Low Loss Optical Interconnects for Harsh Environments

IL = 0.06 dB (typ)

Optik-D™ Series

Conforming to ARINC 801
WHY FIBER?

- High bandwidth
- EMI immune
- Reduced wiring bulk and weight
- Improved data security
- Safe in explosive environments
- Minimal losses over long distances
- Eliminates ground loops
- Future proof applications

WHY OPTIK-D?

- Ultra low insertion loss of 0.06 dB (typical) means less optical power is required, which can mean the difference between an inexpensive LED laser and a costly solid state laser
- Suitable for harsh environments
- More cost effective than D38999 and ARINC 600-based systems
- Wide availability of accessories
- Compatible with other ARINC 801 termini
- Hybrid connector allows for combination of optical, power, signal and/or coax in a single connector
The low loss performance of this system is based on a tight tolerance guide pin and bushing that act jointly to keep the fiber cores precisely aligned.

The guide pins and bushings are installed at the factory and are required for proper performance.

**TECHNICAL SPECIFICATIONS**

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Multi-mode (Contact technical sales for single mode options)</td>
</tr>
<tr>
<td>Ferrule</td>
<td>1.25mm Zirconia Ceramic</td>
</tr>
<tr>
<td>Ferrule Holder</td>
<td>Brass alloy</td>
</tr>
<tr>
<td>Ferrule Holder Plating</td>
<td>Electroless nickel, 200 microinches</td>
</tr>
<tr>
<td>Rear Body &amp; Crimp Sleeve</td>
<td>Corrosion resistant steel alloy</td>
</tr>
<tr>
<td>Passivation</td>
<td>Per SAE-AMS-QQ-PP-35 or ASTM-A-967</td>
</tr>
<tr>
<td>Cable Diameter</td>
<td>1.6 to 2.8 [0.065 to 0.110]</td>
</tr>
<tr>
<td>End Face Geometry</td>
<td>Meets Telcordia GR-326</td>
</tr>
<tr>
<td><strong>Low Loss Variance Tuning</strong></td>
<td><strong>Contact technical sales</strong></td>
</tr>
<tr>
<td>Insertion Loss (IL)</td>
<td>0.06 dB (typical)</td>
</tr>
<tr>
<td>Minimum Loss</td>
<td>0.004 dB</td>
</tr>
<tr>
<td>Maximum Loss</td>
<td>0.08 dB</td>
</tr>
<tr>
<td>Return Loss (RL)</td>
<td>&gt; 45 dB</td>
</tr>
<tr>
<td>Minimum Return Loss</td>
<td>&gt; 45 dB</td>
</tr>
<tr>
<td>Temperature Range</td>
<td>-55º to 125ºC</td>
</tr>
<tr>
<td>Locking System</td>
<td>Jackscrews (required)</td>
</tr>
<tr>
<td>Plastic Optical Fiber (POF)</td>
<td>Contact technical sales. The current Optik-D terminus is intended for glass fiber only. For high volume applications, a POF terminus can be provided. Contact technical sales for more information.</td>
</tr>
<tr>
<td>Cable Compatibility</td>
<td>Loose jacketed (pull-proof), 1.6mm to 2.8mm [0.065&quot; to 0.110&quot;] ø</td>
</tr>
</tbody>
</table>

Pull-proof termini allow for the use of the connector without a backshell.

Contact technical sales for termini intended for use with tight jacketed or 900 µm cable.
During the terminus installation process, ensure that the terminus key is aligned with the keyway on the adapter and that the terminus is not rotated during installation.

Although not shown in this view, jackscrews are required for proper performance.

All items shown here except the termini are installed at the factory prior to shipment.

**GUIDE PIN & BUSHING**

Guide pins and bushings are mandatory for proper performance and occupy a size 8 contact position as shown here.

The guide pin is installed on the male connector and the bushing is installed on the female connector.

Contact technical sales for options to have the guide pin and bushing installed in a different location.

Red circle indicates location of guide pin or bushing.
The terminus design includes a key that aligns with a corresponding keyway in the rear body of the adapter.

Each terminus ships with a factory-installed dust cover and a crimp sleeve.

### Shell Dimensions

<table>
<thead>
<tr>
<th>Shell Size</th>
<th>Connector Variants</th>
<th>A ±0.38</th>
<th>B ±0.38</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>3W3 3WK3</td>
<td>39.14 [1.541]</td>
<td>12.55 [0.494]</td>
</tr>
<tr>
<td>3</td>
<td>5W5 9W4</td>
<td>53.04 [2.088]</td>
<td>12.55 [0.494]</td>
</tr>
<tr>
<td>4</td>
<td>17W5 13W6 8W8</td>
<td>69.32 [2.729]</td>
<td>12.55 [0.494]</td>
</tr>
<tr>
<td>5</td>
<td>24W7</td>
<td>66.93 [2.635]</td>
<td>15.37 [0.605]</td>
</tr>
</tbody>
</table>

### Assembly Dimensions in Mated Condition

For all related shell dimensions, please consult the Combo-D catalog, C-004.

### Part Numbers and Specifications

- **OT1255LMX/AA**: 125.5 µm Multi-mode Pull-proof
- **OT1260LMX/AA**: 126.0 µm Multi-mode Pull-proof
- **OT1270LMX/AA**: 127.0 µm Multi-mode Pull-proof
- **OT1420LMX/AA**: 142.0 µm Multi-mode Pull-proof

Contact technical sales for other types of available termini including those with alternate ferrule diameters and those intended for use with non-pull-proof cable.

 OTA1260LMX/AA
 Crimp sleeve not shown

Jackscrews removed for clarity. All dimensions nominal.
ARINC 801 Termination Kits

This kit contains all of the tools and consumables required for terminating ARINC 801 termini.

Includes:
- Epoxy curing oven
- 200X handheld microscope
- Front epoxy injection tool
- ARINC 801 crimp tool with die set
- ARINC 801 polishing puck
- FiberSure multi-purpose optical strip tool
- Kevlar shears
- Carbide scribe tool
- ARINC 801 oven cure adapters
- ARINC 801 insertion and removal tools
- Tweezers
- Permanent marker
- Metal 6-inch ruler
- Optical cleaning fluid
- Optical cleaning wipes
- Epo-Tek 353ND epoxy
- All necessary polishing films
- Debris container

ARINC 801 Inspection & Cleaning Kits

Designed with input from the commercial air transport industry, this kit is intended to inspect and clean ARINC 801 fiber optic connectors found onboard the aircraft.

Includes:
- HD-2 display with video probe
- 1.25mm visual fault locator
- ARINC 801 cleaning sticks
- ARINC 801 cleaning tool
- Fiber optic cleaning wipes
- Fiber optic grade cleaning fluid
- Video probe tips for ARINC 801 and 1.25mm

ARINC 801 End Face Cleaning Tool

US Conec IBC brand cleaners use a novel dry cleaning strand to gently sweep and lift away contaminates from the end face including:

- Arizona road dust
- Alcohol residue
- Distilled water residue
- Skin oil residue
- Vegetable residue

Graphite
Salt water residue
Hand lotion
T-shirt lint

Insertion / Removal Tool

The Optik-D Series uses a widely available plastic tool for the insertion and removal of the terminus from the adapter.
## Test Data

**Testing performed at Experior Laboratories in Oxnard, CA**

<table>
<thead>
<tr>
<th>Test</th>
<th>Test Condition</th>
<th>Group A Environmental</th>
<th>Group B Mechanical Part 1</th>
<th>Group C Mechanical Part 2</th>
<th>Group D Mating Ability</th>
<th>Requirement</th>
<th>Results</th>
<th>Value (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenuation &amp; Splicing</td>
<td>TIA/EIA-455-171A</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>IL = 0.30 dB Max</td>
<td>Pass</td>
<td>0.06</td>
</tr>
<tr>
<td>Return Loss</td>
<td>TIA/EIA-455-107A</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td>RL = 20 dB Min</td>
<td>Pass</td>
<td>&gt; 45</td>
</tr>
<tr>
<td>Thermal Cycling</td>
<td>TIA-455-3B</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
<td>-0.02</td>
</tr>
<tr>
<td>Humidity</td>
<td>MIL-DTL-24308G EIA-364-31B Method IV</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
<td>-0.02</td>
</tr>
<tr>
<td>Temperature Life</td>
<td>TIA/EIA-455-4C</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
<td>0.05</td>
</tr>
<tr>
<td>Salt Spray</td>
<td>MIL-DTL-24308G EIA-364-32B Method IV</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
<td>-0.04</td>
</tr>
<tr>
<td>Thermal Shock</td>
<td>MIL-DTL-24308G EIA-364-32F Method A Condition 1</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
<td>-0.01</td>
</tr>
<tr>
<td>Vibration</td>
<td>MIL-DTL-24308G EIA-364-28F Method IV</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
<td>-0.01</td>
</tr>
<tr>
<td>Shock</td>
<td>MIL-DTL-24308G EIA-364-27C Method E</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
<td>-0.01</td>
</tr>
<tr>
<td>Maintenance Aging</td>
<td>EIA-364-24B</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>Insertion Force = 8 lbs Max</td>
<td>Pass</td>
<td>n/a</td>
</tr>
<tr>
<td>Mating Durability</td>
<td>MIL-DTL-24308G EIA-364-09C</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>Insertion Force = 8 lbs Max</td>
<td>Pass</td>
<td>0.01</td>
</tr>
<tr>
<td>Cable Pull-Out</td>
<td>TIA-455-6B Method 1</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>Pull Force = 53.4 N for 5 sec</td>
<td>Pass</td>
<td>0.01</td>
</tr>
<tr>
<td>Termini Retention Force</td>
<td>EIA-364-38C Method A</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td>Pull Force = 53.4 N for 1 hour</td>
<td>Pass</td>
<td>n/a</td>
</tr>
<tr>
<td>Return Loss</td>
<td>TIA/EIA-455-107A</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>RL = 20 dB Min</td>
<td>Pass</td>
<td>&gt; 45</td>
</tr>
</tbody>
</table>

• Test conditions were modified in some cases where the original test condition exceeded the performance limitations of the connector or termini. A full test report is available upon request.
• In order to pass the test plan requirements, the optical discontinuity could not exceed 1 µsec.
• Testing performed at 1300 nm.
Specify a part number by selecting an option from each step.

<table>
<thead>
<tr>
<th>STEP</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Example</td>
<td>CBF</td>
<td>5W5</td>
<td>F</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

**STEP 1 - SERIES**

CBF - Optik-D Series

**STEP 2 - CONNECTOR VARIANTS** - Face view of male or rear view of female

<table>
<thead>
<tr>
<th>Shell Size</th>
<th>Shell Size 2</th>
<th>Shell Size 3</th>
<th>Shell Size 4</th>
<th>Shell Size 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>3W3</td>
<td></td>
<td>3WK3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5W5</td>
<td></td>
<td>9W4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17W5</td>
<td></td>
<td>13W6</td>
<td></td>
<td>8W8</td>
</tr>
<tr>
<td>24W7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**STEP 3 - CONNECTOR GENDER**

M - Male
F - Female, open entry signal contacts (if applicable), use with 3W3, 3WK3, 5W5 or 8W8.
S - Female, PosiBand closed entry signal contacts (if applicable), not for use with 3W3, 3WK3, 5W5 or 8W8.

**STEP 4 - ELECTRICAL CONTACT TERMINATION TYPE (IF APPLICABLE)**

0 - Use with 3W3, 3WK3, 5W5 or 8W8, order termini separately (see page 5).
*1 1 - Crimp, signal 0.5mm² [20 AWG], uses CBC Series step molding.
*1 2 - Solder cup.
*1 4 - Solder tail, right angle (90°) PCB with 11.43 [0.450] contact extension.
*1 5 - Solder tail, right angle (90°) PCB with 7.19 [0.283] contact extension.
*1 59 - Solder tail, right angle (90°) PCB with 13.84 [0.545] contact extension.
*1 Not for use with 3W3, 3WK3, 5W5 or 8W8.

**STEP 5 - MOUNTING STYLE**

0 - Mounting Hole, Ø 3.05 [0.120].
*2 R2 - Bracket, mounting, right angle (90°) metal, swaged to connector with 4-40 thread fixed female jackscrews and alignment bar.
*2 R6 - Bracket, mounting, right angle (90°) metal, swaged to connector with 0.120 [3.05] Ø mounting hole and alignment bar.
*2 R7 - Bracket, mounting, right angle (90°) metal, swaged to connector with 4-40 threads and alignment bar.
*2 R8 - Bracket, mounting, right angle (90°) metal, swaged to connector with 4-40 locknut and alignment bar.
S5 - Swaged locknut, 4-40 threads

*2 Not for use with Code 0, 1 or 2 in Step 4.

**Typical Multi-mode Fiber Anatomy**

Many optical cables also have strength members between the jacket and the buffer for greater durability.
STEP 10 - Selecting a Connector Type

Use this step to specify which size 8 positions will NOT be populated with optical termini.

\textit{I.E. CBF8W8M00ANES-A1A8 would yield an 8W8 with positions A1 and A8 empty so that electrical size 8 contacts can be used in those positions.}

STEP 9 - Environment and Material Options

\textit{/AA - RoHS Compliant}

An RoHS compliant connector with stainless steel shells will also have stainless steel hardware (backshell not included).

STEP 8 - Shell and Additions

0 - None

Y - Backshell, top opening, plastic with rotating male jackscrews.

Z - Backshell, top and side opening, robust and extended height, plastic with rotating male jackscrews.

H - Backshell, top opening, metal.

AN - Backshell, lightweight aluminum, nickel finish.

N - Push-on fastener for right angle (90°) mounting brackets.

STEP 7 - Jackscrews and Locking Systems

T2 - Fixed Female Jackscrews.


E2 - Rotating Male Screw Locks.

STEP 6 - Backshell and Additions

0 - None

Y - Backshell, top opening, plastic with rotating male jackscrews.

Available in shell size 5 only.

Z - Backshell, top and side opening, robust and extended height, plastic with rotating male jackscrews.

H - Backshell, top opening, metal.

AN - Backshell, lightweight aluminum, nickel finish.

N - Push-on fastener for right angle (90°) mounting brackets.

Once you have made a connector selection, contact us if you would like a 3D model or 2D drawing. If the drawing does not already exist in our database, we can create one for you. We also have a variety of drawings available from our website, www.connectpositronic.com.

Gore-Tex® gasket tape can be used as a protective layer between the fiber and the backshell cable clamp to prevent chafing.
Cable Assembly Options
Positronic leverages its experience in high reliability connector manufacturing to build cable assemblies held to high standards. The cable assembly facility is certified to ISO9001 and AS9100. Contact Positronic for your optical cable needs.

Capabilities include:
- Design, development, engineering support and documentation
- Build-to-print
- Product prototyping and first articles
- Testing
- Adherence to IPC-620 standards

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