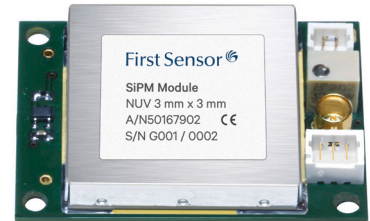


## SiPM Module

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The SiPM Module integrates a stable voltage supply, signal amplification, interfaces and the SiPM detector in a compact plug and play unit. Included software allows optimization of the operating point of the detector to the respective application by the precise and individual setting and storage of the supply voltage. The new SiPM Module is used for test set-ups in research and development and is ideally suited for photon counting applications.



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### Features

- Light detection from 350 to 900 nm
- Ultra compact
- Very light weight
- Different SiPM sizes, 1x1, 3x3, 4x4 mm
- Voltage supply with low ripple
- Control software
- Setup board for voltage setting
- Non cooled, analog output
- Built-in SiPM optimized for NUV (420nm) or RGB (550nm) light detection
- Optional version with LYSO scintillation crystal

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### Applications

- Ultra-low-level light measurement
- Single photon counting
- Scientific applications
- Scintillator readout
- Gamma counting

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### Certificates

- RoHS compliant (2011/65/EU)

## SiPM Module

### Absolute maximum ratings <sup>(1)</sup>

Parameter	Min.	Max.	Unit
Operating temperature ( $T_{op}$ )	-10	+40	°C
Storage temperature ( $T_s$ )	-20	+60	°C
Supply voltage ( $V_s$ )		typ. 5	V
Output voltage ( $V_{out}$ )		typ. 1.2	V @ 50 $\Omega$

### Electro-optical characteristics <sup>(1)</sup>

Parameter	NUV type			RGB type			Unit
	Min.	Typ.	Max.	Min.	Typ.	Max.	
Active area	1x1, 3x3, 4x4			1x1, 3x3, 4x4			mm
Recharge time constant	70			50			ns
Peak responsivity	420			550			nm
Breakdown voltage (BV)	24	26	28	25	27	29	V
Recommended overvoltage range (OV)	2	6		2	4		V
Dark count rate	<50 @ 2 V OV, <100 @ 6 V OV			<100 @ 2 V OV, <200 @ 4 V OV			kHz/mm <sup>2</sup>
Gain	3.6x10 <sup>6</sup>			2.7x10 <sup>6</sup>			

### Characteristics for module

Parameter	Min.	Typ.	Max.	Unit
Bandwidth		25		MHz
Voltage ripple			5	mV

#### Specification notes

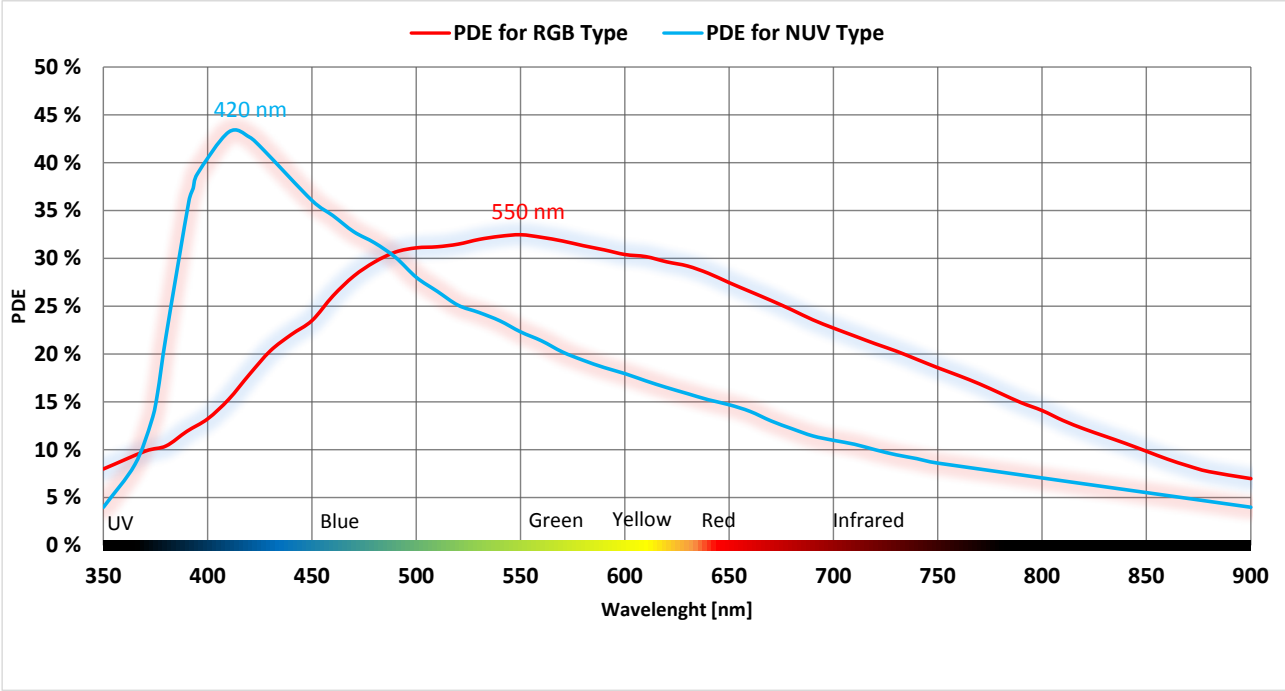
(1) For further technical information, see SiPM datasheets.

## SiPM Module

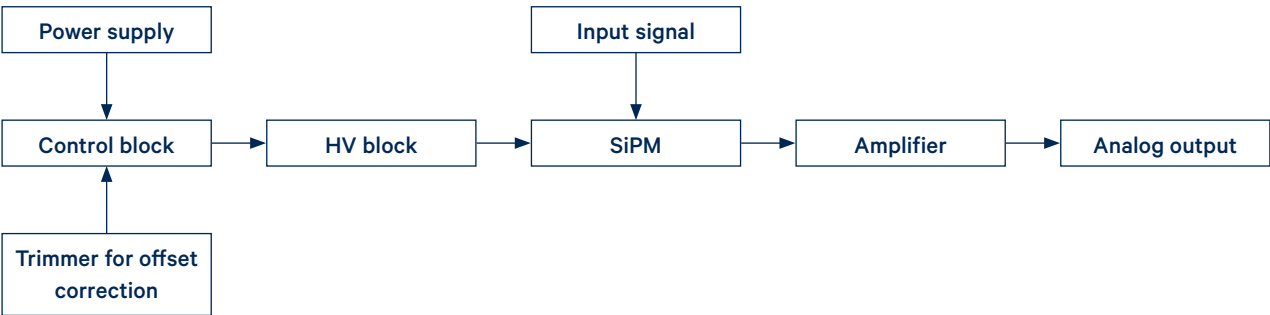
### Device characteristics

#### Photon detection efficiency (PDE) as fct of wavelength

(crosstalk and afterpuls not included)



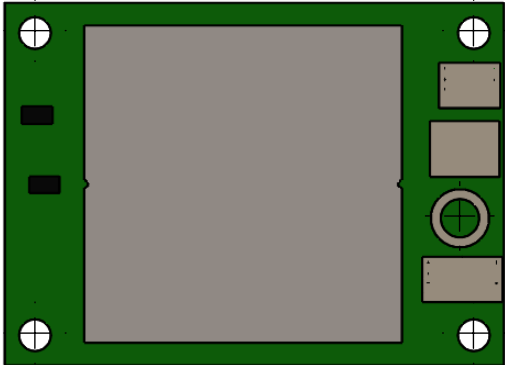
### Schematic



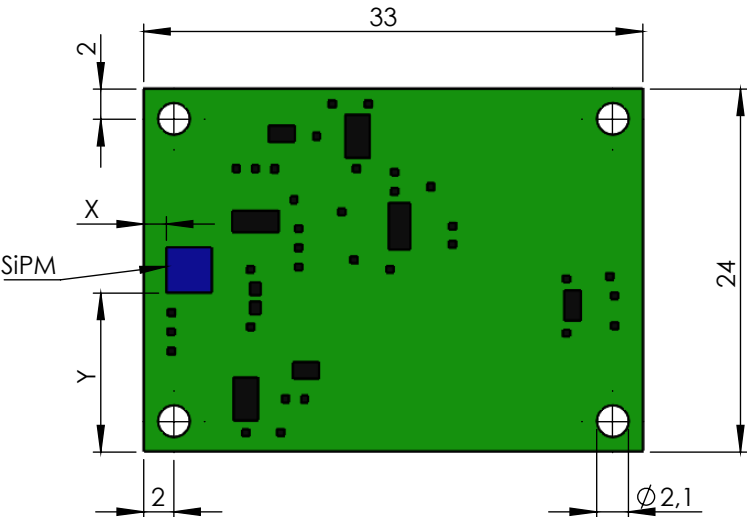
## SiPM Module

### Physical dimensions

#### HV/connector side



#### Detector side



#### SiPM position

SiPM position depends on size of SiPM and is centred to board edges. Distance can vary due to manual processing.

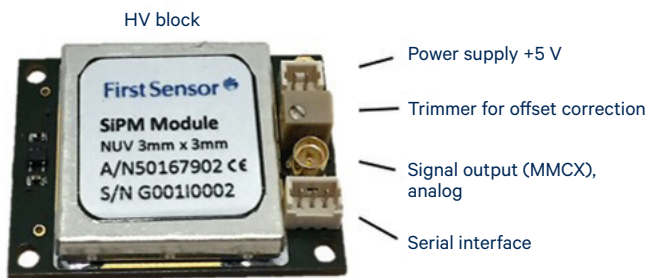
Chip size	Width	Y (distance to edge)
1x1 mm	2.03 mm	typ. 10.98 mm
3x3 mm	3.48 mm	typ. 10.26 mm
4x4 mm	4.48 mm	typ. 9.76 mm

dimensions in mm

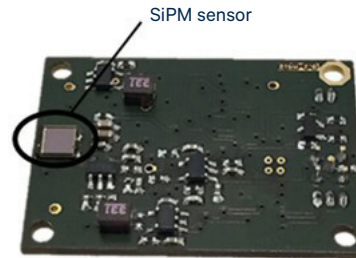
## SiPM Module

### Module components

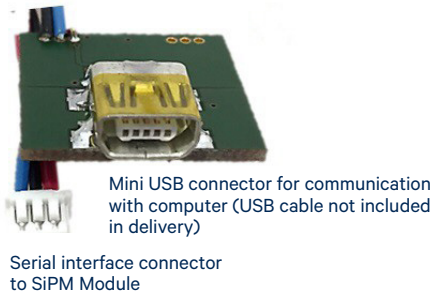
#### HV/connector side



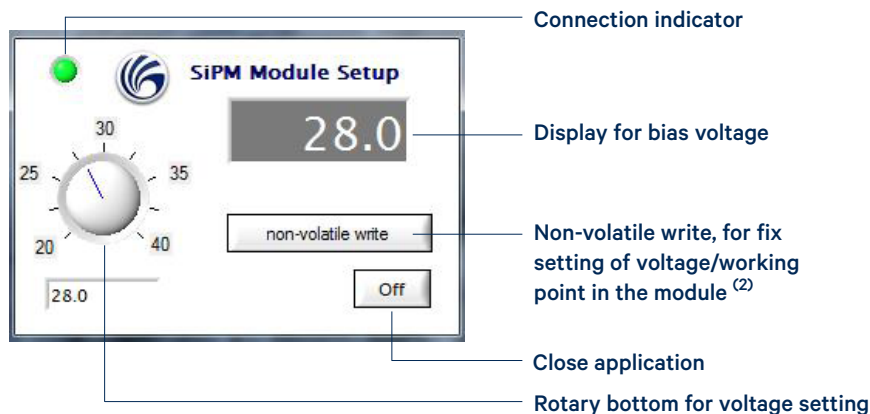
#### Detector side



### Setup board for voltage setting



### Software for working point setting of the SiPM



#### Specification notes

(2) Voltage which was set non-volatile will also be applied to the SiPM after reset/restart/power off of the module

### Workflow

1. Download software from [www.first-sensor.com](http://www.first-sensor.com)
2. Module can run without software, basic setting with 5 V supply voltage.  $V_{br}$  is @  $50 \Omega$  (e.g. oscilloscope) 1 PE approx. 10 mV,  $V_{br}$  can be changed with the software
3. Install the software
4. Install driver
5. Settings for  $V_{br}$  are possible due to keyboard or the rotary bottom
6. If you want to set the value of  $V_{br}$  for the next start of the module you have to click on the "non volatile" button

## SiPM Module

### Ordering information

Type	Chip size	Cell count	Description <sup>(1)</sup>	Part #
NUV	1x1 mm	625	SiPM Module, NUV, 1x1 mm	50167901
	3x3 mm	5520	SiPM Module, NUV, 3x3 mm	50167902
	4x4 mm	9340	SiPM Module, NUV, 4x4 mm	50167903
RGB	1x1 mm	625	SiPM Module, RGB, 1x1 mm	50167801
	3x3 mm	5520	SiPM Module, RGB, 3x3 mm	50167802
	4x4 mm	9340	SiPM Module, RGB, 4x4 mm	50167803
NUV+LYSO	3x3 mm	5520	SiPM Module, NUV, 3x3 mm, with LYSO scintillation crystal	50167904

Accessories	Description		Part #
Setup board	Setup board for voltage setting	not included in delivery	501688
Software	Software for voltage setting	free download	-
Cable MMCX to BNC	Connection cable for signal output	not included in delivery	501692
Cable power supply	Cable with flying leads	included in delivery	-

### Specification notes

(1) For further technical information, see SiPM datasheets.