Simulation with TE connectors

Agilent High Speed Digital Tour

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EVERY CONNECTION COUNTS
A WORLD LEADER IN CONNECTIVITY

- $13.3 billion global company
- Solving connectivity challenges with the broadest range of products
- Engineering driven, customer focused
- Leveraging technology innovations across industries
TE Connectivity: A World Leader Enabling Connectivity

Serving Large Attractive Markets

- Consumer
  - Transportation
  - Consumer Products
  - Communications
  - SubCom
- Industrial and Infrastructure
  - Energy
  - Industrial Equipment
  - Aerospace & Defense
  - Medical

With a Wealth of Technology Platforms

- Connectors
- Fiber Optics
- Circuit Protection
- Sealing & Protection
- Wireless
- Precision Wire & Cable

And Extensive Global Resources

- 7,000 Engineers Close to Our Customers
- 5,000 Salespeople Advising Our Customers
- 150 Countries Served
- ~90 Manufacturing Sites Serving Every Region

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Some product capabilities

- Backplane Connectors
- Power Connectors
- Pluggable I/O
- RJ45 (Ethernet) Jacks
- Stacking Connectors
- Micro PGA and LGA Sockets
- Active Optical Cables
- Fiber Optics
- Coplanar Connectors
- Coax Connectors
- Relays
- Cable Assemblies
Agenda

• How to find an electrical model for a TE connector?

• Simulation versus Measurement

• Simulation, connector choice and cost optimization
How to find an electrical model for a TE connector?
• In the catalog [http://www.te.com/](http://www.te.com/) go to:
  – Resources
  – Electrical models
• Then choose the type and sub-section of the involved connector:
And then you reach the available models:

- USB 3.0 Standard A Connector (Applicable for P/N1932258-1 Only)

To learn more about TE models and connectors contact Circuits & Design Team.
Simulation versus Measurement
Case: TE TinMan System Evaluation Kit
Backplane Channel Configuration

5 inches of daughter card trace
5 mil, 100 Ohm differential traces
Nelco 4000-6 material 0.125”
daughter card thickness, non-counterbored

Standard right angle connector (x2)

4 inches of backplane trace
7 mil, 100 Ohm differential traces
Nelco 4000-13 material
Daughter Board in ADS Layout showing Momentum Meshing
Backplane in ADS 3D Viewer
ADS Simulation Test Bench

S-Parameter Models (provided by TE)

Momentum-Extracted Models
System Performance @ 6.25Gbps

Measurements

Simulations
Comparing data @ 6.25Gbps
Conclusion

- Measurement and simulation are showing equivalent eye opening

- Use of ADS and TE S-parameter models are delivering a reliable prediction of reality
Simulation, connector choice and cost optimization
Substrate / connector comparison

2mm HM in Red

TinMan in blue
FR4 10-in Backplane with 2HM Connectors

Tx

Bit Rate = 6 Gbps
Tx Interface

HM 2mm

ML2CTL_C

Length = 10 in
S = 10 mil
Layer = 2
PLGC_File =
ReusePLGC = no
W_File =

Rx

Rx_Diff
Rx_DIM
ExcludeLoad = no
EnableCTLE = no
EnableFFE = no
EnableDFE = no

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Density

0 0.1 0.2 0.3
0 100 200 300 400

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RO4000 10-in Backplane with 2HM connector

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FR4 10-in Backplane with TinMan Connectors
Backplane focus products

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* Under development
Conclusion

• Using ADS and TE S-parameters models to make the right connector choice will allow you to push FR4 as far as possible

• Cost of system will be optimized by the simulation of various connectors with the same PCB material