UVA Photodiodes
Data Sheets

- Spectral sensitivity from 309 to 367 nm, peak wavelength 331 nm, different packaging, sorted by detector areas.

Boselec
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SG01D–A18
UVA-only SiC based UV photodiode A = 0.50 mm²

**GENERAL FEATURES**

<table>
<thead>
<tr>
<th>Chip area</th>
<th>Spectral response</th>
<th>Housing</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>nothing = broadband</td>
<td>λ&lt;sub&gt;max&lt;/sub&gt; = 280 nm, λ&lt;sub&gt;30%&lt;/sub&gt; = 221 nm ... 358 nm</td>
<td>2-pin TO18 housing, h = 5.2 mm, 1 pin isolated, 1 pin grounded</td>
</tr>
<tr>
<td>M</td>
<td>A = UVA</td>
<td>λ&lt;sub&gt;max&lt;/sub&gt; = 331 nm, λ&lt;sub&gt;30%&lt;/sub&gt; = 309 nm ... 367 nm</td>
<td>3-pin TO18 housing, h = 5.2 mm, 2 pins isolated, 1 pin grounded</td>
</tr>
<tr>
<td>D</td>
<td>B = UVB</td>
<td>λ&lt;sub&gt;max&lt;/sub&gt; = 280 nm, λ&lt;sub&gt;30%&lt;/sub&gt; = 231 nm ... 309 nm</td>
<td>2-pin TO18 housing, h = 3.7 mm, 1 pin isolated, 1 pin grounded</td>
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<tr>
<td>L</td>
<td>C = UVC</td>
<td>λ&lt;sub&gt;max&lt;/sub&gt; = 275 nm, λ&lt;sub&gt;30%&lt;/sub&gt; = 225 nm ... 287 nm</td>
<td>2-pin TO5 housing, h = 4.3 mm for broadband; h = 6.7 mm for filtered UVA, UVB, UVC, UVI</td>
</tr>
<tr>
<td>XL</td>
<td>E = UV-Index</td>
<td>spectral response according to CIEo87</td>
<td>3-pin TO5 housing, h = 4.2 mm, 2 pins isolated, 1 pin grounded</td>
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**Properties of the SG01D–A18 UV photodiode**
- UVA-only sensitivity, 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. 1.85 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**

- S, M, D, L, XL nothing, A, B, C or E

**Rev. 6.2** Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.
### SG01D–A18

UVA-only SiC based UV photodiode A = 0,50 mm²

#### SPECIFICATIONS

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<th>Symbol</th>
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<td>0,037</td>
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<td><strong>Wavelength of max. Spectral Responsivity</strong></td>
<td>$\lambda_{\text{max}}$</td>
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<td><strong>Responsivity Range (S=S₀,1*S_{max})</strong></td>
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<td>VB</td>
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#### General Characteristics (T=25°C)

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<tr>
<td>Active Area</td>
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<td>mm²</td>
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<tr>
<td>Dark Current (1V reverse bias)</td>
<td>$I_d$</td>
<td>1,7</td>
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<td>Capacitance</td>
<td>$C$</td>
<td>125</td>
<td>pF</td>
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<td>Short Circuit (10μW/cm² at peak)</td>
<td>$I_0$</td>
<td>1,85</td>
<td>nA</td>
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<td>Temperature Coefficient</td>
<td>$T_c$</td>
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#### Maximum Ratings

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<td>Operating Temperature</td>
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#### NORMALIZED SPECTRAL RESPONSIVITY

![Normalized Spectral Responsivity Graph]

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SG01D–A18
UVA-only SiC based UV photodiode A = 0.50 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:
- $U_i = I_a R_i = 0 \ldots V_a$
- $U_{V_{in}}$ depends on load and amplifier type
- $R_i = 10 \Omega \ldots 100 \Omega$, $C_i = 3 \mu F$
- Recommendation: $R_i x C_i \geq 10^5 \Omega s$
- $I_{lim} = U_{V_{in}} \div R_i$
- Bandwidth: $DC \ldots \frac{1}{2\pi R_i C_i}$

Example:
- $I_a = 20 nA$, $R_i = 100 \Omega$, $C_i = 100 \mu F$
- $U_a = 20 \times 10^5 \Omega x 100 \times 10^5 \Omega = 2V$

DRAWINGS

REV. 6.2 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.
SG01L–A5
UVA-only SiC based UV photodiode A = 1,0 mm²

GENERAL FEATURES

Properties of the SG01–A5 UV photodiode
• UVA-only sensitivity, PTB reported high chip stability
• Active Area A = 1,0 mm²
• TO5 hermetically sealed metal housing, 1 isolated pin and 1 case pin
• 10μW/cm² peak radiation results a current of approx. 3,7 nA

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SG01L–A5
UVA-only SiC based UV photodiode A = 1,0 mm²

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<td>mm²</td>
</tr>
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<td>3,3</td>
<td>fA</td>
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NORMALIZED SPECTRAL RESPONSIVITY

![Normalized Spectral Responsivity Graph]

Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.
SG01L–A5
UVA-only 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:
- \( U_s = I_l \times R_i = 0 \ldots \rightarrow V_s \)
- \( U_{\text{Ferr}} \) depends on load and amplifier type
- \( R_i = 10k\Omega \ldots \rightarrow 10G\Omega, C = 3pF \)
- Recommendation: \( R_i \times C \geq 10^5 \text{s} \)
- \( I_{\text{Ferr}} = U_{\text{Ferr}} \div R_i \)
- Bandwidth = DC ...

\[ \frac{1}{2\pi \times R_i \times C} \]

Example:
- \( I_l = 20mA, R_i = 100\Omega, C = 100 \text{ pF} \)
- \( U_s = 20 \times 10^5 \times 100 \times 10^5 \) = 2V

DRAWINGS

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**SG01L–A5**

UVA-only SiC based UV photodiode \( A = 1,0 \text{ mm}^2 \)

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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.

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**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/cm\(^2\) up to 18 W/cm\(^2\)
- UV broadband, UVA, UVB, UVC or Erythema measurements

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**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

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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

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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

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**SG01L–A18**

UVA-only SiC based UV photodiode $A = 1,0 \text{ mm}^2$

**GENERAL FEATURES**

**Properties of the SG01L–A18 UV photodiode**
- UVA-only sensitivity, PTB reported high chip stability
- Active Area $A = 1,0 \text{ mm}^2$
- TO18 hermetically sealed metal housing, 1 isolated pin and 1 case pin
- $10\mu\text{W/cm}^2$ peak radiation results a current of approx. 3,7 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, $< 0,1\%/\text{K}$. 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 $0,06 \text{ mm}^2$ up to $36 \text{ mm}^2$. 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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$\lambda_{5\text{%}} = 221 \text{ nm ... 358 nm}$ | $\text{18, 18ISO90, 18S, 5, 5ISO90}$ | nothing, Lens, MEGA, GIGA |
| $M$ $0,20 \text{ mm}^2$ | $A = \text{UVA}$  
$\lambda_{\text{max}} = 331 \text{ nm}$  
$\lambda_{5\text{%}} = 309 \text{ nm ... 367 nm}$ | $\text{18ISO90}$ | 3-pin TO18 housing, $h = 5,2 \text{ mm}$, 2 pins isolated, 1 pin grounded |
| $D$ $0,50 \text{ mm}^2$ | $B = \text{UVB}$  
$\lambda_{\text{max}} = 280 \text{ nm}$  
$\lambda_{5\text{%}} = 231 \text{ nm ... 309 nm}$ | $\text{18S}$ | 2-pin TO18 housing, $h = 3,7 \text{ mm}$, 1 pin isolated, 1 pin grounded |
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| $XL$ $7,60 \text{ mm}^2$ | $E = \text{UV-Index}$  
spectral response according to CIE087 | $\text{5ISO90}$ | 3-pin TO5 housing, $h = 4,2 \text{ mm}$, 2 pins isolated, 1 pin grounded |

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SG01L–A18
UVA-only 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:
\[ U_\text{e} = \frac{\lambda \times R_1}{\alpha} \approx V_a \]
\[ U_{\text{V,w}} \text{ depends on load and amplifier type} \]

\[ R_1 = 10\,\Omega \quad \ldots \quad 10\,G\Omega, \ C = 3\,pF \]
Recommendation: \( R_1 \times C \geq 10^{-3}\)s

\[ I_{\text{V,peak}} = U_{\text{V,peak}} + R_1 \]

Bandwidth = DC ... \[ \frac{1}{2 \times \pi \times R_1 \times C} \]

Example:
\[ I_1 = 20nA, R_1 = 100\,M\Omega, C = 100\,pF \]
\[ U_1 = 20 \times 10^{7} \times 100 \times 10^{-10} = 2V \]

DRAWINGS

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- 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

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**SG01L–A18**
UVA-only SiC based UV photodiode A = 1,0 mm²

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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–A5
UVA-only SiC based UV photodiode \(A = 0,20 \text{ mm}^2\)

GENERAL FEATURES

Properties of the SG01M–A5 UV photodiode
- UVA-only sensitivity, PTB reported high chip stability
- Active Area \(A = 0,20 \text{ mm}^2\)
- TO5 hermetically sealed metal housing, 1 isolated pin and 1 case pin
- 10mW/cm² peak radiation results a current of approx. 740 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

<table>
<thead>
<tr>
<th>Chip area</th>
<th>Spectral response</th>
<th>Housing</th>
<th>Special</th>
</tr>
</thead>
<tbody>
<tr>
<td>S (0,06 \text{ mm}^2)</td>
<td>nothing = broadband</td>
<td>(\lambda_{\text{max}} = 280 \text{ nm} \quad \lambda_{S10%} = 221 \text{ nm} ... 358 \text{ nm})</td>
<td>(18) 2-pin TO18 housing, (h = 5,2 \text{ mm}), 1 pin isolated, 1 pin grounded</td>
</tr>
<tr>
<td>M (0,20 \text{ mm}^2)</td>
<td>nothing, A, B, C or E</td>
<td>(\lambda_{\text{max}} = 331 \text{ nm} \quad \lambda_{S10%} = 309 \text{ nm} ... 367 \text{ nm})</td>
<td>(18) 3-pin TO18 housing, (h = 5,2 \text{ mm}), 2 pins isolated, 1 pin grounded</td>
</tr>
<tr>
<td>D (0,50 \text{ mm}^2)</td>
<td>nothing = broadband</td>
<td>(\lambda_{\text{max}} = 280 \text{ nm} \quad \lambda_{S10%} = 231 \text{ nm} ... 309 \text{ nm})</td>
<td>(18) 2-pin TO18 housing, (h = 3,7 \text{ mm}), 1 pin isolated, 1 pin grounded</td>
</tr>
<tr>
<td>L (1,00 \text{ mm}^2)</td>
<td>nothing, A, B, C or E</td>
<td>(\lambda_{\text{max}} = 275 \text{ nm} \quad \lambda_{S10%} = 225 \text{ nm} ... 287 \text{ nm})</td>
<td>(5) 2-pin TO5 housing, (h = 4,3 \text{ mm}) for broadband; (h = 6,7 \text{ mm}) for filtered UVA, UVB, UVC, UVI</td>
</tr>
<tr>
<td>XL (7,60 \text{ mm}^2)</td>
<td>nothing, A, B, C or E</td>
<td>spectral response according to CIE087</td>
<td>(5) 3-pin TO5 housing, (h = 4,2 \text{ mm}), 2 pins isolated, 1 pin grounded</td>
</tr>
</tbody>
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## SG01M–A5
UVA-only SiC based UV photodiode A = 0.20 mm²

### SPECIFICATIONS

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<tr>
<th>Parameter</th>
<th>Symbol</th>
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<th>Unit</th>
</tr>
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<tr>
<td><strong>Spectral Characteristics</strong></td>
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<tr>
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<td>$S_{\text{max}}$</td>
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<td>331</td>
<td>nm</td>
</tr>
<tr>
<td>Responsivity Range ($S=0.1*S_{\text{max}}$)</td>
<td>–</td>
<td>309 ... 367</td>
<td>nm</td>
</tr>
<tr>
<td>Visible Blindness ($S_{\text{max}}/S_{&gt;405\text{nm}}$)</td>
<td>$V_{\text{B}}$</td>
<td>&gt; 10$^{10}$</td>
<td>–</td>
</tr>
<tr>
<td><strong>General Characteristics (T=25°C)</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Active Area</td>
<td>$A$</td>
<td>0.20</td>
<td>mm$^2$</td>
</tr>
<tr>
<td>Dark Current (1V reverse bias)</td>
<td>$I_d$</td>
<td>0.7</td>
<td>fA</td>
</tr>
<tr>
<td>Capacitance</td>
<td>$C$</td>
<td>50</td>
<td>pF</td>
</tr>
<tr>
<td>Short Circuit (10mW/cm$^2$ at peak)</td>
<td>$I_o$</td>
<td>740</td>
<td>nA</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>$T_c$</td>
<td>&lt; 0.1</td>
<td>%/K</td>
</tr>
<tr>
<td><strong>Maximum Ratings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>$T_{\text{opt}}$</td>
<td>-55 ... +170</td>
<td>°C</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>$T_{\text{stor}}$</td>
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<td>°C</td>
</tr>
<tr>
<td>Soldering Temperature (35)</td>
<td>$T_{\text{sold}}$</td>
<td>260</td>
<td>°C</td>
</tr>
<tr>
<td>Reverse Voltage</td>
<td>$V_{\text{Rmax}}$</td>
<td>20</td>
<td>V</td>
</tr>
</tbody>
</table>

### NORMALIZED SPECTRAL RESPONSIVITY

![Normalized Spectral Responsivity](image)

Rev. 6.2 Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.
SG01M–A5
UVA-only SiC based UV photodiode $A = 0.20 \text{ mm}^2$

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:
- $U_s = \frac{1}{R L} \sum_{n} R_n \sim V_s$
- $U_{r,x}$ depends on load and amplifier type
- $R_L = 10k\Omega \sim 10G\Omega, C = 3pF$
- Recommendation: $R_L \times C \geq 10^5 \text{s}$
- $I_{r,x} = U_{r,x} \div R_L$
- Bandwidth = DC ...
- $\frac{1}{2x \times R L \times C}$
- Example:
  - $I_L = 20\mu\text{A}$, $R_L = 100\text{M}\Omega$, $C = 100 \text{ pF}$
  - $U_s = 20 \times 10^3 \text{A} \times 100 \times 10^5 \text{s} = 2\text{V}$

DRAWINGS
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
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- Good EMC safety for industrial applications

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- 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

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SG01M–A18
UVA-only SiC based UV photodiode A = 0,20 mm²

GENERAL FEATURES

Properties of the SG01M–A18 UV photodiode
- UVA-only sensitivity, PTB reported high chip stability
- 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. 740 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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<td>L 1,00 mm²</td>
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<td>5ISO90</td>
<td>3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded</td>
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<td>XL 7,60 mm²</td>
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<td>3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded</td>
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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–A18
UVA-only SiC based UV photodiode A = 0.20 mm²

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<td></td>
<td></td>
</tr>
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<td>mm²</td>
</tr>
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<td>Dark Current (1V reverse bias)</td>
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<td>fA</td>
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<td>$V_{\text{Rmax}}$</td>
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</table>

NORMAlIZED SPECTRAl RESPONSIVIty

SPECs of 4H SiC Photodiode with UVA filter
- logarithmic
- linear

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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:
- \( U_s = I_x R_x = 0 \ldots \sim V_x \)
- \( U_{var} \) depends on load and amplifier type
- \( R_x = 10k\Omega \ldots 10G\Omega \), \( C_x = 3pF \)
- Recommendation: \( R_x C_x \geq 10^{-3} \)s
- \( I_{var} = U_{var} \div R_x \)
- Bandwidth = DC ... \( \frac{1}{2\pi R_x C_x} \)

Example:
- \( I_x = 2mA, R_x = 100M\Omega, C_x = 100 \) pF
- \( U_s = 20 \times 10^4 \times 100 \times 10^{-7} \) = 2V

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

Rev. 6.2  Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.
SG01S–A5ISO90MEGA-HT
UVA-only SiC based UV photodiode A = 0,06 mm²

GENERAL FEATURES

Properties of the SG01S–A5ISO90MEGA-HT UV photodiode
- UVA-only sensitivity, PTB reported high chip stability
- Active Area A = 0,06 mm²
- TO5 hermetically sealed metal housing, two isolated pins in a circle
- with attenuator up to 0,5 W/cm²

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

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</tr>
<tr>
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<tr>
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<td>B = UVB</td>
<td>18S 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded</td>
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</tr>
<tr>
<td>L 1,00 mm²</td>
<td>C = UVC</td>
<td>5 2-pin TO5 housing, h = 4,3 mm for broadband; h = 6,7 mm for filtered UVA, UVB, UVC, UVI</td>
<td></td>
</tr>
<tr>
<td>XL 7,60 mm²</td>
<td>E = UV-Index</td>
<td>5ISO90 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded</td>
<td></td>
</tr>
</tbody>
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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.
### SPECIFICATIONS

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#### General Characteristics ($T=25^\circ\text{C}$)

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<tr>
<th>Characteristic</th>
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<th>Value</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Active Area</td>
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<td>mm$^2$</td>
</tr>
<tr>
<td>Dark Current (1V reverse bias)</td>
<td>$I_{d}$</td>
<td>0.2</td>
<td>fA</td>
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<tr>
<td>Capacitance</td>
<td>C</td>
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</tr>
<tr>
<td>Temperature Coefficient</td>
<td>$T_{c}$</td>
<td>&lt; 0.1</td>
<td>%/K</td>
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</table>

#### Maximum Ratings

<table>
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<th>Characteristic</th>
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<td>Soldering Temperature (3s)</td>
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<td>°C</td>
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<tr>
<td>Reverse Voltage</td>
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### NORMALIZED SPECTRAL RESPONSIVITY

![Normalized Spectral Responsivity](image)

**Rev. 6.2** Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.
SG01S–A5ISO90MEGA-HT
UVA-only SiC based UV photodiode A = 0.06 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:

\[ U_L = \frac{1}{2 \pi} R \omega \approx V_x \]

\[ U_{V_{\text{pro}}} \text{ depends on load and amplifier type} \]

\[ R = 10 \Omega \ldots \approx 10 G \Omega, \ C = 3 pF \]

Recommendation: \( R \times C \geq 10^{-9} \) s

\[ I_{V_{\text{pro}}} = U_{V_{\text{pro}}} \div R \]

Bandwidth = DC ... \[
\frac{1}{2 \pi R C_1}
\]

Example:
- \( I = 20 mA, R = 100 M \Omega, C_1 = 100 \mu F \)
- \( U_x = 20 \times 10^9 \times 100 \times 10^3 \} = 2 V \)

DRAWINGS
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.

**APPLICATION NOTE FOR PHOTODIODES**

**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
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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
SG01S–A18
UVA-only SiC based UV photodiode A = 0,06 mm²

GENERAL FEATURES

Properties of the SG01S–A18 UV photodiode
- UVA-only sensitivity, 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. 222 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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<th>Spectral response</th>
<th>Housing</th>
<th>Special</th>
</tr>
</thead>
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λ_max = 280 nm  λ_S10% = 221 nm ... 358 nm | 18 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded | nothing, Lens, MEGA, GIGA |
| M 0,20 mm² | A = UVA
λ_max = 331 nm  λ_S10% = 309 nm ... 367 nm | 18S090 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded | |
| D 0,50 mm² | B = UVB
λ_max = 280 nm  λ_S10% = 231 nm ... 309 nm | 18S 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded | |
| L 1,00 mm² | C = UVC
λ_max = 275 nm  λ_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 | |

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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.
SG01S–A18
UVA-only SiC based UV photodiode A = 0,06 mm²

**SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spectral Characteristics</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Typical Responsivity at Peak Wavelength</td>
<td>$S_{\text{max}}$</td>
<td>0,037</td>
<td>AW⁻¹</td>
</tr>
<tr>
<td>Wavelength of max. Spectral Responsivity</td>
<td>$\lambda_{\text{max}}$</td>
<td>331</td>
<td>nm</td>
</tr>
<tr>
<td>Responsivity Range (S=0,1*$S_{\text{max}}$)</td>
<td>–</td>
<td>309 ... 367</td>
<td>nm</td>
</tr>
<tr>
<td>Visible Blindness ($S_{\text{max}}/S_{&gt;405\text{nm}}$)</td>
<td>$\text{VB}$</td>
<td>&gt; $10^{10}$</td>
<td>–</td>
</tr>
<tr>
<td><strong>General Characteristics (T=25°C)</strong></td>
<td></td>
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<td></td>
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<tr>
<td>Active Area</td>
<td>$A$</td>
<td>0,06</td>
<td>mm²</td>
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<tr>
<td>Dark Current (1V reverse bias)</td>
<td>$I_d$</td>
<td>0,2</td>
<td>fA</td>
</tr>
<tr>
<td>Capacitance</td>
<td>$C$</td>
<td>15</td>
<td>pF</td>
</tr>
<tr>
<td>Short Circuit (10mW/cm² at peak)</td>
<td>$I_o$</td>
<td>222</td>
<td>nA</td>
</tr>
<tr>
<td>Temperature Coefficient</td>
<td>$T_c$</td>
<td>&lt; 0,1</td>
<td>%/K</td>
</tr>
<tr>
<td><strong>Maximum Ratings</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>$T_{\text{opt}}$</td>
<td>–55 ... +170</td>
<td>°C</td>
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<td>°C</td>
</tr>
<tr>
<td>Soldering Temperature (35)</td>
<td>$T_{\text{sold}}$</td>
<td>260</td>
<td>°C</td>
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<tr>
<td>Reverse Voltage</td>
<td>$V_{\text{Rmax}}$</td>
<td>20</td>
<td>V</td>
</tr>
</tbody>
</table>

**NORMALIZED SPECTRAL RESPONSIVITY**

![Normalized Spectral Responsivity Graph](image)

**Rev. 6.2** Due to our strive for continuous improvement, specifications are subject to change within our PCN policy according to JESD46C.
SG01S–A18
UVA-only SiC based UV photodiode $A = 0.06 \text{ mm}^2$

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:
- $U_s = I_x R_s = 0 \ldots \sim V_a$
- $U_{knee}$ depends on load and amplifier type
- $R_s = 10k\Omega \ldots \sim 10\Omega$, $C_s = 3pF$
- Recommendation: $R_s \times C_s \geq 10^5 \text{s}$
- $I_{knee} = U_{knee} \div R_s$
- Bandwidth = DC $\ldots \frac{1}{2 \times R_s \times C_s}$

Example:
- $I_s = 20\mu A$, $R_s = 100\Omega$, $C_s = 100 \text{ pF}$
- $U_s = 20 \times 10^5 \times 100 \times 10^{-3} = 2V$

DRAWINGS

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

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• Optional feature for all TOCON detectors
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For correct reading of the photodiode the current (and NOT the voltage) must be analyzed. This requires a short cir-
cuiting 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

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–A5
UVA-only SiC based UV photodiode A = 7,6 mm²

GENERAL FEATURES

Properties of the SG01XL–A5 UV photodiode
- UVA-only sensitivity, PTB reported high chip stability
- Active Area A = 7,6 mm²
- TO5 hermetically sealed metal housing, 1 isolated pin and 1 case pin
- 10µW/cm² peak radiation results a current of approx. 28 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).

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SG01

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SG01XL–A5
UVA-only SiC based UV photodiode A = 7,6 mm²

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NORMALIZED SPECTRAL RESPONSIVITY

Specs of 4H SiC Photodiode with UVA filter
- logarithmic
- linear

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TYPICAL CIRCUIT

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- $U_i = \frac{1}{R_1} \cdot R_i \cdot I_1 \approx V_e$
- $U_{x_{\text{ref}}}$ depends on load and amplifier type
- $R_1 = 10 \text{k}\Omega \ldots \approx 10 \text{G}\Omega, C_r \approx 3 \text{ pF}$
- Recommendation: $R_i \cdot C_r \geq 10^{-9}$ s
- $I_{x_{\text{ref}}} = U_{x_{\text{ref}}} \div R_i$
- Bandwidth = DC ...
- $\frac{1}{2 \pi \cdot R_i \cdot C_r}$

Example:
- $I_1 = 20 \text{nA}, R_i = 100 \text{M}\Omega, C_r = 100 \text{ pF}$
- $U_e = 20 \times 10^3 \text{A} \times 100 \times 10^{-10} \approx 2 V$

DRAWINGS

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