

# Loss Study: Host Backplane Channels & Packages

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IEEE 802.3 100Gb/s per Lane Electrical Study Group

# Supporters

Rich Mellitz, Samtech

Liav Ben Artsi, Marvell Technology

# Intro

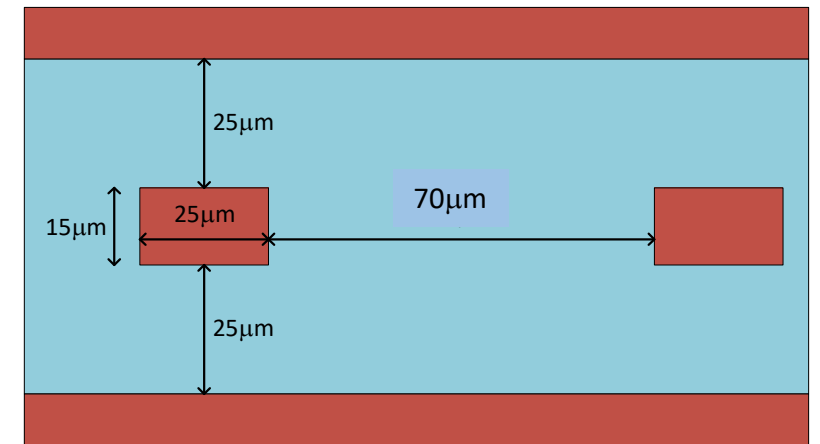
- Context
  - 35dB-36dB discussed as max bump-bump loss
  - 4dB proposed budget for package
- Questions
  - Can we meet 4dB IL for server packages?
  - Can we fit the backplane channel & 2 packages into a 35dB-36dB budget?

# Summary

- Expect >5dB package loss
  - Not including Cd, Cp
  - 30mm length
  - 90C temperature
  - Next gen dielectric (50% loss) & surface roughness (50% reduction)
  - Trace geometries for server CPUs are limited by other interfaces (e.g. DRAM)
- Fitting in a 26dB budget will require trade-offs
  - Conventional: <15" 😞
  - Cabled: 4+" AIC, ≤0.8m cable
  - Orthogonal 4+" AIC

# Package Insertion Loss

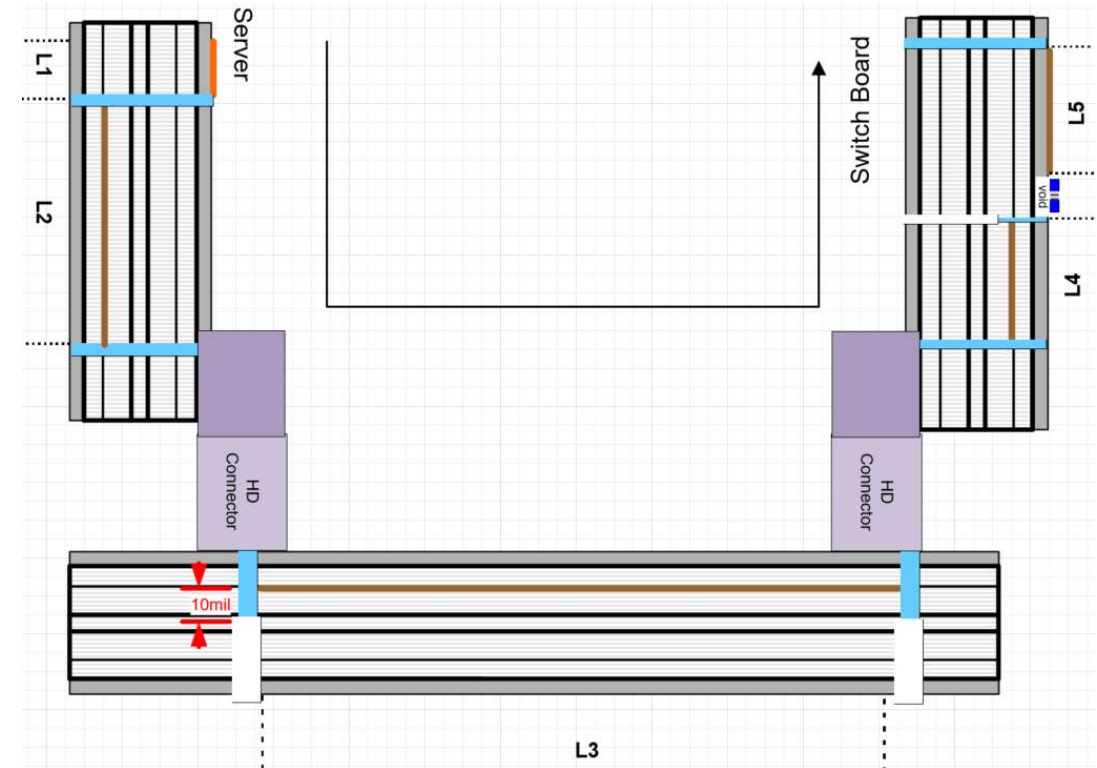
- Our best expected insertion loss is 5dB for a 30mm package (Traces only)
  - Measured in the lab.
  - Only accounts for traces. Cp, Cd will add IL.
- Design
  - Next gen dielectric ~50% reduction in loss tangent
  - Next gen surface roughness ~50% reduction
- Environment: 90C temperature.
  - The delta between 25C and 90C is ~1dB for a 30mm package.



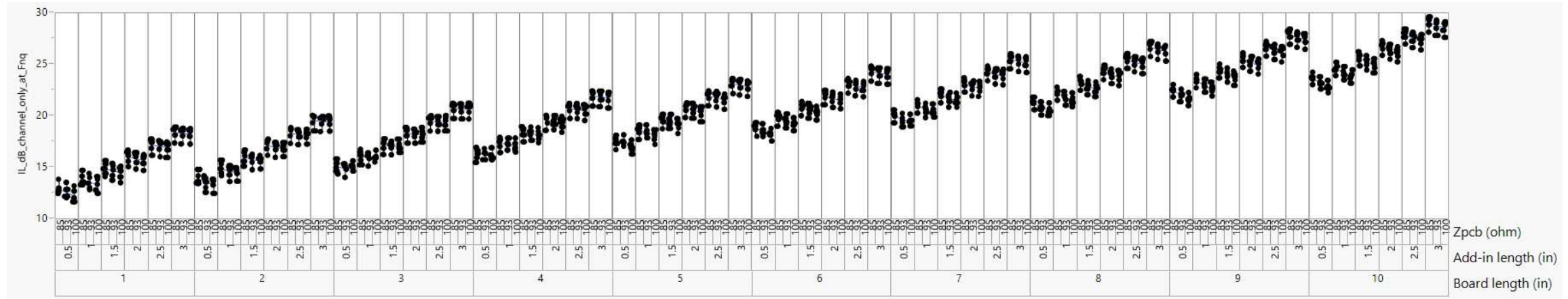
# Backplane Channel Insertion Loss

# Conventional Backplane

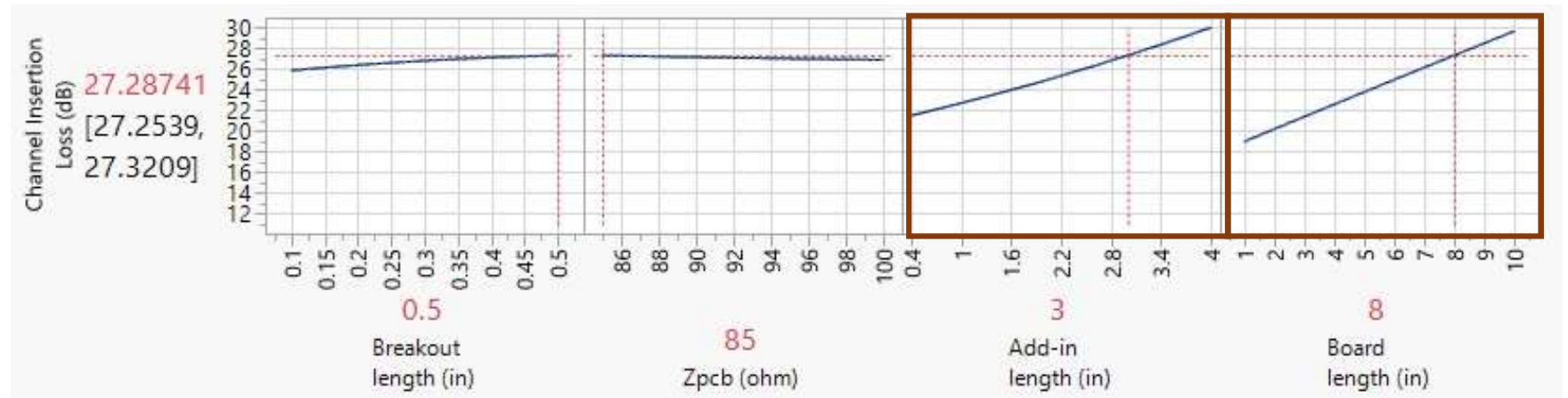
- Trace Lengths
  - CN & Switch: 0.5"-3"
  - BP: 1" – 10"
- PCB material: MEG7N
- PCB Impedance: 85Ω, 93Ω, 100Ω
- 0.093" PCB thickness
- 56G Backplane Connector
- Routes include breakout, vias
- 900 channels total



# Conventional Channel Response



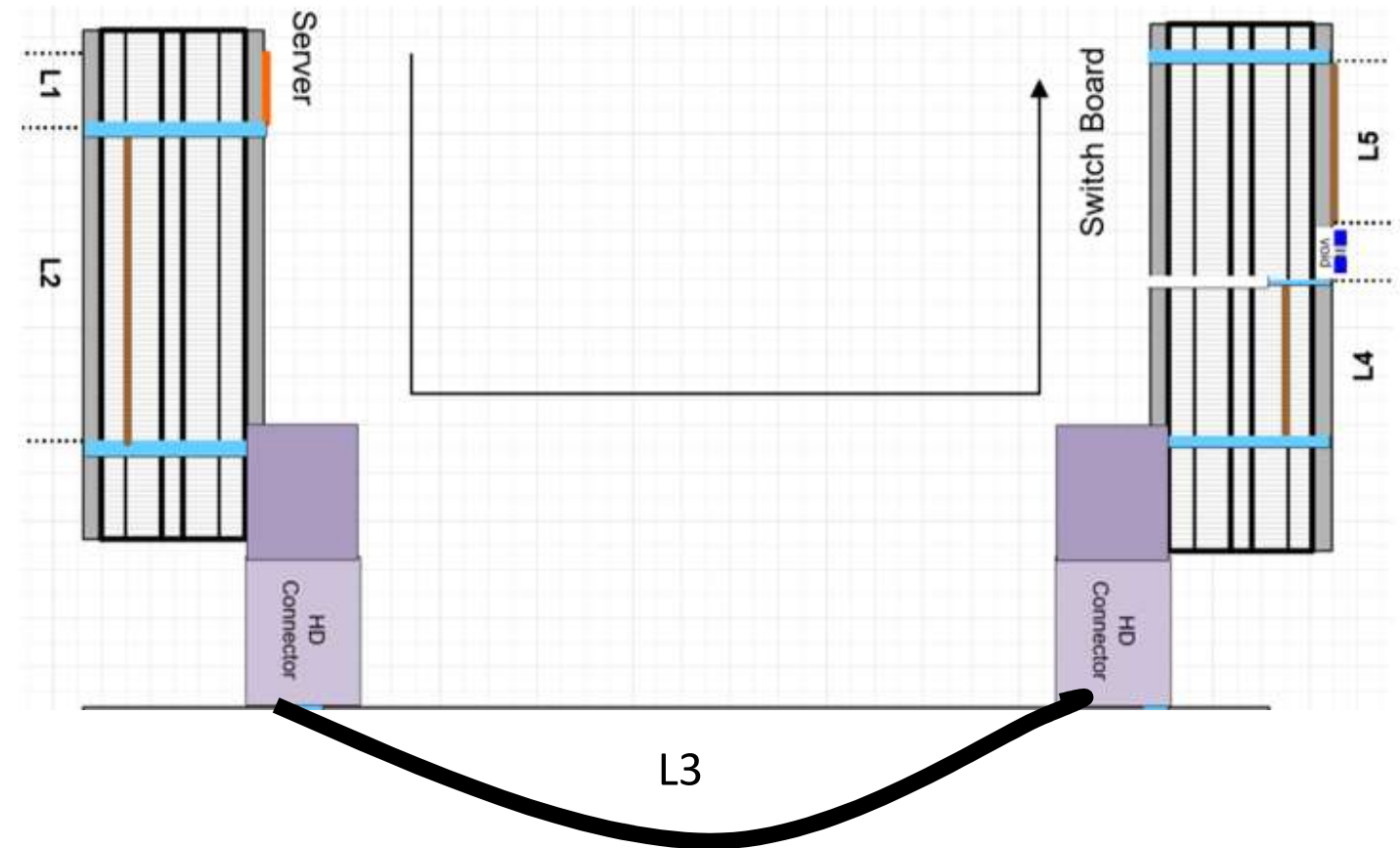
Total PCB length  
<15" at best.



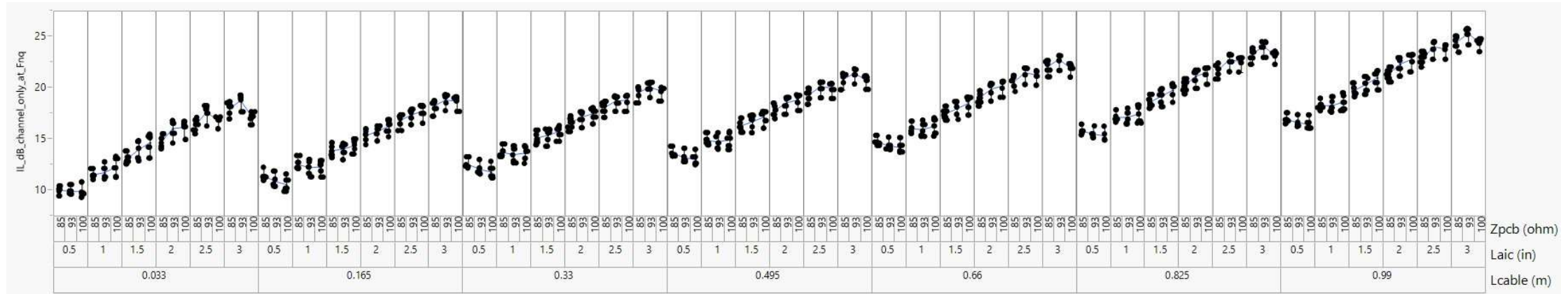


# Cabled Backplane

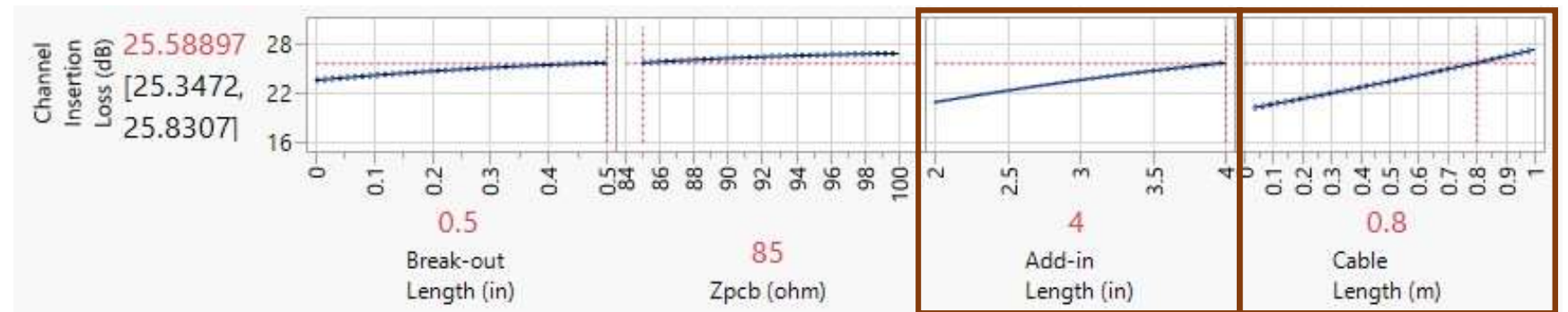
- Trace Lengths
  - CN & Switch: 0.5"-3"
  - Cable: 0.033m – 0.99m
- PCB material: MEG7N
- PCB Impedance: 85Ω, 93Ω, 100Ω
- 0.093" PCB thickness
- 56G Connector & 30AWG cable
- Routes include breakout, vias
- 730 channels total



# Cabled Channel Response



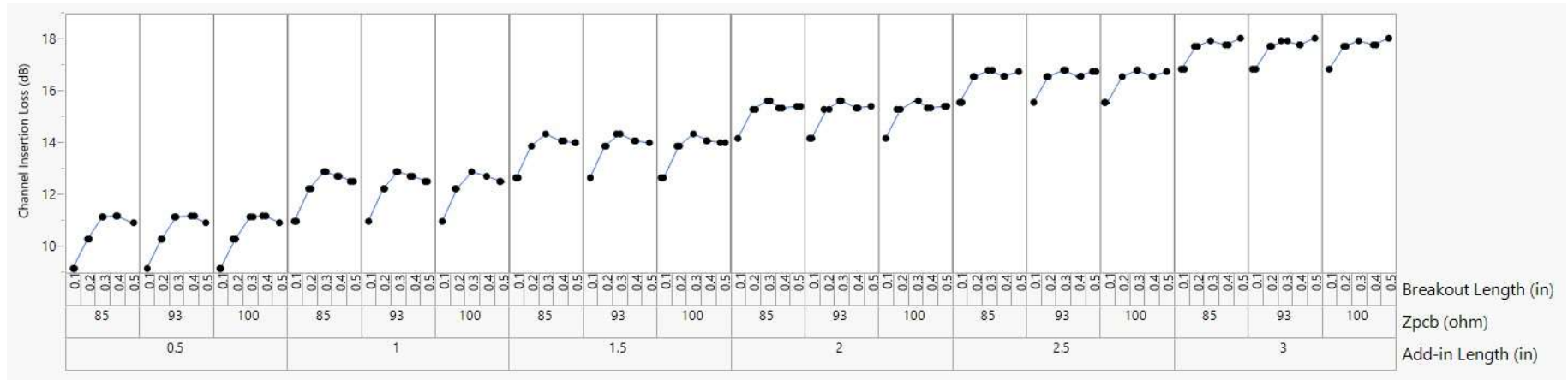
Cabled backplane channel can work with 26dB-28dB.



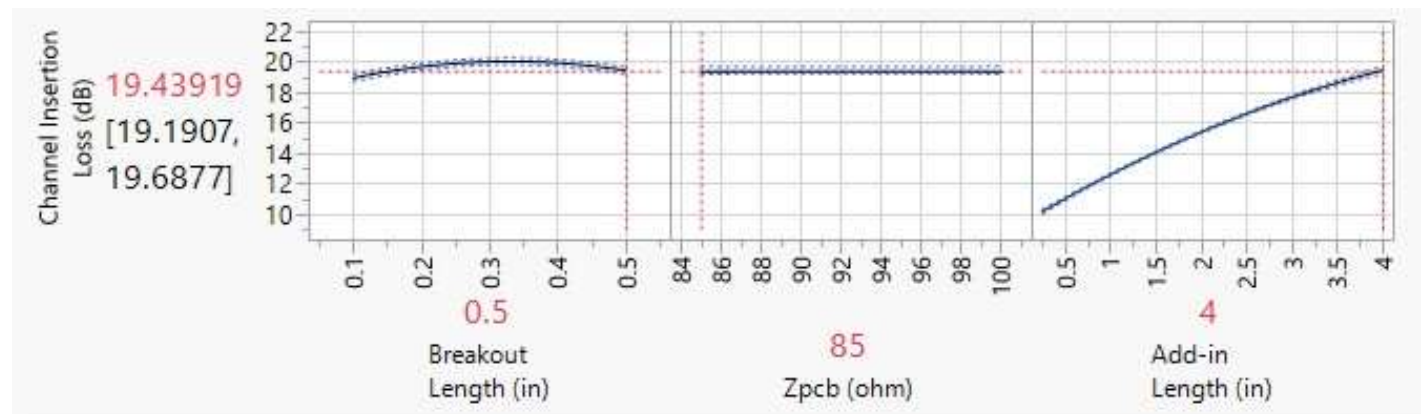
# Orthogonal Backplane

- Trace Lengths
  - CN & Switch: 0.5"-3"
- PCB material: MEG7N
- PCB Impedance: 85 $\Omega$ , 93 $\Omega$ , 100 $\Omega$
- 0.093" PCB thickness
- 56G Connector
- Routes include breakout, vias
- 90 channels total

# Orthogonal Channel Response



Orthogonal backplane with longer card routes will fit in a 26dB budget.



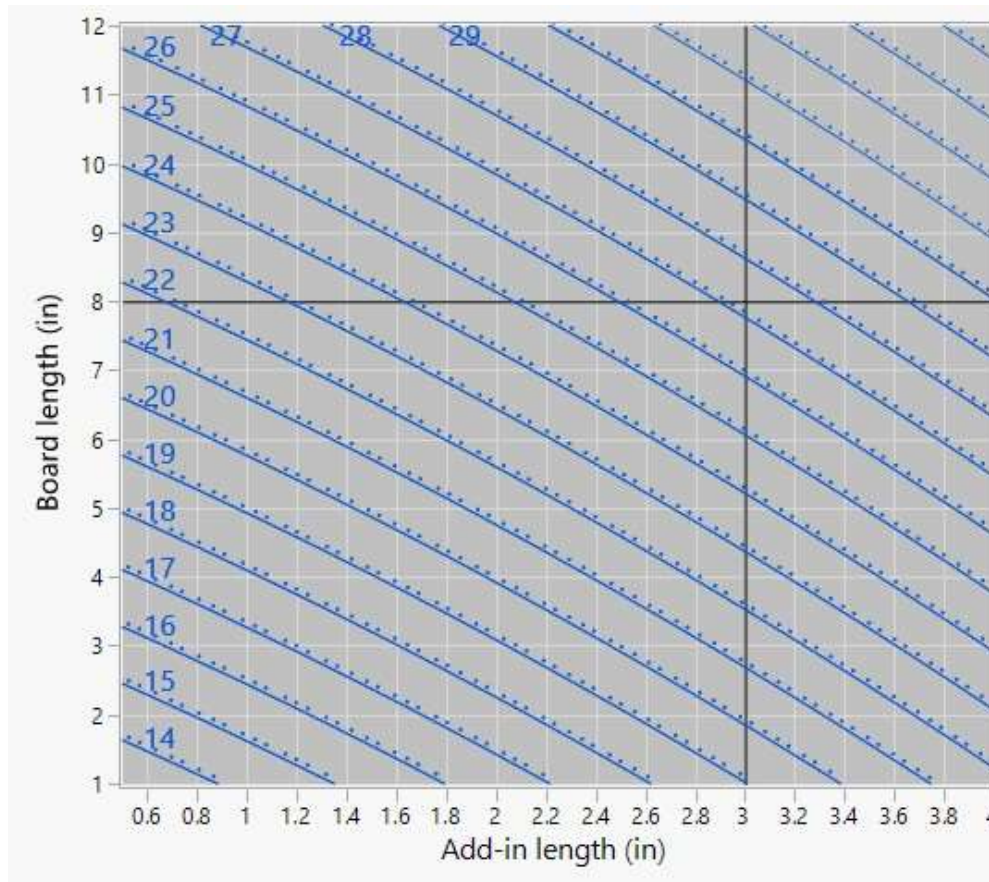
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  - Orthogonal 4+" AIC

Thank you!

# Channel IL Contours

## Conventional Backplane



## Cabled Backplane

