



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR221000365101

Page: 1 of 19

ANTENNA PASSIVE TEST REPORT

Application No. SZCR2210003651AT
Applicant Minut, Inc.
Manufacturer Minut, Inc.
Product Name Minut Home Sensor
Model No. MT-AM1
Standards ANSI/IEEE Std 149-2008
Date Initial Sample(s) Received 2022-12-07
Testing Start Date 2022-12-08
Testing Finish Date 2022-12-08 to 2022-12-09
Report Issue Date 2022-12-09

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

Keny Xu

Keny Xu
EMC Laboratory Manager



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

Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.
Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com
No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com


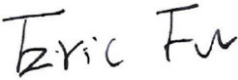
SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR221000365101

Page: 2 of 19

Revision Record				
Version	Chapter	Date	Modifier	Remark
01		2022-12-09		Original

Authorized for issue by:			
			
		Prepared by Ian Li	
			
		Reviewed by Mark Mao	
			
		Approved by Eric Fu	



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch (SZEMC) Laboratory

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com



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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR221000365101

Page: 3 of 19

2 Revision Version

Report No.	Version	Date	Memo
SZCR2210003651AT	00	12/09	Initial creation of report



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch (SZEMC) Laboratory

Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.
Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

Member of the SGS Group (SGS SA)

3 Contents

	Page
1 COVER PAGE	1
2 REVISION VERSION	3
3 CONTENTS	4
4 GENERAL INFORMATION	5
4.1 TESTING LABORATORY	5
4.2 DETAILS OF APPLICANT	5
4.3 DETAILS OF MANUFACTURER	5
4.4 GENERAL DESCRIPTION OF EUT	5
4.5 TEST PROCEDURE	6
4.6 TEST SPECIFICATION	6
4.7 LABORATORY ENVIRONMENT	6
4.8 TEST LOCATION	7
4.9 TEST FACILITY	7
4.10 DEVIATION FROM STANDARDS	7
4.11 ABNORMALITIES FROM STANDARD CONDITIONS	7
5 OTA MEASUREMENTS SYSTEM CONFIGURATION	8
5.1 TEST CONFIGURATION	8
6 EQUIPMENT LIST	9
7 MEASUREMENT UNCERTAINTY.....	10
8 TEST RESULT.....	11
8.1 TEST SUMMARY	11
8.2 WI-FI ANTENNA TEST RESULTS	11
8.3 BT ANTENNA TEST RESULTS	12
9 PATTERN PLOTS.....	13
10 3-D ANTENNA PATTERN.....	16
11 THE EUT AND TEST CONFIGURATION	18



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 83071443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch (SGS-CSTC Laboratory)

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

4 General Information

4.1 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	Mark Mao
Tel.	+86 (0) 755 2532 8628
Fax	+86 (0) 755 2671 0594
E-mail	Mark.Mao@sgs.com

4.2 Details of Applicant

Applicant's Name	Minut, Inc.
Applicant's Address	Baltzarsgatan 23 Minut AB Malmo 211 36 Sweden
Contact	Fredrik Ahlberg
Tel.	+46705518852
E-mail	fredrik@minut.com

4.3 Details of Manufacturer

Manufacturer's Name	Minut, Inc.
Manufacturer's Address	Baltzarsgatan 23 Minut AB Malmo 211 36 Sweden
Contact	Fredrik Ahlberg
Tel.	+46705518852
E-mail	fredrik@minut.com

4.4 General Description of EUT

Device Description:	Minut Home Sensor
Device Manufacturer:	Minut AB
Device Model:	MT-AM1
Hardware Version:	N/A
Software Version:	N/A
S/N:	N/A

4.5 Test Procedure

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

4.6 Test Specification

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

4.7 Laboratory Environment

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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch (SZEMC) EMC Laboratory.

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgsgroup.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

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

SZEMC-TRF-01 Rev. A/0 Aug01,2022

Report No.: SZCR221000365101

Page: 7 of 19

4.8 Test Location

All tests were performed at:

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

No. 1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, Guangdong, China. 518057.

Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

4.9 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **A2LA (Certificate No. 3816.01)**

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

4.10 Deviation from Standards

None

4.11 Abnormalities from Standard Conditions

None



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

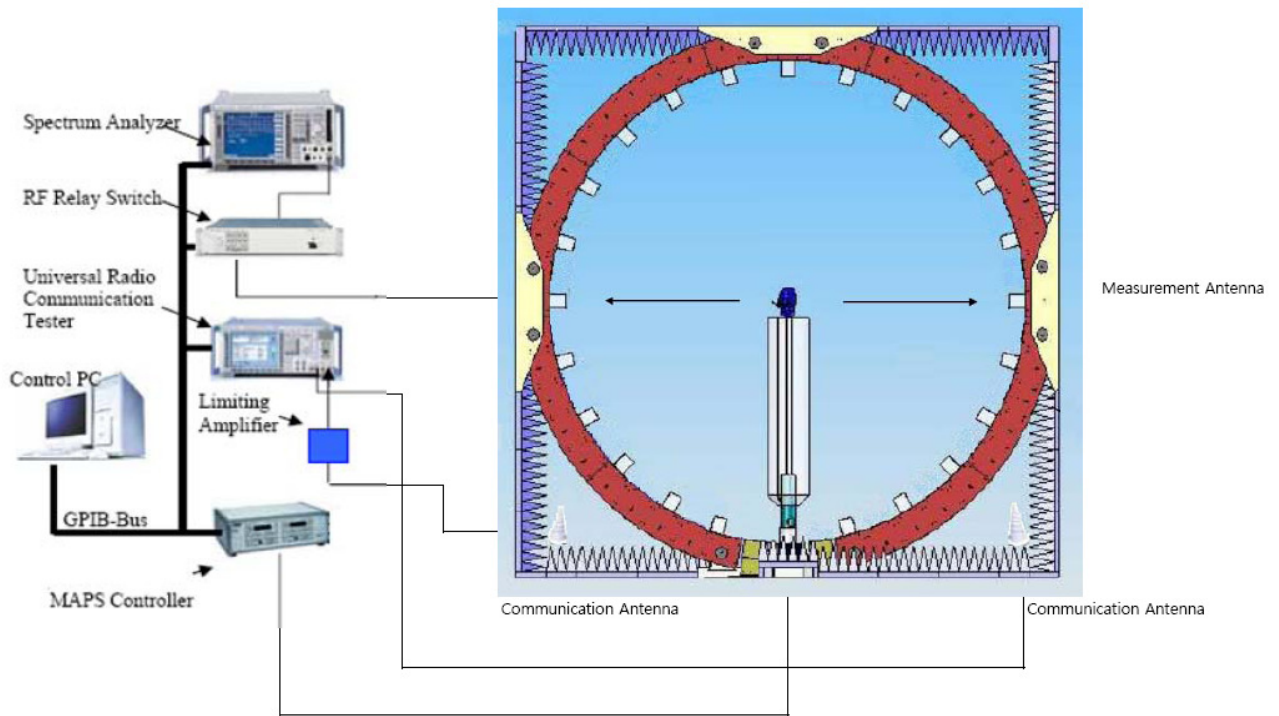
Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.
Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

No.1 Workshop, M-10, Middle Section, Science & Technology Park, Shenzhen, China 518057 t (86-755) 26012053 f (86-755) 26710594 www.sgs.com.cn
中国·深圳·科技园中区M-10栋一号厂房 邮编: 518057 t (86-755) 26012053 f (86-755) 26710594 sgs.china@sgs.com

5 OTA Measurements System Configuration

5.1 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

6 Equipment List

Type of Equipment	Model Number	Manufacture	Calibration Date	Valid Period
Network Analyzer	E5071C S/N MY46523591	Keysight	2022/4/11	2023/4/10
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



Unless otherwise agreed in writing, this document is issued by the Company subject to its General Conditions of Service printed overleaf, available on request or accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx> and, for electronic format documents, subject to Terms and Conditions for Electronic Documents at <http://www.sgs.com/en/Terms-and-Conditions/Terms-e-Documents.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein. Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. This document cannot be reproduced except in full, without prior written approval of the Company. Any unauthorized alteration, forgery or falsification of the content or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law. Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 30 days only.

Attention: To check the authenticity of testing / inspection report & certificate, please contact us at telephone: (86-755) 8307 1443, or email: CN.Doccheck@sgs.com

7 Measurement Uncertainty

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



8 Test Result

8.1 Test summary

product	Maximum Gain Data			
	Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
Wi-Fi antenna	2500	-4.51	35.39	3.21
BT antenna	2500	-4.25	37.57	1.01

8.2 Wi-Fi Antenna Test Results

Free Space			
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
2400	-5.08	31.05	2.58
2402	-5.07	31.14	2.60
2405	-5.07	31.14	2.69
2410	-5.13	30.68	2.59
2415	-5.15	30.57	2.62
2420	-5.18	30.34	2.52
2425	-5.13	30.72	2.63
2430	-5.16	30.50	2.54
2435	-5.16	30.48	2.56
2440	-5.07	31.09	2.58
2441	-5.07	31.11	2.60
2445	-5.06	31.21	2.61
2450	-4.98	31.80	2.67
2455	-4.95	32.00	2.75
2460	-4.91	32.27	2.79
2465	-4.86	32.65	2.90
2470	-5.02	31.49	2.72
2475	-5.01	31.54	2.76
2480	-5.18	30.35	2.52
2482	-5.13	30.71	2.59
2485	-5.02	31.47	2.67
2490	-4.94	32.04	2.73
2495	-4.59	34.71	3.11
2500	-4.51	35.39	3.21



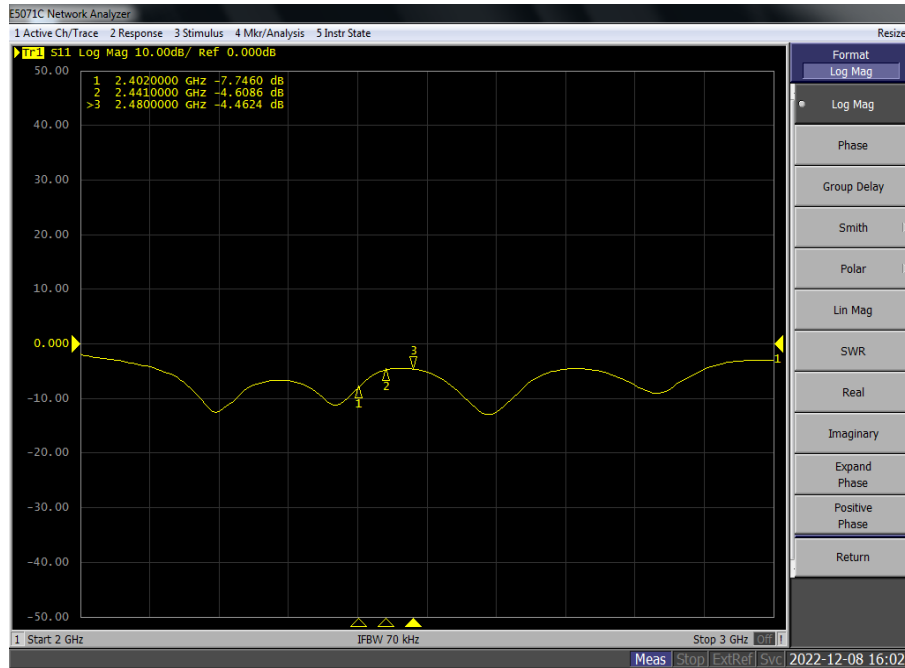
8.3 BT Antenna Test Results

Free Space			
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
2400	-4.49	35.60	0.68
2402	-4.48	35.63	0.65
2405	-4.44	35.98	0.78
2410	-4.53	35.22	0.69
2415	-4.59	34.78	0.64
2420	-4.69	34.00	0.56
2425	-4.64	34.36	0.54
2430	-4.69	33.99	0.47
2435	-4.68	34.01	0.41
2440	-4.62	34.53	0.54
2441	-4.63	34.44	0.55
2445	-4.62	34.48	0.58
2450	-4.55	35.09	0.76
2455	-4.53	35.26	0.83
2460	-4.49	35.54	0.78
2465	-4.45	35.89	0.83
2470	-4.60	34.65	0.58
2475	-4.66	34.19	0.59
2480	-4.89	32.46	0.32
2482	-4.86	32.63	0.30
2485	-4.81	33.01	0.53
2490	-4.73	33.65	0.54
2495	-4.39	36.36	0.93
2500	-4.25	37.57	1.01

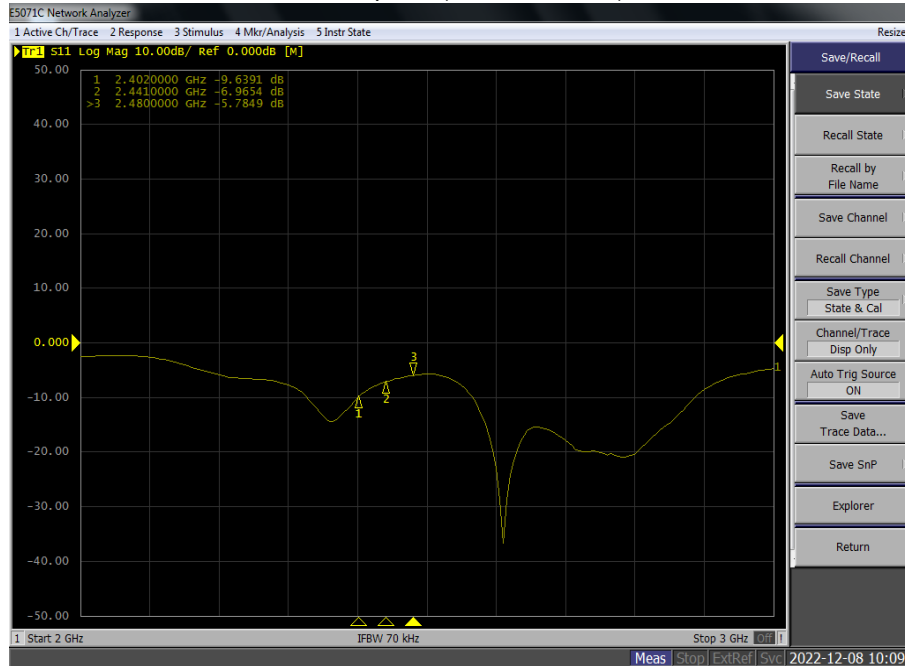


9 Pattern Plots

Return Los



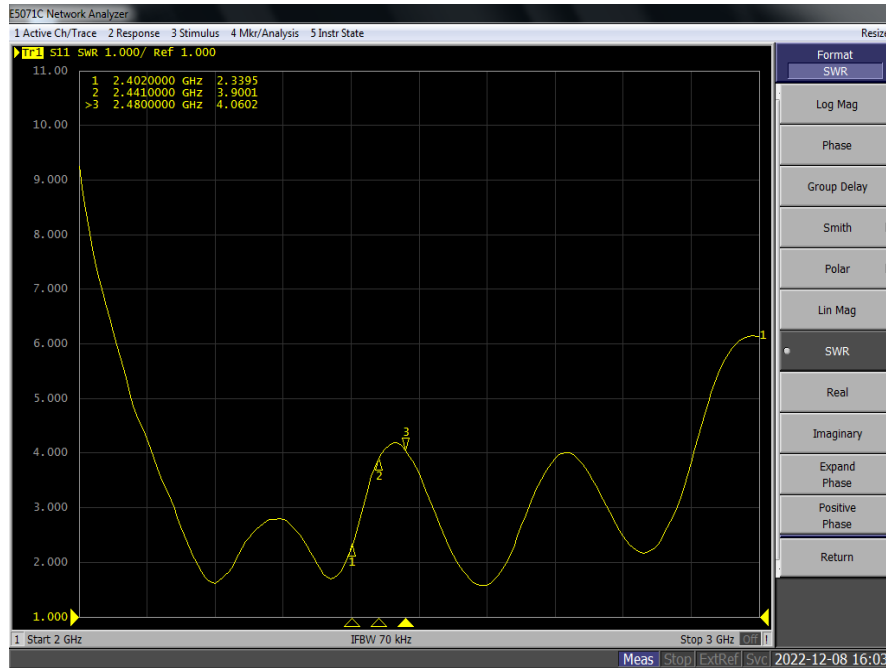
Free Space (Wi-Fi Antenna)



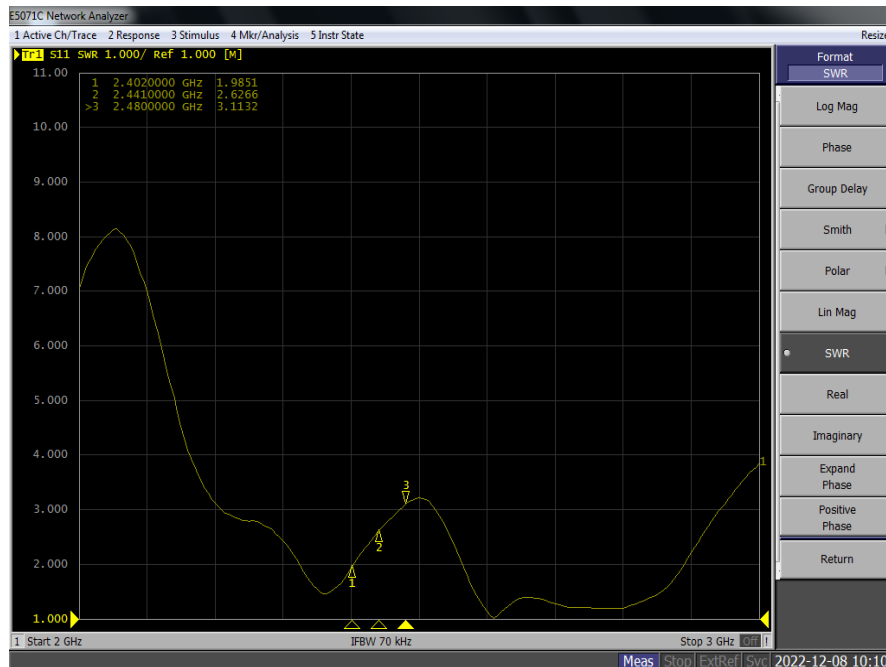
Free Space (BT Antenna)



VSWR



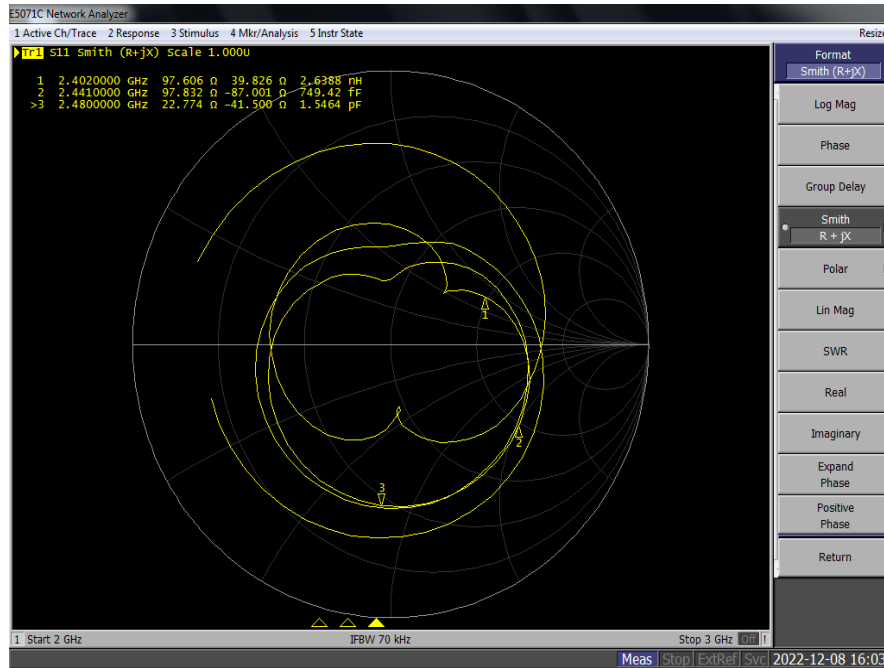
Free Space (Wi-Fi Antenna)



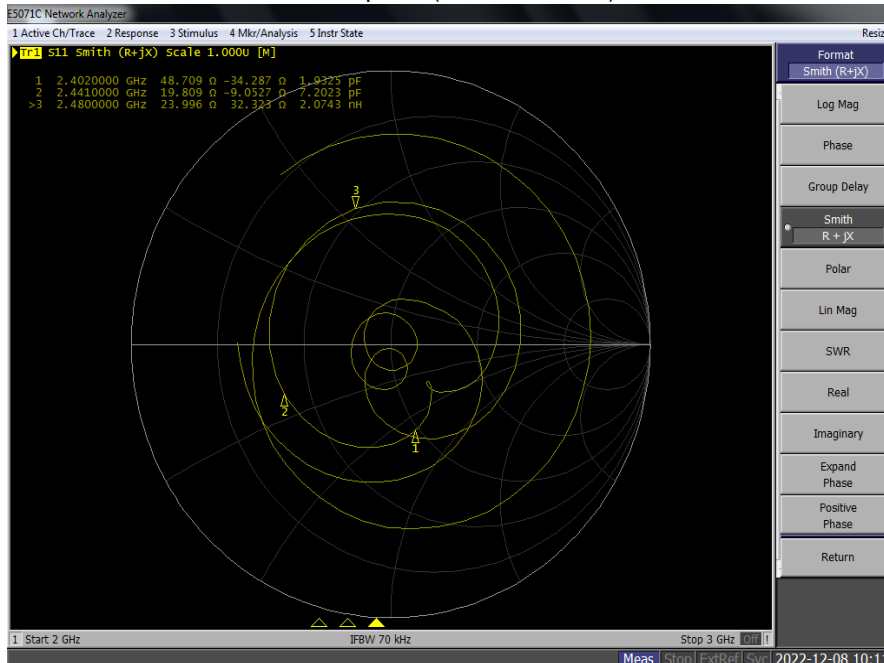
Free Space (BT Antenna)



Stimulus



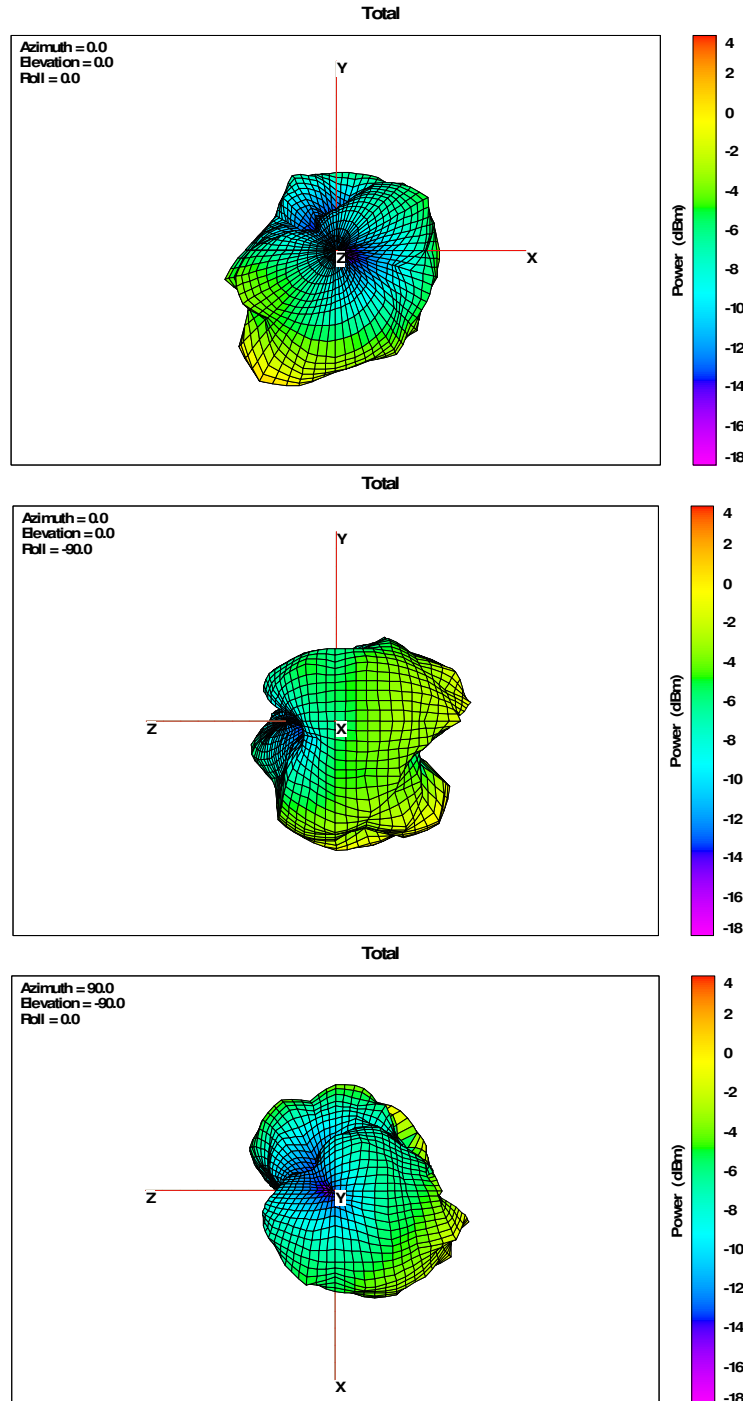
Free Space (Wi-Fi Antenna)



Free Space (BT Antenna)

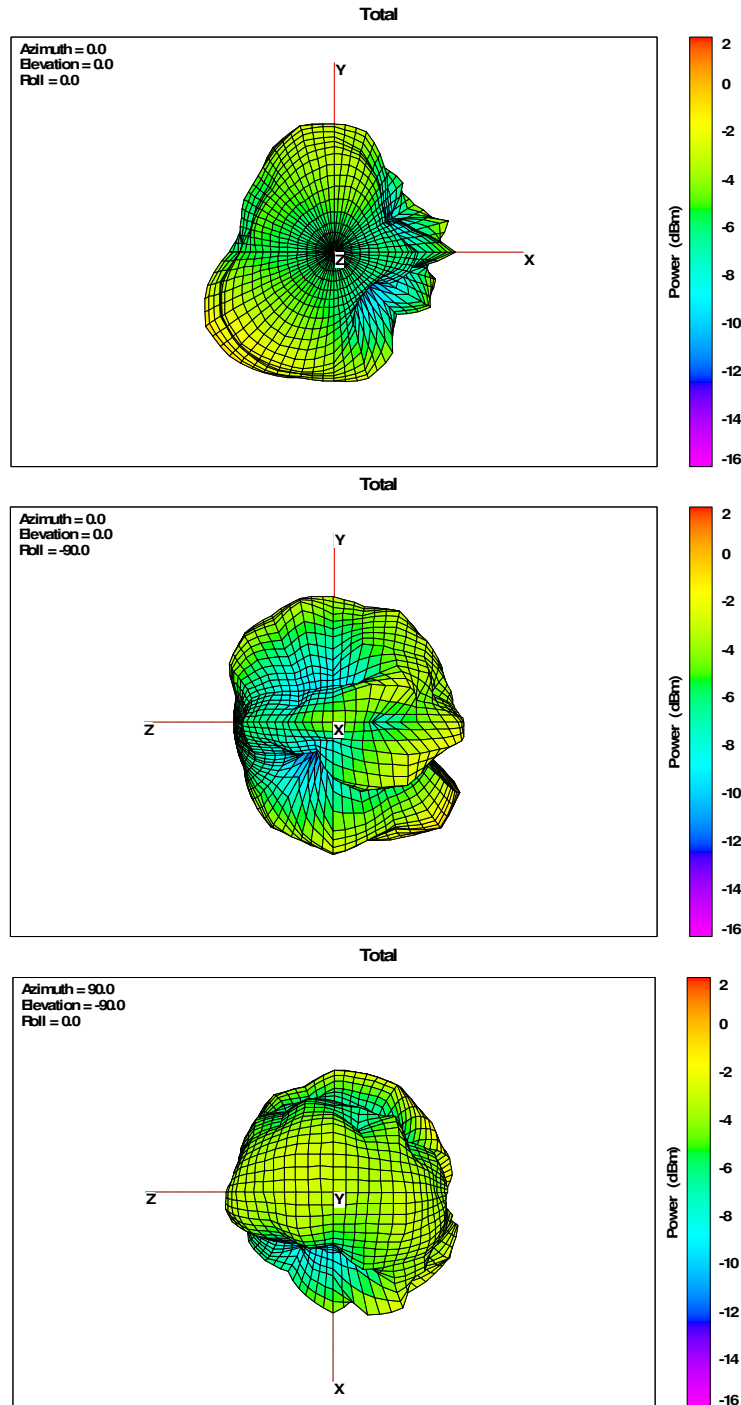


10 3-D Antenna Pattern



Wi-Fi Antenna 3-D Antenna Pattern



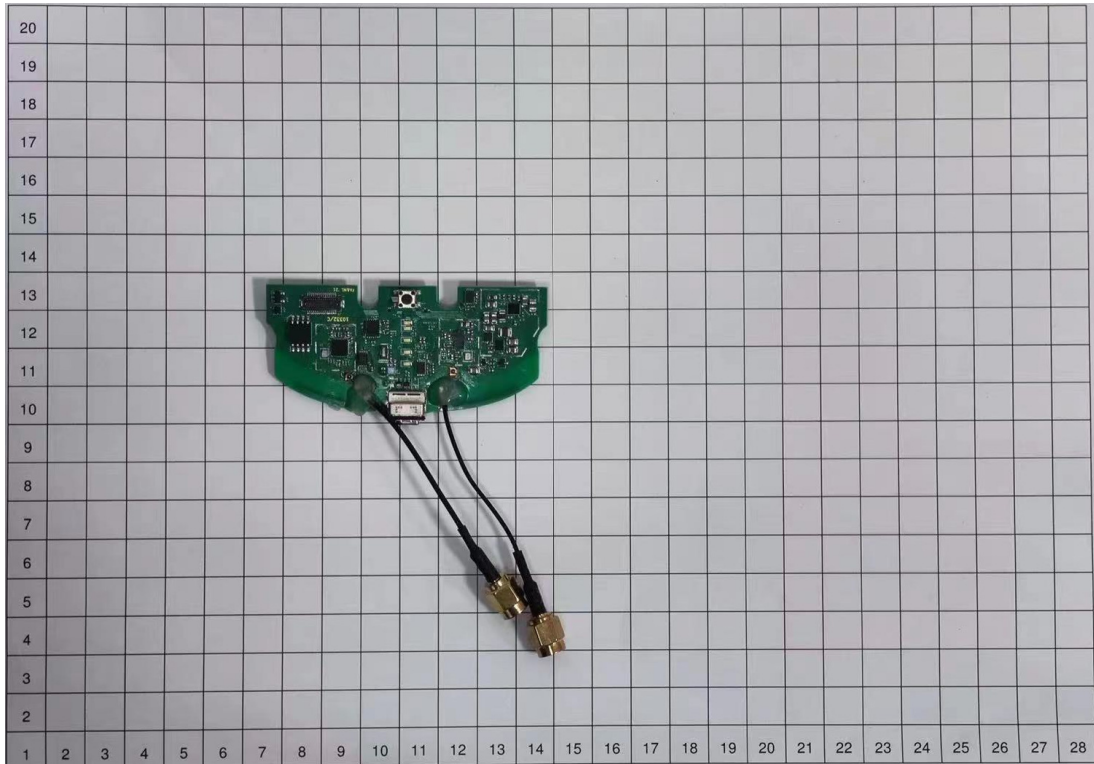


BT Antenna 3-D Antenna Pattern

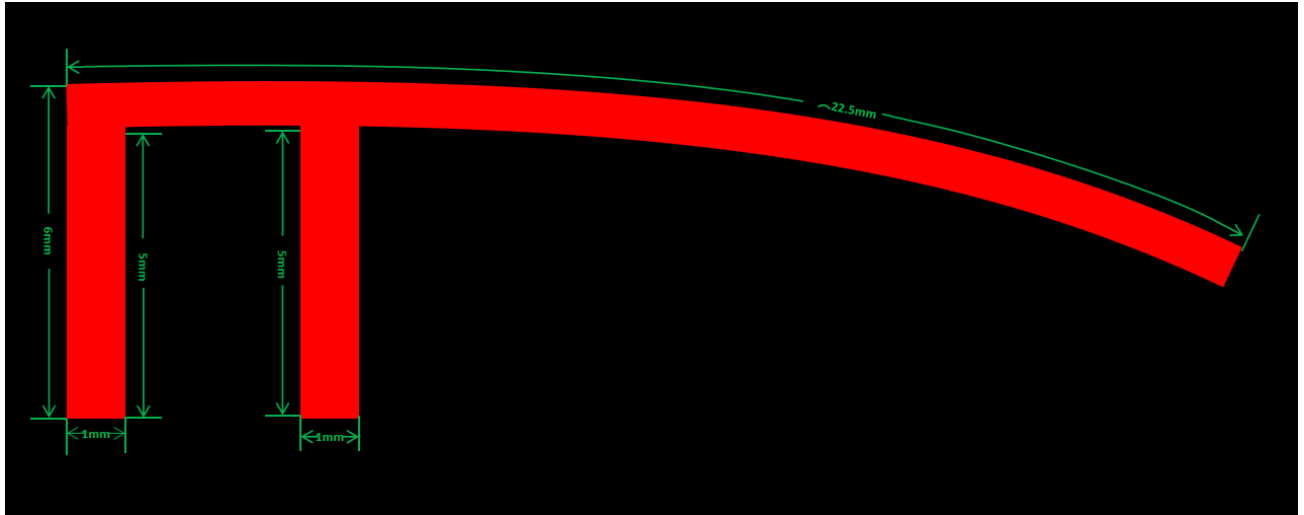


11 The EUT and Test Configuration

Photo of EUT

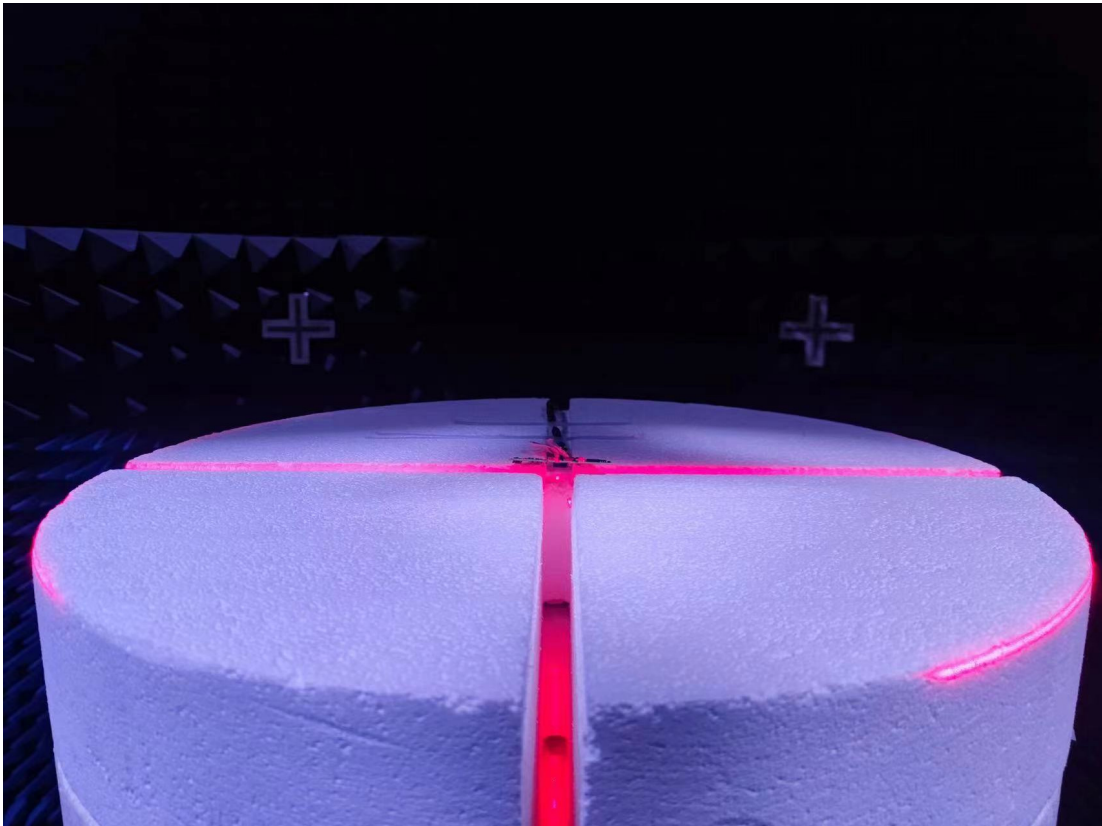


Size of the Antenna



Size of the Antenna in the EUT

Free Space View



- End of the Report -

