ANALOG DEVICES
AHEAD OF WHAT'S POSSIBLE™

TCI Return Loss and Insertion Loss Analysis

802.3da, San Antonio, TX
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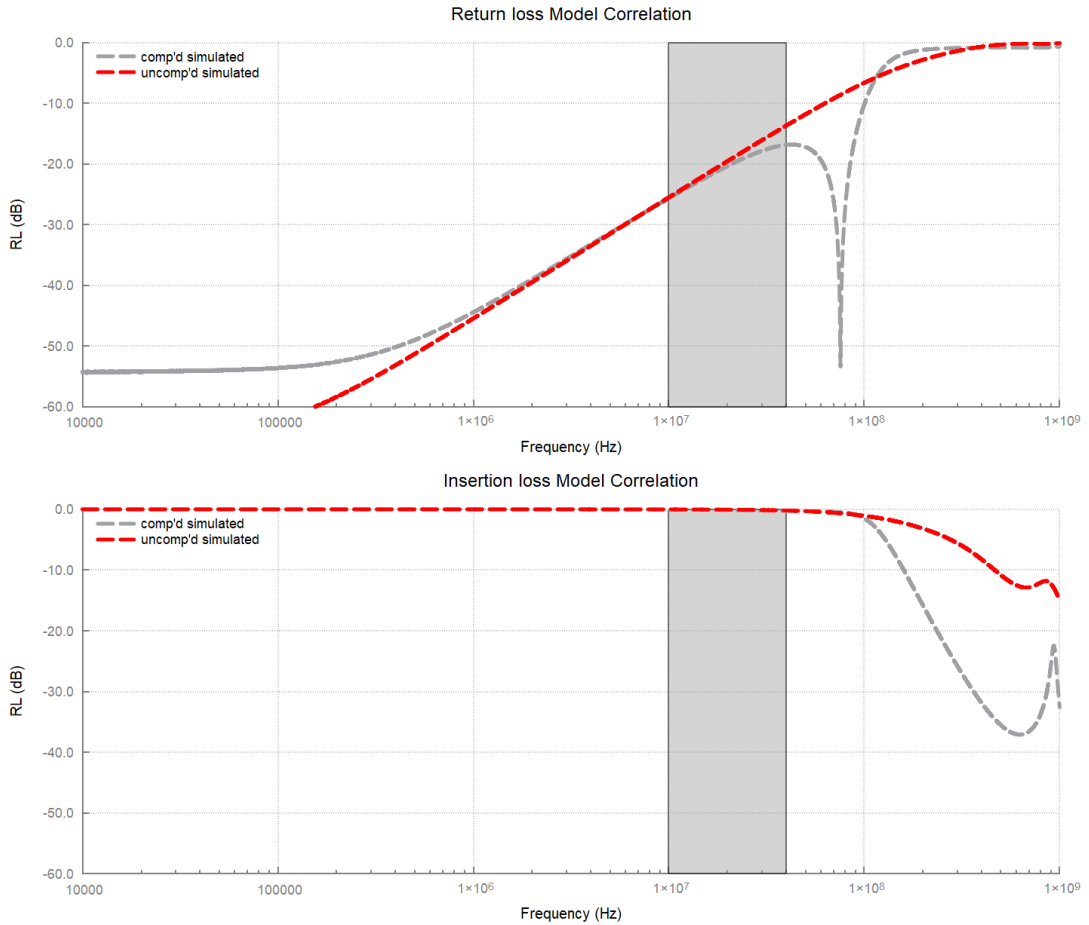
Intro

- Return Loss (RL) and Insertion Loss (IL) limits are needed for TCI interface
- Use RL / IL measurements on correlated T-connectors models
  - Correlate system performance with T-Connector measurements
  - Propose TCI RL and IL limits based on results

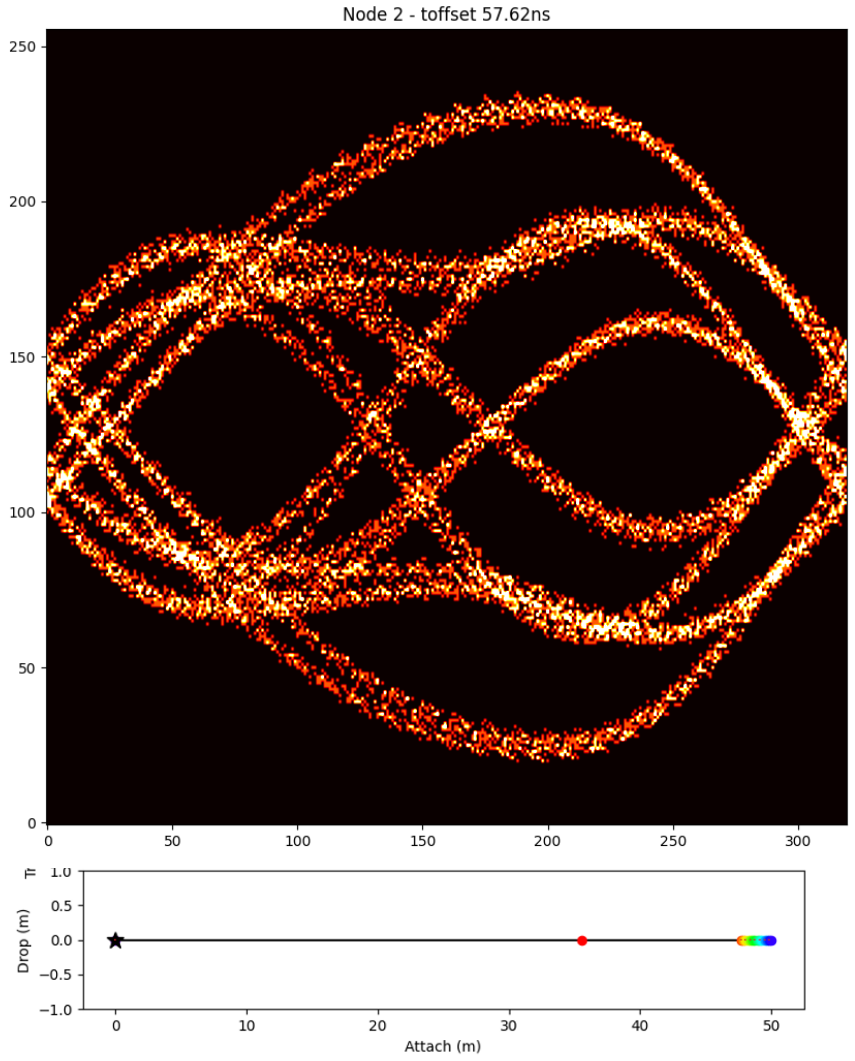
16.8pF uncomp vs comp. (4x82nH) (RL and IL)



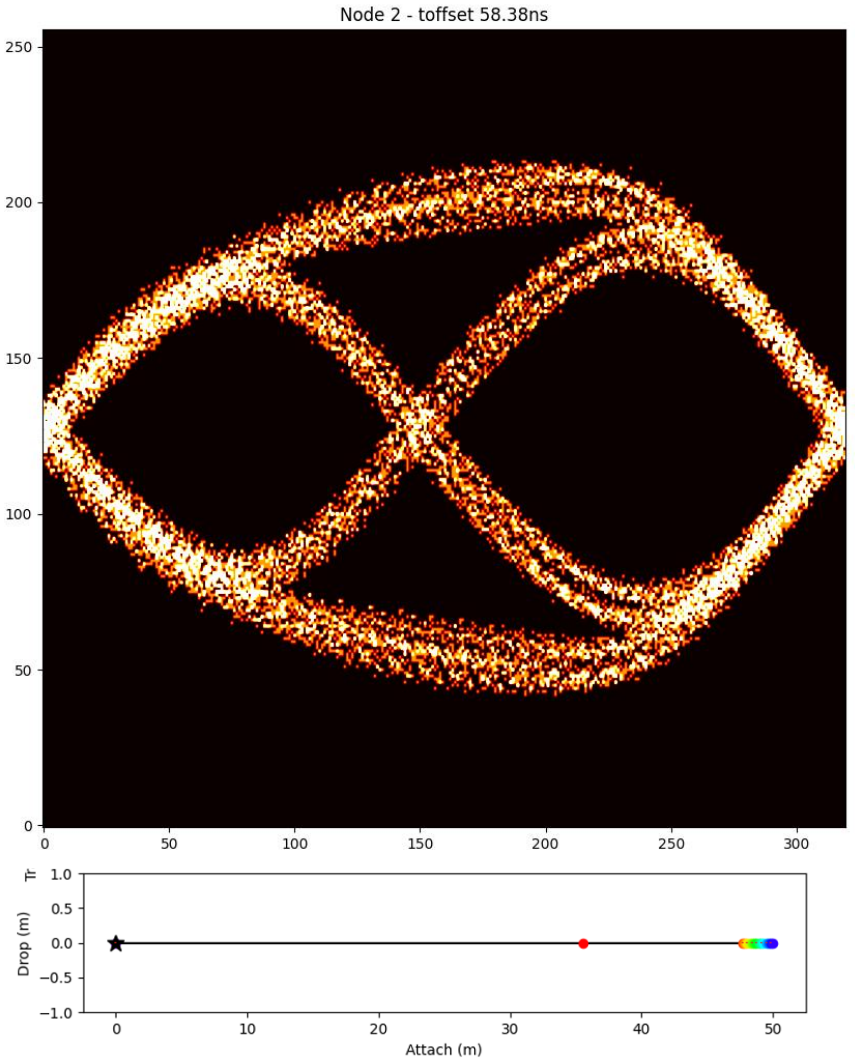
- 70Ω = Sqrt(4*82.5nH / 16.8p)
  - Poor impedance match in compensated system
- Similar RL and IL in signal band (1MHz - 40MHz)

16.8pF uncomp. vs comp. (82nH) eye diagrams

- Node2 eye, All 16 nodes uncompensated
- Min_corr = 0.5

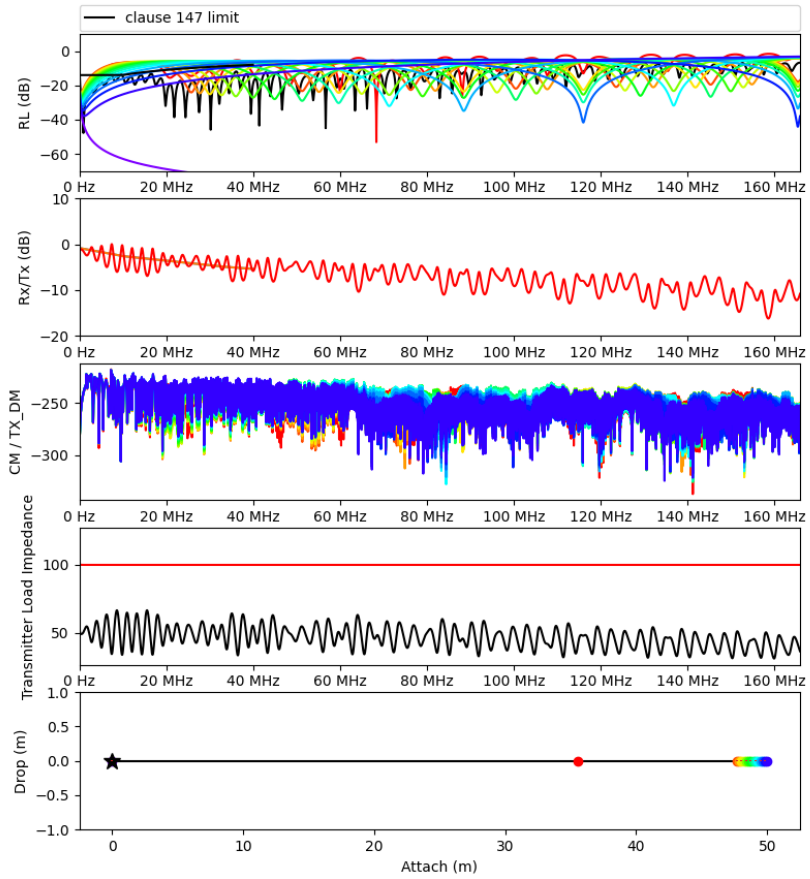


- Node2 eye, All 16 nodes compensated
- Min_corr = 0.75

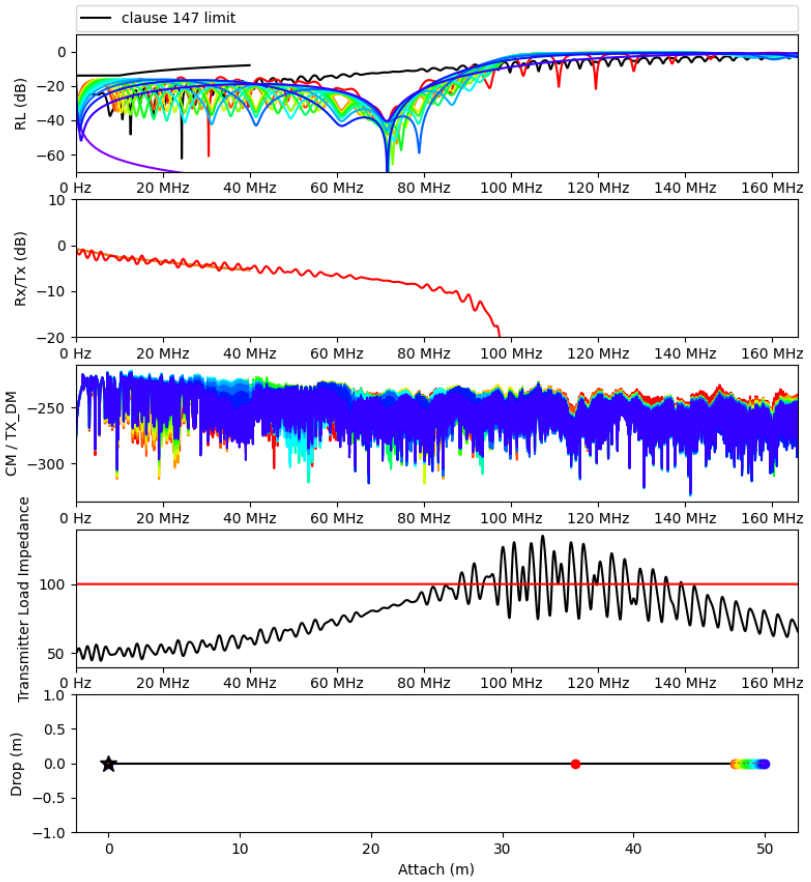


16.8pF uncomp vs comp (82nH) frequency domain

- All nodes uncompensated

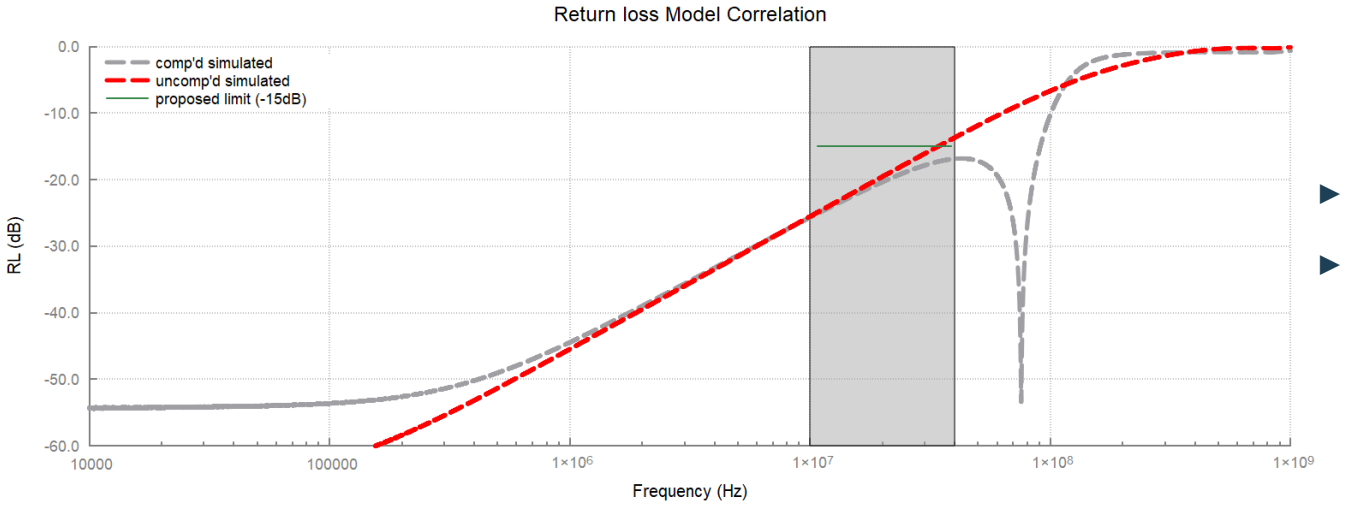


- All nodes compensated

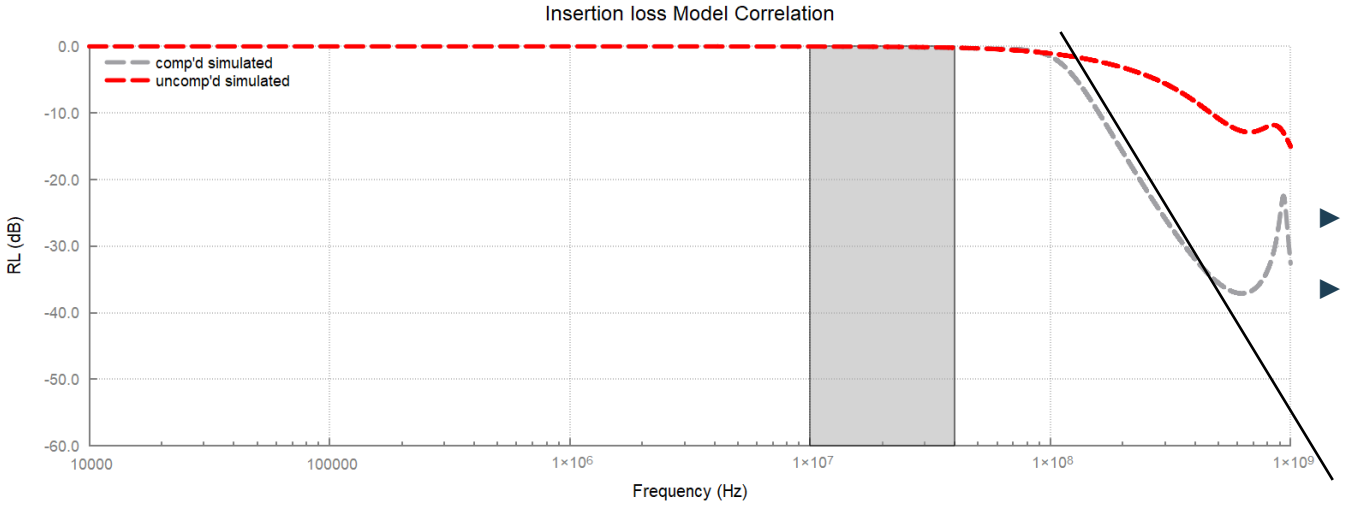


- Comp'd network has better impedance control in signal band (<40MHz)
- High frequency noise is attenuated past 100MHz

16.8pF compensated vs uncompensated



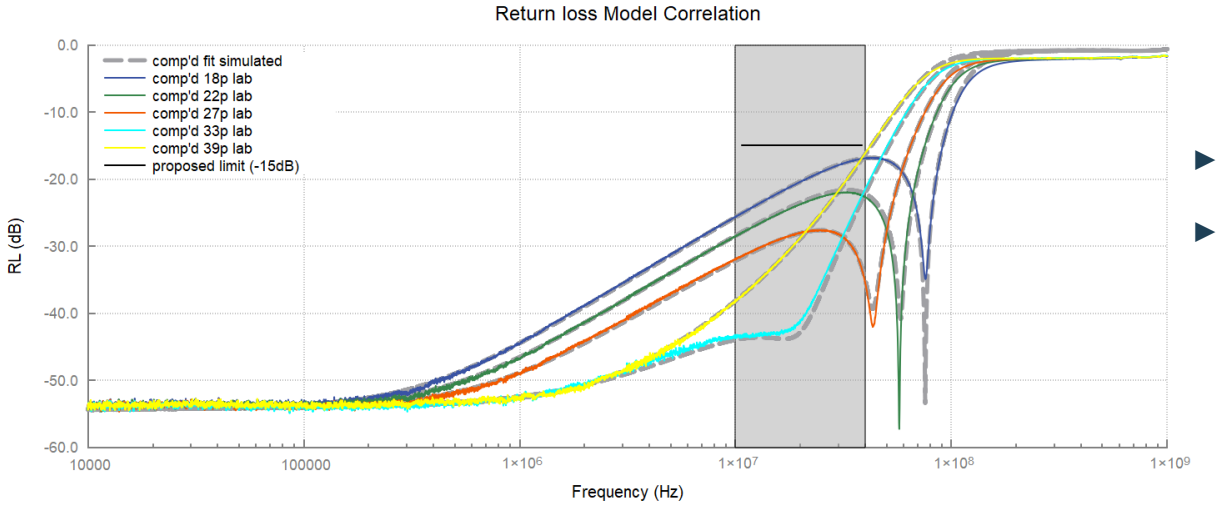
- -15dB Limit
- 10MHz – 40MHz



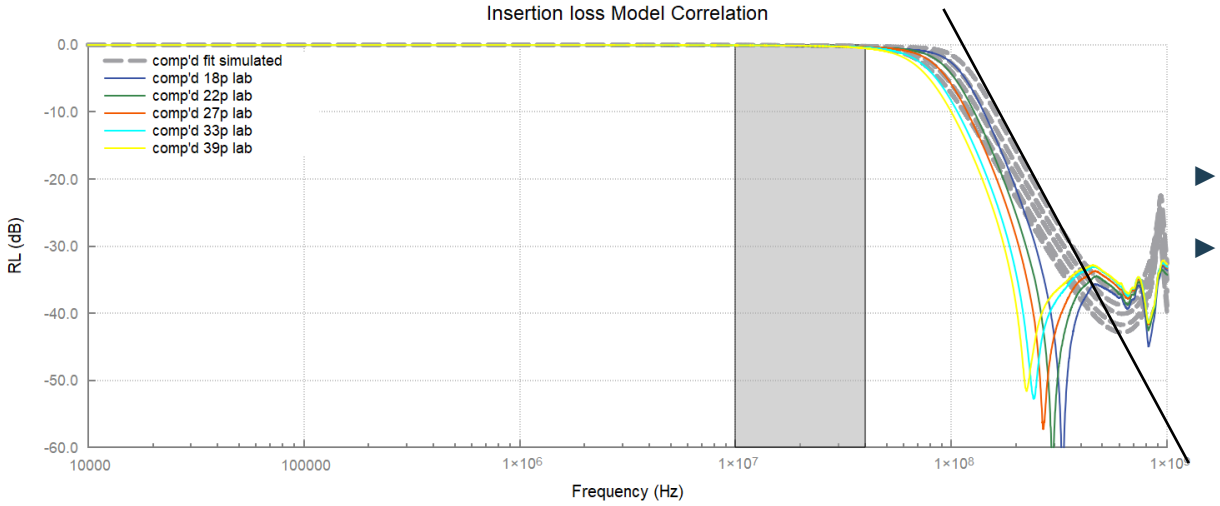
- 3-pole low pass
- 150MHz Corner

T-Connector Model / Lab Correlation with limits

- 82nH * 4 Lcomp
- Variable capacitance



- -15dB Limit
- 10MHz – 40MHz



- 3-pole cutoff
- 150MHz Corner

Summary

- TCI interface needs frequency domain specifications
  - Insertion Loss (IL)
  - Return Loss (RL)
- Frequency domain specifications need to extend beyond 40MHz
  - Attenuation in band >40MHz is one benefit of compensation
- Propose -15dB max for RL in 10MHz to 40MHz band
- Propose 150MHz, 3-Pole low pass cutoff for IL
  - Prevent HF noise from propagating between sections on the mixing segment