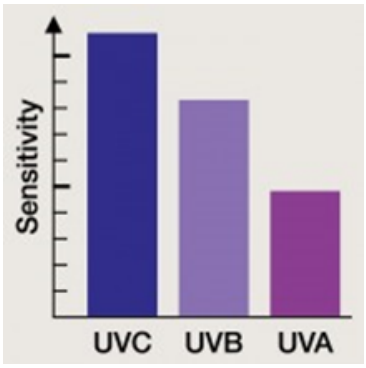
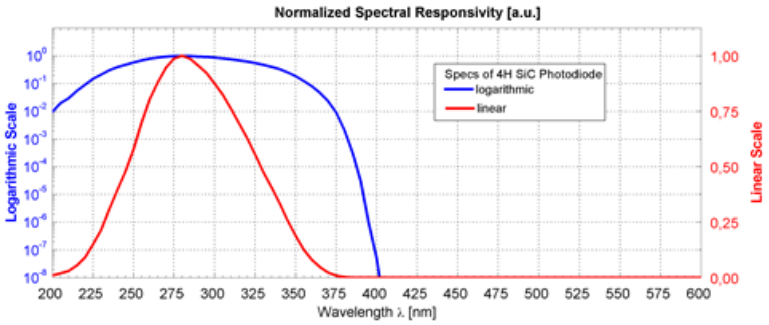
Broadband UV Photodiodes Data Sheets





- **Spectral sensitivity from 221 to 358 nm, peak wavelength 280 nm, different packaging, sorted by detector areas.**

sglux
The UV Experts

BostonElectronics

91 Boylston Street, Brookline, MA 02445
tel: (617)566-3821 fax: (617)731-0935
www.boselec.com boselec@boselec.com

SG01D–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 27.5 mm²

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GENERAL FEATURES

Properties of the SG01D–5LENS UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability, **for flame detection**
- Radiation sensitive area A = 27.5 mm²
- TO5 hermetically sealed metal housing with concentrator lens, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 350 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01D–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 27.5 mm²

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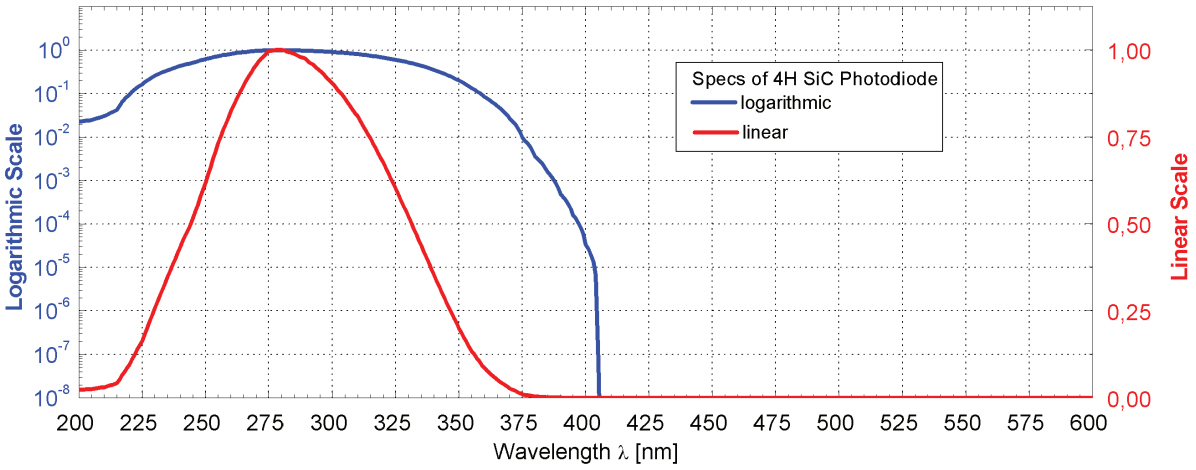
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range ($S=0,1*S_{max}$)	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Sensitive Area (chip size = 0,50 mm²)	A	27,5	mm²
Dark Current (1V reverse bias)	I_d	1,7	fA
Capacitance	C	125	pF
Short Circuit (10µW/cm² at peak)	I_o	350	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01D–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 27.5 mm²

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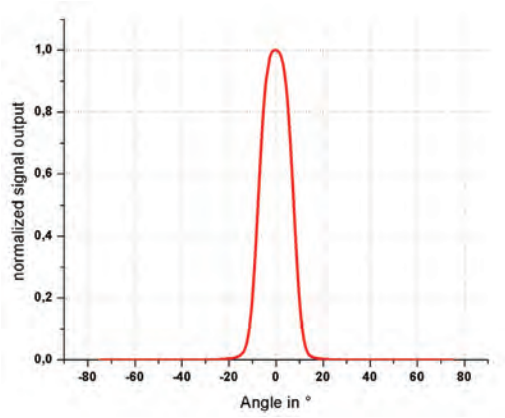
FIELD OF VIEW

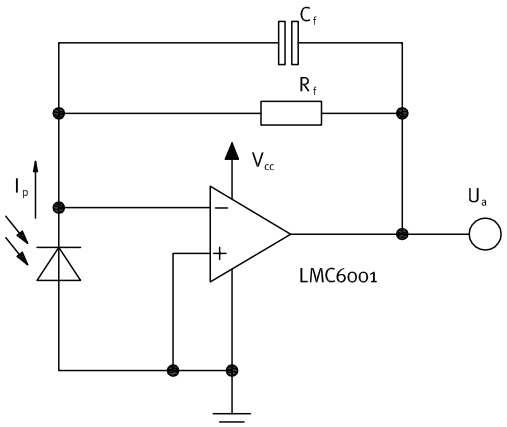


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

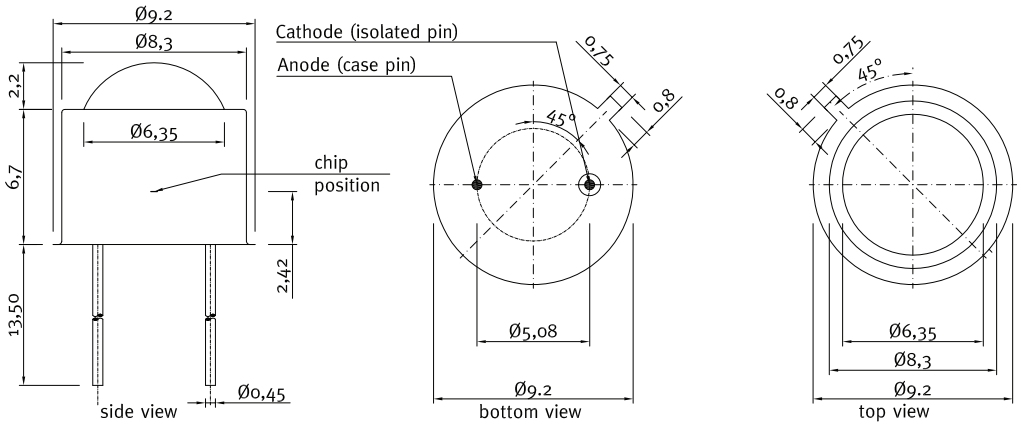
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01D–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 27.5 mm²

APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

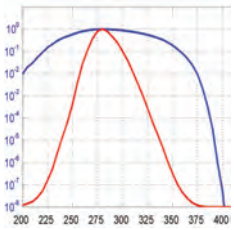
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01D–18

Broadband SiC based UV photodiode A = 0,50 mm²

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GENERAL FEATURES

Properties of the SG01D–18 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,50 mm²
- TO18 hermetically sealed metal housing, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 6,5 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	nothing, A, B, C or E	18, 18ISO90, 18S, 5, 5ISO90	nothing, Lens, MEGA, GIGA
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	**GIGA** with attenuator up to 7 W/cm²
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	

SG01D–18

Broadband SiC based UV photodiode A = 0,50 mm²

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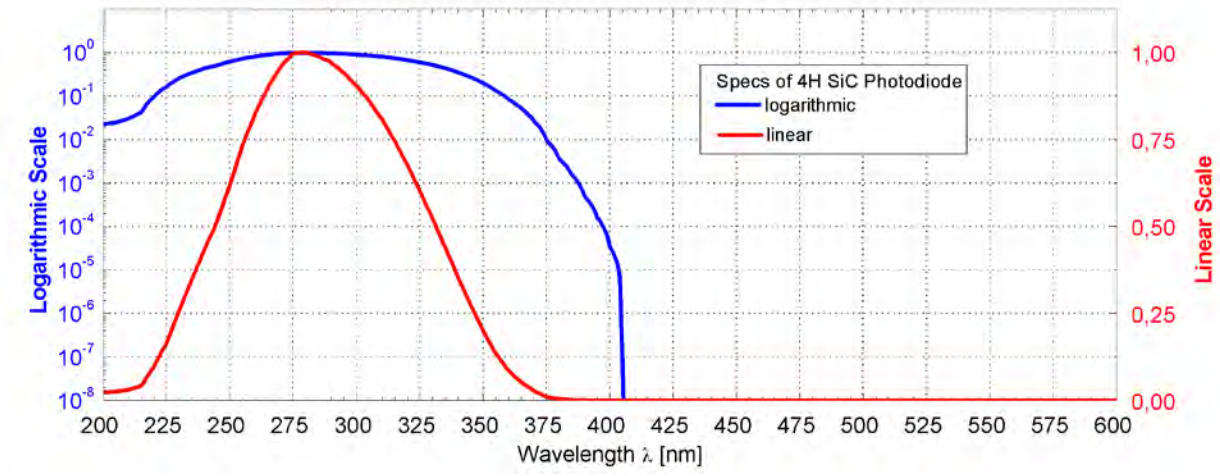
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{peak}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range ($S=0,1*S_{max}$)	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	0,50	mm^2
Dark Current (1V reverse bias)	I_d	1,7	fA
Capacitance	C	125	pF
Short Circuit (10µW/cm² at peak)	I_o	6,5	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01D–18

Broadband SiC based UV photodiode A = 0,50 mm²

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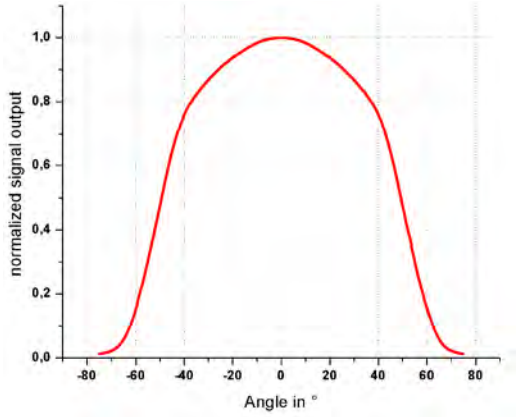
FIELD OF VIEW

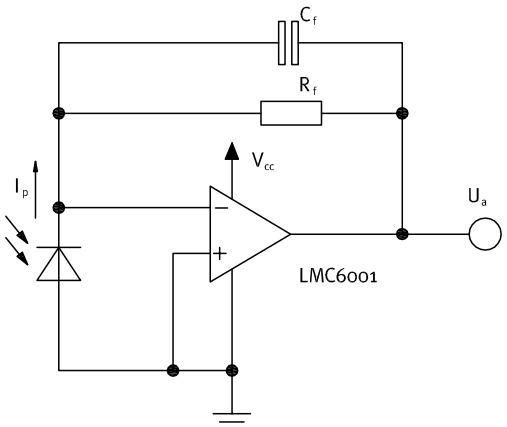


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

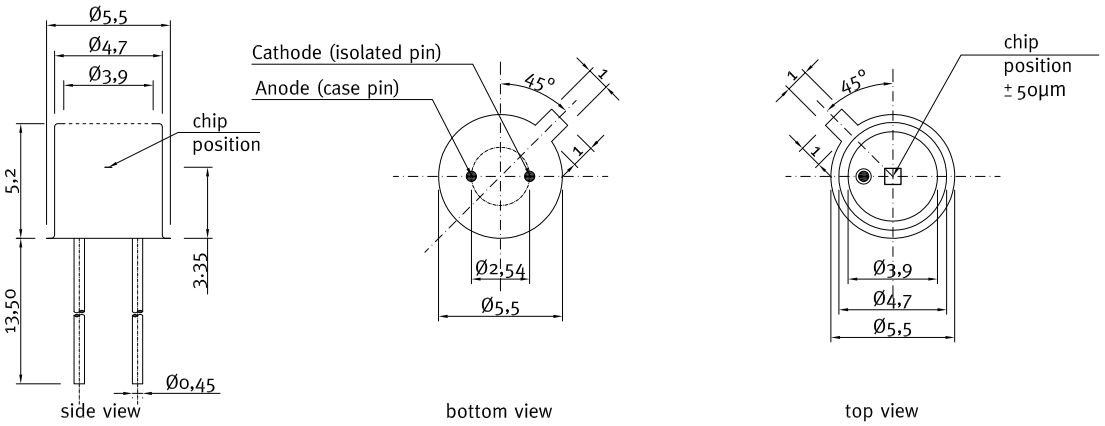
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01D–18

Broadband SiC based UV photodiode A = 0,50 mm²

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APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

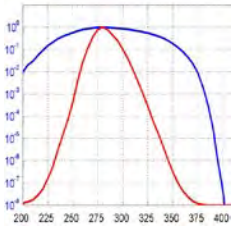
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01F–5ISO90

Broadband SiC based UV photodiode A = 1,82 mm²

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GENERAL FEATURES

Properties of the SG01F–5ISO90 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 1,82 mm²
- TO5 hermetically sealed metal housing, short cap, two isolated pins in a circle
- 1µW/cm² peak radiation results a current of approx. 2,4 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
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XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

Rev. 6.3 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.

SG01F–5ISO90

Broadband SiC based UV photodiode A = 1,82 mm²

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
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Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
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Responsivity Range ($S=0,1*S_{max}$)	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	1,82	mm^2
Dark Current (1V reverse bias)	I_d	6	fA
Capacitance	C	455	pF
Short Circuit (1µW/cm² at peak)	I_o	2,4	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
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Reverse Voltage	V_{Rmax}	20	V

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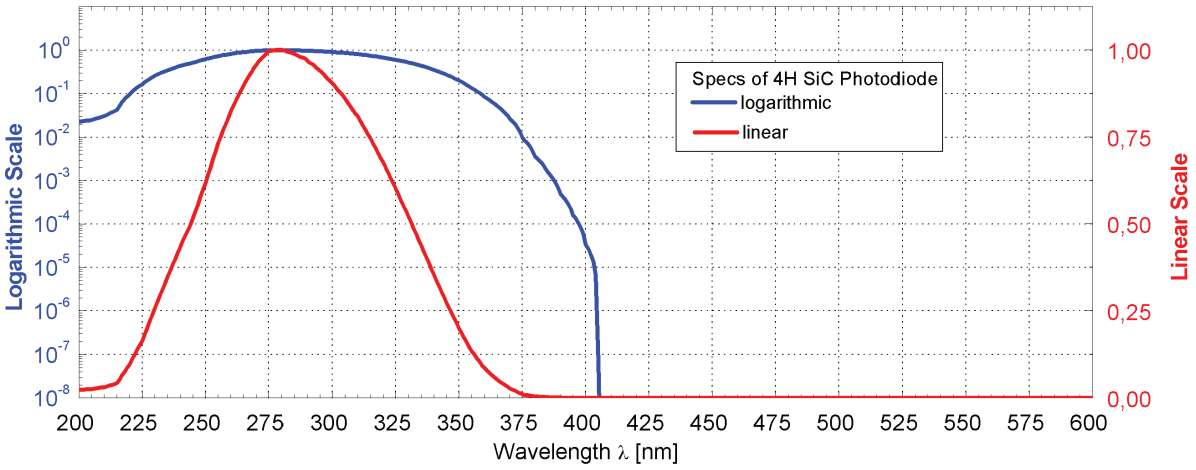

SG01F–5ISO90

Broadband SiC based UV photodiode A = 1,82 mm²

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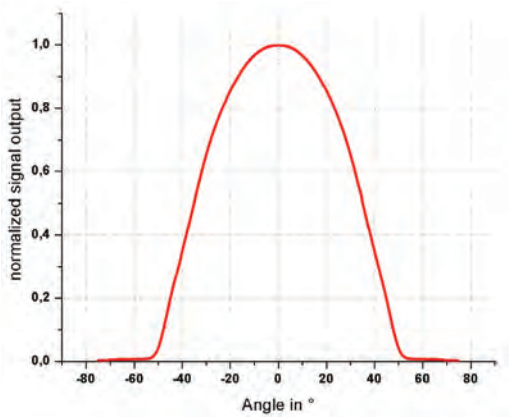
FIELD OF VIEW



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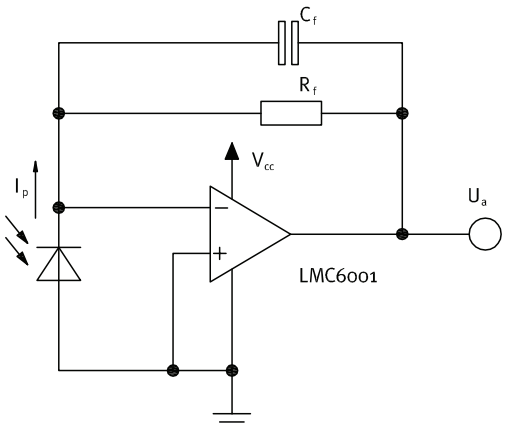

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Example:
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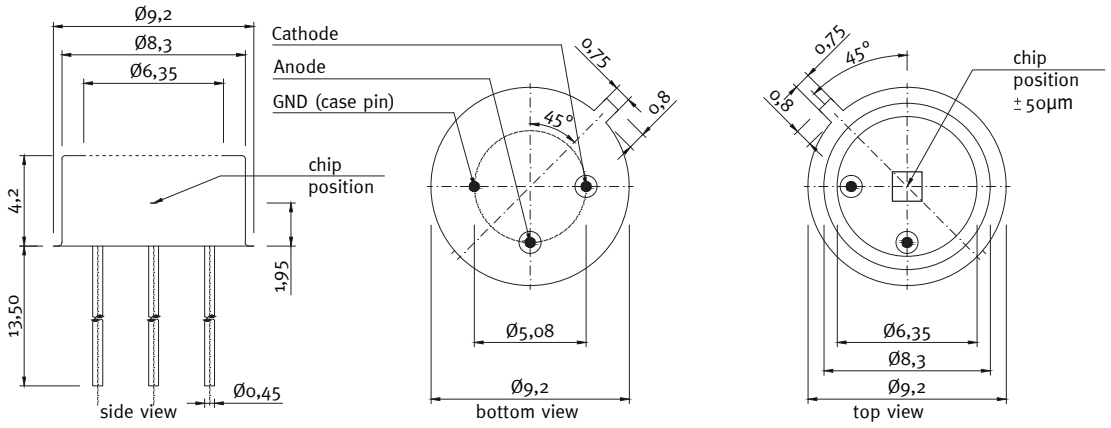
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01F–5ISO90

Broadband SiC based UV photodiode A = 1,82 mm²

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Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
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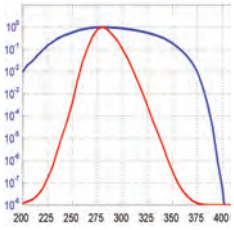
CALIBRATION SERVICE



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- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01L–5

Broadband SiC based UV photodiode A = 1,0 mm²

sglux The UV Experts

Boston Electronics

GENERAL FEATURES

Properties of the SG01L–5 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 1,0 mm²
- TO5 hermetically sealed metal housing, short cap, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 13 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01L–5

Broadband SiC based UV photodiode A = 1,0 mm²

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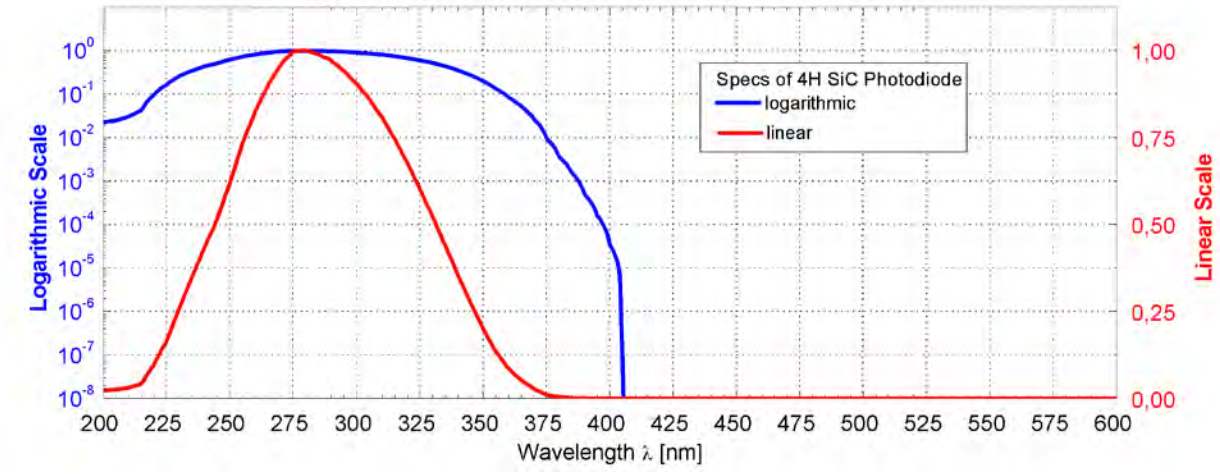
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range (S=0,1*S_{max})	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	1,0	mm^2
Dark Current (1V reverse bias)	I_d	3,3	fA
Capacitance	C	250	pF
Short Circuit (10µW/cm² at peak)	I_o	13	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01L–5

Broadband SiC based UV photodiode A = 1,0 mm²

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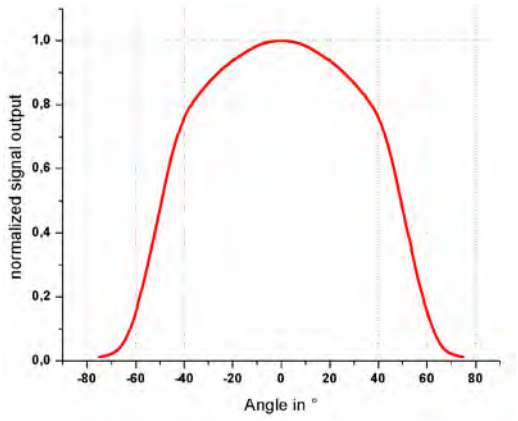
FIELD OF VIEW

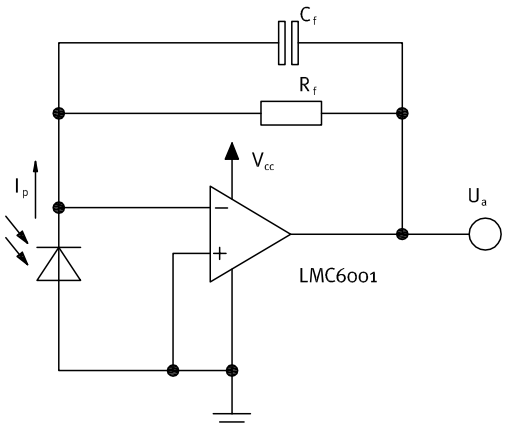


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

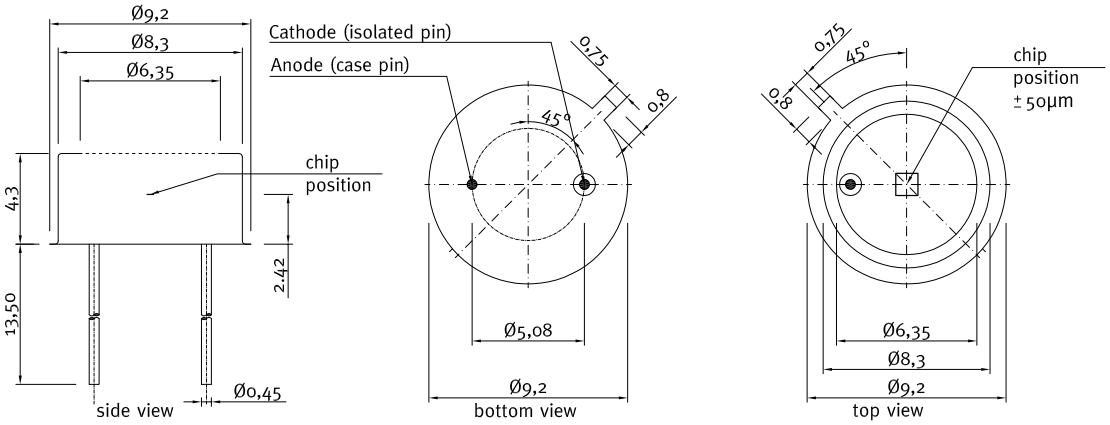
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01L–5

Broadband SiC based UV photodiode A =1,0 mm²

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APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

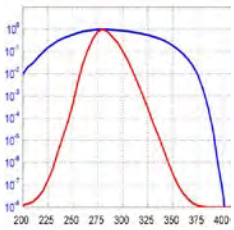
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01L–5ISO90

Broadband SiC based UV photodiode A = 1,00 mm²

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GENERAL FEATURES

Properties of the SG01L–5ISO90 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 1,00 mm²
- TO5 hermetically sealed metal housing, short cap, two isolated pins in a circle
- 10µW/cm² peak radiation results a current of approx. 13 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

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Chip area	**Spectral response**	**Housing**	**Special**
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M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01L–5ISO90

Broadband SiC based UV photodiode A = 1,00 mm²

sglux The UV Experts

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range (S=0,1*S_{max})	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	1,00	mm^2
Dark Current (1V reverse bias)	I_d	3,3	fA
Capacitance	C	250	pF
Short Circuit (10µW/cm² at peak)	I_o	13	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
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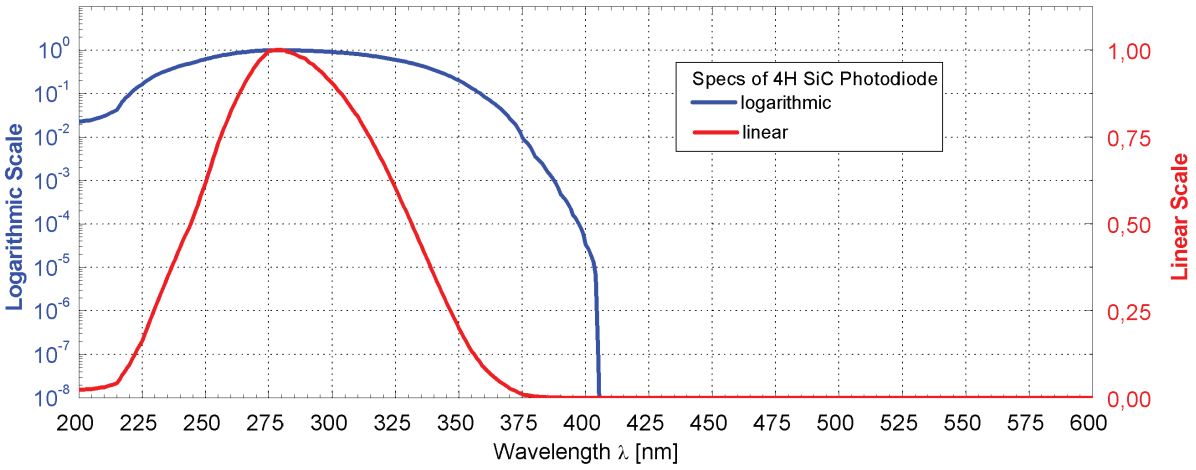
Reverse Voltage	V_{Rmax}	20	V

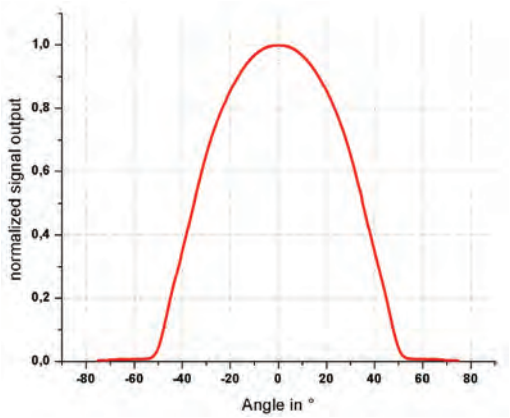
NORMALIZED SPECTRAL RESPONSIVITY



SG01L–5ISO90

Broadband SiC based UV photodiode A = 1,00 mm²

FIELD OF VIEW

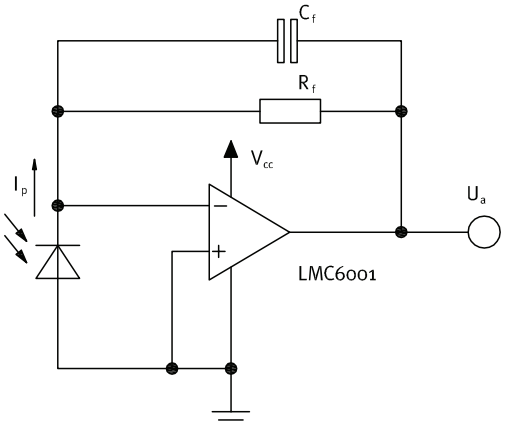


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
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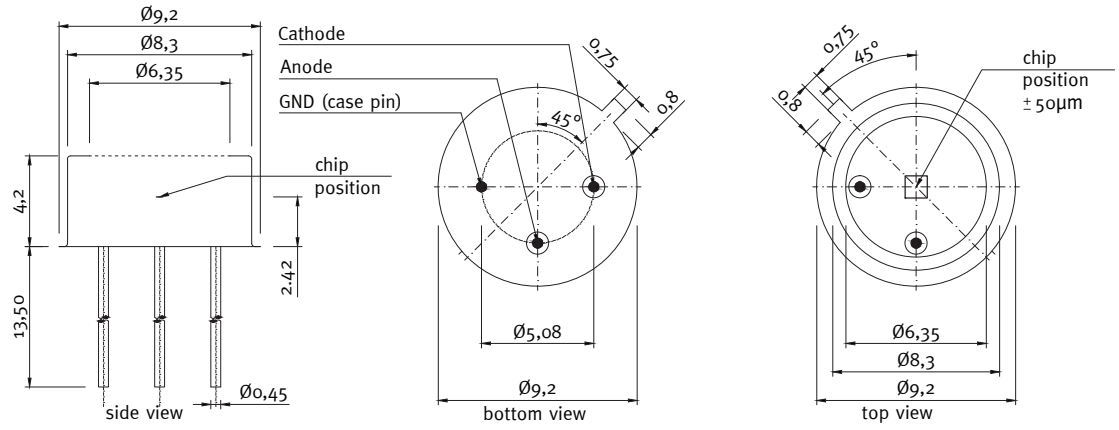
Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01L–5ISO90

Broadband SiC based UV photodiode A = 1,00 mm²

APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

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- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
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- UV broadband, UVA, UVB, UVC or Erythema measurements

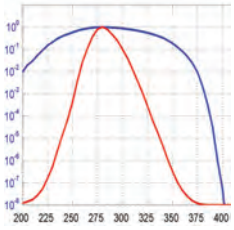
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

Rev. 6.3 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.

SG01L–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 55 mm²

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GENERAL FEATURES

Properties of the SG01D–5LENS UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability, **for flame detection**
- Radiation sensitive area A = 55 mm²
- TO5 hermetically sealed metal housing with concentrator lens, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 700 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01 — **S, M, D, L, XL** — **nothing, A, B, C or E** — **18, 18ISO90, 18S, 5, 5ISO90** — **nothing, Lens, MEGA, GIGA**

Chip area	Spectral response	Housing	Special
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01L–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 55 mm²

sglux The UV Experts

Boston Electronics

SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
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Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range ($S=0,1*S_{max}$)	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Sensitive Area (chip size = 1,0 mm²)	A	55	mm²
Dark Current (1V reverse bias)	I_d	3,5	fA
Capacitance	C	250	pF
Short Circuit (10µW/cm² at peak)	I_o	700	nA
Temperature Coefficient	T_c	< 0,1	%/K
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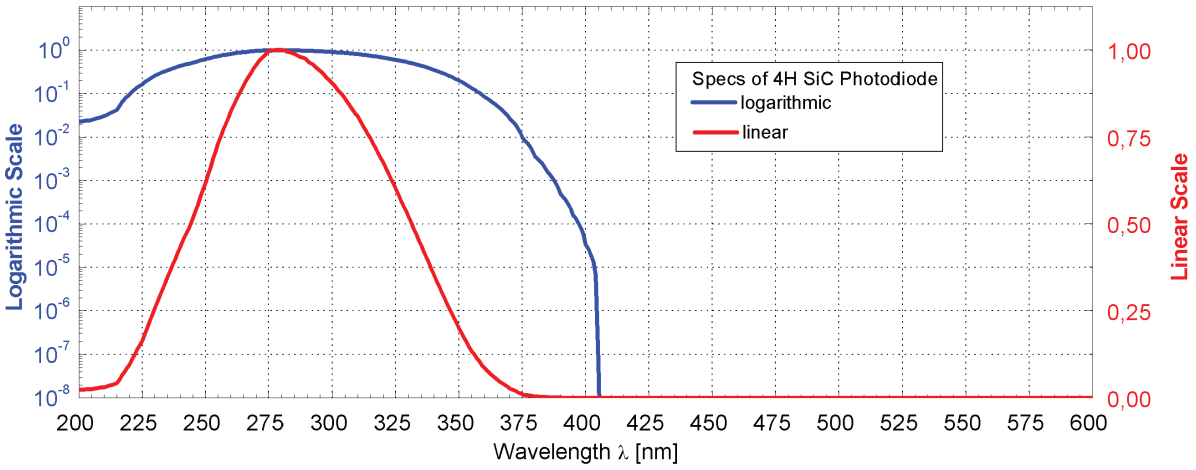

SG01L–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 55 mm²

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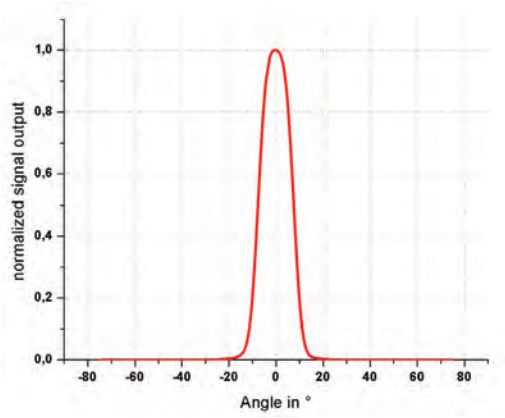
FIELD OF VIEW



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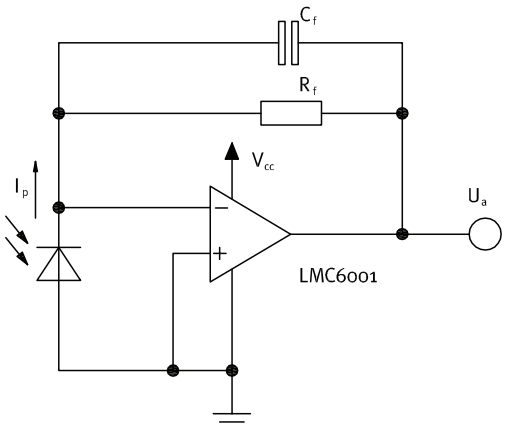
TYPICAL CIRCUIT



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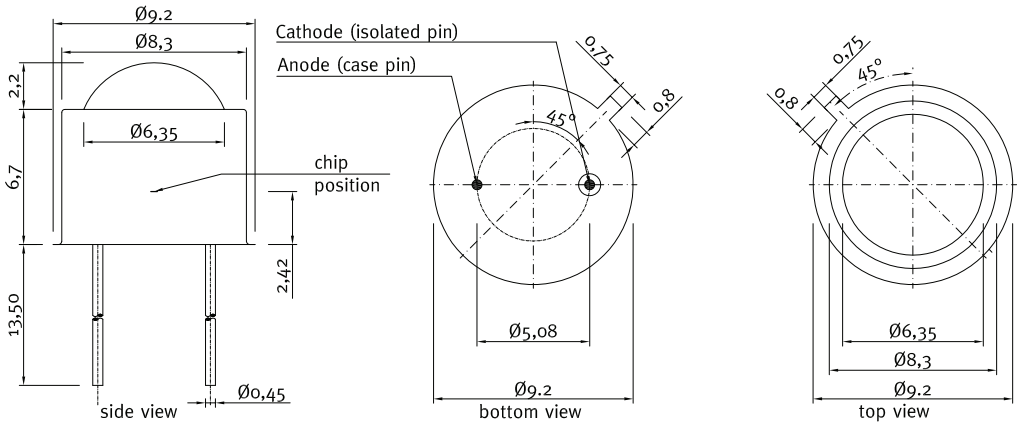
DRAWINGS



SG01L–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 55 mm²

sglux
The UV Experts

Boston Electronics

APPLICATION NOTE FOR PHOTODIODES

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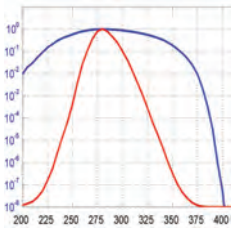
CALIBRATION SERVICE



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- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01L–18

Broadband SiC based UV photodiode A = 1,00 mm²

sglux The UV Experts

Boston Electronics

GENERAL FEATURES

Properties of the SG01L–18 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 1,00 mm²
- TO18 hermetically sealed metal housing, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 13 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typcial circuit on page 3).

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NOMENCLATURE

SG01

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Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01L–18

Broadband SiC based UV photodiode A = 1,0 mm²

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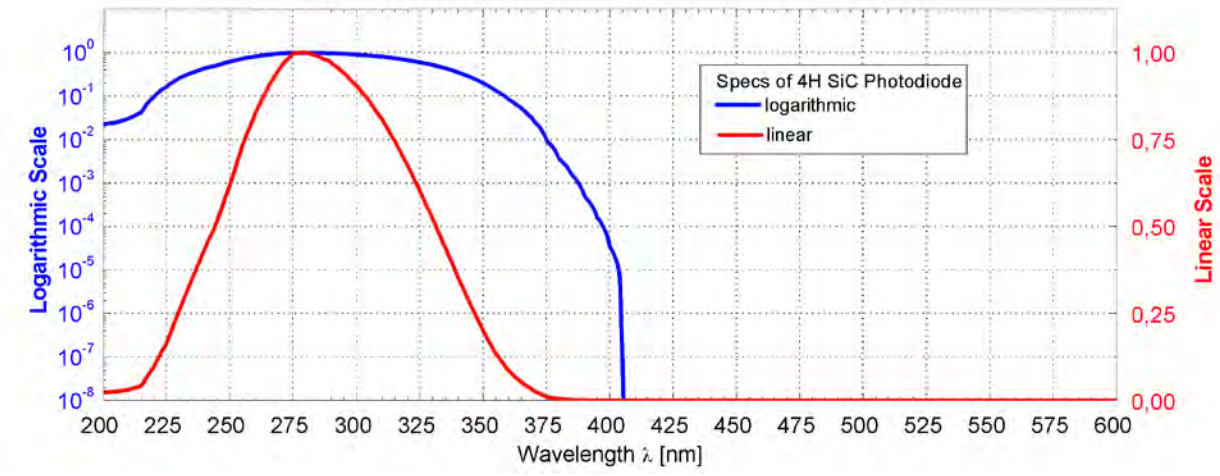
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range (S=0,1*S_{max})	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	1,00	mm^2
Dark Current (1V reverse bias)	I_d	3,3	fA
Capacitance	C	250	pF
Short Circuit (10µW/cm² at peak)	I_o	13	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

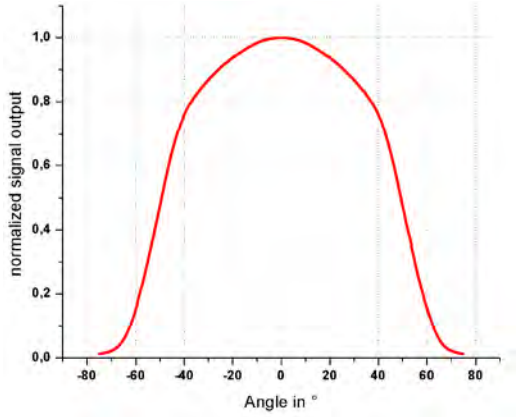
NORMALIZED SPECTRAL RESPONSIVITY



SG01L–18

Broadband SiC based UV photodiode A = 1,0 mm²

FIELD OF VIEW

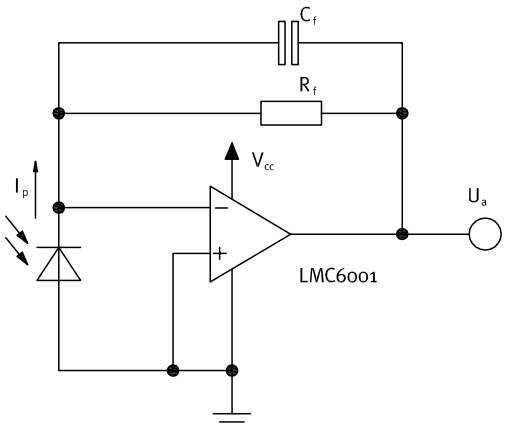


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

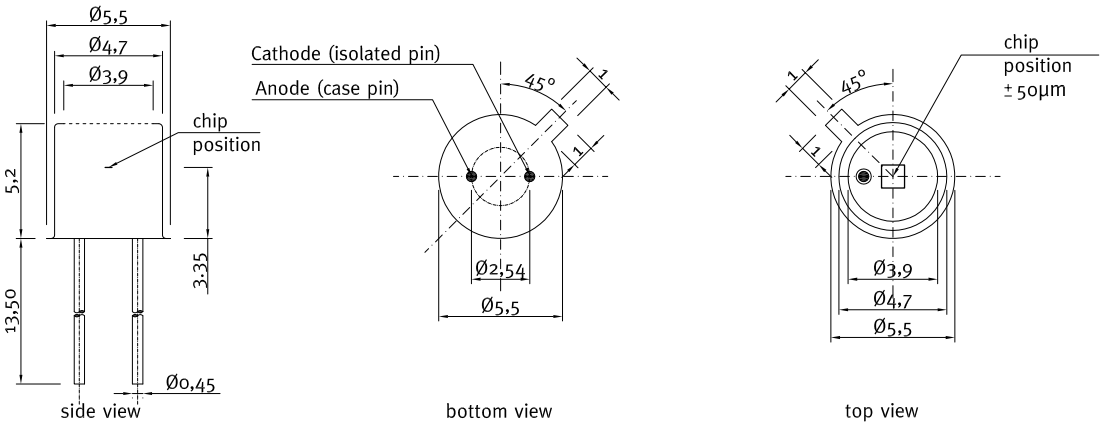
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01L–18

Broadband SiC based UV photodiode A =1,0 mm²

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APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

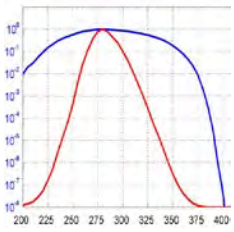
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

Rev. 6.3 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.

SG01L–18ISO90

Broadband SiC based UV photodiode A = 1,0 mm²

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GENERAL FEATURES

Properties of the SG01L–18ISO90 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 1,0 mm²
- TO18 hermetically sealed metal housing, two isolated pins in a circle
- 10µW/cm² peak radiation results a current of approx. 13 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
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XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01L–18ISO90

Broadband SiC based UV photodiode A = 1,0 mm²

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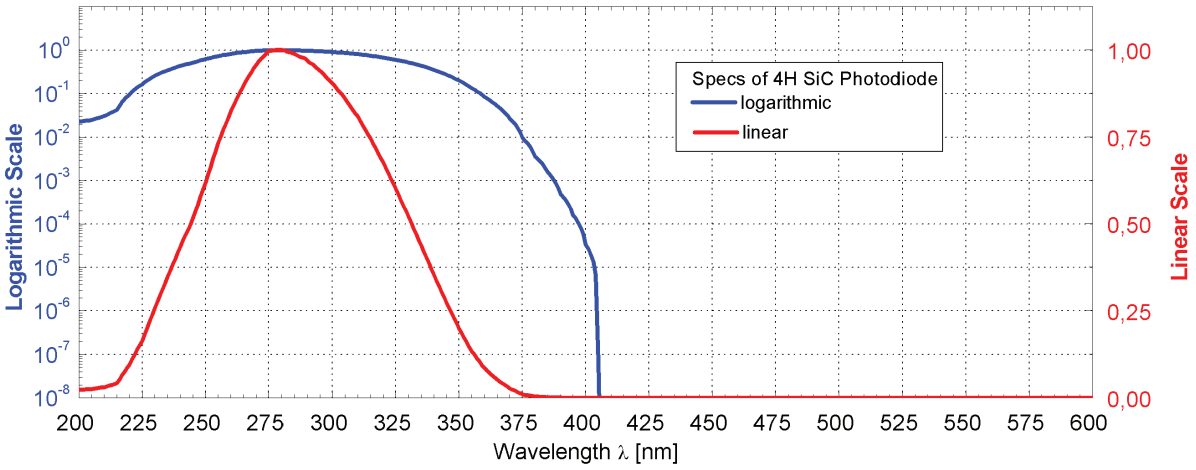
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range ($S=0,1*S_{max}$)	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	1,0	mm^2
Dark Current (1V reverse bias)	I_d	3,3	fA
Capacitance	C	250	pF
Short Circuit (10µW/cm² at peak)	I_o	13	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01L–18ISO90

Broadband SiC based UV photodiode A = 1,0 mm²

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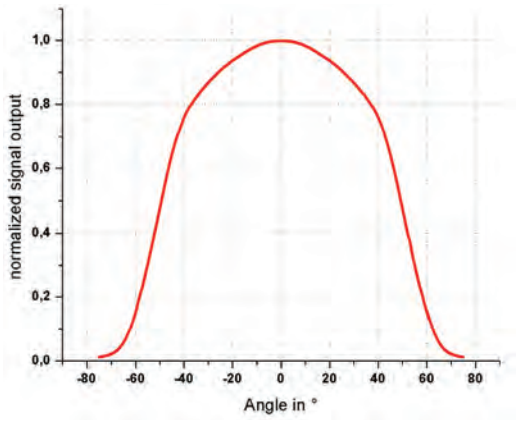
FIELD OF VIEW

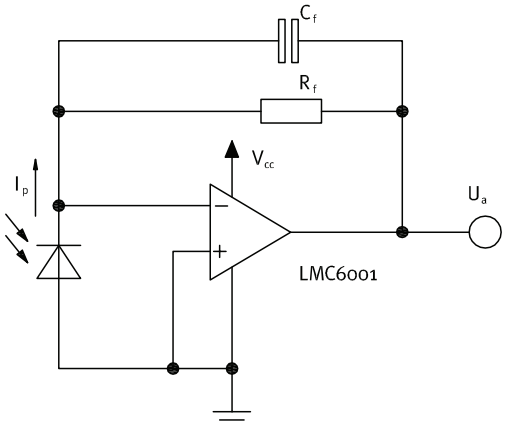


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
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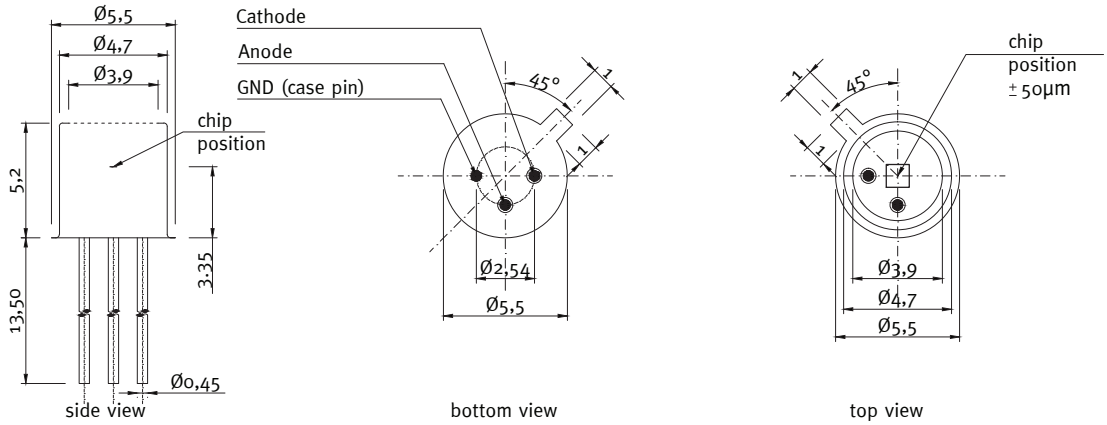
Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01L–18ISO90

Broadband SiC based UV photodiode A =1,0 mm²

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APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

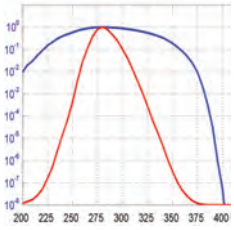
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01L–18S

Broadband SiC based UV photodiode A = 1,0 mm²

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GENERAL FEATURES

Properties of the SG01L–18S UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 1,0 mm²
- TO18 hermetically sealed metal housing, short cap, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 13 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01L–18S

Broadband SiC based UV photodiode A = 1,0 mm²

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
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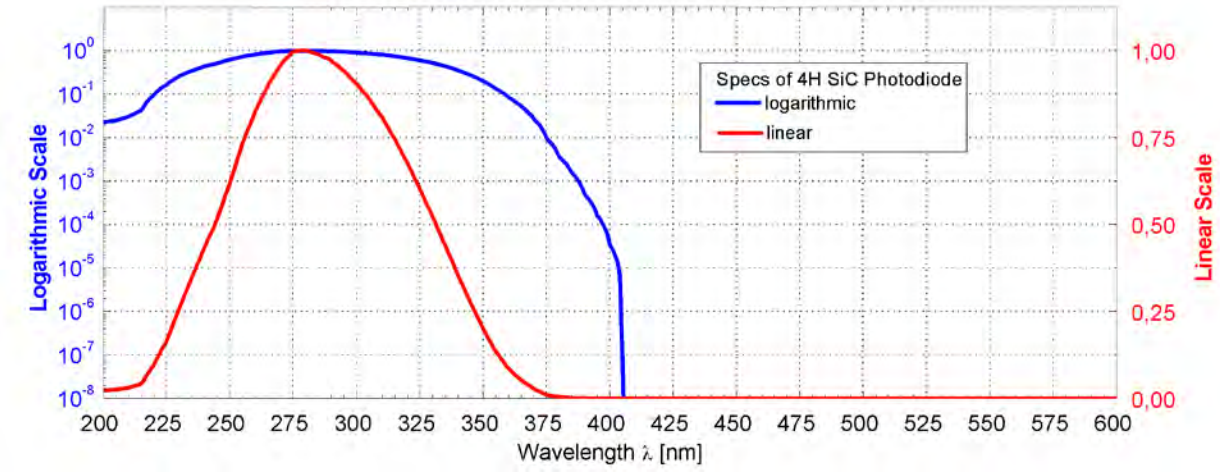
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01L–18S

Broadband SiC based UV photodiode A = 1,0 mm²

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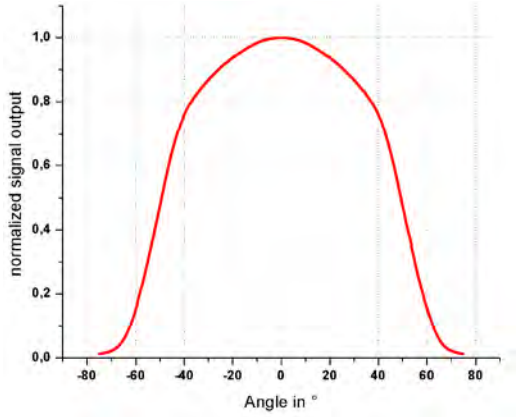
FIELD OF VIEW



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second aperture diameter: 10 mm
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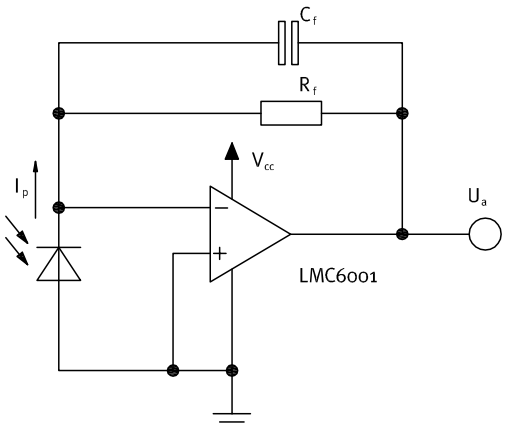
TYPICAL CIRCUIT



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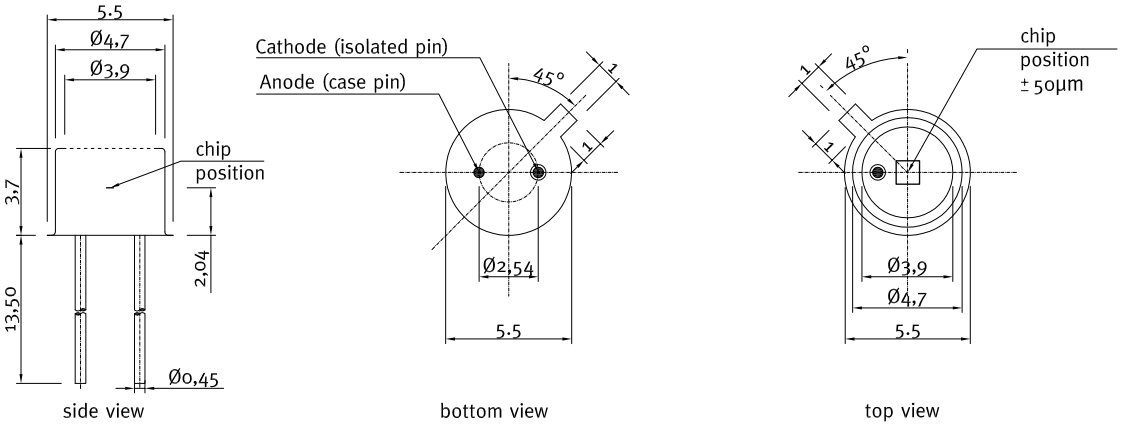
DRAWINGS



SG01L–18S

Broadband SiC based UV photodiode A =1,0 mm²

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APPLICATION NOTE FOR PHOTODIODES

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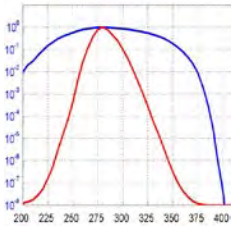
Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



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- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01M–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 11,0 mm²

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Boston Electronics

GENERAL FEATURES

Properties of the SG01M–5LENS UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability, **for very weak radiation**
- Radiation sensitive area A = 11,0 mm²
- TO5 hermetically sealed metal housing with concentrator lens, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 140 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01M–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 11,0 mm²

sglux The UV Experts

Boston Electronics

SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
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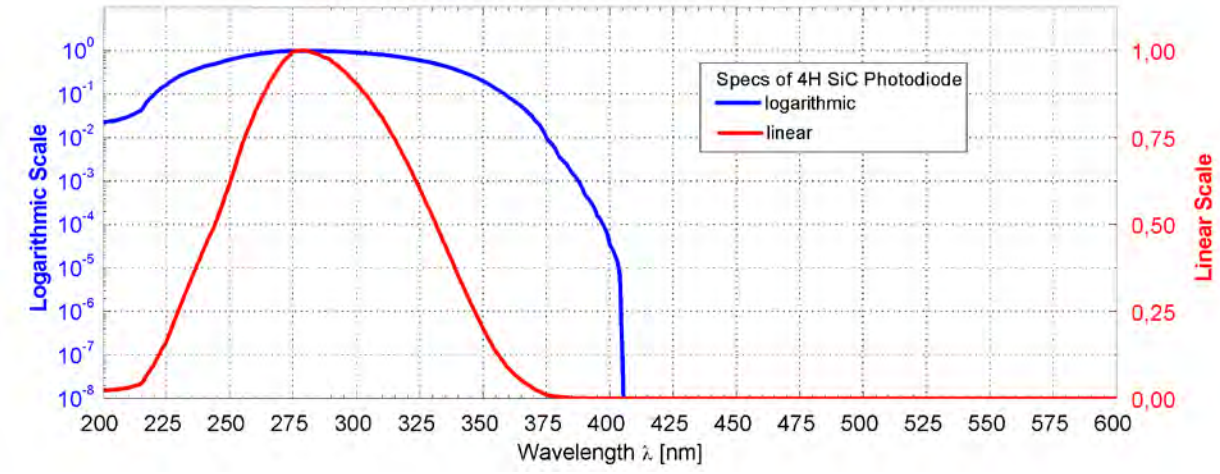
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range ($S=0,1*S_{max}$)	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Sensitive Area (chip size = 0,20 mm²)	A	11,0	mm²
Dark Current (1V reverse bias)	I_d	0,7	fA
Capacitance	C	50	pF
Short Circuit (10µW/cm² at peak)	I_o	140	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01M–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 11,0 mm²

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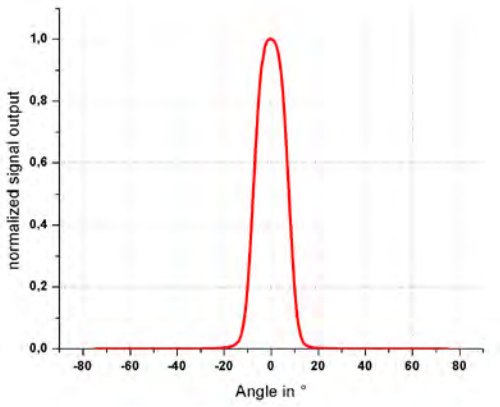
FIELD OF VIEW

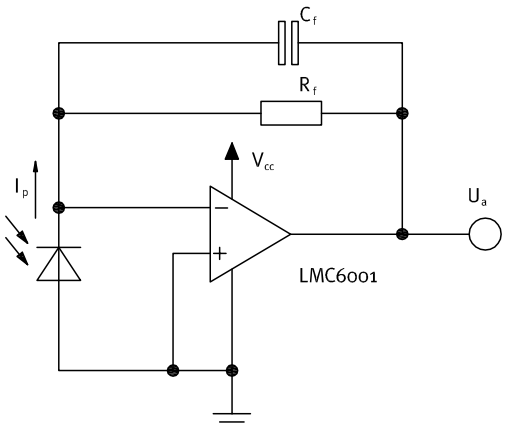


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

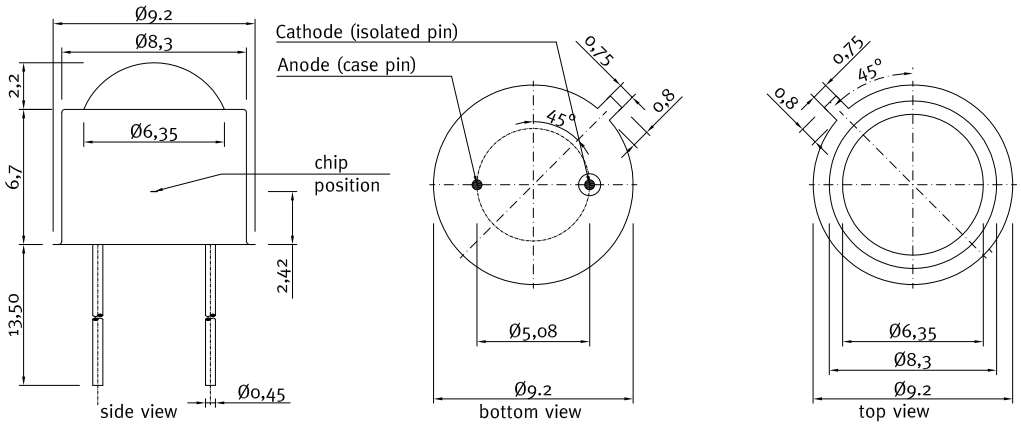
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01M–5LENS

Concentrator lens SiC based UV photodiode $A_{virtual}$ = 11,0 mm²

APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

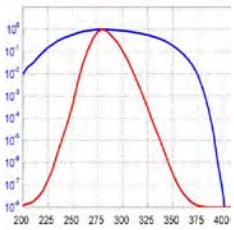
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01M6H–5

Boradband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

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GENERAL FEATURES

Properties of the SG01M6H–5 UV photodiode

- Broadband UVA+UVB+UVC
- 6H SiC chip for enhanced UVA sensitivity, e.g. UVA LED control
- Acitve area A = 0,20 mm²
- TO5 hermetically sealed metal housing, short cap, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 2600 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01M6H–5

Boradband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	290	nm
Responsivity Range (S=0,1*S_{max})	–	226 ... 385	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^3$	–
General Characteristics (T=25°C)			
Active Area	A	0,20	mm^2
Dark Current (1V reverse bias)	I_d	0,7	fA
Capacitance	C	50	pF
Short Circuit (10µW/cm² at peak)	I_o	2600	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
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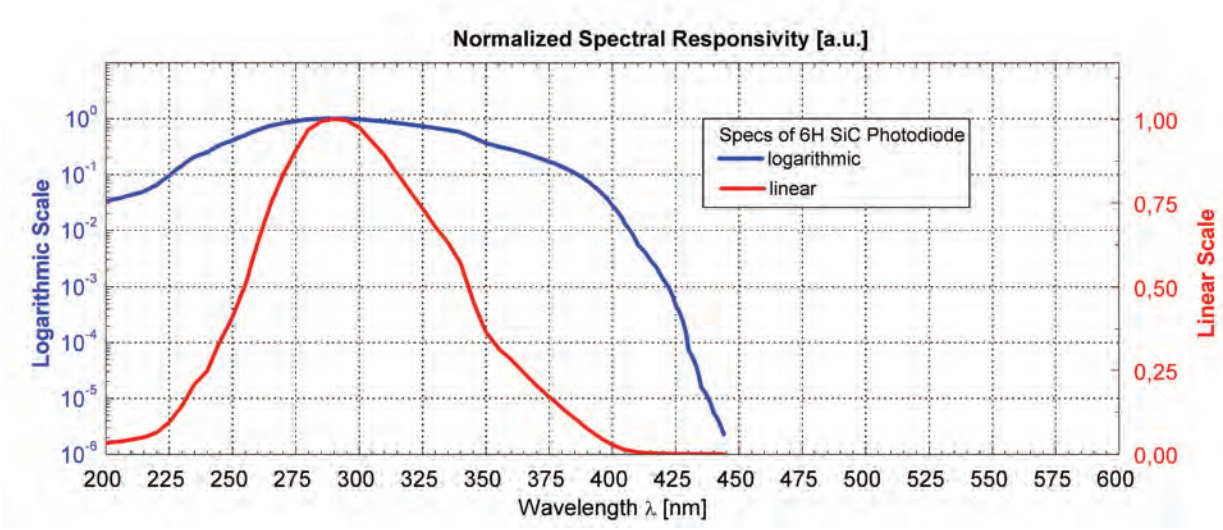
NORMALIZED SPECTRAL RESPONSIVITY



SG01M6H–5

Boradband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

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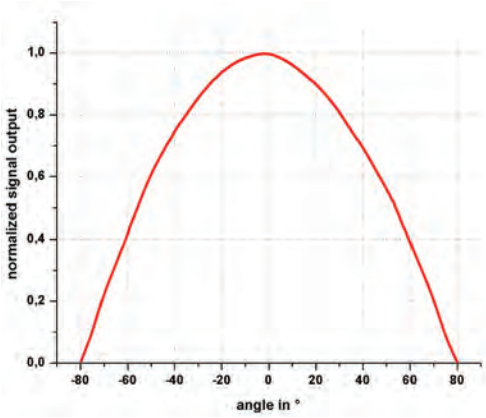
FIELD OF VIEW



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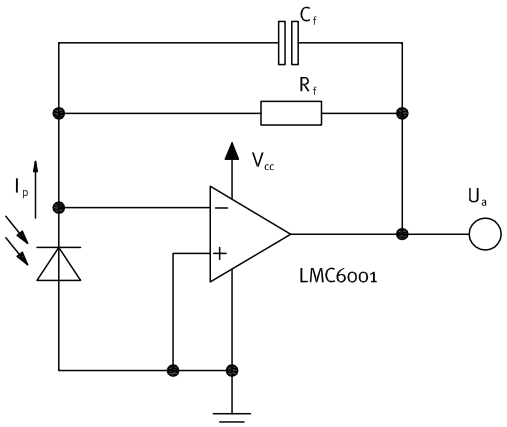
TYPICAL CIRCUIT



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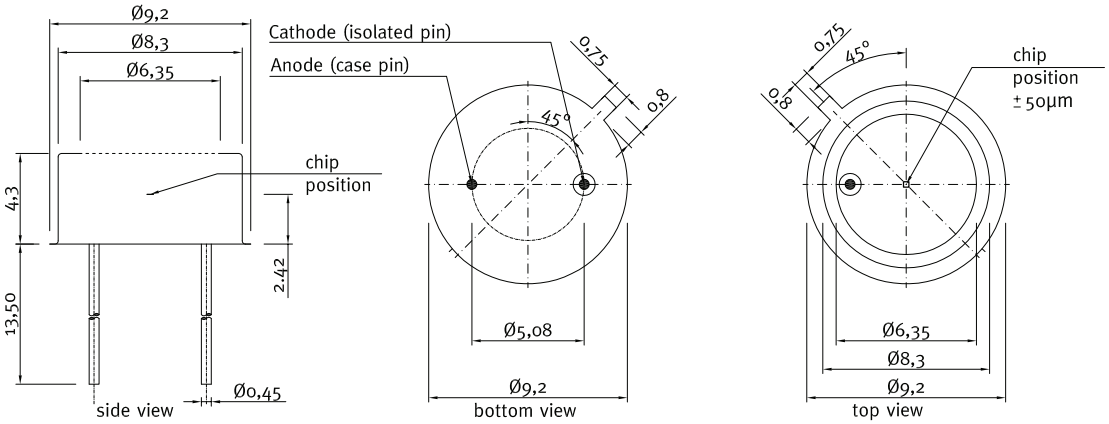
Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01M6H–5

Boradband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

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- Optional feature for all TOCON detectors
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Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
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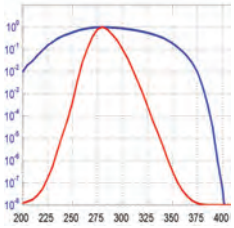
CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01M6H–18

Broadband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

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GENERAL FEATURES

Properties of the SG01M6H–18 UV photodiode

- Broadband UVA+UVB+UVC
- 6H SiC chip for enhanced UVA sensitivity, e.g. UVA LED control
- Active Area A = 0,20 mm²
- TO18 hermetically sealed metal housing, 1 isolated pin and 1 case pin
- 10mW/cm² peak radiation results a current of approx. 2600 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	nothing, A, B, C or E	18, 18ISO90, 18S, 5, 5ISO90	nothing, Lens, MEGA, GIGA
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
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XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01M6H–18

Broadband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
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General Characteristics (T=25°C)			
Active Area	A	0,20	mm^2
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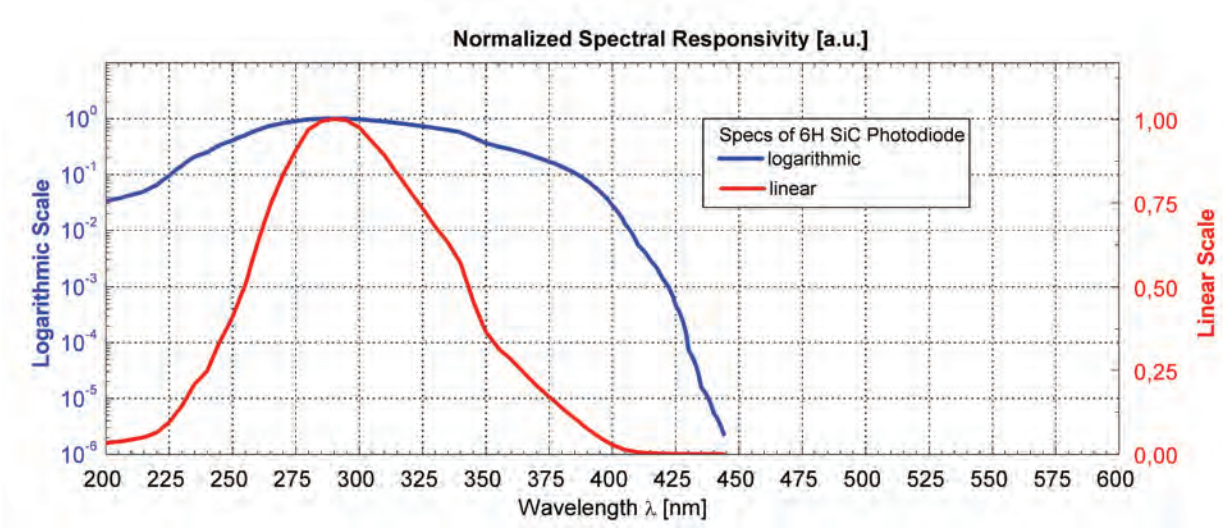

SG01M6H–18

Broadband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

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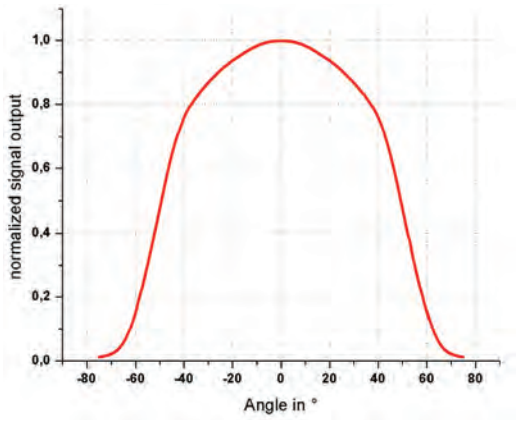
FIELD OF VIEW



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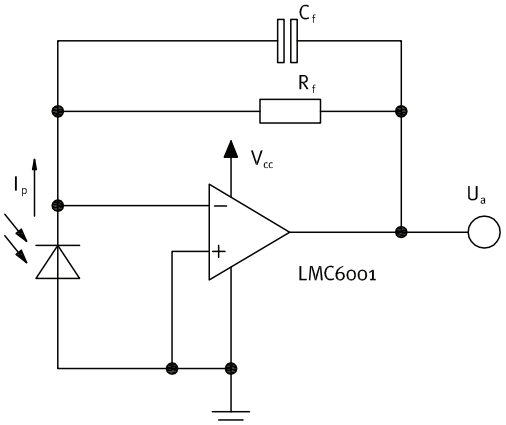

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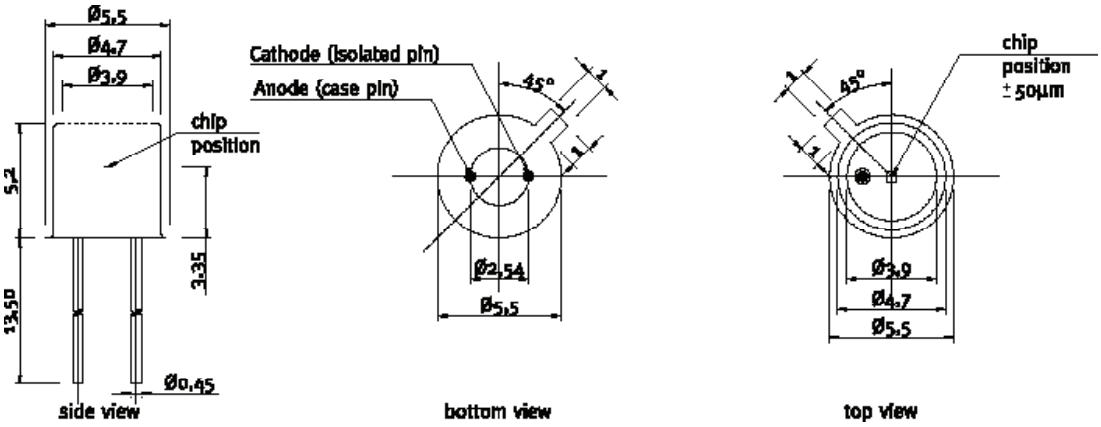

SG01M6H–18

Broadband SiC based UV photodiode A = 0,20 mm², 6H SiC chip

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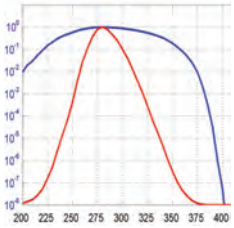

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SG01M–18

Broadband SiC based UV photodiode A = 0,20 mm²

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GENERAL FEATURES

Properties of the SG01M–18 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,20 mm²
- TO18 hermetically sealed metal housing, 1 isolated pin and 1 case pin
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SG01

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Rev. 6.2 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.

SG01M–18

Broadband SiC based UV photodiode A = 0,20 mm²

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Boston Electronics

SPECIFICATIONS

Parameter	Symbol	Value	Unit
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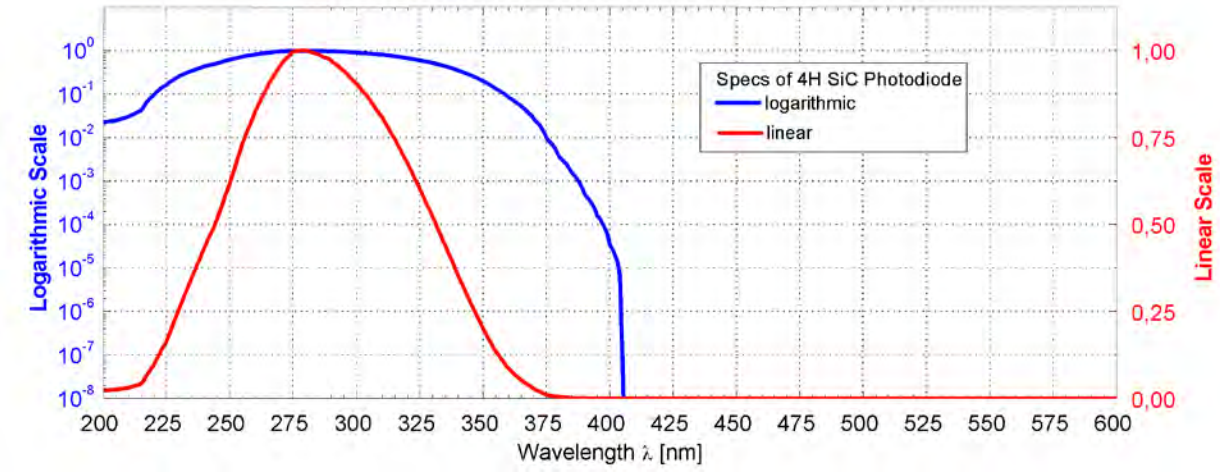
NORMALIZED SPECTRAL RESPONSIVITY



SG01M–18

Broadband SiC based UV photodiode A = 0,20 mm²

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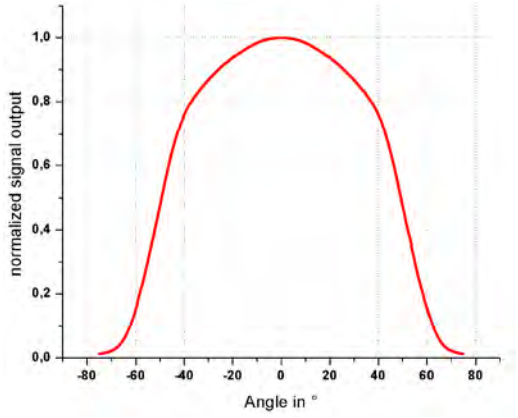
FIELD OF VIEW

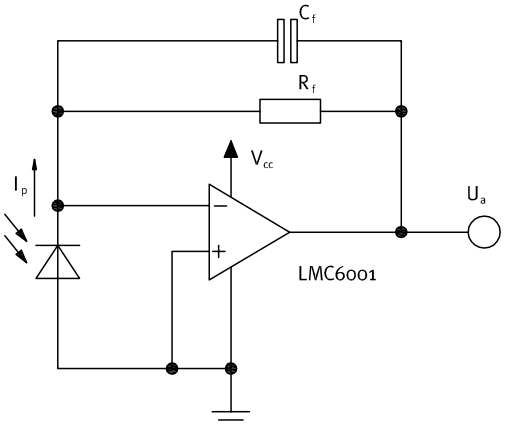


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

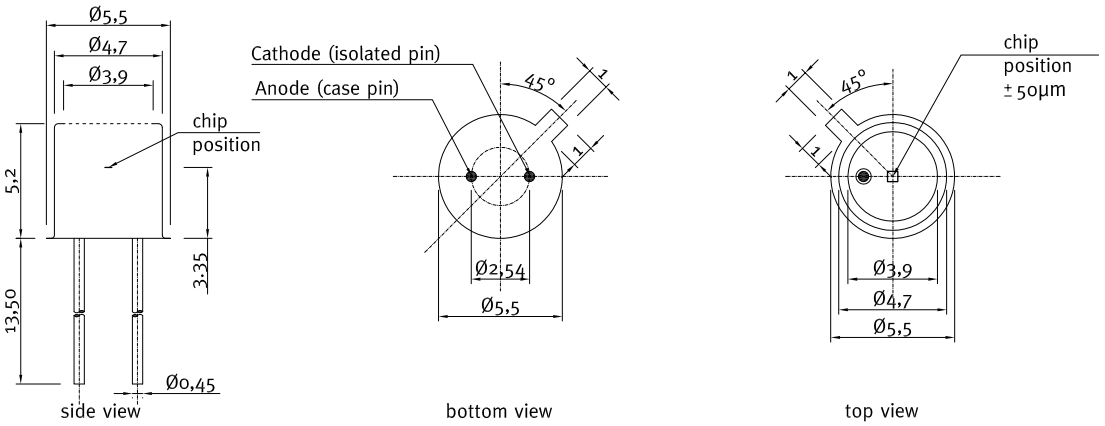
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01M–18

Broadband SiC based UV photodiode A = 0,20 mm²

APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

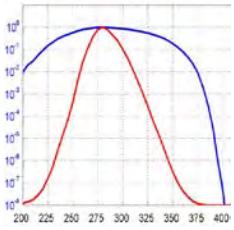
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01M–18ISO90

Broadband SiC based UV photodiode A = 0,20 mm²

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GENERAL FEATURES

Properties of the SG01M–18ISO90 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,20 mm²
- TO18 hermetically sealed metal housing, two isolated pins in a circle
- 10mW/cm² peak radiation results a current of approx. 2600 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01 — **S, M, D, L, XL** — **nothing, A, B, C or E** — **18, 18ISO90, 18S, 5, 5ISO90** — **nothing, Lens, MEGA, GIGA**

Chip area	Spectral response	Housing	Special
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01M–18ISO90

Broadband SiC based UV photodiode A = 0,20 mm²

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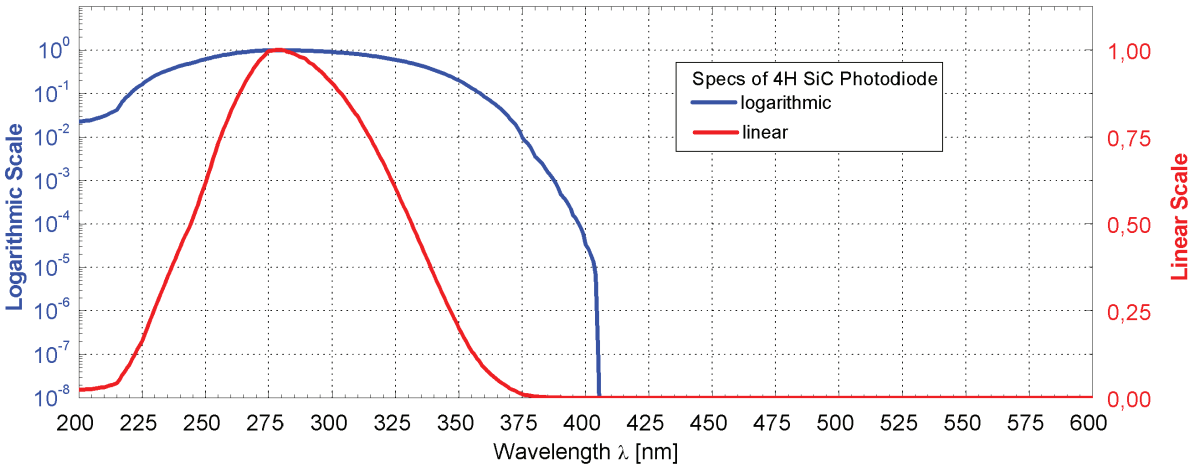
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range (S=0,1*S_{max})	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	0,20	mm^2
Dark Current (1V reverse bias)	I_d	0,7	fA
Capacitance	C	50	pF
Short Circuit (10mW/cm² at peak)	I_o	2600	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01M–18ISO90

Broadband SiC based UV photodiode A = 0,20 mm²

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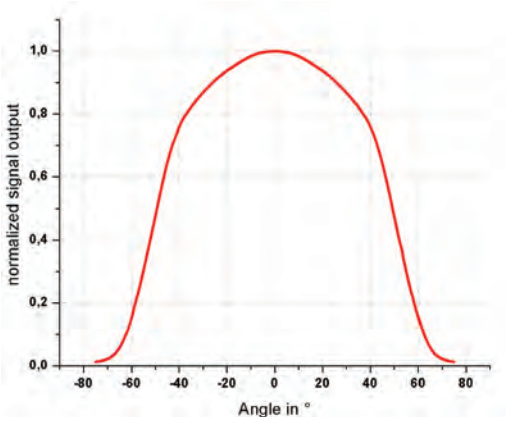
FIELD OF VIEW



Measurement Setup:

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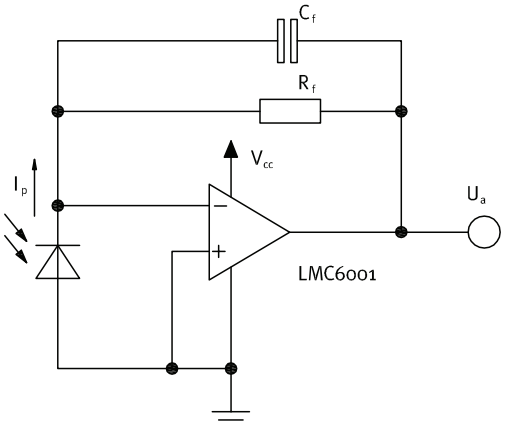
TYPICAL CIRCUIT



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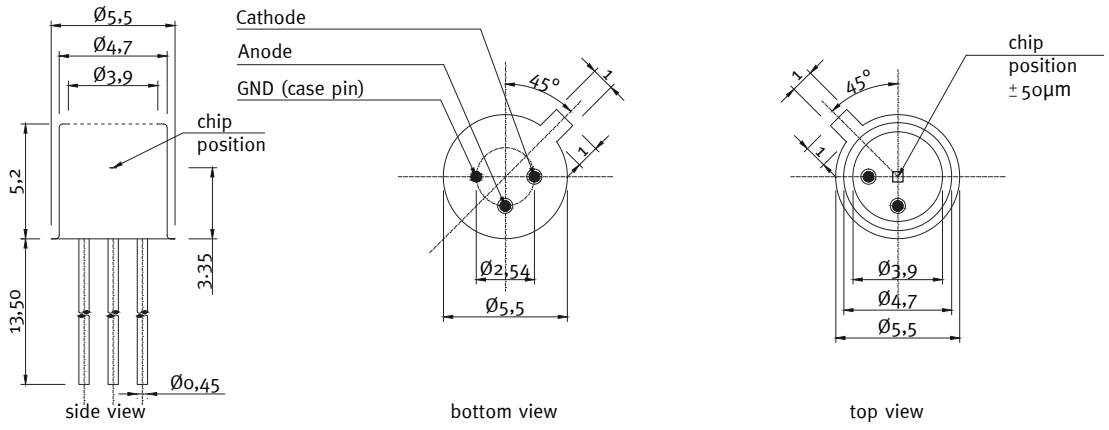
Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01M–18ISO90

Broadband SiC based UV photodiode A = 0,20 mm²

APPLICATION NOTE FOR PHOTODIODES

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Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
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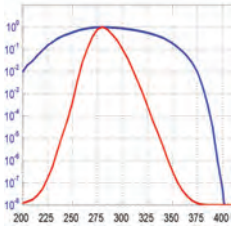
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01M–18S

Broadband SiC based UV photodiode A = 0,20 mm²

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GENERAL FEATURES

Properties of the SG01M–18S UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,20 mm²
- TO18 hermetically sealed metal housing, short cap, 1 isolated pin and 1 case pin
- 10mW/cm² peak radiation results a current of approx. 2600 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

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SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
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SG01M–18S

Broadband SiC based UV photodiode A = 0,20 mm²

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
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Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	0,20	mm^2
Dark Current (1V reverse bias)	I_d	0,7	fA
Capacitance	C	50	pF
Short Circuit (10mW/cm² at peak)	I_o	2600	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
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Reverse Voltage	V_{Rmax}	20	V

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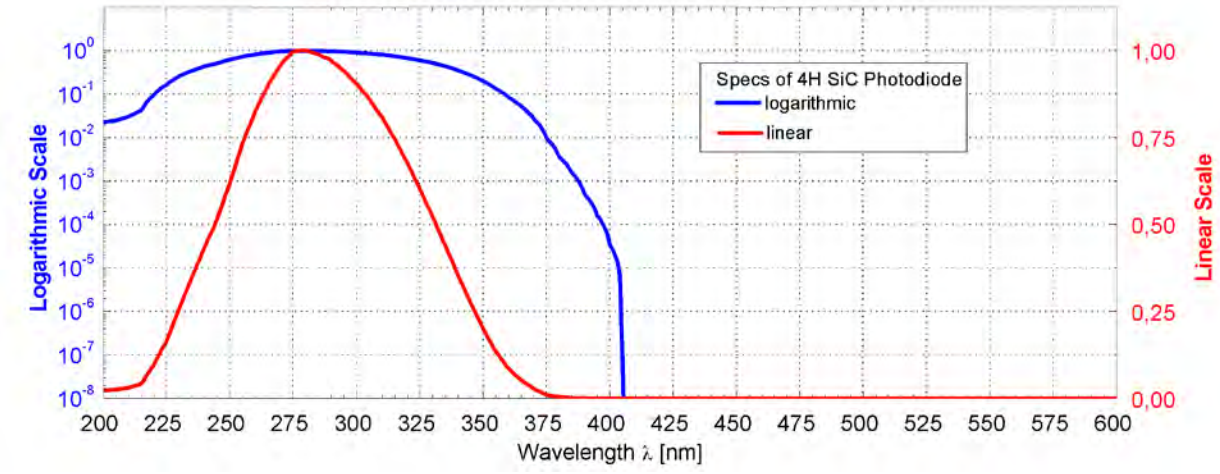

SG01M–18S

Broadband SiC based UV photodiode A = 0,20 mm²

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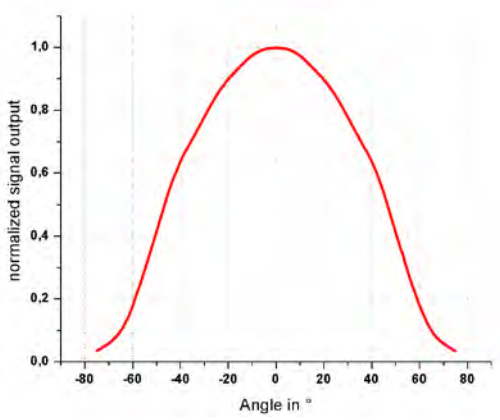
FIELD OF VIEW



Measurement Setup:

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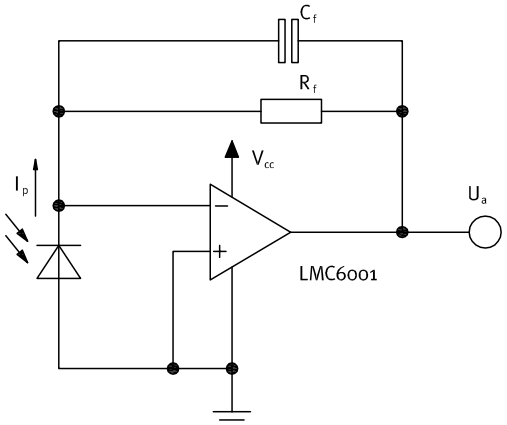
pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



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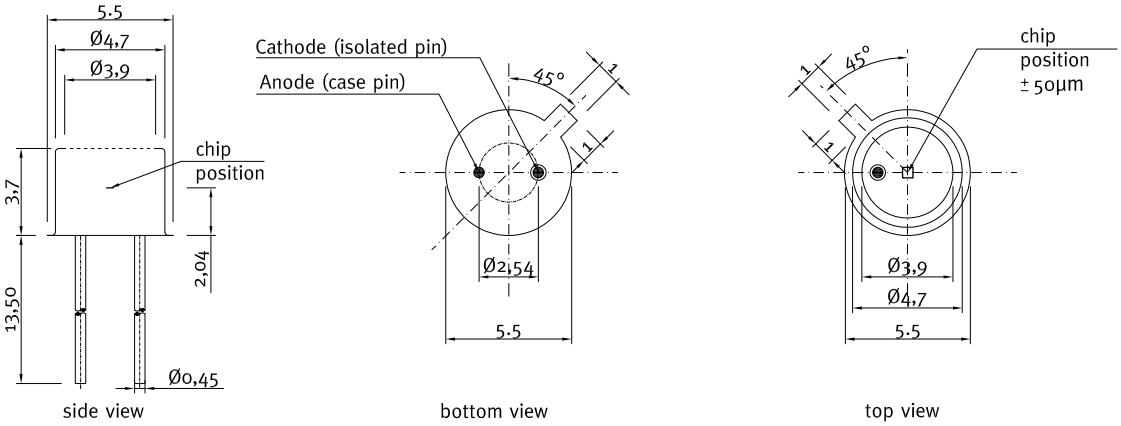
DRAWINGS



SG01M–18S

Broadband SiC based UV photodiode A = 0,20 mm²

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APPLICATION NOTE FOR PHOTODIODES

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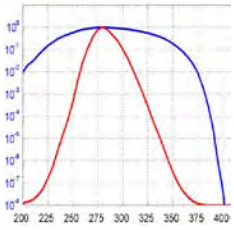
CALIBRATION SERVICE



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- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01S–5

Broadband SiC based UV photodiode A = 0,06 mm²

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Boston Electronics

GENERAL FEATURES

Properties of the SG01S–5 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,06 mm²
- TO5 hermetically sealed metal housing, short cap, 1 isolated pin and 1 case pin
- 10mW/cm² peak radiation results a current of approx. 780 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

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NOMENCLATURE

SG01

S, M, D, L, XL	– nothing, A, B, C or E	18, 18ISO90, 18S, 5, 5ISO90	nothing, Lens, MEGA, GIGA

Chip area	Spectral response	Housing	Special
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01S–5

Broadband SiC based UV photodiode A = 0,06 mm²

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Boston Electronics

SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
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General Characteristics (T=25°C)			
Active Area	A	0,06	mm^2
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Capacitance	C	15	pF
Short Circuit (10mW/cm² at peak)	I_o	780	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
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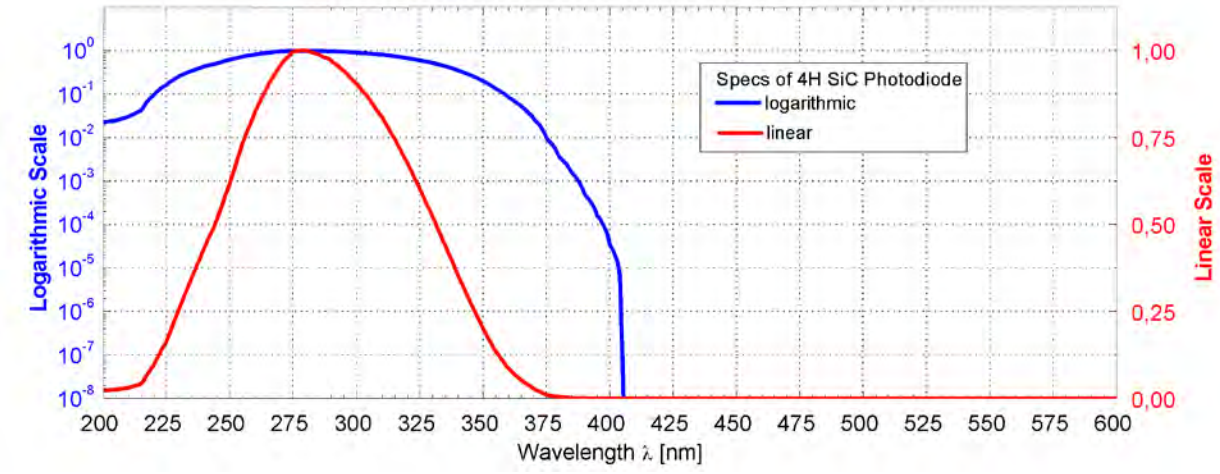
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



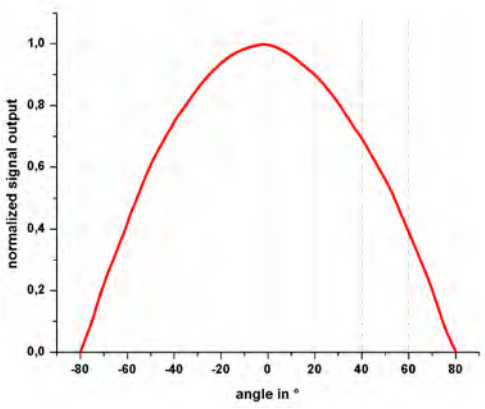
SG01S–5

Broadband SiC based UV photodiode A = 0,06 mm²

sglux
The UV Experts

Boston Electronics

FIELD OF VIEW



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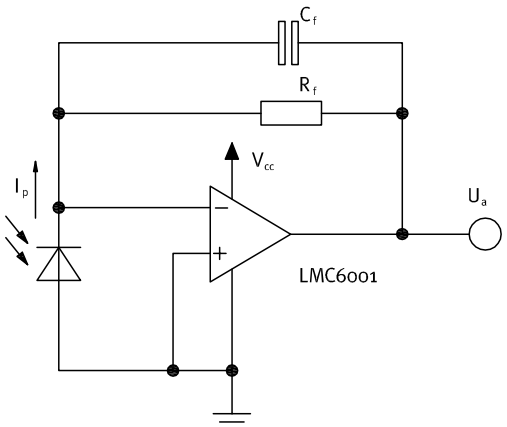
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



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$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

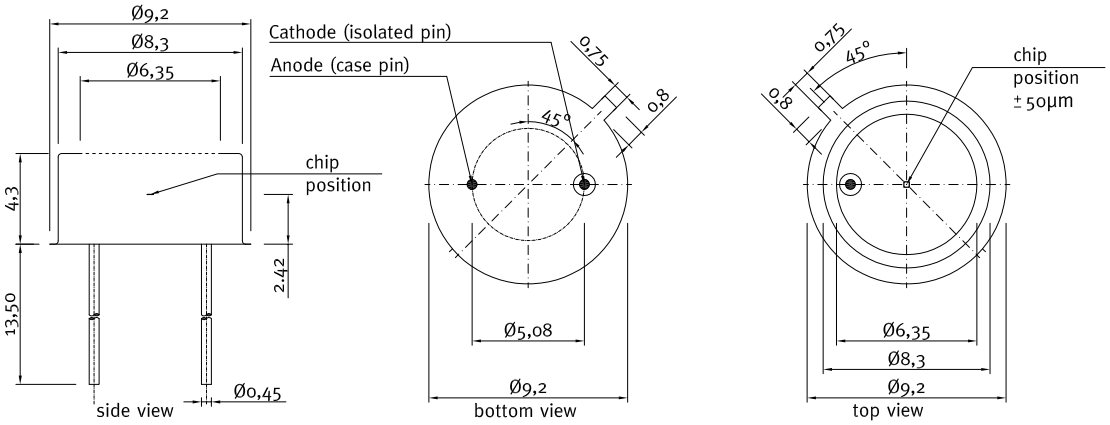
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}s$
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01S–5

Broadband SiC based UV photodiode A = 0,06 mm²

APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements

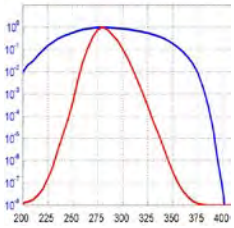
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01S–18

Broadband SiC based UV photodiode A = 0,06 mm²

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GENERAL FEATURES

Properties of the SG01S–18 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,06 mm²
- TO18 hermetically sealed metal housing, 1 isolated pin and 1 case pin
- 10mW/cm² peak radiation results a current of approx. 780 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01 — **S, M, D, L, XL** — **nothing, A, B, C or E** — **18, 18ISO90, 18S, 5, 5ISO90** — **nothing, Lens, MEGA, GIGA**

Chip area	Spectral response	Housing	Special
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

Rev. 6.2 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.

SG01S–18

Broadband SiC based UV photodiode A = 0,06 mm²

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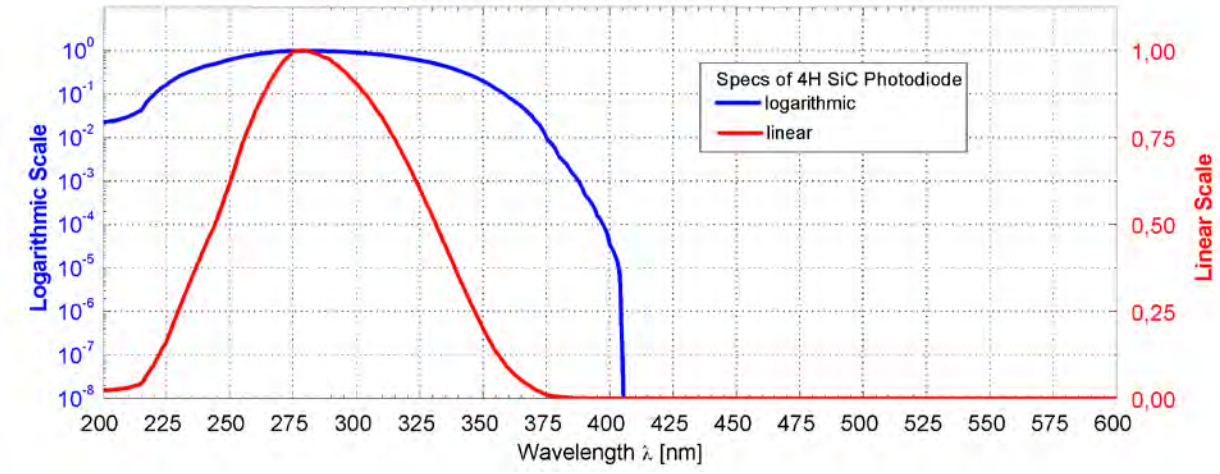
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range ($S=0,1*S_{max}$)	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	0,06	mm^2
Dark Current (1V reverse bias)	I_d	0,2	fA
Capacitance	C	15	pF
Short Circuit (10mW/cm² at peak)	I_o	780	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01S–18

Broadband SiC based UV photodiode A = 0,06 mm²

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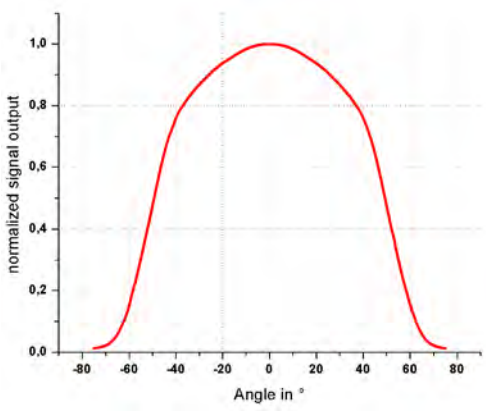
FIELD OF VIEW

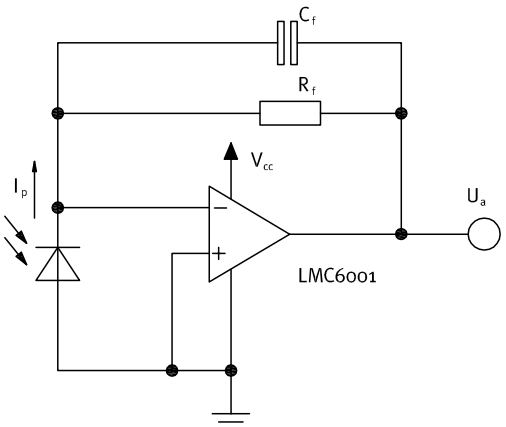


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



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$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

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Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
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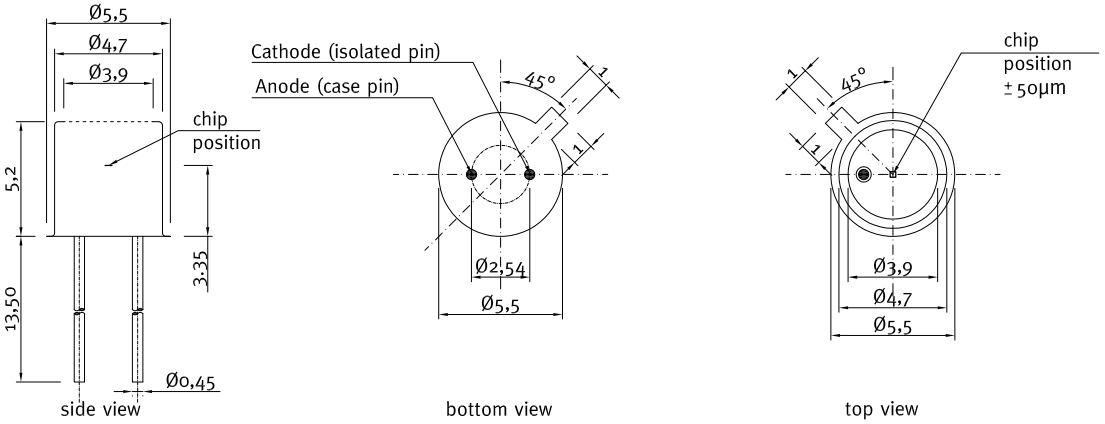
DRAWINGS



SG01S–18

Broadband SiC based UV photodiode A = 0,06 mm²

APPLICATION NOTE FOR PHOTODIODES

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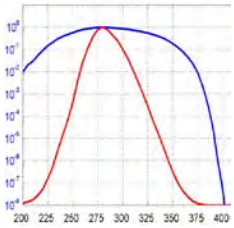
- Good EMC safety for industrial applications

CALIBRATION SERVICE



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- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01S–18ISO90

Broadband SiC based UV photodiode A = 0,06 mm²

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GENERAL FEATURES

Properties of the SG01S–18ISO90 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,06 mm²
- TO18 hermetically sealed metal housing, two isolated pins in a circle
- 10mW/cm² peak radiation results a current of approx. 780 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

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NOMENCLATURE

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Chip area	Spectral response	Housing	Special
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01S–18ISO90

Broadband SiC based UV photodiode A = 0,06 mm²

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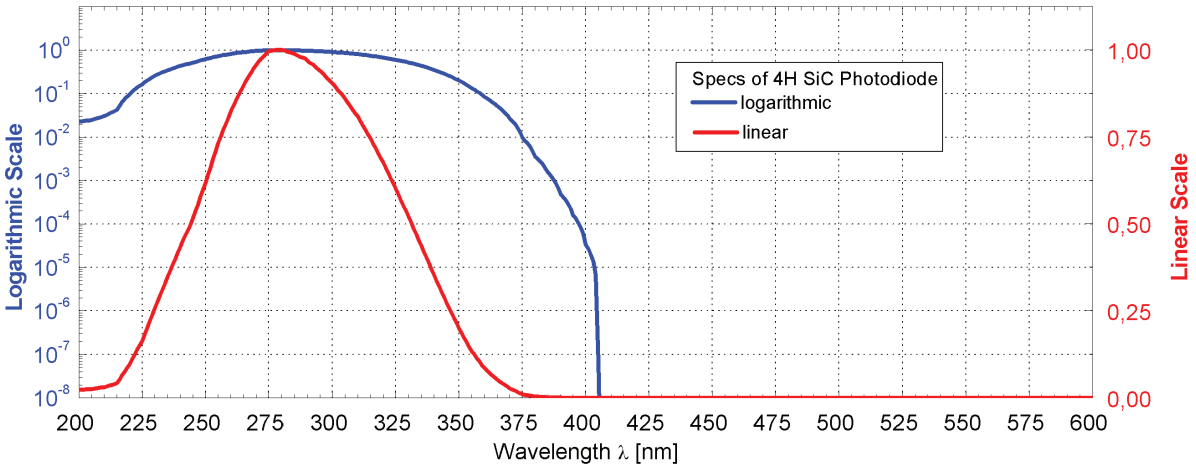
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range (S=0,1*S_{max})	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	0,06	mm^2
Dark Current (1V reverse bias)	I_d	0,2	fA
Capacitance	C	15	pF
Short Circuit (10mW/cm² at peak)	I_o	780	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01S–18ISO90

Broadband SiC based UV photodiode A = 0,06 mm²

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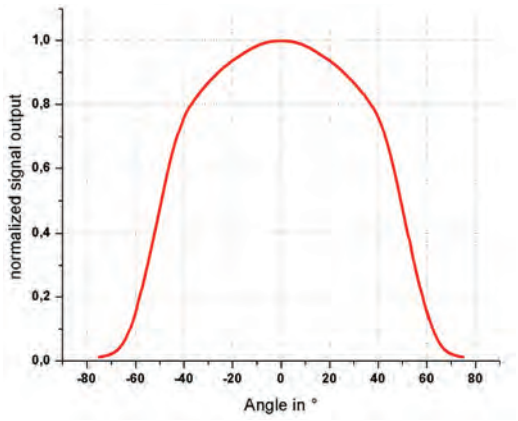
FIELD OF VIEW

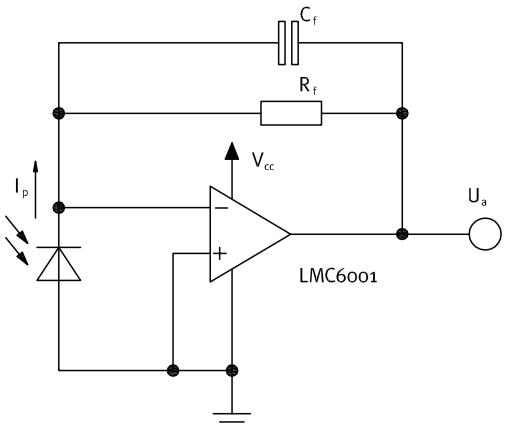


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



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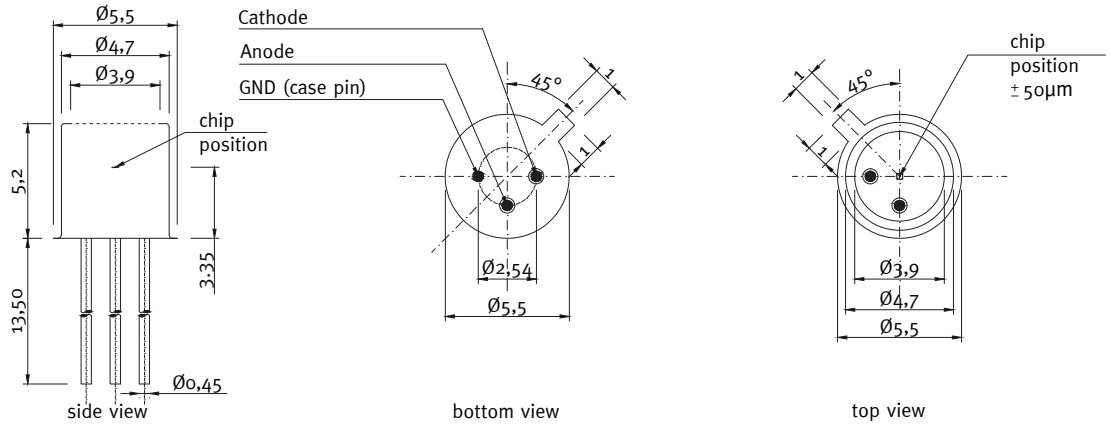
DRAWINGS



SG01S–18ISO90

Broadband SiC based UV photodiode A = 0,06 mm²

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APPLICATION NOTE FOR PHOTODIODES

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UPGRADE TO A TOCON OR A PROBE

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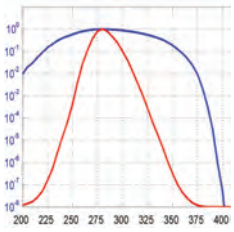
CALIBRATION SERVICE



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Rev. 6.3 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.

SG01S–18S

Broadband SiC based UV photodiode A = 0,06 mm²

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GENERAL FEATURES

Properties of the SG01S–18S UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 0,06 mm²
- TO18 hermetically sealed metal housing, short cap, 1 isolated pin and 1 case pin
- 10mW/cm² peak radiation results a current of approx. 780 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

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NOMENCLATURE

SG01

S, M, D, L, XL	– **nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**

Chip area	Spectral response	Housing	Special
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M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
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L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01S–18S

Broadband SiC based UV photodiode A = 0,06 mm²

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Boston Electronics

SPECIFICATIONS

Parameter	Symbol	Value	Unit
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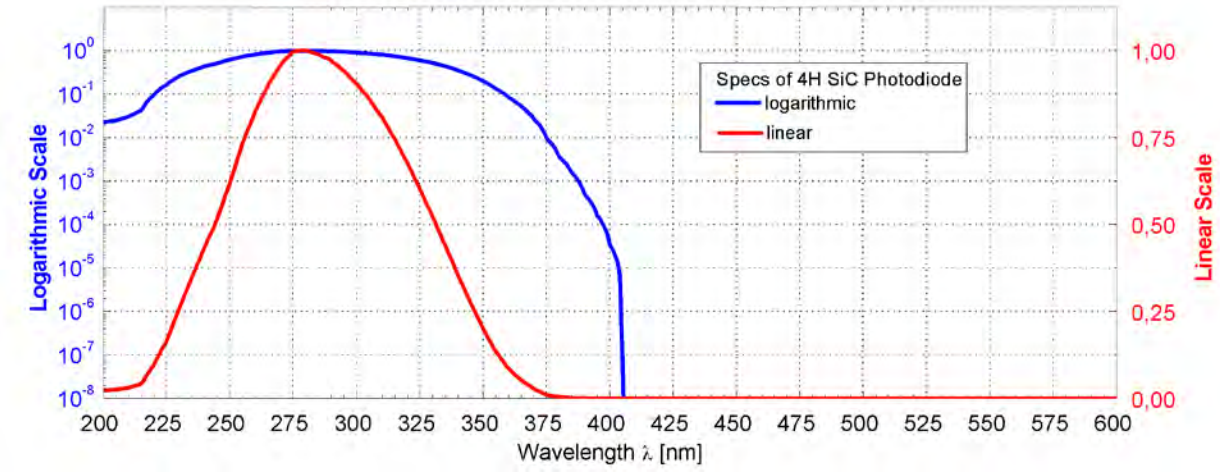
NORMALIZED SPECTRAL RESPONSIVITY



SG01S–18S

Broadband SiC based UV photodiode A = 0,06 mm²

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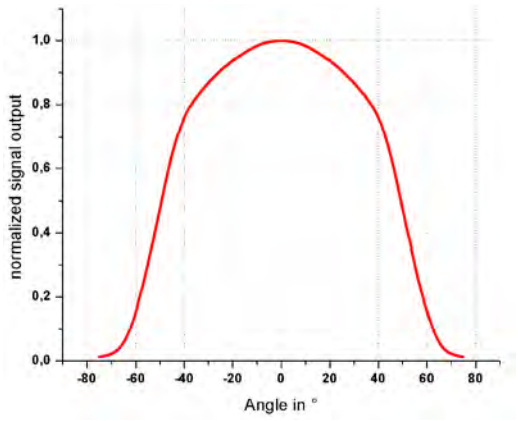
FIELD OF VIEW



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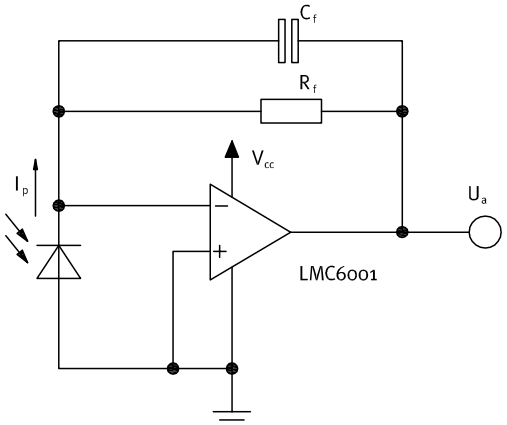

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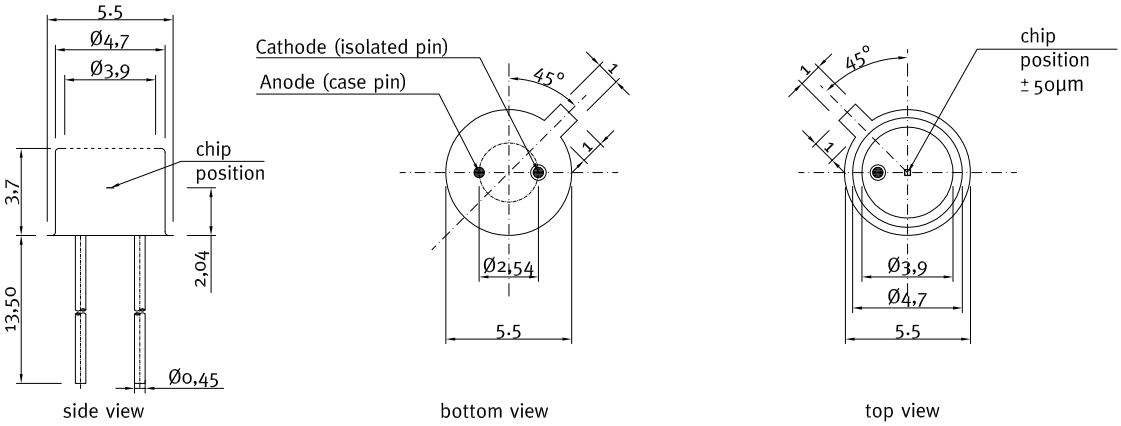
DRAWINGS



SG01S–18S

Broadband SiC based UV photodiode A = 0,06 mm²

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- UV broadband, UVA, UVB, UVC or Erythema measurements

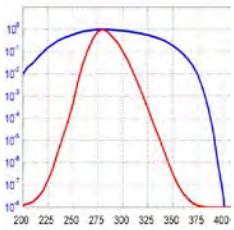
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body
- Integrated sensor connector (Binder 5-Pin plug) with 2m connector cable
- Easy to mount and connect

Industrial UV probes

- Different housings e.g. with cosine response, water pressure proof or sapphire windows
- Different electronic outputs configurable (voltage, current, USB, CAN)
- Good EMC safety for industrial applications

CALIBRATION SERVICE



- Different NIST and PTB traceable calibrations and measurements for all sglux sensors
- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01XL–5

Broadband SiC based UV photodiode A = 7,6 mm²

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Boston Electronics

GENERAL FEATURES

Properties of the SG01XL–5 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 7,6 mm²
- TO5 hermetically sealed metal housing, short cap, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 99 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with seven different active chip areas from 0,06 mm² up to 36 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 7,60 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01XL–5

Broadband SiC based UV photodiode A = 7,6 mm²

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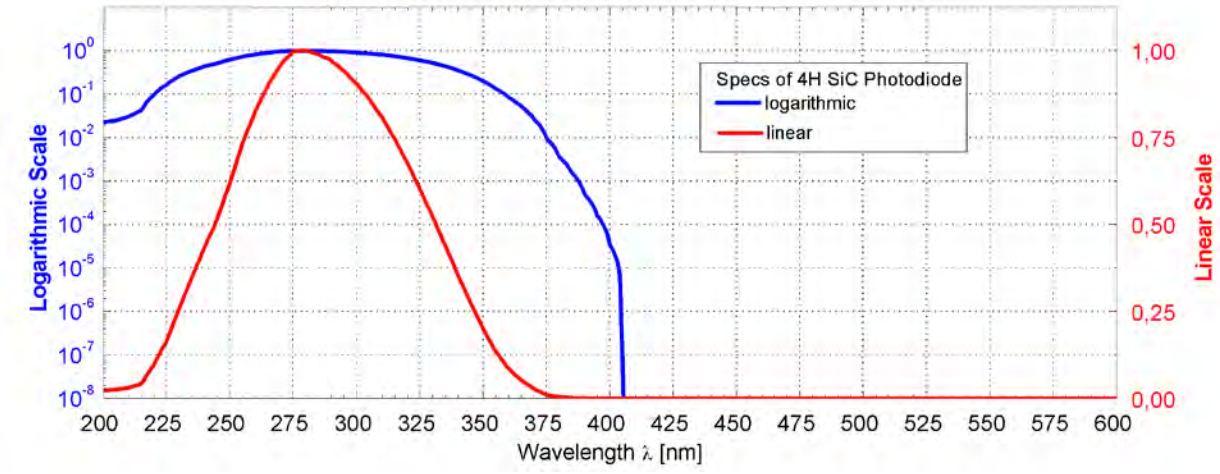
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range (S=0,1*S_{max})	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	7,6	mm²
Dark Current (1V reverse bias)	I_d	25,3	fA
Capacitance	C	1900	pF
Short Circuit (10µW/cm² at peak)	I_o	99	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
Storage Temperature	T_{stor}	–55 ... +170	°C
Soldering Temperature (3s)	T_{sold}	260	°C
Reverse Voltage	V_{Rmax}	20	V

NORMALIZED SPECTRAL RESPONSIVITY



SG01XL–5

Broadband SiC based UV photodiode A = 7,6 mm²

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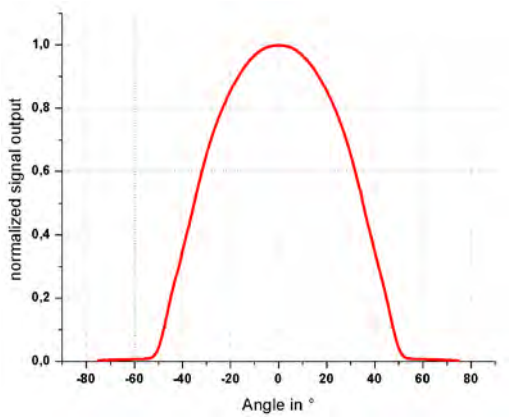
FIELD OF VIEW

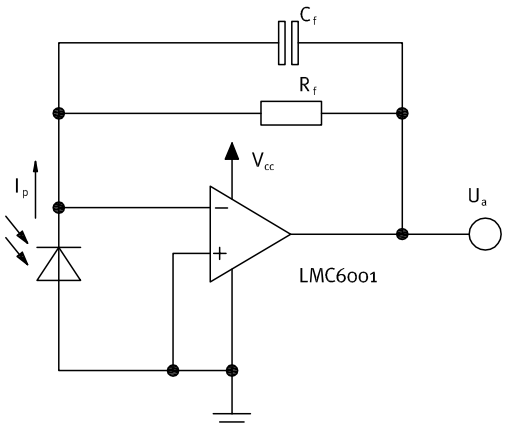


Measurement Setup:

lamp aperture diameter: 10 mm
distance lamp aperture to second aperture: 17 mm
second aperture diameter: 10 mm
distance second aperture to detector: 93 mm

pivot level = top surface of the photodiode window

TYPICAL CIRCUIT



Calculations and Limits:

$U_a = I_p \times R_f = 0 \ldots \sim V_{cc}$

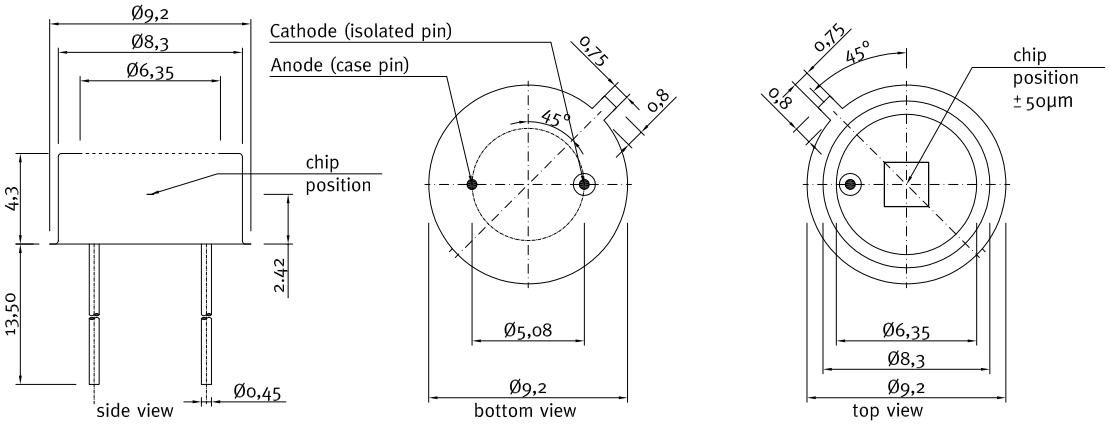
$U_{a,max}$ depends on load and amplifier type

R_f = 10kΩ ... ~ 10GΩ, $C_f \geq 3pF$
Recommendation: $R_f \times C_f \geq 10^{-3}$s
$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
I_p = 20nA, R_f =100MΩ, C_f =100 pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$

DRAWINGS



SG01XL–5

Broadband SiC based UV photodiode A = 7,6 mm²

APPLICATION NOTE FOR PHOTODIODES

For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short circuiting of the photodiode. Usual approaches are using a **Picoamperemeter** or a **transimpedance amplifier** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated amplifier

- SiC based UV hybrid detector with amplifier (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures intensities from 1,8 pW/cm² up to 18 W/cm²
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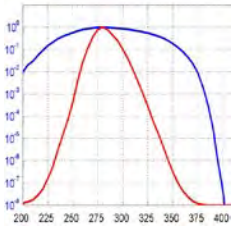
CALIBRATION SERVICE



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- Calibration of sensors for irradiation measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01XL–5ISO90

Broadband SiC based UV photodiode A = 7,6 mm²

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GENERAL FEATURES

Properties of the SG01XL–5ISO90 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 7,6 mm²
- TO5 hermetically sealed metal housing, short cap, two isolated pins in a circle
- 10µW/cm² peak radiation results a current of approx. 99 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

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SG01

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SG01XL–5ISO90

Broadband SiC based UV photodiode A = 7,6 mm²

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
Responsivity Range (S=0,1*S_{max})	–	221 ... 358	nm
Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	7,6	mm²
Dark Current (1V reverse bias)	I_d	25,3	fA
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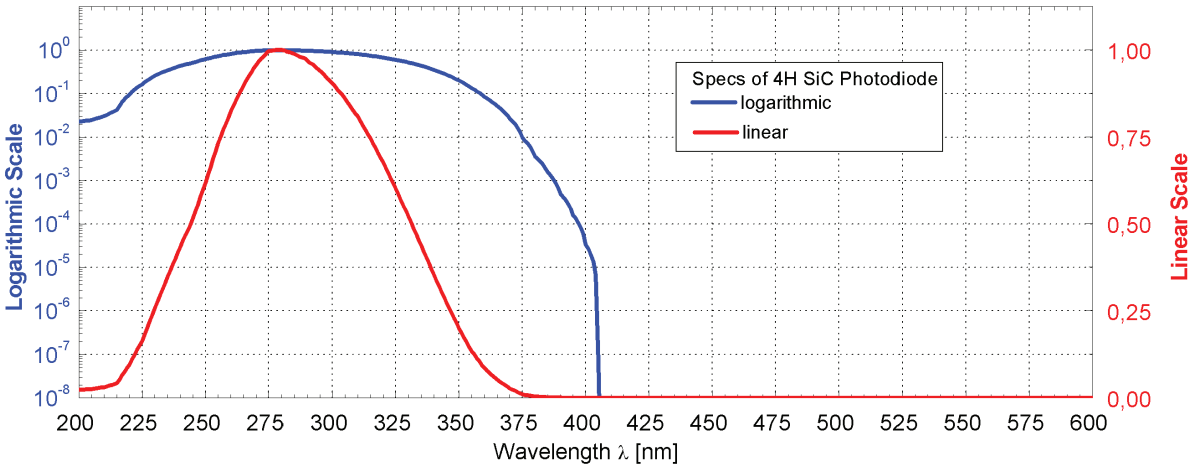
NORMALIZED SPECTRAL RESPONSIVITY



SG01XL–5ISO90

Broadband SiC based UV photodiode A = 7,6 mm²

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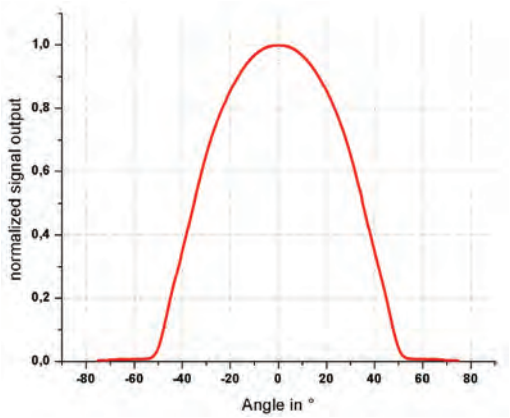
FIELD OF VIEW



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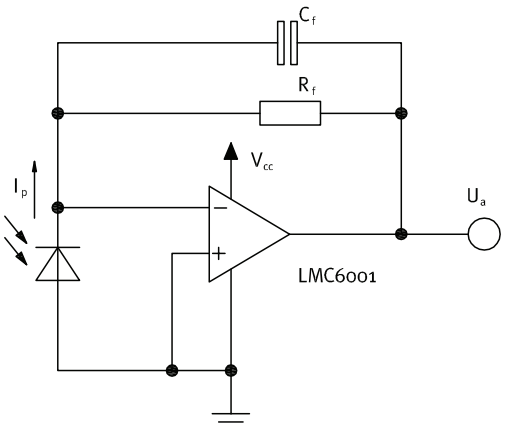
TYPICAL CIRCUIT



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$U_{a,max}$ depends on load and amplifier type

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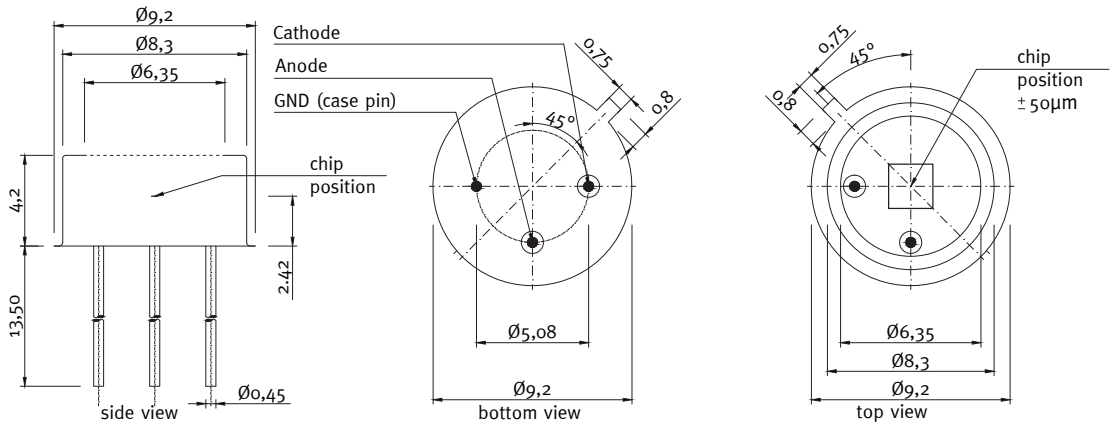
DRAWINGS



SG01XL–5ISO90

Broadband SiC based UV photodiode A = 7,6 mm²

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APPLICATION NOTE FOR PHOTODIODES

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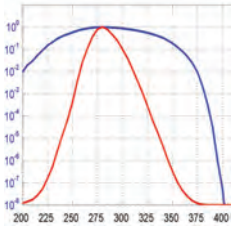
CALIBRATION SERVICE



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- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity

SG01XXL–8ISO90

Broadband SiC based UV photodiode A = 36 mm²

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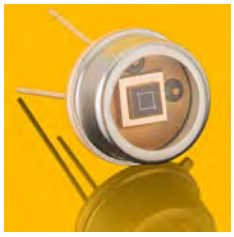
GENERAL FEATURES



Properties of the SG01XXL–8ISO90 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 36 mm²
- TO8 hermetically sealed metal housing, two isolated pins in a circle
- 10µW/cm² peak radiation results a current of approx. 468 nA

About the material Silicon Carbide (SiC)

SiC provides the unique property of extreme radiation hardness, near-perfect visible blindness, low dark current, high speed and low noise. These features make SiC the best available material for visible blind semiconductor UV detectors. The SiC detectors can be permanently operated at up to 170°C (338°F). The temperature coefficient of signal (responsivity) is also low, < 0,1%/K. Because of the low noise (dark current in the fA range), very low UV radiation intensities can be measured reliably. Please note that this device needs an appropriate amplifier (see typical circuit on page 3).

Options

SiC photodiodes are available with five different active chip areas from 0,06 mm² up to 4,00 mm². Standard version is broadband UVA-UVB-UVC. Four filtered versions lead to a tighter sensitivity range. All photodiodes have a hermetically sealed metal housing (TO type), either a 5,5 mm diameter TO18 housing or a 9,2 mm TO5 housing. Further option is either a 2 pin header (1 isolated, 1 grounded) or a 3 pin header (2 isolated, 1 grounded).

NOMENCLATURE

SG01

S, M, D, L, XL	**nothing, A, B, C or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, MEGA, GIGA**
Chip area	**Spectral response**	**Housing**	**Special**
S 0,06 mm²	**nothing = broadband** λ_{max} = 280 nm $\lambda_{S10\%}$ = 221 nm ... 358 nm	**18** 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded	**Lens** with concentrating lens, TO5 only
M 0,20 mm²	**A = UVA** λ_{max} = 331 nm $\lambda_{S10\%}$ = 309 nm ... 367 nm	**18ISO90** 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded	
D 0,50 mm²	**B = UVB** λ_{max} = 280 nm $\lambda_{S10\%}$ = 231 nm ... 309 nm	**18S** 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded	**MEGA** with attenuator up to 0,5 W/cm²
L 1,00 mm²	**C = UVC** λ_{max} = 275 nm $\lambda_{S10\%}$ = 225 nm ... 287 nm	**5** 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI	
XL 4,00 mm²	**E = UV-Index** spectral response according to CIE087	**5ISO90** 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded	**GIGA** with attenuator up to 7 W/cm²

SG01XXL–8ISO90

Broadband SiC based UV photodiode A = 36 mm²

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SPECIFICATIONS

Parameter	Symbol	Value	Unit
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Typical Responsivity at Peak Wavelength	S_{max}	0,130	AW^{-1}
Wavelength of max. Spectral Responsivity	λ_{max}	280	nm
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Visible Blindness ($S_{max}/S_{>405nm}$)	VB	$> 10^{10}$	–
General Characteristics (T=25°C)			
Active Area	A	36	mm^2
Dark Current (1V reverse bias)	I_d	120	fA
Capacitance	C	9000	pF
Short Circuit (10µW/cm² at peak)	I_o	468	nA
Temperature Coefficient	T_c	< 0,1	%/K
Maximum Ratings			
Operating Temperature	T_{opt}	–55 ... +170	°C
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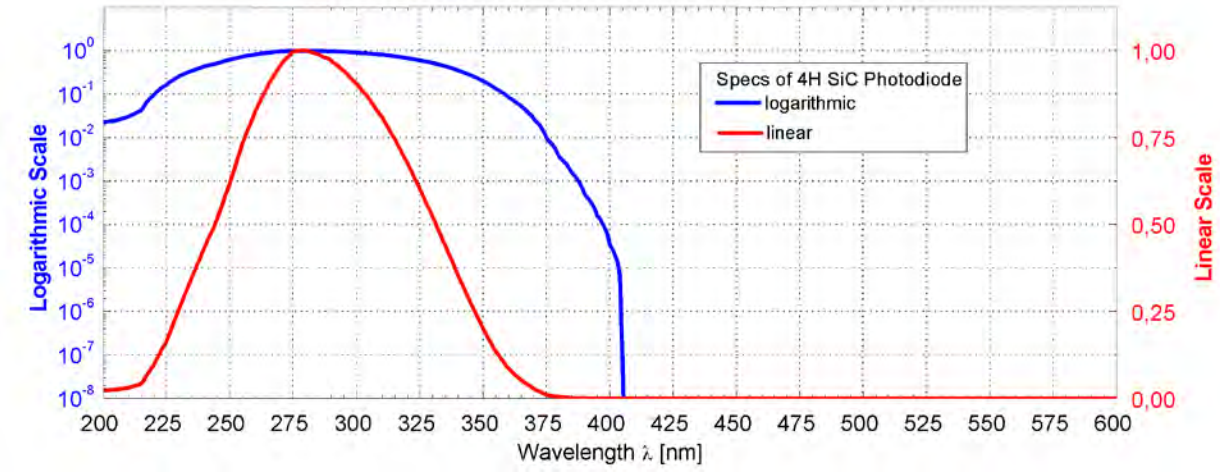
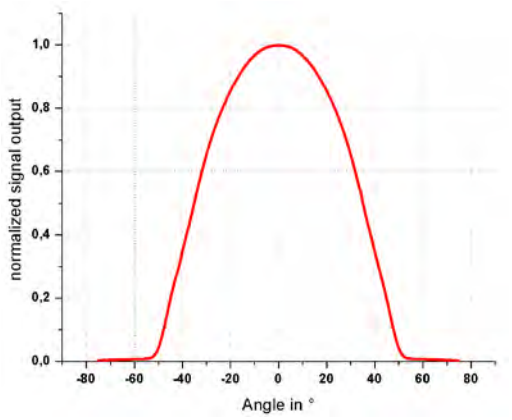
NORMALIZED SPECTRAL RESPONSIVITY



SG01XXL–8ISO90

Broadband SiC based UV photodiode A = 36 mm²

FIELD OF VIEW



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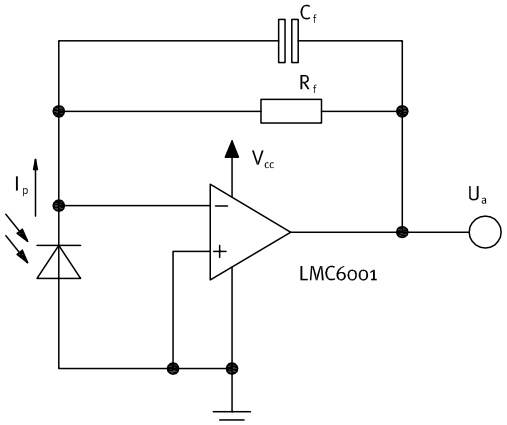
TYPICAL CIRCUIT



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$I_{p,max} = U_{a,max} \div R_f$

Bandwidth = DC ... $\frac{1}{2\pi \times R_f \times C_f}$

Example:
$I_p = 20nA$, $R_f = 100M\Omega$, $C_f = 100$ pF
$U_a = 20 \times 10^{-9}A \times 100 \times 10^{6}\Omega = 2V$