

tML[®] HD - FO Breakout Module 5HP 2x MPO/MTP[®] with Pins/8x LC APC Duplex 9/125µ OS2 40GbE



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.

The tML[®] HD Breakout Module 5HP MPO/MTP[®] is intended for the installation in the tML[®] Rack Mount Enclosure 3U (for 17 x Modules). The tML[®] HD Breakout Module can be used only in combination with the tML[®] HD patch cord.



tde[®] trans data elektronik GmbH

Headquarter address:

Lingener Str. 2
D-49626 Bippen/Ohrte
Tel.: +49 5435 9511 0
Fax.: +49 5435 9511 32

Sales office address:

Prinz-Friedrich-Karl-Str. 46
D-44135 Dortmund
Tel.: +49 231 914 36 99
Fax.: +49 231 914 31 29

info@tde.de | www.tde.de

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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 - 3.5 μ . The max. adjacent fiber height difference is 0.2 μ m and for all fibers 0.3 μ m. 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 | 2 x MPO/MTP [®] Male Adapter (green) front |
| Exit | 8 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 |

| | |
|-------------|------------------------|
| Box | Galvanized steel sheet |
| Front Panel | Stainless steel |

FO Adapters

| | |
|-----------------|--------------------------|
| Type | LC Duplex |
| Application | Singlemode OS2 APC |
| Design | One-Piece without flange |
| Connector style | SC Simplex |
| Color | Green |
| Material | Plastic |
| Sleeve | Zirconia 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 | $\leq 0.6 \mu$ |
| 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. |
|-------|------|------------|---------------------|---------------------|------------------|
|-------|------|------------|---------------------|---------------------|------------------|

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| | | | | | |
|-------------|--------|----------------|----------------|---------|-------|
| 9/125 μ | LC APC | 1310 / 1550 nm | \leq 0.10 dB | 0.18 dB | 75 dB |
|-------------|--------|----------------|----------------|---------|-------|

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 - 3.5 μ m. The max. adjacent fiber height difference is 0.2 μ m and for all fibers 0.3 μ m.

Connector

| | |
|-------------------|---|
| Type | MPO/MTP [®] APC Male Push Pull Locking with Elite Pins (green) |
| 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. |
|-----------------|--------------------------|----------------|---------------------|---------------------|------------------|
| 9/125 μ OS2 | MPO/MTP [®] APC | 1310 / 1550 nm | \leq 0.10 dB | 0.20 dB | 75 dB |

FO Fiber

| | |
|----------------------------|---|
| Type | Corning SMF-28e+ [®] 09/125 μ OS2 G.652.D singlemode fiber |
| Maximum Attenuation | At 1310 nm max. 0.33 - 0.35 dB/km At 1383 \pm 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 |

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| | |
|---|--|
| 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_{ccf}) | $\lambda_{ccf} \leq 1260$ nm |
| Mode-Field Diameter | At 1310 nm = 9.2 ± 0.4 μ m At 1550 nm = 10.4 ± 0.5 μ m |
| Dispersion | At 1550 nm = ≤ 18.0 [ps/(nm*km)] At 1625 nm = ≤ 22.0 [ps/(nm*km)] |
| | Zero Dispersion Wavelength (λ_0): 1310 nm $\leq \lambda_0 \leq 1324$ nm Zero Dispersion Slope (S_0): ≤ 0.092 ps/(nm ² *km) |
| Polarization Mode Dispersion (PMD) | PMD Link Design Value = ≤ 0.06 ps/ \sqrt km Maximum Individual Fiber = ≤ 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 | ≥ 4.0 m radius of curvature |
| Cladding Diameter | 125.0 ± 0.7 μ m |
| Core-Clad Concentricity | ≤ 0.5 μ m |
| Cladding Non-Circularity | $\leq 0.7\%$ |
| Coating Diameter | 242 ± 5 μ m |
| Coating-Cladding Concentricity | < 12 μ m |

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 \pm 2°C | ≤ 0.05 |
| Heat Aging | 85°C \pm 2°C | ≤ 0.05 |
| 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 GPa). |
| Length | Fiber lengths available up to 63.0 km/spool. |

Performance Characterizations

| | |
|--------------------|-------------|
| Core Diameter | 8.2 μ m |
| Numerical Aperture | 0.14 |

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| | |
|---|--|
| Zero Dispersion Wavelength (λ_0) | 1317 nm |
| Zero Dispersion Slope (S_0) | 0.088 ps/(nm ² *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 |
|--------------------|---|
| TML-T08LCAD/MPP09E | tML [®] HD - FO Breakout Module 5HP 2x MPO/MTP [®] with Pins/8x LC APC Duplex 9/125 μ OS2 40GbE |