IEEE 802.3 dj
Test Fixture Electrical Requirements

In Support of Comment 289 Against D2.0

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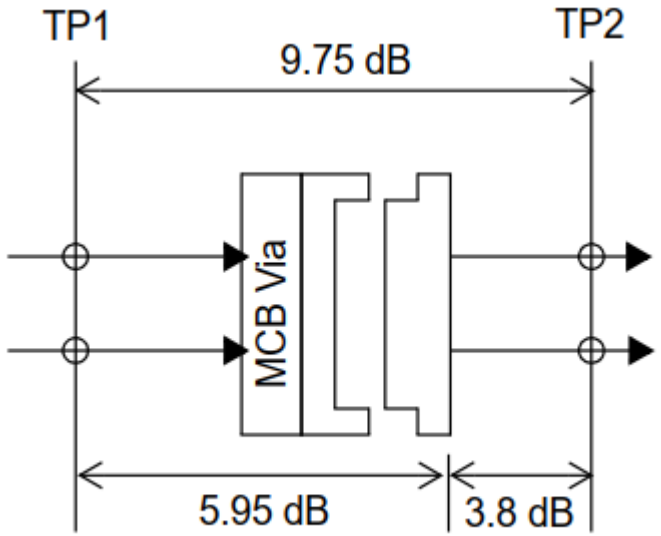
Agenda

1. Problem statement
2. Proposed solution
3. Demonstrate the MCB measurement problem
4. 2x-thru vs proposed EQ179B-2
5. Summary

Problem Statement

1. We need to independently validate/verify the MCB and HCB.
    1. Why? We could have non-compliant test fixtures passing by only looking at the mated test fixture.
    2. What's the problem with that?
        1. Non-compliant HCBs will over stress transmitters.
        2. Non-compliant MCBs can cause cable assembly false positives or negatives
2. MCBs cannot be validated on their own.
    1. Equation 179B-2 which governs MCBs cannot be verified directly, because test points do not and cannot exist at the current reference plane. The open-circuit test have too much noise.
    2. If we cannot validate their performance, we cannot "account for the difference"
    3. Since MCBs cannot be validated on their own, non-compliant HCBs could pass based on the mated test fixture requirement.

Figure 179A-1



179B.3.1 Cable assembly test fixture insertion loss

The insertion loss of the cable assembly test fixture PCB, test point, connector and any associated vias 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.

$$ILdd_{catfref}(f) = 0.016f^{1.5} - 0.0841f + 0.5829\sqrt{f} - 0.0269 \quad (179B–2)$$

where

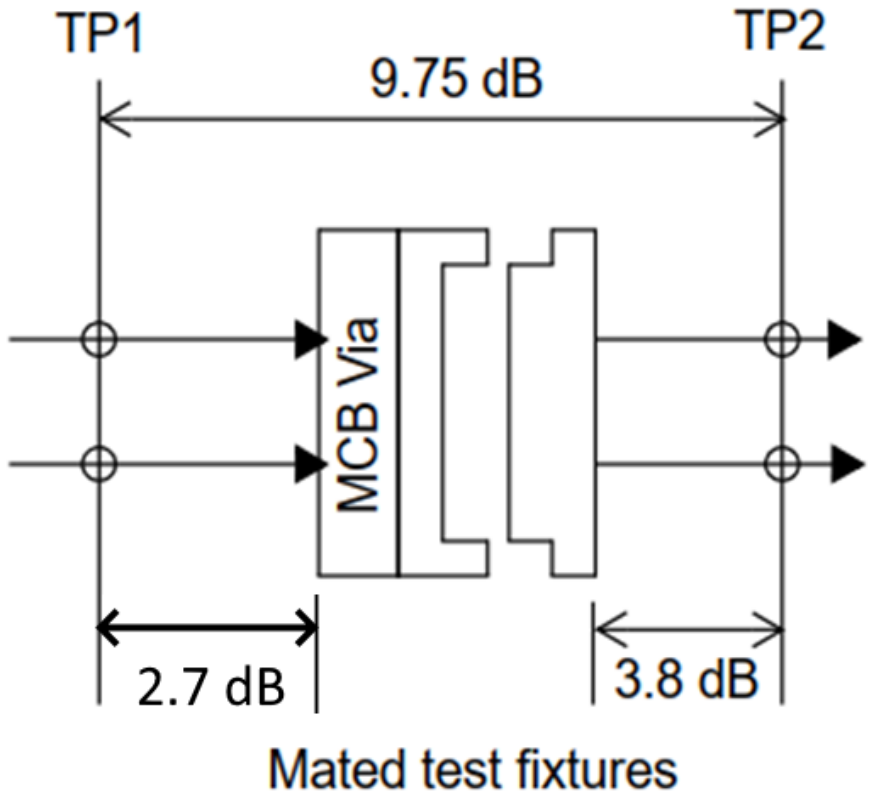
$ILdd_{catfref}(f)$ is the test fixture PCB reference insertion loss in dB at frequency f

f is the frequency in GHz

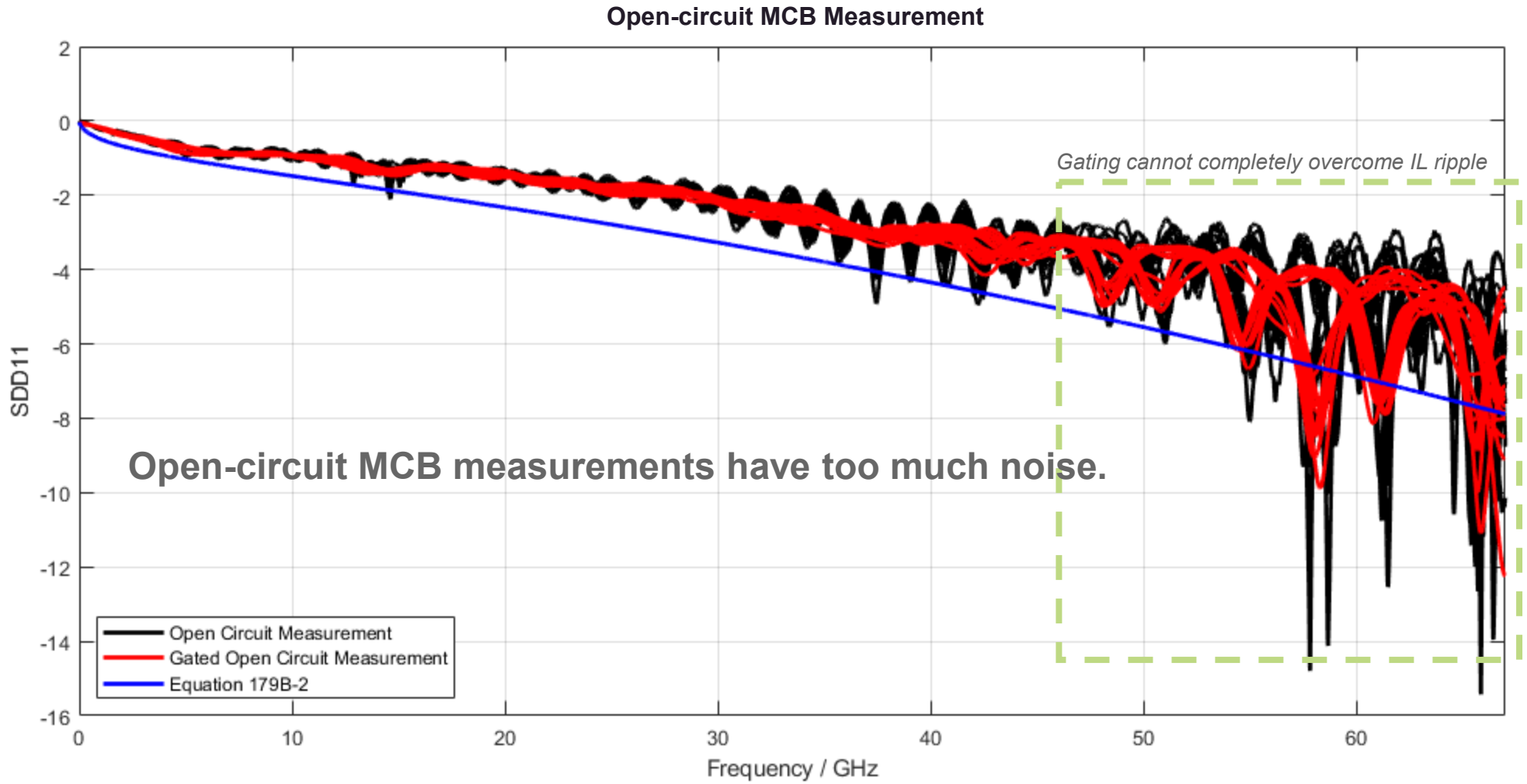
The cable assembly test fixture reference insertion loss is illustrated in Figure 179B–1.

Proposed Solution

1. Add 2.7 dB informative reference back to what it was in Draft 1.4 (Figure 179A-1).
    1. This provides a loss target for MCB designers
2. Change 179B-2 to exclude the connector and only represent the test point and the transitional media up to the connector.
    1. Equation: $IL_{catfref} = -0.0067f^{1.5} + 0.0309f - 0.2523\sqrt{f} + 0.0868$
    2. This provides a loss target for MCB designers
    3. This reference plane can be directly verified in measurement.
3. HCBs and MCBs are validated using 2x-thrus and equations 179B-1 and 179B-2
4. The connector on the MCB is validated using the mated test fixtures.

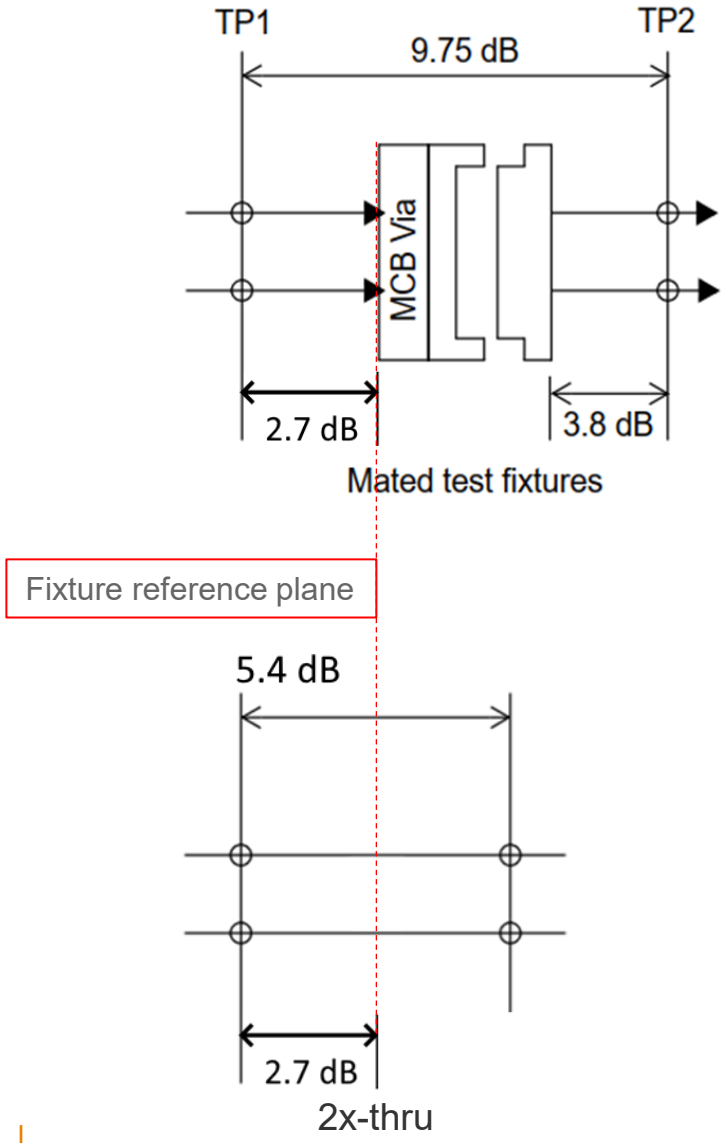


Demonstrate the MCB measurement problem

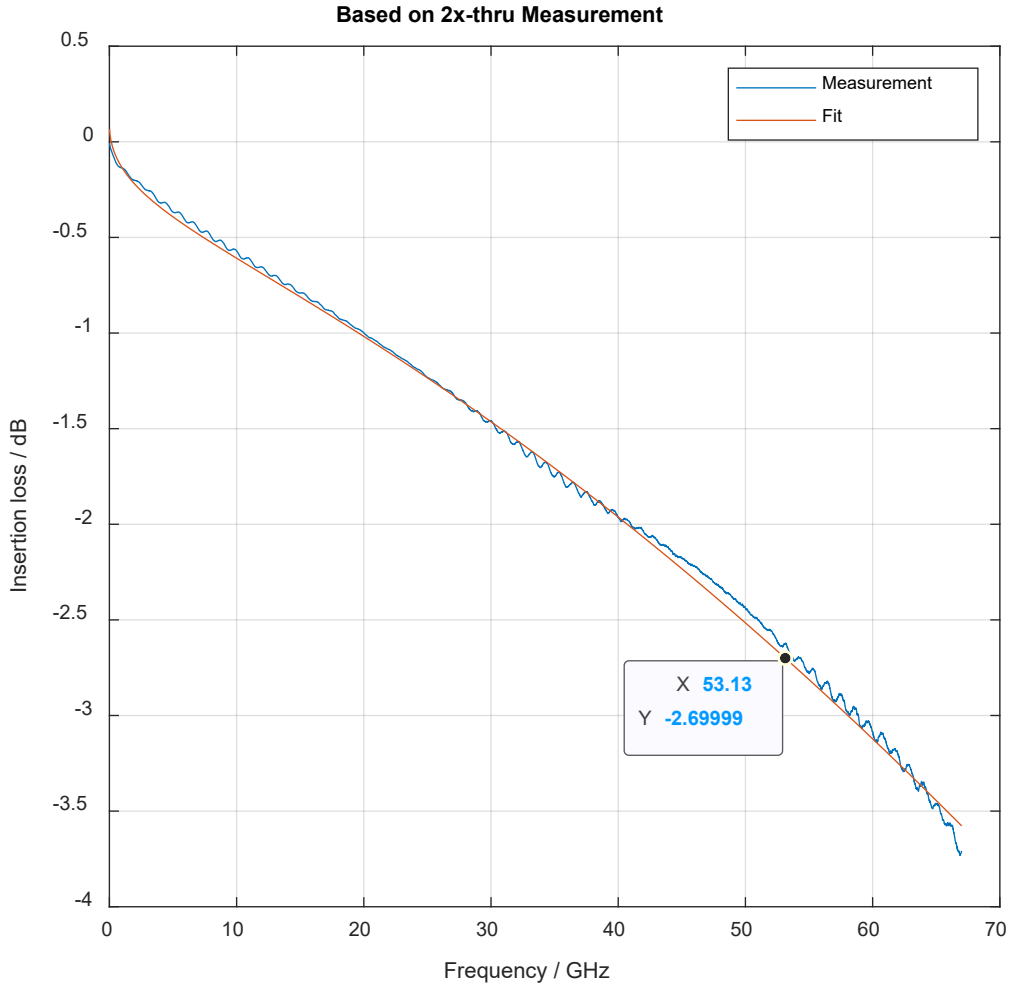


Low loss MCBs could allow non-compliant HCBs to pass the MTF limits without accounting for the difference between MCB loss and Equation 179B-2. Non-compliant HCBs would over-stress transmitters

2x-thru/2 Vs. Proposed Reference Line

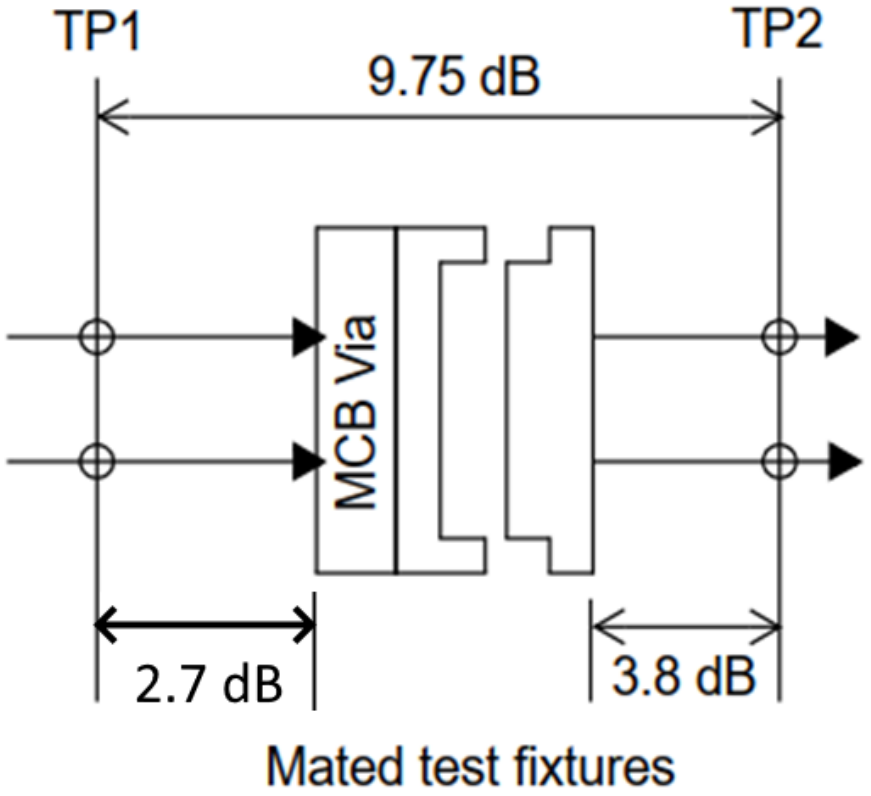


$$IL_{catfref} = -0.0067f^{1.5} + 0.0309f - 0.2523\sqrt{f} + 0.0868$$



Summary

1. Add 2.7 dB informative reference back to what it was in Draft 1.4 (Figure 179A-1).
    1. This provides a loss target for MCB designers
2. Change 179B-2 to exclude the connector and only represent the test point and the transitional media up to the connector.
    1. Equation: $IL_{catfref} = -0.0067f^{1.5} + 0.0309f - 0.2523\sqrt{f} + 0.0868$
    2. This provides a loss target for MCB designers
    3. This reference plane can be directly verified in measurement.
3. HCBs and MCBs are validated using 2x-thrus and equations 179B-1 and 179B-2.
4. The connector on the MCB is validated using the mated test fixtures.
5. We are contributing S-parameters for the measured MCB.



Mated test fixtures