100GEL C2M Channel model Study Update

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Contents

Purpose

1) This is updated of study of 100G/Lane Chip to Module for Yamaichi connectors.

a. Other worst cases of connector was included.
   Total cases are: Mating position, PAD Width and Side Shift.

b. Impedance of QSFP-DD module board and all host boards were improved.

c. COM of all cases were calculated by ourselves.

2) Connector models were same as last presentation in Bangkok.

3) COM files were used “com_ieee_93a_253.m” and “com_ieee_93a_257.m”.

C2M Channel Simulation

- Simulation Conditions of connector : Multi Worst(All dimensions are Worst)

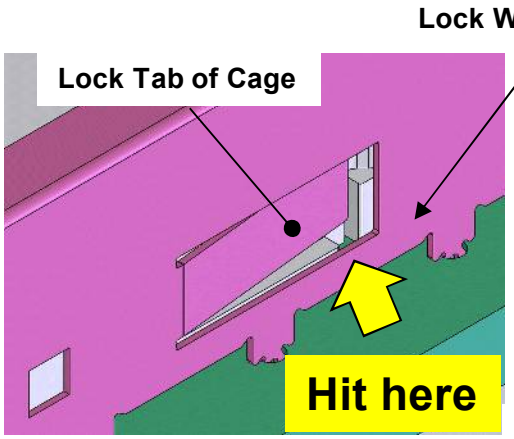
These values are shown at QSFP-DD.

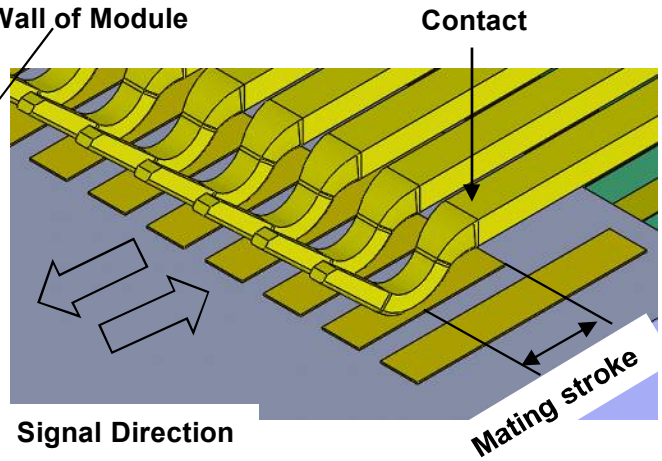
1) Worst Mating: The mating stroke was calculated as a table below.
2) Wider PAD: Pads width of module board are worst (0.58mm).
3) Side Shift: Position of Module board is worst. 0.154mm shift from a center of connector.

1) Mating Strokes

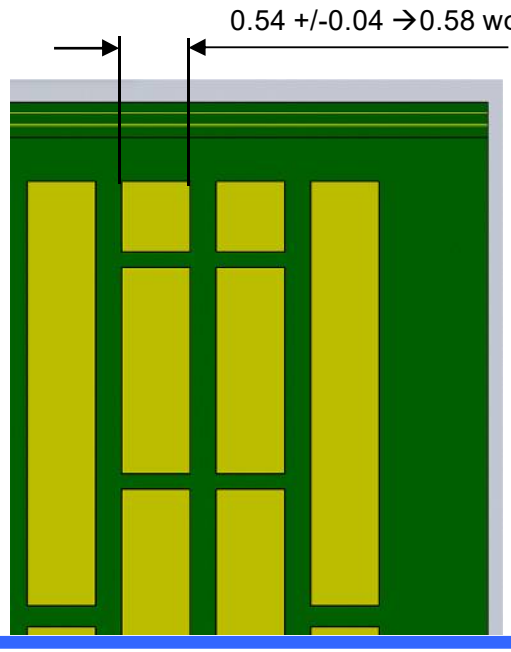
[mm]

	Normal Mating Stroke	Worst Mating Stroke
QSFP-DD	Legacy PAD=0.80 Additional PAD=0.85	Legacy PAD=1.10 Additional PAD=1.20

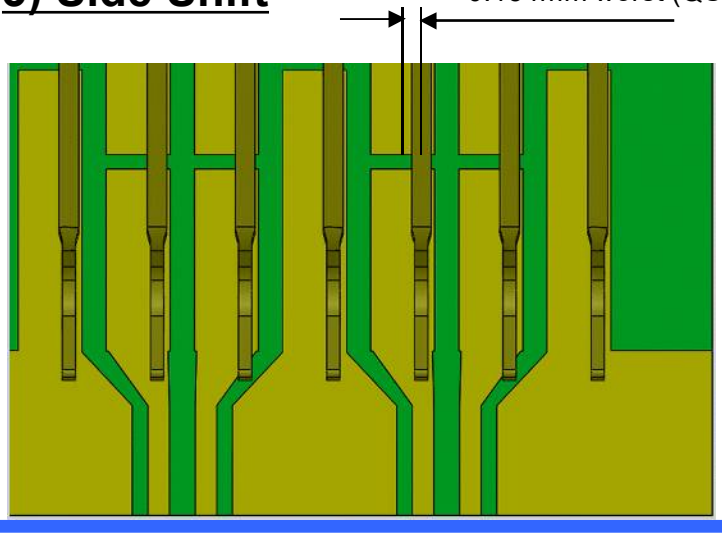




2) Pad Width



3) Side Shift



Module board move in connector at side direction.

C2M Channel Simulation

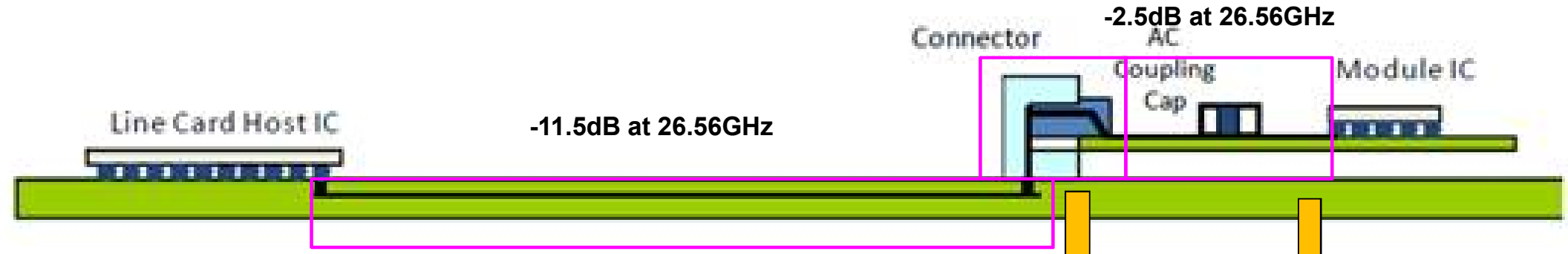
- Simulation Conditions of connector : Worst Dimensions

[UNIT : mm]

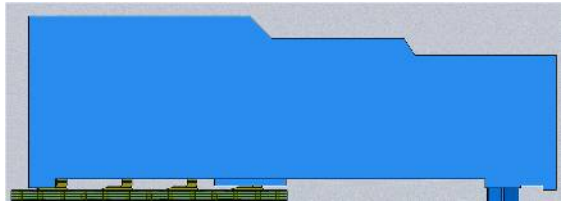
	Normal Mating Stroke	Worst Mating Stroke	Worst PAD width	Worst Side Shift
QSFP-DD	Legacy PAD=0.80 Additional PAD=0.85	Legacy PAD=1.10 Additional PAD=1.20	0.58	0.154
OSFP	0.64	0.98	0.41	0.088
QSFP	0.8	1.1	0.58	0.154
DSFP	0.75	1.06	0.48	0.103
CFP2	0.65	0.9	0.39	0.068
CFP8	0.65	0.9	0.27	0.051
		R.S.S.		R.S.S.

C2M Channel Simulation

- Simulation Conditions of Channel Model : Host and Module board



Host Board Model: Page 7~8



Connector Model

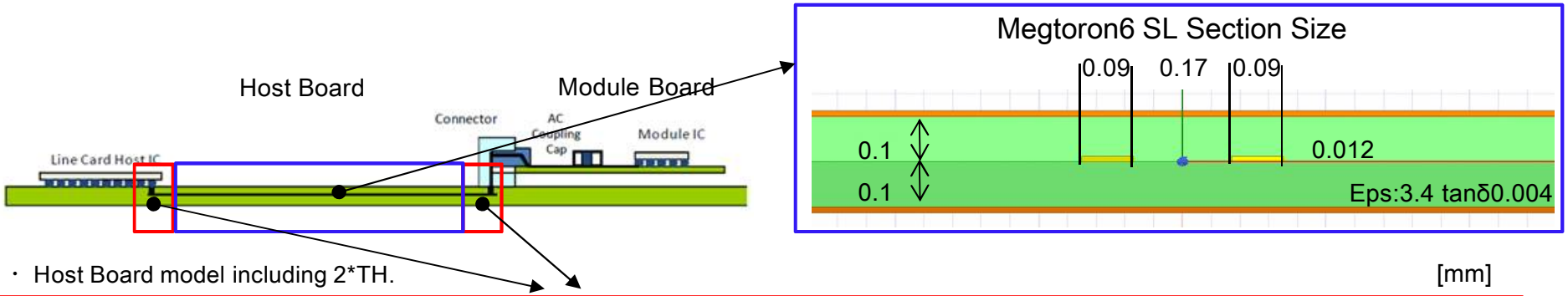
Module Board Model :
Detail at Page 9~10

Insertion loss of traces are shown at Page 11.

C2M Channel Simulation

- Simulation Conditions of Host Board and Improvement Via

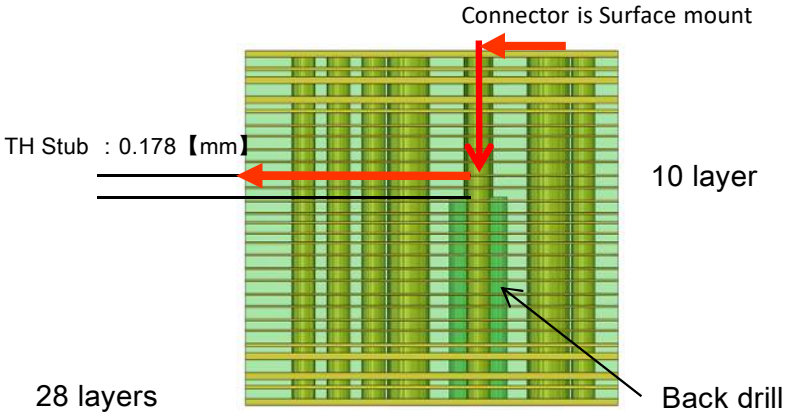
[mm]



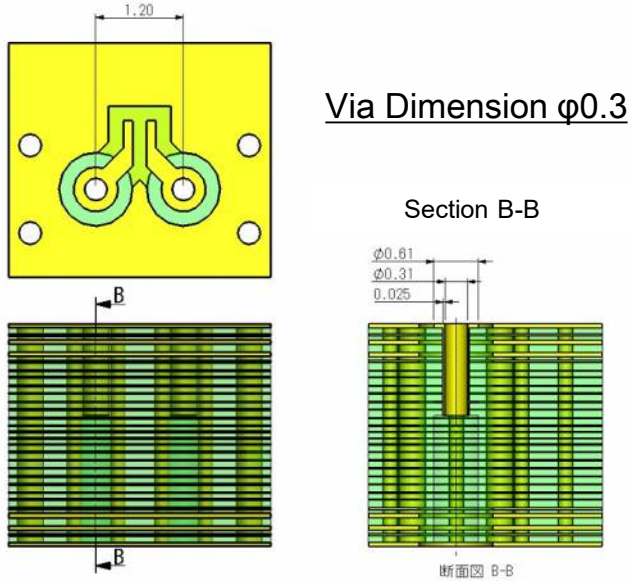
・ Host Board model including 2*TH.

[mm]

Host Board Layer stack-up and routing



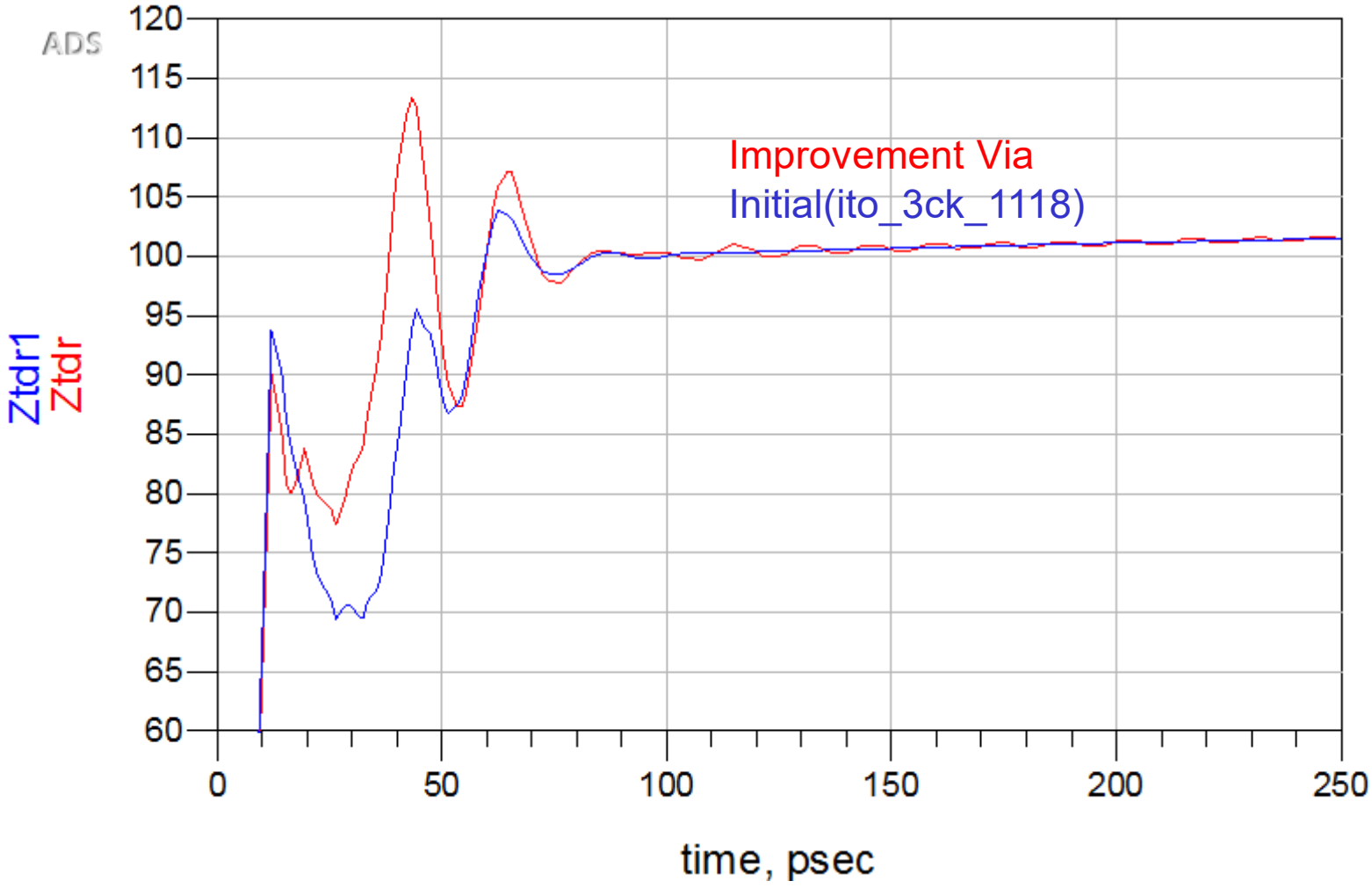
Via Dimension φ0.3



C2M Channel Simulation

- Impedance of Host Board Via

Via diameter is φ0.3



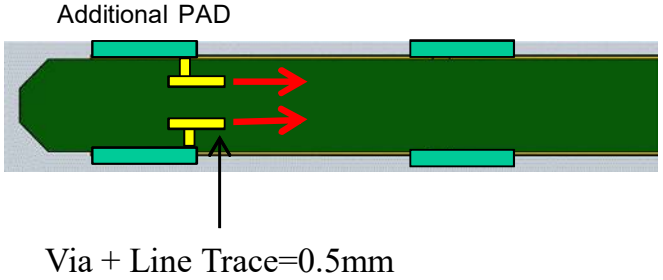
C2M Channel Simulation

-Simulation Conditions of Module Board of QSFP-DD

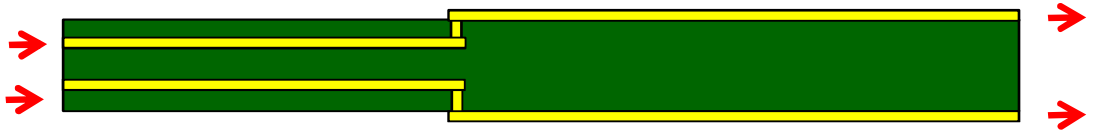
1. Connector model included one Via of module board.
2. Board model of additional Pad have one via in the Board. And Legacy Pad is surface trace.
3. Total insertion loss of each channel are -2.5dB at 26.56GHz.

Additional PAD

Included Connector Model

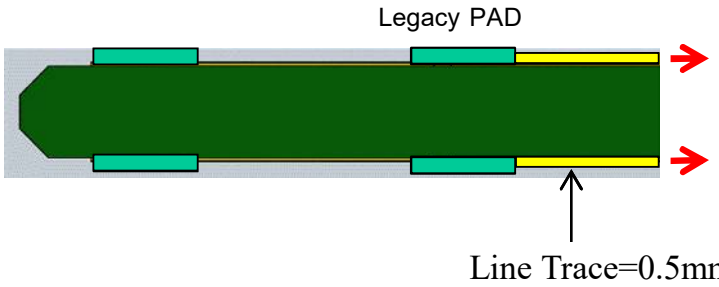


Board Model

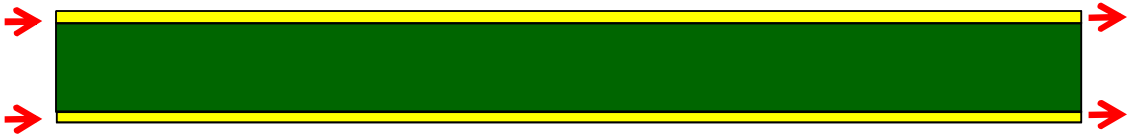


Legacy PAD

Included Connector Model



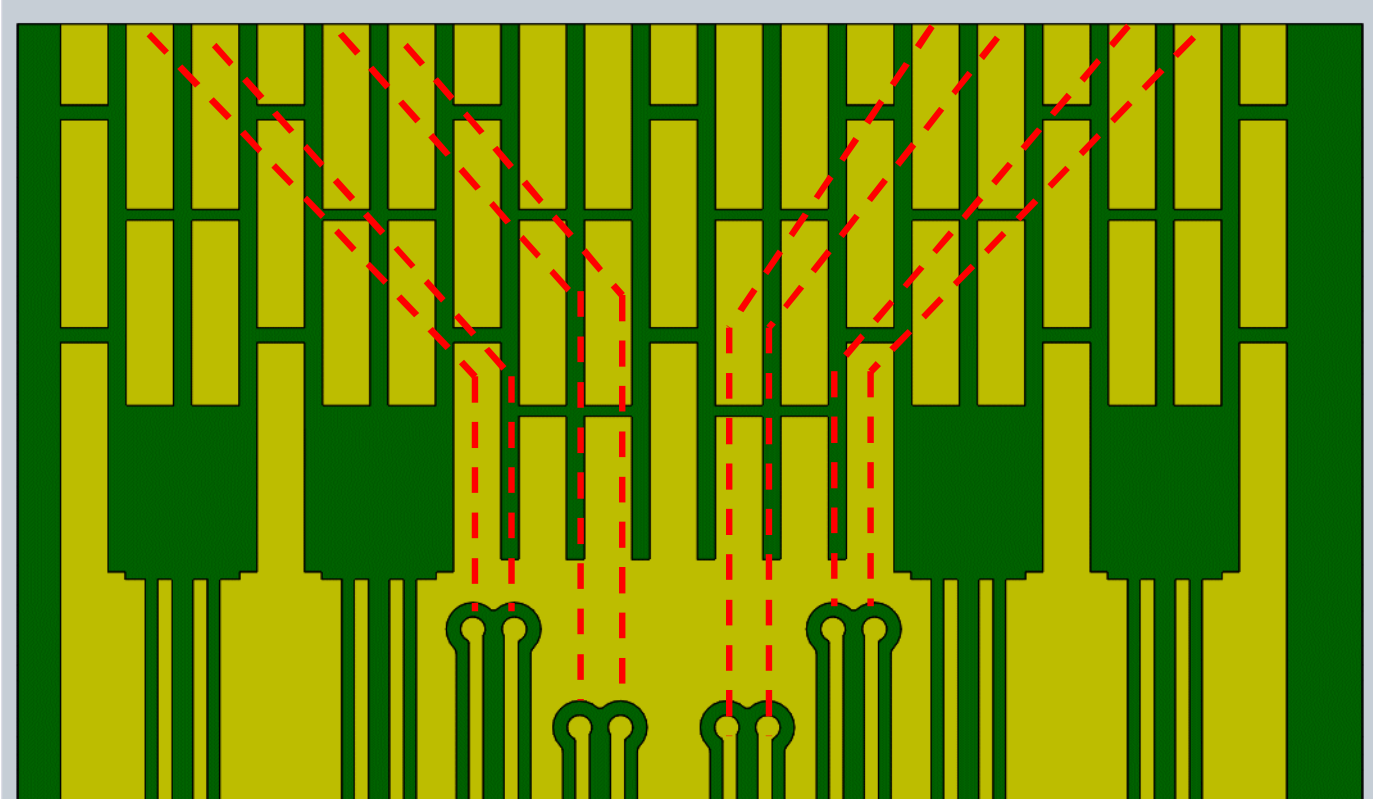
Board Model



C2M Channel Simulation

-Simulation Conditions of Module Board of QSFP-DD

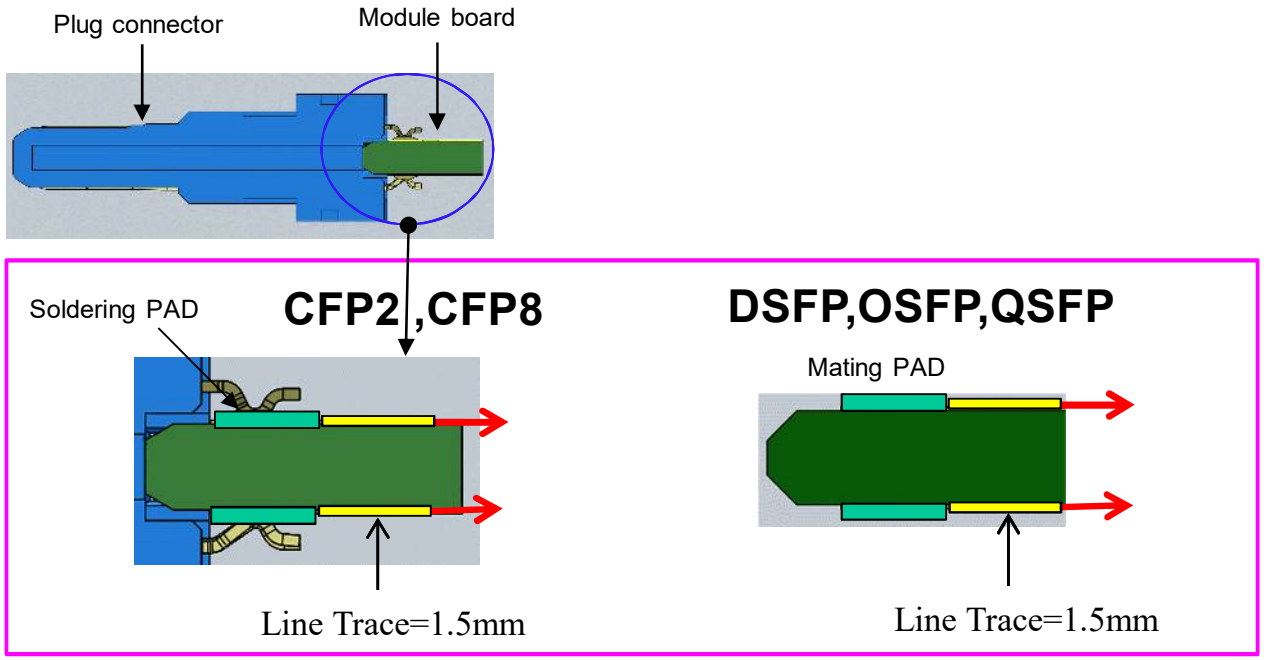
Additional Pad have one via in the Board at Figure below.



C2M Channel Simulation

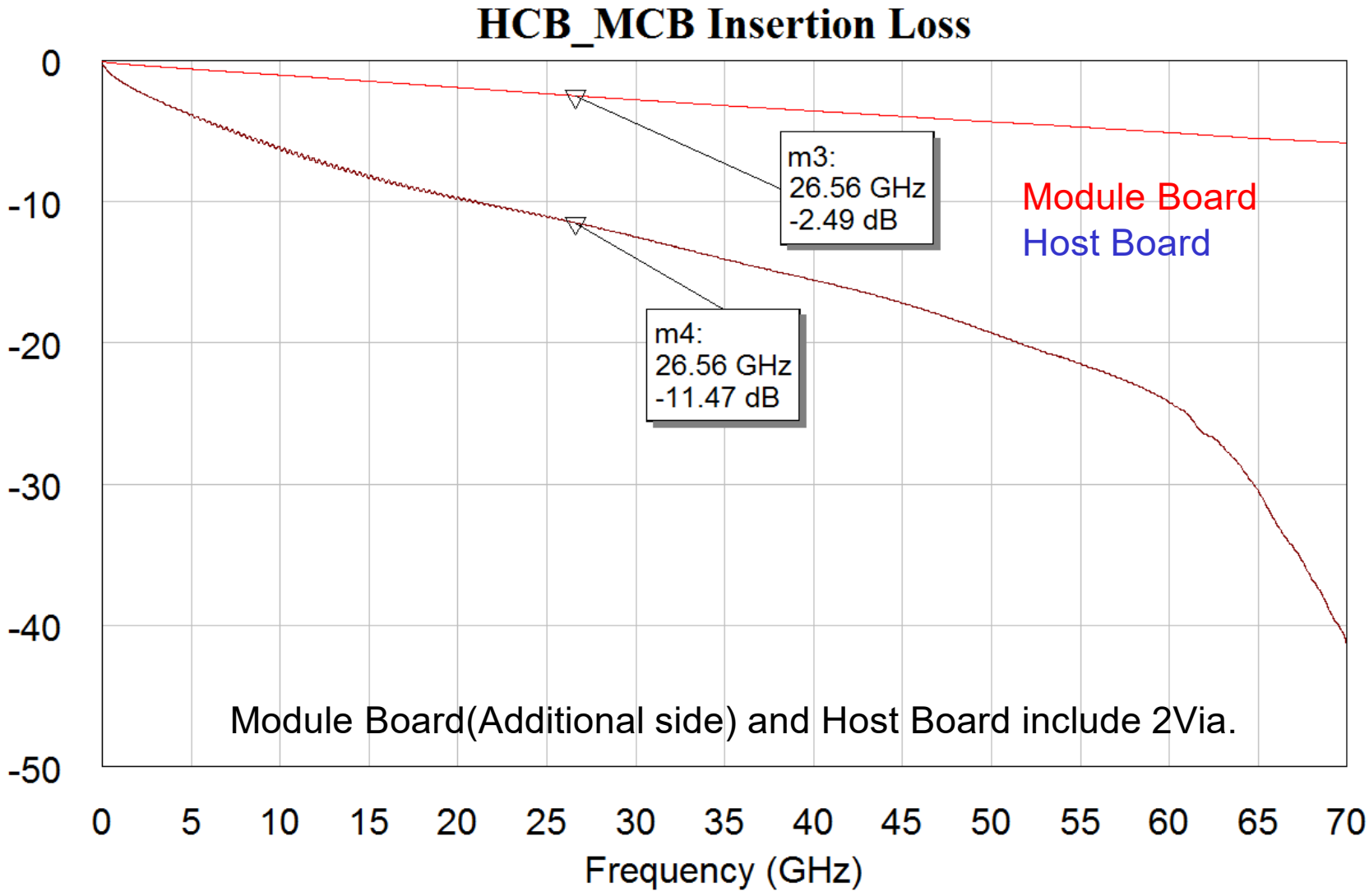
- Simulation Conditions of connector : Module Board of Other Connectors

They are shown the figures below. tan δ of Board is zero and Line loss is zero same as last presentation.



C2M Channel Simulation

- Insertion Loss of Module and Host Board.



C2M Channel Simulation

- COM file : com_ieee_93a_253.m

Table 93A-1 parameters			
Parameter	**Setting**	**Units**	**Information**
f_b	53.125	GBd	
f_min	0.05	GHz	
Delta_f	0.01	GHz	
C_d	[1.1e-4 0]	nF	[TX RX]
z_p select	[1 2]		[test cases to run]
z_p (TX)	[12 30; 1.8 1.8 ; 0 0 ; 0 0]	mm	[test cases]
z_p (NEXT)	[0 0; 0 0; 0 0 ; 0 0]	mm	[test cases]
z_p (FEXT)	[12 30; 1.8 1.8 ; 0 0 ; 0 0]	mm	[test cases]
z_p (RX)	[0 0; 0 0; 0 0 ; 0 0]	mm	[test cases]
C_p	[0.8e-4 0.8e-4]	nF	[TX RX]
C_v	[0 0]	nF	[TX RX]
R_0	50	Ohm	
R_d	[50 50]	Ohm	[TX RX]
A_v	0.41	V	
A_fe	0.41	V	
A_ne	0.6	V	
L	4		
M	32		
filter and Eq			
f_r	0.75	*fb	
c(0)	0.6		min
c(-1)	[-0.3:0.025:0]		[min:step:max]
c(-2)	[0:.025:0.1]		[min:step:max]
c(-3)	[0]		[min:step:max]
c(-4)	[0]		[min:step:max]
c(1)	[0]		[min:step:max]
N_b	0	UI	
b_max(1)	0.7		
b_max(2..N_b)	0.2		
g_DC	[-20:1:0]	dB	[min:step:max]
f_z	21.25	GHz	
f_p1	21.25	GHz	
f_p2	53.125	GHz	
g_DC_HP	[-6:1:0]		[min:step:max]
f_HP_PZ	0.6640625	GHz	
ffe_pre_tap_len	**0**	UI	
ffe_post_tap_len	8	UI	
Include PCB	0	logical	

ffe_tap_step_size	0		
ffe_main_cursor_min	0.7		
ffe_pre_tap1_max	0.3		
ffe_post_tap1_max	0.3		
ffe_tapn_max	0.125		

I/O control		
DIAGNOSTICS	1	logical
DISPLAY_WINDOW	1	logical
CSV_REPORT	1	logical
RESULT_DIR	.\results\100GEL_WG_{date}\	
SAVE_FIGURES	0	logical
Port Order	[1 3 2 4]	
RUNTAG	C2M_DFE1_RxFFE	
COM_CONTRIBUTION	0	logical
Operational		
COM Pass threshold	3	dB
ERL Pass threshold	0	dB
DER_0	1.00E-04	
T_r	6.16E-03	ns
FORCE_TR	1	logical

TDR and ERL options		
TDR	1	logical
ERL	1	logical
ERL_ONLY	0	logical
TR_TDR	0.01	ns
N	300	
TDR_Butterworth	1	logical
beta_x	1.70E+09	
rho_x	**0.3**	
fixture delay time	0	
Receiver testing		
RX_CALIBRATION	0	logical
Sigma BBN step	5.00E-03	V

Noise, jitter		
sigma_RJ	0.01	UI
A_DD	0.02	UI
eta_0	0.00E+00	V^2/GHz
SNR_TX	32.5	dB
R_LM	0.95	

Table 93A - parameters		
Parameter	**Setting**	**Units**
package_tl_gamma0_a1_a2	[0 0.0007901838 0.00050925]	
package_tl_tau	6.325E-03	ns/mm
package_Z_c	[87.5 87.5 ; 92.5 92.5; 100 100 ; 100 100]	Ohm (tdr sel)

Table 92 - 2 parameters		
Parameter	**Setting**	
board_tl_gamma0_a1_a2	*[0 3.8206e-04 9.5909e-05]*	
board_tl_tau	*5.790E-03*	ns/mm
board_Z_c	90	Ohm
z_bp (TX)	*119*	mm
z_bp (NEXT)	*119*	mm
z_bp (FEXT)	*119*	mm
z_bp (RX)	*119*	mm

Configuration setting is config_com_ieee8023_93a=100GEL-KR_DFE_11118.xls

*Use at C2M Sheet

C2M Channel Simulation

- COM file : com_ieee_93a_257.m

Table 93A-1 parameters			
Parameter	**Setting**	**Units**	**Information**
f_b	53.125	GBd	
f_min	0.05	GHz	
Delta_f	0.01	GHz	
C_d	[1.1e-4 1.1e-4]	nF	[TX RX]
z_p select	[1]		[test cases to run]
z_p (TX)	[30 30; 1.8 1.8]	mm	[test cases]
z_p (NEXT)	[15 15; 1.8 1.8]	mm	[test cases]
z_p (FEXT)	[30 30; 1.8 1.8]	mm	[test cases]
z_p (RX)	[15 15; 1.8 1.8]	mm	[test cases]
C_p	[0.87e-4 0.87e-4]	nF	[TX RX]
R_0	50	Ohm	
R_d	[45 45]	Ohm	[TX RX]
A_v	0.41	V	
A_fe	0.41	V	
A_ne	0.6	V	
L	4		
M	32		
filter and Eq			
f_r	0.75	*fb	
c(0)	0.6		min
c(-1)	[-0.3:0.02:0]		[min:step:max]
c(-2)	[0:.02:0.1]		[min:step:max]
c(1)	[-0.1:0.05:0]		[min:step:max]
N_b	4	UI	
b_max(1)	0.5		
b_max(2..N_b)	0.2		
g_DC	[-14:1:0]	dB	[min:step:max]
f_z	21.25	GHz	
f_p1	21.25	GHz	
f_p2	53.125	GHz	
g_DC_HP	[-4:1:0]		[min:step:max]
f_HP_PZ	1.328125	GHz	
ffe_pre_tap_len	**0**	UI	
ffe_post_tap_len	0	UI	
Include PCB	0	logical	
ffe_tap_step_size	0		
ffe_main_cursor_min	0.7		
ffe_pre_tap1_max	0.3		
ffe_post_tap1_max	0.3		
ffe_tapn_max	0.125		
ffe_backoff	0		

I/O control		
DIAGNOSTICS	1	logical
DISPLAY_WINDOW	1	logical
CSV_REPORT	1	logical
RESULT_DIR	\results\100GEL_WG_{date}\	
SAVE_FIGURES	0	logical
Port Order	[1 3 2 4]	
RUNTAG	C2M_1218	
COM_CONTRIBUTION	0	logical
Operational		
COM Pass threshold	3	dB
ERL Pass threshold	10.5	dB
DER_0	1.00E-05	
T_r	6.16E-03	ns
FORCE_TR	1	logical
TDR and ERL options		
TDR	1	logical
ERL	1	logical
ERL_ONLY	0	logical
TR_TDR	0.01	ns
N	300	
TDR_Butterworth	1	logical
beta_x	1.70E+09	
rho_x	**0.3**	
fixture delay time	0	
Receiver testing		
RX_CALIBRATION	0	logical
Sigma BBN step	5.00E-03	V
Noise, jitter		
sigma_RJ	0.01	UI
A_DD	0.02	UI
eta_0	8.20E-09	V^2/GHz
SNR_TX	33	dB
R_LM	0.95	

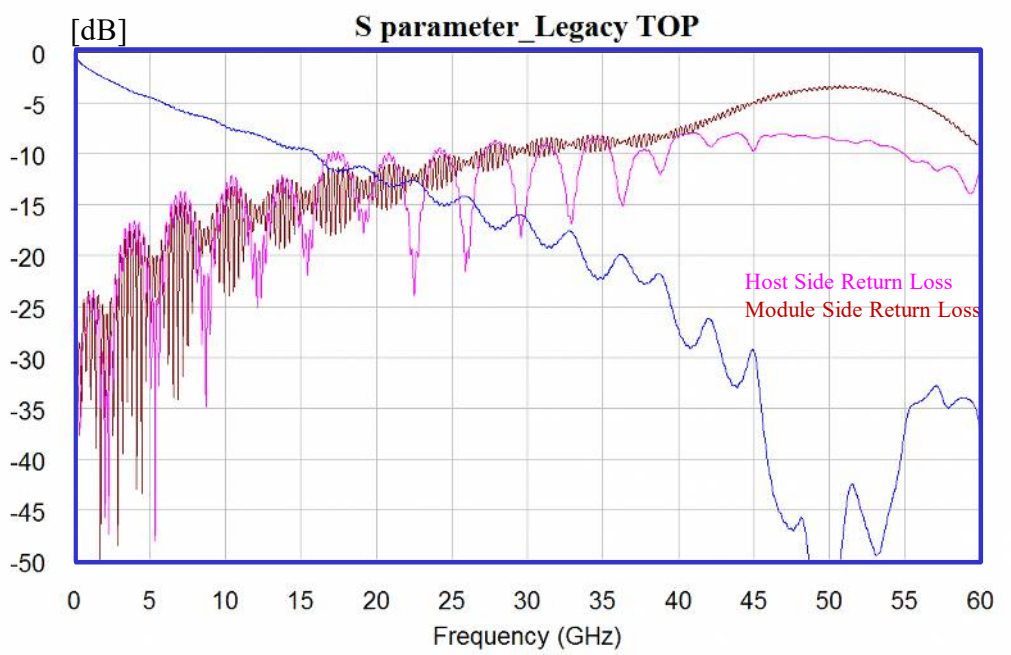
Table 93A・ parameters		
Parameter	**Setting**	**Units**
package_tl_gamma0_a1_a2	[0 0.0009909 0.0002772]	
package_tl_tau	6.1400E-03	ns/mm
package_Z_c	[87.5 87.5 ; 92.5 92.5]	Ohm

Table 92・2 parameters		
Parameter	**Setting**	
board_tl_gamma0_a1_a2	*[0 3.8206e-04 9.5909e-05]*	
board_tl_tau	*5.790E-03*	ns/mm
board_Z_c	90	Ohm
z_bp (TX)	*7*	mm
z_bp (NEXT)	*0*	mm
z_bp (FEXT)	*0*	mm
z_bp (RX)	*7*	mm

Configuration setting is config_100GEL_C2M_4dBpkg_baseline_121918.xls

C2M Channel Simulation

- Simulation Result : QSFP-DD Multi Worst Model



* This S-parameter is shown Legacy Top channel model.
* Channel mapping is refer to following.

	RX Side			TX Side	
Legacy Top ch	FEXT1	Victim	DATA	NEXT1	NEXT2
Additional Top ch	FEXT2	FEXT3	DATA	NEXT3	NEXT4
Additional Bottom ch	FEXT4	FEXT5	DATA	NEXT5	NEXT6
Legacy Bottom ch	FEXT6	FEXT7	DATA	NEXT7	NEXT8

* COM is calculated by Matlab.
* COM file is com_ieee_93a_253.m(P12)

	COM	ILD	ICN	ERL
Legacy TOP	4.32	0.43	1.23	9.38
Additional TOP	3.27	0.51	1.48	8.92
Additional Bottom	4.08	0.48	1.49	8.58
Legacy Bottom	5.40	0.30	1.31	9.76

Connector simulation model touchstone files

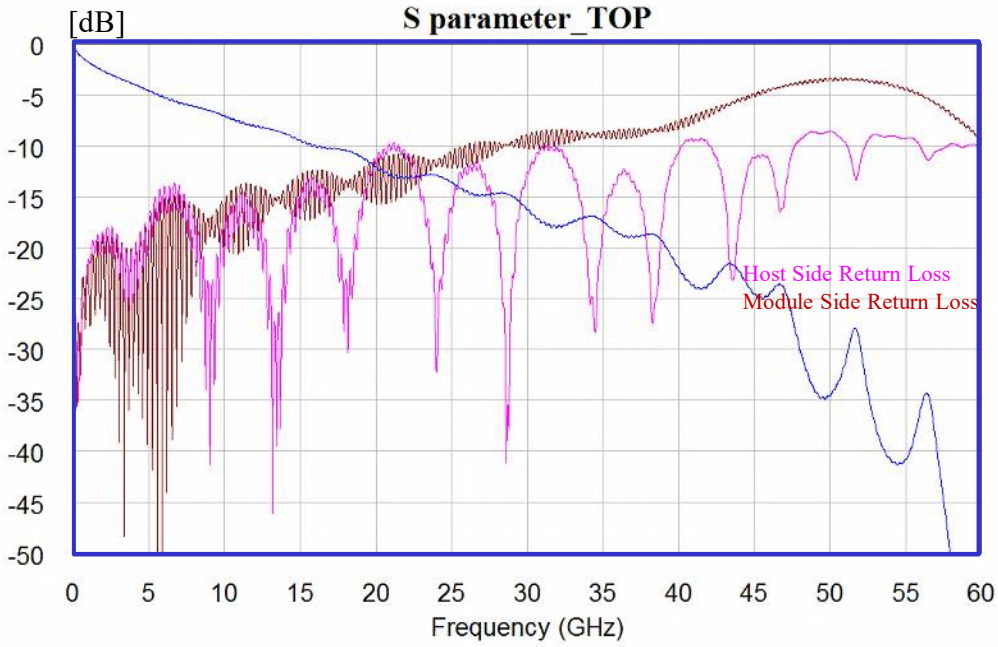
QSFP-DD Channel Model (Multi Worst Model)

Frequency = 0-70GHz / 10MHz Step

Legacy TOP	Additional TOP	Additional BOTTOM	Legacy BOTTOM
QSFP_DD_S_C_legacytop_multiworst_THRU.s4p	QSFP_DD_S_C_additionaltop_multiworst_THRU.s4p	QSFP_DD_S_C_additionalbottom_multiworst_THRU.s4p	QSFP_DD_S_C_legacybottommultiworst_THRU.s4p
QSFP_DD_S_C_legacytop_multiworst_FEXT1.s4p	QSFP_DD_S_C_additionaltop_multiworst_FEXT1.s4p	QSFP_DD_S_C_additionalbottom_multiworst_FEXT1.s4p	QSFP_DD_S_C_legacybottommultiworst_FEXT1.s4p
QSFP_DD_S_C_legacytop_multiworst_FEXT2.s4p	QSFP_DD_S_C_additionaltop_multiworst_FEXT2.s4p	QSFP_DD_S_C_additionalbottom_multiworst_FEXT2.s4p	QSFP_DD_S_C_legacybottommultiworst_FEXT2.s4p
QSFP_DD_S_C_legacytop_multiworst_FEXT3.s4p	QSFP_DD_S_C_additionaltop_multiworst_FEXT3.s4p	QSFP_DD_S_C_additionalbottom_multiworst_FEXT3.s4p	QSFP_DD_S_C_legacybottommultiworst_FEXT3.s4p
QSFP_DD_S_C_legacytop_multiworst_FEXT4.s4p	QSFP_DD_S_C_additionaltop_multiworst_FEXT4.s4p	QSFP_DD_S_C_additionalbottom_multiworst_FEXT4.s4p	QSFP_DD_S_C_legacybottommultiworst_FEXT4.s4p
QSFP_DD_S_C_legacytop_multiworst_FEXT5.s4p	QSFP_DD_S_C_additionaltop_multiworst_FEXT5.s4p	QSFP_DD_S_C_additionalbottom_multiworst_FEXT5.s4p	QSFP_DD_S_C_legacybottommultiworst_FEXT5.s4p
QSFP_DD_S_C_legacytop_multiworst_FEXT6.s4p	QSFP_DD_S_C_additionaltop_multiworst_FEXT6.s4p	QSFP_DD_S_C_additionalbottom_multiworst_FEXT6.s4p	QSFP_DD_S_C_legacybottommultiworst_FEXT6.s4p
QSFP_DD_S_C_legacytop_multiworst_FEX71.s4p	QSFP_DD_S_C_additionaltop_multiworst_FEXT7.s4p	QSFP_DD_S_C_additionalbottom_multiworst_FEXT7.s4p	QSFP_DD_S_C_legacybottommultiworst_FEXT7.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT1.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT1.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT1.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT1.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT2.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT2.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT2.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT2.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT3.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT3.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT3.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT3.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT4.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT4.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT4.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT4.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT5.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT5.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT5.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT5.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT6.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT6.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT6.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT6.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT7.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT7.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT7.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT7.s4p
QSFP_DD_S_C_legacytop_multiworst_NEXT8.s4p	QSFP_DD_S_C_additionaltop_multiworst_NEXT8.s4p	QSFP_DD_S_C_additionalbottom_multiworst_NEXT8.s4p	QSFP_DD_S_C_legacybottommultiworst_NEXT8.s4p

C2M Channel Simulation

- Simulation Result : OSFP Multi Worst Model



* This S-parameter is shown Top channel model.
* Channel mapping is refer to following.

	RX Side				TX Side				
Top ch	FEXT3	FEXT2	FEXT1	Victim	DATA	NEXT2	NEXT1	OMIT	OMIT
Bottom ch	FEXT7	FEXT6	FEXT5	FEXT4	DATA	NEXT4	NEXT3	OMIT	OMIT

Touch Stone files

TOP	BOTTOM
OSFP_S_C_top_multiworst_THRU.s4p	OSFP_S_C_bottom_multiworst_THRU.s4p
OSFP_S_C_top_multiworst_FEXT1.s4p	OSFP_S_C_bottom_multiworst_FEXT1.s4p
OSFP_S_C_top_multiworst_FEXT2.s4p	OSFP_S_C_bottom_multiworst_FEXT2.s4p
OSFP_S_C_top_multiworst_FEXT3.s4p	OSFP_S_C_bottom_multiworst_FEXT3.s4p
OSFP_S_C_top_multiworst_FEXT4.s4p	OSFP_S_C_bottom_multiworst_FEXT4.s4p
OSFP_S_C_top_multiworst_FEXT5.s5p	OSFP_S_C_bottom_multiworst_FEXT5.s4p
OSFP_S_C_top_multiworst_FEXT6.s4p	OSFP_S_C_bottom_multiworst_FEXT6.s4p
OSFP_S_C_top_multiworst_FEXT7.s4p	OSFP_S_C_bottom_multiworst_FEXT7.s4p
OSFP_S_C_top_multiworst_NEXT1.s4p	OSFP_S_C_bottom_multiworst_NEXT1.s4p
OSFP_S_C_top_multiworst_NEXT2.s4p	OSFP_S_C_bottom_multiworst_NEXT2.s4p
OSFP_S_C_top_multiworst_NEXT3.s4p	OSFP_S_C_bottom_multiworst_NEXT3.s4p
OSFP_S_C_top_multiworst_NEXT4.s4p	OSFP_S_C_bottom_multiworst_NEXT4.s4p

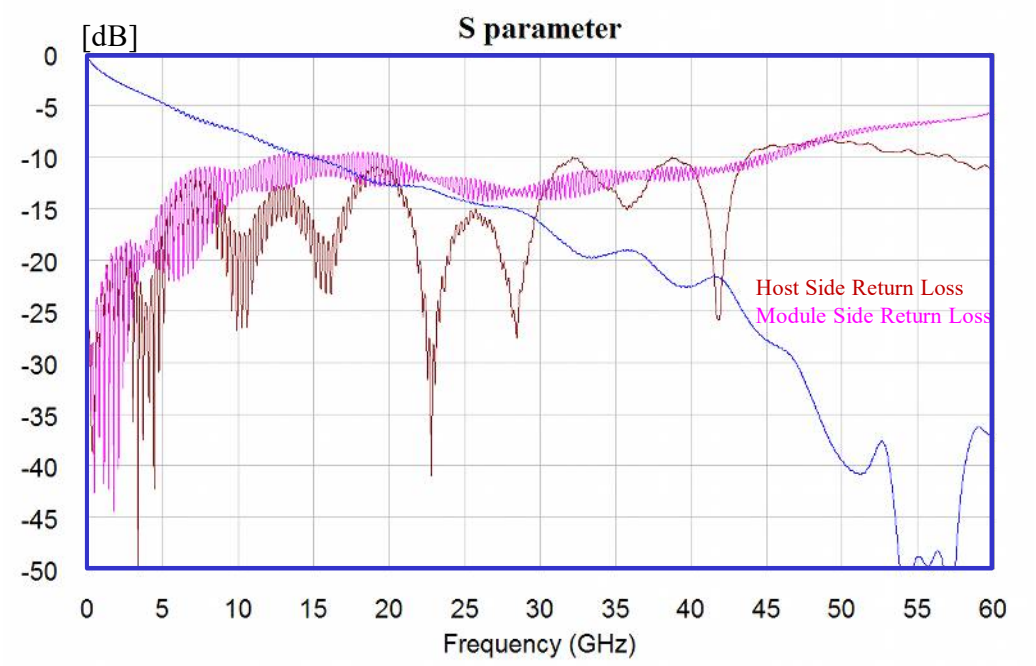
Frequency = 0-70GHz / 10MHz Step

* COM is calculated by Matlab.
* COM file is com_ieee_93a_253.m(P12)

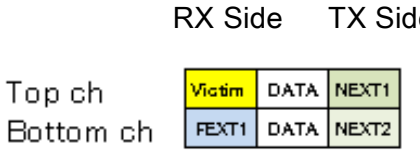
	COM	ILD	ICN	ERL
TOP	4.967	0.2307	0.5927	10.061
Bottom	5.321	0.1918	0.7195	10.150

C2M Channel Simulation

- Simulation Result : DSFP Multi Worst Model



* This S-parameter is shown Top channel model.
* Channel mapping is refer to following.



Touch Stone files

TOP	BOTTOM
DSFP_S_C_top_multiworst_THRU.s4p	DSFP_S_C_bottom_multiworst_THRU.s4p
DSFP_S_C_top_multiworst_FEXT1.s4p	DSFP_S_C_bottom_multiworst_FEXT1.s4p
DSFP_S_C_top_multiworst_NEXT1.s4p	DSFP_S_C_bottom_multiworst_NEXT1.s4p
DSFP_S_C_top_multiworst_NEXT2.s4p	DSFP_S_C_bottom_multiworst_NEXT2.s4p

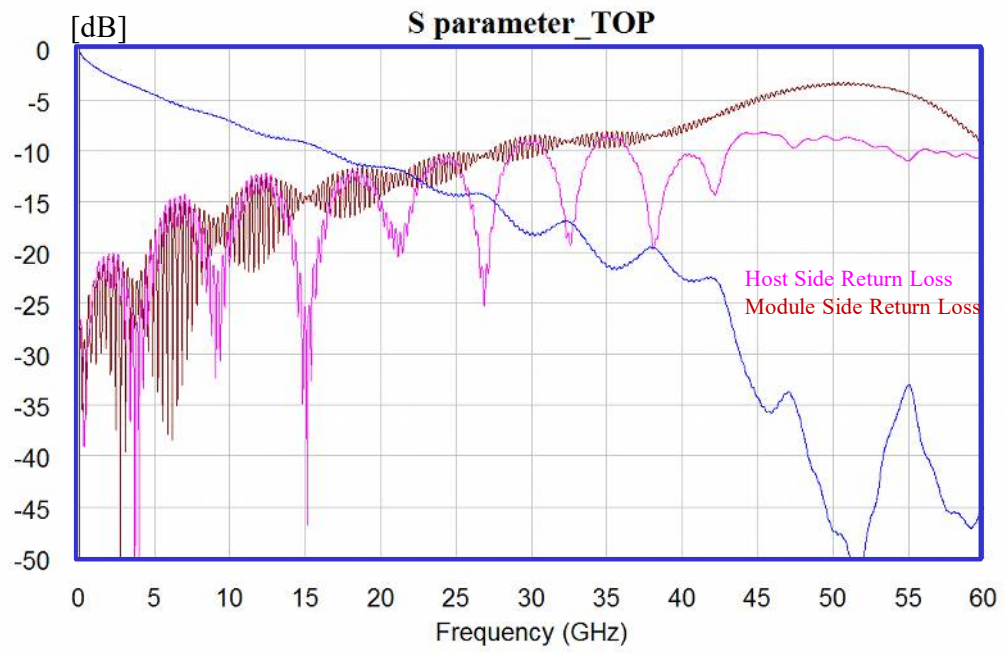
Frequency = 0-70GHz / 10MHz Step

* COM is calculated by Matlab.
* COM file is com_ieee_93a_253.m(P12)

	COM	ILD	ICN	ERL
TOP	5.193	0.2756	0.2800	10.557
Bottom	4.230	0.3224	0.4375	10.092

C2M Channel Simulation

- Simulation Result : QSFP Multi Worst Model



* This S-parameter is shown Top channel model.
* Channel mapping is refer to following.

	RX Side			TX Side	
Top ch	FEXT1	Victim	DATA	NEXT1	NEXT2
Bottom ch	FEXT3	FEXT2	DATA	NEXT3	NEXT4

Touch Stone files

TOP	BOTTOM
QSFP_S_C_top_multiworst_THRU.s4p	QSFP_S_C_bottom_multiworst_THRU.s4p
QSFP_S_C_top_multiworst_FEXT1.s4p	QSFP_S_C_bottom_multiworst_FEXT1.s4p
QSFP_S_C_top_multiworst_FEXT2.s4p	QSFP_S_C_bottom_multiworst_FEXT2.s4p
QSFP_S_C_top_multiworst_FEXT3.s4p	QSFP_S_C_bottom_multiworst_FEXT3.s4p
QSFP_S_C_top_multiworst_NEXT1.s4p	QSFP_S_C_bottom_multiworst_NEXT1.s4p
QSFP_S_C_top_multiworst_NEXT2.s4p	QSFP_S_C_bottom_multiworst_NEXT2.s4p
QSFP_S_C_top_multiworst_NEXT3.s4p	QSFP_S_C_bottom_multiworst_NEXT3.s4p
QSFP_S_C_top_multiworst_NEXT4.s4p	QSFP_S_C_bottom_multiworst_NEXT4.s4p

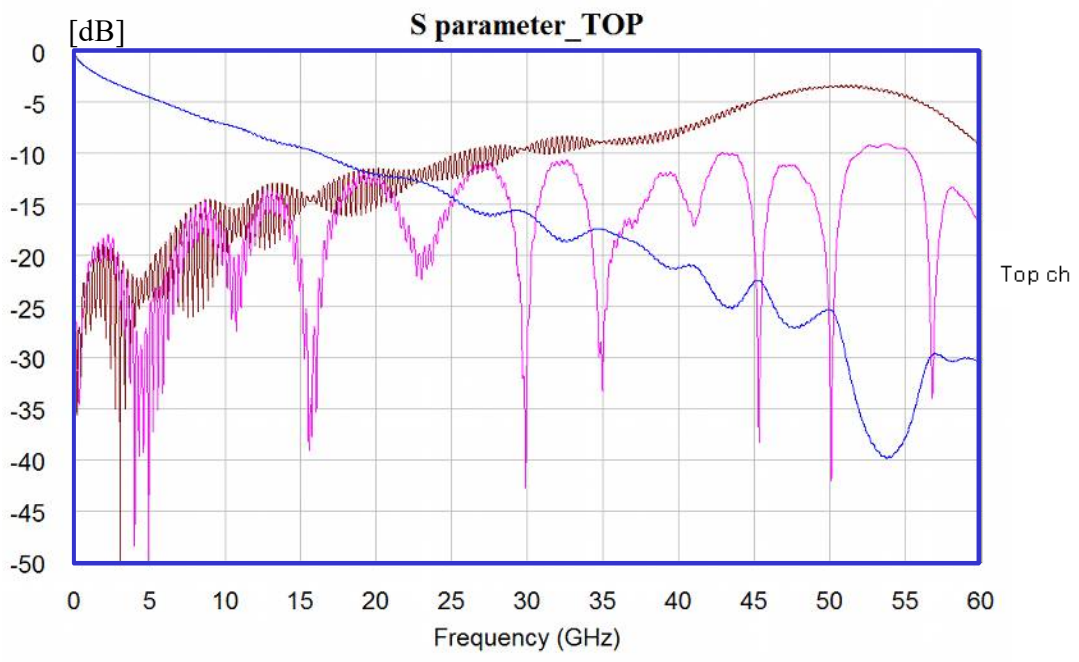
Frequency = 0-70GHz / 10MHz Step

* COM is calculated by Matlab.
* COM file is com_ieee_93a_253.m(P12)

	COM	ILD	ICN	ERL
TOP	3.466	0.3280	1.3292	10.015
Bottom	4.293	0.3578	1.2060	10.206

C2M Channel Simulation

- Simulation Result : CFP2 (8ch) Multi Worst Model



* This S-parameter is shown Top channel model.
* Channel mapping is refer to following.
* CFP2 is 8ch.

RX Side TX Side

FEXT1	FEXT2	FEXT3	FEXT4	FEXT5	Victim	FEXT6	FEXT7	DATA	NEXT1	NEXT2	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT

Touch Stone files

TOP
CFP2_S_C_top_multiworst_THRU.s4p
CFP2_S_C_top_multiworst_FEXT1.s4p
CFP2_S_C_top_multiworst_FEXT2.s4p
CFP2_S_C_top_multiworst_FEXT3.s4p
CFP2_S_C_top_multiworst_FEXT4.s4p
CFP2_S_C_top_multiworst_FEXT5.s4p
CFP2_S_C_top_multiworst_NEXT1.s4p
CFP2_S_C_top_multiworst_NEXT2.s4p

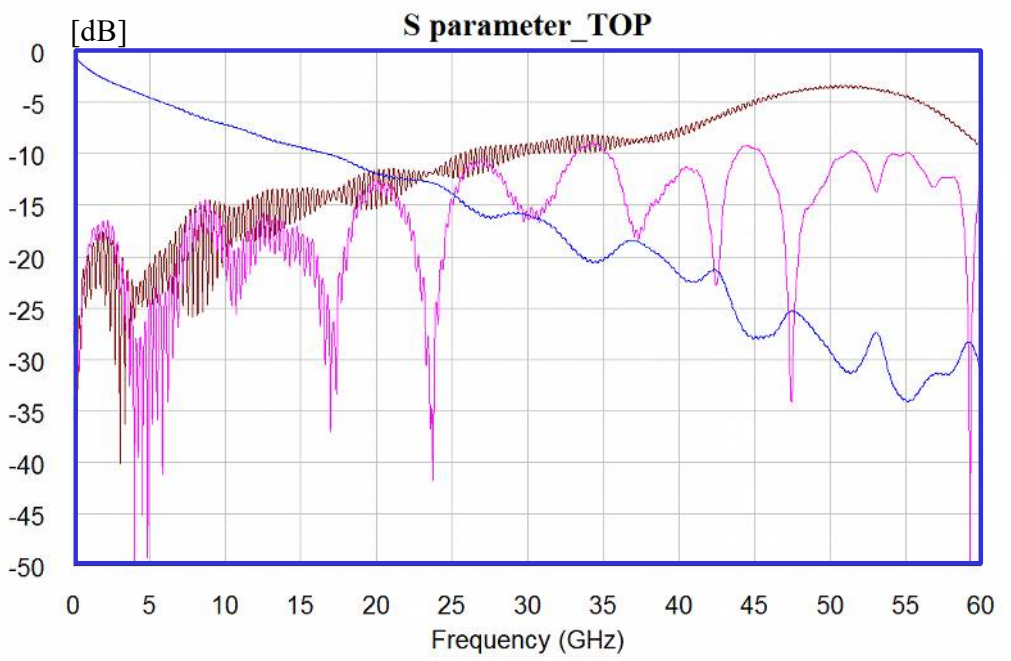
Frequency = 0-70GHz / 10MHz Step

* COM is calculated by Matlab.
* COM file is com_ieee_93a_253.m(P12)

	COM	ILD	ICN	ERL
TOP	5.099	0.2019	1.0298	10.314

C2M Channel Simulation

- Simulation Result : CFP8 Multi Worst Model



* This S-parameter is shown Top channel model.
* Channel mapping is refer to following.

	RX Side								TX Side								
Top ch	OMIT	OMIT	OMIT	OMIT	FEXT3	FEXT2	FEXT1	Victim	DATA	NEXT1	NEXT2	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT
Bottom ch	OMIT	OMIT	OMIT	OMIT	FEXT7	FEXT6	FEXT5	FEXT4	DATA	NEXT3	NEXT4	OMIT	OMIT	OMIT	OMIT	OMIT	OMIT

Touch Stone files

TOP	BOTTOM
CFP8_S_C_top_multiworst_THRU.s4p	CFP8_S_C_bottom_multiworst_THRU.s4p
CFP8_S_C_top_multiworst_FEXT1.s4p	CFP8_S_C_bottom_multiworst_FEXT1.s4p
CFP8_S_C_top_multiworst_FEXT2.s4p	CFP8_S_C_bottom_multiworst_FEXT2.s4p
CFP8_S_C_top_multiworst_FEXT3.s4p	CFP8_S_C_bottom_multiworst_FEXT3.s4p
CFP8_S_C_top_multiworst_FEXT4.s4p	CFP8_S_C_bottom_multiworst_FEXT4.s4p
CFP8_S_C_top_multiworst_FEXT5.s4p	CFP8_S_C_bottom_multiworst_FEXT5.s4p
CFP8_S_C_top_multiworst_FEXT6.s4p	CFP8_S_C_bottom_multiworst_FEXT6.s4p
CFP8_S_C_top_multiworst_FEXT7.s4p	CFP8_S_C_bottom_multiworst_FEXT7.s4p
CFP8_S_C_top_multiworst_NEXT1.s4p	CFP8_S_C_bottom_multiworst_NEXT1.s4p
CFP8_S_C_top_multiworst_NEXT2.s4p	CFP8_S_C_bottom_multiworst_NEXT2.s4p
CFP8_S_C_top_multiworst_NEXT3.s4p	CFP8_S_C_bottom_multiworst_NEXT3.s4p
CFP8_S_C_top_multiworst_NEXT4.s4p	CFP8_S_C_bottom_multiworst_NEXT4.s4p

Frequency = 0-70GHz / 10MHz Step

* COM is calculated by Matlab.
* COM file is com_ieee_93a_253.m(P12)

	COM	ILD	ICN	ERL
TOP	5.597	0.2416	0.8589	10.212
Bottom	5.538	0.2829	0.7247	10.254

Conclusion

1) COMs of Yamaichi's calculation is shown as table of below. This is just reference.
2) Difference of each modes (Normal mating, Worst mating and Multi worst) are 0.3~0.4dB.
3) COM by "com_ieee_93a_257.m" became to worse than "com_ieee_93a_253.m".
- Each modes decreased about 2dB.
4) In case of "com_ieee_93a_253.m", all modes of connectors are over 3.0dB.
5) In case of "com_ieee_93a_257.m",
- OSFP, CFP2 (8ch) ,CFP8 and DSFP are almost over 3.0dB at Normal /Worst mating condition.
- OSFP, CFP2 (8ch) and DSFP are almost over 3.0dB at Multi worst condition.
6) However the possibility of Multi Worst condition will be very few.

Connector Type		Normal Mating		Worst Mating		Multi Worst	
		com_ieee_93a_253.m	com_ieee_93a_257.m	com_ieee_93a_253.m	com_ieee_93a_257.m	com_ieee_93a_253.m	com_ieee_93a_257.m
QSFP-DD	Legacy top	5.417	3.382	5.021	2.989	4.32	2.426
	Additional top	4.453	3.601	3.649	3.076	3.27	2.346
	Additional bottom	5.157	2.39	4.672	1.668	4.08	1.144
	Legacy bottom	6.249	3.415	5.832	3.161	5.4	2.708
OSFP	TOP	6.185	3.706	5.387	3.751	4.97	3.682
	BOTTOM	5.92	3.586	5.61	3.485	5.32	3.075
QSFP	TOP	5.224	2.844	4.219	1.93	3.47	1.463
	BOTTOM	5.847	3.372	5.304	2.747	4.29	2.301
CFP2 (8ch)	TOP	4.709	3.398	4.568	3.201	5.01	3.062
CFP8	TOP	6.038	3.756	5.781	3.61	5.6	3.108
	BOTTOM	5.449	3.214	5.483	2.852	5.54	2.491
DSFP	TOP	5.593	3.286	5.336	3.36	5.19	3.634
	BOTTOM	4.333	3.256	4.51	3.301	4.23	2.969
average		5.43	3.32	5.03	3.01	4.67	2.65