SG01Q–5

Broadband SiC based UV quadrant photodiode A = 4 x 1.4 mm²

sglux The UV Experts

GENERAL FEATURES

Properties of the SG01Q–5 UV photodiode

- Broadband UVA+UVB+UVC, PTB reported high chip stability
- Active Area A = 4 x 1.4 mm². 32 µm pitch
- Designed for UV laser beam adjustment applications, autocollimators and other UV beam position detection applications
- TO5 hermetically sealed metal housing, short cap, common cathode
- 10 µW/cm² peak radiation results a current of approx. 22 nA / pixel

About the sglux SiC UV photodiodes

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. By standard our SiC detectors can be permanently operated at up to 170°C. A 350°C version is available. The temperature coefficient is also low, < 0.1%/K. Because of the low noise (dark current in the fA range), very low UV irradiance can be measured reliably. Please note that this device needs an appropriate signal transducer transducer (see typical circuit on page 3).

Options

This photodiode is also available as a filtered version (UVA, UVB or UVC) to tighten the sensitivy range.

NOMENCLATURE

SG01

S, D, L, F, XL	– **nothing, A, B, C, C-LED or E**	**18, 18ISO90, 18S, 5, 5ISO90**	**nothing, Lens, D**
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
D 0.50 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	
L 1.00 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	**D** with diffuser for cosine FOV
F 1.82 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 ISO 17166	**5ISO90** 3-pin TO5 housing, h = 4.2 mm, 2 pins isolated, 1 pin grounded	

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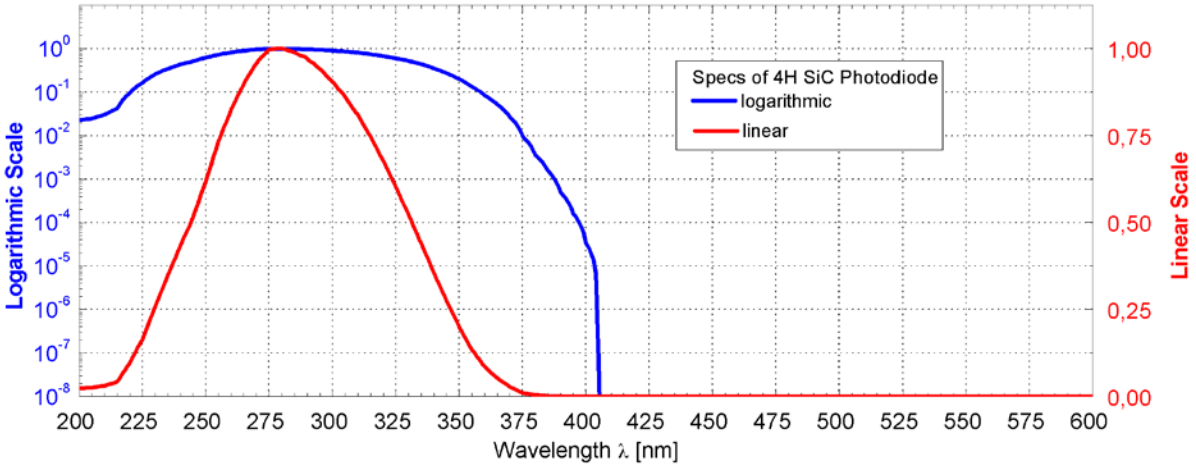
SPECIFICATIONS

Parameter	Symbol	Value	Unit
Spectral Characteristics			
Typical Responsivity at Peak Wavelength	S_{max}	0.160	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	4 x 1.4	mm²
Dark Current (1V reverse bias)	I_d	47	fA
Capacitance	C	350	pF
Short Circuit (10 µW/cm² at peak)	I_o	22	nA/pixel
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



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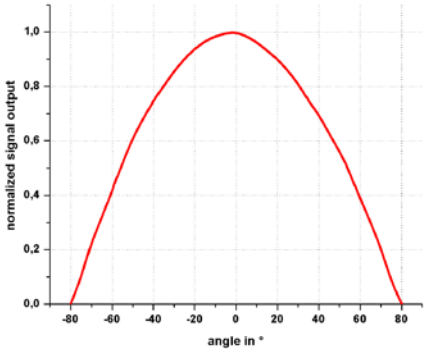
FIELD OF VIEW

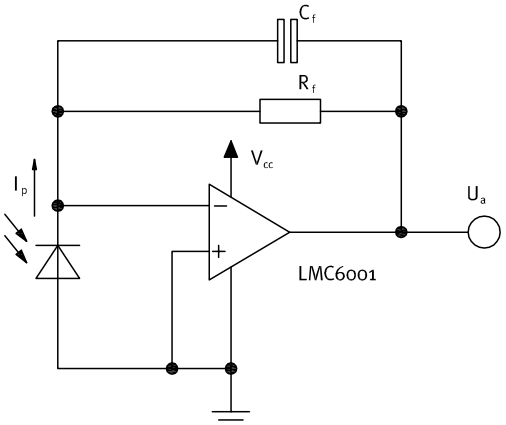


Measurement Setup:

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:

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

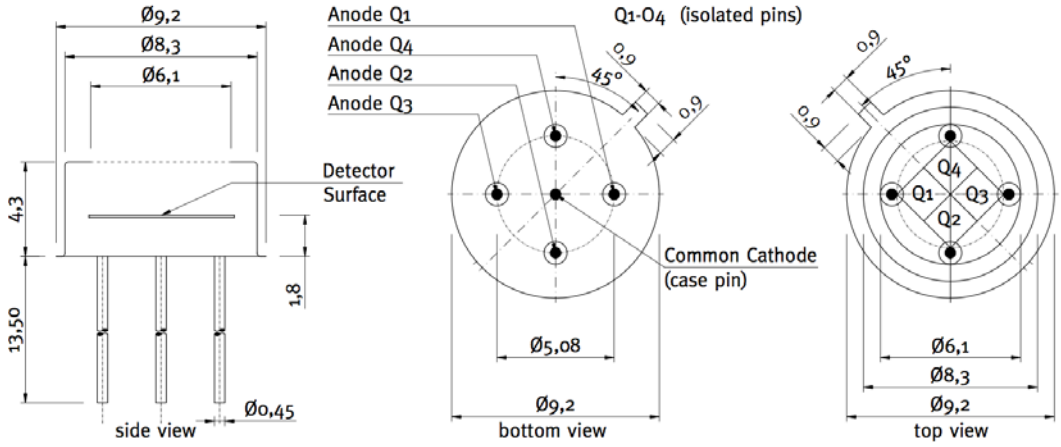
$U_{a,max}$ depends on load and amplifier type

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



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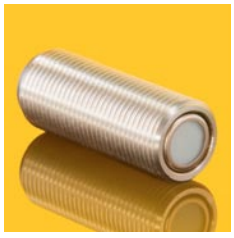
APPLICATION NOTE FOR PHOTODIODES

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 signal transducer** circuit as shown on page 3.

UPGRADE TO A TOCON OR A PROBE

TOCONs = UV sensors with integrated signal transducer

- SiC based UV hybrid detector with signal transducer (0–5V output), no additional amplifier needed, direct connection to controller, voltmeter, etc.
- Measures irradiance from 1.8 pW/cm² up to 18 W/cm²
- UV broadband, UVA, UVB, UVC or Erythema measurements



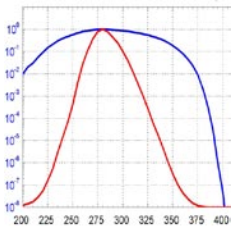
Miniature housing with M12x1 thread for the TOCON series

- Optional feature for all TOCON detectors
- Robust stainless steel M12x1 thread body, supply voltage 7...24 V
- Integrated sensor connector (Binder 4-Pin plug) with 2m connector cable
- Easy to mount and connect, increased EMC safety

UV probes

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

CALIBRATION SERVICE



- PTB traceable calibrations and measurements:
- Calibration of sensors for irradiance measurements
- Calibration of UV sensors on discrete wavelengths
- Determination of a specific spectral sensor responsivity