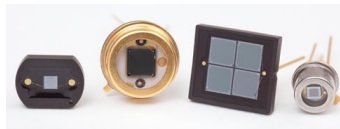


## SensL Product Family Overview

SensL offers a family of Silicon Photomultipliers (SPM), Measurement Instruments, and Photon Counting Detectors. The heart of the product line is the just released “SL” series of 1mm, 3mm and 6mm low light SPM sensors. The “SL” sensors are offered in a wide range of package options from single pixel detectors to large format 144 pixel products. Providing a solid-state alternative to large and position sensitive legacy photomultiplier tubes. Additional information about SensL and our complete line of products is available at [www.sensl.com](http://www.sensl.com).

### MicroSL Family

The SensL MicroSL detectors are a family of visible light sensors that are high gain, single-photon sensitive and based on the silicon photomultiplier concept. They have performance characteristics similar to a conventional PMT, while benefiting from the practical advantages of solid-state technology: low operating voltage, robustness, compactness, low cost and insensitivity to magnetic fields and light over-exposure.



The MicroSL family covers a broad range of detectors that are available in a variety of miniature packages and three detector sizes (1mm, 3mm and 6mm), to suit different applications.

The breakdown voltage of the devices is highly uniform and at 30V bias point, these devices are within the Extra Low Voltage (ELV) range. See the SensL MicroSL Datasheet for more information.

### ArraySL Family

The SensL ArraySL-4 is a 16-element, Silicon Photomultiplier Array based on a 4x4 array of 3mm SPM pixels mounted in a low profile ceramic package. The ArraySL-4 permits close packing on all four sides allowing for a near-continuous detection area that can be as large or small as required by the specific application.



The ArraySL is an alternative to multi anode PMT or multi-pixel APD. It is designed to operate in magnetic fields from 1.5 to 3 Tesla.

The performance characteristics and specification of each pixel in the array are identical to SensL's standard range of 3mm SPMs. The ArraySL-4 is sensitive to visible light in the range of 400nm to 850nm and is suited to applications requiring either direct light detection or for radiation detection via scintillators. Whether the application requires a 1D array for spectrometry or a 2D array for imaging, the ArraySL-4 is an attractive solution and an ideal replacement for MCPs, multi-anode PMTs, APDs, and existing discrete SPM products.

### About SensL

SensL is a leading developer of Silicon Photomultipliers (SPM). The company was formed in 2004 and has been driving the development of SPM technology ever since.

Our SPM technology offers industry leading uniformity in operating voltage and optical response enabling world class system performance and compelling cost advantage.



SensL Headquarters

Additional system level benefits of the SensL SPM include:

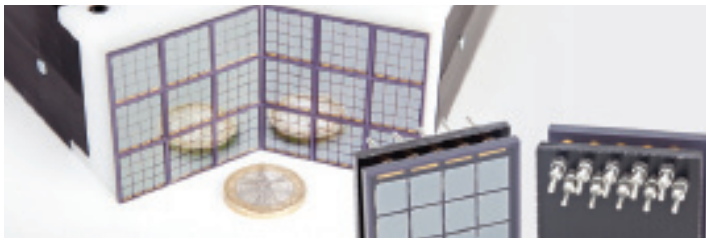
- Uniformity of +/-10% across entire product line allowing simplified readout standardization.
- Low operating voltage of 30V with wide detector operating range
- Sensitive between 400nm and 1000nm, peak at 500nm
- High gain of  $10^6$
- Robust technology not damaged by light
- Extremely stable with very low temperature and operating voltage dependence

SensL has over 1000 customers who have implemented its low light sensors in a wide range of applications including:

- Medical Imaging
- Biophotonics
- Hazard & Threat Detection
- LIDAR
- Academic Research

We strive to help all customers learn and implement our technology by having a focus on application technical support and an engineering commitment to maintaining leading edge sensor and packaging developments.

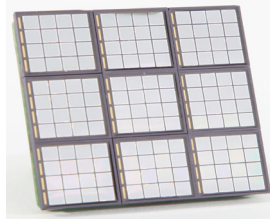
We look forward to talking to you and learning about your application needs.



## ArraySL-4P9 (25cm<sup>2</sup>) 144 Pixel Detector Head

SensL's ArraySL-4p9 is a modular detector array system. Built on SensL SL Silicon detector technology.

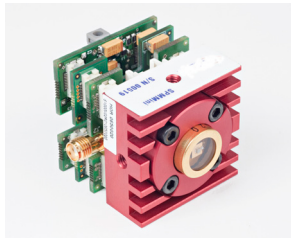
The ArraySL-4p9 provides a fully solid-state, four-side scalable detector array. It is a 3x3 array of the SensL ArraySL-4 product. Each of these detectors can be individually read out from a pair of board to board connectors on the rear side of the detector.



One application for the Array4p9 is a low light imaging detector for the readout of scintillator matrices in Positron Emission Tomography (PET) scanners. Employing SPM technology, the Array4p9 detector head requires low power and operating voltage, is compact, highly robust and offers excellent spatial segmentation and photo response uniformity. Addressing high resolution imagers such as small animal, pre-clinical and mammography PET, Array4p9 is a compelling alternative to multi-anode PMTs.

## MiniSL Module

The SensL MiniSL Module detector consists of a 1mm or 3mm SensL "SL" SPM coupled to an integrated preamp and power supply. The detector is mounted on a Peltier cooler and housed in a hermetically sealed TO8 can. During normal operation the SensL MiniSL is cooled by 50°C (-ΔT). This allows greater performance over room temperature operation as the dark rate is reduced by over 2x orders of magnitude.



A variety of add-on options to enhance functionality are offered, including C-mount (male) adapter and a fiber coupler (adapter and fiber cable included).

## PCD Micro & Mini Family

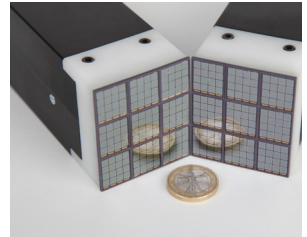
SensL's photon counting products are based upon the next generation "SL" silicon. Sensitive to single photons, they offer precise photon counting (up to 10MHz) and time-stamping (~200ps accuracy).



SensL's photon counting detector (PCD) technology is available as a detector only (PCDMicroSL) or as a complete photon counting module (PCDMiniSL). The PCDMiniSL is mains powered and has an integrated active quench, giving a fast TTL output. In addition, it has USB connectivity for system monitoring and use with SensL's Integrated Environment software that performs counting and correlation. The module also provides sensor cooling by 50°C (-ΔT) that allows for exceptionally low dark count rates, for the most demanding of applications.

## Matrix9 L(Y)SO Medical Imaging Readout Systems

SensL Matrix9 is the first modular, turnkey readout system specifically designed for nuclear medicine imaging applications.



Built on SensL's silicon photomultiplier (SPM) technology and utilizing a 12x12 ArraySL-4P9 or the new 4x36 rectangular detector head, the Matrix9 provides a fully solid-state, four-side scalable detector for the readout of L(Y)SO scintillator arrays. It integrates the detector with all of the electronics required to localize, time stamp and discriminate scintillation events. Digitized event data comprising time, location and energy are sent to the host system via high speed USB interface.

By integrating multiple detector heads, Matrix9 can perform temporal coincidence analysis thereby reducing data rates to the host system. Matrix9 is available as a turnkey, fully integrated module or as an OEM sub-system for rapid integration.

The Matrix9 is comprised of three primary components:

- Detector Head - a 12x12 square ArraySL-4P9 integrated on a four-side scalable daughter board or 4x36 rectangular option.
- Electronics - bias, readout, digitize (crystal ID, timestamp, and energy) signals.
- Coincidence Board - control for up to 16 Matrix9 modules with USB.

## HRM-CFD & HRM-TDC

SensL also offers both a 2-Channel, Constant Fraction Discriminator (CFD) and a 4 Channel High Resolution Timing Module (TDC) which are USB controlled.



### Constant Fraction Discriminator (CFD)

The SensL HRM-CFD provides a solution for picosecond timing with ultra-fast detectors. This compact, rugged and low-power instrument features two independent channels each with its own 0.75GHz amplifier. All settings and adjustments are programmed via USB using the SensL GUI.

### High Resolution Timing Module (TDC)

SensL's HRM-TDC is a portable, highly functional timing system providing flexible, easy-to-use timing functions. The HRM-TDC has four channels, each with 27ps timing resolution and a maximum data rate of 4.5MHz over USB to the host computer. The system also comes equipped with 16 general-purpose, user-configurable I/O ports and a programmable TTL clock output.