

## OptiGrade 550

### OM4 standard (IEC A1a.3)

#### High-Performance Graded Index Multimode Fiber with EMB 4700 MHz·km for 10 Gb/s Ethernet LAN applications over 550 meters

With OptiGrade 550 j-fiber offers a fully OM4 standard compliant Multimode fiber. OptiGrade 550 ensures highest bandwidth performance for Premises, Local Area Network (LAN), Metropolitan Area Network (MAN) and Storage Area Network (SAN) while its low-cost 850 nm lasers (VCSEL) optimized design contributes to overall system cost reduction. Beyond current OM4 standard performance compliance, OptiGrade 550 provides the potential to open future opportunities for higher speed Ethernet data rate transmission of 40/100 Gb/s data rates over shorter distances in one fiber.

#### Highest Performance. Cost-Efficient. Future-Save.

- Guarantees reliable system performance for 10 Gb/s Ethernet serial transmission over 550 m (16 Gb/s over 300 m FibreChannel)
- Guaranteed OM4 compliance: Effective Modal Bandwidth (EMB) of 4700 MHz·km, Overfilled Launch Bandwidth (OFL) of 3500 MHz·km @ 850 nm and 500 MHz·km @ 1300 nm
- Optimized for low cost 850 nm system applications using VCSEL as light sources
- Highest effective modal bandwidth values ensured by 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

#### Optical Characteristics

		Spec. Values	Unit
Bandwidth (Overfilled Launch)	850 nm	≥ 3500	MHz·km
	1300 nm	≥ 500	MHz·km
Effective Modal Bandwidth (EMB) <sup>1</sup>	850 nm	≥ 4700	MHz·km
Transmission link lengths for 10 Gb/s <sup>2</sup>	850 nm	550	m
	1300 nm (LX4)	300	m
Attenuation Coefficient <sup>3</sup>	850 nm	≤ 2.2 – 2.4	dB/km
	1300 nm	≤ 0.6	dB/km
Attenuation at 1383 nm (OH-Peak)		< 2.0	dB/km
Attenuation Discontinuities (OTDR 1300 nm)		< 0.05	dB
Macrobend <sup>4</sup>		≤ 0.5	dB
Zero Dispersion Wavelength		1295 ≤ λ <sub>0</sub> ≤ 1320	nm
Zero Dispersion Slope	1295 ≤ λ <sub>0</sub> ≤ 1300	≤ 0.001 (λ <sub>0</sub> -1190)	ps/nm·km
	1300 ≤ λ <sub>0</sub> ≤ 1320	≤ 0.11	ps/nm·km
Numerical Aperture		0.200 ± 0.015	
Effective Group Index of Refraction	850 nm	1.483	
	1300 nm	1.478	

<sup>1</sup> Minimum value from both template evaluation and minEMB<sub>c</sub> calculation

<sup>2</sup> @ 850 nm operating wavelength with transmitters meeting encircled flux of ≤ 30% @ radius 4.5 μm and ≥ 86 % @ radius 19.0 μm.

<sup>3</sup> Special attenuation values available upon request

<sup>4</sup> Bend induced attenuation at 850 nm and 1300 nm, 100 turns around a mandrel of 75 mm diameter

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

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## Fiber Characterization

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

### a) Use of templates and radial interval 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:  $R_{\text{inner}} = 5 \mu\text{m}$  to  $R_{\text{outer}} = 18 \mu\text{m}$   
 Outer mask:  $R_{\text{inner}} = 0 \mu\text{m}$  to  $R_{\text{outer}} = 23 \mu\text{m}$

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

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

The fiber shall pass at least one of the 3 respective DMD templates as defined in TIA and IEC. In addition, the fiber shall pass the more stringent DMD specification of IEC 60793-2-10; meeting the 4 radial offset interval masks (DMD shall not exceed 0.11 ps/m).

### b) Calculated effective modal bandwidth (EMBc) requirements

The optical pulse shape 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  $EMB_c \text{ min}$ .

This value multiplied with factor 1.13 shall be greater than 4700 MHz·km.

$$1.13 \times EMB_c \text{ min} \geq 4700 \text{ MHz·km}$$

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

j-fiber's OptiGrade 550 fiber features 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 455-220A or IEC 60793-1-49 to ensure the specified effective modal bandwidth @ 850 nm.

The fiber shall pass both requirements as per above method a) Use of templates on the values of differential mode delay (DMD) and per above method b) Calculated effective modal bandwidth (EMBc) requirements.

## Standardization and Compliances for OptiGrade 550

- TIA/EIA 455-220A or IEC 60793-1-49, differential mode delay (DMD), to measure effective modal bandwidth (EMB)
- TIA/EIA 455-204 or IEC 60793-1-41: bandwidth
- ISO/IEC 11801(2) as OM4 type fiber
- IEC 60793-2-10 as fiber type A1a.3

## Geometrical Characteristics

	Spec. Values	Unit
Core Diameter	$50 \pm 2.5$	$\mu\text{m}$
Core Non-Circularity	$\leq 5.0$	%
Core/Clad Concentricity Error	$\leq 1$	$\mu\text{m}$
Cladding Diameter	$125 \pm 1.0$	$\mu\text{m}$
Cladding Non-Circularity	$\leq 1.0$	%
Coating Diameter	$245 \pm 10.0$	$\mu\text{m}$
Coating /Clad Concentricity Error	$\leq 10.0$	$\mu\text{m}$
Standard Lengths	1.1 - 8.8	km

## Mechanical Characteristics

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

## Environmental Characteristics

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

## Coating

j-fiber Multimode optical fiber is 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"/23.5cm
Spool width	4.21"/10.7cm
Spindle	1"/2.54cm
Traverse width	3.75"/9.5cm

## Manufacturing Process

OptiGrade 550 optical fibers are manufactured by j-fiber's proprietary technology using a MCVD (Modified Chemical Vapor Deposition) process for preform fabrication. This technology allows us to flexibly provide innovative fiber and preform designs. Our totally DMD controlled manufacturing process results in a low attenuation fiber with consistent geometric properties, high strength, and precise control of each fiber's index of refraction for best transmission performance.

## 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 550 please call, fax or email us and specify the following parameters when ordering:

Fiber Type:	OptiGrade 550 50/125/245 $\mu\text{m}$
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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