

DESIGN OF AN IMPLANTABLE ANTENNA FOR MICROWAVE HYPERTERMIA

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INTRODUCTION

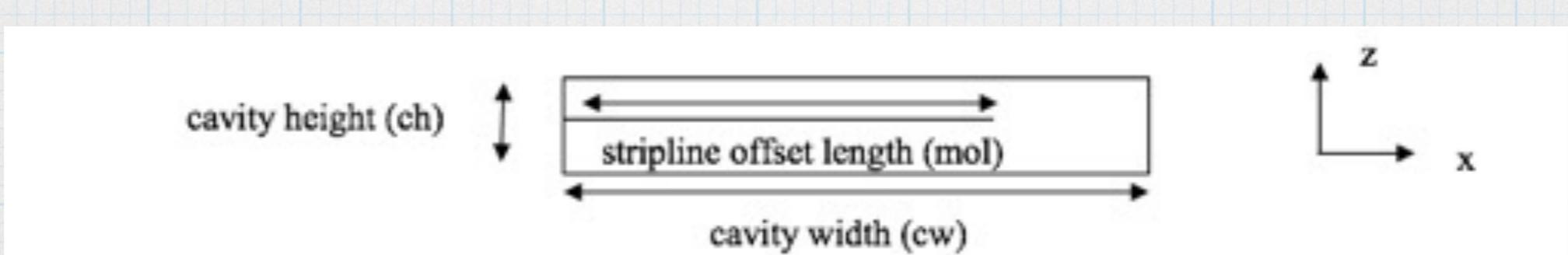
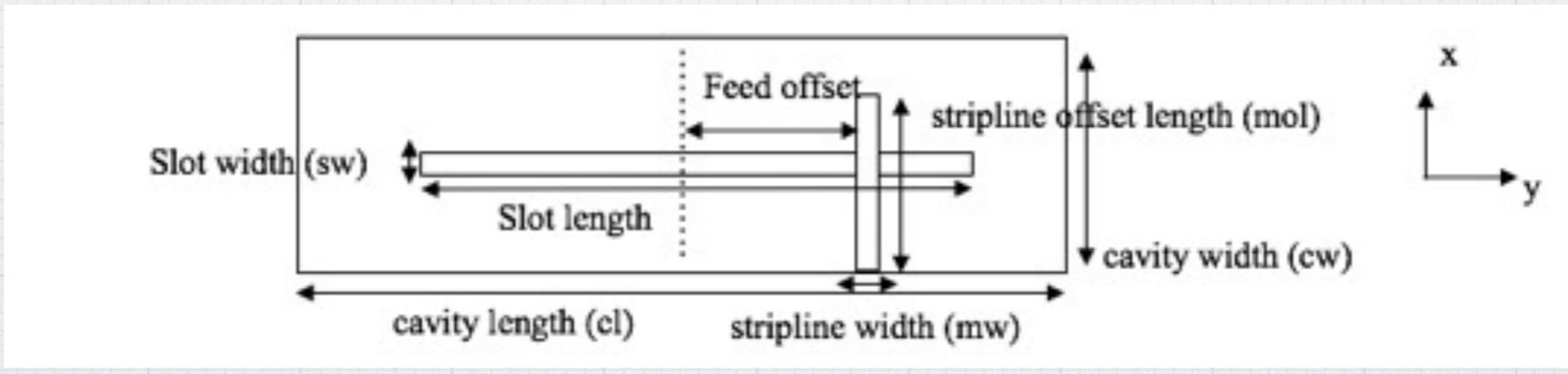
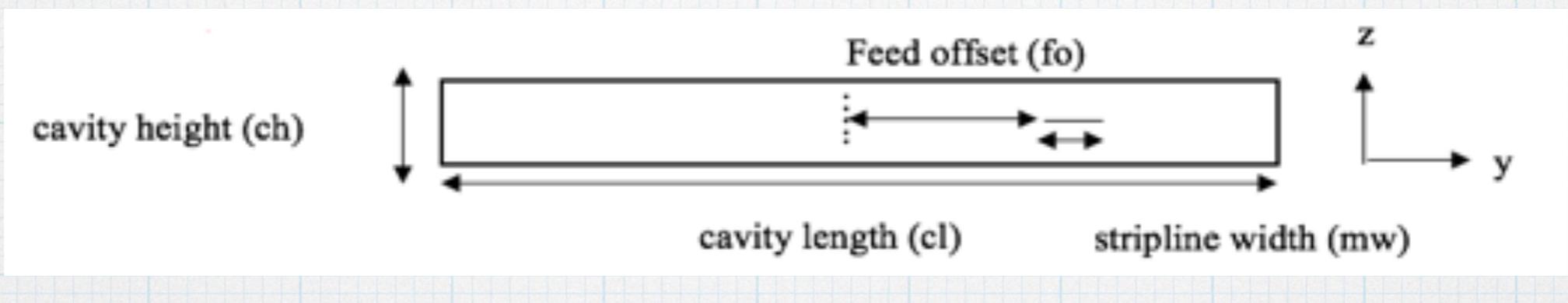
- * Technological advances in healthcare
- * Joint replacement surgery
- * increasing trends in most countries
- * Revision surgery ————— expensive , risky

INTRODUCTION

- * Antibiotic therapy → not successful
- * Why ? → AMR
- * An antenna taking action against infection before and during biofilm formation

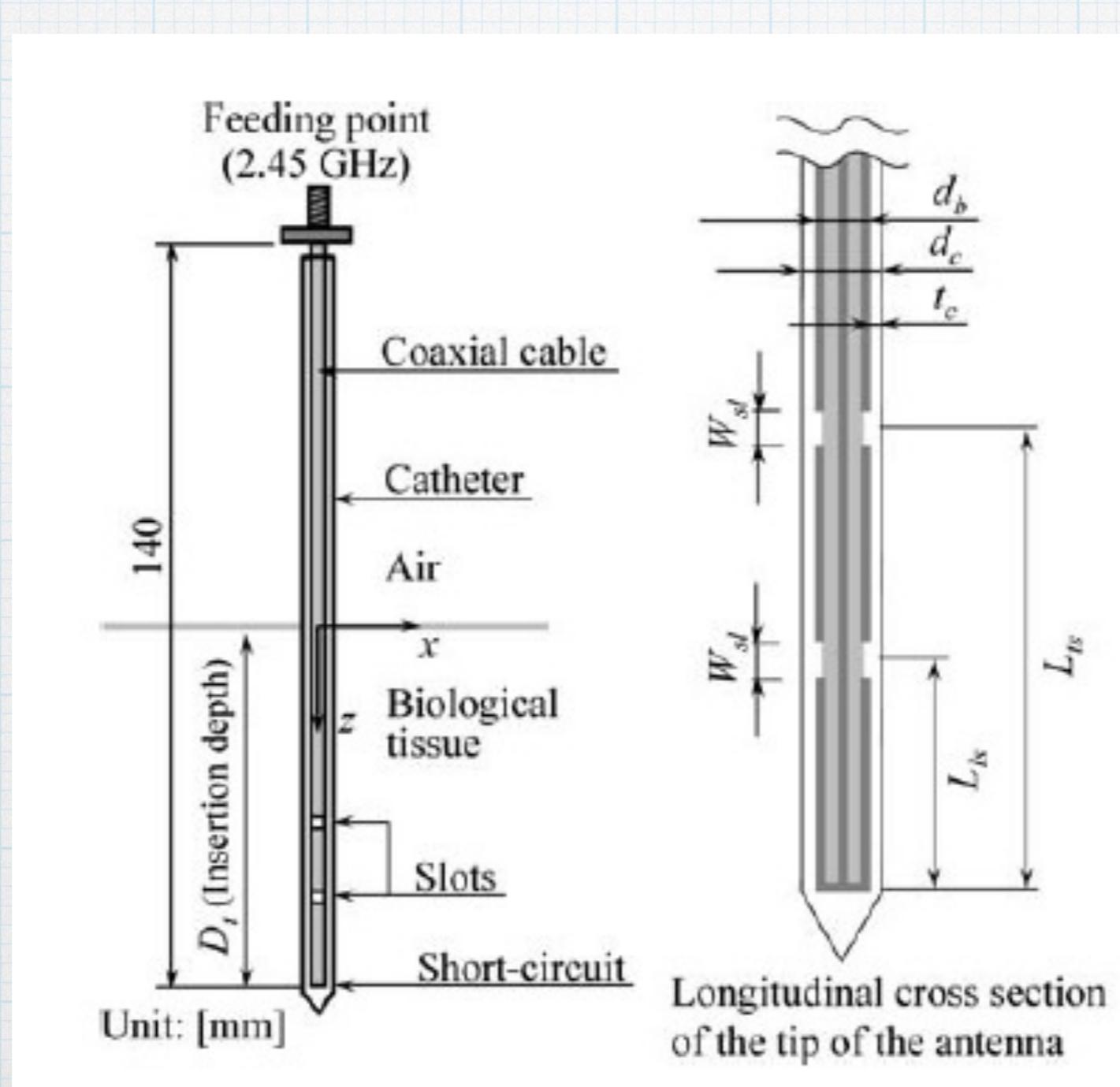
EE 491

* Microstrip-fed CBSA , simple structure



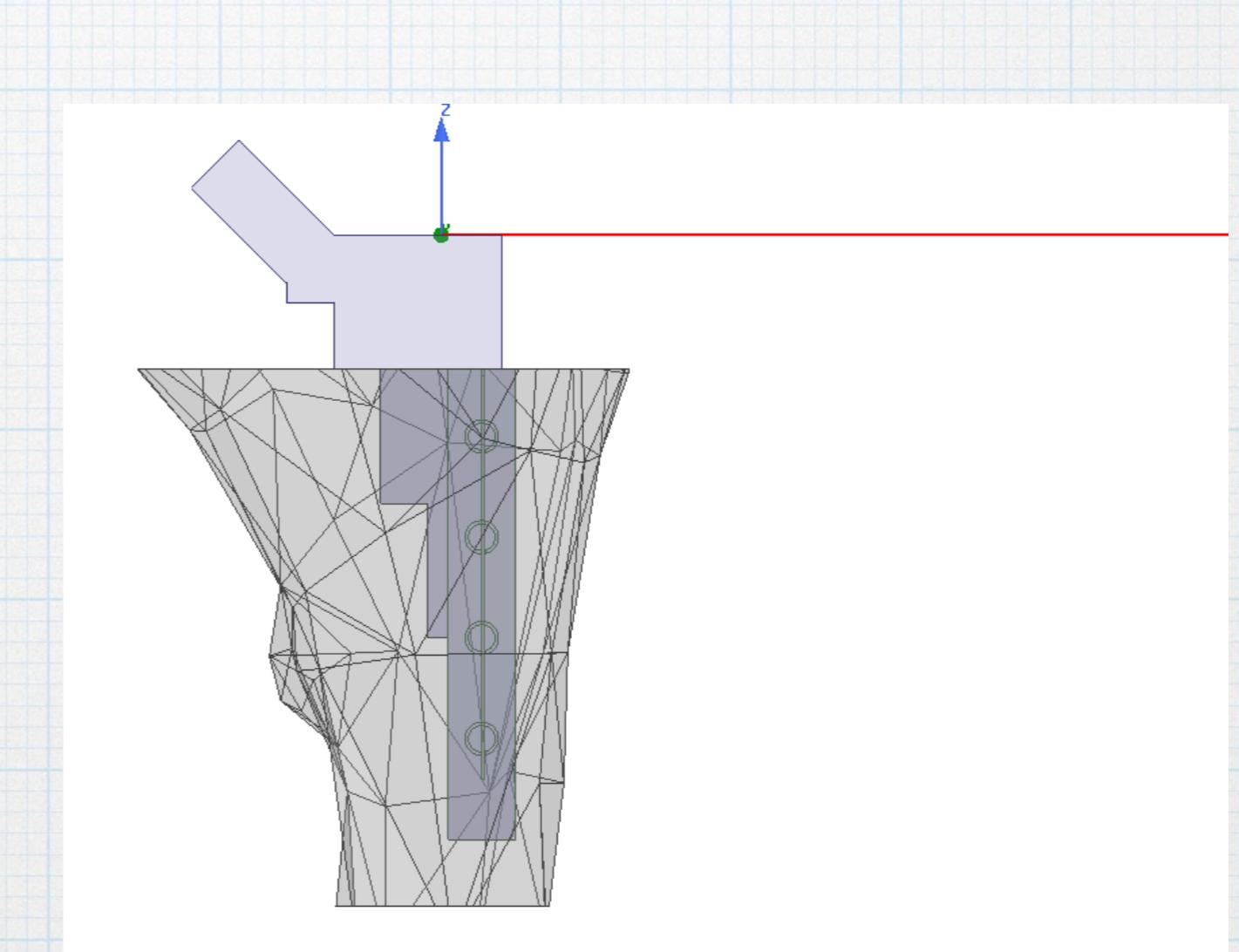
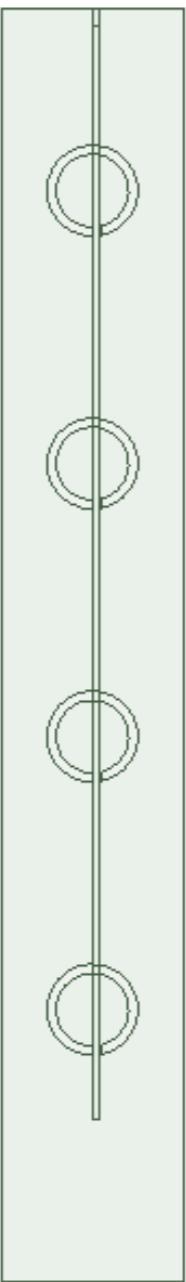
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* Coaxial Slot Antenna



EE 491

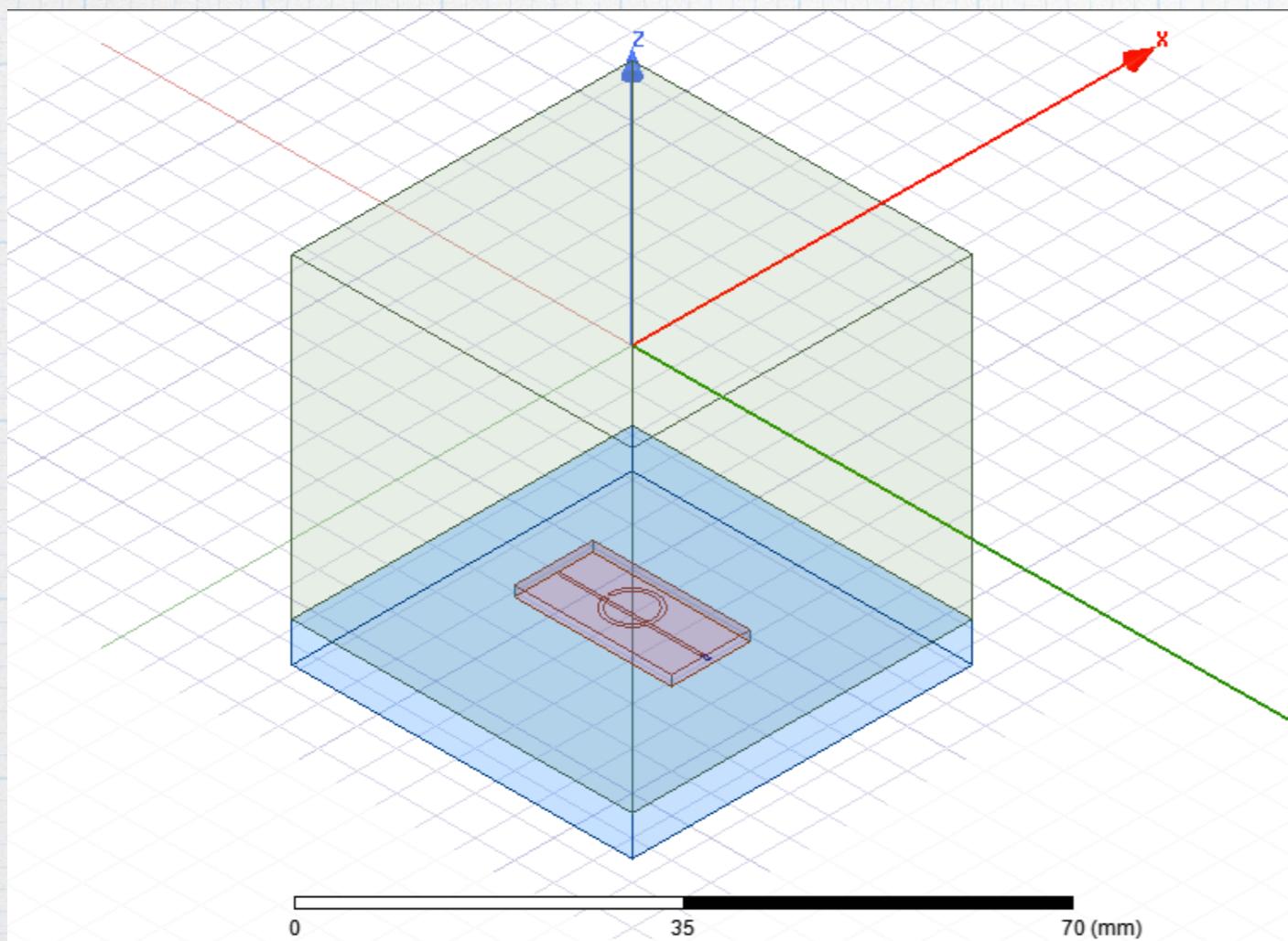
Antenna with C-type slots



EE 492

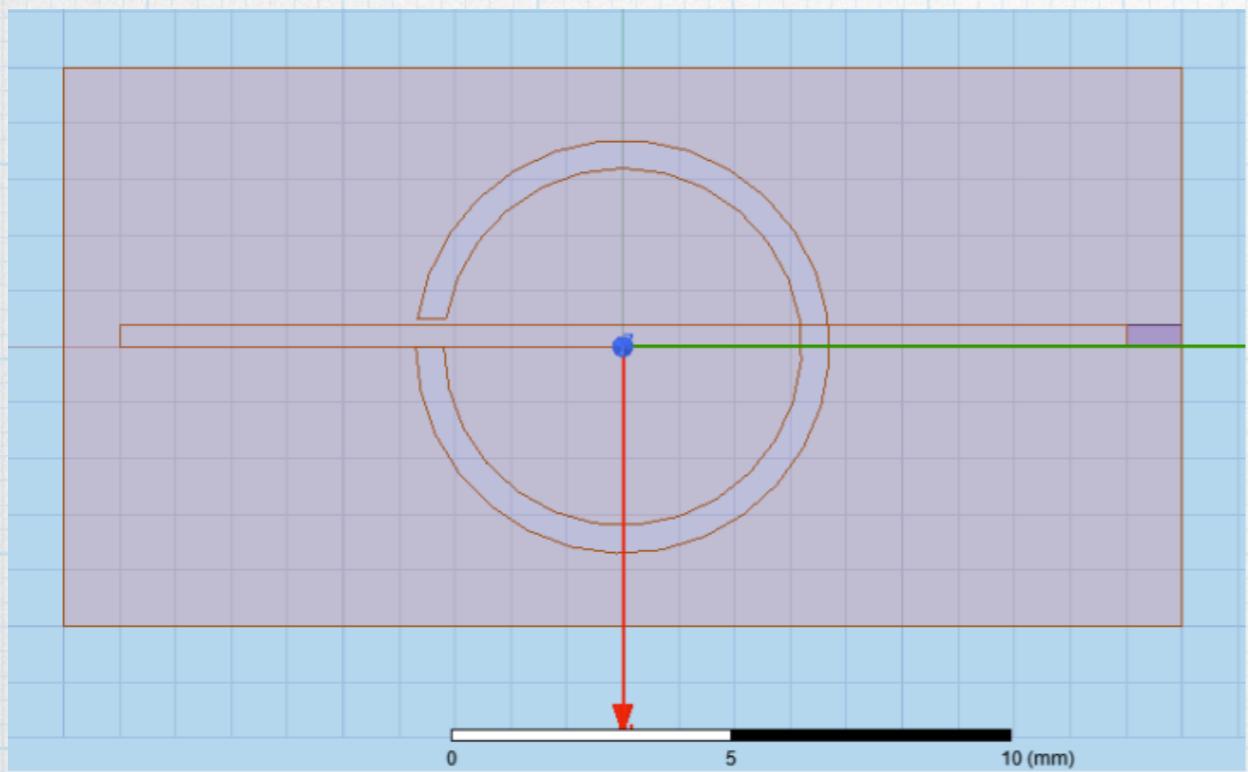
- * A new road map
- * Result-oriented
- * Think about an antenna that can be manufactured and tested easily

Test antenna

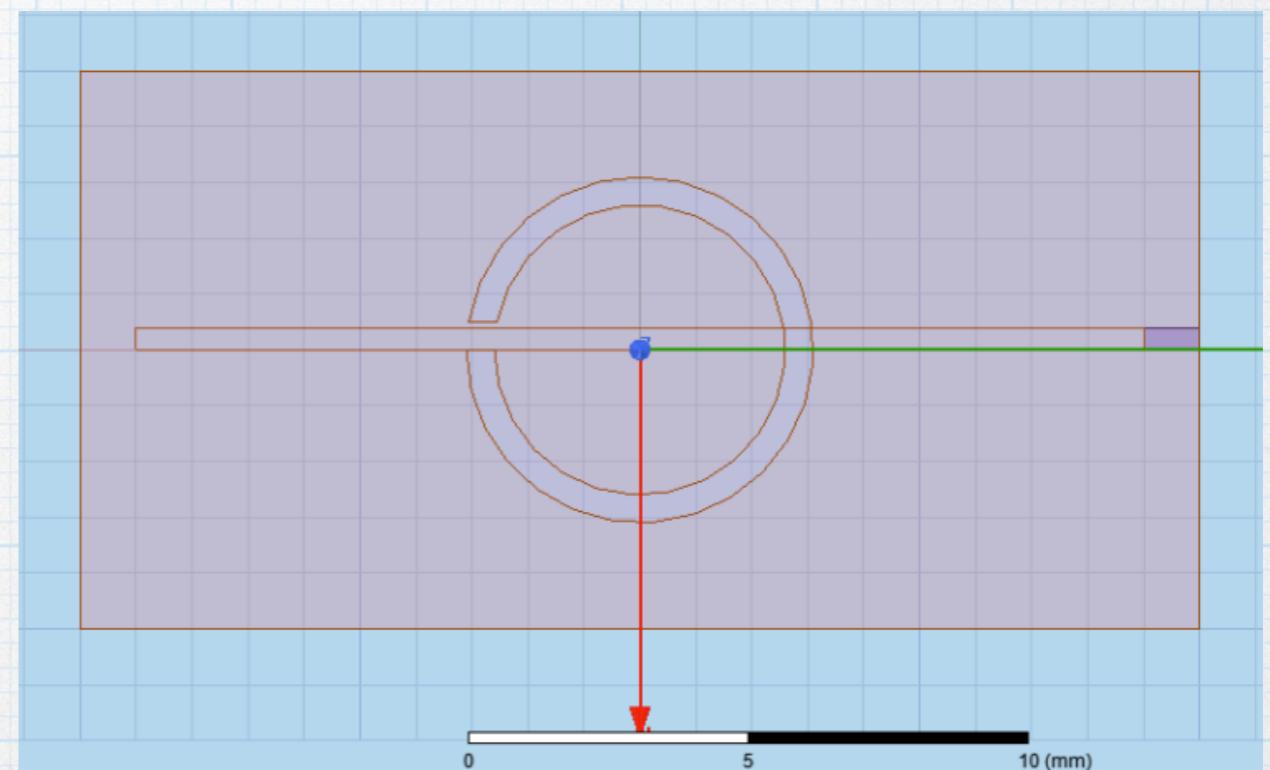


- * Test heating at different frequencies

Test antenna



* Operating @ 2.0GHz

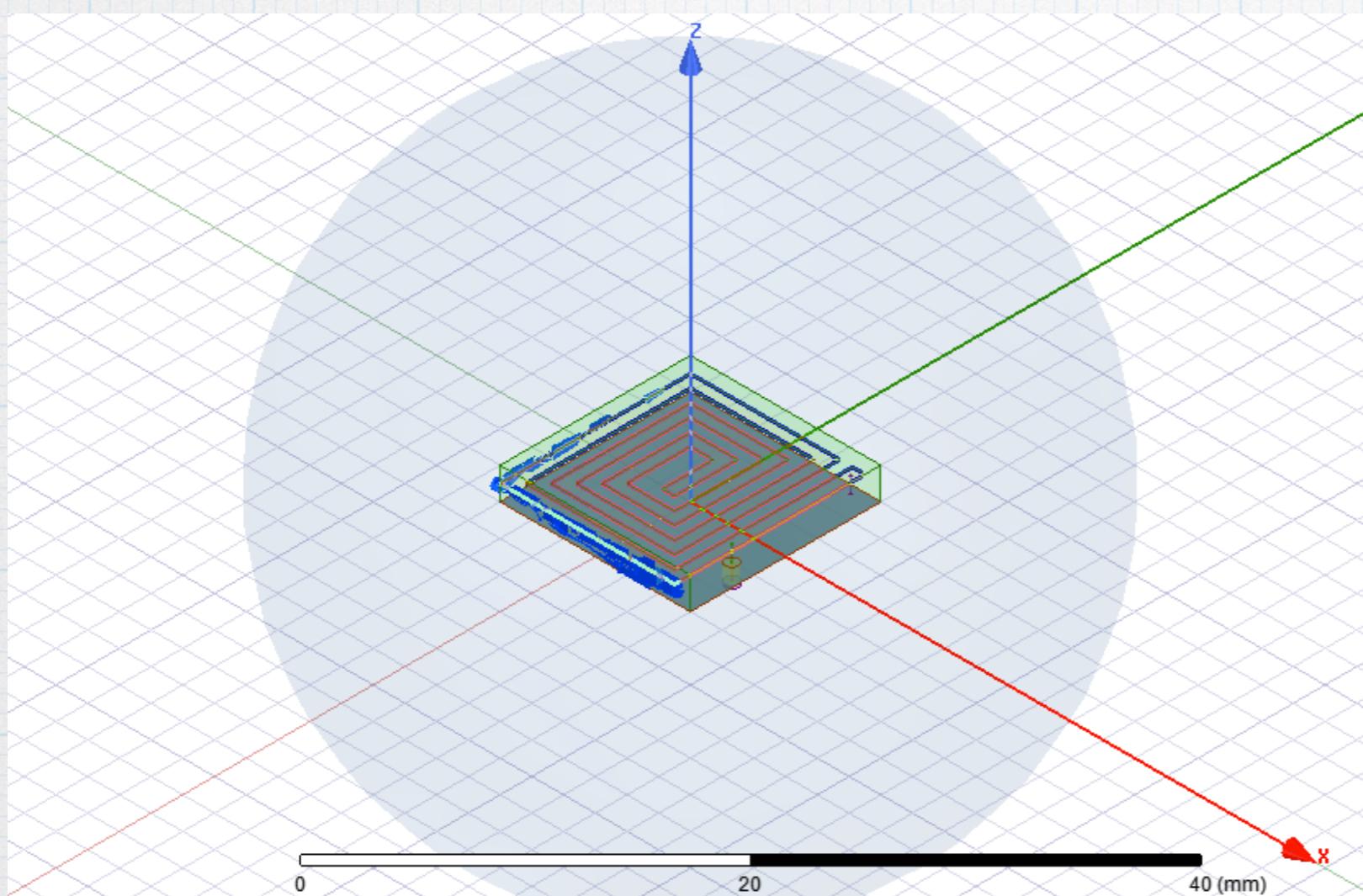


* Operating @ 2.5 GHz

Why so critical?

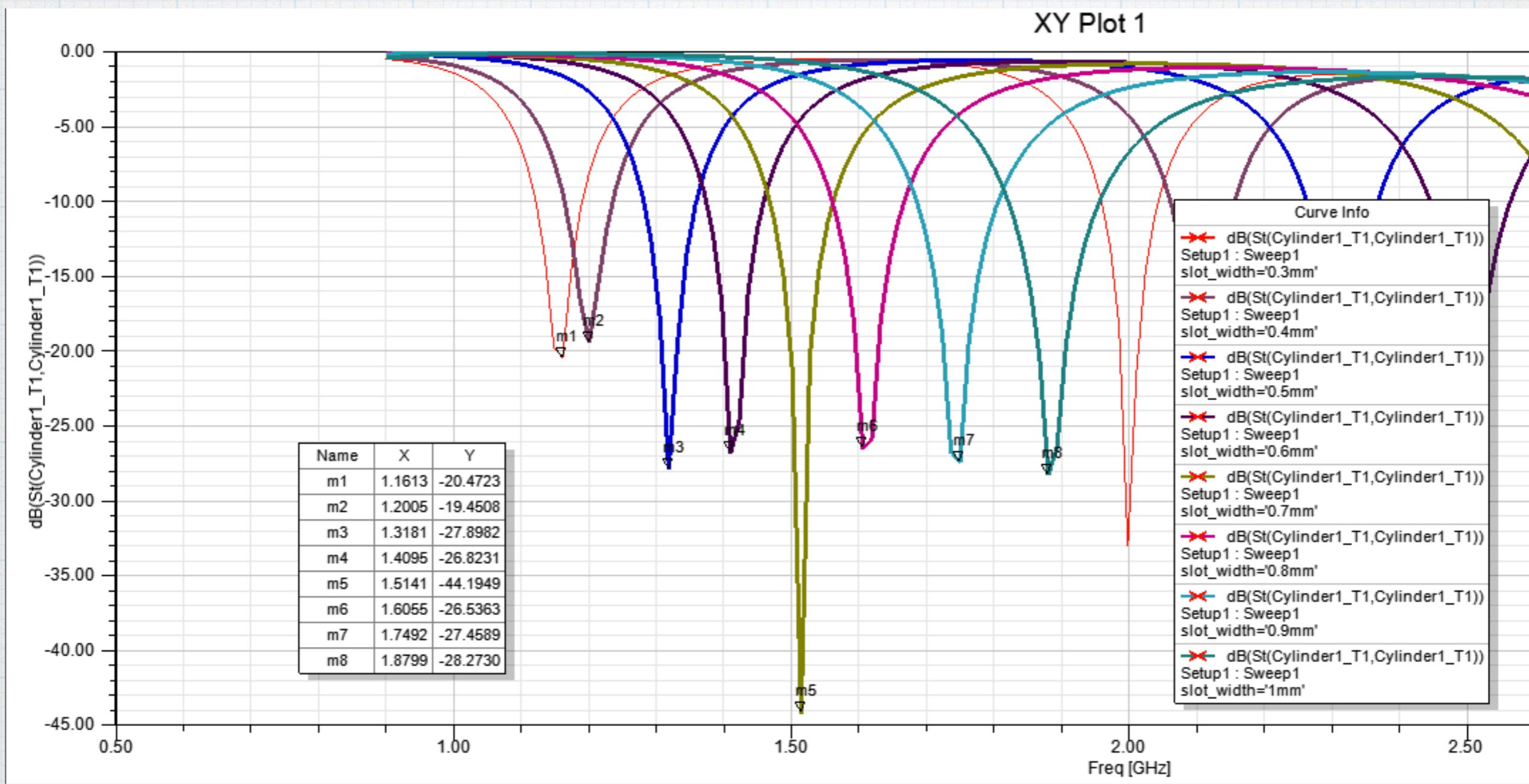
- * Find the optimum operating frequency value of the antenna which results in perfect SAR distribution
- * SAR : power absorbed into the unit mass of tissue

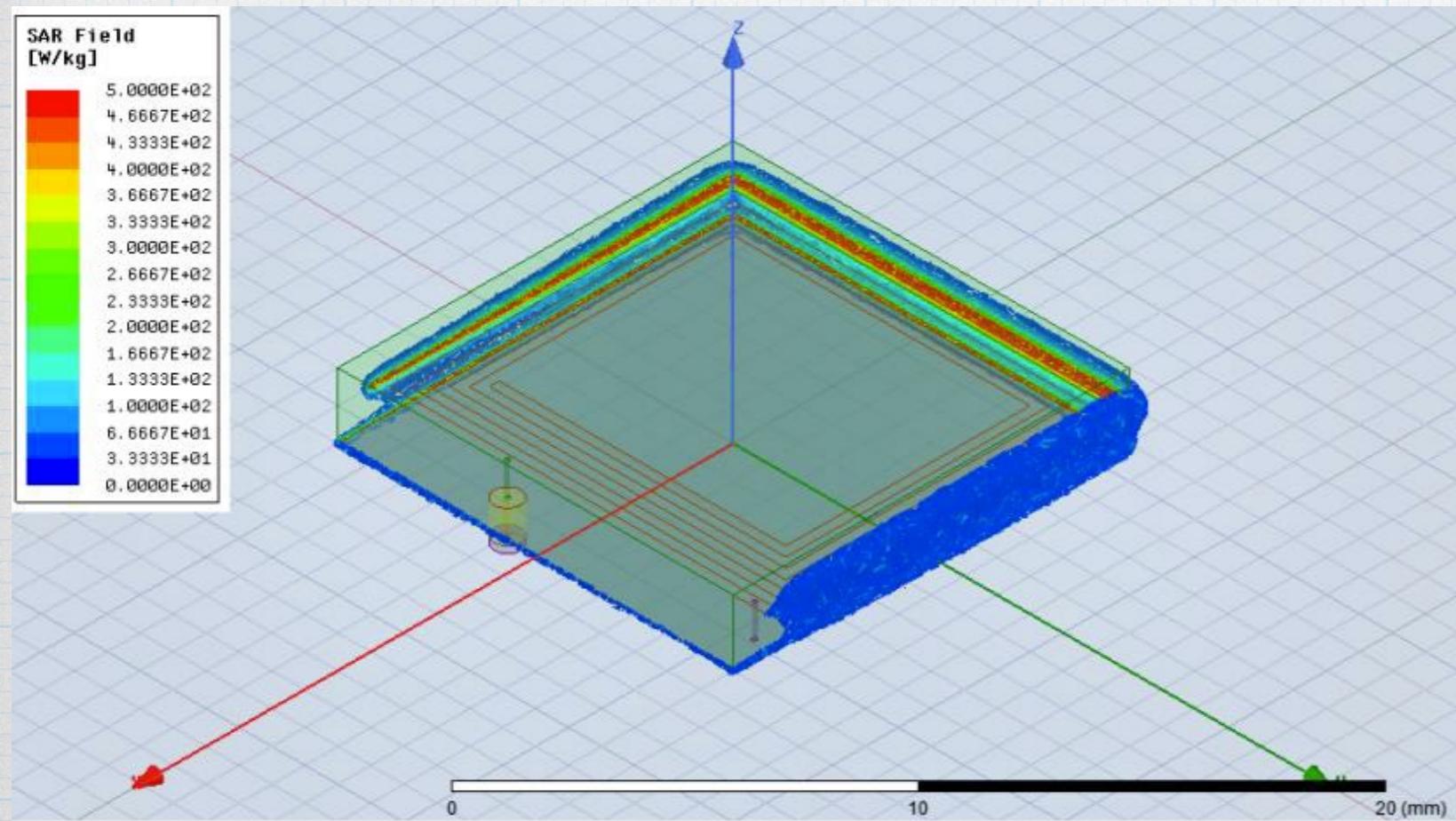
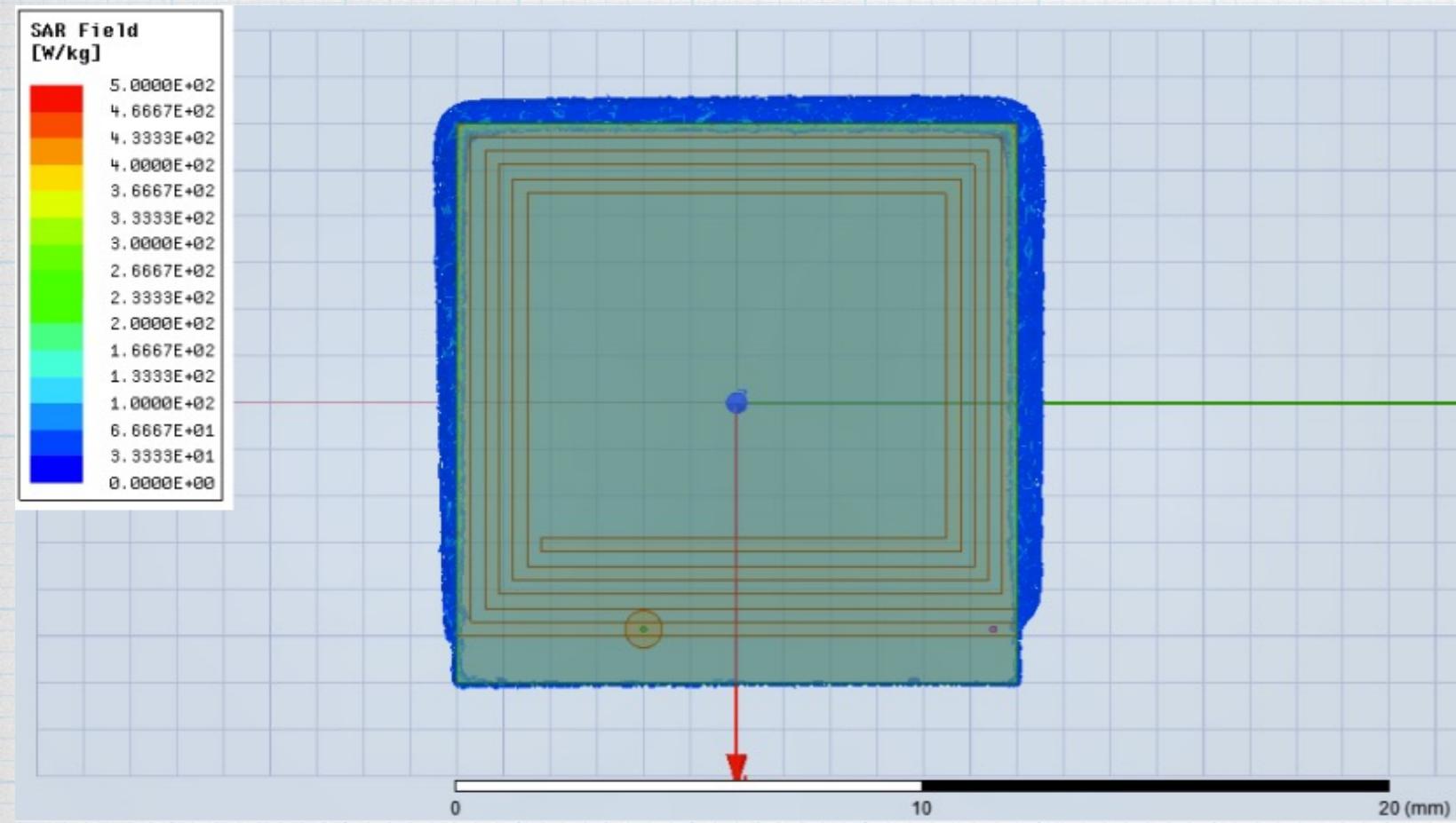
Miniaturized antenna (esa)



- * Spherical medium
- * Labyrinth like slot, ground plane, impact substrate, feeding mechanism

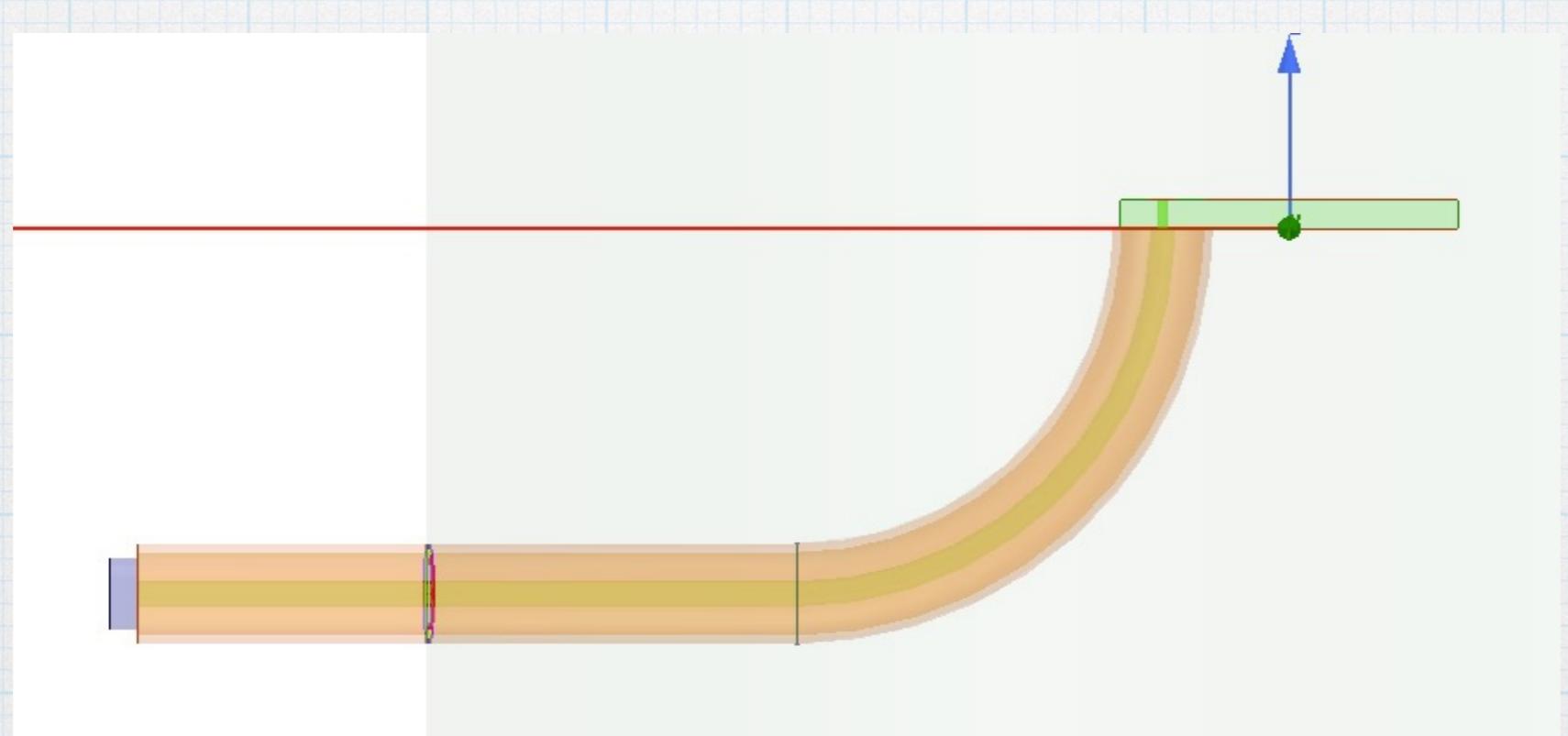
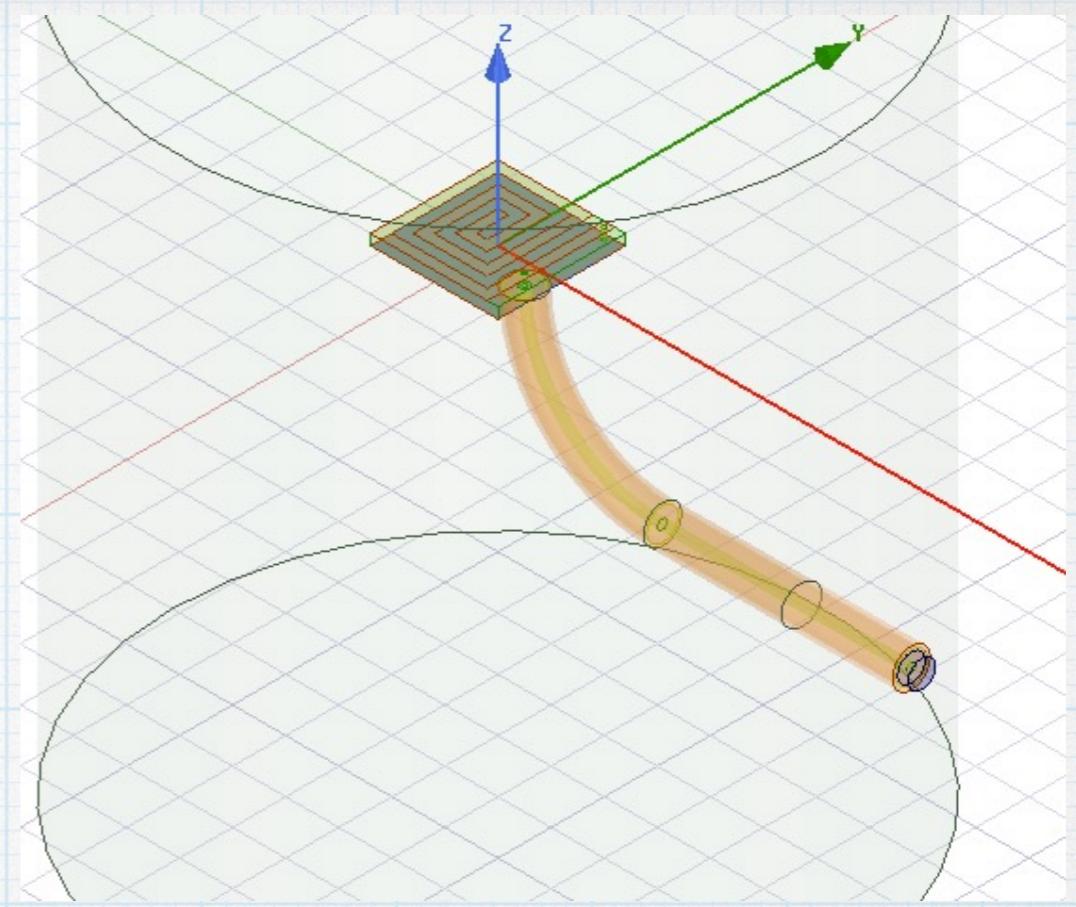
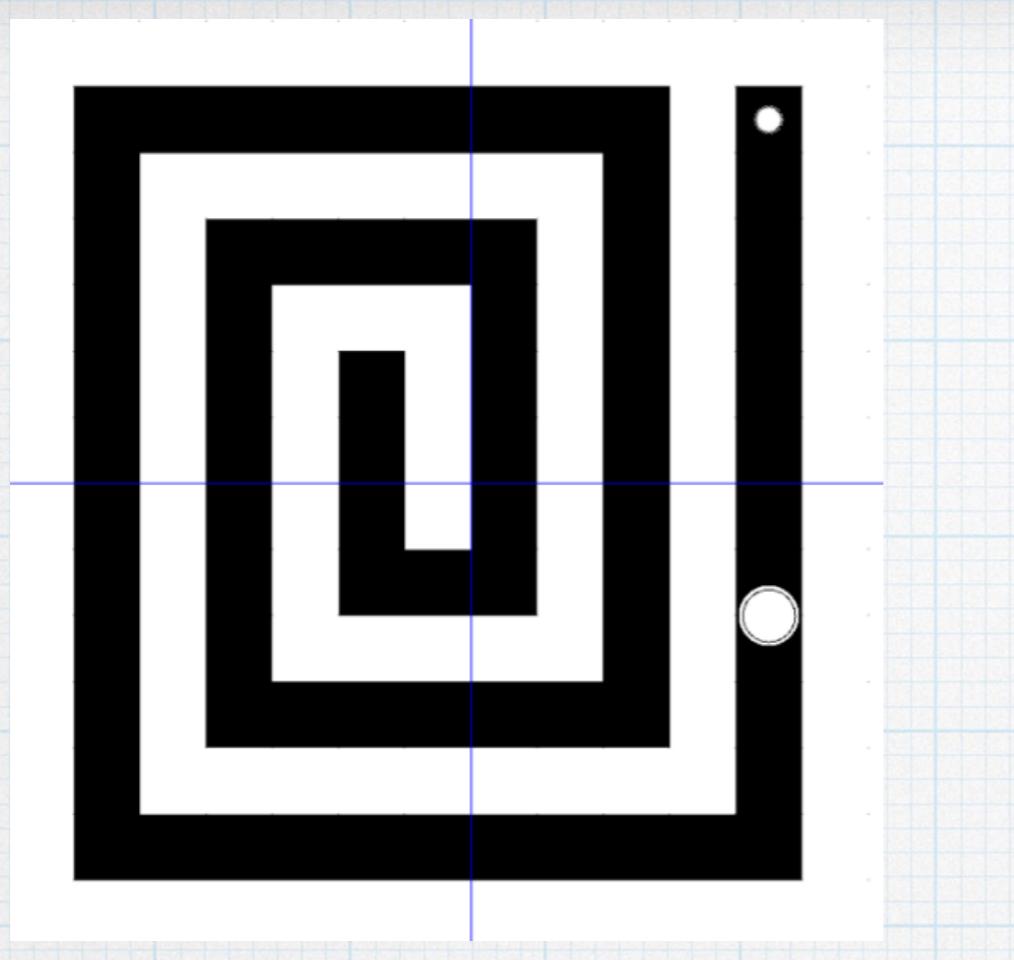
S parameters plot





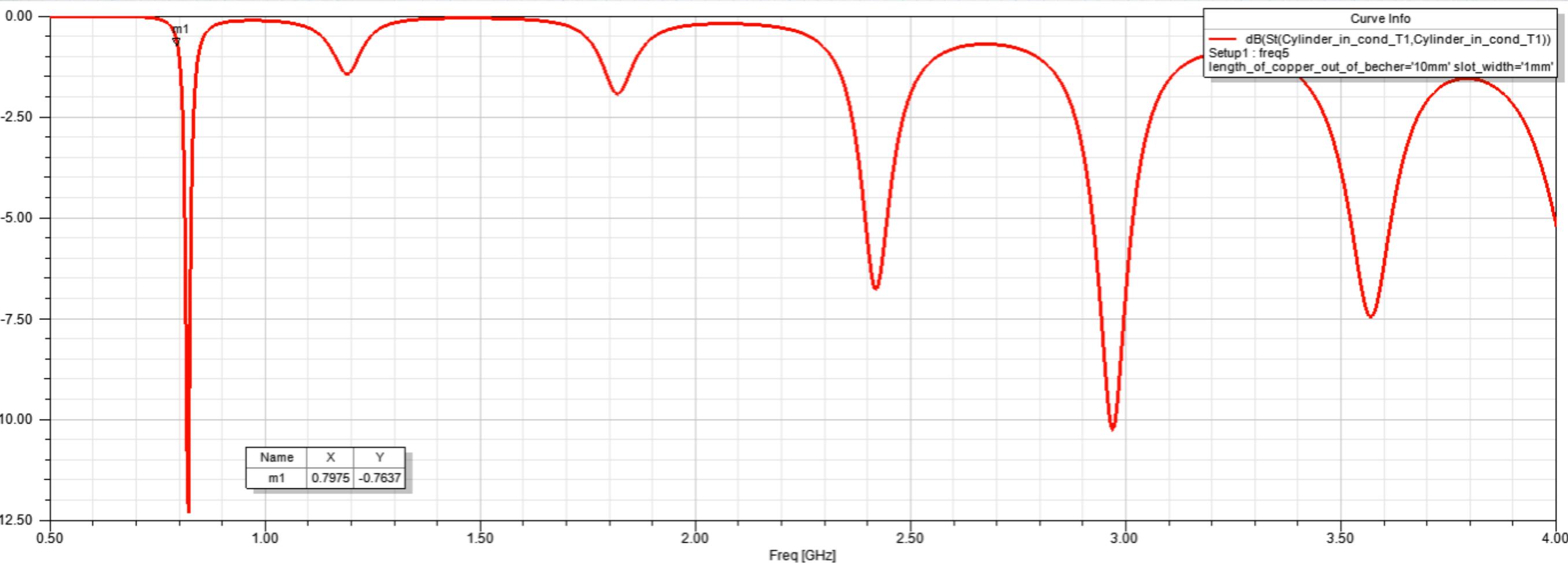
- * SAR distributions at 1.16 GHz seen from different angles

Better SAR at lower frequencies !

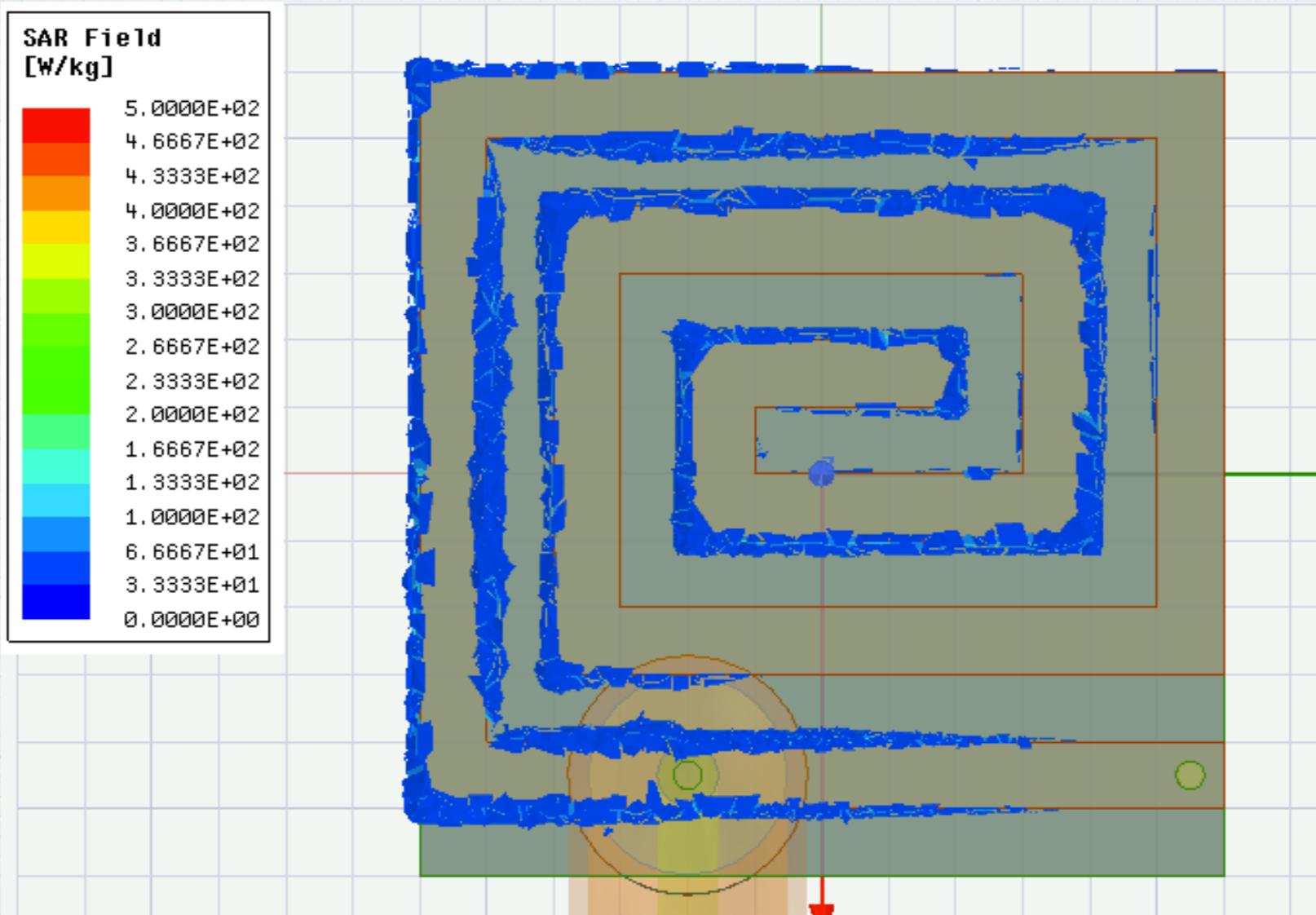


* Measurement setup

Simulated S11



Simulated SAR distribution (input power 6dbm)

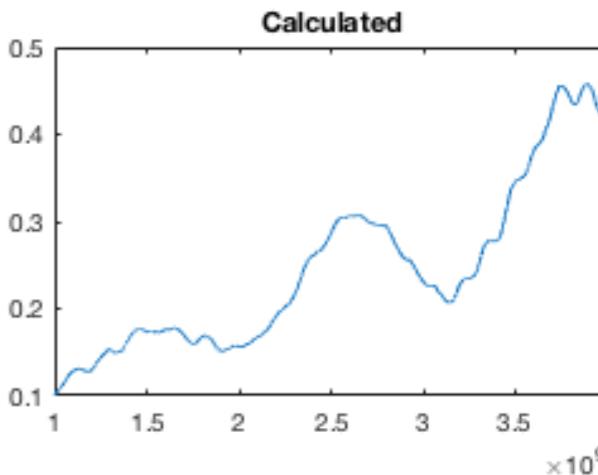
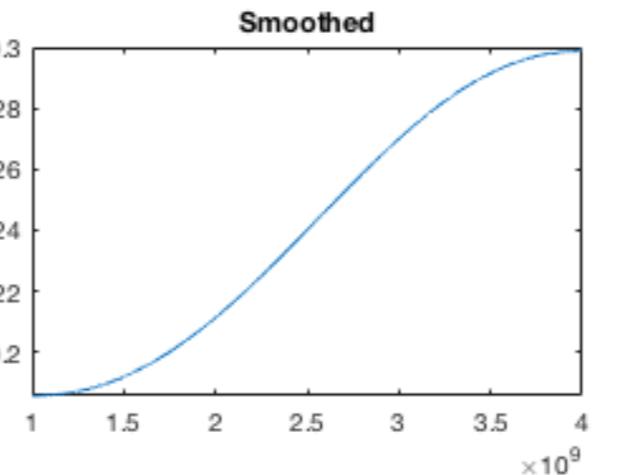
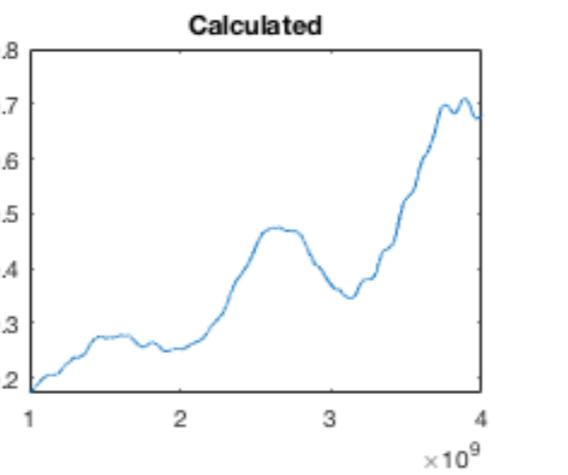
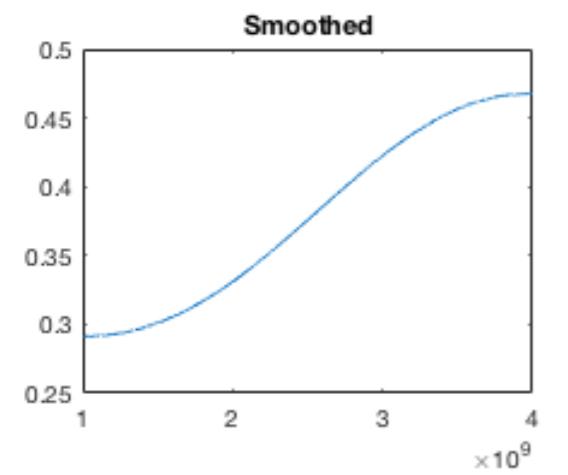
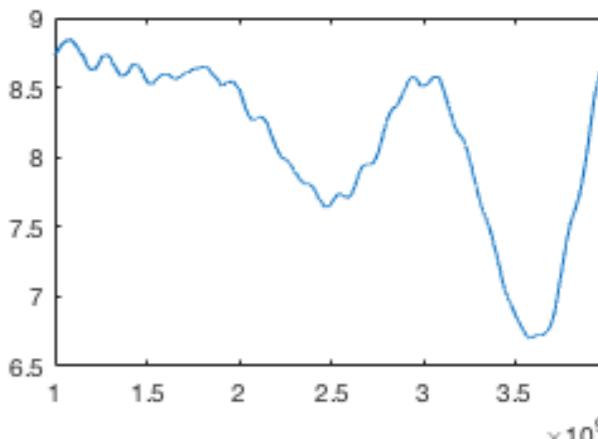
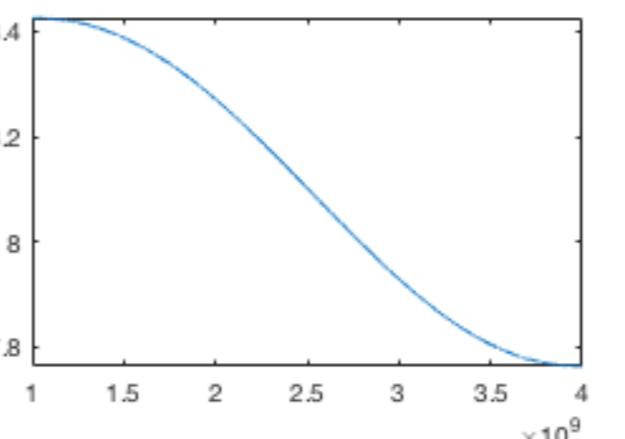
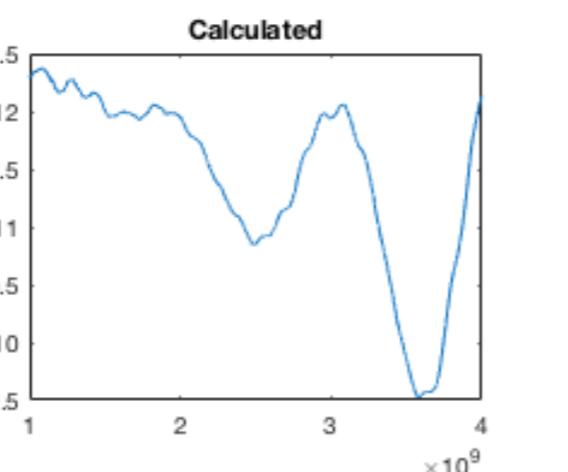
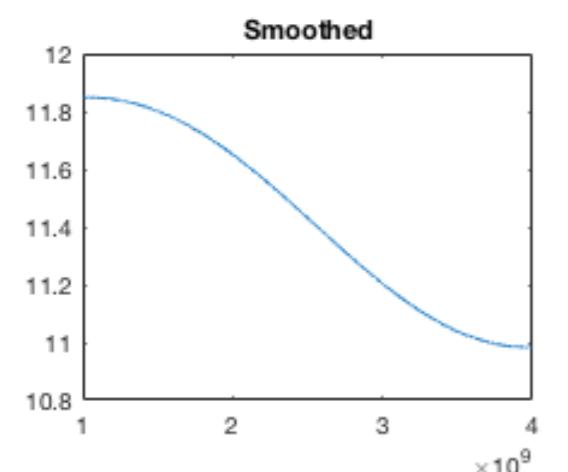
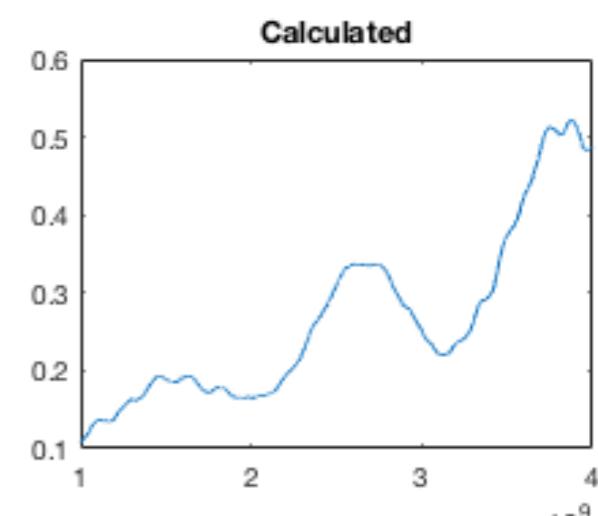
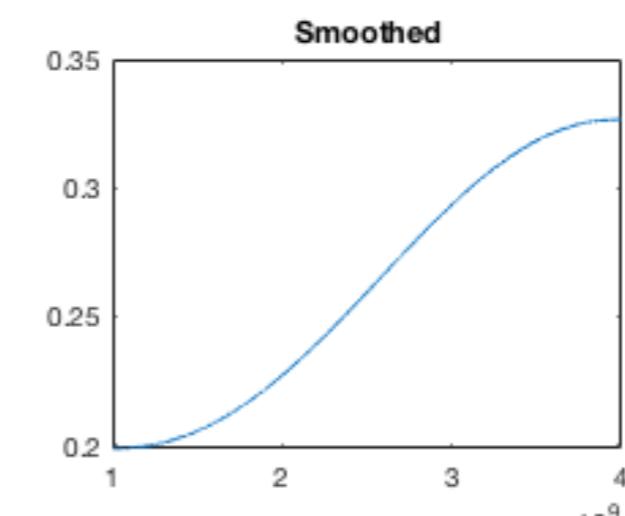
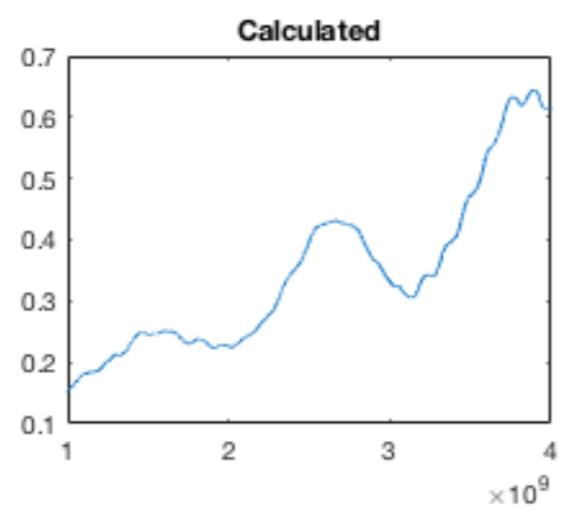
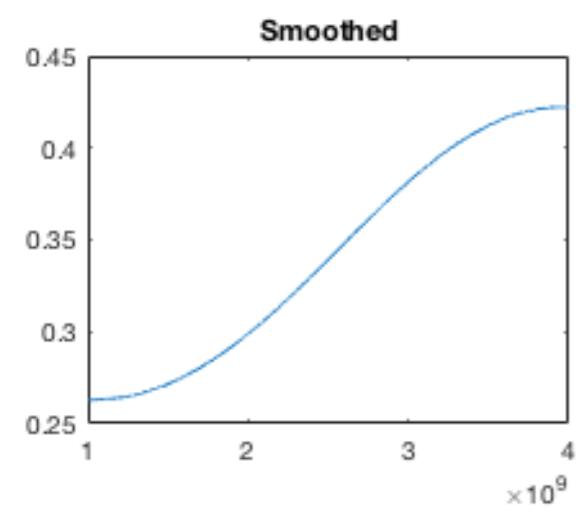
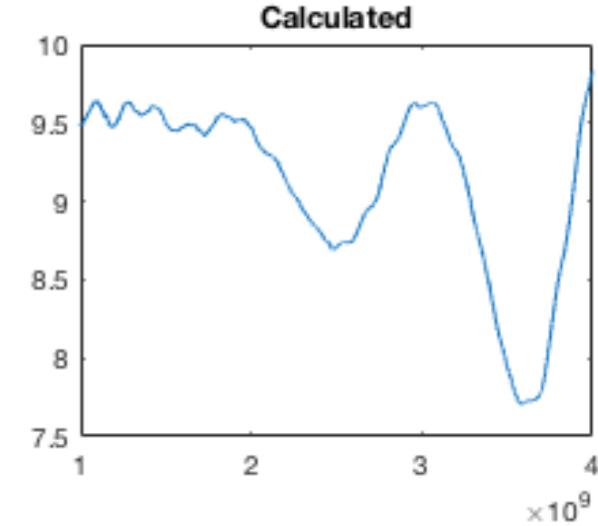
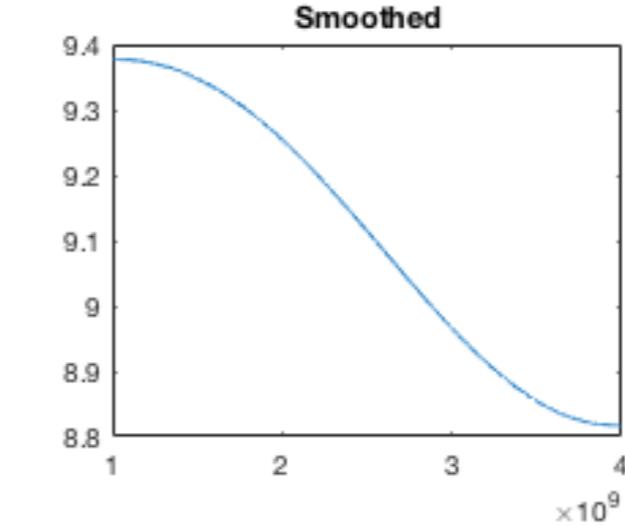
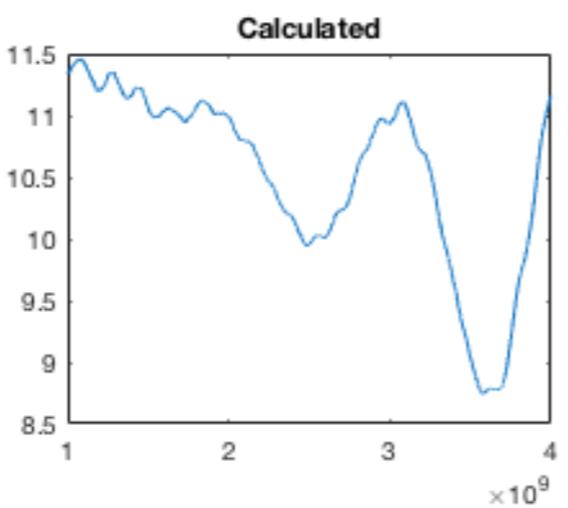
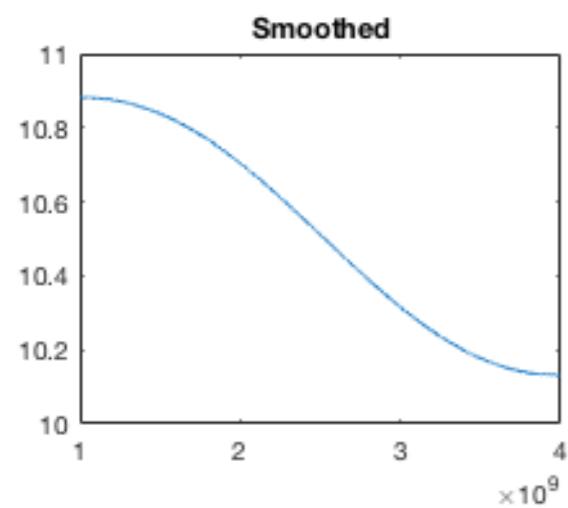


PHANTOM DEVELOPMENT

Tissues	Ingredients	Gelatin (gr)	Water (gr)	Oil (gr)	Salt (gr)
Gland		50	150	37.5	0
Fat		17	40	140	0
Skin		42.86	150	43	0
tumor		50	150	26.475	5

Phantom development

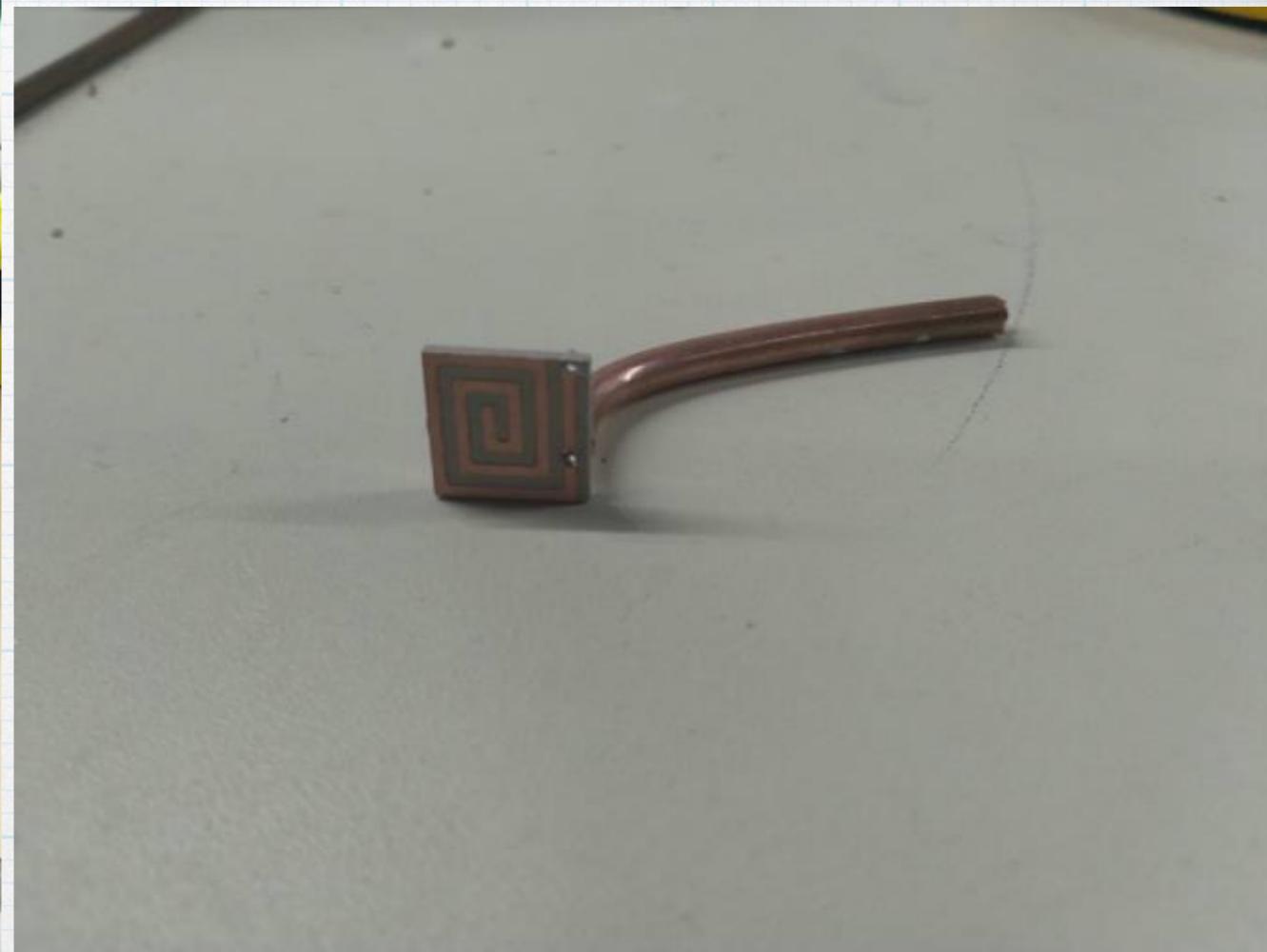




Antenna Production

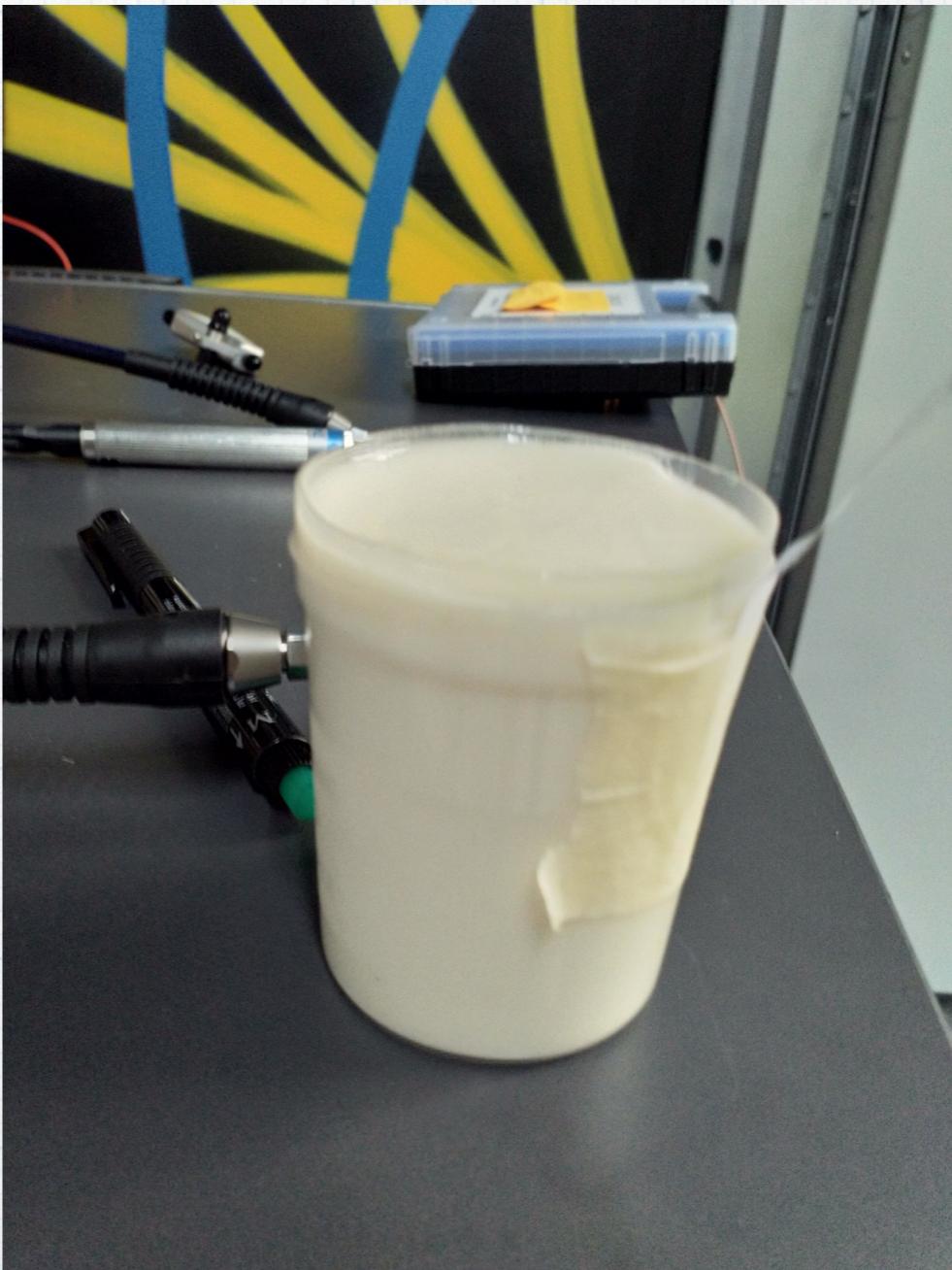


* LPKF device



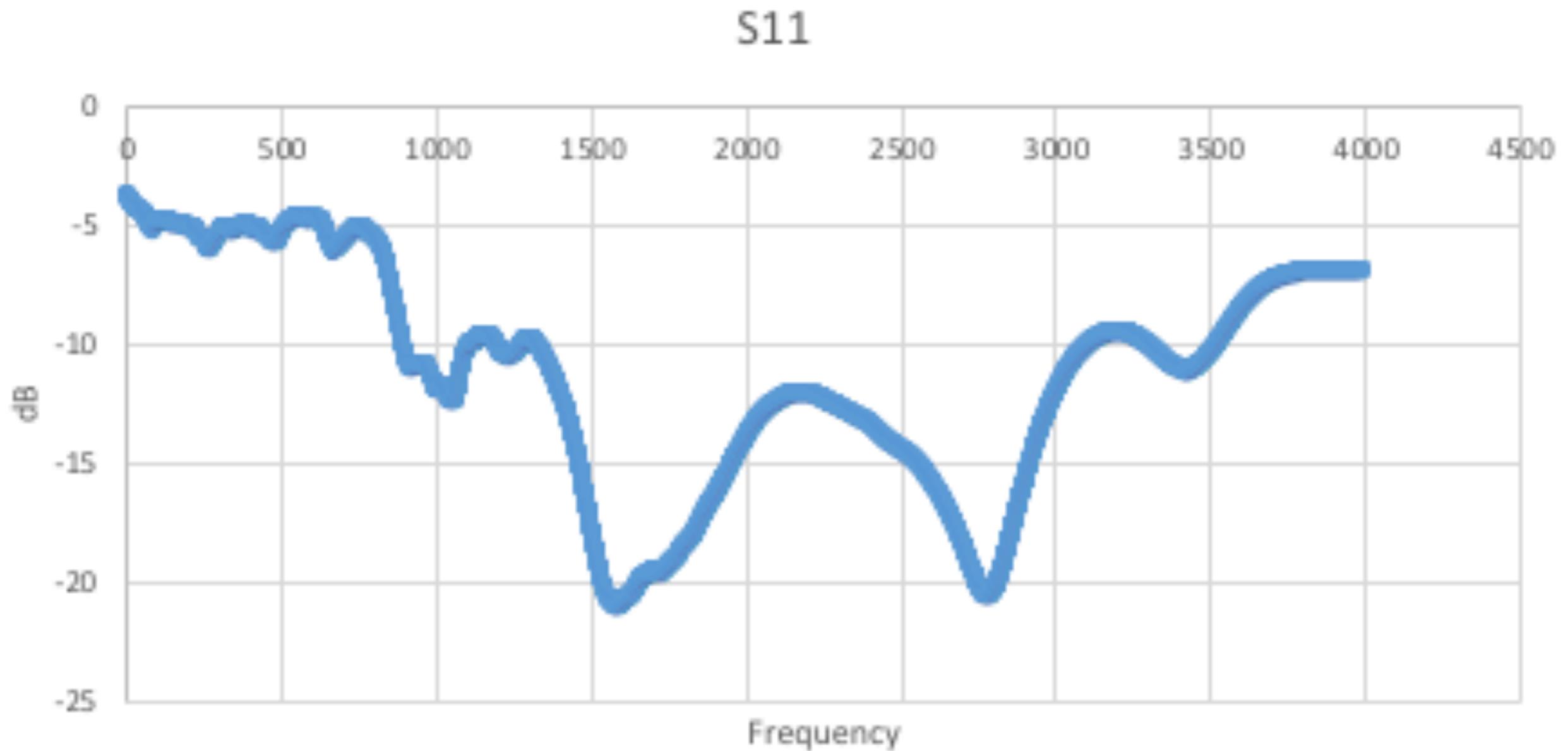
* Soldered antenna

Antenna production



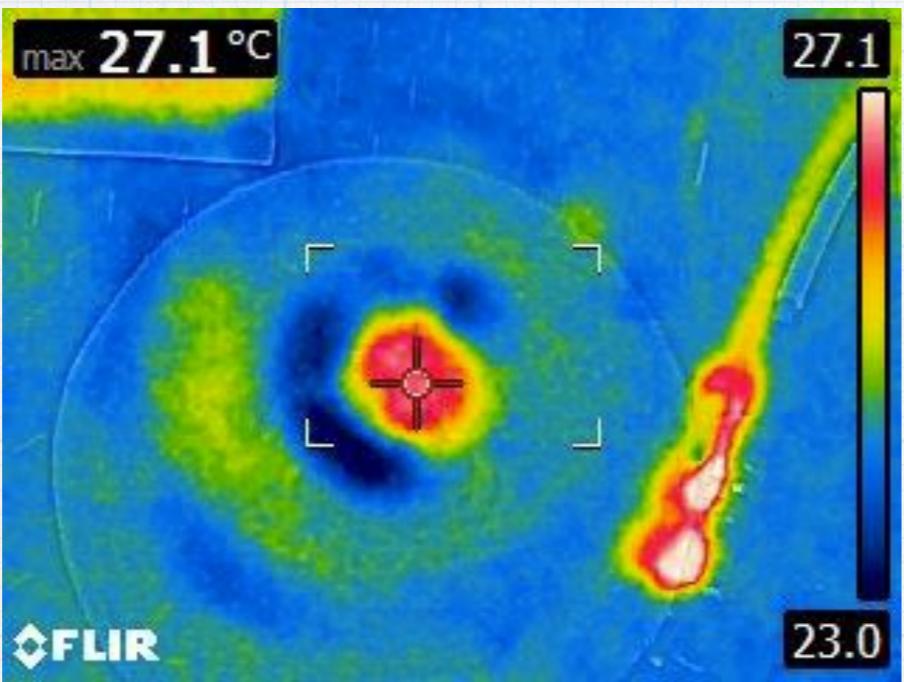
* Measurement setup

Measured S11

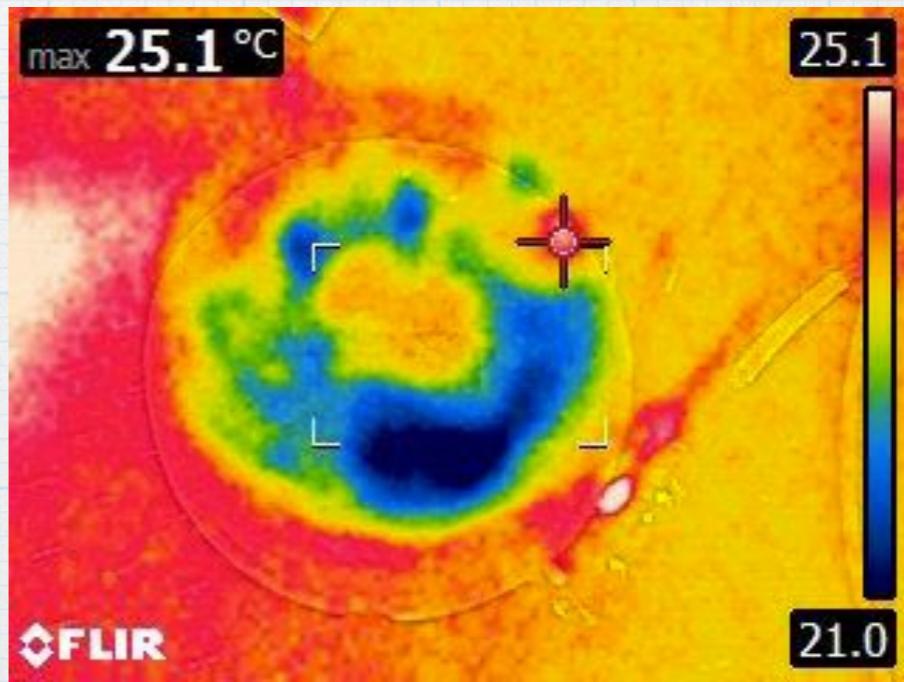
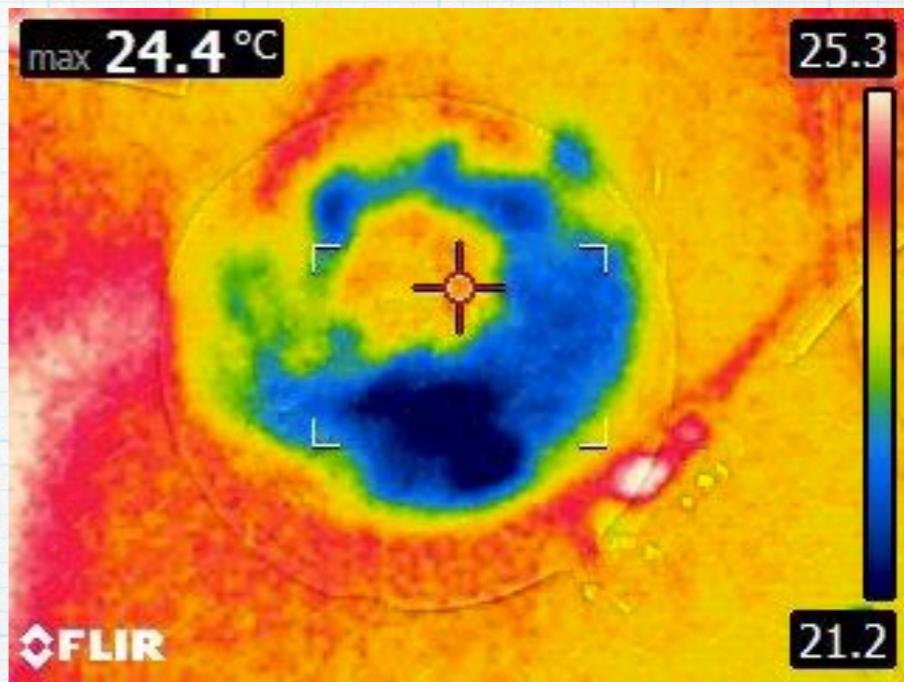
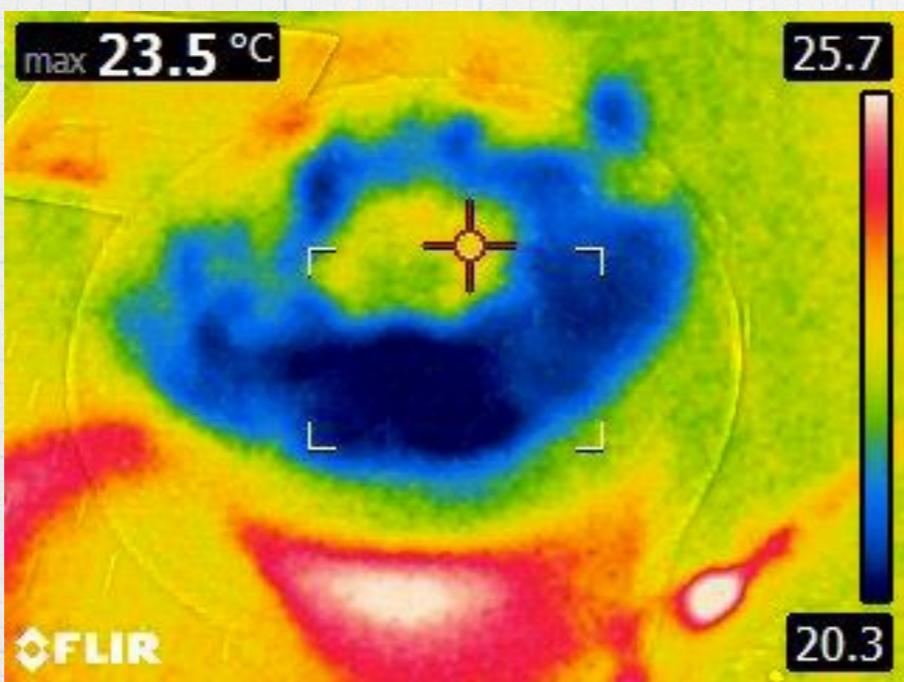


Thermal measurement

* 50dBm



* 10dBm



THANK YOU

* That's all.