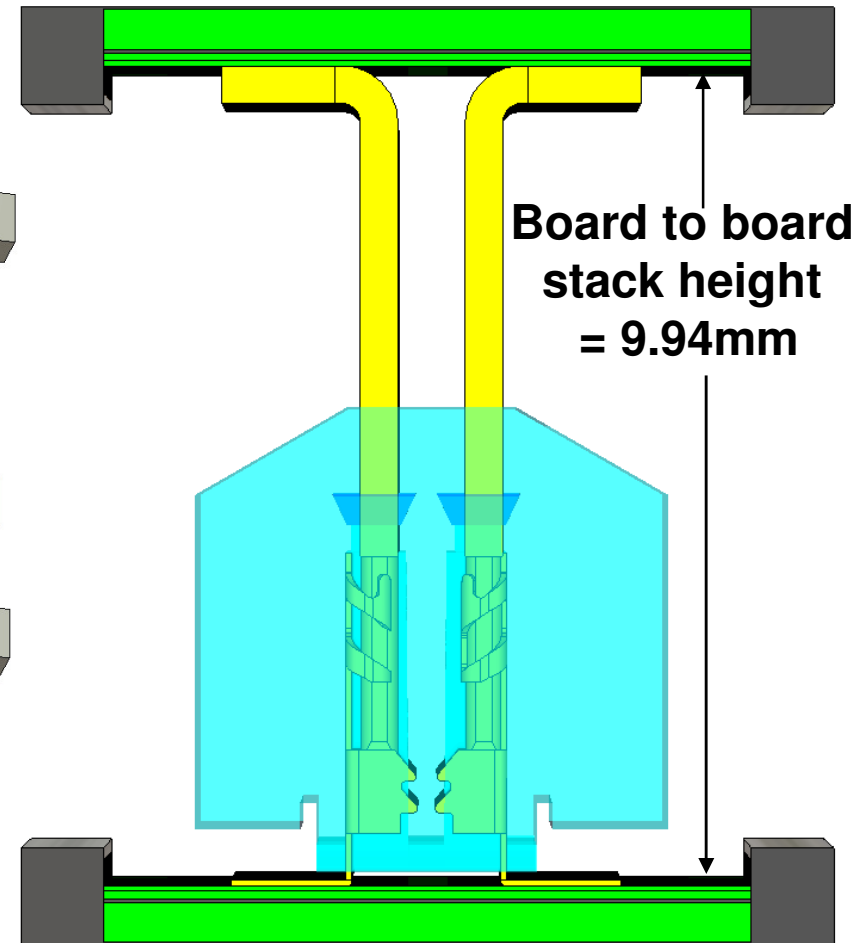
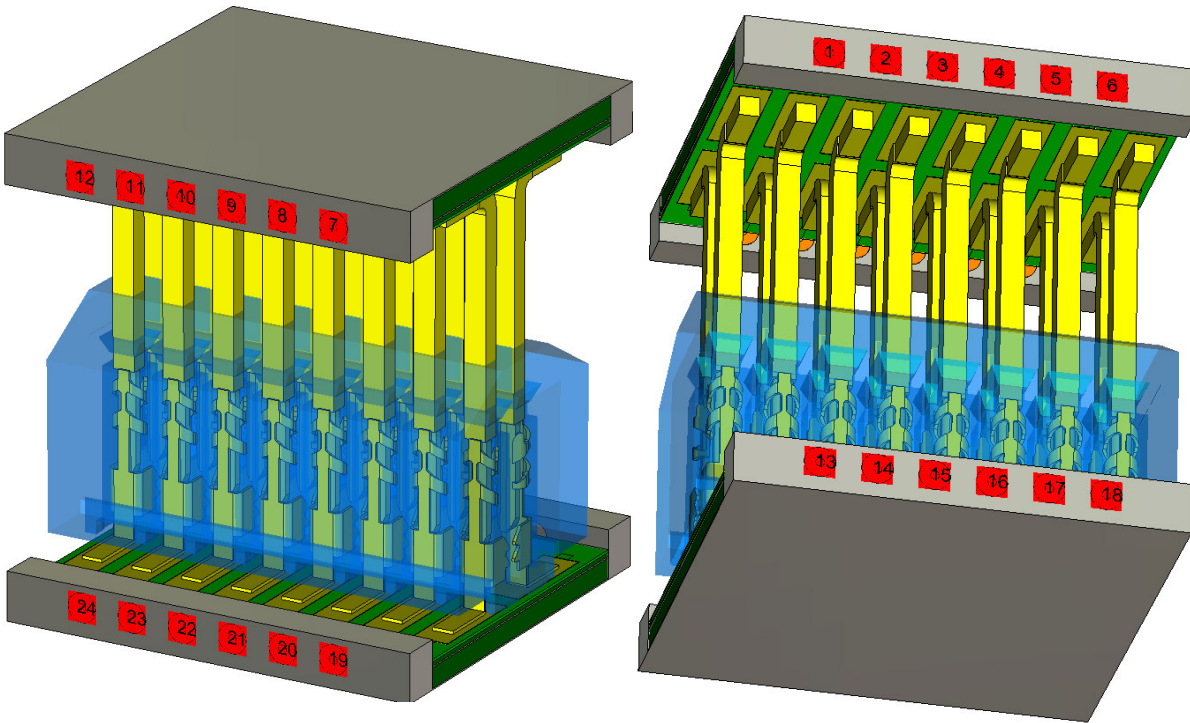


Ribcage SMT Vertical Header to SMT Vertical Receptacle (9.94mm Board to Board)

Part Numbers: 91036, 87024

Jonathan Buck
Staff Signal Integrity Engineer
September 24, 2008
DBH Modified 10/13/08

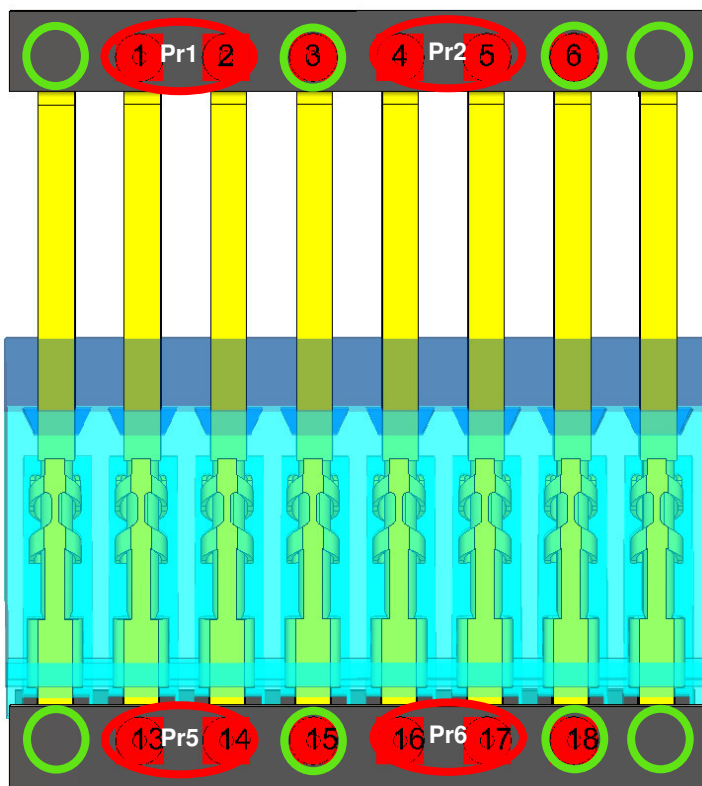
Ribcage Geometry Modeled



PNs: 91036 (Vertical SMT Header)
87024 (Vertical SMT Receptacle)

Note: 1mm of trace and SMT pads with void underneath (impedance control) are included in model and results

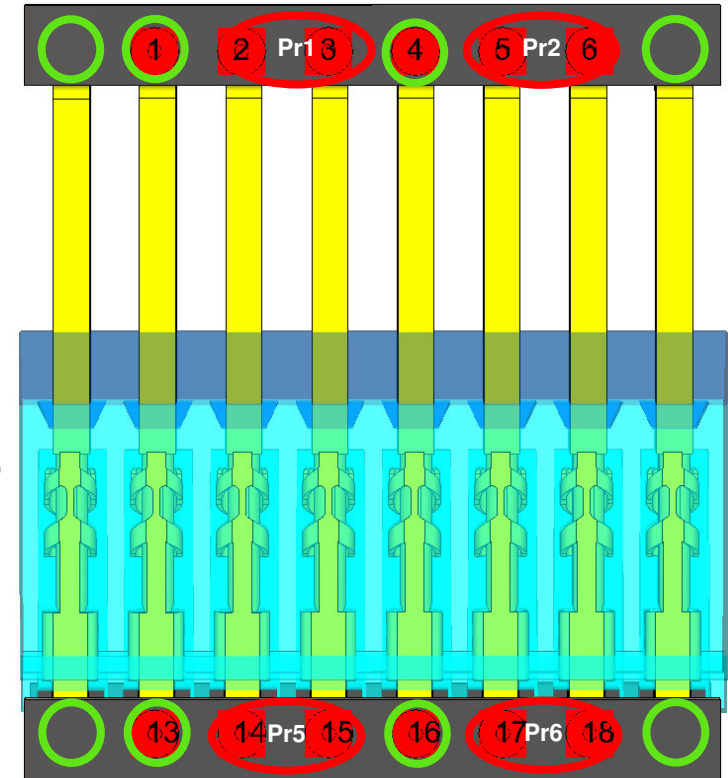
RC Pair Patterns Modeled



**Standard Pair Pattern
(Opposite Side Align)**



Pr1 connects to Pr5
ect...



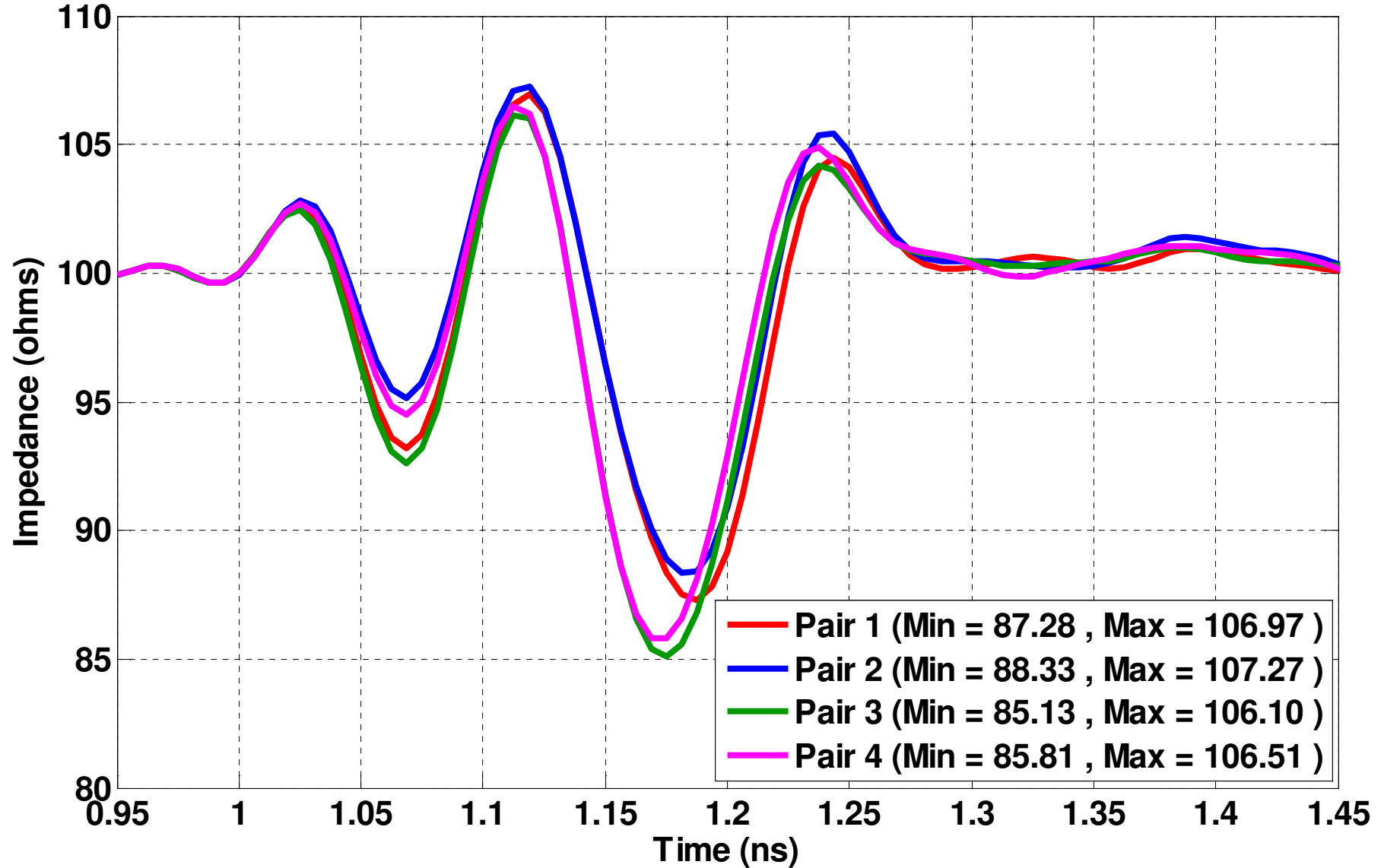
**Staggered Pair Pattern
(Opposite Side Offset 1 Pin)**

Offsetting pairs by one pin front to back reduces crosstalk

RC Standard Differential Impedance



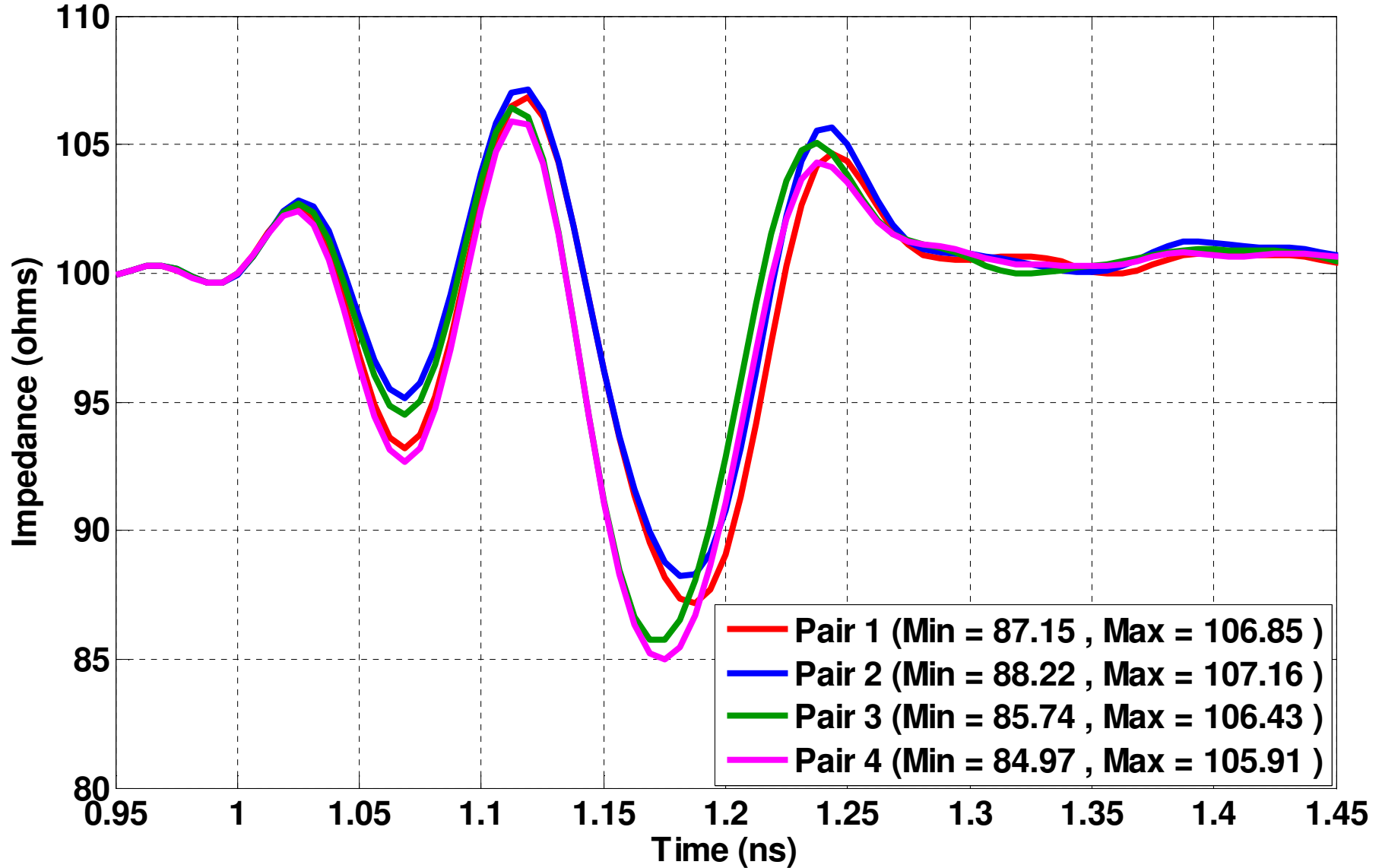
Ribcage Standard Pairs - DIFFERENTIAL IMPEDANCE - Risetime = 50 ps (10-90%)



RC Staggered Differential Impedance



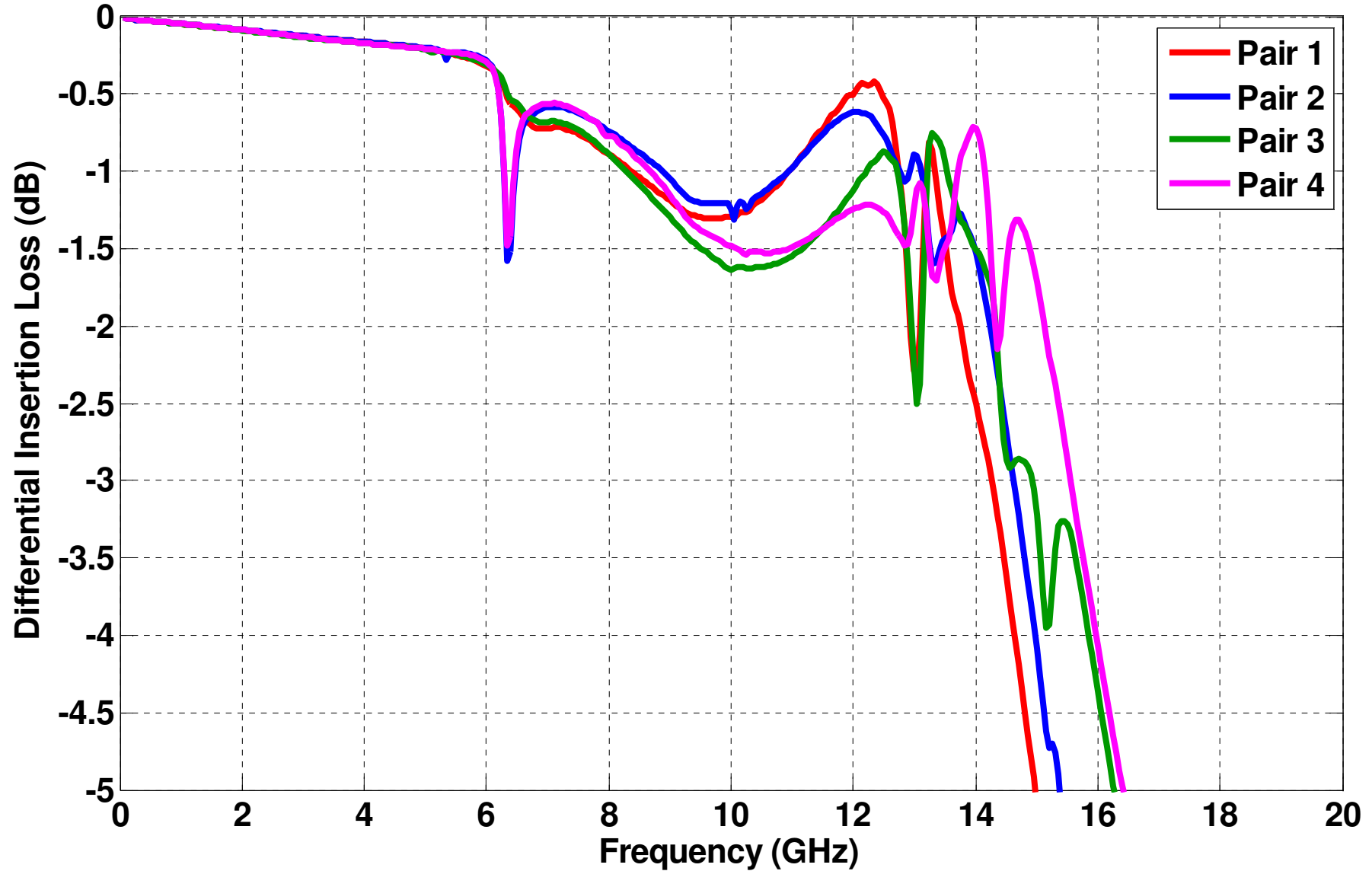
Ribcage Staggered Pairs - DIFFERENTIAL IMPEDANCE - Risetime = 50 ps (10-90%)



RC Standard Differential Insertion Loss



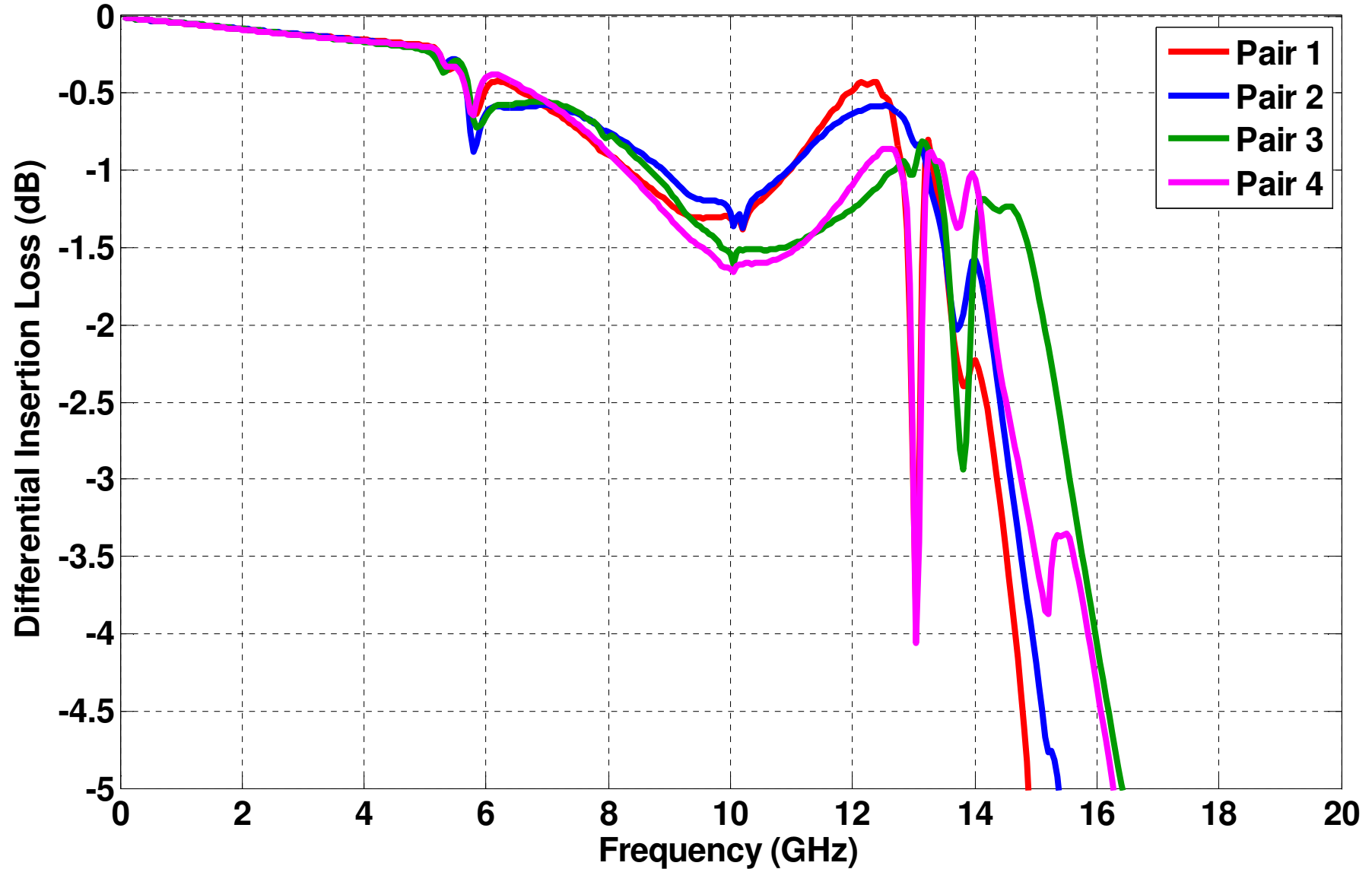
Ribcage Standard Pairs - DIFFERENTIAL INSERTION LOSS



RC Staggered Differential Insertion Loss



Ribcage Staggered Pairs - DIFFERENTIAL INSERTION LOSS



RC Differential Pair X-Talk



Backward/Near End (NEXT) and Forward/Far End (FEXT) Crosstalk shown in %
 (Super-position allows doubling of Pr2 to Pr1/5 and Pr2 to Pr 3/7 to approximate additional pairs)

NEXT[%] - Total NEXT : 6.70 5.09 2.39%				
From	To	Risetime = 50 ps (10-90%)	Risetime = 100 ps (10-90%)	Risetime = 250 ps (10-90%)
Pair 2	Pair 1	-0.36	-0.28	-0.17
Pair 2	Pair 3	0.19	-0.08	-0.05
Pair 2	Pair 4	6.16	4.73	2.17

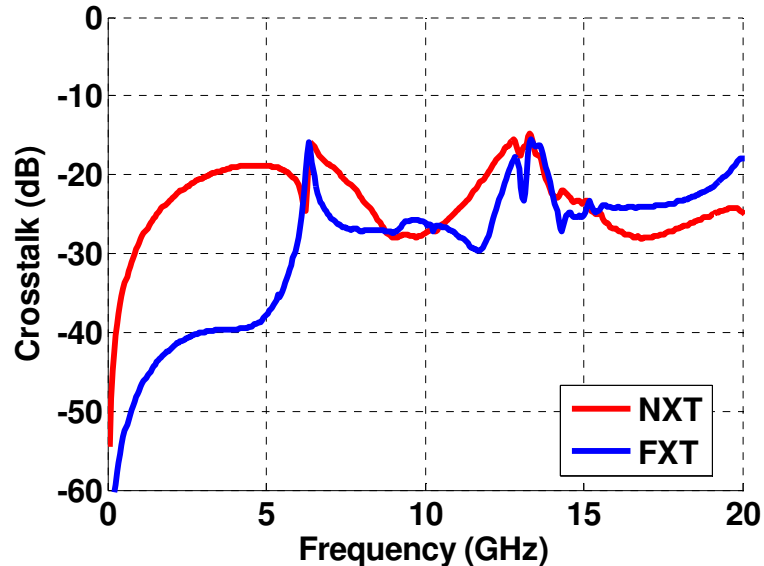
FEXT[%] - Total FEXT : 1.57 0.75 0.36%				
From	To	Risetime = 50 ps (10-90%)	Risetime = 100 ps (10-90%)	Risetime = 250 ps (10-90%)
Pair 2	Pair 5	0.52	0.27	0.10
Pair 2	Pair 7	0.23	0.12	0.04
Pair 2	Pair 8	0.81	0.36	0.22

NEXT[%] - Total NEXT : 3.21 2.51 1.18%				
From	To	Risetime = 50 ps (10-90%)	Risetime = 100 ps (10-90%)	Risetime = 250 ps (10-90%)
Pair 2	Pair 1	-0.37	-0.29	-0.18
Pair 2	Pair 3	-0.98	-0.68	-0.31
Pair 2	Pair 4	-1.86	-1.54	-0.69

FEXT[%] - Total FEXT : 1.77 0.90 0.31%				
From	To	Risetime = 50 ps (10-90%)	Risetime = 100 ps (10-90%)	Risetime = 250 ps (10-90%)
Pair 2	Pair 5	0.52	0.27	0.10
Pair 2	Pair 7	-0.46	-0.17	-0.03
Pair 2	Pair 8	-0.80	-0.45	-0.17

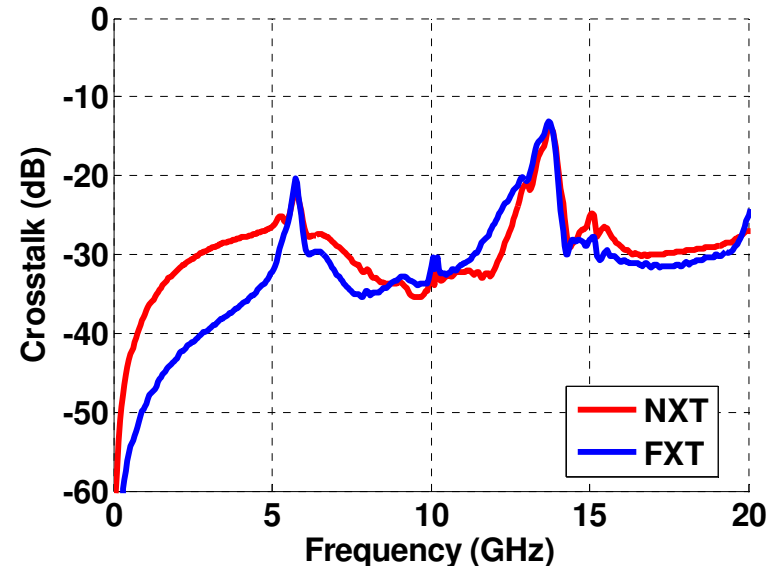
Standard Pair Pattern

Pair 2: POWER SUMMATION OF X-TALK



Staggered Pair Pattern

Pair 2: POWER SUMMATION OF X-TALK



- Product has potential to run up to 10 Gb/s
- Staggering of pairs helps reduce crosstalk levels
- Shorter stack heights will perform better, but may still have high crosstalk levels
- Worst case crosstalk is from the pair in the opposite row, not adjacent pairs, hence lower density wiring patterns could be used to further reduce crosstalk levels