

The background image shows two Amphenol OverPass components. One is a green printed circuit board (PCB) with a silver-colored connector and a white label that reads "Pb". The other is a flexible, braided metal cable with a similar connector and a white label that reads "Pb". The components are set against a light blue background.

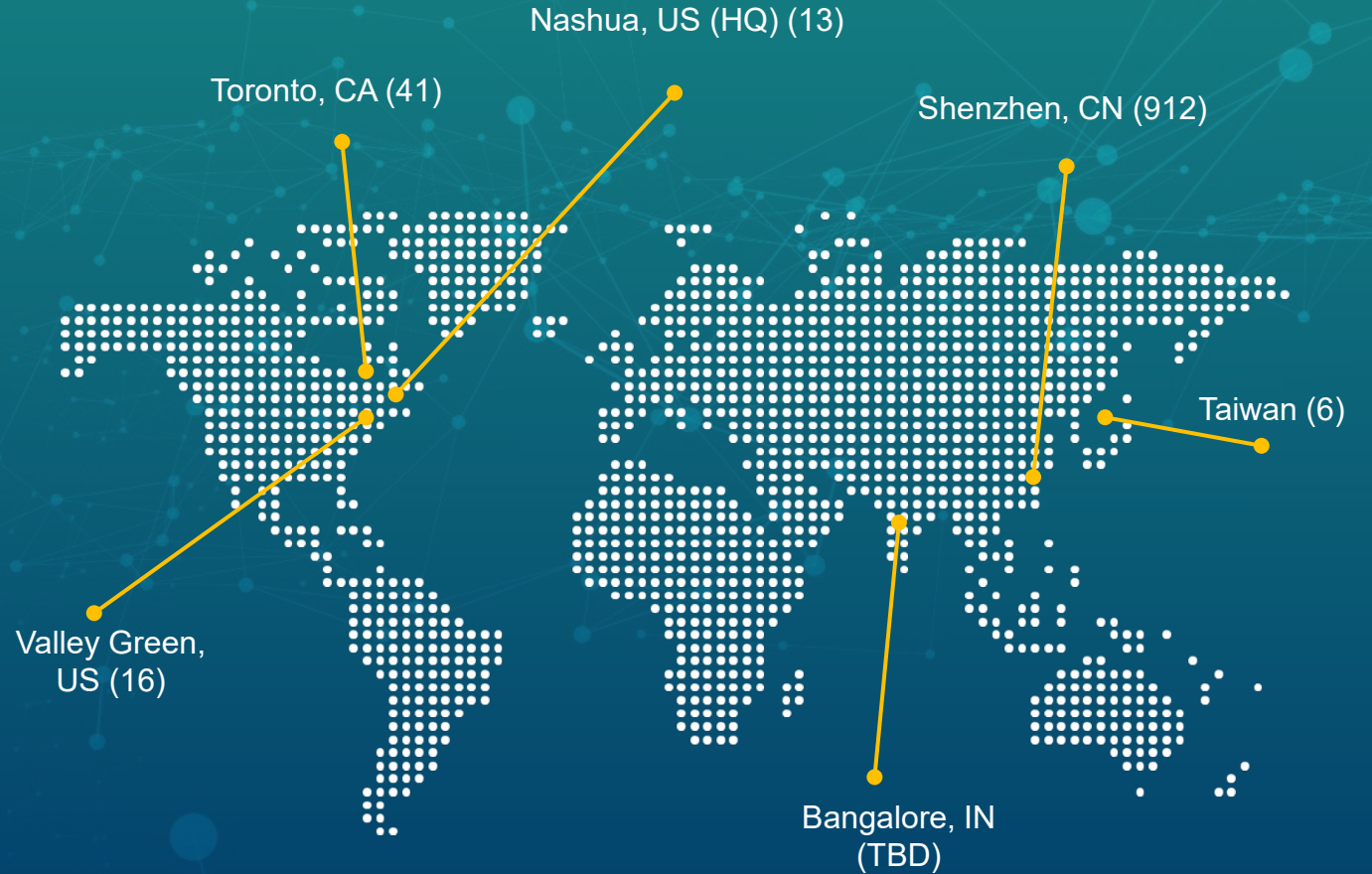
Amphenol OverPass™

Vishal Chandrasekar
Product Line Manager







Amphenol High Speed IO






A global technology leader

- A worldwide organization (1000+ employees):
 - ✓ 5 R&D facilities (2x USA, Canada, China, Taiwan)
 - ✓ Production/Manufacturing in China and India
 - ✓ Local sales/marketing in every continent (200+)
- ✓ Product & Technology leader
 - ✓ 4-5 new products / year
 - ✓ +100 custom designs / year
 - ✓ Leader in MSA standards development
 - ✓ Shortest LT in the market (6-8 wks)

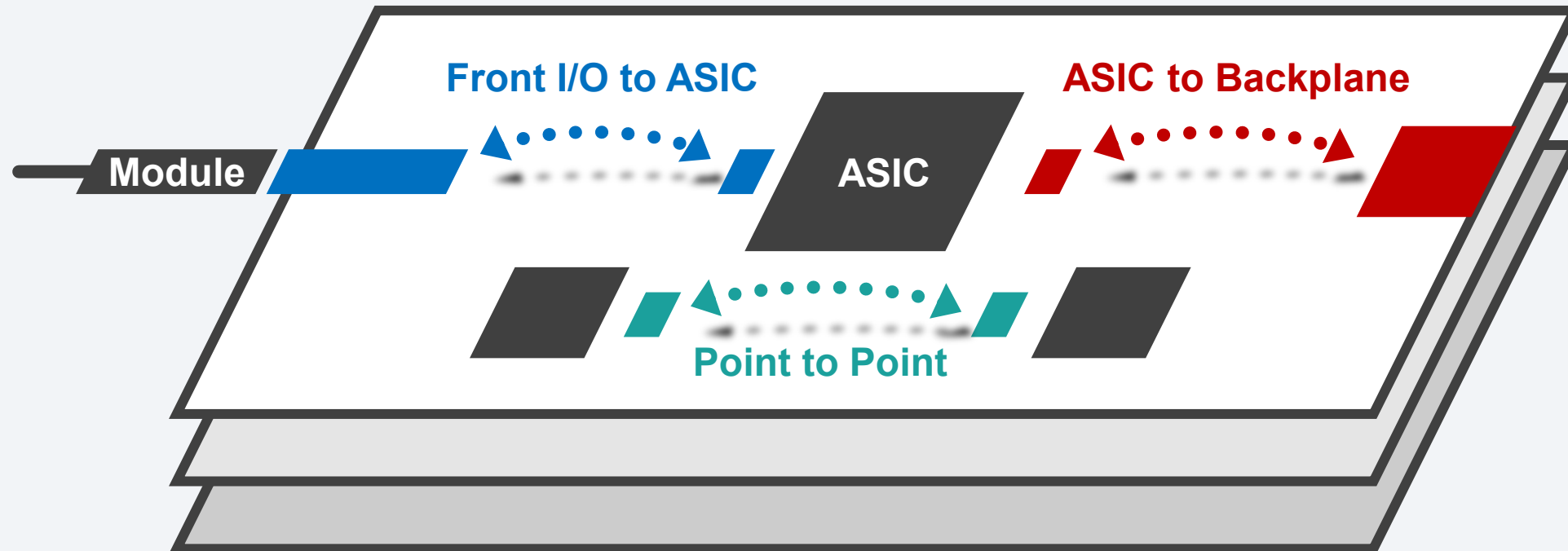


HSIO Connectors Product Portfolio

HSIO Product	Number of Channel	Data Rate/Channel	Max. Bandwidth h/ Port	Connector Configuration	Connector Product Offering
SFP	1 /Port	Up to 2.5 Gbps	2.5 Gbps	Gbps Single Port, Ganged & Stacked	
SFP+	1 /Port	Up to 6 Gbps	6 Gbps		
ExpressPort® SFP	1 /Port	Up to 16 Gbps	16 Gbps		
Ultraport™ SFP	1 /Port	Up to 32 Gbps	32 Gbps		
ExtremePort™ SFP	1 /Port	Up to 56 Gbps	56 Gbps		
QSFP	4 /Port	Up to 10 Gbps	40 Gbps	Single Port, Ganged, Stacked pressfit & stacked SMT	
ExpressPort® QSFP	4 /Port	Up to 25 Gbps	100 Gbps		
Ultraport™ QSFP	4 /Port	Up to 28 Gbps	112 Gbps		
ExtremePort™ QSFP	4 /Port	Up to 56 Gbps	224 Gbps		
XFP	1 /Port	Up to 10 Gbps	10 Gbps	Single Port	
CXP	12 /Port	Up to 25 Gbps	300 Gbps	Single Port & Custom	
Mini-SAS	4Port	Up to 6 Gbps	24 Gbps	1x1, 1x2 and 1x4 conf.	
Mini-SAS HD (MSHD)	4/Port	Up to 24 Gbps	96 Gbps	1x1, 1x2 and 1x4 conf.	

HSIO Product	Number of Channel	Data Rate/Channel	Max. Bandwidth/ Port	Connector Configuration	Connector Product Offering
CFP2	4 /Port	Up to 28 Gbps	112 Gbps	Single Port & Ganged (up to 1x2)	
CFP4	4 /Port	Up to 28 Gbps	112 Gbps	Single Port & Ganged (up to 1x2)	
QSFP DD	8 /Port	Up to 56 Gbps PAM 4	400 Gbps	Single Port, Ganged & Stacked	
OSFP	8 /Port	Up to 56 Gbps PAM 4	400 Gbps	Single Port, Ganged & Stacked	
DSFP	2/Port	Up to 56 Gbps PAM 4	112 Gbps	Single Port & Ganged (up to 1x8)	

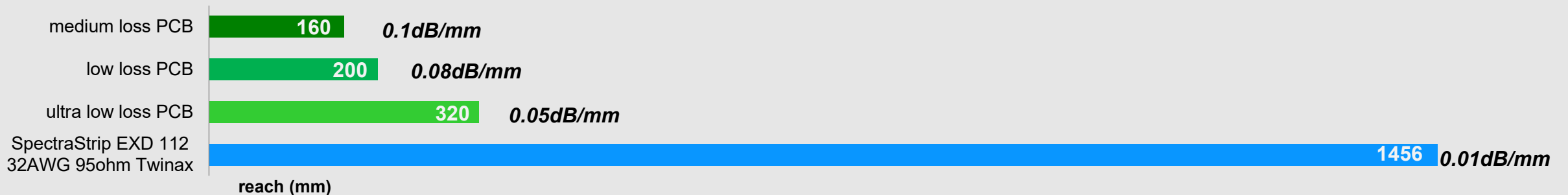
High performance products enabling high speed signal routing through copper cable instead of PCB



Why? Reach at higher speeds

- The physical reach of PCBs becomes limited @ 56G and above.
- Higher performance PCB and signal conditioning elements (re-timers) add cost and complexity
- **Insertion loss per unit length** is significantly less for cable vs PCBs
- OverPass™ solutions attach cable directly from near or on-chip connector external or internal connection point
- Designers can solve reach limitation, cost and power budget issues with OverPass™ solutions.

Expected Reach of Different Material Classes @ 29GHz [assumptions: 16dB host channel w/ no other media and no other interconnect pieces]



Source for PCB material class values: CEI-112G-VSR-PAM4 Draft

Why do we need this?

- Hyperscale / massive data transfer capability driving higher bandwidth
- Chip manufacturers - faster signaling speeds
 - Physically larger chips
 - Simplifies the network (single vs. multiple switches)
 - Reduced latency (single vs. multiple chips)
 - Power Management
 - Increase Serdes pair count
- Transfers signal transmission challenge to the switch system
 - PCB based solution
 - More PCB layers
 - Lower loss materials / re-timers
 - OverPass™ - Robust, lowest applied cost, best signal integrity

OverPass™ Building Blocks

Amphenol
COMMUNICATIONS SOLUTIONS

External IO

SFP

QSFP

QSFP-DD

OSFP

Bulk Cable Spectra-Strip

Near chip / On chip Connectors

Mini Cool Edge IO

Flash

Backplane

Paladin®

ExaMAX 2®

micro-LinkOVER™

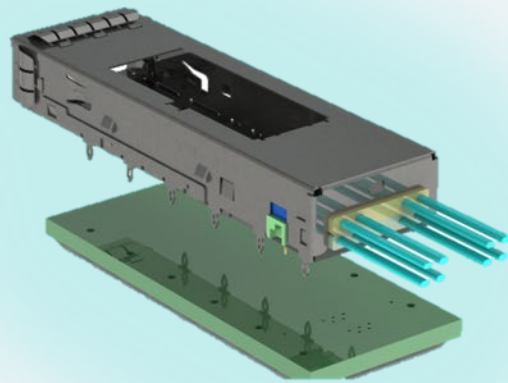
DensiLink®



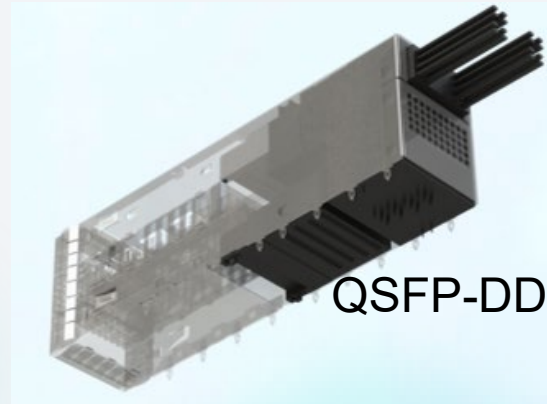
- Raw cables from Amphenol Spectra-Strip
- Variety of cables for different applications
 - Wire gage – 26 / 28 / 29 / 30 / 31 / 32 / 34 / 36 AWG
 - Transmission speeds – 10G, 28G, 56G, 112G, 224G
 - Impedance – 85Ω, 95 Ω
- Optimized for performance with different Amphenol IO and backplane products

Various industry standard form factor for pluggable modules

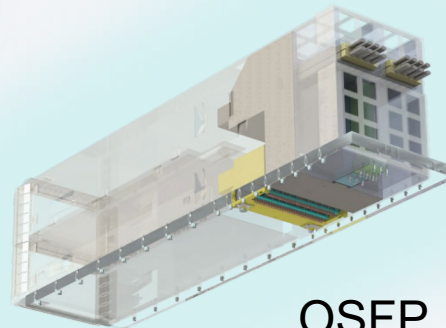
- SFP, QSFP, QSFP-DD, OSFP, Mini-SAS HD
- Designed for 56G / 112G / 224G signaling
- Belly-to-belly mounting capability across all form factors



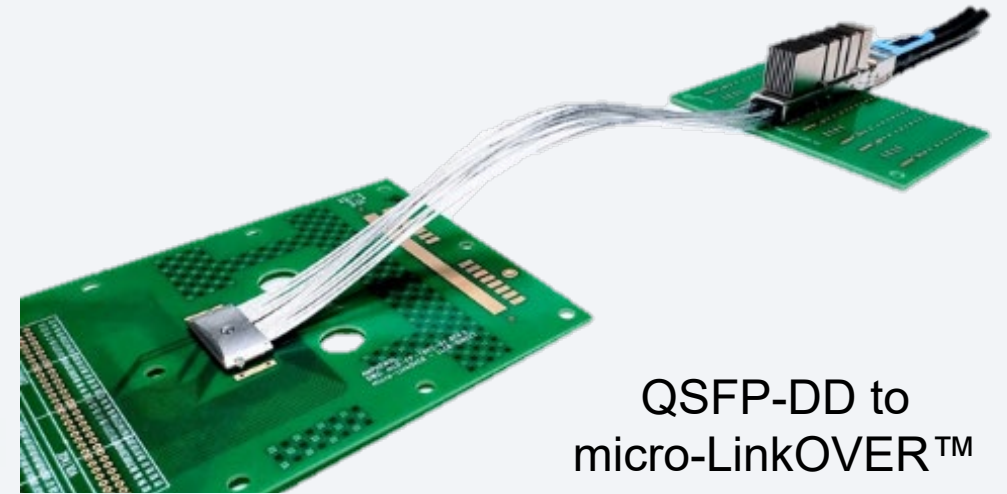
QSFP



QSFP-DD



OSFP



QSFP-DD to
micro-LinkOVER™

Cabled Backplane Systems

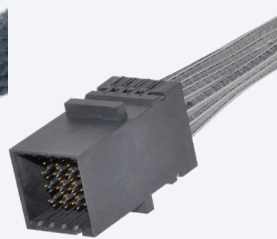
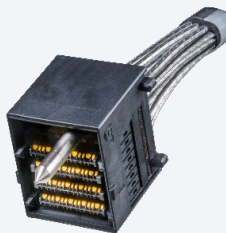
OverPass™ Solutions

Industry Leadership

- More than 10 years of experience developing and manufacturing backplane cables
- Hi volume automated manufacturing and test
- Dedicated applications engineering team
- Optimized performance with Amphenol Spectra-Strip twin-ax

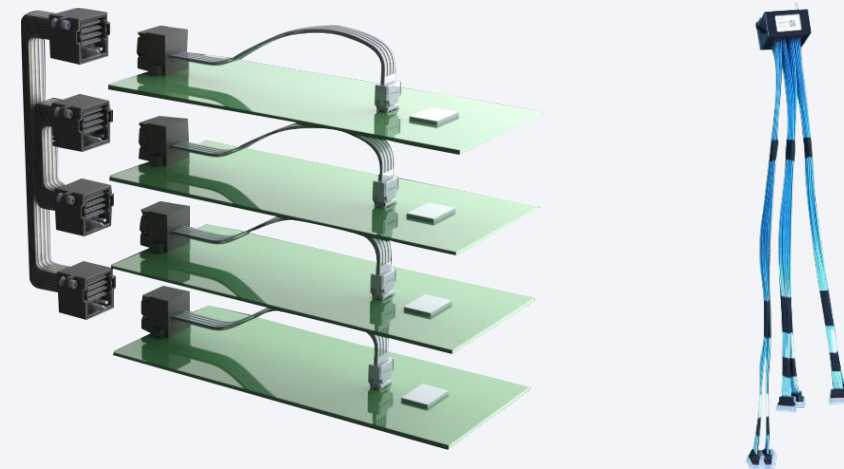
Compatible With Board-mount Backplane Connectors

- 32G to 112G data rates
- 2, 4, 6 & 8 pairs per column
- Multiple wire gauges
- 85, 92 & 95 Ω



ExaMAX® ExaMAX 2® Paladin® Paladin® HD

System Solutions - Backplane and OverPass™



Turnkey Design OverPass™ Solutions

IO Connector	Data Rate	Midboard Connector Examples
ExaMAX	32Gbps - 56Gbps	MiniCoolEdge, Z-Link, SlimSAS, ExtremePort Swift, Ultraport Flash
ExaMAX 2	112 Gbps	DensiLink® micro-LinkOVER™
Paladin		
Paladin HD		

Near chip connectors – 56G

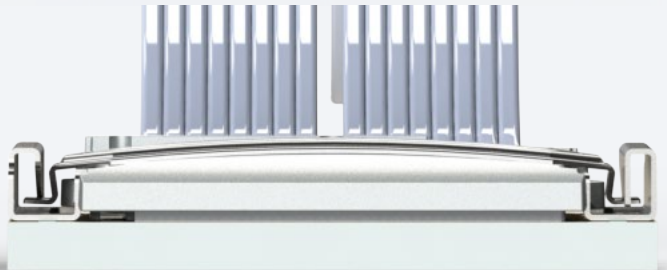
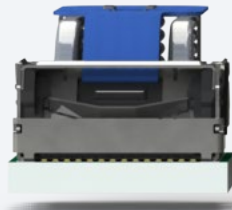
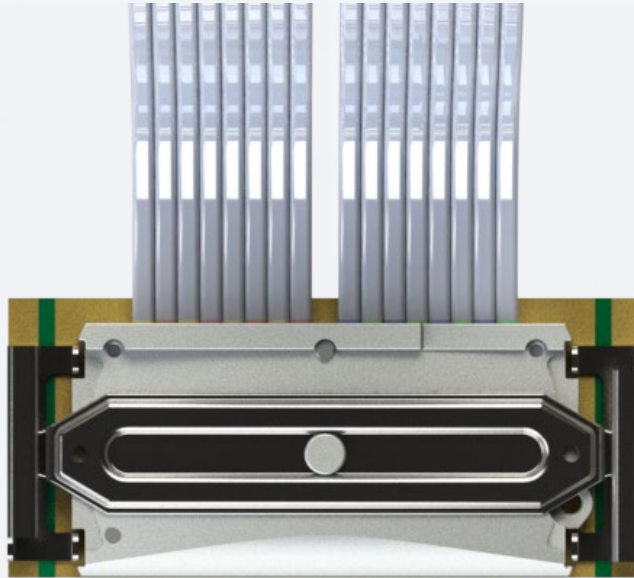
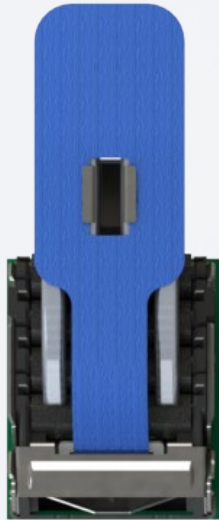
- Mini Cool Edge IO (MCIO)
 - Multiple configurations – 38, 50, 74 and 100 positions
 - Straight & right angle cable exits
 - Vertical & right angle mating board connectors
 - Impedance – 85Ω, 95 Ω
 - Market-wide deployment & usage
- Flash Gen 2
 - 50 / 100 position configuration
 - Low profile (4.50mm mated height)
 - “Under heat sink” capability
 - Robust latching retention
 - Ease of use pull lanyard for un-mating



Near chip connectors – 112G, 16 diff pair

DensiLink®

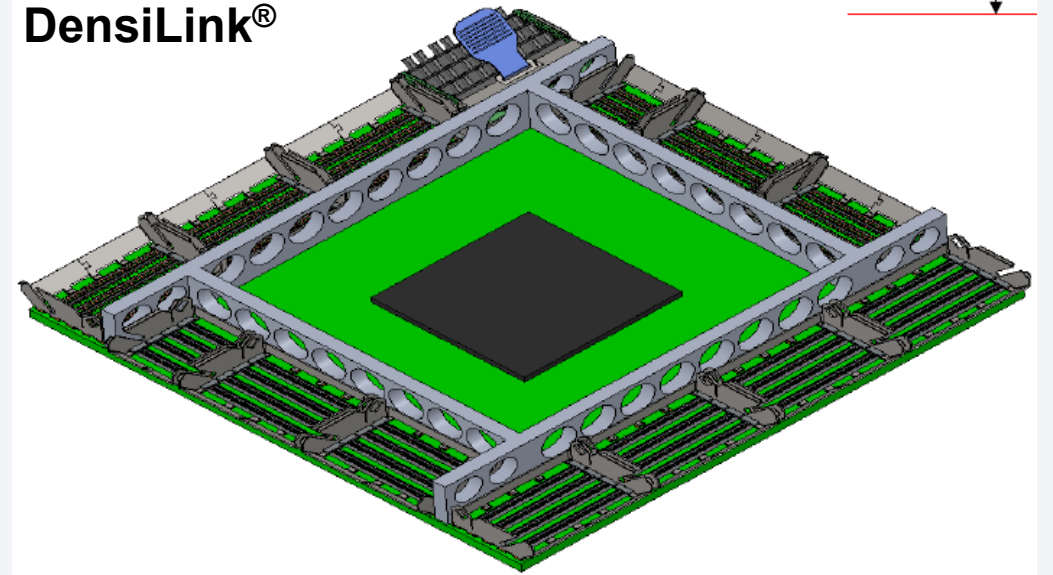
micro-LinkOVER™



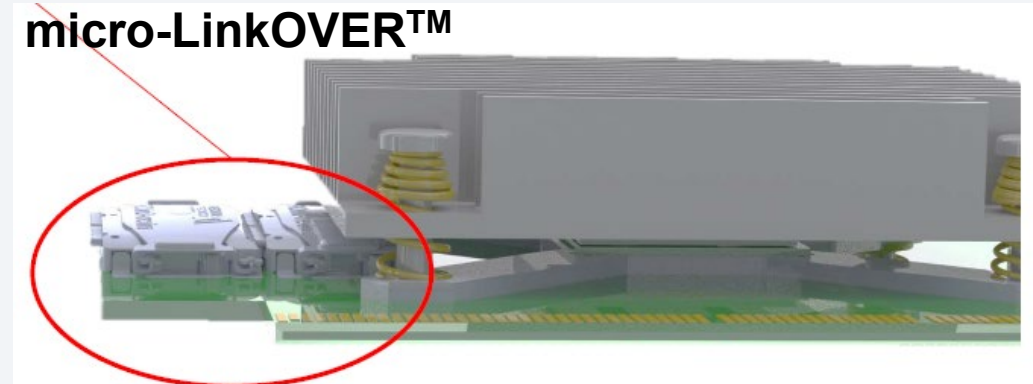
Can fit >1000 diff pairs around ASIC

Can fit under heatsink

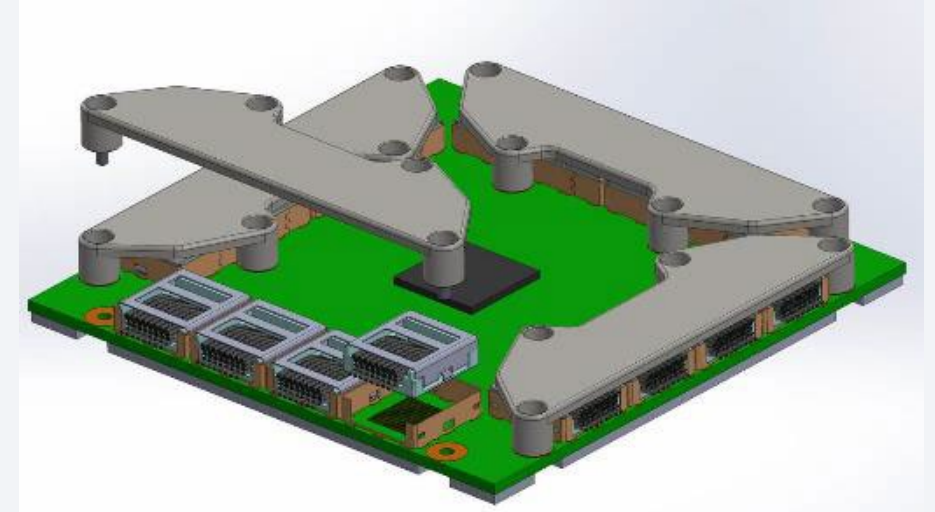
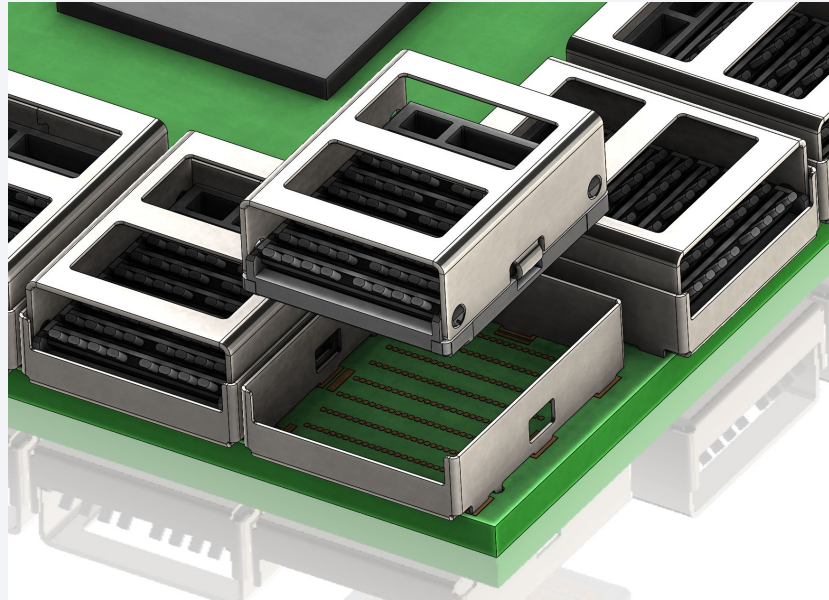
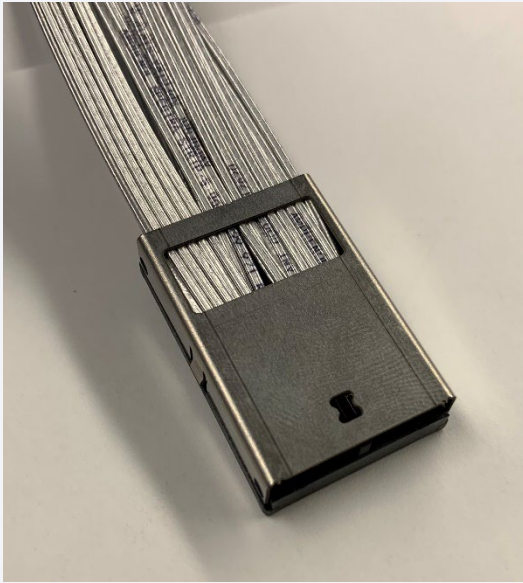
DensiLink®



micro-LinkOVER™



On-Package connectors – 224G, 64 diff pair



- Increasing reach and life of copper solutions
 - Targeting 112G and 224G signaling speeds
 - Co-packaging brings signal as close to chip as possible
 - Interoperable with on-chip optical solutions
 - Over 1000 DPs around the chip, enables 100Tb and 200Tb chip technologies

- Amphenol OverPass™ portfolio
 - Extends copper life and performance
 - Eliminates need for expensive re-timers and PCB materials
 - Increases reach of signal traces without sacrificing signal integrity
 - Has wide variety of a-la-carte solutions
 - Addresses 112G / 224G signaling applications
- Delivers tailored solutions for your unique system architecture
 - Needs design coordination at the earliest stages to provide optimal solution
 - Fill out the product inquiry form at <https://www.amphenol-cs.com/overpass> to start the process for your fully defined OverPass high performance solution