Fiber Wavelength for Multimode Transmission



Overview

Compare OM1, OM2, OM3, OM4, and OM5 multimode fiber specs, distances, bandwidth, and applications. Essential guide for data center fiber selection.

Key Takeaways

Multimode fiber typically operates at 850 nm and 1300 nm, with 850 nm being the most common for short-reach applications using LEDs or VCSELs.

Standard Wavelengths

Multimode fibers (MMF) are designed to carry multiple light modes simultaneously, and their performance depends on the wavelength of the light source. The primary wavelengths for multimode transmission are 850 nm and 1300 nm. The 850 nm wavelength is widely used for short-distance links, such as within data centers or buildings, because it allows the use of cost-effective LEDs or VCSELs and provides lower attenuation compared to longer wavelengths.

The 1300 nm wavelength is less common but can be used for slightly longer multimode links due to lower chromatic dispersion at this wavelength.

Fiber Types and Wavelength Optimization

Multimode fibers are categorized into OM1, OM2, OM3, OM4, and OM5, each optimized for specific wavelengths and data rates: OM1 (62. 5 µm core): Typically uses 850 nm LEDs; supports 1 Gbps up to 275 m and 10 Gbps up to 33 m. OM2 (50 µm core): Uses 850 nm LEDs; supports 1 Gbps up to 550 m and 10 Gbps up to 33 m.

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OM3 (50 µm core, laser-optimized): Designed for 850 nm VCSELs; supports 10G Ethernet up to 300 m and higher-speed links with laser sources. OM4 (50 µm core, laser-optimized): Also optimized for 850 nm VCSELs; supports 10G–100G Ethernet over longer distances than OM3. OM5 (50 µm core, wideband MMF): Supports shortwave WDM (SWDM) from 850 nm to 953 nm, enabling multiple wavelengths for higher aggregate bandwidth.

Practical ConsiderationsLED vs.

VCSE

L: LEDs have a broader emission spectrum and lower modulation rates, suitable for OM1/OM2 short links.

VCSE

Ls provide narrow, coherent light at 850 nm, enabling higher-speed transmission over OM3/OM4/OM5 fibers. Modal Dispersion: Multimode fibers are limited by modal dispersion, which spreads pulses over distance. Shorter wavelengths (850 nm) are preferred for high-speed, short-reach links because they minimize dispersion effects.

Distance and Bandwidth: OM3/OM4/OM5 fibers are laser-optimized for 850 nm, allowing 10G–400G Ethernet over distances ranging from 70 m to 550 m depending on fiber type and wavelength.

Summary

For multimode transmission, the 850 nm wavelength is standard for most short-reach applications, especially with laser-optimized fibers (OM3–OM5). The 1300 nm wavelength is occasionally used for longer multimode links but is less common. OM5 extends the usable wavelength range up to 953 nm for SWDM applications, enabling multiple wavelengths over a single fiber for higher data throughput.

Choosing the correct wavelength depends on fiber type, link distance, and the light source technology.

Article Content

Guide To Multimode Fiber (62.5um & 50um, OM1 to OM5)

Multimode fiber typically operates at a wavelength of 850 nm as it allows for the use of lower-cost, light-emitting diode (LED) sources as the light source over shorter

Wavelength Dependence of Modal Bandwidth of

Recently, high-data-rate MMFs derived from OM3 and OM4 have been proposed. These fibers exhibit higher effective modal bandwidths at 910

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OM1 vs OM2 vs OM3 vs OM4 vs OM5 Multimode Fiber Guide

Compare OM1, OM2, OM3, OM4, and OM5 multimode fiber specs, distances, bandwidth, and applications. Essential guide for data center fiber selection.

Understanding Wavelengths In Fiber Optics

Multimode fiber is designed to operate at 850 and 1300 nm, while singlemode fiber is optimized for 1310 and 1550 nm. The difference between 1300 nm and 1310 nm is simply a matter of convention,

Understanding Multimode Wavelengths: Insights

Multimode wavelengths allow multiple light paths within an optical fiber, enhancing data transmission capabilities. This divergence leads to a varied set of

Multimode Fiber Data Sheet

This fiber is a laser-optimized, bend-insensitive, graded-index multimode fiber designed for transmission speeds of 10 Gb/s and beyond. OM5 is backwards compatible with OM4 and supports single

Tutorial Passive Fiber Optics, Part 4: Multimode Fibers

Multimode fibers are fibers having multiple guided modes at the operating wavelength — sometimes only a few (→ few-mode fibers), but often many. The fiber core is often quite large — for some large

SFP Wavelength Guide: 850nm vs. 1310nm vs. 1550nm

The selected wavelength determines fiber compatibility. 850 nm SFP modules are designed for multimode fiber (MMF), where modal dispersion limits

Multimode Fiber Types: OM1 vs OM2 vs OM3 vs OM4 vs OM5

Identified by ISO 11801 standard, multimode fiber optic cables can be classified into OM1 fiber, OM2 fiber, OM3 fiber, OM4 fiber and newly released OM5 fiber. The next part will compare

Wavelength-division multiplexing

In fiber-optic communications, wavelength-division multiplexing (WDM) is a technology which multiplexes a number of optical carrier signals onto a single

Single Mode vs Multimode Fiber, What is The

What is single mode fiber? Single mode fiber, short as SMF, is a fiber cable that only allows one mode of light to transmit. Typically, this fiber includes

Meaning of Optical Module Pull Tap Colors

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① Multimode fiber optic module: The pull tap is black, corresponding to a wavelength of 850nm, suitable for short-distance transmission (such as less than 2km).

Select The Right Fiber Patch Cables For 1G/10G/25G Modules

Multimode modules typically operate at 850nm, while single-mode modules use 1310nm or 1550nm. These mismatched wavelengths lead to transmission errors or total signal loss.

Fiber Optic Wavelengths Explained: 850 vs 1310 vs 1550 nm

Light in optical fiber travels in the near-infrared region, far beyond visible light, and choosing the right transmission wavelengths is fundamental for minimizing loss and maximizing

Fiber Optic Cable Types Explained

Our comprehensive guide to types of fiber optic cables. Learn all about the differences between single mode and multimode cables, as well as the various fiber wavelengths and standard core sizes used

Fiber Optic Cable Types | Omnitron Systems Guide

Fiber optic technology has transformed the way we transmit data, enabling faster, more reliable connections than traditional copper cables. Understanding fiber

Fiber Optics Part 2: Single-Mode Fiber vs. Multi-Mode

The core of single-mode fiber is much smaller than that of multi-mode but the cladding diameters of both are the same. Fiber optic transmission occurs

Single Mode SFP vs Multimode SFP: What the Differences Are

A single-mode SFP is specially used with the 9/125μm single-mode fiber (SMF) but can not be used with multimode fiber cable. It utilizes ultra-low optical attenuation for medium to long

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