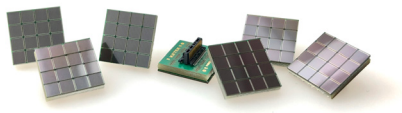
Data Sheet

AFBR-S4K33P1625B

4 × 4 SiPM Array, WB-Type, 3 × 3 mm^2 Channel Size



Description

The Broadcom® AFBR-S4K33P1625B is a silicon photomultiplier (SiPM) array.

The four-side seamlessly tileable 8 × 8 array has an 80% fill factor based on a 3.0 × 3.0 mm^2 pixel size and a pixel pitch of 3.36 mm. Low voltage and excellent uniformity enables tight integration into medical imaging, handhelds, and optical sorting.

Features

- 4 x 4 array, 3 × 3 mm^2 pixel size
- 3.36 mm pixel pitch
- Array fill factor 80%, four-side seamless tileable
- Replacement for PMTs, APDs, and PIN diodes
- Low voltage operation (typically about 30V)
- Excellent uniformity of V_{BD} with ± 125 mV

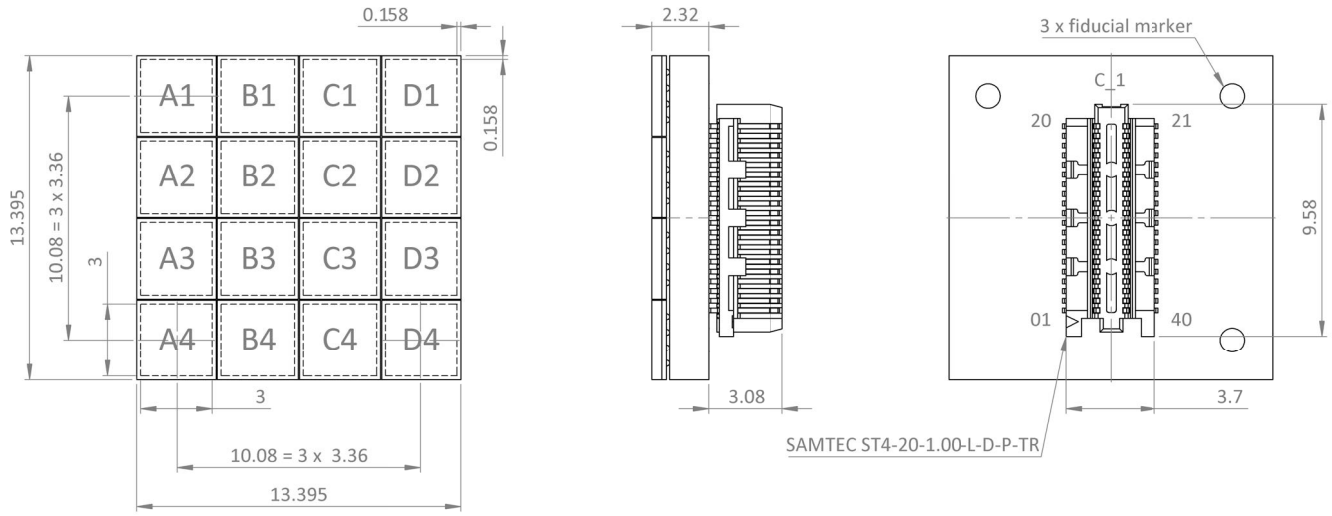
Applications

- Positron emission tomography
- Scintillator readout
- Medical imaging
- Gamma and compton cameras
- Handhelds
- High-energy physics and research
- Optical sorting
- Hazard and threat detection
- Analytical instrumentation

NOTE: All values in this data sheet are typical values if not marked with min., max., <, or >.

Mechanical Specifications

Figure 1: AFBR-S4K33P1625B Dimensions



NOTE: General tolerances are ± 0.1 mm unless otherwise noted.

General Parameters and Ordering Information

Type	Active Area of SiPM Pixel [mm^2]	Microcell Size of SiPM Pixel [µm]	SiPM Pixel Pitch in Array [mm]	Array Dimensions [mm^3]
AFBR-S4K33P1625B based on AFBR-S4K33C0125B SiPM[a]	3.0 × 3.0	25	3.36	13.395 × 13.395 × 5.4

a. Full SiPM specification can be found in the corresponding SiPM Datasheet of AFBR-S4K11C0125B at https://www.broadcom.com/products/optical-sensors/silicon-photomultiplier-sipm.

Main Characteristics

Parameter	Min.	Typ.	Max.	Units
Breakdown Voltage (V_{BD}) at 21°C	24	—	25	V
Breakdown Voltage Variation per Array	—	± 0.125	—	V
Recommended Overvoltage (V_{OV})	—	2.0 to 5.0	6.0	V
Temperature Dependency of V_{BD}	—	22.0	—	mV/K
Temperature Dependency of Gain	—	0.3% at 5.0 V_{OV}	—	1/K
Operating Temperature Range	–40	—	+60	°C
Reliability Classification	—	MSL1	—	
Index of Refraction of Glass Entrance Window		1.52 at 430 nm	—	
Surface Roughness of the Array	—	< 10	—	µm (sigma)

Typical Performance Characteristics

Figure 2: Photo Detection Efficiency at 5V Overvoltage

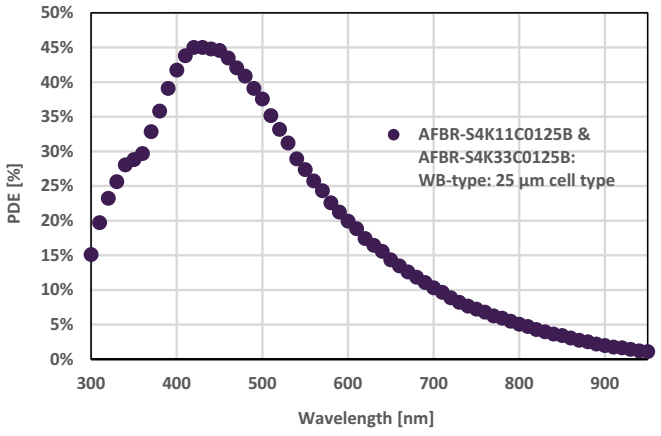
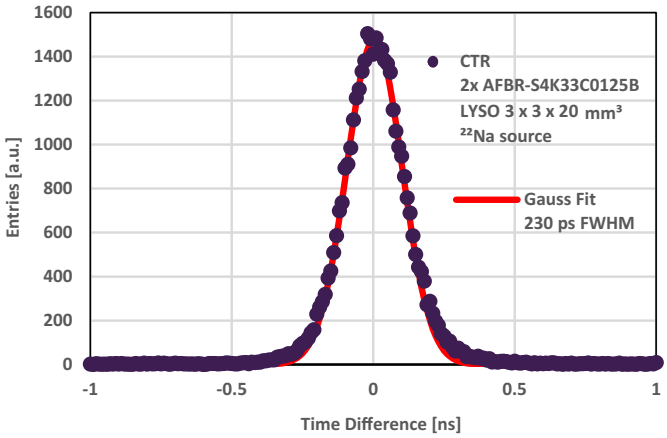


Figure 3: Confidence Time Resolution with LYSO 3 × 3 × 20 mm^3 at 5V Overvoltage



Pin Mapping

Connector C_1	
SAMTEC ST4-20-1.00-L-D-P-TR[a]	
Pin	**SiPM Pixel**
1	Cathode(C4)
2	Cathode(D4)
3	NC[b]
4	Anode(C4)
5	Anode(D4)
6	Anode(D3)
7	Anode(C3)
8	NC
9	Cathode(D3)
10	Cathode(C3)
11	Cathode(C2)
12	Cathode(D2)
13	NC
14	Anode(C2)
15	Anode(D2)
16	Anode(D1)
17	Anode(C1)
18	NC
19	Cathode(D1)
20	Cathode(C1)

Connector C_2	
SAMTEC ST4-20-1.00-L-D-P-TR[a]	
Pin	**SiPM Pixel**
21	Cathode(B1)
22	Cathode(A1)
23	NC
24	Anode(B1)
25	Anode(A1)
26	Anode(A2)
27	Anode(B2)
28	NC
29	Cathode(A2)
30	Cathode(B2)
31	Cathode(B3)
32	Cathode(A3)
33	NC
34	Anode(B3)
35	Anode(A3)
36	Anode(A4)
37	Anode(B4)
38	NC
39	Cathode(A4)
40	Cathode(B4)

a. SAMTEC ST4-20-1.00-L-D-P-TR mates with SAMTEC SS4-20-3.00-L-D-K-TR, mated stacking height 4 mm.

b. NC = Not Connected

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