EDGES Thickness Variation Project

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A study was performed to determine the antenna panel thickness which would produce the optimal S11 parameter response. This study modeled the antenna as though the panels were solid metal as opposed to thin sheets of metal with a rim around the perimeter as described in figures 2-4. Subsequent studies have shown that the rim mimics a solid thick metallic pane with the same thickness as the rim.

With nominal antenna values, the thickness of the solid panes (z_rim) was varied from 0.80” to 2.00”. The widest frequency response was seen at a value of 0.85”. Graphs 1 -7 show the results of the simulation with each graph highlighting a different thickness value. The current value of the rim height is 0.55”. This is a value we may wish to modify in subsequent designs of the antenna.

Parameter	Nominal
t_rim	0.032
z_rim (zthick)	0.55
xy1	12
xy2	5.3125
z_height	18.5
xymin	0.375

Table 1. Nominal Parameters. t_rim is the thickness of the metal. The other parameters are illustrated in figures 2 – 4.

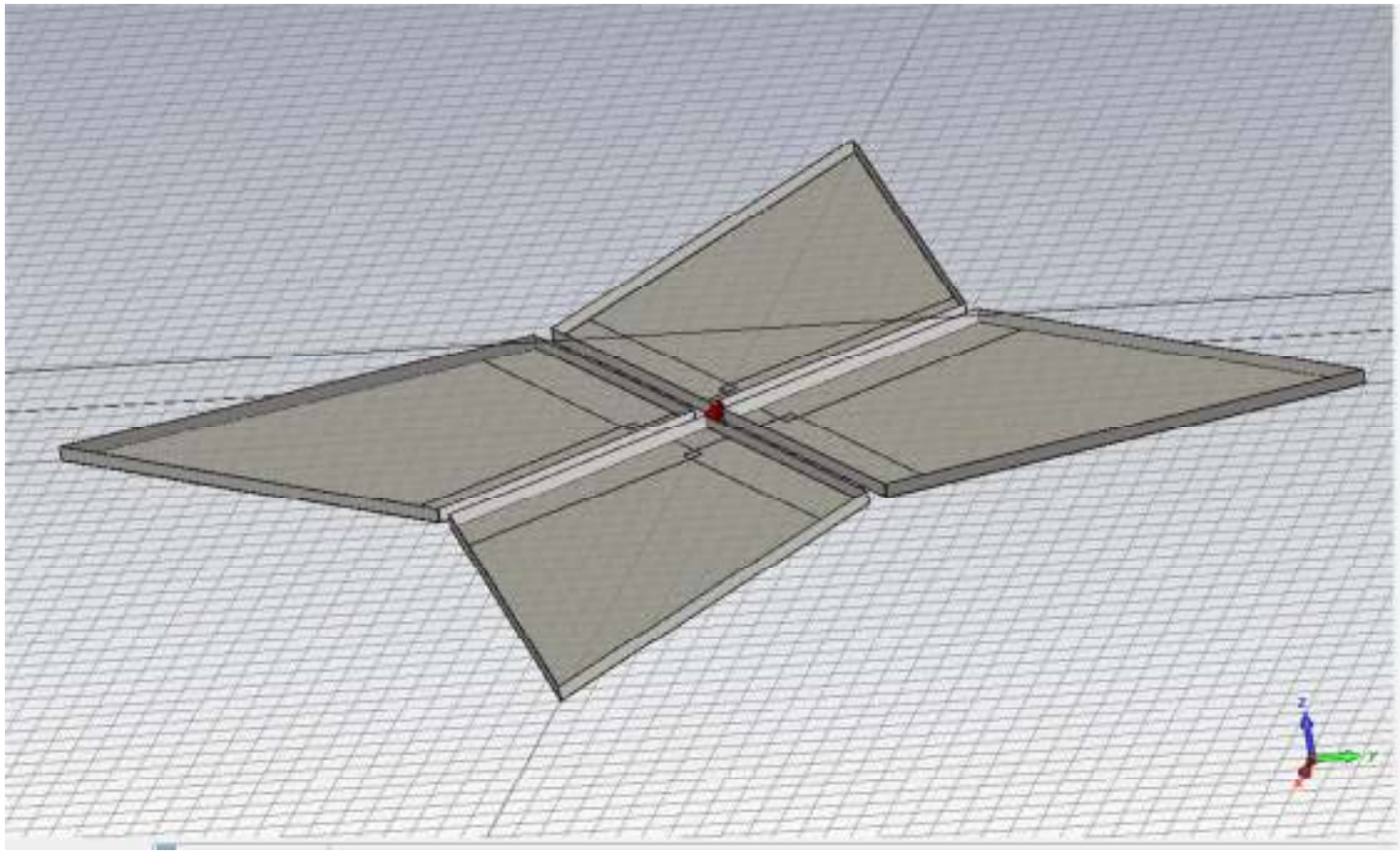


Figure 1. Picture of the EDGES Antenna

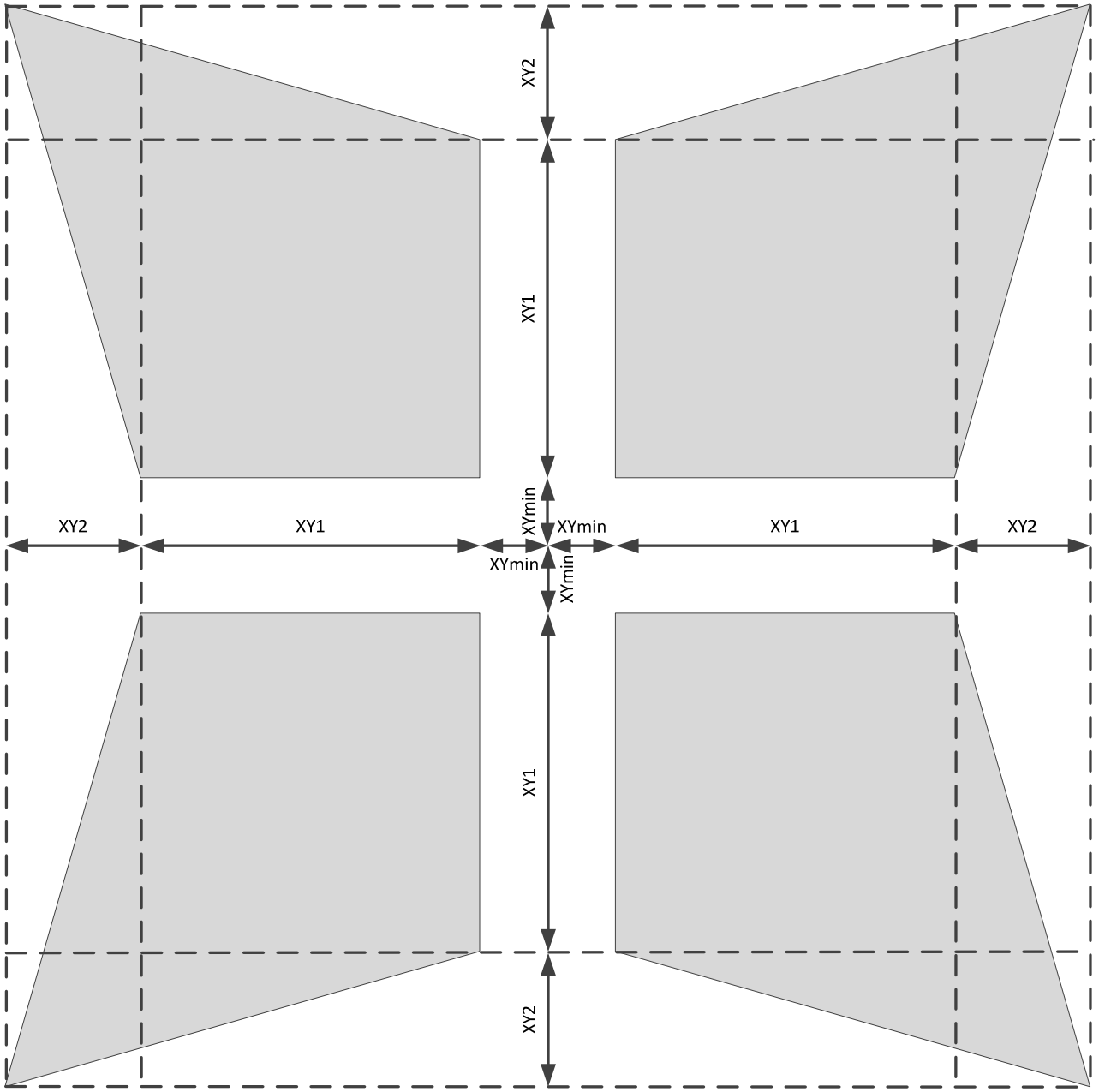


Figure 2. Face view showing the definitions of parameters XYmin, XY1, and XY2

EDGES Side View

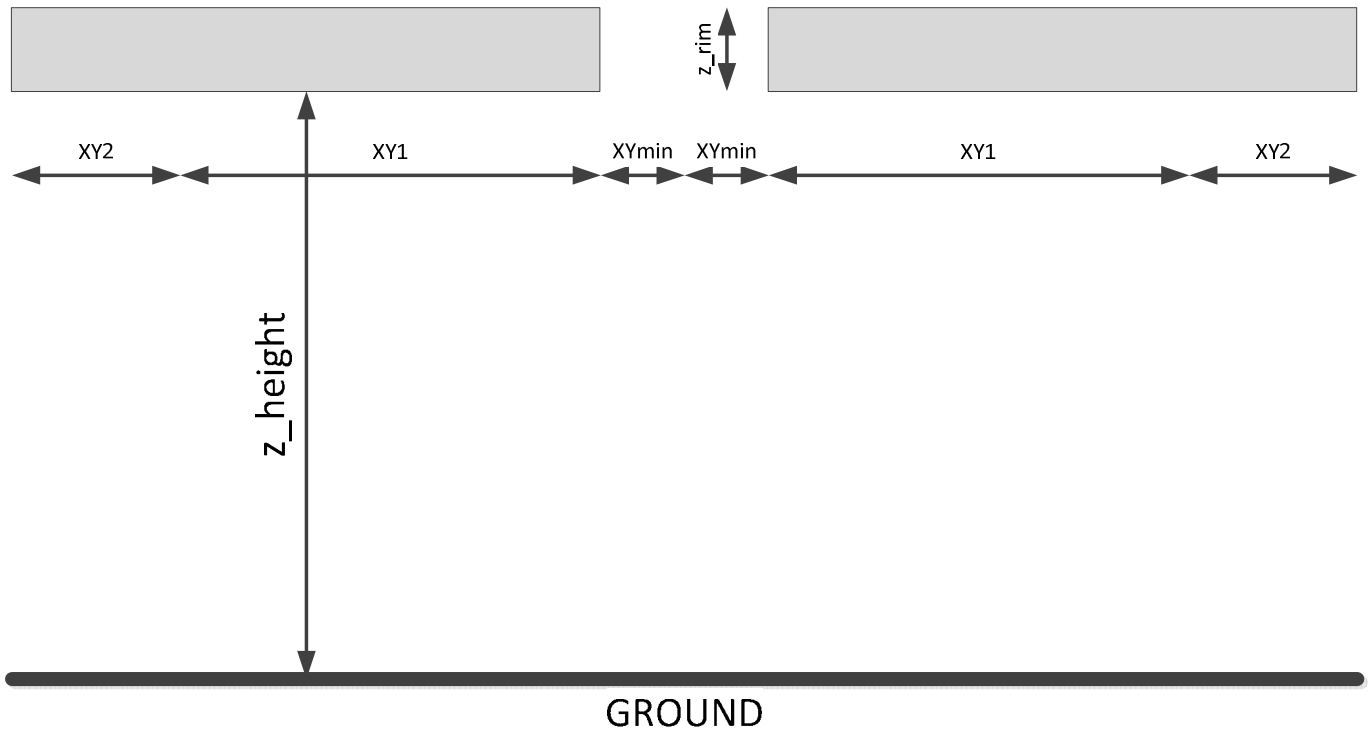
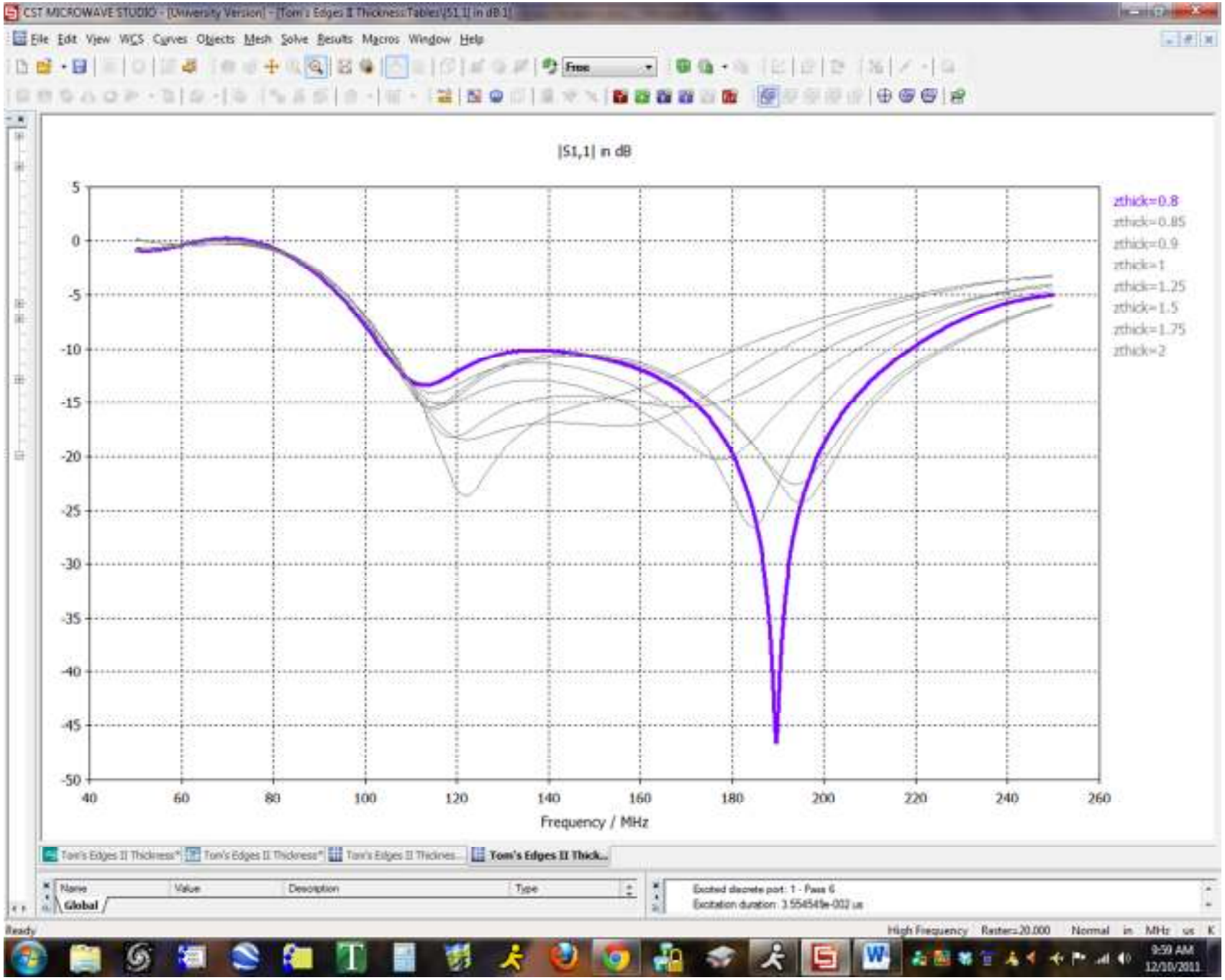
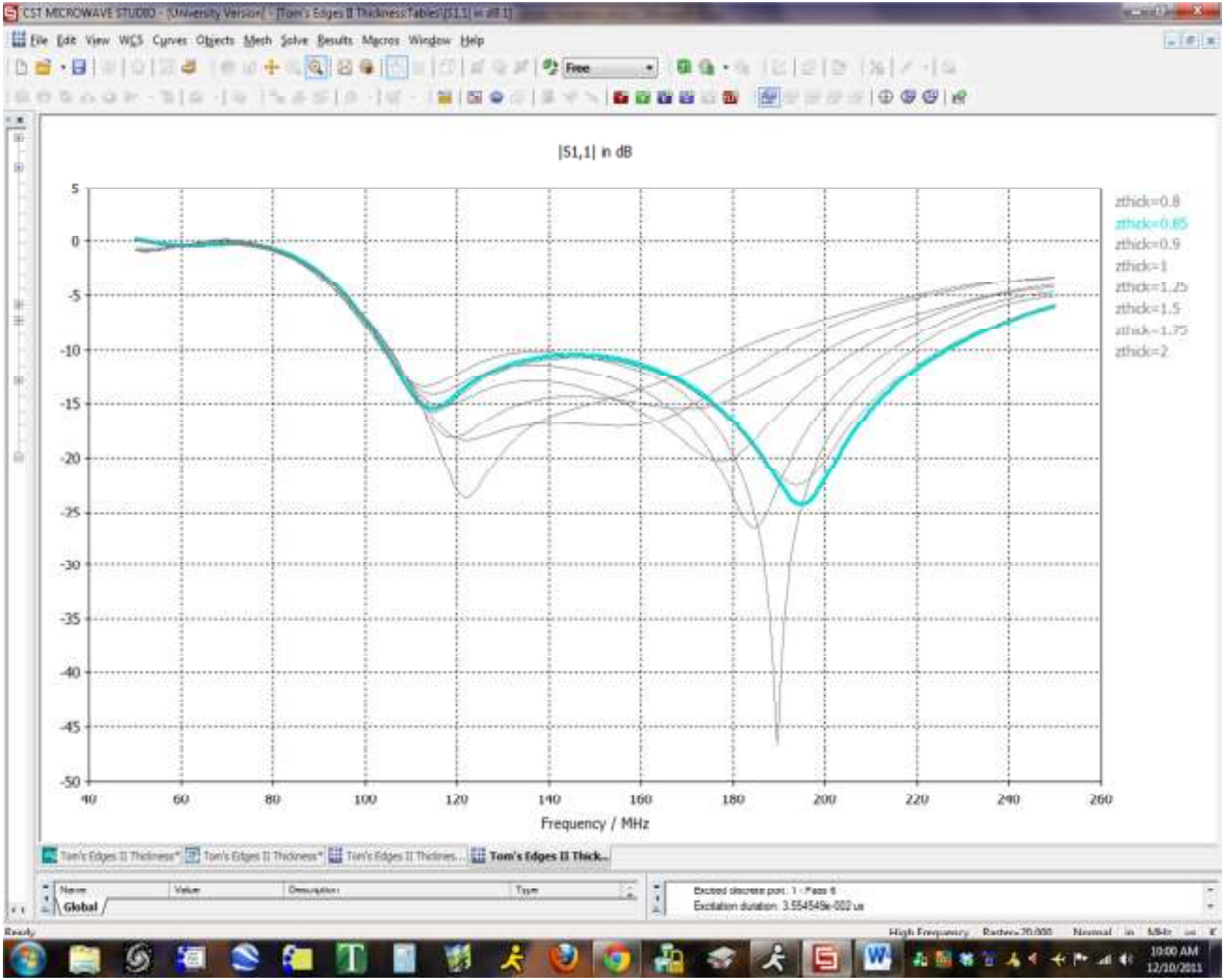


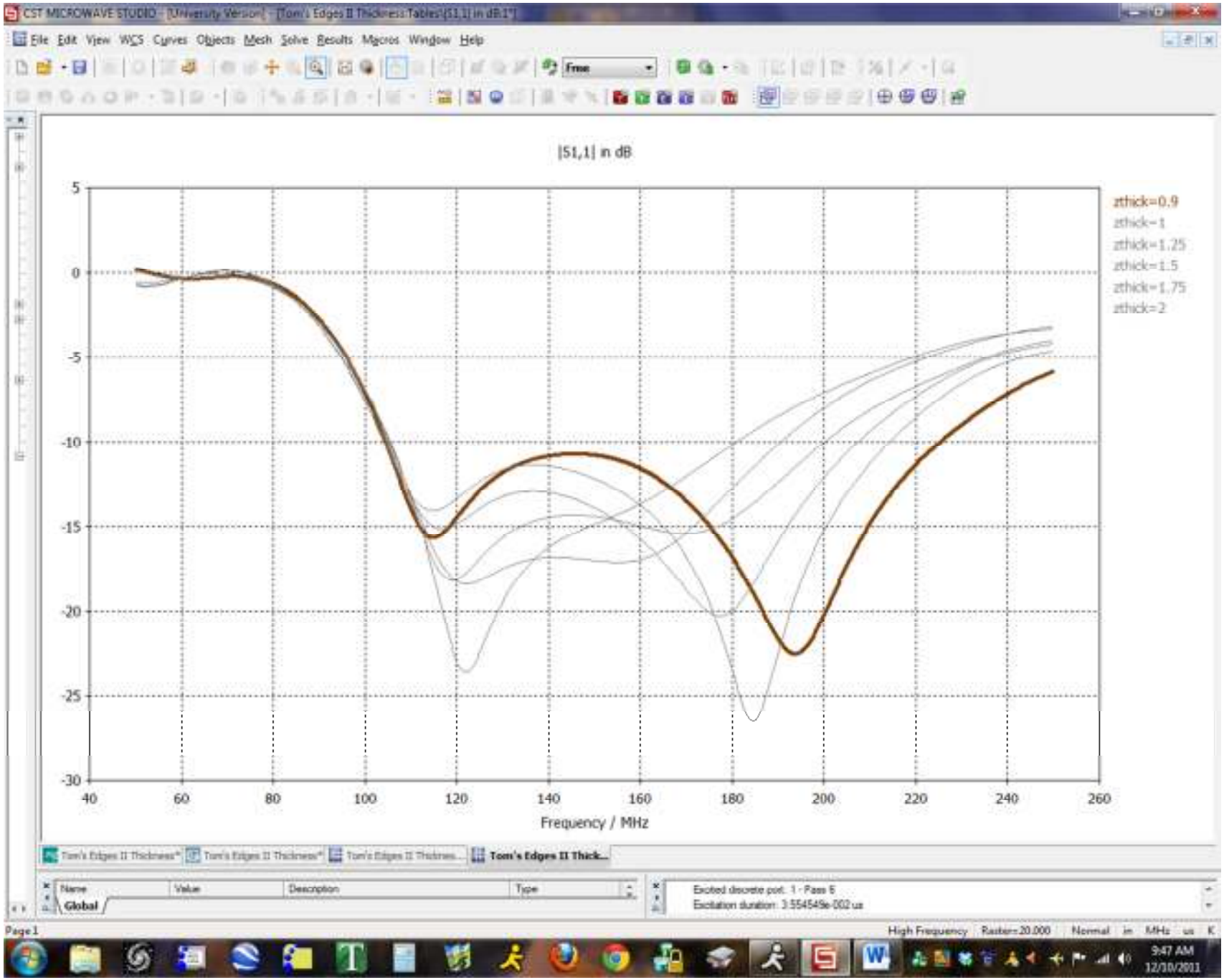
Figure 3. Side view showing the definitions of parameters z_height and z_rim



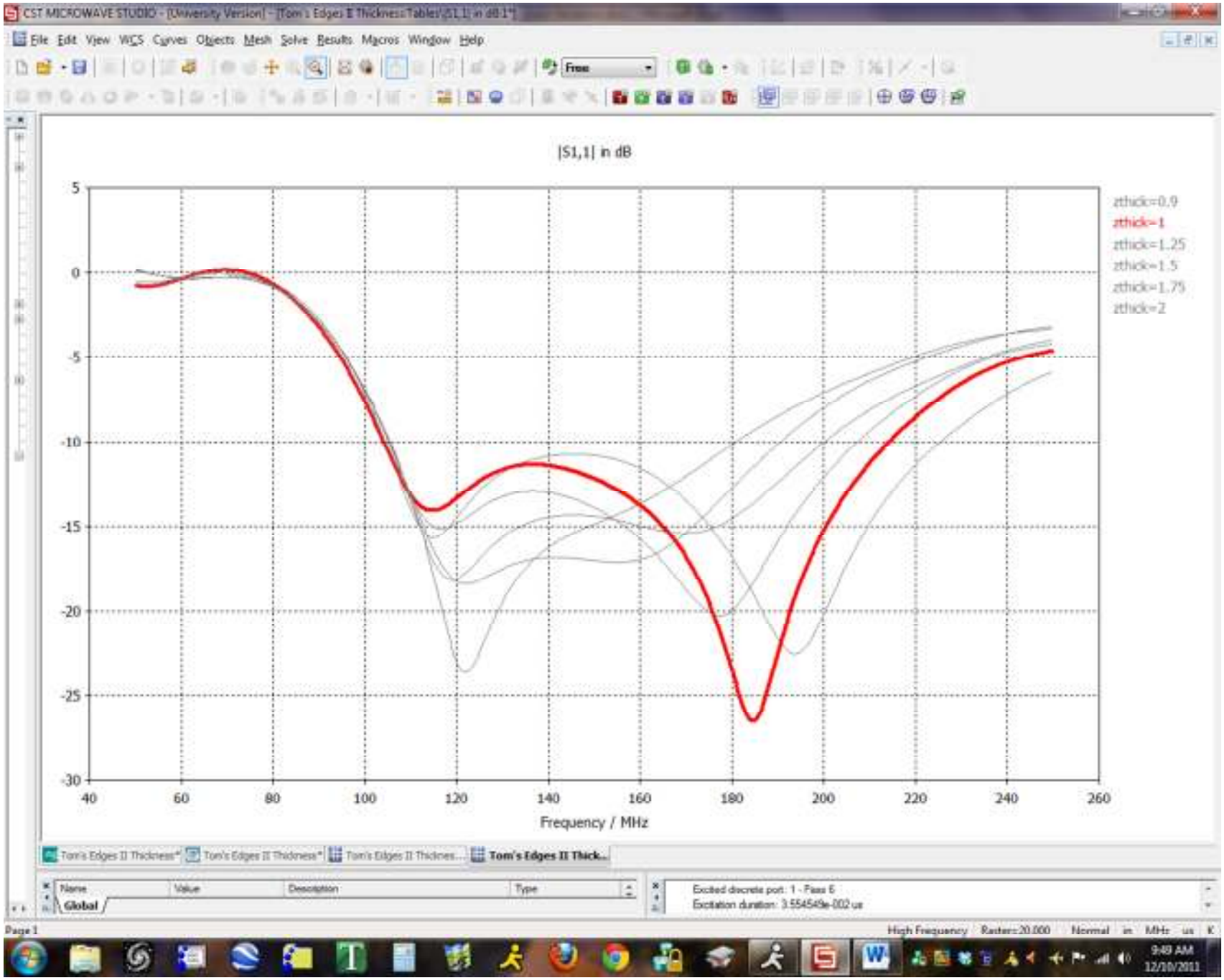
Graph 1. Highlighted curve is: Zthick=z_rim = 0.80”



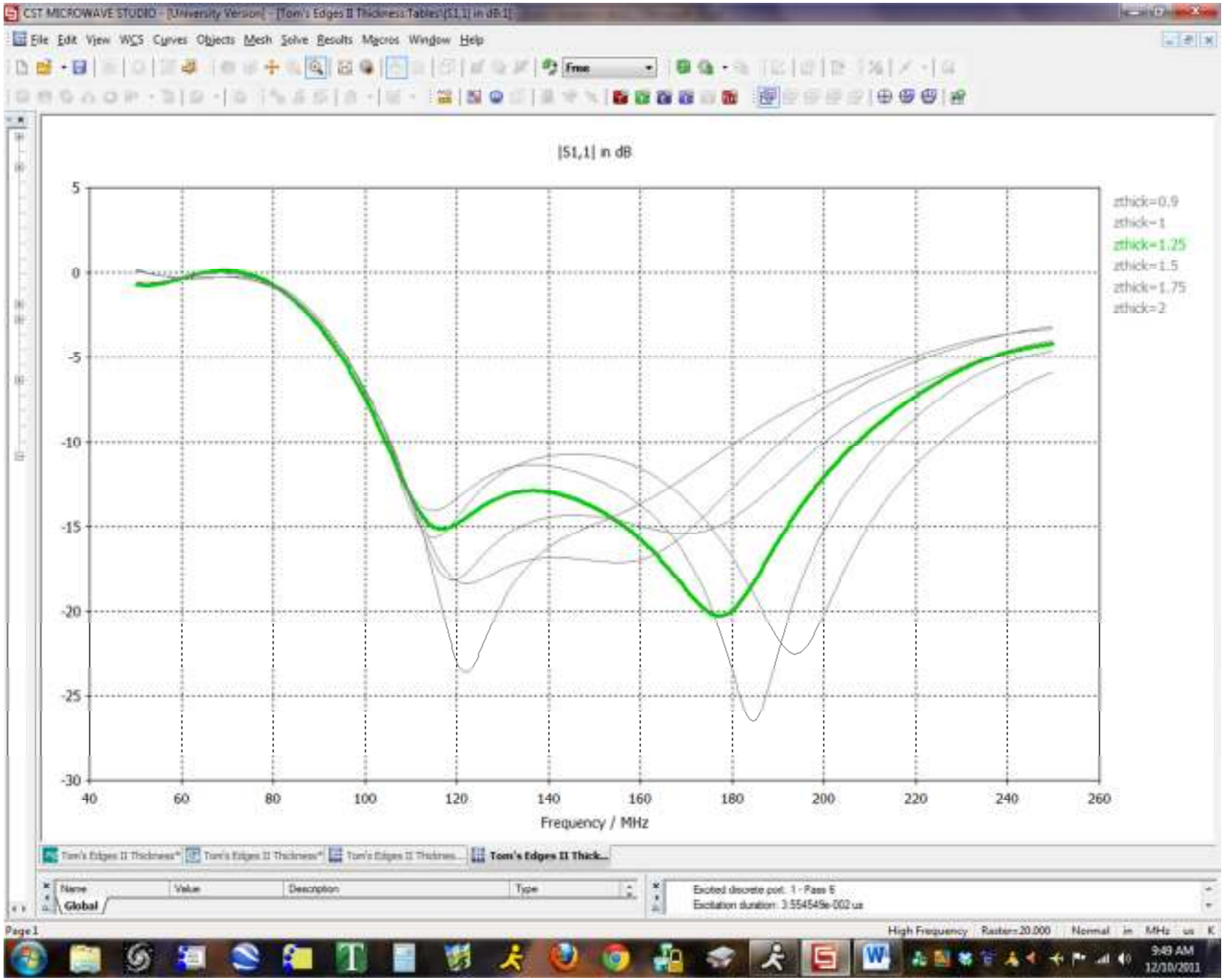
Graph 2. Highlighted curve is: Zthick=z_rim = 0.85”



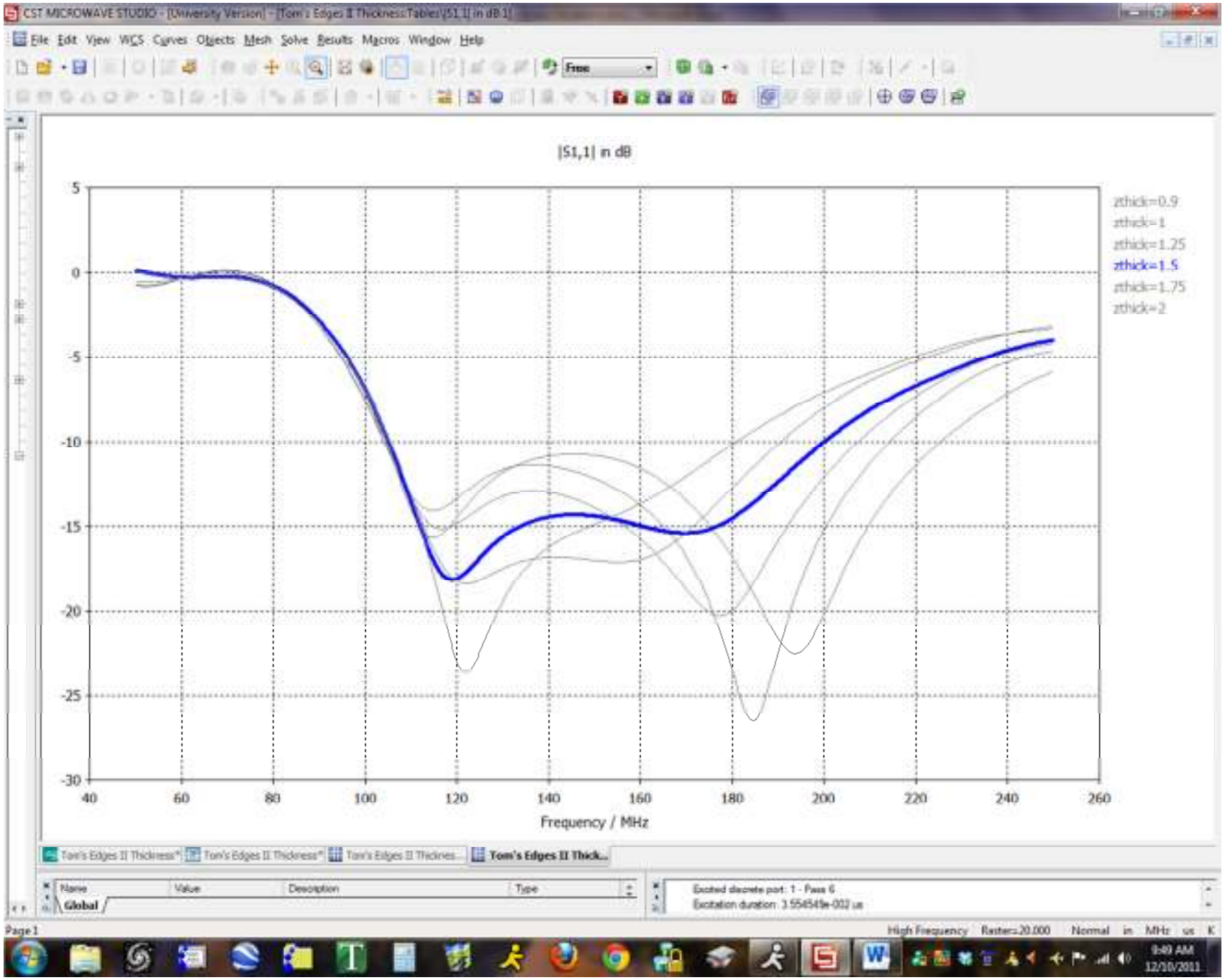
Graph 3. Highlighted curve is: Zthick=z_rim = 0.90”



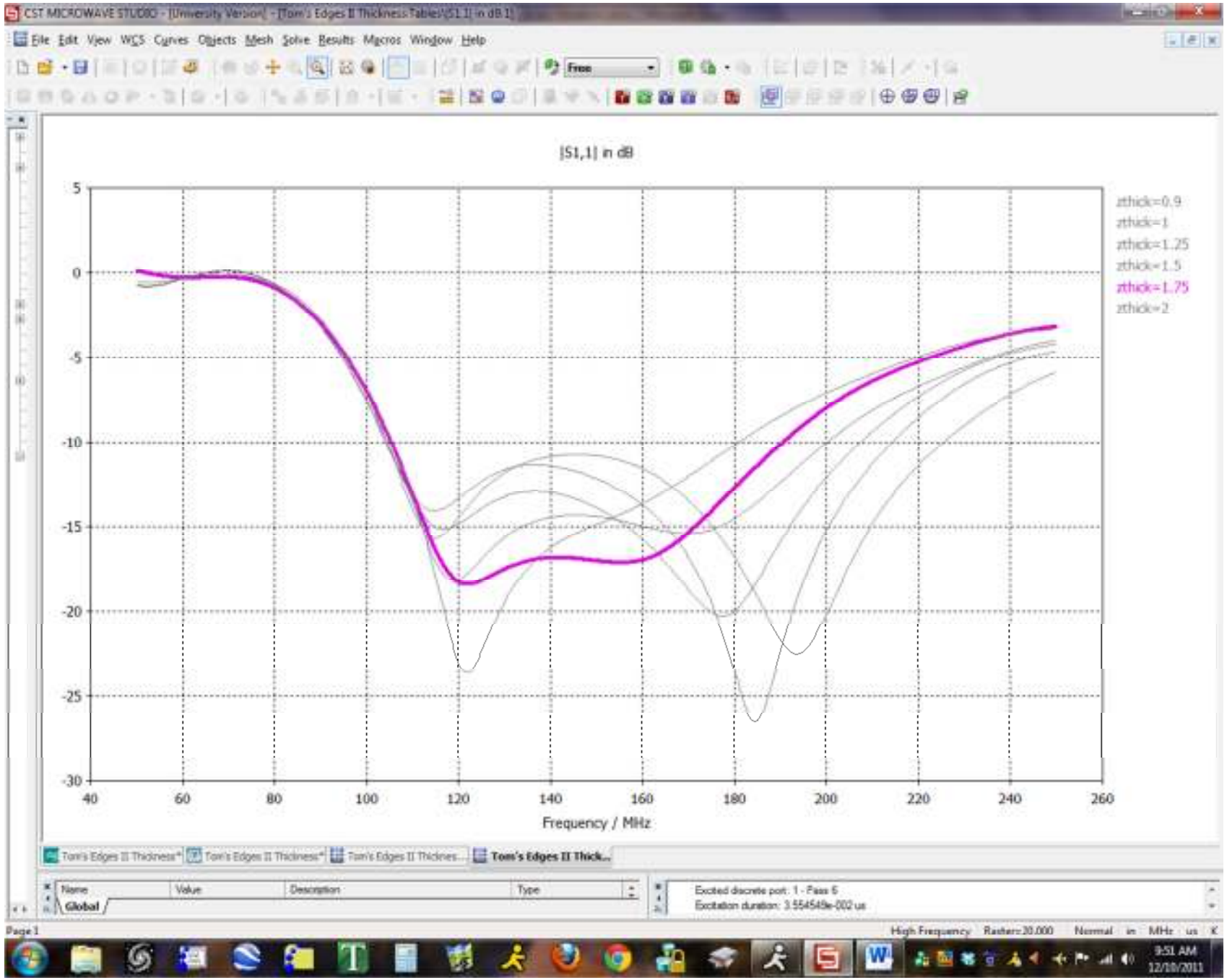
Graph 4. Highlighted curve is: Zthick=z_rim = 1.00”



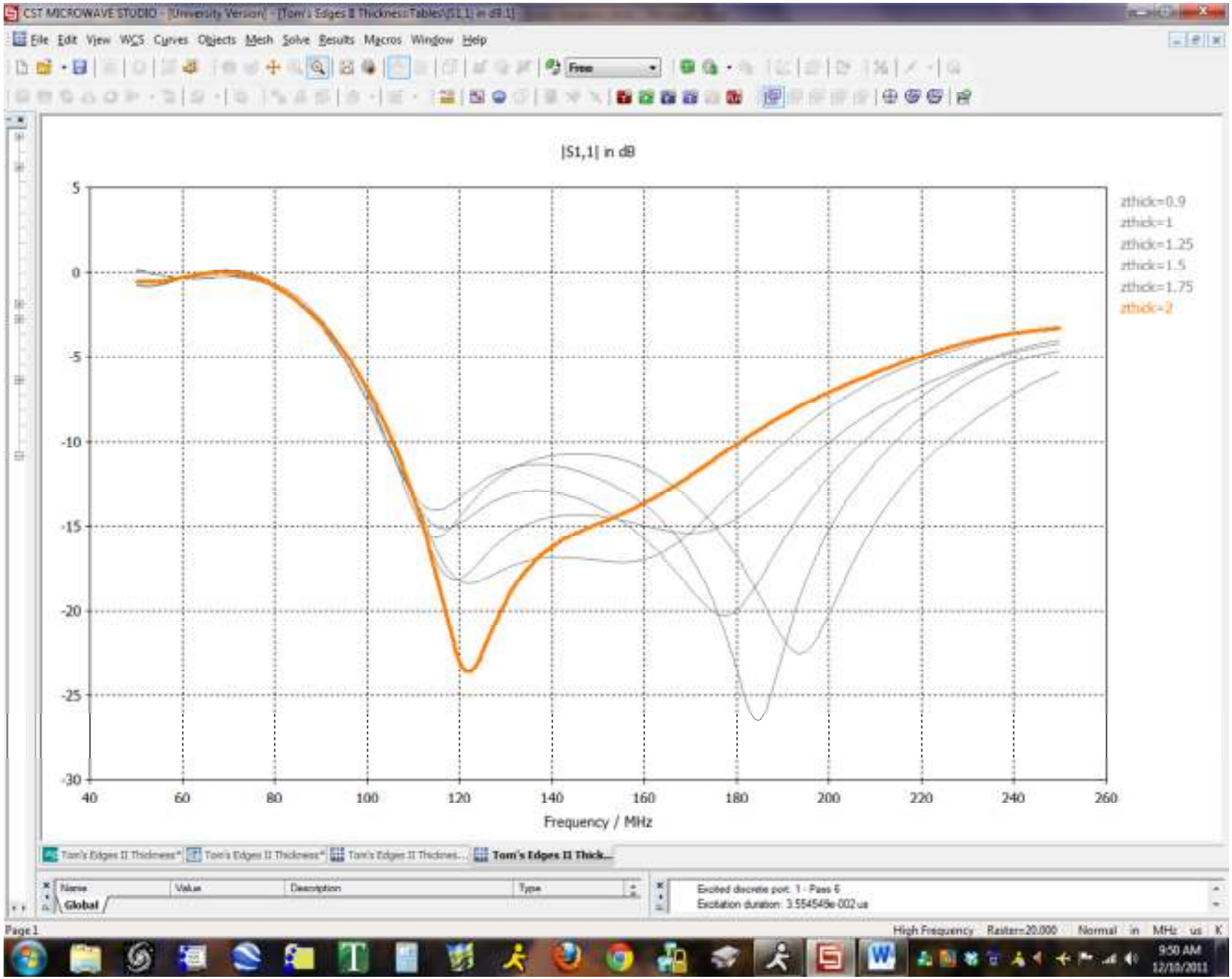
Graph 5. Highlighted curve is: Zthick=z_rim = 1.25”



Graph 6. Highlighted curve is: Zthick=z_rim = 1.50”



Graph 7. Highlighted curve is: Zthick=z_rim = 1.75”



Graph 8. Highlighted curve is: Zthick=z_rim = 2.00”