

# Amphenol Aerospace

## Board Level Products

### HSB<sup>3</sup> High Speed Signal Integrity Analysis



**The Interconnection Leader**

# Quick Look at HDB<sup>3</sup> Performance

- Durability: 100,000 Mating Cycles
- Insertion Force: 1.5 ounce typical per contact
- Signal Speed: 3.125 Gb/s
- Impedance: 100 Ohms on Differential Pairs
- Dielectric Withstanding Voltage: 750 Volts, 60 HZ, RMS @ sea level
- Insulation Resistance: 5 gigaohms Min. at 100 Volts DC
- Solderability: MIL-STD-202, Method 208
- Salt Fog: 48 hours IAW MIL-STD-1344, method 1001, test condition B
- Humidity: IAW MIL-STD-1344, method 1002, type II
- Vibration: IAW MIL-STD-1344, method 2005, test condition V
- Shock: IAW MIL-STD-1344, method 2004, test condition G
- Operational Temperature: -65 to 150°C

# HDB<sup>3</sup> Daughterboard Connector

- Partially populated standard HDB<sup>3</sup> daughterboard insert
- Design utilizes Amphenol's high performance B<sup>3</sup> (Brush) contact system
- 100 ohm differential pair contacts capable of 3.125 Gb/s data rates
- Right angle PCB termination
- D-shape polarization

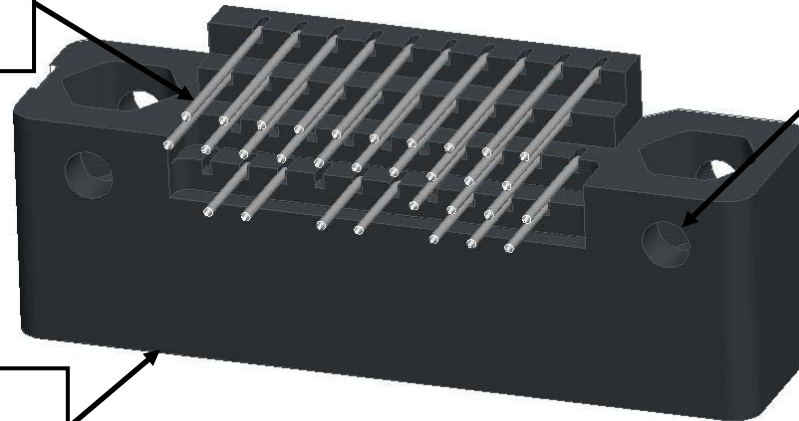
## Contact Spacing:

.070 spacing along a row, .060 spacing between rows with a row offset of .035

Right angle PCB termination

PCB Mounting Holes

Molded dielectric insert

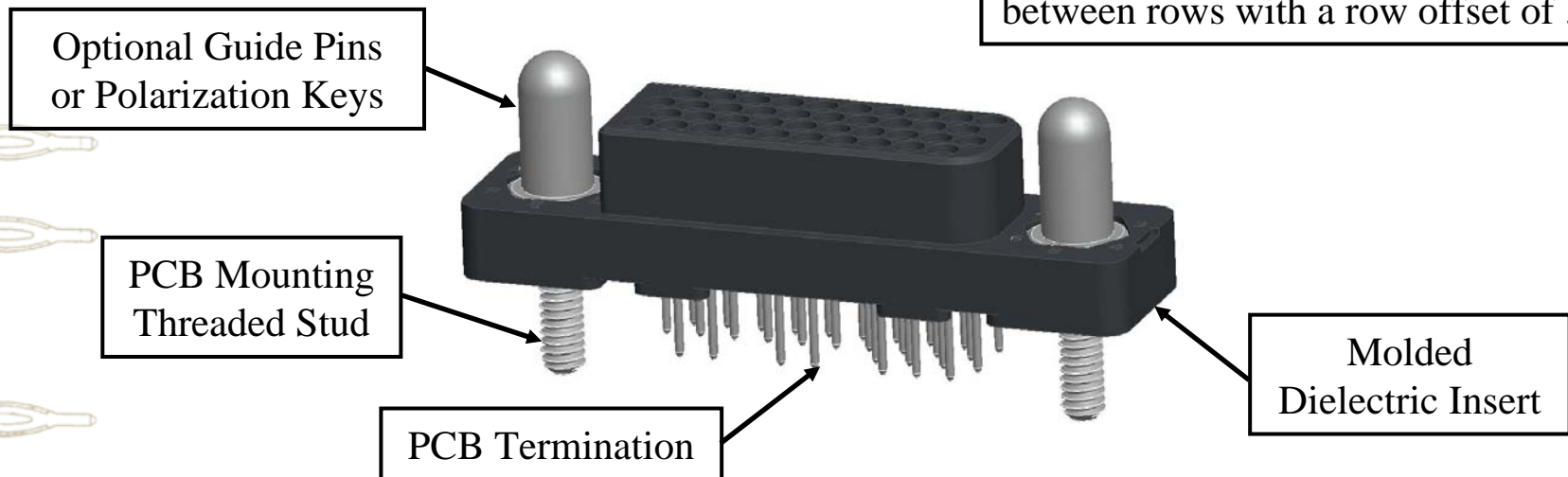


# HDB<sup>3</sup> Motherboard Connector

- Partially populated standard HDB3 motherboard insert
- Design utilizes Amphenol's high performance B<sup>3</sup> (Brush) contact system
- Same contact scheme as daughterboard connector
  - 100 ohm differential contact pairs
- Guide pins – allowing .035" min. misalignment (optional)
- PCB termination
- D-shape polarization

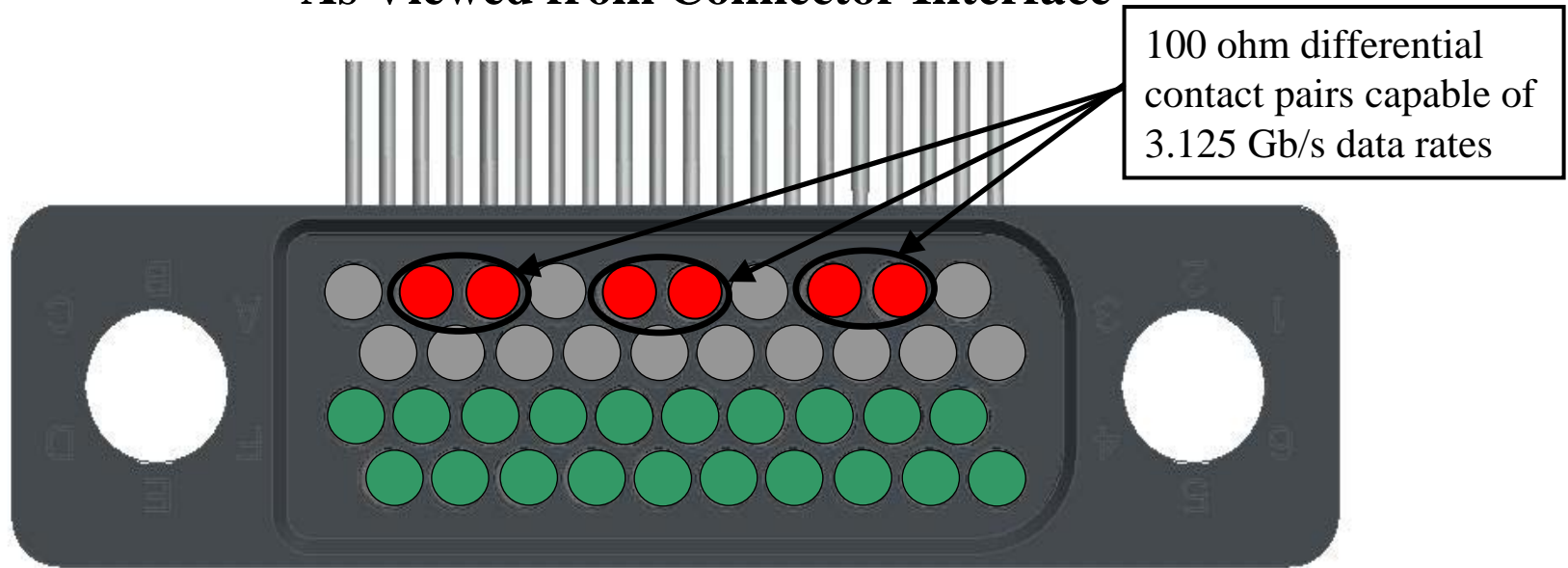
## Contact Spacing:

.070 spacing along a row, .060 spacing between rows with a row offset of .035



# Signal/Ground Contact Definition

As Viewed from Connector Interface



- Low Speed Signal Contacts
- Differential Pair Contacts
- Empty Contact Cavities

# Contact Breakdown Per Connector

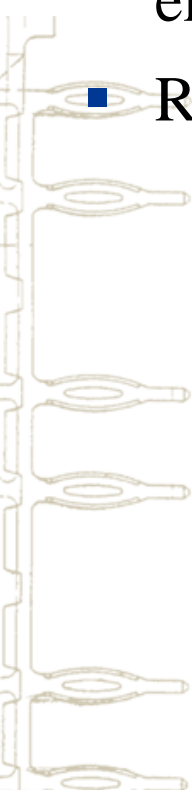
	<b>40 Pin Connector</b>	<b>80 Pin Connector</b>	<b>120 Pin Connector</b>	<b>160 Pin Connector</b>
<b>Differential Pairs</b>	<b>3</b>	<b>7</b>	<b>10</b>	<b>13</b>
<b>Low Speed Signal</b>	<b>20</b>	<b>40</b>	<b>60</b>	<b>80</b>

# HDB<sup>3</sup> Signal Integrity Analysis

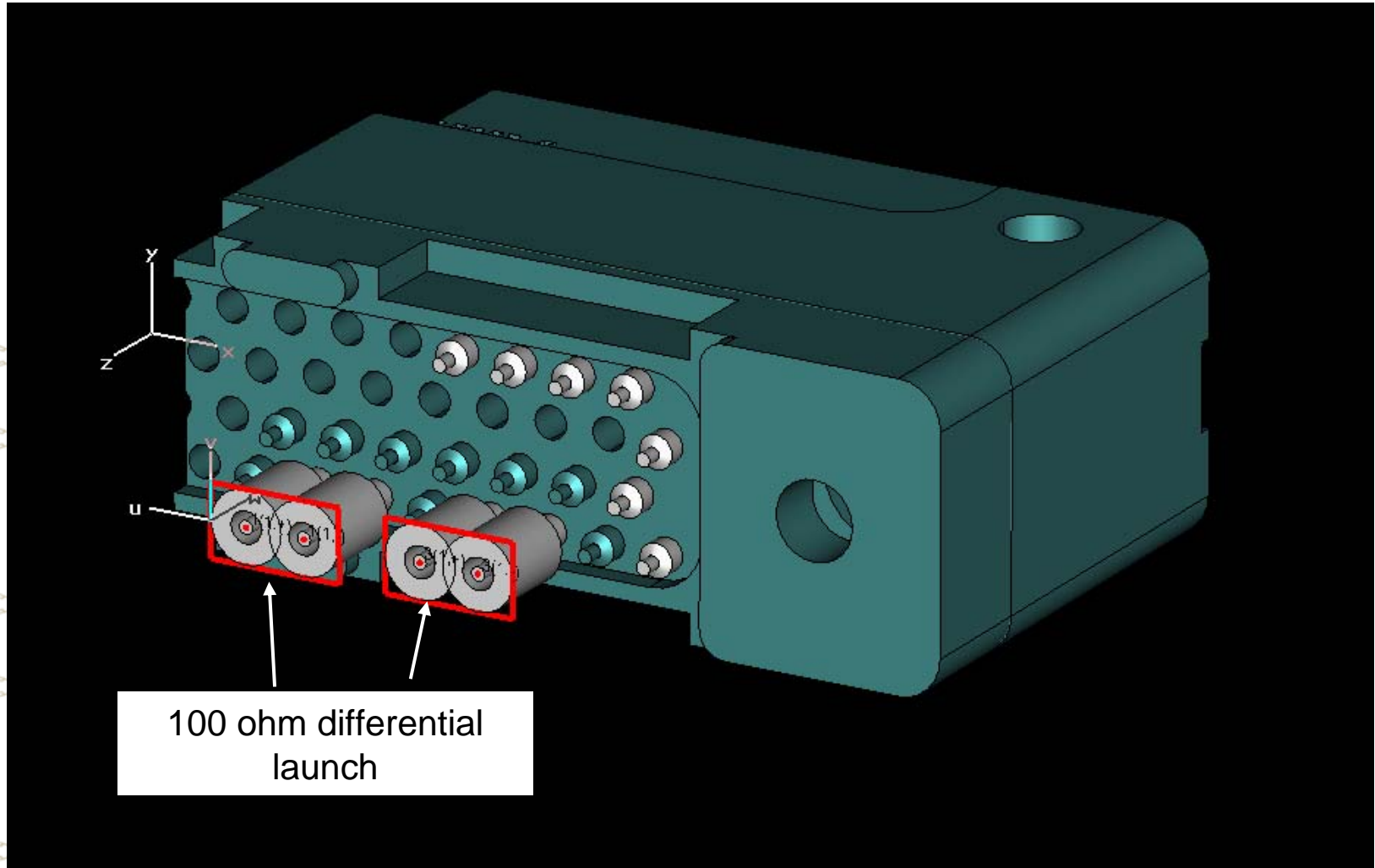
# HDB<sup>3</sup> Connector EM Simulation

**Target:** Differential pairs capable of 3.125 Gb/s data transmission

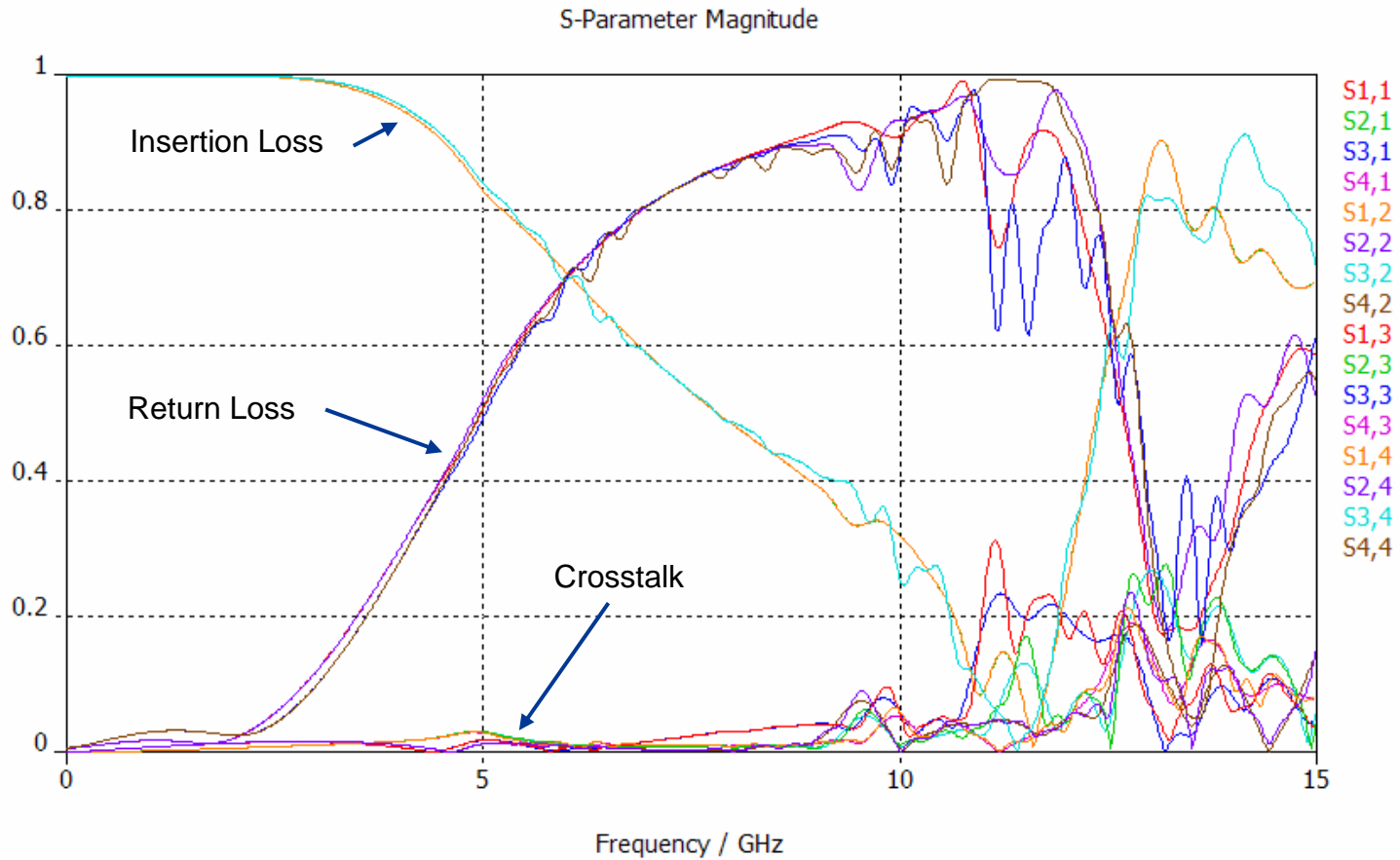
- Bottom row was chosen due to shortest overall tail length
- Differential pairs separated from each other and other contacts by empty contact cavities. (See slide 5 for contact layout)
- Results indicate 3.125 Gb/s data transmission is achievable



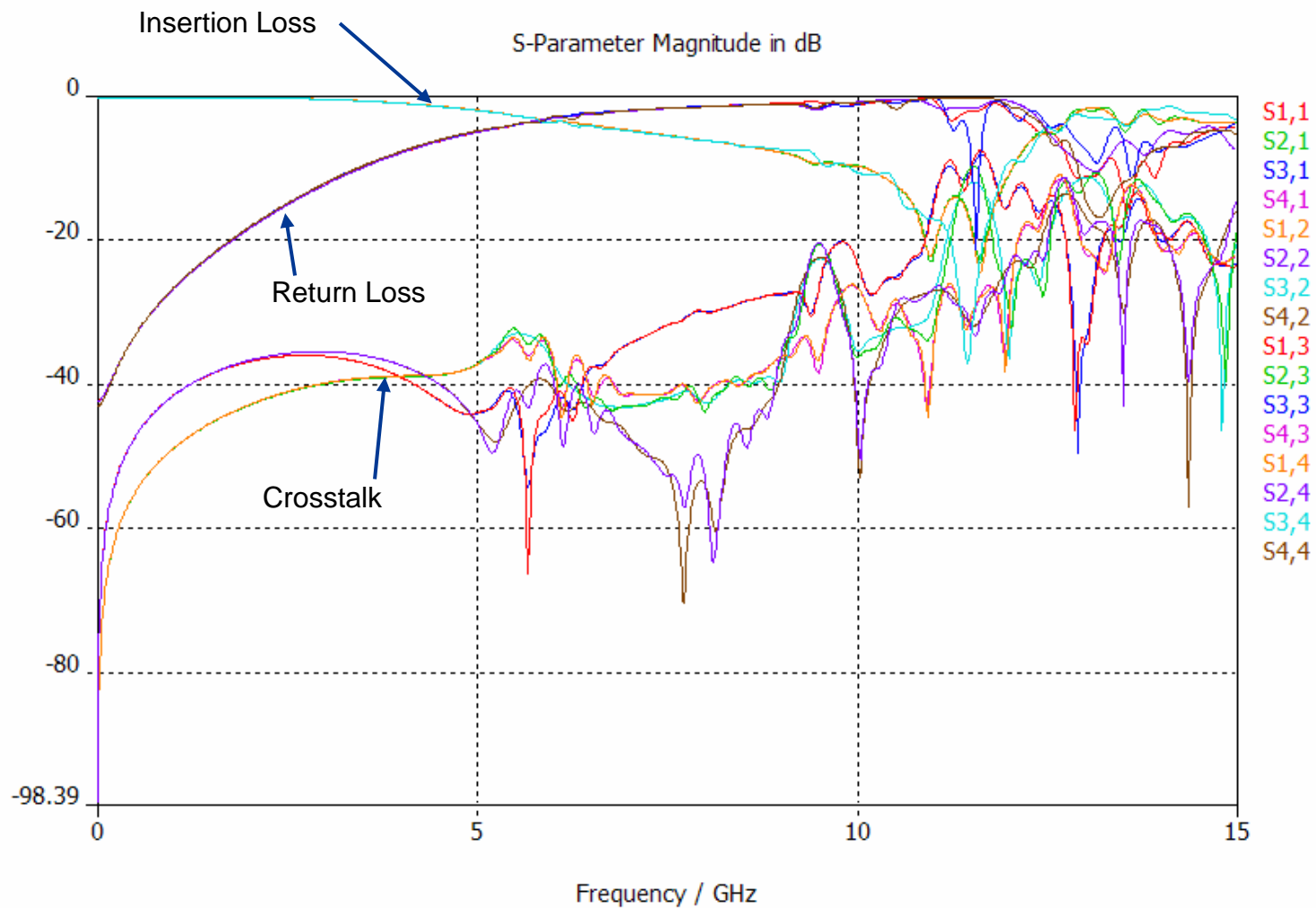
# HDB<sup>3</sup> – EM Model



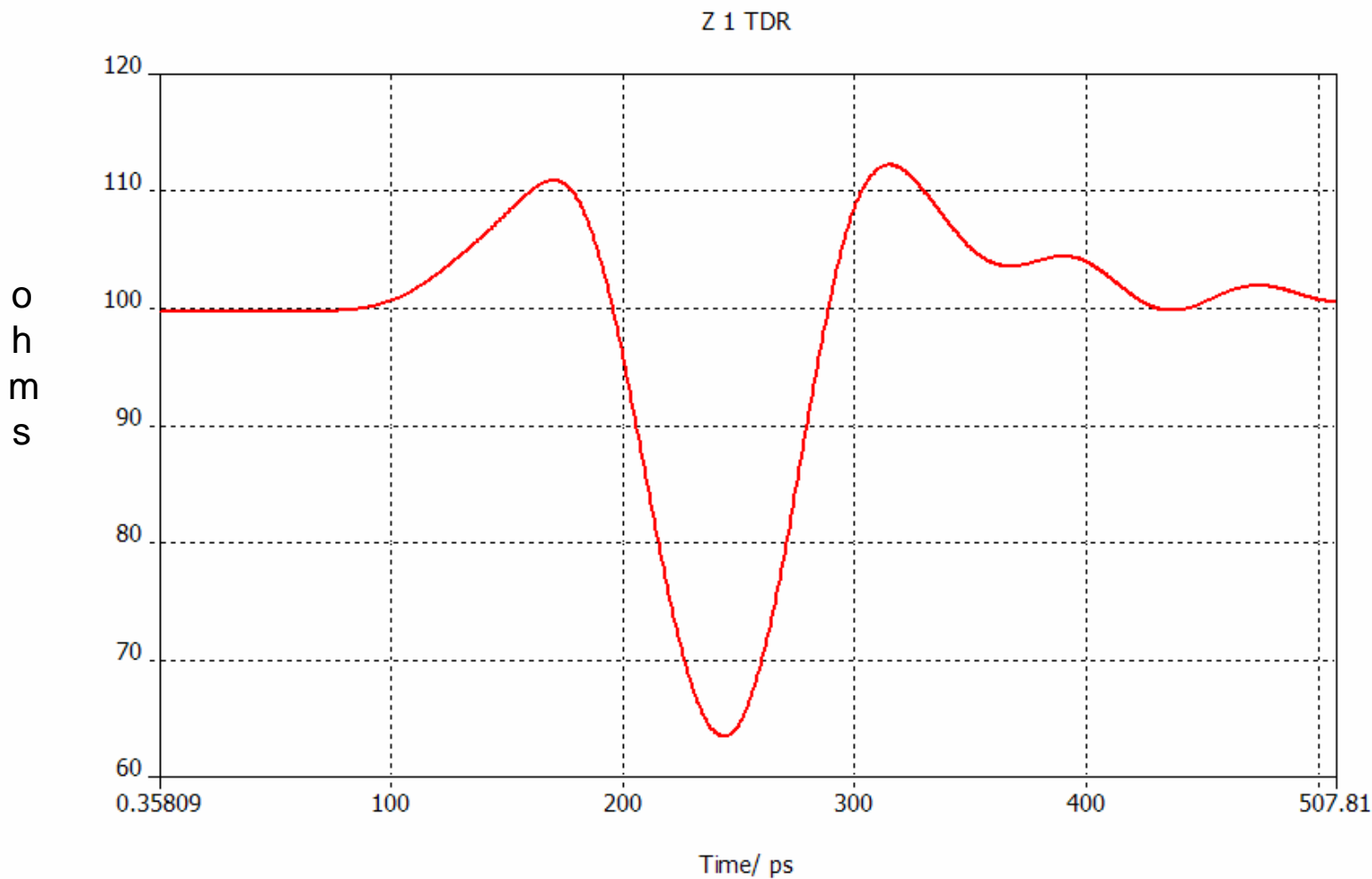
# |S| linear



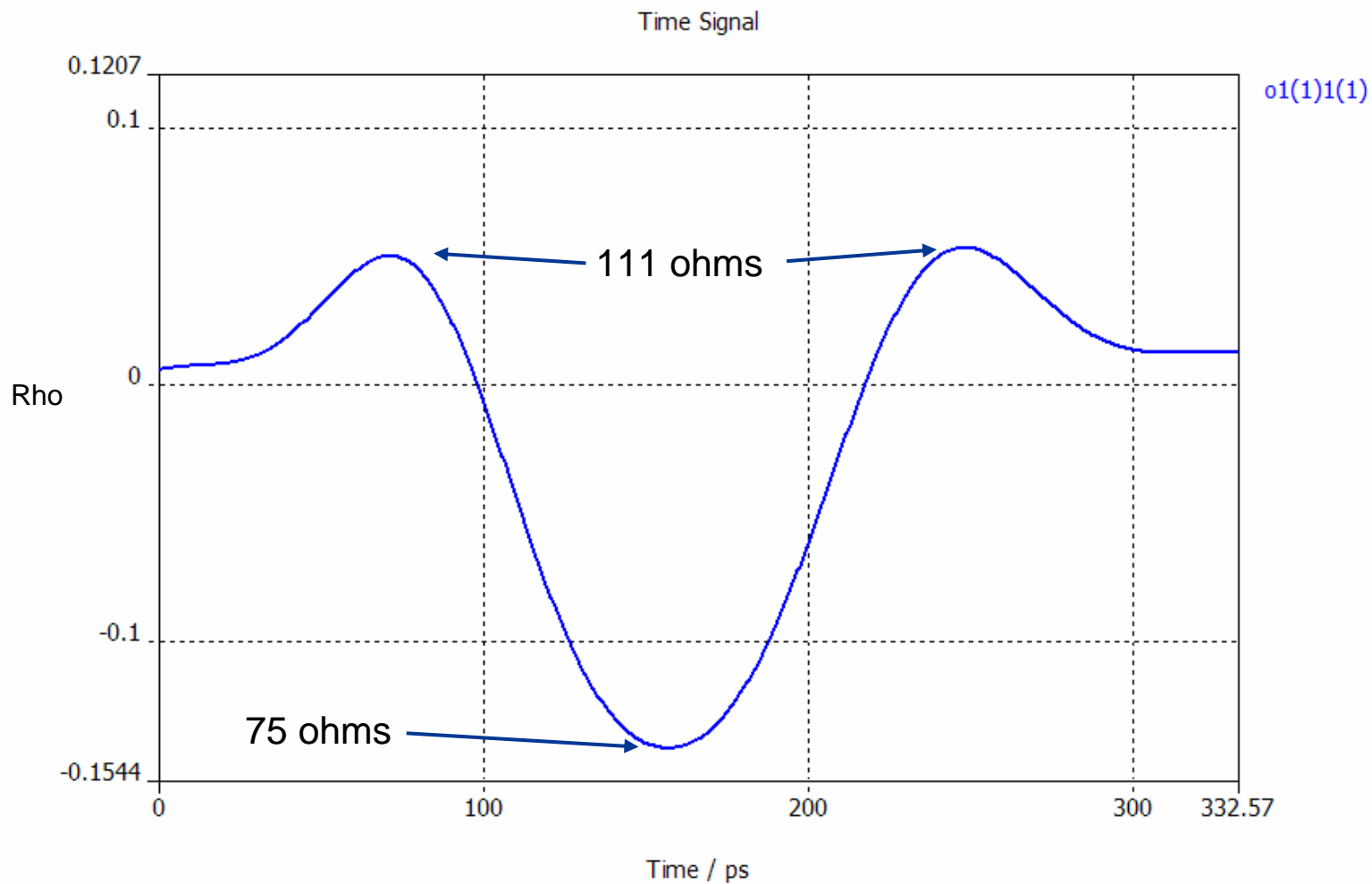
# |S| dB



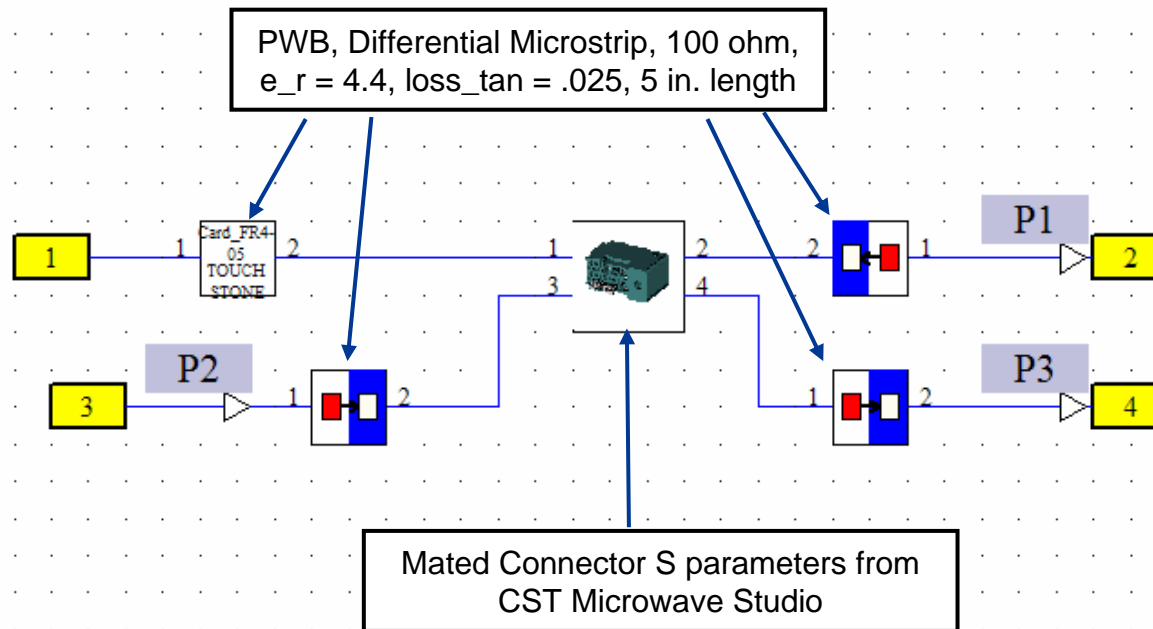
# TDR Impedance Profile – 15 GHz BW



# Impedance Profile @ 3.125 Gbps - 60 ps risetime (20-80%)

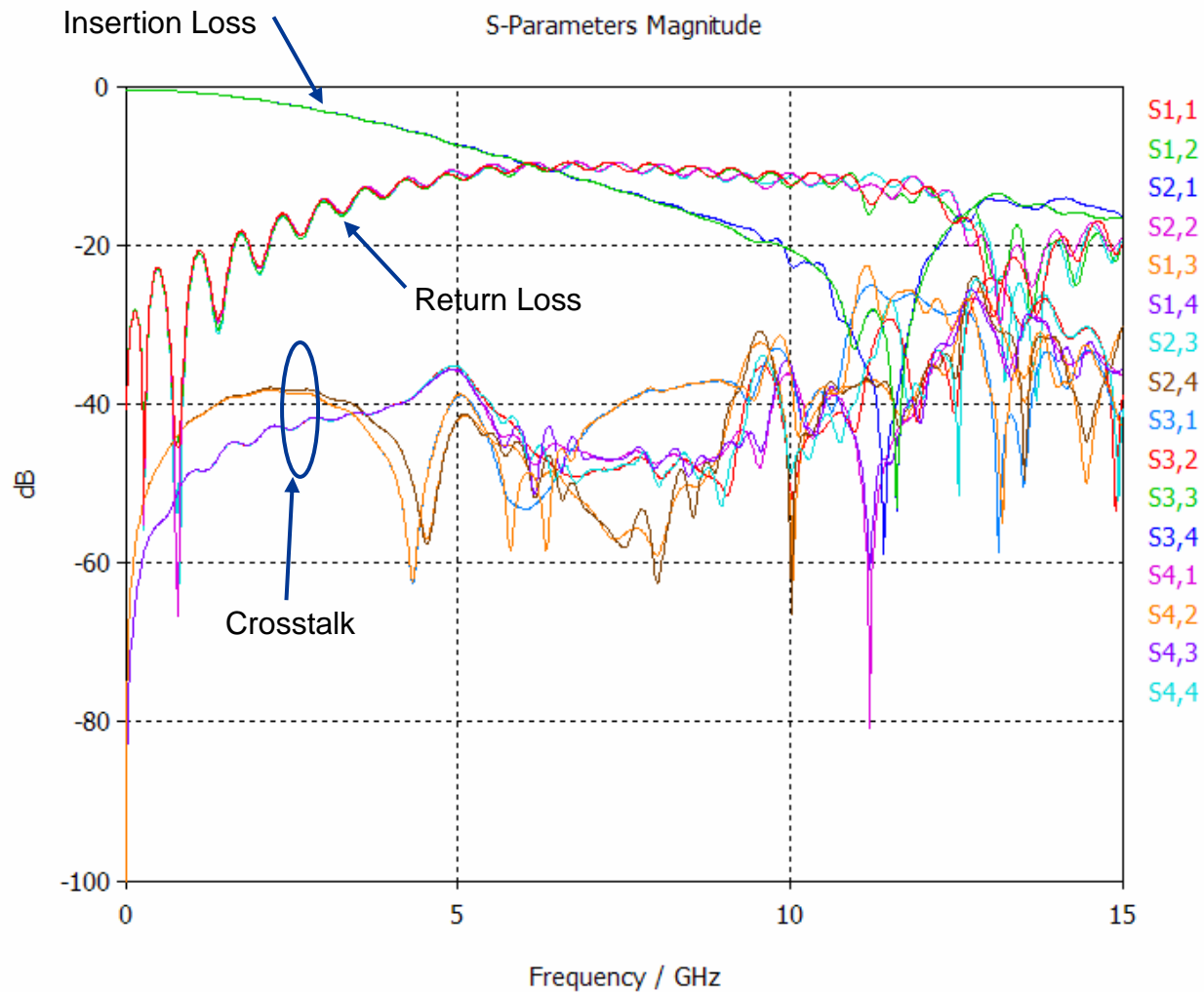


# CST Design Studio Channel Simulation

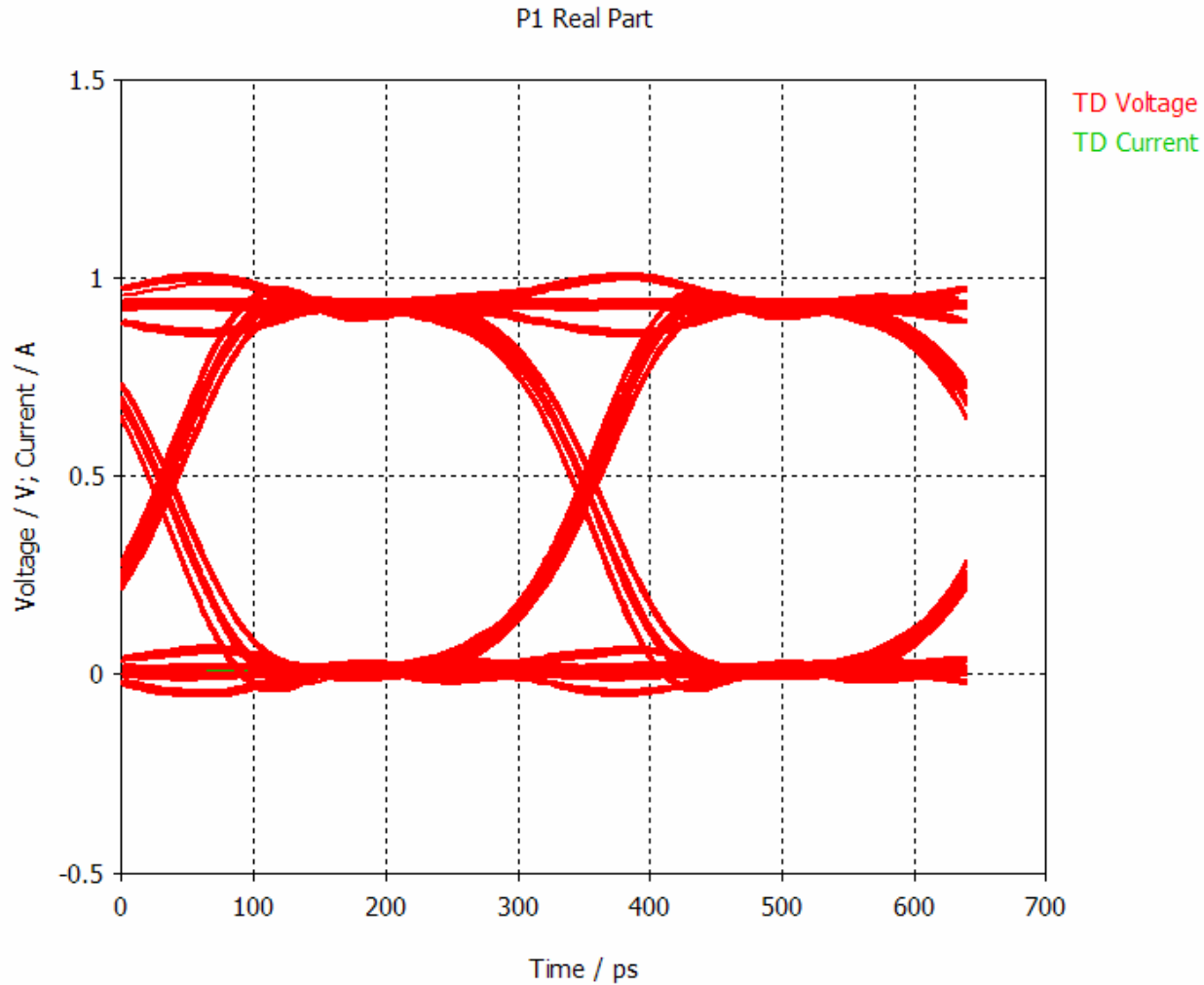


Following slides show results of above simulation.

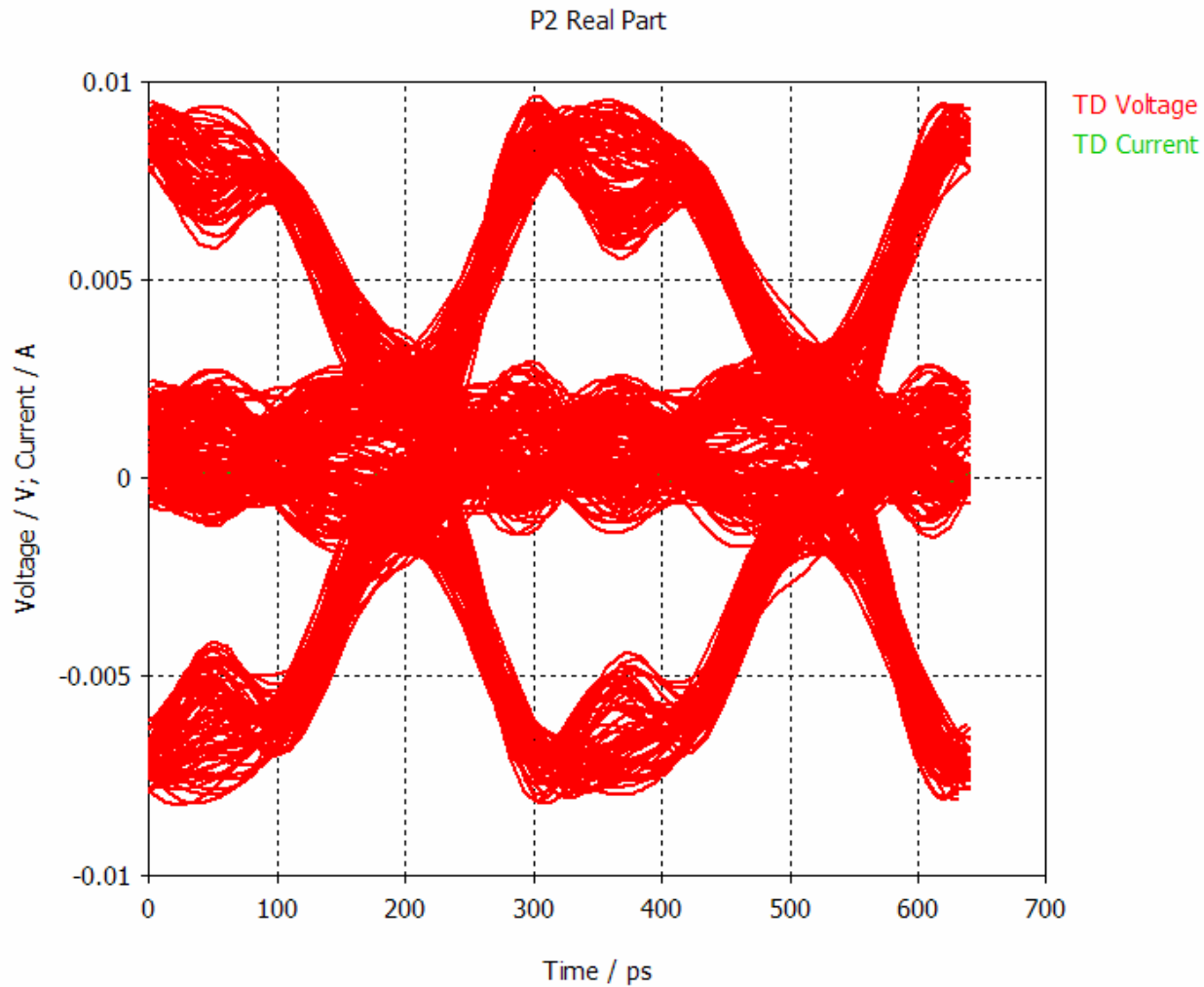
# Channel S Parameters



# 3.125 Gbps Eye (60 ps risetime)



# NEXT (60 ps risetime)



# FEXT (60 ps risetime)

