BTS2048-UV

https://www.gigahertz-optik.com/en-us/product/bts2048-uv/

Product tags: UV ,



Description

UV CCD spectroradiometer vs. broadband CCD spectrometer

The spectral responsivity of conventional CCD detectors usually lies within the 200 nm to 430 nm range. Often, this wide spectral responsivity range of the CCD detector is claimed as the responsivity range of the spectroradiometer. However, this fails to consider the spectral response function of the dispersion grating, which further reduces the detector's responsivity in the UV spectrum. This results in significant errors in the UV measurement signal, primarily through long-wave stray light. The spectral resolution of broadband spectrometers is often not sufficient to guarantee precise measurements of e.g., narrowband UV LEDs.

CCD spectroradiometers that are specifically designed for UV radiation have a constrained spectral range and allow for a very high grating efficiency in connection with a very high spectral resolution. In addition, optical filters can also be used to significantly reduce stray light.

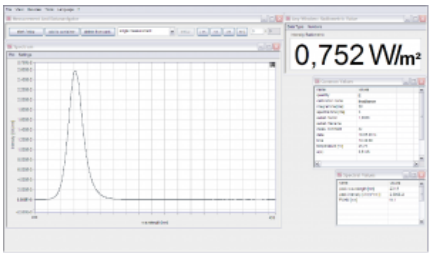


CCD spectroradiometer for UV irradiance

BTS2048-UV CCD spectroradiometer for UV radiation

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

One unique feature of the BiTec sensor is its combination of a back-thinned CCD spectrometer and a Si photodiode that offers high linearity levels enabling extremely fast measurements (see **technical article about BiTec sensor**). 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 µs to 60 s. This enables precise measurements of UV LEDs in a broad intensity range. The design offers high optical resolution of 0.8 nm over the entire spectral measurement range from 190 nm to 430 nm.. The spectrometer is also equipped with two optical filters for automatic low stray light measurements (see also our technical article about stray light reduction for spectroradiometers). Such measurements are necessary for broadband UV lamps and UV LEDs in the presence of other light sources. The very high linearity SiC photodiode within the BiTec detector is used for linearization of the CCD or taken as a reference detector. The radiometric responsivity function of the SiC photodiode enables its use independent of the CCD. The radiometric 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-UV perfect for integration in goniometers. Despite its compact dimensions (103 mm x 107 mm x 52 mm – L x W x H), the BTS2048-UV spectroradiometer has a remote-controlled filter wheel with two optical filters and a shutter for dark measurement.

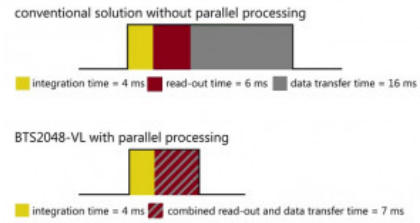


S-BTS2048 software for the BTS2048-UV

Precise Spectral Radiometry (low straylight)

To facilitate optimal use of the CCD sensor's dynamic range and to overcome the problems of most array spectoradiometers in the UV range, a remote-controlled filter wheel (open, closed, optical filter) is located in the optical beam path. This filters combined with smart measurement and stray light correction routines enables high quality measurements of the BTS2048-UV.

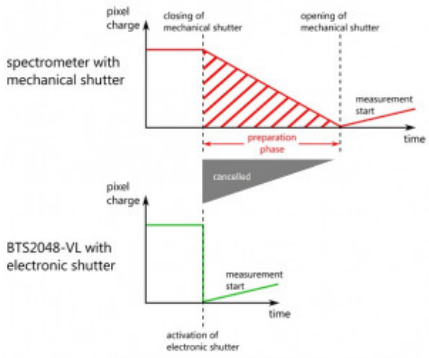
The BTS2048-UV is optimized for general measurements of other UV sources. Gigahertz-Optik's stray light calibration technique in combination with further smart measurement routines enable the superior stray light suppression. **See also our technical article about stray light reduction for spectroradiometers**. The calibration of a BTS2048-UV additional stray light correction matrix is available optionally on request.



Ethernet interface reduces the datatransfer time

Absolute calibration of the absolute irradiance down to 200 nm!

The many years of experience and its well-equipped DAkkS calibration laboratory (D-



Electronic Shutter reduces the measurement time

K-15047-01-00) enables Gigahertz-Optik to offer traceable calibrations down to 200 nm. This broadens the application range of the BTS2048-UV and UV-C-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-UV is perfectly suited for the testing of UV 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-UV spectroradiometer has a diffusor 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-UV 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-UV with the respective accessory components from Gigahertz-Optik GmbH. The S-SDK-BTS2048 developer software is offered for the integration of the BTS2048-UV in the customer's own software.

Calibration

One essential quality feature of photometric devices is their precise and traceable calibration. The BTS2048-UV is calibrated by Gigahertz-Optik's **ISO/IEC 17025 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

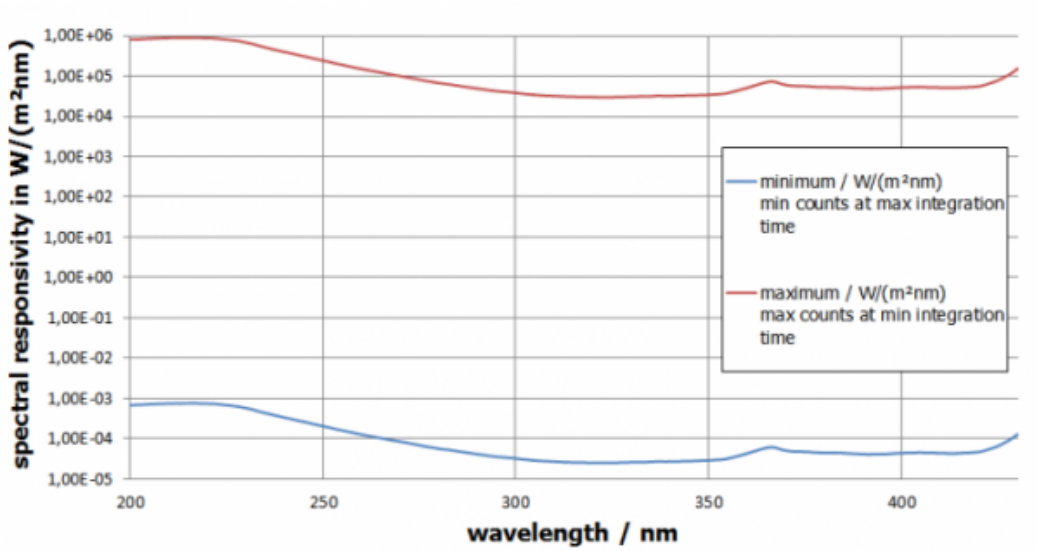
General	
Short description	UV optimized TE cooled CCD spectroradiometer with a wide dynamic range for CW and short-term measurement of the irradiance, spectrum, and peak wavelength. Accessories for other parameters.
Main features	Compact device. BiTec detector with back-thinned TE cooled CCD (2048 pixels, 0.8 nm optical resolution, electronic shutter), and SiC photodiode. Optical bandwidth correction (CIE214). Filter wheel with shutter and edge filter. Input lens with diffusor window. Cosine field of view.
Measurement range	3E-5 W/(m²nm) to 3E4 W/(m²nm) @325nm. Responsivity from 190 nm to 430 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	
Typical applications	Lightmeter for spectral Irradiance, Erythema, etc.
Measured Quantity	Spectral irradiance (W/(m² nm)), irradiance (W/m²), 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 ≤ 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, allowing the photodiode to be scaled radiometrically to the spectral data.
Calibration uncertainty	Spectral irradiance λ — u(*k*=2) (200 - 239) nm — ± 9 % (240 - 339) nm — ± 6.8 % (340 - 359) nm — ± 5 % (360 - 399) nm — ± 4.3 % (400 - 430) nm — ± 4 % Spectral irradiance responsivity (200 - 430) nm
Measurement modes	Standard measurement mode: 200 nm to 430 nm Out of Range stray light corrected measurement mode (OoR SLC): 200 nm to 430 nm Stray light corrected bandpass measurement mode (BP SLC): 300 nm to 386 nm
Spectral Detector	
Integration Time	2 µs - 60 s *1
Spectral range	(190 - 430) nm
Optical Bandwidth	0.8 nm
Pixel resolution	~0.13 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	± 0.05 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	(3E-5 - 3E4) W/(m²nm) @325nm *6*7
Typical measurement time	W/m² of a Halogen lampe from (250 - 400) nm 1 — 4,4 s 10 — 440 ms 100 — 44 ms
Integral Detector	
Measurement time	(0.1 - 6000) ms
Measurement range	seven (7) measurement ranges with transcendent offset correction
ADC	16bit
Measurement range	Optional: (5E-3 - 2E5) W/m² *11

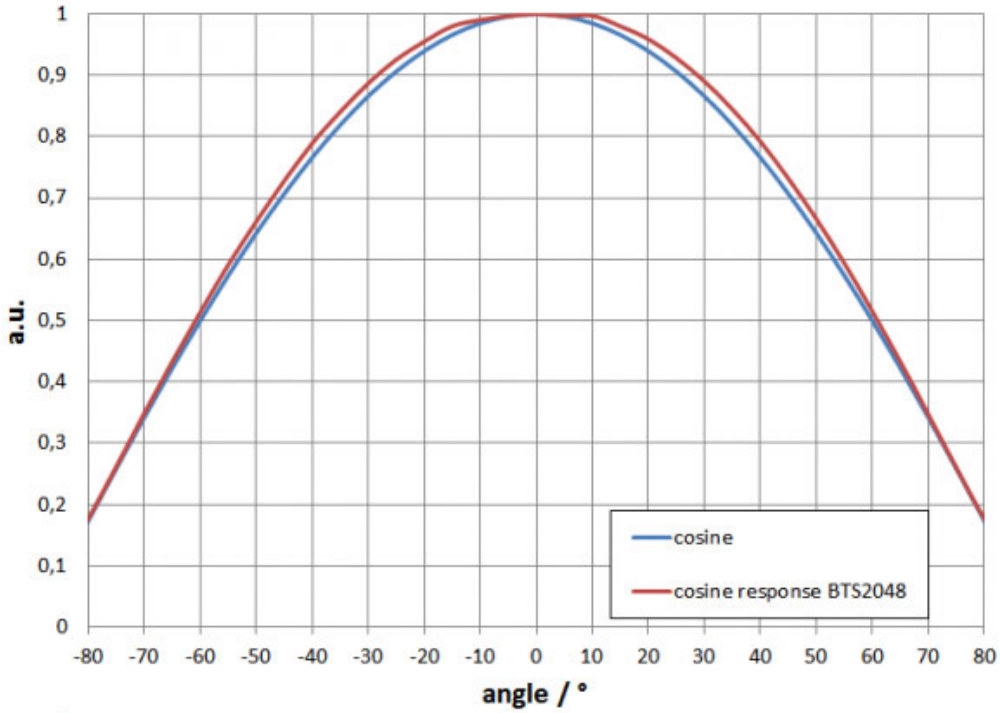
Filter	Mathematical adjustment of the responsivity to a rectangular function from spectral data.

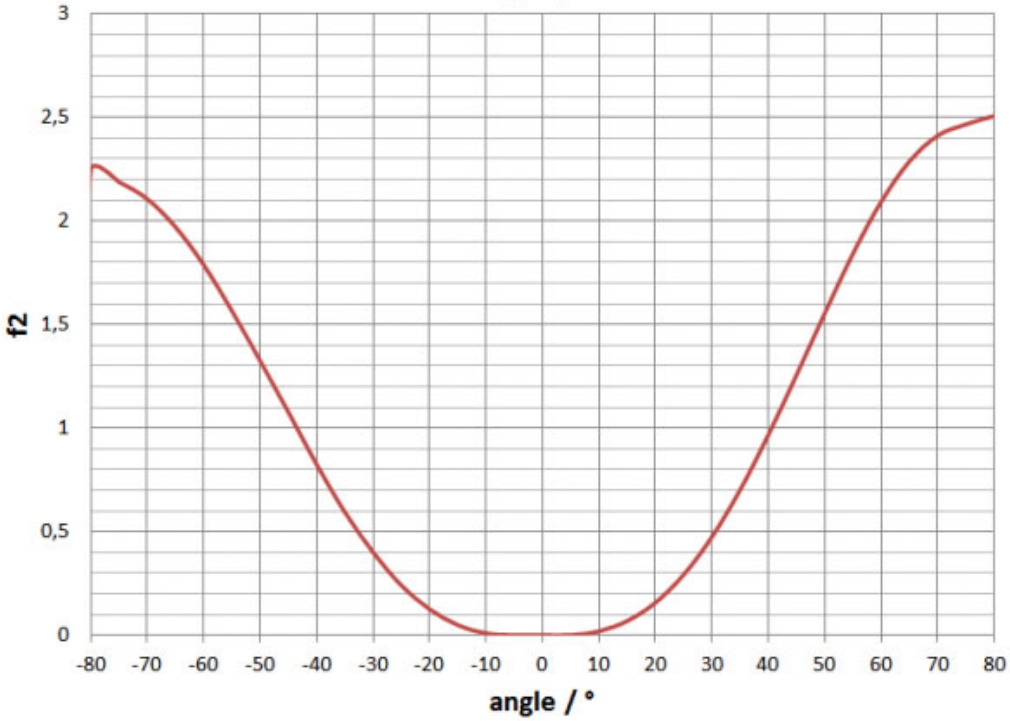
Graphs

Spectral responsivity



f2 (directional response/cosine error)





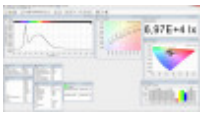
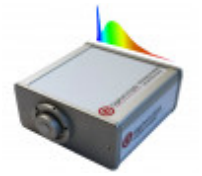
Miscellaneous	
Microprocessor	32bit for device control,16bit for CCD array control, 8bit for photodiode control
Interface	USB V2.0, Ethernet (LAN UDP protocol), RS232, RS485
Data transfer	Standard for 2048 float array values via ethernet 7ms, via USB 2.0 140 ms
Input Interfaces	2x (0 - 25) VDC, 1x optocoupler 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
Info	**1 It is recommended to perform a new dark signal measurement for every change in the integration time* **2 typical value, the uncertainty of the dominant wavelength depends on the spectral distribution of the LED* **3 typical value, measured 100 nm left of the peak of a cold white broadband LED with and deep blue LED peak* **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* **6 Minimum 500/1 S/N. Maximum at full scale control.* **7 Irradiation only allowed for a short time so as to avoid thermal damage* **8 during USB connection, not all functions are available due to the limited current supply e.g. no Ethernet and TEC cooling* **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* **10 With a(Z) correction by a Deuterium lamp* **11 By a spectral power distribution of a deuterium lamp, maximum radiation only allowed for a short time so as to avoid thermal damage*
Spectral responsivity	

Downloads

Type	Description	File-Type	Download
BTS2048-Series	BTS2048 'Not just another spectrometer' brochure	pdf	https://www.gigahertz-optik.com/assets/BTS2048_broschuere_DIN A4_hoch_V2_2022.pdf

Configurable with

Product Name	Product Image	Description	Go to product
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/
GB-GD-360-RB40		Goniometer for the measurement of 2π sources	https://www.gigahertz-optik.com/en-us/product/gb-gd-360-rb40/
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/

Purchasing information

Article-Nr	Modell	Description
Product		
15298858	BTS2048-UV	Measuring device, hard cover box, users guide, S-BTS2048 software, calibration certificate.
Calibration		
15314795	K-BTS2048-XX-SLMC	Determination and implementation of the BTS2048-UV's stray light correction matrix.
15310292	K-BTS2048UV-E-S-V02	Calibration of the BTS2048-UV from 200 nm to 430 nm while applying the stray light correction matrix with calibration certificate.
Re-calibration		
15300808	K-BTS2048UV-E-S-V01	Re-Calibration of the BTS2048-UV from 200 nm to 430 nm with calibration certificate
Software		
15298470	S-SDK-BTS2048	Software development kit with users guide.
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.
Accessories		
15312474	BTS2048-Z03	Trigger cable. For use with LPS-20 power supply.
15308779	CP-SRT-E	Tube for stray light reduction.
15316085	BTS2048-XX-Z08	Tube for stray light reduction. 11.5° field of view.
15317385	BTS2048-UV-Z01	Front tube with 80° field of view (i.e. ICNIRP, EN 62471, etc.).

Article-Nr	Modell	Description
15309109	BTS2048-VL-Z09	Front tube with 11 mrad and 100 mrad field of view. Material: Plastic.
15309268	BTS2048-VL-Z10	Front tube with 11 mrad and 100 mrad field of view. 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.

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:

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- 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

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