

tML[®] - FO Module 5HP black MPO/MTP[®] with Pins/6x LC Duplex 50/125μ OM4



tML[®] - tde Modular Link

tML[®] is a patented, modular cabling system consisting of the three key components module, trunk cable and rack mount enclosure. The system components are 100 percent manufactured, pre-assembled and tested in Germany. They enable plug-and-play installation on site – especially in data centres, but also in industrial environments – within the shortest possible time. Heart of the system are the rear MPO/MTP[®] and Telco connectors, which can be used to connect at least six or twelve ports at a time. Depending on the module configuration, transfer rates of up to 200G are currently possible with SR4. The fibre optic and TP modules can be used together in a module carrier with a very high port density. The tde offers its tML[®] cabling system as a proven tML[®] standard system and in the highly innovative variants tML[®] Xtended, tML[®] 24 System and now tML[®] 32 System for extreme scalability and very easy migration to higher transmission rates such as 40G, 100G, 200G and 400G.

The tML[®] - FO Module 5HP MPO/MTP[®] is intended for the installation in the tML[®] Rack Mount Enclosure 3U (for 17 x Modules).



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Technical Data

The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP®plug has a defined fiber height of 1 - 3.5µ. The max. adjacent fiber height difference is 0.2µm and for all fibers 0.3µm. All system components (modules, trunk cables and patch cords) are co-ordinated for the reaching of the performance particularly. The module is marked with sequential serial number and article number. The modules are ROHS compliant.

Box	Galvanized steel sheet
Front Panel	black
Entry	1 x MPO/MTP®Male Adapter (magenta) back
Exit	6 x LC Duplex Adapter (magenta) front
Tests	Interferometer, Insertion Loss, Return Loss and Visual Final Inspection; all measured values are electronically archived
	QS-Managementsystem ISO 9001, ISO 14001 and TL 9000

Box	Galvanized steel sheet
Front Panel	black

FO Adapters

Type	MPO/MTP®
Application	Multimode OM4
Design	without Flange
Connector style	SC Simplex
Key Orientation	Type A, Key up/down
Color	Magenta
Material	Plastic
Sleeve	--
Shutter	--
Standards	IEC 61754-7 TIA 604-5
Manufacturer	US Conec

FO Adapters

Type	LC Duplex
Application	Multimode OM4
Design	One-Piece without flange
Connector style	SC simplex
Color	Magenta
Material	Plastic
Sleeve	Zirkonia Straight Split
Shutter	--
Manufacturer	tde

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FO Connectors

The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP[®] plug has a defined fiber height of 1 - 3.5μ. The max. adjacent fiber height difference is 0.2μm and for all fibers 0.3μm.

Connector

Type	MPO/MTP [®] Male Push Pull Locking with Elite Pins (magenta)
Ferrule	12 Fiber MM Elite [®] ferrule, PPS
Boot colour	Black
Manufacturer	tde/US Conec

Optical Performance

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
50/125μ OM4	MPO/MTP [®]	850 /1300 nm	≤ 0.12 dB	0.25 dB	35 dB

FO Connectors

Connector Type	LC Unibody Simplex
Housing	Plastic, Magenta
Ferrule	Zirkonia Straight Split, Spring-loaded Axially
Ferrule Hole	126 μ
Mating Cycles	1.000
Operating Temperature	-40°C up to +75°C
Strain Relief to	100 N
Manufacturer	tde

Optical performance

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
50/125μ OM4	LC	850 / 1300 nm	≤ 0.07 dB	0.15 dB	35 dB

FO Fiber

Type	Corning ClearCurve [®] 50/125μ OM4 multimode fiber
Optimized Data Rate over Distance	40/100 Gb over 170 m* 10 Gb/s over 550 m 1 Gb/s over 1100 m
Standard Compliance	ISO/IEC 11801: type OM4 fiber** IEC 60793-2-10: type A1a.3 fiber** TIA/EIA: 492AAAD ITU: ITU G651.1
*	Distances specified in the 40G/100G per IEEE 802.3ba standard are 150m on OM4 and 100m on OM3; Corning fibers are manufactured to tighter dispersion specifications and thereby support the extended distances shown in the table (assuming cable attenuation ≤3.0 dB/km and same 1.0 dB of connector loss for OM3 that the standard requires for OM4)

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**	Assumes IEC draft standard is harmonized with 492AAAD which was approved by TIA
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Optical Specifications

Bandwidth	High Performance EMB* (MHz.km): 4700 at 850 nm only Legacy Performance EMB** (MHz.km): 3500 at 850 nm / 500 at 1300 nm
Attenuation	At 850 nm max. ≤ 2.3 dB/km At 1300 nm max. ≤ 0.6 dB/km
Macrobend Loss	Mandrel Radius (mm): 37.2 / 15 / 7.5 Number of Turns: 100 / 2 / 2 Induced Attenuation (dB) at 850 nm: ≤ 0.05 / ≤ 0.1 / 0.2 Induced Attenuation (dB) at 1300 nm: ≤ 0.15 / ≤ 0.3 / ≤ 0.5
Numerical Aperture	0.200 ± 0.015
*	Ensured via miniEMBc, per TIA/EIA 455-220A and IEC 60793-1-49, for high performance laser-based systems (up to 10Gb/s)
**	OFL BW, per TIA/EIA 455-204 and IEC 60793-1-41, for legacy and LED-based systems (typically up to 100 Mb/s)

Dimensional Specifications

Core Diameter	50.0 ± 2.5 μm
Cladding Diameter	125.0 ± 1.0 μm
Core-Clad Concentricity	≤ 1.5 μm
Cladding Non-Circularity	≤ 1.0%
Core Non-Circularity	≤ 5.0%
Coating Diameter	242 ± 5 μm
Coating-Cladding Concentricity	< 12 μm

Environmental

Environmental Test	Test Condition	Induced Attenuation 850 nm & 1300 nm (dB/km)
Temperature Dependence	-60°C to +85°C	≤ 0.10
Temperature Humidity Cycling	-10°C to +85°C and 4% to 98% RH	≤ 0.10
Water Immersion	23°C ± 2°C	≤ 0.20
Heat Aging	85°C ± 2°C	≤ 0.20
Damp Heat	85°C at 85% RH	≤ 0.20
Operating Temperature Range	-60°C to +85°C	

Mechanical Specifications

Proof Test	The entire fiber length is subjected to a tensile stress ≥ 100 kpsi (0.7 GN/m²).
Length	Fiber lengths available up to 17.6 km/spool.

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Performance Characterizations

Refractive Index Difference	1%
Effective Group Index of Refraction	850 nm: 1.480 1300 nm: 1.479
Fatigue Resistance Parameter (nd)	20
Coating Strip Force	Dry: 0.6 lbs (2.7N) Wet: 14 days in 23°C water soak: 0.6 lbs (2.7N)
Chromatic Dispersion	Zero Dispersion Wavelength (λ_0): 1295 nm $\leq \lambda_0 \leq$ 1315 nm Zero Dispersion Slope (S_0): ≤ 0.101 ps/(nm ² *km)

Product variants & accessories

Art.-No.	Description
TML-T06LCADKH/MPP09ES	tML® - FO Module 5HP black MPO/MTP® with Pins/6x LC APC Duplex 9/125µ OS2
TML-T06LCDKH/MPP09ES	tML® - FO Module 5HP black MPO/MTP® with Pins/6x LC Duplex 9/125µ OS2
TML-T06LCDKH/MPP50G3S	tML® - FO Module 5HP black MPO/MTP® with Pins/6x LC Duplex 50/125µ OM3
TML-T06LCDKH/MPP50G4S	tML® - FO Module 5HP black MPO/MTP® with Pins/6x LC Duplex 50/125µ OM4
TML-T06LCDKH/MPP50GS	tML® - FO Module 5HP black MPO/MTP® with Pins/6x LC Duplex 50/125µ OM2
TML-T06LCDKH/MPP62GS	tML® - FO Module 5HP black MPO/MTP® with Pins/6x LC Duplex 62,5/125µ OM1