

A Giant Leap for Interconnect: Next Gen VITA 100

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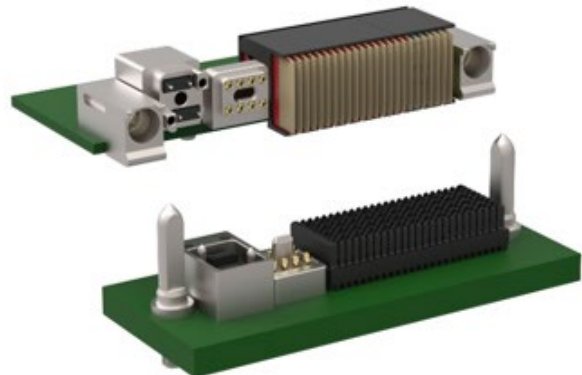
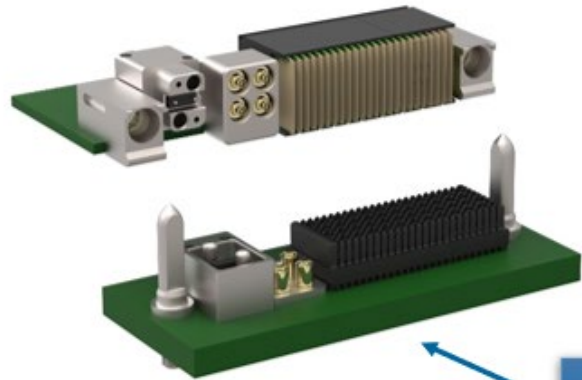
EVERY CONNECTION COUNTS



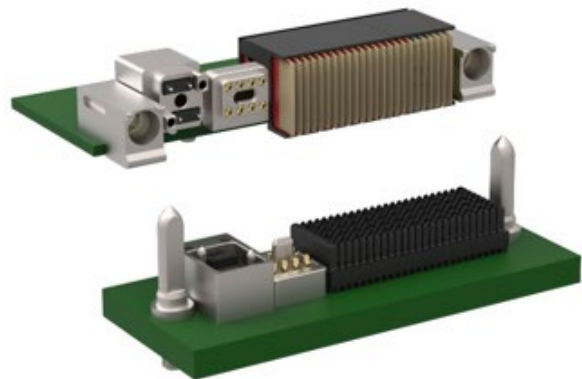
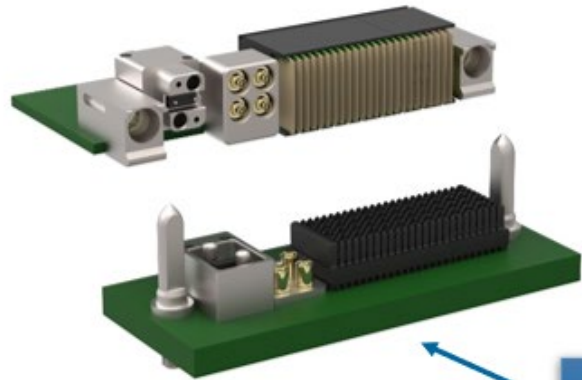
From my 2017 ETT Presentation...



Today	32 diff pairs @ 10 Gb/s	4 RF contacts @ 26.5 GHz	12-24 optical lanes @ 25 Gb/s
Tomorrow (not literally)	32 diff pairs @ 25 Gb/s	8+ RF contacts @ 60 GHz	24-48 optical lanes @ 25 Gb/s

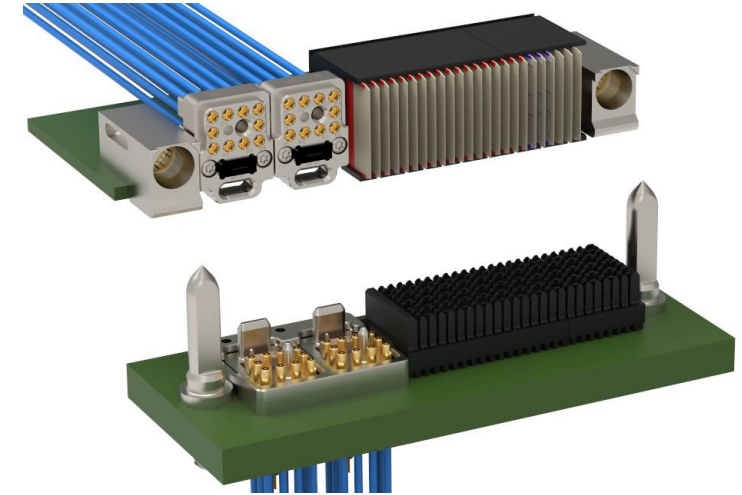


From my 2017 ETT Presentation... to Now...



Today	32 diff pairs @ 10 Gb/s	4 RF contacts @ 26.5 GHz	12-24 optical lanes @ 25 Gb/s
Tomorrow (not literally)	32 diff pairs @ 25 Gb/s	8+ RF contacts @ 60 GHz	24-48 optical lanes @ 25 Gb/s

Where VPX is today:



High Speed Backplane Connectors

VITA 46.30 released for 25+ Gb/s

Higher Density Coax/Optics

VITA 66.5 / 67.3 examples:

10x 50-ohm coax contacts + MT

3 MT's (up to 72 fibers)

But it's not enough!

Key Objectives for the Next Gen VPX Connector

- **Double the pin count** of current VPX Connector (VITA 46)
- **Support higher data rates** including:
 - 100G Ethernet/lane (e.g., 100GBASE-KR1, 400GBASE-KR4)
 - PCIe Gen 6
- **Increase Current capacity** to support up to 45A (for 500W 6U, 12VDC)
- **Mechanical Fit:**
 - Support 1" slot pitch
 - Modularity compatible with 3U, 4U and 6U form factors
 - Compatible with existing VITA 66/67 Coax and Optical Connector Modules
- **Support rugged environments**
 - VITA 47.3 Environmental requirements
 - VITA 72 Extreme Vibration
 - Space compatibility

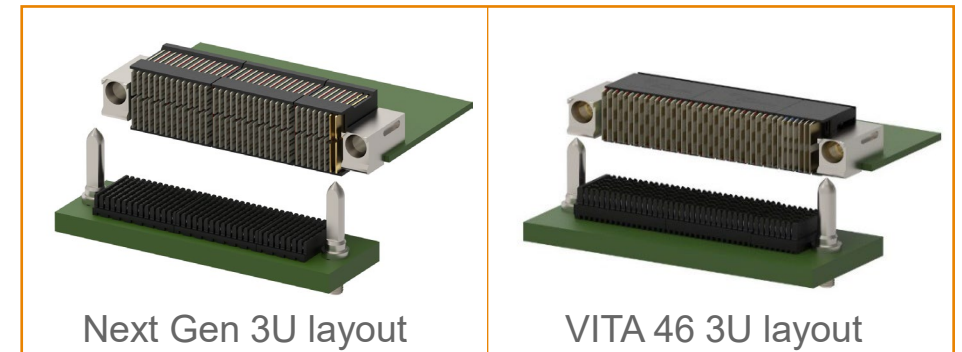
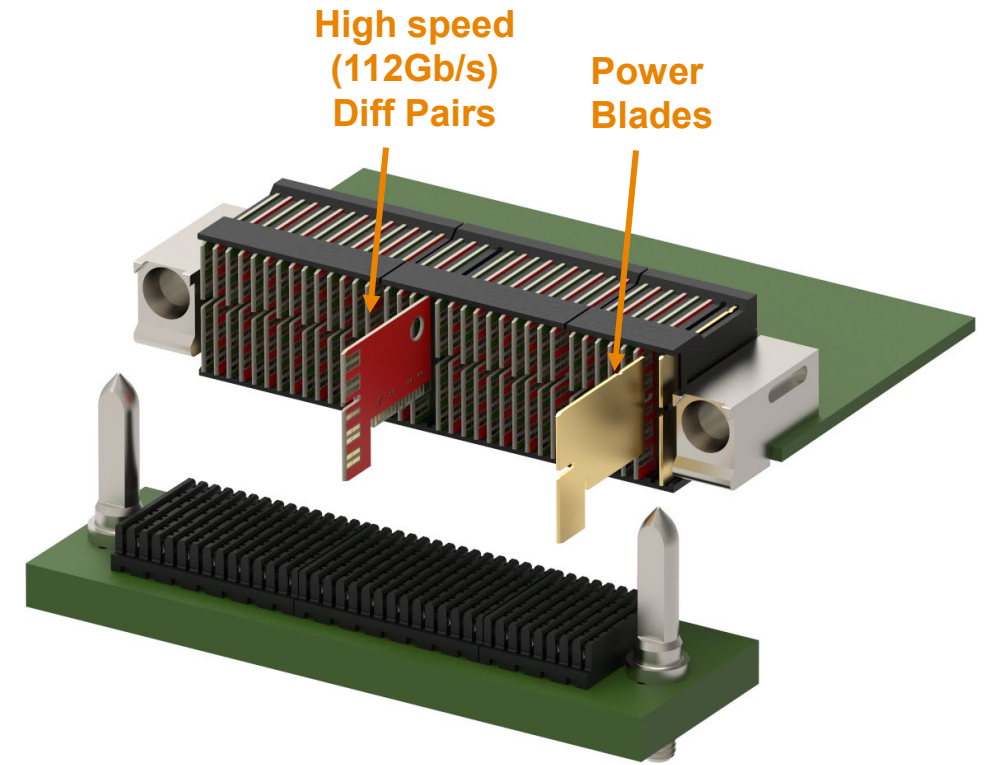


Full set of requirements defined by the VITA 85.106 Study Group

Next Gen VPX Connector VITA 100.30

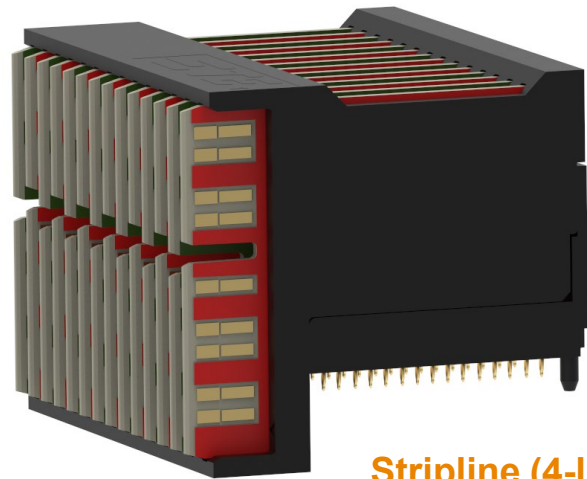
A Revolutionary MULTIGIG Connector

- Integrated wafer technology builds on success of VITA 46.x connectors:
 - Rugged, reliable interface
 - Optimized for varying signal requirements
 - Configurable within a connector
- Significant pin count increase
- Supports higher speed protocols (100G lanes)
- Power blades for increased current capacity

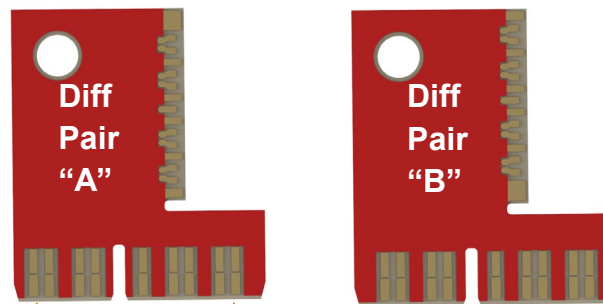


A Look Inside the VITA 100.30 Connectors

Plug-In Module



Stripline (4-layer) wafers
for superior isolation



High Speed
Diff Pairs
Transmit

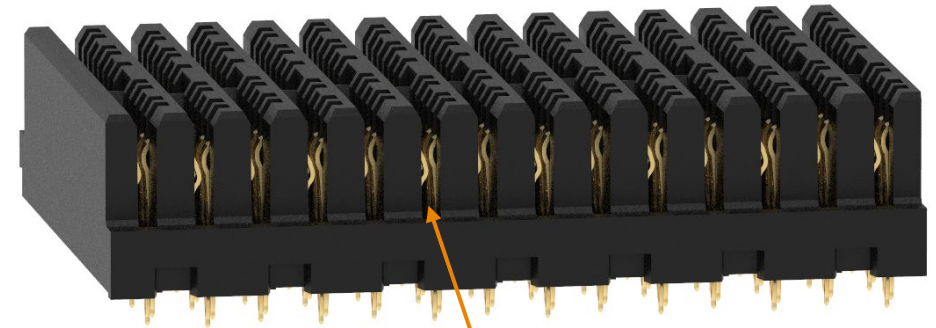
Single
Ended

High Speed
Diff Pairs
Receive

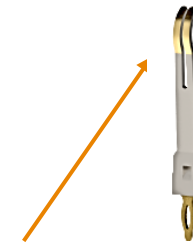
Diff
Pair
"A"

Diff
Pair
"B"

Backplane



Ground shields for isolation
between columns. Backplane shields
connect to back side of wafer to
achieve coplanar grounding



4-point contacts – dual beam design provides
2 contact points per beam for reliability

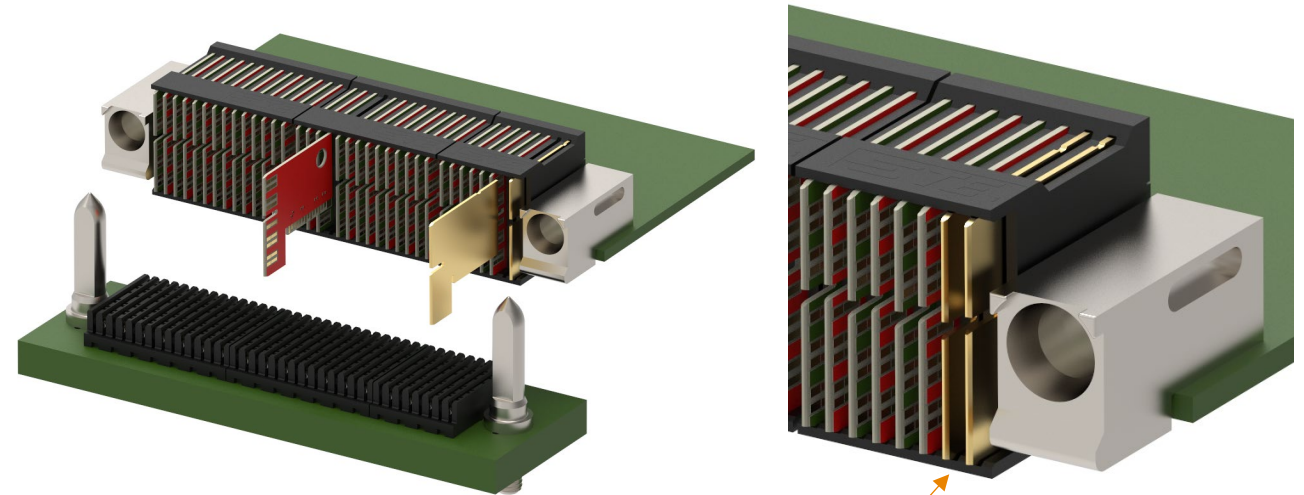
No exposed pins to bend – contacts are
shrouded (same as VITA 46)

Integral High-Current Power Blades

- Supports emerging need for higher power plug-in modules
- Copper-Alloy power blades offer **more than 2X the current capacity over VITA 46**
- Power blades are populated within the connector housing for a high density, integrated solution

Requirements as defined by VITA 85.106:

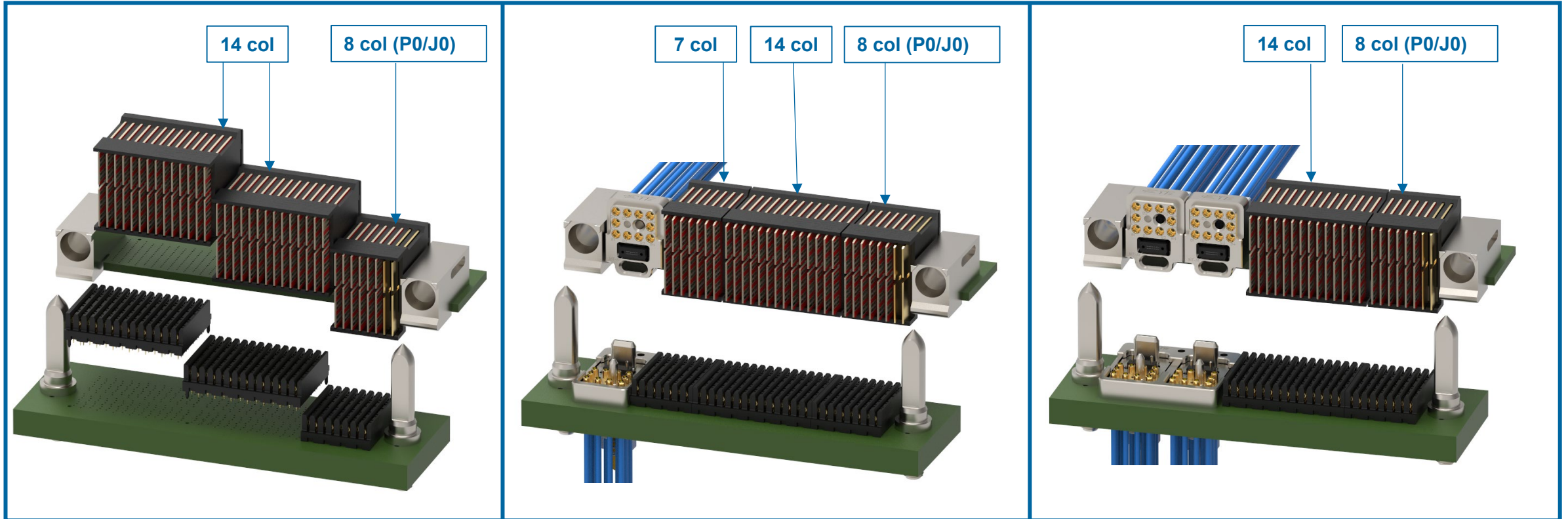
Form Factor	Voltage	Power Level	Connector Current Capacity Required
3U	12VDC	300W	25A
4U	48VDC	500W	11A
6U	12VDC	500W	45A
	48VDC	800W	16.5A



Power Blades:
1 current "IN", 1 current "OUT"
Prototype test data shows support for
45A at 30C T-rise with this layout

VITA 100.30 Connector Building Blocks

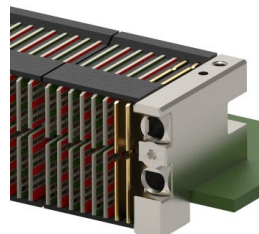
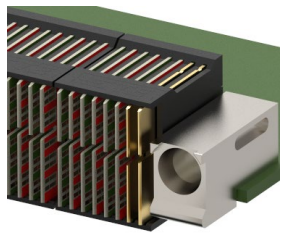
3U Layout Examples



- Common building blocks will populate 3U, 4U and 6U slots
- Compatible with existing VITA 66, 67 coax/optical connector modules

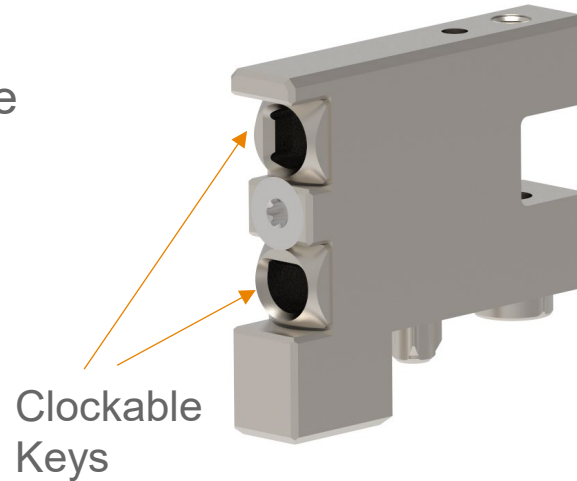
Proposed Slim Guide Hardware

Slim guides reduce the board space required for guides and keying while protecting the connectors

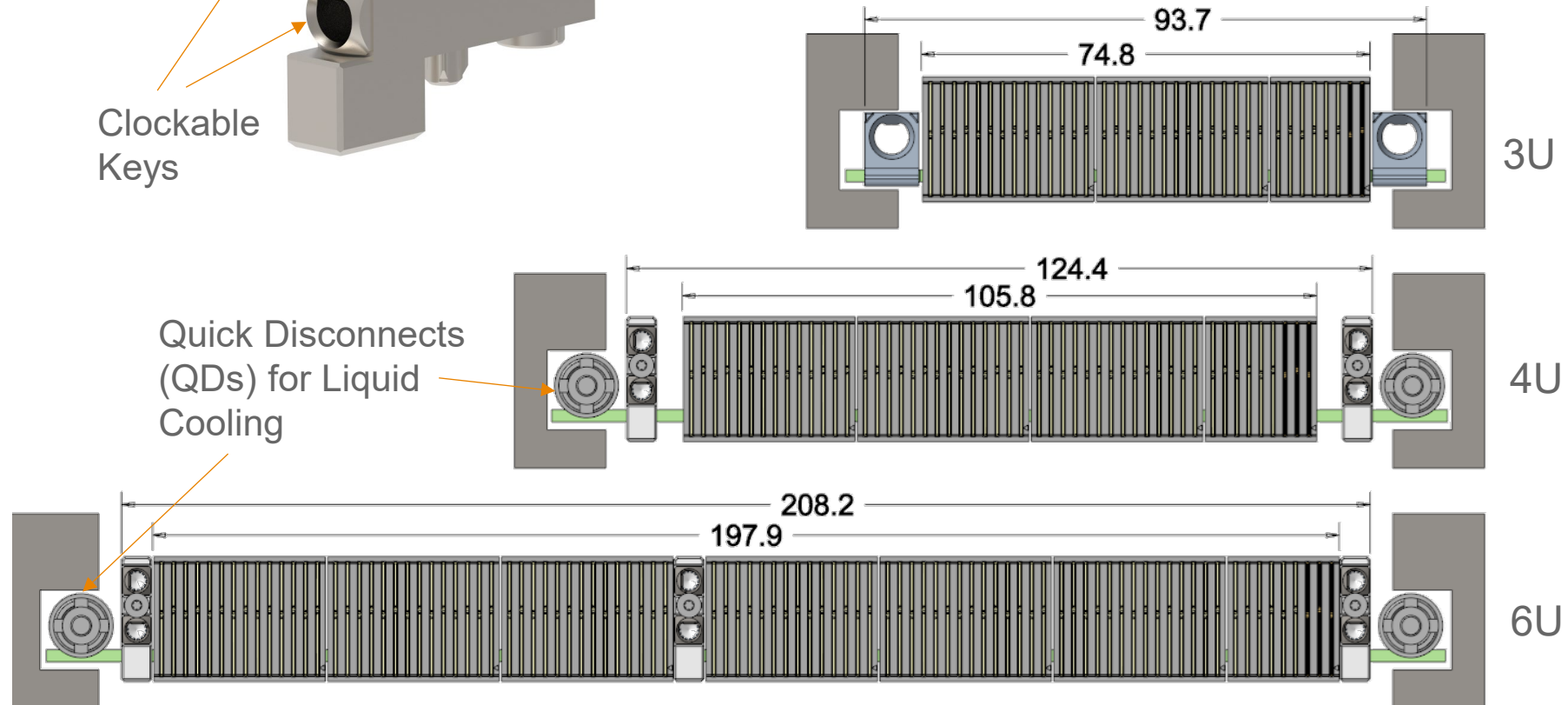


VITA 46
Guide
Hardware
(9mm wide)

Proposed Slim
Guide
Hardware
(5mm wide)

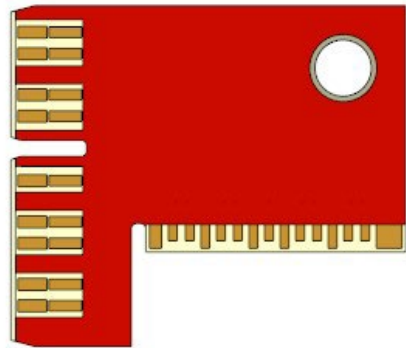


Quick Disconnects
(QDs) for Liquid
Cooling

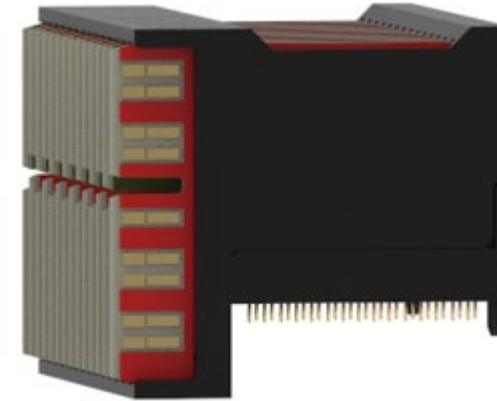


Higher Pin Count with 6-pair VITA 100.30 Connectors

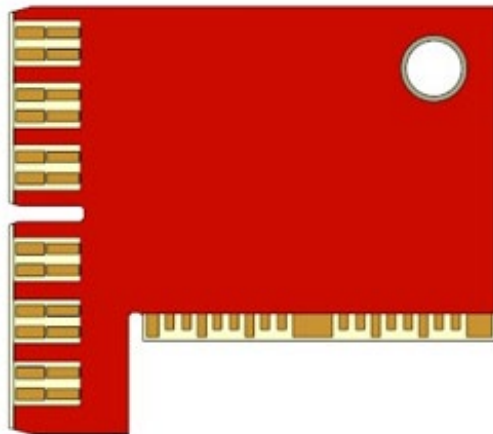
4-Pair



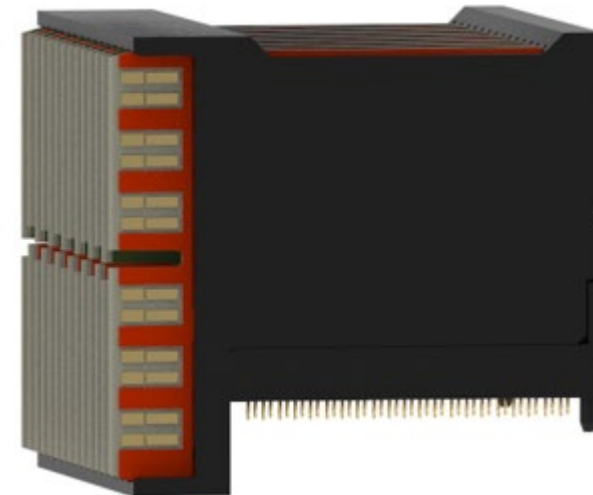
- Supports 1" slot pitch
- Clearance for XMC cards
- 4 diff pairs and 1 single-ended contact per wafer/column



6-Pair

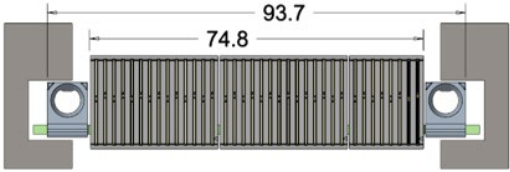
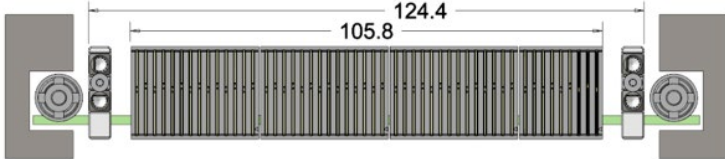
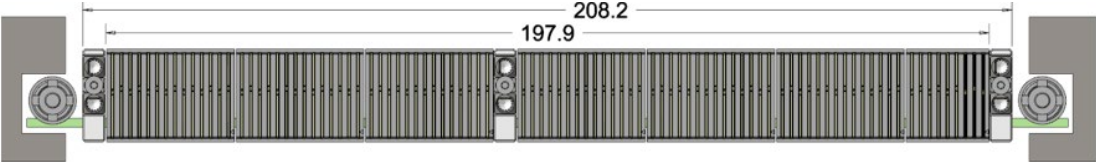


- 1.2" minimum slot pitch required
- Not compatible with XMC cards
- 6 diff pairs per wafer/column
- Suited for high density switches or other applications where more I/O is required.
- 1.2" pitch brings opportunity for 4-MT half modules



Pin Density Increases over VPX

Proposed Slot Configurations – 4-pair and 6-pair VITA 100.30

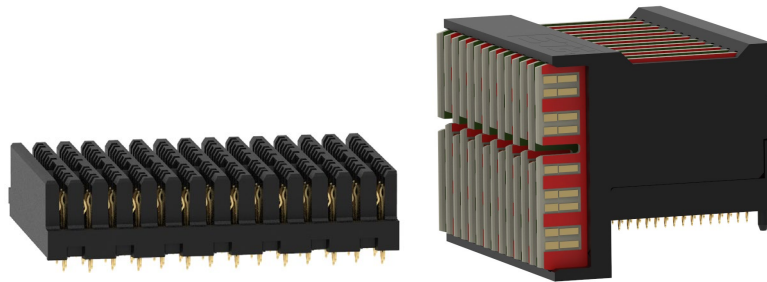
		VITA 100.30			VITA 46.X		
		High Speed Diff Pairs	Low Speed Pins	Total Pins	High Speed Diff Pairs	Low Speed Pins	Total Pins
	3U	112 - 4pr 168 - 6pr	28 - 4pr 0 - 6pr	252 - 4pr 336 - 6pr	64	16	144
	4U	168 - 4pr 252 - 6pr	42 - 4pr 0 - 6pr	378 - 4pr 504 - 6pr			
	6U	336 - 4pr	84 - 4pr	756 - 4pr	192	48	432

Pin counts exclude P0/J0 connectors – utility signals and power
Slot Illustrations show 4-pair connectors

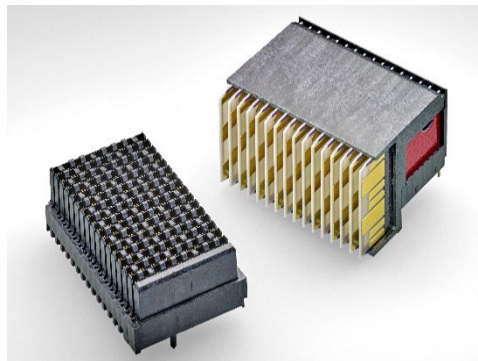
A Leapfrog in Signal Integrity (SI)

- VITA 100.30 connectors are not just an extension of VITA 46 – they bring new technology to VPX architecture
- Stripline wafer construction, ground shields, SI vias in PCB layouts, enhanced internal design
- Crosstalk is significantly reduced, meeting 100G signaling requirements, while providing significantly higher density and supporting 4X data rate over existing VITA 46.30 VPX Connectors

MULTIGIG HD Connectors (VITA 100.30)

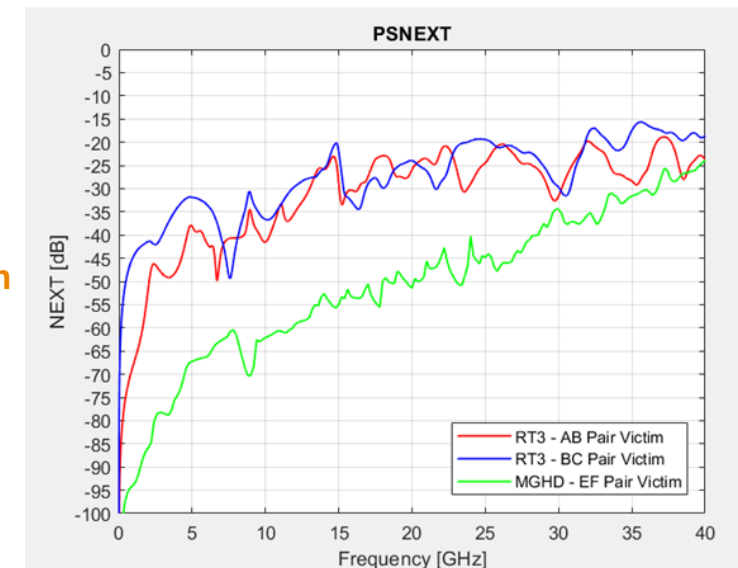


MULTIGIG RT 3 Connectors (VITA 46.30)

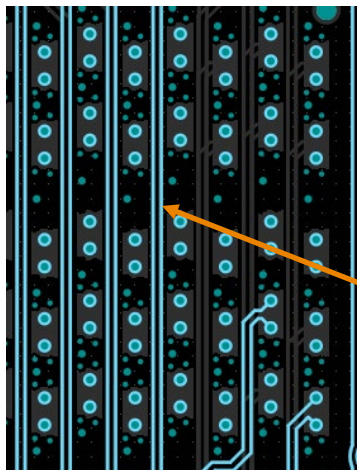


MULTIGIG HD vs MULTIGIG RT 3

**Significant
crosstalk reduction
over VITA 46.30
connectors**



Design for Signal Integrity – more than just the connector



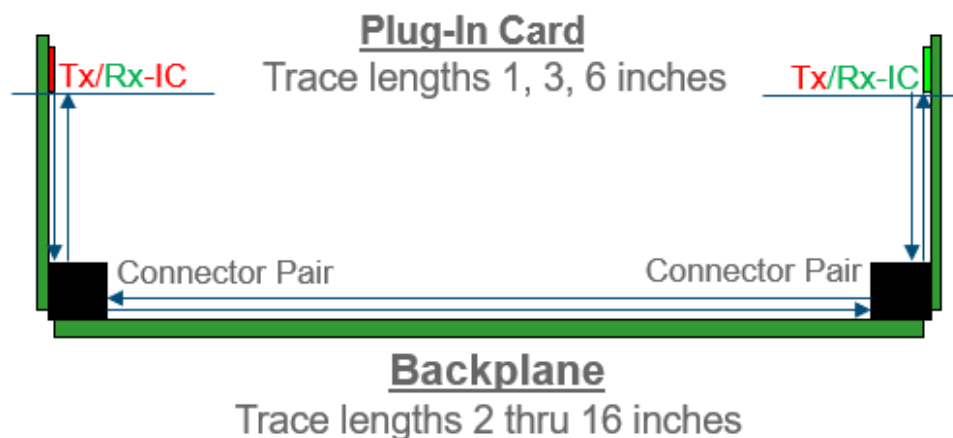
Designed for optimal PCB routing

- Placement of SI/blocking vias allows for “straight” through routing
- Wide routing channel supports 8 mil traces for lower channel insertion loss
- No necking down of traces needed

Channel Modeling

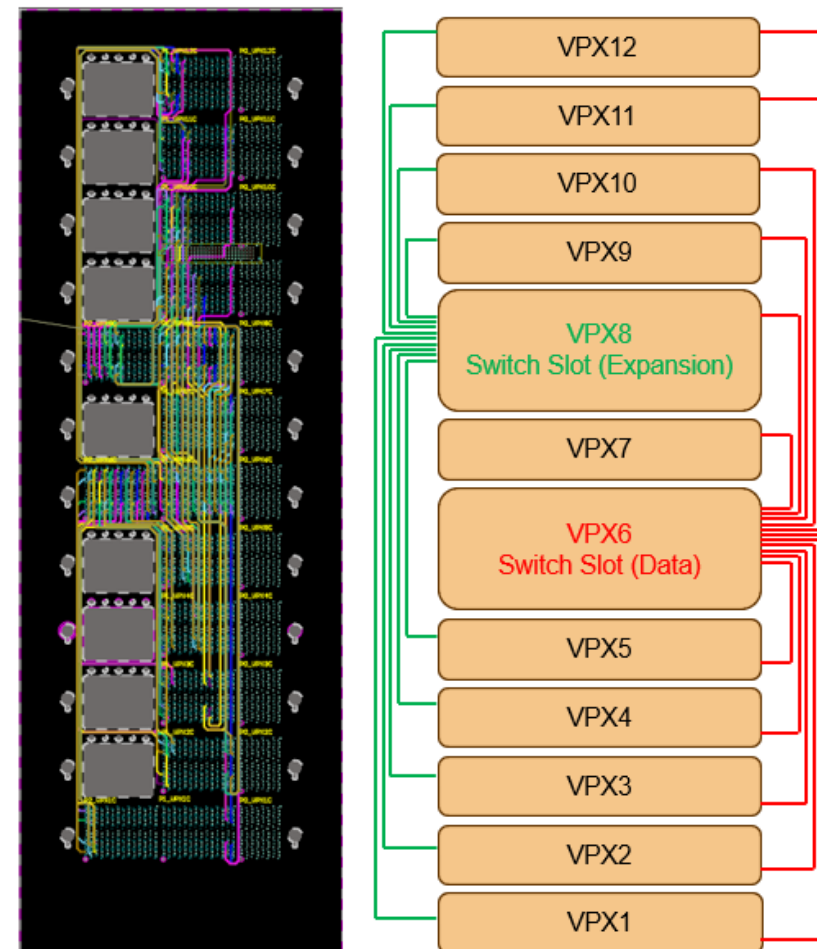
Met requirements for 100G Ethernet, PCIe Gen 6 with margin

Parameters defined in VITA 85.106 for 112G KR Simulation



12-Slot Routing Study

mapped 182 diff pairs over 10 routing layers



Integrating AC-Coupling Capacitors in the Connector

Higher speed protocols require AC coupling capacitors in the channel

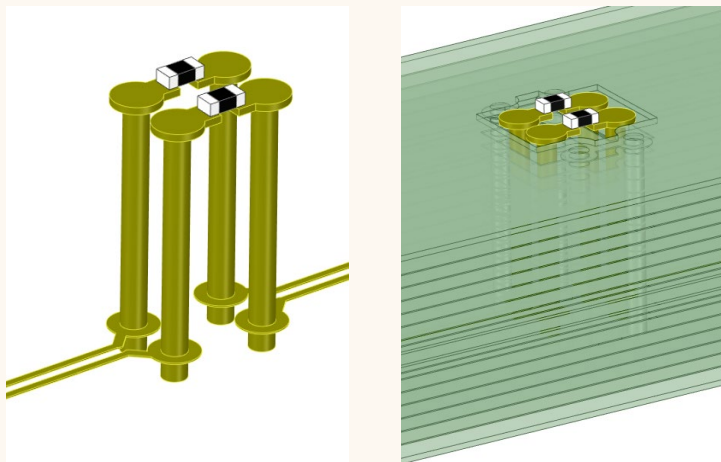
Integrating caps into the connector wafers:

- improves SI performance
- frees up valuable plug-in card space

VITA 100.30 Connectors will be released with Cap-on-Wafer option

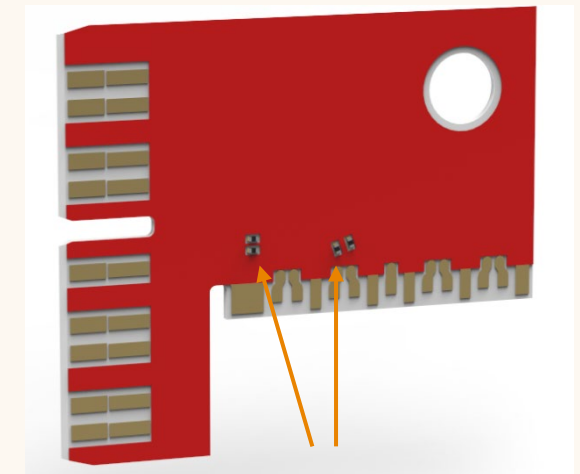
Option #1 Cap on Plug-In Card

- Putting caps on Plug-in-Module Card
 - Requires long vias that include a stub
 - Take up valuable space on PIM



Option #2 Cap on Wafer

- Wafer technology allows use of caps directly on wafer
 - Small, stub-less vias can be used to connect cap to signal trace
 - Frees up space on Plug-In Card

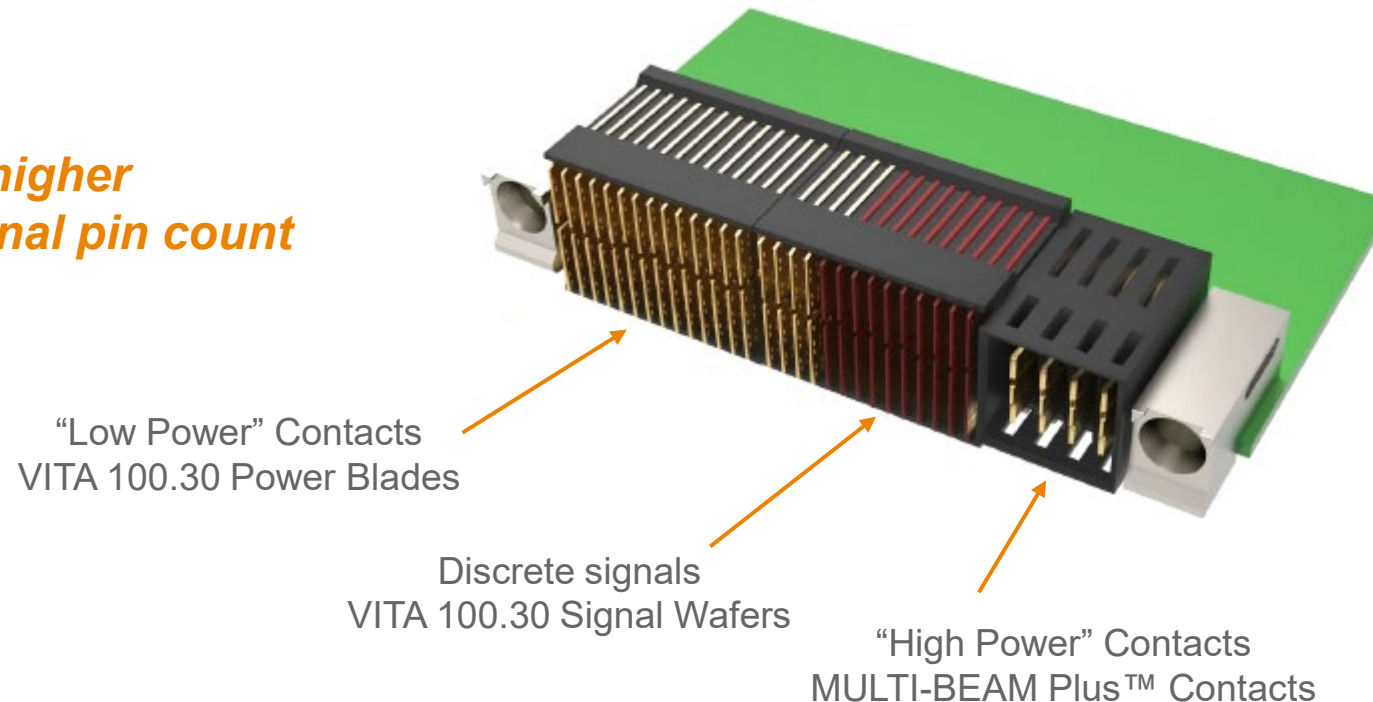


Leverage Technology for Next Gen Power Supplies

VITA 100.30 connector technology brings opportunities for power supplies:

- Leverage VITA 100.30 Connector platform for signal pin density and “lower power” 45A contacts
- Leverage MULTI-BEAM Plus™ (higher current variant than VITA 62) for “higher power” 100A contacts
- Build in isolation fins for creep / clearance distance at high voltage levels
- Easily configurable

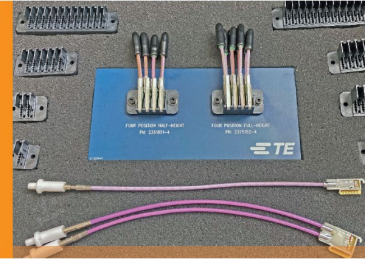
Supports need for higher current and functional pin count



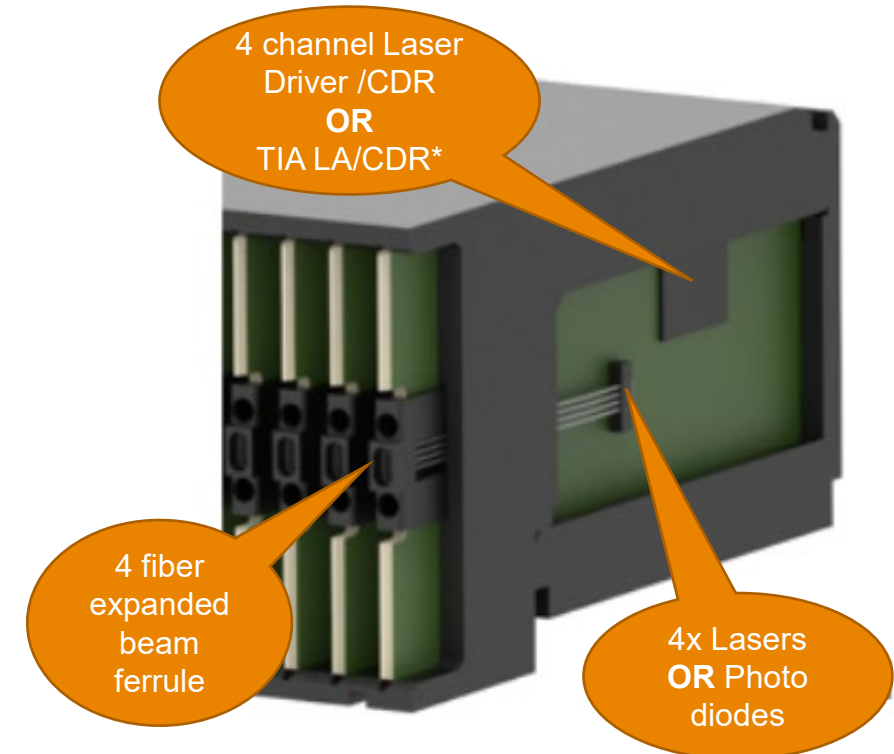
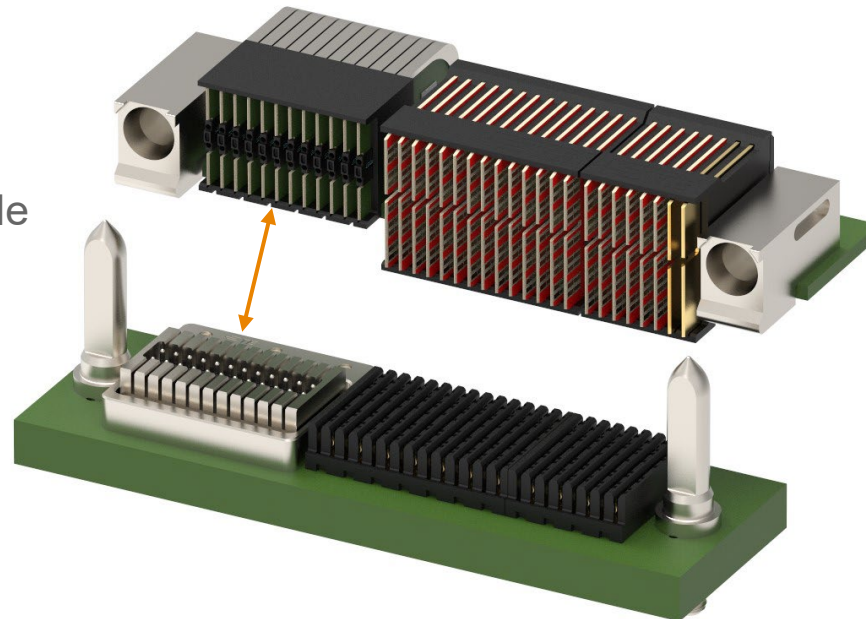
Roadmap for Integration of Optics

- Chiclet-Based Optical Transceiver (CBOT) platform is based on MULTIGIG wafer designs and press fit pin terminations
- 4 Tx or 4 Rx options 56G PAM4 would be supported by the 4 high speed data pairs on VITA 100.30 style wafers
- Separable expanded beam interface
- ***Currently in development***

**MULTIGIG RT FIBER
OPTICS MID-BOARD
TRANSCEIVER
PLATFORM**
850 nm MULTIMODE



Full-size (e.g., P2) module
is 12 ferrules (48 fibers)

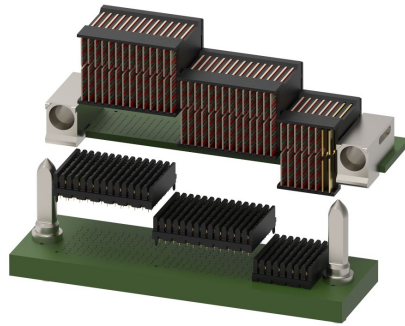


* Trans-Impedance Amp / Clock & Data Recovery

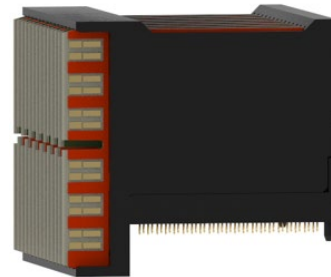
VITA 100 Interconnect

Building a Platform for the Next Generation

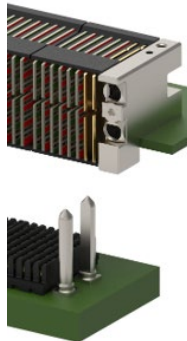
Initial VITA 100.30 Connector Portfolio



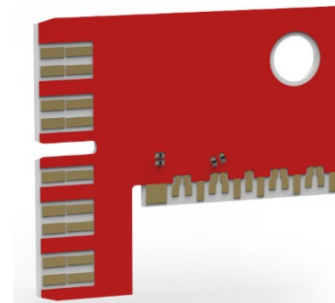
4-pair Connectors



6-pair Connectors

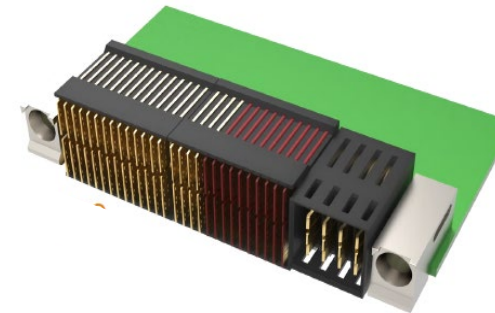


Slim Guides

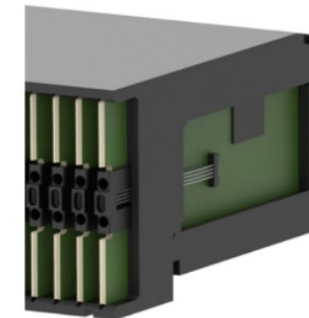


Connectors with
Caps on Wafer

In Development



Proposed Next Gen
Power Connector



Optical Transceiver
on Wafer

CONNECT LIKE THE WORLD DEPENDS ON IT. BECAUSE IT DOES.

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