

tSML - FO Breakout Module 19"/0.5U angled 4x MPO/MTP<sup>®</sup> with Pins/16x LC APC Duplex 9/125 $\mu$  OS2  
40GbE



## 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.



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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.

Entry	4 x MPO/MTP®Male Adapter (green) front
Exit	16 x LC APC Duplex Adapter (green) 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 angled

Box	stainless steel
Front plate	stainless steel
Dimensions	19", 0.5U, depth: 10.5 cm (outside) / 20.5 cm (centered)

## FO Adapters

Type	MPO/MTP®
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® 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® APC Male Push Pull Locking with Elite Pins (green)
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## tSML - FO Breakout Module 19"/0.5U angled 4x MPO/MTP® with Pins/16x LC APC Duplex 9/125µ OS2 40GbE

Ferrule	12 Fiber SM Elite® 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.
9/125µ OS2	MPO/MTP®APC	1310 / 1550 nm	≤ 0.10 dB	0.20 dB	75 dB

### FO Adapters

Type	LC Duplex
Application	Singlemode OS2 APC
Design	One-Piece without flange
Connector style	SC Simplex
Color	Green
Material	Plastic
Sleeve	Zirkonia Straight Split
Shutter	--
Manufacturer	tde

### FO Connectors

Connector Type	LC APC Unibody Simplex
Housing	Plastic, Green
Ferrule	Zirconia Straight Split, Spring-loaded Axially
Ferrule Hole	125.5 µ
Ferrule Concentricity	≤ 0.6 µ
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.
9/125µ	LC APC	1310 / 1550 nm	≤ 0.10 dB	0.18 dB	75 dB

### FO Fiber

Type	Corning SMF-28e+® 09/125µ OS2 G.652.D singlemode fiber
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## tSML - FO Breakout Module 19"/0.5U angled 4x MPO/MTP<sup>®</sup> with Pins/16x LC APC Duplex 9/125μ OS2 40GbE

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. λ: 1310 nm; Max. Difference: 0.03 dB/km Range: 1525 - 1575 nm; Ref. λ: 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
Point Discontinuity	Wavelength: 1310 nm; Point Discontinuity: ≤ 0.05 dB Wavelength: 1550 nm; Point Discontinuity: ≤ 0.05 dB
Cable Cutoff Wavelength (λ <sub>c</sub> cf)	λ <sub>c</sub> cf ≤ 1260 nm
Mode-Field Diameter	At 1310 nm = 9.2 ± 0.4 μm At 1550 nm = 10.4 ± 0.5 μm
Dispersion	At 1550 nm = ≤ 18.0 [ps/(nm*km)] At 1625 nm = ≤ 22.0 [ps/(nm*km)]
	Zero Dispersion Wavelength (λ <sub>0</sub> ): 1310 nm ≤ λ <sub>0</sub> ≤ 1324 nm Zero Dispersion Slope (S <sub>0</sub> ): ≤ 0.092 ps/(nm <sup>2</sup> *km)
Polarization Mode Dispersion (PMD)	PMD Link Design Value = ≤ 0.06 ps/√km Maximum Individual Fiber = ≤ 0.1 ps/√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	≥ 4.0 m radius of curvature
Cladding Diameter	125.0 ± 0.7 μm
Core-Clad Concentricity	≤ 0.5 μm
Cladding Non-Circularity	≤ 0.7%
Coating Diameter	242 ± 5 μm
Coating-Cladding Concentricity	< 12 μm

### Environmental Specifications

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

## tSML - FO Breakout Module 19"/0.5U angled 4x MPO/MTP<sup>®</sup> with Pins/16x LC APC Duplex 9/125μ OS2 40GbE

### 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 μm
Numerical Aperture	0.14
Zero Dispersion Wavelength ( $\lambda_0$ )	1317 nm
Zero Dispersion Slope ( $S_0$ )	0.088 ps/(nm <sup>2</sup> *km)
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-MS16LCAD/MPP09E	tSML - FO Breakout Module 19"/0.5U angled 4x MPO/MTP <sup>®</sup> with Pins/16x LC APC Duplex 9/125μ OS2 40GbE
TSML-MS16LCD/MPP50G3	tSML - FO Breakout Module 19"/0.5U angled 4x MPO/MTP <sup>®</sup> with Pins/16x LC Duplex 50/125μ OM3 40GbE
TSML-MS16LCD/MPP50G4	tSML - FO Breakout Module 19"/0.5U angled 4x MPO/MTP <sup>®</sup> with Pins/16x LC Duplex 50/125μ OM4 40GbE