cādence®

AWR Design Environment

RF/microwave EDA software suite

The Cadence® AWR Design Environment® platform electronic design automation (EDA) software suite provides RF/microwave engineers with access to innovative high-frequency circuit, system, and electromagnetic (EM) analysis technologies. Today's microwave and RF engineers use this powerful, open platform to design wireless products ranging from base stations to cellphones to satellite communications. The AWR Design Environment software advantages are straightforward: an intuitive use model that delivers an exceptional user experience (UX), robust simulation technologies that deliver both speed and accuracy, and an open design flow supporting data to/from third-party tools.

AWR Software Platform

The powerful, innovative AWR® UX provides an intuitive yet powerful environment that unleashes engineering productivity, enabling engineers to address the design challenges of communication and radar systems.

Robust, advanced simulation technologies support detailed device modeling and the same performance measurements used to specify device requirements. These technologies provide fast, accurate results with fully integrated system, circuit, and EM analyses that accurately predict/optimize component performance before prototype manufacturing and test.

Design-flow automation connects simulation models, third-party tools, and layout geometries to manufacturing processes to aid designers as they move from concept through engineering signoff. Flows for PCB, microwave monolithic integrated circuit (MMIC), RFIC, and multi-chip module (MCM) fabrication provide support through process design kits (PDKs), wizards/scripting, and third-party solutions.
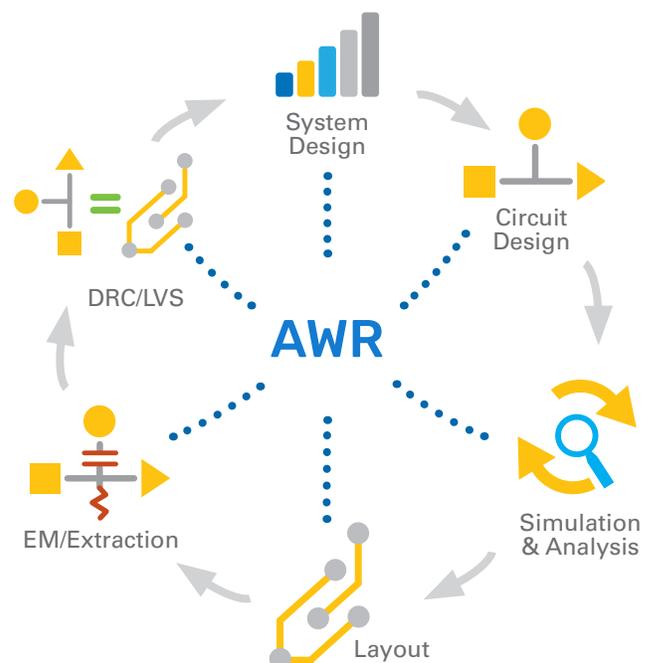
Product Strengths

Unified Design Capture

Provides a front-to-back physical design flow for MMIC, RFIC, PCB, and module process technologies with dynamically linked electrical and layout design entry. Components placed in an electrical schematic automatically generate a synchronized physical layout based on libraries of standard and/or customized components, enabling designs to progress from early concept through final layout in a logical and straightforward manner.

Simulation and Analysis

Integrates circuit, system, and EM simulation technologies, enabling RF/microwave circuit designers to develop component specifications from system link budgets and analyze device performance with system testbenches for communication standards. Linear and nonlinear (time and frequency domain) network behavior can be studied and in-situ EM extraction of interconnects can be performed from within a single environment.

Design Management/Flow

Supports complex hierarchical projects with parameterized subcircuits for easy optimization and state-of-the-art tuning. Circuit, system, or EM-based subcircuits can be quickly generated and reused to create the complex networks common in today's RF front-end circuitry. Additionally, the flow accounts for the parasitic effects of transmission line losses, EM coupling between structures, and impedance mismatches. The layout and physical design work directly with AWR AXIEM® 3D planar and AWR Analyst™ 3D finite element method (FEM) EM solvers to characterize the electrical performance of passive on- and off-chip components and interconnects.

Interoperability and Manufacturing

Supports third-party interoperability with industry-standard tools, allowing the exchange of design data for schematic/netlist import, bi-directional EM co-simulation, electric rule check/design rule check/layout vs. schematic (ERC/DRC/LVS), and production-ready GDSII export. Powerful yield analysis and optimization supports robust design.

Scripting, Customization, and More

The powerful application programming interface (API) extends the capabilities of the software using popular programming languages, enabling users to create scripts for automating common or complex tasks. The platform also offers PDKs, a custom library of models, layout cells, and symbols, as well as other information that configures the environment for a specific foundry process.

AWR Design Environment

Products

▸ AWR Microwave Office® – RF/microwave circuit design software that includes comprehensive component libraries and an integrated AWR APLAC® harmonic balance engine for nonlinear, frequency and time-domain analysis, as well as circuit envelope for digitally modulated devices

▸ AWR Visual System Simulator™ (VSS)– Communication and radar system design software that provides behavioral models and analysis for end-to-end simulations of baseband through the RF front-end / propagation channel for the development of system architectures, transceivers, and antenna arrays.

▸ AWR AXIEM– 3D planar EM analysis software that offers fast solver technology to readily characterize and optimize antennas, passive structures, transmission lines, and large planar devices on RF PCBs, modules, LTCCs, MMICs, and RFICs.

▸ AWR Analyst – Arbitrary 3D FEM EM simulation software provides fast and accurate analysis of non-planar structures such as horn and wire-based antennas, waveguide structures, resonant cavities, and component housings, as well as common or complex interconnect technologies such as wire bonds, ball grid arrays, and vias.

> *The AWR Design Environment platform is highly integrated and brings together most aspects needed for RF design. The software has a user-friendly interface that enables designers to have full control of the tool.*
>
> Bumjin Kim, Qorvo

Applications and Technologies

Microwave Components

Innovative technologies such as linear and nonlinear stability analysis, impedance-matching, and filter synthesis combine with enhanced circuit envelope and robust transient and harmonic-balance simulation, load-pull data management, and powerful measurement plotting/visualization to accelerate front-end component design and optimization. Design automation, an intuitive interface, and scripting/customization support all phases of product development. Co-simulation with system and EM simulators provides in-situ parasitic extraction, design verification, and standards-compliant communication testbenches.
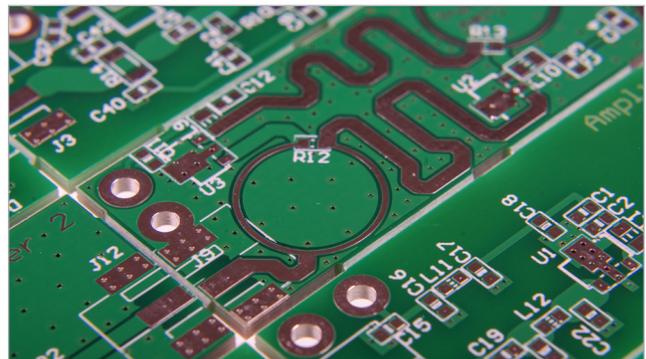
MMICs/RFICs, Modules, and Boards

Enhancements in simulation technology, automation, and design flow support the physical design of high-frequency electronics with improvements in speed, accuracy, and design management for complex process technologies, including mixed-technology design for multi-chip module integration. Accurate modeling of PCB transmission media from the RF signal path to digital control and DC bias lines, as well as circuit/system and EM co-simulation, enables first-pass success with complete PCB analysis of surface-mount components, interconnecting transmission lines, embedded/distributed passive elements, and EM verification.
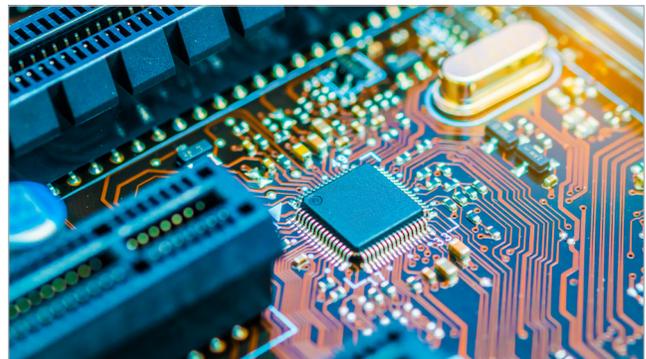
Radar and Antennas

EM technologies simulate antenna metrics of gain, return loss, radiation efficiency, and currents. Phased array models enable antenna-array planners to construct custom configurations based on measured or simulated radiating-element data to study beam steering, shape the main beam and side lobes, and understand the impact of beam steering on driver input impedance. Design automation and simulation/model technology accurately represents signal generation, transmission, phased arrays, T/R switching, clutter, noise, jamming, and signal processing, enabling users to tackle the design challenges for modern radar systems.

Wireless Communications

Simulation models and waveform structures support the most popular wireless standards, including DVB-H/DVB-T, WiMAX/802.16d-2004/802.16e-2005 (mobile and fixed), CDMA2000, GSM/EDGE, WLAN/802.11a/b/g and 802.11ac, 3G WCDMA FDD, IS95, and more. Carrier aggregation with intra/interband component carriers, throughput measurements of combined component carriers, and 5G candidate modulation waveforms are supported with added functionality that includes signal generation and demodulation for full-system simulation, such as adjacent channel power ratio (ACPR), error vector magnitude (EVM), and bit-error rate (BER) measurements.

Services and Support

▸ Get started faster or work through tough issues by contacting AWR software support engineers who are ready to help via phone and email during normal business hours.

▸ Access volumes of self-help information in the AWR KnowledgeBase at kb.awr.com, including application tips, example projects, user forum, and more.

▸ Get a jump-start with self-paced modular training videos on awr.com/elearning that educate new users on AWR software.
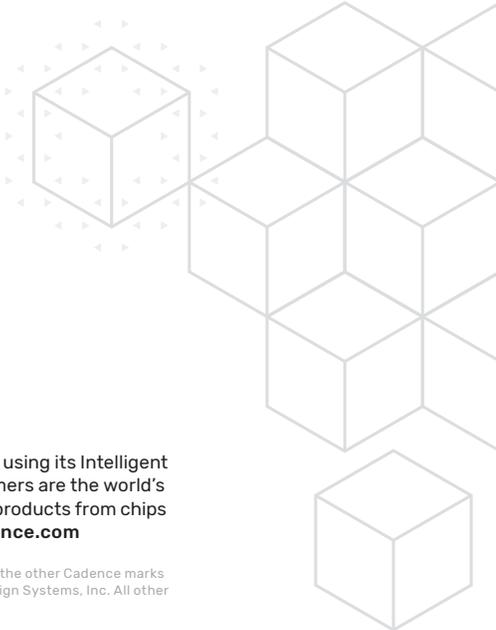
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