



# Supporting Data To Demonstrate 100Gbps Capability of Proposed MDIs

Nathan Tracy

September 13, 2018

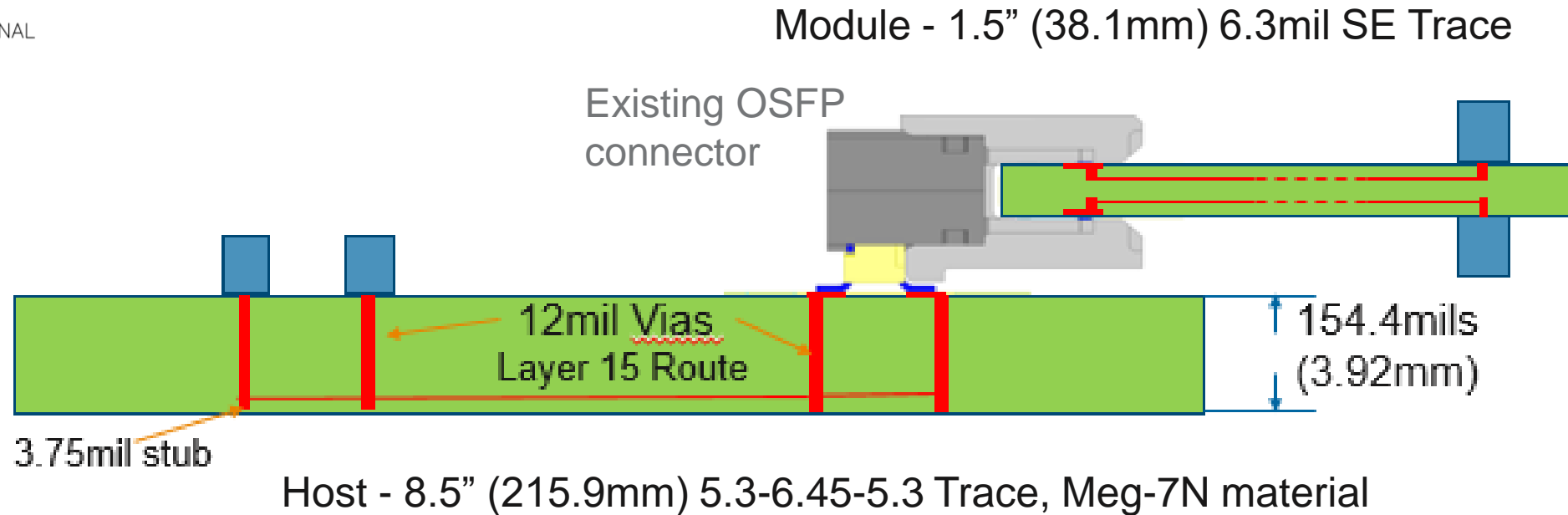
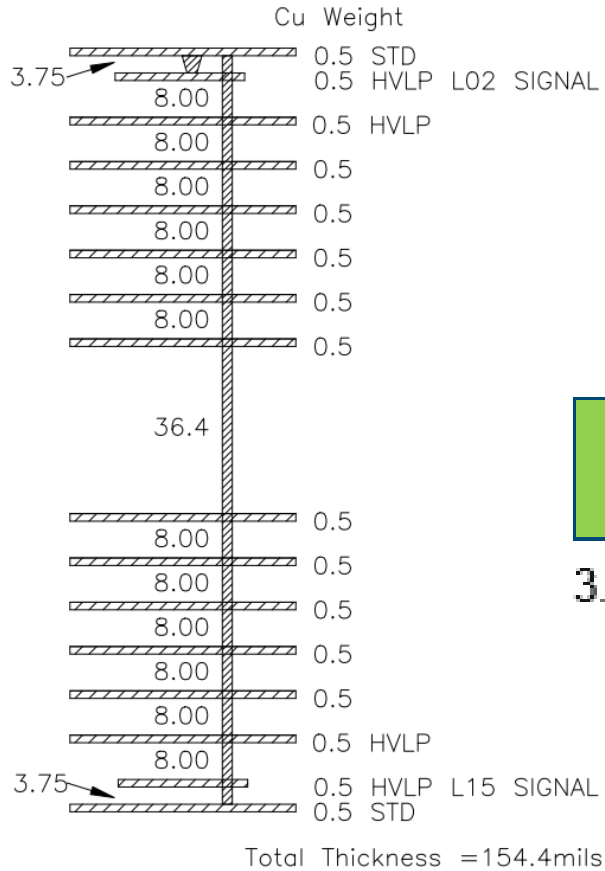


# Objective: Provide Evidence to Support Proposed MDIs

- On July 25 ad hoc, *palkert\_3ck\_adhoc\_01\_072518.pdf* proposed 7 MDIs for inclusion in the project
- This presentation aims to support that proposal with a channel analysis based on one of the two MDIs that use a 0.6mm contact pitch as this tight pitch provides a challenging SI environment (OSFP).

# Channel Details (from *tracy\_100GEL\_01a\_0118*)

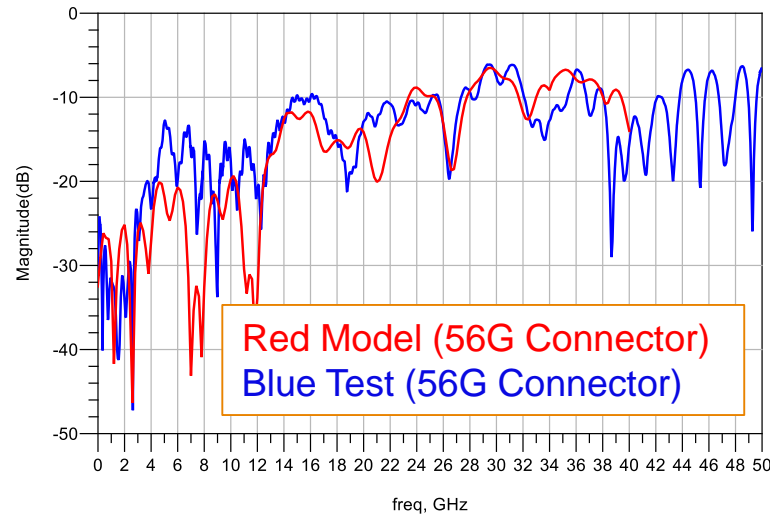
## Host layer stack-up



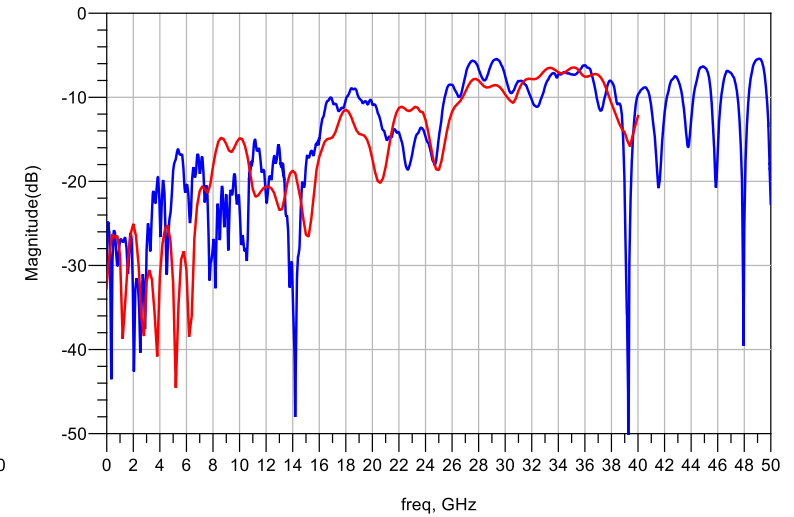
# Test vs Model Results



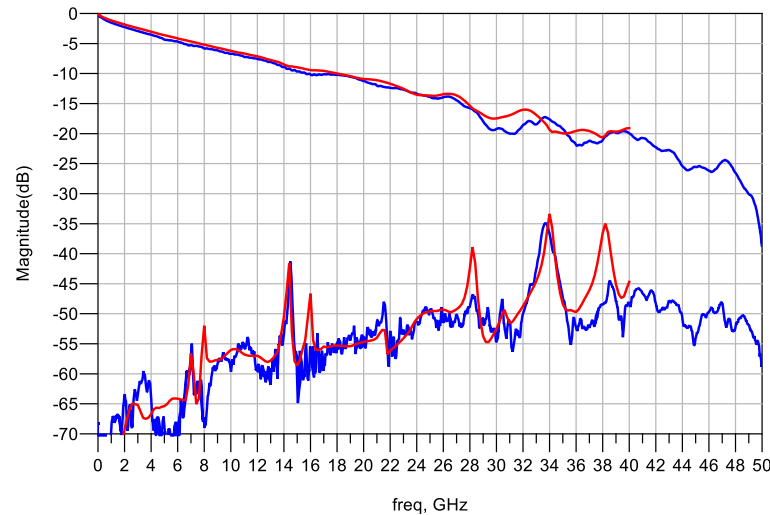
Top Row RL from Module (SDD22) - Layer 15, 12mil Vias



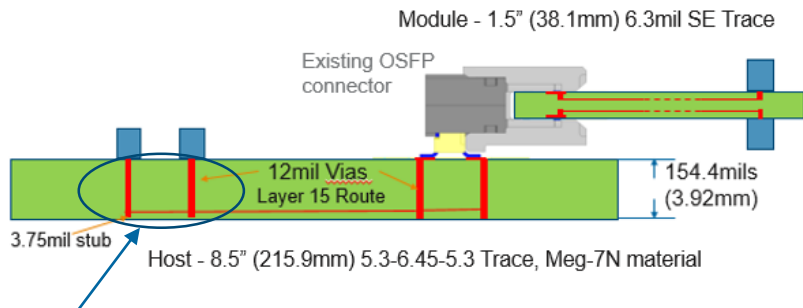
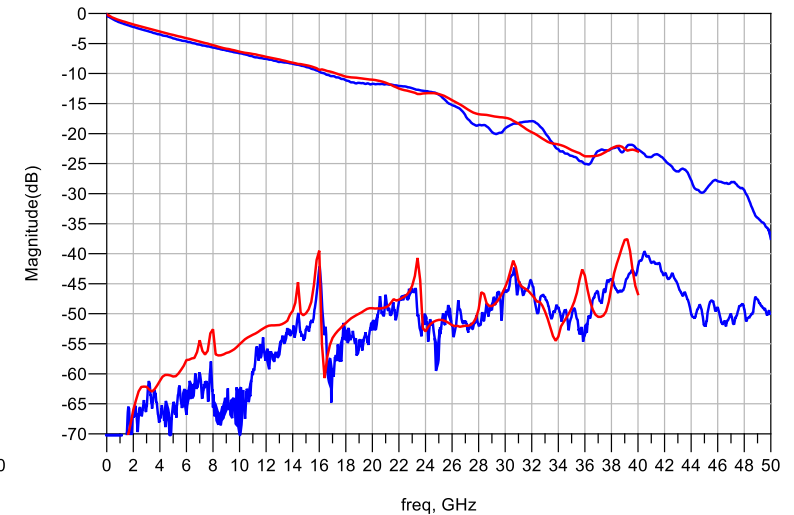
Bot Row RL from Module (SDD22) - Layer 15, 12mil Vias



IL(Top Row) - PSFEXT (Top Row Victim) 5 Aggressors



IL(Bot Row) - PSFEXT (Bot Row Victim) 5 Aggressors

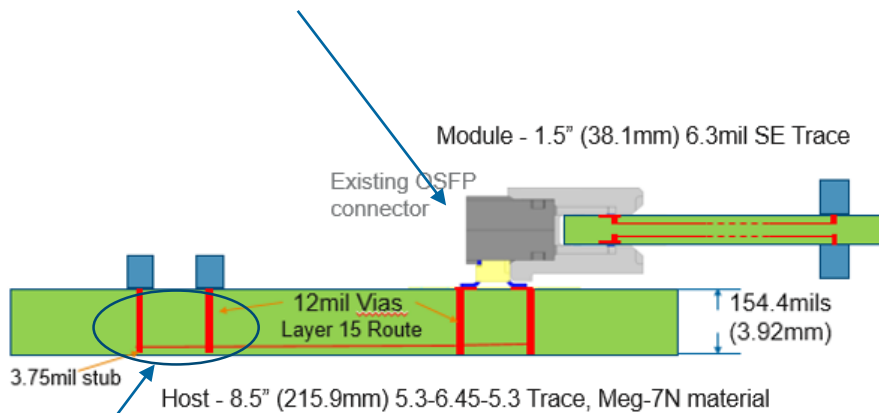


Note: Measured channel includes second set of vias to test point, modeled channels do not include the second set of vias.

# 100G Connector Improvements (in the same 15dB channel)

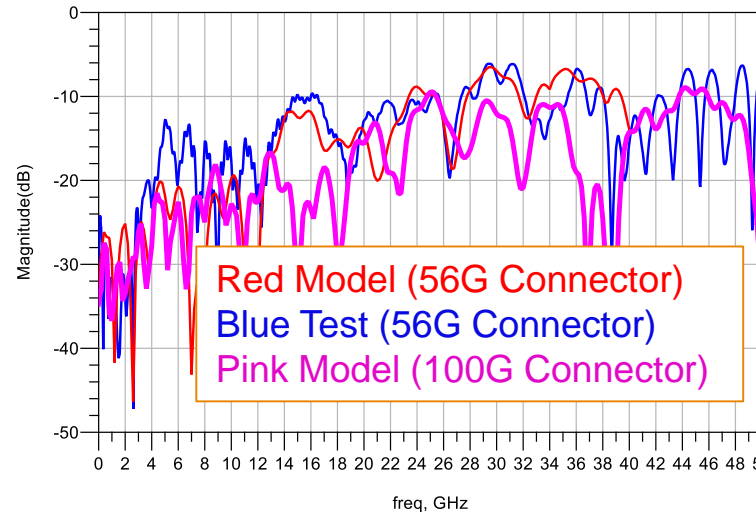
Efforts were focused on insertion loss and return loss optimizations

Improved 100Gbps OSFP connector

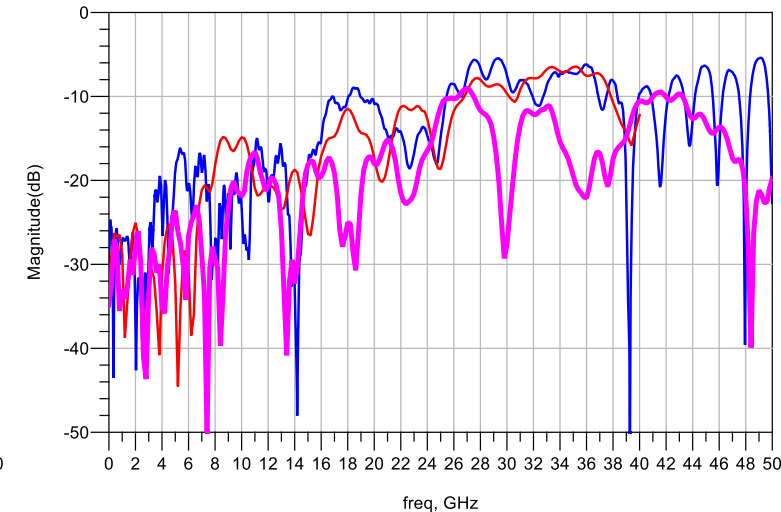


Note: Measured channel includes second set of vias to test point, modeled channels do not include the second set of vias.

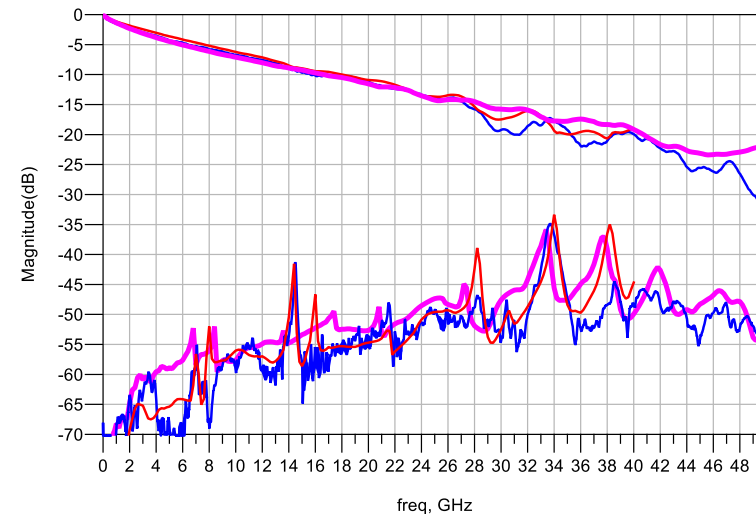
Top Row RL from Module (SDD22) - Layer 15, 12mil Vias



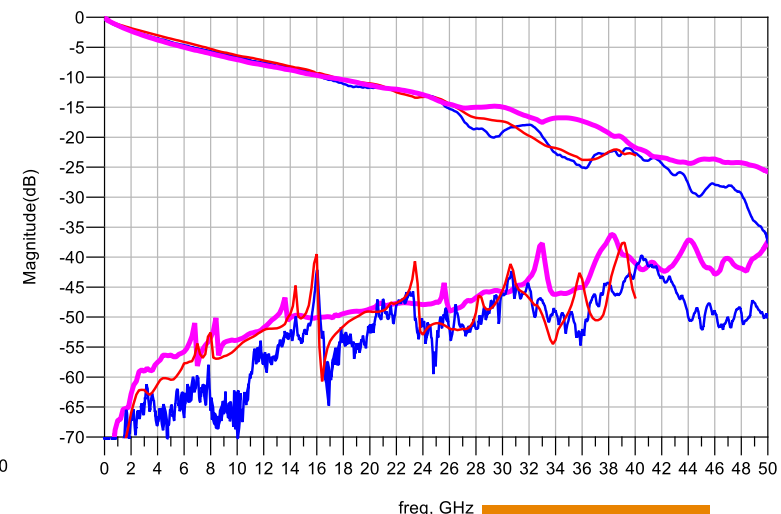
Bot Row RL from Module (SDD22) - Layer 15, 12mil Vias



IL (Top Row) - PSFEXT (Top Row Victim) 5 Aggressors



IL (Bot Row) - PSFEXT (Bot Row Victim) 5 Aggressors



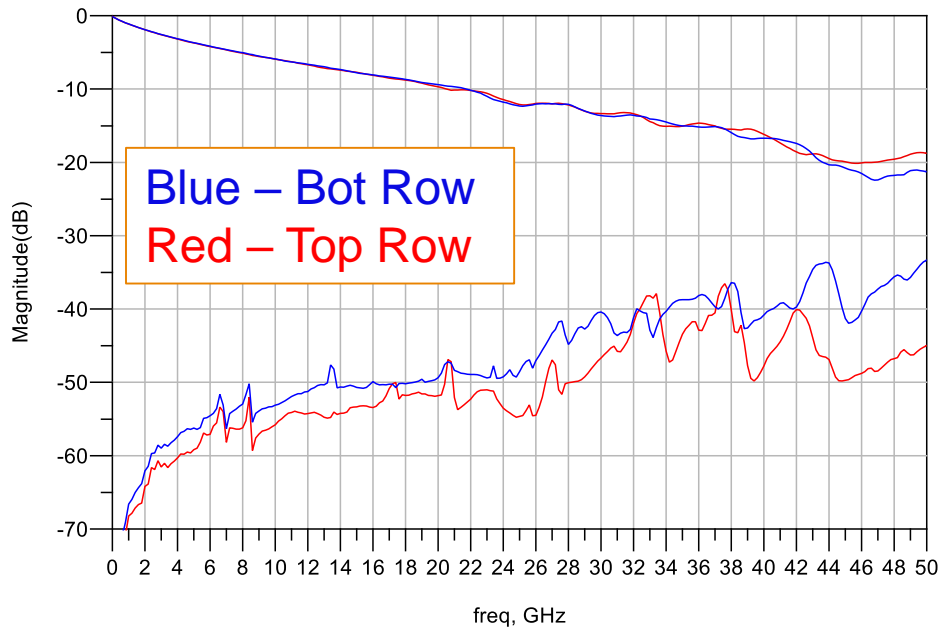
# Improved Connector in a 12dB Channel – Layer 15 Route-out

	Victim
	FEXT Aggressor
	NEXT Aggressor

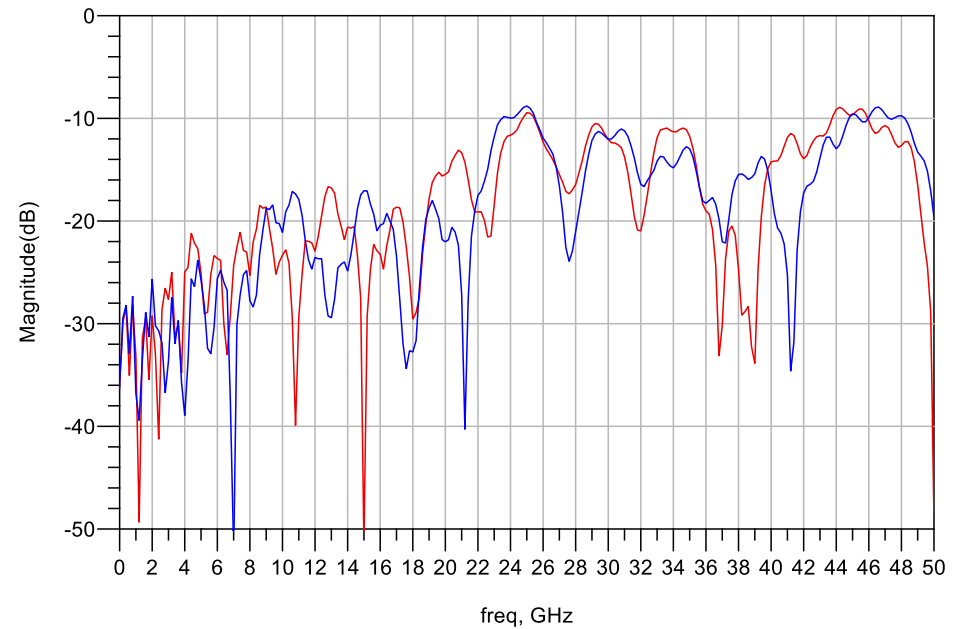
Bot Row  
Victim

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
G	Tx1+	Tx1-	G	Tx3+	Tx3-	G	Tx5+	Tx5-	G	Tx7+	Tx7-	G	SB	SB	SB	SB	G	Rx8-	Rx8+	G	Rx6-	Rx6+	G	Rx4-	Rx4+	G	Rx2-	Rx2+	G
G	Tx2+	Tx2-	G	Tx4+	Tx4-	G	Tx6+	Tx6-	G	Tx8+	Tx8-	G	SB	SB	SB	SB	G	Rx7-	Rx7+	G	Rx5-	Rx5+	G	Rx3-	Rx3+	G	Rx1-	Rx1+	G
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

IL/PSXT - Layer 15 Route, 12mil Vias



RL from Module (SDD22) - Layer 15 Route, 12mil Vias



	Victim
	FEXT Aggressor
	NEXT Aggressor

Top Row  
Victim

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
G	Tx1+	Tx1-	G	Tx3+	Tx3-	G	Tx5+	Tx5-	G	Tx7+	Tx7-	G	SB	SB	SB	SB	G	Rx8-	Rx8+	G	Rx6-	Rx6+	G	Rx4-	Rx4+	G	Rx2-	Rx2+	G
G	Tx2+	Tx2-	G	Tx4+	Tx4-	G	Tx6+	Tx6-	G	Tx8+	Tx8-	G	SB	SB	SB	SB	G	Rx7-	Rx7+	G	Rx5-	Rx5+	G	Rx3-	Rx3+	G	Rx1-	Rx1+	G
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


# COM v2.41 – Improved OSFP Connector in 12dB, 15dB Channels

15 Crosstalk Aggressors – 8 NEXT AND 7 FEXT  
 Maximum Frequency = 50 GHz – 10MHz Step

COM script 2.41  
 (FFE: 2 pre-cursor + 4 post cursor)

	PAM-4 [IEEE802.3ck]	
COM*	Case 1	Case 2
15dB	2.68	3.89
12dB	2.71	4.1

New C2M configuration file:  
[ghiasi\\_3ck\\_adhoc\\_01a\\_082918.pdf](#)



COM script 2.41  
 (FFE: 0 pre-cursor + 4 post cursor)

	PAM-4 [IEEE802.3ck]	
COM	Case 1	Case 2
15dB	4.09	4.71
12dB	4.20	4.89

- \*
- COM script version 2.41 (com\_ieee8023\_93a\_241a.m)
  - Configuration settings (T1config\_com\_ieee8023\_93a=100GEL\_C2M\_tp0\_tp2\_rxFFE7)
  - COM > 3dB PASSES
  - COM Test Case 1 and Test Case 2 differ in the value of the device package transmission line length  $z_p$  - 12mm and 30mm respectively

# COM v2.41 – Improved OSFP Connector in 12dB, 15dB Channels

15 Crosstalk Aggressors – 8 NEXT AND 7 FEXT  
Maximum Frequency = 50 GHz – 10MHz Step

COM script 2.41 (exception to config file) FFE: 2 pre cursor + 6 post cursor + DFE 16 taps

	PAM-4 [IEEE802.3ck]	
COM**	Case 1	Case 2
15dB	5.93	5.16
12dB	6.24	5.45

\*\*

- COM script version 2.41 (com\_ieee8023\_93a\_241a.m)
- COM > 3dB PASSES
- COM Test Case 1 and Test Case 2 differ in the value of the device package transmission line length  $z_p$  - 12mm and 30mm respectively



# Summary

- Selected OSFP MDI for 100Gbps analysis as the 0.6mm pitch provides a difficult SI environment
- Compared OSFP measured to model for model validation
- Inserted improved “100Gbps generation” connector into 15dB channel simulation
- Created new 12dB channel
- Provided analysis of both 15dB and 12dB channels
- Based on current COM definition, generally provides acceptable performance