OrCAD PCB Designer

Real-Time PCB Design, High Speed Signal Routing, DesignTrue DFM, Interactive 3D

The OrCAD® PCB design solution provides everything you need to take your PCB designs from concept to production. Truly scalable and production proven in every market segment from smart-home controllers through industrial robotics to automotive and spacecraft, the OrCAD PCB Designer Standard and OrCAD PCB Designer Professional products help you stay competitive in today's electronics market. The OrCAD PCB design solution helps you manage the challenges in real-time of shorter design cycles, high speed signal routing, DesignTrue DFM, emerging Rigid-Flex substrates, and a faster time to market to achieve your design goals

Overview

OrCAD PCB Designer Standard and OrCAD PCB Designer Professional, provide a tiered, scalable PCB design solution that delivers advanced capabilities and highly integrated flows. Whether your designs are simple or more sophisticated with higher densities, complex rules, mixed-signal circuits, and/or standards-based interfaces, the OrCAD PCB design solution has everything you need to increase your team's productivity and efficiency while reducing your overall costs and time to market.

The OrCAD PCB design solution can not only be tailored to address your specific design needs but also your budget requirements; maximizing your investment with a low cost of entry and ownership. The powerful, tightly integrated PCB design technologies include schematic capture, librarian tools, PCB editing/routing, single, consistent front-to-back Constraint Manager environment, signal integrity exploration, autorouting (Professional), High-speed and Backdrilling rules (Professional), Rigid-Flex circuit support, and optional mixed-signal circuit simulation. Easy-to-use and intuitive, they offer exceptional value and future-proof scalability to the Cadence® Allegro® series of PCB design products.

Highlights

- Proven, scalable, easy-to-use PCB editing and routing solution that grows as design challenges and requirements evolve
- TÜV SÜD "Fit for Purpose – TCL1" certified to meet ISO26262 automotive functional safety requirements
- Shorten time to identify and fix high speed signals in real-time using visual feedback for Real-time Impedance, Real-time Coupling and Real-time Route
- Save significant time using Backdrilling rules and real time checks for clearances with backdrill marked vias and pins
- OrCAD PCB Designer Professional is now High Speed Aware leveraging Dynamic Diff Pair Phase control, Pin Delay Property, Z-Axis Delay, Nested Net Groups, etc
- Constraint Manager provides real-time validation and status of physical/spacing, same net, region, differential pair, and length rules to help ensure first-time success
- Automatic and interactive etch editing delivers intelligent automation to maintain user control while maximizing productivity
- Dynamic real-time copper pour plowing and healing to eliminate error-prone manual voiding and rework
- Rigid-Flex design support with cross-section stackup by zone, Flex bend editor, ARC route editing, and Rigid-Flex-specific DRCs
- Support for IPC-2581, STEP, and IDX brings a level of intelligence and integration that streamlines manufacturing and MCAD-ECAD flows

Automotive TCL1 Certified for ISO 26262

The industry's first PCB design and verification flow to achieve "Fit for Purpose - Tool Confidence Level 1 (TCL1)" certification enables you to meet stringent ISO 26262 automotive safety requirements. The flow includes everything from design authoring to simulation to physical realization and verification using the PSpice®, Allegro, and OrCAD® product suites. The high-performance design entry, simulation, and layout editing tools provide an integrated environment for design engineers to validate the safety specifications against individual circuit specifications for design confidence. For information on the safety manuals, Tool Confidence Analysis (TCA) documents, and compliance reports from TÜV SÜD, download the Functional Safety Documentation Kits through Cadence Online Support.

Powerful Floorplanning

At the heart of the OrCAD PCB design solution is OrCAD PCB Editor, an easy-to-use, interactive place-and-route environment for creating and editing simple to complex PCBs. The extensive feature set addresses a wide range of today's modern design and manufacturability challenges. This powerful and flexible set of features includes automatic, schematic-driven floorplanning and inter-active placement, intelligent interactive routing, dynamic shapes, placement replication, simple and advanced rules (including differential pairs, length, region, layer, etc.), STEP model support and 3D viewing, and MCAD-ECAD (interfaces for manufacturing and mechanical CAD).
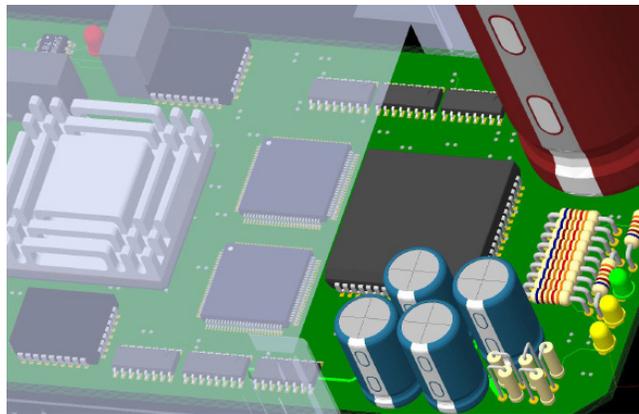
STEP models provide a realistic three dimensional representation of your design

Floorplanning and placement

Automatic, schematic-driven floorplanning and interactive-placement capabilities are designed to accelerate parts placement. Components or subcircuits are assigned to specific "rooms" during design entry to facilitate automatic floorplanning. In interactive placement, components can be filtered and selected in a wide variety of ways to streamline the placement process: by reference desig-nator, device package and footprint style, associated net name, part number, or the schematic sheet/page number.

Interactive etch editing

Interactive routing capabilities deliver controlled automation while maximizing routing productivity. Real-time, shape-based, and any-angle push and shove routing methods address a wide array of routing challenges. The routing engine optimizes traces by either pushing obstacles or following contours while dynamically jumping over obstacles such as vias or component pins. Routing modes include "shove-preferred," "hug-preferred," or "hug-only." The shove-preferred mode constructs the optimum trace path while dynamically pushing obstacles or automatically "jumping" over obstacles such as pins or vias. The hug-preferred mode is the perfect solution when a databus must be constructed. In this mode, the trace contour follows other traces as a priority and only pushes aside or jumps over obstacles when there is no other option.

Backdrilling in PCB Designer Professional

Users can now specify which vias on critical high-speed signals should be back drilled to avoid reflections. An output report—Backdrill NC and Legend Files from Bottom, Top, or Any Layer if backdrilling the inner core(s) of the PCB—allows users to send backdrilling instructions to their PCB manufacturers

Dynamic copper shapes

Dynamic copper shape technology offers real-time copper pour plowing and healing functionality. Shape parameters can be applied at three different levels: global, shape instance, and object-level hierarchies. Traces, vias, and components added to a dynamic shape will automatically plow and void through the shape. When items are removed, the shape automatically fills back in. Dynamic shapes do not require batch autovoiding or other post-processing steps after edits are made.

Placement replication and reuse

Intelligent placement replication technology enables you to automatically place and route replicated circuits using a seed circuit that is applied to other circuit instances within the design. Changes made to the seed circuit are automatically propagated to the duplicated circuits. Circuit templates with "known-good" placement and routing can be reused in other designs with similar circuits.

Constraint Manager

Design rules and electrical and physical constraints are more critical to your projects' success than ever before. Dealing with all the complexities of the rules and constraints of a modern design requires a powerful constraint management system capable of covering all the aspects of creation, management, and validation. The OrCAD PCB constraint management system displays physical/spacing, samenet, region, and differential pair and length rules along with their status (based on the current state of the design) in real time and is available at all stages of the layout process. Each worksheet provides a spreadsheet interface that enables you to easily define, manage, and validate the different rules in a hierarchical fashion.

The constraint management system is completely integrated within the OrCAD PCB design solution, and constraints can be validated in real time as the design process proceeds. The result of the validation process is a graphical representation of whether constraints pass (highlighted in green) or fail (highlighted in red). This approach allows you to immediately see the progress of the design in the spreadsheets, as well as the impact of any design changes.

High Speed Constraints-Driven Autorouting in PCB Designer Professional

Increasing use of standards-based advanced interfaces such as DDR3, DDR4, PCIe, USB 3.0 are bringing a set of constraints that must be adhered to while implementing a PCB. The OrCAD PCB Designer Professional now makes adhering to high speed constraints on advanced interfaces quick and easy. High-speed routing constraints and algorithms handle differential pairs, pin delay, nested net groups, Z-axis delay requirements demanded by today's high-speed circuits. The autorouting algorithms intelligently handle routing around or through vias, and automatically conform to defined length criteria. Separate design rules may be applied to different regions of the design; for example, you can specify tight clearance rules in the connector area of a design and less stringent rules elsewhere.

Real Time PCB Design will shorten time to identity and fix High Speed signals in Real-time with visual feedback using Real-Time Impedance, Real-Time Coupling and Real-Time Route. This is an innovative and unique environment that allows users to graphically see real time delay and phase information directly on the routing canvas. Traditionally, evaluating current status of length of a routed interface required numerous trips to Constraint Manager and/or use of the Show Element command. Using an embedded route engine to evaluate complex timing constraints and interdependencies amongst signals shows current status of a set of routed signals—a DDRx byte lane or a complete DDRx interface— via custom trace/connect line coloring; stipple patterns and customized data tip information to define the delay problem in the simplest terms possible. This functionality is now available in the OrCAD PCB Designer Professional.
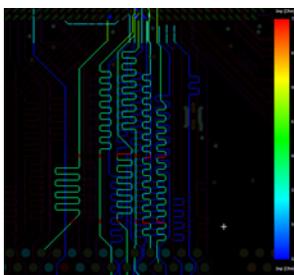
STEP models provide a realistic three dimensional representation of your design
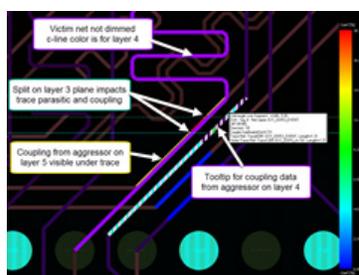
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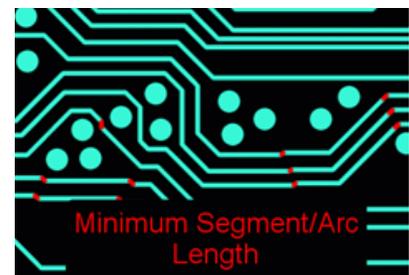
Real time Route

Designing Rigid-Flex

Rigid-Flex substrates are becoming common in IoT, wearables, and mobile smart devices as well as in medical devices and even automotive. In the OrCAD PCB Layout editors, a designer can define multiple substrate material cross-sections as well as area- dependent rules to meet Rigid-Flex design and
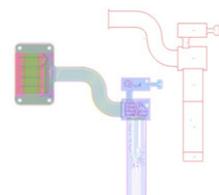
manufacturing guidelines. New Flex focus arc routing and Flex bend editor provide the designer with the necessary tools to manage the complex Rigid-Flex or pure Flex designs.

3D Display and Visualization

The OrCAD 3D viewer environment gives you the ability to see a realistic, three-dimensional representation of your design. The environment supports several filtering options, camera views, graphic display options such as solid, transparency and wireframe, and controls for panning, zooming, and spinning the display. 3D viewing also supports the display of complex via structures or isolated sections of the board for viewing more details. With support for the STEP format and models, the OrCAD PCB design solution supports the import of model-accurate component and mechanical elements, such as an enclosure, to view in the context of your PCB project. This allows you to perform visual clearance checks to detect clashes early on and ensure you will have proper fit when you move to manufacture.

PCB Manufacturing

The OrCAD PCB design solution supports a full suite of phototooling and bare-board fabrication, and test outputs can be generated including Gerber 274x, NC drill, and bare-board test in a variety of formats. The OrCAD PCB design solution also supports the industry initiative toward Gerber-less manufacturing through the export (and import) of design data in the IPC-2581 format. The IPC-2581 data is passed in a single file that creates accurate and reliable manufacturing data for high-quality manufacturing. You have a choice to export a subset of the design data for protecting design IP.
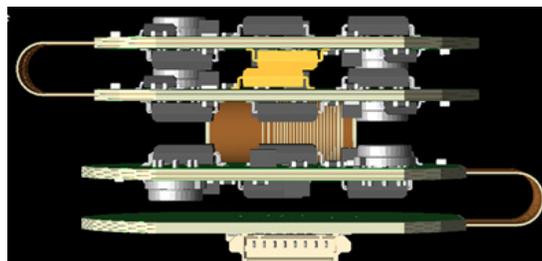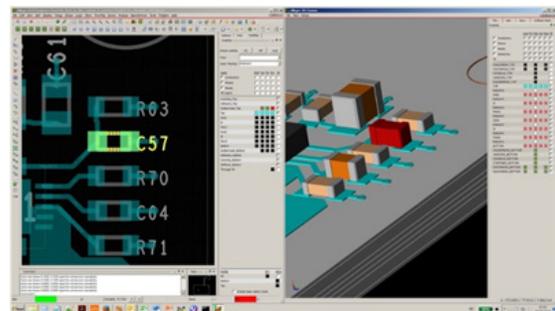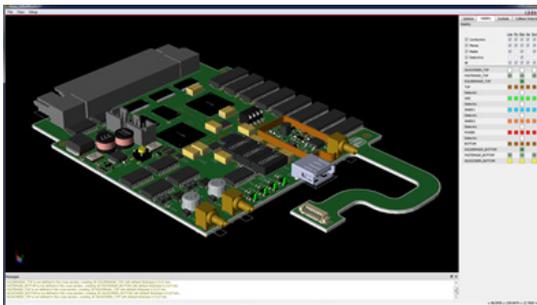
Design Solutions and Flows

Topology exploration with signal integrity analysis

Included with the OrCAD PCB Designer is the Allegro Sigrity™ SI SigXplorer, which provides a graphical view of I/O buffers, transmission lines, and vias such that complex topologies can be modified in a what-if fashion without having to change the actual design. SigXplorer also allows engineers to sweep various parameters within the topology to identify a topology solution space. With the OrCAD PCB Designer Professional product, routed or unrouted topologies can be extracted directly from the PCB design database, enabling you to simulate critical nets to validate that the layout work matches the pre-route requirements. Topology extraction can be performed at three key stages for signal-quality prediction and analysis: during part placement (pre-route), after routing critical nets, and after final routing of the design. Topologies are extracted back into the SigXplorer canvas that was used to analyze the net during pre-route, and the routed signal's analysis is compared to the expected results. The extraction includes a detailed electrical representation of how the net was physically implemented, including models for trace cross-sectional characteristics, routing layers, via models, and trace lengths. If the results do not match, the routed board can be modified and the net re-analyzed.

MCAD-ECAD collaboration

The proven and industry-adopted IDX-based ECAD-MCAD collaboration in the OrCAD PCB design solution allows you to intelligently

and interactively synchronize on incremental changes between the electrical and mechanical design environments.

Unlike interim file formats such as IDF and DXF, IDX formats give you the ability to preview and analyze changes graphically before accepting or rejecting the data. Additionally, designers in both environments can choose to accept or reject the proposed changes on an object-by-object basis as well as offer counter- proposal changes. This level of interaction provides a degree of control and collabo-ration that was previously not possible and helps ensure the two environments remain in sync. It also helps to avoid any miscommuni-cation that can result in rework and significantly improves the chances of first-time success.

Automatic routing

OrCAD PCB Designer Professional is tightly integrated with Cadence SPECCTRA® for OrCAD, the market-leading PCB solution for automatic and auto-interactive interconnect routing. Designed to handle routing challenges from contemporary designs to high-density multilayer PCBs requiring complex design rules, SPECCTRA for OrCAD uses powerful shape-based algorithms to make the most efficient use of the routing area.

The results are increased completion rates, higher productivity, and shorter design cycle times.

Future-Proof Scalability

Unlike other PCB design solutions, the OrCAD PCB design solution has the ability to grow with your evolving technology challenges and as your place and route needs change. Based on Allegro® PCB design technology, the OrCAD PCB design solution provides the security of scalability to meet those challenges easily. Features and technologies are shared across the OrCAD and Allegro product lines, allowing products to be easily upgraded and expanded without the need to translate databases or libraries, learn new applica-tions, or change use models.

For the latest product or release information, visit us at
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Sales, Technical Support, and Training

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