

A decorative graphic consisting of numerous thin, blue, wavy lines that flow from the left side of the page towards the right, creating a sense of motion and depth.

RETURN-LOSS SPECIFICATION PROPOSAL FOR 100BASE-T1 PoDL

Version 1.0, March 6, 2015

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IEEE 802.3bu
Berlin, March 2015

INTRODUCTION



A PoDL-coupling circuit must meet very challenging requirements in 100BASE-T1 applications. The main problem is meeting the currently defined RL specification at the low-frequencies, for which the total inductance would have to be relatively very large (100uH-200uH).

Moreover, the minimum required inductance must be met at all operating conditions – including the maximum DC-current bias and temperature.

Achieving that inductance and at the same time keeping the inductor size and the current-rating within required limits may not be possible in many cases where size is at premium.

If the current specification for RL must be fully met for PoDL applications, it is clearly going to severely limit possible applications of the PoDL technology with 100BASE-T1.

A careful consideration of the requirements is necessary, to see if adjustments are possible to enable PoDL applications where size and current-rating are hard or impossible to meet.

APPROACH

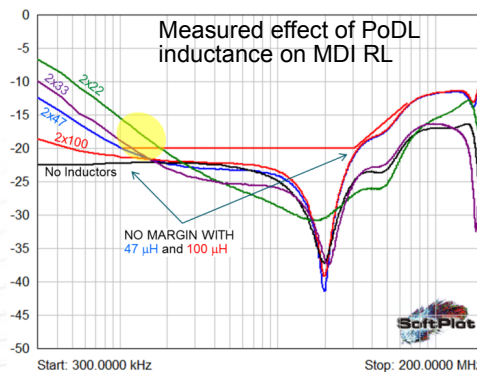
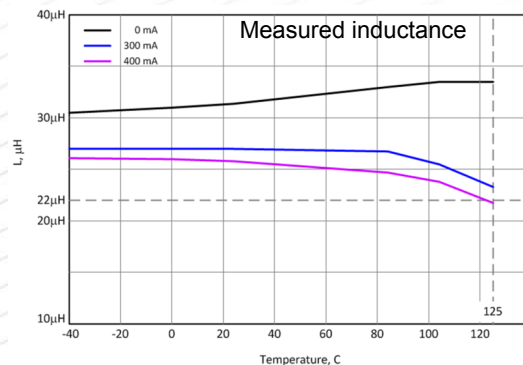


- For PoDL applications only, consider allowing relaxation of the Return-Loss specification at low frequencies.
- Evaluate the effect of reducing the inductance and relaxing the Return-Loss limit line.
- Allowing such a relaxation allows using inductors of lower values, which can in turn allow finding more realistic solutions for practical applications of the PoDL technology.

EXAMPLE (REFER TO ATLANTA PoDL MEETING MATERIAL)



- 1210-size inductors that can carry up to 400mA and are rated up to 125C are available.
- The inductance at the extremes (400mA and 125C) is about 22uH (each inductor).
- Under these extreme conditions (maximum current and temperature) the inductors would cause non-compliance with the RL specification for non-PoDL 100BASE-T1.
- Functional and conformance verifications indicate that such a relaxation does not degrade the operational parameters.
- A relaxed specification with a corner in the RL limit line at 2MHz would be met.



Charts from:
"Practical considerations for
implementing PoDL-coupling
circuits",
IEEE Interim in Atlanta, Jan. 2015.

PROPOSAL: MODIFY RL LIMIT LINE FOR PoDL ONLY



- Proposed change in the RL specification – ONLY FOR PoDL applications:
 - For frequencies between 1 MHz and 2MHz: $RL = -20 + 20\log_2 f$ [dB], frequency in MHz
 - For frequencies above 2 MHz – no change relative to the current 100BASE-T1 RL specification.
- Implement the proposal only as a part of PoDL standard.
- The above proposal will also affect droop, so the specification may need adjustment too.
- Propose and request feedback on this PoDL specification from the 100BASE-T1 task force.