Integrand’s Electromagnetic (EM) simulator EMX has been validated for TSMC’s RF Reference Design Kit (RF RDK) 2.0. The flow works within the Cadence Virtuoso(R) environment and includes a complete validated tutorial demonstrating an EM reference design flow for a Voltage Controlled Oscillator (VCO) designed in TSMC’s 65-nanometer RF CMOS process. EMX can be used from within the TSMC PDK for simulation and modeling of sensitive or custom circuitry -- where high accuracy is critical -- and then combine the resulting models with parasitic extraction of less-critical nets using a layout parasitic extractor for final post-layout simulation flow. EMX is used by TSMC for generating all the scalable models for inductors in the TSMC PDK. EMX handles the width- and spacing-dependent properties described in the TSMC iRCX technology files and automatically modifies the drawn layout to mimic the fabrication process. Excellent correlation with silicon measurements has been observed.

**TSMC uses EMX:**
- Scalable models for design kits
- PDK inductors, MOM capacitors
- Characterization of new devices
- Extensive silicon verification

**EMX simulates fabrication effects**
- Layout is modified according to iRCX
- Mimics the fabrication
- Incorporates metal bias
- Incorporates sheet resistance variation
- Excellent correlation with measurements

**TSMC RF RDK 2.0**
- Fully integrated in TSMC PDK
- S-parameter and subckt generation
- Custom inductor and device flow
- Physical verification flow
- Post-layout simulation flow
- Reference design includes 65nm VCO
- Excellent agreement with reference

**EMX design flow in TSMC RF RDK 2.0**

---

**Integrand Software, Inc.** • 230 Sherman Ave., Suite 11 • Berkeley Heights, NJ 07922
(908) 517-0748 • info@integrandsoftware.com • www.integrandsoftware.com