ANTENNA PASSIVE TEST REPORT

Application No.	ZEWM2304000538OA
Applicant	BM innovations GmbH
Manufacturer	BM innovations GmbH
Product Name	BLE RF Module
Model No.	BM-SP10, BM-SP11
Standards	ANSI/IEEE Std 149-2008
Date Initial Sample(s) Received	2023.04.27
Testing Start Date	2023.04.27
Testing Finish Date	2023.04.27
Report Issue Date	2023.05.08

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

Prepared by	Reviewed By	Approved by
Yuanyu Luo	Max. Huang	Ervin Li

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Revision Version

Report No.	Version	Date	Memo
ZEWM2304000538OA01	00	2023.05.08	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	BM innovations GmbH
Applicant's Address	Mainburger Str. 3 Hoergertshausen 85413 Germany
Contact	N/A
Tel.	N/A
Fax	N/A
E-mail	N/A

1.3 Details of Manufacturer

Manufacturer's Name	BM innovations GmbH
Manufacturer's Address	Mainburger Str. 3 Hoergertshausen 85413 Germany
Contact	N/A
Tel.	N/A
Fax	N/A
E-mail	N/A

1.4 General Description of EUT

Device Description:	BLE RF Module
Device Manufacturer:	BM innovations GmbH
Device Model:	BM-SP10, BM-SP11
Hardware Version:	N/A
Software Version:	N/A

1.5 Test Procedure

Testing is performed according to the **ANSI/IEEE Std 149-2008**.

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

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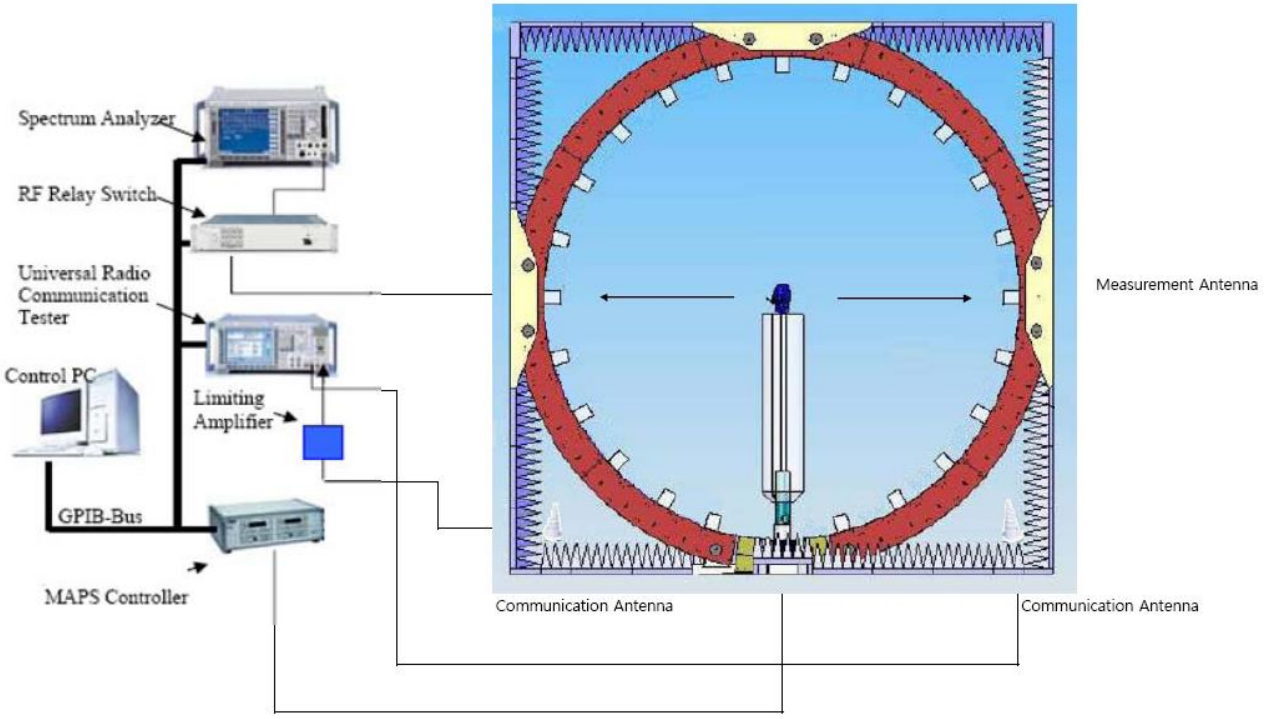
2 OTA Measurements System Configuration

2.1 Test Configuration

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

3 Test Equipment List

Type of Equipment	Model Number	Manufacture	Calibration Date	Valid Period
Network Analyzer	E5071C S/N MY46523591	Keysight	2023/2/16	2024/2/15
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

4 Measurement Uncertainty

Item	2400-2500 MHz (dB)
Gain	0.88
Efficiency	0.88
Measurement Uncertainty (95% CONFIDENCE INTERVAL) K=2	

5 Test Results

Free Space			
Frequency (MHz)	**Efficiency (dB)**	**Efficiency (%)**	**Gain (dBi)**
2350	-7.03	19.82	-4.04
2355	-6.85	20.67	-3.80
2360	-6.48	22.50	-3.26
2365	-6.42	22.78	-3.18
2370	-6.41	22.86	-3.06
2375	-6.38	23.01	-2.97
2380	-6.25	23.69	-2.78
2385	-6.14	24.34	-2.53
2390	-6.01	25.06	-2.45
2395	-5.76	26.55	-2.03
2400	-5.78	26.43	-2.06
2402	-5.76	26.53	-1.97
2405	-5.68	27.04	-1.85
2410	-5.71	26.86	-1.84
2415	-5.72	26.80	-1.78
2420	-5.82	26.15	-1.84
2425	-5.87	25.91	-1.76
2430	-5.93	25.54	-1.69
2435	-5.95	25.38	-1.69
2440	-5.91	25.65	-1.62
2441	-5.93	25.54	-1.64
2445	-5.97	25.31	-1.71
2450	-6.03	24.94	-1.80
2455	-6.14	24.34	-1.78
2460	-6.30	23.42	-1.97

2465	-6.36	23.15	-1.84
2470	-6.56	22.10	-2.05
2475	-6.56	22.08	-2.04
2480	-6.79	20.95	-2.31
2482	-6.81	20.85	-2.46
2485	-6.84	20.72	-2.45
2490	-6.93	20.28	-2.42
2495	-6.85	20.64	-2.35
2500	-6.77	21.02	-2.16
2505	-6.79	20.94	-2.11
2510	-6.83	20.76	-2.23
2515	-7.17	19.21	-2.62
2520	-7.37	18.31	-2.95
2525	-7.57	17.50	-3.08
2530	-7.64	17.23	-3.31
2535	-7.70	17.00	-3.25
2540	-7.79	16.65	-3.20
2545	-7.71	16.94	-3.08
2550	-7.85	16.39	-3.15
2555	-7.85	16.42	-3.19
2560	-7.97	15.96	-3.25
2565	-7.97	15.95	-3.33
2570	-8.04	15.72	-3.44
2575	-8.12	15.43	-3.53
2580	-8.05	15.68	-3.47

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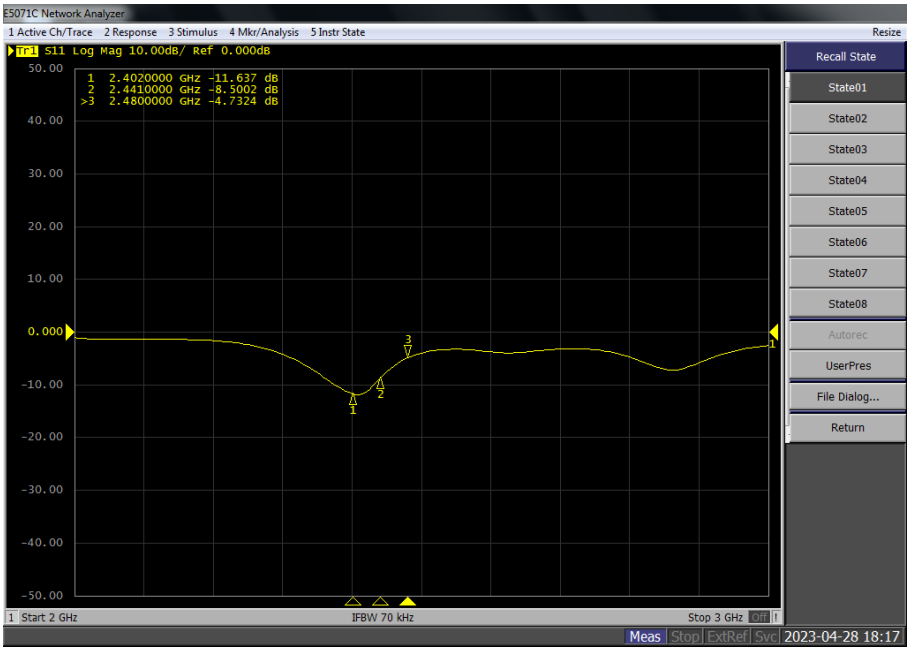
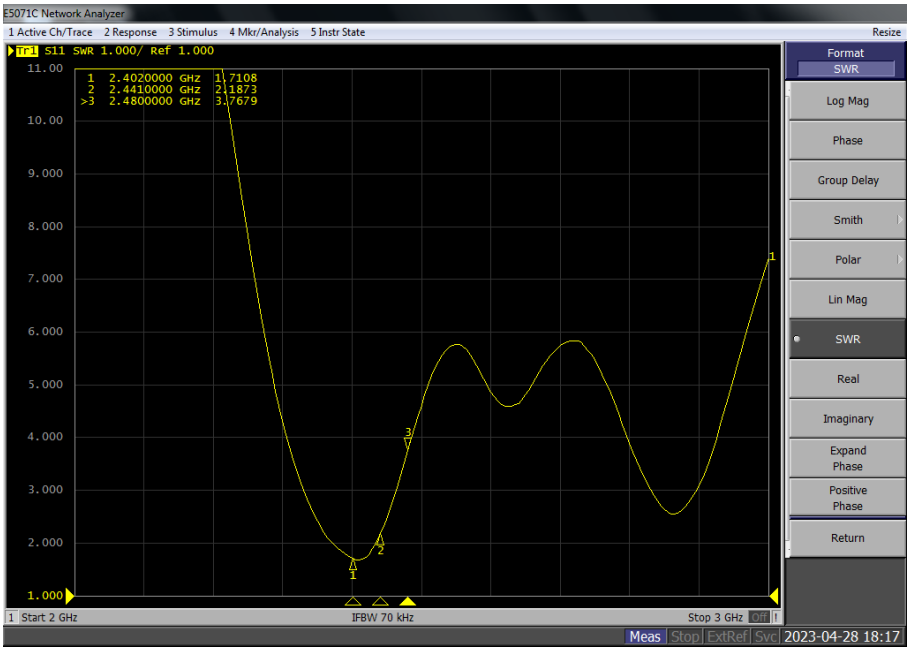
6 Pattern Plots

6.1 Return Loss



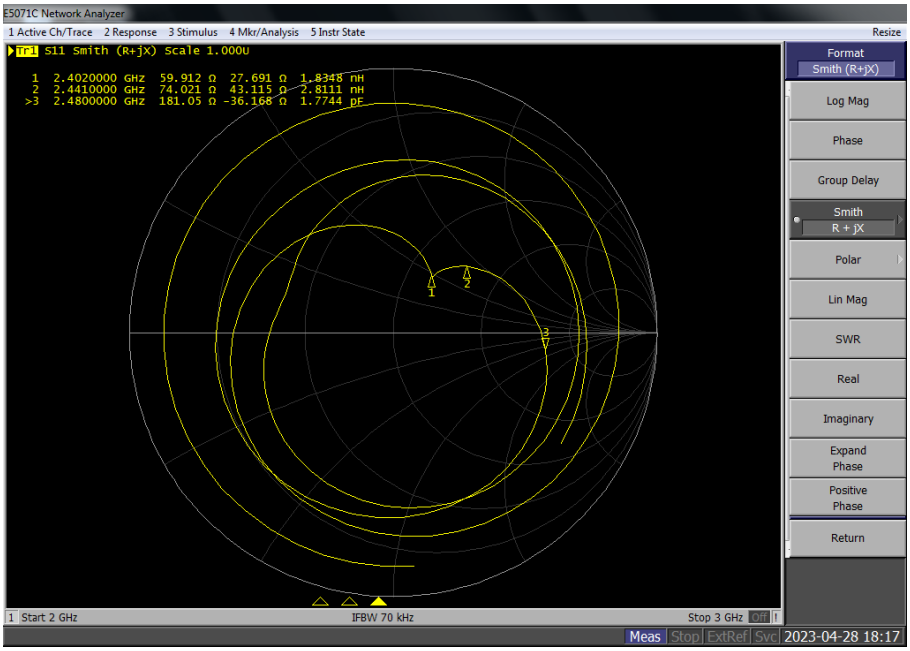
Free Space

6.2 VSWR



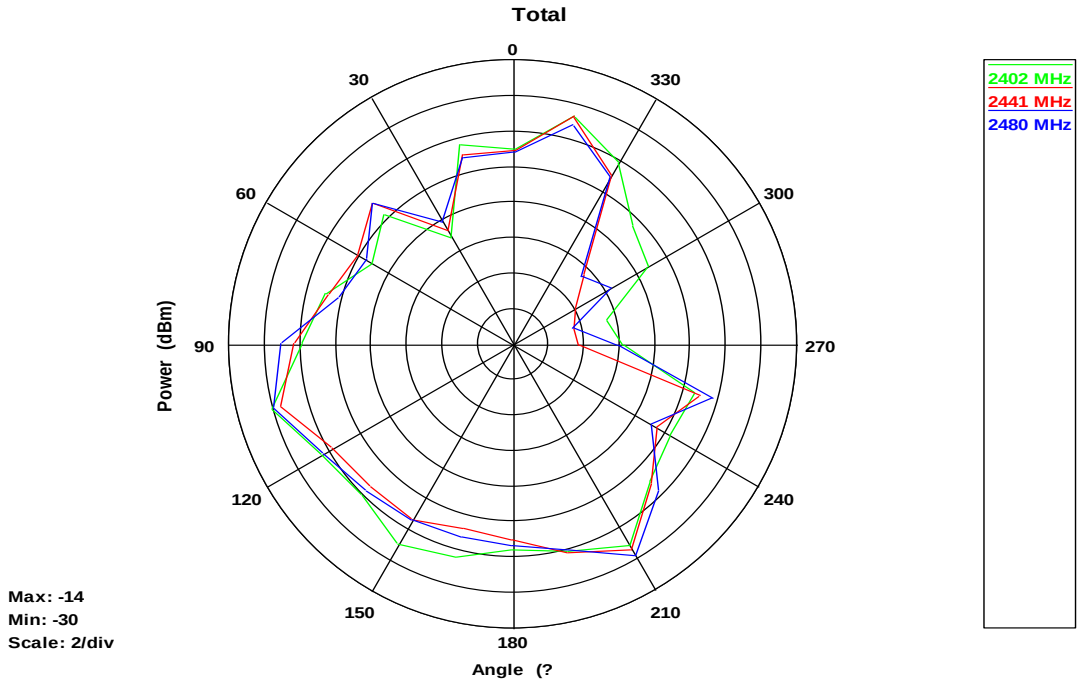
Free Space

6.3 Stimulus



Free Space

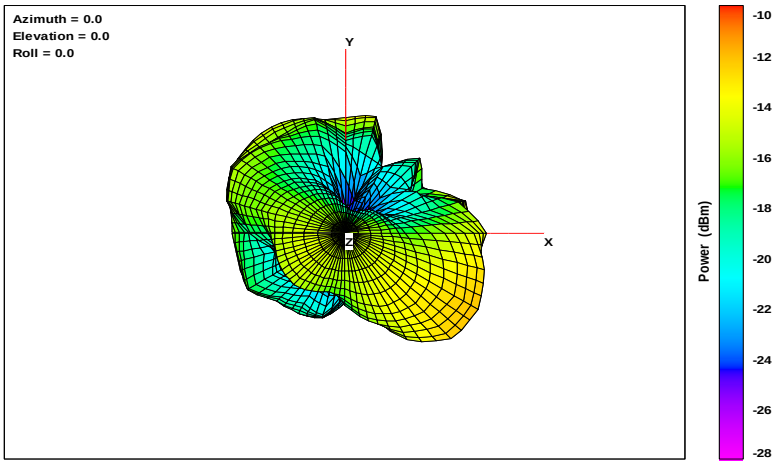
7 2-D Antenna Pattern(Theta=90°)



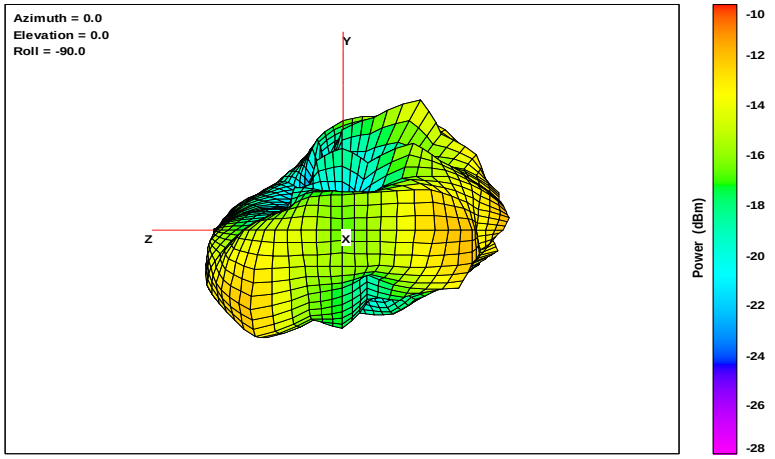
Free Space

8 3-D Antenna Pattern

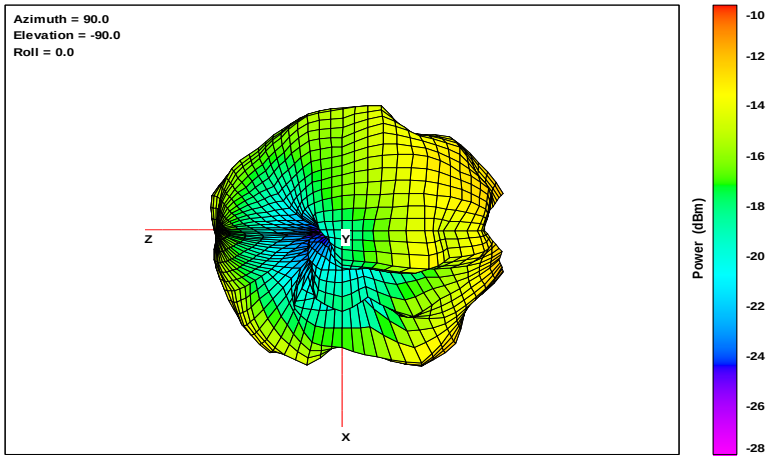
Total



Total

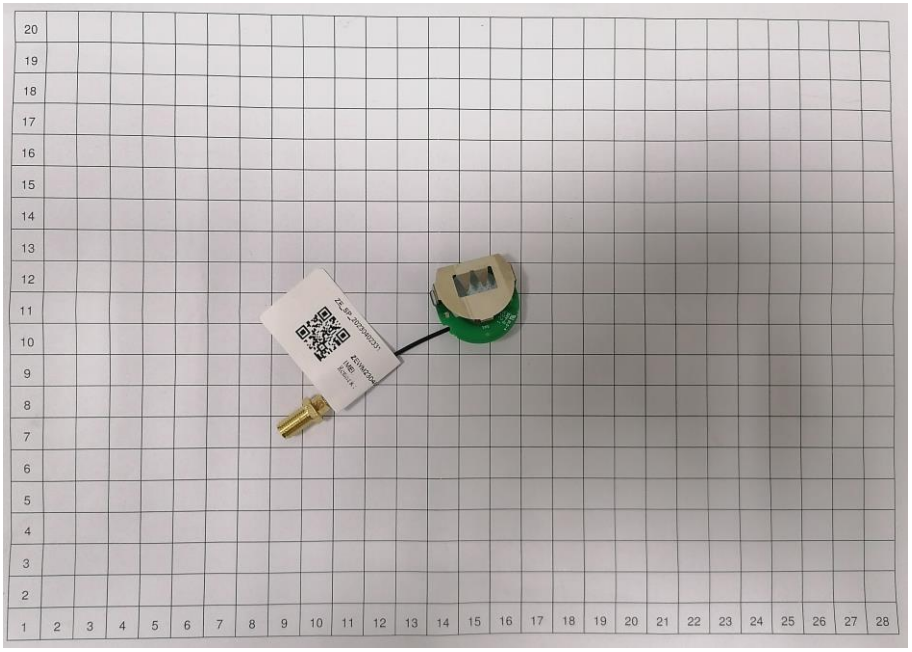


Total

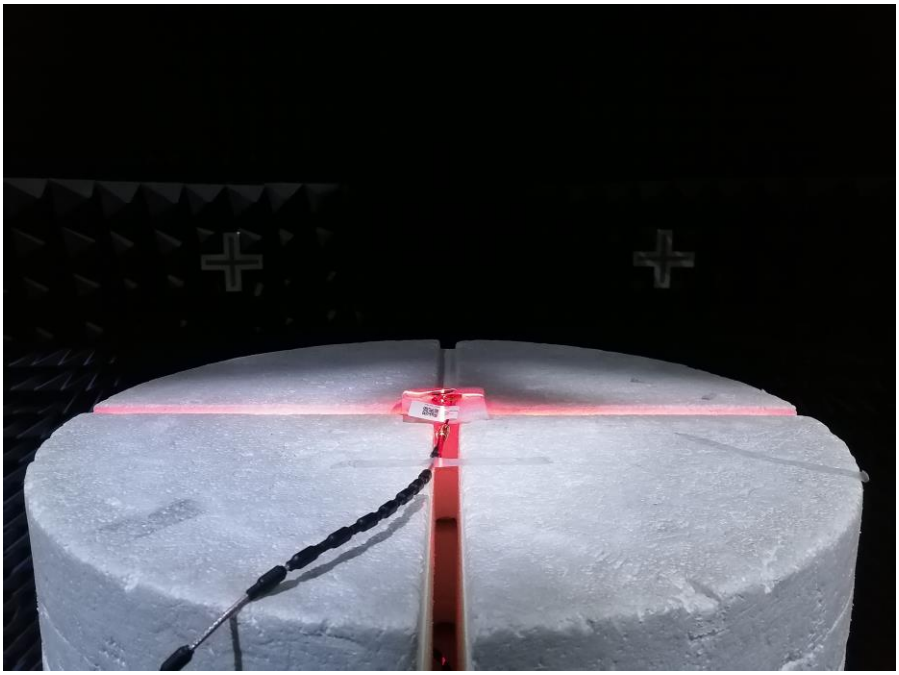


Free Space

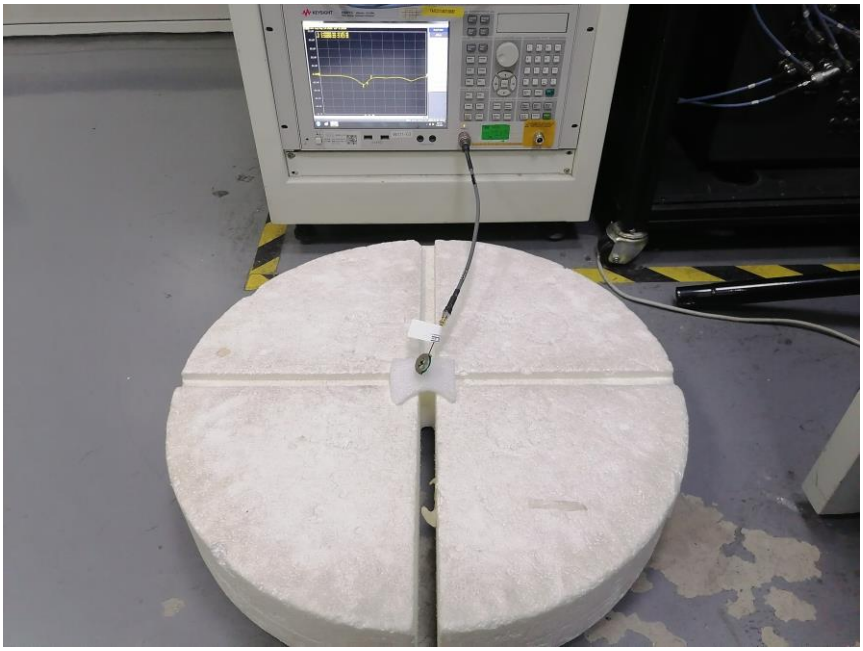
9 The EUT and Test Configuration



Front Side EUT



Free Space View



Free Space Impedance Setup

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