SKILLCAD
Accelerating Custom IC Layout

Quick User's Guide

Exit

SKILLCAD Plus - Create Twisted Bus, vSwap Bus

Multicolor Functions – quickColor, nanojumper

Create Via/Instance – Creating and placing vias and via arrays.

Edit Standard Via – Modify via arrays and metal overlaps, modify via parameters.

MPP/Ring – Create, modify, and reshape MPPs and guard rings.

Fill Via in Area – Fill metal overlaps with vias.

SegJumper – Create, continue, and modify path and bus metal routes.

Path Jumper – Create and continue metal path routes.

Bus Jumper – Create and continue metal bus routes.

Shield Bus – Create shielded path or bus metals.

Bus Joint – Join metal buses.

V-Editor – Advanced bus and shape editing, via chains, gate contacts, comb router, etc.

Track Functions – Track pattern-based layout functions.

Path Router – Guided path auto router.

Bus Router – Guided path bus router.

Layer Handler – Various layer viewing options.

GetNet – Net selecting, extracting, and highlighting functions.

Pin Functions – Functions for pin placement/browsing, alignment, labeling, etc.

Label Functions – Quick labeling functions for pins, instances, voltages, and masks.

Create Slot Holes – Creating and converting slotted metal. Also create metal mesh.

Fill Dummy – Advanced and simple metal fill functions. Also, layer density checking.

Kits – A miscellaneous collection of useful functions.

rSolver – To measure and report metal resistances, for single and multiple routes.

Pattern Placer – To quickly place device arrays for custom placements and matching.

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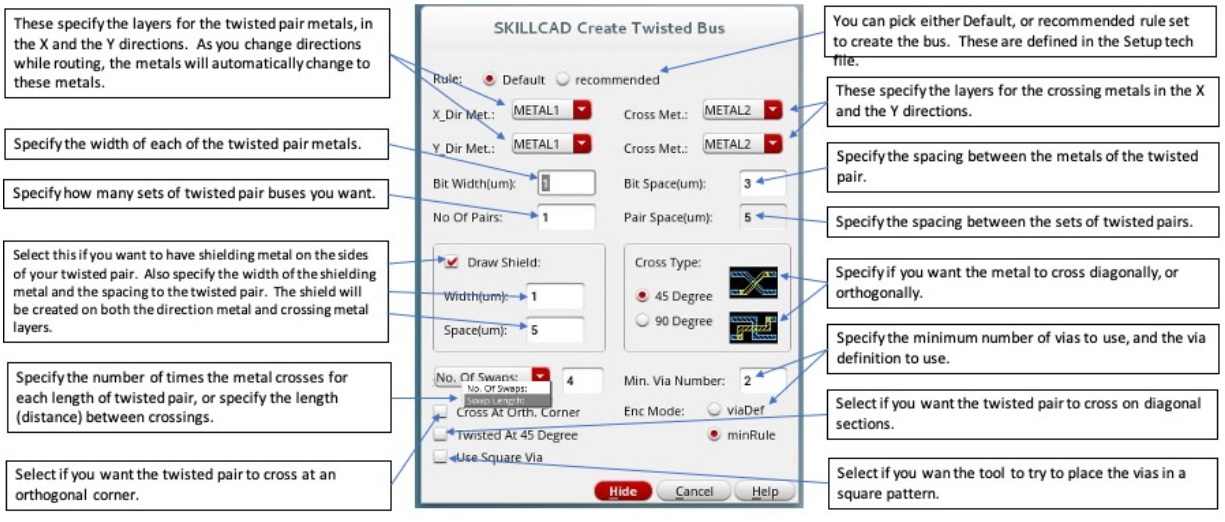
SKILLCAD Plus Functions

Create Twisted Bus - To create a set or multiple sets of twisted pair buses, with or without shielding metals.

vSwap Bus – To swap buses specified by a vLine.

SKILLCAD Plus Functions, Create Twisted Bus

Usage: To create a set or multiple sets of twisted pair buses, with or without shielding metals



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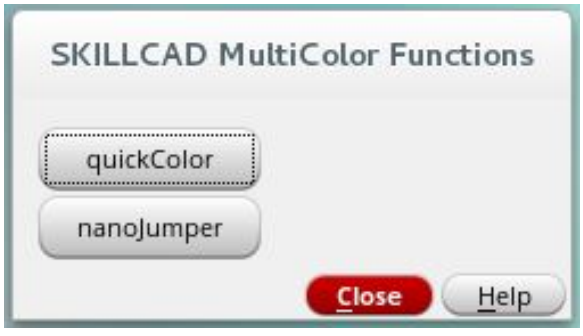
SKILLCAD MultiColor Functions



quickColor – Define metal coloring parameters.

nanojumper – Create metal routing with metal coloring.

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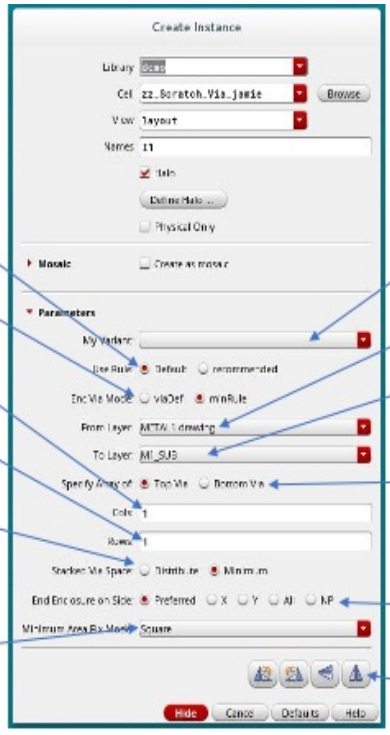
Create Via, Instance, Main Features



Select the rule category to use.

Select the via enclosure mode.

Enter the number of via columns.

Enter the number of via rows.

Select whether to evenly "Distribute" the vias in a via array, or to space them at the "Minimum" distances.

When placing stacked vias, with minimum enclosures between multiple layers, the metals in the intermediate layers, may fail metal area rules. Here you can select how you want the metal increased, to fix the errors.

Here you can select any Variants you have previously defined, or bring up the **SKILLCAD Edit Standard Via** form (see next slide).

Select the "From" layer.

Select the "To" layer.

Select either the "Top Via" or "Bottom Via", as the basis for the number of vias to place. The number of any other vias in the stack, will be calculated for the area, set by the selected "Top Via" or "Bottom Via".

Here you can select the side(s) for the via end enclosures.

Select a rotation, or flip, for the newly created via placements.

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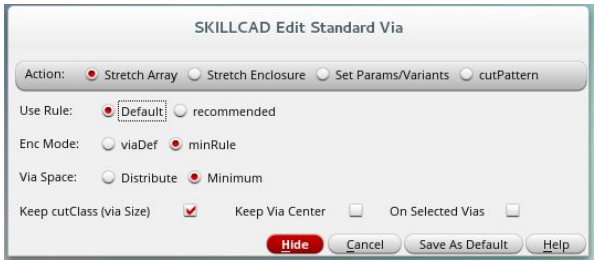
SKILLCAD Edit Standard Via, Main Features



Action- Choose to Stretch Array, Stretch Enclosure, Set Params/Variants, or use a Cut Pattern.

Via Space– Choose to Distribute the vias evenly or use the Minimum spacing.

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SKILLCAD Create MPP, Main Features

Select the rule category to use.

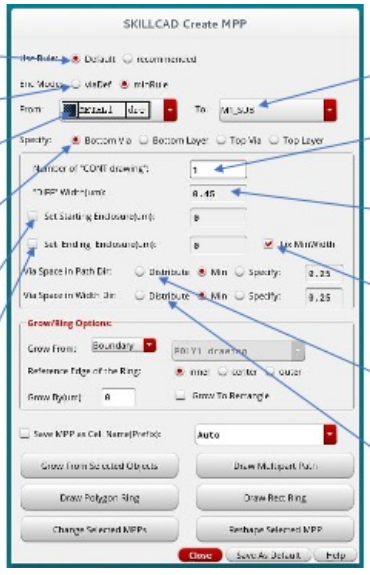
Select the via enclosure mode.

Select the "From" layer.

Specify what via or layer to use, to calculate the number of vias and the enclosures. The options are "Bottom Via", "Bottom Layer", "Top Via", and "Top Layer".

If you select "Set Starting Enclosure", you can specify a distance from the start of the path to the first vias/contacts.

If you select "Set Ending Enclosure", you can specify a distance from the end of the path to the last vias/contacts.



Select the "To" layer.

Specify the number of vias to use for the width of the multipart path.

If you "Specify" "Bottom Layer" or "Top Layer", you can specify the width of the layer. This will be used to calculate the number of vias that can fit in that width.

Select "Fix MinWidth" to fix the minimum width of the layers in the multipart path object.

Here you can specify how you want the vias/contacts spaced in the direction of the path.

Here you can specify how you want the vias/contacts spaced in the width of the path.

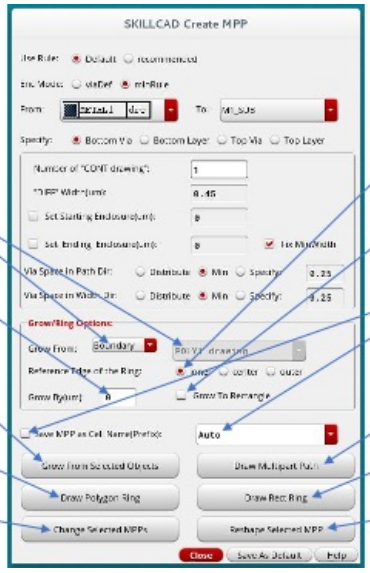
Here you can select to grow a multipart path ring from a "Boundary" or a "Layer". If you select "Layer" you can then select the layer.

Enter the amount of spacing from the ring to the selected objects, when the ring is created.

Click on "Grow From Selected Objects" to create a multipart path ring around all the selected objects. The ring will follow the cell boundaries, unless overridden by the options.

Click on "Draw Polygon Ring" to create a polygonal multipart path.

If you click on "Change Selected MPPs", any changes made to the parameters will be applied to the selected multipart path.



Specify where the MPP ring will be created, in relation to the drawn line. The choices are "Inner", "Center", and "Outer".

Select "Grow To Rectangle", to have a rectangular ring created, instead of following the outline of the cell boundaries.

Select "Save MPP as Cell Name (Prefix)" to save the created multipart path as a cell. Then you can specify the cell name, or if you select "Auto", it will use the current cell name as a prefix, and add a numerical suffix.

Click on "Draw Multipart Path" to create a regular multipart path.

Click on "Draw Rect Ring" to create a rectangular multipart path.

If you click on "Reshape Selected MPP", you can change the shape of a selected multipart path.

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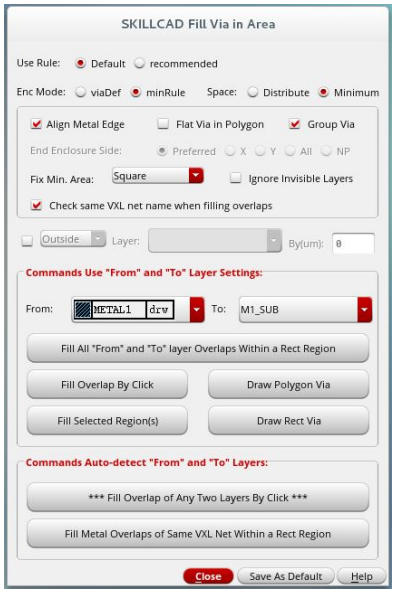
SKILLCAD Fill Via in Area, Main Features



Space – Select ”Distribute” to evenly distribute the vias, or “Minimum” for minimum spacing.

From and To – Select the ”From” and “To” layers. Vias and metals will stack to make the connection between these layers.

Fill Overlap By Click – Click on the overlapped shapes and it will be filled with vias.

Fill Overlap of Any Two Layers By Click – Just click on the overlapped metals and the tool will “Auto-detect” the layers and fill the overlap with the correct vias.

Fill Metal Overlaps of Same VXL Net Within a Rect Region – Specify the region and the tool finds any overlapped metals on the same net and fills the overlaps with the correct vias.

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SKILLCAD SegJumper

Usage: To create single metal and bus routing and to solve many metal routing issues.

Specify the rule definition to use. These are defined during setup.

Specify the number of metal runs to create.

Specify the width of the metal(s).

Specify the spacing between the metals.

Specify if you want the even bits of a metal bus to be on the Same metal layer, or select a different metal layer.

Specify the minimum number of vias.

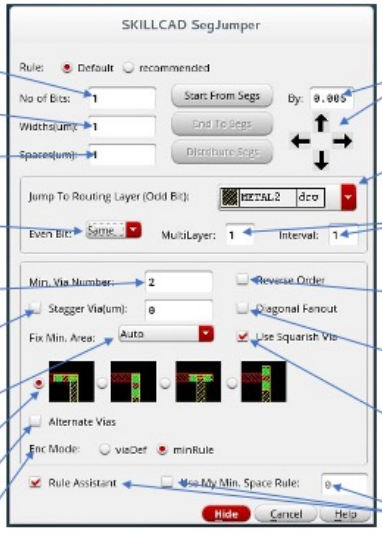
Select if you want to stagger the vias when changing metals inline, and by how much.

Select the mode for fixing the minimum area violations around vias.

Select the via alignment.

Select if you want the bus vias to alternate rotations.

Select the via metal enclosure mode.



These arrows are used for fine adjustment of the metal to help with alignment. You can specify how much to move the metal with each arrow click.

Select the starting metal layer, or the metal layer for the next metal change.

Specify how many metal layers to stack and the interval of the metals.

Select if you want the bus metal lines to reverse order at a corner when changing metal layers.

Select if you want the metal fanning to use diagonal corners. The default is orthogonal.

Select if you wan the tool to try to place the vias in a square pattern, for inline metal changes.

Select to turn on the rule assistant, and if desired, specify a different metal spacing.

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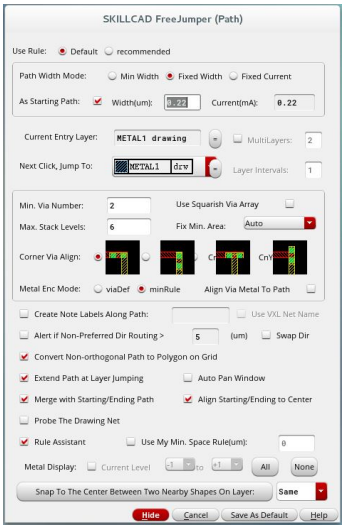
SKILLCAD FreeJumper Path, Main Features



Path Width Mode – The path width can be set to minimum. It can also be set to a fixed width or a width determined by a user supplied current requirement.

Next Click, jump To – Select the layer to via to on the next mouse click.

Min. Via Number, Use Squarish Via Array, Max. Stack Levels, Fix Min. Area, and Metal Enc Mode – This allows the designer to set the via requirements.

Snap To The Center Between Two Nearby Shapes On Layer – Specify a layer. The tool will take the next entry point for the route, find two shapes on the specified layer, next to the entry point, and center the next path segment between these two shapes.

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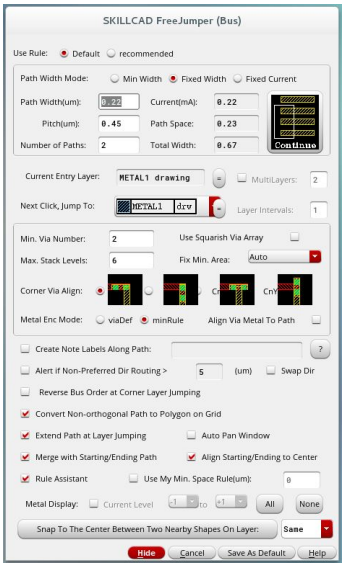
SKILLCAD FreeJumper Bus, Main Features



Path Width Mode – The path widths can be set to minimum. They can also be set to a fixed widths or a widths determined by a user supplied current requirement.

Continue – Continue routing from the end of an existing bus.

Next Click, jump To – Select the layer to via to on the next mouse click.

Min. Via Number, Use Squarish Via Array, Max. Stack Levels, Fix Min. Area, and Metal Enc Mode – This allows the designer to set the via requirements.

Snap To The Center Between Two Nearby Shapes On Layer – Specify a layer. The tool will take the next entry point for the route, find two shapes on the specified layer, next to the entry point, and center the next bus segments between these two shapes.

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ShieldBus Functions

ShieldBus Jumper - To create a shielded pat or bus. Includes many shielding options.

Via Wall Shield – To create a shield for metal paths, where the shield metals are tied together with a continuous row of vias.

ShieldBus (Via Wall) Form

Select one of the rule modes that you have defined during the SKILLCAD setup process.

Select where you want the shielding wires to be placed.

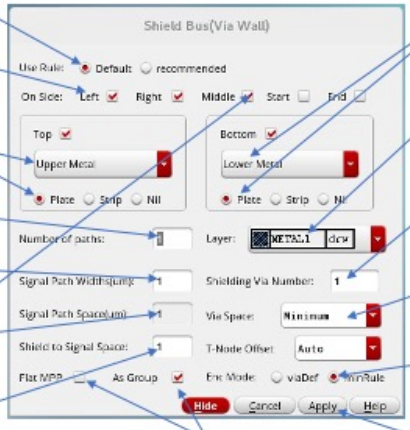
Specify where to put shielding metal over the routes, and specify what metals you want for these shields.

Specify how many routing lines you want.

Specify the signal path width.

Specify the spacing between the signal paths. This field is deactivated if Middle is selected as a side for the shielding.

Specify the spacing from the shielding paths to the signal paths.



Selecting Flat MPP causes the data objects in the bus to be flattened. Selecting As Group causes the data in the bus to be grouped.

Specify where to put shielding metal under the routes, and specify what metals you want for these shields.

Select the layer for your signal paths.

Specify how many vias will be in the width of the shielding metals. This, along with the Via Space, and Enclosure Mode, will determine how wide your metal shielding paths will be on the sides and ends of your signal paths.

Select or specify the distance between vias, in both the X and Y directions.

Select one of the via enclosure modes that you have defined during the SKILLCAD setup process.

Selecting Apply sets all the parameters you have specified and finishes the bus. Until you hit Apply you can modify the parameters to see how they affect the bus.

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SKILLCAD Bus Connect, Main Features

Click on "?" to see information on the application, and how to assign the commands to bindkeys.

Select "Any Angle Mode" if one of the buses is not orthogonal.

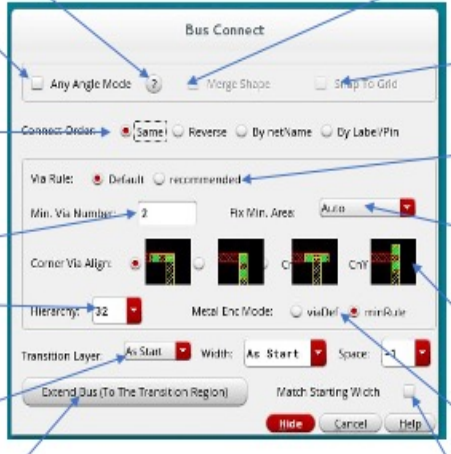
The "Connect Order" allows you to select in what order you want the metals in the two buses to connect. You can select the "Same" order, or "Reverse order. The bus metals can also be connected according to net name or by label/pin name.

Enter the minimum number of vias.

Enter the levels of hierarchy, the application can traverse to access the bus data.

Select the transition metal layer, the metal widths and spacings for the metals connecting the two buses. These options are used in the case where the two buses face each other, inline.

Clicking on "Extend Bus ..." allows you to select the limit for the levels of hierarchy to make the bus connections.



If you have selected "Any Angle Mode", you can decide if you want the metals to merge, or not.

If you have selected "Any Angle Mode", you can decide if you want the non-orthogonal metals to snap to a grid.

Select the via rule category to use.

Select how you want issues with minimum area metals, resolved.

Select how you want the vias aligned, if layer and direction changes are necessary to connect the buses.

Select the metal enclosure mode.

When "Match Starting Width" is selected, the metal widths in the second selected bus will be changed to match the widths in the first bus.

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SKILLCAD V-Editor

BusAdjust – To modify the widths and spaces of the metal routes in an existing bus.

busGrow- To create additional bits in an existing bus.

vStretch - To stretch bus routes, polygon edges, routing ends, etc. .

Vmove - To create a set or multiple sets of twisted pair buses, with or without.

busTap – To create metal routes which tap into an existing bus.

Bus Connect - To create the metal routes to connect two existing buses.

Bridge - To create a metal routing bridge in an existing metal bus, whish will allow other metal(s) to cross.

Distribute Bus - To evenly distribute the metal routes in an existing bus, across a defined region.

Align BusEnd - To align the ends of an existing bus to a shape, existing vias, or a drawn line.

Bus Continue - To create metal routes which continue an existing bus..

Break Bus - To chop the metal in an existing bus and create a specified space between the bus ends.

changeLayer - To change the metal routes and associated vias, in an existing bus, from one layer to another.

Detour - To create a U-shaped bend in an existing metal bus, which can enable to bus to go around an object.

Dent Corner - To create a 45-degree bend in place of an orthogonal bend, in an existing metal bus.

Via Chain - To create metal and via contacts across device sources and drains, as defined by a drawn V-line.

Gate Cont - To create poly and metal contacts to single and multiple gate contacts, as defined by a V-line.

combRouter - To create metal routes and connecting vias, from multiple source/drains to a metal back bone .

Fix MinArea - To create enough metal in a pin or metal shape, to satisfy minimum metal area requirements.

Taper Connect - To create metal routes to connect two buses in a non-orthogonal manner.

Round Corner - To create rounded metal corners in place of orthogonal corners.

River Router - To connect face to face buses, in a way that maximizes the available area at the corner.

Trim BusConnect - To connect two overlapping metal buses with vias, and trim the ends, creating a corner.

SameL Connect - To connect two right angle buses, creating metal routes to equalize the metal lengths.

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SKILLCAD Track Functions

Nano Track Router – Set the parameters for the track routing.

Transition Connector – Connects routing in transition regions.

View Patterns – Display the defined track patterns.

Push Bus To Tracks – Move the bus metals to the defined track pattern.

Fill Via By Click – Fill metal overlaps defined by a mouse click.

Fill Via By Box (Same Net) – Fill metal overlaps in a user defined region, if the metals are the same net. This is determined by net connectivity.

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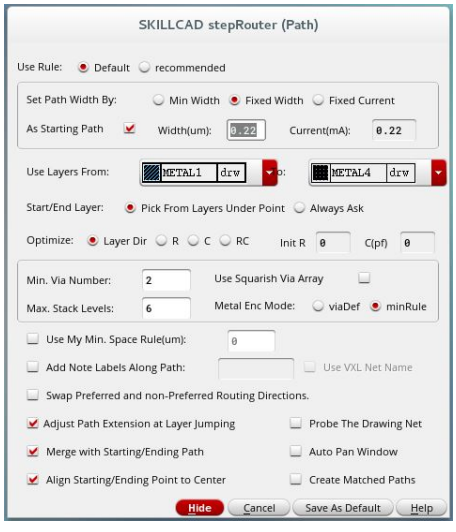
SKILLCAD StepRouter Path, Main Features



Set Path Width By – The path width can be set to minimum. It can also be set to a fixed width or a width determined by a user supplied current requirement.

Use Layers From and To – Select the range of layers the tool can use to create the routes.

Min. Via Number, Use Squarish Via Array, Max. Stack Levels, and Metal Enc Mode – This allows the designer to set the via requirements.

Create Matched Paths – Powerful tool to enable the designer to create matched metal routing, by entering just one of the routes. The other route is automatically generated to match the defined route.

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SKILLCAD StepRouter Bus, Main Features

Set Path Width By – The path widths can be set to minimum. They can also be set to a fixed width or a width determined by a user supplied current requirement.

No. of Paths and Pitch – Here the designer sets the number of paths and the pitch for the metal routes. When the designer enters the points for the routes, all the metal routes for the bus are created at the same time.

Continue – Continue routing from the end of an existing bus.

Use Layers From and To – Select the range of layers the tool can use to create the routes.

Min. Via Number, Use Squarish Via Array, Max. Stack Levels, and Metal Enc Mode – This allows the designer to set the via requirements.

Create Matched Paths – Powerful tool to enable the designer to create matched metal routing, by entering just one of the routes. The other route is automatically generated to match the defined route.

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SKILLCAD Layer Handler, Main Features

Get Layers Under – The designer determines how to select the layers.

Import LSW Layers – This will import the layers from the LSW as a starting point for the layer list.

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SKILLCAD GetNet Menu

Select Net - To select an entire net, including all metals and vias, through the hierarchy.

Extract Net - To extract an entire net, including all metals and vias, through the hierarchy. This also has the option to save the extracted net to a cell view.

Hilight Net - To hilight an entire net, including all metals and vias, through the hierarchy.

Clear Hilight - To clear the highlight of an entire net, including all metals and vias, through the hierarchy.

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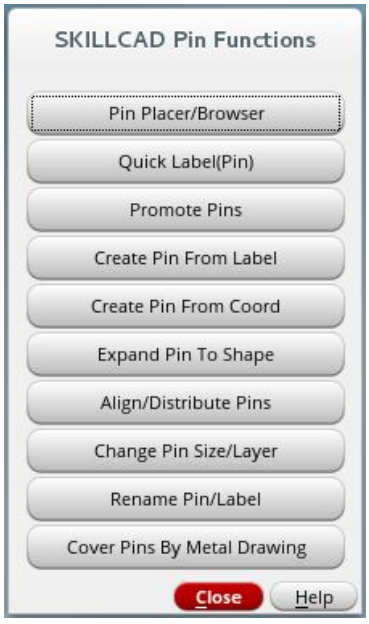
SKILLCAD Pin Functions



Pin Placer/Browser – Displays pins and facilitates pin placement.
Quick Label (Pin) – Provides many pin labeling features.
Promote Pins – This tool is able to place pins from a lower-level circuit block in a higher-level circuit block.
Create Pin From Label – Creates physical pins from a pin label.
Create Pin From Coord – Creates pins and labels from a designer supplied coordinates.
Expand Pin To Shape – Creates a pin that completely covers the associated metal shape.
Align/Distribute Pins – This tool can align and/or distribute pins to a given circuit object side.
Change Pin Size/Layer – Used to edit a pins size and/or layer.
Rename Pin/Label – Changes the bus notation type for bus pins.
Cover Pins By Metal Drawing – Covers metal pin purpose, with the appropriate metal drawing purpose.

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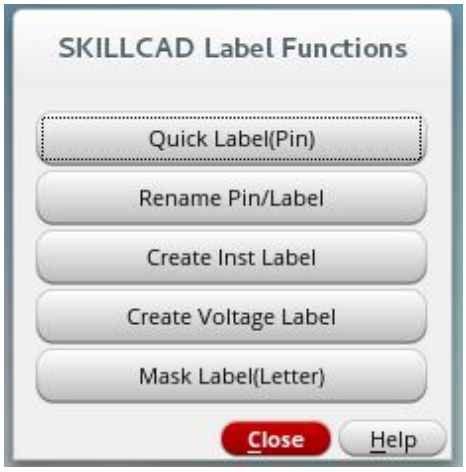
SKILLCAD Label Functions



Quick Label (Pin) – Provides many pin labeling features

Rename Pin/Label – Changes the bus notation type for bus pins

Create Inst Label – Creates instance labels for selected instances.

Create Voltage Labe l – Creates a designer specified voltage label on a metal route or instance.

Mask Label (Letter) – Create a PG-able mask label.

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SKILLCAD SlotPath

Draw Slot Path – Define the parameters for and generate a slotted metal path.

Convert To Slot Path – Convert an existing metal to a slotted path metal.

Copy Slot Holes – Creates shapes from the holes of an existing slotted metal.

Create Mesh – Define and create a mesh shape.

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SKILLCAD Fill Dummy

Advanced Fill – To create fill, or dummy metal, with a variety of options.

Simple Fil – To quickly generate dummy shapes, with a minimum of setup time.

Check Density - To quickly check the layer coverage, or density, in a defined area.

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SKILLCAD Kits

Calculate Area Perimeter – Tools to calculate the area and/or perimeter of a selected shape.

Simple Net R- To create a set or multiple sets of twisted pair buses, with or without.

Fix Offgrid- To create a set or multiple sets of twisted pair buses, with or without.

Sky View- To create a set or multiple sets of twisted pair buses, with or without.

Flip Within Bbox - To create a set or multiple sets of twisted pair buses, with or without.

Swap Bit Line(Vias)- To create a set or multiple sets of twisted pair buses, with or without.

Toggle Via CutClass- To create a set or multiple sets of twisted pair buses, with or without.

Full Selection- To create a set or multiple sets of twisted pair buses, with or without.

Select Net Objs- To create a set or multiple sets of twisted pair buses, with or without.

nCopy- To create a set or multiple sets of twisted pair buses, with or without.

Manhattan Edge (Conic)- To create a set or multiple sets of twisted pair buses, with or without.

Create Spiral- To create a set or multiple sets of twisted pair buses, with or without.

Formula Plotter- To create a set or multiple sets of twisted pair buses, with or without.

Fill Holes- To create a set or multiple sets of twisted pair buses, with or without.

Cut Out Short– To eliminate overlaps of one layer, over other shapes on the same layer.

Cover Fig/Net – Tools to cover a selected net or shape with a specified layer.

Grow Shapes - To create a set or multiple sets of twisted pair buses, with or without.

Edge Grow- To create a set or multiple sets of twisted pair buses, with or without.

Line Distance- To create a set or multiple sets of twisted pair buses, with or without.

Sync Window View – To sync two layout window views, to allow a comparison of two layouts.

Copy From Background View- To create a set or multiple sets of twisted pair buses, with or without.

Chop Array - To create a set or multiple sets of twisted pair buses, with or without.

Inductor Pin Checker- To create a set or multiple sets of twisted pair buses, with or without.

Create Arc Shapes- To create a set or multiple sets of twisted pair buses, with or without.

Convert Shapes- To create a set or multiple sets of twisted pair buses, with or without.

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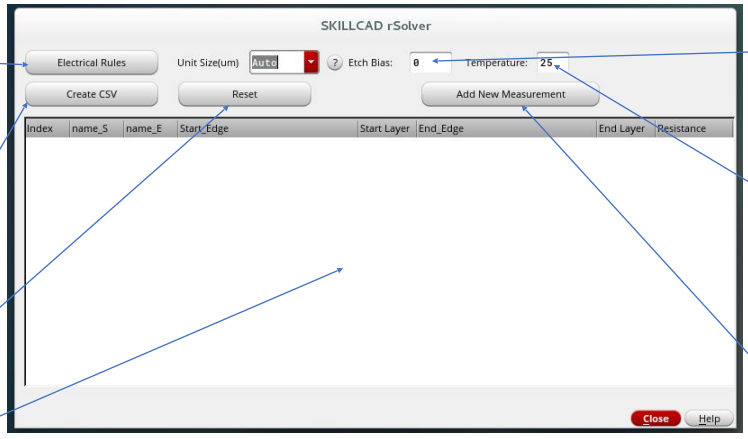
SKILLCAD rSolver, Main Features

Select to bring up the electrical rules form. These are initially created during the SKILLCAD setup.

Select to create a CSV (Comma Separated Variable) file, for importing into Excel or other spreadsheet programs.

Click on this to clear the results window.

This is the window where the results are displayed.



Enter a number to represent the process metal etching factor, in microns.

Enter a number to represent the temperature for the measurement. The default is 25 degrees.

Select this to start a new measurement. The previous measurements will remain in the results window.

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SKILLCAD Place

Pattern Placer – To place device arrays for custom placements and matching.