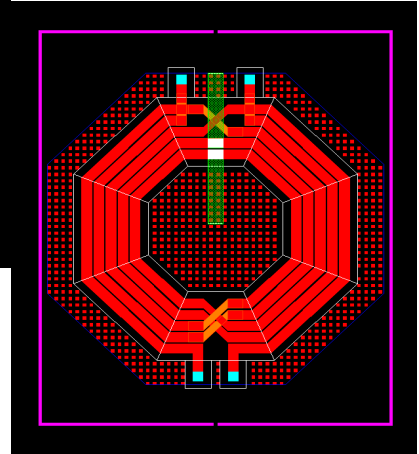
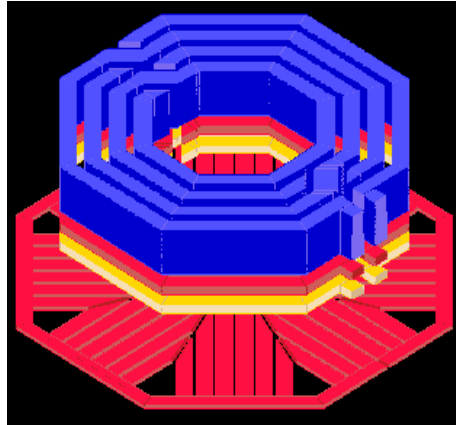


# SPIRAL

## 3D Spiral Inductor Design & Synthesis Tool

### SPIRAL™ Features:

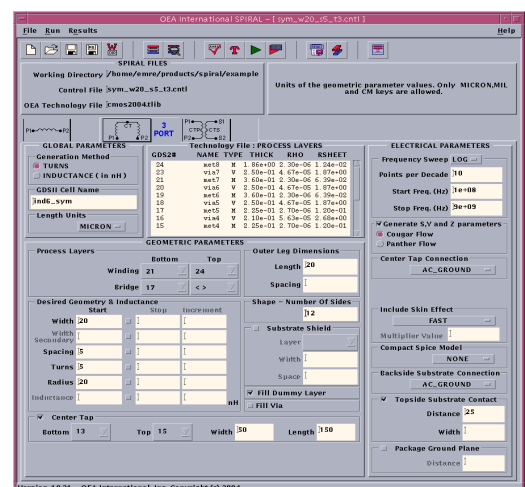
- ◀ Finds the optimum inductor specific to your design resulting in better performance, smaller size or higher yield over a non-optimized inductive device
- ◀ Extremely easy to use - no electromagnetic expertise required - engineered for use by the RF Designer
- ◀ Utilizes proprietary full field simulation technology
- ◀ Builds “DRC clean” GDSII cell of finished spiral including slotting and dummy metal
- ◀ Builds and models substrate shields
- ◀ Includes complex substrate effects, skin and proximity effects
- ◀ Creation and modeling of complex transformers and baluns
- ◀ Can generate windings with any number of metal layers
- ◀ Generates graphs of input impedance, inductance, resistance and quality factor over selected frequency range
- ◀ Automatically generates compact spice models
- ◀ Completely integrated with the Cadence design environment and other RF Design Software



SPIRAL is a specialized tool set for designing embedded spiral inductors in today's high speed analog RF and wireless communication chips. Designed for ease of use and maximum automation, SPIRAL lets the user specify the spiral structure with simple performance parameters or directly specify the geometry. Current library based methods of providing inductors to RF designers greatly limit overall design quality. Restricting designers to select from a library of pre-defined or scalable components forgoes circuit specific optimization that typically leads to inferior performance characteristics, such as power efficiency.

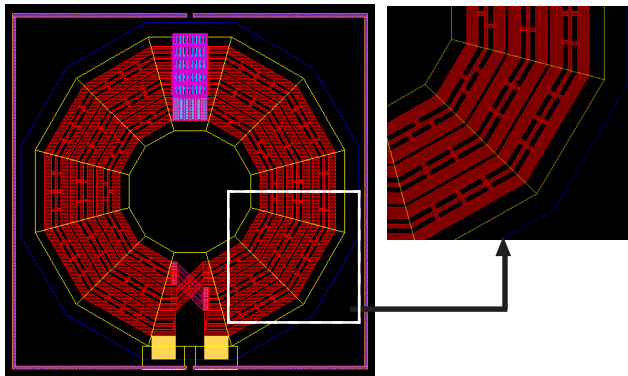
### Fully Automatic Synthesis of Spiral and Differential Inductors, Baluns, and Transformers

The input to SPIRAL is a description of the desired inductor and the known parameters or constraints, such as maximum size and frequency of operation. Also, a technology file is defined for the foundry process material thickness and electrical properties and DRC rules. Then, SPIRAL synthesizes the spiral inductor, either using the specific constraints or using the automatic optimization feature to look at thousands of possibilities and finds the best inductor with the highest Q at the specified frequency and size.



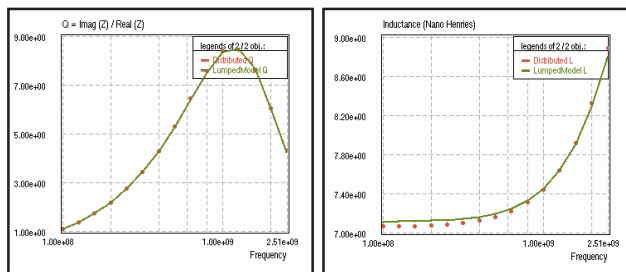
## Ready for 90nm and 65nm Design

SPIRAL is already compatible with the latest technologies. Included if required are the simulation and output of dummy metal fill required for CMP density rules. Also, SPIRAL inserts and models complex slots into the spirals when required by foundry DRC maximum metal width rules.



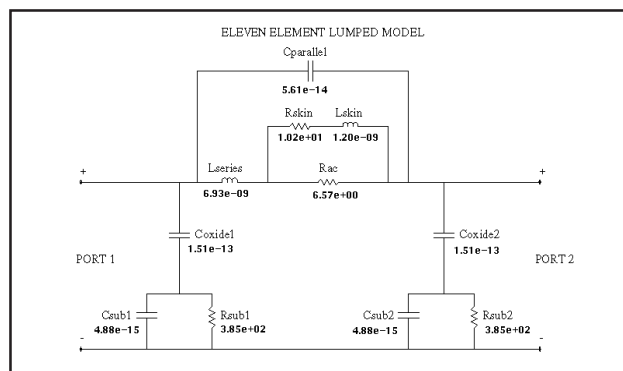
## Plug-in Ready Outputs

SPIRAL generates the full physical layout in GDSII or DF2 format including all marker and ID layers. For further simulation the user has a choice of full RCLK sub-circuit, one of several compact models to it narrow or wide-band applications, or S-, Y-, and Z-parameter models.



## Patterned Ground Shield Support

Spiral inductors often have a large coupling to the substrate thus a ground shield is often required. SPIRAL can automatically generate these poly-ground shields and thus improve isolation and quality factors.



## Very High Accuracy and Fast

SPIRAL accurately models simple spirals in seconds and complex transformers and baluns in a few minutes. This allows easy automatic optimization or extensive design space exploration searching for the best spiral, transformer, or inductor for the design application. Since SPIRAL uses the full 3D model and includes all the parasitic effects including all substrate, skin and proximity effects, the SPIRAL results are always a close match to the measured silicon.

## Extremely Easy to Use

SPIRAL is targeted for average RF designer and requires no EM knowledge. SPIRAL has simple menu interactive input or a full batch operation for the power user. SPIRAL is fully integrated through with the Cadence Analog Artist database. The Cadence user needs only add the spiral and call for an OEA model, the SPIRAL interface does the rest. Other techniques for making inductors available to RF designers, such as the use of full-wave field solvers, require extensive electromagnetic expertise along with very significant experience using the tool before accurate results can be produced.



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