



PKG MODEL FOR 802.3CK COM

Package Discussions Update
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Status Update

- Inputs from the group claimed that PKG trace loss is on the pessimistic side – Updated – Slide #3
 - *Current suggestion is to go forward with the updated trace parameters (excluding length) as a basis for analysis - Slide #4 ; Impedance may vary later on if we find fit – not to be accounted for @ this stage*
- Inputs stated that the trace length in a 70mm² PKG will exceed 30mm (36mm-40mm)
 - *It is assumed that in a long trace case PKG trace characteristics can not follow 5dB @30mm (as was presented in Bangkok)*
 - *What is the appropriate trace length to be used in COM? (many options)*
- Decision tree will be presented going forward mainly targeting topology stake in the ground

PKG Extracted Trace Change Highlights

- Surface Roughness to follow best case of surface roughness technology
- Dielectric material characteristics taken @ room temperature (0.004)
- **Resulting loss \approx 4dB @ Nyquist – Correlated to inputs**
- Ball side equivalent capacitance taken closer to the higher end. i.e. 0.9fF (actual is 0.87fF)
- Impedance used was a bit higher (closer to the 92.5 Ω target)
- Matched to a model by Rich (Thanks!)
- There is a notion to proceed with this trace loss (and the model that goes with it) to the next phase
- Used 110fF for die side capacitance in runs
- Running with Zambel orthogonal 28.6dB orthogonal BP result >3.5dB COM

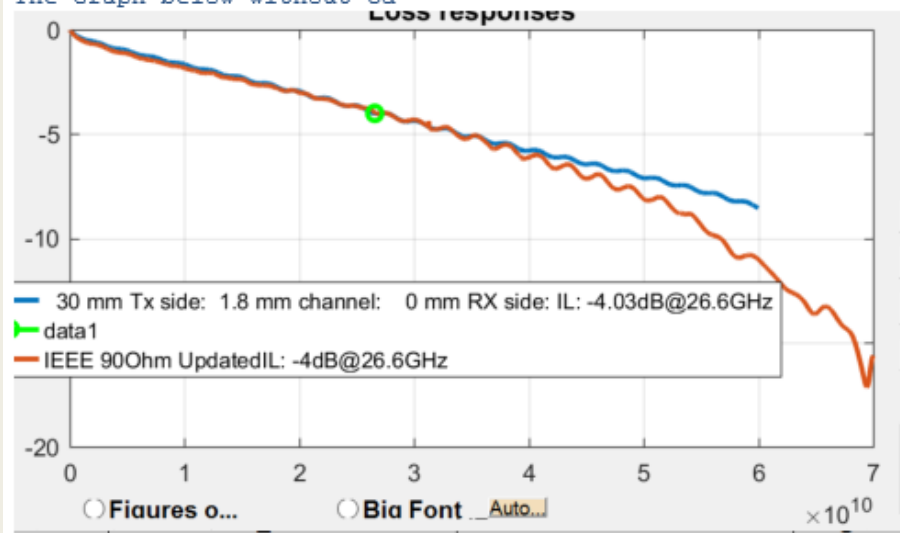
Suggested Matched Parameters

C_d	[1.1e-4 1.1e-4]	nF	[TX RX]
z_p select	[1 2]		[test cases to run]
z_p (TX)	[12 30; 1.8 1.8; 0 0; 0 0]	mm	[test cases]
z_p (NEXT)	[12 30; 1.8 1.8; 0 0; 0 0]	mm	[test cases]
z_p (FEXT)	[12 30; 1.8 1.8; 0 0; 0 0]	mm	[test cases]
z_p (RX)	[12 30; 1.8 1.8; 0 0; 0 0]	mm	[test cases]
C_p	[0.87e-4 0.87e-4]	nF	[TX RX]

package_tl_gamma0_a1_a2	[0 0.0009909 0.0002772]	
package_tl_tau	6.14E-03	ns/mm
package_Z_c	[87.5 87.5 ; 92.5 92.5; 100 100 ; 100 100]	Ohm (tdr sel)

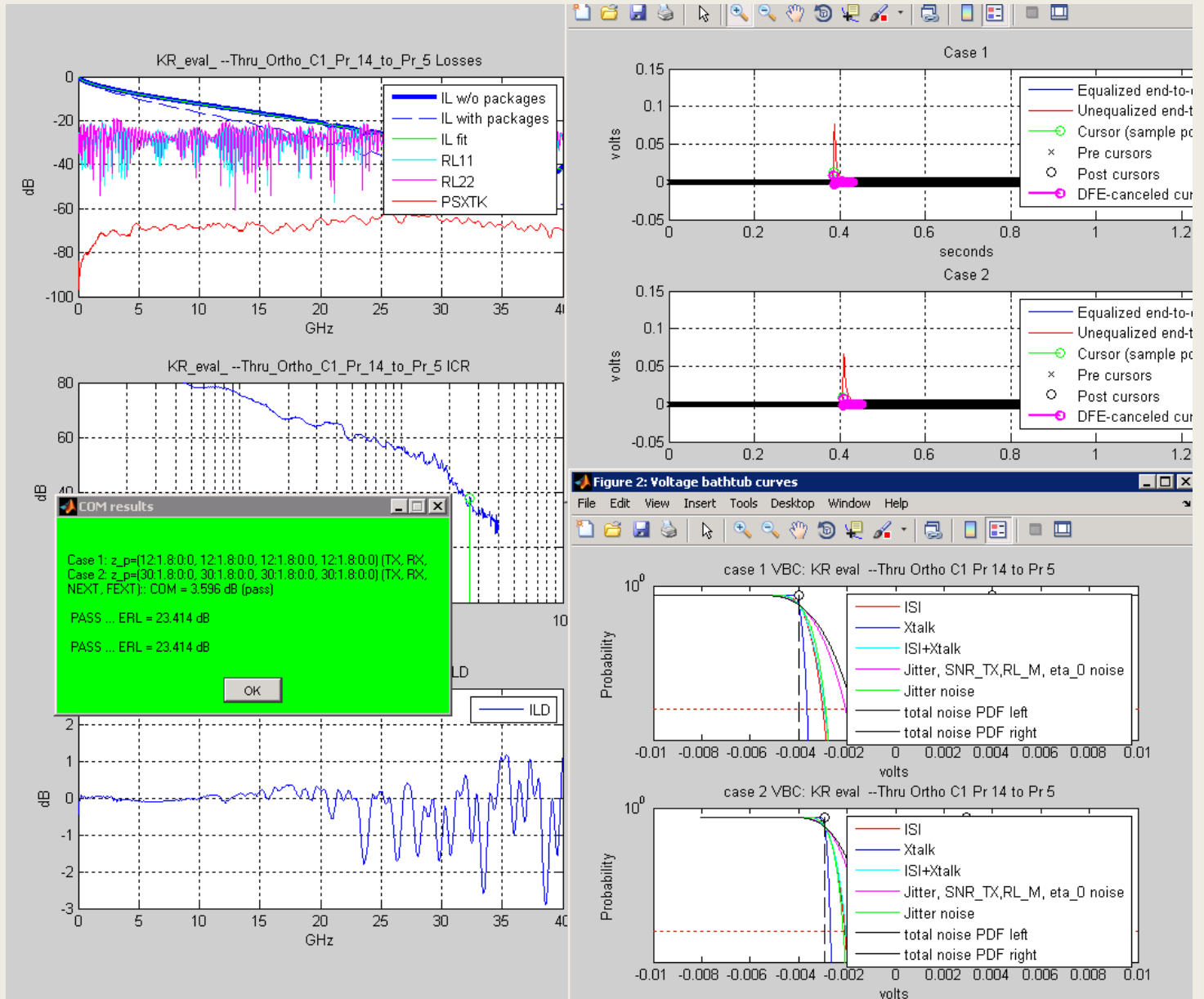
* First section impedance may vary to 92.5Ω/97.5Ω

The Graph below without Cd



Updated Run

- Former runs resulted in ~2.8-2.9dB of COM
- Current parameters result in 3.6dB COM



Decision Tree

- Assumption: Trace parameters and ball discontinuity to follow written in slide #4
 - *Recommendation is that these parameters will be used for future analysis (excluding length)*
- **Decision #1:** Topology options (main open item to be defined before putting PKG model stake in the ground):
Lengths below exclude 1.8mm designated for PTH+lower laser via+ball delay and loss
 - **Symmetric**
 - 30mm, 32mm, 34mm, 36mm per side
 - **Asymmetric (36mm & 30mm)**
 - Tx Longer (may pose a challenge on ITol Rx testing)
 - Rx Longer (May pose a challenge on Tx qual @ TPO in longer packages)
- **Decision #2:** Cd = 130fF / 110fF (10fF assumed to be related to PKG side bump pad parasitic capacitance)
- **Recommendation:**
 - *Use data provided to analyze and come up with recommendation(s) as to appropriate decision(s) in the above decision tree*

Thanks!