

MDI connector insertion loss

Thomas Müller, Michael Angerbauer

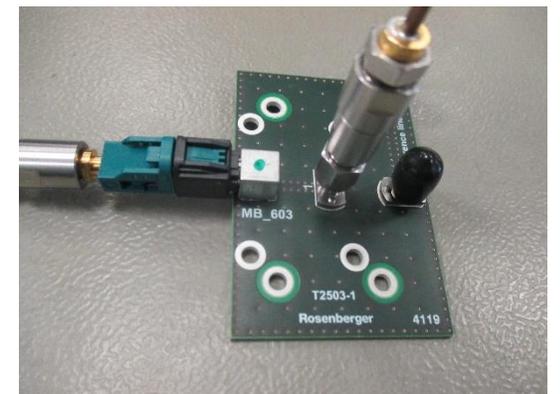


Scope

- Insertion loss of electrical RF transmission links is increasing with frequency due to resistive and dielectric losses
- This applies to the link segment (cabling) as well as the MDI (PCB and components)
- To define insertion loss requirements and test points for the MDI, it is necessary to clarify what the typical insertion loss of typical automotive coaxial and differential connectors are.

Measurement setup

- Automotive PCB connectors with measurement fixture and de-embedding structure (2 x Thru)
- Pair of precision measurement adapter (plug/socket) to measure from cable side
- Frequency range of up to 12 GHz
- Network analyzer with test cables and calibration kit
- Coaxial connector based on HFM interface (to be standardized in USCar)
- Differential connector based on H-MTD interface (open)



Measurement procedure

De-embedding with calibration structure on the PCB connector measurement fixture and a mated pair of precision adapters.

1. 2 x Thru of PCB traces (2 x fixture 1)



2. 2 x Thru of cable connector precision adapters (2 x fixture 2)



3. Overall (1 x fixture 1 + DUT + 1 x fixture 2)



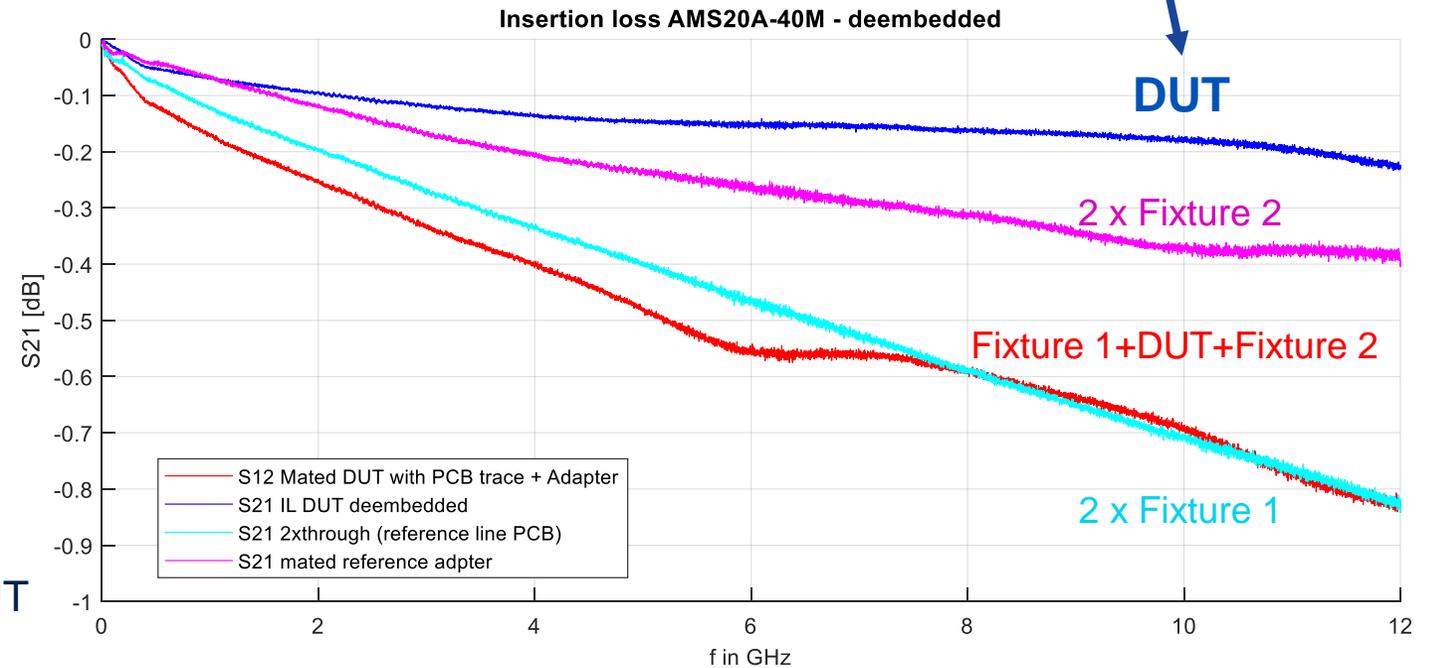
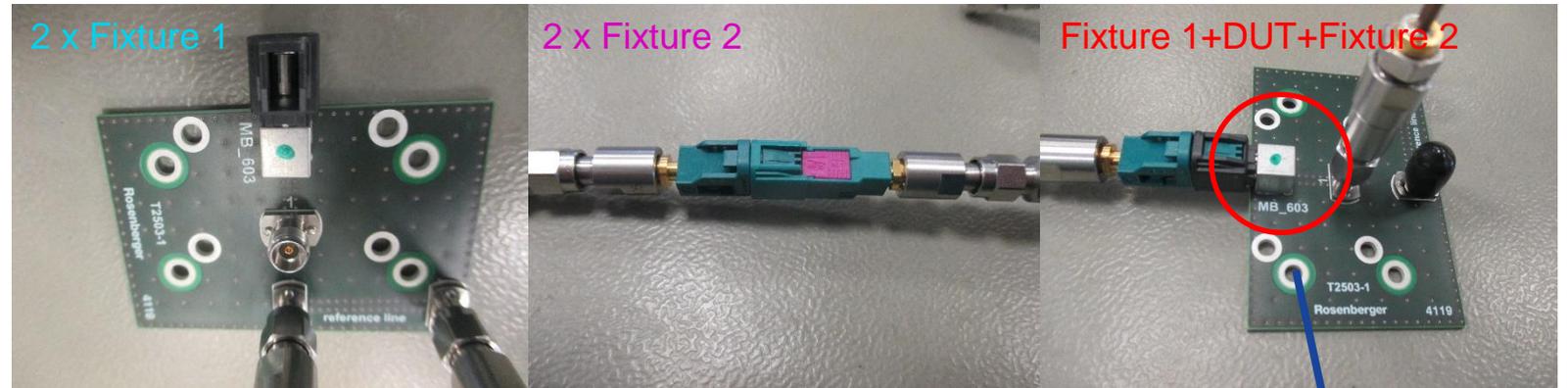
4. In-situ de-embedding removes fixtures 1 and fixture 2 from overall to get DUT as result



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Measurement results

Coaxial connector

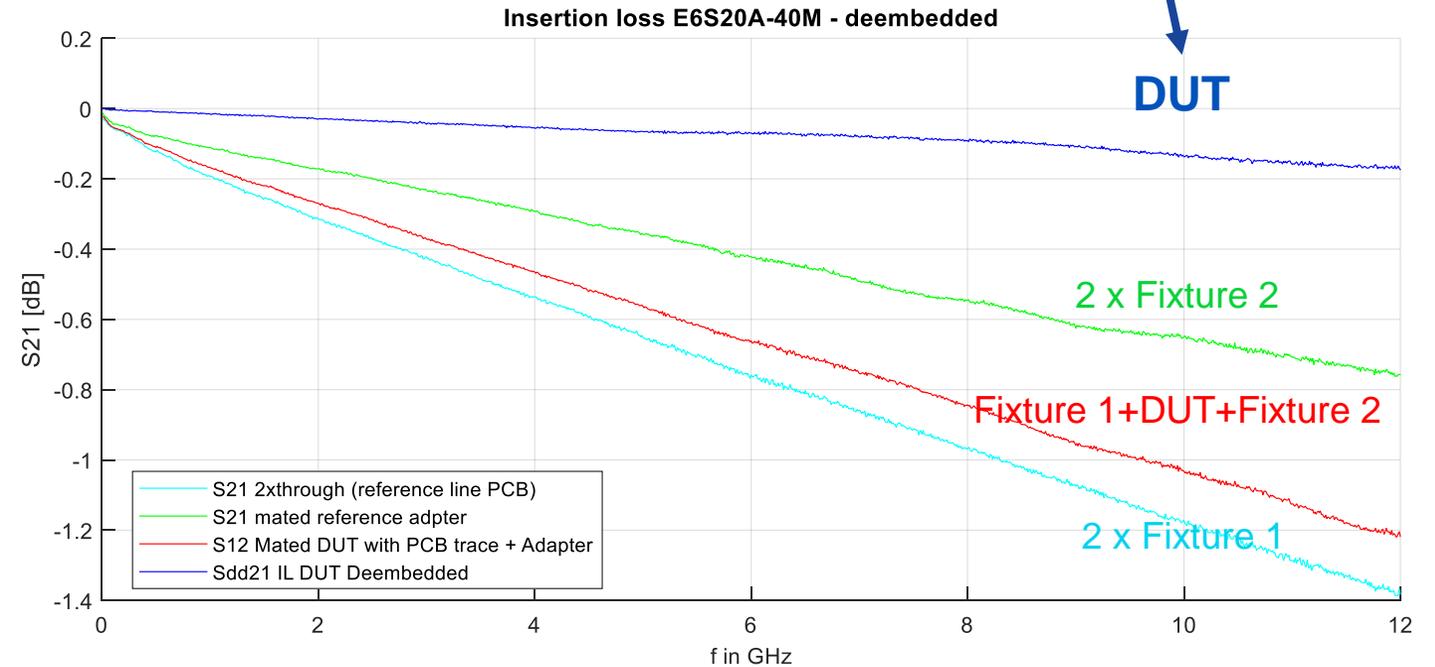
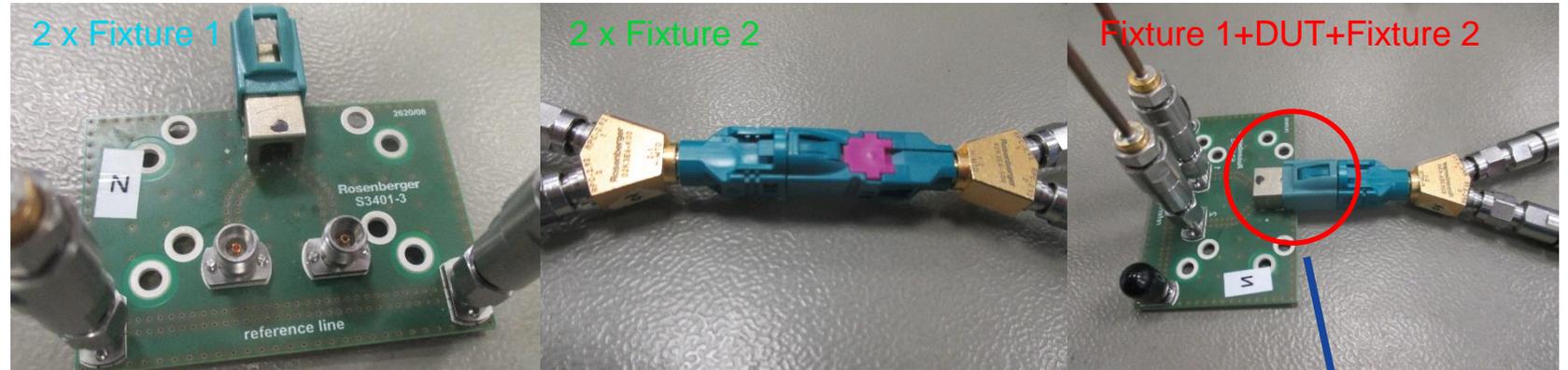


Remark:

2 x fixture 1 shows PCB calibration line without DUT

Measurement results

Differential connector



Conclusion

- The insertion loss of an automotive coaxial or differential MDI connector is in the range of 0.2 dB @ 10 GHz.
- The provided measurement results shall help to define an appropriate MDI insertion loss requirement.
- The insertion loss of the MDI connector is small in comparison to the link segment (cabling) and the MDI PCB traces.
- Recommendation is not to specify a complementary MDI connector insertion loss limit.