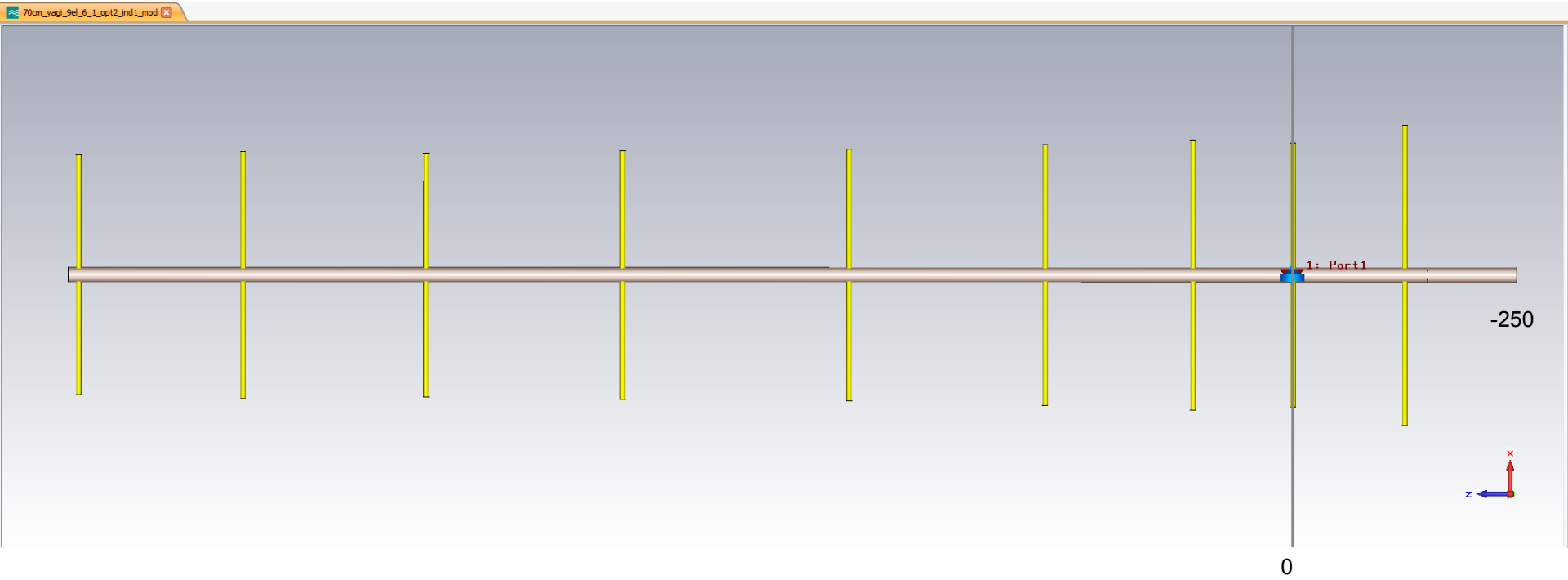
4 x 9 el Yagi for 432 MHz

SM6FHZ

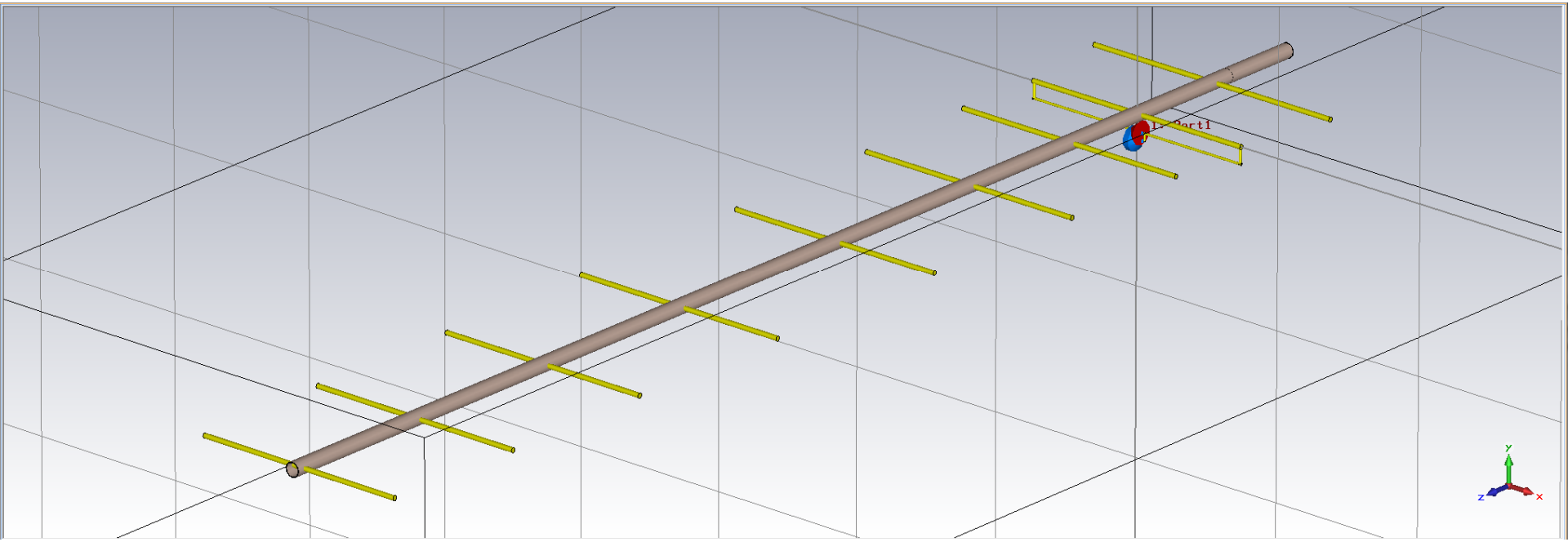
Background

- Needed a compact, light weight antenna for 432 MHz.
- Specification
  - No metal boom
  - Back mounted
  - Possible to feed with a open ladder feed network i.e. 200 ohm feeding impedance
  - Low noise i.e. low side lobe and back lobe levels
- Using readily available materials

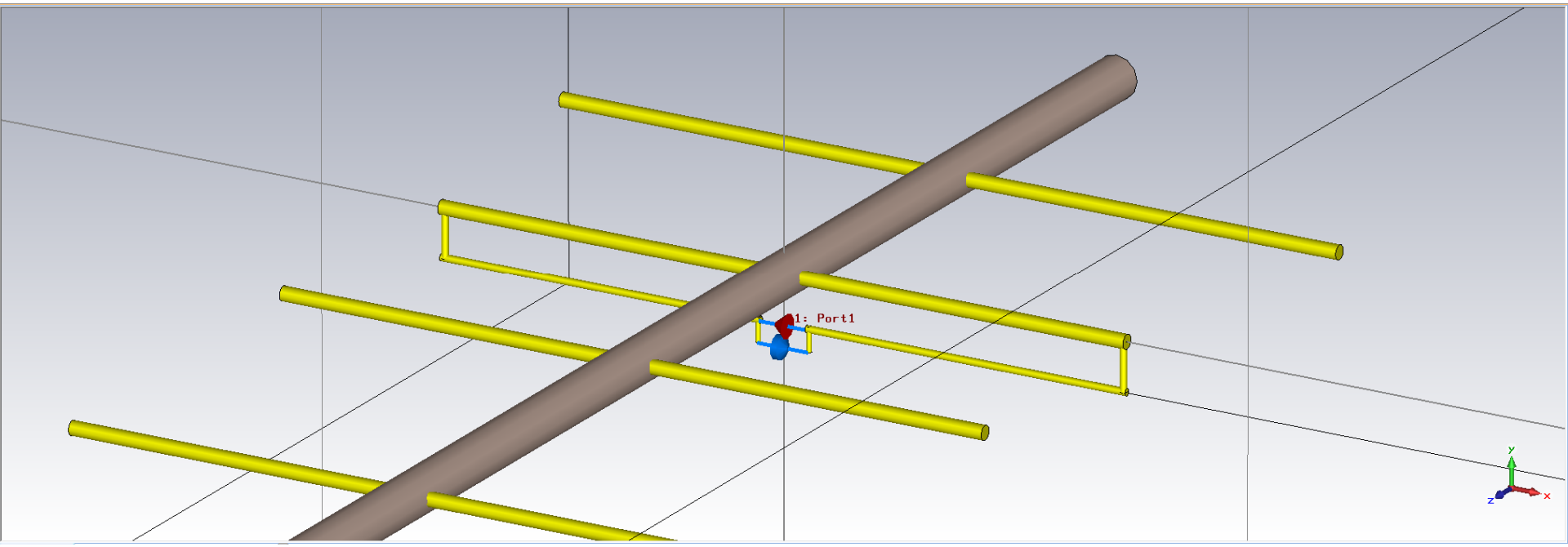
Model, bottom view



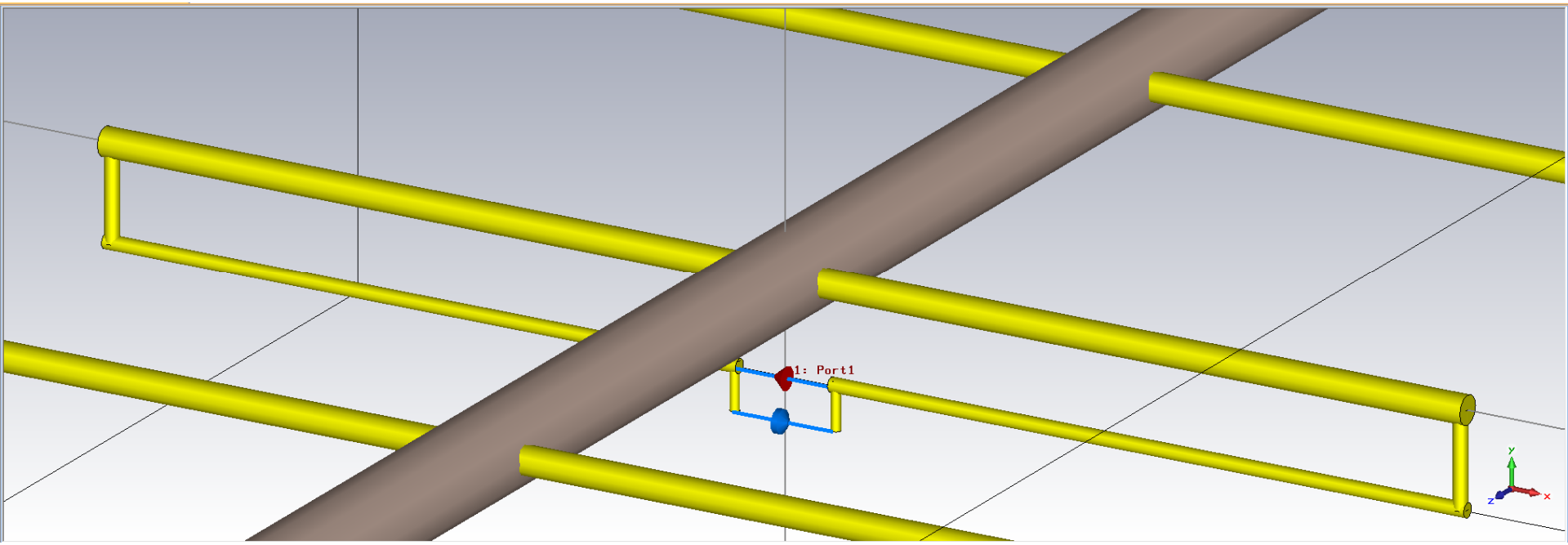
Model



Model, close in on feeding



Model, close in on feeding



Comments

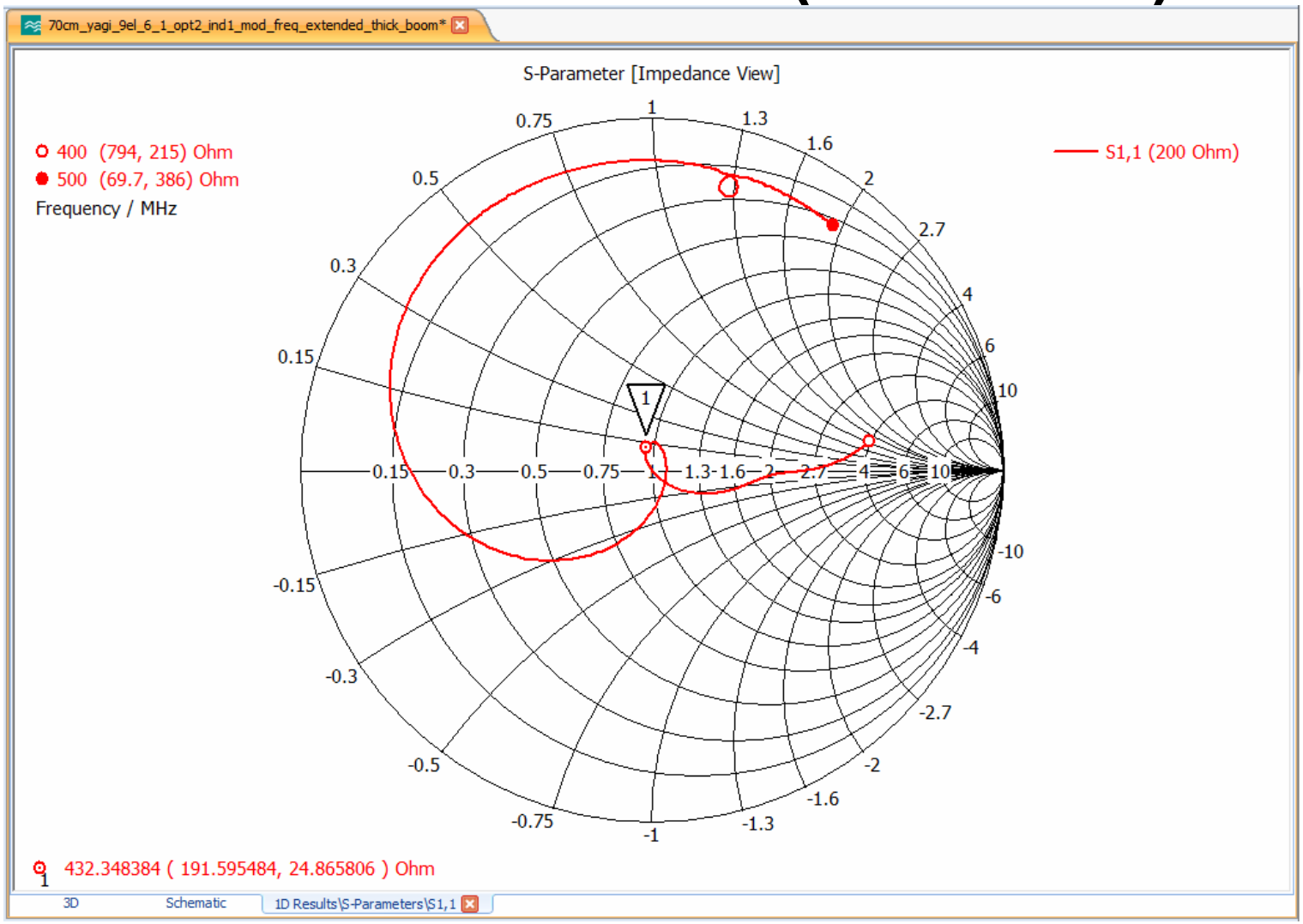
- 20/15 mm fiberglass boom
- Stacking distance 850 mm in E-plane and 880 mm in H-plane
- Matching done by a lumped inductance (100/120 nH) across the feeding point at the dipole. 6 turns, 1.2 mm copper wire, 7 mm inner diameter, 20 mm long, tune inductance by bending coil for best return loss.

Element dimensions

Parameter List

Name	Value	Description
Dipole_left	-148	Dipole left end
Dipole_right	148	Dipole right end
Dir1_len	151.3	Director1 length/2
Dir1_pos	112	Director1 position
Dir2_len	146	Director2 length/2
Dir2_pos	277.2	Director2 position
Dir3_len	140.8	Director3 length/2
Dir3_pos	496.6	Director3 position
Dir4_len	139.2	Director4 length/2
Dir4_pos	750	Director4 position
Dir5_len	136.7	Director5 length/2
Dir5_pos	969.7	Director5 position
Dir6_len	138.3	Director6 length/2
Dir6_pos	1174.4	Director6 position
Dir7_len	134.5	Director7 length/2
Dir7_pos	1358.4	Director7 position
El_rad	3	Element radius
Refl_len	168	Reflector length/2
Refl_pos	-124.9	Reflector position
StubC_len	1	Matching capacitive Stub length
Stub_len	10	Matching Stub length

Simulated S11 (100 nH)



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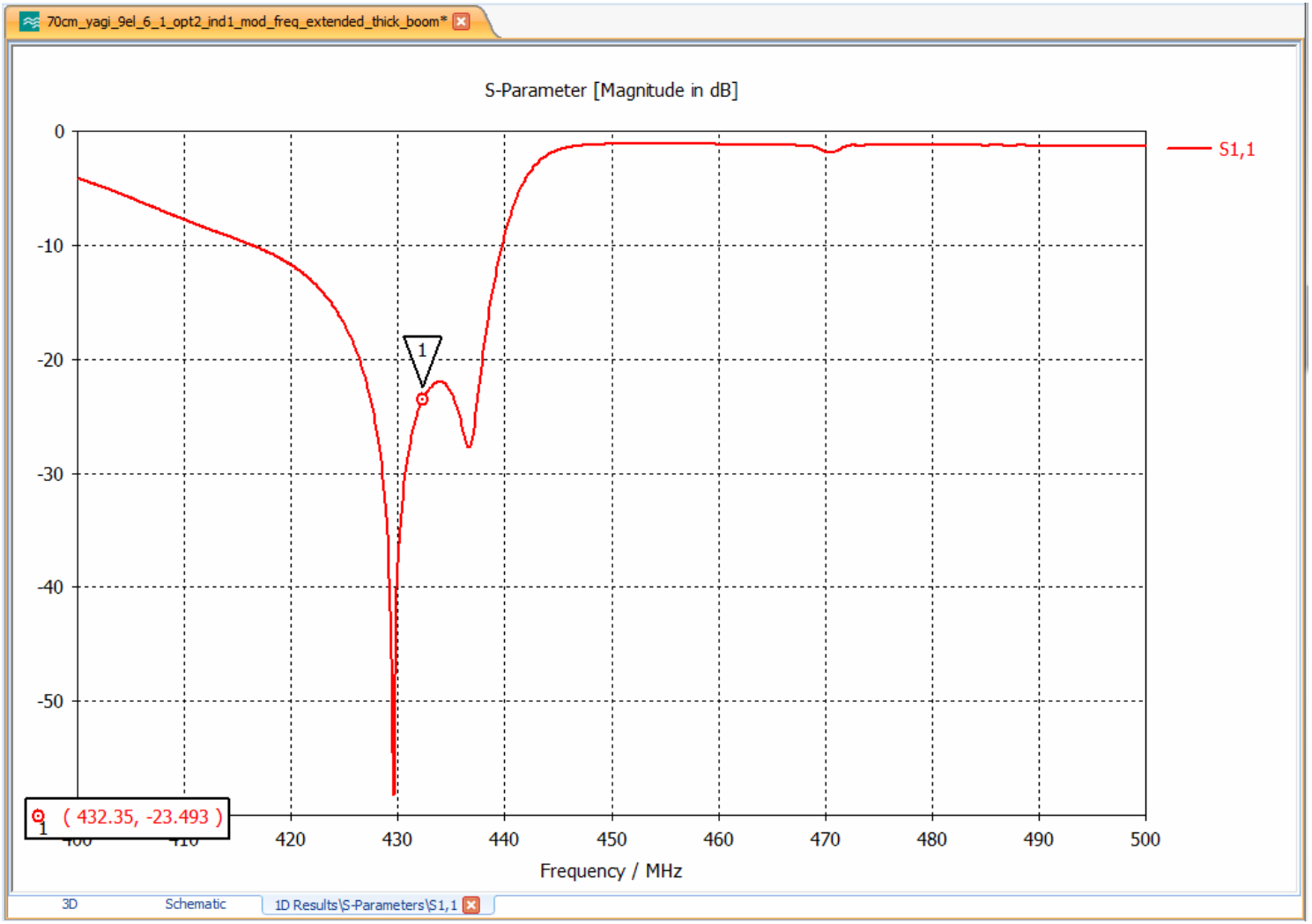
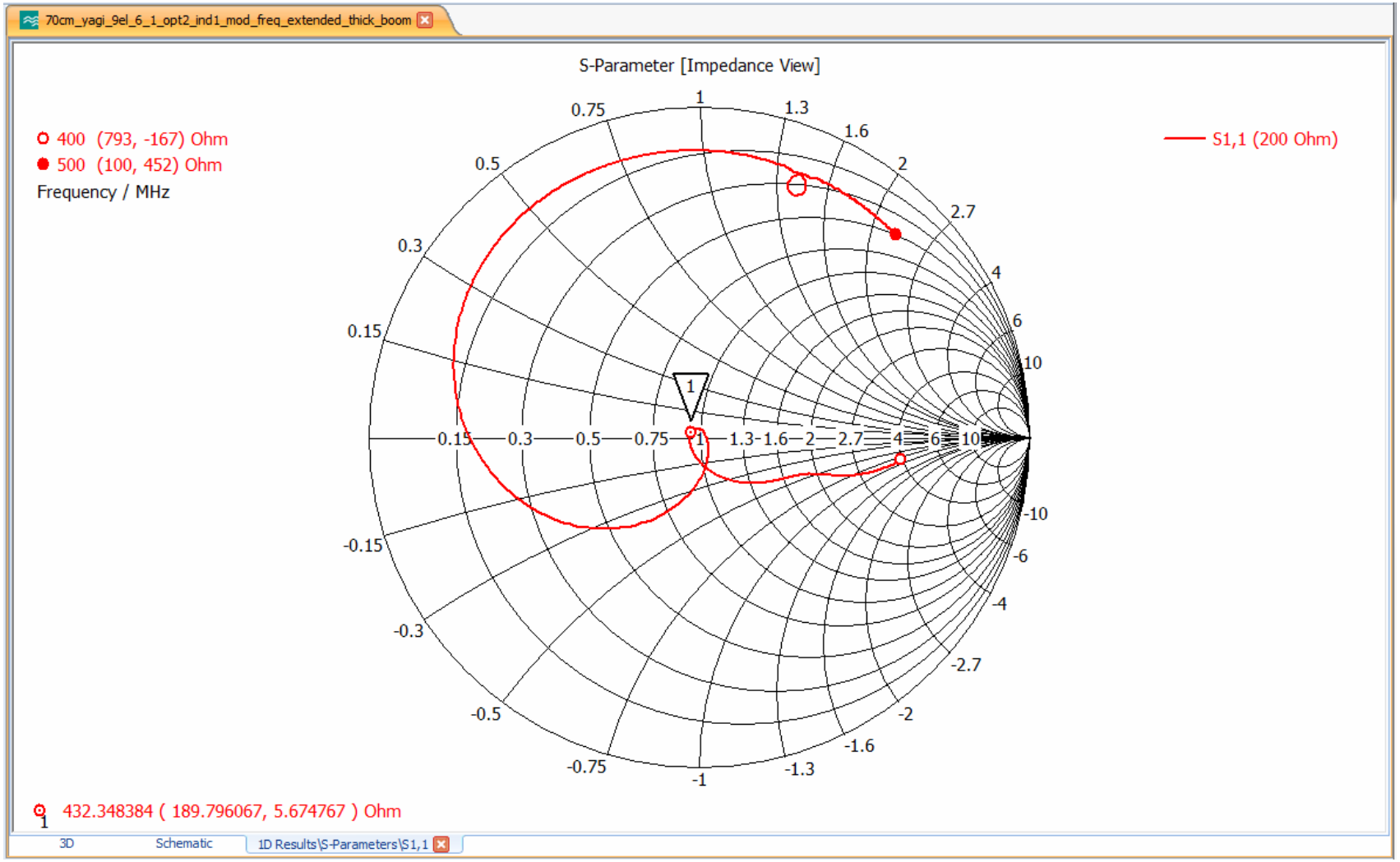
Simulated S11 (100 nH)



Simulated S11 (120 nH)



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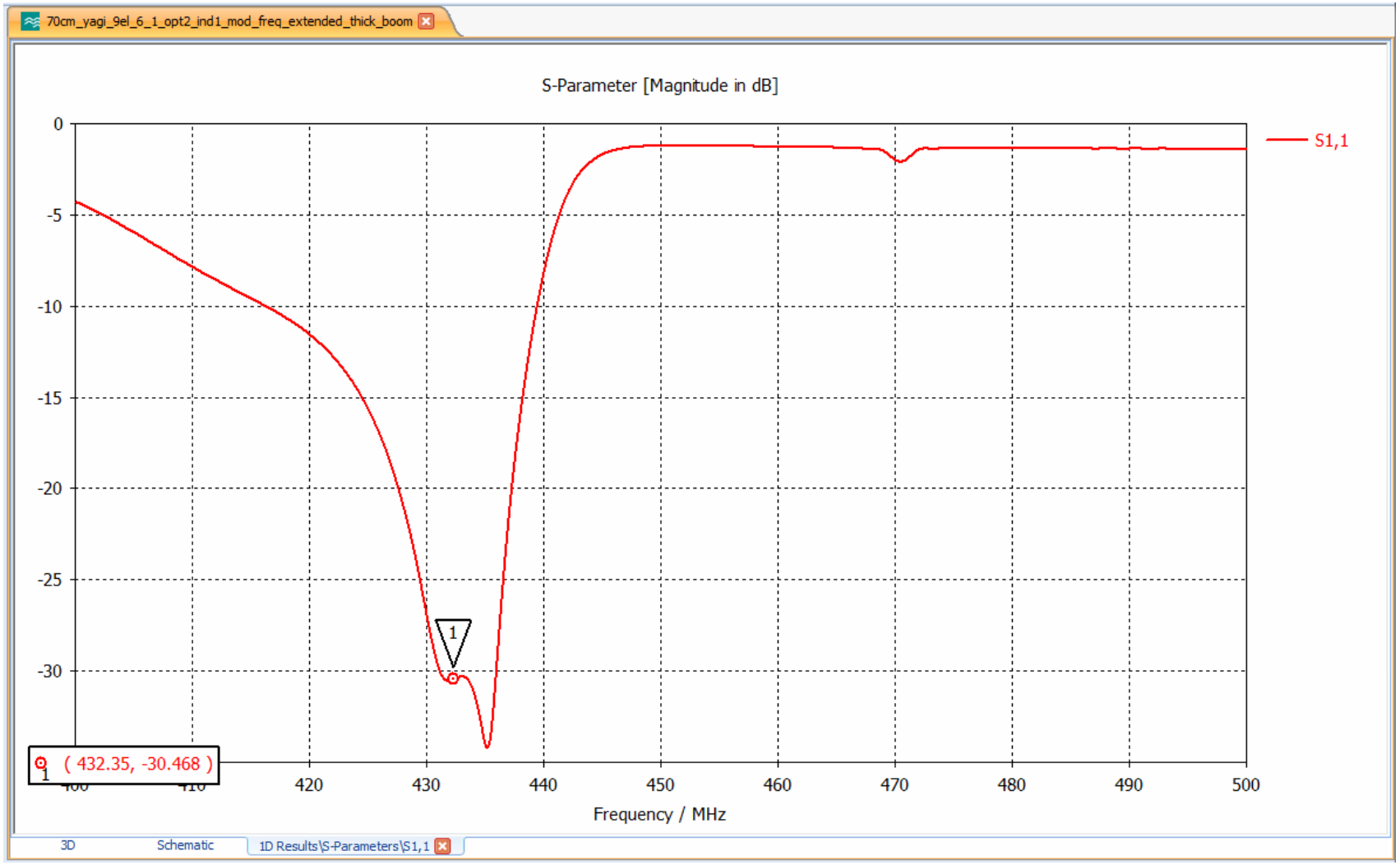
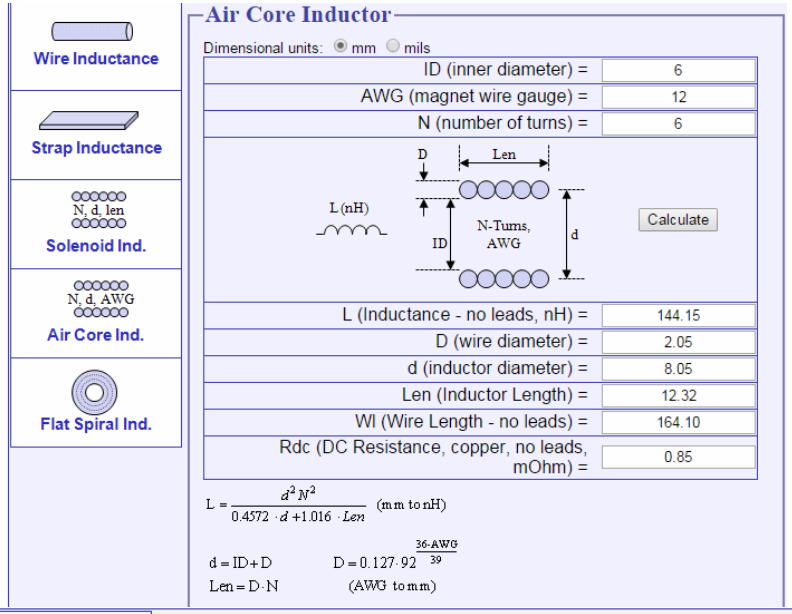
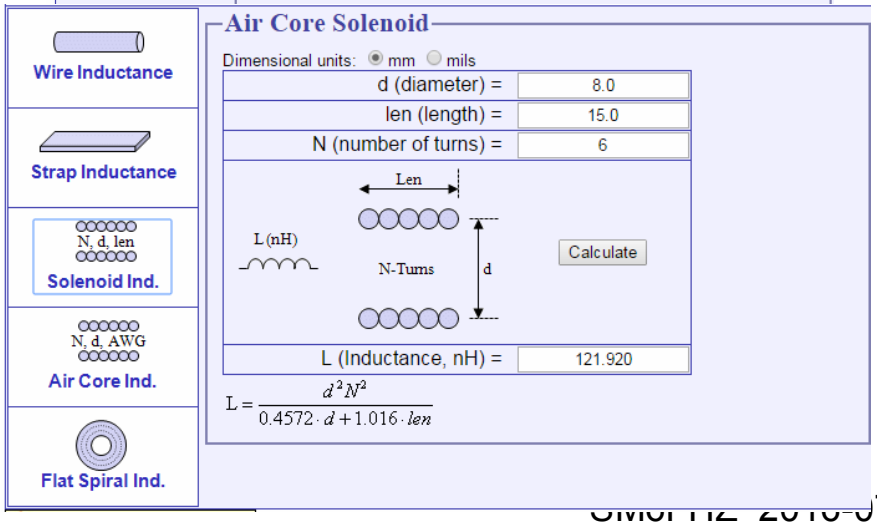
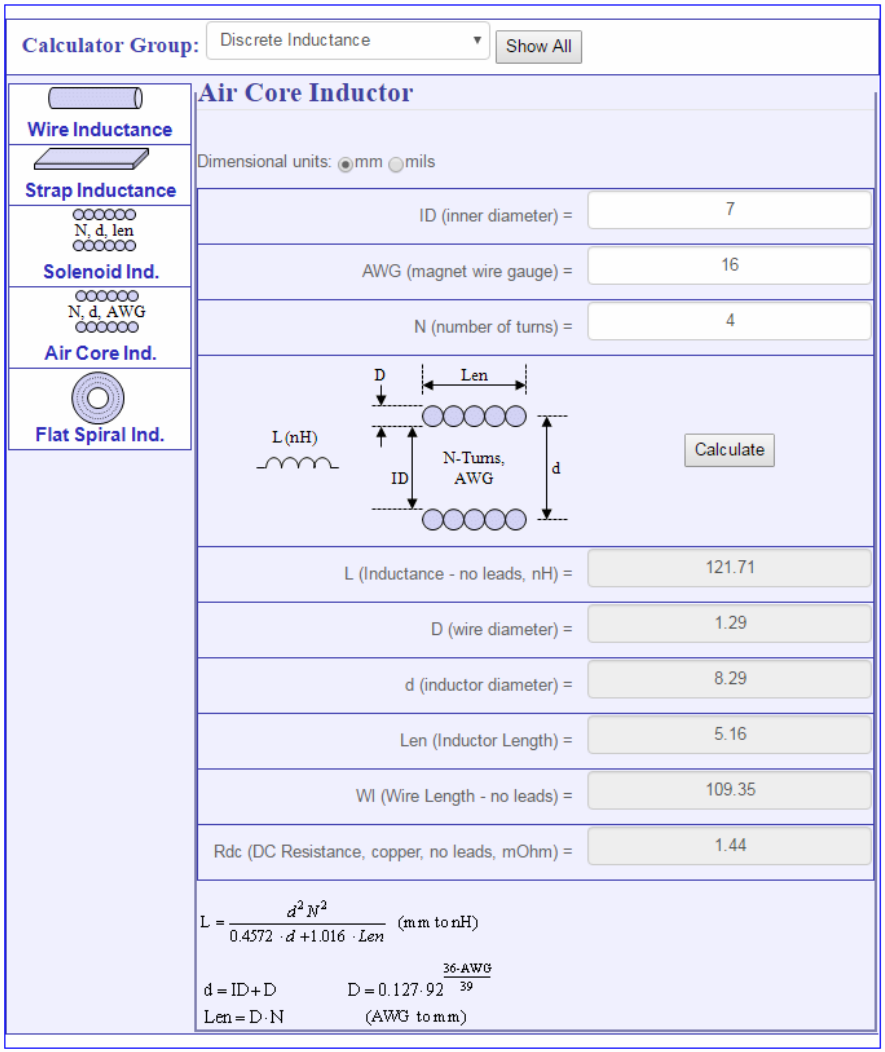
Simulated S11 (120 nH)



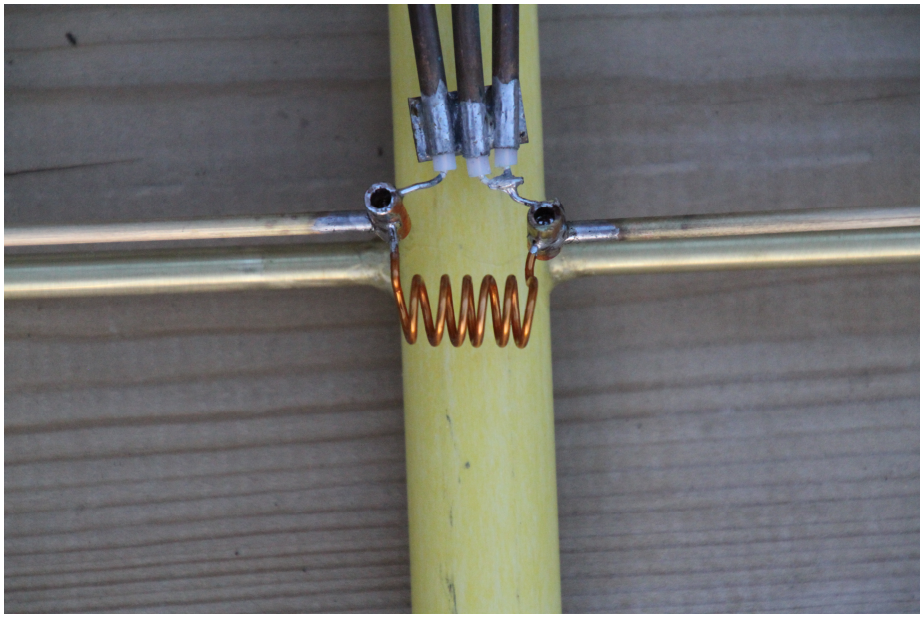
Inductor dimensions



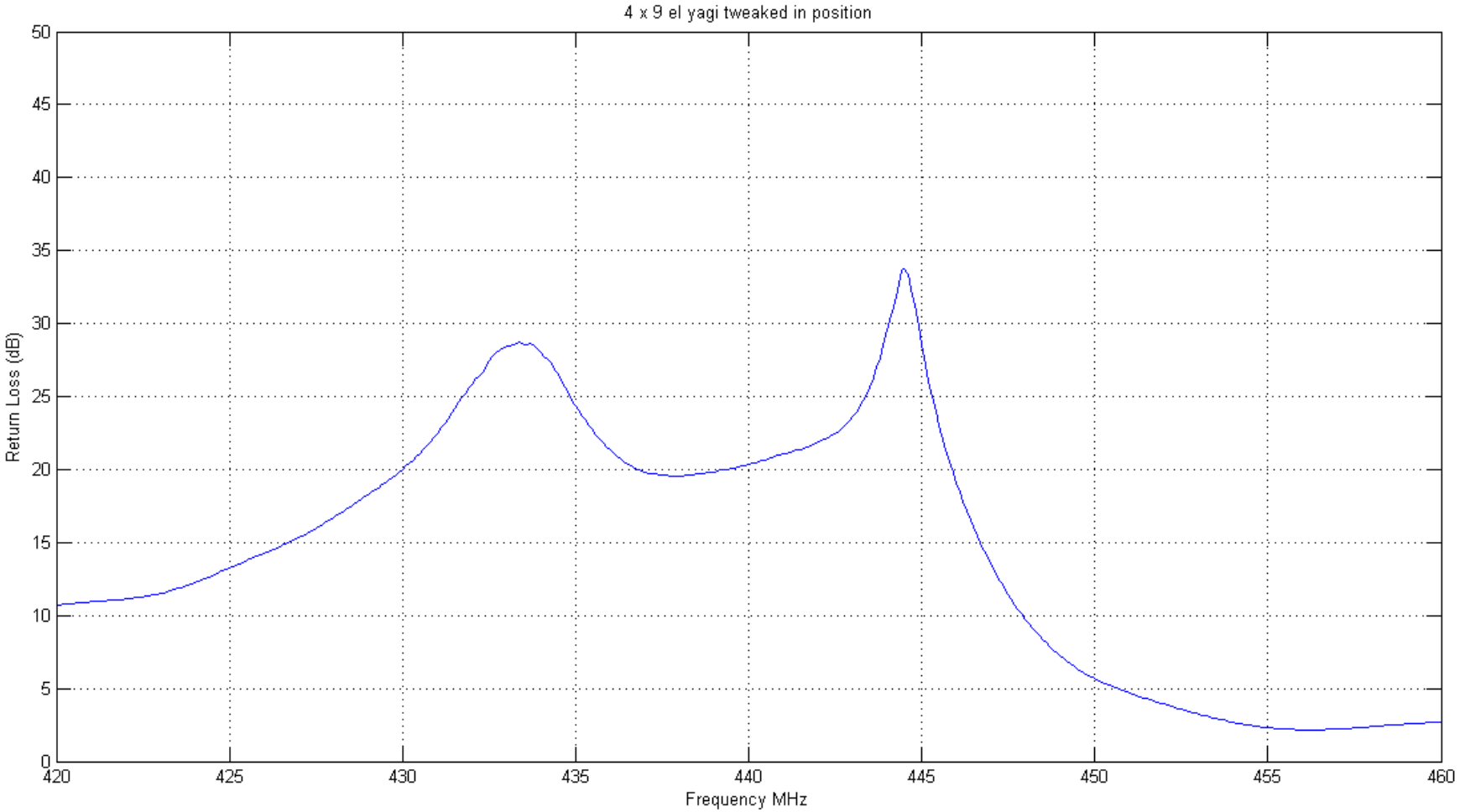




120 nH inductance



Measured Return Loss for 4x9 el



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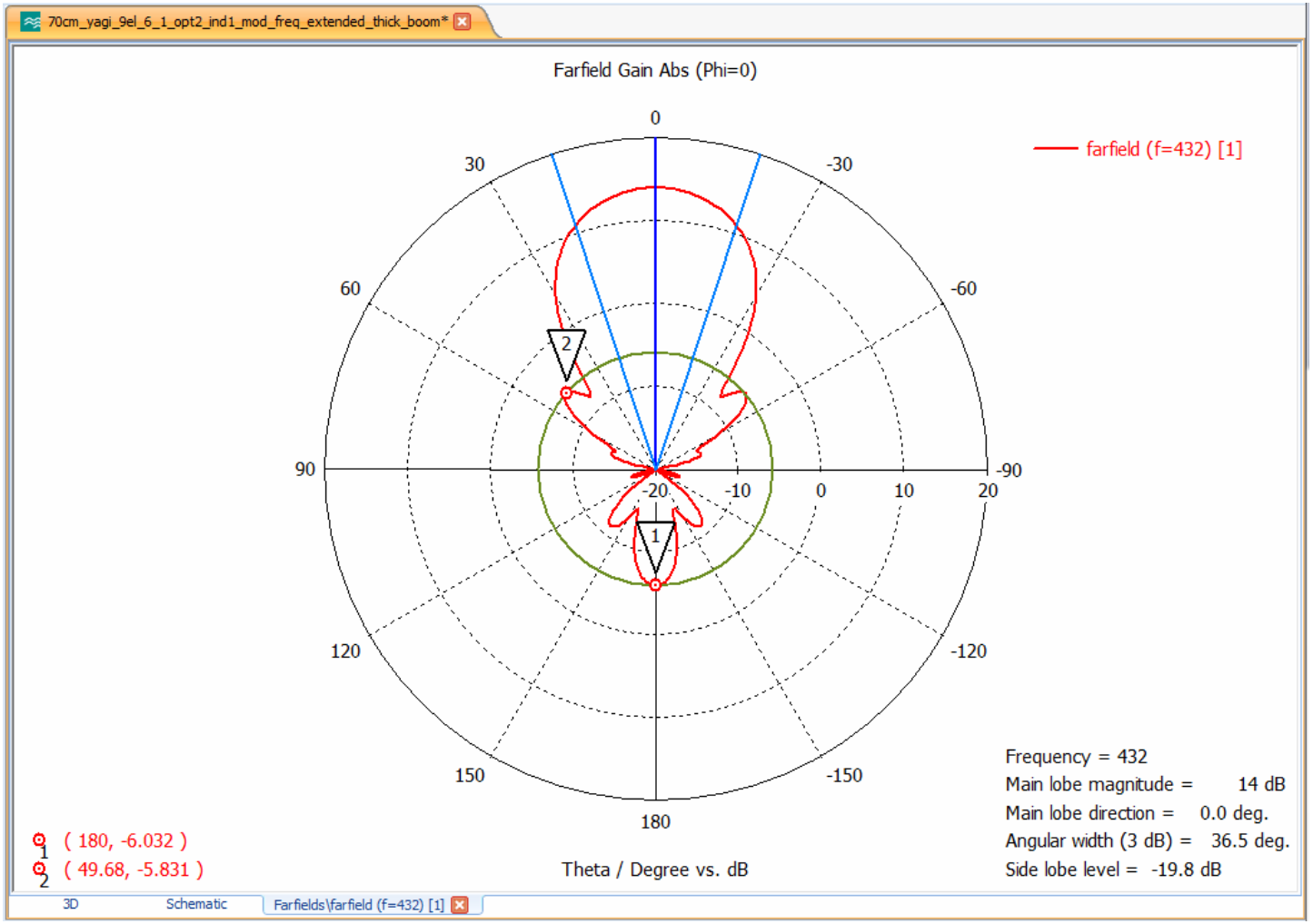
Simulated E-plane pattern
9 element 432 MHz



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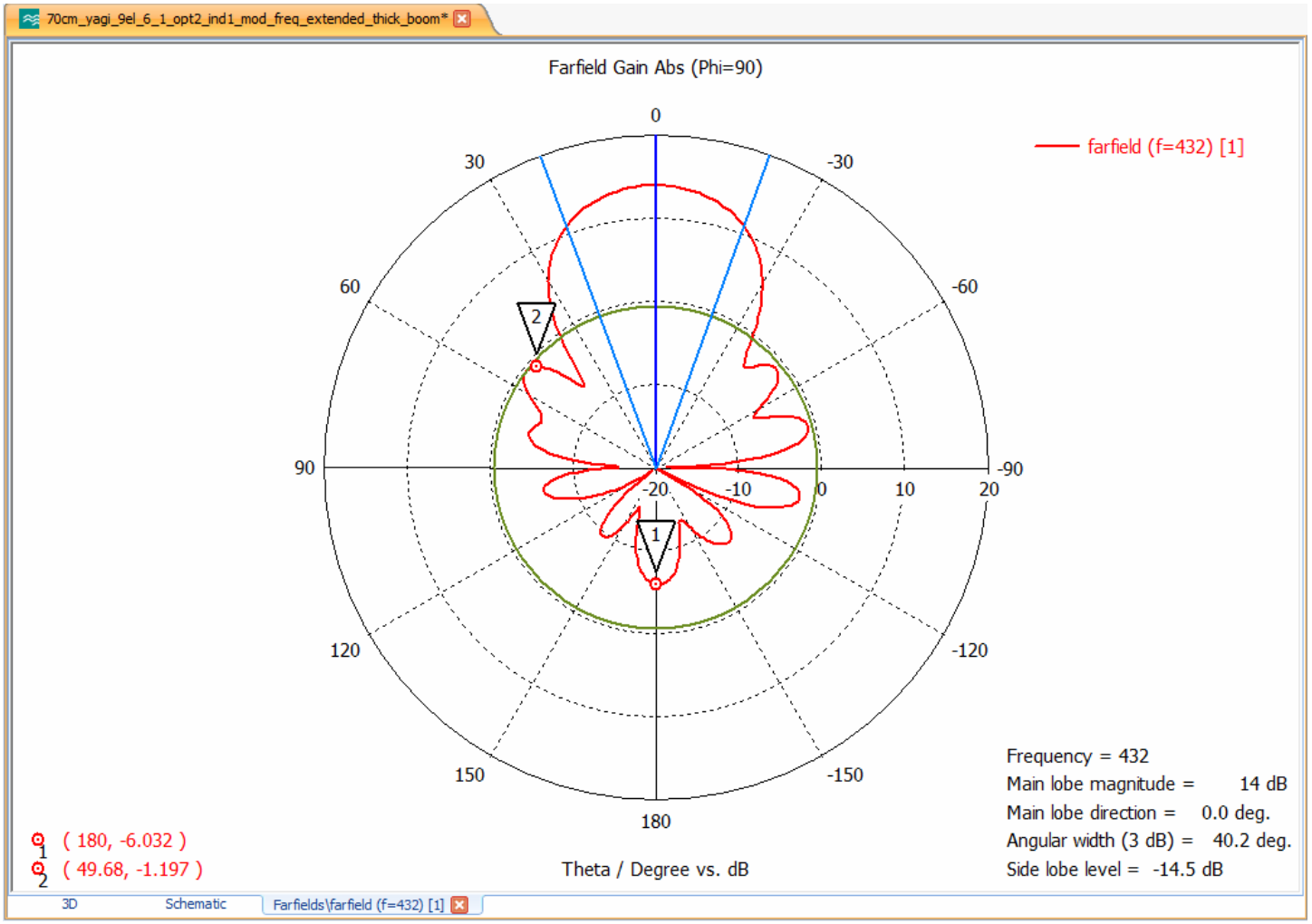
Simulated H-plane pattern
9 element 432 MHz



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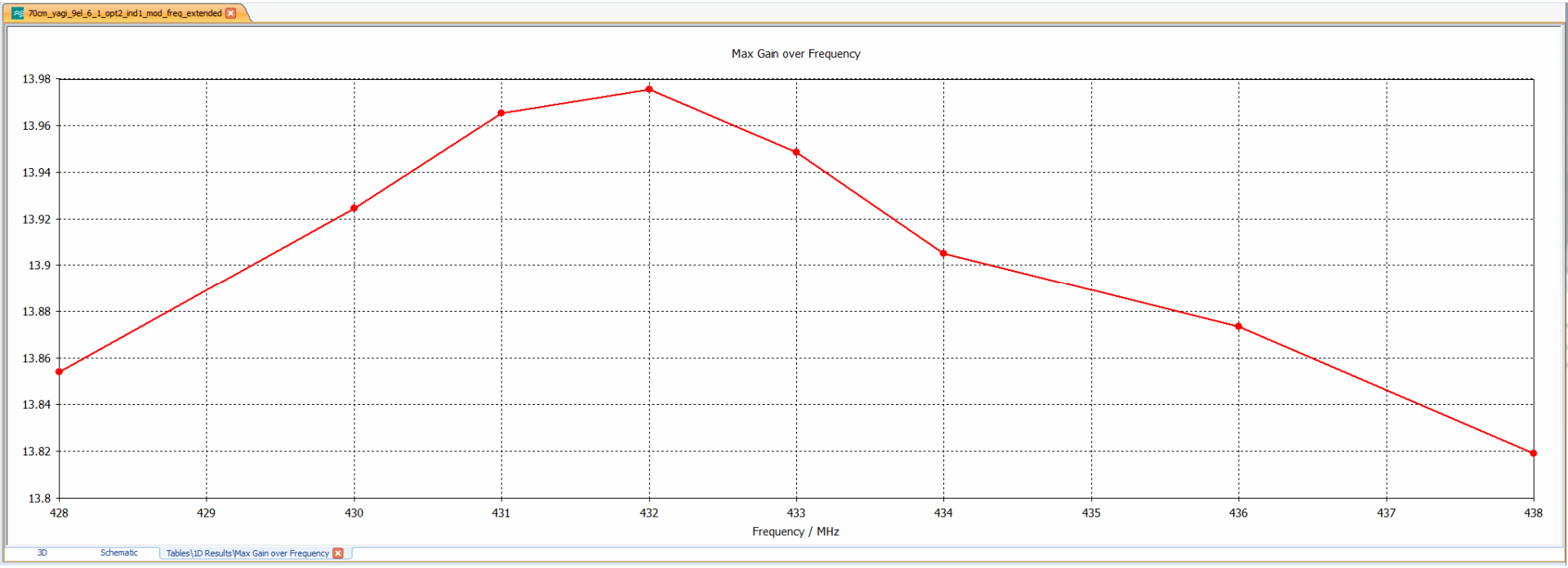
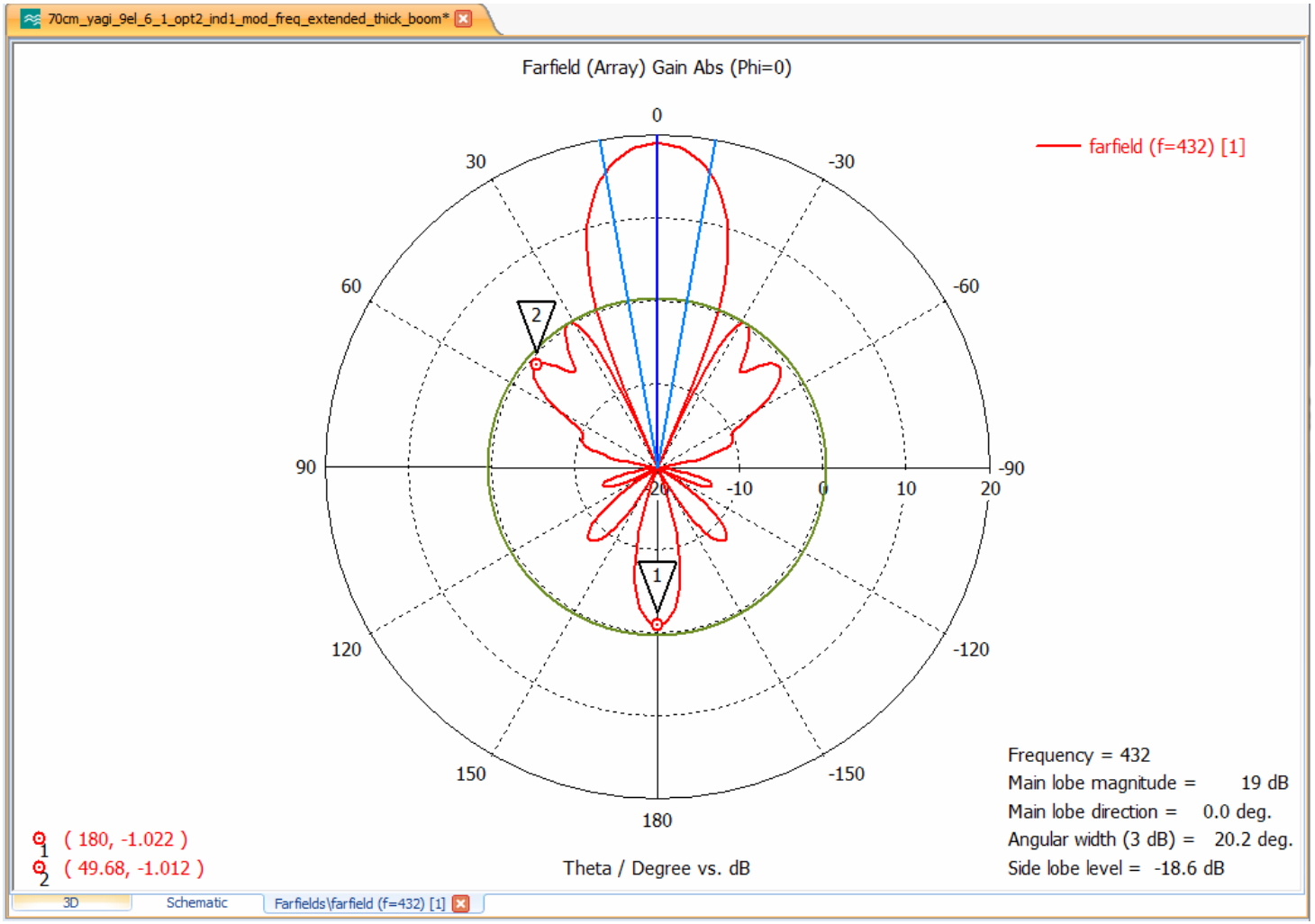
Simulated Gain over frequency



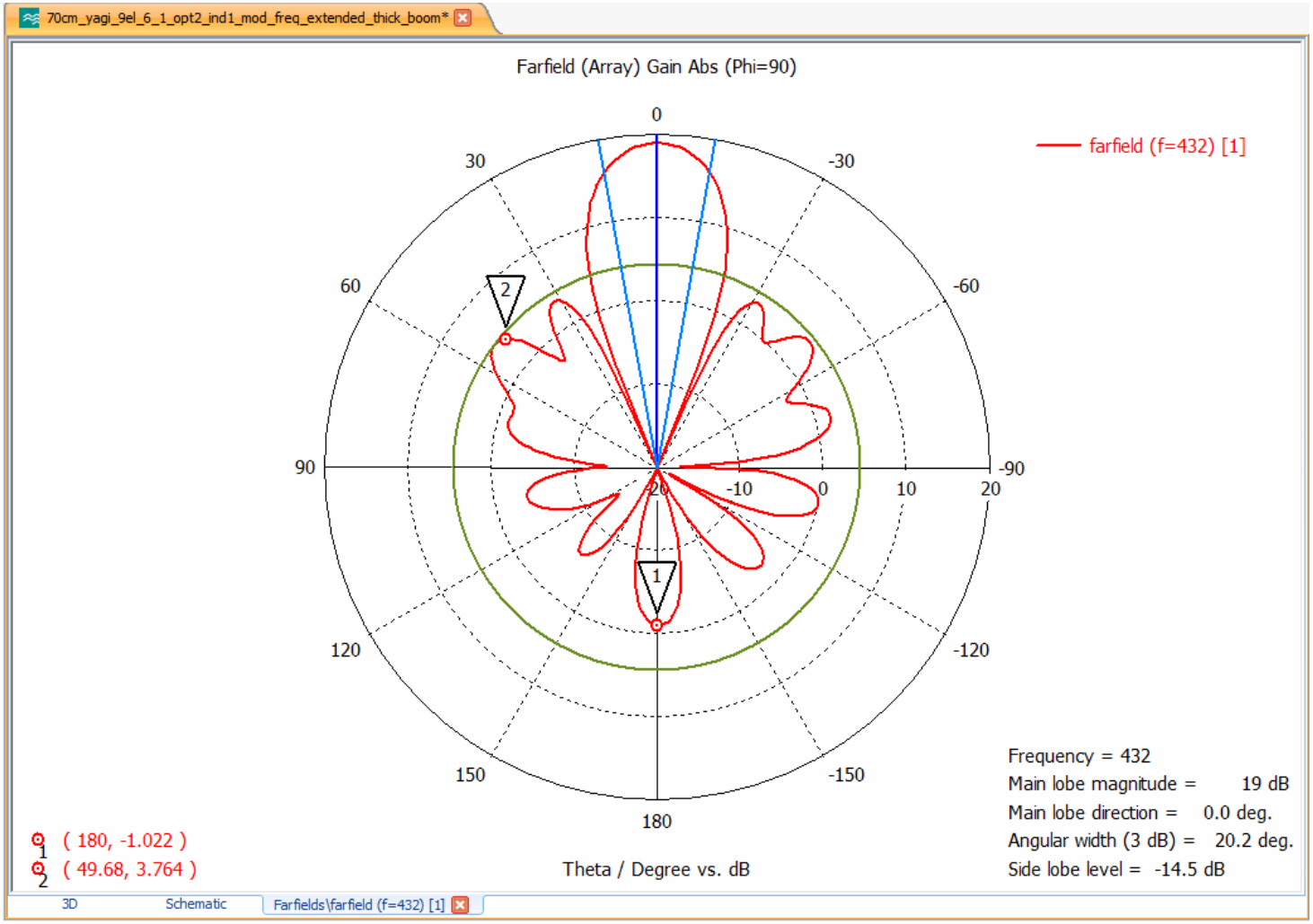
Mounting details

Full array in situ

Simulated E-plane pattern for 4 x 9 element at 850 (E-plane) x 880 (H-plane) mm



Simulated H-plane pattern for 4 x 9 element at 850 (E-plane) x 880 (H-plane) mm



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