



**Measurement Results of
3m QSFP-to-4SFP Breakout Cable
for Non-FEC 25Gbps/lane Server Connections**

11/2014

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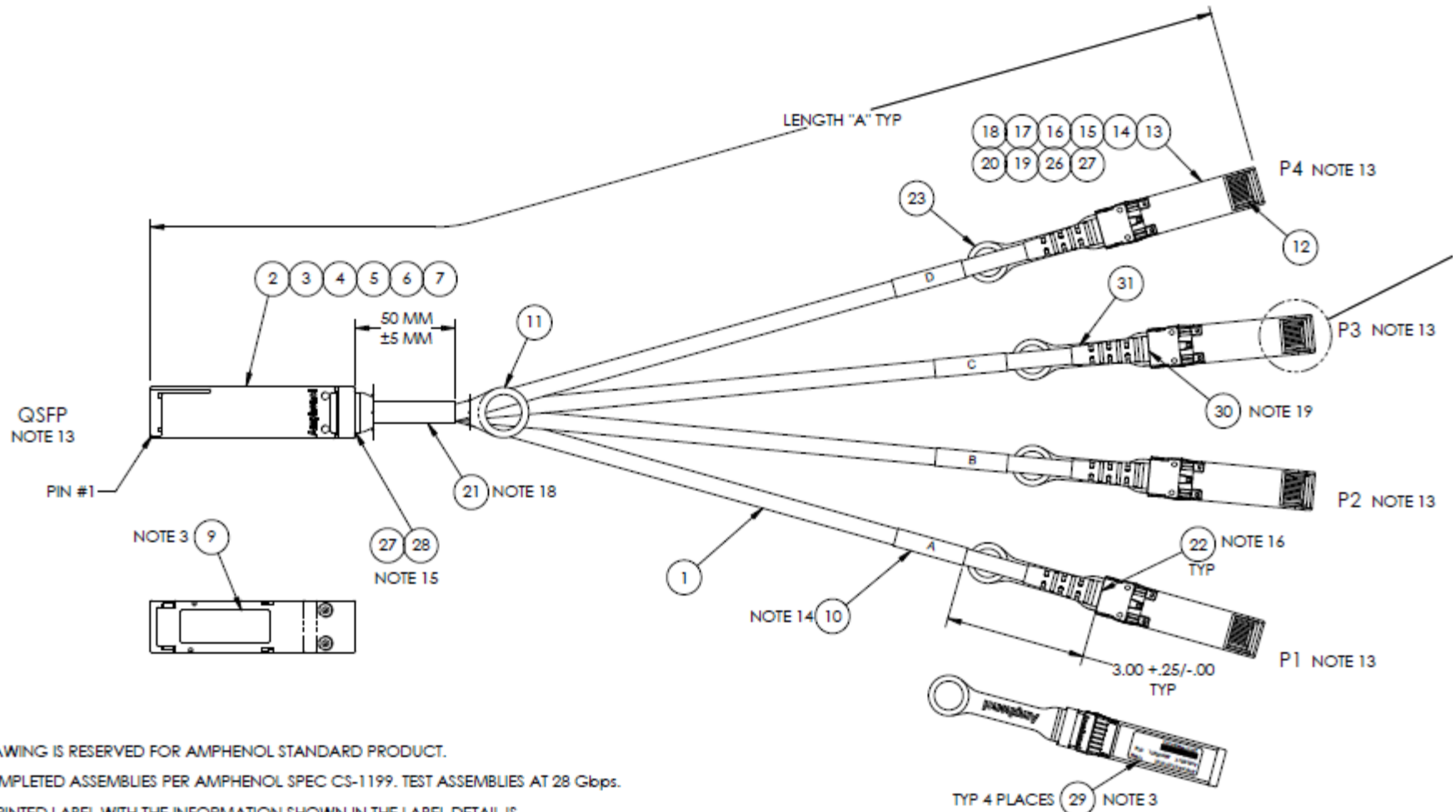
erdem.matoglu@amphenol-tcs.com



Supporter : Rich Mellitz – Intel Corporation

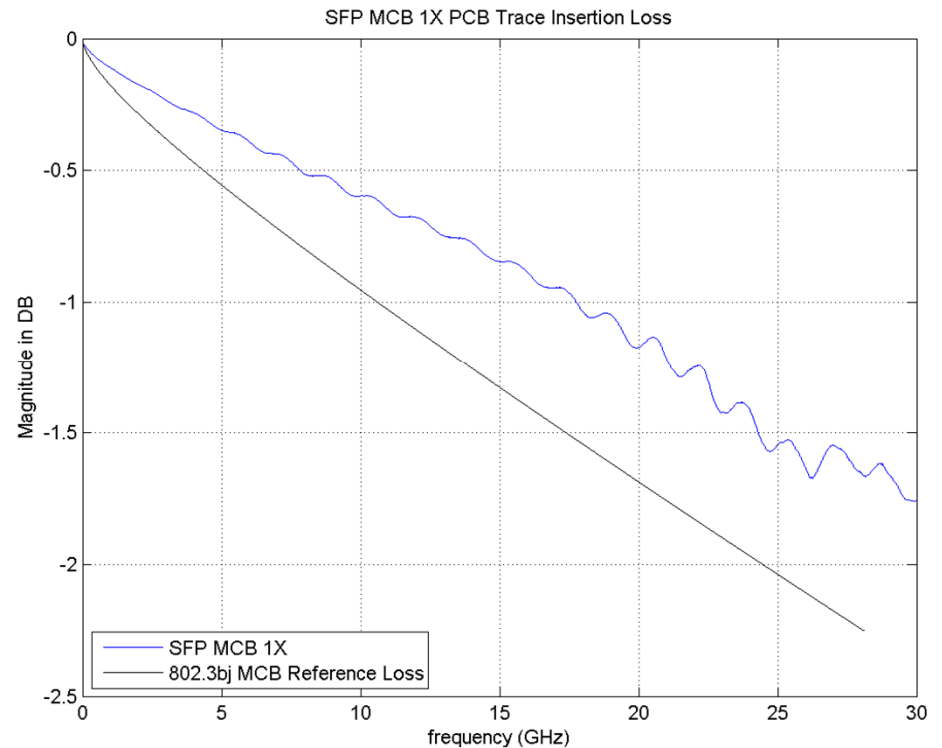
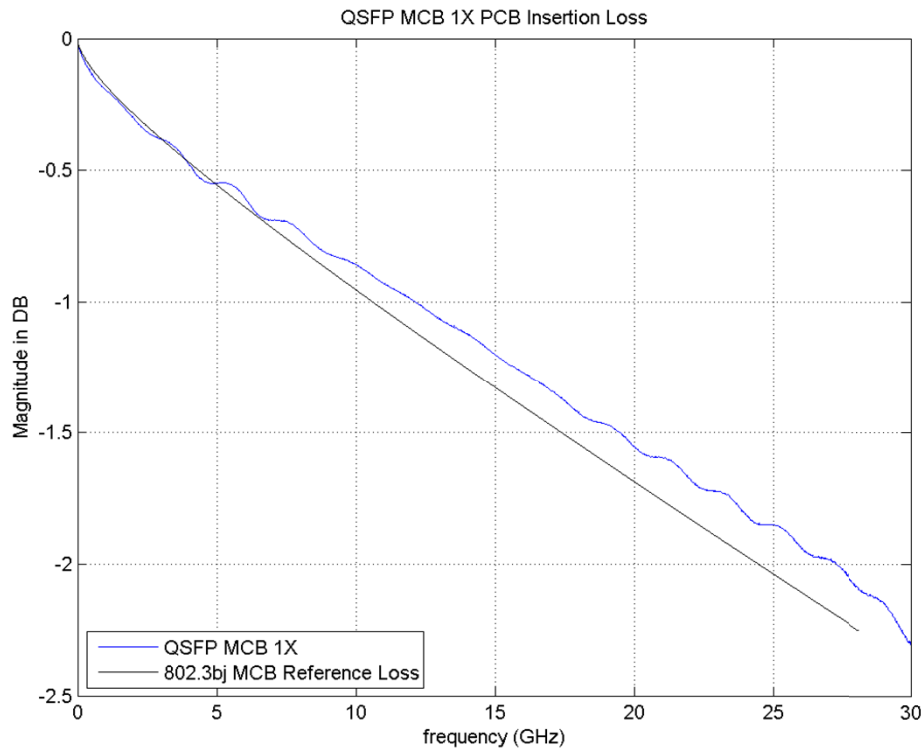
Amphenol AHSP

3m 26AWG QSFP-4SFP Splitter Cable



1. THIS DRAWING IS RESERVED FOR AMPHENOL STANDARD PRODUCT.
2. TEST COMPLETED ASSEMBLIES PER AMPHENOL SPEC CS-1199. TEST ASSEMBLIES AT 28 Gbps.
3. A PRE-PRINTED LABEL WITH THE INFORMATION SHOWN IN THE LABEL DETAIL IS POSITIONED WITHIN THE INDICATED AREA ON THE CABLE ASSEMBLY.

Measurement Test Card Losses for the QSFP and SFP plugs



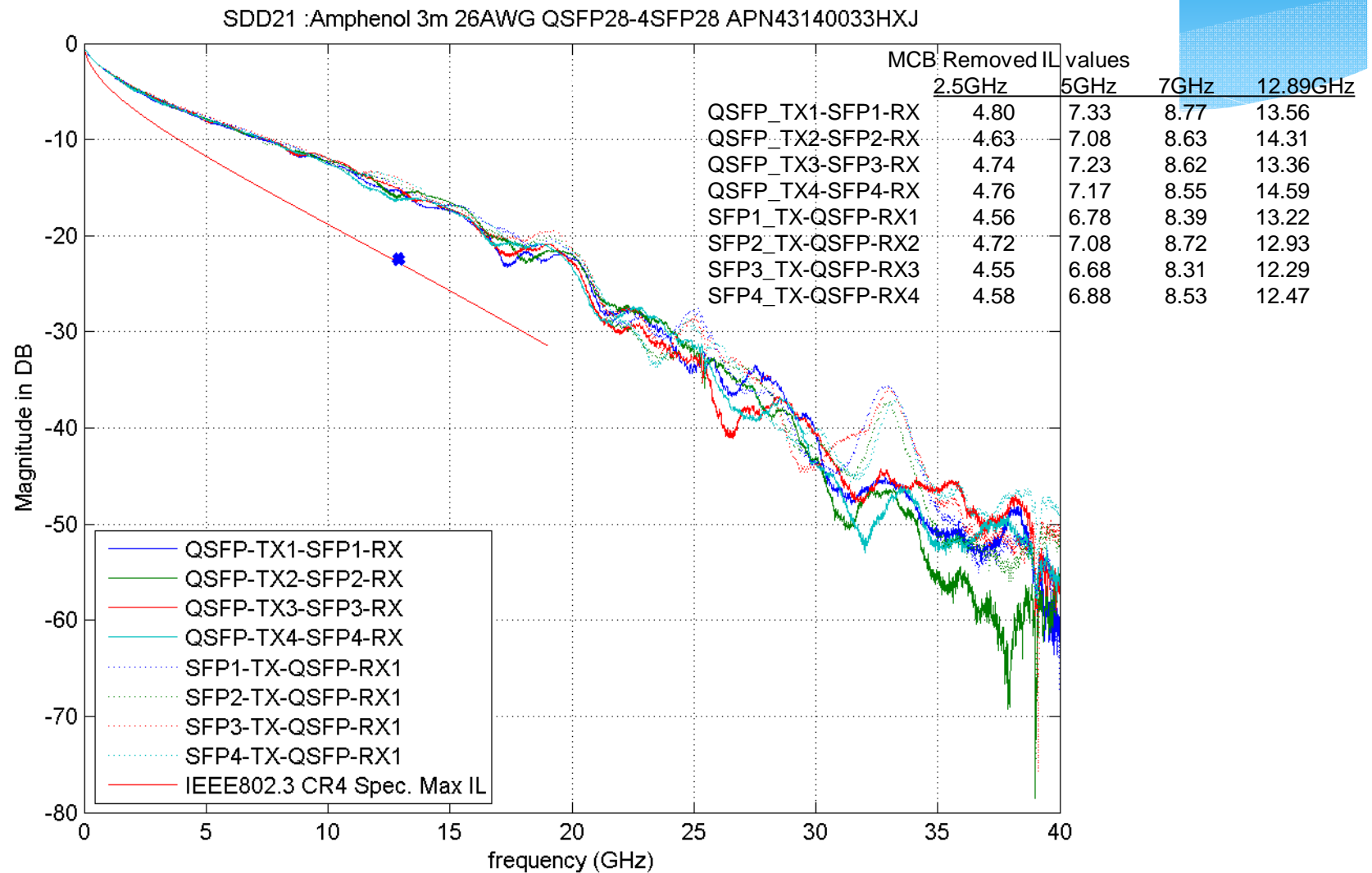
QSFP Receptacle Connector: Amphenol FS1Z3820Z610, QSFP MCB: Amphenol PCB L57-2

SFP Receptacle Connector: Amphenol UE763GA203600, SFP MCB: Amphenol PCB L-84

RF Connectors: 2.92mm

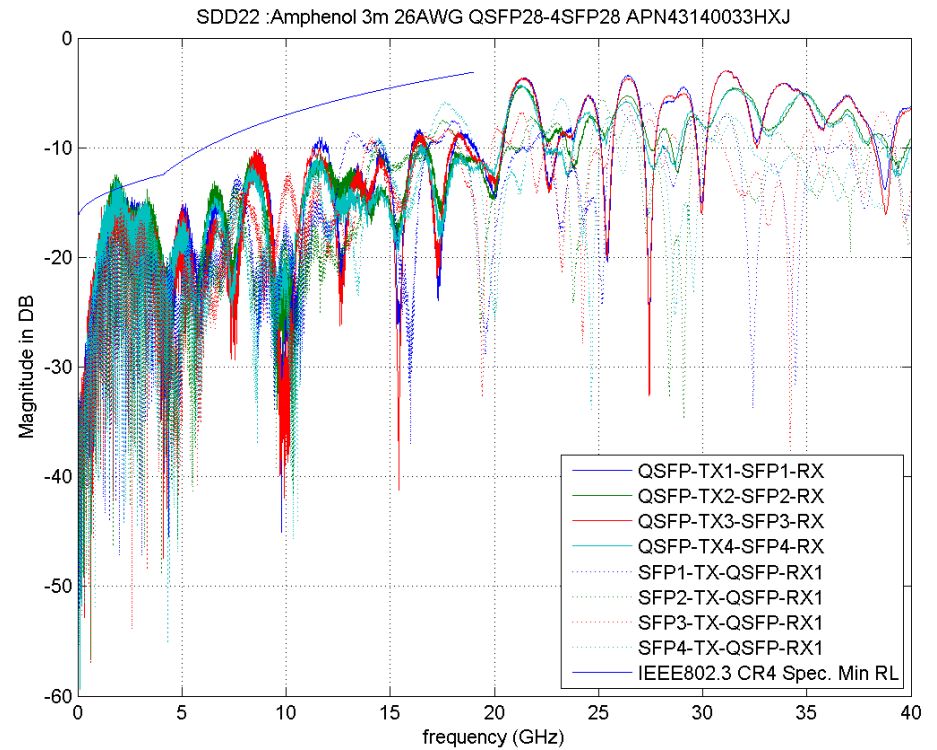
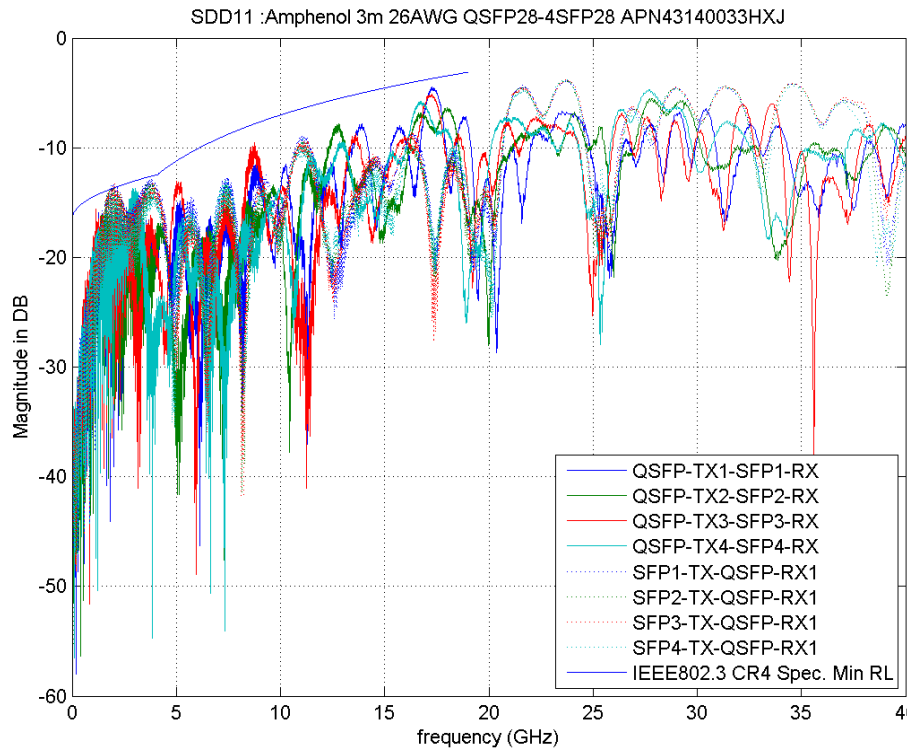
VNA : Agilent (Keysight) PNA-X N5247A.

3m 26AWG QSFP-4SFP Splitter Cable Insertion Loss



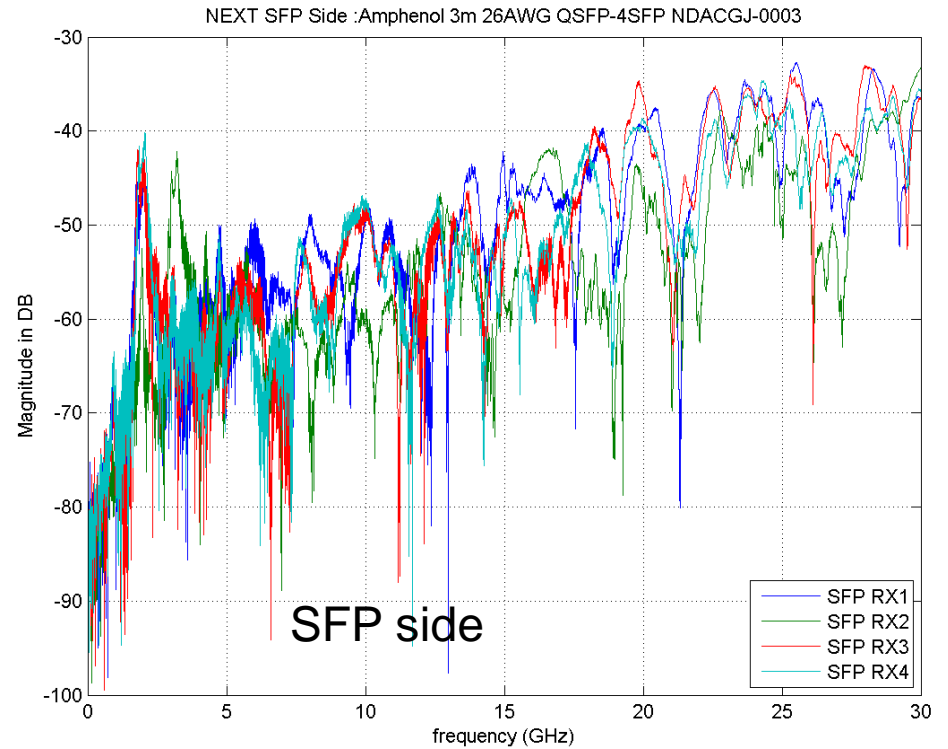
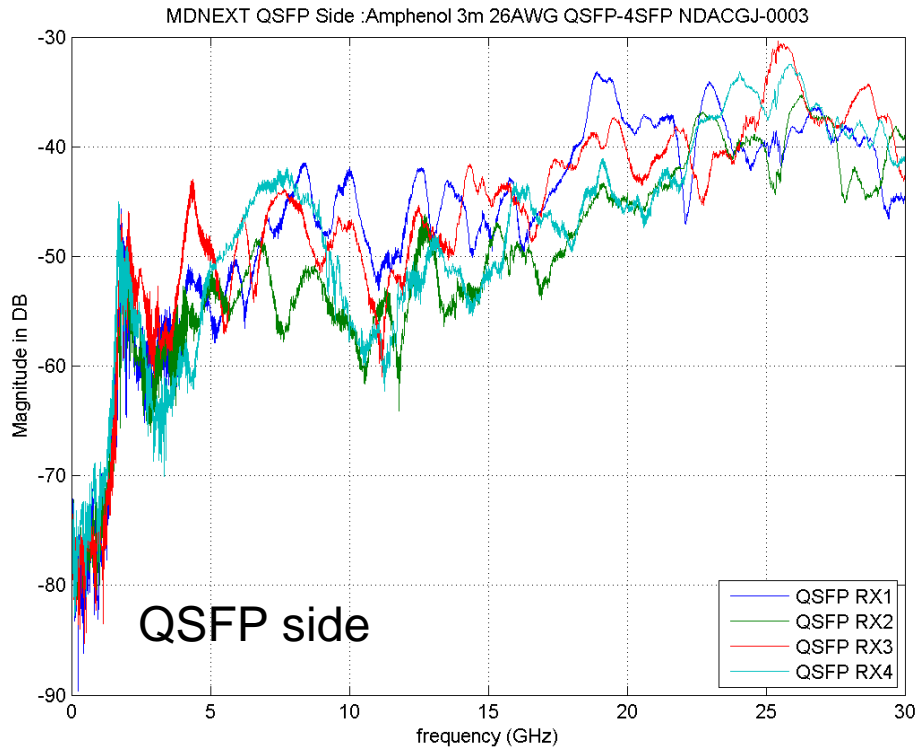
All measurements include the test fixture losses
 Specification limits are from 802.3bj 100GBASE CR-4 Clause 92

3m 26AWG QSFP-4SFP Splitter Cable Differential Return Loss



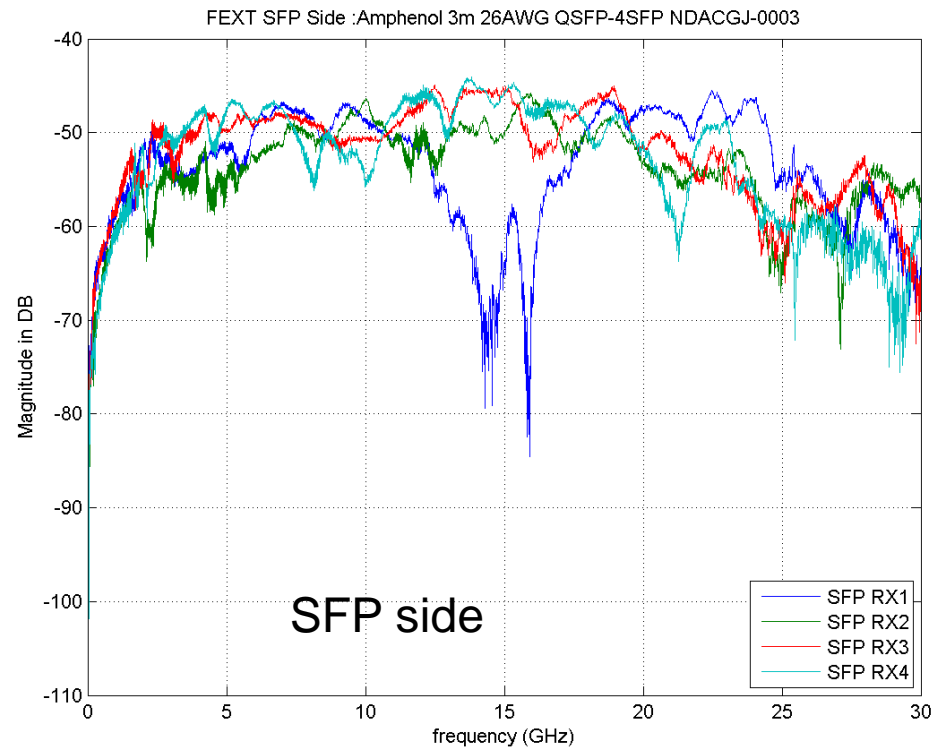
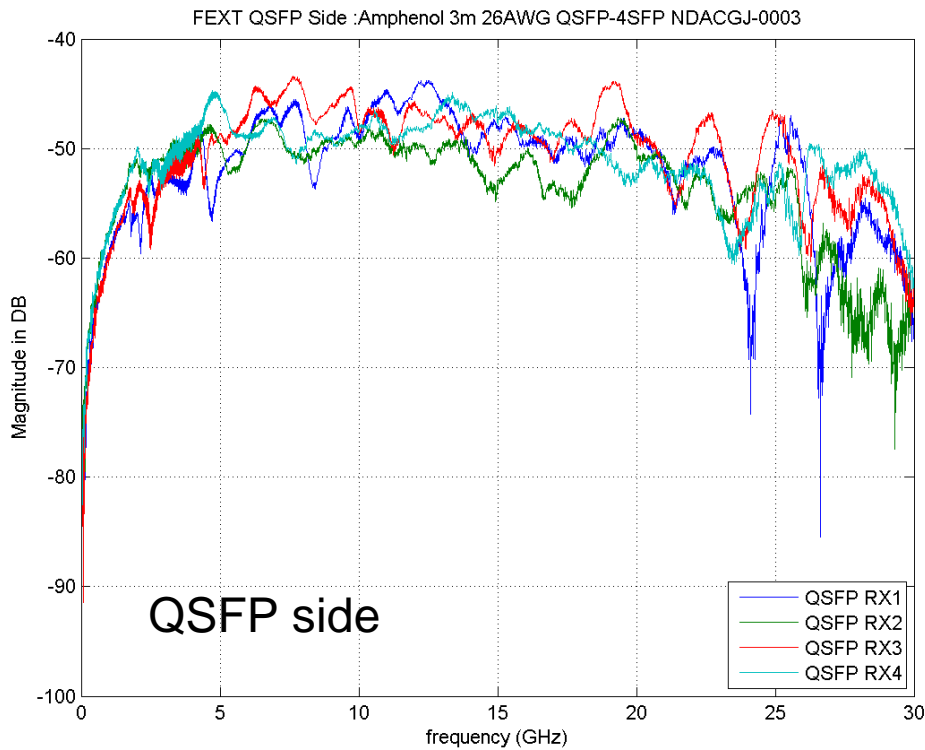
All measurements include the test fixture losses
Specification limits are from 802.3bj 100GBASE CR-4 Clause 92

3m 26AWG QSFP-4SFP Splitter Cable Near-End Crosstalk



All measurements include the test fixture losses

3m 26AWG QSFP-4SFP Splitter Cable Far-End Crosstalk



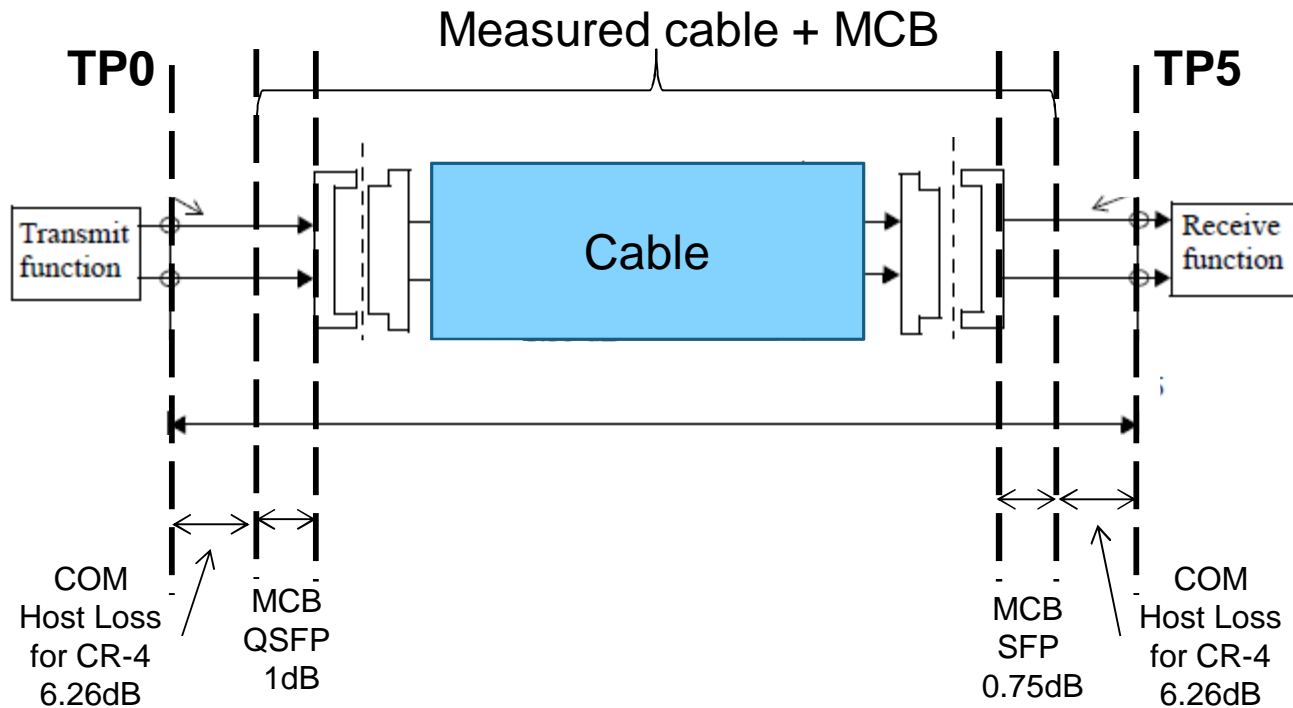
All measurements include the test fixture losses

3m 26AWG QSFP-4SFP Splitter Cable COM

COM is computed per IEEE802.3bj Section 92.10.7 with parameters and Test1 & Test 2 specified in Table 93-8. The specification requirement is minimum 3dB

Test 1 and Test 2 differs by device package length z_p . COM Test 2 models 30mm package length.
COM Test 1 models 12mm device package length

DER is set to $1e-12$ for Non-FEC analysis



TP0 to TP5 insertion loss is the measured cable (including MCBs) + 12.52 (6.26×2)

3m 26AWG QSFP-4SFP Splitter Cable COM

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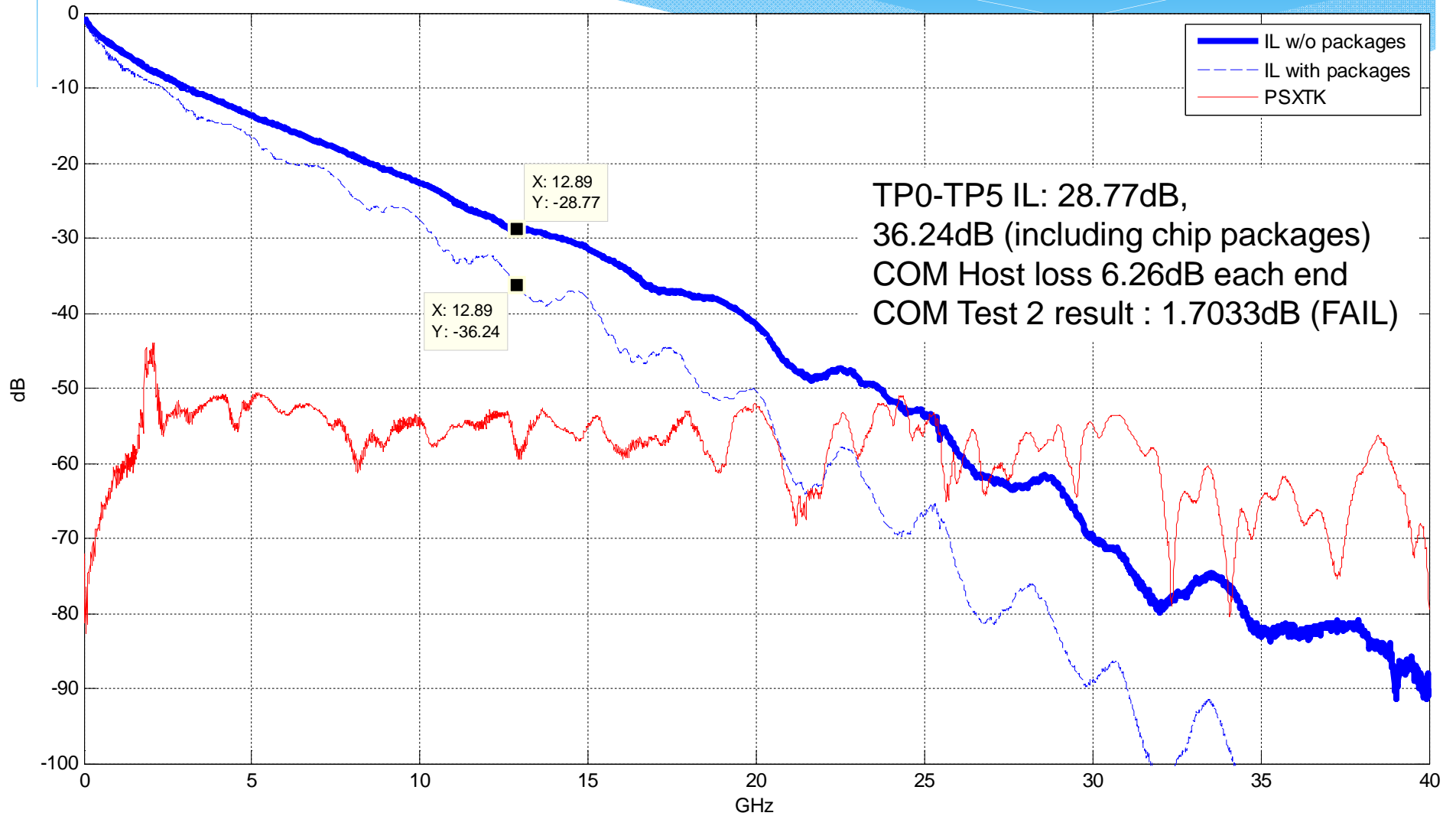
Test 1 and Test 2 differs by device package length *zp*. COM Test 2 models 30mm package length.
COM Test 1 models 12mm device package length

DER=1e-12 for non-FEC	Cable measurement at 12.89GHz (dB) (including MCBs)	TP0 to TP5 IL at 12.89GHz 6.26dB host loss on each end (dB)	COM Test 1 Result (dB)	COM Test 2 Result (dB)
QSFP_TX1-SFP1-RX	15.25	27.77	2.7553	1.918
QSFP_TX2-SFP2-RX	15.99	28.51	3.287	2.368
QSFP_TX3-SFP3-RX	15.05	27.57	2.964	2.1045
QSFP_TX4-SFP4-RX	16.28	28.77	2.6797	1.7033
SFP1_TX-QSFP-RX1	14.91	27.43	2.6914	1.9031
SFP2_TX-QSFP-RX2	14.62	27.14	3.0561	2.2266
SFP3_TX-QSFP-RX3	13.98	26.50	2.837	1.9366
SFP4_TX-QSFP-RX4	14.16	26.68	2.9213	2.0946

Reduce the 6.26dB COM host loss until the worst lane passes COM

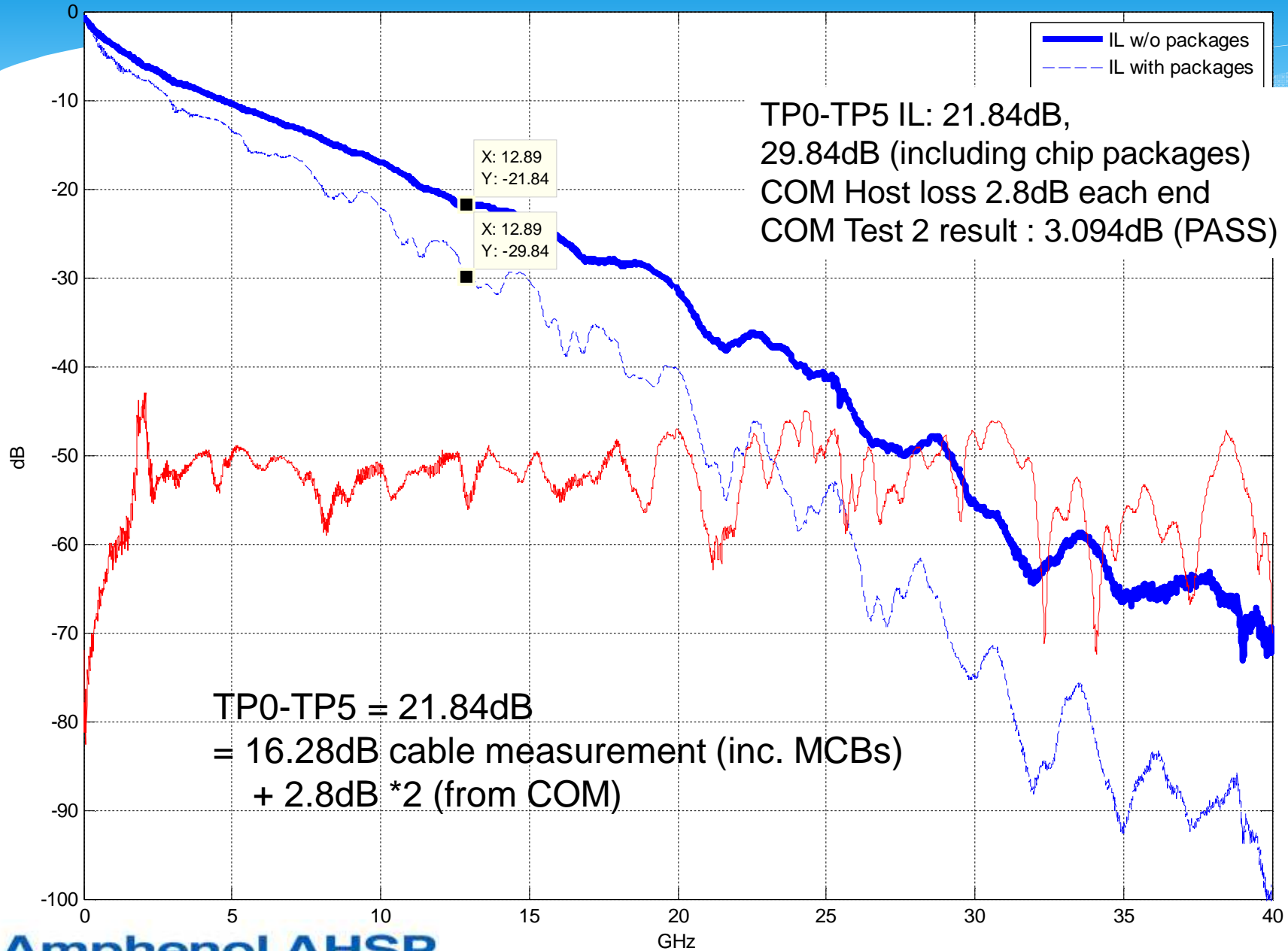
3m 26AWG QSFP-4SFP Splitter Cable COM

APN43140033HXJ--P1TX4_P2RX4 Losses



3m 26AWG QSFP-4SFP Splitter Cable COM

APN43140033HXJ-P1TX4_P2RX4 Losses



3m 26AWG QSFP-4SFP Splitter Cable COM

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Test 1 and Test 2 differs by device package length *zp*. COM Test 2 models 30mm package length.
COM Test 1 models 12mm device package length

DER=1e-12 for non-FEC	Cable measurement at 12.89GHz (dB) (including MCBs)	TP0 to TP5 IL at 12.89GHz 2.8dB host loss on each end (dB)	COM Test 1 Result (dB)	COM Test 2 Result (dB)
QSFP_TX1-SFP1-RX	15.25	21.01	3.5642	3.0051
QSFP_TX2-SFP2-RX	15.99	21.31	4.3943	3.7912
QSFP_TX3-SFP3-RX	15.05	20.67	3.8282	3.2027
QSFP_TX4-SFP4-RX	16.28	21.84	3.807	3.094
SFP1_TX-QSFP-RX1	14.91	20.48	3.802	3.2256
SFP2_TX-QSFP-RX2	14.62	20.27	4.1413	3.6239
SFP3_TX-QSFP-RX3	13.98	19.60	3.9542	3.3835
SFP4_TX-QSFP-RX4	14.16	19.85	4.1514	3.6088

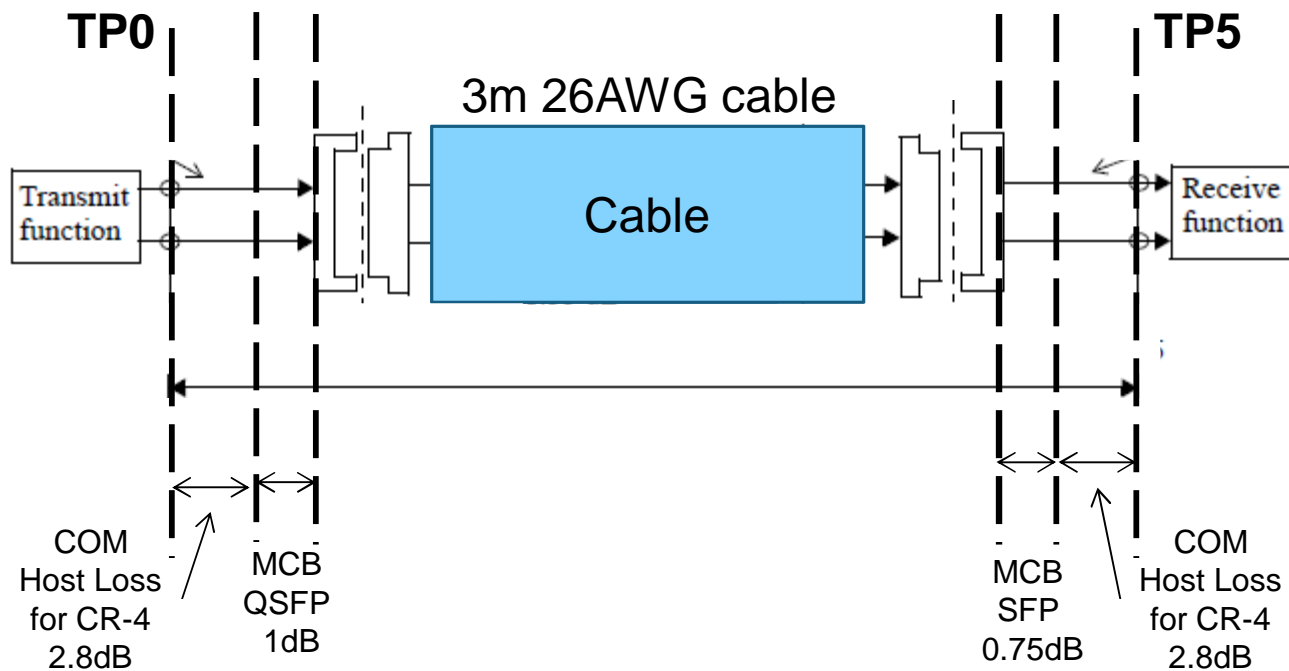
All Lanes PASS COM Tests

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3m 26AWG QSFP-4SFP Splitter Cable COM

Summary: The 3m QSFP-4SFP breakout cable topology that supports DER=1e-12 (Non-FEC) requires an end-to-end consideration for host pkg, and host PCB loss.

A recommended topology that satisfies COM and non-FEC operation with 3m QSFP-4SFP cable is presented below.



@12.89GHz, 3.8dB Host 1

3.5dB Host 2

Recommended QSFP-4SFP Cu Breakout Cables for FEC and non-FEC 25Gbps/lane Ethernet

	1m 30AWG QSFP- 4SFP	2m 30AWG QSFP- 4SFP	2m 26AWG QSFP- 4SFP	3m 26AWG QSFP- 4SFP	3m 30AWG QSFP- 4SFP	4m 26AWG QSFP- 4SFP	5m 26AWG QSFP- 4SFP
With FEC	✓	✓	✓	✓	✓	✓	✓
Without FEC	✓	✓ Max7.3dB total host PCB loss	✓ Max10.8dB total host PCB loss	✓ Max7.3dB total host PCB loss	-	-	-



Passes COM spec with 100GBASE-CR4 Host Loss (13.62dB total @ 12.89GHz)



Passes COM spec with a reduction in host channel loss (@ 12.89GHz)

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