IEEE P802.3cd 50 Gb/s, 100 Gb/s and 200 Gb/s Ethernet Task Force

Backplane Measurements using Draft 1.0 COM Parameters

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Amphenol FCI

Purpose

- To characterize the performance of backplane measurements using the COM parameters in Draft 1.0.
- To gauge if the parameters are suitable in determining 50 Gb/s performance or if they still need work.
- To address an issue with the lack of BGA footprints and measured channels.

Channel Details

Amphenol FCi

Link #	Total Length (in)	Daughter Cards			Backplane		
		Length (in)	Material	Impedance (ohms)	Length (in)	Material	Impedance (ohms)
Link 1	32.25	6	Megtron 6	95	20.25	Megtron 6	95
Link 2	32.25	6	Megtron 6	95	20.25	Megtron 6	95
Link 3	32.25	6	Megtron 6	95	20.25	Megtron 6	95
Link 4	38.75	6	Megtron 6	95	*26.75*	*Megtron 6*	95
Link 5	38.75	6	Megtron 6	95	*26.75*	*Megtron 7*	95
Link 6	38.75	6	Megtron 6	95	*26.75*	*Tachyon-100G*	95

The only difference between links 1-3 is the connectors and their footprints.
The only difference between links 4-6 is the backplane PCB material.

COM Summary

Amphenol FCi

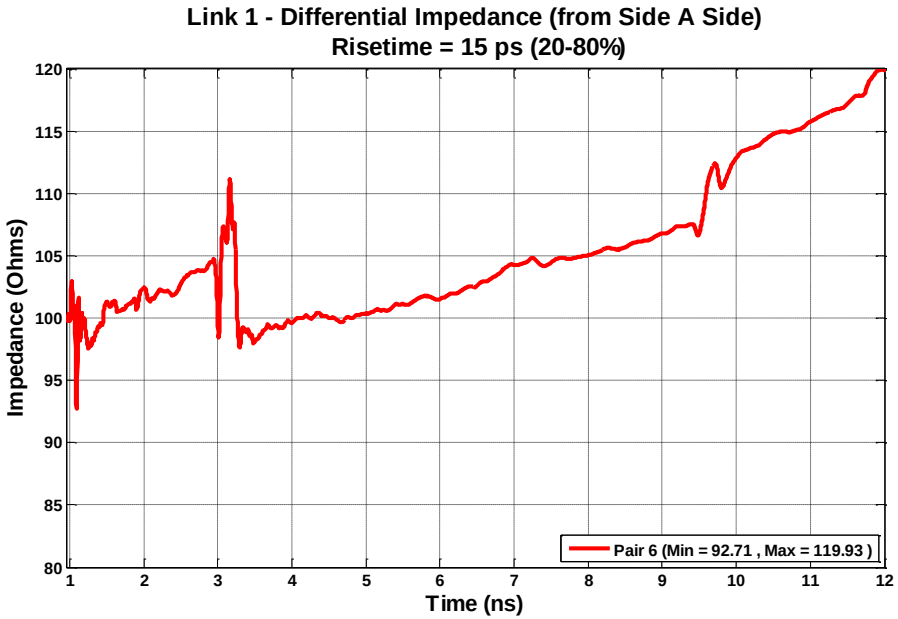
Link #	COM (dB)	Fitted IL @ 13.28 GHz (dB)	ICN (mV)
Link 1	0	28.3	4.29
Link 2	-1.04	29.6	4.52
Link 3	2.28	26.1	2.66
Link 4	2.91	29.9	1.39
Link 5	3.53	28.2	1.39
Link 6	3.06	30.1	1.31

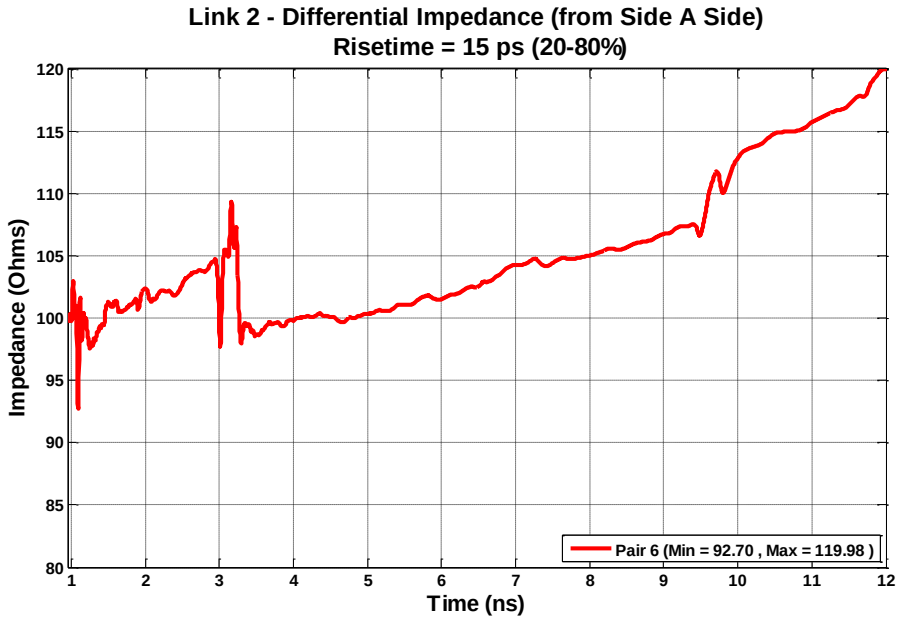
Links 1-3 are using lower performing connectors and are not intended for 50G systems; shown for reference only.

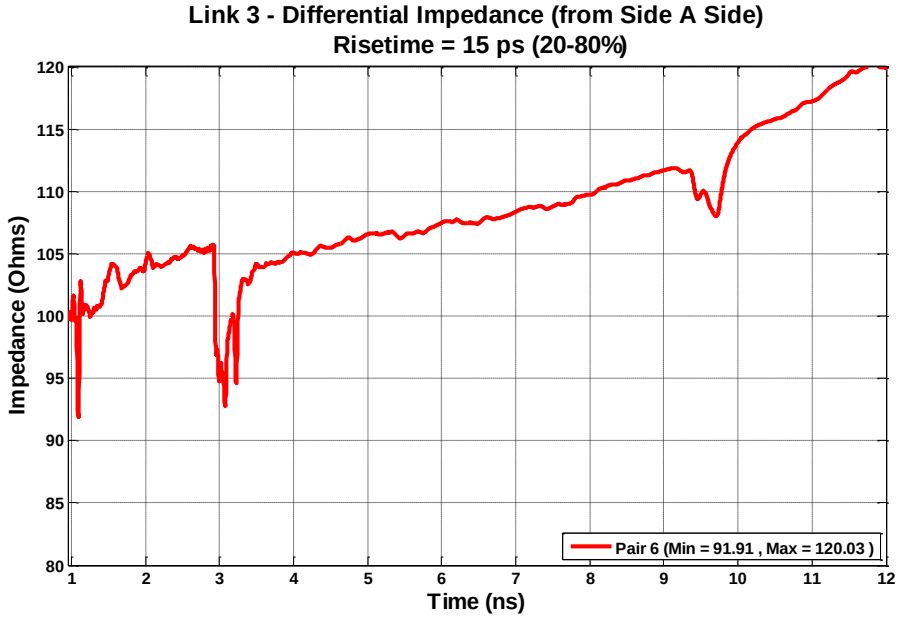
Links 4-6 all use the same 50G connector; only the backplane PCB material is different.

All channels include 8 NEXT and 7 FEXT aggressors

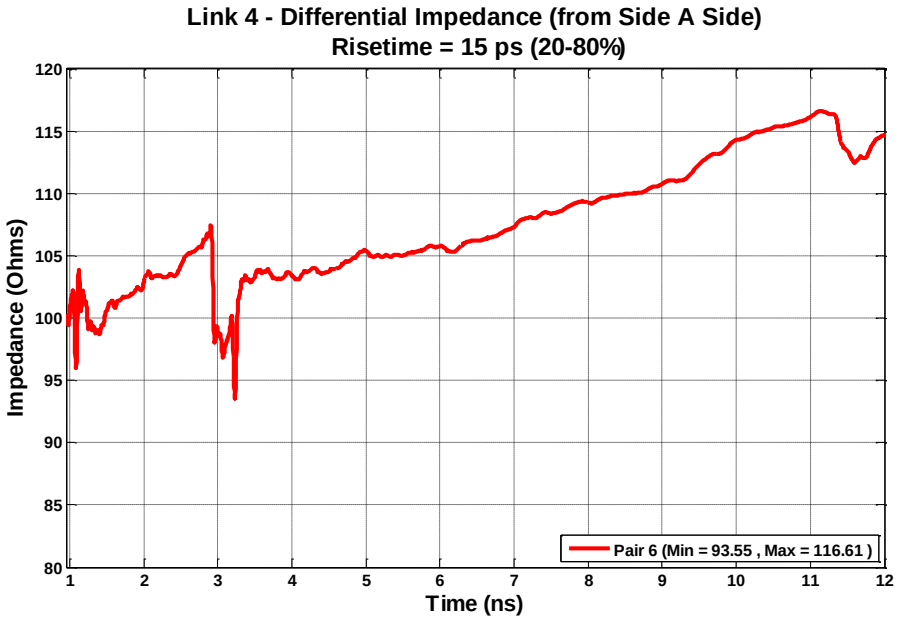
Differential Impedance

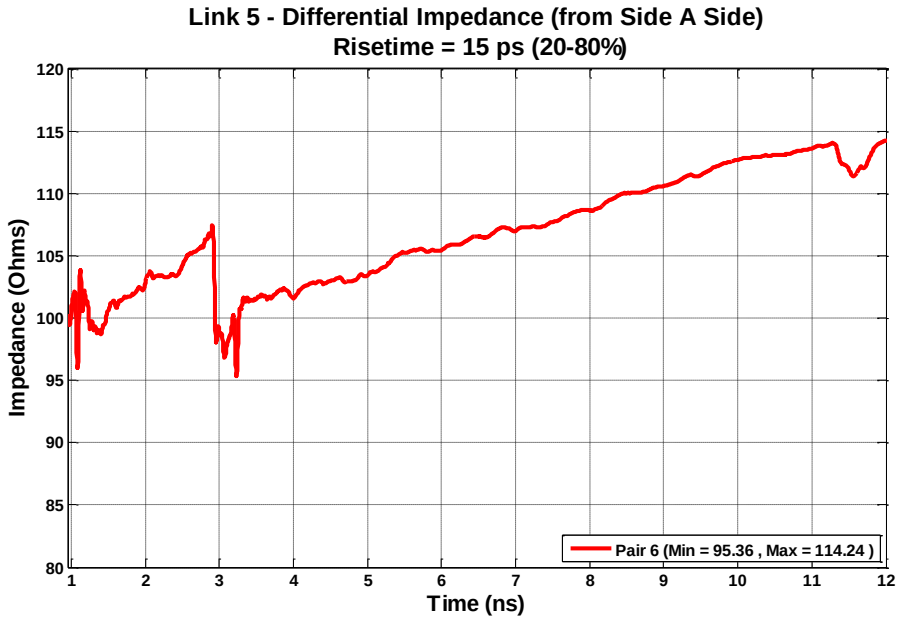


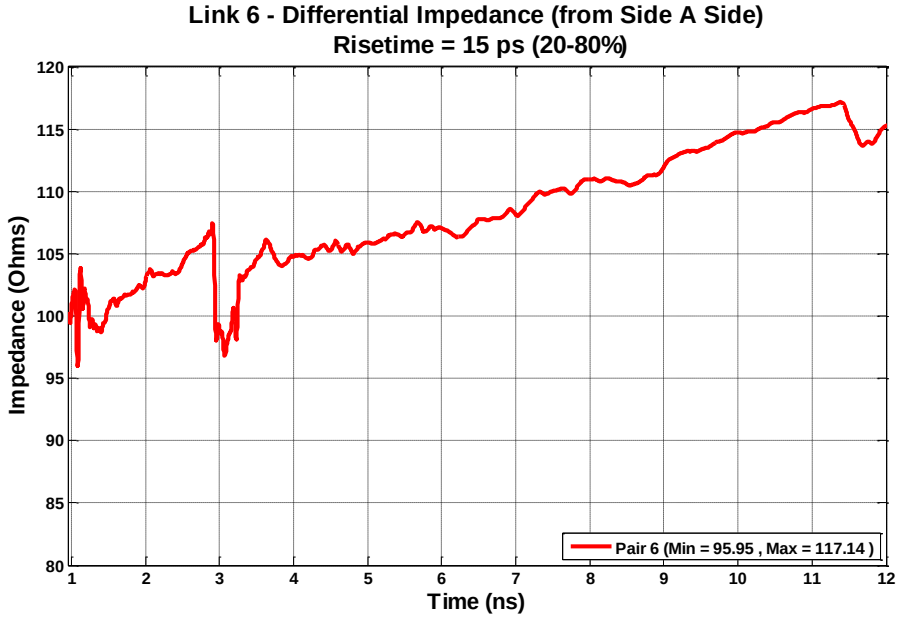




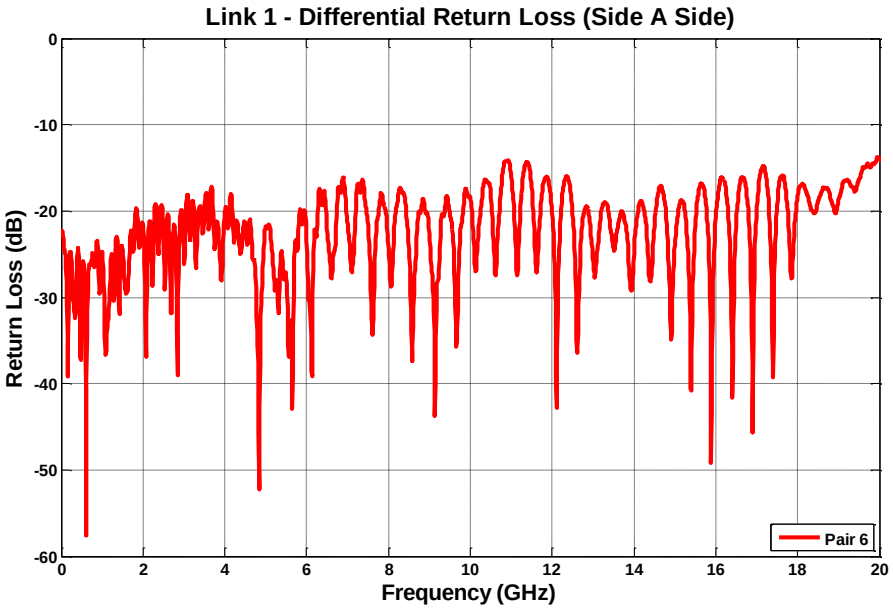
Differential Impedance

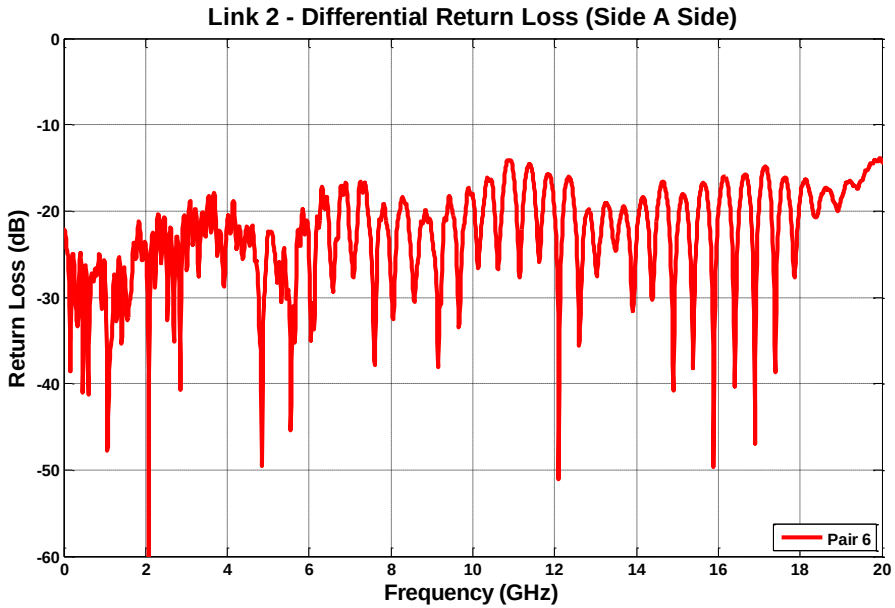


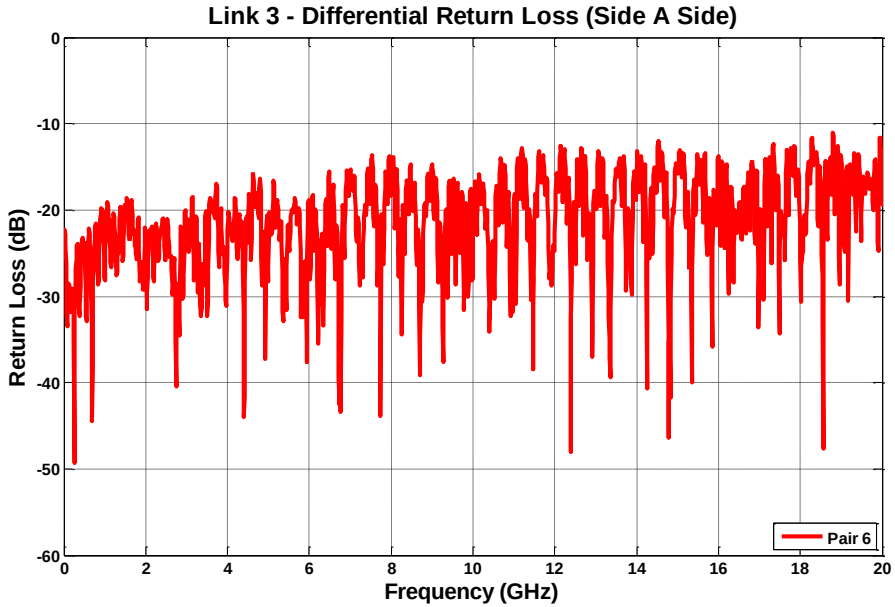




Differential Return Loss







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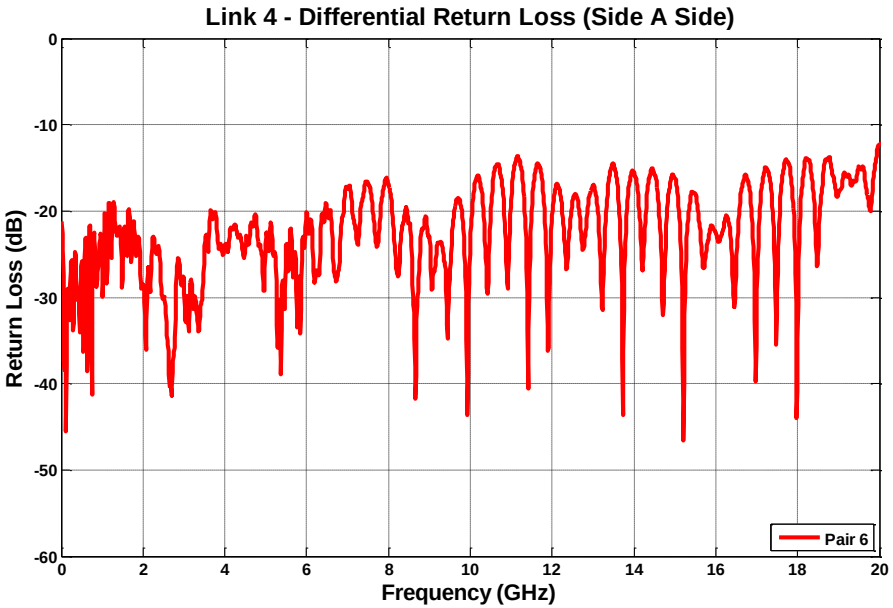
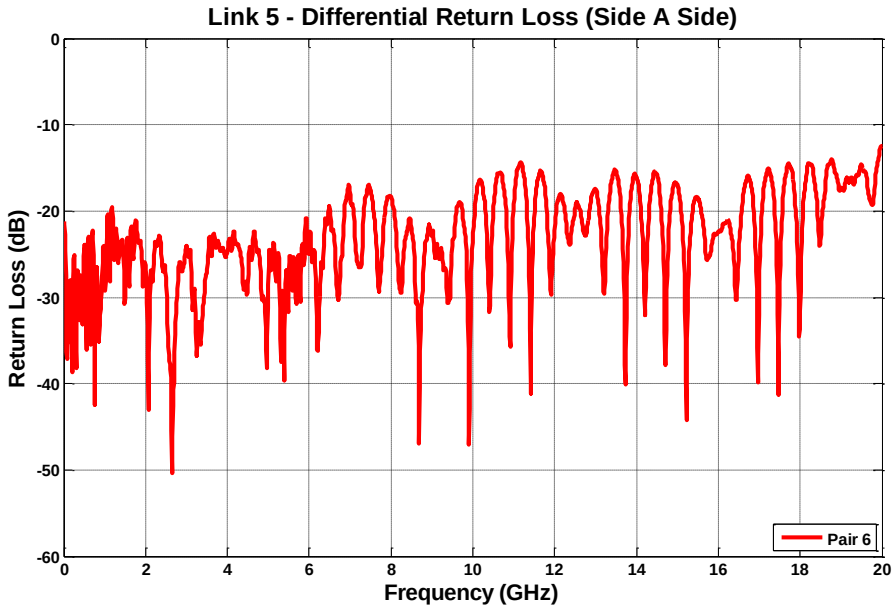
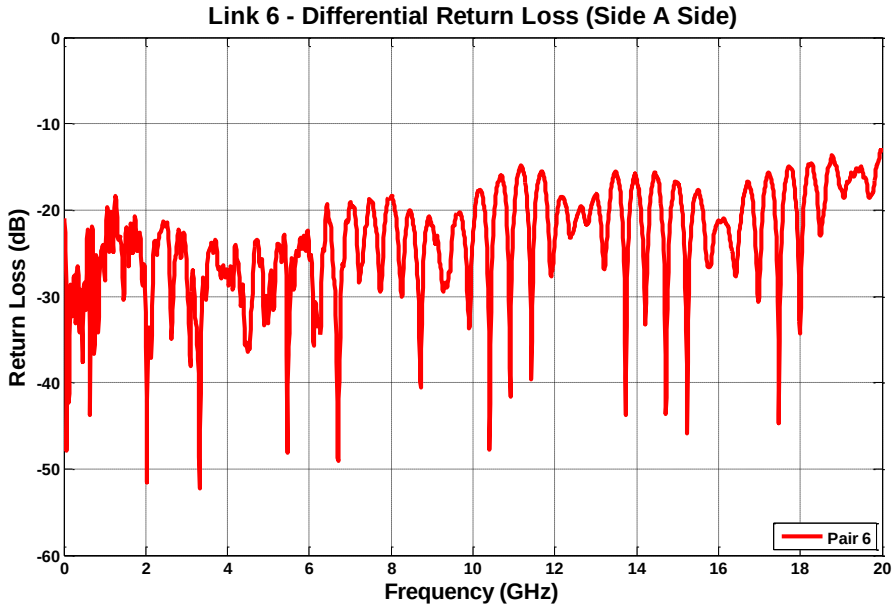
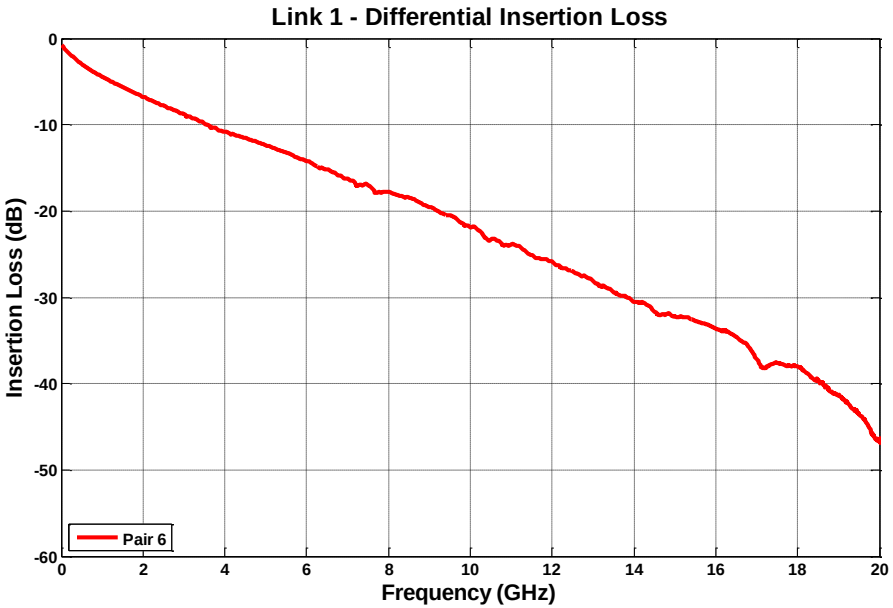
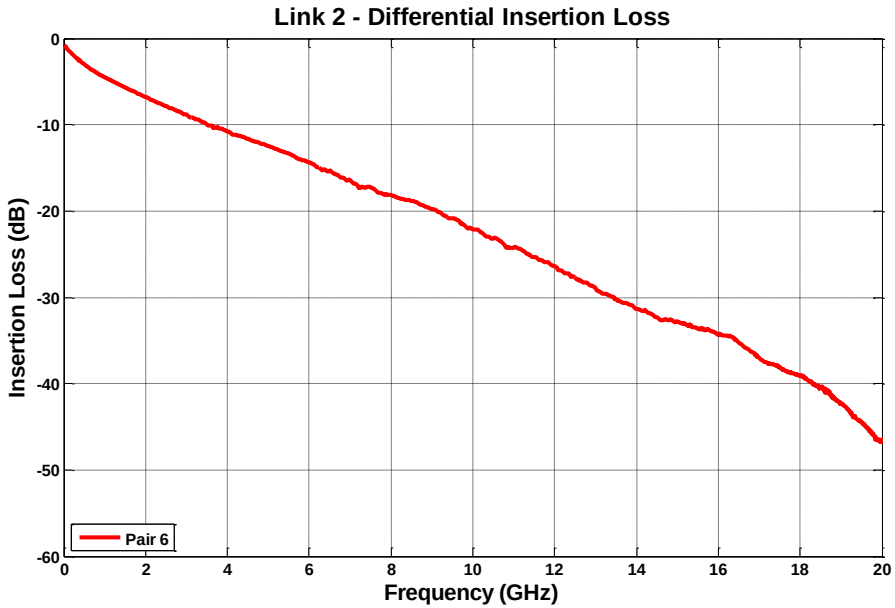


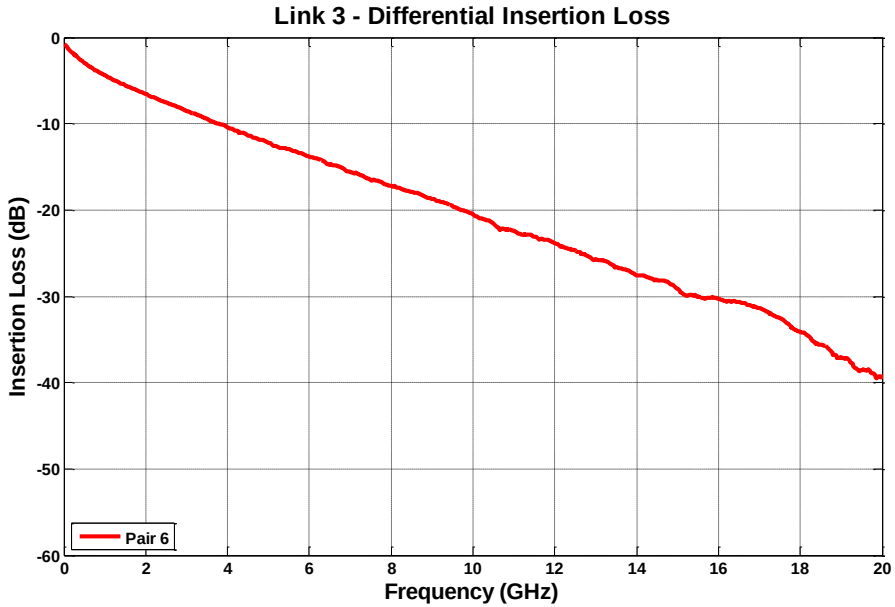




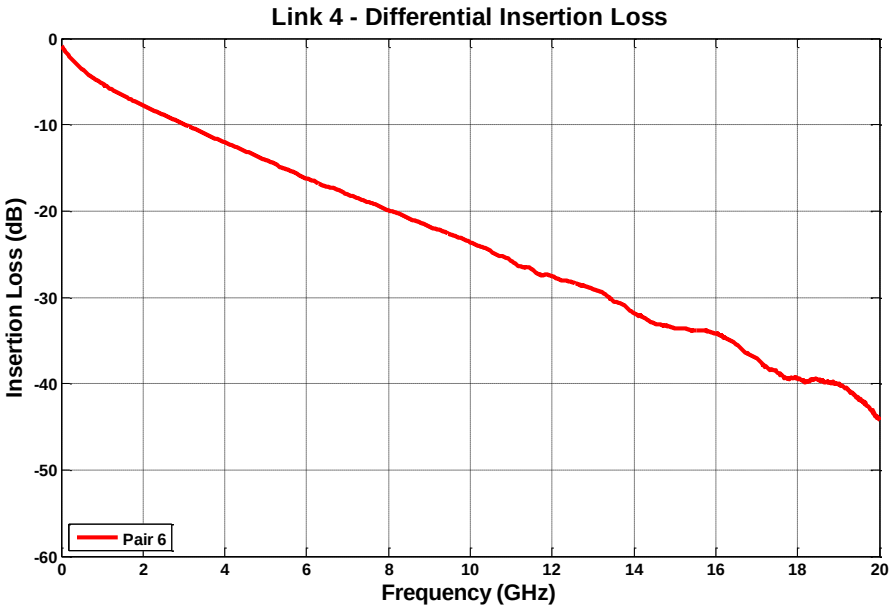
Differential Insertion Loss

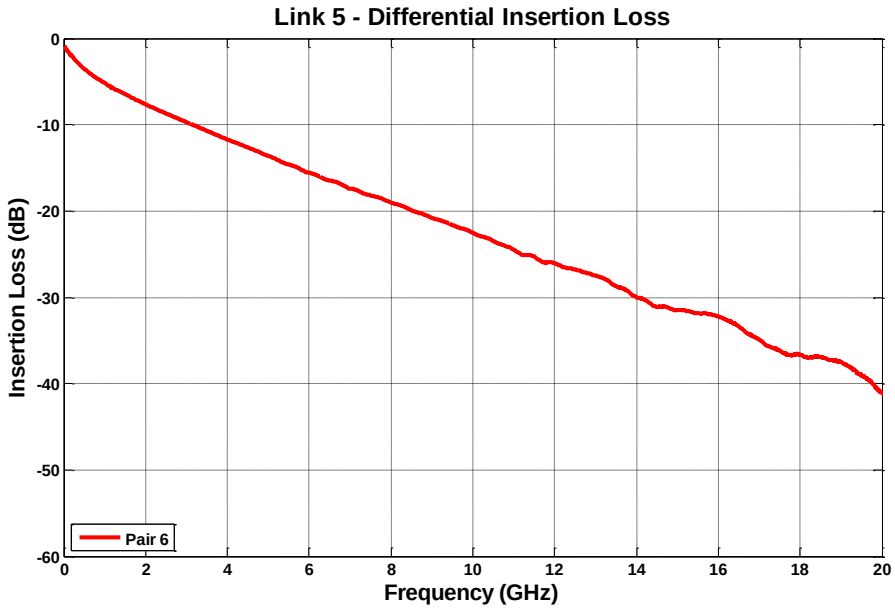


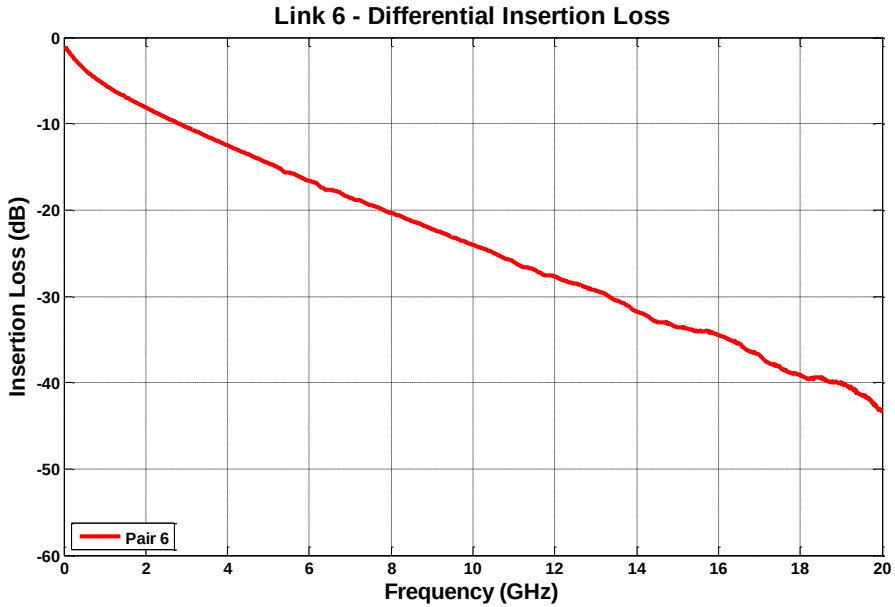




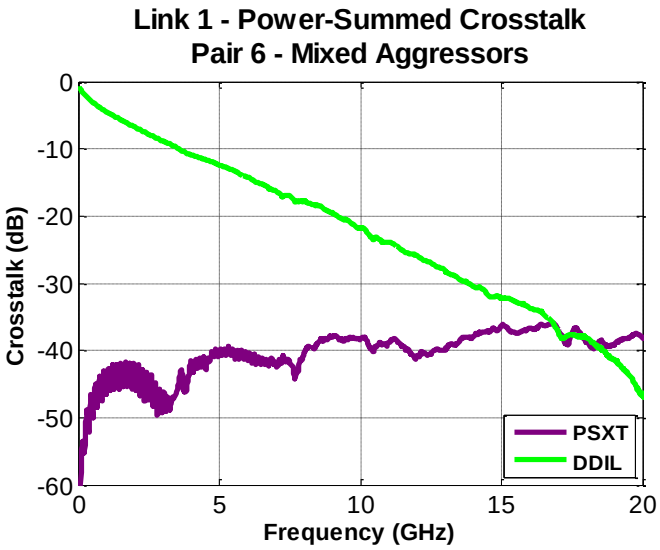
Differential Insertion Loss

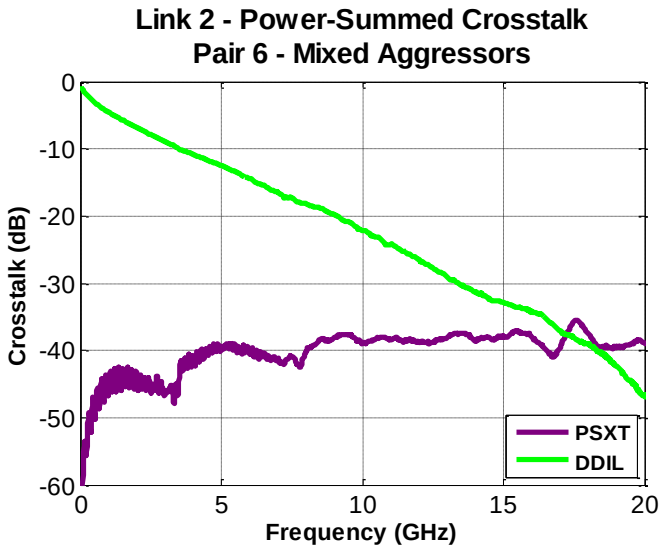


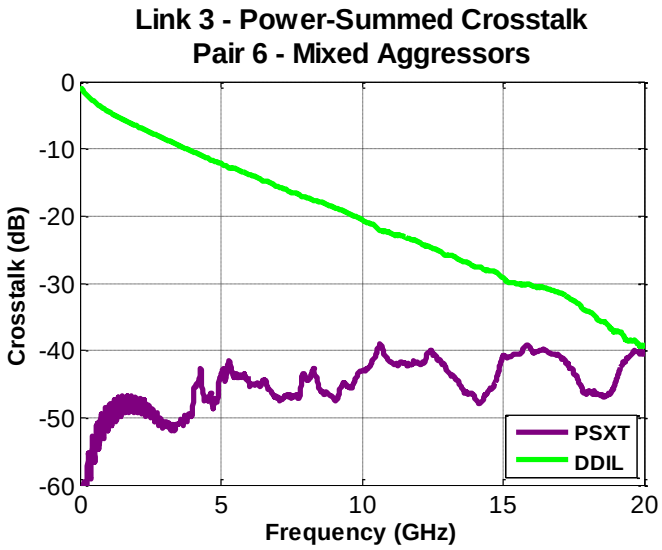


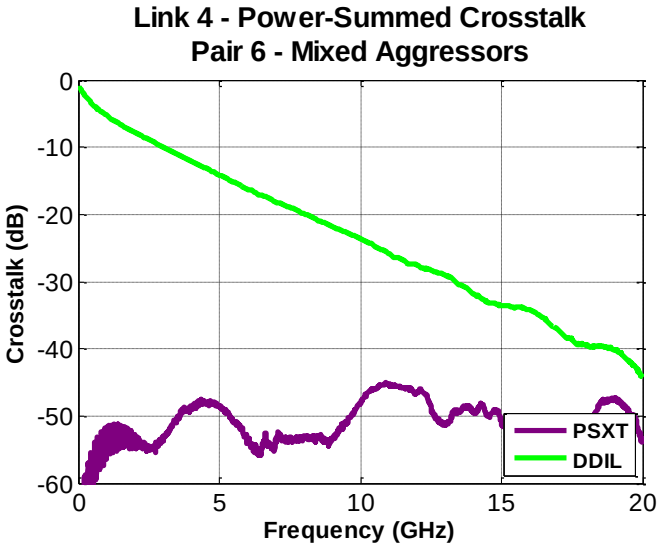


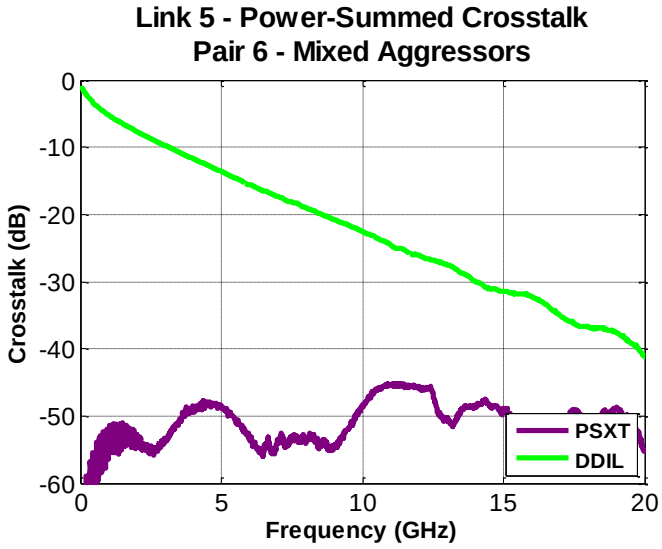
Power-Summed Crosstalk

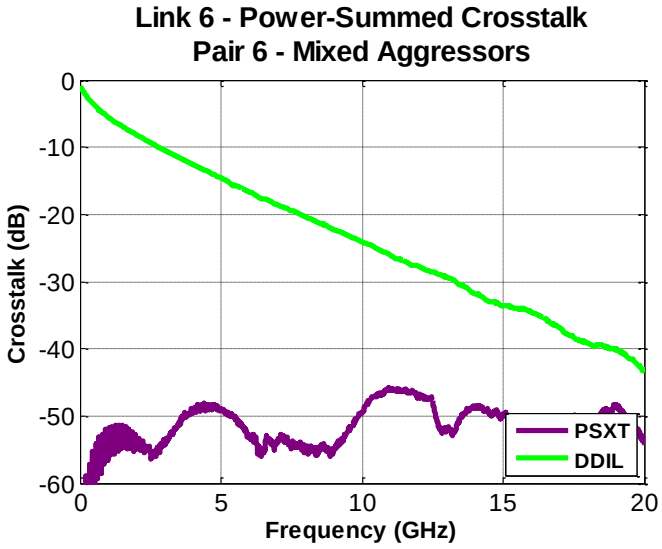












Conclusions

- Links 1-3 were not expected to pass and since they do not, the COM parameters are not overly optimistic.
- Links 4-6 were expected to pass and except for link 4 failing slightly, the COM parameters are not overly pessimistic.
  - Links 4-6 have been shown to work with real SERDES chips at 56 Gb/s which is why they were expected to pass.
- The COM parameters could be changed slightly in order to get link 4 to pass but otherwise no major changes are needed.

- Some uploaded channels have BGA footprints and some do not, but all the channels are held to the same standard.
- Therefore if BGA footprints need to be accounted for one of the below options should be implemented:
  - Option 1: Adjust the COM parameters so there's more margin for channels without a BGA footprints. Therefore, when BGA footprints are added, they would still pass.
  - Option 2: Figure out how much of an effect BGA footprints have on channels and adjust the COM limit accordingly. For example, if BGA footprints reduce COM by 0.5 dB, make the COM limit 2.5 dB.
- Also, should a reference BGA footprint be provided (informatively) in the specification so that it can be concatenated with measured S-parameters?