

Altium Coil Script Usage

Chris Oberhauser, SSP Applications

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Sequence Overview

- 1. Altium Project preparation**
- 2. Coil Calculations**
- 3. Running the Altium Script**
- 4. Multi-layer Coils and Sensor connections**

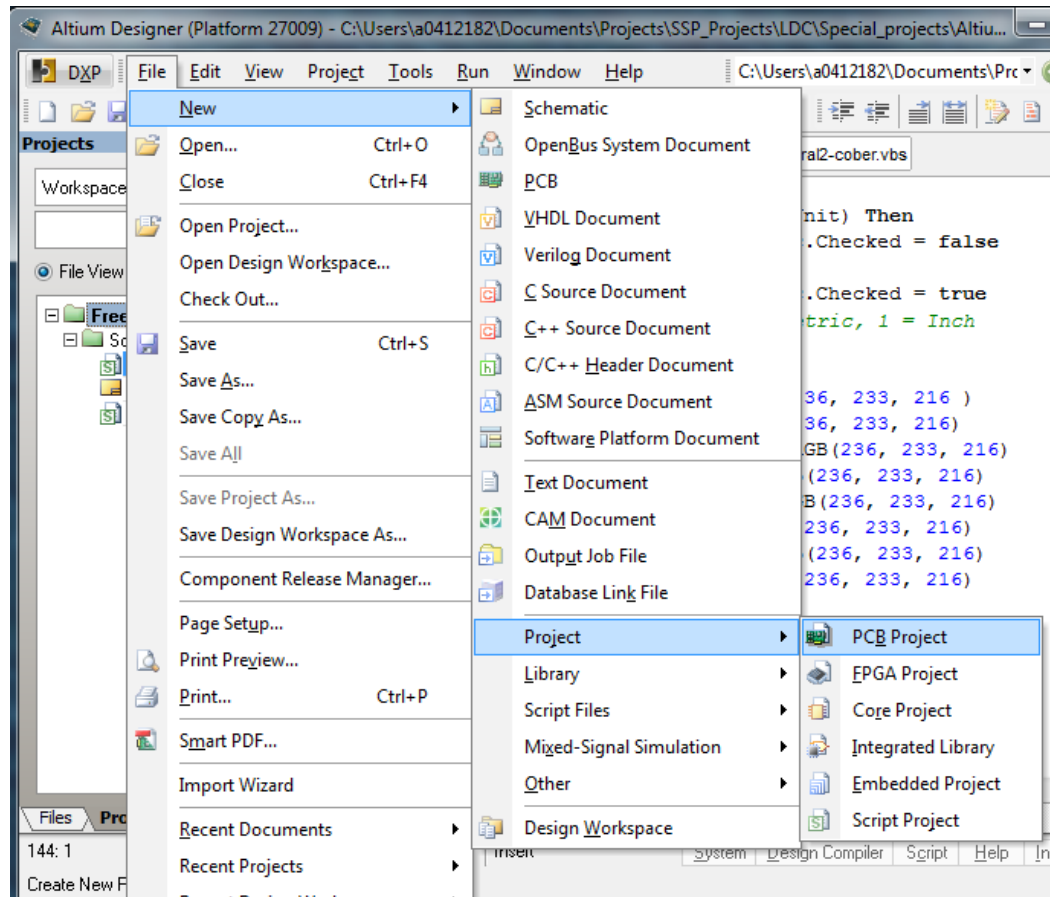
Setting Up an Altium Project

Project Preparation

Only necessary for a new, empty project.

Create a new PCB project:

File ► New ► Project ► PCB Project

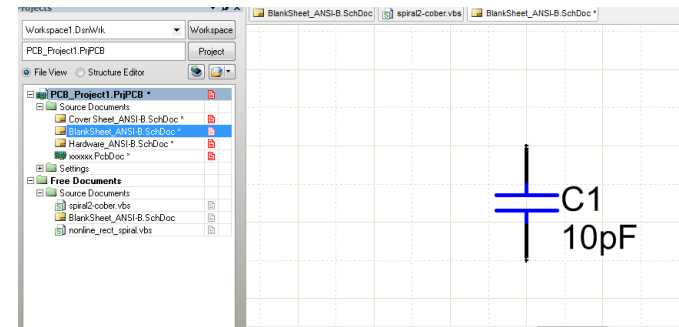


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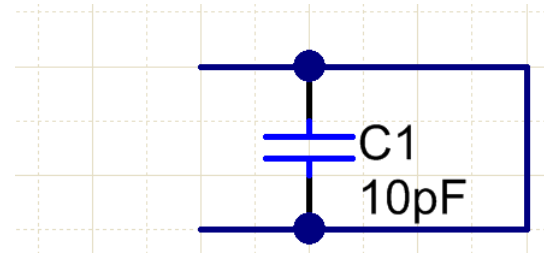
Schematic Entry of the Sensor

If the sensor capacitor is not present on the schematic, enter it onto the appropriate schematic page:

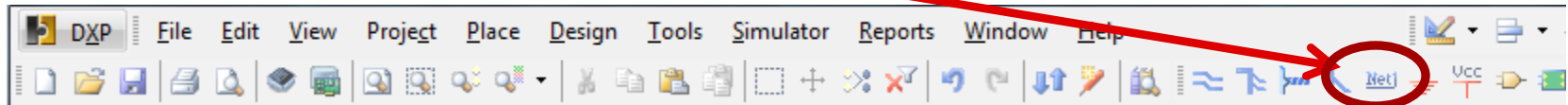
(Tip – select the correct package size, 10pF is typically too low a C)



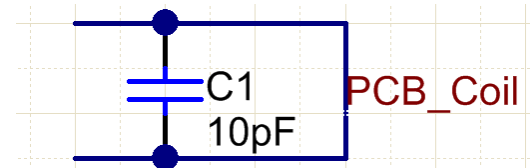
Now enter the coil – this can be done by simply shorting the capacitor:



Enter a Net Name for the coil

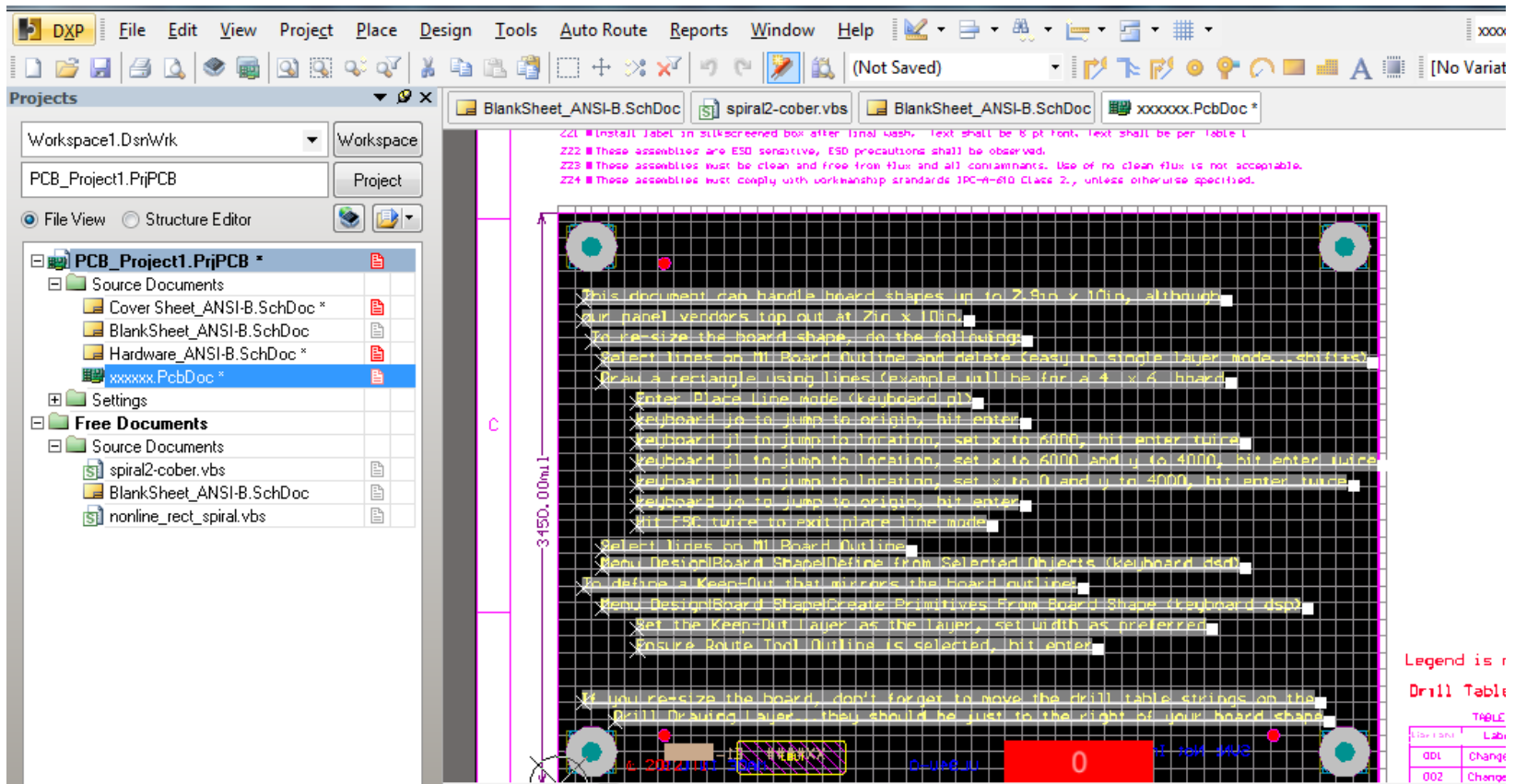


Now save the schematic:



On the PCB:

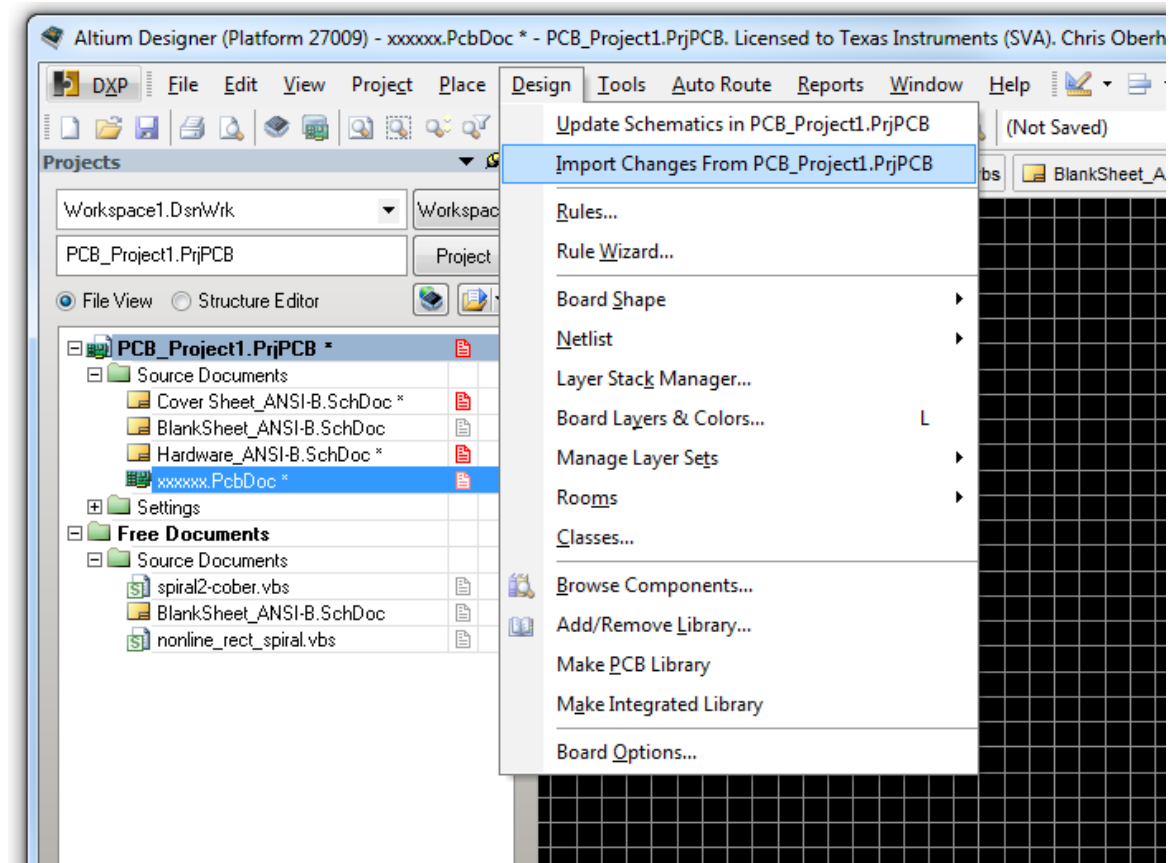
A new Altium project places instructions on how to change the size of the PCB. Follow these instructions if necessary, then simply select and delete the instructions:



Update the PCB with the schematic:

The sensor cap and the coil need to be added onto the PCB:
Design ► Import Changes from <ProjectName>

Be sure to click on ***Execute Changes!***
Then press ***Close***.



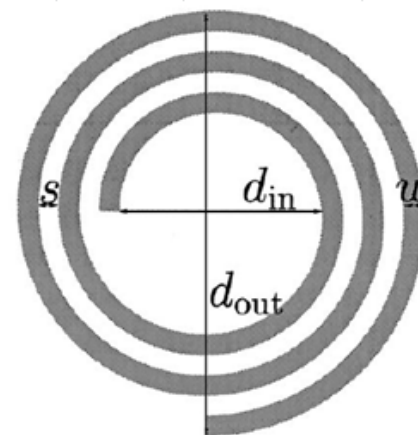
Coil Calculations

The Excel Inductance calculator

Determine coil that fits within available geometric constraints:

Only enter into the **Yellow** fields; the **Orange** fields are outputs

Nominal Calculation: 2 layers			
# of turns	n	23	Turns/layer
Inner Diameter	d_{in}	0.754	mm
spacing	S	0.1016	mm
width	w	0.1016	mm
Outer Diameter	d_{out}	10.000	mm
layer spacing	x	0.15	mm
	d_{avg}	5.3772	mm
	p	0.8597	
	L	2.5170	μH
	Kc	0.8863	
	L_{total}	9.4957	μH
Tank Cap	C	300.0000	pf
Frequency	F_{osc}	2981.92	kHz



Running Scripts

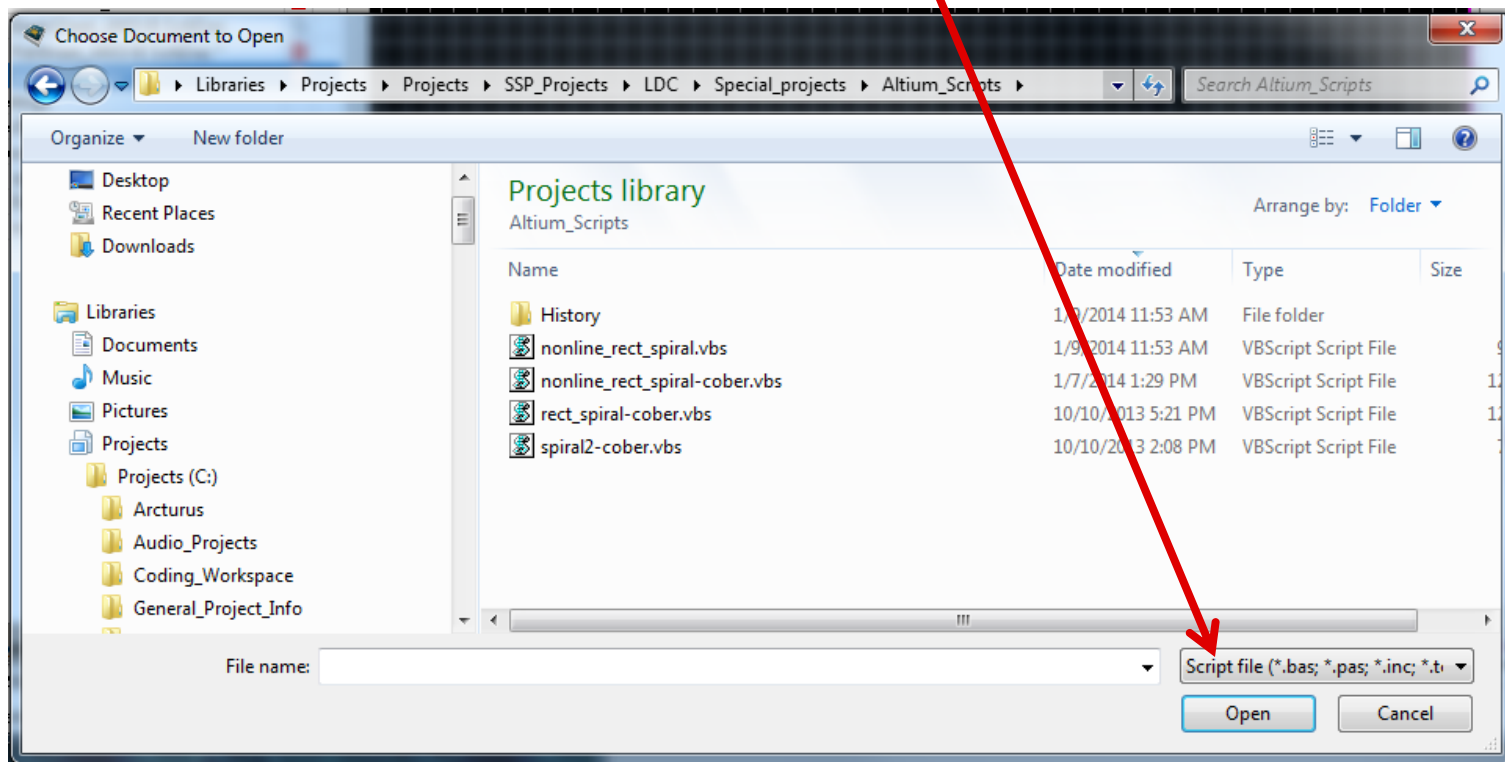
Opening the Script file

Goto *File* ► *Open*

Navigate to the script file location.

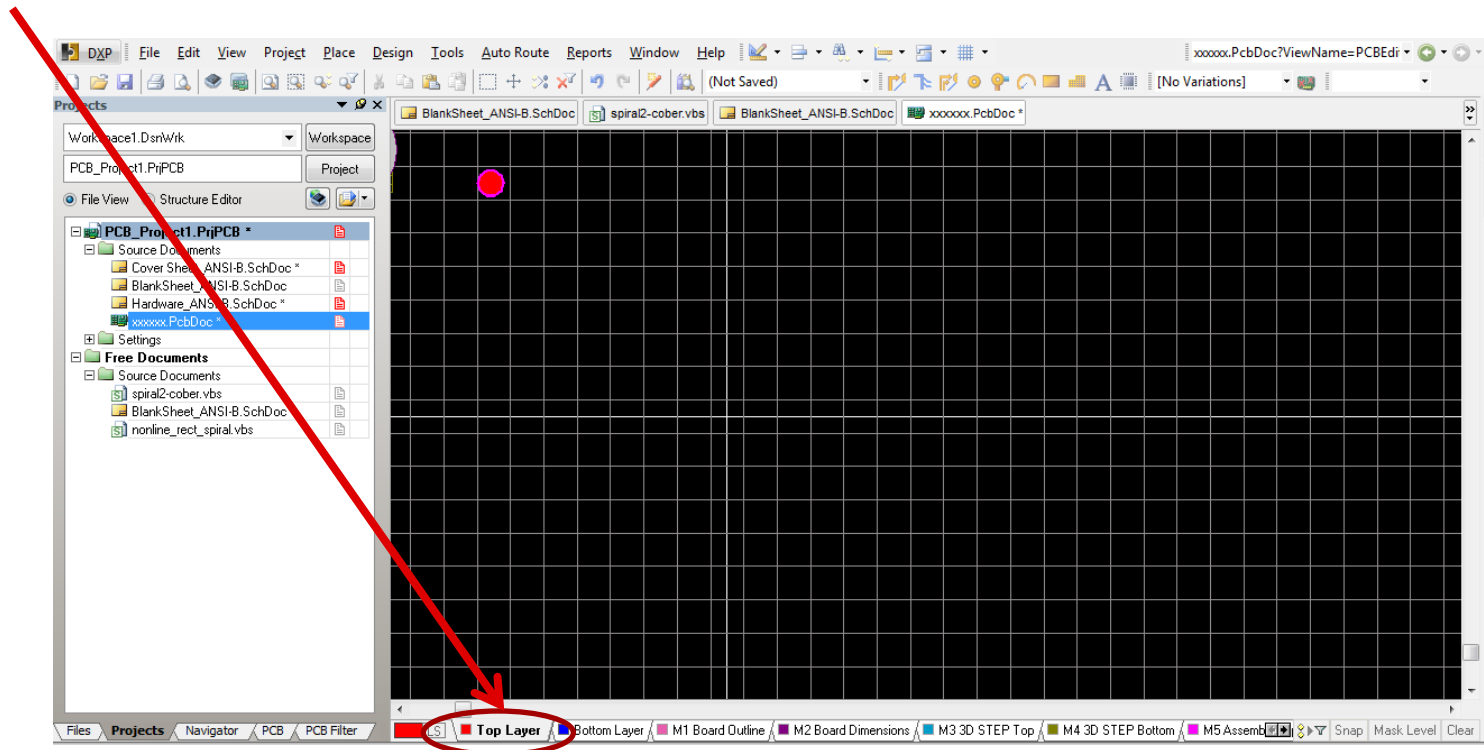
But you won't see the script files until you filter for them!

Choose “Script file (*.bas; *.pas; *.inc;” or All files.



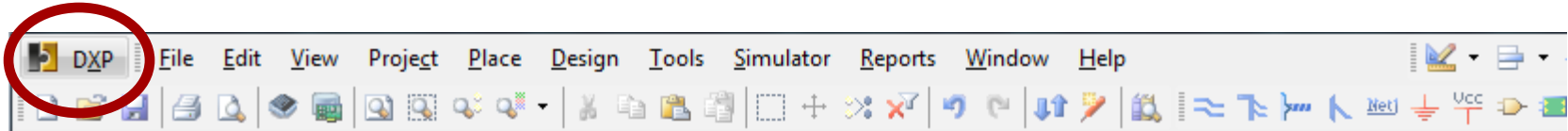
Before running the script:

1. Select the PCB in the Project.
2. Goto the layer where the Coil should be placed:
For example, the Top Layer or Bottom Layer.



Running the Script

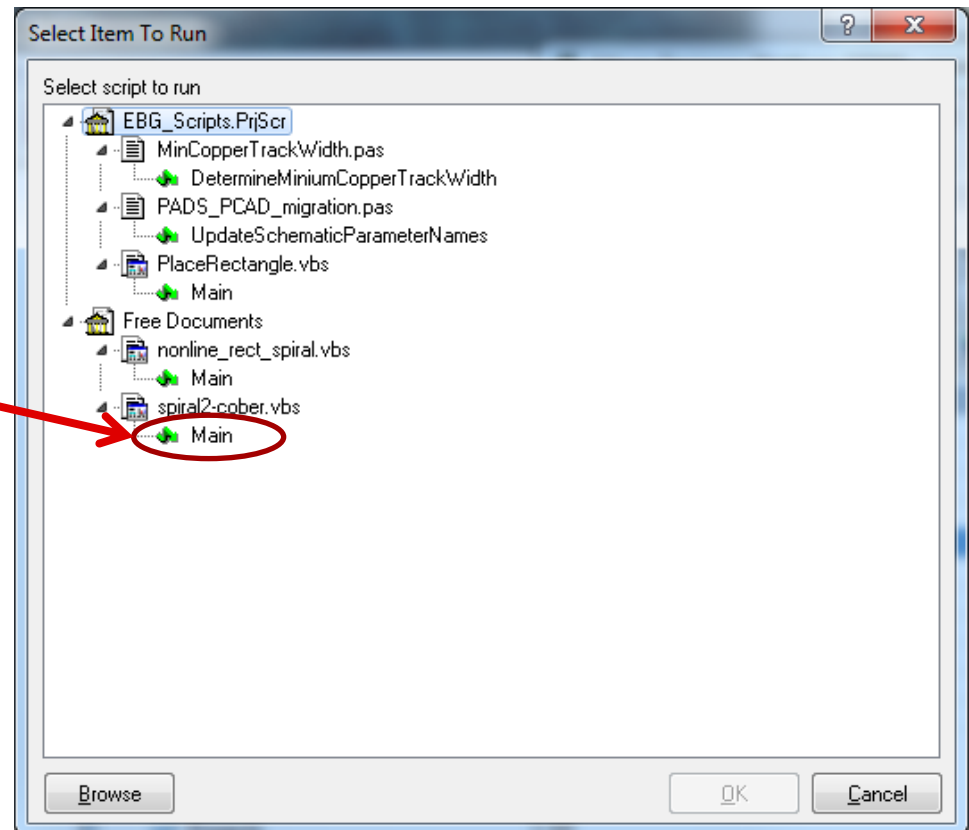
1. Select the DXP in top Left



2. Select **DXP** ► **Run Script**

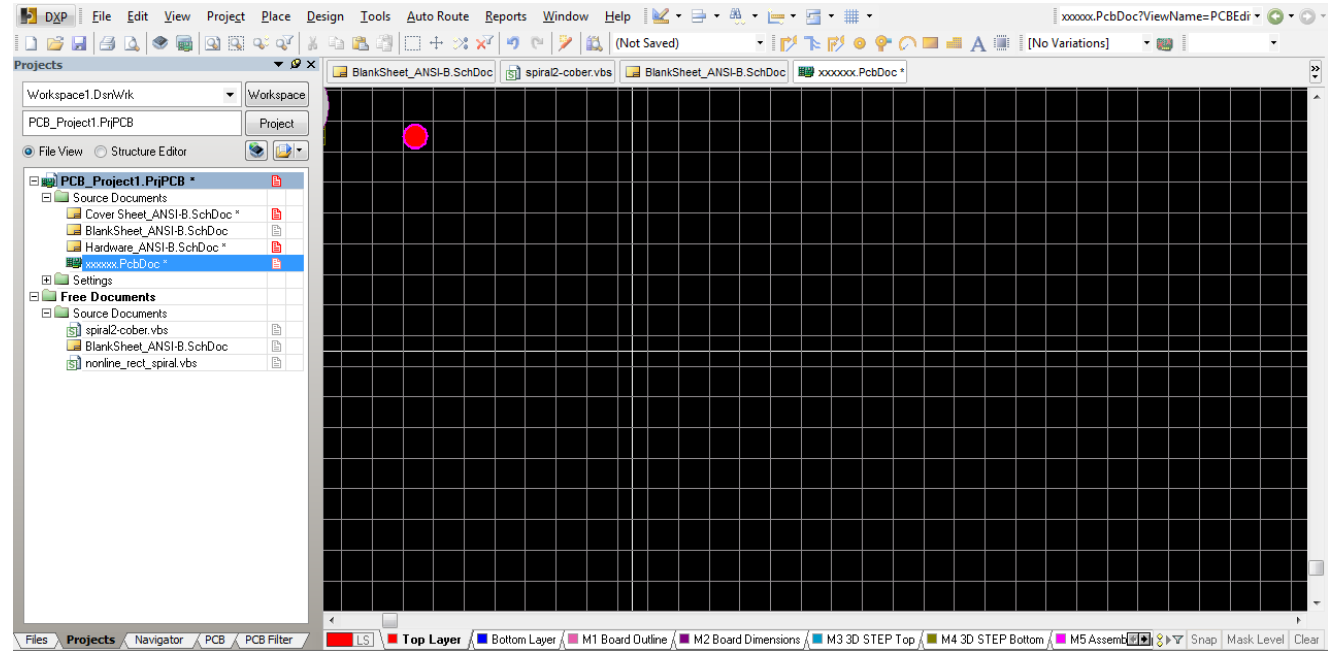
3. In the Select Item To Run window, choose Main under the opened script file.

4. Left Click OK **ONCE!**



Coil Positioning

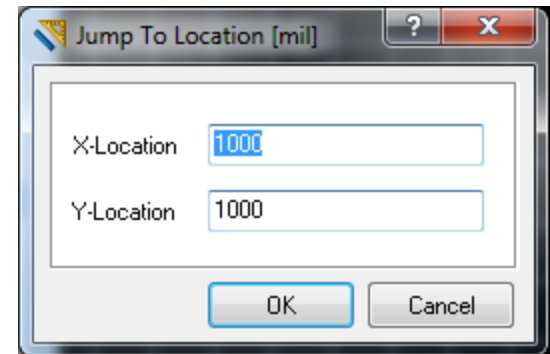
The Script has placed Altium into a select mode – there will be crosshairs visible when the cursor is over the PCB area:



Left Click **ONCE** when the crosshairs are positioned at the desired location.

OR

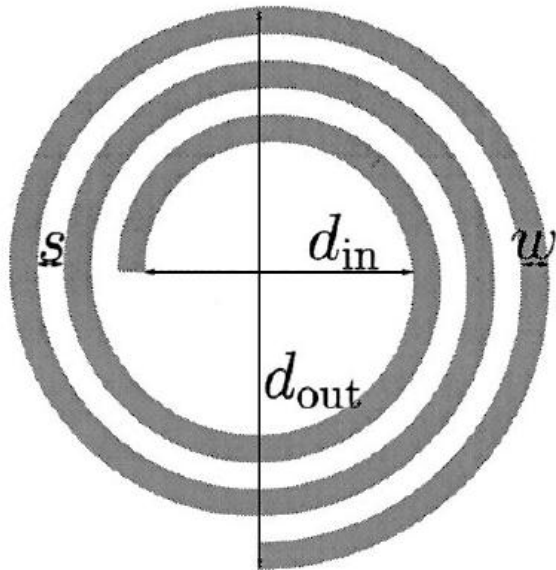
For accurate placement, press **J** then **L** (for Jump to Location) and type in the desired coordinates then press **OK** and then **Left Click** once:



Entering Coil Parameters:

Enter the values into the window. The trace Space is S , Trace Width is W , and Center Space Dia is d_{in} . You can check the box next to Metric for units of **mm** instead of **mil**.

Enter the Number of Turns in “Turns”.



Place_spr2_form

Trace Space	<input type="text" value="S"/>	mil	<input type="checkbox"/> Metric
Trace Width	<input type="text" value="5"/>	mil	<input type="checkbox"/> Generate Center Via
Center Space Dia	<input type="text" value="40"/>	mil	<input type="checkbox"/> Counter Clockwise Spiral
Via Size Dia	<input type="text" value="20"/>	mil	
Via Drill Dia	<input type="text" value="10"/>	mil	
Turns	<input type="text" value="5"/>		
X Position	<input type="text" value="1612"/>		
Y Position	<input type="text" value="2584"/>		
Layer	<input type="text" value="Top Layer"/>		

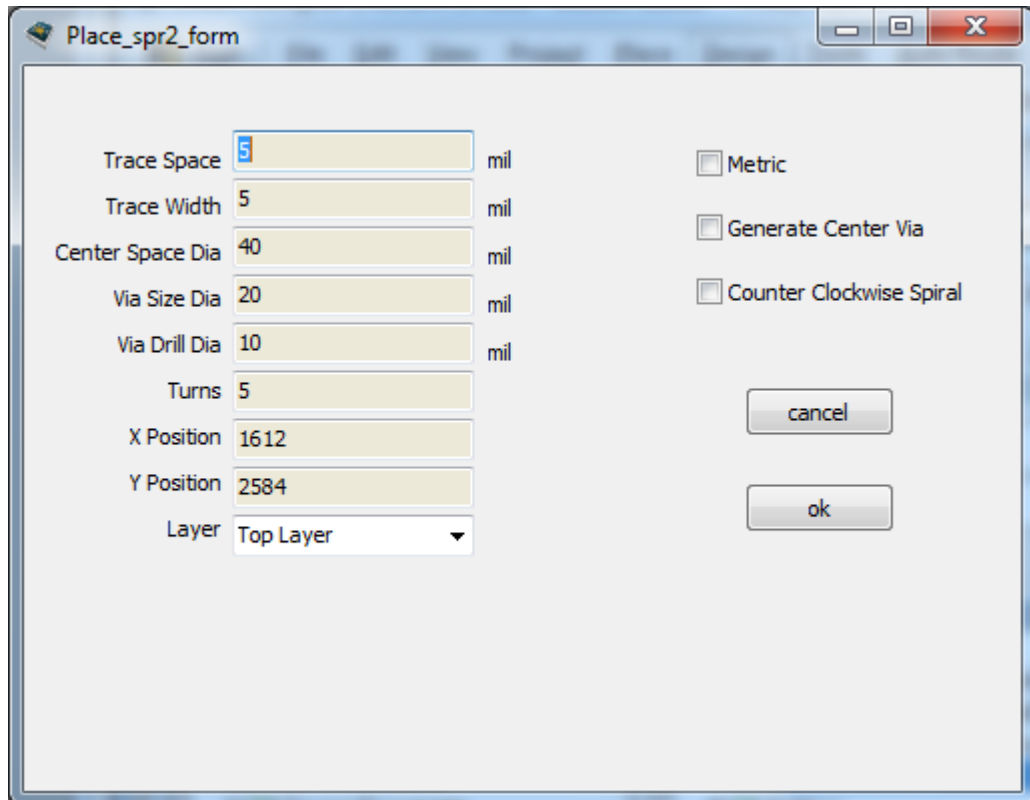
cancel

ok

Center Via:

A Center Via can be placed also if desired by clicking Generate Center Via. This is optional and can be done later.

A Center Via is needed with inductors that have coils on multiple layers. Enter the Via Size Dia (Diameter) and Via Drill Dia (Diameter).



The screenshot shows a dialog box titled "Place_spr2_form" with the following fields and options:

Parameter	Value	Unit
Trace Space	5	mil
Trace Width	5	mil
Center Space Dia	40	mil
Via Size Dia	20	mil
Via Drill Dia	10	mil
Turns	5	
X Position	1612	
Y Position	2584	
Layer	Top Layer	

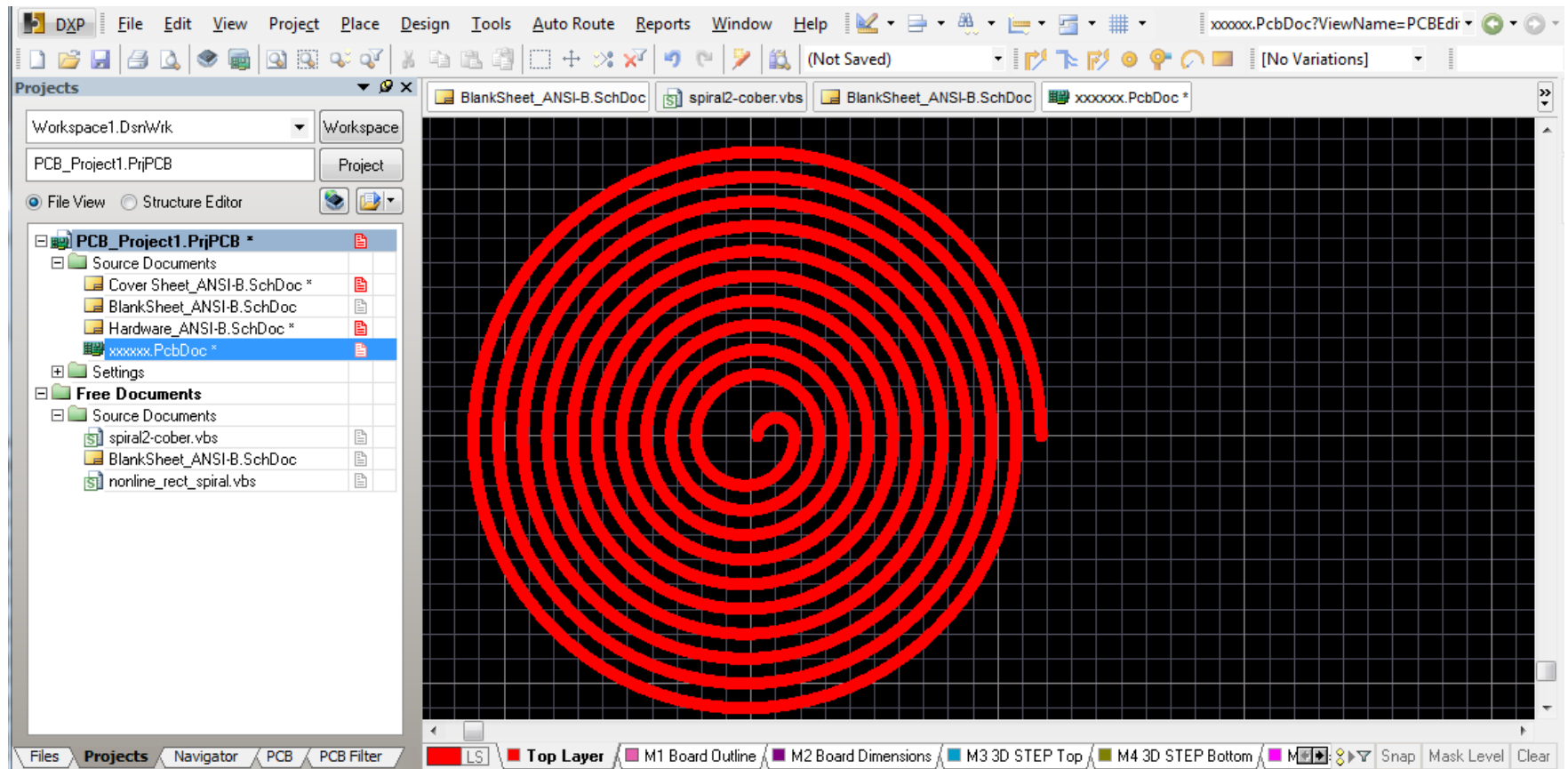
On the right side of the dialog, there are three checkboxes:

- ☐ Metric
- ☐ Generate Center Via
- ☐ Counter Clockwise Spiral

At the bottom right, there are two buttons: "cancel" and "ok".

Coil Placed

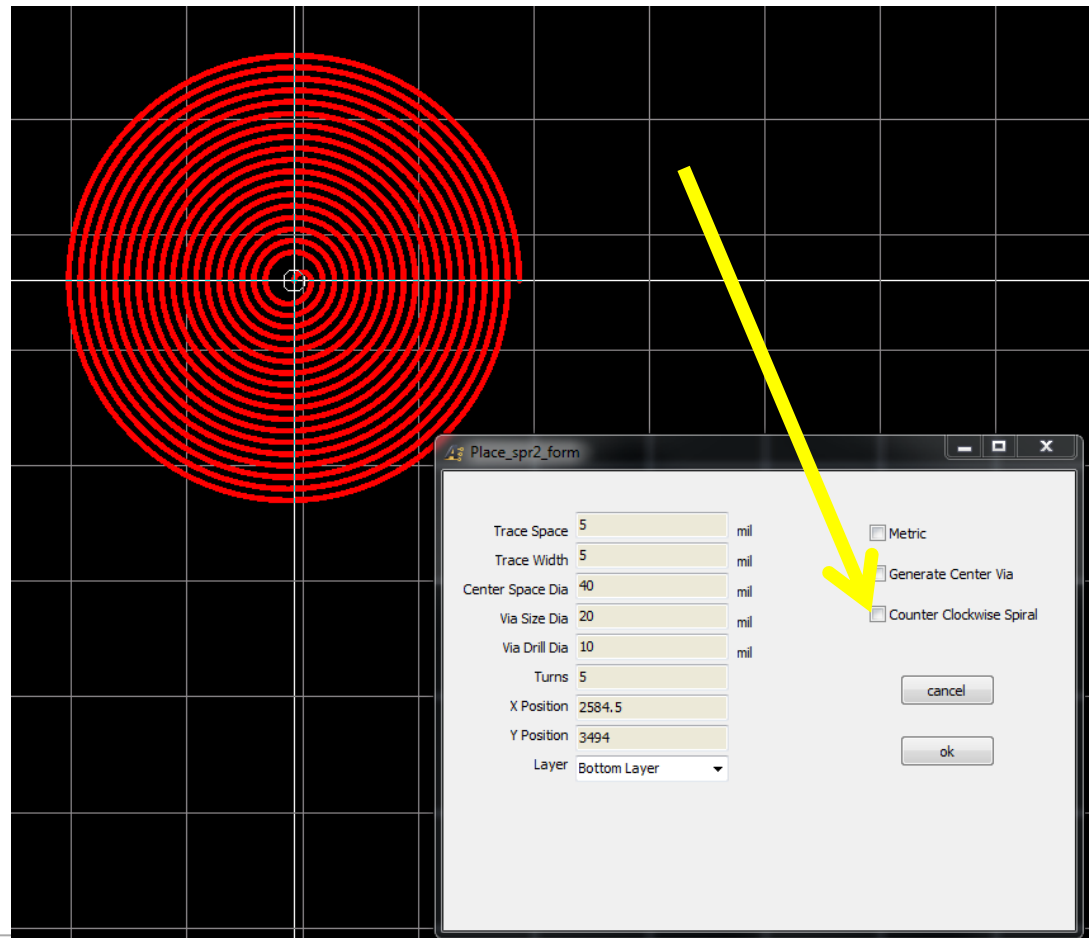
Success!



Finishing Steps...

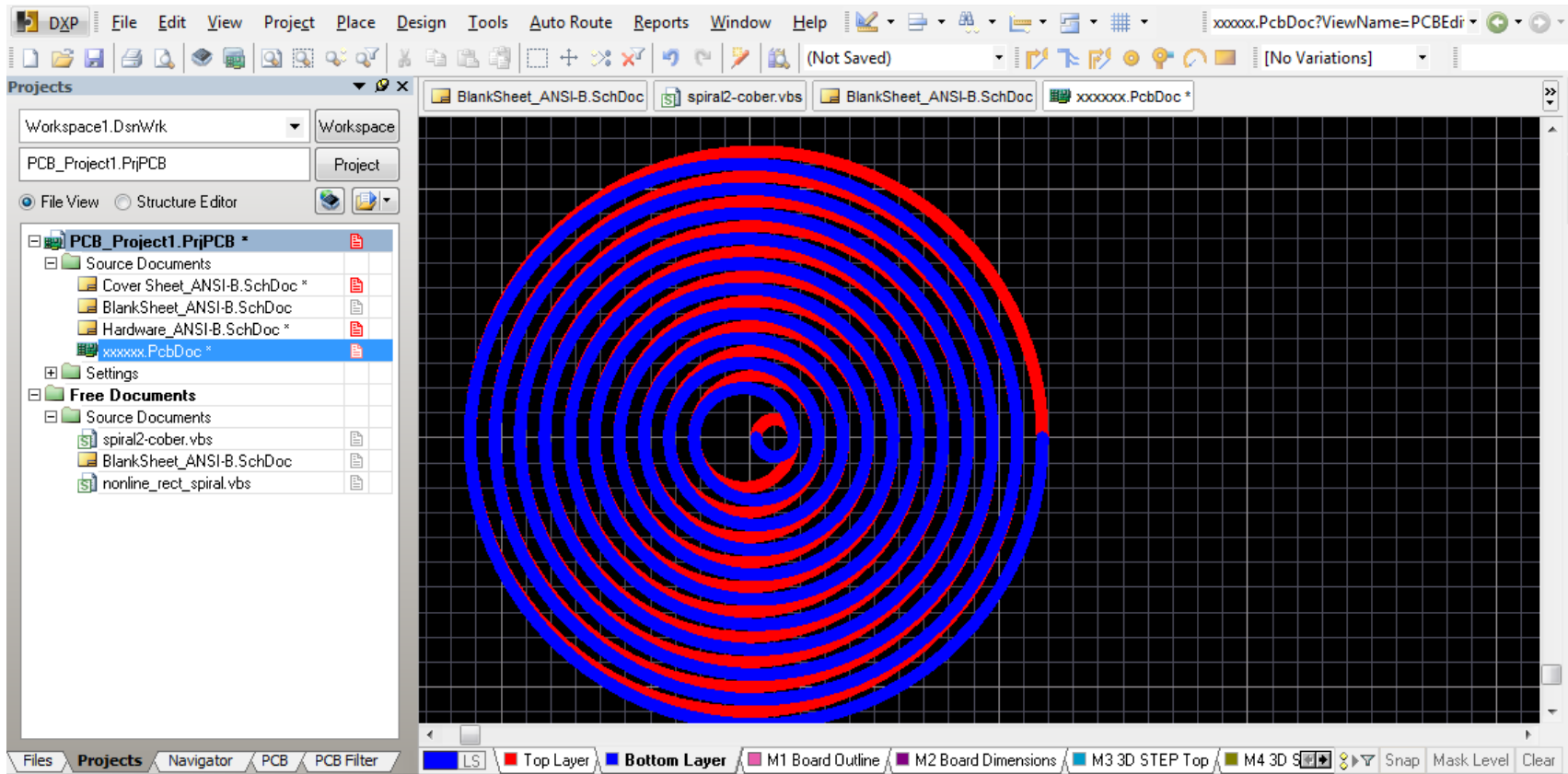
Multi-Layer Coils

When making multi-layer coils, be sure to alternate the clockwise and counter-clockwise rotations. Use the same parameters for the alternating coil – and be sure to click on “Counterclock wise”

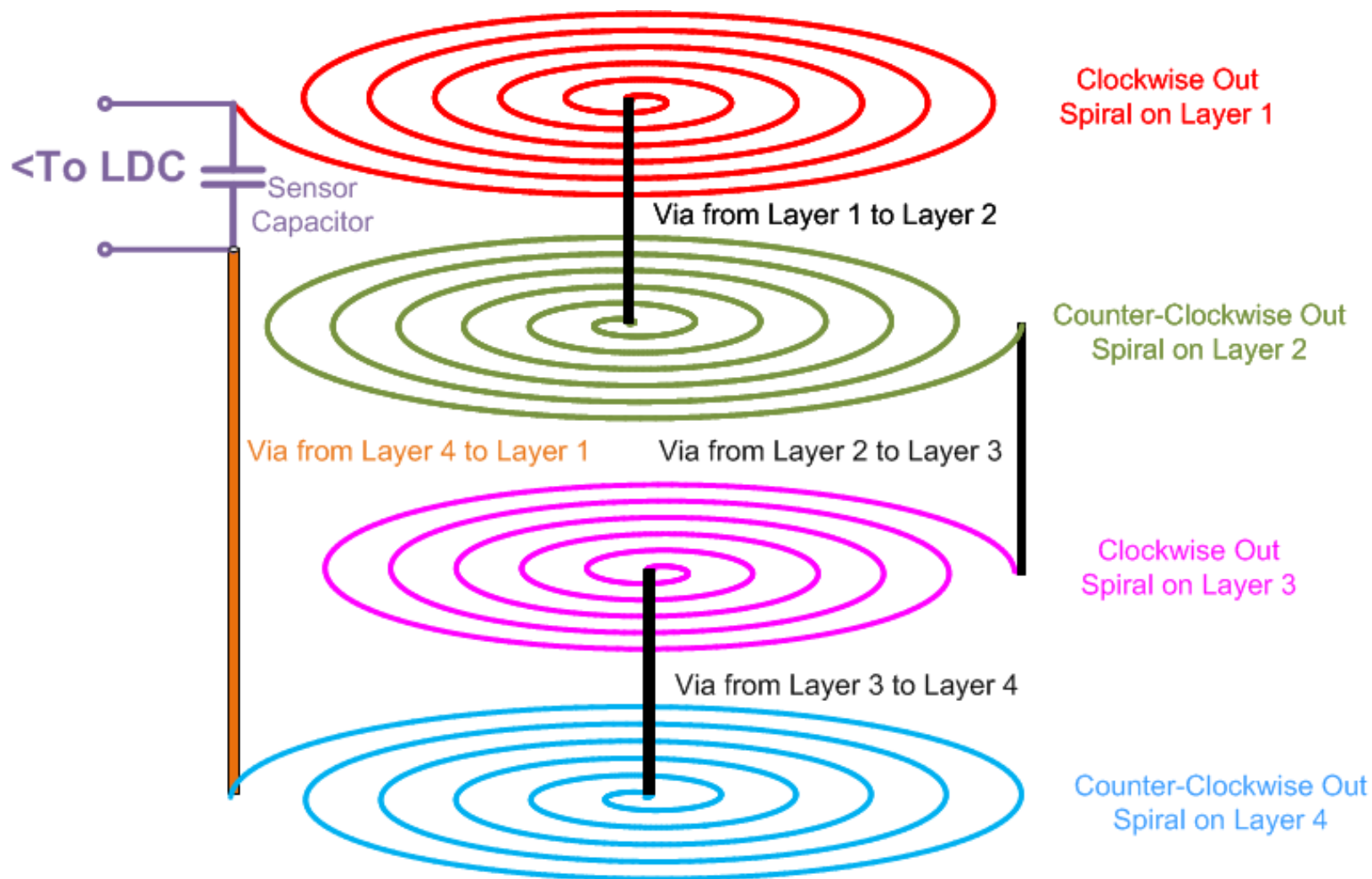


Multi-Layer Coils

Here you can see the bottom layer coil is wound counter-clockwise, while the top layer coil is wound clockwise.



4 Layer Inductor Design

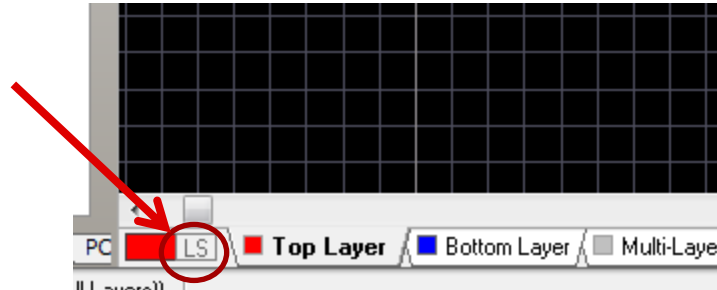


Setting the Net for the Coil

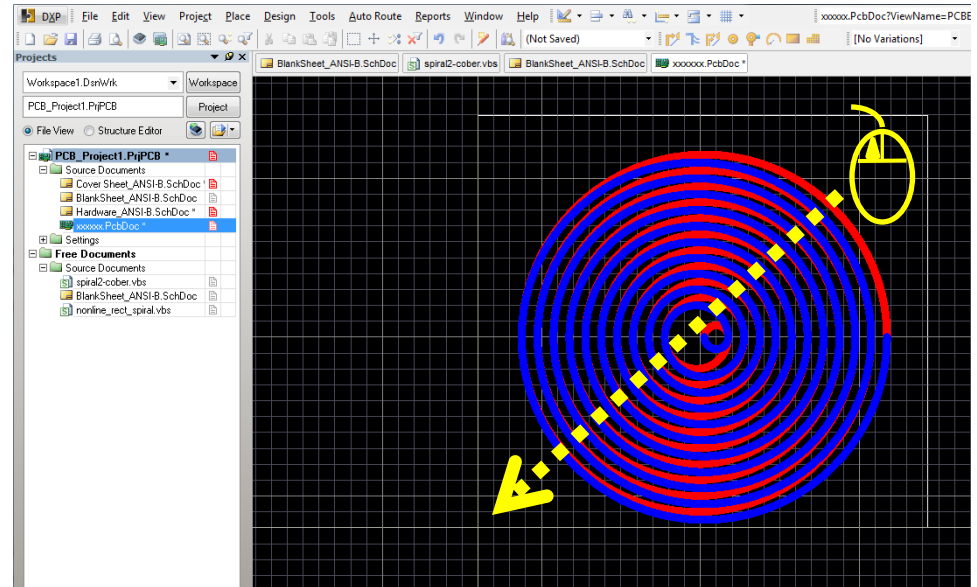
To connect the coil to the rest of the circuit, you will need to set the net for the coil.

It is useful to only work on the signal layers for the following step.

To do this, left click on the LS and select **Signal layers**.

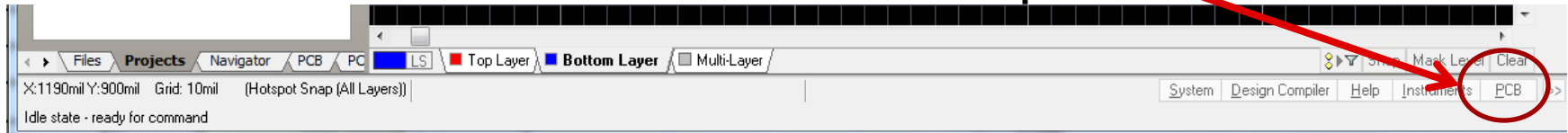


Press and hold the left mouse button to draw a box around the coils.

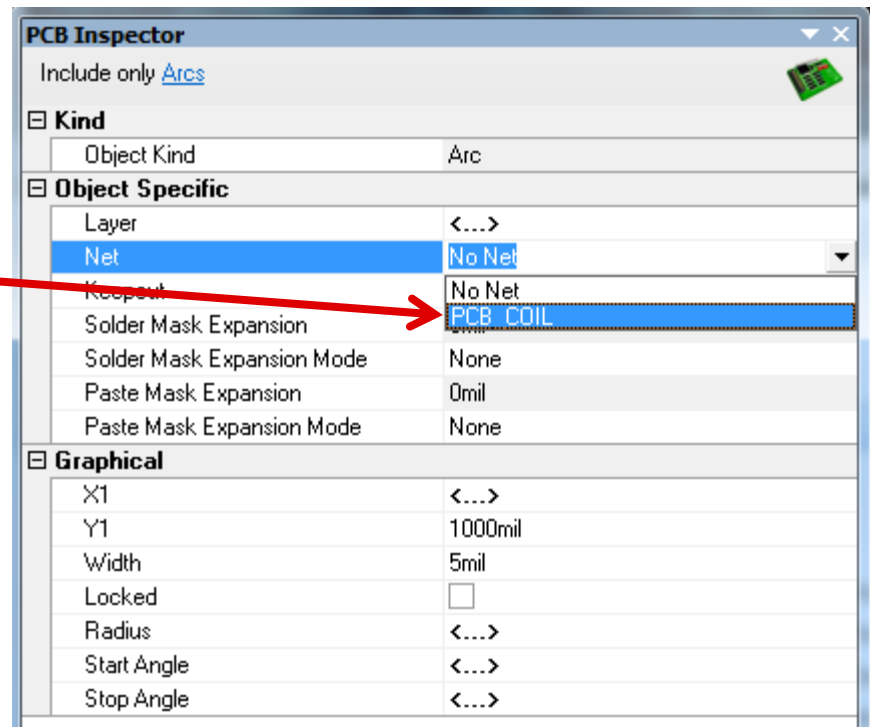


Multi-Layer Coils

Left click on the PCB box and choose “PCB Inspector”

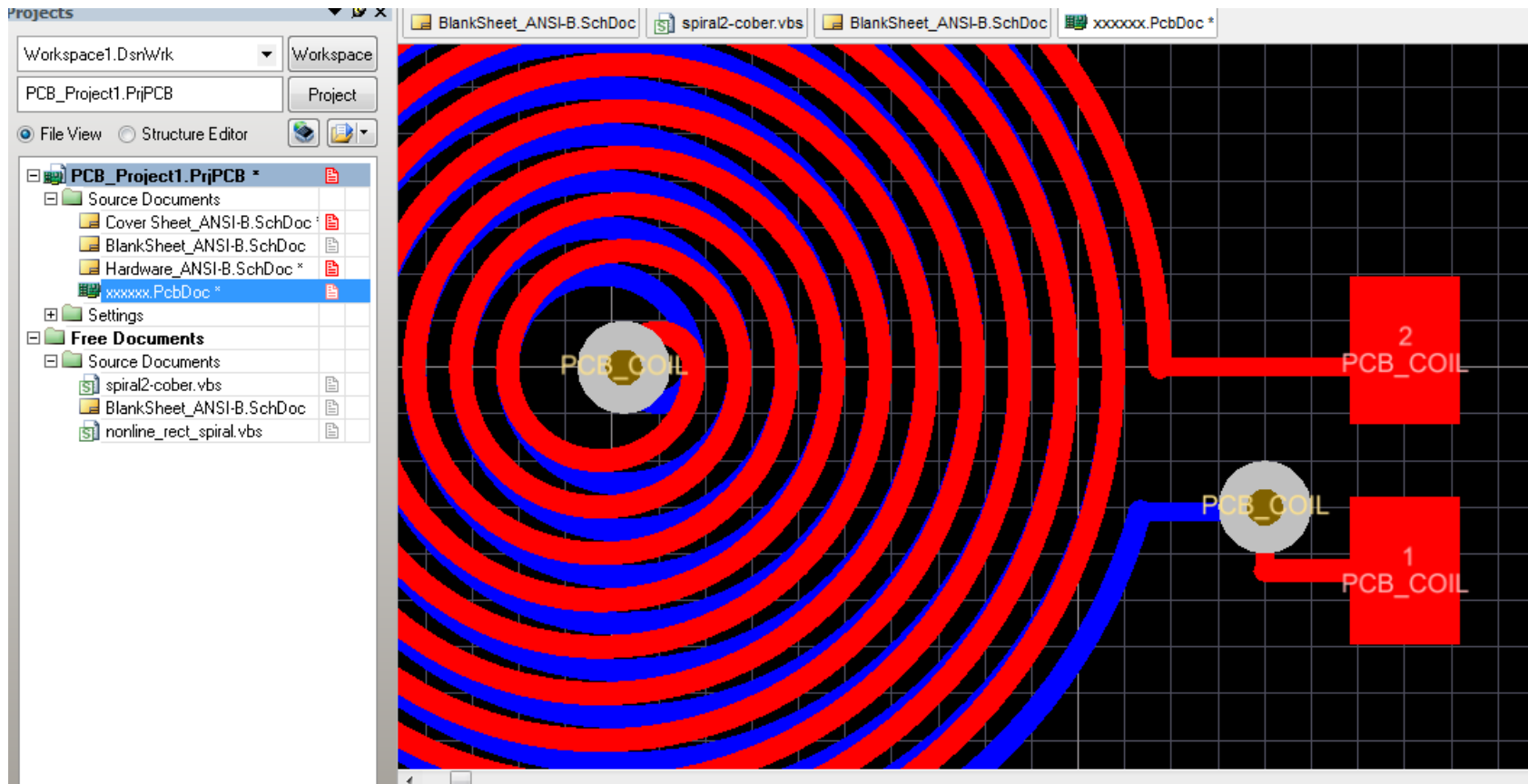


Then Change the Net to the desired Net from the schematic



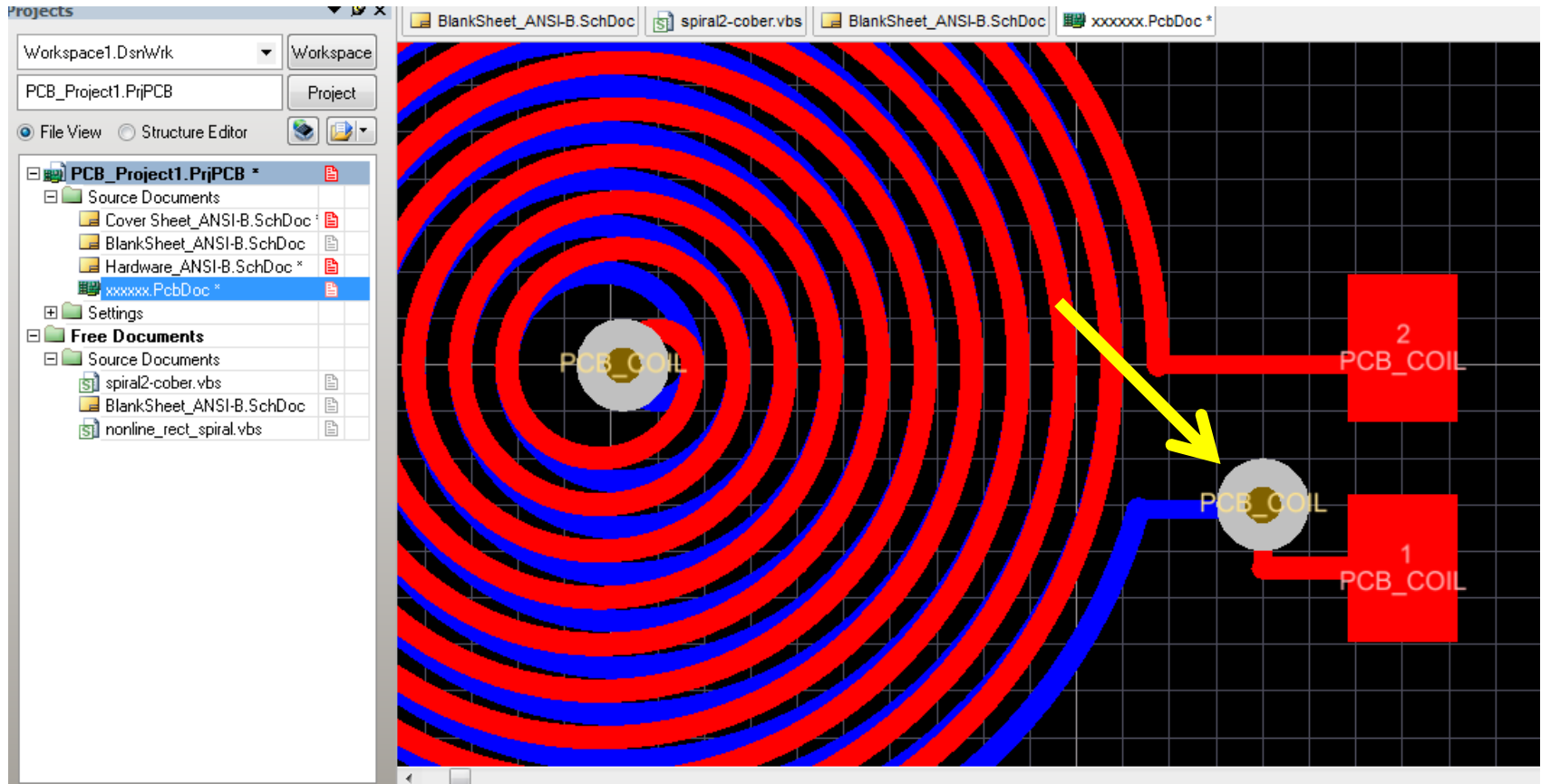
Completing the coil

Move the sensor capacitor close and connect the capacitor to the coil.



Completing the coil

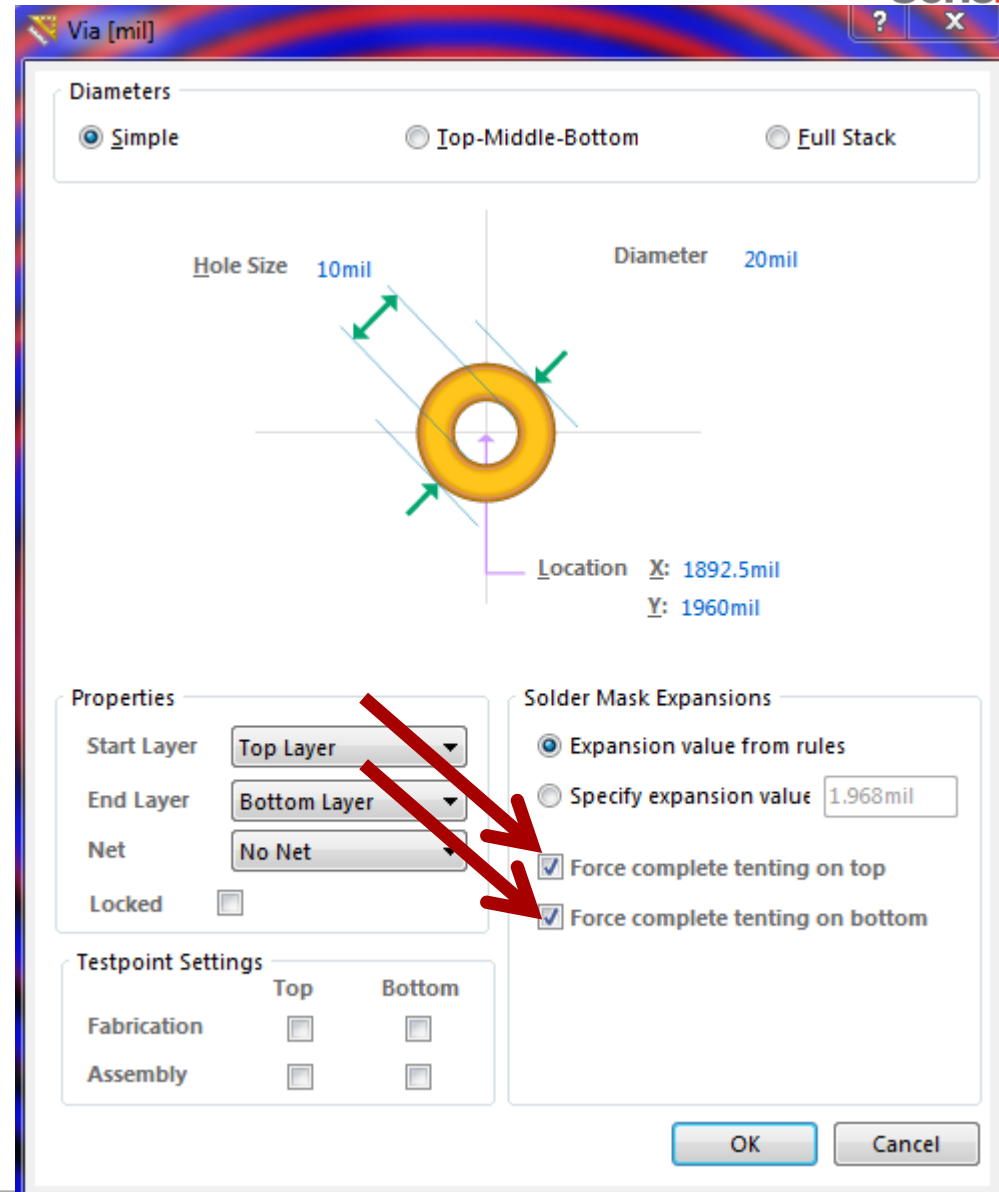
Also, we had to place a via to get from the bottom of the board to the top for the capacitor.



Tented Vias

It is recommended to put tenting (covering the Via with soldermask) on the vias.

1. Select the Via, and choose properties.
2. Then click on the tenting options for both top and bottom.



End