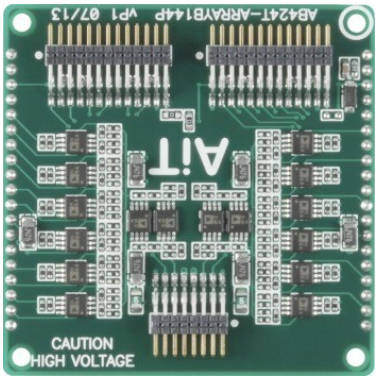
Summary

Features

- Supports the SensL ArrayC-30035-144P-PCB
  12x12 array of 3mm SiPMs
- 4-channel or 24-channel readout
  - Four position signals for event centroid calculations: X+, X-, Y+, Y-
  - 12 row signals and 12 column signals
- Patented diode-coupled readout,
  superior to traditional resistive readout
  - Improved spatial uniformity
  - Faster rise time
  - Reduced image noise
- < 20ns rise time
- DC-coupled signal path
- Low power consumption
- Precision temperature sensor
- SensL's dedicated fast output signals are not used

Mechanical

- Mounts within the perimeter of the SiPM array for 4-sided tileable installation
- 4 mounting holes supports #2 hardware
- 0.050" pitch signal connectors use low-profile micro IDC cable assemblies for versatile placement

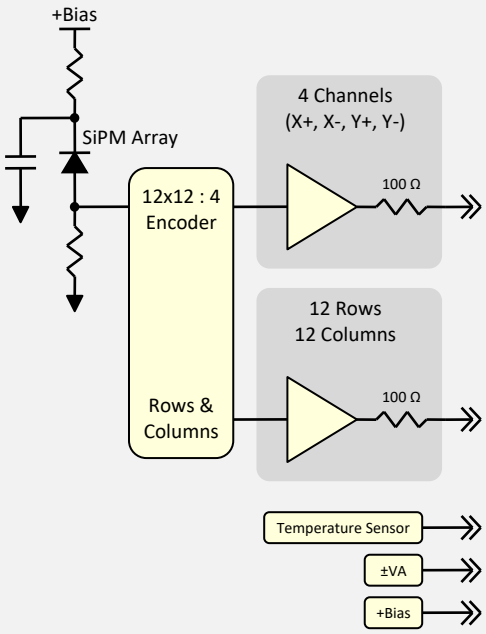


(Top View)

SiPM array not included

(Bottom View)

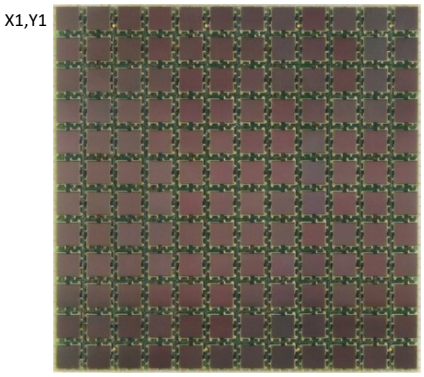
4+24 Channel 12x12 Base



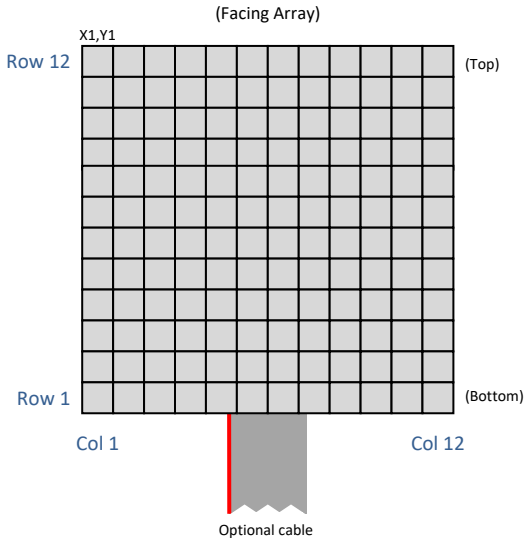
4-Channel Specifications

Position Signal Output	
Channels	4
Encoding	Charge division multiplexed to 4 output channels: X+, X-, Y+, Y-
Encoder gain	375Ω transimpedance gain (high-Z load)
Rise time	< 20 ns
Output voltage	0 → -1V (100Ω load)
Output impedance	100Ω
Output current	50mA max.
Temperature Sensor	
Output voltage	500mV + 10mV per °C
Output current	10mA
Output impedance	100Ω
Accuracy	±0.5°C
Bias Voltage	+27.6V typical (refer to manufacturer's data)
Over-voltage clamp	47V Zener diode
Amplifier Voltage (±VA)	±2.8V typ.; ±5V max.
Current	±50mA typ. (Iq, no signal, no load)
Signal Connector	Right angle 16-pin 2-row header 0.050" pin pitch
Mating assembly	Samtec FFSD-08-D-XX.XX-01-N (XX.XX = length in inches)

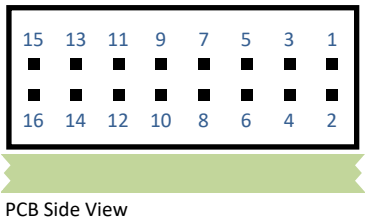
Array-144P



Array Channel Map



Signal Connector



Pin	Function	Pin	Function
1	Temperature	2	GND
3	X-	4	GND
5	X+	6	GND
7	-VA	8	GND
9	+VA	10	GND
11	Y-	12	GND
13	Y+	14	GND
15	+Bias	16	GND

24-Channel Specifications

Position Signal Output

Channels	24
Encoding	12 rows & 12 columns
Encoder gain	750Ω transimpedance gain (high-Z load)
Rise time	< 20 ns
Output voltage	0 → -1V (100Ω load)
Output impedance	100Ω
Output current	50mA max.

Temperature Sensor

Output voltage	500mV + 10mV per °C
Output current	10mA
Output impedance	100Ω
Accuracy	±0.5°C

Bias Voltage +27.6V typical (refer to manufacturer's data)

Over-voltage clamp	47V Zener diode
NOTE	Bias voltage must be applied to the ROWS connector. Bias voltage is disconnected from the COLUMNS connector.

Amplifier Voltage (±VA) ±2.8V typ.; ±5V max.

Current	±50mA typ. (Iq, no signal, no load)

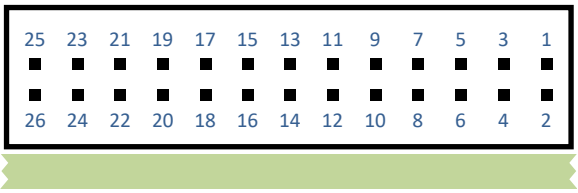
Signal Connectors (2) Right angle 26-pin 2-row header 0.050" pin pitch

Mating assembly	Samtec FFSD-13-D-XX.XX-01-N (XX.XX = length in inches)

CAUTION

Connect either the 4-channel connector or the ROWS & COLUMNS connectors, NOT BOTH. Applying bias voltage through the 4-channel connector and the ROWS connector at the same time may cause damage.

Signal Connectors (2)



PCB Side View

Rows Connector

Pin	Function	Pin	Function
1	Row 1	2	Temperature
3	Row 2	4	GND
5	Row 3	6	GND
7	Row 4	8	GND
9	Row 5	10	GND
11	Row 6	12	-VA
13	Row 7	14	GND
15	Row 8	16	+VA
17	Row 9	18	GND
19	Row 10	20	GND
21	Row 11	22	GND
23	Row 12	24	GND
25	+Bias	26	GND

Columns Connector

Pin	Function	Pin	Function
1	Column 1	2	Temperature
3	Column 2	4	GND
5	Column 3	6	GND
7	Column 4	8	GND
9	Column 5	10	GND
11	Column 6	12	N/C
13	Column 7	14	GND
15	Column 8	16	N/C
17	Column 9	18	GND
19	Column 10	20	GND
21	Column 11	22	GND
23	Column 12	24	GND
25	N/C	26	GND

4-Channel Position Encoder

Row & Column Encoder Weights

Row# or Col# (for X- or Y-)	Row# or Col# (for X+ or Y+)	Fraction (ideal)	Fraction (actual)	% Error	Notes
1	12	0.0833	0.0833	0.00 %	Sum of X- and X+ fractions or Y- and Y+ fractions = **1.0833** Independent of signal position
2	11	0.1667	0.1650	-1.02 %	
3	10	0.2500	0.2483	-0.68 %	
4	9	0.3333	0.3311	-0.66 %	
5	8	0.4167	0.4167	0.00 %	
6	7	0.5000	0.5000	0.00 %	
7	6	0.5833	0.5882	0.84 %	
8	5	0.6667	0.6637	-0.45 %	
9	4	0.7500	0.7500	0.00 %	
10	3	0.8333	0.8333	0.00 %	
11	2	0.9167	0.9091	-0.83 %	
12	1	1.0000	1.0000	0.00 %	

Note: Errors exclude component tolerances

Output Signals

X- = (SiPM signal) * (encoder gain) * (X- fraction)
X+ = (SiPM signal) * (encoder gain) * (X+ fraction)
Y- = (SiPM signal) * (encoder gain) * (Y- fraction)
Y+ = (SiPM signal) * (encoder gain) * (Y+ fraction)

Typical event position calculation:

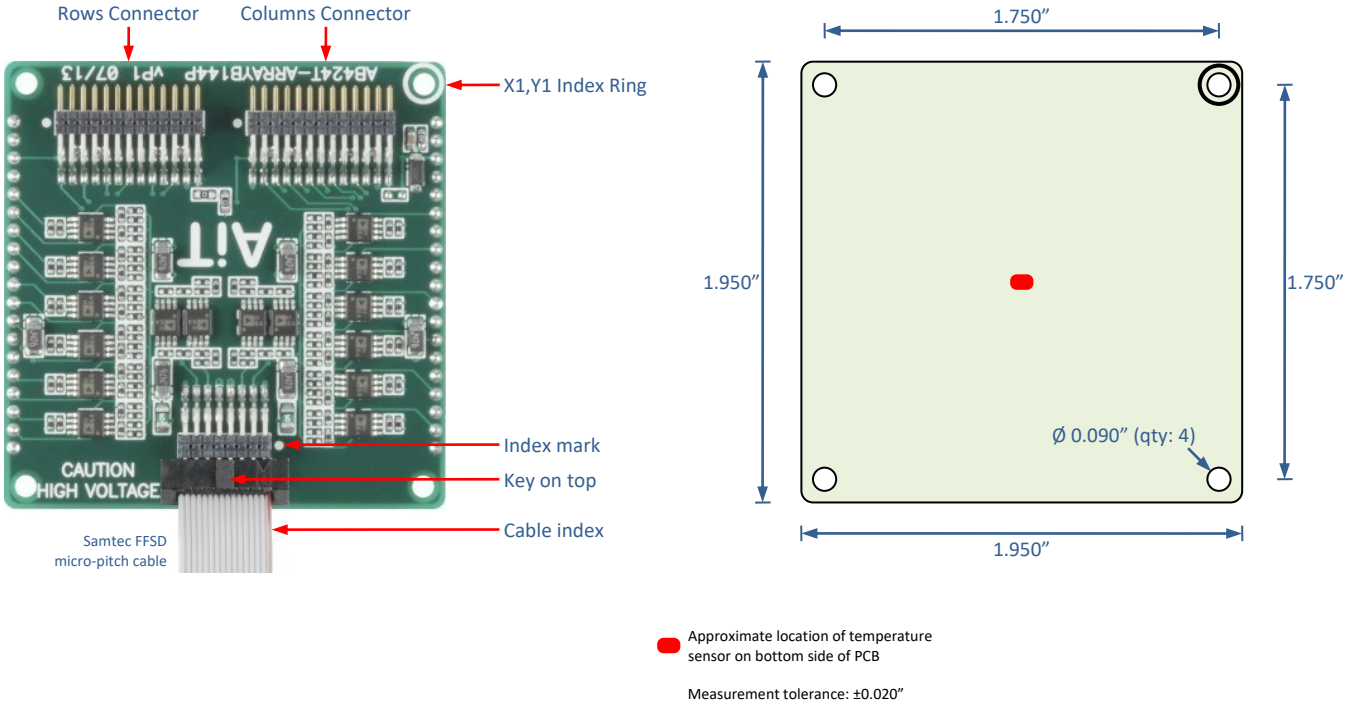
X column = (X+ - X-) / (X+ + X-)
Y row = (Y+ - Y-) / (Y+ + Y-)

Example

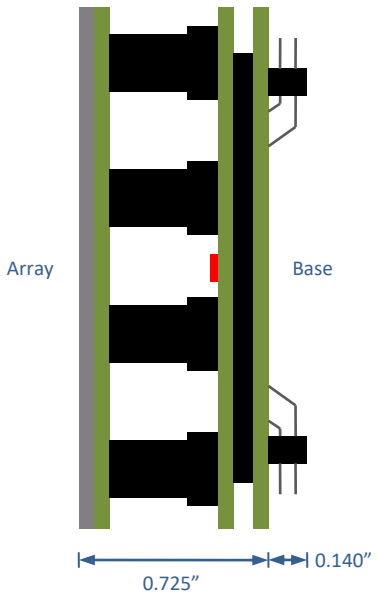
SiPM signal at column=4, row=3 (excluding encoder gain)			
X- = (Col4 signal) * 0.3311	**X+** = (Col4 signal) * 0.7500	**Y-** = (Row3 signal) * 0.2483	**Y+** = (Row3 signal) * 0.8333

Mechanical

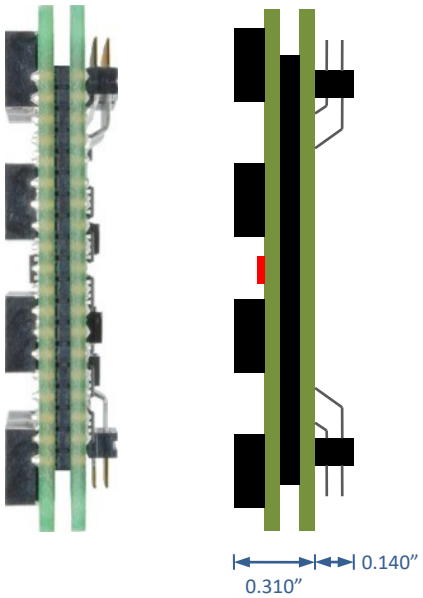
Top View



Side View, Base Attached to Array



Side View, Base Only



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.