



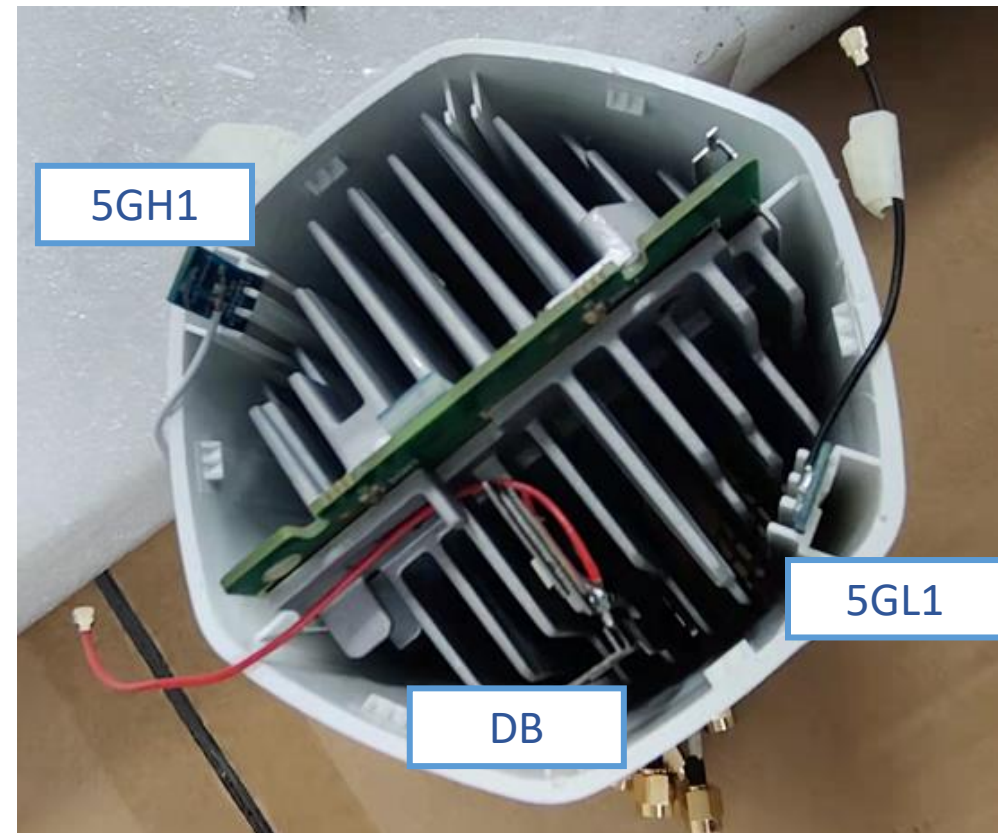
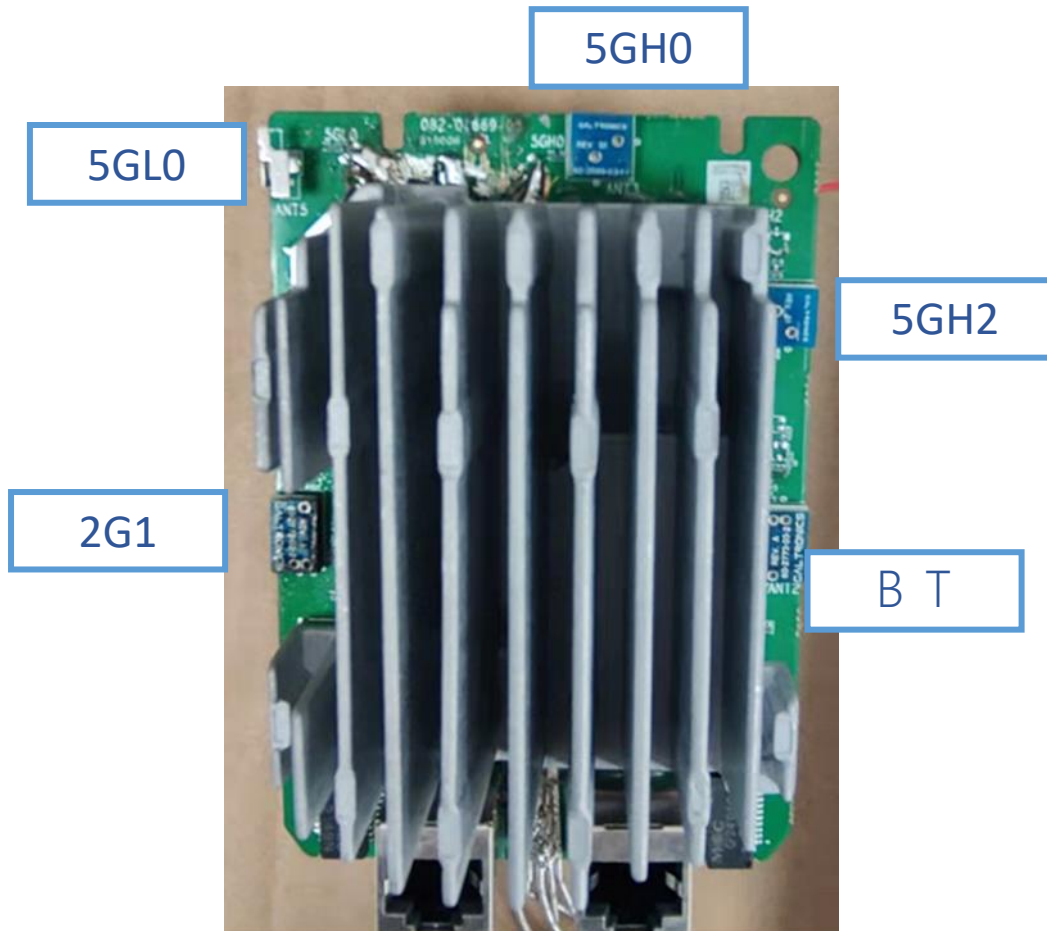
Wireless Infrastructure | Embedded & Home Networking

**Antenna Performance Report CIG
Triband Mesh Router WF810 (Galtronics
project :7647)**

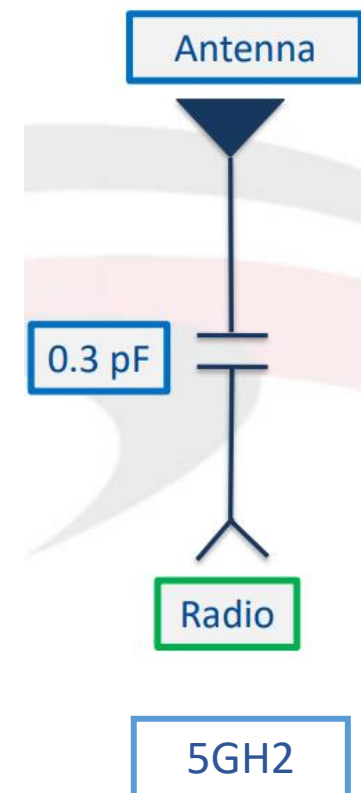
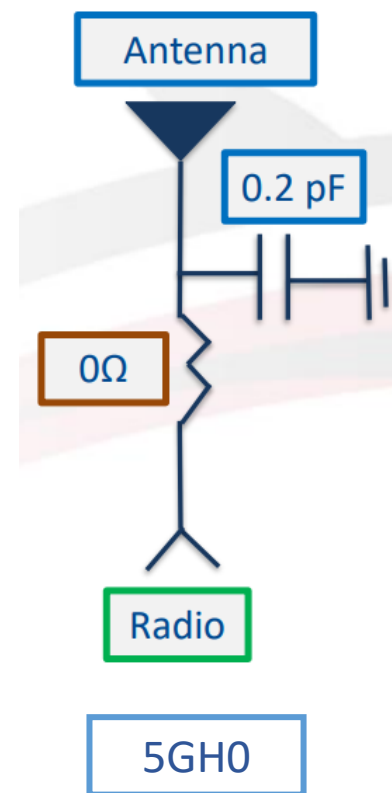
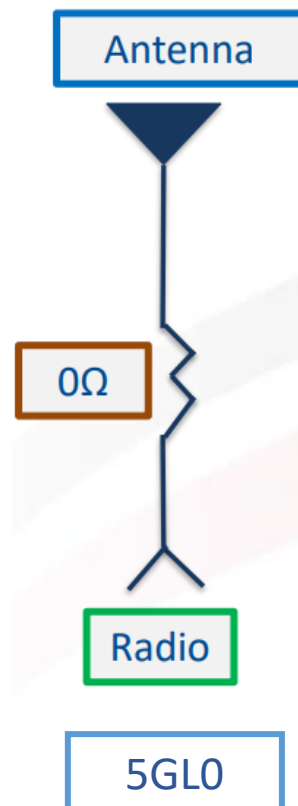
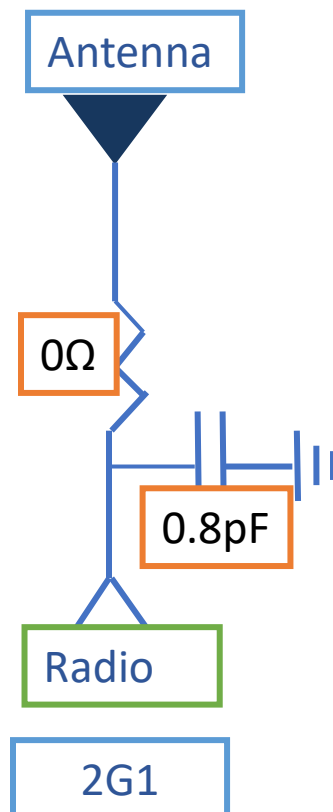
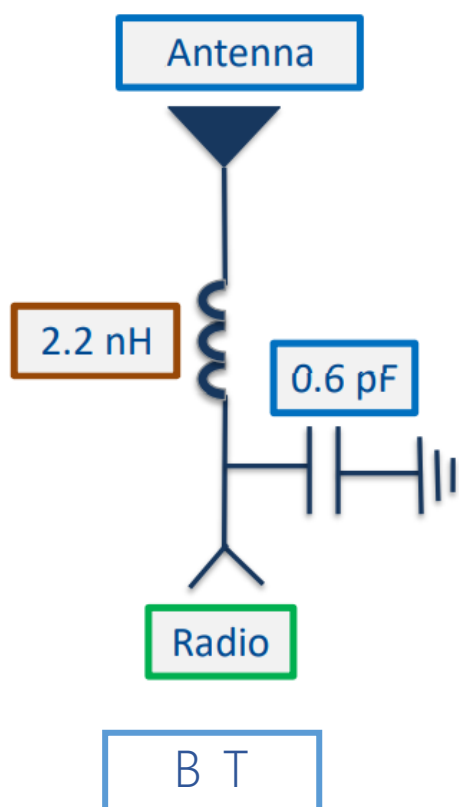
Introduction

- » Galtronics has provided a solution for CIG WF 810 Tri-band mesh router.
- » Galtronics received AM3 unit.
- » There are 8 antennas in this solution:
- » One on-board 2G1 antenna: 2.4GHz-2.5GHz
- » One on-board BT antenna: 2.4GHz-2.5GHz
- » Two 5G low band antennas designated by 5GL0 and 5GL1: 5150MHz-5350MHz.
- » 5GL0 is on-board. 5GL1 antenna is cabled.
- » Three 5G high band antennas designated by 5GH0, 5GH1 and 5GH2: 5490MHz-5835MHz.
- » 5GH0 and 5GH2 antennas are on-board. 5GH1 antenna is cabled.
- » One cabled metal DB antenna.
- » 5GL0 antenna modified for better performance. 2G1 changed LC Matching components.

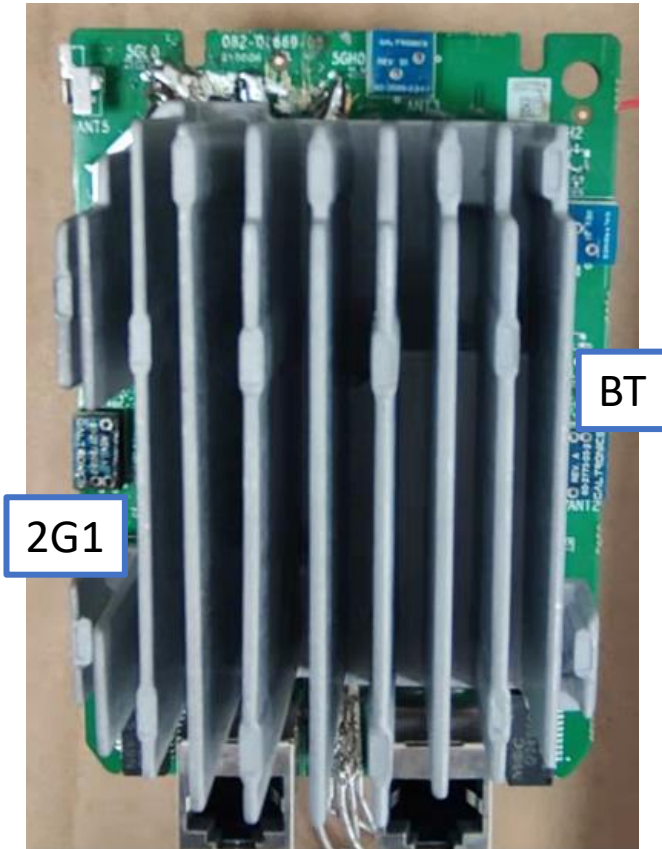
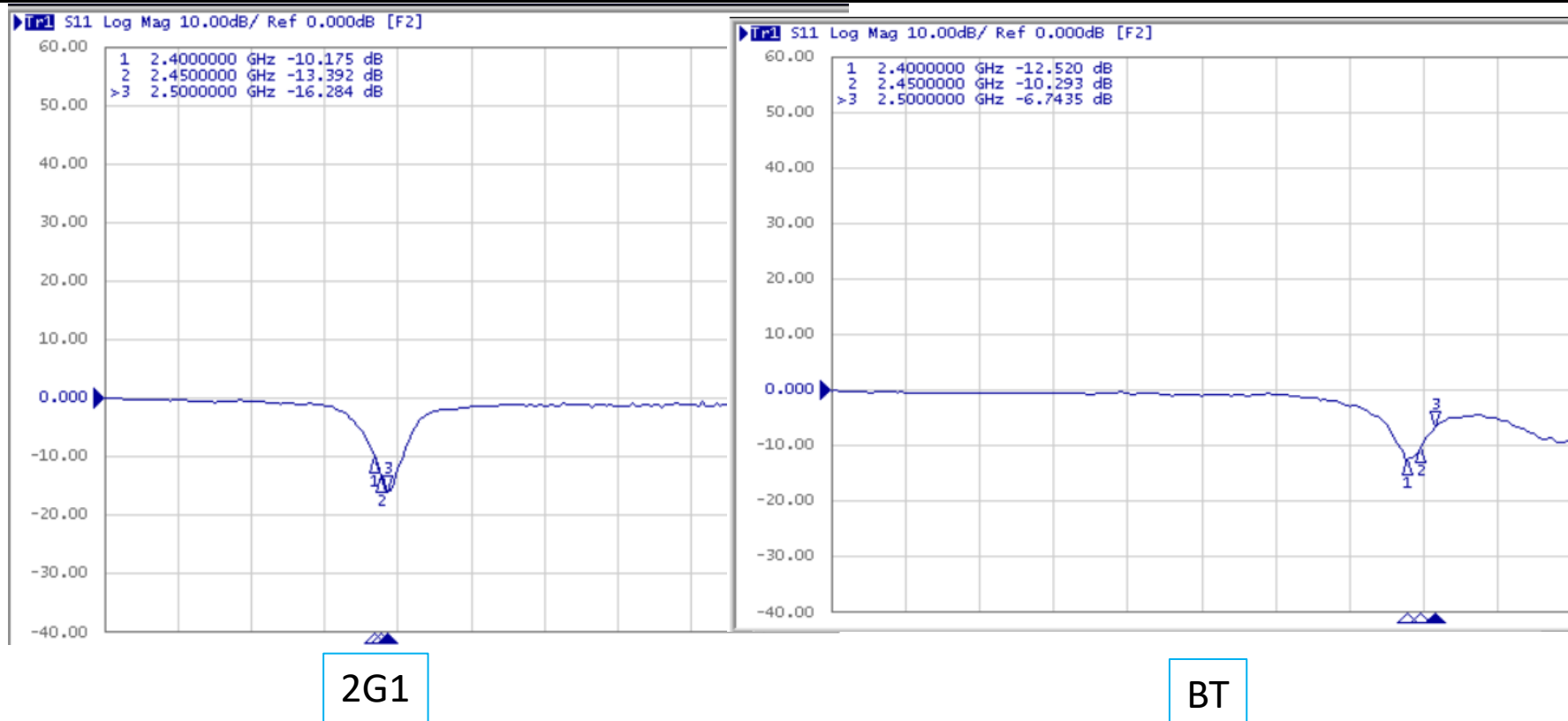
Antenna configuration



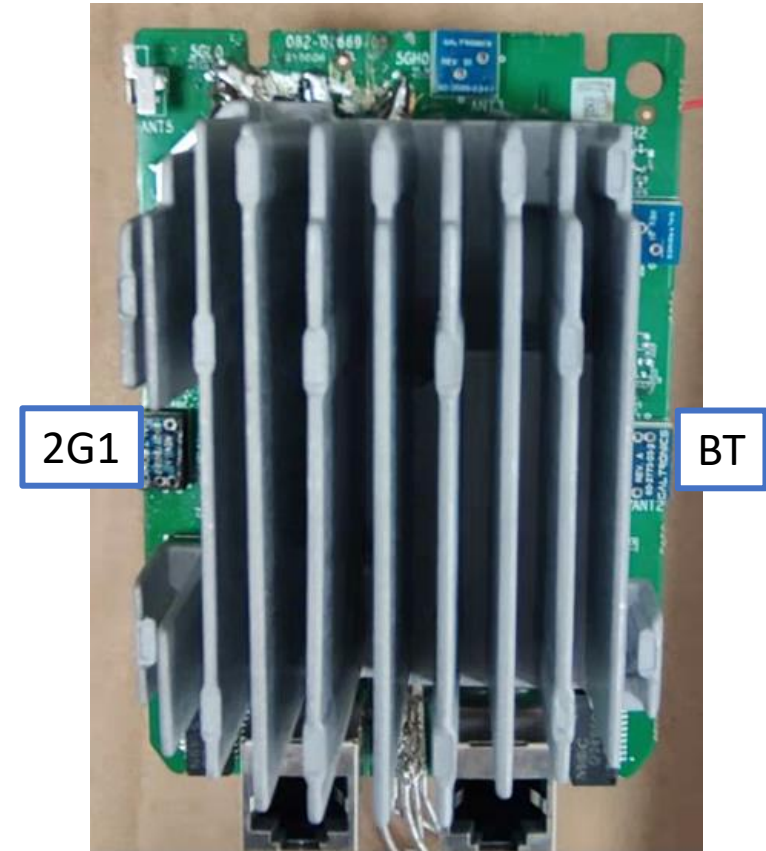
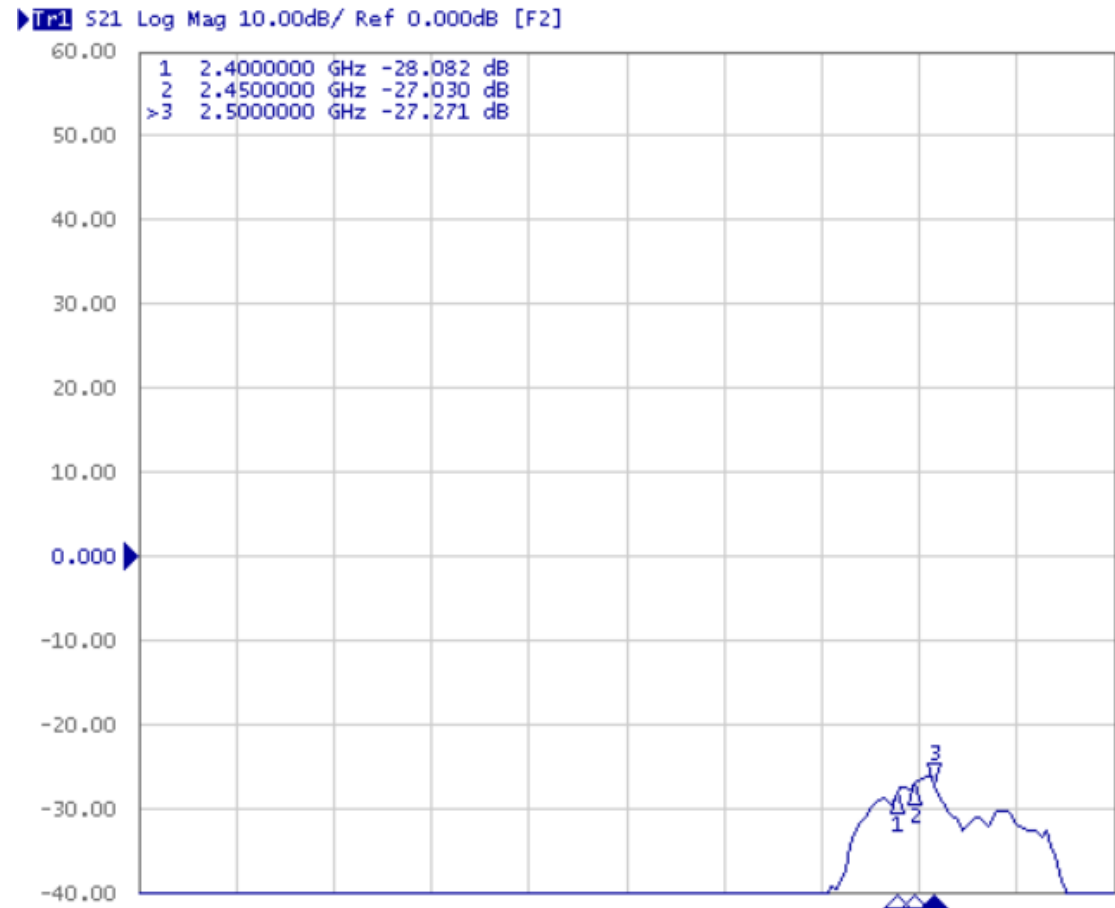
LC Matching components



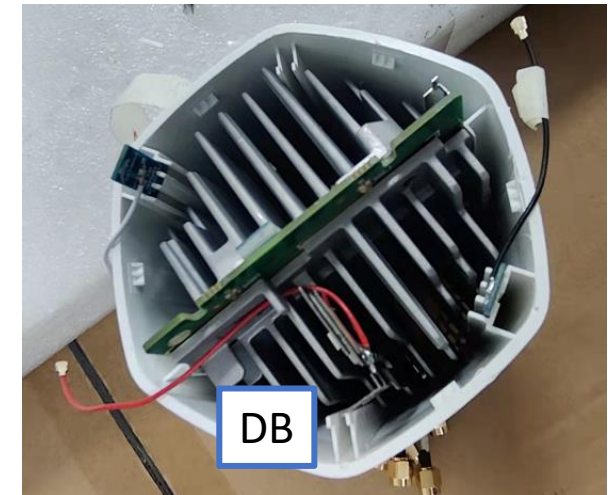
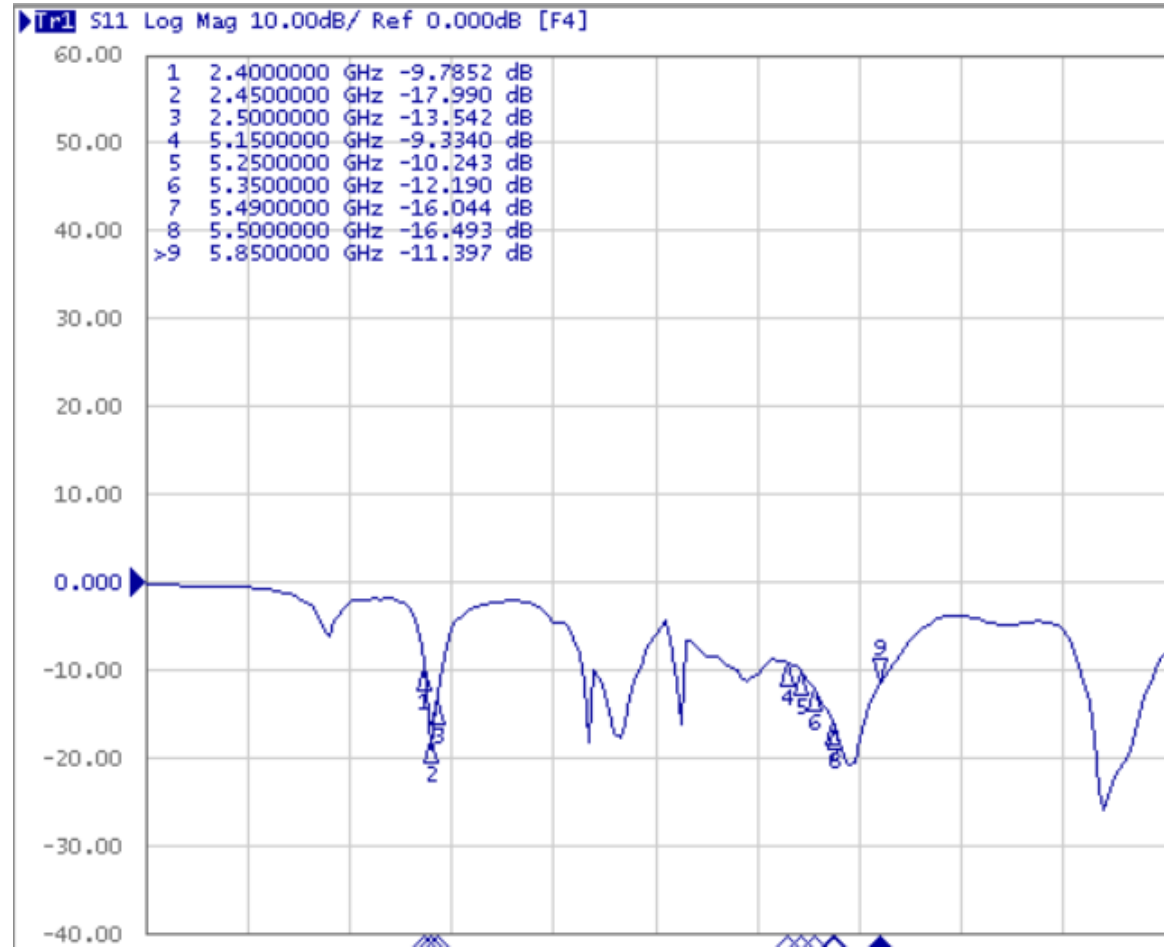
Antenna Return Loss of the 2G1/BT



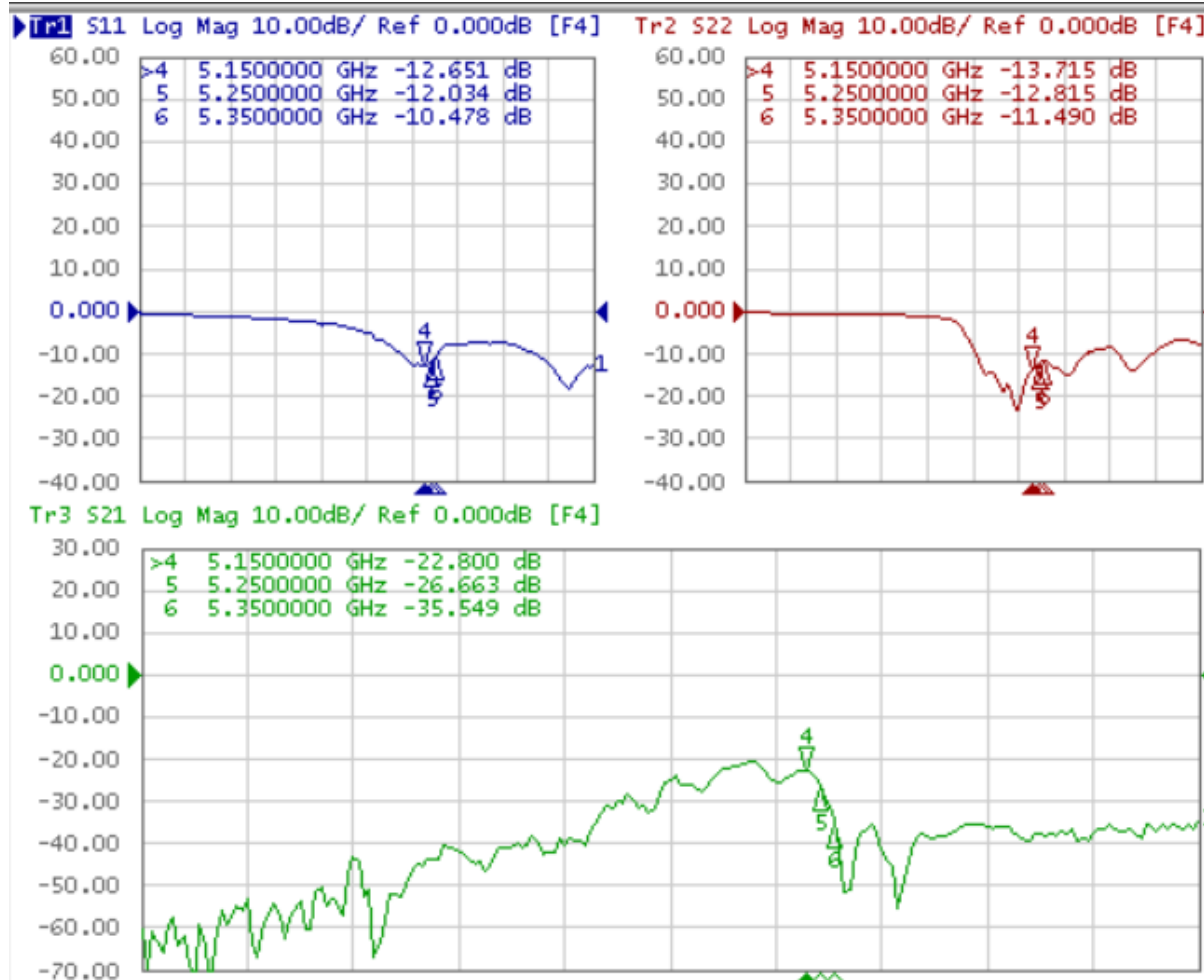
Antenna Isolation of the 2G1/BT



Antenna Return Loss of DB



Antenna Return Loss and Isolation of the 5GL



5GL0

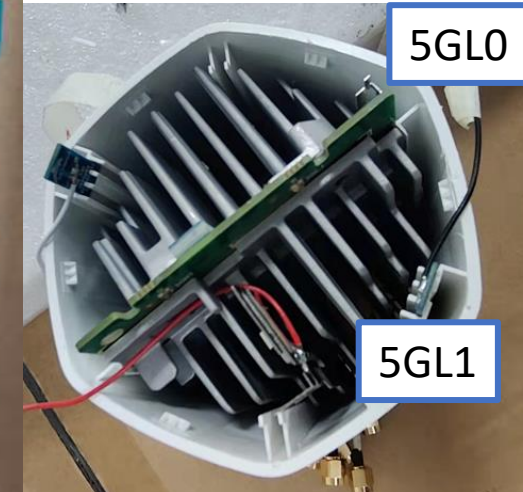


Port1=5GL0

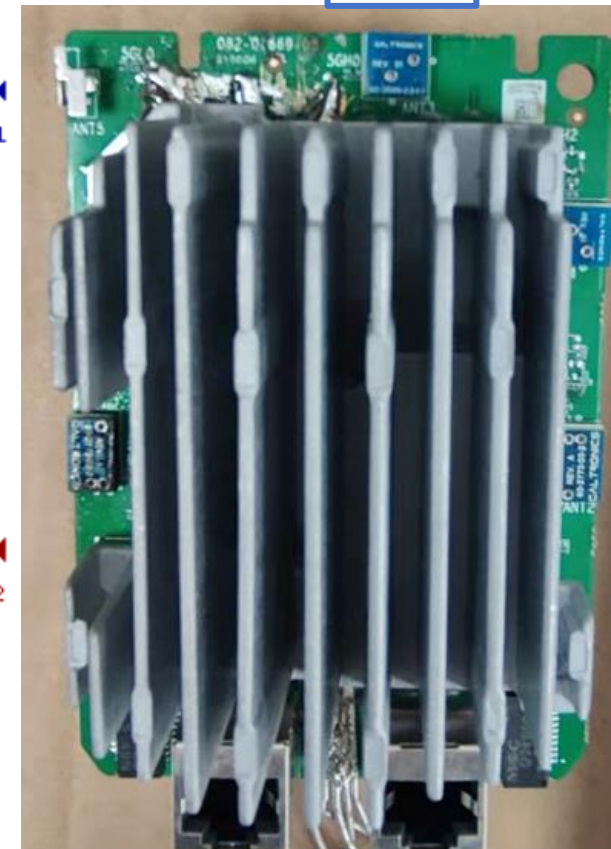
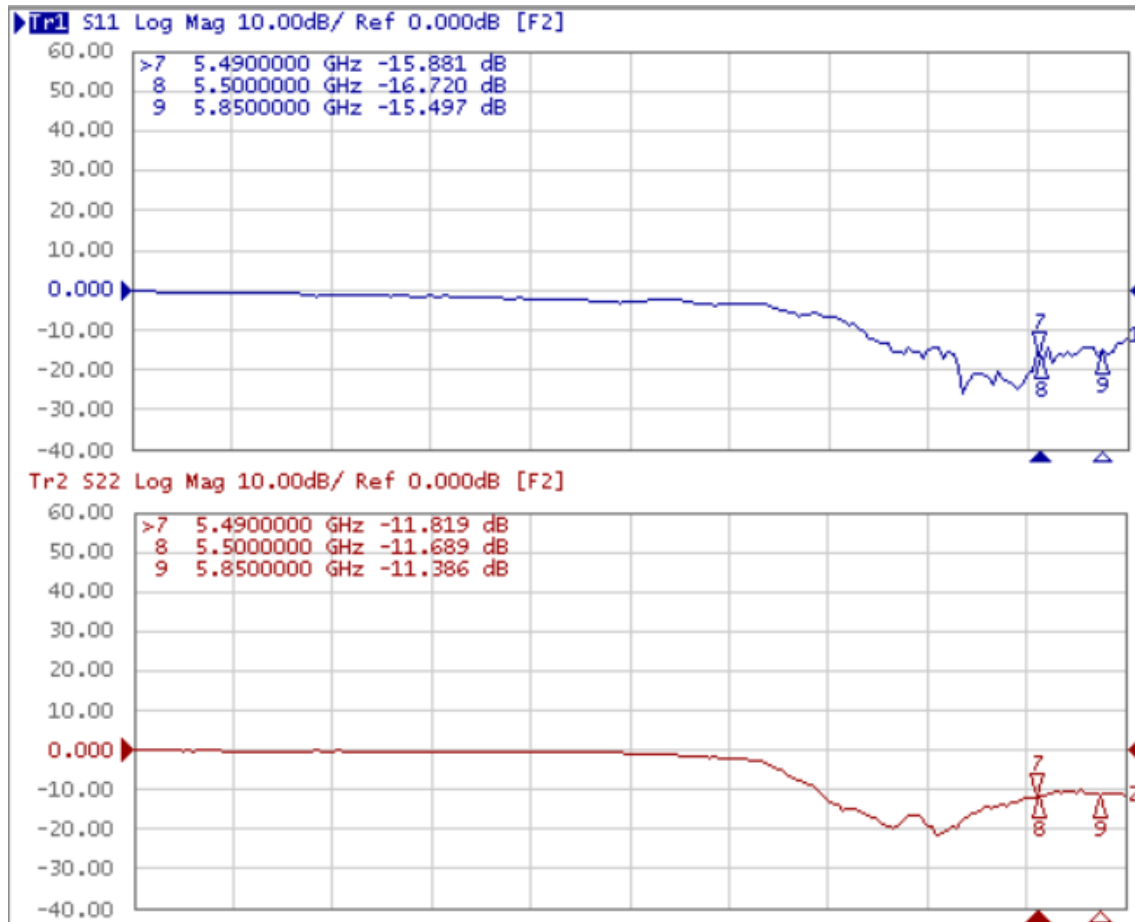
Port2=5GL1

5GL0

5GL1

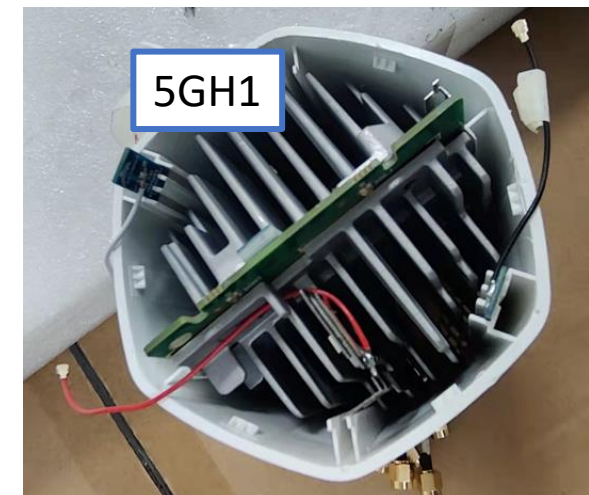


Antenna Return Loss of the 5GH0 and 5GH1

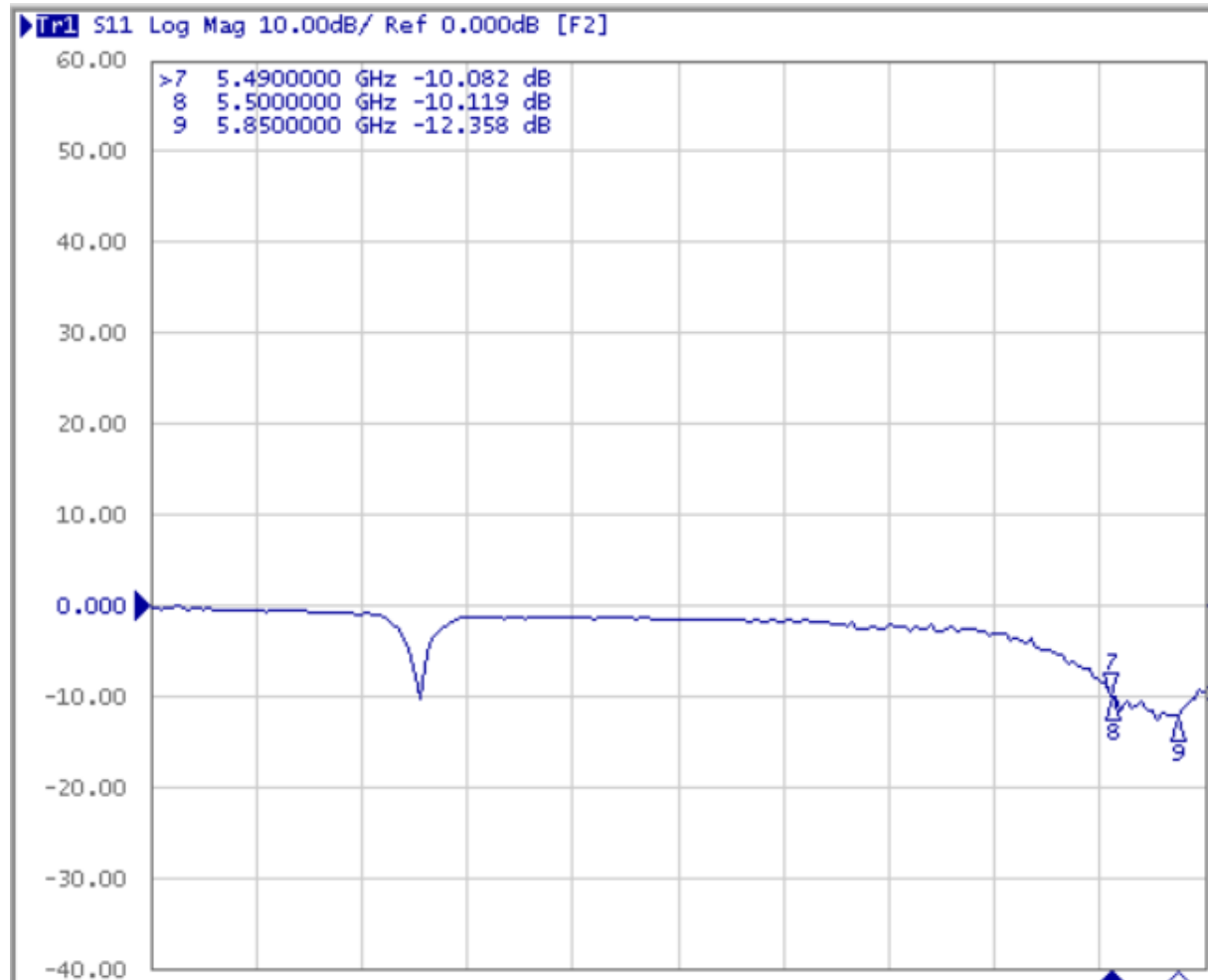


Port1=5GH0

Port2=5GH1



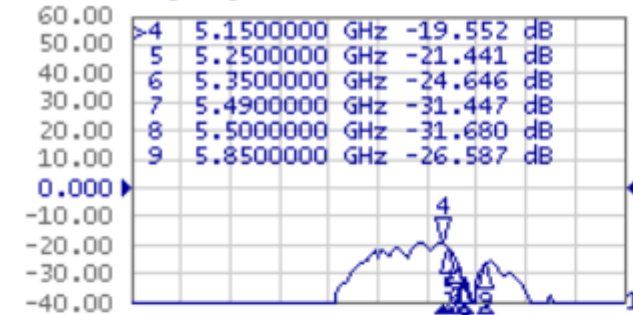
Antenna Return Loss of the 5GH2



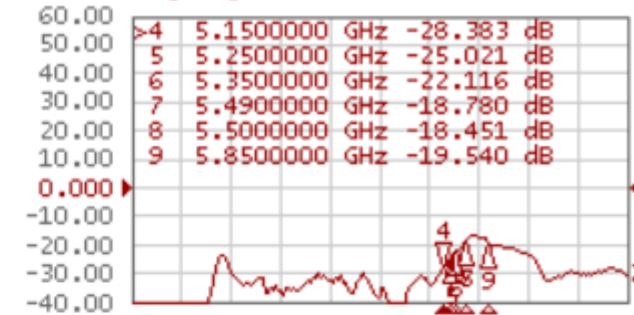
5GH2

Antenna Isolation of the 5GH

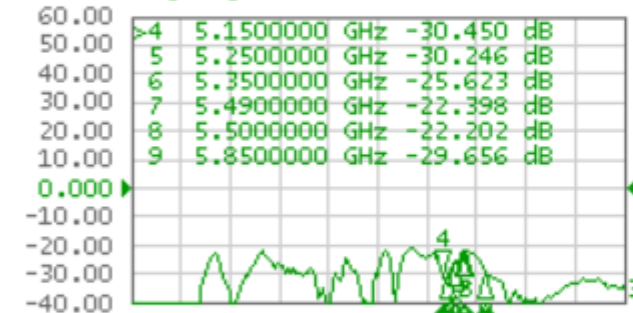
Tr1 S21 Log Mag 10.00dB/ Ref 0.000dB [F4]



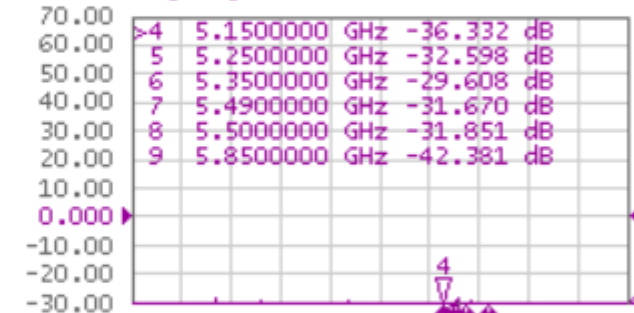
Tr2 S31 Log Mag 10.00dB/ Ref 0.000dB [F4]



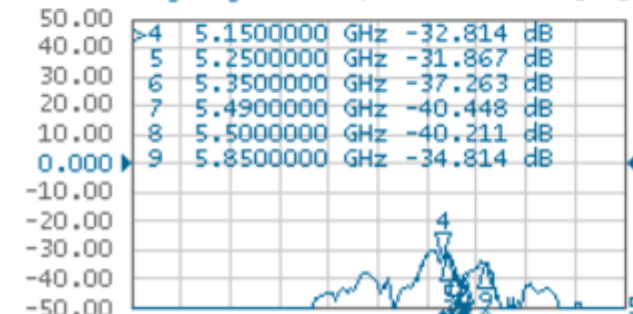
Tr3 S41 Log Mag 10.00dB/ Ref 0.000dB [F4]



Tr4 S43 Log Mag 10.00dB/ Ref 0.000dB [F4]



Tr5 S32 Log Mag 10.00dB/ Ref 0.000dB [F4]



Tr6 S42 Log Mag 10.00dB/ Ref 0.000dB [F4]

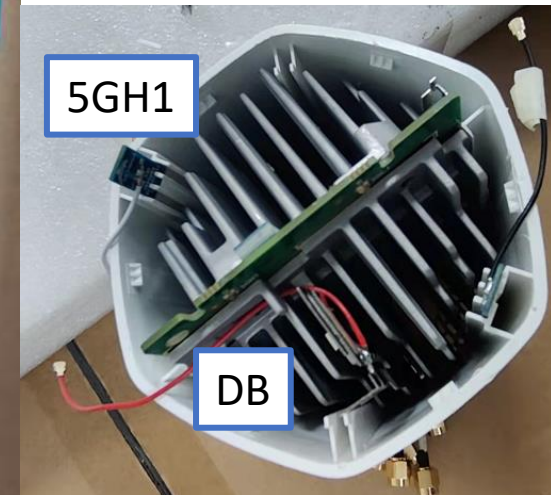


Port1=5GH0

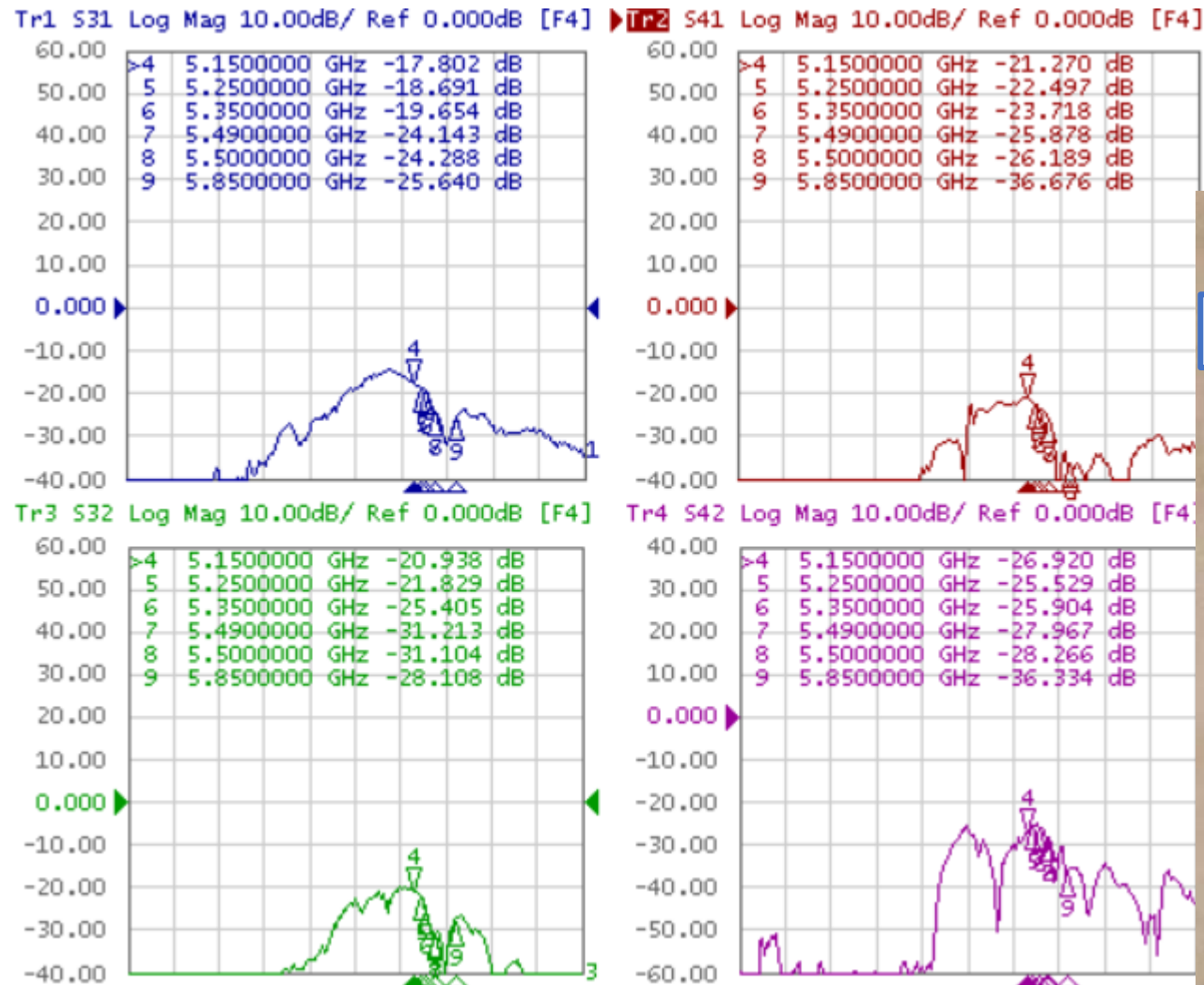
Port2=5GH1

Port3=5GH2

Port4=DB



Antenna Isolation Between 5GL and 5GH

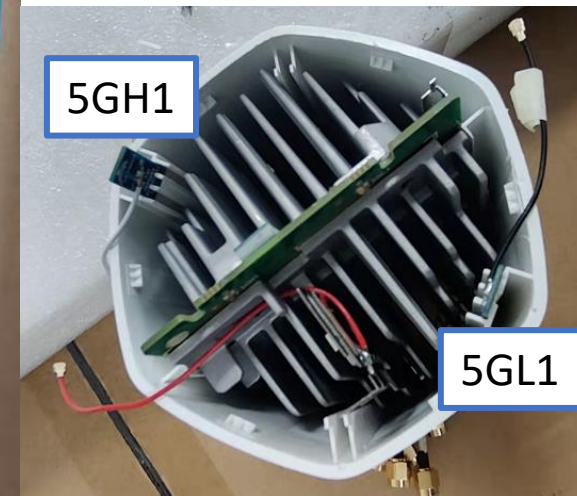


Port1=5GL0

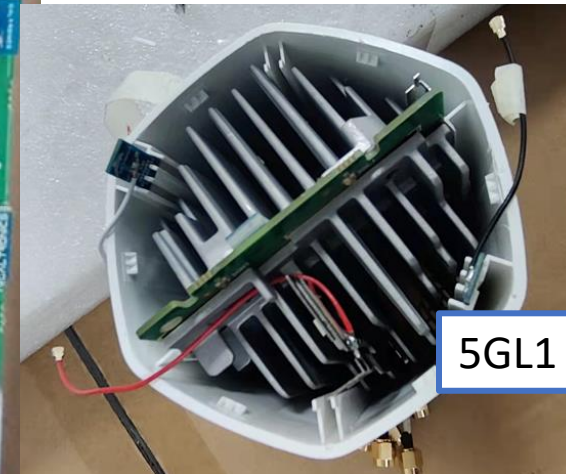
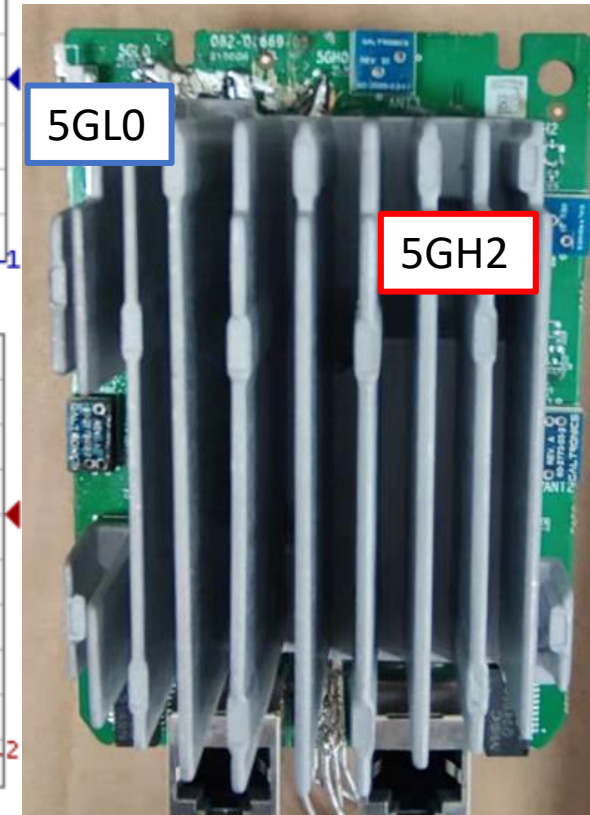
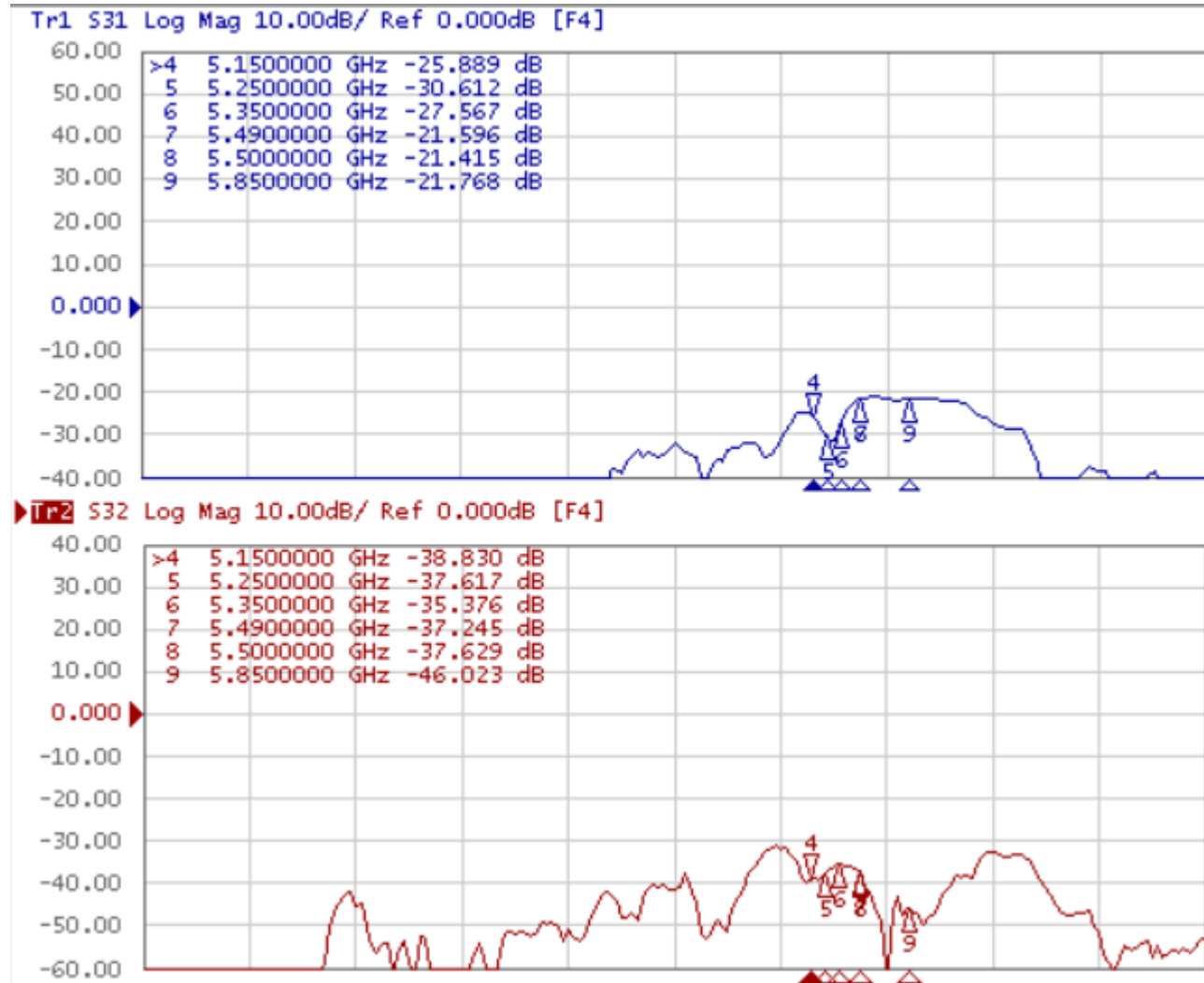
Port2=5GL1

Port3=5GH0

Port4=5GH1



Antenna Isolation Between 5GL and 5GH



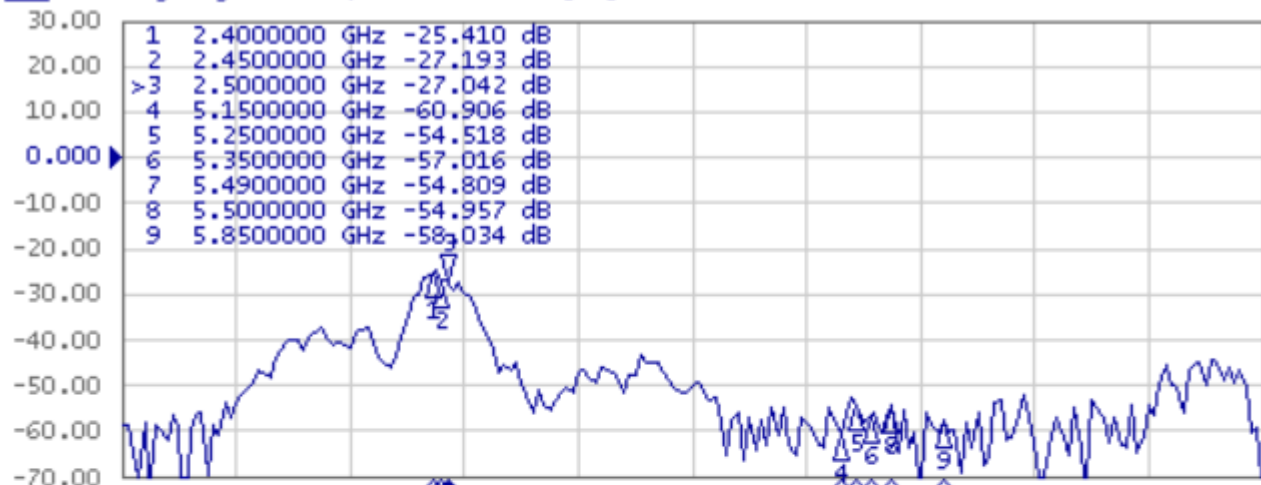
Port1=5GL0

Port2=5GL1

Port3=5GH2

Antenna Isolation Between 2G1,BT and DB

Tr1 S31 Log Mag 10.00dB/ Ref 0.000dB [F4]



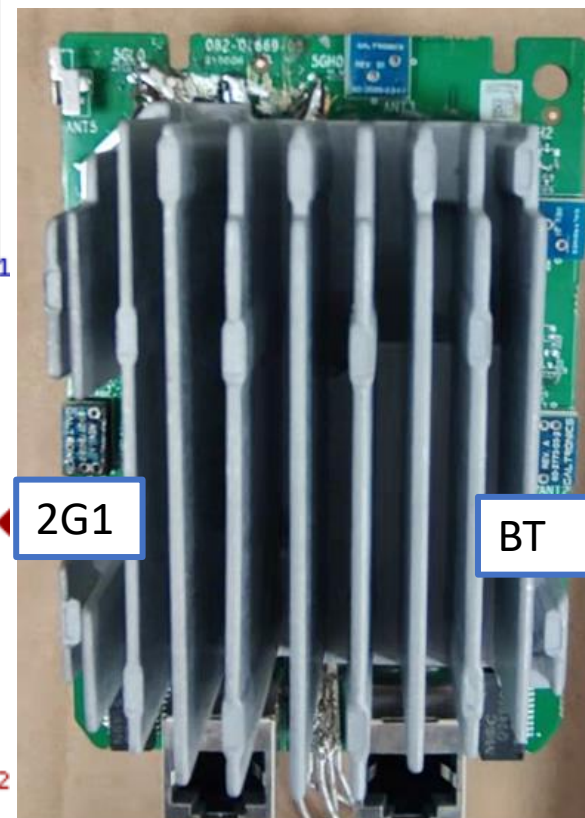
Tr2 S32 Log Mag 10.00dB/ Ref 0.000dB [F4]



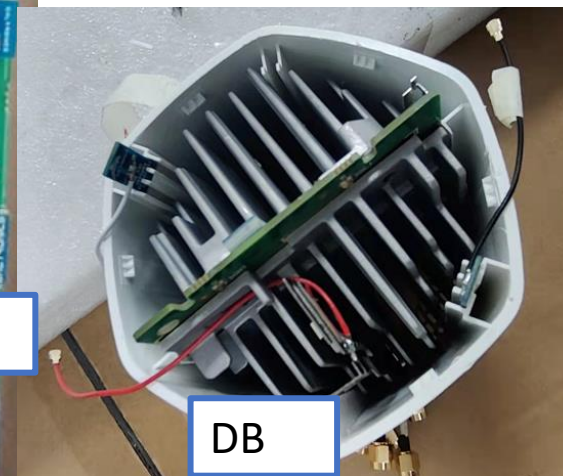
Port1=2G1

Port2=BT

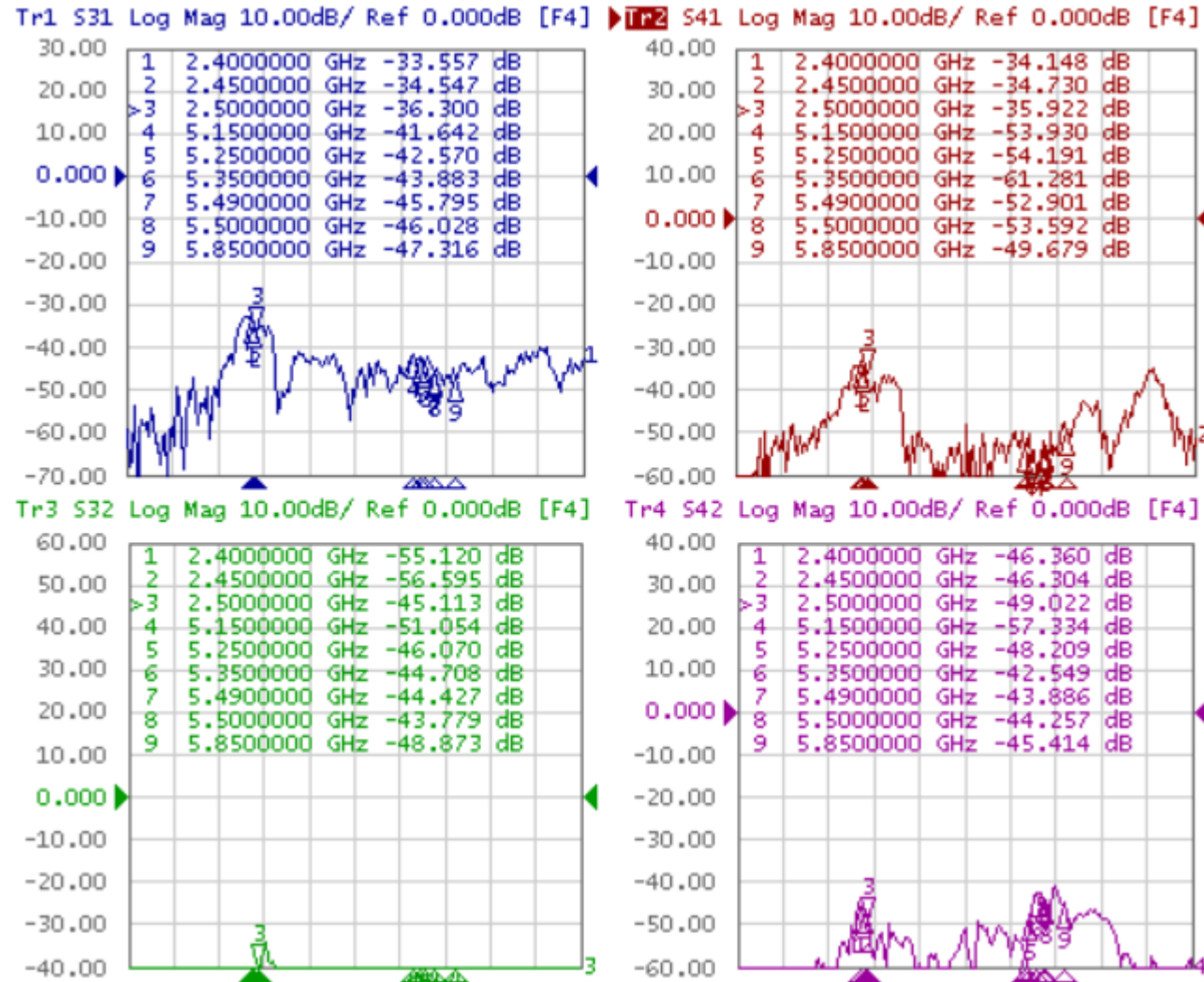
Port3=DB



BT



Antenna Isolation Between 2G1,BT and 5GL

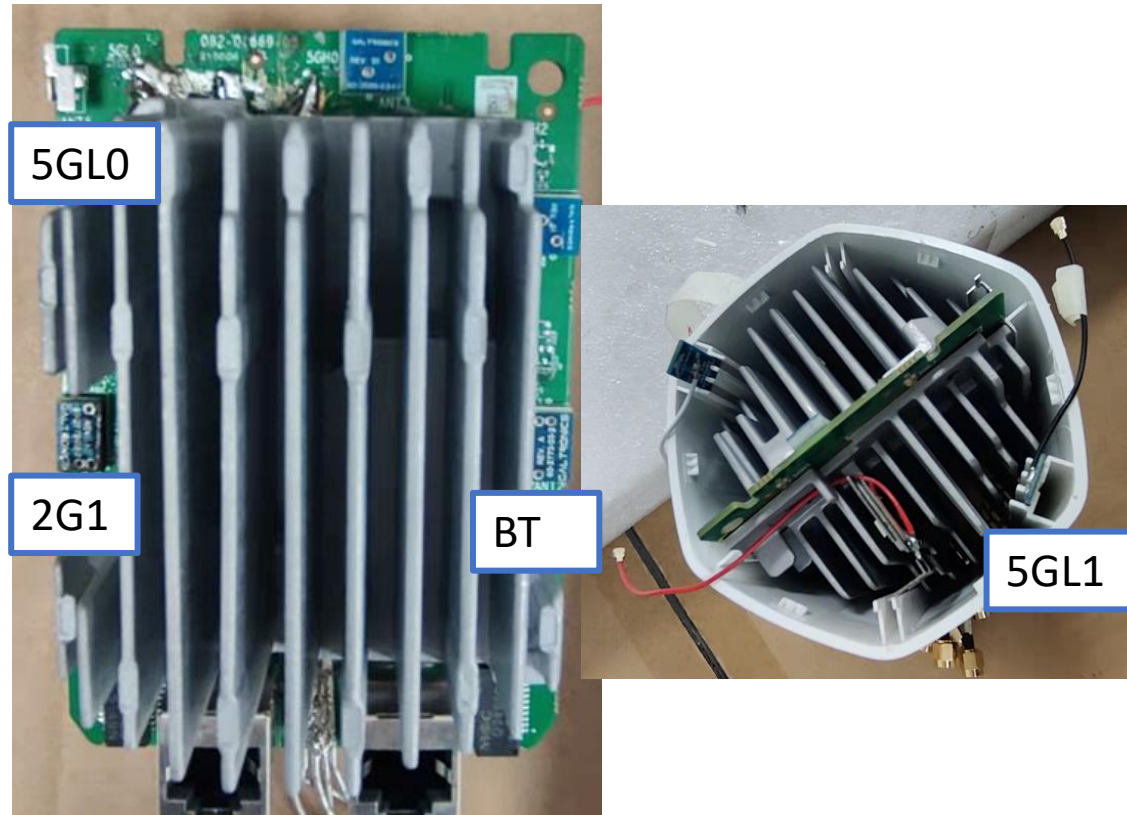


Port1=2G1

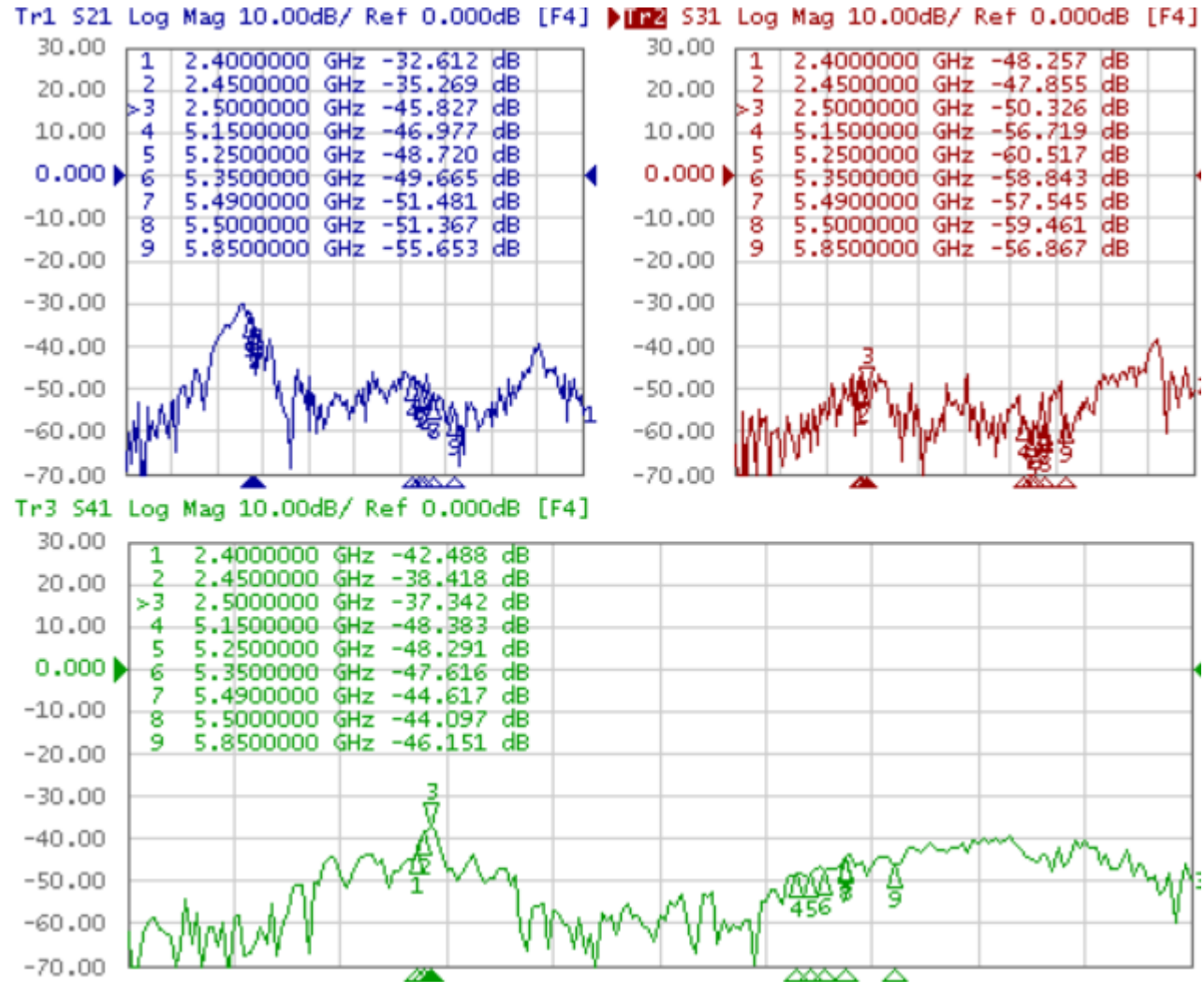
Port2=BT

Port3=5GL0

Port4=5GL1



Antenna Isolation Between 2G1 and 5GH

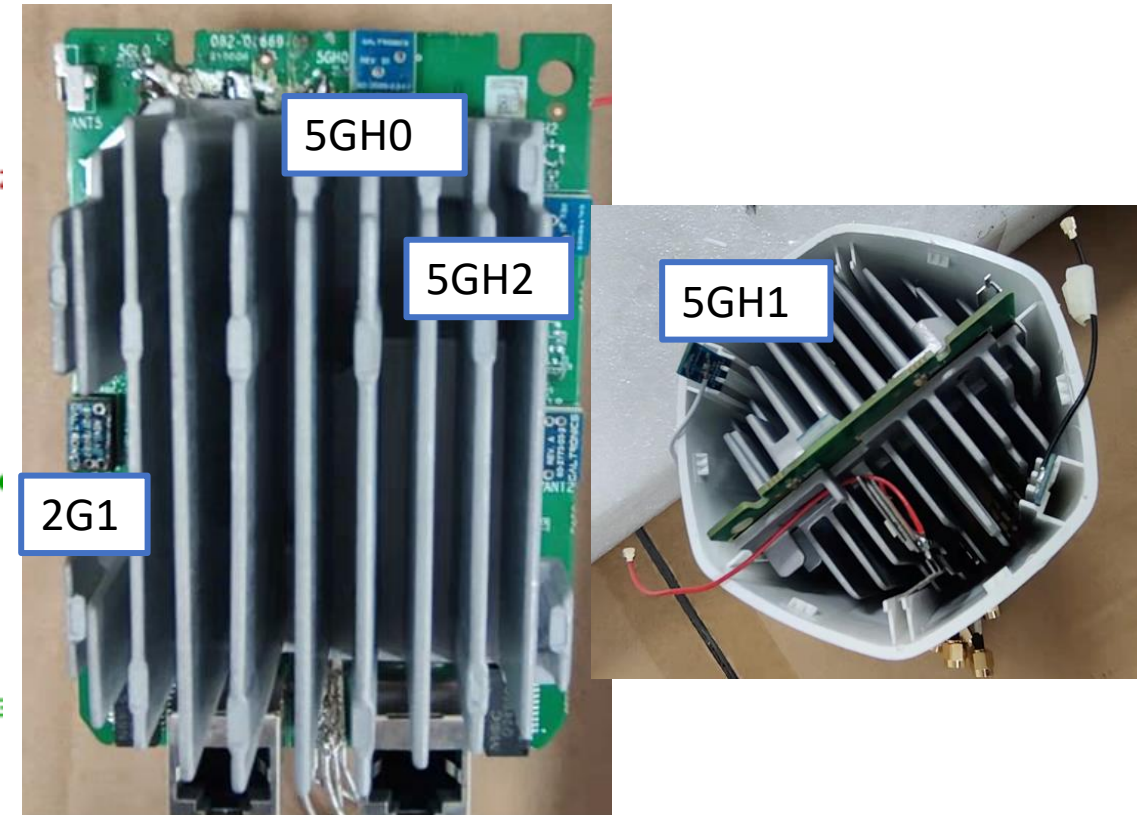


Port1=2G1

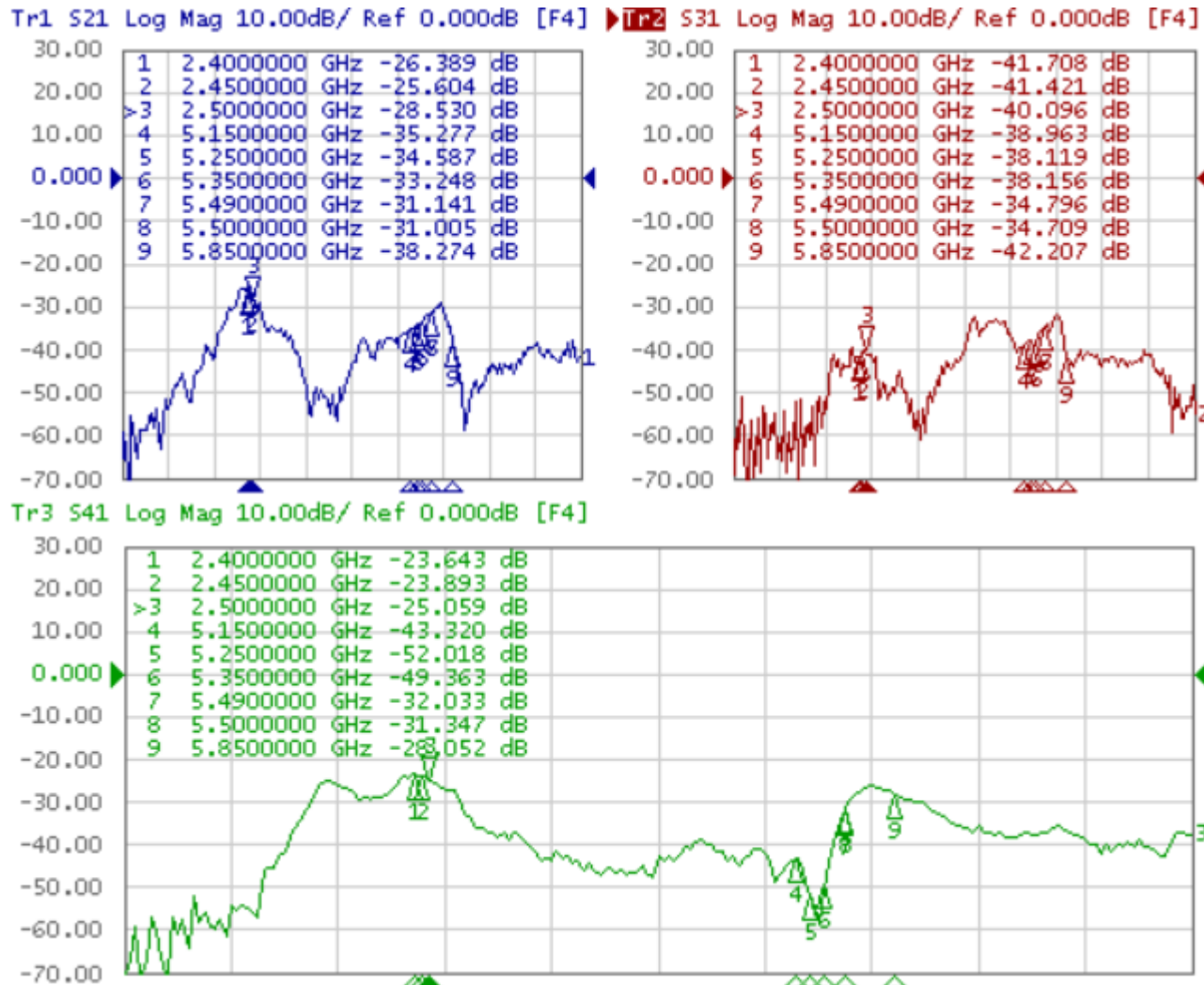
Port2=5GH0

Port3=5GH1

Port4=5GH2



Antenna Isolation Between BT and 5GH

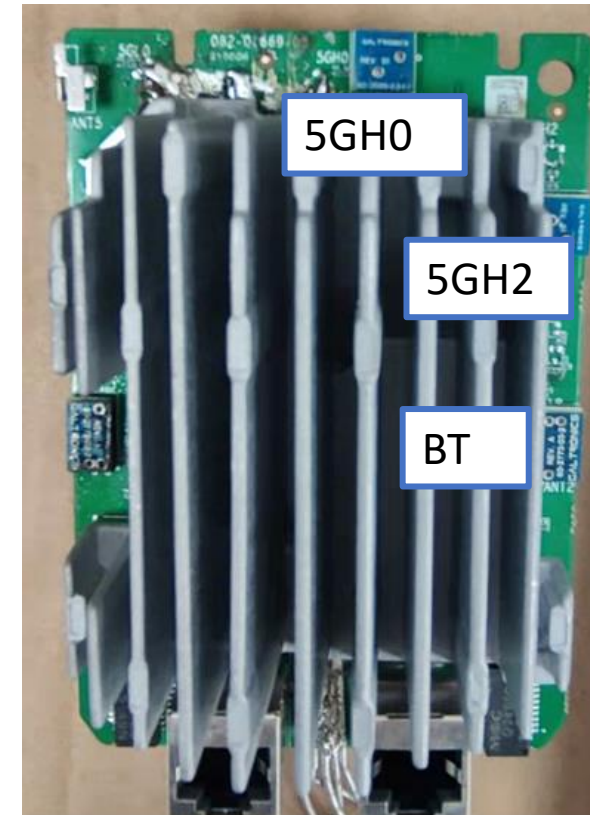


Port1=BT

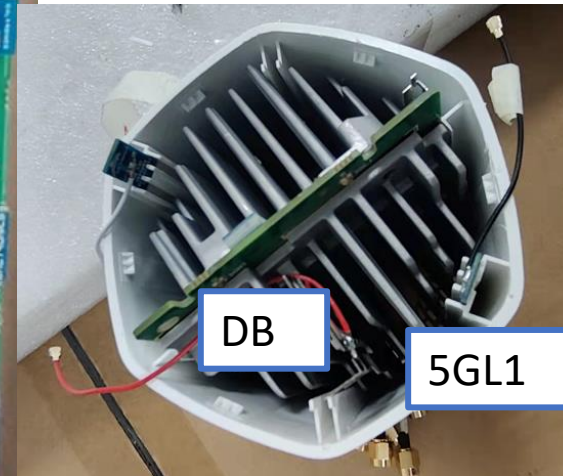
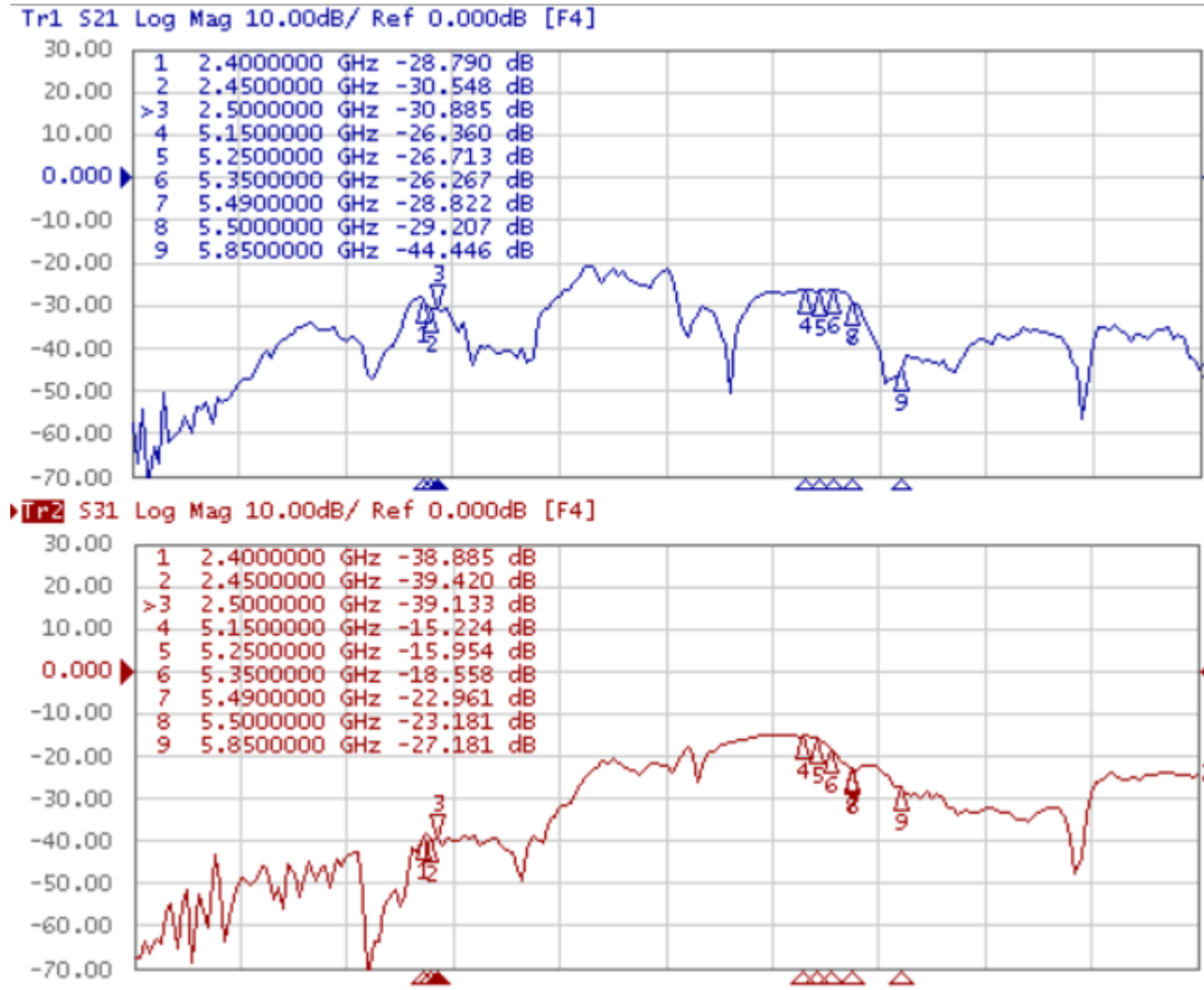
Port2=5GH0

Port3=5GH1

Port4=5GH2



Antenna Isolation Between DB and 5GL



Port1=DB

Port2=5GL0

Port3=5GL1

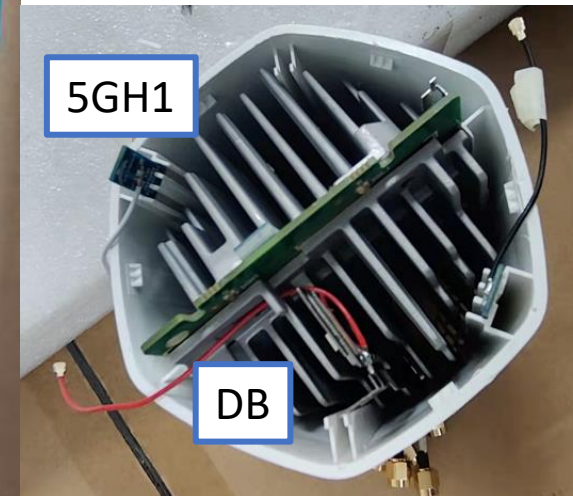
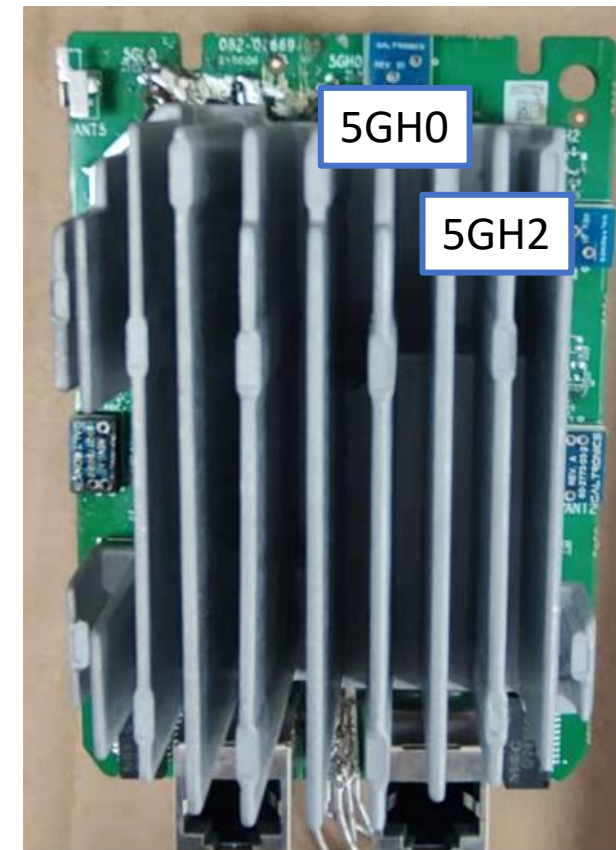
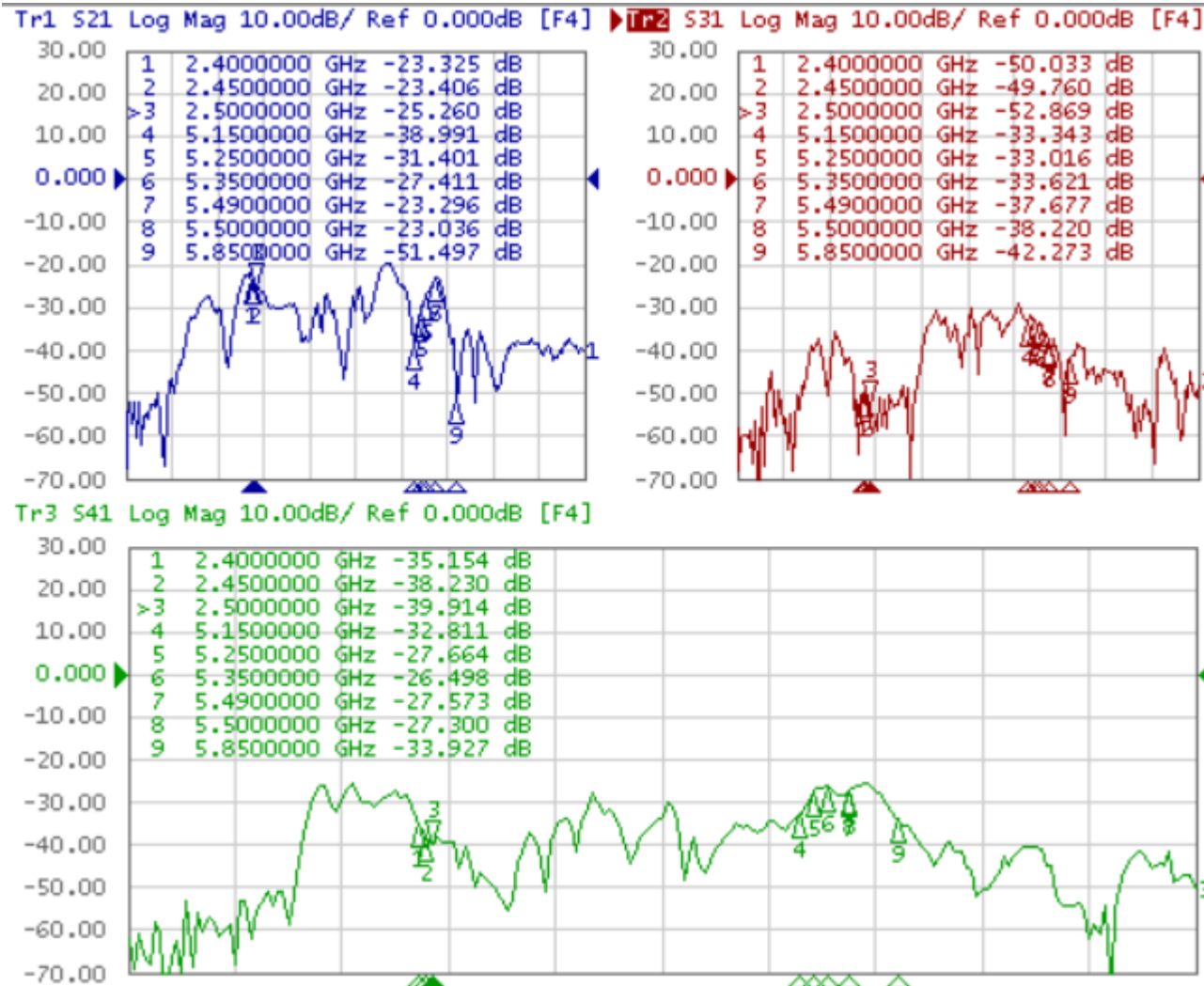
Antenna Isolation Between DB and 5GH

Port1=DB

Port2=5GH0

Port3=5GH1

Port4=5GH2



Antenna Peak Gain and Efficiency

2G	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	2400	3.74	5.75	63.04
	2450	3.16	5.47	60.12
	2500	3.76	5.442	67.86
	AVG			63.67

DB	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	2400	4.03	5.91	64.94
	2450	4.22	5.94	67.38
	2500	3.96	5.95	63.11
	AVG			65.14

BT	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	2400	0.76	4.49	42.39
	2450	0.88	5.16	37.25
	2500	0.72	4.73	39.75
	AVG			39.80

DB	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	5500	6.14	8.51	72.29
	5725	6.61	7.74	78.07
	5825	5.95	7.65	67.71
	AVG			72.69

Antenna Peak Gain and Efficiency

5GL0	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	5150.00	3.32	5.28	63.67
	5250.00	4.67	6.11	71.60
	5350.00	4.40	5.83	71.96
AVG				69.08

5GL1	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	5150.00	4.31	6.20	71.40
	5250.00	4.31	5.54	77.70
	5350.00	4.21	5.85	72.00
AVG				73.70

5GH0	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	5500	3.96	5.54	69.59
	5725	3.80	5.16	73.16
	5825	3.53	5.70	60.72
AVG				67.82

5GH1	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	5500	5.48	6.53	78.46
	5725	5.17	6.53	79.20
	5825	4.33	5.96	68.68
AVG				75.45

5GH2	Freq (MHz)	Peak Gain(dBi)	Directivity(dB)	Efficiency
	5500	4.44	6.64	60.31
	5725	5.16	7.08	64.27
	5825	4.13	6.25	61.46
AVG				62.01

2GHz Band Horizontal, Vertical and Total Correlated/Uncorrelated Gain

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Correlated Gain(dBi)-V-Pol
	Theta	Phi	2G1	DB	
2400	270	15	3.38	-0.85	4.53
2450	270	15	2.60	-0.46	4.22
2500	270	15	1.38	-0.63	3.45

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Uncorrelated Gain(dBi)-V-Pol
	Theta	Phi	2G1	DB	
2400	270	15	3.375	-0.854	1.76
2450	270	15	2.603	-0.456	1.34
2500	135	105	-7.084	3.846	1.17

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Correlated(dBi)-H-Pol
	Theta	Phi	2G1	DB	
2400	120	45	-4.35	-3.42	-0.86
2450	195	0	-11.48	-0.43	-1.29
2500	210	0	-6.10	-1.38	-0.41

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Uncorrelated Gain(dBi)-H-Pol
	Theta	Phi	2G1	DB	
2400	195	15	-13.28	-0.31	-3.11
2450	195	15	-16.16	0.05	-2.85
2500	195	15	-11.06	-0.19	-2.86

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Correlated Gain(dBi)-Total
	Theta	Phi	2G1	DB	
2400	270	15	3.459	-0.56	4.69
2450	270	15	2.741	-0.103	4.45
2500	135	120	-2.947	3.955	4.18

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Uncorrelated(dBi)-Total
	Theta	Phi	2G1	DB	
2400	270	15	3.459	-0.56	1.90
2450	135	120	-6.682	4.223	1.55
2500	135	120	-2.947	3.955	1.75

5GL Band Horizontal, Vertical and Total Correlated/Uncorrelated Gain

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Correlated Gain(dBi)-V-Pol
	Theta	Phi	5GL0	5GL1	
5150	90	15	0.346	4.234	5.52
5250	240	30	1.038	2.765	4.95
5350	255	165	-0.842	3.565	4.65

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Correlated(dBi)-H-Pol
	Theta	Phi	5GL0	5GL1	
5150	195	135	0.712	-6.658	0.80
5250	225	15	-0.797	-2.25	1.52
5350	150	0	2.068	-6.071	1.93

Frequeccy (MHz)	Degree(°)		Gain (dBi)		Correlated Gain(dBi)-Total
	Theta	Phi	5GL0	5GL1	
5150	90	15	1.732	4.308	6.13
5250	240	30	2.496	2.917	5.72
5350	255	120	1.19	3.519	5.44

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Uncorrelated Gain(dBi)-V-Pol
	Theta	Phi	5GL0	5GL1	
5150	90	15	0.346	4.234	2.71
5250	240	30	1.038	2.765	1.99
5350	255	165	-0.842	3.565	1.90

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Uncorrelated Gain(dBi)-H-Pol
	Theta	Phi	5GL0	5GL1	
5150	195	135	0.71	-6.66	-1.57
5250	195	135	2.57	-12.75	-0.31
5350	150	0	2.07	-6.07	-0.32

Frequeccy (MHz)	Degree(°)		Gain(dBi)		Uncorrelated(dBi)-Total
	Theta	Phi	5GL0	5GL1	
5150	90	15	1.732	4.308	3.21
5250	240	30	2.496	2.917	2.71
5350	285	150	-0.571	4.503	2.67

5GH Band Horizontal, Vertical and Total Correlated/Uncorrelated Gain

Frequeccy (MHz)	Degree(°)		Gain(dBi)				Correlated Gain(dBi)-V-Pol
	Theta	Phi	5GH0	5GH1	5GH2	DB	
5500	75	45	-0.14	2.78	-5.01	3.20	6.78
5725	75	45	0.50	4.23	-4.04	4.38	7.91
5825	75	30	-0.99	3.48	-3.63	2.71	6.87

Frequeccy (MHz)	Degree(°)		Gain(dBi)				Uncorrelated Gain(dBi)-V-Pol
	Theta	Phi	5GH0	5GH1	5GH2	DB	
5500	75	45	-0.14	2.78	-5.01	3.20	1.19
5725	75	45	0.50	4.23	-4.04	4.38	2.37
5825	75	30	-0.99	3.48	-3.63	2.71	1.24

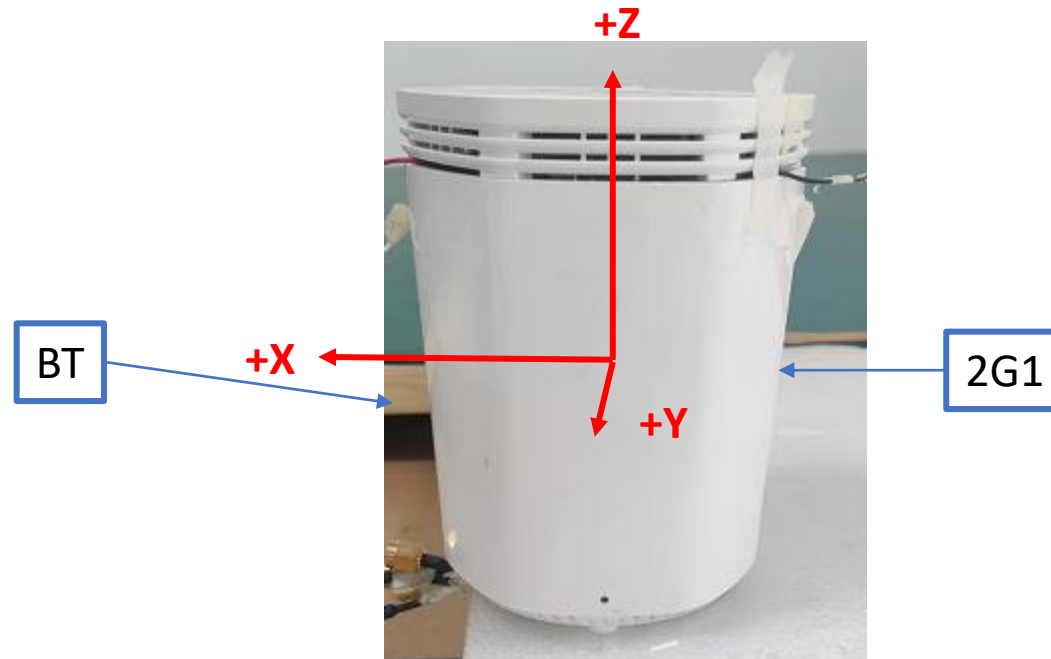
Frequeccy (MHz)	Degree(°)		Gain(dBi)				Correlated Gain(dBi)-H-Pol
	Theta	Phi	5GH0	5GH1	5GH2	DB	
5500	30	45	-9.57	-2.38	-1.66	2.71	4.31
5725	30	0	-4.76	-8.49	-0.42	2.36	4.13
5825	345	165	-15.39	-6.35	0.79	1.47	3.32

Frequeccy (MHz)	Degree(°)		Gain(dBi)				Uncorrelated Gain(dBi)-H-Pol
	Theta	Phi	5GH0	5GH1	5GH2	DB	
5500	30	45	-9.57	-2.38	-1.66	2.71	-0.92
5725	285	150	-7.31	-13.23	4.39	-4.04	-0.74
5825	285	150	-2.45	-17.65	3.14	-5.89	-1.39

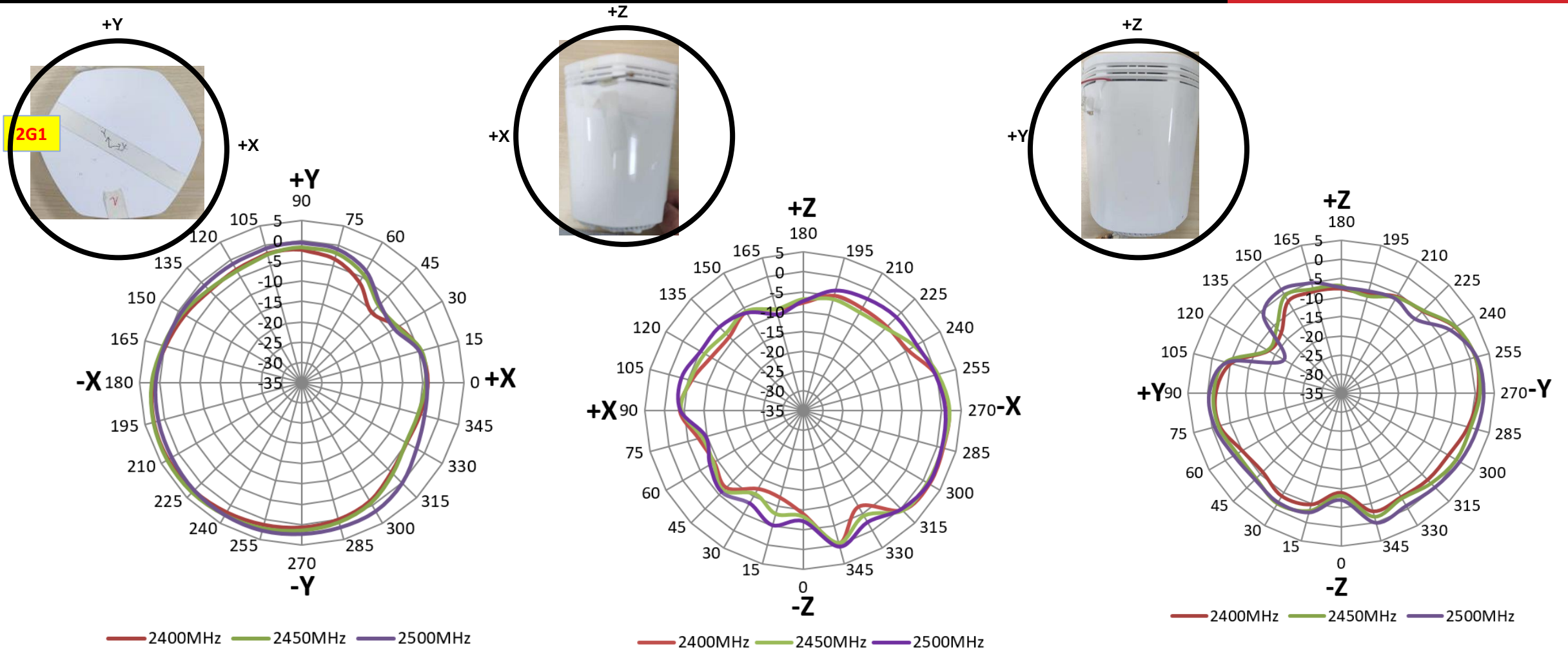
Frequeccy (MHz)	Degree(°)		Gain(dBi)				Correlated Gain(dBi)-Total
	Theta	Phi	5GH0	5GH1	5GH2	DB	
5500	60	45	0.53	4.78	-0.78	2.28	7.98
5725	75	45	0.60	4.34	-0.55	4.40	8.49
5825	75	30	-0.68	3.61	-1.20	2.79	7.40

Frequeccy (MHz)	Degree(°)		Gain(dBi)				Uncorrelated (dBi)-Total
	Theta	Phi	5GH0	5GH1	5GH2	DB	
5500	60	45	0.53	4.78	-0.78	2.28	2.21
5725	75	45	0.60	4.34	-0.55	4.40	2.73
5825	75	30	-0.68	3.61	-1.20	2.79	1.62

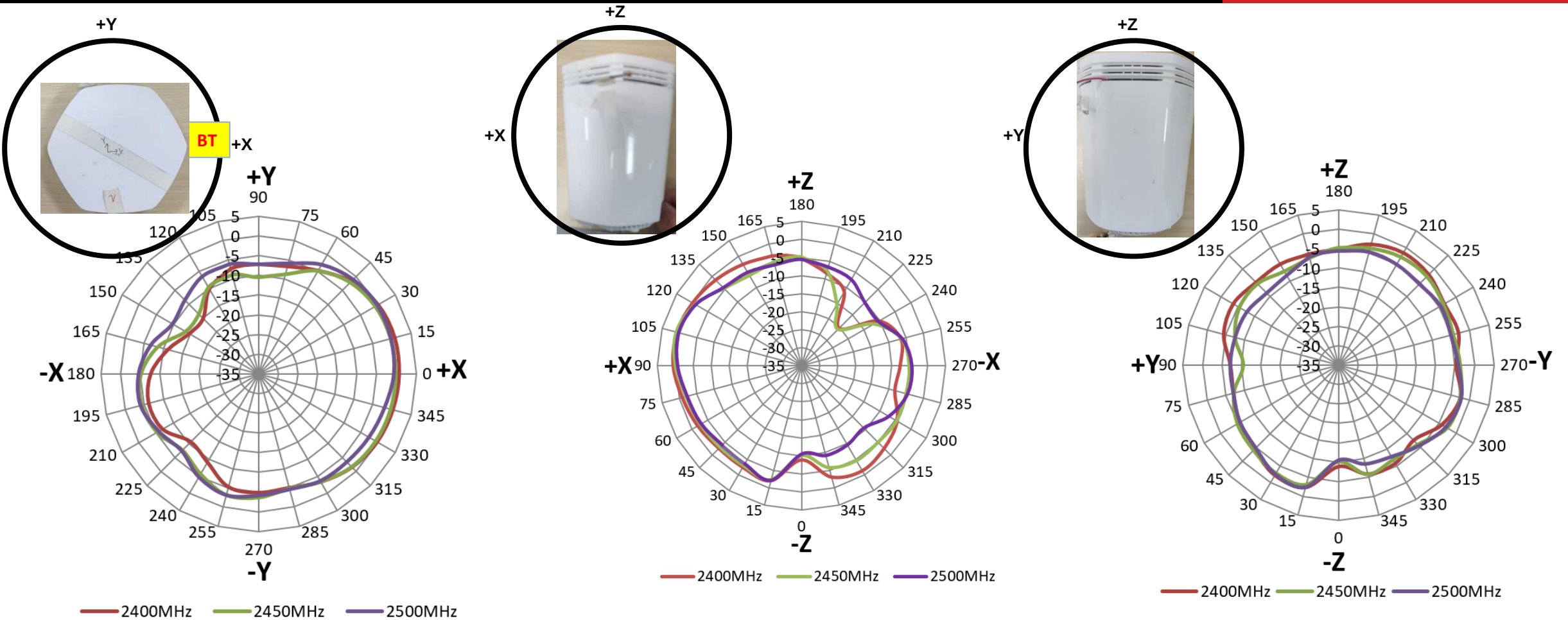
Chamber Coordinates



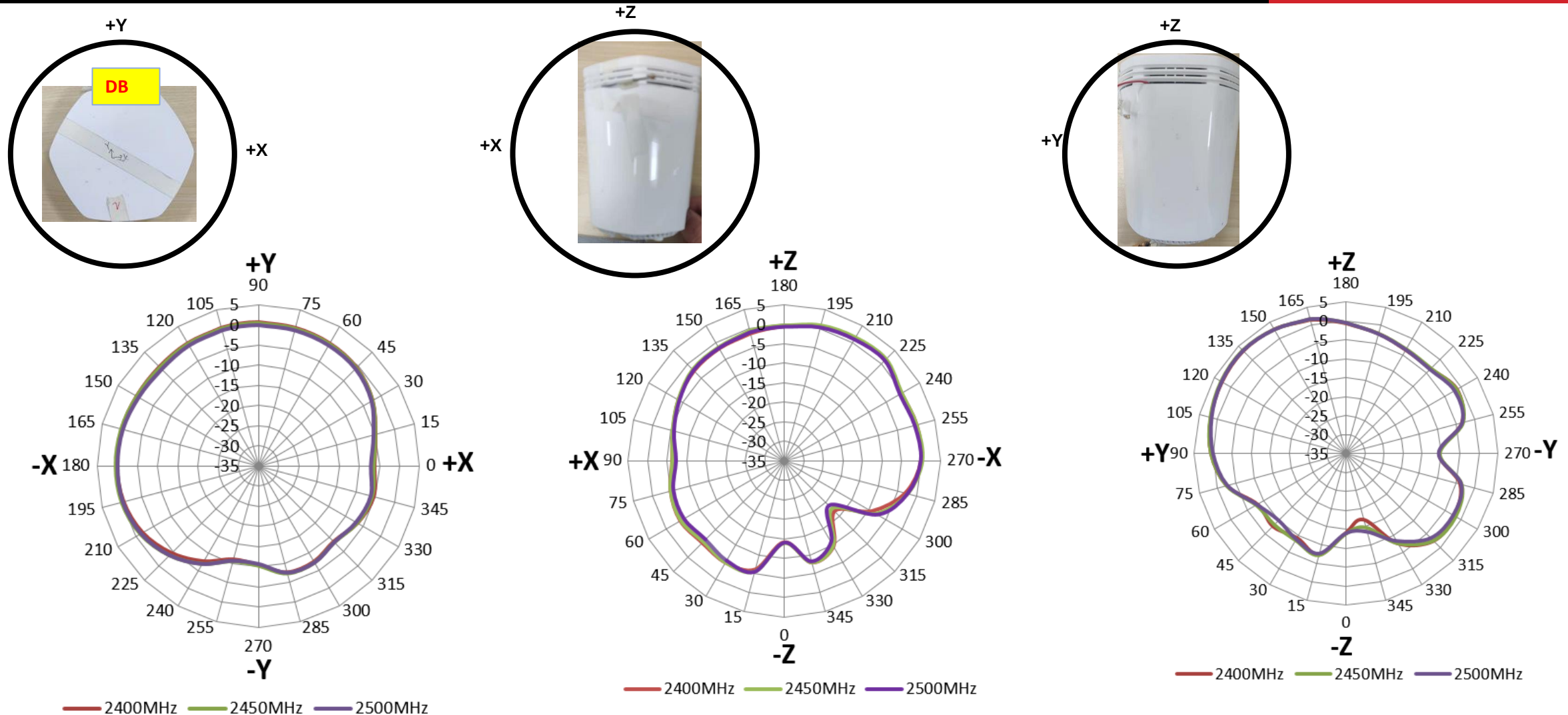
2G1 Antenna Power Sum Gain Patterns



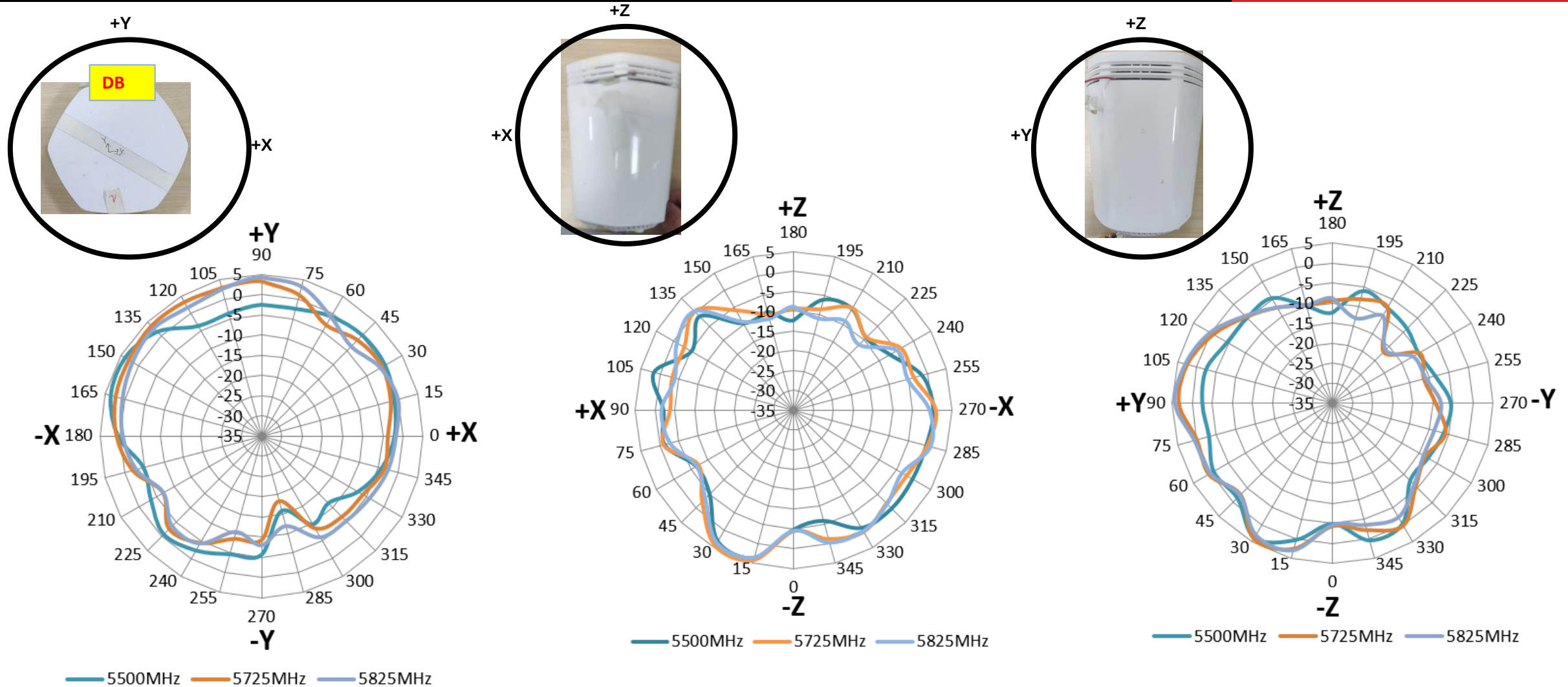
BT Antenna Power Sum Gain Patterns



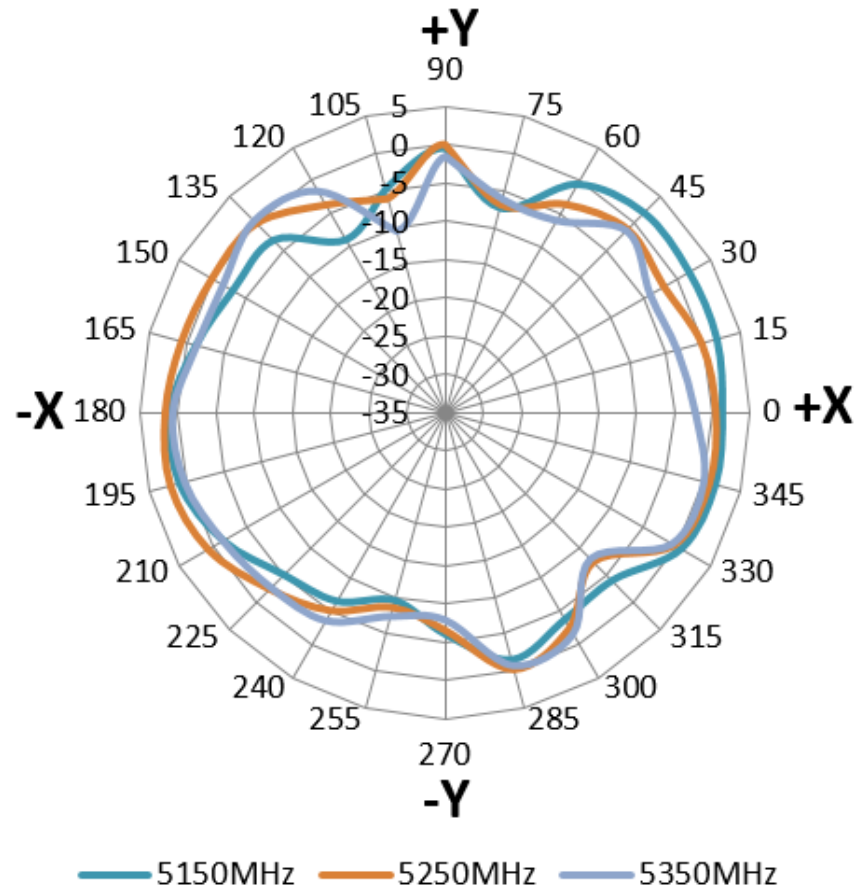
DB_2G Band Antenna Power Sum Gain Patterns



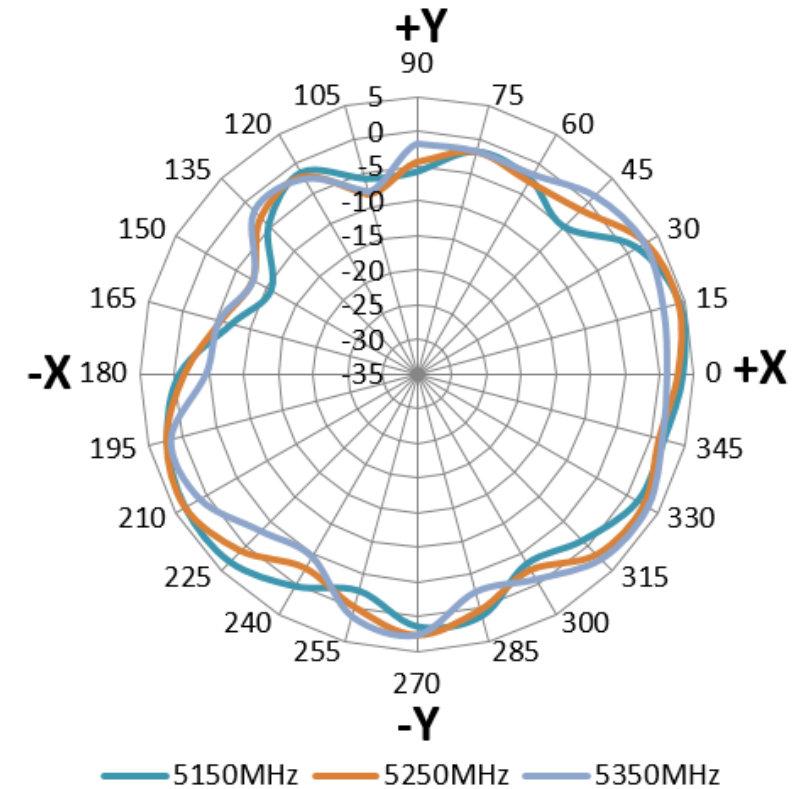
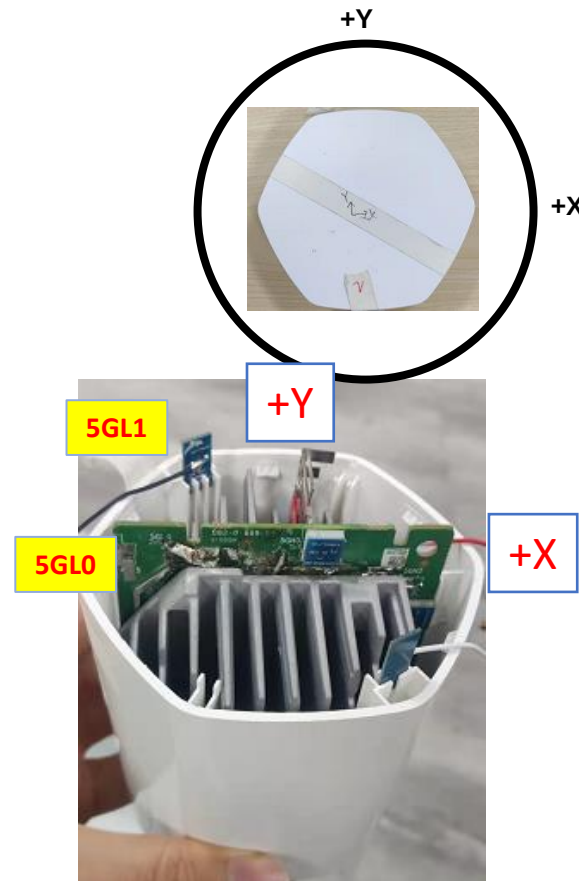
DB_5GH Band Antenna Power Sum Gain Patterns



Azimuth Cut - Power Sum 5GL Antennas

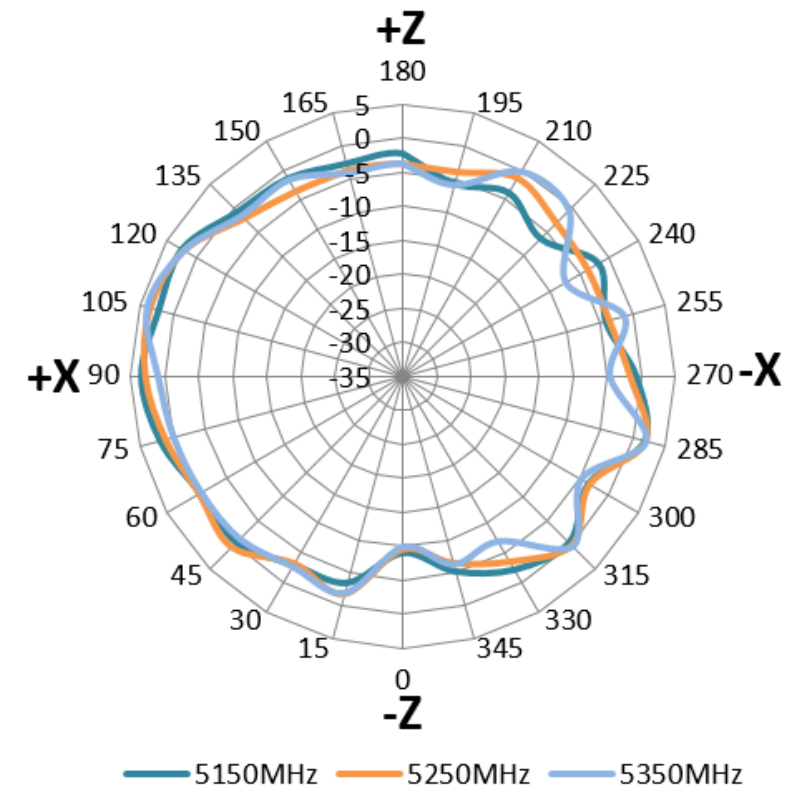
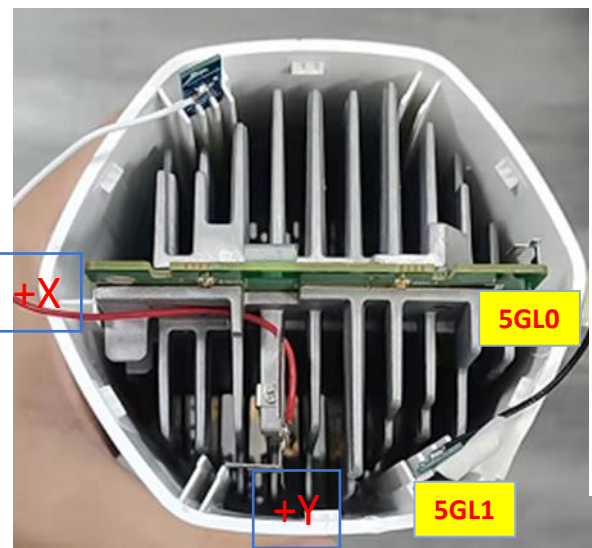
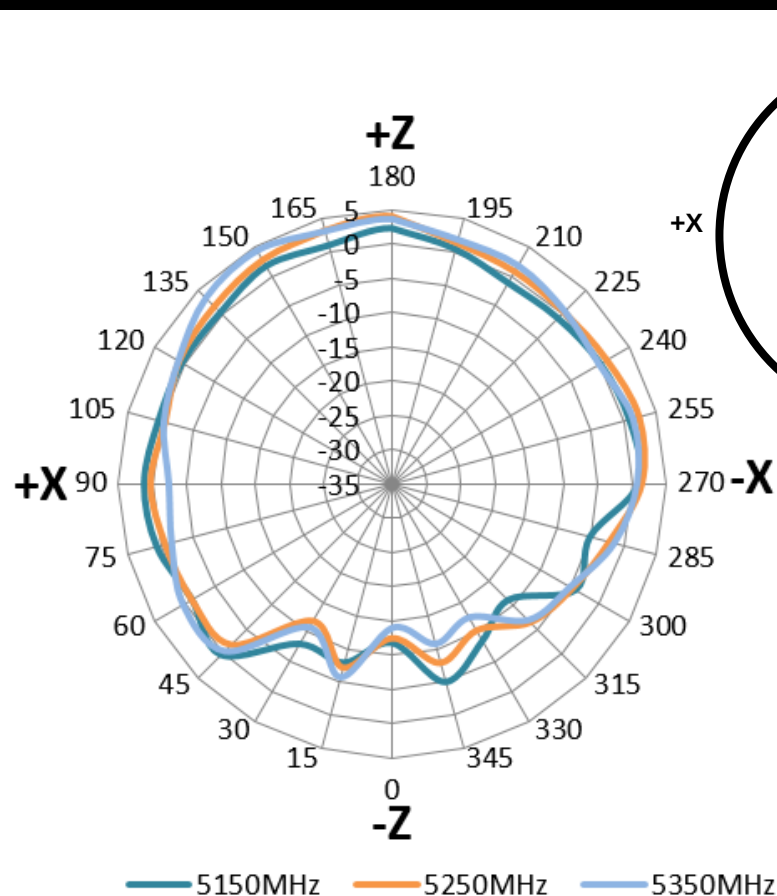


5GL0

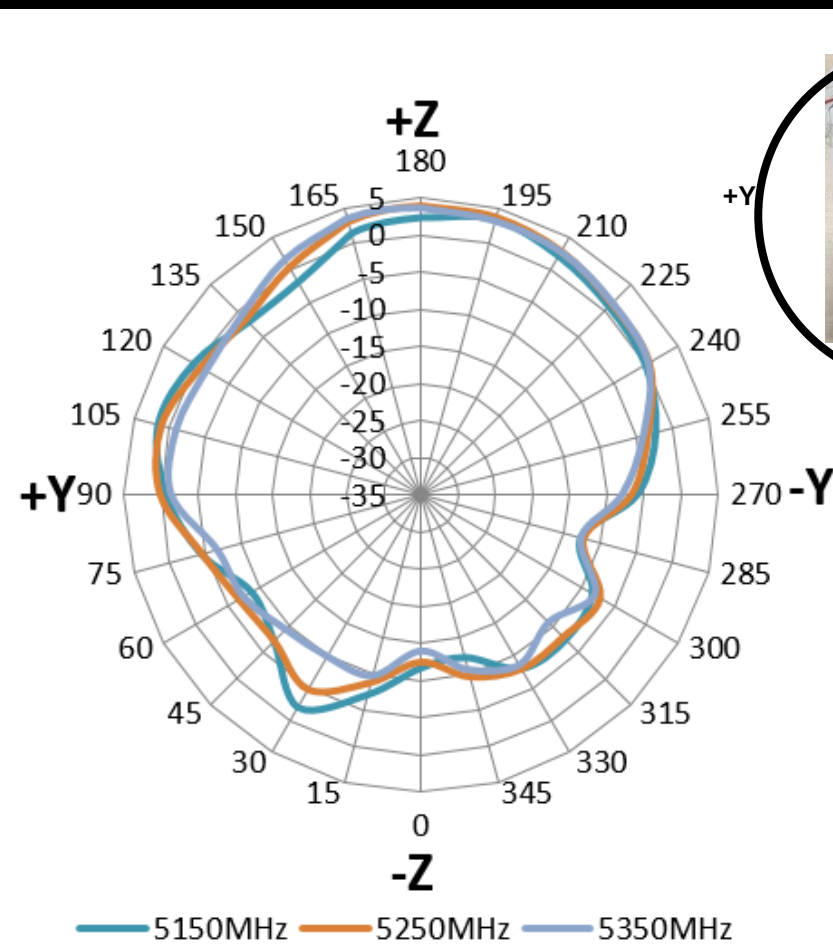


5GL1

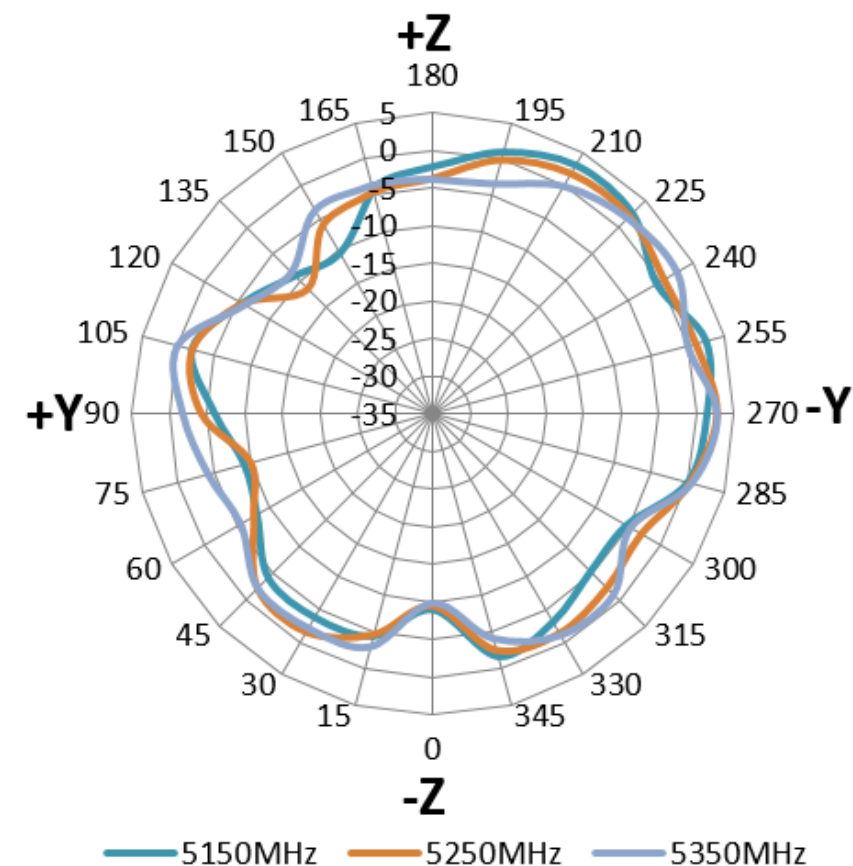
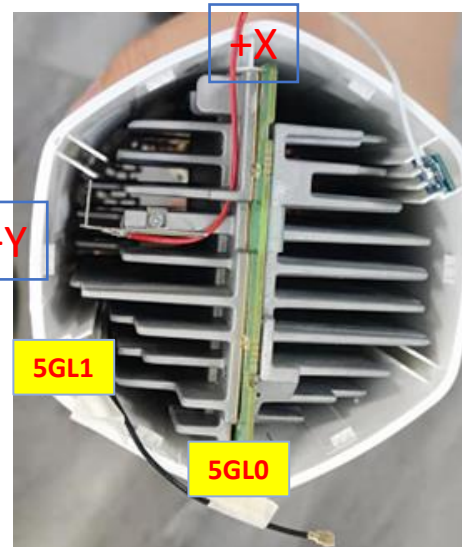
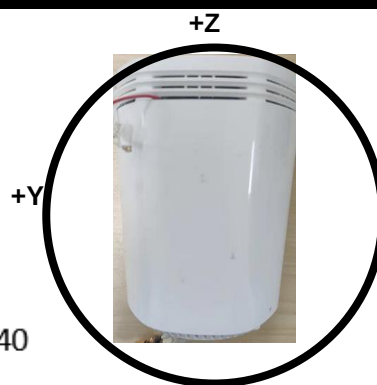
Elevation Cut XZ - Power Sum 5GL Antennas



Elevation Cut YZ - Power Sum 5GL Antennas

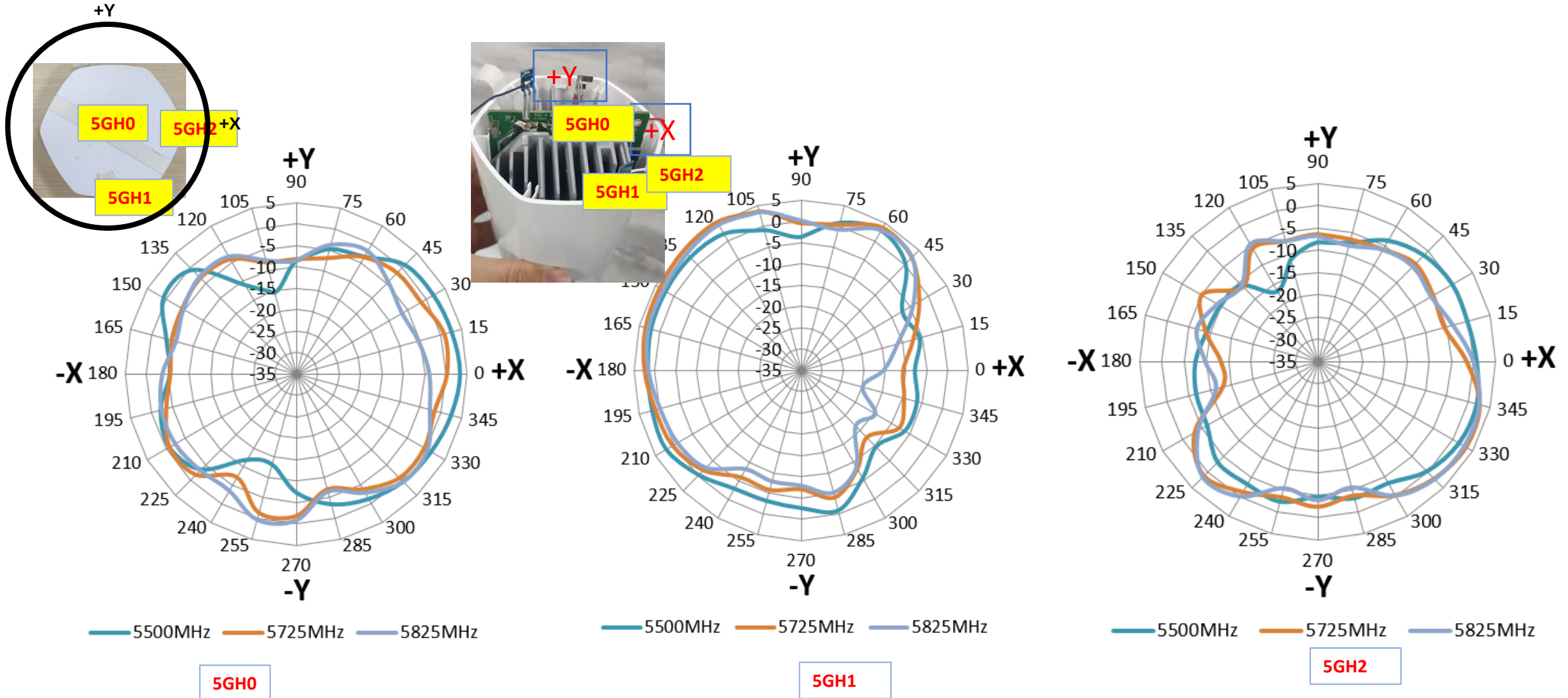


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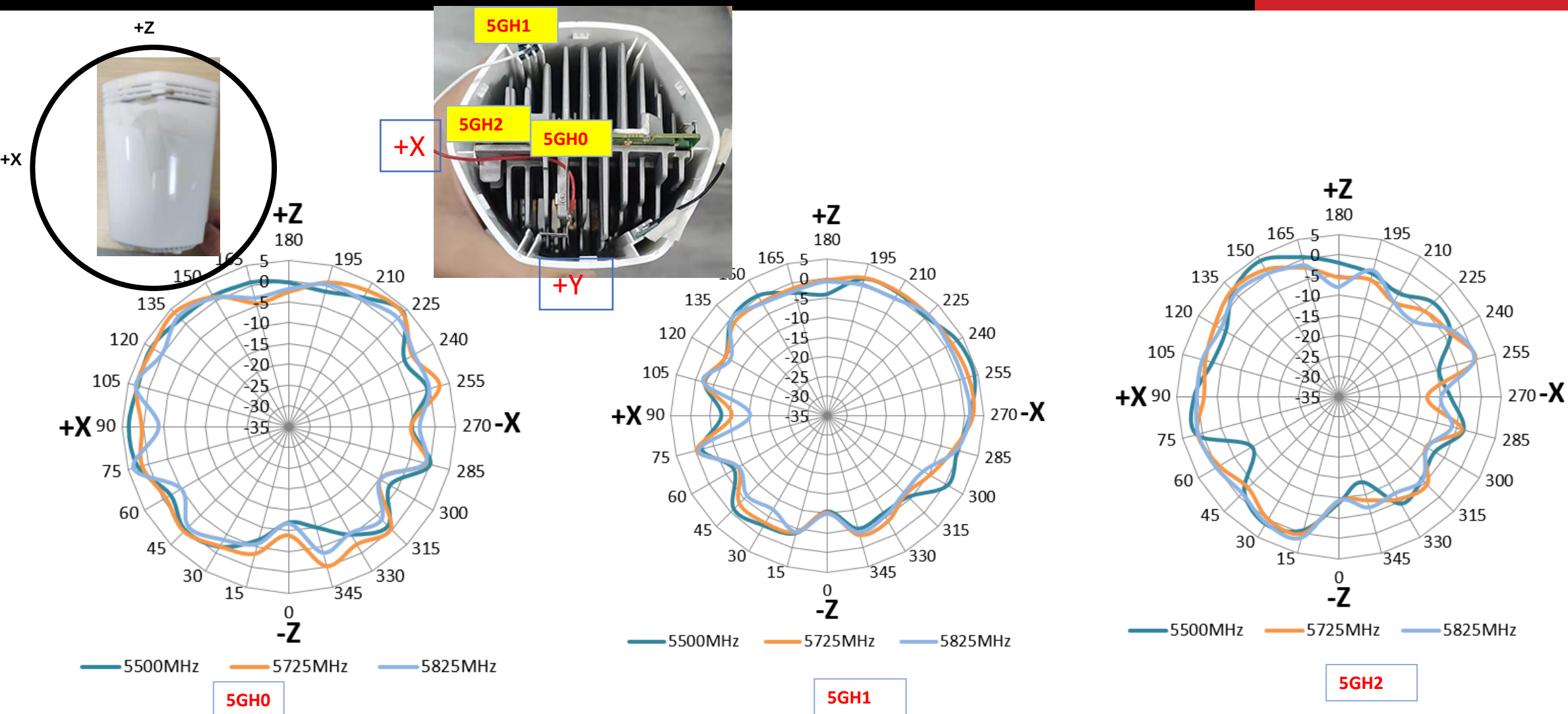


5GL1

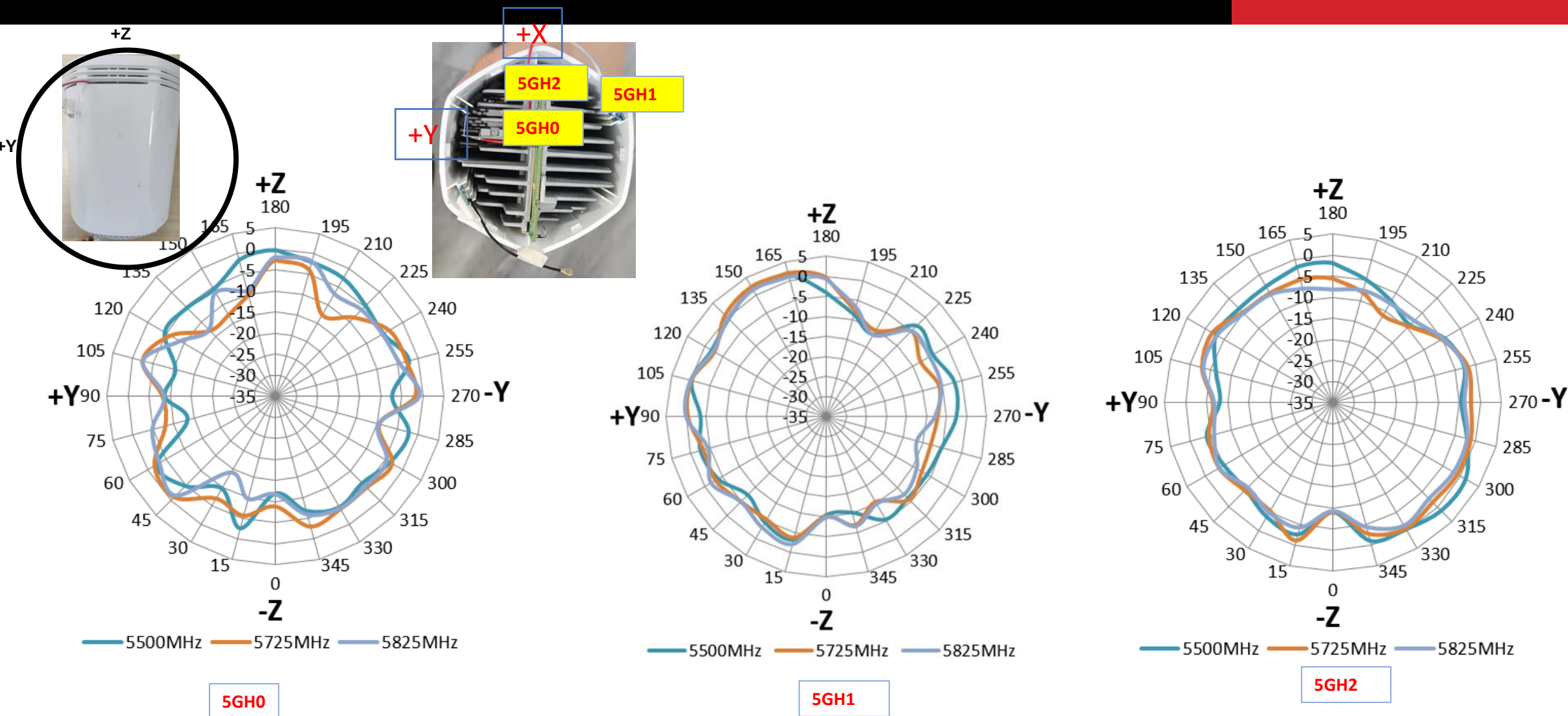
Azimuth Cut - Power Sum 5GH Antennas



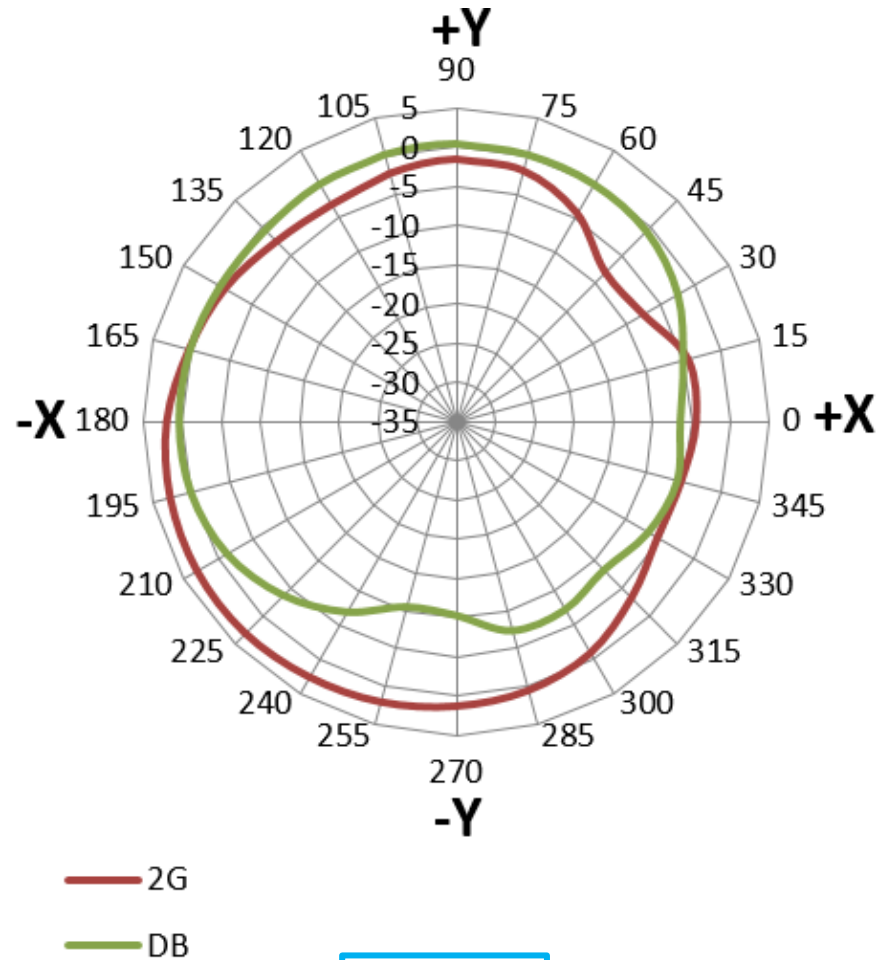
Elevation (XZ) Cut - Power Sum 5GH Antennas



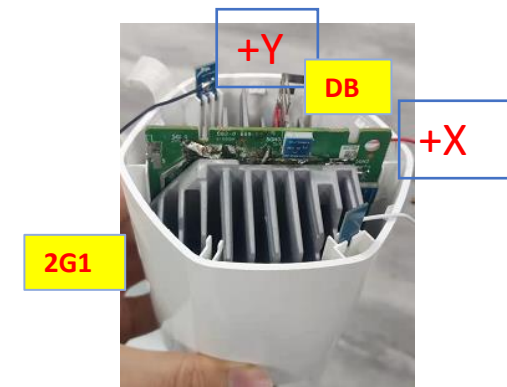
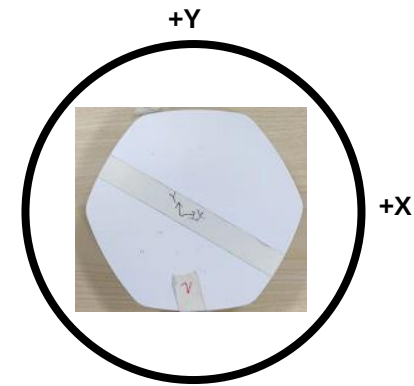
Elevation (YZ) Cut - Power Sum 5GH Antennas



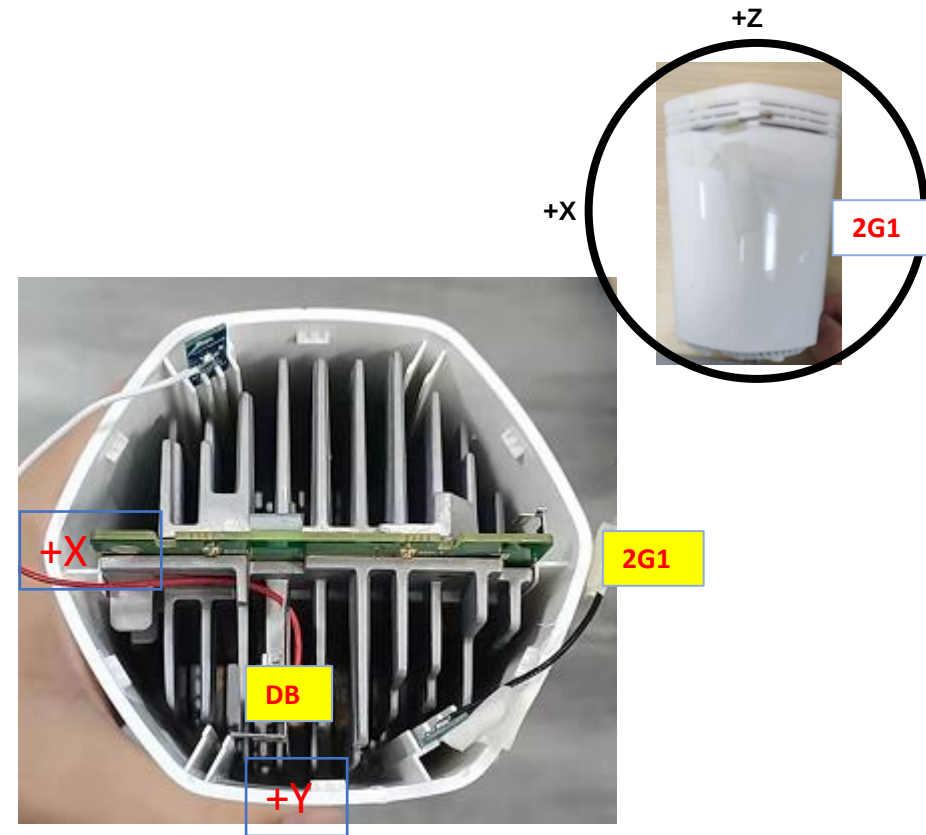
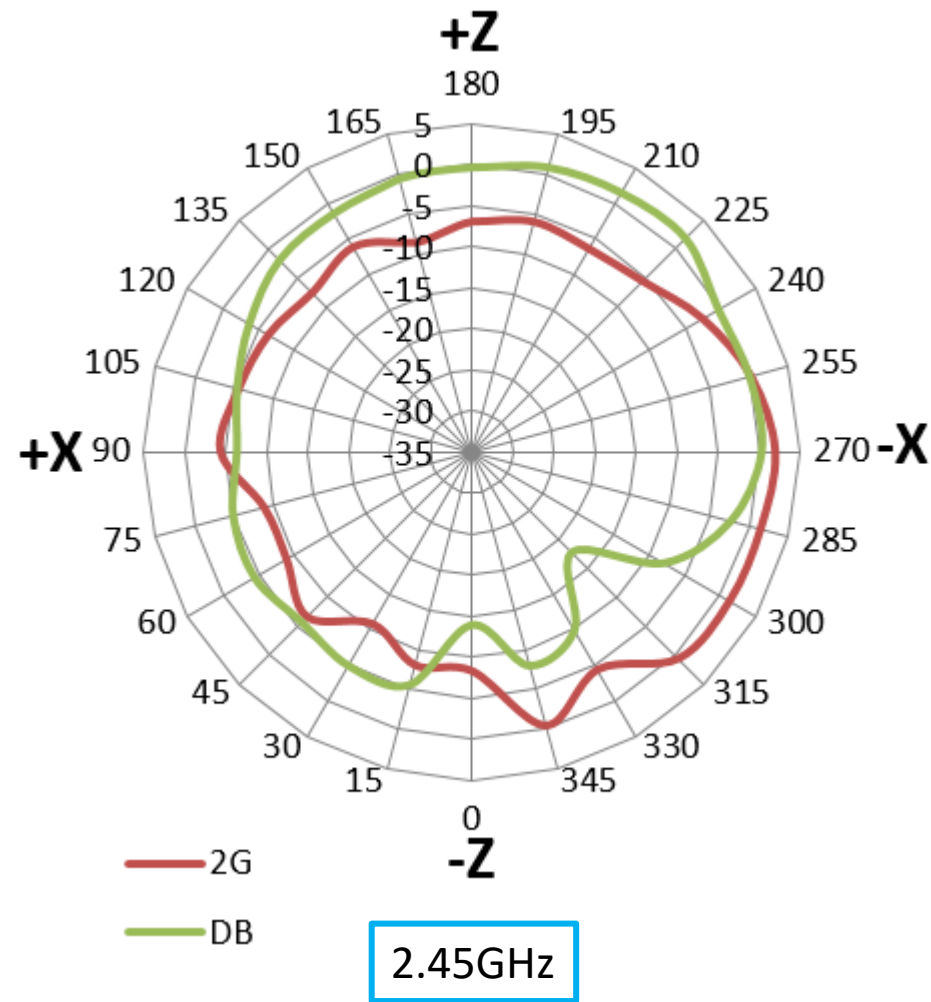
Azimuth Cut - Power Sum System Coverage - 2.45 GHz Band



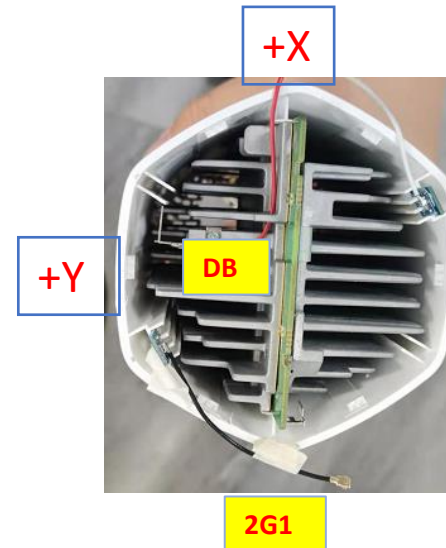
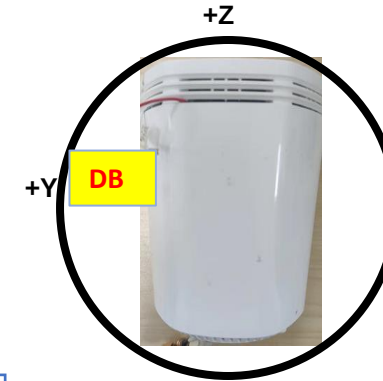
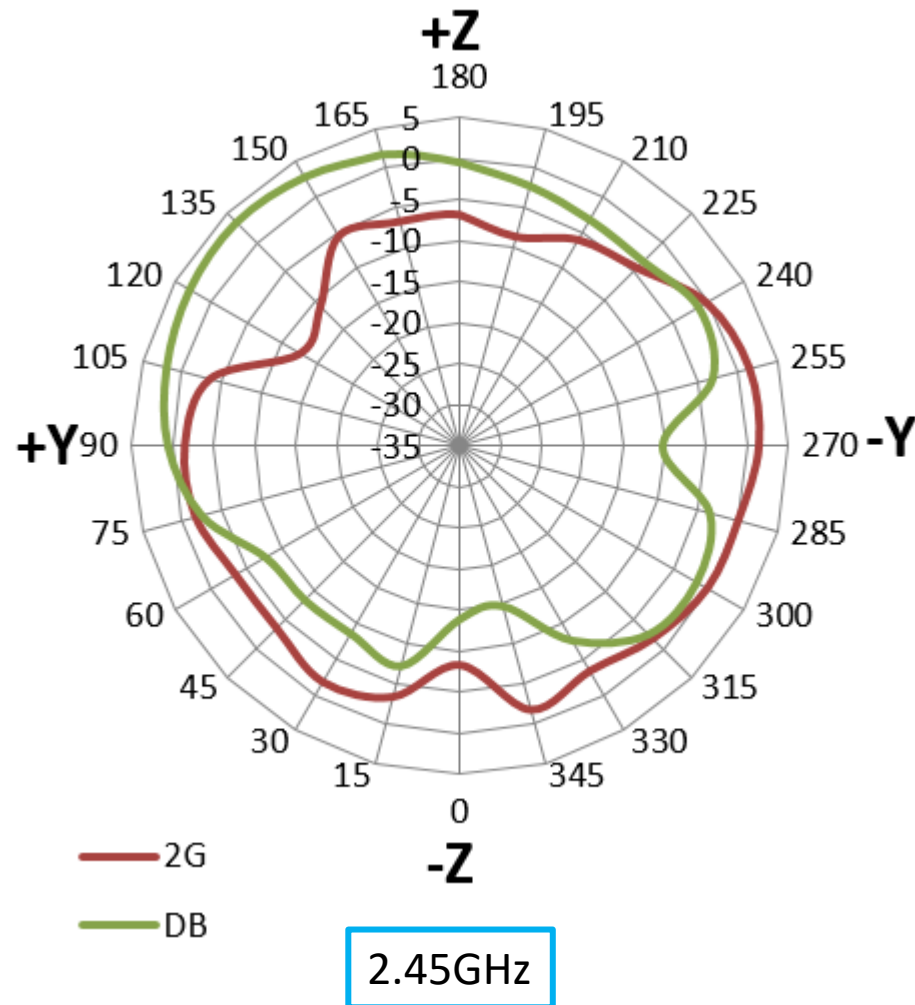
2.45GHz



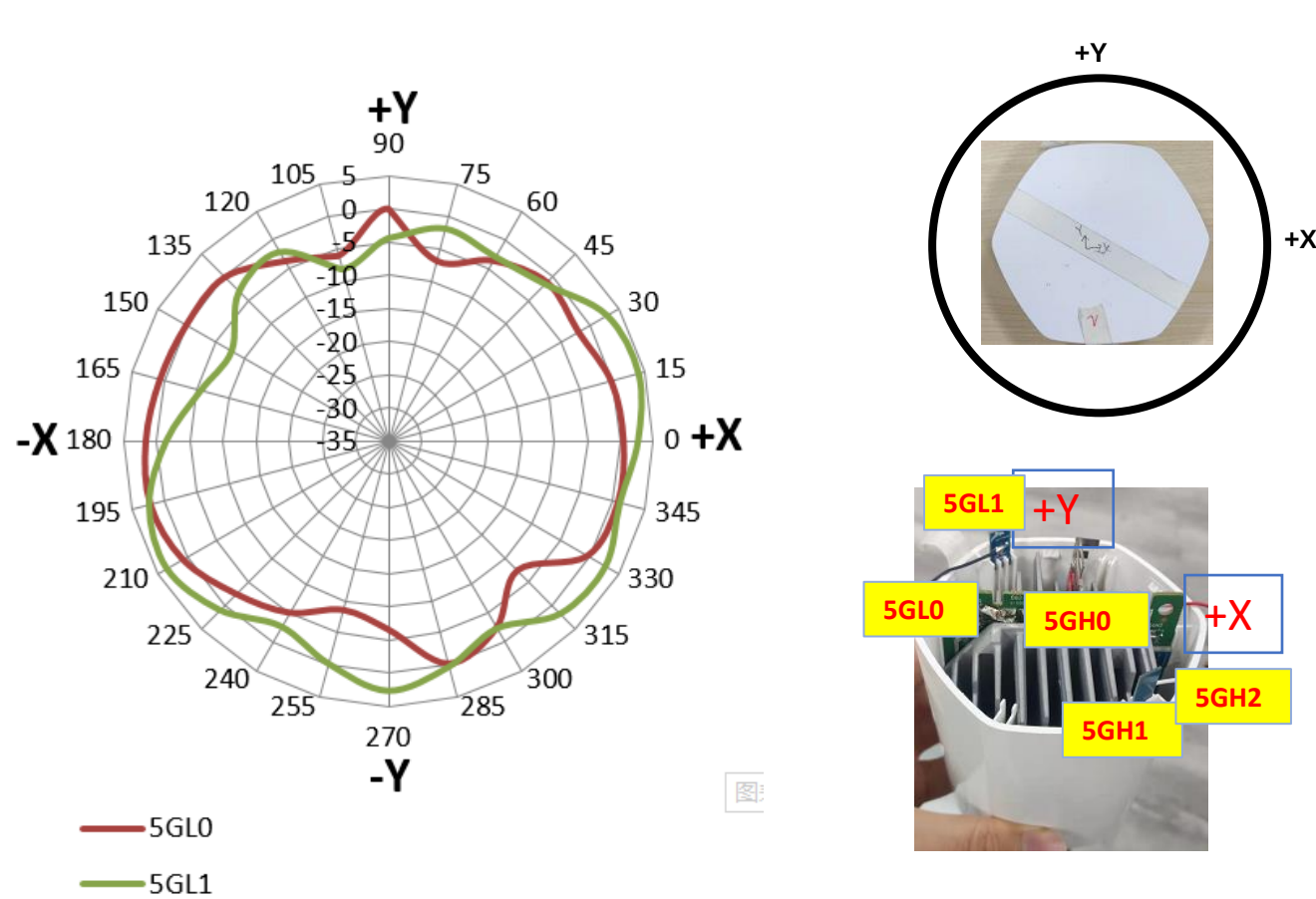
Elevation (XZ) Cut - Power Sum System Coverage – 2.45 GHz Band



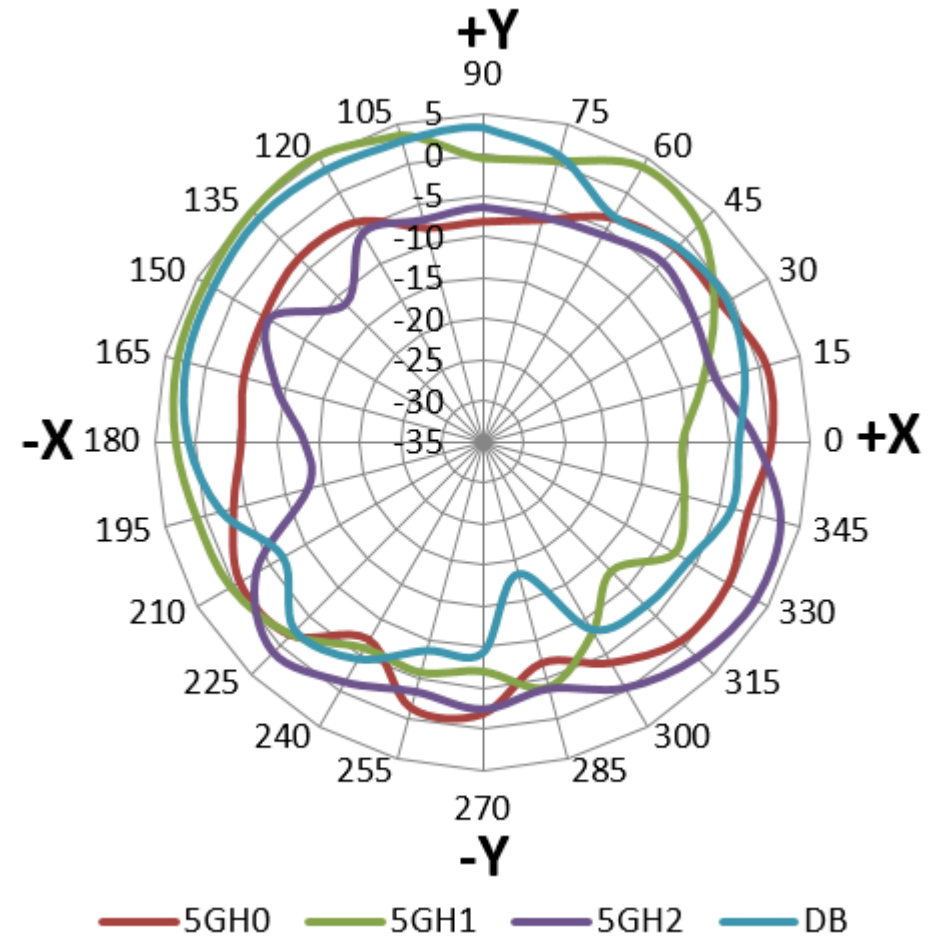
Elevation (YZ) Cut - Power Sum System Coverage – 2.45 GHz Band



Azimuth Cut - Power Sum System Coverage - 5GHz Band

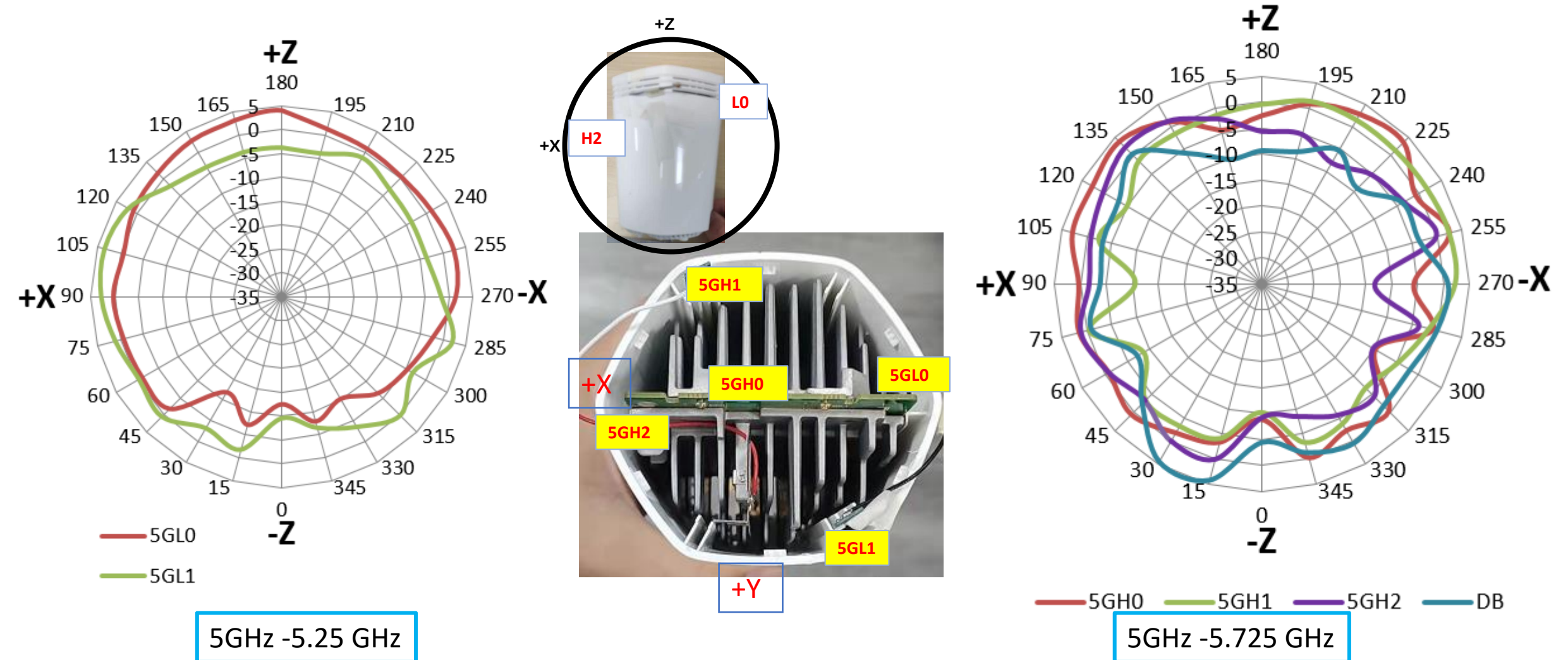


5GHz -5.25 GHz

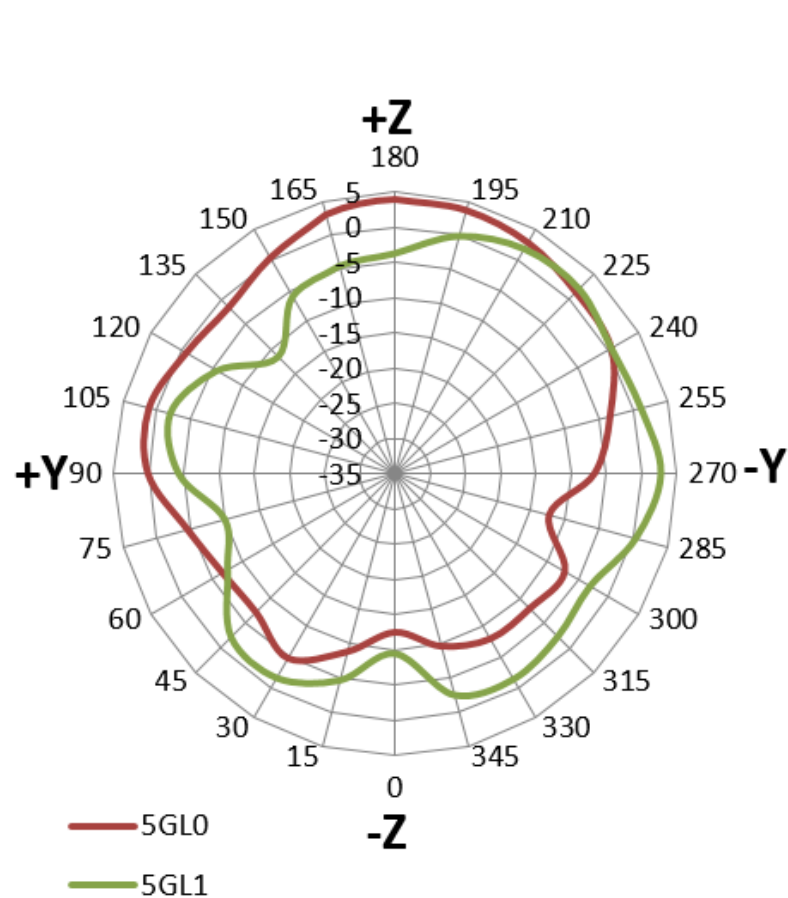


5GHz -5.725 GHz

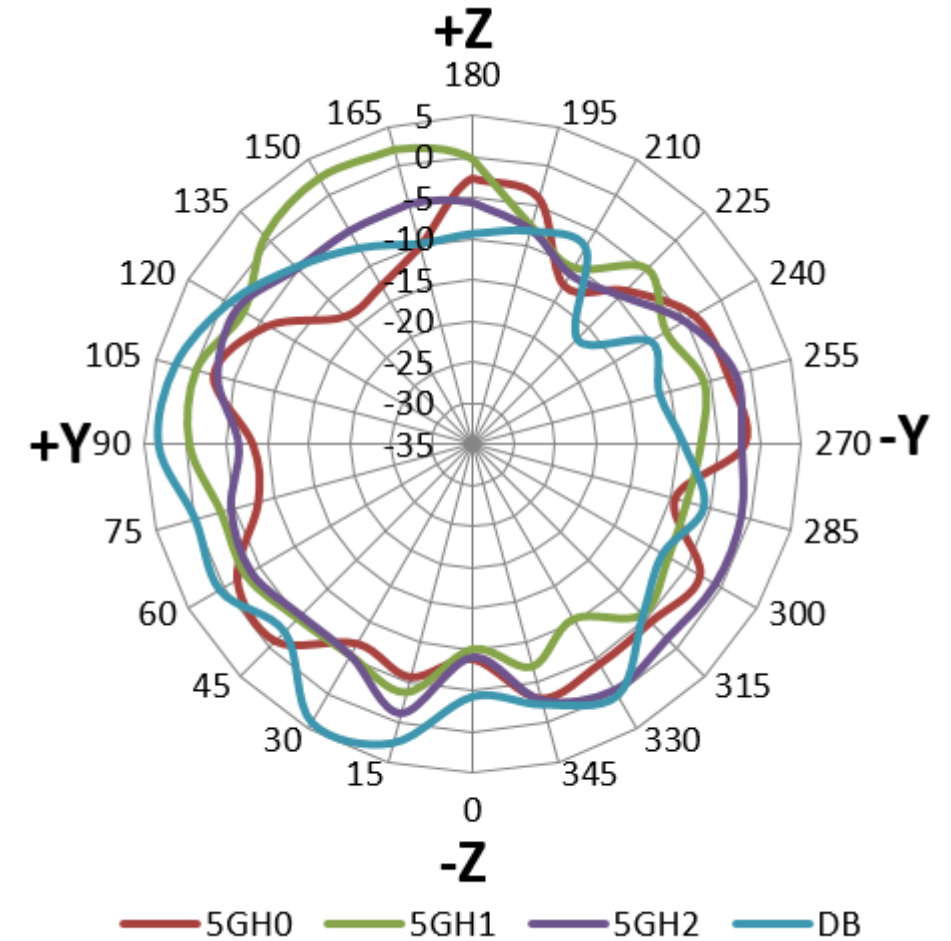
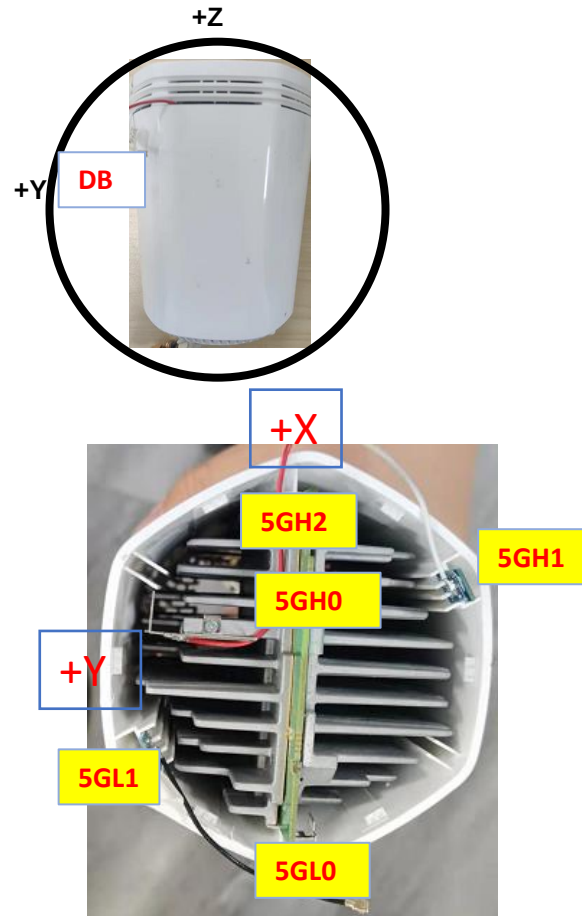
Elevation (XZ) Cut - Power Sum System Coverage - 5GHz Band



Elevation (YZ) Cut - Power Sum System Coverage - 5GHz Band



5GHz -5.25 GHz



5GHz -5.725 GHz

Antenna Performance Summary

Antenna	Worst Case Return Loss (dB) 2.45 GHz Band	Worst Case Return Loss (dB) 5 GHz Low Band	Worst Case Return Loss (dB) 5 GHz High Band	Average Efficiency 2.45 GHz Band (%)	Average Efficiency 5 GHz Low Band (%)	Average Efficiency 5 GHz High Band (%)	Highest Peak Gain 2.45 GHz Band (dBi)	Highest Peak Gain 5 GHz Low Band (dBi)	Highest Peak Gain 5 GHz High Band (dBi)	Mutual Isolation (dB) 2.45 GHz Band			Mutual Isolation (dB) 5 GHz Low Band		Mutual Isolation (dB) 5 GHz High Band			
										2G1	BT	DB	5GL0	5GL1	5GH0	5GH1	5GH2	DB
2G1	-10.1			63.67			3.7				-27		-41.6	-53.9	-51.4	-56.9	-44	-54.8
DB	-9.7		-11.3	65.14			4.2			-25.4	-24		-26.3	-15.2	-23.2	-22.4	-27.3	
5GL0		-10.4			69.08			4.6		-33.5	-45.1	-28.8	-22.8		-24.1	-25.8	-21.4	-28.8
5GL1		-11.4			73.7			4.3		-34.1	-46.3	-38.8			-28.1	-27	-37.2	-22.9
5GH0			-15.4			67.8			3.9	-32.6	-25.4	-23.3	-17.8	-20.9				
5GH1			-11			75.45			5.4	-47.2	-40.1	-49.7	-21.3	-25.5	-26.5			
5GH2			-10			62.01			5.1	-37.3	-23.6	-35.1	-25.8	-35.3	-18	-34.8		
BT	-6.7			39.8			0.8					-24.5			-31.1	-34.7	-28	-37.4

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