



Simplex DAS Cable with AcoustiSens® Fiber P/N: C87945: Improved OSNR for Great ASNR



Typical Applications

This OFS AcoustiSens Wideband Simplex Cable is intended for use in laboratories to help researchers assess DAS performance in tight buffered cable configurations. Where DAS measurements are concerned, DAS performance of bare fibers may differ from those in cabled form due to added layers of material between the vibration source and sensing fiber. The OFS AcoustiSens Wideband Simplex Cable is intended to help characterize DAS performance when tight-buffered cables are invoked.

Product Description

AcoustiSens Wideband Simplex Optical Cable, the newest addition to the OFS LineaSens® family, is a tight-buffered, simplex (single fiber) enhanced Rayleigh backscatter single-mode vibration sensing cable. As a prototype technology this cable is intended for laboratory use to help demonstrate DAS Signal-to-Noise Ratio (SNR) improvements enabled by AcoustiSens fibers. Using a waveguide design based on the ITU-T G.657.A1 telecom-grade single-mode standard, AcoustiSens Wideband Simplex Cables significantly increase Rayleigh backscatter while maintaining low attenuation to improve Optical Signal to Noise Ratio (OSNR). Furthermore, the AcoustiSens Wideband cable provides bend-insensitivity and expands the DAS operating wavelength band (1538 - 1554 nm) ensuring interoperability with all known DAS interrogators. Without the need for changes in interrogation equipment or complex optical amplification schemes AcoustiSens Wideband Cable is a drop-in replacement that provides greatly improved sensing performance with OSNR orders of magnitude better than telecom-grade fibers, as depicted in the example data shown below. (all data shown compare C87945 to an identical cable with telecom-grade G.657.A1 optical fiber) This translates into significantly improved ASNR for DAS systems. Due to its waveguide design, AcoustiSens fibers are also bend-insensitive and splice compatible with G.657.A1 and G.652.D optical fibers, assuring smooth integration with commonly deployed sensing solutions. Please contact OFS to discuss your specific application. Our sensing cable experts will work with you to determine a suitable cable design to help DAS users succeed.

Note: DAS and Distributed Vibration Sensing (DVS) are often used interchangeably.

As critical components within acoustic and vibration sensing cables for DAS, AcoustiSens fibers improve sensitivity by increasing Rayleigh backscatter while adding little attenuation thereby lowering the noise floor of the sensor to improve the ASNR of the sensing system.

Features	Benefits
10-15 dB increase in Rayleigh backscatter	Fiber has greater sensitivity to environmental vibration
16 nm window	Compatible with all known commercial interrogator operating wavelengths
Little added attenuation over commercially available G.657.A1 and G.652.D optical fibers	Increased sensitivity with little added noise dramatically improves Signal to Noise Ratio (SNR) enabling improvements Distributed Acoustic Sensing (DAS) Systems
Simplified coupling	Splice-compatible with telecom grade G.657.A1 and G.652.D optical fibers
Dramatically improved OSNR for detection of vibration/acoustics	Enables design of sensing cables for increased offset from assets being monitored: oil and gas pipelines, railroads, perimeters, borders, and more Detection of weaker acoustic/vibration events as compared to standard G.657.A1 and G.652.D fibers
	Improves effectiveness of DAS systems allowing extension of traditional sensing range

Simplex DAS Cable with AcoustiSens [®] Optical Fiber	
Specifications for C87945*	
Physical Characteristics	
Base Fiber Type	G.657 AcoustiSens Wideband GS86545 Bend Insensitive Similar to ITU G.657.A1
Fiber Cladding Diameter	125 μm
Fiber Coating Diameter	200 μm
Cable Buffer Diameter	500 μm
Cable Buffer Material	Hytrel [®]
Cable Strength Member Material	Aramid Yarn
Cable Outer Jacket Diameter	2.2 mm
Cable Outer Jacket Color	PVC - Black
Optical Characteristics	
Attenuation @ 1310 nm	≤ 1.5 dB/km
Attenuation @ 1550 nm	For reference only
DAS Operating Bandwidth	1538 - 1554 nm
Mechanical and Environmental	
Fiber Proof Test	100 kpsi
Maximum Installation Load	87 N
Maximum Operating Load	29 N
Minimum Bend Radius (Installation)	35 mm
Minimum Bend Radius (Operating)	25 mm
Operating Temperature	-20 to 80 °C
Storage Temperature	-20 to 80 °C

*Note: This is a prototype design, therefore achievement of the target specifications is not guaranteed; OFS will use commercially reasonable efforts to achieve the target specifications

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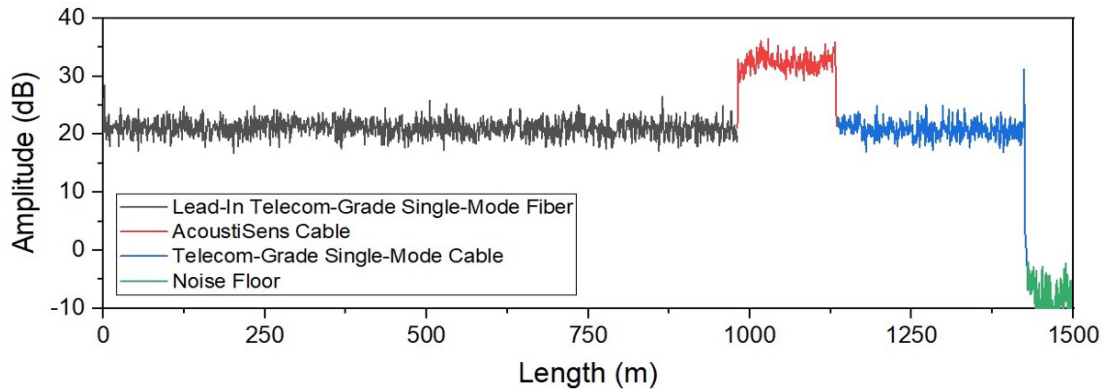
Response Comparison to Single-mode Optical Fiber

The table below provides a sample comparison of signal to noise ratio between AcoustiSens and Telecom-grade Single-mode Optical Fiber when exposed to excitations at a range of frequencies.

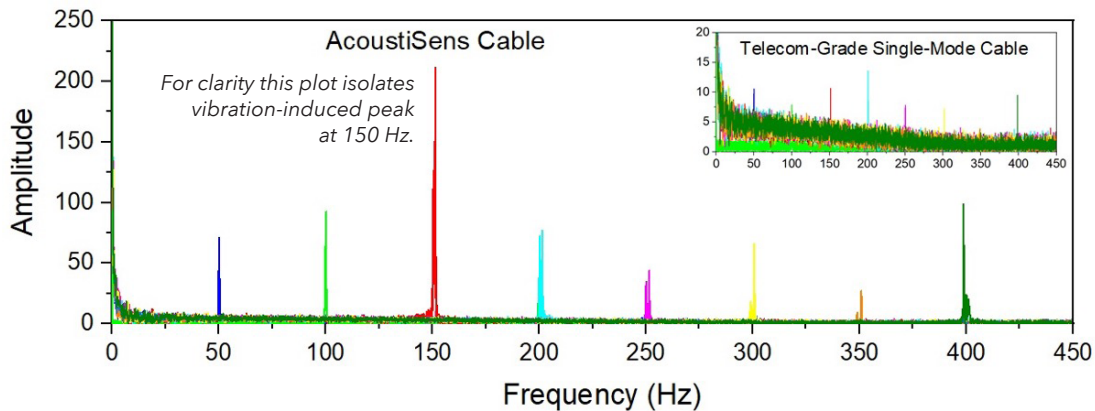
Excitation Frequency	50Hz	100Hz	150Hz	200Hz	250Hz	300Hz	350Hz	400Hz
AcoustiSens Signal to Noise Ratio	70.9	92.6	211.6	77	44.0	66.1	27.3	98.9
Single-mode Fiber Signal To Noise Ratio	10.5	6.8	10.6	13.5	7.8	7.2	2.7	9.4
Percent Increase (AcoustiSens)	575%	1262%	1896%	470%	464%	818%	911%	952%

NOTE: Results will vary based upon cable design, installation conditions, and DAS interrogator model.

To help clarify the performance advantages of AcoustiSens over telecom-grade single-mode fibers, representative signal comparison plots between AcoustiSens optical fiber and single-mode optical fibers are shown below:



NOTE: Results will vary based upon cable design, installation conditions, and DAS interrogator model.



NOTE: Measurements were taken using a Fotech Helios 3HSI Distributed Acoustic Sensor Interrogator. Results will vary based upon cable design, installation conditions, and DAS interrogator model.



For additional information please contact Paul Toller at 860-678-6636.

You can also visit our website at www.ofsoptics.com or call 1-888-fiberhelp (1-888-342-3743) USA or 1-770-798-5555 outside the USA.

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