

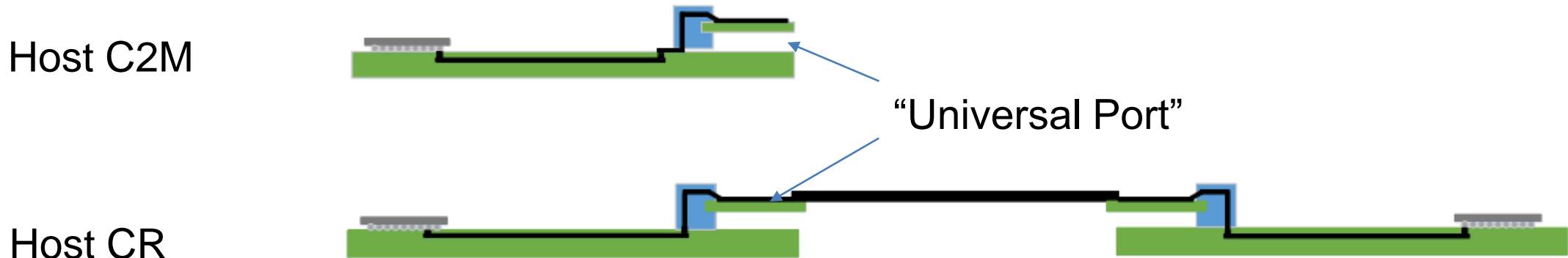
# **A 212.5 Gbps-PAM4 Chip-to-Module Channel for “Universal Port” and Its Characteristics: Design B**

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# Background and Introduction (I)

- An important and common Chip-to-Module (C2M) Channel is the so-called “Universal Port” C2M, as shown in the following diagram

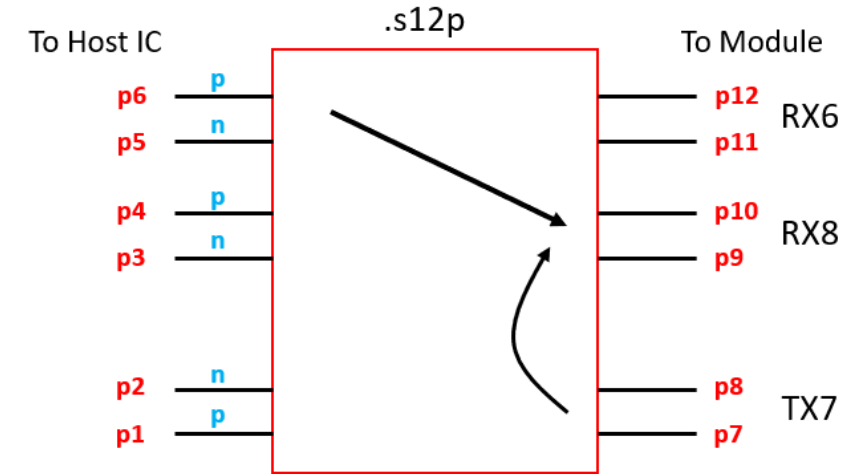
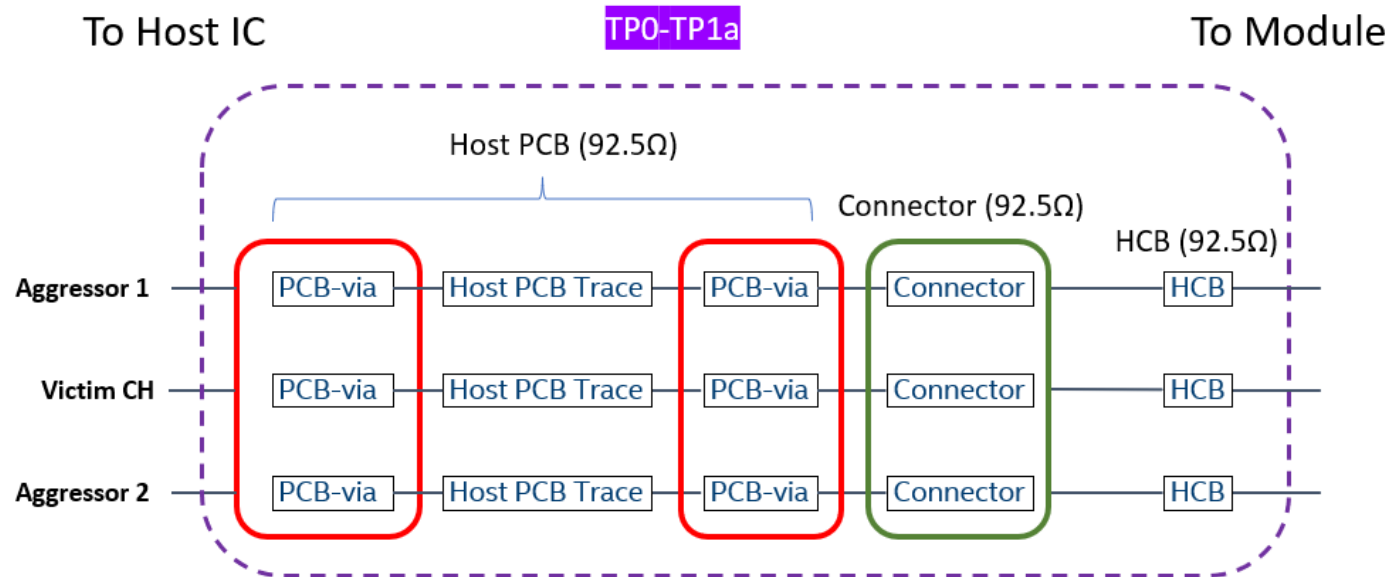


- The loss of the C2M channel (TP0-TP1A) budget is determined/bounded by the bump-to-bump, ref PKG, and DAC loss budget, which are trending  $\leq 40$  dB,  $\sim 6$  dB, and  $\sim 16$  dB for 212.5 Gbps-PAM4 signaling.

# Background and Introduction (II)

- We leveraged our established/validated C2M channel design tool-flow-methodology (TFM) (e.g., oif2022.355.00, oif2022.498.00, oif2023.032.00) to create this C2M channel design B to support 212.5 Gbps-PAM4 “Universal Port”.

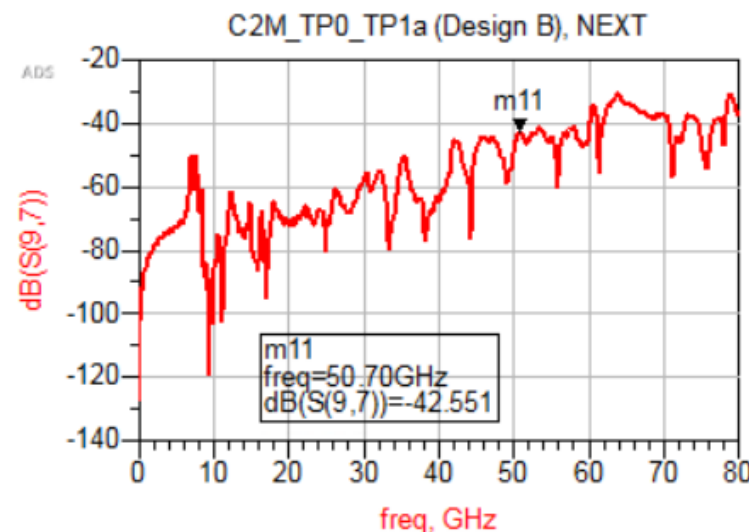
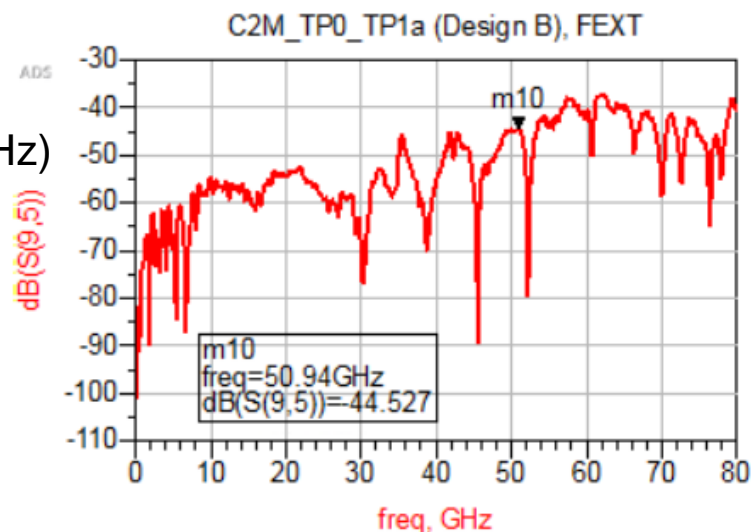
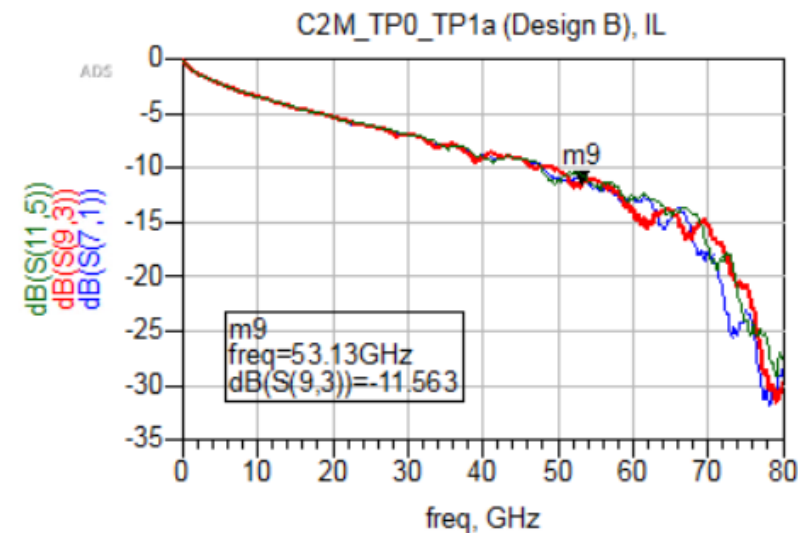
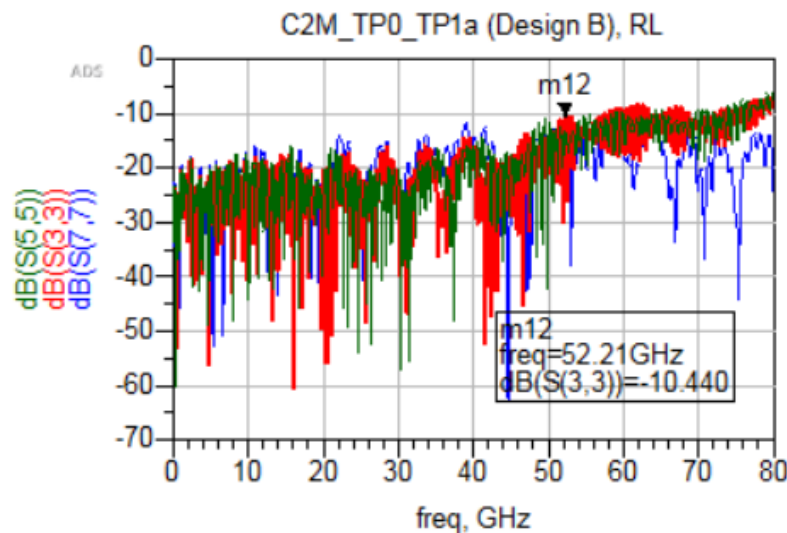
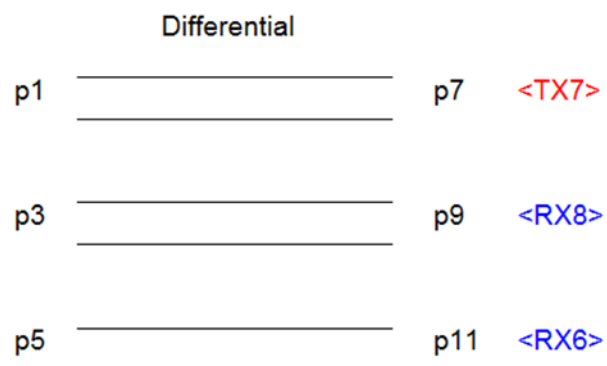
# C2M Channel Design B for “Universal Port”



Component	Insertion Loss TP0-TP1a (dB) @ 53.125GHz
	<i>Design B</i>
Host PCB via	0.75 dB
Host PCB Trace	3.75 inch (1.27 dB/inch)
Connector	2.10 dB
HCB	3.42 dB
Total *	11.6 dB

\* Not lineally added

# C2M Channel Design B Characteristics (I)

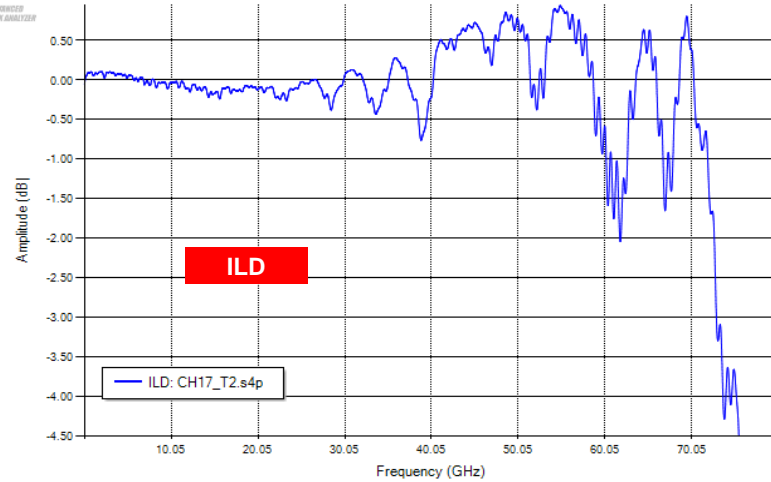


## TP0-TP1a Characteristics (DC-53.125GHz)

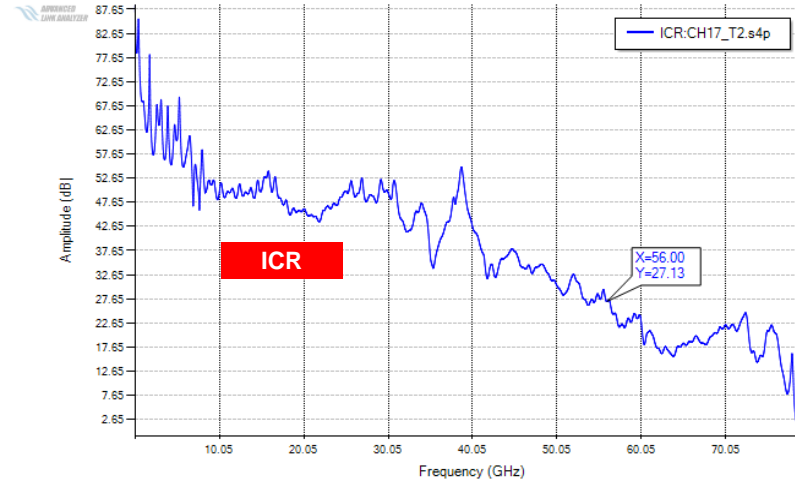
- IL: 11.56dB @ 53.125GHz
- RL < ~10.4dB (<53.125GHz)
- FEXT < 44.5dB (<53.125GHz)
- NEXT < 42.5dB (<53.125GHz)

# C2M Channel Design B Characteristics (II)

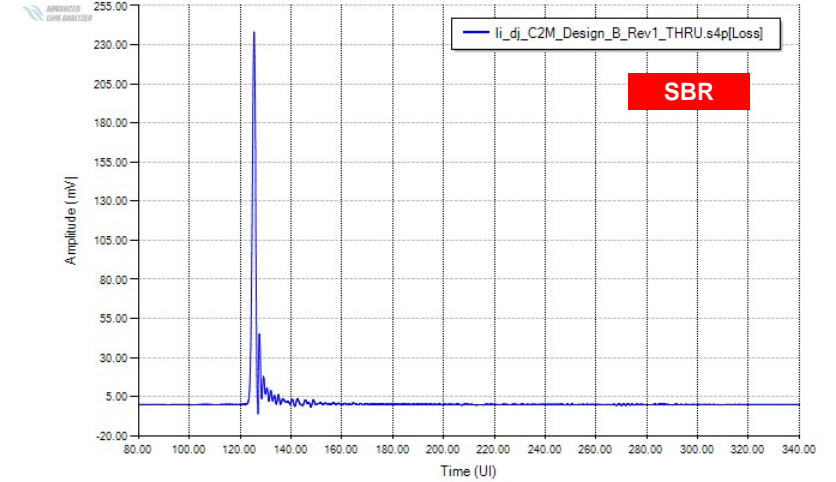
Channel Viewer: [4] CP: ILD



Channel Viewer: [6] CP: ICR

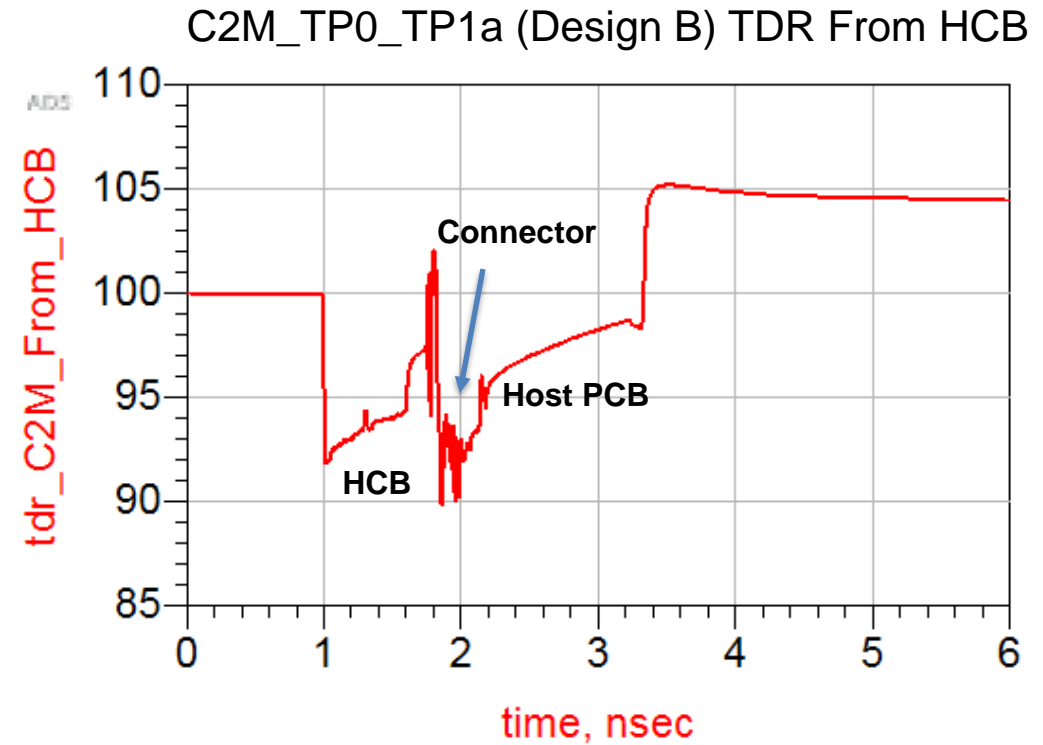
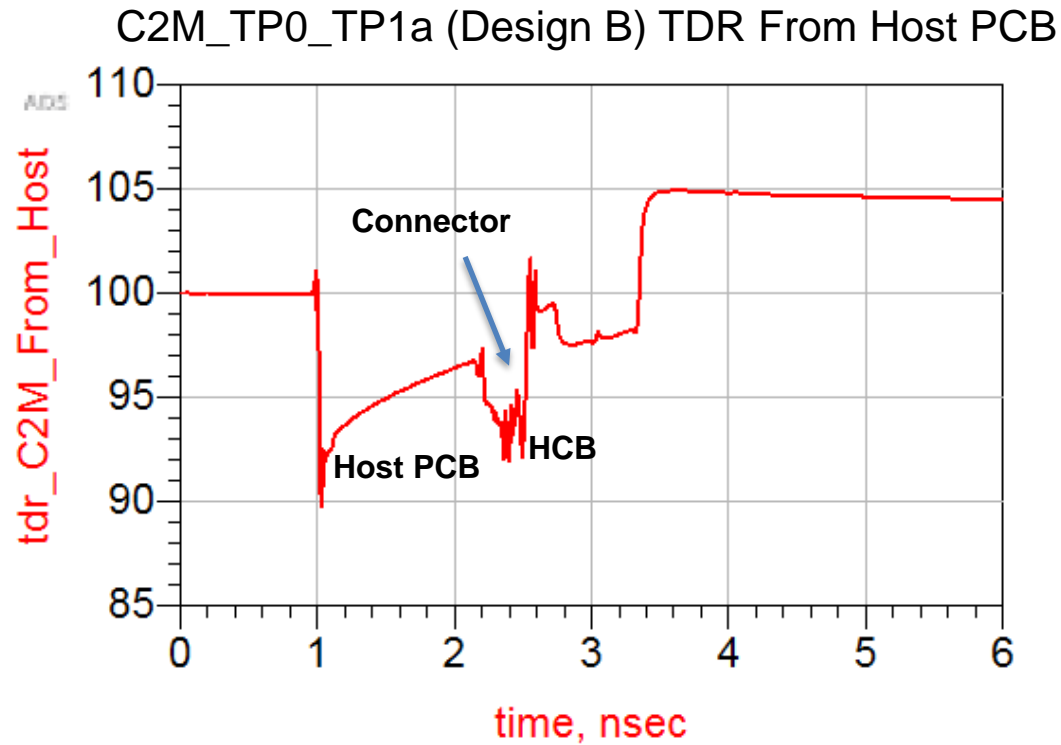


Channel Viewer: [5] SBR: Sdd21



- $ILD < \pm 1 \text{ dB} (< 53.125 \text{ GHz})$
- $ICR > 27.13 \text{ dB} (< 53.125 \text{ GHz})$

# C2M Channel Design B Characteristics (III)



[S] parameter BW DC-80GHz

# Summary

- We have created a C2M channel Design B supporting “Universal Port” at 212.5 Gbps-PAM4
- This C2M channel includes PCB-Via, PCB, connector, and HCB
- This C2M channel has:
  - An IL (TP0-TP1A) of  $\sim 11.6$  dB at 53.125 GHz
  - $RL < \sim 10.4$  dB at  $\leq 53.125$  GHz
  - $FEXT < 44.5$  dB,  $NEXT < 42.5$  dB, at  $\leq 53.125$  GHz
  - PCB IL of 4.8 dB/reach of 3.75 inch (with 1.27 dB/inch) at 53.125 GHz