



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

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Rev.: 01
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ANTENNA PASSIVE TEST REPORT

Application No. SZOA2407000166AT
Applicant Janus International Group LLC
Manufacturer Huizhou Zecheng Electronics Co.,Ltd.
Product Name NOKĒ 3.2 Unit Controller
Model No. UC-XXX
Standards ANSI/IEEE Std 149-2021
Date Initial Sample(s) Received July 23, 2024
Testing Start Date July 23, 2024
Testing Finish Date August 5, 2024
Report Issue Date September 9, 2024

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

Yuanyu Luo

Prepared by: Yuanyu Luo/ Test Engineer

Ervin Li

Approved by: Ervin Li/ Technical Manager



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Revision History

Revision	Issue Date	Description
01	September 9, 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	Janus International Group LLC
Applicant's Address	135 Janus International Blvd. Temple, GA 30179
Contact	Kathrine Cao
Tel.	0086 13592732924
Fax	N/A
E-mail	kathrine.cao@janusintl.com

1.3 Details of Manufacturer

Manufacturer's Name	Huizhou Zecheng Electronics Co.,Ltd.
Manufacturer's Address	No.18,Weigang Rd, Qibu District, Zhonghan Chanye Yuan, Zongkai Gaoxinqu, Huizhou, Guangdong, China
Contact	Ruby Zhang
Tel.	0086 13410786201
Fax	N/A
E-mail	ruby.zhang@flexiblecircuit.cn



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1.4 General Description of EUT

Device Description:	NOKĒ 3.2 Unit Controller
Device Manufacturer:	Huizhou Zecheng Electronics Co.,Ltd.
Device Model:	UC-XXX
Hardware Version:	N/A
Software Version:	N/A
Antenna Dimensions:	34.00 x 1.60x1.60 mm
Antenna Type:	BLE NRF52840: Wire , WIRPAS NRF52832: Wire

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

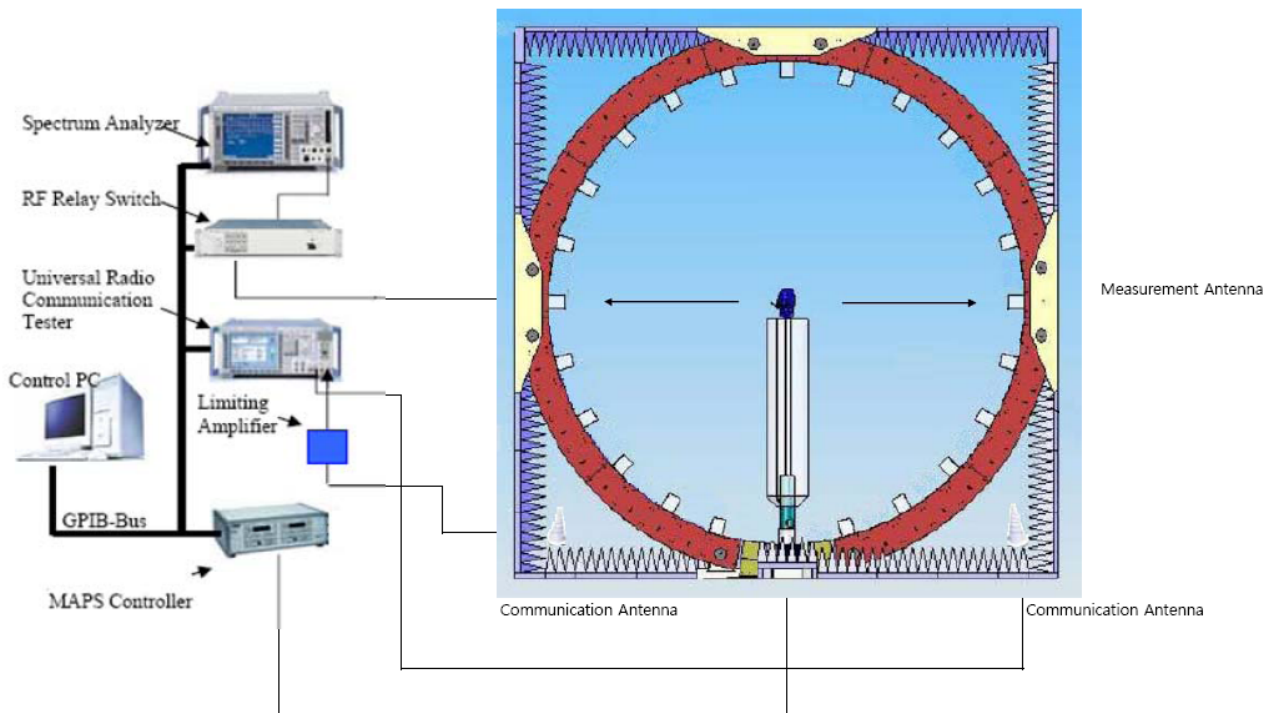
2.1 Test Configuration

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

BLE NRF52840			
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
2350	-10.57	8.77	-3.87
2355	-10.59	8.72	-3.84
2360	-10.32	9.30	-3.36
2365	-10.41	9.10	-3.77
2370	-10.32	9.29	-3.73
2375	-10.37	9.17	-3.81
2380	-10.29	9.36	-3.87
2385	-10.12	9.73	-2.89
2390	-10.04	9.91	-2.68
2395	-9.75	10.58	-2.14
2400	-9.88	10.27	-2.30
2402	-9.92	10.19	-2.39
2405	-9.92	10.19	-2.26
2410	-10.01	9.97	-2.62
2415	-10.10	9.77	-3.39
2420	-10.08	9.82	-3.56
2425	-10.31	9.31	-4.01
2430	-10.48	8.95	-5.04
2435	-10.83	8.27	-5.46
2440	-10.81	8.30	-5.57
2441	-10.74	8.44	-5.63
2445	-10.63	8.65	-5.17

WIRPAS NRF52832			
Frequency (MHz)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
2350	-10.07	9.84	-3.20
2355	-10.11	9.74	-3.46
2360	-9.87	10.30	-3.13
2365	-10.00	10.01	-3.20
2370	-9.96	10.08	-3.60
2375	-10.10	9.78	-4.18
2380	-10.07	9.85	-4.12
2385	-9.97	10.07	-3.50
2390	-9.94	10.13	-3.16
2395	-9.77	10.55	-2.65
2400	-10.03	9.93	-2.34
2402	-10.12	9.73	-2.61
2405	-10.20	9.55	-2.69
2410	-10.33	9.26	-2.98
2415	-10.34	9.25	-3.11
2420	-10.07	9.85	-3.03
2425	-10.01	9.98	-2.95
2430	-9.94	10.14	-3.05
2435	-10.07	9.83	-4.07
2440	-10.04	9.92	-5.19
2441	-9.96	10.09	-5.27
2445	-9.92	10.18	-6.06



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2450	-10.44	9.04	-5.04
2455	-10.23	9.49	-4.95
2460	-10.30	9.32	-4.74
2465	-10.24	9.45	-4.31
2470	-10.44	9.04	-4.08
2475	-10.45	9.01	-4.20
2480	-10.52	8.88	-4.35
2485	-10.50	8.92	-4.01
2490	-10.43	9.06	-3.72
2495	-10.26	9.42	-3.32
2500	-10.25	9.43	-3.20
2505	-10.16	9.63	-3.17
2510	-10.16	9.64	-3.38
2515	-10.29	9.36	-3.95
2520	-10.37	9.18	-3.77
2525	-10.47	8.97	-3.53
2530	-10.39	9.14	-3.31
2535	-10.29	9.35	-3.34
2540	-10.10	9.78	-3.33
2545	-9.81	10.45	-2.84
2550	-9.59	10.99	-2.54
2555	-9.44	11.38	-2.14
2560	-9.40	11.49	-2.23
2565	-9.31	11.71	-2.20
2570	-9.27	11.84	-2.40
2575	-9.11	12.28	-2.55
2580	-9.03	12.49	-2.22

2450	-9.90	10.24	-5.85
2455	-9.83	10.39	-5.05
2460	-10.06	9.87	-4.85
2465	-10.10	9.77	-4.65
2470	-10.44	9.04	-4.98
2475	-10.54	8.83	-5.21
2480	-10.71	8.49	-5.22
2485	-10.73	8.46	-5.00
2490	-10.73	8.45	-4.70
2495	-10.64	8.64	-4.54
2500	-10.70	8.50	-4.47
2505	-10.66	8.59	-4.48
2510	-10.71	8.49	-4.73
2515	-10.86	8.21	-4.61
2520	-10.96	8.01	-4.43
2525	-11.08	7.79	-4.48
2530	-11.03	7.88	-4.50
2535	-10.99	7.96	-4.63
2540	-10.82	8.28	-4.51
2545	-10.57	8.77	-4.18
2550	-10.39	9.15	-3.93
2555	-10.30	9.32	-3.58
2560	-10.32	9.29	-3.61
2565	-10.29	9.36	-3.59
2570	-10.28	9.38	-3.74
2575	-10.13	9.71	-3.69
2580	-10.10	9.78	-3.54



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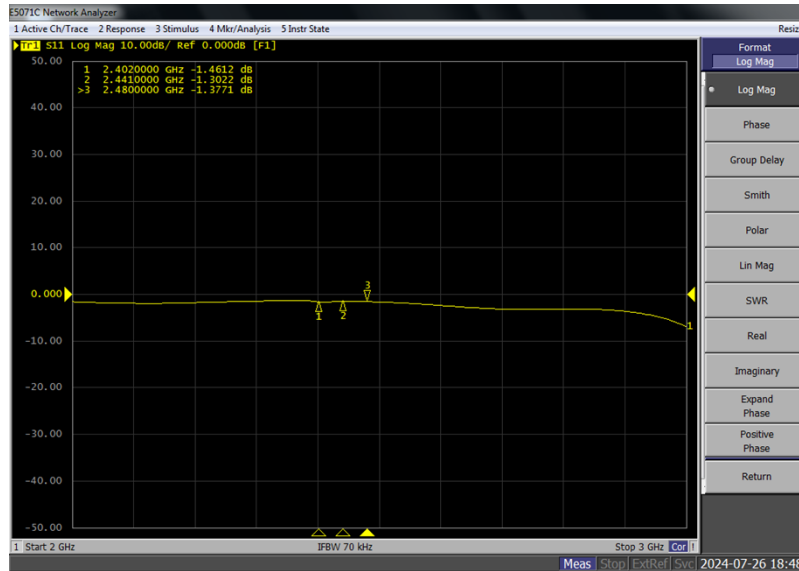
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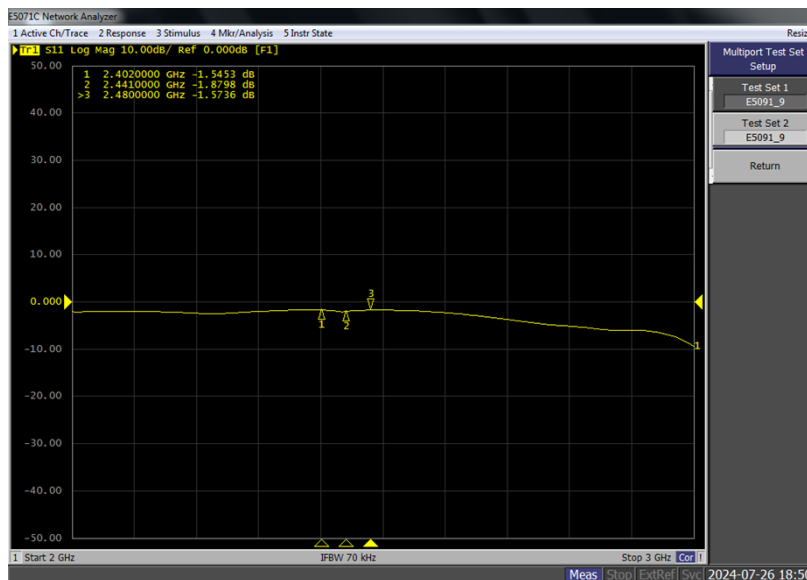
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6 Pattern Plots

6.1 Return Loss



Free Space (BLE NRF52840)



Free Space (WIRPAS NRF52832)

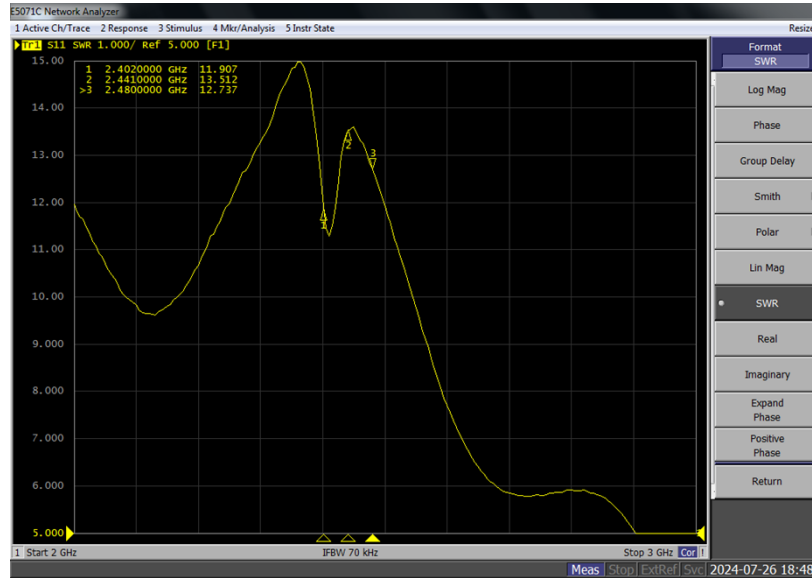


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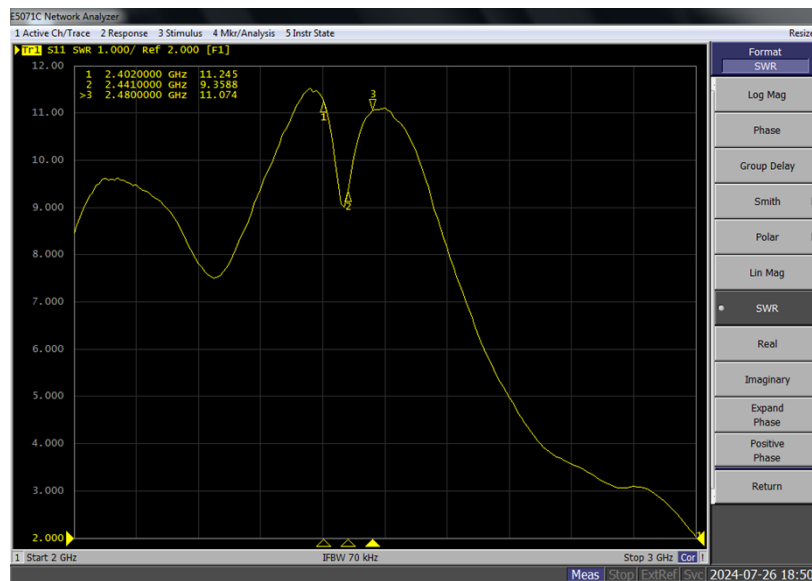
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6.2 VSWR



Free Space (BLE NRF52840)



Free Space (WIRPAS NRF52832)



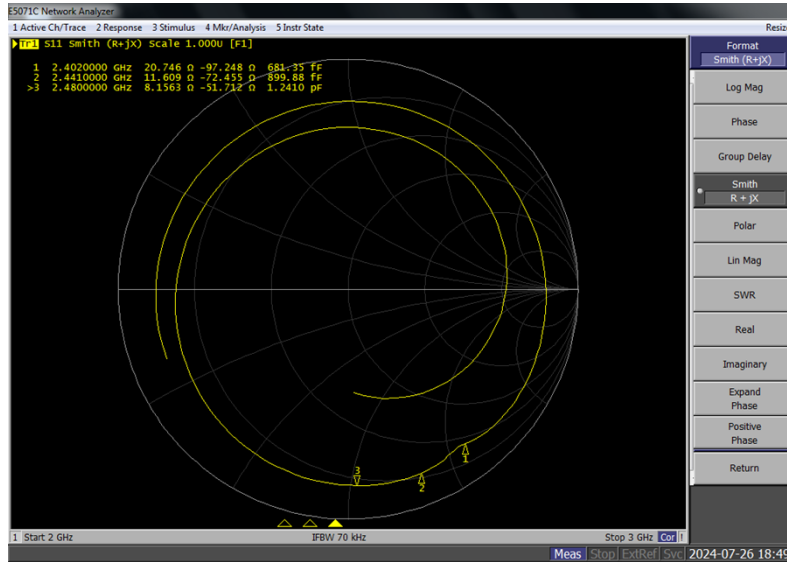
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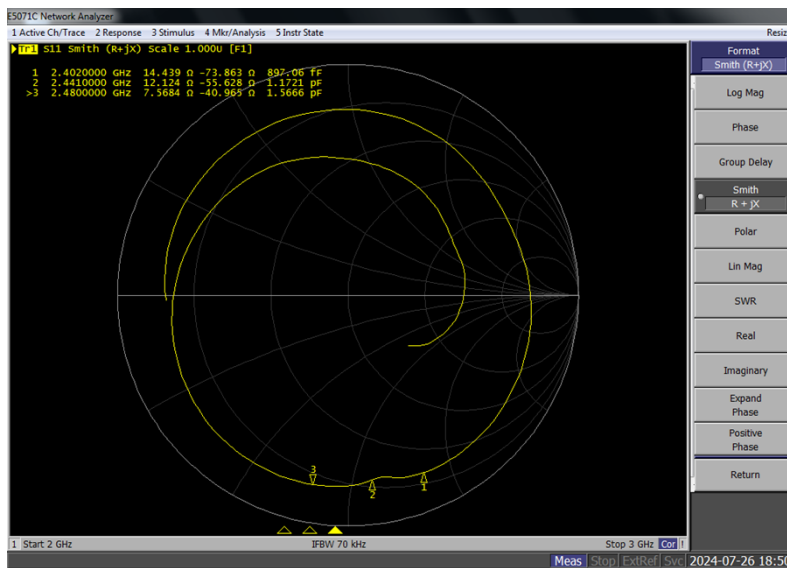
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6.3 Stimulus



Free Space (BLE NRF52840)



Free Space (WIRPAS NRF52832)



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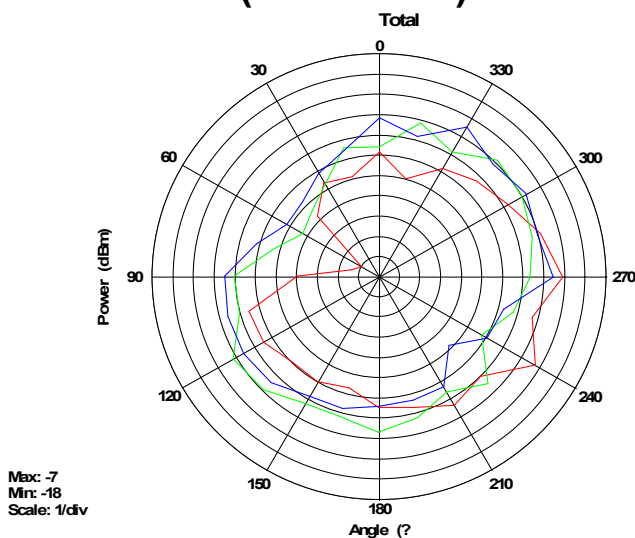
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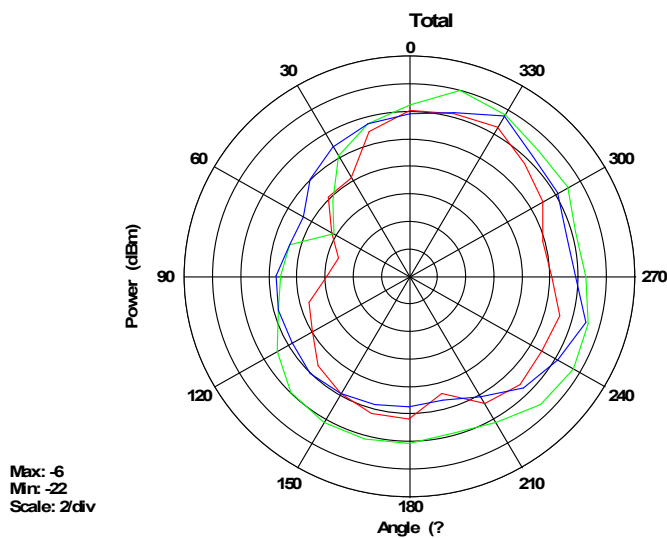
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7 2-D Antenna Pattern(Theta=90°)



Free Space (BLE NRF52840)



Free Space (WIRPAS NRF52832)

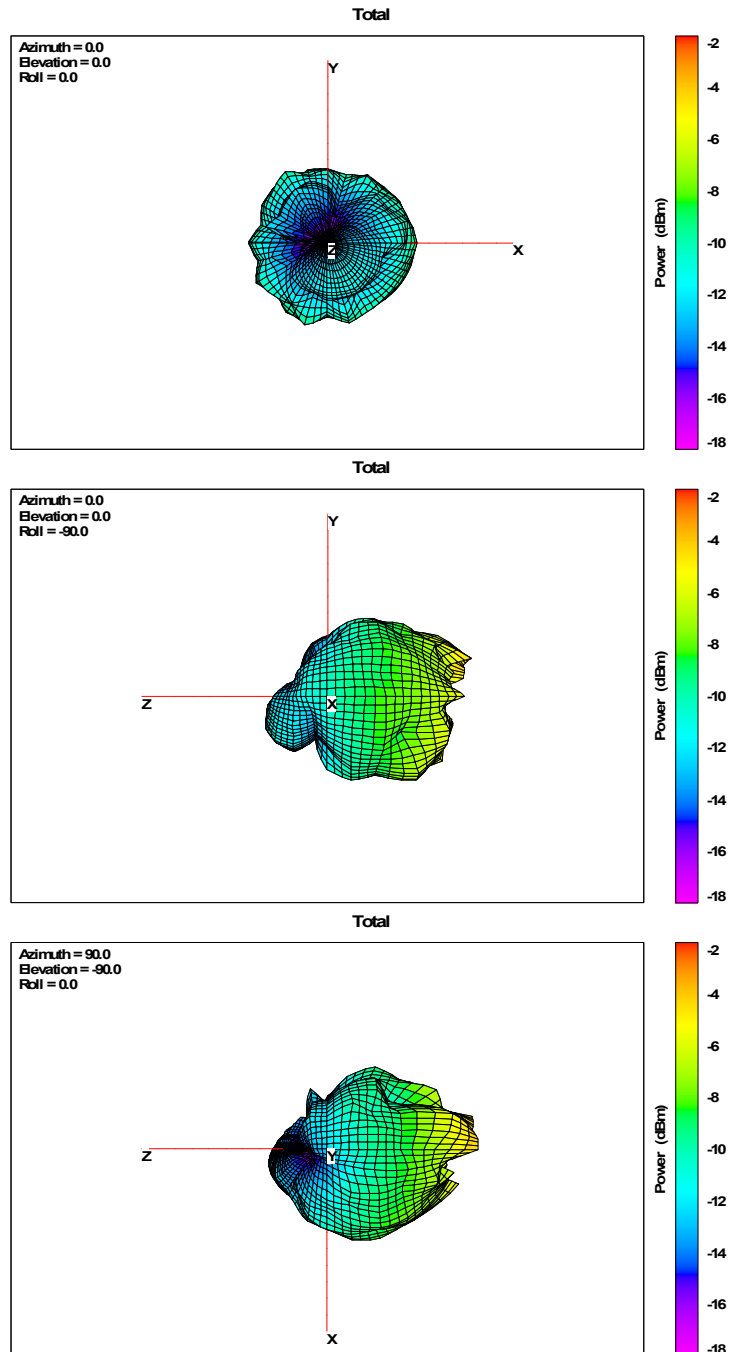


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8 3-D Antenna Pattern



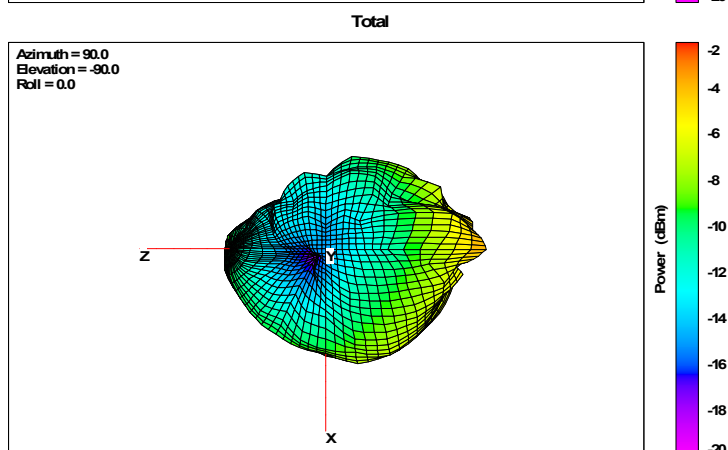
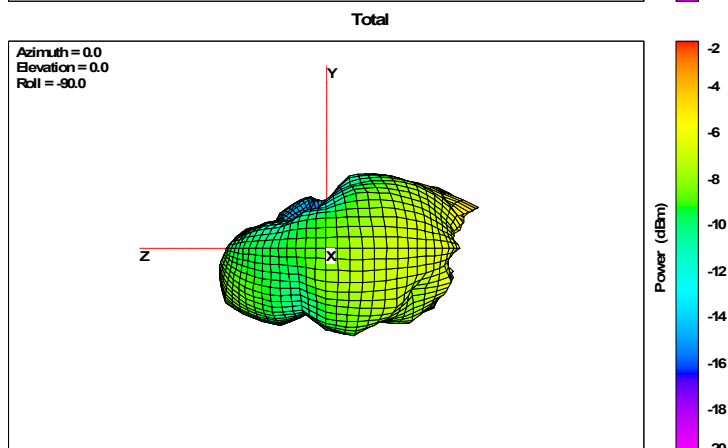
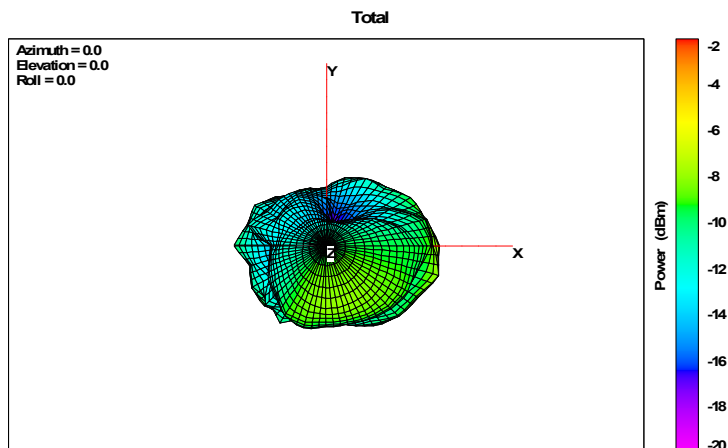
Free Space (BLE NRF52840)



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Free Space (WIRPAS NRF52832)



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9 The EUT and Test Configuration

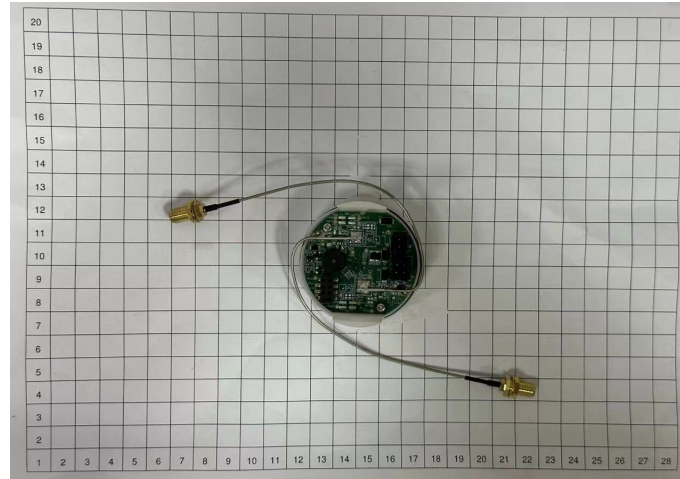
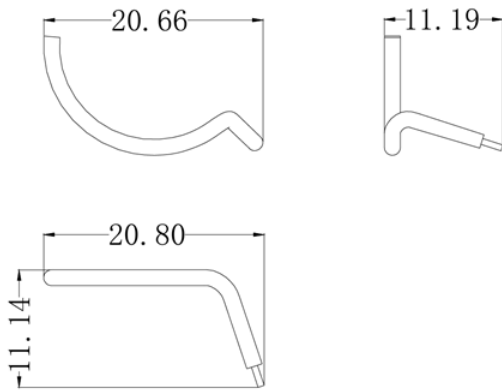
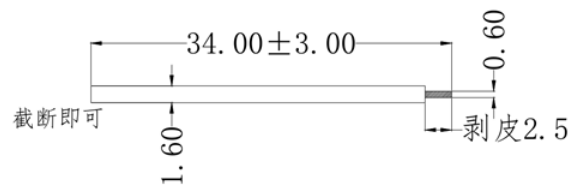


Photo of EUT (BLE NRF52840 & WIRPAS NRF52832)

天线组装折弯三视图



天线展平视图



Antenna Dimensions (BLE NRF52840 & WIRPAS NRF52832)

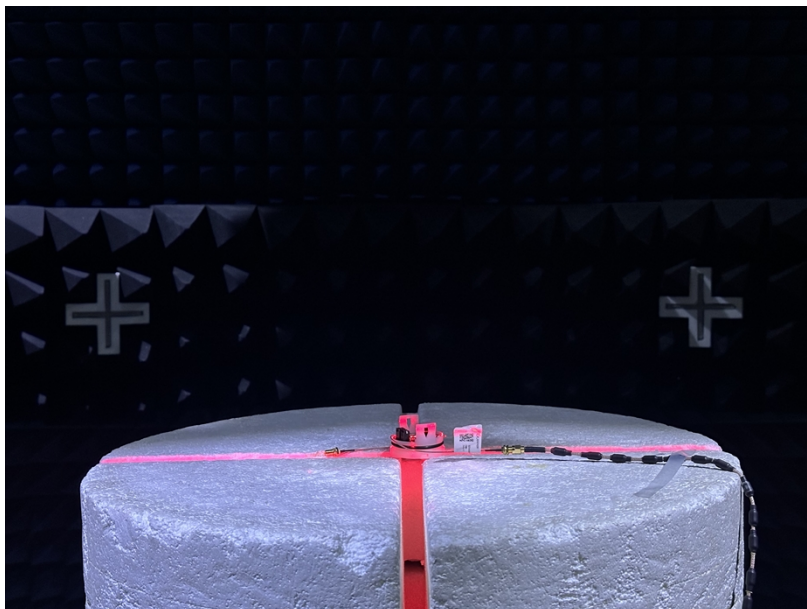


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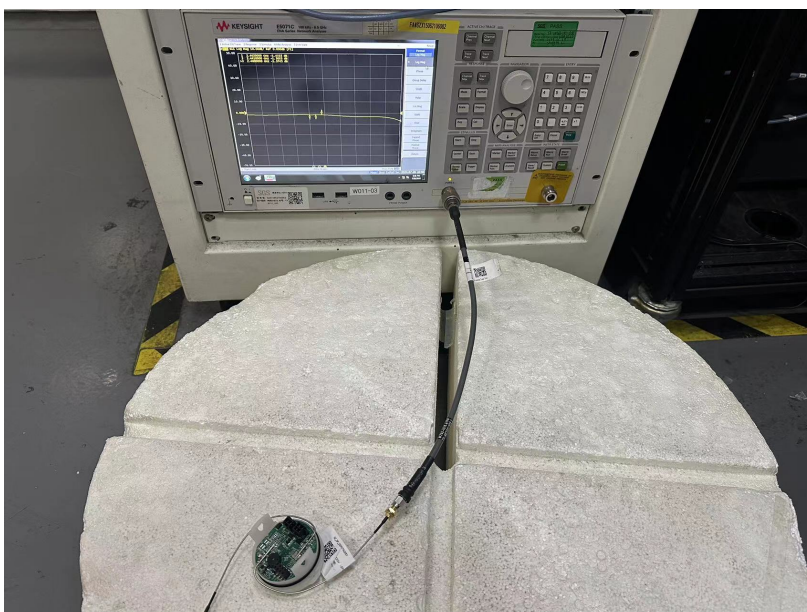
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Free Space View (BLE NRF52840& WIRPAS NRF52832)



Free Space Setup (BLE NRF52840& WIRPAS NRF52832)

---END---



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