Pulsonix Advanced Technology

Embedded Component Technology

Leading-edge Technology

Where embedded or buried components are being employed in your PCB design, the Pulsonix Advanced Technology option provides the essential functionality to support embedded semiconductors, thinned dies as well as buried or printed resistors, buried capacitors, RF spiral inductors and planar transformers.

Buried Semiconductors and Thinned Dies

As part of the European funded Hermes project, Pulsonix has been developed well beyond the current commercial capabilities such is the belief that Pulsonix can also be used to help steer new technology into the market.

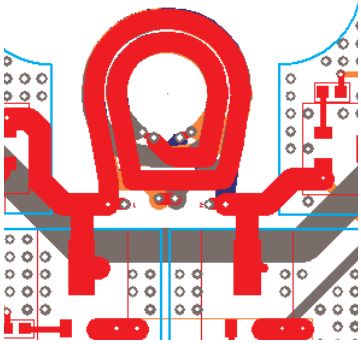
The Hermes project has enabled Pulsonix to introduce the concept of 'thinned' dies and buried semiconductors into inner layer substrates. Essentially, that means burying semiconductors into cavities within the layer substrate, as well as the current capability where special components can be added to the surface of an inner layer using build-up technology that would then be used to construct the board.

Passive Components

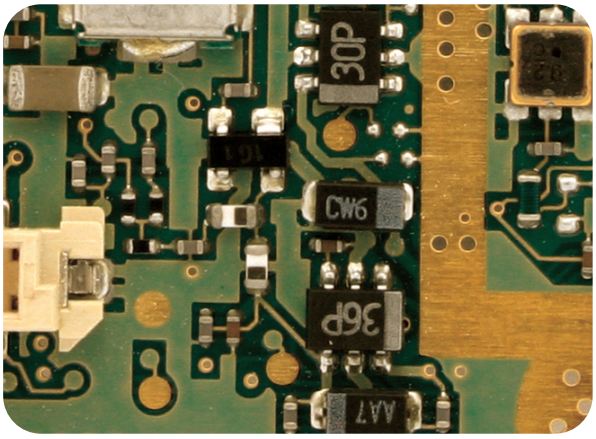
Passive resistors can be printed on inner layers and connected using resistive material. Depending on the manufacturing method, a resist mask or encapsulating coating will be required. Pulsonix handles this by allowing you to associate the necessary additional manufacturing layers for the resistive and other materials with the correct inner copper layer.

Planar Components

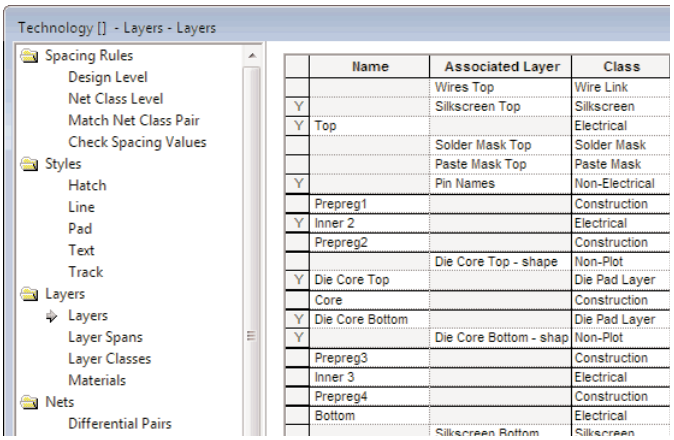
A planar converter or transfer component may exist on the outer only or through-hole layers and may have a physical body applied to the outer layers. However, part of the footprint consists of copper spirals which are connected by a component via, effectively joining the two footprint pads. By defining the footprint as embedded, the Component can be mirrored in situ and all the inner layers will swap as required. Special DRC properties also allow the checking of correct internal connectivity made on the elements of these components.



Irregular spiral shapes can be created using the Pulsonix Embedded Component option



Where boards become too dense for conventional components, embedded components become essential



Advanced Intelligent Layer and Layer Classes are rapidly defined in Pulsonix

Feature Summary:

- Supports embedded component types for:
  - Buried resistors and printed 'internal' resistor components
  - Buried capacitors and dielectric/insulator layers
  - Planar convertors and transformers
  - Embedded semiconductors and thinned dies
  - Flexi-rigid embedded components
- Rules driven technology interface
- Layer definitions and layer class definitions for 'internal' components
- Internal layer definition for supporting layer documentation and associated layers
- Supports mixed conventional, SMD & embedded component technologies
- Interactive Spirals and spiral inductor creation
- Internal layer cavity spans
- Board Outline Cutouts and Area spans
- Manufacturing checks for embedded technologies
- Interactive component layer change feature supports internal layers
- Footprint library creation for internal 'SMD' components and pads
- Footprint definition with 'component via' support
- Report Maker output of embedded technology features
- Layers report with reference for embedded components

Pulsonix Advanced Technology

Flexi-rigid Board Technology

Flexi-rigid technology

True Flexi-rigid support is available using the features within the Advanced Technology package; Multi-spanned Layer Areas, Board Outlines, Board Cutouts and Layer Spanned Components. Using these powerful options, Board outlines can be created to span 'internal' flexi layers that are still exposed externally.

Advanced Layer Spans

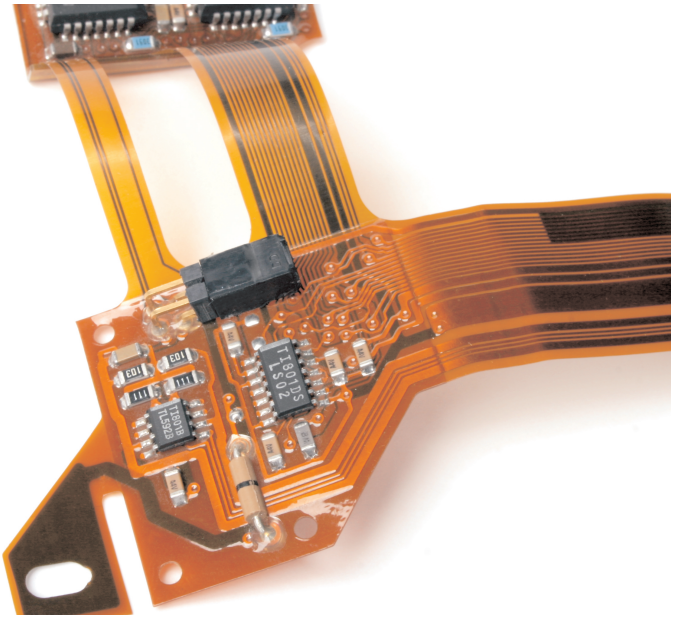
Advanced layer span definitions enable you to create the regular board outline plus the board outline required for an inner flexi-layer which may extend outside of the normal board boundaries.

Layer Spanned Components

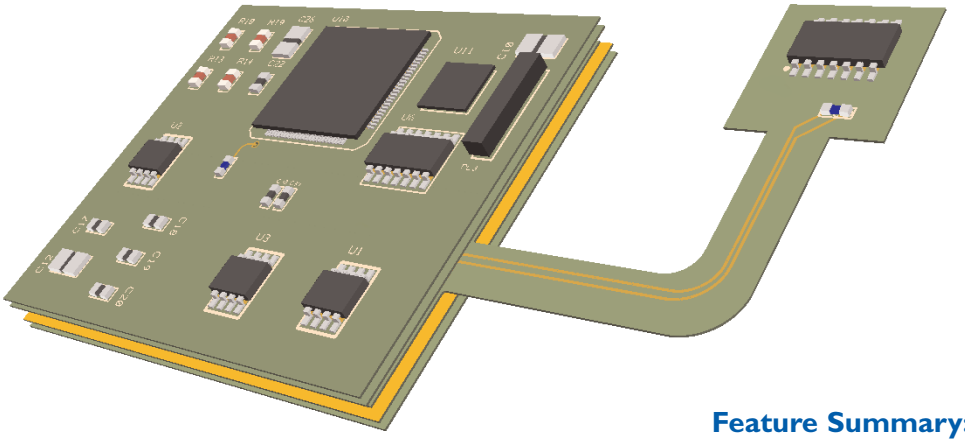
Adding Components to layer span allows them to also be exposed. Both through-hole and surface-mounted components on inner flexi layers can be achieved but with true 'side' and layer characteristics available within their Property definitions. This means accurate assembly reports, manufacturing plots. Precise build details can be exported for accurate manufacturing.

Manufacturing Outputs

Each set of board outlines can be output in a 'drill-ready' format for profiling for each layer span produced. Manufacturing reports and design detail can all be easily output through a set of built-in Report Maker and standard output options.



Next-generation flexi-rigid designs can easily be created in Pulsonix



Flexi-rigid boards can be viewed in the Pulsonix 3D Viewer to preview them before manufacture

Feature Summary:

- Advanced Intelligent Layer definition
- Advanced Layer spans
- Layer specific board spans
- Component layer spans available
- Components on flexi-layers as:
  - Through-hole
  - Surface mounted on top and bottom flexi substrate
- 3D View of flexi-board including 'exploded' view
- Advanced Board Area Cutouts for creation of flexi boards

Pulsonix Advanced Technology

Micro-via Technology

Within the powerful Pulsonix environment, advanced Micro-via technologies are easily created for everyday design engineers.

Constraint Rules Driven

Constraints rules are created for Micro-vias using the Net Class and Net Styles mechanism. This enables specific Micro-via sizes and styles to be used from layers which require this specialised technology.

Micro-via Entry Pads

Pad styles for Micro-via use can be created using the normal pad styles dialog. However, from within this, special pad styles can be specified for Micro-via Entry Pads and Micro-via Stop Pads on different layers where the landing layer for the laser drill is to be a solid pad. The technique enables stacked Micro-vias to be created where multi-drilling for stacked layers is used.

Y	Via (60)		Round
Y	Via 400 120		Round
		Micro-via Entry Pad	Round
		Micro-via Stop Pad	Round

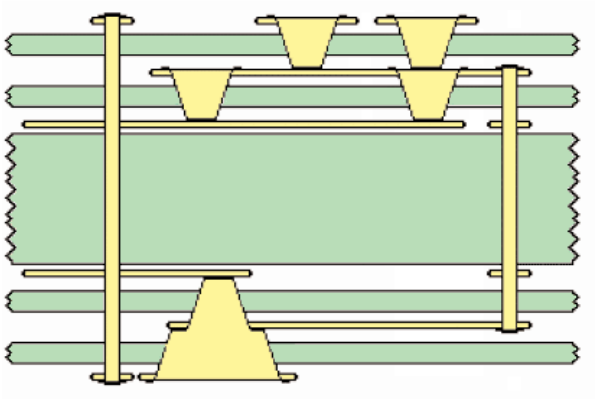
Micro-via Entry Pads and Micro-via Stop Pads on specific layers allow advanced technology features to be realised

Composite Micro-Vias

Composite Micro-via creation allows individual Micro-vias to be stacked at coincident points through the board and then moved as one via 'unit'.

Manufacturing Outputs

Outputs for via location by layer are available in NC Drill and report format thus ensuring your manufacturing export integrity is maintained right through to the final board production. Drill sets for laser drilling can be output based on layer class and drill type rules.

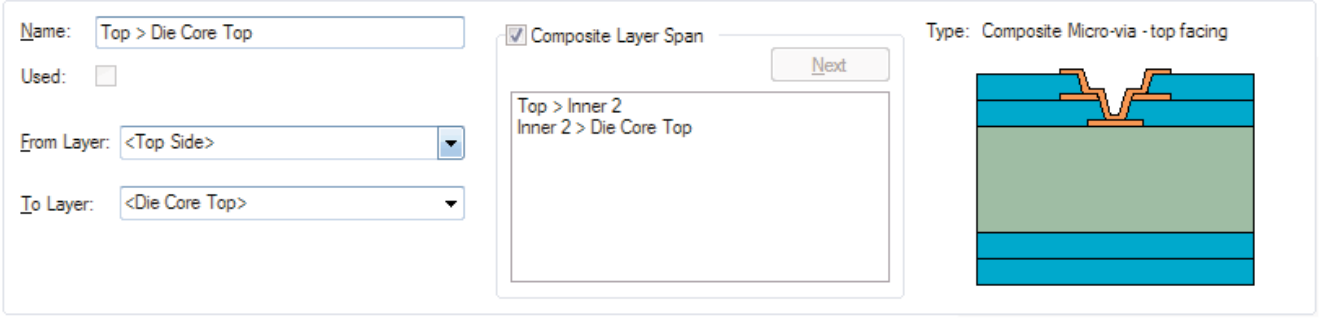


Advanced technology catering for normal, stacked, tapered and composite Micro-via styles is easily achievable in Pulsonix

Feature Summary:

- Ability to create Micro-via styles for:
  - Normal Micro-vias
  - Blind/Buried Micro-vias
  - Stacked Micro-vias
  - Tapered Micro-vias
  - Multi-spanned Composite Micro-vias
- Constraint base rules
- Advanced Intelligent Layer definition
- Advanced layer spans
- Micro-via Entry/Stop Pads for laser-drilling
- Separate drill output for laser-drilling
- Manufacturing outputs based on Via type and layer
- Advanced Reports for manufacturing
- Advanced Micro-via constraint rules
- Layer Stack preview
- Micro-via display in 3D Viewer
- Available within the Advanced Technology option

	Name	From Layer	To Layer	Type
	<Through Hole>	<Top Side>	<Bottom Side>	Through Hole
Y	Top > Die Core Top	<Top Side>	<Die Core Top>	Composite Micro-via - top facing
Y	Top > Inner 2	<Top Side>	<Inner 2>	Micro-via - top facing
Y	Inner 2 > Die Core Top	<Inner 2>	<Die Core Top>	Micro-via - top facing
Y	Die Core Top > Die Core Bottom	<Die Core Top>	<Die Core Bottom>	Buried



Complex layer spans for Micro-vias are quickly created

Pulsonix Advanced Technology

Chip-On-Board Technology

Advanced Packaging Support

Where real estate space needs to be maximised, devices can often be supplied as stripped down versions presented as bare dies. These can be mounted on traditional substrates using chip on board technology. The Pulsonix Chip-On-Board toolset option enables this technology to be easily incorporated into your Pulsonix PCB designs.

Chip-On-Board

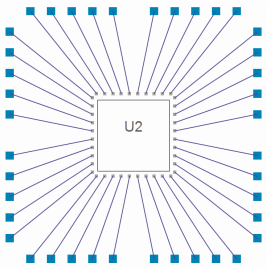
The Chip-On-Board option provides features for creation and annotation of die & bond pads and bond wires. It also allows automatic placing bond pads around the die. Within the Pulsonix design the bond pads are treated as special pads and can move independently of die and normal pads.

Advanced Rule Sets

Pulsonix contains a set of rules that are obeyed using both the Online DRC and batch DRC processes. Rules can be set for min and max length of the bond pad from the die pad, and for the crossing over of bond wires. Conditional Spacing rules can be defined for COB devices that use smaller values for this type of detailing. This is also a highly desirable requirement where mixed conventional and bare die technologies are used.

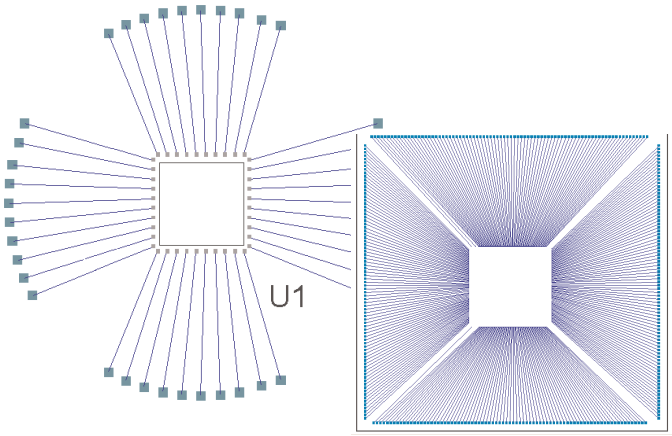
Footprint Creation

The Footprint editor allows fast and simple creation of Chip-On-Board footprints. Options for the insertion of die and bond pads into the footprint ensure that the correct pad type is available and subsequently handled correctly later on in the design editor. Addition of die pads will allow the die and bond pad plus the bond wire to be added in one single process. To facilitate placement of bond pads in a uniform pattern, a Place on Shape option is provided where the pads follow any shape drawn. Where bond pads must be in-line with the wire, regardless of the pad angle, automatic alignment, even when the bond pad is rotated or moved in the footprint is possible.



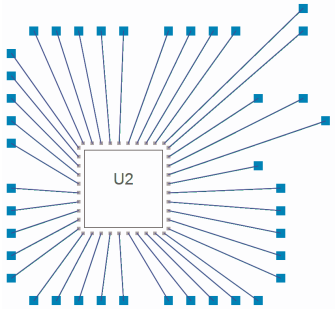
Component Interaction

Components which contain die and bond pads are handled intelligently using an advanced rule set. Bond pads can be interactively moved independently of the main die 'body'. This movement is controlled using the min and max length rules of the bond wire, with cross-over rules also maintained in this process. The chip die can also be moved independently of the bond pads and position reset if necessary.



Moving COB Components

During move, selection of a complete Component ensures that all bond pad positions are maintained relative to the main Component body, hence precise bond pad positions are always guaranteed.



Move individual Bond pads for precise placement

Comprehensive Reports

Pulsonix provides a set of detailed reports that can be used to output wire positions. The built-in Report Maker option also allows all Chip-On-Board items to be output into comprehensive customised reports.

Feature summary:

- Insert Bond and Die pad functions
- Insert Wire between die and bond pads
- Automatically place bond pads around shape
- Align bond pad to wire angle option
- Die pads allowed on inner layers and in board cavities
- Min/Max wire length rules
- Independently move die body
- Reset bond pad option
- Min Die pad space
- Ability to move independently floating bond pads in PCB editor
- Support for insulated or non-insulated (bond) wires

The lists below are ancillary features which aid the production and reporting of the die items but are included within the standard Pulsonix PCB system.

- Output bond and die pad positions using Report Maker
- Create a report for wire machines using the Report Maker
- Wire report output
- On-line and batch design rules checking of:
  - Wires crossing and their insulation status (insulated or not)
  - Min/max bond wire lengths
  - Item colours for bond pads and wires
  - Wires inserted on special layer
  - Layer Class definitions for bond pad only plots

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