

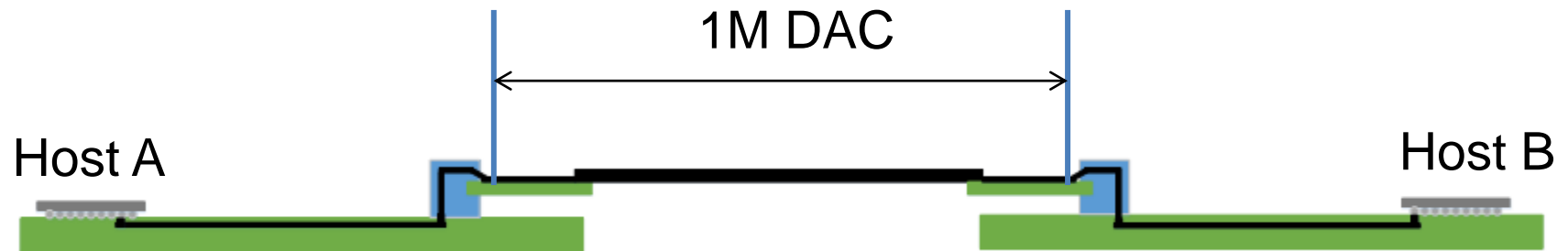
A 212.5 Gbps-PAM4 1 Meter DAC Long Reach Channel and Its Characteristics: Design B

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Background and Introduction (I)

- An important use case of 212.5 Gbps-PAM4 is the cable reach (CR) with a 1 Meter DAC.

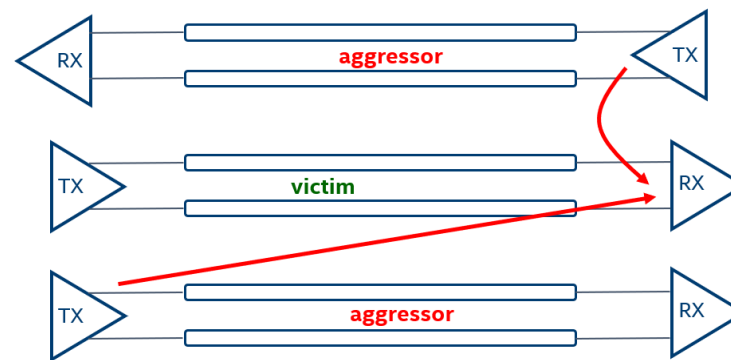
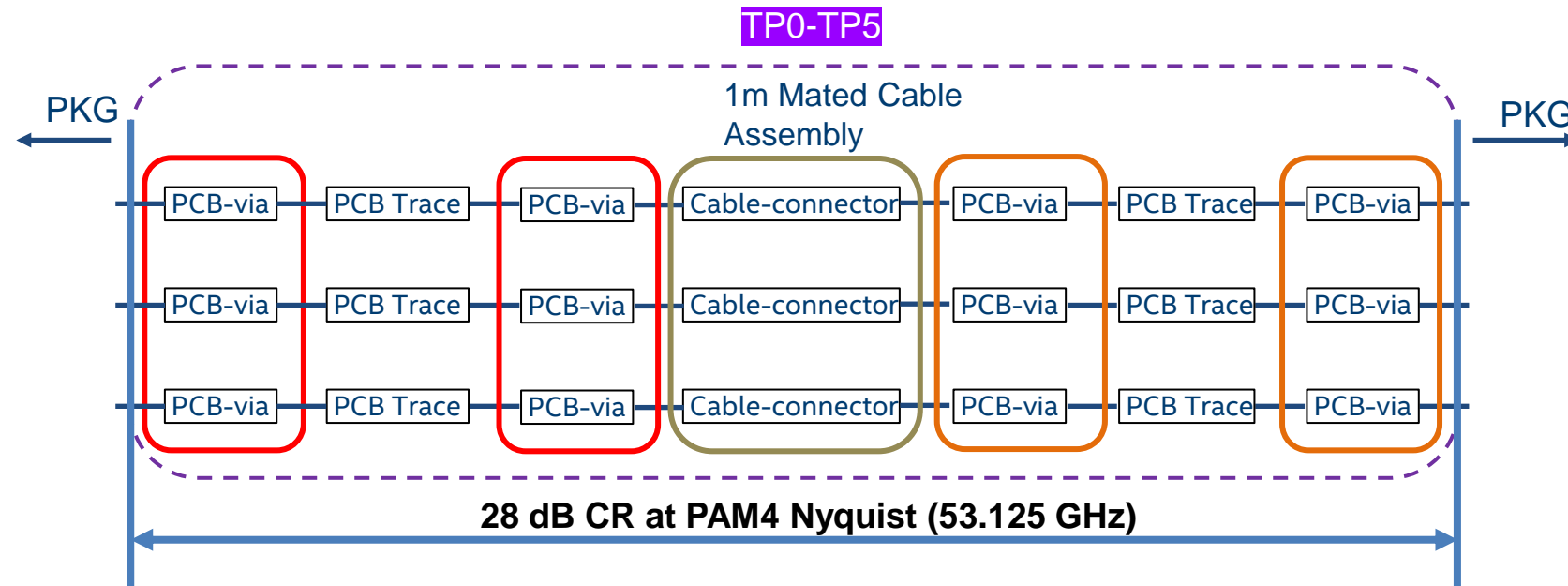


- The channel loss budget between the host bump-to-bump (or TP0d-TP5d) is determined/bounded by the SERDES technology and capability, which is trending ≤ 40 dB, for 212.5 Gbps-PAM4 signaling.

Background and Introduction (II)

- We leveraged our established/validated CR channel design tool-flow-methodology (TFM) (e.g., oif2022.066.00) and the latest connector and DAC technologies to create this CR ball-to-ball channel Design B to support 1 Meter DAC with 212.5 Gbps-PAM4 signaling.

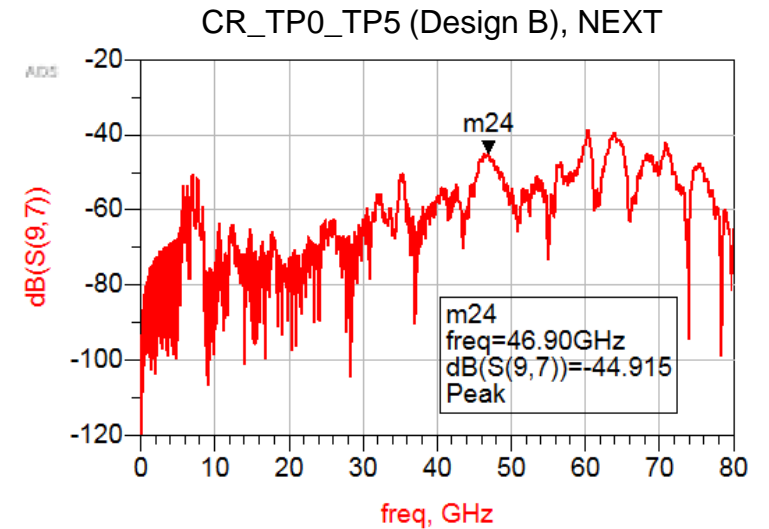
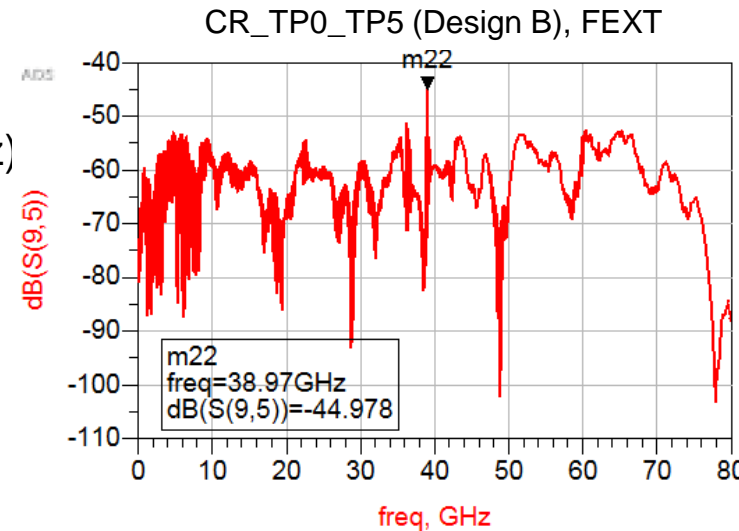
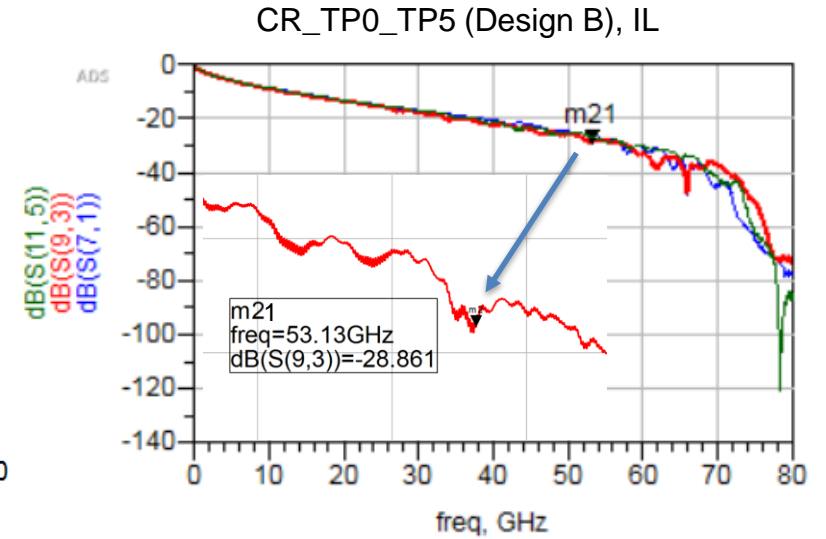
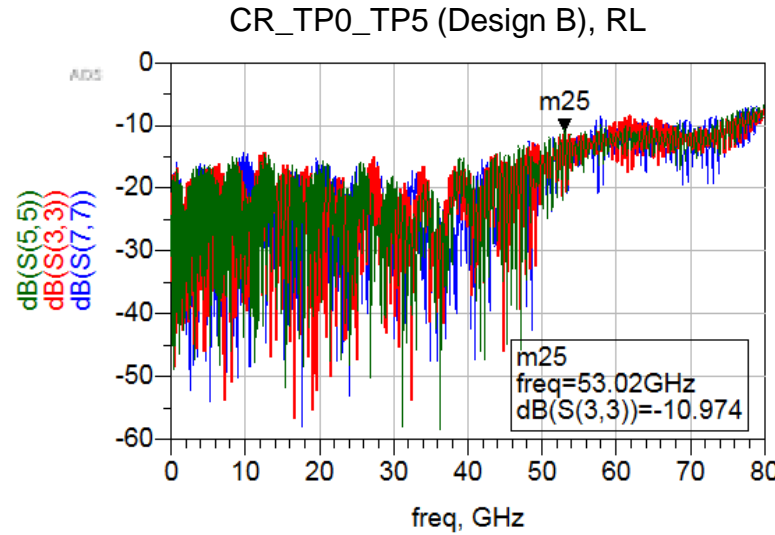
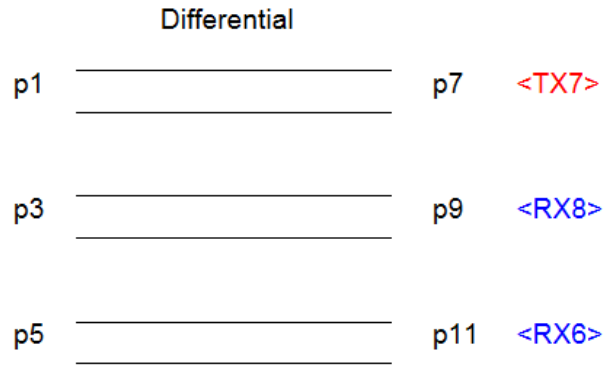
212.5 Gbps-PAM4 CR Channel Structure



Component	TP0-TP5 Insertion Loss (dB) @ 53.125GHz
	<i>Design B</i>
PCB via	1.5 dB
PCB Trace	7.5 inch (TX+RX, 1.27 dB/inch)
Cable Assembly	16.5 dB
Total *	~28 dB

* Not lineally added (big ILD at 53.125GHz)

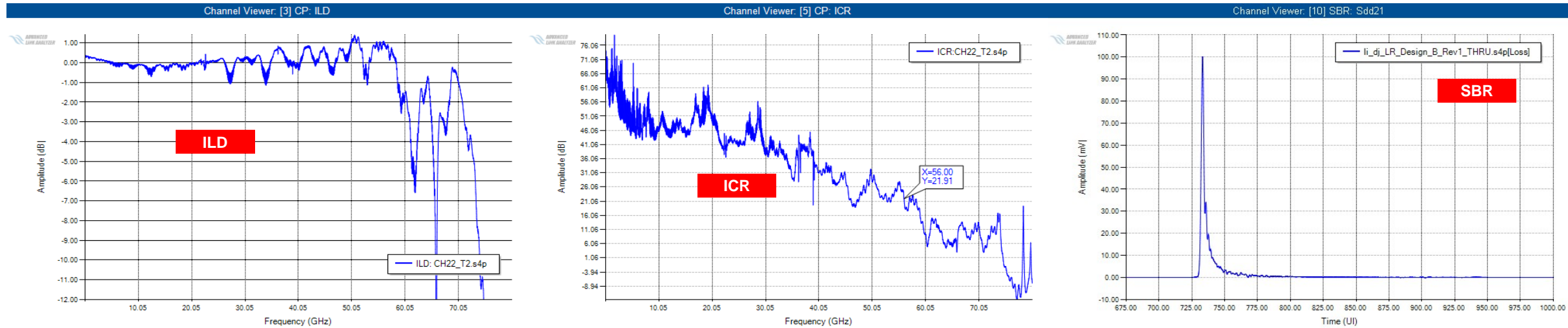
212.5 Gbps-PAM4 CR Channel Characteristics (I)



TP0-TP5 Characteristics (DC-53.125GHz)

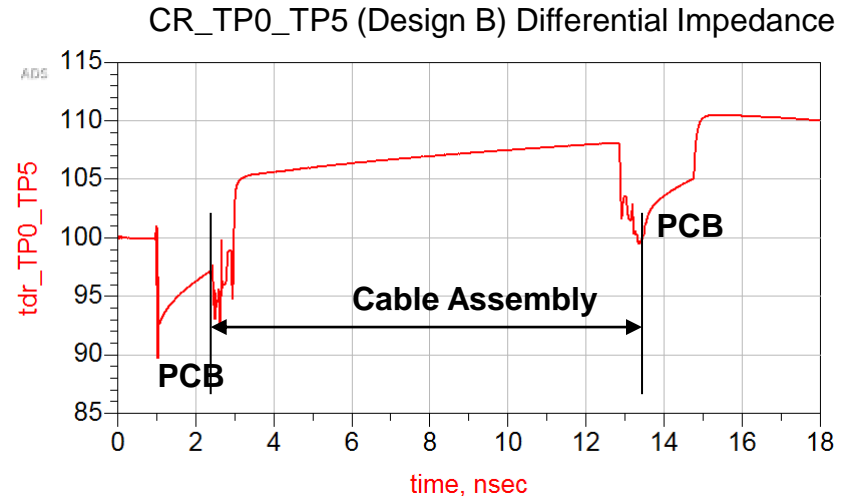
- IL: ~28dB @ 53.125GHz
- RL <~ 11dB (<53.125GHz)
- FEXT < 45dB (<53.125GHz)
- NEXT < 45dB (<53.125GHz)

212.5 Gbps-PAM4 CR Channel Characteristics (II)

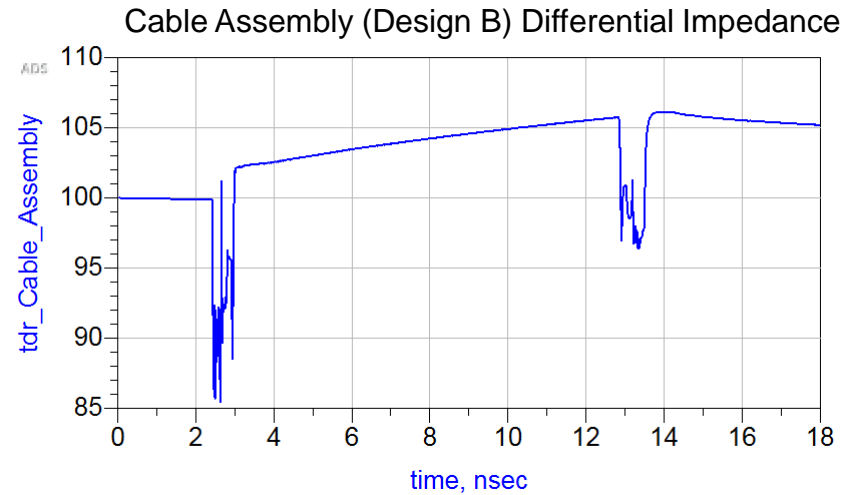


- ILD ~ +/- 1 dB (<53.125 GHz)
- ICR > 21.9 dB (<53.125 GHz) (2FEXT+1NEXT used)

212.5 Gbps-PAM4 CR Channel Characteristics (III)



- Cable Assembly p-p discontinuity 15.9 Ω
- PCB p-p discontinuity 11.5 Ω



[S] parameter BW DC-80GHz

Summary

- We have created a CR channel Design B supporting 1 Meter DAC at 212.5 Gbps-PAM4
- This CR channel includes PCB-Vias, PCB traces, connectors, and 1 Meter DAC
- This CR channel has:
 - An IL (TP0-TP5) of ~ 28 dB at 53.125 GHz (Big ILD at 53.125GHz)
 - $RL < \sim 11$ dB at ≤ 53.125 GHz
 - $FEXT < 45$ dB, $NEXT < 45$ dB, at ≤ 53.125 GHz