Considerations of Technical Feasibility for Mated Compliance Fixtures

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References

- Short channel model from 802.3df (akinwale_3df_01_20220502)

Objective of this Contribution

- Show technical feasibility of continuing the use of an HCB/MCB-based test methodology for 224 Gb/s per lane compliance (802.3dj)
  - Demonstrating compliance fixture design which can emulate loss of a short C2M channel

- This contribution will not address:
  - Required minimum bandwidth for channel characterization & compliance test
    - (1.85 mm versus 1.00 mm connectors for TP1, TP1a, TP4, TP4a)
  - Test fixture impedance
    - (92 Ω versus 100 Ω)

Methodology

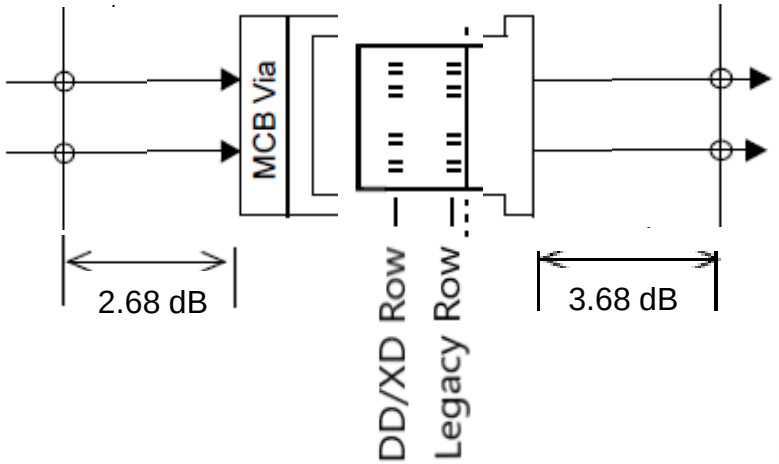
- As with 802.3ck, and previous projects, the IL of mated compliance test fixtures (MTF) for 802.3dj will be designed to emulate the shortest channels from the group of contributed channel models
  - Module receiver stressed input test will continue to test with MCB only for short channel test and MCB + Frequency Dependent Attenuator for longer channel test

- Short channel model selected was contributed by Femi Akinwale, et. al to the 802.3df Working Group (akinwale_3df_01_20220502)
  - IL is 10.32dB at 53.125 GHz

- MTF IL target to be agnostic to MDI form factor
  - OSFP, QSFP-DD, OSFP-XD were considered for this exercise

Proposed MTF Topology

- Dual-row form factors (-DD & -XD) have additional trace length beyond the legacy reference plane
  - Up to 6.5mm trace length ≈ 0.50 dB @ 53.125 GHz



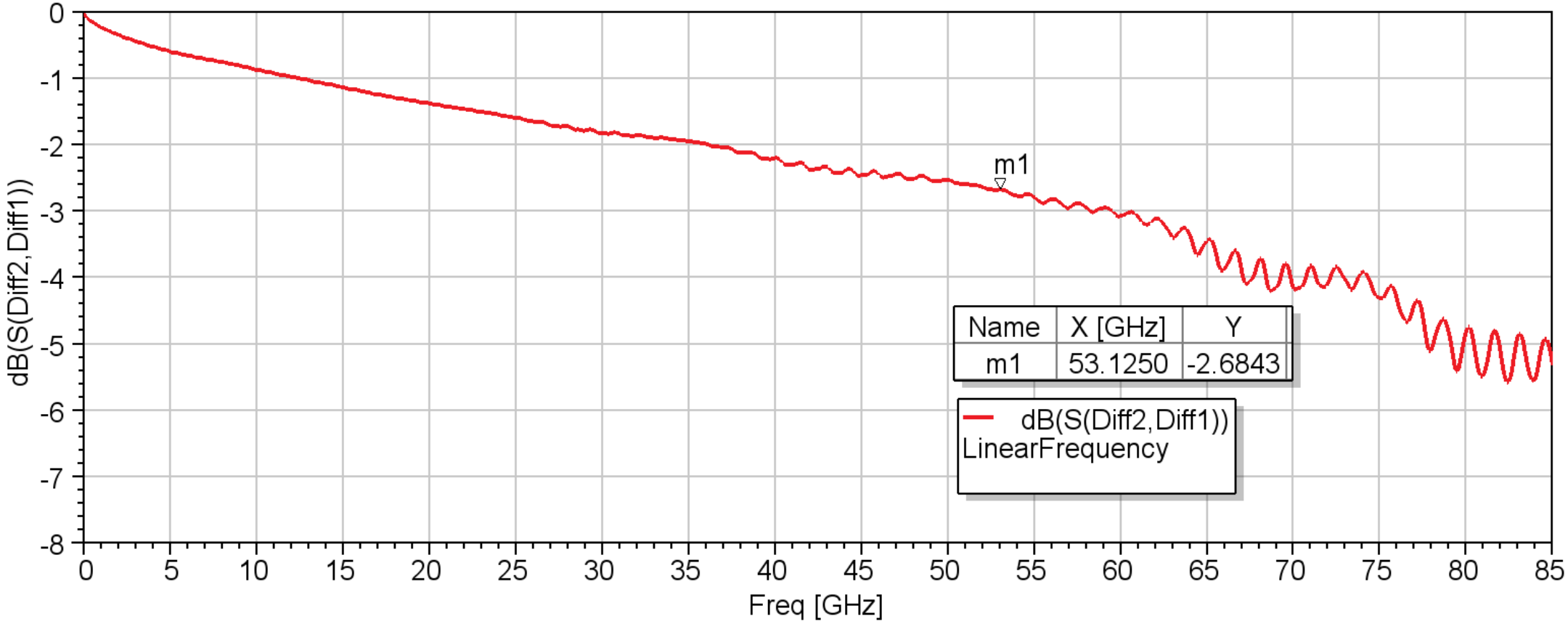
MCB PCB *ILdd* includes the RF connector (up to the RF connector reference plane)

MCB via allowance is 0.45 dB

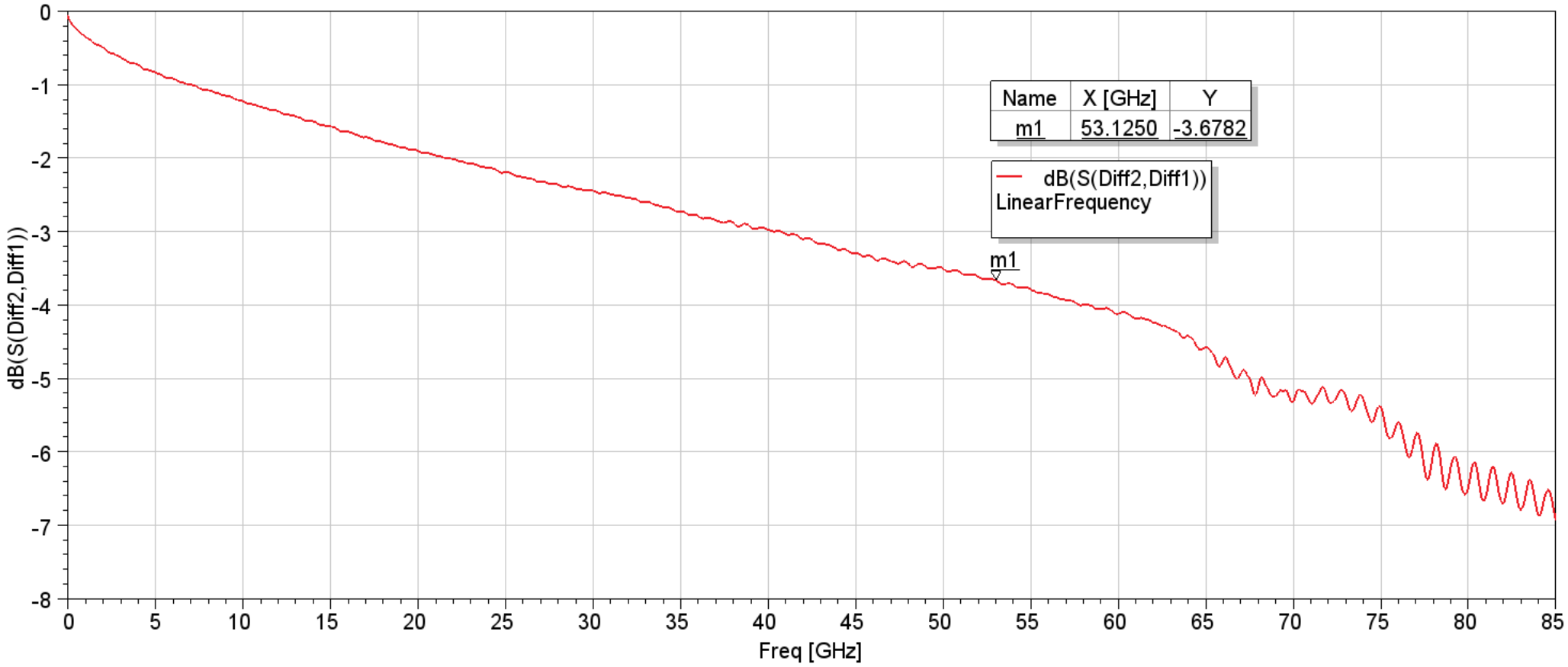
Preliminary Fixture Design

- Practical design of 224 Gb/s per lane HCB/MCB have been completed
  - Detailed simulations of complete fixtures, including MCB connector have been completed (summary of results on following slides)
  - Prototype completion and characterization expected by mid-December
- Resulting IL budget at 53.125 GHz
  - MTF: 9.31 dB, MCB: 2.68 dB, HCB: 3.68 dB
  - Design characterized to 85 GHz
- Note: Design simulations show good return loss characteristics

Simulation Results: MCB only



Simulation Results: HCB only



Simulation Results: MTF IL

- Total Mated Test Fixture Insertion Loss breakdown at 53.125 GHz:

Simulated Module Connector Loss (all MDI): 2.00 dB
HCB Loss Allocation: 3.68 dB
HCB DD/XD Row Trace Lead-In: 0.50 dB
MCB Loss Allocation: 2.68 dB
MCB Via Allowance: 0.45 dB

Total Mated Test Fixture Insertion Loss: 9.31 dB (*8.81 dB*)

Conclusions and Next Steps

- Simulation of detailed 224 Gb/s HCB/MCB designs support technical feasibility of implementing an MTF below the total channel loss for the shortest channel model

- Next Steps:
  - Validate simulations with measurements from prototypes
  - Propose plots for MTF IL reference and provide equations for min/max limits
  - Propose requirements and equations for ERL, SCD21 (skew), ICN, etc.