GORE™ Aerospace Fiber Optic Cable

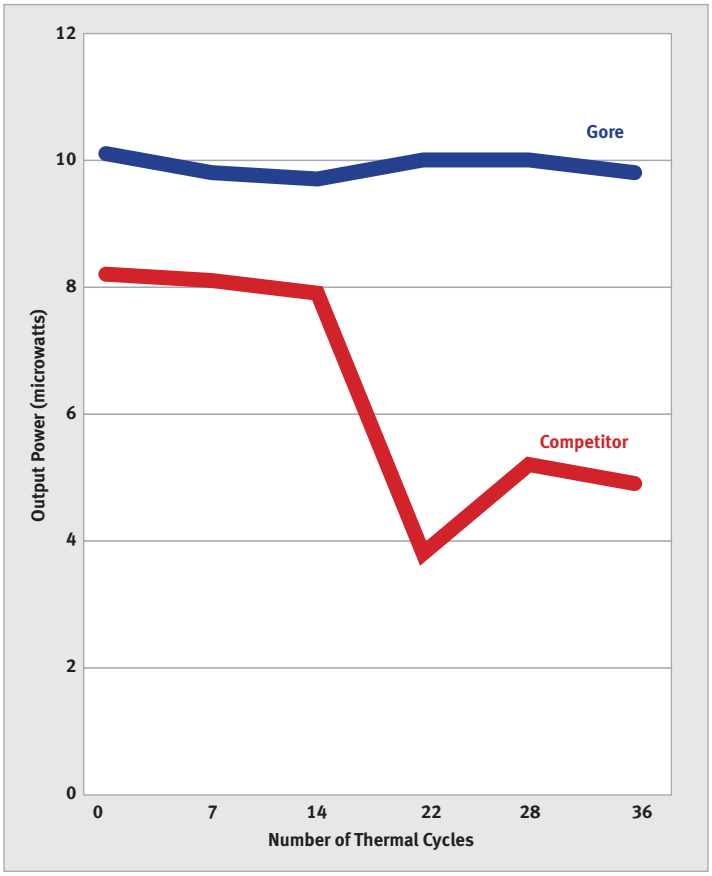
1.2mm Simplex

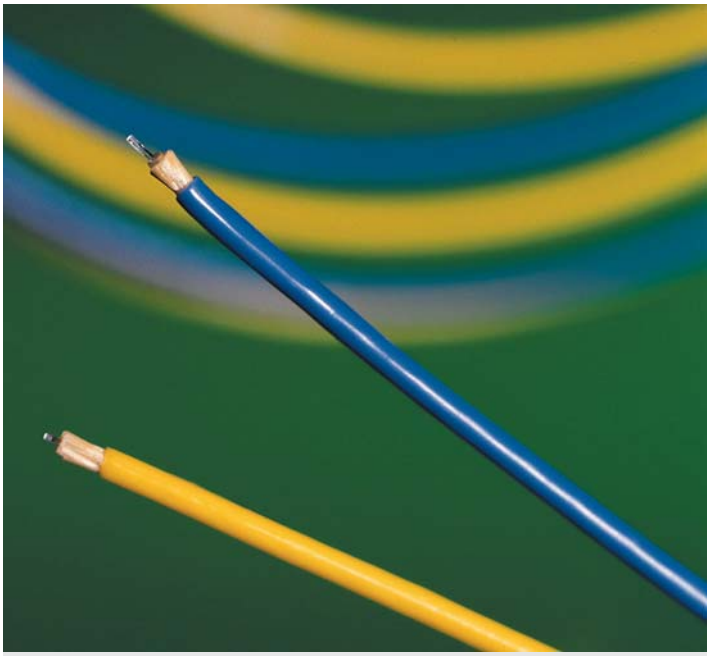
Executive Summary

W. L. Gore and Associates, Inc. provides high performance fiber optic cables and assemblies for military and aerospace application. Traditional fiber optic cable materials affect the well-known optical stability of a bare fiber. The GORE™ Fiber Optic Cable product line is differentiated from traditional fiber optic cable by a patented expanded PTFE buffer system that effectively decouples the optical fiber from other cable elements. As a result, optical performance of a Gore cable closely approximates that of a bare optical fiber, even under mechanical or thermal stresses. This differentiating technology is common to all of GORE™ Fiber Optic Cable products: ribbon interconnects, high strength tether cables, hybrid round cables, and simplex cables.

Figure 1

Optical Power Output After Thermal Cycling of Gore FON 1008 Versus Competition





Features and Benefits

- Wide temperature range from –55°C to +150°C
- Reduced thermally induced attenuation changes
- Reduced thermally induced phase changes
- Reduced bend sensitivity
- Shock and vibration resistant
- Accepts standard aerospace connectors
- Testing per EIA/TIA-455 and DOD-STD-1678
- ISO 9001 certified facility
- Kevlar® aramid strength member
- Fluoropolymer jackets

Performance

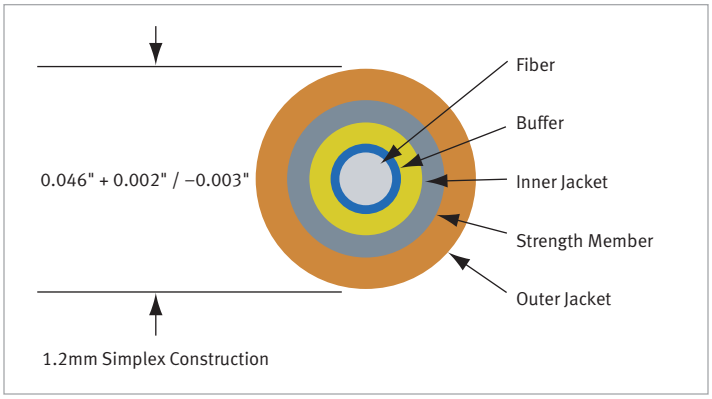
Space and military optical systems require proven components that will provide consistent performance in severe thermal and environmental conditions. Unpredictable component performance can adversely affect overall system performance. GORE™ 1.2mm Simplex Cable has demonstrated stable optical performance when subjected to vibration, mechanical shock, tension, and temperature extremes. As a result, the GORE™ 1.2mm Simplex Cable is the first and only single mode cable qualified for spaceflight use.

1.2mm Simplex Options

P.N.	Core Type	Core/Cladding/ Coating (µm)	Coating	Carbon Layer (Hermetic)	Operating Wavelength	Loss
FON 1002	Single mode	9.3/125/155	Polyimide	No	1310 nm	<1.7dB/km
FON 1003	Multimode Graded Index	62.5/125/155	Polyimide	No	1310 nm	<2.5dB/km
FON 1008	Multimode Graded Index	62.5/125/250	Acrylate	No	1310 nm	<1.9dB/km
FON 1009	Single mode	9.3/125/250	Acrylate	No	1310 nm	<1.4dB/km
FON 1011	Single mode	9.3/125/155	Polyimide	Yes	1310 nm	<1.7dB/km
FON 1012	Multimode Graded Index	100/140/172	Polyimide	Yes	1310 nm	<4.0dB/km
FON 1013	Single mode	7.5/125/245	Acrylate	No	1550 nm	<1.4dB/km
FON 8383	Single mode	7.0/125/250	Acrylate	No	980 nm	<4.0dB/km
FON 8386	Single mode	7.0/125/250	Acrylate	Yes	980 nm	<4.0dB/km

Design Characteristics

The GORE™ 1.2mm Simplex Cable design has found usage in a variety of demanding applications. Within the product line, products incorporate different optical fibers but have a common design utilizing the expanded PTFE buffer, extruded jackets, and a high strength braid. The product line has expanded over the years to include the most commonly available optical fibers. Fibers may be specified as either single mode or multimode, polyimide or acrylate coated, and standard fiber or polarized maintaining fiber. For your special requirements, the design can accept any optical fiber with a coating diameter of 150 µm to 250 µm. The design is compatible with standard aerospace connectors including the Diamond AVIM connector family and the Deutsch MC3 MkII and MC5 lines.



Single Mode Performance

Until now, single mode cable has presented a special challenge for system integrators and designers. Single mode fiber optic cable has much higher bandwidth than multimode fiber optic cable but is more sensitive to bending losses that can affect system performance. As temperature changes, bending losses can be induced by coefficient of expansion mismatches between cable layers. High attenuation due to cable shrinkage after thermal cycling is one example of this effect. Further. cable routing can induce bending losses if the fiber is not adequately buffered and outer cable layers pinch or crush the optical fiber. The Gore expanded PTFE buffer protects the optical fiber and helps to minimize these types of optical losses.

Figure 2

Attenuation Stability with Temperature FON 1002 Single mode

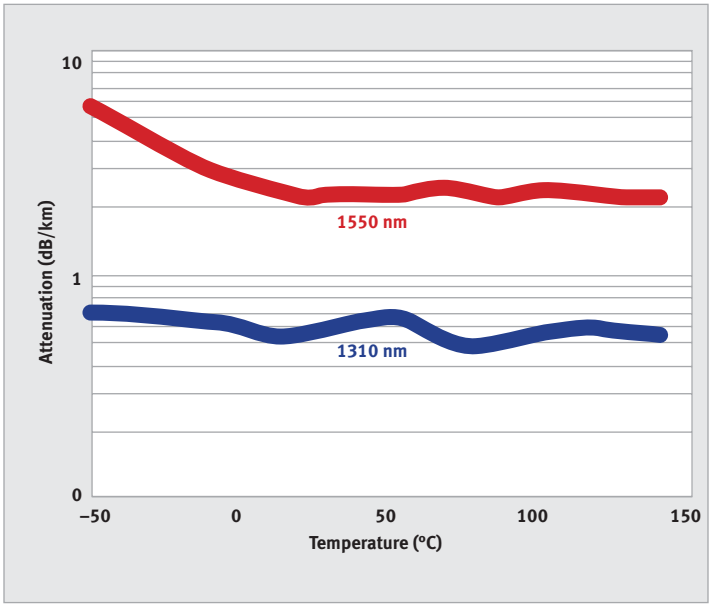
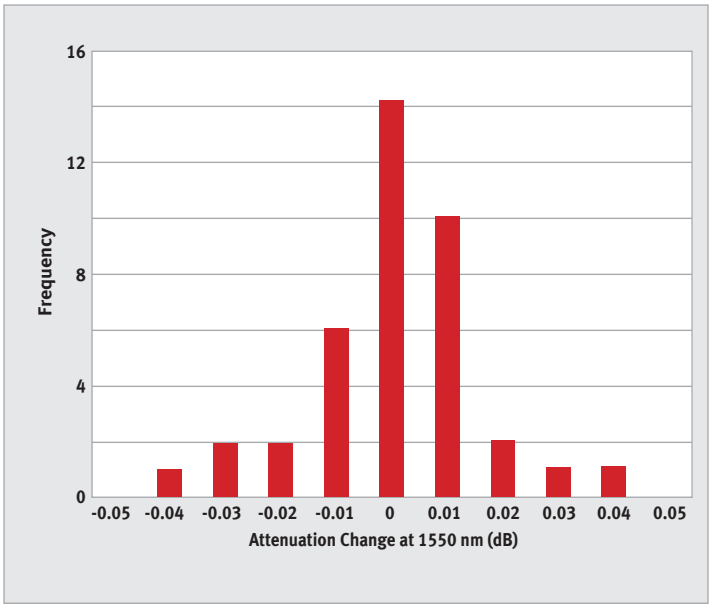


Figure 3

Attenuation Stability with Bending GORE™ ePTFE Buffered Payout Fiber-Single Mode 100 Wraps Around a 1" Mandrel



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W. L. Gore & Associates, Inc.

North America
1 (800) 445-GORE (4673)

Europe
+49 9144 6010
+44 1382 561511

International
1 (302) 292-5100

China: Beijing
+86 10 6510 2980

China: Shanghai
+86 21 6247 1999

China: Shenzhen
+86 755 8359 8262

gore.com

More international phone numbers can be found at gore.com/phone

Japan
+81 33 570 8712

Korea
+82 2 393-3411

Taiwan
+886 2 8771 7799

Singapore
+65 6 733 2882

Creative Technologies Worldwide

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