

## **ANTENNA PASSIVE TEST REPORT**

<b>Application No.</b>	SZOA2411000214AT
<b>Applicant</b>	SKULLCANDY, INC.
<b>Manufacturer</b>	SKULLCANDY, INC.
<b>Product Name</b>	MOD 180
<b>Model No.</b>	S2MGW
<b>Standards</b>	ANSI/IEEE Std 149-2021
<b>Date Initial Sample(s) Received</b>	Nov.07, 2024
<b>Testing Start Date</b>	Nov.07, 2024
<b>Testing Finish Date</b>	Nov.07, 2024
<b>Report Issue Date</b>	Dec.16, 2024

\* In the configuration tested, the EUT detailed in this report complied with the standards specified above.

*Turner He*

Prepared by: Yuanyu Luo/ Test  
Engineer

*Ervin Li*

Approved by: Ervin Li/ Technical  
Manager



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# SGS-CSTC Standards Technical Services Co., Ltd Shenzhen Branch

Report No.: SZOA2411000214AT01

Rev.: 01

Page: 2 of 21

## Revision History

Revision	Issue Date	Description
01	Dec.16, 2024	Initial creation of report



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## 1 General Information

### 1.1 Testing Laboratory

Test Lab	SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch
Address	No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057
Contact	Ervin Li
Tel.	+86 18823369694
Fax	+86-755-25328600
E-mail	Ervin.Li@sgs.com

### 1.2 Details of Applicant

Applicant's Name	SKULLCANDY,INC.
Applicant's Address	6301 N Landmark Dr Park City, UT 84098, United States of America
Contact	ANDREW CARTER
Tel.	404-56-0830
Fax	N/A
E-mail	andrew.carter@skullcandy.com

### 1.3 Details of Manufacturer

Manufacturer's Name	SKULLCANDY,INC.
Manufacturer's Address	6301 N Landmark Dr Park City, UT 84098, United States of America
Contact	ANDREW CARTER
Tel.	404-56-0830
Fax	N/A
E-mail	andrew.carter@skullcandy.com



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## 1.4 General Description of EUT

Device Description:	MOD 180
Device Manufacturer:	SKULLCANDY, INC.
Device Model:	S2MGW
Hardware Version:	V1.1
Software Version:	V2.7.4
Air Interface Supported	BDR+EDR+BLE
Dimension:	10.60mm*12.13mm

## 1.5 Test Procedure

Testing is performed according to the **ANSI/IEEE Std 149-2021**.



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## 1.6 Test Specification

Identity	Document Title
ANSI/IEEE Std 149-2008	IEEE Standard Test Procedures for Antennas

## 1.7 Laboratory Environment

Temperature	Min. =19°C , Max. = 25°C	
Relative humidity	Min. =40% , Max. =72%	
Shield effect	0.7-6GHz	> 100dB
Ground resistance	<0.5Ω	



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## 2 OTA Measurements System Configuration

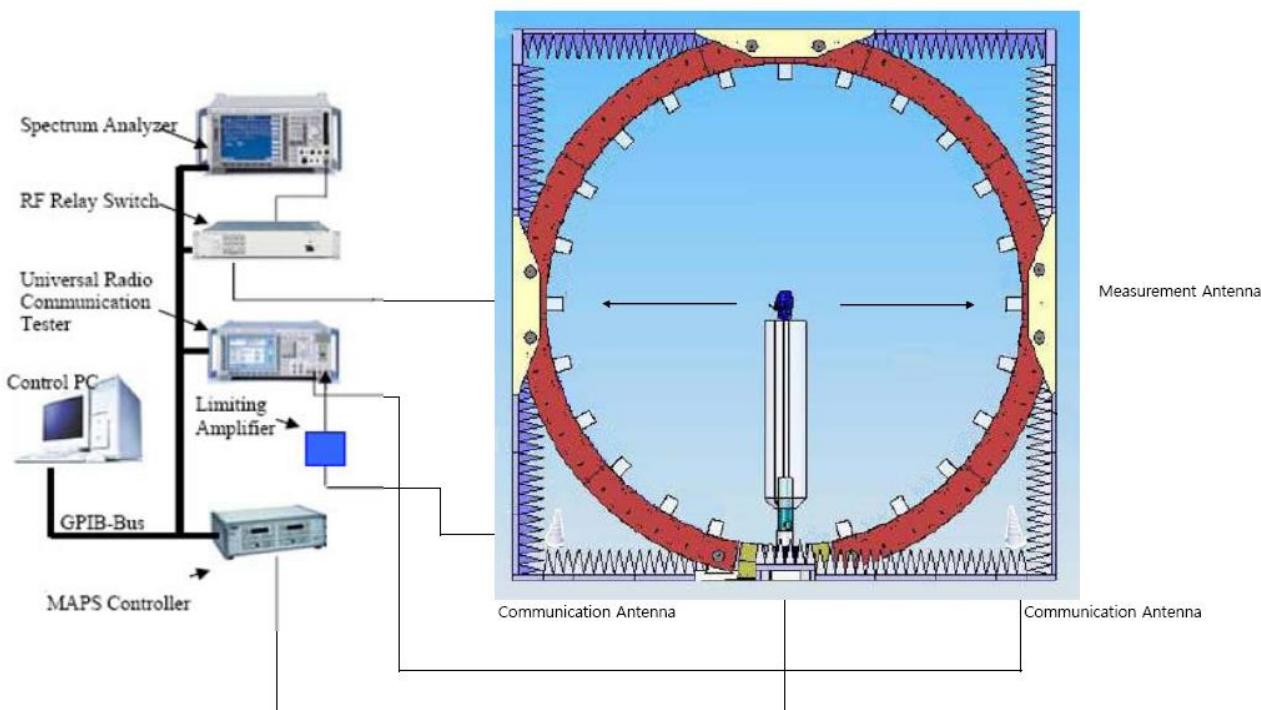
### 2.1 Test Configuration

#### Testing Condition:

- Temperature:  $22 \pm 3^\circ\text{C}$
- Humidity: <80%

#### Measurement Facility:

Great-Circle-Cut method is used to measure the antenna 3D GAIN of EUT in OTA qualified anechoic chamber. Equipment Under Test (EUT) geometry centre vertical projection at the centre of platform, the distance from EUT to measurement antenna is 5m



F-1. OTA Measurement System Configuration



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### 3 Test Equipment List

Type of Equipment	Model Number	Manufacture	Calibration Date	Valid Period
Network Analyzer	E5071C S/N MY46523591	Keysight	2024/01/30	2025/01/29
Quad-Ridge Horn Antenna 700 MHz-10 GHz	EMCO 3164-08 S/N 161915	ETS-Lindgren L.P.	N/A	N/A
MAPS Controller	EMCENTER S/N 160485	ETS-Lindgren L.P.	N/A	N/A
SAM V4.5BS Head Phantom	Head Phantom S/N 3609	SPEAG	NCR	NCR

#### Definition of Acronyms:

NCR: No Calibration Requirement.



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## 4 Measurement Uncertainty

Item	2400-2500 MHz (dB)
Gain	0.88
Efficiency	0.88

Measurement Uncertainty (95% CONFIDENCE INTERVAL) K=2



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## 5 Test Results

Free Space Left #1			
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
2350	-4.70	33.92	-0.79
2355	-4.57	34.95	-0.74
2360	-4.14	38.52	-0.36
2365	-4.14	38.58	-0.16
2370	-4.07	39.17	-0.25
2375	-4.15	38.45	0.03
2380	-4.08	39.06	-0.22
2385	-3.94	40.40	0.30
2390	-3.86	41.09	0.09
2395	-3.61	43.60	0.69
2400	-3.71	42.55	0.52
2402	-3.72	42.50	0.46
2405	-3.68	42.84	0.78
2410	-3.65	43.17	0.78
2415	-3.67	43.00	0.85
2420	-3.53	44.38	1.09
2425	-3.65	43.13	0.92
2430	-3.75	42.15	0.94
2435	-3.85	41.22	0.77
2440	-3.82	41.46	0.96
2441	-3.77	41.96	0.97
2445	-3.61	43.51	1.09

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2450	-3.56	44.01	1.39
2455	-3.45	45.18	1.46
2460	-3.66	43.07	1.39
2465	-3.75	42.17	1.33
2470	-4.01	39.68	0.96
2475	-4.05	39.36	1.01
2480	-4.08	39.12	0.86
2485	-4.01	39.73	1.19
2490	-3.90	40.70	1.22
2495	-3.74	42.28	1.52
2500	-3.70	42.64	1.74
2505	-3.62	43.47	1.76
2510	-3.69	42.73	1.73
2515	-3.92	40.56	1.45
2520	-4.15	38.44	1.34
2525	-4.33	36.89	1.10
2530	-4.42	36.14	1.07
2535	-4.44	36.01	1.00
2540	-4.41	36.25	1.14
2545	-4.27	37.38	1.17
2550	-4.30	37.14	1.24
2555	-4.35	36.74	1.12
2560	-4.49	35.59	1.08
2565	-4.55	35.09	0.97
2570	-4.56	34.99	0.94
2575	-4.51	35.37	1.01
2580	-4.39	36.37	1.03

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Free Space Right #1			
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
2350	-5.44	28.57	-1.38
2355	-5.21	30.15	-1.15
2360	-4.75	33.48	-0.73
2365	-4.69	33.94	-0.46
2370	-4.51	35.44	-0.41
2375	-4.60	34.67	-0.21
2380	-4.41	36.21	-0.16
2385	-4.32	37.02	0.11
2390	-4.19	38.10	0.16
2395	-3.97	40.09	0.52
2400	-4.06	39.23	0.32
2402	-4.00	39.85	0.50
2405	-3.92	40.54	0.68
2410	-3.85	41.18	0.69
2415	-3.73	42.33	0.87
2420	-3.53	44.35	1.17
2425	-3.63	43.38	1.01
2430	-3.65	43.17	1.05
2435	-3.81	41.55	0.80
2440	-3.73	42.37	1.04
2441	-3.66	43.06	1.04
2445	-3.56	44.01	1.14
2450	-3.49	44.80	1.36

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2455	-3.34	46.34	1.61
2460	-3.54	44.24	1.33
2465	-3.58	43.88	1.47
2470	-3.89	40.87	0.89
2475	-3.88	40.88	1.10
2480	-3.94	40.39	0.92
2485	-3.87	41.04	1.21
2490	-3.83	41.40	1.19
2495	-3.72	42.47	1.35
2500	-3.77	42.00	1.42
2505	-3.75	42.13	1.35
2510	-3.88	40.91	1.39
2515	-4.13	38.61	1.03
2520	-4.36	36.65	0.96
2525	-4.58	34.80	0.59
2530	-4.68	34.05	0.60
2535	-4.76	33.43	0.49
2540	-4.77	33.32	0.47
2545	-4.75	33.53	0.57
2550	-4.86	32.70	0.48
2555	-5.01	31.58	0.39
2560	-5.21	30.13	0.20
2565	-5.32	29.37	0.08
2570	-5.38	28.96	-0.02
2575	-5.34	29.27	0.06
2580	-5.33	29.33	0.00



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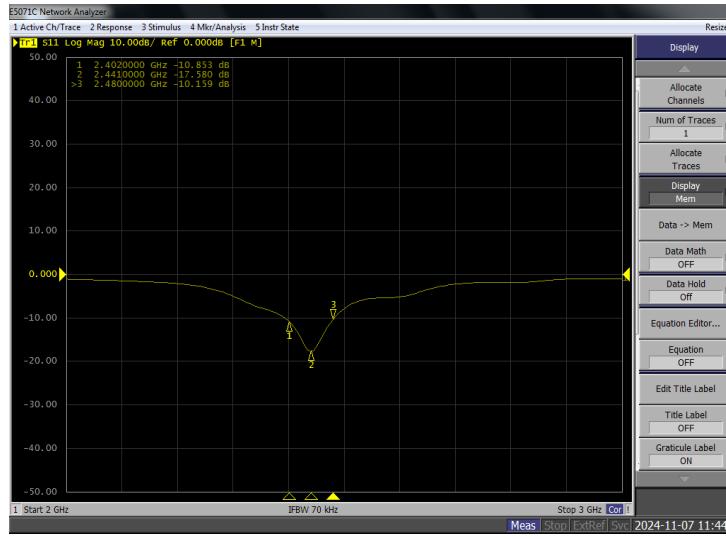
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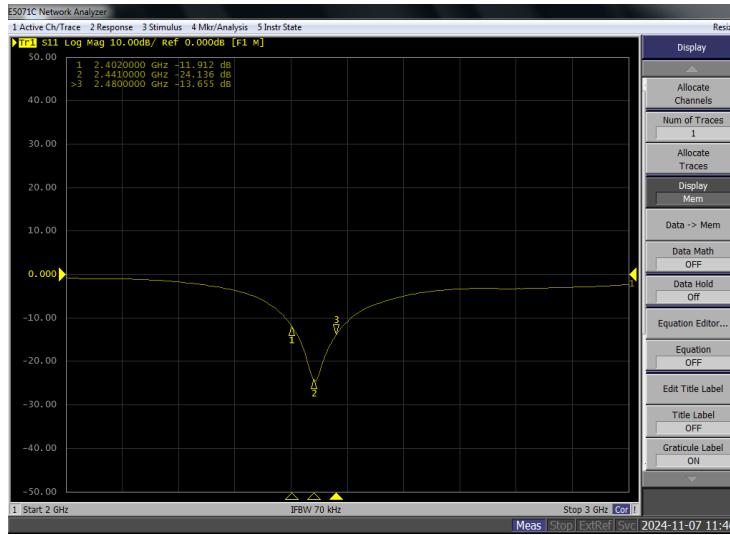
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## 6 Pattern Plots

### 6.1 Return Loss



Free Space Left #1



Free Space Right #1



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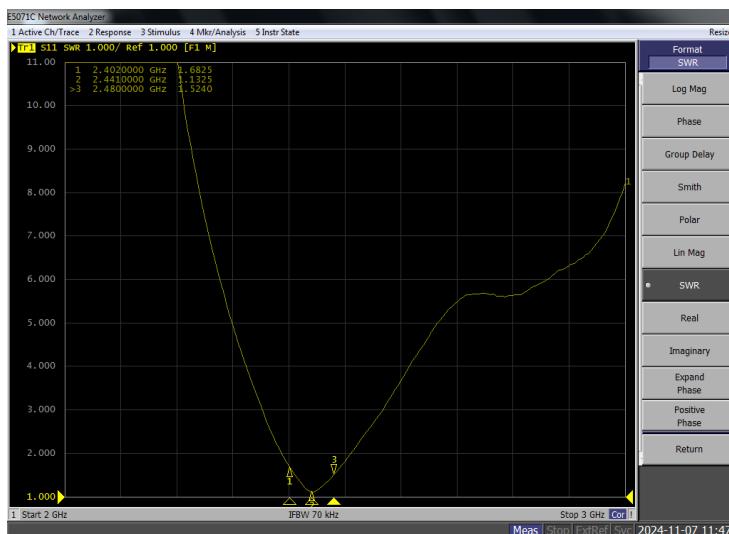
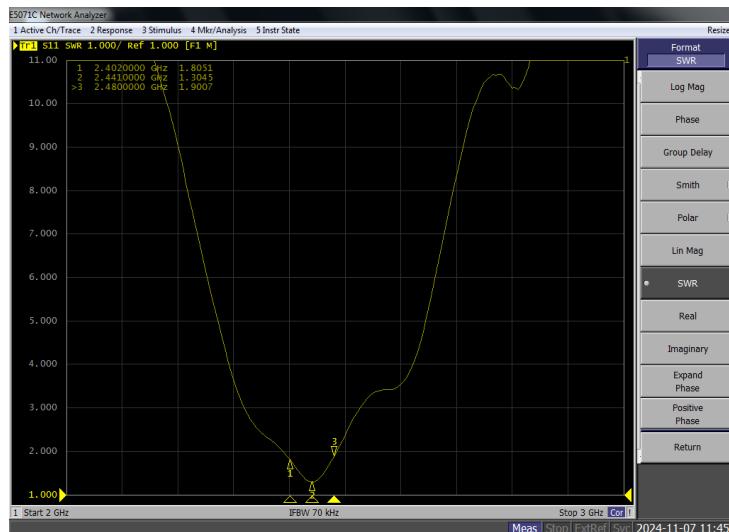
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## 6.2 VSWR



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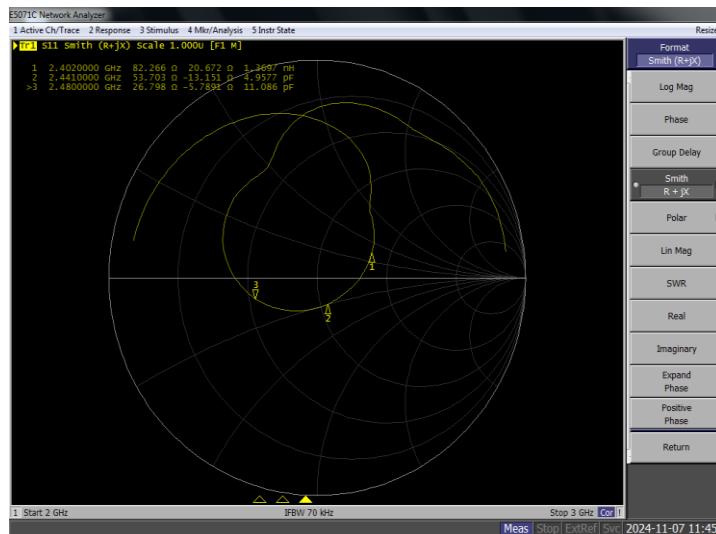
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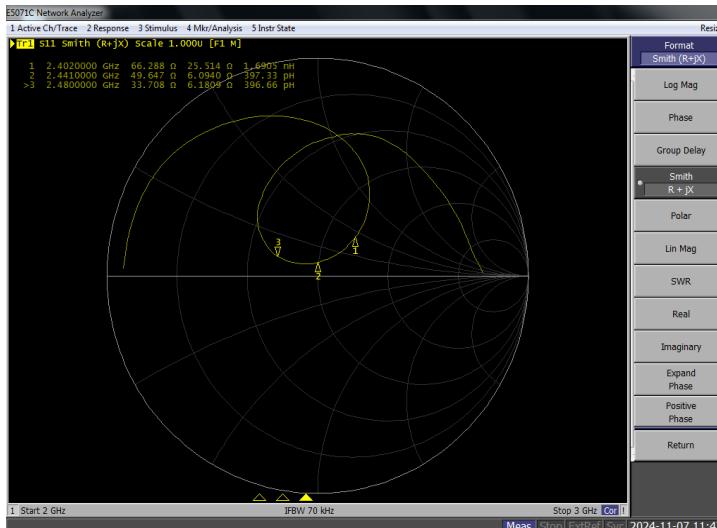
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### 6.3 Stimulus



Free Space Left #1



Free Space Right #1



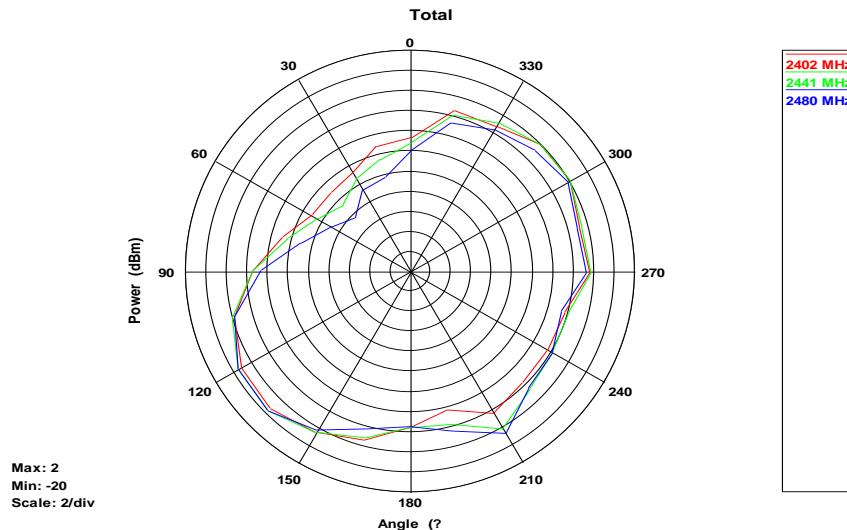
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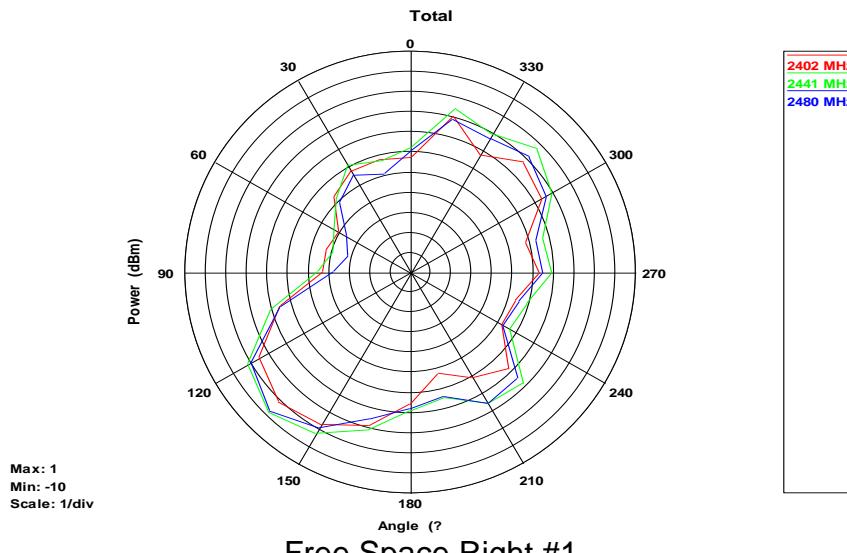
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**7 2-D Antenna Pattern(Theta=90°)**

Free Space Left #1



Free Space Right #1



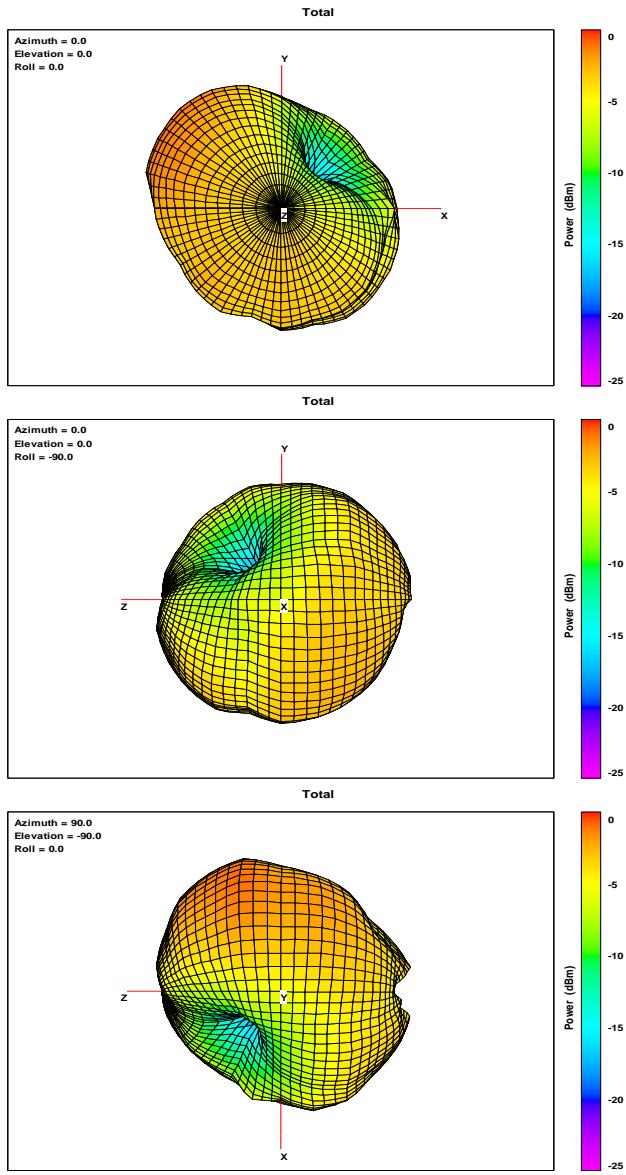
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## 8 3-D Antenna Pattern



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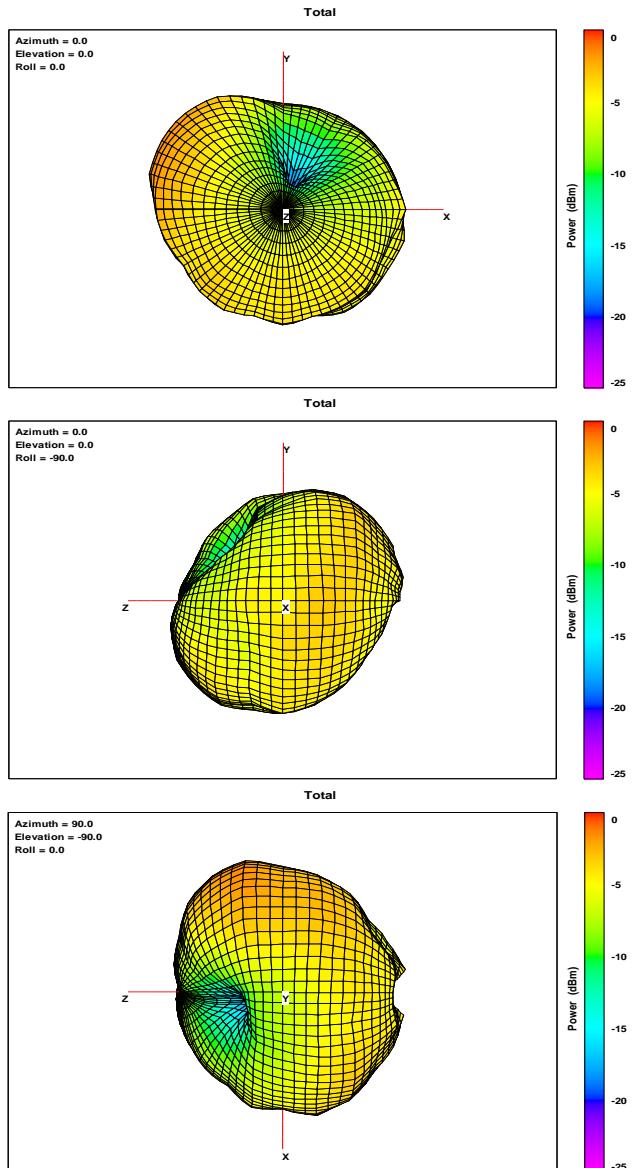
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## 9 The EUT and Test Configuration

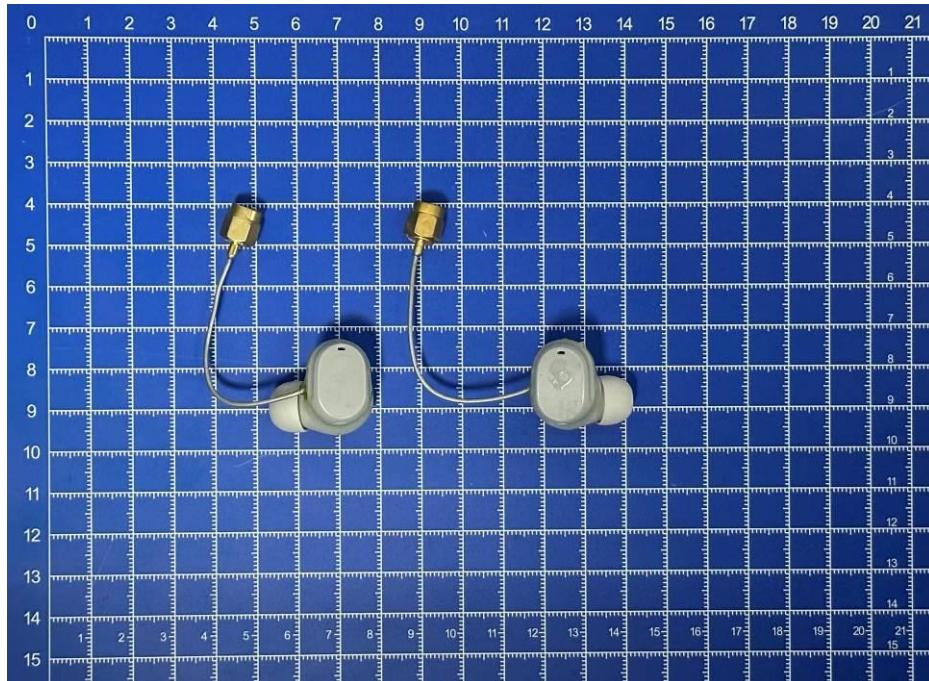
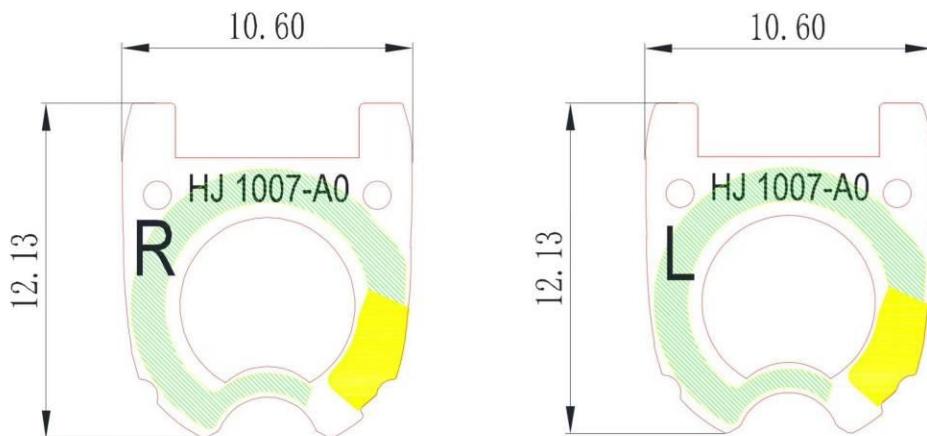


Photo of EUT



Antenna Dimensions



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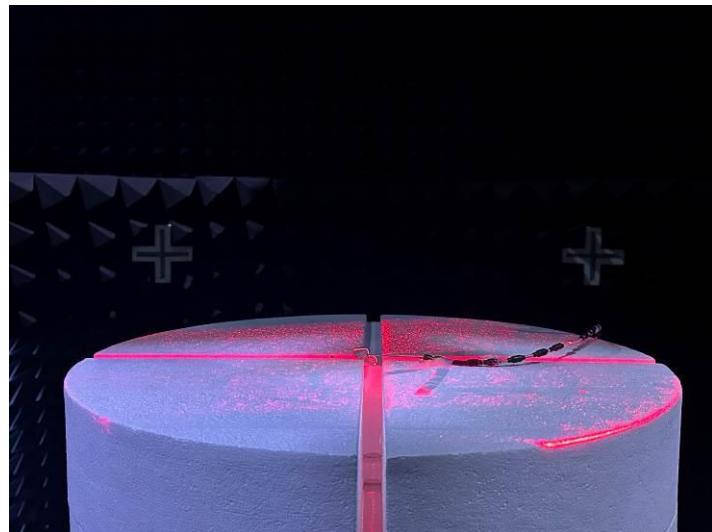
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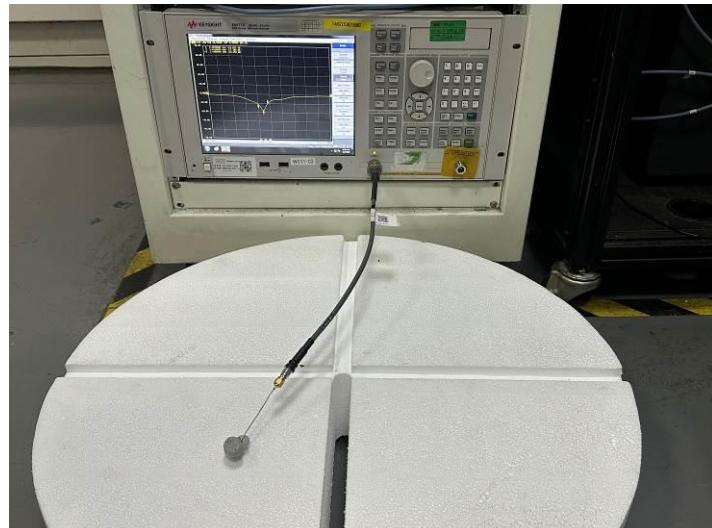
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