Region

Modified by Phil Loughhead on Dec 13, 2015

Parent page: Objects

Region objects used to define a logo, created by copying from an image editor (MS Paint) and pasting into the PCB editor.

Summary

A Region, also known as a Solid Region, is a polygonal-shaped primitive object that can be placed on any layer. It can be configured to be positive, for example placed as a copper region; or negative, for example placed as a polygon pour cutout. By placing it as a negative on the multi-layer, it can be placed as a board cutout.

A region can have any number of sides and vertices (corners). It can be placed on a signal layer to define an area of solid copper, to be used to provide shielding or to carry large currents. Positive regions can be combined with tracks or arc segments and be connected to a net. In the PCB Library editor regions can be used to create custom pad shapes on copper layers, or special mask shapes on the solder and paste masks. On non-electrical layers regions can be used to define custom shapes for tasks such as logos, which is how it is used when a bitmap is copy/pasted into the PCB editor (as shown in the image above).

A region can also be used to define *no-go* areas for component placement and routing, which are also known as *keep-outs*. These can apply to all layers by placing the region on the Keep-out layer, or they can be layer-specific by placing the region on a signal layer and enabling the **Keep-out** option for that region.

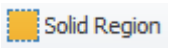
When placed as a negative, a region can create a cutout (a void) in a polygon pour. In this mode the region will not be filled with copper when the polygon is poured. When used as a negative region for a board cutout (by placing it on the multi-layer), it defines an area that become a hole through the finished board. Board cutout regions are transferred to Gerber and ODB++ files for manufacturing purposes.

Availability

Regions are available for placement in both the PCB editor and the PCB Library editor.

PCB Editor

Use the following method to place a region in the PCB editor:

- Click **Home** | **Place** | 

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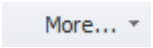
PCB Library Editor

Use the following method to place a region in the PCB Library editor:

- Click **Home** | **Place** | 

and select **Solid Region** from the menu.

Placement

After launching the command, the cursor will change to a crosshair and you will enter region placement mode. Placement is made by performing the following sequence of actions:

1. Position the cursor and click to anchor the starting vertex for the region.
2. Move the cursor ready to place the second vertex. The default behavior is to place 2 edges with each click (as shown in the first 5 images in the set below), with a user-defined corner shape between them. Refer to the Placement Modes topic below for more details on changing corner modes.
3. Continue to move the mouse and click to place further vertices.
4. After placing the final vertex, right-click or press **Esc** to close and complete placement of the region. There is no need to manually close the region as the software will automatically complete the shape by connecting the start point to the final point placed.
5. Continue placing further regions, or right-click or press **Esc** to exit placement mode.

> A region will adopt a net name if it is placed over an object that is already connected to a net.

Additional actions that can be performed during placement include:

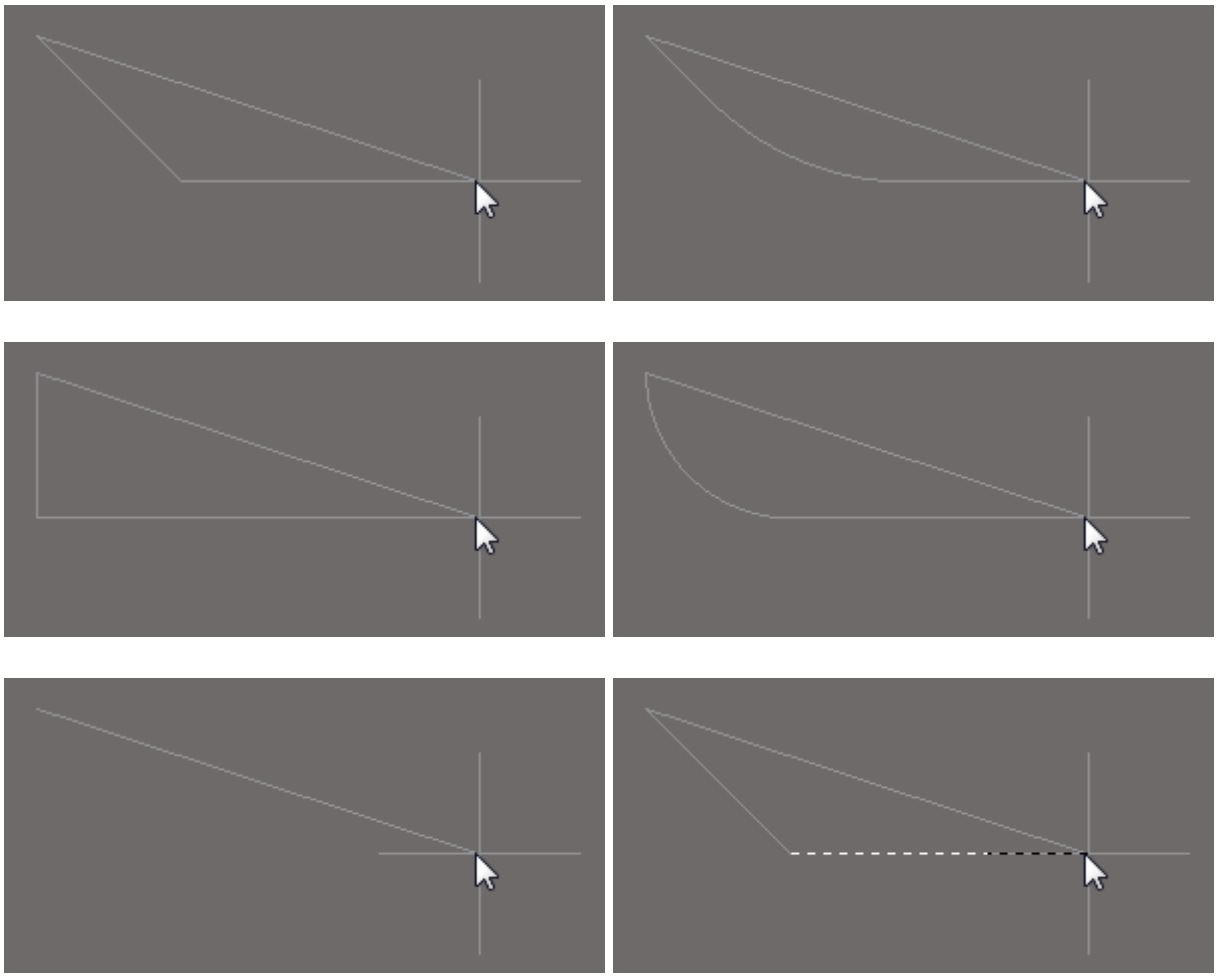
- Press the **+** and **-** keys on the numeric keypad to cycle forward and backward through all layers currently visible in the design.
- Press the * key to cycle through the visible signal layers.
- Press the **Tab** key to access an associated properties dialog, from where properties for the region can be changed on-the-fly.

> Note that the attributes can be modified during placement, press **Tab** to bring up the *Region* dialog. Changes made will affect the object being placed, and subsequent objects placed during the same editing session.

Placement Modes

While placing a region there are 5 available corner modes, 4 of which also have corner direction sub-modes. During placement:

- Press **Shift+Spacebar** to cycle through the 5 available corner modes: 45 degree, 45 degree with arc, 90 degree, 90 degree with arc, and Any Angle.
- Press **Spacebar** to toggle between the two corner direction sub-modes.
- When in either of the arc corner modes, hold the , or keys to shrink or grow the arc. Hold the **Shift** key as you press to accelerate arc resizing.
- Press the **1** shortcut key to toggle between placing 2 edges per click, or one edge per click. In this second mode the dashed edge is referred to as the look-ahead segment (as shown in the last image in the set below).
- Press the **Backspace** key to remove the last vertex.



Press Shift+Spacebar to cycle through the 5 available corner modes, press the 1 shortcut to toggle placement between 2 edges or 1 edge.

Placing a Region as a Keepout

A region can be placed as a layer-specific keepout object or an all-layer keepout to act, for example, as a placement or routing barrier. Objects defined as keepouts are ignored during output generation, such as photo plotting and printing. A layer-specific keepout region is simply a region object with its **Keepout** property enabled, an all-layer keepout is a region that has been placed on the **Keepout** layer.

1. To place a layer-specific keepout either place a standard region on the required signal layer and then enable the **Keepout** property to make it a layer-specific keepout, or use the predefined **Solid Region** keepout placement command, available in the sub-menu on the Ribbon at **Home | Place | Keepout**.
2. To place an all-layer keepout make the Keepout layer the active layer, then place a region from the Ribbon (**Home | Place | Solid region**).

Placing a Region as a Polygon Cutout

A Region can also act as a polygon cutout. To place a polygon cutout:

1. Place a standard region over the polygon and then enable the **Polygon Cutout** option in the dialog to achieve this, or
2. Run the **Polygon Pour Cutout** command, available on the Ribbon at **Home | Pour | Polygon Pour**.
3. Repour the polygon to pour around the new cutout using one of the **Repour** commands available on the Ribbon at **Home | Pour | Polygon Pour**.

Placing a Region as a Board Cutout

A Region can also act as a board cutout. To place a board cutout:

1. Place a standard region over the board shape and then edit the region and enable the **Board Cutout** option in the dialog to achieve this, or,
2. Place a board cutout directly via the Ribbon at **Home | Board | Board Cutout**.
3. Repour any polygons that overlay the board cutout using one of the **Repour** commands available on the Ribbon at **Home | Pour | Polygon Pour**.

Graphical Editing

This method of editing allows you to select a placed region object directly in the workspace and change its size and/or shape, graphically. A region object is a polygonal object, as such it offers the same graphical editing techniques available to all polygonal objects, including 3D body objects and polygons.

The basic approach to editing a polygonal-shaped object is:

- Click once to select the object - editing handles (vertices) will appear at each corner, as well as a handle at the center of each straight or curved edge. For a polygon, you must first switch to the layer that the object is placed on to be able to select it.
- Click and hold on a handle to move it: if it is a center handle (displayed as hollow) you will be breaking the edge, if it is an corner (end) handle (displayed as solid), you will be moving the vertex.
- To move an edge of the polygonal object, click and hold anywhere along the edge then slide it to the required location.
- To remove a handle, click and hold on it, then press **Delete** on the keyboard.

To move an entire region, click and hold anywhere on the region (it does not need to be selected), then move it to the new location.

> If attempting to graphically modify an object that has its **Locked** property enabled, a dialog will appear asking for confirmation to proceed with the edit. Double click on the locked object directly and disable the **Locked** property to graphically edit the object.

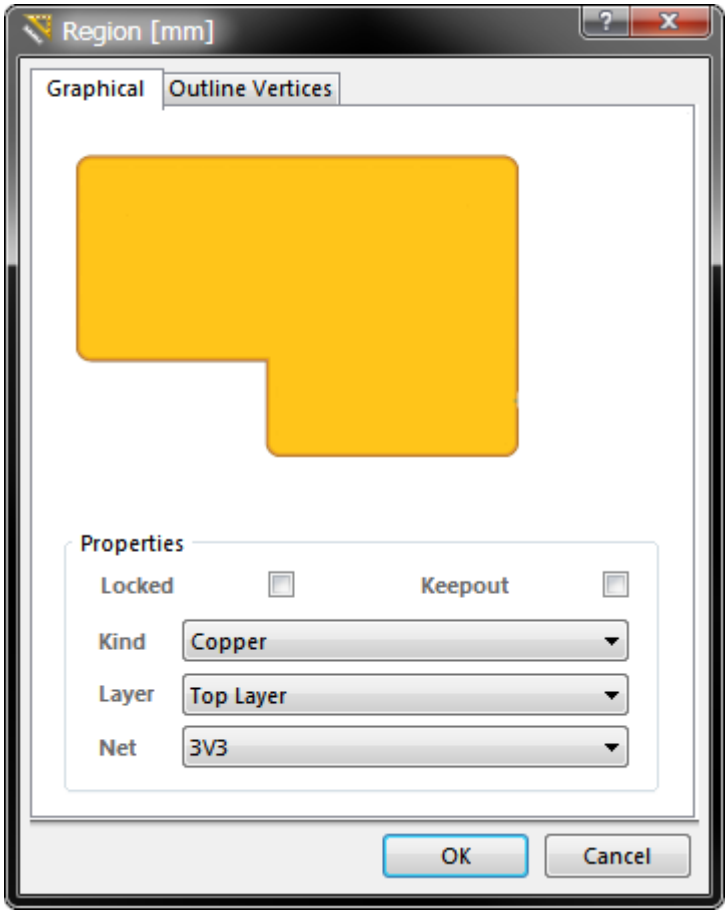
Non-Graphical Editing

The following methods of non-graphical editing are available:

Editing via an Associated Properties Dialog

Dialog page: Region

This method of editing uses the *Region* dialog to modify the properties of a region object.



The *Region* dialog.

During placement, the dialog can be accessed by pressing the **Tab** key.

After placement, the dialog can be accessed in one of the following ways:

- Double-click on the placed object.
- Place the cursor over the object, right-click and choose **Properties** from the context menu.

Editing via an Inspector Panel

An *Inspector* panel enables the designer to interrogate and edit the properties of one or more design objects in the active document. Used in conjunction with appropriate filtering, the panel can be used to make changes to multiple objects of the same kind, from one convenient location.
