Features

Supports two SensL ArrayJ-30035-64P-PCB 8x8 3mm SiPM arrays for a total of 16x8 SiPMs

Horizontal signal connectors located on the back, arrays located on the front

- 2-side tileable installation

Four encoded position signals for event centroid calculations: X+, X-, Y+, Y-

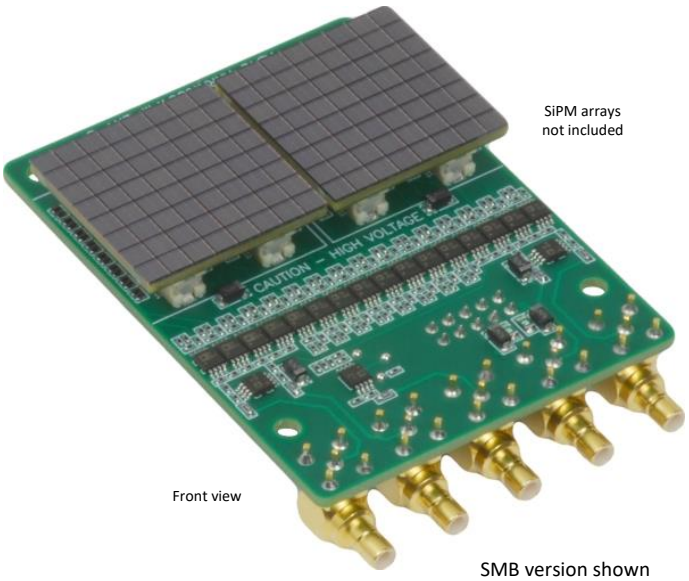
- DC-coupled signal path
- Low power consumption
- Sum output with adjustable gain

Patented diode-coupled charge division readout, superior to traditional resistive readout

- Improved spatial uniformity
- Faster rise time
- Reduced image noise

Precision temperature sensor

SensL's fast output signals are not connected



SMB version shown

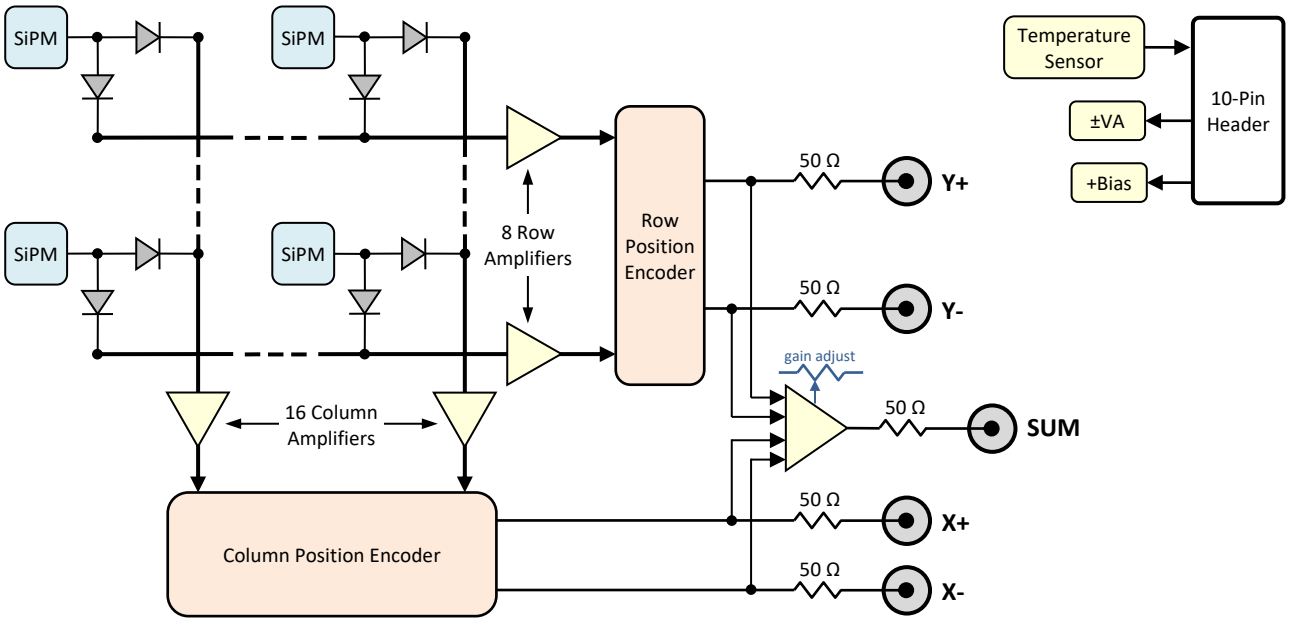
Part Number

AB4L-ARRAYJ364P-2X1-S-P/N-XXXX

-P/N: P = Positive output signal polarity
N = Negative output signal polarity

XXXX: MCX, SMA, SMB, LEMO

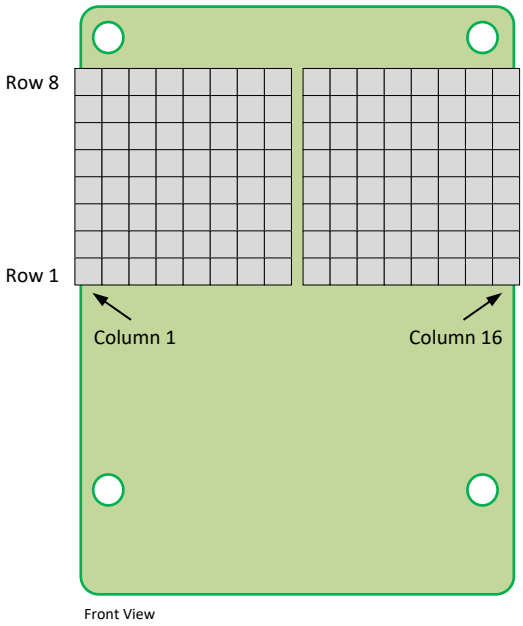
Example: AB4L-ARRAYJ364P-2X1-S-P-SMB
Positive output signal polarity, SMB connectors



Specifications

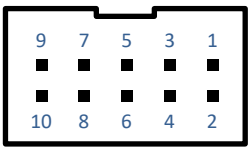
Position Signal Outputs	
Encoding	Charge division multiplexed to 4 output channels: X+, X-, Y+, Y-
Gain	750Ω transimpedance gain
Output voltage	0 → +1V into 50Ω load
Output impedance	50Ω
Output current	50mA maximum
Sum Signal Output	
Output voltage	0 → +1V into 50Ω load
Output impedance	50Ω
Output current	50mA maximum
Gain adjustment	x0 → x1.5 (position signal sum) 25-turn potentiometer
Temperature Sensor	
Output voltage	500mV + 10mV per °C
Output current	10mA
Output impedance	100Ω
Accuracy	±0.5°C
Bias Voltage	+29V typical (refer to SiPM data)
Voltage clamp	47V Zener diode 500mW maximum
Amplifier Voltage (±VA)	±2.8V → ±5V maximum
Current	±70mA typical (Iq, no signal, no load)
Signal Connectors	50Ω coaxial options: MCX, SMA, SMB, LEMO
Power Connector	Vertical 10-pin 2-row shrouded header, 0.1” pin pitch

Channel Map



Front View

Power Connector



Pin	Function	Pin	Function
1	+VA	2	Ground
3	-VA	4	Ground
5	Temperature	6	Ground
7	Ground	8	Ground
9	Bias	10	Ground

4-Channel Position Encoder

Column Encoder Weighs

Column# for X-	Column# for X+	Fraction ideal	Fraction actual	% Error	Notes
1	16	0.0625	0.0625	0.00 %	Sum of X- and X+ fractions = **1.0625** Independent of signal position
2	15	0.1250	0.1250	0.00 %	
3	14	0.1875	0.1861	-0.75 %	
4	13	0.2500	0.2483	-0.68 %	
5	12	0.3125	0.3158	1.06 %	
6	11	0.3750	0.3731	-0.51 %	
7	10	0.4375	0.4412	0.85 %	
8	9	0.5000	0.5000	0.00 %	
9	8	0.5625	0.5618	-0.12 %	
10	7	0.6250	0.6250	0.00 %	
11	6	0.6875	0.6818	-0.83 %	
12	5	0.7500	0.7500	0.00 %	
13	4	0.8125	0.8021	-1.28 %	
14	3	0.8750	0.8876	1.44 %	
15	2	0.9375	0.9375	0.00 %	
16	1	1.0000	1.0000	0.00 %	

Row Encoder Weights

Row# for Y-	Row# for Y+	Fraction ideal	Fraction actual	% Error	Notes
1	8	0.1250	0.1250	0.00 %	Sum of Y- and Y+ fractions = **1.1250** Independent of signal position Sum gain applies 1.068 weight (5% reduction) to match column encoder weights
2	7	0.2500	0.2483	-0.68 %	
3	6	0.3750	0.3731	-0.51 %	
4	5	0.5000	0.5000	0.00 %	
5	4	0.6250	0.6250	0.00 %	
6	3	0.7500	0.7500	0.00 %	
7	2	0.8750	0.8876	1.44 %	
8	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)

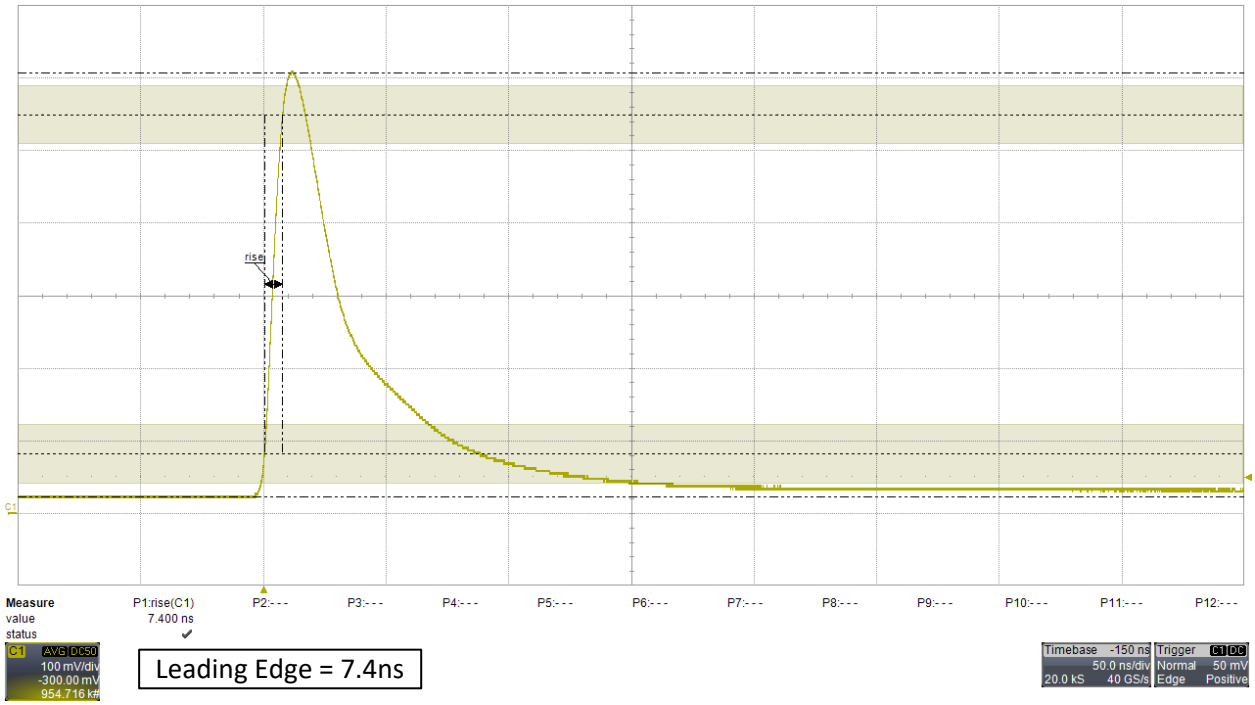
X- = (Column 4 signal) * 0.2483
X+ = (Column 4 signal) * 0.8021

Y- = (Row 3 signal) * 0.3731
Y+ = (Row 3 signal) * 0.7500

Typical Signals

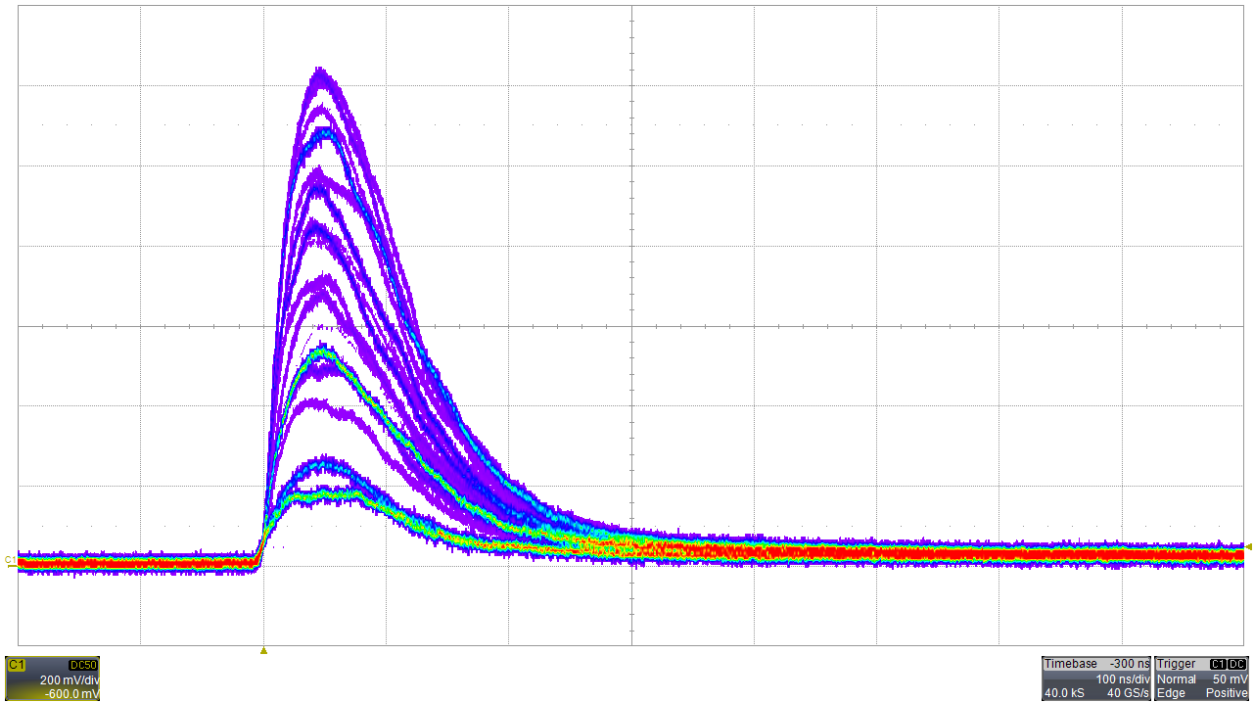
Signal = Sum; Bias = +29V

Source = Laser



Leading Edge = 7.4ns

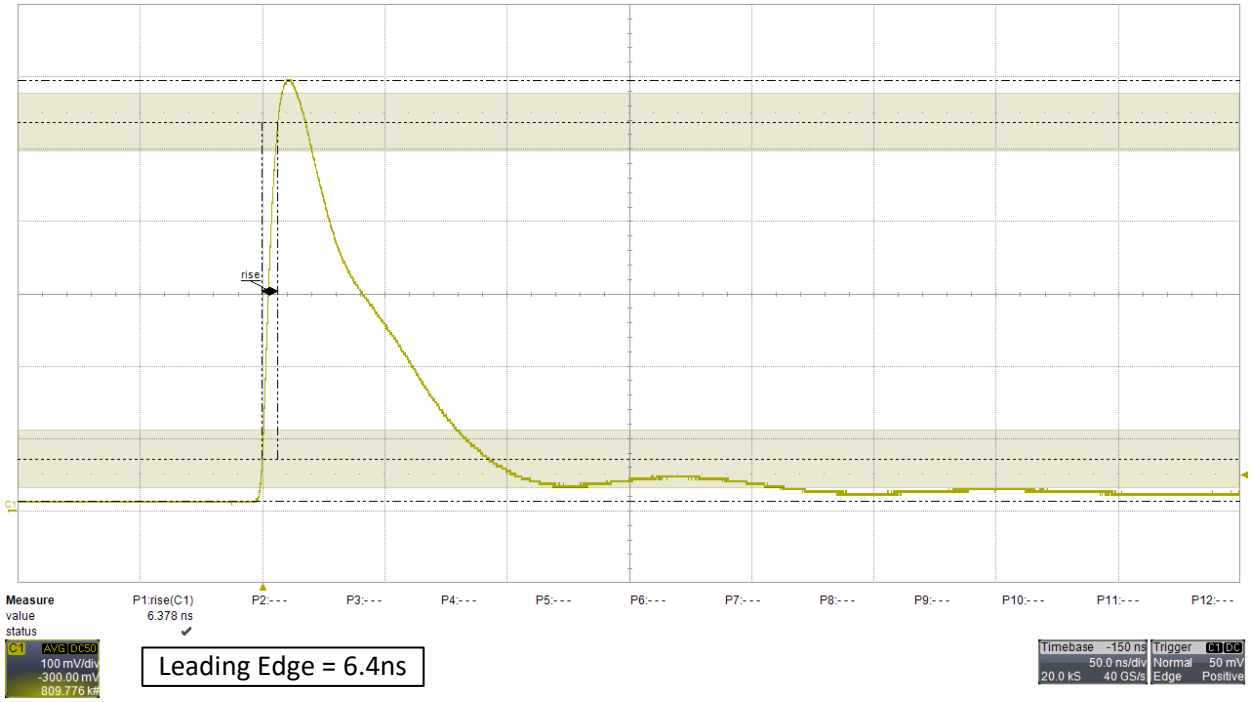
Source = LYSO emission; persistence display



Typical Signals

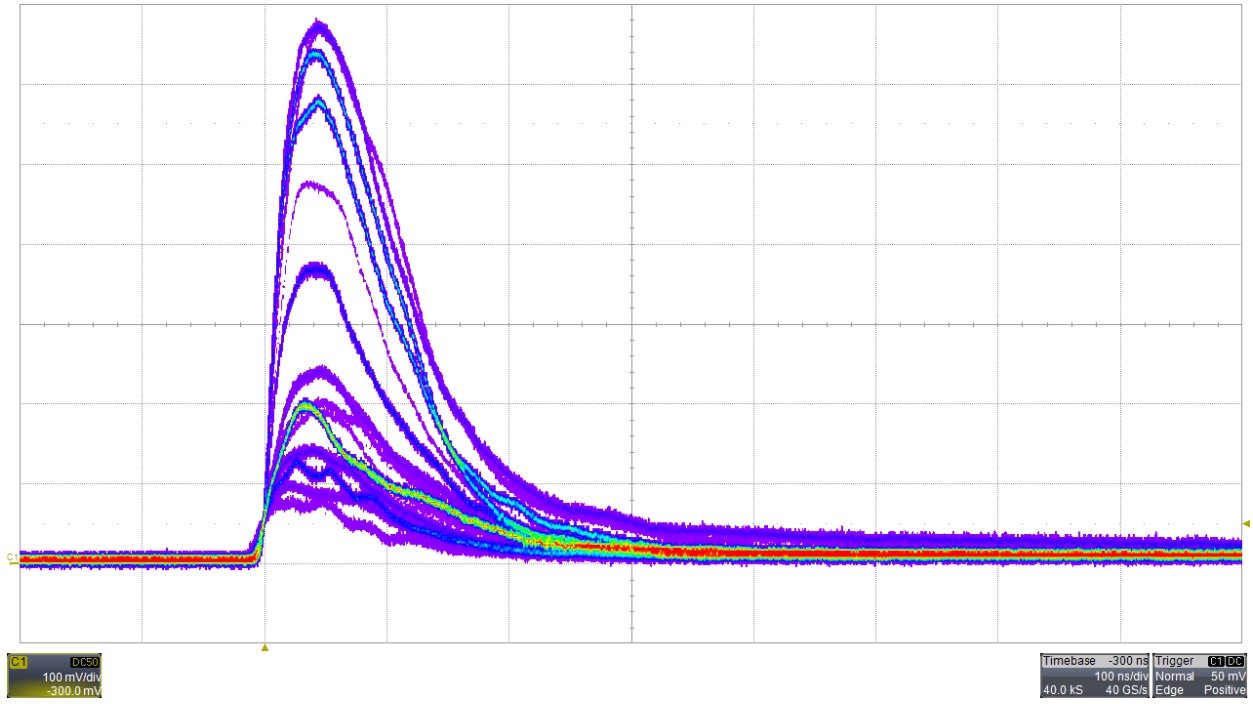
Signal = Y+ output; Bias = +29V

Source = Laser



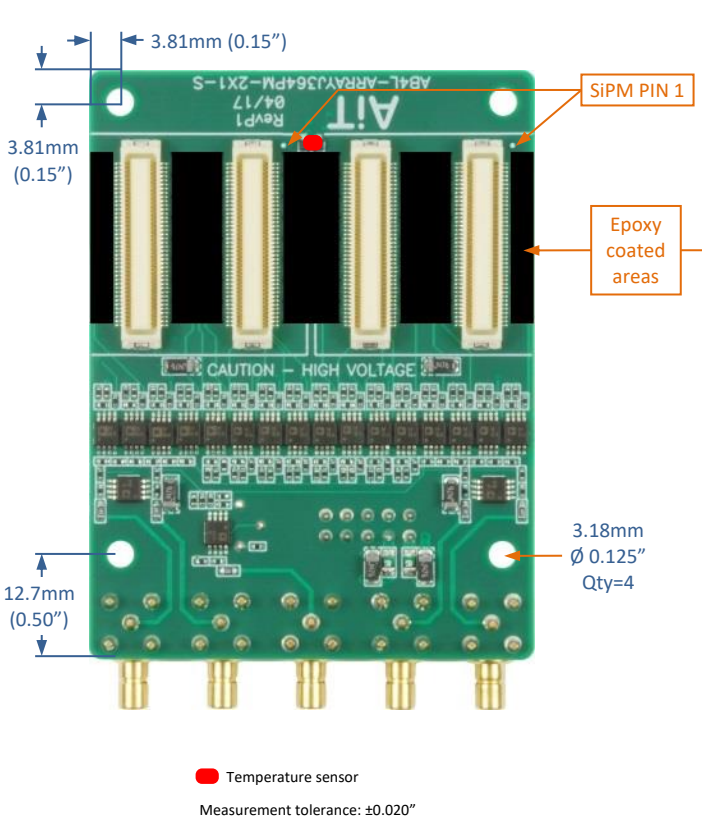
Leading Edge = 6.4ns

Source = LYSO emission; persistence display

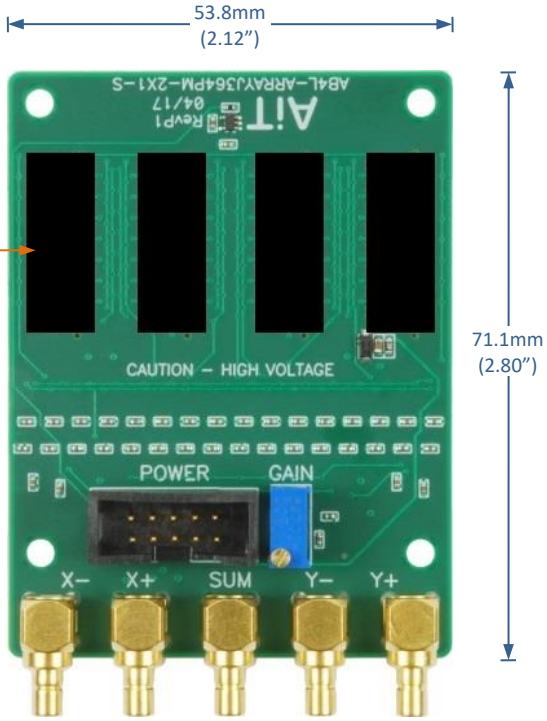


Mechanical

Front View

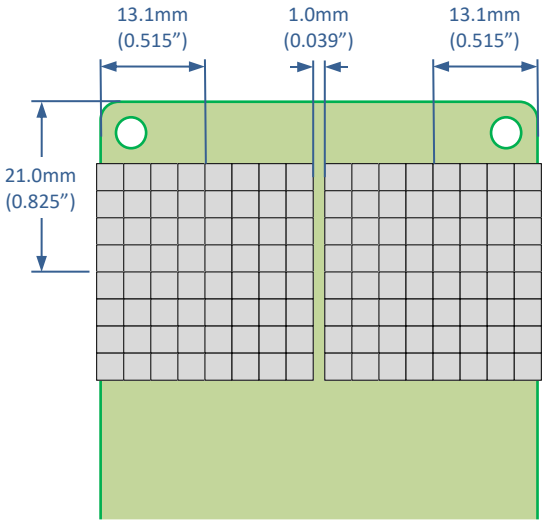


Back View



SMB version shown

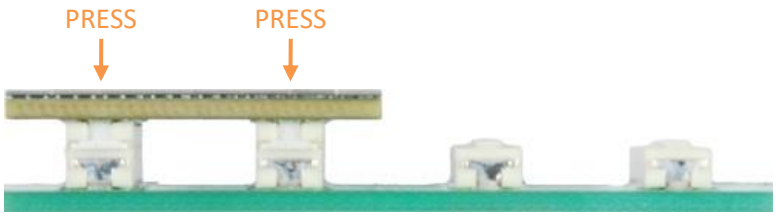
Array Locations



Array Installation Guide

STEP 1

Install the first array by carefully pressing on the array surface above the connectors until the array is firmly seated. An audible “click” will indicate that the connectors are seated.

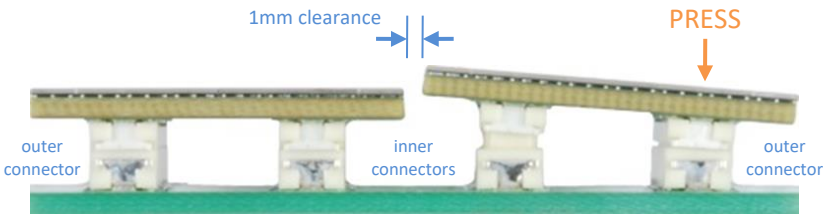


CAUTION: Do not contact the glass surface with any hard object. Any contact will damage the glass.

STEP 2

Attach the second array by carefully pressing above the outer connector until the connector is firmly seated.

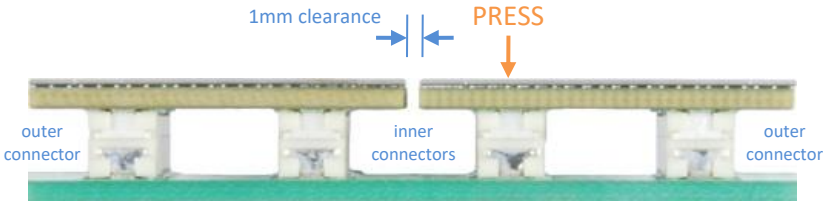
Do not press the inner connector first or the glass surfaces may touch and damage the glass.



CAUTION: Do not contact the edges of the arrays with each other. Any contact will damage the glass.

STEP 3

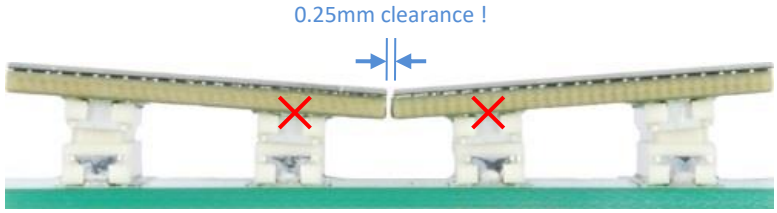
Firmly press above the inner connector until the second array is firmly seated.



Array Removal

To remove the arrays, reverse the installation procedure. Pull up the connectors labeled PRESS. Always pull up the inner connectors first.

WARNING
Never insert the inner connectors first, or remove the outer connectors first. In this case, the small clearance between arrays increases the chance of contacting the surfaces and damaging the glass.



Never insert inner connectors first
Never pull up outer connectors first

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.