tML® HD - FO Patch cord switchable LC HD / LC HD Duplex Mini 50/125µ, FRNC, OM4, Crossover, Length: xxx in m

tML® 24

tML® 24 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® 24 fiber 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 400G 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 and now tML® 32 for extreme scalability and very easy migration to higher transmission rates such as 40G, 100G, 200G and 400G.

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Technical Data

FO Connectors

Connector type	LC HD Duplex Uniboot
Housing	Plastic, integrated locking of unlocking aid
Polarity change	Tool-less
Ferrule	Zirkonia Staight Split, Spring-loaded Axially
Ferrule hole	126 µm
Mating cycles	1000
Operating temperature	-40°C to 75°C
Strain relief to	100 N
Manufacturer	tde
Simplex/Duplex clip	Uniboot Duplex Housing

Optical performance

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
50/125µ OM4	LC Uniboot HD	850 nm	< 0.10 dB	0.30 dB	35 dB

FO Cables

Flame resistance	IEC 60332-3
	IEC 60754
	IEC 61034-1
	IEC 61034-2

Cable construction

Type	DVH02G50-OM4-2.0
Tight buffer	2x 600µ coated fibers (free movable in the compound)
Fiber type	MM-OM4, 50/125µ, Corning ClearCurve OM4
Strength members	Aramid yarn (free movable in the compound)
Outer jacket	LSZH (Halogen free, low smoke, flame retardant thermoplastic compound)
Jacket color	Magenta, RAL 4003
Identification	"t d e – DVH02G50-OM4-2.0mm LSZH" and sequential meter marking + Lot number

Physical properties

Outer diameter cable	2.0 ± 0.1 mm
Maximum tensile load, short term	500 N
Maximum tensile load, long term	300 N
Min. Bending radius, unloaded	20 mm

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Min. Bending radius, loaded	40 mm
Temperature range (operation)	-5°C to +60°C

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

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

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Environmental

Enviromental 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.

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)
Cromatic Dispersion	Zero Dispersion Wavelength (λ_0): 1295 nm ≤λ_0≤ 1315 nm Zero Dispersion Slope (S_0): ≤ 0.101 ps/(nm²*km)

Product variants & accessories

Art.-No.	Description
TML-HLCA/HLCA09DRMxxx	tML® HD - FO Patch cord switchable LC APC HD / LC APC HD Duplex Mini 9/125µ, FRNC, OS2, Crossover, Length: xxx in m
TML-HLC/HLC09DRMxxx	tML® HD - FO Patch cord switchable LC HD / LC HD Duplex Mini 9/125µ, FRNC, OS2, Crossover, Length: xxx in m
TML-HLC/HLC50D4RMxxx	tML® HD - FO Patch cord switchable LC HD / LC HD Duplex Mini 50/125µ, FRNC, OM4, Crossover, Length: xxx in m
TML-HLC/HLC50D5RMxxx	tML® HD - FO Patch cord switchable LC HD / LC HD Duplex Mini 50/125µ, FRNC, OM5, Crossover, Length: xxx in m