

MCB Insertion Loss

D2.2 Comment #232

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November 2025

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Agenda

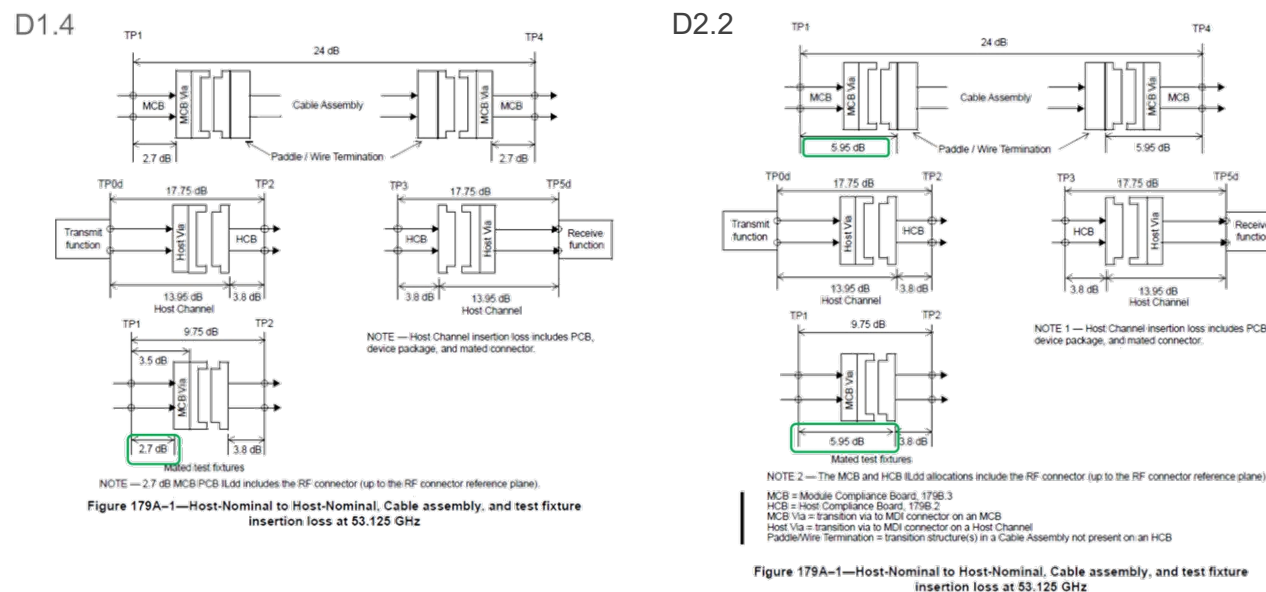
- Background
- Proposed Changes
 - Summary
 - Details

Background

- MTF informative IL specification changed @ D1.5.
 - This is a fundamental methodology change from prior generations to clearly define MTF performance.
 - This had the consequence that connector and via improvements are absorbed into the test fixture and don't benefit cable, module or host.
- 07/25 and 09/25 meetings discussed the issue and built consensus over that period of time.
- This contribution provides a more thorough set of proposed changes that resulted from consensus building with a broad set of stakeholders through October.



Background: MTF IL Specification Change Post D1.4



Summary of Proposed Changes (1)

Location	Description
Figure 179A-1	Reduce insertion loss by 1 dB: <ul style="list-style-type: none">• TP1-connector (2x) & connector-TP4 (1x)• TP1-TP2 (1x)• TP0d-connector (1x) & connector-TP5d (1x)• TP0d-TP2 (1x) & TP3-TP5d (1x)
Figure 179A-2	Reduce host channel insertion loss by 1 dB (2x). Modify budget equation to reflect the IL changes.
Table 179A-1	Reduce maximum insertion loss for all 3 host classes by 1 dB for host channels and for TP0d-TP2/TP3-TP5d.
Table 179A-2	For all link configurations in the table reduce <ul style="list-style-type: none">• (Column 3) Ildd_TP0d-TP2,max by 1 dB• (Column 4) Ildd_TP3-TP5d,max by 1 dB• (Column 5) Ildd_MTFref by 1 dB
Table 179A-3	Reduce Ildd_MTFref by 1 dB. Modify budget equation to reflect the IL changes.
Table 176D-3	Change R_peak to account for change in IL (1 dB MCB loss)
Table 176D-6	Change partial host trace lengths to account for reduced connector loss. Comment #204 proposes to change it to 280 mm.

Summary of Proposed Changes (2)

Location	Description
Equation (179B-2)	Modify to reflect change in insertion loss.
Equation (179B-3)	Modify to reflect change in insertion loss.
Equation (179B-4)	Modify to reflect change in insertion loss.
Equation (179B-5)	Modify to reflect change in insertion loss.
Figure 179B-1	Update to reflect change in (179B-2)
Figure 179B-2	Update to reflect change in (179B-3), (179B-4), (179B-5)

Proposed Changes: Figure 179A-1

179A.5

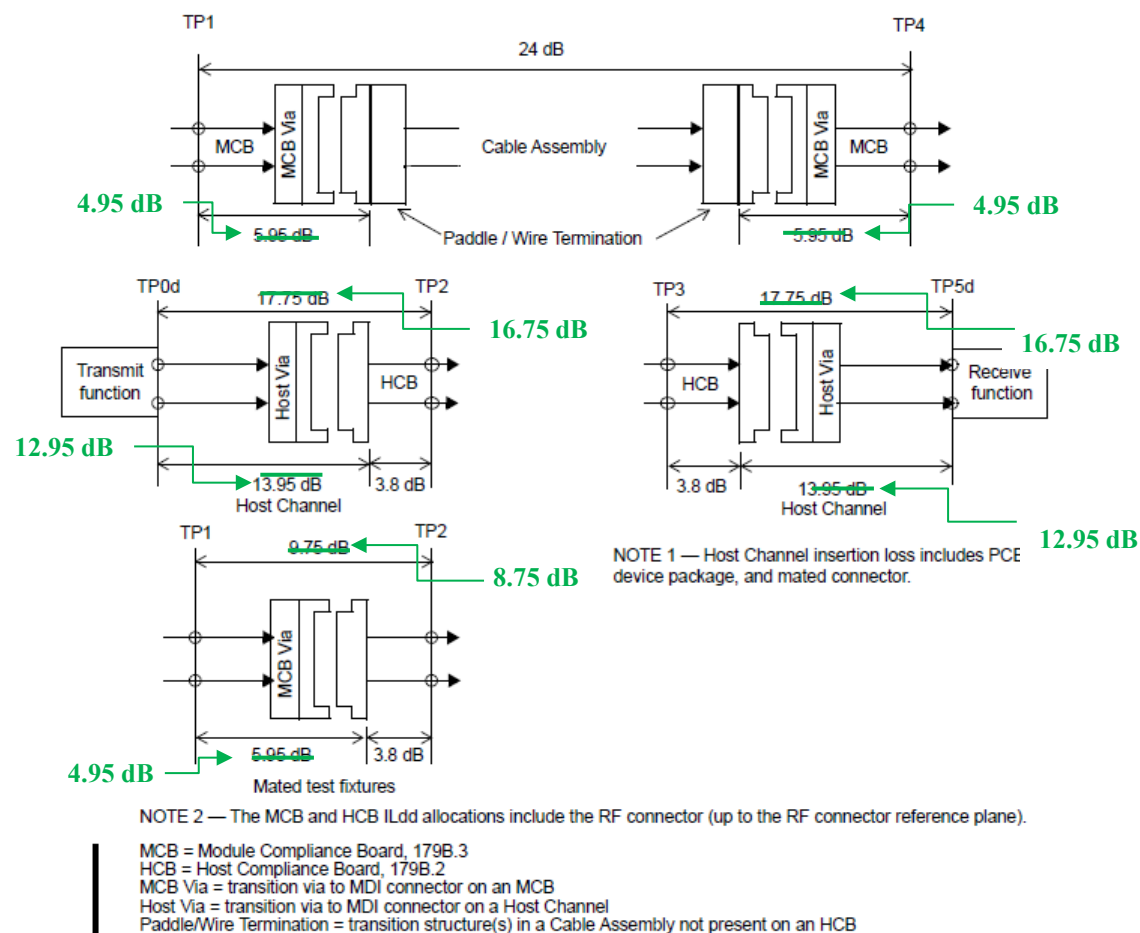


Figure 179A-1—Host-Nominal to Host-Nominal, Cable assembly, and test fixture insertion loss at 53.125 GHz

Proposed Changes: Figure 179A-2

179A.5

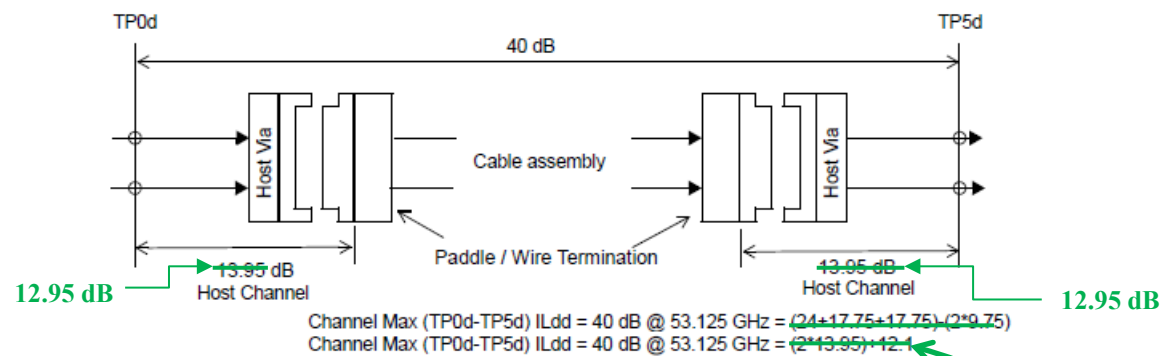


Figure 179A-2—HN-to-HN Channel Max (TP0d-TP5d) at 53.125 GHz

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

Changes: Figure 179A-3

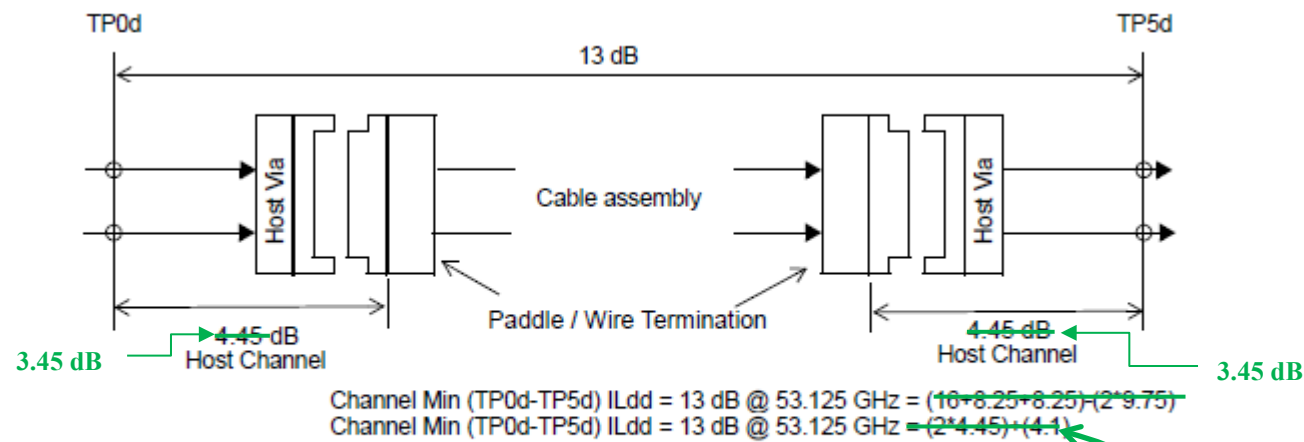


Figure 179A-3— Channel Min (TP0d-TP5d) at 53.125 GHz

Channel Min (TP0d-TP5d) ILdd = 13 dB @ 53.125 GHz = (16+7.25+7.25)-(2*8.75)
Channel Min (TP0d-TP5d) ILdd = 13 dB @ 53.125 GHz = (2*3.45)+6.1

Table 179A-3—Minimum Insertion loss budget values at 53.125 GHz

Link Configuration	$ILdd_{CA,min}$ (dB)	$ILdd_{TP0d,TP2,min}$ (dB)	$ILdd_{TP3,TP5d,min}$ (dB)	$ILdd_{MTRef}$ (dB)	$ILdd_{Ch,min}$ (dB)
Host-Min to Host-Min	16	8.25	8.25	9.75	13

Proposed Changes: Table 179A-1

Table 179A-1—Recommended differential insertion loss limits at 53.125 GHz

Host class	Host channels	TP0d to TP2 or TP3 to TP5d
	Max (dB)	Max (dB)
Host-Low (HL)	-8.95 7.95	12.75 11.75
Host-Nominal (HN)	-13.95 12.95	17.75 16.75
Host-High (HH)	-18.95 17.95	22.75 21.75

Proposed Changes: Table 179A-2

Table 179A-2—Maximum Insertion loss budget values at 53.125 GHz

Link Configuration	$ILdd_{CA,max}$ (dB)	$ILdd_{TP0d-TP2,max}$ (dB)	$ILdd_{TP3-TP5d,max}$ (dB)	$ILdd_{MTFref}$ (dB)	$ILdd_{Ch,max}$ (dB)
HH to HN	19 (CA-A)	22.75 21.75	17.75 16.75	9.75 8.75	40
HH to HL	24 (CA-B)	22.75 21.75	12.75 11.75	9.75 8.75	40
HN to HN	24 (CA-B)	17.75 16.75	17.75 16.75	9.75 8.75	40
HN to HL	29 (CA-C)	17.75 16.75	12.75 11.75	9.75 8.75	40
HL to HL	34 (CA-D)	12.75 11.75	12.75 11.75	9.75 8.75	40

Proposed Changes: Table 176D-3

Table 176D-3—Summary of module output specifications at TP4

Parameter	Reference	Value	Units
...
Linear fit pulse peak ratio, R_{peak} (min)	176D.8.5	0.456	—

0.46

For specifics on proposed values please refer to healey_3dj_01_2511.

Proposed Changes: Table 176D-6

Table 176D-6—Host and module model parameters (continued)

Parameter	Symbol	Value	Units
...
Partial host channel model	-		
Single-ended board capacitance at the package-to-board interface	C_0	0	nF
Transmission line parameter γ_0	$\gamma_0^{(h)}$	0	1/mm
Transmission line parameter a_1	$a_1^{(h)}$	5.95×10^{-4}	ns ^{1/2} /mm
Transmission line parameter a_2	$a_2^{(h)}$	2.6×10^{-5}	ns/mm
Transmission line parameter τ	$\tau^{(h)}$	5.79×10^{-3}	ns/mm
Transmission line characteristic impedance	$Z_c^{(h)}$	92.5	Ω
Transmission line length	$z_p^{(h)}$	250	mm
Single-ended capacitance at the model-to-measurement interface	C_1	0	nF

280 Refer to comment #204 & healey_3dj_01_2511.pdf

Proposed Changes: 179B Equations & Figures

$$ILdd_{tfref}(f) = 0.3073\sqrt{f} + 0.01172f + 0.0003321f^2$$

$$ILdd_{catref}(f) = 0.0912 + 0.3102\sqrt{f} + 0.008578f + 0.000759f^2$$

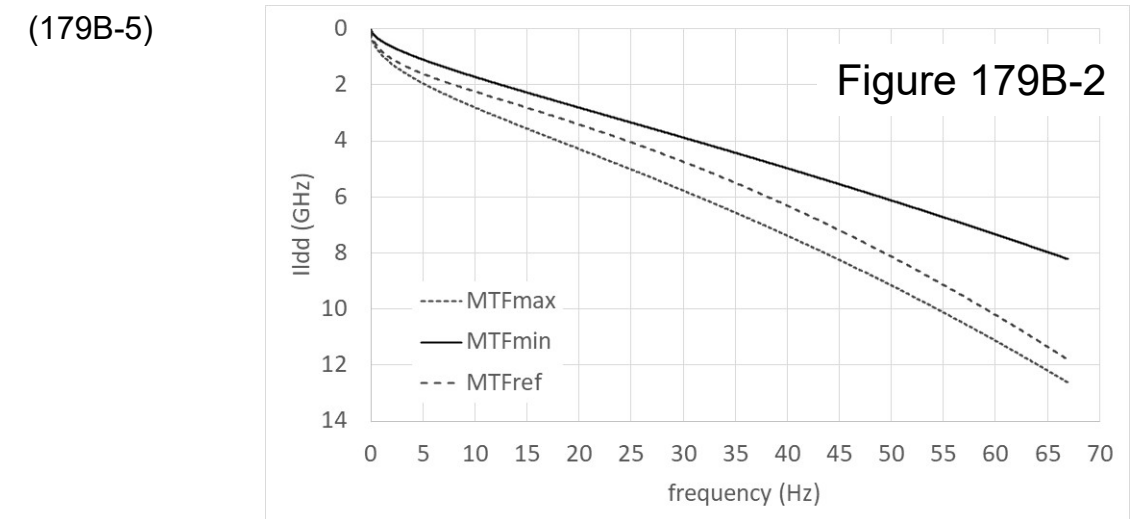
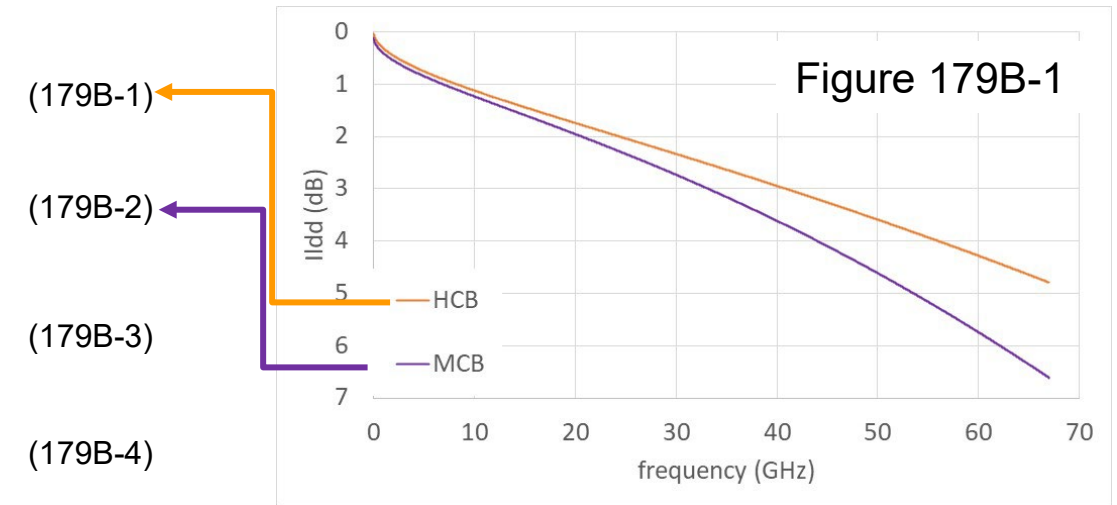
$$ILdd(f) \geq ILdd_{MTFmax}(f) = 0.1 + 0.8\sqrt{f} + 0.0055f + 0.00125f^2$$

$$ILdd(f) \geq ILdd_{MTFmin}(f) = 0.3854\sqrt{f} + 0.0455f + 0.00045f^2$$

$$ILdd_{MTFrefTF}(f) = 0.0912 + 0.6175\sqrt{f} + 0.0203f + 0.001091f^2$$

Notes:

- For (179B-1) & (179B-2) refer to healey_3dj_01_2511.pdf
- (179B-5) is the sum of (179B-1) & (179B-2)



THANK YOU

Equation Fitting for 179B

$$ILdd_{MTFmax}(f) = 0.1 + 0.8\sqrt{f} + 0.0055f + 0.00125f^2$$

$$ILdd_{MTFmin}(f) = 0.3854\sqrt{f} + 0.0455f + 0.00045f^2$$

