

Voltage Transfer Function

Effects of Tx and Rx RL on channel cases
10/7/05

Voltage Transfer Function (VTF) relevance to simulation

2

- What is really of most relevance to time domain analysis is the voltage transfer function.
- This is what we simulate when we include the package and die in the channel simulation.
- It includes the effect of non-perfect loads.
- Γ_L and Γ_S are the Rx and Tx reflection coefficient
- Gamma relates to the spec's return loss in the spec.
 - ✦ $20 \cdot \log(|\Gamma|)$

Voltage transfer function definition

- S11, S21, S12, and S22 are channel s-parameters
- The voltage transfer functions for a 2 port network is given by the following equation.

$$\frac{s_{21}}{2} \cdot (\Gamma_L + 1) \cdot (1 - \Gamma_s)$$

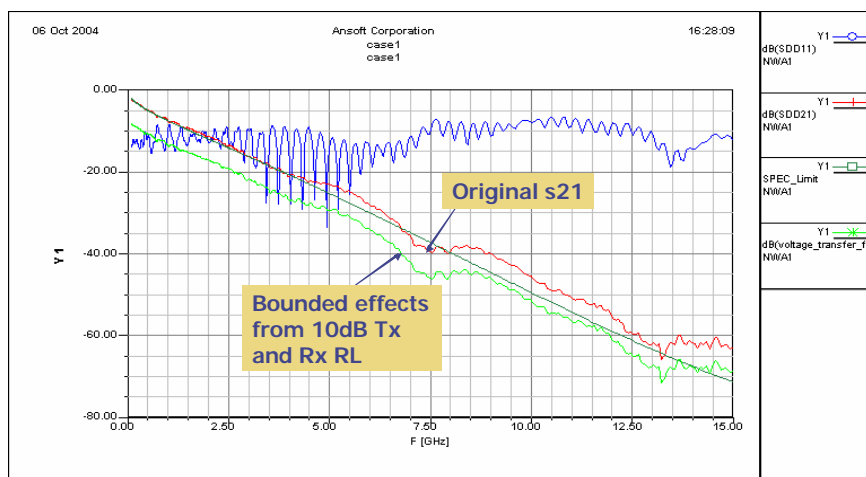
$$1 - s_{11} \cdot \Gamma_s - s_{22} \cdot \Gamma_L - s_{21} \cdot s_{12} \cdot \Gamma_L \cdot \Gamma_s + s_{11} \cdot s_{22} \cdot \Gamma_L \cdot \Gamma_s$$

- Notice it is not S21
- The effect of Tx and Rx packages is bound approximately 6dB for respective return loss spec of 10dB. See next slide



Richard Mellitz

VTF case1



Richard Mellitz

Simulation Proposal

- More realistic Γ_L and Γ_s vs. frequency would yield more realistic results.
- The issue.
 - ✦ The standard needs to work when the channel and device specs are put together
 - ✦ It's apparent that vendors can do better i.e. they have a good RL or a good Rx design.
 - ✦ However can a device with max RL work?
 - ✦ If not, then we need to change the RL spec.
- Proposal
 - ✦ The channel spec is the standard.
 - ✦ Simulation work should use the derived voltage transfer function instead of a vendors device and the channel spec.
 - ✦ Maybe we define a more realistic RL vs. Freq.
 - The Constant -10dB is pessimistic.

