EMC Ad Hoc Conference

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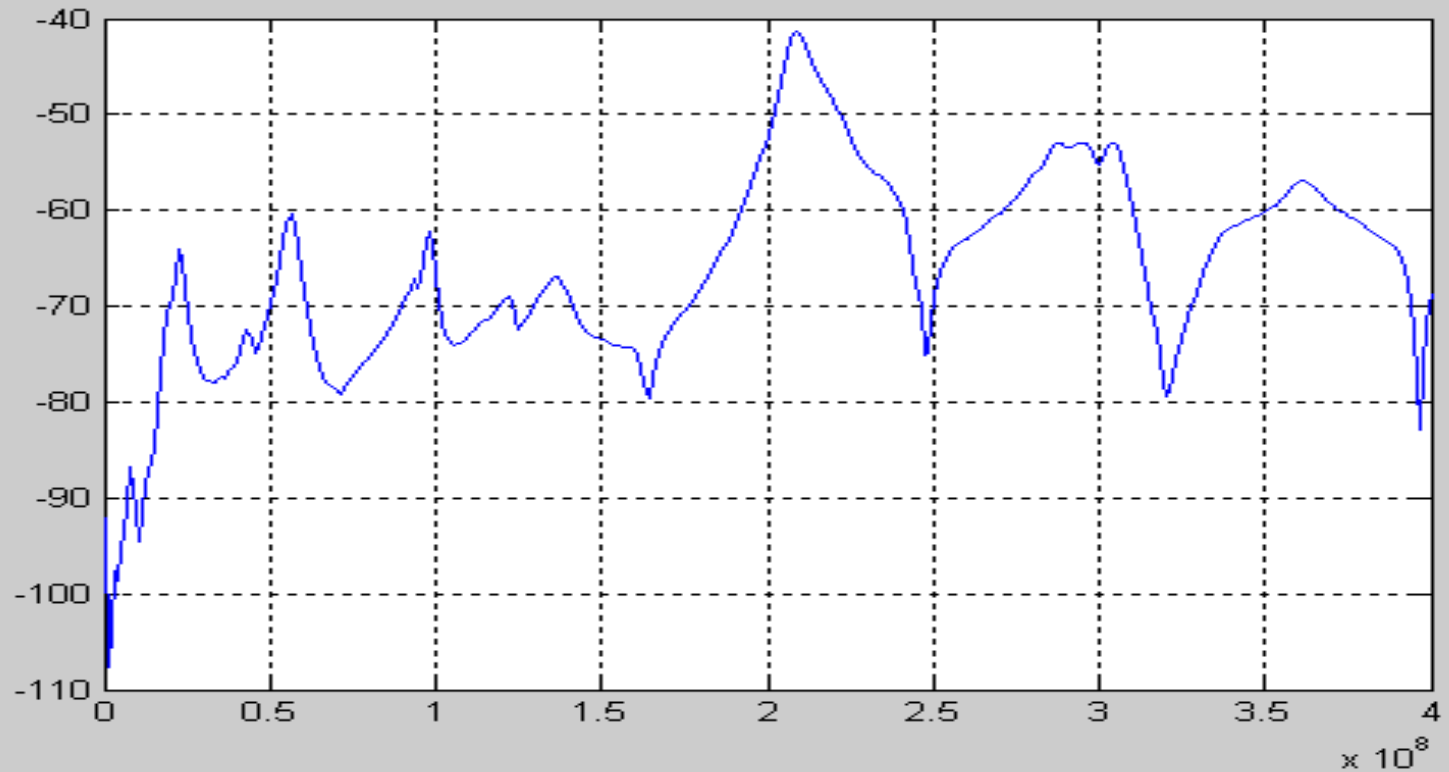Marvell
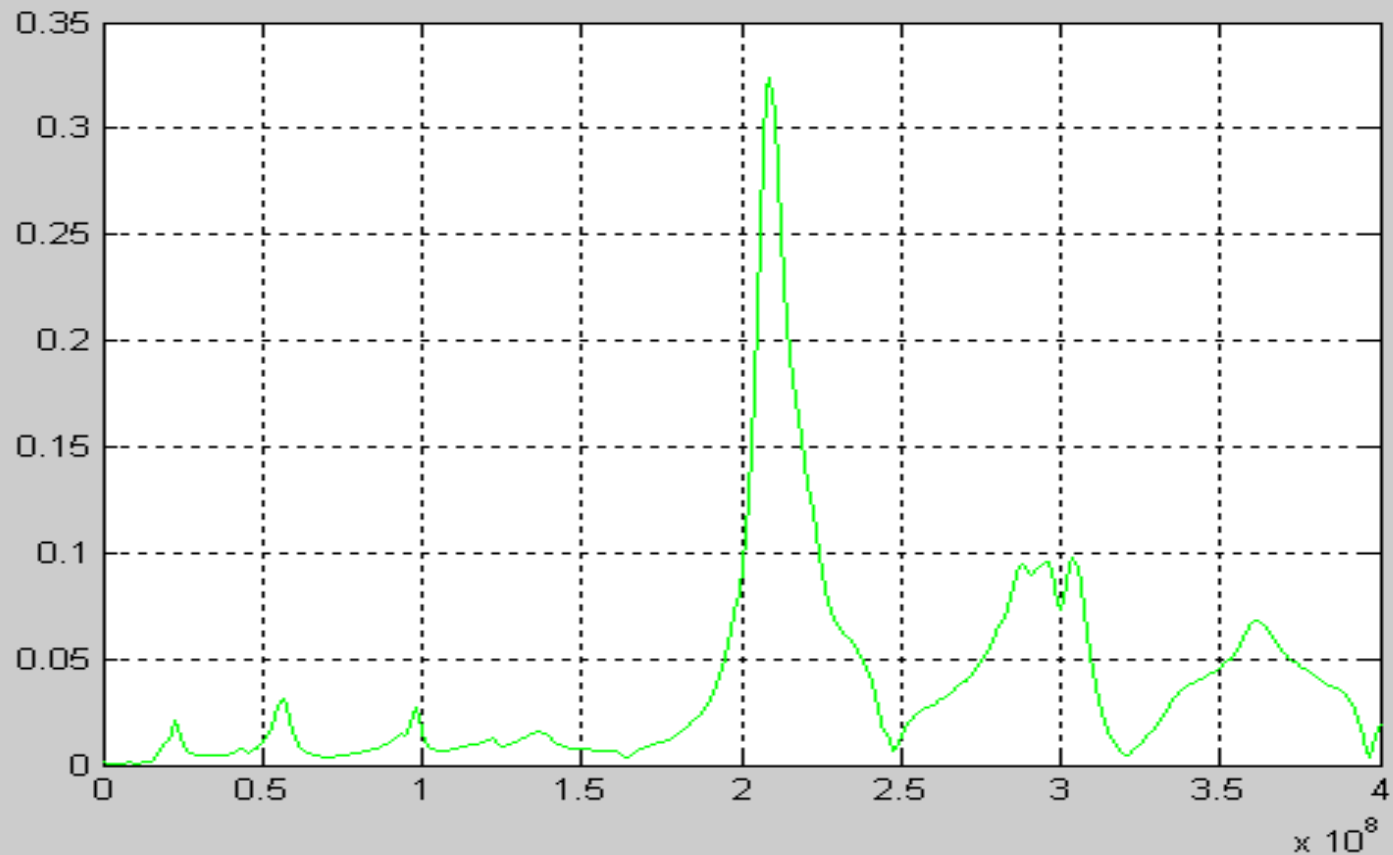
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EMC Mode Conversion Baseline Discussion

- **3-port and 2-port discussion**
- **The worst case consideration**
- **Impedance variation simulations**
- **Signal budget consideration**

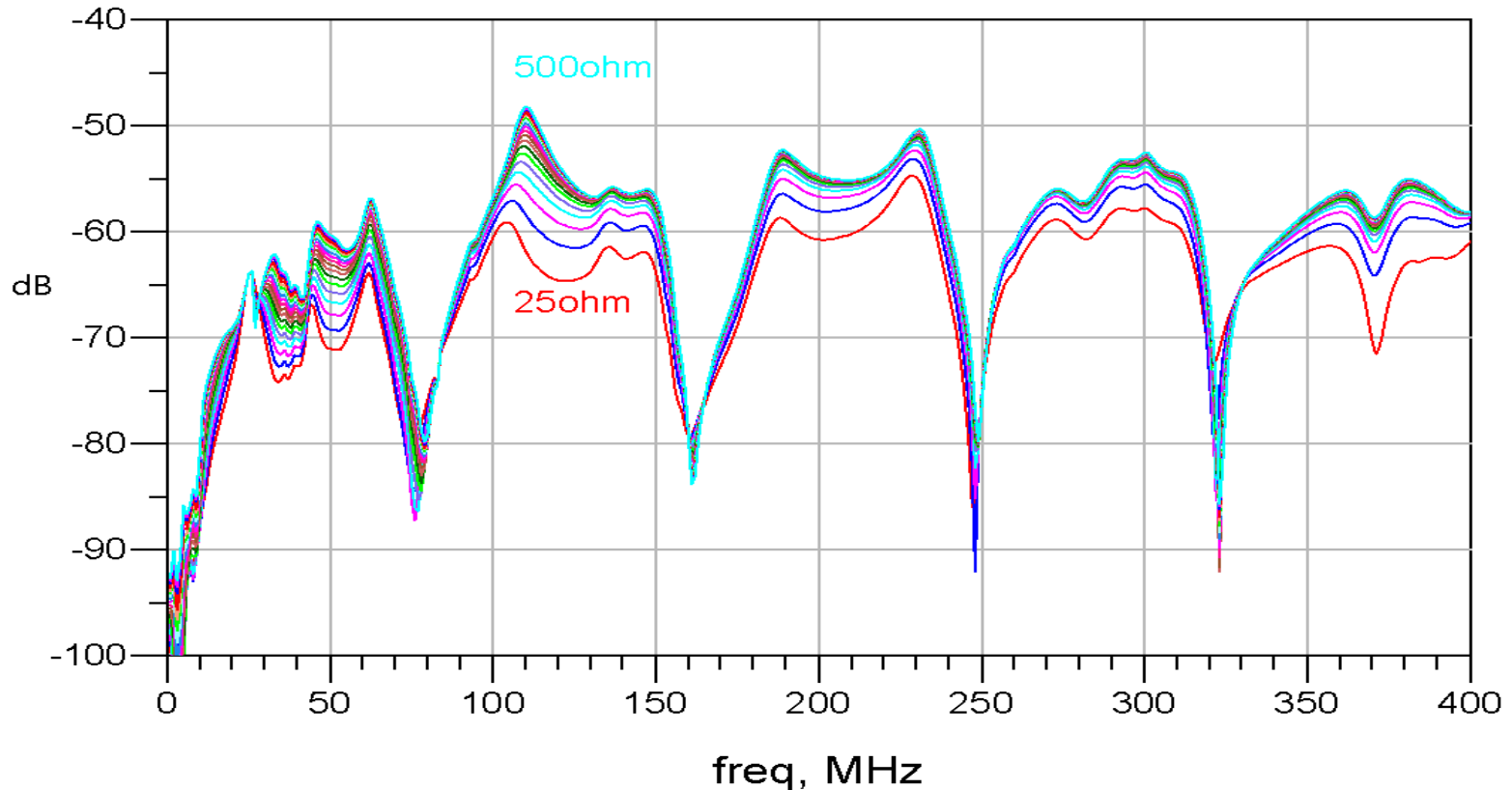# 2-port Mode Conversion (two ends floated) S-Parameter

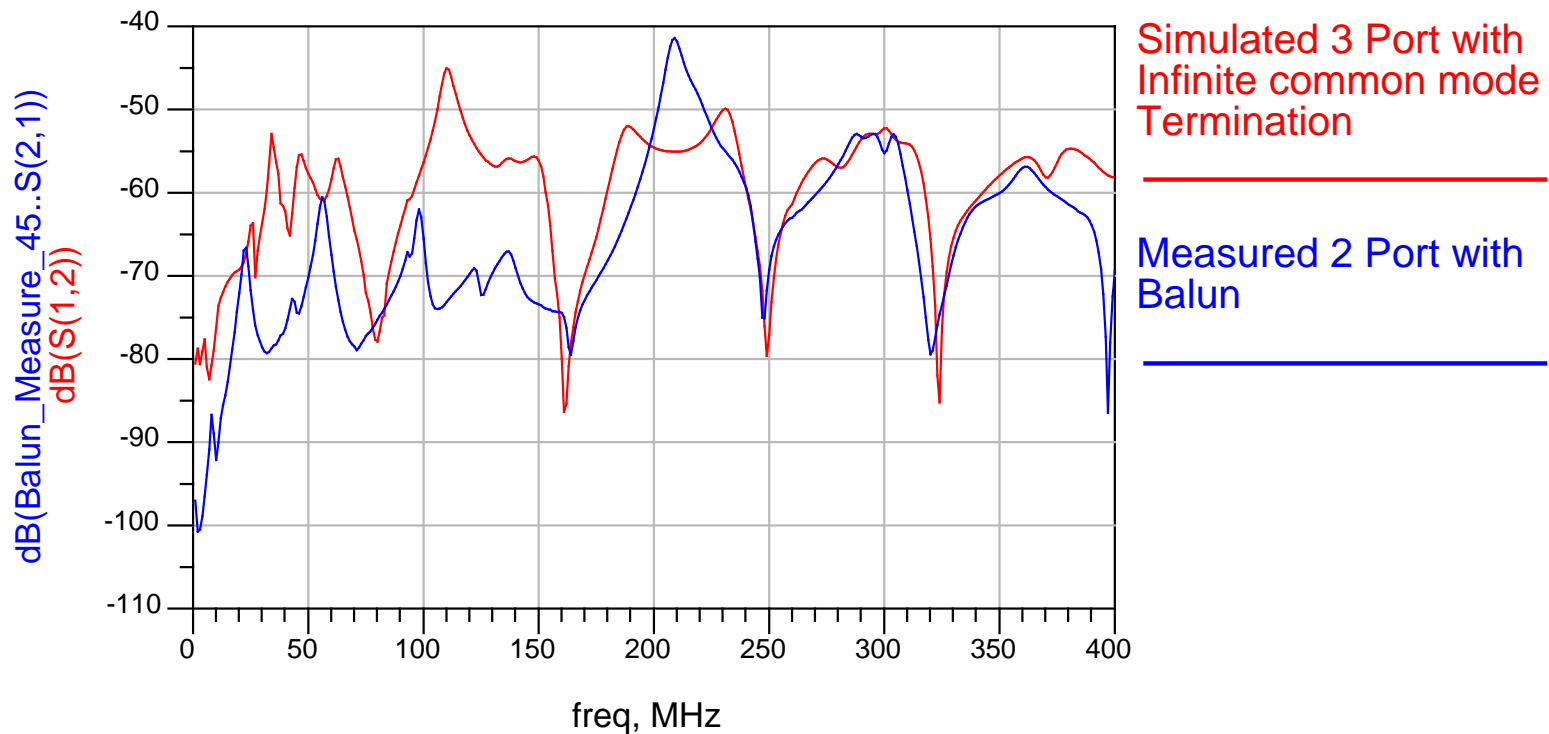# Interference for the worst case (two ends floated, 200mA, Peak)

Mode Conversion vs. Impedance Variation (6dB difference)

Common mode termination sweep from 25 to 500 ohm for Case2

3-port simulation vs. 2-port measurement (3.5dB difference, both ends floated)

-50dB Mode Conversion Limit Line

- 3-port BCI test S-parameters mode conversion (-55dB) is less than -50dB
  - It's terminated on both side with common mode impedance of 25Ohm
- 2-port BCI test S-parameter (one end terminated with 25Ohm and the other end floated)
  - 4dB worse than that of the 3-port measurement
- 2-port BCI test S-parameter (two ends floated)
  - 6dB worse than one end terminated and another end floated

-50dB Mode Conversion Limit Line

- **The worst case of Mode Conversion is -41.5dB**
  - ☐ 324mVpp differential interference corresponding to 200mA peak (458mVpp with 200mA rms)

- **Considering BCI Current limit defined as RMS Value**
  - ☐ 3dB more interference power compared with the peak value, at least -53dB should be considered

Signal Budget Consideration

- Insertion Loss Baseline

- Modulation Scheme and Bandwidth

- FEC Coding Gain

- One-pair affirmation based on EMC Mode Conversion Limit of -60dB (less than 100mVpp observed) and 200mA peak current limit

- Considering 60mVpp PHY requirement and -45dB worst case for cable (e.g. PAM4)
  - -66dB 3-port limit line required

EMC Mode Conversion Baseline

- Not only to meet the achievable baseline of cable
  - -50dB 3-port S-parameter
- But also to meet the signal budget requirement
  - -66dB for the worst case
- Gap between the cable balance and the signal budget requirement
  - Gap: 16dB (200mA RMS current limit)

Discussion on the PHY Performance of Interference Transient Response

- EMC Baseline should be followed by Cable, connector and PHY venders

- Lower the transient BER requirement would reduce the SNR budget requirement (16dB gap), how low we can go? Bottom line?

- Lower the transient BER requirement would make RTPGE restrained from the critical and time-sensitive applications