First Sensor

PRELIMINARY

SiPM Module

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.

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

Applications

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

Certificates

- RoHS compliant (2011/65/EU)

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SiPM Module

Absolute maximum ratings (1)

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 Ω**

Electro-optical characteristics (1)

	NUV type			RGB type			
Parameter	Min.	Typ.	Max.	Min.	Typ.	Max.	Unit
Active area		**1×1, 3x3, 4x4**			**1×1, 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/mm²**
Gain		**3.6×10^6**			**2.7×10^6**		

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.

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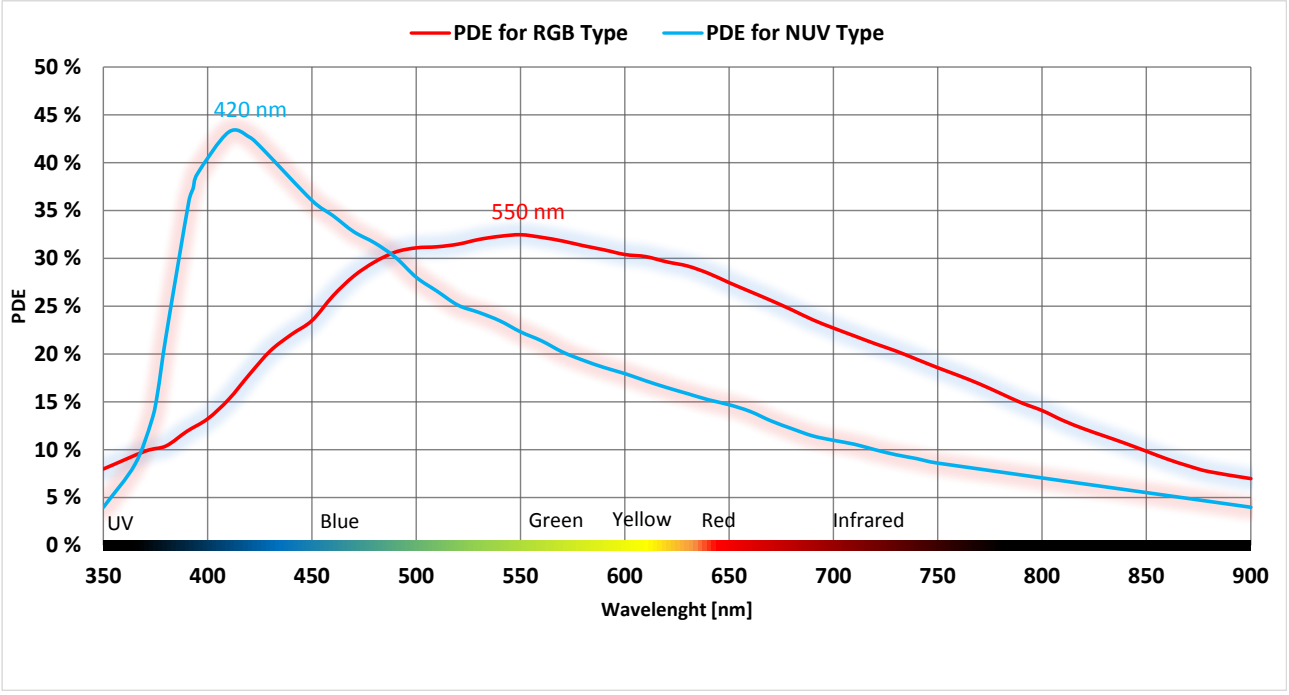
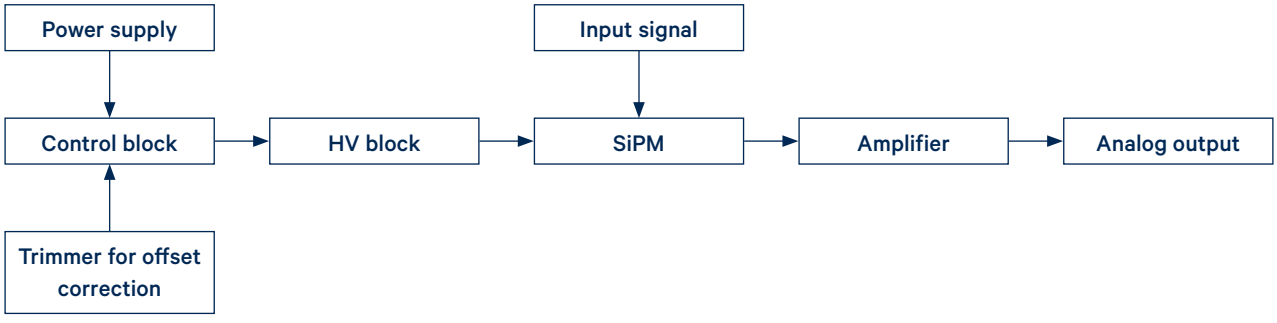
SiPM Module

Device characteristics

Photon detection efficiency (PDE) as fct of wavelength
(crosstalk and afterpuls not included)



Schematic



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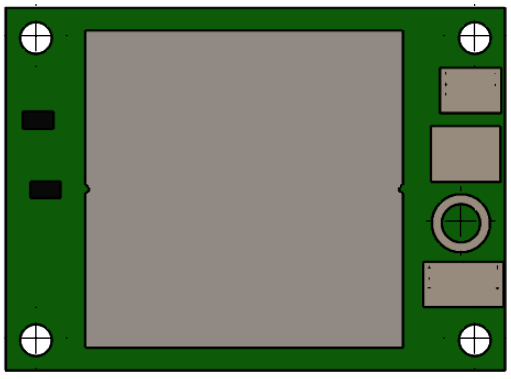
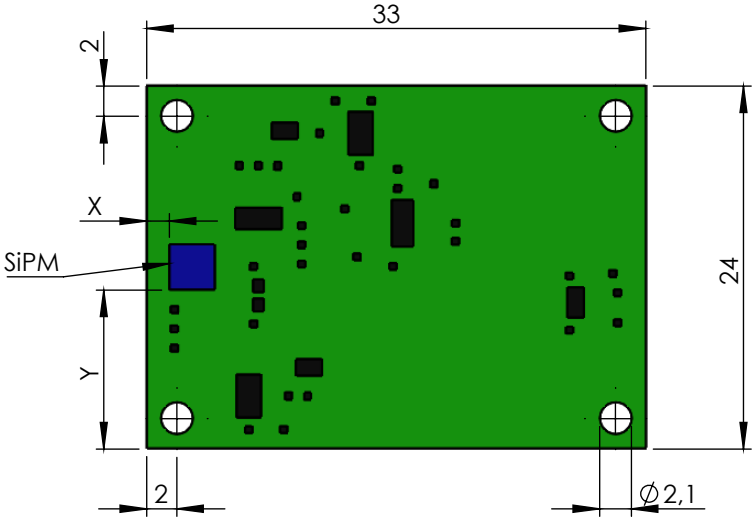
SiPM Module

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

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SiPM Module

Module components

HV/connector side

HV block

Power supply +5 V

Trimmer for offset correction

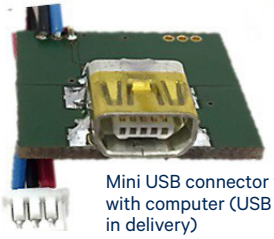
Signal output (MMCX), analog

Serial interface

Detector side

SiPM sensor

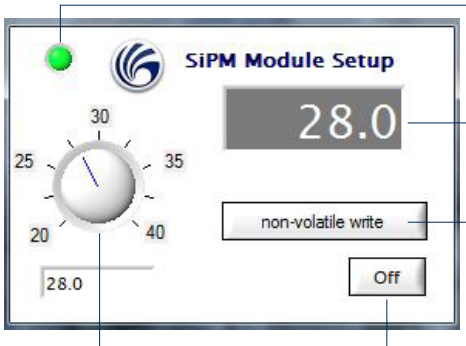
Setup board for voltage setting



Mini USB connector for communication with computer (USB cable not included in delivery)

Serial interface connector to SiPM Module

Software for working point setting of the SiPM



Connection indicator

Display for bias voltage

Non-volatile write, for fix setting of voltage/working point in the module (2)

Close application

Rotary bottom for voltage setting

Workflow

1. Download software from www.first-sensor.com
2. Module can run without software, basic setting with 5 V supply voltage. Vbr is @ 50 Ω (e.g. oscilloscope) 1 PE approx. 10 mV, Vbr can be changed with the software
3. Install the software
4. Install driver
5. Settings for Vbr are possible due to keyboard or the rotary botton
6. If you want to set the value of Vbr for the next start of the module you have to klick on the “non volatile” button

Specification notes

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

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SiPM Module

Ordering information

Type	Chip size	Cell count	Description [1]	Part #
NUV	1x1 mm	**625**	SiPM Module, NUV, 1x1 mm	**3001477**
	3x3 mm	**5520**	SiPM Module, NUV, 3x3 mm	**3001478**
	4x4 mm	**9340**	SiPM Module, NUV, 4x4 mm	**3001479**
RGB	1x1 mm	**625**	SiPM Module, RGB, 1x1 mm	**3001473**
	3x3 mm	**5520**	SiPM Module, RGB, 3x3 mm	**3001475**
	4x4 mm	**9340**	SiPM Module, RGB, 4x4 mm	**3001476**
NUV+LYSO	3x3 mm	**5520**	SiPM Module, NUV, 3x3 mm, with LYSO scintillation crystal	**3001481**

Accessories	Description		Part #
Setup board	Setup board for voltage setting	**not included in delivery**	**3001304**
Software	Software for voltage setting	**free download**	**-**
Cable MMCX to BNC	Connection cable for signal output	**not included in delivery**	**3001306**
Cable power supply	Cable with flying leads	**included in delivery**	**-**

Specification notes

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

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