

**ANTENNA GAIN AND PATTERN MEASUREMENT REPORT***For Gain value reference***FOR****ACTUATOR****PART/MODEL NUMBER: CASPIAN VB-SP02Y-002****DATE ISSUED: DECEMBER 06, 2022****REPORT NUMBER: 14560018-O1V2**

Prepared for  
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**251 Little Falls Drive**  
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Revision History

<u>Rev.</u>	<u>Issue Date</u>	<u>Revisions</u>	<u>Revised By</u>
V1	11/29/2022	Initial Issue	
V2	12/06/2022	Added Theta Arm detail to Sect. 2 Test Facility	

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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	Actuator
Part/Model	CASPIAN VB-SP02Y-002
Date Tested	11/10/2022

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
Non-standard Test Method*	Information Only
*as agreed upon the quote for order #14560018	

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:



Ekta Budhbhatti  
OTA SUPERVISOR  
UL Verification Services Inc.

Tested and Prepared By:



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	Caspian VB-SP02Y-002
Frequency range (MHz)	2402,2412,2437,2440,2462,2480
Device/Antenna type	WLAN Antenna 1, WLAN Antenna 2, Bluetooth Antenna 3



## 5 RESULT SUMMARY

### 5.1 Passive Antenna 1 Pattern

Measurement	Frequency (MHz)		
	2412	2437	2462
3D Peak Gain (dBi)	0.64	-0.17	0.47
2D/Peak Gain (dBi)	0.71	0.20	0.64

### 5.2 Passive Antenna 2 Pattern

Measurement	Frequency (MHz)		
	2412	2437	2462
3D Peak Gain (dBi)	4.36	4.41	4.38
2D/Peak Gain (dBi)	4.45	4.68	4.57

### 5.3 Passive Antenna 3 Pattern

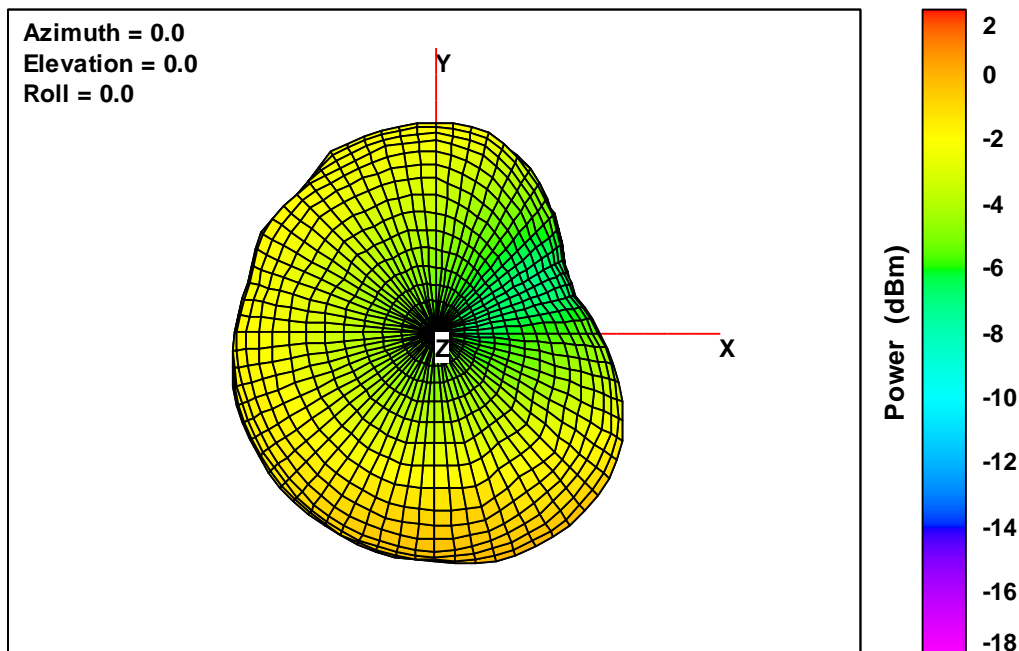
Measurement	Frequency (MHz)		
	2402	2440	2480
3D Peak Gain (dBi)	-1.76	-1.72	-1.92
2D/Peak Gain (dBi)	-1.60	-1.60	-1.76

Note: Refer to device design image Section 4 for antenna identification.

## 6 PLOTS

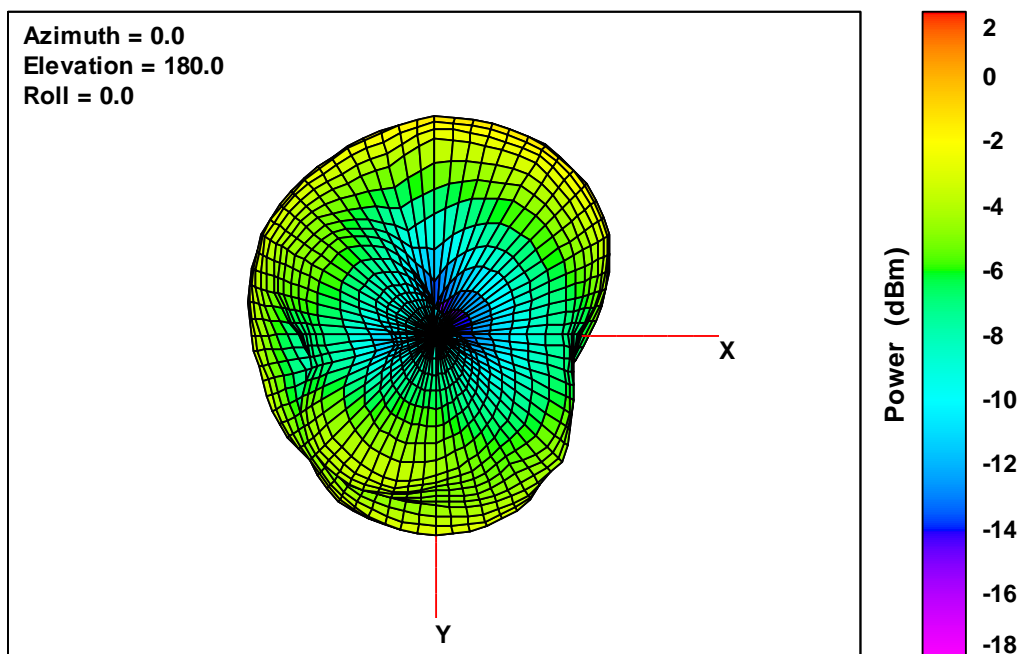
### 6.1 Antenna 1 3D PASSIVE- 2402 MHz

Total EIRP, Top View



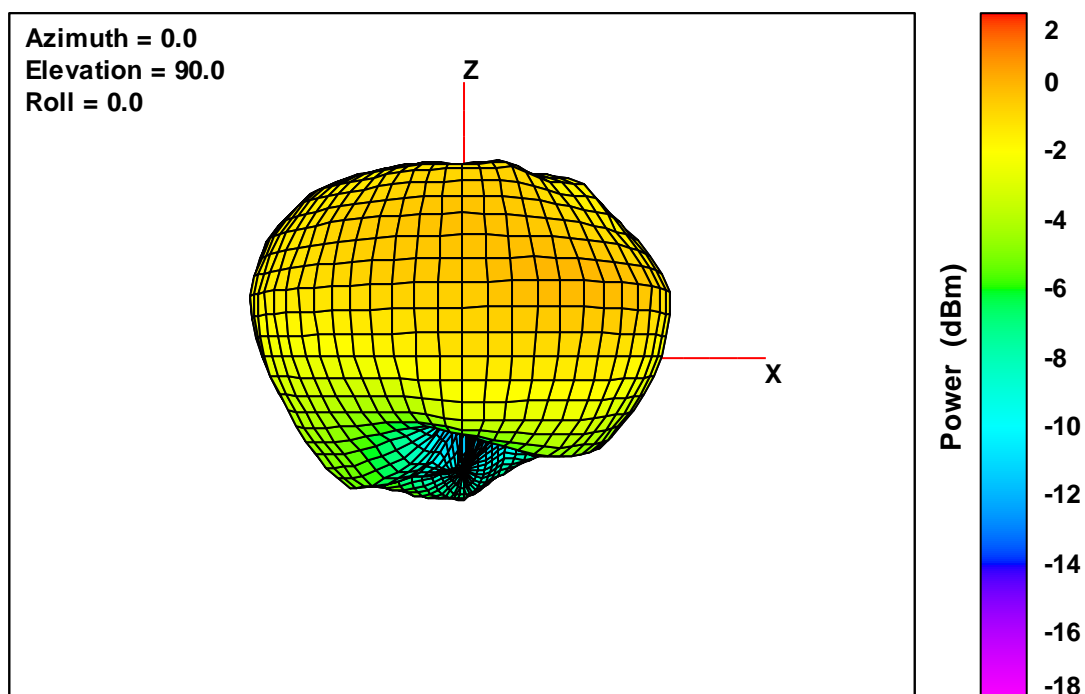
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Top View, 2402 MHz

Total EIRP, Bottom View



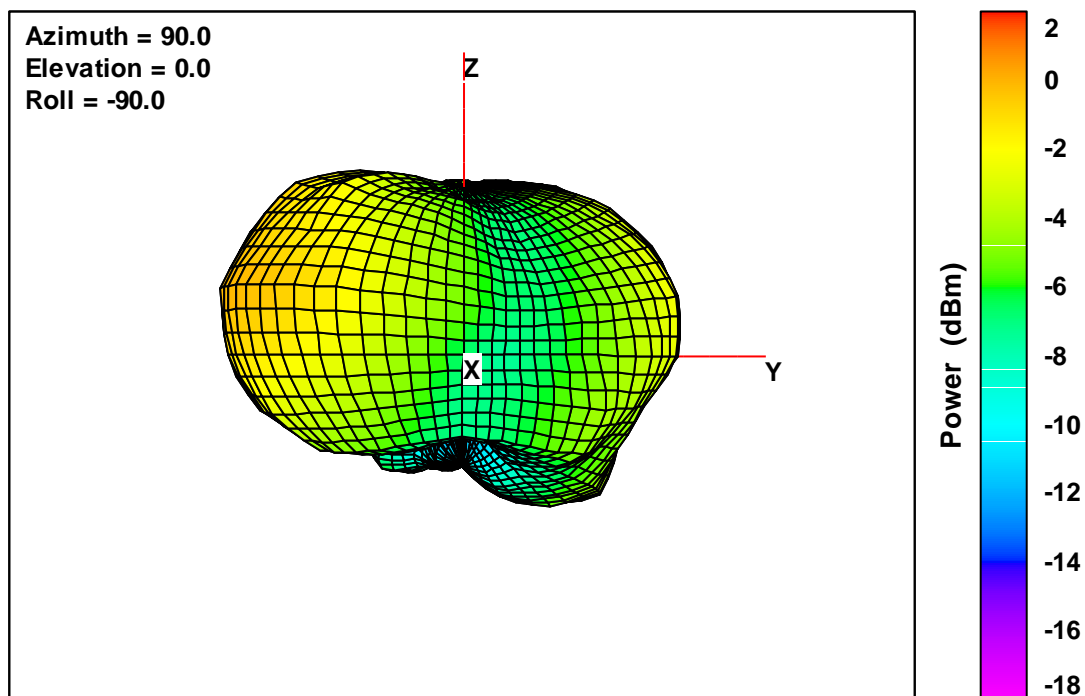
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Bottom View, 2402 MHz

### Total EIRP, Left Side View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Left Side View, 2402 MHz

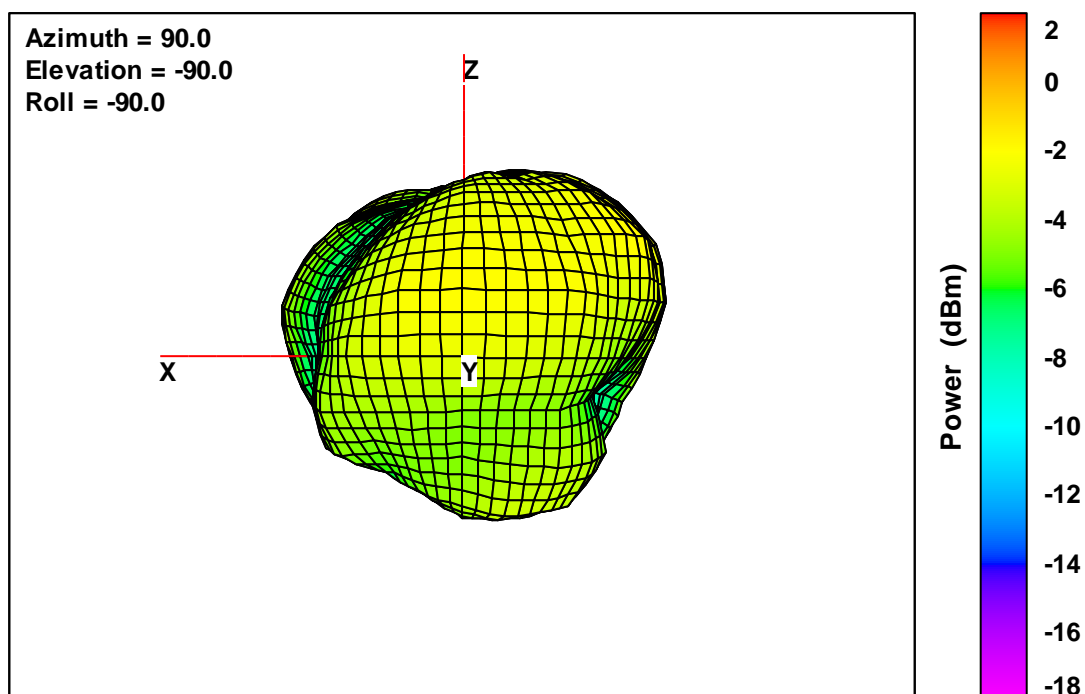
### Total EIRP, Front Face View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Front Face View, 2402 MHz

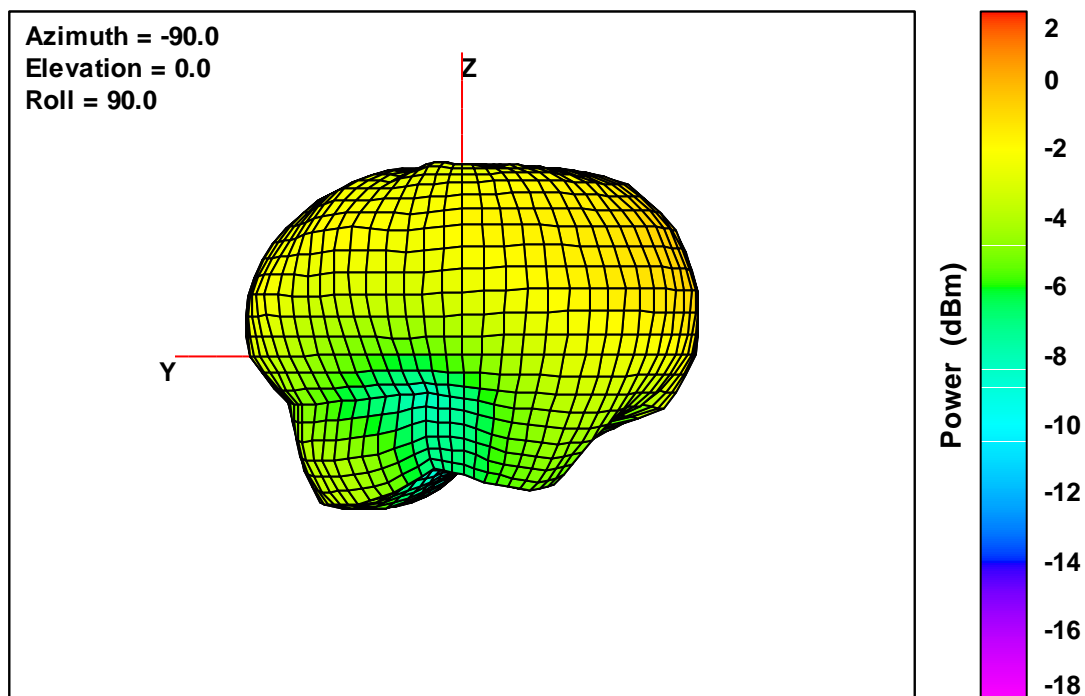


### Total EIRP, Right Side View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Right Side View, 2402 MHz

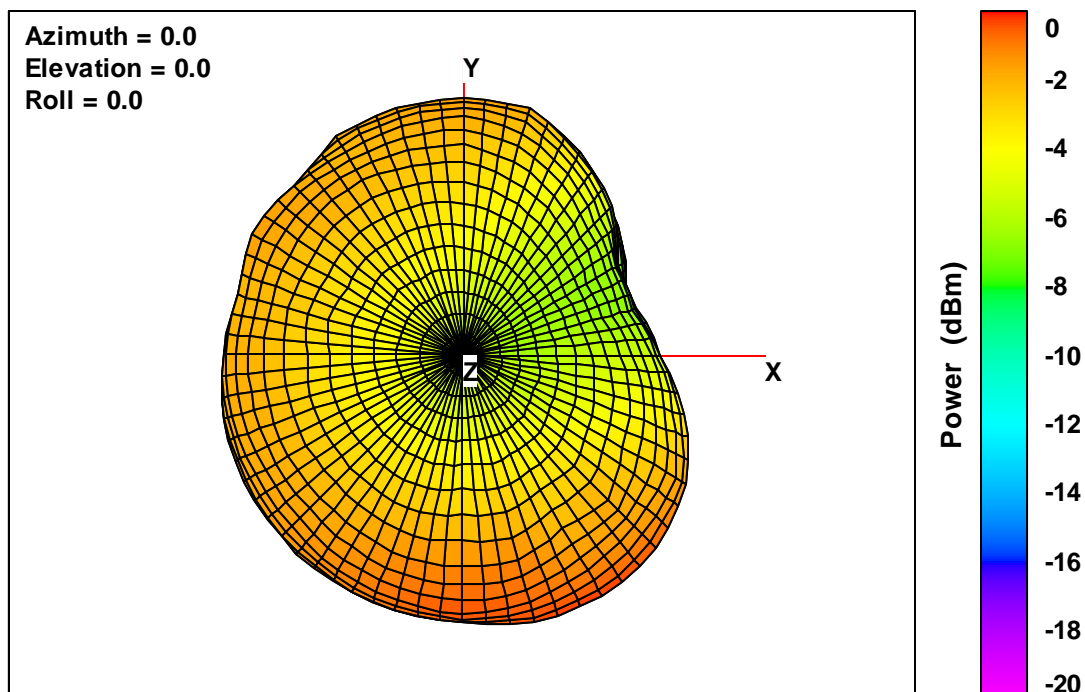
### Total EIRP, Back Face View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Back Face View, 2402 MHz

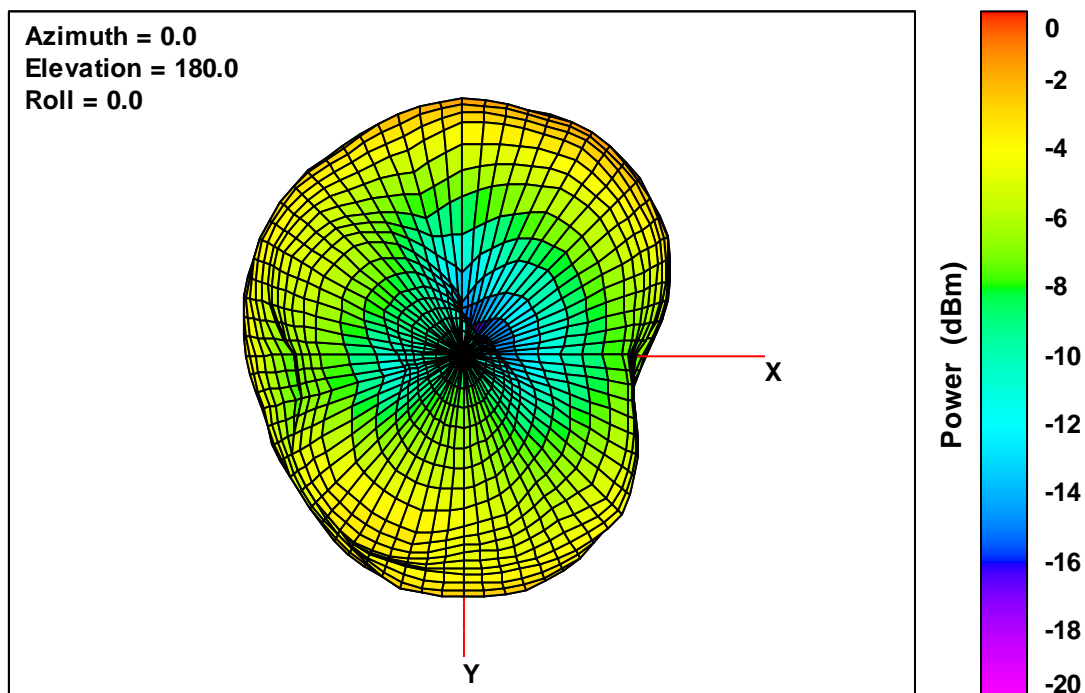
## 6.2 Antenna 1 3D PASSIVE- 2412 MHz

### Total EIRP, Top View



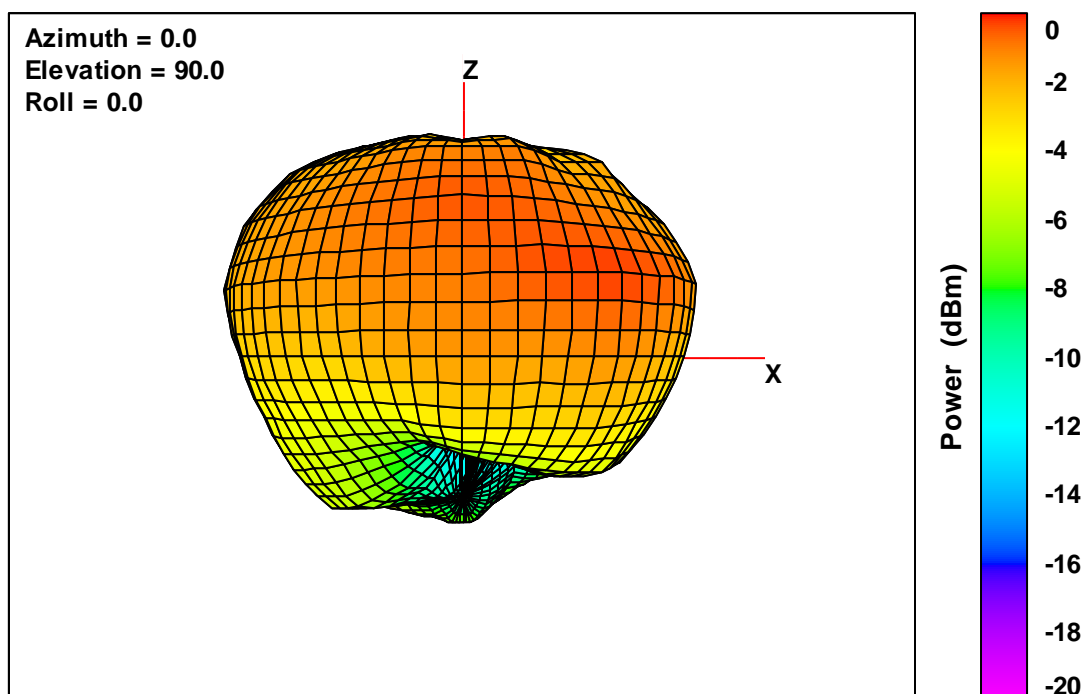
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Top View, 2412 MHz

### Total EIRP, Bottom View



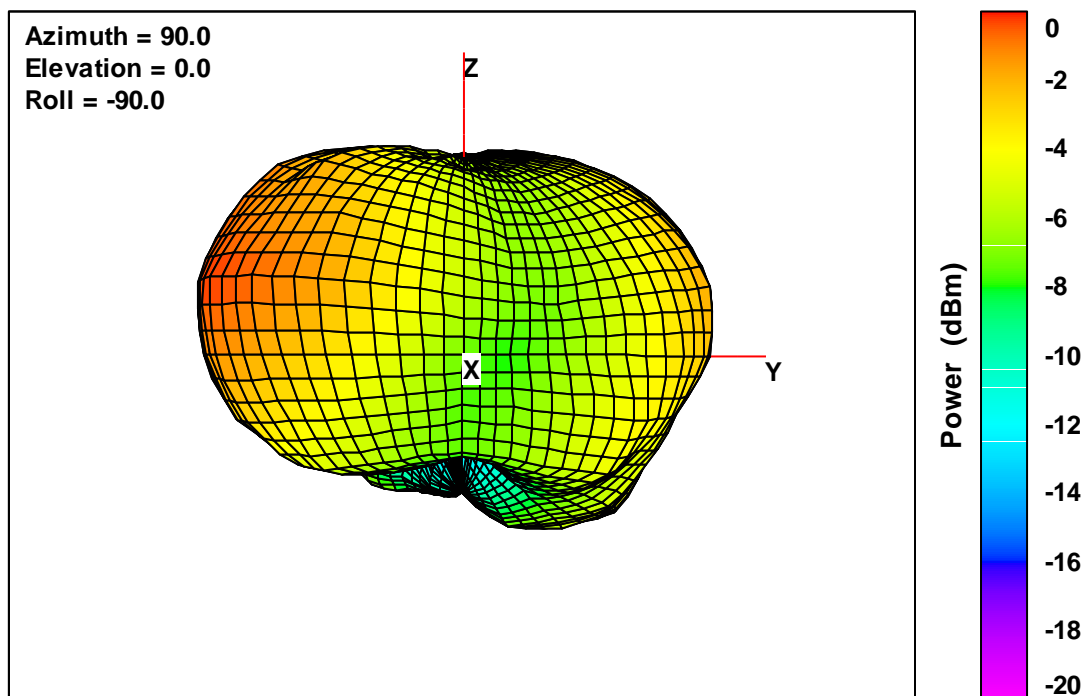
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Bottom View, 2412 MHz

### Total EIRP, Left Side View



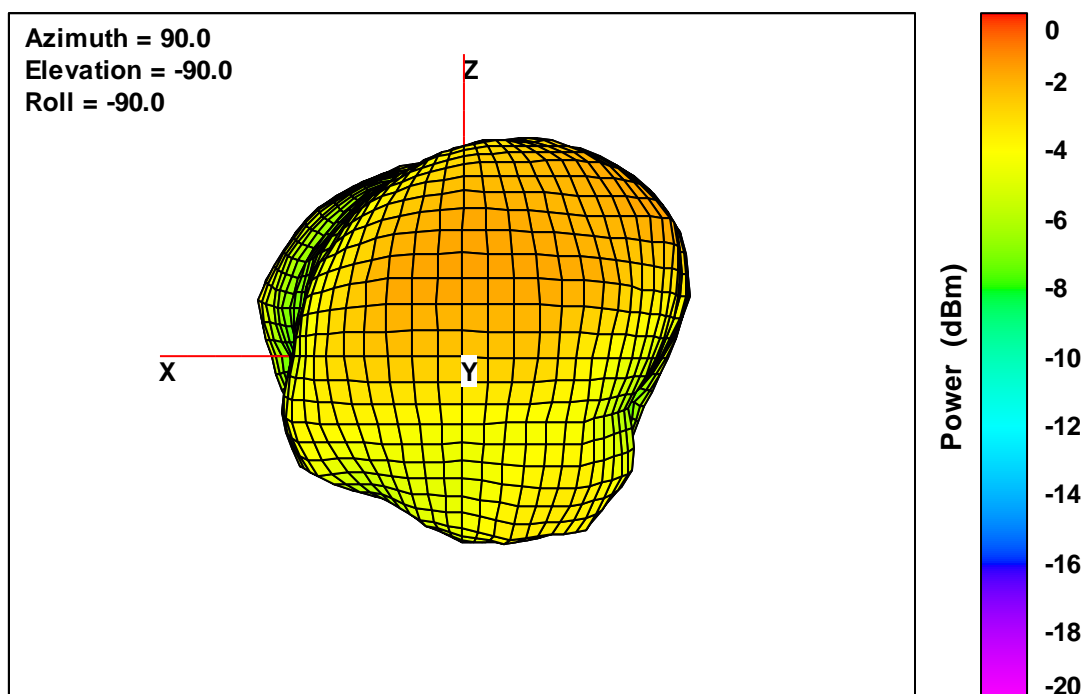
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Left Side View, 2412 MHz

### Total EIRP, Front Face View



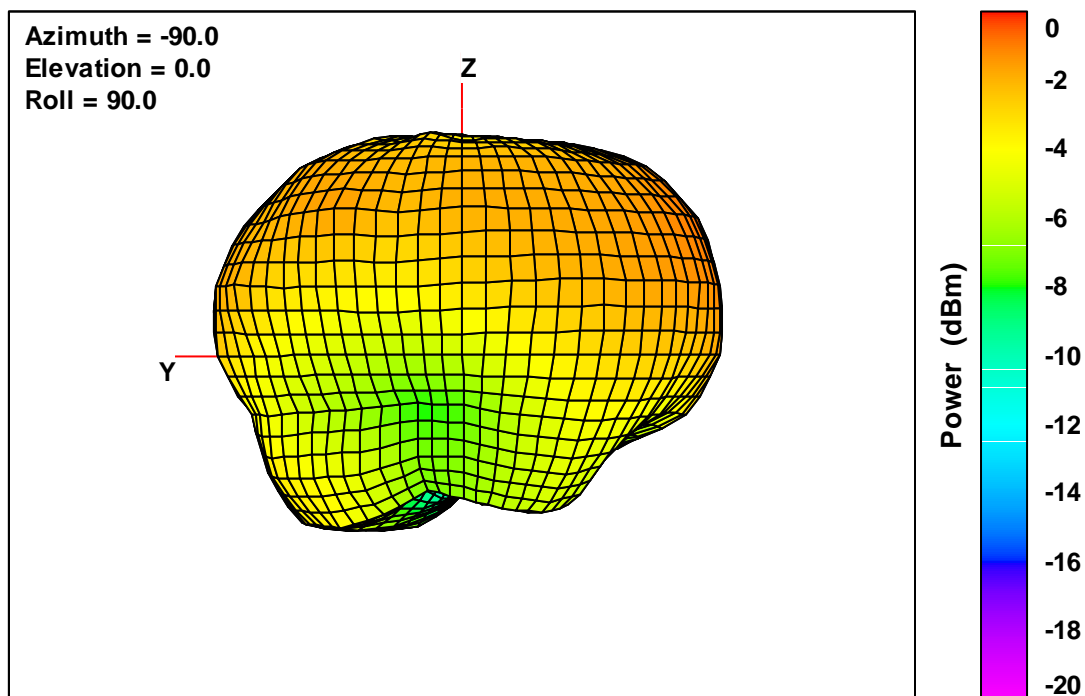
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Front Face View, 2412 MHz

### Total EIRP, Right Side View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Right Side View, 2412 MHz

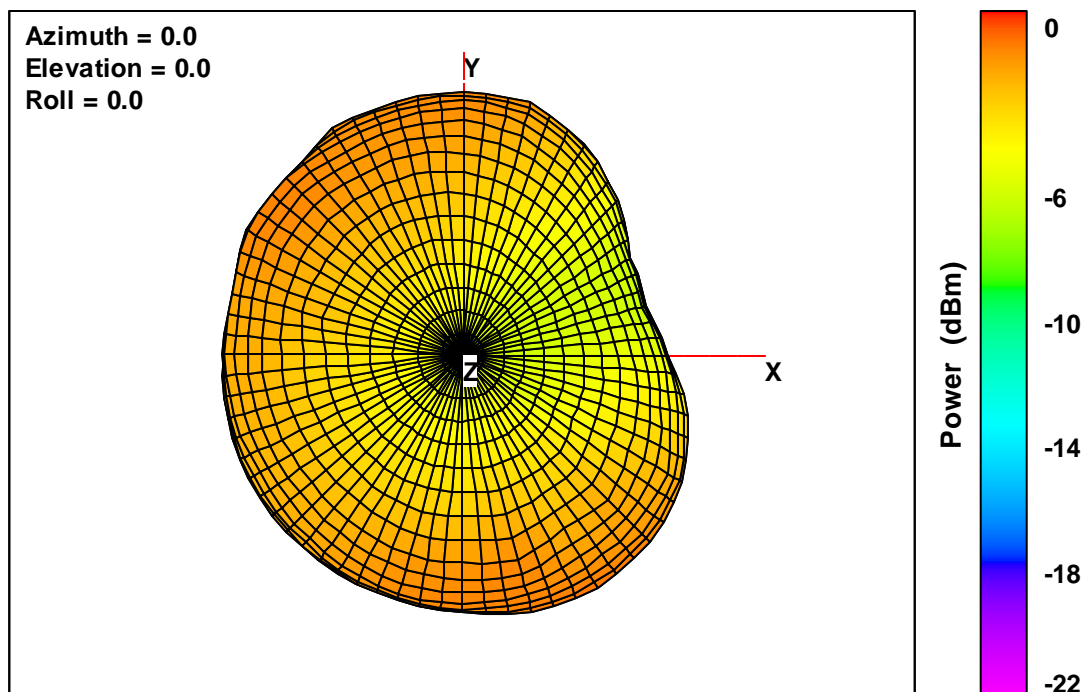
### Total EIRP, Back Face View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Back Face View, 2412 MHz

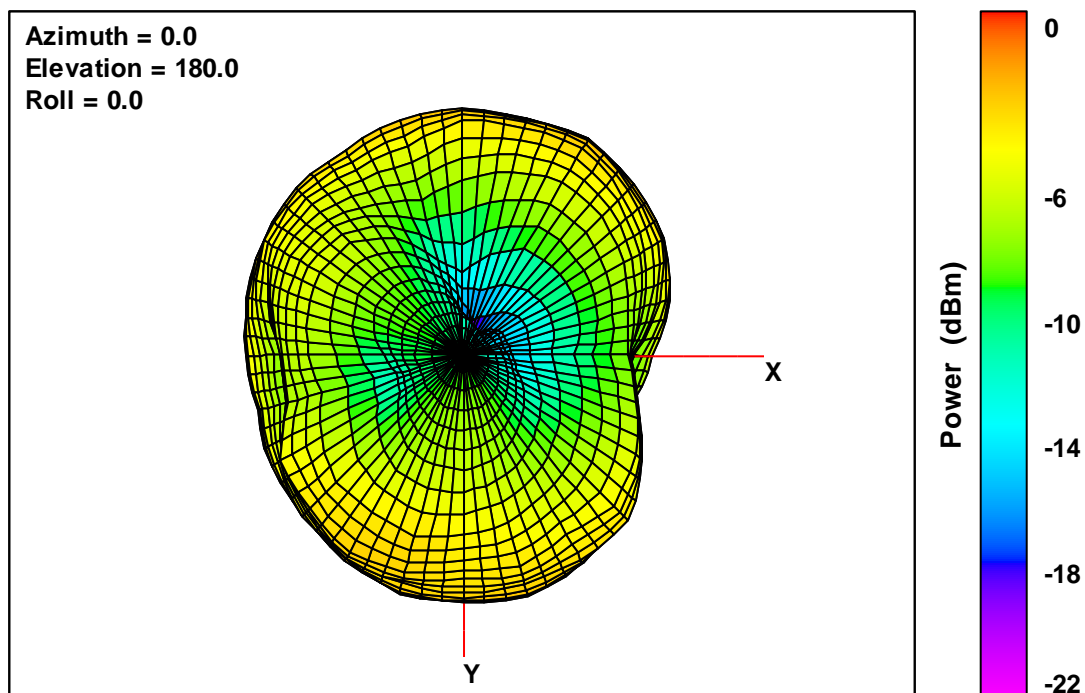
### 6.3 Antenna 1 3D PASSIVE- 2437 MHz

#### Total EIRP, Top View



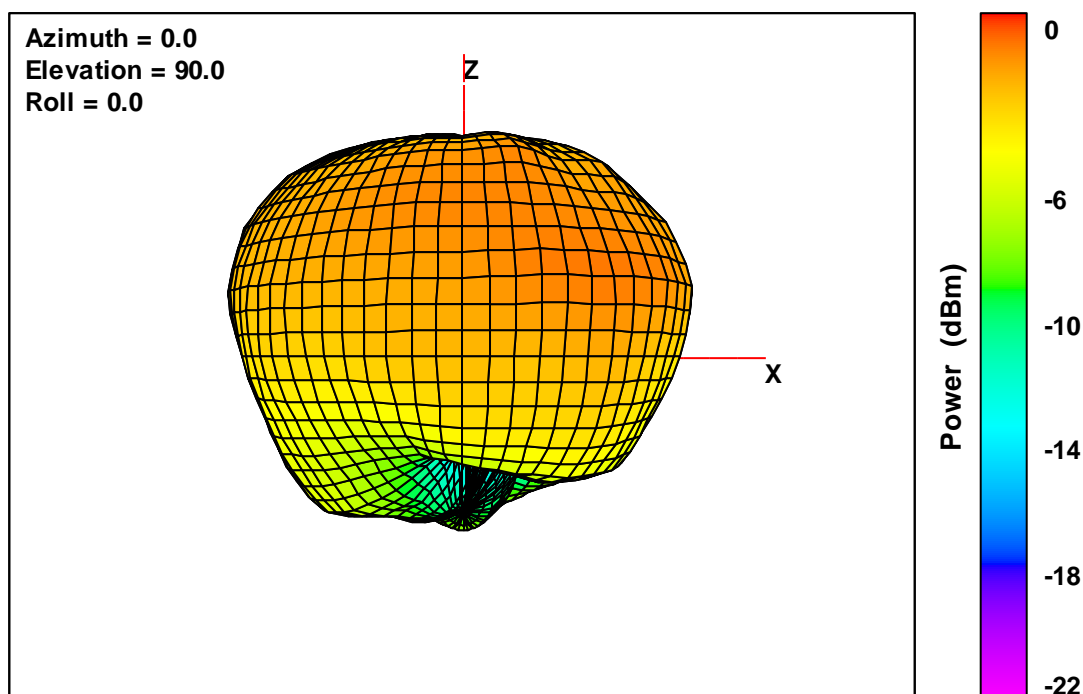
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Top View, 2437 MHz

#### Total EIRP, Bottom View



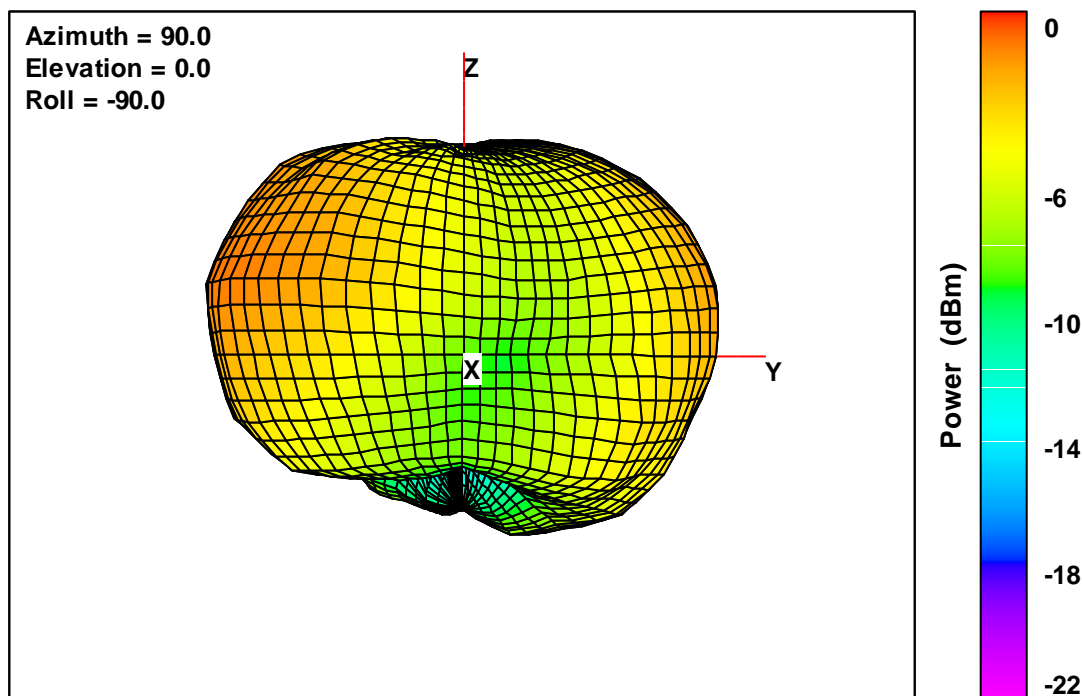
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Bottom View, 2437 MHz

### Total EIRP, Left Side View



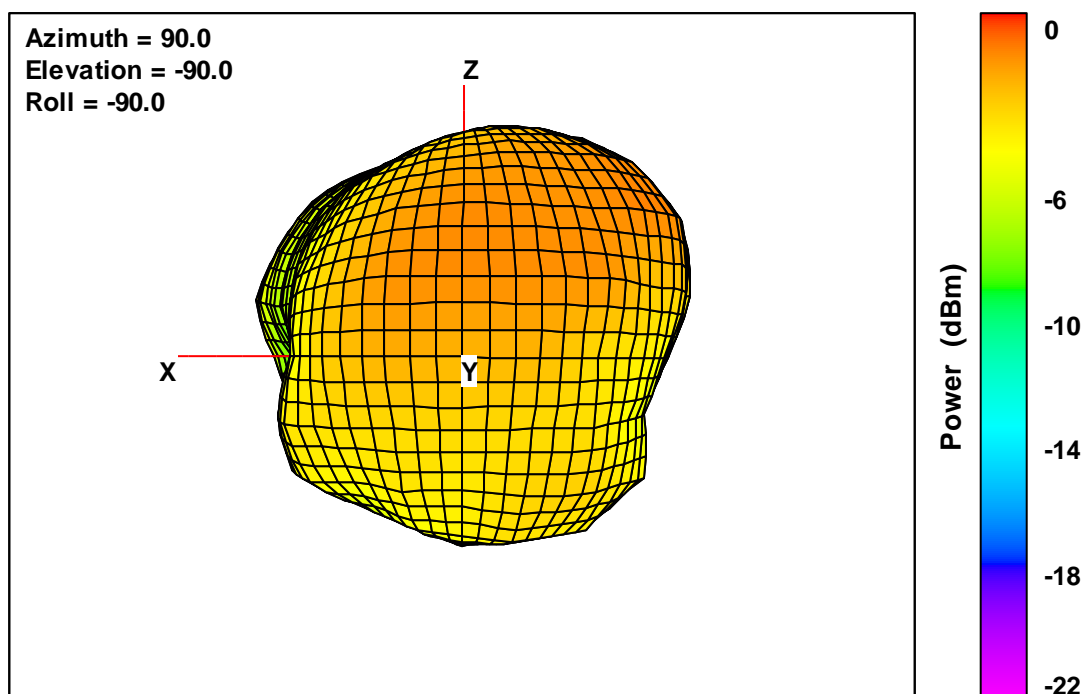
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Left Side View, 2437 MHz

### Total EIRP, Front Face View



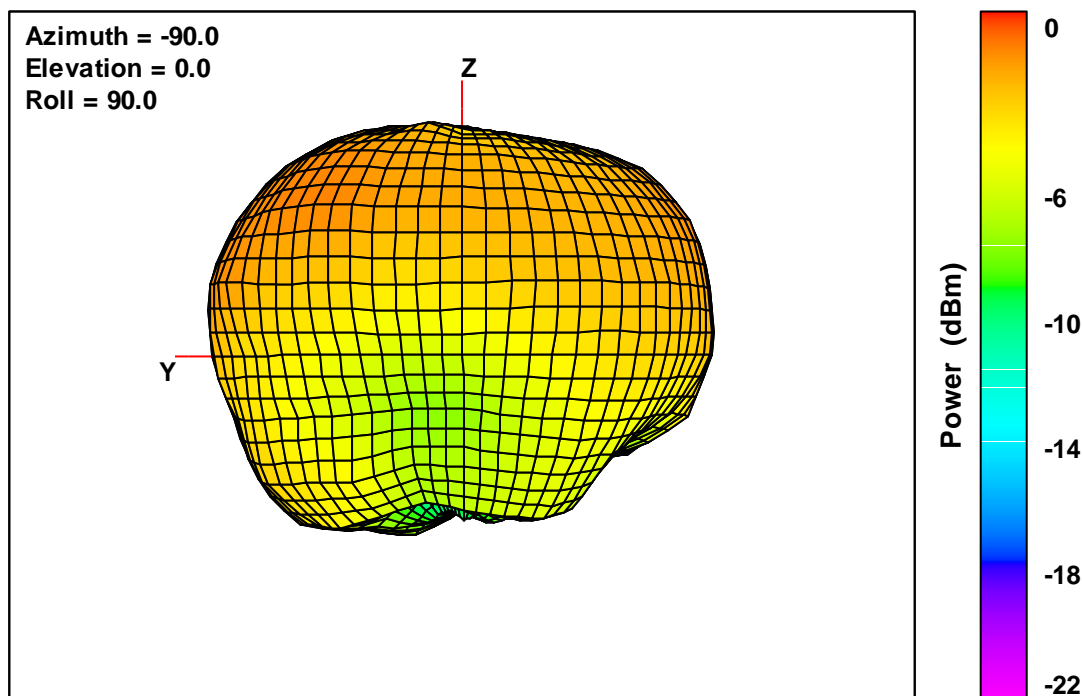
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Front Face View, 2437 MHz

### Total EIRP, Right Side View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Right Side View, 2437 MHz

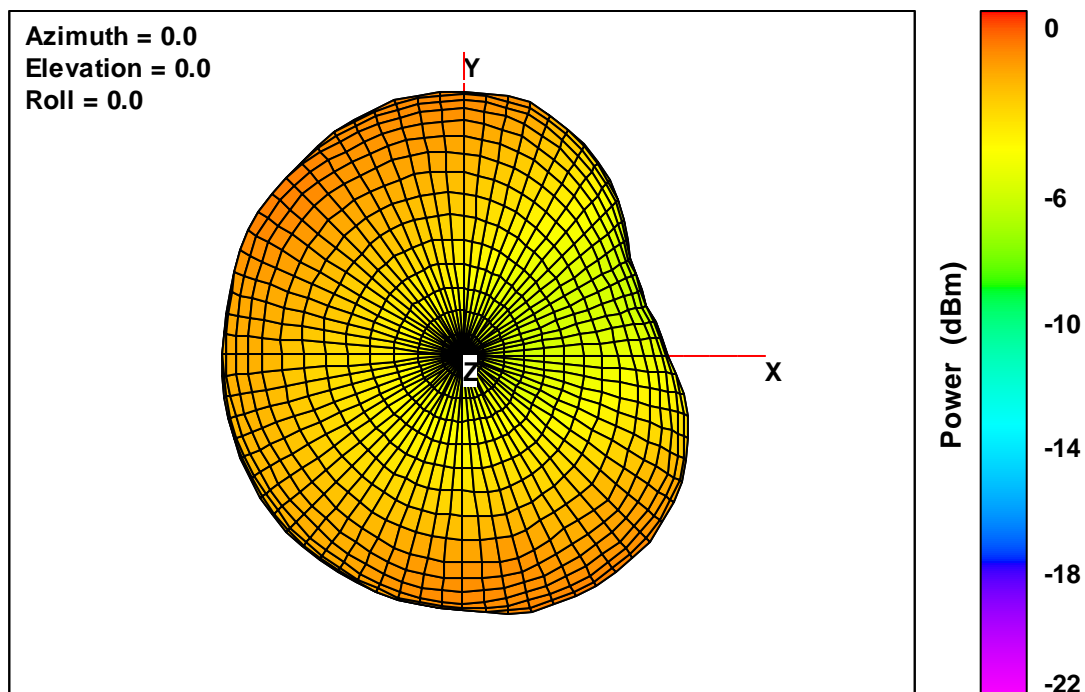
### Total EIRP, Back Face View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Back Face View, 2437 MHz

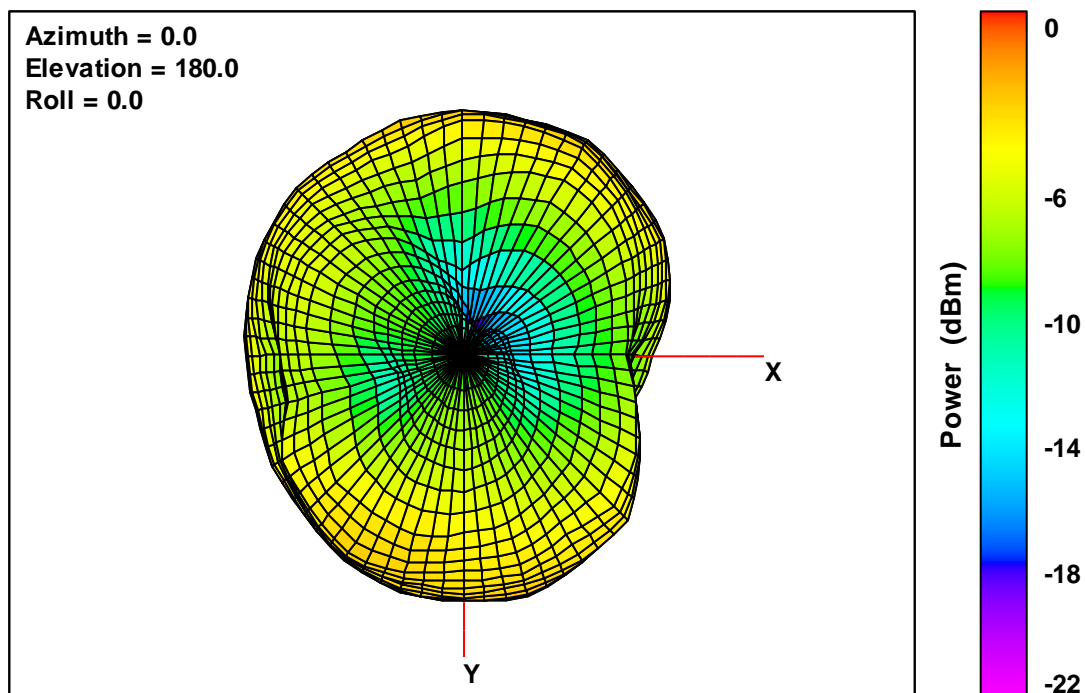
## 6.4 Antenna 1 3D PASSIVE- 2440 MHz

### Total EIRP, Top View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Top View, 2440 MHz

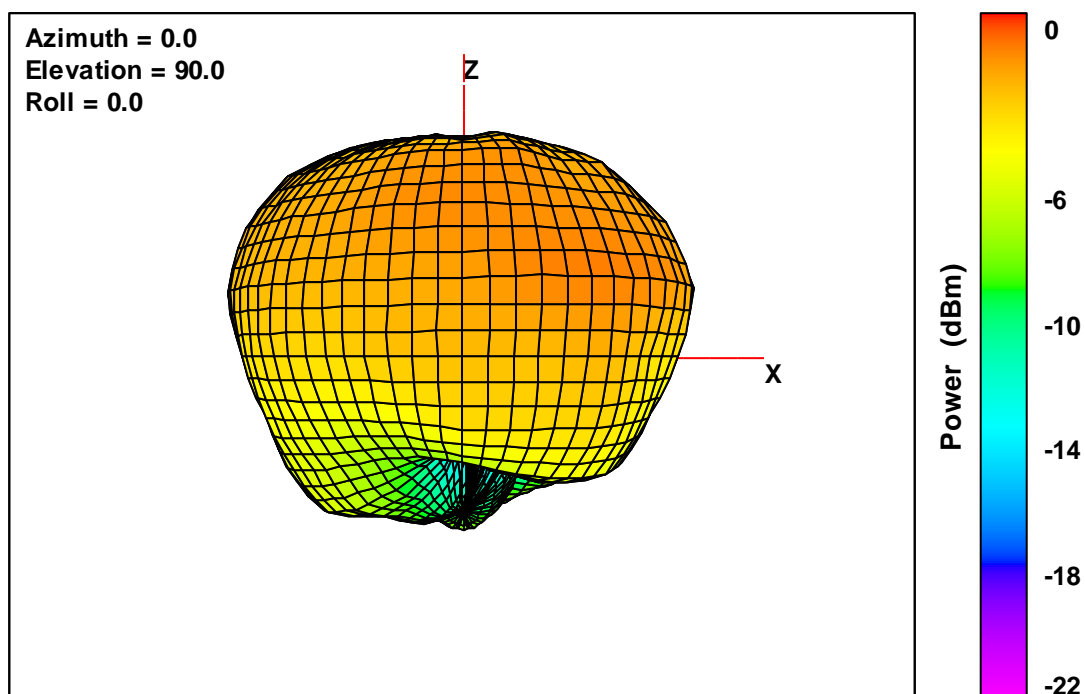
### Total EIRP, Bottom View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Bottom View, 2440 MHz

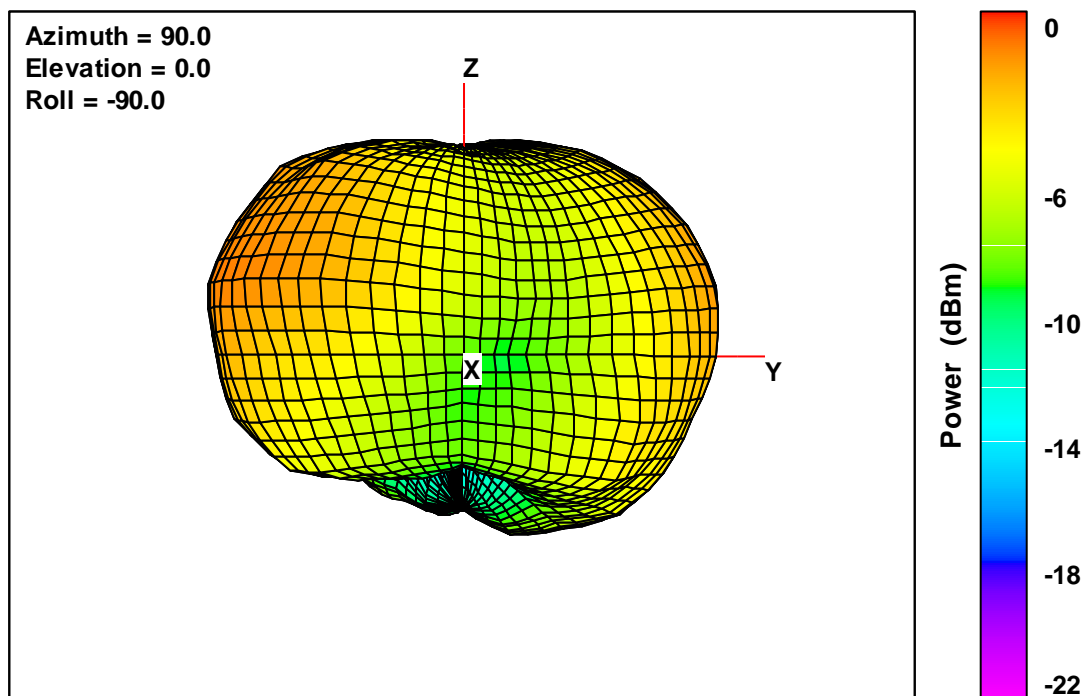


### Total EIRP, Left Side View



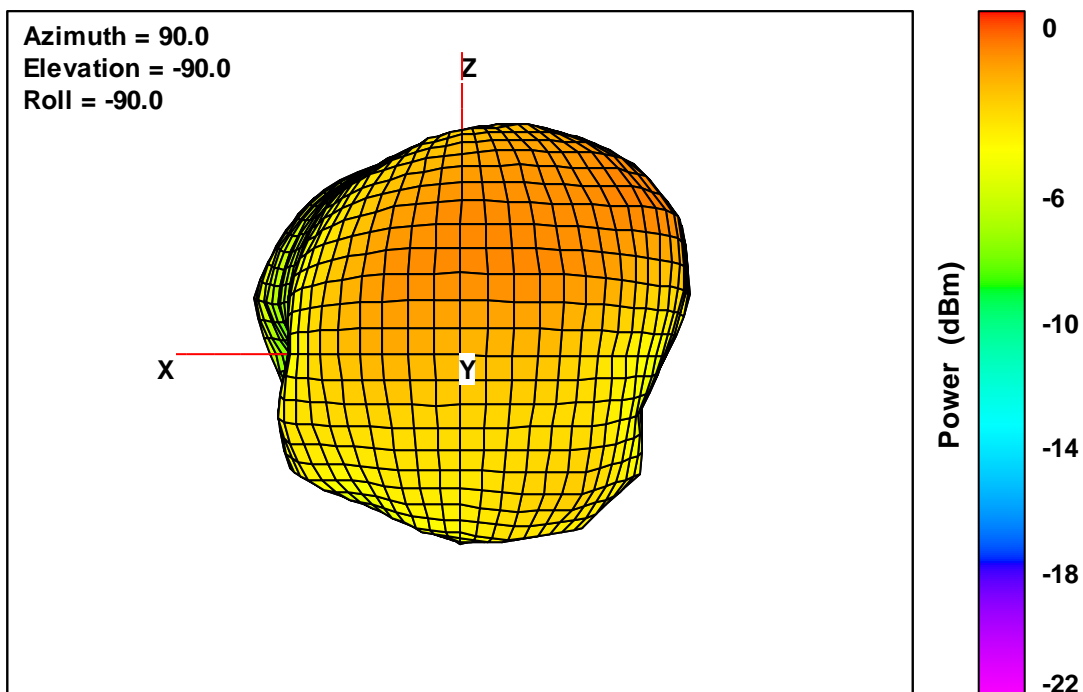
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Left Side View, 2440 MHz

### Total EIRP, Front Face View



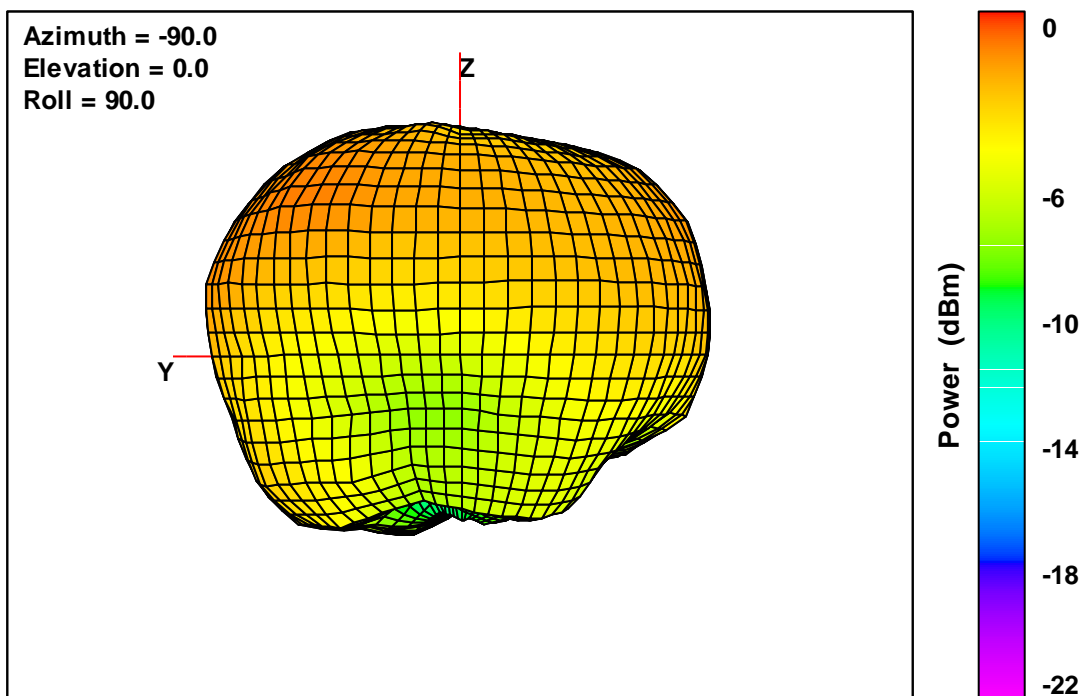
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Front Face View, 2440 MHz

### Total EIRP, Right Side View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Right Side View, 2440 MHz

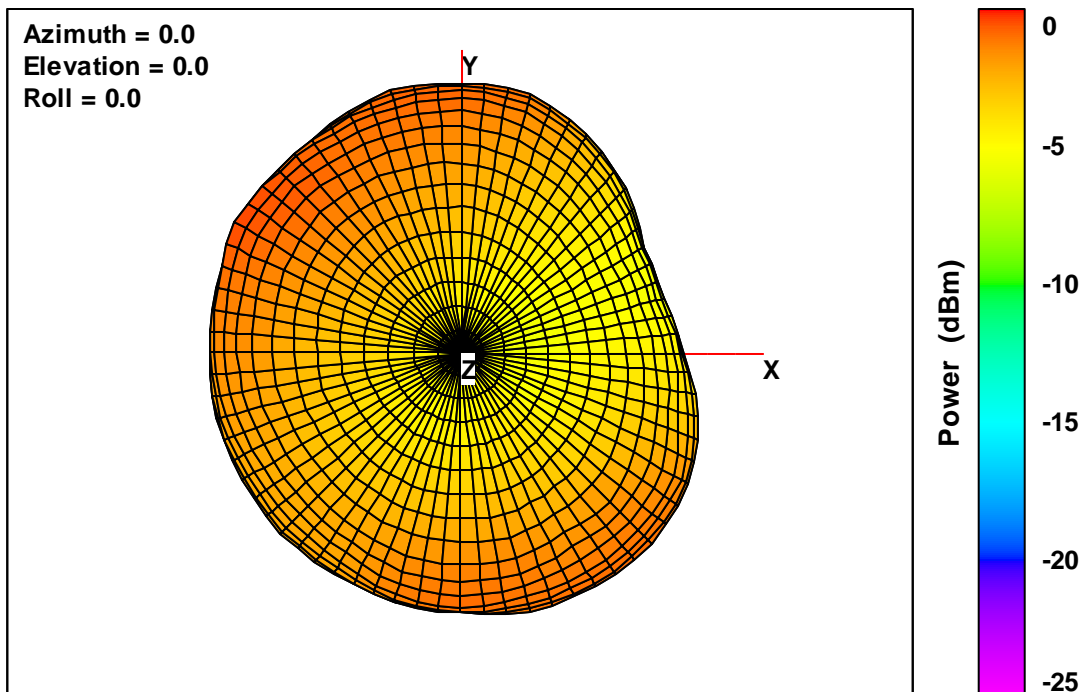
### Total EIRP, Back Face View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Back Face View, 2440 MHz

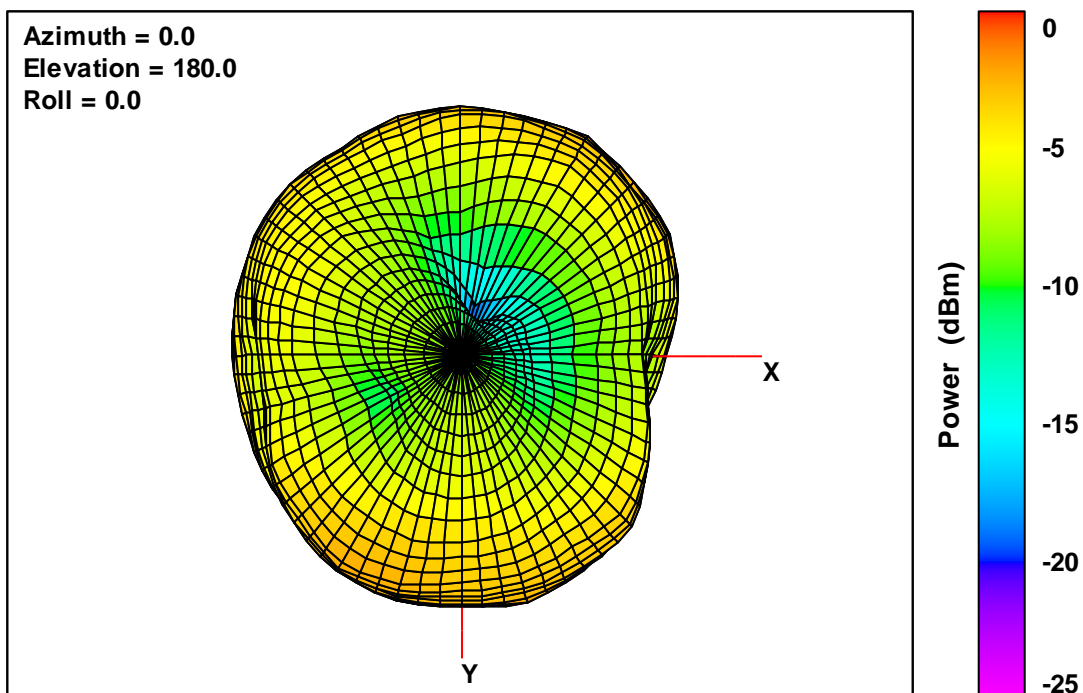
## 6.5 Antenna 1 3D PASSIVE- 2462 MHz

### Total EIRP, Top View



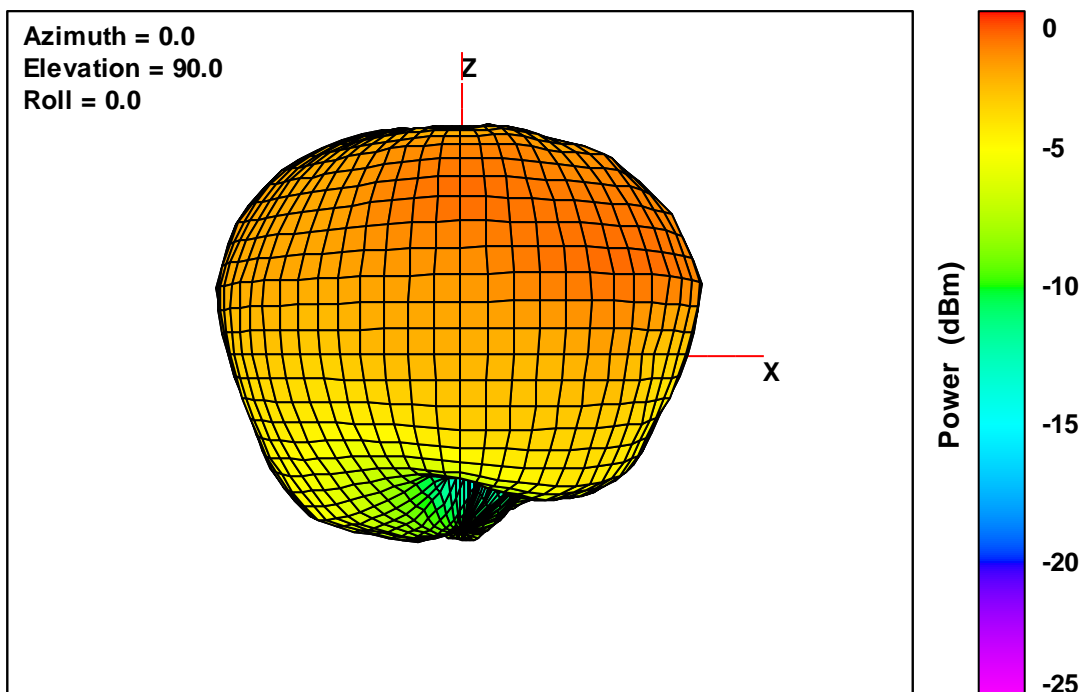
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Top View, 2462 MHz

### Total EIRP, Bottom View



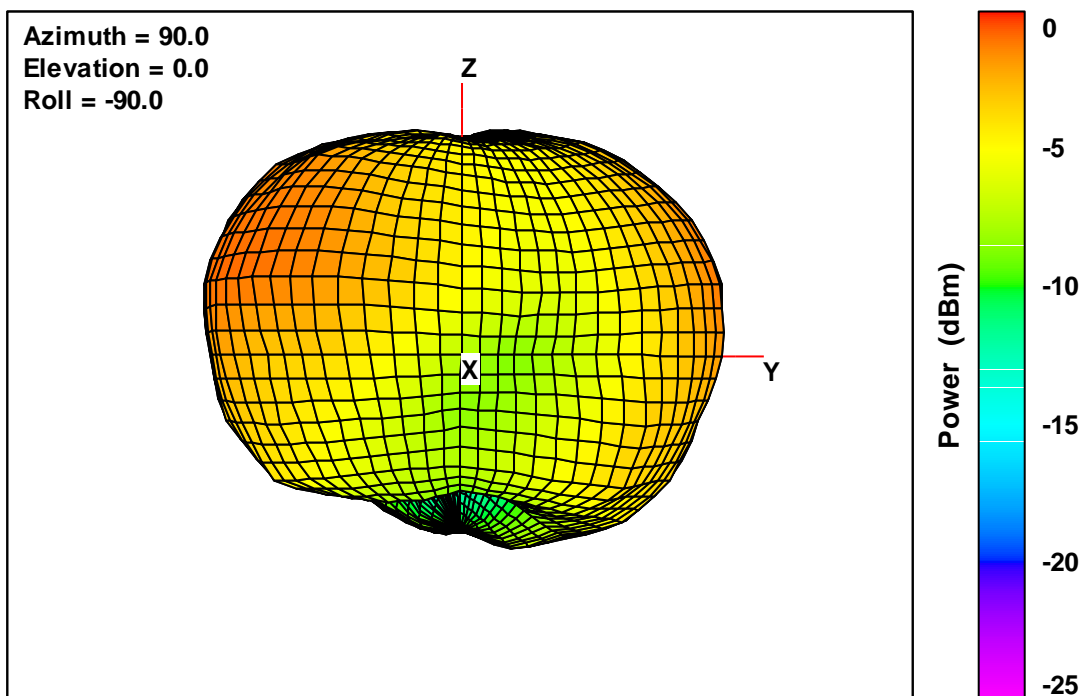
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Bottom View, 2462 MHz

### Total EIRP, Left Side View



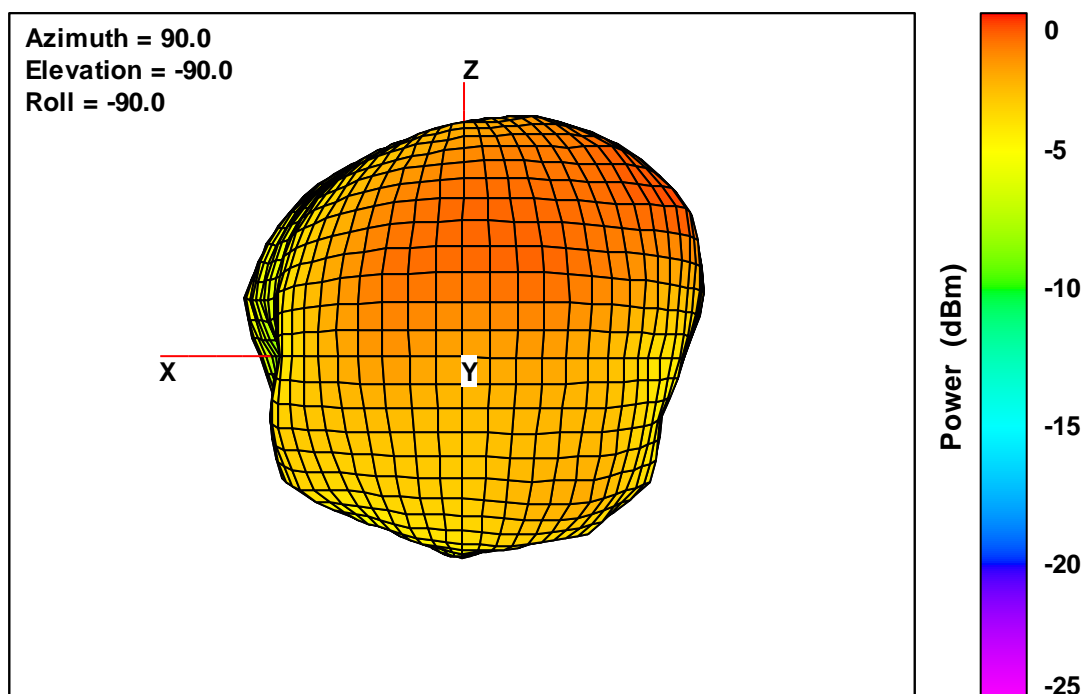
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Left Side View, 2462 MHz

### Total EIRP, Front Face View



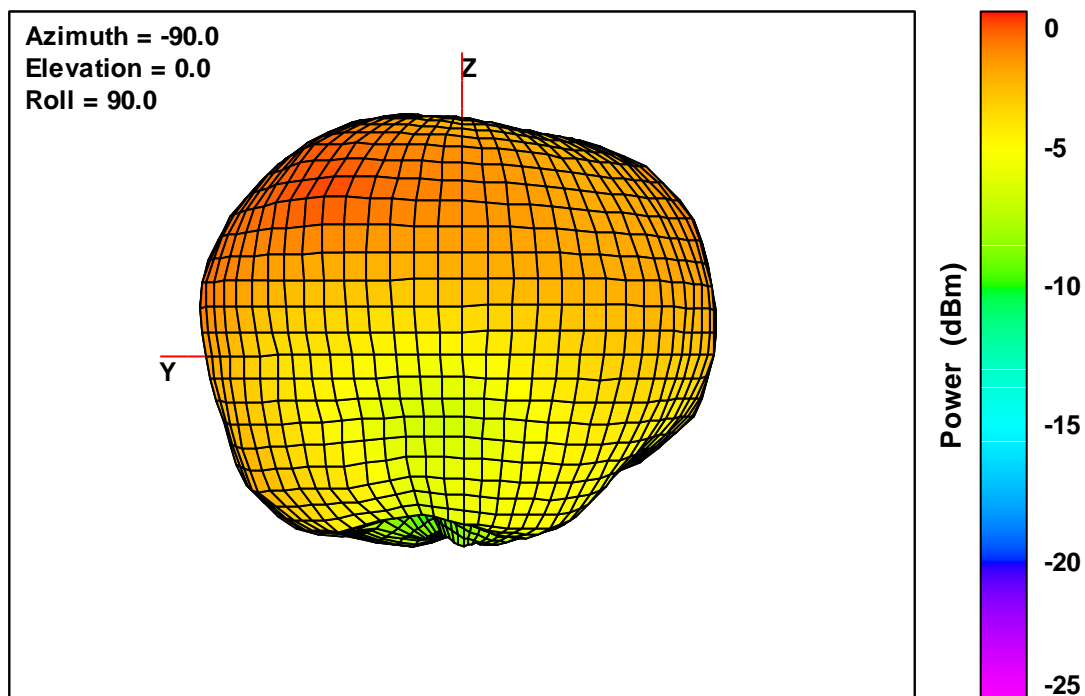
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Front Face View, 2462 MHz

### Total EIRP, Right Side View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Right Side View, 2462 MHz

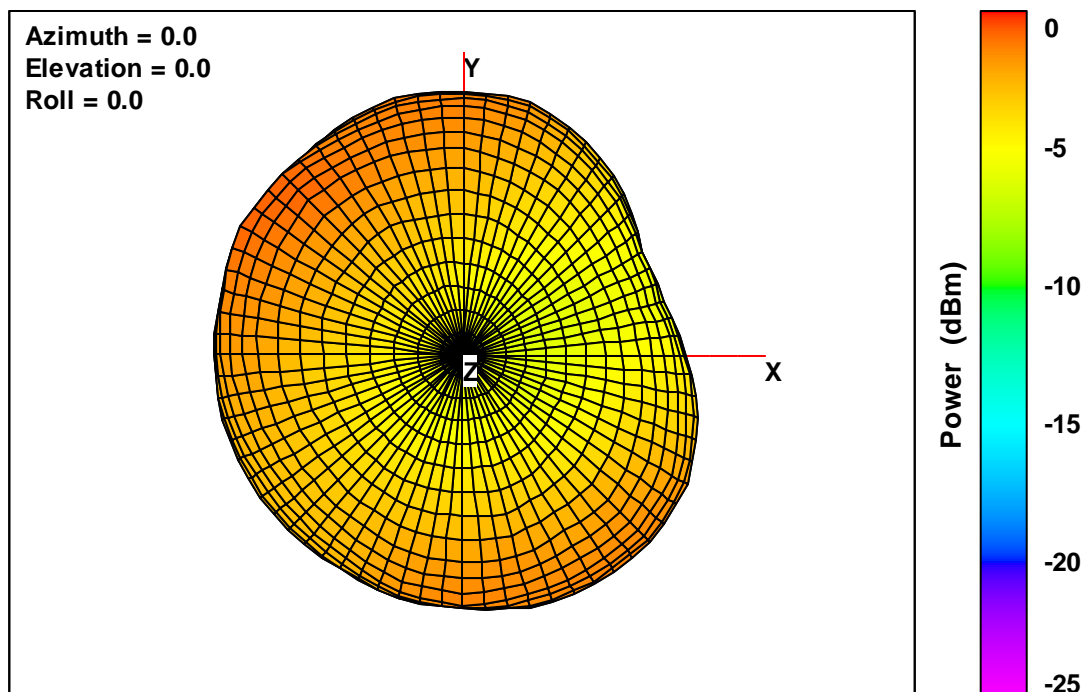
### Total EIRP, Back Face View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Back Face View, 2462 MHz

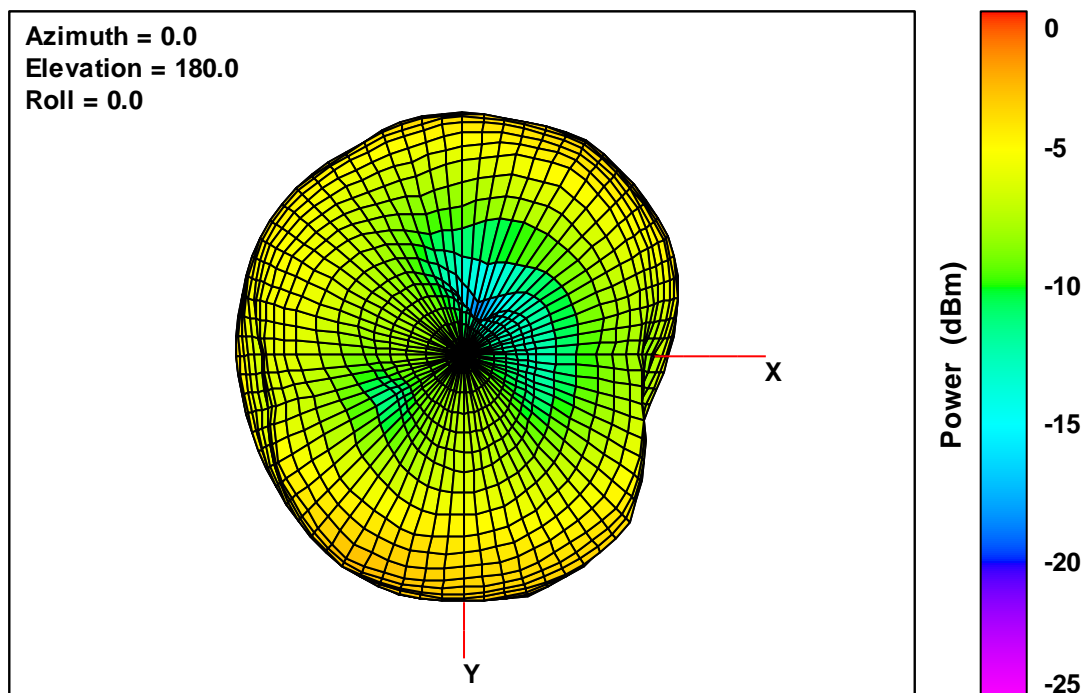
## 6.6 Antenna 1 3D PASSIVE- 2480 MHz

### Total EIRP, Top View



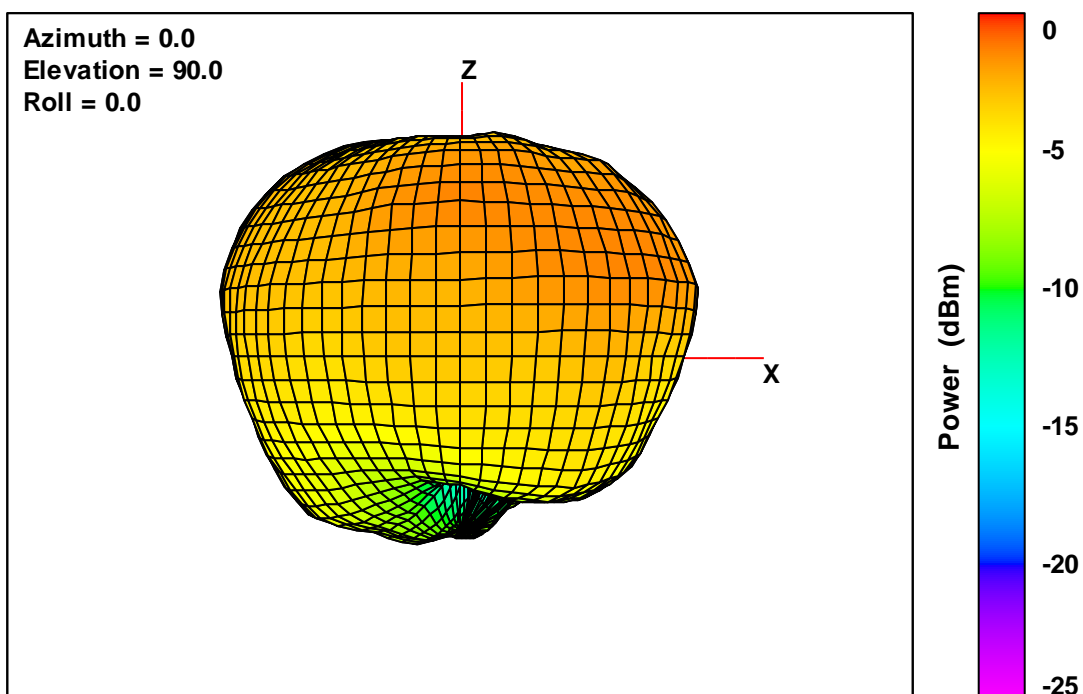
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Top View, 2480 MHz

### Total EIRP, Bottom View



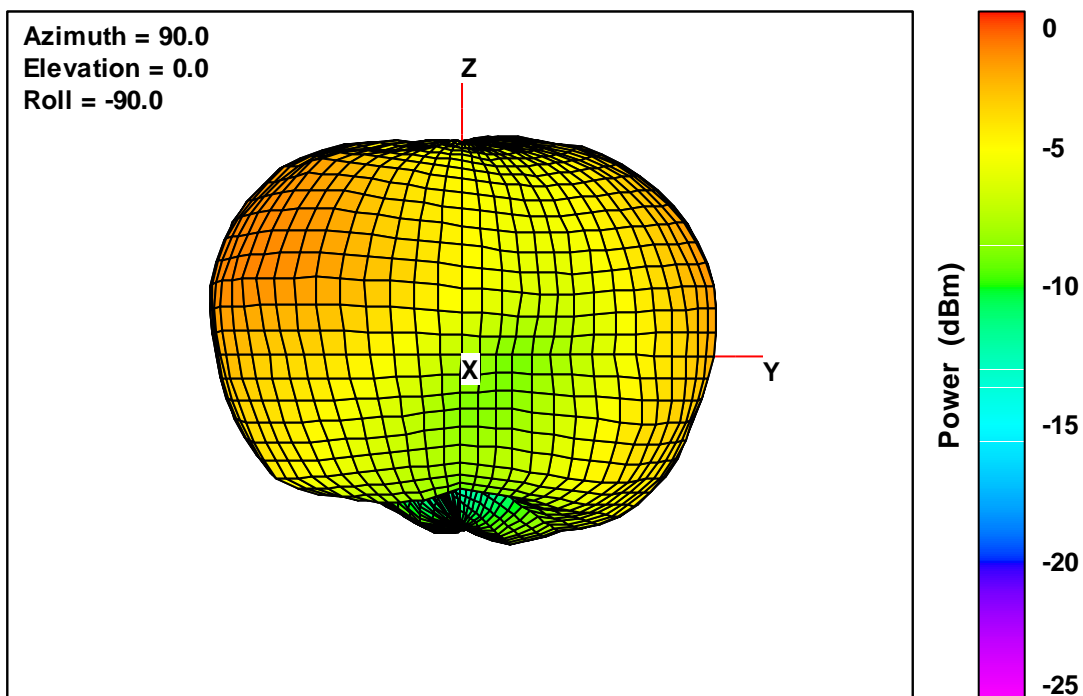
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Bottom View, 2480 MHz

### Total EIRP, Left Side View



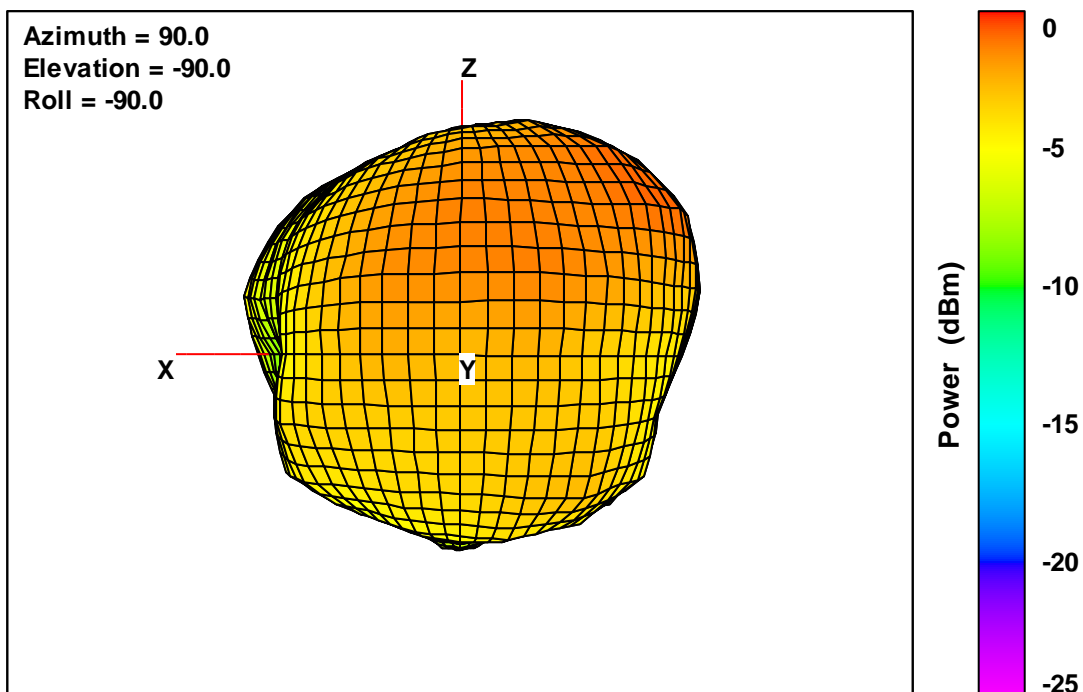
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Left Side View, 2480 MHz

### Total EIRP, Front Face View



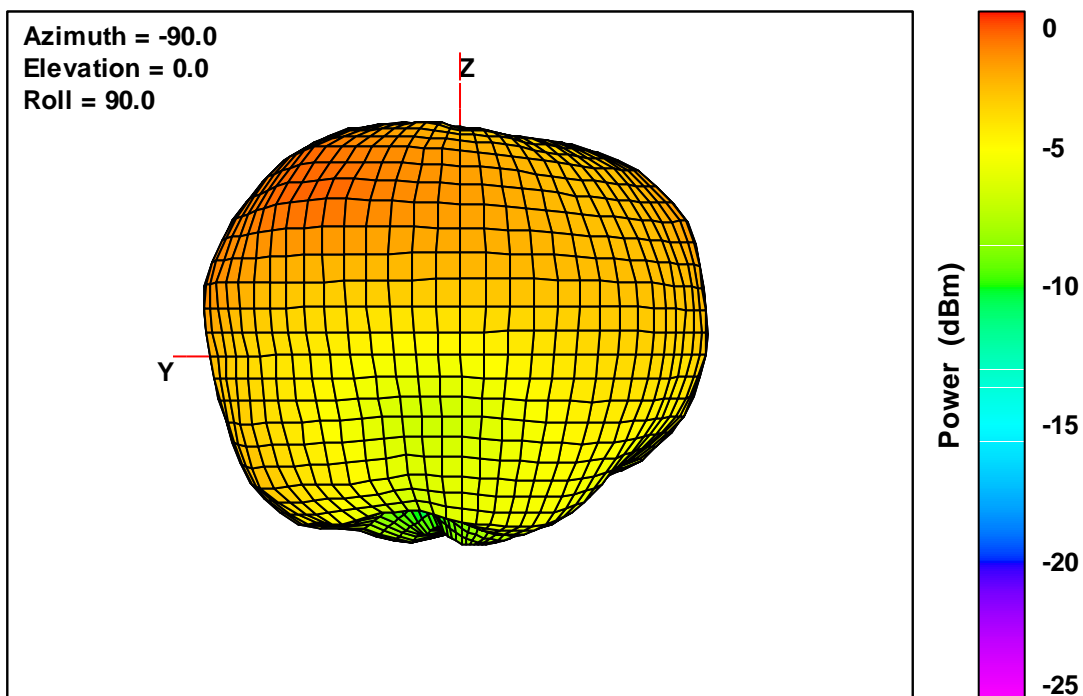
ANT1- ANT2 TERMINATED Free-Space Total EIRP, Front Face View, 2480 MHz

### Total EIRP, Right Side View



ANT1- ANT2 TERMINATED Free-Space Total EIRP, Right Side View, 2480 MHz

### Total EIRP, Back Face View

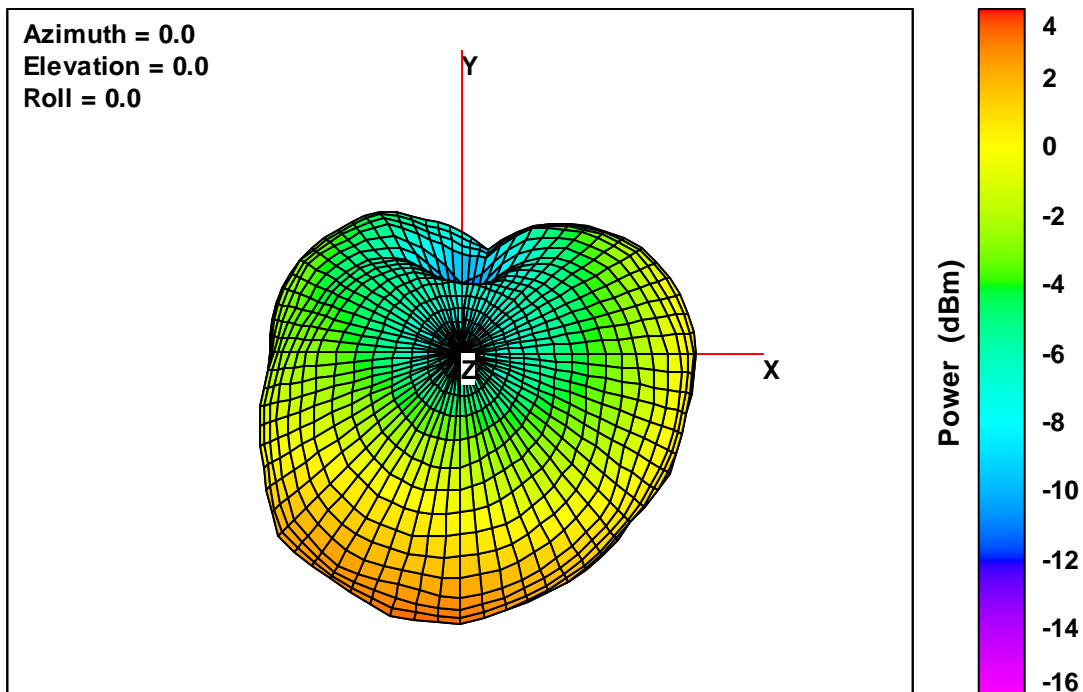


ANT1- ANT2 TERMINATED Free-Space Total EIRP, Back Face View, 2480 MHz



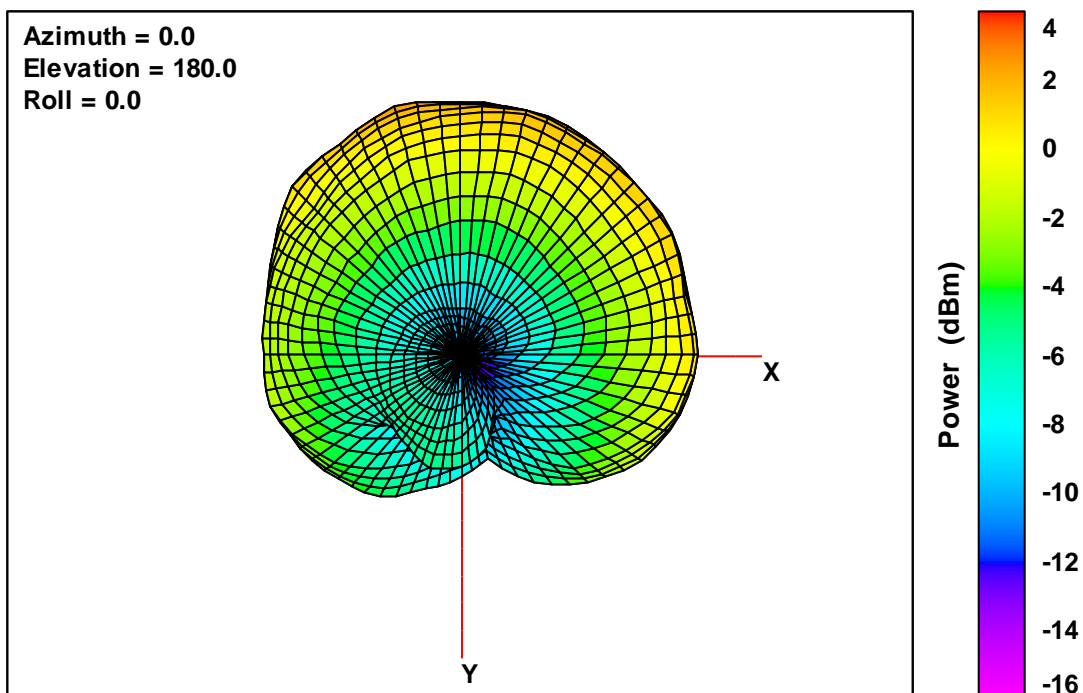
## 6.7 Antenna 2 3D PASSIVE- 2402 MHz

### Total EIRP, Top View



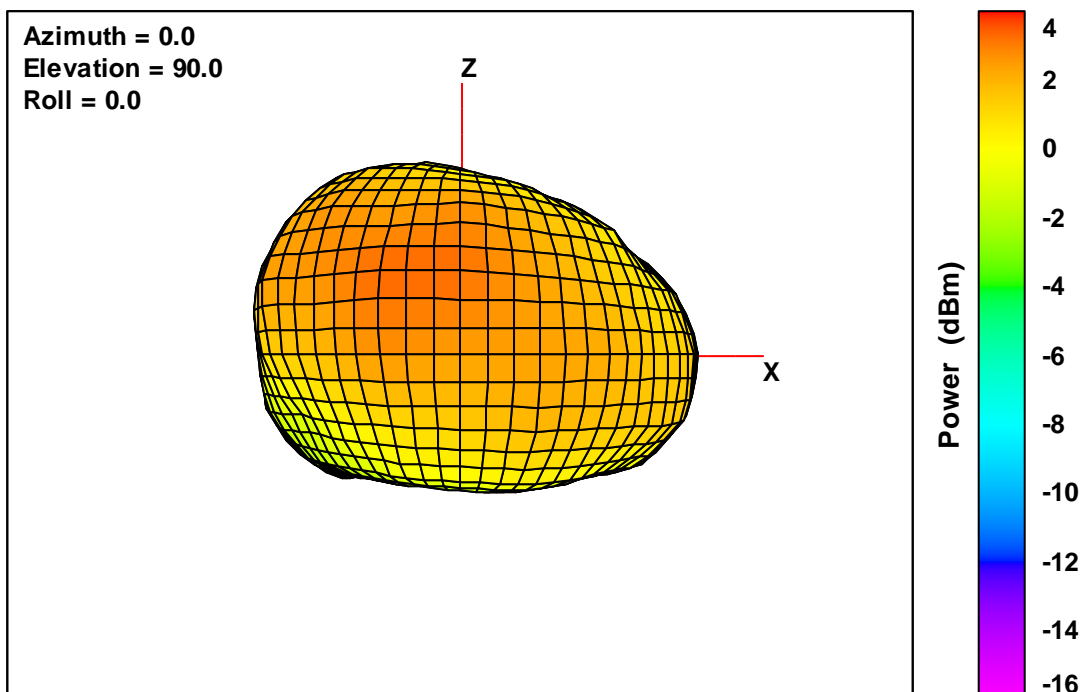
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Top View, 2402 MHz

### Total EIRP, Bottom View



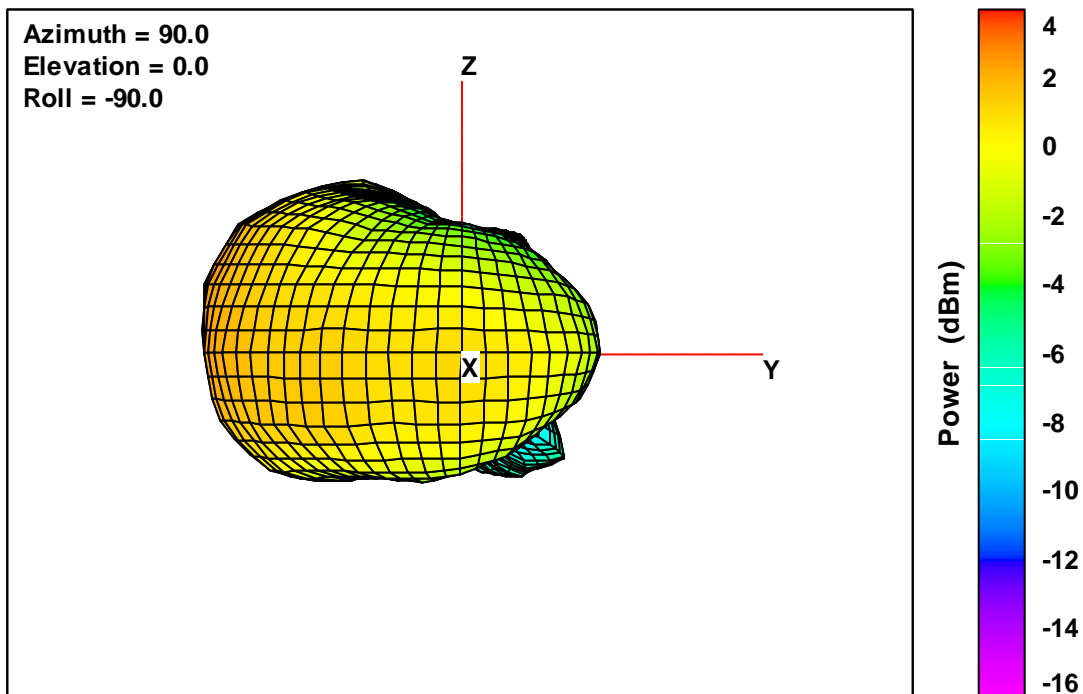
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Bottom View, 2402 MHz

### Total EIRP, Left Side View



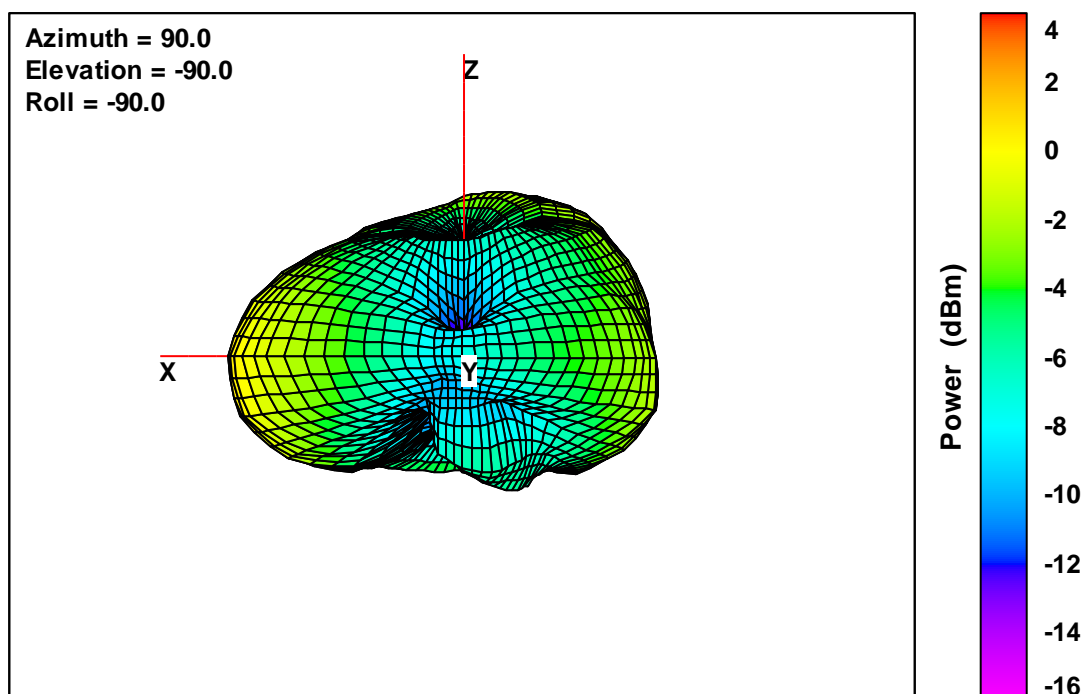
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Left Side View, 2402 MHz

### Total EIRP, Front Face View



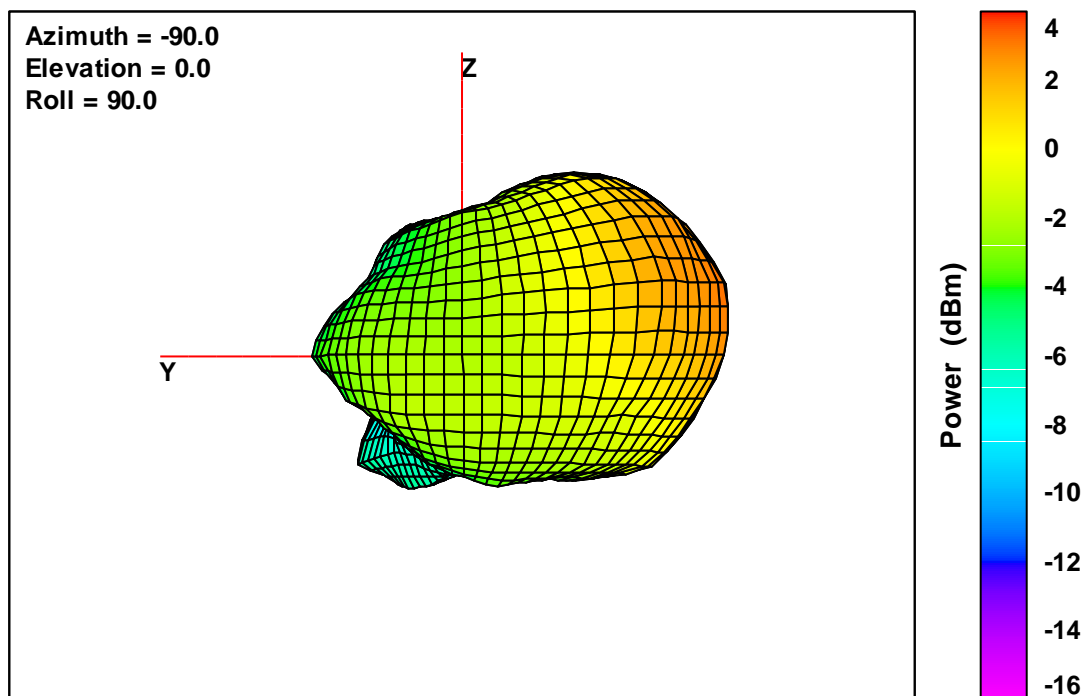
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Front Face View, 2402 MHz

### Total EIRP, Right Side View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Right Side View, 2402 MHz

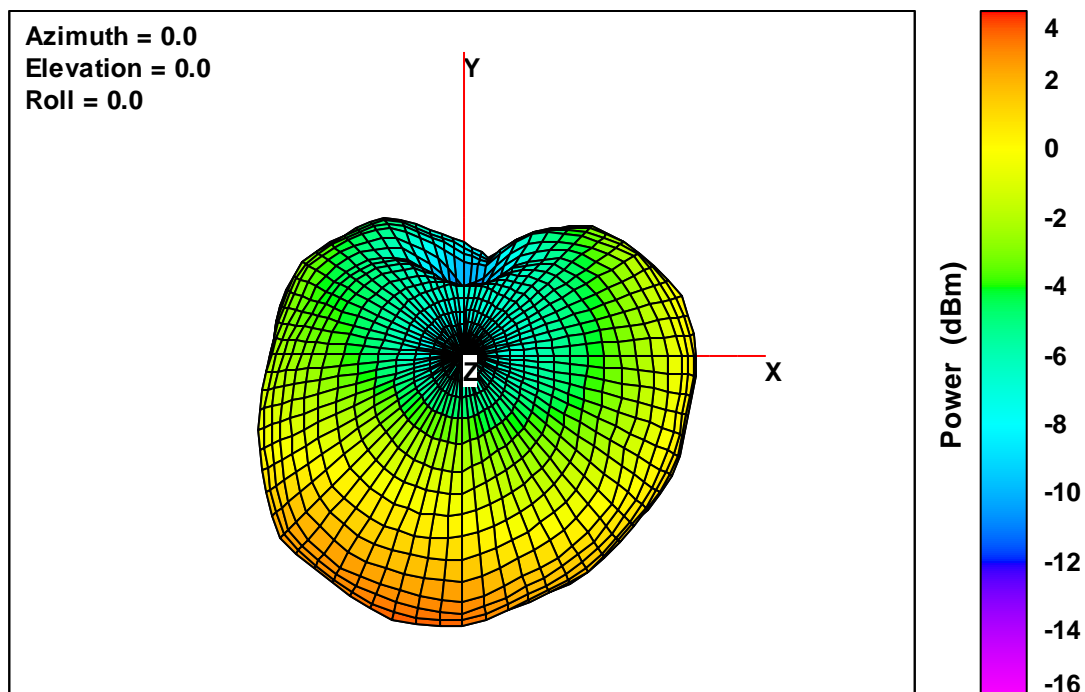
### Total EIRP, Back Face View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Back Face View, 2402 MHz

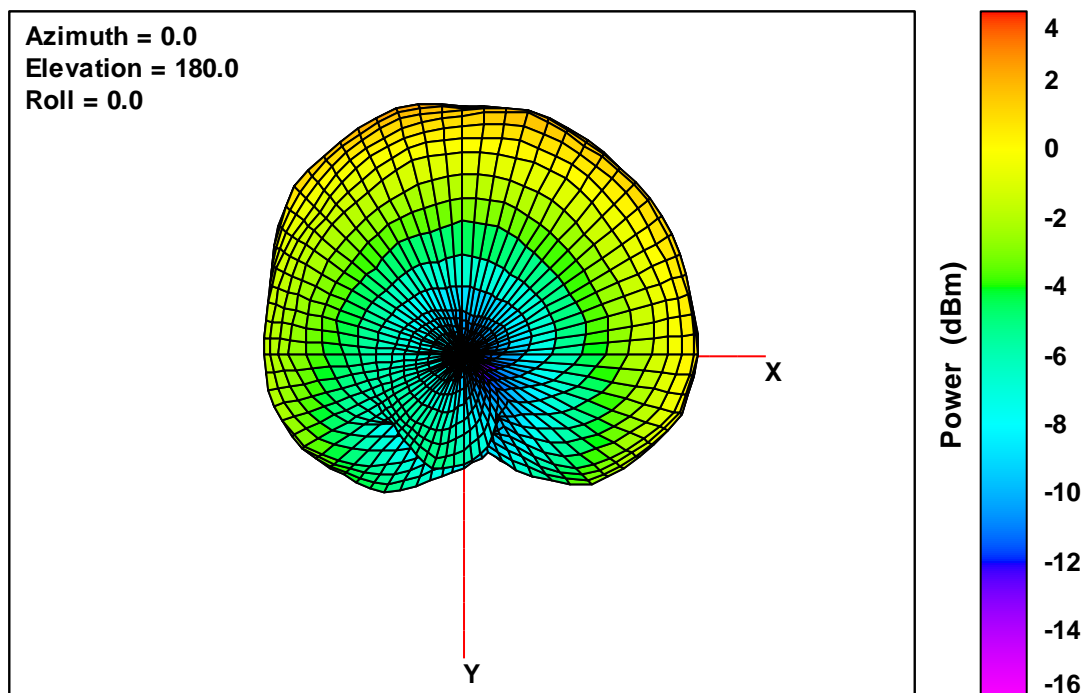
## 6.8 Antenna 2 3D PASSIVE- 2412 MHz

### Total EIRP, Top View



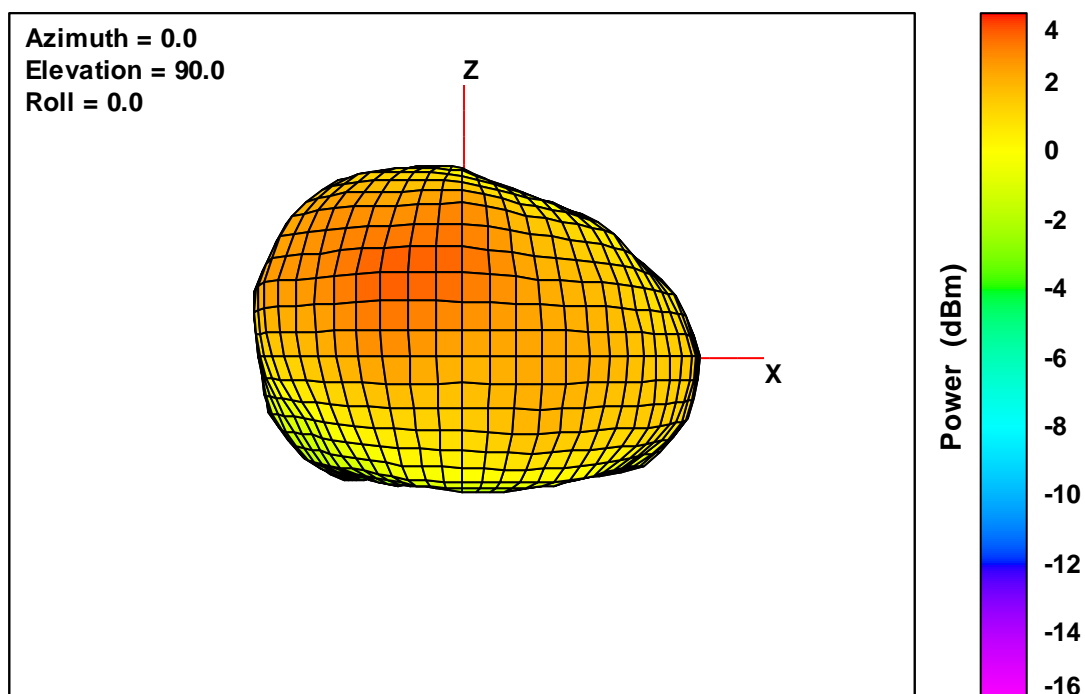
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Top View, 2412 MHz

### Total EIRP, Bottom View



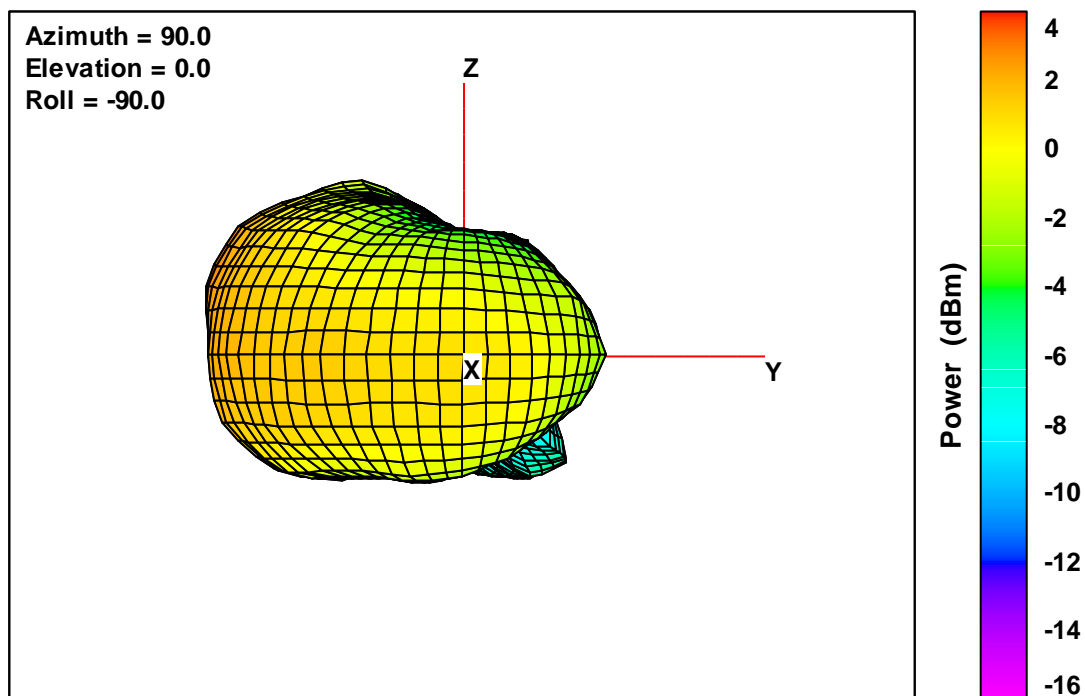
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Bottom View, 2412 MHz

### Total EIRP, Left Side View



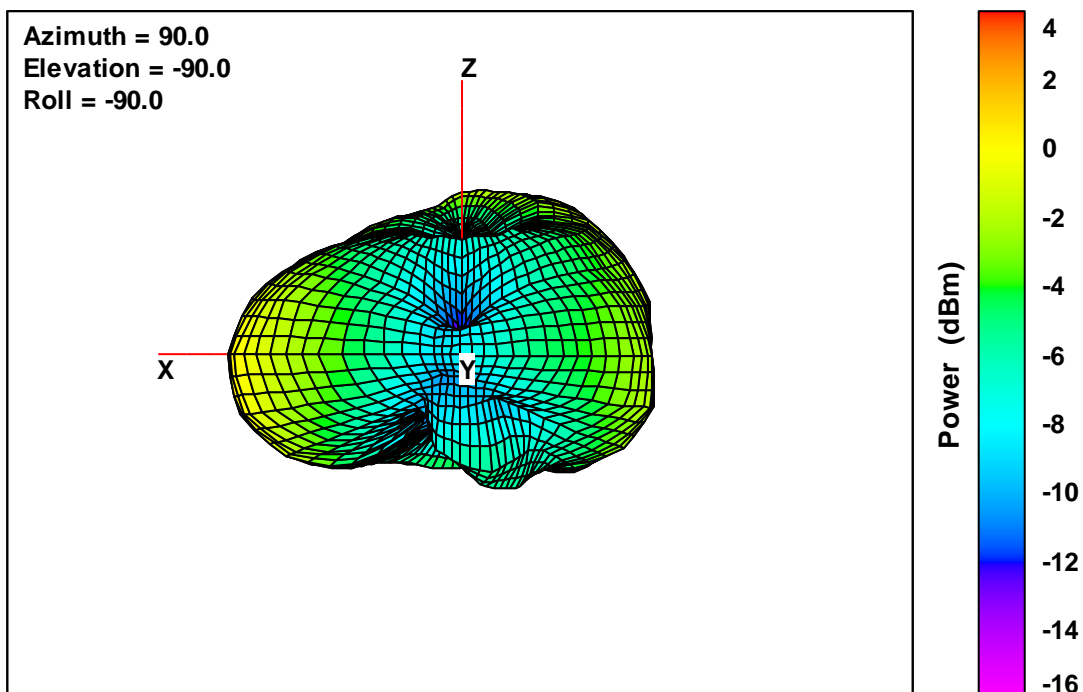
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Left Side View, 2412 MHz

### Total EIRP, Front Face View



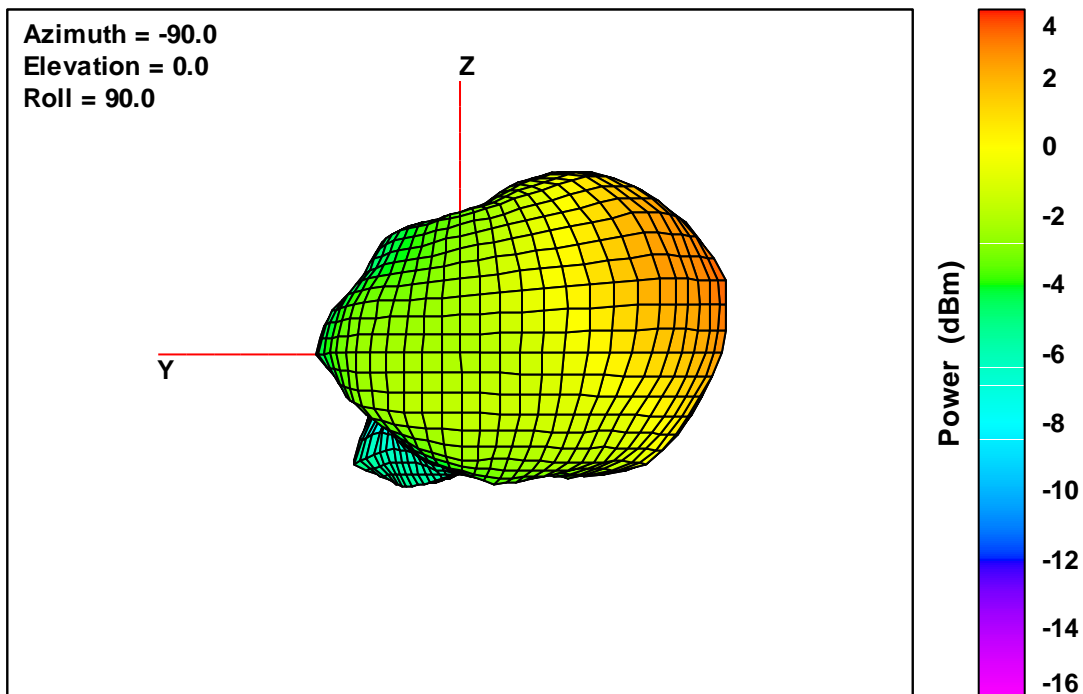
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Front Face View, 2412 MHz

### Total EIRP, Right Side View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Right Side View, 2412 MHz

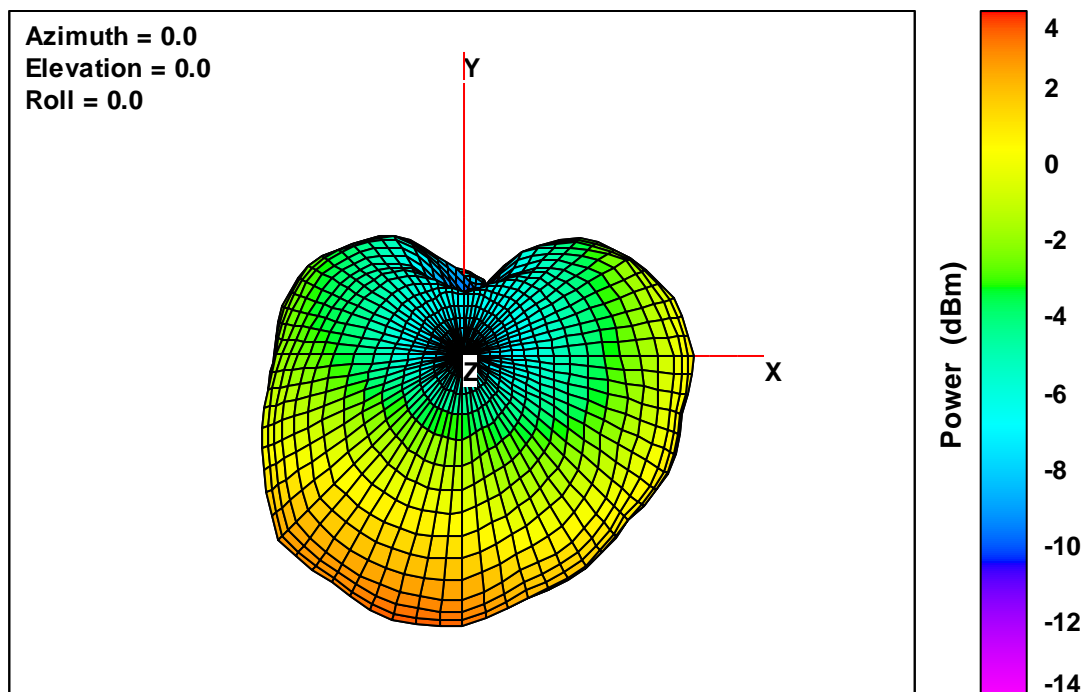
### Total EIRP, Back Face View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Back Face View, 2412 MHz

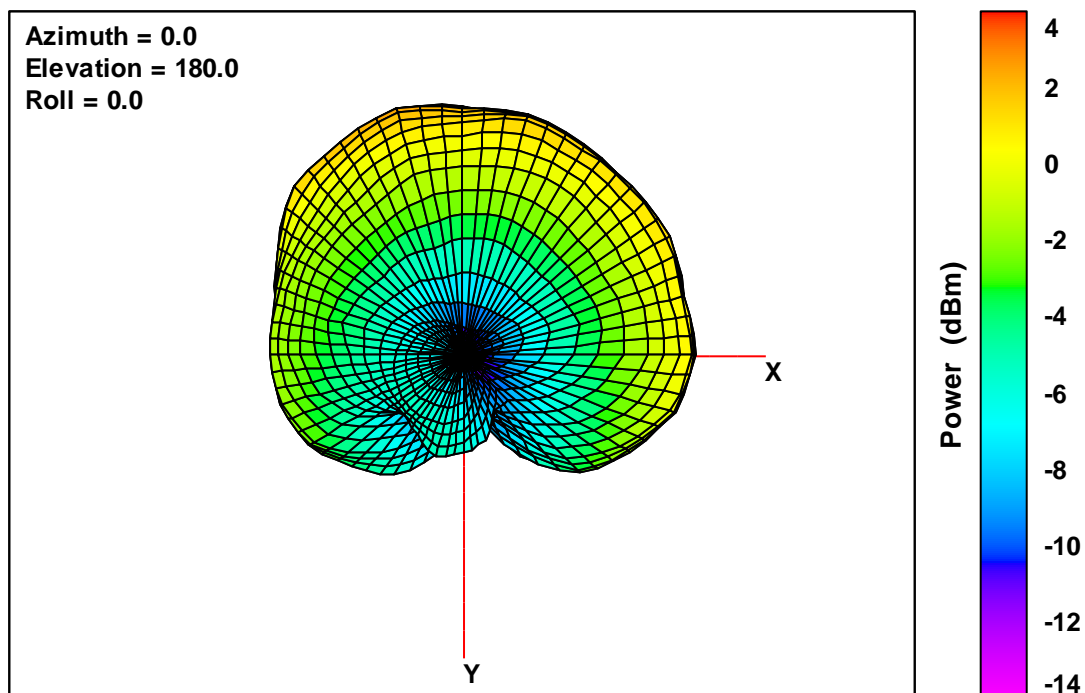
## 6.9 Antenna 2 3D PASSIVE- 2437 MHz

### Total EIRP, Top View



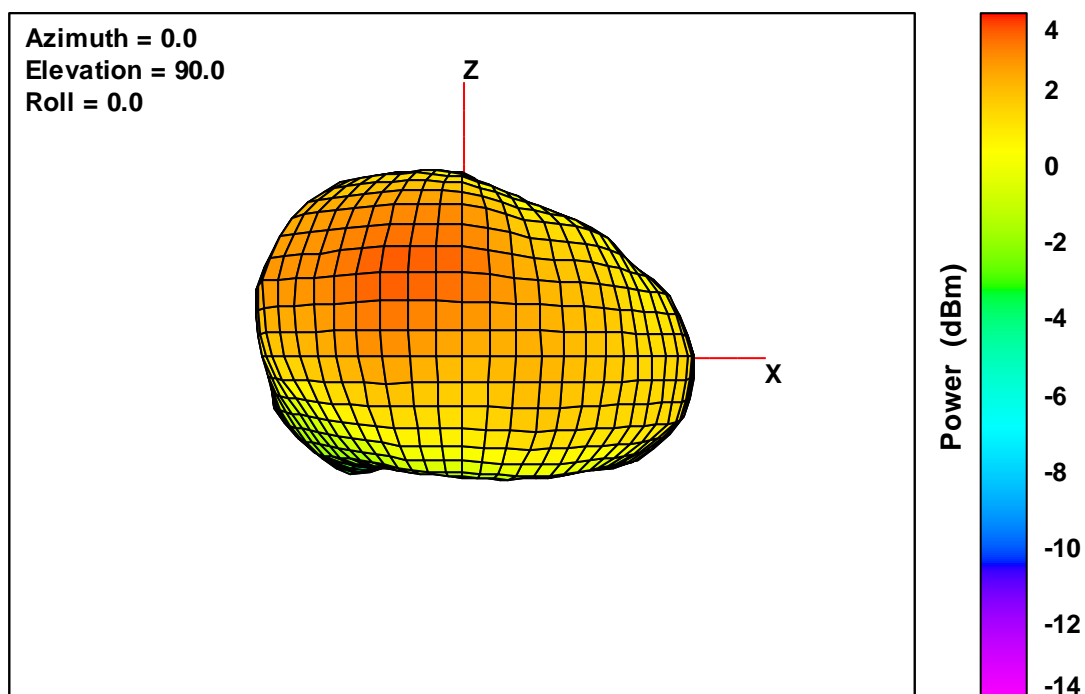
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Top View, 2437 MHz

### Total EIRP, Bottom View



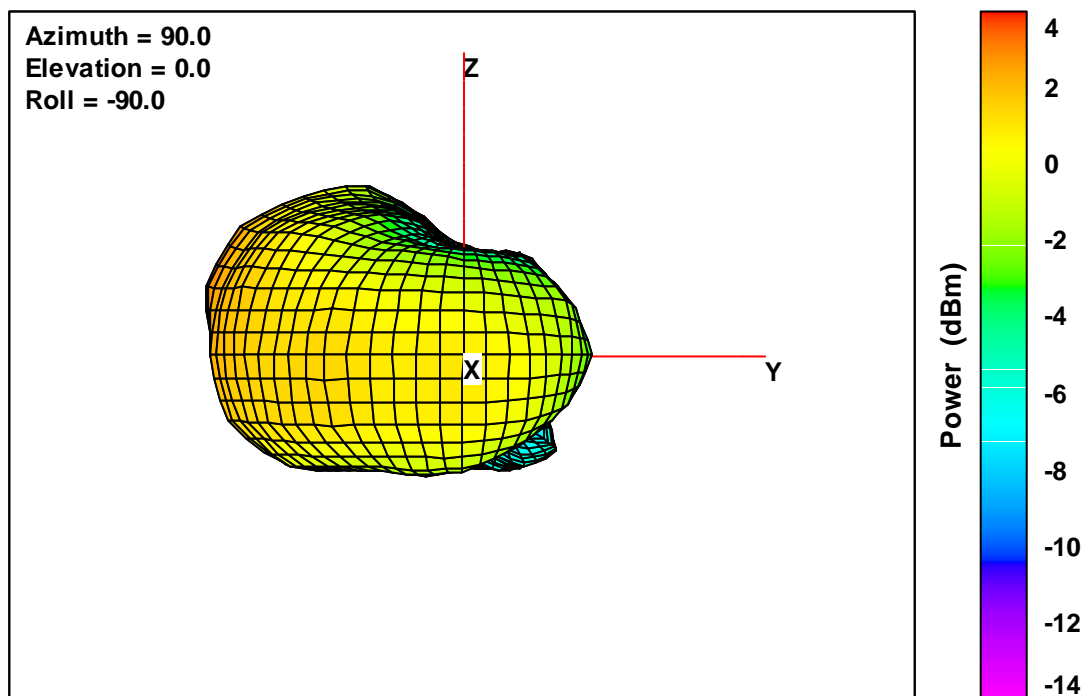
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Bottom View, 2437 MHz

### Total EIRP, Left Side View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Left Side View, 2437 MHz

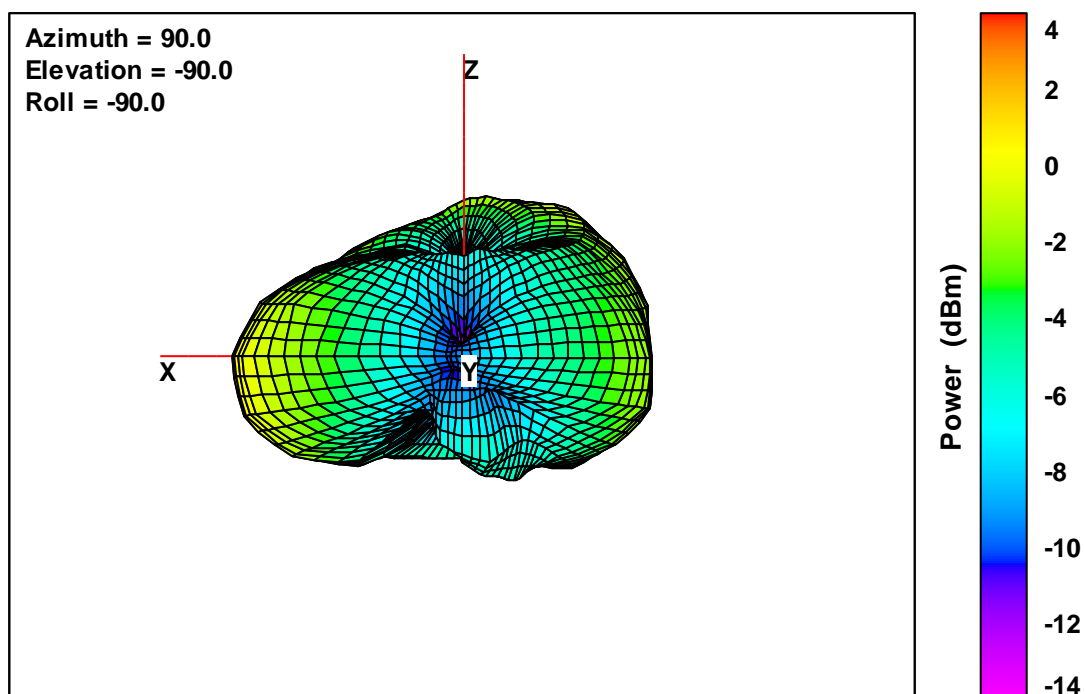
### Total EIRP, Front Face View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Front Face View, 2437 MHz

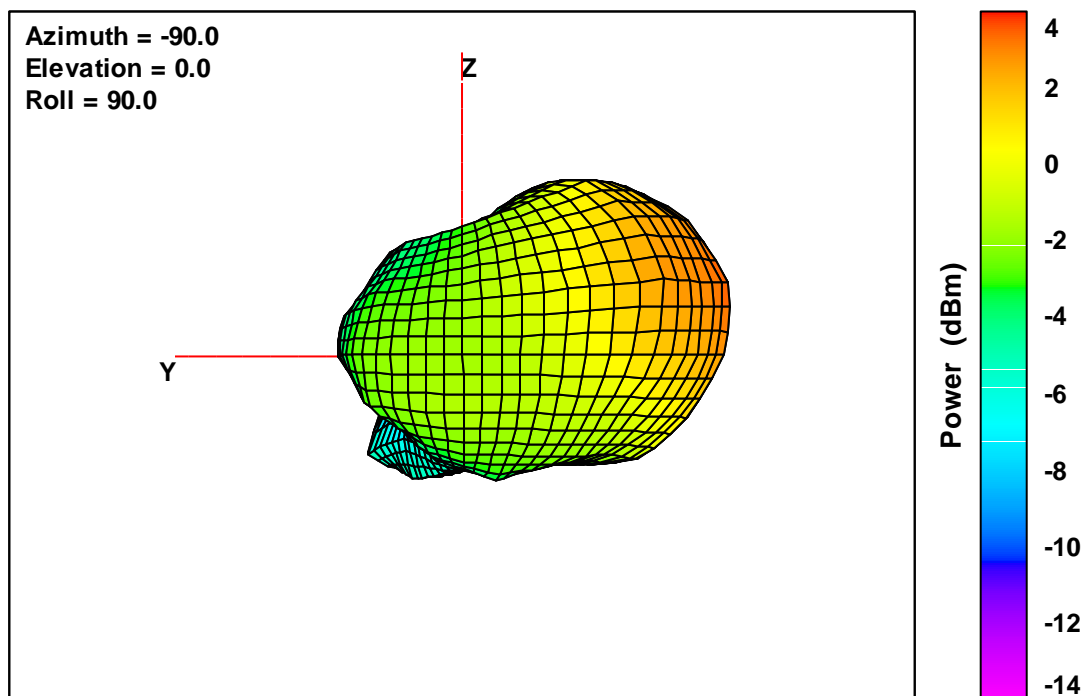


### Total EIRP, Right Side View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Right Side View, 2437 MHz

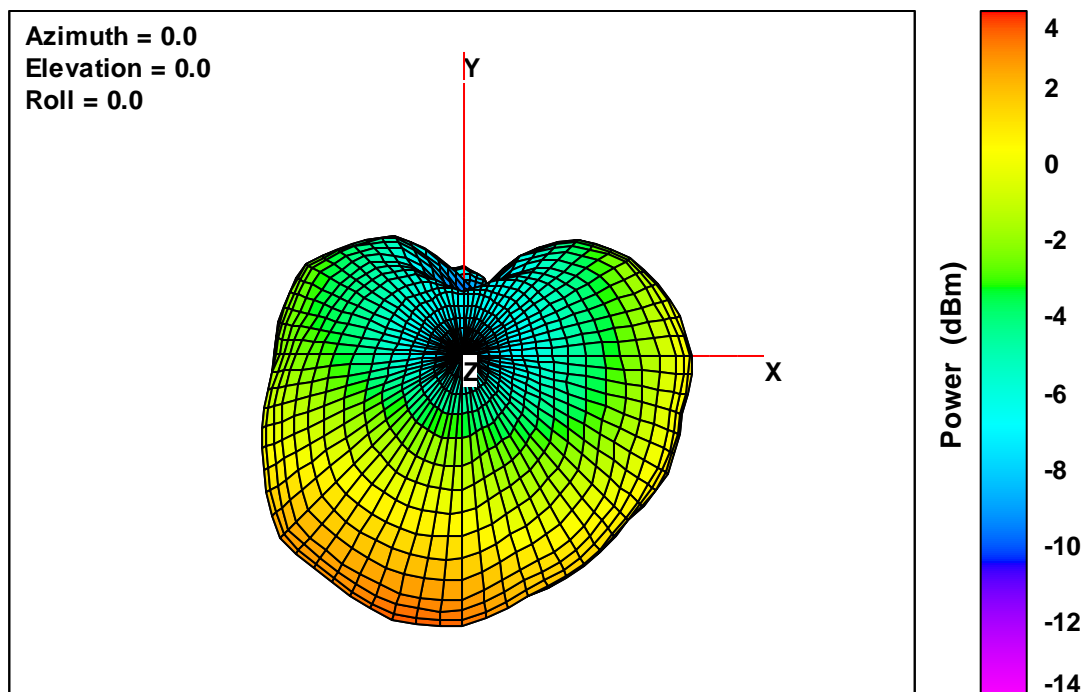
### Total EIRP, Back Face View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Back Face View, 2437 MHz

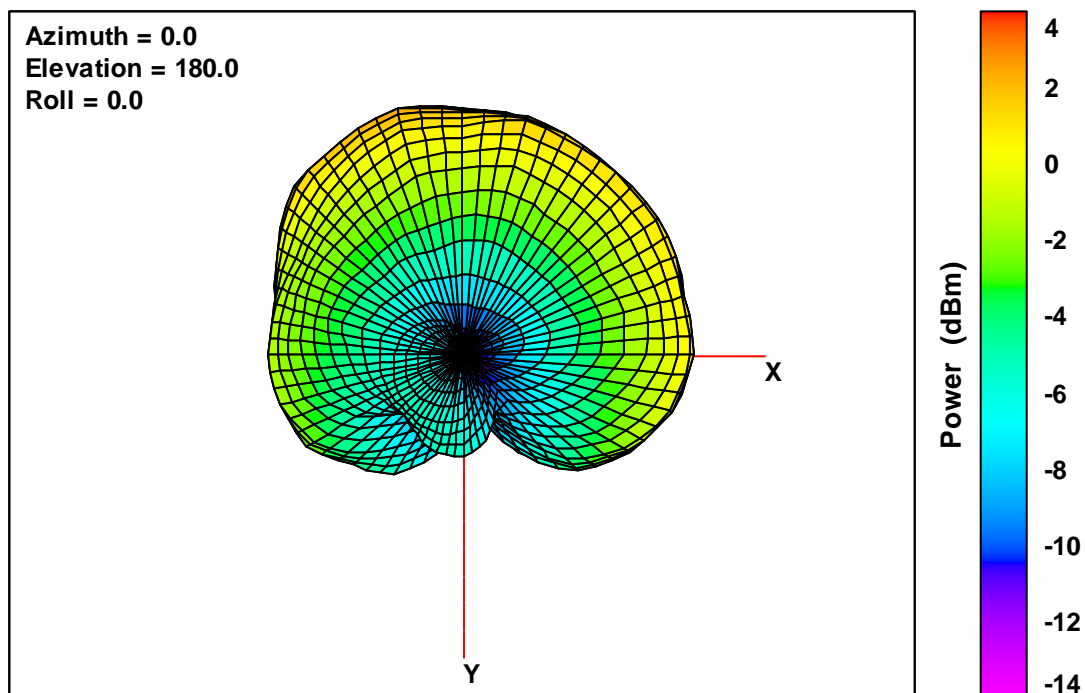
## 6.10 Antenna 2 3D PASSIVE- 2440 MHz

### Total EIRP, Top View



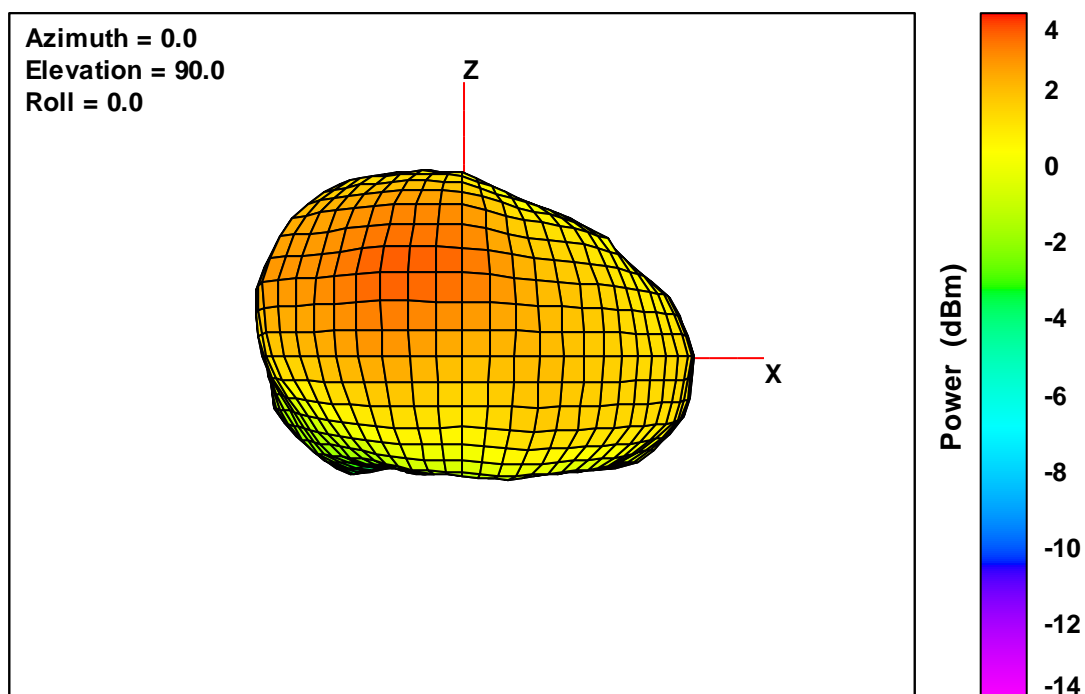
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Top View, 2440 MHz

### Total EIRP, Bottom View



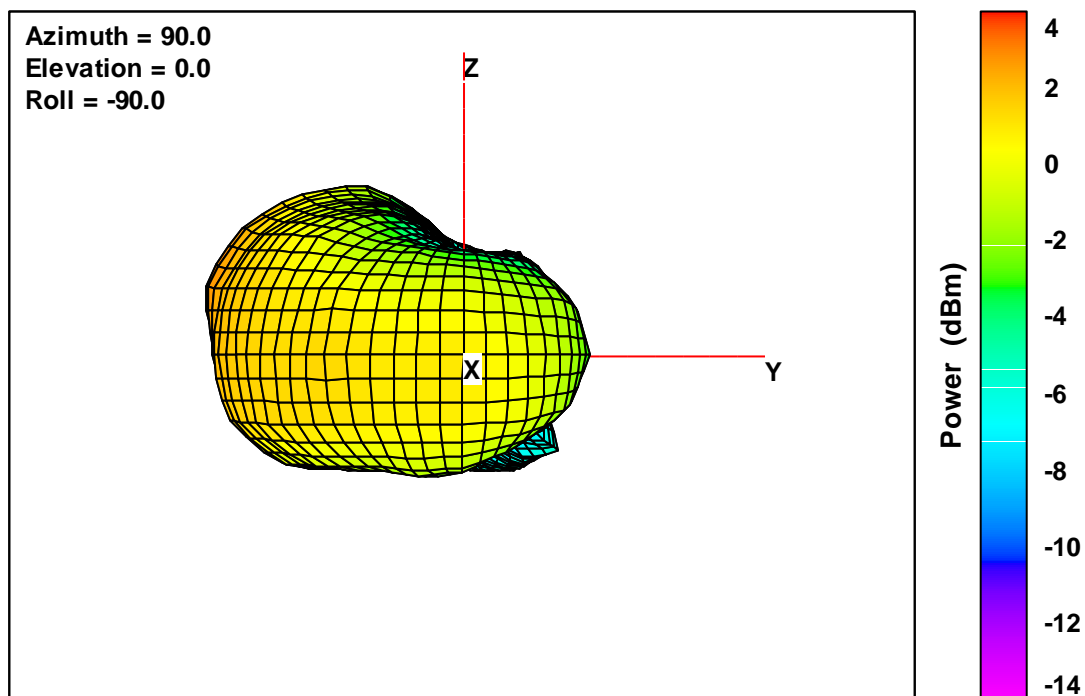
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Bottom View, 2440 MHz

### Total EIRP, Left Side View



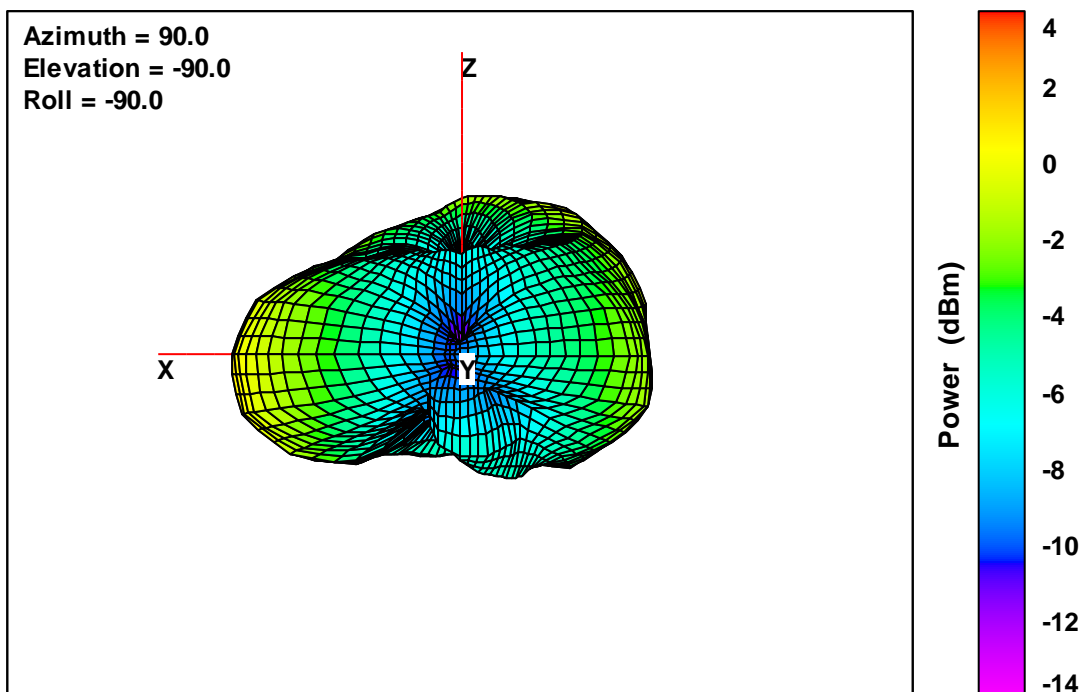
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Left Side View, 2440 MHz

### Total EIRP, Front Face View



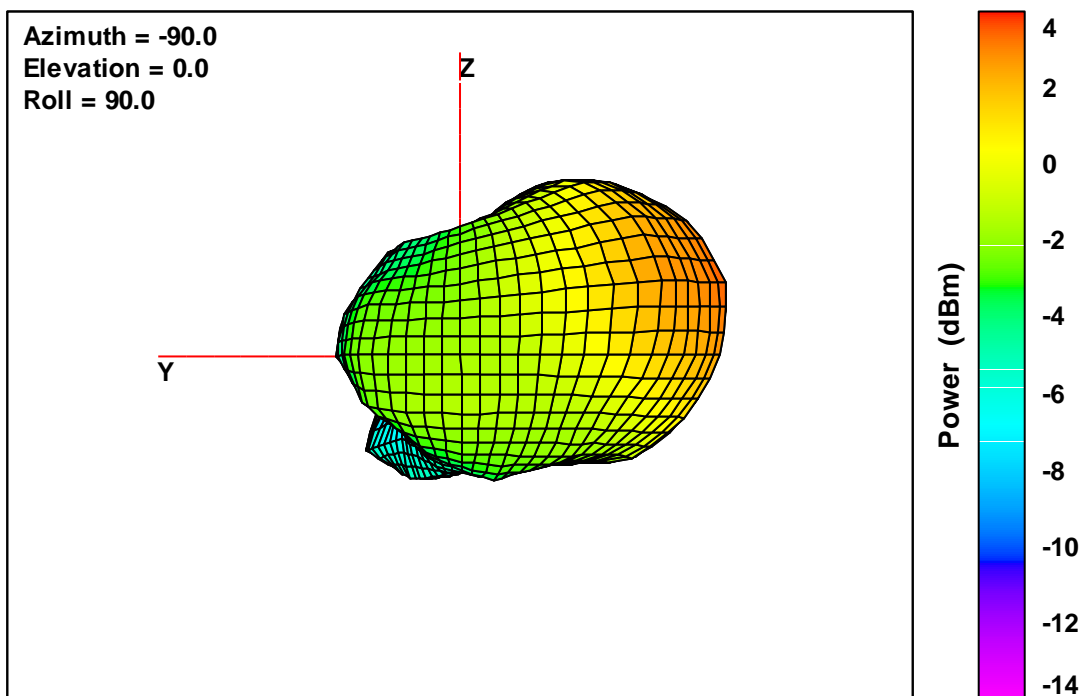
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Front Face View, 2440 MHz

### Total EIRP, Right Side View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Right Side View, 2440 MHz

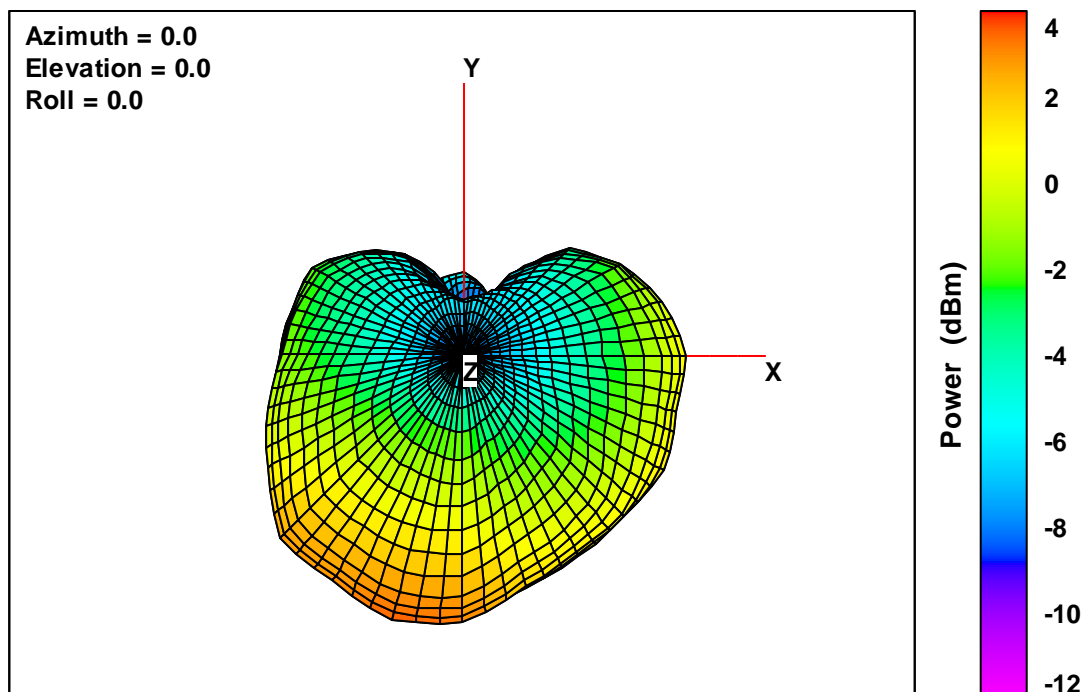
### Total EIRP, Back Face View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Back Face View, 2440 MHz

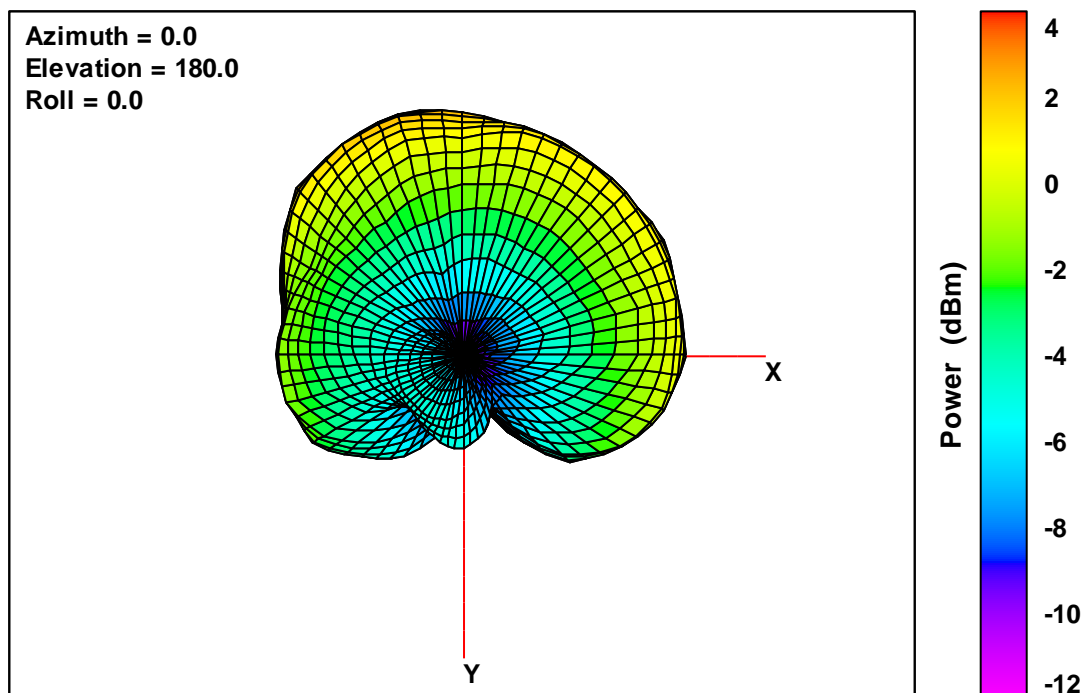
## 6.11 Antenna 2 3D PASSIVE- 2462 MHz

### Total EIRP, Top View



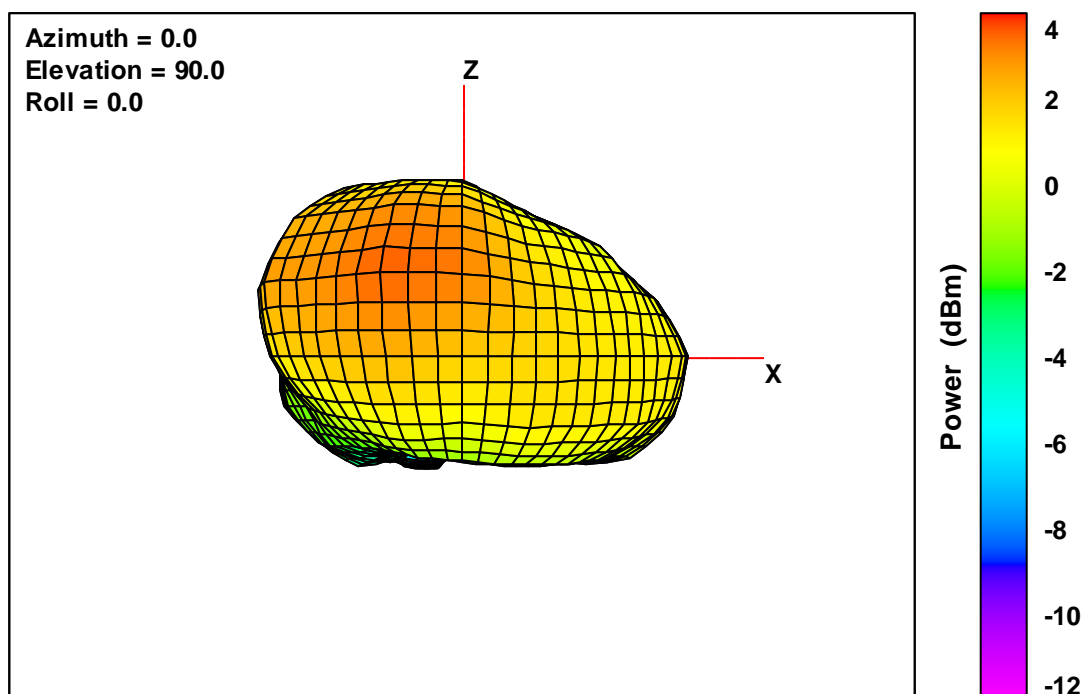
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Top View, 2462 MHz

### Total EIRP, Bottom View



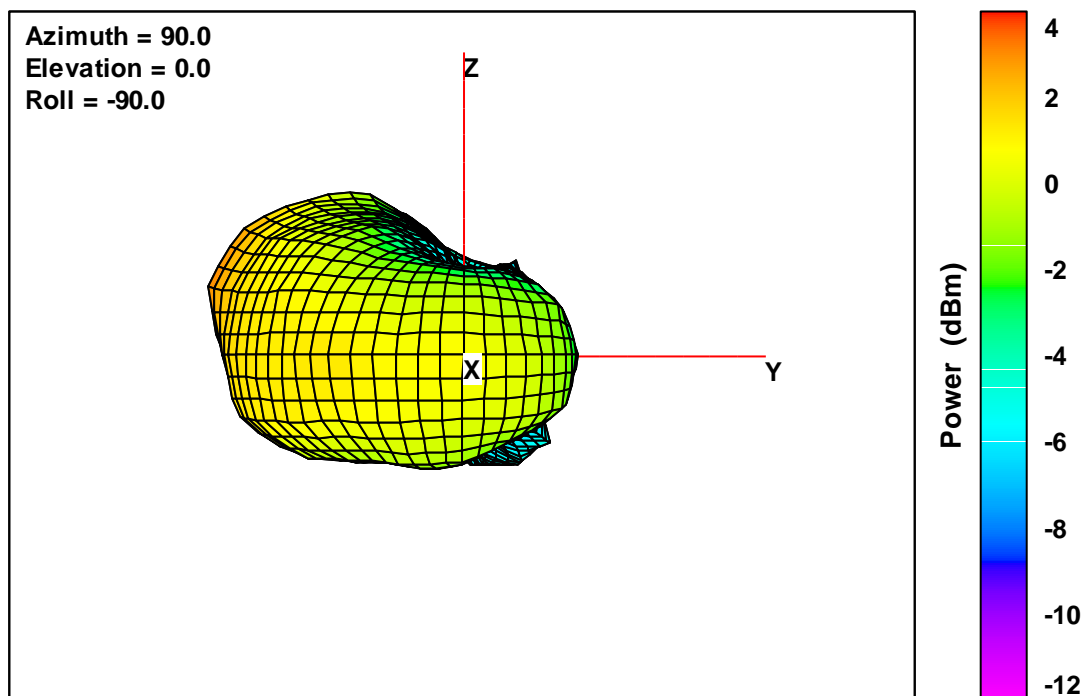
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Bottom View, 2462 MHz

### Total EIRP, Left Side View



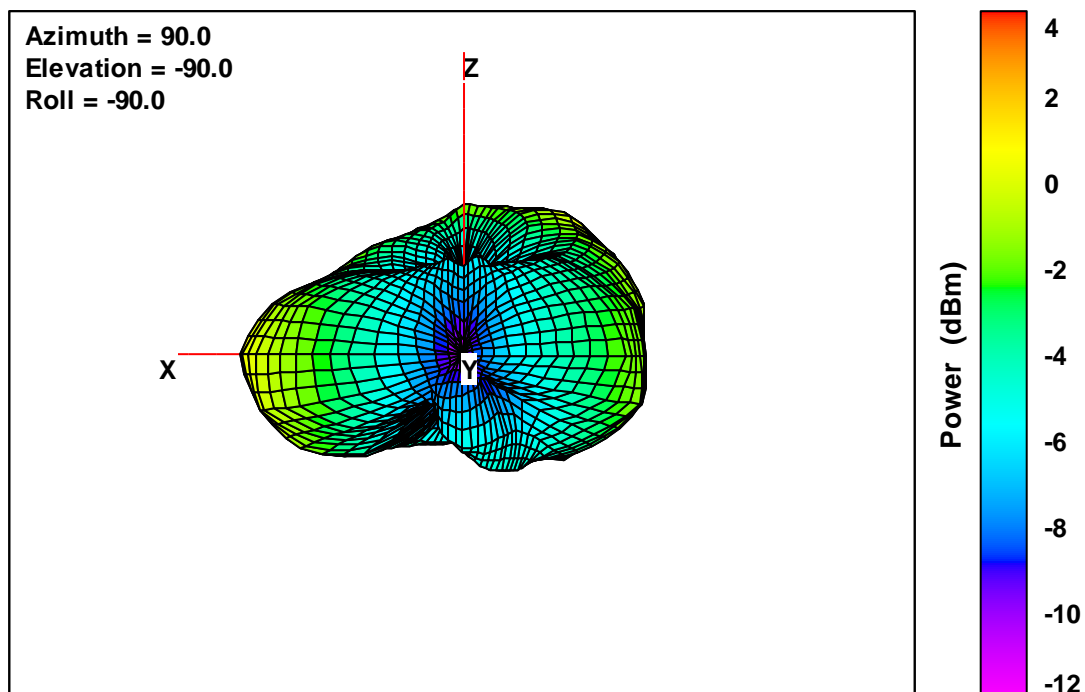
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Left Side View, 2462 MHz

### Total EIRP, Front Face View



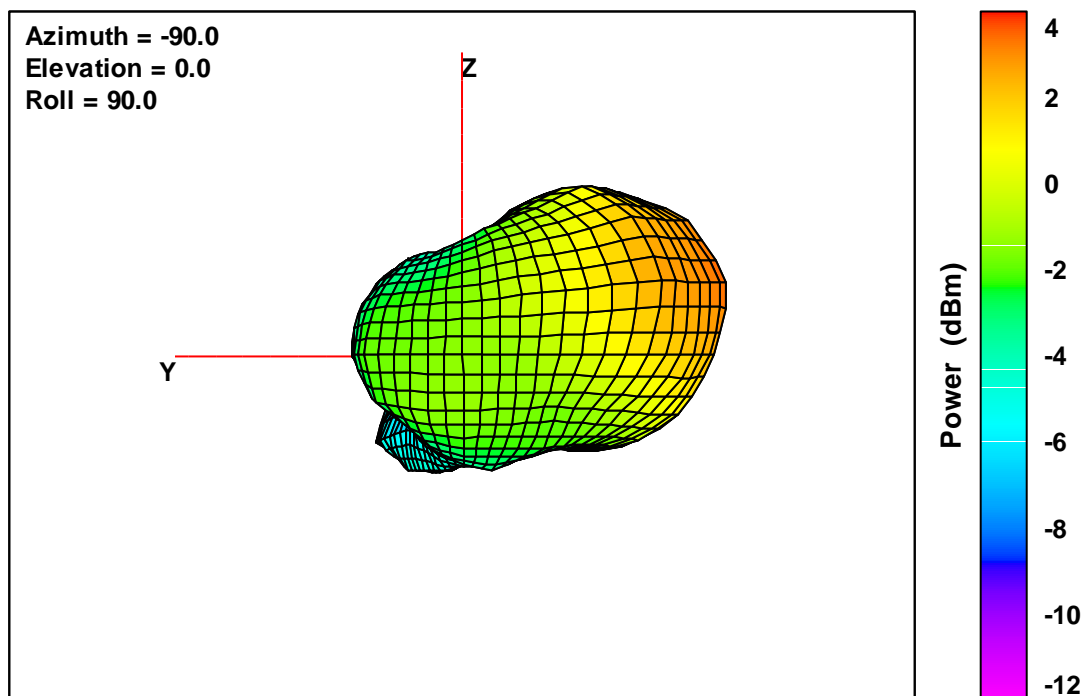
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Front Face View, 2462 MHz

### Total EIRP, Right Side View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Right Side View, 2462 MHz

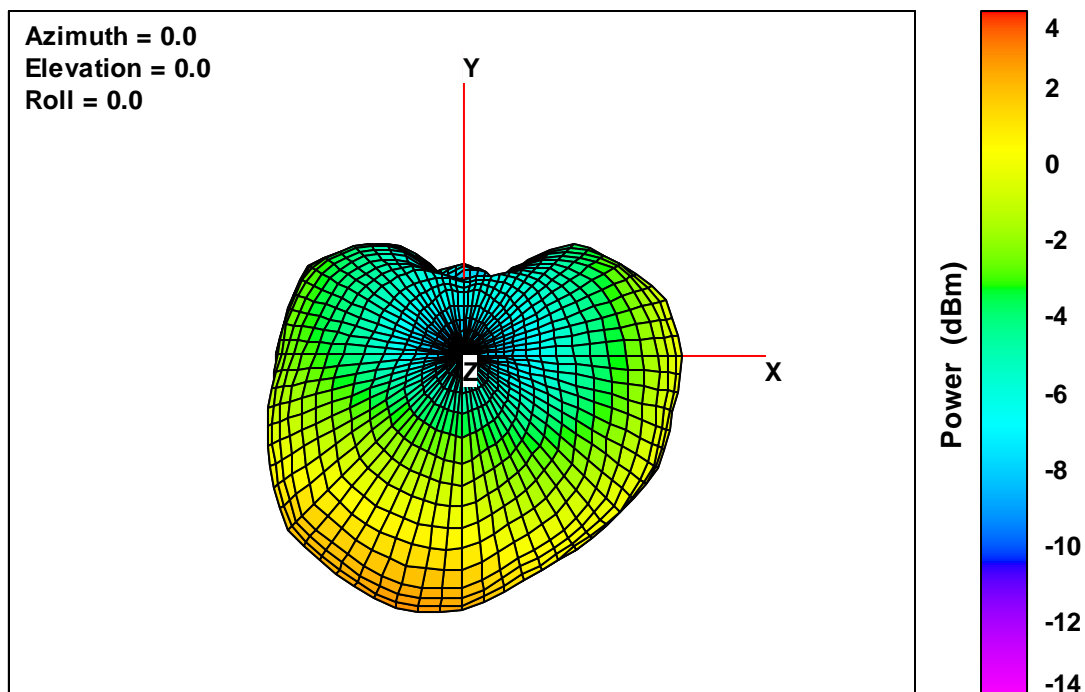
### Total EIRP, Back Face View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Back Face View, 2462 MHz

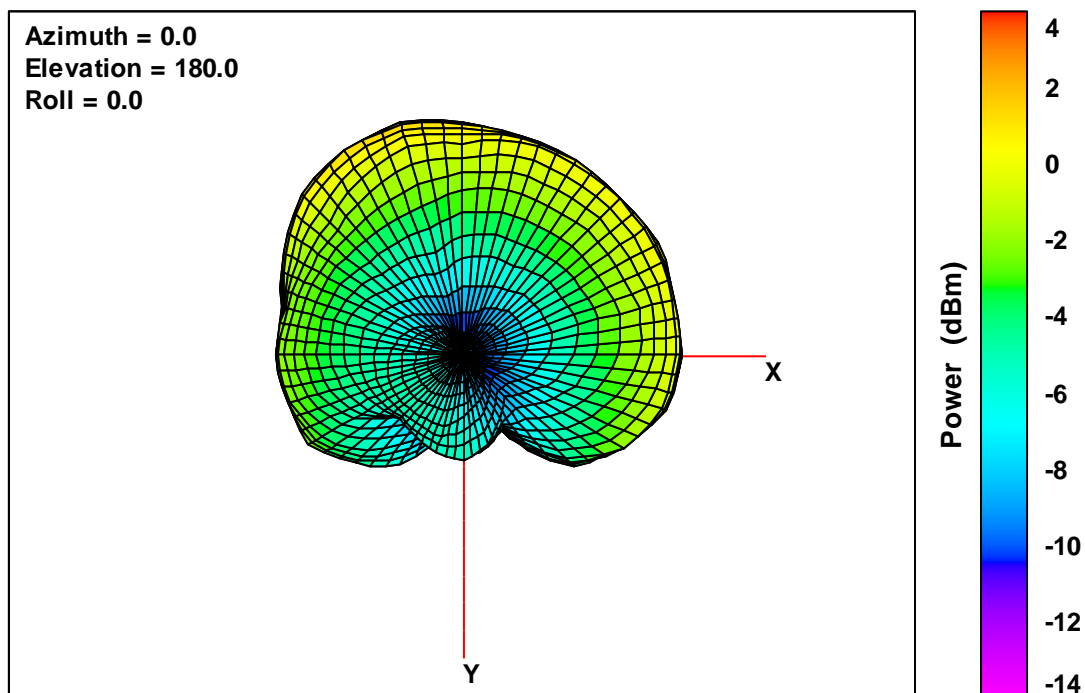
## 6.12 Antenna 2 3D PASSIVE- 2480 MHz

### Total EIRP, Top View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Top View, 2480 MHz

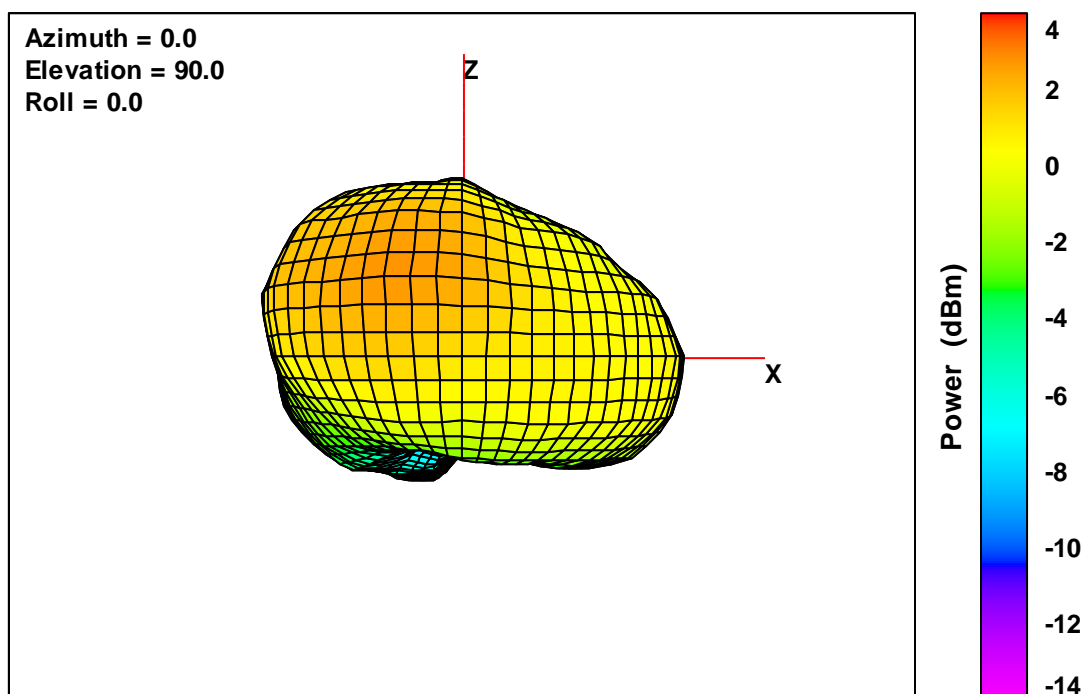
### Total EIRP, Bottom View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Bottom View, 2480 MHz

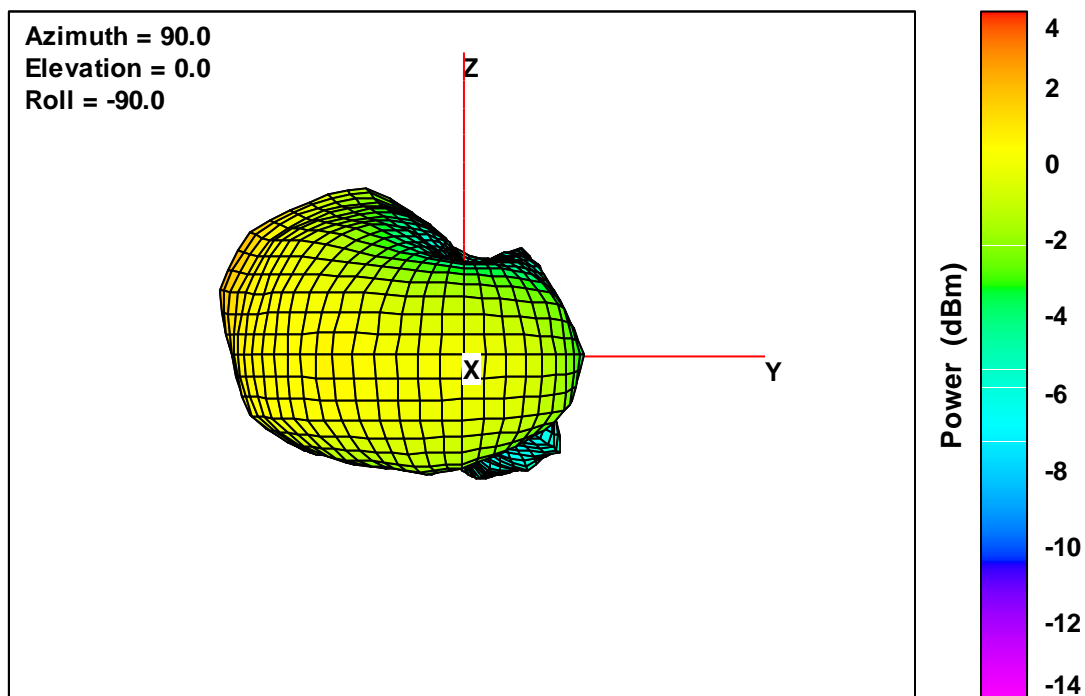


### Total EIRP, Left Side View



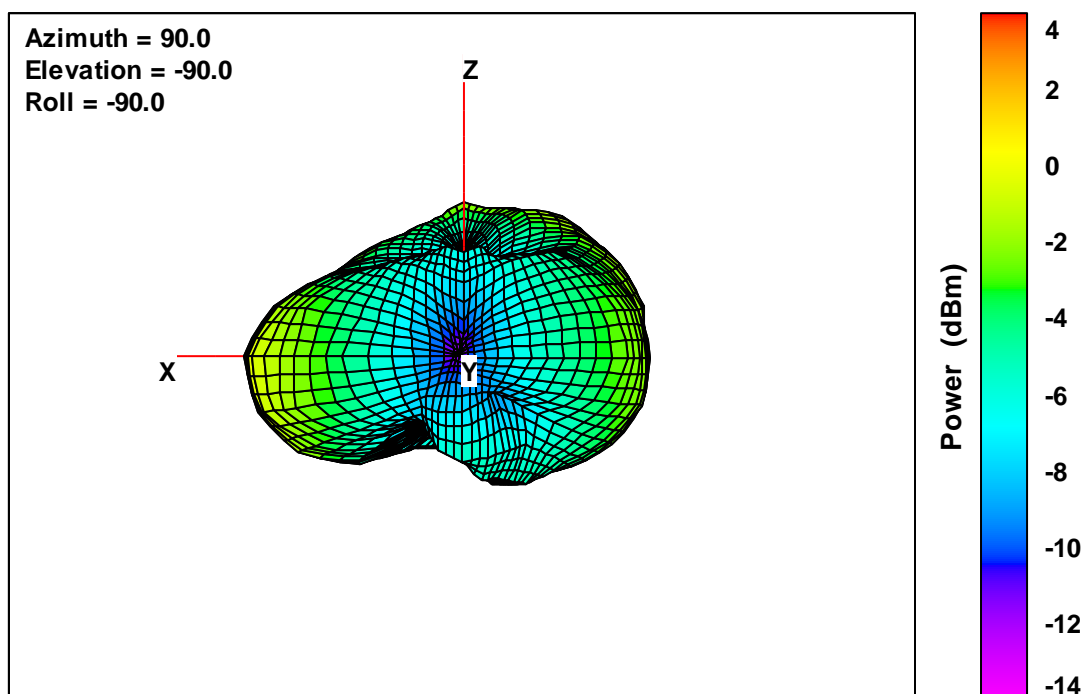
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Left Side View, 2480 MHz

### Total EIRP, Front Face View



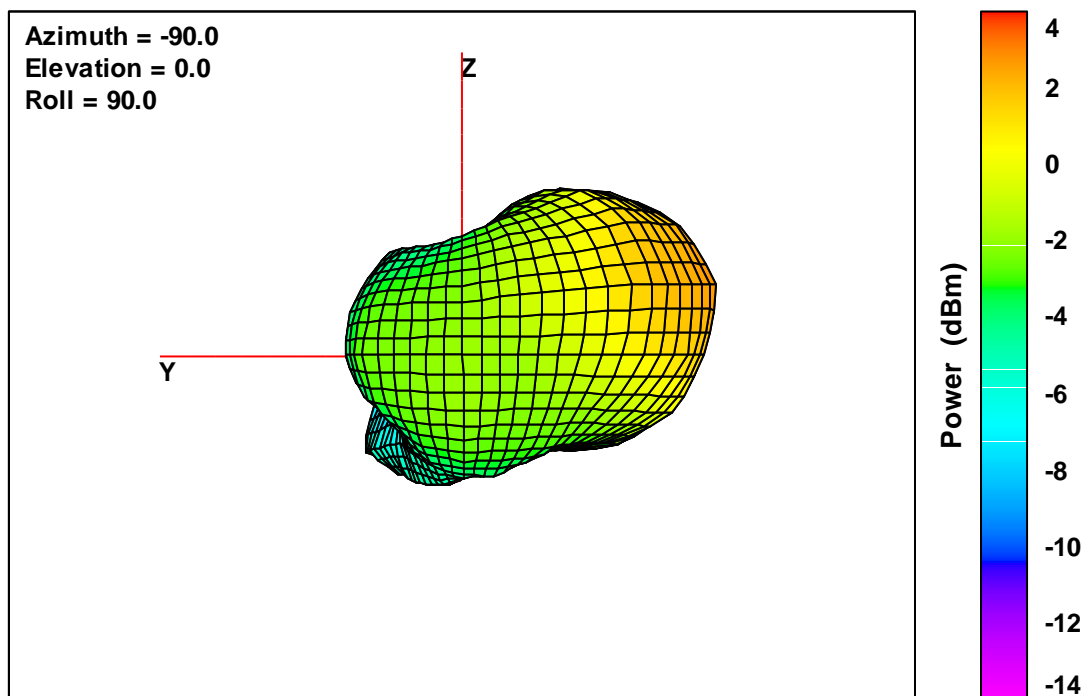
ANT2- ANT1 TERMINATED Free-Space Total EIRP, Front Face View, 2480 MHz

### Total EIRP, Right Side View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Right Side View, 2480 MHz

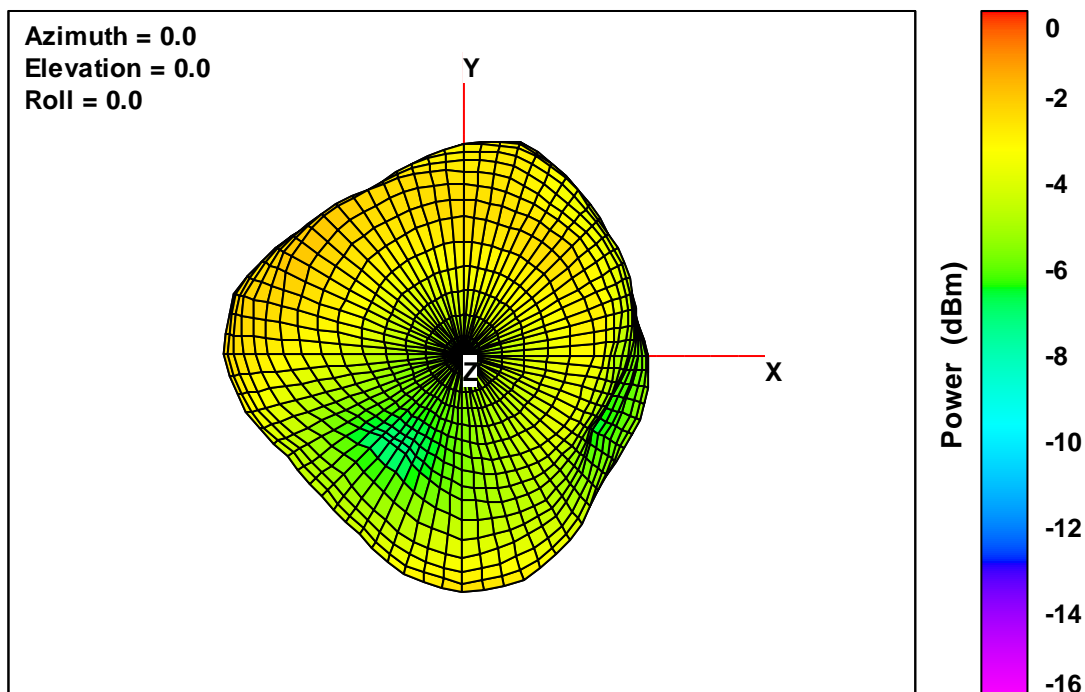
### Total EIRP, Back Face View



ANT2- ANT1 TERMINATED Free-Space Total EIRP, Back Face View, 2480 MHz

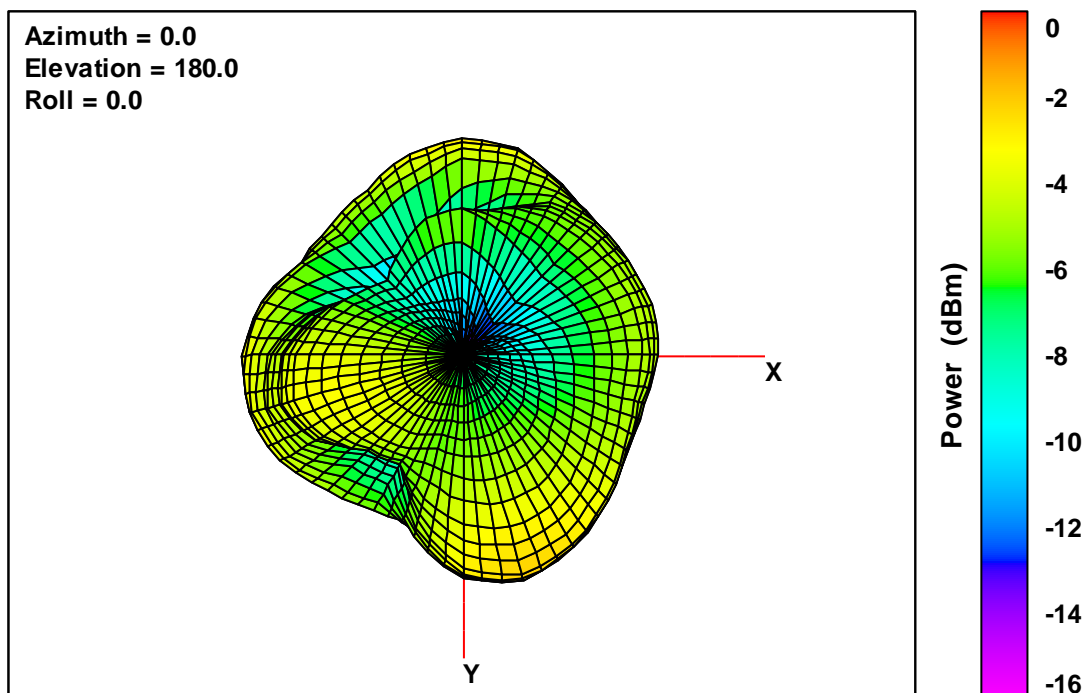
## 6.13 Antenna 3 3D PASSIVE- 2402 MHz

### Total EIRP, Top View



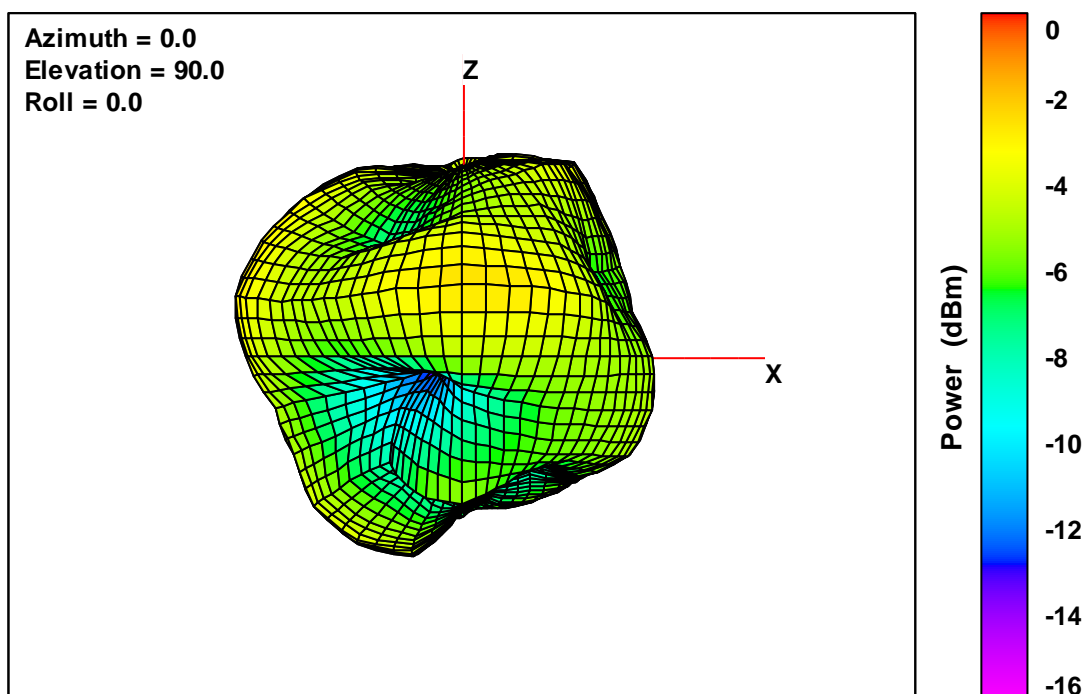
ANTENNA THREE Free-Space Total EIRP, Top View, 2402 MHz

### Total EIRP, Bottom View



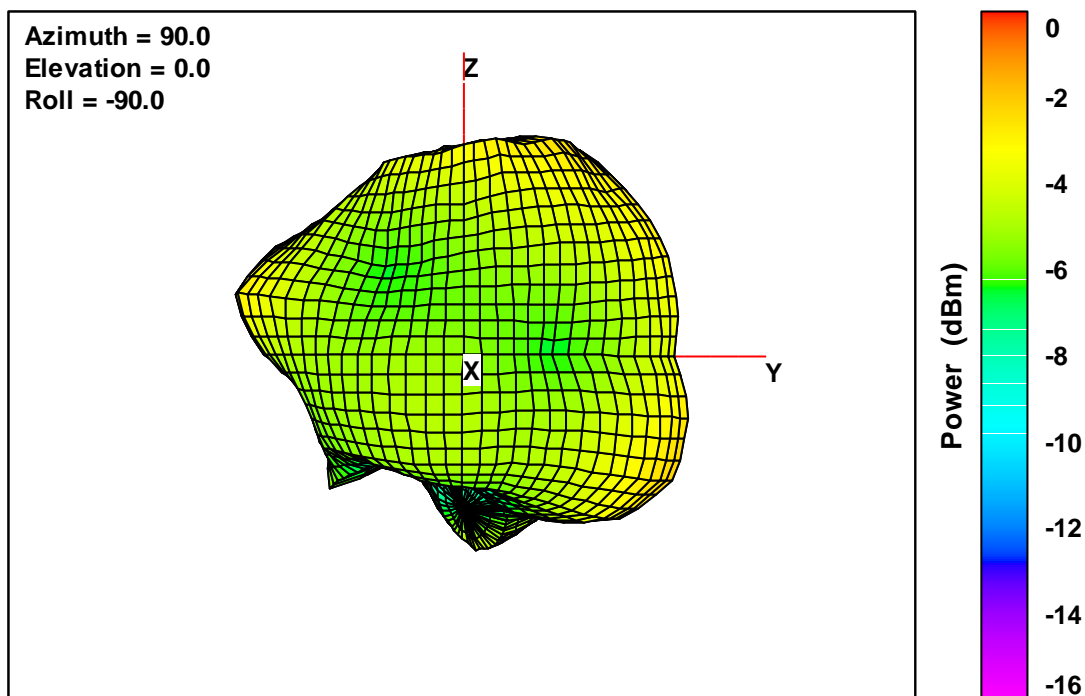
ANTENNA THREE Free-Space Total EIRP, Bottom View, 2402 MHz

### Total EIRP, Left Side View



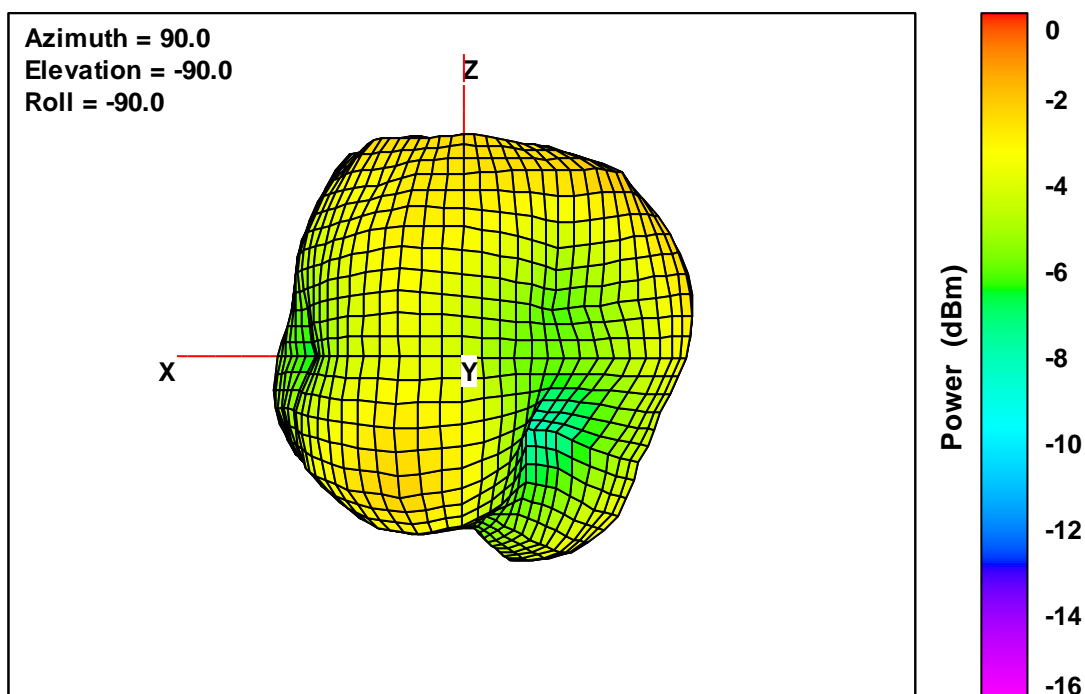
ANTENNA THREE Free-Space Total EIRP, Left Side View, 2402 MHz

### Total EIRP, Front Face View



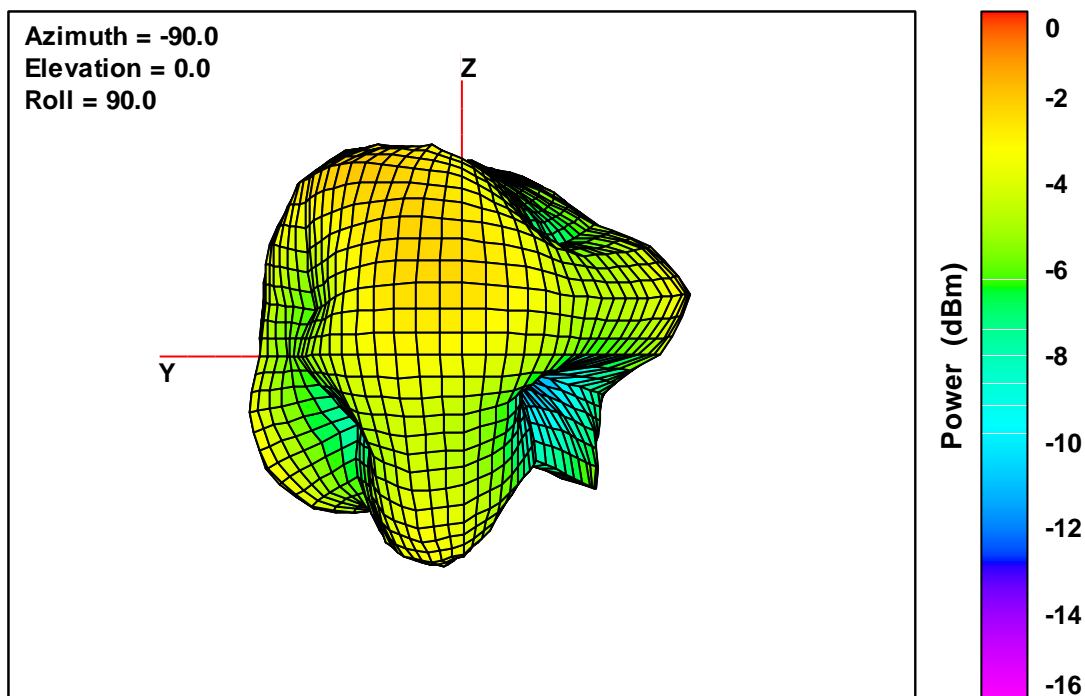
ANTENNA THREE Free-Space Total EIRP, Front Face View, 2402 MHz

### Total EIRP, Right Side View



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

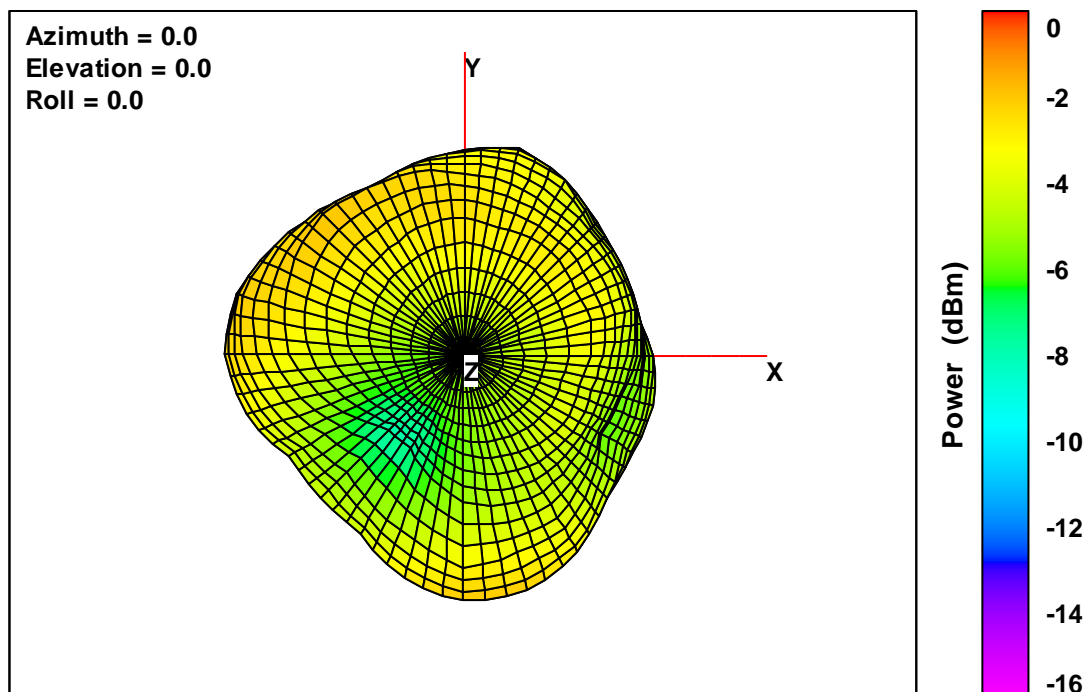
### Total EIRP, Back Face View



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

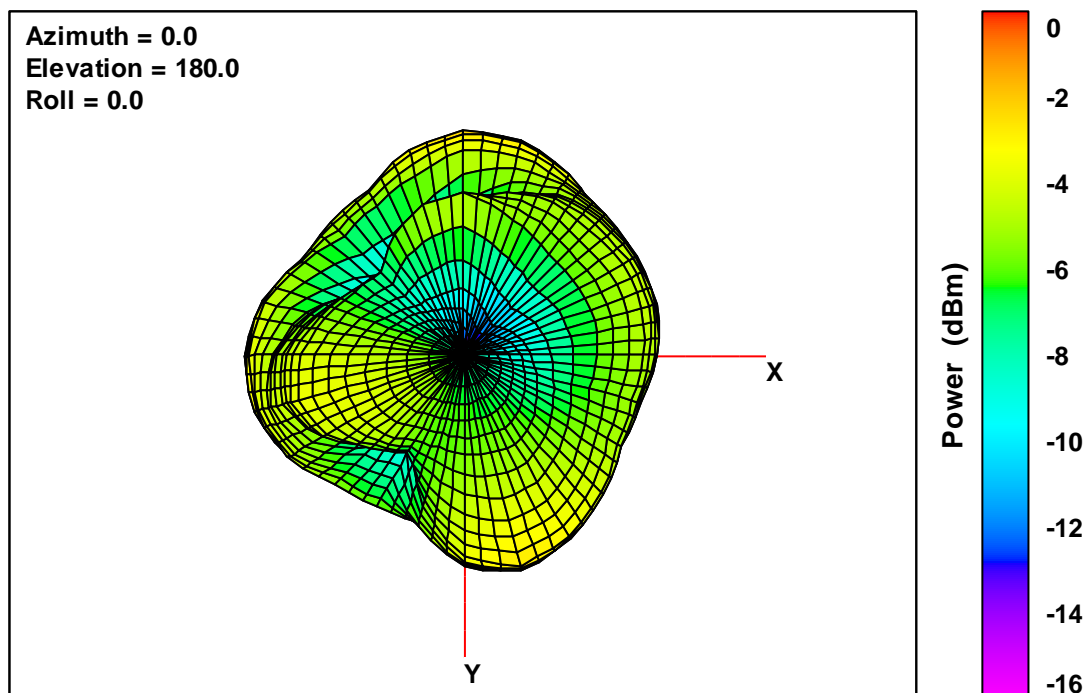
## 6.14 Antenna 3 3D PASSIVE- 2440 MHz

### Total EIRP, Top View



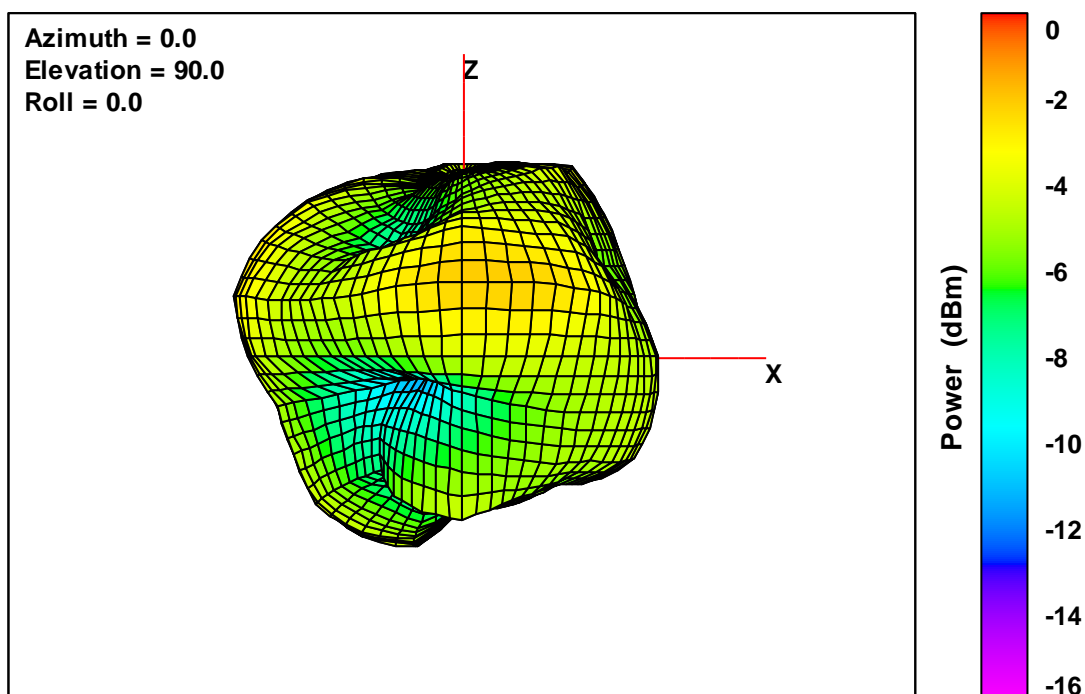
ANTENNA THREE Free-Space Total EIRP, Top View, 2440 MHz

### Total EIRP, Bottom View



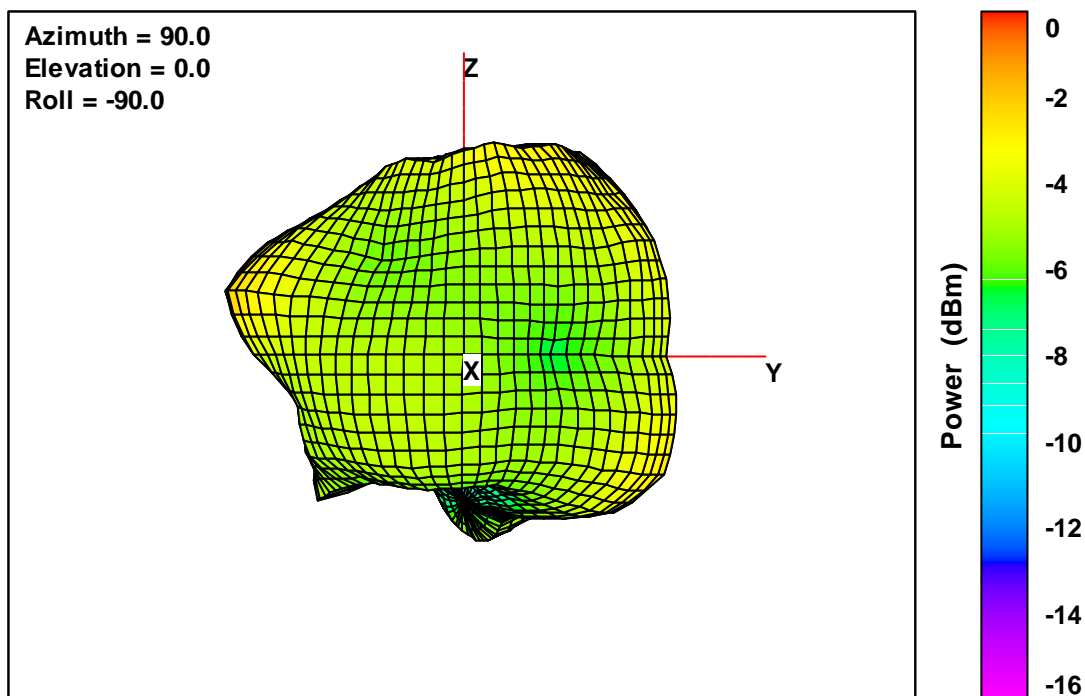
ANTENNA THREE Free-Space Total EIRP, Bottom View, 2440 MHz

### Total EIRP, Left Side View



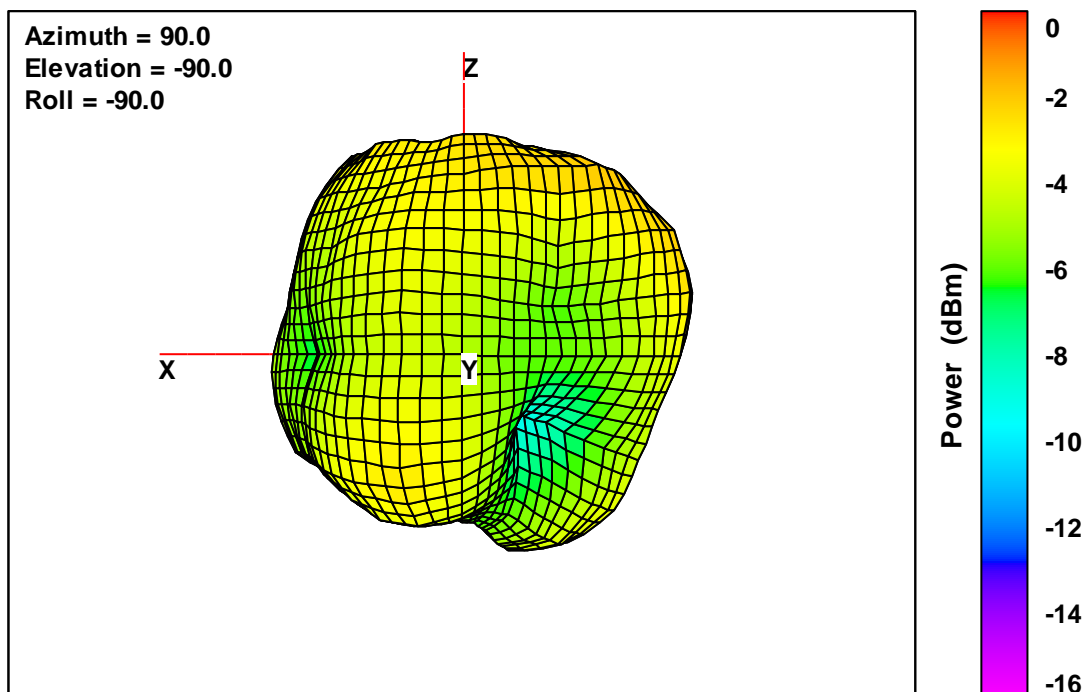
ANTENNA THREE Free-Space Total EIRP, Left Side View, 2440 MHz

### Total EIRP, Front Face View



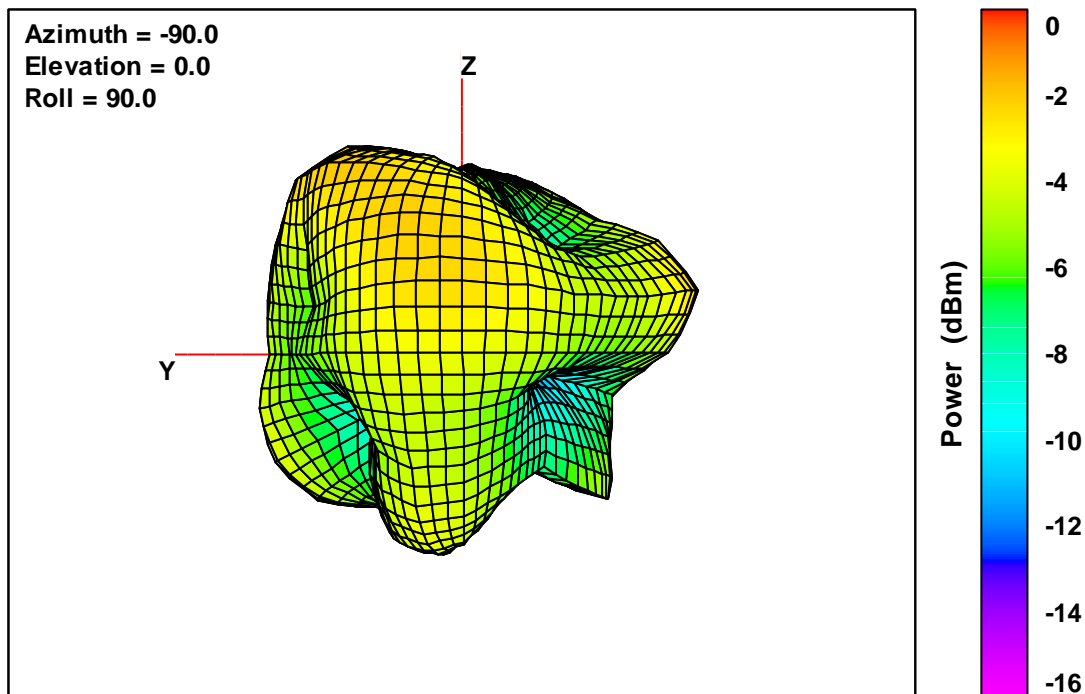
ANTENNA THREE Free-Space Total EIRP, Front Face View, 2440 MHz

### Total EIRP, Right Side View



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

### Total EIRP, Back Face View

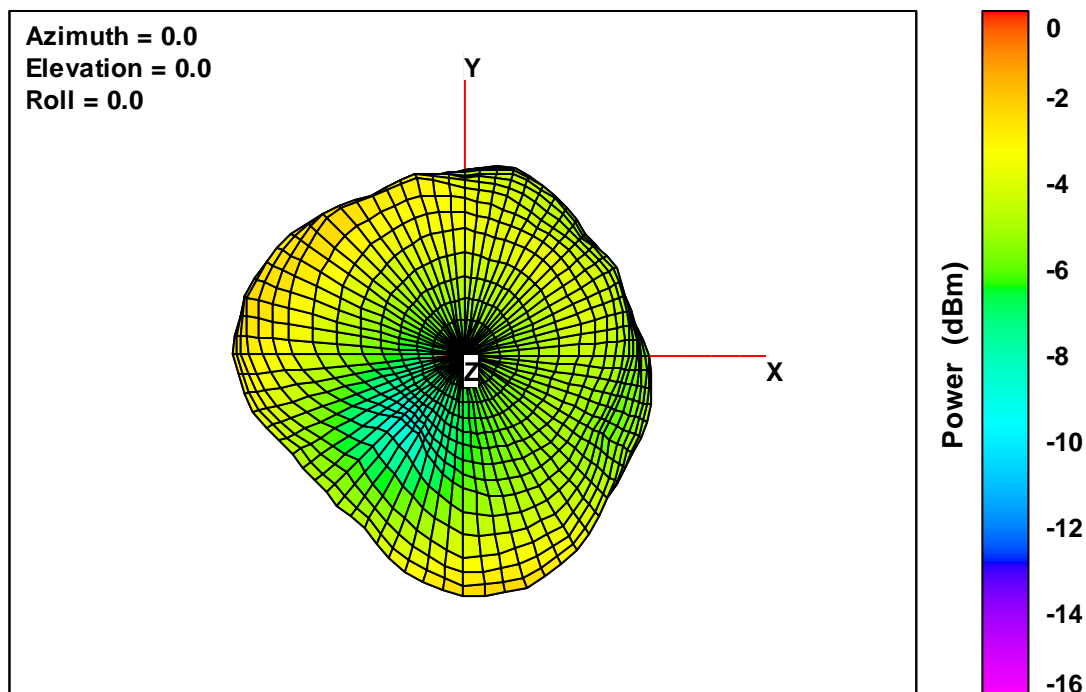


ANTENNA THREE Free-Space Total EIRP, Back Face View, 2440 MHz



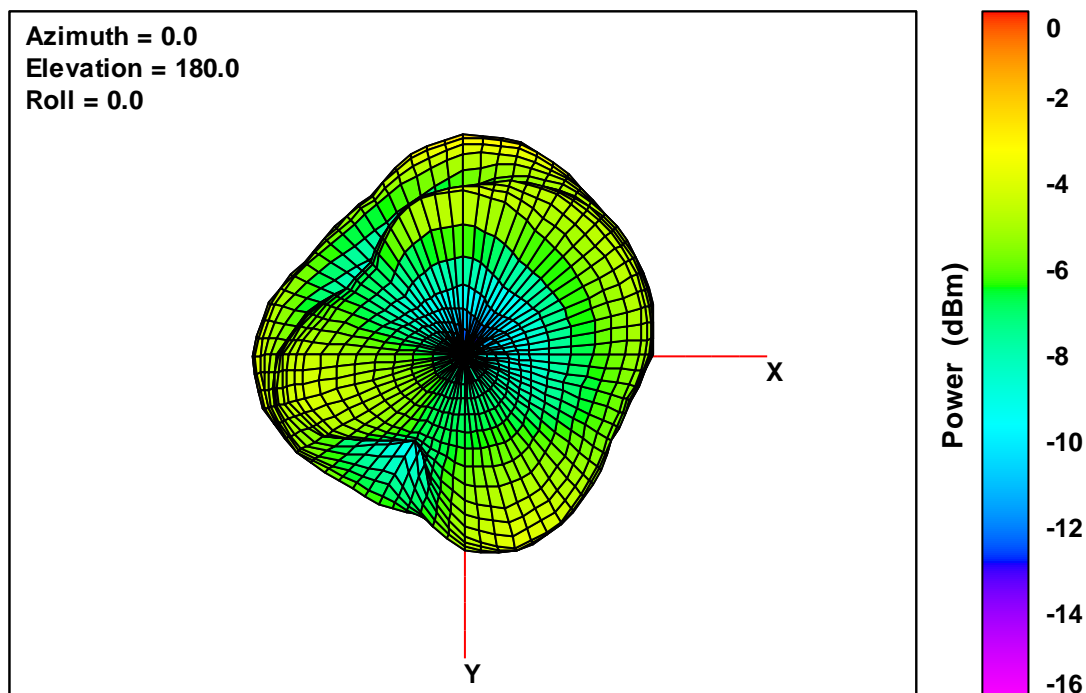
## 6.15 Antenna 3 3D PASSIVE- 2480 MHz

### Total EIRP, Top View



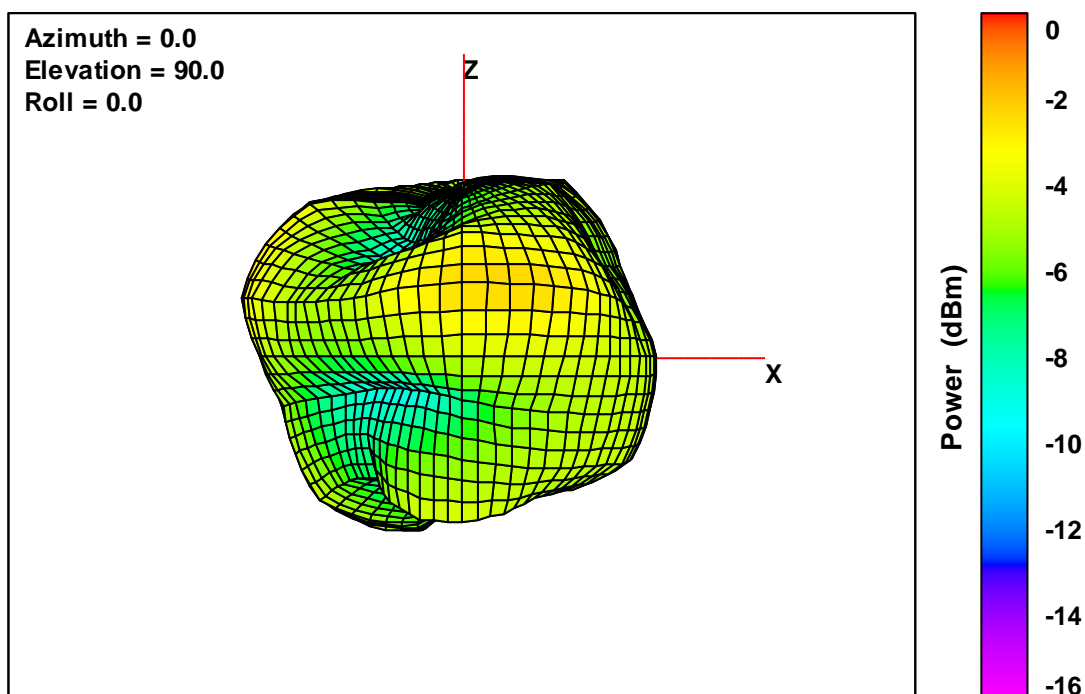
ANTENNA THREE Free-Space Total EIRP, Top View, 2480 MHz

### Total EIRP, Bottom View



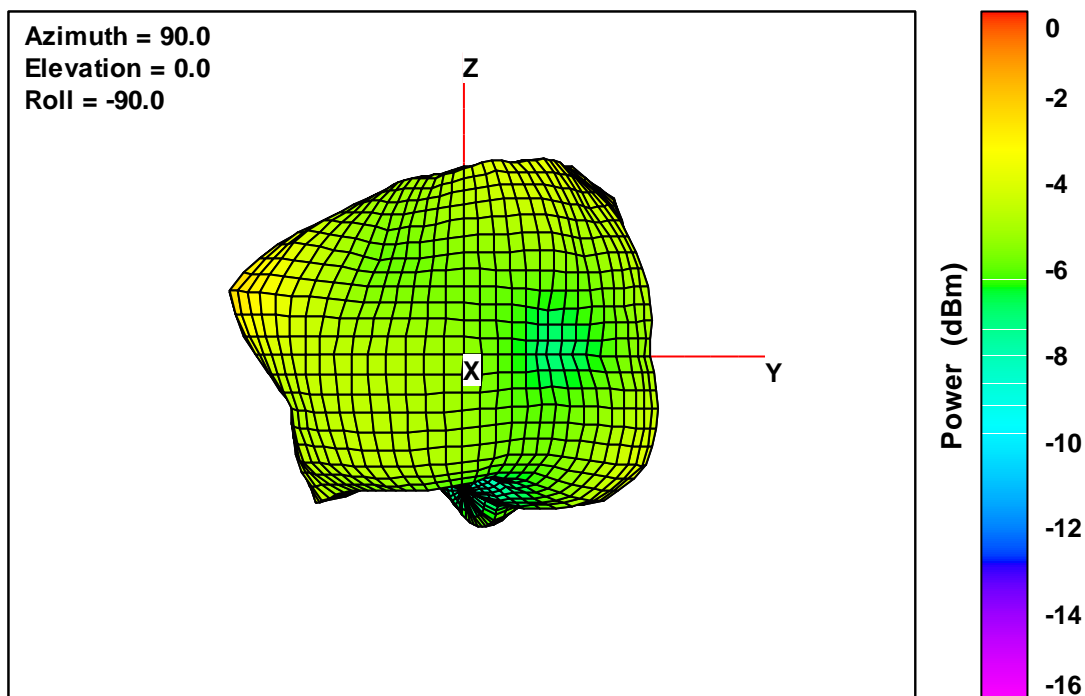
ANTENNA THREE Free-Space Total EIRP, Bottom View, 2480 MHz

### Total EIRP, Left Side View



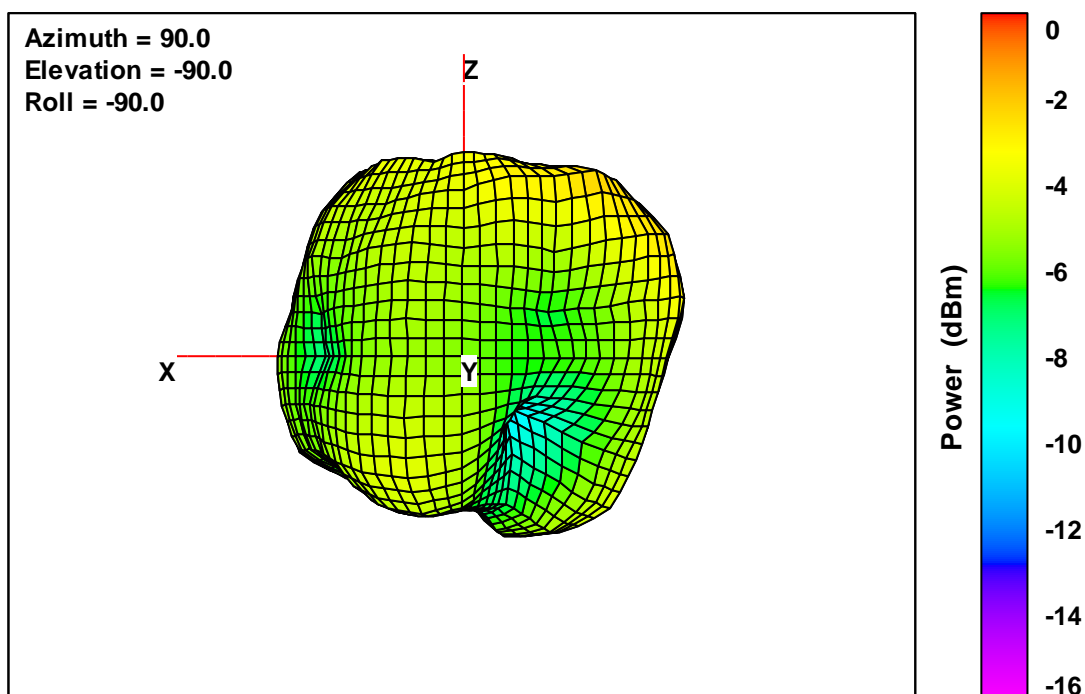
ANTENNA THREE Free-Space Total EIRP, Left Side View, 2480 MHz

### Total EIRP, Front Face View



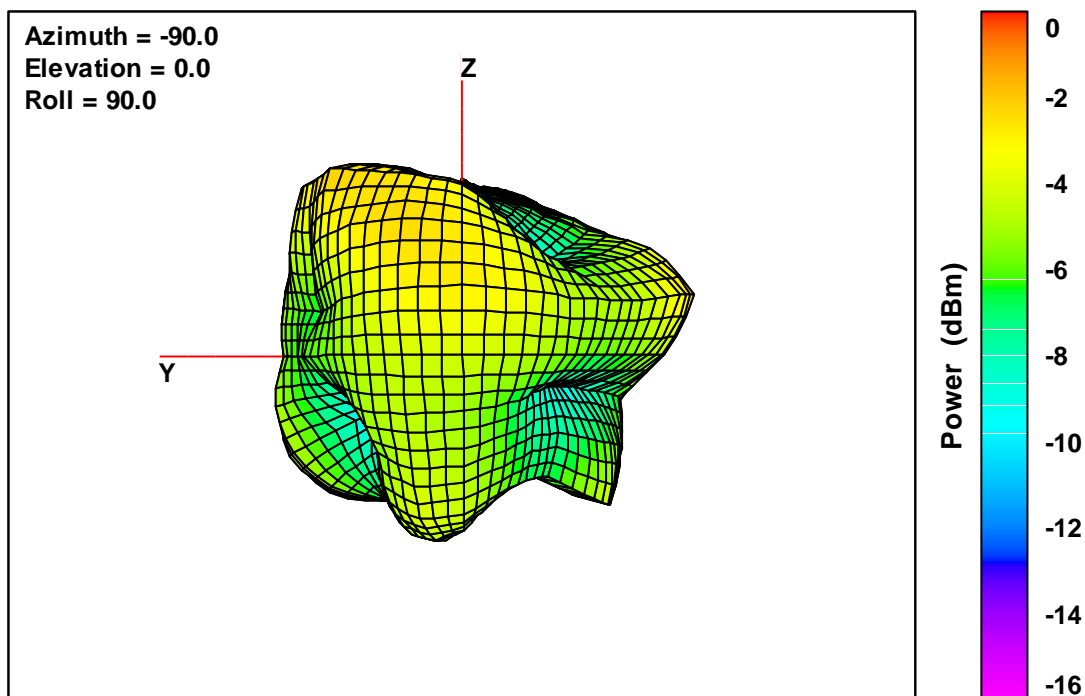
ANTENNA THREE Free-Space Total EIRP, Front Face View, 2480 MHz

### Total EIRP, Right Side View



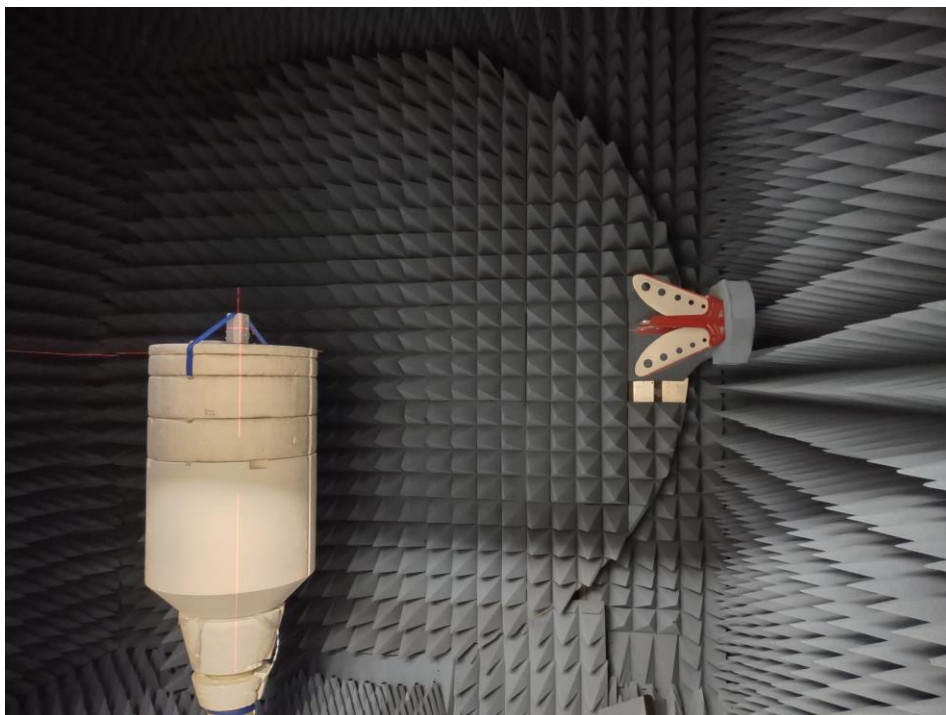
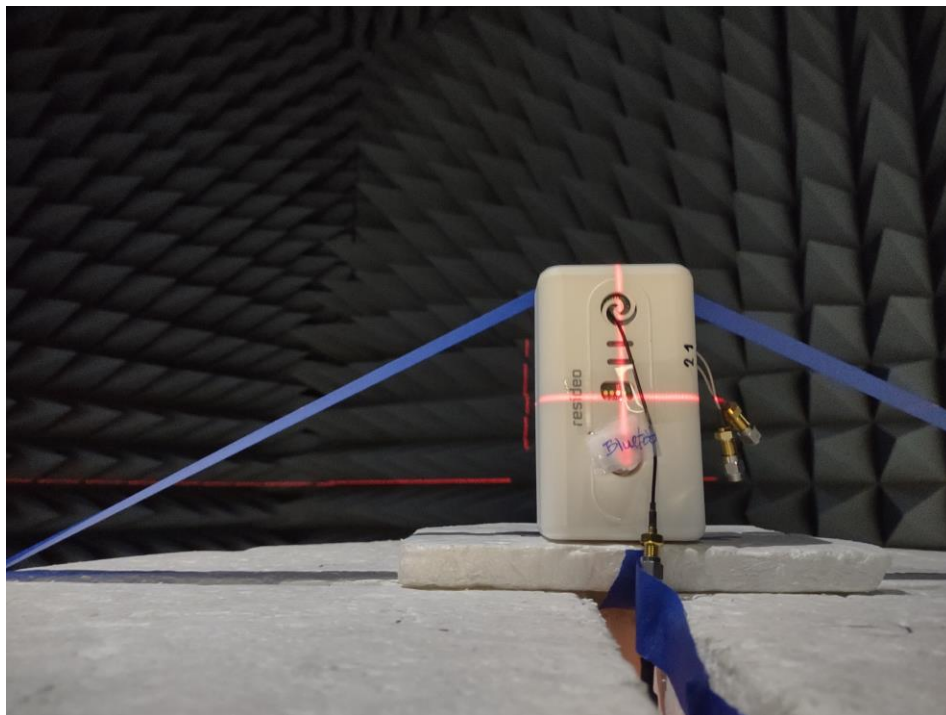
ANTENNA THREE Free-Space Total EIRP, Right Side View, 2480 MHz

### Total EIRP, Back Face View



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

## 7 TEST SETUP



**END OF REPORT**