



ONYXTM

sensing unit

Features and Technical Specification

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Next Generation Distributed Fiber Sensing System

ONYX™ represents the next step in the evolution of Distributed Fiber Sensing; it provides distributed acoustic data over long fiber lengths with a high detection sensitivity and a low false alarm rate in a compact, low power unit.

ONYX™ has been designed to address three key aspects:

- Performance
- Usability
- Cost

A new approach to Distributed Fiber Sensing

Building on over a decade's worth of experience, the team at Sintela are focused on providing Next Generation Distributed Fiber Sensing solutions.

- Standard 100 km range:** Each ONYX™ Sensing Unit contains a unique optical module capable of simultaneously interrogating two sensing fibers - each up to 50 km to 65 km (depending on applications) in length. This represents 130 km range for one unit. This long-range capability results in significantly less equipment being required and lower cost per kilometre of monitoring.
- Quantitative Measurements:** ONYX™ makes coherent quantitative measurements over 100 km. This enables the implementation of sophisticated signal processing techniques - significantly improving the detection and classification of events, thereby improving the probability of detection whilst reducing the nuisance alarm rate. This also allows machine learning algorithms to be used reliably on the system.
- Integrated Design:** A single ONYX™ Sensing Unit integrates the optical sensing components, processing hardware and engineering displays into a single 3U enclosure. This considerably reduces the space, weight, and power requirements as well as simplifying system setup. Furthermore, the ONYX™ Sensing Unit has been designed with an internal modular design, allowing for quick and easy maintenance for individual modules and components.
- Distributed Architecture:** The ONYX™ system has been designed from the outset to be entirely distributed. This distributed architecture results in no single point-of-failure, minimizing downtime and increasing system availability. Administration and control functions are distributed throughout the ONYX™ Sensing Units, providing the system with a high degree of fault tolerance.
- Class 1 Laser Safety:** Class 1 lasers are defined as being eye-safe under all operating conditions, which makes the ONYX™ system inherently safe for use, lowers the HSE burden for end clients, and increases the life span of the optical components. This also eliminates the need for costly interlock safety switches and physical keys to operate the equipment.
- Automatic Setup with integrated OTDR:** The ONYX™ has an integrated OTDR [Optical Time Domain Reflectometer] capability and automated installation process, simplifying the setup, commissioning and testing stages of system implementation. This results in lower manpower costs and simplifies maintenance and administrative tasks for support by local engineers; specialist engineers are not required as often for straightforward tasks. The integrated OTDR enables the fiber health to be monitored and is extremely useful in mitigating faults caused by engineering works carried out on the telecoms network.

Features

Measurement type: Quantitative

Number of fibers: Two (simultaneously monitored)

Standard operating wavelength:
1550.12 nm [ITU-CH34, 193,400 GHz]

Performance specification

Performance measured according to SEAFOM MSP-02:
Measurements taken using a 6.4 m Gauge Length, using a standard SMF with a one-way insertion loss of 0.2 dB/km

Sensing range:
Standard range up to 50 km per fiber (100 km in total)
Longer ranges possible depending upon the application

Minimum detectable signal:
-80 dB Rad/√Hz at the front of a 5 km fiber
-60 dB Rad/√Hz at the front of a 50 km fiber

Dynamic range:
155 dB @ 1 Hz | 135 dB @ 10 Hz | 115 dB @ 100 Hz

Crosstalk isolation: > 80 dB

Linearity Harmonic distortion typ. < -40 dB

Minimum gauge length: 3.2 m

Minimum sample interval: 1.6 m

Acoustic Frequency Range:
Min: 1 mHz [Arbitrarily selectable]
Max: 10 kHz @ 5 km | 1 kHz @ 50 km

Sensing fiber requirement specification

Standard fiber types:
SMF-28e, ITU-T G.652, G.654 or G.655

Maximum acceptable loss budget: 20 dB

Maximum acceptable back reflection: < 2 %

Processing capability

Fully integrated processing using NVIDIA Volta™ architecture with 512 NVIDIA CUDA cores and 64 Tensor cores

Connection Interface

Power: 2x IEC 320 C14 sockets (Dual redundant power supply)

Data: 1x SFP@1 Gbit/s | 1x USB 3.2 Gen 1 (USB C)

Trigs: Up to eight available via LEMO connector and Trigger Interface Unit (application specific)

GNSS Antenna: SMA connector, up to 300 m 50 Ω
– coaxial cable

Fiber: 2x Diamond E2000-PS APC (single mode)

Size, Weight and Power

Height: 3U – 133 mm

Width: 483 mm (for 19" rack)

Depth: 453mm

Weight: <17 kg

Power: 100 W

Environmental characteristics

Storage Temperature: -40 °C to +70 °C

Operating Temperature: -5 °C to +50 °C

Operating Relative Humidity 10% to 85%
(non-condensing)

Ingress Protection: IP50 (Protected against dust)

Conformity

Class 1 Laser

FCC, CE, UKCA and RoHS compliant

The all in one solution

The new ONYX™ system delivering a clear smaller size and cost advantage



A clear size and cost advantage

The smaller, lighter, lower power design of the ONYX™ Sensing Unit simplifies shipping, setup and commissioning, reducing the time and cost required to get the system fully operational.

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