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5 Things You Should Know

## LaserWave® FLEX Bend-Optimized Multimode Optical Fiber

[www.ofsoptics.com](http://www.ofsoptics.com)

- 1 First introduced in 2009, Bend-Insensitive 50  $\mu\text{m}$  Multimode Fiber (BIMMF) is now the fiber of choice for high-performance enterprise local area networks (LANs) and data centers. BIMMF was developed to enable more compact fiber management systems and to improve space utilization in modules, enclosures, cabinets and patch fields. BIMMF can also help to mitigate link failures when optical cables undergo small-diameter bends, particularly in data center jumpers and modules and also in demanding computer applications.

*What you should know:*

When compared with standard fibers, BIMMFs have a different “waveguide,” or index profile design, which includes an optical trench that confines light within the core, even under tight bends. However, this new design transmits light differently than conventional multimode fibers and also impacts other important fiber parameters such as core diameter, numerical aperture (NA) and bandwidth.

- 2 Led by OFS, industry standards organizations worked to ensure that BIMMF was interoperable with existing OM4 and OM3 50  $\mu\text{m}$  multimode fibers, to help provide the low loss and highly reliable bandwidth required by today’s demanding networks. An industry standard for BIMMF (IEC 60793-2-10:2015) was published in 2015. Significant changes were made to testing procedures for NA (IEC 60793-1-43) and core diameter (IEC-60793-1-20) to ensure that backward compatibility with non-bend-insensitive fibers was maintained.

*What you should know:*

Based on our standards work and extensive R&D efforts involving OFS Labs (formerly part of Bell Labs), OFS

designed a fiber that is specifically optimized for tighter bend configurations while preserving high bandwidth and interoperability with the embedded base of multimode fibers. Our LaserWave FLEX Bend-Optimized Optical Fiber provides all the benefits of LaserWave Optical Fiber, while also exceeding standards requirements. This bend-optimized fiber design enables enhanced system performance capability for extra reliability margin within the most demanding network installations.

- 3 Low-loss connections are critical parts of the overall link loss budget. For this reason, it’s important that BIMMFs maintain excellent backward compatibility with legacy, non-BIMMF fibers.

*What you should know:*

OFS led the way in establishing standards to ensure that core diameter and NA (two key attributes for low connection and splice loss) are fully compatible with conventional multimode fiber. In fact, the design of LaserWave FLEX Optical Fiber is specifically optimized to accomplish this. The geometric specifications such as NA, clad diameter, clad non-circularity, core diameter and core-to-clad concentricity of OFS’ LaserWave FLEX Optical Fibers are significantly tighter than published standards. These specifications are critical to providing low connector mating loss. A connectivity study performed by OFS shows that LaserWave FLEX Optical Fiber is capable of reference grade connections (less than 0.1 dB) to itself, as well as to conventional OM3 and OM4 multimode fibers.



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- ④ Fusion splicing is sometimes used in high-density applications. Bend-insensitive multimode fiber is fully backward compatible with non-bend-insensitive fiber in splicing applications.

**What you should know:**

Because multimode fusion splicers use clad alignment rather than core alignment, they are unaffected by the trench surrounding the fiber core. LaserWave *FLEX* Optical Fiber's tighter geometry and NA specifications play a key role in minimizing splice loss, just as they do in obtaining low connector mating loss.

- ⑤ It is still very important to use good installation practices and maintain bend radius control with BIMMF. At bends approaching a 5 mm radius or less, all fibers, including BIMMF, can become over-stressed and may break prematurely. Such a bend could occur by closing a door on a jumper or pulling an interconnect cable tightly around a sharp edge. LaserWave *FLEX* Optical Fiber is optimized to prevent these conditions. You can maintain low loss down to a 7.5 mm bend radius. However, smaller bends (around 5 mm or less) will result in a noticeable increase in loss, which serves as an "early warning" of a dangerous bend condition.

**What you should know:**

LaserWave *FLEX* Optical Fiber provides "early warning" of very small diameter bends that can lead to a catastrophic fiber break. Our fiber is designed with you, the end user, in mind, to maintain the outstanding bandwidth reliability that LaserWave Multimode Optical Fiber is known for. This fiber provides significantly improved macrobend characteristics and backward compatibility with standard fibers to offer high performance, very low potential connector loss, enhanced system performance and an extra reliability margin for demanding installations and the next generation of network technology.

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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