

# User Guide: SPM 1000 Series

## 1. Introduction

The SPM is an extremely versatile detector offering several configurations depending on amplification method and cooling requirements. This User Guide contains information on how to operate the SPM detector with or without cooling. For an explanation of the effects of the different parameters on the detector's performance, see [SPM Technical and Application Notes](#) on our website. Topics covered in this document are module description, handling, and user operation.

The product comes with a choice of integrated preamplifier boards depending on the configuration chosen. This user guide applies to the following products:

SPMMicro1000X01A1	SPMMini1000X03A1	SPMScint1000X04A3
SPMMicro1000X01A3	SPMMini1000X03A3	

**Note:** Before operating the detector please read this User Guide thoroughly as the detector may be damaged by incorrect handling or application of voltages.

## 2. Getting Started with SPM Detectors

Unpack the contents carefully and identify each of the components:

SPM detector module

- Power supply connector
- Module test data sheet
- User Guide
- For Product Options, please see [SPM Product Options](#)

## 3. Procedure for Powering Up the Module

- Plug in the power cable to the SPM unit and use a regulated power supply to provide VCC, SPM bias, and ground connection.
- Ensure that the power supply is able to supply the appropriate currents.

Supply Name	Color Code	Voltage (V)		Current (mA)	
		Typical	Max.	Typical	Max.
VCC	red	+5	5.1	10 (300)**	1000
VCC	yellow	-5	5.1	10	100
SPM bias*	blue	approx. 30	36	0.001-0.1	0.5
Ground	black	0	-	-	-

\* see final test sheet for module specific settings

\*\* 300mA drawn using SPMMiniC1 cooling board, see Section 5: Cooling Board Operation

## 4. SPM Bias Settings

This sets the voltage at which the SPM is biased. Typically the SPM detector is set to +2V over the breakdown voltage. The breakdown voltage for these devices is typically +28V. (Refer to the test sheets for your detector.)

Increasing the SPM bias increases the photon detection efficiency at the expense of increased dark count. Decreasing the bias voltage decreases the dark count. Therefore the bias voltage used is a trade off between the PDE and the acceptable dark rate for your application. For good PDE, we recommend a working voltage of about +4V over breakdown. A current compliance of 0.5mA should be set to protect the device. Once the wires are connected, as in the table above, the bias can be switched on. If the device is operated in the dark, pulses will be observed corresponding to the dark rate of the device. (Refer to final test sheet data). A uniform level of pulses should be clearly visible. This corresponds to the single photon level. The detector is now ready for light detection.

**Note:** *This module is an ultra-sensitive low light detector and therefore under ambient light conditions the detector output will saturate.*

## 5. Cooling Board Operation

The cooling board option, SPMMiniC1, is only available with the following products:

SPMMini1000X03A1      SPMMini1000X03A3

The electronics board that operates the TEC (cooling board) comes attached to the underside of the preamplification board and no additional connections or power sources are required. The cooling board uses the same VCC power source as the amplifier to cool the detector.

With the cooling board attached, the amplifier power supply will draw several hundred milliamps (mA) and the temperature of the TEC will reduce to -20°C. For the +5V connection, set the current compliance to 1A because, when the power is initially switched on, 0.3A is drawn. After 10 seconds the current should drop and stabilize to 0.15A. This sequence of events indicates that the device is cooling.

## 6. Maintenance and Safety

- Remember that your SPM detector is a sensitive optoelectronic instrument; always handle the detector as carefully as possible.
- Keep the glass cap of the TO can of the detector clean and avoid touching the glass face.
- Use only the power supply cable supplied with the SPM module.
- The power supply should be disconnected from the bench power supply or user's power supply unit when not in use.
- The module is not intended for outdoor use.
- The SPM module layers should not be taken apart.
- Liquids should not be spilled on or into the module.
- Normal ESD-aware handling protocols should be observed.