EMC Ad Hoc Conference

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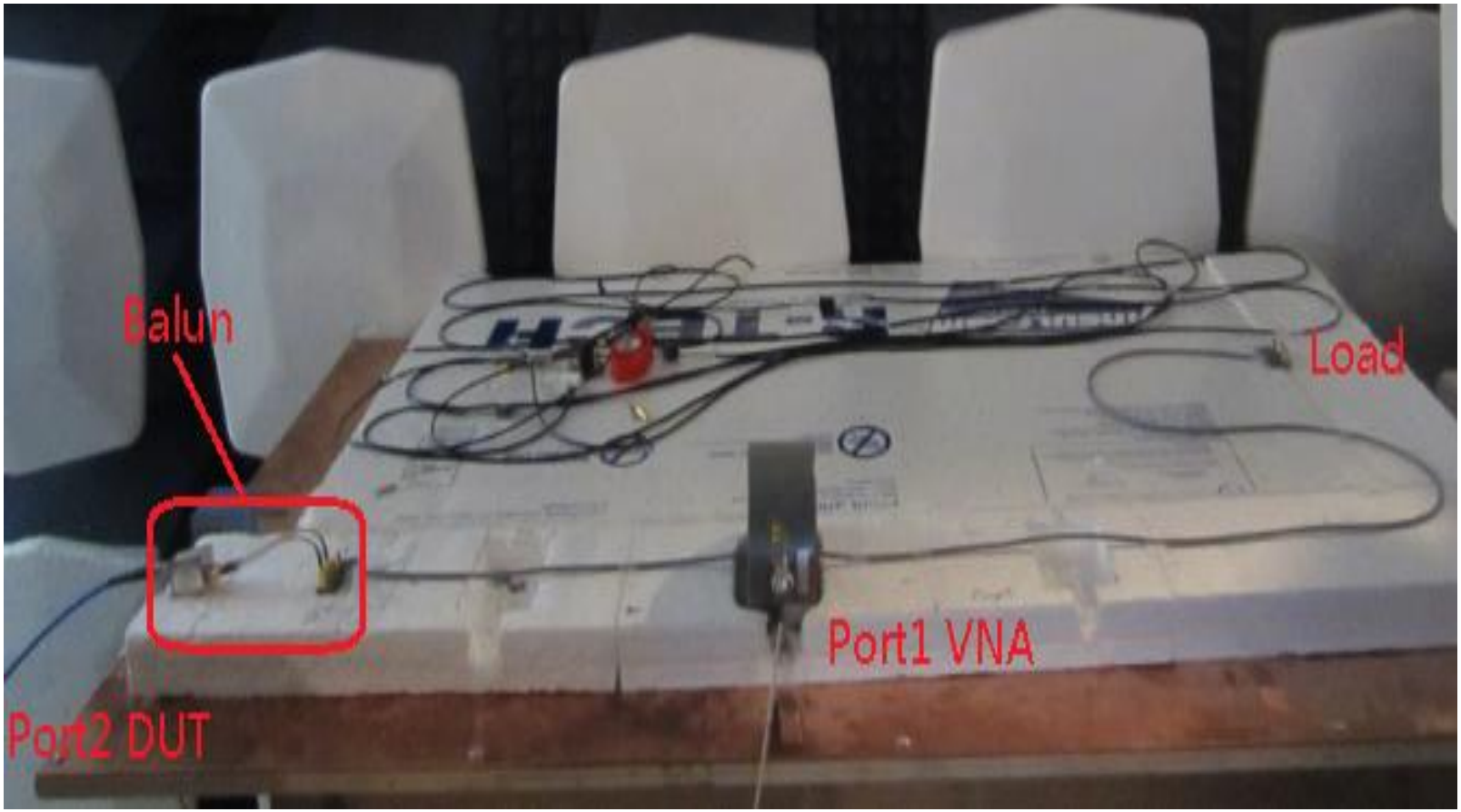
BCI Lab Measurements and Common Mode Impedance Effects

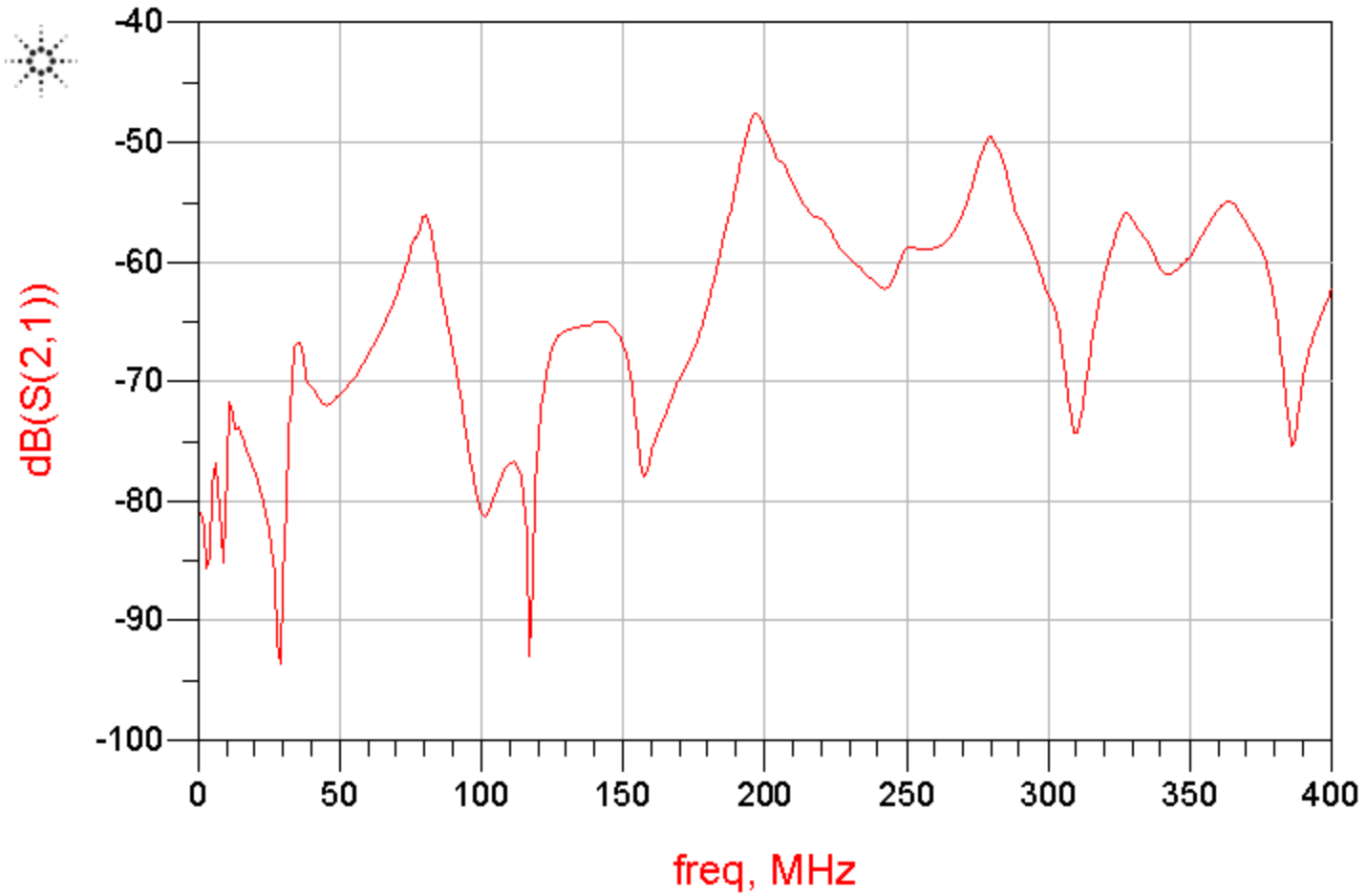
- BCI with 2m UTP cable Mode Conversion measurements
- Time domain differential noise measurement
- Correlation between frequency domain prediction and time domain measurements
- Comparison of 3-port measurement and 2-port with a Balun measurement

Measurement setup

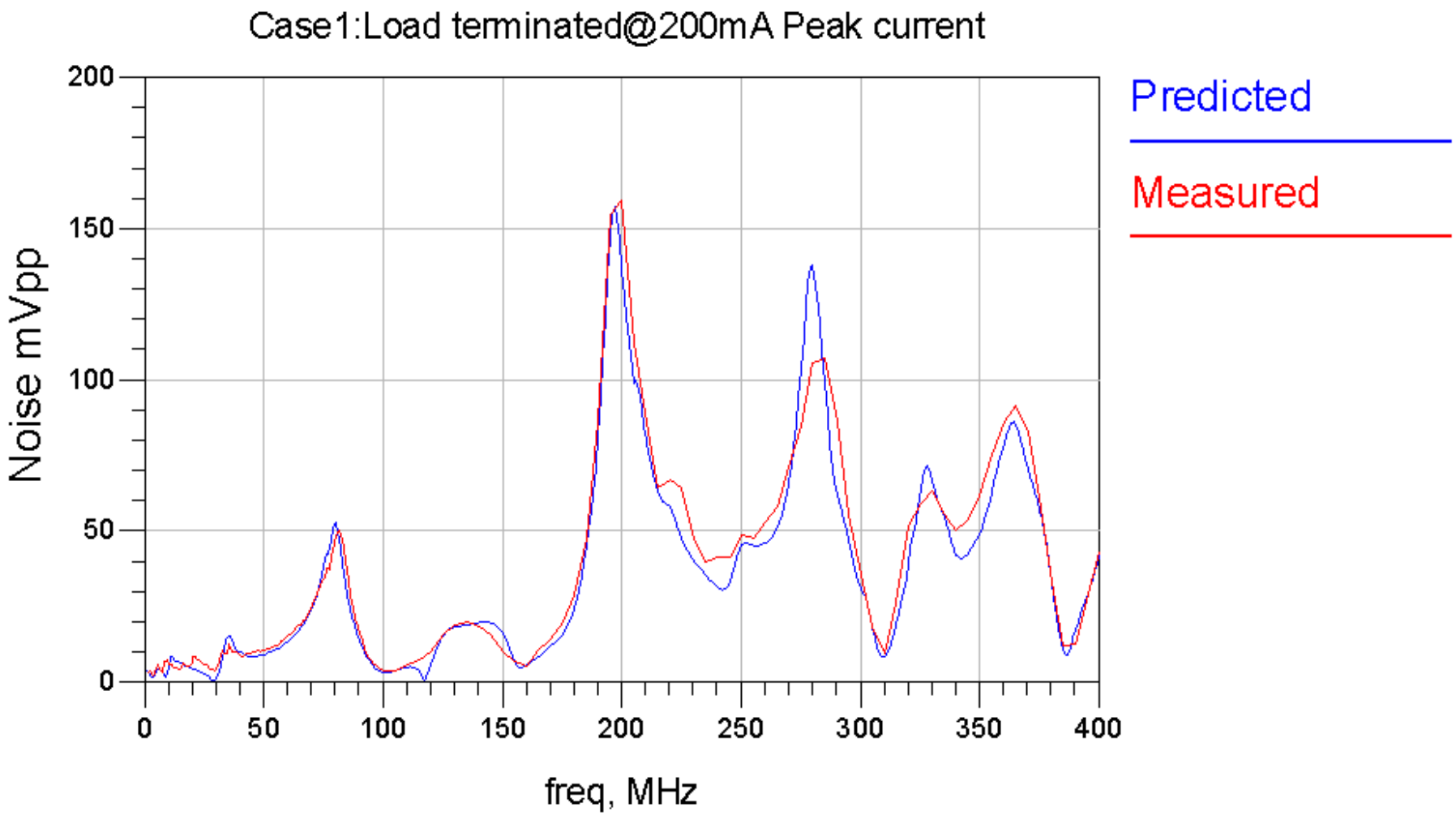
- A Balun is used to isolate the interference from the measurement



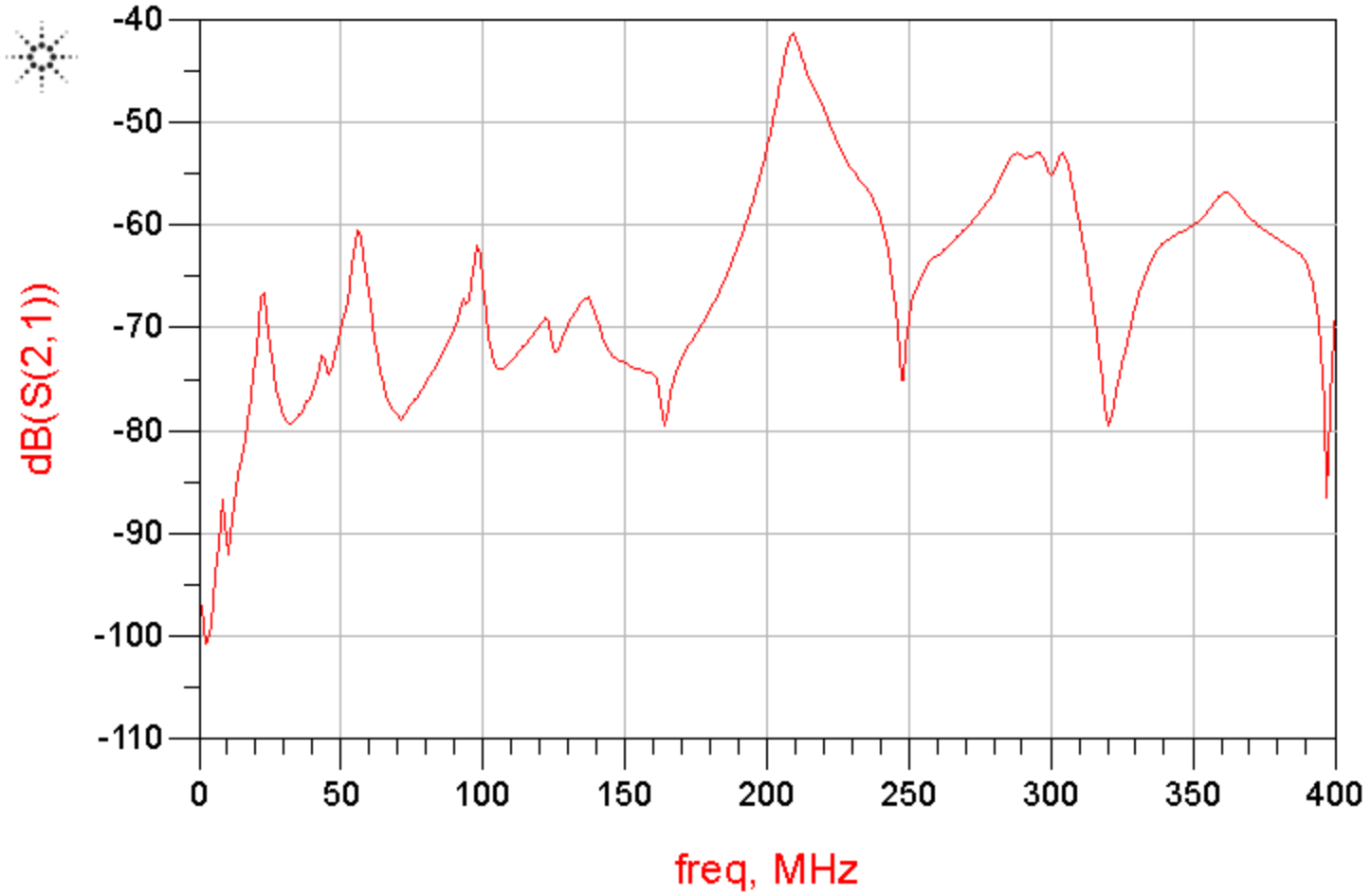
Case 1: Measured 2-Port S-parameter with the common mode terminated to the Metal Plain



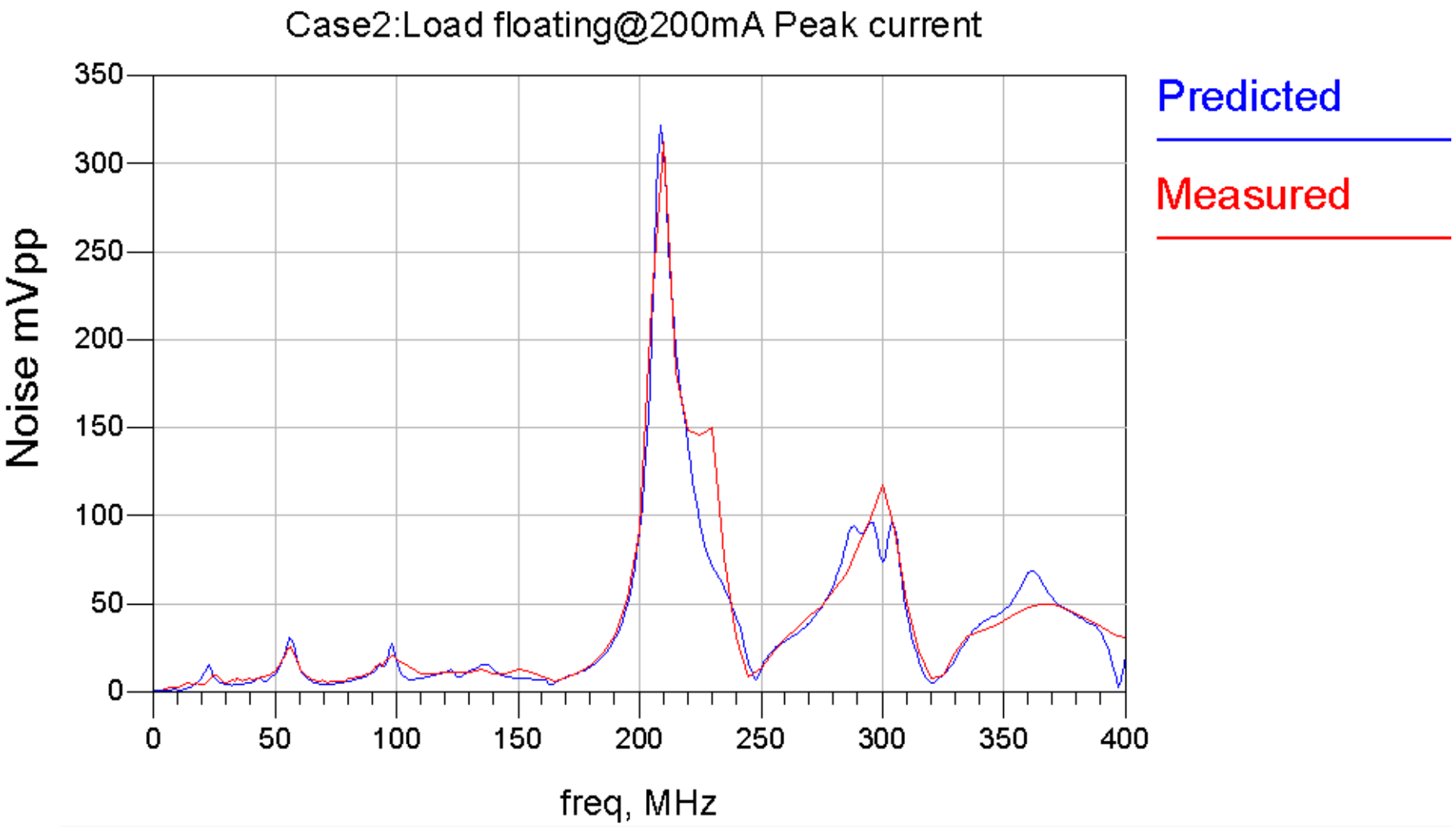
Predicted VS Measured for Case1



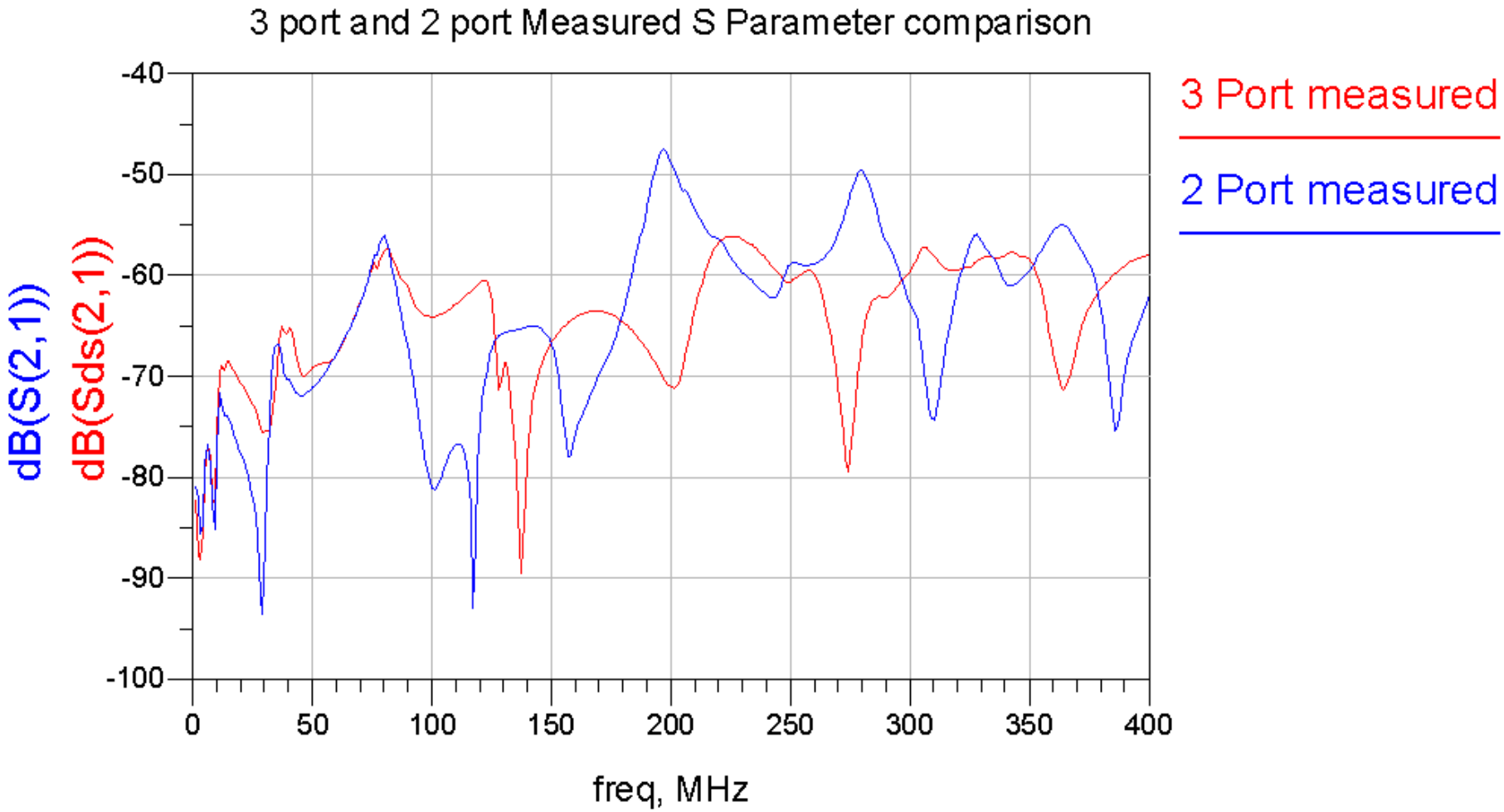
Case 2: Measured 2-Port S-parameter with floating common mode connection



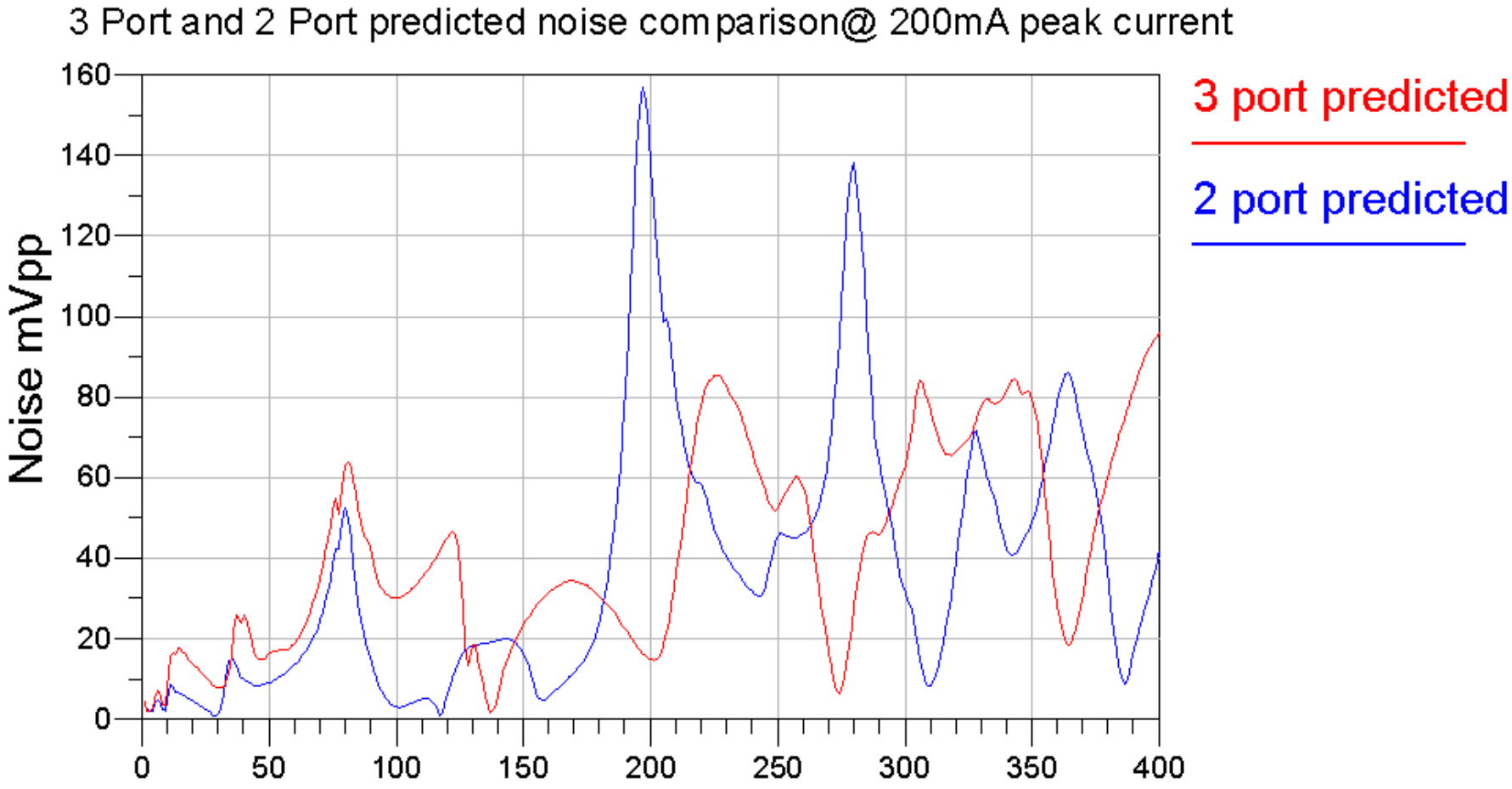
Predicted VS Measured for case2



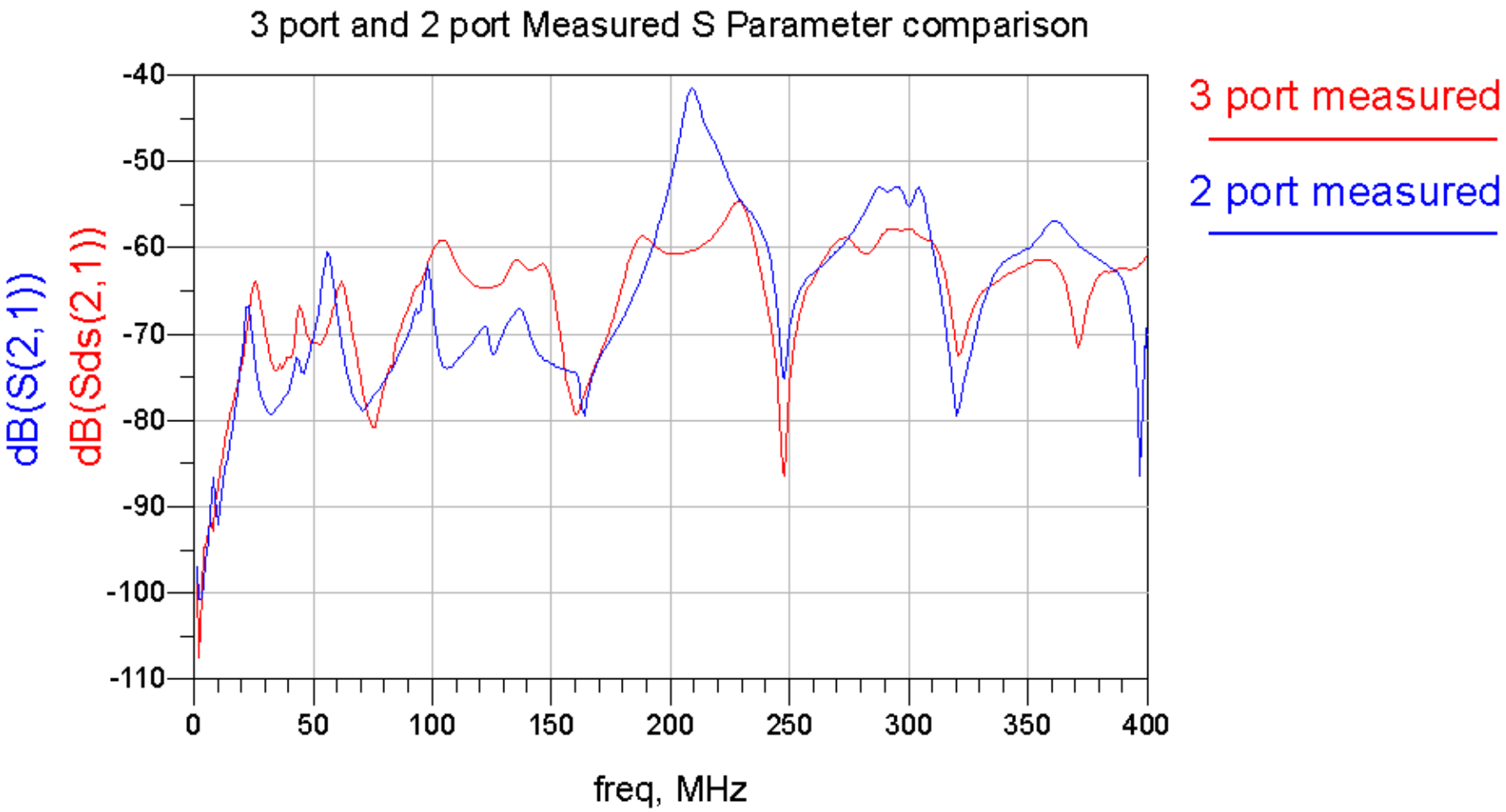
3-Port and 2-port with Balun Mode Conversion Comparison for Case1



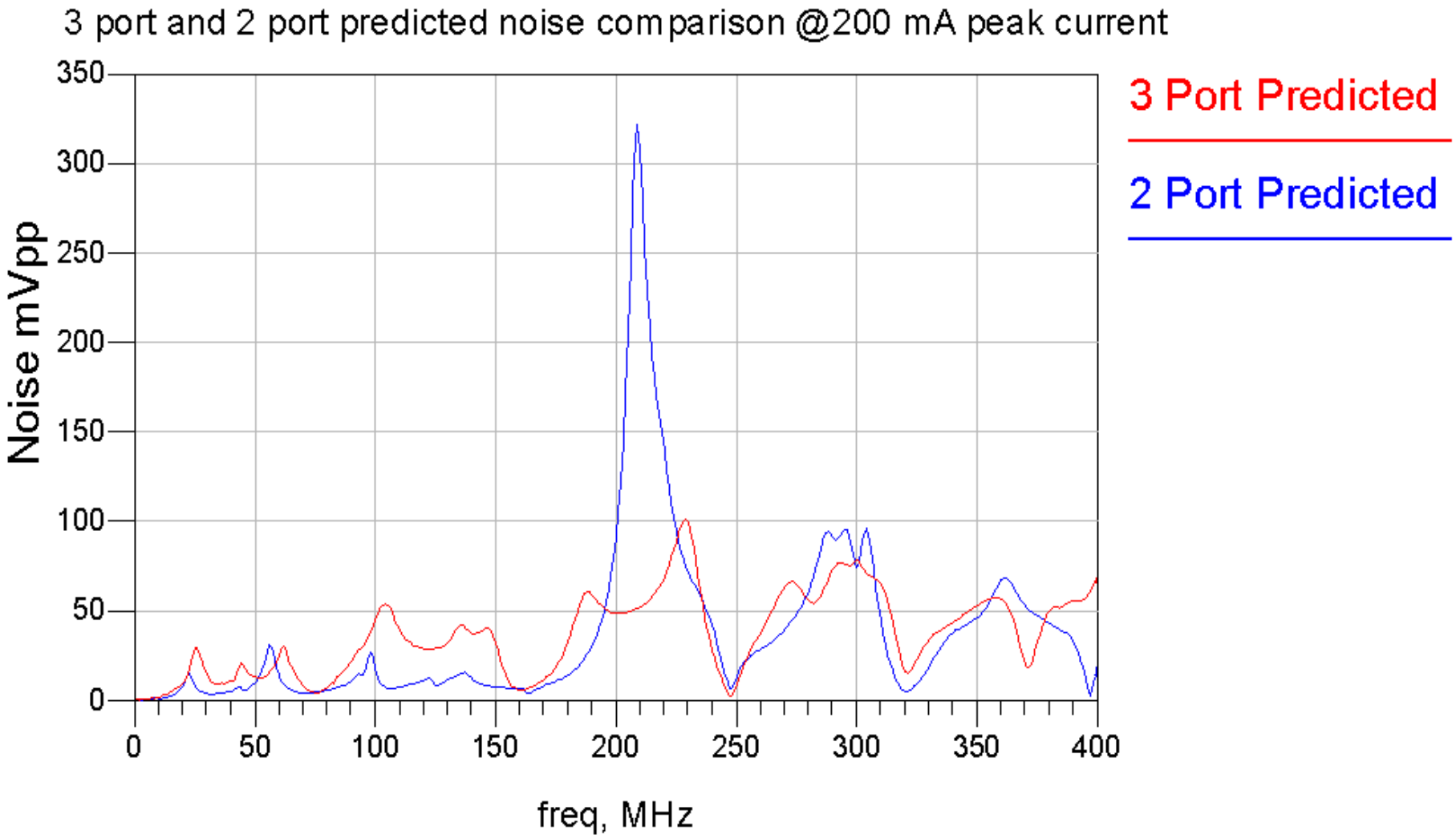
3-port and 2-port with Balun Predicted Noise Comparison for Case1



3-port and 2-port with Balun Mode Conversion Comparison for Case2



3-port and 2-port with Balun Predicted Noise Compare for Case2



Conclusions

- Predicted differential voltages based on S-parameter measurements correlate well with the time domain measurements.
- The common mode impedance does affect the mode conversion(6dB difference observed)
- 3-port and 2-port measurement methods cause 4dB difference for case1 and 10dB difference for case2

Discussions

- Peak or RMS
  - BCI standard defines the current unit as a RMS value though different OEMs define their own BCI current limit line
  - Many OEMs if not most, use 200mA RMS as test standard. 802.3bp should define and have a consensus on the current limit line used in the EMC baseline, for example, 200mA RMS or 141mA RMS(200mA Peak)