

212Gb/s Per Lane PAM4 CR Channels with Flexible Host Architectures and Longer Reach Cables - NIC Perspective

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Objective

- To provide a set of simulated CR channels with a focus on NIC perspective (Host-Low)
 - TP0 – TP5: Ball-to-Ball

	Host Loss	Cable Assembly	Host Loss	Vendor
Channel 1	4dB	22dB (CA-C)	4dB	“X”
Channel 2	4dB	27dB (CA-D)	4dB	“X”
Channel 3	4dB	22dB (CA-C)	4dB	“Y”
Channel 4	4dB	27dB (CA-D)	4dB	“Y”

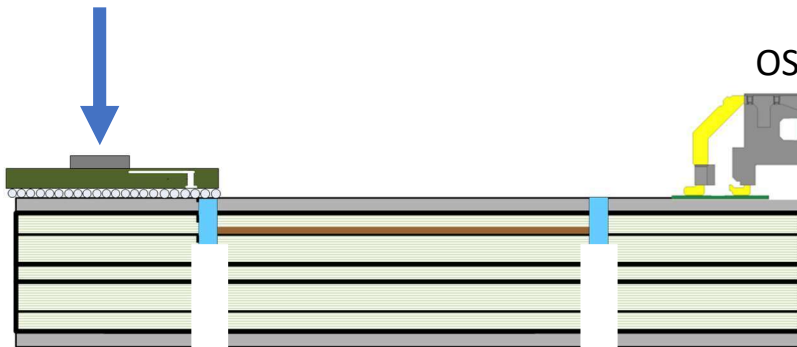
- This presentation intends to provide a set of channels to support a flexible host and longer cable approach. Refer to [tracy_3dj_01_2311](#)
- This is a companion contribution to [weaver_3dj_01_2311](#) which represents the switch perspective

Channel Description

- Simulation of 200Gbps/Lane CR channels
- Number of aggressors
 - FEXT: 3 aggressors
 - NEXT: 2 aggressors
- BGA escape model.
 - BGA ball not included, 5 mil stub, 0.8mm pitch
 - Via Drill Depth: Tx: 10 mils and Rx: 20 mils
- Host PCB
 - 93 ohms
 - 1.5dB/in @ 53.125 GHz
- Does NOT include Package or Silicon structures

Copper Cable Assembly + Conventional Host

ASIC Tx
Does NOT
Include package



OSFP

Twinax

OSFP

ASIC Rx
Does NOT
Include package



- OSFP SMT 200G Connector
- Host Loss: 4dB @ 53.125GHz
- Cable Loss: 22dB and 27dB @ 53.125GHz

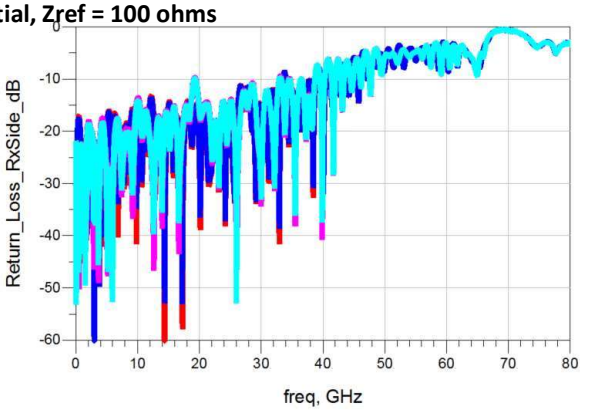
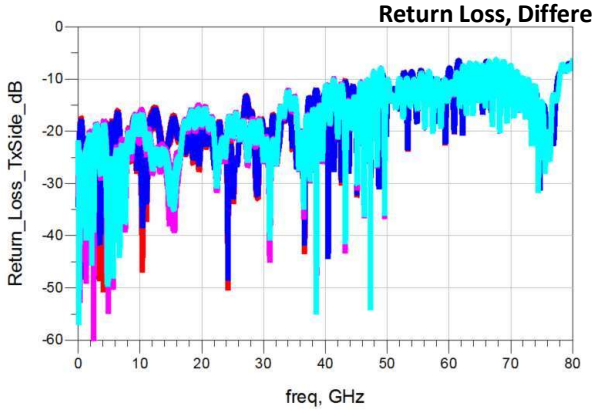
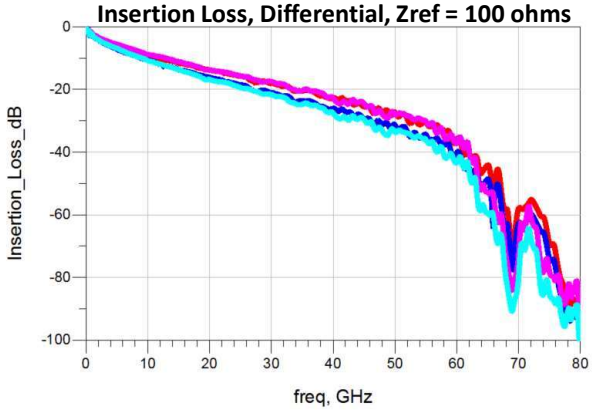
- All components are at room temperature
- Skew is not artificially included

OSFP Pin out

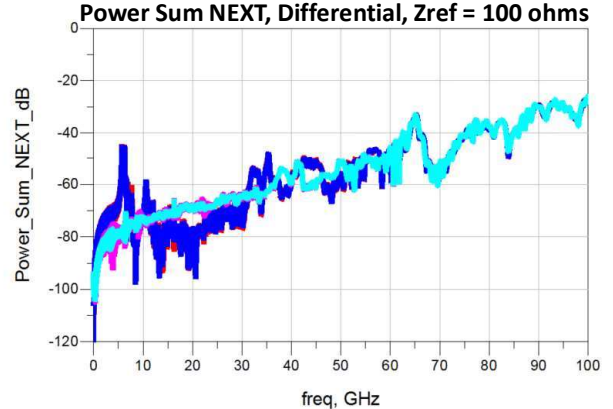
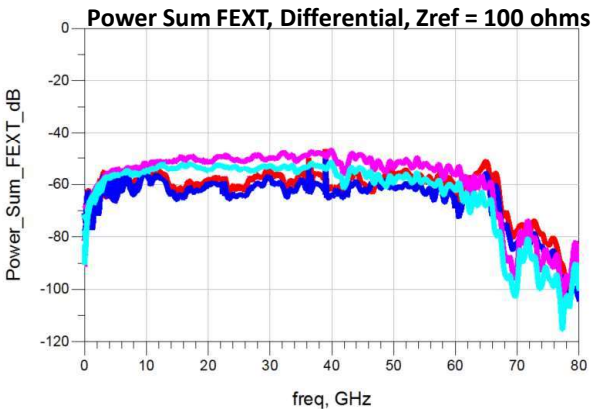
60	59	58	57	56	55	54	53	52	51	50	49	48	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32	31
GND	TX1P	TX1M	GND	TX3P	TX3M	GND	TX5P	TX5M	GND	TX7P	TX7M	GND	CMIS	VCC	VCC	CMIS	GND	RX8M	RX8P	GND	RX6M	RX6P	GND	RX4M	RX4P	GND	RX2M	RX2P	GND
GND	TX2P	TX2M	GND	TX4P	TX4M	GND	TX6P	TX6M	GND	TX8P	TX8M	GND	CMIS	VCC	VCC	CMIS	GND	RX7M	RX7P	GND	RX5M	RX5P	GND	RX3M	RX3P	GND	RX1M	RX1P	GND
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30

- 4 Tx and 2 Rx differential pairs selected
- Tx7 -> Rx 7 is the victim path

CR Channel Characteristics



- Channel 1
- Channel 2
- Channel 3
- Channel 4



Channel Naming Convention

CHANNEL 1	CHANNEL 2
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_thru1.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_thru1.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk1_Fext.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk1_Fext.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk2_Fext.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk2_Fext.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk3_Fext.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk3_Fext.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk4_Next.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk4_Next.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk5_Next.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorX_xtalk5_Next.s4p
CHANNEL 3	CHANNEL 4
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_thru1.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_thru1.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk1_Fext.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk1_Fext.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk2_Fext.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk2_Fext.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk3_Fext.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk3_Fext.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk4_Next.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk4_Next.s4p
Tx_PCB_4dB_OSFP_22dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk5_Next.s4p	Tx_PCB_4dB_OSFP_27dB_OSFP_4dB_PCB_Rx_TP0_TP5_VendorY_xtalk5_Next.s4p

Summary

- We have created a set of CR channels supporting the flexible host architecture and cable reach.
 - Nominal Conditions: Temperature and Impedance
 - No skew is added intentionally
- These CR channels include PCB Vias, PCB Traces, OSFP Connectors, and External Cables.