

RaySensor

Yichang RaySensor Optoelectronic Technology Co., Ltd.



Ultra-Weak FBG DAS Analyzers

English Product Brochure

Acoustic-grade distributed vibration sensing for infrastructure, pipelines, energy assets and perimeter security.

uwDAS

Acoustic Micro-Vibration

Long-Distance Monitoring

High Sensitivity

PRODUCT FAMILY

RS-UWDAS

MODELS

01-04

VERSION

V2.0 English Layout

YEAR

2025

uwDAS Analyzers

Translated and redesigned from the source Chinese product files for international technical communication.

<p>TECHNOLOGY PLATFORM</p> <p>Ultra-weak FBG enhanced distributed acoustic sensing using directional grating reflection, phase compensation and real-time phase demodulation.</p>	<p>MEASUREMENT TARGETS</p> <p>Acoustic-grade micro-vibration, phase and frequency information along the sensing fiber.</p>	<p>APPLICATION DOMAINS</p> <p>Tunnels, railways, highways, dams, pipelines, oil and gas fields, perimeter intrusion and geohazard monitoring.</p>
<p>CUSTOMIZATION</p> <p>Refresh rate, sensing distance, spatial resolution, channel count and host configuration can be tailored by project.</p>	<p>DEPLOYMENT FLEXIBILITY</p> <p>Compact module, rack-mount analyzer and portable analyzer versions cover system integration and field diagnostics.</p>	<p>DOCUMENT SCOPE</p> <p>This brochure covers English operating principles, applications, specifications and ordering structures for RS-UWDAS-01 to RS-UWDAS-04.</p>

DOCUMENT INFORMATION

Version		Change summary	Prepared by	Date
V1.0		Initial release	Luo Zhihui	2022.04.21
V2.0		Content update	Wang Huilan	2025.03.31

Company: Yichang RaySensor Optoelectronic Technology Co., Ltd.

PORTFOLIO

Product Family Overview

A concise map of the product platform and application direction.

Model	English product name	Core sensing target	Form factor	Typical application focus
RS-UWDAS-01	Ultra-Weak FBG DAS Demodulation Module	Acoustic micro-vibration	Embedded module	DAS signal enhancement and dense points
RS-UWDAS-02	Enhanced DAS Demodulation Module	Long-distance vibration	Enhanced embedded module	Long-distance distributed vibration sensing
RS-UWDAS-03	Rack-Mount DAS Demodulator	High-capacity uwDAS	Rack-mount analyzer	Remote cabinet systems
RS-UWDAS-04	Portable DAS Analyzer	Field vibration acquisition	Portable analyzer	On-site acquisition and analysis

PRODUCT VISUALS



RS-UWDAS-01

Ultra-Weak FBG DAS Demodulation Module

Acoustic-grade micro-vibration demodulation module



OPERATING PRINCIPLE

RS-UWDAS-01 is an acoustic-grade micro-vibration demodulation module based on ultra-weak FBG arrays. A near-infrared laser pulse is launched into the sensing fiber and is directionally reflected at each grating position. After 3x3 phase compensation and interference, the signal carries distributed vibration information along the fiber. Acquisition and processing extract phase and frequency information in real time. A high-performance ARM+FPGA SoC performs low-level phase analysis to address massive data throughput.

TYPICAL APPLICATIONS

- Vibration monitoring for large tunnels, railways, highways and dams
- Vehicle trajectory and geohazard acoustic monitoring
- Pipeline leakage, oil and gas production and perimeter intrusion monitoring

ORDERING INFORMATION

Company	Product family	Variant	Model	Rate	Distance	Resolution	Channels	Host config.
RS	UWDAS	01	G: 3x3 O: Other	1: 10 kHz 2: 33 kHz 3: Other	1: 2 km 2: 5 km 3: 10 km 4: Custom	1: 2 m 2: 5 m 3: Custom	1: 1 ch 2: 2 ch 3: Other	L: Bare unit B: Laptop S: Server

TECHNICAL SPECIFICATIONS

Parameter	Typical specification
Sensitivity	≤ 0.5 nanostrain
Dynamic range	30 dB
Wavelength / channels	1550.12 nm, single channel
Grating reflectivity	0.01%
Data refresh rate	33 kHz @ 2.5 km; customizable by fiber length
Spatial resolution	≥ 5 m; custom 2 m, 10 m or 20 m
Single-channel measurement distance	2.5 km typical; custom up to 10 km
Data interfaces	Gigabit Ethernet, RS232, Gigabit Ethernet
OS / application software	Windows 10/11, C#, secondary development supported
Power / rated consumption	DC 12 V / 23 W full load
Dimensions	250 mm x 180 mm x 45 mm
Weight	2 kg

RS-UWDAS-02

Enhanced DAS Demodulation Module

Enhanced long-distance uwDAS demodulation module



OPERATING PRINCIPLE

RS-UWDAS-02 is an enhanced ultra-weak FBG acoustic-grade micro-vibration demodulation module. Reflected signals from each grating position are phase-compensated and interfered to recover vibration information along the sensing fiber. The built-in high-performance ARM+FPGA SoC performs real-time phase analysis, enabling long-distance distributed vibration sensing.

TYPICAL APPLICATIONS

- Structural health monitoring for tunnels, railways, highways and dams
- Vehicle trajectory and debris-flow acoustic monitoring
- Pipeline leakage, oil and gas production and perimeter intrusion monitoring

ORDERING INFORMATION

Company	Product family	Variant	Model	Rate	Distance	Resolution	Channels	Host config.
RS	UWDAS	02	1: IQ hardware 2: IQ software	1: 10 kHz 2: 33 kHz 3: Other	1: 5 km 2: 10 km 3: 50 km 4: Custom	1: 2 m 2: 5 m 3: Custom	1: 1 ch 2: 2 ch 3: Custom	L: Bare unit B: Laptop S: Server

TECHNICAL SPECIFICATIONS

Parameter	Typical specification
Sensitivity	<= 0.5 nanostrain
Dynamic range	30 dB
Wavelength / channels	1550.12 nm, single channel
Grating reflectivity	0.01%
Data refresh rate	33 kHz @ 2.5 km; customizable by fiber length
Spatial resolution	>= 5 m; custom 2 m, 10 m or 20 m
Single-channel measurement distance	10 km typical; custom 20 km or 50 km
Data interfaces	Gigabit Ethernet, RS232, Gigabit Ethernet
OS / application software	Windows 10/11, C#, secondary development supported
Operating temperature	0 °C to 50 °C
Power / rated consumption	DC 12 V / 23 W full load
Dimensions	270 mm x 180 mm x 45 mm
Weight	2.3 kg

RS-UWDAS-03

Rack-Mount DAS Demodulator

Cabinet-type ultra-weak FBG micro-vibration analyzer



OPERATING PRINCIPLE

RS-UWDAS-03 is a rack-mount ultra-weak FBG acoustic-grade micro-vibration demodulation analyzer. It integrates a uwDAS demodulation module to detect and analyze the position and phase of each sensor in real time. The rack system can be paired with a dedicated server and supports remote operation and configuration for cabinet deployment.

TYPICAL APPLICATIONS

- Structural health monitoring for tunnels, railways, highways and dams
- Vehicle trajectory and debris-flow acoustic detection
- Pipeline leakage, oil and gas production and perimeter intrusion monitoring

ORDERING INFORMATION

Company	Product family	Variant	Model	Rate	Distance	Resolution	Channels	Host config.
RS	UWDAS	03	G: 3x3 5 m H: 3x3 2 m I: IQ enhanced O: Custom	1: 10 kHz 2: 33 kHz 3: Other	1: 2 km 2: 5 km 3: 10 km 4: 50 km 5: Custom	1: 2 m 2: 5 m 3: Custom	1: 1 ch 2: 2 ch 3: Custom	L: Bare unit B: Laptop S: Server

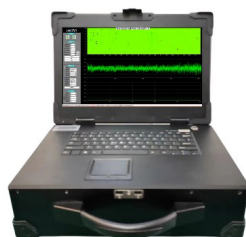
TECHNICAL SPECIFICATIONS

Parameter	Typical specification
Sensitivity	≤ 0.5 nanostrain
Dynamic range	30 dB
Wavelength / channels	1550.12 nm, single channel
Grating reflectivity	0.001% to 0.1%
Data refresh rate	33 kHz @ 2.5 km; customizable by fiber length
Spatial resolution	≥ 2 m; custom development down to 1 m
Single-channel measurement distance	10 km typical; custom 20 km
Display / output interfaces	HDMI, USB, Gigabit Ethernet
OS / application software	Windows 10/11, C#, secondary development supported
Operating temperature	0 °C to 50 °C
Power / consumption	220 V / 50 Hz, 25 W excluding server
Dimensions	482 mm x 328 mm x 132 mm
Weight	6.5 kg

RS-UWDAS-04

Portable DAS Analyzer

Portable high-capacity ultra-weak FBG vibration analyzer



OPERATING PRINCIPLE

RS-UWDAS-04 is a portable high-capacity ultra-weak FBG micro-vibration analyzer. It integrates a uwDAS demodulation module, computer host, 15-inch LCD, 88-key keyboard, touchpad and lithium battery. The analyzer supports on-site or remote operation, configuration and data acquisition, making it suitable for field vibration acquisition and analysis.

TYPICAL APPLICATIONS

- Micro-vibration signal acquisition and analysis in scientific experiments
- Signal acquisition and analysis for vehicle trajectory, pipeline leakage, oil and gas production and perimeter intrusion

ORDERING INFORMATION

Company	Product family	Variant	Model	Rate	Distance	Resolution	Channels	Host config.
RS	UWDAS	04	G: 3x3 5 m H: 3x3 2 m I: IQ enhanced	1: 2 kHz 2: Other	1: 2 km 2: Custom	1: 2 m 2: 5 m 3: Custom	1: 1 ch 2: Custom	O: Other

TECHNICAL SPECIFICATIONS

Parameter	Typical specification
Sensitivity	<= 0.5 nanostrain
Dynamic range	30 dB
Wavelength / channels	1550 nm, single channel
Grating reflectivity	0.001% to 0.1%
Data refresh rate	33 kHz @ 2.5 km; customizable by fiber length
Spatial resolution	>= 2 m; custom development down to 1 m
Single-channel measurement distance	10 km typical
Data output interface	Gigabit Ethernet
OS / application software	Windows 10/11, C#, secondary development supported
Power / consumption	AC 220 V / 50 Hz or self-powered, 60 W
Dimensions	390 mm x 280 mm x 115 mm
Weight	6 kg

Distributed Acoustic Sensing with Weak-Grating Enhancement

RaySensor uWDAS analyzers use ultra-weak FBG arrays to enhance directional reflection and improve distributed vibration signal quality over long sensing distances.

HIGH SENSITIVITY

Micro-vibration detection with phase-based signal extraction.

LONG DISTANCE

Configurable measurement length from typical field links to extended-distance systems.

FIELD DEPLOYMENT

Embedded, rack-mount and portable formats for laboratory and outdoor use.

SCENARIO COVERAGE

Infrastructure vibration, vehicle tracking, pipeline leakage, oil and gas monitoring and intrusion detection.