RTPGE Test Head Proposal

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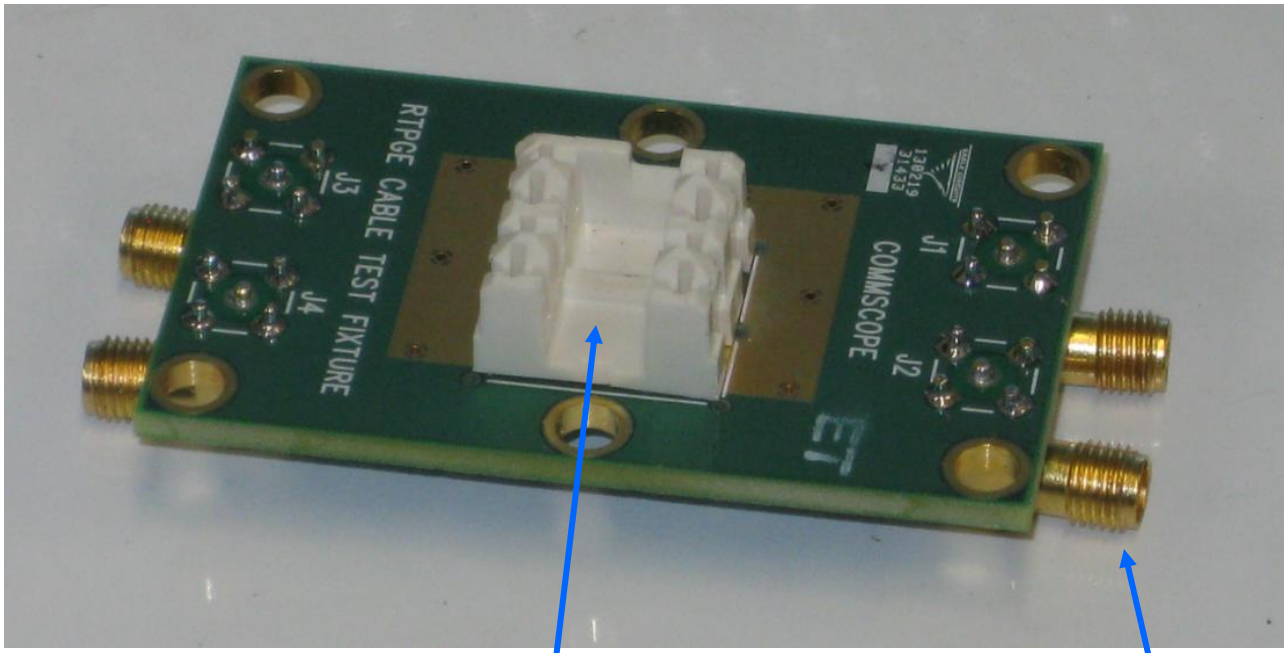
- Xiaofeng Wang – Qualcomm Technologies Inc.
- Joseph Chou - Realtek Semiconductor Corp.
- Thomas Muller – Rosenberger
- Sudhakar Gundubogula - Marvell

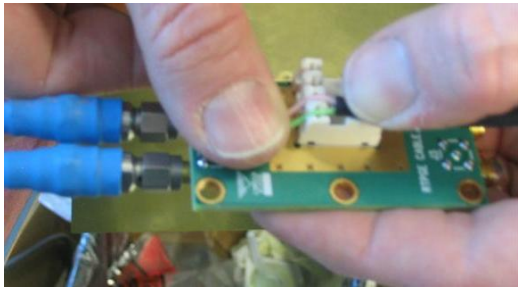
Proposed RTPGE test head



Insulation Displacement Contact

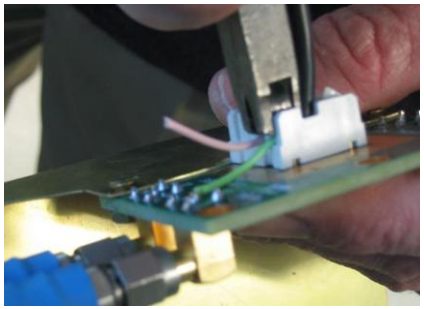
2 pair punch block

4 SMA ports



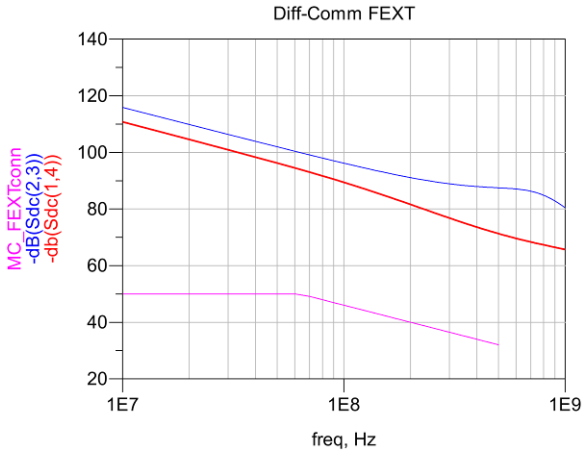
Push conductors into slots

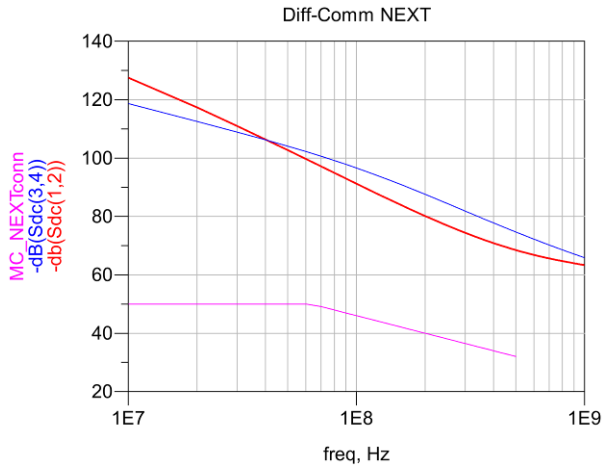
Punch conductors down

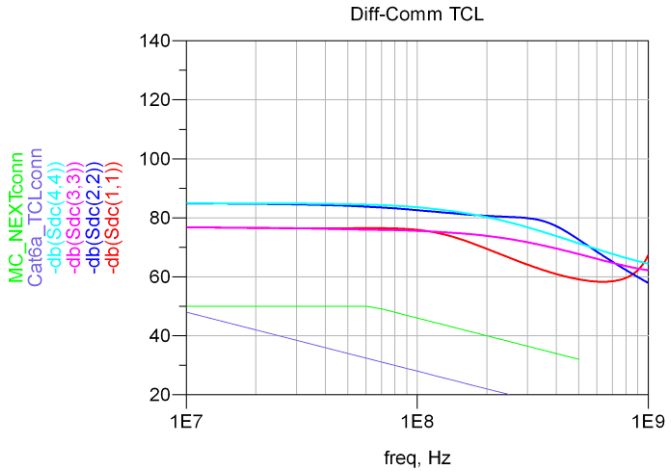


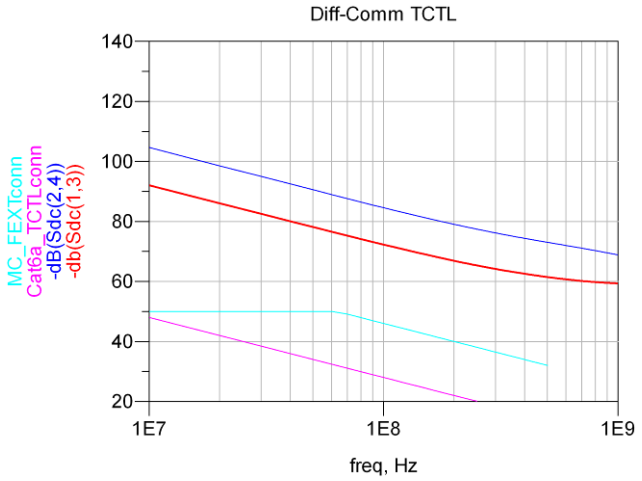
Trim ends with fine edge cutter

HFSS Simulation Balance

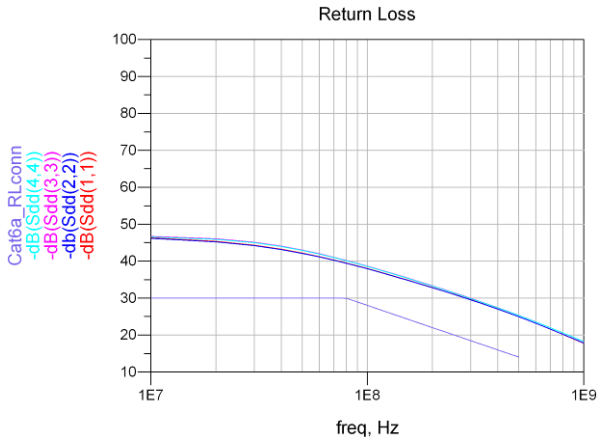


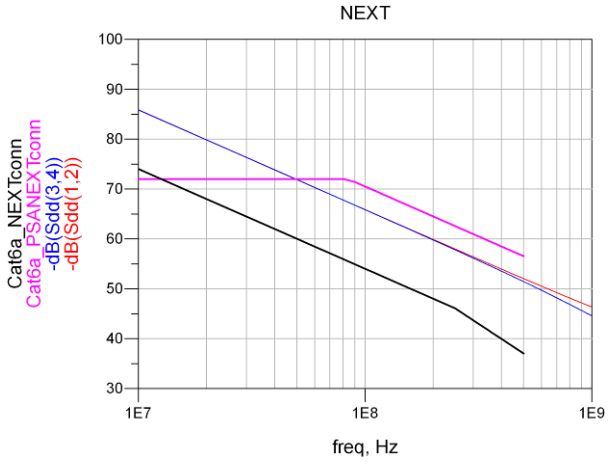


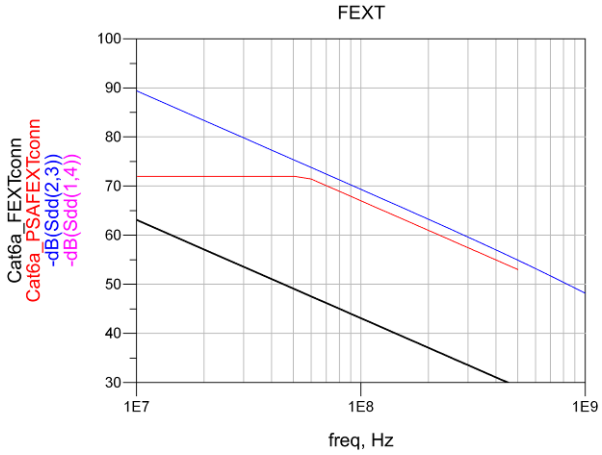




HFSS Simulation Differential



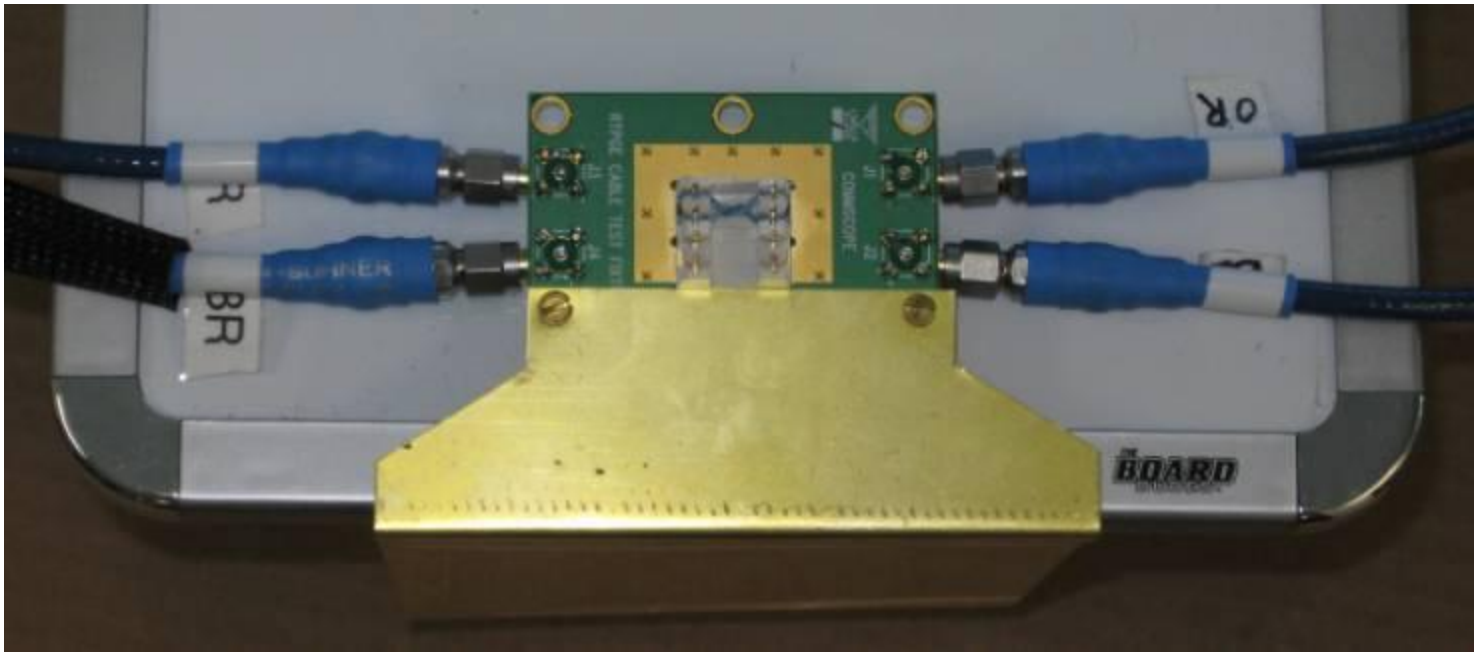




The easiest way to measure the head with a 4 port Network Analyzer:

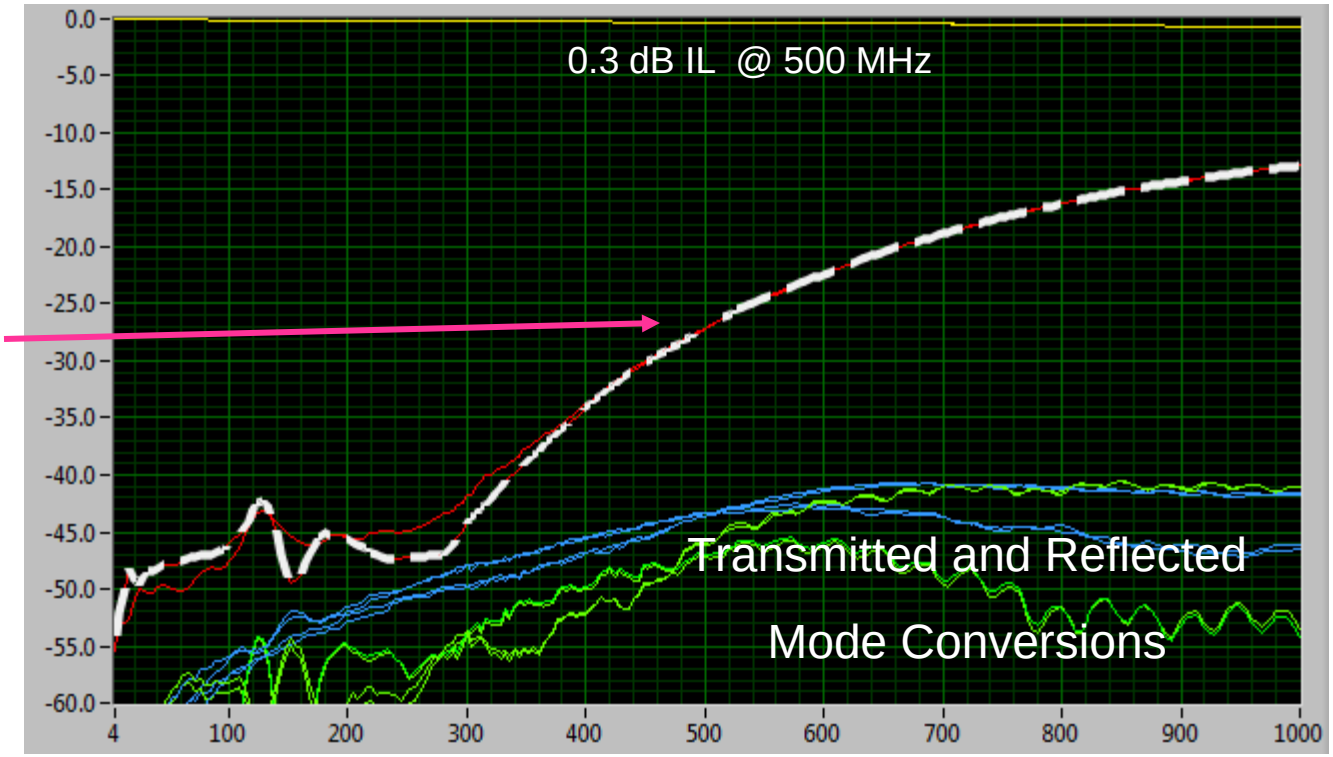
Using a single 100 Ω pair punched in as a left-to-right-pair-thru connection

- Differential RL better than 27 dB with tight entry
- Differential IL better than 0.3 dB
- Mode conversion better than 43 dB with centered punch



Direct 4 port RTPGE Test Head measurement plots

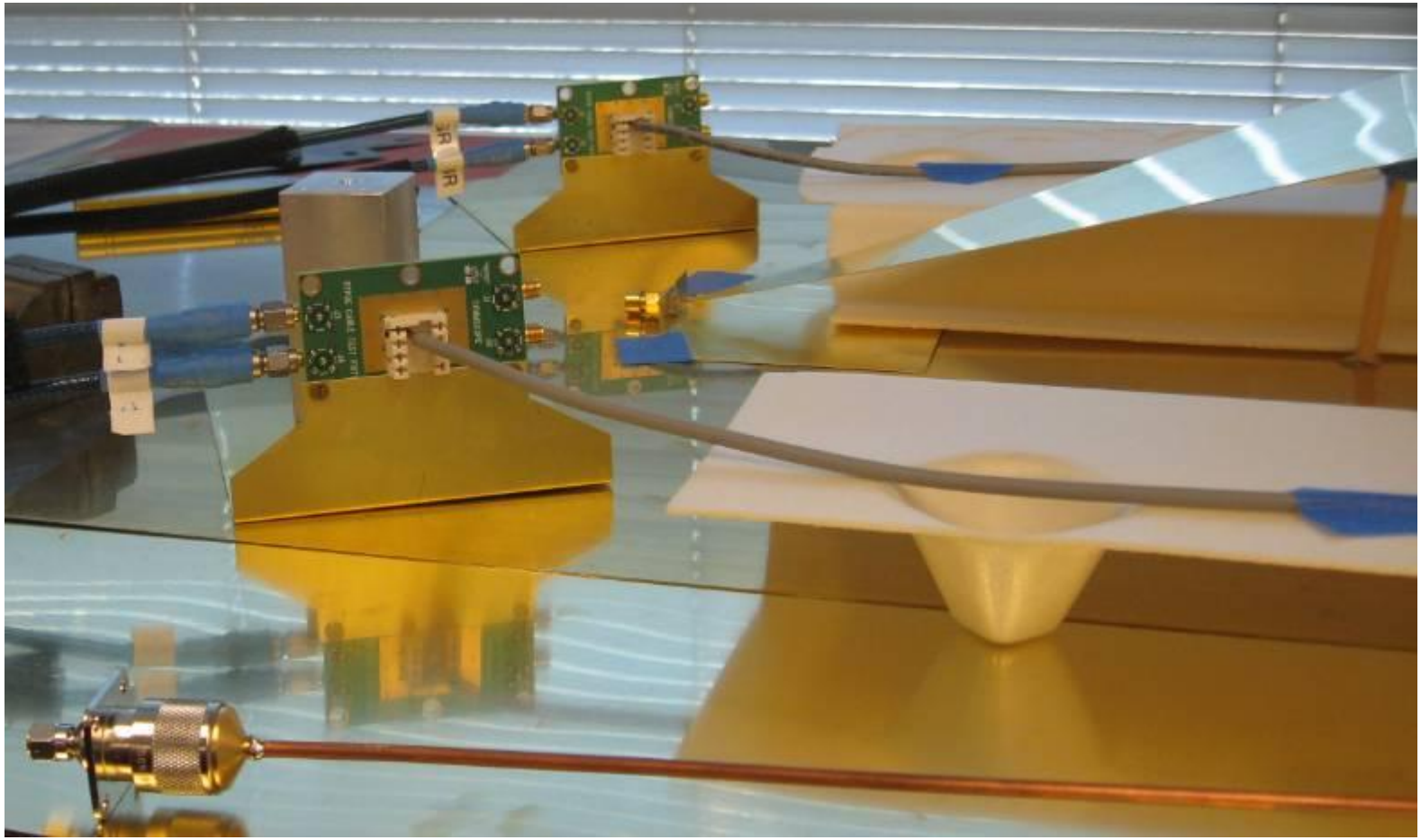
27 dB RL
@ 500 MHz

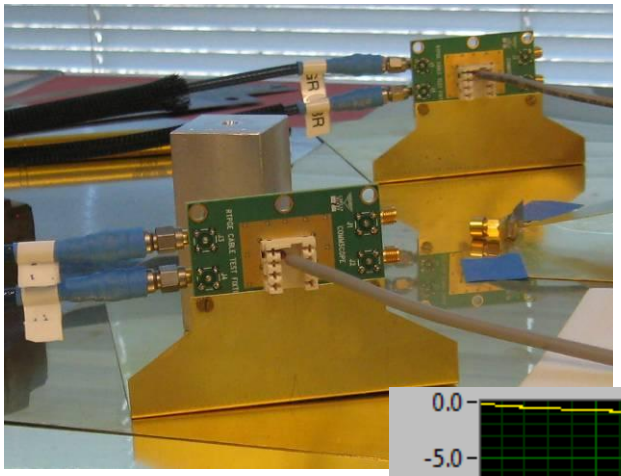


Mixed Mode plots Z_{DM} = 100Ω Z_{CM}=25Ω

CommScope channel measurement Setup - Heads mounted on ground reference holder plates shown driving 1 pair cable 4 cm over brass reference plane

(note: EMC stripline is not part of this measurement)

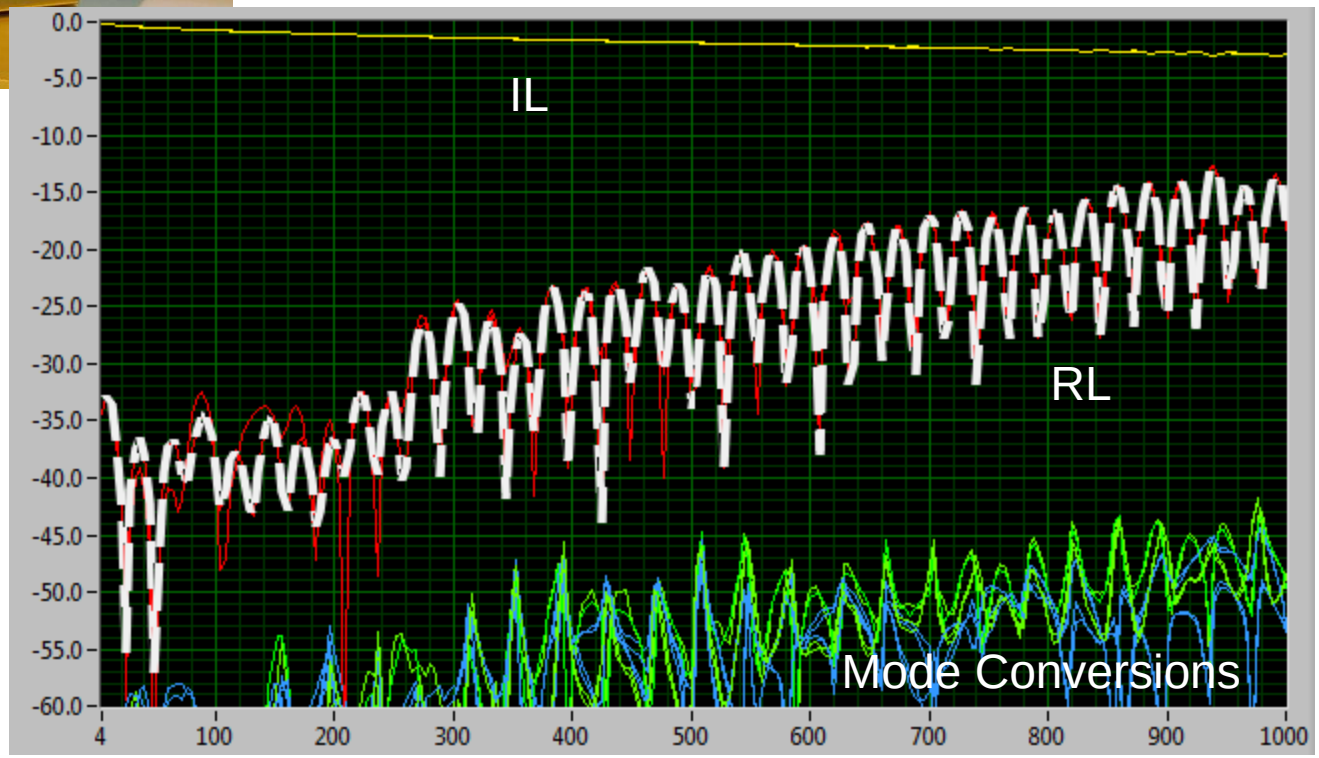




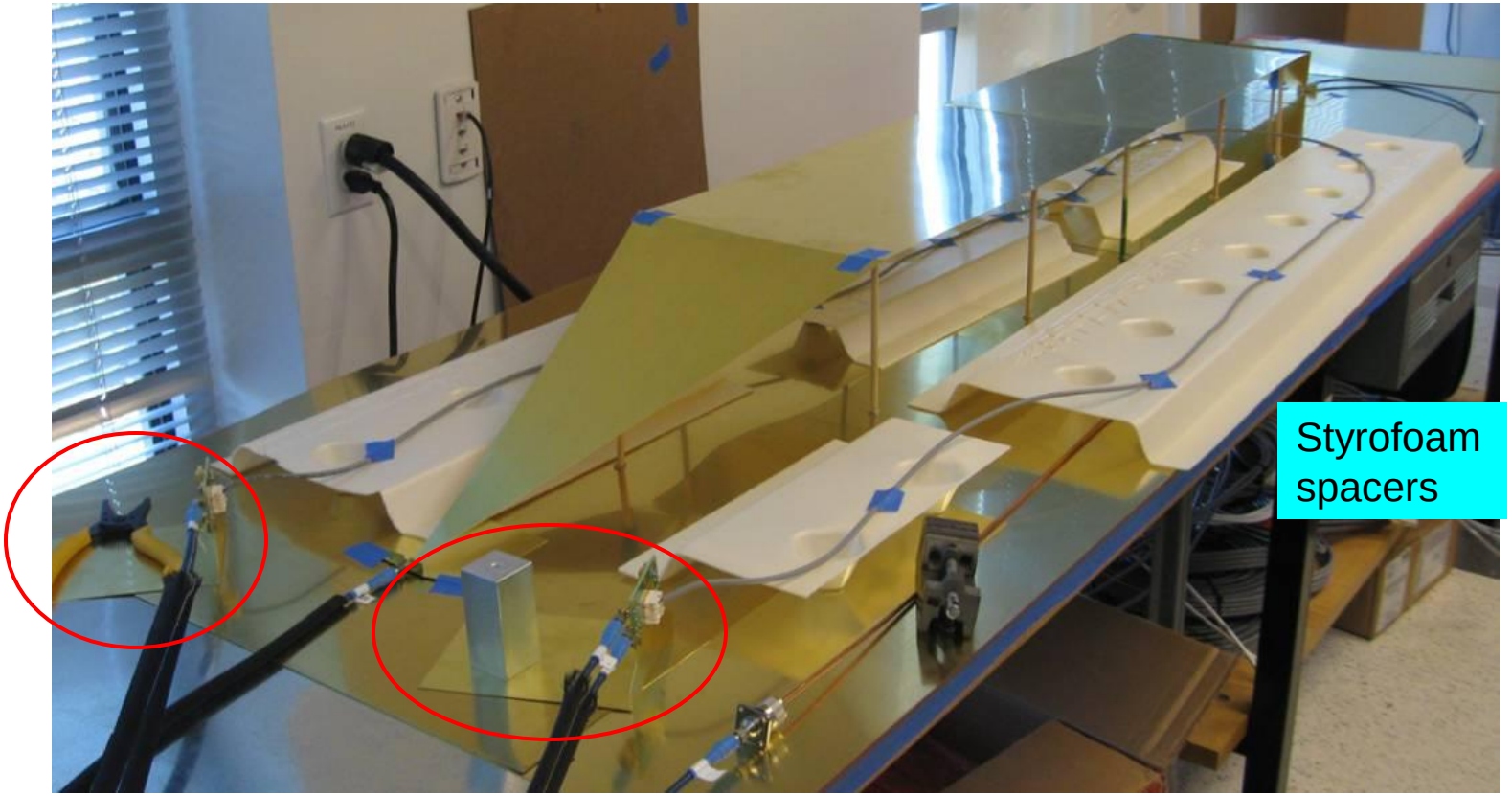
3.5 meter 1 pair 100 Ω cable result

(a short cable has high margins to channel specs and is a good reference for accuracy study)

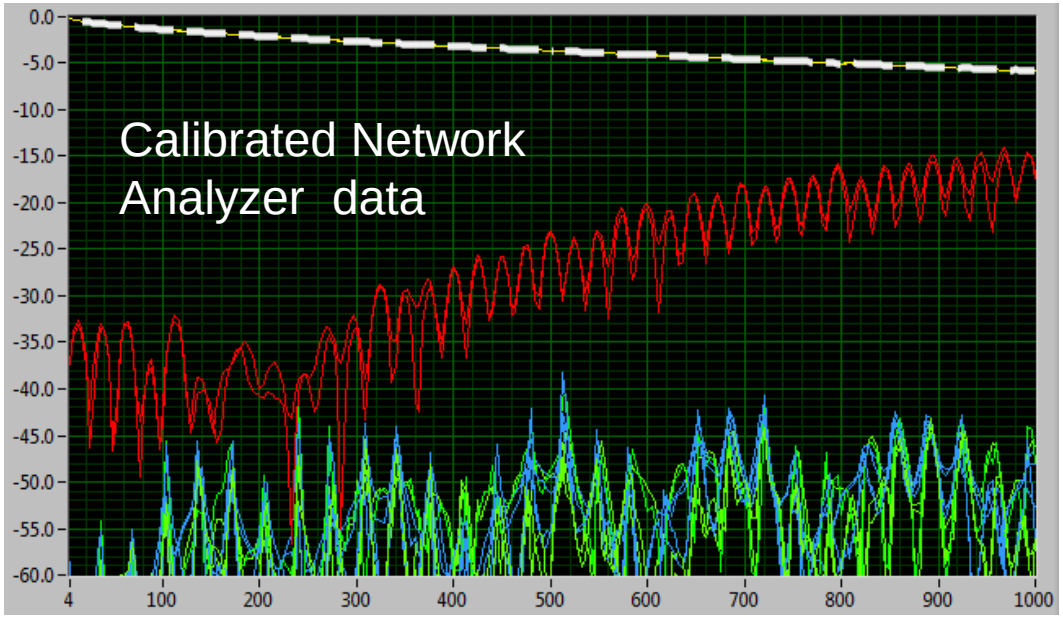
Suitable for direct EMC work out to 1 GHz

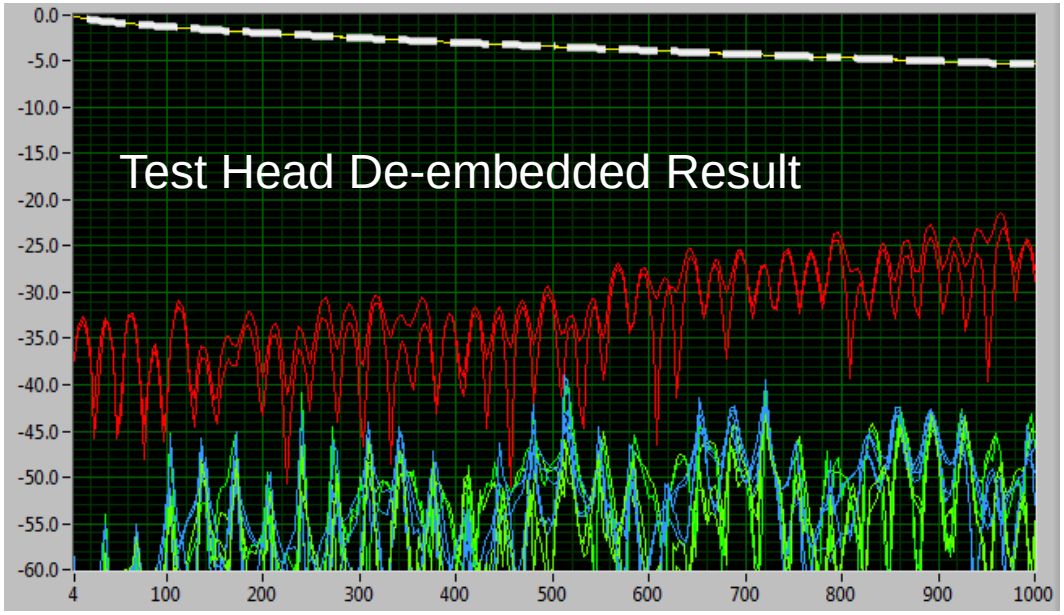


Typical 1 pair cable laid out and back 4 cm over the reference plane between near end and far end port pairs (note: the EMC stripline is not in use)



A small weight (block and pliers in this case) stabilizes the head positions and provides good electrical reference contact if metals are not tarnished.





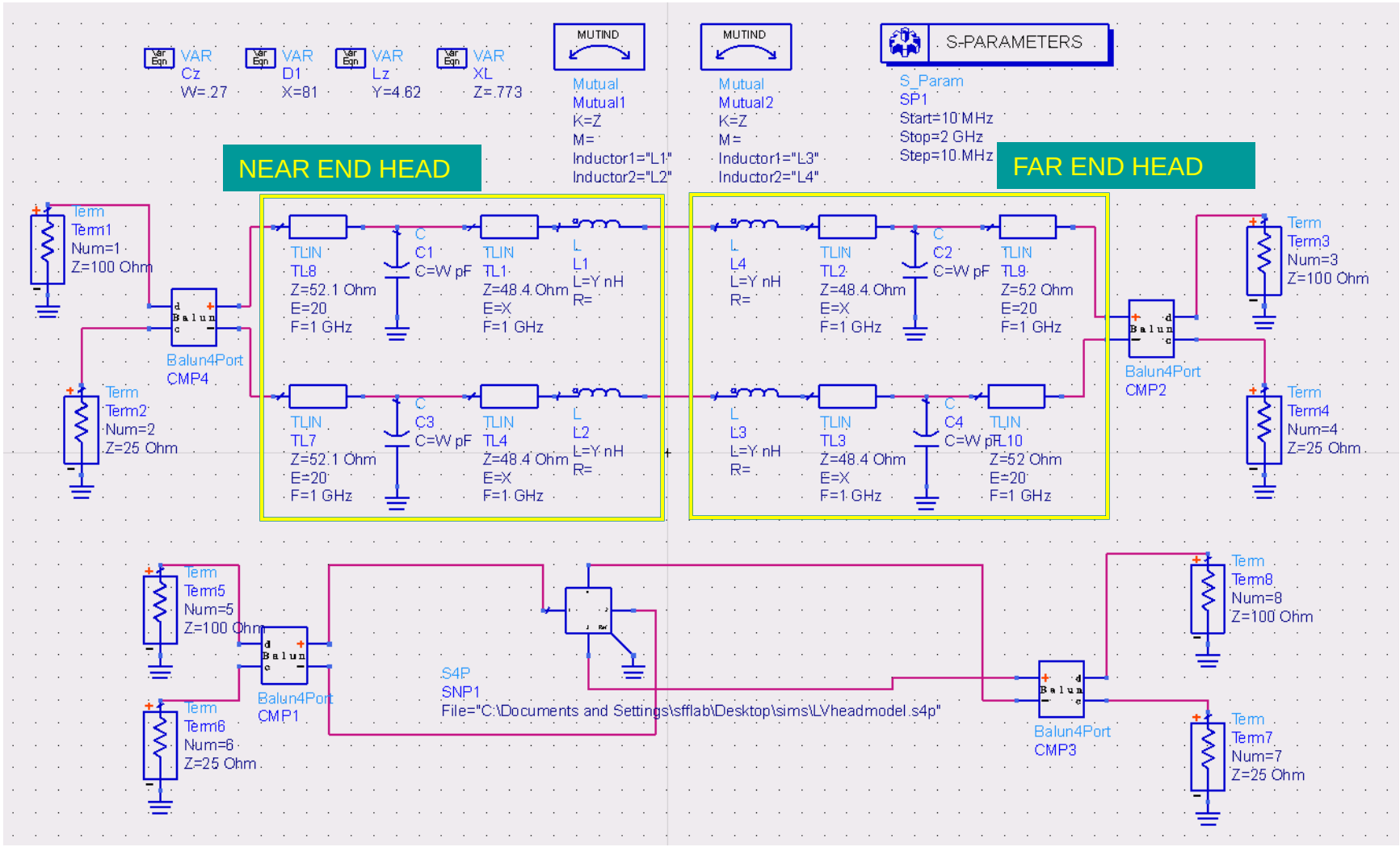
Test Head De-embedding provides high accuracy for 4 port Network Analyzer data

(4 meter cable measurement with no connections provides high margin result)

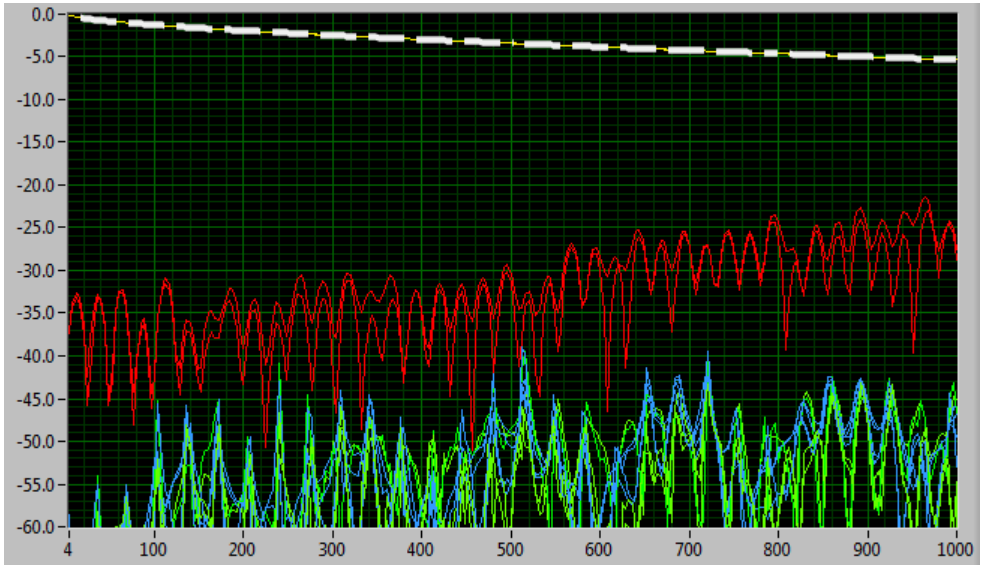
** Custom software controlled and processed results shown

Alternate de-embedding model derived to match the 4 port THRU measurement using Agilent ADS

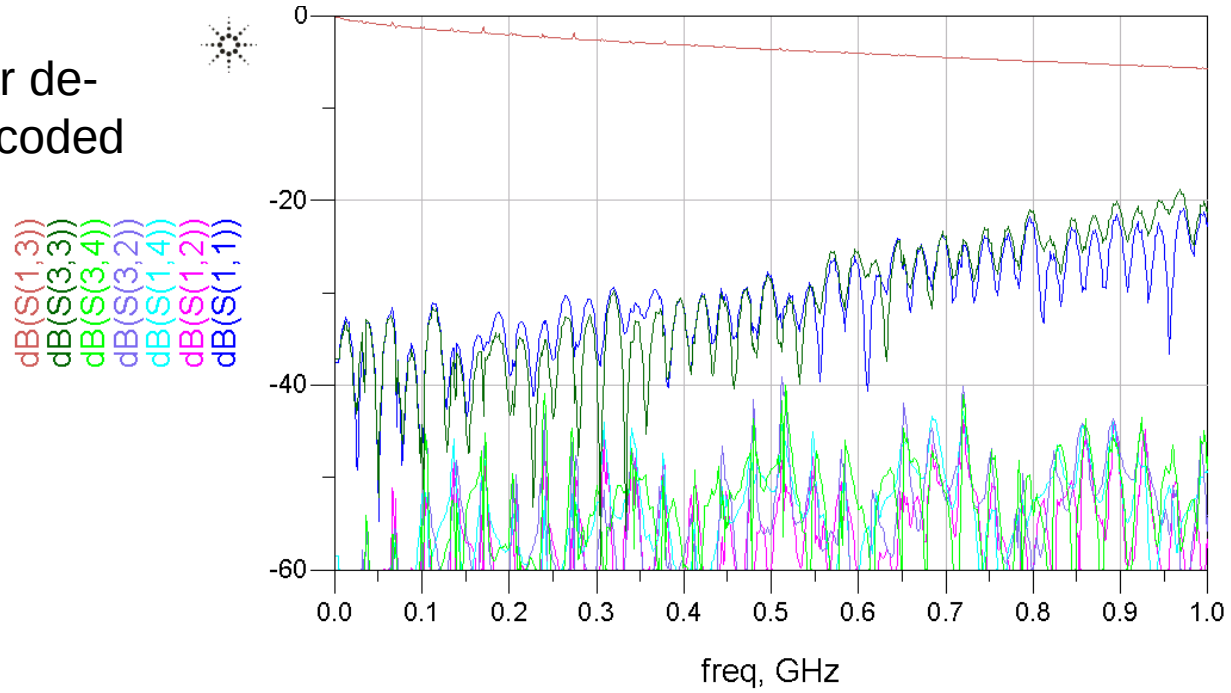
(preliminary)



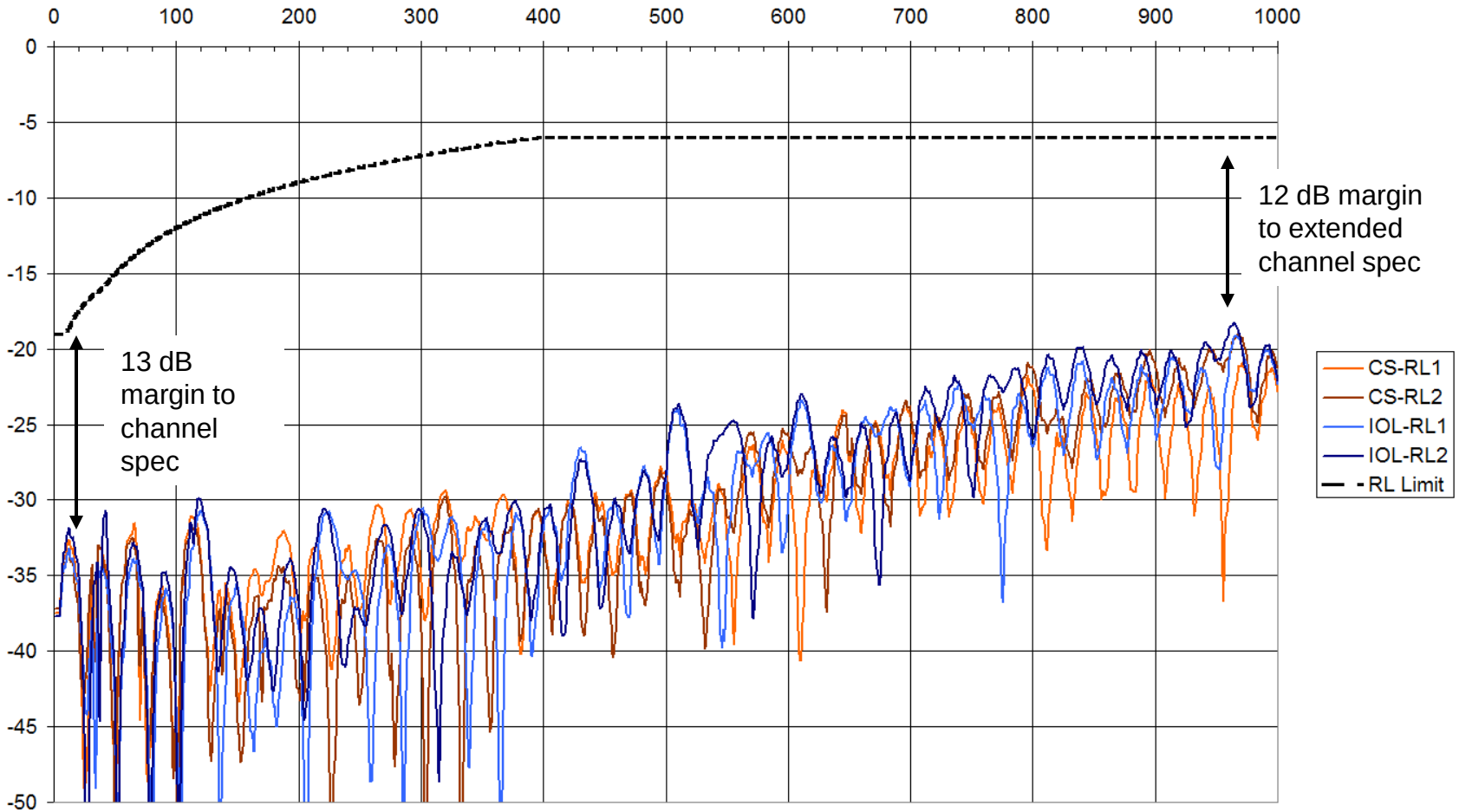
Custom software code de-embedded result



Result using similar de-embedding model coded in Agilent ADS



Results of two 4 m samples cut from the same cable measured with these Test Heads in separate Labs

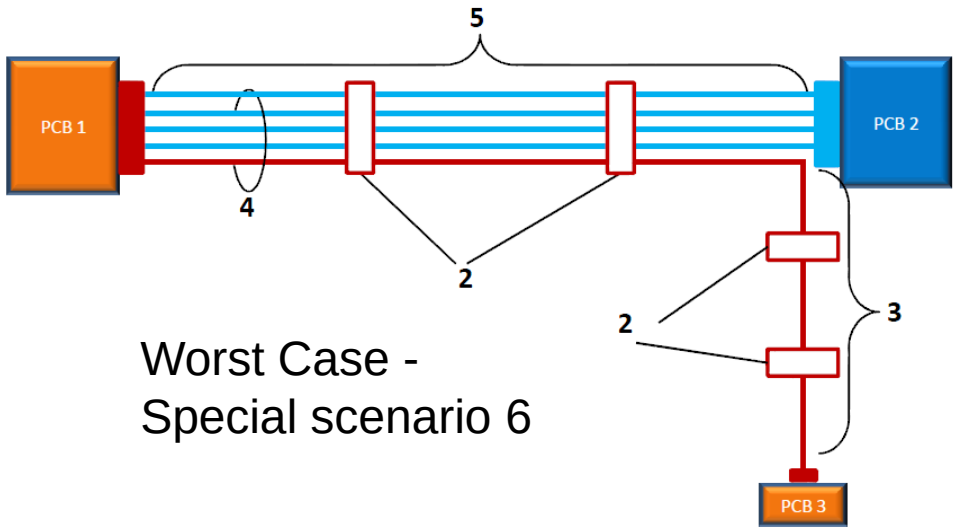


Demonstrates consistency and accuracy

Also:

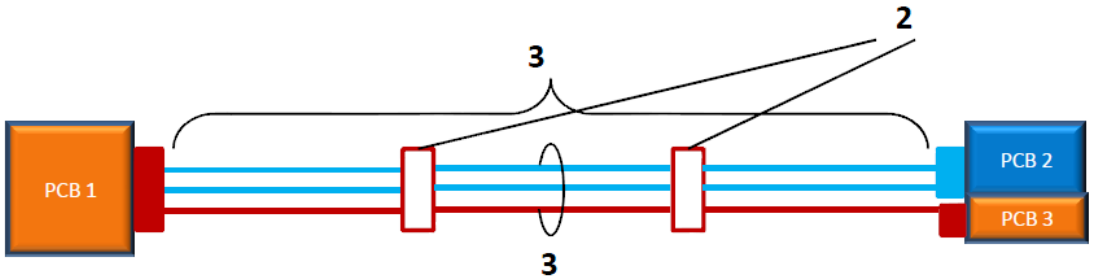
2 Recommended Test Configurations

(from Phoenix meeting)

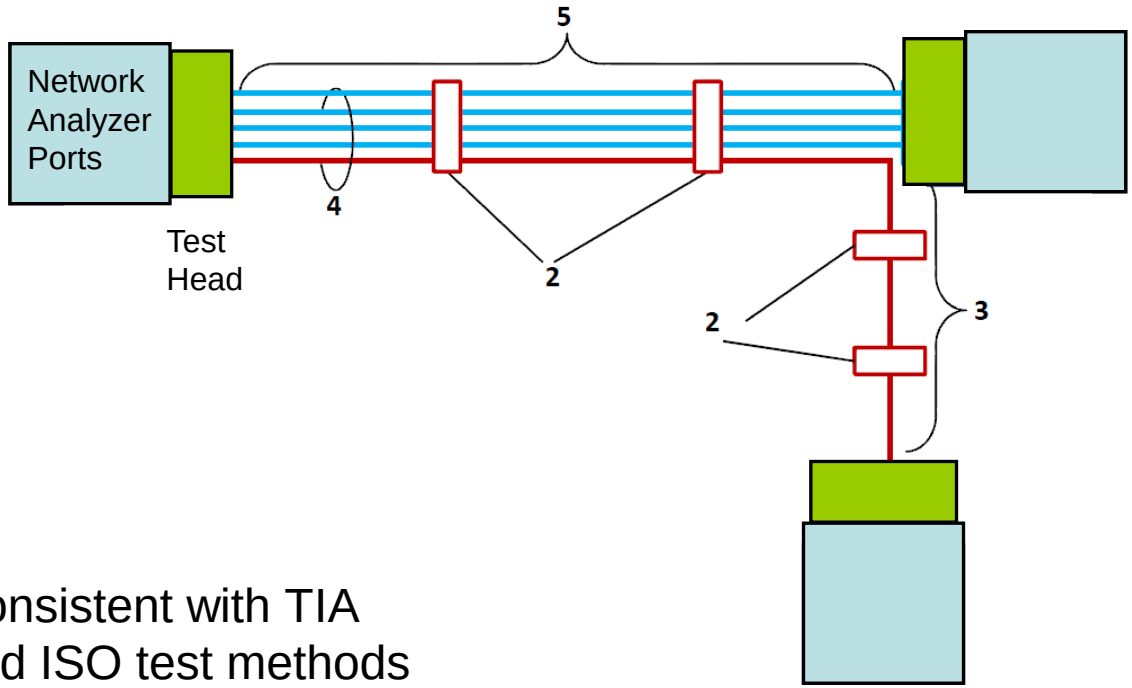


Worst Case -
Special scenario 6

Additional worst case - common scenario 1A



Worst Case - Special scenario 6 Testing using Test Head



Consistent with TIA
and ISO test methods

Conclusions and Proposals

Utilize this IDC test head for:

- easy consistent test of channels
- EMC work out to 1 GHz

Focus on testing the 2 worst case Channel configurations