162 cable assembly
162 A-D Annexes (TBDs)

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Purpose

- **Proposals for 162 cable assembly and 162 Annexes A-D TBDs**
- **Changes to MTF IL and RL limits**

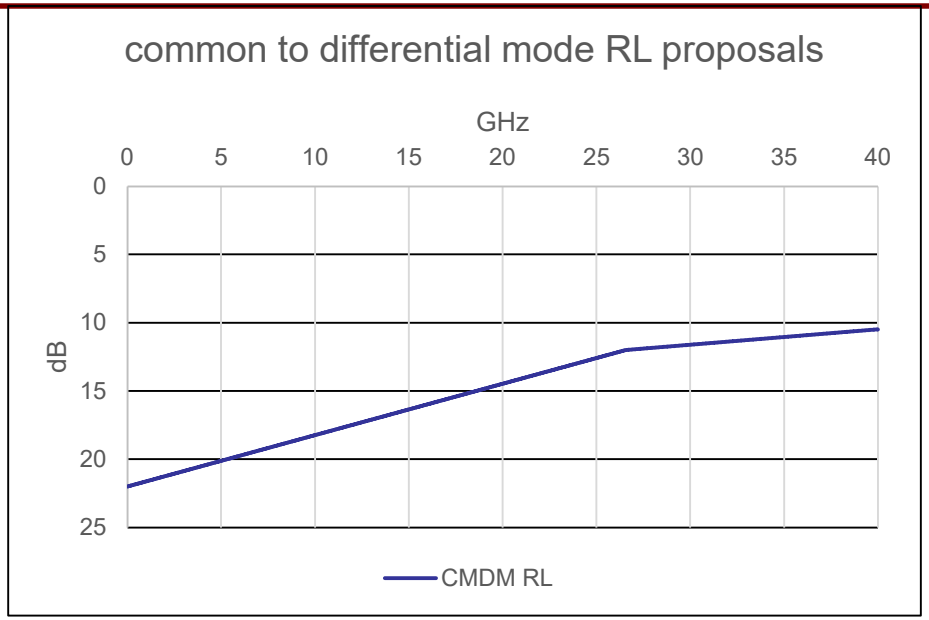
Cable Assembly (TBDs)

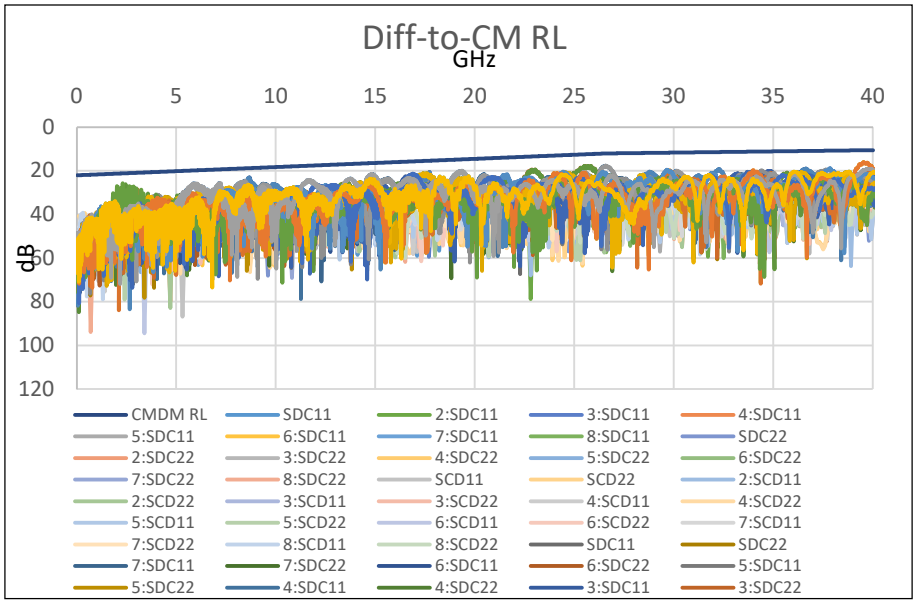
Table 162–16—Cable assembly characteristics summary

Description	Reference	Value	Unit
Maximum insertion loss at 26.56 GHz	162.11.2	19.75	dB
Minimum insertion loss at 26.56 GHz	162.11.2	11	dB
Minimum cable assembly ERL[a]	162.11.3	TBD	dB
Differential to common-mode return loss	162.11.4	TBD	dB
Differential to common-mode conversion loss	162.11.5	TBD	dB
Common-mode to common-mode return loss	162.11.6	Equation (162–9)	dB
Minimum COM	162.11.7	3	dB

[a]Cable assemblies with a COM greater than 4 dB are not required to meet minimum ERL.

162.11.4 Cable Assembly DC RL





CDRL(f) ≥
22-10*f/26.56, 0.05 ≤ f ≤ 26.56
15-3*f/26.56, 26.56< f ≤ 40
Where

f is the frequency in GHz

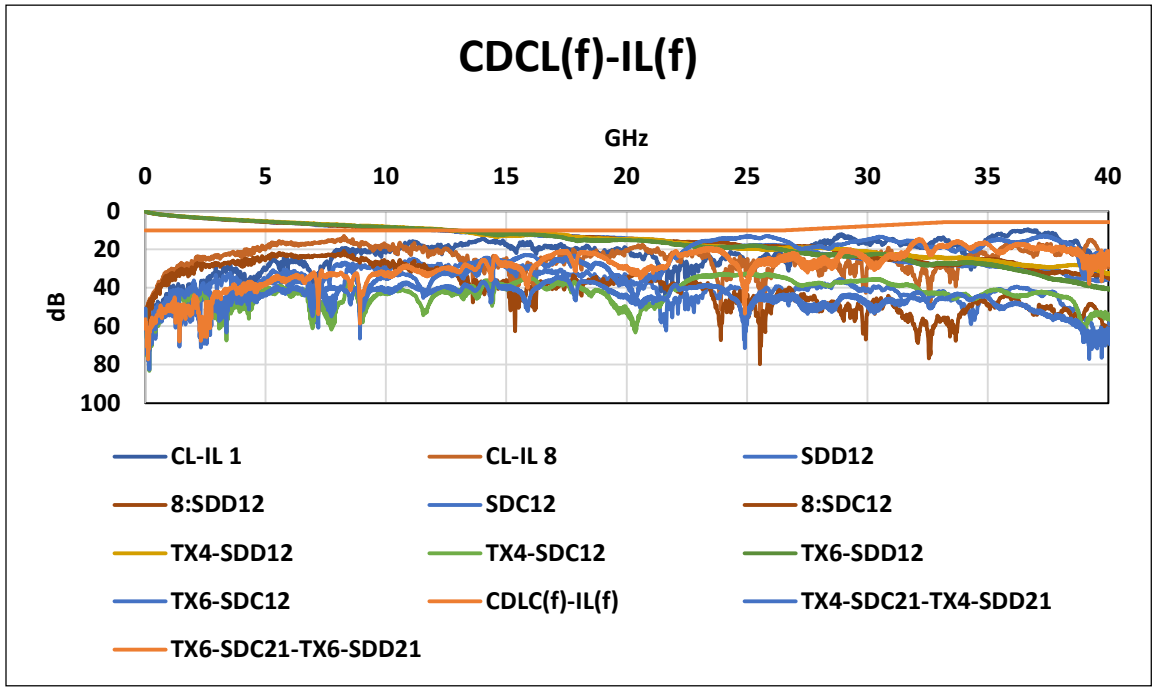
https://www.ieee802.org/3/ck/public/19_07/tracy_3ck_01b_0719.pdf

100 Gbps Copper Cable Measurement and S-Parameter File
8 Channel Cable Measurement

https://www.ieee802.org/3/ck/public/tools/cucable/matoglu_3ck_adhoc_01_030420_channels.zip

Cu Cable Channels
OSFP112G 2m Cable Assembly Measurements Update
Measured OSFP 2m 25awg Cable
4-March-2020 Erdem Matoglu Amphenol ICC

162.11.5 Cable Assembly CDCL



https://www.ieee802.org/3/ck/public/19_07/tracy_3ck_01b_0719.pdf

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162.11.5 Cable assembly differential to common-mode conversion loss
The difference between the cable assembly differential to common-mode conversion loss and the cable assembly insertion loss shall meet Equation (162-new).

CDCL(f) - IL(f) ≥
10, 0.05 ≤ f ≤ 26.56
27-17*f/26.56, 26 < f ≤ 33.2
5.75, 33.2 < f ≤ 40
Where
f is the frequency in GHz

Cable Assembly (TBDs)

162.11.2 Cable assembly insertion loss

The measured insertion loss at 26.56 GHz of a cable assembly shall be less than or equal to 19.75 dB.

The measured insertion loss of a cable assembly shall be greater than or equal to the minimum cable assembly insertion loss given in Equation (162–8) and illustrated in Figure 162–4.

$$IL_{min}(f) \geq 0.418\sqrt{f} + 0.177f + 0.0059f^2 \qquad (162–8)$$

for TBD $\leq f \leq$ 40 GHz

TBD = 0.05 GHz

where

ILmin(f)	is the minimum cable assembly insertion loss in dB
f	is the frequency in GHz

162A.4 Tx and Rx differential PCB loss

The recommended maximum and minimum insertion loss allocation for the transmitter or receiver differential controlled impedance printed circuit boards are determined using Equation (162A–1) and Equation (162A–2), respectively, and illustrated in Figure 162A–1. Note that the recommended maximum insertion loss allocation for the transmitter or receiver differential controlled impedance printed circuit boards with allowances for ball grid array (BGA) footprint and host connector footprints is 6.875 dB at 26.56 GHz and the recommended minimum insertion loss allocation for the transmitter or receiver differential controlled impedance printed circuit boards is 2.3 dB at 26.56 GHz.

$$(IL_{PCB}(f) \le IL_{PCBmax})(f) = IL_{PCBmax}(f_{GHz})=0.9809*(0.471*SQRT(f_{GHz}) +0.1194*f_{GHz}+0.002*(f_{GHz}\text{^}2)) \quad (162A–1)$$

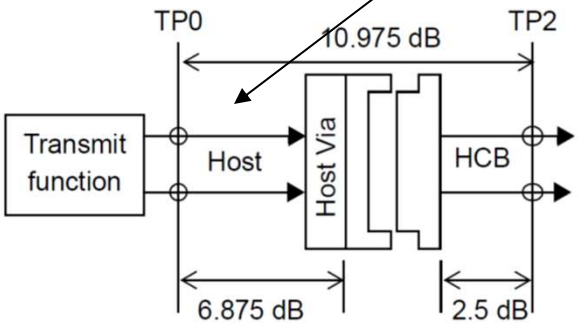
for $0.01\ \text{GHz} \le f \le 50\ \text{GHz}$ $IL_{PCBmax}\ (26.56)= 6.875\ dB$

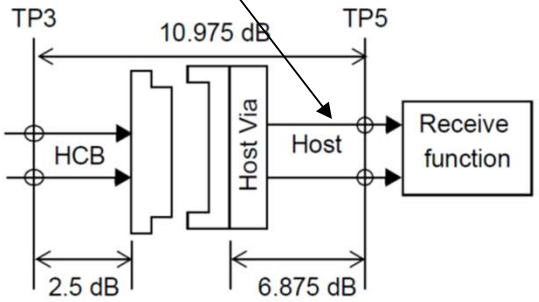
where

$IL_{PCB}(f)$ is the insertion loss of the transmitter and receiver PCB in dB

$IL_{PCBmax}(f)$ is the maximum insertion loss of the transmitter and receiver PCB in dB

f is the frequency in GHz



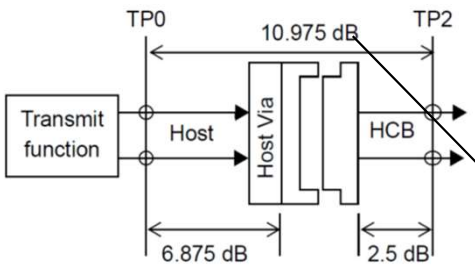


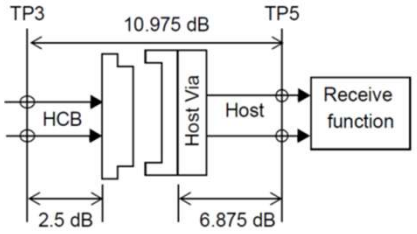
NOTE—The 6.875 dB IL includes allowance for BGA and connector footprint vias.

162A.4 IL from TP0 to TP2 or from TP3 to TP5 (host)

The recommended maximum insertion loss from TP0 to TP2 or from TP3 to TP5 including the test fixture is determined using Equation (162A–3). The recommended maximum insertion loss allocation for the transmitter or receiver differential controlled impedance printed circuit boards is consistent with the insertion loss from TP0 to TP2 or TP3 to TP5 and an assumed mated connector loss of 1.6 dB. Note that the recommended maximum insertion loss from TP0 to TP2 or from TP3 to TP5 is 10.975 dB at 26.56 GHz.

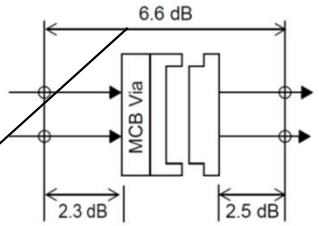
TBD



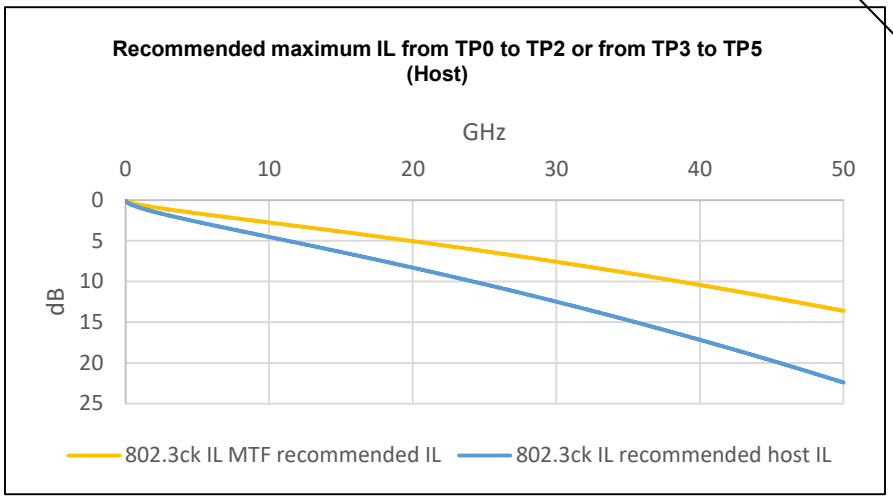


NOTE—The 6.875 dB IL includes allowance for BGA and connector footprint vias.

(162A–3)



Mated cable assembly and test point test fixture



$$ILMTF(f_{GHz})=0.9502*(0.471*SQRT(f_{GHz})+0.1194*f_{GHz}+0.002*(f_{GHz}\text{^}2))$$

$$ILMTF(26.56)= 6.6\ dB$$

$$ILHOST(f_{GHz})=1.5658*(0.471*SQRT(f_{GHz})+0.1194*f_{GHz}+0.002*(f_{GHz}\text{^}2))$$

$$ILHOST(f_{GHz})= 10.975\ dB$$

162B.1.3.1 Mated test FOM_{ILD}

The FOM_{ILD} is calculated according to 93A.4 with f_b=53.125 GHz, T_t=7.5 ps, and f_r=0.75 × f_b. The fitted insertion loss and insertion loss deviation are computed over the range f_{min}=0.01 GHz to f_{max}=40 GHz. FOM_{ILD} shall be less than (TBD) dB.

The reference insertion loss of the mated test fixture is determined using Equation (162B–5).

$$IL_{MatedTF}(f) = 0.9502(0.471\sqrt{f} + 0.1194f + 0.002f^2) \quad \text{(162B–5)}$$

for 0.01 GHz ≤ f ≤ 50 GHz

where

$IL_{MatedTF}(f)$	is the reference insertion loss of the mated test fixture insertion loss in dB at frequency f
f	is the frequency in GHz

162B.1.3.6 Mated test fixtures ICN

Table 136B–2—SFP28 mated test fixture integrated near-end crosstalk noise voltage

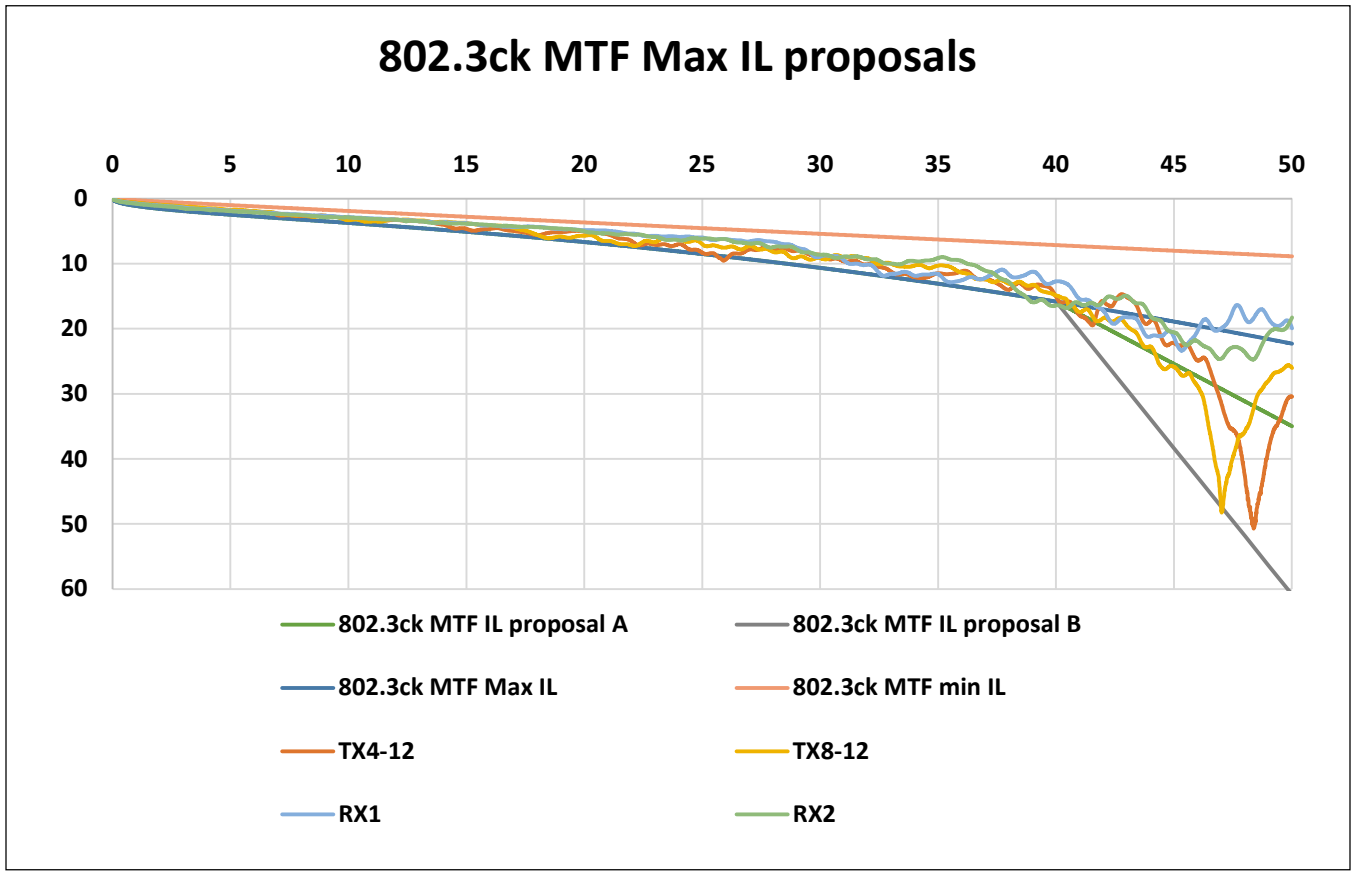
Parameter	Value	Units
Integrated near-end crosstalk noise voltage	Less than 1.6	mV

Table 162B–2—SFP+ mated test fixture integrated near-end crosstalk noise voltage

Parameter	Value	Units
Integrated near-end crosstalk noise voltage	Less than TBD	mV

TBD = 1.6 mV

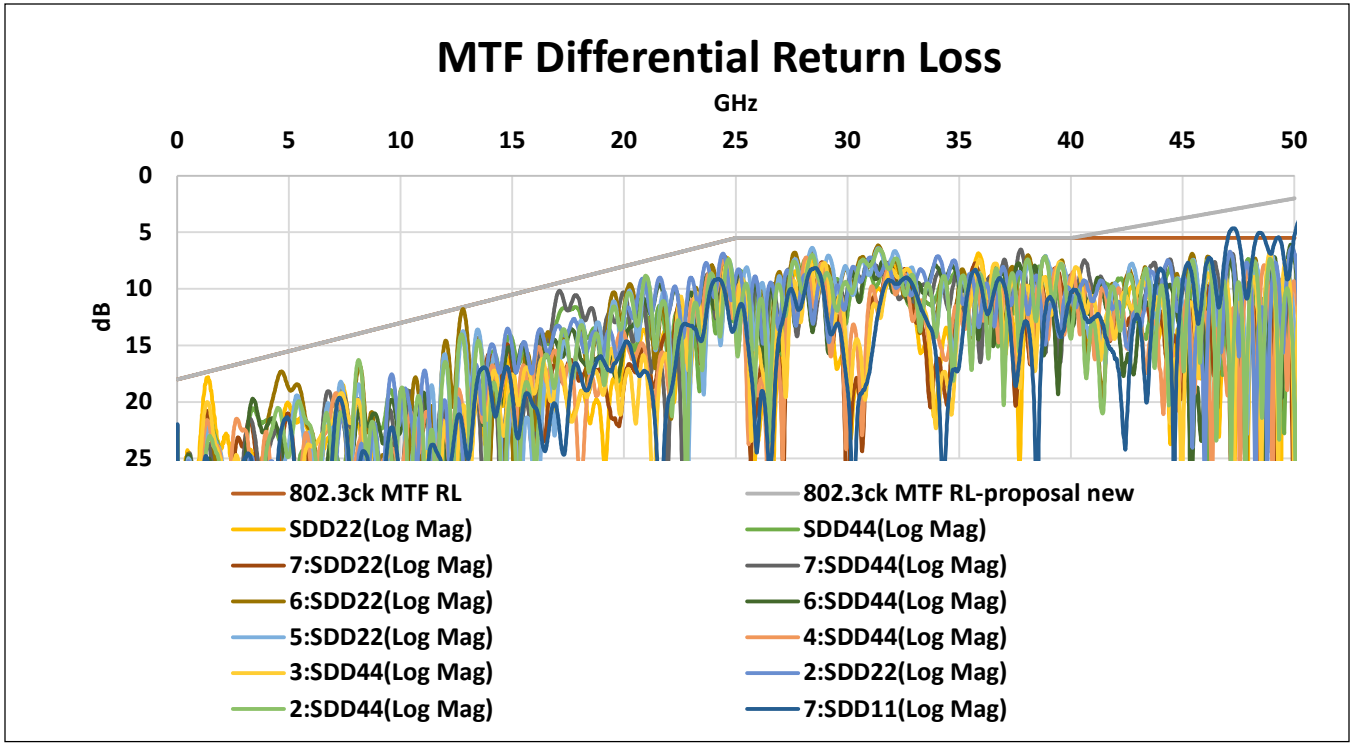
162B.1.3.1 Mated test fixtures differential insertion loss



MTF IL proposal A =1.185*SQRT(f)-0.072*f+0.007*f^2 0.01 GHz ≤ f < 40 GHz
MTF IL proposal A =1.915*f-60.78 40 GHz ≤ f ≤ 50 GHz

MTF IL proposal B =1.185*SQRT(f)-0.072*f+0.007*f^2 0.01 GHz ≤ f < 40 GHz
MTF IL proposal B =4.5*f-164.186 40 GHz ≤ f ≤ 50 GHz

162B.1.3.2 MTF differential return loss



PROPOSAL: Differential Return Loss =

$18-0.5*f_{GHz}$	$0.05\ GHz \le f_{GHz} < 25\ GHz$
5.5	$25\ GHz \le f_{GHz} < 40\ GHz$
$-3.5*(f_{GHz}-40)+5.5$	$40\ GHz \le f_{GHz} \le 50\ GHz$