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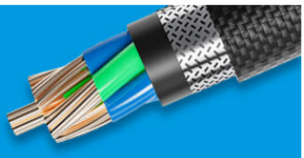
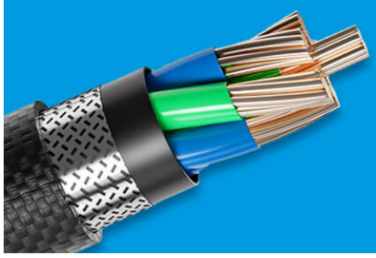
Smart Link Better Life.



OM2 OPTICAL FIBRE

TIME FOR PHASING OUT OF DATA CENTERS



01 BACKSTORY OF OM2 OPTICAL FIBRE

OM2 optical fibre is a traditional 50/125 graded refractive index multi-mode fibre. Traditional OM2 optical fibre standards and designs use LEDs (see Figure 1) in low bandwidth scenarios, transmitting data at rates of 100 Mbit/s or lower.

02 OM3 OPTICAL FIBRE, TAILORED TO VCSEL

About 20 years ago, 850 nm vertical-cavity surface-emitting laser (VCSEL) technology reached maturity and was commercialized, rapidly becoming the major light source for multi-mode communication systems. With a spot size of approximately 30 microns (see Figure 2), VCSEL possesses advantages in terms of stability, service life and economical pricing.

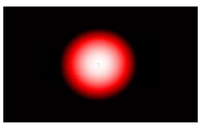


Figure 1 LED Light Source

Figure 2 VCSEL Light Source

OM3 optical fibre was developed to improve the transmission capacity and range of multi-mode fibre transmission systems based on 850 nm VCSEL. For operation with 850 nm VCSEL, OM3 optical fibre offers the following improvements over traditional OM2 fibre:

1.The design of the optical fibre is optimized to 850 nm, maximizing its bandwidth at that wavelength.

2.The optical fibre offers an "effective modal bandwidth" technical rating tailored to VCSEL's mode characteristics. This rating evaluates the bandwidth of multi-mode fibre during VCSEL usage, and has been standardized to guarantee transmission performance when VCSEL is used with OM3 optical fibre. Later, OM4 optical fibre was to set higher requirements for this rating compared to OM3, while requirements have never been imposed on OM2 optical fibre in terms of this rating.

03 COMPARISON OF OM2/OM3/OM4/OM5 TRANSMISSION CAPABILITIES

OM3 to OM5 optical fibres are designed for VCSEL light sources. OM5 optical fibre is referred to as wideband multi-mode fibre, with a high bandwidth in the 850-950 nm wavelength range achieved via adoption of wavelength division multiplexing in that range, for transmission at 100 Gbit/s or higher.

Table 1 lists the transmission distances of OM2 to OM5 optical fibres in 10-400 Gbit/s systems, compliant with IEEE 802.3 series Ethernet standards, and assuming adoption of parallel transmission and wavelength division multiplexing techniques for systems rated 40 Gbit/s and above.

Transmission Rate(Gbit/s)	Standard	Wavelength (nm)	Maximum Transmission Distance (m)			
			OM2	OM3	OM4	OM5
10	10GBASE-SR	850	82	300	550	550
25	25GBASE-SR	850	N/A	70	100	100
40	40GBASE-SR4	850	N/A	100	150	150
100	100GBASE-SR4	850	N/A	70	100	100
	100GBASE-SR10	850	N/A	100	150	150
400	400GBASE-SR16	850	N/A	70	100	100
	400GBASE-SR8	850	N/A	70	100	100
	400GBASE-SR4.2	850，910	N/A	70	100	150

Table 1 Transmission Capabilities of OM2 to OM5 Optical Fibres

As indicated in the table above, OM2 optical fibre is usable only in ultra-short-distance transmission applications at 10 Gbit/s, and is not compatible with 25 Gbit/s or higher systems.

04 OM2 OPTICAL FIBRE: NOT APPLICABLE IN NEW DATA CENTERS

Internal connections in data centers have entered the 25G+ era. OM2 optical fibre offers only low bandwidth, and its design has not been optimized to suit use of VCSEL. According to IEEE standards, OM2 optical fibre is not compatible with 25 Gbit/s or higher systems, and can thus no longer be used for new data centers or to upgrade existing data centers. Instead, OM3/OM4/OM5 optical fibre should be selected based on the actual transmission rates and distances for which the multi-mode fibre is to be applied.

05 MULTI-MODE FIBRE QUALITY PROBLEMS THREATEN DATA CENTER SECURITY

Testing multi-mode fibre's "effective modal bandwidth" requires expensive instrument, and test samples of at least several hundred meters in length. But the multi-mode fibre patch cords available on the market are usually only tens of meters in length, rendering such testing impossible, and thus making it impossible to directly determine whether or not they are genuine OM3 and OM4 patch cords. Some suppliers manufacturing multi-mode fibre patch cords may provide inferior OM3 or OM4 patch cords - many of which are actually OM2 cords - threatening data centers' operational security.

YOFC uses the PCVD process to manufacture multi-mode fibres. Advantages of this process include its thin deposition layer, strong process control and accurate refractive index profile, making it the best process for the manufacturing of high-bandwidth multi-mode fibres. YOFC is continuing to upgrade the PCVD platform and process, improving multi-mode fibre designs and processes. Furthermore, YOFC is continually investing in multi-mode fibre test platforms, and investigating enhanced testing methods to ensure the quality of multi-mode fibres. By working with customers, YOFC aims to empower them to build secure data centers.

CRU statistics indicate that, in 2018, YOFC became the largest manufacturer of multi-mode fibres in the world, thus playing a significant role in the construction of data centers worldwide.