

tSML - FO Module 19"/0.5U straight 4x MPO/MTP<sup>®</sup> Male/24x LC Duplex 9/125 $\mu$  OS2



## tSML - tde Semi Modular Link

tSML is a modular developed cabling system, which consists of two core components: module and trunk cable. The system components, preterminated with connectors and tested ex works, facilitate very fast installation of both twisted pair and fiber-optic cables. Ready-made trunk cables, providing a high number of pairs or fibers, can simply be plugged together using patch panels. Up to 96x LC duplex and/or 48 x RJ45 of haven can be accommodated in such a way on 1U. At the heart of the System are MPO/MTP<sup>®</sup> and Telco connectors, with which 12 optical fibers or 24 copper pairs can be connected simultaneously. Fiber-optic and twisted pair modules can be combined on 1U within a panel without difficulty.

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



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### Technical Data

Entry	4 x MPO/MTP <sup>®</sup> Male Adapter (green) back
Exit	24 x LC Duplex Adapter (blue) 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

### tSML - FO Modules 19"/0.5U

Box	stainless steel
Front plate	stainless steel
Dimensions	19", 0.5U, depth 11 cm

### FO Adapters

Type	LC Duplex
Application	Singlemode OS2 PC
Design	One-Piece without flange
Connector style	SC simplex
Color	Blue
Material	Plastik
Sleeve	Zirkonia Straight Split
Shutter	--
Manufacturer	tde

### FO Adapters

Type	MPO/MTP <sup>®</sup>
Application	Singlemode OS2 APC
Design	without Flange
Connector style	SC Simplex
Key Orientation	Type A, Key up/down
Color	Green
Material	Plastic
Sleeve	--
Shutter	--
Standards	IEC 61754-7 TIA 604-5
Manufacturer	US Conec

### FO Connectors

The end faces of the connectors are optimized by means of Lasercleaving and machine polish. The MPO/MTP<sup>®</sup> plug has a

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defined fiber height of 1 - 3.5 $\mu$ . The max. adjacent fiber height difference is 0.2 $\mu$ m and for all fibers 0.3 $\mu$ m.

### Connector

Type	MPO/MTP <sup>®</sup> APC Male Push Pull Locking with Elite Pins (green)
Ferrule	12 Fiber SM Elite <sup>®</sup> ferrule, PPS
Boot colour	Black
Temperature range	-40°C bis +75°C
Manufacturer	tde/US Conec

### Optical Performance

Fiber	Type	Wavelength	Insertion loss typ.	Insertion loss max.	Return loss min.
9/125 $\mu$ OS2	MPO/MTP <sup>®</sup> APC	1310 / 1550 nm	≤ 0.10 dB	0.20 dB	75 dB

### FO Connectors

Connector Type	LC UPC Unibody Simplex
Housing	Plastic, Blue
Ferrule	Zirconia Straight Split, Spring-loaded Axially
Ferrul Hole	125.5 $\mu$
Ferrule Concentricity	≤ 0.6 $\mu$
Mating Cycles	500
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.
9/125 $\mu$	LC UPC	1310 / 1550 nm	≤ 0.10 dB	0.25 dB	55 dB

### FO Fiber

Type	Corning SMF-28e+ <sup>®</sup> 09/125 $\mu$ OS2 G.652.D singlemode fiber
Maximum Attenuation	At 1310 nm max. 0.33 - 0.35 dB/km At 1383 ± 3 nm max. 0.31 - 0.35 dB/km At 1490 nm max. 0.21 - 0.24 dB/km At 1550 nm max. 0.19 - 0.20 dB/km At 1625 nm max. 0.20 - 0.23 dB/km
Attenuation vs. Wavelength	Range: 1285 - 1330 nm; Ref. $\lambda$ : 1310 nm; Max. Difference: 0.03 dB/km Range: 1525 - 1575 nm; Ref. $\lambda$ : 1550 nm; Max. Difference: 0.02 dB/km
Macrobend Loss	Mandrel Diameter:32mm; Number of Turns: 1; Wavelength: 1550nm; Induced Attenuation: ≤0.03 dB Mandrel Diameter:50mm; Number of Turns: 100; Wavelength: 1310nm; Induced Attenuation: ≤0.03 dB Mandrel Diameter:50mm; Number of Turns: 100; Wavelength: 1550nm; Induced Attenuation: ≤0.03 dB Mandrel Diameter:60mm; Number of Turns: 100; Wavelength: 1625nm; Induced Attenuation: ≤0.03 dB

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Point Discontinuity	Wavelength: 1310 nm; Point Discontinuity: $\leq 0.05$ dB Wavelength: 1550 nm; Point Discontinuity: $\leq 0.05$ dB
Cable Cutoff Wavelength ( $\lambda_{ccf}$ )	$\lambda_{ccf} \leq 1260$ nm
Mode-Field Diameter	At 1310 nm = $9.2 \pm 0.4$ $\mu$ m At 1550 nm = $10.4 \pm 0.5$ $\mu$ m
Dispersion	At 1550 nm = $\leq 18.0$ [ps/(nm*km)] At 1625 nm = $\leq 22.0$ [ps/(nm*km)]
	Zero Dispersion Wavelength ( $\lambda_0$ ): 1310 nm $\leq \lambda_0 \leq 1324$ nm Zero Dispersion Slope ( $S_0$ ): $\leq 0.092$ ps/(nm <sup>2</sup> *km)
Polarization Mode Dispersion (PMD)	PMD Link Design Value = $\leq 0.06$ ps/ $\sqrt$ km Maximum Individual Fiber = $\leq 0.1$ ps/ $\sqrt$ km
Norm	ITU-T Recommendation G.652 (Tables A, B, C, and D) IEC Specifications 60793-2-50 Type B1.3 TIA/EIA 492-CAAB Telcordia Generic Requirements GR-20-CORE ISO 11801 OS2

### Dimensional Specifications

Fiber Curl	$\geq 4.0$ m radius of curvature
Cladding Diameter	$125.0 \pm 0.7$ $\mu$ m
Core-Clad Concentricity	$\leq 0.5$ $\mu$ m
Cladding Non-Circularity	$\leq 0.7\%$
Coating Diameter	$242 \pm 5$ $\mu$ m
Coating-Cladding Concentricity	$< 12$ $\mu$ m

### Environmental Specifications

Environmental Test	Test Condition	Induced Attenuation 1310 nm, 1550 nm & 1625 nm
Temperature Dependence	-60°C to +85°C	$\leq 0.05$
Temperature Humidity Cycling	-10°C to +85°C up to 98% RH	$\leq 0.05$
Water Immersion	23°C $\pm$ 2°C	$\leq 0.05$
Heat Aging	85°C $\pm$ 2°C	$\leq 0.05$
Operating Temperature Range	-60°C to +85°C	

### Mechanical Specifications

Proof Test	The entire fiber length is subjected to a tensile stress $\geq 100$ kpsi (0.7 GPa).
Length	Fiber lengths available up to 63.0 km/spool.

### Performance Characterizations

Core Diameter	8.2 $\mu$ m
Numerical Aperture	0.14
Zero Dispersion Wavelength ( $\lambda_0$ )	1317 nm
Zero Dispersion Slope ( $S_0$ )	0.088 ps/(nm <sup>2</sup> *km)

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Effective Group Index of Refraction	1310 nm: 1.4676 1550 nm: 1.4682
Fatigue Resistance Parameter (nd)	20
Coating Strip Force	Dry: 0.6 lbs (3N) Wet: 14 days room temperature: 0.6 lbs (3N)
Rayleigh Backscatter Coefficient (for 1 ns Pulse Width)	1310 nm: -77 dB 1550 nm: -82 dB

## Product variants & accessories

Art.-No.	Description
TSML-M24LCDK/MPP09E	tSML - FO Module 19"/0.5U straight 4x MPO/MTP <sup>®</sup> Male/24x LC APC Duplex 9/125 $\mu$ OS2
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TSML-M24LCDK/MPP50G3	tSML - FO Module 19"/0.5U straight 4x MPO/MTP <sup>®</sup> Male/24x LC Duplex 50/125 $\mu$ OM3
TSML-M24LCDK/MPP50G4	tSML - FO Module 19"/0.5U straight 4x MPO/MTP <sup>®</sup> Male/24x LC Duplex 50/125 $\mu$ OM4