

Multimode Fibre Types



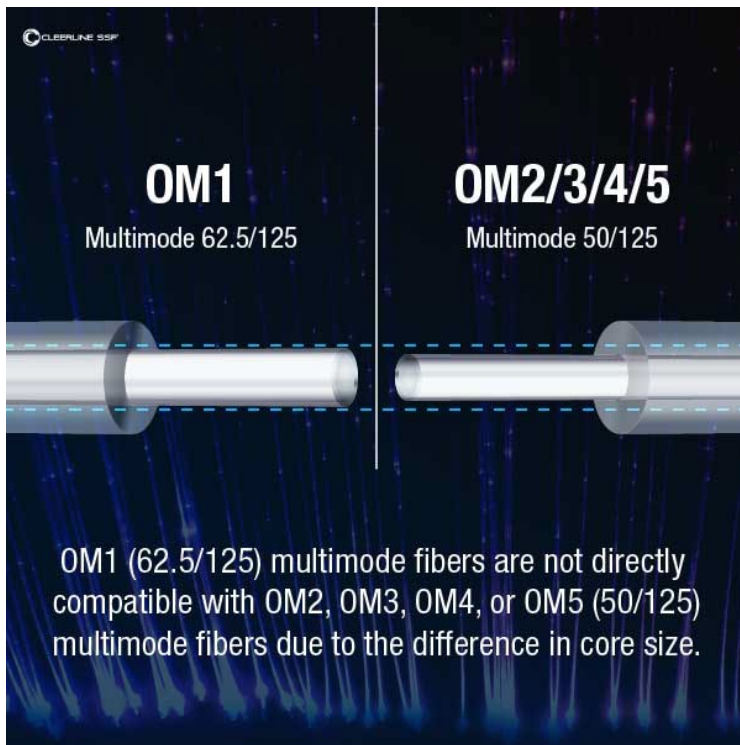
Multimode Fibre Types: OM1, OM2, OM3, OM4, OM5?

There are 5 grades of multimode fibre: OM1, OM2, OM3, OM4, and now OM5. What exactly makes them different?

At the core (pardon the pun), what separates these fibre grades are their core sizes, transmitters, and bandwidth capabilities.

Optical multimode (OM) fibres have a core of 50 μm (OM2-OM5) or 62.5 μm (OM1). The larger core means that multiple modes of light travel down the core at the same time, thus the name "multimode."

Legacy Fibres



Importantly, OM1's 62.5 μm core size means that it is not compatible with other grades of multimode and cannot accept the same connectors. Since OM1 and OM2 can both have orange outer jackets (per TIA/EIA standards), always check the print legend on the cable to ensure you are using the correct connectors.

Early OM1 and OM2 fibres were both designed for use with LED sources or transmitters. The modulation limitations of LEDs likewise limited the capabilities of OM1 and early OM2.

However, the increasing need for speed meant that optical fibres needed higher bandwidth capabilities. Enter the laser-optimized multimode fibres (LOMMF): OM2, OM3 and OM4, and now OM5.

Laser-Optimization

OM2, OM3, OM4, and OM5 fibres are designed to work with vertical-cavity surface-emitting lasers (VCSELs), generally at 850 nm. Today, laser optimized OM2 (such as ours) is also readily available. VCSELs allow far faster modulation rates than LEDs, meaning that laser-optimized fibres can transmit far more data.

Per industry standards, OM3 has an effective modal bandwidth (EMB) of 2000 $\text{MHz}\cdot\text{km}$ at 850 nm. OM4 can handle 4700 $\text{MHz}\cdot\text{km}$.

In terms of identification, OM2 maintains the orange jacket, as noted above. OM3 and OM4 can both have an aqua outer jacket (this is true of Cleerline OM3 and OM4 patch cables). OM4 can alternatively appear with an “Erika violet” outer jacket. If you run into a bright magenta fibre optic cable, it’s probably OM4. Happily, OM2, OM3, OM4, and OM5 are all 50/125 µm fibres and can all accept the same connectors.

Note, however, that connector colour codes vary. Some multimode connectors may be marked as “optimized for OM3/OM4 fibre” and will be coloured aqua. Standard laser-optimized multimode connectors can be beige or black. If there is confusion, please check the connector specification specifically in regard to core size. Matching the core size is the most important attribute for mechanical connectors, as it ensures that the signal will maintain continuity through the connector.

Bandwidth and Limitations

FIBER TYPE	CORE/CLADDING (UM)	BANDWIDTH (MHZ*KM)		DISTANCE LIMITATIONS		
		OVERFILLED LAUNCH (LED SOURCE), 850 NM	EFFECTIVE MODAL BANDWIDTH (LASER SOURCE), 850 NM	10GBASE-SR DISTANCE	40GBASE-SR4 DISTANCE	100GBASE-SR10 DISTANCE
OM1	62.5/125	200	N/A	33m / 100ft		
OM2	50/125	500	N/A	82m / 260ft		
OM3	50/125	1500	2000	300m / 1000ft	100m / 330ft	100m / 330ft
OM4	50/125	3500	4700	400m / 1300ft	150m / 500ft	150m / 500ft
OM5	50/125	3500	4700	400m / 1300ft	150m / 500ft	150m / 500ft

OM5?

OM5 is a wideband multimode fibre, identifiable by a lime green outer jacket. It has many of the same characteristics of OM4, including the same EMB and distance limitations for 10 GB, 40 Gb, and 100 Gb Ethernet. OM5 is really intended for data centres and high-speed applications, situations that require shortwave division multiplexing (SWDM).

For most applications requiring multimode fibre, we recommend either OM3 or OM4. Particularly, OM3 remains our choice for most residential installations with cable distances of 300 meters (1000 feet) or less.

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