Classification of Multimode Fiber Wavelengths

Article Overview

Multimode fibers are primarily classified to operate at 850 nm and 1300 nm wavelengths, with OM1 through OM5 types optimized for different bandwidths, distances, and light sources.

Overview of Multimode Fiber Wavelengths

Multimode fibers (MMF) are designed to carry multiple light modes through a larger core diameter (50-62.5 um), making them suitable for short-distance applications such as data centers and enterprise LANs. The primary operational wavelengths for MMF are 850 nm (short wavelength) and 1300 nm (long wavelength), which correspond to the optimal transmission windows for LED and VCSEL light sources . These wavelengths influence attenuation, dispersion, and modal bandwidth, which are critical for determining the maximum data rate and distance.

OM Fiber Classification and Wavelengths

The ISO/IEC 11801 standard defines multimode fiber types OM1 through OM5, each with specific wavelength and bandwidth characteristics:

o OM1: Core diameter 62.5 um, typically uses LED light sources, optimized for 850 nm and 1300 nm. Supports 10 Gigabit Ethernet up to 33 meters and is mostly used for legacy 100 Megabit Ethernet applications .
o OM2: Core diameter 50 um, LED-based, also operates at 850 nm and 1300 nm, with improved bandwidth over OM1, supporting 10 Gigabit Ethernet up to 82 meters .
o OM3: 50 um core, laser-optimized (VCSEL), primarily for 850 nm, supports 10 Gigabit Ethernet up to 300 meters and 40/100 Gigabit Ethernet up to 100 meters .
o OM4: 50 um core, laser-optimized, 850 nm, enhanced modal bandwidth for 10 GbE up to 550 meters and 40/100 GbE up to 150 meters. Fully backward compatible with OM3 .
o OM5: 50 um core, wideband multimode fiber (WB-MMF), supports short-wavelength division multiplexing (SWDM) across 850-953 nm, enabling multiple wavelengths over a single fiber for 40G, 100G, and 400G applications . OM5 is backward compatible with OM4 but adds multi-wavelength capability.

Key Considerations

o Light Sources: OM1 and OM2 typically use LEDs, while OM3, OM4, and OM5 are optimized for VCSEL lasers .
o Distance and Bandwidth: Higher OM numbers correspond to higher modal bandwidth and longer supported distances at 850 nm, making OM3-OM5 suitable for modern high-speed data centers .

o Applications: OM1/OM2 are mostly legacy fibers for short-range Ethernet, while OM3-OM5 are standard for 10G-400G Ethernet in enterprise and hyperscale data centers .

Summary

Multimode fiber classification is closely tied to wavelength and modal bandwidth. 850 nm is the primary wavelength for high-speed VCSEL-based transmission, while 1300 nm is used for legacy LED-based systems. OM1 and OM2 are suitable for older networks, whereas OM3, OM4, and OM5 support modern high-speed, short-distance applications, with OM5 enabling multi-wavelength SWDM for future-proofing high-capacity networks .

Multimode Fiber Cable Types: Complete Comparison The TIA-498 and IEC 60793-2-10 standards classify multimode

Table of Contents Multimode Fiber Classification OM1 OM2 OM3 OM4 OM5 Bend capability of multimode fiber

Learn the basics of multimode fiber and the evolution of the different fiber standards as well as the differences

With several types available--OM1, OM2, OM3, OM4, and OM5--each offering distinct

We breakdown the differences between single mode and multimode fiber optic cable, covering aspects like physical

Our comprehensive guide to types of fiber optic cables. Learn all about the differences between single mode and multimode cables,

Best for: 40G/100G/400G over multimode with fewer fibers OM5 is designed to support multiple wavelengths on a

Multimode wavelengths are characterized by multiple light paths through the fiber, which can lead to modal

Fiber types Fibers are classified as multimode fibers and single-mode fibers. Multimode fibers Multimode fibers (MMFs) have thicker

17.3.2.2 Multimode, multicore, and few-mode fibers Multimode fibers are simultaneously an old and emerging technology within the

Classification of Multimode Fiber Wavelengths

Multimode fiber carries multiple propagation modes and typically has a larger core than single-mode fiber, which

Compare OM1, OM2, OM3, OM4, and OM5 multimode fiber specs, distances, bandwidth, and applications. Essential

Multimode fiber optic cables are essential in modern data communication systems since

Figure 2: Schematic comparison of multimode fiber classes OM1-OM5, showing nominal core size, typical jacket color identification,

Learn more about Single Mode and Multimode Optical Fibers - their design, key differences, and intended fiber optic systems

In addition, multi-mode fibers are described using a system of classification determined by the ISO 11801 standard -- OM1, OM2,

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