Rosenberger

IEEE 802.3bp
Channel Measurements

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Supporters:

Channel measurements
Outline

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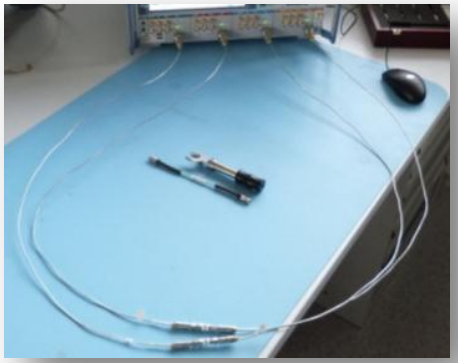
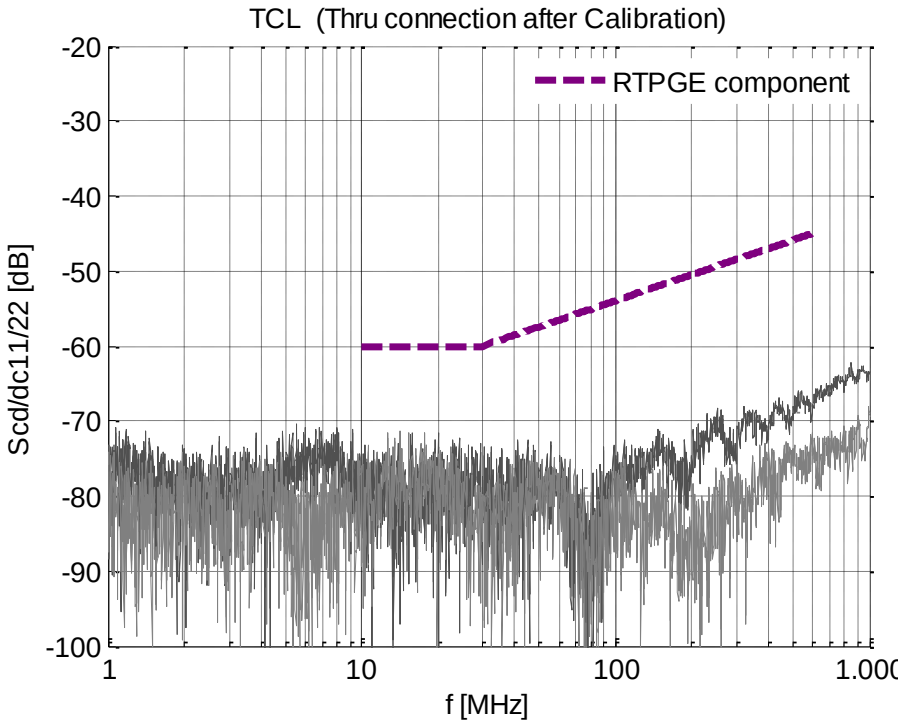
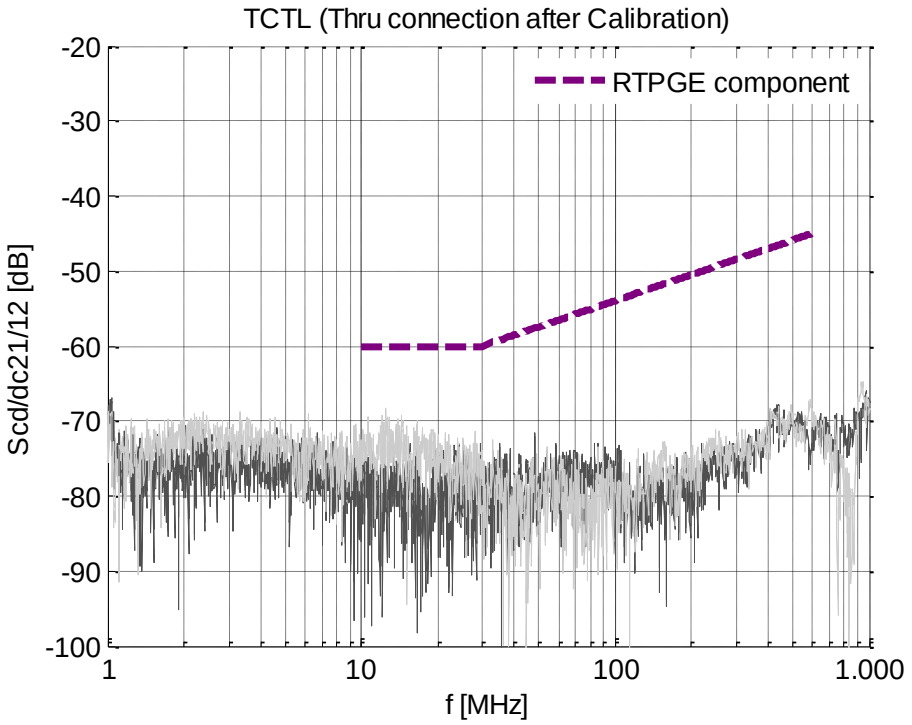
- Measurement setup
  - Balance calibration check
  - Balance of breakout boards
- Measurement results
  - Insertion Loss
  - Return Loss
  - Balance
- EMC stripline test system simulation

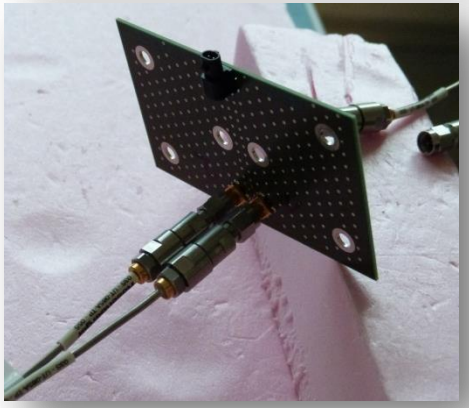
- Validation of balance calibration with thru connection

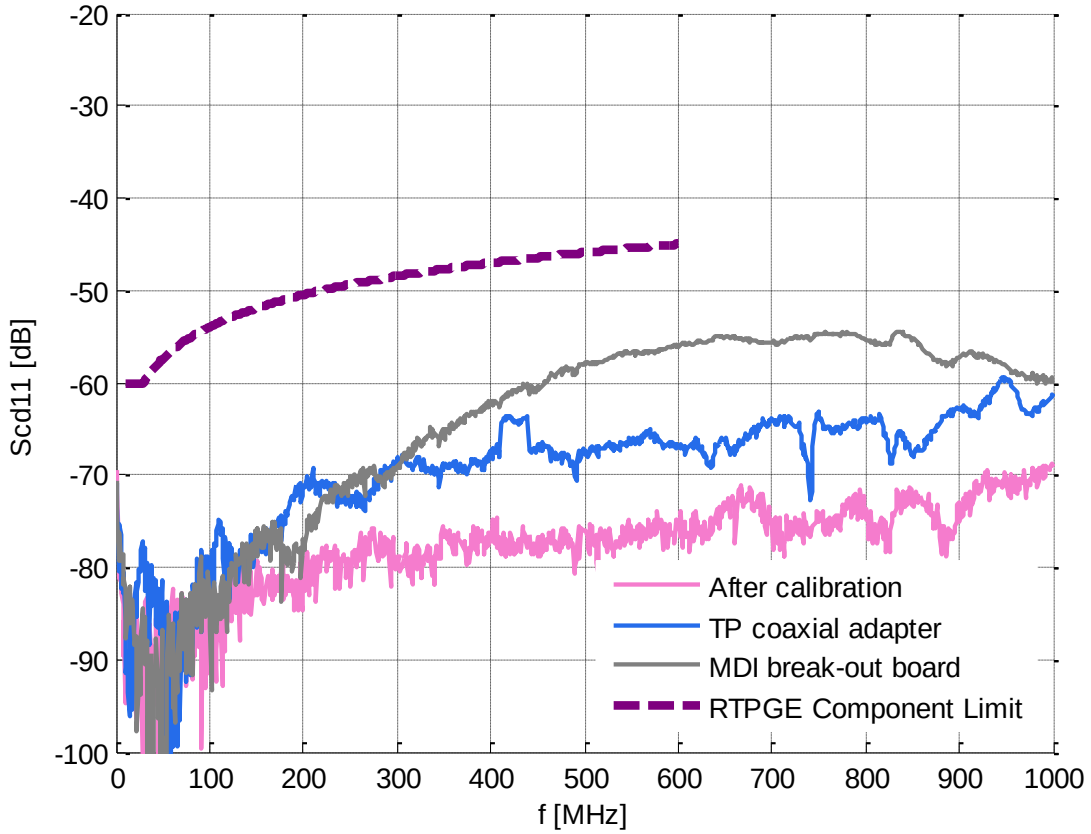






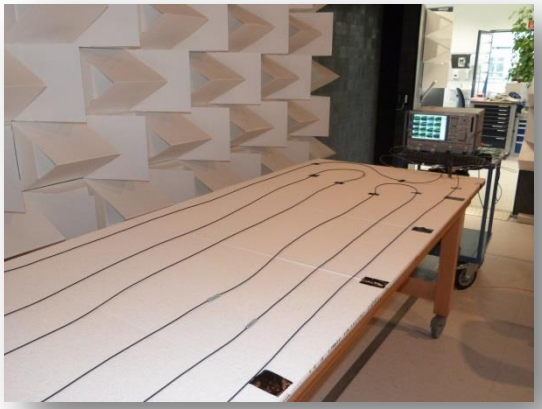
- Verification of test fixture balance against open (sdc11)

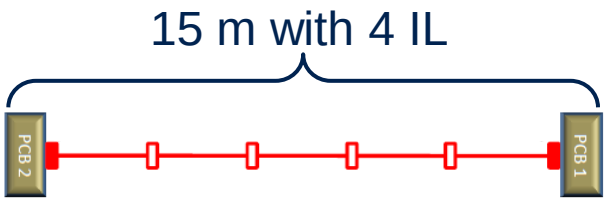


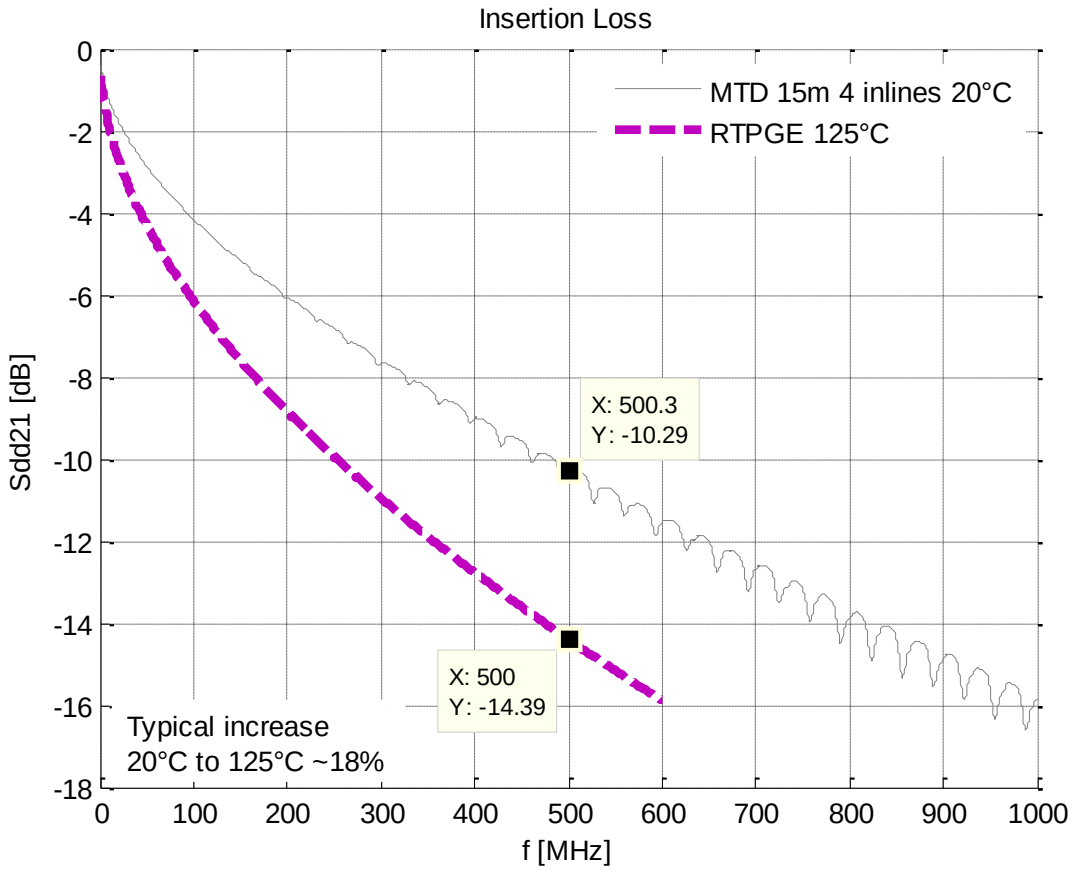


- MDI break-out board and coaxial adapter are adequate

- Reference channel including MDI and breakout boards







- Meets insertion loss baseline proposal

Return Loss
Reference Channel

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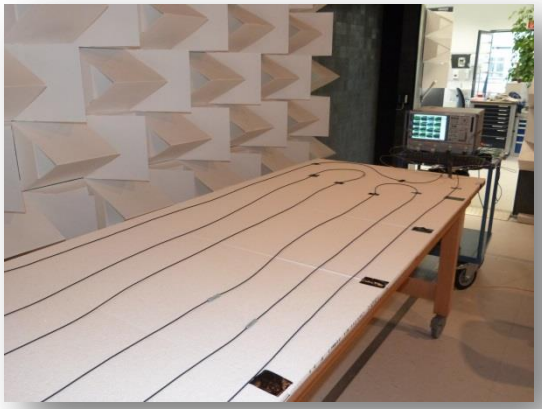
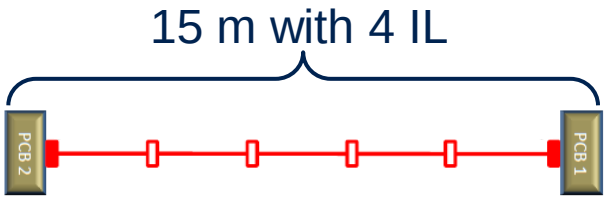
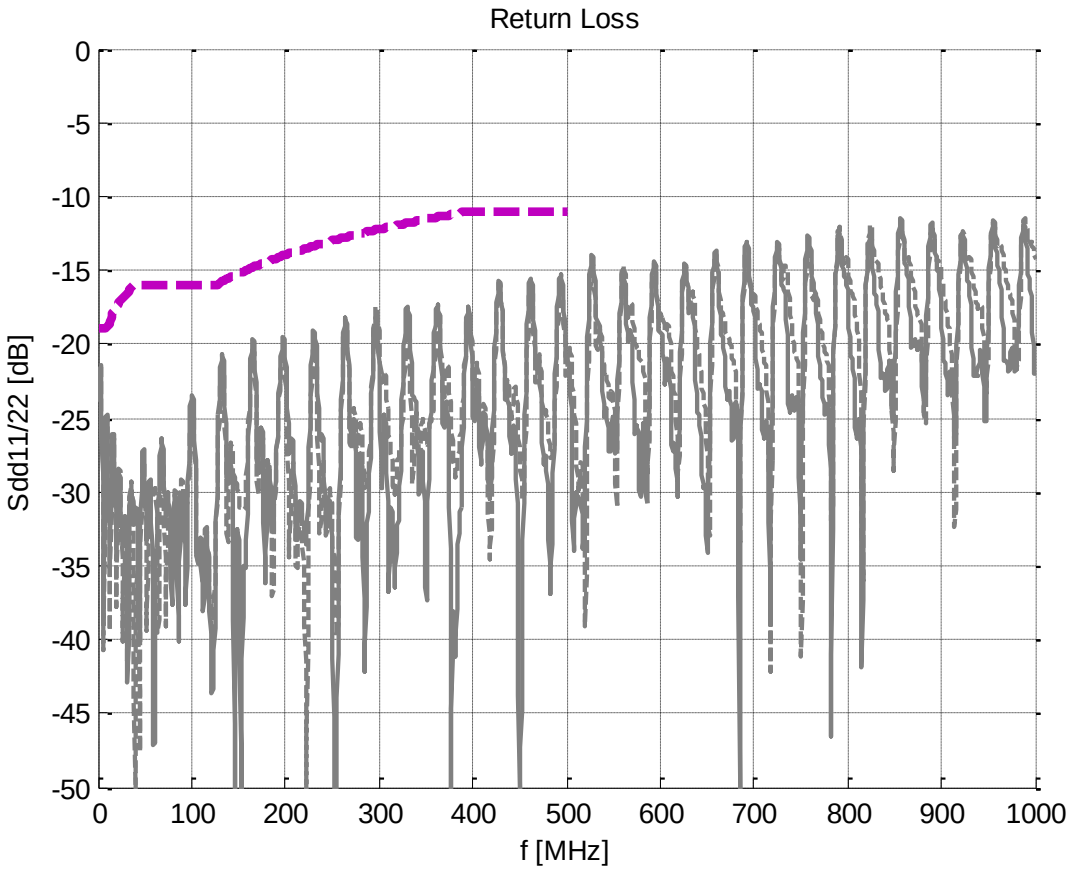
- Reference channel including MDI and breakout boards







- Meets return loss baseline proposal

Return Loss
Worst Case Channel

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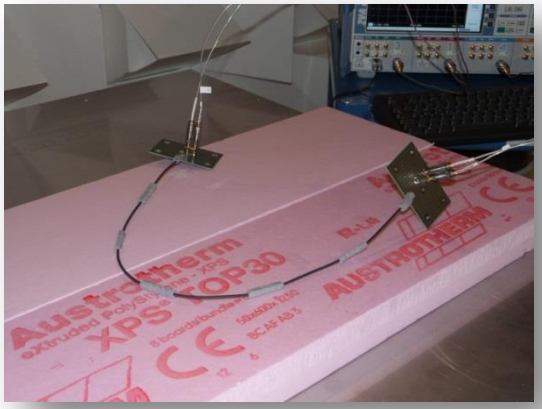
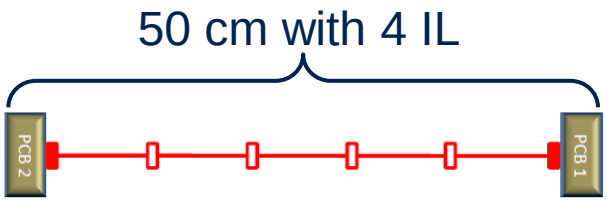
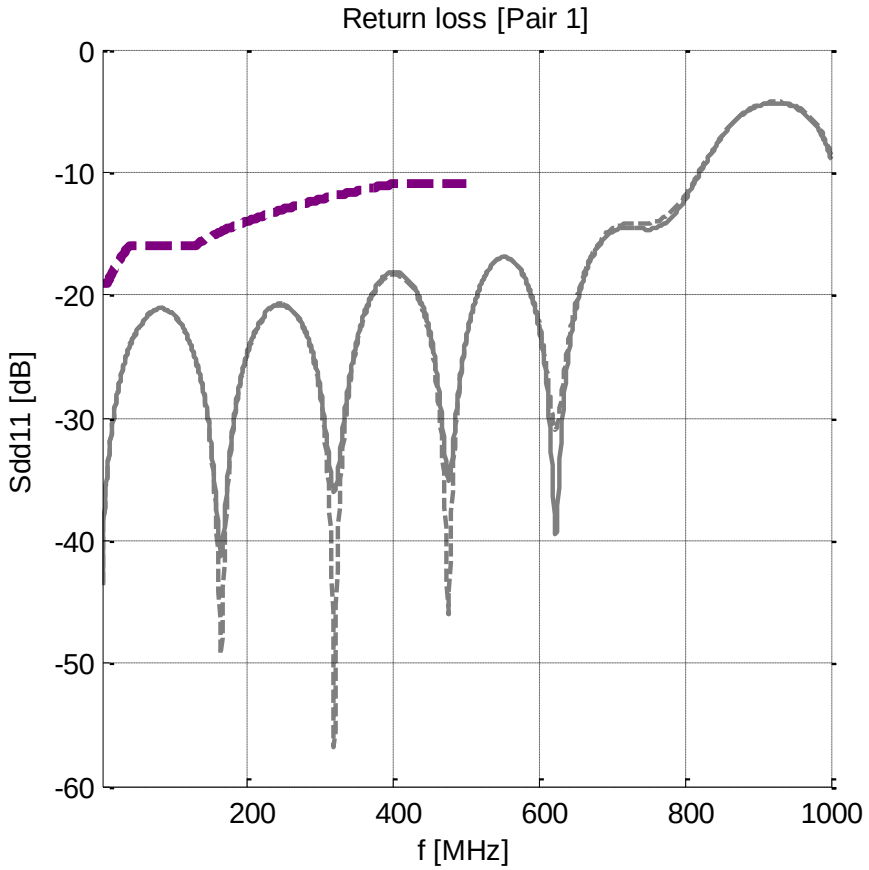
- Including MDI connectors and breakout boards

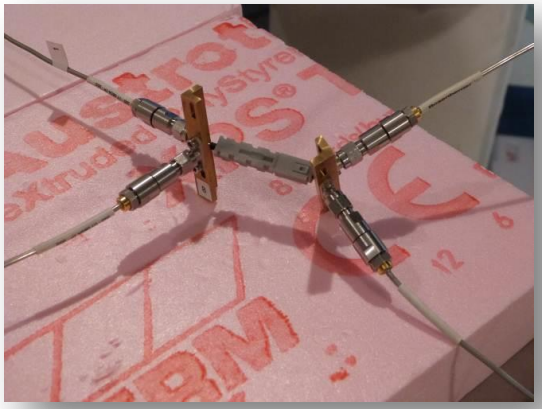


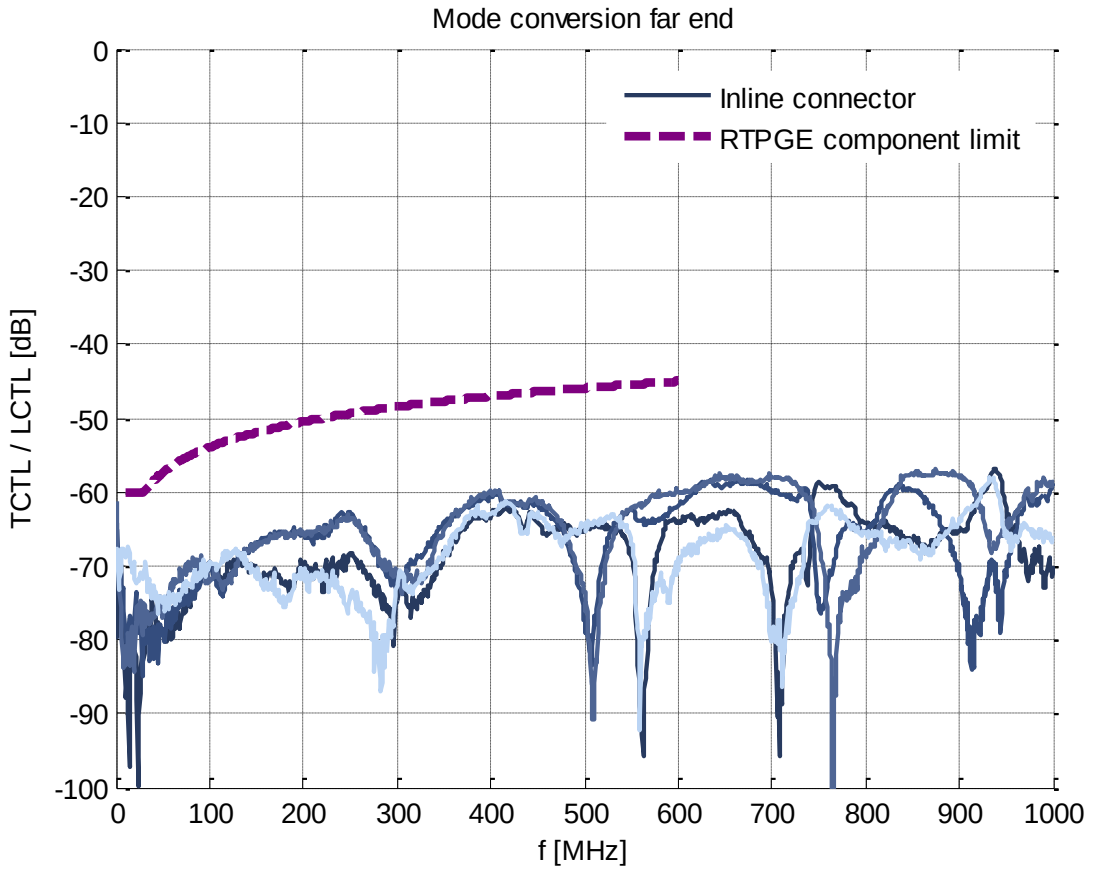




- Meets return loss baseline proposal

- Measured with coaxial adapters





- Meets balance of component level baseline proposal

Balance
Two meter cable without inline

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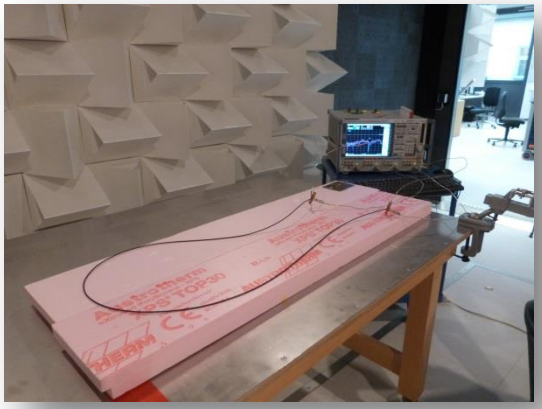
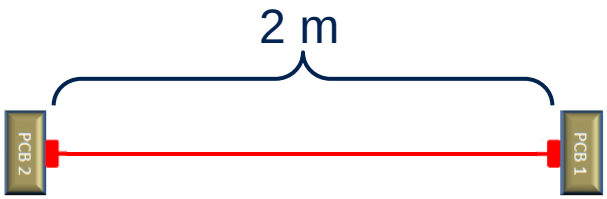
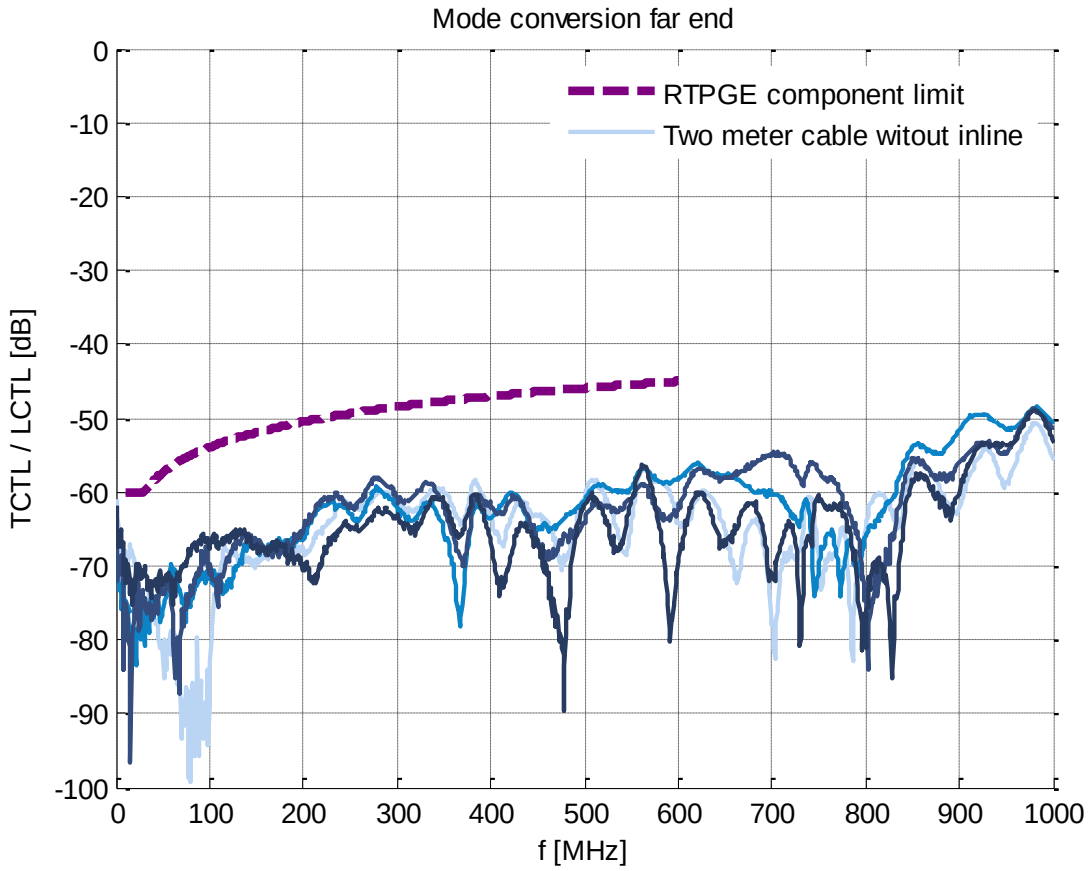
- Measured with coaxial adapters







- Meets balance of component level baseline proposal

Balance
Influence of inline connectors

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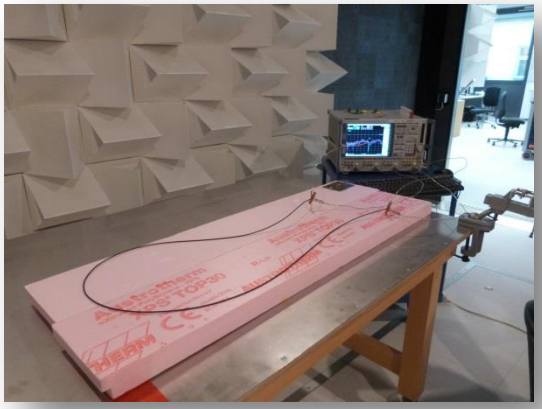
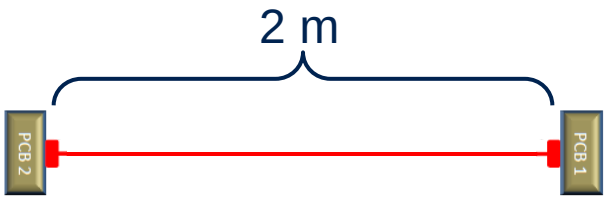
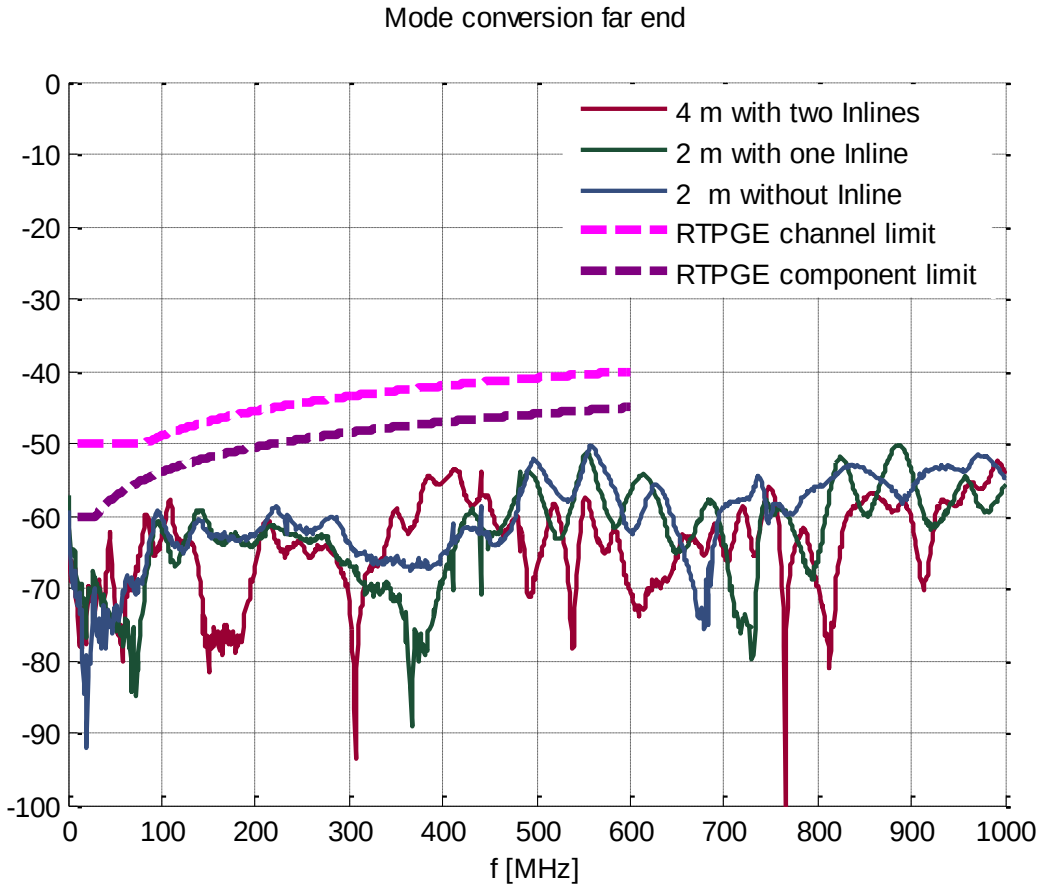
- Including MDI connectors and breakout boards

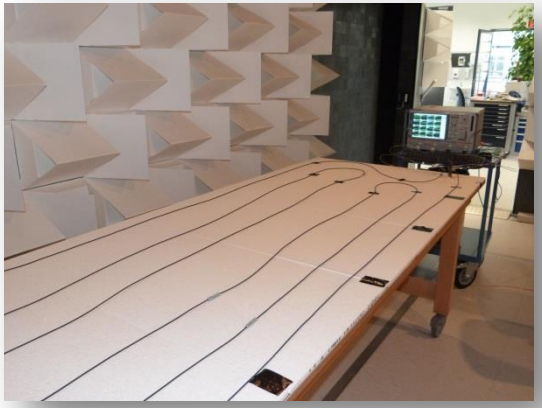


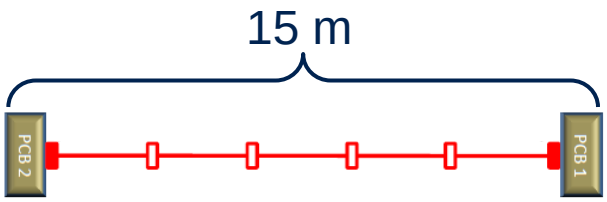


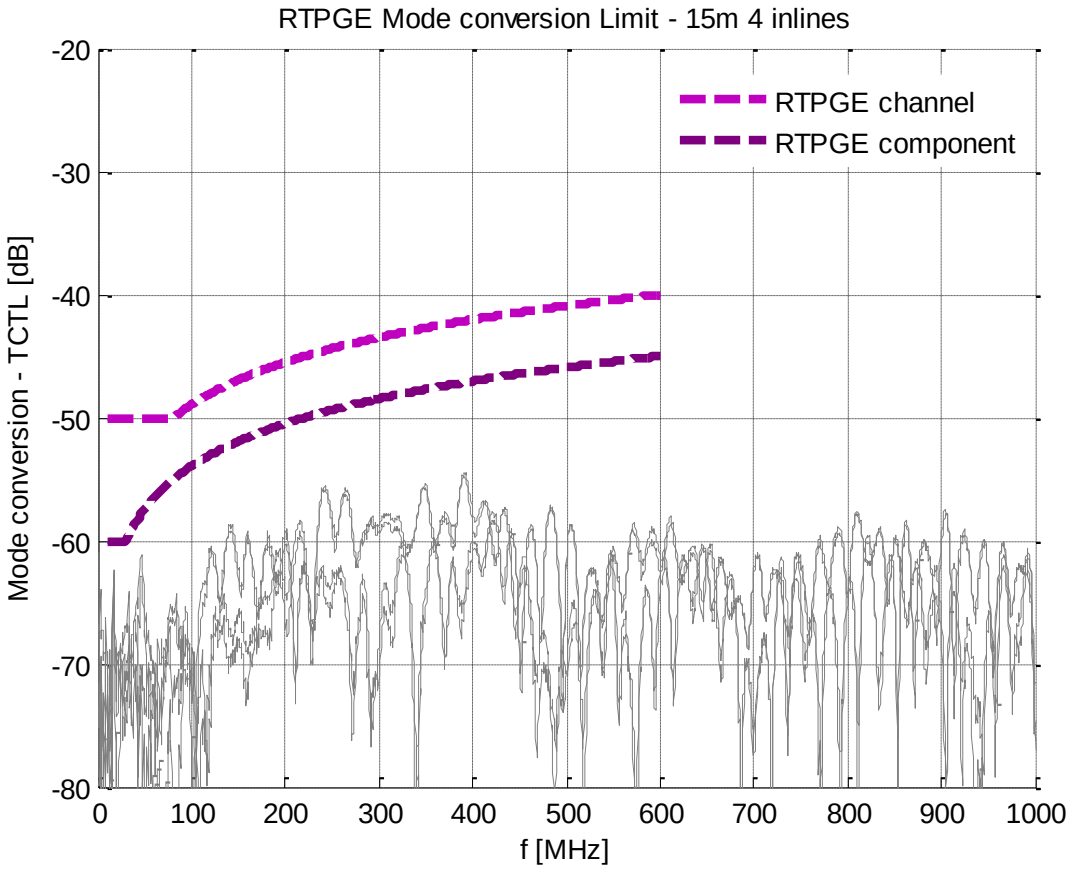


- Meets balance of component level baseline proposal
- Influence of inline connectors on balance is low

- Including MDI connectors and breakout boards

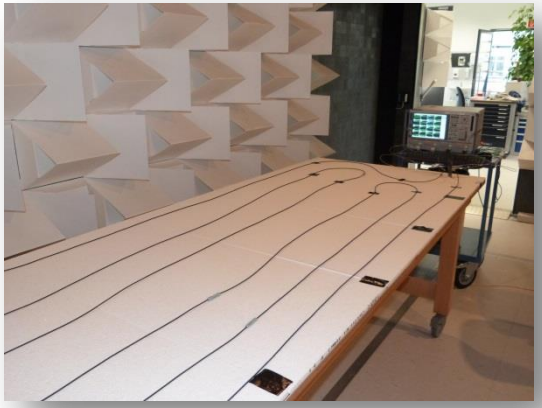


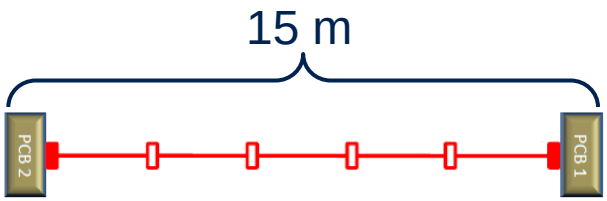


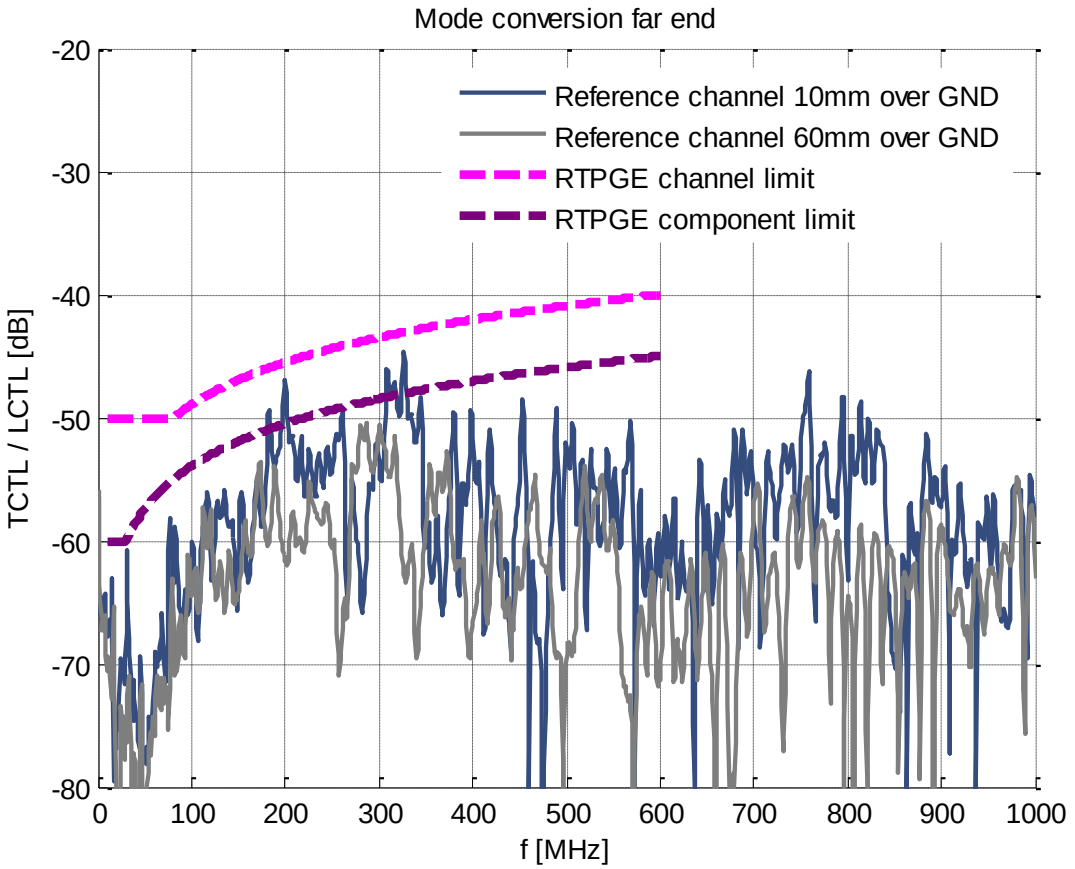


- Over non conductive surface
- Meets balance of component level baseline proposal

- Including MDI connectors and breakout boards







- Over conductive surface
- Height above ground must be considered

System simulation
Stripline emission simulation

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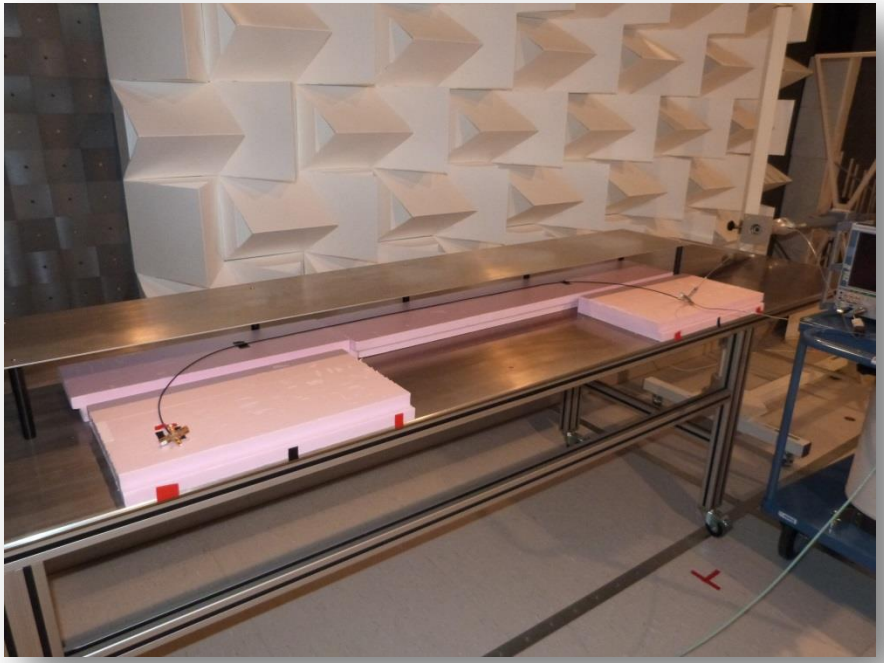

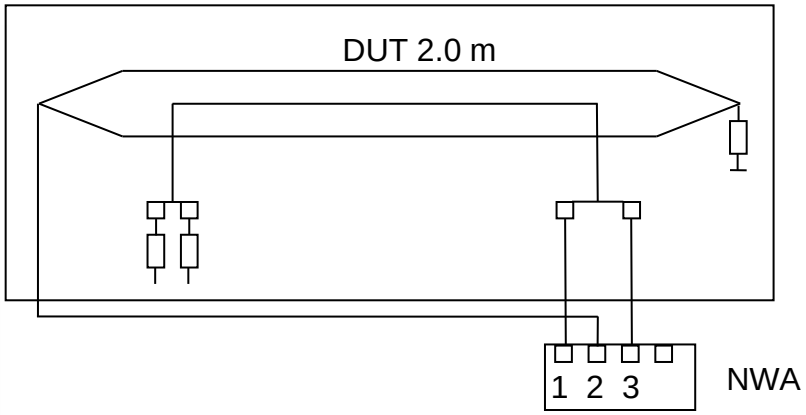

- Measure differential and common mode coupling to stripline in a three port NWA measurement
- DUT length 2.0 m
- 50 mm isolation material height
- Both ends floating against ground plane

System simulation
Stripline emission simulation

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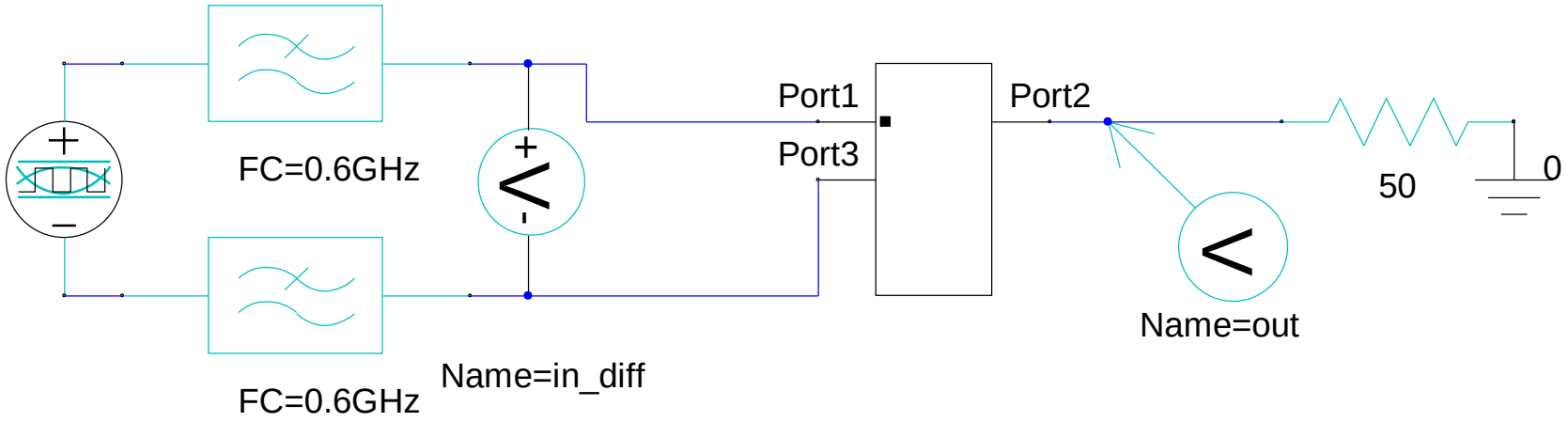
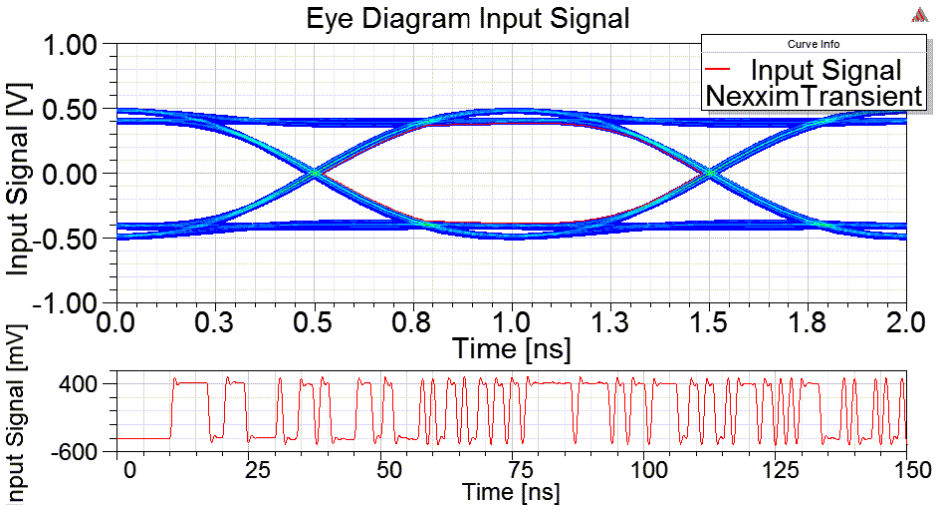


- 1 GBit/s PRBS10 signal source
- 1.0 V peak to peak
- 250 ps rise time filter
- 3rd order low pass (600 MHz)
- 3-port s-parameter file from stripline measurement
- Voltage probe at the stripline measurement output



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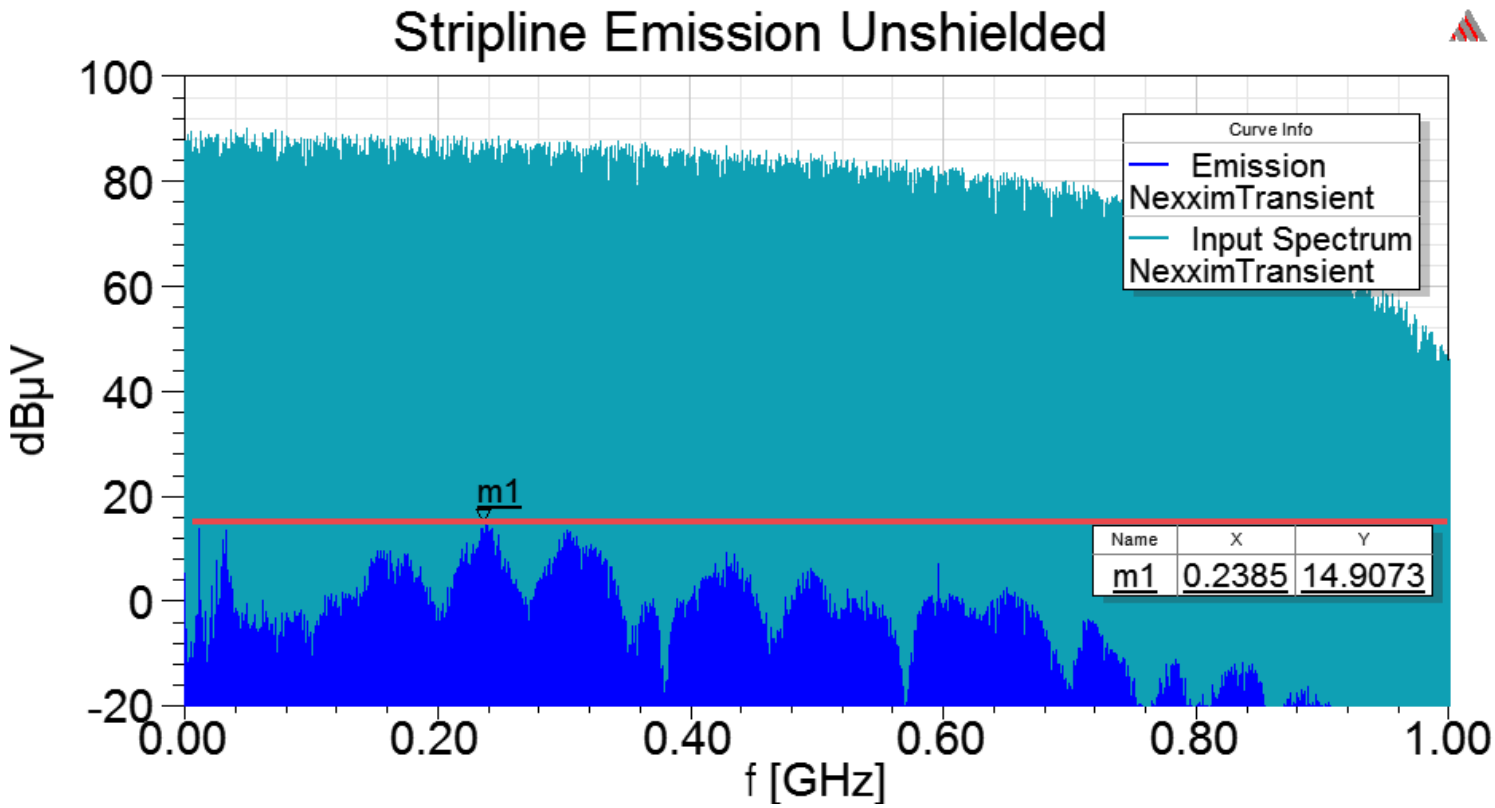
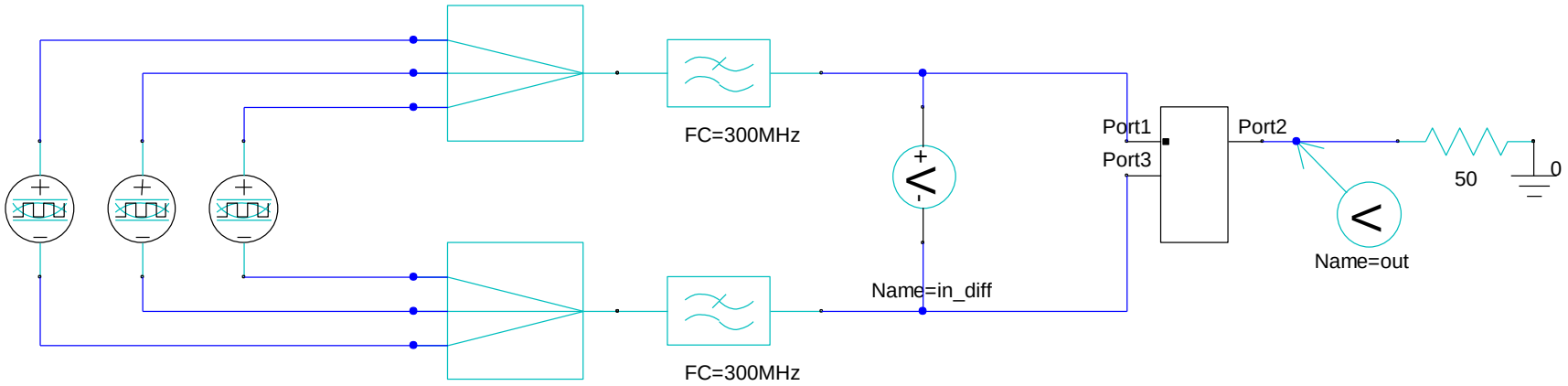
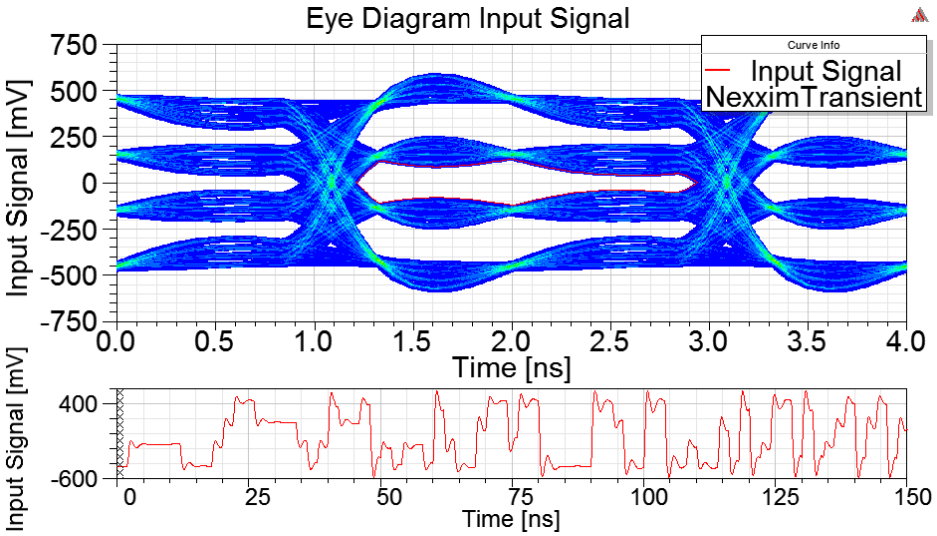


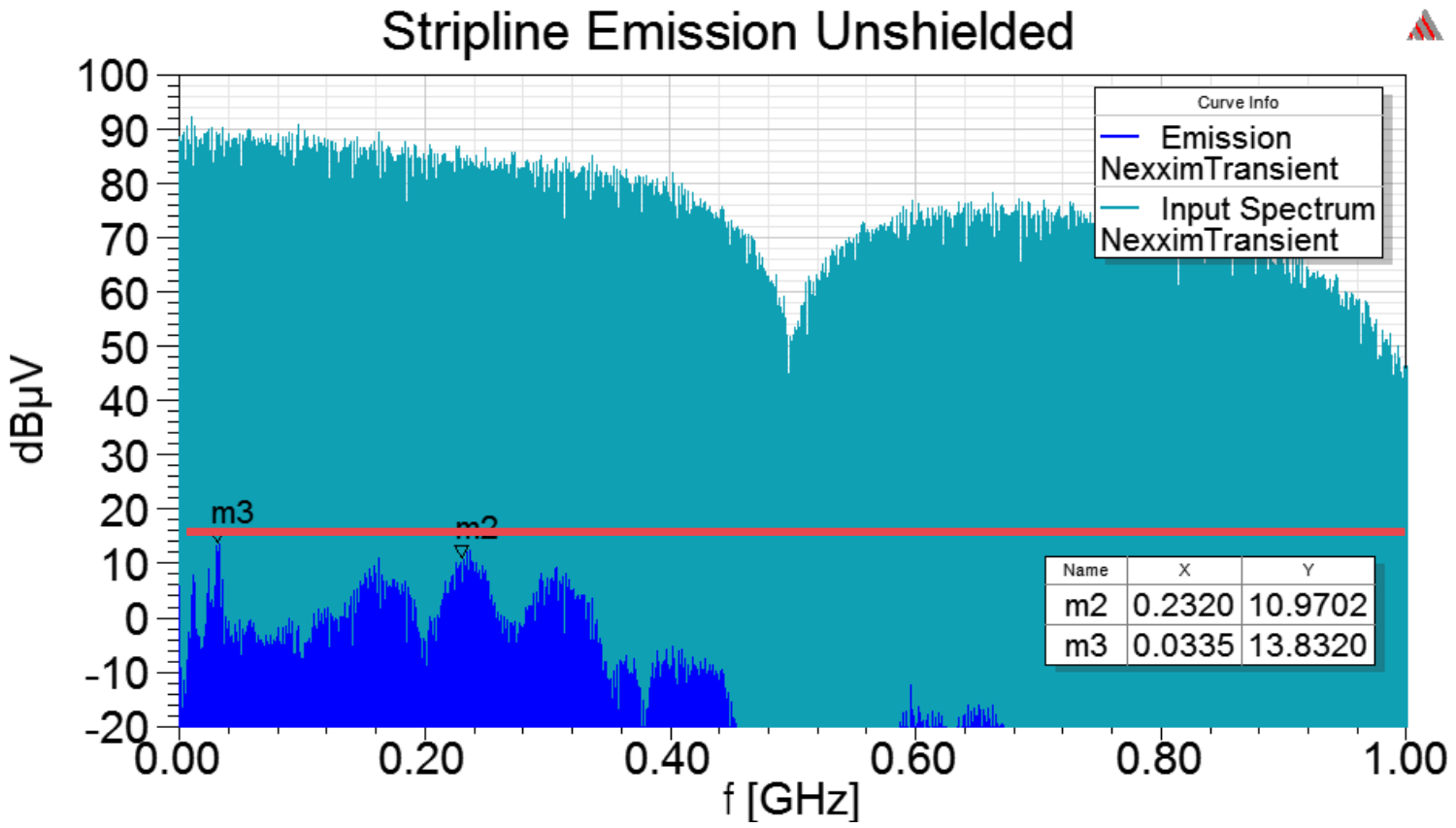
- NRZ emission spectrum with 1 V_{pp} input signal voltage
- With refined measurement setup and calibration the peak to peak voltage of the input signal can be increased from 0.2 V_{pp} to ~1 V_{pp} while maintaining the 15 dBµV emission limit

System simulation
Stripline emission simulation



- Three bit sources combined
- 1.0 V peak to peak
- 250 ps rise time filter
- 3rd order low pass (300 MHz)
- 3-port s-parameter file from stripline measurement
- Voltage probe at the stripline measurement output





- PAM4 emission spectrum with 1 V_{pp} input signal voltage

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- Baseline proposals for Insertion Loss, Return Loss and Mode-conversion can be verified by measurements

- With refined EMC measurement setup the emission limit of 15 dBµV can be met while increasing the input signal amplitude