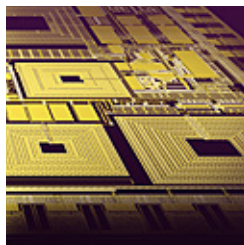
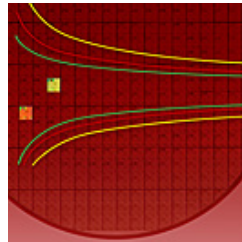
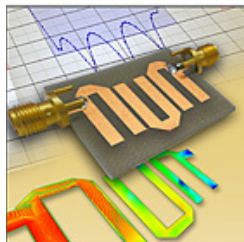
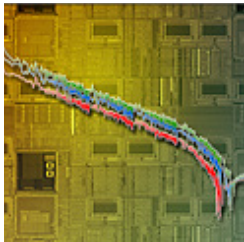
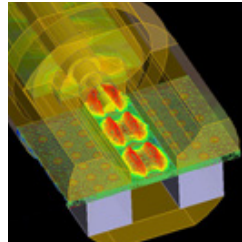


# Keysight EEsof EDA

## Premier Communications Design Software



## Offering Design Software for Complete Flow Solutions

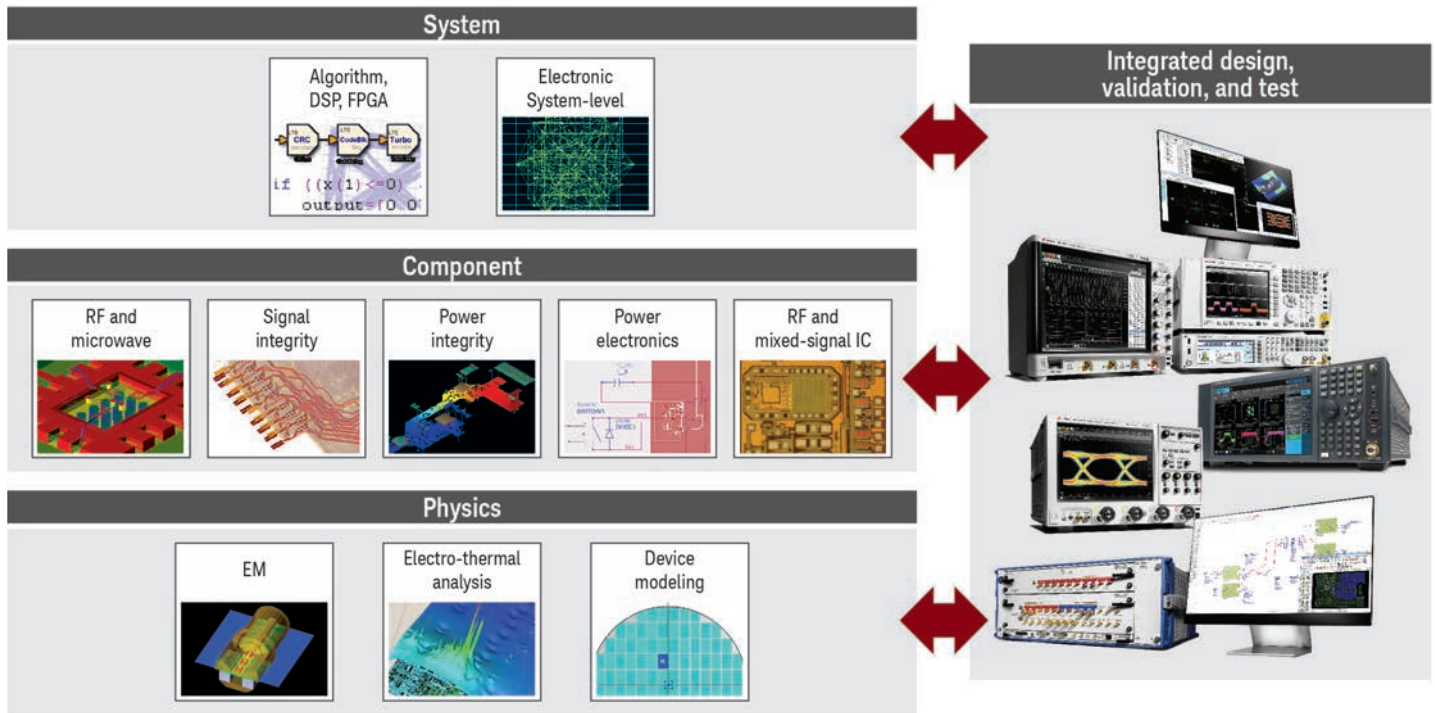


Figure 1. Keysight EEsof EDA is the leading supplier of Electronic Design Automation (EDA) software for communications designs.

Keysight EEsof EDA is the leading supplier of Electronic Design Automation (EDA) software for communications product design. RF, microwave, Signal Integrity, Power Integrity, device modeling, and signal-processing design engineers create better products faster using design flows built on our system, component, and physics-level design tools. We offer complete design integration for products such as cellular phones, wireless networks, radar, satellite communications systems and high-speed digital wireline designs. Applications include electronic system level (ESL), Signal Integrity, Power Integrity, RF-Mixed signal, device modeling, RF and Microwave design for commercial wireless, aerospace, and defense markets. Our software is compatible with and is used to design Keysight's own test and measurement equipment.

All of our EDA software bundles are scalable to offer you the widest variety and most flexible plans available to work within your design flow and your budget. As your design needs grow, you can add simulators, models and libraries as you require them. We are dedicated to providing the right software and support to increase your design productivity and advance your long-term success.



**Keysight EDA 69%**

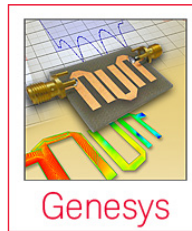
Keysight EDA is the leading provider of RF Design and Simulation tools.  
(Courtesy of Gary Smith EDA)

Figure 2. Keysight EDA is the leading provider of RF Design and Simulation tools. (Courtesy of Gary Smith EDA)

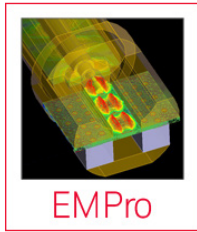
## World-Class Products Enabling the Entire Communications Design Flow



Advanced Design System (ADS) is the industry's leading RF, microwave, Signal Integrity, and Power Integrity electronic design automation software for wireless communications and networking, aerospace and defense, and signal integrity applications.



Genesys is an affordable, accurate, easy-to-use RF/microwave circuit synthesis and simulation software created for the circuit board and subsystem designer.



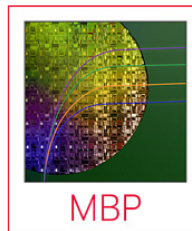
Electromagnetic Professional (EMPro) is the first 3D Electromagnetic EM simulation software platform that completely integrates 3D EM simulation and the ADS circuit simulation software.



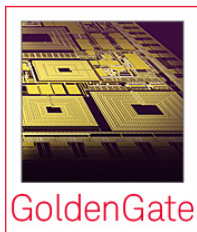
Integrated Circuit Characterization and Analysis Program (IC-CAP) is the industry standard for DC and RF semiconductor device modeling. IC-CAP extracts accurate compact models used in high speed/digital, analog and power RF circuit design applications.



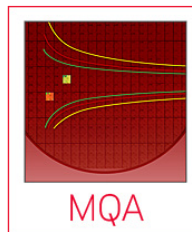
SystemVue is an electronic system-level (ESL) design tool that enables system architects and algorithm developers to innovate the physical layer (PHY) of next-generation wireless and aerospace/defense communications systems.



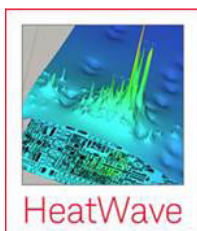
Model Builder Program (MBP) is a one-stop solution that provides both automation and flexibility for silicon device modeling. MBP includes powerful, built-in characterization and modeling capabilities as well as an open interface for modeling strategy customization.



GoldenGate is an advanced simulation and analysis solution for integrated mixed signal RFIC designs. GoldenGate RFIC software is fully integrated into the Cadence Analog Design Environment (ADE).



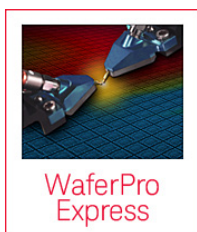
Model Quality Assurance (MQA) provides the complete solution and framework to fabless design companies, IDMs, and foundries for SPICE model library validation, comparison, and documentation.



HeatWave is a device-level electro-thermal simulator for ICs and stacked-die SiP. It computes a 3-D temperature profile of your chip, and annotates the device temperatures into your circuit simulator, making it thermally accurate.



The Advanced Low-Frequency Noise Analyzer is the premier system for characterization and analysis of 1/f (flicker) noise and random telegraph signal noise (RTN).



WaferPro Express provides a unified measurement platform that allows users to setup and execute automated wafer-level measurements of semiconductor devices such as transistors and circuit components.

## Advanced Design System (ADS) – Premier RF, Microwave, Signal Integrity and Power Integrity Design Platform

Advanced Design System is the leading electronic design automation software for RF, microwave, Signal Integrity and Power Integrity applications, providing the design simulation software environment that enables co-design of IC, package, and board. ADS has pioneered the most innovative and commercially successful technologies, including the industry's most advanced suite of system, circuit, and EM simulation products, plus X-parameters\* for nonlinear modeling. ADS offers the industry's only true multi-technology design environment which allows multiple IC's combined with laminate and packaging PCB to all be designed together. ADS seamlessly integrates these powerful tools in a complete front-to-back design platform, taking you every step from concept to manufacturing, making it the choice of leading companies in the wireless communication and networking and aerospace and defense industries.

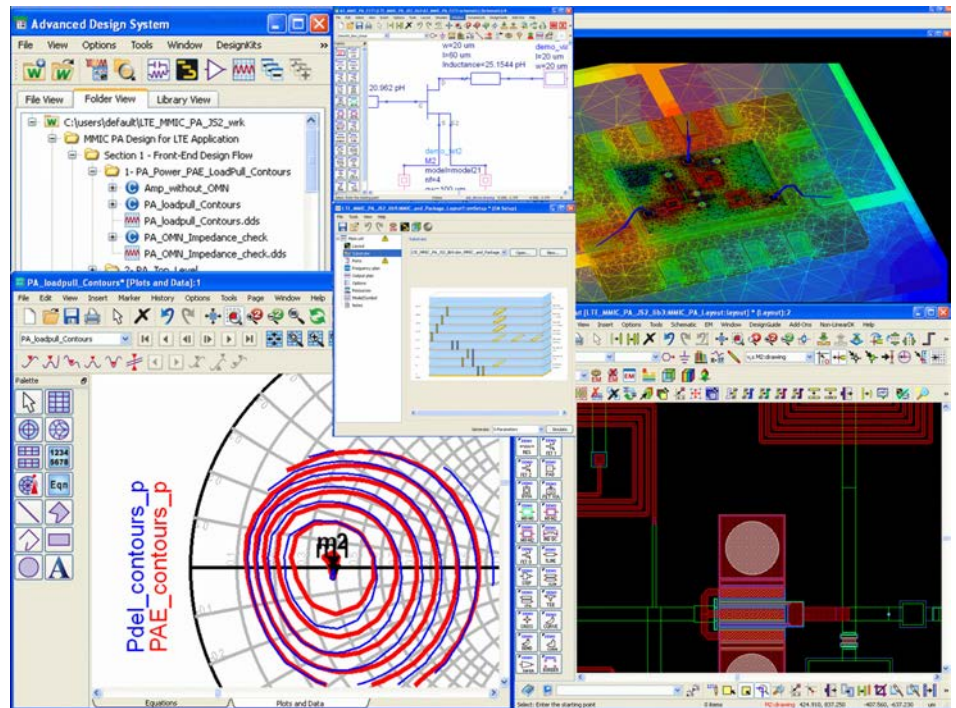


Figure 3. ADS is the industry's leading electronic design automation software for wireless communications and networking, aerospace and defense, and signal integrity applications.

### The industry's leading technology, and much more

ADS puts an unparalleled suite of simulation technology at your fingertips including: S-parameter, AC analysis, harmonic balance, high-frequency SPICE, convolution, circuit envelope, high-speed channel, Keysight Ptolemy system dataflow, Momentum 3D planar EM, and full 3D EM finite element method, but that is only the beginning.

To shorten your design cycles, ADS provides a huge amount of application-specific data. Over 300 examples cover everything from specific application circuits to tutorials on how to get the most out of ADS. Through DesignGuides, we have integrated the experience and best practices of leading designers. They provide wizards, pre-configured set-ups and displays, and step-by-step instructions for design applications such as amplifiers, filters, mixers, RF systems, etc., giving you easy access to the power of ADS from day one.

Keysight also works with top GaAs, GaN, InP, SiGe and Silicon foundries around the world to develop and support process design kits for RFIC and MMIC design in ADS. Finally, all the major surface mount component vendors provide up-to-date component libraries, representing thousands of models, specifically for ADS RF PCB design.

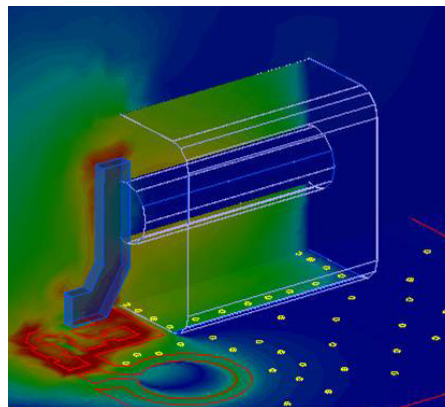


Figure 4. Enhanced Integrated 3D EM Analysis – including Finite Element EM sweeps, optimization and co-simulation with circuit analysis.

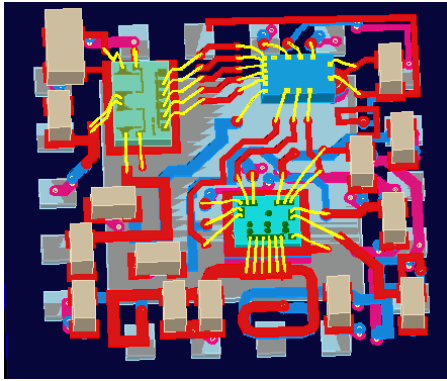
### ADS key features

- Complete schematic capture and layout environment
- Innovative and industry leading circuit and system simulators
- Direct, native access to 3D planar and full 3D EM field solvers
- Accurate and efficient electrothermal analysis for temperature aware circuit simulation
- Largest number of process design kits (PDKs) developed and maintained by leading foundry and industry partners
- EDA and Design Flow Integration with companies such as Cadence, Mentor, and Zuken
- Optimization Cockpit for real-time feedback and control when using any of 12 powerful optimizers
- X-parameters model generation from circuit schematic and Keysight's NVNA for nonlinear high-frequency design
- Up-to-date Wireless Libraries enable design and verification of the latest emerging wireless standards

## ADS Speeds Your Optimized Design From Concept to Implementation

### Innovative multi-technology capability

ADS capabilities enable tradeoffs to be made interactively on the IC, laminate, packaging, and printed circuit boards being designed or co-designed together. Circuits designed in multiple technologies can be combined and simulated at both the circuit and full 3D EM level.



### Boost productivity with an integrated design environment

ADS is the best in class RF and Microwave design platform for GaAs, GaN, SiGe, SOI and RF CMOS design including circuit, electromagnetic and electro-thermal simulation, optimization, data post processing, visualization and analysis; as well as physical layout design and verification (DRC/LVS) for GaAs and silicon MMIC, RFIC and RF Module/ Laminate design. Additionally, ADS works with other EDA frameworks to fit well with your specific design flow and, with the ADS instrument connectivity, it provides a truly unique integration of design and measurement.

This proven software environment is easily customized to meet your unique design or application needs. ADS runs on Windows and LINUX, with complete file compatibility between platforms and across networks.

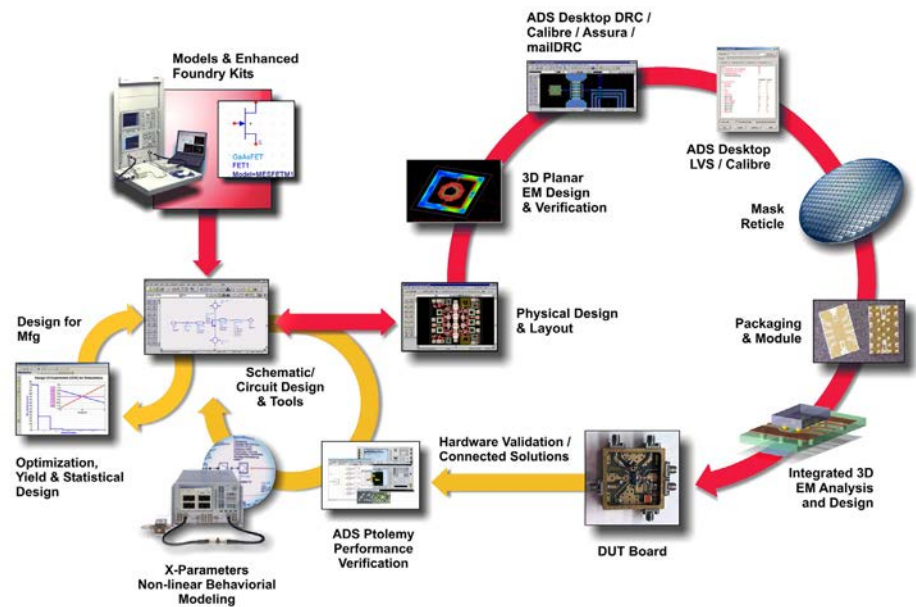
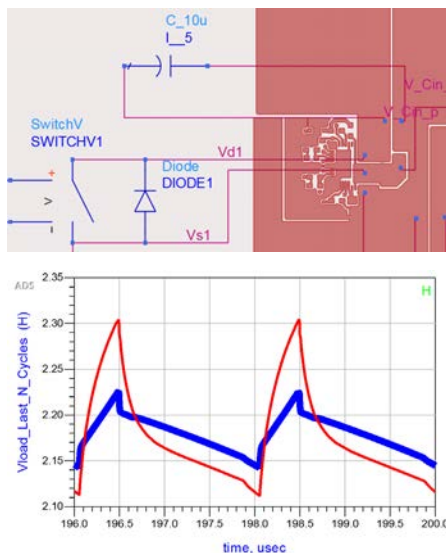


Figure 5. ADS integrates all this proven RF, signal integrity, mixed-signal and electromagnetic technology into a single, flexible environment.



### Power electronics

In contrast to traditional electronics, which is all about handling data, power electronics is all about handling power: generating it, converting it, and moving it from source to load. This technology finds applications in a wide range of industries including power utility generation and distribution; automotive; and consumer electronics.

The fast dV/dt edges of modern switched-mode converters that benefit from SiC and GaN transistors require new thinking about EDA tools. Traditional SPICE alone is not enough because it is limited to the time-domain and to lumped elements. It does not capture physical layout effects that can dominate performance. ADS and EMPro offer both time- and frequency-domain simulation of both lumped and distributed elements. The simulations yield insights and important performance metrics such as efficiency, and reliability indicators such as surge voltage device overstress.

# ADS Provides a Cohesive Workflow for Signal Integrity and Power Integrity Analyses

## Facing today's high-speed PCB design challenges

When digital signals reach multigigabit speeds, the unpredictable becomes the norm. Keysight's signal integrity (SI) and power integrity (PI) solutions include EDA design and simulation tools that will help you cut through the challenges of multigigabit digital PCB designs. ADS delivers industry leading time and frequency domain simulation technology, within a cohesive workflow, to help you overcome SI and PI issues and ensure compliant designs.

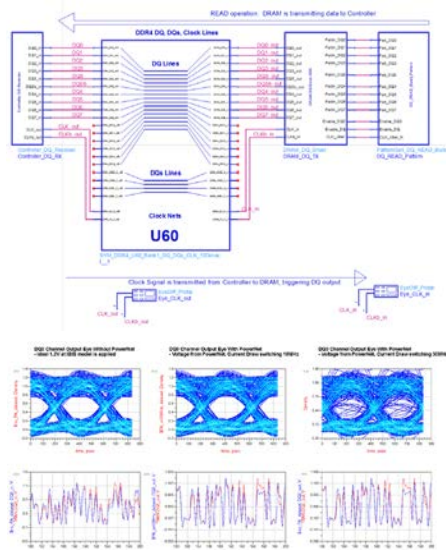


Figure 6. ADS includes industry-leading channel simulation technology.

## State-of-the-art channel analysis

With ADS and other tools from Keysight you can:

- Analyze complete chip-to-chip links by modeling at the channel-, circuit- and physical-level of abstraction.
- Import frequency-domain s-parameter models accurately into time-domain circuit and channel simulations, using patented causality and passivity algorithms
- Determine ultra-low BER contours in seconds not days using the statistical and bit-by-bit modes of Channel Simulator
- Import transceiver models in IBIS format (both traditional and AMI) and in netlist format (both unencrypted and encrypted with the Keysight key)
- Generate IBIS AMI models in days not months

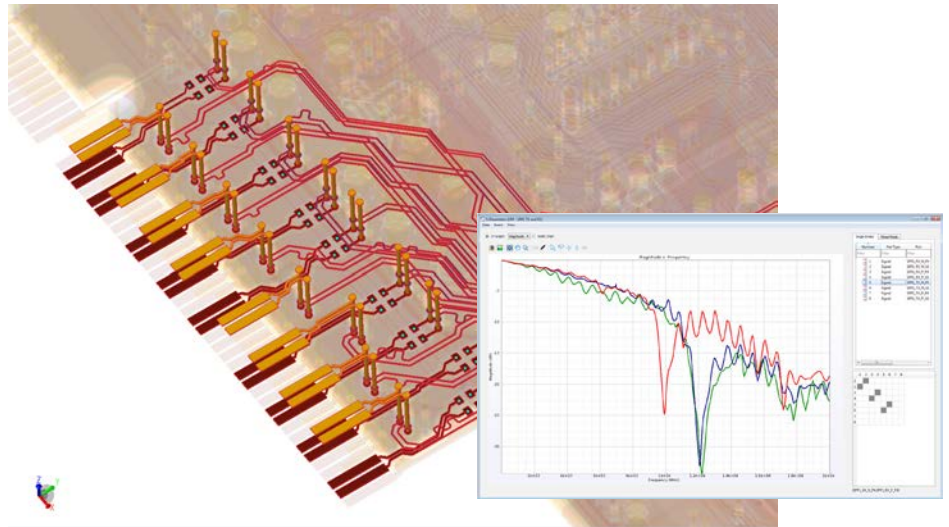


Figure 7. SIPro utilizes composite EM technology to quickly simulate large, complex PCBs and extract accurate models for high data-rate links, all within ADS.

## Fast and accurate post-layout EM analysis

ADS includes innovative EM technologies that combine accuracy, speed and capacity required to simulate large, complex PCB designs with multigigabit links. With the SIPro and PIPro EM simulators in ADS you can:

- Import post-layout artwork from enterprise PCB tools from Cadence, Mentor, Zuken, etc. for EM analysis of power integrity and signal integrity issues
- Quickly set up SI and PI analyses in the same environment, using a focused, net-driven use-model
- Extract accurate S-parameter models of high speed links including the effects of signal coupling, non-ideal ground and power planes, and via coupling
- Perform PI analyses to characterize DC IR drop, AC impedance and power plane resonance
- Automatically generate schematic test benches in ADS based on the results of EM-based SI and PI analyses

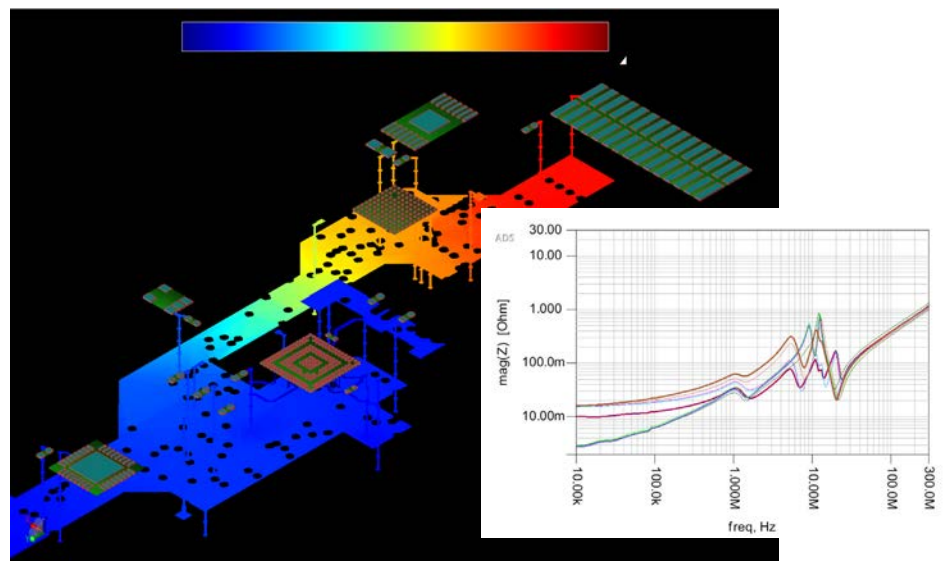


Figure 8. PIPro in ADS provides power integrity analysis of your power distribution network, including DC IR drop analysis, AC impedance analysis and power plane resonance analysis.

# EMPro – 3D Electromagnetic Modeling and Simulation Environment Integrated With Your ADS Design Flow

Electromagnetic Professional (EMPro) is a 3D modeling and simulation environment for analyzing the 3D electromagnetic (EM) effects of high-speed and RF/microwave components. EMPro features a modern design, simulation and analysis environment, high capacity time- and frequency-domain simulation technologies and integration with the industry's leading high-frequency and high-speed design environment. EMPro allows you to create 3D components that can be simulated together with 2D circuit layouts and schematics within Advanced Design System (ADS), using EM-circuit cosimulation. Designers can quickly create arbitrary 3D structures with a modern, simple GUI that saves time and our EMPro EM simulation software provides advanced scripting features.

## Features

Modern, efficient 3D solid modeling environment

EMPro provides the flexibility of drawing arbitrary 3D structures and the convenience of importing existing CAD files. You can create 3D shapes, add material properties, set up simulations, and view results—all within the EMPro environment.

Time and frequency-domain simulation technology

3D structures can be analyzed in EMPro using the same FEM simulator available in ADS. FEM is a frequency-domain technology widely used for RF/microwave applications. For electrically large problems, such as antennas and EMI, the finite difference time domain (FDTD) simulator can be used.

Parameterized 3D EM component generation

Parameterized 3D components can be created in EMPro and placed on a layout design in ADS. The FEM simulator can then be used to simulate the combination of the 2D layout and the 3D EM component.

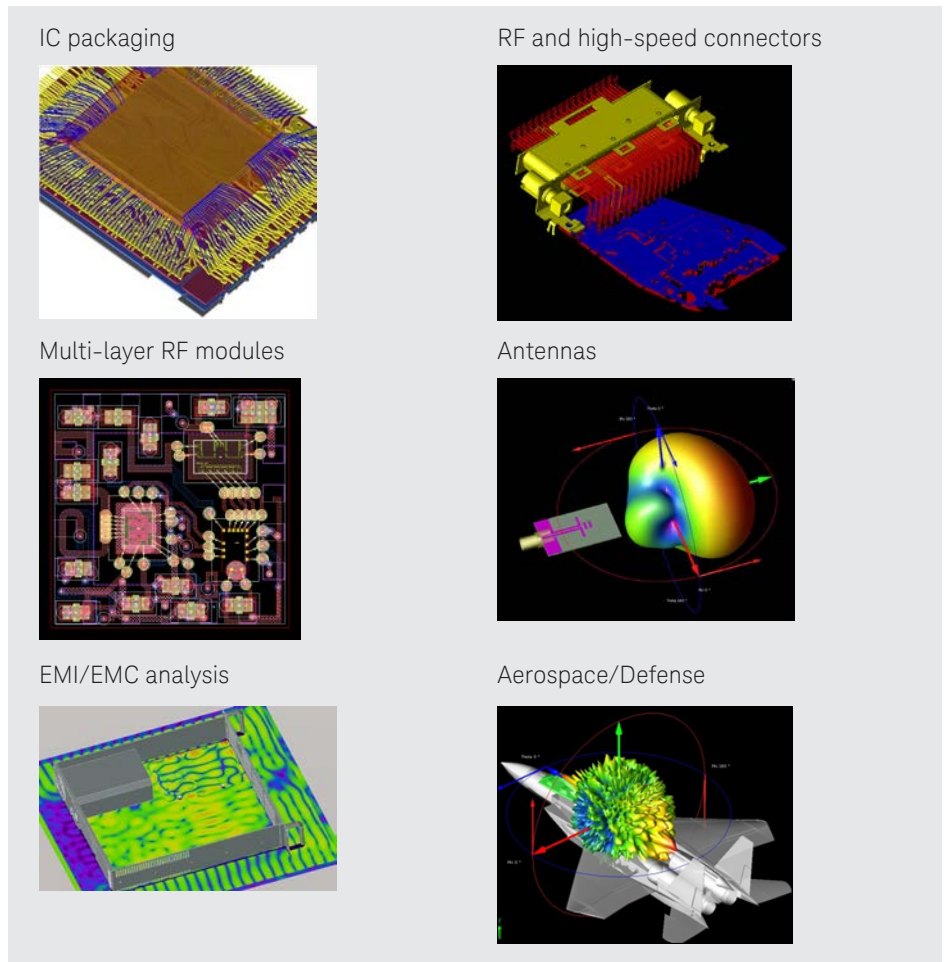


Figure 9. EMPro is used in a wide variety 3D electromagnetic modeling and simulation applications.

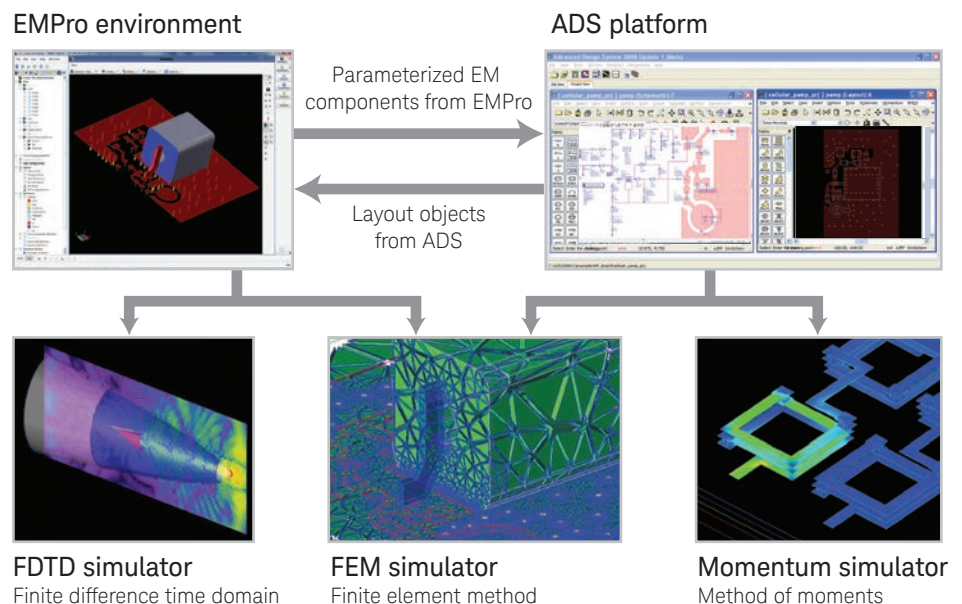
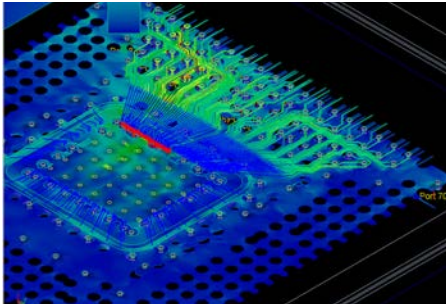


Figure 10. Keysight provides multiple EM simulation technologies integrated with the ADS design flow. EMPro adds a 3D solid modeling environment to this flow.

## Keysight Offers the Broadest Selection of EM Simulation Technologies

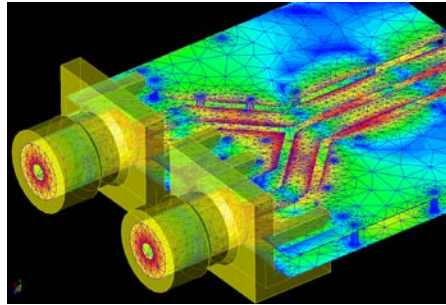
### Momentum simulator



The Keysight Momentum Simulator is the leading 3D planar electromagnetic (EM) simulator used for passive circuit modeling and analysis. It uses frequency-domain Method of Moments (MoM) technology to accurately simulate coupling and parasitic effects of complex multi-layer designs.

Momentum is integrated with ADS, Genesys, and GoldenGate, along with third-party tools from Cadence, Mentor and Zuken.

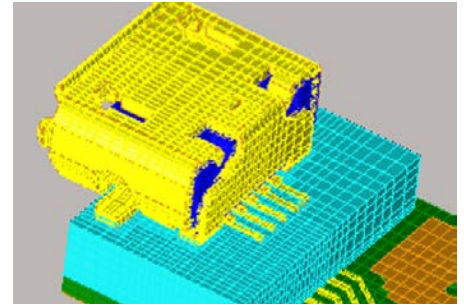
### Finite Element Method (FEM) simulator



The Keysight FEM Simulator is based on the industry-proven Finite Element Method. Unlike 3D planar simulators, this technology can handle arbitrarily shaped 3D structures.

Keysight FEM is integrated with ADS so layout designs do not need to be exported to third-party EM simulators. Keysight FEM is also available in EMPro for simulating 3D models imported from other CAD tools or created natively.

### Finite Difference Time Domain (FDTD) simulator



The Keysight FDTD Simulator is based on Finite Difference Time Domain technology. Like FEM, FDTD can handle arbitrarily shaped 3D structures. Whereas FEM produces a large matrix during the solution process, FDTD uses an iterative process to update field values at each time step.

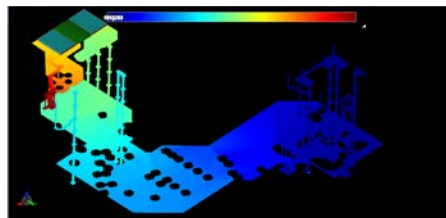
The Keysight FDTD simulator is available in EMPro for simulating 3D models imported from other CAD tools or created natively.

### SIPro: A fraction of full wave 3DEM simulation time



SIPro's composite EM-technology delivers high-frequency accuracy, together with the speed and capacity required for densely-routed cutting-edge PCB design. With Automatic Schematic Generation, extracted EM models flow directly into an ADS transient simulation and ADS channel simulation for complete channel analysis.

### PIPro: Accurate, efficient net-driven PI analysis



PIPro provides power integrity (PI) analysis of your power distribution network (PDN), including DC IR drop analysis, AC impedance analysis and power plane resonance analysis. PIPro utilizes a common setup and analysis environment within ADS. The EM technologies in PIPro are tuned specifically for PI applications; they are much faster and more efficient than general purpose EM tools.



# SystemVue – Shortest Path From Imagination to Verified Hardware for Physical Layer Systems Design

## Key benefits

- Best-in-class RF fidelity among today's baseband/PHY environments – allows baseband designers to virtualize the RF and eliminate excess margin
- Superior integration with Test accelerates real-world maturity and streamlines your model-based design flow, from Architectures to Verification
- IP reference designs for many applications including 5G, Radar, Satellite, and more

## Key SystemVue features

- RF/DSP co-design for superior system-level partitioning
- Polymorphic modeling in C++, MATLAB Script, VHDL, or graphical blocks
- Distortion-true RF models, with X-parameters support
- Fixed-point and HW design kits for HDL (FPGA) and C++ (DSP)
- PHY waveform reference libraries for 4G/5G, Radar/EW, and Satellite, and more
- Scriptable integration of simulation with test and measurement

## Key Spectrasys features

- Accurate RF architecture analysis, re-useable in dynamic system-level scenarios
- Quickly diagnose root causes of poor system performance
- Easy like a spreadsheet, but handles many more effects
- Full nonlinear RF and noise modeling, with X-parameters

SystemVue is a multi-domain modeling implementation and verification cockpit for electronic system-level (ESL) design. It allows system architects and algorithm developers to cross traditional Baseband and RF boundaries in order to innovate the physical layer (PHY) of next generation aerospace/defense and wireless communications systems. SystemVue simplifies tasks by integrating popular DSP modeling and implementation interfaces, along with accurate RF EDA tools, Standards/IP references, and Test and Measurement links into a single, highly productive environment. The result is that SystemVue “speaks RF,” links model-based design across important domains, and cuts PHY development and verification time in half.

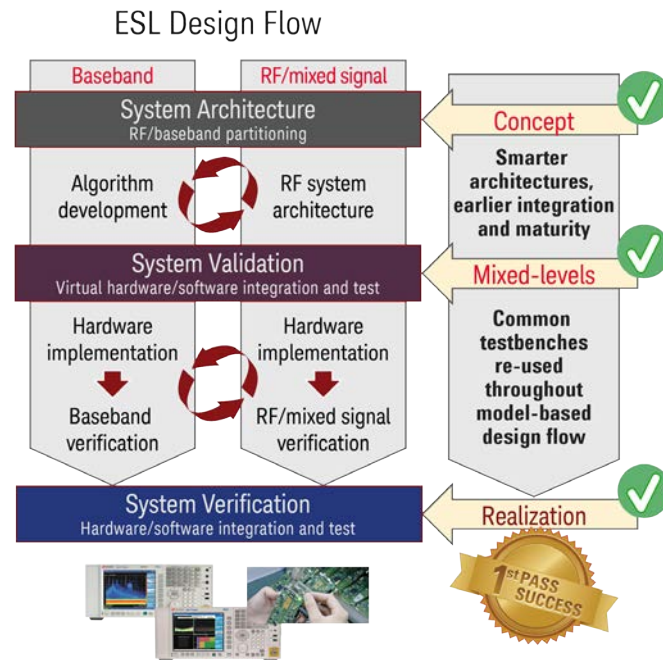


Figure 11. SystemVue unites a top-down system-level design approach that crosses the RF/Baseband gap and connects to major digital and RF design flows. A platform that sits above the “A-to-D converter divide” is able to create superior architectures.

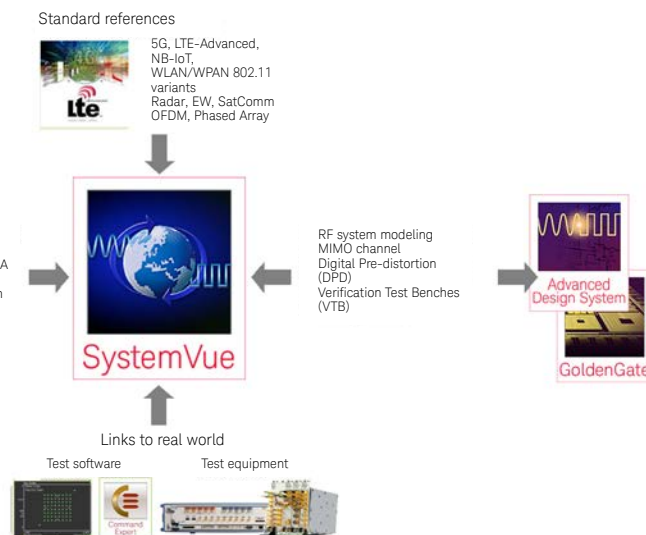
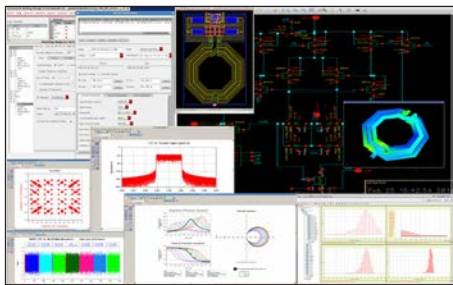


Figure 12. SystemVue provides a System-level Design Cockpit that unifies a nucleus of cross-domain capabilities into one environment.

## GoldenGate – Advanced Simulation and Analysis Solutions for RF-Mixed Signal IC Design

### Features

- GoldenGate is fully compatible with Cadence IC5 and IC6 platforms.
- Speed and capacity enables full characterization of complete RF transceivers, including parasitics, prior to tape-out.
- Performs both small and large signal analysis including DC, Transient, AC, Harmonic Balance, Envelope, Convolution, Noise, Yield, fast Mismatch and Verilog-AMS co-simulation.
- Includes a suite of automation tools to quickly analyze circuit performances and diagnose problematic issues with mixed-signal RFICs earlier in the design cycle.
- Part of Keysight's unique RF-MS IC flow that links the RF system, subsystem and component-level design and analysis as part of a comprehensive design flow.



GoldenGate provides the framework for RF-Mixed Signal (RF-MS) designers to rapidly simulate circuits, verify specs and validate potential yield of complex highly integrated RFICs. Designers can confidently simulate blocks, combinations of blocks and full receive/transmit chains to understand the influences introduced by noise, distortion, parasitics and numerous other effects confronted in modern RF-MS IC design. Additionally, designers can analyze the manufacturability of circuits using industry standard techniques such as Process and Mismatch Monte Carlo as well as unique Keysight statistical mismatch and process analyses.

These tools provide a comprehensive circuit simulation, verification and analysis methodology that has been seamlessly integrated into the Cadence Analog Design Environment. Designers can move smoothly through schematic capture, test bench setup, simulation and analysis to achieve insight into design performance and manufacturability prior to tape out, avoiding costly mistakes and design re-spins.

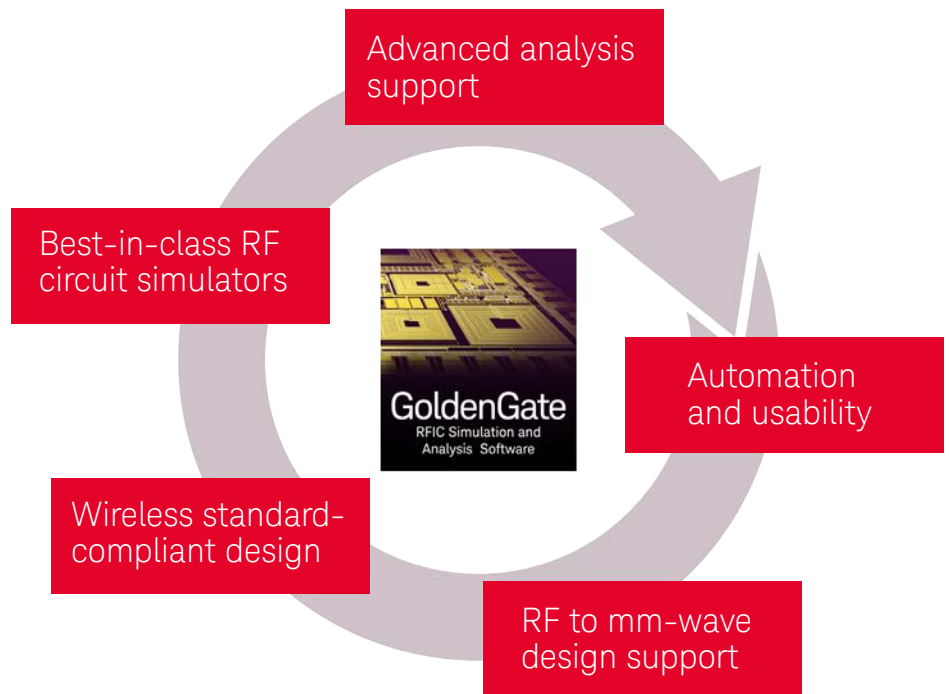


Figure 13. While GoldenGate offers traditional analog simulators, it also goes beyond innovative RF simulation technology to provide a variety of solutions for designing, analyzing and verifying integrated RF circuits.

### Comprehensive RFIC design and verification solution

GoldenGate is part of a comprehensive RF-MS IC design flow which originates at design capture and flows seamlessly to prototype test. Designs initially are created in Cadence Virtuoso Schematic Capture. Circuits are then simulated in GoldenGate directly from the schematic, enabling a smooth capture to simulation. Advanced simulation analyses including Carrier, Envelope, Fast Envelope, Noise and Transient can be used in combination with specific tasks such as Load Pull, optimization, parameter sweeping, Monte Carlo/ Corners, including Fast Mismatch, provide “real world” view of performance and yield. Simulation results can be viewed using either Cadence results viewer or Keysight's rich set of RF-oriented Data Display capabilities.

After the IC layout is complete, extracted parasitics can be simulated and performances analyzed with GoldenGate. Additional EM based parasitic and RF passive component modeling is performed using Momentum and EMPro simulators. Co-simulation with the Keysight SystemVue system simulator is used to verify that overall system behavior matches the relevant wireless specification. Final prototype measurements, and additional circuit and device modeling are performed with Keysight test equipment and IC-CAP software.

# Genesys – Affordable, High-Performance RF/Microwave Design Software

## Key benefits

- Industry’s widest coverage of automatic RF/microwave circuit synthesis
- RF system analysis and frequency planning with interactive rootcause problem identification
- Linear and nonlinear RF circuit simulators with optimization and statistical analysis for high-performance and high-yield designs
- 3D-planar EM simulator for analyzing printed circuit board and antenna layout to reduce board turns
- 3X more affordable than competitive products that offer less capability

## Lowest cost of ownership

- A node-locked license of Genesys including the first year of support and upgrades costs typically 1/3 less than any competing equivalent capabilities in the industry.
- The cost of a perpetual Genesys license is even less than a 1-year rental of many other RF/microwave design tools of lesser capabilities.
- For projects with tight budgets or where cash low conservation is critical, Genesys is also available as time-based licenses to lower ownership costs further.

Genesys is an affordable, accurate, easy-to-use RF and microwave circuit synthesis and simulation tool created for the circuit board and subsystem designer. Automatic circuit synthesis of matching networks, filters, oscillators, mixers, transmission lines, PLL and signal routing structures enable engineers without prior expertise to design these components quickly. The Genesys synthesis collection is consistently the best selling bundle because no other equivalent capabilities are available in the market at such an affordable price.

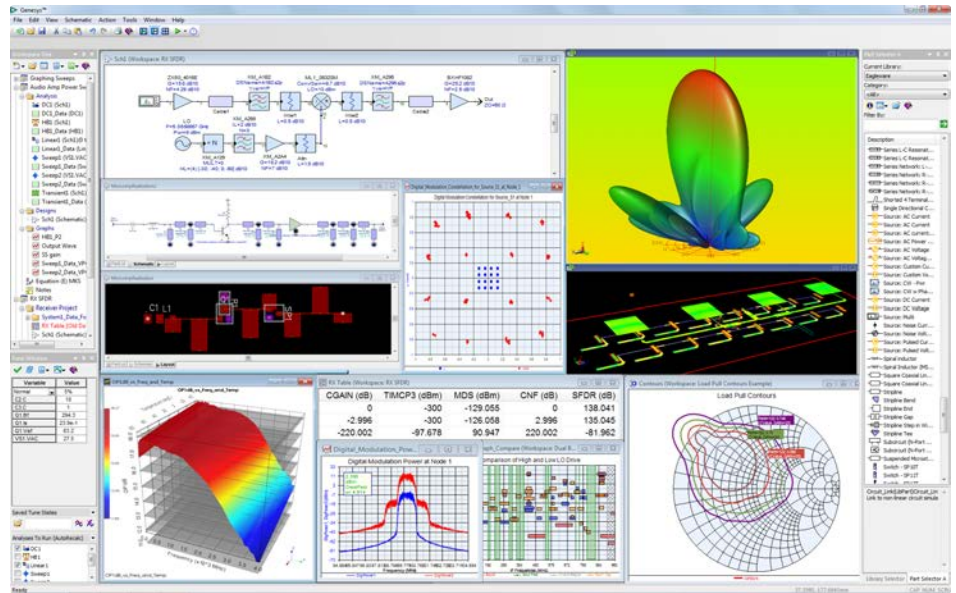


Figure 14. Genesys is an affordable and accurate synthesis and simulation software for RF/microwave circuit board and subsystem designers.

The integrated 3D planar electromagnetic (EM) simulator simplifies the validation of RF PCB boards containing both lumped and distributed RF components before hardware fabrication. It automatically partitions distributed RF components such as microstrip traces, filters or antenna from interconnected lumped components for EM simulation and combine the results with circuit simulation for the best possible accuracy and unprecedented ease of doing EM-circuit cosimulation.

Genesys RF system simulation and fast frequency planning enables system block diagrams to be architected for optimal performance. Unique root cause analysis identifies culprit system blocks and signal paths that cause performance degradation so that costly hardware implementation errors are caught early during design. Simulateable libraries of vendor system components enable accurate system performance validation with off-the-shelf parts before hardware purchase.

As a proven safe investment, Genesys literally pays for itself through cost savings within its first year of deployment as a design productivity tool. As your requirements expand to include enterprise level design of RF/high speed boards, MMICs or multi-technology RF system-in-package (SIP) modules, Keysight protects your Genesys investment by providing full trade-up credit towards the even more capable ADS.

## Genesys Cost of Ownership

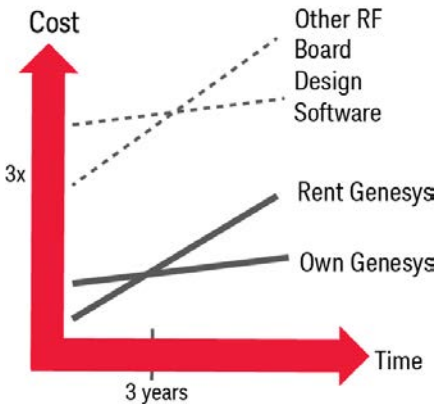


Figure 15. As a proven safe investment with an installed base of 5,000 satisfied designers, Genesys literally pays for itself through cost savings within its first year of deployment.

## HeatWave - Temperature-Enabling Your Simulations

### Key benefits

- Enables your circuit simulator to show how temperature affects your circuit's performance, helping you to neutralize adverse temperature effects before committing to fabrication.
- By providing the accurate operational temperature profile within the IC, HeatWave reveals hotspots and excessive temperature variations in precision circuitry.
- Enhances your ability to detect reliability and wear out/lifetime issues, using accurate and realistic temperature data.

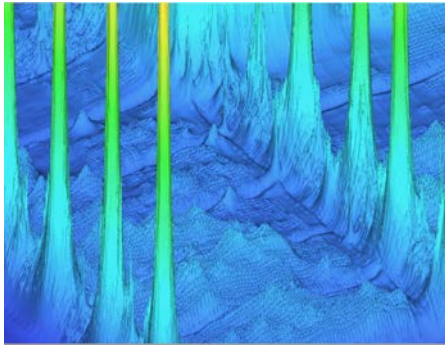


Figure 16. A close-up of a temperature map from a 3D IC design shows the level of detail that is provided by high-resolution electro-thermal analysis. (Courtesy North Carolina State University)

HeatWave Electro-Thermal Analysis Software is an IC thermal simulator for chips, and stacked-die SiP. HeatWave computes the full-chip temperature profile at the spatial resolution of your devices and interconnects, and annotates this data into your circuit simulator, making your simulation results temperature-accurate.

Because the geometric features of power sources and heat conduction paths inside a chip are at the submicron scale, the thermal modeling and numerical solution techniques have to be commensurate with such feature sizes. The simulation results are 3-dimensional temperature profiles with the necessary resolution and accuracy.

HeatWave works with several IC design tools, including Cadence Virtuoso. A version of the HeatWave solver is also available in Advanced Design System (ADS) for RFIC and MMIC applications.

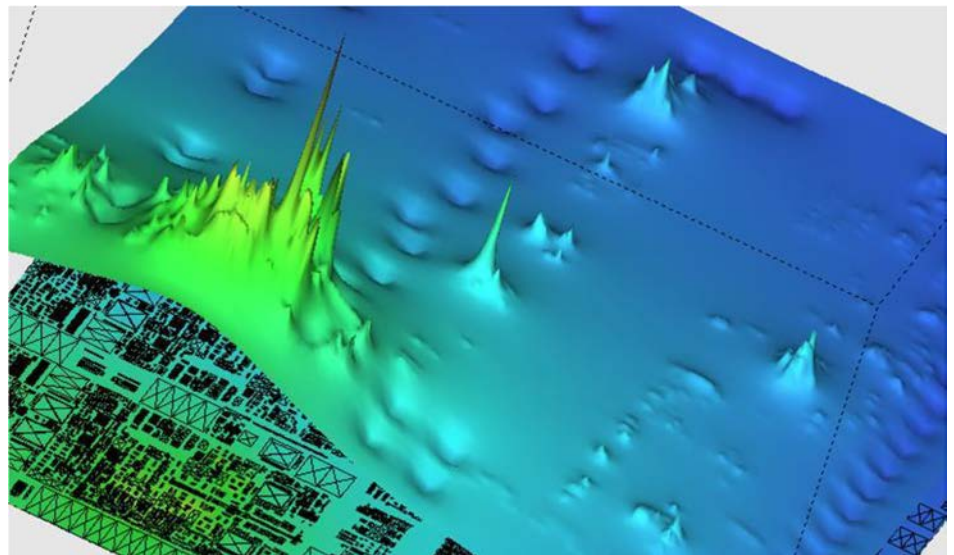


Figure 17. Temperature surface plot showing peaks, calculated from the actual power dissipated by each device, and temperature troughs, caused by heat conduction of the solder bumps.

### Applications

#### Thermally-accurate circuit simulation

HeatWave provides your circuit simulator with instance-specific temperatures that are computed using the full knowledge of the layout geometry, layer material properties, power dissipation, and package.

#### Reliability and lifetime analysis

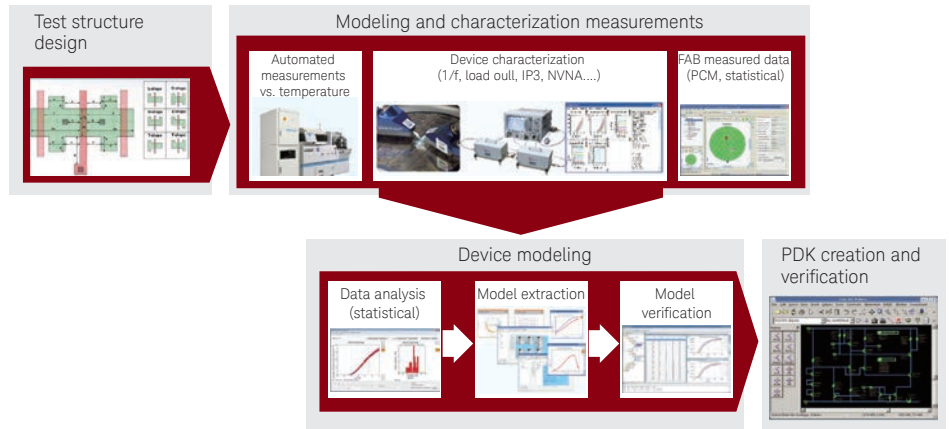
Temperature is a strong driver of most IC failure mechanisms, such as electro-migration, NBTI/PBTI, TDDB, etc. HeatWave computes the actual temperature of each device and wire segment, to enable accurate reliability and failure rate estimates.

#### Thermal simulation with incomplete layout

HeatWave can be used as a thermal floor-planning tool, to help avoid thermal hazards early in the design cycle. HeatWave can provide accurate thermal simulations of one or more defined regions on a chip, while only using layout and power abstractions for the remainder of the partially designed chip.

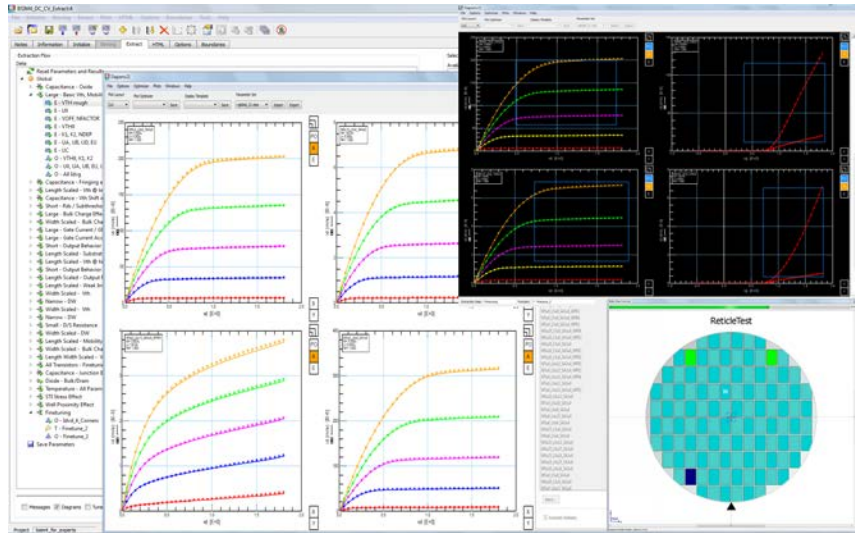
## Premier Si/III-V Device Modeling and Characterization Solutions

Our products and premier solutions provide for characterization and modeling of cutting-edge CMOS and compound semiconductor devices. Keysight is the only vendor that provides complete end-to-end modeling solutions, from automated measurements, accurate device model extraction, comprehensive qualification to final process design kit (PDK) validation. Comprehensive modeling services are offered, supported by Keysight's expert engineers and advanced labs. Our key device modeling and characterization EDA software and hardware solutions are included below.



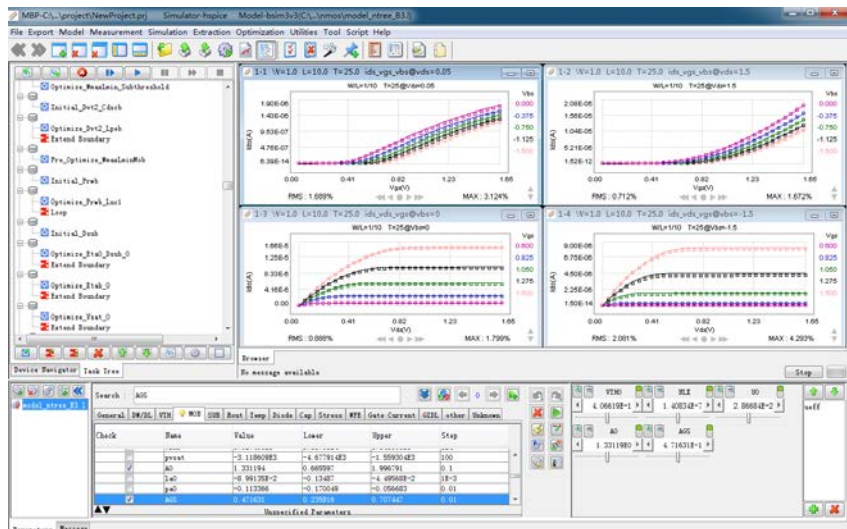
## Integrated Circuit Characterization and Analysis Program (IC-CAP)

IC-CAP is the platform of choice for customers developing their own custom modeling solutions as well as customers modeling compound semiconductor Devices. IC-CAP allows users to write custom extraction routines, create user interface dialogs and automate extraction flows. IC-CAP gives access to cutting edge model technology for compound semiconductor devices, such as the Keysight HBT model and the Keysight NeuroFET based on neural network technology. Additionally, Keysight's IC-CAP WaferPro software is a fast single and multi-wafer automated measurement solution.



## Model Builder Program (MBP)

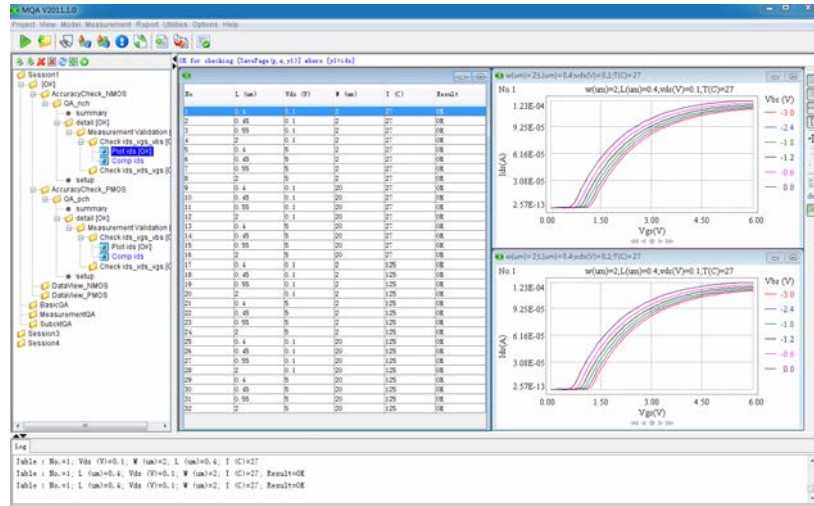
MBP is a complete silicon turnkey device modeling platform that integrates device simulation, model parameter extraction and optimization. MBP supports all popular compact models including the latest BSIM-CMG, BSIM-IMG, and BSIM6 for DC, AC and RF applications. MBP also supports the macro (subcircuit) model and Verilog-A model. MBP provides automatic extraction. The open interface enables optimization flow customization, device target definition and the ability to define GUI operations.



## Complete End-to-End Modeling Solutions

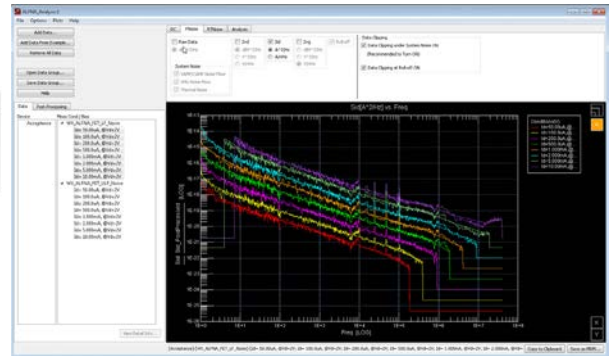
### Model Quality Assurance (MQA)

MQA is a collection of comprehensive SPICE model validation procedures, interfaces and utilities that provide the ability to thoroughly check SPICE model quality and automate QA and reporting procedures for both silicon and III-V technologies. MQA satisfies a critical industry need by rigorously checking the model quality, plotting model characteristics, and customizing the output targets with its comprehensive checking rules while employing easy-to-use interfaces and utilities.



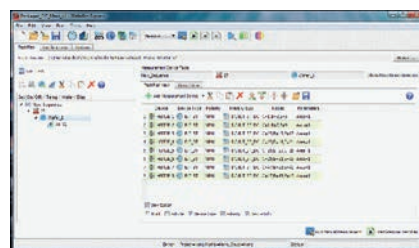
### Advanced low-frequency noise analyzer

The E4727A Advanced Low-Frequency Noise Analyzer enables fast, accurate and repeatable low-frequency noise (LFN) measurements on numerous device types. Thanks to tight integration with Keysight's WaferPro Express software, device modeling and characterization engineers can now add noise measurements to a larger suite that includes high-speed DC, capacitance and RF S-parameter measurements, all the while automating wafer prober control. Designed for both on-wafer and discrete device/circuit measurement.



### WaferPro Express on-wafer measurement program software

WaferPro Express provides a unified measurement platform that takes the software integration complexity out of the picture. The software allows users to setup and execute automated wafer-level measurements of semiconductor devices such as transistors and circuit components. It drives Keysight instruments as well as prober control software (including temperature control), and provides powerful data handling and display capabilities. WaferPro Express's modern and intuitive user interface allows test engineers to reduce the necessary steps to setup the system for automated measurements.



WaferPro Express



- WinCal
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- PNA
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Water-level Measurement Solutions



## Making Your Job Easier With Worldwide Technical Keysight EDA Experts

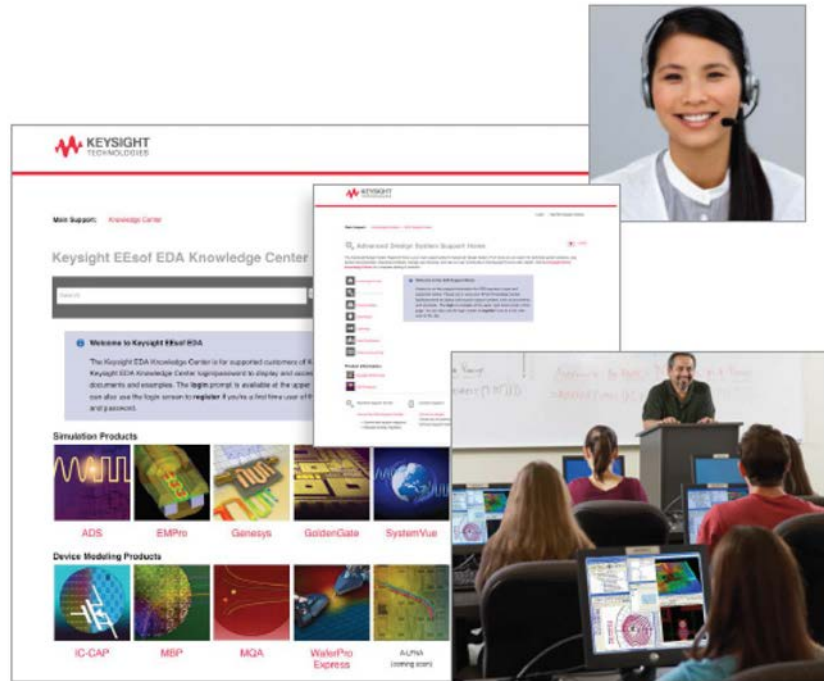
Keysight is committed to customer satisfaction. We are dedicated to providing the right software, support, and consulting solutions to increase your engineering productivity and advance your long-term success. Whether you are a novice or an experienced user, Keysight EDA's customer support offerings are designed to help you every step of the way.

### Significant software updates

Keysight EDA regularly enhances and upgrades its design software. You can expect significant updates that include new features, user interface enhancements, defect fixes, Service Packs, and up-to-date application examples for today's design needs. By using the latest software technology as soon as it becomes available, you can keep your productivity at a maximum.

### Worldwide phone support

Keysight EDA regional technical support teams are experienced with all products and supported platforms. Teams are staffed with highly trained engineers; most have extensive design experience and hold advanced engineering degrees. Whether it's a hardware installation question or a complex circuit or system problem, your call is routed to a specialist whose goal is to get you back to work as quickly as possible.



### Web-based support

The Keysight EDA support web site, featuring the Knowledge Center, is an around-the-clock resource for designers. The Knowledge Center contains thousands of support documents and hundreds of downloadable examples created by our support and application engineers to supplement the examples and documentation supplied with the software. Software updates to previously released software versions are available for download within the Knowledge Center. The My Knowledge Center feature enables you to submit and manage on-line support cases and any related defect and enhancement requests. The Knowledge Center also includes free recorded Technical Info Sessions and introductory e-Learning Short Courses. You will need a valid support contract to access the Knowledge Center.

### Customer education

Increase designer efficiency in setting-up Keysight EDA tools and get a full understanding of how EDA tools can be applied to your own designs. Keysight offers customer education that includes learning weeks, open-enrolment classes, and tailored courses in-house or on-site.

### Premium services

Premium services are typically delivered on-site to help your team use Keysight EDA tools in your own IT and design environment, as well as on your application. The Keysight consultant can help designers to configure, use, and customize Keysight EDA tools for a given design purpose. The goal of Premium Services is to contribute to increasing designer productivity and improve time to market by implementing appropriate design flows.

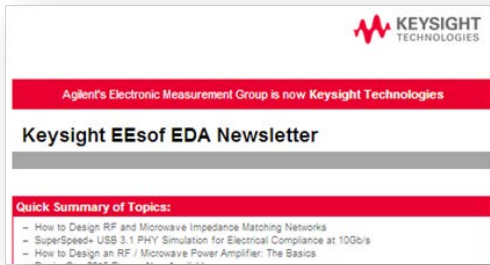
### Consulting projects

Get access to external manpower experts to build a turn-key solution fulfilling your requirements and needs to improve your time-to-market. After an in-depth qualification of your needs, Keysight generates a statement of work which includes deliverable content, delivery timelines, and terms and conditions to build a customized solutions according to your requirements.

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Keysight EEs of EDA is committed to building long-term relationships with its customers and has built online communities just for you. Find the complete list of Keysight EEs of EDA online communities at [www.keysight.com/find/eesof-online-communities](http://www.keysight.com/find/eesof-online-communities).

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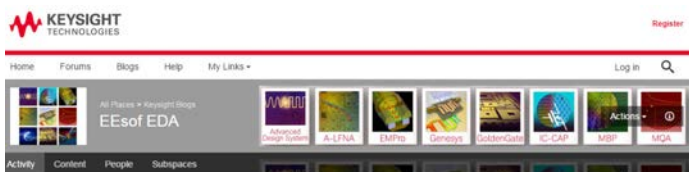
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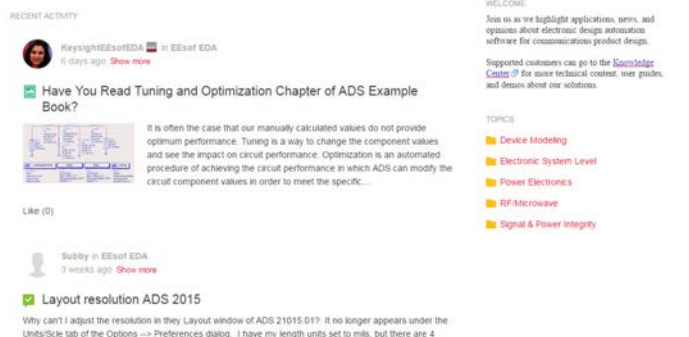


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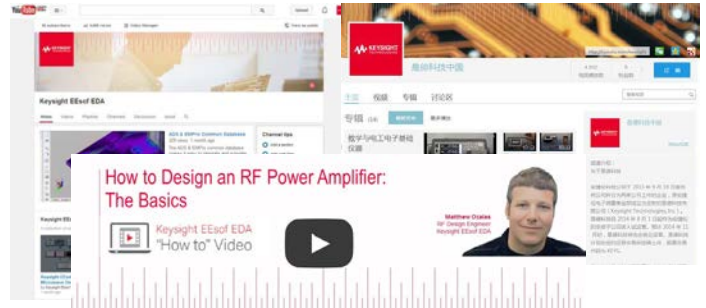


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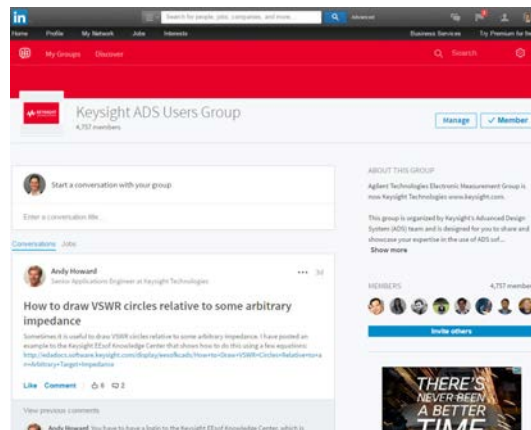
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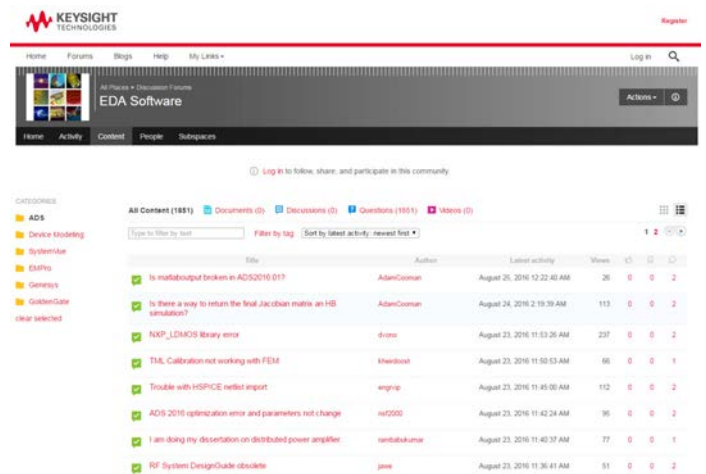
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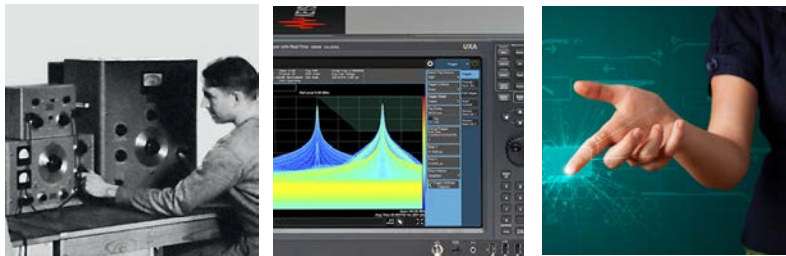
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