SG01S–C18
UVC-only SiC based UV photodiode A = 0,06 mm²

GENERAL FEATURES

Properties of the SG01S–C18 UV photodiode
- UVC-only sensitivity, compliant with DVGW W294, 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. 720 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 18 2-pin TO18 housing, h = 5,2 mm, 1 pin isolated, 1 pin grounded
M 0,20 mm² A = UVA 18ISO90 3-pin TO18 housing, h = 5,2 mm, 2 pins isolated, 1 pin grounded
D 0,50 mm² B = UVB 18S 2-pin TO18 housing, h = 3,7 mm, 1 pin isolated, 1 pin grounded
L 1,00 mm² C = UVC 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 5ISO90 3-pin TO5 housing, h = 4,2 mm, 2 pins isolated, 1 pin grounded

spectral response according to CIE087

Lens with concentrating lens, TO5 only

MEGA with attenuator up to 0,5 W/cm²

GIGA with attenuator up to 7 W/cm²

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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-C18

UVC-only SiC based UV photodiode $A = 0.06 \text{ mm}^2$

### SPECIFICATIONS

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<td>$S_{\text{max}}$</td>
<td>0.120</td>
<td>AW$^{-1}$</td>
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<td>Wavelength of max. Spectral Responsivity</td>
<td>$\lambda_{\text{max}}$</td>
<td>275</td>
<td>nm</td>
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<td>Responsivity Range ($S=0.1*S_{\text{max}}$)</td>
<td>$-\text{ }$</td>
<td>225 ... 287</td>
<td>nm</td>
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<tr>
<td>Visible Blindness ($S_{\text{max}}/S_{&gt;405nm}$)</td>
<td>$VB$</td>
<td>$&gt;10^{10}$</td>
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<tr>
<td><strong>General Characteristics ($T=25^\circ C$)</strong></td>
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<tr>
<td>Active Area</td>
<td>$A$</td>
<td>0.06</td>
<td>mm$^2$</td>
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<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>
<td>15</td>
<td>pF</td>
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<tr>
<td>Short Circuit (10mW/cm$^2$ at peak)</td>
<td>$I_o$</td>
<td>720</td>
<td>nA</td>
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<tr>
<td>Temperature Coefficient</td>
<td>$T_c$</td>
<td>$&lt;0.1$</td>
<td>%/K</td>
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<td><strong>Maximum Ratings</strong></td>
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<tr>
<td>Operating Temperature</td>
<td>$T_{\text{opt}}$</td>
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<td>Storage Temperature</td>
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<td>Soldering Temperature (3s)</td>
<td>$T_{\text{sold}}$</td>
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<td>$^\circ C$</td>
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<td>Reverse Voltage</td>
<td>$V_{R_{\text{max}}}$</td>
<td>20</td>
<td>V</td>
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</table>

### NORMALIZED SPECTRAL RESPONSIVITY

![Normalized Spectral Responsivity Graph](image)

Specs of 4H SiC Photodiode with UVC 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:
- $U_v = \frac{1}{2}\pi R_v \sim 0 \sim V_a$
- $U_{\text{max}}$ depends on load and amplifier type
- $R_v = 10k \Omega \sim 10\Omega, C_v = 3pF$
- Recommendation: $R_v \times C_v \geq 10^5 \text{s}$
- $I_{\text{max}} = U_{\text{max}} \div R_v$

Bandwidth = DC ... $\frac{1}{2xR_v \times C_v}$

Example:
- $I_v = 200\mu A, R_v = 100\Omega, C_v = 100 \text{ pF}$
- $U_v = 20 \times 10^5 \text{A} \times 100 \times 10^5[\text{s}] = 2V$

**DRAWINGS**

Cathode (isolated pin)
Anode (case pin)

chip position ± 50µm
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