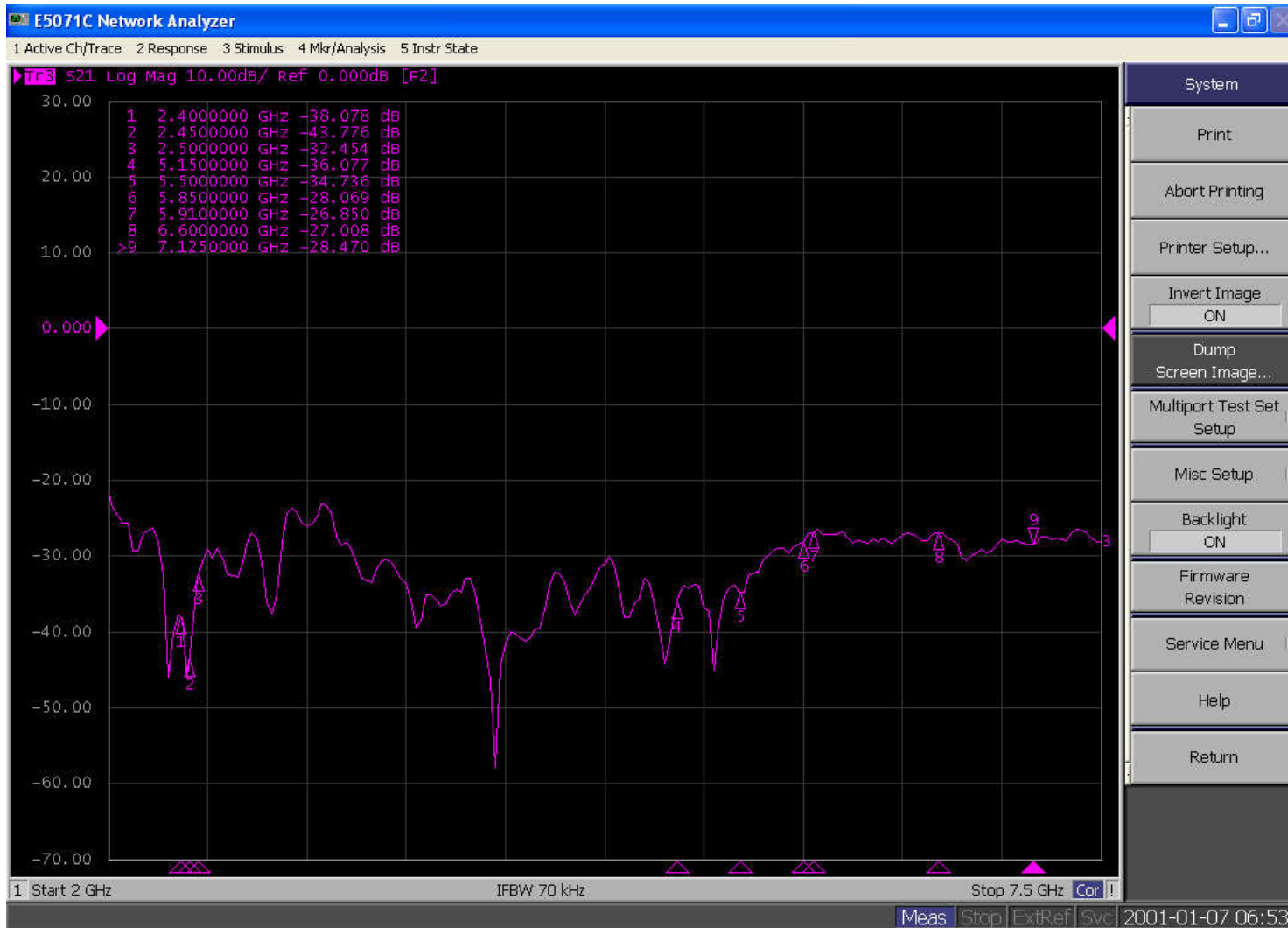


Return Loss and Isolation



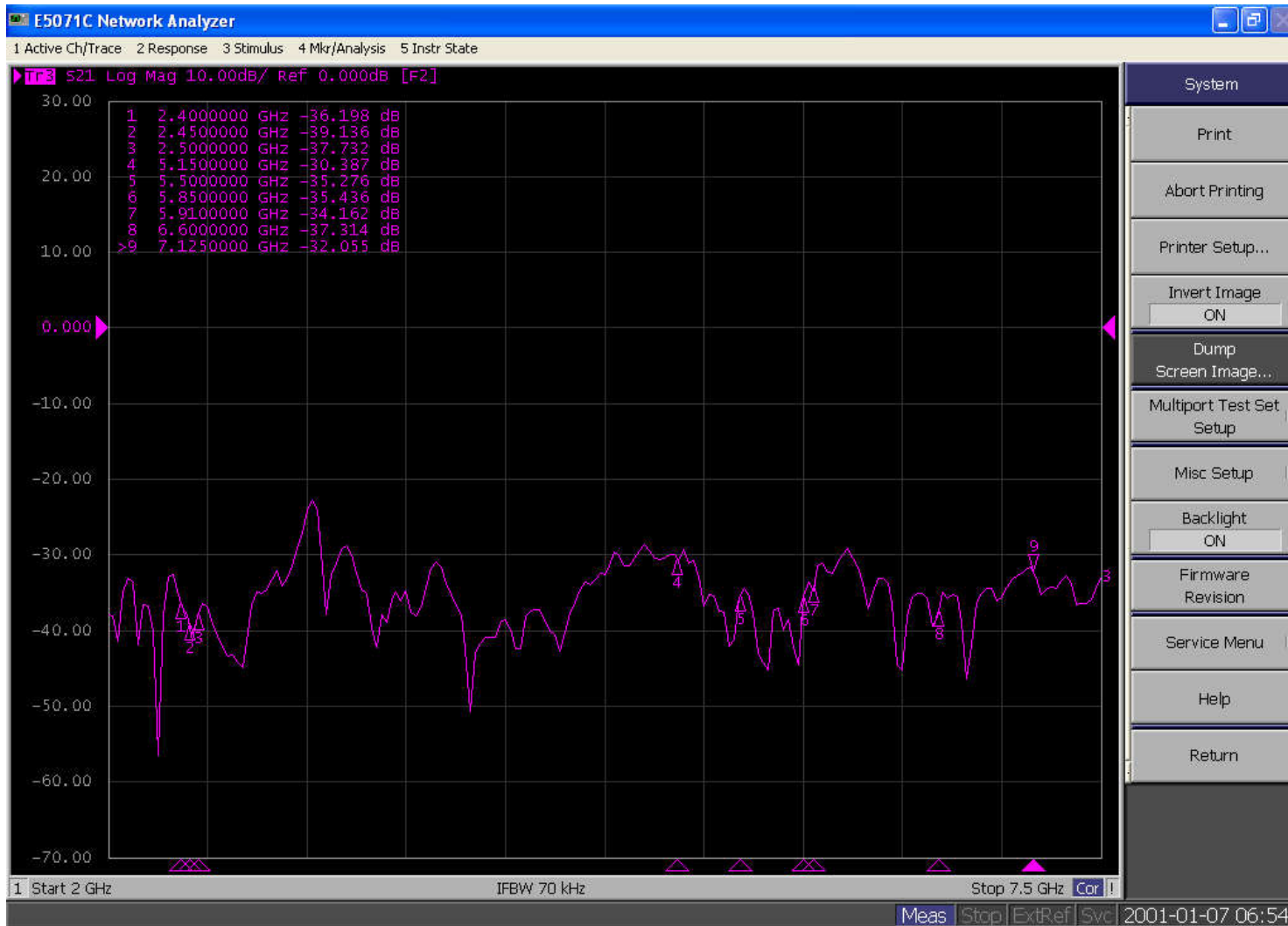
6E wifi ANT3& (2.4G wifi & 5G wifi ANT2)



Return Loss and Isolation



6E wifi ANT3&5G wifi ANT3



Return Loss and Isolation



6E wifi ANT3&5G wifi ANT4



Return Loss and Isolation



6E wifi ANT3&BLE ANT



Return Loss and Isolation



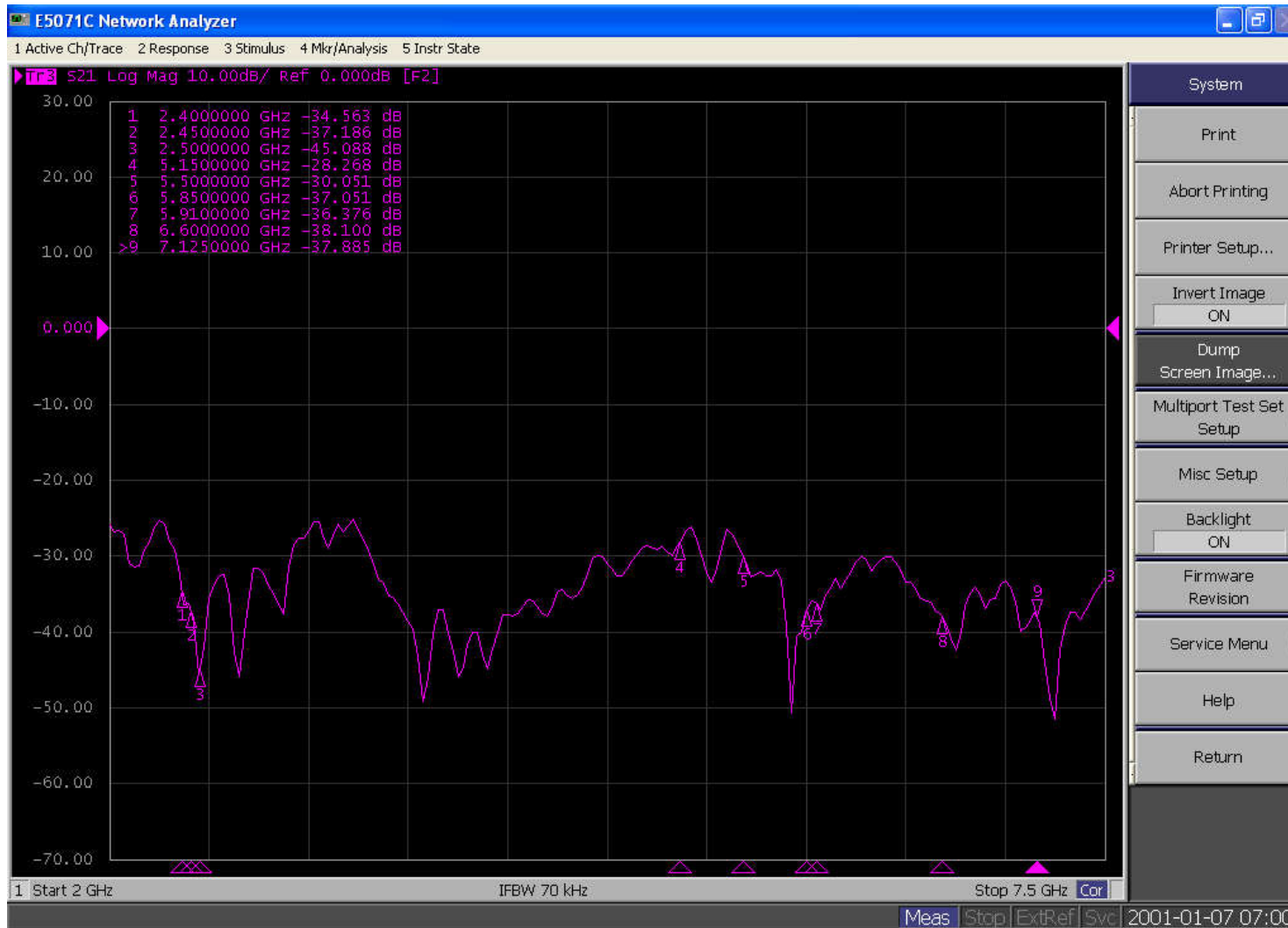
6E wifi ANT4 & (2.4G wifi & 5G wifi ANT1)



Return Loss and Isolation



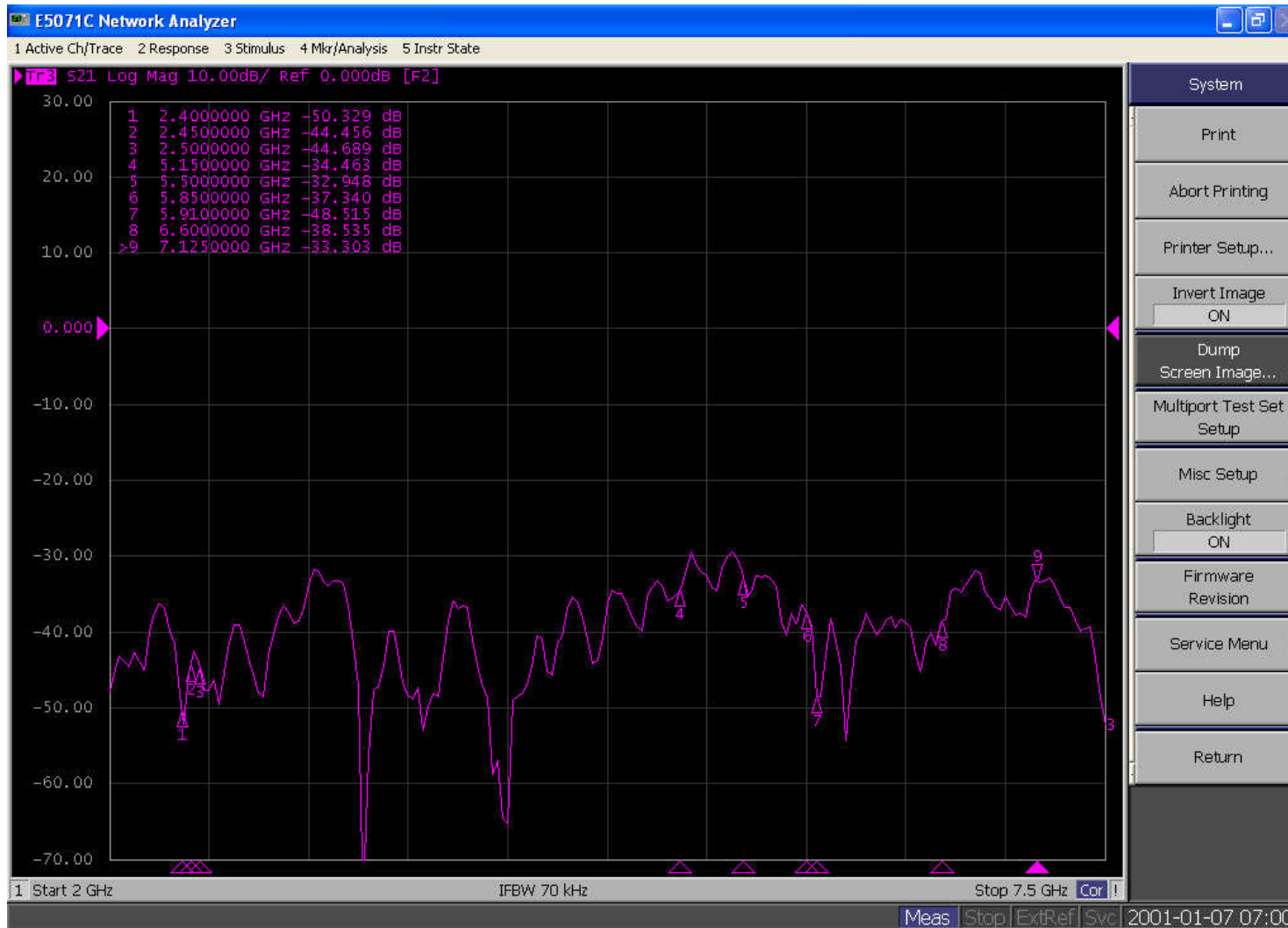
6E wifi ANT4&(2.4G wifi & 5G wifi ANT2)



Return Loss and Isolation



6E wifi ANT4&5G wifi ANT3



Return Loss and Isolation



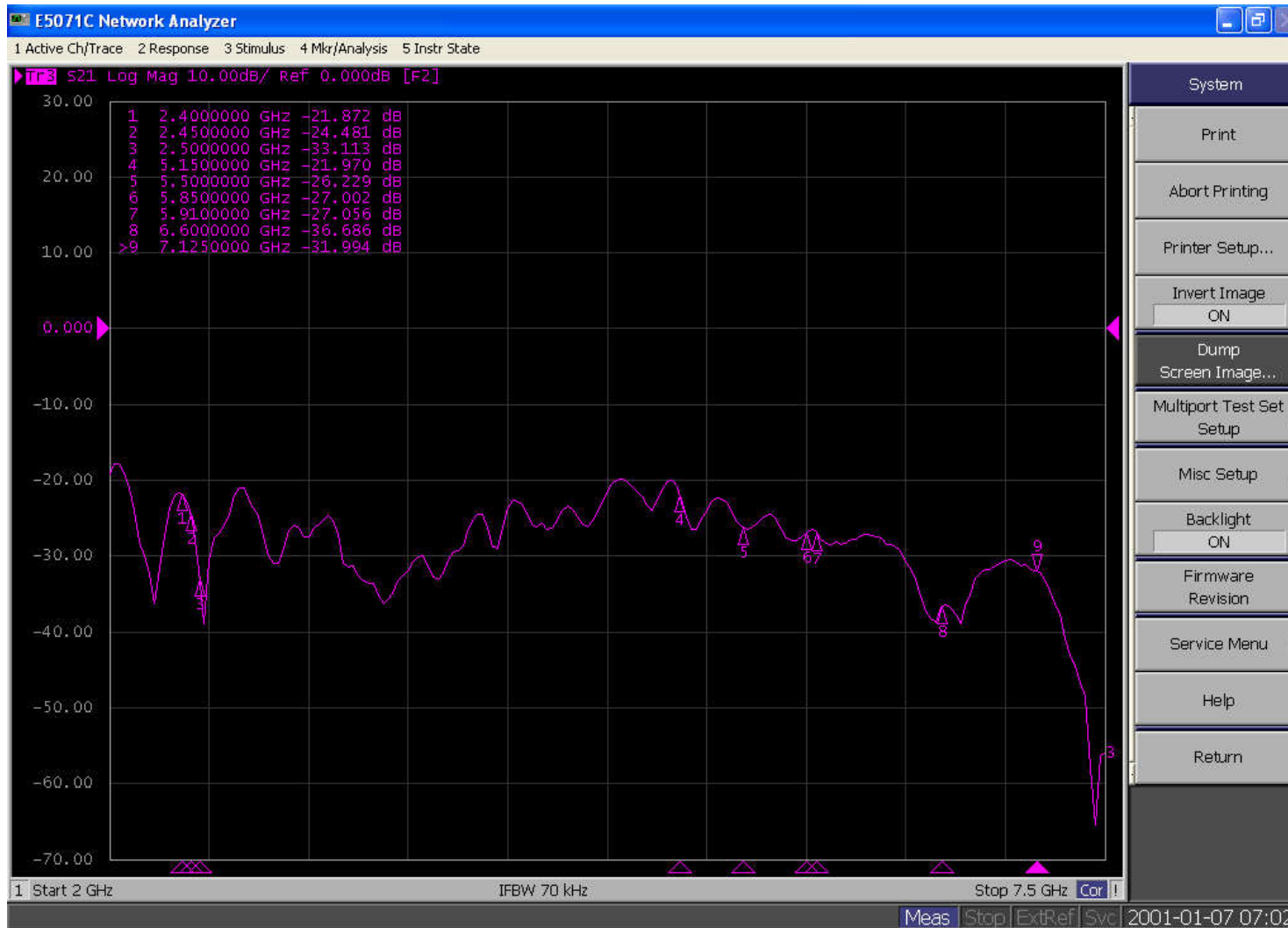
6E wifi ANT4&5G wifi ANT4



Return Loss and Isolation



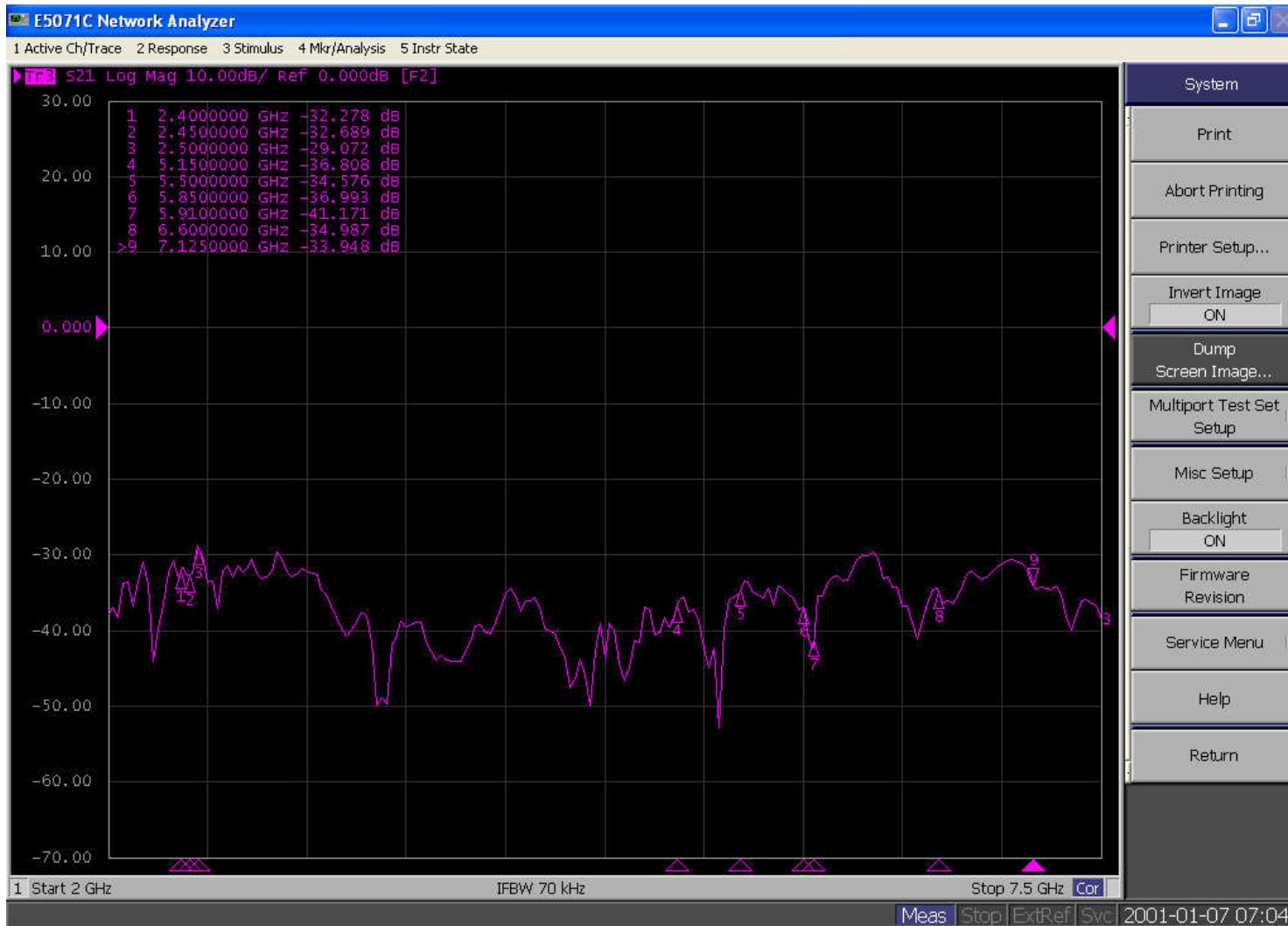
6E wifi ANT4&BLE ANT



Return Loss and Isolation



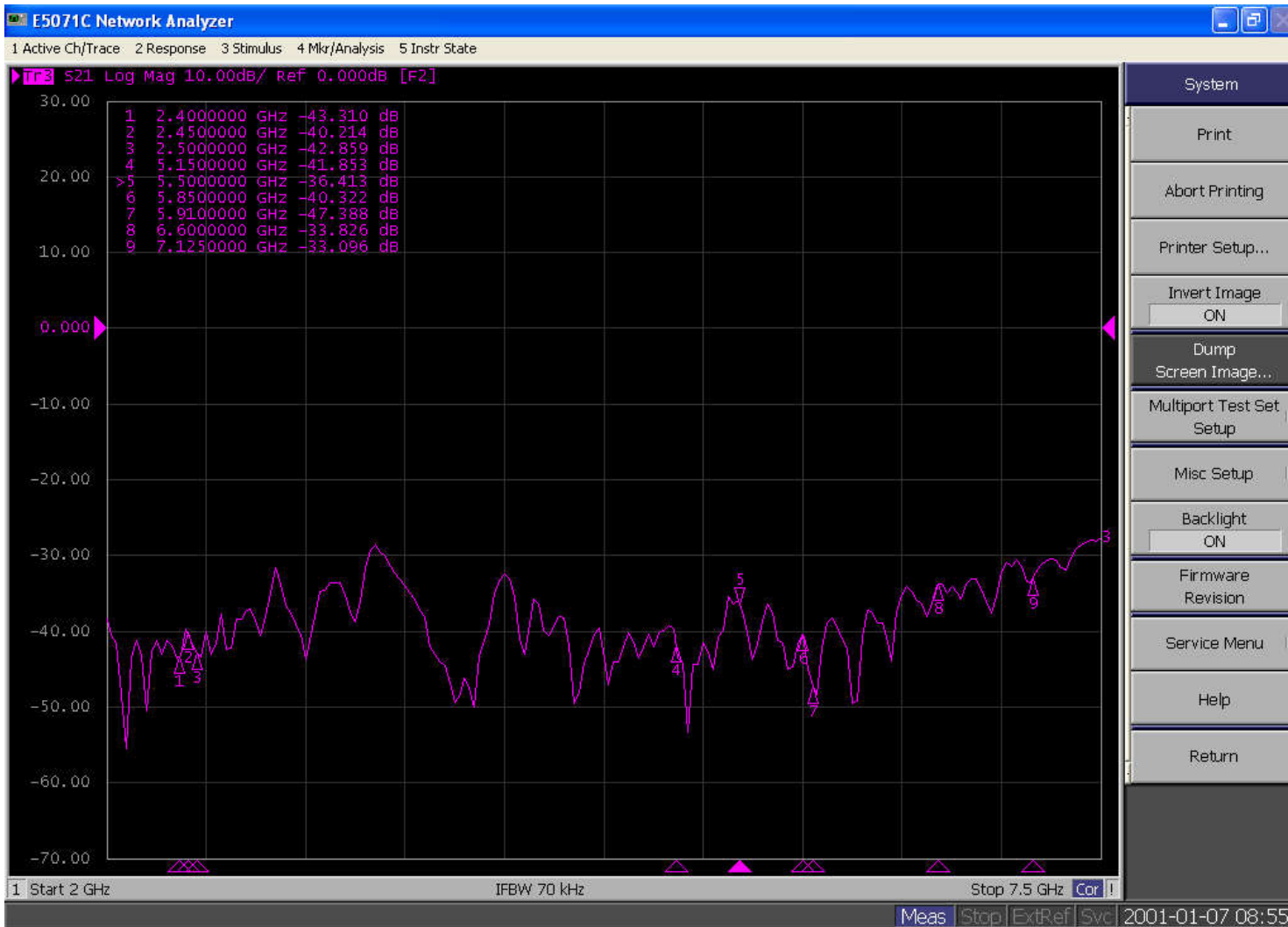
(2.4G wifi & 5G wifi ANT1)&(2.4G wifi & 5G wifi ANT2)



Return Loss and Isolation



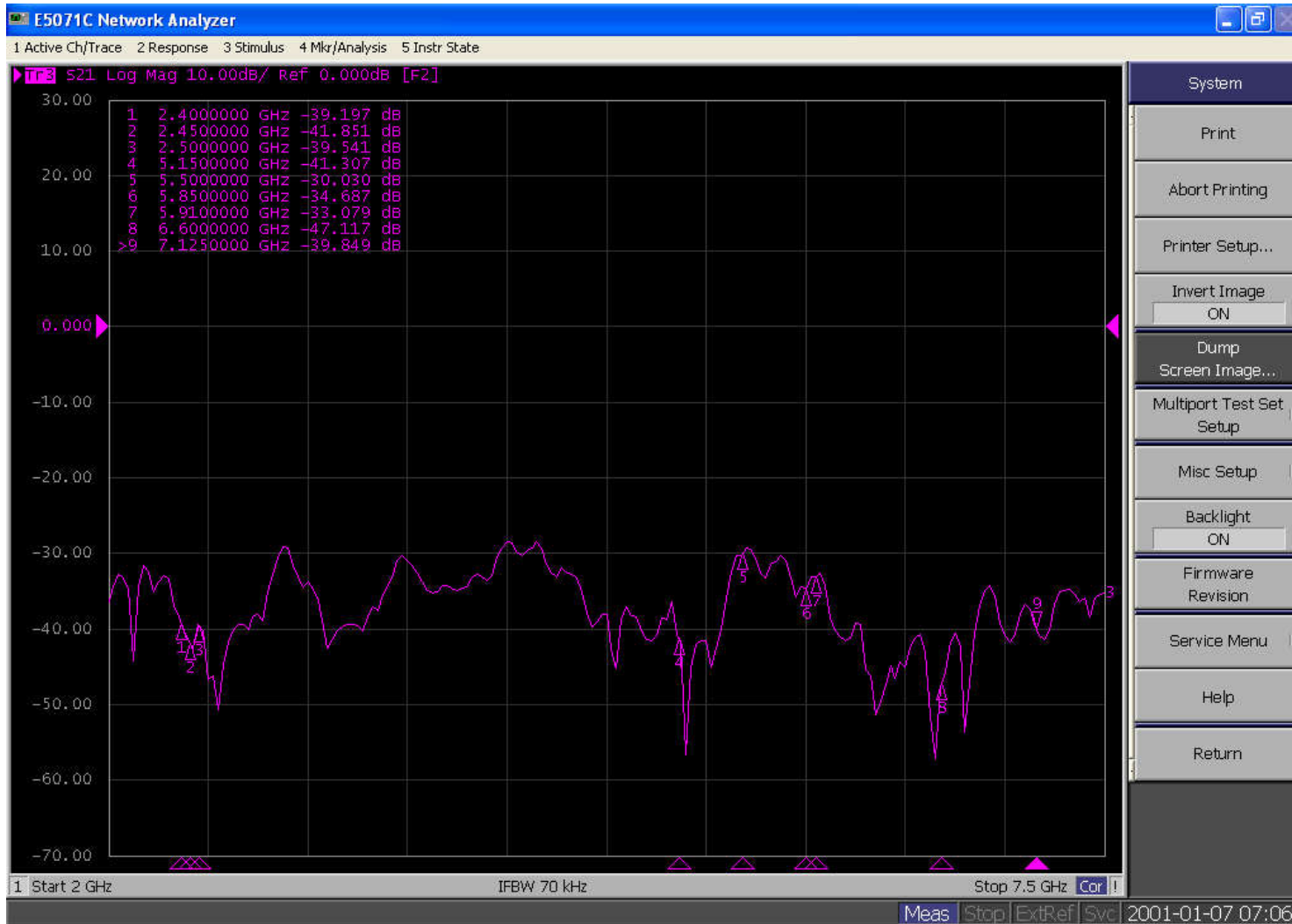
(2.4G wifi & 5G wifi ANT1)&5G wifi ANT3



Return Loss and Isolation



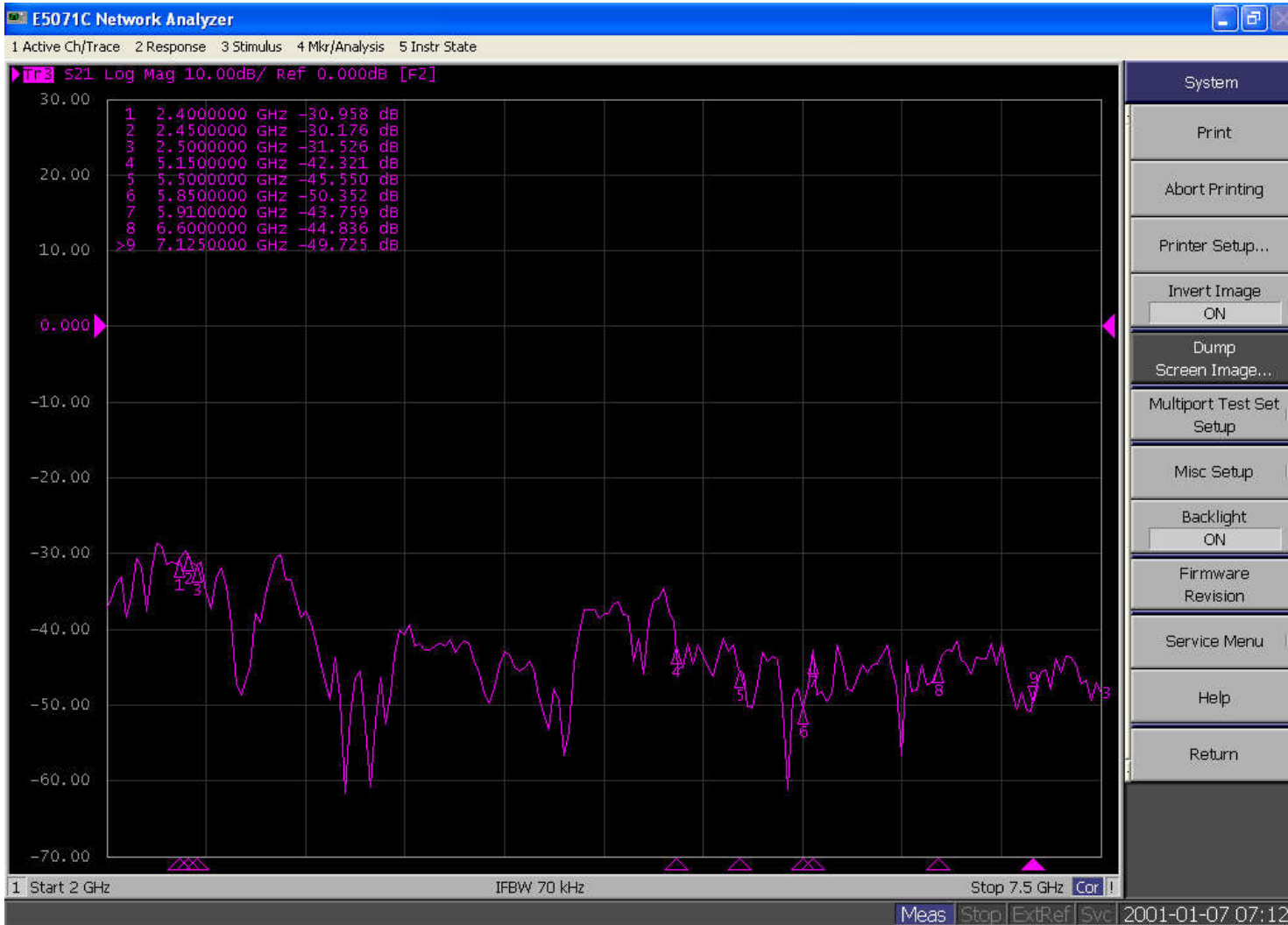
(2.4G wifi & 5G wifi ANT1)&5G wifi ANT4



Return Loss and Isolation



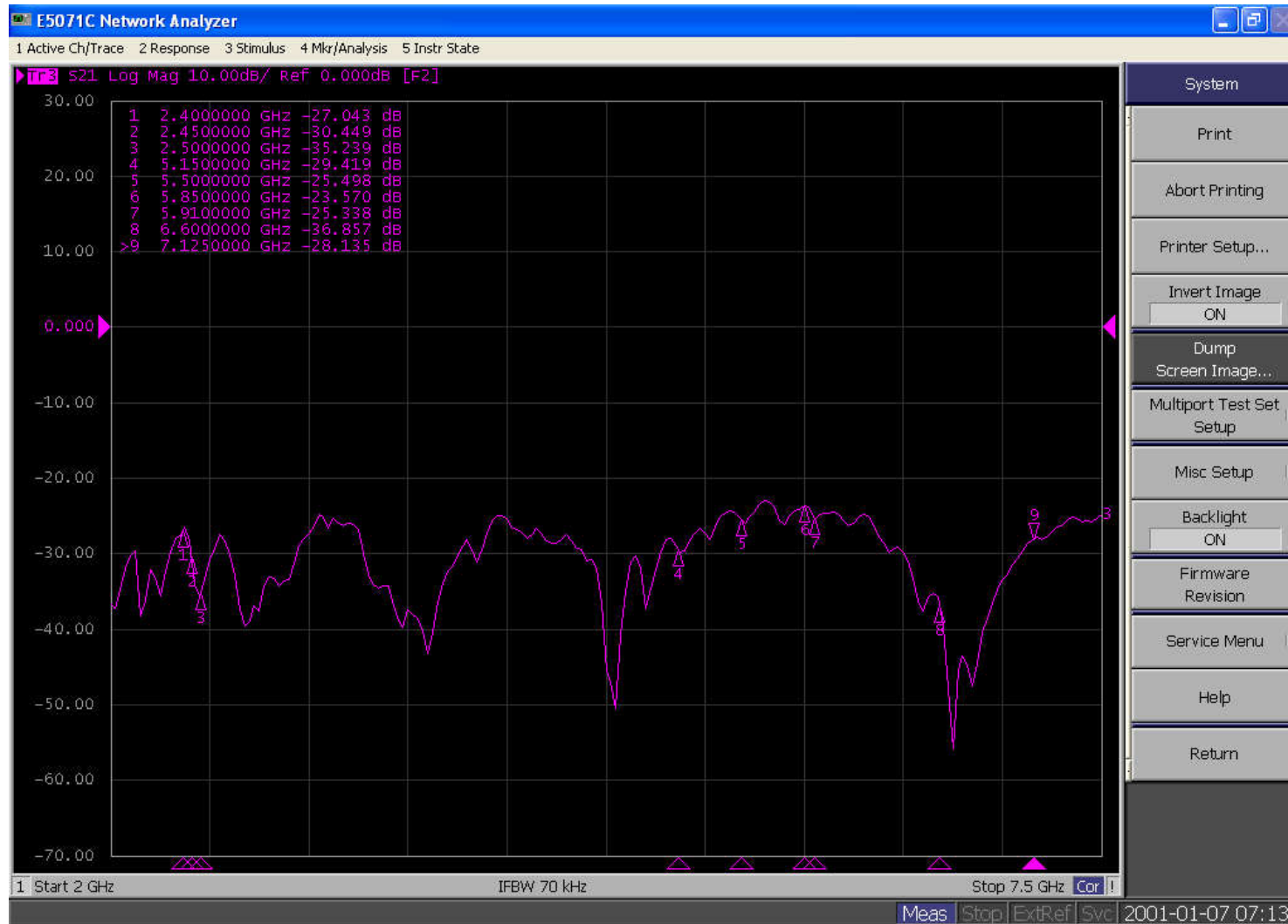
(2.4G wifi & 5G wifi ANT1)&BLE ANT



Return Loss and Isolation



(2.4G wifi & 5G wifi ANT2) & 5G wifi ANT3



Return Loss and Isolation



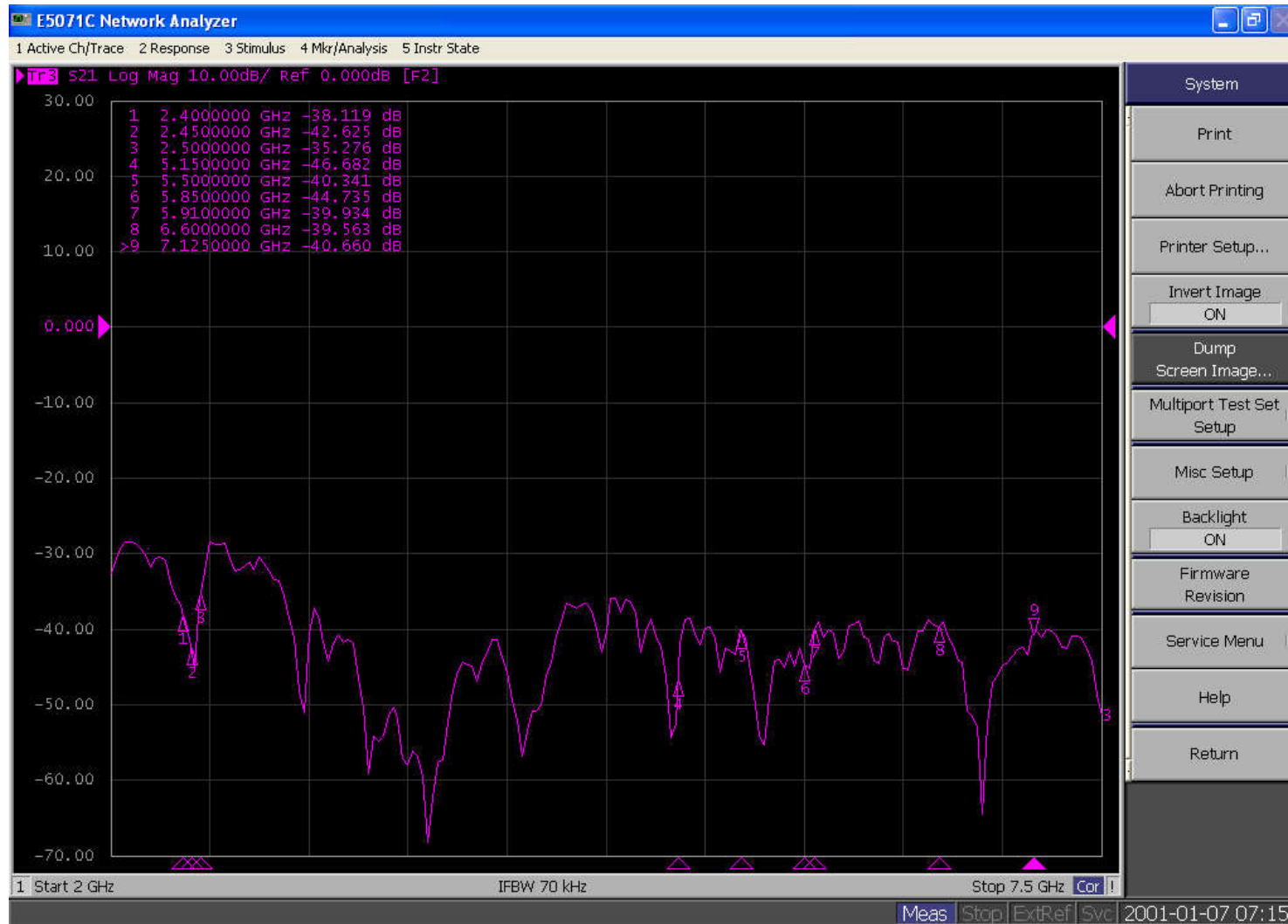
(2.4G wifi & 5G wifi ANT2) & 5G wifi ANT4



Return Loss and Isolation



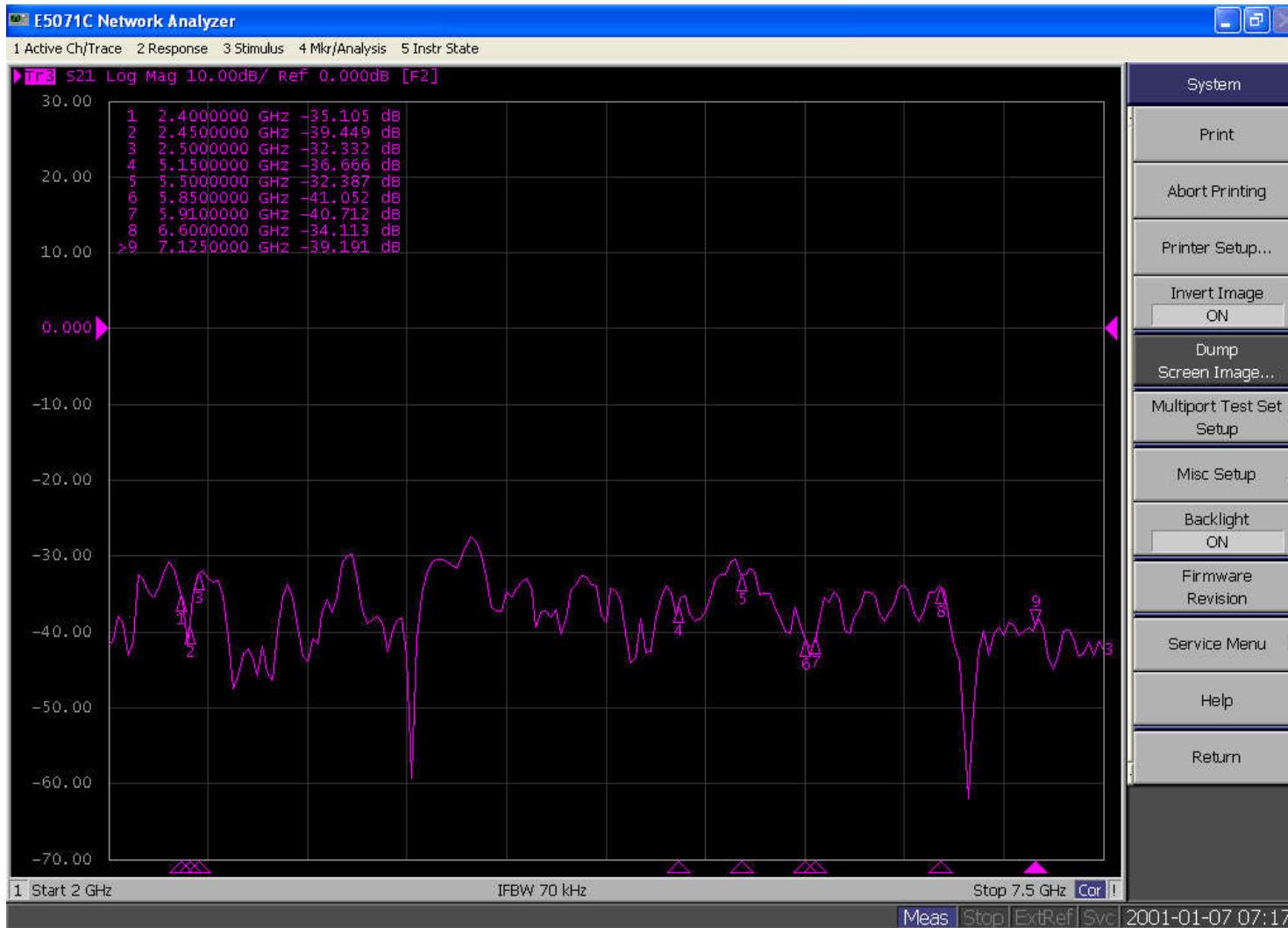
(2.4G wifi & 5G wifi ANT2) & BLE ANT



Return Loss and Isolation



5G wifi ANT3&5G wifi ANT4



Return Loss and Isolation



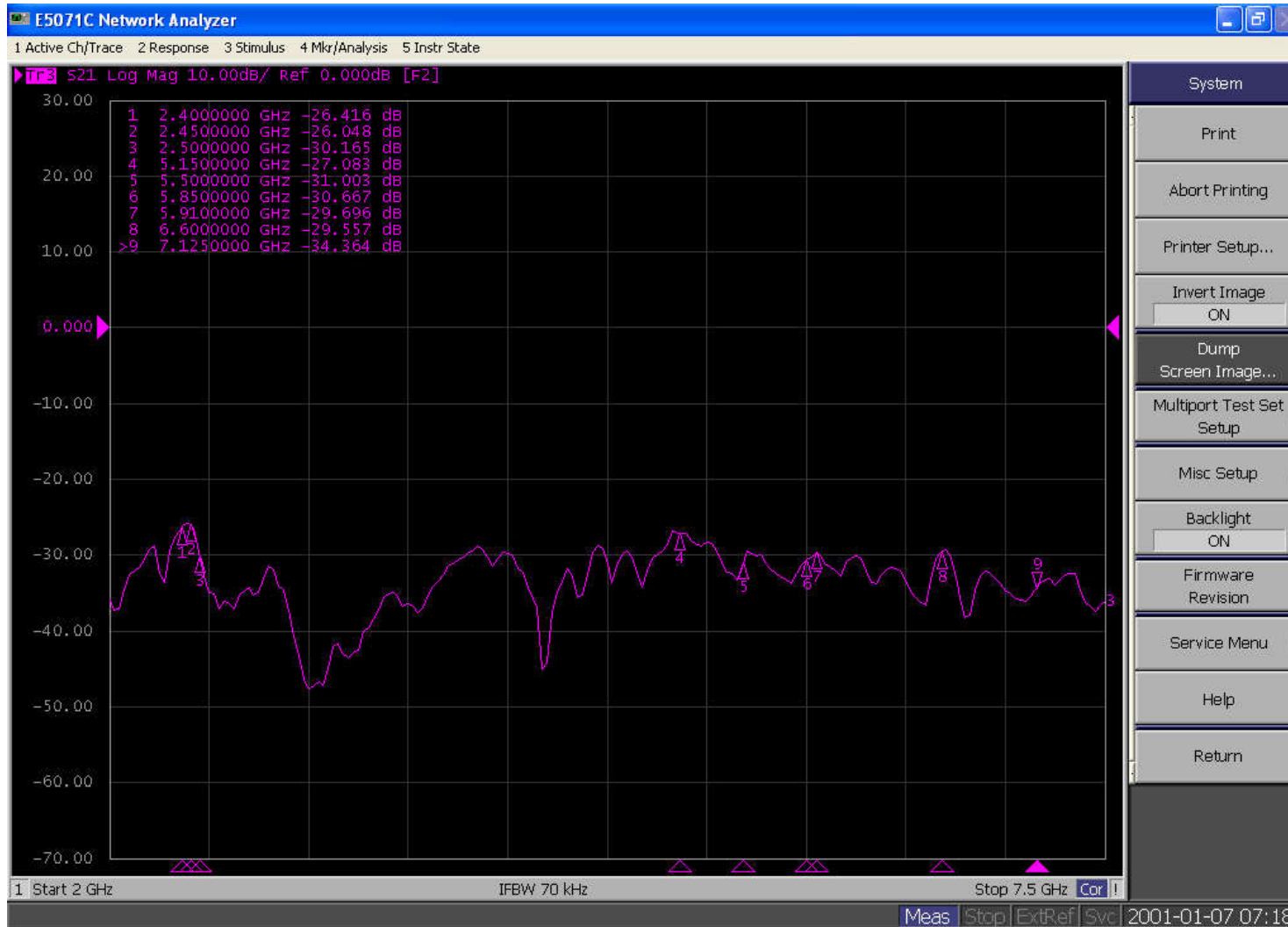
5G wifi ANT3&BLE ANT



Return Loss and Isolation



5G wifi ANT4&BLE ANT



Return Loss and Isolation

Test results

	Return loss			Results
Frequency (GHz)	2.4-2.5GHz	5.15-5.85GHz	5.91-7.125GHz	PASS
6E_ANT1	NA	NA	<-15dB	
6E_ANT2	NA	NA	<-15dB	
6E_ANT3	NA	NA	<-13dB	
6E_ANT4	NA	NA	<-15dB	
Dual band_ANT1	<-15dB	<-15dB	NA	
Dual band_ANT2	<-15dB	<-12dB	NA	
5G_ANT3	NA	<-13dB	NA	
5G_ANT4	NA	<-12dB	NA	
BLE_ANT	<-12dB	NA	NA	

Return Loss and Isolation

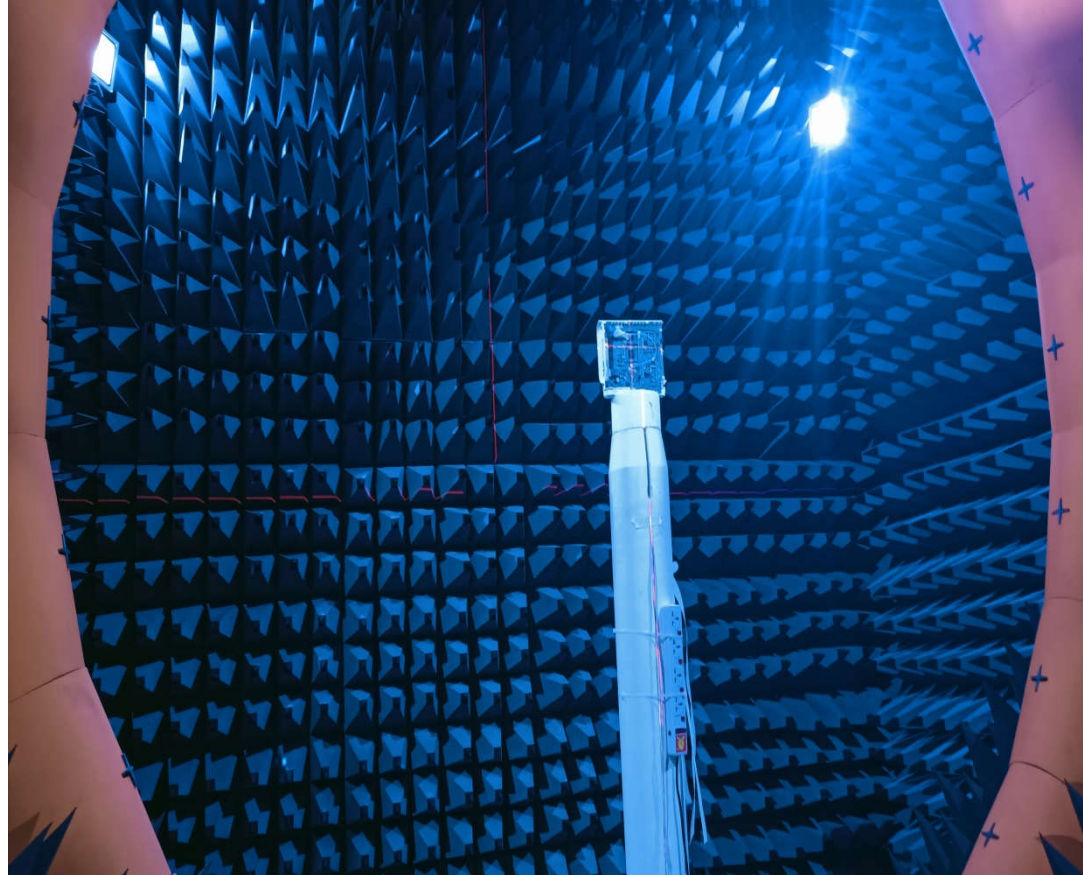


Test results

	Isolation			5G&6G
Frequency (GHz)	2.4-2.5GHz	5.15-5.85GHz	5.91-7.125GHz	
6E_ANT1	< -20dB			ANT1&5G < -25dB ANT2&5G < -25dB ANT3&5G < -25dB ANT4&5G < -25dB
6E_ANT2				
6E_ANT3				
6E_ANT4				
Dual band_ANT1				
Dual band_ANT2				
5G_ANT3				
5G_ANT4				
BLE_ANT				
Results				

2D/3D Radiation pattern

Test Condition

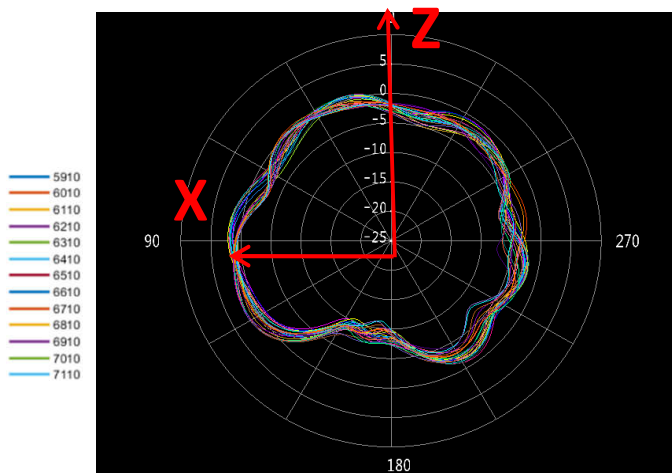
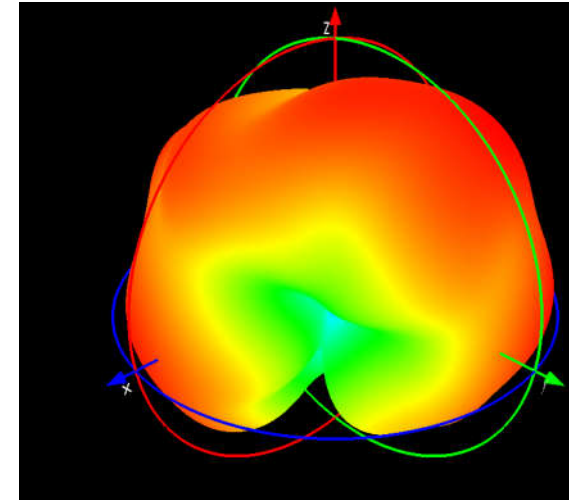
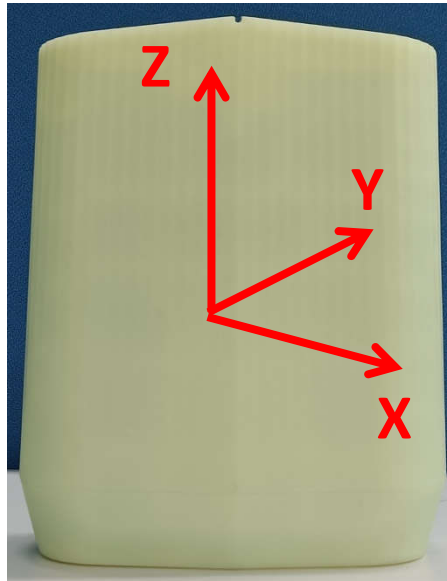
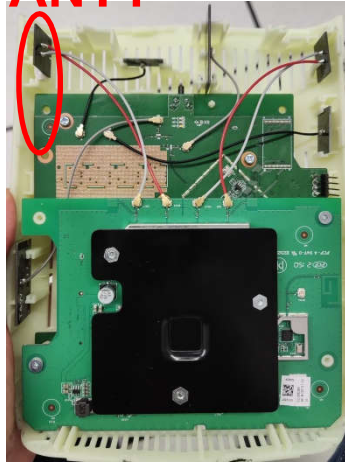


Microwave anechoic chamber

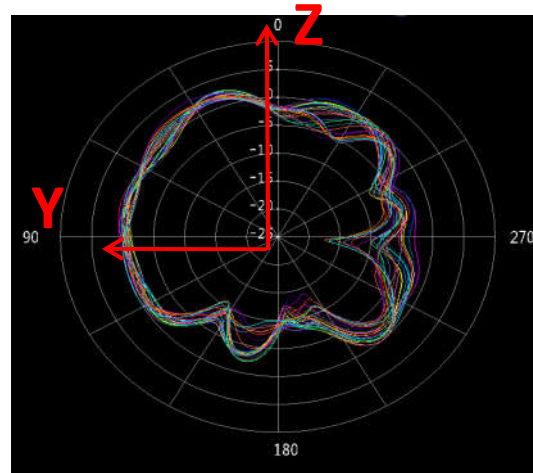
2D/3D Radiation pattern-6E

6E-Wifi

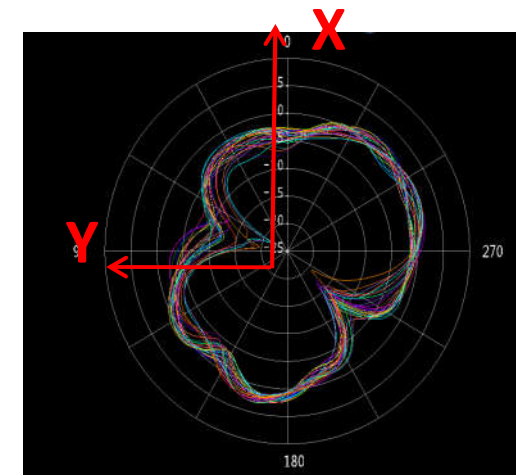
ANT1



E1 (Phi=0)



E1 (Phi=90)

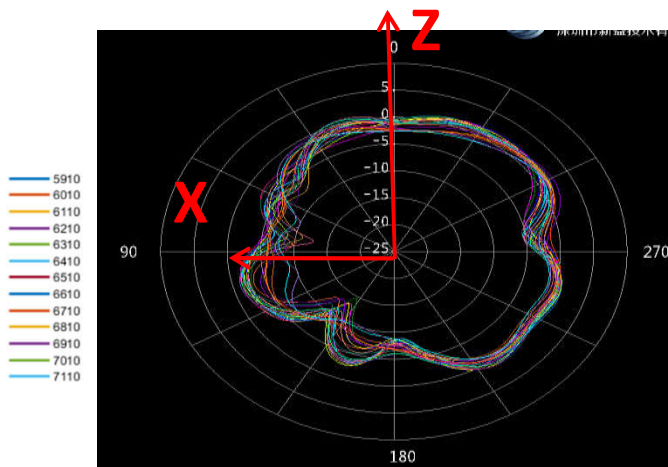
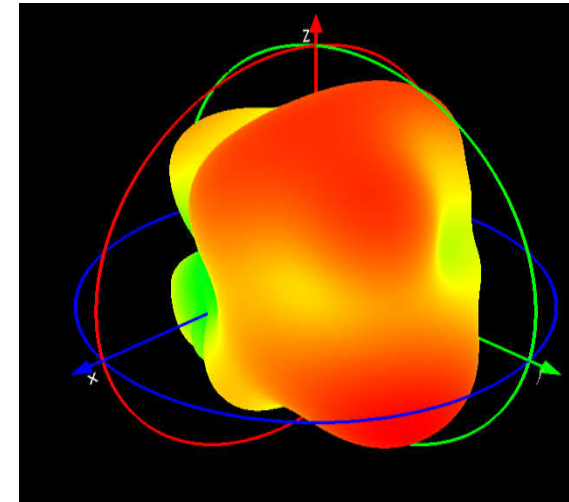
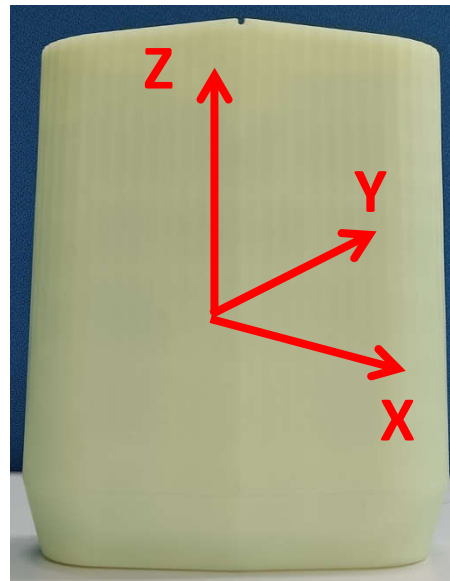
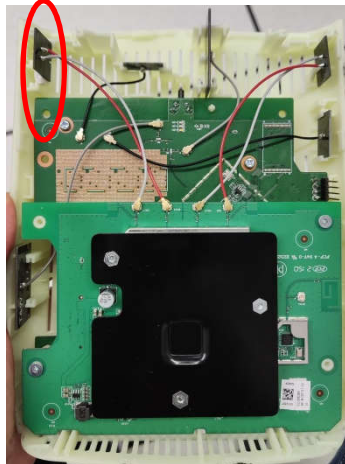


H (Theta=90)

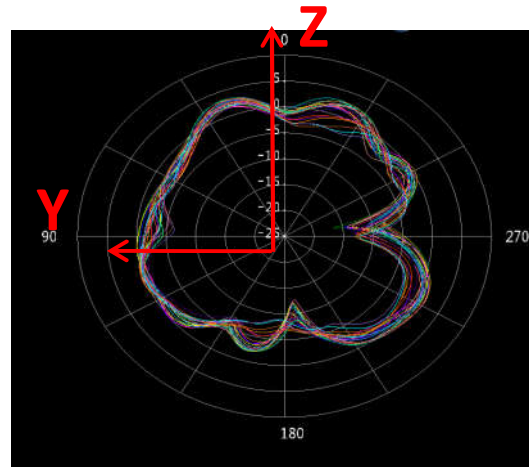
2D/3D Radiation pattern-6E

6E-Wifi

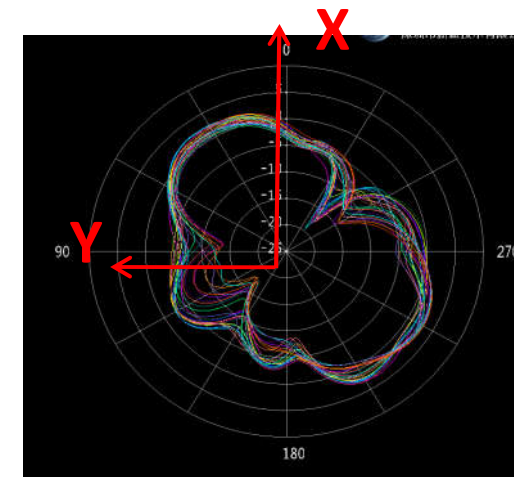
ANT2



E1 (Phi=0)



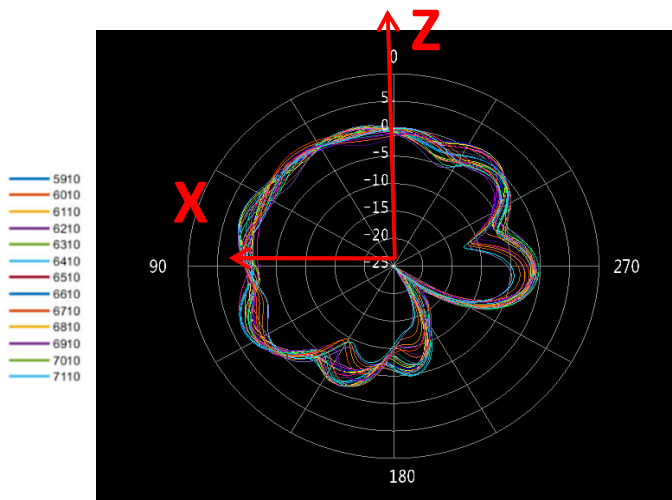
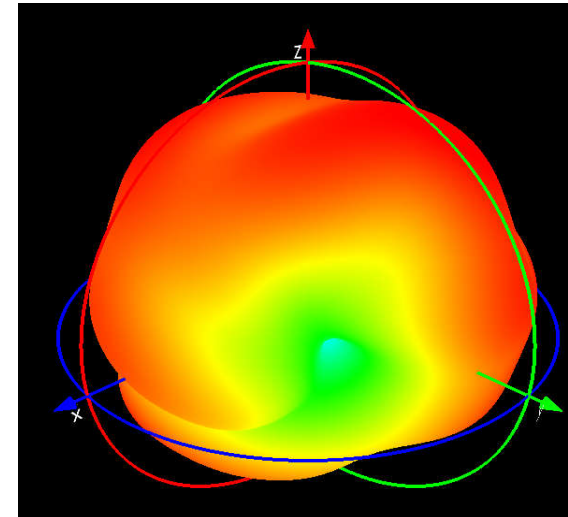
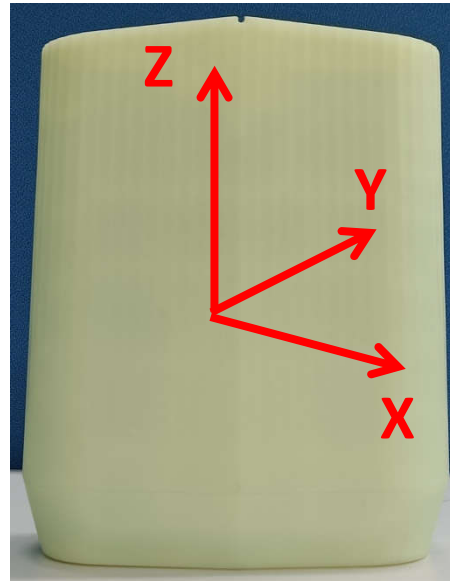
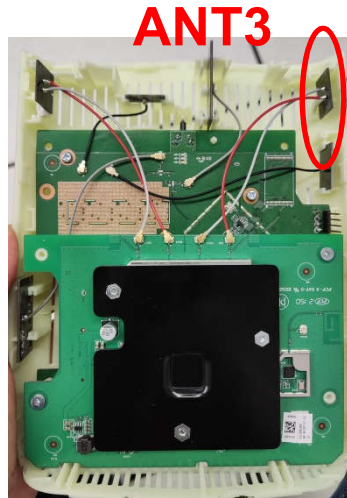
E1 (Phi=90)



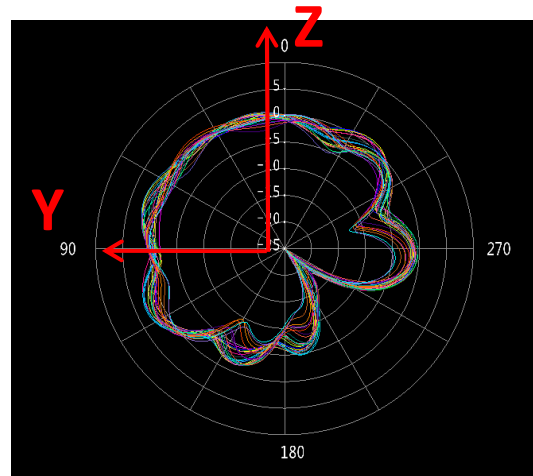
H (Theta=90)

2D/3D Radiation pattern-6E

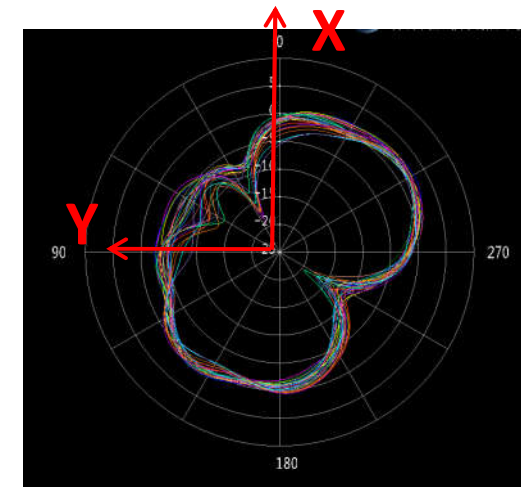
6E-Wifi



E1 (Phi=0)



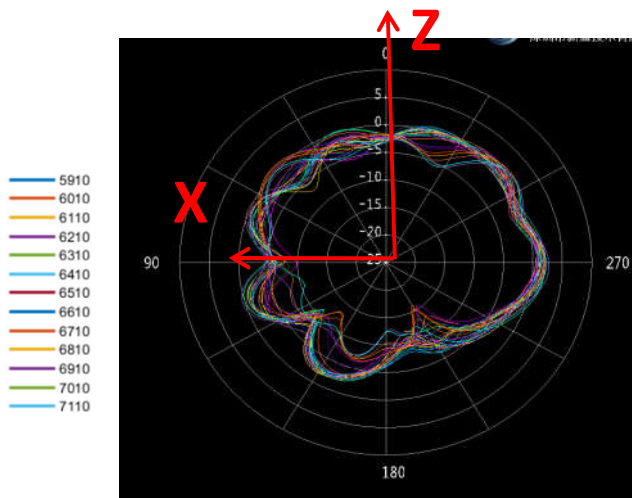
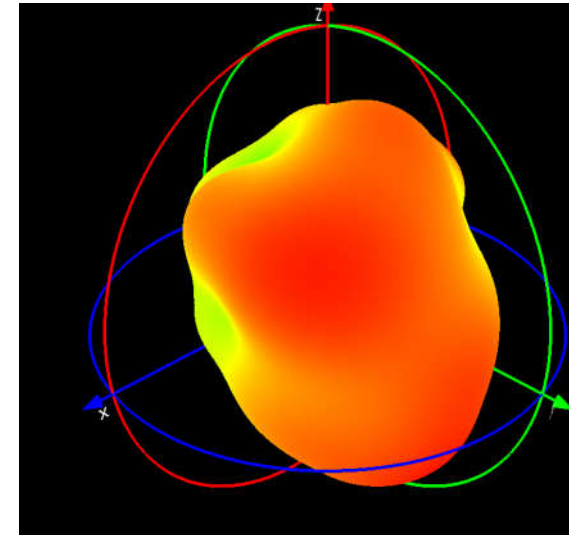
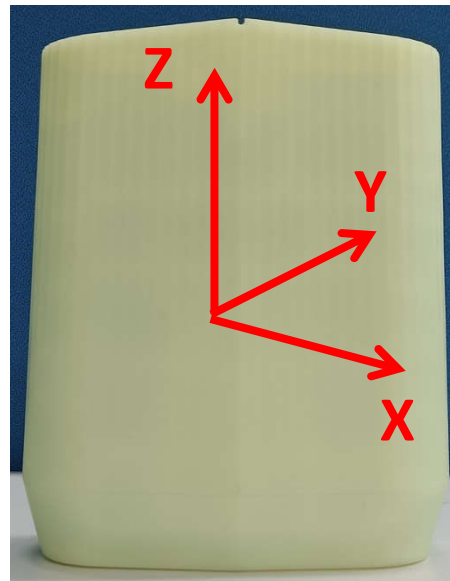
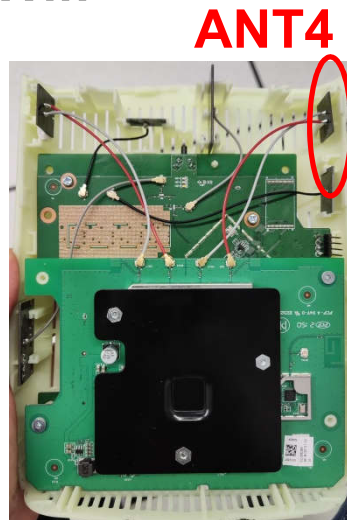
E1 (Phi=90)



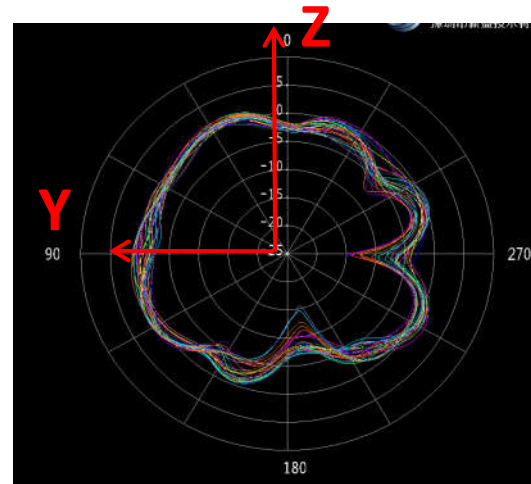
H (Theta=90)

2D/3D Radiation pattern-6E

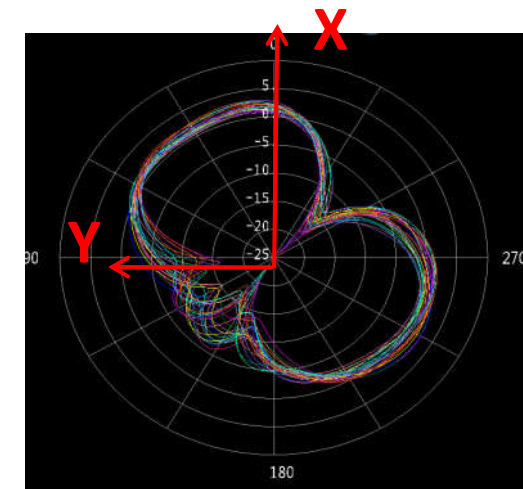
6E-Wifi



E1 (Phi=0)



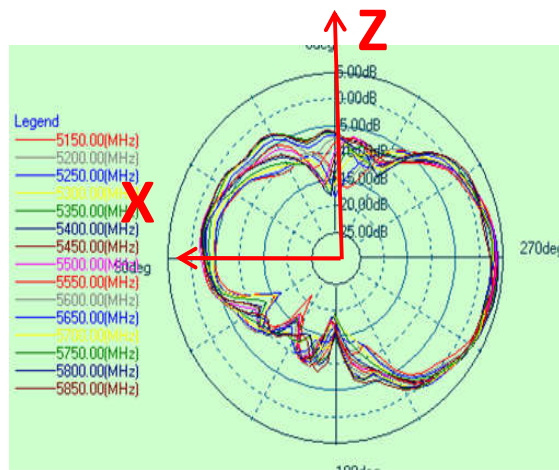
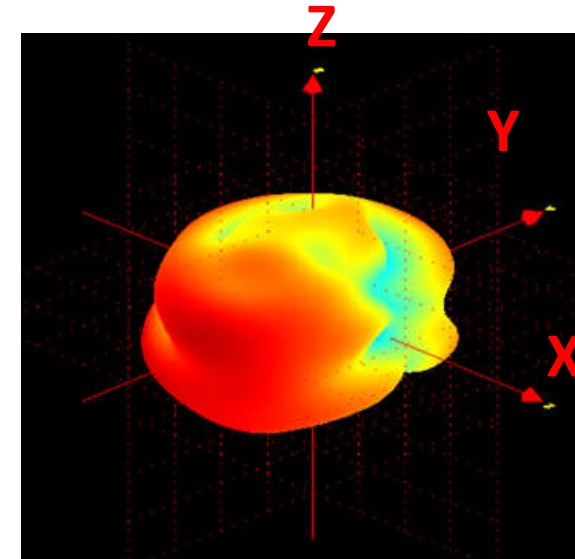
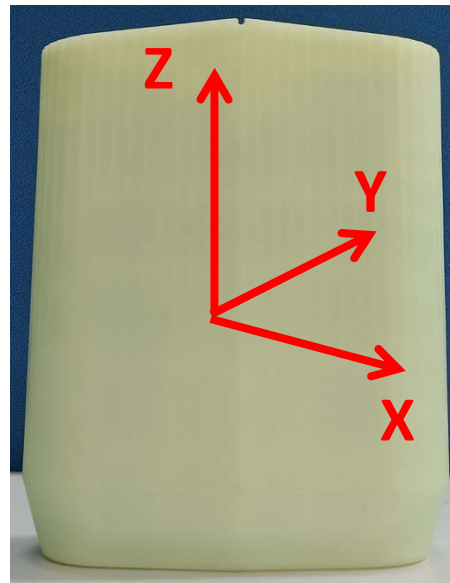
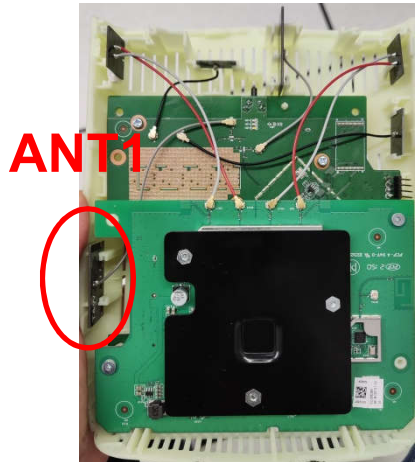
E1 (Phi=90)



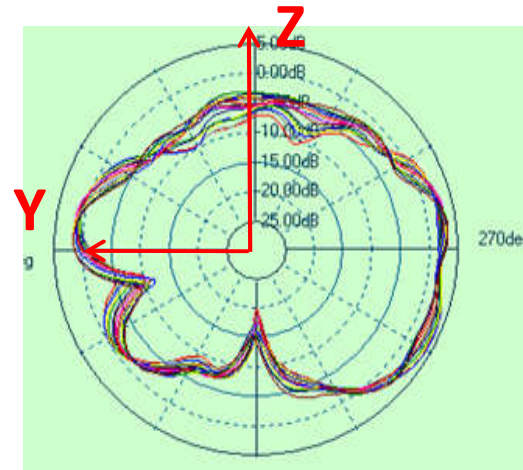
H (Theta=90)

2D/3D Radiation pattern-5G

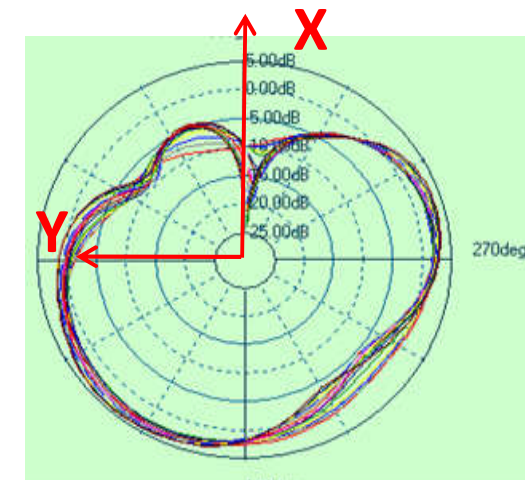
5G-Wifi



E1 (Phi=0)



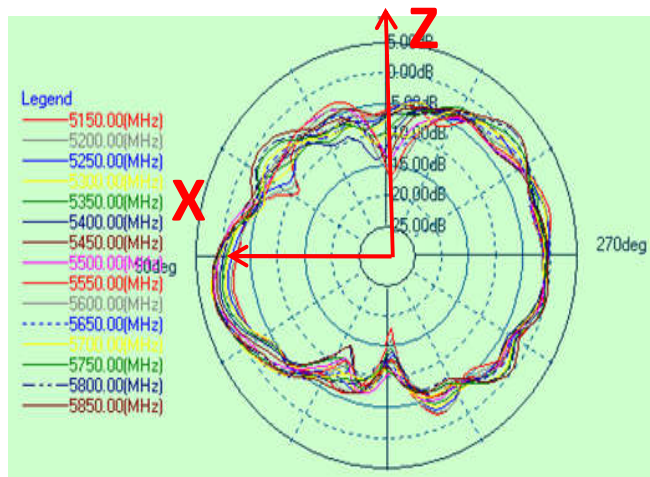
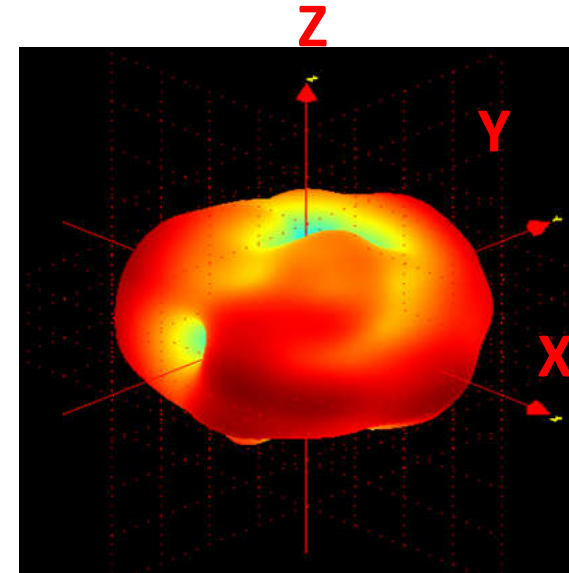
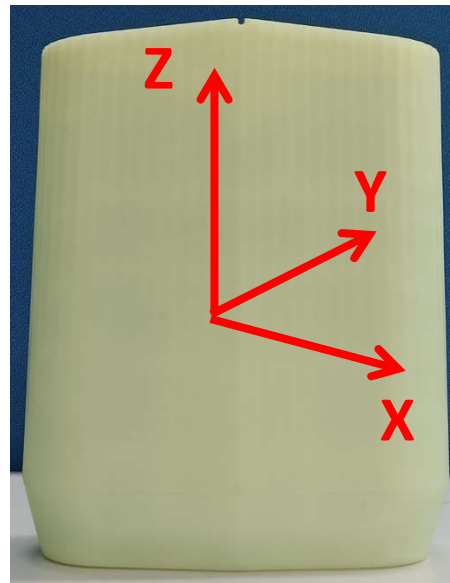
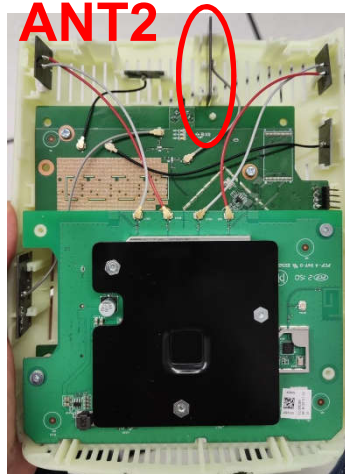
E1 (Phi=90)



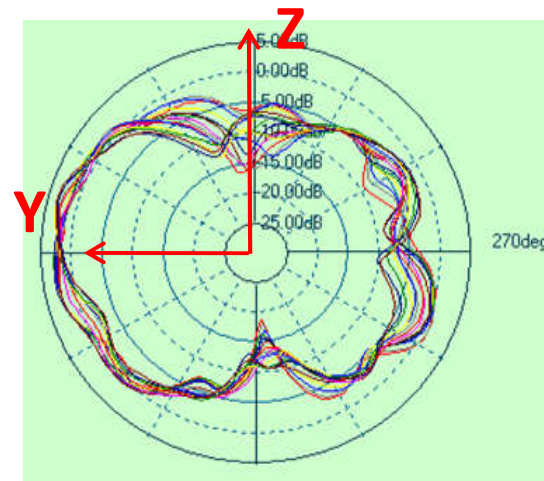
H (Theta=90)

2D/3D Radiation pattern-5G

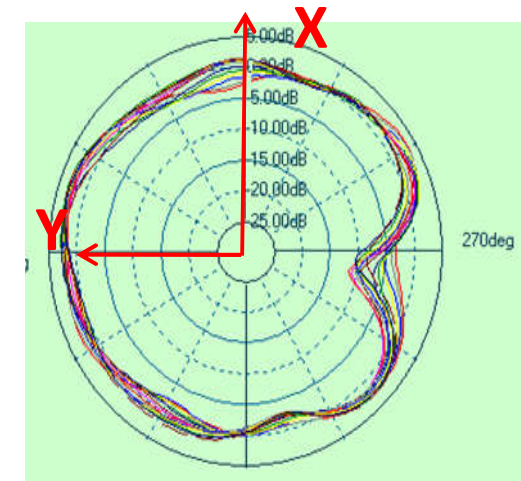
5G-Wifi



E1 (Phi=0)



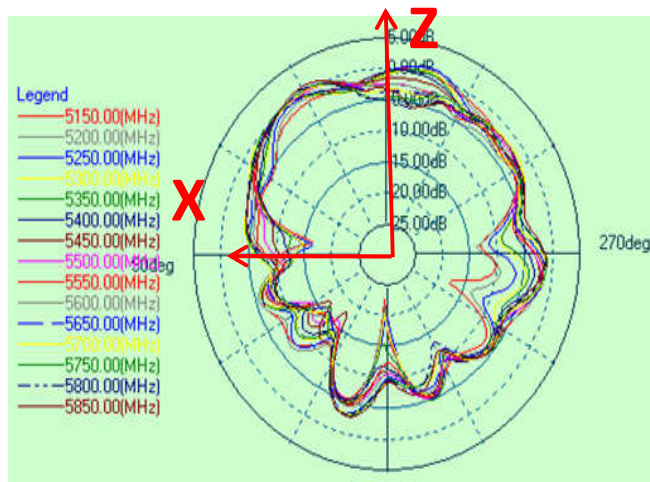
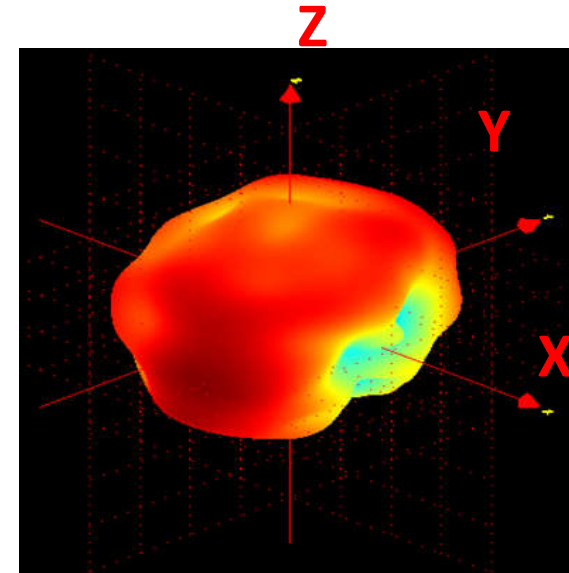
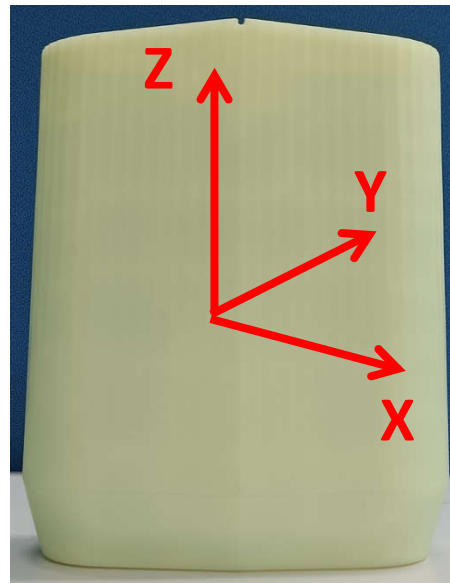
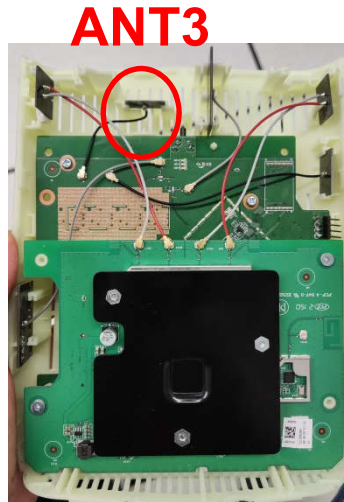
E1 (Phi=90)



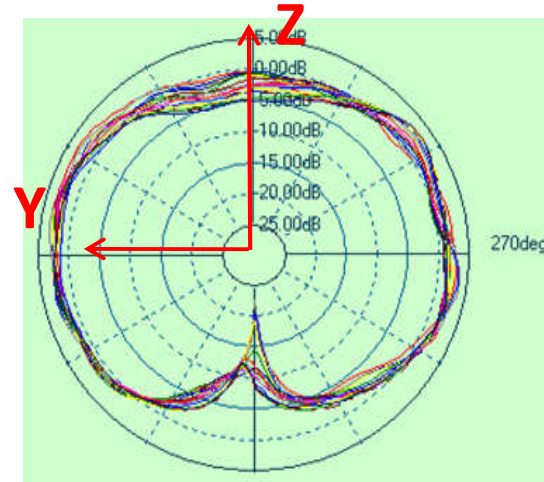
H (Theta=90)

2D/3D Radiation pattern-5G

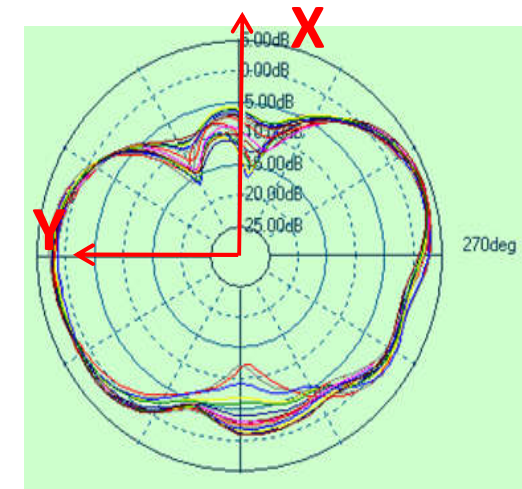
5G-Wifi



E1 (Phi=0)



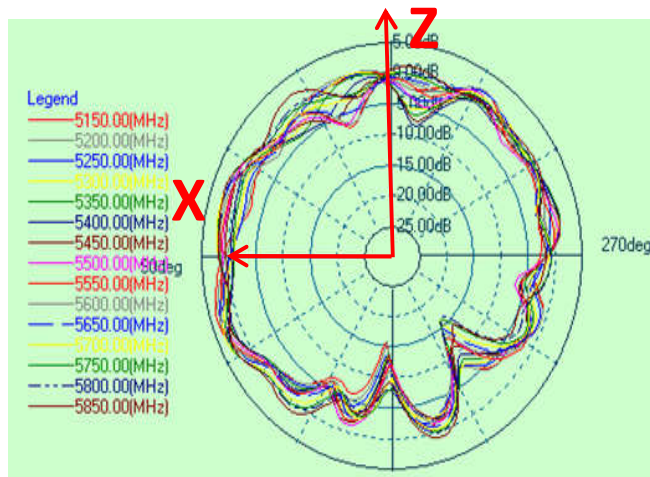
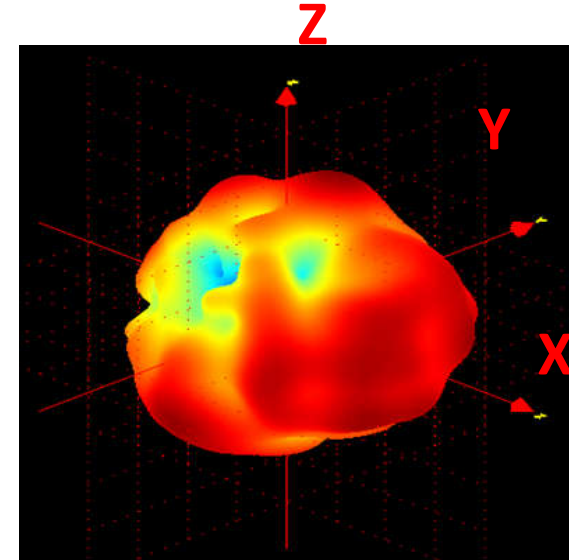
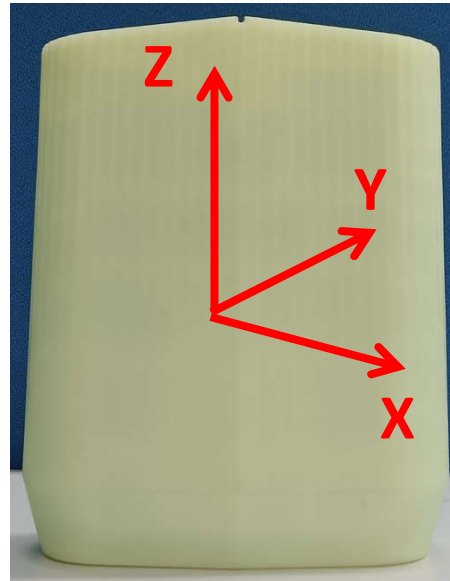
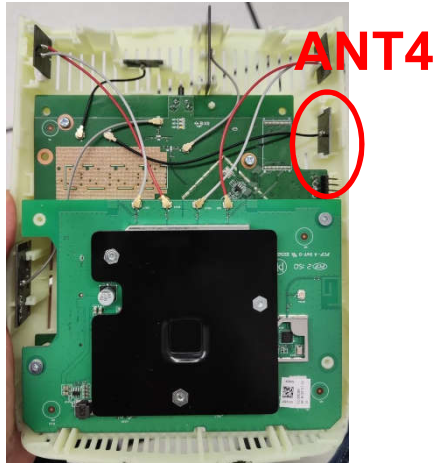
E1 (Phi=90)



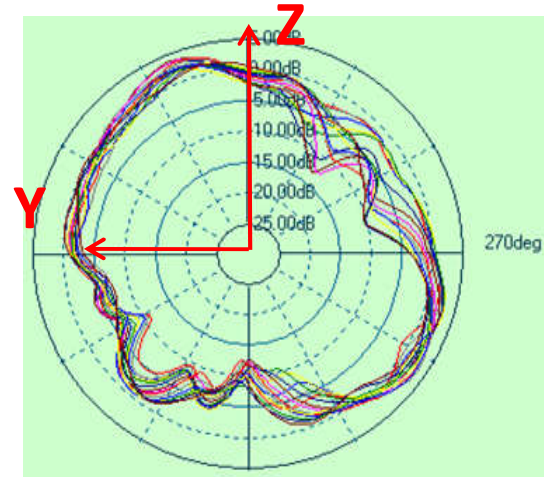
H (Theta=90)

2D/3D Radiation pattern-5G

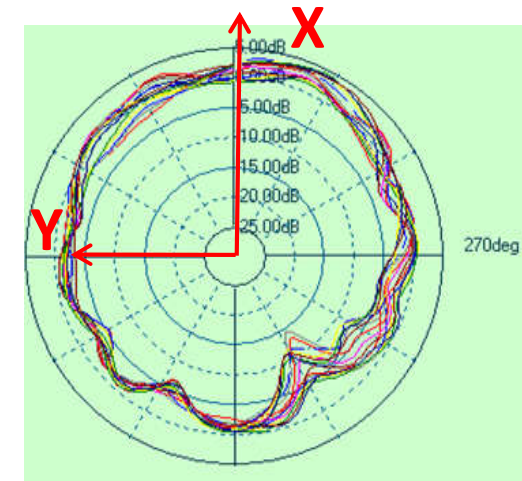
5G-Wifi



E1 (Phi=0)



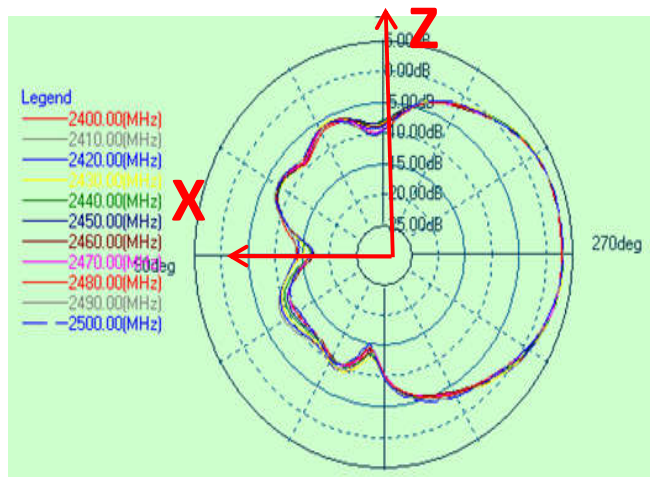
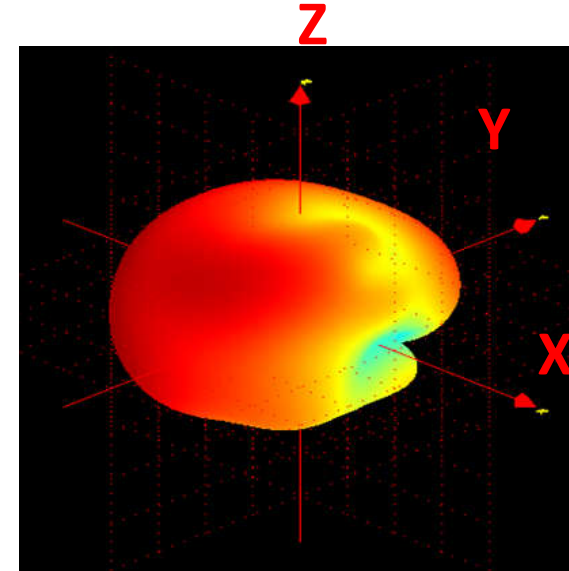
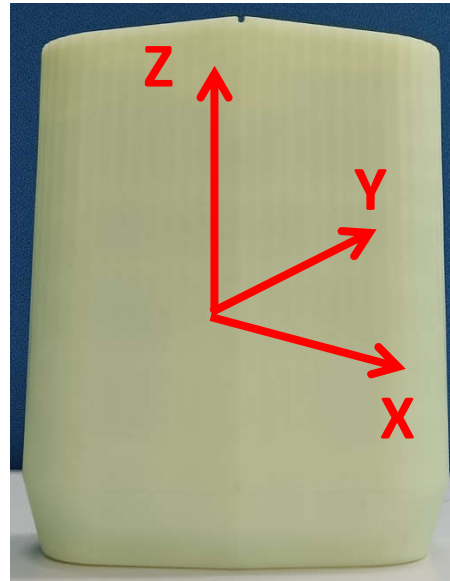
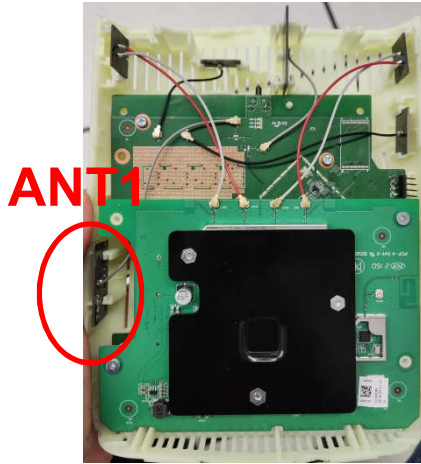
E1 (Phi=90)



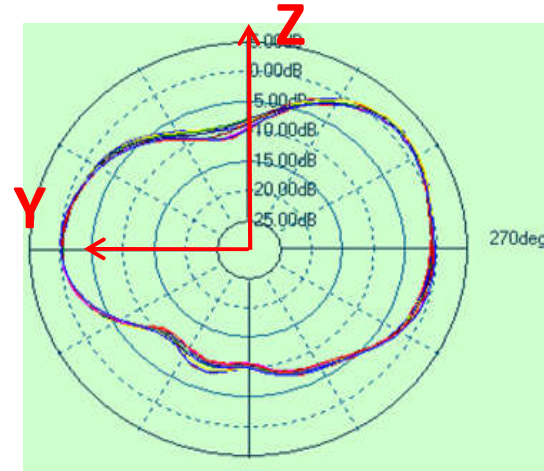
H (Theta=90)

2D/3D Radiation pattern-2.4G

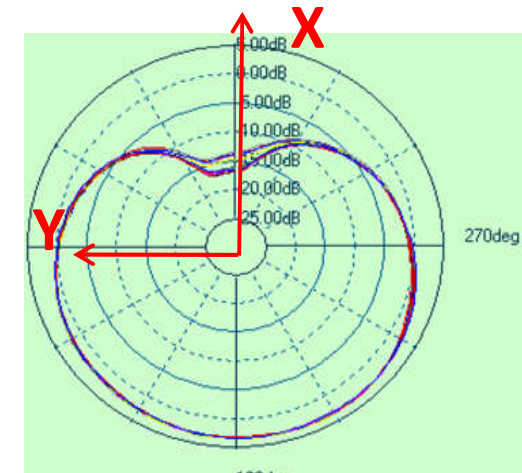
2.4G-Wifi



E1 (Phi=0)



E1 (Phi=90)

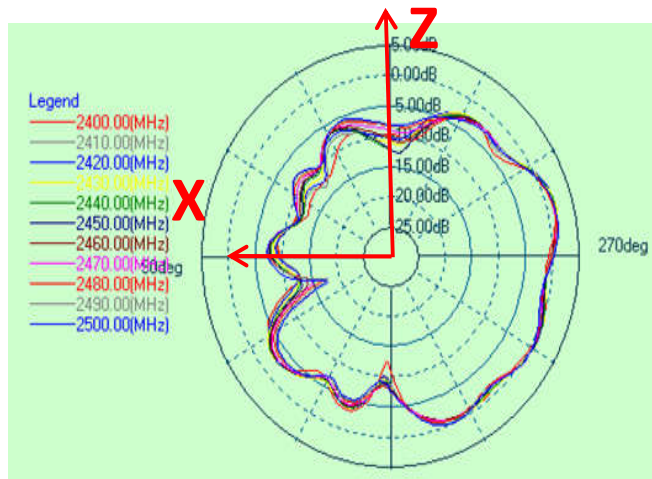
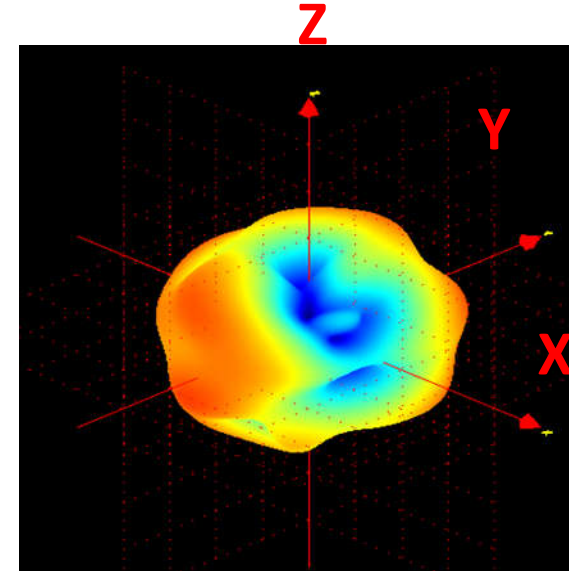
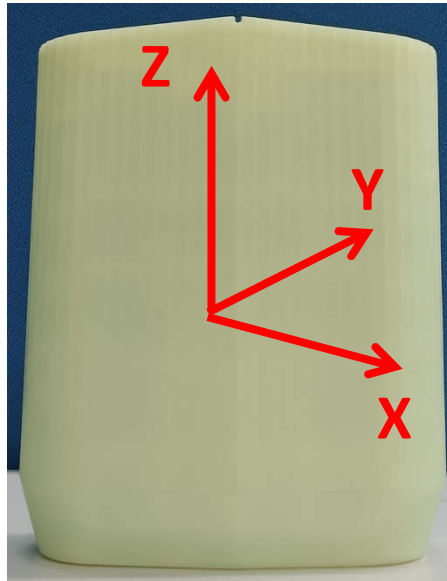
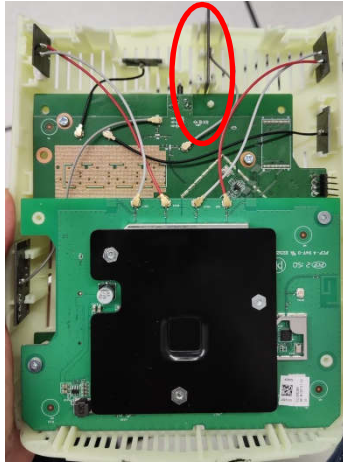


H (Theta=90)

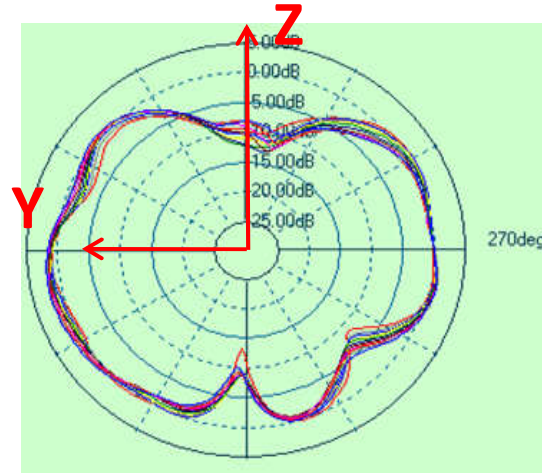
2D/3D Radiation pattern-2.4G

2.4G-Wifi

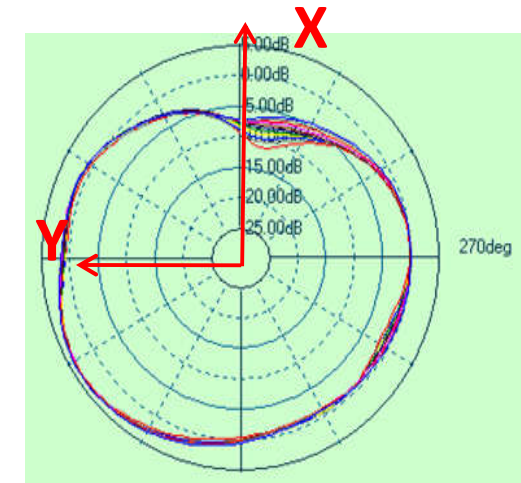
ANT2



E1 (Phi=0)



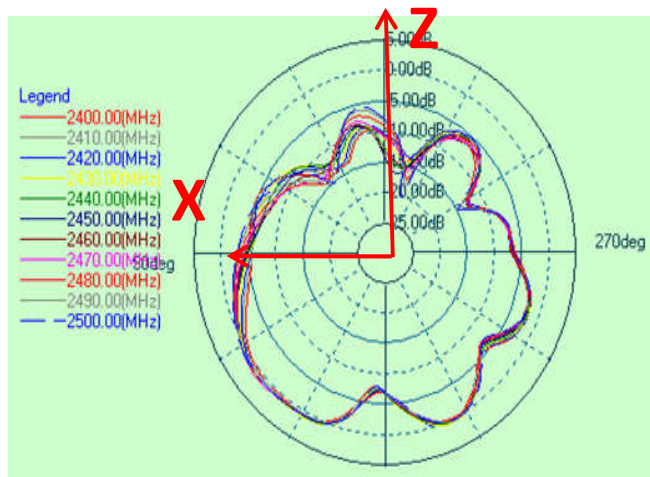
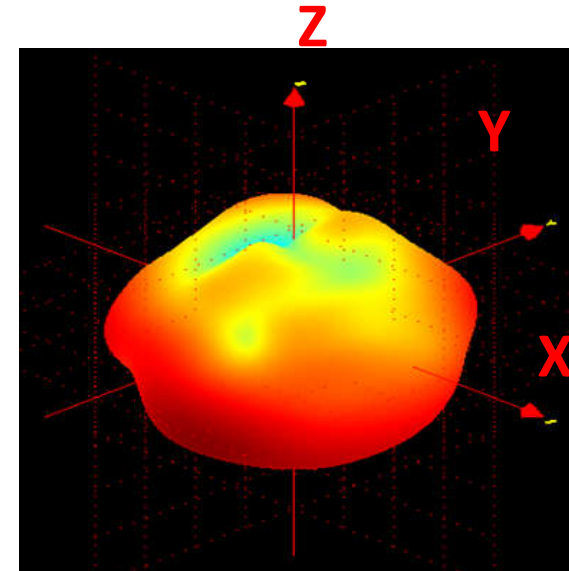
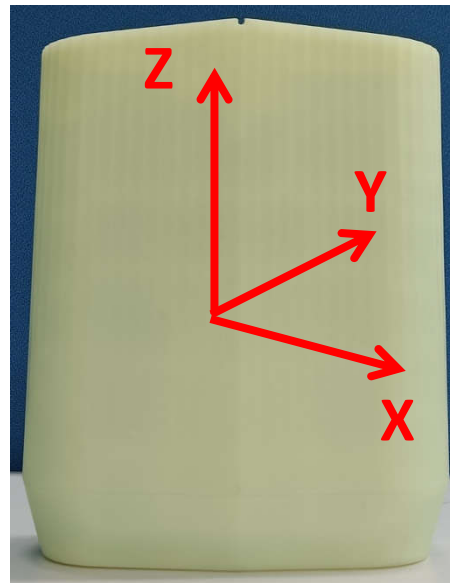
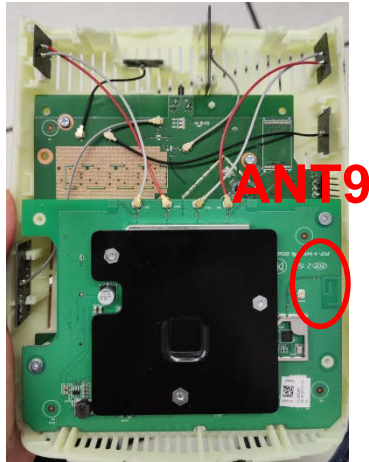
E1 (Phi=90)



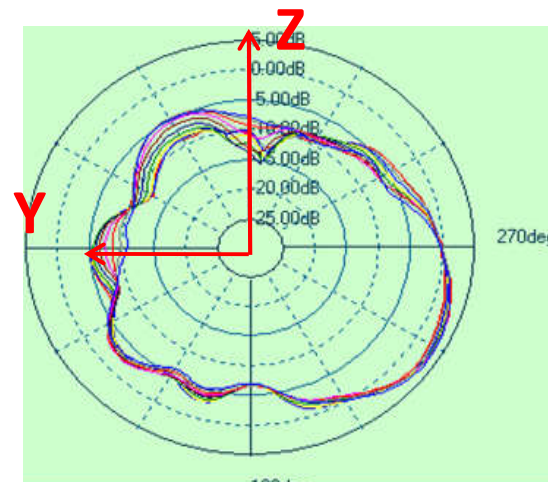
H (Theta=90)

2D/3D Radiation pattern-2.4G

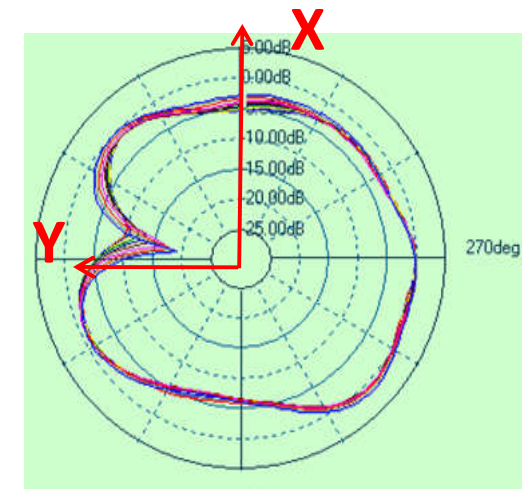
2.4G-BLE



E1 (Phi=0)



E1 (Phi=90)



H (Theta=90)

Efficiency and Peak Gain



Test results-6G

	Frequency	E Total. dB(dB)	Efficiency(%)	Type
ANT1 (WIFI)	5.91GHz	3.47	65.27%	PCB
	7.125GHz	3.98	70.59%	
ANT2 (WIFI)	5.91GHz	3.55	61.64%	
	7.125GHz	3.57	75.98%	
ANT3 (WIFI)	5.91GHz	3.86	64.5%	
	7.125GHz	3.39	69.81%	
ANT4 (WIFI)	5.91GHz	3.02	65.97%	
	7.125GHz	3.15	74.82%	
Directional Gain (dBi)	1S4T	6.55	6.43	
	4S4T	1.96	1.89	

Directional Gain

$$\text{Directional gain} = 10 \log \left[\frac{(10^{G1 \phi / 20} + 10^{G2 \phi / 20} + \dots + 10^{GN \phi / 20})^2}{N_{\text{ANT}}} + (10^{G1 \theta / 20} + 10^{G2 \theta / 20} + \dots + 10^{GN \theta / 20})^2 / N_{\text{ANT}} \right] \text{ dBi}$$

Note: G1, G2... GN is not the maximum gain value, but the actual gain value for each phase. Only max Directional gain was recorded

Efficiency and Peak Gain



Test results-2G

	Frequency	E Total. dB(dB)	Efficiency(%)	Type
ANT1 (WIFI)	2.4GHz	3.16	70.97%	PCB
	2.5GHz	3.50	71.22%	
ANT2 (WIFI)	2.4GHz	3.44	70.19%	
	2.5GHz	3.63	75.44%	
Directional Gain (dBi)	1S2T	4.81	4.97	
	2S2T	2.03	2.11	
BLE ANT	2.4GHz	3.55	60.75%	
	2.5GHz	3.90	62.4%	

Directional Gain

$$\text{Directional gain} = 10 \log\left[\frac{(10^{G1 \phi / 20} + 10^{G2 \phi / 20} + \dots + 10^{GN \phi / 20})^2}{N_{\text{ANT}}} + \frac{(10^{G1 \theta / 20} + 10^{G2 \theta / 20} + \dots + 10^{GN \theta / 20})^2}{N_{\text{ANT}}}\right] \text{ dBi}$$

Note: G1, G2... GN is not the maximum gain value, but the actual gain value for each phase.
Only max Directional gain was recorded

Efficiency and Peak Gain



Test results-5G

	Frequency	E Total. dB(dB)	Efficiency(%)	Type
ANT1 (WIFI)	5.15GHz	4.5	75.17%	PCB
	5.85GHz	4.46	74.48%	
ANT2 (WIFI)	5.15GHz	3.63	71.84%	
	5.85GHz	3.79	77.37%	
ANT3 (WIFI)	5.15GHz	3.54	70.25%	
	5.85GHz	3.75	75.41%	
ANT4 (WIFI)	5.15GHz	3.74	65.14%	
	5.85GHz	4.25	72.61%	
Directional Gain (dBi)	1S4T	6.51	6.43	
	4S4T	1.77	1.68	

Directional Gain

$$\text{Directional gain} = 10 \log \left[\frac{(10^{G_1 \phi / 20} + 10^{G_2 \phi / 20} + \dots + 10^{G_N \phi / 20})^2}{N_{\text{ANT}}} + (10^{G_1 \theta / 20} + 10^{G_2 \theta / 20} + \dots + 10^{G_N \theta / 20})^2 / N_{\text{ANT}} \right] \text{ dBi}$$

Note: G1, G2... GN is not the maximum gain value, but the actual gain value for each phase. Only max Directional gain was recorded

T&W

Thanks!

