

Product Selection Guide

PRODUCT BRIEF

SiPM Product Overview

Compared to other photosensor technologies, such as PIN diodes, APDs and PMTs, SiPMs offer a winning combination of properties. These include high gain, excellent PDE and fast timing along with the practical advantages associated with solid-state technology: compactness, ruggedness, low bias voltage and insensitivity to magnetic fields. This document is intended to help the user navigate SensL's catalog of sensors.

SensL is now recognized as a market leader for low-light sensing products as a result over 10 years of continuous product improvements, serving hundreds of customers. The SensL advantage lies in a number of fundamental factors that come together to result in a product and service that surpass the competition.

Silicon Type

SensL has three different silicon series, each of which combines high photon detection efficiency (PDE) with low dark count rate, but with other varying characteristics that are suited to specific applications. The different silicon series can be summarized as follows:

C-Series - High gain, low operating voltage, excellent temperature stability, a compact and highly robust MLP package, high output uniformity and with single photon sensitivity from UV to visible wavelengths.

The SensL SiPM Advantage:

- *Fast Output*
- *Best Uniformity*
- *Low Voltage*
- *Low Noise*
- *Reflow Compatible*
- *ISO 9001*
- *High Volume*
- *Robust Package*

J-Series - Blue sensitive, highest PDE, optimized for fast timing applications, high-fill factor package, low operating voltage and optimized for time of flight PET.

R-Series - Enhanced NIR sensitivity (10.5% PDE at 905nm), developed specifically for automotive LiDAR applications, enabling long-distance ranging with low-reflectivity targets.

Related Materials

- [Introduction to Silicon Photomultiplier \(SiPM\) Sensors](#)
- [How to Evaluate and Compare SensL Silicon Photomultiplier](#)
- [Biasing & Readout of SensL SiPM Sensors](#)

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The table below summarizes some of the main parameters for each silicon series, based on an individual microcell size.

The full datasheets for each silicon series are found on the website.

Series	Key Features	Sensor Size	Microcell Size	PDE	Vbr	Gain	Spectral Range	Afterpulsing	Crosstalk	Dark Count Rate
C-Series	<ul style="list-style-type: none"> Lowest noise High PDE Robust Package 	1 mm	10 μ m	@420 nm 18 %	24.5 V	2×10^5	200 - 900 nm	0.2 %	0.6 %	30 kHz/mm ²
		1 mm, 3 mm	20 μ m	31 %		1×10^6		0.2 %	3 %	
		1 mm, 3 mm, 6 mm	35 μ m	41 %		3×10^6		0.2 %	7 %	
J-Series	<ul style="list-style-type: none"> Highest PDE Timing Performance TSV Package 	3 mm	20 μ m	38 %	24.5 %	1.9×10^6	200 - 900 nm	0.75 %	2.5 %	50 kHz/mm ²
		3 mm, 4 mm, 6 mm	35 μ m	50 %	24.5 %	6.3×10^6		0.75 %	8 %	60 kHz/mm ²
R-Series	<ul style="list-style-type: none"> Red Sensitive High Responsivity Timing Performance 	1 mm	10 μ m	@905 nm 4.1 %	27.1 %	0.7×10^6	300 - 1050 nm	13 %	30 %	2.5 MHz/mm ²
			20 μ m	5.6 %	23.2 %	0.9×10^6		6 %	22 %	2.7 MHz/mm ²
			35 μ m	9.1 %	23.0 %	1.7×10^6		1 %	33 %	3.8 MHz/mm ²

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SiPM Sensors and Arrays

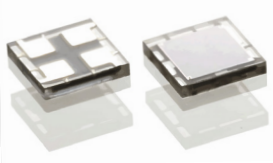
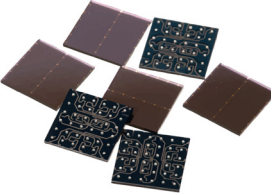
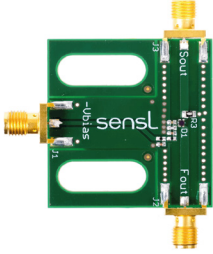
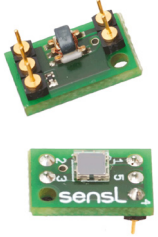
Silicon Series		Package	Fast Output?	1 mm				3 mm			6 mm	
				10	20	35	50	20	35	50	35	
C-Series	Single Channel	MLP	Y	•	•	•	•	•	•	•	•	
		SMA	Y	•	•	•	•	•	•	•	•	
		SMTPA	Y	•	•	•	•	•	•	•	•	
		X18	Y	•	•	•	•					
		X13	N			•			•		•	
	Multichannel	ArrayC	2 x 2	N								•
			4 x 4	Y						•		
			8 x 8	Y			•					•
12 x 12			Y						•			
J-Series	Single Channel	TSV	Y					•	•		•	
		SMA	Y					•	•		•	
		SMTPA	Y					•	•		•	
	Multichannel	ArrayJ	2 x 2	Y								•
			4 x 4	Y					•	•		
			8 x 8	Y					•	•		•
R-Series	Single Channel	MLP	Y	•	•	•						
		SMA	Y	•	•	•						

Application Specific Evaluation Systems

Silicon Series		Package	Fast Output?	1 mm				3 mm			6 mm
				10	20	35	50	20	35	50	35
M-Series	Single Channel	Mini	N			•			•		
B-Series	Single Channel	Matrix	N						•		

SiPM Package and Evaluation Board Type Overview

The range of package types are described below, which in combination with the tables on the preceding pages, can aid the user in choosing the ideal SiPM product for their application.

	SMT / MLP	TSV	SMA	SMTPA
Package Type				
Size	1 mm, 3 mm, 6 mm	3 mm, 4 mm, 6 mm	1 mm, 3 mm, 6 mm	1 mm, 3 mm, 6 mm
Shipping Option	Available on tape & reel	Available on tape & reel		
Connectors	Surface mount package	Surface mount package	<ul style="list-style-type: none"> SMT (or TSV) packaged SiPM mounted onto a pin 	<ul style="list-style-type: none"> SMT (or TSV) packaged SiPM mounted onto a pin
I/O	<ul style="list-style-type: none"> Anode, Cathode and fast outputs 	<ul style="list-style-type: none"> Anode, Cathode and fast outputs 	<ul style="list-style-type: none"> Standard and fast outputs SMA connector I/Os 	<ul style="list-style-type: none"> Easy access to the fast and standard outputs

Related Materials

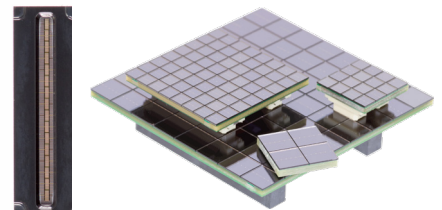
- [Handling and Soldering of SensL TSV Sensors](#)
- [Handling and Soldering of MLP \(SMT\) Sensors](#)
- [SiPM SMA Board Experiment Guide](#)
- [CAD](#)
- [TSV Handling Guide when used with Scintillators](#)



Shipping Option Tape & Reel



MLP & TSV

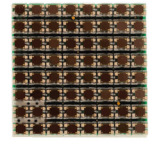
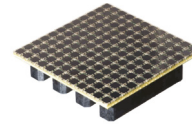
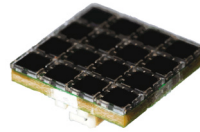
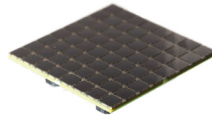
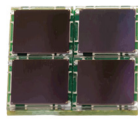


Arrays

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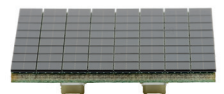
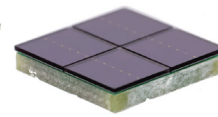
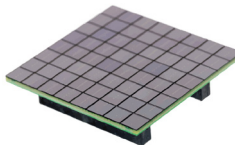
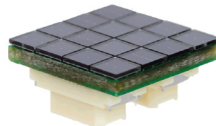
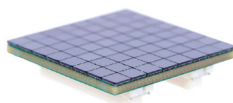
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SiPM C-Series Arrays



	ArrayC-60035-4P-BGA	ArrayC-60035-64P-PCB	ArrayC-30035-16P-PCB	ArrayC-30035-144P-PCB	ArrayC-10035-64P-BGA
Array Size	2 x 2	8 x 8	4 x 4	12 x 12	8 x 8
Board Dimensions	14.2 mm x 14.2 mm	57.4 mm x 57.4 mm	16.6 mm x 16.6 mm	50.2 mm x 50.2 mm	15.8 mm x 15.5 mm
Array Fill Factor	71%	70%	52%	51%	26%
Connectors	3 x 3 BGA	2 x 80 - way	1 x 40 - way	4 x 80 - way	12 x 12 BGA
I/O	<ul style="list-style-type: none"> 4 x standard I/O 5 x common I/O 	<ul style="list-style-type: none"> 64 x fast output 64 x standard I/O 32 x common I/O 	<ul style="list-style-type: none"> 16 x fast output 16 x standard I/O 8 x common I/O 	<ul style="list-style-type: none"> 144 x fast output 144 x standard I/O 32 x common I/O 	<ul style="list-style-type: none"> 64 x fast output 64 x standard I/O 16 x common I/O
Options	EVB Option	BOB (Pixelated & Summed Option)	BOB (Pixelated & Summed Option)	BOB (Pixelated Option)	EVB Option

SiPM J-Series Arrays



	ArrayJ-30035-64P-PCB	ArrayJ-30035-16P-PCB	ArrayJ-60035-64P-PCB	ArrayJ-60035-4P-BGA	ArrayJ-40035-64P-PCB
Array Size	8 x 8	4 x 4	8 x 8	2 x 2	8 x 8
Board Dimensions	26.68 mm x 26.68 mm	13.24 mm x 13.24 mm	50.44 mm x 50.44 mm	12.46 mm x 12.46 mm	33.4 mm x 33.4 mm
Array Fill Factor	81%	82%	91%	93%	89%
Connectors	2 x 80 - way	2 x 20 - way	2 x 80 - way	3 x 3 - BGA	2 x 80 - way
I/O	<ul style="list-style-type: none"> 64 x fast output 64 x standard I/O 32 x common I/O 	<ul style="list-style-type: none"> 16 x fast output 16 x standard I/O 8 x common I/O 	<ul style="list-style-type: none"> 64 x fast output 64 x standard I/O 32 x common I/O 	<ul style="list-style-type: none"> 4 x standard I/O 5 x common I/O 	<ul style="list-style-type: none"> 64 x fast output 64 x standard I/O 32 x common I/O
Options	BOB (Pixelated)	BOB (Pixelated)	BOB (Pixelated or Summed Option)	Pinned PCB (Pixelated Option)	BOB (Pixelated)