

Antenna measurement report for project OWA813V

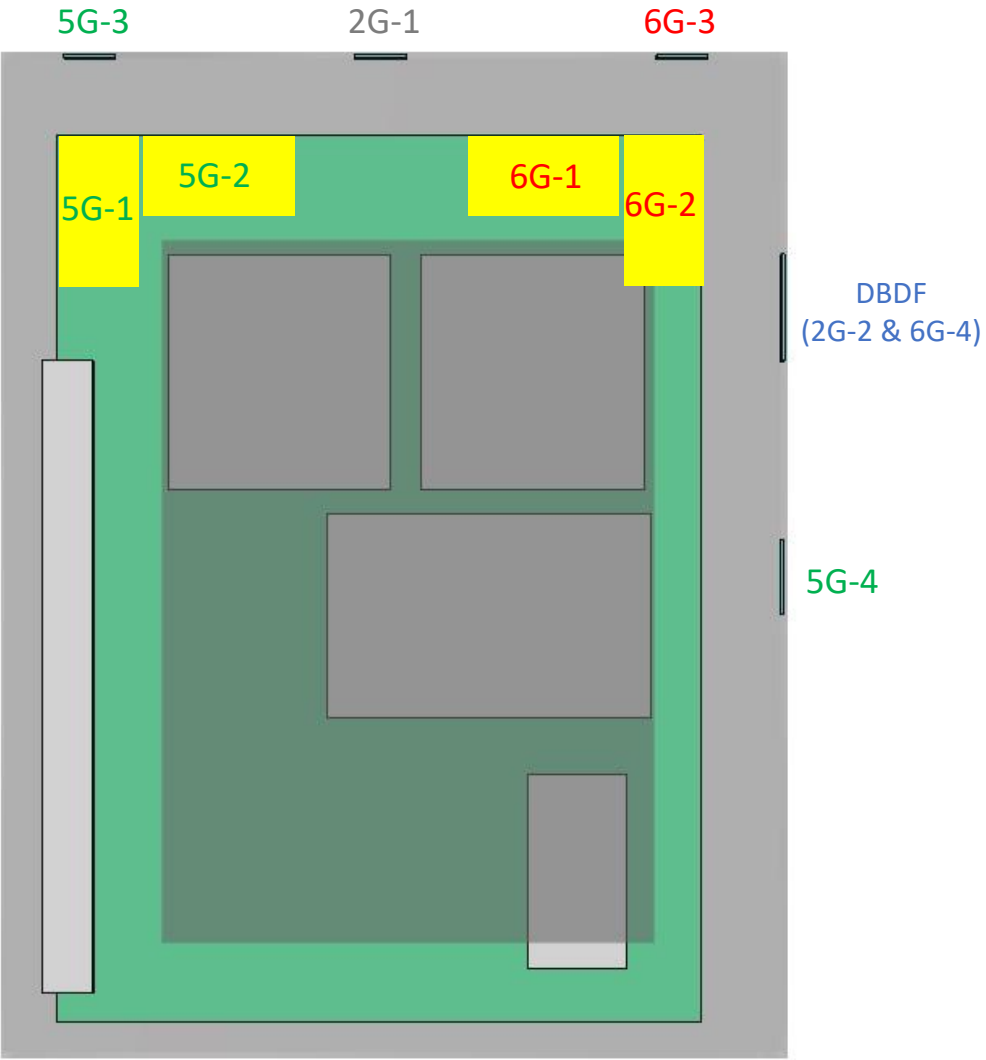
Pegatron BU6

2025/05/05

Contents

- Antenna proposal and specification
- Measurement data
- Summary

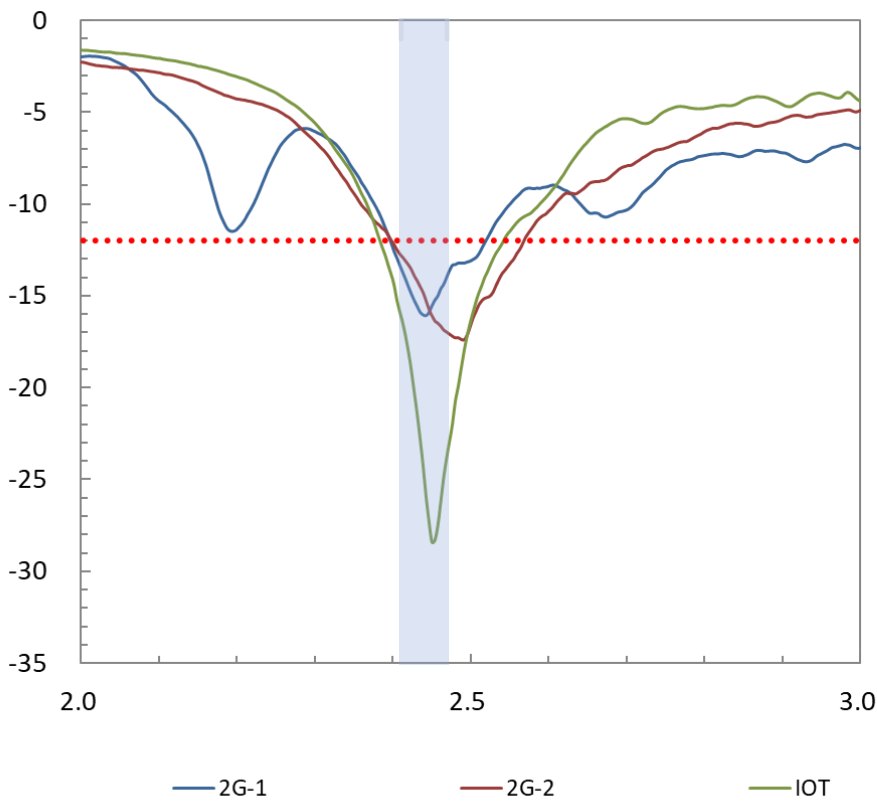
Antenna proposal and specification



Antenna Proposal		
Wireless Function	■ Wi-Fi 2G antenna 2X2 ■ Wi-Fi 5G antenna 4X4 ■ Wi-Fi 6G antenna 4X4	
Antenna type	■ On-board : 5G antenna*2 ■ On-board : 6G antenna*2 ■ Off-board : 5G antenna*2 ■ Off-board : 6G antenna*2 ■ Off-board : 2G antenna*2	
Specification and measurement data		
	Customer spec	Measurement data
Return loss	<-12 dB	<-12 dB
Isolation	■ 2G to 2G antenna < -20 dB ■ 2G to 5G antenna < -20 dB ■ 2G to 6G antenna < -20 dB ■ 5G to 5G antenna < -20 dB ■ 6G to 6G antenna < -20 dB ■ 5G to 6G antenna < -30 dB	■ 2G to 2G antenna < -20 dB ■ 2G to 5G antenna < -20 dB ■ 2G to 6G antenna < -20 dB ■ 5G to 5G antenna < -20 dB ■ 6G to 6G antenna < -20 dB ■ 5G to 6G antenna < -30 dB
Antenna efficiency	> 60%	■ 2G > 68% ■ 5G > 60% ■ 6G > 52%

Measurement data

- S-parameter : Return loss_2G & IoT

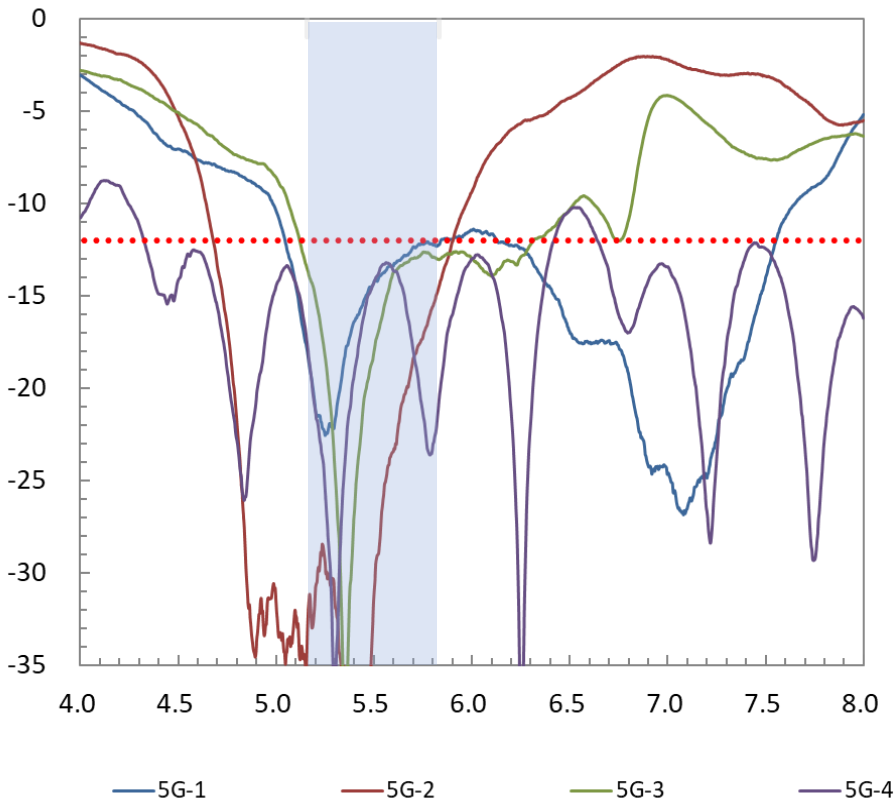


Frequency (GHz)	2G-1	2G-2 (DBDF)	IOT
2.41GHz	-13.32	-12.73	-15.89
2.44GHz	-16.02	-14.83	-24.34
2.47GHz	-13.98	-16.97	-23.86

Unit: dB

Measurement data

- S-parameter : Return loss_5G

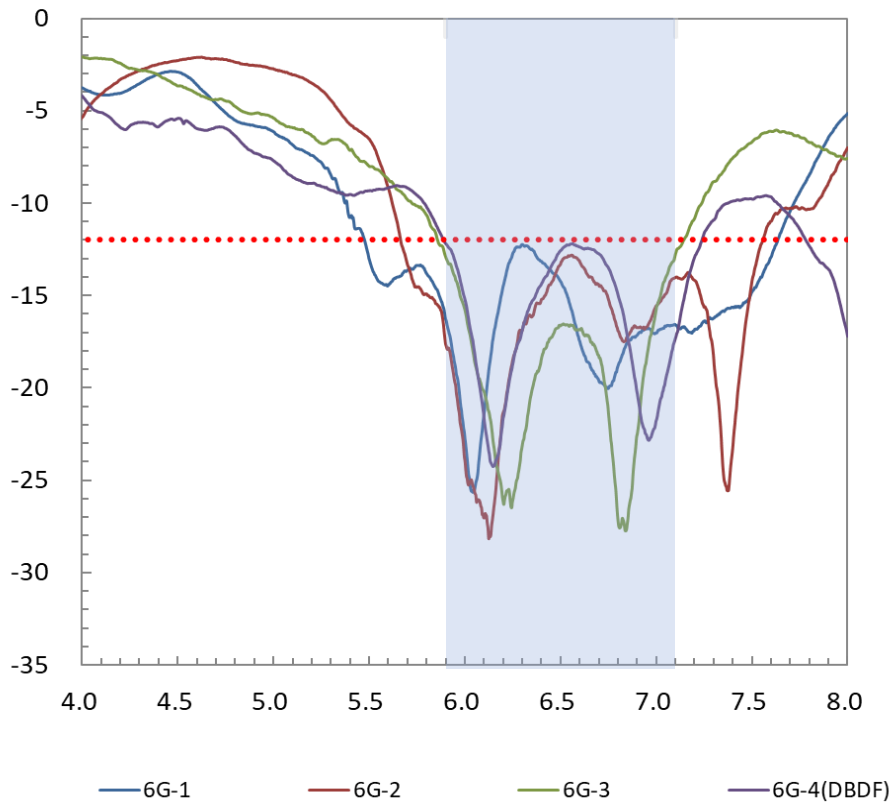


Frequency (GHz)	5G-1	5G-2	5G-3	5G-4
5.16GHz	-17.85	-34.60	-13.45	-17.41
5.25GHz	-22.39	-29.11	-18.01	-24.89
5.34GHz	-19.32	-35.20	-33.09	-26.49
5.48GHz	-14.54	-36.07	-18.98	-14.85
5.6GHz	-13.41	-23.45	-13.72	-13.66
5.72GHz	-12.34	-17.93	-12.93	-19.06
5.83GHz	-12.30	-14.67	-13.00	-21.18

Unit: dB

Measurement data

- S-parameter : Return loss_6G

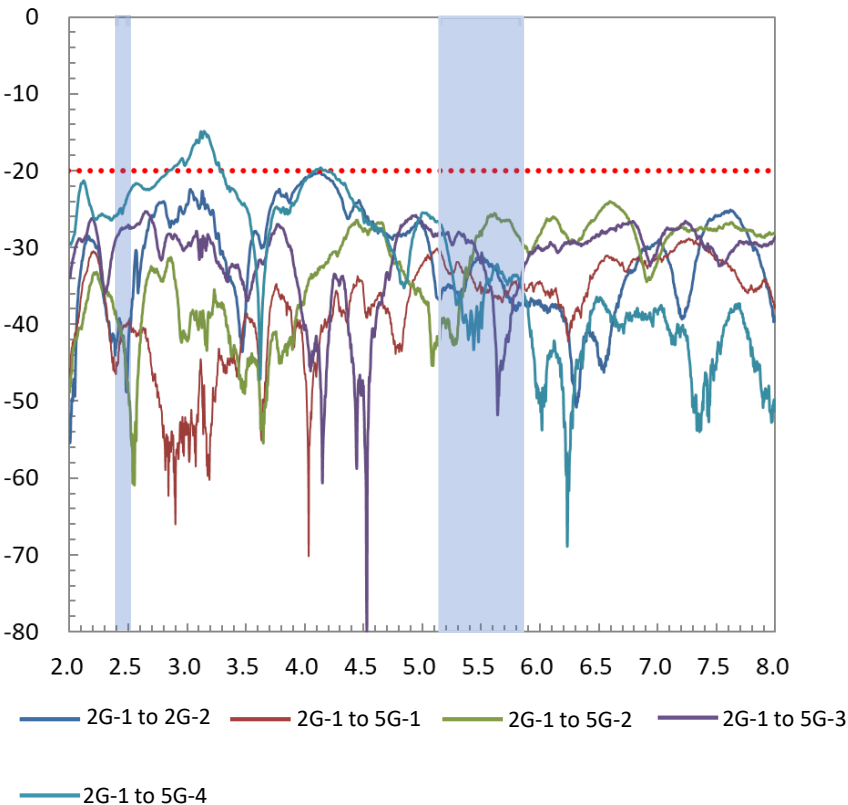


Frequency (GHz)	6G-1	6G-2	6G-3	6G-4 (DBDF)
5.9GHz	-16.27	-17.65	-12.90	-12.17
6.1GHz	-21.56	-27.02	-20.15	-21.44
6.3GHz	-12.22	-16.97	-23.28	-16.98
6.5GHz	-14.22	-13.32	-16.64	-12.56
6.7GHz	-19.54	-14.40	-18.21	-12.71
6.9GHz	-17.16	-16.75	-22.65	-20.11
7.1GHz	-16.57	-14.03	-12.77	-17.32

Unit: dB

Measurement data

- S-parameter :Isolation

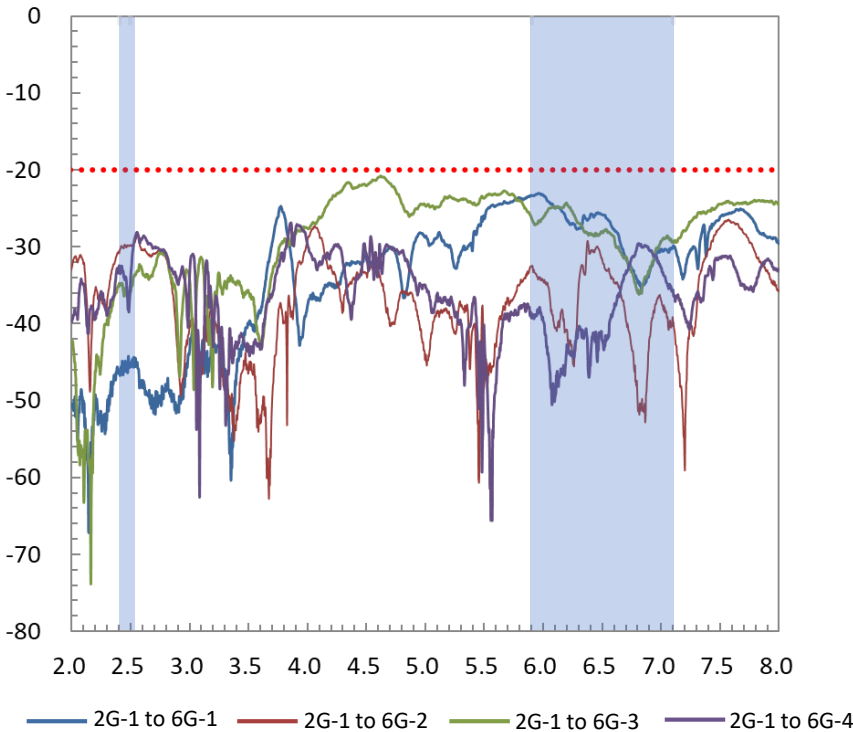


Frequency (GHz)	2G-1 to 2G-2	2G-1 to 5G-1	2G-1 to 5G-2	2G-1 to 5G-3	2G-1 to 5G-4
2.41GHz	-31.40	-39.16	-45.23	-36.18	-25.81
2.44GHz	-29.07	-39.28	-43.79	-34.88	-28.10
2.47GHz	-27.88	-39.82	-44.50	-33.24	-31.26
5.16GHz	-	-35.79	-26.54	-42.27	-34.43
5.25GHz	-	-34.37	-28.32	-35.90	-33.63
5.34GHz	-	-35.18	-30.00	-31.96	-36.35
5.48GHz	-	-34.58	-28.71	-29.71	-48.37
5.6GHz	-	-35.81	-26.39	-29.65	-43.75
5.72GHz	-	-37.75	-27.51	-30.27	-46.88
5.83GHz	-	-39.72	-29.18	-29.28	-51.57

Unit: dB

Measurement data

- S-parameter :Isolation

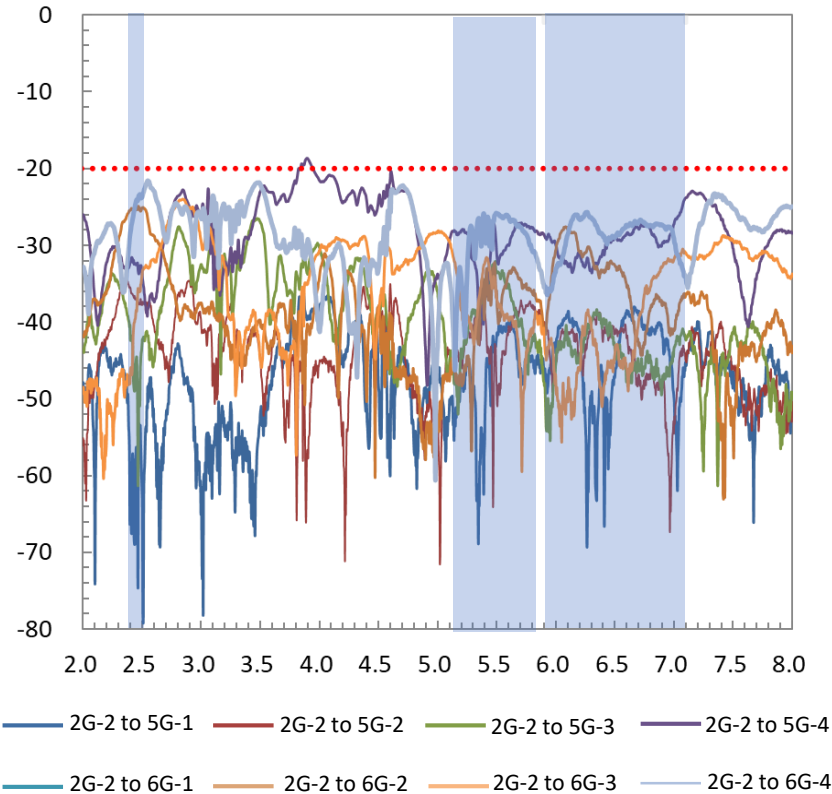


Frequency (GHz)	2G-1 to 6G-1	2G-1 to 6G-2	2G-1 to 6G-3	2G-1 to 6G-4
2.41GHz	-46.76	-30.50	-34.82	-33.27
2.44GHz	-45.11	-30.09	-35.95	-33.57
2.47GHz	-45.18	-30.02	-36.44	-35.44
5.9GHz	-23.34	-32.58	-26.27	-39.27
6.1GHz	-24.88	-40.44	-25.02	-49.53
6.3GHz	-27.61	-36.79	-26.90	-40.72
6.5GHz	-25.85	-31.43	-28.09	-42.05
6.7GHz	-31.43	-38.76	-31.24	-33.54
6.9GHz	-33.49	-43.41	-33.04	-30.31
7.1GHz	-30.12	-39.13	-29.33	-35.58

Unit: dB

Measurement data

- S-parameter :Isolation

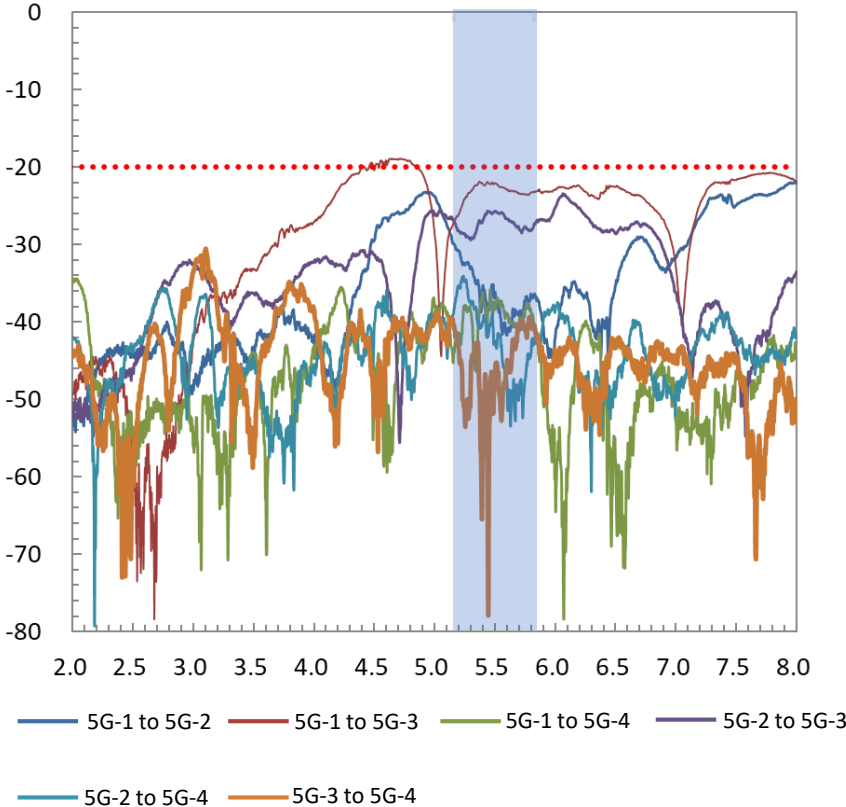


Frequency (GHz)	2G-2 to 5G-1	2G-2 to 5G-2	2G-2 to 5G-3	2G-2 to 5G-4	2G-2 to 6G-1	2G-2 to 6G-2	2G-2 to 6G-3	2G-2 to 6G-4
2.41GHz	-67.50	-36.31	-41.77	-31.69	-27.41	-25.18	-46.52	-27.41
2.44GHz	-68.95	-37.02	-48.76	-32.43	-24.97	-25.01	-39.65	-24.97
2.47GHz	-56.44	-37.48	-56.32	-33.60	-23.69	-24.92	-35.84	-23.69
5.16GHz	-52.44	-43.78	-47.30	-28.28	-	-	-	-
5.25GHz	-45.73	-41.13	-41.98	-28.45	-	-	-	-
5.34GHz	-61.22	-40.78	-40.44	-35.16	-	-	-	-
5.48GHz	-42.66	-44.72	-33.16	-27.38	-	-	-	-
5.6GHz	-40.12	-40.51	-35.02	-29.90	-	-	-	-
5.72GHz	-48.12	-38.30	-40.87	-27.28	-	-	-	-
5.83GHz	-46.11	-38.60	-42.54	-28.22	-	-	-	-
5.9GHz	-	-	-	-	-35.48	-41.01	-41.20	-35.48
6.1GHz	-	-	-	-	-28.68	-27.80	-48.96	-28.68
6.3GHz	-	-	-	-	-26.35	-30.88	-40.05	-26.35
6.5GHz	-	-	-	-	-28.90	-32.63	-44.11	-28.90
6.7GHz	-	-	-	-	-27.00	-43.06	-40.15	-27.00
6.9GHz	-	-	-	-	-27.35	-37.79	-32.92	-27.35
7.1GHz	-	-	-	-	-34.03	-36.48	-30.98	-34.03

Unit: dB

Measurement data

- S-parameter :Isolation

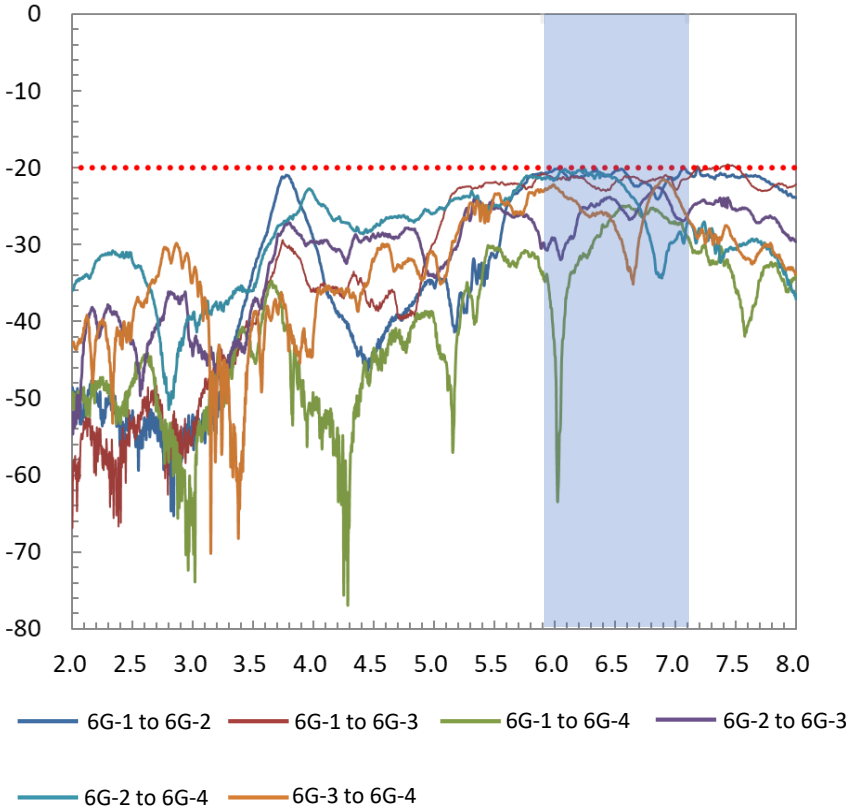


Frequency (GHz)	5G-1 to 5G-2	5G-1 to 5G-3	5G-1 to 5G-4	5G-2 to 5G-3	5G-2 to 5G-4	5G-3 to 5G-4
5.16GHz	-29.86	-27.06	-44.22	-26.99	-38.94	-40.53
5.25GHz	-32.49	-24.10	-38.41	-28.63	-34.67	-50.59
5.34GHz	-34.89	-22.30	-46.18	-28.70	-38.24	-43.66
5.48GHz	-35.22	-22.06	-39.05	-26.06	-39.02	-49.21
5.6GHz	-41.74	-22.85	-39.20	-26.72	-47.48	-45.55
5.72GHz	-39.39	-23.40	-39.76	-28.37	-47.53	-40.12
5.83GHz	-36.35	-23.11	-40.38	-27.30	-42.82	-40.83

Unit: dB

Measurement data

- S-parameter :Isolation

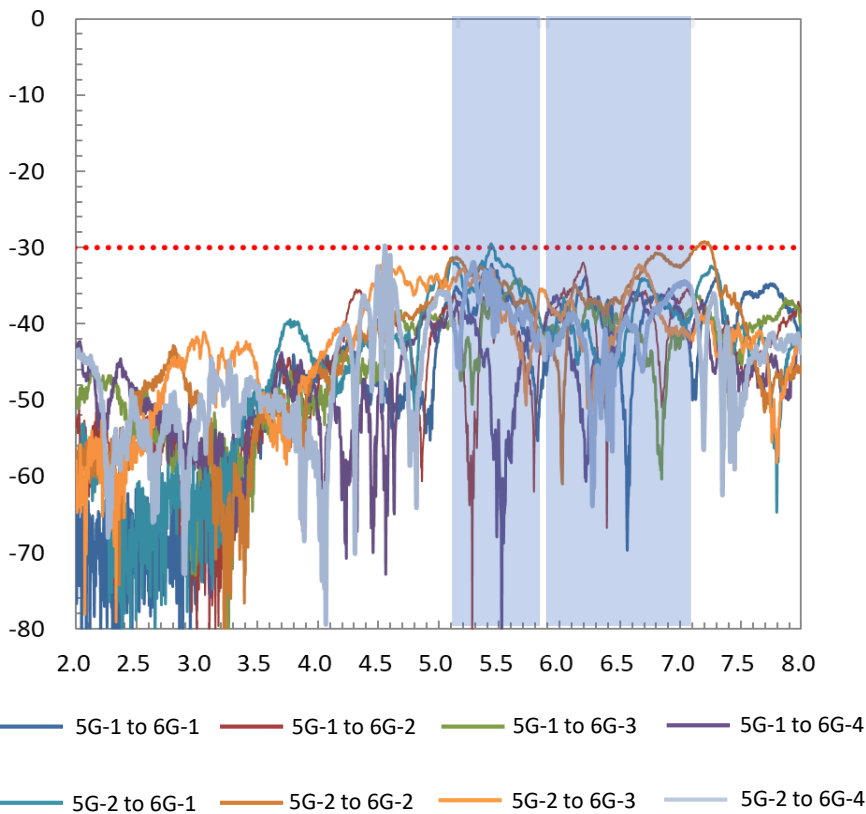


Frequency (GHz)	6G-1 to 6G-2	6G-1 to 6G-3	6G-1 to 6G-4	6G-2 to 6G-3	6G-2 to 6G-4	6G-3 to 6G-4
5.9GHz	-20.84	-20.81	-33.52	-29.86	-21.45	-23.13
6.1GHz	-21.08	-21.53	-36.45	-29.81	-20.41	-23.81
6.3GHz	-20.83	-22.23	-30.53	-24.78	-20.67	-26.33
6.5GHz	-20.41	-21.96	-26.04	-24.20	-21.28	-27.50
6.7GHz	-22.40	-21.55	-25.79	-25.11	-25.01	-29.33
6.9GHz	-22.69	-21.25	-26.28	-23.01	-33.95	-21.56
7.1GHz	-20.61	-21.43	-29.10	-26.26	-27.23	-26.36

Unit: dB

Measurement data

- S-parameter :Isolation

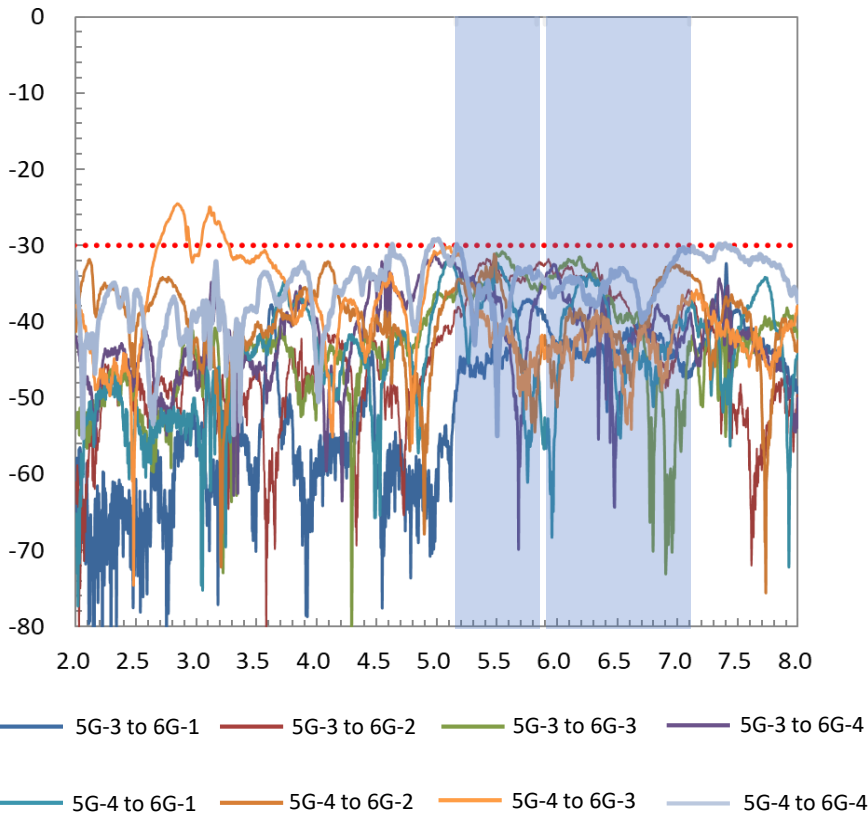


Frequency (GHz)	5G-1 to 6G-1	5G-1 to 6G-2	5G-1 to 6G-3	5G-1 to 6G-4	5G-2 to 6G-1	5G-2 to 6G-2	5G-2 to 6G-3	5G-2 to 6G-4
5.16GHz	-35.43	-38.45	-43.85	-37.43	-32.06	-31.38	-33.36	-45.69
5.25GHz	-38.37	-58.18	-42.38	-39.44	-35.53	-33.79	-34.74	-33.41
5.34GHz	-34.90	-41.72	-44.90	-42.48	-32.45	-32.58	-34.03	-37.16
5.48GHz	-33.15	-40.44	-36.40	-67.87	-31.58	-34.75	-35.59	-35.34
5.6GHz	-36.75	-38.67	-35.26	-58.23	-32.67	-36.12	-40.57	-39.29
5.72GHz	-41.22	-46.28	-35.43	-42.25	-35.19	-37.05	-50.36	-37.94
5.83GHz	-52.25	-44.78	-41.84	-41.41	-39.20	-42.00	-35.94	-41.73
5.9GHz	-44.94	-38.65	-40.61	-38.76	-41.15	-41.73	-36.70	-41.56
6.1GHz	-39.23	-35.34	-38.56	-46.04	-40.31	-36.47	-36.83	-39.61
6.3GHz	-38.30	-40.08	-39.99	-44.28	-44.65	-37.07	-47.49	-49.21
6.5GHz	-45.13	-43.15	-40.20	-41.66	-44.29	-37.16	-39.92	-41.48
6.7GHz	-38.44	-36.10	-42.82	-37.80	-34.08	-32.89	-33.17	-44.42
6.9GHz	-37.37	-41.98	-44.70	-35.92	-37.55	-31.58	-40.83	-36.25
7.1GHz	-49.99	-36.05	-38.21	-40.60	-38.24	-30.58	-41.75	-36.40

Unit: dB

Measurement data

- S-parameter :Isolation



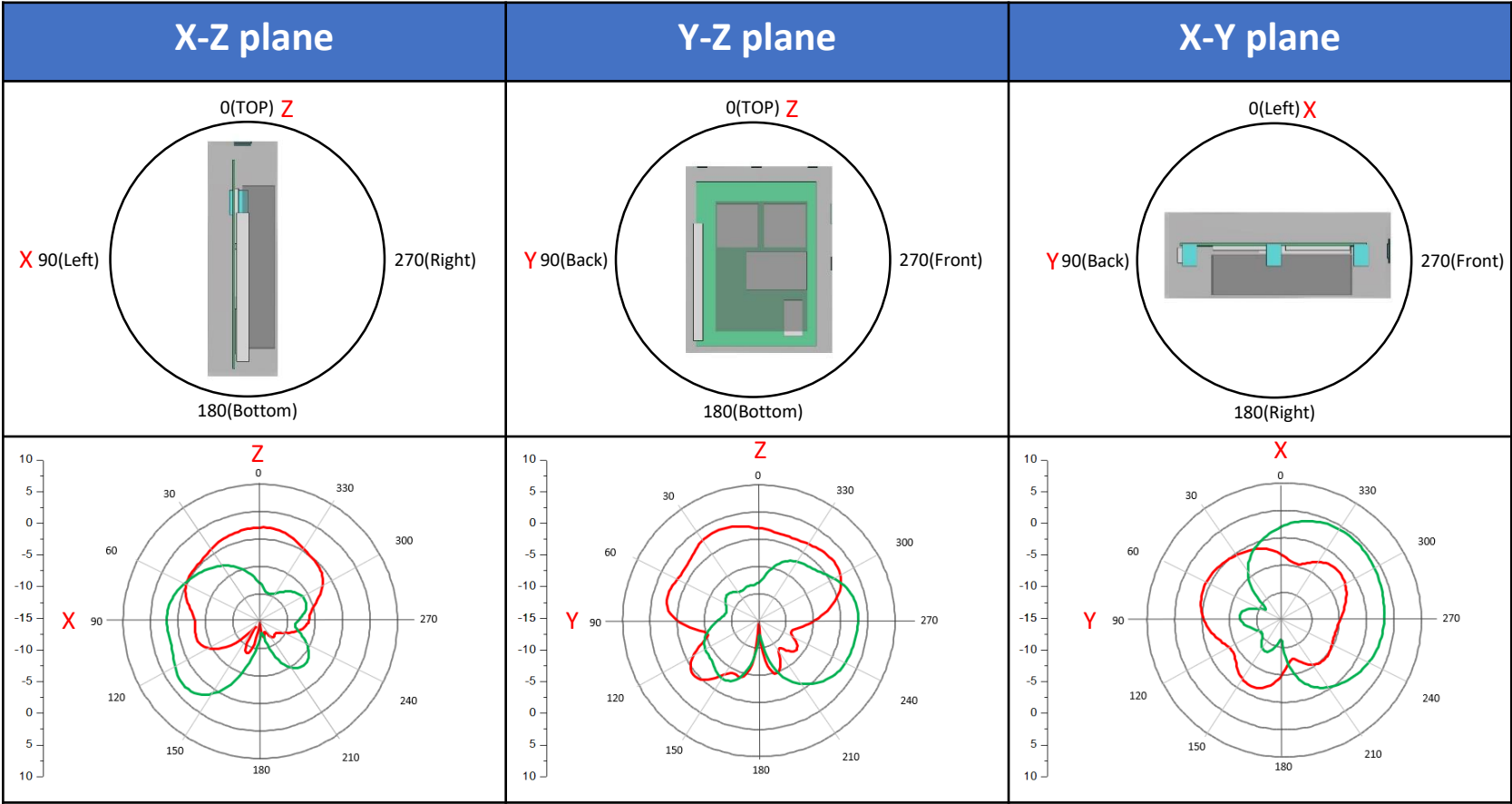
Frequency (GHz)	5G-3 to 6G-1	5G-3 to 6G-2	5G-3 to 6G-3	5G-3 to 6G-4	5G-4 to 6G-1	5G-4 to 6G-2	5G-4 to 6G-3	5G-4 to 6G-4
5.16GHz	-50.40	-38.82	-36.42	-32.88	-33.46	-35.60	-31.17	-30.13
5.25GHz	-45.21	-37.22	-34.68	-34.89	-43.32	-36.65	-35.25	-34.15
5.34GHz	-45.27	-33.35	-35.36	-34.96	-39.32	-35.55	-39.53	-36.83
5.48GHz	-45.63	-32.81	-32.10	-36.14	-33.14	-31.86	-39.41	-39.18
5.6GHz	-43.86	-34.57	-31.72	-42.68	-35.25	-39.16	-42.67	-38.69
5.72GHz	-37.59	-34.28	-33.72	-47.83	-50.32	-45.82	-47.23	-33.67
5.83GHz	-38.04	-32.49	-35.69	-37.28	-46.82	-49.76	-44.96	-34.06
5.9GHz	-39.92	-32.56	-35.60	-34.45	-54.77	-42.41	-43.70	-33.98
6.1GHz	-43.52	-32.90	-31.89	-36.45	-37.92	-38.70	-43.51	-33.93
6.3GHz	-44.35	-33.27	-33.99	-37.80	-34.51	-40.06	-39.43	-36.58
6.5GHz	-44.22	-36.53	-39.87	-51.74	-49.74	-42.06	-45.66	-33.40
6.7GHz	-40.48	-41.03	-41.66	-40.36	-45.95	-40.17	-41.52	-39.26
6.9GHz	-43.88	-46.30	-65.49	-39.93	-44.30	-33.17	-47.32	-33.51
7.1GHz	-47.01	-36.21	-43.85	-39.21	-37.99	-33.49	-37.58	-30.27

Unit: dB

Measurement data

- Radiation pattern – 2.44GHz

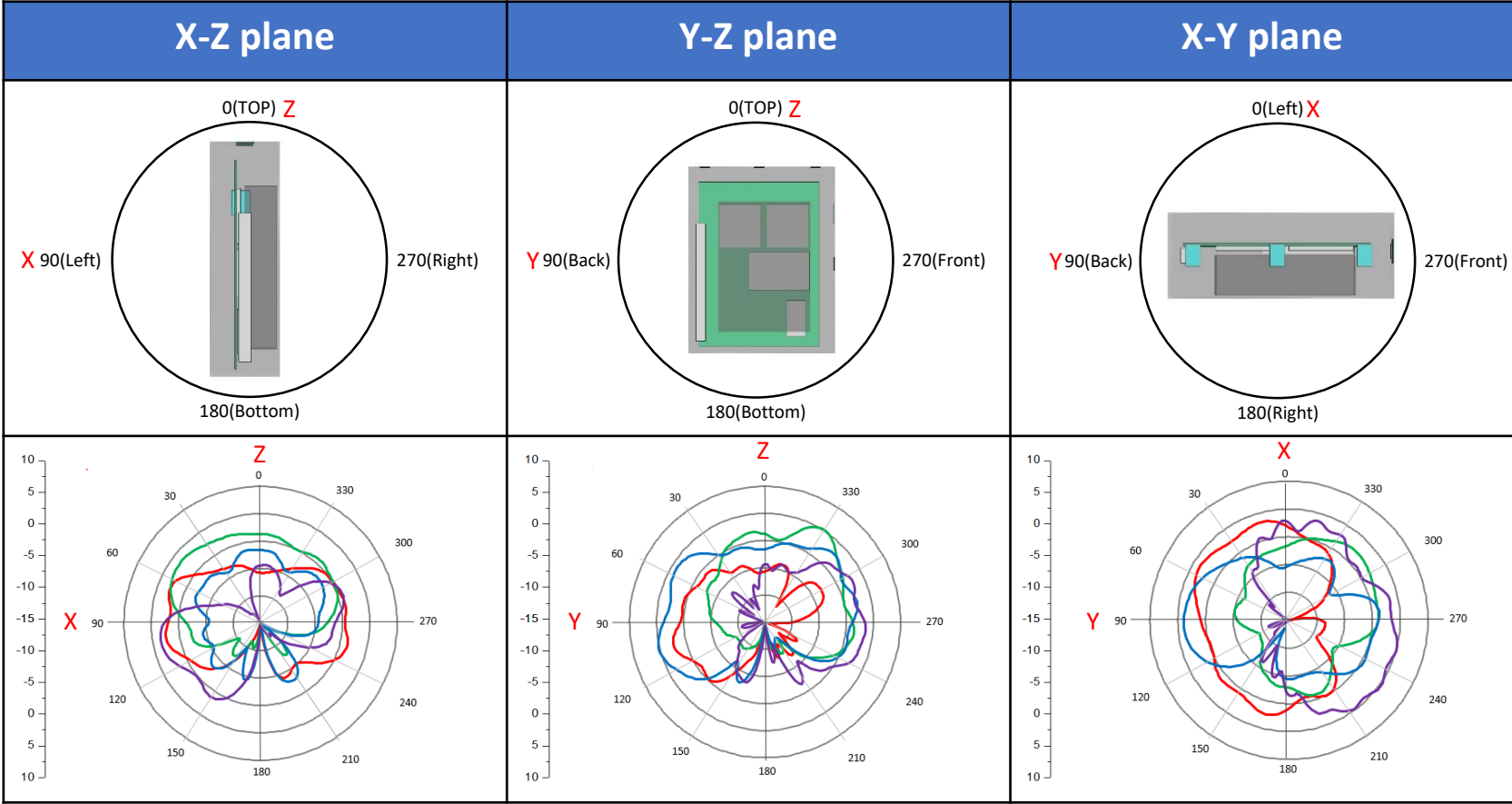
— 2G-1 — DBDF(2G-2)



Measurement data

- Radiation pattern – 5.48GHz

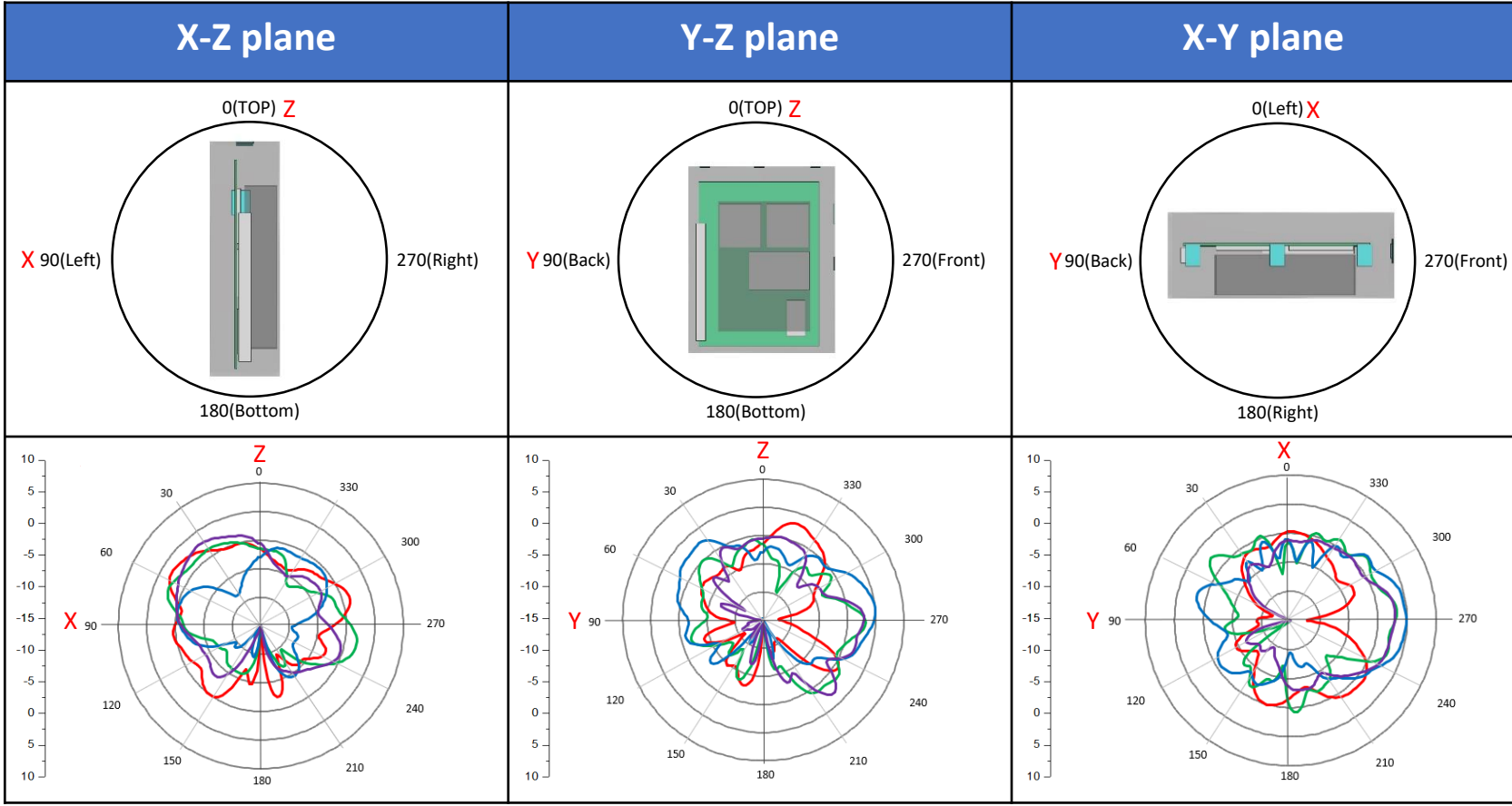
— 5G-1 — 5G-2
— 5G-3 — 5G-4



Measurement data

- Radiation pattern – 6.5G

— 6G-1 — 6G-2
— 6G-3 — DBDF(6G-4)



Measurement data

- Gain table

Frequency (MHz)	2G-1		DBDF(2G-2)	
	Phi	Theta	Phi	Theta
2410	3.21	2.38	-1.95	3.84
2440	3.37	2.22	-1.77	4.27
2470	3.21	1.42	-2.37	4.24

Measurement data

- Gain table

Frequency (MHz)	5G-1		5G-2		5G-3		5G-4	
	Phi	Theta	Phi	Theta	Phi	Theta	Phi	Theta
5160	-2.48	3.22	4.38	3.15	4.93	1.22	0.58	5.07
5250	-1.94	4.04	4.10	3.75	5.16	1.47	0.03	4.91
5340	-1.06	4.03	4.05	4.42	5.09	1.52	-0.57	5.26
5480	-0.59	3.49	4.62	5.00	5.16	0.34	-0.72	5.38
5600	-0.64	2.63	4.30	4.35	4.87	-0.03	0.05	5.53
5720	-1.25	3.17	3.42	3.83	5.16	1.21	-0.72	5.41
5830	-0.96	3.47	2.75	3.30	4.79	1.43	-1.21	5.61

Measurement data

- Gain table

Frequency (MHz)	6G-1		6G-2		6G-3		DBDF(6G-4)	
	Phi	Theta	Phi	Theta	Phi	Theta	Phi	Theta
5900	3.83	1.63	3.00	3.21	4.20	1.73	2.91	4.27
6100	3.52	3.36	1.92	1.91	5.12	1.18	1.94	3.75
6300	3.78	4.08	2.87	2.15	4.89	1.10	1.51	3.54
6500	2.58	2.70	2.53	4.26	4.87	1.70	2.03	3.24
6700	1.56	1.65	0.90	4.08	3.90	1.81	2.52	3.76
6900	2.13	2.34	0.15	3.97	2.90	0.02	2.47	3.33
7100	2.88	3.04	2.03	4.55	3.15	2.21	2.44	3.96

Measurement data

❖ Directional gain table _ Correlated

Frequency (MHz)	Peak Gain of 3D Directional pattern					
	2G		5G		6G	
	Phi	Theta	Phi	Theta	Phi	Theta
2410	2.71	3.26	-	-	-	-
2440	2.54	3.92	-	-	-	-
2470	2.27	3.58	-	-	-	-
5160	-	-	3.86	5.22	-	-
5250	-	-	3.99	5.22	-	-
5340	-	-	3.70	5.32	-	-
5480	-	-	3.61	5.37	-	-
5600	-	-	3.81	5.11	-	-
5720	-	-	3.50	4.97	-	-
5830	-	-	3.67	5.27	-	-
5900	-	-	-	-	5.85	5.08
6100	-	-	-	-	6.21	5.49
6300	-	-	-	-	5.19	5.68
6500	-	-	-	-	5.01	4.44
6700	-	-	-	-	4.41	4.59
6900	-	-	-	-	3.87	4.86
7100	-	-	-	-	4.47	5.83

Summary

◆ Return loss:

- All antenna can be under -12dB.

◆ Isolation:

- We follow the latest cable routing. The 5G to 6G isolation can meet Spec -30.
- The in band isolation can meet Spec -20dB.

◆ Radiation:

- In the 2.4G band:

The combine radiation pattern are similar than before.

- In 5G band :

The combine radiation pattern are similar than before.

- In 6G band

The combine radiation pattern are similar than before.

Antenna Information

Ant.	Port	Brand Name	Model Name	Ant. Type	Connector	Support	Radio	Manufacturer
2G-1	2.4G ANT1	Pegatron	2G-1	Dipole Antenna	I-Pex	2.4G	Radio 1	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
2G-2	2.4G ANT0	Pegatron	DBDF	Dipole Antenna	I-Pex	2.4G	Radio 1	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
5G-1	5G ANT0	Pegatron	5G-0	PCB Antenna	-	5G	Radio 2	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
5G-2	5G ANT1	Pegatron	5G-1	PCB Antenna	-	5G	Radio 2	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
5G-3	5G ANT2	Pegatron	5G-2	Dipole Antenna	I-Pex	5G	Radio 2	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
5G-4	5G ANT3	Pegatron	5G-3	Dipole Antenna	I-Pex	5G	Radio 2	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
6G-3	6G ANT0	Pegatron	6G-0	Dipole Antenna	I-Pex	6G	Radio 3	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
6G-1	6G ANT1	Pegatron	6G-1	PCB Antenna	-	6G	Radio 3	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
6G-2	6G ANT2	Pegatron	6G-2	PCB Antenna	-	6G	Radio 3	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)
6G-4	6G ANT3	Pegatron	DBDF	Dipole Antenna	I-Pex	6G	Radio 3	INPAQ No. 106, Ligong St., Beitou Dist., Taipei City 112019, Taiwan (R.O.C.)