

TeraSPEED® Technical Report

Technical Document

July 2010

Why TeraSPEED®

TeraSPEED single-mode optical fiber cable continues a CommScope tradition of being a leading manufacturer of innovative and performance-enhancing products for the enterprise industry.

CommScope's TeraSPEED optical fiber cable is fully backwards compatible with existing single-mode legacy fiber optic cable plants. TeraSPEED makes available 30% more usable transmission spectrum, which can be used for Dedicated Wavelength Services for business or other applications like Coarse Wave Division Multiplexing (CWDM).

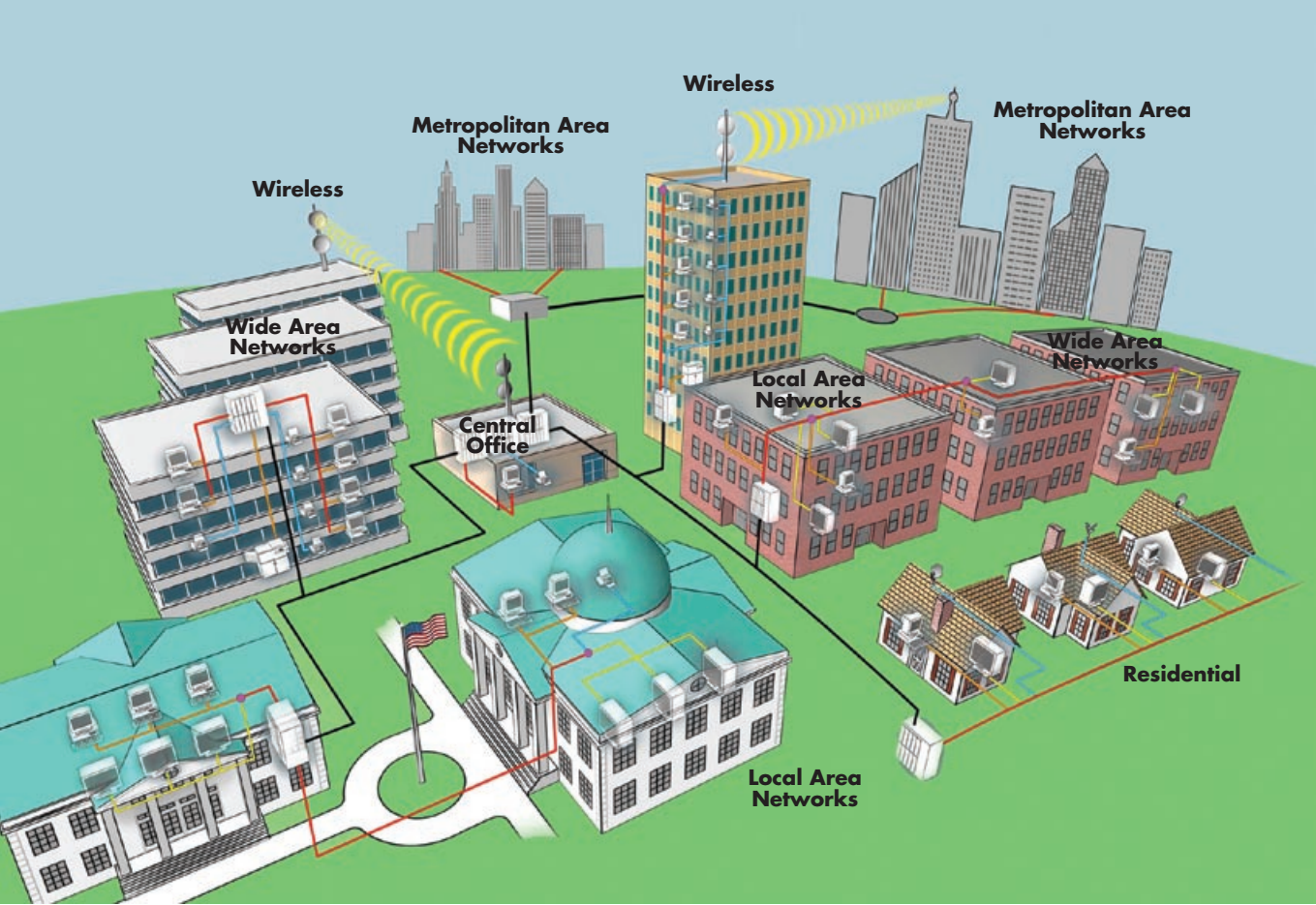
The dispersion characteristics of TeraSPEED fiber cable match those of conventional single-mode fiber cable historically used in networks, allowing migration to full spectrum capability. TeraSPEED is not a specialty product, but rather a standard single-mode offering with one significant change—the elimination of the typical fiber attenuation peak which occurs at or about the 1385 nm wavelength. This “water peak” is removed by proprietary manufacturing techniques, resulting in a smooth attenuation curve across all spectrum bands. Increased usable wavelengths mean expanded bandwidth capabilities and tremendous network design flexibility for existing and future expansion requirements. Coarse Wavelength Division Multiplexing (CWDM) solutions on TeraSPEED cable are expected to yield significant cost saving opportunities compared to dense wavelength division multiplexing (DWDM) over conventional single-mode fiber in certain unamplified applications. These savings are achieved by using uncooled lasers and relaxing stringent DWDM component specifications, and will result in significant commercial value for network operators.

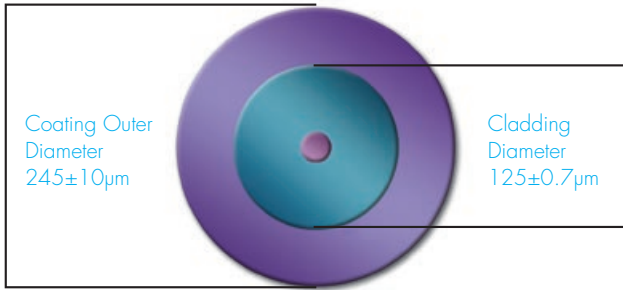
Features & Benefits:

- TeraSPEED, zero water peak full spectrum single-mode optical fiber cable, opens up transmission over the previously unusable wavelength range from 1360 nm to 1460 nm known as the “Extended Band” or E-band.
- Enables 16 channel coarse wavelength division multiplexing (CWDM) as a lower cost alternative to dense wavelength division multiplexing (DWDM) in unamplified portions of networks.
- Enables transmission from 1260 nm to 1625 nm adding 30% more usable spectrum.
- For the enterprise industry, making use of the full transmission spectrum translates to added capacity enabling service-rich systems and revenue enhancing growth.
- Fully compatible with legacy standard single-mode fiber optic networks.
- Provides future bandwidth upgradeability.

Reduced Attenuation

TeraSPEED cable is designed for use in the wavelengths between 1260 nm and 1625 nm, including the formerly off-limit wavelengths in the E-band. TeraSPEED provides superior attenuation performance throughout this range of wavelengths, including a lower attenuation performance at 1385 nm than at 1310 nm.





TeraSPEED - Reduced Water Peak

Standard single-mode fiber has a pronounced attenuation increase at 1385 nm. This region, called the water peak, is an area within the fiber's transmission spectrum where light is increasingly absorbed by the hydroxyl (OH-) ions present within the structure of the glass core. Hydroxyl ions are the cause of increased attenuation within the E-band. These ions are removed during the manufacturing of LightScope TeraSPEED, thereby reducing attenuation spikes in the E-band and rendering this portion of the transmission spectrum usable. The E-band accounts for 30% of the transmission spectrum available in silica glass fibers.

TeraSPEED provides superior low water peak performance in the E-band over the lifetime of the product. This performance is ensured by a unique ultra-purifying manufacturing process which virtually eliminates hydroxyl ions in the glass fiber. The resulting decrease in attenuation over the water peak region, and relatively lower 1400 nm band dispersion (compared with conventional fiber in the 1550 nm band), results in a product offering increased transmission spectrum and the economic benefits of less expensive transmission options.

PHYSICAL SPECIFICATIONS:

Cladding Diameter	125 ± 0.7 µm
Core/Clad Offset	≤ 0.5 µm
Coating Diameter (uncolored)	245 ± 10 µm
Coating Diameter (colored)	254 ± 7 µm
Coating/Cladding Concentricity Error, max.	12 µm
Clad Non-Circularity	≤ 1%

MECHANICAL CHARACTERISTICS:

Proofstress	100 kpsi (.69 Gpa)
Coating Strip Force	0.3 - 2.0 lbf (1.3 - 8.9 N)
Fiber Curl	≥ 4 m radius of curvature
Dynamic Fatigue Parameter	≥ 20 nd
Macrobend 100 turns @ 50mm mandrel	
1310 nm	0.05 dB maximum
1550 nm	0.05 dB maximum
Macrobend 1 turn @ 32mm mandrel	
1550 nm	0.05 dB maximum

ENVIRONMENTAL CHARACTERISTICS:

Temperature Dependence -60°C to +85°C	< 0.05 dB
Temperature Humidity Cycling -10°C to 85°C up to 95% RH	< 0.05 dB
Water Immersion, 23 + 2°C	< 0.05 dB
Heat Aging, 85 + 2°C	< 0.05 dB

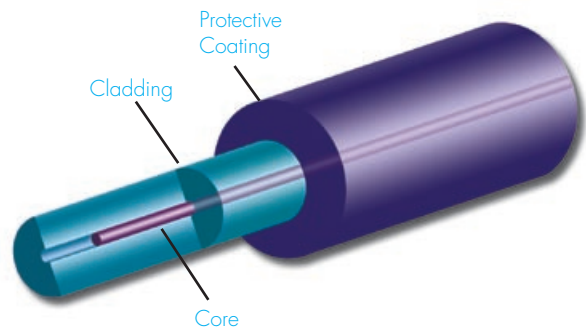
OPTICAL CHARACTERISTICS, WAVELENGTH SPECIFIC:

Attenuation, Loose Tube Cable	
1310 nm	0.34 dB/km
1385 nm	0.31 dB/km
1550 nm	0.22 dB/km
Attenuation, Tight Buffer Cable	
1310 nm	0.50 dB/km
1550 nm	0.50 dB/km
1385 nm	0.50 dB/km
Mode Field Diameter	
1310 nm	9.2 + 0.3 µm
1385 nm	9.6 + 0.6 µm
1550 nm	10.4 + 0.5 µm
Group Refractive Index	
1310 nm	1.467
1385 nm	1.468
1550 nm	1.468
Dispersion	
1310 nm	3.2 ps/(nm-km) from 1285 to 1330 nm max.
1550 nm	18 ps/(nm-km) max.

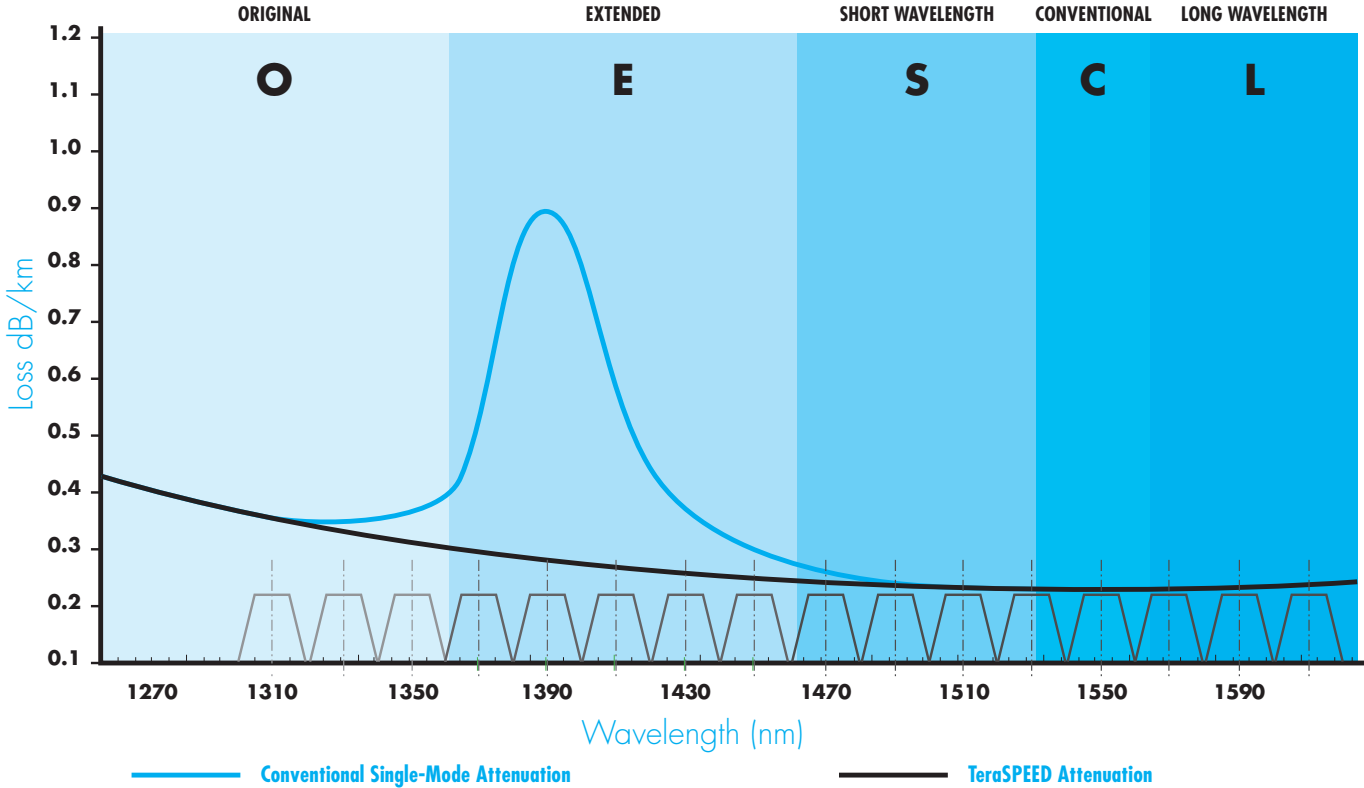
OPTICAL CHARACTERISTICS, GENERAL:

Point Defects	0.10 dB
Cutoff Wavelength	≤ 1260 nm
Zero Dispersion Wavelength	1302 - 1322 nm
Zero Dispersion Slope	0.090 ps/(km-nm-nm) max.
Polarization Mode Dispersion Link Design Value	≤ 0.06 ps/sqrt(km)

TERASPEED SINGLE-MODE FIBER



ATTENUATION PERFORMANCE ACROSS OPERATING BANDS



All Specifications subject to change without notice.
 Designed to meet TIA/EIA 492-CABB; ITU-T G.652.D



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