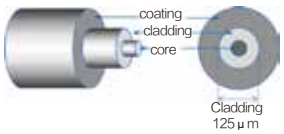
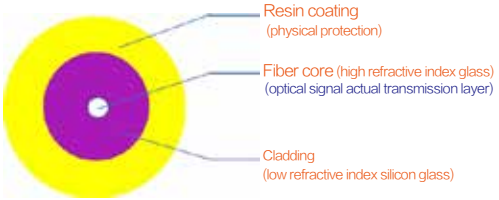
Structure classification of optical fiber and optical signal transmission window

Structure of optical fiber:





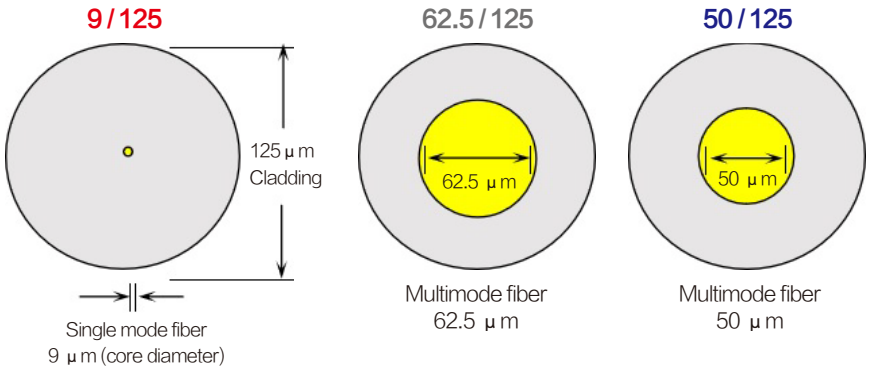
Optical fibers are generally divided into three layers:

The first layer of fiber core: the center is a glass core with high refractive index, which is used to transmit optical signals;

The second layer of cladding: the middle is a silicon glass cladding with low refractive index, which forms total reflection conditions with the fiber core;

The third layer of coating: the outermost layer is the resin coating for reinforcement. The main component of bare optical fiber is silicon dioxide, which is fragile and has poor bending resistance. In order to provide the micro bending performance of optical fiber, a layer of polymer resin coating is coated.

Classification of optical fiber:



Optical fibers are divided into single-mode and multi-mode. The diameter of single-mode core is 9 μm, the diameter of multi-mode OM1 core is 62.5 μm, and the diameter of OM2, OM3, OM4 and OM5 core is 50 μm. However, no matter which specification of optical fiber, its cladding diameter is 125 microns, so we usually see the description of optical fiber diameter as: 9/125, 62.5/125 and 50/125.

OS2 Zero water peak full wave optical fiber has been popularized (OS1 has been virtually eliminated);

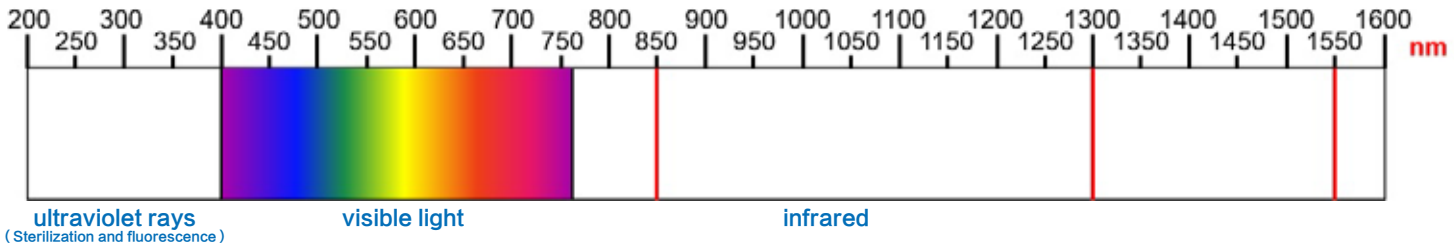
OM1 (62.5 μm) It has also been eliminated (the price is more expensive than OM2);

OM2 It has also been basically abandoned in the data center;

OM3 & **OM4** It has become the mainstream of 10G multimode fiber;

OM5 Although there are advantages in performance, there are only a few applications in the data center at present。

Transmission window of optical signal:



The above figure shows the spectrum of white light, in which the wavelength range of visible light is 400~760nm. Ultraviolet light with wavelength shorter than 400nm is usually used for sterilization; The infrared part with wavelength greater than 760nm, such as infrared remote control and optical fiber signal transmission, is carried out in this area.

Three transmission windows:

1st window: **850nm**;
2nd window: **1300/1310nm**;
3rd window: **1550nm**。

The short wave window of multimode fiber is **850nm**,
The long wave window of multimode fiber is 1300nm。

The short wave window of single-mode fiber is **1310nm**,
The long wave window of single-mode fiber is 1550nm。

*. In addition to these windows, the transmission attenuation of other wavelength signals is very large, which is not suitable for optical fiber communication in general.