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Demonstrated implementation feasibility of suggested 224G C2M test fixture loss with measurement data

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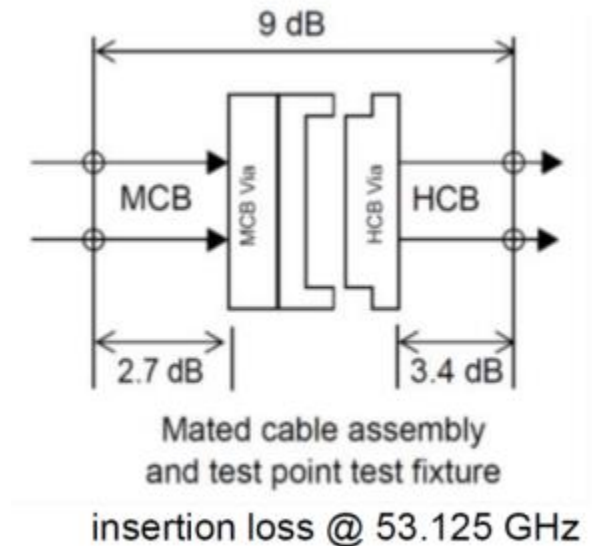
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 - Sam Kocsis, Amphenol Corporation
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 - John Calvin, Keysight Technologies
 - Sam Kocsis, Amphenol Corporation
- References:
 - Considerations for CR Insertion Loss Budget Baseline: Cable Assemblies and Test Fixtures (diminico_3dj_01_2311)
 - Considerations of Technical Feasibility for Mated Compliance Fixtures (kocsis_3dj_01_2311)

Intent

- Follow up previous simulation backed contributions recommending IL budget (diminico_3dj_01_2311) for mated compliance test fixtures with measurement data from prototypes.

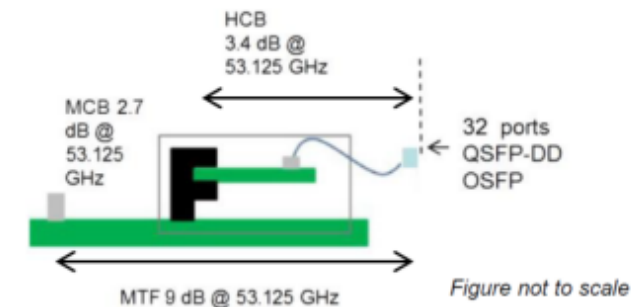
Design Guidelines

- IL Targets presented in diminico_3df_01_220502:
 - MCB: 2.7 dB*** **HCB: 3.4 dB**
 - *Voted on: MCB TP1-TP4a IL
- Agnostic to module form factor
 - QSFP-DD selected as is worse case over OSFP
- MCB and HCB break out all HS lanes in single fixture
 - Need to access all lanes for NEXT/FEXT insertion during Rx and Tx measurements



Component	Insertion Loss (dB)
Module Compliance Board (MCB) PCB - 2" of ~1.35 dB/in	2.7
Host Compliance Board (HCB) - 1inch*1.35dB/in + 6inch coax * .28dB/inch + 0.5dB via and co-ax transitions.	3.4
Mated Test Fixture (MTF)	9
MTF connector + 2 via's	2.9

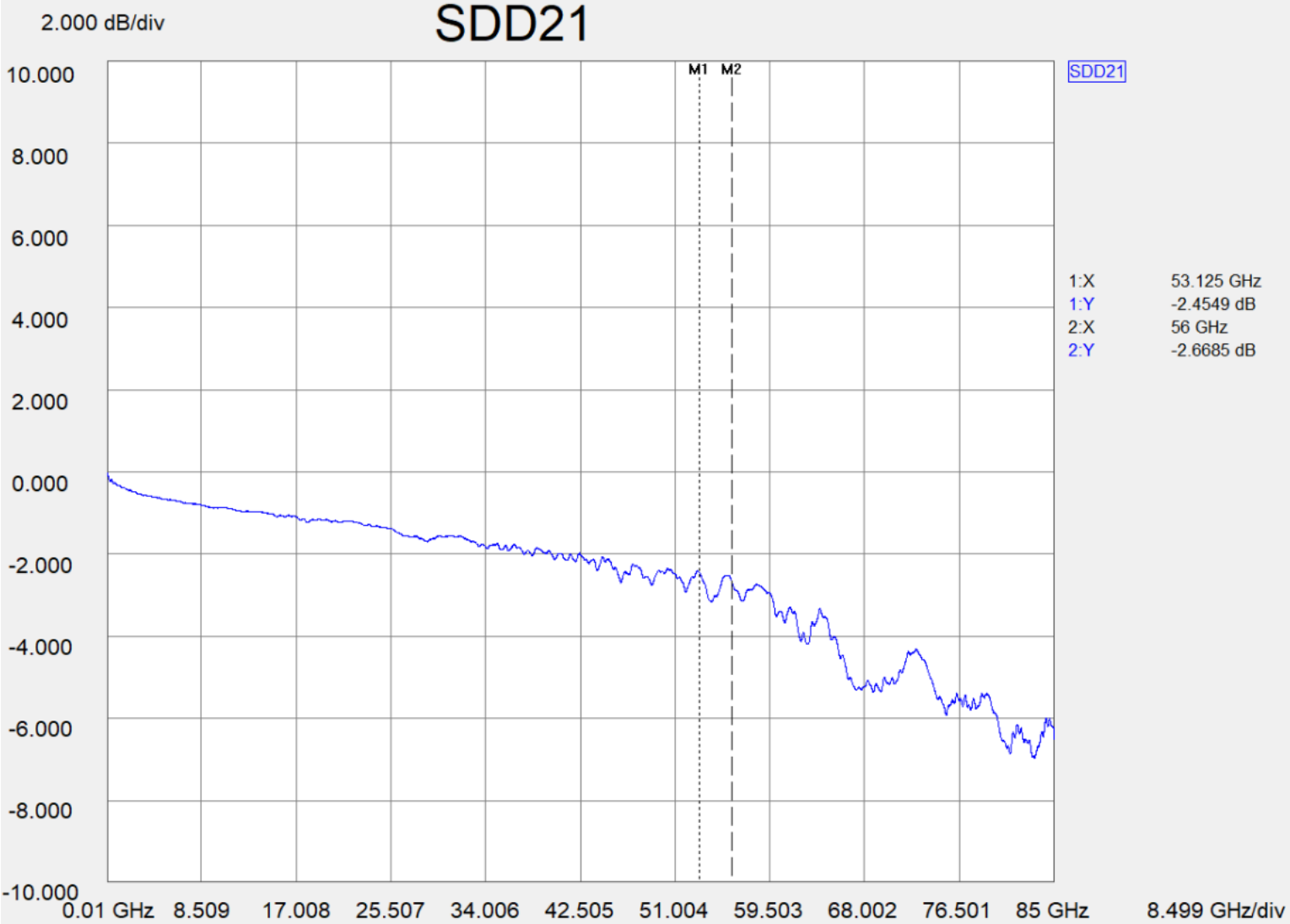
Mated test fixture and host insertion loss allocations @ 53.125 GHz



Prototype construction and measurement

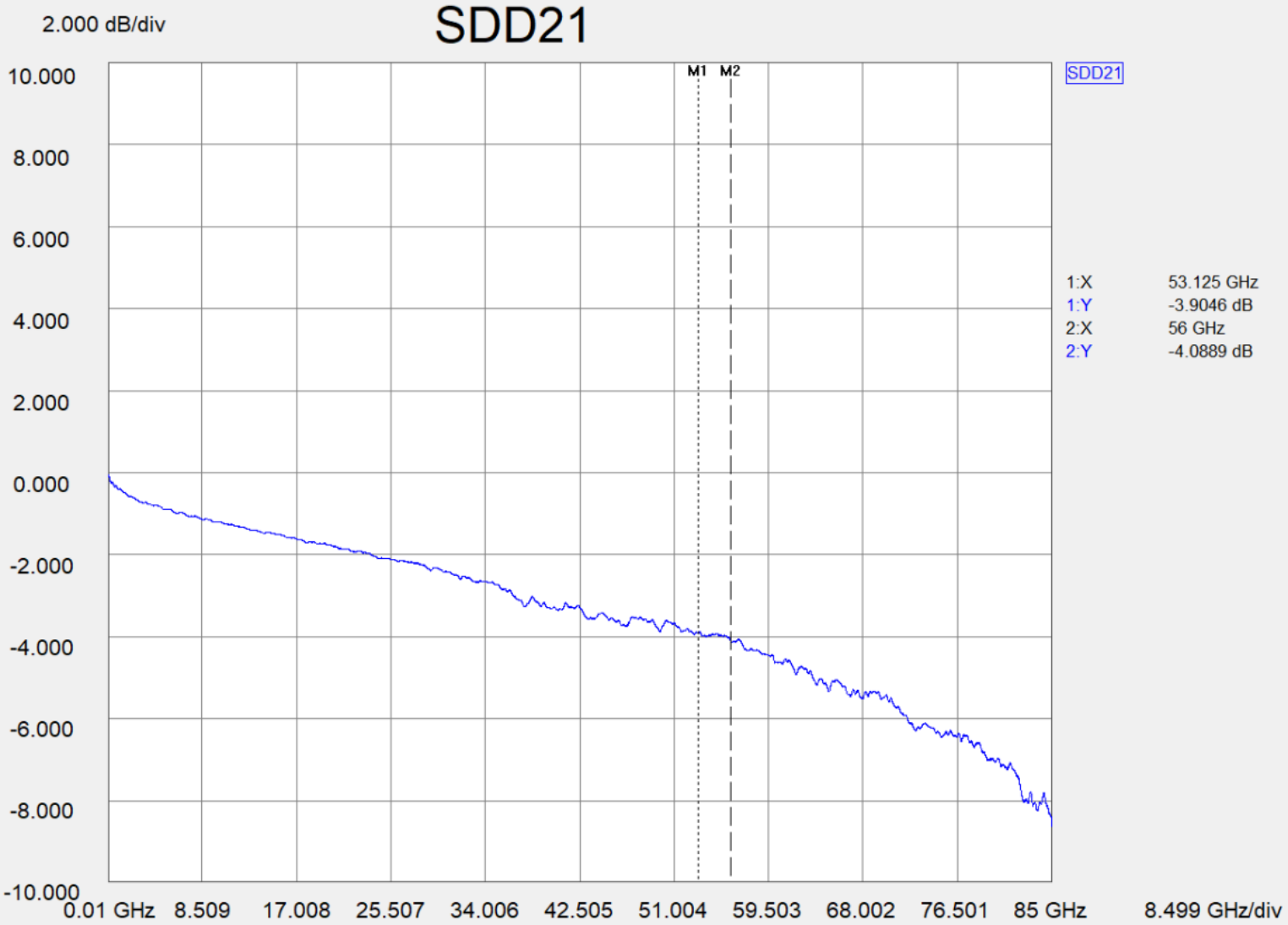
- Complete electrical and mechanical designs for 224G/lane MCB and HCB QSFP-DD fixtures were simulated
- MCB and HCB were prototyped and characterized
 - Fixtures designed and built with 1 mm F RF coax connectors
 - Measurements characterized to 85 GHz
- MCB characterized without module connector
 - W/o connector measurements were made by probing to, but excluding connector pads
- Measurement data for HCB and MCB correlate well with simulation prediction

MCB (Fixture only w/o connector)



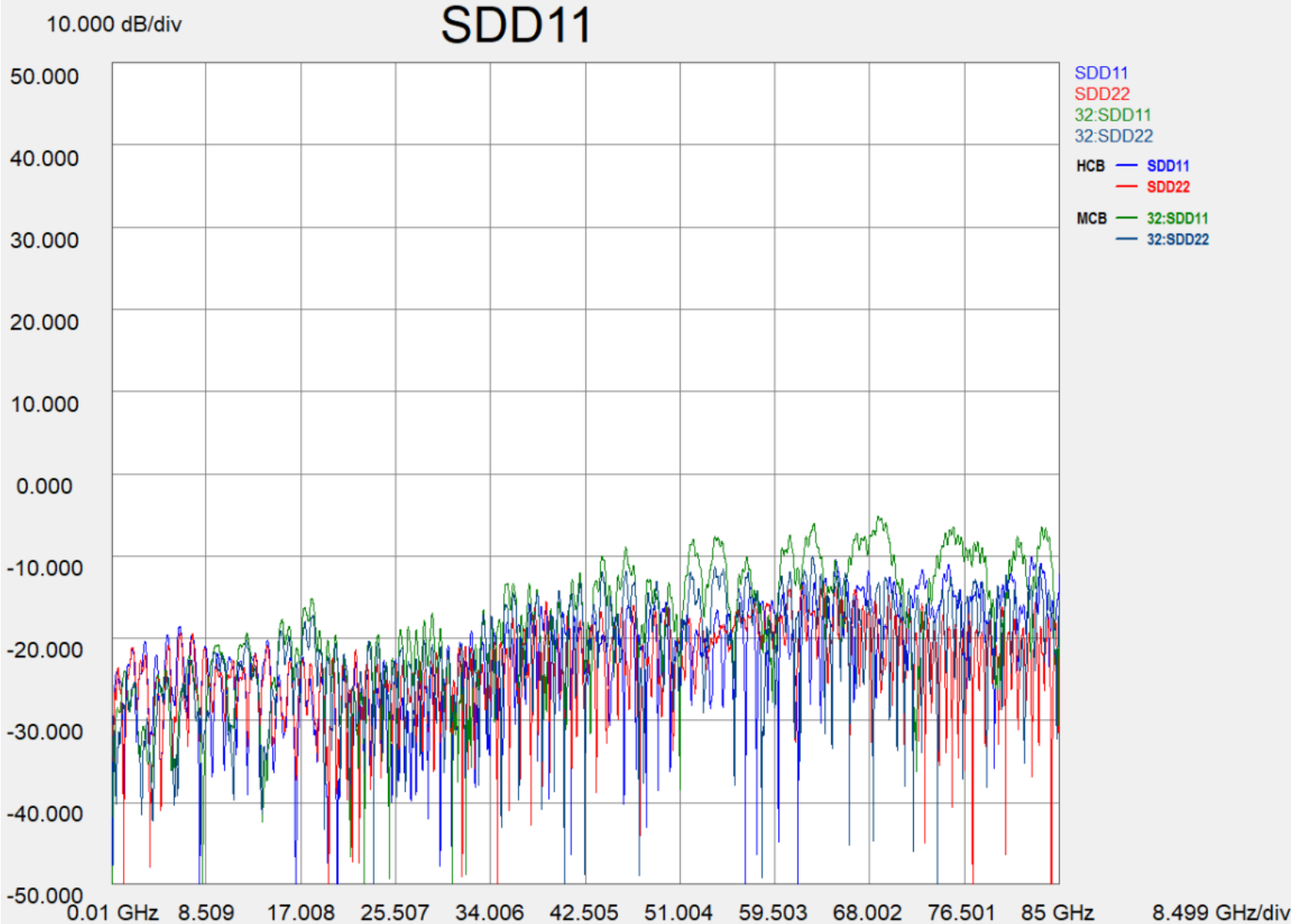
IL: 2.46 dB @ 53.125 GHz

HCB



IL: 3.905 dB @ 53.125 GHz

MCB and HCB RL



Summary and Conclusion

- Measurement data for HCB and MCB correlate well with simulation prediction
 - Need more work before presenting MTF measurement
- Simulation and measurement demonstrate 2.7 dB IL target for MCB is achievable, agnostic to module form factor
- Simulations and measurements demonstrate 3.4 dB IL Target for HCB is tight
 - May be possible to achieve with additional work / fixture tuning
 - Suggest relaxing target by 0.5 dB to 3.9 dB for practical fixture implementation
- RL measurement shows reasonable results