Altium Designer

Advanced Course

Module: ActiveRoute

Software, documentation and related materials:

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ActiveRoute

1.1 Purpose

For this exercise, we will be using ActiveRoute on a series of connections to illustrate its basic capabilities.

1.2 Shortcuts

> Shortcuts when working with ActiveRoute
> **F1:**   Help
> **Alt+Selection:** Selection of Unr**outet connections**
> **Ctrl+A:**   Active Route
> **G:**   Grid
> **CTRL+S:**   Save Document

1.3 Preparation

1. **Close all existing projects and documents.**
2. Open the `ActiveRoute.PrjPCB` project found in its respective folder of the Advanced Training.

1.4 ActiveRoute Setup

We will configure ActiveRoute from within the PCB to allow for routing on multiple layers, the default if no layers are selected is that the active layer will be used. We will start with nothing enabled first and then add all signal layers for illustration.

1.4.1 Running ActiveRoute in the default layer mode

3. Open the schematic and let us have a quick overview of the connections that we will be making in the PCB. This design utilizes bus connections as well as nets in net classes. We will employ several ways of selecting connections for ActiveRoute. The nets on the `P1` connector are part of a net class `P1nets`, while the bus `ADDR[7..0]` connects to connectors `P2` and `P3`.
4. Switching to the `ActiveRoute.PcbDoc` document, we see power routes have been placed but nothing else.
5. If not already selected, click on the *TopLayer* Tab to make it the active layer.
6. Holding down the **ALT** key, use the left mouse button and sweep from right to left on the lower 4 connection lines associated with `P1` selecting them, as seen in Figure 1.
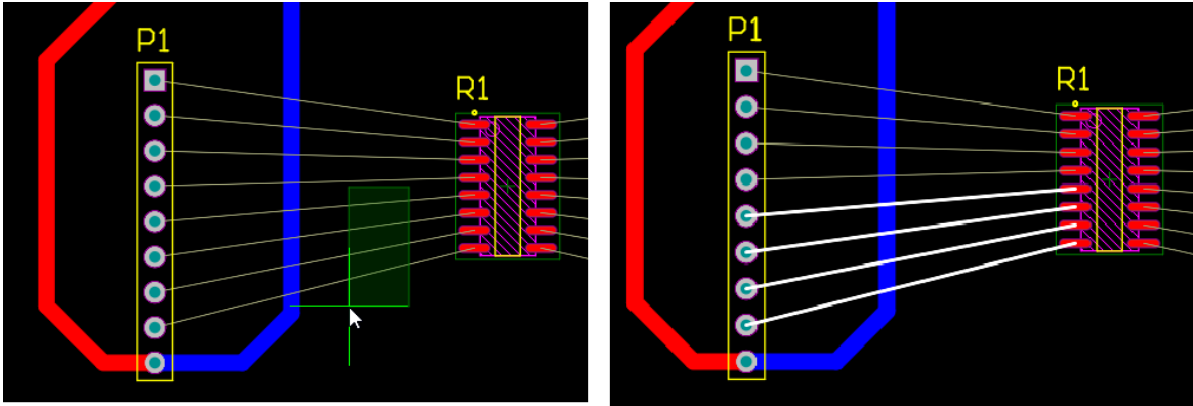
Figure 1. Manual selection using ALT and Right to Left Mouse sweep

7. Now with those 4 connections selected, click on the **Panels** button in the lower right and open the *PCB ActiveRoute* panel. Note there are currently no layers enabled, Figure 2.
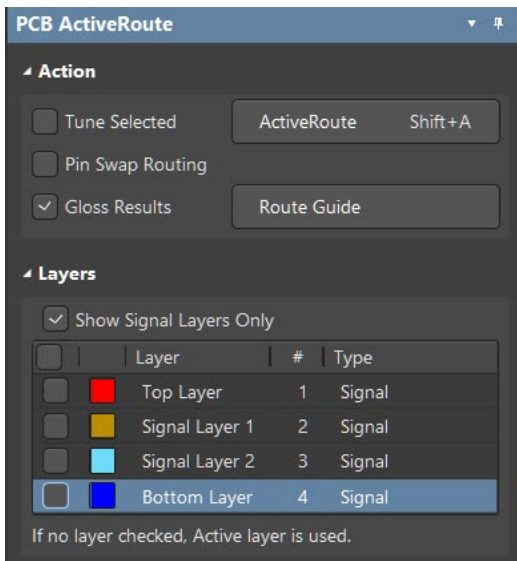

Figure 2. ActiveRoute panel with no layers enabled

> There are more options available in this panel, but we will leave them be and accept the defaults in this module.

8. Click on the **ActiveRoute (Shift+A)** button top right in the panel to run the ActiveRoute on the selected connections. This will route the 4 nets on the TopLayer.
9. Next Check the **Top Layer** to enable it for ActiveRoutes. If none are checked, it will place the ActiveRoute on any available layers.
10. Let's select the rest of the P1 connections using the net class we assigned in the schematics. Open up the *PCB* panel (if not already opened) from the **Panels** button and switch the mode to *Nets*. Here we see 2 net classes: `P1nets` and `ADDR[7..0]`.
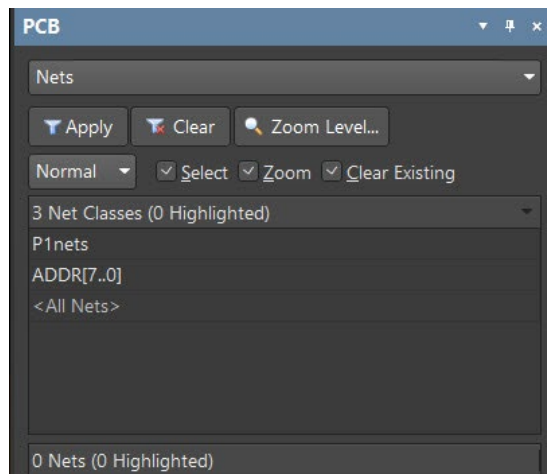
Figure 3. PCB panel – Nets mode showing the net classes

11. Click on the `P1nets` net class, making sure the **Select** check box is checked. This selects the entire group of nets. The highlighting should resemble what is found in Figure 4.
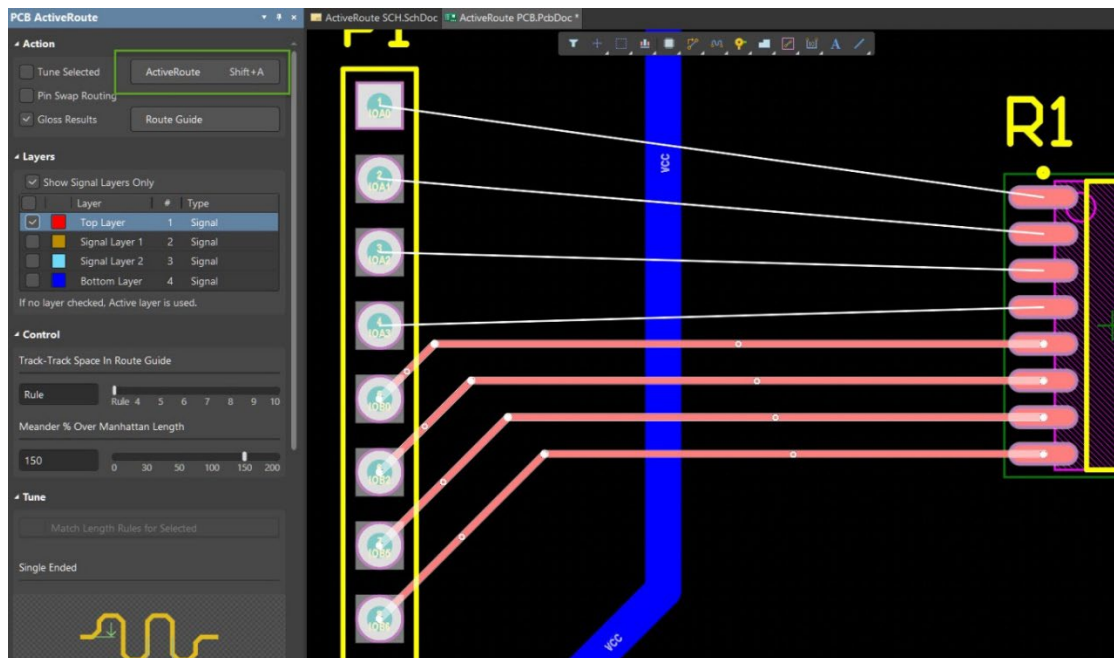

Figure 4. Ready to ActiveRoute the remaining P1 nets

12. Switching back to the *PCB ActiveRoute* panel click on the **ActiveRoute (Shift+A)** button to finish routing the remaining nets.

1.4.2 Running ActiveRoute by selecting busses and adding routing layers

13. Moving to the right side of R1 we have the ADDR[7..0] bus. We could have used the **ALT** and mouse sweep to select these connection lines, but it is faster to use the *PCB* panel and click on the ADDR[7..0] net class entry, Figure 5.
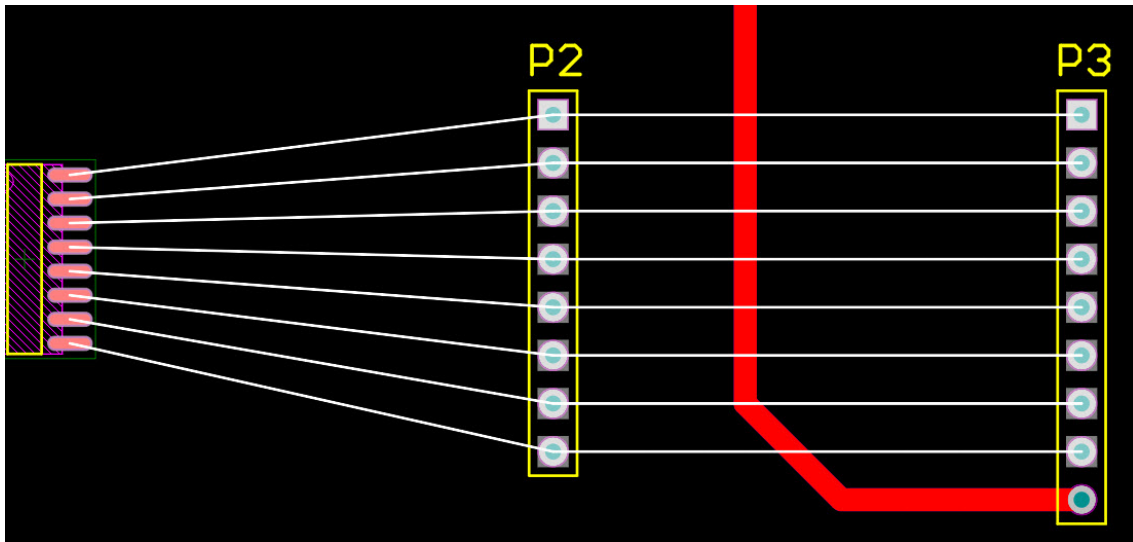

Figure 5. ADDR[7..0] bus selected

14. Switching back to the *PCB ActiveRoute* panel, notice only the Top Layer is enabled. Click on the **ActiveRoute** button to run ActiveRoute. Notice only the R1 to P2 traces have been added, Figure 6. This is due to the existing Top Layer route.
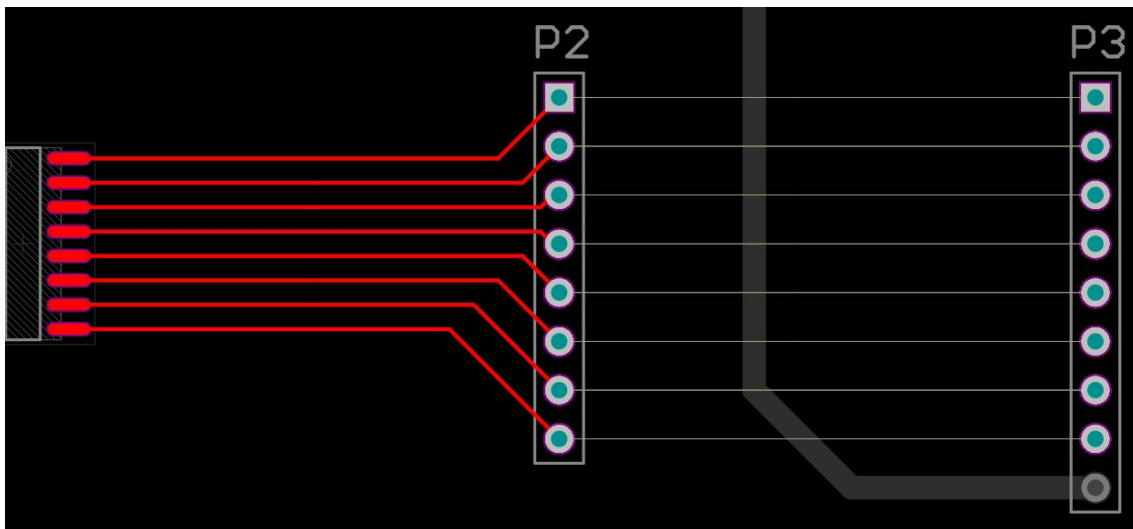
Figure 6. Results of ActiveRoute with only Top Layer enabled

15. Click the checkboxes next to each layer in the ActiveRoute panel to enable the ActiveRouter on all 4 layers on the PCB. Alternately, click the checkbox above these to enable all layers simultaneously.

16. Reselect the ADDR[7..0] bus from the *PCB* panel and hit **Shift+A** to start the ActiveRouter. The remaining connections from P2 to P3 were continued on Signal Layer 1, Figure 7.
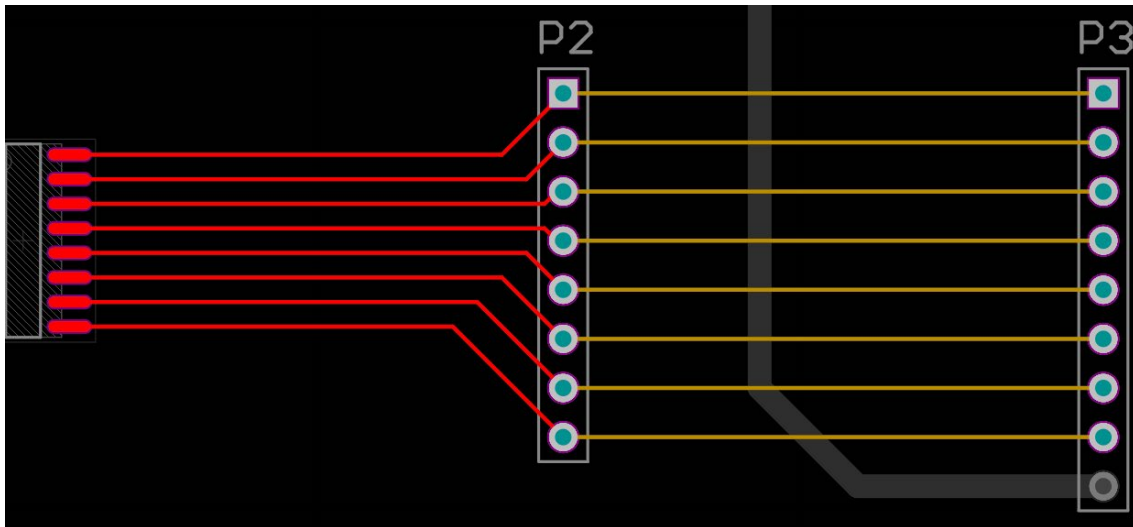
Figure 7. Results of ActiveRoute with all layers enabled

17. We could have achieved the same result if we had enabled all the signal layers from the start and had selected the ADDR net class when we ran the ActiveRouter. This was done to illustrate the ability of the ActiveRouter to be layer limited and to enable a multi-step approach.

1.4.3 **Using the Route Guide for path planning with ActiveRoute**

18. Using the *PCB* panel click on the ADDR[7..0] net class. Then, in the PCB, click and hit the **DEL** key on the keyboard to remove the tracks.

19. Click the checkboxes next to each layer in the ActiveRoute panel to disable the ActiveRouter on all 4 layers on the PCB. Alternately, click the checkbox above these to enable all layers simultaneously. By disabling all Layers the Active Layer (Top Layer) is the routing layer for our next steps)

20. Use the **ALT** key and sweep left to right to select the R1 to P2 connections.

21. In the *PCB ActiveRoute* panel click on the **Route Guide** button. Now, moving onto the PCB, notice the fly lines are bunched up on the cursor. Start to place the Route Guide with a first mouse click, THEN hit the UP ARROW key multiple times (min 5x, max 10x) to increase the size of the Route Guide. Follow the line on Mechanical Layer 1 as reference to place the guide as shown in Figure 8.
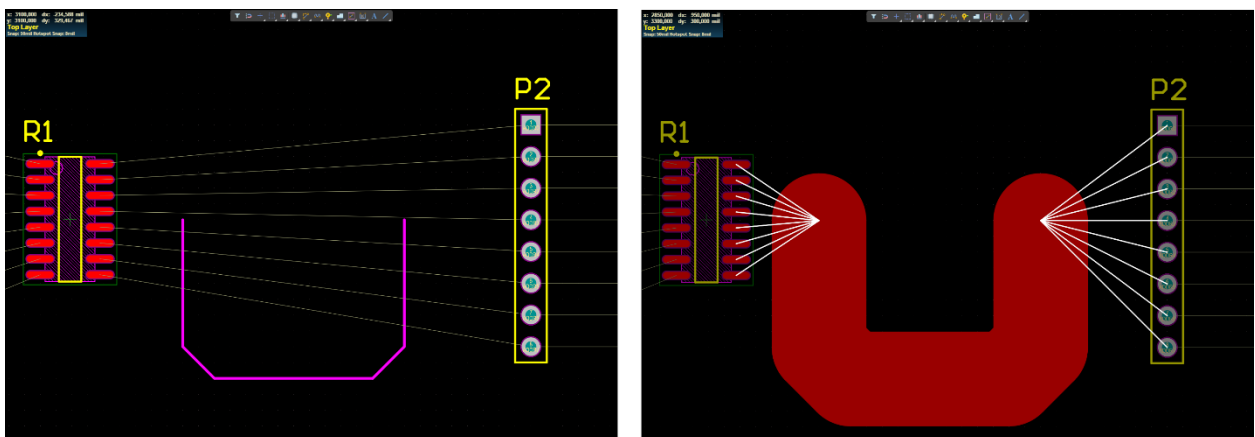

Figure 8. Placed, wide Route Guide

22. Now, if the Route Guide was wide enough for all the signals it will route the traces. Click on the **ActiveRoute (Shift+A)** button or type **SHIFT+A**.

23. Based on the setting for **Gloss Results** (*PCB Active Route* panel), the position and width of the Route Guide, your results may differ from the training example.

24. Using the Route Guide can be useful for directing the flow of tracks when using ActiveRouter.

Figure 9. Successful Route using an ActiveRoute guide

25. Feel free to optimize the routing by using the Glossing function.

26. **Close the project and any open documents.**

Congratulations on completing module

ActiveRoute

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