Tyco Electronics Proposal T10/08-434r1 for a New Internal and External High Density Mini-SAS Connector System

Electrical Connector and Mechanical Cage for Pluggable Interfaces up to 12 Gbps / Channel

Submittal Date: October 2008

Revised October 31 2008

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Our Commitment, Your Advantage

TE's new High Density Mini-SAS proposal provides the following advantages to customers using Mini-SAS technology.

- Suitable for 6 & 12 Gbps SAS Applications
- PCI Bracket Compatible
- External Push or Pull Latching capability (Customers discretion)
- Improved Insertion and Return Loss Performance
- Designed for External Fiber Cable Option
- Designed for Active Cable Assembly Option
- Heat Sink Compatible Designs
- Single Port or Multi-port Configurations Available
- Various EMI Containment Options

Physical Information

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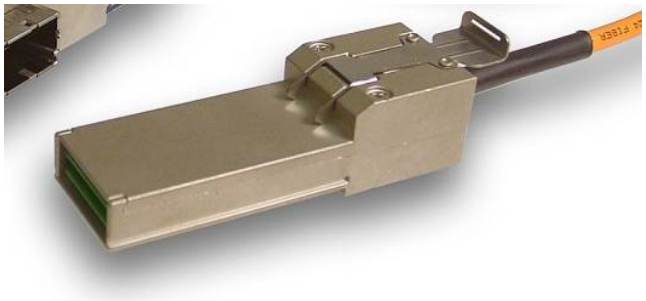
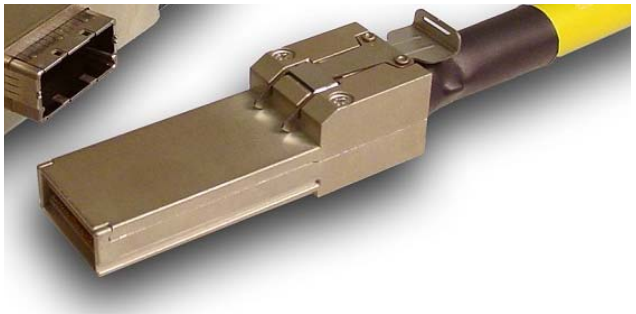
External Embedded Fiber and Copper Plug Cable Description

26, 28 and 30 AWG Cable will be available

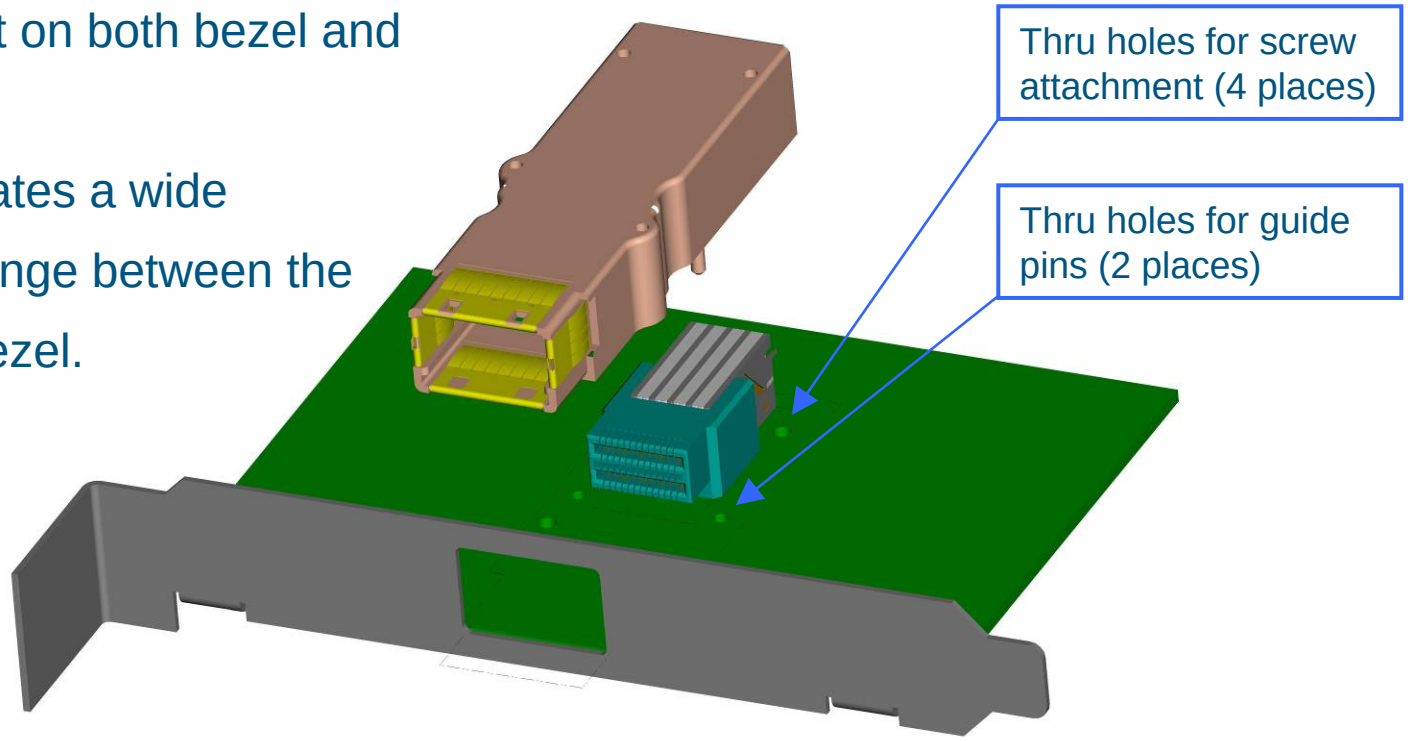




	Embedded Fiber	Copper
Cable Diameter	6.2mm (Dual 4x) 13.2mm (8x)	11mm(1 cable), 8.2mm(2 Cables)
Cable Construction	12 or 24 fiber	8 or 16 pair
Cable Bend Radius, min	5x Dia min	6X Cable Dia
Industry Specification	TIA-492AAAC-XBAX ICEA S-83-596-2001	
Max Cable Length @ 12Gbps	100 Meters	10m (Passive) 30m (Active)
Power (Watts)	2.0 – 2.5 max	1.5 max (Active)

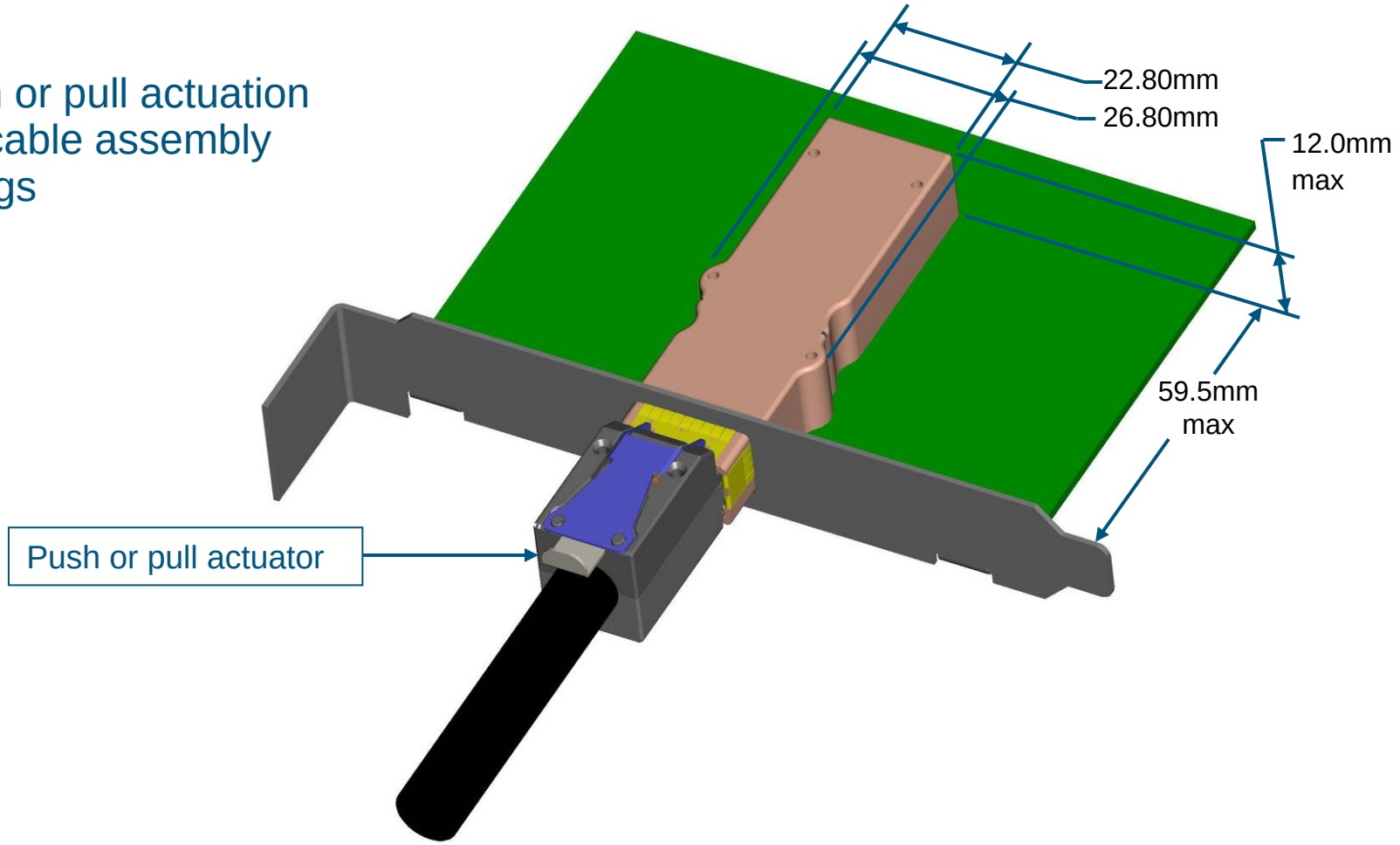
External PCI Compatible Single Port Receptacle with optional EMI Springs

- EMI Springs provide full EMI containment on both bezel and cable plug
- Accommodates a wide tolerance range between the cage and bezel.

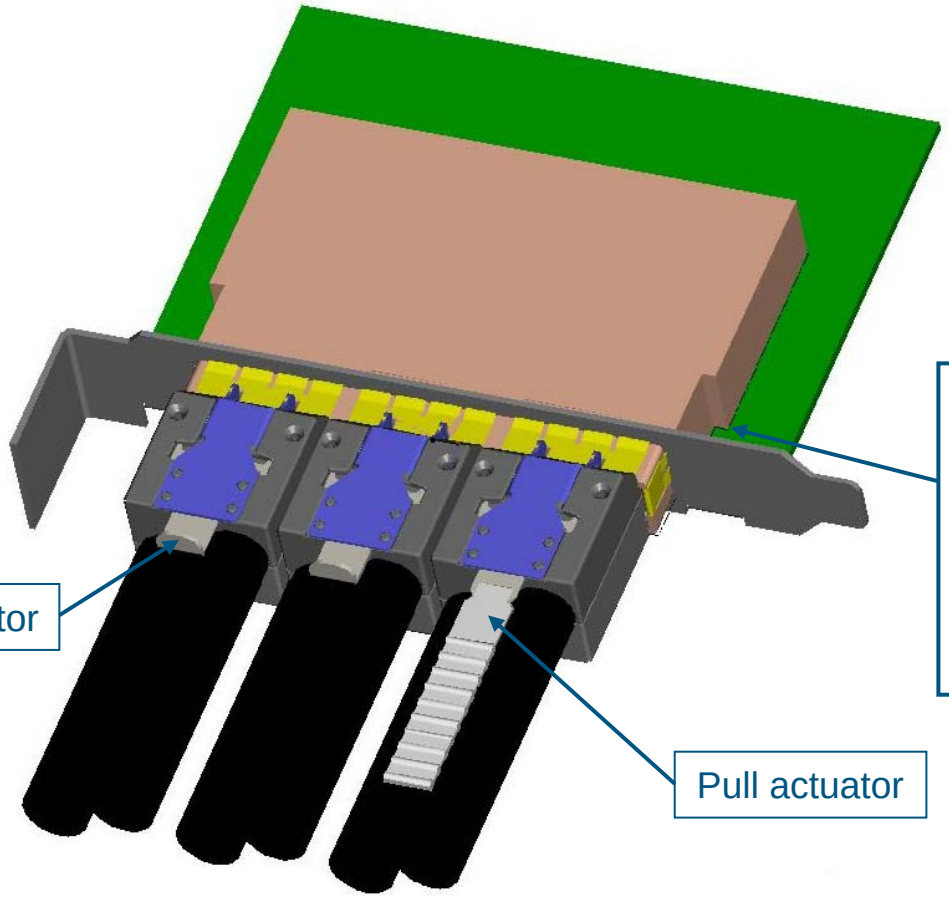


External Single port PCI Configuration

Push or pull actuation of cable assembly plugs



External 1x3 Multi-Port PCI Configuration

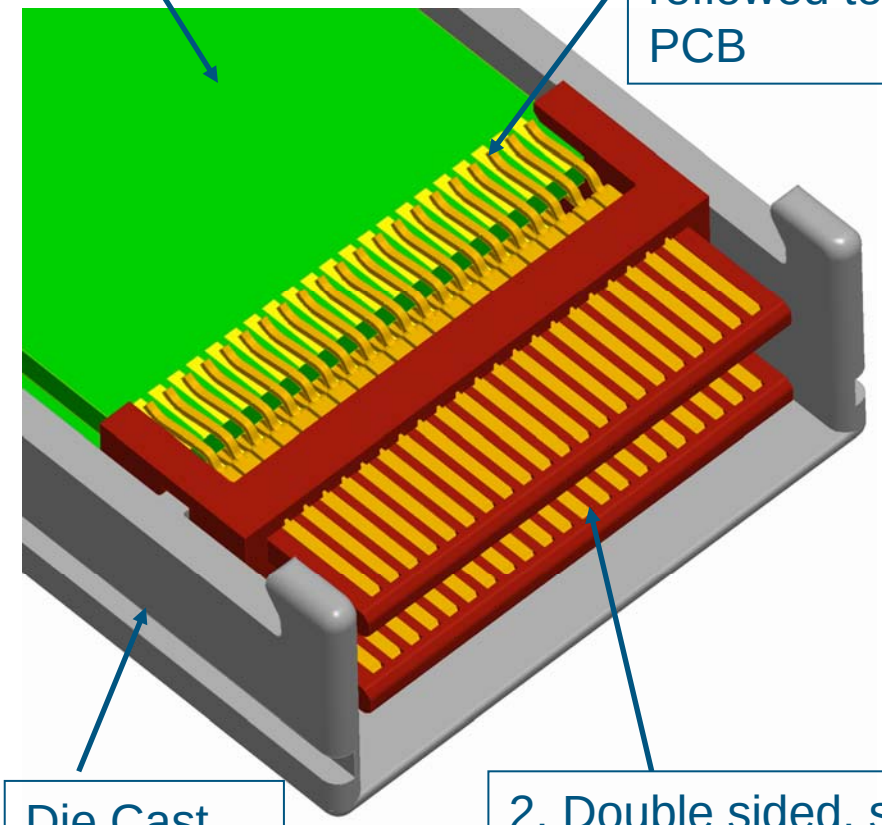


Push actuator

Pull actuator

Die cast housing **FULLY** encapsulates module boards to provide robust stabilization, polarization and to prevent stubbing during insertion of the plug into the receptacle.

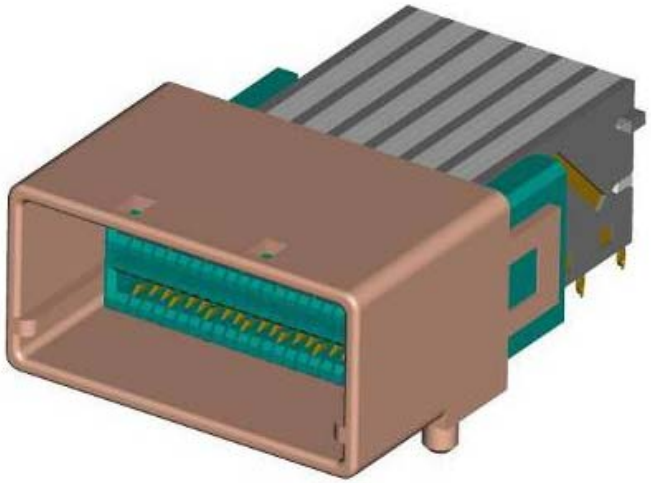
2-Piece Plug Option



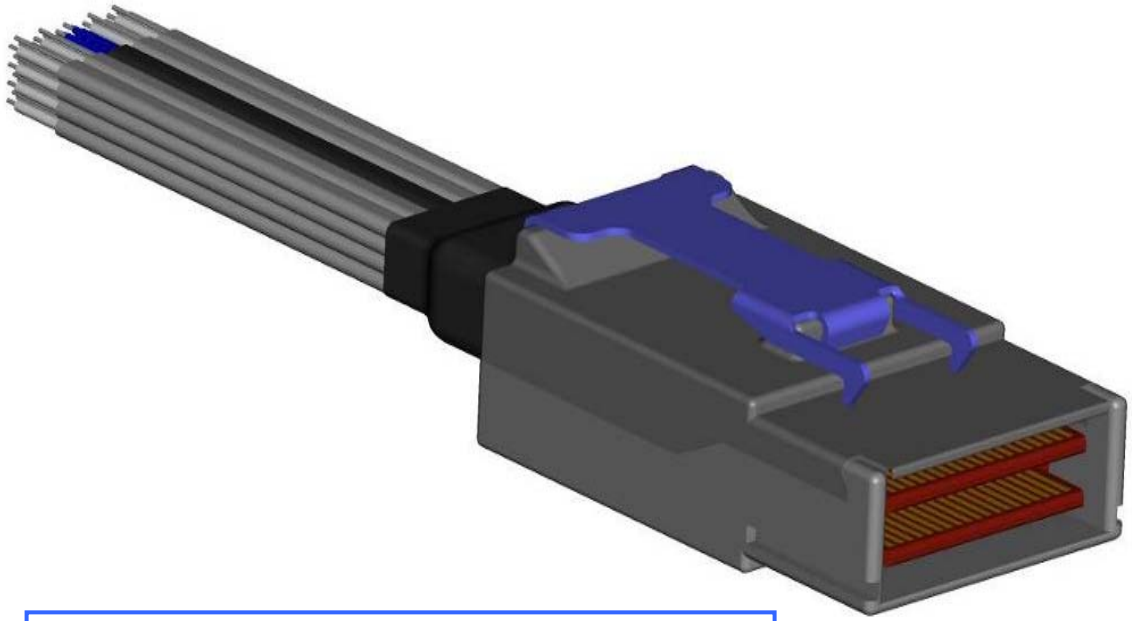
- Adding a straddle mount connector:
  - Eliminates hard gold plating on the module board
  - Permits tighter tolerances between the contact pads and exterior surfaces
    - Lowers the cost of the module PCB
    - Increases the vendor base for PCB suppliers
  - Improves durability to 500 cycles

Internal Assembly Details

Preassembled Single Unit

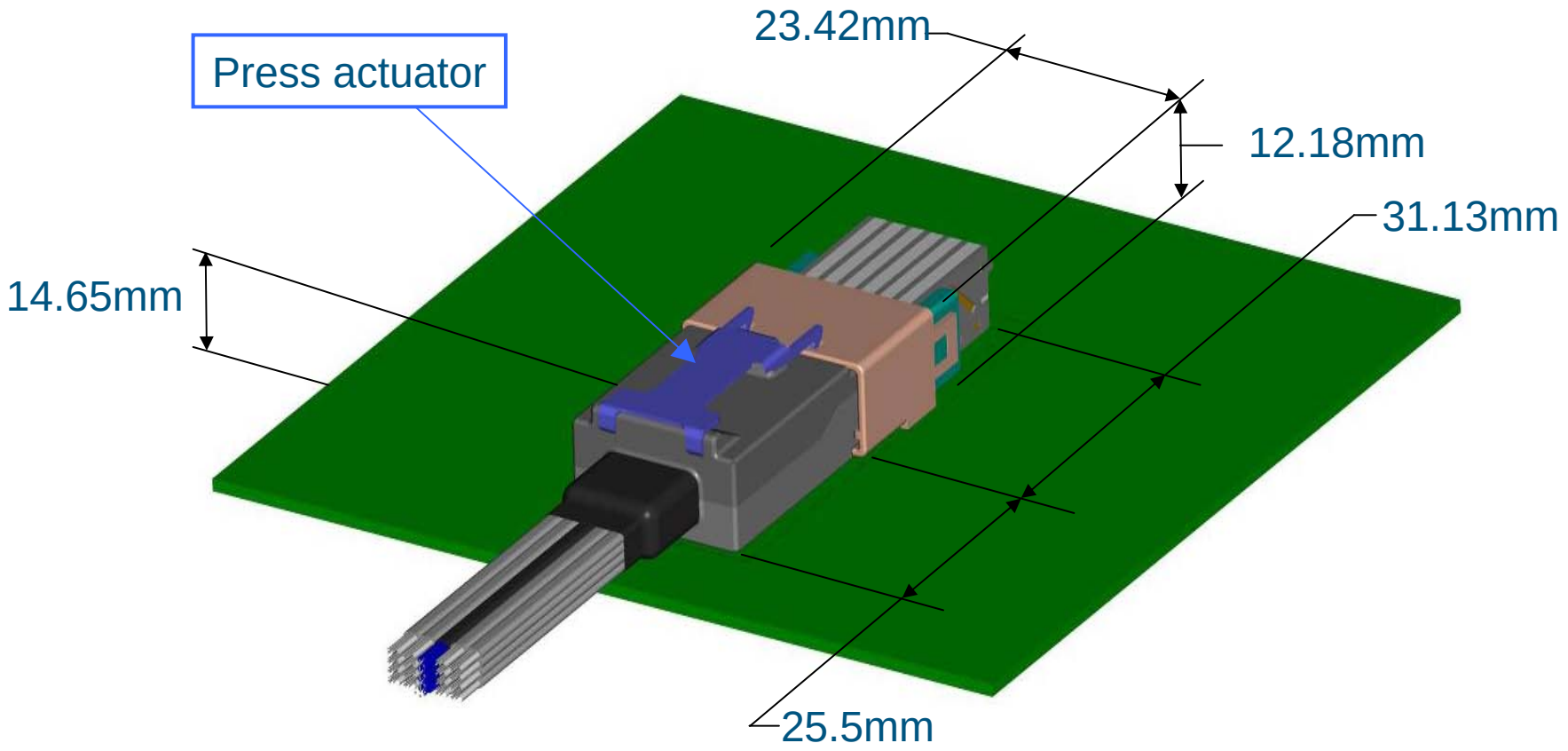


Press fit pins



Plastic shell with guide rails to prevent stubbing during insertion of the plug into the receptacle

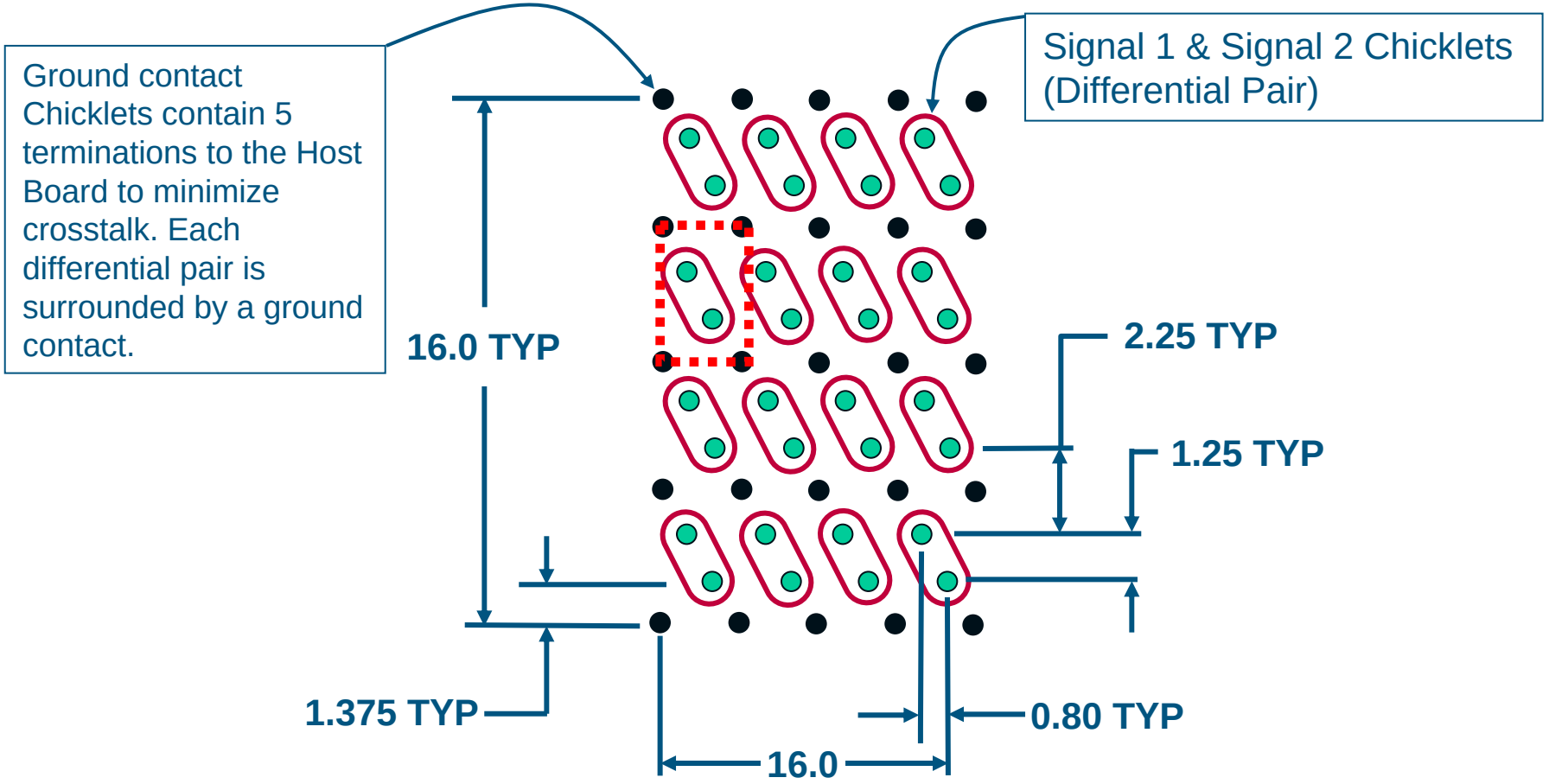
Internal Single Port Configuration



Pinout Options

- Current offerings for SAS applications are 26 positions for external and 36 positions for internal assemblies
  - Requests have been made by various customers for the ability to increase the density of the 36 position internal assembly
  - Additional requests have been made to add power and EEPROM features to the external assembly
    - Active cable assemblies for longer distances
    - Active equalization options
    - External direct attach optics

Receptacle Host Board Layout



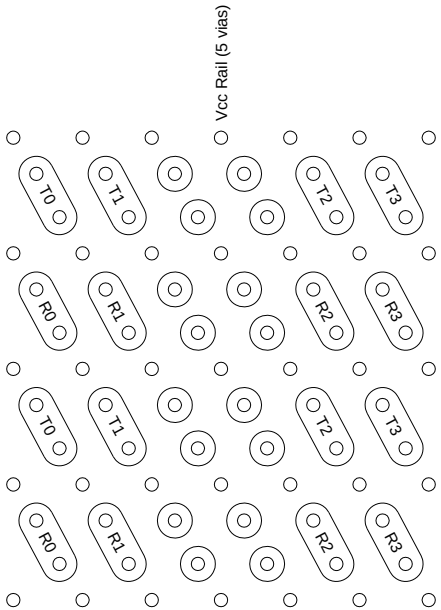
3 Chicklet Approach; Ground, Signal 1 & Signal 2

Optional Pinouts

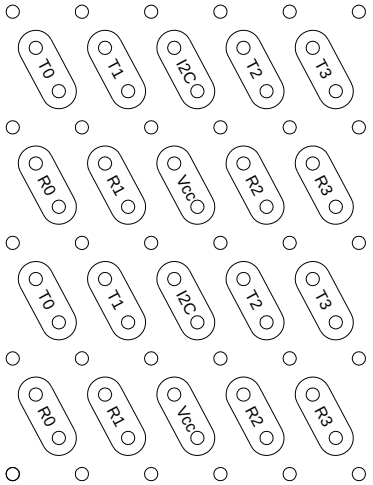
- Existing external assemblies are 26 positions
- Potential to add additional contacts for power, I^2C, or other user defined features

Connector 1

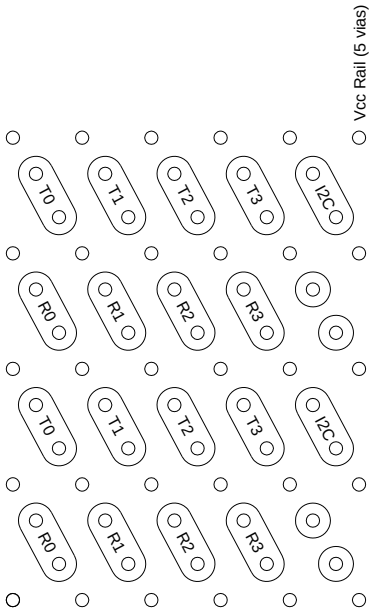
Connector 2



SAS Style (38pos)



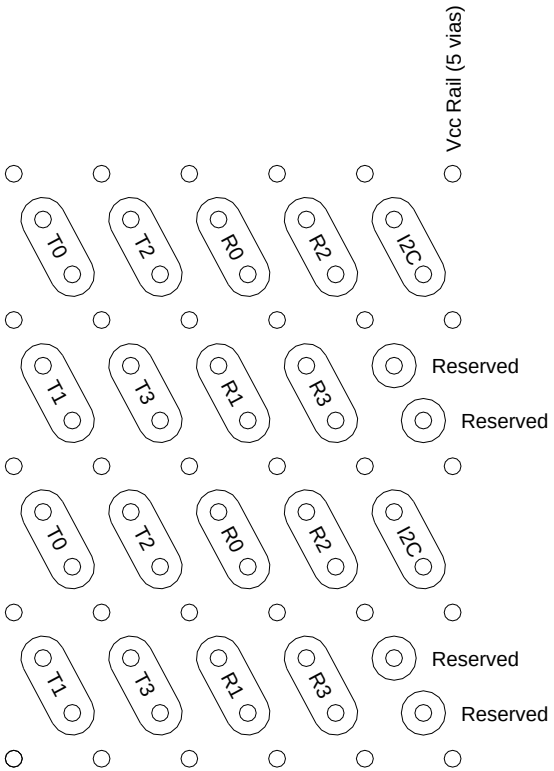
SAS Style (32pos)



SAS Style 2 (32pos)

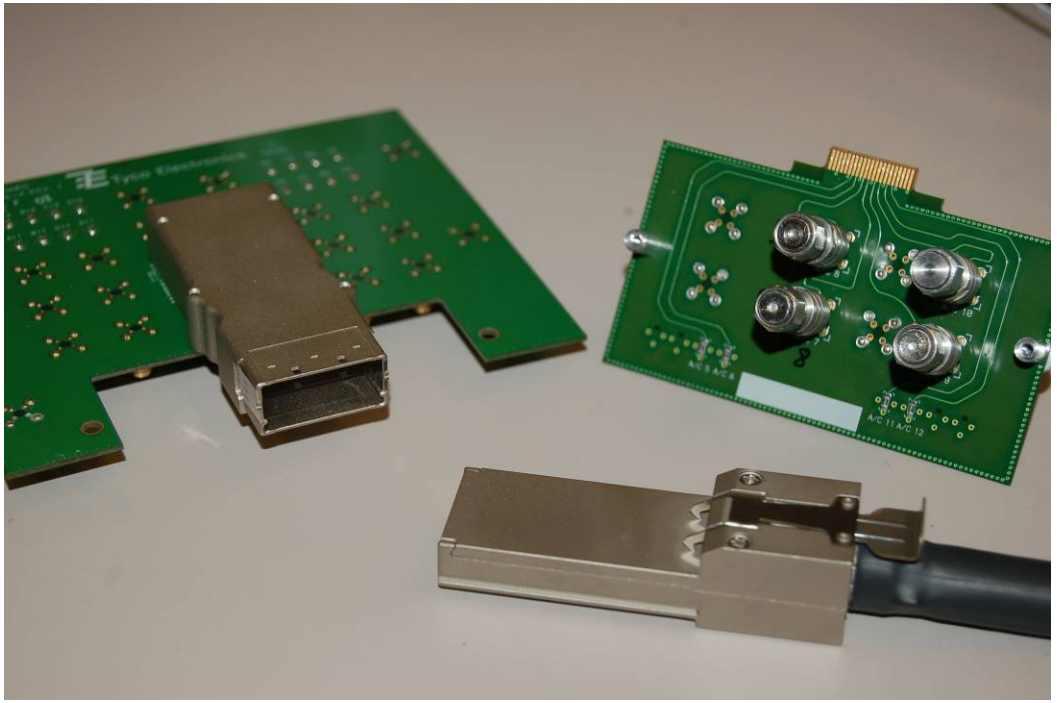
Pinout Studies, Cont'd

- Preferred pinout for a powered, external assembly



SAS Style (32pos)

Electrical Performance Summary



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Electrical Performance Update

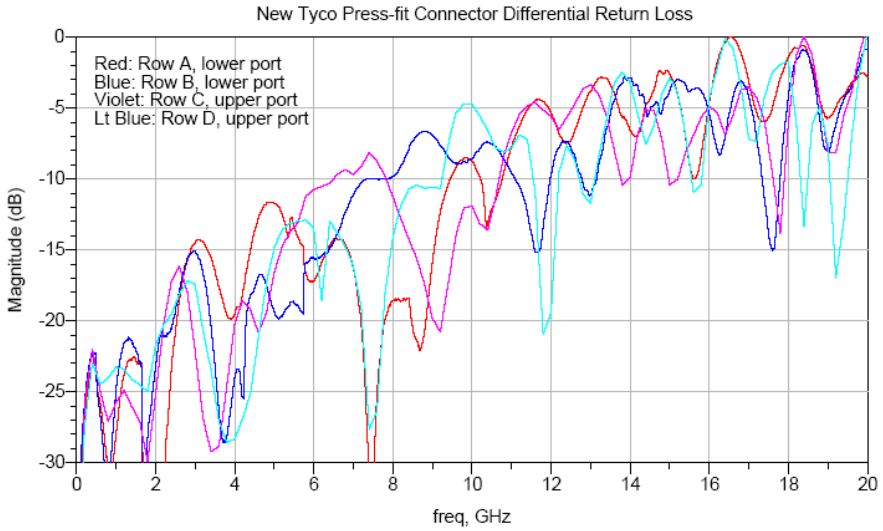
- Product has been fully simulated and various .s4p, .s8p, and .s16p files are available for the interface and/or cable assembly
- Production assemblies have been tested with the following data collected
  - Characteristic Impedance (Time domain)
    - Interface (card edge style for module usage)
    - Two piece connector version with cable attached to contacts
    - Card edge with cable attach (Similar to current MiniSAS)
  - NEXT and FEXT (Time domain)
    - Interface (card edge style for module usage)
    - Two piece connector version with cable attached to contacts
    - Card edge with cable attach (Similar to current MiniSAS)

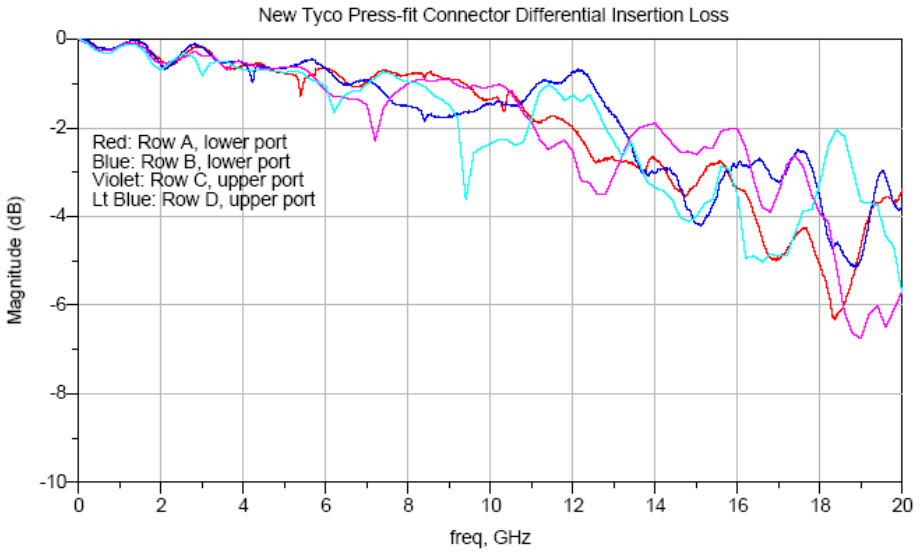
Electrical Performance Update, cont'd

- Production assemblies have been tested with the following data collected
  - Insertion and Return Loss
    - Interface (module usage)
    - Two piece connector version with cable attached to contacts
    - Card edge with cable attach
  - NEXT and FEXT (frequency domain)
    - Interface (module usage)
    - Two piece connector version with cable attached to contacts
    - Card edge with cable attach

Insertion and Return Loss Performance

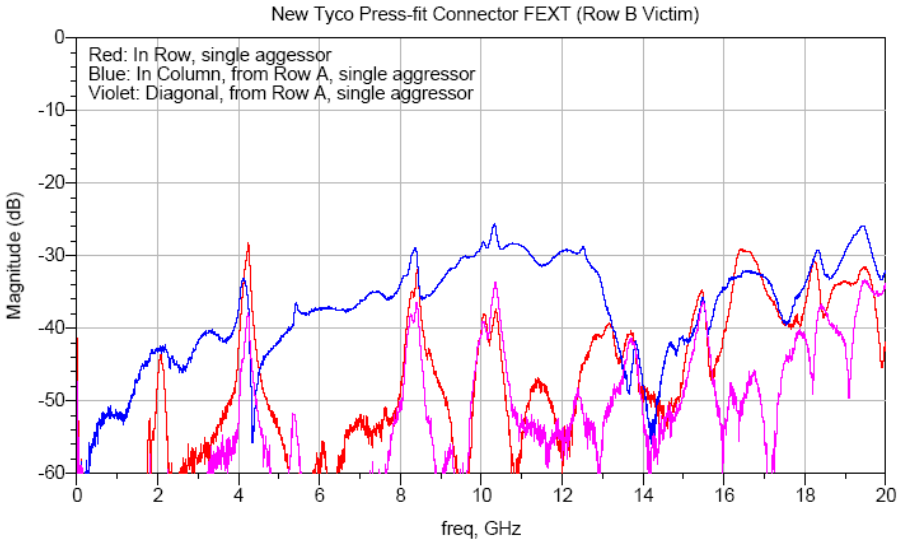
- Host to Module Board (Does not include cable)
- Data is de-embedded to include through-hole/connector/footprint
  - Test board is 1.0mm thick, 6 layer construction, signals on layer 5

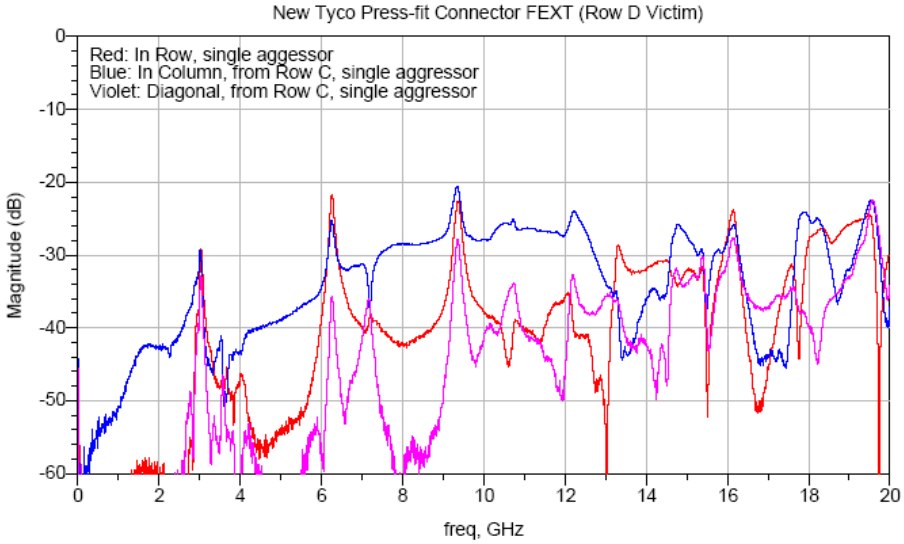




Crosstalk Performance

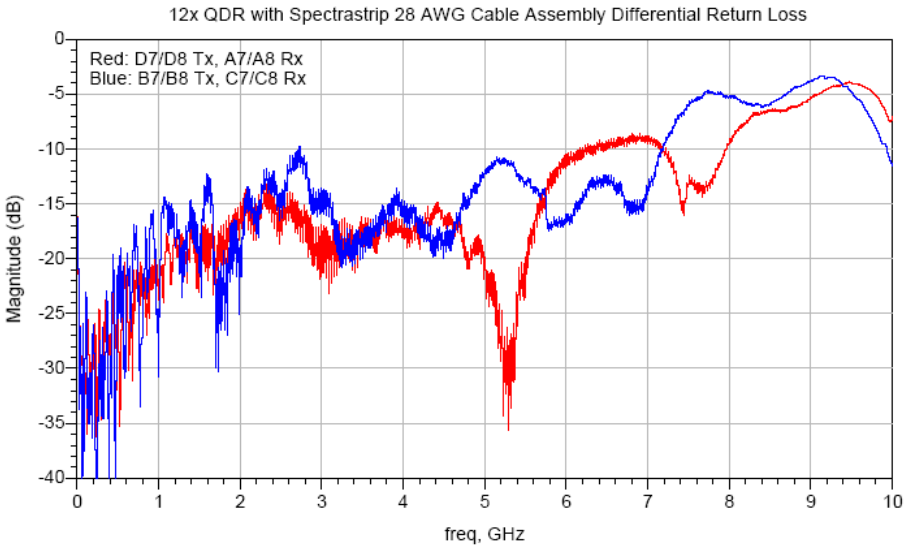
- Host to Module Board (Does not include cable)
- Data is de-embedded to include through-hole/connector/footprint

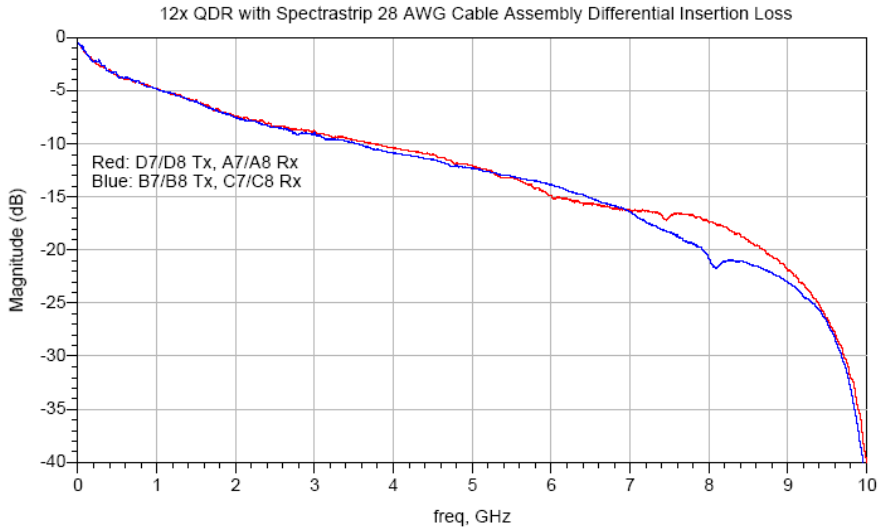




Insertion and Return Loss Performance (Spectrastrip Cable)

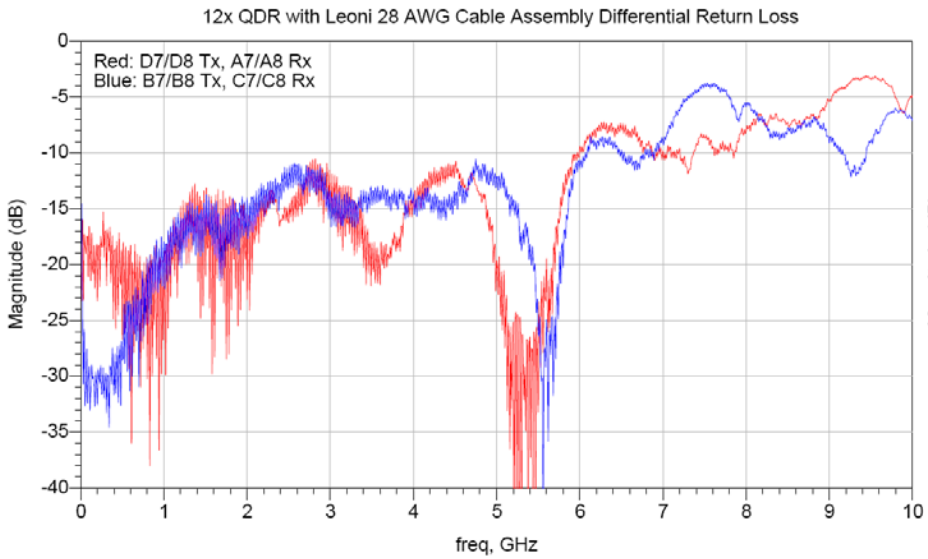
- 4m Cable Assembly (28 AWG, 100 Ohm)
- Data is de-embedded to include through-hole/connector/footprint
- Assembly is unequalized

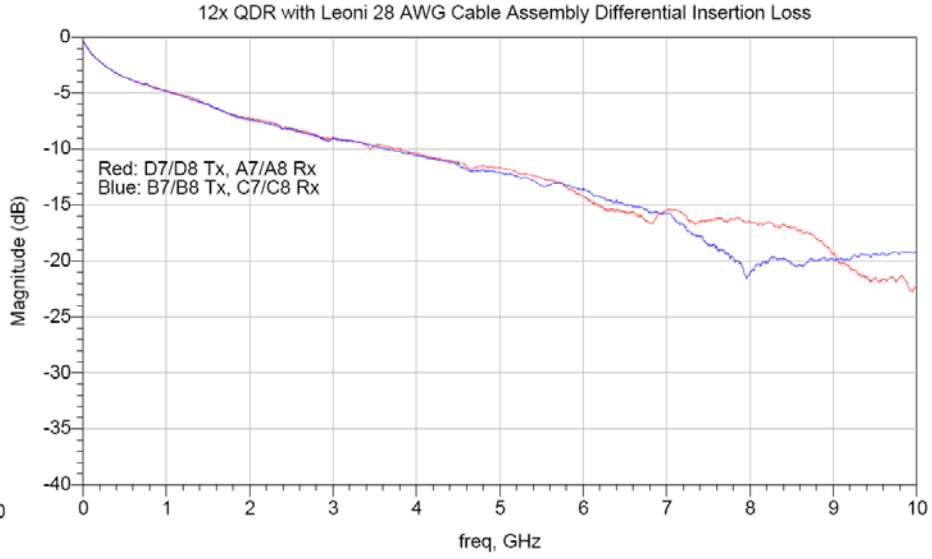




Insertion and Return Loss Performance (Leoni 28 AWG)

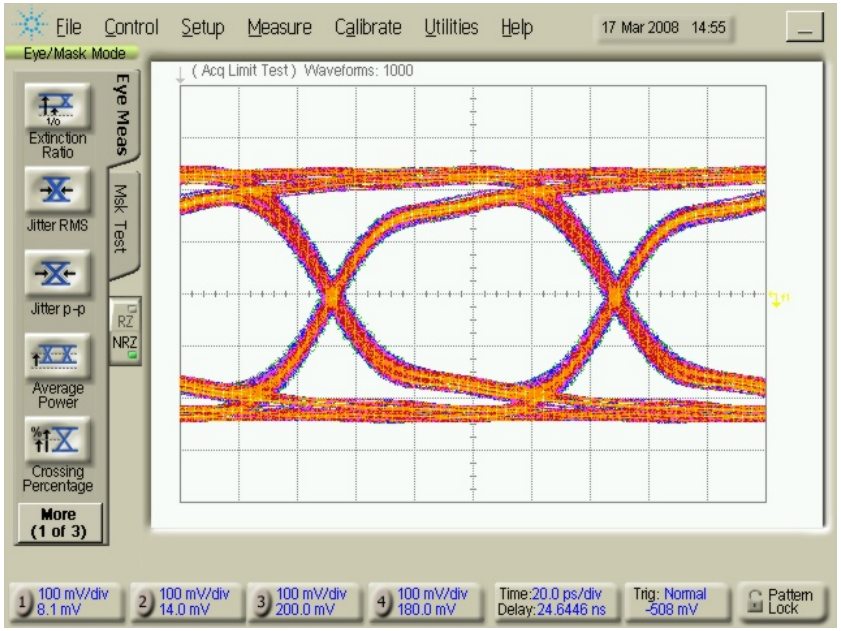
- 4m Cable Assembly (28 AWG, 100 Ohm)
- Data is de-embedded to include through-hole/connector/footprint
- Assembly is unequalized



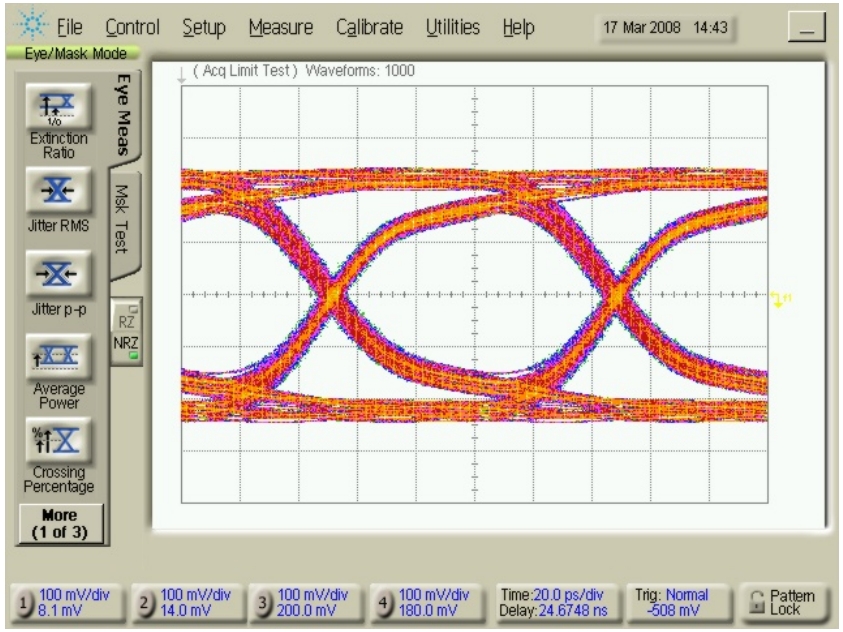


Time Domain Performance - Throughput

- Host to Module Board (Does not include cable)
  - Includes 3” Micro-strip trace



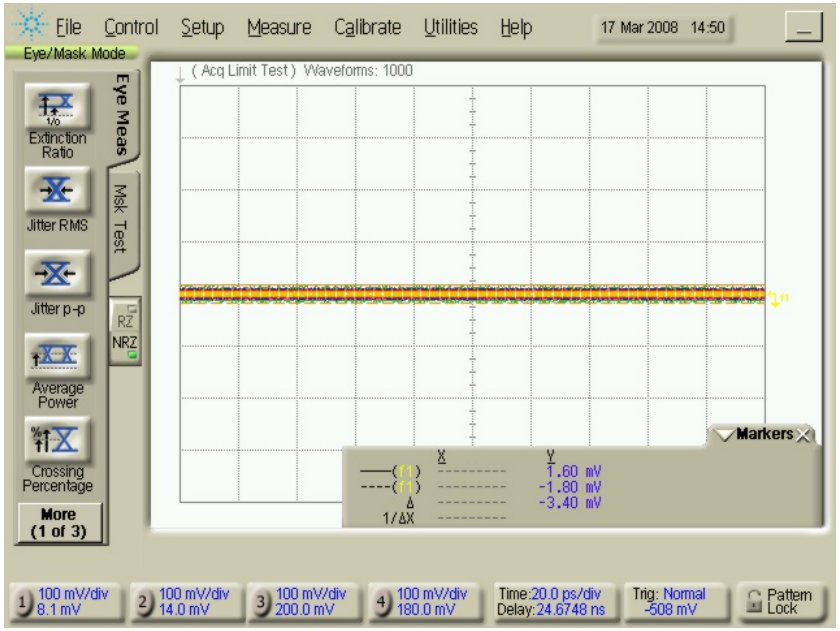
Reference Eye Results:
•627 mV
•9.8 psec Tj



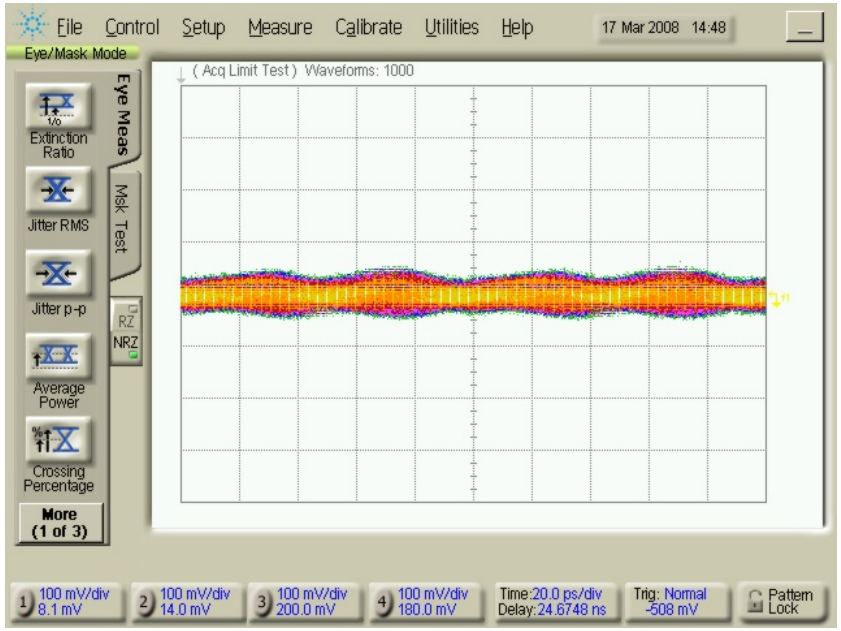
Upper Row Eye Normalized Results:
•545 mV (0.87 $V_{reference}$)
•2.4 ps additional jitter (12.2ps total)

Time Domain Testing – Single Aggressor Noise

- Host to Module Board (Does not include cable)
  - Includes 3” Micro-strip trace



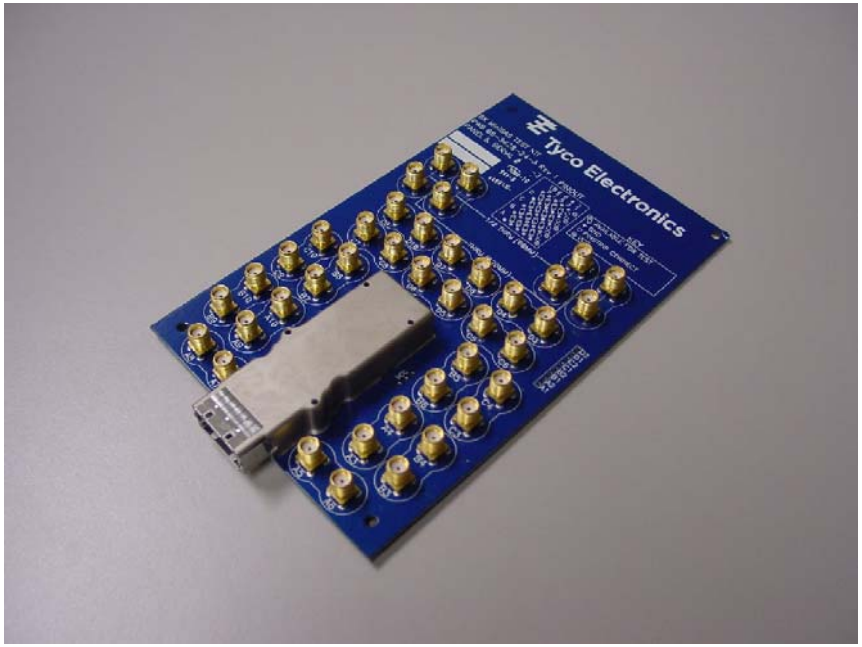
Noise Floor Results:
3.4 mV
(10.3125 Gbps)

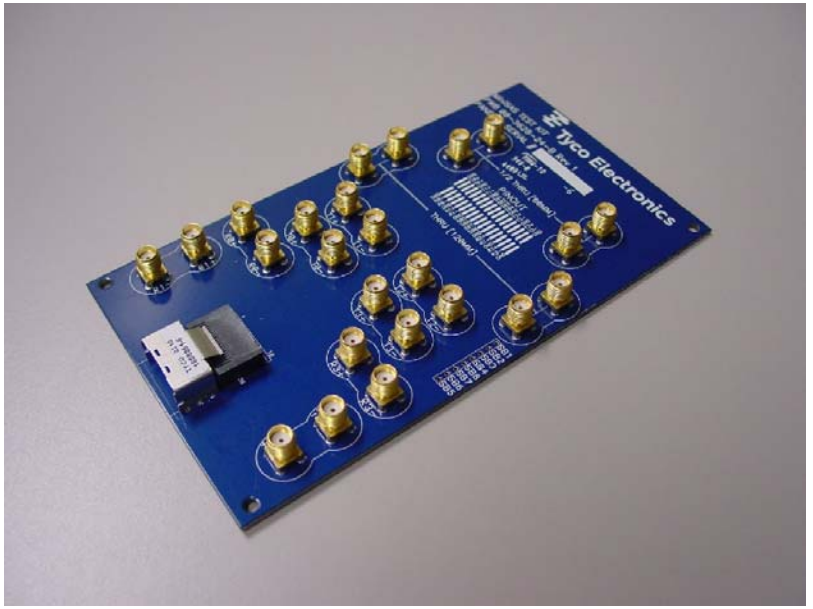


Single Aggressor Noise Normalized Results:
7.2 mV additional noise (1.4% V_{output})
(10.3125 Gbps)

Current Status

- Full Channel testing capability
- Side Band access
- Assemblies and test boards available now





Questions?

- For more information or if you have questions you can contact one of the following people.
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