

LYNwave Technology

Antenna & Thermal solution provider

Antenna Test Report

Model Name: W550CA ,HX-W550CA-NA,
HX-W550CA-EU ,HX-W550CA-UK ,HX-W550CA-00

Feature: 2.4G/5G

Application: Wi-Fi AP

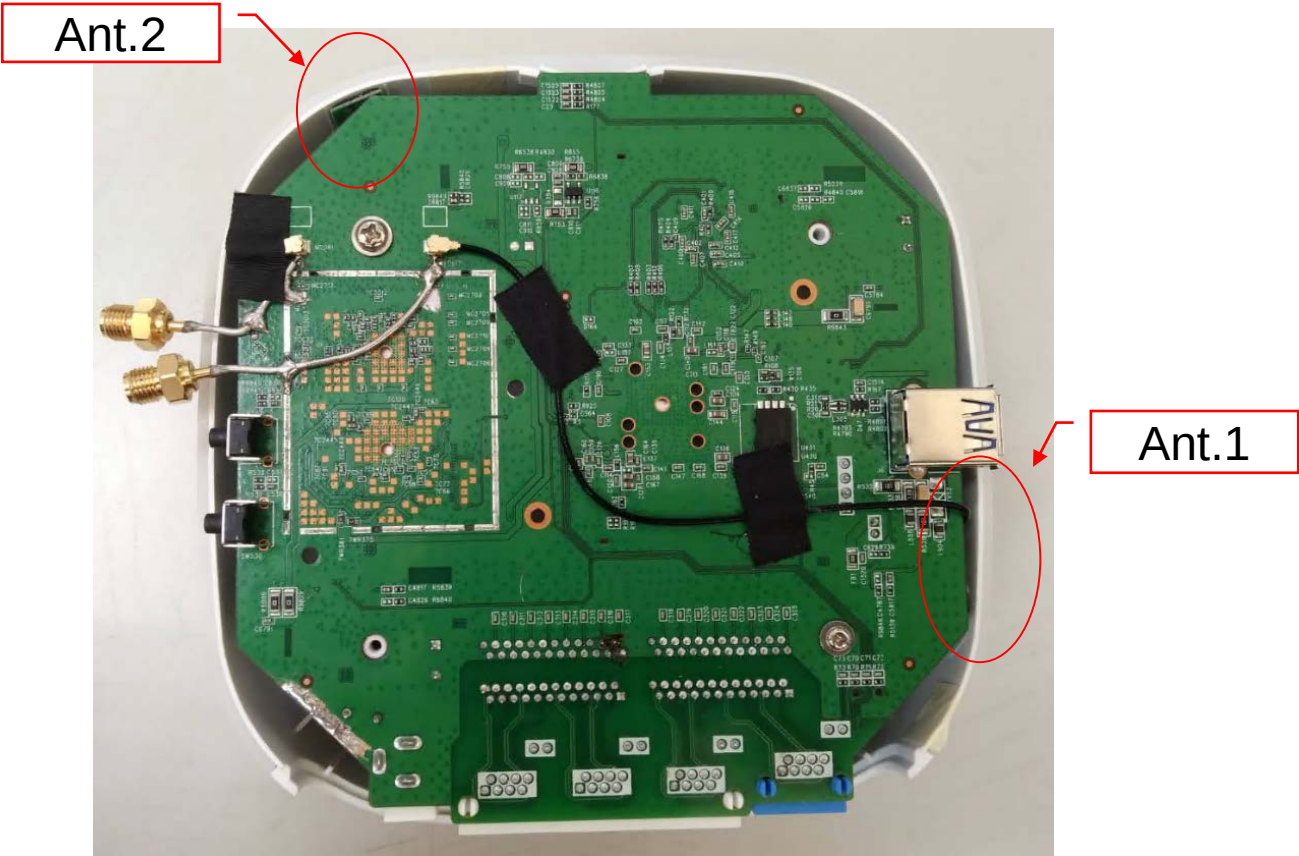
Date	Owner	Revision
2021/09/27	Alon Cai	1. S-Parameters Measurement 2. Antenna 3D Passive Measurement
2022/01/21	Alon Cai	1. S-Parameters Measurement 2. Antenna 3D Passive Measurement
2022/02/14	Xavi / Danny	1. Approval
2022/06/06	Alon Cai	1. Add Device Description
2022/06/07	Xavi/Danny	Approval
2022/06/22	Xavi/Danny	1.Added antenna chamber calibration description
2022/06/23	Daniel	1. Update antenna chamber calibration description

Table of Contents

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Antenna Placement

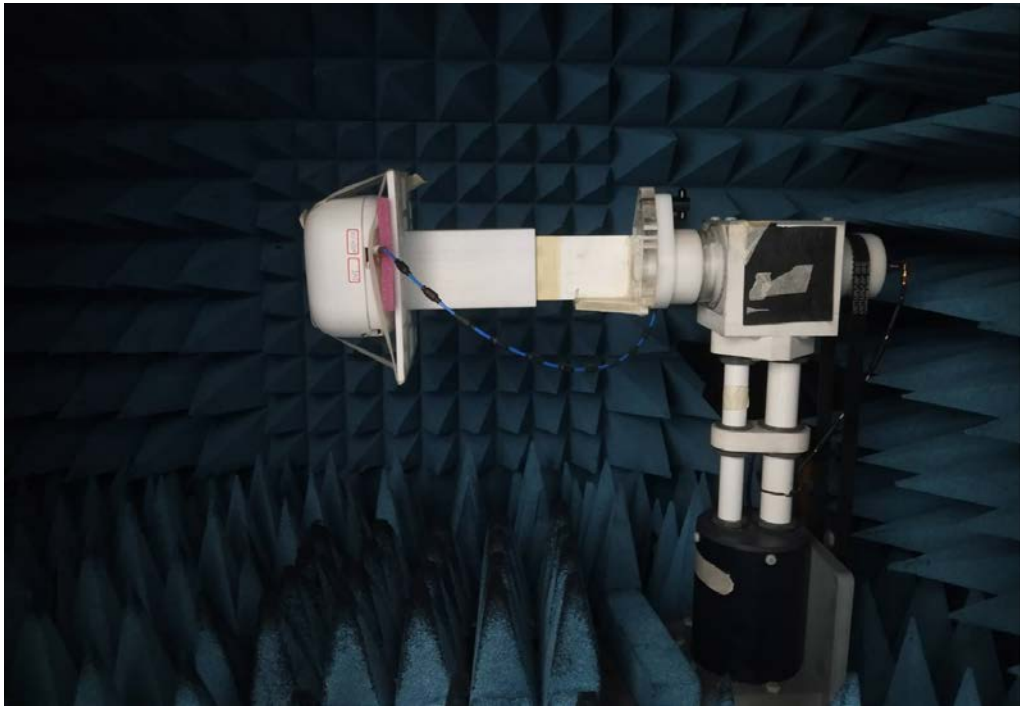
Antenna	Description	Frequency
Ant.1	ALX21P-221AA6-00	2412~2484 MHz ; 5150 ~ 5825 MHz
Ant.2	ALX21P-221AA6-01	2412~2484 MHz ; 5150 ~ 5825 MHz



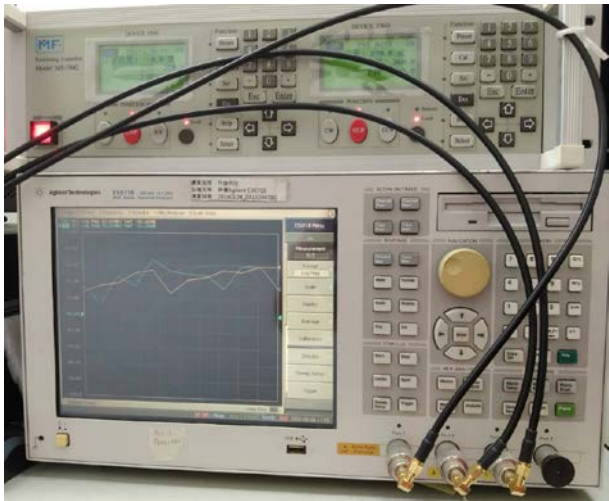
Equipment List :

Antenna Chamber	MFC-2531(1.4x1.4x2.8m)
Test software	Passive 2D/3D川升
Network analyzer	Agilent E5071B
Controller	MF7802
Calibration time	2022/04/30

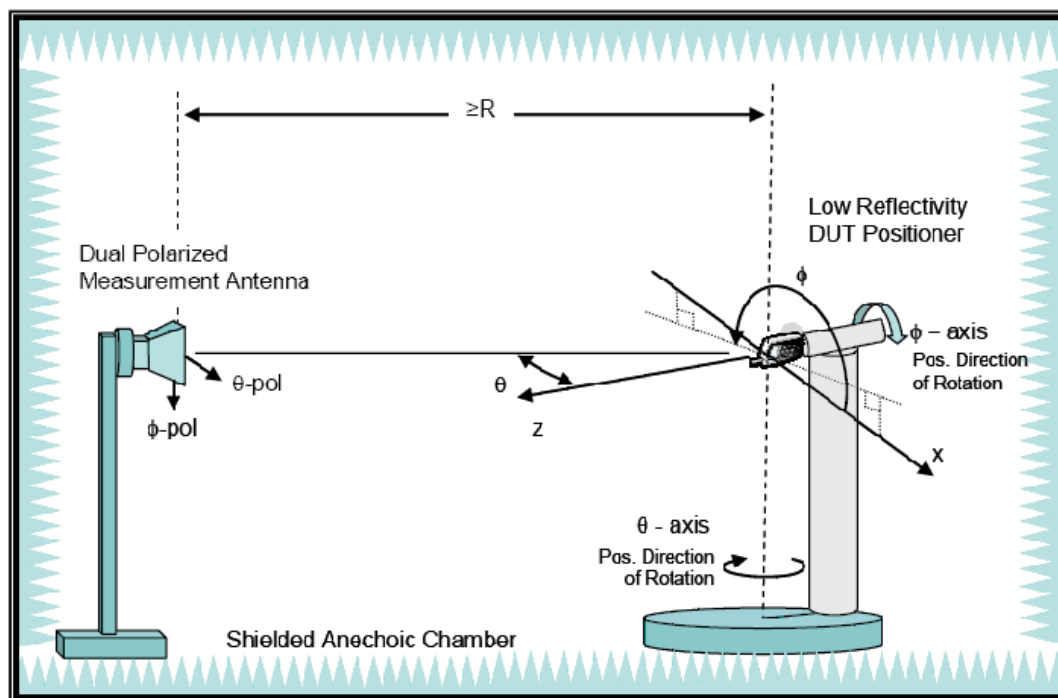
Antenna Chamber



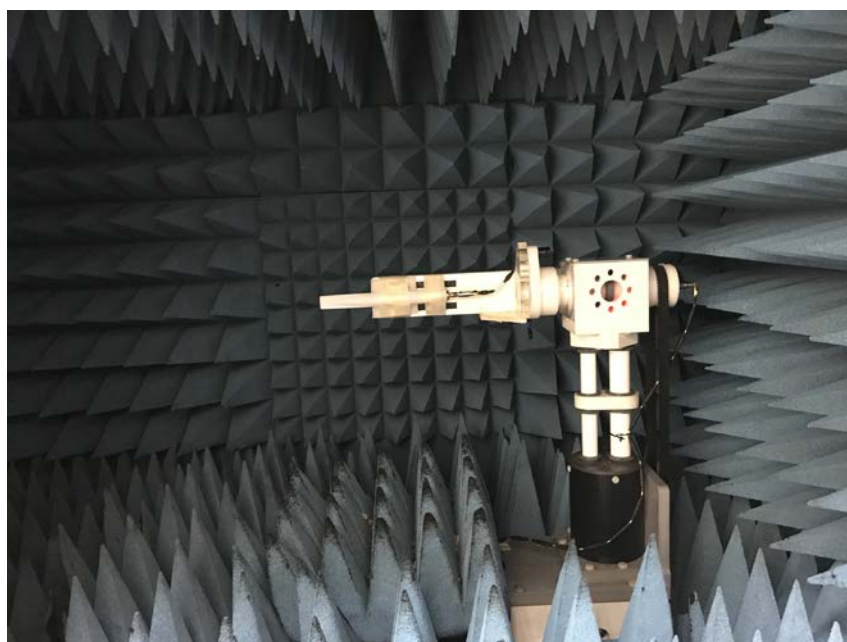
Network analyzer and Controller :



Test architecture :



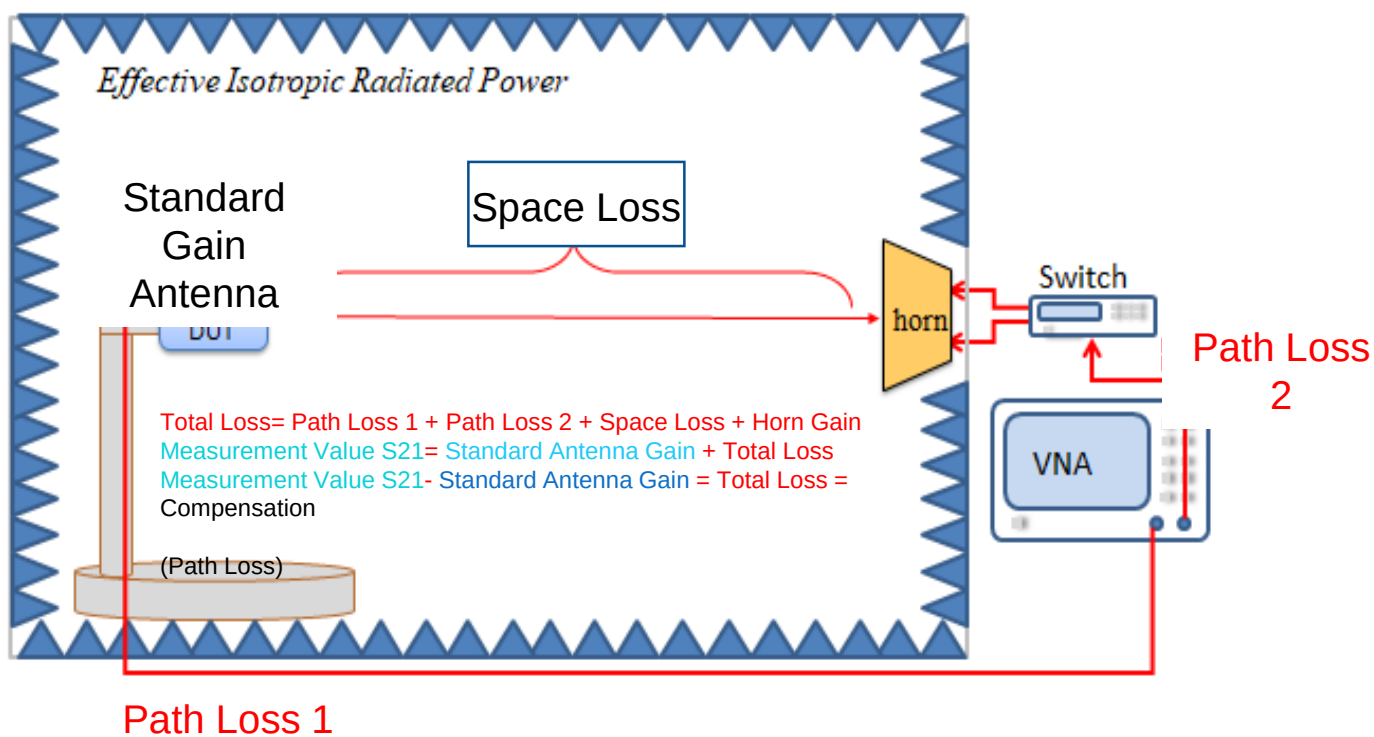
Test System Calibration



We will use a standard antenna which have been verified and whose accurate gain table is available to carry out the chamber calibration.

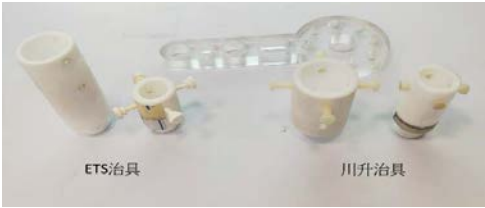
The standard antenna will be re-measured by the chamber. The difference between the measured gain values and its verified gain table will be compensated to the measurement system.

Theory

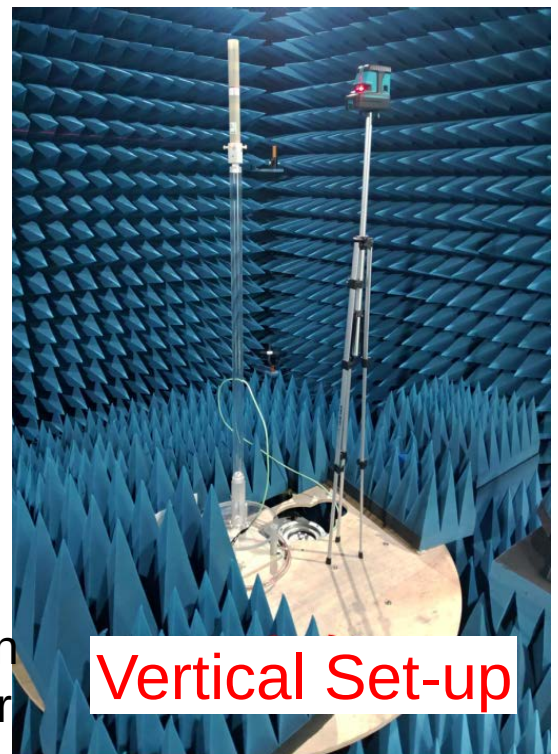
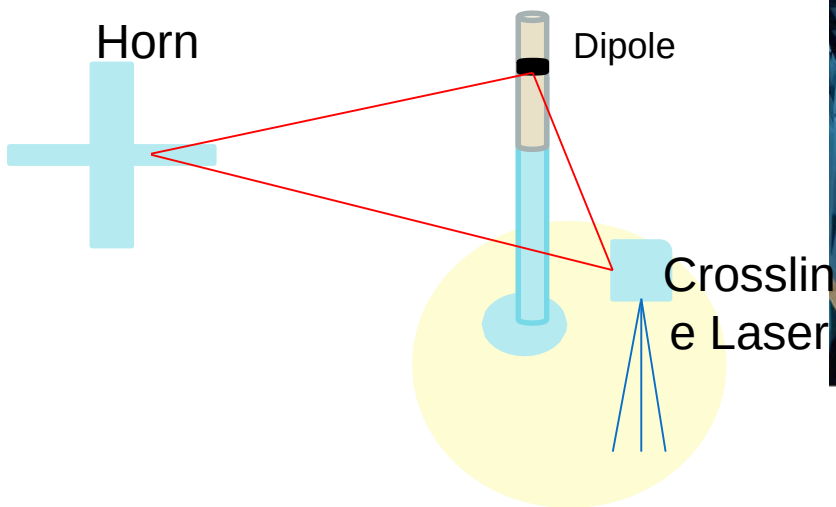


Check	List
	Remove the 3dB attenuator from the DUT's cable
	No other metal substances in the measurement environment
	No extension cable taped on Phi axis
	Align the DUT to the laser line center
	Prepare ETS or Bwant Dipole Fixture
	Crossline laser
	VNA, Turn Table, Switch on and confirm in NIMAX
	Passive Software

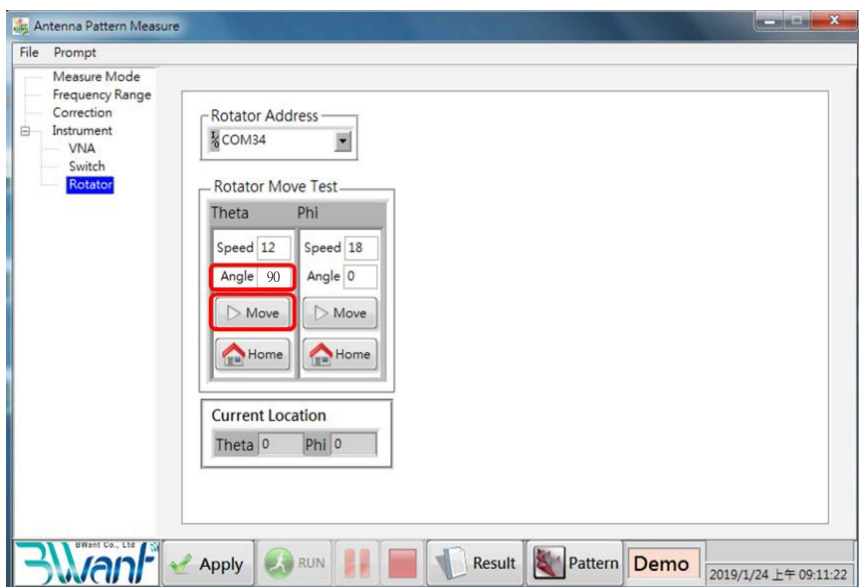
◆ The measured value of the same test object might be changed before and after calibration, so it is not recommended to calibrate frequently.



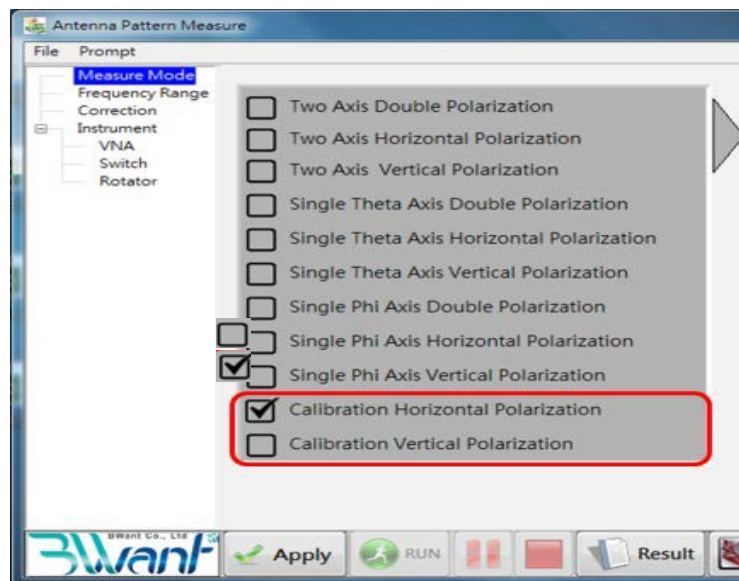
1. Align the horn horizontal blade by crossline laser.
2. Align the dipole feeding point to laser line.



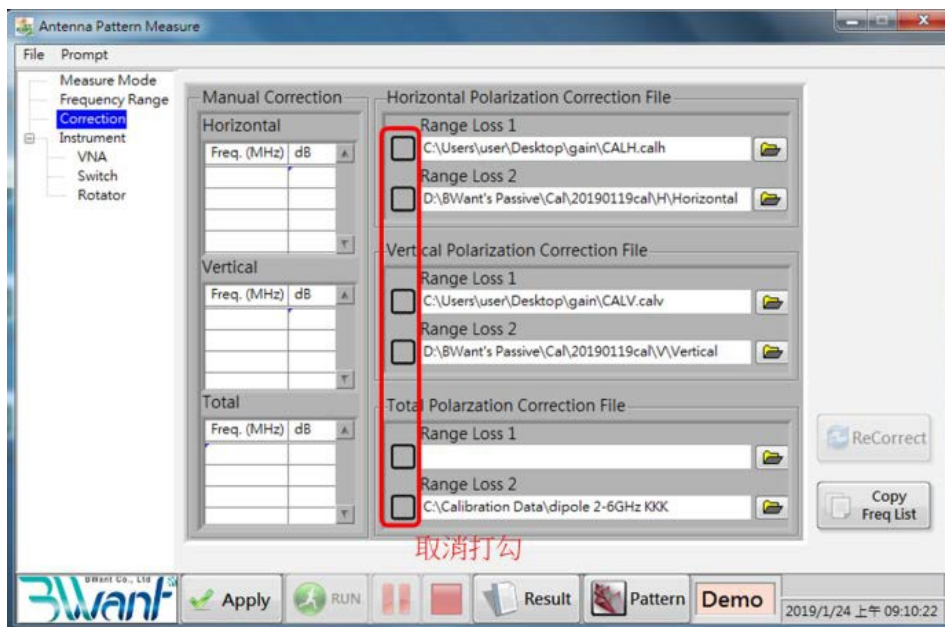
1. Set-up the dipole start from low frequency (SD650).
2. Rotate 90 degree on Theta axis.



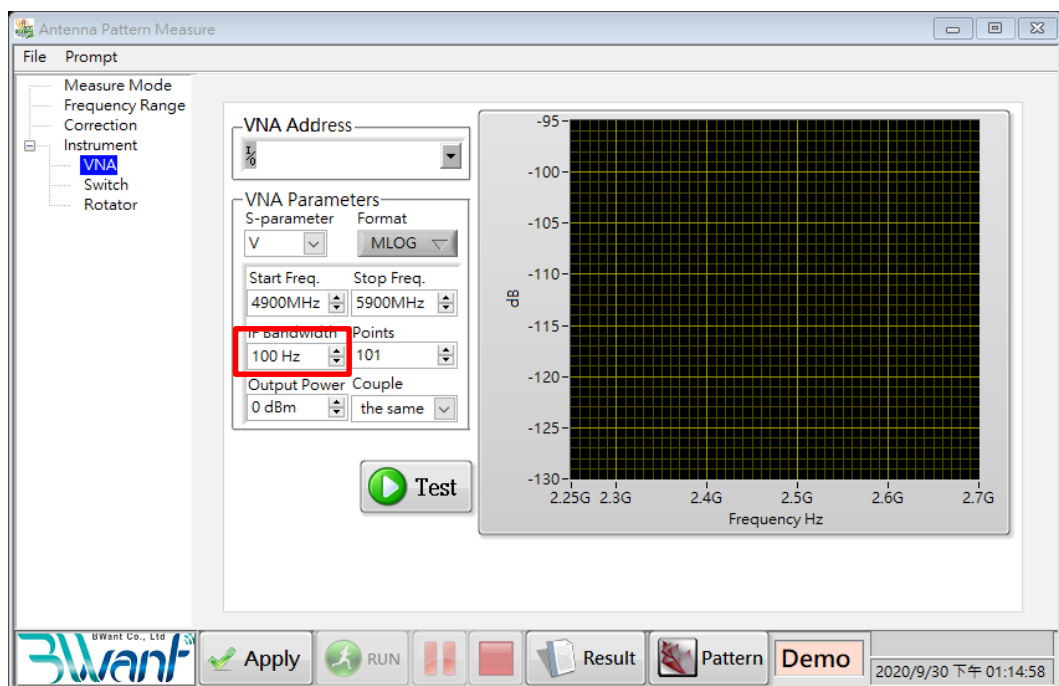
- Choose “Calibration Vertical Polarization”.
- Or choose “Calibration Horizontal Polarization” if you need a horizontal one.



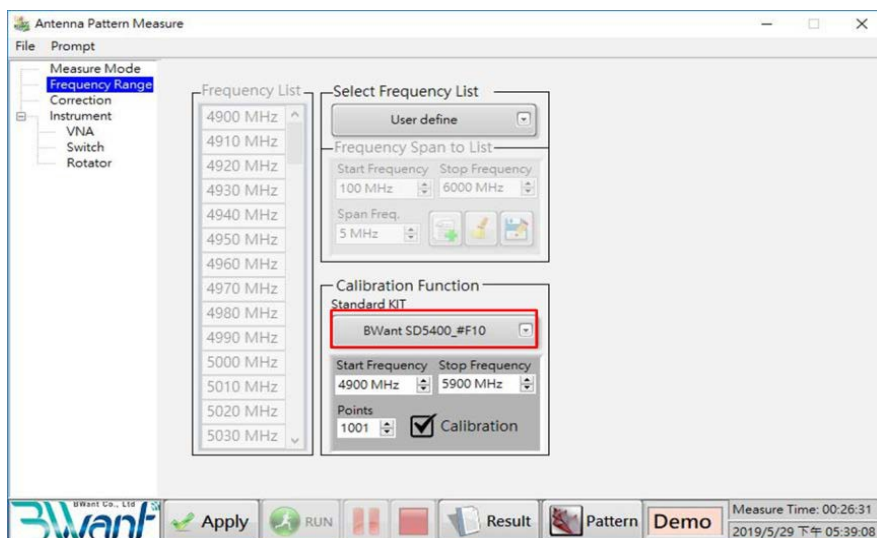
- Cancel all the selection as follow picture.



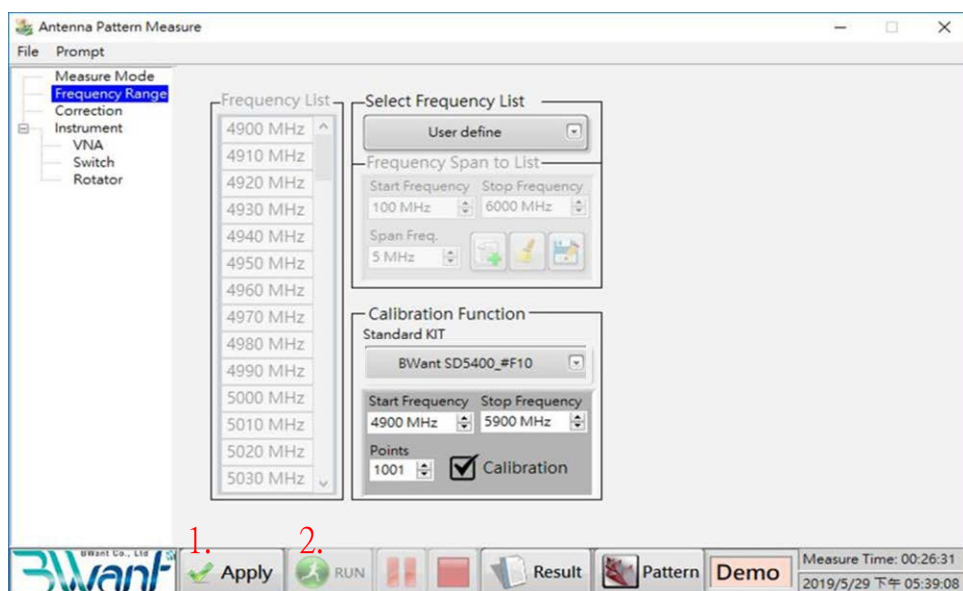
- Set the IF Bandwidth to 100Hz.



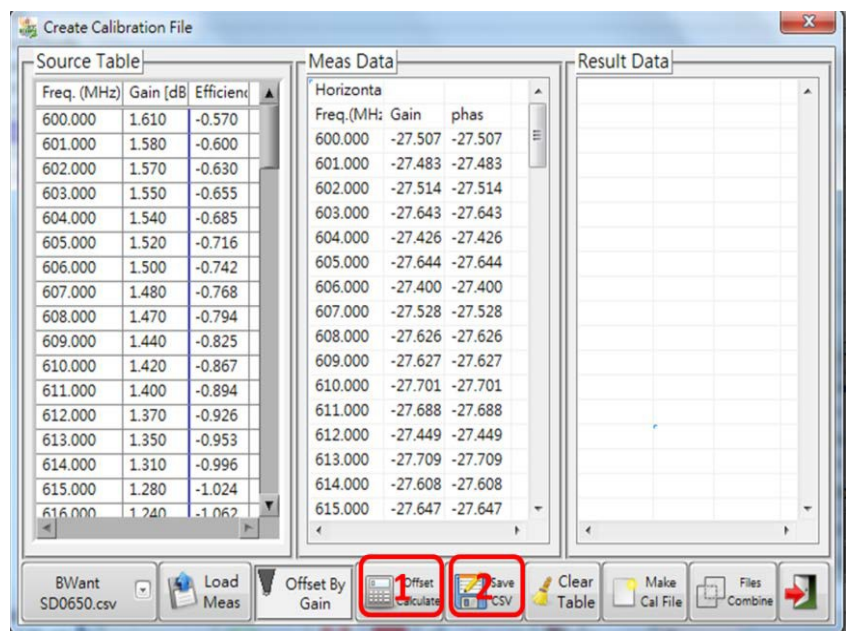
- Select the calibration dipole type from Standard KIT.
 - The frequency band is labeled on the dipole (the start & cutoff frequencies and the test points number would be set automatically after selection).



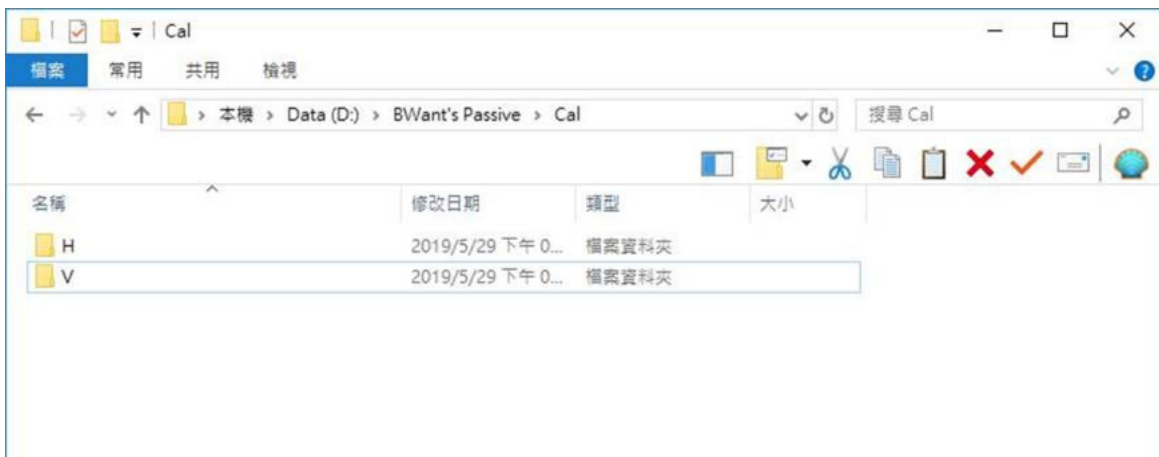
1. Click on "Apply".
2. Click on "Run" and start the testing.



1. Confirm there is testing value in “Meas Data” field.
2. Click on “Offset Calculate”.
3. Click on “Save CSV”.

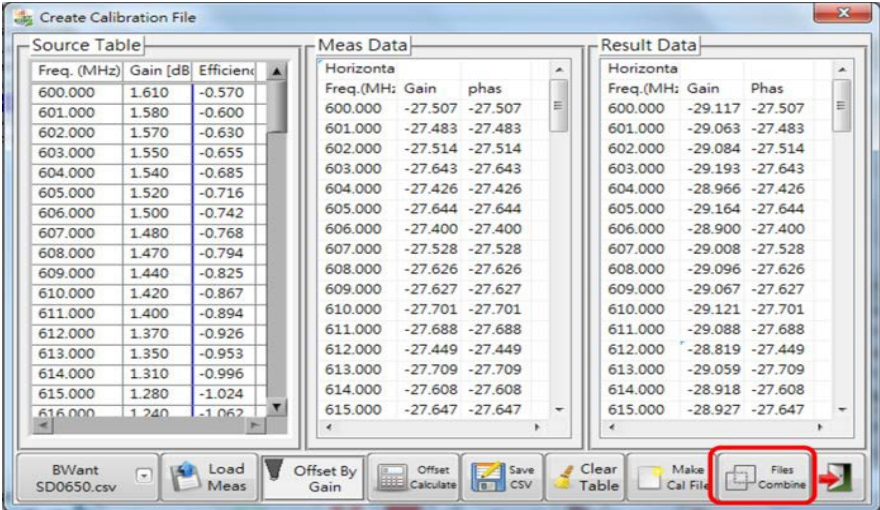


- Save the testing file according by each dipole test band and polarization.
 - Ex Vertical Polarization SD650
 - Place the Cal->V Folder and named it as “SD650_V”

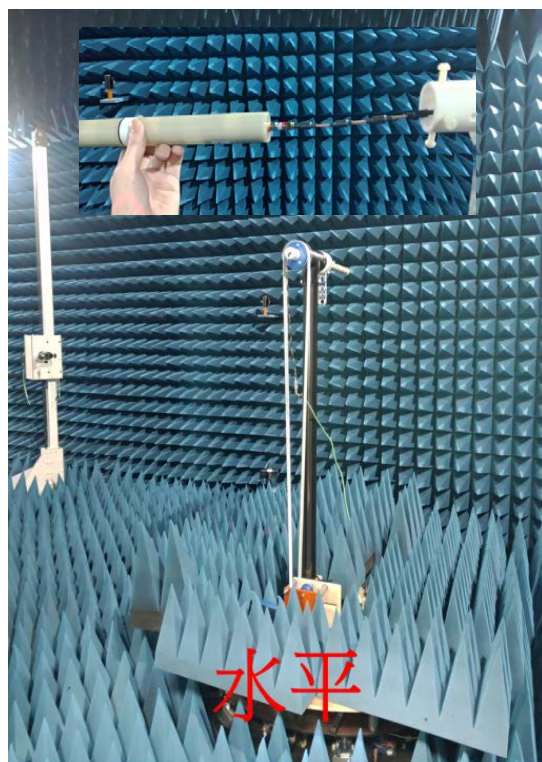
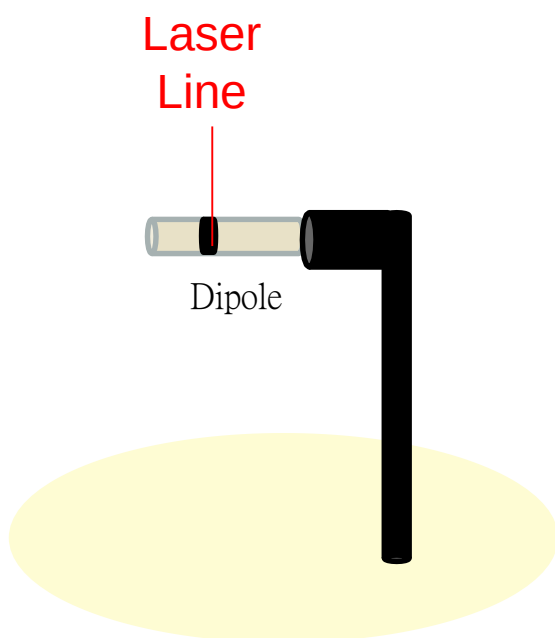


- Repeat all the 11pcs antenna as right table to complete the full band frequency according the steps from Page 5~12.
- Click on “Files Combine” , select the “Folder V” and all frequency band file would be generated.
 - Ex. Vertical Polarization 600-5900 MHzPath Loss.csv

Vertical Confirmation	Dipole Name
	SD650
	SD740
	SD900
	SD1150
	SD1575
	SD1800
	SD2140
	SD2450
	SD3200
	SD3600
	SD5400

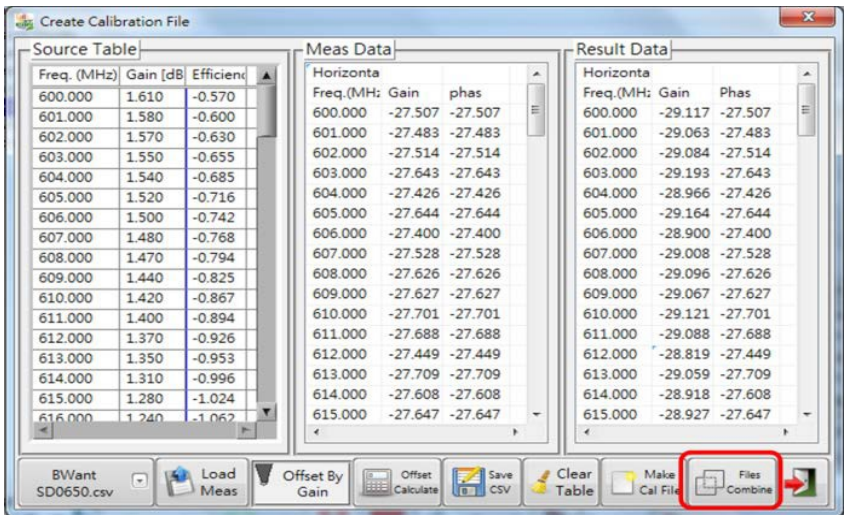


1. Align the dipole feeding point to laser line.

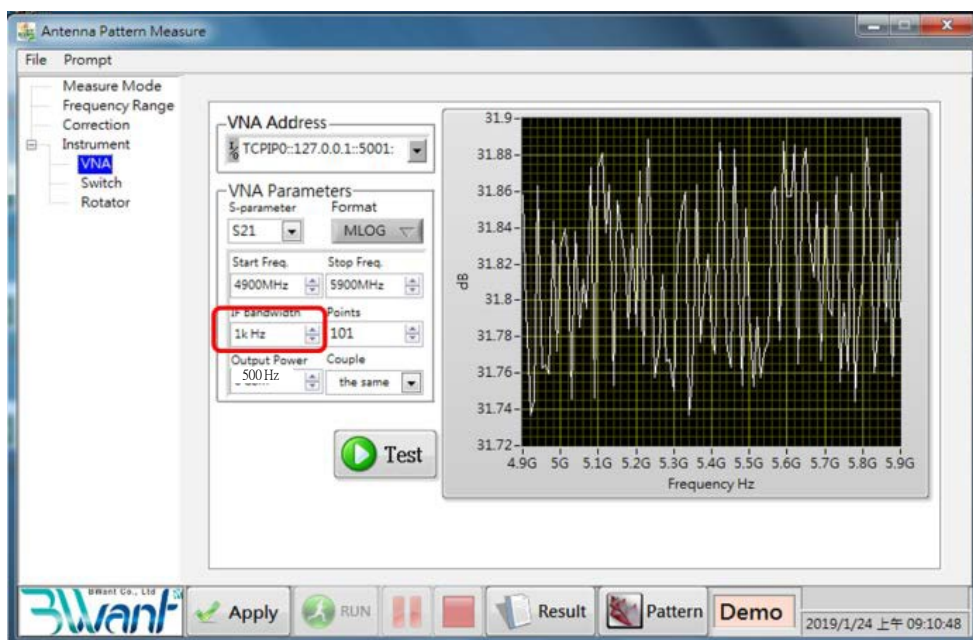


- Repeat all the 11pcs antenna as right table to complete the full band frequency according the steps from Page 5~12.
- Click on “Files Combine” , select the “Folder H” and all frequency band file would be generated.
 - Ex. Horizontal Polarization 600-5900 MHzPath Loss.csv

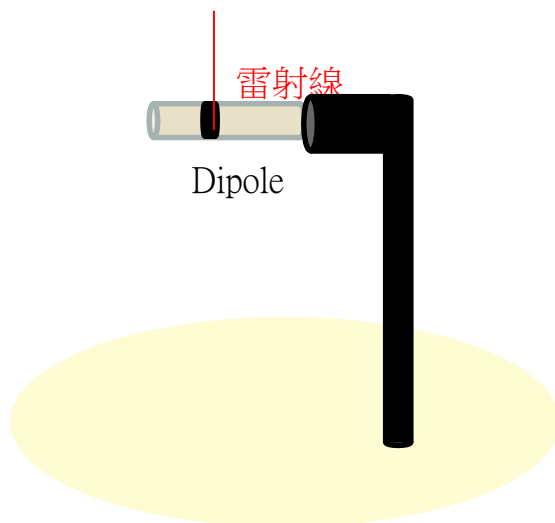
Horizontal Confirmation	Dipole Name
	SD650
	SD740
	SD900
	SD1150
	SD1575
	SD1800
	SD2140
	SD2450
	SD3200
	SD3600
	SD5400



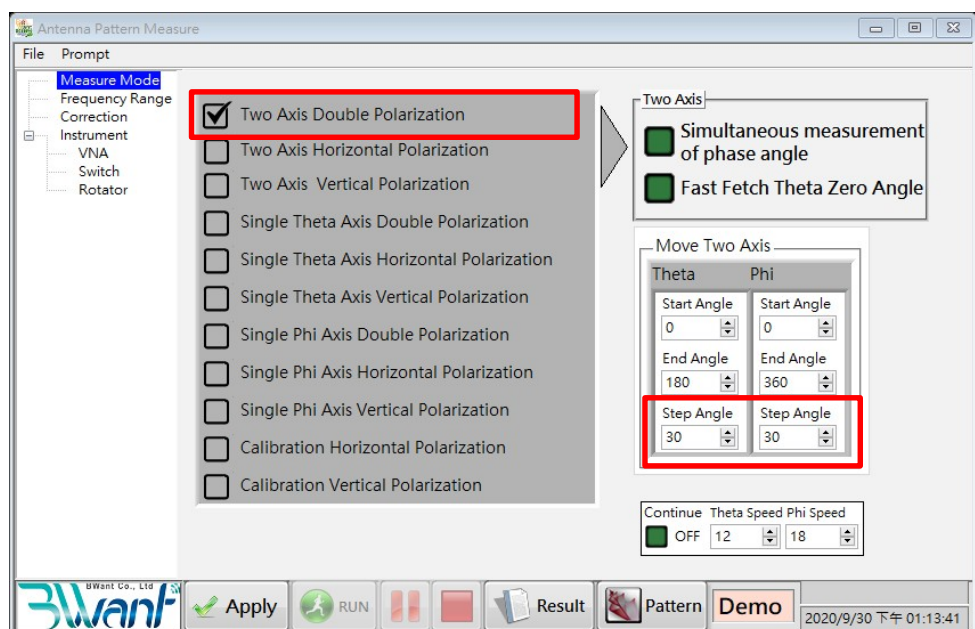
- Change the "IF Bandwidth" value back to 500Hz.



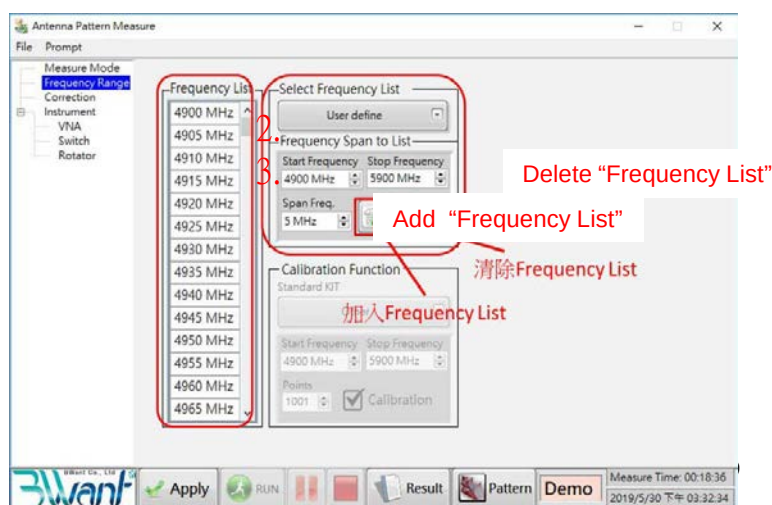
1. Set-up the dipole start from low frequency (SD650) as Page 14.



- Select “Two Axis Double Polarization “ on Measure Mode Page.
- Set the angle of Theta and Phi to 30 degree.

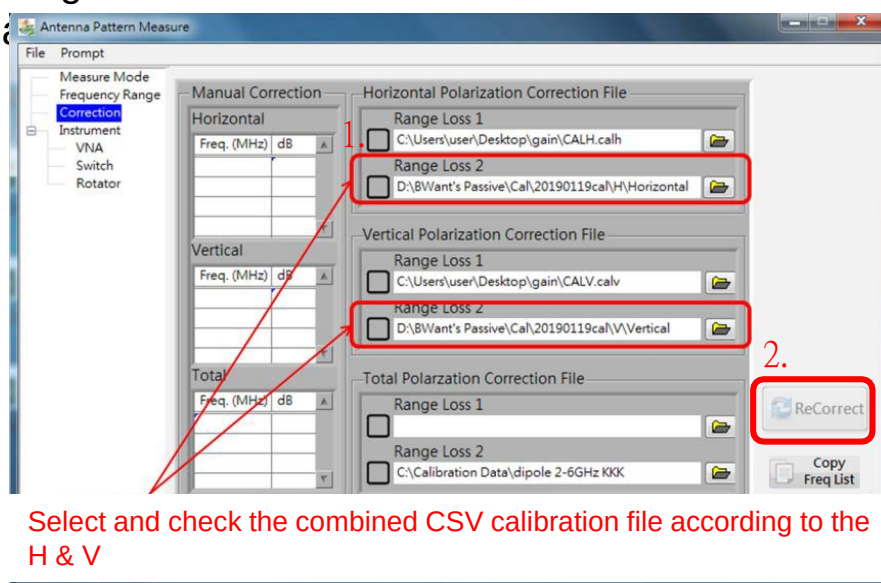


1. Delete “Frequency List”.
2. Insert the current dipole “start & cutoff frequencies”.
3. Insert Span Freq.
 - SD650、SD740: 1MHz
 - – SD900、SD1575、SD5400: 5MHz
 - Other Dipole : 10MHz
4. Add “Frequency List”.
5. Apply.
6. Run.



1. Select and check the calibration files that generated on Page 13 & Page 15.
2. Click on "ReCorrect".

- Apply .calh file in "Range Loss1"
- Apply .csv file in "Range Loss2"



- If any efficiency value $>100\%$, please refer to the next page to correct.
- Efficiency $>100\%$ - the calibration is done

Antenna Pattern Measure

File Prompt

Measure Mode
Correction
Instrument
VNA
Switch
Rotator

Power	Phase	Coordinate										
5900.000	-26.599	-18.255	8.344	-26.599	0.219	-18.255	-55.637	225.000	165.000	3		
Total Pol												
Frequenc	Tot. Rad.	Peak EIRF	Directivity	Efficiency	Efficiency	Gain (dBi)	Min EIR	Peak Phi	Peak Theta			
4900.000	-0.220	1.443	1.663	-0.220	95.054	1.443	-22.750	15.000	60.000	C		
4905.000	-0.109	1.543	1.652	-0.109	97.512	1.543	-22.559	15.000	60.000	C		
4910.000	-0.023	1.659	1.682	-0.023	99.482	1.659	-23.848	15.000	60.000	C		
4915.000	-0.115	1.630	1.745	-0.115	97.386	1.630	-23.359	15.000	60.000	C		
4920.000	-0.062	1.701	1.763	-0.062	98.580	1.701	-23.550	45.000	60.000	C		
4925.000	-0.301	1.459	1.761	-0.301	93.297	1.459	-23.590	15.000	60.000	C		
4930.000	-0.335	1.397	1.732	-0.335	92.571	1.397	-22.497	15.000	60.000	C		
4935.000	-0.133	1.577	1.710	-0.133	96.989	1.577	-21.297	15.000	60.000	C		
4940.000	-0.165	1.603	1.768	-0.165	96.272	1.603	-21.298	15.000	60.000	C		
4945.000	-0.218	1.591	1.809	-0.218	95.104	1.591	-20.277	330.000	60.000	C		
4950.000	-0.205	1.663	1.868	-0.205	95.384	1.663	-19.716	15.000	60.000	C		
4955.000	-0.132	1.805	1.937	-0.132	97.009	1.805	-18.919	15.000	60.000	C		
4960.000	-0.131	1.815	1.946	-0.131	97.033	1.815	-18.275	15.000	60.000	C		
4965.000	-0.119	1.888	2.007	-0.119	97.299	1.888	-19.220	15.000	60.000	C		
4970.000	0.016	2.045	2.029	0.016	100.369	2.045	-18.712	45.000	60.000	C		
4975.000	0.023	2.065	2.042	0.023	100.531	2.065	-19.120	15.000	60.000	C		
4980.000	0.105	2.113	2.008	0.105	102.453	2.113	-18.912	15.000	60.000	C		

Transpose
Direct
ECC
Combine
Save CSV
Save as RAW
Simulator
OFF
Theta Step
15
Phi Step
15

3wAnt Co., Ltd

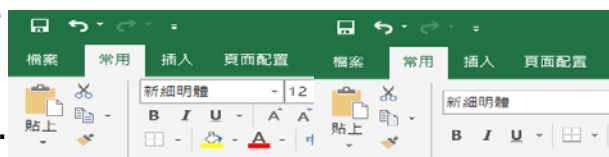
Apply RUN Result Pattern Demo

Measure Time: 00:18:36
2019/5/30 下午 03:14:36

3. Correct the H & V calibration data.

– Ex. Max: 0.105

– New Gain=Red Frame + Max + 0.



Horizontal Polarization

Freq.(MHz)	Gain	Phas
600	-53.382	81.172
601	-53.432	39.542
602	-53.487	-2.081
603	-53.544	-43.572
604	-53.604	-84.996
605	-53.675	-126.298
606	-53.738	-167.518
607	-53.802	-151.311
608	-53.854	-110.324
609	-53.896	-69.311
610	-53.929	-28.323
611	-53.94	-12.64
612	-53.947	-53.618
613	-53.948	-94.539
614	-53.938	-135.581
615	-53.924	-176.539
616	-53.911	-142.475
617	-53.872	-101.449
618	-53.836	-60.392
619	-53.785	-19.342
620	-53.728	-21.844
621	-53.658	-63.059
622	-53.602	-104.368

SD650_H

Ex. Original Freq 600 Gain= -53.382

New Gain=-53.382 +0.105 + 0.1= -53.177

Vertical Polarization

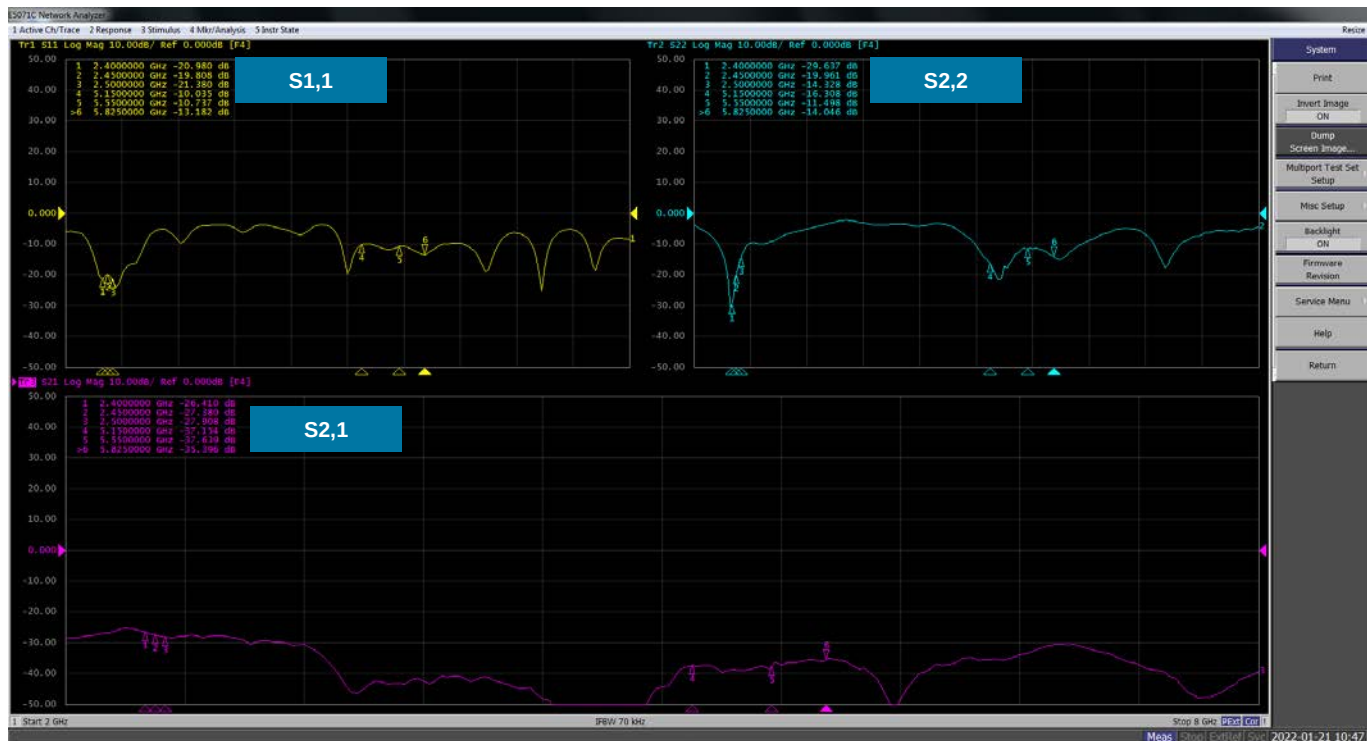
Freq.(MHz)	Gain	Phas
600	-53.177	81.172
601	-53.227	39.542
602	-53.282	-2.081
603	-53.339	-43.572
604	-53.399	-84.996
605	-53.47	-126.298
606	-53.533	-167.518
607	-53.597	-151.311
608	-53.649	-110.324
609	-53.691	-69.311
610	-53.724	-28.323
611	-53.735	-12.64
612	-53.742	-53.618
613	-53.743	-94.539
614	-53.733	-135.581
615	-53.719	-176.539
616	-53.706	-142.475
617	-53.667	-101.449
618	-53.631	-60.392
619	-53.58	-19.342
620	-53.523	-21.844
621	-53.453	-63.059
622	-53.397	-104.368

SD650_V

- According to the Page 17~24, keep confirm all the antennas' efficiency value.

Efficiency Value Confirmation	Dipole Name
	SD650
	SD740
	SD900
	SD1150
	SD1575
	SD1800
	SD2140
	SD2450
	SD3200
	SD3600
	SD5400

S-Parameter



Gain Table _Copper tube

Ant.1						
Frequency (MHz)	2400	2450	2500	5150	5550	5825
Efficiency(%)	62	64	61	60	61	62
Peak Gain(dBi)	2.5	2.7	2.4	2.8	3.1	3.1
Ant.2						
Frequency (MHz)	2400	2450	2500	5150	5550	5825
Efficiency(%)	68	69	65	60	60	63
Peak Gain(dBi)	2.9	2.6	2.4	3.4	2.9	3.9

The antenna characteristics

- Return loss
 - RL < -10dB in operating band
- Gain
 - 2G Band : 2.4~2.9dBi
 - 5G Band : 2.8~3.1dBi
- Efficiency
 - 2G Band > 60%
 - 5G Band > 60%
- Isolation
 - 2G Band > 25dB
 - 5G Band > 25dB

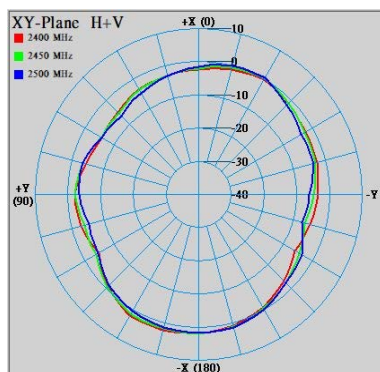
Ant.1_2.4GHz 2D.3D Radiation Pattern with Heatsink

Frequency(MHz) : 2D. 2400~2500

3D. 2450

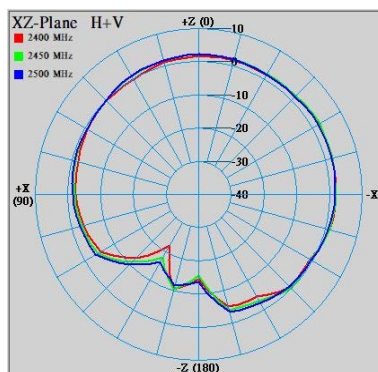
Radiation Pattern :

Azimuth Plane



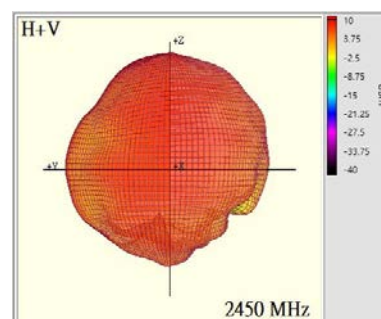
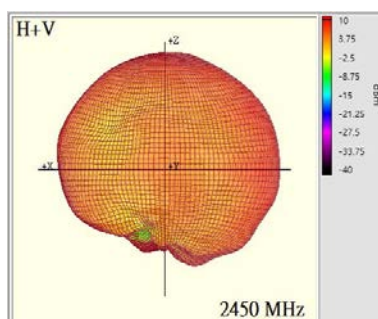
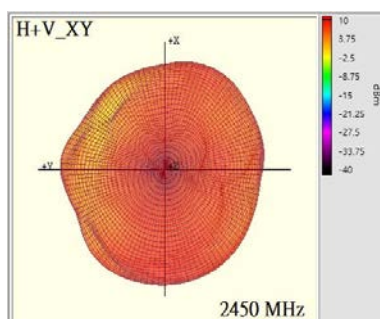
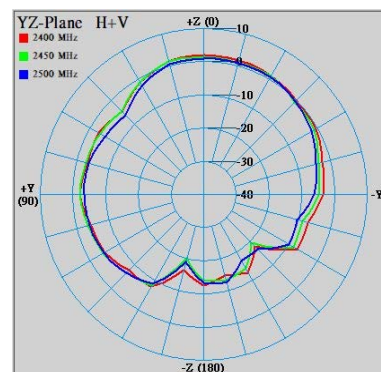
Elevation Plane

phi = 0

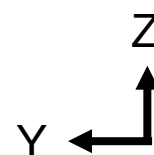
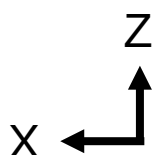
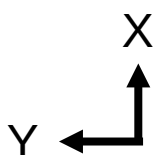


Elevation Plane

phi = 90



Setup :

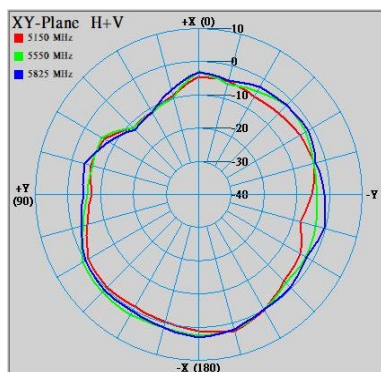


Ant.1_5GHz 2D.3D Radiation Pattern with Heatsink

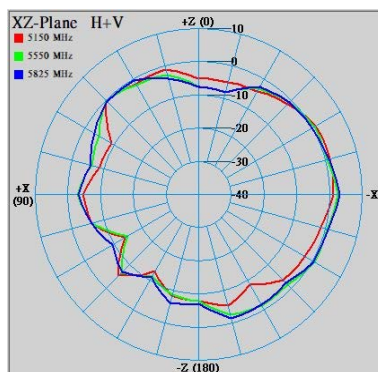
Frequency(MHz) : 2D. 5150~5825
3D. 5550

Radiation Pattern :

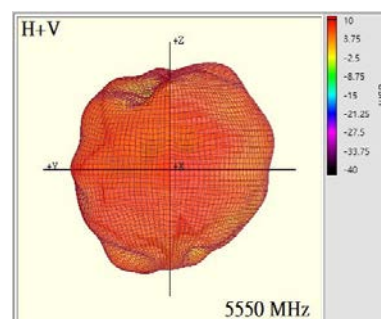
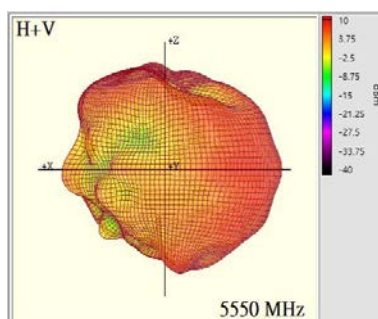
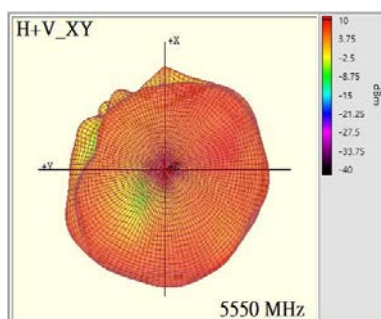
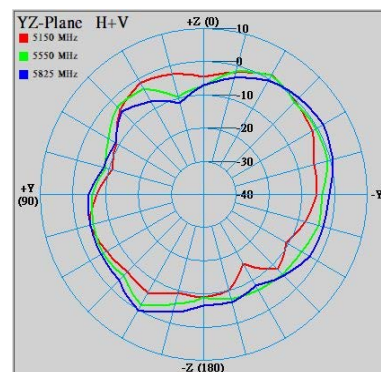
Azimuth Plane



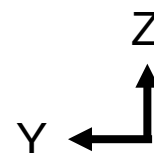
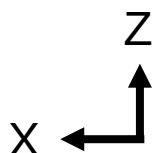
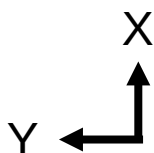
Elevation Plane
phi = 0



Elevation Plane
phi = 90



Setup :

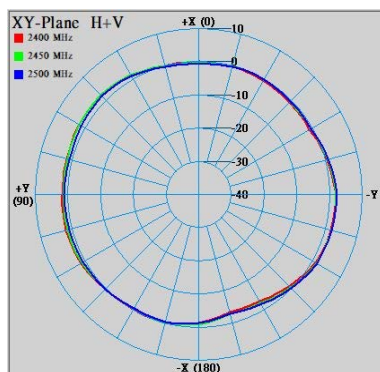


Ant.2_2.4GHz 2D.3D Radiation Pattern with Heatsink

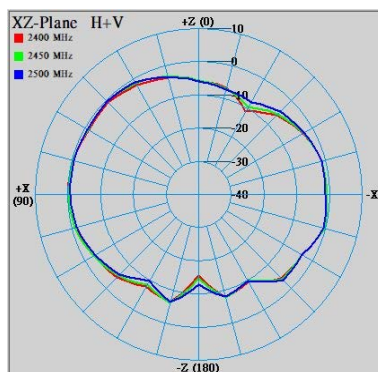
Frequency(MHz) : 2D. 2400~2500
3D. 2450

Radiation Pattern :

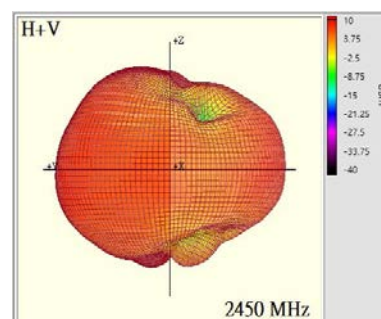
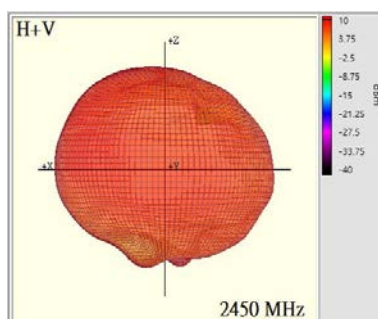
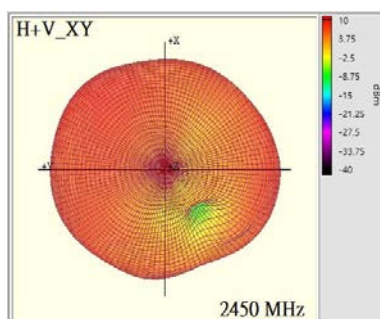
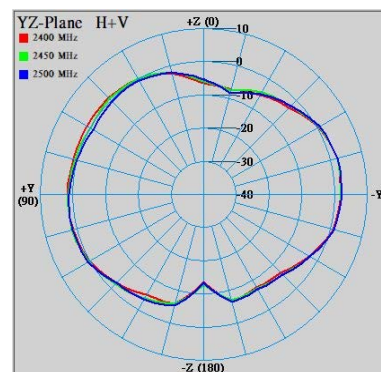
Azimuth Plane



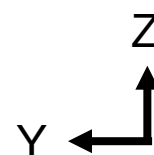
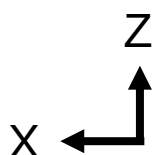
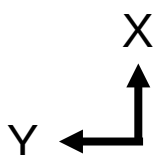
Elevation Plane
phi = 0



Elevation Plane
phi = 90



Setup :

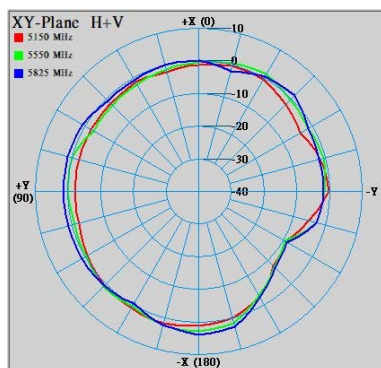


Ant.2_5GHz 2D.3D Radiation Pattern with Heatsink

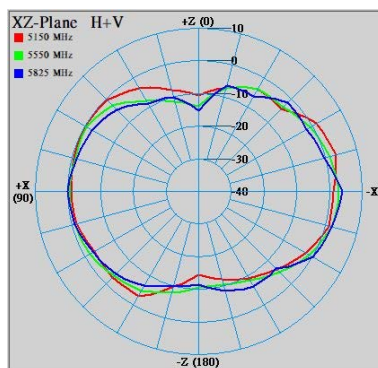
Frequency(MHz) : 2D. 5150~5825
3D. 5550

Radiation Pattern :

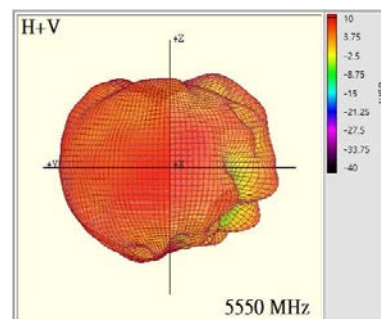
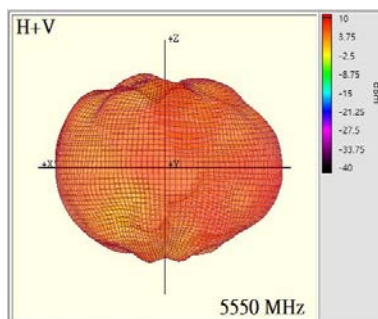
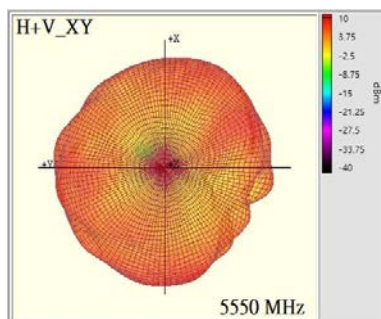
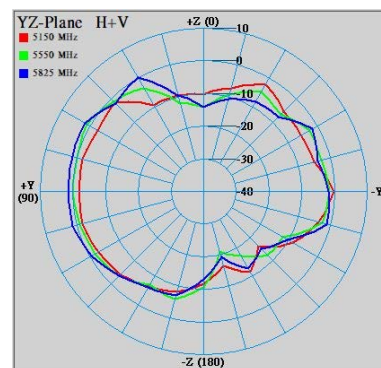
Azimuth Plane



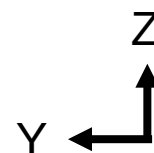
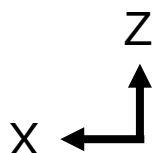
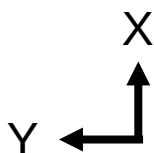
Elevation Plane
phi = 0



Elevation Plane
phi = 90



Setup :

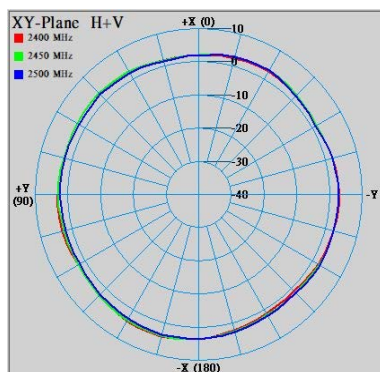


Combine Gain 2D Radiation Pattern with Heatsink

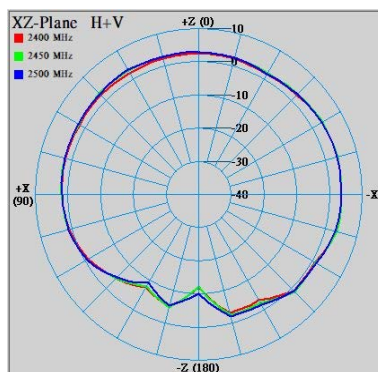
Frequency(MHz) : 2400~2500

Radiation Pattern :

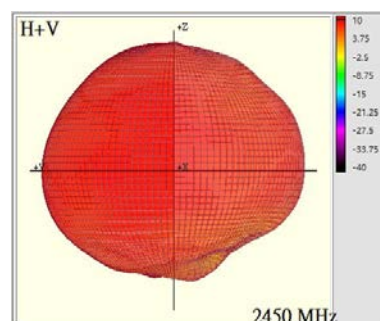
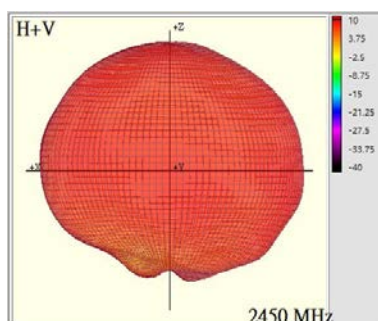
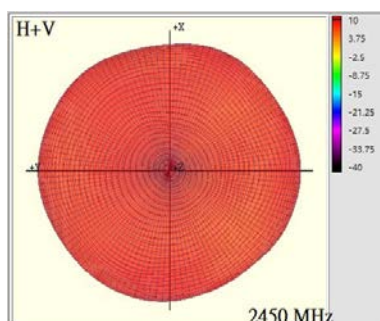
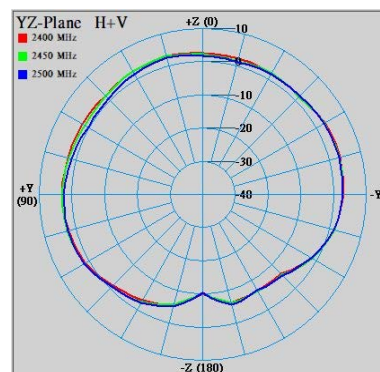
Azimuth Plane



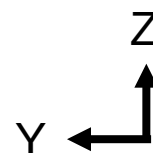
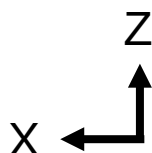
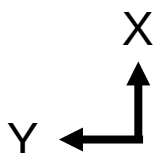
Elevation Plane
phi = 0



Elevation Plane
phi = 90



Setup :

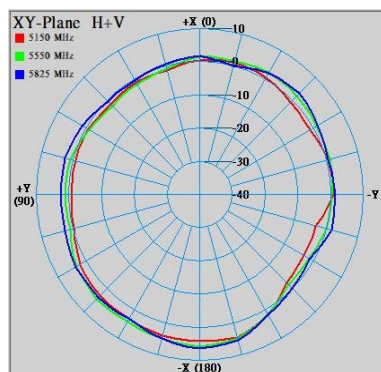


Combine Gain 2D Radiation Pattern with Heatsink

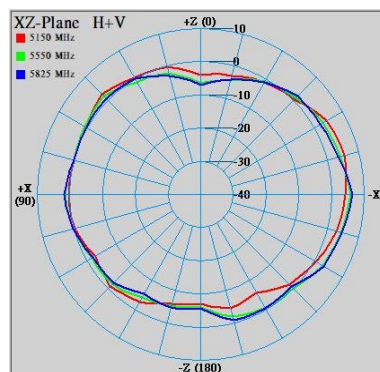
Frequency(MHz) : 5150~5825

Radiation Pattern :

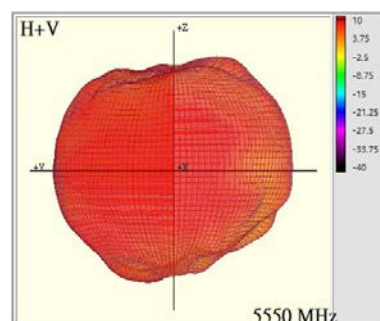
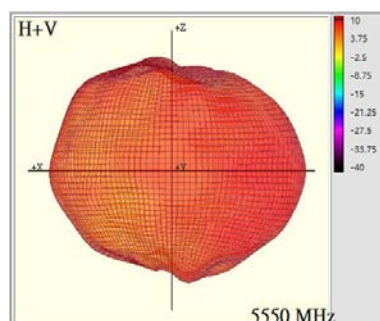
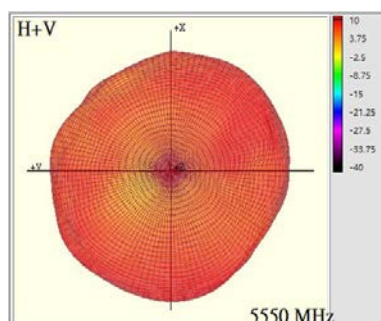
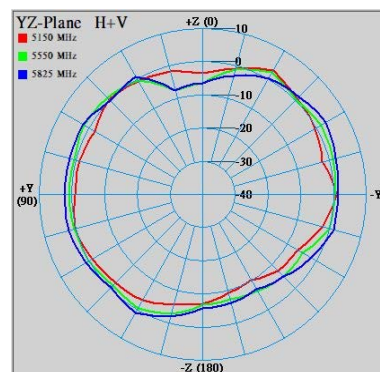
Azimuth Plane



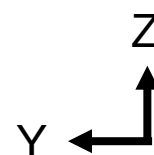
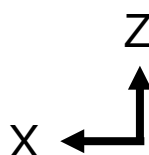
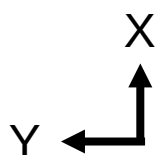
Elevation Plane
phi = 0



Elevation Plane
phi = 90



Setup :



Summary

- Antenna meet the specification .

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