

# BTS256-EF

<https://www.gigahertz-optik.com/en-us/product/bts256-ef/>

**Product tags:** VIS , Handheld device



## Description

### Development from Lux Meter to Spectral Light Meter

Traditional lux meters are increasingly being replaced by spectral light meters such as the [MSC15](#). **However, the lighting industry also needs high accuracy spectral light meters that can handle more complex measurements.** These include measurement of pulse width modulated light and the ability to measure both internal and external illumination, determination of thermal transient behavior of lamps, and so on. The primary criterion that such meters must always meet is the quality of their photometric features. Additional electronic features may improve usability and display quality, but they cannot compensate for substandard measurement results.

From a formal point of view with the CIE 231:2019 and DIN 5032-7:2024 photometers with built-in spectral mismatch correction by spectral measurements are treated the same way as classic photometers. Resulting parameters such as  $f_1'$  can be determined in accordance with DIN EN 13032-1, provided that the spectral and integral measurements are performed with the same input optics, which is always the case with our BTS devices. The BTS were already ahead of their time, and standardization has now caught up.

Manufacturers of lamps and luminaires for general lighting purposes must consider light flicker when qualifying product safety in terms of **EMC immunity requirements**. In addition to the influence of mains voltage fluctuations, flicker effects caused by the lamp and the luminaire itself must be taken into account. The European Commission's Ecodesign Regulation now requires SVM and Pst measurements and even specifies limit values for them.

With the BTS256-EF, Gigahertz Optik GmbH, a renowned measuring device manufacturer, offers a universal measuring device for the determination of all relevant light parameters in general lighting. Combined with a programmable AC source, the BTS256-EF becomes a comprehensive flicker test system for lamps and luminaires including voltage fluctuation immunity tests IEC TR 61547-1:2017. See [technical article about the measurement of TLA \(Temporal Light Artefacts\)](#).

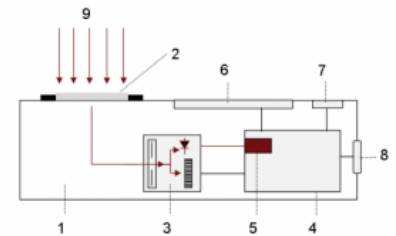
### BTS256-EF – High-Quality, Spectral Light and Color Measurement Meter

The BTS256-EF is a high-quality measuring device for photometric and colorimetric measurement of general lighting products and conditions.

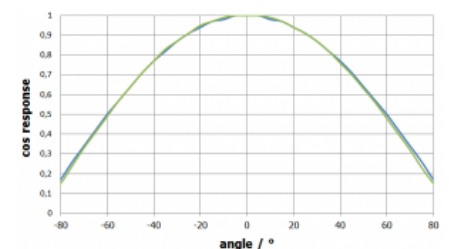
\*One of its unique features is the from Gigahertz-Optik developed [innovative BiTec sensor](#) that consists of a V( $\lambda$ ) filtered Si



BTS256-EF for complex measurements in lighting technology, including flicker measurement



Principle illustration of the BTS256-EF  
1) BTS256-EF  
2) Precision cosine diffuser  
3) BiTec sensor with Si photodiode, CMOS diode array spectrometer and shutter  
4) Photometric Si-photodiode with fast amplifier  
5) Microprocessor  
6) Display  
7) Control Buttons  
8) USB 2.0 interface  
9) Light incident



BTS256-EF light meter with precise cosine field of view function

photodiode and a spectroradiometer unit. This makes it extremely linear, stable, and fast and is therefore a guarantee for higher measurement accuracy which is not accompanied by any disadvantages. Both sensors can be used independently and the mutual correction of the sensors is advantageous for accuracy, speed and versatility.

Thus, the meter **supports all the requirements of a modern spectral light meter** allowing also high accuracy for LED measurements:

- Cosine field of view illuminance measurement for accurate evaluation of extended illumination (class B DIN 5032 part 7 or AA according to JIS C 1609-1:2006)
- Flicker measurement
- Spectral measurement technology, required for LED light, color, color rendering, color effects
- Photodiode for synchronization to pulse width modulated light and flicker measurement
- alpha-opic illuminance and irradiance measurement (CIE S 026:2018)
- Compact and robust design for portable hand-held use

## A High Accuracy Light Flicker Meter suited also for LEDs

In its function as a light-flicker meter, the BTS256-EF supports all current [flicker measurands/quantities](#):

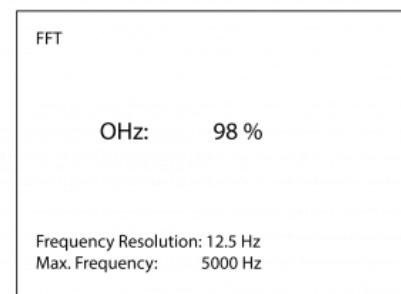
- Percent Flicker (IEEE Std 1789-2015, IES: RP-16-10, CIE:TN-006, CIE:TN-012)
- Flicker Index (IEEE Std 1789-2015, IES: RP-16-10, CIE:TN-006, CIE:TN-012)
- FFT Frequency component analysis
- P<sub>st</sub> Short term flicker severity (CIE:TN-006, CIE:TN-012, IEC TR 61547)
- Stroboscopic Visibility Measure, SVM (CIE:TN-006, CIE:TN-012, IEC TR 63158)
- M<sub>p</sub> ASSIST Flicker perception metric
- Joint Appendix JA10

The measurands Percent Flicker, Flicker Index and the FFT frequency component analysis are available in the BTS256-EF's stand-alone configuration. All other measurands are only accessible when the BTS256-EF is remote-controlled via the included S-BTS256 software. The same is true for the Wi-Fi version of the BTS256-EF. There is a limitation though: The measurands P<sub>st</sub>LM and SVM require a very high data throughput that can only be realized via a USB cable. These are not available when the BTS256-EF WiFi is connected via Wi-Fi.

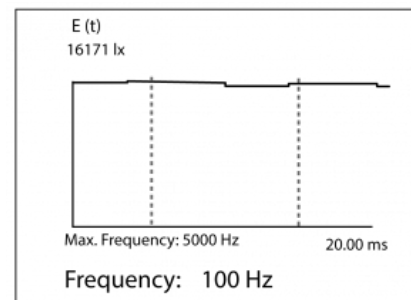
In addition, the BTS256-EF allows [flicker tests according to IEC TR 61547 when operated in combination with power supply LPS-CH-500](#). These tests aim to probe flicker stability when light sources are operated in an AC circuit under the influence of disturbance signals.

## Meter for Photosynthetically Active Radiation (PAR) in Plant Growth

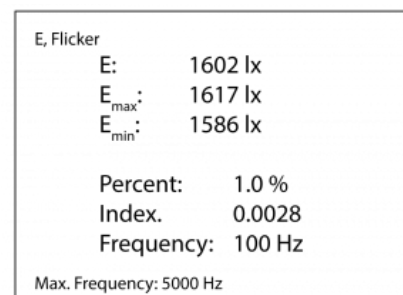
LED grow lights need to be measured in terms of the Photosynthetically Active Radiation (PAR) they produce. This function is supported by the BTS256-EF. The Photosynthetic Photon Flux Density (PPFD) in  $\mu\text{mol}/(\text{m}^2\cdot\text{s})$  can be measured which is a measure of the total number of photons within the PAR wavelength range that reach a surface each second per square meter area. Furthermore, the daylight integral (DLI) can be displayed which represents the total amount of photosynthetically active



BTS256-EF Flicker Measurement (FFT and max. Frequency)



BTS256-EF Flicker Measurement (Temporal Plot)



BTS256-EF Flicker Measurement (Flicker Percent, Flicker Index, Flicker Frequency)

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radiation received by a plant in the course of a day.

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## Calibration of the Flicker and General Lighting Meter

One essential quality feature of photometric devices is their precise and traceable calibration. The BTS256-EF is calibrated by [Gigahertz-Optik's ISO 17025 highest quality calibration laboratory](#) that was accredited by DAkkS (D-K-15047-01-00) for the *spectral responsivity* and *spectral irradiance* according to ISO/IEC 17025. The calibration also included the corresponding accessory components. Every device is delivered with its respective calibration certificate.

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## DALI Alliance Tests IEC 62386-209

Enables CCT measurements to be fully automated in the official DALI Alliance tests in accordance with IEC 62386-209 (colour control gear).

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## Further Options for the Spectral Light Meter BTS256-EF

- Software development kit for integration of the device in the user's own software
- In combination with [software tool S-T-Flicker and the programmable AC Source LPS-CH-500](#) Gigahertz-Optik GmbH offers a functional extension of the BTS256-EF for an test system according to the IEC TR 61547-1:2017 Equipment for general lighting purposes - EMC immunity requirements - Part 1: An objective light flicker and fluctuation immunity test method.

## Specifications

### General

|                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|----------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Short description    | Spectroradiometer for the illuminance (photopic, scotopic, melanopic), PAR, spectrum, light color, color rendering index, and flicker                                                                                                                                                                                                                                                                                                                                                                                                       |
| Main features        | Mobile measurement device, BiTec sensor with a V-lambda photodiode and low stray light CMOS spectroradiometer with a 10 nm optical bandwidth and additional optical bandwidth correction (CIE214), remote-controlled offset shutter, precise cosine-corrected field of view, data logger, automatic PWM synchronization, color quantities (x, y, u', v', X,Y,Z, delta uv, color temperature, color rendering index (CRI) Ra, R1-R15, TM-30-20, CIE224, CQS, CIE170, alpha-opic, etc.), flicker measurement of Pst, SVM, Flicker Index, etc. |
| Measurement range    | 1 lx to >199,000 lx, 360 nm to 830 nm, flicker frequency between 0.25 Hz and 200 kHz                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Typical applications | Precise spectral light meter for the lighting industry                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Calibration          | Factory calibration, traceable to international standards                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

### Product

|              |                                                                                                                                                                                                                                                           |
|--------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Sensor       | class B DIN 5032 part 7 or AA according to JIS C 1609-1:2006<br>class A DIN 5032 part 7 for $f_4$ , or general precision class according to JIS C 1609-1:2006<br>class L DIN 5032 part 7 for $f_1'$ and UV response, IR response, $f_3$ , $f_6$ and $f_7$ |
| Sensor       | Bi-Technology sensor with a photometric broadband detector and a array spectrometer. Integrated aperture for automatic dark signal adjustment.                                                                                                            |
| Input optics | Diffuser window with 20 mm diameter, cosine corrected field of view, $f_2$ Error $\leq 3\%$                                                                                                                                                               |
| Filter       | Spectral responsivity with fine CIE photometric matching. Online correction of the photometric matching through spectral measurement data (spectral mismatch factor correction)                                                                           |

Flicker

Measurands: Percent flicker (IES:RP-16-10, CIE TN 006:2016, CIE TN 012:2021), flicker index (IES:RP-16-10, CIE TN 006:2016, CIE TN 012:2021), flicker frequency, fast fourier transformation (FFT),  $P_{st}$  short-term flicker severity Pst (CIE TN 006:2016, CIE TN 012:2021, IEC TR 61547:2020), stroboscopic effect visibility measure SVM (CIE TN 006:2016, CIE TN 012:2021, IEC TR 63158), Mp ASSIST, joint appendix JA10.

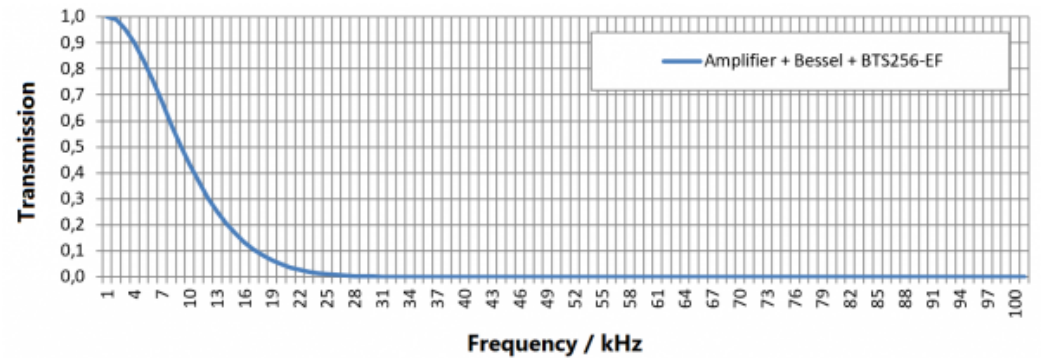
The **measurement range extends** to the following range when the BTS256-EF is used in combination with a PC (by USB, not not suited for WiFi) and the S-BTS256 or S-SDK-BTS256 **software**:

| Measurement time (Flicker) | Sampling Rate | Upper Cut-Off Frequency           | Lower Cut-Off Frequency |
|----------------------------|---------------|-----------------------------------|-------------------------|
| 1 ms - 180 s               |               | (3dB)<br>see details in the graph | 0.00 Hz                 |

The BTS256-EF has a **limited** internal memory and can thus only access the following frequency range **when used as a handheld** meter (without a PC):

| Measurement Time (Sensor) | Measurement Time (Flicker) | Sampling Rate | Upper Cut-Off Frequency | Lower Cut-Off Frequency |
|---------------------------|----------------------------|---------------|-------------------------|-------------------------|
| 50 ms                     | 41.0 ms                    | 20 $\mu$ s    | 5 kHz                   | 60 Hz                   |
| 100 ms                    | 81.9 ms                    | 40 $\mu$ s    | 5 kHz                   | 30 Hz                   |
| 200 ms                    | 163.8 ms                   | 80 $\mu$ s    | 2.5 kHz                 | 15 Hz                   |
| 500 ms                    | 327.7 ms                   | 160 $\mu$ s   | 1.2 kHz                 | 8 Hz                    |
| 1000 ms                   | 655.4 ms                   | 320 $\mu$ s   | 0.6 kHz                 | 4 Hz                    |
| 3000 ms                   | 2620 ms                    | 1280 $\mu$ s  | 150 Hz                  | 1 Hz                    |
| 6000 ms                   | 5240 ms                    | 2560 $\mu$ s  | 75 Hz                   | 0.5 Hz                  |
| 12000 ms                  | 10486 ms                   | 5120 $\mu$ s  | 33 Hz                   | 0.25 Hz                 |

Filter Transmission Amplifier:



3dB Range 0 to 5 = 10 kHz, Range 6 to 8 = 200Hz

(for Flicker measurements only range 0 to 5 are recommended)

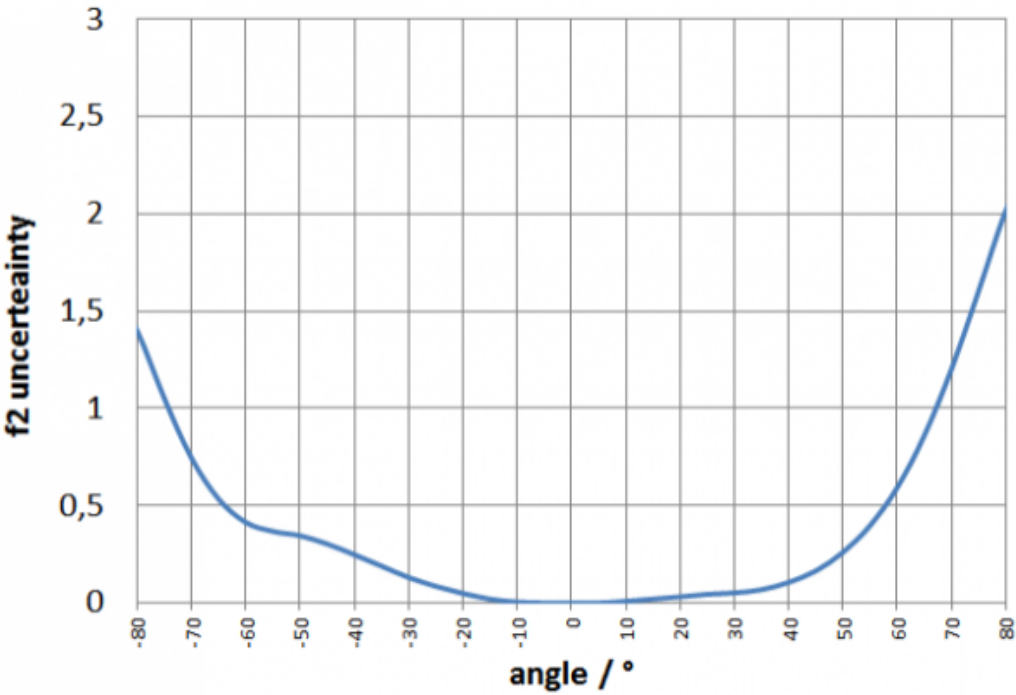
Spectral Detector

|                   |                                                                                                                                       |
|-------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Chip              | CMOS diode-array                                                                                                                      |
| Spectral range    | (360 - 830) nm                                                                                                                        |
| Optical Bandwidth | 10 nm, mathematical optical bandwidth correction according to CIE 214 can be automatically applied                                    |
| Data Resolution   | 1 nm                                                                                                                                  |
| Integration Time  | (5.2 - 30000) ms                                                                                                                      |
| Shutter           | Automatic aperture for dark signal measurements with the same integration time as that of light measurements. Aperture delay = 100ms. |

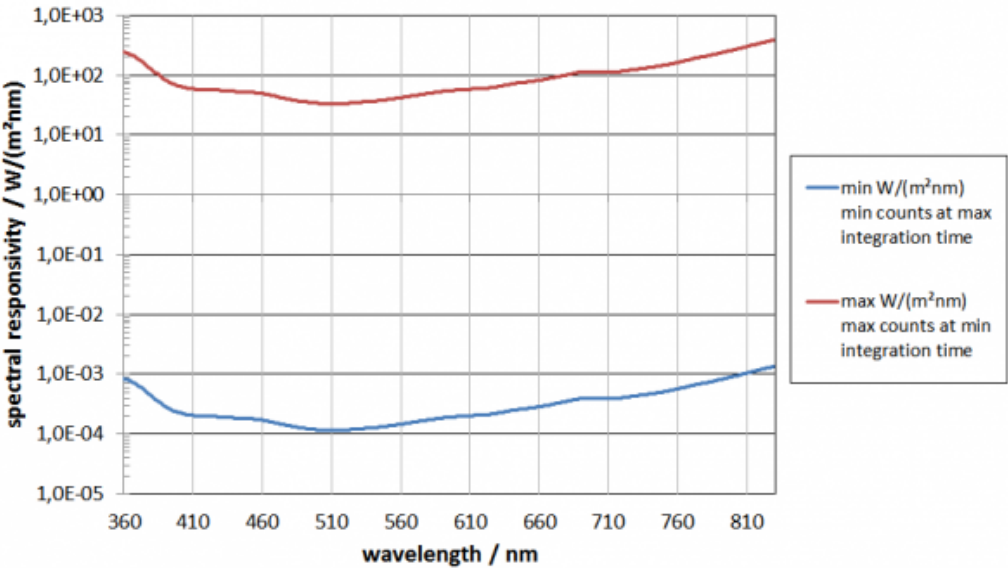
|                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |          |                |             |                |           |                |             |                |             |                                                 |  |
|-------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|----------------|-------------|----------------|-----------|----------------|-------------|----------------|-------------|-------------------------------------------------|--|
| Typical measurement time                        | 199,999 lx $\leq$ 5ms (white light)<br>100 lx $\leq$ 1s (white light)                                                                                                                                                                                                                                                                                                                                                                                         |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Color measurement range spectral                | (1 - 199,999) lx                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Scotopic                                        | Scotopic measurement range spectral (1 - 199,999) lx<br>Calibration uncertainty of scotopic Illuminance $\pm$ 2.2%                                                                                                                                                                                                                                                                                                                                            |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Peak wavelength                                 | $\pm$ 1 nm                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Dominant wavelength                             | $\pm$ 1 nm                                                                                                                                                                                                                                                                                                                                                                                                                                                    |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Repeatability $\Delta x$ and $\Delta y$         | $\pm$ 0.0001 (Standard illuminant type A)<br>$\pm$ 0.0002 (LED)                                                                                                                                                                                                                                                                                                                                                                                               |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| $\Delta y$ $\Delta x$ uncertainty               | $\pm$ 0.002 (Standard illuminant type A)<br>$\pm$ 0.005 (typ. LED)                                                                                                                                                                                                                                                                                                                                                                                            |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| CCT Measurement range                           | (1700 - 17000) K                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| $\Delta$ CCT                                    | $\pm$ 50K (standard illuminant type A)<br>$\pm$ 4% (depending on the LED spectrum)                                                                                                                                                                                                                                                                                                                                                                            |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| CRI (color rendering index)                     | Ra and R1 to R15                                                                                                                                                                                                                                                                                                                                                                                                                                              |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Stray Light                                     | 6E-4 (Blue LED)<br>6E-4 (Green LED)<br>6E-4 (Red LED)<br>1E-3 (White LED)<br>(typical value, measured 100 nm to the left of the peak of the LEDs)                                                                                                                                                                                                                                                                                                             |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Calibration uncertainty                         | Spectral irradiance<br><br><table> <tr> <td><math>\lambda</math></td><td><math>u(k=2)</math></td></tr> <tr> <td>(360 - 399) nm</td><td><math>\pm</math> 5,5 %</td></tr> <tr> <td>(400 - 479) nm</td><td><math>\pm</math> 4 %</td></tr> <tr> <td>(480 - 779) nm</td><td><math>\pm</math> 3,8 %</td></tr> <tr> <td>(780 - 830) nm</td><td><math>\pm</math> 4,3 %</td></tr> <tr> <td>Spectral irradiance responsivity (360 - 830) nm</td><td></td></tr> </table> | $\lambda$ | $u(k=2)$ | (360 - 399) nm | $\pm$ 5,5 % | (400 - 479) nm | $\pm$ 4 % | (480 - 779) nm | $\pm$ 3,8 % | (780 - 830) nm | $\pm$ 4,3 % | Spectral irradiance responsivity (360 - 830) nm |  |
| $\lambda$                                       | $u(k=2)$                                                                                                                                                                                                                                                                                                                                                                                                                                                      |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| (360 - 399) nm                                  | $\pm$ 5,5 %                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| (400 - 479) nm                                  | $\pm$ 4 %                                                                                                                                                                                                                                                                                                                                                                                                                                                     |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| (480 - 779) nm                                  | $\pm$ 3,8 %                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| (780 - 830) nm                                  | $\pm$ 4,3 %                                                                                                                                                                                                                                                                                                                                                                                                                                                   |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Spectral irradiance responsivity (360 - 830) nm |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| <b>Integral Detector</b>                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Calibration uncertainty                         | Illuminance $\pm$ 2.2%                                                                                                                                                                                                                                                                                                                                                                                                                                        |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| f1' (spectral mismatch)                         | $\leq$ 6% (uncorrected)<br><br>$\leq$ 1.5% (f1' $a^*(s_z(\lambda))$ ) respectively $F^*(s_z(\lambda))$ corrected by spectral data, done automatically by BTS technology)                                                                                                                                                                                                                                                                                      |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| max. illuminance                                | $\geq$ 199,999 lx (limited by temperature)                                                                                                                                                                                                                                                                                                                                                                                                                    |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Noise equivalent illuminance                    | $\leq$ 0.01 lx                                                                                                                                                                                                                                                                                                                                                                                                                                                |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Measurement time                                | (0.1 - 6000) ms                                                                                                                                                                                                                                                                                                                                                                                                                                               |           |          |                |             |                |           |                |             |                |             |                                                 |  |
| Temperature range                               | The measured values of the diode are corrected by means of an internal temperature sensor.                                                                                                                                                                                                                                                                                                                                                                    |           |          |                |             |                |           |                |             |                |             |                                                 |  |

## Graphs

f2 (directional response/cosine error)



Spectral responsivity



Miscellaneous

|                   |                                                                                    |
|-------------------|------------------------------------------------------------------------------------|
| Microprocessor    | 16Bit, 25ns instruction cycle time                                                 |
| Power Supply      | 5VDC, 450mA per USB                                                                |
| Interface         | USB 2.0 (Type B USB)<br>Option WiFi: WiFi 2,4 GHz (external antenna, range > 100m) |
| Temperature range | Operation: +10°C bis +30°C<br>Storage: -10°C bis +50°C                             |
| Housing           | Splashproof IP54                                                                   |
| Transport case    | 333mm x 280mm x 70mm, 650g                                                         |
| Dimensions        | 159mm x 85mm x 45mm (Length x Width x Height)                                      |
| Weight            | 500 g                                                                              |

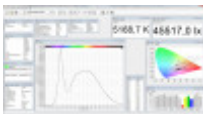


|                 |                                                               |
|-----------------|---------------------------------------------------------------|
| Battery runtime | Lithium-Ion battery with 1600 mAh                             |
|                 | 10 hours with display backlight on and continuous measurement |
|                 | 48 hours in stand-by with backlight off                       |

## Downloads

| Type     | Description                                                      | File-Type | Download                                                                                                                                                                                                    |
|----------|------------------------------------------------------------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Brochure | Light measurement solutions for general and specialized lighting | pdf       | <a href="https://www.gigahertz-optik.com/assets/Uploads-v2/generallighting-broschuere-DINA4-hoch-v2.pdf">https://www.gigahertz-optik.com/assets/Uploads-v2/generallighting-broschuere-DINA4-hoch-v2.pdf</a> |

## Configurable with

| Product Name | Product Image                                                                       | Description                                                                                                             | Go to product                                                                                                                                                       |
|--------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| S-SDK-BTS256 |   | Software Development Kit for BTS256 variants.                                                                           | <a href="https://www.gigahertz-optik.com/en-us/product/s-sdk-bts256/">https://www.gigahertz-optik.com/en-us/product/s-sdk-bts256/</a>                               |
| S-BTS256     |  | Application software for BTS256 variants.                                                                               | <a href="https://www.gigahertz-optik.com/en-us/product/s-bts256/">https://www.gigahertz-optik.com/en-us/product/s-bts256/</a>                                       |
| LPS-CH-500   |  | Signal Generator for example for testing of flicker properties of lamps and luminaires according to IEC TR 61547-1:2017 | <a href="https://www.gigahertz-optik.com/en-us/product/lps-ch-500-with-s-t-flicker/">https://www.gigahertz-optik.com/en-us/product/lps-ch-500-with-s-t-flicker/</a> |

## Purchasing information

| Article-Nr         | Modell         | Description                                                                                                                                                                                              |
|--------------------|----------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Product</b>     |                |                                                                                                                                                                                                          |
| 15312815           | BTS256-EF      | BTS256-EF meter, user manual (D or E), S-BTS256 user software as a download, USB cable for PC operation and battery charging, USB power adapter (EU, USA or GB), BHO-17 hard-top case                    |
| 15312983           | BTS256-EF WiFi | BTS256-EF WiFi meter, user manual (D or E), WiFi antenna, S-BTS256 user software as a download, USB cable for PC operation and battery charging, USB power adapter (EU, USA or GB), BHO-17 hard-top case |
| <b>Calibration</b> |                |                                                                                                                                                                                                          |
| 15311565           | KP-BTS256E-E-S | Optional DIN EN ISO/IEC 17025:2018 (DAkKS) accredited test of the BTS256-EF's illuminance and spectral irradiance sensitivity in the wavelength range according to the device specifications.            |



| Article-Nr            | Modell          | Description                                                                                                                         |
|-----------------------|-----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| <b>Re-calibration</b> |                 |                                                                                                                                     |
| 15300751              | K-BTS256E-E-S   | Recalibration of the BTS256-EF's illuminance and spectral irradiance sensitivity. Calibration certificate.                          |
| 15311564              | KKP-BTS256E-E-S | Factory calibration with following DIN EN ISO/IEC 17025:2018 accredited test of the BTS256-EF. Calibration and testing certificate. |
| <b>Options</b>        |                 |                                                                                                                                     |
| 15308526              | LPS-CH-500      | Programmable power supply with reference source impedance                                                                           |
|                       |                 | Commissioning and training on request                                                                                               |
| <b>Software</b>       |                 |                                                                                                                                     |
| 15298218              | S-SDK-BTS256    | Software Development Kit; Software and users guide on CD                                                                            |
| 15308525              | S-T-Flicker     | Flicker software tool, only usable in combination with LPS-CH-500                                                                   |

## Contact, Calibration, Service & Support

We are known worldwide for excellent technical consulting and after sales support. Contact us to find together the best solution for you. Our services:

- Technical Consulting & Sales
- After-Sales Support
- Calibrations & Re-Calibrations ([ISO/IEC 17025 Calibration Services](#), [factory calibration](#), [Calibration of Third-Party Products](#))
- Repairs & Updates
- OEM & Feasibility Consulting of Customized Solutions

[Send us your inquiry](#) or contact us by phone or e-mail. We would welcome your feedback too or review us on [Google](#).

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