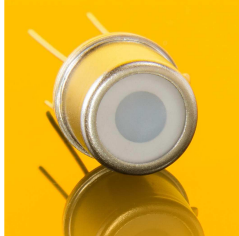


## General Features



### Properties of the TOCON\_E2

- Pre-amplified SiC UV detector for UV-Index measurements
- DIN5050/ CIE087 UVI measurement with very small error  $<\pm 3\%$
- 1 UVI result a voltage of approx. 170 mV
- RoHS compliant

### The TOCON\_ERYCA pre-amplified UV photodetectors

The TOCON devices are using modern hybride technology to cancel unwanted signal disturbances caused by moisture or electromagnetic radiation. The stable 0...5V output voltage can be directly connected to a SPC controller or a voltage multimeter. No external amplifier is needed.

### Information about the UV-Index (UVI)

The UV index is an international standard measurement of how strong the ultraviolet (UV) radiation from the sun is at a particular place on a particular day. It is a scale primarily used in daily forecasts aimed at the general public. The UV-Index is calculated by integrating the sun's UV spectrum multiplied with the Erythema action curve (fig. 1, black curve and fig. 2, formula 1). That integral is divided by  $25 \text{ mW/m}^2$  to generate a convenient index value, which becomes essentially a scale of 0 to 10. The Erythema action curve is a wavelength resolved measure of the sunburn danger. It is maximised at 297nm (UVB) and then strongly decreases towards UVA radiation. Literature: A. F. McKinlay and B. L. Diffey, "A reference action spectrum for ultraviolet induced erythema in human skin" CIE Journal, 6-1, 17-22 (1987)

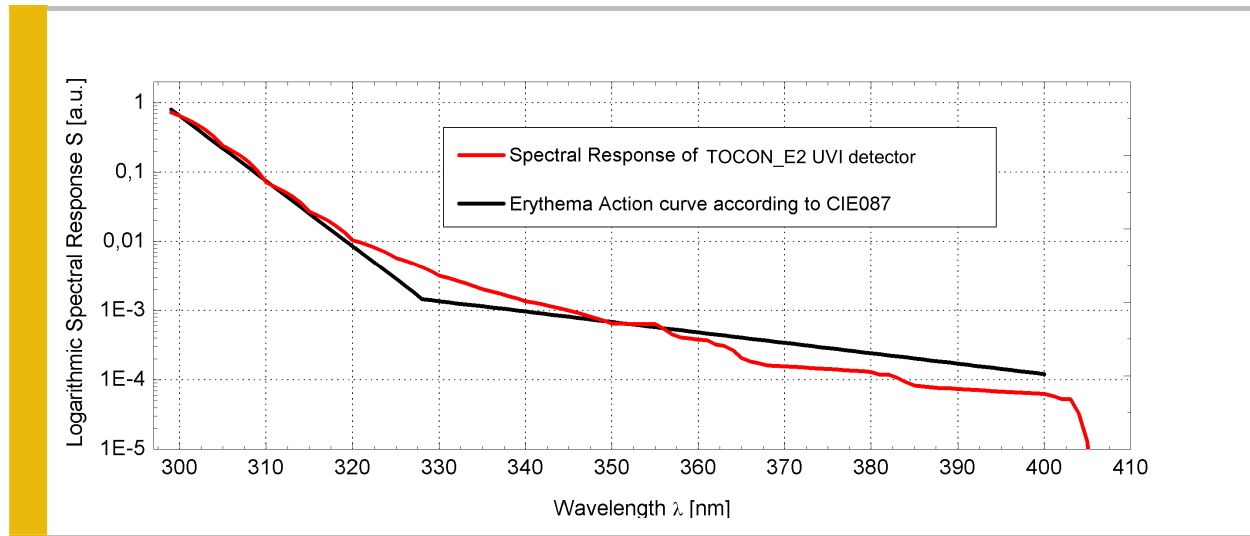
### About the sglux TOCON\_ERYCA sensors

The ERYCA is designed for accurate measurement of the UV-Index. ERYCA's error is  $<3\%$  only which is sufficiently small for scientific and high performance commercial applications.

### How ERYCA's $<3\%$ error is calculated?

A good erythema sensor's response needs to follow the Erythema Action curve (fig 1) as close as possible. Additionally the visible blindness needs to be extremely high as the visible part of sun's radiation exceeds the erythema causing radiation by five orders of magnitude. ERYCA works with a 4H SiC detector chip providing a visible blindness of more than ten orders of magnitude. That means that absolutely no visible light interferes the sensors output value. Sensors with a visible blindness of less than six orders of magnitude are unsuited for UVI measurement even if they match with the CIE curve. ERYCA's curve (fig. 1, red curve) has a near perfect match from 295nm to 320nm. From 320nm a leakage of approx. 0,1% is seen. To find out how that leakage negatively influences the UVI measurement a closer look at different sun spectra (varying tilt angle and ozone layer thickness) is needed. Fig. 4 shows different sun UV spectra issued by the Swiss governmental institute of meteorology. In total nine different sun spectra calculating an UVI from 1,12 to 10,92 were used. For error calculation the different sun spectra were integrated with the Erythema action curve and subsequently the integral of the same spectra with ERYCA's response curve (fig. 2, formula 1 and 2) were calculated. Finally the error was calculated by using formula 3 (fig. 2). As shown by the blue curve (fig. 3) the error of all UVI is less than 3%.

**Fig. 1 Spectral Response**



**Fig. 2 Calculation Formulae**

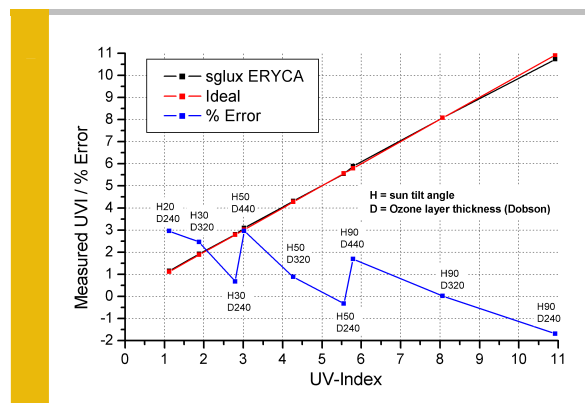
$$UVI_{ideal} = \int_{\lambda=297\text{ nm}}^{\lambda=400\text{ nm}} \frac{S(\lambda) \cdot CIE(\lambda)}{25\text{mW/m}^2} d\lambda \quad (1)$$

$$UVI_{real} = \int_{\lambda=297\text{ nm}}^{\lambda=400\text{ nm}} \frac{S(\lambda) \cdot ERYCA(\lambda)}{25\text{mW/m}^2} d\lambda \quad (2)$$

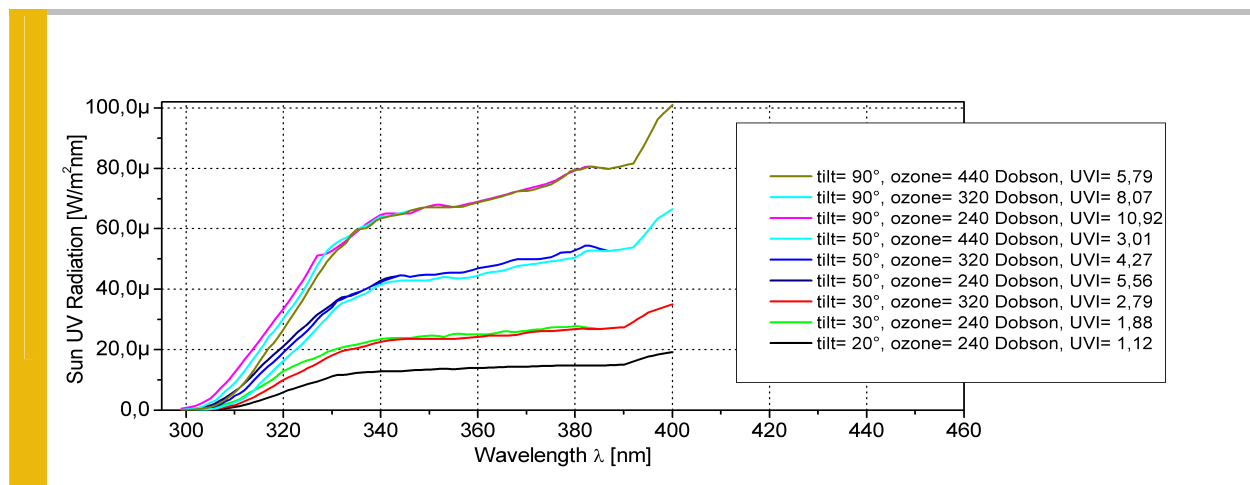
$$E = \frac{(UVI_{ideal} - UVI_{real}) \cdot 100}{UVI_{ideal}} \quad (3)$$

**Legend**  
 S(λ) = sun UV spectrum  
 CIE(λ) = CIE087 standard curve  
 ERYCA(λ) = ERYCA response curve  
 E = error in %

**Fig. 3 Error Graph**



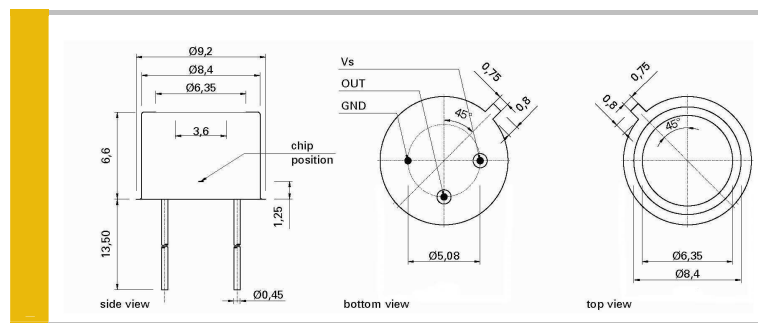
**Fig. 4 Sun Spectra Issued by the Swiss Meteo Institute**



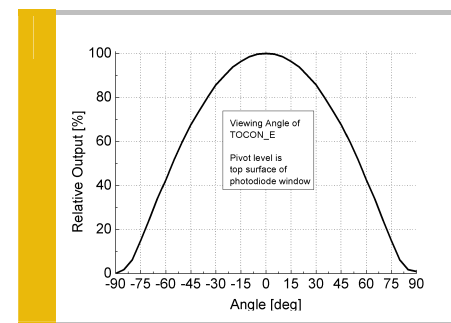
**Fig. 5 Specifications**

Parameter	Symbol	Value	Unit
<b>Maximum Ratings</b>			
Operating Temperature Range	$T_{opt}$	-25 ... +85	°C
Storage Temperature Range	$T_{stor}$	-40 ... +100	°C
Soldering Temperature (3s)	$T_{sold}$	300	°C
<b>General Characteristics (T=25°C)</b>			
Supply voltage	$V_{supply}$	2,5 ... 5,0	V
Saturation voltage	$V_{sat}$	$V_{supply}$	V
Dark offset voltage	$V_{offset}$	0,05	mV
Temperature coefficient	$Tc$	<+0,3	%/K
Current	$I$	0,8	mA
Bandwidth (-3 dB)	$\theta$	15	Hz
Risetime (63%) (other risetimes on demand)	$t_{rise}$	10	ms
<b>Spectral Characteristics (T=25°C)</b>			
Approx. sensitivity (unit is not calibrated)	$S_{max}$	170	mV/UVI
Visible blindness ( $S_{max} / S_{>405nm}$ )	$VB$	$>10^{10}$	-

**Fig. 6 Drawing**



**Fig. 7 Field of View**



**Fig. 8 TOCON Product Portfolio**

Selection of TOCONs with UV Index sensitivity:

Option	Approx. max irradiance ( $V_{out} = 5 V$ )
TOCON_E1	3 UVI needs sunlight attenuator
<b>TOCON_E2</b>	<b>30 UVI</b> <i>this device</i>
TOCON_E3	0,75 mW/cm <sup>2</sup>

TOCONs are also available with other spectral sensitivity (UVA, UVB, UVC, UV broadband).

## Upgrades

### TOCON housings for easy mounting of the TOCON\_E2

#### TOCON\_housing



#### Advantages of the TOCON\_housing

- Easy to mount and connect
- Robust stainless steel M12x1 thread body, length 32 mm
- Integrated sensor connector (Binder 5-Pin plug)
- Comes with 2 m connector cable

#### TOCON\_PTFE\_housing



#### Advantages of the TOCON\_PTFE\_housing

- Easy to mount and connect, cleanable
- Dirt-repellant, water proof at wetside (IP 68)
- Teflon (PTFE) M12x1 thread body, length 31 mm
- Wide field of view
- Integrated sensor connector (Binder 5-Pin plug)
- Comes with 2 m connector cable

*The PTFE housing reduces the signal output by 95 %.*

### Sensor Monitor 5.0 for monitoring, datalogging and process control with TOCON\_E2



The **Sensor Monitor 5.0** series are measurement and control modules for monitoring and automation of irradiation processes. They display radiation, dose and state information.

A selection of devices with one or two channels, optional USB & RS232 data output and computer software is offered.

### UVMICROLOG for datalogging and permanent measurements with TOCON\_E2



The **UVMICROLOG** is designed for logging of ultraviolet radiation, temperature, pressure and acceleration. Sophisticated microcontroller technology and low noise SiC TOCON based UV detectors allow up to 3 months of permanent measurement and logging without battery charging. The miniature UV datalogger for long-time monitoring of moving goods, persons or animals can be mounted with a belt or screws.