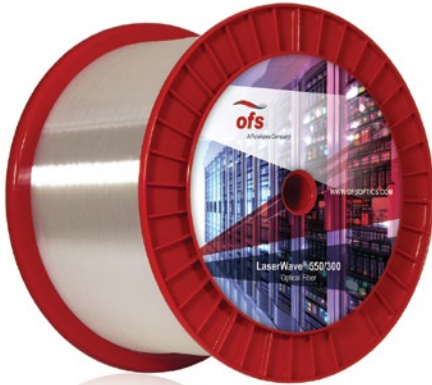




A Furukawa Company

## LaserWave® 550/300 Optical Fiber

50  $\mu\text{m}$  multimode fibers optimized for 850 nm laser-based applications to 10 Gb/s and beyond



### Applications

LaserWave OM4/OM3 Multimode Fiber is designed to enable low cost connectivity for 10 Mb/s through 100 Gb/s applications that include:

- Local Area Networks
- Storage Area Networks
- Data Centers
- High-Speed Computing and Supercomputing Centers
- Central Offices

### Flex-10™ Coating

OFS multimode optical fibers are made with a world-class draw process and our enhanced Flex-10 coating, designed to minimize induced attenuation that can occur in tight-buffer cable. Easy to strip and install, the coating offers outstanding performance in attenuation-sensitive 1 Gb/s and 10 Gb/s systems.

### Features and Benefits

- Superior geometric tolerances and very low attenuation
- Enables minimal connection loss and low cabled attenuation
- Allows for Gigabit Ethernet operation up to 300 m at 850 nm and up to 550 m at 1300 nm
- Designed for laser based Gigabit Ethernet applications while supporting legacy LED applications

### Overview

LaserWave Laser-Optimized OM4/OM3 Fibers extend the application of multimode fiber to support transmission at 10 Gb/s and future speeds such as 40 and 100 Gb/s. Using low cost 850 nm Vertical Cavity Surface Emitting Laser (VCSEL) transceivers, these fibers support a wide variety of applications including 10 Gigabit Ethernet, Fibre Channel, InfiniBand, and the Optical Internet-working Forum (OIF) Interface Agreements.

Used in low-loss cabling systems, LaserWave Fiber can provide extended reach beyond the rated length, as well as more connections and greater power margins.

LaserWave Fiber meets and exceeds the specification requirements of both the EMBc and the more discriminating DMD mask methods for verifying Effective Modal Bandwidth.

### Product Description

**LaserWave 550 OM4 Optical Fiber** extends the system cost benefits of LaserWave Optical Fibers to ultra long building backbones and medium length campus backbones. It supports 10 Gb/s Ethernet, Fibre Channel, and OIF applications to 550 m or more using low cost 850 nm VCSELs. The OFS patented MCVD process provides this extraordinary performance by producing a fiber with nearly zero differential mode delay (DMD) and 4700 MHz-km of EMB, more than double the IEEE requirement for 10 Gb/s 300 m support.

**LaserWave 300 OM3 Optical Fiber** is designed specifically to support 300 m link lengths for 10 Gb/s applications. LaserWave 300 OM3 Fiber features a DMD controlled core that assures 10 Gb/s support with 850 nm serial applications for distances of up to 300 m. Its industry-standard 50  $\mu\text{m}$  core size supports legacy applications like Ethernet, Token Ring, Fiber Distributed Data Interface (FDDI), and Fast Ethernet. The 50  $\mu\text{m}$  core size is also directly compatible with laser-based applications like Gigabit Ethernet, providing support up to 1000 m for low cost 850 nm VCSEL-based Gigabit Ethernet (1000BASE-SX) applications. The fibers also extend the reach of 2.5 Gb/s parallel applications.

Product Specifications	LaserWave 550/300 Optical Fiber
<b>Physical Characteristics</b>	<b>50/125</b>
Core Diameter	50 ± 2.5 µm
Core Non-Circularity	≤ 5 %
Clad Diameter	125 ± 1 µm
Clad Non-Circularity	≤ 1 %
Core/Clad Concentricity Error (Offset)	≤ 1.0 µm
Coating Diameter	245 ± 10 µm
Coating Non-Circularity	≤ 5 %
Coating-Clad Concentricity Error (Offset)	≤ 8 µm
Tensile Proof Test	100 kpsi (0.69 GPa)
Coating Strip Force	Range: 0.2 - 1.0 lbf (0.9 - 4.4 N) Typical: 0.6 lbf (2.7 N)
Standard Reel Lengths	2.2 - 8.8 km
<b>Optical Characteristics</b>	
Attenuation @ 850 nm @ 1300 nm	≤ 2.3 dB/km ≤ 0.6 dB/km
Laser Bandwidth/EMB	See Transmisison Characteristics Table
Transmission Distance (Link Length) Support	See Applications Support Table
Attenuation at 1380 nm minus attenuation at 1300 nm	≤ 1.0 dB/km
Attenuation Uniformity / Point Discontinuities at 850 nm and 1300 nm	≤ 0.08 dB
Numerical Aperture	0.20 ± 0.015
Chromatic Dispersion Zero Dispersion Wavelength ( $\lambda_0$ ) Zero Dispersion Slope ( $S_0$ )	1295 – 1340 nm ≤ 0.105 ps/nm <sup>2</sup> -km (1295 ≤ $\lambda_0$ ≤ 1310 nm) ≤ 0.000375 x (1590 – $\lambda_0$ ) (1310 ≤ $\lambda_0$ ≤ 1340 nm)
Group Refractive Index at 850 nm at 1300 nm	1.483 1.479
Backscatter Coefficient at 850 nm at 1300 nm	-68.4 dB -75.8 dB
Macrobend Attenuation 100 turns on a 75 mm mandrel at 850 nm and 1300 nm	≤ 0.5 dB
<b>Environmental Characteristics</b>	
Operating Temperature Range	-60 °C to +85 °C
Temperature Induced Attenuation at 850 nm and 1300 nm from -60 °C to +85 °C (5 24-hour cycles)	≤ 0.1 dB/km
Temperature and Humidity Induced Attenuation at 850 nm and 1300 nm from -10 °C to +85 °C 94% RH, (30 24-hour cycles)	≤ 0.1 dB/km
Accelerated Aging (Temperature) Induced Attenuation at 85 °C for 30 days	≤ 0.1 dB/km
Water Immersion Induced Attenuation, 23 °C for 30 days	≤ 0.1 dB/km
Dynamic Fatigue Stress Corrosion Parameter ( $n_d$ )	≥ 18

**Transmission Characteristics***Minimum Bandwidth Specifications (MHz-km)*

	<b>LaserWave 550 OM4 Fiber</b>	<b>LaserWave 300 OM3 Fiber</b>
Laser EMB @ 850 nm <sup>1</sup>	4700	2000
Laser EMB @ 1310 nm	500	500
Overfilled @ 850 nm	3500	1500
Overfilled @ 1300 nm	500	500

<sup>1</sup> Effective Modal Bandwidth, per TIA/EIA-492AAAC (OM3), TIA/EIA-492AAAD (OM4) and IEC 60793-2-10, ensured by EMBc or DMD performance specifications for sources meeting launch conditions specified in 10 Gigabit Ethernet (IEEE 802.3ae), OIF OC-192/STM-64 VSR-4-04, and 10 Gigabit Fibre Channel (10GFC). LaserWave 550/300 OM4/OM3 Fiber meets the specification requirements of both the EMBc and the more discriminating DMD mask methods.

*DMD Specifications (ps/m maximum)*

The fiber shall meet at least one of the following DMD templates, each of which consists of both an inner and outer mask specification, and the sliding mask specifications shown below.

The requirements for LaserWave 300 OM3 Fiber are compliant with, but more stringent than the requirements of TIA-492AAAC and IEC 60793-2-10 A1a.2.

Template Number	850 nm DMD-Inner Mask (ps/m) (Radius 0-18 $\mu\text{m}$ ) <sup>2, 3</sup>	850 nm DMD-Outer Mask (ps/m) (Radius 0-23 $\mu\text{m}$ ) <sup>3</sup>
1	$\leq 0.23$	$\leq 0.70$
2	$\leq 0.24$	$\leq 0.60$
3	$\leq 0.25$	$\leq 0.50$
4	$\leq 0.26$	$\leq 0.40$
5	$\leq 0.27$	$\leq 0.35$
6	$\leq 0.33$	$\leq 0.33$

Sliding Interval Masks:  $\leq 0.25$  ps/m

The requirements for LaserWave 550 OM4 Fiber are compliant with, but more stringent than, the requirements of TIA-492AAAD and IEC 60793-2-10 A1a.3.

Template Number	850 nm DMD-Inner Mask (ps/m) (Radius 0-18 $\mu\text{m}$ ) <sup>2, 3</sup>	850 nm DMD-Outer Mask (ps/m) (Radius 0-23 $\mu\text{m}$ ) <sup>3</sup>
1	$\leq 0.10$	$\leq 0.30$
2	$\leq 0.11$	$\leq 0.17$
3	$\leq 0.14$	$\leq 0.14$

Sliding Interval Masks:  $\leq 0.11$  ps/m

<sup>2</sup> OFS Inner Mask Radial specification is more stringent than the TIA/EIA-492AAAC (OM3), TIA/EIA-492AAAD (OM4) and IEC 60793-2-10 requirement of 5-18  $\mu\text{m}$ .

<sup>3</sup> OFS DMD measurement scanning steps are 1  $\mu\text{m}$ , twice as stringent as the maximum 2  $\mu\text{m}$  steps required by the standards.

For more information on DMD, visit our website at [www.ofsoptics.com](http://www.ofsoptics.com) and download our white paper, Measuring Bandwidth of High-Speed Multimode Fiber.

For additional information please contact your sales representative.

You can also visit our website at [www.ofsoptics.com](http://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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**Product Specifications LaserWave® 550/300**

**Application Support**

*Application Support Examples Distance (Meters)<sup>1</sup>*

	<b>LaserWave Fibers</b>	
	<b>550</b>	<b>300</b>
100 Gigabit Ethernet 850 nm (100GBASE-SR10)	150 <sup>2</sup>	100
40 Gigabit Ethernet 850 nm (40GBASE-SR4)	150 <sup>2</sup>	100
10 Gigabit Ethernet 850 nm (10GBASE-S) 1310 nm CWDM lasers (10GBASE-LX4) 1310 serial w/ EDC (10GBASE-LRM)	550 <sup>3</sup> 300 220	300 300 220
1 Gigabit Ethernet 850 nm (1000BASE-SX) 1310 nm (1000BASE-LX)	1040 600	1000 <sup>4</sup> 600

<sup>1</sup> Unless otherwise indicated, application support distances are based on standard total connection plus splice loss of 1.5 dB and cable attenuations of 3.5/1.5 dB/km at 850 nm and 1300 nm respectively. Lower-loss connectors and lower cable attenuations can lead to longer supportable distances. Contact OFS for specific cable attenuation and connection plus splice loss necessary to support a target distance.

<sup>2</sup> 150 meter reach assuming 1.0 dB total connection and splice loss.

<sup>3</sup> 550 meter reach assuming 3.5 dB/KM maximum cabled attenuation at 850 nm plus 1.0 dB of total connection and splice loss, or 3.0 dB maximum cabled attenuation at 850 nm and 1.3 dB total connection and splice loss.

<sup>4</sup> 1000-meter reach assuming total connection plus splice loss of 0.9 dB.