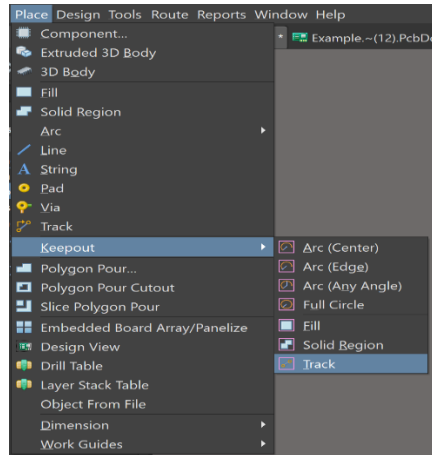


## PCB DESIGN: BOARD OUTLINE, POURS, & OVERLAYS

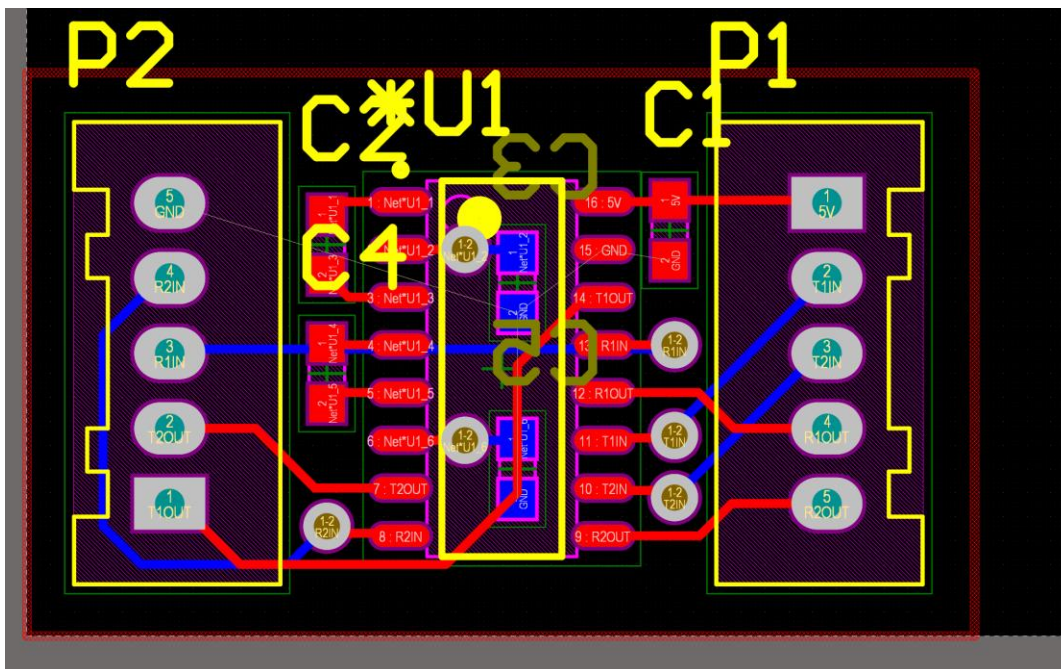
We will now move on to the next part of our PCB design where we will cover how to change the size of our board, lay down polygon pours, and edit text overlays.

1. Place tracks for your desired board outline by pressing Place > Keepout > Track.



*Figure 1: Path to Place Keep-Out Track*

2. Place tracks around your components as shown in Figure 2.



*Figure 2: Completed Traces for Keep-Out Layer*

3. Select all of your tracks at the same time using Ctrl+Click.

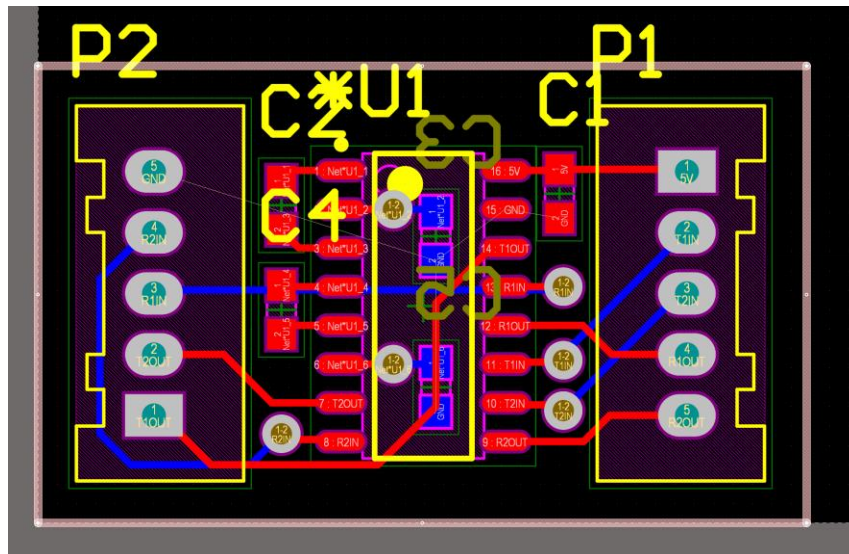


Figure 3: Selected Keep-Out Tracks

4. Define the board by going to Design > Board Shape > Define from selected objects.

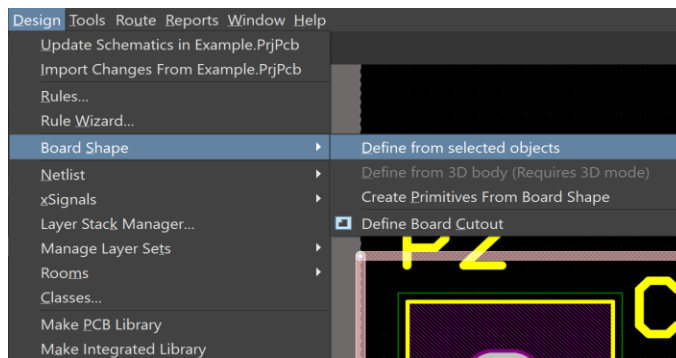


Figure 4: Path to Define Board Outline

5. You should now see something similar to Figure 5.

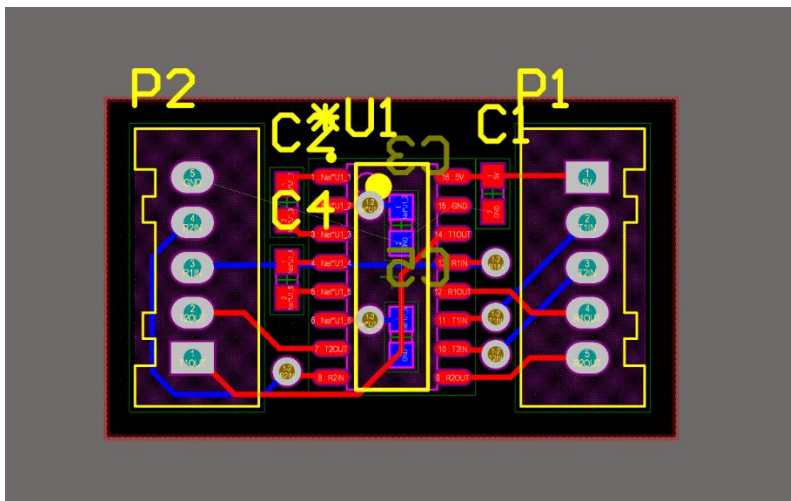


Figure 5: Successfully Defined Board Outline

6. Change the layer that your traces reside from “Top Layer” to “Keep-Out Layer” as you’ve learned to do in the previous part.

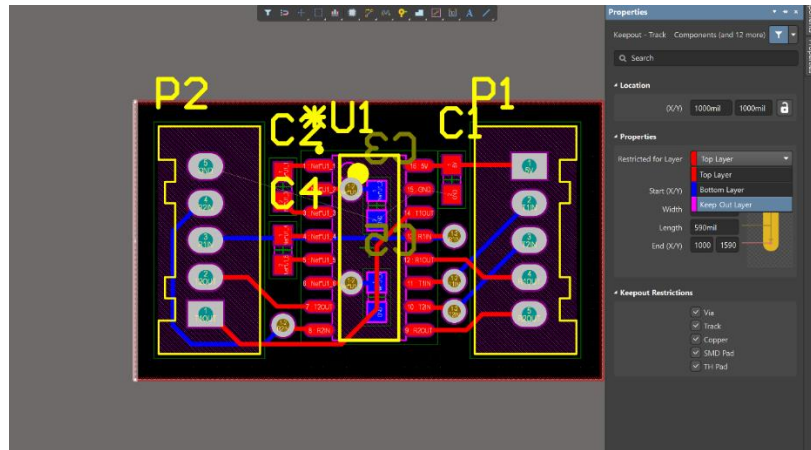


Figure 6: Properties to Switch Track Layers

7. We will now learn how to place a Polygon Pour over our existing board.
8. Click on Place > Polygon Pour...

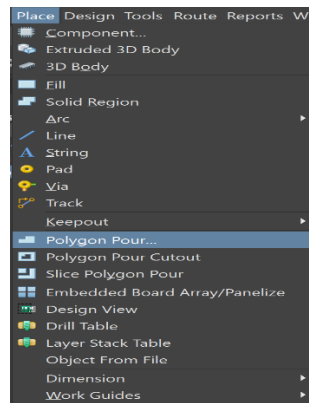


Figure 7: Path to Polygon Pour

9. Click on each one of the corners of your board as shown in Figure 8 then either click the esc key or right click to exit your pour.

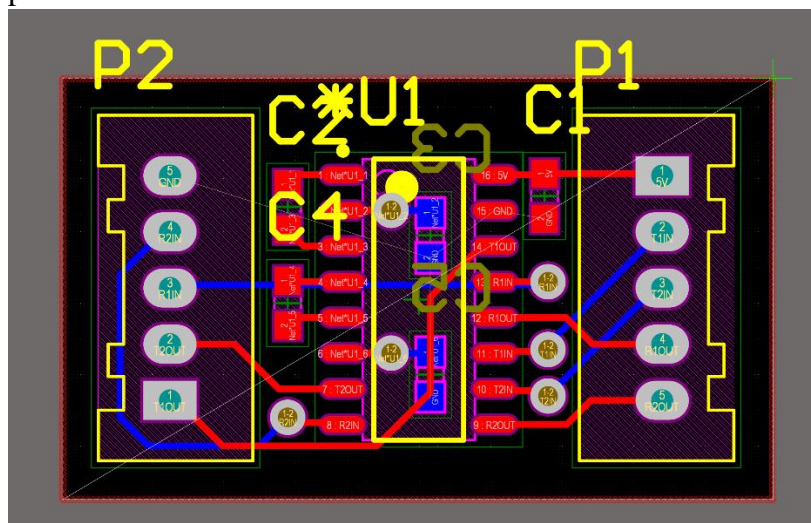


Figure 8: Placing a Polygon Pour



10. Once you've finished pouring, you need to set a net.
11. Access your pours properties and change its net to "GND" as shown below.

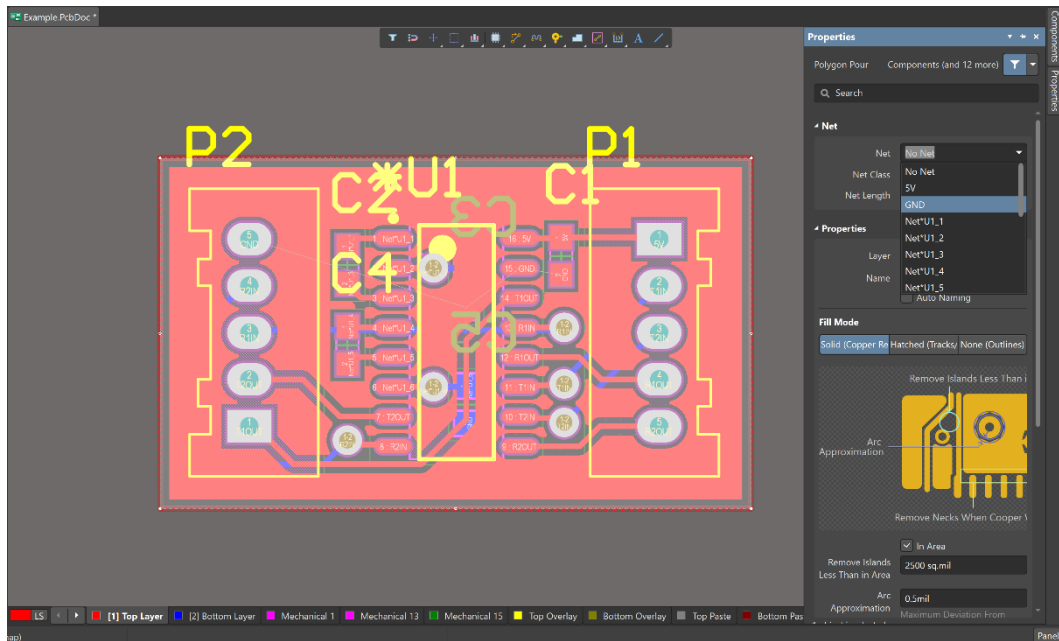


Figure 9: Selecting Net for Pour

12. Your pour should now look like Figure 10. Do not be concerned by the green x's, we will deal with them in the next step.

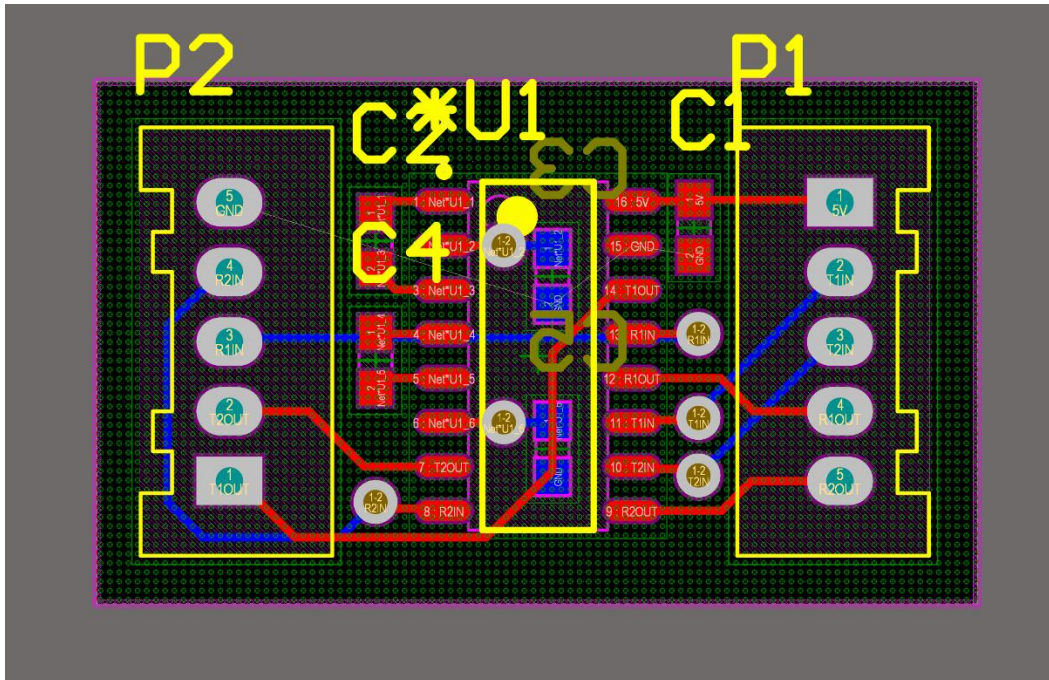


Figure 10: Result of Defined Net

- 
- The screenshot displays the SolidWorks software interface. On the left, the 'Feature Tree' pane is open, showing a list of features. The 'Polygon Actions' menu is highlighted, and the 'Polygon Manager' dialog box is open in the background. The 'Polygon Manager' dialog box shows a list of polygons, with 'Polygon 1' selected. The 'Polygon Manager' dialog box has a 'Repour Selected' button, which is highlighted in blue. The 'Polygon Manager' dialog box also has a 'Repour All' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Repour Violating Polygons' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Repour Modified' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Shelve Selected' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Shelve All' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Bring to front' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Send to back' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Move Polygon' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Resize Polygon' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Slice Polygon Pour' button, which is highlighted in blue. The 'Polygon Manager' dialog box has an 'Explode Polygon To Free Primitives' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Combine Selected Polygons' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Subtract Polygons From Selected' button, which is highlighted in blue. The 'Polygon Manager' dialog box has a 'Modify Polygon Border' button, which is highlighted in blue.
- Find Similar Objects...
  - Clear Filter Shift+C
  - Place
  - xSignals
  - Unions
  - Component Actions
  - Room Actions
  - Polygon Actions**
    - Align
    - Cross Probe
    - Y Cut Ctrl+X
    - Copy Ctrl+C
    - Paste Ctrl+V
    - Applicable Unary Rules...
    - Applicable Binary Rules...
    - Violations
    - Preferences...
    - Properties...
- Polygon Manager**
- Repour Selected**
  - Repour All
  - Repour Violating Polygons
  - Repour Modified
  - Shelve Selected
  - Shelve All
  - Bring to front
  - Send to back
  - Move Polygon
  - Resize Polygon
  - Slice Polygon Pour
  - Explode Polygon To Free Primitives
  - Combine Selected Polygons
  - Subtract Polygons From Selected
  - Modify Polygon Border

The screenshot displays the Altium Designer application window. The top menu bar contains the following items: View, Project, Place, Design, Tools, Route, Reports, Window, and Help. Below the menu bar is a toolbar with icons for Board Planning Mode, 2D Layout Mode, 3D Layout Mode, File, Edit Board, Around Point, Selected Objects, Zoom In, Zoom Out, Zoom Last, Flip Board, Full Screen, Increase Mask Level, Decrease Mask Level, Toolbars, Panels, Status Bar, Command Status, Board Insight, Connections, Jumpers, Grids, Isolate Units, and Differences. The right side of the interface shows a panel with a tree view containing the following items: Example PCBDoc, Example SchDoc, Differences, Navigator, MCAD CoDesigner, Collaborate Compare and Merge, PCB ActiveRoute, PCB Pad Via Templates, PCB 3D Movie Editor, PCB List, PCB Editor, PCB Rules and Violations, Components, Manufacturer Part Search, Messages, Output, Snippets, Storage Manager, Explorer, Projects, View Configuration, Properties, and Layers.

Figure 13: Path to “View Configuration”

17. On the side panel, select “View Options” and look under “Object Visibility”.
18. Slide the bar labelled “Polygons” right until you are satisfied with the transparency of your polygon.

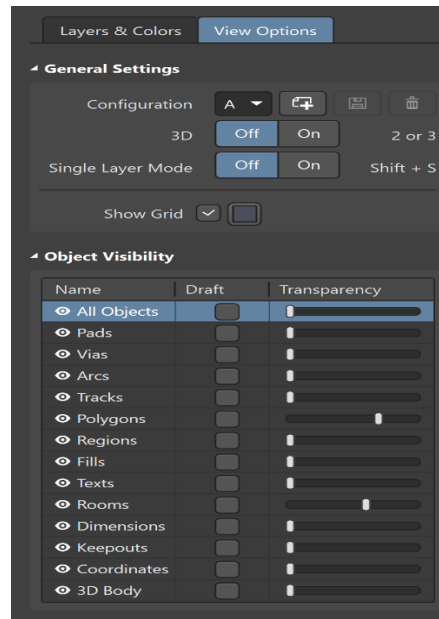


Figure 14: Making Polygons Transparent

19. Repeat steps 8-14 on your own for the bottom layer of the board. If you did it correctly, you should see something similar to Figure 15.

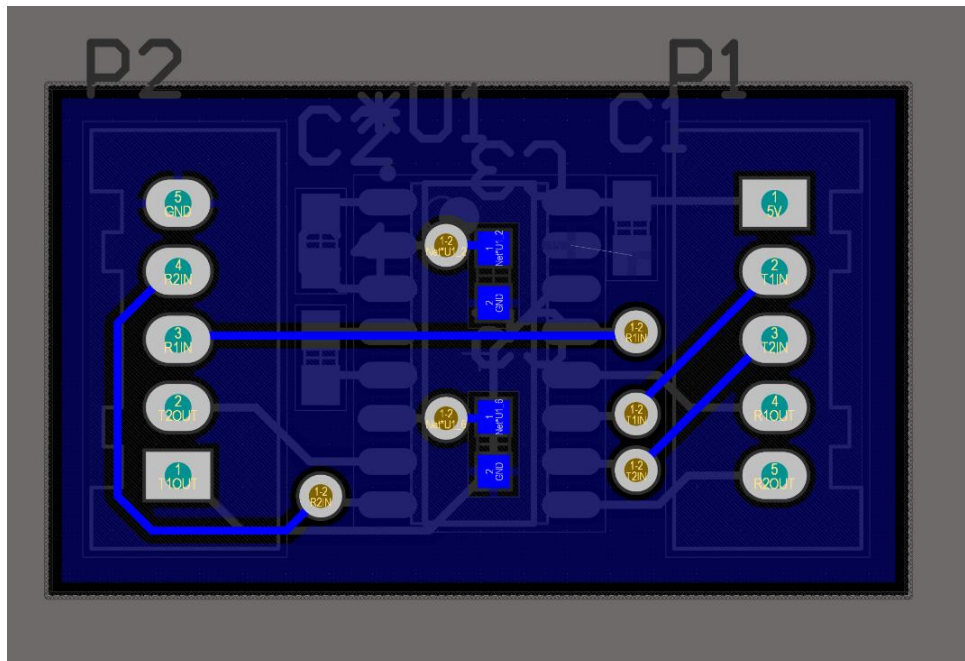
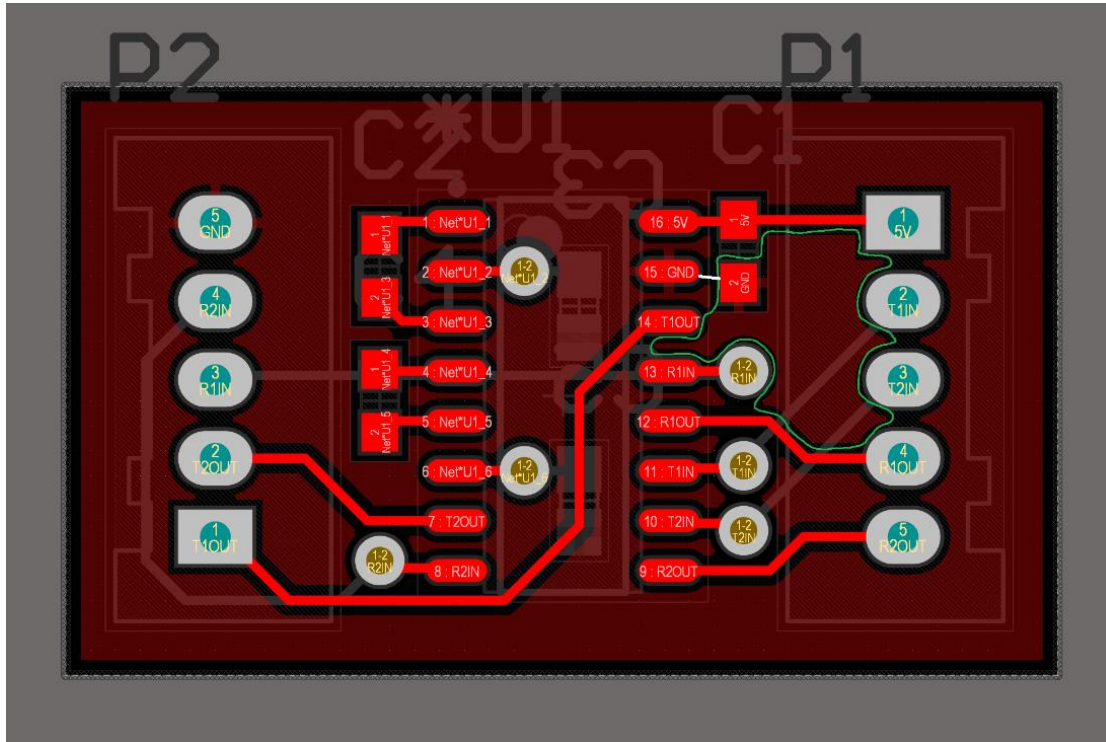


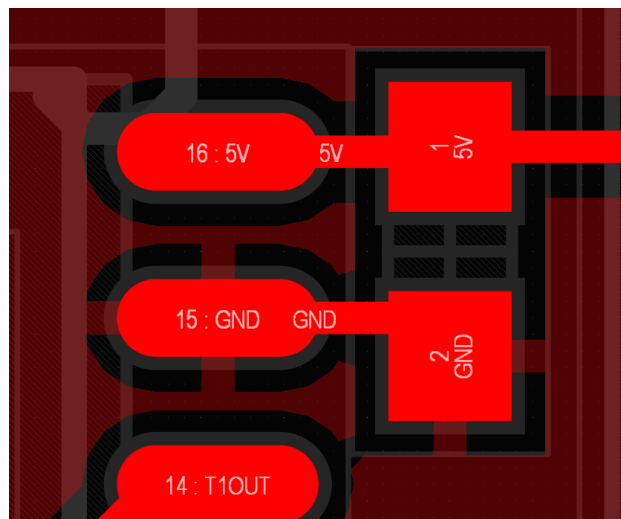
Figure 15: View of Completed Bottom Polygon Pour

20. You will notice that there is one final connection that needs to be made before we're complete. This is because we have an isolated polygon node due to manufacturing constraints and our positioning. The result is that the section outlined in green is disconnected from the other ground nodes.



*Figure 16: View of Incomplete Node Connection*

21. While we could move some components around or use vias to remedy this issue, the simplest solution for this tutorial is to just place an extra trace connecting the two nodes as shown in Figure 17.



*Figure 17: View of Final Node Connection*



22. We will now move on to the final step of our board design which is to position our labels for the different components so that when we print the boards, we will know where to solder our components.
23. Right click one of your labels and select “Find Similar Objects”.

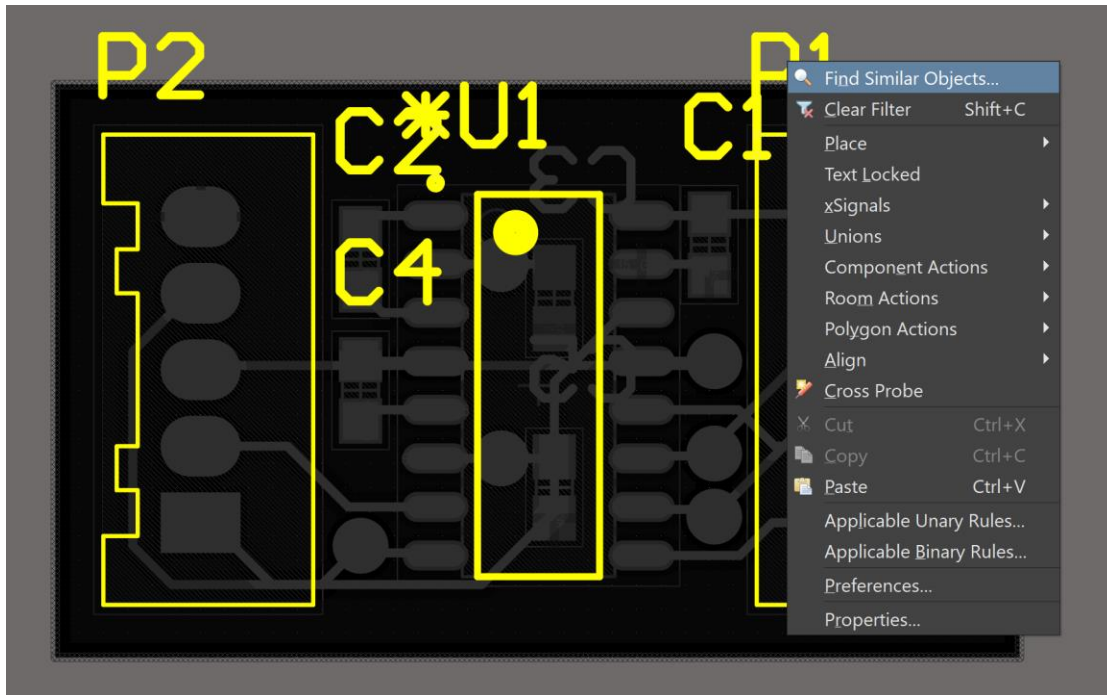


Figure 18: Path to Similar Objects

24. When shown this popup, make sure both “Object Kind” and “String Type” have “Same” selected on the right column. Also make sure to uncheck “Open properties”.

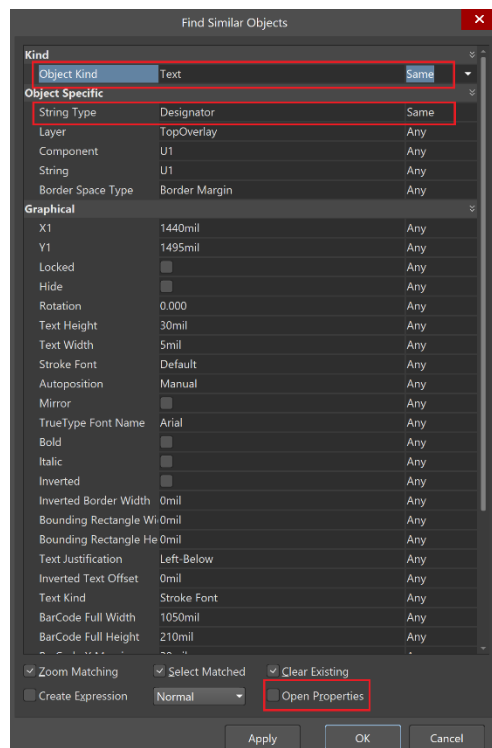
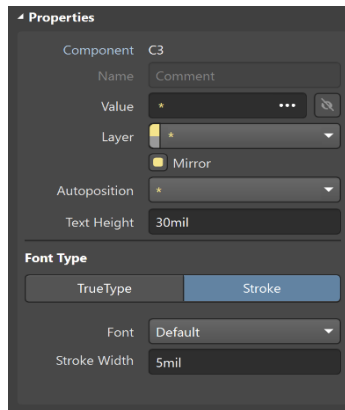


Figure 19: Settings to Select All Labels

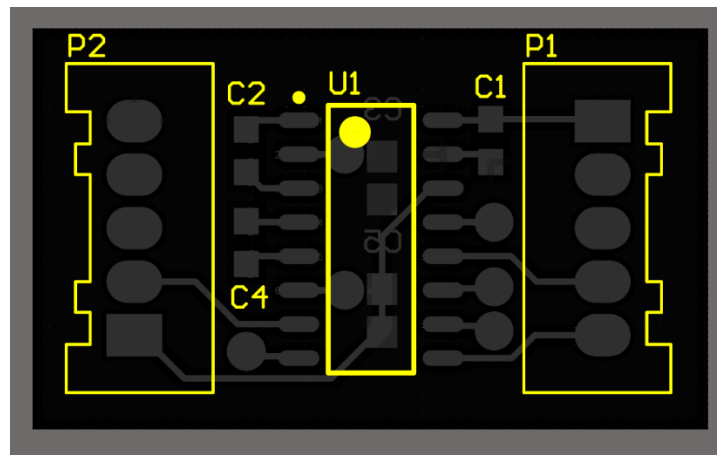


25. Manually open the properties panel to change the “Text Height” to 30mil and “Stroke Width” to 5 mil  
(Note: mil stands for one thousandth of an inch).



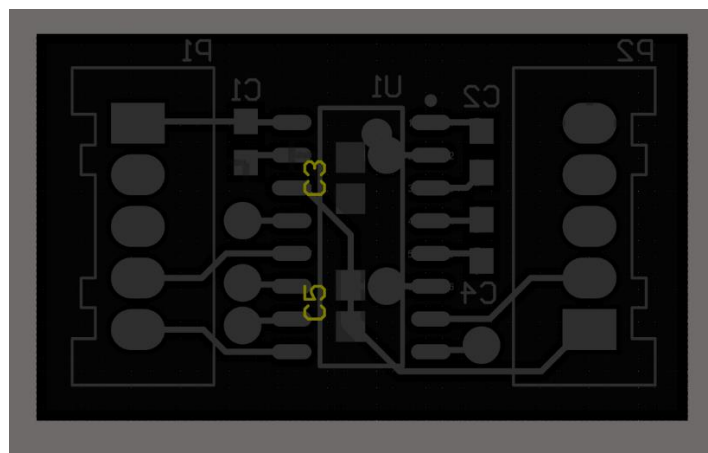
*Figure 20: Settings to Change Size and Width of Labels*

26. Once you finish entering your values, you should notice that your labels are much smaller than they were before.  
27. Organize your “Top Overlay” labels as shown in Figure 21.



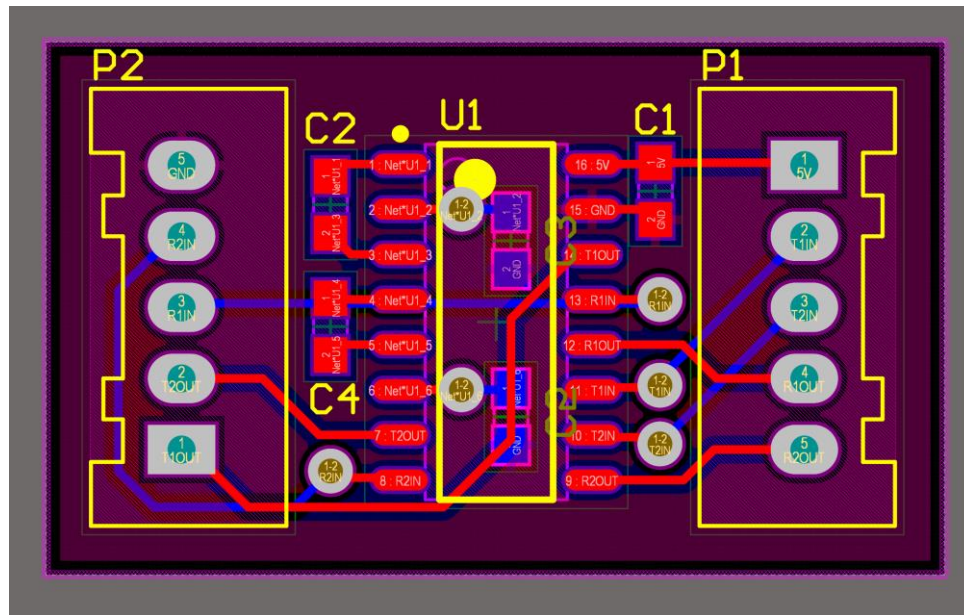
*Figure 21: Final View of Top Overlay*

28. Now do the same for the “Bottom Overlay” (Note: I used Ctrl+F to flip the board to see how it would look like looking from the other side of the board).



*Figure 22: Final View of Bottom Overlay*

29. Now you're done! Your board should now look like Figure 23.

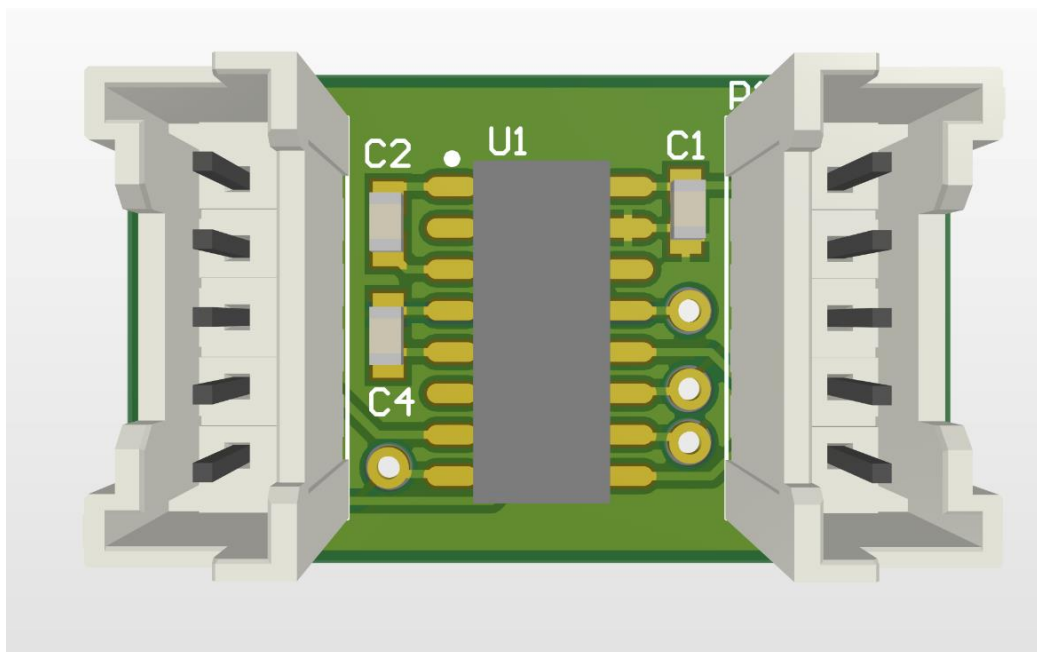


*Figure 23: Finished View of Our Board*

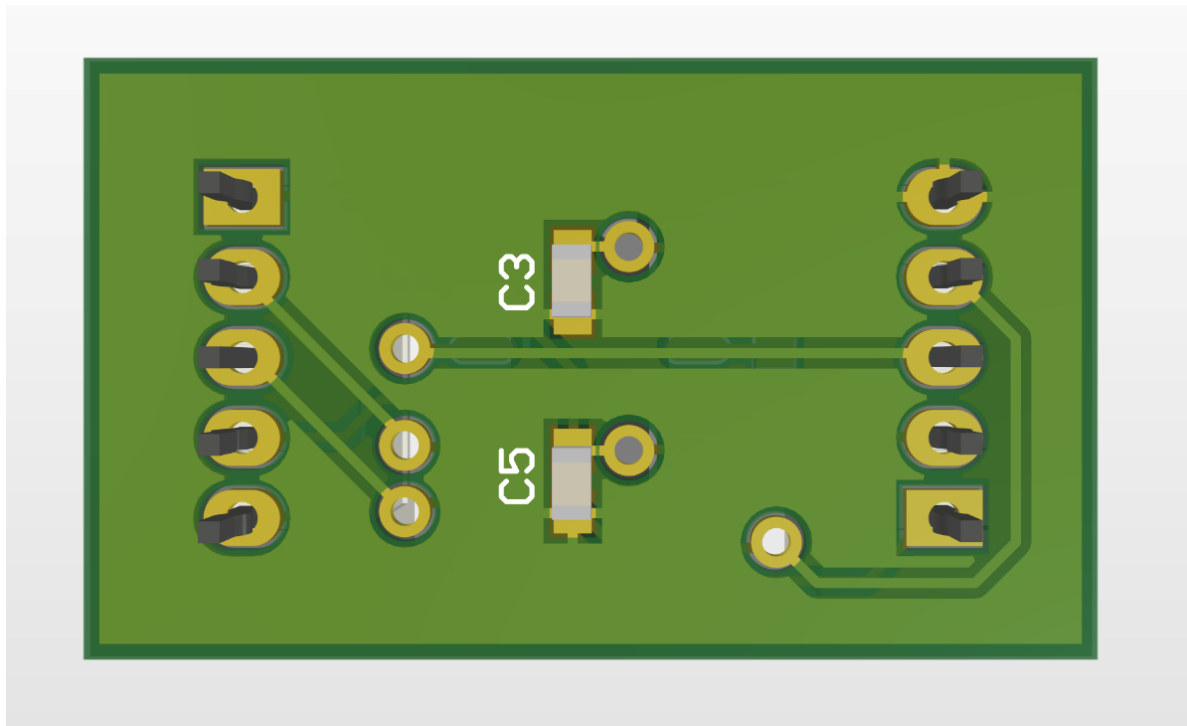
30. Another useful feature when viewing your board is to put it into 3D view.

31. To do this, simply press 3 on your keyboard.

32. To look at the back of the board, flip it using Ctrl+F.



*Figure 24: 3D View of the Front of Board*



*Figure 25: 3D View of the Back of the Board*