



# DELTA Technical Memorandum

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## Reduction of radiated power on iPhone 4S with PowerTrend Anti-radiation SafeFilm applied

### Performed for RadiCover

Project no.: T208254 Rev. A

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**Title** Reduction of radiated power on iPhone 4S with Power-Trend Anti-radiation SafeFilm applied

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## 1. **Conclusion**

Damping of radiated electromagnetic power was measured with the PowerTrend Anti-radiation SafeFilm applied to the iPhone 4S. The product did attenuate field strength with 85 %.

## 2. Introduction

RadiCover sells and market products for damping electromagnetic radiation from handheld devices, in order to reduce human exposure of electromagnetic field. In that context they contacted DELTA, to make measurements on the damping of radiated electromagnetic field of their PowerTrend Anti-radiation SafeFilm applied. The measurements have been done as free field measurements with the cell phone forced to maximum transmission power.



Fig. 2.1 PowerTrend Anti-radiation SafeFilm.

### 3. Test results

The measurements were done as far field measurements and over the entire sphere around the phone. During measurement a call from a communication tester was established and the cell phone was controlled by the communication tester, and the output power of the cell phone was set to maximum.

First a reference measurement was done on an iPhone 4S without PowerTrend Anti-radiation SafeFilm. Afterwards the measurement was repeated with the same iPhone 4S with PowerTrend Anti-radiation SafeFilm applied and the phone mounted in the same position. By comparing the results of these two measurements one can state an attenuation of the radiated field.

The scale used in the enclosed plots is all in dBm EIRP. To calculate the attenuation of the radiation in percentage, units should first be converted to a linear unit (e.g. Watt).

Radiated power was integrated over the hemisphere in front and on back side of the phone and the entire sphere containing the phone.

	Reference [mW]	PowerTrend Anti-radiation SafeFilm [mW]	Attenuation [%]
Total radiated power	170	26	85
Front hemisphere	85	17	80
Rare side hemisphere	86	9.5	89

For reference Fig. 3.1 gives the coordinate system used in the DELTA antenna facility. Positive Y direction is in front of the phone, positive Z direction is towards the top of the phone, and positive X direction is to the left of the phone (the side with the volume control).

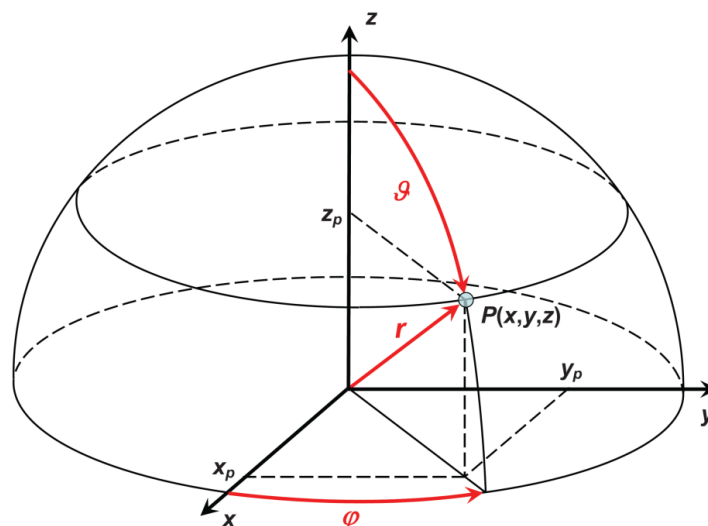


Fig. 3.1 Spherical coordinate system

3.1 Reference

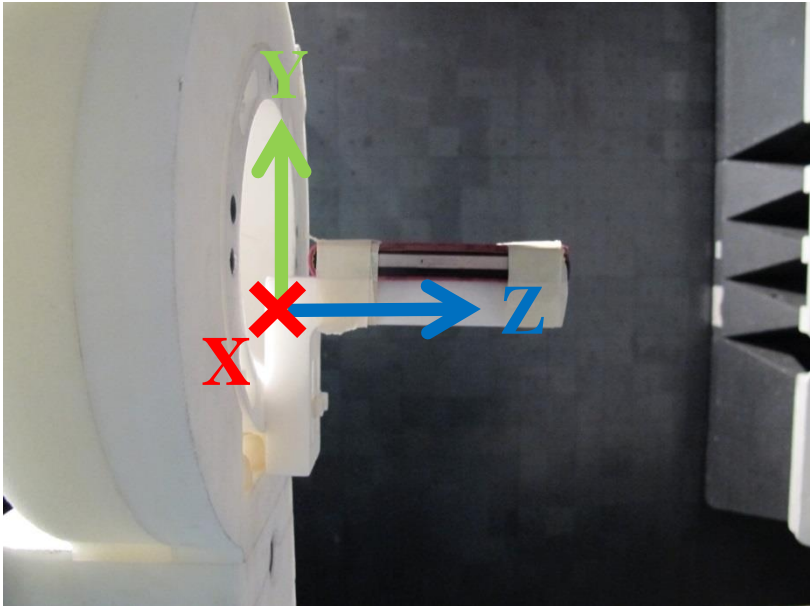
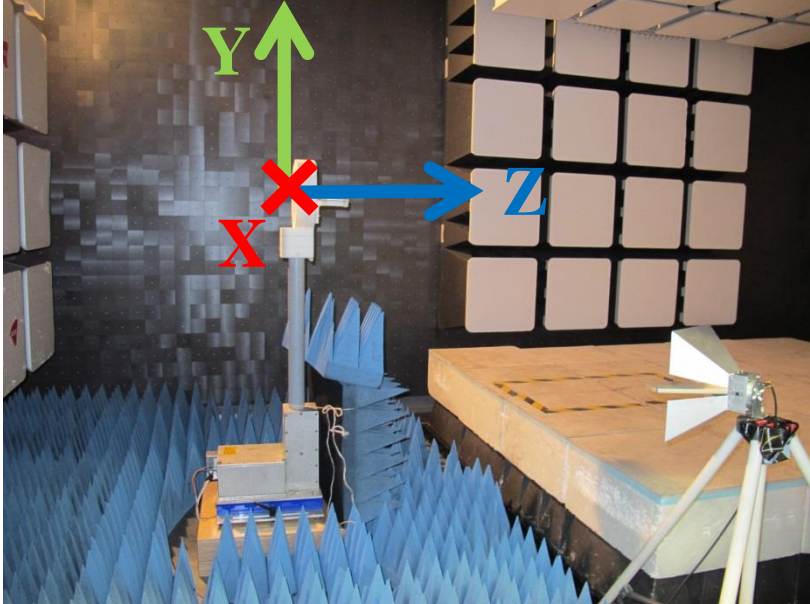
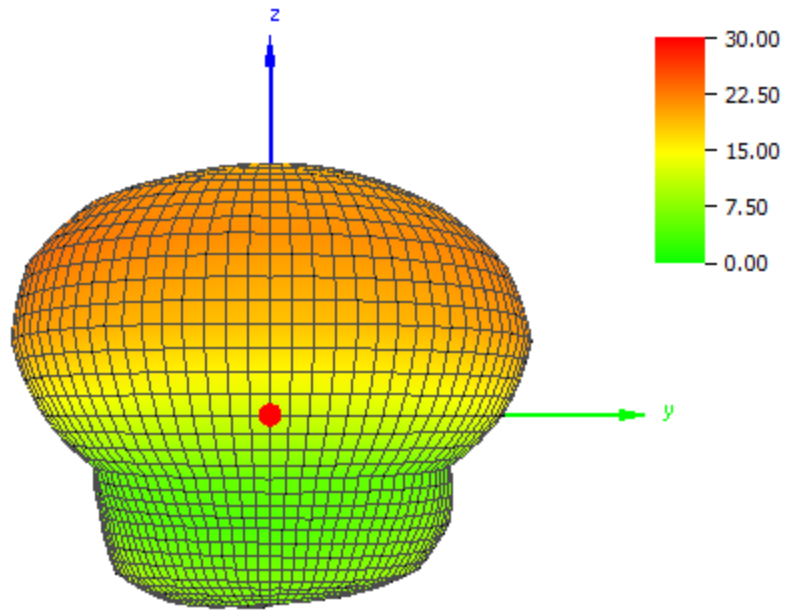
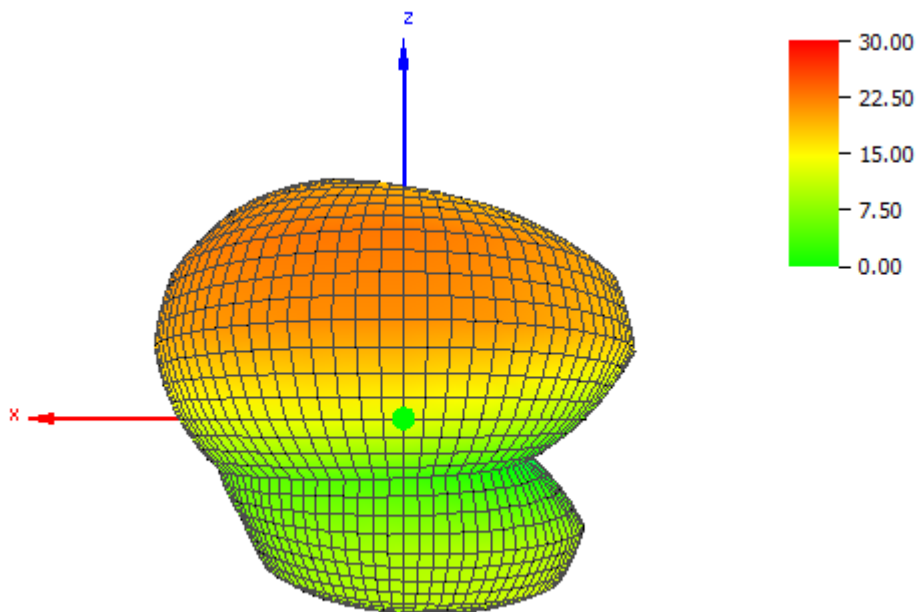


Fig. 3.2 Test setup for reference measurement on iPhone 4S.

**Theta = 90, Phi = 0**

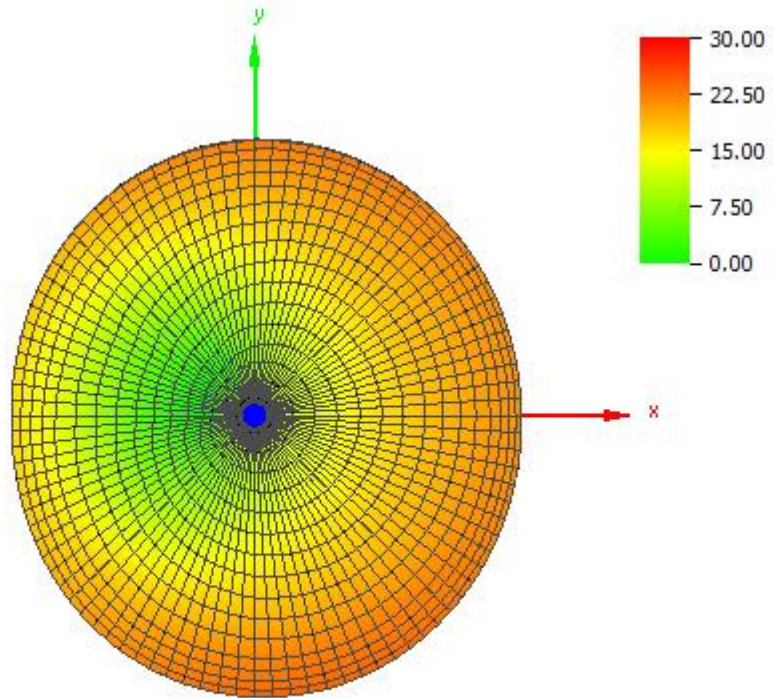


**Theta = 90, Phi = 90**

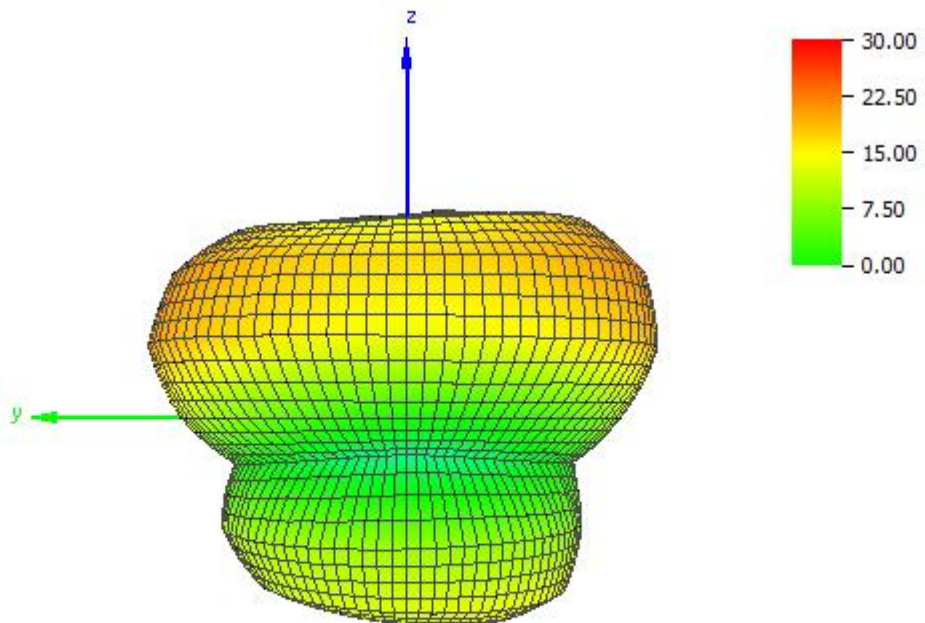




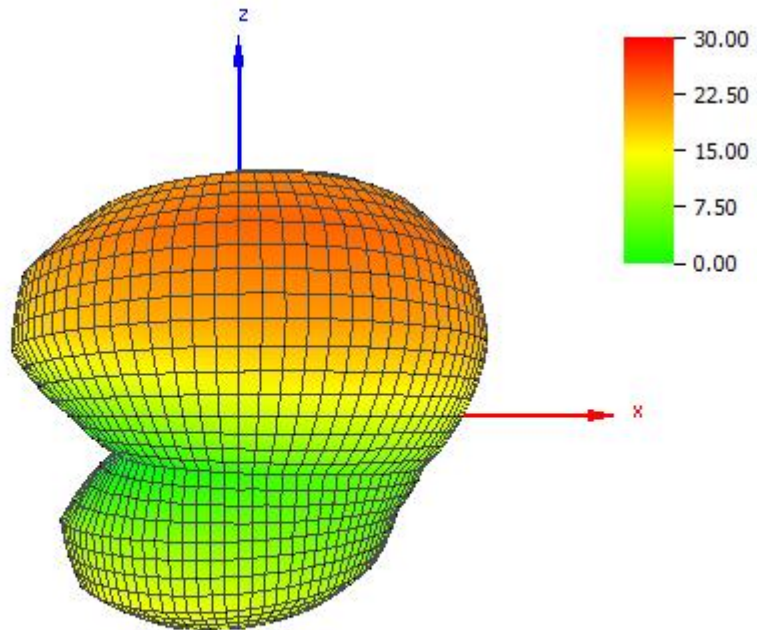
**Theta = 0, Phi = 0**



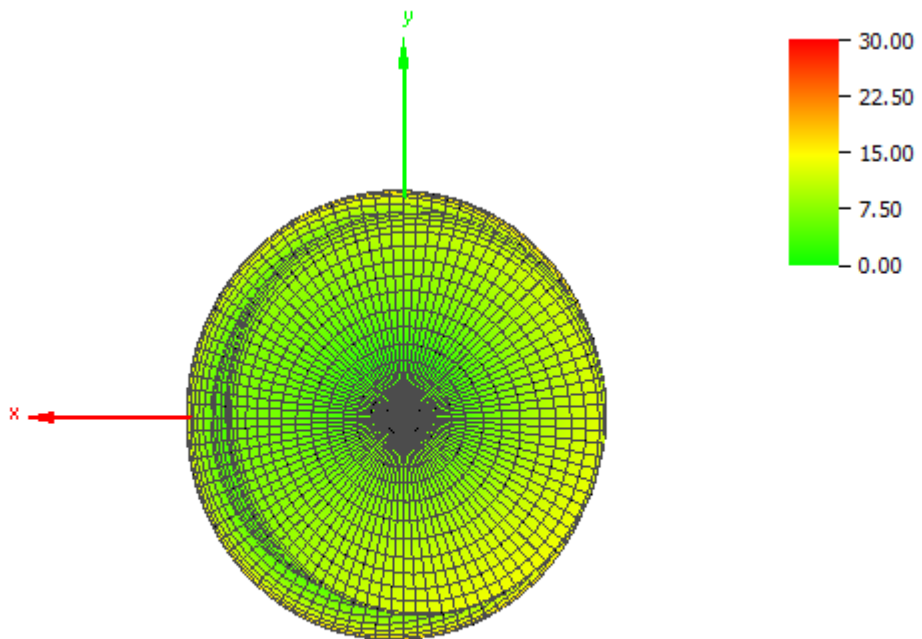
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**Theta = 90, Phi = 270**

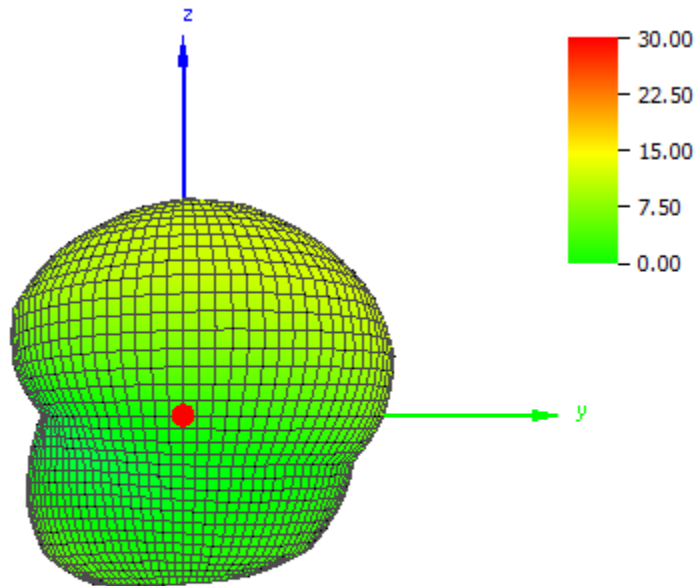


**Theta = 180, Phi = 0**

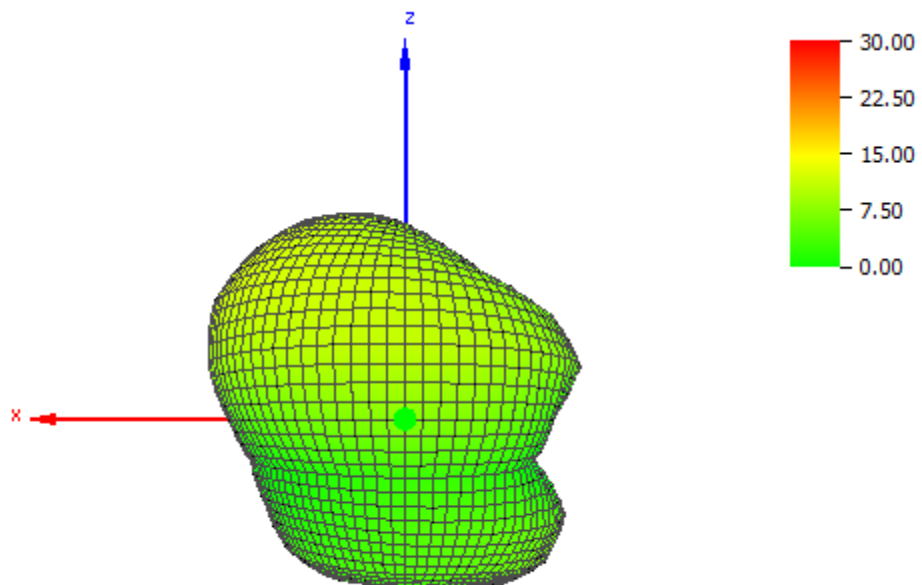


### 3.2 PowerTrend Anti-radiation SafeFilm

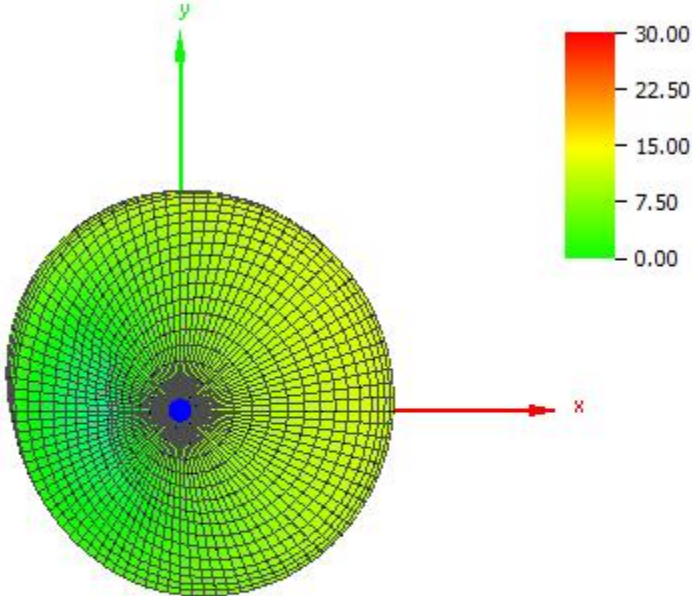
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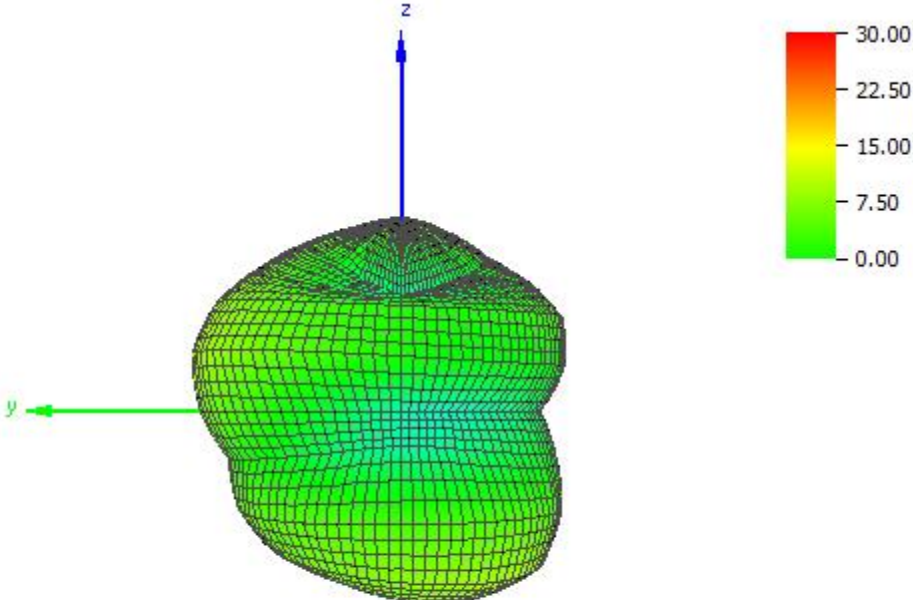
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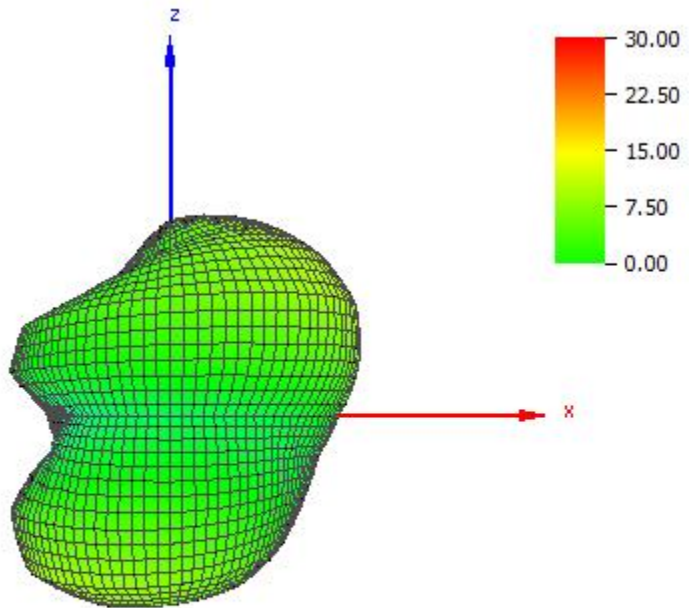
**Theta = 0, Phi = 0**



**Theta = 90, Phi = 180**



**Theta = 90, Phi = 270**



**Theta = 180, Phi = 0**

