CR Mated Test Fixture Insertion Loss (Comment #357)

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TE Connectivity

EVERY CONNECTION COUNTS

Supporters

Bill Simms, Nvidia

Rohan Phadke, Arista

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Jim Weaver, Arista

Scott Sommers, Molex

Vivek Shah, Molex

Tobey Li, Mediatek

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Jeff Maki, Juniper

John Calvin, Keysight

Sam Kocsis, Amphenol

Tom Palkert, Samtec

Steve Sekel, Wilder Technologies

Kevin Mamenga, Wilder Technologies

Ali Ghiasi, Ghiasi Quantum

Matt Brown, Alphawave Semi

Rich Mellitz, Samtec

Agenda

- Introduction
- Background
- Problem Description
- Proposed Changes
- Summary

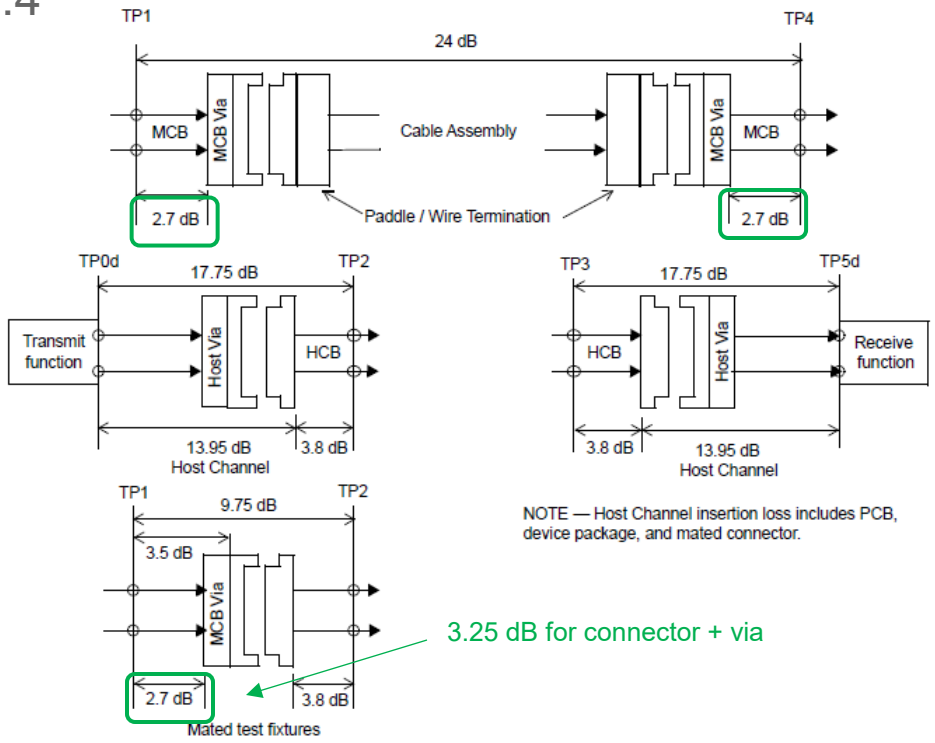
Introduction

- Comment #140 against D1.4 resulted in a change to Figure 179A-1 that resulted in the loss of the MCB PCB and the via+connector being lumped into a single value.
- This has the unintended consequence of requiring adjustment to the MCB PCB design to compensate for any difference in via+connector insertion loss from the amount allocated to it prior to D1.5, which can increase the amount of MCB trace loss that must be included in a TP1-TP4 cable assembly measurement.
  - Cable assemblies to date have been measured with MCBs designed to the D1.4 specifications.
- To address the problem, we propose change Figure 179A-1 by either
  1. Reverting to the version that was in D1.4 (as proposed in D2.0 comment #289).
  2. (Preferred) Reduce the loss from TP1 to far side of connector from 5.95 dB to 4.95 dB, reduce TP1-TP2 from 9.75 dB to 8.75 dB, reduce TP0d to TP2 from 17.75 dB to 16.75 dB.

  Note: Both options are accounting for 1dB lower than expected connector loss. Neither affects the insertion loss allocation for cable assemblies or host routing.

Background: MTF IL Specification Change Post D1.4

D1.4



NOTE — Host Channel insertion loss includes PCB, device package, and mated connector.

3.25 dB for connector + via

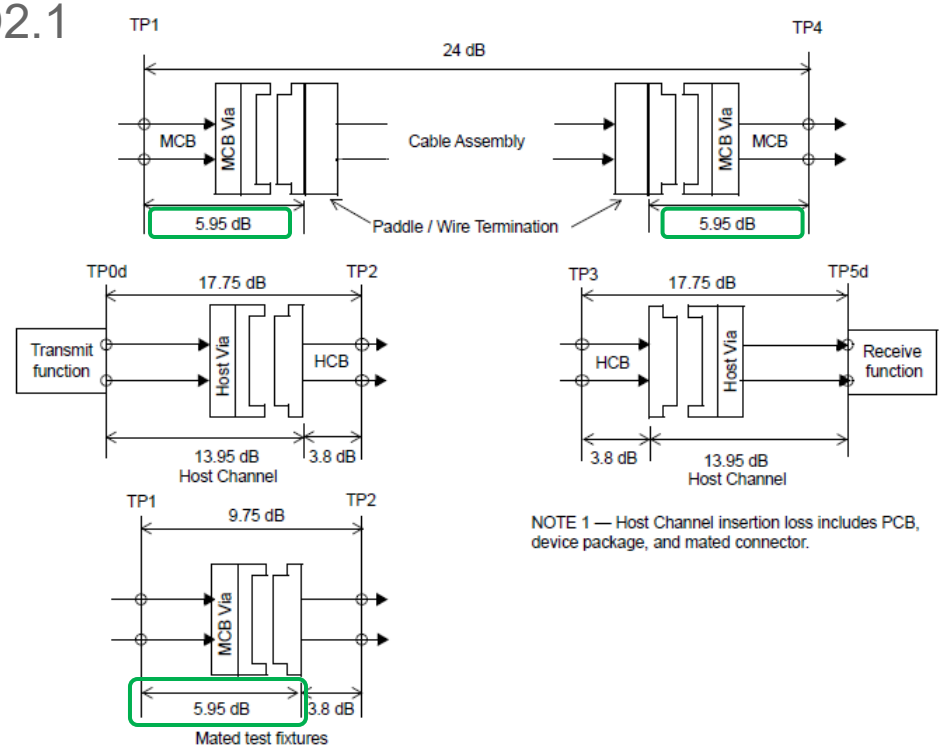
NOTE — 2.7 dB MCB PCB ILdd includes the RF connector (up to the RF connector reference plane).

Figure 179A–1—Host-Nominal to Host-Nominal, Cable assembly, and test fixture insertion loss at 53.125 GHz

D1.4, 179A.4, Page 801, Line 53

The recommended maximum differential insertion loss (TP0d-to-TP2) or (TP3-to-TP5d) are consistent with the host channels and an assumed mated connector insertion loss of 2.45 dB.

D2.1



NOTE 1 — Host Channel insertion loss includes PCB, device package, and mated connector.

NOTE 2 — The MCB and HCB ILdd allocations include the RF connector (up to the RF connector reference plane).

MCB = Module Compliance Board, 179B.3
HCB = Host Compliance Board, 179B.2
MCB Via = transition via to MDI connector on an MCB
Host Via = transition via to MDI connector on a Host Channel
Paddle/Wire Termination = transition structure(s) in a Cable Assembly not present on an HCB

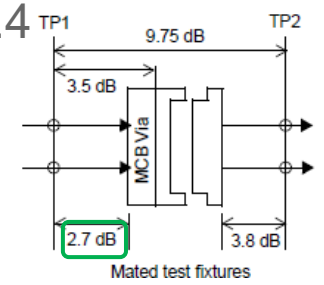
Figure 179A–1—Host-Nominal to Host-Nominal, Cable assembly, and test fixture insertion loss at 53.125 GHz

Problem Description

- MTF loss specifications:
  - TP1-TP2 = 9.75 dB
  - HCB from TP2 to connector = 3.8 dB
  - MCB from TP1 to the far side of the connector = 5.95 dB

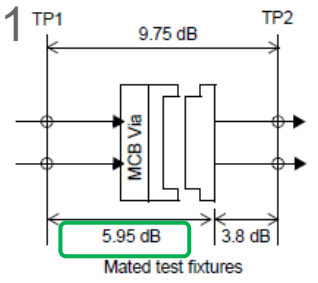
  MCB loss specification therefore includes PCB, PCB via and the via+connector.
- Through D1.4, the MCB loss was specified as PCB only with a value of 2.7 dB, allocating 3.25 dB for the via+connector.
  - Note: Cable assemblies to date have been measured with MCBs designed to the 2.7 dB trace insertion loss.
- Measurement of MTFs are showing via+connector loss to be in the range of 2.25 dB.
  - Since MCB loss specification includes the via+connector, the MCB traces require 1 dB additional loss to compensate for the lower via+connector loss.
  - Based on all drafts since D1.5, all CR cable assemblies should be measured with redesigned MCB's.
  - This increases the amount of MCB loss included in a TP1-TP4 cable assembly measurement by 2 dB, effectively reducing cable assembly portion of the loss by 2 dB (2 MCBs in a measurement), compromising the ability to meet the existing TP1-TP4 insertion loss specs. We do not believe this was the intent of the change made in D1.5

D1.4



MCB trace only

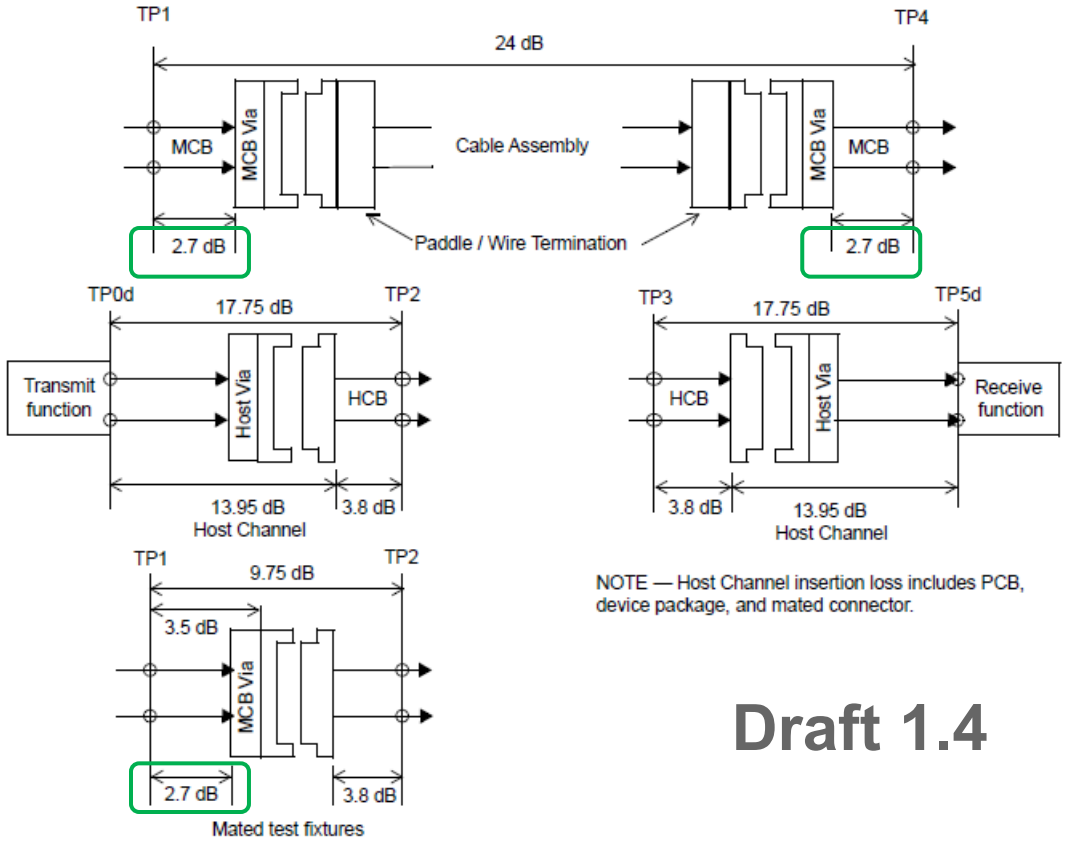
D2.1



MCB trace + via + connector

Proposed Changes – Option 1

Return to the insertion specification in Figure 179A-1 from Draft 1.4.



NOTE — Host Channel insertion loss includes PCB, device package, and mated connector.

NOTE — 2.7 dB MCB PCB ILdd includes the RF connector (up to the RF connector reference plane).

Figure 179A–1—Host-Nominal to Host-Nominal, Cable assembly, and test fixture insertion loss at 53.125 GHz

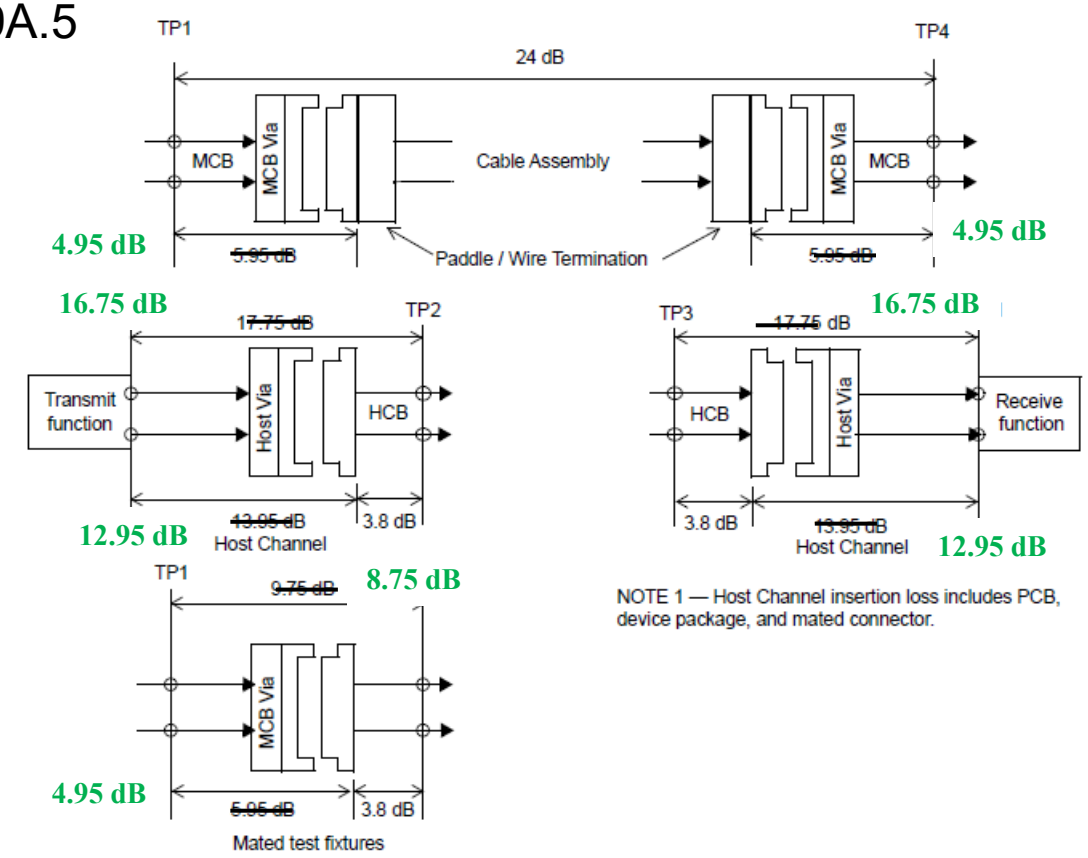
Draft 1.4

Page 801, Line 53

The recommended maximum differential insertion loss (TP0d-to-TP2) or (TP3-to-TP5d) are consistent with the host channels and an assumed mated connector insertion loss of 2.45 dB.

Proposed Changes - Option 2 (Preferred)

179A.5



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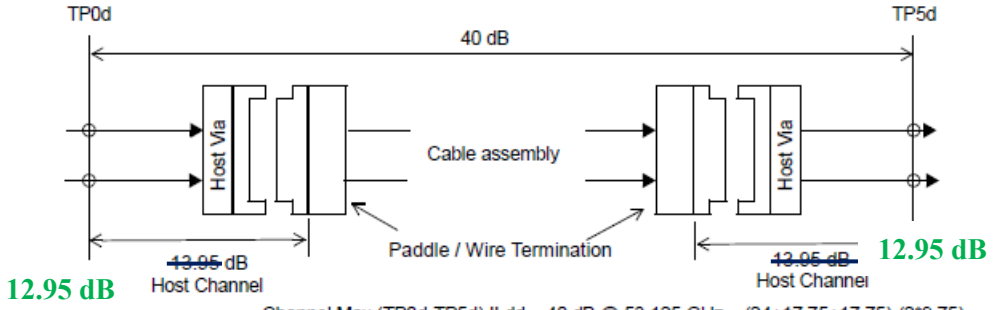

Figure 179A–2—HN-to-HN Channel Max (TP0d-TP5d) at 53.125 GHz

Channel Max (TP0d-TP5d) ILdd = 40 dB @ 53.125 GHz = (24+16.75+16.75)-(2*8.75)
Channel Max (TP0d-TP5d) ILdd = 40 dB @ 53.125 GHz = (2*12.95)+14.1

Note: The change in host channel loss is due solely to reduced connector loss. Host routing is not affected.

Summary

- The MTF insertion loss specification requires adjustment of MCB trace insertion loss to account for difference between actual allocated connector insertion loss.
- Increasing MCB trace loss to account for lower than allocated connector loss results in additional fixture loss in TP1-TP4 cable assembly measurements, jeopardizing the ability to meet the cable assembly insertion loss specification.
- Proposed options for resolving the issue:

1) Change the MCB specification back to "trace only" (D1.4).
    - Proven method used on past IEEE data rate specifications and acceptable to the commenter, but commenter believes is not desired by the people commenting on D1.4.
2) (Preferred) Reduce the loss from TP1 to far side of connector by 1 dB.
    - Preserves the intent of the change made in D1.5.
    - Preserves the full insertion loss allocation intent for the cable assembly.

Thank you!