

HFSS DUAL BAND PIFA TUTORIAL

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Open up the HFSS Simulator on your computer

****Note:** If the program has issues coming up and you are off campus insure you are connected to the VPN

Once HFSS has loaded:

Click Project > Insert HFSS Design

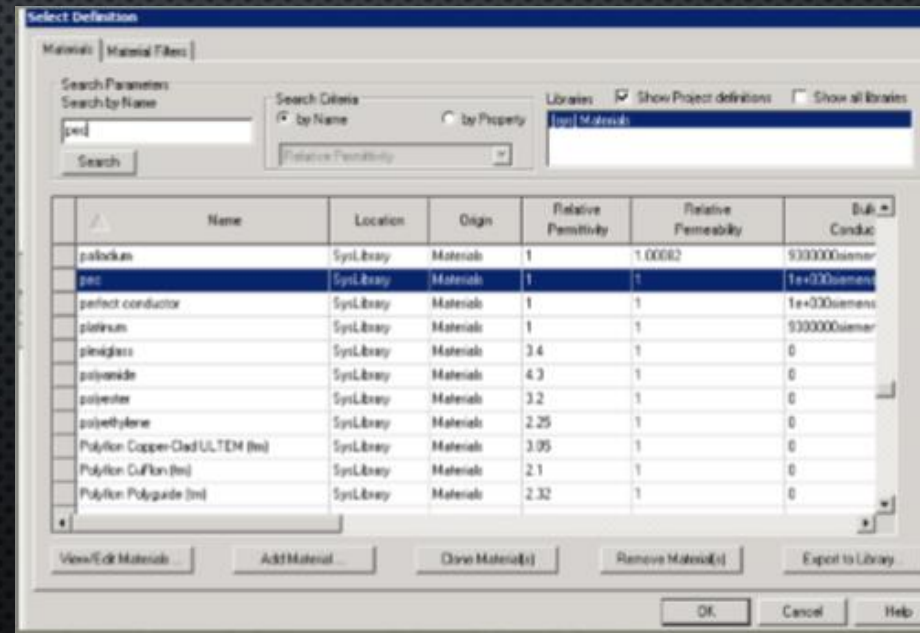
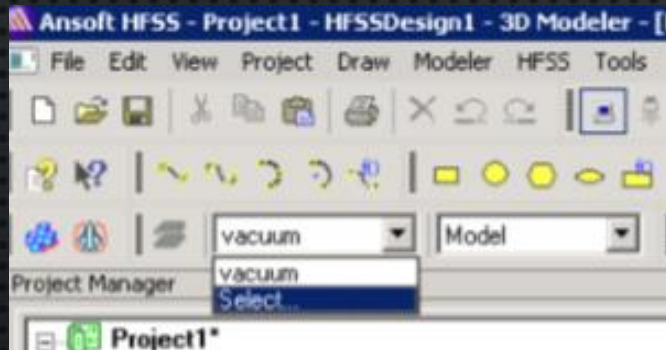
Click HFSS > Solution Type... and Select Driven Modal

Click Modeler > Units and Select mm in the drop down menu

Adding an additional material:

From the drop down menu with vacuum displayed click on Select..

Click on PEC from the list and Click Ok



Draw the Coaxial

Select PEC from the Material Drop Down Menu


Click Draw > Cylinder

Draw a cylinder anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Attribute

Name	Value	Unit	Evaluated V...	Description	Read-only
Name	Coaxial				<input type="checkbox"/>
Material	"pec"		"pec"		<input type="checkbox"/>
Solve Inside	<input type="checkbox"/>				<input type="checkbox"/>
Orientation	Global				<input type="checkbox"/>
Model	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Display Wir...	<input type="checkbox"/>				<input type="checkbox"/>
Color					<input type="checkbox"/>
Transparent	0				<input type="checkbox"/>

☐ Show Hidden

OK Cancel Apply

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateCylinder			
Coordinate ...	Global			
Center Posi...	-2.7,0	mm	-2mm , 7mm ...	
Axis	Z			
Radius	0.4559	mm	0.4559mm	
Height	18.5	mm	18.5mm	
Number of ...	0		0	

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OK Cancel Apply

Draw the Airbox

Select vacuum from the Material Drop Down Menu

Click Draw > Box

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Attribute

Name	Value	Unit	Evaluated V...	Description	Read-only
Name	Airbox				<input type="checkbox"/>
Material	"vacuum"		"vacuum"		<input type="checkbox"/>
Solve Inside	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Orientation	Global				<input type="checkbox"/>
Model	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Display Wir...	<input type="checkbox"/>				<input type="checkbox"/>
Color					<input type="checkbox"/>
Transparent	0				<input type="checkbox"/>

☐ Show Hidden

OK Cancel Apply

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateBox			
Coordinate ...	Global			
Position	-45 , -30 , 0	mm	-45mm , -30...	
XSize	91.61	mm	91.61mm	
YSize	156.13	mm	156.13mm	
ZSize	65.8	mm	65.8mm	

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OK Cancel Apply

Draw the Ground Plane

Click Draw > Rectangle

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Attribute

Name	Value	Unit	Evaluated V...	Description	Read-only
Name	Ground				<input type="checkbox"/>
Orientation	Global				<input type="checkbox"/>
Model	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Display Wir...	<input type="checkbox"/>				<input type="checkbox"/>
Color					<input type="checkbox"/>
Transparent	0				<input type="checkbox"/>

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OK Cancel Apply

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateRectangle			
Coordinate ...	Global			
Position	-28.805 , -5 , 0	mm	-28.805mm , ...	
Axis	Z			
XSize	51.61	mm	51.61mm	
YSize	116.13	mm	116.13mm	

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OK Cancel Apply

Create a Circle and Subtract

Click Draw > Circle

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Once created, in the Modeling Space click on the Ground Plane the hold ctrl and click on the newly created circle.

Now Click Modeler > Boolean > Subtract and Click Ok

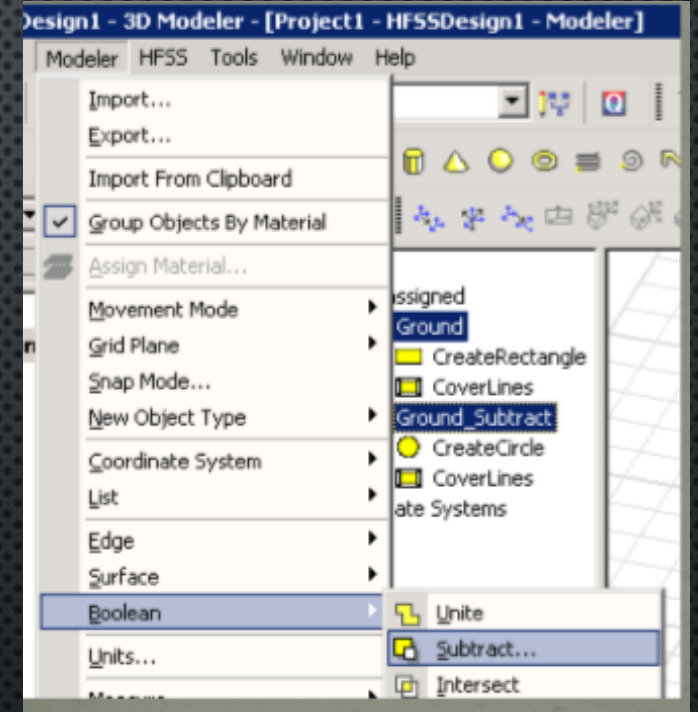
Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateCircle			
Coordinate ...	Global			
Center Posi...	-2,7,0	mm	-2mm, 7mm ...	
Axis	Z			
Radius	1.7097	mm	1.7097mm	
Number of ...	0		0	

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OK Cancel Apply



Draw the 1GHz PIFA


Click Draw > Rectangle

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Attribute

Name	Value	Unit	Evaluated V...	Description	Read-only
Name	PIFA1				<input type="checkbox"/>
Orientation	Global				<input type="checkbox"/>
Model	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Display Wir...	<input type="checkbox"/>				<input type="checkbox"/>
Color					<input type="checkbox"/>
Transparent	0				<input type="checkbox"/>

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OK Cancel Apply

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateRectangle			
Coordinate ...	Global			
Position	-12.905,0,18.5	mm	-12.905mm , ...	
Axis	Z			
XSize	25	mm	25mm	
YSize	60	mm	60mm	

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OK Cancel Apply

Draw the 815 MHz PIFA


Click Draw > Rectangle

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Attribute

Name	Value	Unit	Evaluated V...	Description	Read-only
Name	PIFA815				<input type="checkbox"/>
Orientation	Global				<input type="checkbox"/>
Model	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Display Wir...	<input type="checkbox"/>				<input type="checkbox"/>
Color					<input type="checkbox"/>
Transparent	0				<input type="checkbox"/>

Value

☐ Show Hidden

OK Cancel Apply

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateRectangle			
Coordinate ...	Global			
Position	-12.905,0,4.9	mm	-12.905mm, ...	
Axis	Z			
XSize	26.5	mm	26.5mm	
YSize	68.5	mm	68.5mm	

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OK Cancel Apply

Draw the Grounding Strip

Select the ZX plane on the drop down menu below Tools


Click Draw > Rectangle

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Attribute

Name	Value	Unit	Evaluated V...	Description	Read-only
Name	Shortstrip				<input type="checkbox"/>
Orientation	Global				<input type="checkbox"/>
Model	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Display Wir...	<input type="checkbox"/>				<input type="checkbox"/>
Color					<input type="checkbox"/>
Transparent	0				<input type="checkbox"/>

☐ Show Hidden

OK Cancel Apply

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateRectangle			
Coordinate ...	Global			
Position	0.0.0	mm	0mm, 0mm, ...	
Axis	Y			
XSize	5	mm	5mm	
ZSize	18.5	mm	18.5mm	

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OK Cancel Apply

Draw the Waveport

Select the XY plane on the drop down menu below Tools

Click Draw > Circle

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Attribute

Name	Value	Unit	Evaluated V...	Description	Read-only
Name	Waveport				<input type="checkbox"/>
Orientation	Global				<input type="checkbox"/>
Model	<input checked="" type="checkbox"/>				<input type="checkbox"/>
Display Wir...	<input type="checkbox"/>				<input type="checkbox"/>
Color					<input type="checkbox"/>
Transparent	0				<input type="checkbox"/>

Value

☐ Show Hidden

OK Cancel Apply

Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateCircle			
Coordinate ...	Global			
Center Posi...	-2.7,0	mm	-2mm, 7mm ...	
Axis	Z			
Radius	1.7907	mm	1.7907mm	
Number of ...	0		0	

☐ Show Hidden

OK Cancel Apply

Create a Circle and Subtract

Click Draw > Circle

Draw a box anywhere on the Modeling Space

Click on the newly created object on the list to the left of the Modeling Space and enter the following information from the graphic below:

Once created, in the Modeling Space click on the Ground Plane the hold ctrl and click on the newly created circle.

Now Click Modeler > Boolean > Subtract and Click Ok

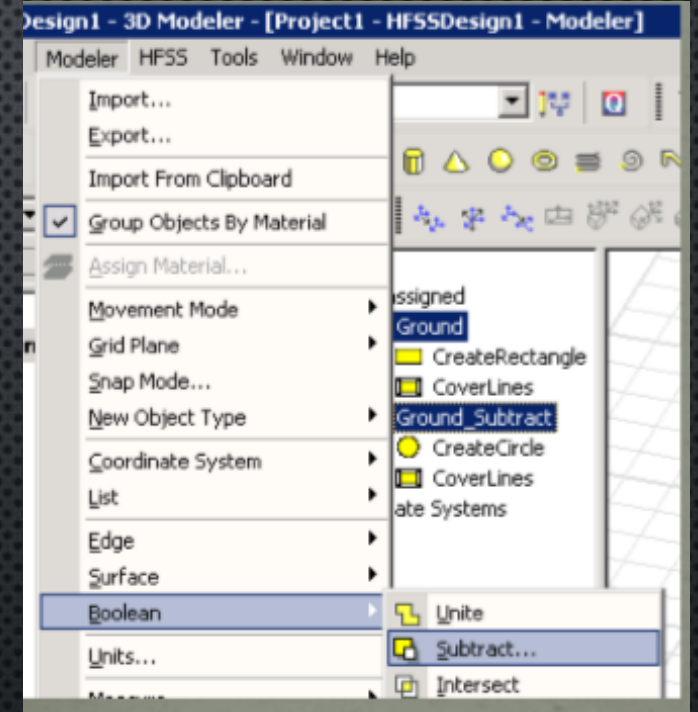
Properties: DualFreqPIFA - HFSSDesign1 - Modeler

Command

Name	Value	Unit	Evaluated V...	Description
Command	CreateCircle			
Coordinate ...	Global			
Center Posi...	-2,7,0	mm	-2mm, 7mm ...	
Axis	Z			
Radius	0.4559	mm	0.4559mm	
Number of ...	0		0	

☐ Show Hidden

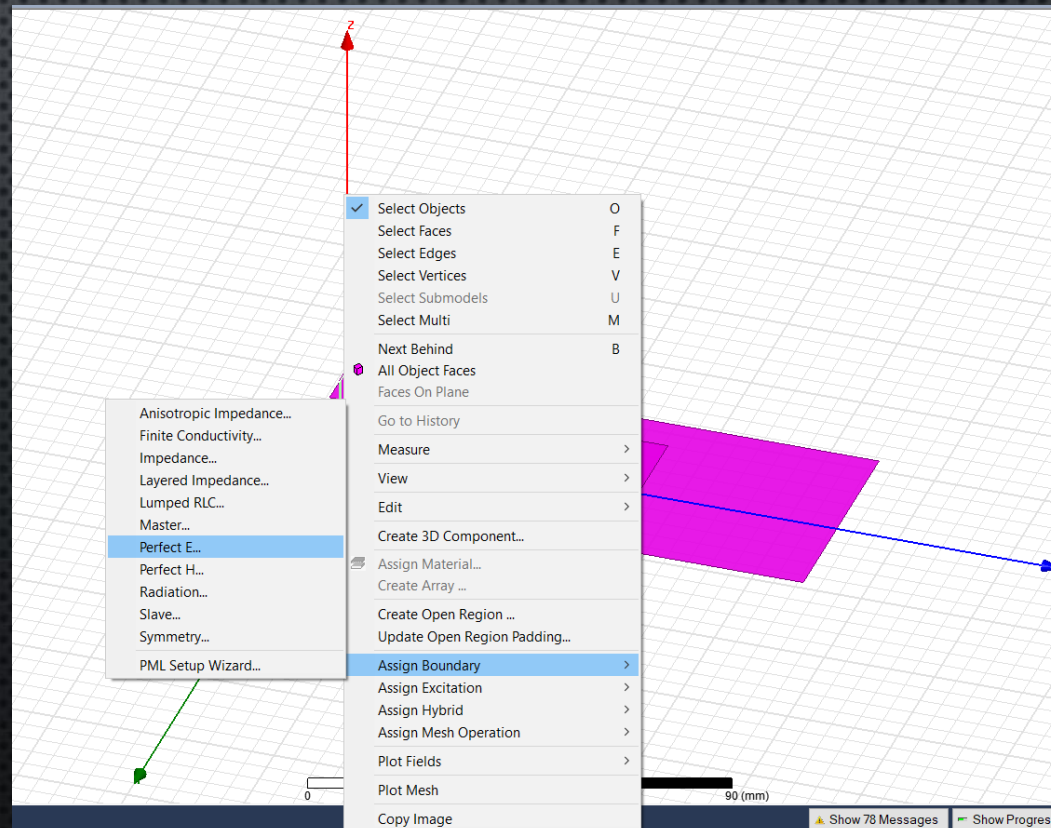
OK Cancel Apply



Assign Perfect E Boundary

In the Modeling Window Click on the Ground Plane, PIFA1, PIFA815, and the Shortstrip while holding down on ctrl.

Right Click the selected Objects and Click on Assign Boundary > Perfect E and Click Ok



Assign Waveport Excitation

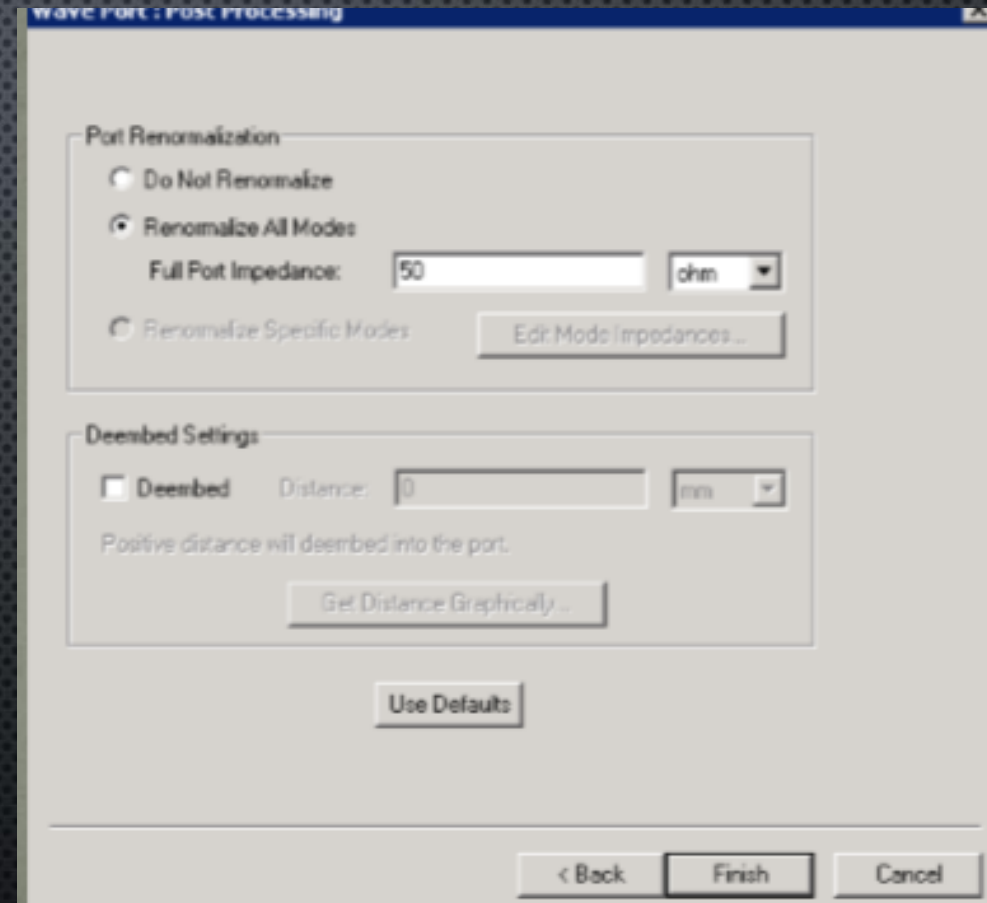
Click on the Waveport in the Modeling Window

Right Click the selected Object and

Click on Assign Excitation > Waveport

Click > Next > Next

Select "Renormalize All Modes" > Finish



The image shows a software dialog box titled "Wave Port: Post Processing". It contains two main sections: "Port Renormalization" and "Deembed Settings".

Port Renormalization:

- There are three radio button options: "Do Not Renormalize", "Renormalize All Modes" (which is selected), and "Renormalize Specific Modes".
- Below "Renormalize All Modes", there is a text field for "Full Port Impedance" containing the value "50" and a dropdown menu set to "ohm".
- Below "Renormalize Specific Modes", there is a button labeled "Edit Mode Impedances...".

Deembed Settings:

- There is a checkbox labeled "Deembed" which is currently unchecked.
- Next to it is a "Distance:" label followed by a text field containing "0" and a dropdown menu set to "mm".
- Below this, there is a text label: "Positive distance will deembed into the port."
- Below that is a button labeled "Get Distance Graphically...".

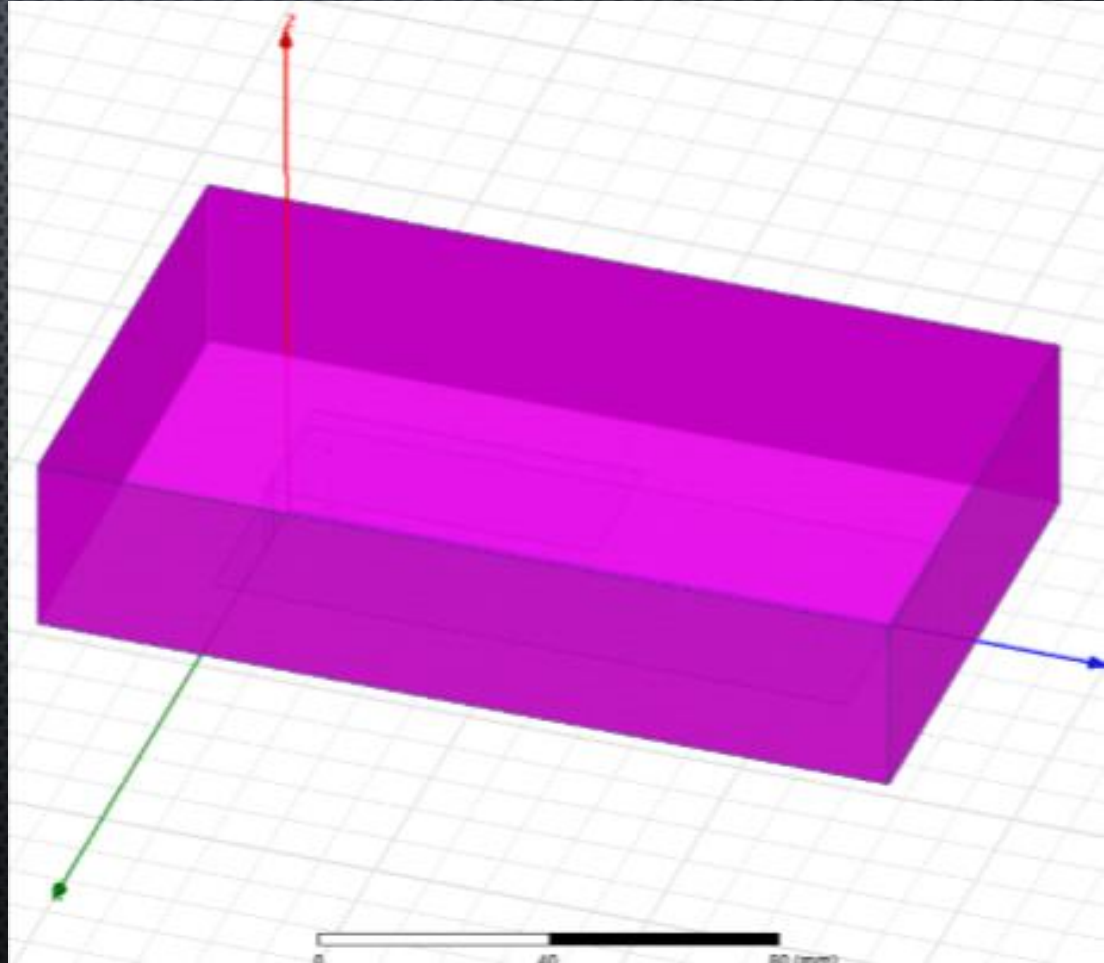
At the bottom of the dialog, there is a "Use Defaults" button. At the very bottom, there are three navigation buttons: "< Back", "Finish", and "Cancel".

Assign Radiation Boundary

Click Edit > Select > Faces

Click on each face of the Airbox in the Modeling Space while holding down the ctrl key

Click > Boundaries > Assign > Radiation



Congratulations! You have successfully created a Dual Band PIFA Antenna in HFSS!

