The solution for rugged active blind mate VPX interconnect systems

The LightCONEX® active blind mate optical interconnect is a revolutionary solution for VPX systems that includes a fixed plug-in module connector and a floating backplane connector compatible with proposed VITA 66.5 standard. The low-profile plug-in module connector is screwed on the board edge through an interposer, saving board space and eliminating fiber cable handling. The backplane connector has a spring-loaded MT to ensure a secure MT to MT mating connection under extreme shock and vibration conditions.

Key advantages

- **Optical interconnect**: Mechanical Transfer (MT) ferrule with linear array of 12 or 24 parallel multimode fibers
- **Secure connection**: Spring within the backplane optical cable provides the mating force between plug-in module and backplane MTs.
- **Standards**: Designed following VITA 66.5 standard (forthcoming).
- **Maintenance**: Supports two-level maintenance.
- **Blind mate**: Eliminates fiber handling and frees up space on host board.
- **Robustness**: Tested for vibration and shock over industrial temperature range, exposure to humidity, salt fog, sand and dust, mate/un-mate cycles, following military specs.

Configurations

12.5G
- 4TRX (50G, full duplex), 12TX or 12RX (150G), 12TRX (150G, full duplex)

28G
- 4TRX (100G, full duplex), 12TX or 12RX (300G), in development

Applications

- VPX single board computing
- C4ISR embedded systems
- AESA radars
- Ethernet switches, high BW communication links

Two LightCONEX 12TRX Style A
(2 × 24 fibers total)

This Interface Concept 3U VPX card uses a LightCONEX LC 12TRX, 150G (full duplex) Style A.
**LightCONEX styles A, B, and C product line**

**VITA apertures**

<table>
<thead>
<tr>
<th>VITA 66.4</th>
<th>VITA 67.3D</th>
<th>VITA 67.3C</th>
<th>VITA 67.3E</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="BP_FPb_AP1" alt="AP1" /></td>
<td><img src="BP_FPa_AP2" alt="AP2" /></td>
<td><img src="BP_FPa_AP3" alt="AP3" /></td>
<td><img src="BP_FPb_AP4" alt="AP4" /></td>
</tr>
<tr>
<td>Style A</td>
<td>Style C</td>
<td>Style B</td>
<td>Style B</td>
</tr>
<tr>
<td>BP_FPb_AP1</td>
<td>BP_FPa_AP2</td>
<td>BP_FPa_AP3</td>
<td>BP_FPb_AP4</td>
</tr>
</tbody>
</table>

**Plug-in module connector**

**Optical transceiver with front mating plate**

The plug-in module connectors are equipped with optical transceivers offering multiple transmit and receive and bandwidth configurations and with required interposers:

- **LightCONEX 4TRX module**: for Styles A, B, and C
- **LightCONEX 12TX-12RX modules**: for Styles A, B, and C
- **LightCONEX28 4TRX, 12TX, and 12RX modules**: for Style B and C

**Interposers**

- **415-00012**: 2.74 mm, 96 positions. Style A (ITP1)
- **415-00011**: 3.03 mm, 233 positions. Style A (ITP2)
- **415-00018**: 1 mm, 96 positions. Style B and C (ITP3)
- **415-00019**: 1.2 mm, 233 positions. Style B and C (ITP4)
- **415-00035**: 2 mm, 96 positions. Style B and C (ITP5)

**Backplane connector**

**Face Plates**

Different backplane face plates are available to accommodate VITA apertures:

- **450-00064**: Backplane Face Plate (b) for aperture AP1
- **450-00065**: Backplane Face Plate for aperture AP2
- **450-00066**: Backplane Face Plate for aperture AP3
- **450-00068**: Backplane Face Plate (b) for aperture AP4

**Inserts**

The face plate styles have matching insert styles. The inserts come with the required MT-terminated optical cable(s) and MT ferule(s). Compatibility is shown in above diagram:

- **450-00062**: Backplane Insert Connector Style Ab
- **450-00042**: Backplane Insert Connector Style C
- **450-00054**: Backplane Insert Connector Style B
Backplane connector features

The LightCONEX backplane connector contains the Face plate and Insert. The connector is designed to provide float in both the X- and Y-directions to enable alignment of the MT ferrule mating interfaces. The design complies with the ANSI/VITA 66.4 mating requirements with the MT ferrule displacement occurring within the backplane connector. Single or dual MT ferrules are available.

- Spring-loaded MT ferrule (12-lane or 24-lane)
- Coarse and fine mating alignment
- Low profile: 10 mm height
- Compatible with 12-lane or 24-lane OM3 or OM4 fiber ribbon cable

The main components of the backplane connector are:

1. Face plates. Dedicated face plates are available for VITA 67.3 (apertures C, D, and E) and VITA 66.4.
2. Insert housing available in styles A, B, and C. The main components of the housing are:
   - Primary alignment feature
   - MT ferrule with alignment pins
   - Optical cable assembly with springs.

Optical cable options are:
- **12 fibers MT**: 6 in. 12-fiber optical cable with MT12 termination at both ends, alignment pins, and a single MT clip.
- **24 fibers MT**: 6 in. dual 12-fiber optical cable with MT24 termination at one end and dual MT12 termination at the other, alignment pins, and 2 MT clips.

Style A

The LightCONEX backplane connector Style A design is intended for active optical applications utilizing the 0.8-in. plug-in module pitch. It is dedicated for the VITA 66.4 aperture.

- Primary alignment feature located above the single MT ferrule.
- Insert housing retrofits into VITA 66.4 aperture (0.8 in. pitch).

Style B

The LightCONEX backplane connector Style B design offers a combination of dual MT ferrule and can provide up to 48 fibers (2 x 24).

- The lower MT ferule mates with the plug-in module active MT, while the upper one is cabled.

Style C

The LightCONEX backplane connector Style C design offers a single MT ferrule with the upper portion left open for other applications.

Plug-in module connector features

The LightCONEX plug-in module connector contains the optical transceiver with its MT ferrule, an LGA interposer, and a front mating plate. The front mating plate has the primary alignment feature socket and a hole to accommodate the MT from the transceiver.

The main components of the plug-in module connector are:

1. Front mating plate, with:
   - Hole to accommodate MT from the transceiver
   - Primary alignment feature socket
2. Optical transceiver
3. Interposer

Style A

The LightCONEX plug-in module connector Style A is dedicated for the VITA 66.4 aperture and is a unique style with the primary alignment feature socket located above the optical transceiver. These connectors require interposers ITP1 or IPT2.

Style B and C

The LightCONEX plug-in module connector Style B and C are dedicated for the VITA 67.3 aperture and have front mating plates for each respective styles. The primary alignment feature is located below the optical transceiver. These connectors require interposers ITP3, ITP4, or IPT5.

- Style B has one optical transceivers and one cabled MT.
- Style C has one optical transceiver.

These plug-in module connectors are secured with screws directly to the edge of the host board along with their dedicated LGA interposers.
**LightCONEX optical performance**
The LightCONEX LC and LightCONEX28 LC modules come in different configurations. They both feature CML data interface.

**LightCONEX LC 4TRX, 12RX, 12TX, and 12TRX**
- **Performance**: 12.5 Gbps/lane from –40 ºC to 100 ºC
- **Reach**: up to 300 m, OM3 fiber
- **Sensitivity**: –12 dBm or –9 dBm with BER 10\(^{-12}\)
- **Power consumption**: 1.4 W (12-lane, 12.5G) 2.8 W (24-lane, 12.5G)

**LightCONEX28 LC 4TRX**
- **Performance**: 28 Gbps/lane from –40 ºC to 85 ºC
- **Reach**: up to 100 m, OM3 fiber
- **Sensitivity**: –7.5 dBm (typical) with BER 10\(^{-12}\)
- **Power consumption**: 1.4 W (4+4-lane, 28G)

**LightCONEX ordering information**

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Product Description</th>
<th>Lanes</th>
<th>Bandwidth (Gbps/lane)</th>
<th>Sensitivity (dBm)</th>
<th>Insert style</th>
<th>Interposer</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCX04A418532301</td>
<td>LightCONEX 4TRX Transmit/Receive</td>
<td>4+4</td>
<td>12.5</td>
<td>–12</td>
<td></td>
<td>ITP1 (PN: 450-00062)</td>
</tr>
<tr>
<td>LCX04A418532101</td>
<td>LightCONEX 4TRX Transmit/Receive</td>
<td>4+4</td>
<td>12.5</td>
<td>–9</td>
<td></td>
<td>ITP2 (PN: 450-00011)</td>
</tr>
<tr>
<td>LCT12A418533001</td>
<td>LightCONEX 12TX Transmitter</td>
<td>12</td>
<td>12.5</td>
<td>n.a.</td>
<td></td>
<td>ITP3 (PN: 450-00018)</td>
</tr>
<tr>
<td>LCR12A418530301</td>
<td>LightCONEX 12RX Receiver</td>
<td>12</td>
<td>12.5</td>
<td>–12</td>
<td></td>
<td>ITP4 (PN: 450-00019)</td>
</tr>
<tr>
<td>LCR12A418530101</td>
<td>LightCONEX 12RX Receiver</td>
<td>12</td>
<td>12.5</td>
<td>–9</td>
<td></td>
<td>ITP3 (PN: 450-00018)</td>
</tr>
<tr>
<td>LCX12P418532101</td>
<td>LightCONEX 12TRX Transmit/Receive</td>
<td>12+12</td>
<td>12.5</td>
<td>–9</td>
<td></td>
<td>ITP4 (PN: 450-00019)</td>
</tr>
<tr>
<td>LCX04C418532301</td>
<td>LightCONEX 4TRX Transmit/Receive</td>
<td>4+4</td>
<td>12.5</td>
<td>–12</td>
<td></td>
<td>ITP5 (PN: 450-00035)*</td>
</tr>
<tr>
<td>LCT12C418530001</td>
<td>LightCONEX 12TX Transmitter</td>
<td>12</td>
<td>12.5</td>
<td>n.a.</td>
<td></td>
<td>ITP3 (PN: 450-00018)</td>
</tr>
<tr>
<td>LCR12C418530301</td>
<td>LightCONEX 12RX Receiver</td>
<td>12</td>
<td>12.5</td>
<td>–12</td>
<td></td>
<td>ITP4 (PN: 450-00019)</td>
</tr>
<tr>
<td>LCR12C418530101</td>
<td>LightCONEX 12RX Receiver</td>
<td>12</td>
<td>12.5</td>
<td>–9</td>
<td></td>
<td>ITP3 (PN: 450-00018)</td>
</tr>
<tr>
<td>LCX12C418532101*</td>
<td>LightCONEX 12TRX Transmit/Receive</td>
<td>12+12</td>
<td>12.5</td>
<td>–9</td>
<td></td>
<td>ITP4 (PN: 450-00019)</td>
</tr>
<tr>
<td>LCX04B428532101</td>
<td>LightCONEX28 28G 4TRX Transmit/Receive</td>
<td>4+4</td>
<td>28</td>
<td>–9</td>
<td></td>
<td>ITP5 (PN: 450-00035)*</td>
</tr>
<tr>
<td>LCT12B428530001*</td>
<td>LightCONEX28 28G 12TX Transmitter</td>
<td>12</td>
<td>28</td>
<td>n.a.</td>
<td></td>
<td>ITP4 (PN: 450-00019)</td>
</tr>
<tr>
<td>LCR12B428530101*</td>
<td>LightCONEX28 28G 12RX Receiver</td>
<td>12</td>
<td>28</td>
<td>–9</td>
<td></td>
<td>ITP5 (PN: 450-00035)*</td>
</tr>
<tr>
<td>LCT12C428533001*</td>
<td>LightCONEX28 28G 12TX Transmitter</td>
<td>12</td>
<td>28</td>
<td>n.a.</td>
<td></td>
<td>ITP5 (PN: 450-00035)*</td>
</tr>
</tbody>
</table>

*: In development