Reference ILdd equations for HCB and MCB

Comments #357 and #358

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Addressing these TBDs

179B.2.1 TP2 or TP3 test fixture insertion loss

The TP2 or TP3 test fixture printed circuit board (PCB) insertion loss values determined using Equation (179B–1) shall be used as the TP2 or TP3 test fixture reference insertion loss. The effects of differences between the insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements.

$$ILdd_{tfref}(f) = TBD \qquad\qquad (179B–1)$$

for $0.01 \leq f \leq 67$

where

$ILdd_{tfref}(f)$ is the test fixture PCB reference insertion loss in dB at frequency f

f is the frequency in GHz

The TP2 or TP3 test fixture PCB reference insertion loss is illustrated in Figure 179B–1.

Editor's note: Figure 179B-1 equations have not been adopted, and serve as placeholders.

Editor's note: A TP2 or TP3 test fixtures insertion loss of 3.8 dB @ 53.125 GHz has been adopted. Contributions for Equation (179B–1) to populate Figure 179B-1 are encouraged.

179B.3.1 Cable assembly test fixture insertion loss

The cable assembly test fixture PCB and test point insertion loss values determined using Equation (179B–2) shall be used as the test fixture reference insertion loss. The effects of differences between the insertion loss of an actual test fixture and the reference insertion loss are to be accounted for in the measurements.

$$ILdd_{catfref}(f) = TBD \qquad\qquad (179B–2)$$
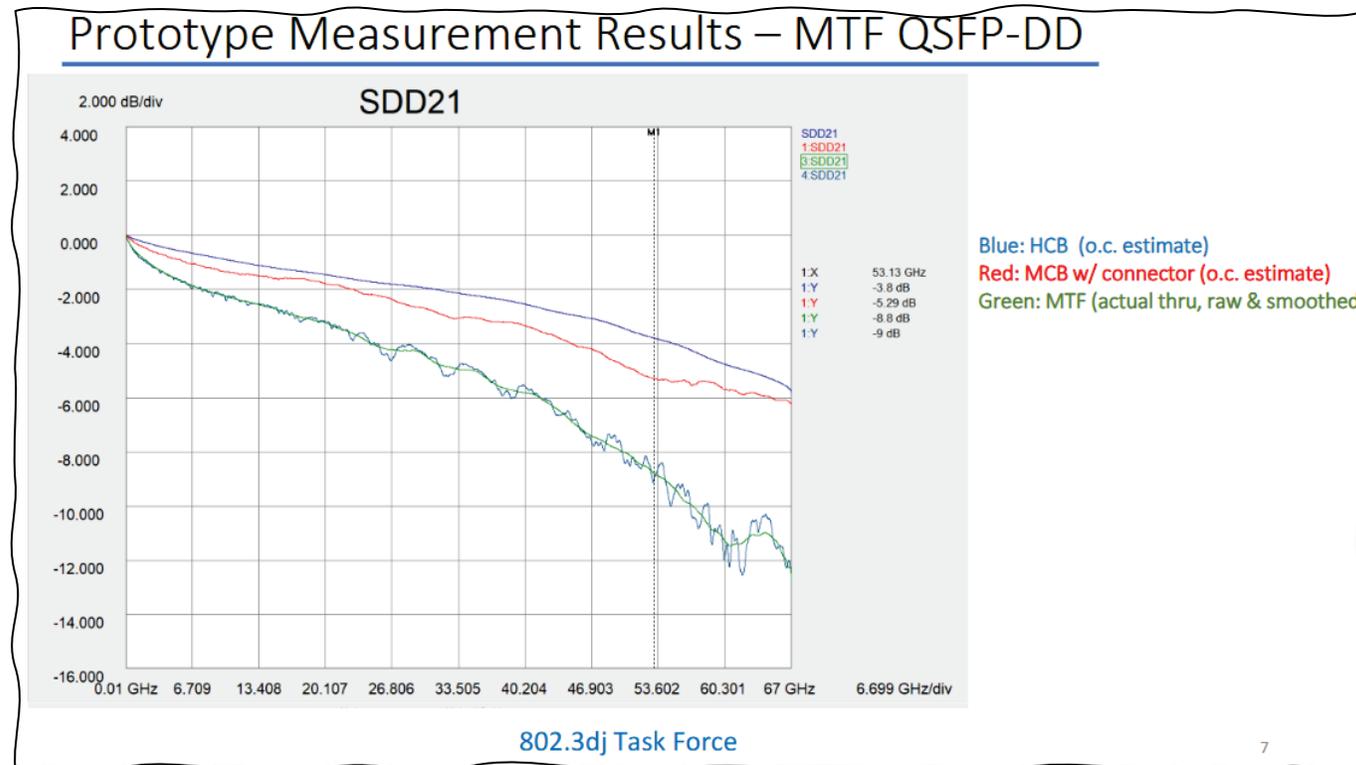
for $0.01 \leq f \leq 67$

where

$ILdd_{catfref}(f)$ is the test fixture PCB reference insertion loss in dB at frequency f
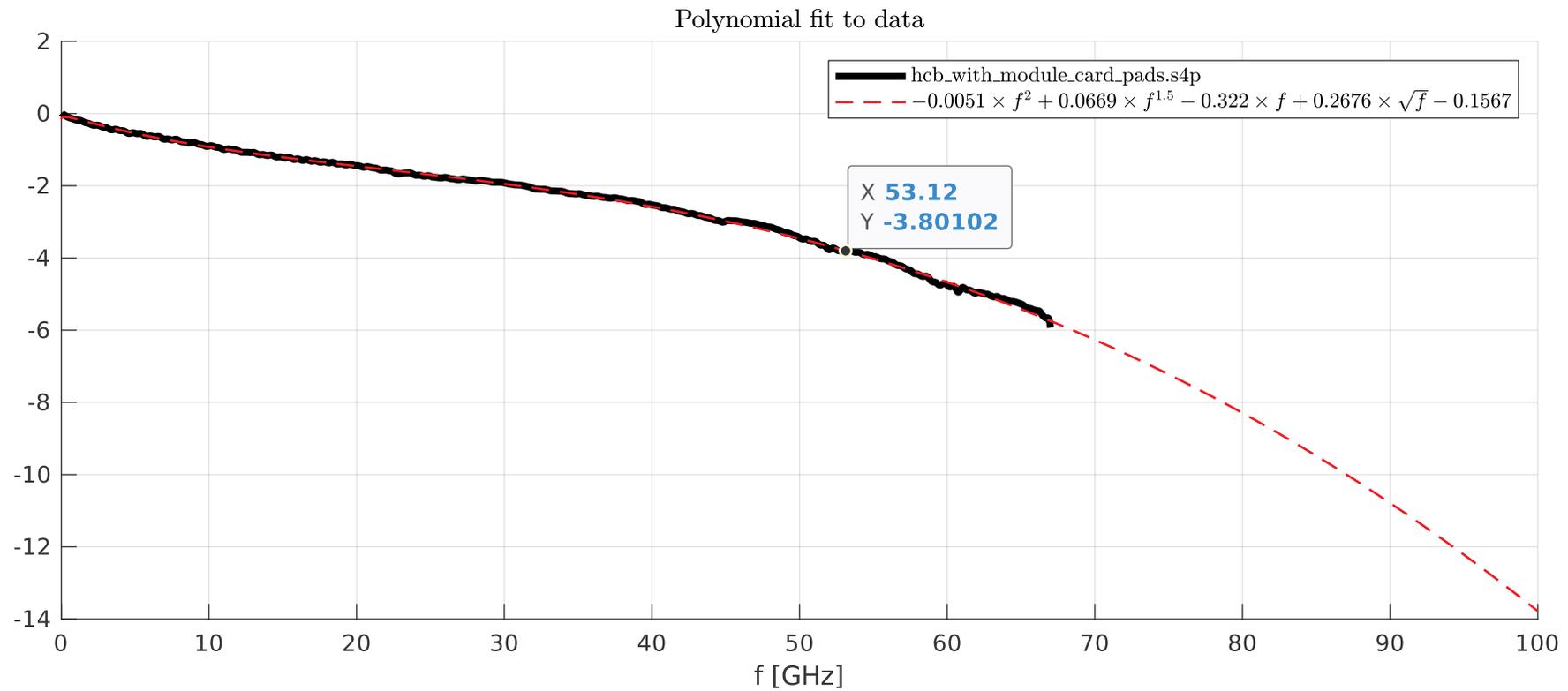
f is the frequency in GHz

Editor's note: A Cable assembly test fixtures insertion loss of 2.7 dB @ 53.125 GHz has been adopted. Contributions for Equation (179B–2) are encouraged.
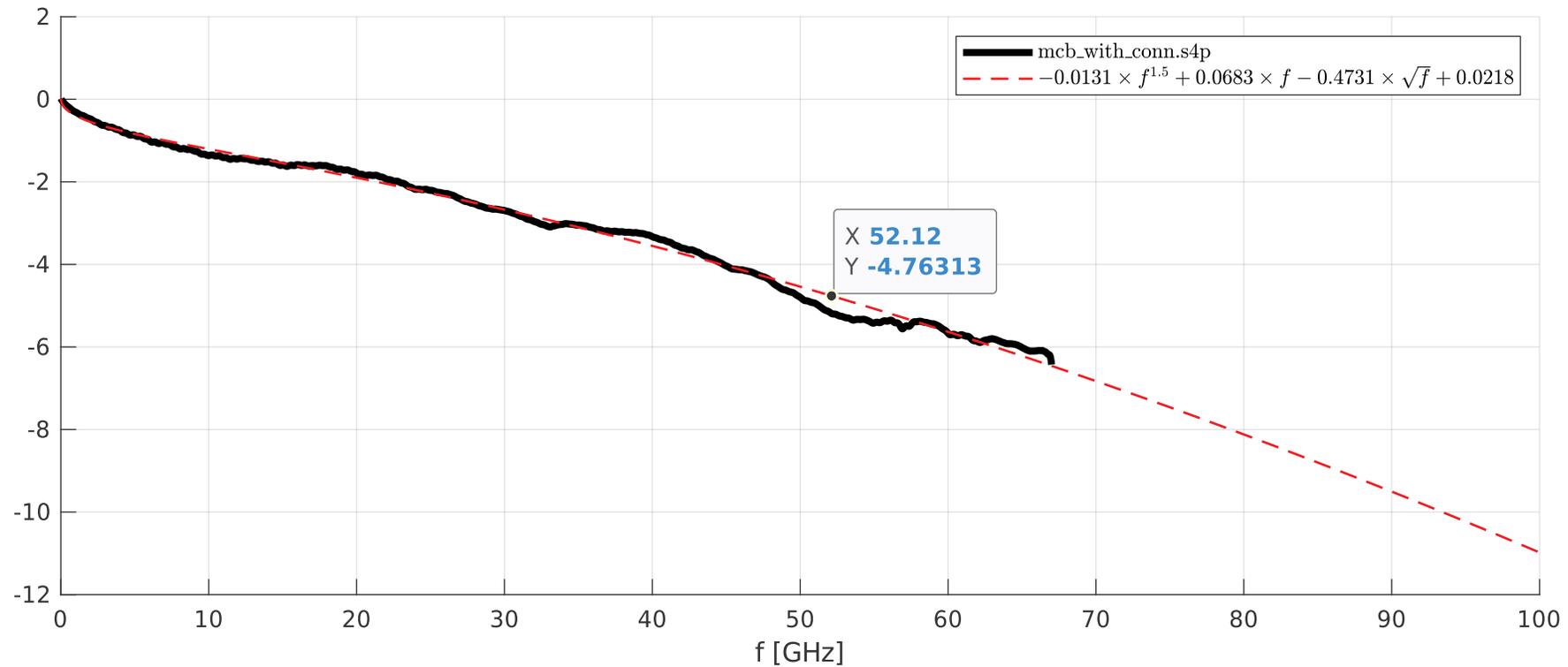
Test fixture data

- Using contributed S-parameters from sekel_3dj_02_2407
  - QSFP-DD test fixture, per slide 7 of sekel_3dj_01_2407

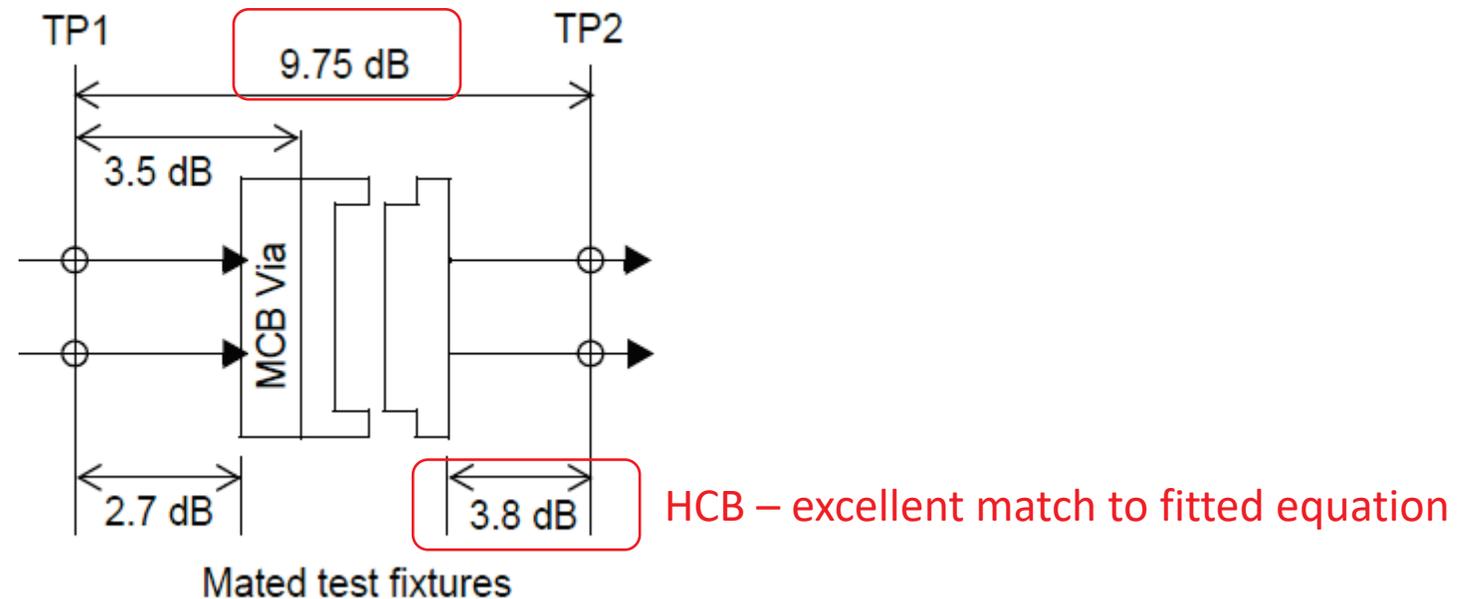# HCB fitted ILdd (polynomial in $\sqrt{f}$)

Polynomial fit to data

Legend:
- hcb_with_module_card_pads.s4p
- $-0.0051 \times f^2 + 0.0669 \times f^{1.5} - 0.322 \times f + 0.2676 \times \sqrt{f} - 0.1567$

X **53.12**
Y **-3.80102**

f [GHz]

MCB fitted ILdd (polynomial in $\sqrt{f}$)

Legend:
- mcb_with_conn.s4p
- $-0.0131 \times f^{1.5} + 0.0683 \times f - 0.4731 \times \sqrt{f} + 0.0218$

X **52.12**
Y **-4.76313**

f [GHz]

Reference ILdd values at 53.125 GHz

MCB with connector: 9.75-3.8 = 5.95 dB ? (not a good match – equation yields 4.76 dB)

Note that the measured MTF shown on slide 7 of sekel_3dj_01_2407 has ILdd of just 8.8 dB. This would make the MCB + connector become just 5 dB, to which the equation matches better.
However, no S-parameter that yield 9.75 dB were provided.

Proposal

- Replace Equations 179B–1 and 179B–2, with the equations shown on slides 4 and 5, respectively.

- Generate Figure 179B–1 accordingly.

That's all

Questions?