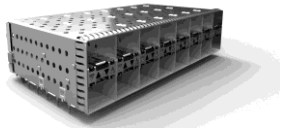

QSFP28 to SFP28, Breakout Cable Assembly Measurement Data

IEEE802.3by 25Gb/s Ethernet Task Force
February 4, 2015 Ad Hoc

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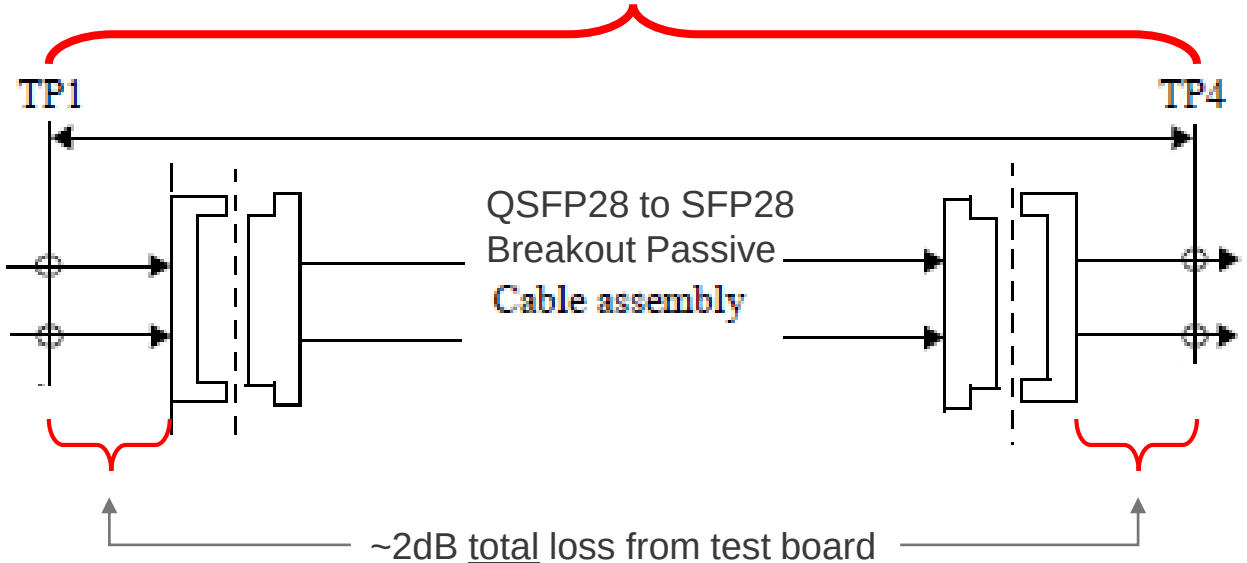
Purpose

- To aid the consensus building effort for 25Gb/s Ethernet Task Force, data for five measured cable assemblies are being provided –
  - 2 meter, 26AWG, QSFP28 to SFP28 breakout, passive
  - 3 meter, 24AWG, QSFP28 to SFP28 breakout, passive
  - 3 meter, 26AWG, QSFP28 to SFP28 breakout, passive
  - 3 meter, 28AWG, QSFP28 to SFP28 breakout, passive
  - 3 meter, 30AWG, QSFP28 to SFP28 breakout, passive
- Other AWG sizes and lengths are available upon request

Cable Assembly Measurement Setup

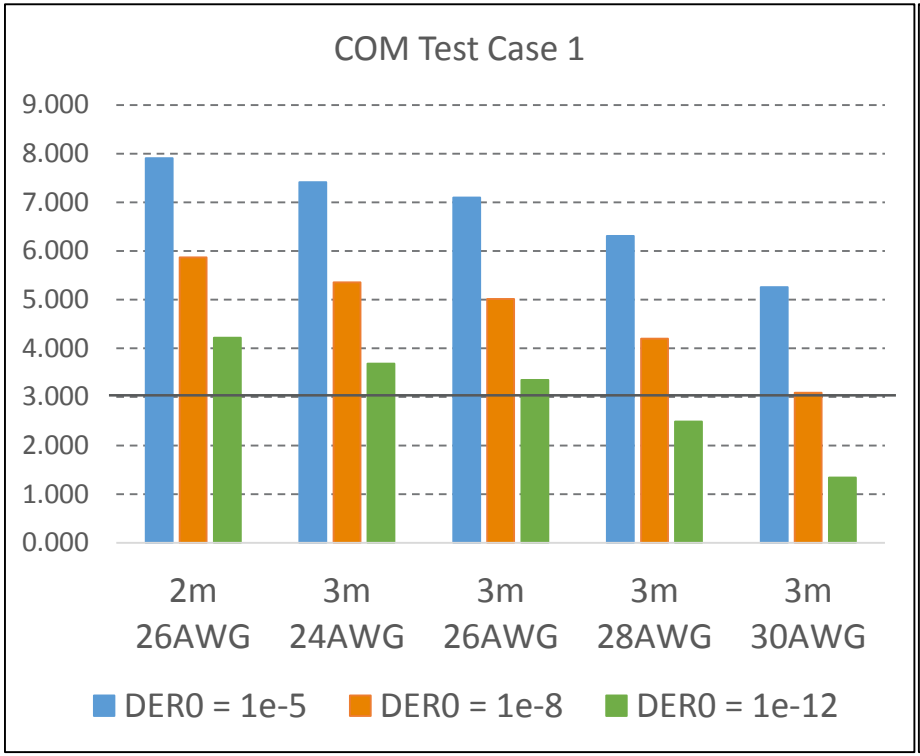
- All data are from actual measurements
- Provided as s4p files
- Data ranges from 10MHz – 26.5GHz in 10MHz steps
- The five cable assembly measurements (2m-26AWG, 3m-24AWG, 3m-26AWG, 3m-28AWG & 3m-30AWG) each contain,
  - 8 subsets of data
  - Each subset → 1 THRU (victim) + 3 FEXT aggressors + 4 NEXT aggressors
- Data does include test points (SMAs at QSFP end and 2.92s at the SFP end)

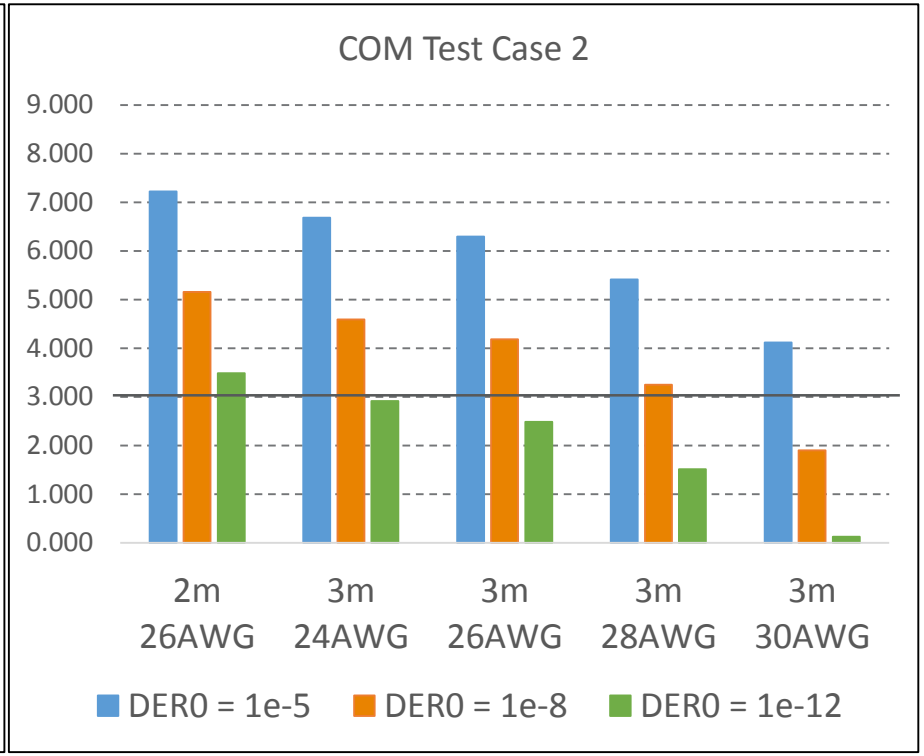
Measurement includes cable + connectors + trace + test points



COM Summary

QSFP28 – SFP28 Breakout Measurements



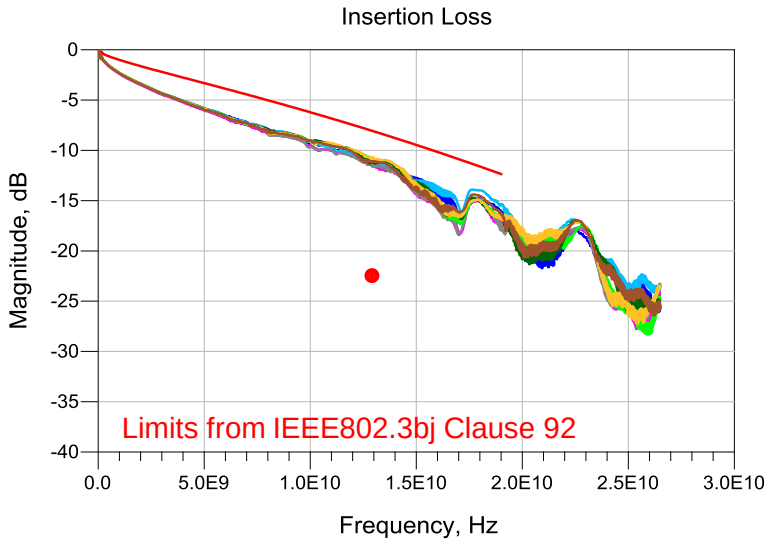


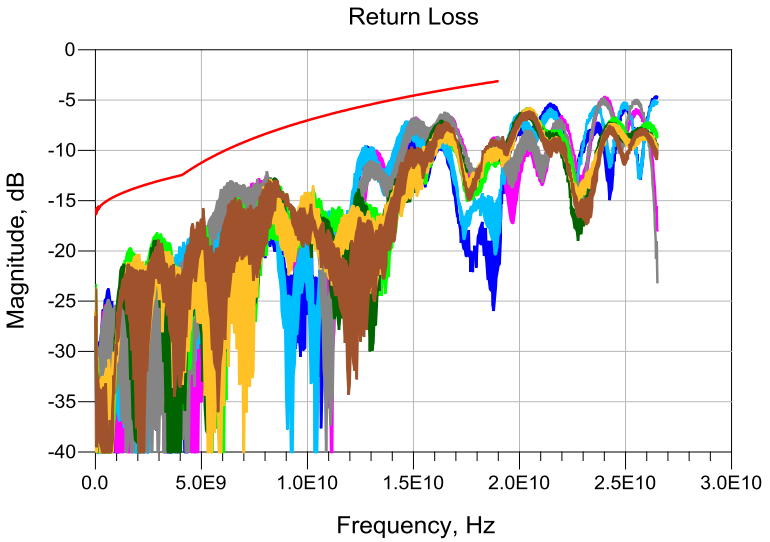
- COM > 3dB PASSES
- COM Test Case 1 and Test Case 2 differ in the value of the device package transmission line length z_p - 12mm and 30mm respectively, per Table 93-8 of IEEE Std 802.3bj™-2014
- COM numbers above are average across 8 pairs for each cable type. Detailed results for each cable type shown on following slides
- COM Release date 08/14, Revision1.54

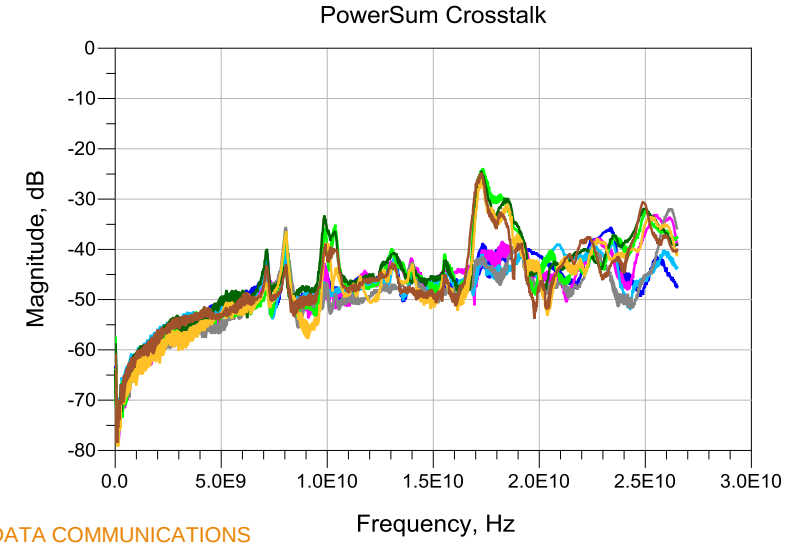
2 Meter, 26AWG, Measurement

QSFP28 – SFP28 Breakout

Cable assembly measurement includes test points







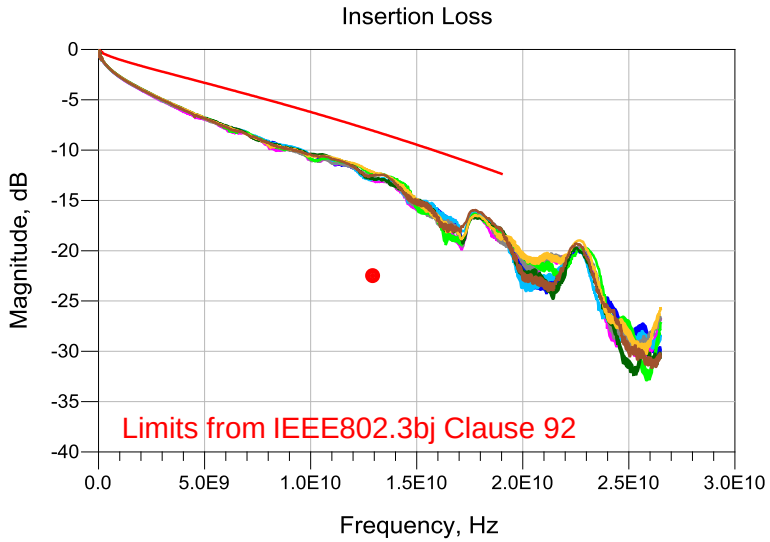
QSFP-4SFP, 2m 26AWG						
	DER0 = 1e-5		DER0 = 1e-8		DER0 = 1e-12	
Victim	Case1	Case2	Case1	Case2	Case1	Case2
P1_TX1	8.043	7.402	6.024	5.357	4.387	3.696
P1_TX2	7.906	7.257	5.871	5.190	4.223	3.530
P1_TX3	8.020	7.275	5.991	5.206	4.352	3.543
P1_TX4	7.848	7.209	5.840	5.163	4.216	3.516
P2_TX1	7.797	7.143	5.737	5.076	4.068	3.394
P2_TX2	7.896	7.127	5.821	5.039	4.147	3.352
P2_TX3	7.970	7.231	5.910	5.143	4.246	3.461
P2_TX4	7.769	7.122	5.723	5.060	4.073	3.395
Avg	7.906	7.221	5.865	5.154	4.214	3.486

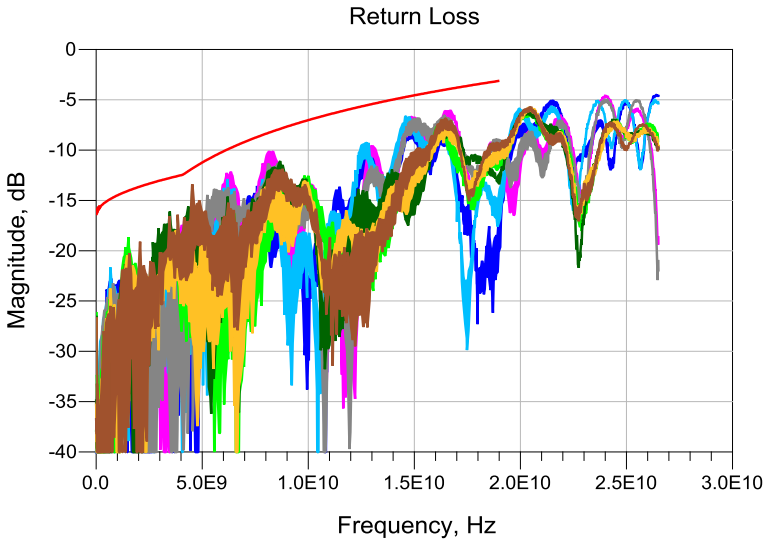
- COM Release date 08/14, Revision1.54
- All parameters at default except DER0 which is as stated in table

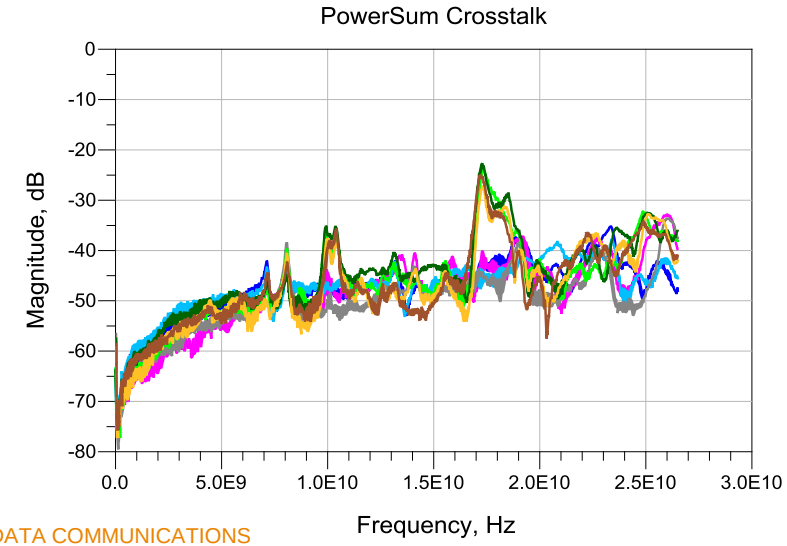
3 Meter, 24AWG, Measurement

QSFP28 – SFP28 Breakout

Cable assembly measurement includes test points







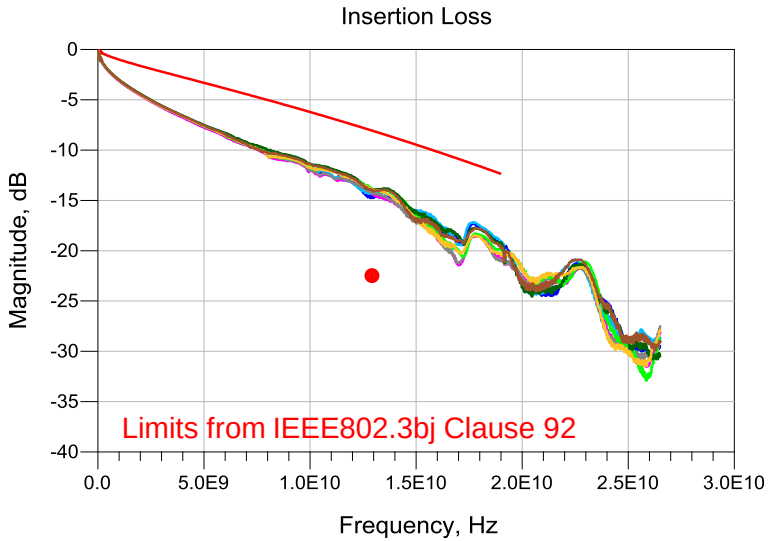
QSFP-4SFP, 3m 24AWG						
	DER0 = 1e-5		DER0 = 1e-8		DER0 = 1e-12	
Victim	Case1	Case2	Case1	Case2	Case1	Case2
P1_TX1	7.518	6.773	5.471	4.687	3.827	3.014
P1_TX2	7.543	6.731	5.484	4.652	3.815	2.968
P1_TX3	7.442	6.794	5.363	4.697	3.698	3.061
P1_TX4	7.648	6.841	5.600	4.769	3.938	3.097
P2_TX1	7.223	6.497	5.151	4.398	3.485	2.709
P2_TX2	7.188	6.472	5.104	4.367	3.436	2.674
P2_TX3	7.439	6.805	5.371	4.713	3.697	3.021
P2_TX4	7.327	6.578	5.267	4.476	3.602	2.784
Avg	7.416	6.686	5.351	4.595	3.687	2.916

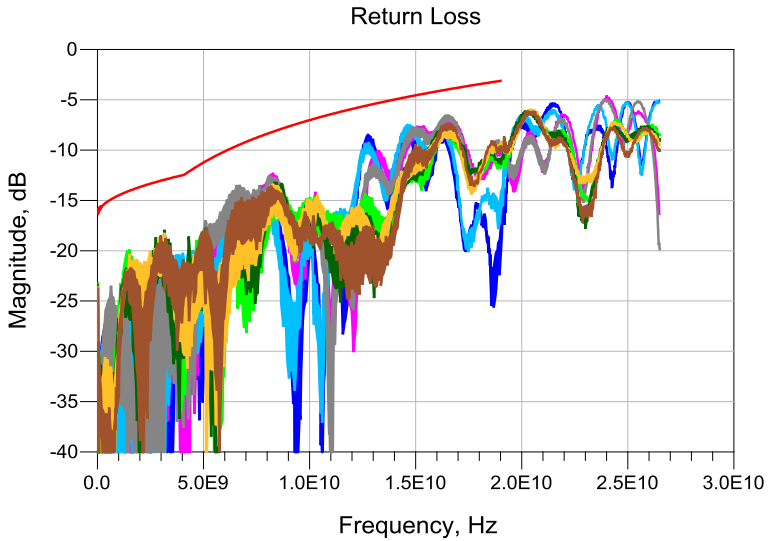
- COM Release date 08/14, Revision1.54
- All parameters at default except DER0 which is as stated in table

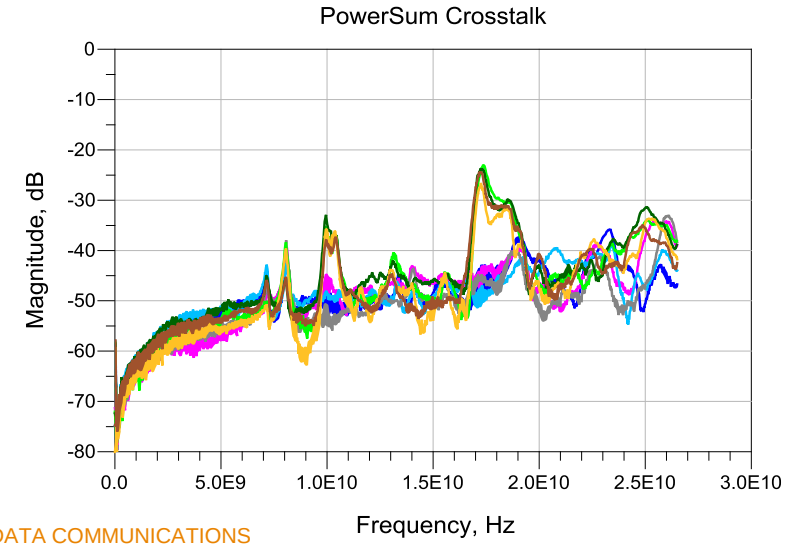
3 Meter, 26AWG, Measurement

QSFP28 – SFP28 Breakout

Cable assembly measurement includes test points







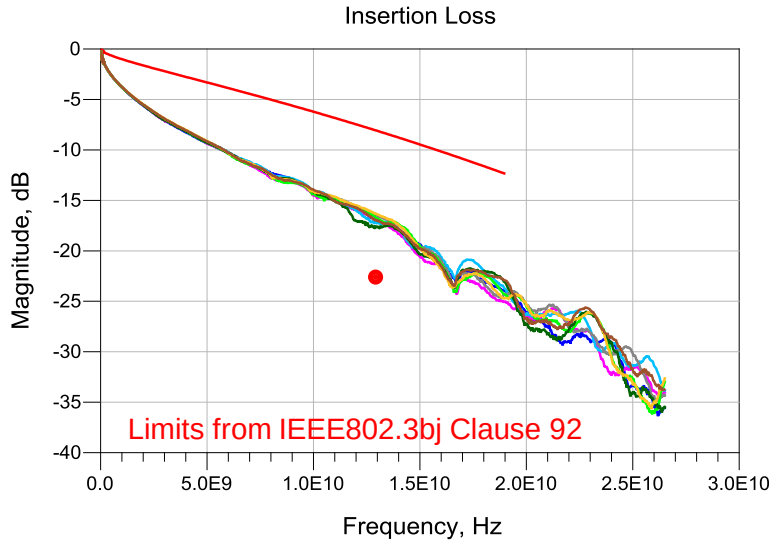
QSFP-4SFP, 3m 26AWG						
	DER0 = 1e-5		DER0 = 1e-8		DER0 = 1e-12	
Victim	Case1	Case2	Case1	Case2	Case1	Case2
P1_TX1	7.311	6.496	5.244	4.400	3.583	2.705
P1_TX2	7.154	6.341	5.078	4.240	3.404	2.550
P1_TX3	7.179	6.397	5.115	4.305	3.545	2.620
P1_TX4	7.324	6.480	5.261	4.401	3.595	2.707
P2_TX1	6.953	6.142	4.844	4.008	3.142	2.296
P2_TX2	6.926	6.192	4.808	4.056	3.118	2.343
P2_TX3	6.970	6.061	4.893	3.941	3.219	2.245
P2_TX4	6.951	6.231	4.876	4.126	3.202	2.424
Avg	7.096	6.293	5.015	4.185	3.351	2.486

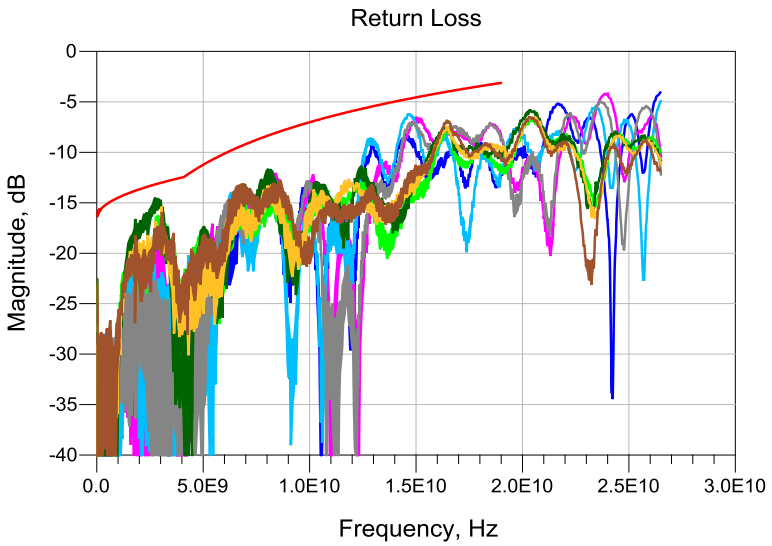
- COM Release date 08/14, Revision1.54
- All parameters at default except DER0 which is as stated in table

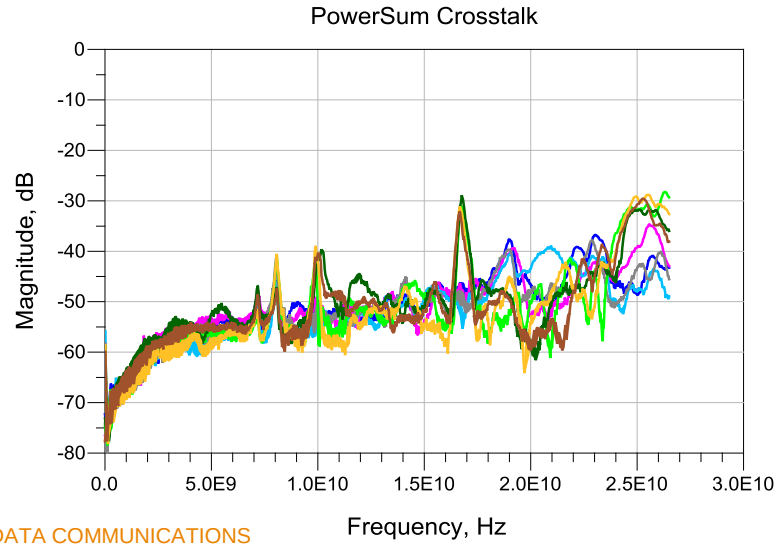
3 Meter, 28AWG, Measurement

QSFP28 – SFP28 Breakout

Cable assembly measurement includes test points







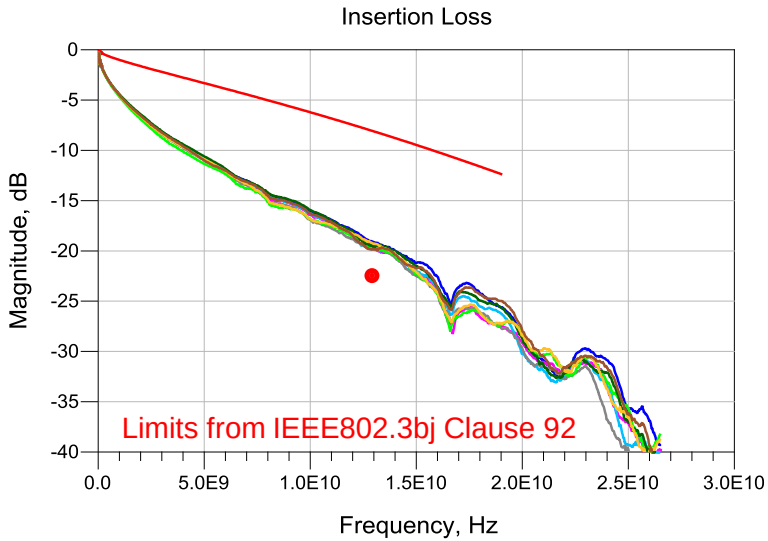
QSFP-4SFP, 3m 28AWG						
	DER0 = 1e-5		DER0 = 1e-8		DER0 = 1e-12	
Victim	Case1	Case2	Case1	Case2	Case1	Case2
P1_TX1	6.386	5.524	4.249	3.367	2.544	1.630
P1_TX2	6.276	5.340	4.155	3.174	2.460	1.422
P1_TX3	6.442	5.518	4.343	3.345	2.653	1.619
P1_TX4	6.404	5.502	4.303	3.363	2.604	1.635
P2_TX1	6.404	5.422	4.288	3.242	2.587	1.501
P2_TX2	6.020	5.227	3.893	3.071	2.178	1.335
P2_TX3	6.360	5.417	4.237	3.246	2.532	1.501
P2_TX4	6.185	5.335	4.082	3.185	2.382	1.463
Avg	6.310	5.411	4.194	3.249	2.493	1.513

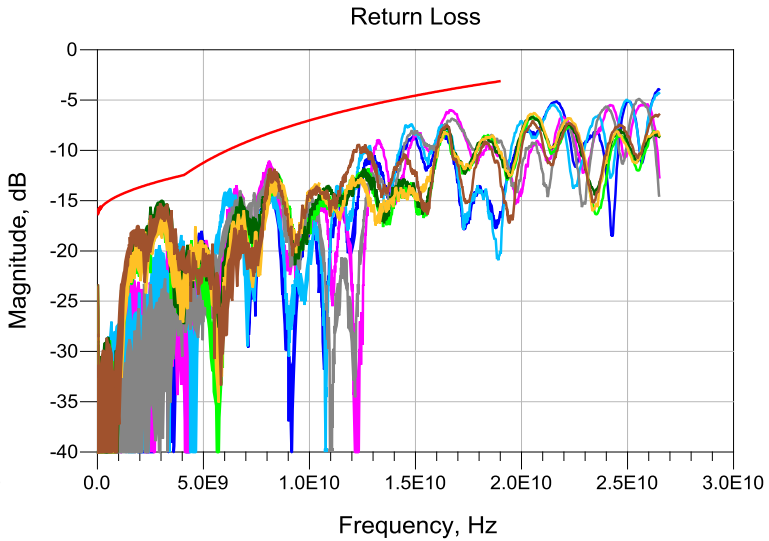
- COM Release date 08/14, Revision1.54
- All parameters at default except DER0 which is as stated in table

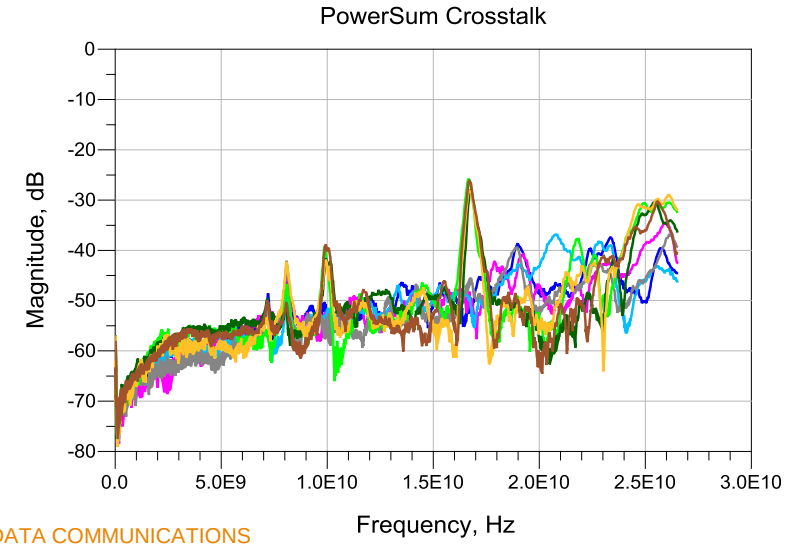
3 Meter, 30AWG, Measurement

QSFP28 – SFP28 Breakout

Cable assembly measurement includes test points







QSFP-4SFP, 3m 30AWG						
	DER0 = 1e-5		DER0 = 1e-8		DER0 = 1e-12	
Victim	Case1	Case2	Case1	Case2	Case1	Case2
P1_TX1	5.611	4.408	3.455	2.214	1.720	0.446
P1_TX2	5.355	4.180	3.206	1.971	1.466	0.202
P1_TX3	5.314	4.180	3.147	1.960	1.405	0.184
P1_TX4	5.291	4.096	3.127	1.884	1.376	0.105
P2_TX1	4.952	3.849	2.746	1.618	0.978	-0.181
P2_TX2	5.297	4.237	3.136	2.026	1.407	0.247
P2_TX3	5.102	3.958	2.928	1.734	1.171	-0.035
P2_TX4	5.119	4.041	2.959	1.830	1.212	0.061
Avg	5.255	4.119	3.088	1.905	1.342	0.129

- COM Release date 08/14, Revision1.54
- All parameters at default except DER0 which is as stated in table

Comments

- For the Without-FEC (DER0=1e-5) case,
  - 2m-26AWG cable assembly passes COM
  - 3 m-24AWG and 3m-26AWG cable assemblies pass COM for Test Case 1
  - 3m-24AWG and 3m-26AWG cables both fail COM for Test Case 2 (the 3m-24AWG sample is barely failing)
- The 3m-24AWG cable assembly has a loss of <13dB @ 12.89GHz
    - So TP0-TP5 loss is <26dB @ 12.89GHz but it fails COM Case 2 without FEC