ADS for your RF Board
Design Flow

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Agilent EEsof EDA
Agilent EEsof EDA

• Global solution provider and #1 supplier of RF EDA tools
• Unique position as the only company delivering Test&Measurement solutions as well as EDA software.
• 60 years of in-house RF-uW instrumentation design experience
• A leader for in technical innovation for over 20 years
• Agilent EEsof consistently ranked high in customer satisfaction
• Value and ROI is recognized by successful leading companies
Genesys & ADS product lines for RF board

ADS Product Line for RF board

- Medium-scale to Enterprise productivity and flows
- More complex multilayer, multifunctional RF boards
- Multi-technology platform with enterprise PCB links
- Multi OS support

Genesys Product Line for RF board

- Self-supporting RF design teams and individuals
- Conventional RF board and uW components
- Stand-alone RF board solution
- Native Windows PC environment

Breadth & Capability
Trends in RF board design

Trends

- More complex multilayer, multifunctional RF boards
- Higher integration of different technologies like RF and Multichip Modules (MCM), die-in-board,...
- 3D Stacking of board laminates with Multichip Modules and RF wireless technologies
Design challenges in RF board design

Main Design Challenges

1. Increase RF and wireless functionality
2. Reduce design spins
3. Design For Manufacturing

Business Drivers

...to meet market demands
...to reduce development cost and time to market
...to reduce production cost
ADS Complete Front to Back RF Board Design Flow

1. Increased RF and wireless functionality …to meet market demands
2. Reducing design spins …to reduce development cost and time to market
3. Design For Manufacturing …to reduce production cost
“Doing fast and accurate system trade-offs”

Increased wireless and RF functionality
Reducing design spins
Design for Manufacturing

**Design Challenge**

**ADS Solution & Benefits**

- RF cascaded budget and spurious analysis
- Complete set (>100) of linear and non-linear parameterized system models: filters, amplifiers, mixers, modulators, demodulators, PLL, RX&TX subsystems,…
- Genesys RF Architect interface to enable unique Genesys system architect tools Spectrasys and WhatIF
- RF System and budget design guides containing a broad range of pre-configured simulation set-ups and data displays.

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**ADS Budget Analysis**

**Performance of All IFs**

![Graph showing performance of all IFs](image)

**Genesys What IF**

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[Image and data visualization showing budget analysis and performance of IFs]
“Design my analog RF design together with the baseband and digital part”

Increased wireless and RF functionality  Reducing design spins  Design for Manufacturing

**Design Challenge**

**ADS Solution & Benefits**

- Co-design and co-verify your RF and DSP design together.
- See what circuit level effects have on system-level performance like EVM, BER,…
- Integration of user supplied IP in Verilog, VHDL,C++ or M-Code, together with circuit level or behavior RF models
“Design and verify my RF design with against a wireless standard”

**Increased wireless and RF functionality**

**Reducing design spins**

**Design for Manufacturing**

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**Design Challenge**

**ADS Solution & Benefits**

- Wireless test benches to design and test your RF design using realistic input signals for **all commercial wireless standards**, including WLAN, WiMAX, GSM/EDGE/3GPP along with emerging standards like WiMEDIA and 3GPP-LTE

- **Only vendor** to use the same wireless standard specification for simulation and signal sources and analyzers

- Bridges the gap to the wireless world for the RF designer!
“Use my measurement and simulation results together”

Increased wireless and RF functionality  Reducing design spins  Design for Manufacturing

**Design Challenge**

**ADS Solution & Benefits**

- Connect ADS to test and measurement equipment using Connected Solutions
- Download the in ADS created waveform in a signal generator to replicate its real time stimulus that will be presented to a device or sub-system when the system is complete.
- Have the hardware Vector Signal Analyzer virtually running in your simulation.
- Use your device and sub-system data in your simulation (e.g. create nonlinear P2D behavioral models from existing physical component)
“Get accurate models for my discrete components I’ll use”

Increased wireless and RF functionality  Reducing design spins  Design for Manufacturing

Design Challenge  ADS Solution & Benefits

Currently >35 vendors, monthly updates

http://eesof.tm.agilent.com/partners/vendor_libraries.html
“Get EM accurate microstrip and stripline models without sacrificing speed”

Increased wireless and RF functionality | Reducing design spins | Design for Manufacturing

**Design Challenge**

**ADS Solution & Benefits**

- AMC brings the **accuracy of EM simulation** and the **speed of analytical models** into a single, user-defined, compact model.

- **Arbitrary** user-defined parameterized passive models with continuous frequency range & discrete and/or continuously varying layout parameters.

- Based upon proven Momentum technology to develop model upfront

- Once the model is calculated, AMC provides a **fast and accurate model** ideally for custom board/laminate/substrate passive structures libraries.

- Unique, patented modeling technology
“Design my layout structures with EM accuracy together with my circuit components”

**Design Challenge**

**ADS Solution & Benefits**

- **Momentum** as 3D planar EM simulator, integrated in the ADS design environment
- **EM-circuit co-simulation** concept to simulate and optimize circuit including the board EM effects.
  - Momentum models the EM behavior of simple microstrip structures up to the most complex multi-layer geometries with hundreds of vias
  - Advanced meshing and solver techniques to enable fast and accurate simulation of different board structures. Complex mixed signal → uW transitions.
  - Support for multi-core, multiprocessor, 64-bit and distributed computing
“Simulate finite dielectric structures like cavities in a board or bondwires”

**Design Challenge**

- **Board cavity & bondwires**
- **EMDS-for-ADS circuit co-simulation**
- **UWB antenna with finite dielectric**

**ADS Solution & Benefits**

- **EMDS-for-ADS** is a **full 3D** Finite Element Simulator (FEM) integrated in ADS
- No need to export/import files to a stand-alone 3D simulator
- Goes beyond some limitations of momentum like finite dielectrics, bondwires,…
- Uses the established momentum use model for simulating directly from layout as well as simulation from schematic via the layout look-a-like component to perform a EM circuit co-simulation

**Increased wireless and RF functionality**

**Reducing design spins**

**Design for Manufacturing**
“Simulate the full board including antennas in a closure”

**Design Challenge**

**ADS Solution & Benefits**

- **AMDS** is a full 3D Finite Difference Time domain simulator.
- Designed to simulate antenna and board structures within their appliance.
- Takes real-world proximity effects of the human hand and head in account.
- Minimizes the risk of downstream failures in prototype testing of board+antenna+appliance.
- Import of ADS design files

**Increased wireless and RF functionality**

**Reducing design spins**

**Design for Manufacturing**
“Powerful and flexible layout solution targeted at RF design and verification”

Increased wireless and RF functionality
Reducing design spins
Design for Manufacturing

Design Challenge

ADS Solution & Benefits

- Unlike generic pcb tools, ADS layout is focused on RF PCB layout.
- Not restricted to one mode of design synchronization between schematic and layout to allow full flexibility.
- Polygonal, custom shape interconnects
- RF specific functions like trace routing, via stitching,…
- 3D board previewer to inspect and work on complex board/via stackups
- Real-time connectivity check using the Physical Connectivity Engine
- Layout Versus Schematic, LVS to capture parameter mismatches, overlaid components, open connections,…
“Design a product with maximum production yield”

Increased wireless and RF functionality

Reducing design spins

Design for Manufacturing

**Design Challenge**

**ADS Solution & Benefits**

- ADS provides a complete set of statistical design options including: optimization, Sensitivity Analysis, Yield, Yield Optimization, Design Of Experiments (DOE), and Yield sensitivity histograms.

- Ensures **product robustness** and reliability for low volume production

- **Eliminates** manufacturing process and component variations **surprises**.

- Maximizes yield and **reduces production cost**
“Bullet proof layout export ready for manufacturing”

Increased wireless and RF functionality  Reducing design spins  Design for Manufacturing

**Design Challenge**

**ADS Solution & Benefits**

- Support for industry standard database output formats, including Gerber, DXF, GDSII, IGES
- **Output verification** tool to achieve highest confidence in layout export because of intelligent output versus database verification (ADS2008 Update version).
- Fully customizable pick and place, Bill Of Material files.
“Integrate ADS in our enterprise pcb design flow”

Increased wireless and RF functionality  Reducing design spins  Design for Manufacturing

**Design Challenge**

**In detail**

- The integration of the ADS RF Board designer removes your boundaries to the RF design domain.
- Bi-directional interfaces to all major pcb enterprise tools including Mentor, Cadence and Zuken
- PCB product designers are free to deliver any amount of RF value from concept to production within your native design flow.
- Long standing partnerships and experience to provide best-in-class integration an technology.

**ADS Solution & Benefits**
Increased wireless and RF functionality  
Reducing design spins  
Design for Manufacturing