Cadence Sigrity XtractIM

IC package model extraction

The Cadence® Sigrity™ XtractIM™ tool provides a complete model extraction environment focused specifically on IC package applications. The tool generates electrical models of IC packages in IBIS or SPICE circuit netlist format. These concise parasitic models can be per pin/net RLC list, coupled matrices, or Pi/T SPICE sub-circuits. Using models created with XtractIM, you can quickly assess package electrical characteristics and perform system-level signal and power integrity simulations by including drivers, receivers, and other interconnects. XtractIM is more than an order of magnitude faster than alternative approaches, and also yields higher accuracy and more broadband package models.

Benefits

- Extracts models for an entire package or only selected nets
- Creates ball grid array (BGA), system-in-package (SiP), and leadframe package models
- Supports designs with wirebond and flip-chip die attachment
- Produces standard IBIS models (with or without coupling)
- Generates RLGC models with asymmetric PI or T circuits
- Produces compact broadband models with verifiable full-wave accuracy
- Examines RLC model values as tables and netlists, or as 2D curves and 3D distributions
- Assures broadband model compatibility with time-domain circuit simulation
- Generates HTML format electrical performance assessment report

Features

Full-wave accuracy

In contrast with quasi-static RLGC package extraction tools, XtractIM provides RLGC parasitics based on S-parameters obtained from full-wave hybrid solvers. The numerical solvers include all physical effects, such as nets, vias, wirebonds, solder balls/bumps, and arbitrarily shaped planes. All coupling mechanisms are also considered; these include net to net, net to plane, plane to plane, and wirebond to wirebond. High-capacity solvers enable the XtractIM tool to uniquely generate entire package models from a single simulation, which

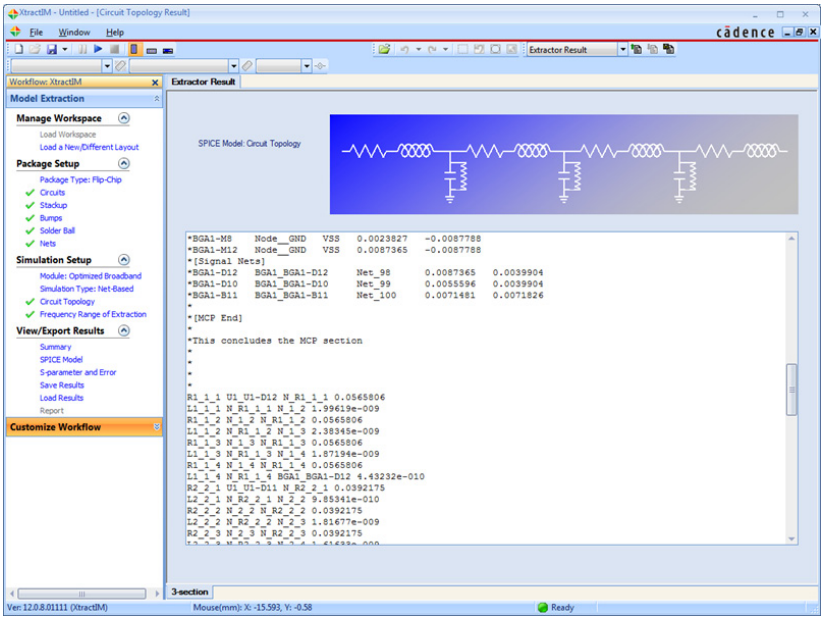

Figure 1: Compact broadband SPICE model

increases accuracy by including all return path effects. Full-wave solvers enable extraction of circuit netlists that correctly represent asymmetric physical structures for higher model accuracy and greater bandwidth.

Comprehensive package support

XtractIM supports a wide range of IC package types, including both BGA and leadframe. The tool also supports wirebond and flip-chip die attach styles for single-die and SiP implementations. Multi-die designs can include stacked die, side-by-side positioning, and package-on-package approaches. You can extract models for entire packages or for selected nets. XtractIM models can incorporate discrete components (such as on-package decoupling capacitors), more accurately reflecting package power delivery systems and the coupling amongst power, ground, and signal nets. This is particularly important for simultaneous switching output (SSO)/simultaneous switching noise (SSN) analysis.

Broadband frequency support

XtractIM is the only dedicated package extraction solution to provide broadband multi-stage optimized models. These models offer verifiable accuracy over a specified frequency range and fill a gap between IBIS/RLGC and full-wave S-parameters. With their compact sizes (typically 2% of S-parameter or pole-zero models), you benefit from highly efficient time-domain simulations. The circuit topology of these broadband models implicitly assures passivity, causality, and proper DC behavior. The XtractIM optimization of RLC component values to fit broadband full-wave results is significantly more accurate than approaches that depend on guesses to distribute single R, L, and C static values for multi-stage circuits.

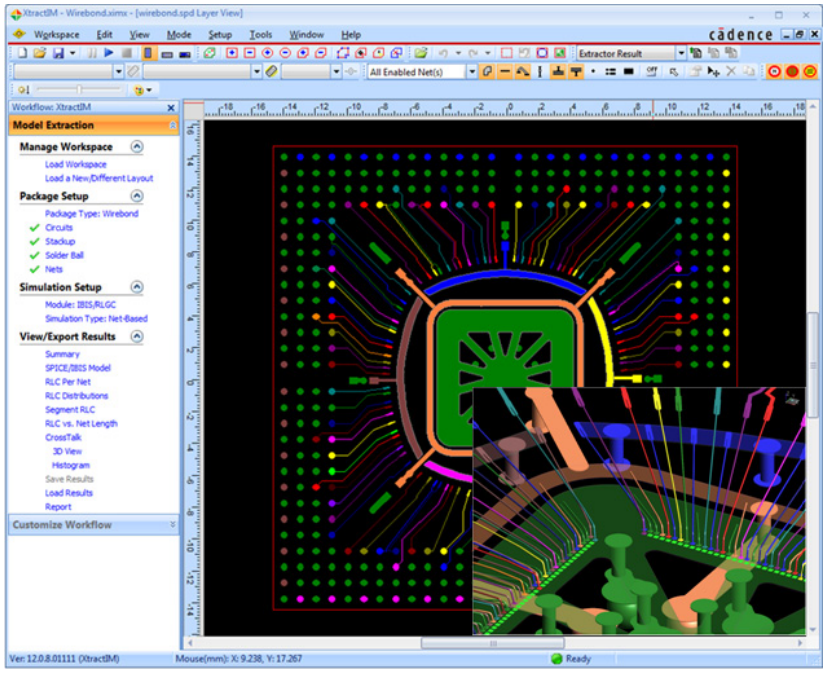

Figure 2: Intuitive checklist workflow and 3D viewing guides extraction of wirebond package

User-friendly workflow

XtractIM has an easy-to-use workflow that assists with set-up tasks such as stackup checking, C4 bump and solder ball creation, signal and power/ground net selection, and defining other extraction parameters. This guidance ensures that extracted models accurately reflect your objectives. You can select either RLGC or broadband model options from a menu in the step-by-step flow. XtractIM provides a variety of options for viewing results and for the analysis of RLC distributions among all the nets. You can export extracted models in a variety of formats to accommodate specific application objectives.

Integration

- Available for use with Windows and Linux
- Interfaces to IC package layout databases from Cadence, Mentor Graphics, Zuken, and AutoCAD
- DXF import utility with customization options for leadframe designs
- Outputs Model Connection Protocol (MCP) and Chip Package Protocol (CPP) for circuit model connection

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