

# ANTENNA PASSIVE TEST REPORT

Application No. SZOA2408000177AT  
 Applicant Janus International Group LLC  
 Manufacturer Huizhou Zecheng Electronic., Ltd.  
 Product Name KP-2  
 Model No. NOKĒ Keypad 3x4  
 Standards ANSI/IEEE Std 149-2021  
 Date Initial Sample(s) Received August 8, 2024  
 Testing Start Date August 8, 2024  
 Testing Finish Date August 16, 2024  
 Report Issue Date September 20, 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 20, 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.                | +86 13592732924                                 |
| Fax                 | N/A                                             |
| E-mail              | kathrine.cao@janusintl.com                      |

#### 1.3 Details of Manufacturer

|                        |                                                                                                    |
|------------------------|----------------------------------------------------------------------------------------------------|
| Manufacturer's Name    | Huizhou Zecheng Electronic., 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:  | Wire                             |
| Device Manufacturer: | Huizhou Zecheng Electronic., Ltd |
| Device Model:        | KP-2                             |
| Hardware Version:    | N/A                              |
| Software Version:    | N/A                              |
| Antenna Dimensions:  | 28.0 x 0.6 x 0.6 mm              |
| Antenna Type:        | N52832: Wire, N52840: Wire       |

### 1.5 Test Procedure

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

### 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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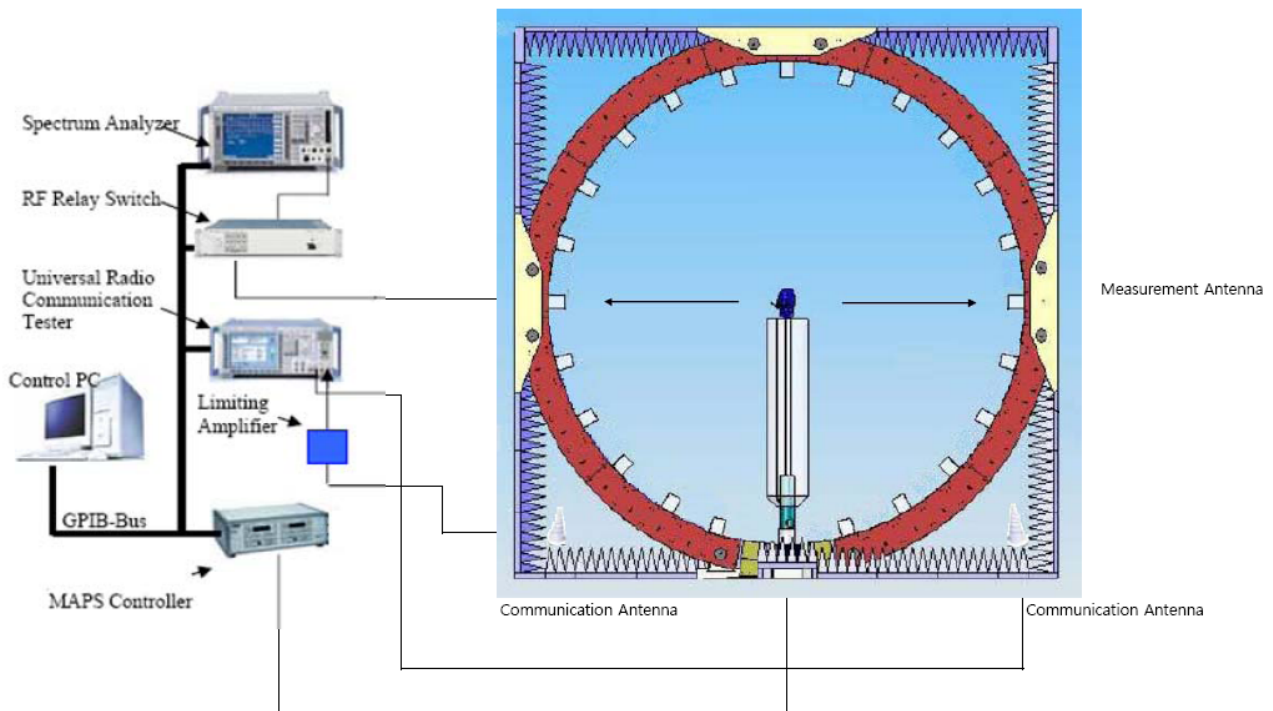
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## 2 OTA Measurements System Configuration

### 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



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3 Test Equipment List

| Type of Equipment                         | Model Number               | Manufacture       | Calibration Date | Valid Period |
|-------------------------------------------|----------------------------|-------------------|------------------|--------------|
| Network Analyzer                          | E5071C<br>S/N MY46523590   | Keysight          | 2024/1/30        | 2025/1/29    |
| Quad-Ridge Horn Antenna<br>700 MHz-10 GHz | EMCO 3164-08<br>S/N 161915 | ETS-Lindgren L.P. | N/A              | N/A          |
| MAPS Controller                           | EMCENTER<br>S/N 160485     | ETS-Lindgren L.P. | N/A              | N/A          |



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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

| N52832          |                 |                |            |
|-----------------|-----------------|----------------|------------|
| Frequency (MHz) | Efficiency (dB) | Efficiency (%) | Gain (dBi) |
| 2350            | -16.50          | 2.24           | -10.89     |
| 2355            | -16.58          | 2.20           | -11.26     |
| 2360            | -16.32          | 2.34           | -11.20     |
| 2365            | -16.45          | 2.27           | -11.52     |
| 2370            | -16.54          | 2.22           | -11.00     |
| 2375            | -16.69          | 2.14           | -11.13     |
| 2380            | -16.78          | 2.10           | -10.64     |
| 2385            | -16.76          | 2.11           | -10.63     |
| 2390            | -16.88          | 2.05           | -10.52     |
| 2395            | -16.87          | 2.05           | -10.59     |
| 2400            | -17.39          | 1.82           | -11.30     |
| 2402            | -17.58          | 1.75           | -11.29     |
| 2405            | -17.87          | 1.63           | -11.73     |
| 2410            | -18.29          | 1.48           | -12.37     |
| 2415            | -18.65          | 1.37           | -12.53     |
| 2420            | -18.72          | 1.34           | -12.89     |
| 2425            | -18.93          | 1.28           | -13.02     |
| 2430            | -19.08          | 1.24           | -13.44     |
| 2435            | -19.02          | 1.25           | -13.44     |
| 2440            | -18.83          | 1.31           | -13.16     |
| 2441            | -18.71          | 1.34           | -12.99     |
| 2445            | -18.44          | 1.43           | -12.78     |
| 2450            | -18.12          | 1.54           | -12.14     |



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|      |        |      |        |
|------|--------|------|--------|
| 2455 | -17.78 | 1.67 | -11.54 |
| 2460 | -17.65 | 1.72 | -11.23 |
| 2465 | -17.45 | 1.80 | -11.20 |
| 2470 | -17.52 | 1.77 | -11.10 |
| 2475 | -17.40 | 1.82 | -11.39 |
| 2480 | -17.32 | 1.85 | -11.46 |
| 2482 | -17.27 | 1.87 | -11.34 |
| 2485 | -17.23 | 1.89 | -11.37 |
| 2490 | -17.12 | 1.94 | -11.46 |
| 2495 | -17.04 | 1.98 | -11.37 |
| 2500 | -17.16 | 1.92 | -11.40 |
| 2505 | -17.23 | 1.89 | -11.41 |
| 2510 | -17.49 | 1.78 | -11.59 |
| 2515 | -17.87 | 1.63 | -11.94 |
| 2520 | -18.27 | 1.49 | -12.28 |
| 2525 | -18.72 | 1.34 | -12.82 |
| 2530 | -19.03 | 1.25 | -13.24 |
| 2535 | -19.28 | 1.18 | -13.61 |
| 2540 | -19.41 | 1.15 | -13.47 |
| 2545 | -19.37 | 1.16 | -13.36 |
| 2550 | -19.42 | 1.14 | -13.33 |
| 2555 | -19.37 | 1.16 | -13.27 |
| 2560 | -19.32 | 1.17 | -13.33 |
| 2565 | -19.18 | 1.21 | -13.08 |
| 2570 | -18.94 | 1.28 | -12.35 |
| 2575 | -18.69 | 1.35 | -11.95 |
| 2580 | -18.34 | 1.47 | -11.47 |



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| N52840          |                 |                |            |
|-----------------|-----------------|----------------|------------|
| Frequency (MHz) | Efficiency (dB) | Efficiency (%) | Gain (dBi) |
| 2350            | -12.69          | 5.39           | -6.69      |
| 2355            | -12.85          | 5.19           | -7.08      |
| 2360            | -12.62          | 5.47           | -6.68      |
| 2365            | -12.74          | 5.32           | -6.59      |
| 2370            | -12.74          | 5.32           | -6.76      |
| 2375            | -12.80          | 5.25           | -6.68      |
| 2380            | -12.70          | 5.37           | -6.59      |
| 2385            | -12.49          | 5.64           | -6.36      |
| 2390            | -12.41          | 5.75           | -6.24      |
| 2395            | -12.20          | 6.02           | -5.94      |
| 2400            | -12.43          | 5.71           | -6.02      |
| 2402            | -12.52          | 5.60           | -6.34      |
| 2405            | -12.55          | 5.56           | -6.40      |
| 2410            | -12.53          | 5.59           | -6.20      |
| 2415            | -12.49          | 5.64           | -6.32      |
| 2420            | -12.26          | 5.94           | -6.05      |
| 2425            | -12.31          | 5.87           | -6.19      |
| 2430            | -12.41          | 5.74           | -6.26      |
| 2435            | -12.50          | 5.62           | -6.36      |
| 2440            | -12.61          | 5.48           | -6.40      |
| 2441            | -12.60          | 5.50           | -6.37      |
| 2445            | -12.56          | 5.55           | -6.45      |
| 2450            | -12.66          | 5.42           | -6.41      |
| 2455            | -12.66          | 5.42           | -6.61      |



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Report No.: SZOA2408000177AT01

Rev.: 01

Page: 12 of 21

|      |        |      |       |
|------|--------|------|-------|
| 2460 | -12.94 | 5.08 | -6.90 |
| 2465 | -13.18 | 4.81 | -7.18 |
| 2470 | -13.59 | 4.37 | -7.56 |
| 2475 | -13.85 | 4.12 | -7.64 |
| 2480 | -14.10 | 3.89 | -7.76 |
| 2482 | -14.18 | 3.82 | -7.75 |
| 2485 | -14.28 | 3.73 | -7.76 |
| 2490 | -14.41 | 3.62 | -7.76 |
| 2495 | -14.44 | 3.60 | -7.55 |
| 2500 | -14.55 | 3.50 | -7.56 |
| 2505 | -14.62 | 3.46 | -7.53 |
| 2510 | -14.75 | 3.35 | -7.51 |
| 2515 | -15.02 | 3.15 | -7.63 |
| 2520 | -15.29 | 2.96 | -7.78 |
| 2525 | -15.52 | 2.81 | -7.91 |
| 2530 | -15.64 | 2.73 | -8.05 |
| 2535 | -15.68 | 2.70 | -8.18 |
| 2540 | -15.61 | 2.75 | -8.05 |
| 2545 | -15.42 | 2.87 | -7.56 |
| 2550 | -15.33 | 2.93 | -7.21 |
| 2555 | -15.19 | 3.02 | -6.97 |
| 2560 | -15.14 | 3.06 | -6.98 |
| 2565 | -14.94 | 3.20 | -6.53 |
| 2570 | -14.74 | 3.36 | -6.39 |
| 2575 | -14.46 | 3.58 | -6.22 |
| 2580 | -14.12 | 3.88 | -5.97 |



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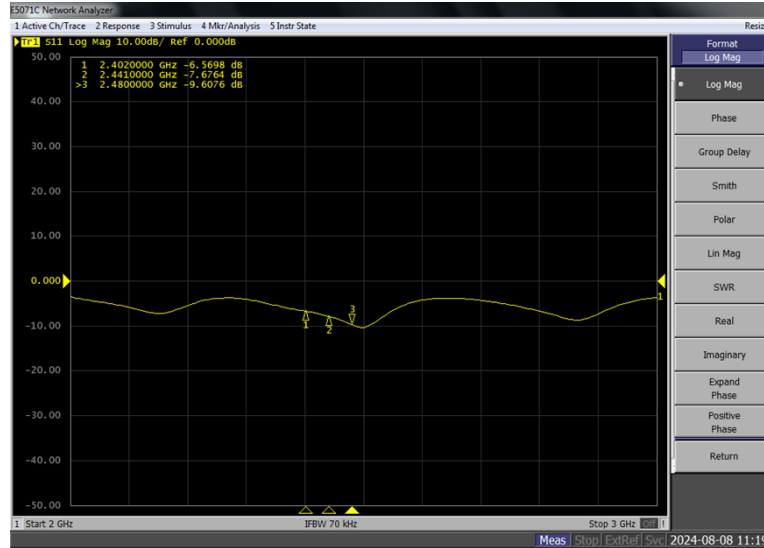
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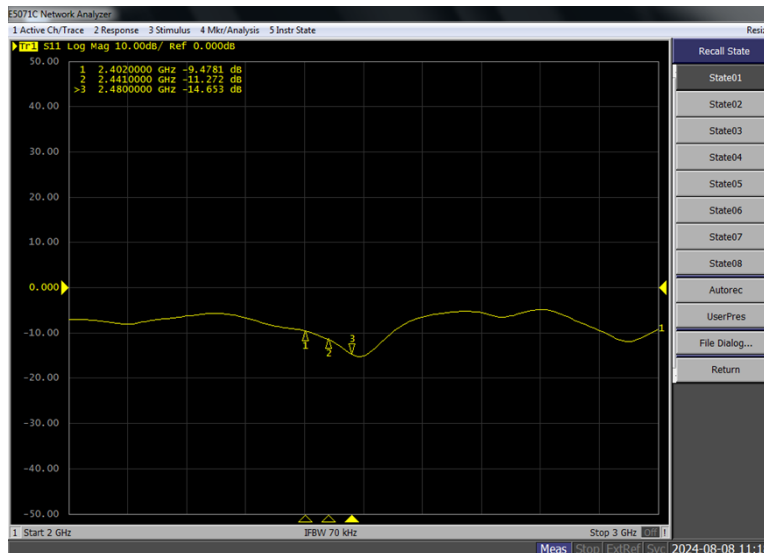
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## 6 Pattern Plots

### 6.1 Return Loss



N52832



N52840



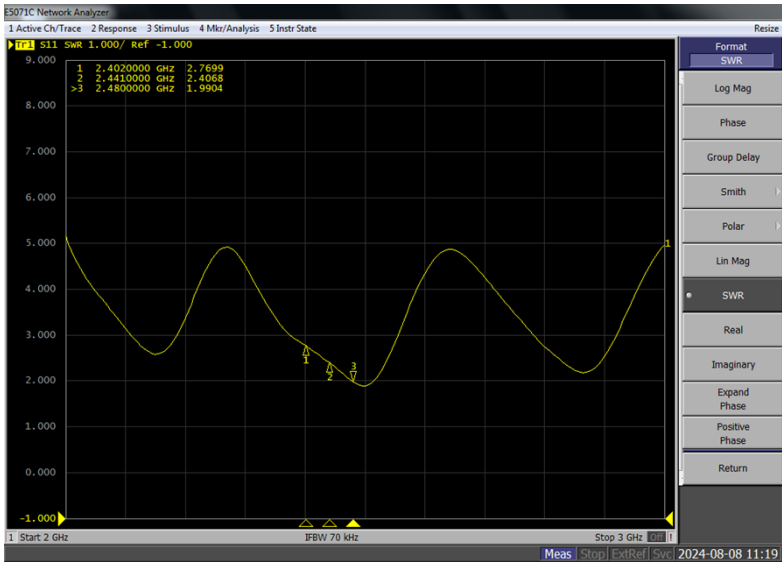
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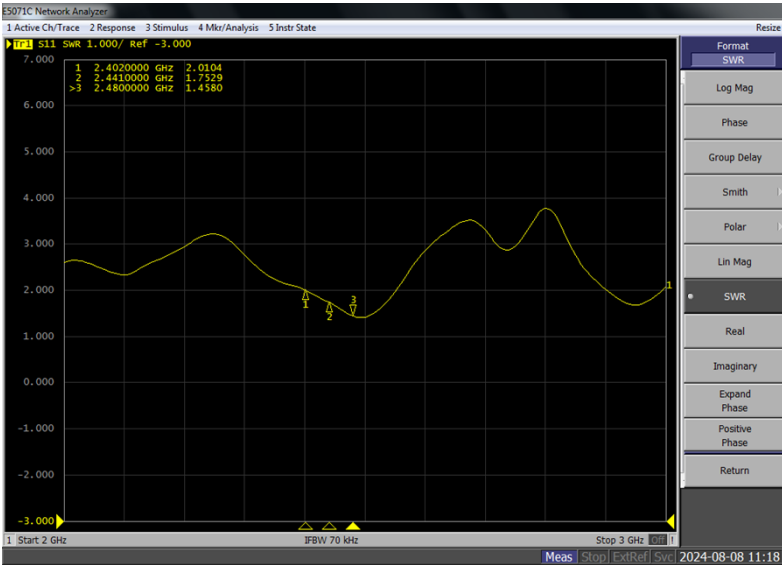
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### 6.2 VSWR



N52832



N52840

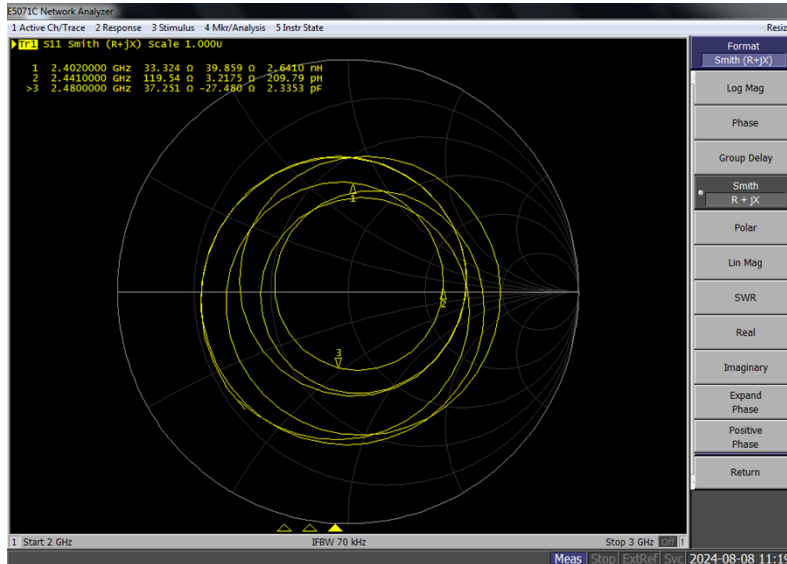


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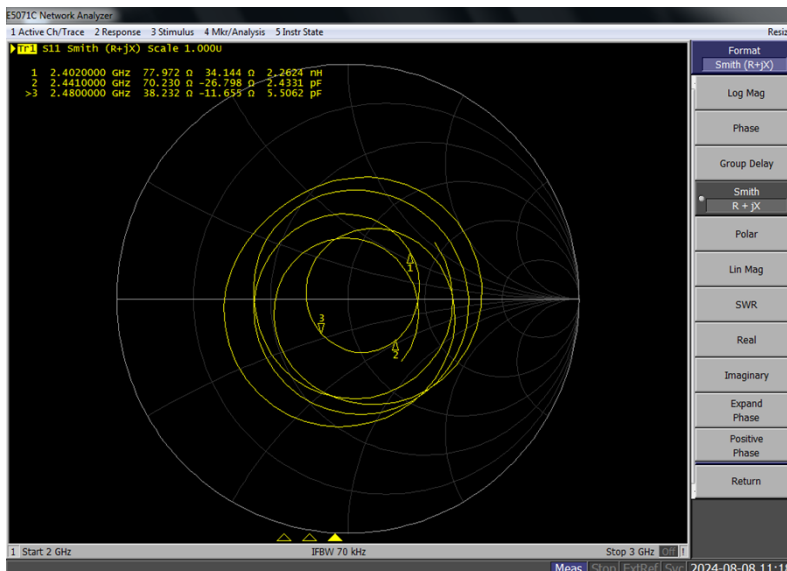
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### 6.3 Stimulus



N52832



N52840

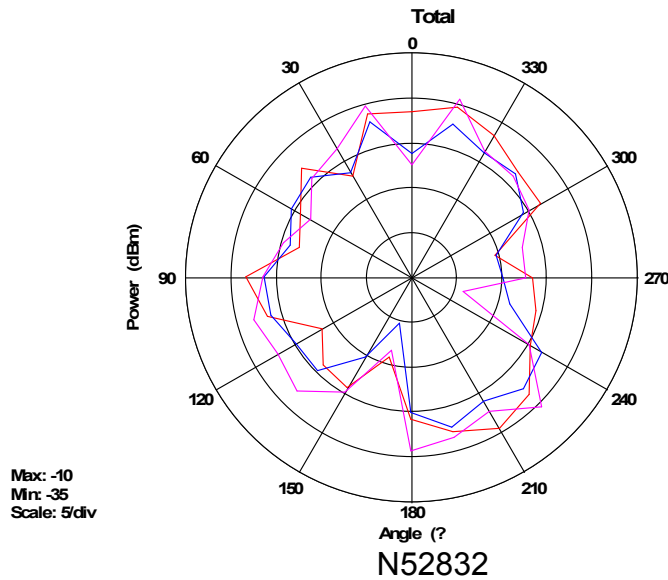


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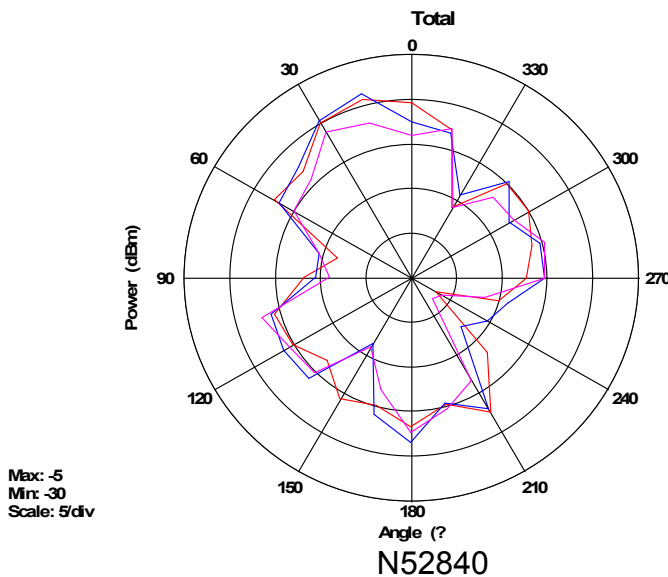
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### 7 2-D Antenna Pattern(Theta=90°)



2402 MHz  
2441 MHz  
2480 MHz



2402 MHz  
2441 MHz  
2480 MHz

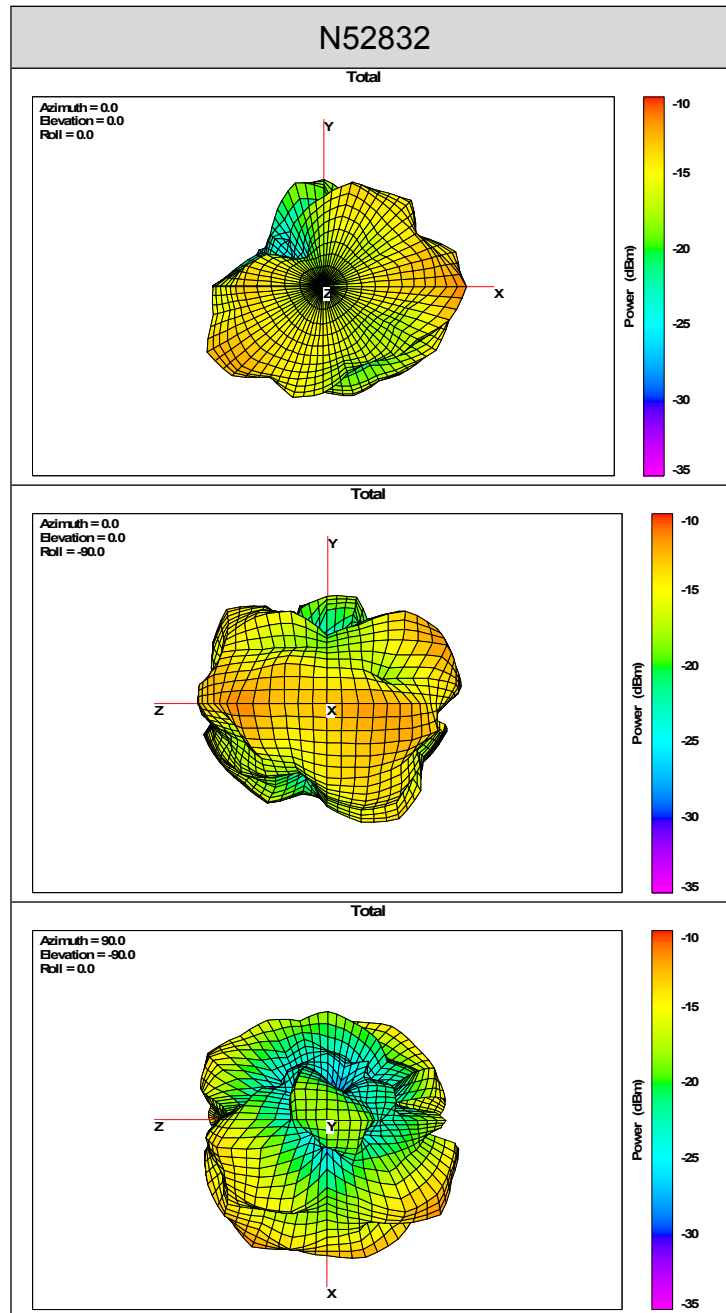


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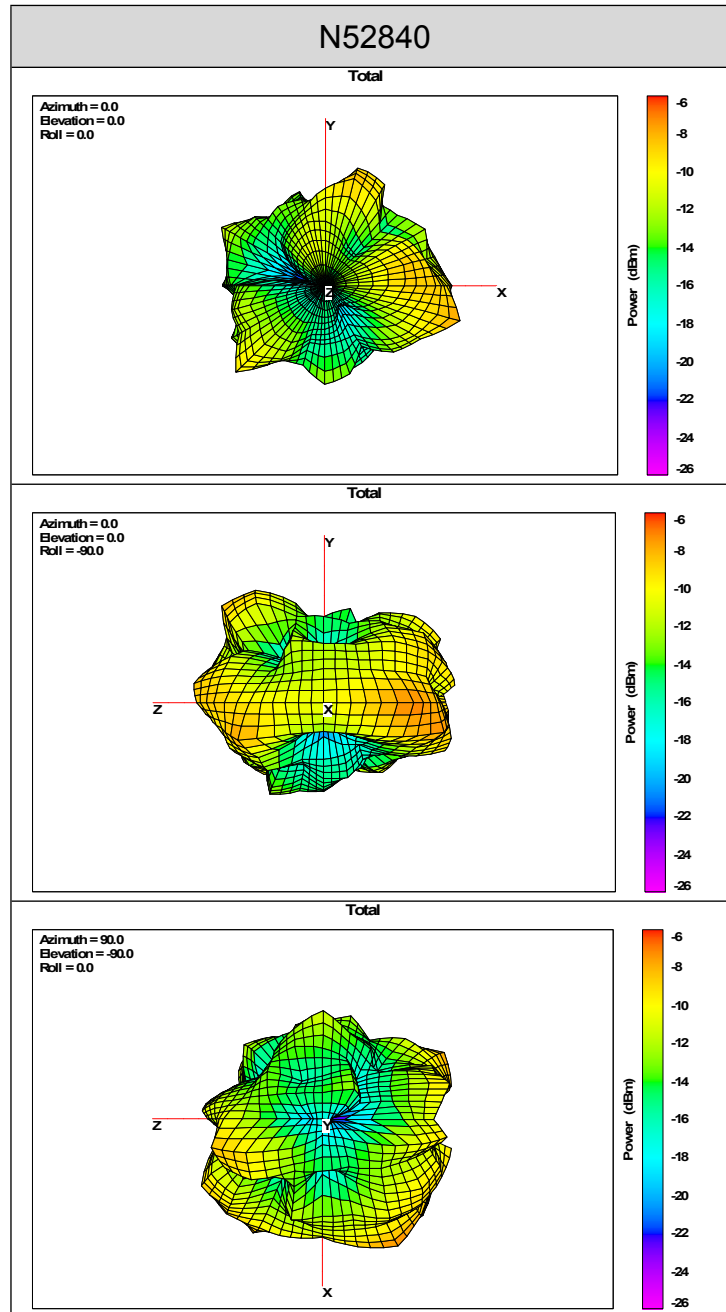
### 8 3-D Antenna Pattern



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## 9 The EUT and Test Configuration

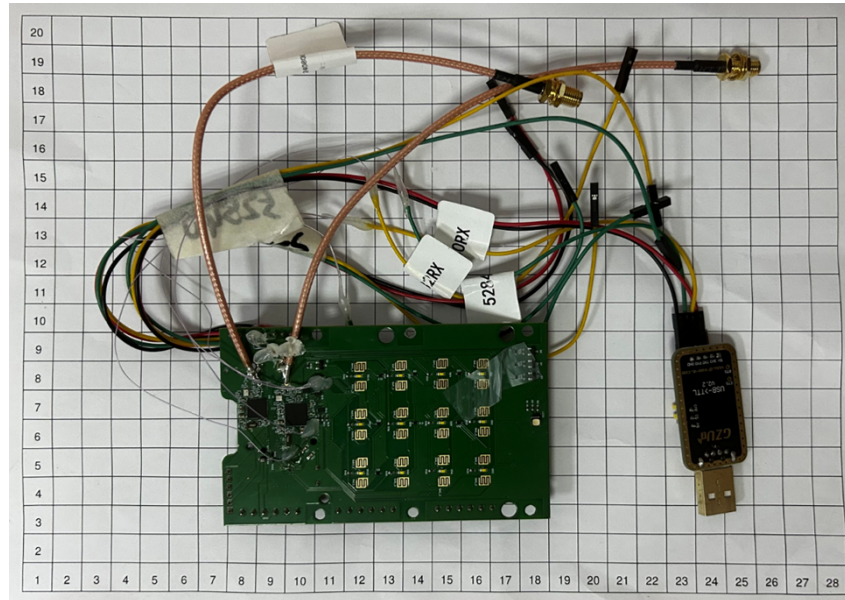
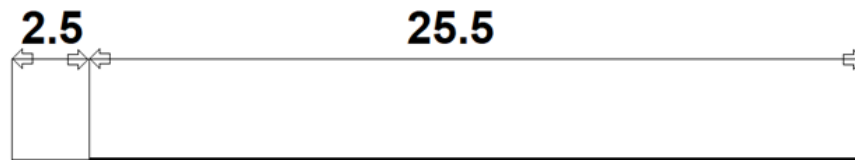


Photo of EUT



**0.6mm solid core wire**  
**1.5mm insulation**  
**28mm total length**

Antenna Dimensions ( N52832& N52840 )



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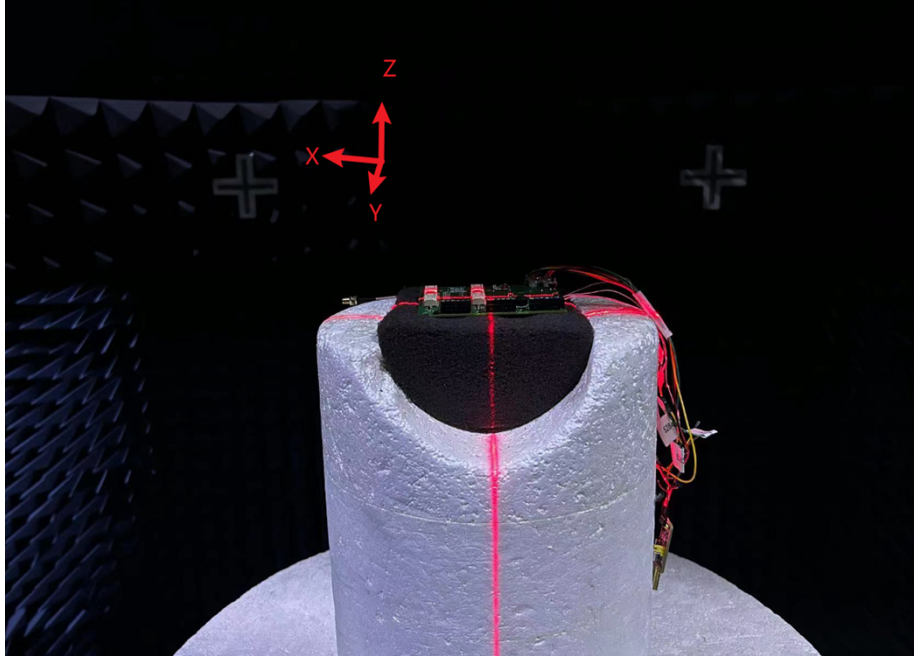


Photo of EUT N52832

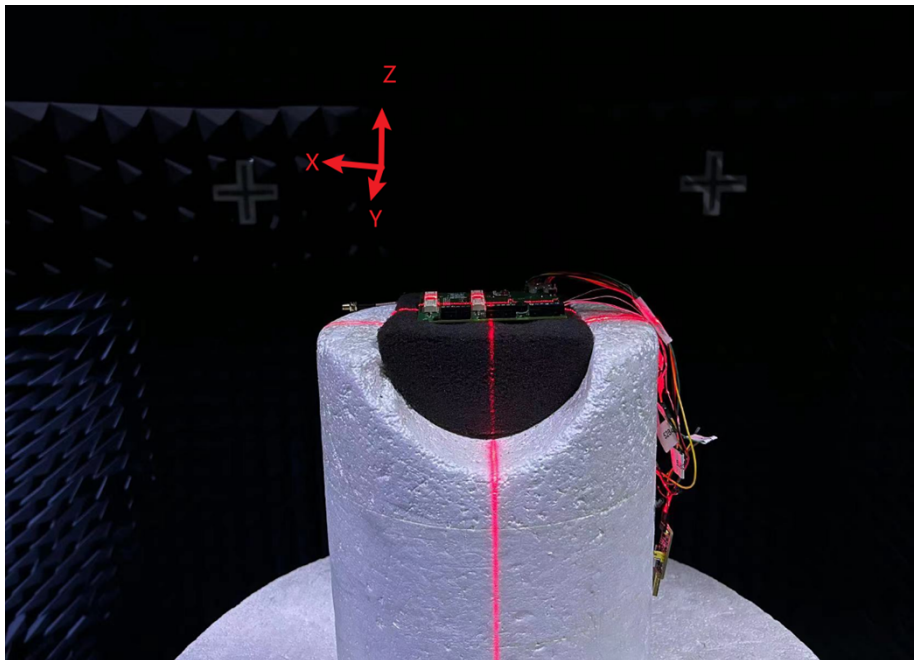


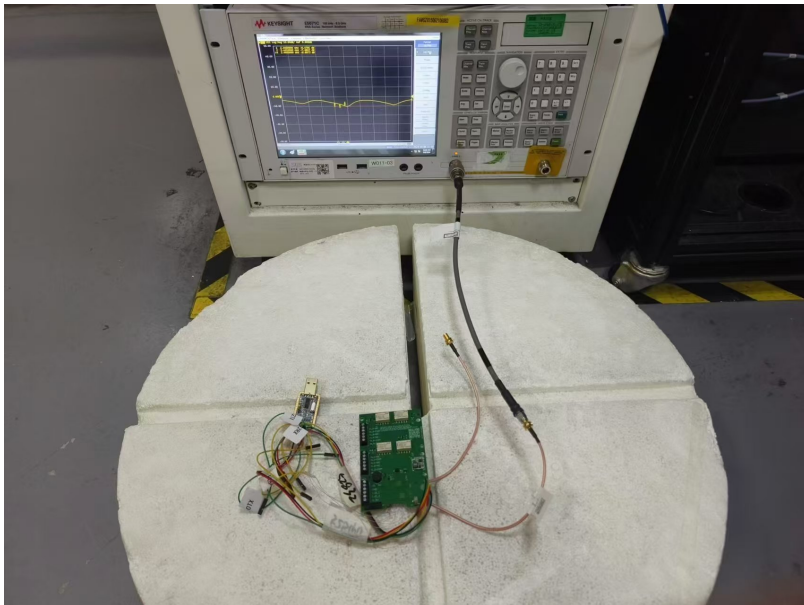
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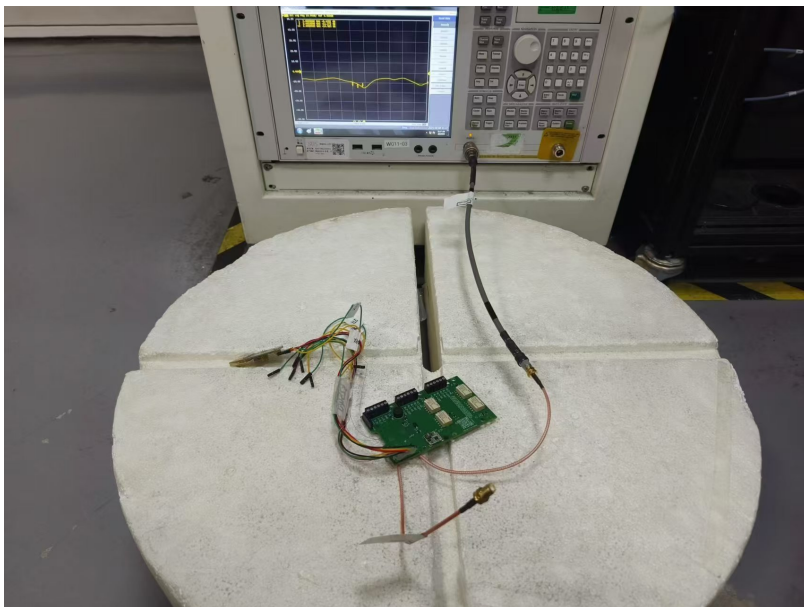
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N52832 Impedance Setup



N52840 Impedance Setup

---END---



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