BTS256-E, the mobile light meter for photopic and scotopic illuminance, EVE factor, luminous color, color rendering and luminous spectrum

Technology changes in mobile light measurement engineering

Just like incandescent bulbs are being replaced by new technological advancements, traditional photometers and light meters also have to pave way to new measurement techniques. The new measurement technology must be accustomed to the exceptional features of LED lights and other energy-saving bulbs as well as be able to perform color rendering, luminous color and luminous spectrum measurements in addition to the illuminance measurements.

Fourteen different measurands

In order to be able to measure the luminous intensity, color and spectrum, a contemporary light meter is expected to incorporate the following fifteen measurands:

- Ep photopic illuminance
- Es scotopic illuminance
- Es/Ep ratio of scotopic and photopic vision
- EVE "Equivalent Visual Efficiency" factor
- Ee irradiance
- Eλ spectral irradiance
- x, y CIE 1931 color coordinate
- u', v' CIE 1976 color coordinate
- CT color temperature
- Δ_{uv} deviation from the blackbody locus
- λ_{dom} dominant wavelength
- λp peak intensity wavelength
- $\lambda_{0,5}$ spectral half-width
- Purity color purity
- CRI Ra and R1 to R15 color rendering index

Accurate measurement data using the Bi-technology sensor

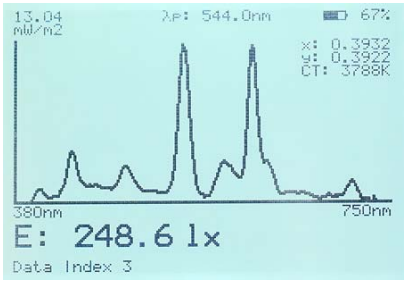
The BTS256-E light meter is equipped with a BTS256 Bi-technology light sensor from Gigahertz-Optik. The employment of two different light detectors blends in both of their characteristic features and hence helps avoid typical constraints.

Si-photodiode with photometric correction filter

The traditional light detector with silicon diodes and a photometric correction filter is, with regards to the dynamic range, linearity and speed, still the ultimate sensor.

256 pixels diode array spectral radiometer

The BTS256 light sensor's CMOS diode array provides precise luminous spectrum measurement data. The spectral data is used for luminous value and scotopic illuminance calculations.



Standard display with illuminance, x,y color coordinate, color temperature and emission spectrum of an energy-saving lamp

Automatic dark signal adjustment

A dark signal aperture in front of the photodiode and diode array is ideal for the compensation of dark signal dependent of the measurement time and hence enables an optimum signal-to-noise ratio.

Bi-directional tuning of the measurement values

The measurement data of the photodiode improves the linearity of the diode array whereas the diode array's measurement values lead to a better goodness-of-fit of the photodiode.

Modulated light measurement (PWM)

The fast photodiode additionally enables the necessary synchronization for the measurement of pulse width modulated light.

The cosine adjusted field of view

The measurement geometry of the input optics has a huge influence on the quality of the measurement values. The BTS256-E, with its 20mm large diameter diffusor window having an f2 ≤ 3%, corresponds to the DIN 5036 Quality Class B.

DIN Quality Class B and A Luxmeter

Based on its cutting-edge bi-technology sensor concept, the use of the newest electronics, the online dark signal adjustment and temperature compensation, the DIN 5036 Quality Classes evaluation criteria is no longer suited to the BTS256 concept. Taking the ≤ 3% f2 error into consideration, the BTS256-E corresponds to the Quality Class B (DIN 5032 part 7). In an application where the field of view can be limited, the BTS256-E corresponds to the Quality Class A (DIN 5032 part 7) due to its f1, f3 and f4 values.

Easy operation and handling

Thanks to 3 function keys and the diligently structured menu navigation, the device can easily and safely be operated. In standard measurement mode, the device automatically selects the optimum measurement parameters. In Expert measurement mode, the experienced user can influence these.

Many useful extra functions

- ◊ If the user would like to get out of the field of view when performing the measurement, he can opt for the time delay measurement.
- ◊ The display can be automatically switched off during the measurement.
- ◊ The end of the measurement can be indicated using an acoustic signal.
- ◊ In order to measure the illuminance distribution, a computer generated layout with the bases for the single measurements can be used with the device.
- ◊ Fast data logger measurement mode with a 100ms maximum measuring pulse rate of the photodiode.
- ◊ Data logger measurement mode for clocked recording of all measurands including spectral measurement data.
- ◊ Date and time (real time clock) can be set.

Tripod mount

An integrated tripod socket is available underneath the device.

Use with computer

The BTS256-E has a USB2 interface for its use with a PC.

User software

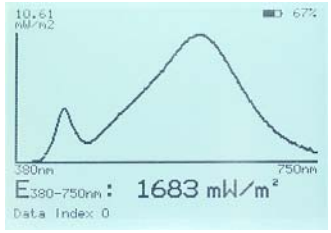
The S-BTS256-E software offers all the functions necessary for measurement, measurement data display and data transfer. The up-to-date, flexible desktop concept of the software offers the user an individual constellation of the required measurement values. This can either be just a full screen lux measurement values' display or a matrix containing the numerical and graphical display fields. Each desktop constellation can of course be saved for later use.

Software development kit

Gigahertz-Optik offers self-programmers the S-SDK-BTS256-E Software Development Tool. This can be used with Lab View from National Instruments, NET from Microsoft and C/C++. The SDKs simplify the incorporation of the BTS256-E in a self developed software.

11 selectable and 5 configurable displays for the most important measurands at a glance

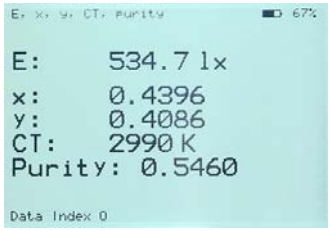
Spectral illuminance lx



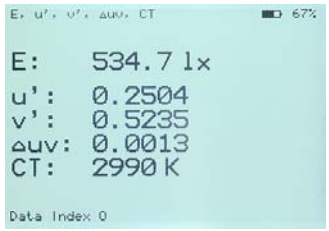
Spectral irradiance W/m²

Photopic illuminance

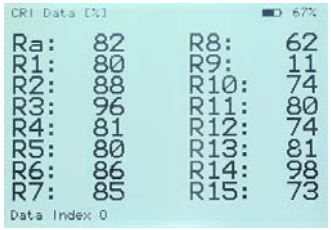
Scotopic illuminance



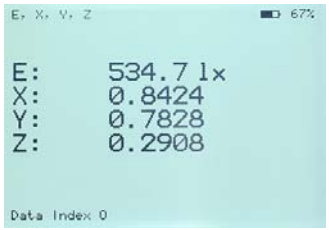
x,y color coordinates



u',v' color coordinates



Color Rendering Index



Standard color values

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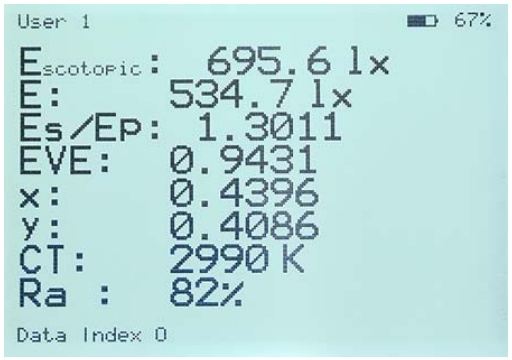
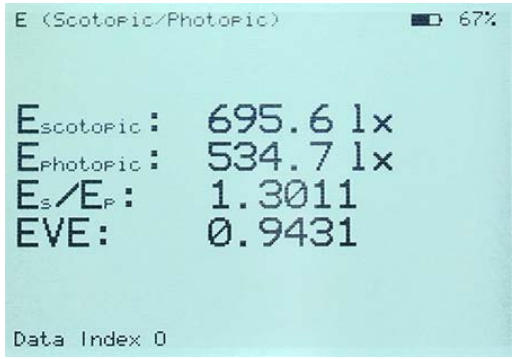
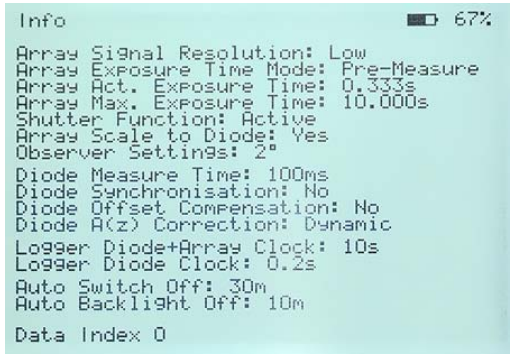


Five user displays with up to 8 individually selectable measurands



Relationship between the scotopic and photopic illuminance and the EVE factor as per IES TM-24-13



The measurement parameter protocol is saved together with the measurement values' data file

Gigahertz-Optik

Measurement with Light Measurement of Light

BTS256-E

The universal light meter