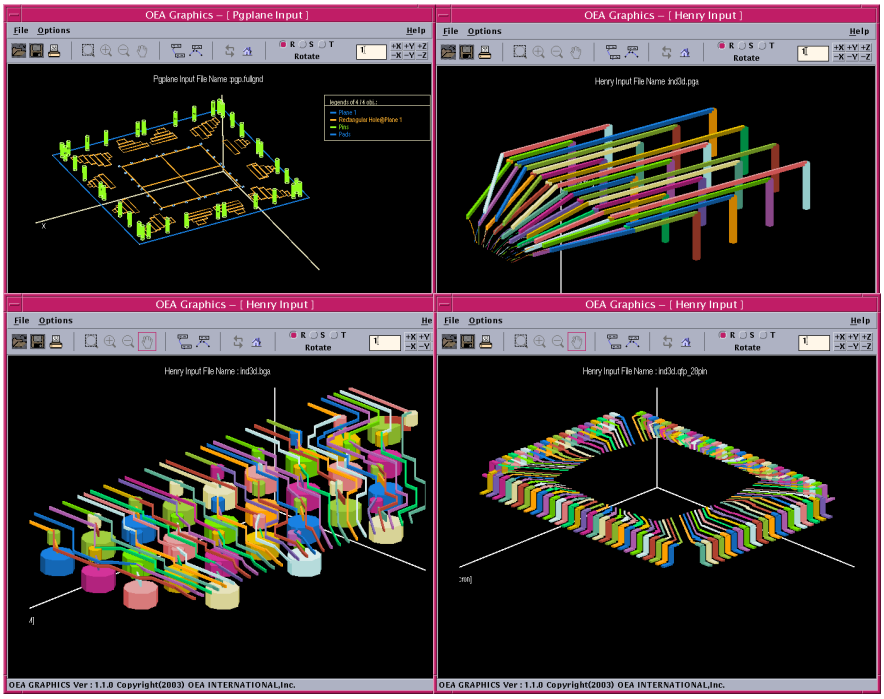
HENRY

3D Inductance Simulation Tool



HENRY™ Features:

- ***Calculates accurate frequency dependent self-inductance, resistance, mutual-inductance, and effective inductance of interconnect structures and complex planes***
- ***Multiple complex interconnect elements are modeled in full 3D***
- ***Multiple power and ground plane modeling***
- ***Design utility programs to create complex models such as bond wires or tabs***
- ***Graphics 2D/3D display of input and results plots***
- ***Runs on all popular workstation platforms***

HENRY is a set of fast and accurate solvers and utilities for modeling three-dimensional inductance, resistance, and mutual inductance effects found in interconnect, packaging, and components of integrated circuits, printed circuit boards, multi-chip modules, and hybrids. HENRY utilizes the partial equivalent element calculation (PEEC) method for calculating frequency dependent inductances and mutual inductances.

Other solvers may use simple models based on transmission line assumptions which may not be true for all cases. The full solution techniques and robustness of algorithms found in HENRY, gives it a completeness and accuracy unparalleled in the industry and allows the program to be applied without limitations in any non-magnetic inductance problem. The accuracy of HENRY has been proven to be within 1% of the analytically available formulas.

HENRY can be applied to cases where the structure exhibits either uniform current flow, like package leads and bond wires, or non-uniform current flow, like power and ground planes. The 'henry' solver is used for structures with uniform current flow and outputs both a matrix and SPICE deck for the defined structure. The 'pgplane' and 'simplify' programs, used for non-uniform current distribution cases, produce SPICE deck and equivalent inductance output. All proprietary solvers are optimized for speed in solving inductance equations without sacrificing accuracy and are much faster than other commercially available solvers.

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Easy to Create Input Files
The input required for the programs are in an easy to understand formatted text file with 3D coordinate and cross-sectional information on each structure to be analyzed. The required data can easily be post-processed from any 2D or 3D CAD system data.

HENRY comes with a complete set of design utility programs to help define complex geometries in 3D space. The utility programs help to automatically generate complex wire bonds, tab lead frames, and wire coils from a few user input parameters. A step-and-repeat program creates connector pin, lead frame and other repeated structures with ease. These design aids will save engineers hours of typing complex coordinate information.

Three-Dimensional Graphics Viewing
HENRY allows you to visually review your defined three-dimensional structures and graphed results with a powerful graphics viewing window. Structures can be rotated, panned and zoomed in 2D or 3D space with the click of a mouse button.

Numerous Applications
Because of the flexible input format, HENRY can be applied to a wide variety of applications including the calculation of self and mutual inductances and resistances for IC package leads, ground planes, bond wires, vias, connectors, traces, spirals, and coils. HENRY is fully technology independent and can be used in PCB, MCM, IC package, Hybrid, or RF design.

Other Related OEA Products

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.

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

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

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.

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.

BUS-AN - A tool for exploring the design space of a process technology as it relates to interconnect design limits and interconnect behavior. BUS-AN performs a variety of pre-design explorations such as inductive shielding effects, buffering strategies, clock-tree prototyping, and process corner simulations.

OEA International, Inc.

Distributed by:

155 East Main Avenue, Suite 110
Morgan Hill, CA 95037
Phone: (408) 778-6747
FAX: (408) 778-6748
Email: info@oea.com
http://www.oea.com