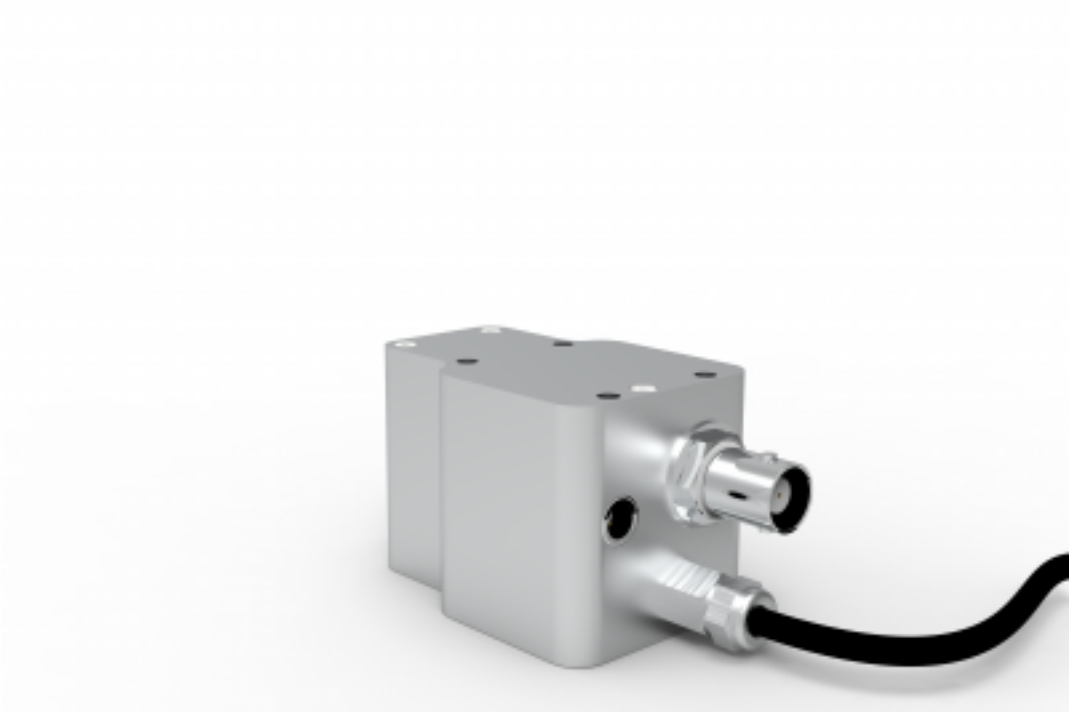
ISD-1.6-SP-Vxx

https://www.gigahertz-optik.com/en-us/product/isd-1-6-sp-vxx/

Product tags: VIS , NIR , Multi-Channel



Description

Pulsed laser diodes, LiDAR laser, VCSEL and pulsed LEDs used in range finders, environmental scanners and image capture emit pulses with a few nanoseconds length of very high peak power. To measure the temporally resolved pulse shape fast detectors (**short rise time**) are required. These are usually small-area photodiodes with diameters of sometimes significantly less than 1 mm. Technical details regarding rise time and pulse shape measurements with photodiodes can be found for example in our knowledge portal. The small detector area of the photodiodes results in metrological limitations:

- The extent of the laser spot is larger than the active area of the photodiode and thus does not allow measurement of the radiant power (W). Thus, no measurement of the radiant power (W) is possible with such a photodiode alone.
- The position of the photodiode in the laser spot is critical because of possible modes (inhomogeneous laser spot).
- Very small photodiodes cannot be calibrated absolutely.
- Attachment optics used to focus the laser spot on the photodiode surface cannot be calibrated.
- The electronic wiring of the photodiodes required for short pulse lengths further limits the calibration capability.

With the ISD-xx-SP-series of detectors in combination with the P-9710 series or P-21 series optometers (current amplifier), Gigahertz-Optik provides a way to determine the absolute peak performance of pulsed lasers and pulsed LEDs.

To overcome the limitations of pure photodiodes, **a technology based on a small integrating sphere and two complementary photodiodes** is used.

Figure 1: ISD-1.6-SP-V02 detector with single channel optometer P-9710-2

Figure 2: System illustration, oscilloscope, P-9710-2, ISD-1.6-SP-V02

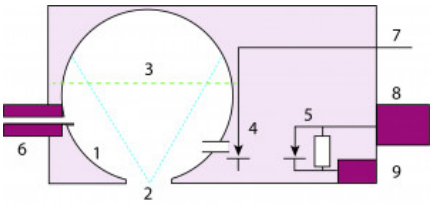


Figure 3: Schematic representation (1: integrating sphere 2: measuring aperture 3: spherical surface of the first reflection 4: pulse energy photodiode 5: pulse progression photodiode 6: 2 x SMA connectors 7: cable for optometer 8: female BNC connector oscilloscope 9: bias voltage)

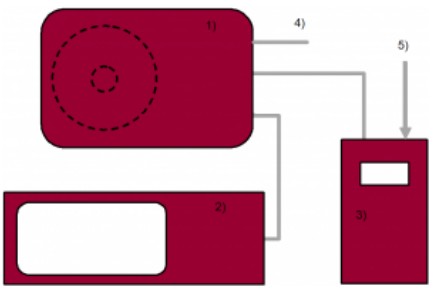


Figure 4: Schematic measuring arrangement (1: ISD-1.6-SP-Vxx 2: oscilloscope 3: P-9710-4 4: bias voltage 5: TTL signal trigger Input

Function and structure

The **detector incorporates two photodiodes** within a compact integrating sphere assembly. The first photodiode has a short rise time and hence, in conjunction with a sufficiently fast oscilloscope, allows the measurement of the relative time resolved pulse shape (pulse length, half-width, peak power). The second photodiode measures the absolute pulse energy (in joules) of a single pulse or pulse train. The evaluation is carried out by an optometer of the P-9710 or P-21 series according to the pulse-stretching method. The absolute peak power can be calculated from the pulse energy and the relative pulse shape. Thus, the short duration light signal can be completely characterized.

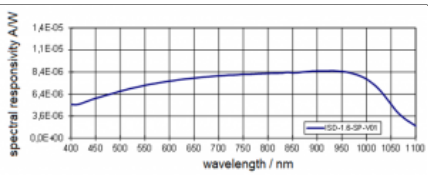
The integrating sphere with a diameter of 16 mm offers a measuring aperture of 5 mm, alternatively 7 mm (**Eye-Safety for Laser according to IEC/EN 60825-1 and 2006/25/EC**), diameter and can be calibrated to measure the absolute radiant power (W). Because of the very small diameter of the integrating sphere, the temporal pulse deformations (pulse-stretching-effect of integrating spheres) are small compared to

integrating spheres with larger diameters. As a result, pulses of a few nanoseconds pulse length are hardly deformed and can be measured in a time-resolved manner. The sphere itself, the photodiodes and the electrical circuit are housed and shielded by a high quality CNC-machined aluminium housing. For higher power and a larger input port with 10 mm we offer the ISD-5P-SP or with 20 mm input port the ISD-10P-SP.

The optional oscilloscope is connected via a BNC connector. The optometer is connected via a 2 m cable with a multi-pin connector in which the calibration data are stored.

The integrating sphere also offers two SMA-fiber connectors. For example, a spectrometer for measuring the wavelength and an auxiliary lamp for compensating for possible influences of the back reflection through the sample at the measurement port(self-absorption correction) can be connected. Ideal suited could be also one of our BTS2048 Series high end spectroradiometer.

Because of its small diameter, the sphere factor of the integrating sphere is relatively small. As a result, the permissible beam divergence in the version with a 7 mm measuring opening is additionally limited compared to the 5 mm version.



Picture 5: Typical spectral sensitivity

Two-Diode-Technology

High speed integrating spheres which are equipped with Gigahertz-Optik's two-diode technology offer two photodiodes mounted on the sphere. A traceable calibrated photodiode is accurately measuring the total pulse energy. The second photodiode is performing a temporal characterization of the pulse and will deliver its relative pulse shape as result. With both results combined mathematically, the pulse can be completely characterized regarding all important parameters (pulse form, peak power, average power).

Evaluation

Gigahertz-Optik offers various optometers with the required "pulse energy" measurement function for measuring the pulse energy of short pulse signals:

P-9710 (Version-2): Single-channel optometer with manual triggering of the measurement

P-9710 (Version-4): Single-channel optometer with TTL trigger input for triggering the measurement

P-2000: two-channel optometer

P-9801: Eight-channel optometer

P-21: Touchscreen Single-channel optomter with manual or trigger input for triggering the measurement

To evaluate the time resolved pulse shape, the user must provide a sufficiently fast oscilloscope.

Calibration

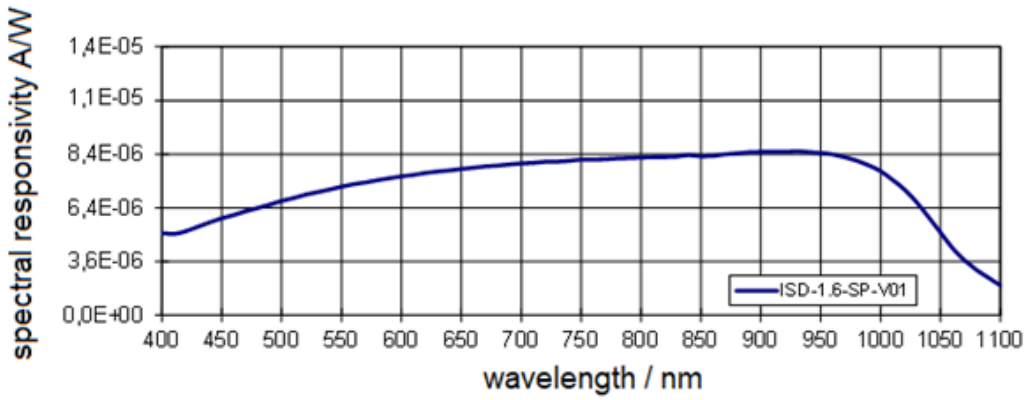
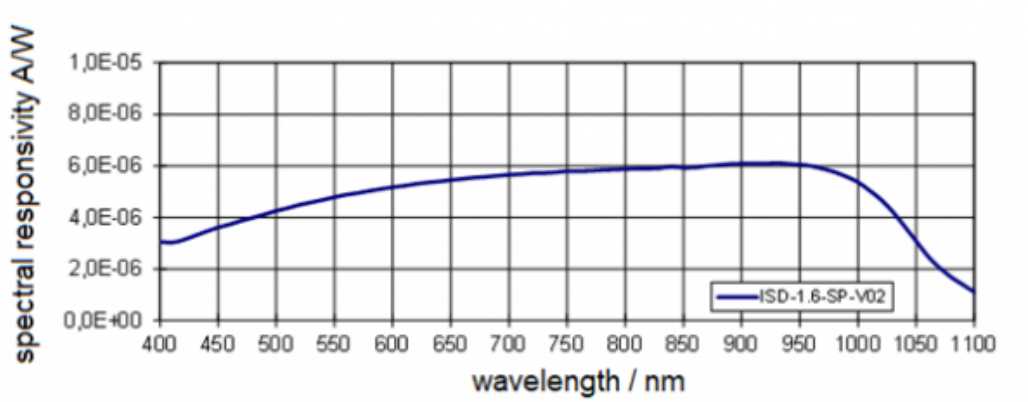
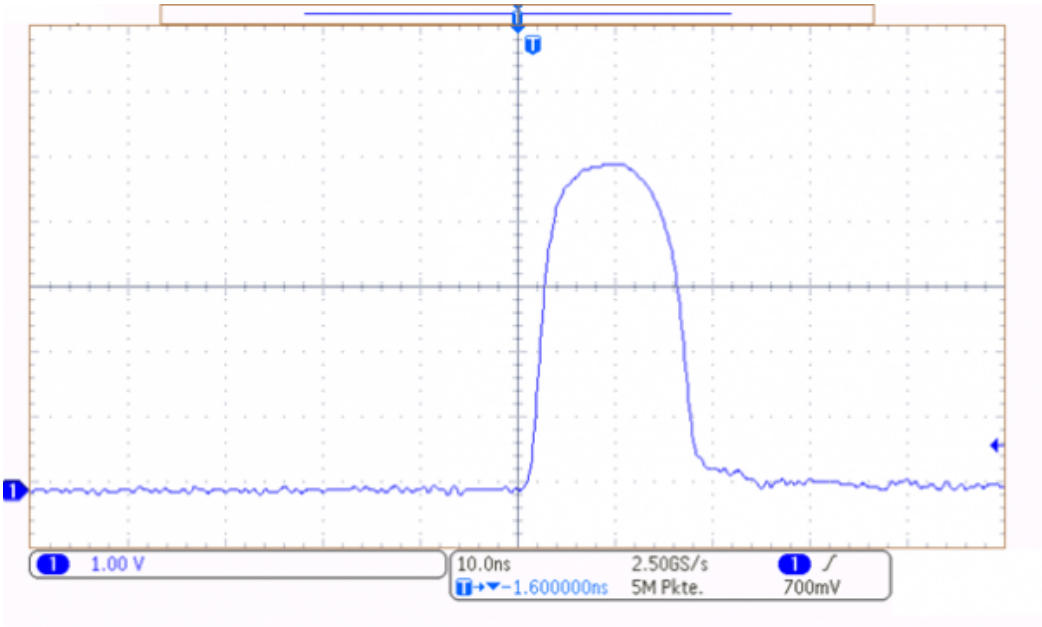
The factory calibration of the spectral sensitivity of the pulse Energy detector is performed by the **ISO/IEC 17025 calibration laboratory** for optical radiation measurements at Gigahertz Optik GmbH. The principle of the pulse-stretch-method allows the calibration of the detector in CW operation. The CW-calibration is fully traceable.

Applications

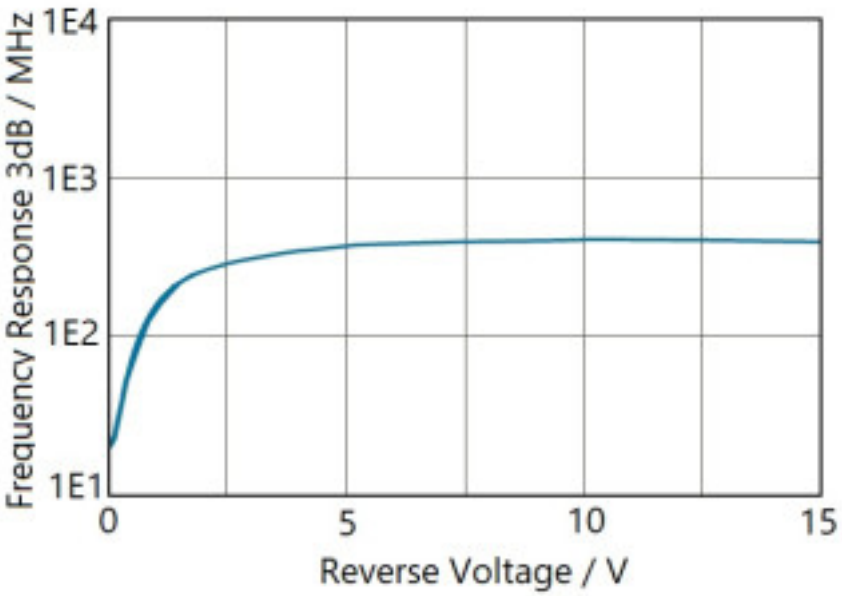
The application areas of the detector can be found, for example, in the development and quality assurance (on- and in-line) of pulsed laser diodes, LiDAR laser, VCSEL and pulsed LEDs as well as in the end application of such light sources.

Specifications

General	
Short description	Detector for the measurement of the temporal intensity course and the radiant power of pulse lasers and pulse LEDs. In conjunction with the optometers P-21, P-9710-2 and P-9710-4 and a fast oscilloscope, the absolute peak performance of pulse lasers and pulse LEDs can be determined.
Main features	Compact measuring head with 16 mm diameter integrating sphere. Si photodiodes for radiant power and temporal intensity curve for pulse lengths in the ns range.
Measurement ranges	Peak power up to typ. 200 W (fast photodiode, pulsed), typ. 100 W (slow photodiode for absolute measurement), spectral sensitivity range 400 nm to 1100 nm.
Typical applications	The application areas of the detector can be found, for example, in the development and quality assurance (on- and in-line) of pulse laser diodes and pulse LEDs. In addition, in measurement tasks in the context of the application of the aforementioned pulse laser diodes and pulse LEDs. With the 7 mm measuring aperture, the detector is also suitable for measuring tasks in the field of laser safety (ISD-1.6-SP-V01 with 7 mm aperture for the detection of eye safety).
Calibration	Factory calibration of the spectral sensitivity of the photodiode for radiant power. Traceable to PTB calibration standards
Product	

Spectral radiant flux	V0x:  V01: 
Logger Clock Time	typical pulse measurement: 
Port Size	V0x: 5 mm V01: 7 mm
max. Radiant Power (Peak)	fast photodiode: V0x: typically 200 W (@ 950 nm, pulsed) fast photodiode: V01: typically 300 W (@ 950 nm, pulsed)
Max. signal current	1 mA (photodiode used for absolute measurement)

Typical responsivity	V0x: 8.4 µA/W @900 nm V01: 6.0 µA/W @900 nm (slow photodiode)
Spectral range	(400 - 1100) nm
Rise time	photodiode for puls-shape measurement: <1 ns photodiode for absolute signal: 100 ns
Bias	Starting with 3V sufficient:



Miscellaneous	
Weight	200 g
Temperature range	Application: (10 to 30) ° C Storage: (-10 to 50) ° C
Humidity	The device must not be exposed to high humidity. Range 20% ~ 70% RH not condensing.

Downloads

Type	Description	File-Type	Download
ISD-1.6-SP-Vxx Technical datasheet	ISD-1.6-SP-Vxx Brochure	pdf	https://www.gigahertz-optik.com/assets/Uploads-v2/Technical-Datasheet-ISD1.6-SP-Vxx-210x297-EN-sheets.pdf

Configurable with

Product Name	Product Image	Description	Go to product
P-21		Multi-Purpose Touchscreen Optometer for Measurement of CW-, Single Pulse and Modulated Radiation in any Photometric and Radiometric Application	https://www.gigahertz-optik.com/en-us/product/p-21/
TR-22 Ultra Fast Transient Recorder		Ultra fast transient recorder with 4 ns sampling rate and trigger options enable many analyses	https://www.gigahertz-optik.com/en-us/product/tr-22-transient-recorder/

Purchasing information

Article-Nr	Modell	Description
Product		
15309101	ISD-1.6-SP-V0x-2	ISD-1.6-SP-V0x-2 with 5 mm aperture, calibration certificate Power-Diode
15309700	ISD-1.6-SP-V01-2	ISD-1.6-SP-V01-2 with 7 mm aperture, calibration certificate Power-Diode
Calibration		
15311050	K-ISD1.6SP-SD	Calibration of spectral radiant power sensitivity of the power-diode in A/W of an ISD-1.6-SP and ISD-1.6-SP-V01. Calibration from 400 nm to 1100 nm in 10 nm steps. Calibration certificate.
Accessories		
15309724	CP-VCC-45-V01	Power supply for biasing the shape diode

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- Technical Consulting & Sales
- 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

Send us your inquiry or contact us by phone or e-mail. We would welcome your feedback too or review us on Google.

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