ViaExpert:

3D Via Modeling and Simulation

Impedance discontinuity in the signal path has a significant impact on signal integrity for high speed channel design. Among the many discontinuities, via discontinuity is the critical one which requires extra attention in channel design. Three-dimensional full-wave EM simulation is constantly used to analyze via discontinuity. Conventional 3D full-wave simulation approach suffers from various drawbacks including the complex model creation and the long simulation time. ViaExpert provides a fast and accurate way to simulate via structures for both pre-layout and post-layout scenarios. For pre-layout analysis, various built-in templates allow users to quickly assemble the models, analyze and optimize SMA, SMD, AC Cap, via array and BGA physical parameters based on design constrains. The model can also be built by extracting the area of interest from the existing layout. The fast 3D FEM and hybrid solver yields accurate results with unprecedented speed. Optimal 3D mesh improves the simulation accuracy and speed. The powerful parameterization on the critical via variables such as antipad size, trace escape layer, and backdrill layer enables quick what-if analysis. Additional features such as exporting to HFSS and CST are also provided for quick benchmarking.

ViaExpert Solution

Impedance discontinuity from via significantly affects the signal integrity for high speed channel designs. Vias have to be addressed with three-dimensional full-wave EM simulators for any multi-gigabit serial link applications. ViaExpert provides a fast and accurate way to model and simulate vias. It allows designers at the pre-layout stage to quickly build via model and check the key signal integrity metrics such as insertion loss, return loss, and crosstalk. It also allows designer to perform post-layout simulation of vias and trace breakout. The built-in connector footprint and stackup databases provide another convenient way of via modeling and simulation.

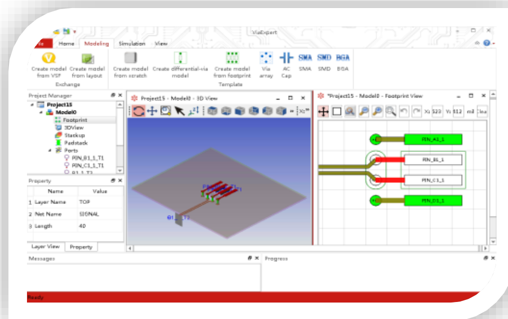
Key Points

- Implementation of Ribbon UI offered by Microsoft in their office solutions, and makes Xpeedic application keeping up with the time, and has a modern look and feel.
- Fast 3D FEM and leading edge hybrid solver offers better capacity and speed compared to other tools in market.
- Optimized tetrahedron mesh improves simulation speed and precision, also provides “Speed” and “Accuracy” mesh strategy to improve simulation efficiency without sacrifice accuracy based on user scenario.
- Built-in multiple pre-layout templates for quick model exploration, and support Via Array, Differential Via, SMA, SMD, BGA and AC-Decap template.
- Built-in multiple connector footprint database for quick via model creation and analysis.
- Support Allegro *.brd/*.mcm/*.sip import, and crop arbitrary area for simulation.
- Automatic lumped/coax port generation simplifies EM analysis setup.
- Support Adaptive frequency sweep and multi-threading processing technology to achieve excellent performance speedup.
- Support manual routing for single-ended and differential pair trace with arbitrary geometry.
- Provides powerful 2D footprint edit window to add port, add trace, split via, combine antipad, add tear drop and so on.
- Backdrill and non-functional pad removal option can be easily added.
- Support via and transmission line parametric and optimization sweep for easy via exploration.
- 3D-View makes the model check easier.
- Integrate SnpExpert into ViaExpert to automate S-parameter and TDR plot.
- Easy export ViaExpert simulation project to HFSS and CST for easy verification.

FEATURES

Modern Look and Feel

Implement the concept of Microsoft Ribbon, and makes ViaExpert keeping up with the times.

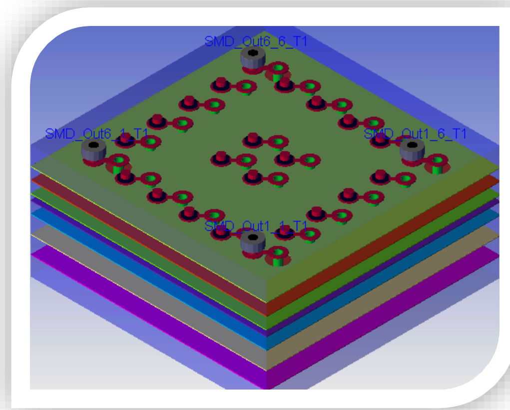


ViaExpert

Multiple Ways to Create Models

Provides multiple ways to quickly create simulation models:

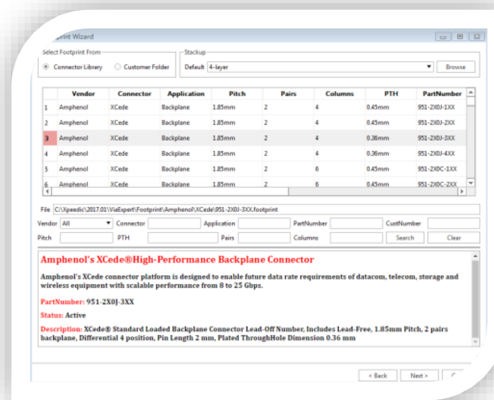
- Built-in "Create Model from Footprint" wizard to quickly create connector 3D model.
- Built-in SMA/SMD/AC Decap Template to analyze and optimize multiple SMA/SMD/AC Decap model with crosstalk.
- Built-in BGA Template to investigate BGA array and fanout pattern .
- Built-in "Create Differential Via Model" template to evaluate differential vias.
- Support Allegro *.brd/*.mcm/*.sip import, and crop arbitrary area for simulation.



BGA Template

Multiple Connector Database

Built-in multiple connector footprint database for quick via model creation, also provide Allegro plugin "dra2footprint" to batch create connector database automatically.



Connector Database

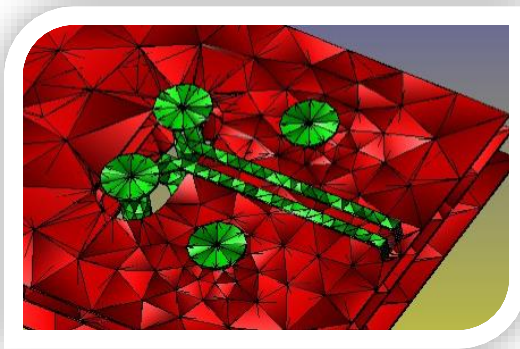
Fast 3D FEM Solver

Built-in two leading edge solver technologies for 3D model simulation, including fast 3D full-wave Finite Element Method (FEM) solver and hybrid solver. Support Adaptive frequency sweep and

multi-threading processing technology to achieve excellent performance speedup.

Optimized Mesh Generation

Optimized tetrahedron mesh improves simulation speed and precision, also provides "Speed" and "Accuracy" mesh strategy to improve simulation efficiency.

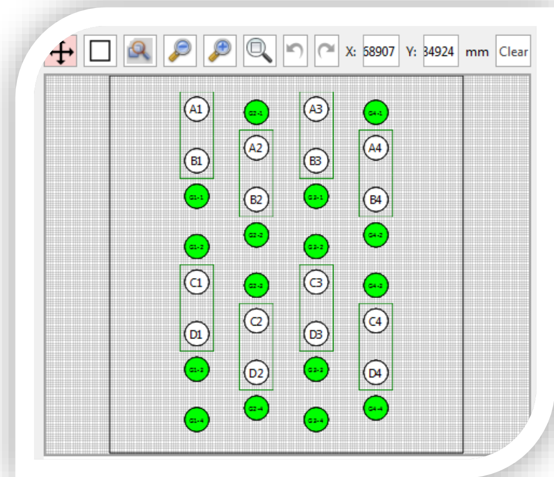


Optimized Mesh

Easy 2D Layout Edit

Provides powerful footprint window to edit 3D layout, and create simulation model quickly and intuitively in 2D environment.

- Add and edit Lumped/Coax/Wave port for trace, via and SMD.
- Split one via into multiple vias.
- Combine and uncombine antipad
- Add tear drop, AC Decap and trace compensation.
- Measure via/trace distance.
- Fill plane with conductor or remove conductor.

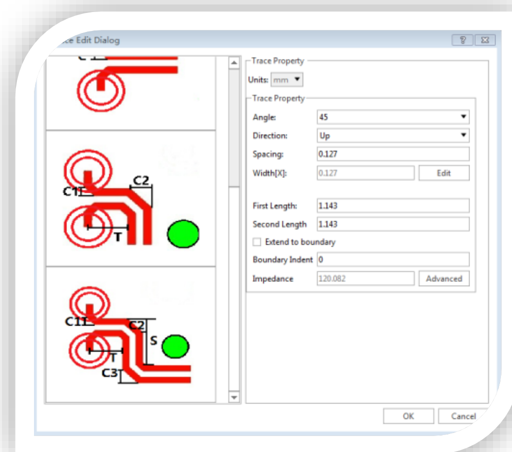


Footprint Window

Powerful Trace Creation

Built-in several ways to create single-ended trace and differential pairs.

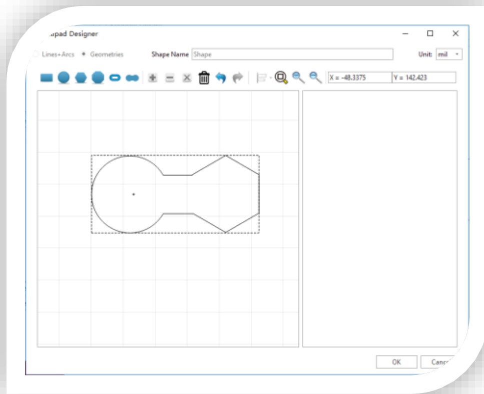
- Differential pair template: built-in multiple constantly used differential pairs patterns.



Differential Pair

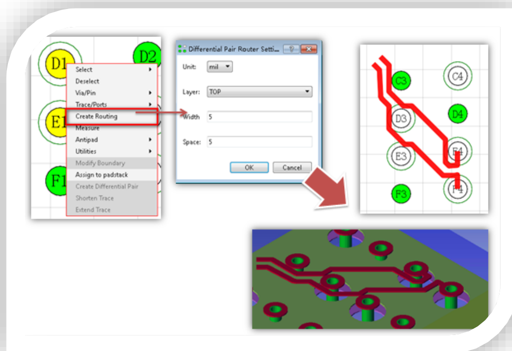
- Antipad Designer：Support user defined keep out functionality, keep

out shape can be edited by lines and arcs or geometries



Antipad Designer

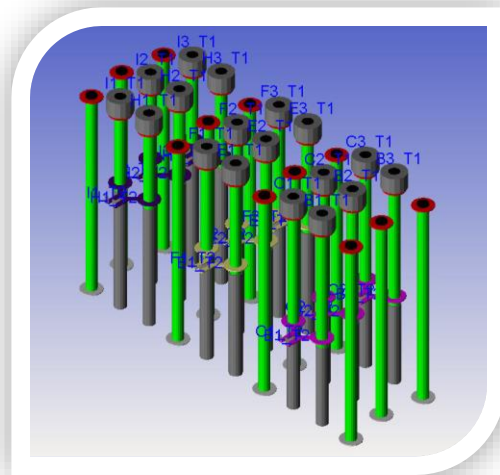
- Manual routing: support both single-ended and differential pair trace routing with arbitrary geometry.



Manual Routing

3D Model View

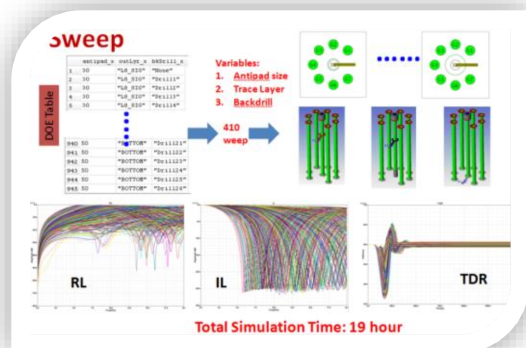
3D CAD model view gives user an intuitive feeling about simulation structure, and makes the model check easier.



3D Model View

Parametric Sweep and Optimization

Support parametric and optimization sweep for antipad, backdrill, trace in/out layer, SMA/SMD/BGA template physical parameters and so on, explore and optimize via structure performance, and easily explore parametric results in SnpExpert.



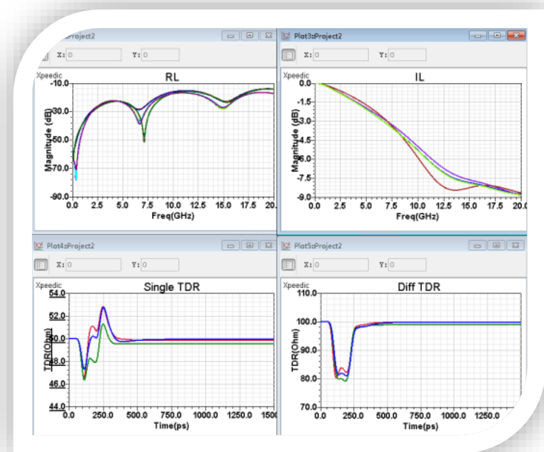
Parametric Sweep

Export to HFSS and CST

ViaExpert offer users a quick way to export to HFSS and CST for the benchmarking purpose. It helps to set up the 3D model, ground ring, air box, materials, excitations, EM boundaries and simulation sweep plan. The resultant HFSS and CST is ready to run with no need of manual editing.

Result Post-Process

S-parameter generated from ViaExpert is displayed in SnpExpert. User can enjoy the features offered by SnpExpert to explore the S-parameter such as frequency domain and TDR view in both single ended and differential modes.



S-parameter Display

US Office

Seattle

14205 SE 36th St, Bellevue, WA 98006

Silicon Valley

19925 Stevens Creek Blvd #100

Cupertino, CA 95014

sales_us@xpeedic.com

China, Shanghai Office

No.608, ShengXia Road, Building 2, Room210-211, Pudong New Area, Shanghai, 201203

Tel: 86-021-61636350

sales@xpeedic.com

China, Suzhou Office

No.2358, Changan Road, Bldg 1, Floor 5, Wujiang, Suzhou, 215200

Tel: 86 512 63989910

sales@xpeedic.com