

**ANTENNA GAIN AND PATTERN MEASUREMENT REPORT**  
*For Gain value reference*

**FOR**

**TH6220WF THERMOSTAT**

**PART/MODEL NUMBER: TH6220WF**

**DATE ISSUED: DECEMBER 07, 2022**

**REPORT NUMBER: 14606219-O1V1**

Prepared for  
**Ademco Inc.**  
**251 Little Falls Drive**  
**Wilmington, Delaware, 19808-1674**  
**U.S.A.**

*Prepared by*  
**UL VERIFICATION SERVICES INC.**  
**47173 BENICIA STREET**  
**FREMONT, CA 94538, U.S.A.**  
**TEL: (510) 319-4000**  
**FAX: (510) 661-0888**

Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	12/07/2022	Initial Issue	

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# 1 ATTESTATION OF TEST RESULTS

Company Name and Address	Ademco Inc.
	251 Little Falls Drive
	Wilmington, Delaware, 19808-1674
	U.S.A.
EUT Description	TH6220WF Thermostat
Part/Model	TH6220WF
Date Tested	11/14/2022

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
Non-standard Test Method*	Information Only
*as agreed upon the quote for order # 14606219	

UL Verification Services Inc. tested the above equipment in accordance with the requirements set forth in the above standards. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. All samples tested were in good operating condition throughout the entire test program. Measurement Uncertainties are published for informational purposes only and were not taken into account unless noted otherwise.

This document may not be altered or revised in any way unless done so by UL Verification Services Inc. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by UL Verification Services Inc. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP/A2LA, NIST, or any agency of the U.S. Government.

This report contains data provided by the customer which can impact the validity of results. UL Verification Services Inc. is only responsible for the validity of results after the integration of the data provided by the customer.

Approved & Released For  
 UL Verification Services Inc. By:

*E.B.*

Ekta Budhbhatti  
 OTA SUPERVISOR  
 UL Verification Services Inc.

Tested and Prepared By:

*Casey Dial*

Casey Dial  
 TEST ENGINEER  
 UL Verification Services Inc.

## 2 TEST FACILITY

The test sites and measurement facilities used to collect data are located at 47173 Benicia Street, Fremont, California, USA. The test was performed in OTA A.

Test Site used for testing	
OTA Lab A (Theta Arm Chamber)	<input checked="" type="checkbox"/>
OTA Lab B (MAPS Chamber)	<input type="checkbox"/>

- Test operator and Report writer: Casey Dial
- Report reviewed by: Ekta Budhbhatti

## 3 TEST AND MEASUREMENT EQUIPMENT

The following test and measurement equipment was utilized for the tests documented in this report:

TEST EQUIPMENT LIST					
Description	Manufacturer	Model	Asset	Cal Date	Cal Due
PNA-L Network Analyzer	Agilent	N5230C	MY49001404	09 February 2022	09 February 2023

## 4 DEVICE UNDER TEST INFORMATION

Antenna	
Manufacturer	Ademco Inc.
Part/Model Number	TH6220WF
Frequency range (MHz)	2402,2412,2437,2440,2462,2480
Device/Antenna type	PIFA for WLAN and BLE.

## 5 RESULT SUMMARY

### 5.1 Passive Antenna 1 Pattern

Measurement	Frequency (MHz)					
	2402	2412	2437	2440	2462	2480
3D Peak Gain (dBi)	1.55	1.44	1.57	1.59	1.60	1.44
2D/Peak Gain (dBi)	1.85	1.74	1.86	1.85	1.84	1.66

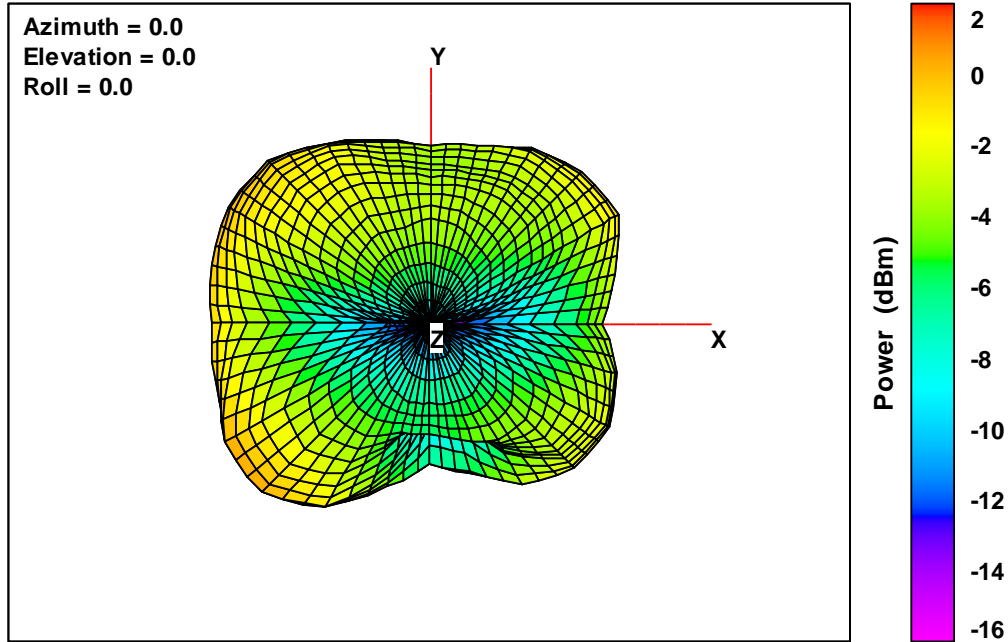
### 5.2 Passive Antenna 2 Pattern

Measurement	Frequency (MHz)					
	2402	2412	2437	2440	2462	2480
3D Peak Gain (dBi)	2.73	2.55	2.49	2.47	2.31	2.09
2D/Peak Gain (dBi)	2.78	2.56	2.58	2.59	2.44	2.30

## 6 PLOTS

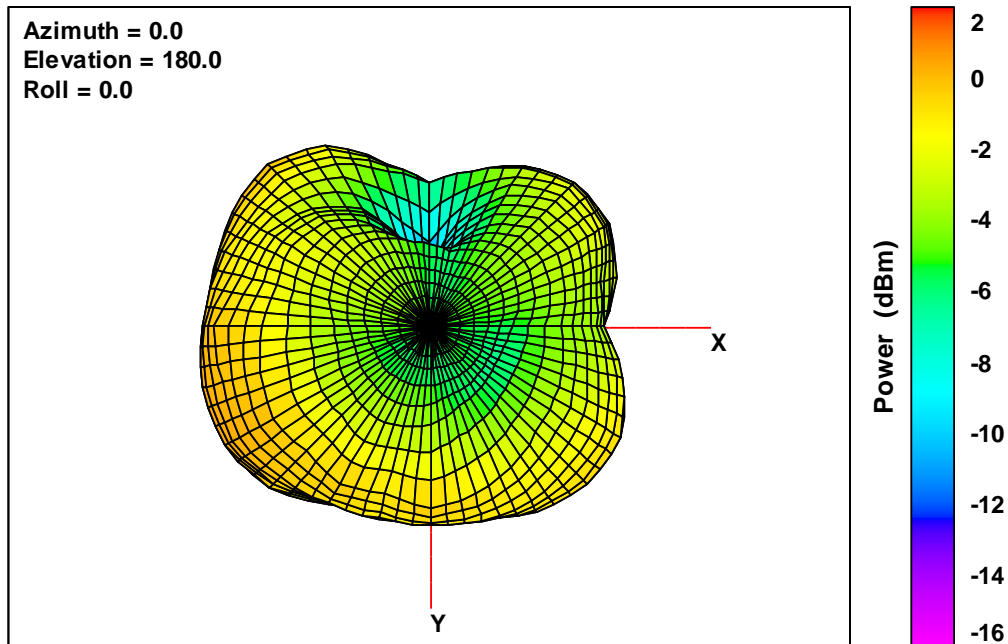
### 6.1 Antenna 1 3D PASSIVE- 2402 MHz

Total EIRP, Top View



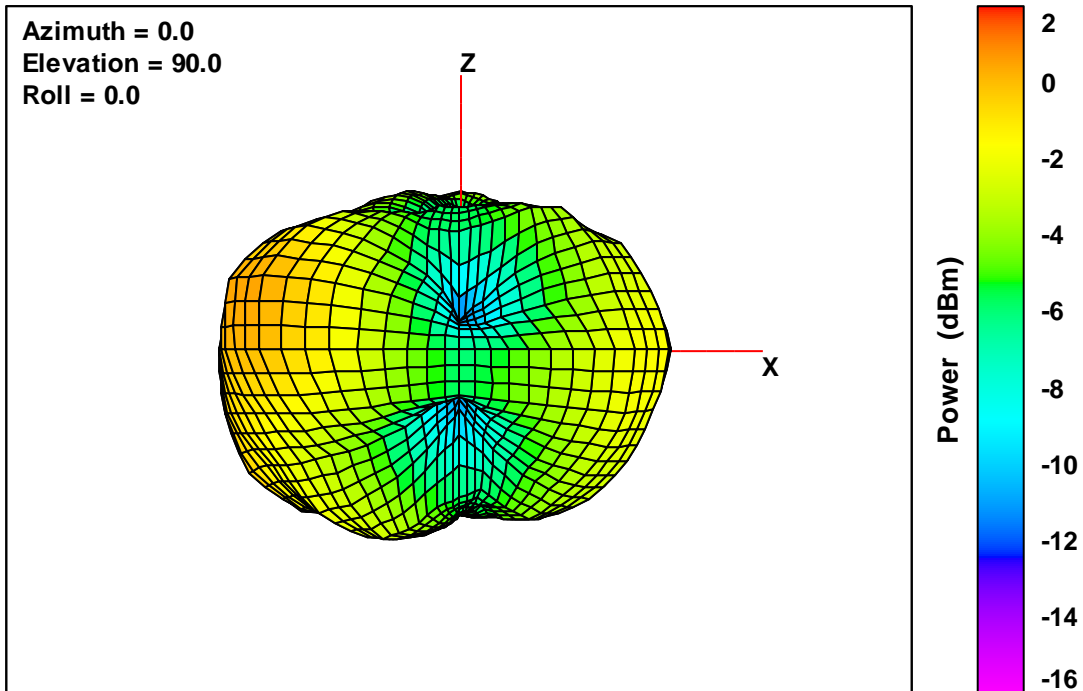
ANTENNA ONE Free-Space Total EIRP, Top View, 2402 MHz

Total EIRP, Bottom View



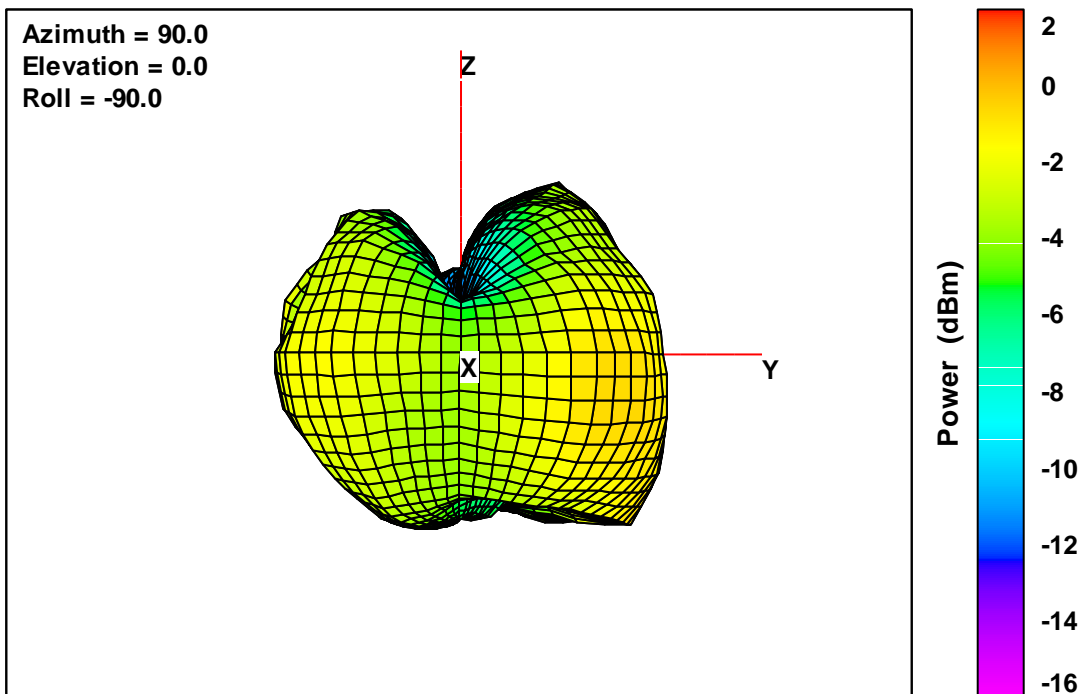
ANTENNA ONE Free-Space Total EIRP, Bottom View, 2402 MHz

### Total EIRP, Left Side View



ANTENNA ONE Free-Space Total EIRP, Left Side View, 2402 MHz

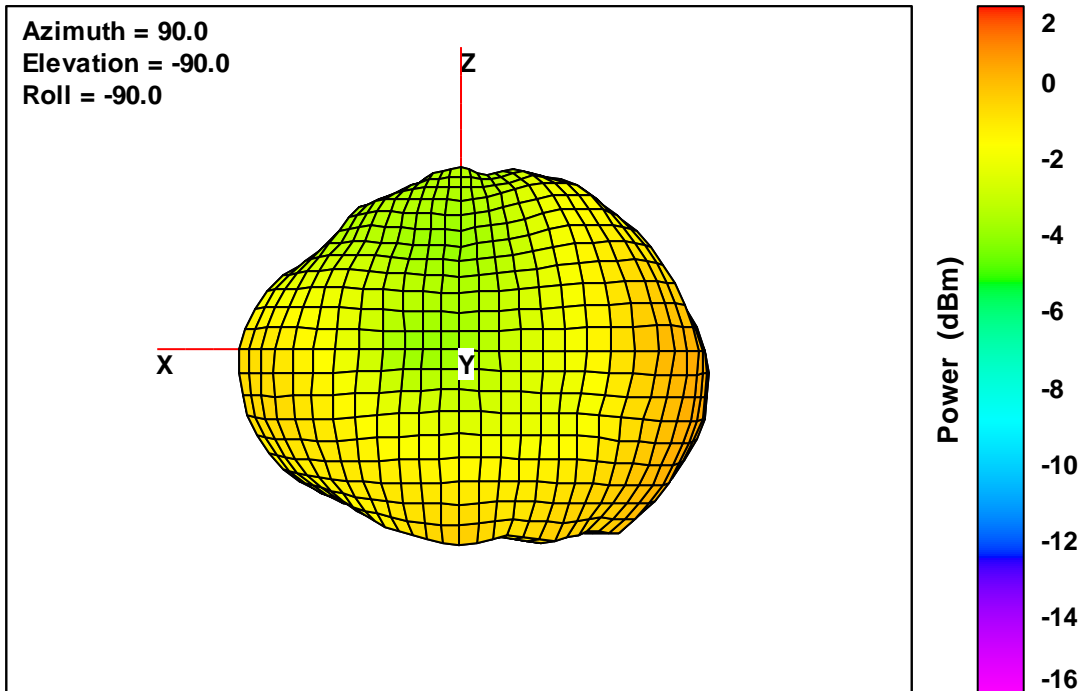
### Total EIRP, Front Face View



ANTENNA ONE Free-Space Total EIRP, Front Face View, 2402 MHz

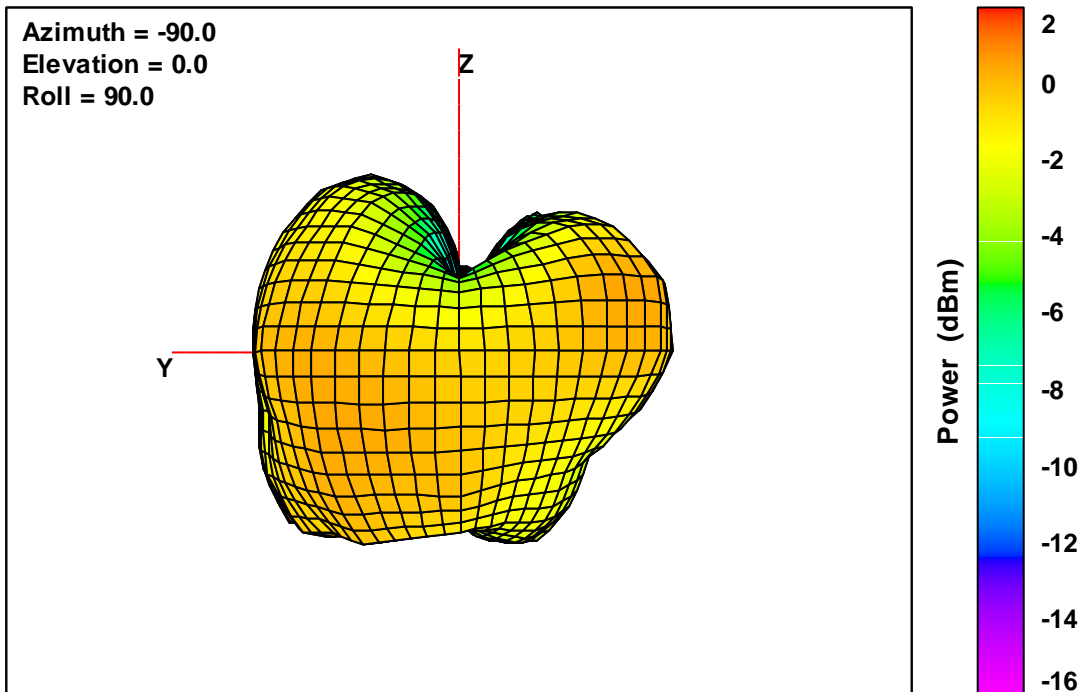


### Total EIRP, Right Side View



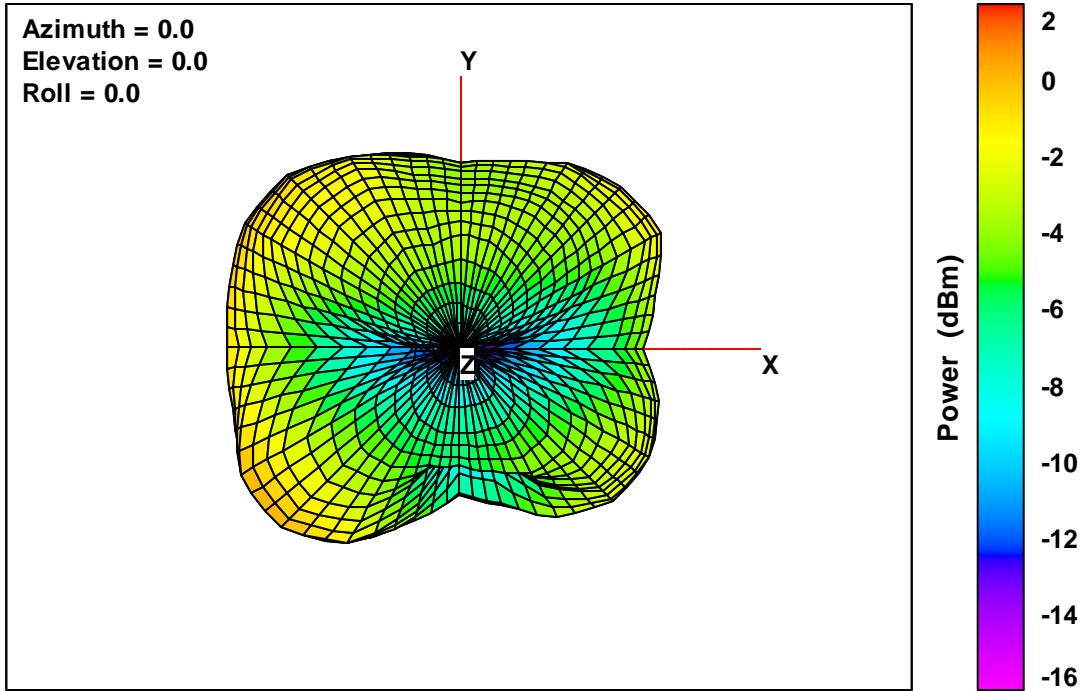
ANTENNA ONE Free-Space Total EIRP, Right Side View, 2402 MHz

### Total EIRP, Back Face View



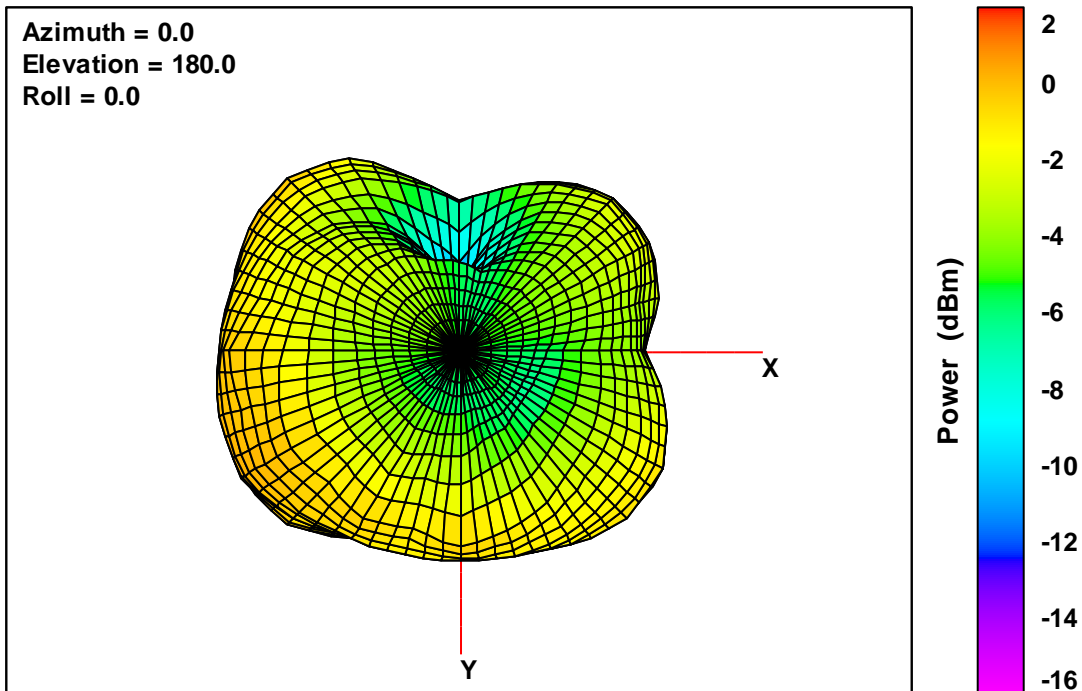
ANTENNA ONE Free-Space Total EIRP, Back Face View, 2402 MHz

### 6.2 Antenna 1 3D PASSIVE- 2412 MHz Total EIRP, Top View



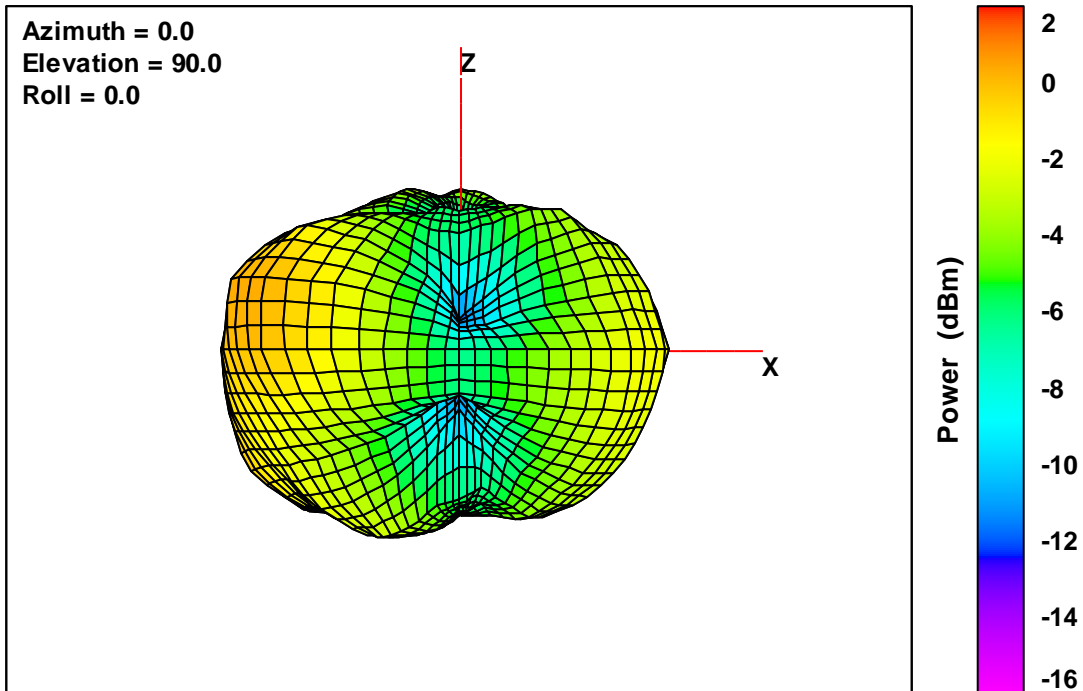
ANTENNA ONE Free-Space Total EIRP, Top View, 2412 MHz

### Total EIRP, Bottom View



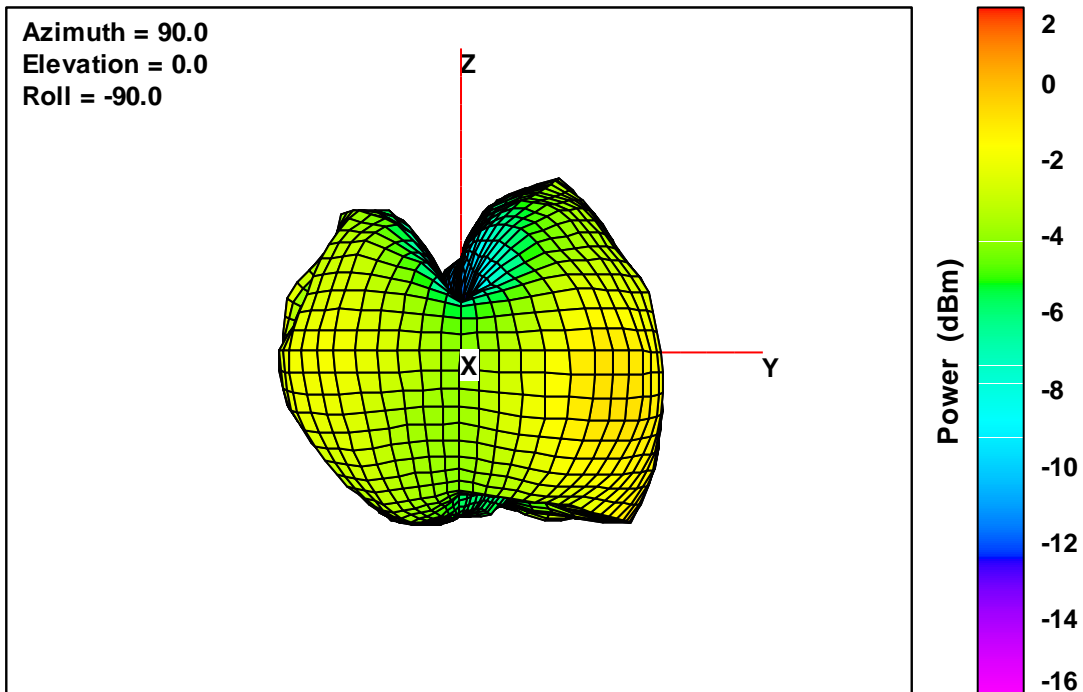
ANTENNA ONE Free-Space Total EIRP, Bottom View, 2412 MHz

### Total EIRP, Left Side View



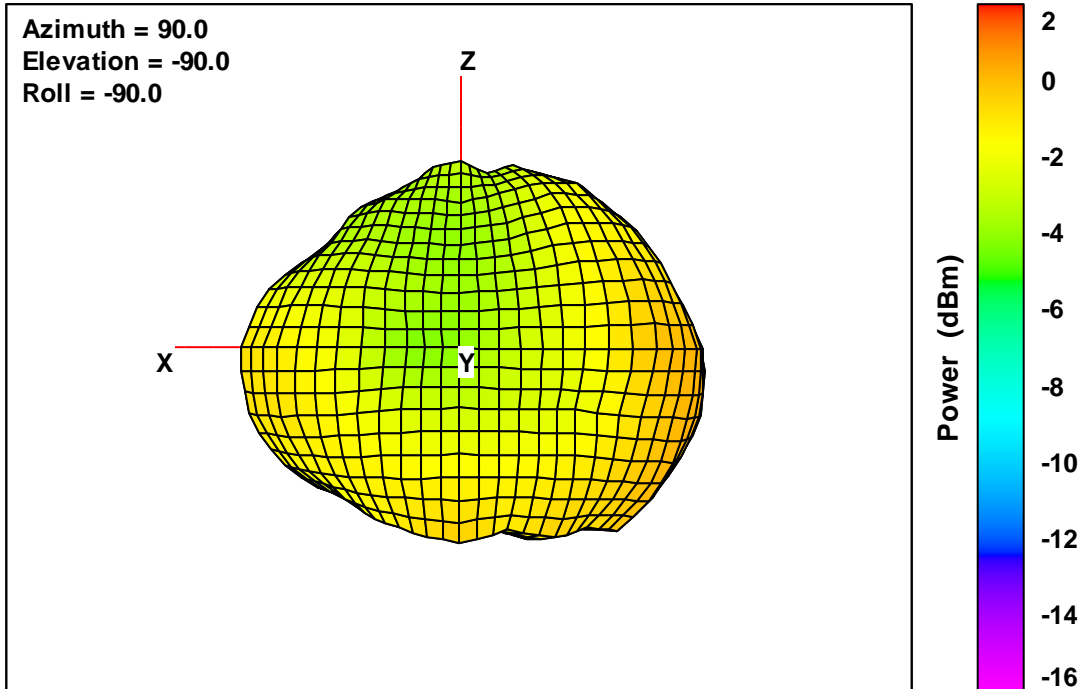
ANTENNA ONE Free-Space Total EIRP, Left Side View, 2412 MHz

### Total EIRP, Front Face View



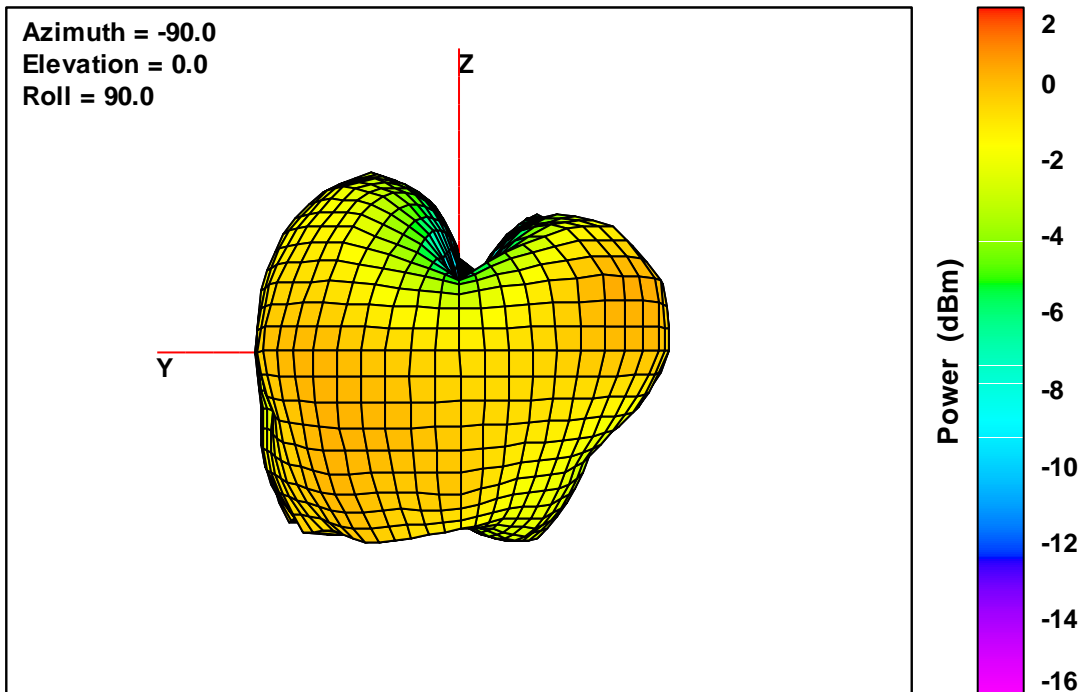
ANTENNA ONE Free-Space Total EIRP, Front Face View, 2412 MHz

### Total EIRP, Right Side View



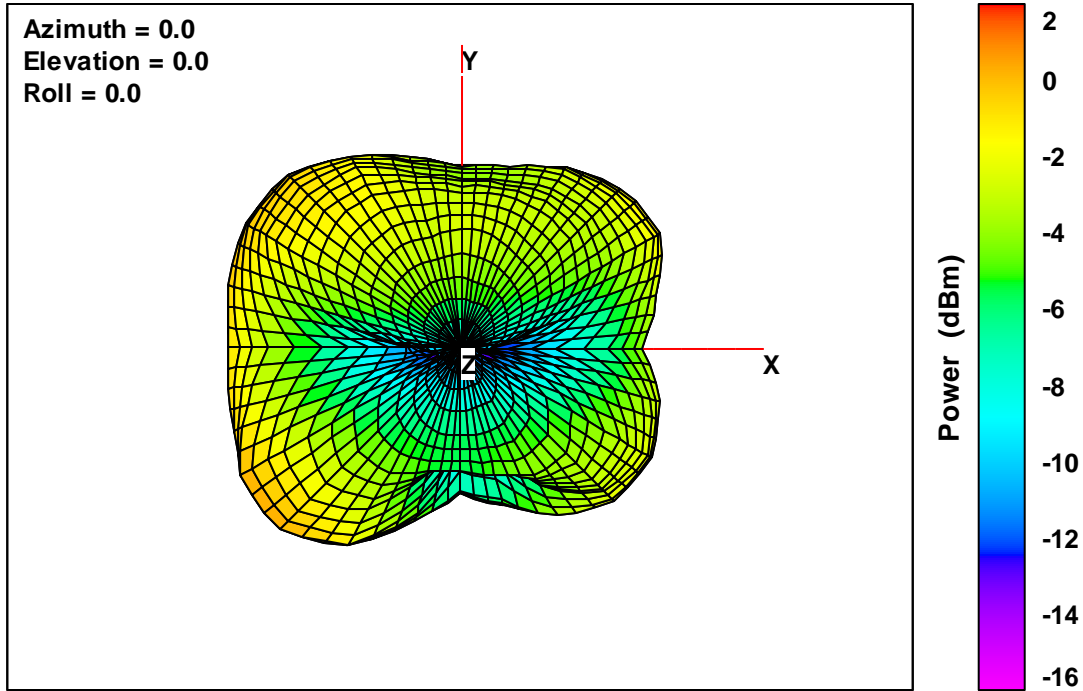
ANTENNA ONE Free-Space Total EIRP, Right Side View, 2412 MHz

### Total EIRP, Back Face View



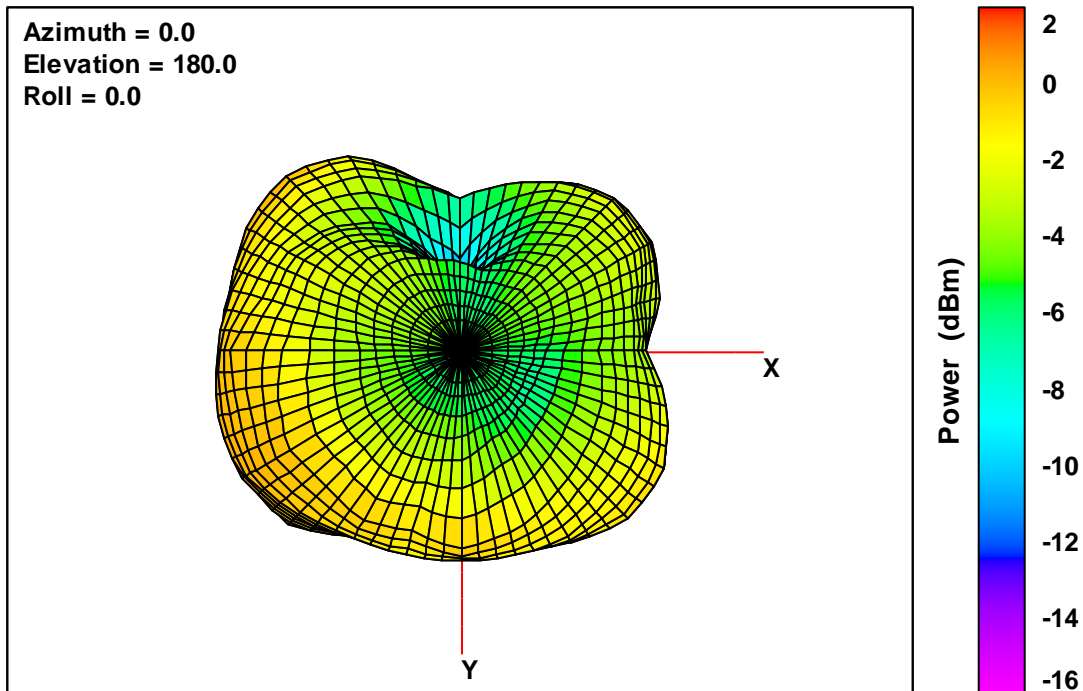
ANTENNA ONE Free-Space Total EIRP, Back Face View, 2412 MHz

### 6.3 Antenna 1 3D PASSIVE- 2437 MHz Total EIRP, Top View



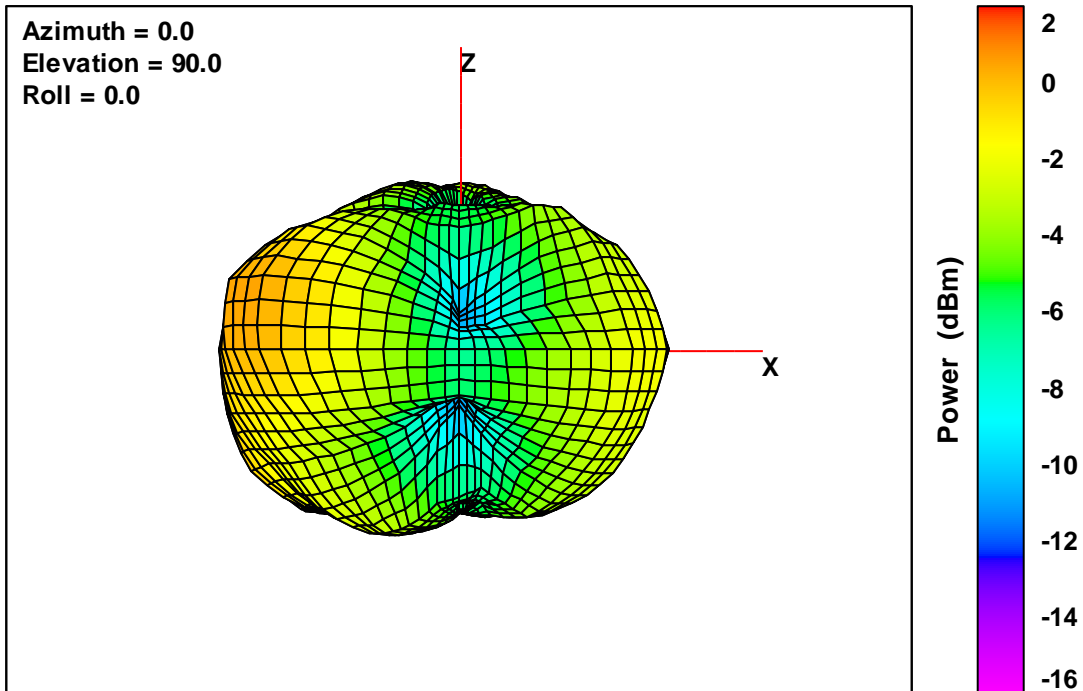
ANTENNA ONE Free-Space Total EIRP, Top View, 2437 MHz

### Total EIRP, Bottom View



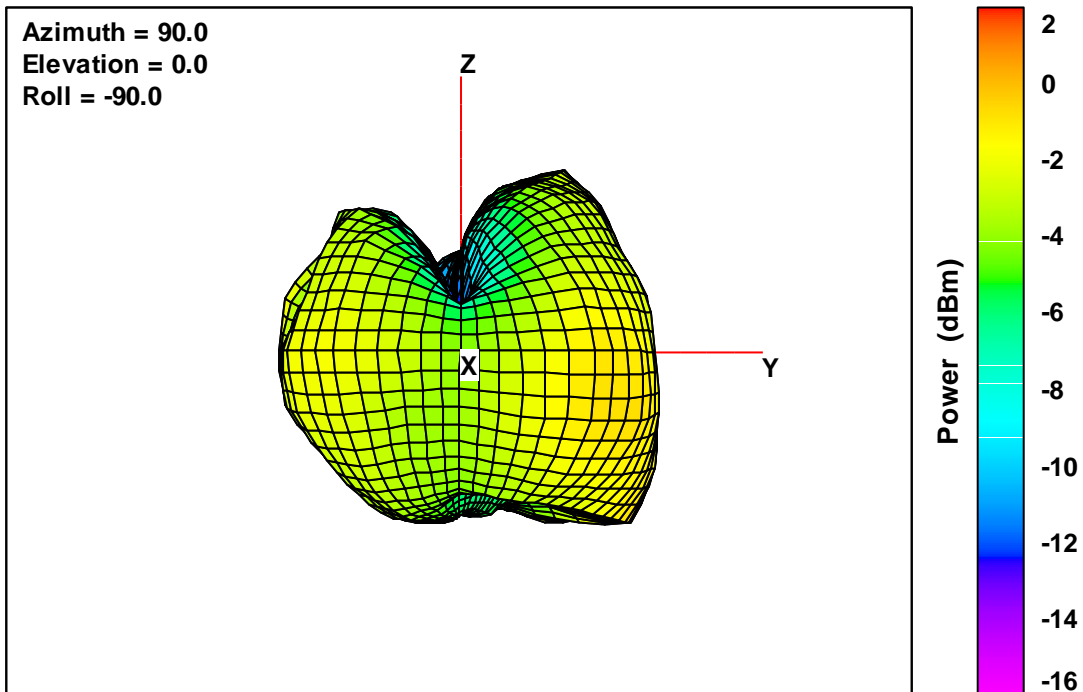
ANTENNA ONE Free-Space Total EIRP, Bottom View, 2437 MHz

### Total EIRP, Left Side View



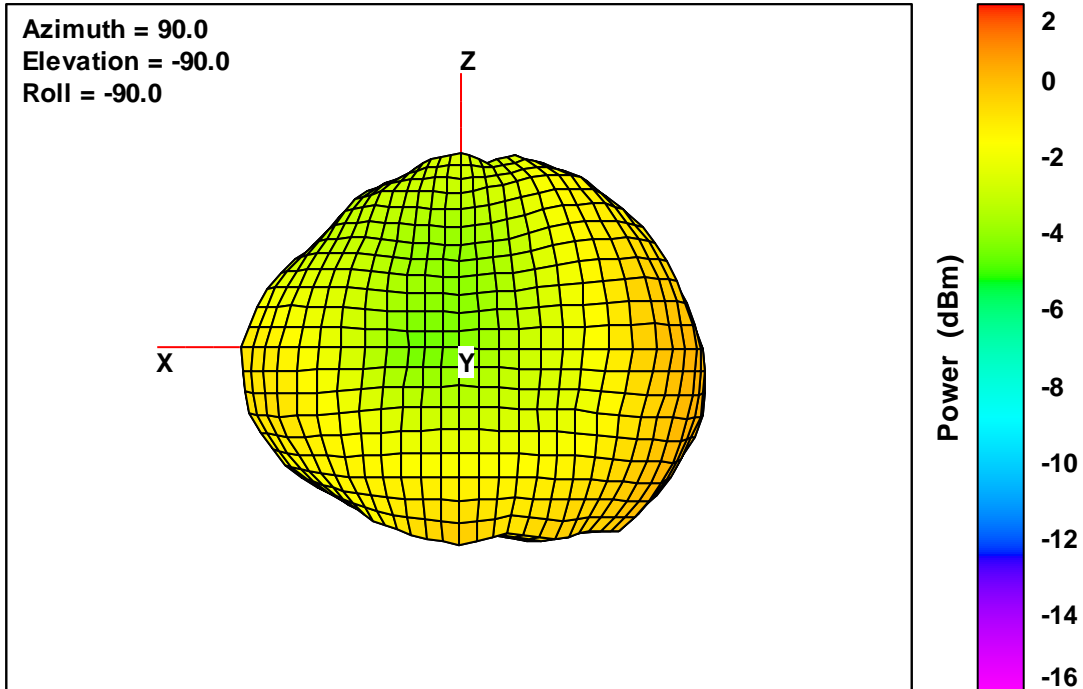
ANTENNA ONE Free-Space Total EIRP, Left Side View, 2437 MHz

### Total EIRP, Front Face View



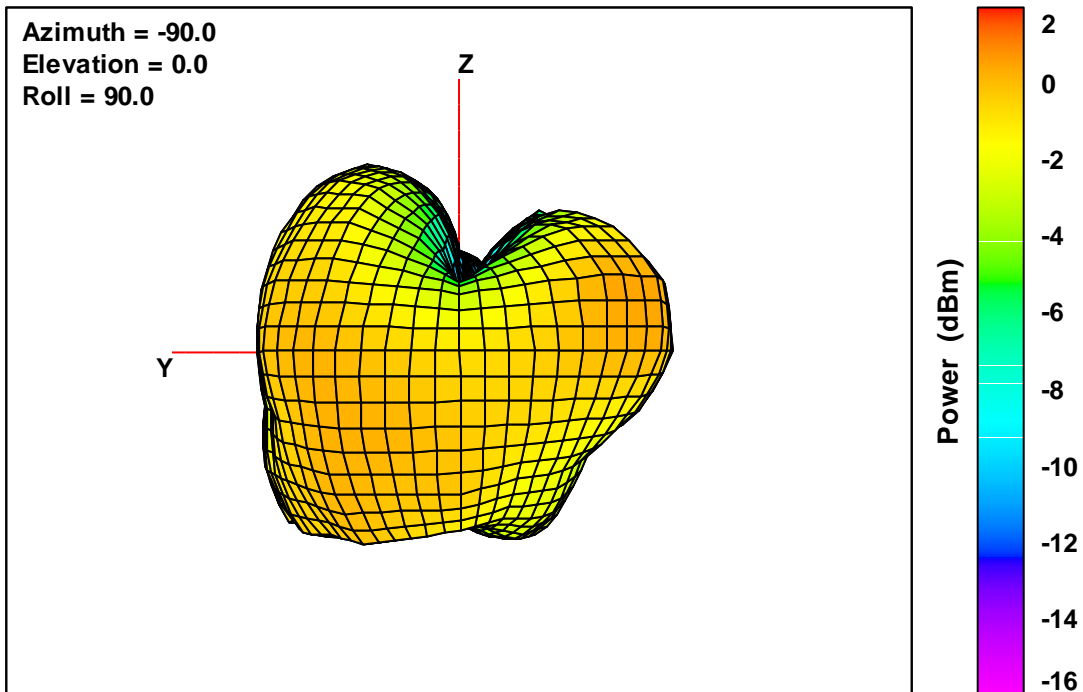
ANTENNA ONE Free-Space Total EIRP, Front Face View, 2437 MHz

### Total EIRP, Right Side View



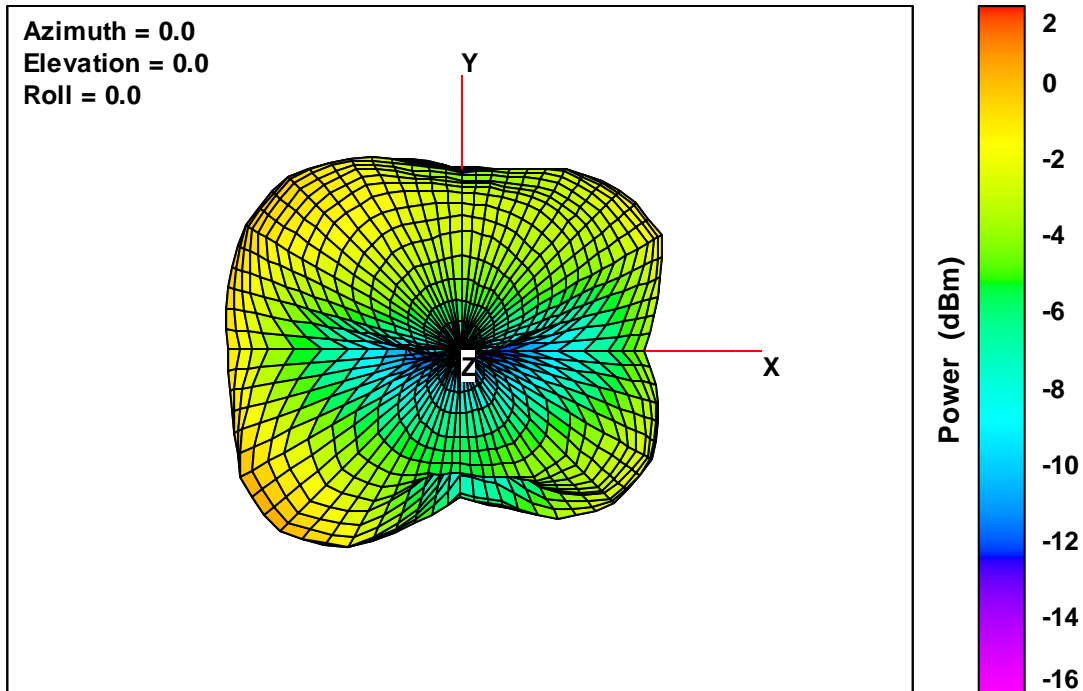
ANTENNA ONE Free-Space Total EIRP, Right Side View, 2437 MHz

### Total EIRP, Back Face View



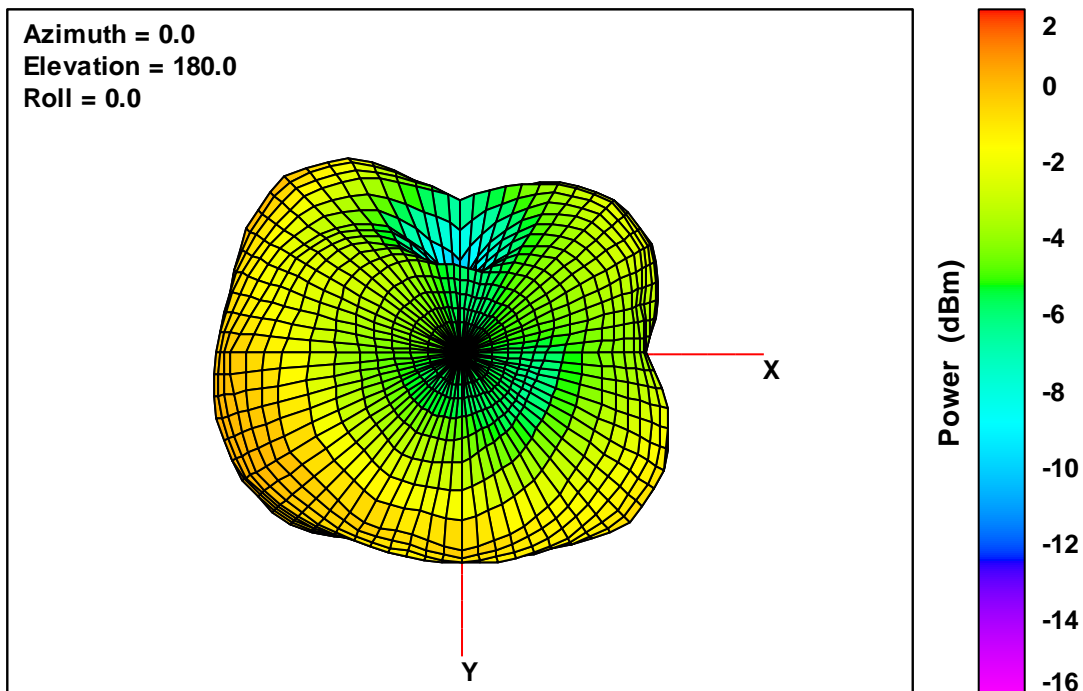
ANTENNA ONE Free-Space Total EIRP, Back Face View, 2437 MHz

### 6.4 Antenna 1 3D PASSIVE- 2440 MHz Total EIRP, Top View



ANTENNA ONE Free-Space Total EIRP, Top View, 2440 MHz

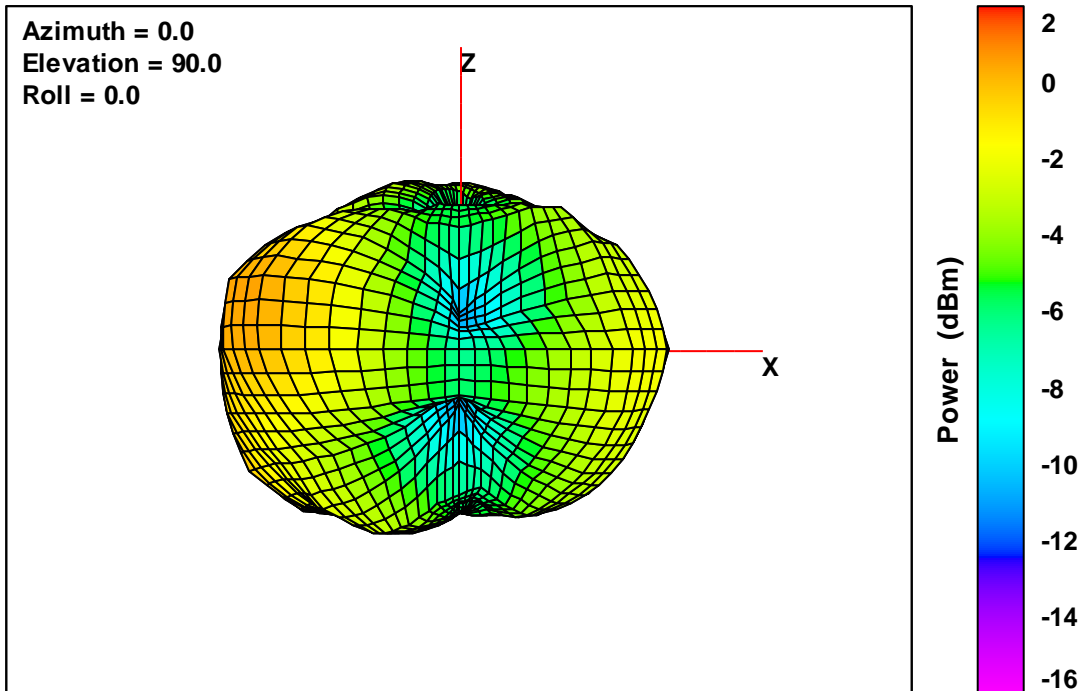
### Total EIRP, Bottom View



ANTENNA ONE Free-Space Total EIRP, Bottom View, 2440 MHz

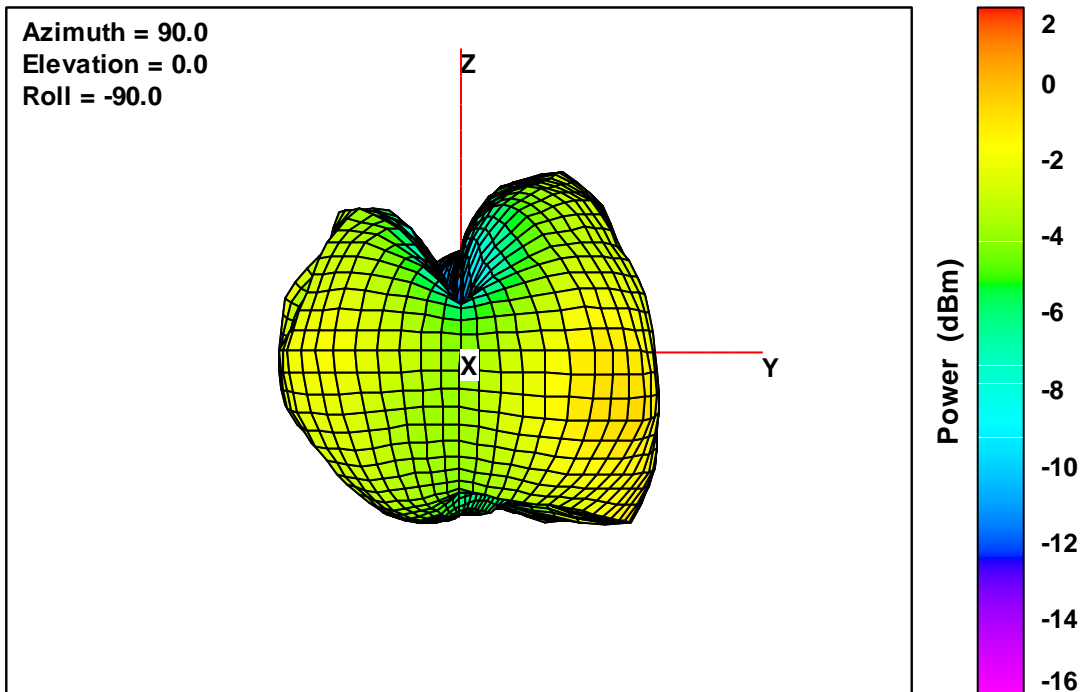


### Total EIRP, Left Side View



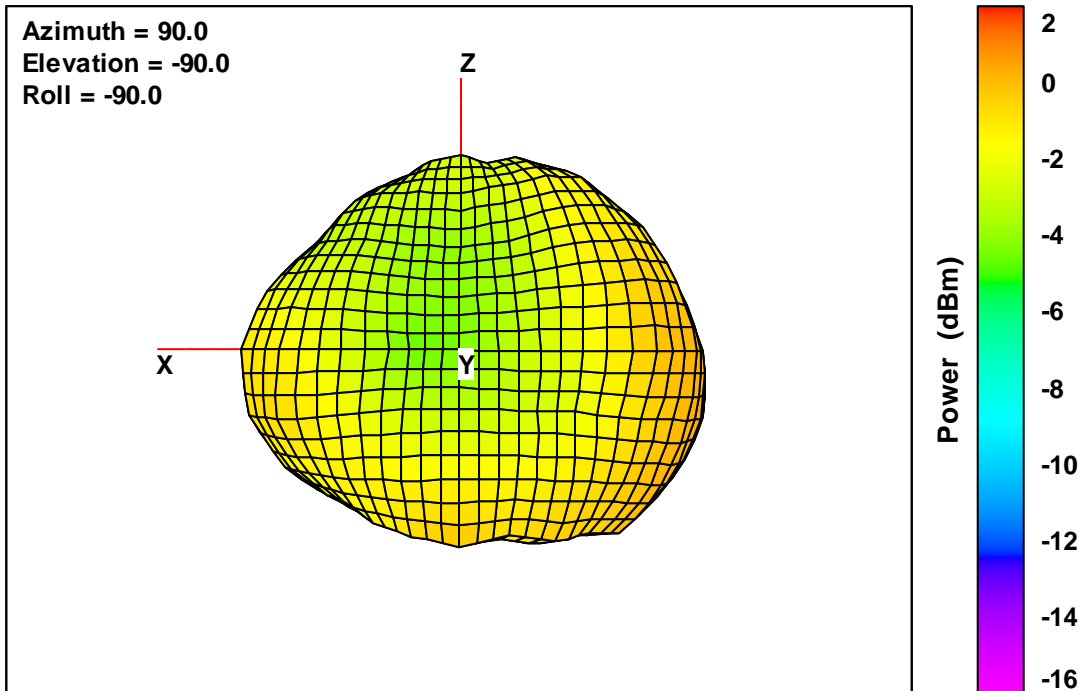
ANTENNA ONE Free-Space Total EIRP, Left Side View, 2440 MHz

### Total EIRP, Front Face View



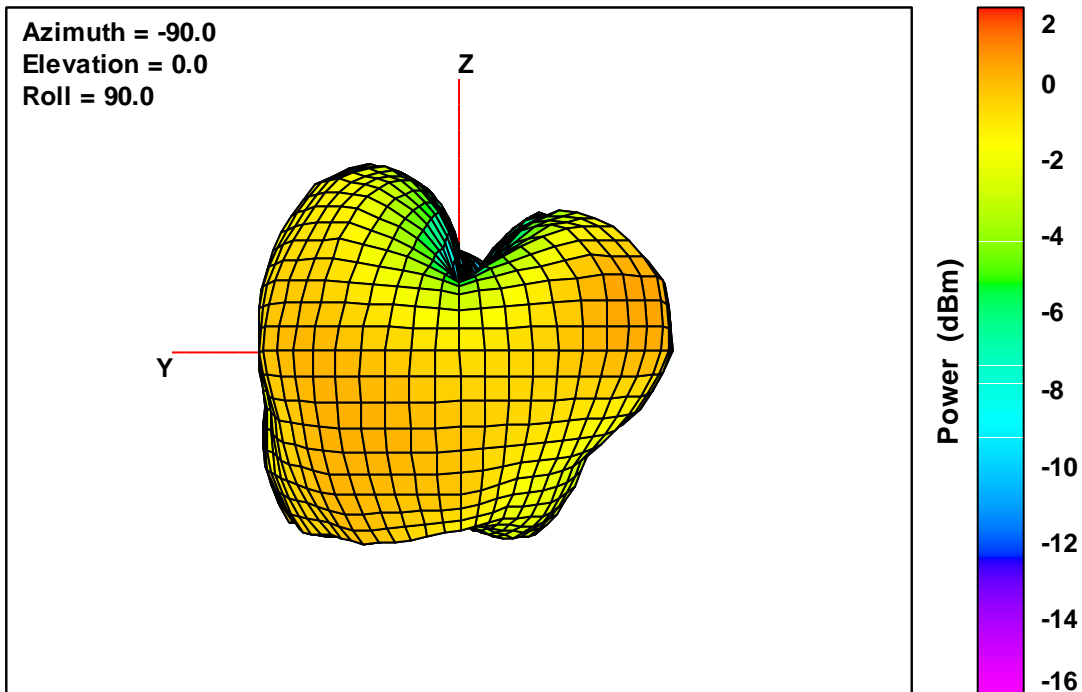
ANTENNA ONE Free-Space Total EIRP, Front Face View, 2440 MHz

### Total EIRP, Right Side View



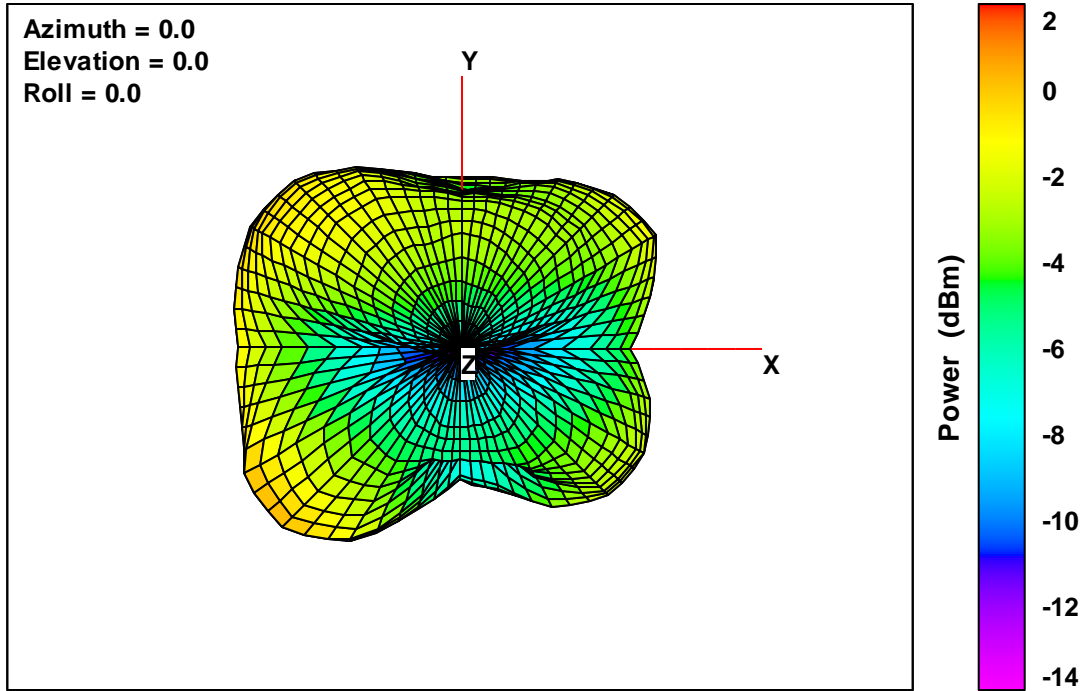
ANTENNA ONE Free-Space Total EIRP, Right Side View, 2440 MHz

### Total EIRP, Back Face View



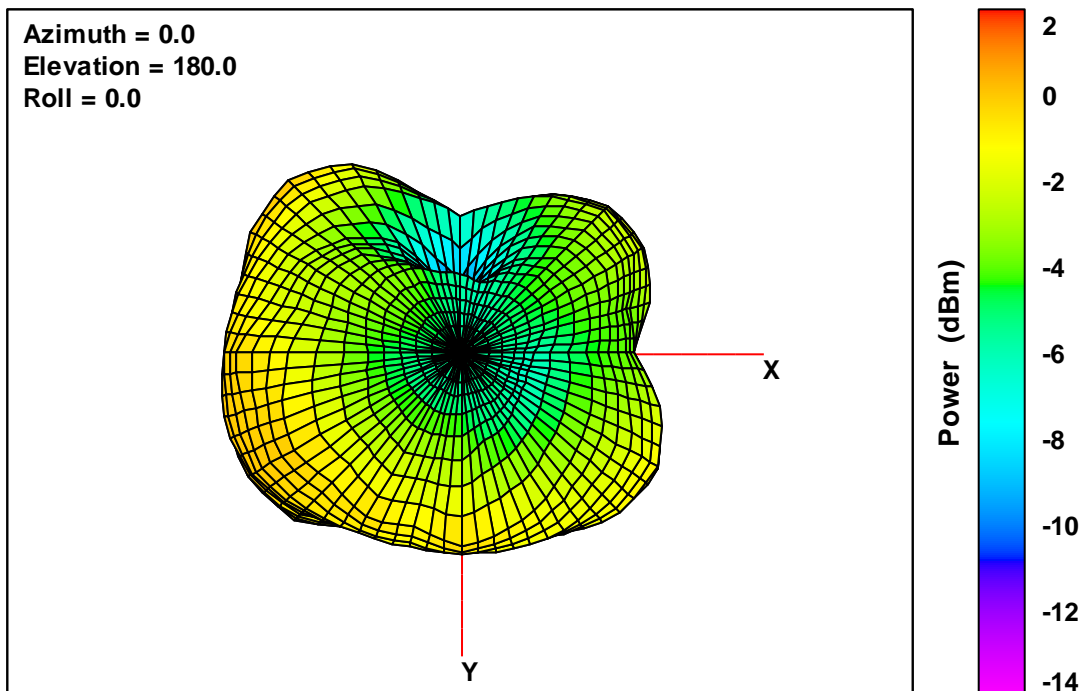
ANTENNA ONE Free-Space Total EIRP, Back Face View, 2440 MHz

### 6.5 Antenna 1 3D PASSIVE- 2462 MHz Total EIRP, Top View



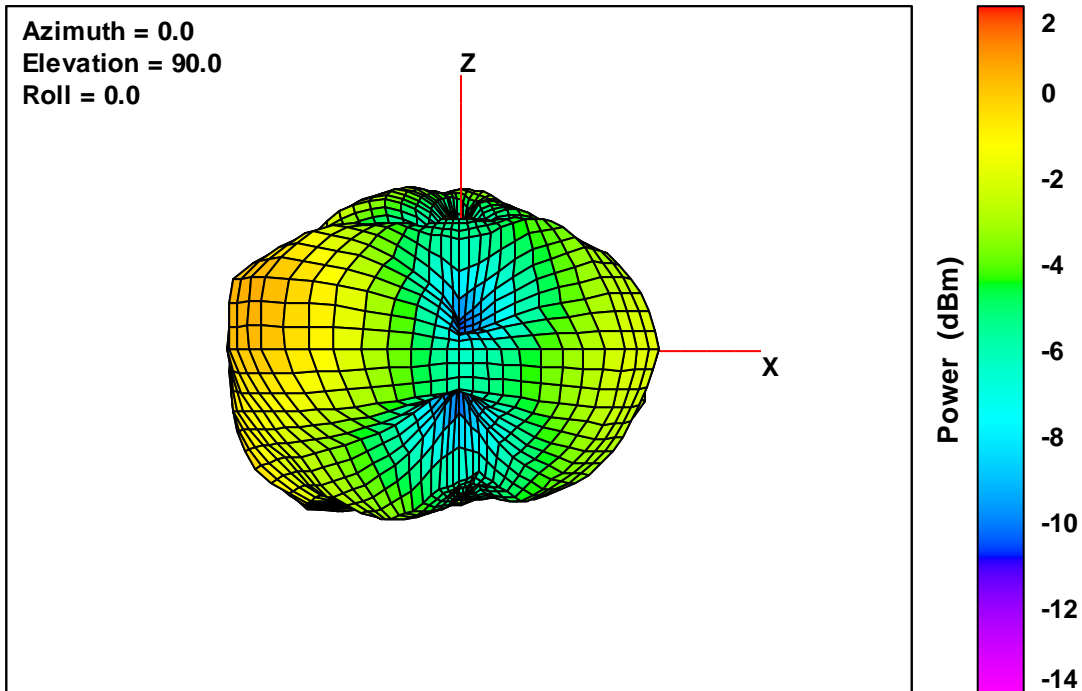
ANTENNA ONE Free-Space Total EIRP, Top View, 2462 MHz

### Total EIRP, Bottom View



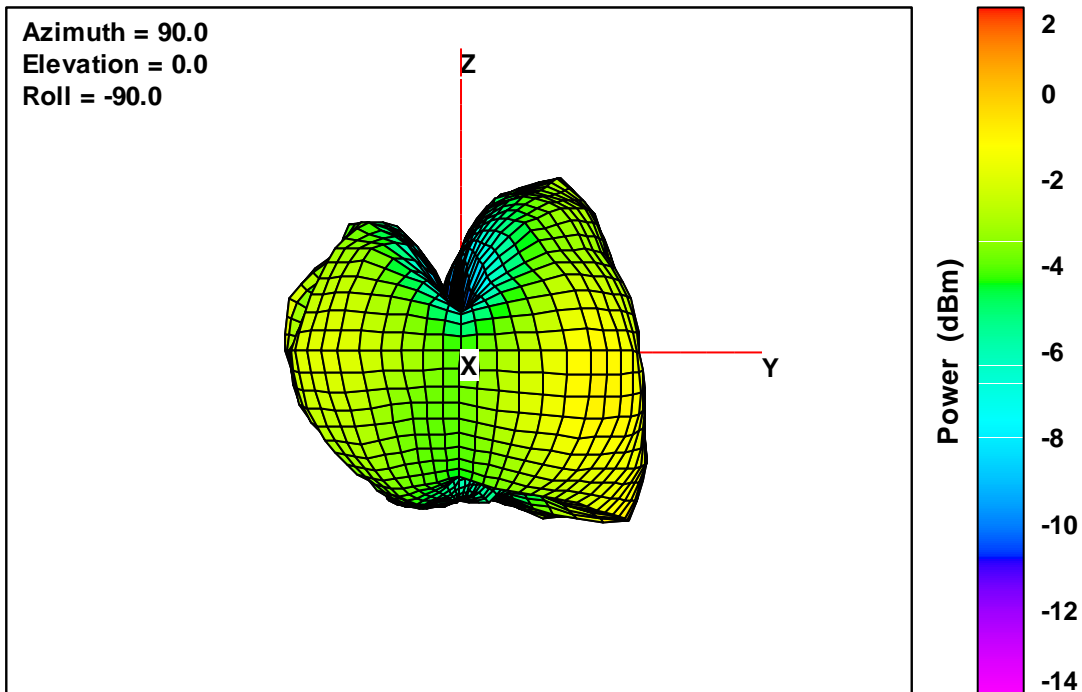
ANTENNA ONE Free-Space Total EIRP, Bottom View, 2462 MHz

### Total EIRP, Left Side View



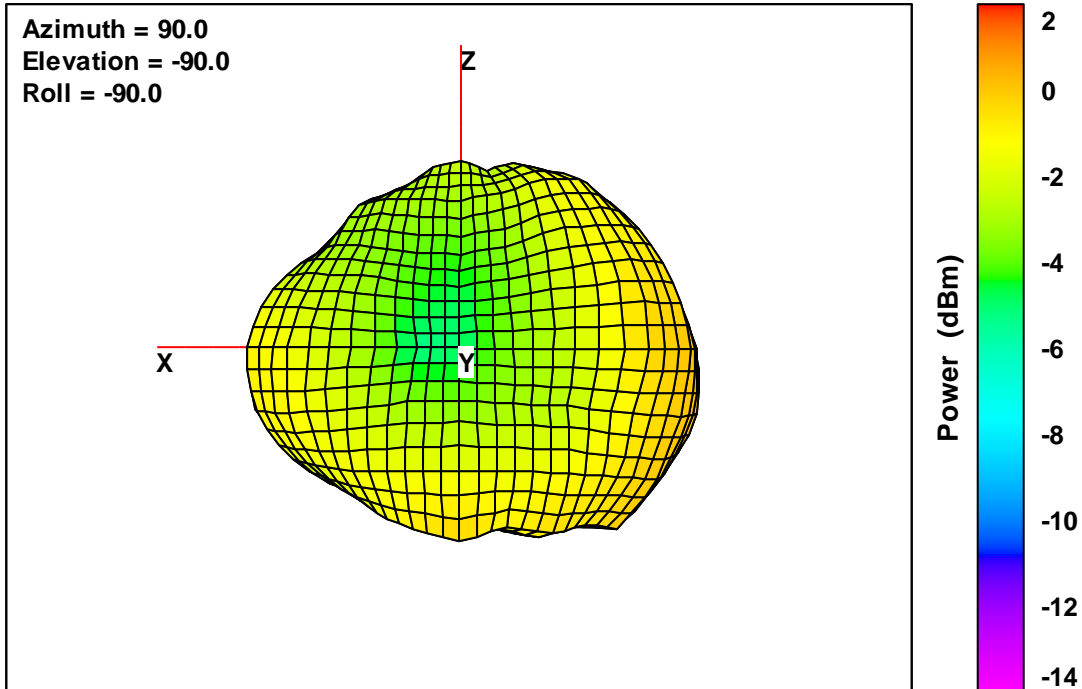
ANTENNA ONE Free-Space Total EIRP, Left Side View, 2462 MHz

### Total EIRP, Front Face View



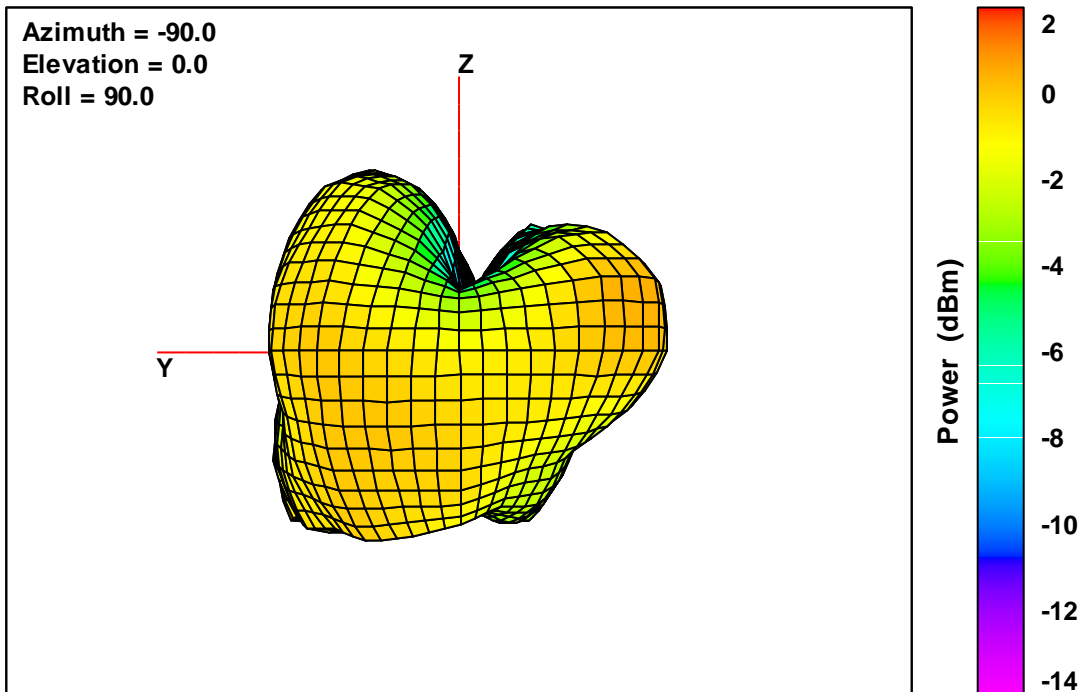
ANTENNA ONE Free-Space Total EIRP, Front Face View, 2462 MHz

### Total EIRP, Right Side View



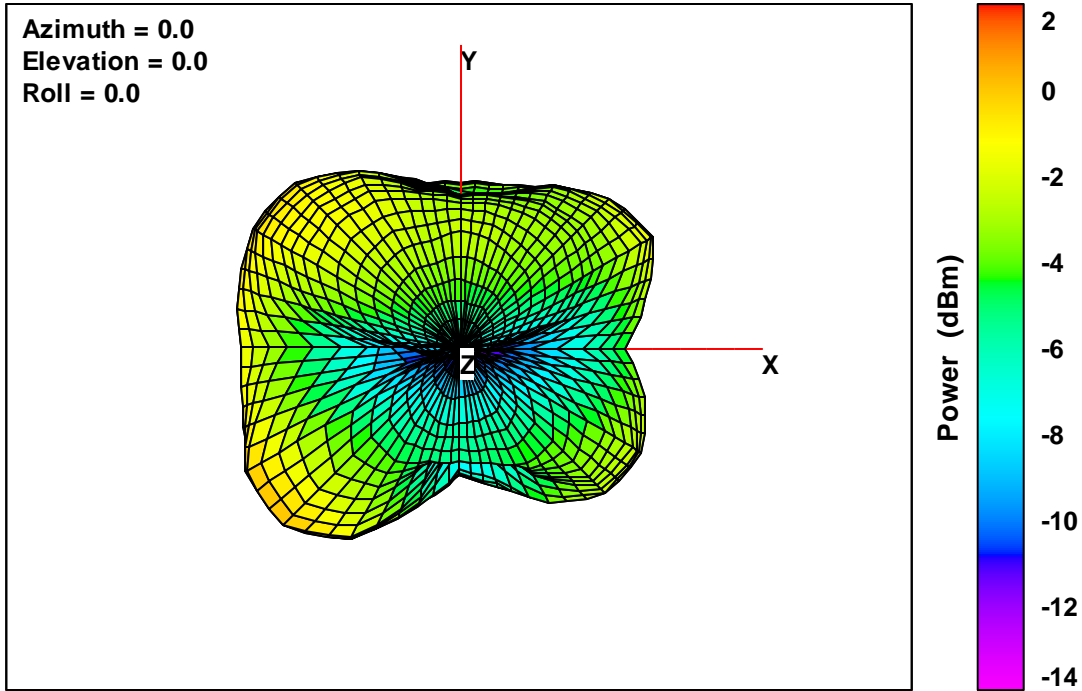
ANTENNA ONE Free-Space Total EIRP, Right Side View, 2462 MHz

### Total EIRP, Back Face View



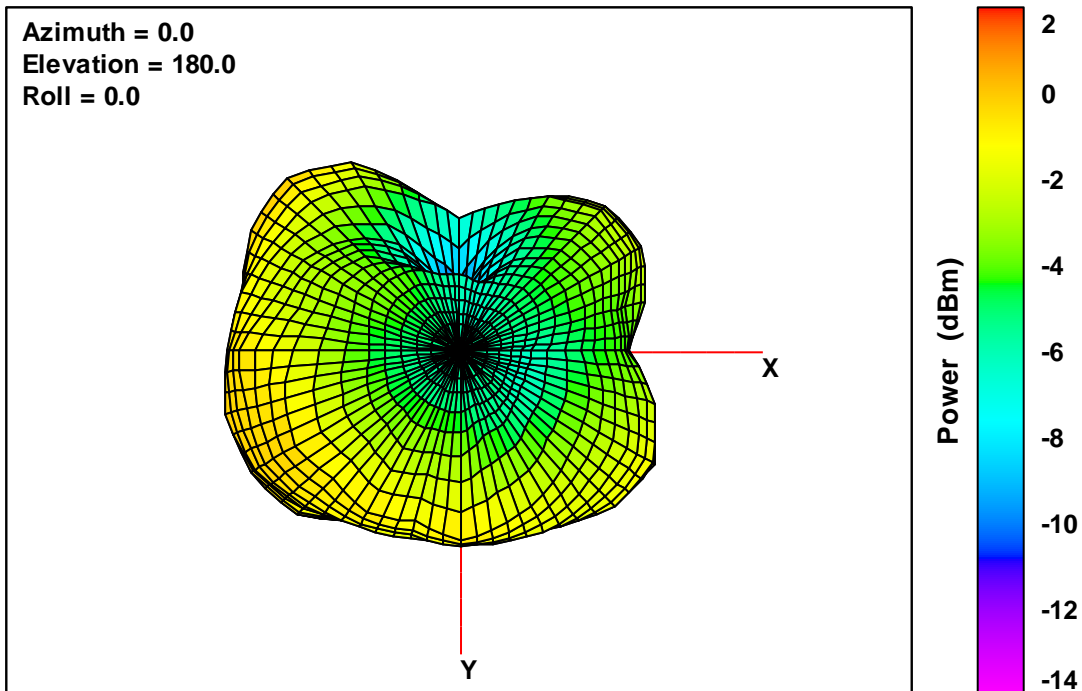
ANTENNA ONE Free-Space Total EIRP, Back Face View, 2462 MHz

### 6.6 Antenna 1 3D PASSIVE- 2480 MHz Total EIRP, Top View



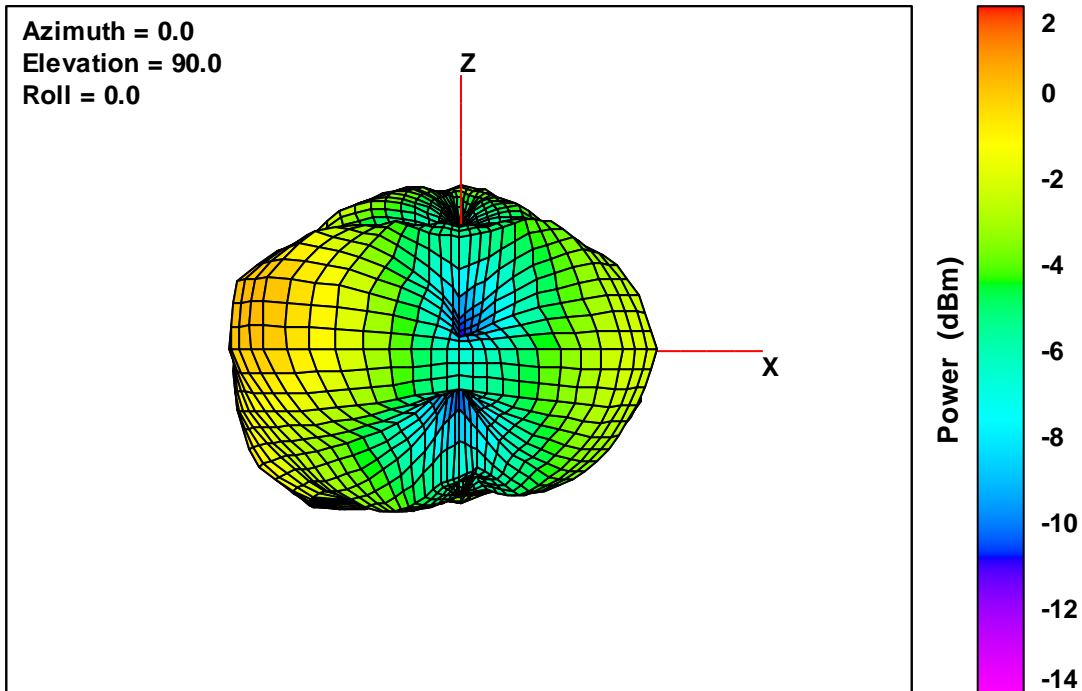
ANTENNA ONE Free-Space Total EIRP, Top View, 2480 MHz

### Total EIRP, Bottom View



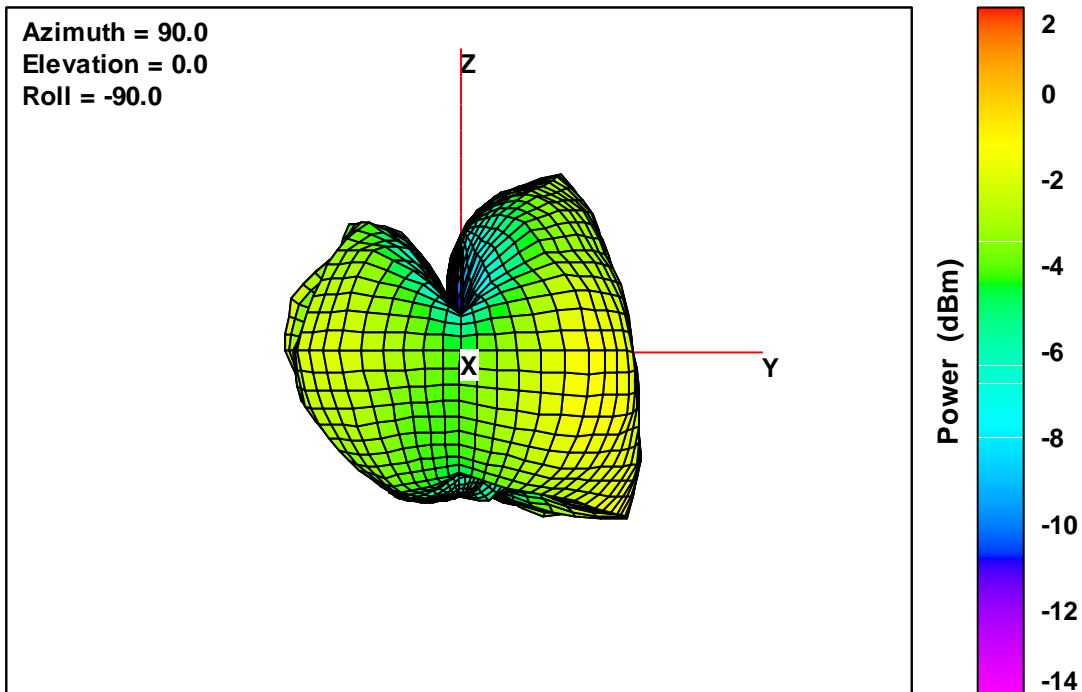
ANTENNA ONE Free-Space Total EIRP, Bottom View, 2480 MHz

### Total EIRP, Left Side View



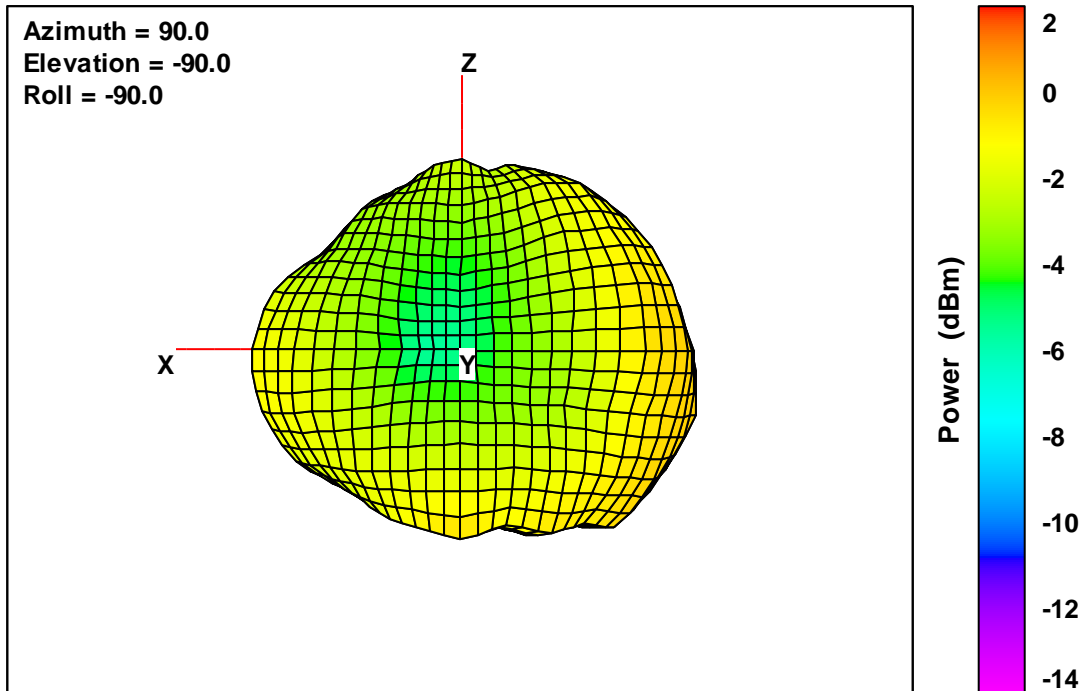
ANTENNA ONE Free-Space Total EIRP, Left Side View, 2480 MHz

### Total EIRP, Front Face View



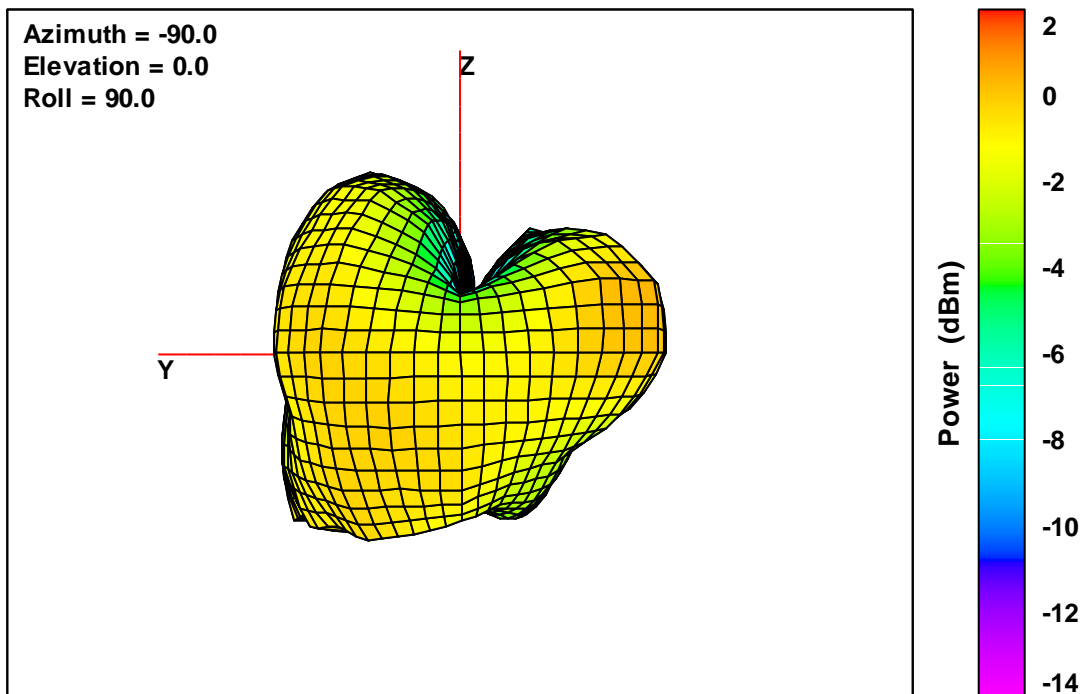
ANTENNA ONE-Free-Space Total EIRP, Front Face View, 2480 MHz

### Total EIRP, Right Side View



ANTENNA ONE Free-Space Total EIRP, Right Side View, 2480 MHz

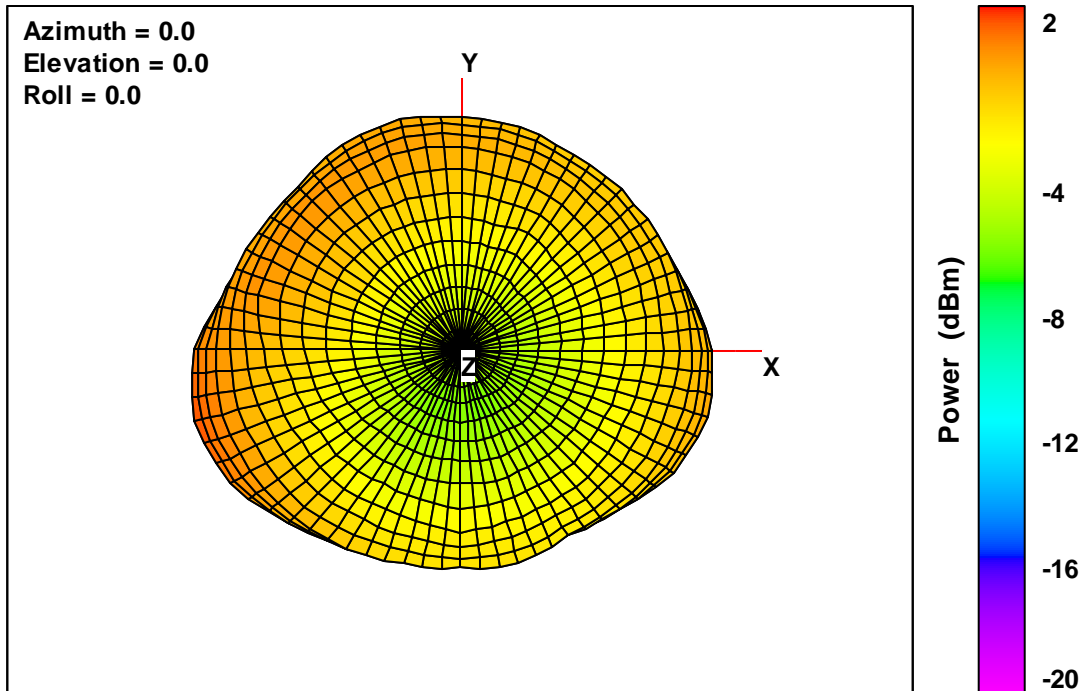
### Total EIRP, Back Face View



ANTENNA ONE Free-Space Total EIRP, Back Face View, 2480 MHz

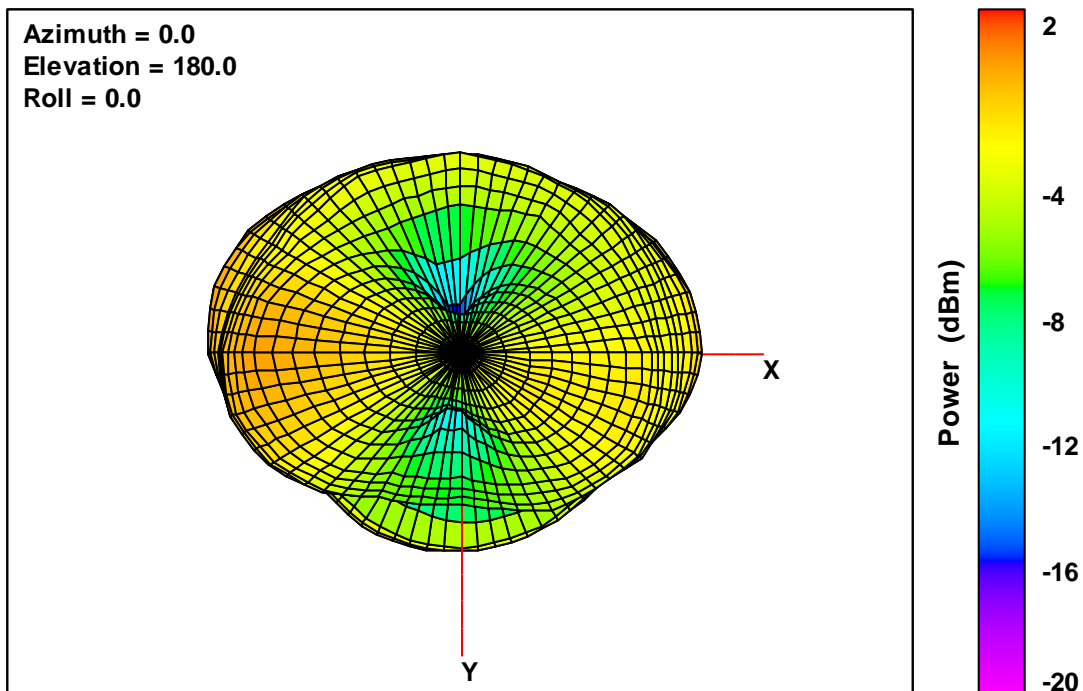


### 6.7 Antenna 2 3D PASSIVE- 2402 MHz Total EIRP, Top View



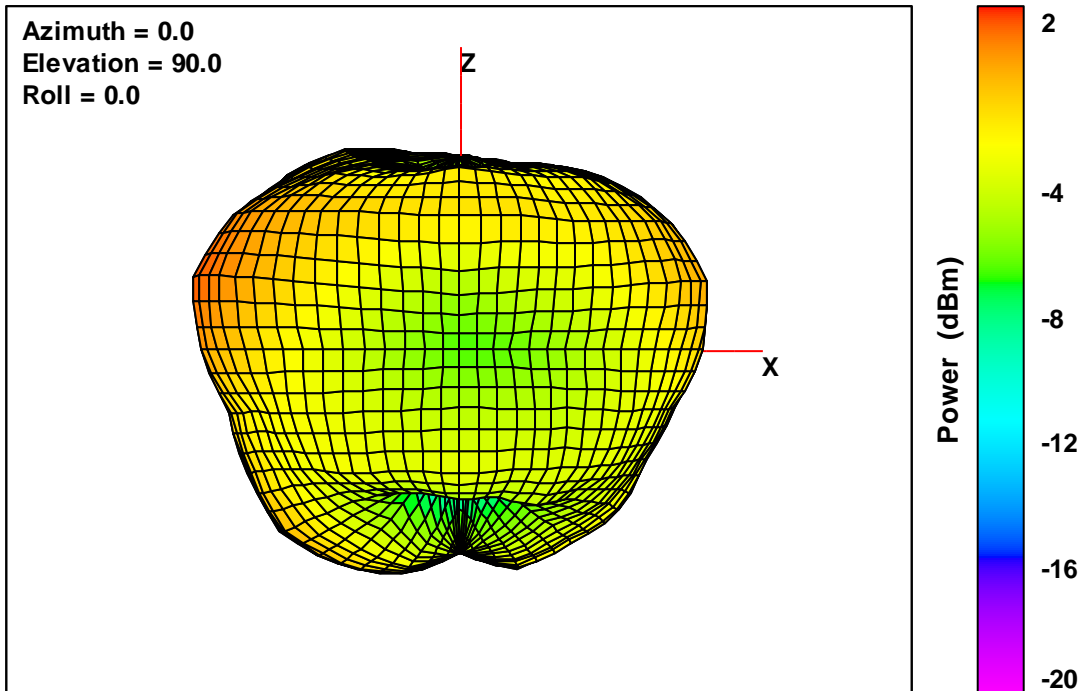
ANTENNA TWO Free-Space Total EIRP, Top View, 2402 MHz

### Total EIRP, Bottom View



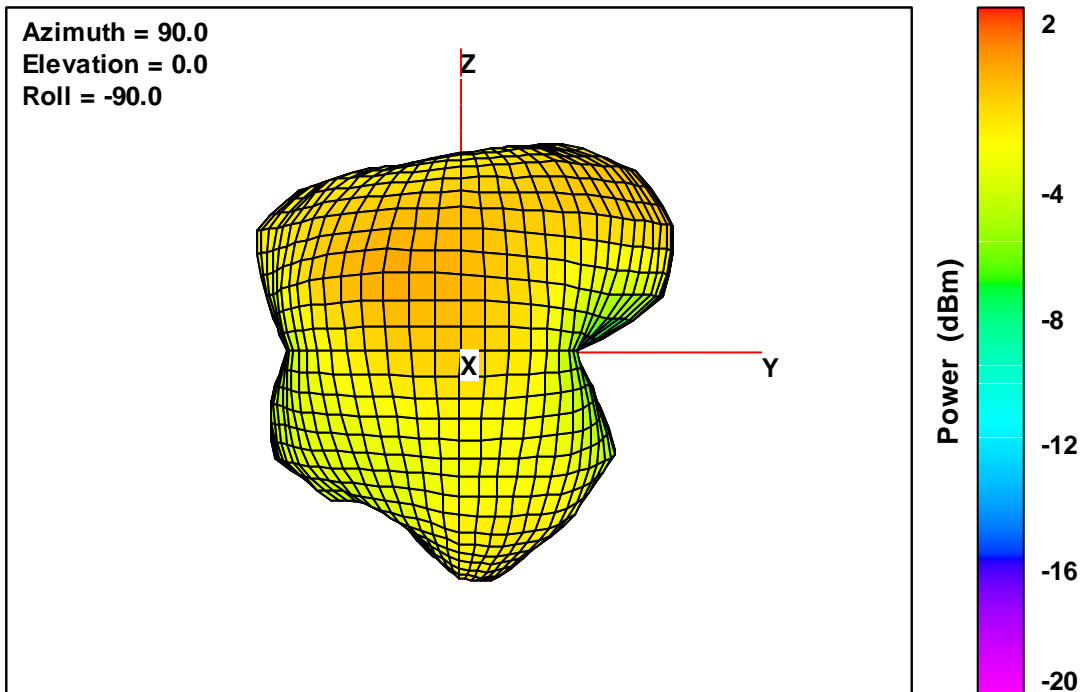
ANTENNA TWO Free-Space Total EIRP, Bottom View, 2402 MHz

### Total EIRP, Left Side View



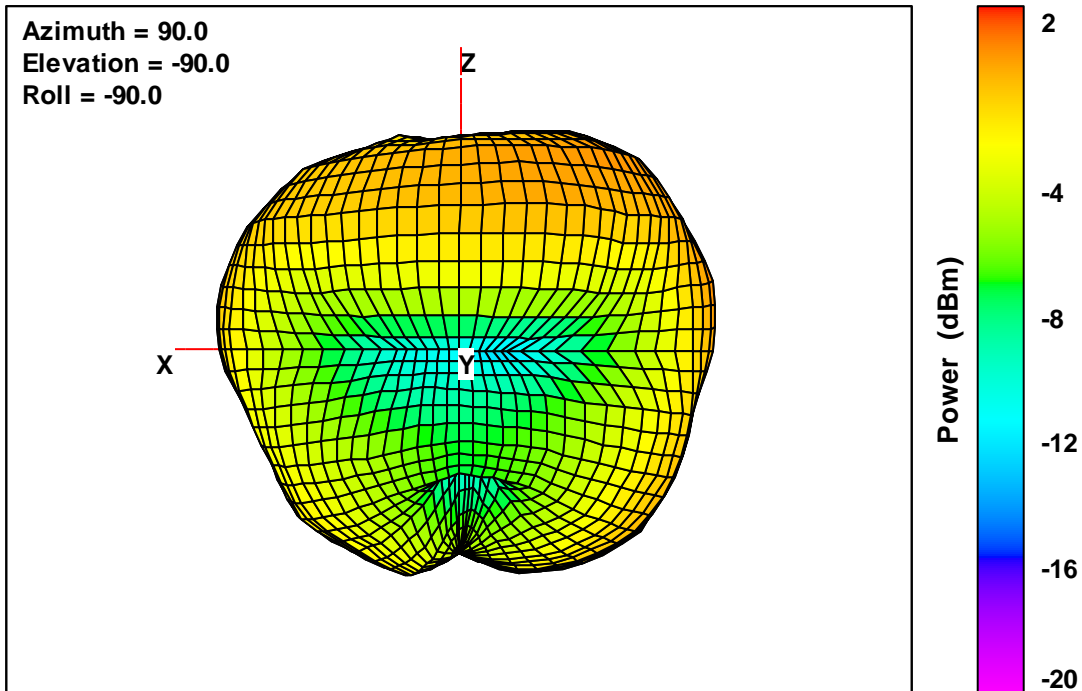
ANTENNA TWO Free-Space Total EIRP, Left Side View, 2402 MHz

### Total EIRP, Front Face View



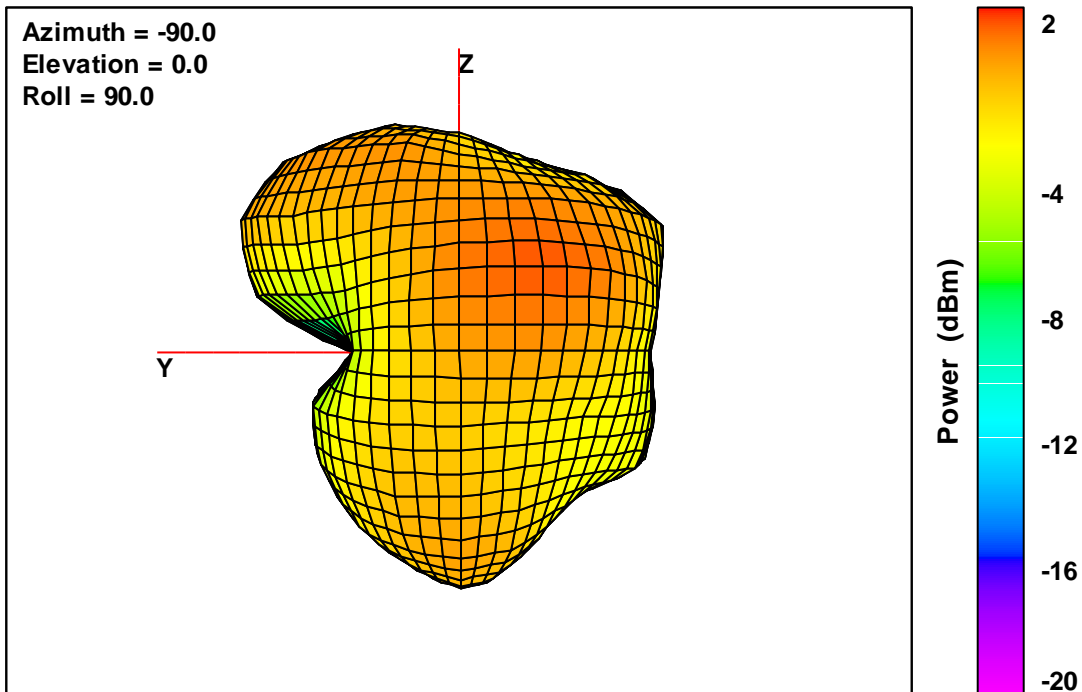
ANTENNA TWO Free-Space Total EIRP, Front Face View, 2402 MHz

### Total EIRP, Right Side View



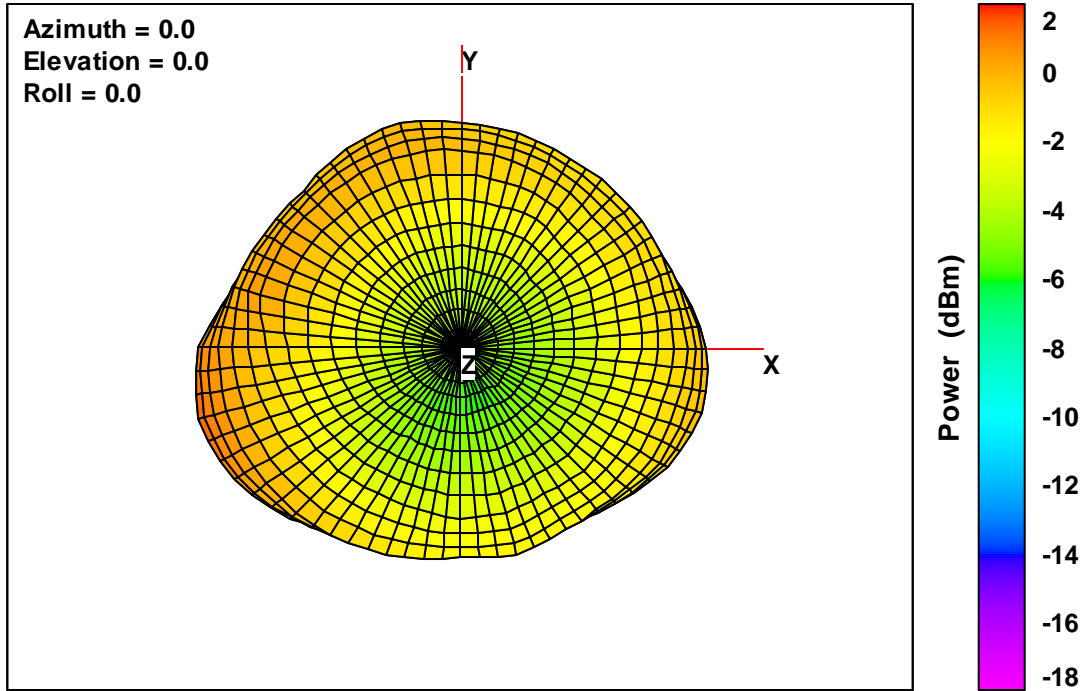
ANTENNA TWO Free-Space Total EIRP, Right Side View, 2402 MHz

### Total EIRP, Back Face View



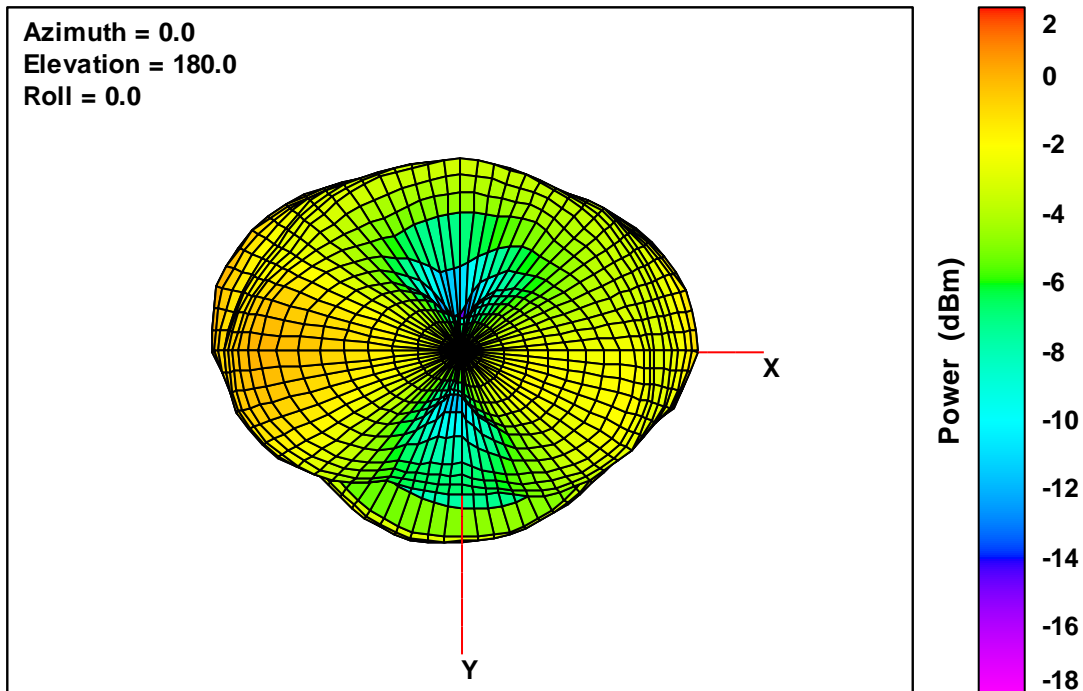
ANTENNA TWO Free-Space Total EIRP, Back Face View, 2402 MHz

### 6.8 Antenna 2 3D PASSIVE- 2412 MHz Total EIRP, Top View



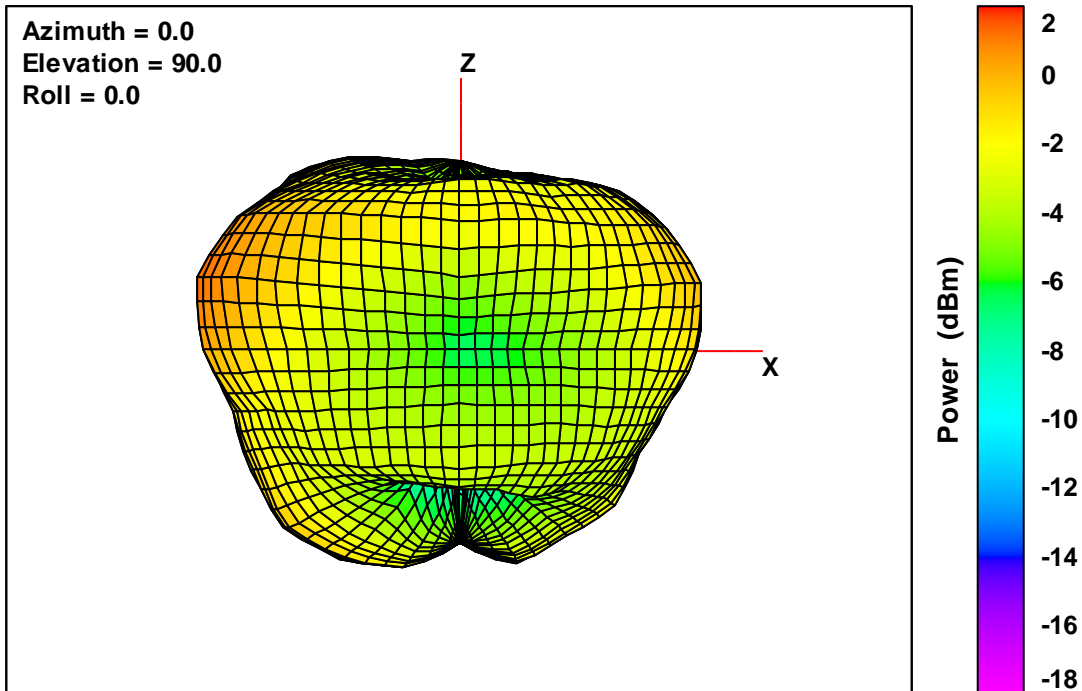
ANTENNA TWO Free-Space Total EIRP, Top View, 2412 MHz

### Total EIRP, Bottom View



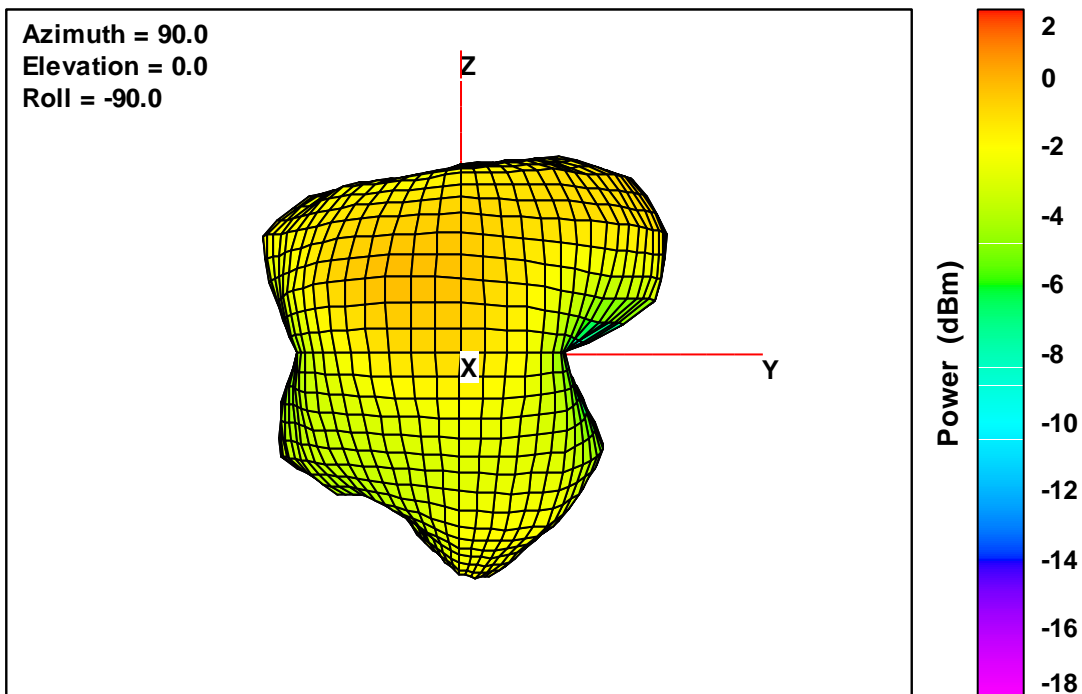
ANTENNA TWO Free-Space Total EIRP, Bottom View, 2412 MHz

### Total EIRP, Left Side View



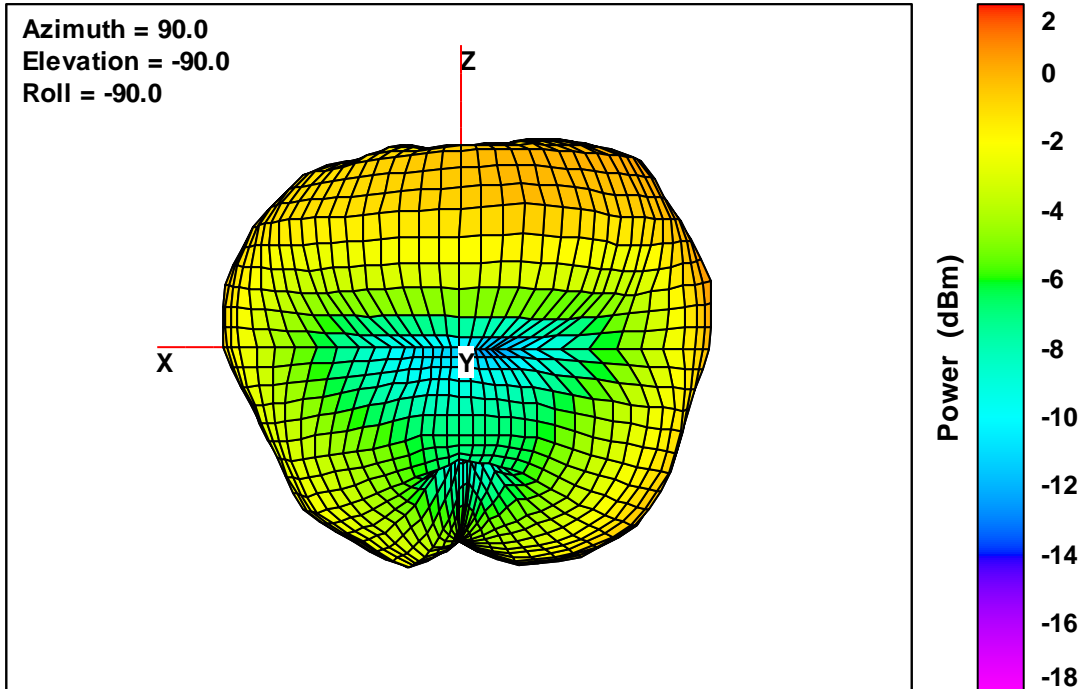
ANTENNA TWO Free-Space Total EIRP, Left Side View, 2412 MHz

### Total EIRP, Front Face View



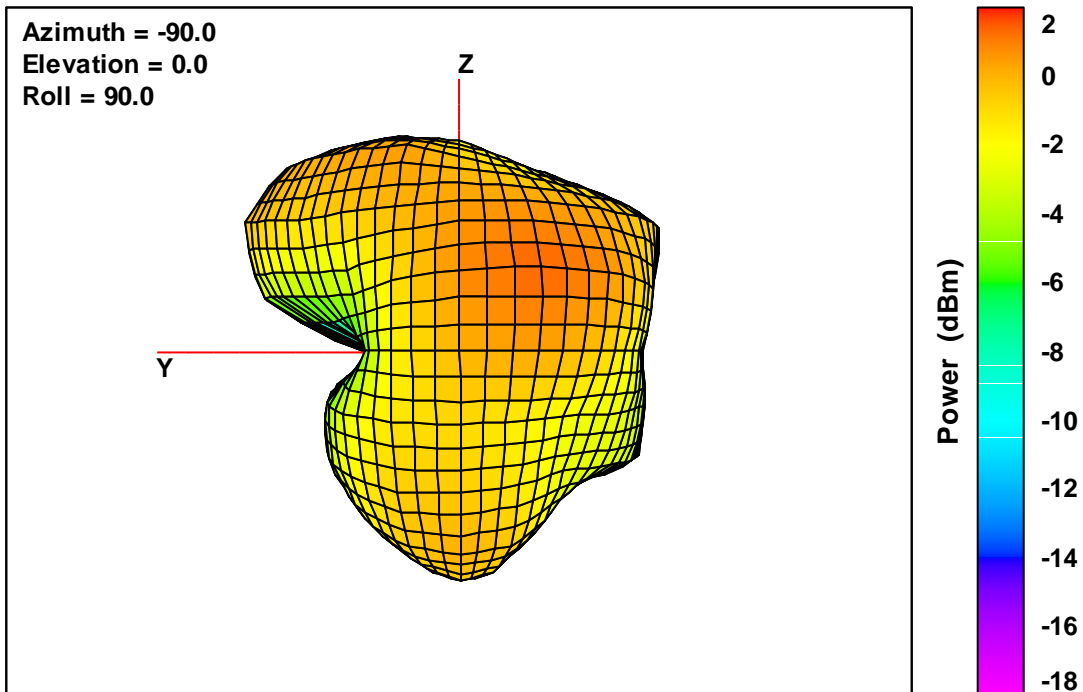
ANTENNA TWO Free-Space Total EIRP, Front Face View, 2412 MHz

### Total EIRP, Right Side View



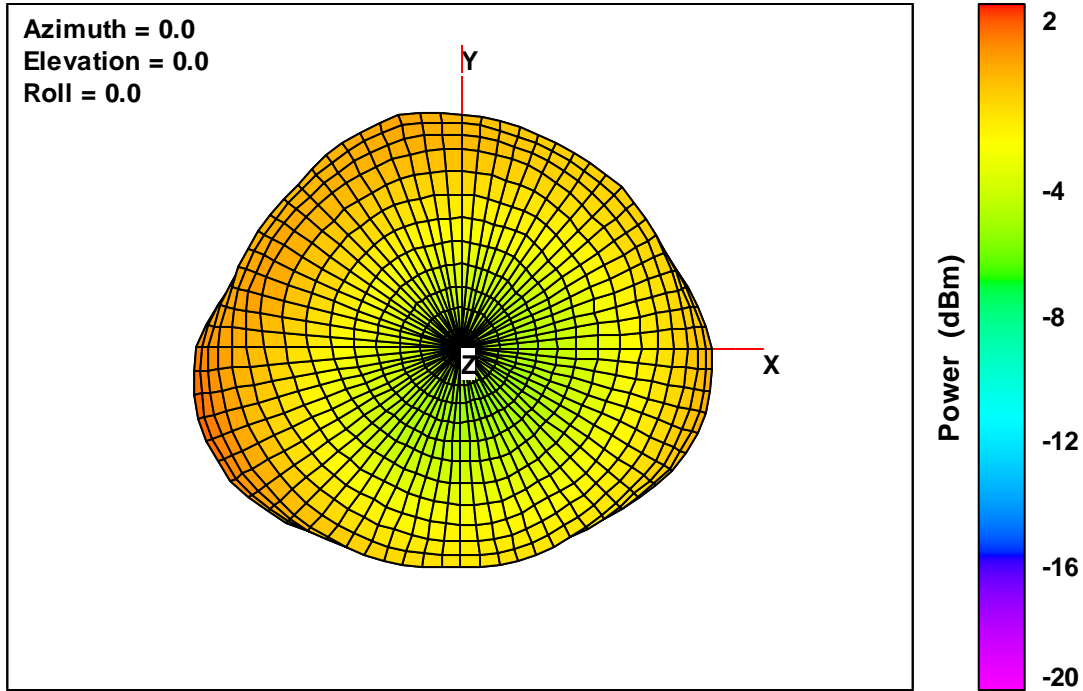
ANTENNA TWO Free-Space Total EIRP, Right Side View, 2412 MHz

### Total EIRP, Back Face View



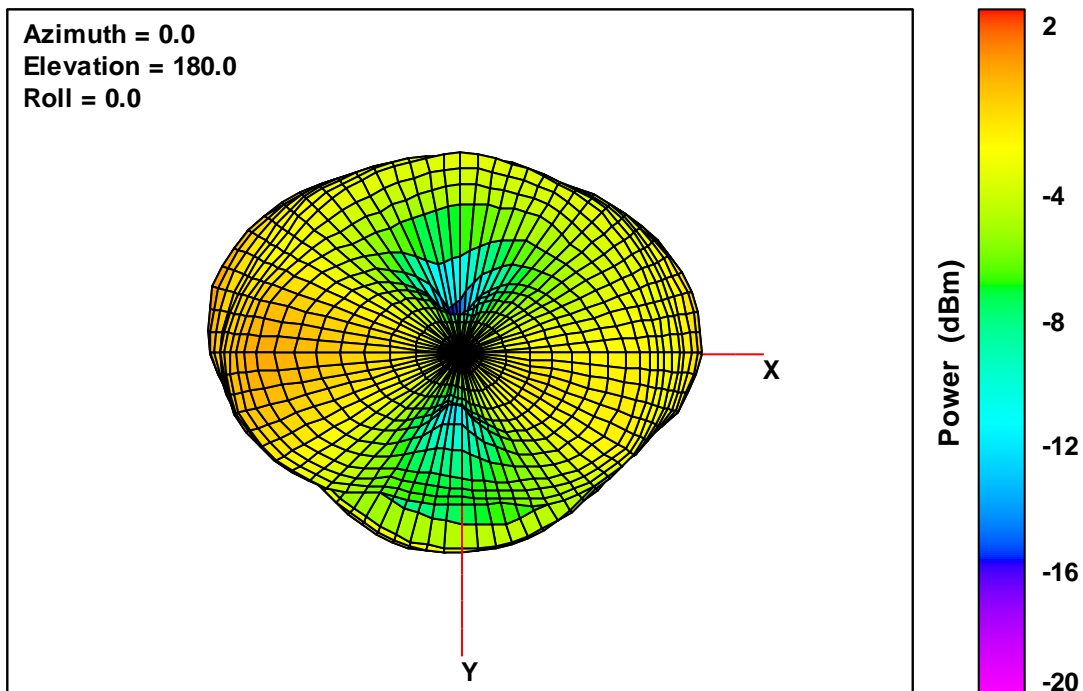
ANTENNA TWO Free-Space Total EIRP, Back Face View, 2412 MHz

### 6.9 Antenna 2 3D PASSIVE- 2437 MHz Total EIRP, Top View



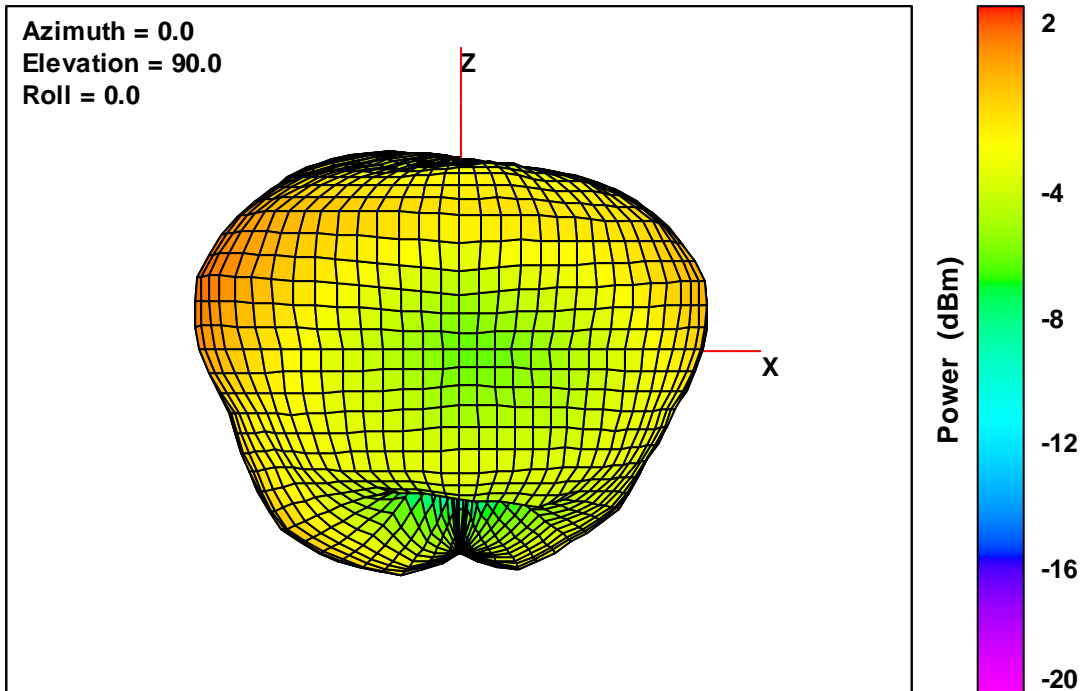
ANTENNA TWO Free-Space Total EIRP, Top View, 2437 MHz

### Total EIRP, Bottom View



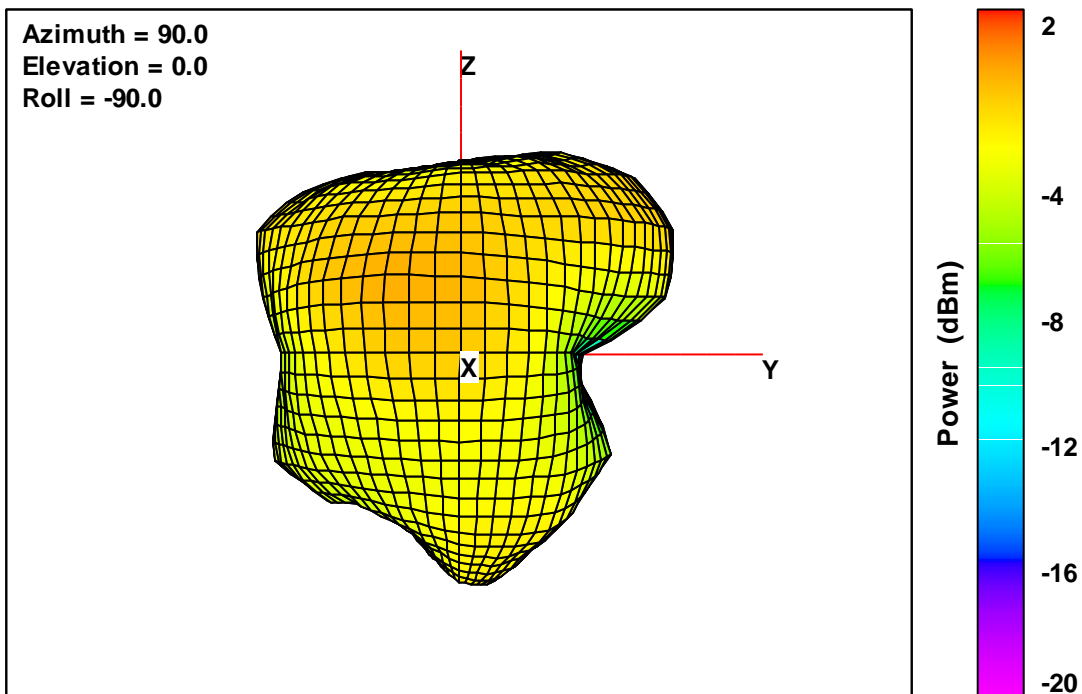
ANTENNA TWO Free-Space Total EIRP, Bottom View, 2437 MHz

### Total EIRP, Left Side View



ANTENNA TWO Free-Space Total EIRP, Left Side View, 2437 MHz

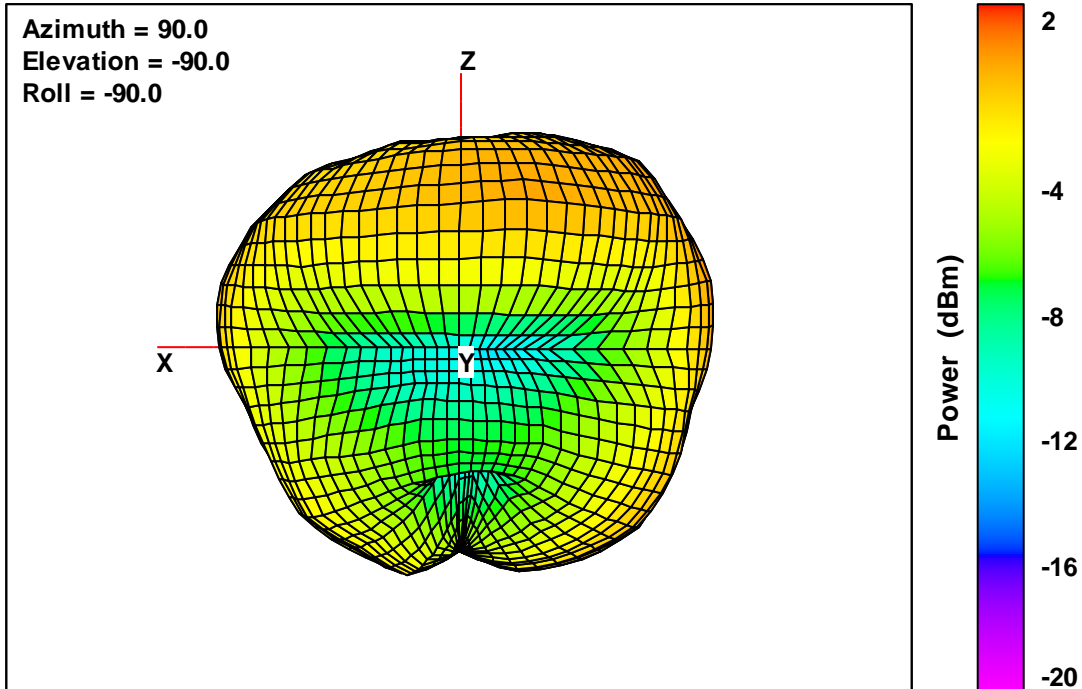
### Total EIRP, Front Face View



ANTENNA TWO Free-Space Total EIRP, Front Face View, 2437 MHz

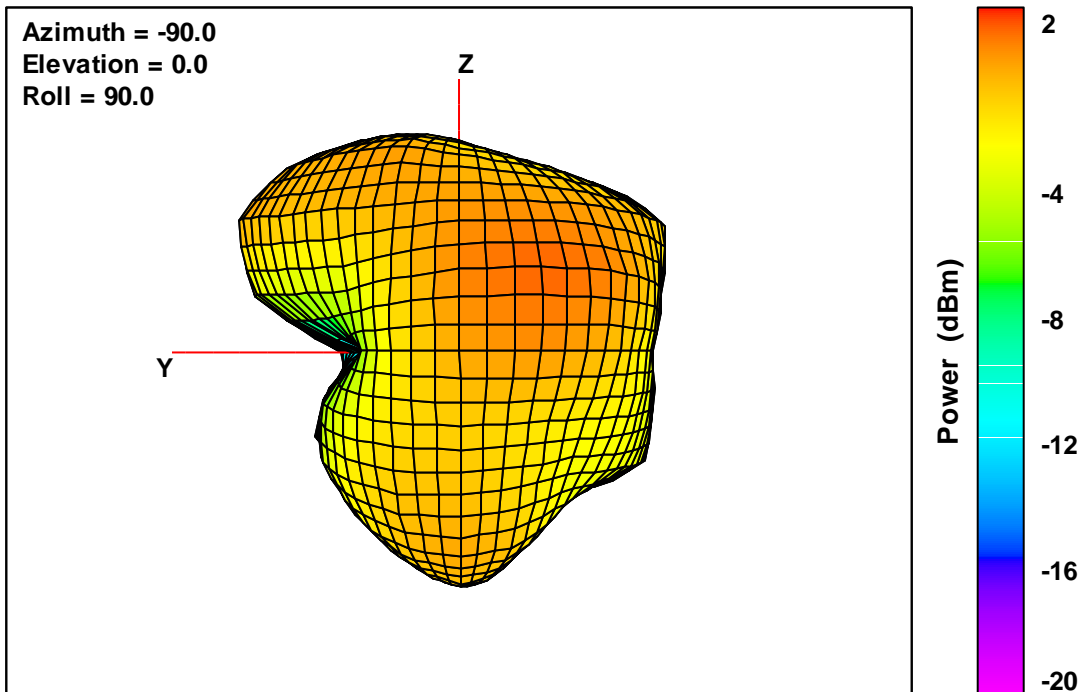


### Total EIRP, Right Side View



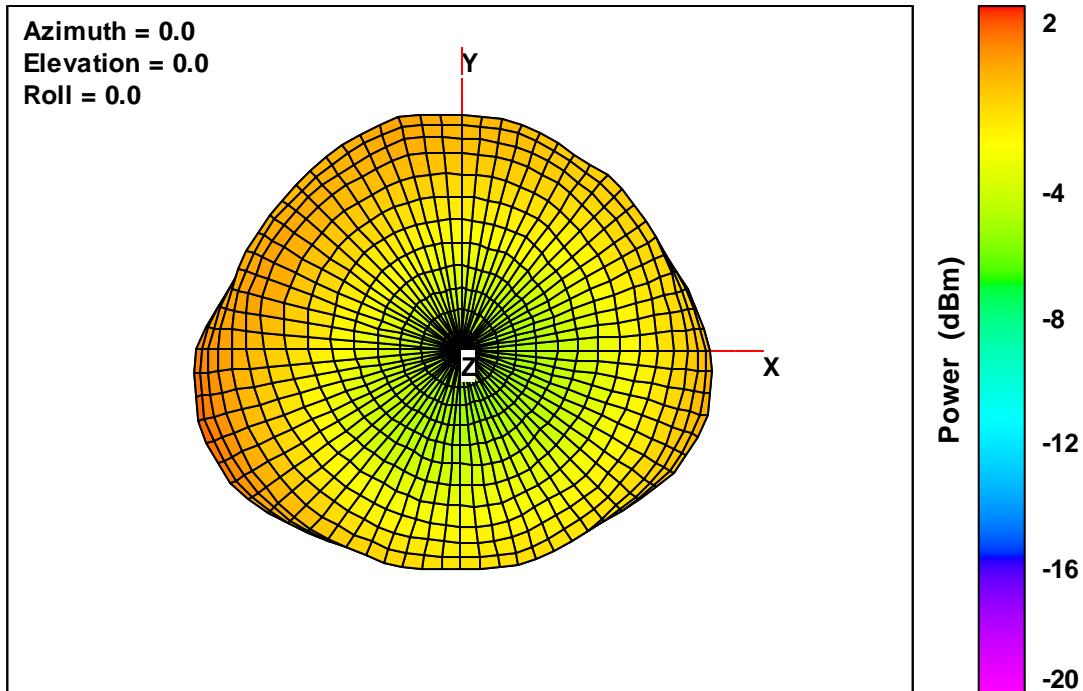
ANTENNA TWO Free-Space Total EIRP, Right Side View, 2437 MHz

### Total EIRP, Back Face View



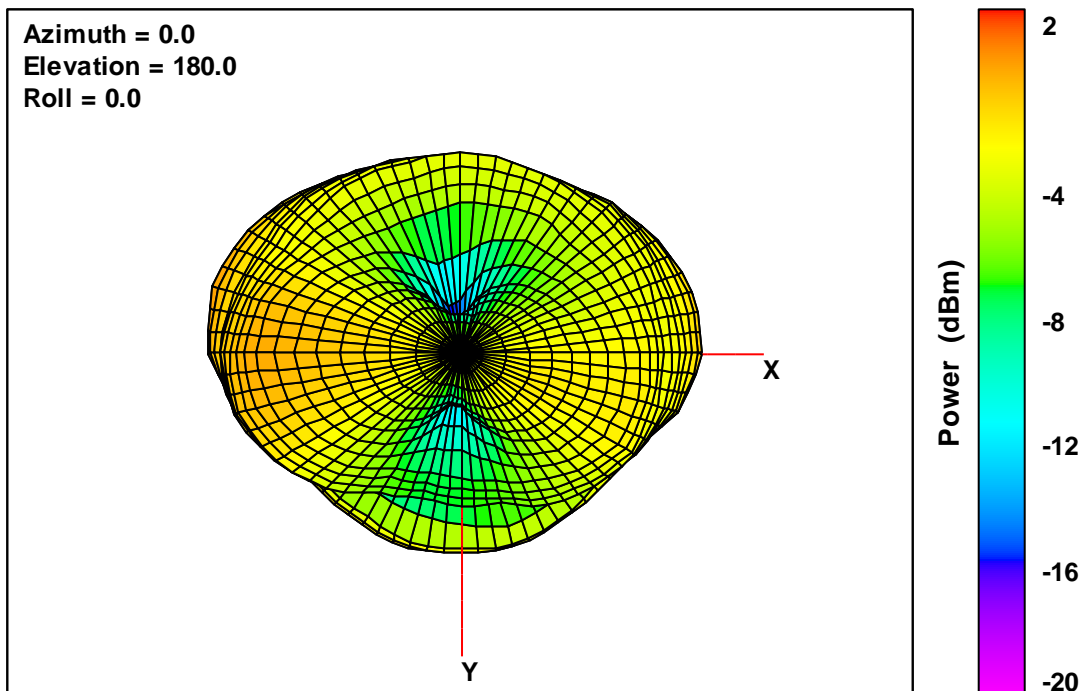
ANTENNA TWO Free-Space Total EIRP, Back Face View, 2437 MHz

### 6.10 Antenna 2 3D PASSIVE- 2440 MHz Total EIRP, Top View



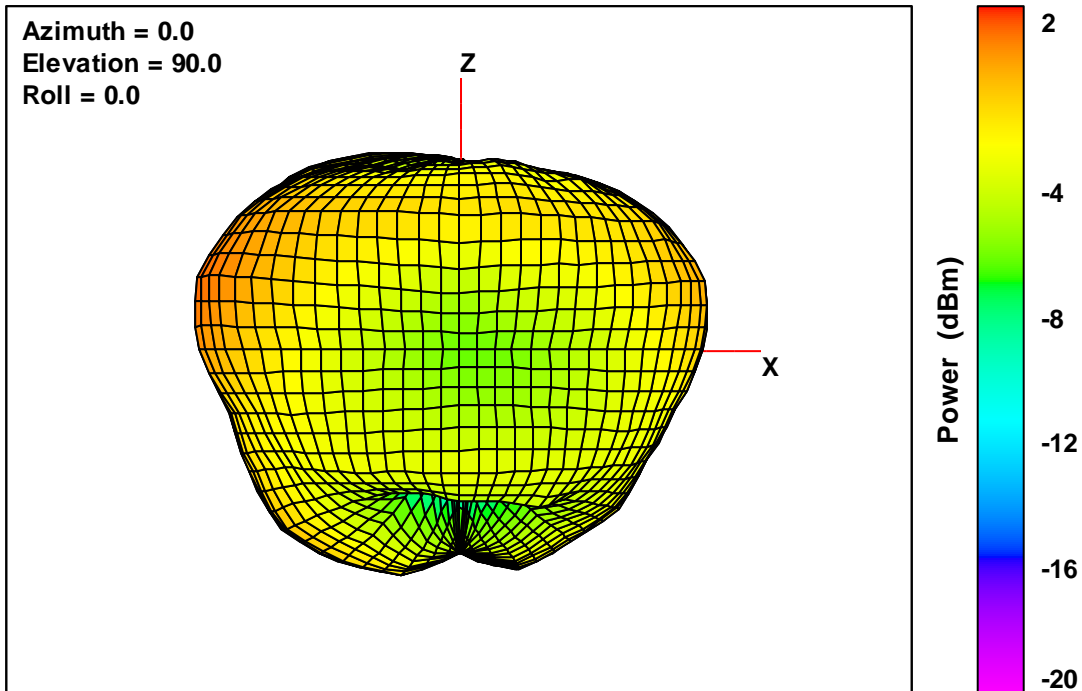
ANTENNA TWO Free-Space Total EIRP, Top View, 2440 MHz

### Total EIRP, Bottom View



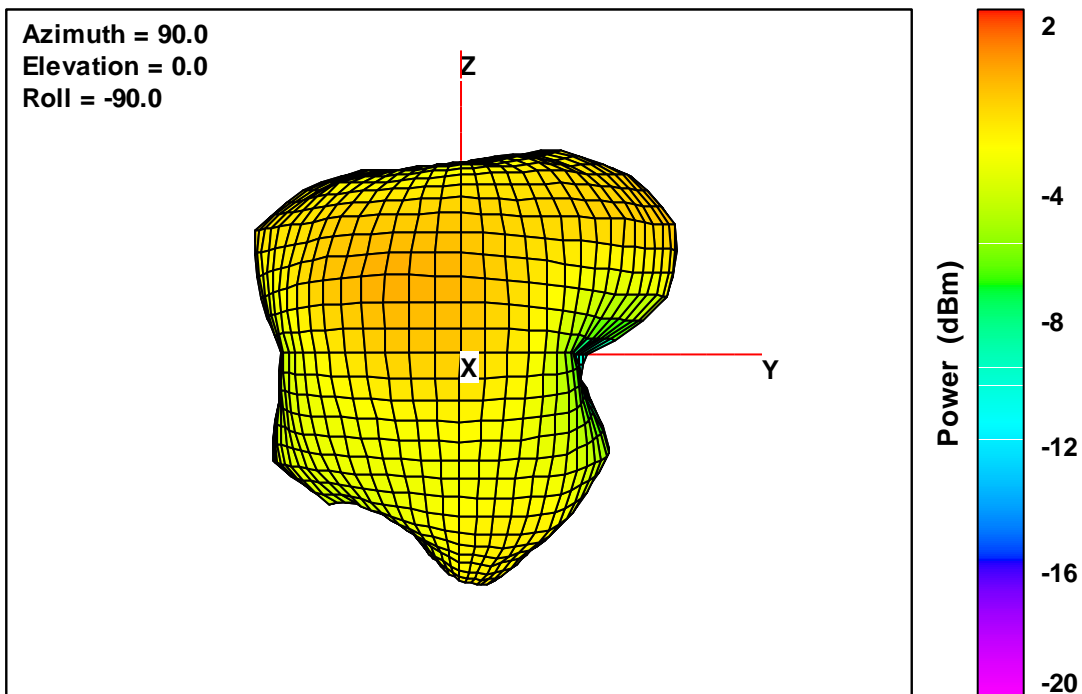
ANTENNA TWO Free-Space Total EIRP, Bottom View, 2440 MHz

### Total EIRP, Left Side View



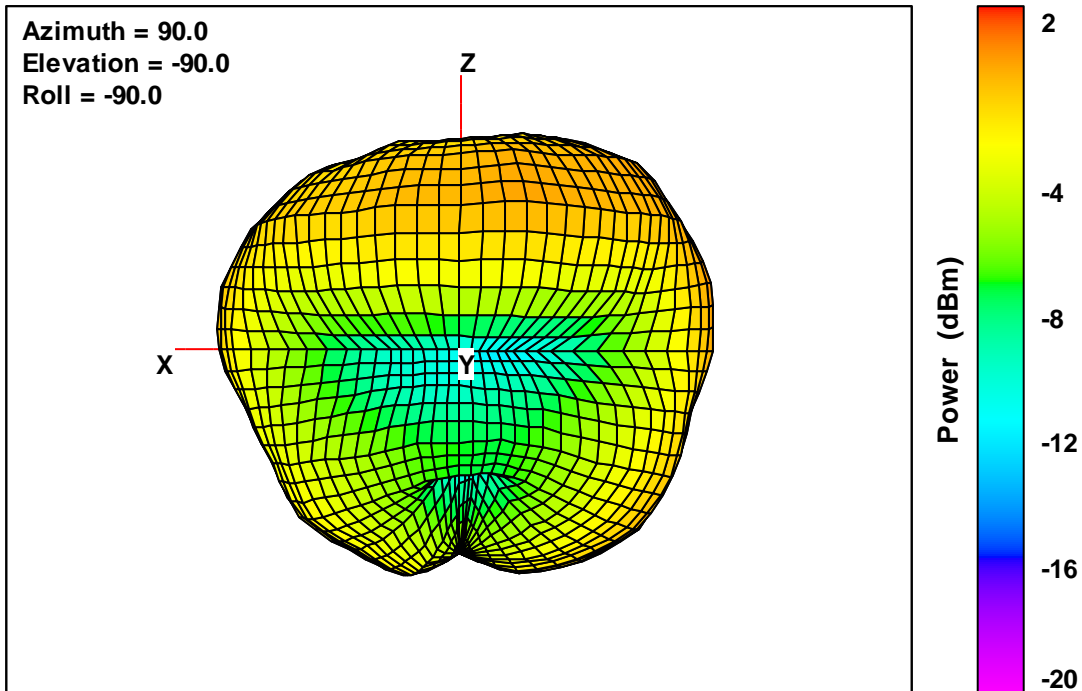
ANTENNA TWO Free-Space Total EIRP, Left Side View, 2440 MHz

### Total EIRP, Front Face View



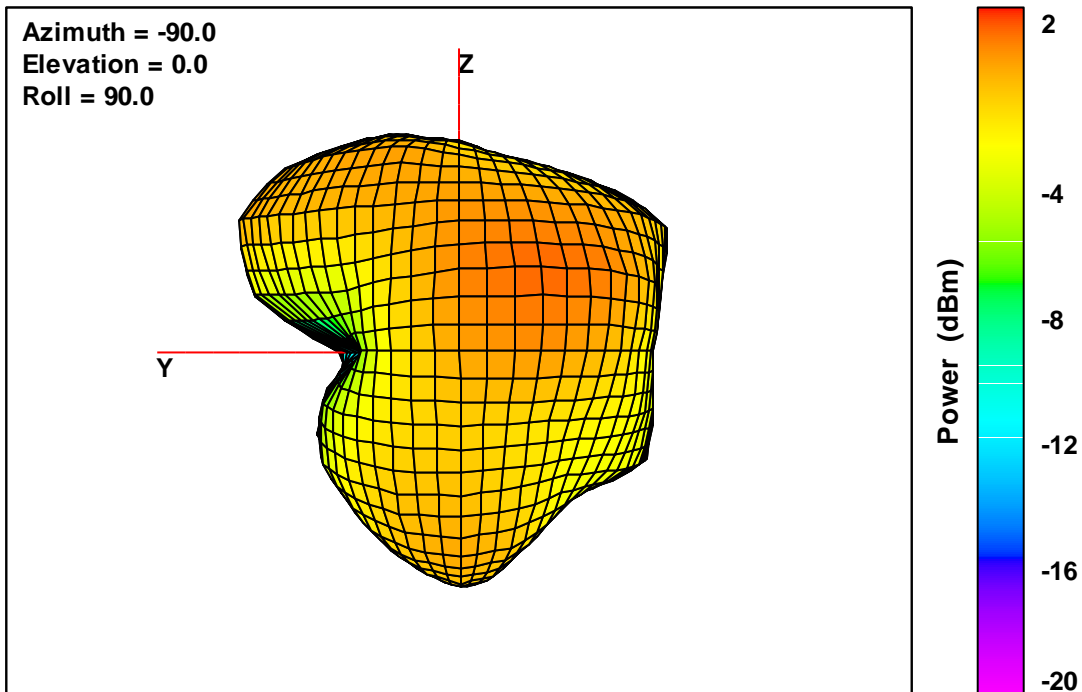
ANTENNA TWO Free-Space Total EIRP, Front Face View, 2440 MHz

### Total EIRP, Right Side View



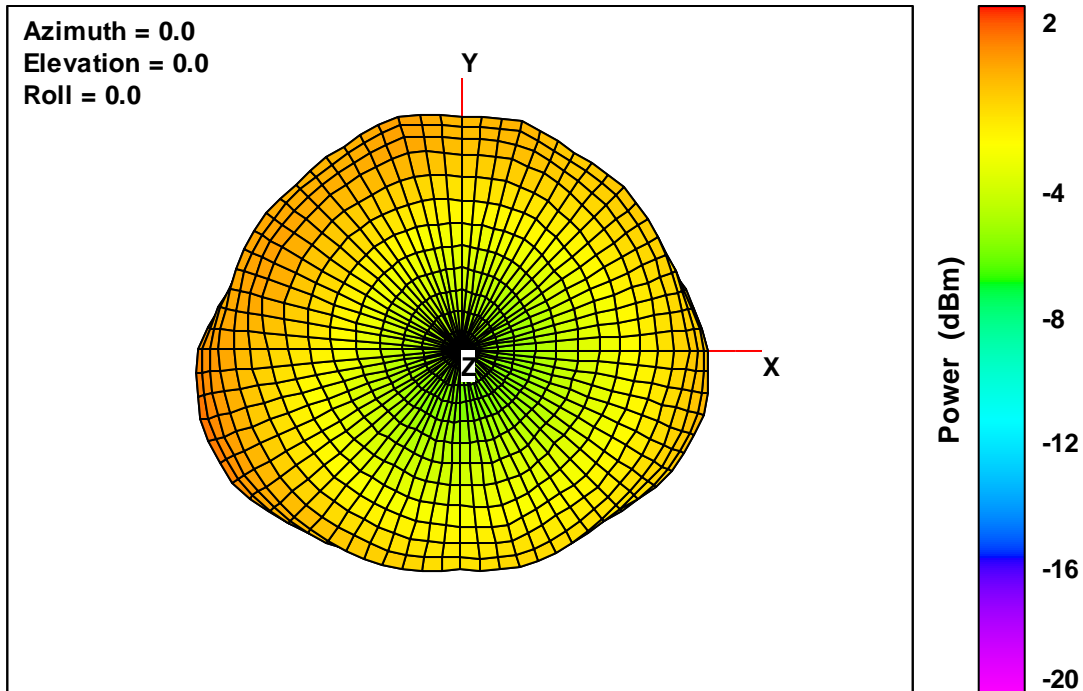
ANTENNA TWO Free-Space Total EIRP, Right Side View, 2440 MHz

### Total EIRP, Back Face View



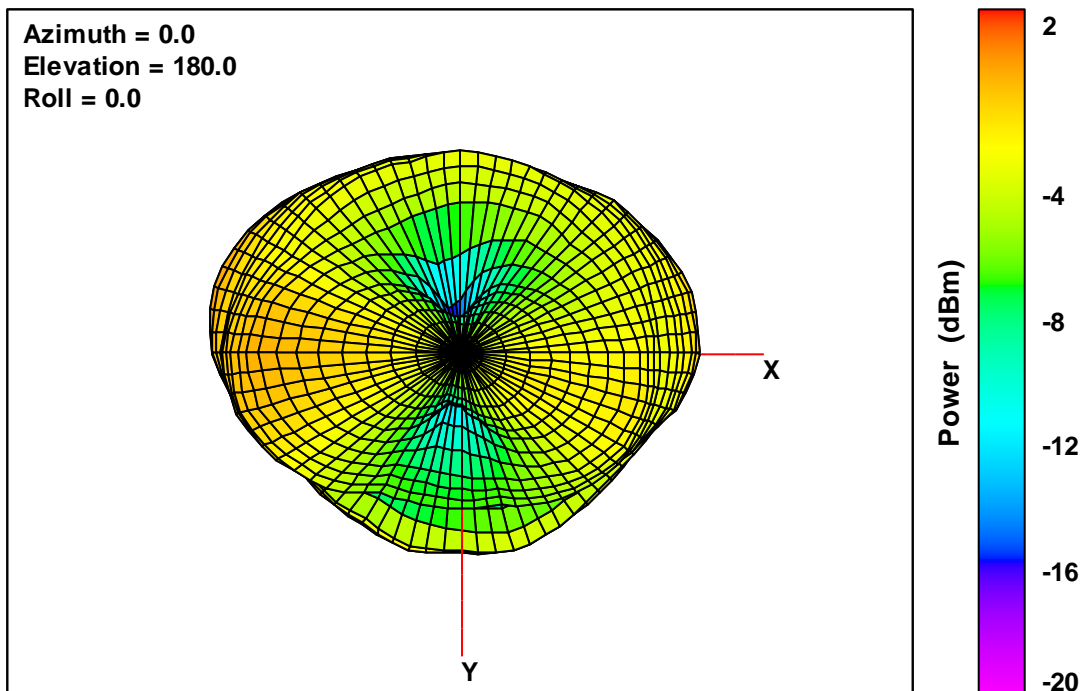
ANTENNA TWO Free-Space Total EIRP, Back Face View, 2440 MHz

### 6.11 Antenna 2 3D PASSIVE- 2462 MHz Total EIRP, Top View



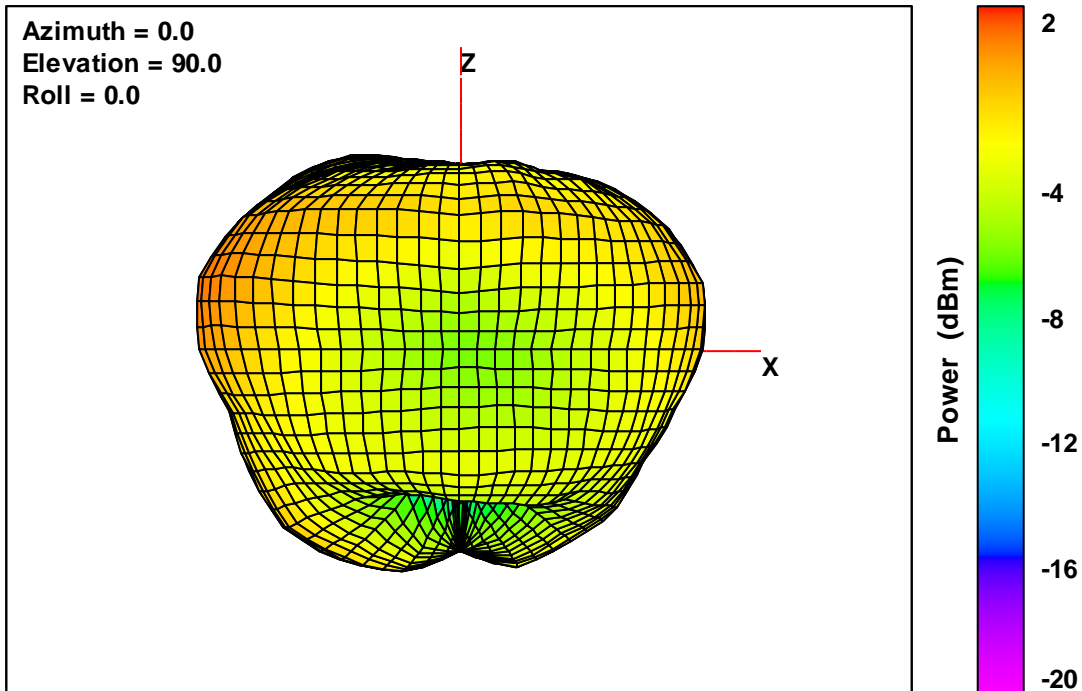
ANTENNA TWO Free-Space Total EIRP, Top View, 2462 MHz

### Total EIRP, Bottom View



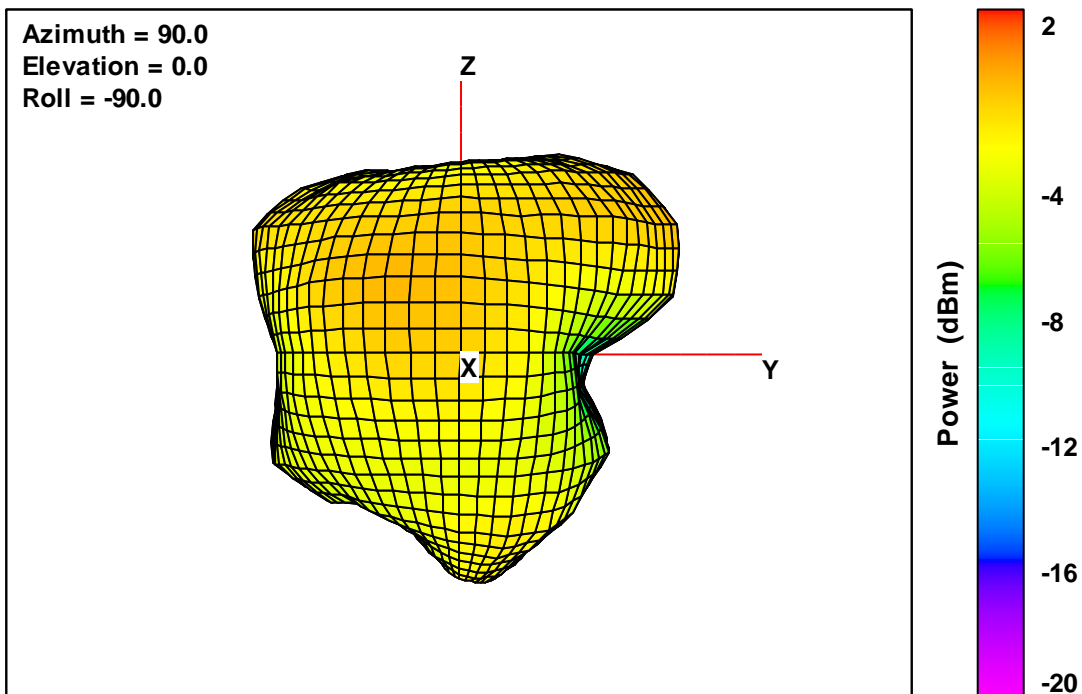
ANTENNA TWO Free-Space Total EIRP, Bottom View, 2462 MHz

### Total EIRP, Left Side View



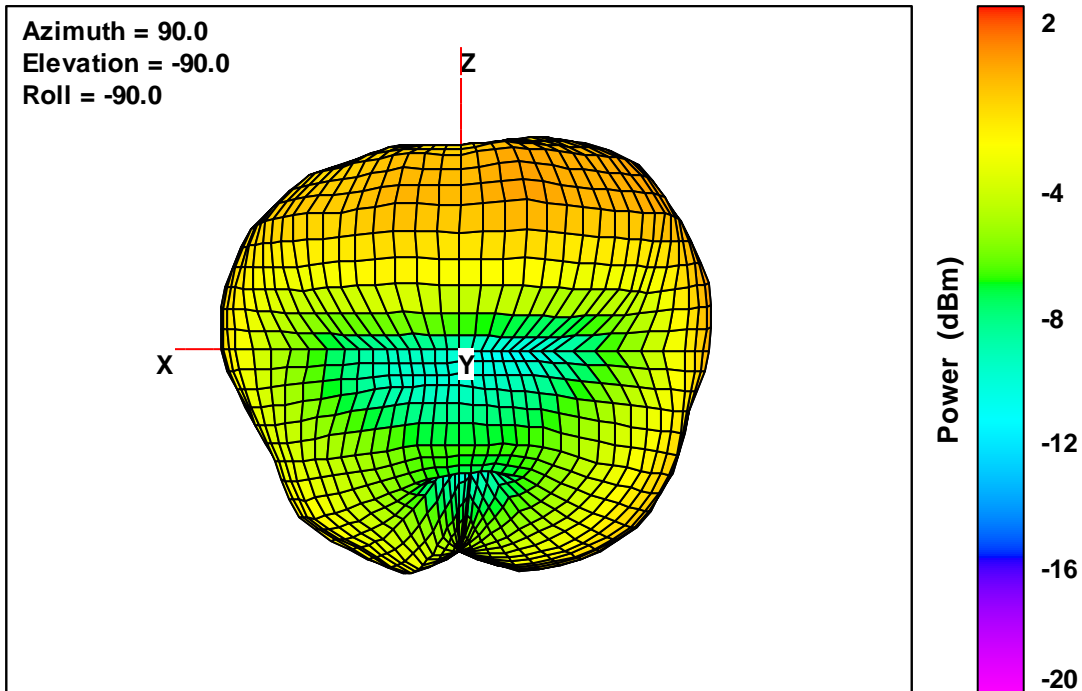
ANTENNA TWO Free-Space Total EIRP, Left Side View, 2462 MHz

### Total EIRP, Front Face View



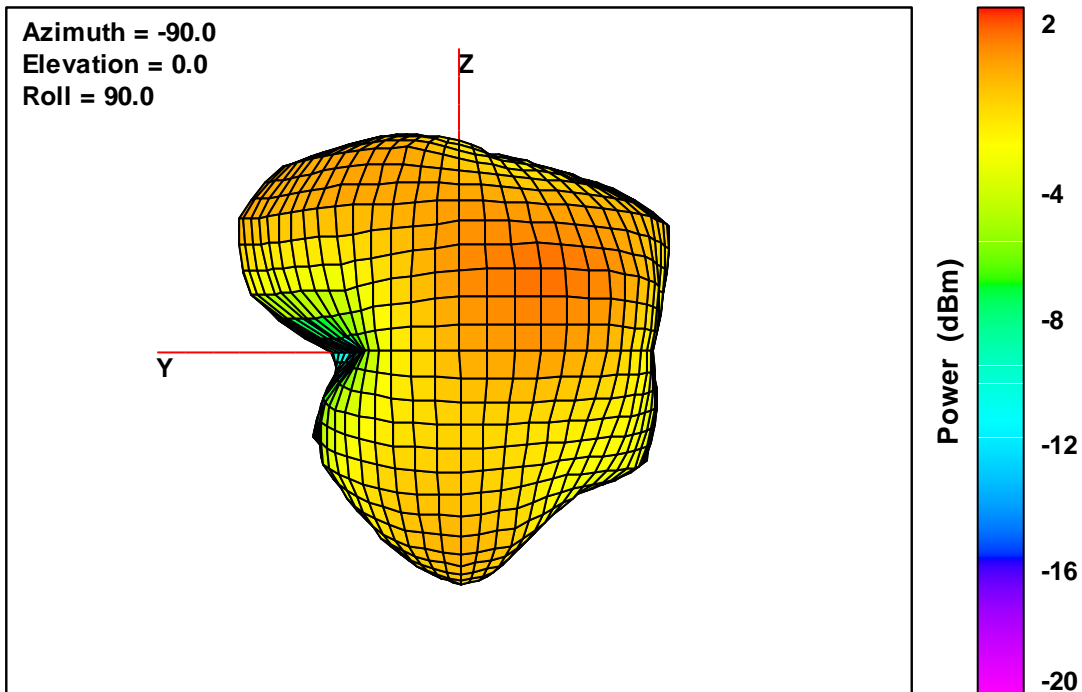
ANTENNA TWO Free-Space Total EIRP, Front Face View, 2462 MHz

### Total EIRP, Right Side View



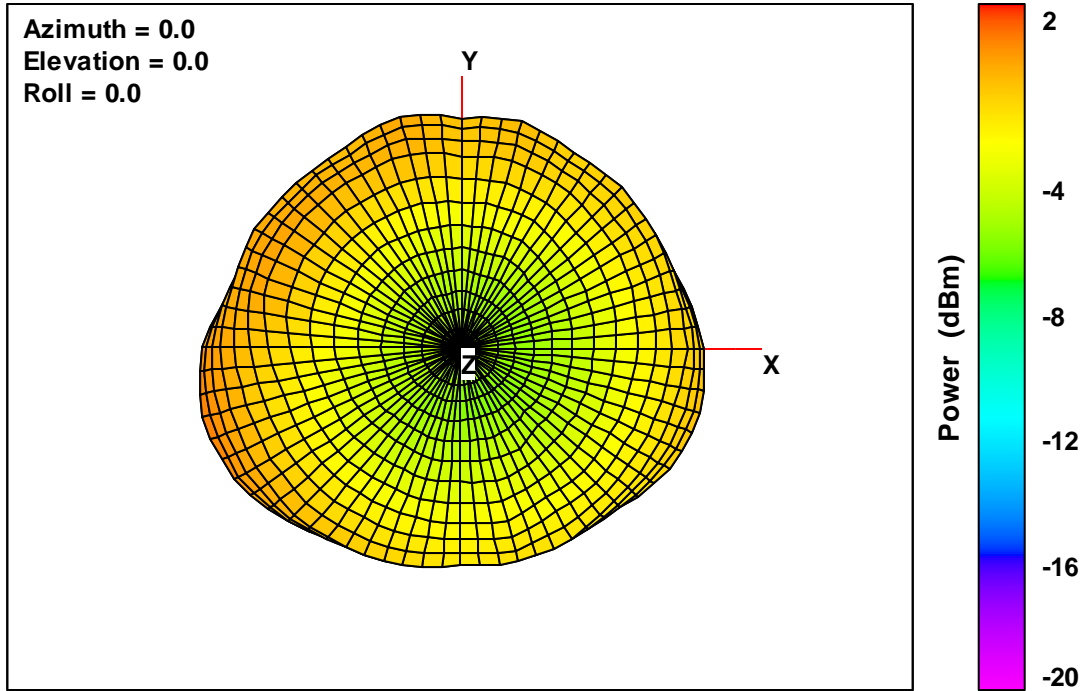
ANTENNA TWO Free-Space Total EIRP, Right Side View, 2462 MHz

### Total EIRP, Back Face View



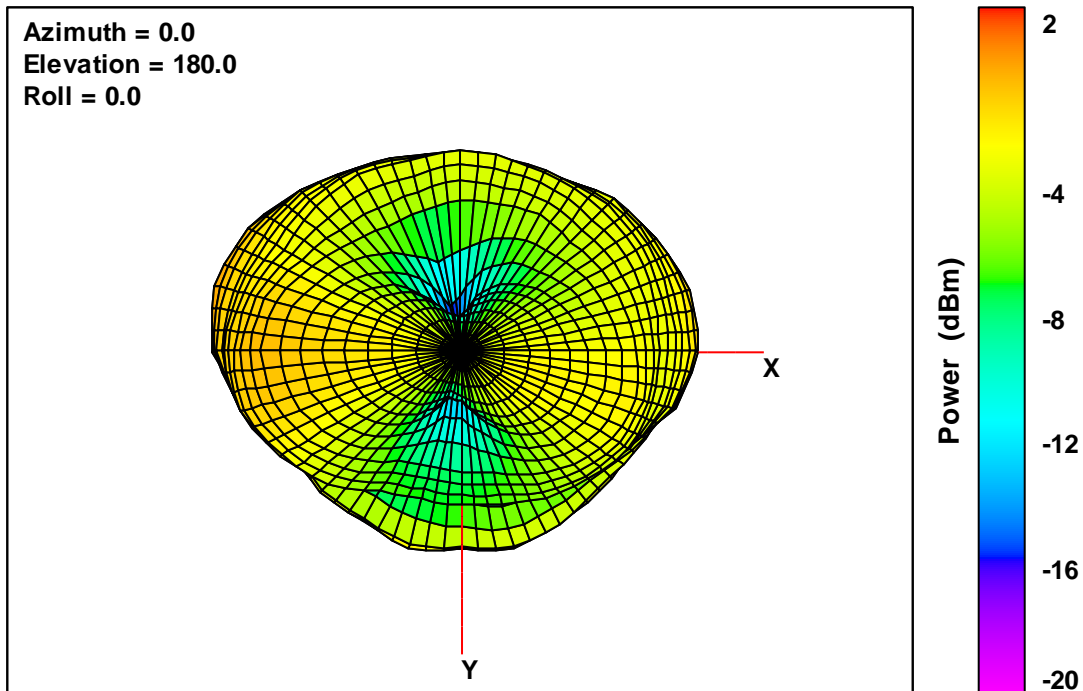
ANTENNA TWO Free-Space Total EIRP, Back Face View, 2462 MHz

### 6.12 Antenna 2 3D PASSIVE- 2480 MHz Total EIRP, Top View



ANTENNA TWO Free-Space Total EIRP, Top View, 2480 MHz

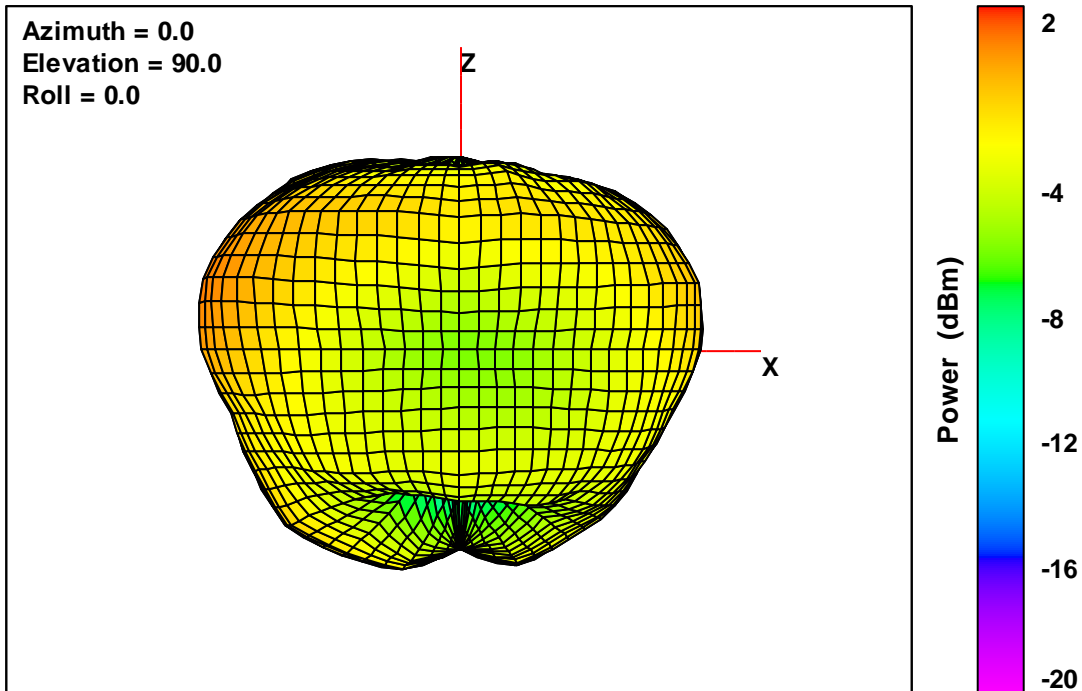
### Total EIRP, Bottom View



ANTENNA TWO Free-Space Total EIRP, Bottom View, 2480 MHz

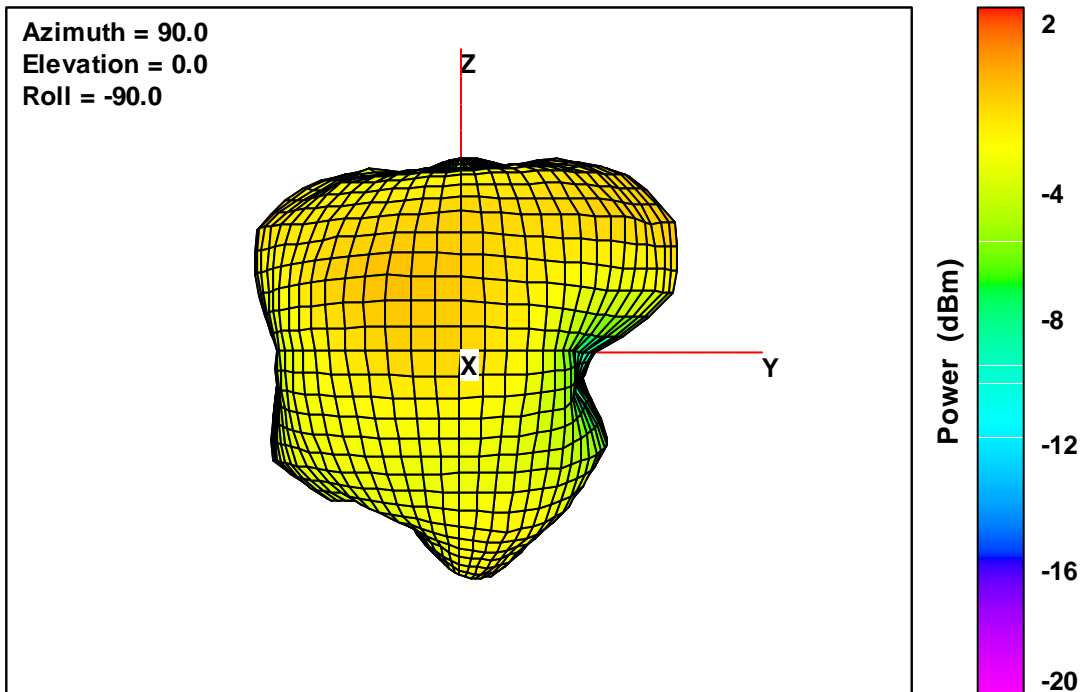


### Total EIRP, Left Side View



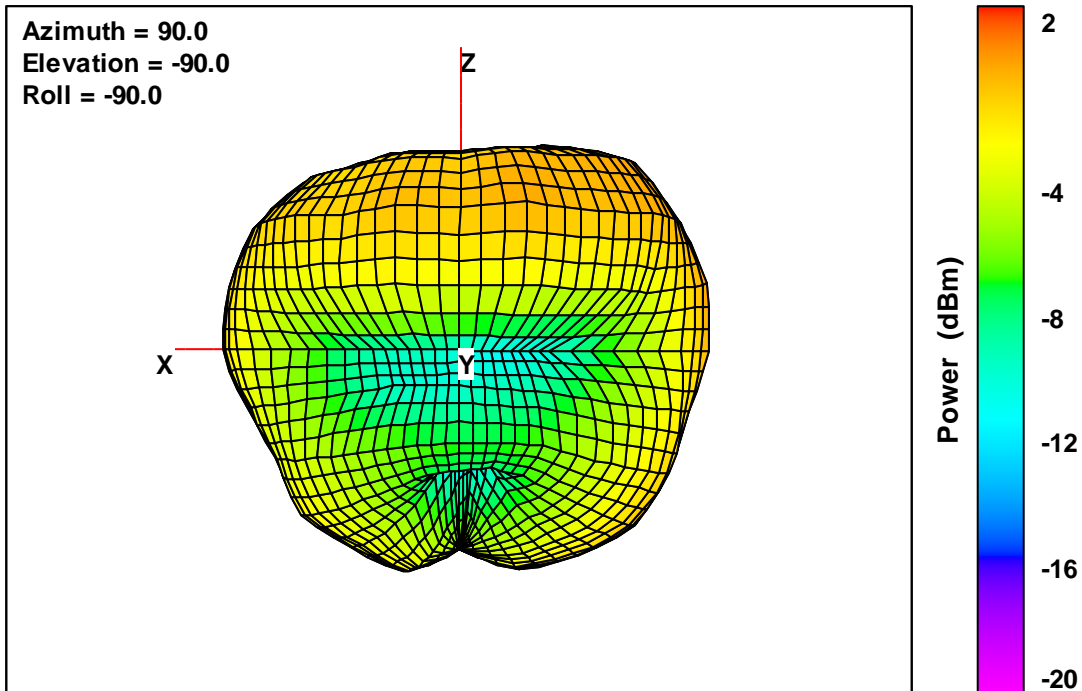
ANTENNA TWO Free-Space Total EIRP, Left Side View, 2480 MHz

### Total EIRP, Front Face View



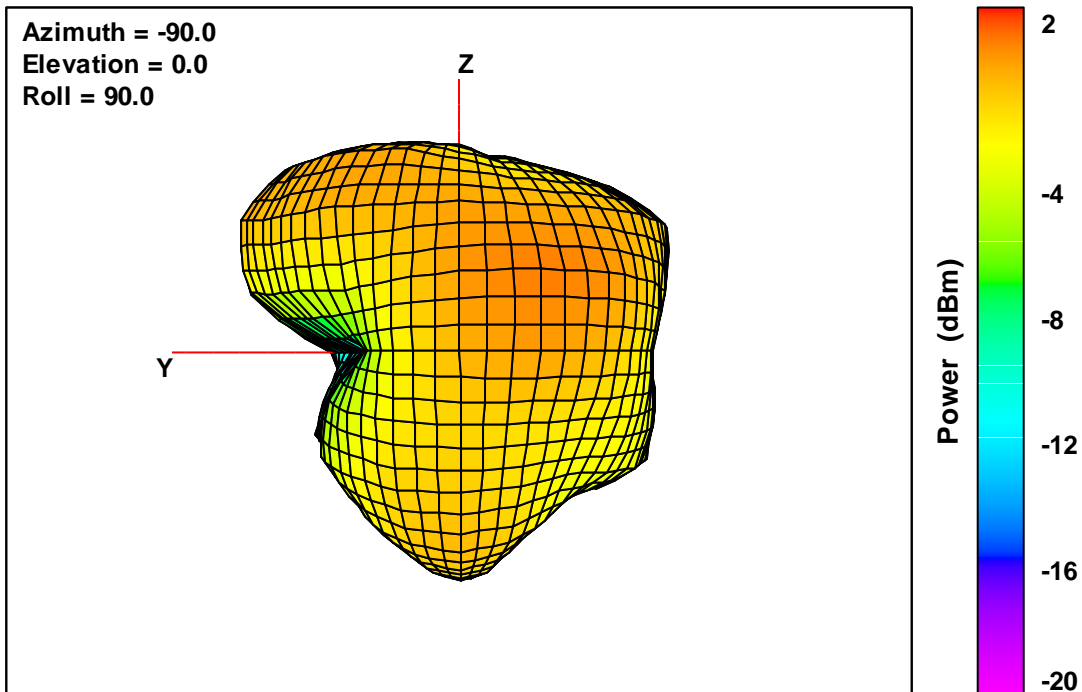
ANTENNA TWO Free-Space Total EIRP, Front Face View, 2480 MHz

### Total EIRP, Right Side View



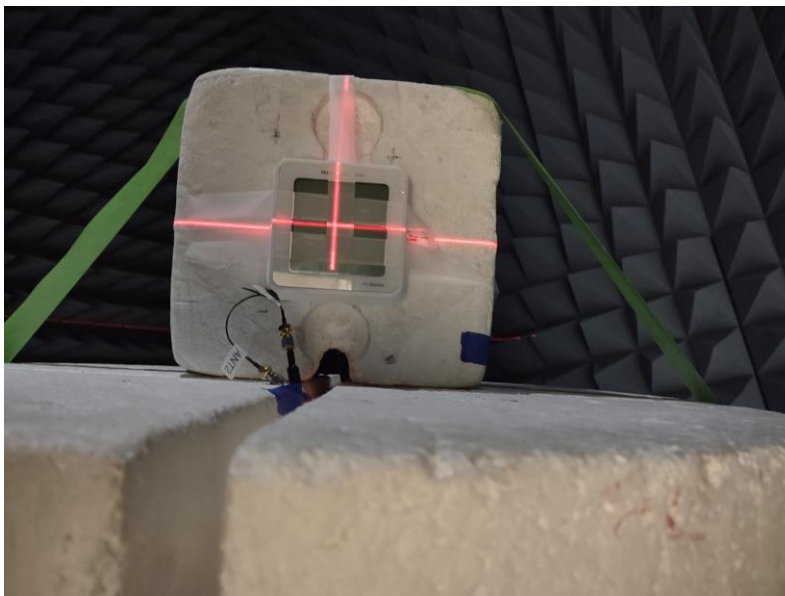
ANTENNA TWO Free-Space Total EIRP, Right Side View, 2480 MHz

### Total EIRP, Back Face View



ANTENNA TWO Free-Space Total EIRP, Back Face View, 2480 MHz

## 7 TEST SETUP



**END OF REPORT**