

【TN0022A】 Wi-Fi/Bluetooth Antenna

1.Specification

Antenna Type : Inverted F Antenna
Part No. ANT1 : ANT2312-A3.0-W/U-90-W
 ANT2 : ANT2312-A3.0-W/U-99-A
Antenna Gain(Peak) : ANT1 Wi-Fi 2.4GHz -0.84dBi
 ANT1 Wi-Fi 5GHz 3.49dBi
 ANT2 Bluetooth -0.35dBi
 ANT2 Wi-Fi 5GHz 3.43dBi

Frequency Band : Bluetooth 2402 - 2480 MHz
 Wi-Fi 2.4GHz 2412 - 2462 MHz
 Wi-Fi 5GHz(W52) 5180 - 5240 MHz
 Wi-Fi 5GHz(W58) 5745 - 5825 MHz

2.Appearance / Dimension

See fig.1 on another Document.(FCC Test Setup Photo_AUT)

Measurement content

1.Measurement condition

- Measurement ANT : ETS-LINDGREN 3115 (1-18GHz)
- Reference ANT : ETS-LINDGREN 3160-03 (1.7-2.6GHz) / 3160-05 (3.95-5.85GHz)
- Measuring instrument : P9372A (Keysight network analyzer)
- Measured distance : 3m (1.5m high)
- Range of measurement : 360 degree/5 degree step
- Measurement layout : The measurement environment is measured with the following layout.

See fig2 on another Document.(FCC Test Setup Photo_AUT)

2.Measurement direction

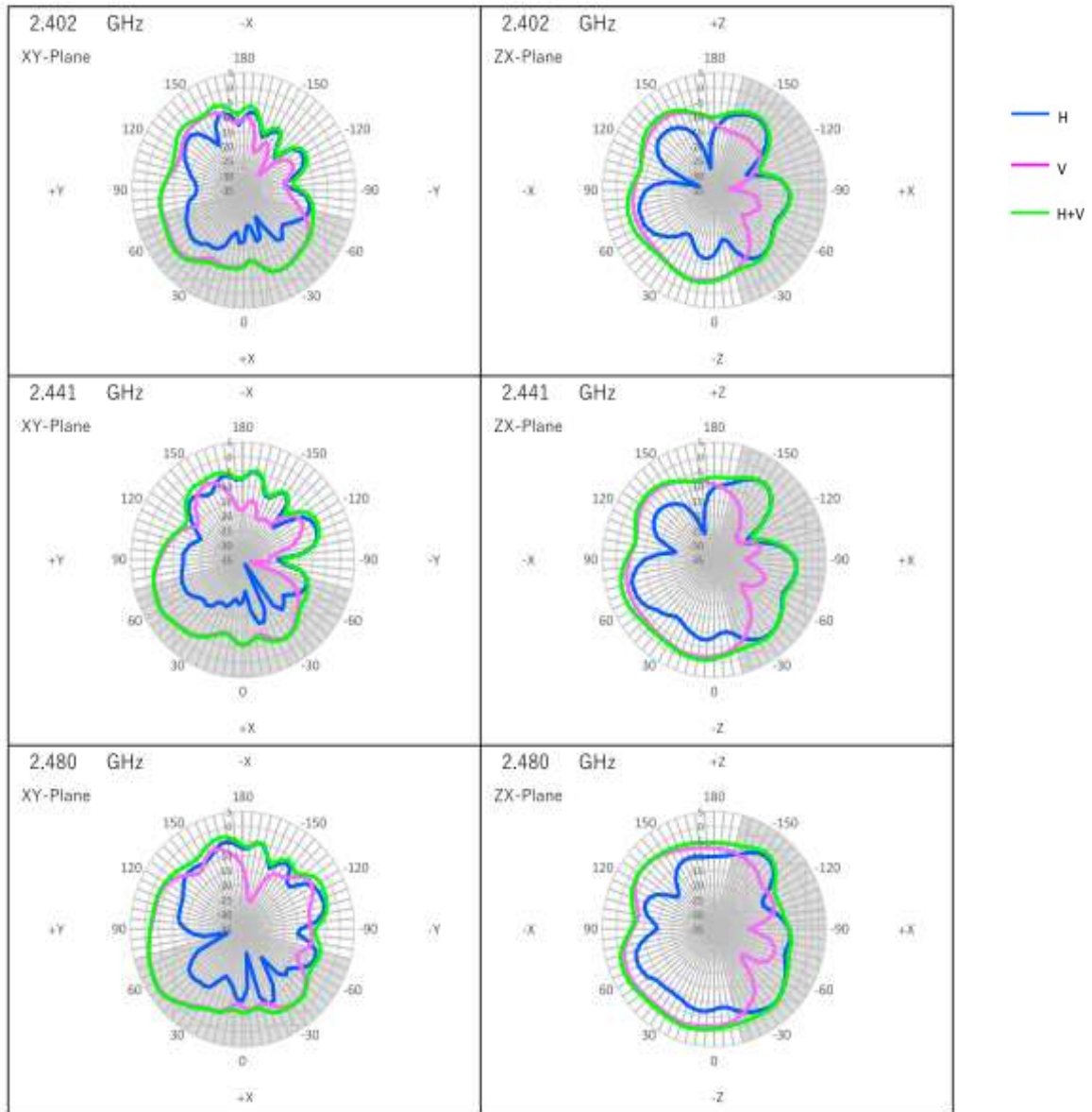
See fig3 on another Document.(FCC Test Setup Photo_AUT)

- Test dates : 2023/12/20~12/21
- Names of test personnel : Toshiaki Hirose(NISSEI ELECTRIC CO.,LTD.)
- Names of commercial test software being used : Antenna gain measurement system(NISSEI ELECTRONICS CO.,LTD.)

3.Antenna gain and Radio wave radiation pattern (directivity graph)

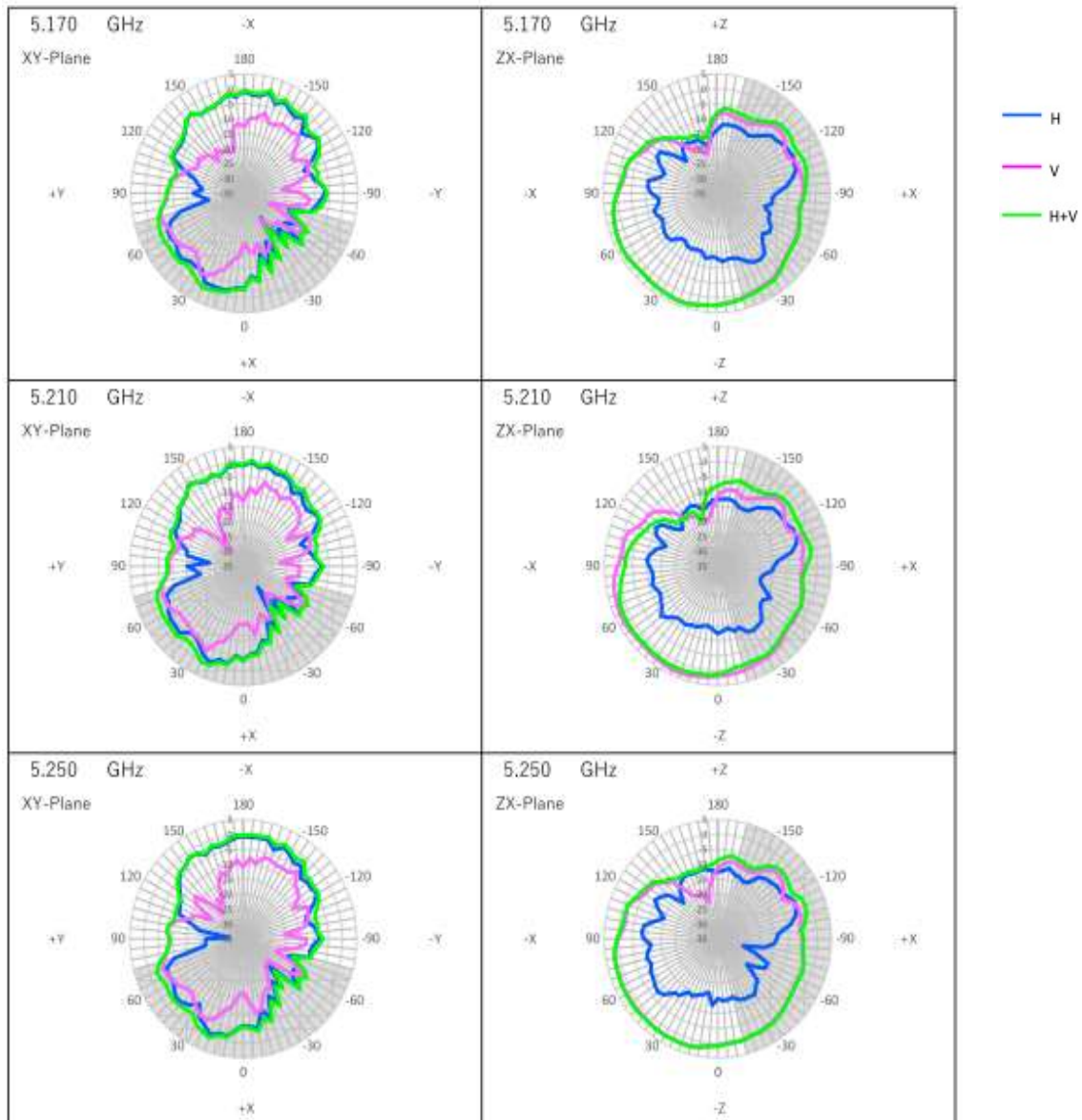
3-1. Ant1 (2.4GHz-Band)

Frequency [GHz]	Plane	Polarization (H/Horizontal /V/Vertical)	Peak [dBi]	$\pm 100^\circ$ Average[dBi]	$\pm 100^\circ$ Avg. linear value	Composite linear value	Composite [dBi]	DIP [dBi]	DIP-AVE [dBi]
2.402	XY	H	-7.84	-11.87	0.06	0.17	-7.75	-18.83	14.54
		V	-4.87	-9.88	0.10				
	ZX	H	-7.23	-11.40	0.07	0.33	-4.83	-10.08	5.78
		V	-3.72	-5.90	0.26				
2.441	XY	H	-4.69	-9.39	0.12	0.21	-6.82	-20.63	16.34
		V	-2.96	-10.33	0.09				
	ZX	H	-4.51	-9.22	0.12	0.54	-2.71	-7.44	3.15
		V	-1.53	-3.81	0.42				
2.480	XY	H	-4.62	-8.13	0.15	0.37	-4.37	-10.93	6.63
		V	-1.00	-6.75	0.21				
	ZX	H	-5.18	-8.82	0.13	0.63	-2.04	-6.34	2.05
		V	-0.84	-3.06	0.49				
Average Gain[dBi]			-4.30		Max.Peak[dBi]			-0.84	



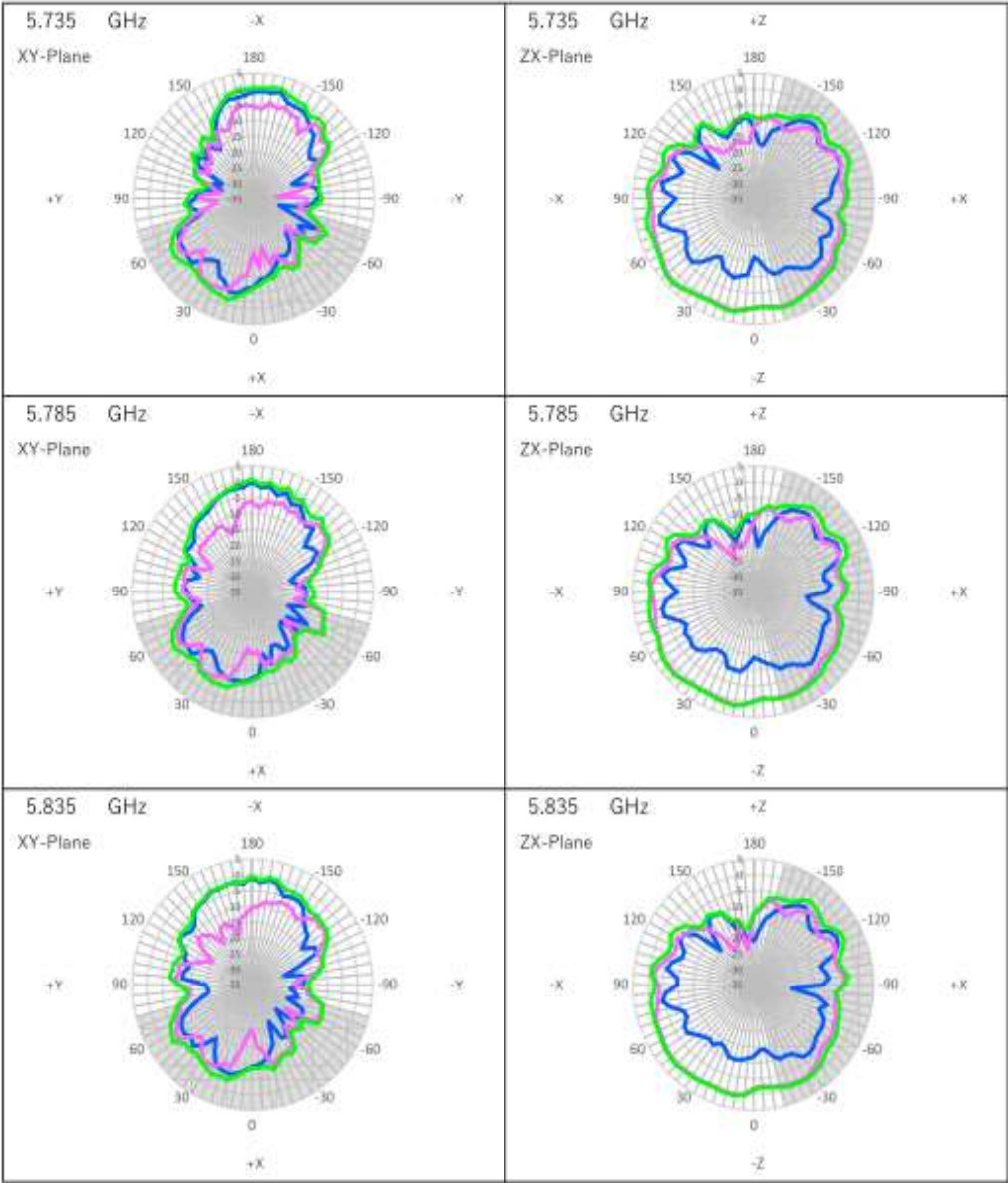
3-2. Ant1 (5GHz-Band1)

Frequency [GHz]	Plane	Polarization H(Horizontal) V(Vertical)	Peak [dBi]	$\pm 100^\circ$ Average[dBi]	$\pm 100^\circ$ Avg. linear value	Composite linear value	Composite [dBi]	DIP [dBi]	DIP-AVE [dBi]
5.170	XY	H	-0.05	-4.84	0.33	0.41	-3.92	-10.40	9.02
		V	-5.46	-11.10	0.08				
	ZX	H	-10.67	-13.51	0.04	1.06	0.27	-16.26	14.87
		V	3.49	0.08	1.02				
5.210	XY	H	-0.09	-4.62	0.34	0.43	-3.65	-9.88	8.50
		V	-5.91	-10.61	0.09				
	ZX	H	-8.87	-12.38	0.06	1.09	0.37	-14.04	12.65
		V	3.33	0.14	1.03				
5.250	XY	H	-0.68	-4.70	0.34	0.43	-3.67	-10.01	8.62
		V	-5.71	-10.45	0.09				
	ZX	H	-7.35	-11.09	0.08	0.94	-0.27	-10.92	9.53
		V	2.34	-0.64	0.86				
Average Gain[dBi]			-1.39		Max.Peak[dBi]			3.49	



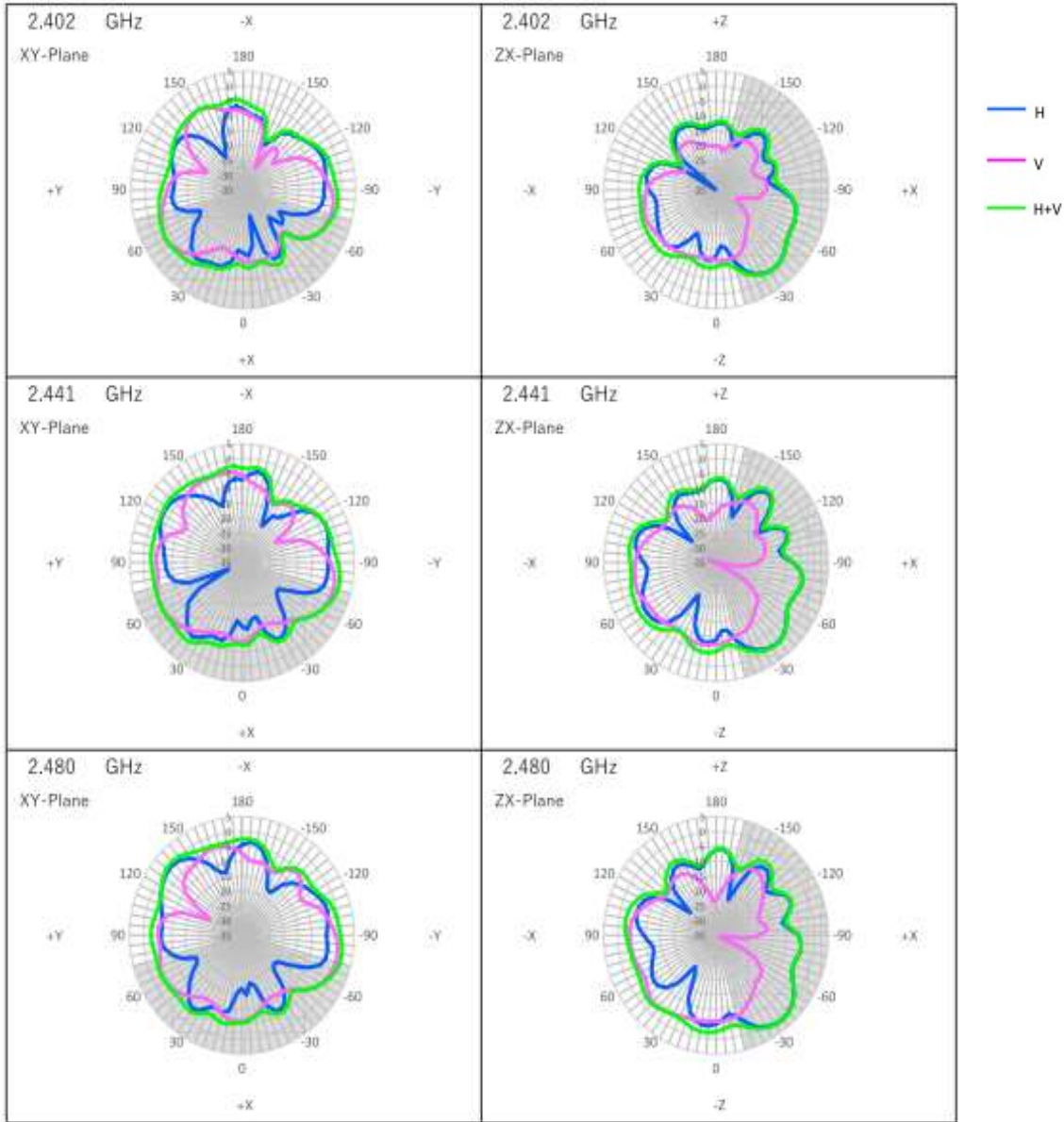
3-3. Ant1 (5GHz-Band4)

Frequency [GHz]	Plane	Polarization H(Horizontal) V(Vertical)	Peak [dBi]	± 100° Average[dBi]	± 100° Avg. linear value	Composite linear value	Composite [dBi]	DIP [dBi]	DIP-AVE [dBi]
5.735	XY	H	0.18	-6.32	0.23	0.37	-4.37	-19.26	16.69
		V	-3.52	-8.79	0.13				
	ZX	H	-2.79	-8.17	0.15	0.84	-0.75	-11.91	9.34
		V	2.64	-1.62	0.69				
5.785	XY	H	-0.08	-6.08	0.25	0.36	-4.41	-16.21	13.63
		V	-4.27	-9.36	0.12				
	ZX	H	-4.03	-9.07	0.12	0.78	-1.09	-15.26	12.68
		V	1.92	-1.85	0.65				
5.835	XY	H	-0.96	-6.20	0.24	0.33	-4.82	-16.42	13.84
		V	-5.10	-10.48	0.09				
	ZX	H	-4.05	-9.88	0.10	0.64	-1.94	-17.20	14.63
		V	1.00	-2.70	0.54				
Average Gain[dBi]			-2.58		Max.Peak[dBi]			2.64	



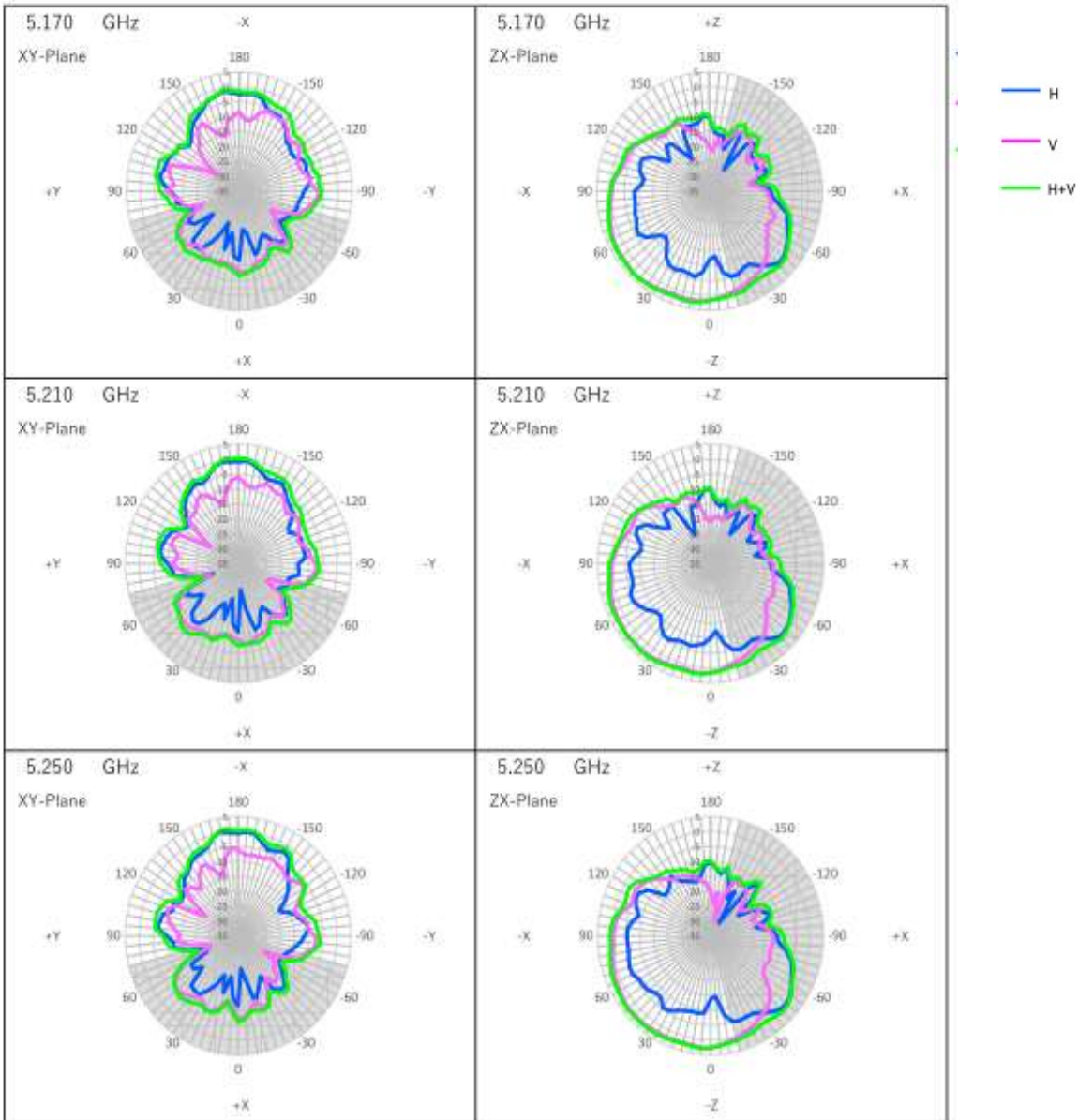
3-4. Ant2 (2.4GHz-Band)

Frequency [GHz]	Plane	Planization (H/Horizontal /V/Vertical)	Peak [dBi]	±100° Average[dBi]	±100° Avg. linear value	Composite linear value	Composite [dBi]	DIP [dBi]	DIP-AVE [dBi]
2.402	XY	H	-4.46	-8.24	0.15	0.32	-4.99	-16.44	11.97
		V	-2.55	-7.77	0.17				
	ZX	H	-9.31	-12.29	0.06	0.12	-9.18	-20.32	15.86
		V	-8.29	-12.10	0.06				
2.441	XY	H	-2.41	-5.62	0.27	0.51	-2.92	-12.14	7.68
		V	-1.47	-6.27	0.24				
	ZX	H	-5.13	-8.60	0.14	0.27	-5.67	-12.18	7.71
		V	-5.40	-8.76	0.13				
2.480	XY	H	-0.85	-5.09	0.31	0.57	-2.45	-9.66	5.19
		V	-0.35	-5.87	0.26				
	ZX	H	-4.28	-8.36	0.15	0.36	-4.45	-12.37	7.91
		V	-3.18	-6.71	0.21				
Average Gain[dBi]			-4.46		Max.Peak[dBi]			-0.35	



3-5. Ant2 (5GHz-Band1)

Frequency [GHz]	Plane	Polarization (H=Horizontal) (V=Vertical)	Peak [dBi]	$\pm 100^\circ$ Average[dBi]	$\pm 100^\circ$ Avg. linear value	Composite linear value	Composite [dBi]	DIP [dBi]	DIP-AVE [dBi]
5.170	XY	H	-1.06	-6.40	0.23	0.33	-4.82	-10.79	9.28
		V	-6.19	-9.96	0.10				
	ZX	H	-5.86	-9.49	0.11	1.03	0.14	-14.04	12.53
		V	3.43	-0.36	0.92				
5.210	XY	H	-0.44	-5.83	0.26	0.37	-4.34	-11.91	10.40
		V	-5.91	-9.73	0.11				
	ZX	H	-4.80	-8.53	0.14	1.03	0.14	-13.84	12.32
		V	3.02	-0.50	0.89				
5.250	XY	H	0.60	-5.32	0.29	0.41	-3.82	-11.34	9.82
		V	-5.32	-9.18	0.12				
	ZX	H	-4.48	-7.95	0.16	1.06	0.24	-13.00	11.48
		V	2.89	-0.47	0.90				
Average Gain[dBi]			-1.51		Max.Peak[dBi]			3.43	



3-6. Ant2 (5GHz-Band4)

Frequency [GHz]	Plane	Plarization H(Horizontal) V(Vertical)	Peak [dBi]	$\pm 100^\circ$ Average[dBi]	$\pm 100^\circ$ Avg. linear value	Composite linear value	Composite [dBi]	DIP [dBi]	DIP-AVE [dBi]
5.735	XY	H	-0.35	-6.27	0.24	0.42	-3.73	-17.43	14.79
		V	-0.87	-7.27	0.19				
	ZX	H	-3.29	-6.64	0.22	0.81	-0.90	-21.25	18.60
		V	1.43	-2.25	0.60				
5.785	XY	H	-1.55	-6.55	0.22	0.41	-3.92	-14.09	11.45
		V	-1.64	-7.34	0.18				
	ZX	H	-3.51	-6.83	0.21	0.72	-1.42	-20.39	17.75
		V	1.33	-2.90	0.51				
5.835	XY	H	-3.97	-8.03	0.16	0.32	-4.94	-14.41	11.77
		V	-2.66	-7.87	0.16				
	ZX	H	-3.59	-7.84	0.16	0.58	-2.34	-18.02	15.38
		V	0.50	-3.78	0.42				
Average Gain[dBi]			-2.64		Max.Peak[dBi]			1.43	

