

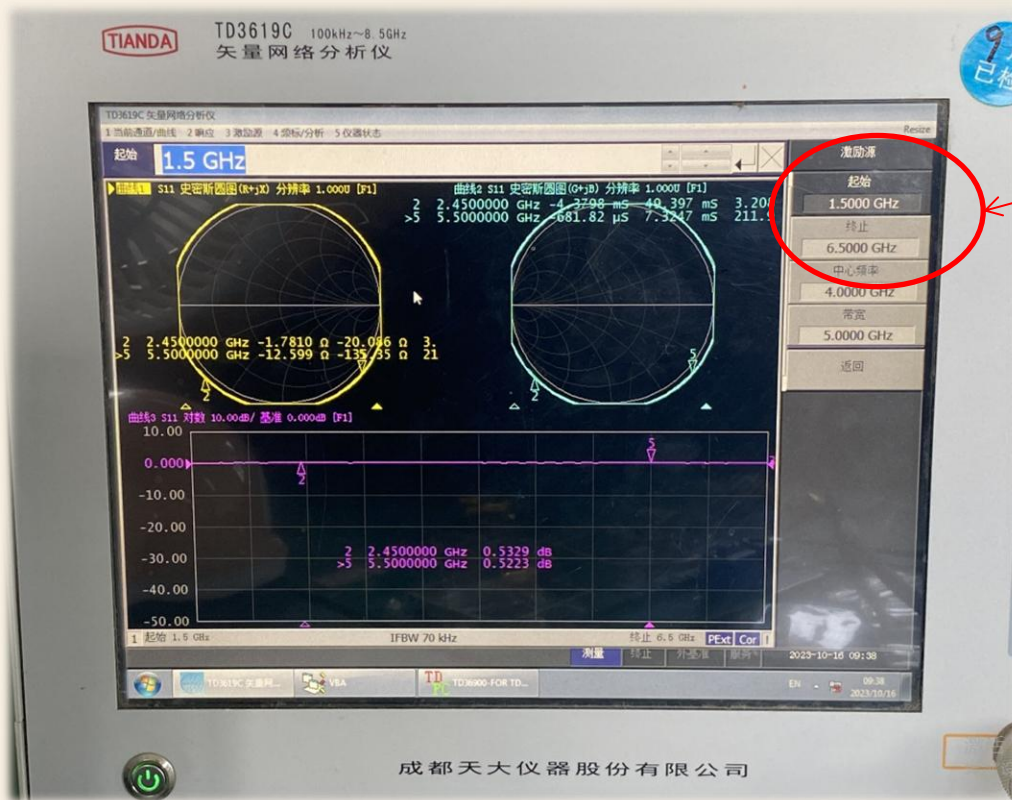
Antenna test report

Tester name:Ye Zhihao

testing dates:2023/05/05

A28 Antenna S-parameters

SWEEP RANGE



A28 Antenna S-parameters

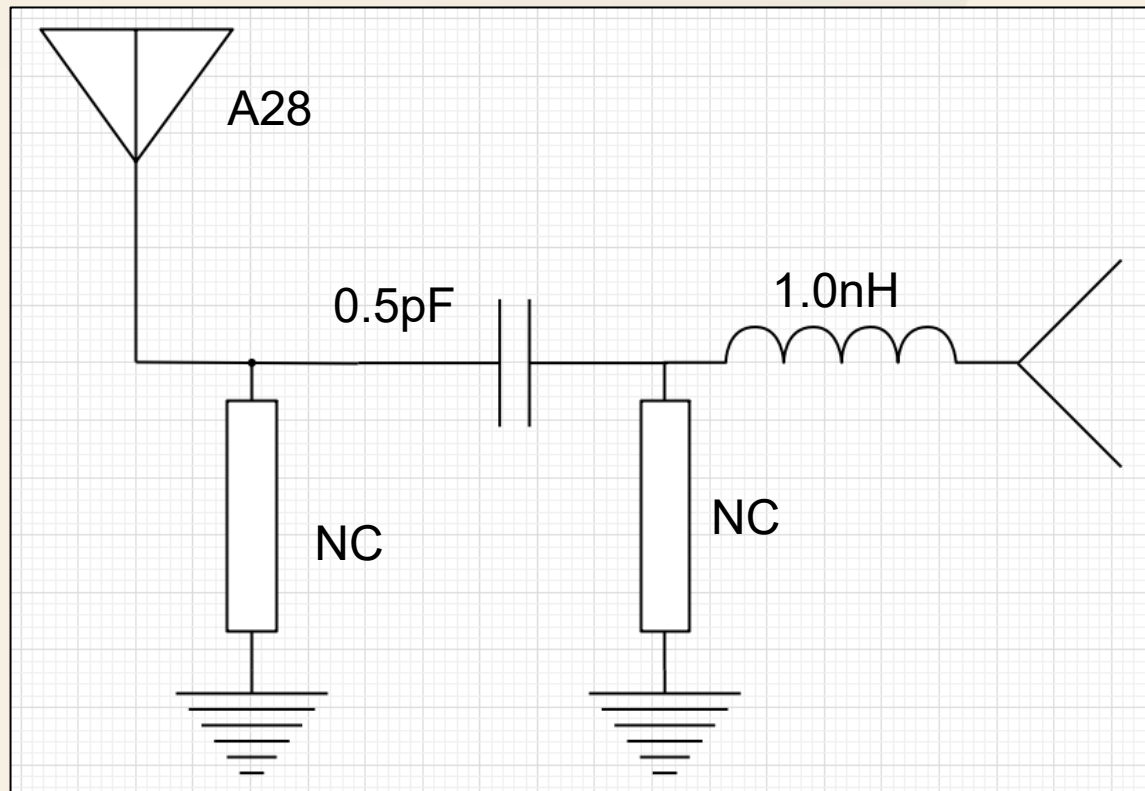
Calibration KIT



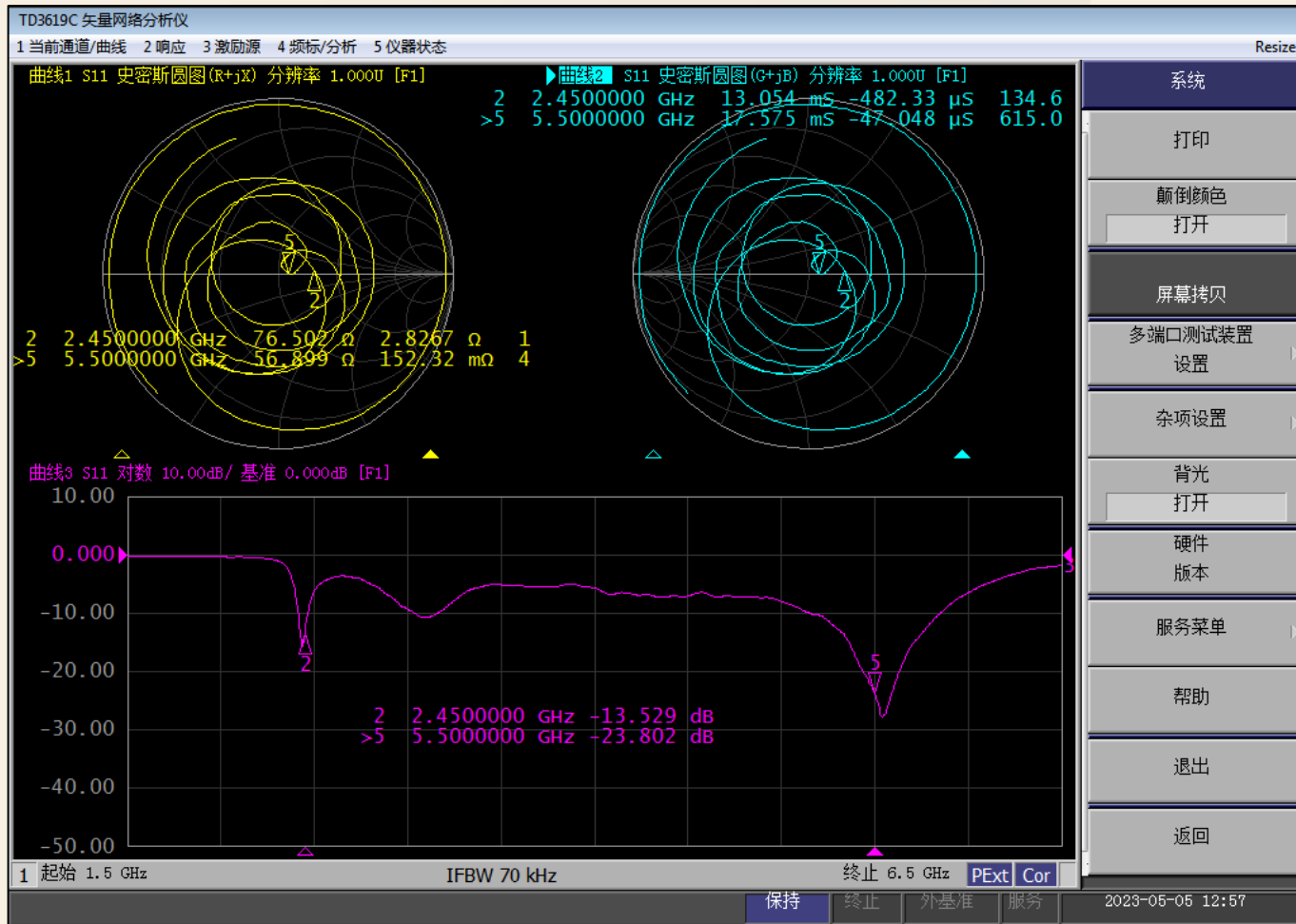
A28 Antenna S-parameters

Matching Circuit

RF circuit

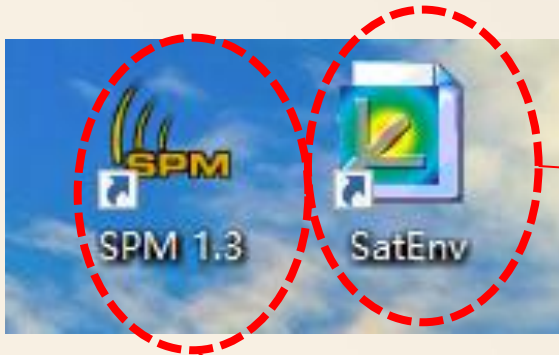


A28 Antenna S-parameters Return Loss



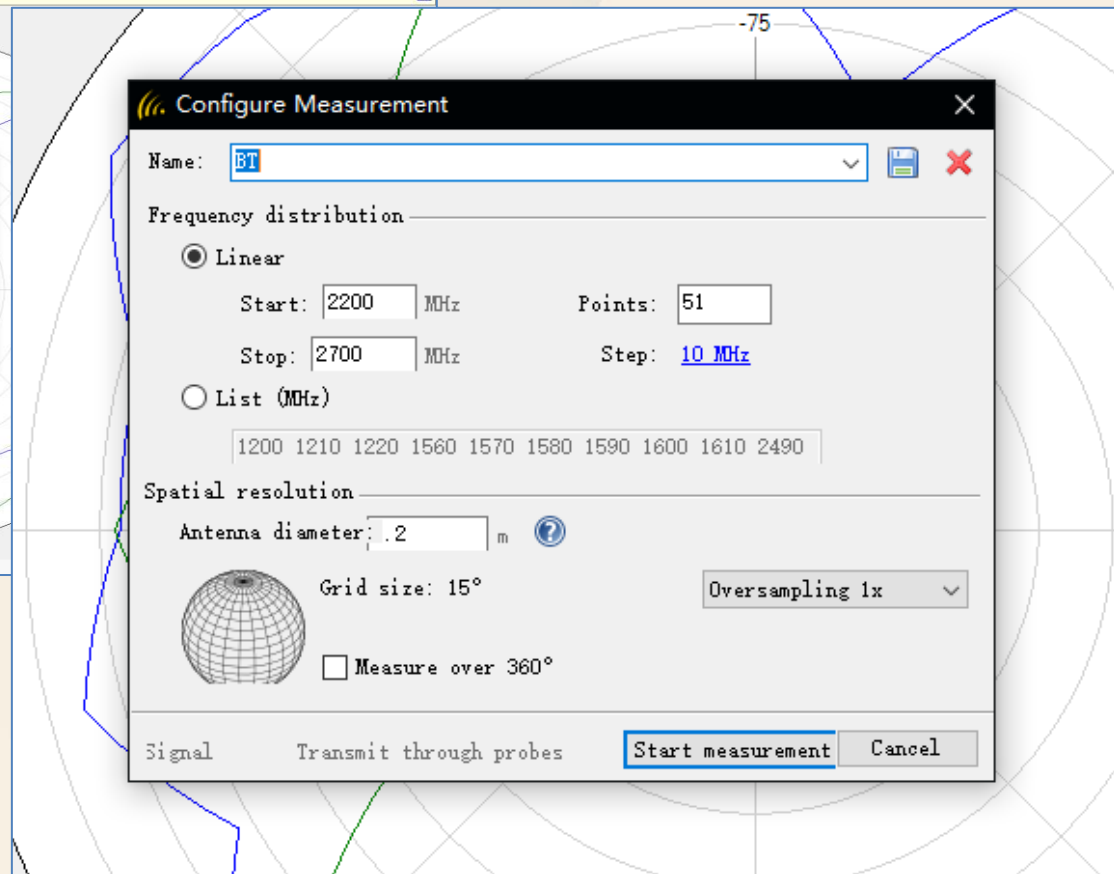
Antenna pattern test

2、Testing software



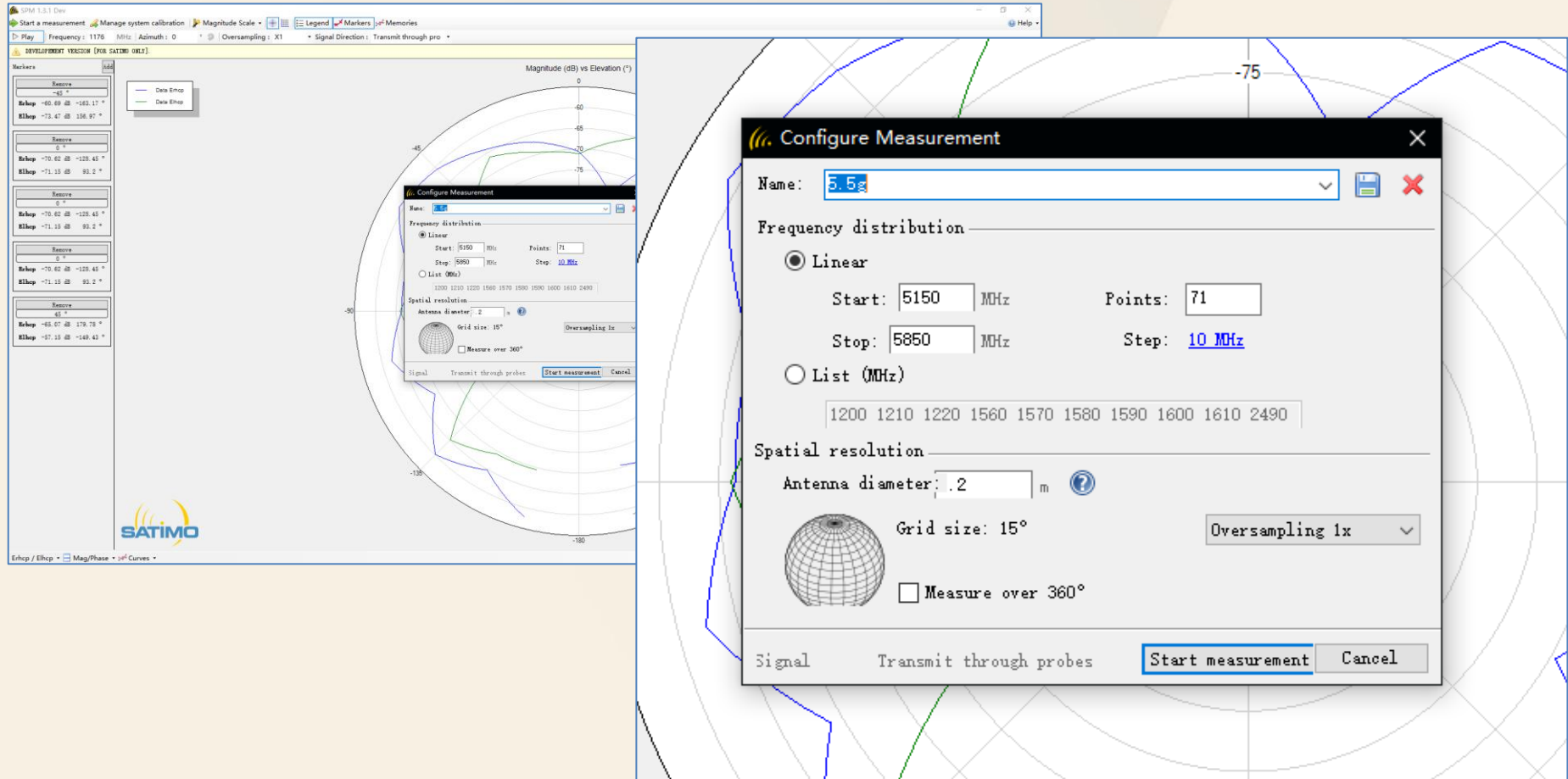
: Processing data

: Scanning



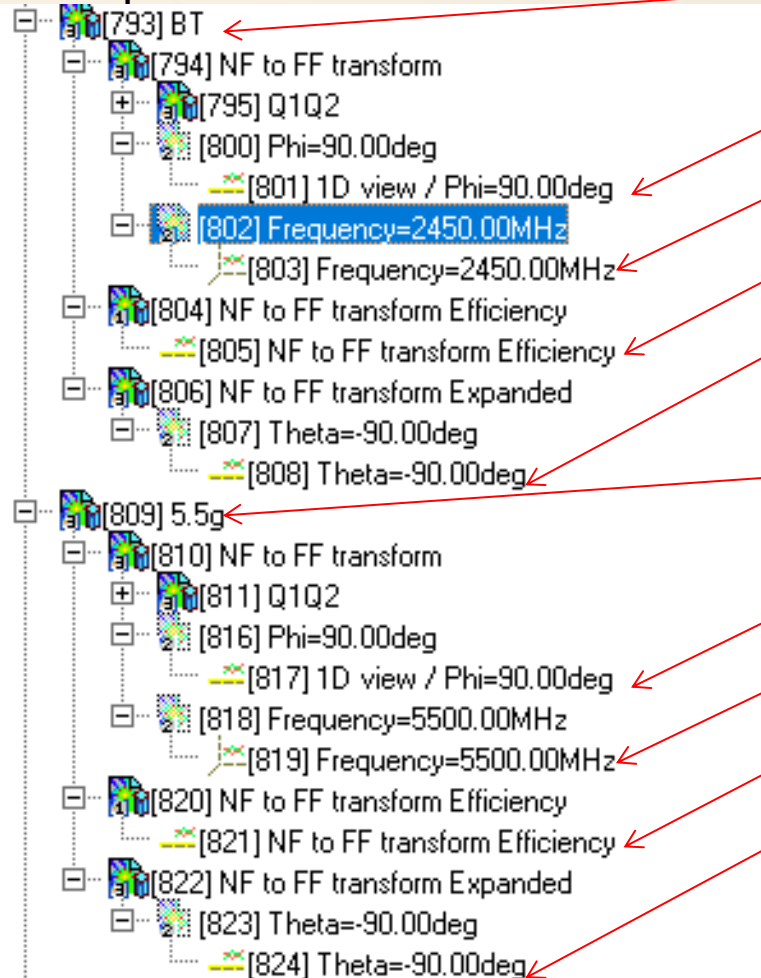
Antenna pattern test

4、5.5G Parameter in SPM 1.3



Antenna pattern test

5、Export data to **SatEnv**



2.45g

X-Z Plane Plane/Y-Z Plane Plane

3D Radiation Pattern

Efficiency

X-Y Plane Plane

5.50g

X-Z Plane Plane/Y-Z Plane Plane

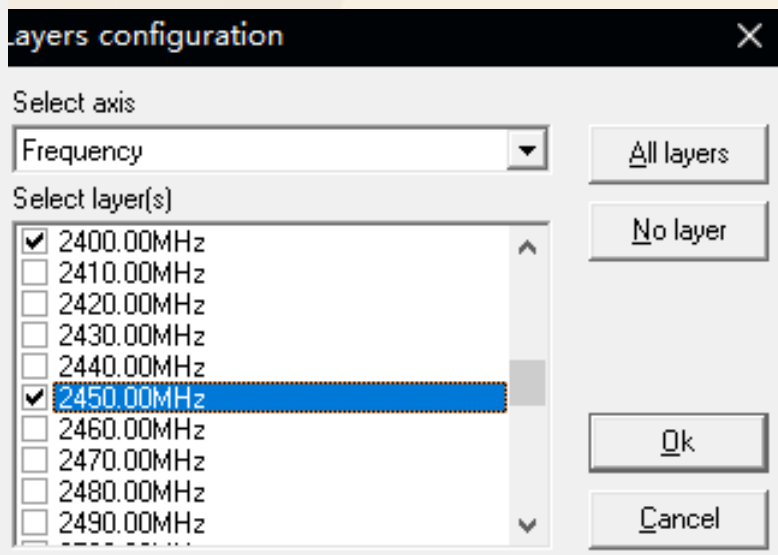
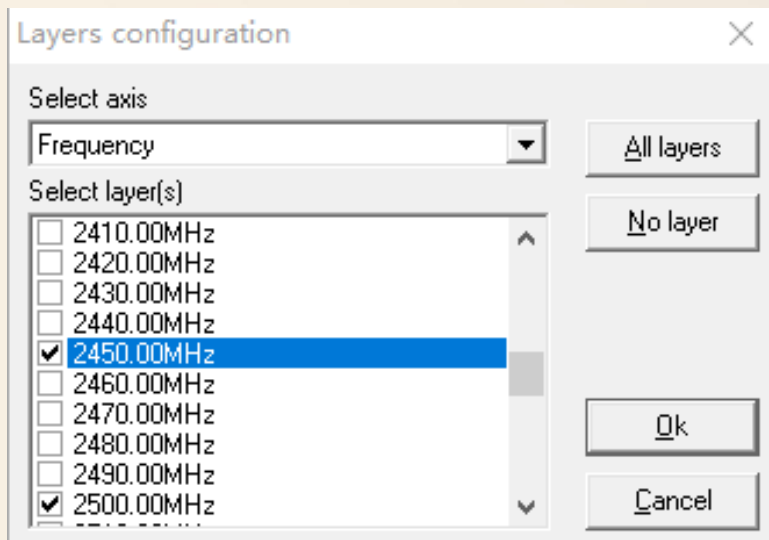
3D Radiation Pattern

Efficiency

X-Y Plane Plane

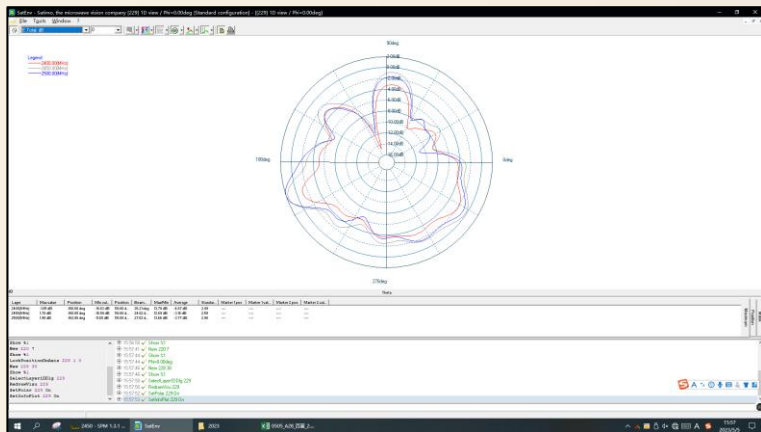
A28 Antenna measured data(2.45Ghz)

1、Antenna test data graphic (Select 2400/2450/2500Mhz Gain)

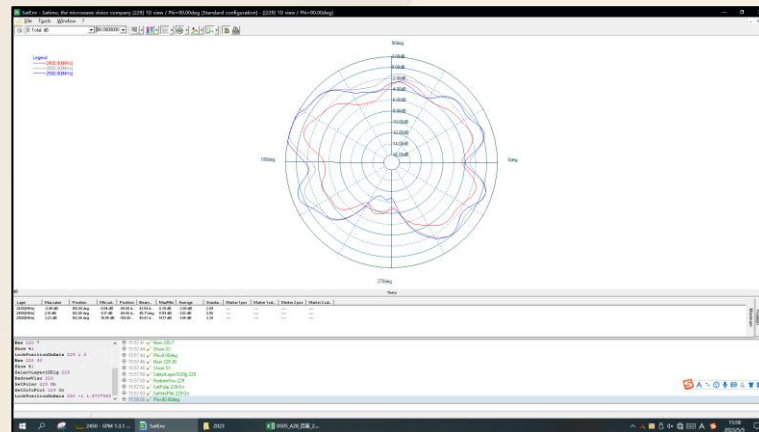


A28 Antenna measured data(2.45Ghz)

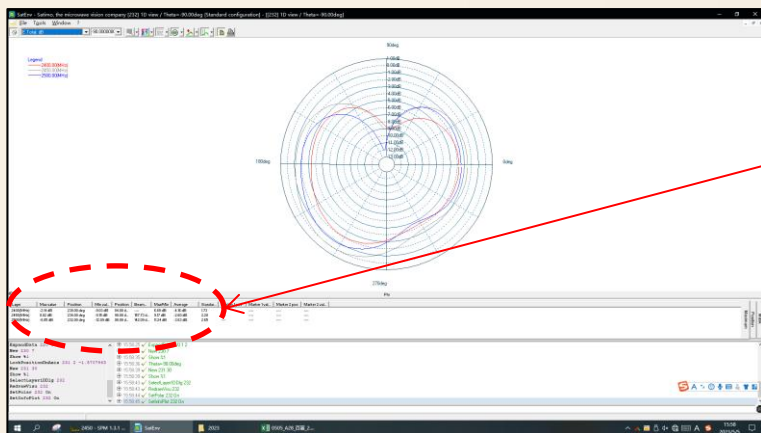
1、Antenna test data graphic (Select 2400/2450/2500Mhz Gain)



X-Z Plane Plane



Y-Z Plane Plane



X-Y Plane Plane

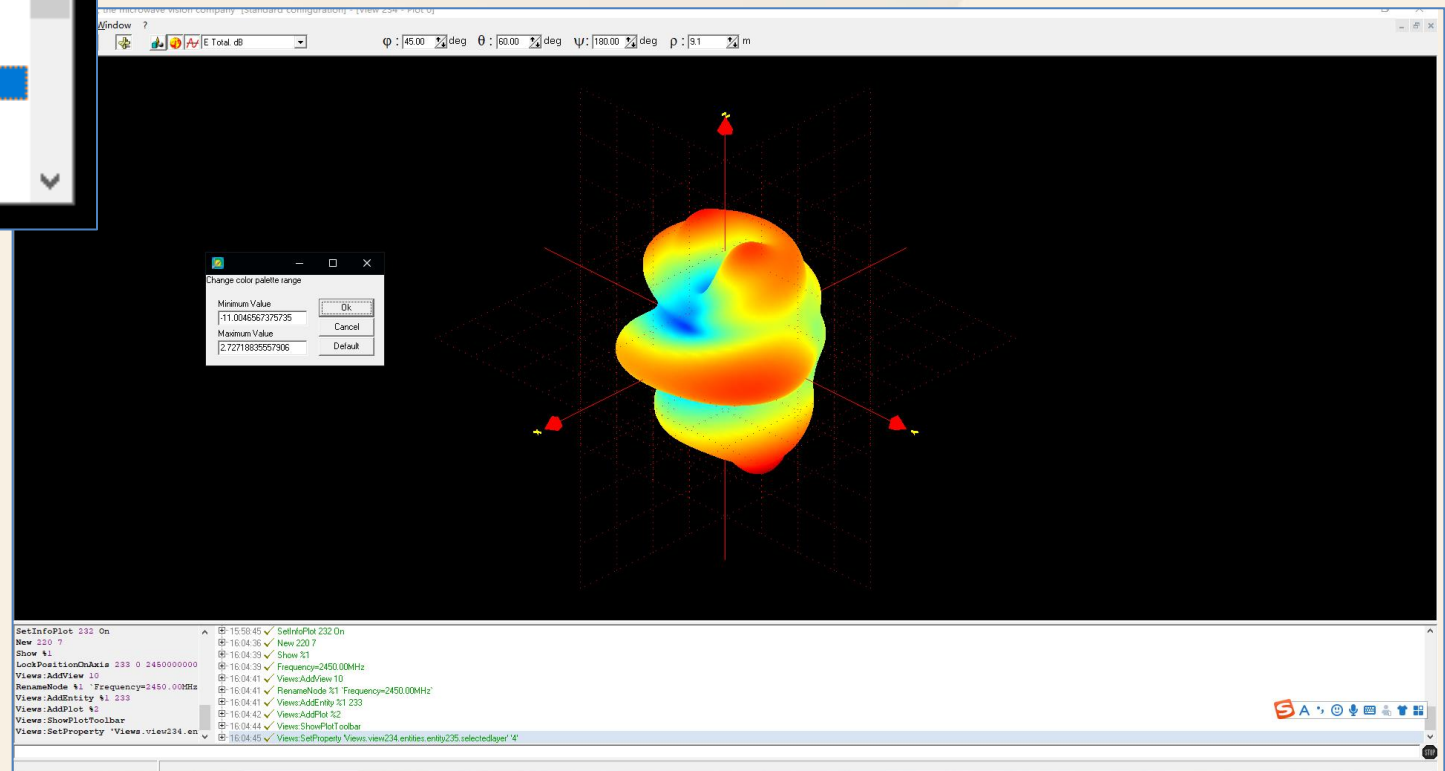
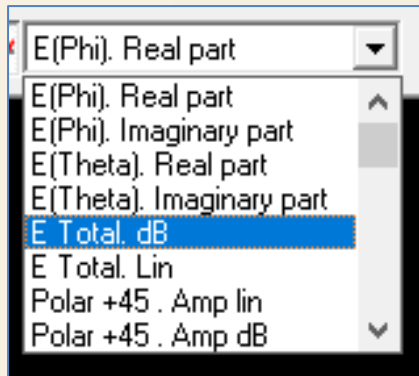
Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average
5180(MHz)	6.80 dB	-164.00 deg	-11.27 dB	-76.00 d...	15.99 deg	18.07 dB	-1.26 dB
5500(MHz)	6.92 dB	-166.00 deg	-11.37 dB	80.00 d...	17.90 deg	18.29 dB	-1.01 dB
5820(MHz)	6.00 dB	-166.00 deg	-11.86 dB	46.00 d...	16.20 deg	17.86 dB	-1.79 dB

max (X-Z_Max value, Y-Z_Max value, X-Y_Max value)
=Peak Gain

Avg. (X-Z_Average, Y-Z_Average, X-Y_Average)
=Avg. Gain

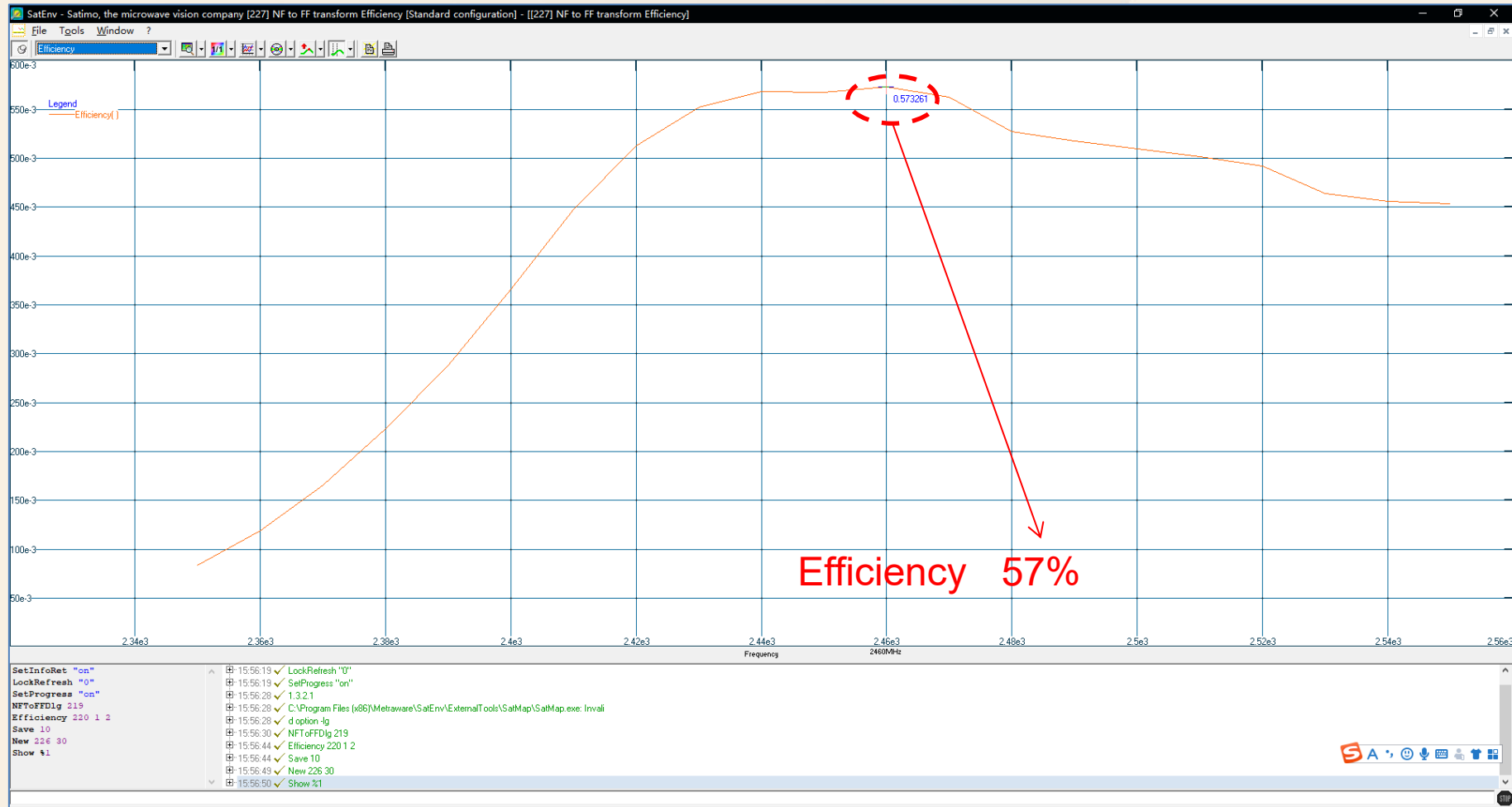
A28 Antenna measured data(2.45Ghz)

2、Antenna test data graphic (3D Radiation Pattern)



A28 Antenna measured data(2.45Ghz)

3、Antenna test data graphic (Efficiency)



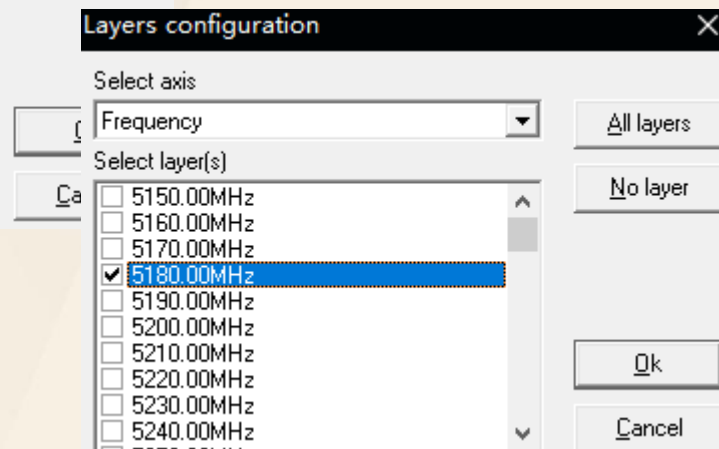
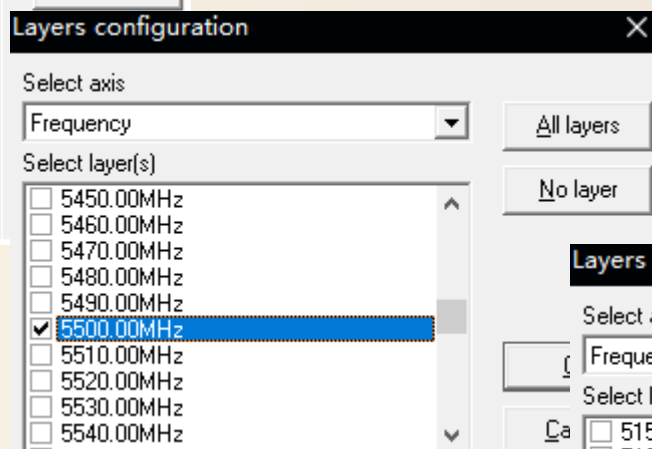
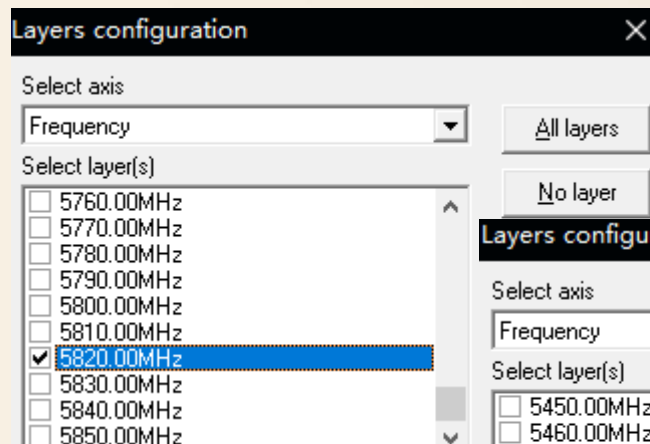
A28 Antenna measured data(2.45Ghz)

4、Antenna test data graphic (Data Statistics)

Frequency (MHz)	2400	2450	2500
Peak Gain (dBi)	-1.2	1.4	1.5
Avg. Gain (dBi)	-4.3	-2.5	-3.1
Efficiency (%)	35	56	50

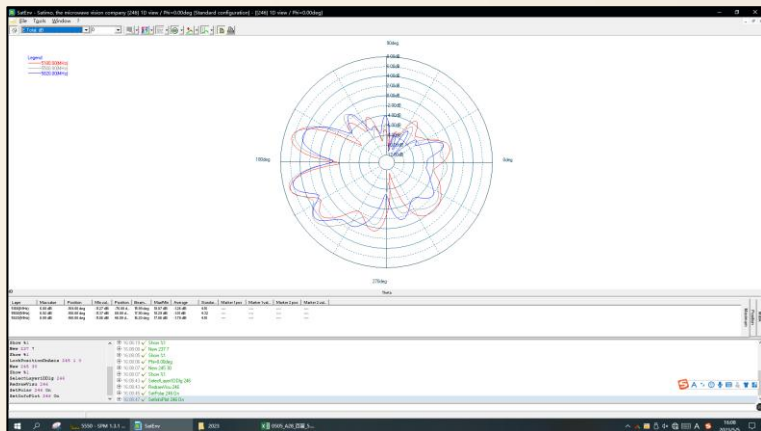
A28 Antenna measured data(5.50Ghz)

1、Antenna test data graphic (Select 5180/5500/5820Mhz Gain)

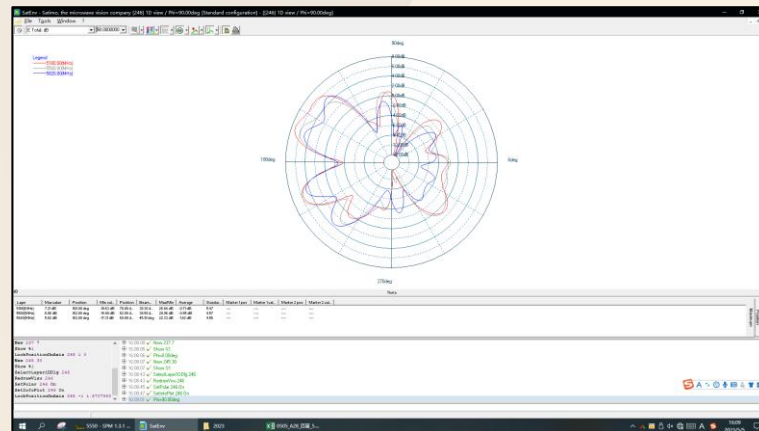


A28 Antenna measured data(5.50Ghz)

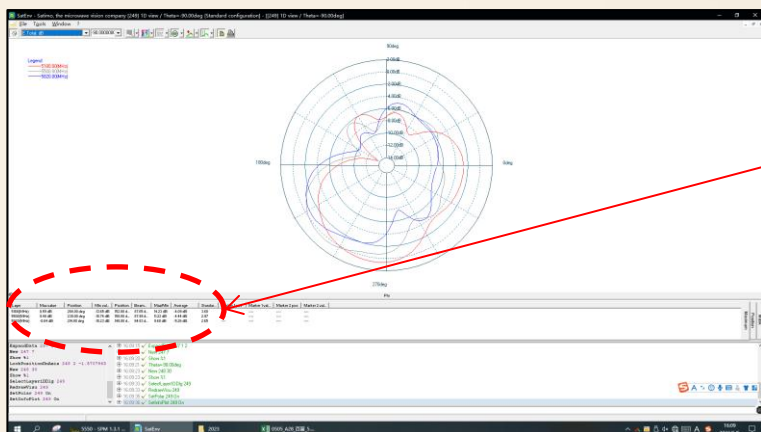
1、Antenna test data graphic (Select 5180/5500/5820Mhz Gain)



X-Z Plane Plane



Y-Z Plane Plane



X-Y Plane Plane

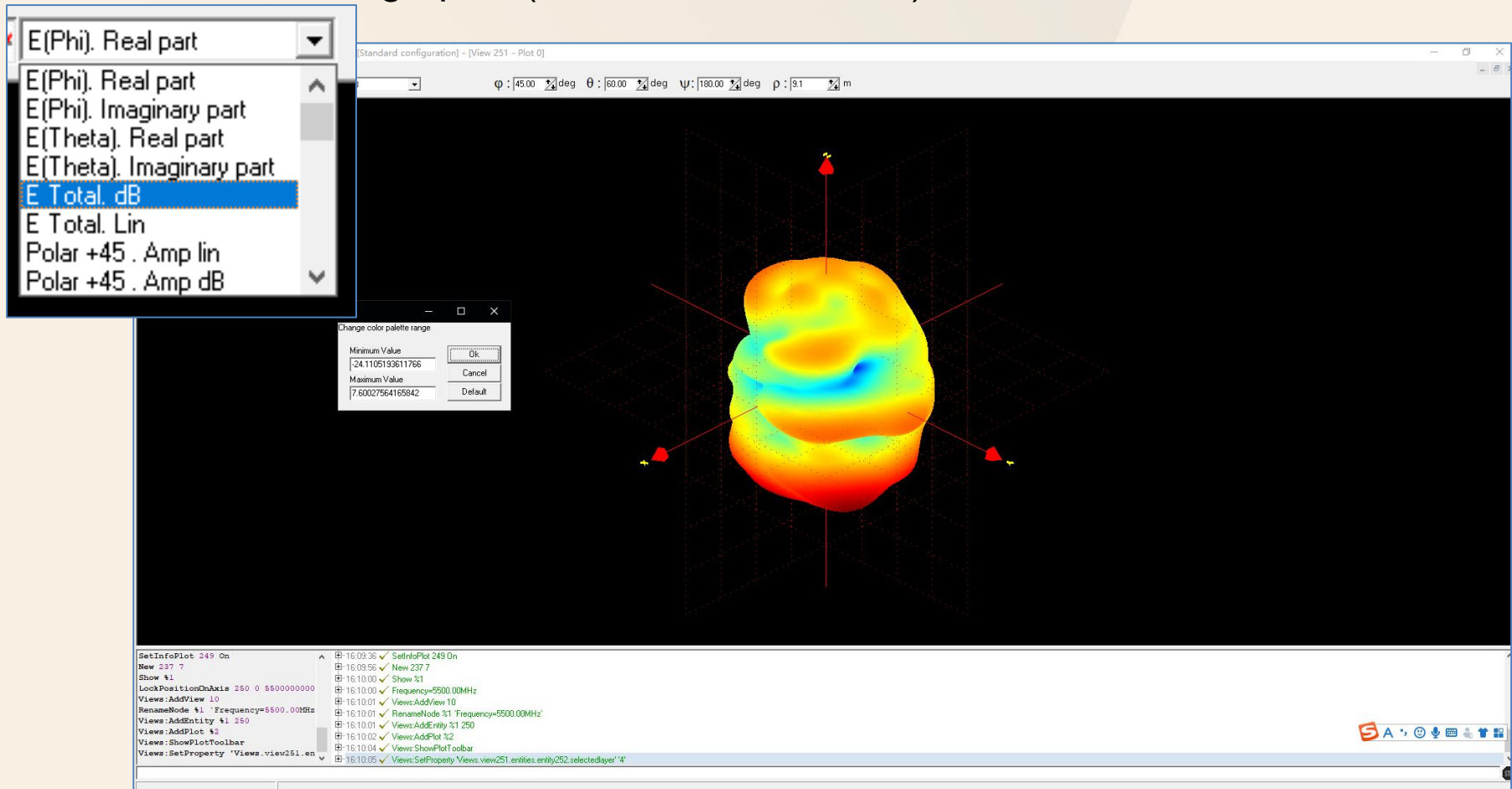
Layer	Max value	Position	Min val...	Position	Beam...	Max/Min	Average
5180(MHz)	6.80 dB	-164.00 deg	-11.27 dB	-76.00 d...	15.99 deg	18.07 dB	-1.26 dB
5500(MHz)	6.92 dB	-166.00 deg	-11.37 dB	80.00 d...	17.90 deg	18.29 dB	-1.01 dB
5820(MHz)	6.00 dB	-166.00 deg	-11.86 dB	46.00 d...	16.20 deg	17.86 dB	-1.79 dB

max (X-Z_Max value, Y-Z_Max value, X-Y_Max value)
=Peak Gain

Avg. (X-Z_Average, Y-Z_Average, X-Y_Average)
=Avg. Gain

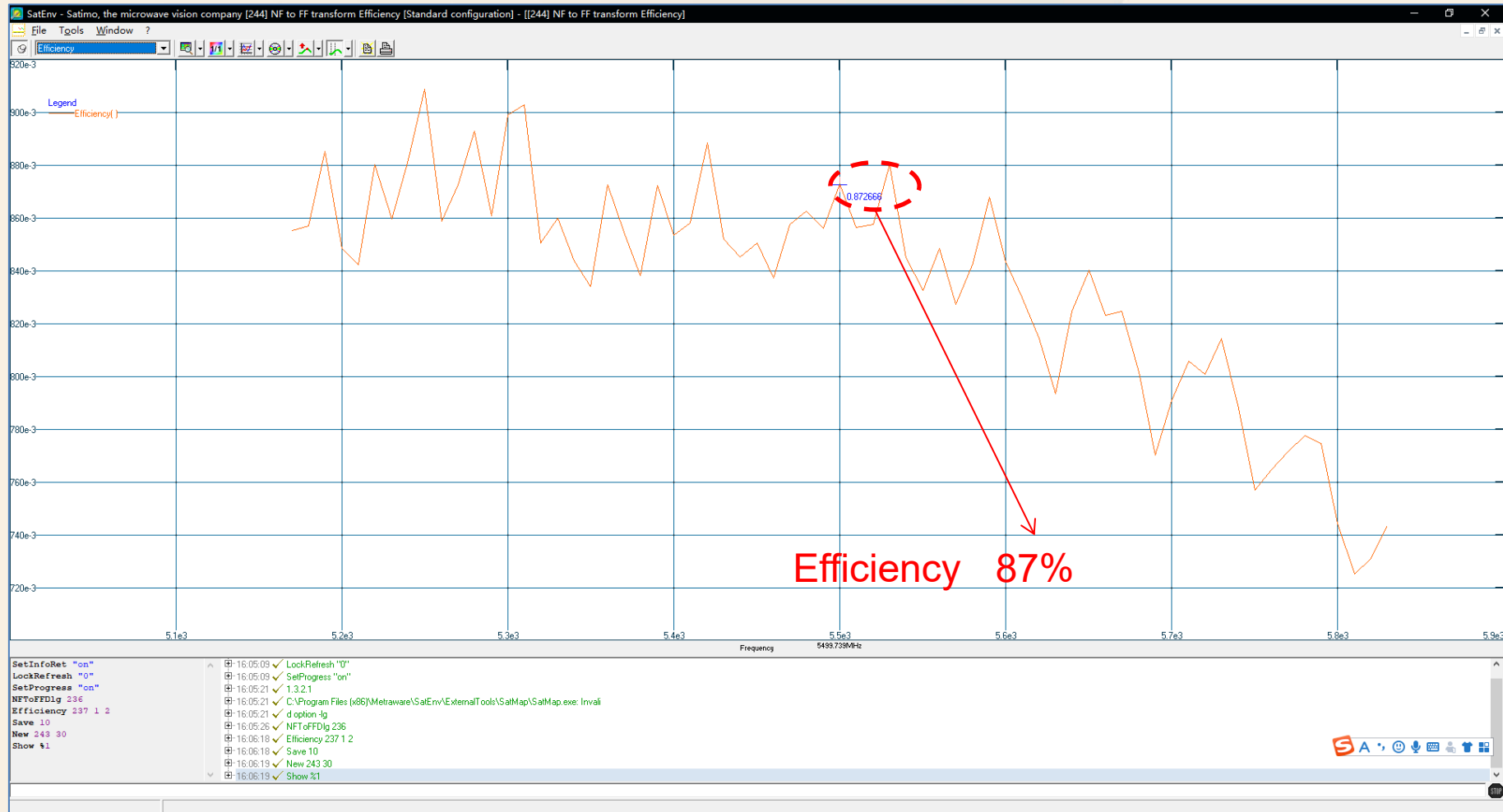
A28 Antenna measured data(5.50Ghz)

2、Antenna test data graphic (3D Radiation Pattern)



A28 Antenna measured data(5.50Ghz)

3、Antenna test data graphic (Efficiency)



A28 Antenna measured data(5.50Ghz)

4、Antenna test data graphic (Data Statistics)

Frequency (MHz)	5180	5500	5820
Peak Gain (dBi)	6.90	6.92	6.00
Avg. Gain (dBi)	-2.0	-2.1	-3.0
Efficiency (%)	85	87	73

A28 Antenna Dependability Test

1、Post Dependability Tolerance

No.	Item	Post Dependability Tolerance
8.1	Central Frequency	± 5 MHz
8.2	Band Width	± 5 MHz
8.3	Gain	± 0.1 dBi
8.4	V. S. W. R (in BW)	± 0.1

Post Dependability Tolerance (Refer to the table)

A28 Antenna Dependability Test

2 Dependability Test

Temperature range	$25 \pm 5^{\circ}\text{C}$
Relative Humidity range	55~75%RH
Operating Temperature range	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$
Storage Temperature range	$-40^{\circ}\text{C} \sim +85^{\circ}\text{C}$

2.1 Vibration Resist

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after applied to the vibration of 10 to 55Hz with amplitude of 1.5mm for 2 hours each in X , Y and Z directions.

2.2 Drop Shock

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after dropping onto the hard wooden board from the height of 100cm for 3 times each facet of the 3 dimensions of the device.

A28 Antenna Dependability Test

2.3 Solder Heat Proof

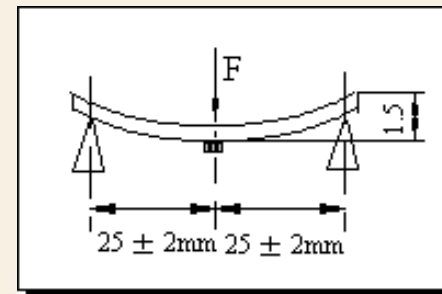
The device should be satisfied after preheating at $120^{\circ}\text{C}\sim 150^{\circ}\text{C}$ for 120 seconds and dipping in soldering Sn at $255^{\circ}\text{C}\pm 10^{\circ}\text{C}$ for 5 ± 0.5 seconds, or electric iron $300^{\circ}\text{C}\sim 10^{\circ}\text{C}$ for 3 ± 0.5 seconds, without damage.

2.4 Adhesive Strength of Termination

The device have no remarkable damage or removal of the termination after horizontal force of $5\text{N}(\leq 0603)$; $10\text{N}(> 0603)$ with 10 ± 1 seconds.

2.5 Bending Resist Test

Weld the product to the center part of the PCB with the thickness $1.6\pm 0.2\text{mm}$ as the illustration shows, and keep exerting force arrow-ward on it at speed of 1mm/S , and hold for $5\pm 1\text{S}$ at the position of 1.5mm bending distance, so far, any peeling off of the product metal coating should not be detected.



A28 Antenna Dependability Test

2.6 Moisture Proof

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to the temperature $60\pm 2^{\circ}\text{C}$ and the relative humidity 90~95% RH for 96 hours and 1~2 hours recovery time under normal condition.

2.7 High Temperature Endurance

The device should satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to temperature $85\pm 5^{\circ}\text{C}$ for 96 ± 2 hours and 1~2 hours recovery time under normal temperature.

2.8 Low Temperature Endurance

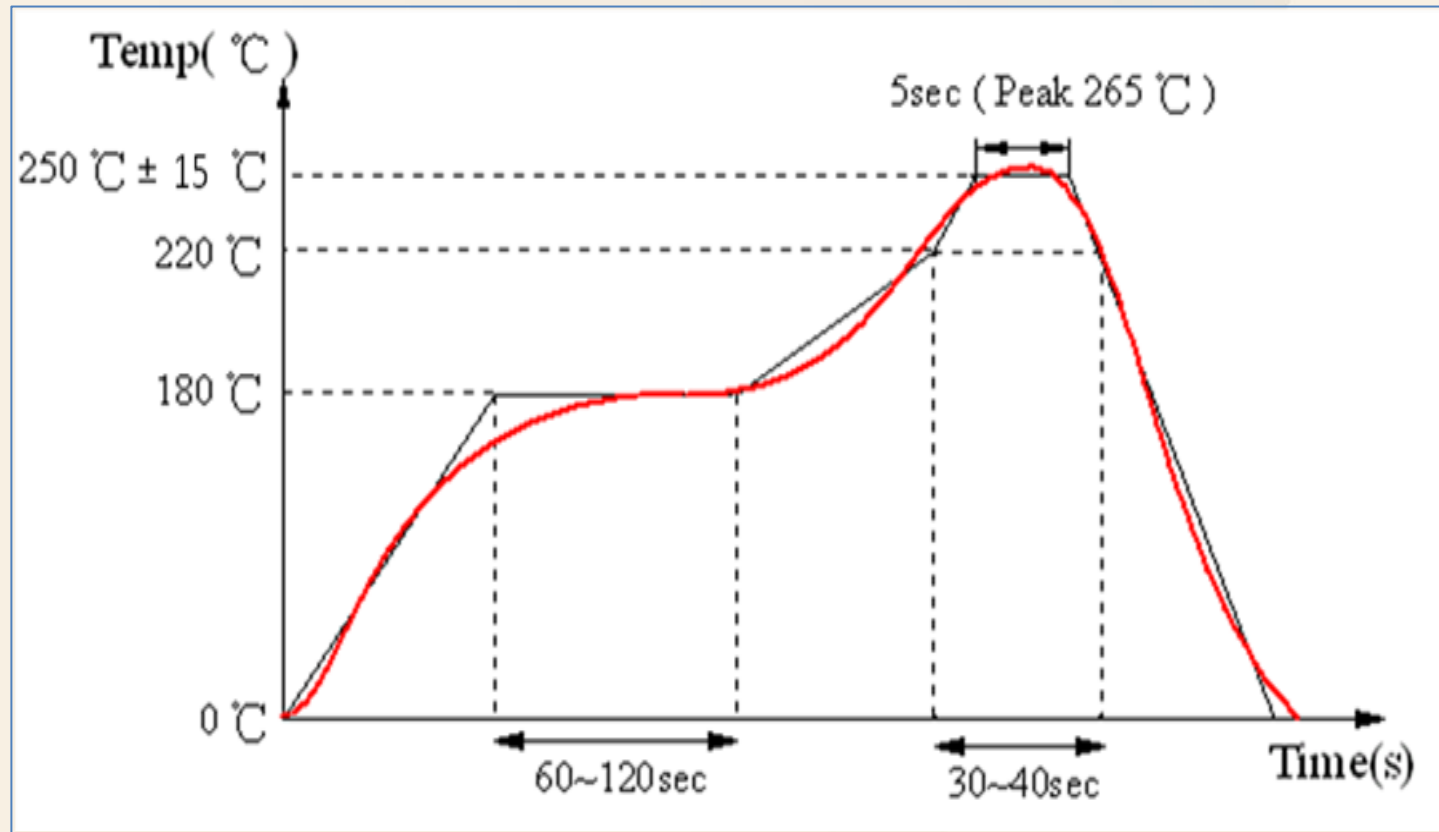
The device should also satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to the temperature $-40^{\circ}\text{C}\pm 5^{\circ}\text{C}$ for 96 ± 2 hours and to 2 hours recovery time under normal temperature.

2.9 Temperature Cycle Test

The device should also satisfy the electrical characteristics specified in paragraph 8.1~8.4 after exposed to the low temperature -40°C and high temperature $+85^{\circ}\text{C}$ for 30 ± 2 min each by 5 cycles and 1 to 2 hours recovery time under normal temperature.

A28 Antenna Dependability Test

3 Reflow Soldering Standard Condition



Test Procedure

Test Step Flow

- 1. Maintain the test ambient temperature of $23 \pm 2\text{ }^{\circ}\text{C}$, the instrument is powered on and preheated for more than 30 minutes
- 2. Tum on the darkroom power supply, connect the test cable, and set up the sample according to the standard
- 3. Outline sets the test content objectives and conducts calibration tests
- 4. Run the EMQuest OTA software, the test is complete, export the corresponding test diagram and test data, and save to the corresponding directory

Test Principle

The test principle can be seen in accordance with the standard ANSI/IEEE std 149-2021

Test Conditions

- 1.The analyte, the network analyzer for testing, the test equipment and the test cable connector should have good reliability, stability, dynamic range and measurement accuracy to ensure the correctness of the measurement accuracy
- 2. The measuring instrument should have a certificate of conformity and be within the effective calibration period
- 3. The analyte should be complete and undamaged, and the test environment should be kept clean

Equipment list and calibration date:

Equipment	Manufacturer	Model No.	Last Cal.	Due Date
Network Analyzer	Agilent	E5071C	2023.01.20	2024.01.19