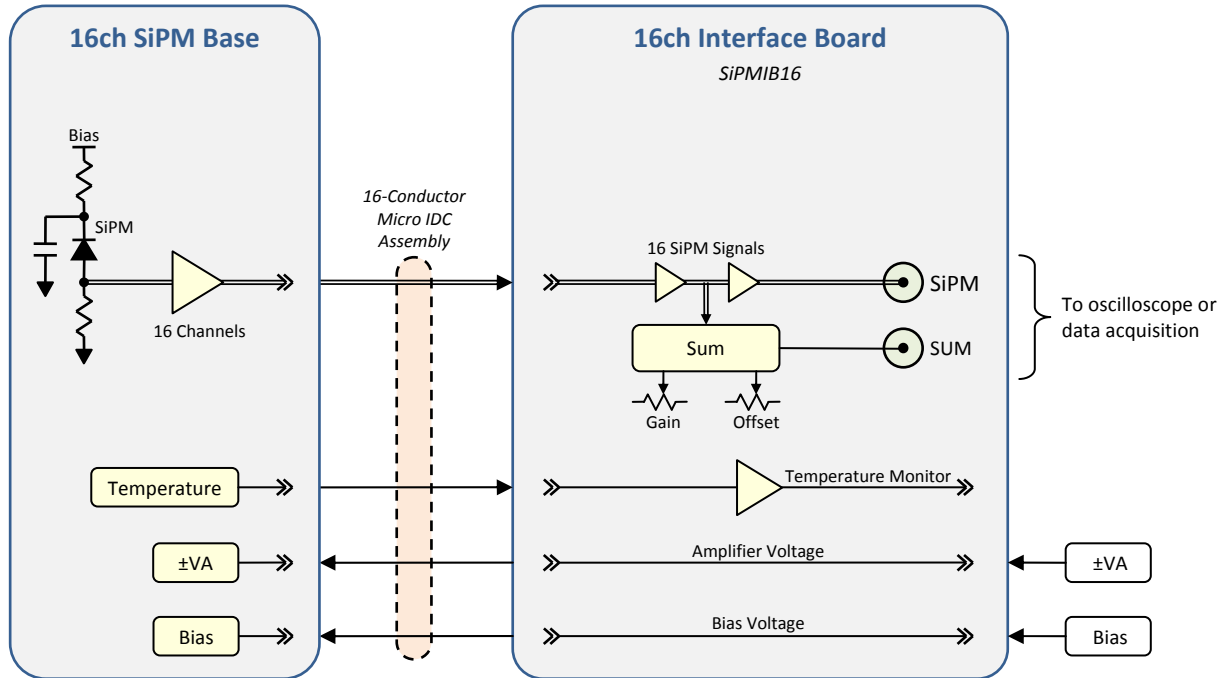
- Interface Board
- SiPM Port signal connector pins
- Exposed base of the SiPM Port signal connector
- SiPM signal cable
- SiPM Base

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

PCB Mounting

This device is intended to be incorporated into another system or product. The circuit board may be mounted using standard #4 hardware. Mounting hardware should not exceed 0.25" diameter contact area with the circuit board. Allow for adequate ventilation space around the circuit board.

16-Channel SiPM Evaluation System



Summary

A 16-channel SiPM array evaluation system consists of a 16-channel SiPM Base plus a SiPMIB16 (“IB16”) Interface Board. The 16-channel Base connects to the IB16 through a micro-pitch ribbon cable that permits versatile placement of the Base.

The IB16 buffers 16 SiPM signals and forms an analog sum of all SiPM signals. The SiPM signals and the sum are provided on 17 LEMO EP.00 coaxial receptacles for use with an oscilloscope or external data acquisition. The sum may be used to form a trigger.

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 or without 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/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.