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# ANTENNA GAIN AND PATTERN MEASUREMENT REPORT

*For Gain value reference*

**FOR**

**Comet 2.0 5GHz Patch Antenna**

**PART/MODEL NUMBER: 610-00335**

**DATE ISSUED: AUGUST 29, 2023**

**REVISION DATE: AUGUST 31, 2023**

**REPORT NUMBER: 14897507-O1V2**

Prepared for
**Starry Inc.**
**38 Chauncy St, Suite 200**
**Boston, Massachusetts, 02111**
**U.S.A.**

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

## Revision History

| Rev. | Issue Date | Revisions | Revised By |
|---|---|---|---|
| V1 | 08/29/2023 | Initial Issue | |
| V2 | 08/31/2023 | Added a statement about input power in section 2. Fixed the format for section 3. | E. Budhbhatti |


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# 1 ATTESTATION OF TEST RESULTS

| | |
|---|---|
| Company Name and Address | Starry Inc. |
| | 38 Chauncy St, Suite 200 |
| | Boston, Massachusetts 02111 |
| | U.S.A. |
| EUT Description | Comet 2.0 5GHz Patch Antenna |
| Part/Model | 610-00335 |
| Date Tested | 07/28/2023 |

| APPLICABLE STANDARDS | |
|---|---|
| **STANDARD** | **TEST RESULTS** |
| Non-standard Test Method* | Information Only |
| *Reference Section 2 Test Methodology | |

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 METHODOLOGY

The 3D Passive Antenna Pattern tests documented in this report were performed using a dual polarized quad-ridged horn antenna mounted on the theta scanning arm with a resolution (increment) of 15° for both elevation and azimuth utilizing ETS-Lindgren EMQuest Data Acquisition and Analysis Software. The network analyzer output power was set to 0dBm.

The 2D Passive Antenna Pattern tests documented in this report were performed using a dual polarized quad-ridged horn antenna mounted on the theta scanning arm with a fixed elevation and a resolution (increment) of 2° for azimuth utilizing ETS-Lindgren EMQuest Data Acquisition and Analysis Software. The network analyzer output power was set to 0dBm.

# 3 TEST FACILITIES

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) | ☒ |
| OTA Lab B (MAPS Chamber) | ☐ |

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

# 4 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 | 27 January 2023 | 31 January 2024 |

| TEST SYSTEM & SOFTWARE – OTA A | | | | |
|---|---|---|---|---|
| **Description** | **Manufacturer** | **Model** | **SW Version** | **Asset** |
| OTA Test Chamber | ETS-Lindgren | AMS8800 | N/A | 1100181 |
| OTA Test Software | ETS-Lindgren | EMQuest Data Acquisition and Analysis Software | 1.15 build 27347 SN:1229 | 231770 |

# 5 DEVICE UNDER TEST INFORMATION

| **Antenna** | |
|---|---|
| Manufacturer | Starry Inc. |
| Part/Model Number | 610-00335 |
| Frequency range (MHz) | 5745, 5785, 5825 |
| Device/Antenna type | Patch |

## 5.1 END PRODUCT DESCRIPTION

The Comet 2.0 5GHz Patch Antenna (Part Number 610-00335) is utilized in several Starry station (STA) millimeter wave radio variants to form a secondary 5GHz RF communication link.

# 6 RESULT SUMMARY

## 6.1 Passive Antenna Pattern

| Measurement | Frequency (MHz) | | |
|---|---|---|---|
| | 5745 | 5785 | 5825 |
| 3D Peak Gain (dBi) | 4.06 | 3.53 | 3.29 |
| 2D Peak Gain (dBi) | 4.29 | 3.73 | 4.26 |


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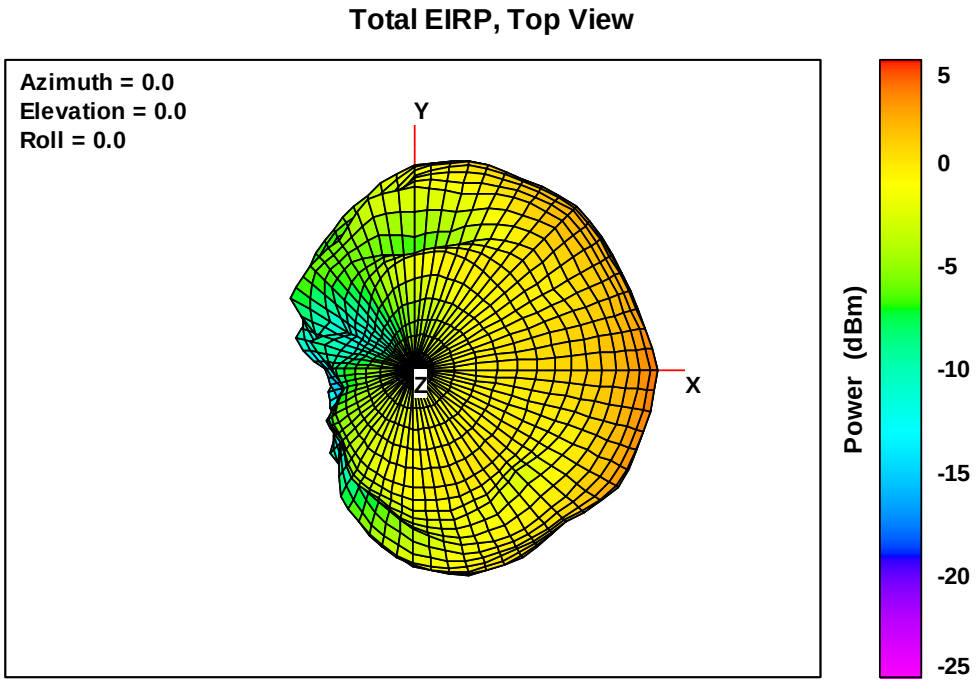
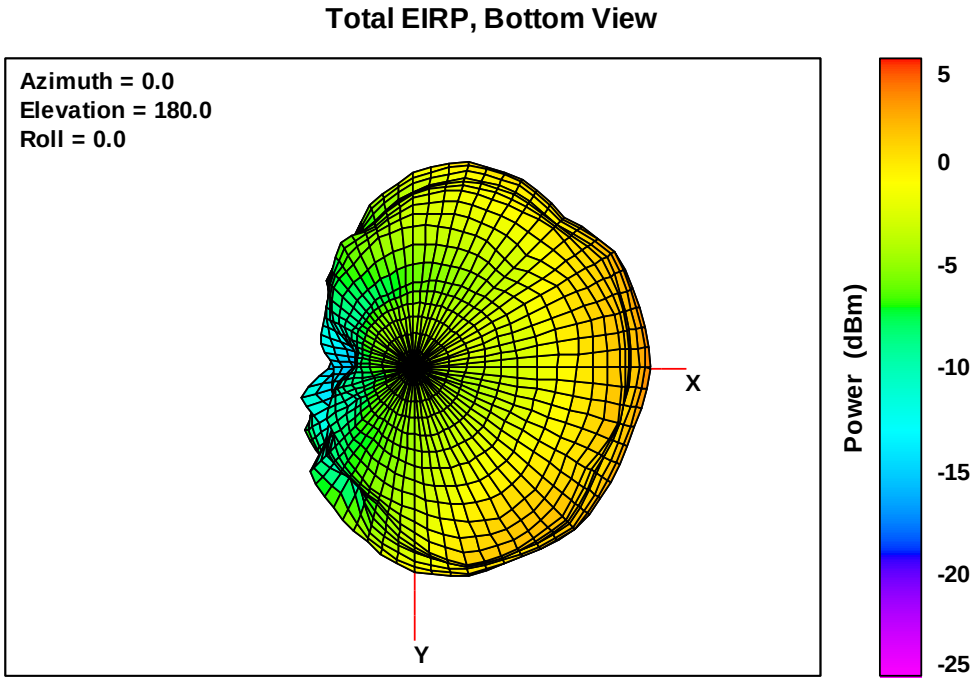
# 7 PLOTS

## 7.1 3D PASSIVE- 5745 MHz

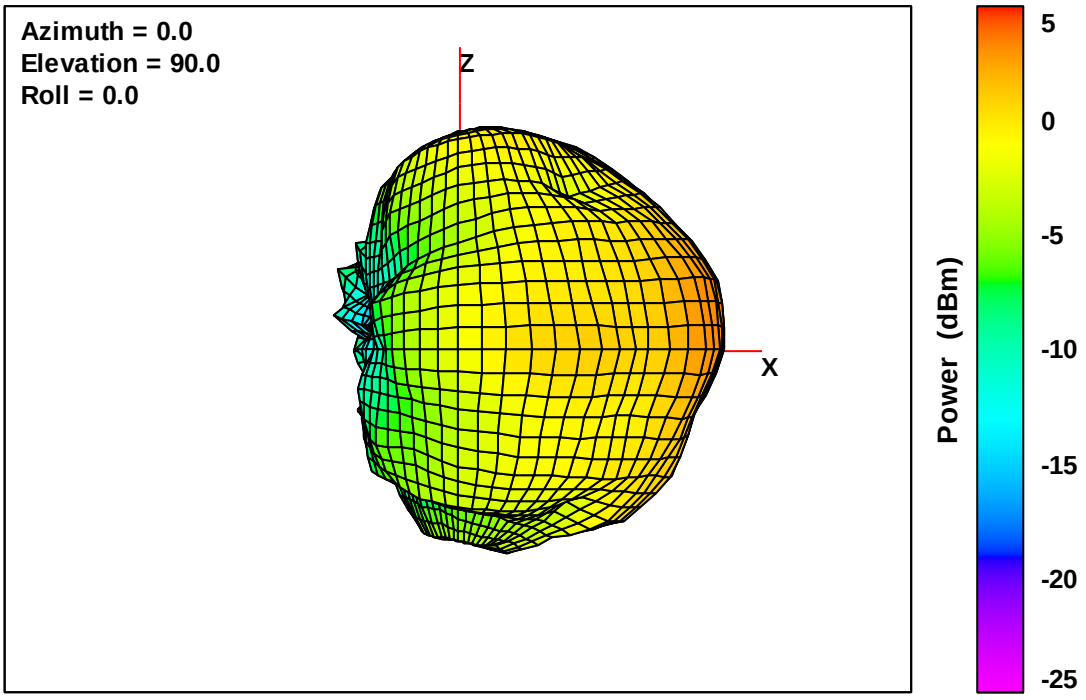



**Free-Space Total EIRP, Top View, 5745 MHz**



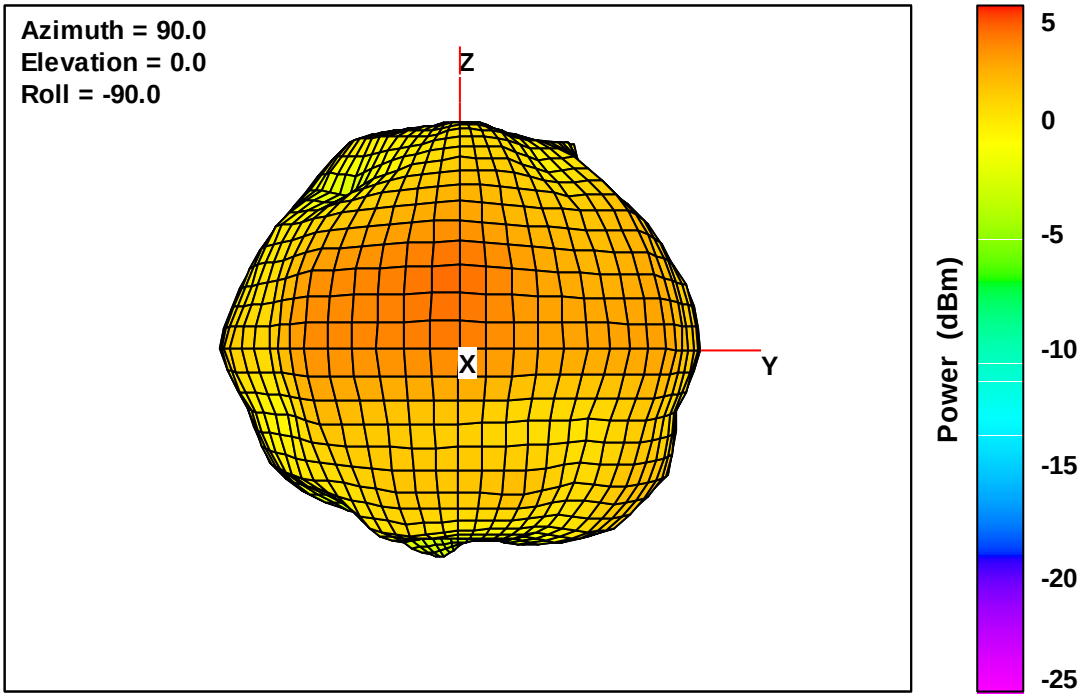

**Free-Space Total EIRP, Bottom View, 5745 MHz**

## Total EIRP, Left Side View



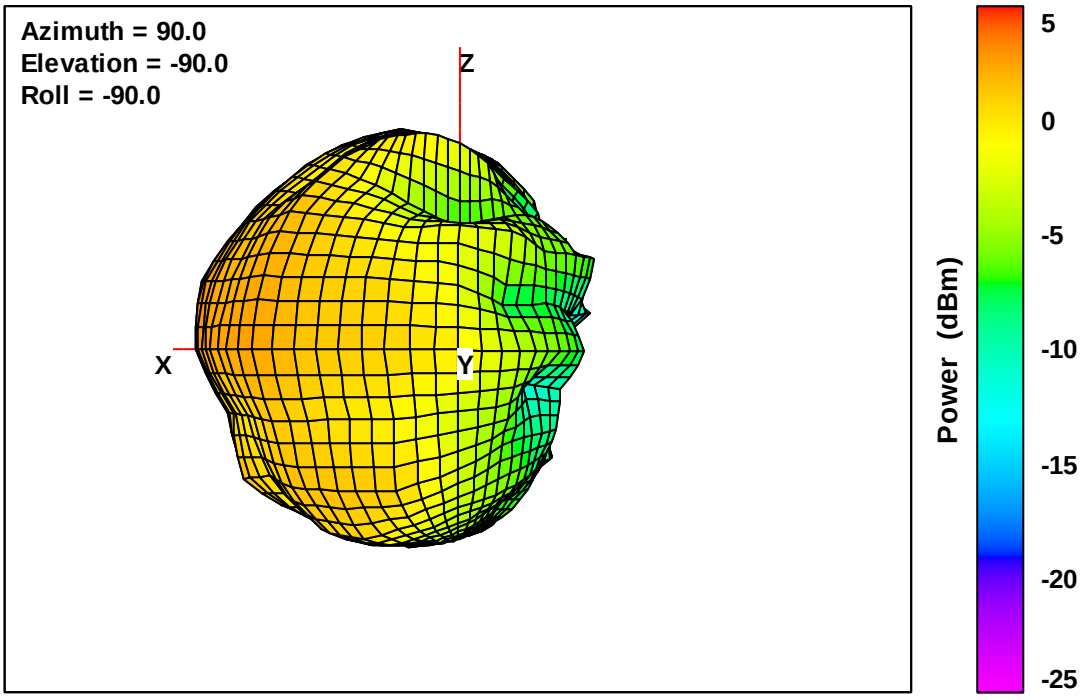

**Free-Space Total EIRP, Left Side View, 5745 MHz**

## Total EIRP, Front Face View



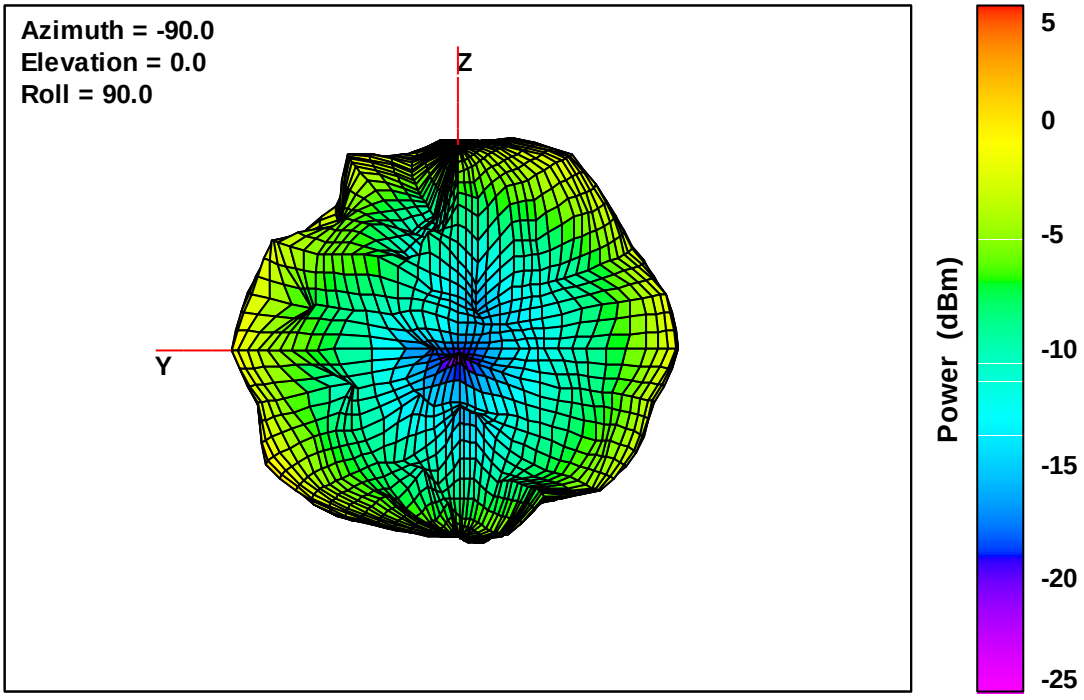

**Free-Space Total EIRP, Front Face View, 5745 MHz**

## Total EIRP, Right Side View



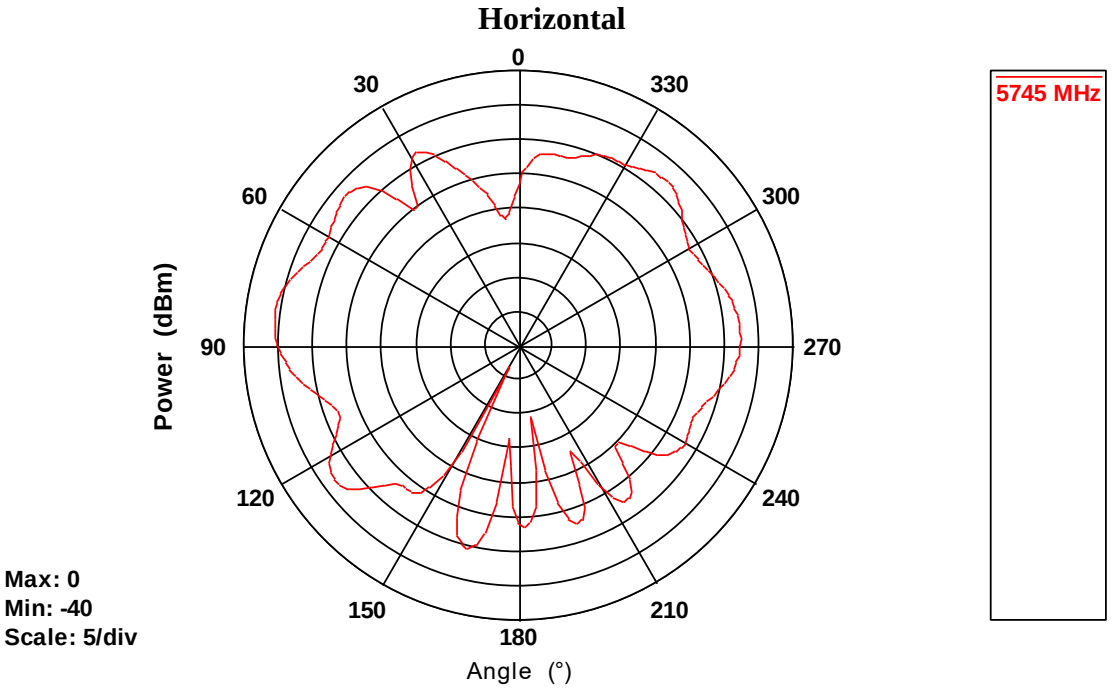

**Free-Space Total EIRP, Right Side View, 5745 MHz**

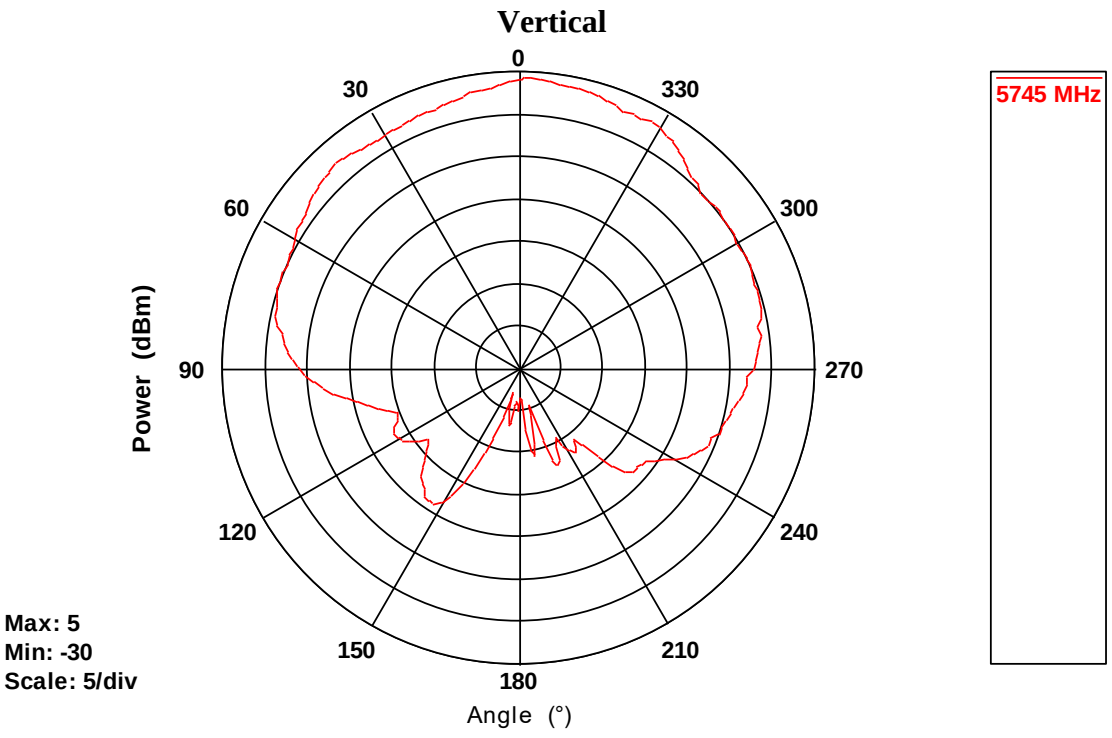
## Total EIRP, Back Face View

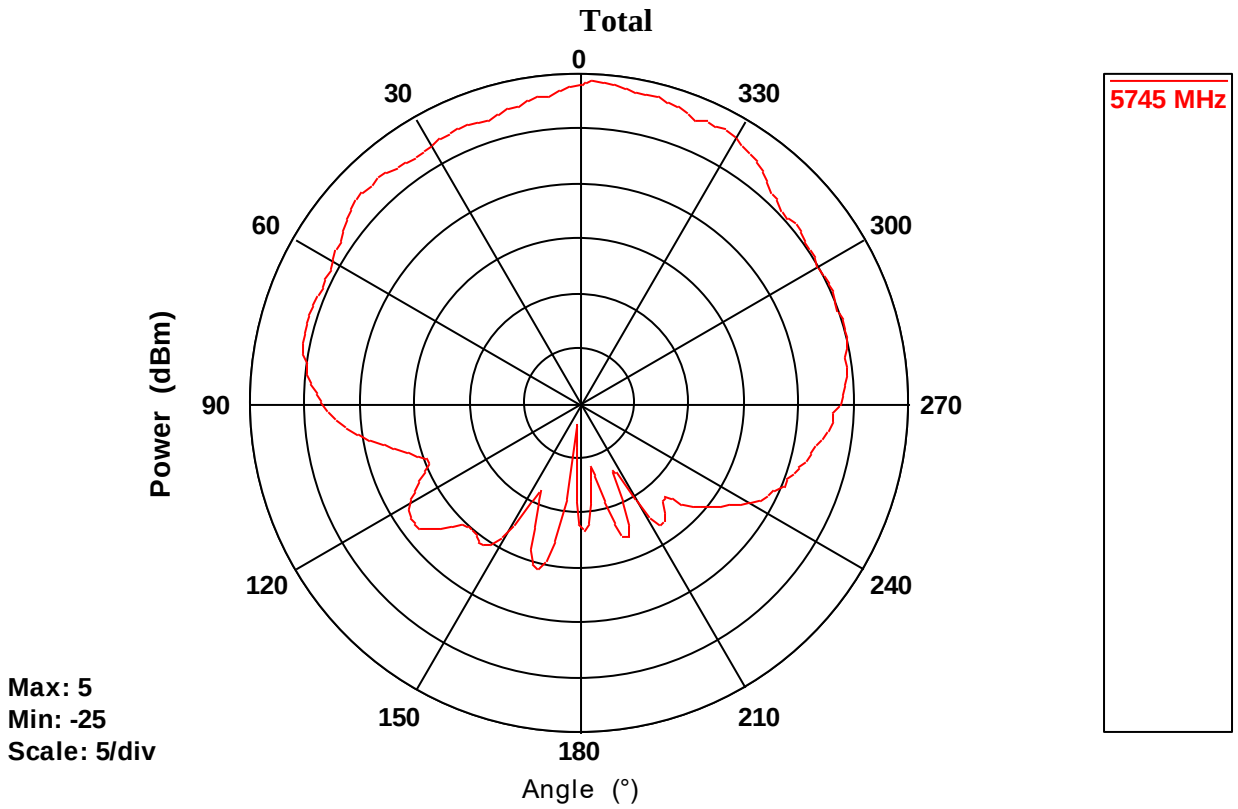



**Free-Space Total EIRP, Back Face View, 5745 MHz**

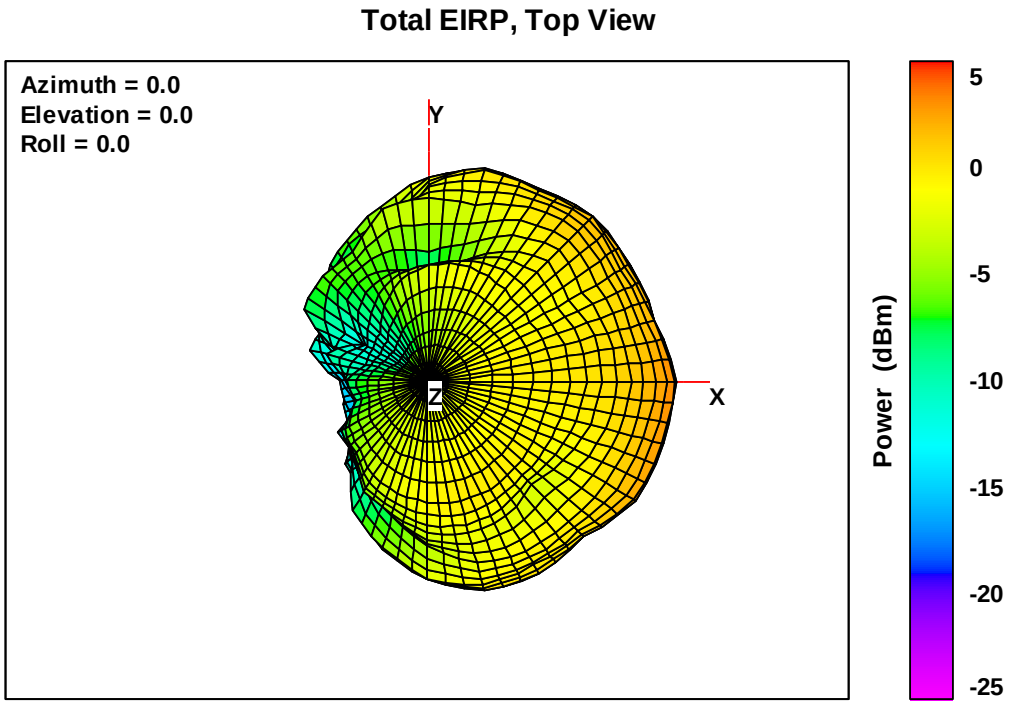
## 7.2 2D PASSIVE- 5745 MHz



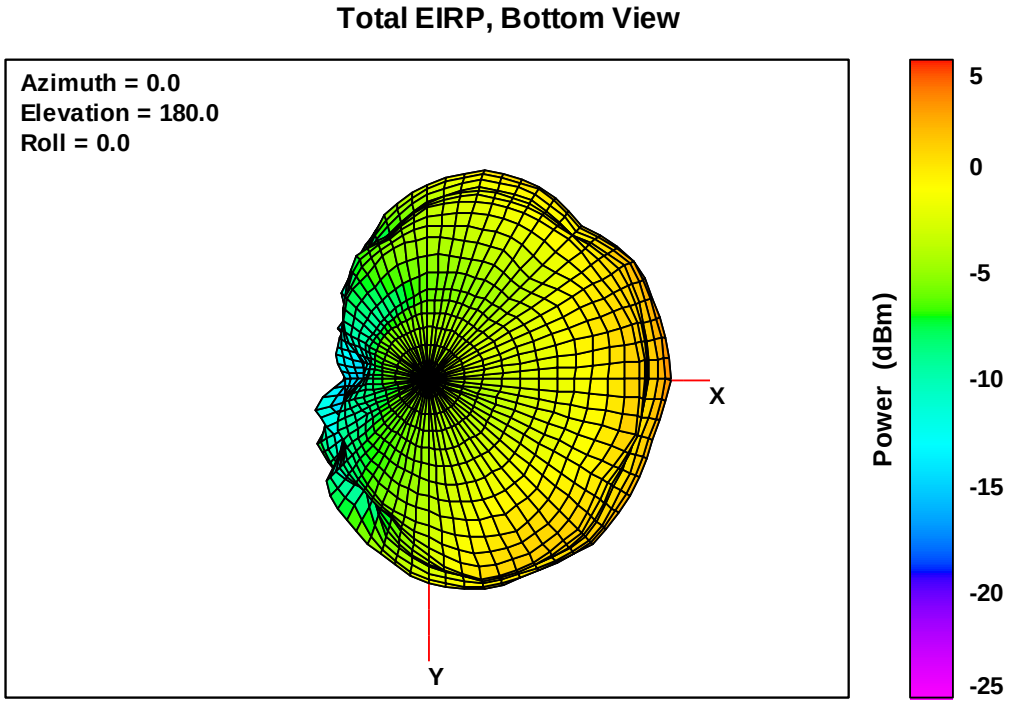





## 7.3 3D PASSIVE- 5785 MHz

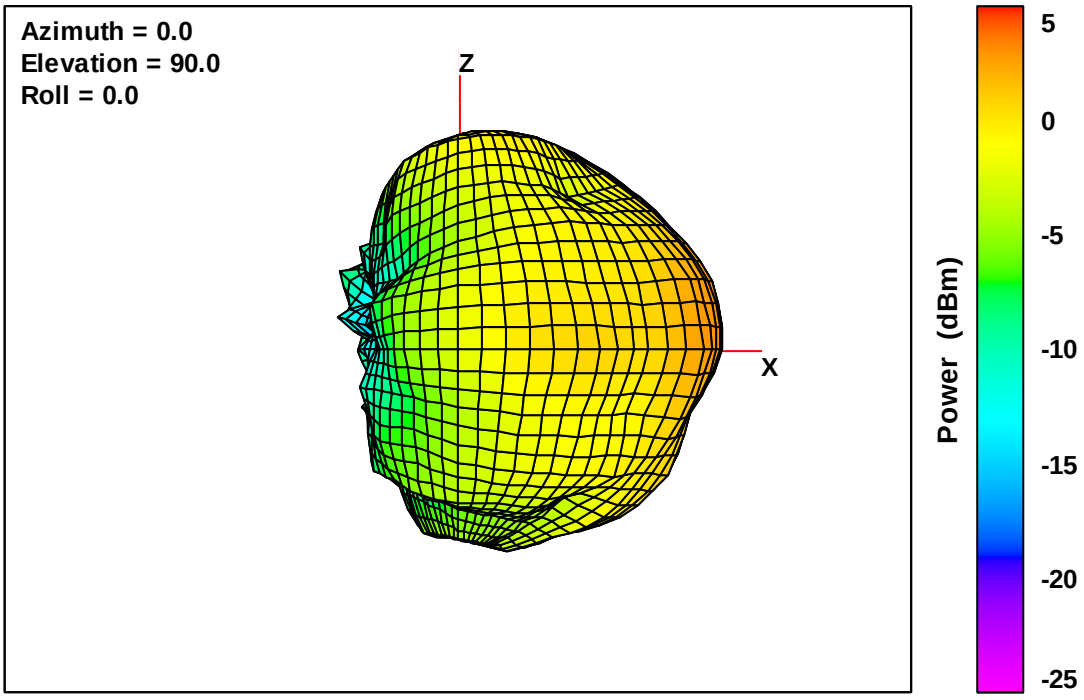



**Free-Space Total EIRP, Top View, 5785 MHz**



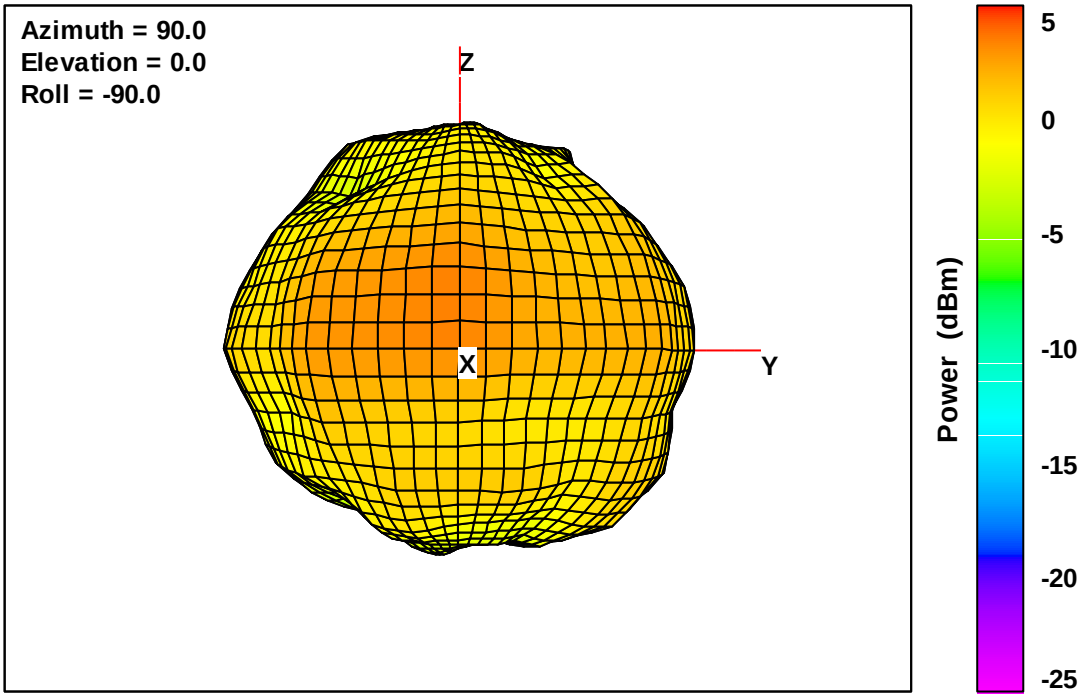

**Free-Space Total EIRP, Bottom View, 5785 MHz**

## Total EIRP, Left Side View



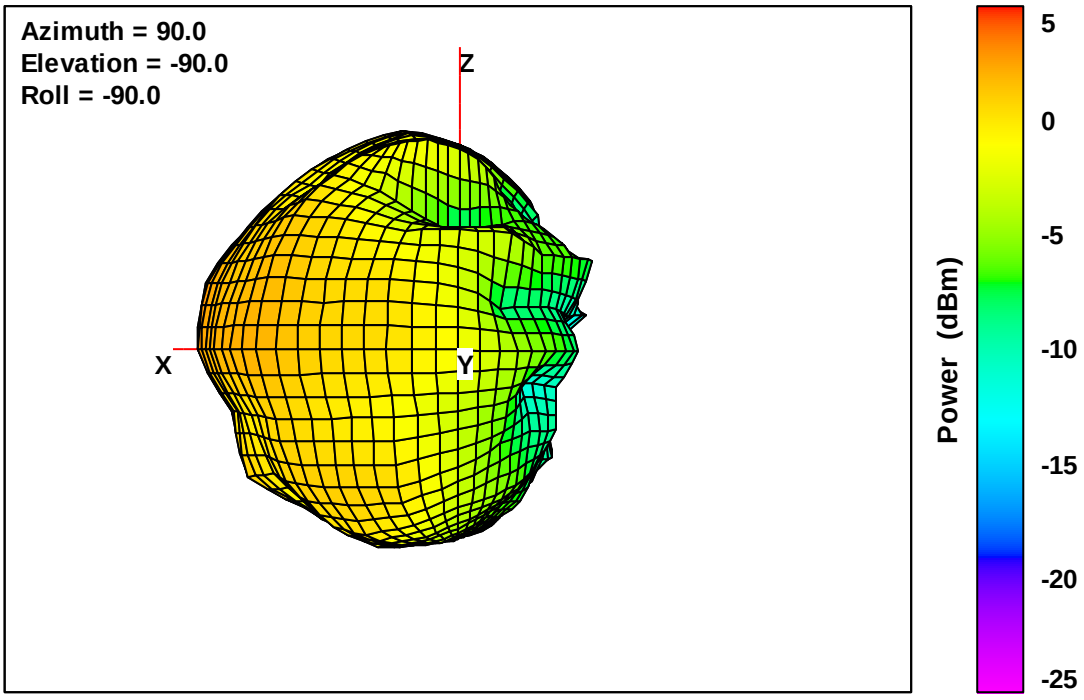

**Free-Space Total EIRP, Left Side View, 5785 MHz**

## Total EIRP, Front Face View



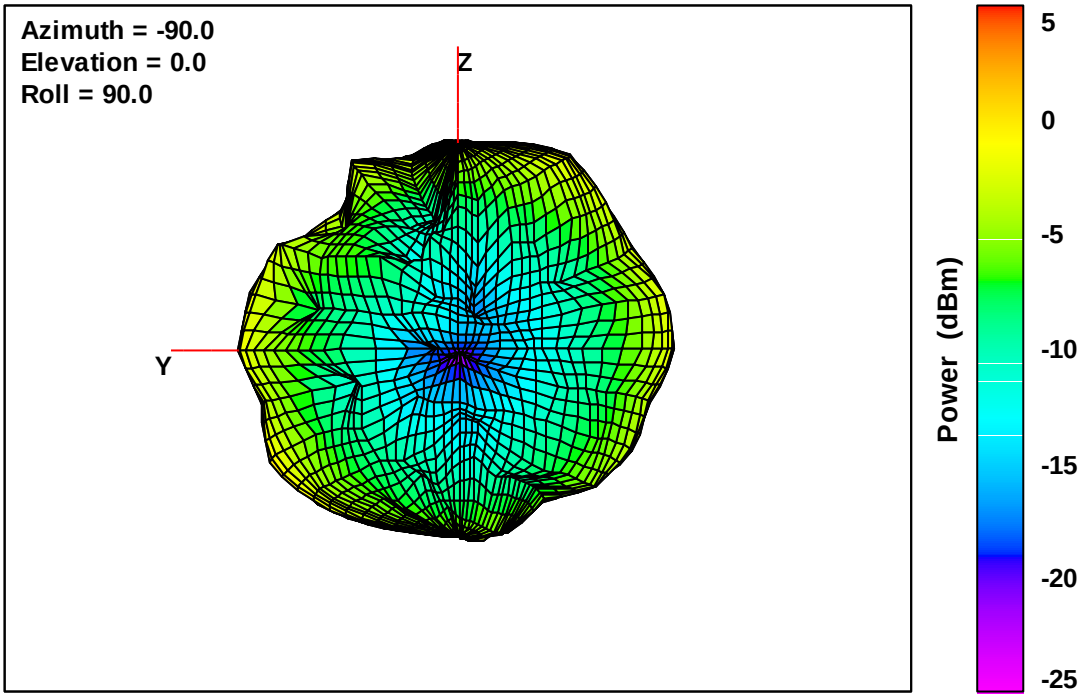

**Free-Space Total EIRP, Front Face View, 5785 MHz**

## Total EIRP, Right Side View



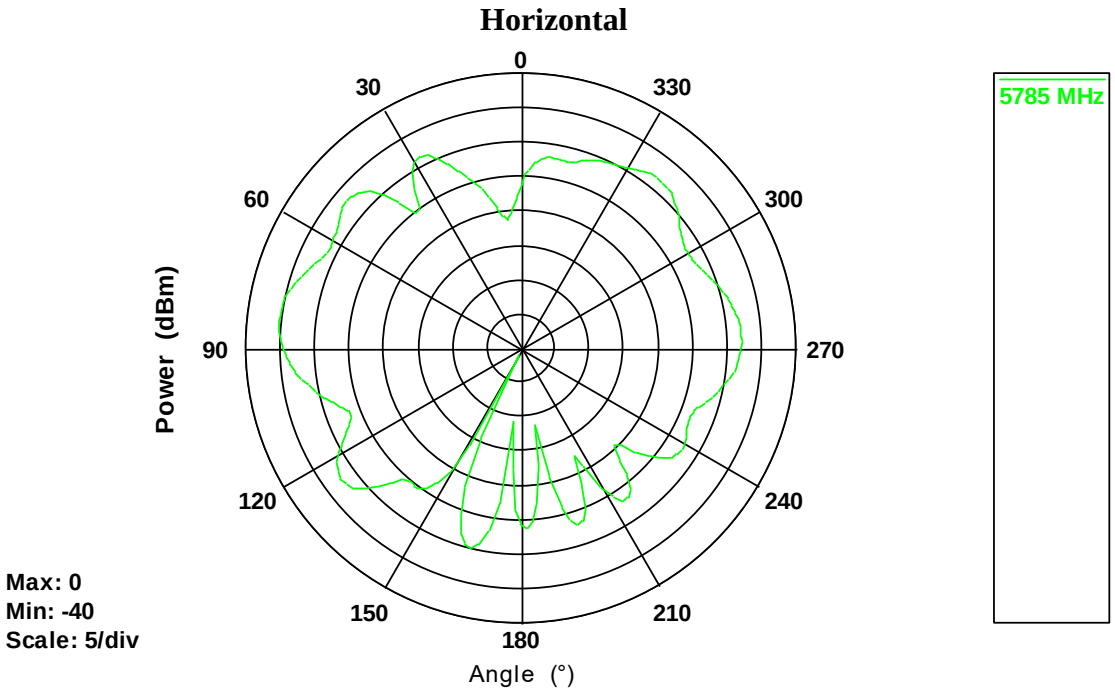

**Free-Space Total EIRP, Right Side View, 5785 MHz**

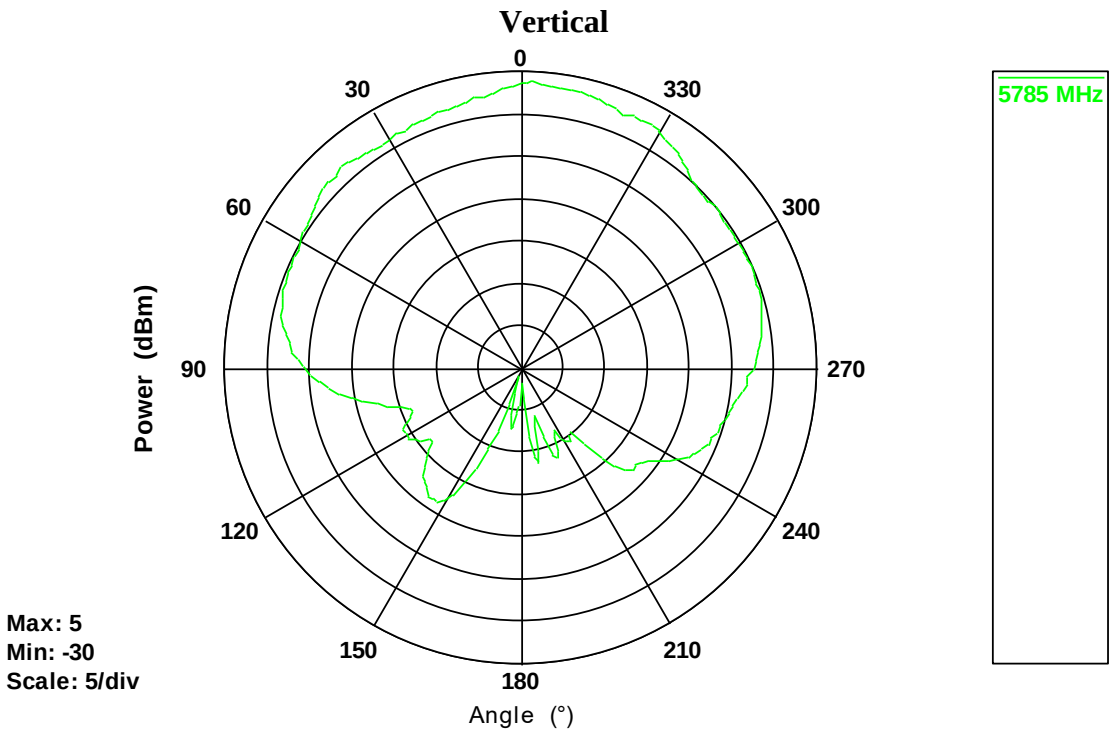
## Total EIRP, Back Face View



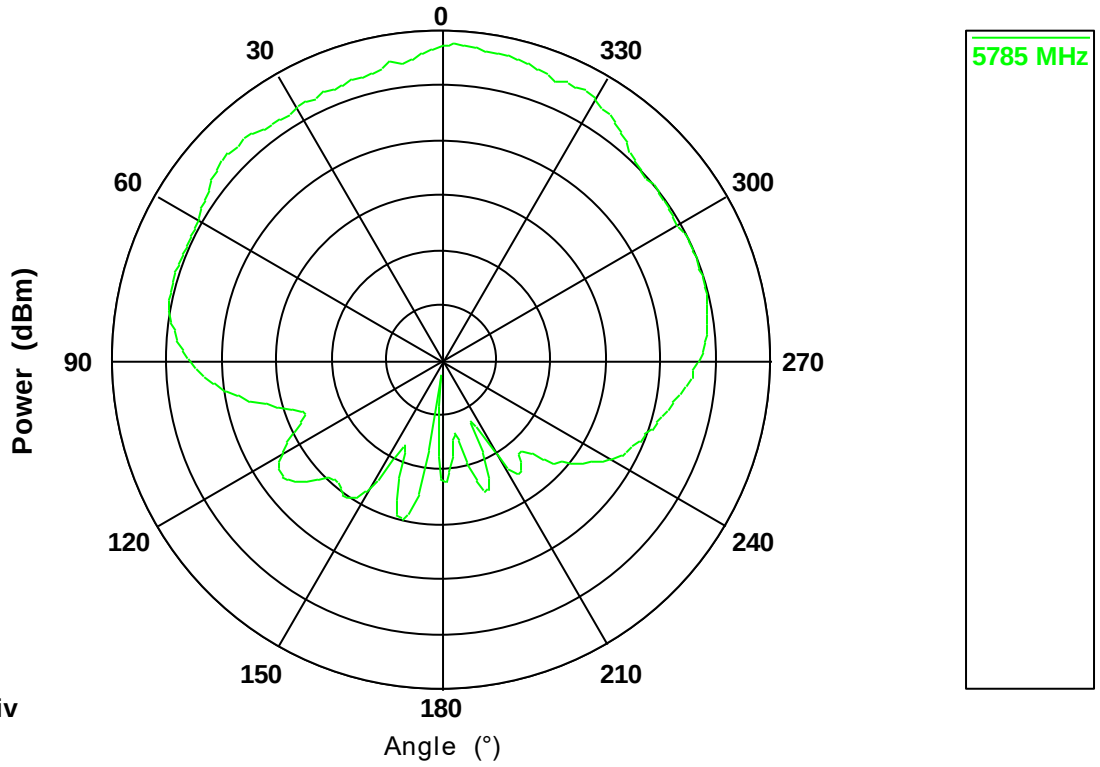

**Free-Space Total EIRP, Back Face View, 5785 MHz**

## 7.4 2D PASSIVE- 5785 MHz

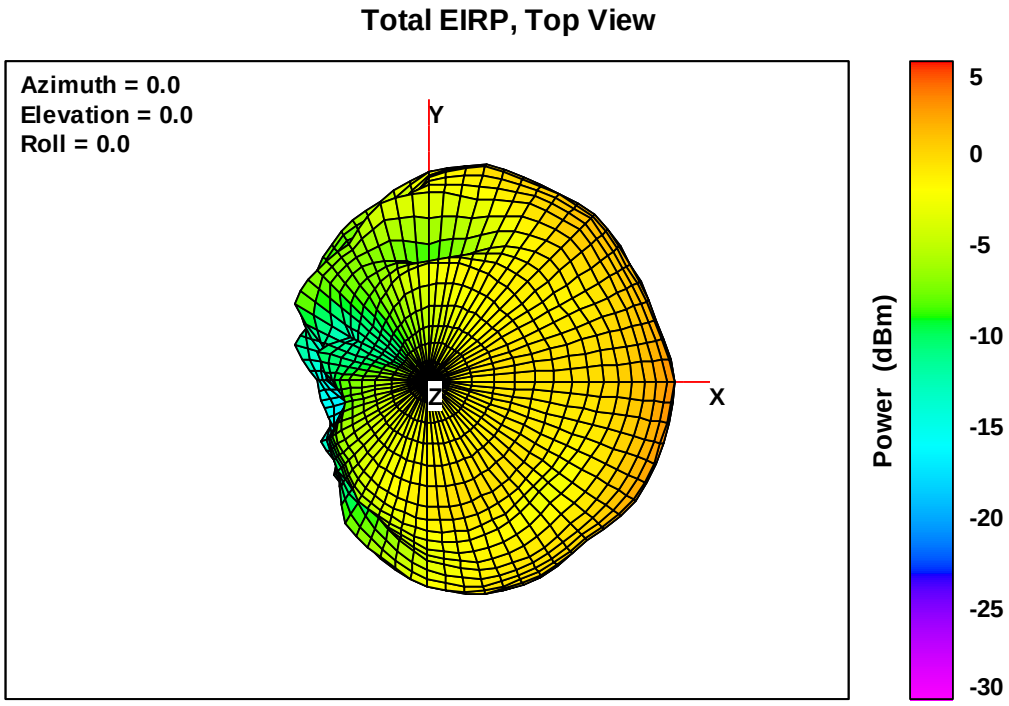


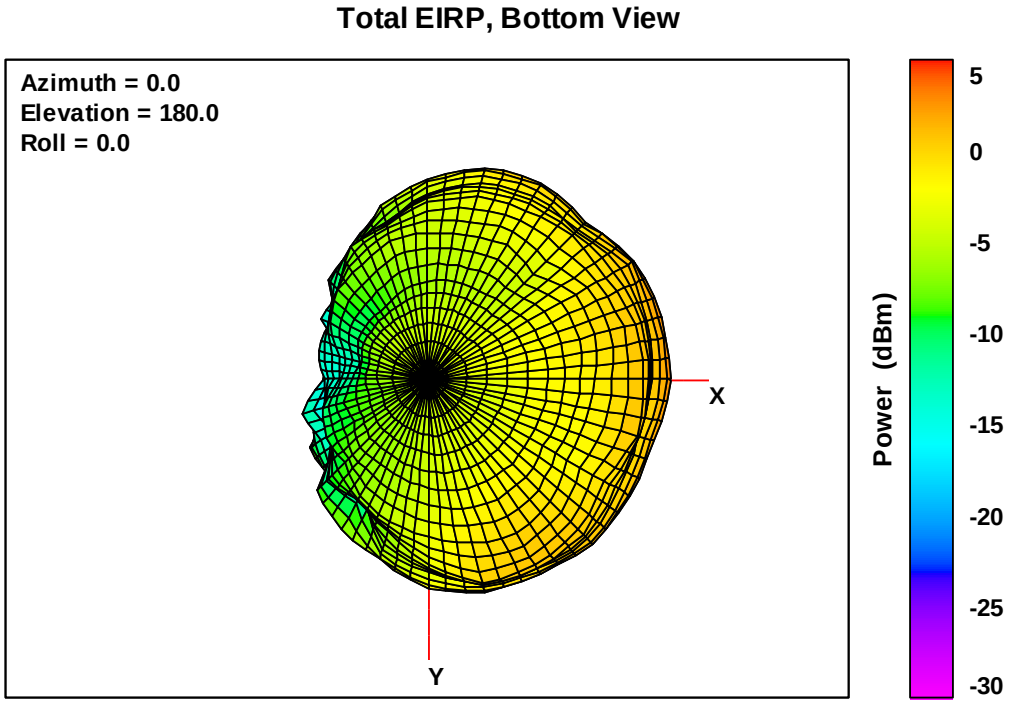
**Total**



## 7.5 3D PASSIVE- 5825 MHz

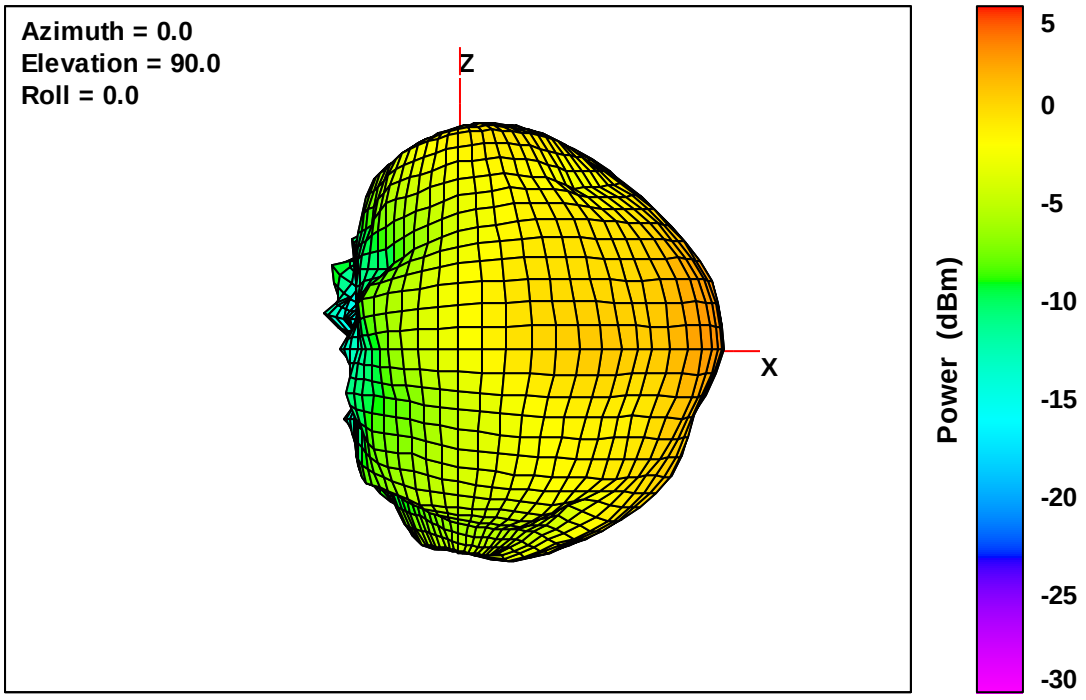



**Free-Space Total EIRP, Top View, 5825 MHz**



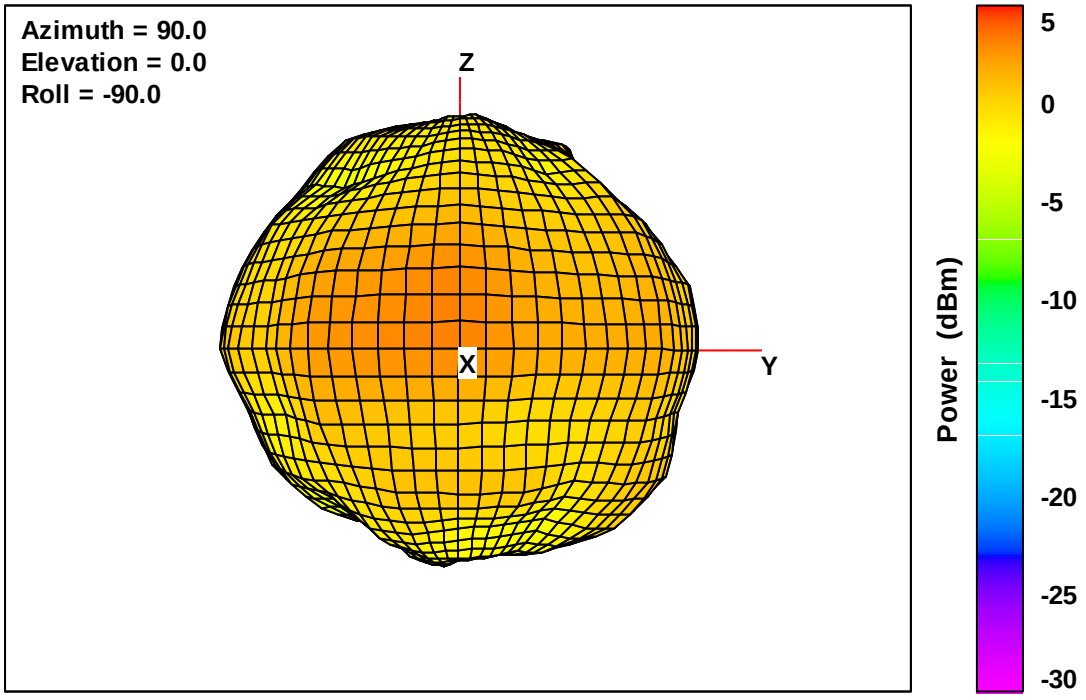

**Free-Space Total EIRP, Bottom View, 5825 MHz**

## Total EIRP, Left Side View



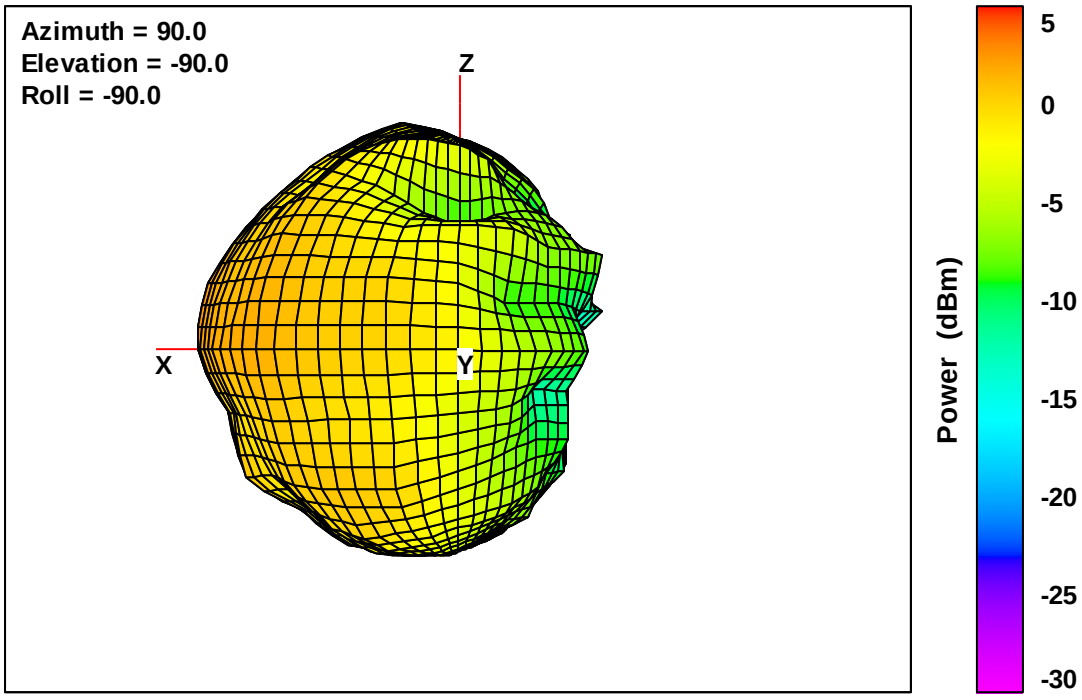

**Free-Space Total EIRP, Left Side View, 5825 MHz**

## Total EIRP, Front Face View



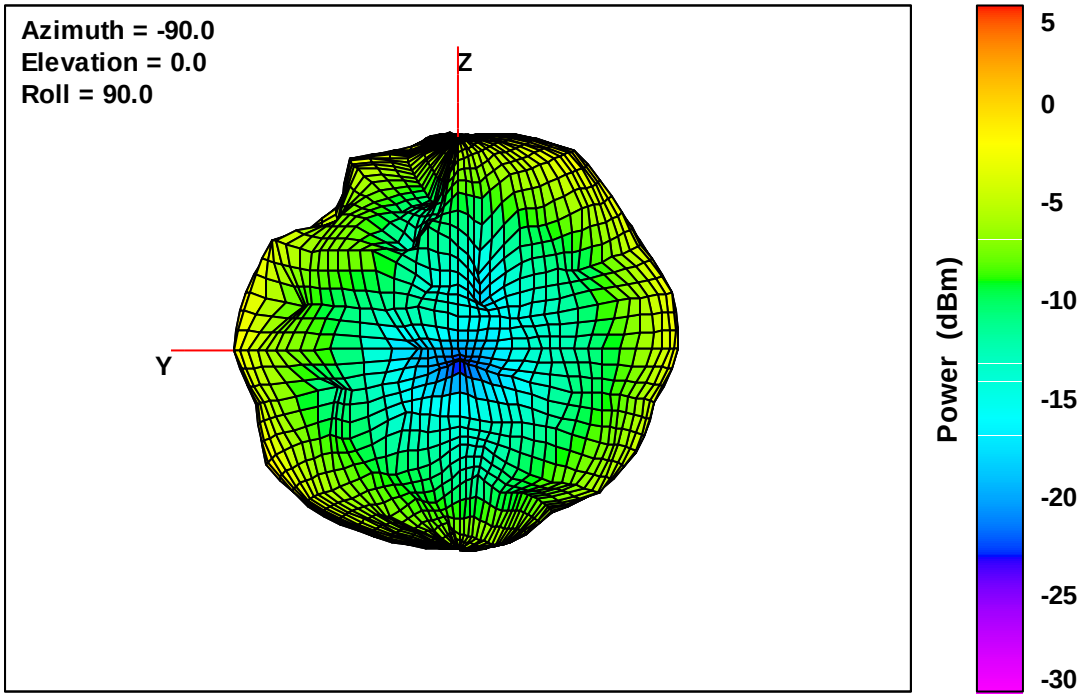

**Free-Space Total EIRP, Front Face View, 5825 MHz**

## Total EIRP, Right Side View



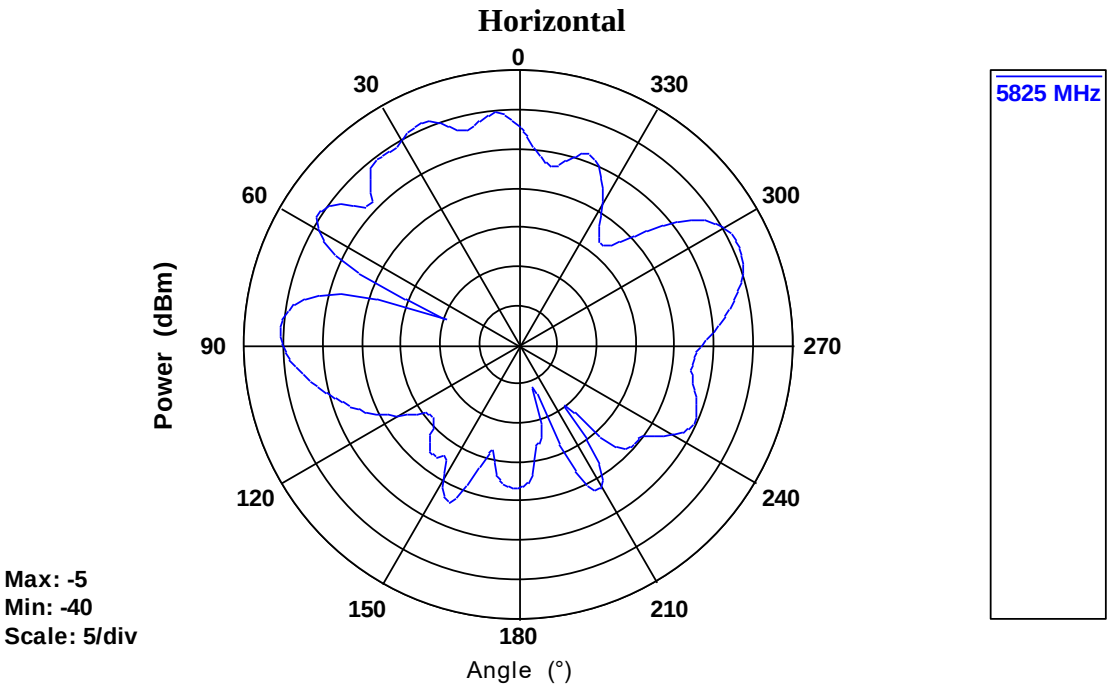

**Free-Space Total EIRP, Right Side View, 5825 MHz**

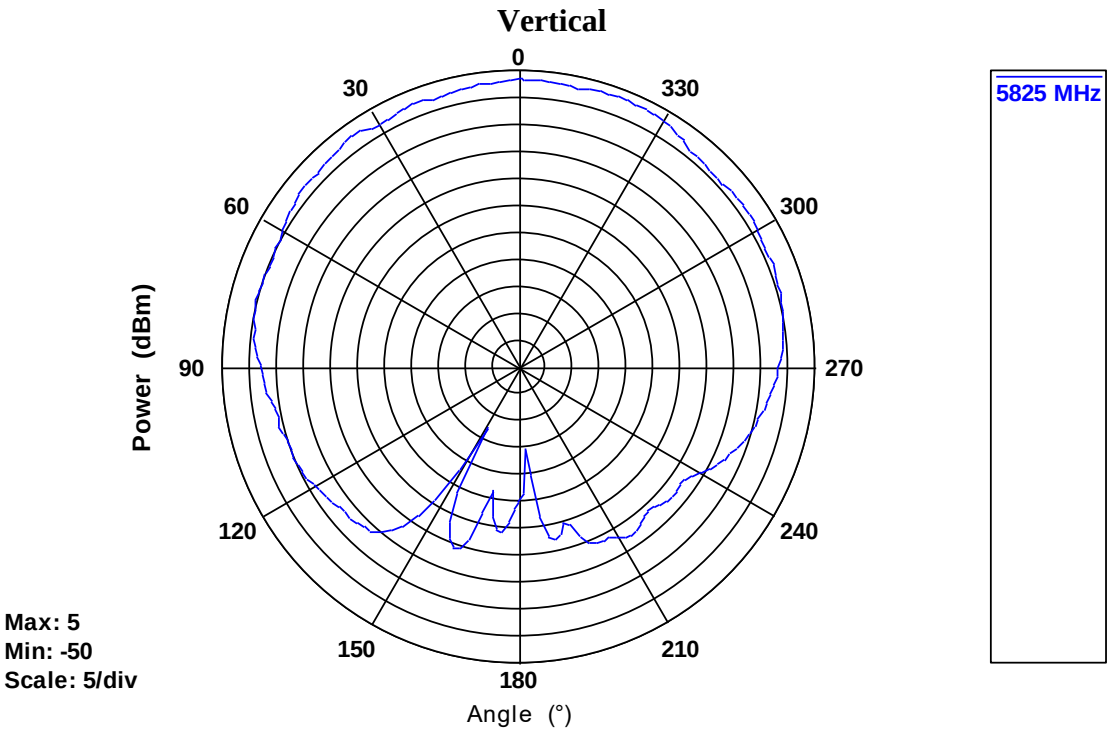
## Total EIRP, Back Face View

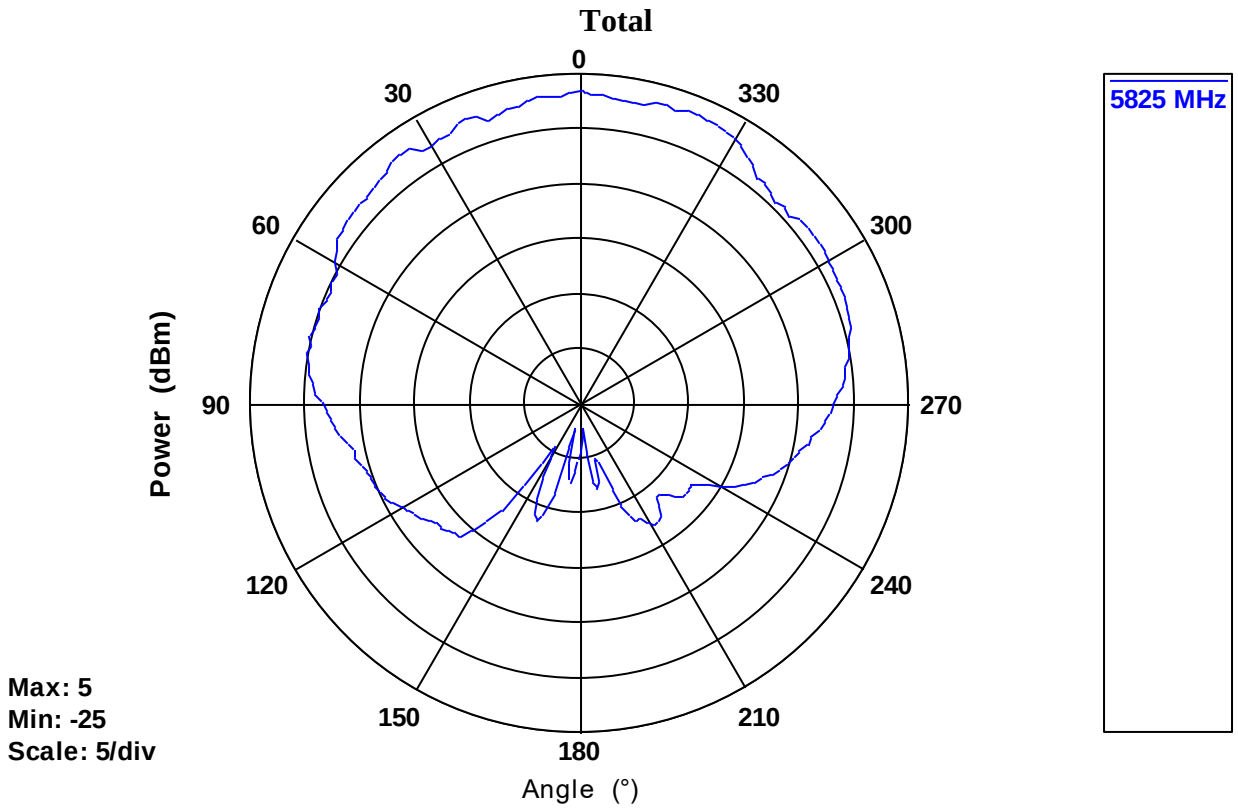



**Free-Space Total EIRP, Back Face View, 5825 MHz**

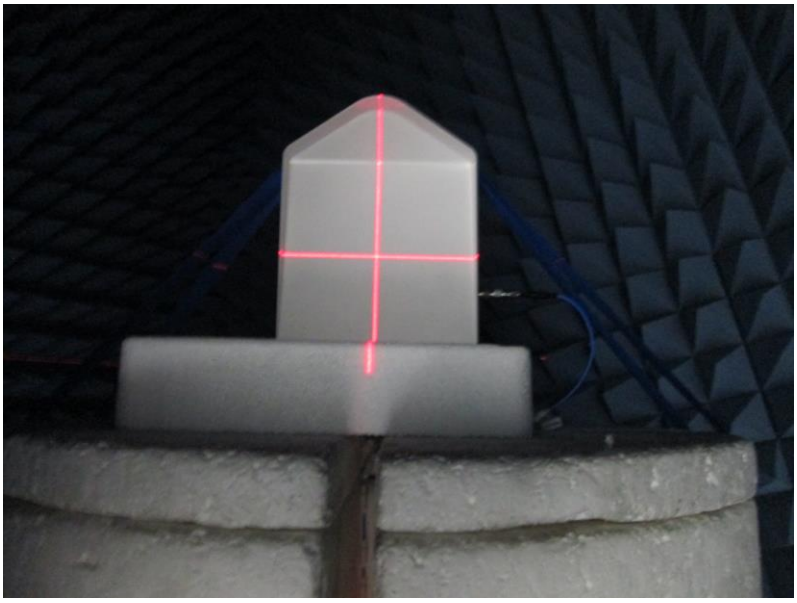
## 7.6 2D PASSIVE- 5825 MHz

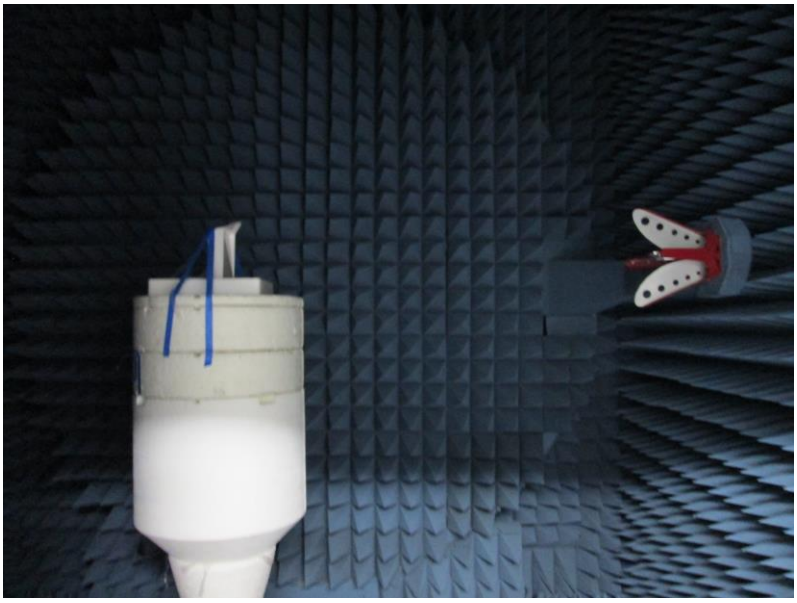




# 8 TEST SETUP





**END OF REPORT**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