

BTS2048-UVVISNIR

<https://www.gigahertz-optik.com/en-us/product/bts2048-uvvisnir/>

Product tags: UV , VIS , NIR



Description

BTS2048-UVVISNIR CCD spectroradiometer for UV, VIS and NIR radiation

The BTS2048-UVVISNIR meets all the requirements of a high-end UV and VIS diode array spectroradiometer and is available at an attractive price despite its cutting-edge technology.

*One of its unique features is the from Gigahertz Optik GmbH developed innovative **BiTec sensor** that consists of a $V(\lambda)$ filtered Si 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 (see article on [BTS technology](#)).

The fully linearized 2048 pixel CCD detector with thermoelectric cooling offers a very wide dynamic range thanks to its integration time that ranges from 2 μ s to 60 s. This enables precise measurements of UV, VIS and some NIR LEDs in a broad intensity range. The design offers high optical resolution of 2 nm over the entire spectral measurement range from 200 nm to 900 nm. The spectrometer is also equipped with an optical filter for automatic low stray light measurements. Such measurements are necessary for broadband UV lamps and UV LEDs in the presence of other light sources. The very high linearity Si photodiode within the BiTec detector is used for linearization of the CCD or taken as a reference detector. The photometric responsivity function of the Si photodiode enables its use independent of the CCD. The photometric precision can be auto-corrected using the respective spectral data. The device can therefore be used to perform fast measurements on very weak signals, something that makes the BTS20418-UVVISNIR perfect for integration in [goniometers](#). Despite its compact dimensions (103 mm x 107 mm x 52 mm – L x W x H), the BTS2048-UVVISNIR spectroradiometer has a remote-controlled filter wheel with two optical filters and a shutter for dark measurement.

Absolute calibration of the absolute irradiance down to 200 nm!

The many years of experience and its well-equipped DAKKS calibration laboratory (D-K-15047-01-00) enables Gigahertz-Optik to offer traceable calibrations down to 200 nm. This broadens the application range of the BTS2048-UVVISNIR to UV-C-LEDs but also VIS or some NIR LEDs. For the shortwave spectral range, Gigahertz-Optik GmbH has implemented a special deuterium lamp-based calibration strategy.

Use in front-end and back-end LED test measurements

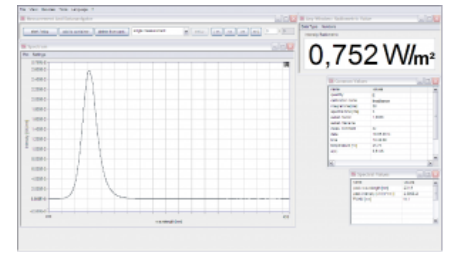
The BTS2048-UVVISNIR is perfectly suited for the testing of UV and VIS front-end and back-end LEDs in industrial applications. Its CCD detector integrates an electronic zero setting feature of all pixels before a measurement is triggered (electronic shutter). The electronic shutter and triggering of the measurement can be synchronized with a power supply via a trigger port when the test LED is operated in pulsed current mode. The powerful microprocessor only requires 7 ms to transfer a complete dataset to the system computer via the fast LAN interface.

Direct mounting instead of using a light guide

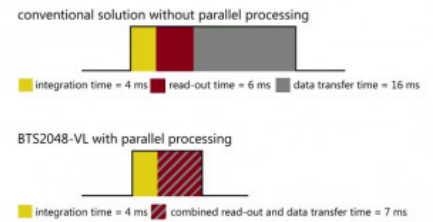
The BTS2048-UVVISNIR spectroradiometer has a diffuser window and can therefore be used to measure the UV irradiance, incl. spectrum and peak wavelength, without any additional accessory components. With the diffuser window, the BTS2048-UVVISNIR can also be mounted directly onto accessories such as integrating spheres, radiance lenses, and goniometers in order to measure the radiant power, radiance, and radiance distribution.

User software and developer software

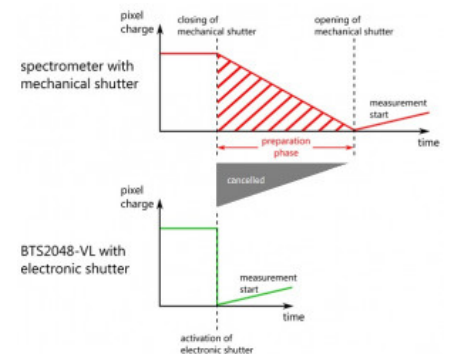
The standard [S-BTS2048](#) user software has a customizable user interface and offers a large number of display and function modules which can be activated when configuring the BTS2048-UVVISNIR with the respective accessory components from Gigahertz-Optik GmbH. The [S-SDK-BTS2048](#) developer software is offered for the integration of the BTS2048-UVVISNIR in the customer's own software.



S-BTS2048 software for the BTS2048-UVVISNIR



Ethernet interface reduces the datatransfer time



Electronic Shutter reduces the measurement time

Calibration

One essential quality feature of photometric devices is their precise and traceable calibration. The BTS2048-UUVISNIR is calibrated by Gigahertz-Optik's 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.

Specifications

General

| | |
|----------------------|---|
| Short description | UV optimized TE cooled CCD spectroradiometer with a wide dynamic range for CW and short-term measurement of the irradiance, spectrum, and peak wavelength. Accessories for other parameters. |
| Main features | Compact device. BiTec detector with back-thinned TE cooled CCD (2048 pixels, 1.0 nm optical resolution, electronic shutter), and SiC photodiode with radiometric filter. Optical bandwidth correction (CIE214). Filter wheel with shutter and edge filter. Input lens with diffusor window. Cosine field of view. |
| Measurement range | Spectral: 1E-6 W/(m ² nm) to 1E4 W/(m ² nm) @280 nm. Responsivity from 200 nm to 900 nm. |
| Typical applications | CCD spectroradiometer for design applications. Module for integration in test systems for front-end and back-end LED testing. |
| Calibration | Factory calibration. Traceable to international calibration standards |

Product

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| Typical applications | Lightmeter for spectral Irradiance, Erythema, etc. | | | | | | | | | | |
| Measured Quantity | Spectral irradiance (W/(m ² 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 | 4 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 <table><tr><td>λ</td><td>$u(k=2)$</td></tr><tr><td>(200 - 249) nm</td><td>$\pm 12\%$</td></tr><tr><td>(250 - 339) nm</td><td>$\pm 7\%$</td></tr><tr><td>(340 - 399) nm</td><td>$\pm 5\%$</td></tr><tr><td>(400 - 900) nm</td><td>$\pm 4.5\%$</td></tr></table> Spectral irradiance responsivity (200 - 900) nm | λ | $u(k=2)$ | (200 - 249) nm | $\pm 12\%$ | (250 - 339) nm | $\pm 7\%$ | (340 - 399) nm | $\pm 5\%$ | (400 - 900) nm | $\pm 4.5\%$ |
| λ | $u(k=2)$ | | | | | | | | | | |
| (200 - 249) nm | $\pm 12\%$ | | | | | | | | | | |
| (250 - 339) nm | $\pm 7\%$ | | | | | | | | | | |
| (340 - 399) nm | $\pm 5\%$ | | | | | | | | | | |
| (400 - 900) nm | $\pm 4.5\%$ | | | | | | | | | | |
| Measurement modes | Standard measurement mode: 200 nm to 900 nm Out of Range stray light corrected measurement mode (OoR SLC): 200 nm to 900 nm | | | | | | | | | | |

Spectral Detector

| | |
|-------------------|----------------------|
| Integration Time | 2 μ s - 60 s *1 |
| Spectral range | (200 - 900) nm |
| Optical Bandwidth | 2 nm |
| Pixel resolution | ~ 0.34 nm/Pixel |
| Number of pixels | 2048 |

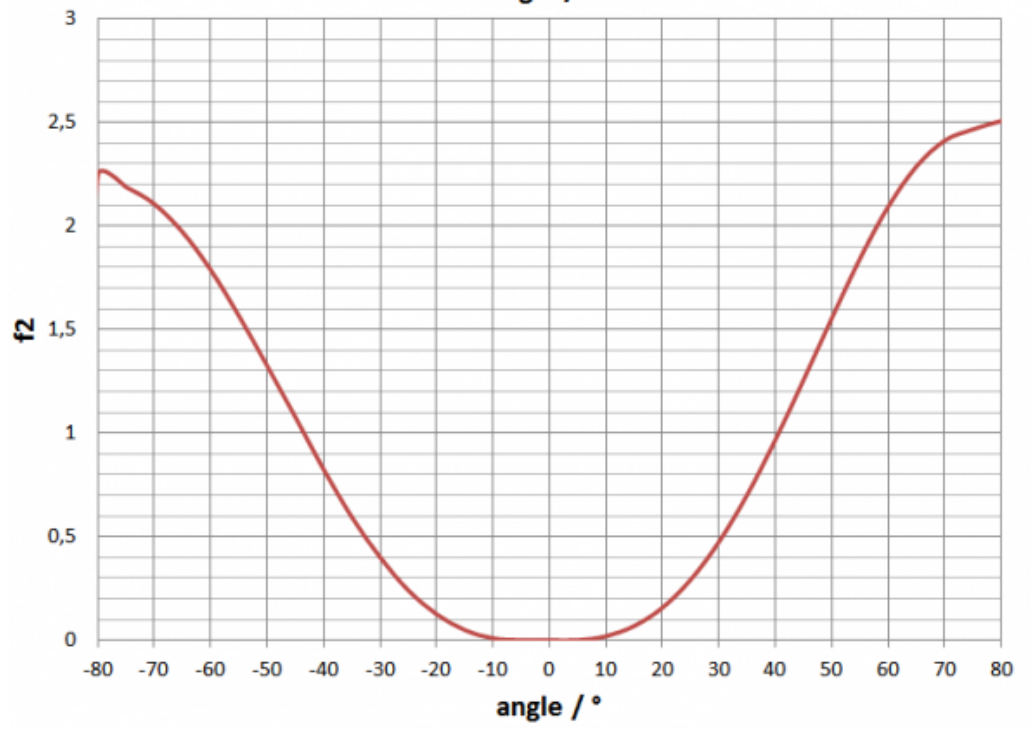
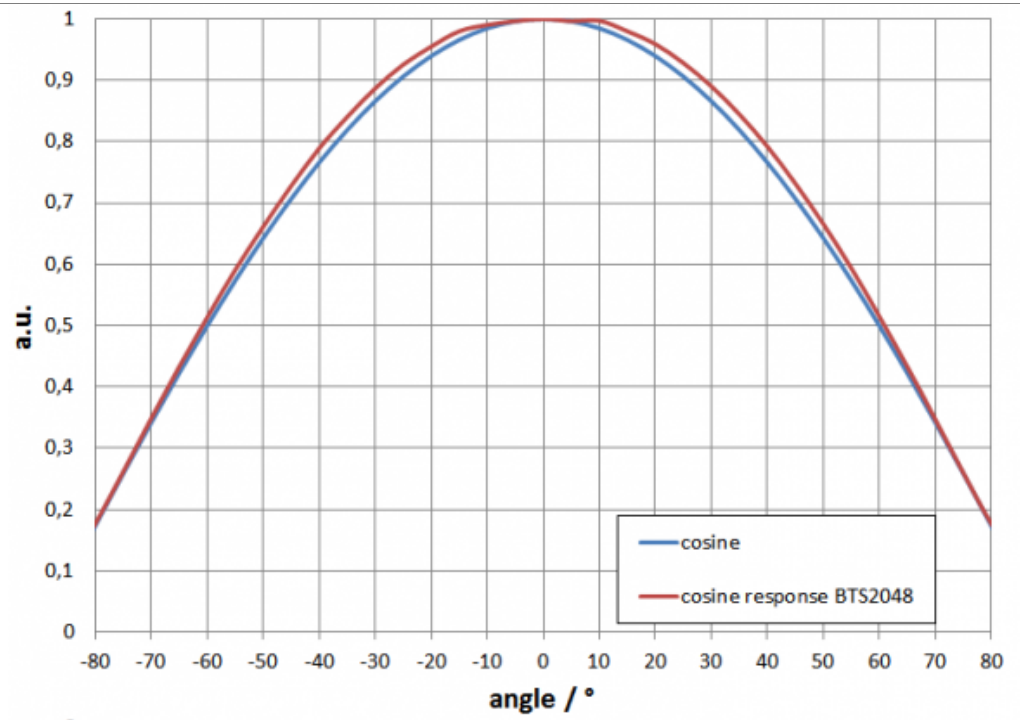
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|--------------------------|---|
| Chip | Highly sensitive back-thinned CCD chip, one stage cooled (1TEC) |
| ADC | 16bit (25 ns instruction cycle time) |
| Peak wavelength | ± 0.2 nm |
| Band-pass correction | mathematical online band-pass correction is supported |
| Linearity | completely linearized chip >99.6% |
| Stray Light | Out of Bound method < 1E-4 *3 |
| Base line noise | 5 cts *4 |
| SNR | 5000 *5 |
| Dynamic range | >9 Magnitudes |
| Spectral responsivity | (1E-6 - 1E5) W/(m²nm) @550nm *6*7 |
| Typical measurement time | 10 lx 3 s *10 100 lx 300 ms *10 1000 lx 30 ms *10 |

Integral Detector

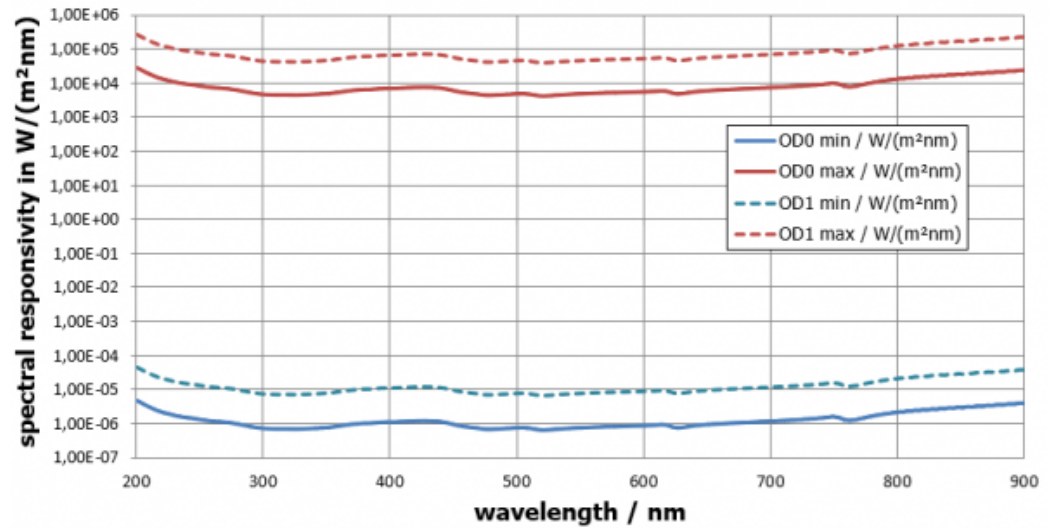
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|-------------------------|--|
| Measurement time | (0.1 - 6000) ms |
| Measurement range | Nine (9) measurement ranges with transcendent offset correction |
| Calibration | Illuminance ± 2.2 % |
| Measurement range | Max measureable illuminance value 3E8lx *7 Noise equivalent illuminance value 1E-1lx |
| Filter | Spectral responsivity with fine CIE photometric matching. Online correction of the photometric matching through spectral measurement data (spectral mismatch factor correction). |
| f1' (spectral mismatch) | ≤ 6 % (uncorrected) ≤ 1.5 % (f1' a*(s ₂ (λ)) respectively F*(s ₂ (λ)) corrected by spectral data, done automatically by BTS technology) |
| ADC | 16bit |

Graphs

f2 (directional response/cosine error)



Spectral responsivity



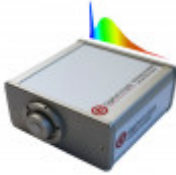
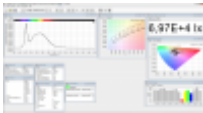


(OD1 is optional)

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 (±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 |

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| Info | <p>*1 It is recommended to perform a new dark signal measurement for every change in the integration time</p> <p>*2 typical value, the uncertainty of the dominant wavelength depends on the spectral distribution of the LED</p> <p>*3 typical value, measured 100 nm left of the peak of a cold white broadband LED with and deep blue LED peak</p> <p>*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</p> <p>*6 Minimum 500/1 S/N. Maximum at full scale control.</p> <p>*7 Irradiation only allowed for a short time so as to avoid thermal damage</p> <p>*8 during USB connection, not all functions are available due to the limited current supply e.g. no Ethernet and TEC cooling</p> <p>*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</p> <p>*10 With $a(Z)$ correction by a Deuterium lamp</p> <p>*11 By a spectral power distribution of a deuterium lamp, maximum radiation only allowed for a short time so as to avoid thermal damage</p> |
|------|---|

Configurable with

| Product Name | Product Image | Description | Go to product |
|----------------|---|--|---|
| BTS2048 Series |  | Compact spectroradiometers with excellent optical performance and BiTec technology for precise measurements for lab and field use. | https://www.gigahertz-optik.com/en-us/product/bts2048-series/ |
| S-BTS2048 |  | Application software for BTS2048 variants. | https://www.gigahertz-optik.com/en-us/product/s-bts2048/ |
| S-SDK-BTS2048 |  | Software Development Kit for BTS2048 variants. | https://www.gigahertz-optik.com/en-us/product/s-sdk-bts2048/ |
| LDM-C50 |  | Spectral radiance optic for BTS2048 series with integrated camera. Focus-able achromatic objective, for the usage with BTS2048 series. Different apertures and measurement distances including calibration are possible. | https://www.gigahertz-optik.com/en-us/product/ldm-c50/ |

Purchasing information

| Article-Nr | Modell | Description |
|------------|--------|-------------|
| Product | | |

| Article-Nr | Modell | Description |
|-----------------------|---------------------------|--|
| 15312538 | BTS2048-UVVISNIR | Measuring device, hard cover box, users guide, S-BTS2048 software, calibration certificate. |
| Calibration | | |
| 15314795 | K-BTS2048-XX-SLMC | Determination and implementation of the stray light correction matrix. |
| 15313441 | K-BTS2048UVVISNIR-E-S-V02 | Calibration of the BTS2048-UVVISNIR from 200 nm to 900 nm while applying the stray light correction matrix. Calibration certificate. |
| Re-calibration | | |
| 15313441 | K-BTS2048UVVISNIR-E-S-V01 | Re-calibration of the BTS2048-UVVISNIR from 200 nm to 900 nm with calibration certificate. |
| Software | | |
| 15298470 | S-SDK-BTS2048 | Software development kit, software CD with users guide. |
| Accessories | | |
| 15307925 | S-T-RECAL-BTS2048 | Software module for functional enhancement of S-BTS2048 software. Support of BTS2048 series light meter re-calibration via the user. |
| 15312474 | BTS2048-Z03 | Triggering cable for BTS2048 series measuring devices. |
| 15308779 | CP-SRT-E | Tube for stray light reduction. |
| 15316085 | BTS2048-XX-Z08 | Tube for stray light reduction. 11.5° field of view. |
| 15309137 | BTS2048-UV-S-Z01 | Front tube with 80° field of view (i.e. ICNIRP, EN 62471, etc.). |
| 15309109 | BTS2048-VL-Z09 | Front tube with 11 mrad and 100 mrad field of view (i.e. ICNIRP, EN 62471, etc.). Material: Plastic. |
| 15309268 | BTS2048-VL-Z10 | Front tube with 11 mrad and 100 mrad field of view (i.e. ICNIRP, EN 62471, etc.). Material: Aluminum. |
| 15298714 | BTS2048-VL-Z07 | Adapter for mounting an SRT-M37-L accessory. Required for radiance measurements. |
| 15298717 | BTS2048-VL-Z08 | Filter holder for attaching filters in front of COS diffuser of BTS2048 devices. Filter size: 18 mm x 18 mm. |
| 15298718 | BTS2048-VL-Z08S | UV transmissive protection screen for mounting in BTS2048-VL-Z08. |

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