

MSI MRBE110_ Antenna Passive Report

V2.1



Wen
2025-05-12

Report Change List



Version	Change description	Author	Date
V1.0	First version	Wen	2025.02.15
V1.1	New antenna model, cable size, optimized combination gain	Wen	2025.02.20
V1.2	Adjust the combined gain values of the 6G antenna	Wen	2025.03.11
V1.3	Adjust the position of the 5G ANT4 antenna	Wen	2025.03.26
V1.4	Optimize the 6G antenna	Wen	2025.04.14
V2.1	Mold sample testing, optimize the 6G antenna	Wen	2025.05.12

CONTENTS

- ◆ Purpose & Environment
- ◆ DUT Antenna
- ◆ Return Loss and Isolation
- ◆ 2D&3D Radiation Pattern
- ◆ Peak Gain and Efficiency
- ◆ Summary

Purpose

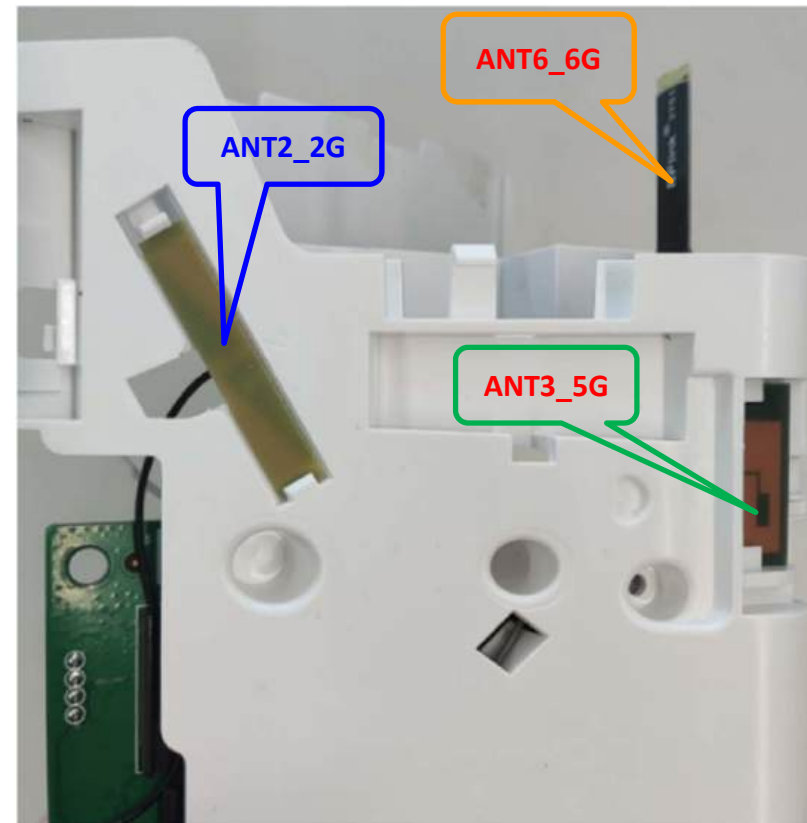
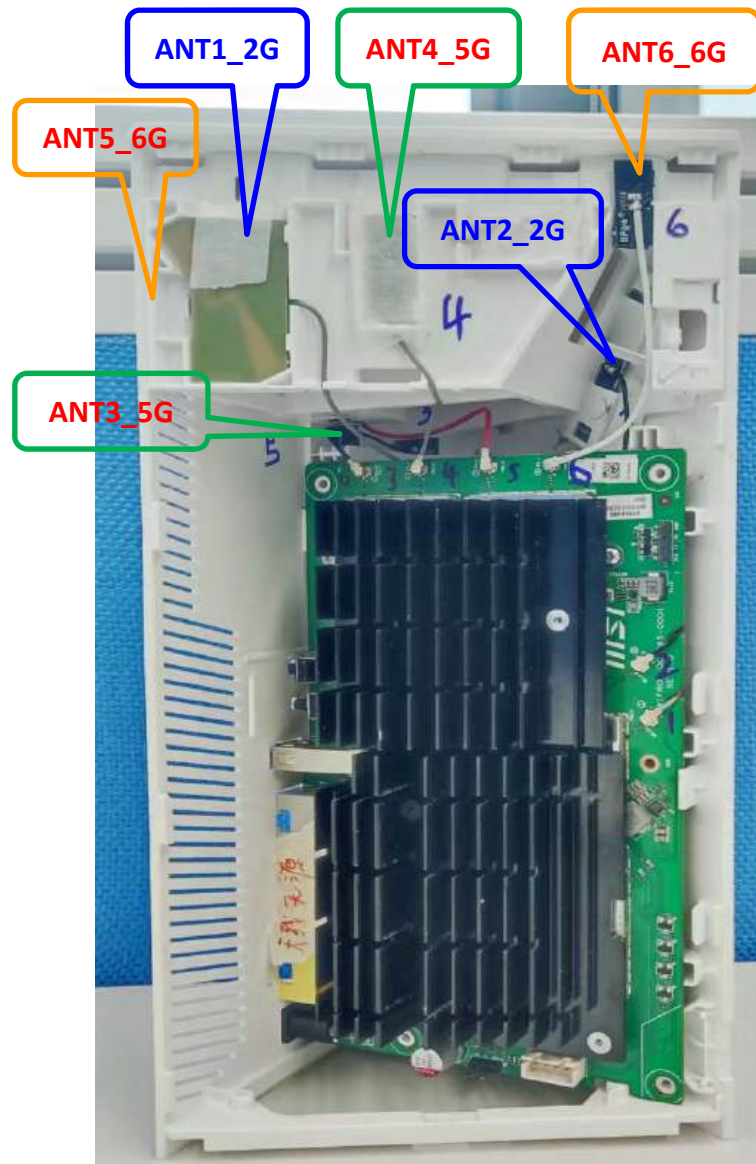
- Meet the electrical performance index ;
- Confirm the antenna scheme to meet the design requirements;

Environment

- Test Condition: the network analyzer(E5071C) and SATIMO microwave anechoic chamber
- Passive measurement results are presented mock up

Antenna Model

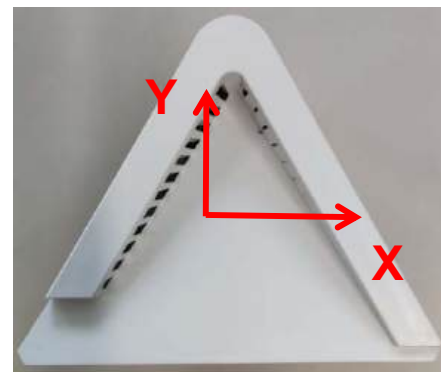
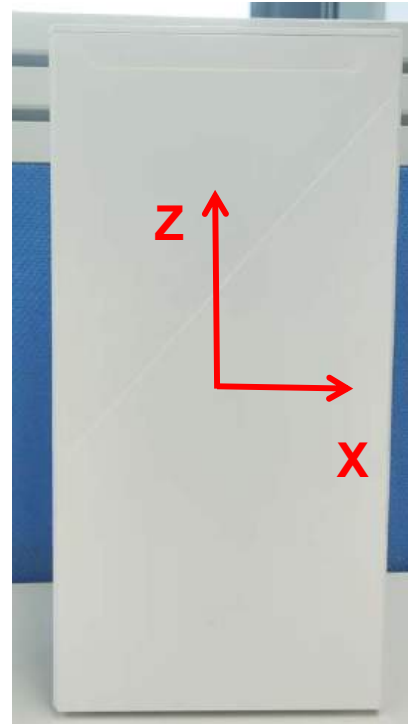
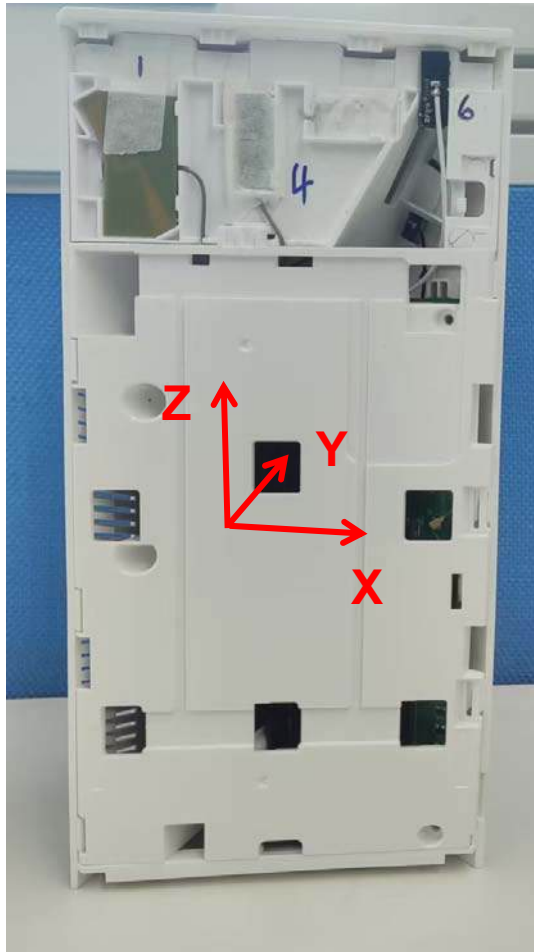
T&W



	ANT NO.	Frequency (GHz)
WIFI-2G	ANT1	2.4-2.5
	ANT2	2.4-2.5
WIFI-5G	ANT3	5.15-5.85
	ANT4	5.15-5.85
WIFI-6G	ANT5	5.925-7.125
	ANT6	5.925-7.125

Antenna Model

T&W



Antenna Model

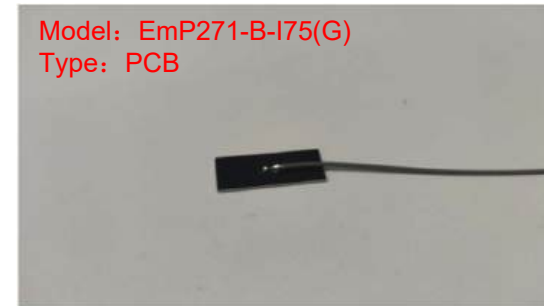
T&W

Ant 1



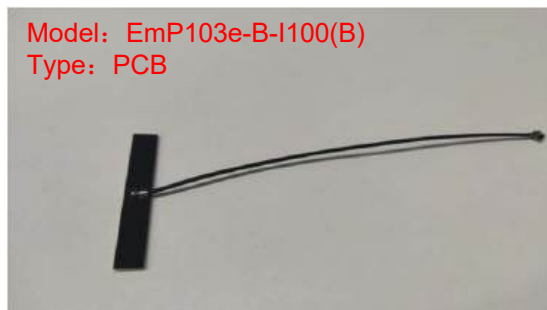
Size: 38.1*26.1*0.8mm L=215mm

Ant 4



Size: 25*10*0.8mm L=75mm

Ant 2



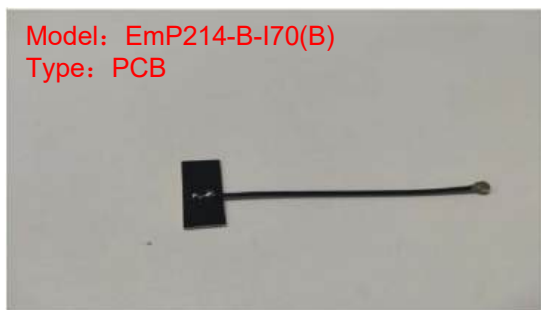
Size: 40*7*1.0mm L=100mm

Ant 5



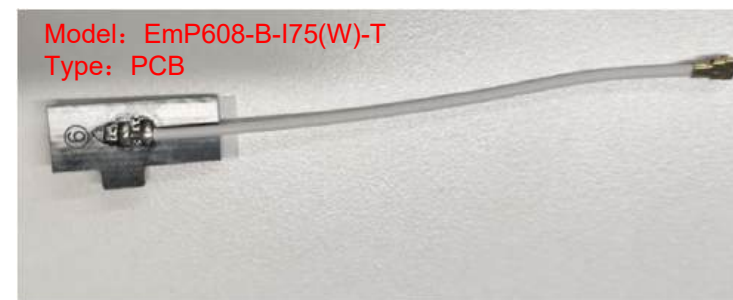
Size: 66.5*9.3*0.6mm L=75mm

Ant 3



Size: 25*10*0.6mm L=70mm

Ant 6



Size: 20*10.5*0.8mm L=75mm

DUT Antenna



1. Main Antenna manufacturer :

Dongguan City Xinsheng Electronics Co.,Ltd

Manufacturer address:

No.6 Village, Datanlang District, Dalingshan, Dongguan, Guangdong, China.

2. Substitute Antenna manufacturer :

Dongguan City Renfeng Electronic Technology Co., LTD

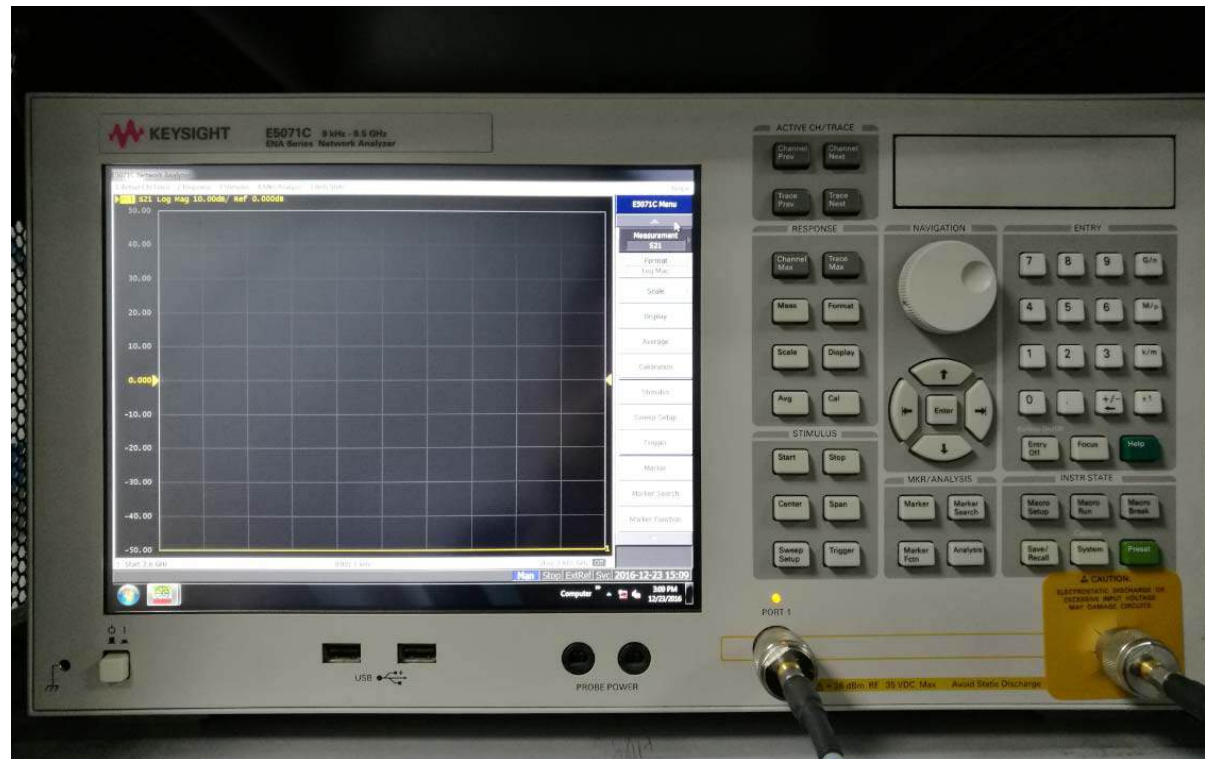
Manufacturer address:

No. 1, Sankeng Industrial Zone, Qinghutou, Tangxia Town, Dongguan, Guangdong, China.

*The data is based on samples from two brands, with consistent appearance, design drawings and performance.

Return Loss and Isolation

Measurement Condition

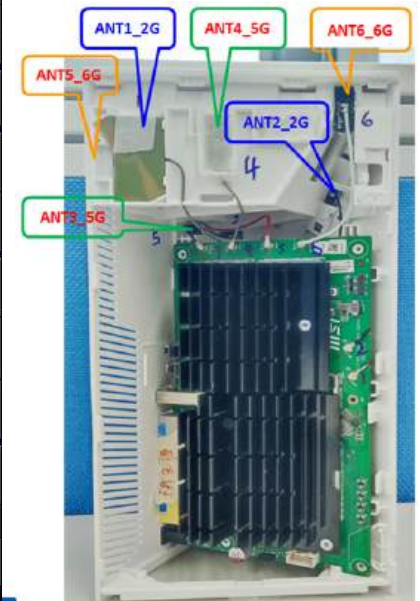


The network Analyzer

Return loss

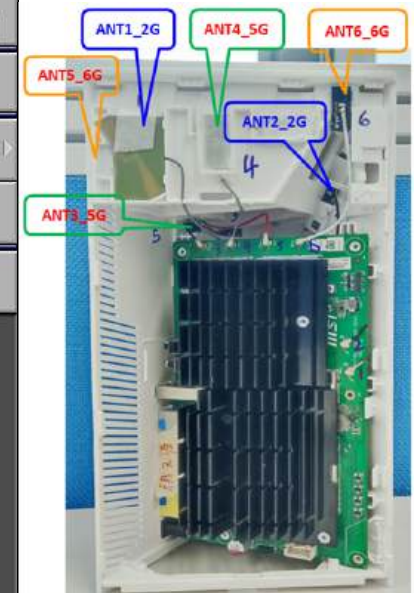
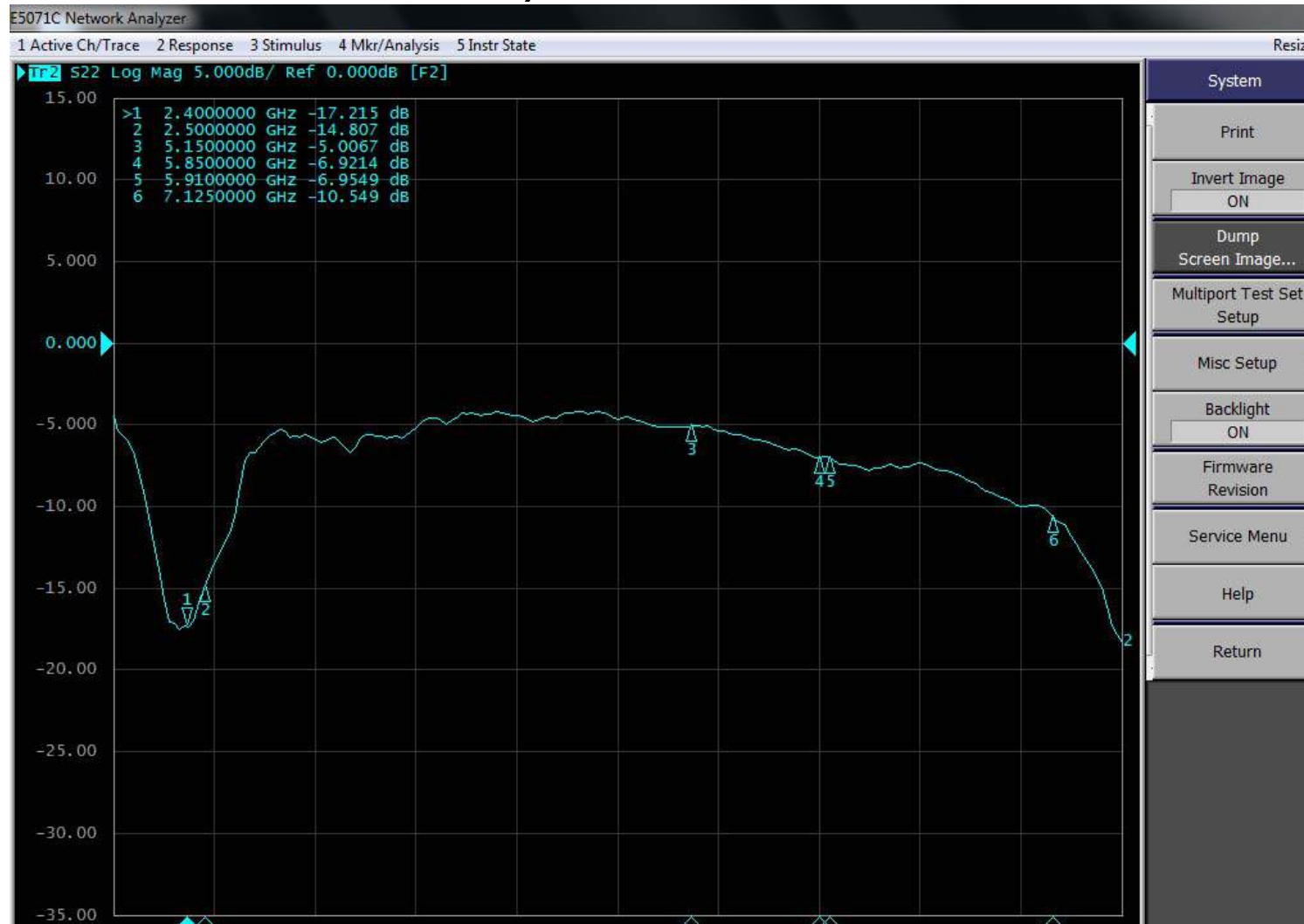
T&W

ANT1-2G (2.4-2.5GHz)



Return loss

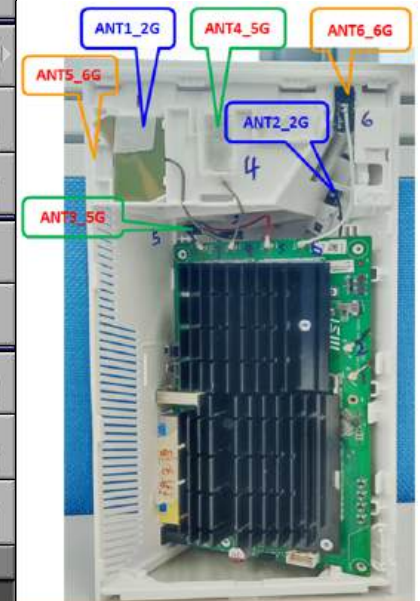
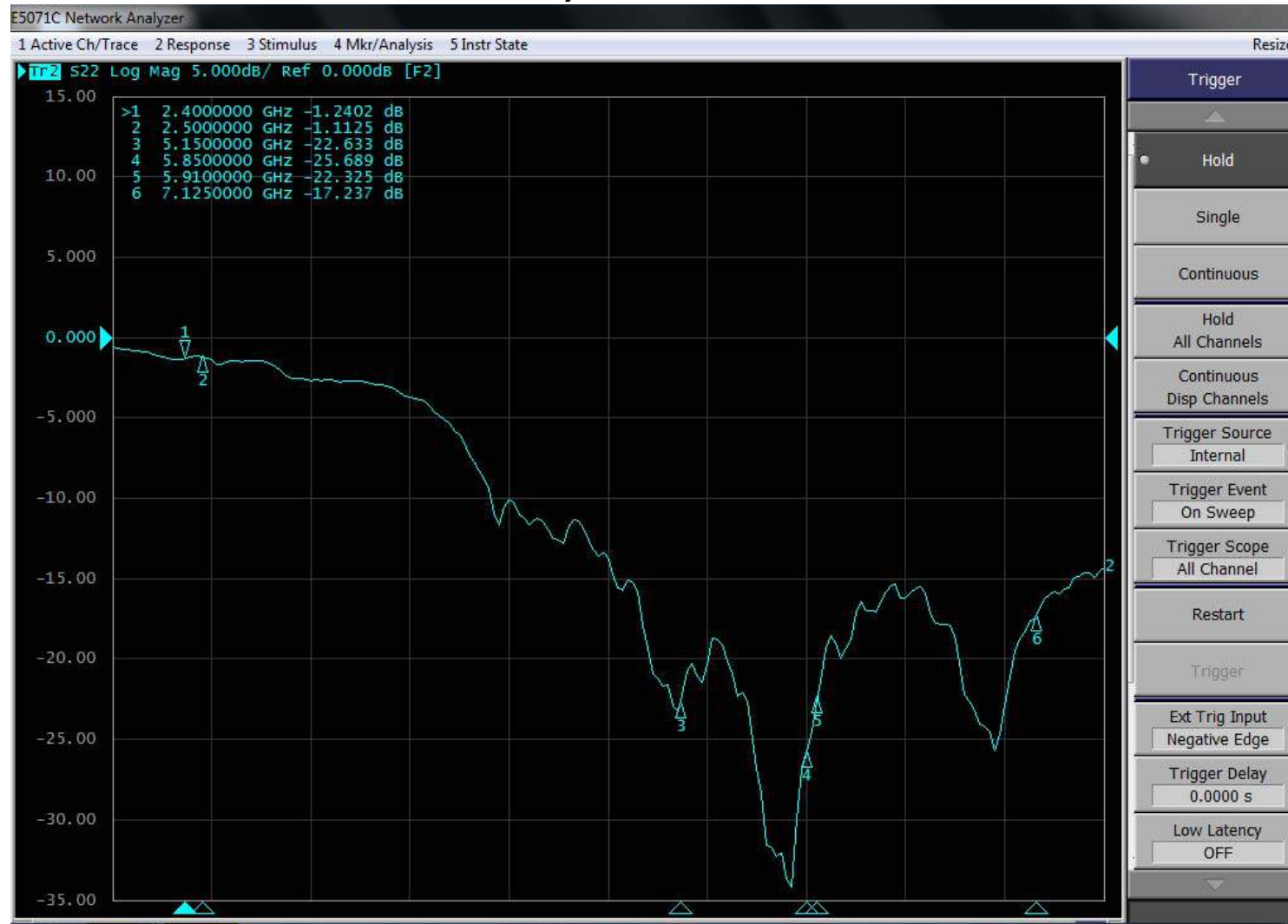
ANT2-2G (2.4-2.5GHz)



Return loss

T&W

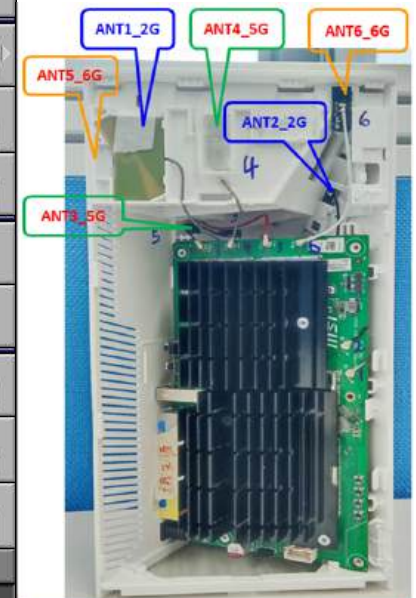
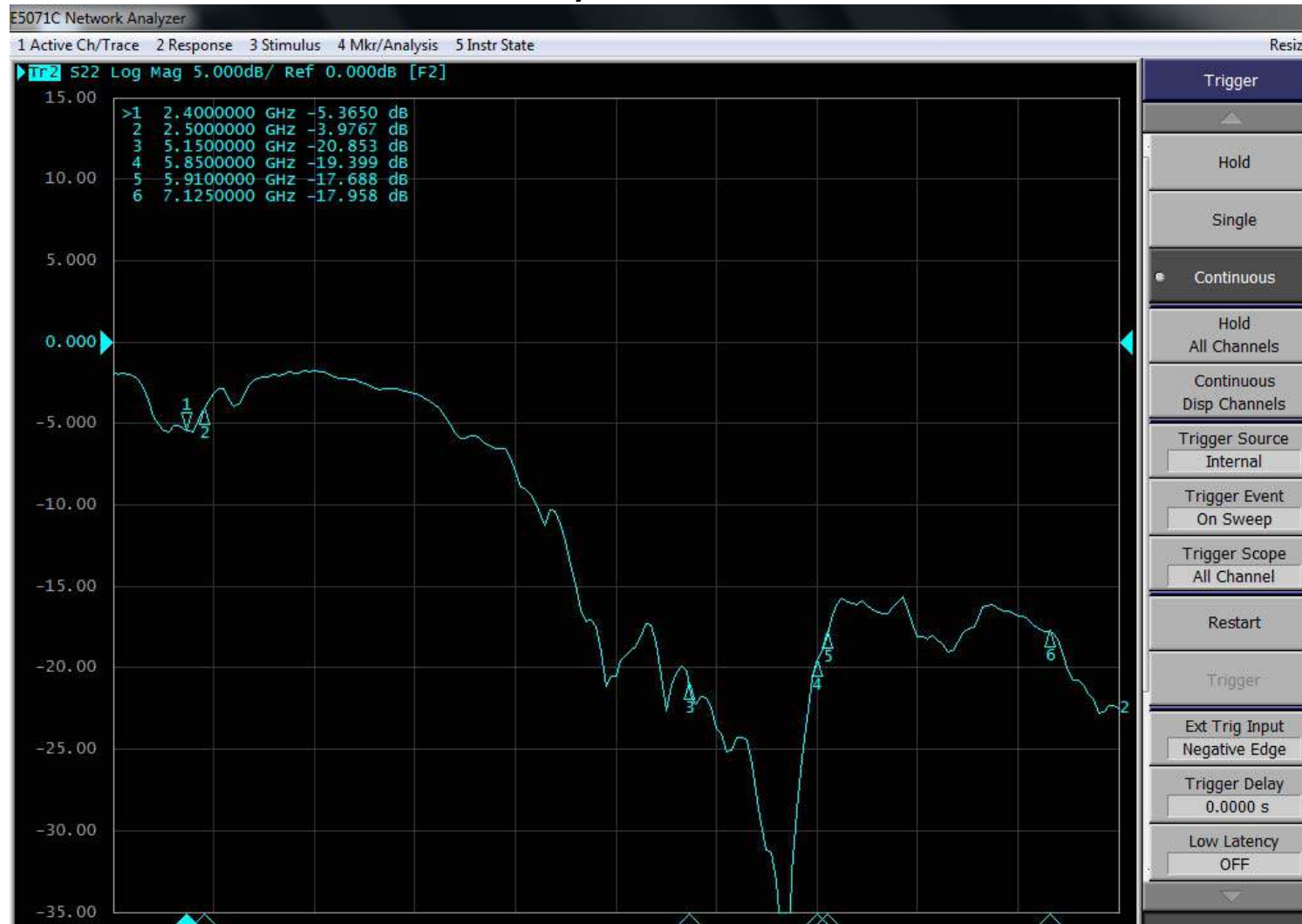
ANT3-5G (5.15-5.85GHz)



Return loss

T&W

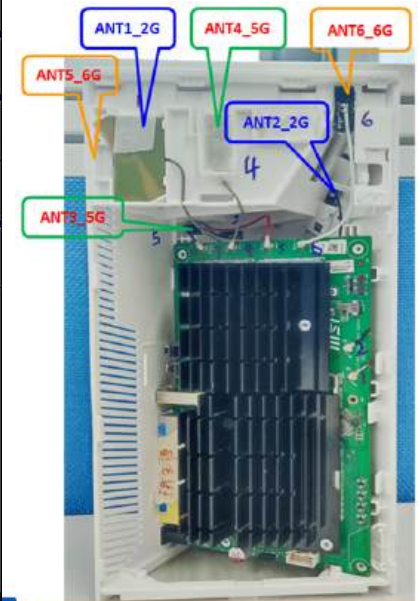
ANT4-5G (5.15-5.85GHz)



Return loss

T&W

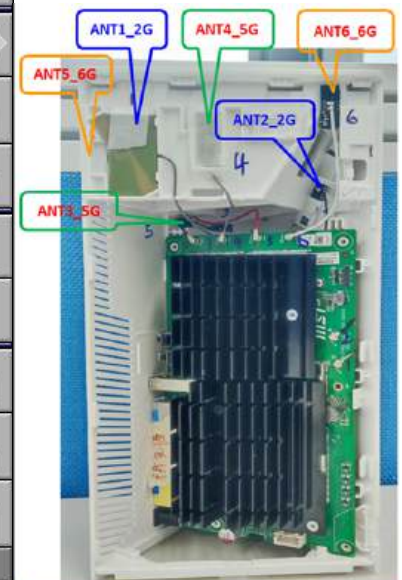
ANT5-6G (5.925-7.125GHz)



Return loss

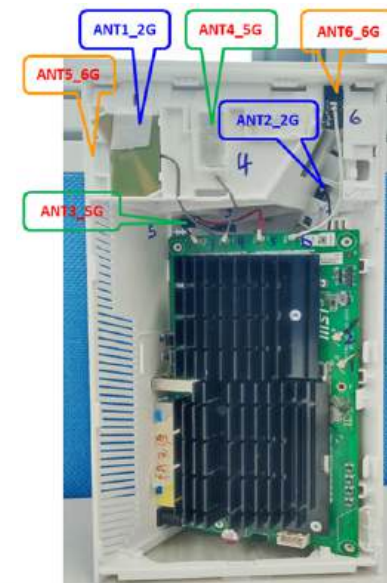
T&W

ANT6-6G (5.925-7.125GHz)



Return loss

Return loss				
ANT	Frequency/NO.	2.4-2.5GHz	5.15-5.85GHz	5.925-7.125GHz
2G	ANT1	<-11.7dB	NA	
	ANT2		NA	
5G	ANT3	NA	<-11.7dB	NA
	ANT4	NA		NA
6G	ANT5	NA	NA	<-11.7dB
	ANT6	NA	NA	

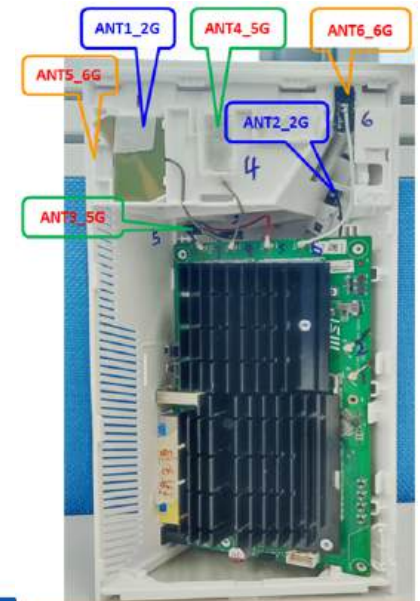
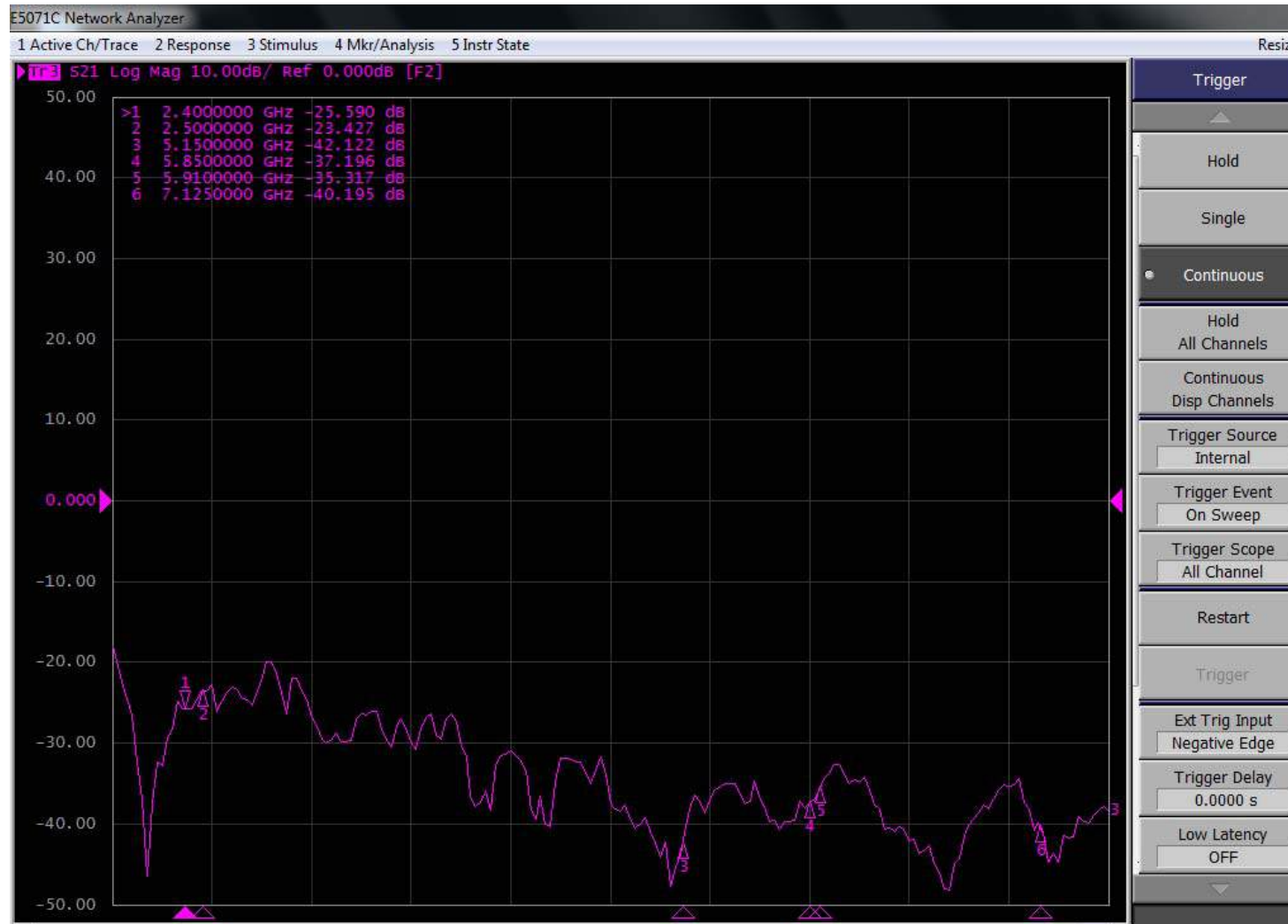


- The WIFI 2.4G antenna's Return loss $< -11.7\text{dB}$;
- The WIFI 5G antenna's Return loss $< -11.7\text{dB}$;
- The WIFI 6G antenna's Return loss $< -11.7\text{dB}$;

Isolation

T&W

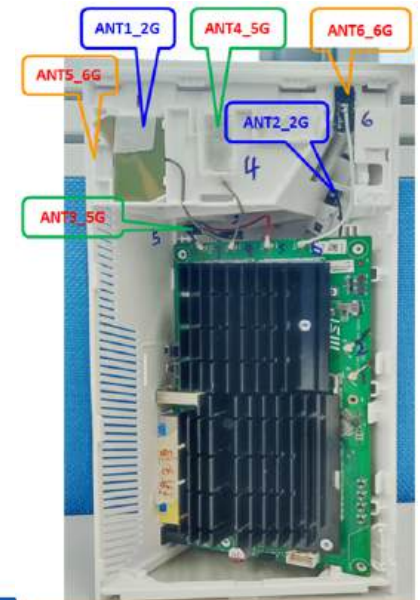
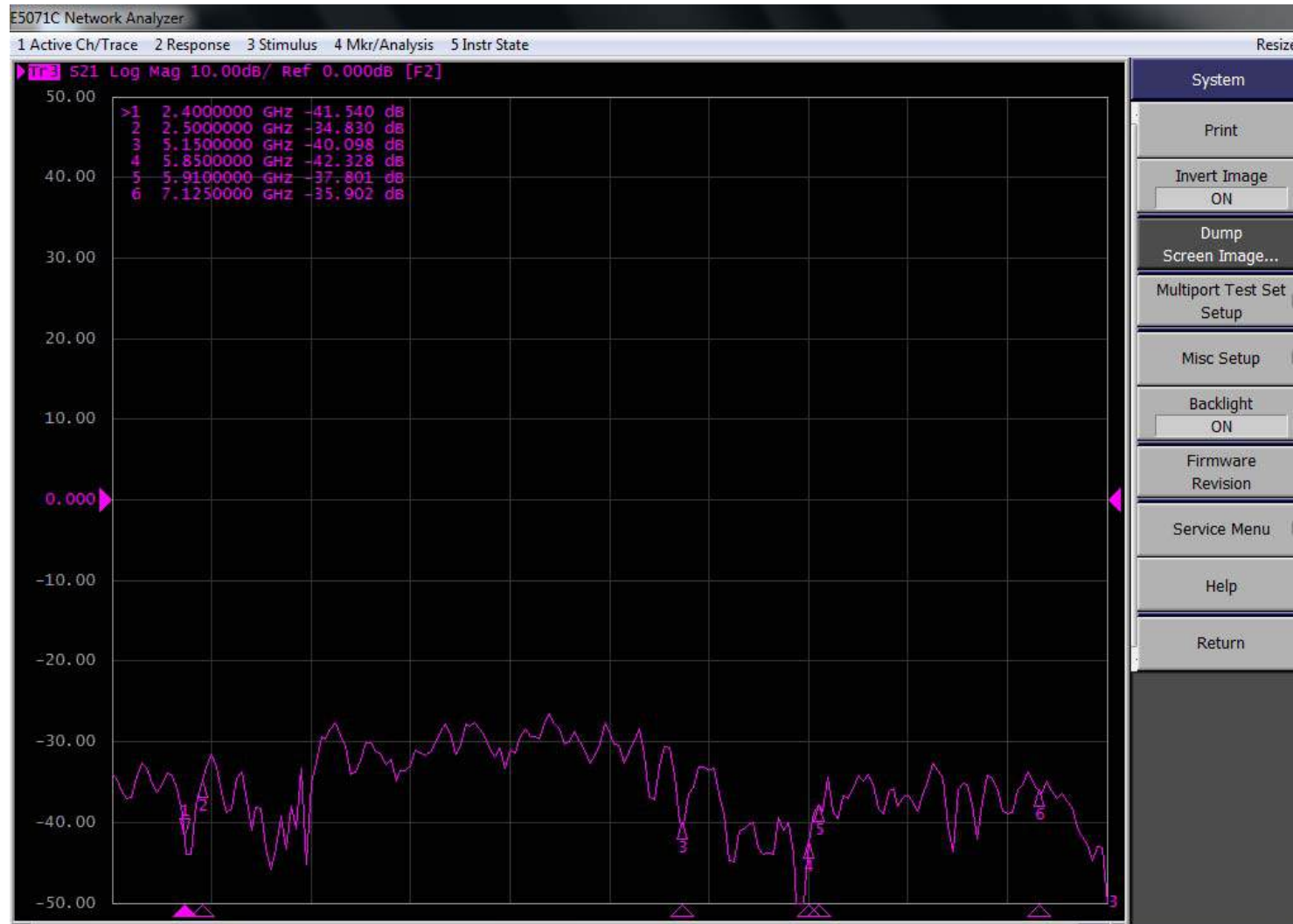
ANT1&ANT2



Isolation

T&W

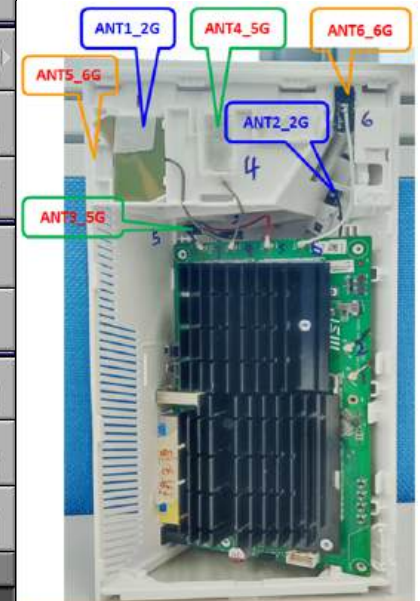
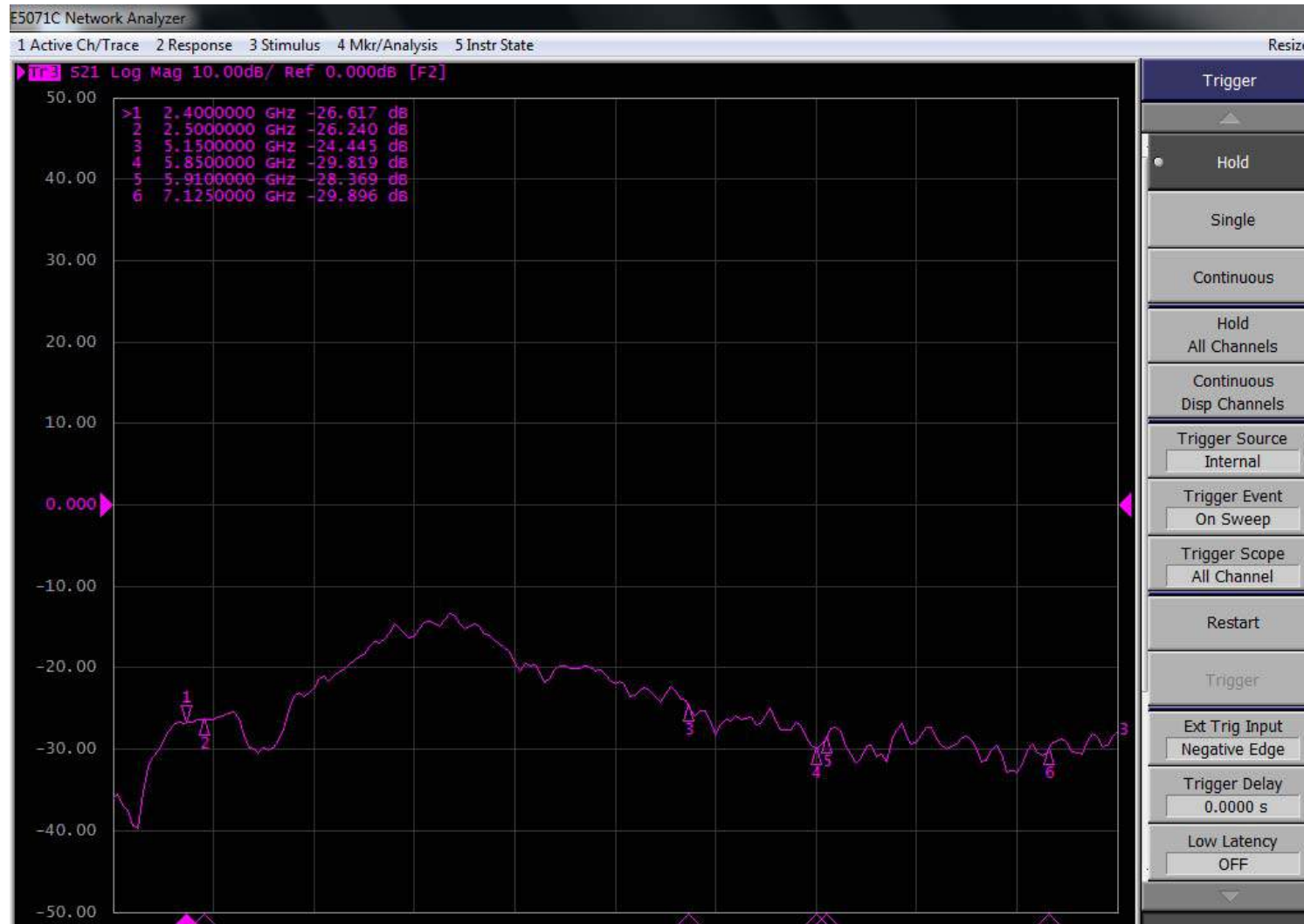
ANT3&ANT4



Isolation

T&W

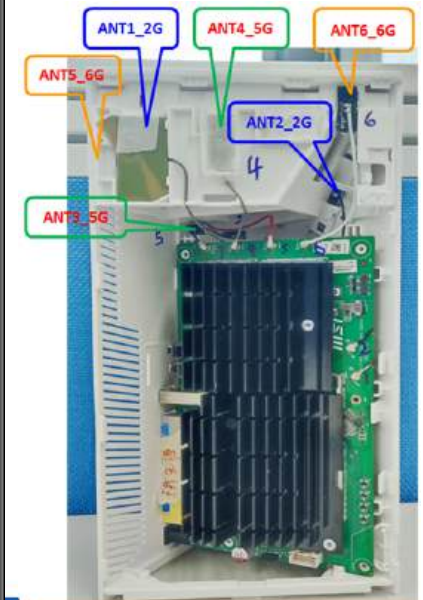
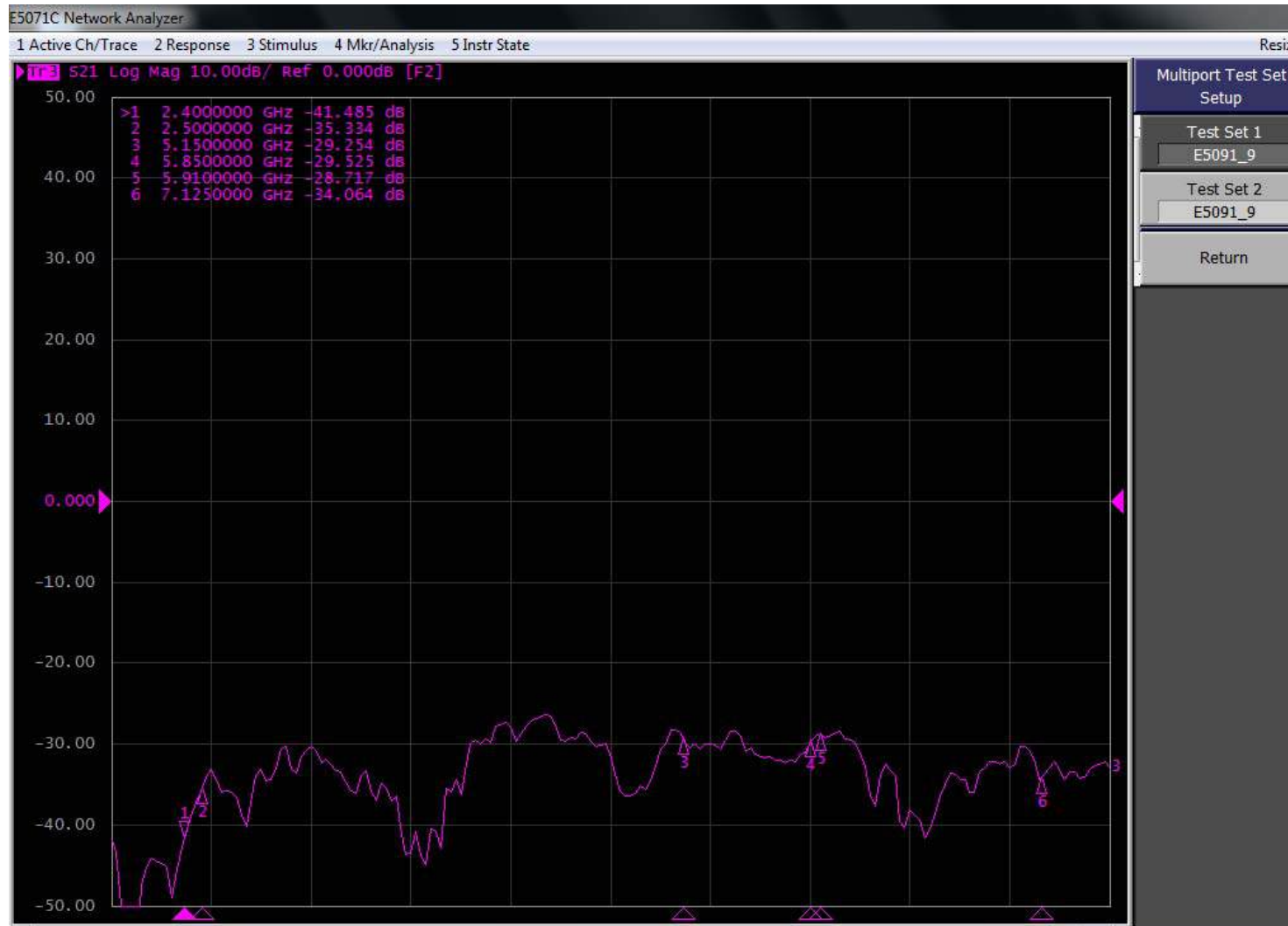
ANT3&ANT5



Isolation

T&W

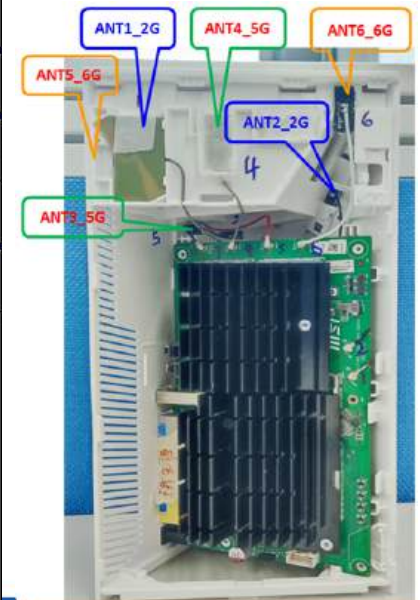
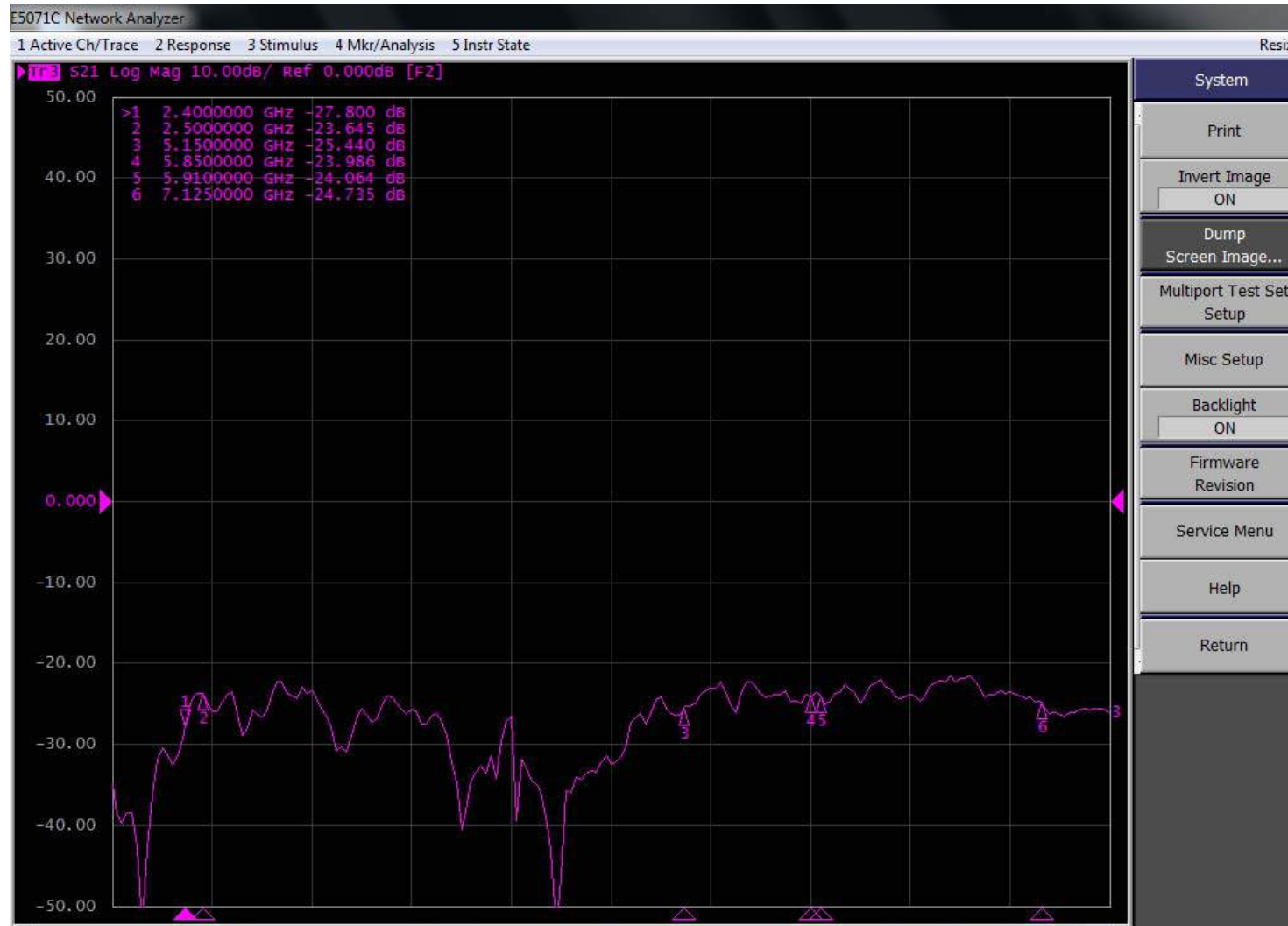
ANT3&ANT6



Isolation

T&W

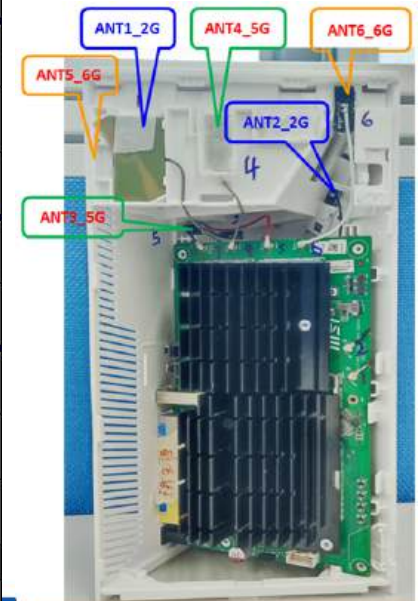
ANT4&ANT5



Isolation

T&W

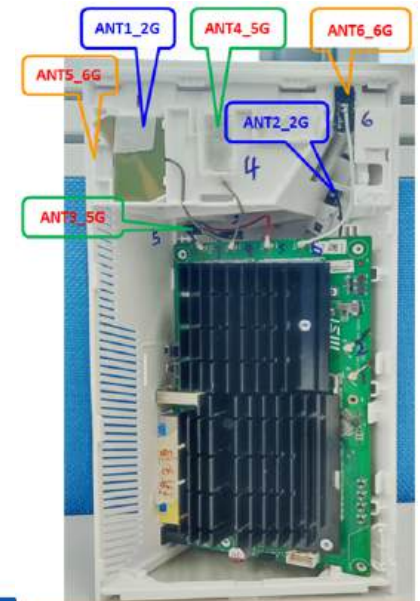
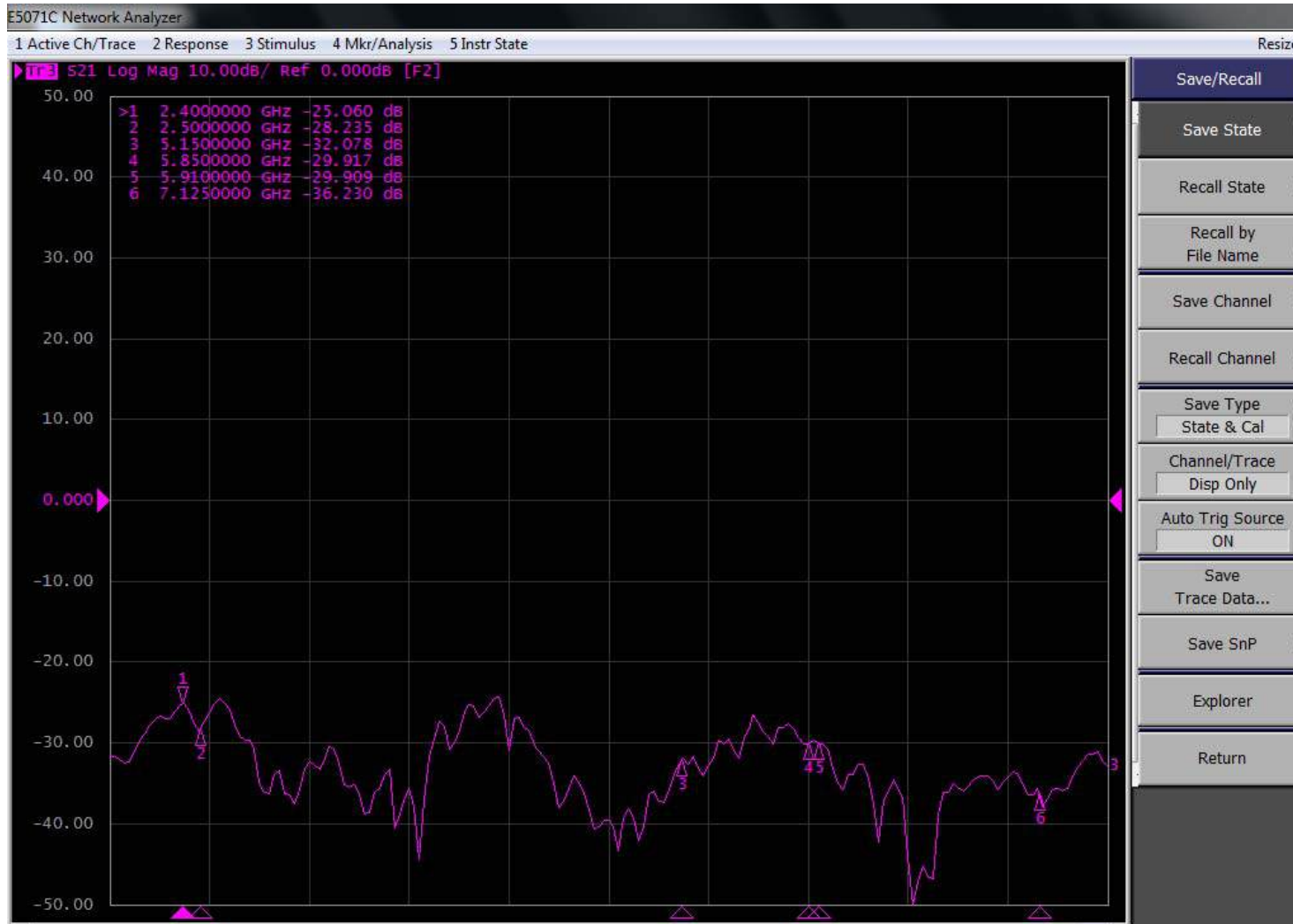
ANT4&ANT6



Isolation

T&W

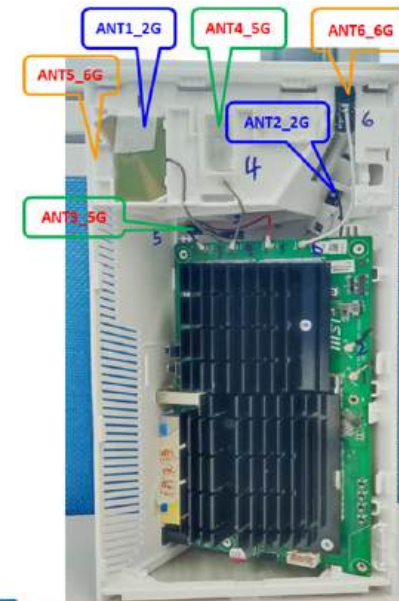
ANT5&ANT6



Isolation

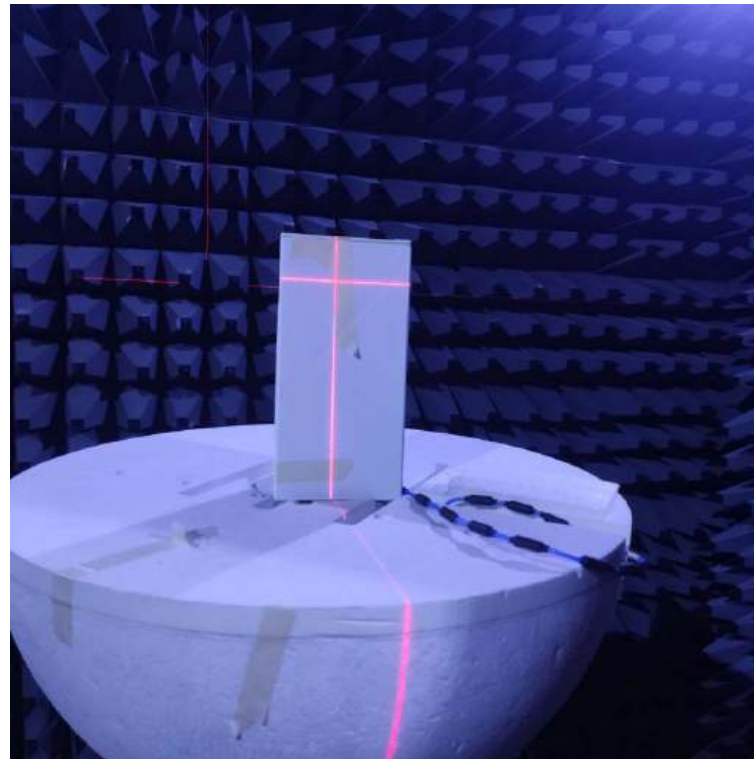
Isolation				
ANT	Frequency/NO.	2.4-2.5GHz	5.15-5.85GHz	5.91-7.125GHz
2G	ANT1	<-20dB	-	
	ANT2			
5G	ANT3	-	<-20dB	<-20dB
	ANT4			
6G	ANT5		<-20dB	<-20dB
	ANT6			

- The Isolation between WIFI 2.4G antennas < - 20dB;
- The Isolation between WIFI 5G antennas < - 20dB;
- The Isolation between WIFI 6G antennas < - 20dB;
- The Isolation between WIFI 5G &6G antennas < - 20dB;



2D/3D Radiation pattern

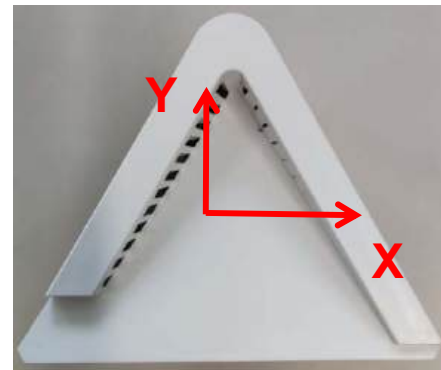
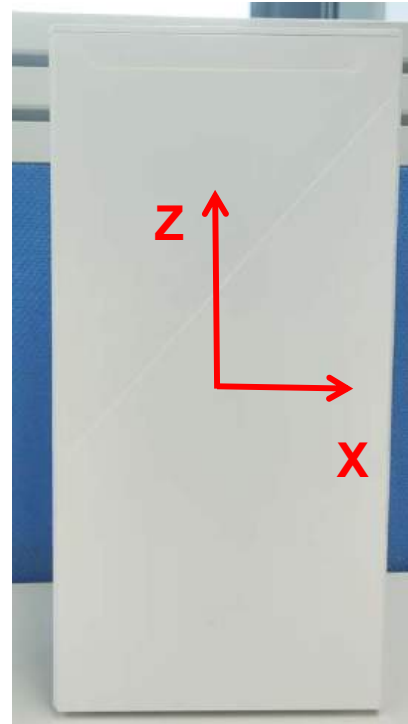
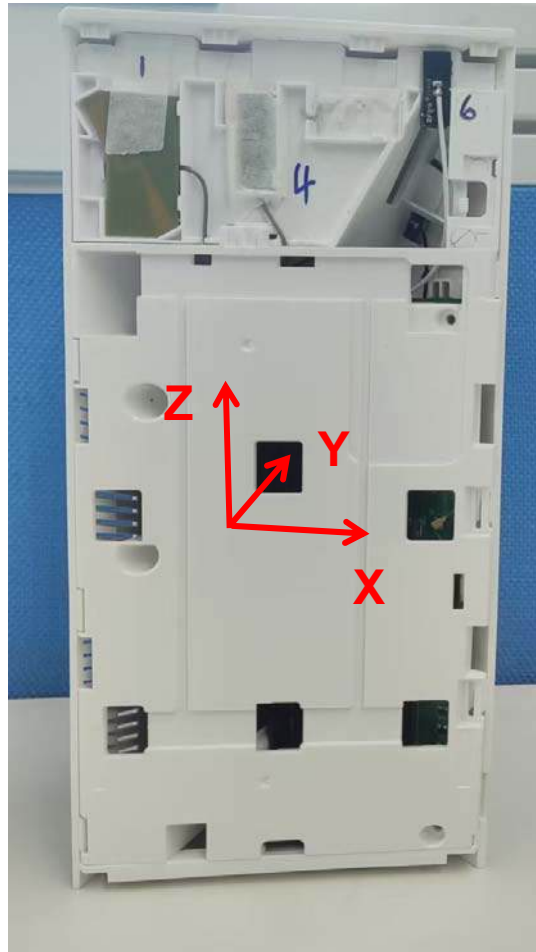
Measurement Condition



Microwave anechoic chamber

Antenna Model

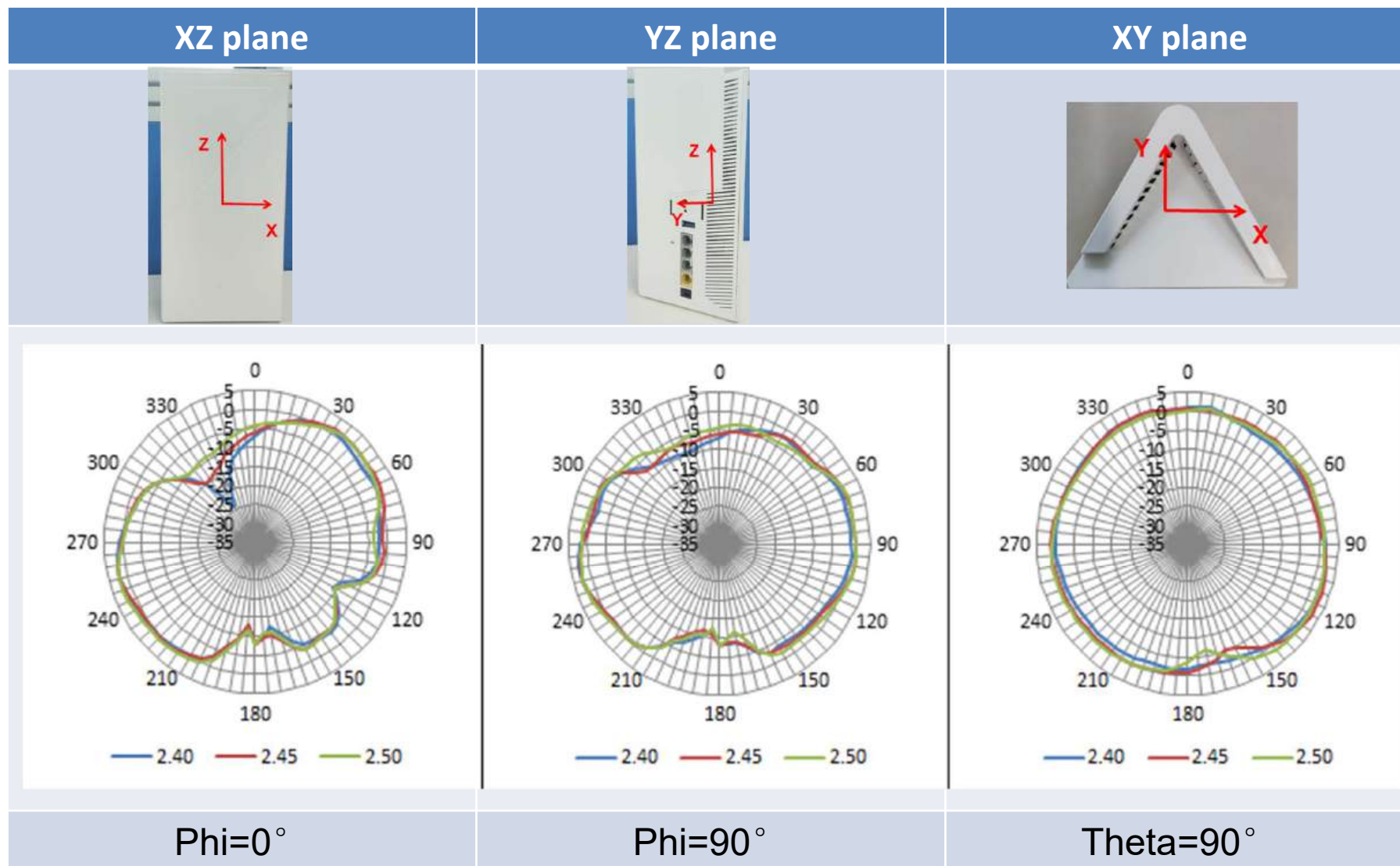
T&W



2D Radiation Pattern@2.4G

T&W

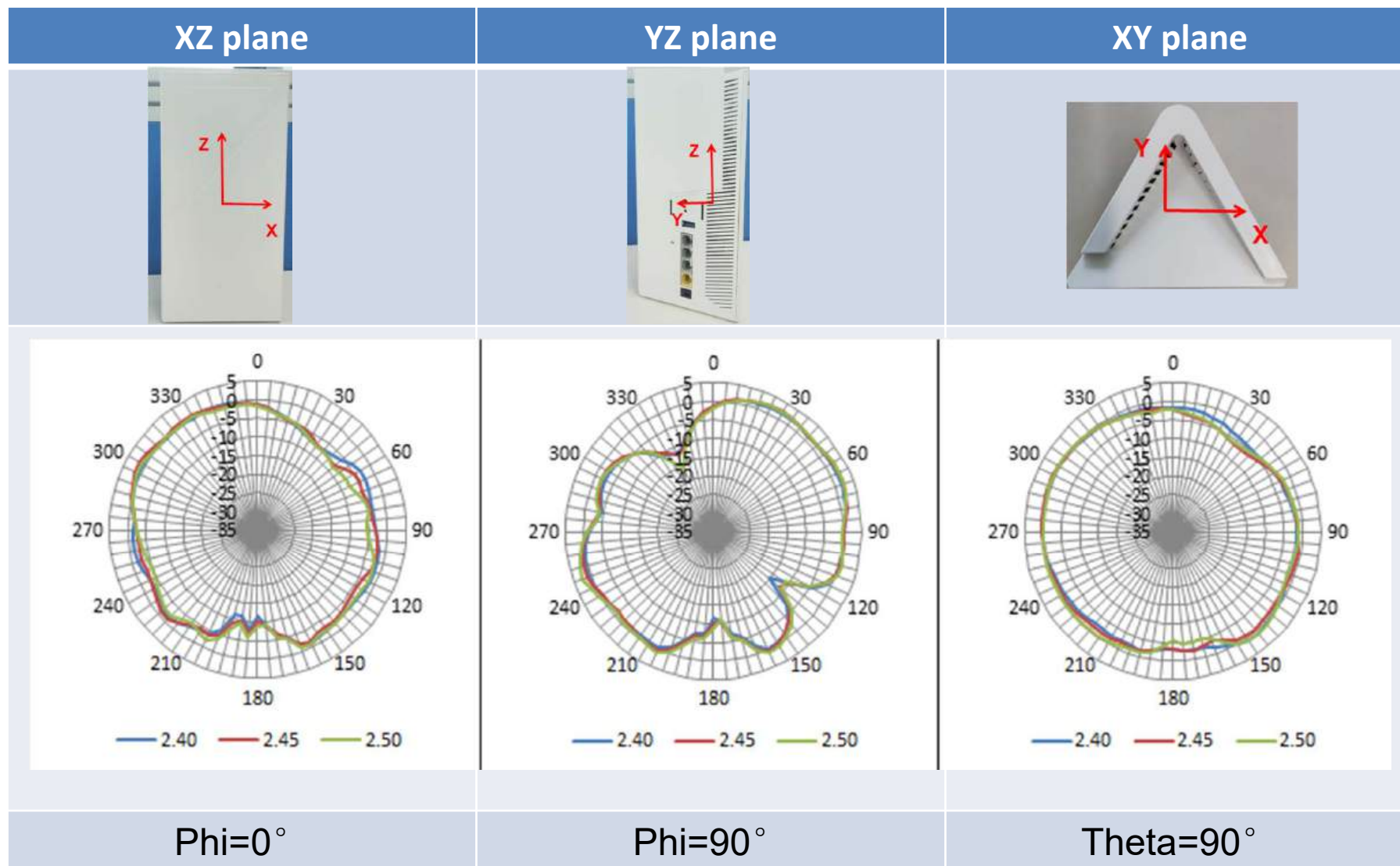
ANT1



2D Radiation Pattern@2.4G

T&W

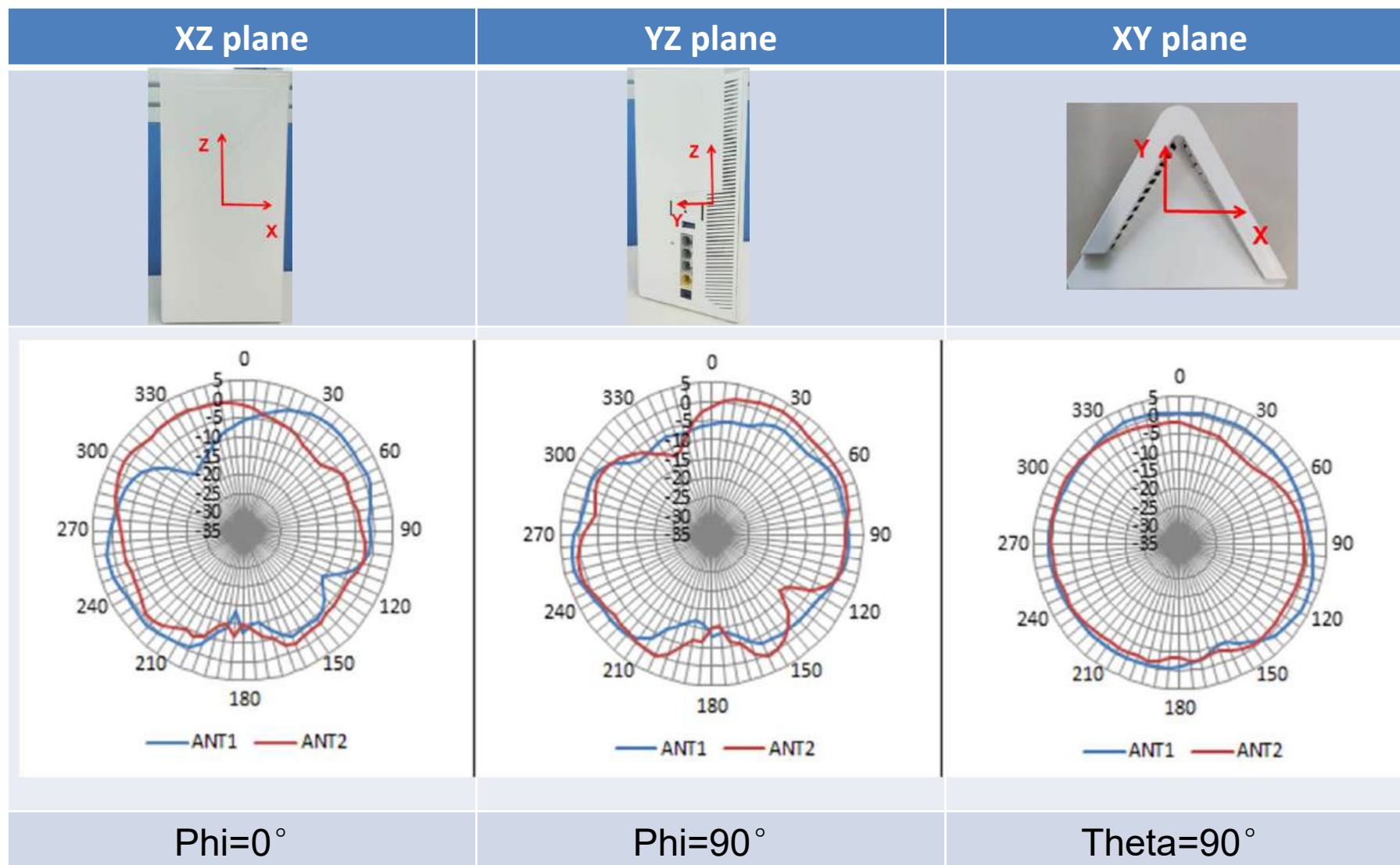
ANT2



2D Radiation Pattern@2.45GHz

T&W

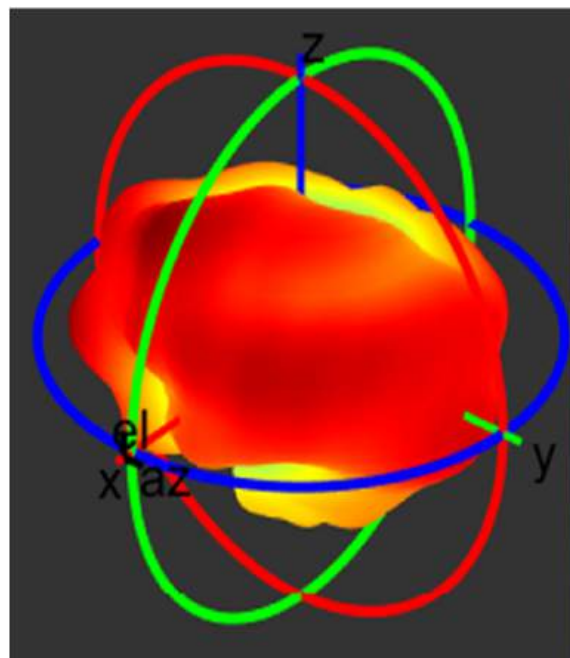
ANT1&ANT2



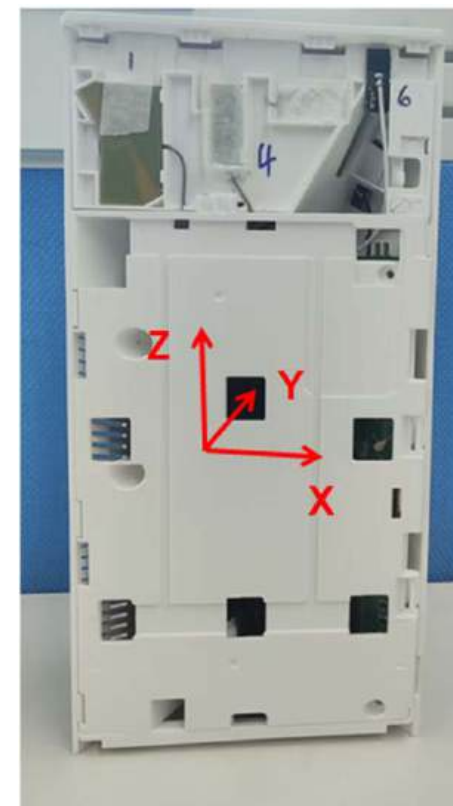
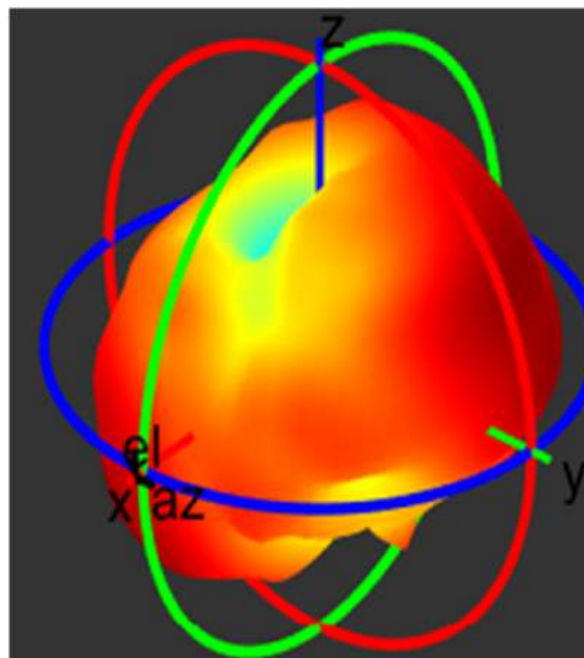
3D Radiation Pattern@2.45GHz

T&W

ANT1-2G



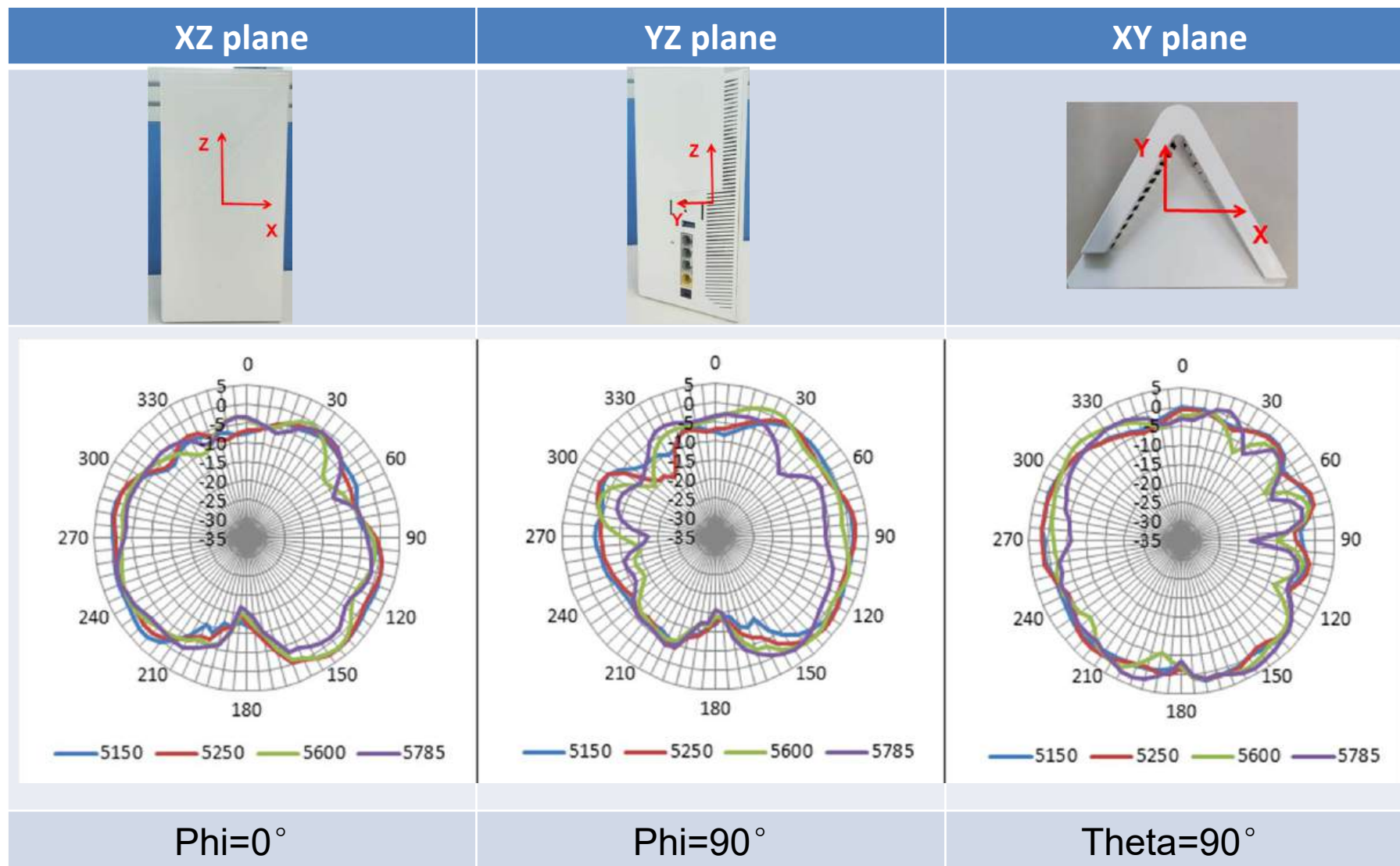
ANT2-2G



2D Radiation Pattern@5G

T&W

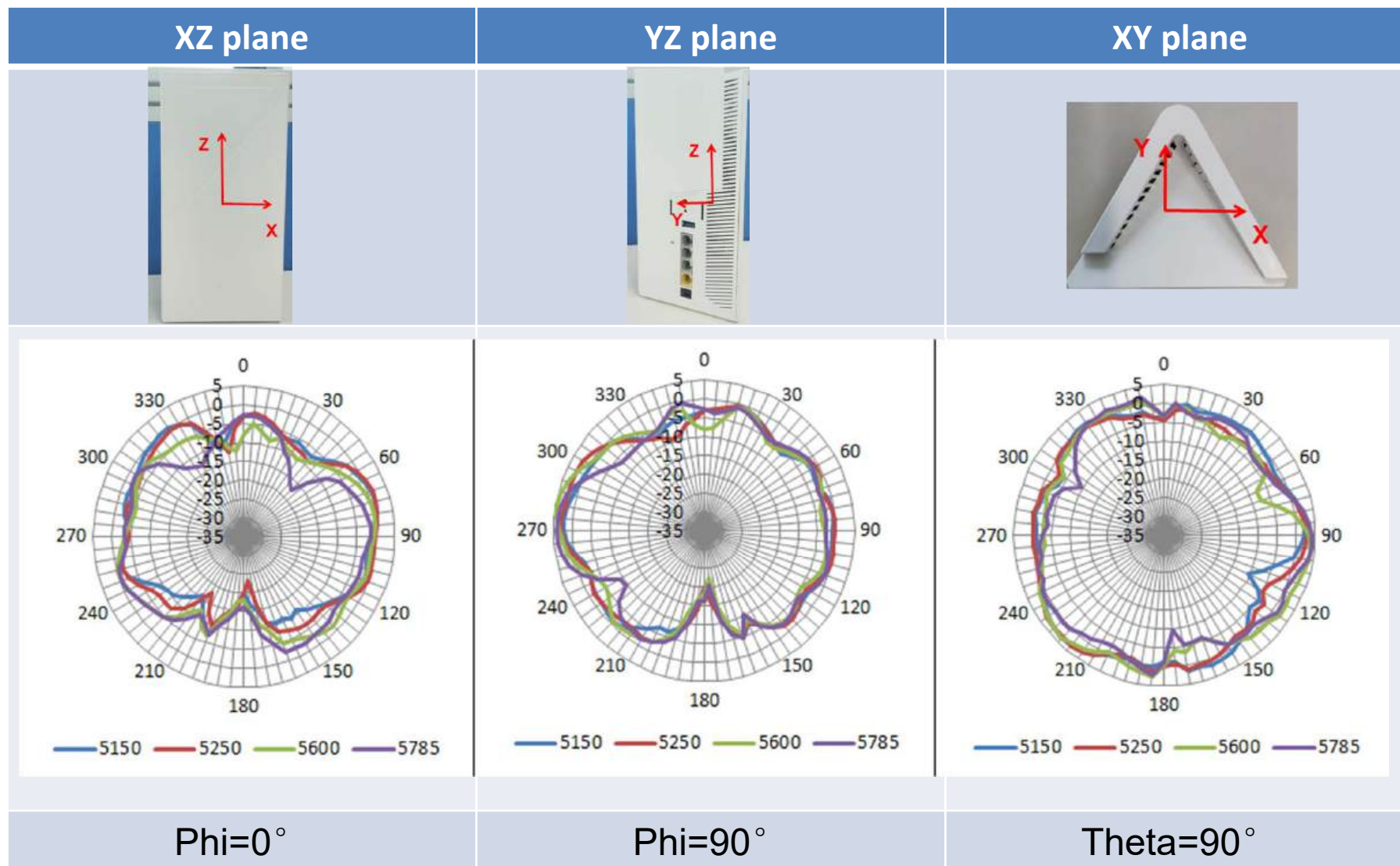
ANT3



2D Radiation Pattern@5G

T&W

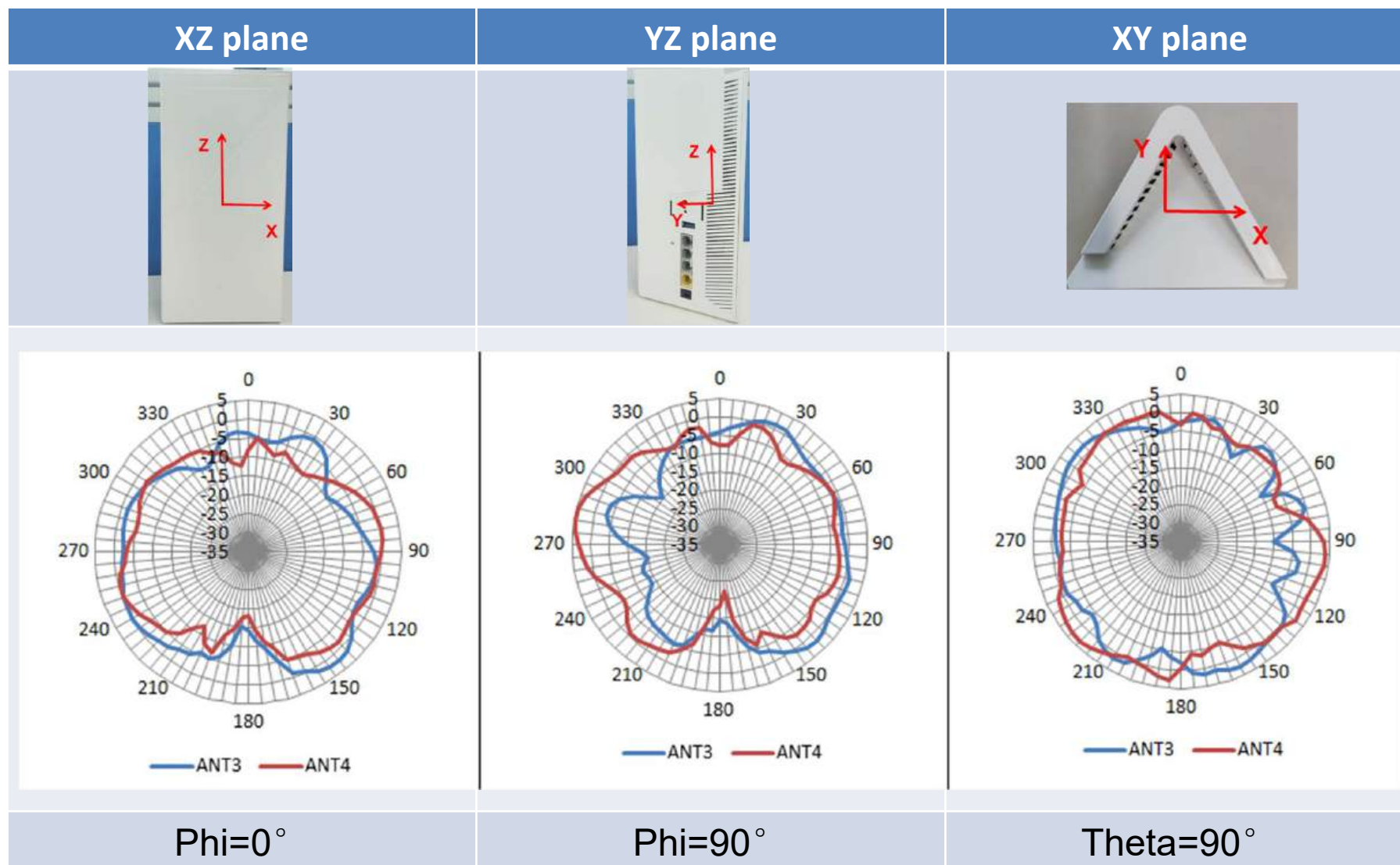
ANT4



2D Radiation Pattern@5.6GHz

T&W

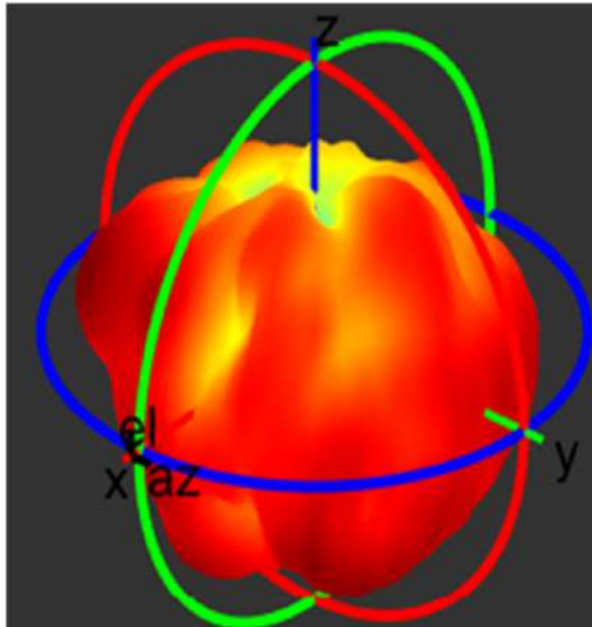
ANT3&ANT4



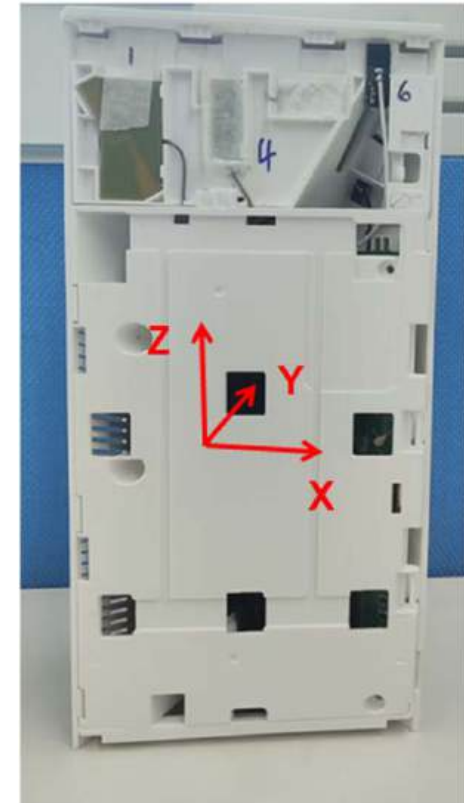
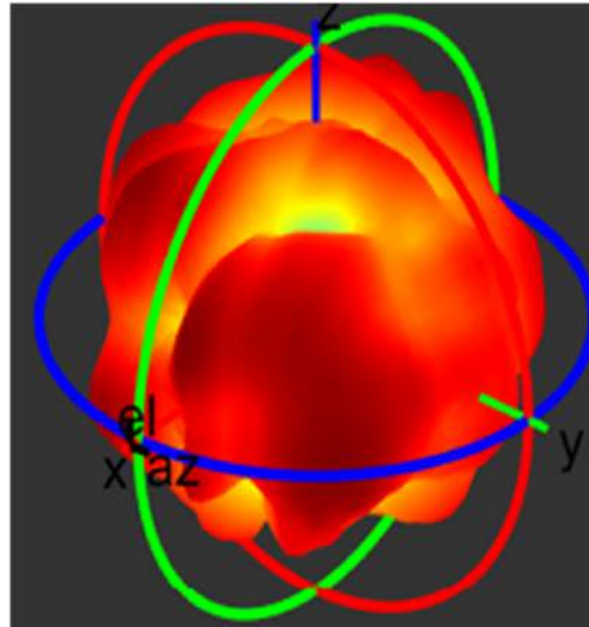
3D Radiation Pattern@5.6GHz

T&W

ANT3-5G



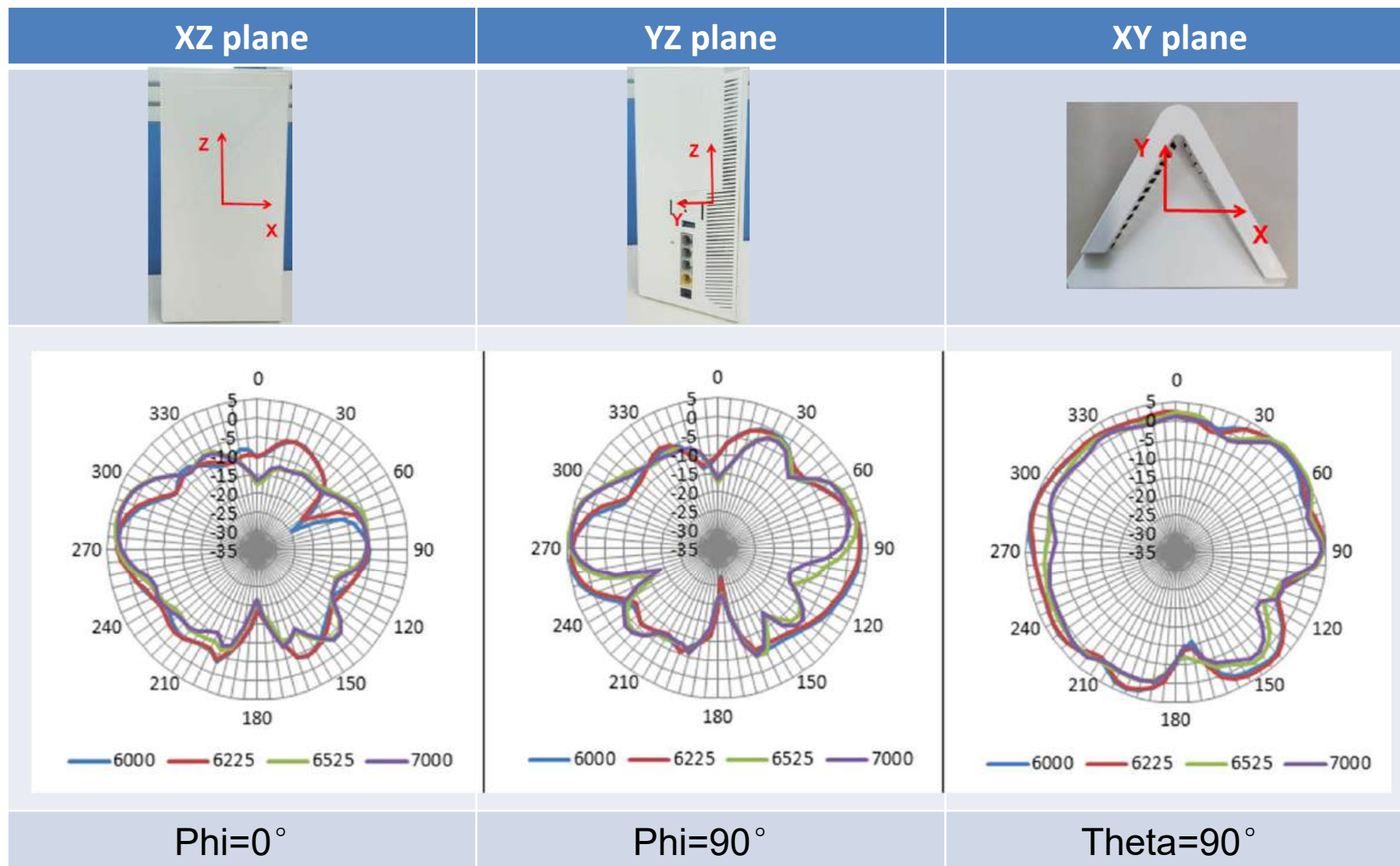
ANT4-5G



2D Radiation Pattern@6G

T&W

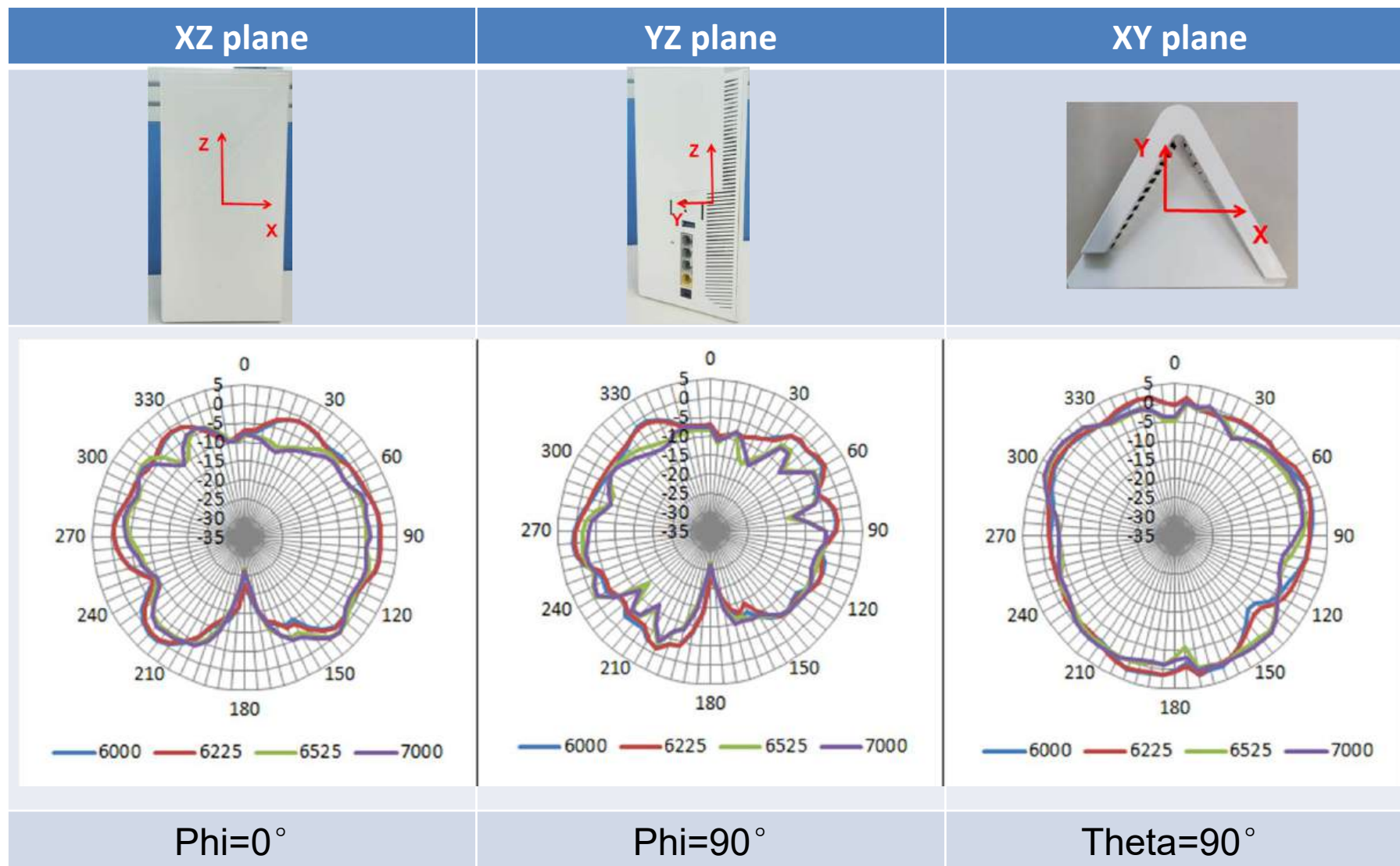
ANT5



2D Radiation Pattern@6G

T&W

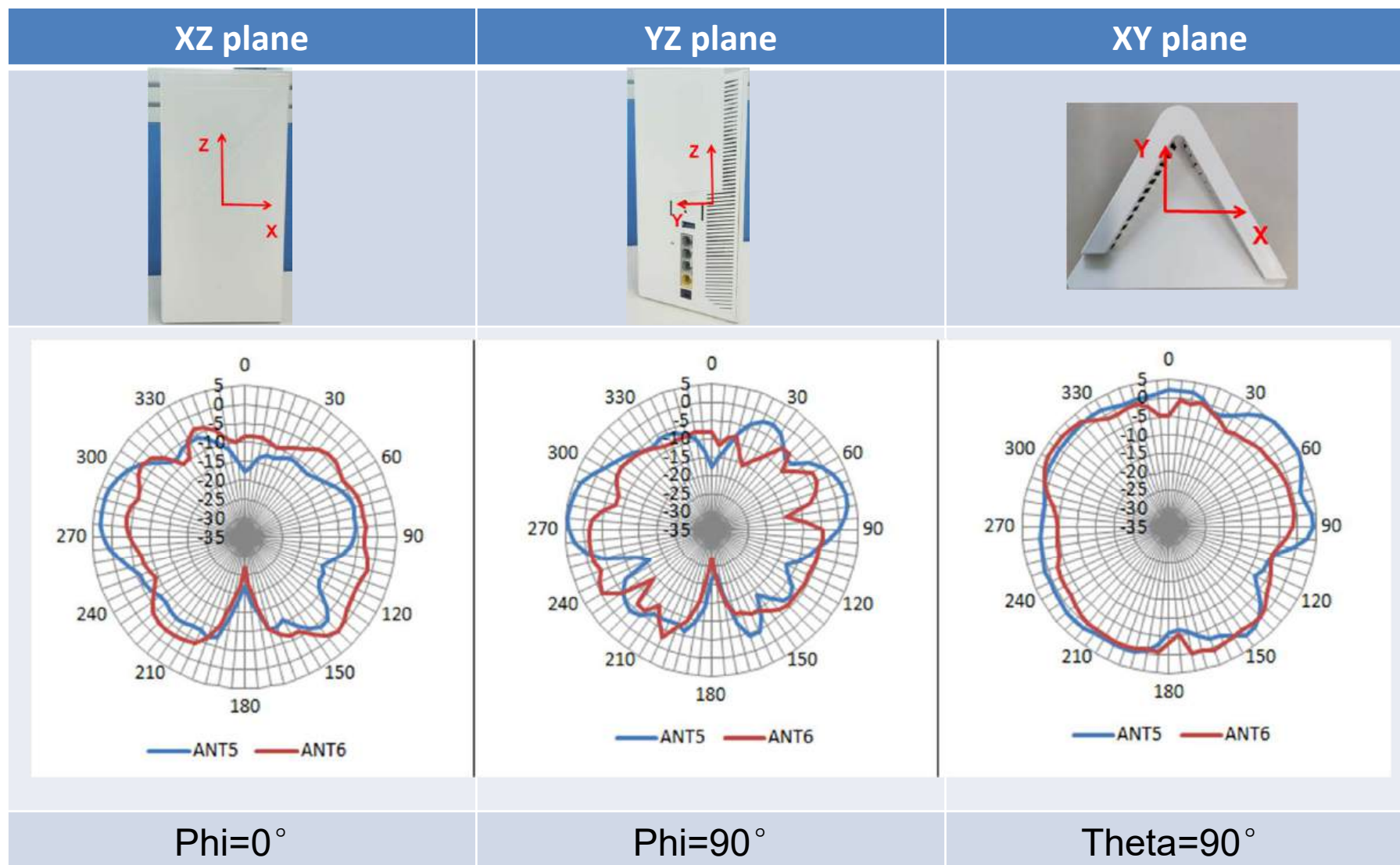
ANT6



2D Radiation Pattern@6.525GHz

T&W

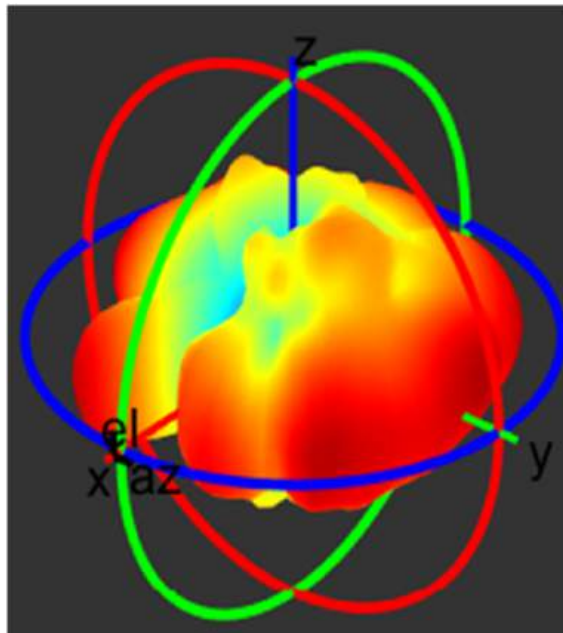
ANT5&ANT6



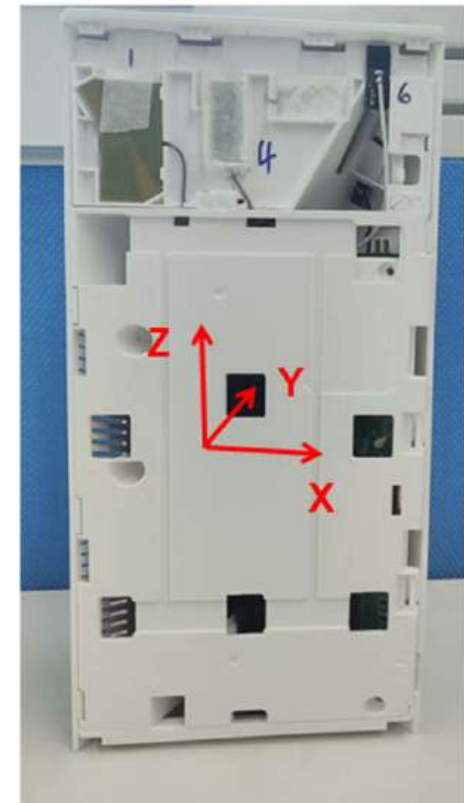
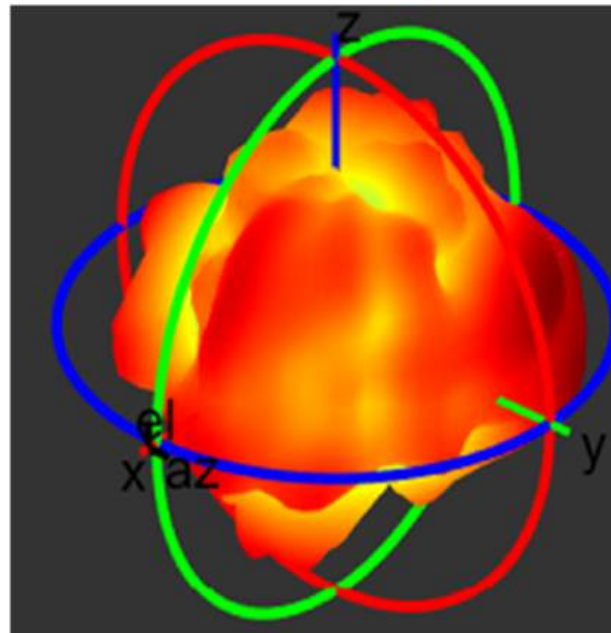
3D Radiation Pattern@6.525GHz

T&W

ANT5-6G



ANT6-6G



Gain & Efficiency



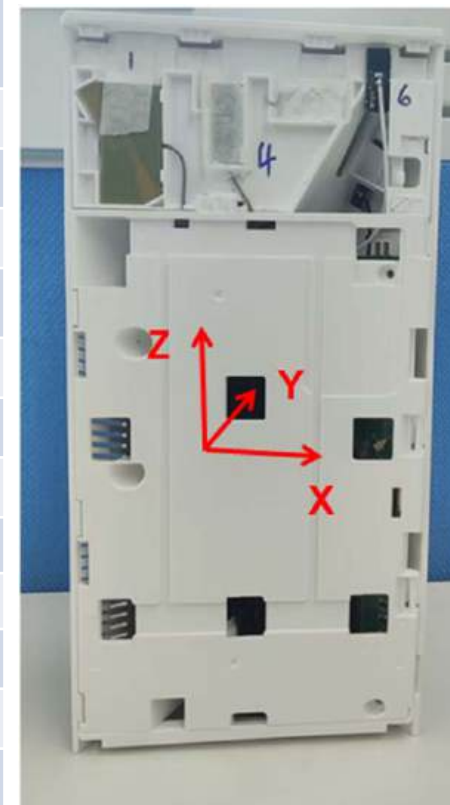
	ANT1		ANT2		ANT3		ANT4	
Frequency (GHz)	Gain (dBi)	Efficiency (%)	Gain (dBi)	Efficiency (%)	Gain (dBi)	Efficiency (%)	Gain (dBi)	Efficiency (%)
2.4	2.9531	71.2674	3.0904	73.5505				
2.45	3.1305	76.4436	3.0582	70.2686				
2.5	3.053	75.1494	3.1073	72.386				
5.150					3.54	71.8227	3.6293	73.7449
5.250					3.6885	73.1173	4.1747	75.5282
5.350					4.1105	69.638	4.0679	68.5157
5.470					3.9664	72.4537	4.4602	71.0075
5.600					3.6939	70.172	4.8479	69.9059
5.725					3.6828	70.8928	4.8259	68.7725
5.785					3.912	69.5116	4.1468	65.6729
5.850					3.8066	67.8912	4.0489	66.5122

- The WIFI 2.4G antenna's Gain < 3.5dBi, Efficiency > 65%;
- The WIFI 5G antenna's Gain < 5.0dBi, Efficiency > 65%;

Gain & Efficiency

T&W

	ANT5		ANT6	
Frequency (GHz)	Gain (dBi)	Efficiency (%)	Gain (dBi)	Efficiency (%)
5865	5.1552	66.5152	3.027	63.2616
5885	5.3501	67.4671	3.1997	64.3539
5905	5.5654	66.1568	3.2167	65.4731
5925	5.4001	64.2192	3.0628	65.3828
6000	5.0282	67.7455	2.8604	64.7701
6125	5.0938	78.1741	3.0159	71.5902
6225	4.8895	70.1297	3.0511	66.2205
6325	5.3494	70.6268	3.355	74.4322
6425	5.7068	72.9651	3.7315	75.5532
6525	5.5730	75.5765	4.3670	70.0681
6625	5.3175	72.6436	4.4095	67.7221
6725	5.6335	73.6434	4.5921	68.923
6875	5.4475	64.3423	4.7574	63.087
6925	5.2346	62.9544	4.5633	61.3301
7000	5.2028	63.1602	4.1109	61.5976
7125	4.9208	60.2570	4.0617	60.8927



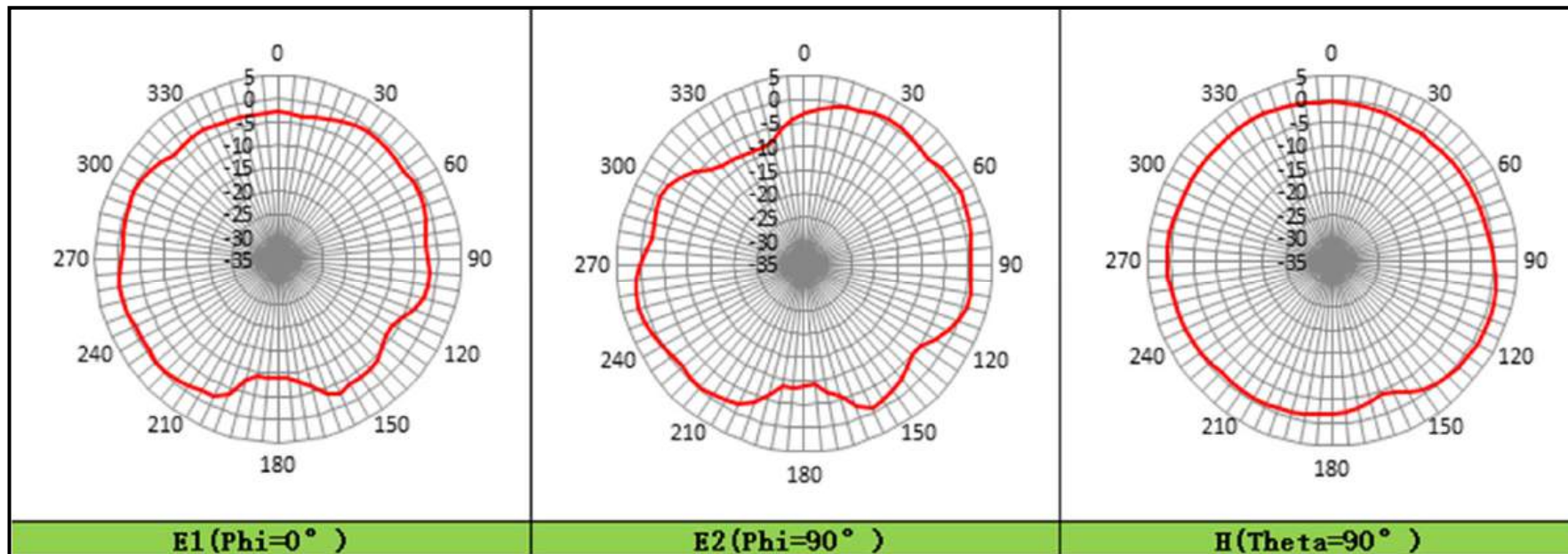
- The WIFI 6G antenna's Gain < 6.0dBi, Efficiency > 60%;

Uncorrelated Combined Gain

Uncorrelated Combined Gain(2S2T)@2.45GHz

	Peak Gain(dBi)
Unco_DG (2S2T)	2.42

2D Radiation Pattern:

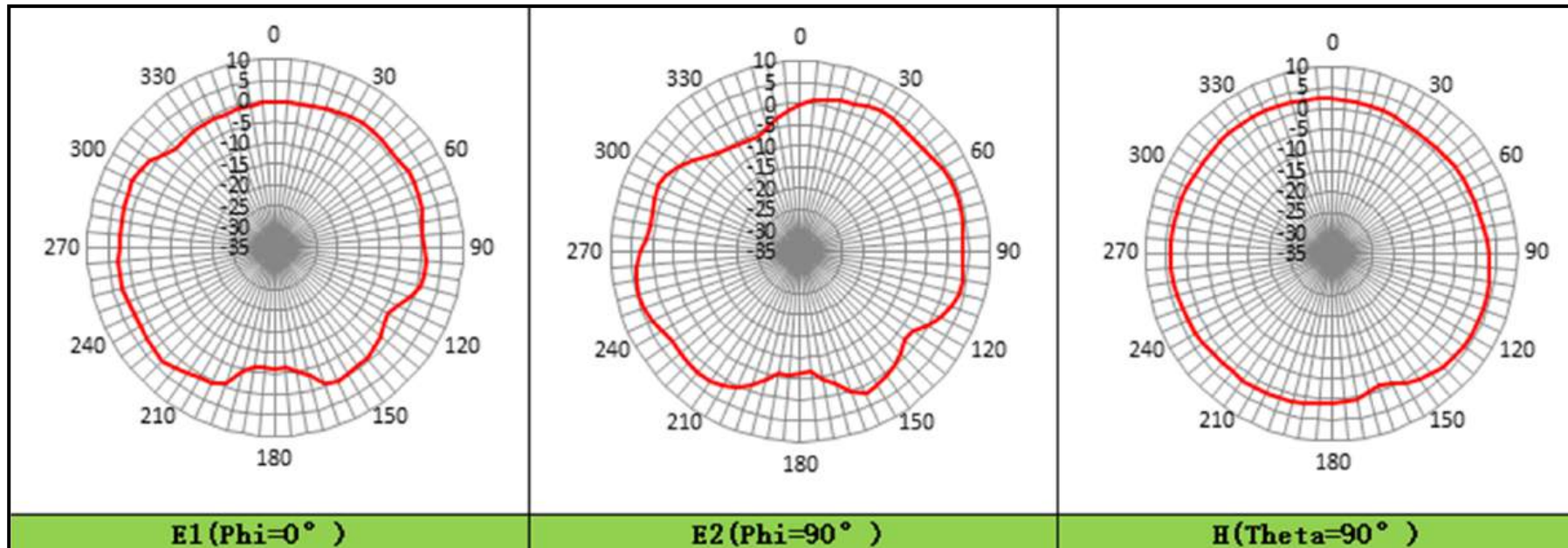


Correlated Combined Gain

Correlated Combined Gain(1S2T)@2.45GHz

	Peak Gain(dBi)
Co_DG(1S2T)	5.43

2D Radiation Pattern:

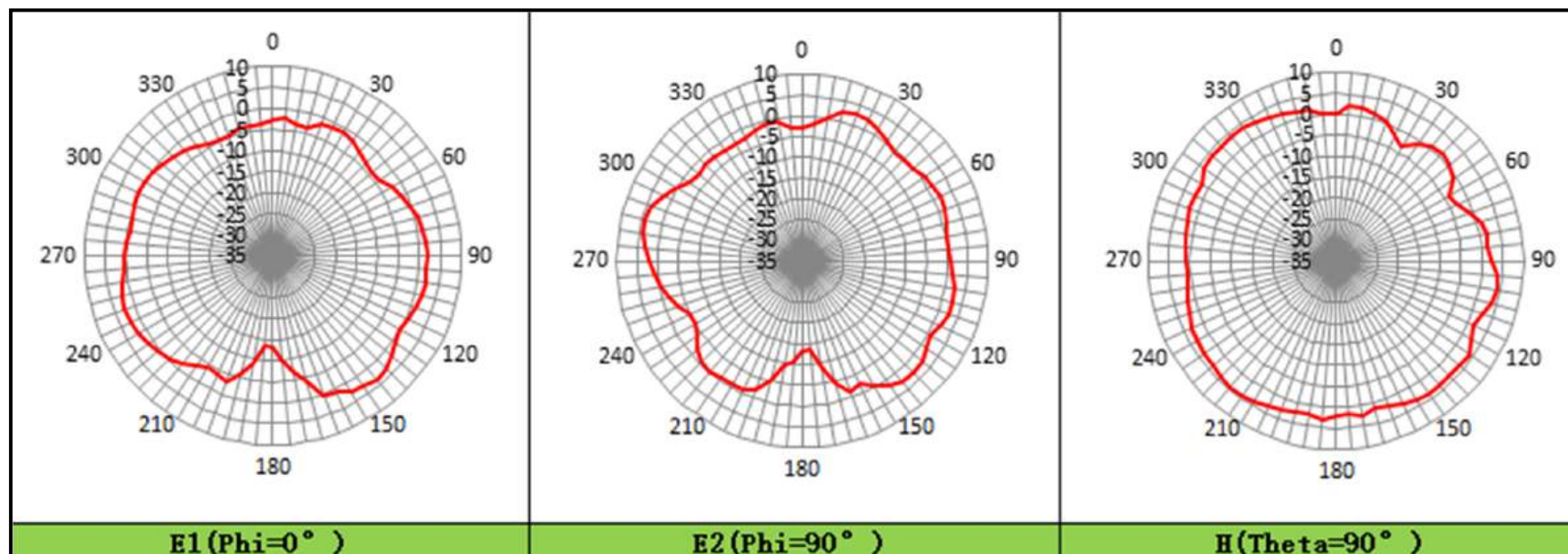


Uncorrelated Combined Gain

Uncorrelated Combined Gain(2S2T)@5.60GHz

	Peak Gain(dBi)
Unco_DG (2S2T)	2.78

2D Radiation Pattern:

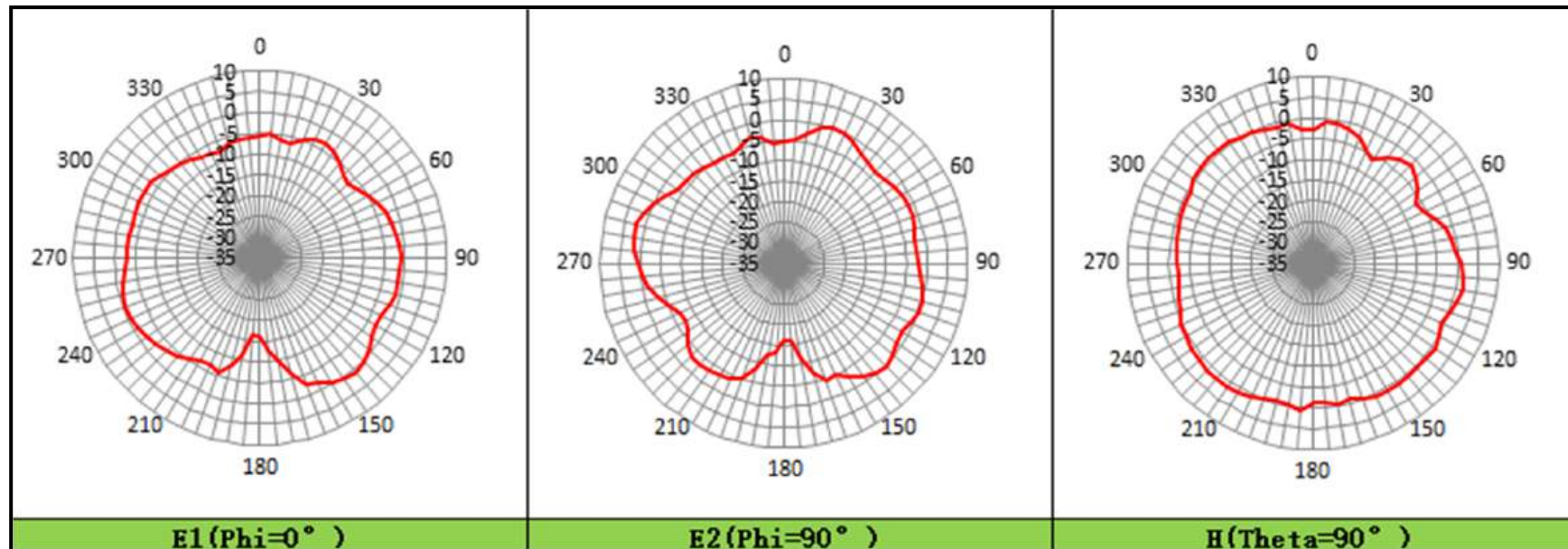


Correlated Combined Gain

Correlated Combined Gain(1S2T)@5.60GHz

	Peak Gain(dBi)
Co_DG(1S2T)	5.73

2D Radiation Pattern:

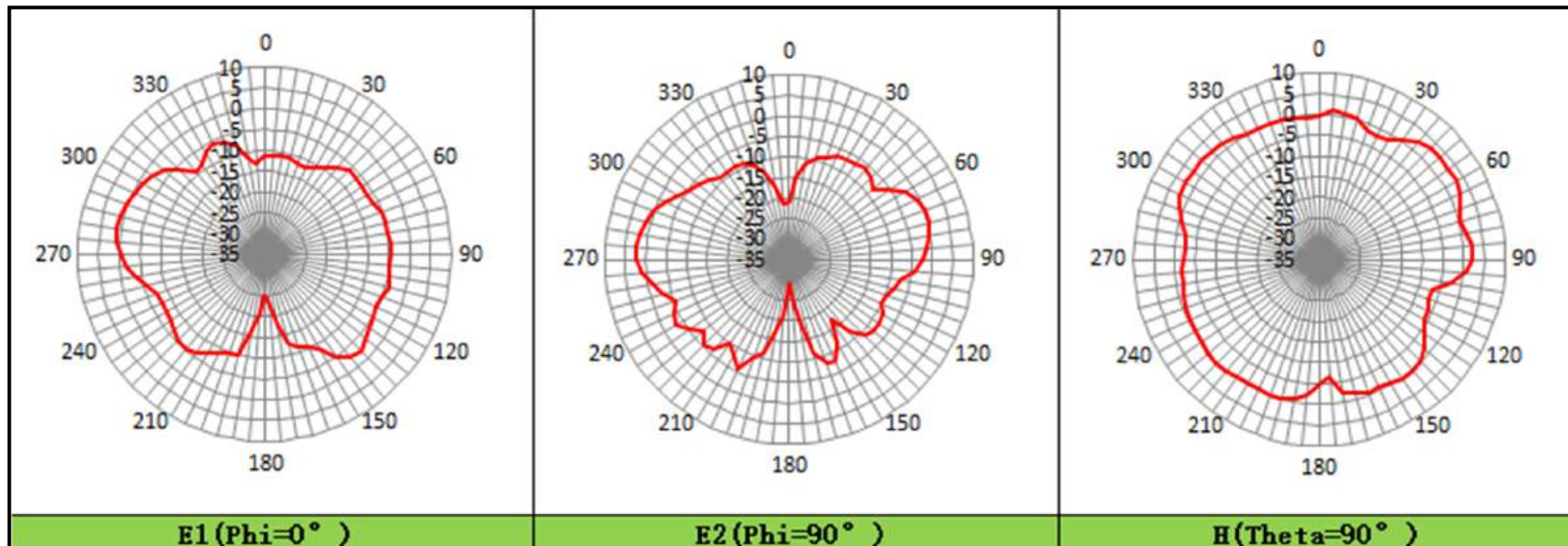


Uncorrelated Combined Gain

Uncorrelated Combined Gain(2S2T)@6.525GHz

	Peak Gain(dBi)
Unco_DG (2S2T)	3.13

2D Radiation Pattern:

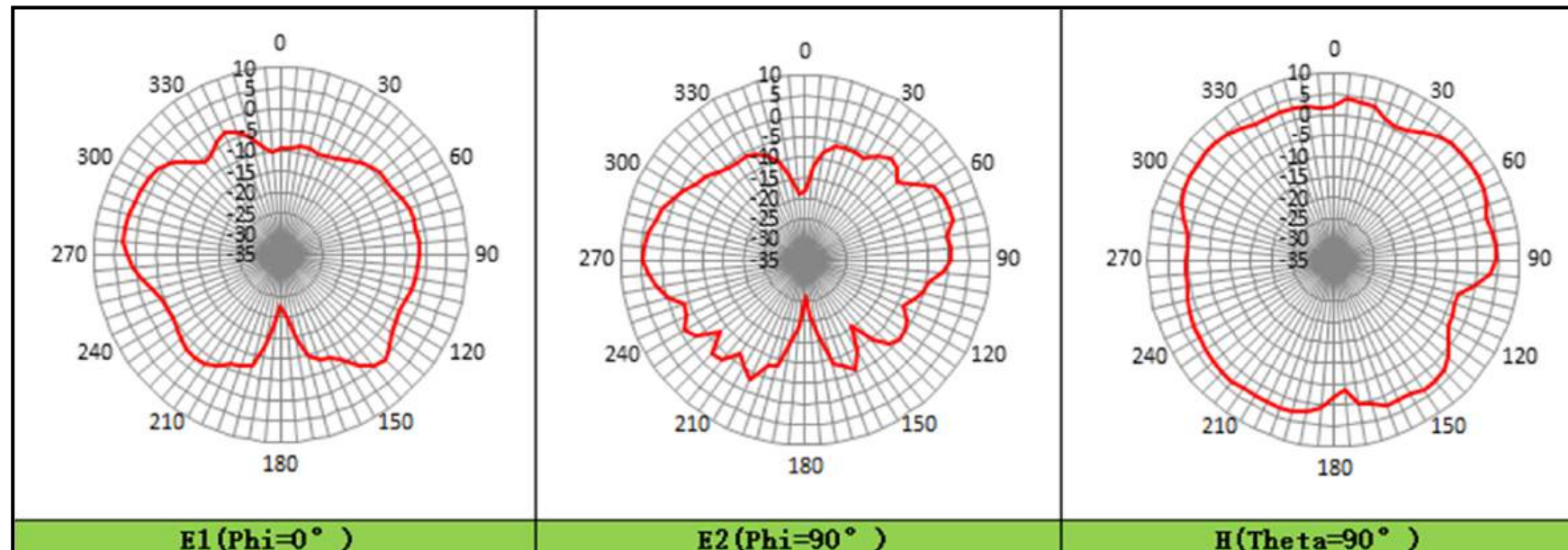


Correlated Combined Gain

Correlated Combined Gain(1S2T)@6.525GHz

	Peak Gain(dBi)
Co_DG(1S2T)	5.51

2D Radiation Pattern:



Combined Gain

频率GHz		2.400	2.450	2.500	5.150	5.250	5.600	5.785	6.000	6.225	6.525	7.000
组合增益 (dBi)	ANT1+ANT2	4.94	5.43	5.48								
	ANT1,ANT2	1.93	2.42	2.47								
	ANT3+ANT4				5.62	5.90	5.73	5.83				
	ANT3,ANT4				2.62	2.90	2.78	2.82				
	ANT5+ANT6								5.88	5.84	5.51	5.75
	ANT5,ANT6								2.97	2.99	3.13	3.15

- Uncorrelated combined gain < 3.0dBi@2.4G &5G
- Correlated combined gain < 6.0 dBi@2.4G &5G
- Uncorrelated combined gain < 3.2dBi@6G
- Correlated combined gain < 6.0 dBi@6G

*注：

- ① 相关性：ANT1+ANT2 （1S2T）表示一条码流两根天线发射；
- ② 非相关性：ANT1，ANT2 （2S2T）表示两条码流两根天线发射；

Summary

- **Return loss**

The data on page 16 shows:

- The WIFI 2.4G antenna's Return loss $< -11.7\text{dB}$;
- The WIFI 5G antenna's Return loss $< -11.7\text{dB}$;
- The WIFI 6G antenna's Return loss $< -11.7\text{dB}$;

- **Isolation**

The data on page 24 shows:

- The Isolation between WIFI 2.4G antennas $< -20\text{dB}$;
- The Isolation between WIFI 5G antennas $< -20\text{dB}$;
- The Isolation between WIFI 6G antennas $< -20\text{dB}$;
- The Isolation between WIFI 5G & 6G antennas $< -20\text{dB}$;

- **Gain & Efficiency**

The data on page 39、40 shows:

- The WIFI 2.4G antenna's Gain $< 3.5\text{dBi}$, Efficiency $> 65\%$;
- The WIFI 5G antenna's Gain $< 5.0\text{dBi}$, Efficiency $> 60\%$;
- The WIFI 6G antenna's Gain $< 6.0\text{dBi}$, Efficiency $> 60\%$;

- **Combined Gain**

The data on page 47 shows:

- Uncorrelated combined gain $< 3.0\text{dBi}@2.4\text{G} \& 5\text{G}$
- Correlated combined gain $< 6.0\text{dBi}@2.4\text{G} \& 5\text{G}$
- Uncorrelated combined gain $< 3.2\text{dBi}@6\text{G}$
- Correlated combined gain $< 6.0\text{dBi}@6\text{G}$



Through the above data analysis, the single antenna can meet the performance requirements.

Thanks!

