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.

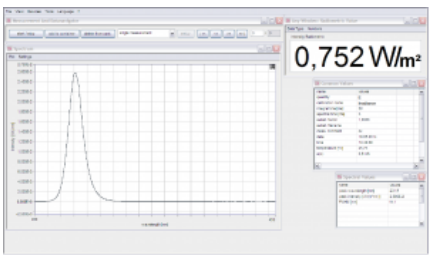
CCD spectroradiometers that are specifically designed for UV radiation have a constrained spectral range and allow for a very high grating efficiency in connection with a very high spectral resolution. In addition, optical filters can also be used to significantly reduce stray light.

UV spectroradiometer BTS2048-UV

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.

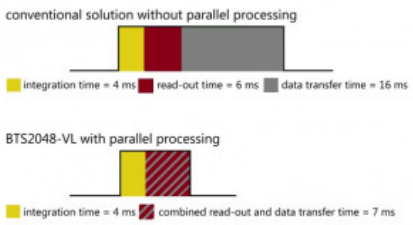
One unique feature of the BiTec sensor is its combination of a back-thinned CCD spectrometer and a Si photodiode that offers high linearity levels enabling extremely fast measurements. The fully linearized 2048 pixel CCD detector with thermoelectric cooling offers a very wide dynamic range thanks to 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. 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

Absolute calibration of the absolute irradiance down to 200 nm!

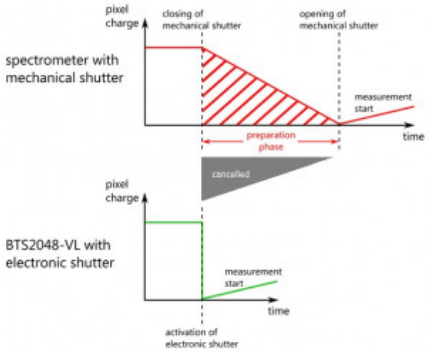
The many years of experience and its well-equipped DAkkS calibration laboratory (D-K-15047-01-00) enables Gigahertz-Optik to offer traceable calibrations down to 200 nm. This broadens the application range of the BTS2048-UV and UV-C-LEDs. For the shortwave spectral range, Gigahertz-Optik GmbH has implemented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



Ethernet interface reduces the datatransfer time

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.



Electronic Shutter reduces the measurement time

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 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	Spectral: 3E-5 W/(m²nm) to 3E4 W/(m²nm) @325nm. Responsivity from 190 nm to 430 nm. Integral: 2E5 W/m² to noise equivalent level by 5E-3 W/m²
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, thereby linearity correction of the array through the diode and online correction of the spectral mismatch of the diode through a*($s_z(\lambda)$) respectively F*($s_z(\lambda)$).
Calibration uncertainty	Spectral irradiance (200 - 249) nm: ± 12 % (250 - 299) nm: ± 7 % (300 - 399) nm: ± 5 % (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-4 - 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

Filter	Mathematical adjustment of the responsivity to a rectangular function from 220 nm to 360 nm (SMCF on-line correction to the radiometric function with the measured spectral data).* * The spectral responsitivity of the diode does not correspond to a rectangular function (not possible with optical filters). When measuring light sources with a spectrum that deviates from the calibration spectrum of the integral detector (UV LED, peak at 405 nm), the measurement result is corrected using SMCF. The uncertainty of this correction depends on the quality of the measured spectrum (noise) and the size of the correction factor (spectral range).
Measurement time	(0.1 - 6000) ms
Measurement range	seven (7) measurement ranges with transcendent offset correction
Calibration	Irradiance ± 6 % *10
Measurement range	(5E-3 - 2E5) W/m² *11

Graphs

spectral responsivity	[image src="/var/www/html/web/assets/responsivity-BTS2048-UV.png" id="6369" width="600" height="319" class="leftAlone ss-htmleditorfield-file image" title="responsivity BTS2048 UV"]
f2 (directional response/cosine error)	[image src="/var/www/html/web/assets/cos-BTS2048-VL2.png" id="6366" width="600" height="849" class="leftAlone ss-htmleditorfield-file image" title="cos BTS2048 VL2"]

Miscellaneous

Microprocessor	32bit for device control,16bit for CCD array control, 8bit for photodiode control

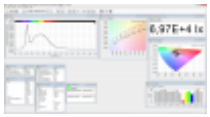
Interface	USB V2.0, Ethernet (LAN UDP protocol), RS232, RS485
Data transfer	Standard for 2048 float array values via ethernet 7ms, via USB 2.0 140 ms
Input Interfaces	2x (0 - 25) VDC, 1x optocoupler isolated 5 V / 5 mA
Output Interfaces	2x open collector, max. 25 V, max. 500 mA
Trigger	Trigger input 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/Uploads/BTS2048-broschuere-DINA4-hoch-V2-WEB.pdf

Configurable with

Product Name	Product Image	Description	Show 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. Features: Measurement of the luminous and radiant intensity distribution as well as luminous flux and radiant power from compact spot lamps and light-emitting diodes. Measurement distance 100 mm to 2000 mm. Remote control. Optional Lightmeters, user software, etc.	https://www.gigahertz-optik.com/en-us/product/gb-gd-360-rb40

Purchasing information

Article-Nr	Modell	Description
Product		
15298858	BTS2048-UV	Measuring device, hard cover box, users guide, S-BTS2048 software, calibration certificate.
Re-calibration		
15300775	K-BTS2048-UV	Recalibration of the BTS2048-UV 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.