# PoDL for NGAUTO: Demonstration of Feasibility

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Overview

- For NGAUTO, media other than balanced twisted-pair may be used

- Clause 104 currently defines PoDL for use with 100BASE-T1 and 1000BASE-T1 on single balanced twisted-pair media
  - Link segment definitions in Clause 104 do not rely on the fact that it is a balanced twisted-pair
  - Any two-conductor media meeting the loop resistance would suffice

- Technical feasibility of PoDL with NGAUTO on other than UTP is shown

NGAUTO PoDL Test Fixture
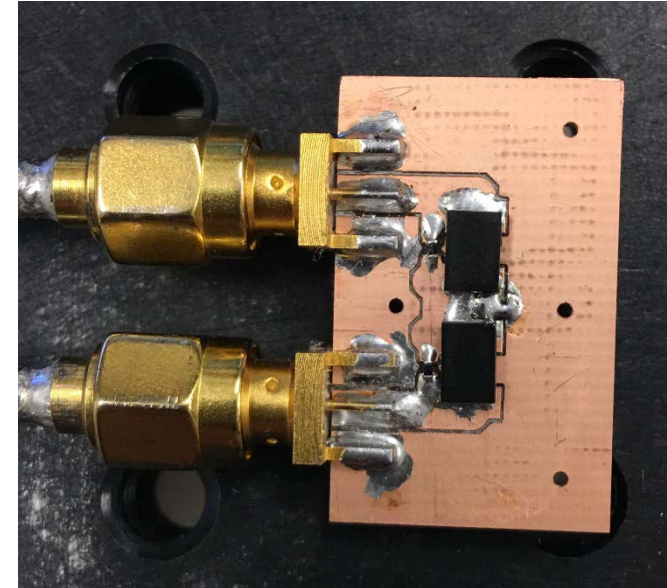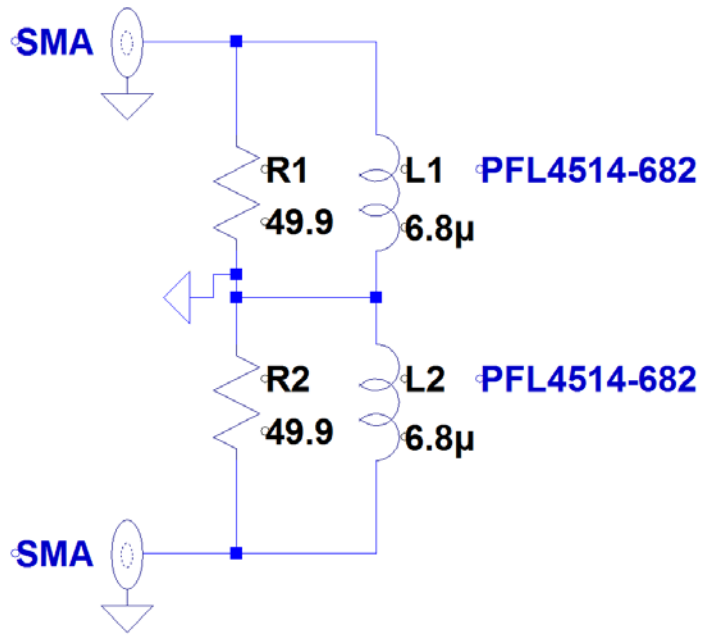
- Used off-the-shelf inductors from an established magnetics vendor
- No attempt was made to add common mode impedance in series with inductors L1/L2 in order to limit mode conversion resulting from mismatch
- Inductors have ~0.9A ampacity which is limited by self-heating resulting from 0.4 Ω DCR (typ)

NGAUTO PoDL Test Fixture Mode Conversion Loss

- Low frequency mode conversion is a function of inductor OCL matching

- -46dB sdcc11 at 1MHz is consistent with 1.1% mismatch between the two inductors used in the test fixture

- ±20% inductor tolerance will yield -48dB sdc11 at 60MHz

- A PoDL CMC could be used to suppress low frequency sdc11 for mismatched inductors at increased solution cost and complexity

sdc11

reference, post measurement
reference, post cal
Test fixture sdc11
40GBase-T MDI limit
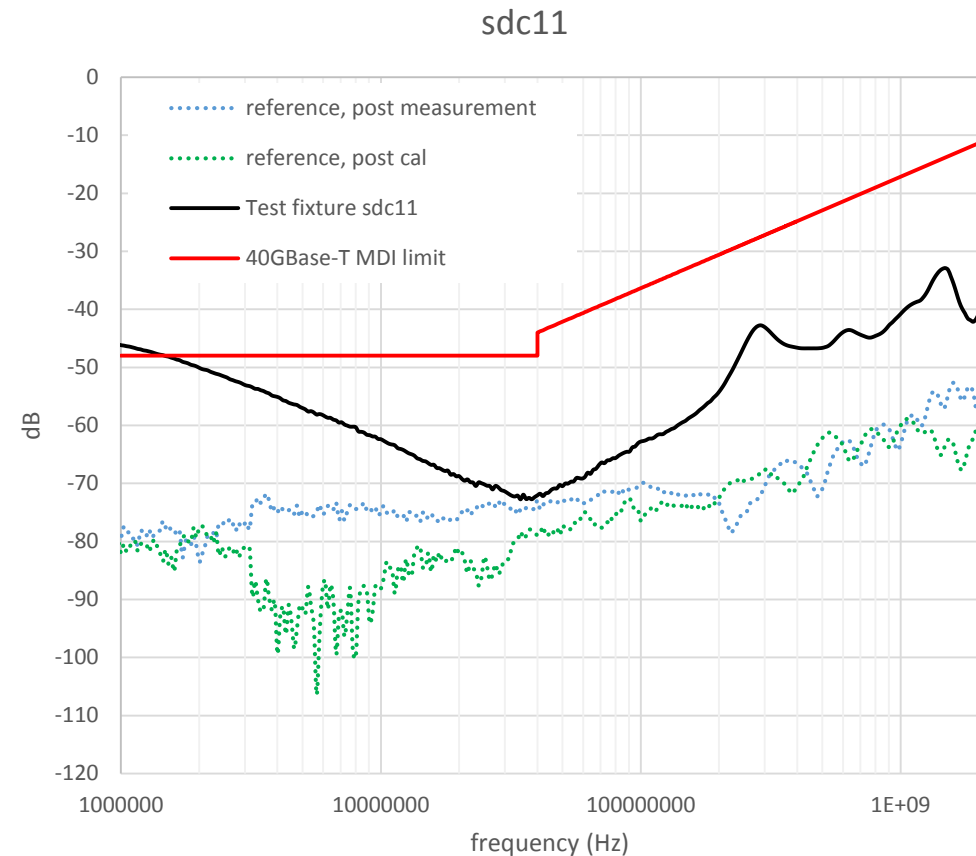
frequency (Hz)

NGAUTO PoDL Test Fixture MDI Return Loss

- Low frequency sdd11 is limited by inductor's 6.8µH OCL.

- High frequency sdd11 is limited by inductors self-resonant frequency

- 6.8µH OCL was selected to meet the 40GBase-T transmitter droop specification with 20% margin instead of the MDI sdd11 limit at 1MHz

sdd11
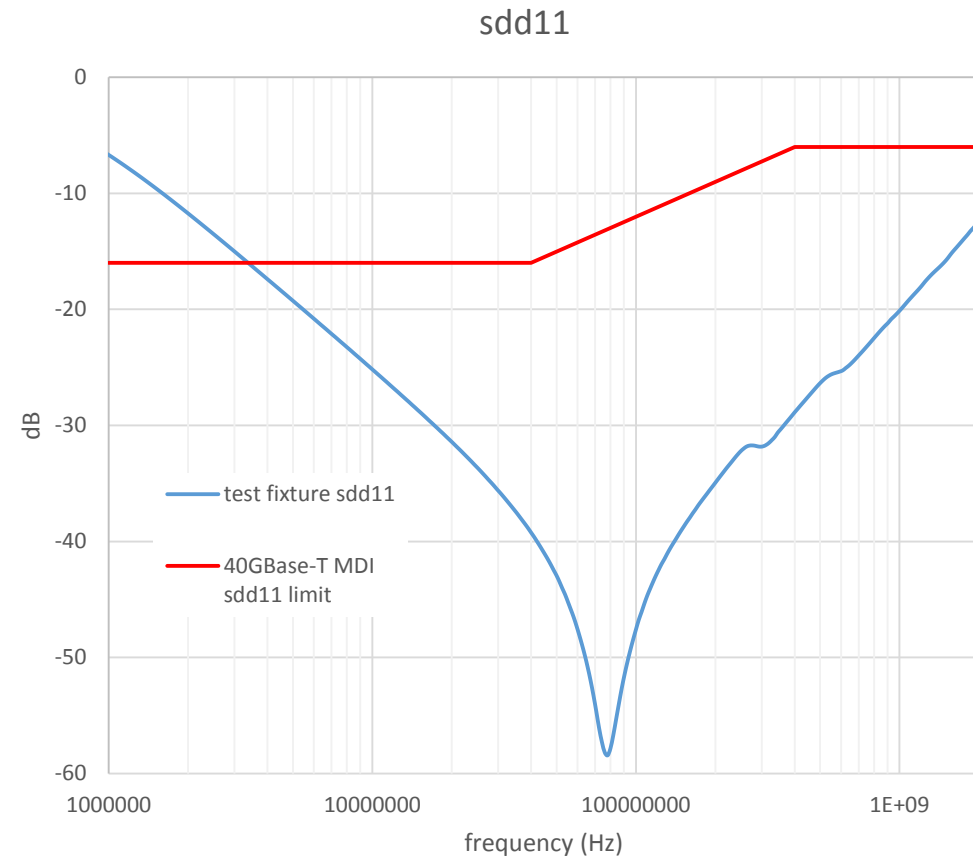
Conclusions

- PoDL for UTP is challenging because of the simultaneous MDI return loss, MDI mode conversion loss, and application ampacity requirements

- PoDL for NGAUTO STP or FTP is feasible for a simple power coupling network if the MDI sdc11 low frequency limit can be relaxed from that in 40GBase-T to -48dB at 60MHz
  - Otherwise a PoDL CMC or well matched inductors are required

- If the 40GBase-T transmitter droop requirement is the only constraint on PoDL inductor OCL, off-the-shelf 6.8uH inductors with 0.9A ampacity can meet the 40GBase-T MDI sdd11 limit above 4MHz

Proposed Objective

- Support optional Clause 104 power over data lines on appropriate media