

## ■ Compact spectroradiometer BTS256-LED

**Compact spectroradiometer** with internal integrating sphere for measurement of the luminous flux, spectrum, color, and color rendering indices of single LEDs test

The photometric specifications of LEDs must commonly meet very high tolerance requirements even for non-specialist applications such as general and automotive lighting. This is often a problem since the manufacturing tolerances of LEDs can be higher than those permitted in the applications. The tolerance limits offered by LED manufacturers' intensity and color based binning are only applicable if the operating conditions are similar to those in the binning tests. Therefore, manufacturers incorporating LEDs into their products require devices that can accurately measure the precise in-situ photometric performance of LEDs.

### Compact spectral radiometer

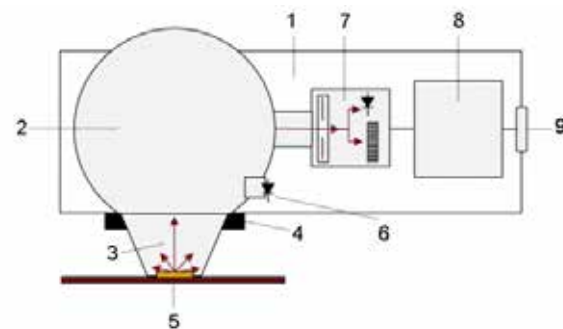
The compact BTS256-LED enables you to conveniently measure the luminous flux, spectrum, color, and color rendering indices of single LEDs. One special feature is the conical measurement port of the device. The ability to perform measurements of onboard LEDs makes it possible to also include thermal effects in the measurement. The luminous flux, color, color rendering indices and spectrum of an LED are all typically measured within a few seconds. The device is therefore ideal for inspection of incoming products as well as the quality control in produc-

tion processes. It can also be very useful in the design department.

The BTS256-LED comes in a compact aluminum housing and offers all functions that are necessary for precise measurement of the luminous flux, spectrum, color, and color rendering indices. For greatest accuracy and versatility, this device is based on a BiTec light sensor that consists of a V-lambda-filtered Si photodiode and a spectrometer unit that has a CMOS diode array. Si photodiodes are unsurpassed in terms of dynamic range, linearity, and speed. The CMOS diode array-based spectrometer guarantees precise measurement data of the luminous spectrum which is used to determine the color values. The combination of the two detectors enables mutual correction (see article on the BTS technology) for greater precision. This also makes it possible to perform accurate, time-synchronized measurements, e.g., of PWM signals. One cutting-edge feature of the BTS256-LED is its remote-controlled shutter for dark current compensation of the array as well as its software-controlled auxiliary lamp for compensation of light absorbed by the measurement samples (self-absorption correction). The remote control takes place via a USB 2.0 interface using the supplied S-BTS256 software.



BTS256-EF



- 1) BTS256-LED housing
- 2) 50mm integrating sphere with synthetic coating
- 3) Conical measurement port
- 4) Precision bayonet Mount
- 5) Test LED on a circuit board (device under test)
- 6) Remote-controlled auxiliary lamp
- 7) BiTec sensor with Si photodiode, CMOS diode array spectrometer and shutter
- 8) Microprocessor
- 9) USB 2.0 interface

### Measurands

- Luminous flux: 10 mlm - 1100 lm
- spectral range: 360 nm - 830 nm
- 5 nm with optical bandwidth correction according to CIE 214

## ■ Compact spectroradiometer BTS256-LED

### Calibration

One essential quality of photometric devices is their precise and traceable calibration. Calibration of the BTS256-LED is performed in Gigahertz-Optik's calibration laboratory that is accredited by DAkkS (D-K-15047-01-00) for the spectral responsivity and spectral irradiance according to ISO/IEC 17025. The device has two calibrations: one is done using a specially developed reference lamp offering 2pi illumination which enables precise measurement of the luminous flux of diffusely emitting LEDs. The second calibration is for sources that have narrower illumination characteristics.



*BTS256-LED for measurement of the luminous flux, spectrum, color, and color rendering index of single LEDs*



*The conical measurement port is placed over the test LED and detects all the radiation in a 2pi space*

## ■ Compact spectroradiometer BTS256-LED

### Options for the BTS256-LED

The **BTS256-LED Plus Concept** offers an interchangeable range of accessories including integrating spheres, goniometers, cosine diffusers and intensity adapters thereby offering a cost effective solution across the demands of LED product development and manufacturing.

The **ISD-Series** of external integrating spheres enable 4-Pi luminous flux measurements in spheres up to 100cm diameter and 2-Pi measurements of directional lamps with diameters up to 254 mm.

The **BTS256-LED-IB illuminance adapter** is designed for measurement of the averaged LED intensity according to CIE 127 Condition B. When combined with the internal integrating sphere of the BTS256-LED, this adapter provides extremely high uniformity across the 1 cm<sup>2</sup> measurement area specified within CIE 127.

The addition of the **BTS256-LED-DA diffuser window** to the BTS256-LED makes it possible to use the device for illuminance measurements. It provides the required cosine correction over a +/- 30 degree field of view and is therefore only recommended for measurement of directional lamps.

The **GB-GD-360-R40 goniometer** can be used to enhance the BTS256-LED in order to perform illuminance distribution measurements of directional lamps.



*BTS256-LED Plus Concept*



*ISD-Series with BTS256-LED Tester*



*ISD-Series with BTS256-LED Tester*

## ■ Specifications spectroradiometer BTS256-LED

Specifications	
Main features	Compact measurement device with internal integrating sphere, BiTec light sensor, remote-controlled auxiliary lamp and shutter. Fast data logger for the luminous flux. Software
Measurement range	Luminous flux: 10 mlm - 1100 lm, spectral range: 360 nm - 830 nm, bandwidth: 5 nm with optical bandwidth correction according to CIE 214
typical applications	Goods-in inspection of individual LEDs, quality assurance of assembled LEDs in production processes, Research and development testing.
Calibration	For diffuse emitting and narrow beam LEDs. Factory calibration. Traceable to international calibration standards.
Sensor	Bi-Technology Sensor (BTS) with a photometric broadband detector and a array spectrometer. Integrated aperture for automatic dark signal adjustment.
Input optics	Integrating sphere with synthetic ODM98 coating and protective window at the sphere port. Cone adapter coated with ODP97 for radiation absorption. 10 mm diameter measurement port. LED auxiliary lamp.  Adapter change effect $\pm 0.5\%$ Max. xy responsivity deviation of the 10mm measurement port $\pm 2\%$ Max. z responsivity deviation of the 10mm measurement port $\pm 2\%$ (1 mm to 11mm)
spectral range	(360 - 830) nm
Integration Time	(5.2 - 30000) ms
typical measurement time	1100 lm $\leq$ 5ms (white light) 10 mlm $\leq$ 30s (white light)
CCT Measurement range	(1700 - 17000) K



With its innovative and high-quality products as well as application solutions, Gigahertz-Optik enjoys a high regard from its international customers within the field of optical radiation measurement technology. As a manufacturer, Gigahertz-Optik offers standard and custom-made solutions. Regular investments in new technologies ensure that Gigahertz-Optik is able to offer modern measuring solutions to its customers in industry and science.

### Broadband light measurement devices

- UV Radiometer
- Photometer
- Hazard

### Spectral light meter

- Handheld devices
- High-end devices
- UV Spectroradiometer
- Weather-proof devices
- Light transmission

### Complementary products

- Integrating spheres
- Integrating sphere light sources
- Calibration standards
- Electronics, optomechanics
- Optically diffuse materials

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