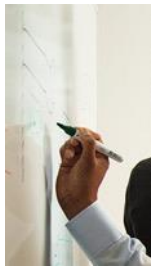
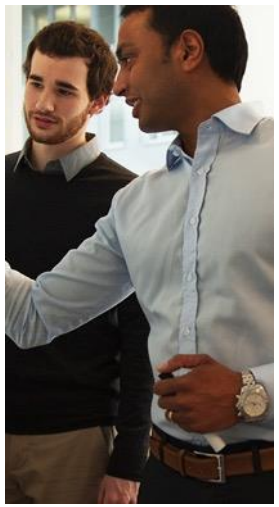




Channel Simulations for 112G Backplane Analysis

Nathan Tracy

January 14, 2019

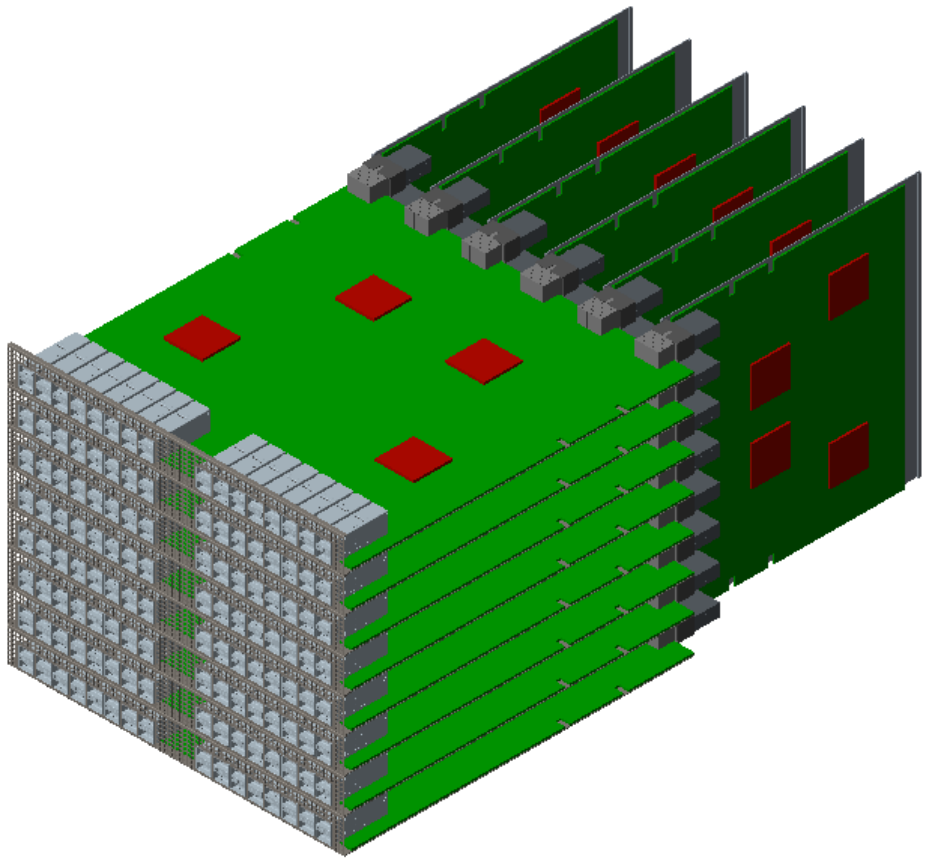
Objective

- To support 112G backplane channel analysis, the following two backplane channel configurations are being provided:

    1. Orthogonal Channel with 4/10/12/14 inch traces on both Line Cards with Megtron-7N material (S-Parameter files: tracy_3ck_02_0119.zip)
    2. Traditional Backplane Channel w/ 2 inch traces per Line Card with Megtron-7N material and 8 inch traces per Backplane with Megtron-7N material (S-Parameter files: tracy_3ck_03_0119.zip)

- All Channels include Next-Gen STRADA Whisper* backplane connectors

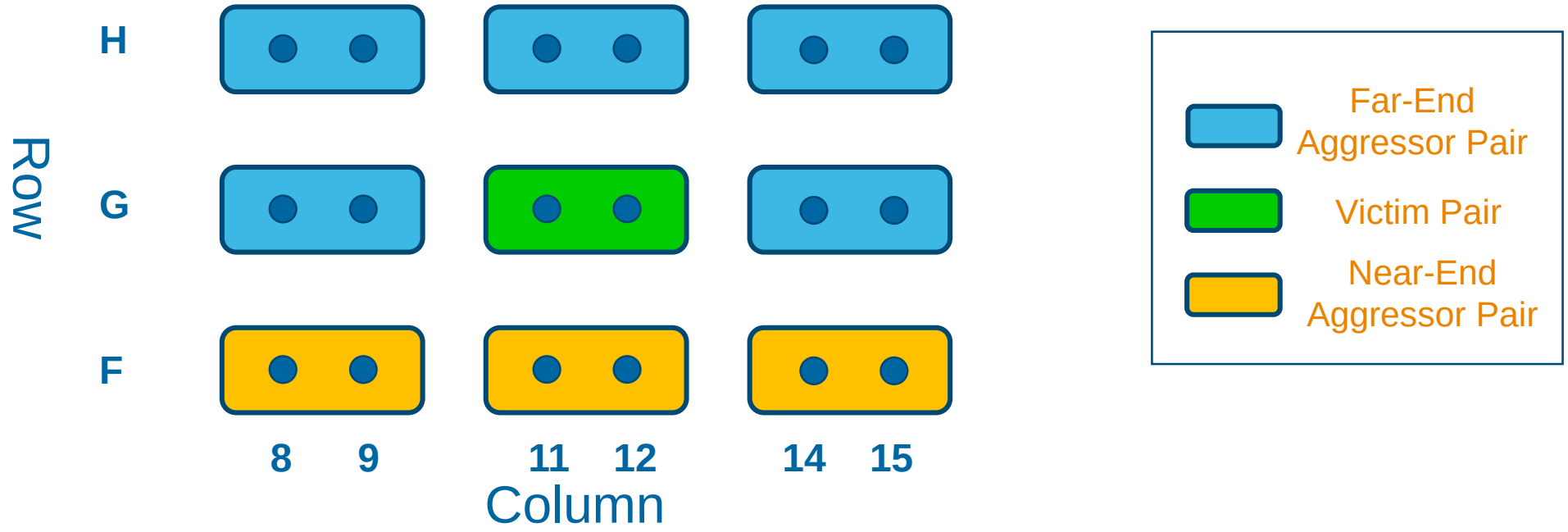
Orthogonal Backplane Channel



- 8/20/24/28” PCB Trace Total
  - 4/10/12/14” Trace per board
  - 6/6/6 trace geometry
  - Meg7N Laminates
  - HVLP Foils
- 140mil (3.56mm) Thick PCBs
  - Victim pair uses layer 2 routing
  - Victim pair: 15mil Stub w/ Shallow EON Technology
  - Aggressor Pairs are thru board to bottom layer
- Next-Gen STRADA Whisper Connector Model
  - Direct-Plug Orthogonal
  - Stub resonance has been addressed
  - Additional noise control features
- S-Parameter files: tracy_3ck_02_0119.zip

Orthogonal Backplane Channel Crosstalk

Pin Configuration and File Format

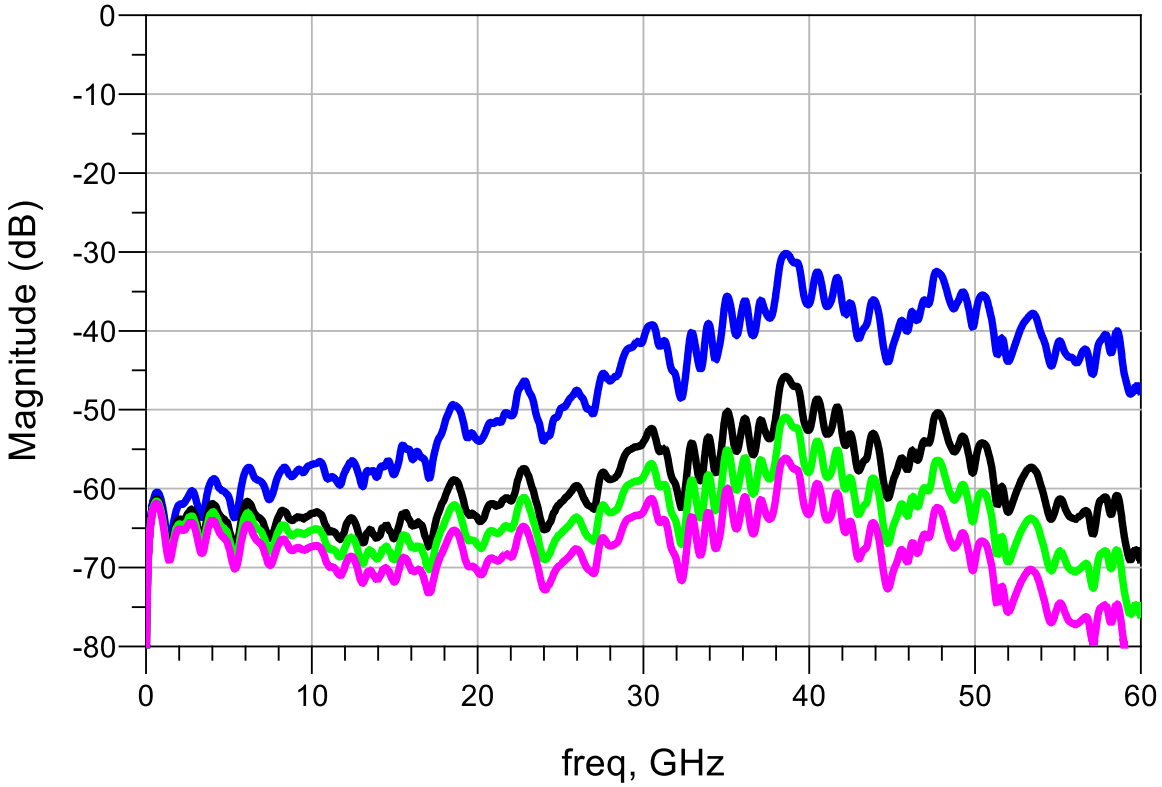


- The S-Parameter package includes separate .s4p files for THRU pair and crosstalk pairs
- Pair G11/12 is the central victim pair. Crosstalk files aggress upon this pair
- Near-End and Far-End Crosstalk available in a typical TX/RX Pattern
- 0-60GHz in 10MHz steps
- S-Parameter files: tracy_3ck_02_0119.zip

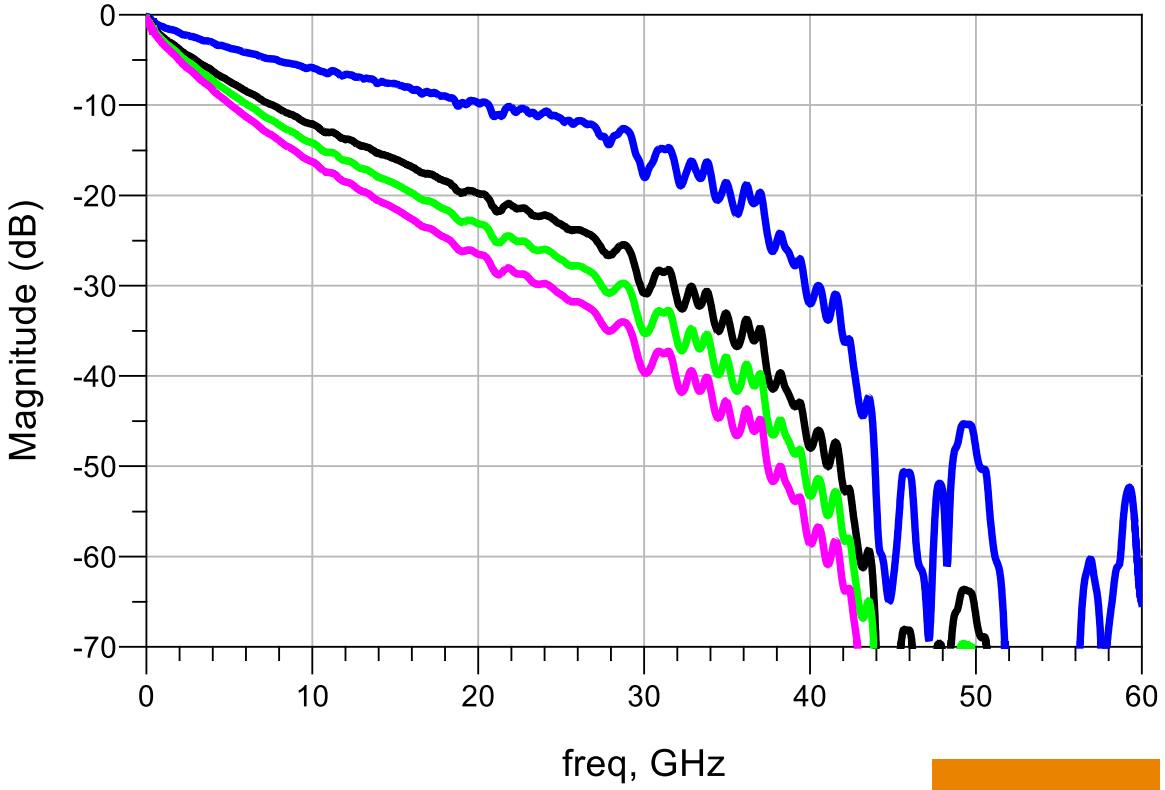
Orthogonal Backplane Channel Results

OPO - IL 12dB@26.56GHz - 4" Line Cards
OPO - IL 24dB@26.56GHz - 10" Line Cards
OPO - IL 28dB@26.56GHz - 12" Line Cards
OPO - IL 32dB@26.56GHz - 14" Line Cards

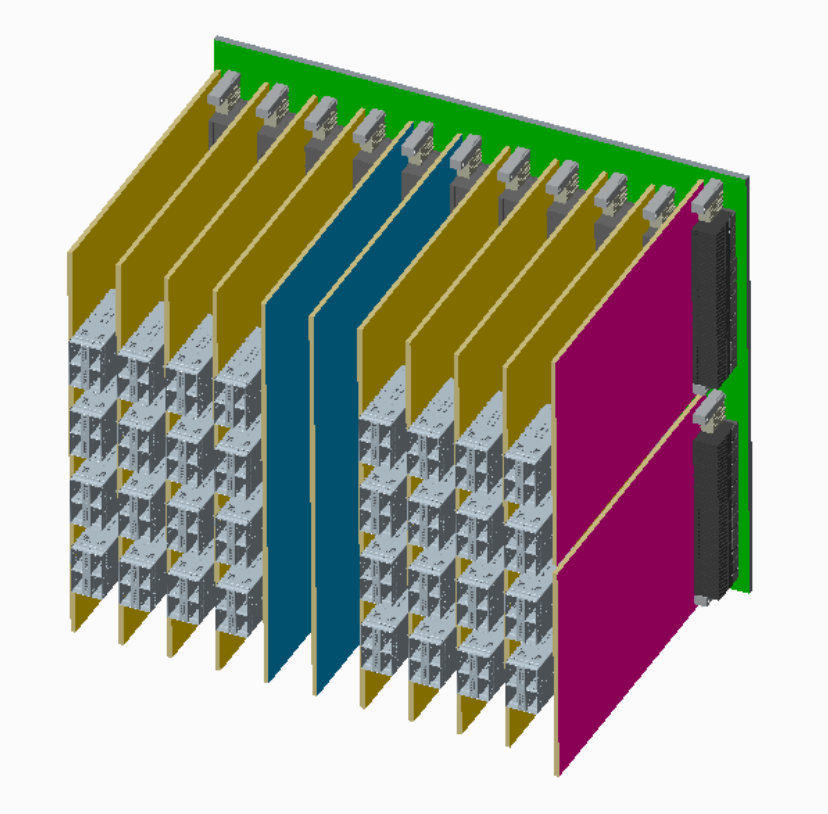
TX/RX 8-Aggressor PowerSum Crosstalk



Differential Insertion Loss



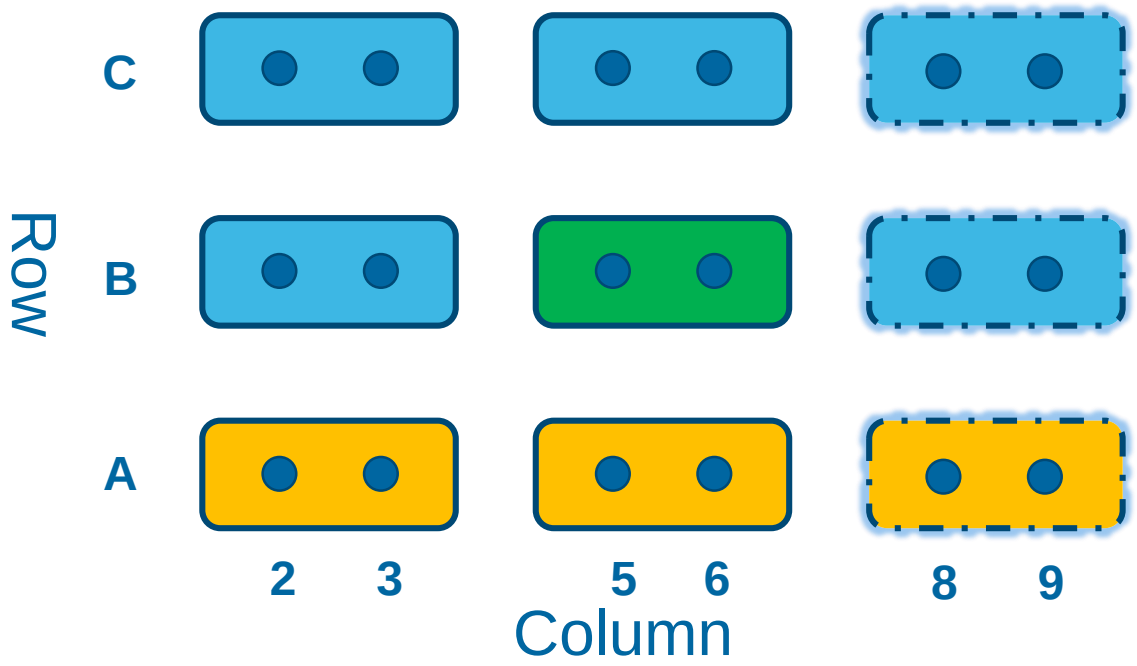
Traditional Backplane Channel

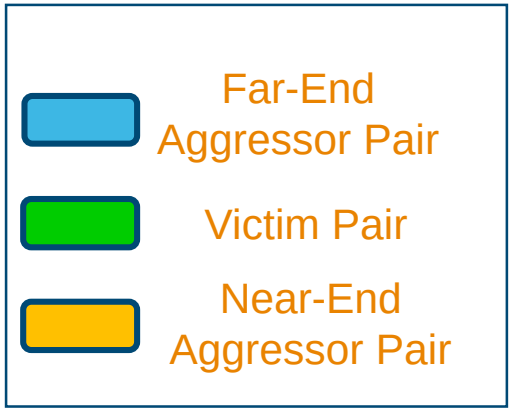


- 12” PCB Trace Total
  - 2” Daughtercard Trace per Board
  - 8” Backplane Trace
  - 6/6/6 Geometry
  - Meg7N Laminates
  - HVLP Foils
- 230mil (5.86mm) Backplane PCB thickness
- 133mil (3.38mm) Daughtercard thickness
- Next-Gen STRADA Whisper Connector Model
  - Additional noise control features
  - Stub resonance addressed
- S-Parameter files: tracy_3ck_03_0119.zip

Traditional Backplane Channel Crosstalk

Pin Configuration and File Format





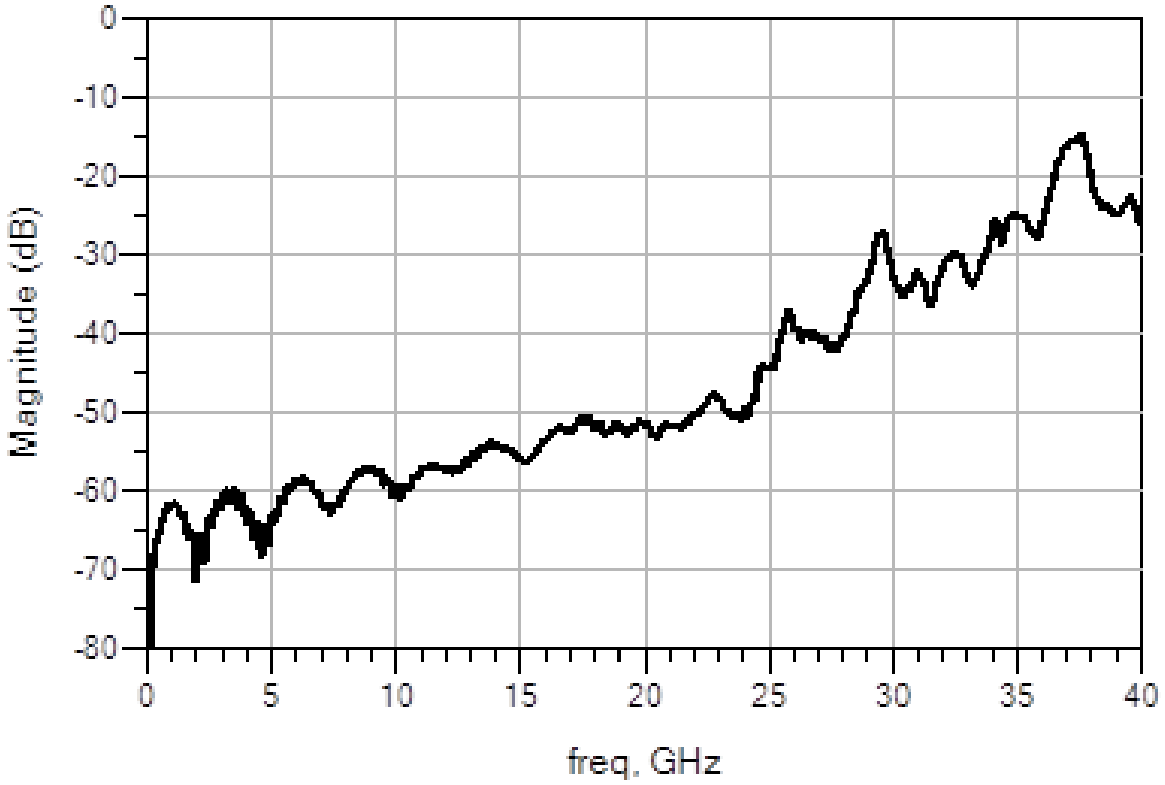
Aggressors used in PowerSum calculation using symmetry assumptions

- The S-Parameter package includes separate .s4p files for THRU pair and crosstalk pairs
- Pair B5/6 is the central victim pair. Crosstalk files aggress upon this pair
- Near-End and Far-End Crosstalk available in a typical TX/RX Pattern
- Test vehicle has 6 pairs, 3 more aggressors are added by symmetry
- 0-40GHz in 10MHz steps
- S-Parameter files: tracy_3ck_03_0119.zip

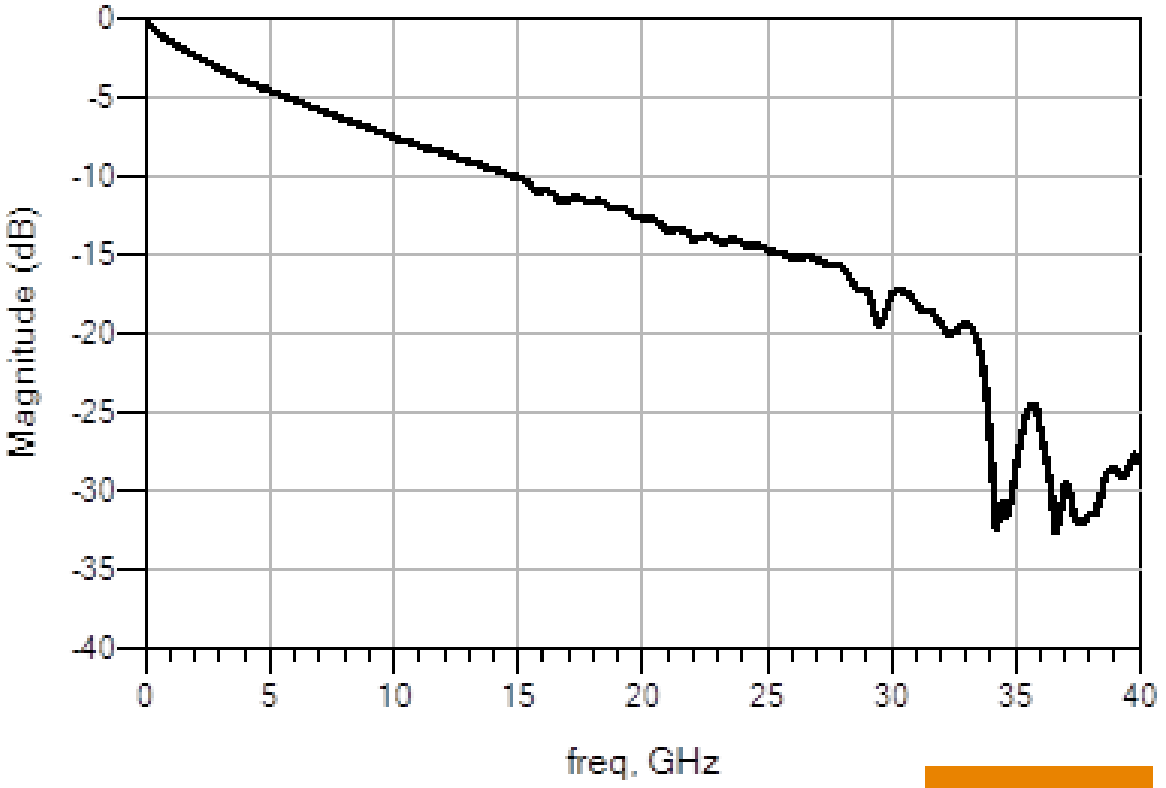
Traditional Backplane Channel Results

STD_BP_12in_Meg7_Thru

TX/RX 8-Aggressor PowerSum Crosstalk



Differential Insertion Loss



Summary

- Six channel models have been contributed for study group analysis as 112Gbps backplane channels
  - Orthogonal backplane channel S-Parameter files: tracy_3ck_02_0119.zip
  - Traditional backplane channel S-Parameter files: tracy_3ck_03_0119.zip
- Connector/channel power sum noise suggest these are good candidates for 112Gbps backplane analysis
- Solutions provide high density and enable 112G backplanes reaches
- An improved backplane connector is included in the channels