

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 BTS2048-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

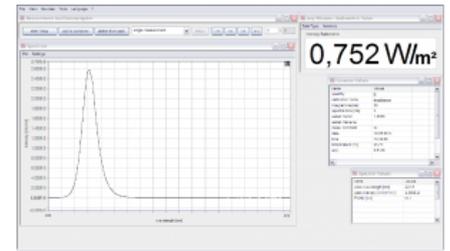
The BTS2048-UVVISNIR is perfectly suited for the testing of UV and VIS front-end and back-end LEDs in industrial applications. Its CCD detector integrates an electronic zero setting feature of all pixels before a measurement is triggered (electronic shutter). The electronic shutter and triggering of 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

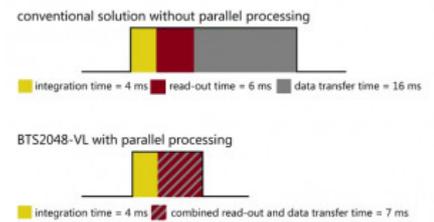
The BTS2048-UVVISNIR spectroradiometer has a diffuser window and can therefore be used to measure the UV irradiance, incl. spectrum and peak wavelength, without any additional accessory components. With the diffuser window, the BTS2048-UVVISNIR can also be mounted directly onto accessories such as integrating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

User software and developer software

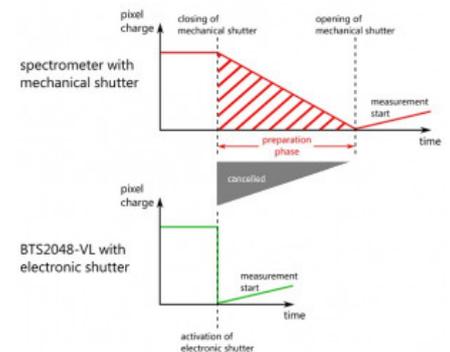
The standard [S-BTS2048](#) user software has a customizable user interface and offers a large number of display and function modules which can be activated when configuring the BTS2048-UVVISNIR with the respective accessory components from Gigahertz-Optik GmbH. The [S-SDK-BTS2048](#) developer software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

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	$\pm 4.5\%$
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(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

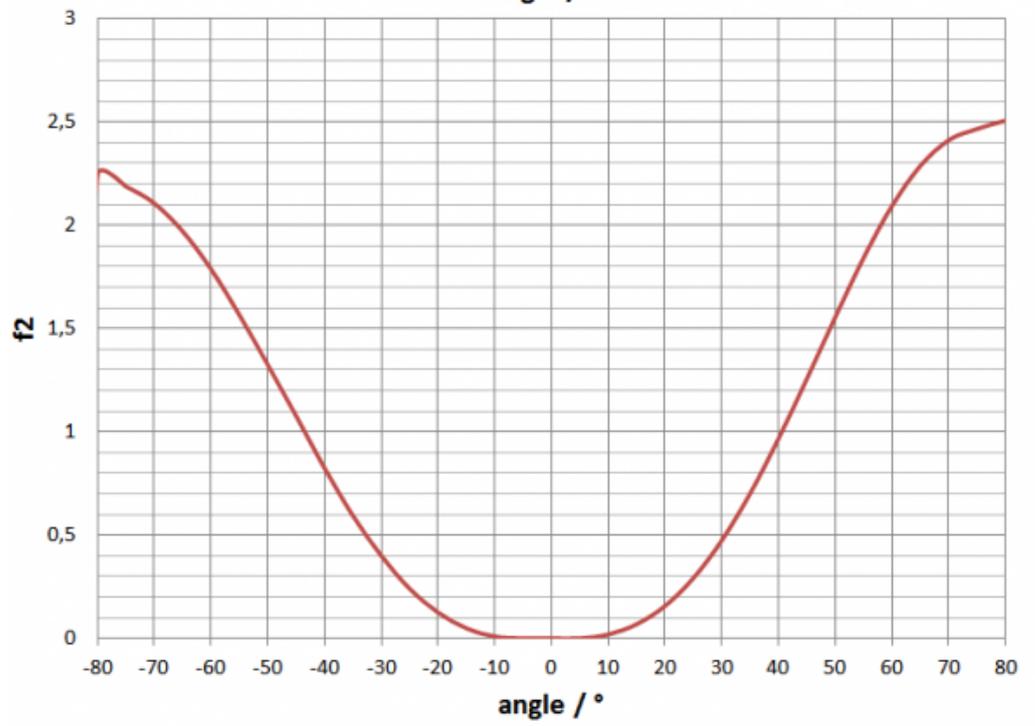
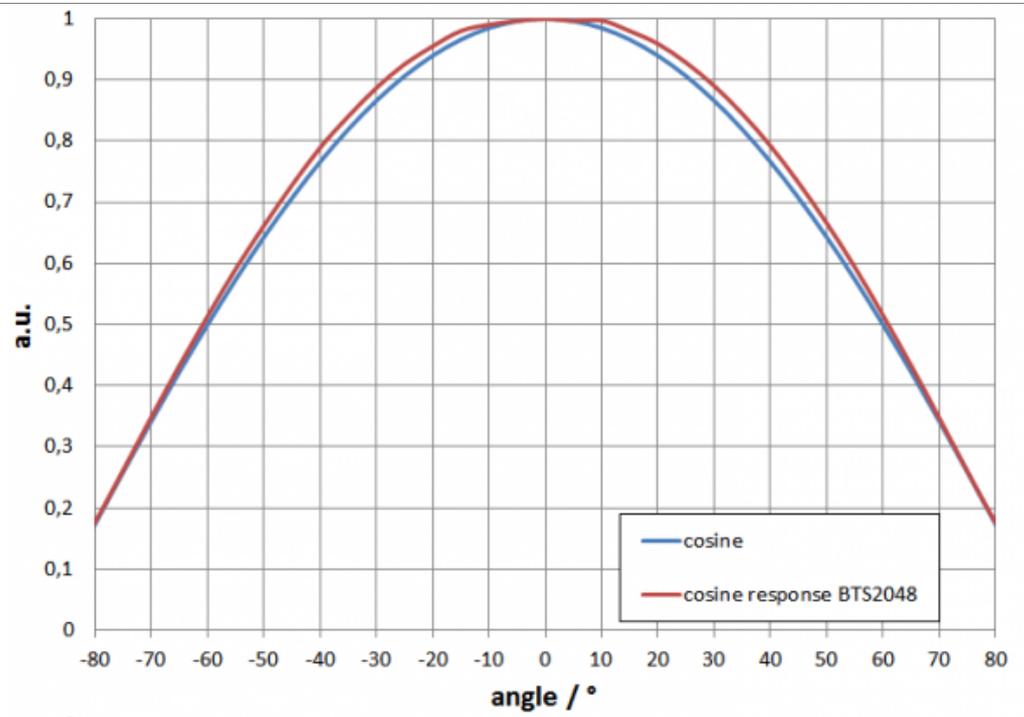
Chip	Highly sensitive back-thinned CCD chip, one stage cooled (1TEC)
ADC	16bit (25 ns instruction cycle time)
Peak wavelength	± 0.2 nm
Band-pass correction	mathematical online band-pass correction is supported
Linearity	completely linearized chip >99.6%
Stray Light	Out of Bound method < 1E-4 *3
Base 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

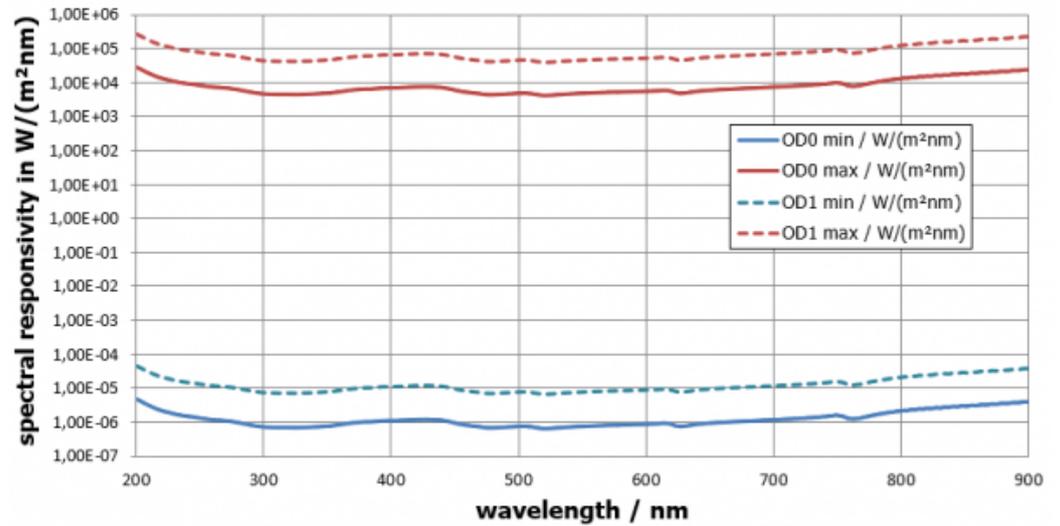
Measurement time	(0.1 - 6000) ms
Measurement range	Nine (9) measurement ranges with transcendent offset correction
Calibration	Illuminance ± 2.2 %
Measurement range	Max measurable illuminance value 3E8lx *7 Noise equivalent illuminance value 1E-1lx
Filter	Spectral responsivity with fine CIE photometric 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



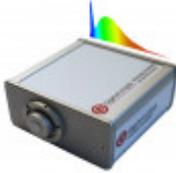
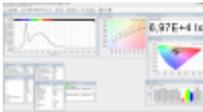
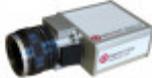
(OD1 is optional)

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

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>
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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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Gigahertz Optik GmbH (Headquarter)

Tel.: +49 (0)8193-93700-0
Fax: +49 (0)8193-93700-50
info@gigahertz-optik.de

An der Kaelberweide 12
82299 Tuerkenfeld, Germany

Gigahertz-Optik, Inc. (US office)

Phone: +1-978-462-1818
info-us@gigahertz-optik.com

Boston North Technology Park
Bldg B - Ste 205
Amesbury, MA 01913 USA