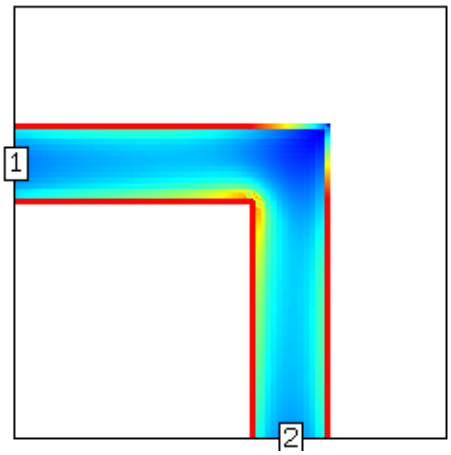
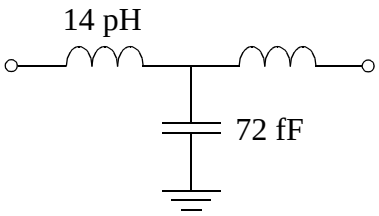
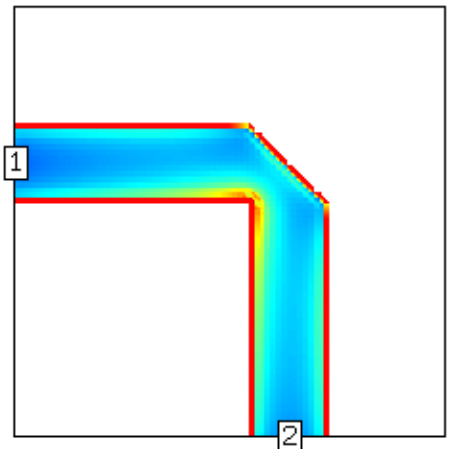
Microstrip Mitered Bend

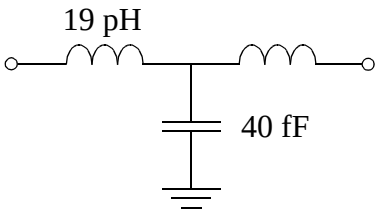
The microstrip bend is a discontinuity where current low around a corner is critical. Below is a right angle bend in a 15 mil wide line on 15 mil alumina. Note the current null at the outer corner and the current maximum on the inner corner. If we set the reference planes at the inside corner, we can extract a simple lumped element model.



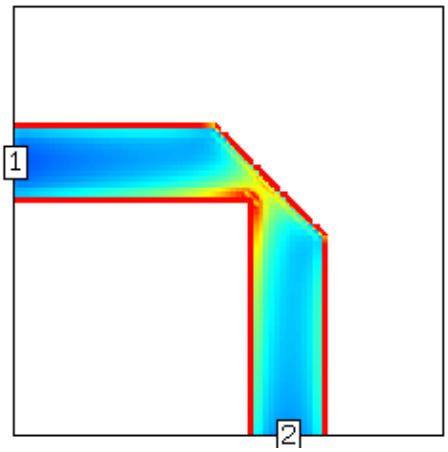


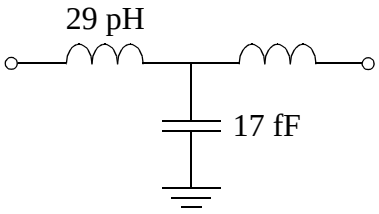
Below the bend has been mitered by 50%. The equivalent capacitance has decreased almost 50% and the series inductance has increased slightly.





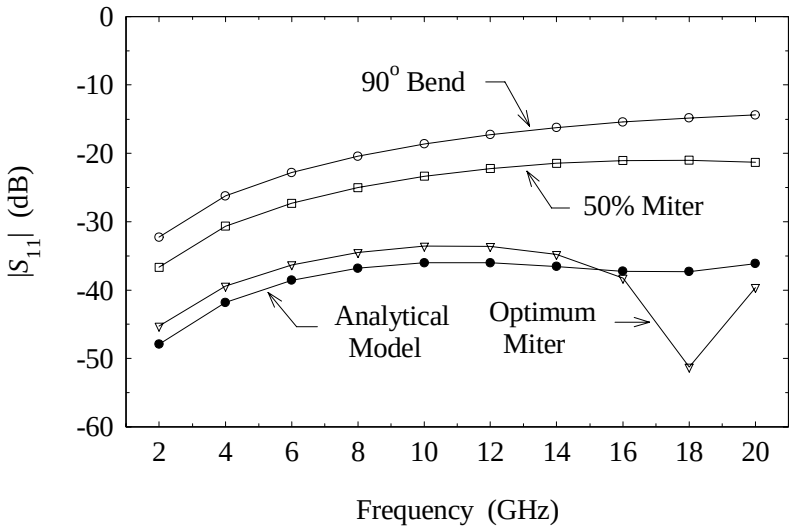
Finally, the “optimum” miter has been computed using a well known formula [25]. The capacitance has been cut in half again and the inductance is two times larger than the full right angle bend case. The current scale is 5−55 amps/meter in all three color plots.





Microstrip Mitered Bend (cont.)

The return loss for all three bends is shown below. Mitering clearly improves the return loss. The analytical model for the optimum miter is also shown.



All open symbols are field-solver data.

Analytical model from Touchstone Ver. 3.5

This analytical model seems to work quite well for these substrate parameters and line width. To do a more careful validation, we should also look at the phase responses. Some recent experimental data on the microstrip bend can be found in [26].

Notes: