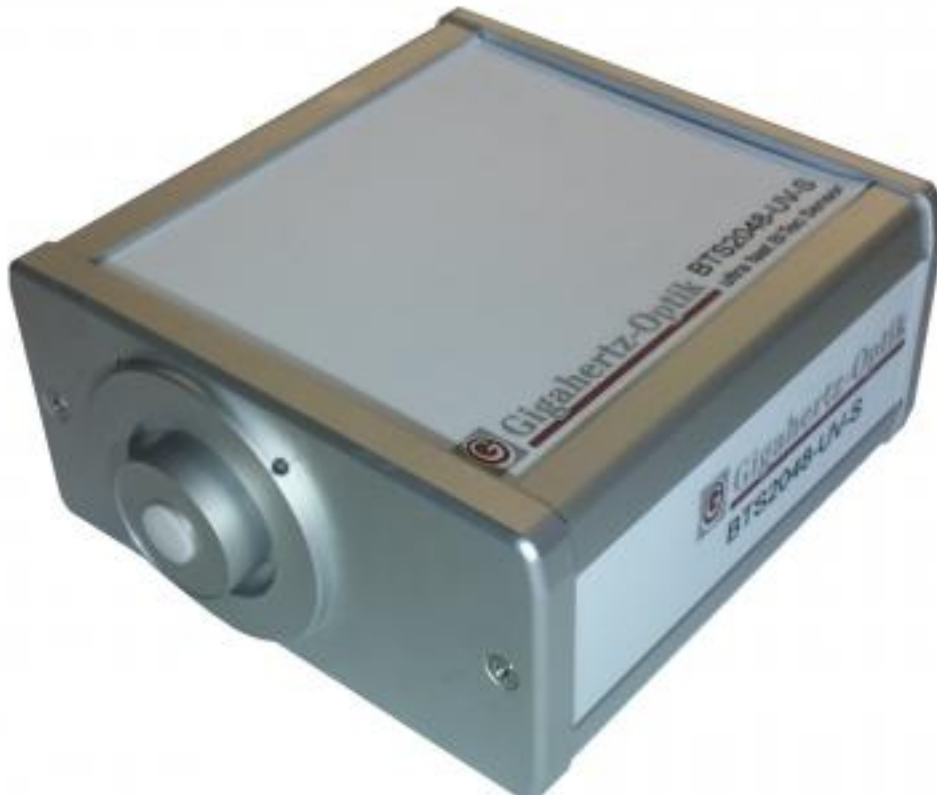


BTS2048-UV-S

<https://www.gigahertz-optik.de/en-us/product/BTS2048-UV-S>

Product tags: UV



Description

Nominated for the Innovation Award Bavaria 2018

BTS2048-UV-S fast BiTec sensor spectroradiometer for high-quality UV measurements

The BTS2048-UV-S is a high-quality spectralradiometer whose compact design and elaborate optical, electronic and mechanical interfaces make it ideal for integration in complex industrial and scientific measurement tasks.

BiTec sensor for high-end light measurement

One of the outstanding features of this exceptional spectroradiometer is its BiTec sensor. This combines the special properties of a photodiode with those of a back-thinned CCD diode array. Through bilateral correction of measurement signals from both sensors, the BiTec sensor ensures precise radiometric and spectral-radiometric measurement values over a large dynamic range.

High-quality back-thinned CCD detector

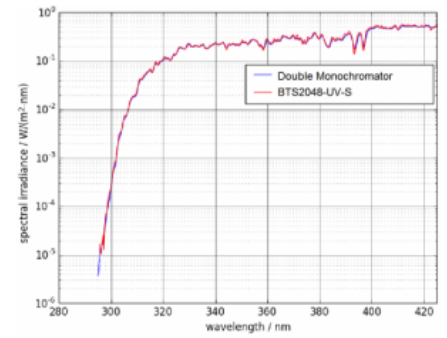
The diode array comprising of 2048 pixels has a utilizable spectral responsivity range between 190 nm and 430 nm. It has a 0.7 nm optical bandwidth and a pixel resolution of 0.13nm/pixel. Due to the back-thinned technology, this CCD chip is substantially more sensitive as compared to conventional front-illuminated CCD chips. Furthermore the CCD is one stage cooled (1TEC).

Flash spectral radiometer

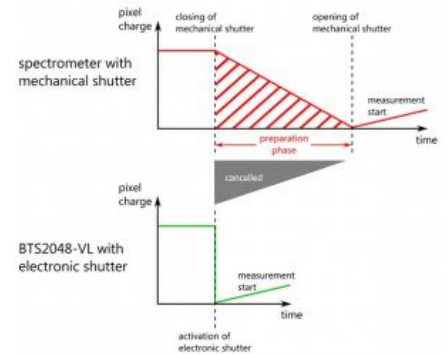
Another of its features is that the back-thinned CCD detector is equipped with an electronic shutter. This makes the measurement within a light flash possible. Together with the diverse trigger functions, integration times of between 2µs and 60000ms, the powerful micro-processor and the very fast LAN interface (7ms for a complete data file), the BTS2048-UV-S qualifies for a wide range of applications.

Precise spectral radiometry (low straylight)

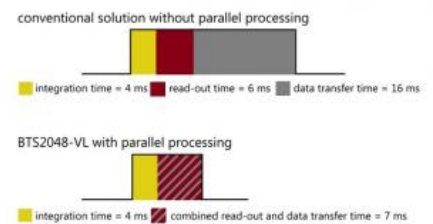
To facilitate optimum use of the CCD sensor's dynamic range and to overcome the problems of most array spectroradiometers in the UV range, there is a remote controlled filter wheel (Open, Closed, optical filters) located in the optical beam path. This filters combined with smart measurement and stray light correction routines enables high quality



Comparison of a solar measurement of the BTS2048-UV-S and a standard double monochromator. The BTS2048-UV-S achieves about the same quality in a measurement time of a few s compared to about 1.5 min of the double monochromator.

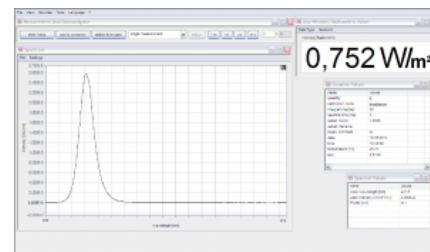


Electronic Shutter reduces the measurement time



Ethernet interface reduces the datatransfer time

measurements of the BTS2048-UV-S. Results are comparable with double monochromator results (see figure). However the measurements time is significantly lower. Since for the BTS2048-UV-S a filter wheel with 8 filter positions is implemented a further smart measurement routine for stray light reduction is implemented compared to the BTS2048-UV.



Diffuser window instead light guide

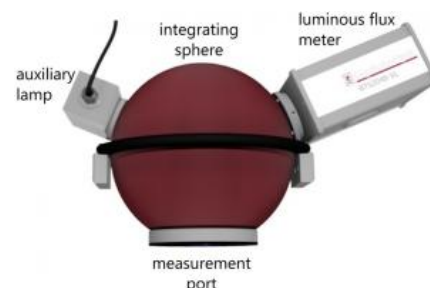
As for the input optics, the BTS2048-UV-S has an incorporated diffuser window with a cosine corrected field of view. The fact that a light guide has not been used improves sensitivity and calibration stability. The f2 adjustment of the cosine corrected field of view to less than 3% makes it possible to use the BTS2048-UV-S for direct measurement in absolute radiometric measurands

- Irradiance (W/m^2)
- Spectral irradiance ($W/(m^2 nm)$)
- Radiant intensity (W/sr)
- Spectral radiant intensity ($W/sr nm$)

Radiant power measurement

In connection with integrating spheres, the BTS2048-UV-S is the optimal light meter for measurement of the radiant power respectively spectral radiant power. The prefixed diffuser window can be positioned in the sphere such that an uninterrupted hemispherical field of view is created. Gigahertz-Optik manufactures a wide range of integrating spheres as well as the necessary accessories e.g. calibration standards.

S-BTS2048 software for the BTS2048-UV-S



The BTS2048-UV can directly plugged on a integrating sphere (picture shows the constructional identical BTS2048-VL)

Ultra fast interfaces

The BTS2048-UV-S is controlled via a USB 2.0 or Ethernet interface. With regards to the communication speed the ethernet port is superior to the USB2.0 interface. Furthermore, the data preparation occurs in the BTS2048-UV-S to optimize the datatransfer speed. For this purpose, an independent, high-performance microprocessor is incorporated.

User software with flexible desktop structure

Among the BTS2048-UV-S delivery contents is the S-BTS2048 user software. One of the characteristic features it has to offer is the flexible desktop that can be individually configured by the user. This entails a potpourri from which the user can choose graphical and numerical display windows:

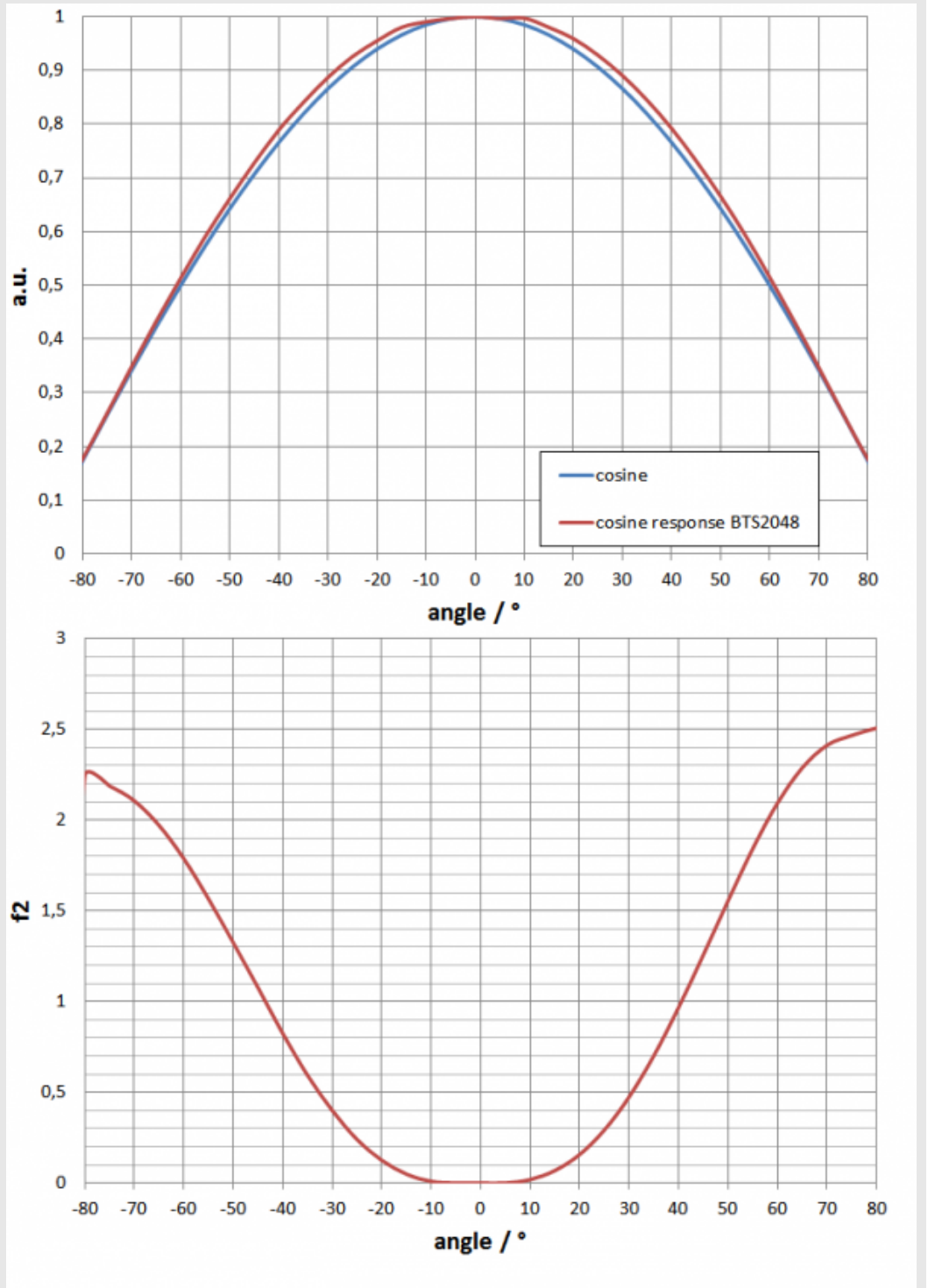
- Freely definable numerical displays in decimal or scientific representation. Zoom function.
- Numerical display fields for radiometric, spectral and other measurands.
- Measurement protocol of the selected measurement parameters.
- CIE 1931 chromaticity diagram. Zoom function.
- Spectrum. Zoom function.
- Data logger. Zoom function.
- etc.

Traceable calibration

Calibration of the BTS2048-UV-S, including its accessories, is performed by Gigahertz-Optik calibration laboratory for optical measurands with reference to national and international calibration standards.

Specifications

| General | |
|-------------------------|---|
| typical applications | Lightmeter for spectral Irradiance, Erythema, etc. |
| Measured Quantity | Spectral irradiance ($W/(m^2 \text{ nm})$), irradiance (W/m^2), peak wavelength, center wavelength, centroid wavelength, Erythema. Option integrating sphere: in addition spectral radiant power (W/nm) and radiant power (W) |
| Input optics | Diffusor, cosine corrected field of view ($f2 \leq 3 \%$) |
| Filter wheel | 8 positions (open, closed, optical filters). Use for remote dark current measurement and stray light reduction. |
| BiTec | Parallel measurement with diode and array is possible, thereby linearity correction of the array through the diode and online correction of the spectral mismatch of the diode through $a^*(s_2(\lambda))$ respectively $F^*(s_2(\lambda))$. |
| Calibration uncertainty | Spectral irradiance (200 - 249) nm: $\pm 12 \%$ (250 - 339) nm: $\pm 7 \%$ (340 - 399) nm: $\pm 5 \%$ (400 - 430) nm: $\pm 4 \%$ Spectral irradiance responsivity (200 - 430) nm |
| Spectral Detector | |
| Integration Time | 2 μs - 60 s *1 |
| spectral range | (190 - 430) nm |
| Optical Bandwidth | 0.8 nm |
| Pixel resolution | $\sim 0.13 \text{ nm/Pixel}$ |
| Number of pixels | 2048 |
| Chip | Highly sensitive back-thinned CCD chip, one stage cooled (1TEC) |
| ADC | 16bit (25 ns instruction cycle time) |
| Peak wavelength | $\pm 0.05 \text{ nm}$ |
| Band-pass correction | mathematical online band-pass correction is supported |
| Linearity | completely linearized chip >99.6% |
| Stray Light | Out of Bound method $< 1E-4$ *3 Bandpass method $< 1E-5$ *3 |
| Base line noise | 5 cts *4 |

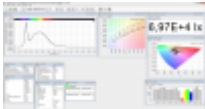



Miscellaneous

| | |
|-------------------|---|
| Microprocessor | 32bit for device control, 16bit for CCD array control, 8bit for photodiode control |
| Interface | USB V2.0, Ethernet (LAN UDP protocol), RS232, RS485 |
| Data transfer | Standard for 2048 float array values via ethernet 7ms, via USB 2.0 140 ms |
| Input Interfaces | 2x (0 - 25) VDC, 1x optocoupler isolated 5 V / 5 mA |
| Output Interfaces | 2x open collector, max. 25 V, max. 500 mA |
| Trigger | Trigger input incorporated (different options, rising/falling edge, delayed, etc.) |
| Software | User software S-BTS2048 Optional software development kit S-SDK-BTS2048 for user software set-ups based on .dll's in C, C++, C# or in LabView. |

| | |
|-------------------|--|
| Power Supply | With power supply: DC Input 5V ($\pm 10\%$) at 700 mA With USB bus (500mA) ^{*8} |
| Dimensions | 103 mm x 107 mm x 52 mm (Length x Width x Height) |
| Weight | 500 g |
| Mounting | Tripod and M6 screw threads Front adapter UMPA-1.0-HL for use with integrating sphere port-frame UMPF-1.0-HL |
| temperature range | Storage: (-10 to 50) °C Operation: (10 to 30) °C ^{*9} |
| temperature range | CCD Chip: $\leq \pm 0.25$ °C |
| Info | <p><i>*1 It is recommended to perform a new dark signal measurement for every change in the integration time</i></p> <p><i>*2 typical value, the uncertainty of the dominant wavelength depends on the spectral distribution of the LED</i></p> <p><i>*3 typical value, measured 100 nm left of the peak of a cold white broadband LED with and deep blue LED peak</i></p> <p><i>*4 *5 typical value measured without averaging for a 4ms measurement time and full scale control of the array. Averaging results in quadratic rise of the S/N i.e. quadratic fall of the base noise e.g. averaging to a factor 100 improves the S/N by a factor 10</i></p> <p><i>*6 Minimum 500/1 S/N. Maximum at full scale control.</i></p> <p><i>*7 Irradiation only allowed for a short time so as to avoid thermal damage</i></p> <p><i>*8 during USB connection, not all functions are available due to the limited current supply e.g. no Ethernet and TEC cooling</i></p> <p><i>*9 Device required for temperature stabilization in approx. 25min. In measurement is performed in the warm-up phase, or if measurements are performed under varying temperatures, dark signal measurement is required for each measurement</i></p> <p><i>*10 With a(Z) correction by a Deuterium lamp</i></p> <p><i>*11 By a spectral power distribution of a deuterium lamp, maximum radiation only allowed for a short time so as to avoid thermal damage</i></p> |

Configurable with

| Produktname | Product Image | Description | Show product |
|---------------|---|--|---|
| S-BTS2048 |  | Application software for BTS2048 variants. | https://www.gigahertz-optik.de/en-us/product/S-BTS2048 |
| S-SDK-BTS2048 |  | Software Development Kit for BTS2048 variants. | https://www.gigahertz-optik.de/en-us/product/S-SDK-BTS2048 |

Purchasing information

| Article-Nr | Modell | Description |
|--------------------|----------------|--|
| Product | | |
| 15298727 | BTS2048-UV-S | Measuring device, hard cover box, users guide, software CD, calibration certificate. |
| Calibration | | |
| 15300809 | K-BTS2048-UV-S | Recalibration of the BTS2048-UV-S with calibration certificate |
| Software | | |
| 15298470 | S-SDK-BTS2048 | Software development kit, software CD with users guide. |
| 15298474 | S-BTS2048 | User software for BTS2048 and variants. |