



Member of LEONI Group

OptiGrade 150 / OptiGrade 200 for Short Distances (10 Gb/s)

Laser Optimized Graded Index Multimode Fiber

With OptiGrade 150 / OptiGrade 200 Multimode Fiber series for short distances j-fiber offers an enhanced 50/125 Multimode fiber for the high-speed network protocols and transmission rates.

OptiGrade 150 / OptiGrade 200 Multimode fiber series for short distances support 10 Gb/s serial transmission up to 150 m and 200 m in the 850 nm wavelength range. The ideal solution to provide low cost, short-reach connectivity for Storage Area Networks (SAN) high speed interconnects for central offices and data centers as well as for various interconnections in IT networks for distances up to 200 m.

OptiGrade 150 / OptiGrade 200 fibers are fully compatible with the installed fiber base of conventional 50 μ m Multimode fiber (Legacy Local Area Networks) and j-fiber's entire line of high-performance 50 μ m Multimode fiber. While optimized for 10 Gb/s performance @ 850 nm (SX) serial applications, OptiGrade 150 / OptiGrade 200 fiber also exceeds industry standards at lower speed network protocols.

Low Cost. Reliability. Performance.

- High-Performance Multimode fibers for guaranteed 10 Gb/s Ethernet serial transmission over distances of 150 m and 200 m
- Effective Modal Bandwidth (EMB) from 1000 up to 1400 MHz·km @ 850 nm and 500 MHz·km @ 1300 nm
- Provides high performance at overfilled launch (OFL) bandwidth of 750 MHz·km @ 850 nm and 500 MHz·km @ 1300 nm to support conventional applications
- Allows the use of low-cost 850 nm system applications (LEDs, VCSELs)
- Available with guaranteed transmission performance @ 1300 nm
- Guarantees reliable system performance with most stringent DMD characterization
- Guarantees all j-fiber Multimode fiber standard features: easy to work with in cabling and installation and high-performance results; fully compatible with installed fiber base

Application

OptiGrade 150 / OptiGrade 200 Multimode fiber series has been designed to provide high connectivity in bandwidth intensive applications at short distances.

For further information about our Multimode Fibers and other j-fiber products and services, please contact us:

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Performance Characteristics

OptiGrade Class		150	200	Unit
Bandwidth (Overfilled Launch, LED based sources)	850 nm	≥ 750	≥ 1000	MHz·km
	1300 nm	≥ 500	≥ 500	MHz·km
Effective Modal Bandwidth (EMB) ¹	850 nm	≥ 1000	≥ 1500	MHz·km
Transmission link lengths for 1 Gb/s	850 nm	750	750	m
	1300 nm	600	600	m
Transmission link lengths for 10 Gb/s ²	850 nm	150	200	m
	1300 nm (LX4)	300	300	m

¹ See "Fiber Characterization"

² @ 850 nm operating wavelength with transmitters meeting encircled flux of ≤ 30% @ radius 4.5 μ m and ≥ 86 % @ radius 19.0 μ m

Fiber Characterization

j-fiber's OptiGrade fibers feature a DMD controlled core that assures 10 Gb/s support with 850 nm serial applications.

For each OptiGrade fiber shipped DMD characterization has been performed according to TIA/EIA 455-220 or IEC 60793-1-49 to ensure the specified effective modal bandwidth (EMB) at 850 nm.

The EMB values are assured by DMD measurement rated by two methods:

a) Use of templates and radial offset masks

Fibers shall meet the respective DMD templates specified in or according to the standard TIA/EIA 455-220 or IEC 60793-2-10, for transmitters meeting TIA/EIA-492 AAAC. Each template includes an inner and an outer mask requirement with:

Inner mask: $R_{inner} = 5 \mu\text{m}$ to $R_{outer} = 18 \mu\text{m}$
 Outer mask: $R_{inner} = 0 \mu\text{m}$ to $R_{outer} = 23 \mu\text{m}$

Upon request our fiber can be selected meeting inner mask radial specifications more stringent than the TIA/EIA-492 AAAC requirement:

Inner mask: $R_{inner} = 0 \mu\text{m}$ to $R_{outer} = 18 \mu\text{m}$

The fiber shall pass at least one of the 6 respective DMD templates as defined in TIA and IEC with consideration of the scaling rules. In addition, the fiber shall pass the more stringent DMD specification of IEC 60793-2-10; meeting the 4 radial offset interval masks, which sources out fibers, which have rapid changes of the DMD. (sliding window).

b) Calculated effective modal bandwidth (EMB_c) requirements

The optical pulse shapes of the fiber are weighted by a set of laser launch distributions defined in IEC 60793-2-10 to determine the calculated minimum effective modal bandwidth EMB_cmin.

This value multiplied with factor 1.13 shall be greater than 1000 / 1500 MHz·km.

$$1.13 \times \text{EMB}_c \text{ min} \geq 1000 / 1500 \text{ MHz}\cdot\text{km}$$

The factor 1.13 aligns the EMB_c min to the theoretical effective modal bandwidth required by the 10Gb/s application.

The fiber shall pass both requirements as per above method

a) Use of templates and radial offset masks and per above method

b) Calculated effective modal bandwidth (EMB_c) requirements.

Optical Characteristics

		Spec. Values	Unit
Attenuation	850nm	≤ 2.4	dB/km
Coefficient ¹	1300nm	≤ 0.7	dB/km
Attenuation @ 1383 nm (OH-Peak)		< 2.0	dB/km
Attenuation Discontinuities (OTDR 1300 nm)		< 0.05	dB
Macrobend ²		≤ 0.5	dB
Zero Dispersion Wavelength		$1295 \leq \lambda_0 \leq 1320$	nm
Zero Dispersion Slope			
	$1295 \leq \lambda_0 \leq 1300$	≤ 0.001 ($\lambda_0 - 1190$)	ps/nm·km
	$1300 \leq \lambda_0 \leq 1320$	≤ 0.11	ps/nm·km
Numerical Aperture		0.200 ± 0.015	
Effective Group Index of Refraction			
	850nm	1.483	
	1300nm	1.478	

¹ Special attenuation values available upon request

² Bend induced attenuation @ 850 nm and 1300 nm, 100 turns around a mandrel of 75 mm diameter

Geometrical Characteristics

	Spec. Values	Unit
Core Diameter	50 ± 2.5	μm
Core Non-Circularity	≤ 5.0	%
Core/Clad Concentricity Error	≤ 1.5	μm
Cladding Diameter	125 ± 1.0	μm
Cladding Non-Circularity	≤ 1.0	%
Coating Diameter	245 ± 10	μm
Coating /Clad Concentricity Error	≤ 10	μm
Available Lengths	1.1-8.8 ¹	km

¹ 1.1 km increments

Mechanical Characteristics

	Spec. Values	Unit
Proof Test	≥ 100 ≥ 8.8	kpsi N
Dynamic Tensile Strength Unaged Fiber (0.5 m)		
Median Tensile Strength	≥ 3.8	GPa
15th Percentile Tensile Strength	≥ 3.3	GPa
Aged Fiber (0.5 m)		
Median Tensile Strength	≥ 3.03	GPa
15th Percentile Tensile Strength	≥ 2.76	GPa
Dynamic Fatigue		
Stress Corrosion Parameter n_f	≥ 20	
Operating Temperature Range	-60°C to +85°C	
Coating Strip Force (typical)	1.9	N

Applied Measurement Standards

- TIA/EIA 455-220A or IEC 60793-1-49, differential mode delay (DMD), to measure effective modal bandwidth (EMB) for 10 Gb/s data rates
- TIA/EIA 455-204 or IEC 60793-1-41, overfilled mode launch bandwidth (OFL BW) to measure bandwidth for less than 1 Gb/s data rates

Standardization and Compliances for OptiGrade 150 / OptiGrade 200 Multimode Fiber

- IEC 60793-2-10 as fiber type A1a
- TIA/EIA 492AAAB as Laser-Optimized Multimode Fiber 50/125 @ 850 nm

Environmental Characteristics

	Spec. Values	Unit
	@ 850/1300 nm	
Change of Temperature Attenuation increase, -60°C to +85°C	≤ 0.20	dB/km
Dry Heat Attenuation increase, 30 days @ 85°C	≤ 0.20	dB/km
Damp Heat Attenuation increase, 30 days @ 85°C/85% R.H.	≤ 0.20	dB/km
Water Immersion Attenuation increase, 30 days in 23°C water	≤ 0.20	dB/km

Coating

j-fiber Multimode optical fibers are protected with our enhanced coating material that guarantees long-term performance and reliability. The dual layer acrylate material is user friendly and compatible in all cable constructions, such as tight buffer and loose tube designs with low bending loss. Optimized for Multimode fiber the coating shows best-in-class low microbending sensitivity. The coating is mechanically strippable and leaves no residue.

Spool Size

	Size
Spool diameter	9.25"/23.5 cm
Spool width	4.21"/10.7 cm
Spindle	1"/2.54 cm
Traverse width	3.75"/9.5 cm

Manufacturing Process

OptiGrade Multimode fibers are manufactured by j-fiber's proprietary technology using a MCVD (Modified Chemical Vapour Deposition) process for preform fabrication. This technology allows us to flexibly provide innovative fiber and preform designs in accordance with each customer's specifications. Our totally DMD controlled manufacturing process results in low attenuation fiber with consistent geometric properties, high strength, and precise control of each fiber's index of refraction. OptiGrade fibers have a high level of splice compatibility with optical fibers manufactured by other processes.

Environmental friendly Packaging

The shipping spool is designed to safeguard j-fiber optical fiber not only during shipping but also during subsequent handling in the customer's plant. It features smooth inside surfaces to ensure that the fiber is wound on and off the reel without the risk of breaking. The reel barrel is isolated via a polyethylene air cushion cover. The inside end of the fiber can be accessed for various measurements while still on the shipping spool. Each spool carries product information, including fiber type, measurement data and peel-off bar coding to assist with inventory control. All reels and transport boxes are designed to take advantage of our recycling program.

Ordering Information

To order our OptiGrade optical fibers please call, fax or email us and specify the following parameters when ordering:

Fiber Type:	OptiGrade Multimode Fiber 50/125/245 μ m
Desired Performance:	OptiGrade Class
Desired Attenuation:	at 850 nm/1300 nm
Fiber Quantity:	kms
Other:	desired ship date, reel length, special requests

All fibers and preforms are subject to j-fiber's ongoing process and quality improvement programs ensuring excellent performance and high reliability. We reserve the right to make changes to the above specification without notice.

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