BTS2048-VL-TEC-WP

https://www.gigahertz-optik.com/es-es/producto/bts2048-vl-tec-wp/

Etiquetas del producto: VIS , NIR ,

Descripción

BTS2048-VL-TEC-WP BiTec sensor spectroradiometer for high-quality outdoor VIS measurements

The BTS2048-VL-TEC-WP is a high-quality spectralradiometer whose compact design and elaborate optical, electronic and mechanical interfaces make it ideal for high precision outdoor VIS measurements. Due to its spectrometer design and optional stray light reduction by the well know Zong or Nevas matrix methods it is able to measure solar radiation with a good straylight reduction performance. With the included S-BTS2048 application software precise measurements and data analysis can be intuitive performed. In addition for the UV spectral range with the complementary BTS2048-UV-S-WP a high resolution and even better device in terms of stray light reduction is available.

for VIS measurements in outdoor use

BiTec sensor for high-end light measurement

One of the outstanding features of this exceptional spectroradiometer is its BiTec sensor. This combines the special properties of a photodiode with those of a back-thinned CCD diode array. Through bilateral correction of measurement signals from both sensors, the BiTec sensor ensures precise radiometric and spectral-radiometric measurement values over a large dynamic range (see technical article **BiTec Sensor**).

Entrance optic is blow-dried by warm air to prevent dirt, rain or snow

Spectrometer based on a high-quality back-thinned CCD detector

The spectrometer unit is based on a diode array with a utilizable spectral responsivity range between 190 nm and 430 nm. It has a 0.7 nm optical bandwidth and a pixel resolution of 0.13 nm/pixel. Due to the back-thinned technology, this CCD chip is substantially more sensitive as compared to conventional front-illuminated CCD chips. Furthermore the CCD is one stage cooled (1TEC) to reduce the dark current and increased thereby the SNR.

Side View of the BTS2048-VL-TEC-WP

Precise spectral radiometry (high dynamic and low straylight)

To facilitate optimum use of the CCD sensor's dynamic range and to overcome the problems of most array spectoradiometers in the UV range, the option to characterize and apply the Zong or Nevas straylight reduction methods is possible. For a high dynamic range a remote controlled filter wheel (Open, Closed, OD1 and OD2) is located in the optical beam path, this additional to the high dynamic of the integration times (2 µs to 60 s).

Accuracy for spectral AOD (Aerosol Optical Depth)

The BTS2048-VL-TEC-WP showed its high accuracy in a peer-reviewed paper in terms of high accuarcy spectral AOD measurements traceable calibrated.

The WP version in a winter measurement campaign

WP means weather proofed

The housing of the BTS2048-VL-TEC-WP is designed for outdoor measurements. The cooled backthinned CCD and the spectrometer unit are temperature controlled in a second housing. In this housing humidity is removed by a exchangeable cartridge. To avoid dust, rain or snow on the entrance optics the quartz dome is blow-dried by warm air.

Diffuser window directly connected instead of light guide

As for the input optics, the BTS2048-VL-TEC-WP has an incorporated diffuser window with a cosine corrected field of view. The fact that a light guide has not been used improves sensitivity and calibration stability which is an large advantage for outdoor use. Especially in terms of size of the device. The f2 adjustment of the cosine corrected field of view to less than 3% makes it possible to use the BTS2048-VL-TEC-WP for direct measurement in absolute radiometric measurands

- Irradiance (W/m²)
- Spectral irradiance (W/(m² nm))

State of the art interface

The BTS2048-VL-TEC-WP is controlled via a USB 2.0 or Ethernet interface. With regards to the communication speed and cable length the Ethernet port is superior to the USB2.0 interface. Furthermore, the data preparation occurs in the BTS2048-VL-TEC-WP to optimize the data-transfer speed. For this purpose, an independent, high-performance microprocessor is incorporated. Data and power interface are of course weatherproof designed as well.

User software with flexible desktop structure

Among the BTS2048-VL-TEC-WP delivery contents is the S-BTS2048 user software. One of the characteristic features it has to offer is the flexible desktop that can be individually configured by the user. This entails a potpourri from which the user can choose graphical and numerical display windows:

- Freely definable numerical displays in decimal or scientific representation. Zoom function.
- Numerical display fields for radiometric, spectral and other measurands.
- Measurement protocol of the selected measurement parameters.
- Spectrum. Zoom function.
- Data logger. Zoom function.
- etc.

Traceable calibration

Calibration of the BTS2048-VL-TEC-WP, including its accessories, is performed by Gigahertz-Optik **ISO/IEC 17025 calibration laboratory** for optical measurands with reference to national and international calibration standards. Due to the small dimensions of the device it can be shipped easily for re-calibration purposes.

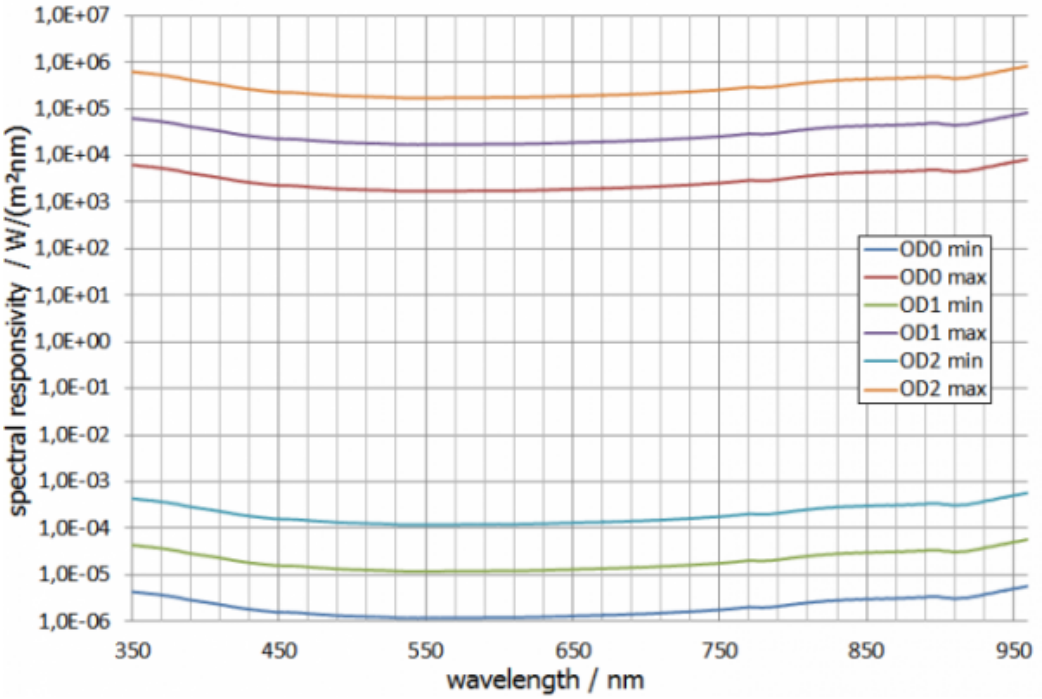
Scientific Measurement Campaign

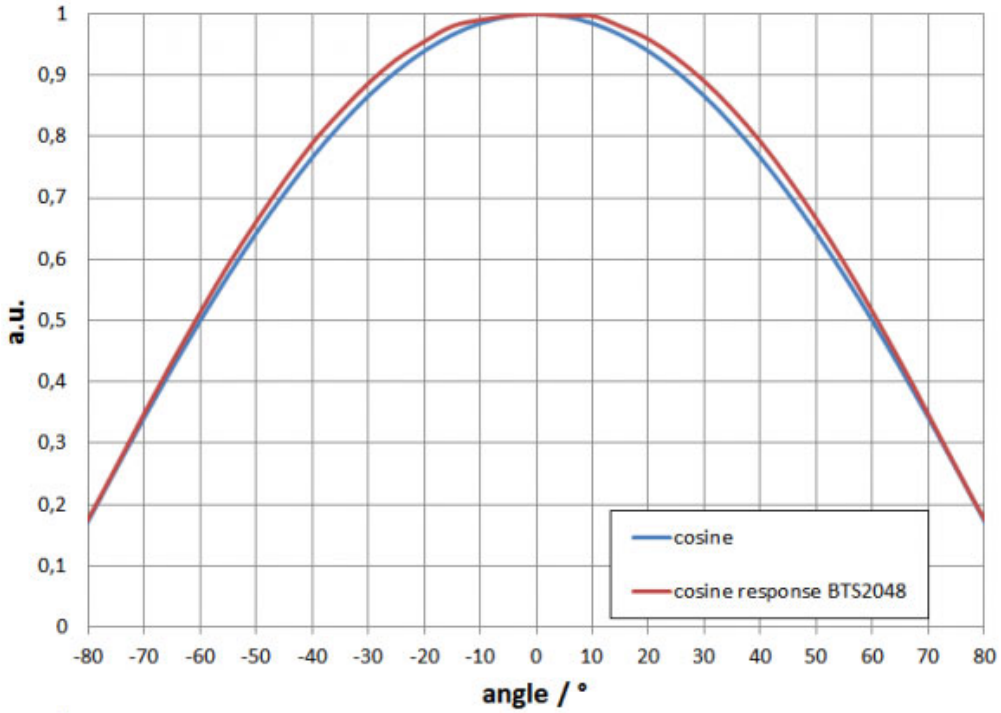
The BTS2048-VL-TEC-WP has took part in an scientific intercomparison, to prove the quality of the measurement data in the scientific framework.

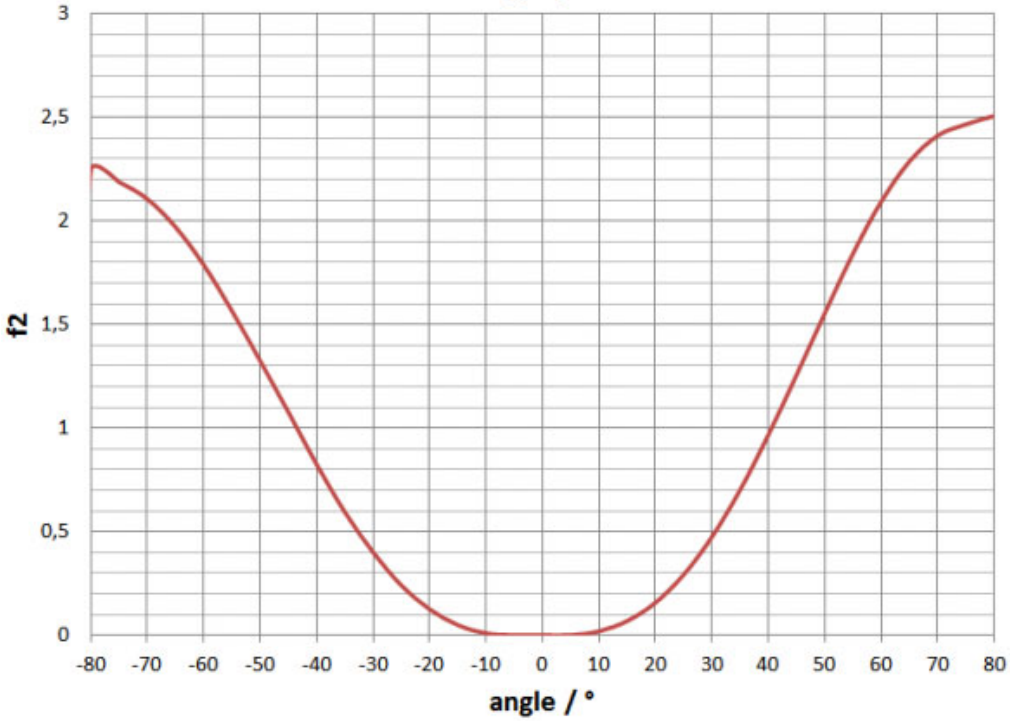
Especificaciones

General	
Breve descripción	High speed TE cooled CCD spectroradiometer with a wide dynamic range for CW and pulsed measurements of irradiance/illuminance, specturm in the VIS region for outdoor measurements.
Características principales	Compact device. BiTec detector with back-thinned TE cooled 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 attenuation filters. Input lens with a diffusor window that has a cosine field of view. Housing for outdoor use.
Rango de medición	Spectral: 0.5 lx to 1,000,000 lx 280 nm to 1050 nm. Integral: 0.1 lx Noise signal up to 3E8 lx, photometric 360 nm to 830 nm
aplicaciones típicas	CCD spectroradiometer for scientific measurements, solar cells, outdoor measurements, development tasks.
Calibración	Factory calibration. Traceable to international calibration standards
Producto	
Cantidad medida	Spectral irradiance (W/(m² nm)), illuminance (lx), peak wavelength, calculated quantities of the spectral power distribution, etc.
Sensor	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
Óptica de entrada	Diffusor, cosine corrected field of view (f2 ≤ 3 %)
Rueda filtrante	Versión VL: 4 posiciones (abierto, cerrado, OD1, OD2). Se utiliza para medir la corriente oscura y ampliar el rango dinámico. Versión VL-2: 4 posiciones (abierto, cerrado, OoR, OD1). Se utiliza para medir la corriente oscura, corregir la luz difusa y ampliar el rango dinámico.

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*($s_z(\lambda)$).
Calibración	Spectral irradiance λ u(*k*=2) (280 - 304) nm: ± 7 % (305 - 349) nm: ± 5 % (350 - 399) nm: ± 4.5 % (400 - 780) nm: ± 4 % (781 - 1030) nm: ± 4.5 % (1031 - 1050) nm: ± 5.5 % Spectral irradiance responsivity (280 - 1050) nm. Standard calibration (350 - 1050) nm. Optional calibration (280 - 1050) nm.
Detector espectral	
Tiempo de integración	2 µs - 60 s *1
rango espectral	(280 -1050) nm
Ancho de banda óptico	2 nm
Resolución de píxeles	~0.4 nm/Pixel
Número de píxeles	2048
Chip	One stage cooled highly sensitive back-thinned CCD chip
ADC	16bit (25 ns instruction cycle time)
Longitud de onda máxima	± 0.2 nm
Longitud de onda dominante	± 0.5 nm *2
	± 0.0015 (Standard illuminant A, white LED) ± 0.0020 (common LED)
Repetibilidad Δx y Δy	± 0.0001
ΔCCT	Standard illuminant A 30K; LED up to +/- 1.5 % depending of the LED spectrum
Corrección de paso de banda	mathematical online band-pass correction is supported
Linealidad	completely linearized chip >99.6%
Luz parásita	2E-4 *3
Ruido de la línea de base	5 cts *4
SNR	5000 *5
rango dinámico	>10 Magnitudes
Rango de respuesta de la irradiancia espectral	(1E-6 - 1E5) W/(m²nm) *6*7
CRI (índice de reproducción cromática)	Ra and R1 to R15
tiempo de medición típico	10 lx 2,5 s *10 100 lx 250 ms *10 1000 lx 25 ms *10
ADC	16bit
Detector integral	
Filtro	Spectral responsivity with fine CIE photometric matching. Online correction of the photometric matching through spectral measurement data (spectral missmatch factor correction).

Tiempo de medición	(0.1 - 6000) ms
Rango de medición	seven (7) measurement ranges with transcendent offset correction
Rango de medición	Max measureable illuminance value 3E8lx [*7] Noise equivalent illuminance value 1E-1lx
Calibración	Illuminance +/- 2,2 %
f1' (desajuste espectral)	≤ 6 % (uncorrected) ≤ 3 % (f1' a*($s_z(\lambda)$) respectively F*($s_z(\lambda)$) corrected by spectral data, done automatically by BTS technology)
Gráficos	
respuesta espectral	
f2 (respuesta direccional/error de coseno)	





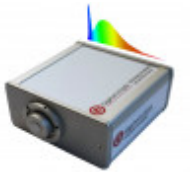
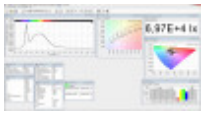
Miscelánea	
Microprocesador	32bit for device control,16bit for CCD array control, 8bit for photodiode control
Interfaz	USB V2.0, Ethernet (LAN UDP protocol), RS232, RS485
Transferencia de datos	Standard for 2048 float array values via ethernet 7ms, via USB 2.0 140 ms
Interfaces de entrada	2x (0 - 25) VDC, 1x optocoupler isolated 5 V / 5 mA
Interfaces de salida	2x open collector, max. 25 V, max. 500 mA
Disparador	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.

Fuente de alimentación	With power supply: DC Input 5V (±10 %) at 700 mA With USB bus (500mA) *8
Dimensiones	diameter: 160 mm height: 222 mm (see drawing)
Peso	2.85 kg
Montaje	Tripod and M6 screw threads Front adapter UMPA-1.0-HL for use with integrating sphere port-frame UMPF-1.0-HL
rango de temperatura	Storage: (-10 to 50) °C Operation: (-25 to 50) °C *9
Estabilidad	inside WP housing (electronics): ≤ ± 1 °C CCD Chip: ≤ ± 0.25 °C
Carcasa	Spectroradiometer unit: IP67 Outdoor housing itself: IPx5
Información	**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 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 measurement of a white LED and 20000 counts (signal-dark) saturation* **The typical uncertainty considerations in the data sheet refer to the calibration conditions (temperature, humidity, warm-up, modulation, etc.) and, as this is not possible, do not include user effects such as aging, contamination, etc.*

Descargas

Tipo	Descripción	Tipo de archivo	Descargar
BTS2048-Series	BTS2048 'Not just another spectrometer' brochure		

Configurable con

Nombre del producto	Imagen del producto	Descripción	Ir al producto
BTS2048-UV-S-WP		Espectrorradiómetro ideal para mediciones de UV en exteriores de alta precisión	https://www.gigahertz-optik.com/es-es/producto/bts2048-uv-s-wp/
S-SDK-BTS2048		Software Development Kit for BTS2048 variants.	https://www.gigahertz-optik.com/es-es/producto/s-sdk-bts2048/
SUT-1711		Sun tracker for use with e.g. BTS2048-xx-WP series meter for direct solar irradiance measurement.	https://www.gigahertz-optik.com/es-es/producto/sut-1711/
BTS-Solar		Espectrorradiómetro UV sobre seguidor solar para medir la irradiación solar directa y determinar el COT	https://www.gigahertz-optik.com/es-es/producto/bts-solar/
BTS2048 Serie		Espectrorradiómetros compactos con excelentes prestaciones ópticas y tecnología BiTec para realizar mediciones precisas en el laboratorio y sobre el terreno.	https://www.gigahertz-optik.com/es-es/producto/bts2048-series/
S-BTS2048		Application software for BTS2048 variants.	https://www.gigahertz-optik.com/es-es/producto/s-bts2048/
BN-LH250_10.05.2022_10.05.47		Calibration Lamp for Spectral Irradiance and Illuminance	https://www.gigahertz-optik.com/es-es/producto/bn-lh250-2/

Información de compra

Número de artículo	Modelo	Descripción
Producto		
15305846	BTS2048-VL-TEC-WP	Measuring device, hard cover box, users guide, S-BTS2048 software, calibration certificate.
Calibración		
15311103	KP-BTS2048VLTECWP-E-S	Option: DIN EN ISO/IEC 17025:2018 Test Certificate (DAkkS). Spectral irradiance measurement and illuminance measurement in wavelength range 280 nm to 1050 nm.
Recalibración		

Número de artículo	Modelo	Descripción
15300499	K-BTS2048-VL-I	Recalibration of the BTS2048-VL with calibration certificate
El 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.
Accesorios		
15307929	BTS2048-XX-WP-Z02	tube for the measurement of the direct solar irradiance

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