



Agilent EEsof EDA

Integrated RF Design Flow Part 3 - Layout Libraries

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Agenda:

1. Top level system design using ADS New Budget analysis
2. Modeling “off the shelf components” In terms of data based models or parametric models.
3. *Creating Layout libraries for off the shelf components*
4. Creating an EM based RF board model.
5. Release to Manufacturing.



Review of ADS Component Definitions

Each ADS Component is defined in three files:

< comp name > .dsn

The Design File

Contains symbol and/or circuit and/or layout graphics.

< comp name > .ael

The component definition file.

Controls the behavior of < comp name > in a schematic or a layout.

< comp name > .atf

The compiled component definition file.

Each ADS Design File has three views:

Symbol View,
access with schematic editor
and View Create/Edit Symbol

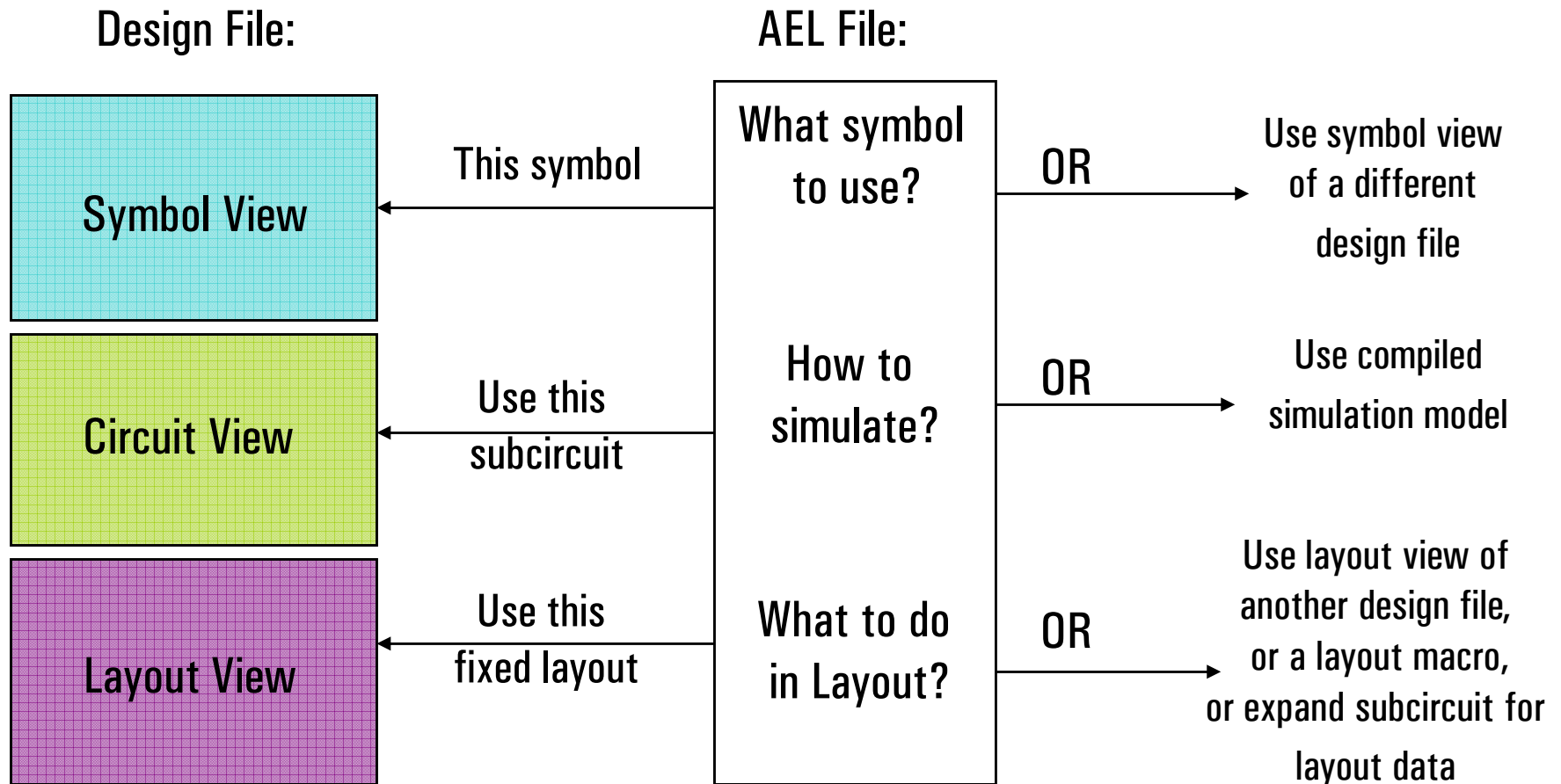
Circuit View,
access with schematic editor

Layout View,
access with layout editor



Design File / AEL File Interaction

The three views of a design file can be used together, or independently, based on the design definition in the AEL file:



Recommendations for Fixed Artwork Designs

Fixed artwork should be stored in a separate design file (empty symbol and circuit view)

- allows for sharing by multiple components
- avoids danger of being accidentally overwritten

Ports are required to pass connectivity from schematic to layout, layout to schematic

Port location and orientation control behavior in schematic-to-layout synchronization

New in 2004A – ports are NOT required for “pinless via” components used to complete DC/GND connections in layout

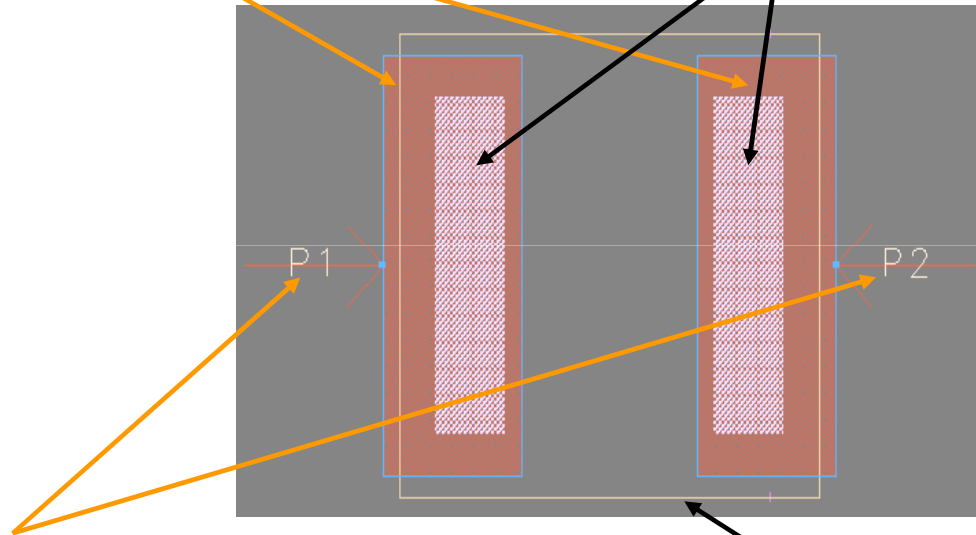
Footprints should be defined in the same layout units/precision as the target design to avoid potential round-off problems.



A sample ADS fixed artwork

Pad areas on layer "cond"

Optional component lead graphics on layer "leads"



Ports on layer "cond", facing into component body for layout synchronization

Optional body outline on layer "packages"



Additional fixed artwork considerations

Port Location with respect to artwork component (0,0) will affect how easy it is to connect to component in layout:

- (0,0) of the fixed artwork should be at a consistent location – either Port 1 or center of component
- All ports should be on-grid with respect to artwork (0,0)
- If component is placed on-grid with respect to its (0,0), ports will be on grid as well, simplifying connections with traces/transmission lines



More on artwork port location

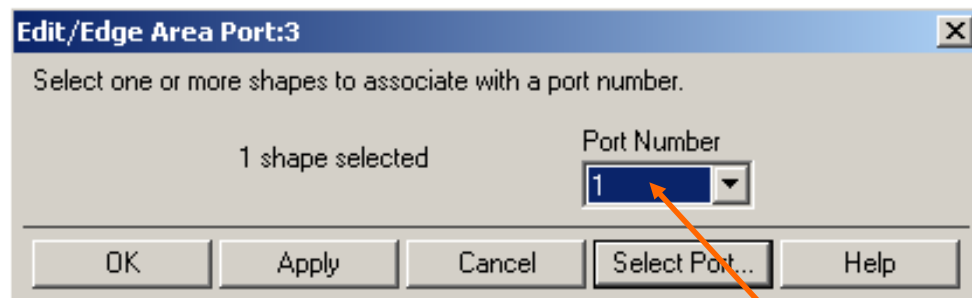
- **Port defines the “connect spot” for transmission line to attach to footprint**
- **Controls the transition from the transmission line model to the component model**
- **By convention, port is placed at the edge of the pad**
- **For highest frequency, smallest value parts, port should be located at the reference plane of the simulation model – usually the edge of the component lead, not the edge of the pad**
- **New in 2004A – edges and/or areas can be associated with ports, allows for connectivity to alternate locations on the pad**



New in 2004A - Edge/Area Ports

Especially useful to simplify DC/Ground routing –
enables polygon connection to any defined area or
edge

To enable, during geometry creation, select pad area,
then **Edit>Edge/Area Pins**

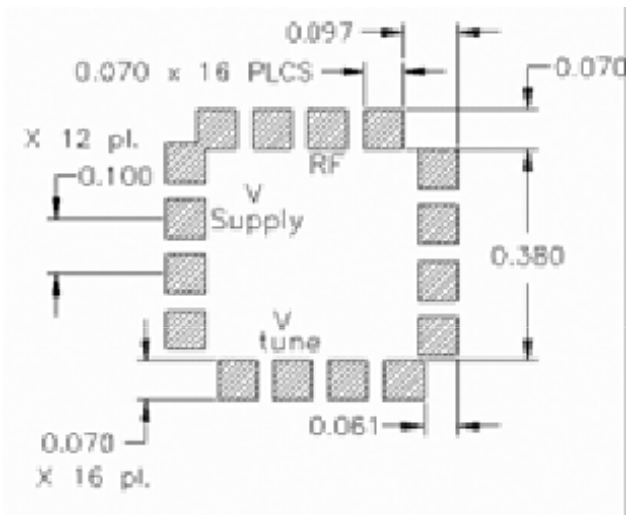


Associate selected shape
with a specific port number

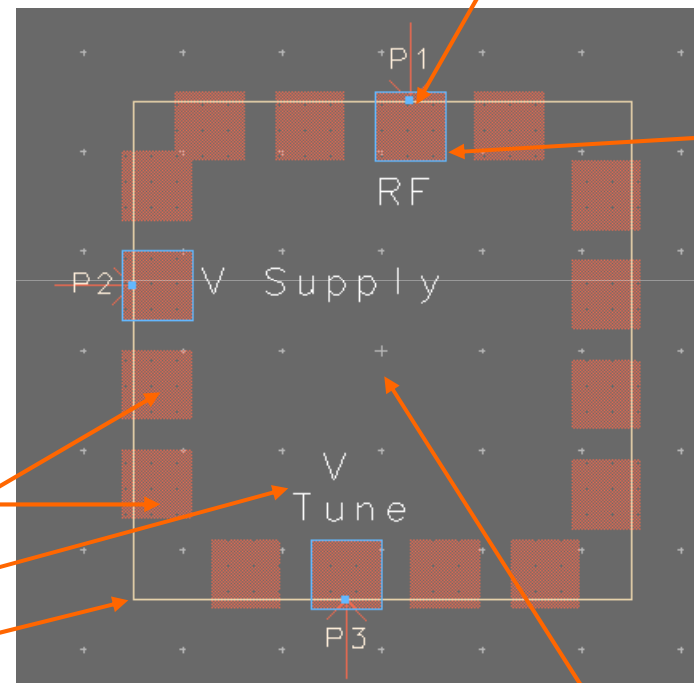


Fixed Artwork Example-local oscillator

Vendor specification:



ADS geometry:



Ports on layer "cond", facing inward

Pad areas assigned as area ports

Pad areas on layer "cond"

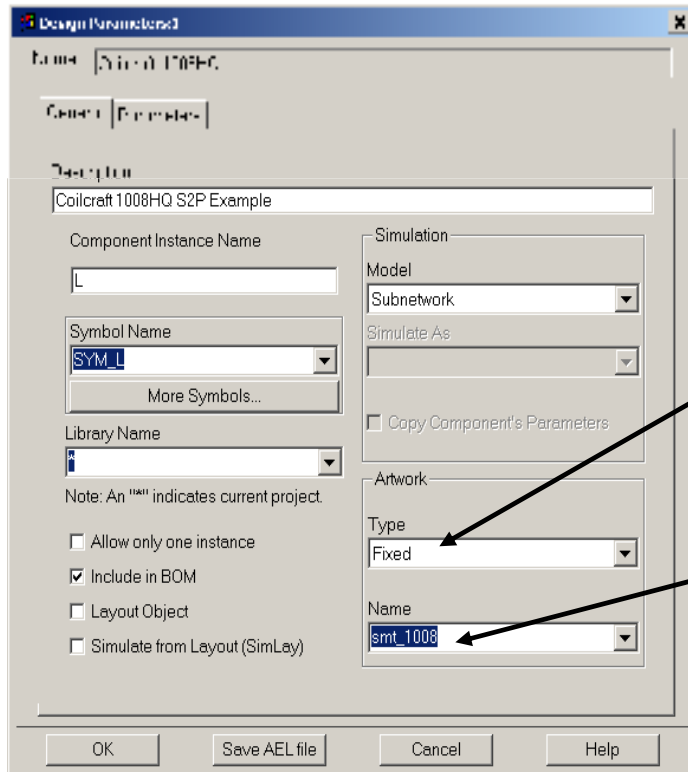
Optional text on layer "text"

Body outline on layer "packages"

Geometry centered around (0,0), ports on 1 mil grid with respect to (0,0)

Associating a component with a fixed artwork

- Create fixed artwork design file, save with “footprint” design name
- Create design containing simulation model, save with component name
- Create custom symbol, or use built-in ADS symbol
- With component (not footprint!) open, use **File>Edit>Design Parameters** to associate fixed artwork with component:

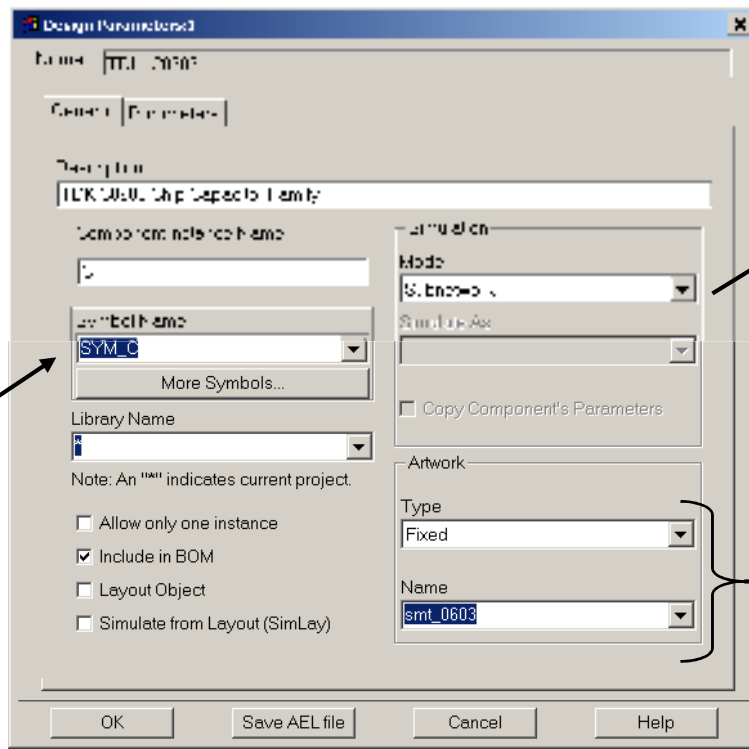


Change setting from default value of “Synchronized” to “Fixed” artwork

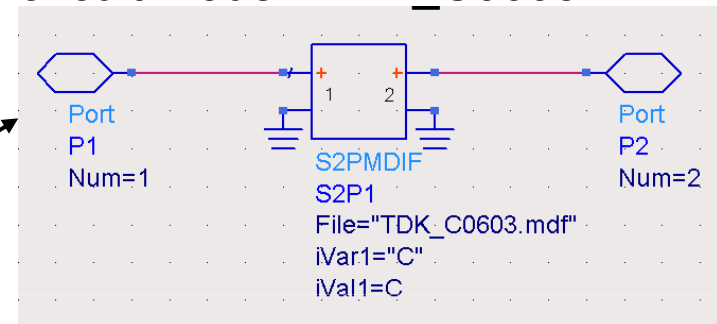
Choose a built-in fixed artwork from the list, or type in the name of your custom fixed artwork

Example – TDK capacitor from Module 2

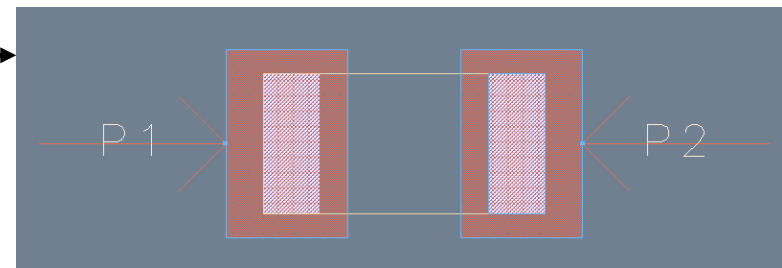
Component Definition “TDK_C0603”



Simulates by calling sub-circuit model “TDK_C0603”



Appears in layout by calling fixed geometry “smt_0603”



Appears in a schematic using built-in symbol “SYM_C”

New for ADS 2004A – pinless vias

- **Prior to 2004A, via artwork required ports on each layer, association to a schematic symbol, connectivity was only passed to each port**
- **2004A physical connectivity checker recognizes pinless vias as long as layer binding is correctly set.**
- **Draw copper pads on appropriate layers, drill hole on appropriate layer**
- **No need to associate with a schematic symbol or simulation model, will be used in layout only**

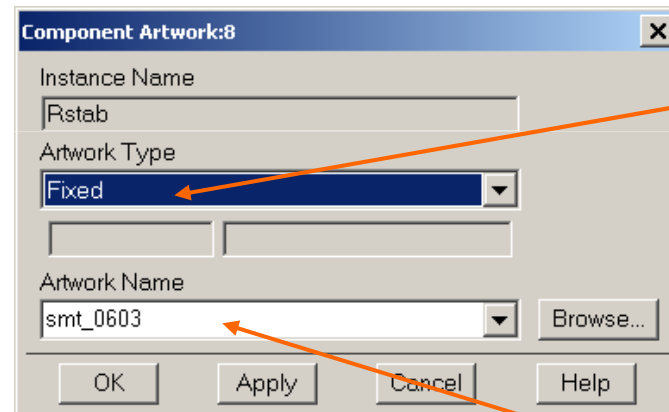
Artwork substitution for built-in ADS components

Built-in ADS layout geometries may not meet your design standards

Custom fixed geometries can be substituted on an instance-by-instance basis

Select the schematic component, then:

Edit>Component>Edit Component Artwork



Change Artwork Type from Default to Fixed

Browse or type in the name of any custom fixed footprint

Note: This technique can also be used to assign a custom geometry to an ideal lumped element

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