

10 Gbps Data Transmission in FR408/ GbX[®] Reference Backplane

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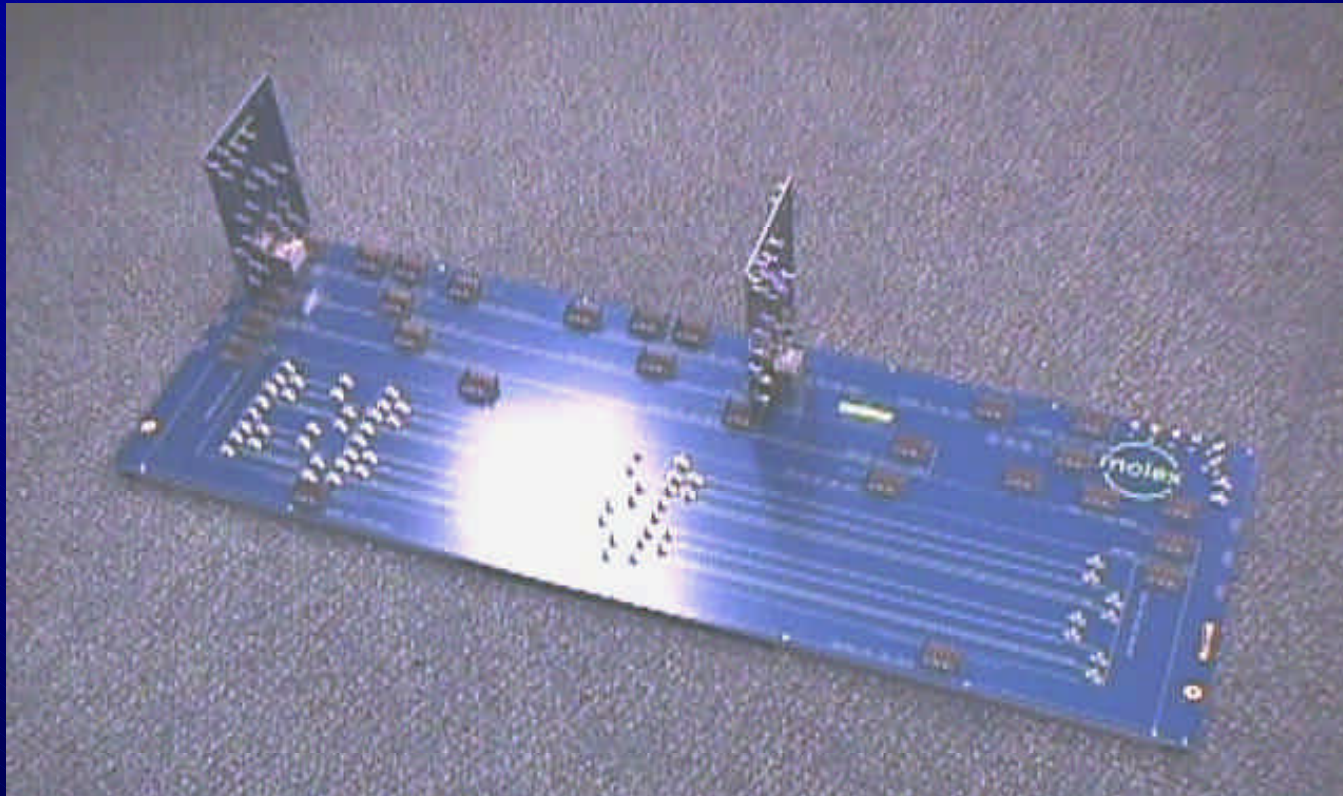
Introduction

- **Isola FR408 reference backplane**
 - Test and demonstration vehicle
 - Set of channels including 1.0 m and 1.25 m
 - GbX connectors
- **Extension of Nelco 4000-13SI work**
 - Described in [mccallum_01_0704.pdf](#)
 - Performance comparison
 - Lower relative cost



Backplane

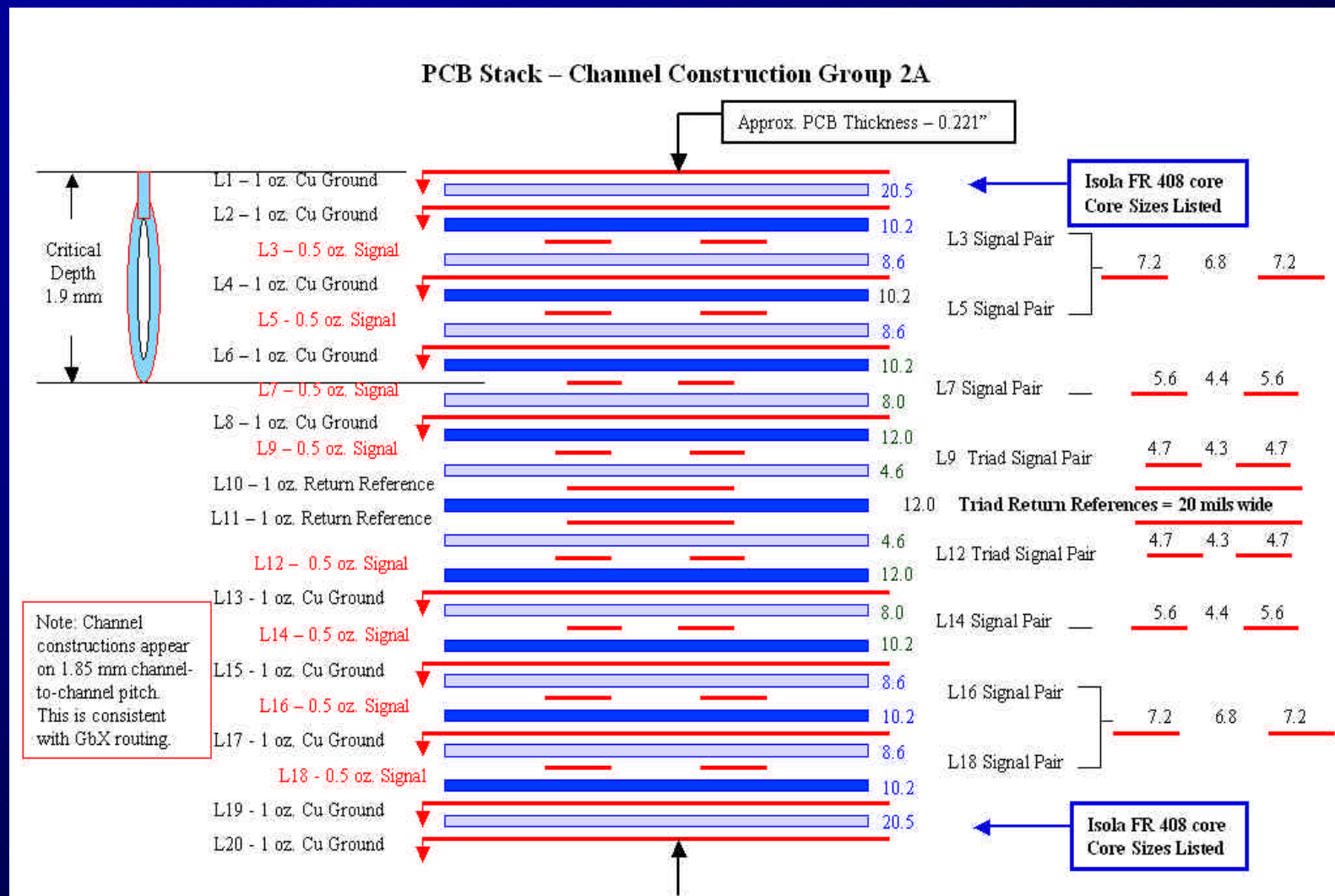
- Overall length: 97 cm; overall width 33 cm
- Thickness: 5.7 mm
- 1.85 mm channel pitch progression maintained over length of channel



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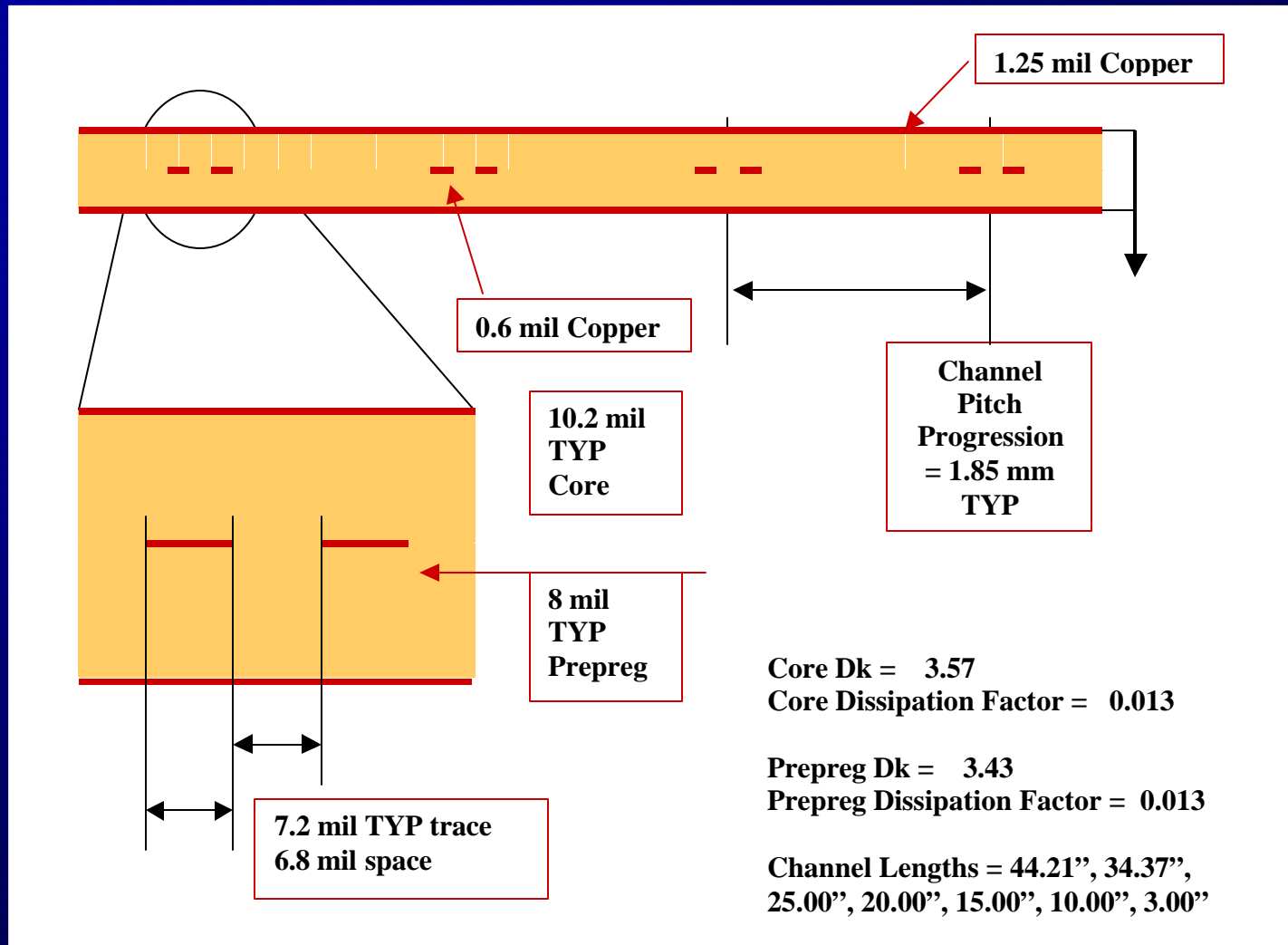
Backplane Construction



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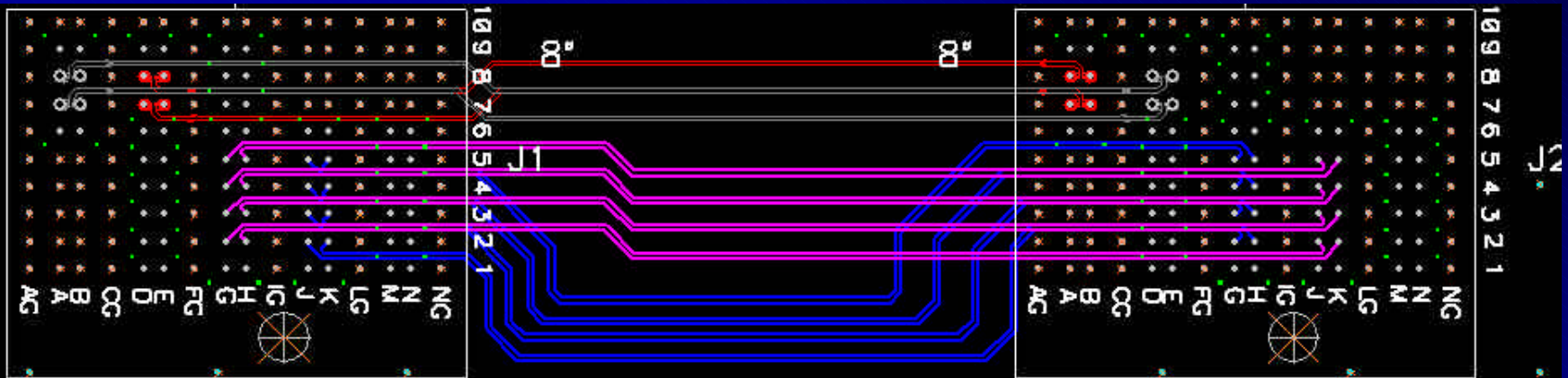
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Channel Routing Example



TRANSMIT — LAYER 3 — SIGNAL 1 — BACK DRILL
RECEIVE — LAYER 18 — SIGNAL 8

- Shows 8 inch channel
- 1 m channel is similar
- Channel nomenclature from connector pin locations

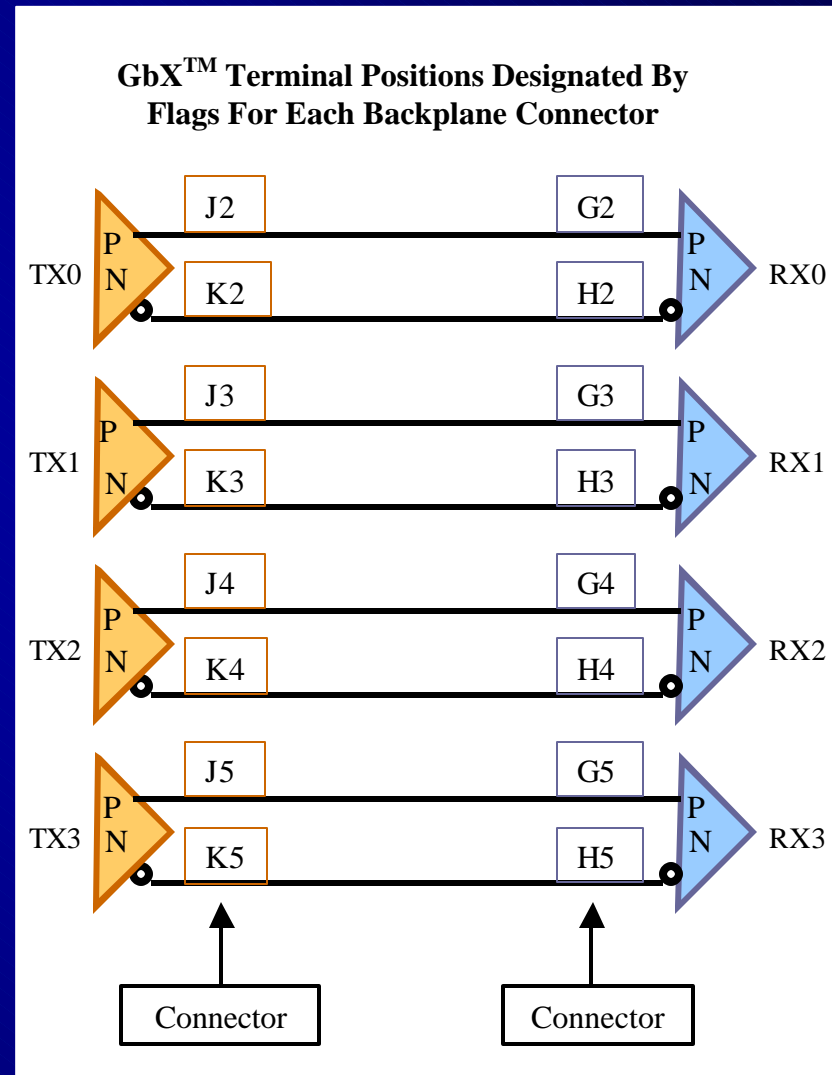


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Channel Nomenclature

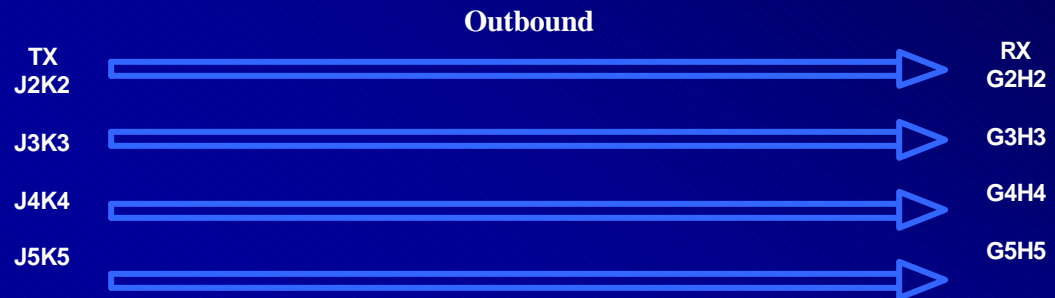
- Aids interpretation of posted data
- Description posted to Channel Model Library
- All channels discussed here are backdrilled



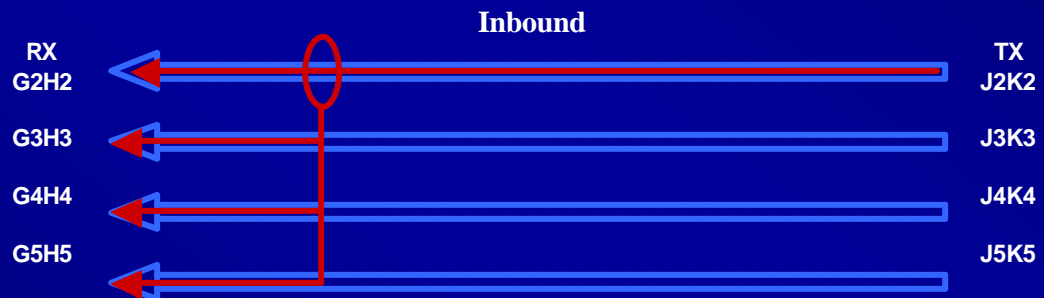
NEXT and FEXT Measurements

Inbound FEXT Example

Layer 3 (top)
backdrilled



Layer 18 (bottom)
backdrilled



Inbound Thru Channel → sj2k2g2h2

• Associated FEXT Channels → Located in Inbound FEXT Channel Folder

- sj2k2g3h3
- sj2k2g4h4
- sj2k2g5h5



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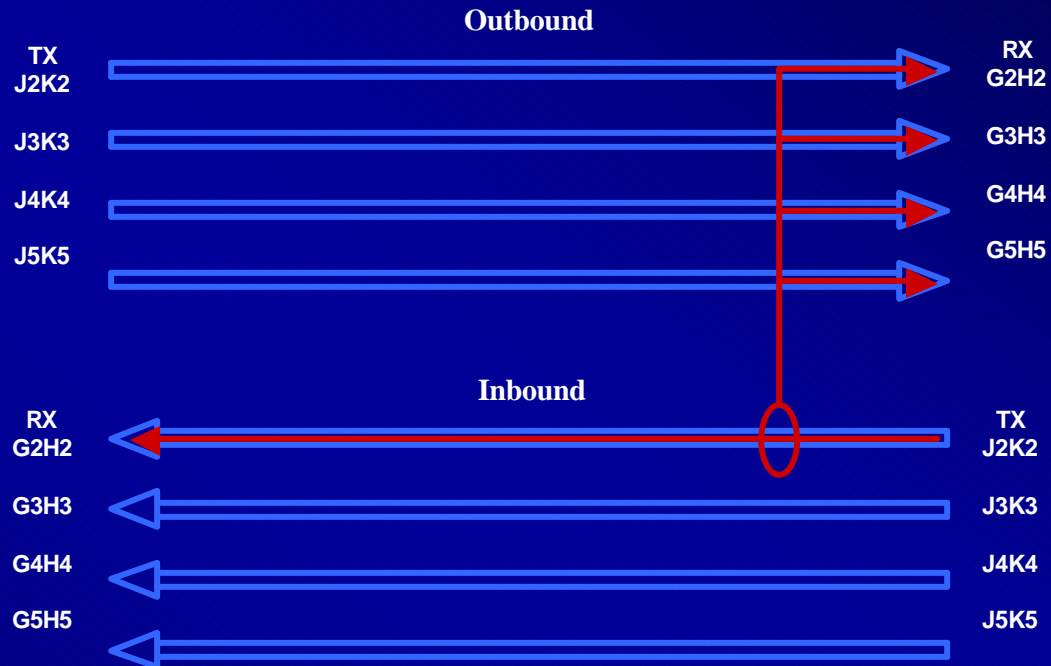
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NEXT and FEXT Measurements

Inbound NEXT Example

Layer 3 (top)
backdrilled

Layer 18 (bottom)
backdrilled



Inbound Thru Channel → sj2k2g2h2

• Associated NEXT Channels → Located in Inbound NEXT Channel Folder

- sj2k2g2h2
- sj2k2g3h3
- sj2k2g4h4
- sj2k2g5h5

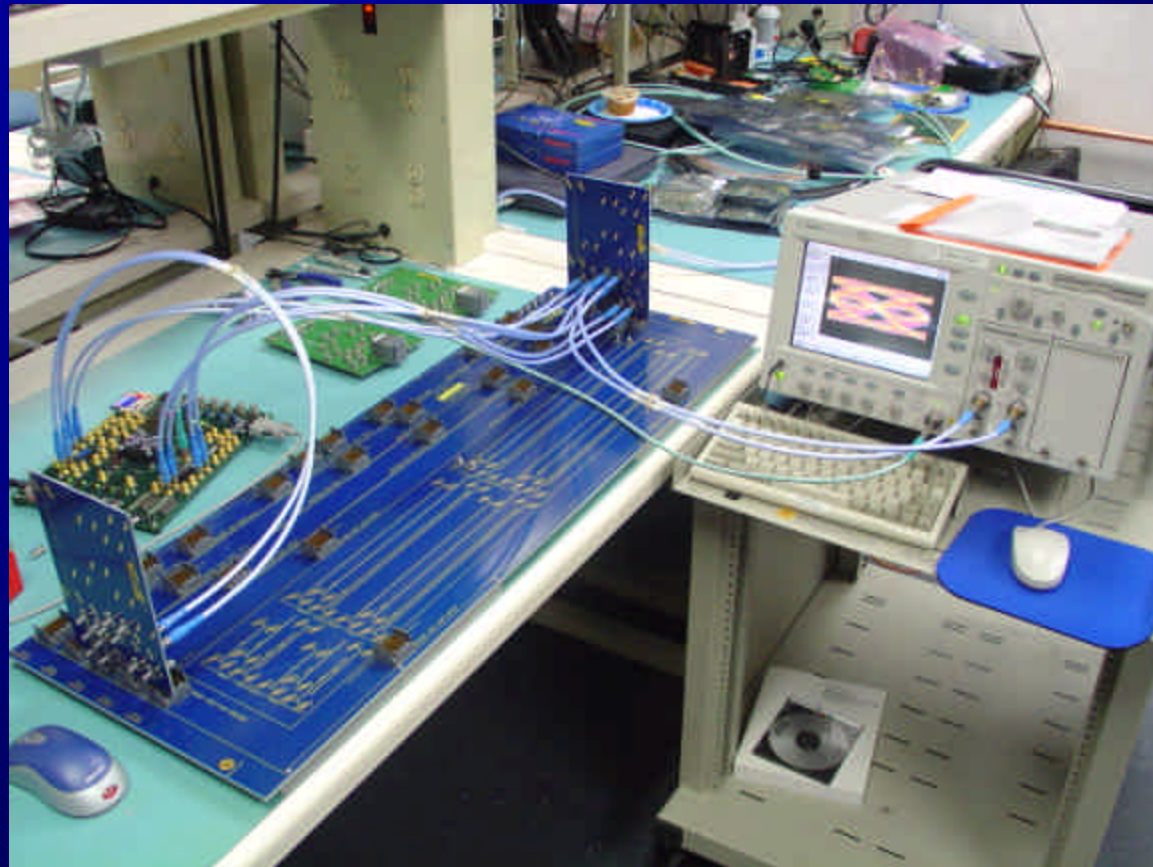


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Measurement Results

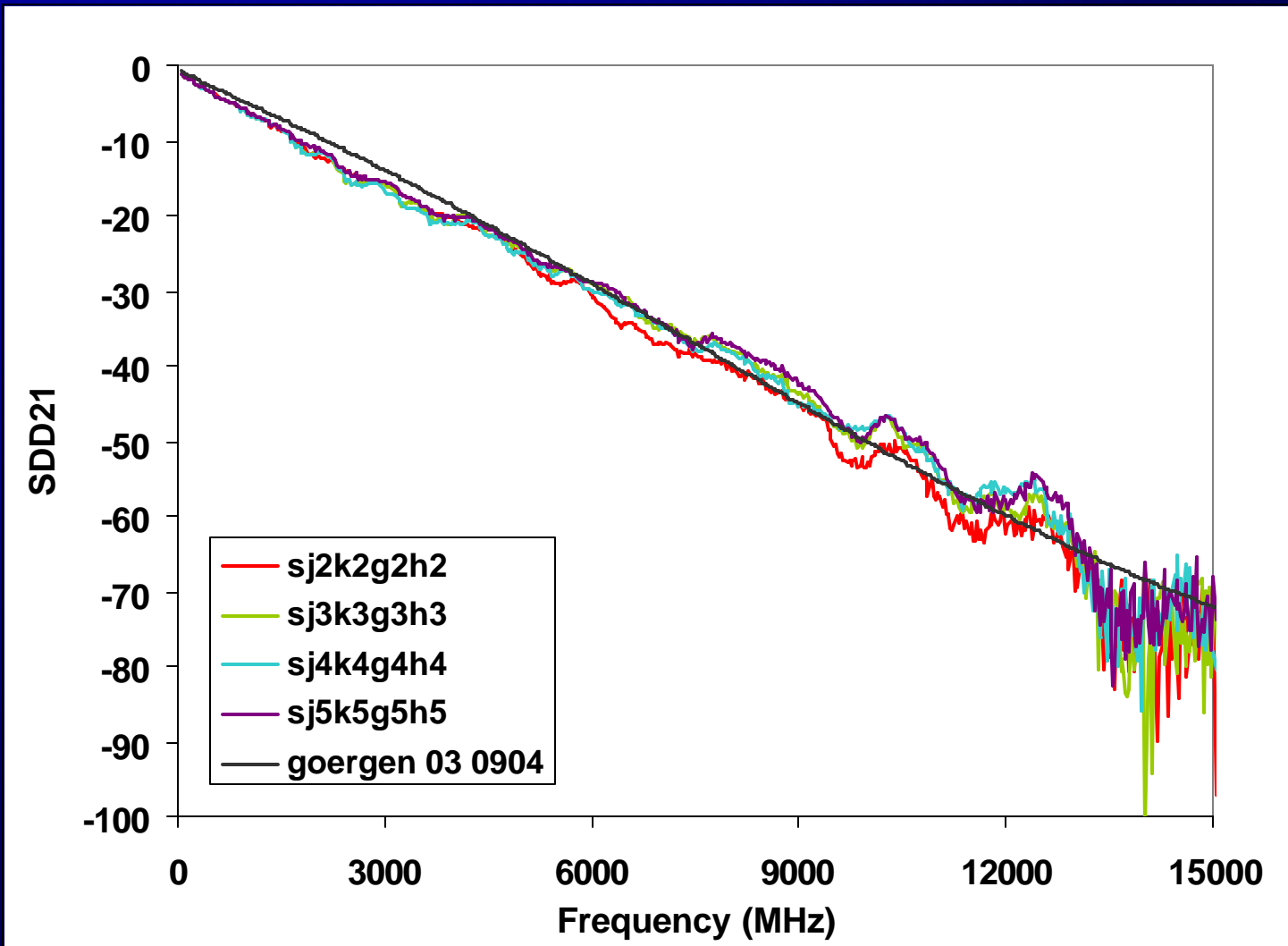
- Test configuration
 - Xilinx silicon



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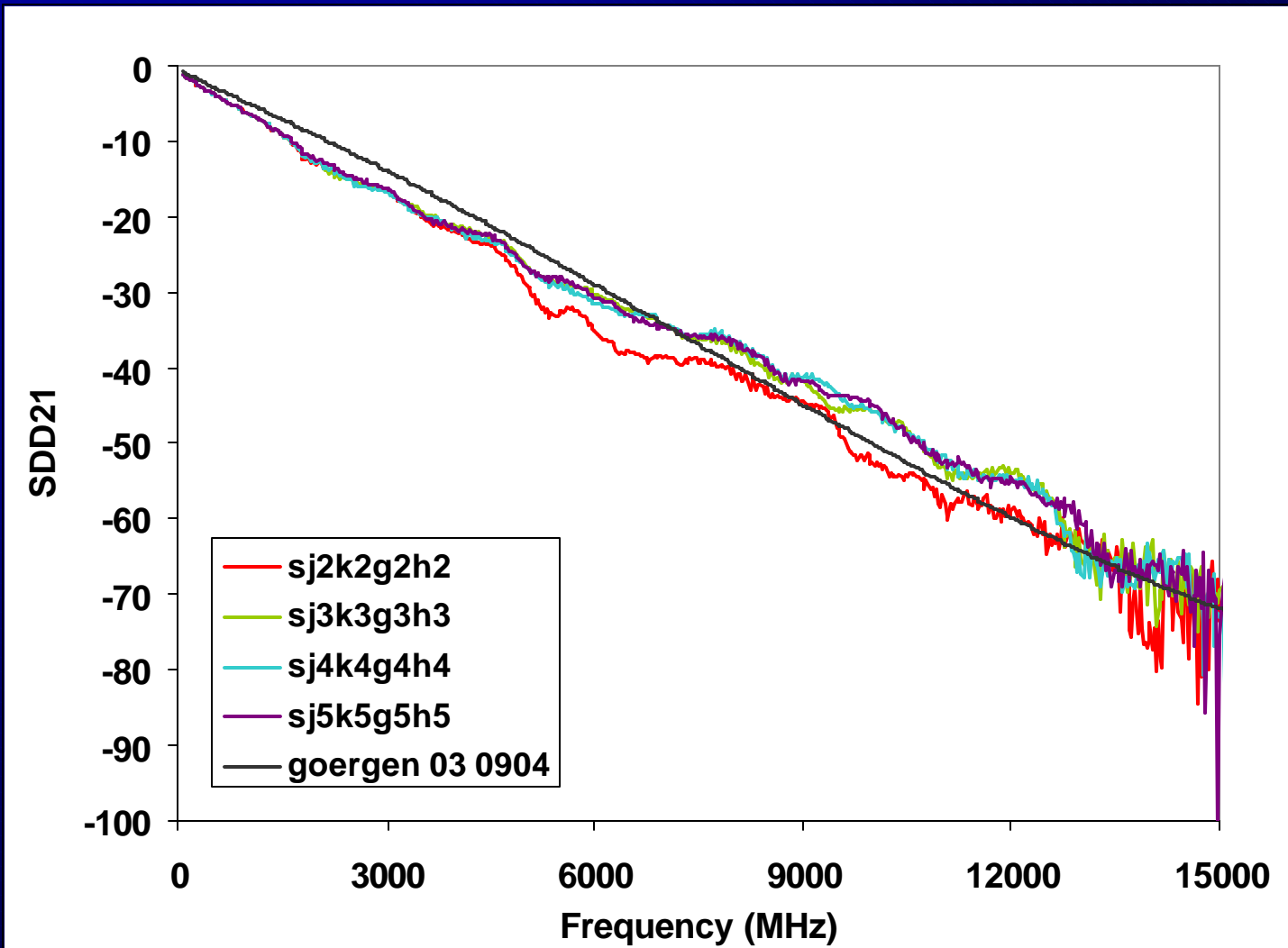
Test Results: SDD21 Outbound



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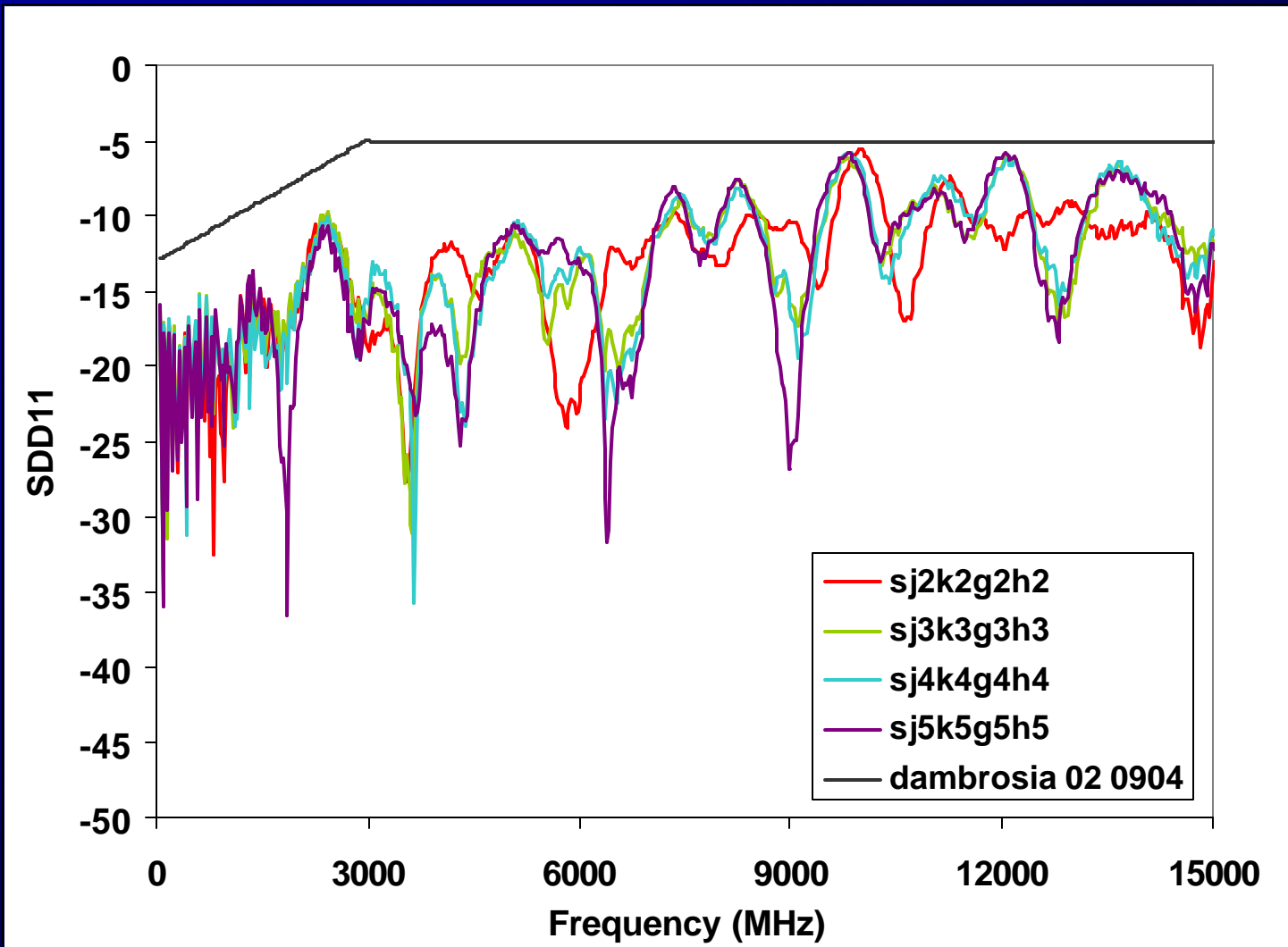
Test Results: SDD21 Inbound



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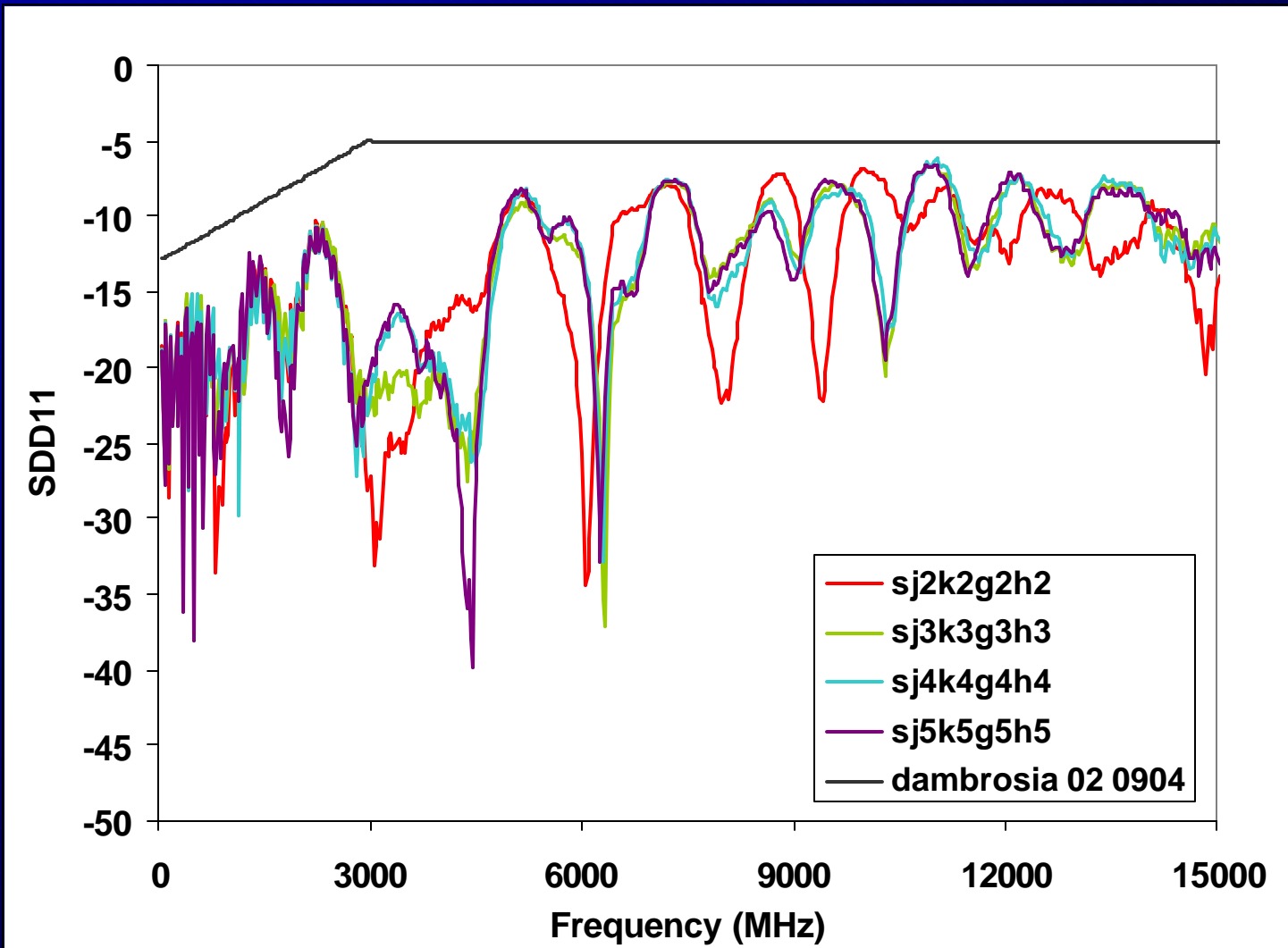
Test Results: SDD11 Outbound



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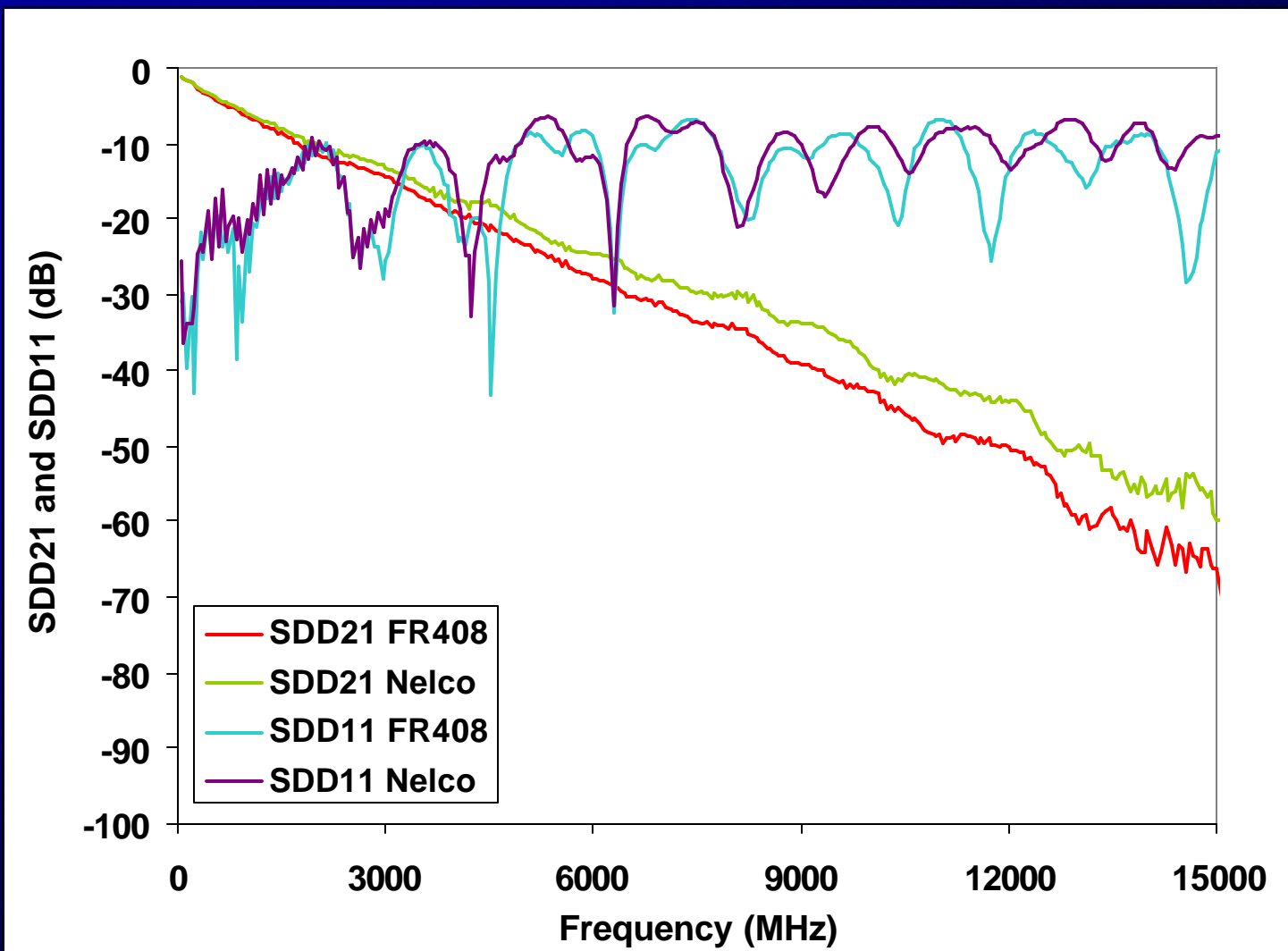
Test Results: SDD11 Inbound



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Compare to Nelco 4000-13SI Backplane



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BER Data @ 10 Gbps

Backplane Material	Channel length	Near end crosstalk?	Max pattern length	BER
N4000-13SI	1m	No	$2^{11}-1$	$<4e-13$
FR408	1m	No	$2^{11}-1$	$<2e-13$
FR408	1m	Yes	2^7-1	$<1.45e-15$

Measurements made by Xilinx

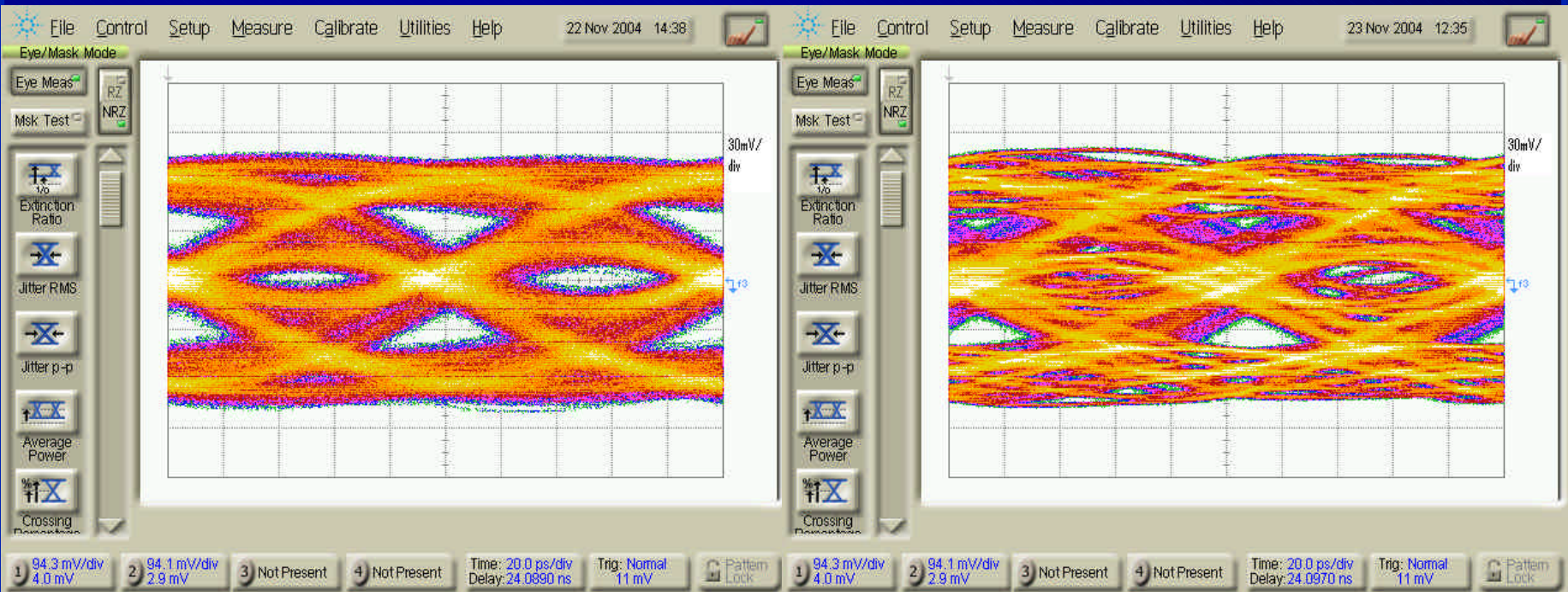


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Eye Diagrams

- FR408 backplane eyes with pre-emphasis, before error correction



No crosstalk

With crosstalk



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Interoperability data

- Backplane included in OIF interoperability tests
- Tested with silicon from four providers
- Interoperability successfully demonstrated at 10 Gbps on the 1 m channel
- Complete documentation available at <http://www.oiforum.com/public/documents/CEIWP1.pdf>



Summary

- Isola FR408 backplane
 - GbX connectors
- 1m, 1.25m channels
- S-parameter measurements up to 15 GHz
 - Posted to Channel Model Library
- Demonstrated data transmission at 10 Gbps
 - Measured BER $\sim 1e-15$
- Compared with Nelco 4000-13SI backplane
 - Slight return loss decrease
 - Slight insertion loss increase
 - Comparable performance at lower cost



Thank You

