BTS2048-VL-F

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

Product tags: VIS

Description

BTS2048-VL-F, CCD spectroradiometer with light guide input

The only difference between the BTS2048-VL-F and the BTS2048-VL is that the BTS2048-VL-F has a light guide input and therefore meets all the requirements of a high-end array spectroradiometer.

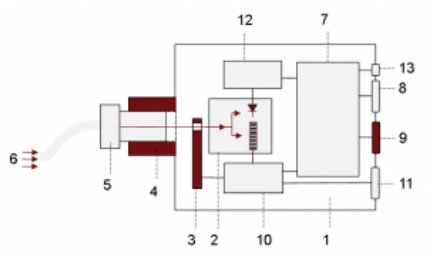
Flexible light guides are convenient for applications where the BTS2048-VL cannot be coupled directly to the input accessories required for the application. The BTS2048-VL-F has a mount to which the light guide can be attached easily using a 10 mm sleeve. Light guides of different lengths, diffusor windows for axial or 90° incident light and adapters for attachment of the light guide to an integrating sphere are among the accessories offered by Gigahertz-Optik. Customized light guides are also available on request.

*One of its unique features is the from Gigahertz-Optik developed innovative **BiTec sensor** that consists of a V(lambda) filtered Si photodiode and a spectroradiometer unit. This makes it extremely linear, stable, and fastand 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).

CP-CD-90-10: 90° Irradiance Optics with Fiber

User software and developer software

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



1) BTS2048-VL 2) BiTec sensor with Si photodiode, CCD array spectrometer 3) Filter wheel with OD1, OD2 and shutter 4) Light-guide mount 5) Light-guide Adapter 6) Light incident 7) Microprocessor for data procesing and communication 8) USB 2.0 Interface 9) High Speed ethernet Interface 10) Microprocessor CCD sensor control 11) Trigger In/Out 12) Microprocessor photodiode 13) DC voltage supply

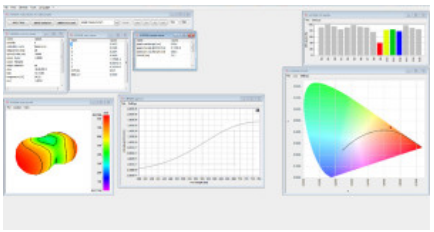
Calibration

One essential quality feature of photometric devices is their precise and traceable calibration. The BTS2048-VL-F 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.

CP-F16-M-10 light guide adapter

BTS2048-VL-F-Z01: Probe header for small LED chips (waferprober)

CP-CD-IL-10: Inline 37 mm Detector Head



S-BTS2048 User software interface

Specifications

General	
Short description	CCD spectroradiometer with light guide input for coupling the light meter from the application. Wide dynamic range for CW and pulsed measurements. Measurement parameters dependent on the optional accessory, spectrum, luminous color, and color rendering index
Main features	Compact device. BiTec detector with back-thinned CCD (2048 pixels, 2 nm optical resolution, electronic shutter) and Si-photodiode with V(lambda) filter. Optical bandwidth correction (CIE214). Filter wheel with shutter and two attenuation filters. Input lens for light guide
Measurement range	Depending on the accessories. Spectral range 280 nm to 1050 nm
Typical applications	Separate setup of the CCD spectroradiometer and measurement optics. Measurement device with light guide for integration in test systems for front-end and back-end LED binning
Calibration	Factory calibration. Traceable to international calibration standards
Product	
Measured Quantity	Spectral irradiance (W/(m² nm)), irradiance (W/m²), illuminance (lx), spectral radiant intensity (W/(sr nm)), radiant Intensity (W/sr), luminous intensity (cd), dominant wavelength, peak wavelength, center wavelength, centroid wavelength, x, y, u´, v´, X,Y,Z, delta uv, color temperature, color rendering index (CRI) Ra, R1-R15, TM-30-15, CQS, CIE-170, etc.. Option integrating sphere: in addition spectral flux (W/nm) and luminous flux (lm) Option goniometer: in addition radiant intensity (W/sr) distribution and luminous intensity (cd) distribution
Sensor	With light guide and diffuser Accuracy class B according to DIN 5032 and CIE No. 69 Accuracy class A for f1`, u, f3 and f4 according to DIN 5032 and CIE No. 69

Input optics	Light guide adapter F16-F
Filter wheel	4 positions (open, closed, OD1, OD2). Use for remote dark current measurement and dynamic range extension.
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	Depending on the light guide
Spectral Detector	
Integration Time	2 µs - 4 s *1
Spectral range	(280 -1050) nm, if a calibration down to 280 nm is needed we recommend the BTS2048-VL-TEC-F version
Optical Bandwidth	2 nm
Pixel resolution	~0.4 nm/Pixel
Number of pixels	2048
Chip	Highly sensitive back-thinned CCD chip
ADC	16bit (25 ns instruction cycle time)
Peak wavelength	±0.2 nm
Dominant wavelength	±0.5 nm *2
Δy Δx uncertainty	±0.0015 (Standard illuminant A) ±0.0020 (common LED)
Repeatability Δx and Δy	±0.0001
ΔCCT	Standard illuminant A 30K; LED up to +/- 1.5 % depending of the LED spectrum
Band-pass correction	mathematical online band-pass correction is supported
Linearity	completely linearized chip >99.6%
Stray Light	2E-4 *3
Base line noise	5 cts *4
SNR	5000 *5
Dynamic range	>9 Magnitudes
CRI (color rendering index)	Ra and R1 to R15
Integral Detector	
Filter	Spectral responsivity with fine CIE photometric matching. Online correction of the photometric matching through spectral measurement data (spectral missmatch factor correction).
Measurement time	20 µs - 6000 ms range rise time (10 – 90) % 0,1,2 50 µs 3,4,5 65 µs 6,7,8 1.5 ms
Measurement range	Nine (9) measurement ranges with transcendent offset correction
f1' (spectral mismatch)	≤6% (uncorrected) ≤1,5% (f1' a*($s_z(\lambda)$) respectively F*($s_z(\lambda)$) corrected by spectral data, done automatically by BTS technology)

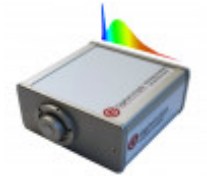
Miscellaneous	
Microprocessor	32bit for device control,16bit for CCD array control, 8bit for photodiode control
Interface	USB V2.0, Ethernet (LAN UDP protocol), RS232, RS485
Data transfer	Standard for 2048 float array values via ethernet 7ms, via USB 2.0 140 ms
Input Interfaces	2x (0 - 25) VDC, 1x optocoupler 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) + Fiber Adapter
Weight	500g
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 100nm left of the peak of a cold white broadband LED* **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* **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. At high temperatures and at the maximum integration time a decreased dynamic can be used.*

Option: CP-CD-IL-10 or CP-CD-90-10 (Irradiance)	
Spectral irradiance responsivity range (spectral measurement)	(5E-5 - 3E5) W/(m²nm) *(Note: typically CP-CD-90-10 is 10% insensitive compared to this stated numbers of CP-CD-IL-10)*
Illuminance measurement range (integral measurement)	(5E-1 - 1E9) lx *(Note: typically CP-CD-90-10 is 10% insensitive compared to this stated numbers of CP-CD-IL-10)*

Downloads

Type	Description	File-Type	Download
BTS2048 Series	BTS2048 'Not just another spectrometer' brochure	pdf	https://www.gigahertz-optik.com/assets/BTS2048_broschuere_DINA4_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/
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/
CP-LG Series		The CP-LG Series offers all kind of optical light guides. We have many different length, detector designs (inline, 90°, probes, etc.) available. Also customized designs are possible.	https://www.gigahertz-optik.com/en-us/product/cp-lg-series/

Purchasing information

Article-Nr	Modell	Description
Product		
15298737	BTS2048-VL-F	Measuring device, hard cover box, users guide, S-BTS2048 software, calibration certificate.
15305452	CP-F16-M-10	Adapter for LG-1.5-10 light guides to lightmeters with F16-F mount.
15307119	CP-LG-1.5-10-2	Flexible light-guide with 1.5 mm Diameter fiber, 10 mm diameter mounts and 2 m length.
15308904	BTS2048-XX-F-Z01	Adapter for connecting optical fibers with FC type connectors to a BTS2048-XX-F series spectroradiometer.
15305454	CP-CD-IL-10	Diffusor window adapter for LG-1.5-10 light-guides. 37 mm housing diameter.
15305453	CP-CD-90-10	90° diffusor window adapter for LG-1.5-10 light-guides. 37 mm housing diameter.
15298741	BTS2048-VL-F-Z01	Probe header for small LED chips (waferprober) including fiber and adapter
Calibration		
15308520	K-BTS2048VLF-E-S-V01	Calibration of the BTS2048-VL-F including light guide and COS diffuser from 350 nm to 1050 nm with calibration certificate.

Article-Nr	Modell	Description
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	Triggering cable for BTS2048 series measuring devices.
15306234	BTS2048-Z02	Mounting plate for the connection of two BTS2048-series devices using a Y-fiber.
15311525	BTS2048-XX-Z06	Mounting plate for the connection of three BTS2048-series devices using a triple light guide.

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