

# EyeSafe 25 Micron Core Thulium-Doped LMA Double Clad Fibers



True LMA fiber featuring a unique low NA (< 0.1) high concentration Tm-doped core design. It is fully optimized for high slope efficiency (composition has demonstrated > 130% quantum efficiency) when pumped at 793 nm. This extraordinary efficiency is due to composition enabled cross relaxation of Thulium ions in the core. The high Tm concentration allows short device lengths and high pump conversion efficiency while the low NA (few moded) core design is ideal for applications where robust single-mode beam quality is critical. The high NA (0.46) large pump cladding waveguide allows for efficient coupling of high pump powers. The large core diameter (25  $\mu\text{m}$ ) maintains a large mode field diameter and short device length, thereby minimizing non-linear effects such as SBS and SRS.

## Typical Applications

- High power 2  $\mu\text{m}$  CW and pulsed EyeSafe lasers & amps
- EyeSafe industrial & medical lasers
- Military and commercial LIDAR
- 2  $\mu\text{m}$  TEM<sub>00</sub> fiber lasers for pumping crystal lasers

## Features & Benefits

- Unique low NA Tm-doped core design — Robust single-mode beam quality
- Optimized composition for 793 nm pumping — Very high conversion efficiency
- High pump absorption — Short fiber length, efficient lasing in the ~2  $\mu\text{m}$  window

## Optical Specifications

	PLMA-TDF-25P/400-HE	LMA-TDF-25P/400-HE
Operating Wavelength	1900 – 2100 nm	1900 – 2100 nm
Core NA	0.090	0.090
First Cladding NA (5%)	$\geq 0.460$	$\geq 0.460$
Cladding Attenuation	$\leq 15.0$ dB/km @ 860 nm	$\leq 15.0$ dB/km @ 860 nm
Cladding Absorption	$0.80 \pm 0.10$ dB/m at 1180 nm	$0.60 \pm 0.10$ dB/m at 1180 nm
Birefringence	$4.8$ dB/m at 793 nm nominal $2.5 \times 10^{-4}$	$3.6$ dB/m at 793 nm N/A

## Geometrical & Mechanical Specifications

	PLMA-TDF-25P/400-HE	LMA-TDF-25P/400-HE
Cladding Diameter	$400.0 \pm 15.0$ $\mu\text{m}$	$400.0 \pm 15.0$ $\mu\text{m}$
Cladding Diameter (flat-to-flat)	N/A	$25.0 \pm 2.5$ $\mu\text{m}$
Core Diameter	$25.0 \pm 2.5$ $\mu\text{m}$	$550.0 \pm 20.0$ $\mu\text{m}$
Coating Diameter	$550.0 \pm 20.0$ $\mu\text{m}$	Low Index Polymer
Coating Material	Low Index Polymer	$\geq 100$ kpsi (0.7 GN/m <sup>2</sup> )
Proof test Level	$\geq 100$ kpsi (0.7 GN/m <sup>2</sup> )	

The passive version of each fiber is also available.



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Nufern products are manufactured under an ISO 9001:2008 certified quality management system.



Standard specifications and design parameters are listed above. Specifications are subject to change without notice. Other configurations such as alternative form factors, optimized cut-off and UV cured color coating may be available. Let us know how Nufern can assist with your requirements.

# Low Index Specialty Multimode Beam Delivery Fibers



Coherent's passive, Germanium-doped, low NA specialty beam delivery fibers are designed to complement standard Coherent Ytterbium-doped fibers such as LMA-YDF-20/400-M, LMA-YDF-25/250-M and LMA-YDF-30/250-M. These Germanium-doped fibers are available with a high 0.11 NA and 25 micron core, in both 250 and 400 micron form factors. These fibers can be spliced with low losses to the 0.06 NA fibers and ensure good beam stability as the low power is delivered to the work piece. Both offerings have NuCOAT-FA™ coating technology, which provides excellent reliability at elevated power levels demanded by today's industrial fiber laser applications. As with all Coherent fibers, they are drawn in a clean room and proof-tested to > 100 kpsi, allowing them to carry high powers for a long, worry-free lifetime.

## Typical Applications

- Beam Delivery for CW & Pulsed Lasers
- Fiber Coupled Isolators
- Military, Industrial and Medical

## Features & Benefits

- Complimentary high NA passive fibers — ensures continuation of excellent beam quality
- Exceptional geometric uniformity and core/clad concentricity — Ease of splicing to active fibers
- NuCOAT-FA™ coating technology — provides an extended operating life at high power levels
- Proof-tested to > 100 kpsi — an industry requirement for long term reliability.

## Optical Specifications

Operating Wavelength  
Core NA  
First Cladding NA (5%)  
Cladding Attenuation

### BD-G25/250-11FA

800 – 2100 nm  
0.110 ± 0.010  
≥ 0.460  
≤ 15.0 dB/km @ 1095 nm

### BD-G25/400-11FA

800 – 2100 nm  
0.110 ± 0.010  
≥ 0.460  
≤ 15.0 dB/km @ 1095 nm

## Geometrical & Mechanical Specifications

Cladding Diameter  
Core Diameter  
Coating Diameter  
Core/Clad Offset  
Clad Non-Circularity  
Coating Material  
Proof-test Level

250.0 ± 3.0 μm  
25.0 ± 1.5 μm  
395.0 ± 15.0 μm  
≤ 2.00 μm  
≤ 0.5 %  
Low Index Acrylate  
≥ 100 kpsi (0.7 GN/m<sup>2</sup>)

400.0 ± 5.0 μm  
25.0 ± 1.5 μm  
550.0 ± 15.0 μm  
≤ 2.00 μm  
≤ 0.5 %  
Low Index Acrylate  
≥ 100 kpsi (0.7 GN/m<sup>2</sup>)



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Custom developed fiber (FUD) specifications are subject to change without notice. Other configurations such as alternative form factors, optimized cut-off and UV cured color coating may be available. Let us know how Coherent can assist with your requirements.



# FUD-3716, Revision: C PLMA-GDF-25/400-10FA Optical Fiber

You have selected an application designed fiber, not fully released which may have a longer lead time than our standard products.

Parameter	Min	Nom	Max	Unit	Compliance
Operating Wavelength	1900		2100	nm	Design
Birefringence		0.0002			Design
Clad Diameter	385		415	μm	Measured
Cladding Attenuation at 1095nm	0		15	dB/km	Measured
Cladding NA (5%)	0.46				Design
Coating Diameter	530		570	μm	Measured
Core Diameter	22.5		27.5	μm	Measured
Core NA	0.09		0.11		Design
Core/Clad Offset	0		2	μm	Measured
Proof test Level	100		120	kpsi	Measured
Comments	Coating Requirements: Low Index Polymer Other Requirements: Polarization Maintaining fiber with dual circular stress elements.				



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