BTS256-UV

http://www.gigahertz-optik.de/en-us/product/BTS256-UV

Product tags: UV

Description

BTS256-UV-4 hand-held measuring device with flexible detector head.

Typical applications for high-intensity radiation sources in the ultraviolet and blue spectral range are UV radiation curing, solar simulation, UV sterilization, UV test systems, and UV sewer rehabilitation. For process-based applications with repetitive measurement tasks, broadband radiometers such as the X11 with RCH-116-4 are generally the most effective solution because of their ease of use, value for money, and low re-calibration cost.

Spectroradiometers such as the BTS256-UV are an alternative to broadband radiometers that provide additional information about the spectral distribution of radiation sources. The spectral information is particularly important if the wavelength-dependent aging behavior of broadband UV lamps must be investigated or if the irradiance must be measured in different wavelength ranges. This is also important if sources of differing spectral distribution must be measured. For this purpose, broadband radiometers ideally require separate calibration factors that take these spectral differences into account. This is not necessary with spectroradiometers. In addition, spectroradiometers offer more precise measured values than broadband radiometers. This is due to their spectral sensitivity function which corresponds to a rectangular function in the selected spectral measuring range. For precise measurements in the UV spectral range, very good stray-light rejection is necessary, which is not provided by the array spectrometers typically available on the market.

BTS256-UV-1 handheld with safety distance to UV radiation

BTS256-UV spectroradiometers comply with the latest design criteria for radiometric measuring instruments in the field of optical radiation:

Wide spectral sensitivity range

The spectral sensitivity range from 200 nm to 525 nm enables the precise irradiance measurement in the ultraviolet to blue wavelength range. Even the long-wave spectral component of UVA LEDs, which typically range up to approximately 490 nm, is completely captured. In particular, applications in radiation curing and trends in the use of shortwave LEDs down to the UVC range are supported with this wide spectral range.

Cosine field of view and flat design

When samples are diffusely irradiated, correct measurement of the angle-dependent irradiance requires a cosine field of view function of the instrument. In addition, the distance of the sensor to the irradiance reference plane must be as small as possible. With a height of only 12 mm and precise cosine field of view, the BTS256-UV measuring instruments are among the thinnest spectroradiometers on the market that are suitable for the precise measurement of absolute irradiance.

BTS256-UV-2 Continuous flow meter

Stray light and dark signal

for use on conveyor belts

Stray light and dark signal both have a significant influence on measurement results of UV spectroradiometers with CCD or CMOS array sensors. Stray light is always critical if the emission spectrum of UV lamps has a long-wave component (VIS to IR), which leads to stray light in the actual measuring range of the device. The intensity of stray light in the UV range can easily exceed the intensity of the actual measurement signal and thus lead to considerable measurement errors. In contrast, dark signals are caused by operating temperature fluctuations during mobile use and by the variation of integration times required for the measurement of differing irradiance levels.

BTS256-UV-2 Continuous flow meter for use on conveyor belts / Backview

Despite their very flat design, BTS256-UV spectroradiometers incorporate innovative stray light correction with an integrated optical filter as well as a dark level shutter as standard. Both functions are automated. This guarantees precise irradiance measurements of different emitter types and over varying operating temperatures.

Intense UV and temperature radiation

In practice, spectroradiometers are often exposed to the same intense UV and temperature radiation that is supposed to trigger aging effects or crosslinking processes in an application. The BTS256-UV spectroradiometers are built into a stainless steel housing that has excellent UV stability and low thermal conductivity to protect the electronics. At the same time, the stability of the wavelength and irradiance readings of the meter is ensured.

Hand-held measuring device and process flow meter

With the BTS256-UV-1 handheld meter, the sensor is placed 250mm away from the meter. As such, it can be positioned in front of the radiation source without exposing the operator to hazardous levels of UV radiation. The sensor itself is extremely flat with an overall height of 8 mm. The calibration of the BTS256-UV-1 is carried out over a wavelength range of 225 nm - 525 nm.

With the BTS256-UV-2 flow meter, the sensor is attached directly to the meter. As such, it is ideal for UV systems where samples pass below the UV light sources on a conveyor belt. The calibration of the BTS256-UV-2 is carried out over a wavelength range of 200 nm - 525 nm.

The BTS256-UV-4 handheld meter offers an alternate sensor configuration compared to the BTS256-UV-1. Instead of a rigid rod, the meter uses a flexible light guide. The sensor itself is equally flat with a height of 8 mm. This makes positioning of the sensor in narrow environments and around corners much easier. The calibration of the BTS256-UV-4 is carried out over a wavelength range of 225 nm - 525 nm.

Irradiance and dose measuring range

The BTS256-UV records the spectral irradiance in W / m² as its base measurand. The minimum and maximum measurable irradiance depends on the wavelength of the radiation as presented in the typical spectral responsivity, shown in the specification tab.

For example, at a wavelength of 405 nm for both the BTS256-UV-1 and the BTS256-UV-2, the minimum resolvable spectral irradiance is around 2 mW / (m². nm). The maximum measurable spectral irradiance is approx. 2 kW / (m². nm). Assuming that the radiation is monochromatic, this corresponds to a measuring range of 2 mW / m² to 2 kW / m².

The BTS256-UV also offers the option of displaying the dose, measured in J / m². Dose is determined by the product of irradiance and time of exposure (W / m² x seconds = J / m²). Since it is still the irradiance that is measured, the dynamic range of the dose measurement is also based on the minimum and maximum irradiance. This value is then multiplied by the duration of the dose measurement. For example, this results in the following dynamic range at 405 nm:

Exposure time / s	Minimum dose of a blue LED with 405 nm emission peak under the assumption of a constant output signal / mJ / m²	Maximum dose of a blue LED w nm emission peak under the as of a constant output signal / kJ /
0.1	0.2	0.2
1	2	2
10	20	20

It should be noted, however, that in the case of light sources with a non-monochromatic spectrum, a wider wavelength range contributes to the irradiance. Furthermore, the irradiance level may not be constant over the exposure time. These factors will therefore influence the absolute minimum and maximum dose values that can be measured to some extent.

Flexible measurement configuration with and without datalogger

Due to their design, BTS256-UV spectroradiometers offer a very flexible measurement configuration. Besides the basic option of taking just one single measurement, it is also possible to configure the device for a whole measurement series. Hence, it is suitable for measuring along the whole length of a moving conveyor belt. In this case, the device's internal memory is used as a data logger that can afterwards be read out via the included S-BTS256 software.

In addition to their array sensor, BTS256-UV spectroradiometers include a broadband photodiode as a second sensor. This enables a much higher data logging rate than can be reached using only the array sensor.

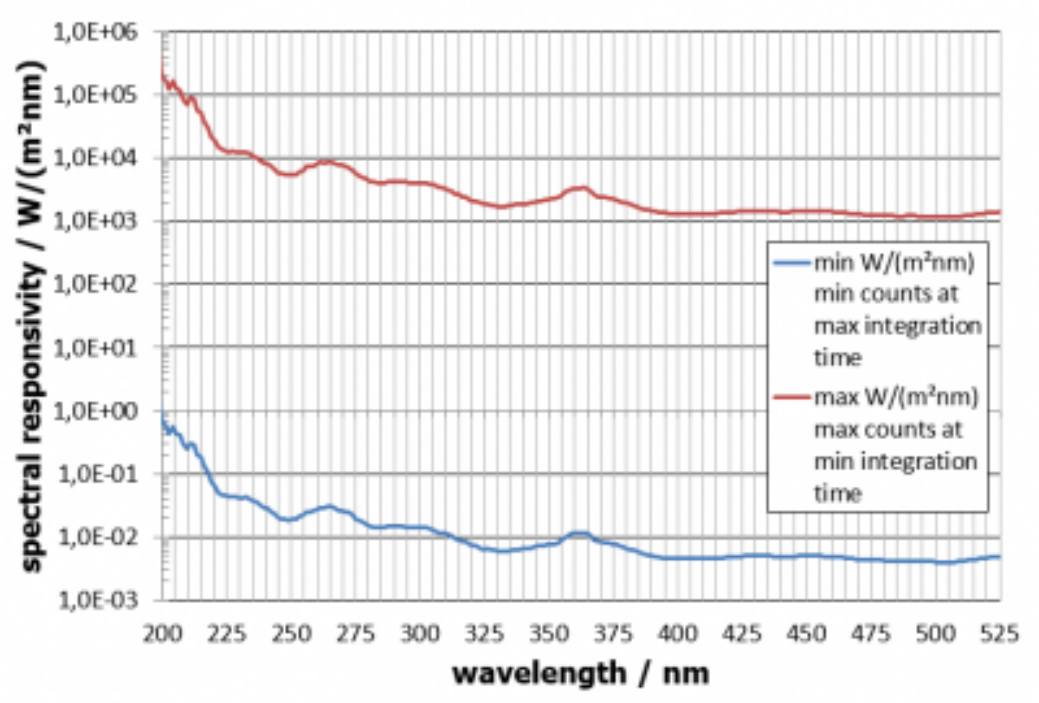
Factory calibration and ISO 17025 test certificate

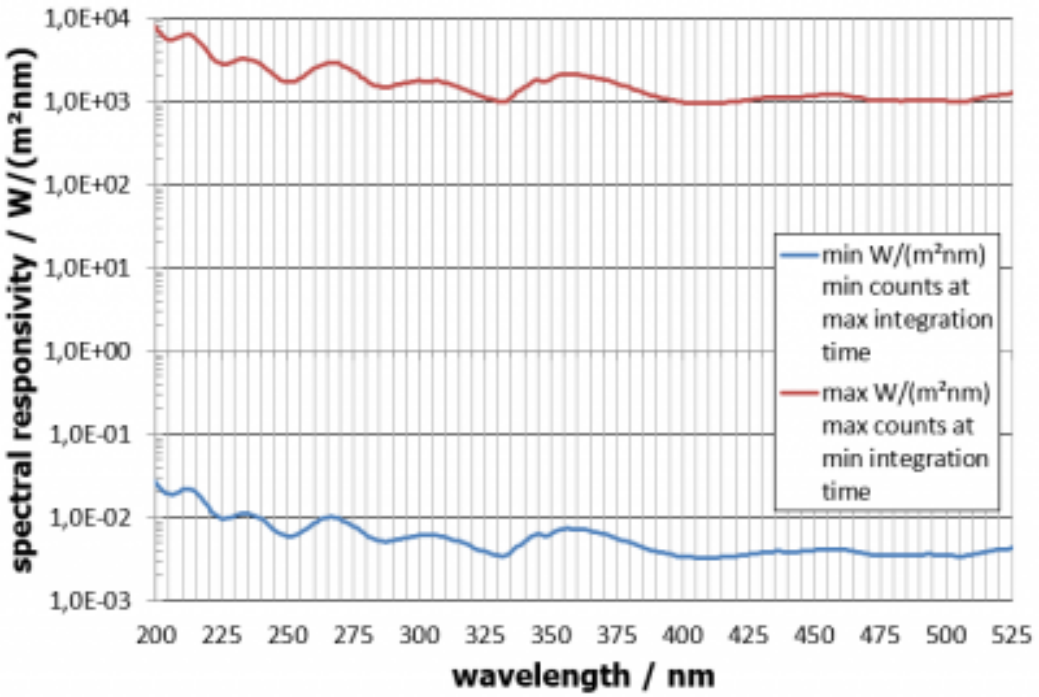
The measurement laboratory of Gigahertz-Optik offers high quality, traceable factory calibrations of their BTS256-UV. Factory calibrations are handled in Gigahertz-Optik's calibration laboratory using the same quality

management procedure as per NMI accredited test measurements. NMI accredited testing measurements with an ISO/IEC/EN 17025 testing certificate are optionally available.

Specifications

General	
Short description	Spectroradiometer for irradiance and dose of intense UV radiation in the wavelength range 200 nm to 525 nm.
Main features	12 mm height. Stainless steel housing enables high temperature operation and intense UV radiation measurement. Electromechanical aperture for offset compensation. Internal stray light suppression. Traceable calibration.
Measurement range	up to 40,000 mW/cm² , 200 nm to 525 nm.
typical applications	Measurement device for process control in UV curing applications both as a process flow meter as well as a mobile handheld measurement device, UV accelerated ageing of drugs, use inside environmental chambers with UV light sources.
Calibration	Factory calibration, traceable to international standards.
Product	
Sensor	Bi-technology sensor with a broadband sensor and an array spectroradiometer. Integrated aperture for automatic dark adjustment.
Input optics	different input optics. For example diffuser with 10 mm diameter directly on the device or diffuser with 9 mm diameter on heat-resistant rod.
Spectral Detector	
Chip	CMOS detector
spectral range	(200 - 525) nm
Optical Bandwidth	2.8 nm
Data Resolution	0.1 nm
Integration Time	(5.2 - 30000) ms
Shutter	Automatic aperture for dark signal measurements with the same integration time as the integration time of the measurement. In addition, stray light correction by means of built-in color filter (OoR correction). Aperture delay = 100ms.
Peak wavelength	+/- 0.3 nm
typical measurement time	BTS256-UV-2 and BTS256-UV-3: typical 360 nm LED with 50 mW/cm² - 65 ms typical 460 nm LED with 50 mW/cm² - 35 ms BTS256-UV-1: typical 360 nm LED with 50 mW/cm² - 100 ms typical 460 nm LED with 50 mW/cm² - 45 ms
Integral Detector	

ADC	12Bit
Measurement time	(0.1 - 6000) ms
temperature range	The measured values of the diode are corrected by means of an internal temperature sensor.
Filter	Mathematical adjustment of the responsivity to a rectangular function from 250 nm to 450 nm (SMCF correction). * * The spectral responsitivity of the diode does not correspond to a rectangular function (not possible with optical filters). When measuring light sources with a spectrum that deviates from the calibration spectrum of the integral detector (UV LED, peak at 405 nm), the measurement result is corrected using SMCF. The uncertainty of this correction depends on the quality of the measured spectrum (noise) and the size of the correction factor (spectral range). To correctly calculate the SMCF, the entire spectrum of the radiator to be measured must be measured. If the emitter has radiation outside the spectral sensitivity range of the measuring device, this increases the uncertainty of the SMCF.
typical irradiance	Blue LED with Peak @405 nm: (2E-3 - 2E3) W/m²
Graphs	
spectral responsivity	typical spectral responsivity BTS256-UV-1 (standard calibration 225 nm to 525 nm):  typical spectral responsivity BTS256-UV-2 and BTS256-UV-3 (standard calibration 200 nm to 525 nm):

	
Miscellaneous	
Microprocessor	16Bit, 25 ns command cycle time
Power Supply	5 VDC, 450 mA by USB
Interface	USB 2.0 (type mini USB) RS-485
Weight	275 g
Dimensions	basic body BTS256-UV-1 und BTS256-UV-3: 148 mm x 92 mm x 13 mm (Länge x Breite x Höhe) basic body BTS256-UV-2: 148 mm x 92 mm x 12 mm (Länge x Breite x Höhe)
Logger memory	100 samples (spectral data), 10000 samples (diode)
temperature range	Operation: +10°C bis +30°C (The temperature at the measuring head can be higher for a short time) Storage: -10°C bis +50°C

Downloads

Type	Description	File-Type	Download
BTS256-UV Technical datasheet	BTS256-UV Brochure	pdf	http://www.gigahertz-optik.de/assets/Uploads/Technical-Datasheet-BTS256-UV-210x297-EN-RZ-web.pdf
BTS256-UV-1	technical drawing	pdf	http://www.gigahertz-optik.de/assets/Uploads/V127889.pdf

Purchasing information

Article-Nr	Modell	Description
	Product	
15310078	BTS256-UV-1	Measuring device with rigid light guide sensor, carry case, users guide, factory calibration certificate, application software.
15310350	BTS256-UV-2	Measuring device integrated sensor back side, carry case, users guide, factory calibration certificate, application software.
15312019	BTS256-UV-4	Measuring device with flexible light guide sensor, carry case, users guide, factory calibration certificate, application software.
	Calibration	
15310353	KP-BTS256UV1-E-S	ISO/IEC 17025 testing of a BTS256-UV-1 including test certificate.
15310354	KP-BTS256UV2-E-S	ISO/IEC 17025 testing of a BTS256-UV-2 including test certificate.
15312249	KP-BTS256UV4-E-S	ISO/IEC 17025 testing of a BTS256-UV-4 including test certificate.
	Re-calibration	
15310351	K-BTS256UV1-E-S	Re-calibration of a BTS256-UV-1 including factory certificate.
15310352	K-BTS256UV2-E-S	Re-calibration of a BTS256-UV-2 including factory certificate
15312248	K-BTS256UV4-E-S	Re-calibration of a BTS256-UV-4 including factory certificate.
15311115	KKP-BTS256UV1-E-S	ISO/IEC 17025 testing of a BTS256-UV-1 including test certificate and factory certificate.
15311116	KKP-BTS256UV2-E-S	ISO/IEC 17025 testing of a BTS256-UV-2 including test certificate and factory certificate.
15312250	KKP-BTS256UV4-E-S	ISO/IEC 17025 testing of a BTS256-UV-4 including test certificate and factory certificate.