RF-PASS

## RF Passive Component Synthesis Tool

RF-PASS™ Features:

- ◄ *Analyzes Inductors, Transformers, Baluns, Capacitors and Resistors*

- ◄ *Full 3D seamless field solution for the highest accuracy - yet runs in seconds*

- ◄ *Includes non-uniform current distribution due to skin effects*

- ◄ *Detailed model of substrate includes losses due to eddy currents and displacement current*

- ◄ *Generates S, Y, and Z Parameters*

- ◄ *Generate fully coupled and distributed Spice sub-circuits*

- ◄ *Generates equivalent lumped element models*
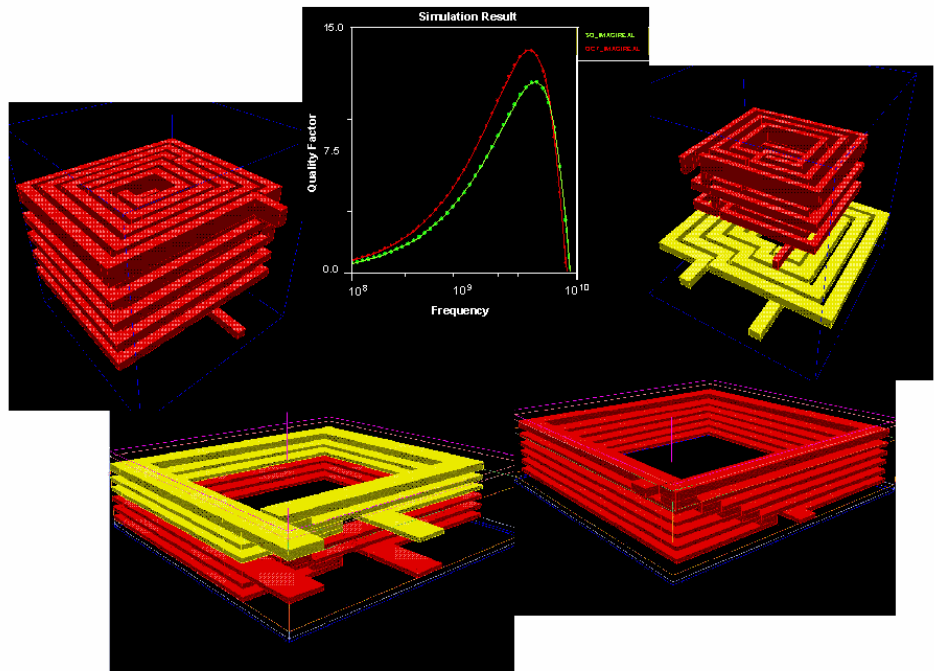
RF-PASS is designed to assist RF engineers in accurately optimizing and modeling inductors, transformers, capacitors and resistors for RFIC applications. RF-PASS can also be used in modeling large distributed structures such as bond pads and ESD devices.

Passive components have a great number of parameters that interact with one another in a complex manner. To accurately model a passive component for RFIC applications one must include: frequency dependent skin effects, capacitive and inductive coupling to the substrate, and complex ground return paths. As these effects must be considered simultaneously, and the tradeoffs are complex, it is very difficult to deliver an optimum design. RF-PASS combines an easy to use interface with the highest performance 3D-field solver technology available to generate highly sophisticated and detailed models for substrate coupling as well as frequency dependent effects. RF-PASS is engineered to simply and directly address the most complex issues facing designers of RF passive components.

RF-PASS can read a typical structure in GDSII format and output S, Y, and Z Parameters, a detailed Spice model and lumped SPICE model in less than one minute. This allows one to try many hundreds of variations in just a few hours. The built in optimization engine helps find the design that best matches requirements; for example, a complex coil inductor that maximizes Q for a given value of inductance and at a given frequency.

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A coil design utility is included that allows direct synthesis of many inductor layouts. Multiple coupled structures such as transformers can also be analyzed. A generalized n-port analysis is available for structures with more than 2 ports. Complex resistors and high value capacitors can also be synthesized, optimized and modeled. After synthesizing structure, RF-PASS allows one to model the addition of arbitrary structures such as pads, interconnects, substrate shields or substrate ground taps. Rerunning the analysis while including such nearby structures gives the designer a greatly improved model of the real device behavior.

With the advent of IC technologies incorporating six or more metallizations many more options have become available to the designer of RF passive components. Elegant and highly sophisticated passive structures are now practical. RF-PASS is engineered to maximize utilization of these new IC processes and enable a higher level of RFIC integration. Getting maximum utility from new IC technologies will make a very significant difference in driving down the cost of wireless technology and other RF technologies.

Other OEA Products

SPIRAL - A design synthesis tool set for creating embedded spiral inductors, baluns and transformers in RFICs. It integrates together a geometry building engine, an optimizer, a 3D field solver for extraction of RCLM, and a frequency dependent circuit simulator. Outputs include GDSII, graphical plot file, SPICE models, and S-Parameter and Z-Parameter files.

NET-AN - A three-dimensional IC multi-net analysis tool for extracting distributed RCLM SPICE networks from critical IC nets.

METAL - A general purpose 2D/3D interconnect simulator for extracting RCL parasitics from interconnect structures. It features automatic mesh generation and refinement, and automatic SPICE sub-circuit generation.

P-GRID - A power network analysis tool that extracts power network parasitics and solves them for low voltage violations and current density violations.

P-PLAN - A VLSI power distribution network floorplanning tool used with P-GRID for optimizing the geometric configuration of VDD and VSS rings, internal power rails, and ring voltage source pad locations using estimated block current sources.

HENRY - A three-dimensional simulator that calculates inductance and mutual inductance of interconnect and ground plane structures.

CELL-AN - A three-dimensional level SPICE extraction tool that generates a cell or macro sub-circuit with significant RC, S/D resistances, and geometry dependent transistor SPICE model parameters.

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