TEST REPORT

APPLICANT	:	Zhejiang Lierda Internet of Things Technology Co., Ltd.
PRODUCT NAME	:	SB16 series Bluetooth LE communication module
MODEL NAME	:	L-BTMSB16-G0NP4,L-BTMSB16-G0PP4 L-BTMSB16-G0SP4
TRADE NAME	:	Lierda
BRAND NAME	:	Lierda
STANDARD(S)	:	IEEE Std 149-2021
RECEIPT DATE	:	2023-10-25
TEST DATE	:	2023-10-25
ISSUE DATE	:	2023-11-29

Edited by: Fang Jinshan

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Approved by:

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MORLAB

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DIRECTORY

Change History		
Version	Date	Reason for change
1.0	2023-11-29	First edition

The original report SZ23100201E01 is replaced by this report SZ23100201E01A.

1.Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

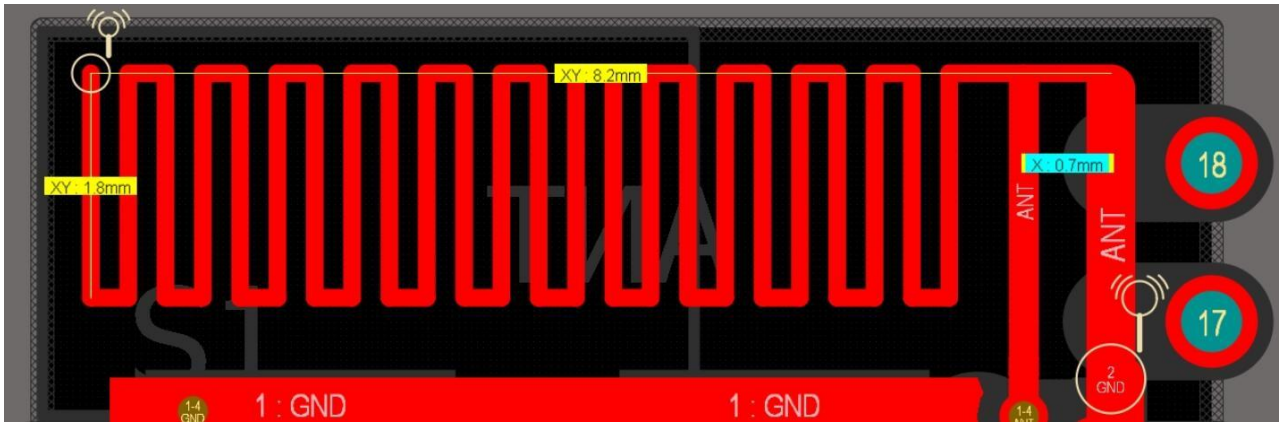
Applicant:	Zhejiang Lierda Internet of Things Technology Co., Ltd.
Applicant Address:	Room 1402, building 1, No. 1326, Wenyi West Road, Cangqian street, Yuhang District, Hangzhou, Zhejiang, China
Manufacturer:	Zhejiang Lierda Internet of Things Technology Co., Ltd.
Manufacturer Address:	Room 1402, building 1, No. 1326, Wenyi West Road, Cangqian street, Yuhang District, Hangzhou, Zhejiang, China

1.2. Equipment Under Test (EUT) Description

Wireless Type	Bluetooth
Frequency	2400MHz-2500MHz
IMEI	N/A
Product HW Version	V1.0
Product SW Version	V1.0
Sample No.	1#

Note: Hereby, we, < Zhejiang Lierda Internet of Things Technology Co., Ltd.>, declare that for model number: L-BTMSB16-G0NP4, L-BTMSB16-G0PP4, L-BTMSB16-G0SP4 have the same hardware, only different in model name software function (L-BTMSB16-G0NP4 needs to place the pins to high or low to transmit and receive, L-BTMSB16-G0PP4, L-BTMSB16-G0SP4 only by softwre), but it does not affect the test results, the main test model name is L-BTMSB16-G0NP4, all parameters remain the same.

Dimension：



2. Test Results

2.1. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	IEEE Std 149-2021	IEEE Recommended Practice for Antenna Measurements

2.2. Test Conditions

Test Environment Conditions：

Relative Humidity(%):	25 - 75
Temperature(°C):	10 - 30

2.3. Measurement Uncertainty

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in Measurement” (GUM) published by ISO. When the test result is a critical value,we will use the measurement uncertainty give the judgment result based on the 95% Confidence intervals.

2.4. Test Results lists

2.4.1. Gain and Efficiency

Frequency (MHz)	Gain(dBi)	Efficiency(%)
2400	-1.60	16.36
2410	-1.55	16.93
2420	-1.41	17.48
2430	-1.25	17.41
2440	-1.07	18.06
2450	-0.93	17.95
2460	-0.88	17.49
2470	-1.18	16.34
2480	-1.46	15.23
2490	-1.45	14.74
2500	-1.45	14.34

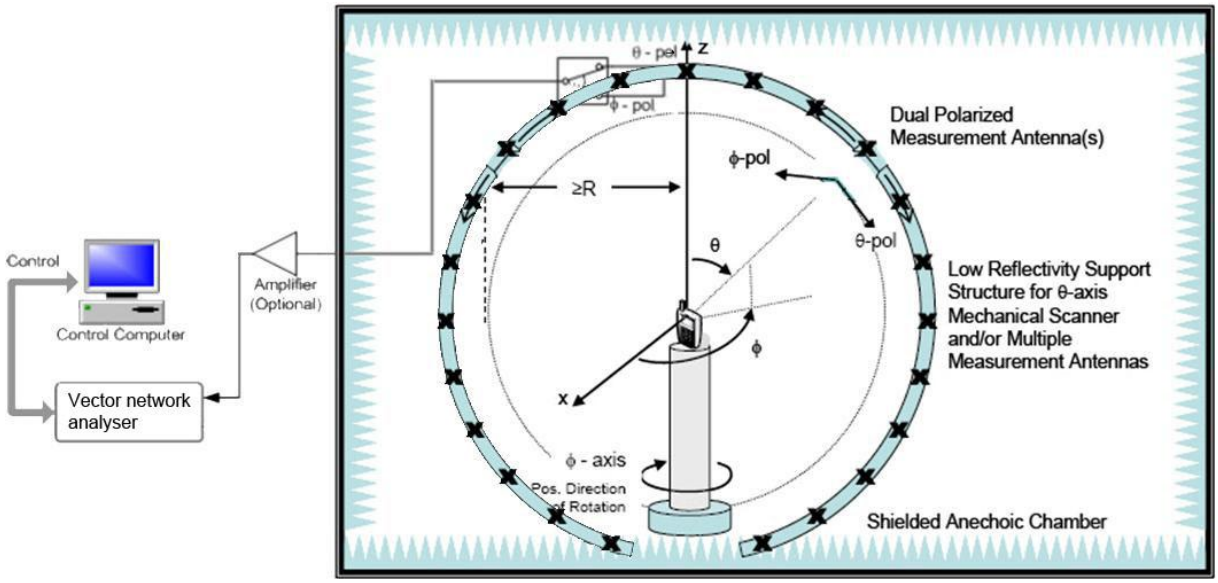
2.4.2. VSWR and Impedance

Frequency (MHz)	VSWR	Impedance (Ω)
2400	1.93	83.65
2450	1.24	47.28
2500	2.27	22.73

2.4.3. Return Loss

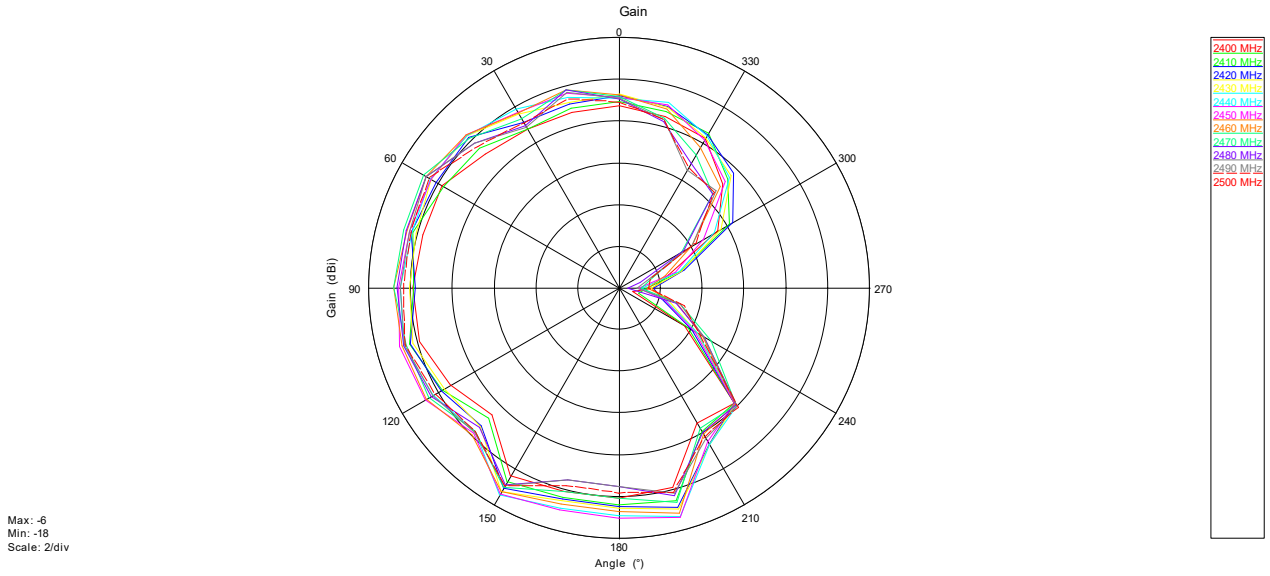
Frequency (MHz)	Return Loss (dB)
2400	-9.93
2450	-19.13
2500	-8.17

Annex A Test Setup Photos

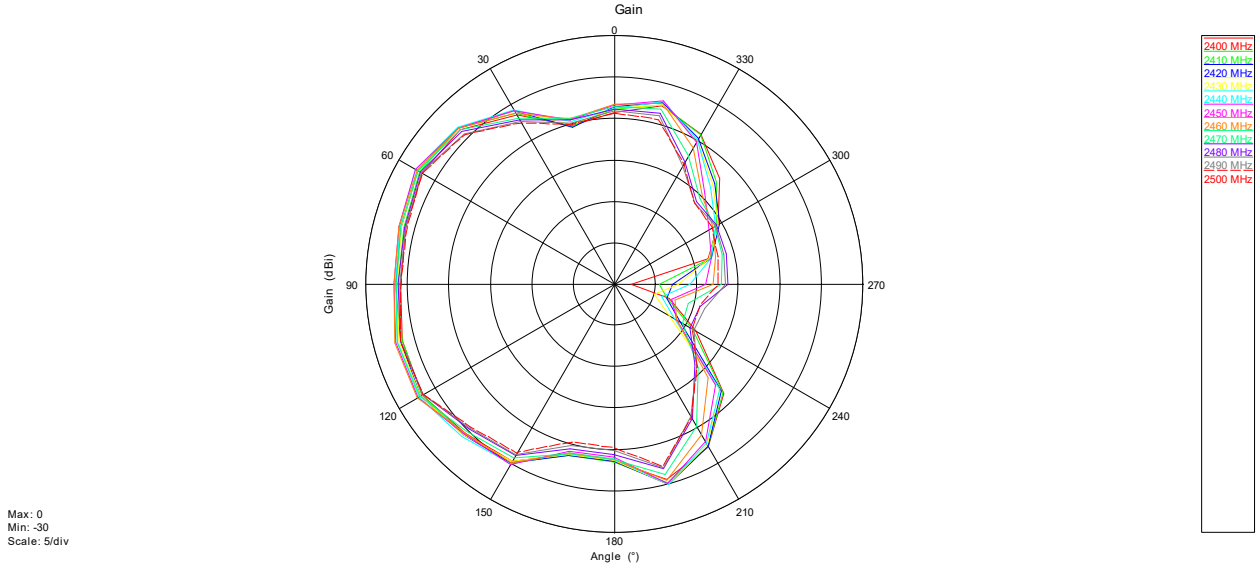


Annex B Figures

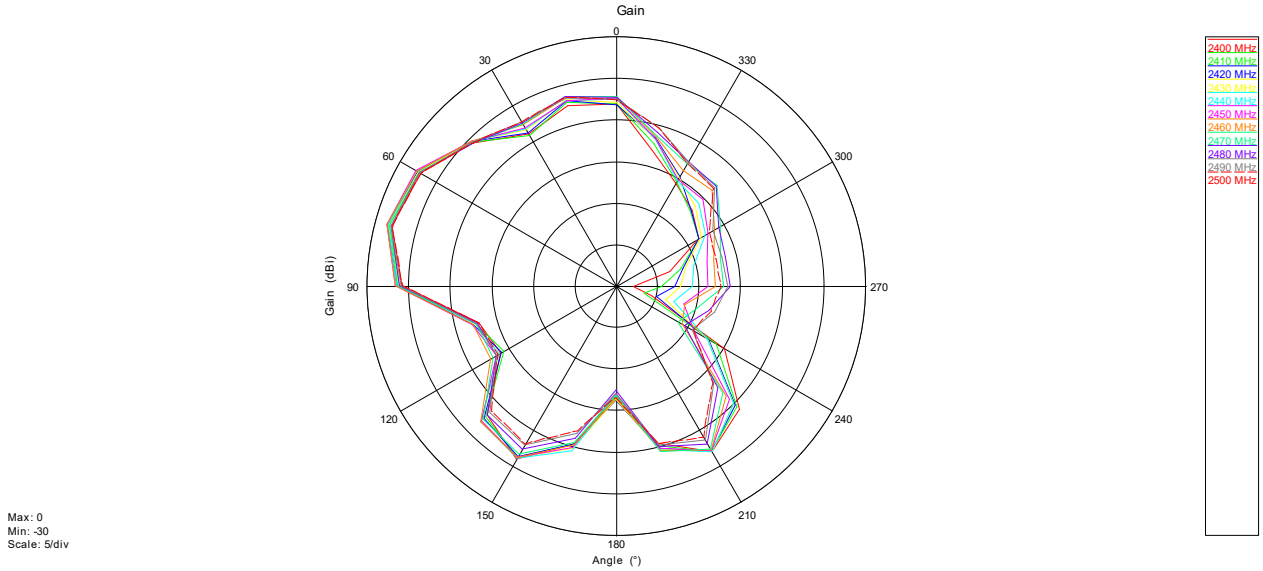
1. 2D Radiation Pattern



Phi=0°

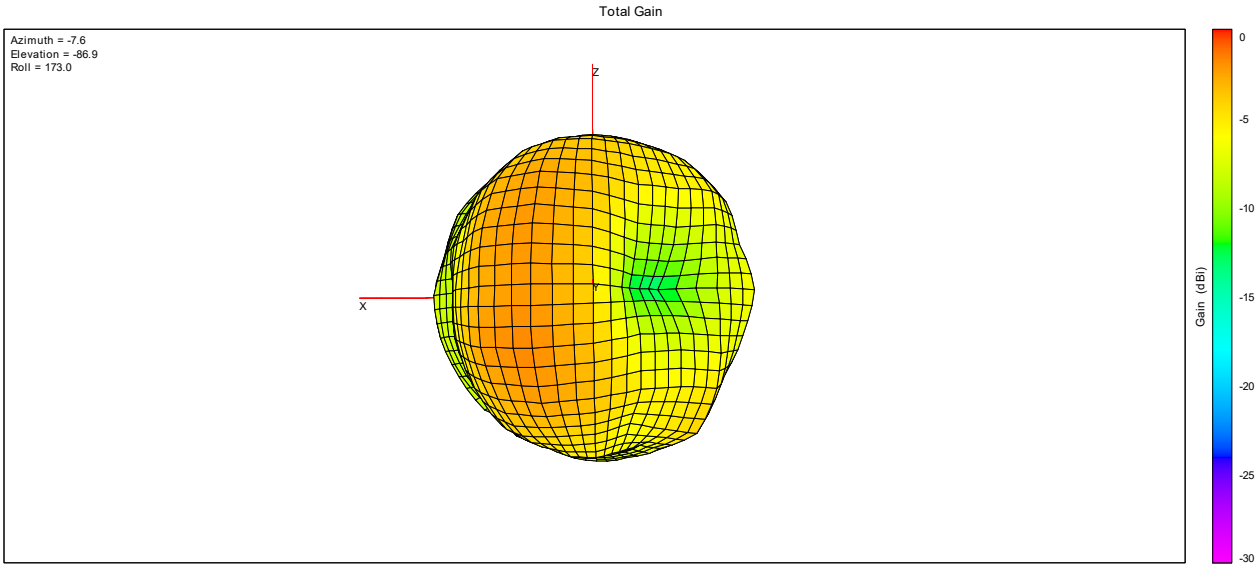


Phi=90°

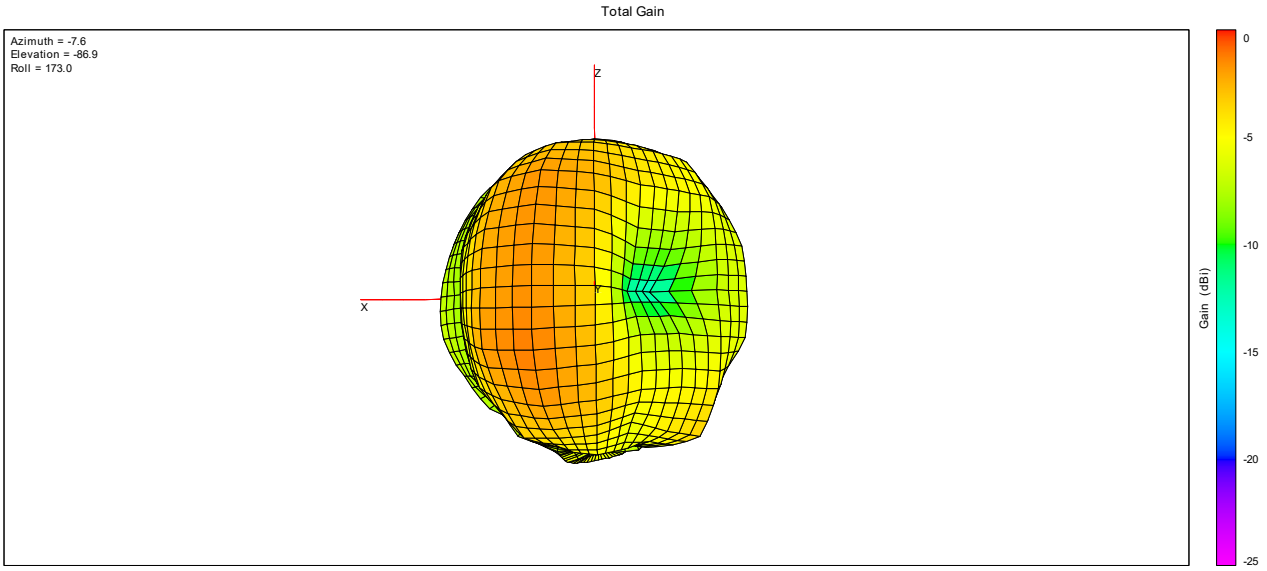


Theta=90°

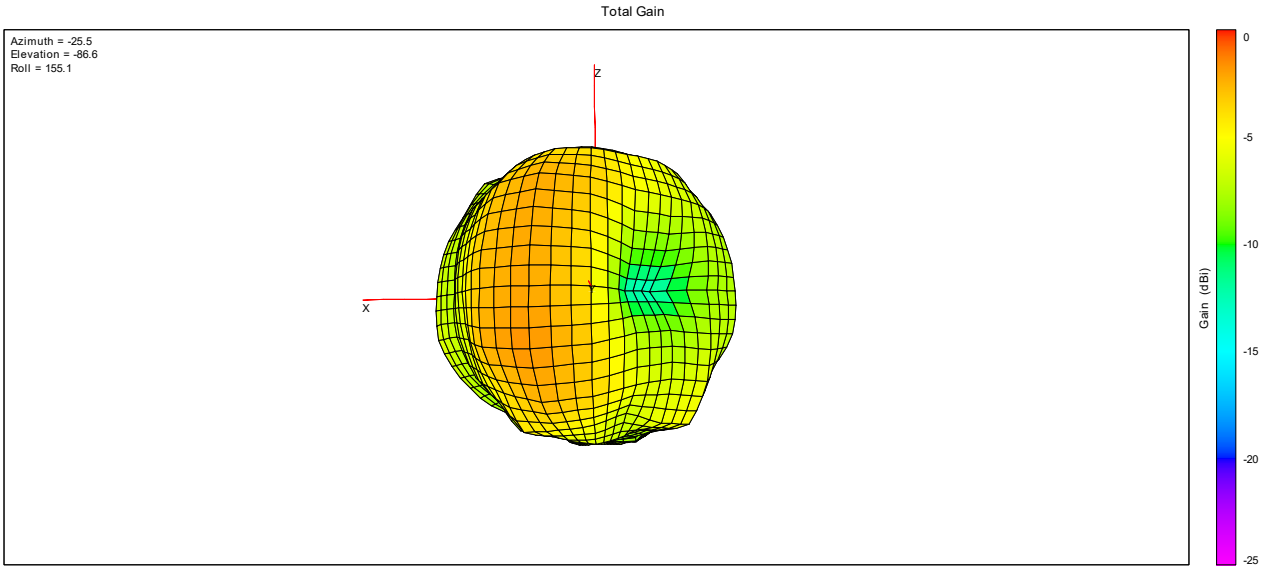
2. 3D Radiation Pattern



2400MHz

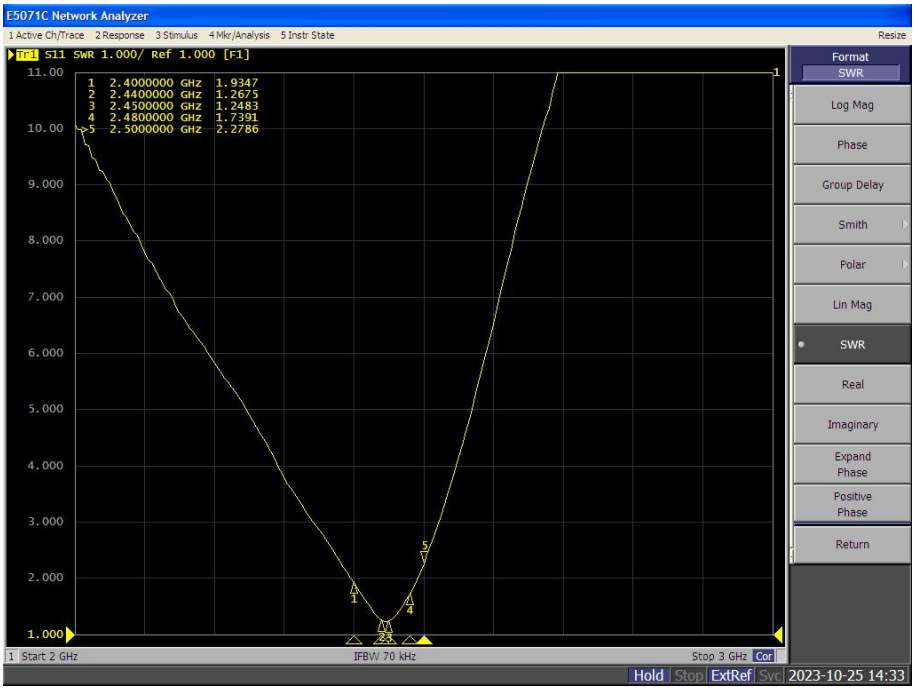


2440MHz

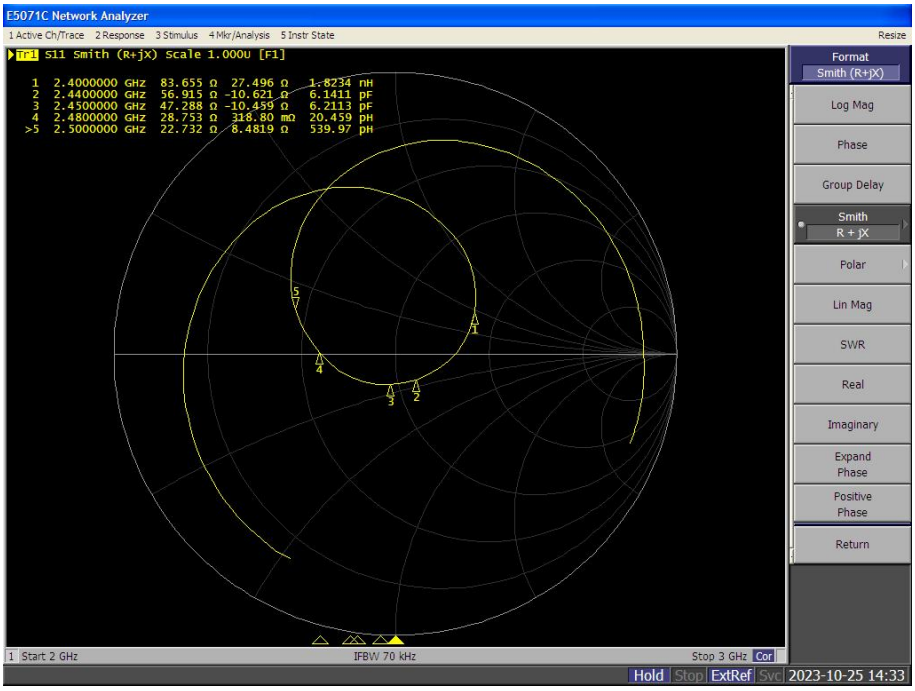


2480MHz

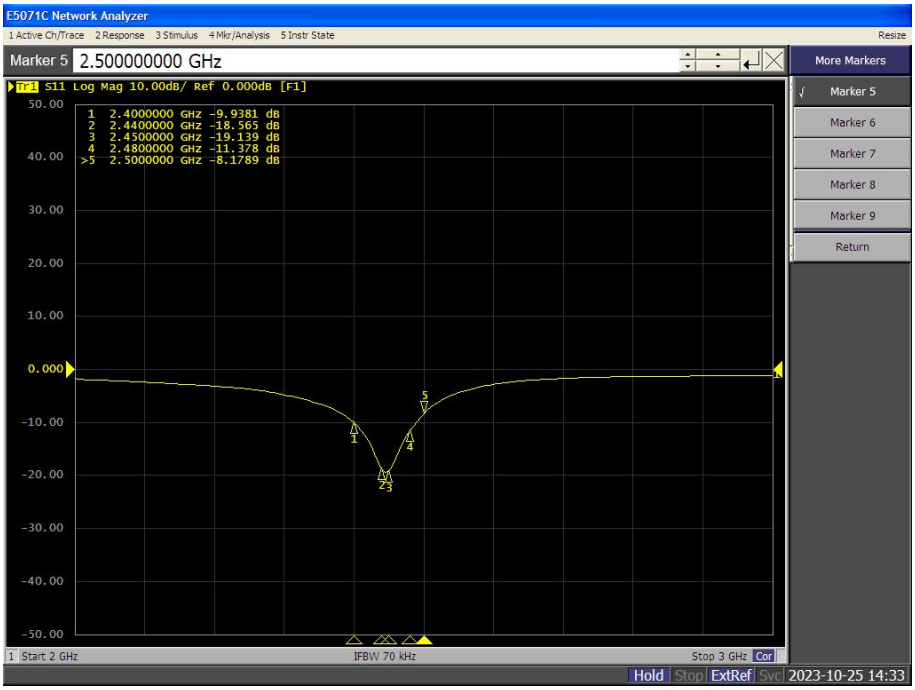
3. VSWR



4. Impedance



5. Return Loss



Annex C General Information

1.1 Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

1.2 Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.1-3, Building A, FeiYang Science Park, No.8 LongChang Road, Block67, BaoAn District, ShenZhen , GuangDong Province, P. R. China

1.3 Test Equipments Utilized

No.	Equipement Name	Serial No.	Type	Manufacturer	Cal.Date	Cal.Due Date
1	Network Analyzer	MY46110140	E5071C	Agilent	2023.06.21	2024.06.20
2	OTA Chamber	TJ2235-Q1793	AMS-8923 -150	ETS	2022.11.30	2025.11.29

1.4 Test Software Utilized

No.	Software Name	Serial No.	Type	Manufacturer	Cal.Date	Cal.Due Date
1	Antenna Measurement System	1685	EMQuest EMQ-100 V 1.13 Build 21267	ETS	N/A	N/A

Note: The Main report is end here and the other Annex D will be submitted separately.

——— END OF MIAN REPORT ———