

【TN0023A】 Wi-Fi/Bluetooth Antenna

1.Specification

Antenna Type : Inverted F Antenna
Part No. ANT1 : ANT2312-A3.0-W/U-100-W
 ANT2 : ANT2312-A3.0-W/U-135-A
Antenna Gain(Peak) : ANT1 Wi-Fi 2.4GHz -0.98dBi
 ANT1 Wi-Fi 5GHz 2.69dBi
 ANT2 Bluetooth -0.56dBi
 ANT2 Wi-Fi 5GHz 3.40dBi

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

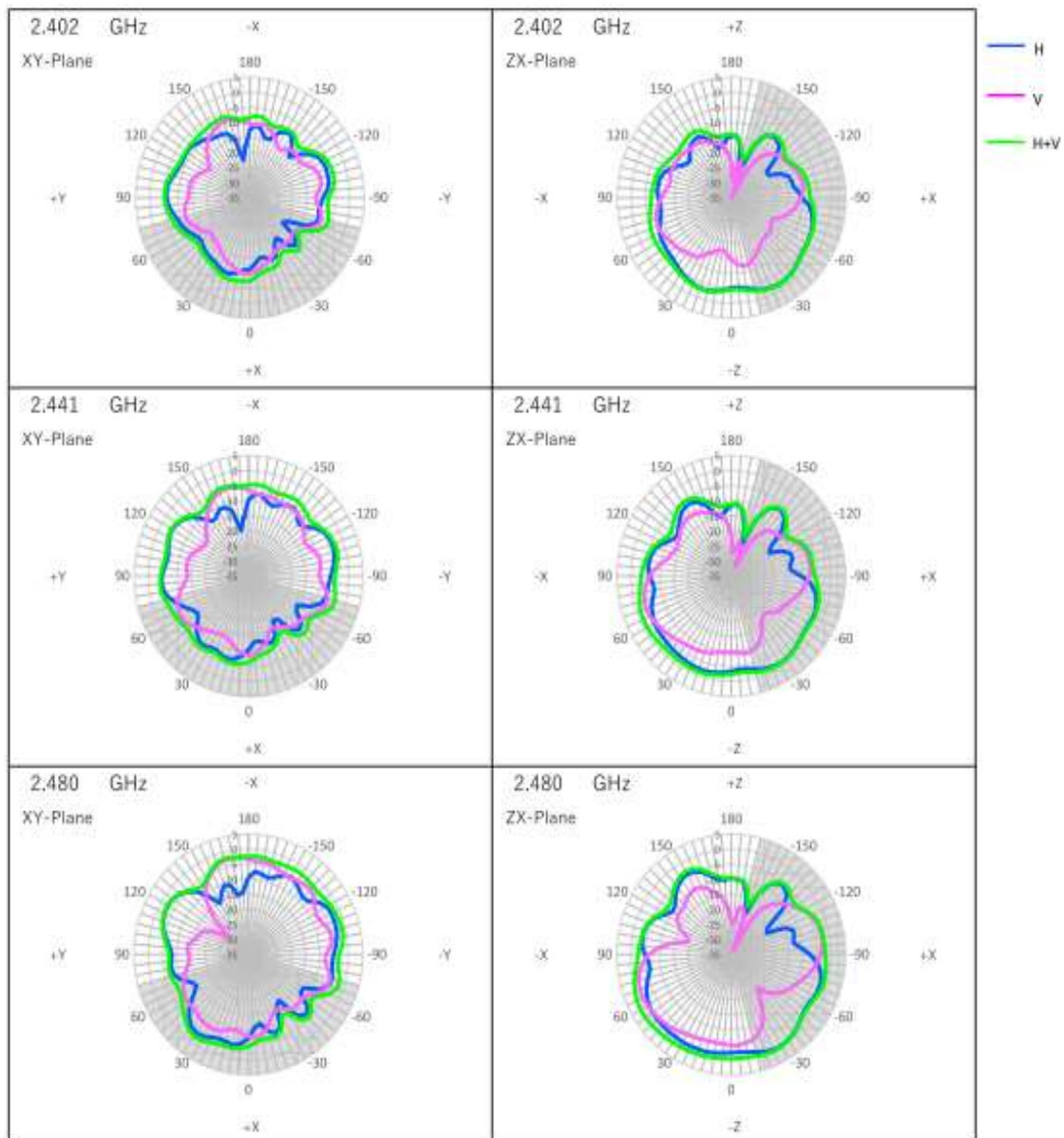
See fig3 on another Document.(FCC Test Setup Photo_AUT)

- Test dates : 2023/12/18
- 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)

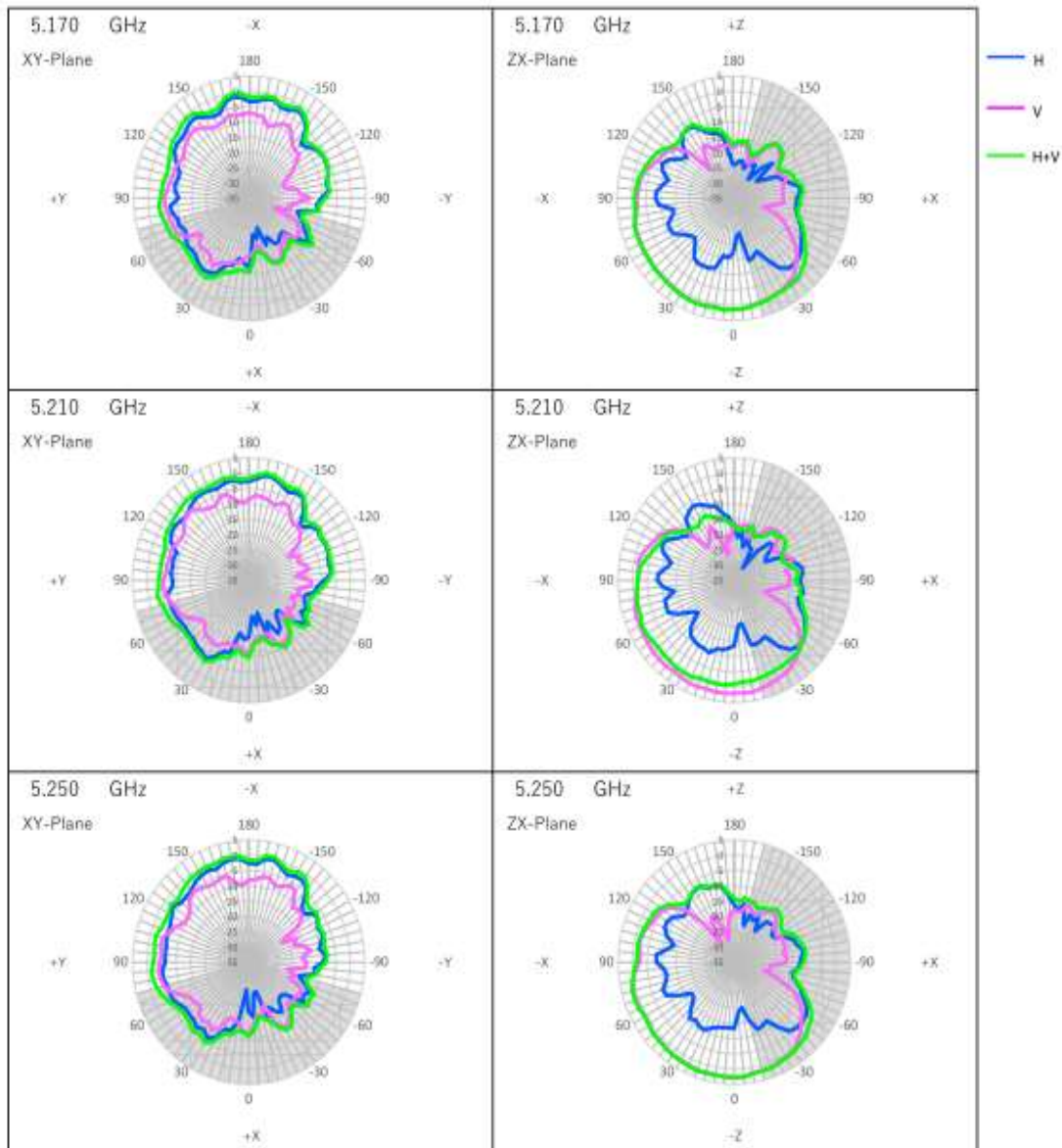
3-1. Ant1 (2.4GHz-Band)

Frequency [GHz]	Plane	Polarization (Horizontal/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	-5.88	-9.20	0.12	0.19	-7.17	-11.32	7.25
		V	-7.91	-11.46	0.07				
	ZX	H	-3.11	-7.71	0.17	0.23	-6.34	-16.47	12.39
		V	-7.70	-12.05	0.06				
2.441	XY	H	-3.88	-6.80	0.21	0.33	-4.78	-8.14	4.07
		V	-4.92	-9.08	0.12				
	ZX	H	-2.13	-5.58	0.28	0.43	-3.69	-12.37	8.29
		V	-3.40	-8.22	0.15				
2.480	XY	H	-2.48	-5.83	0.26	0.48	-3.16	-7.35	3.28
		V	-2.57	-6.53	0.22				
	ZX	H	-1.35	-3.82	0.41	0.68	-1.67	-10.04	5.97
		V	-0.98	-5.75	0.27				
Average Gain[dBi]			-4.08		Max.Peak[dBi]		-0.98		



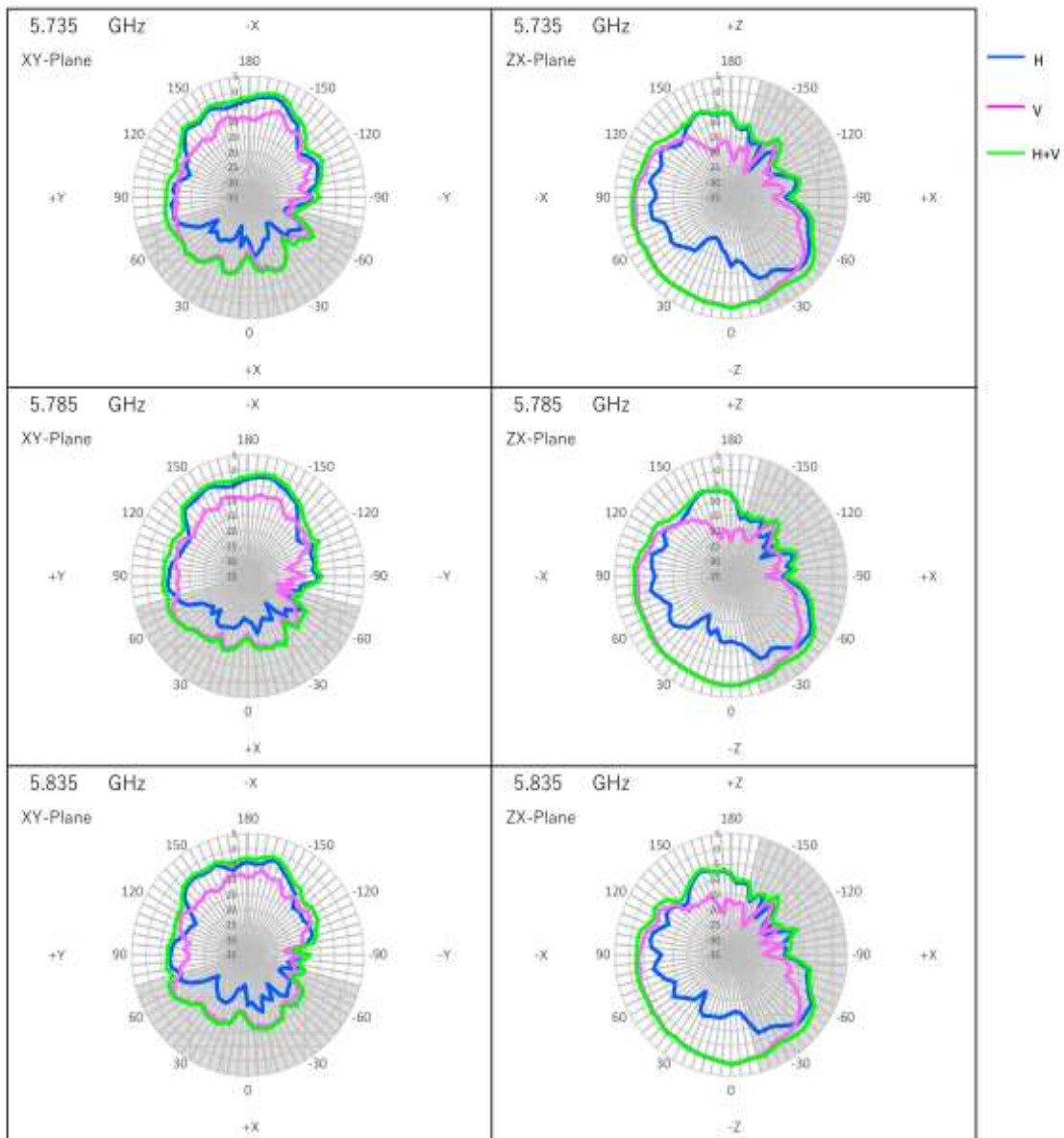
3-2. Ant1 (5GHz-Band1)

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	-1.34	-4.95	0.32	0.45	-3.43	-10.95	9.19
		V	-5.50	-8.74	0.13				
	ZX	H	-7.40	-11.66	0.07	0.72	-1.44	-17.54	15.78
		V	1.62	-1.87	0.65				
5.210	XY	H	-0.16	-4.33	0.37	0.52	-2.82	-11.17	9.41
		V	-4.57	-8.15	0.15				
	ZX	H	-6.74	-10.97	0.08	0.86	-0.68	-15.92	14.17
		V	2.14	-1.10	0.78				
5.250	XY	H	-0.46	-4.21	0.38	0.55	-2.59	-11.51	9.75
		V	-3.85	-7.65	0.17				
	ZX	H	-7.62	-10.92	0.08	0.90	-0.45	-15.19	13.43
		V	2.69	-0.86	0.82				
Average Gain[dBi]			-1.76		Max.Peak[dBi]		2.69		



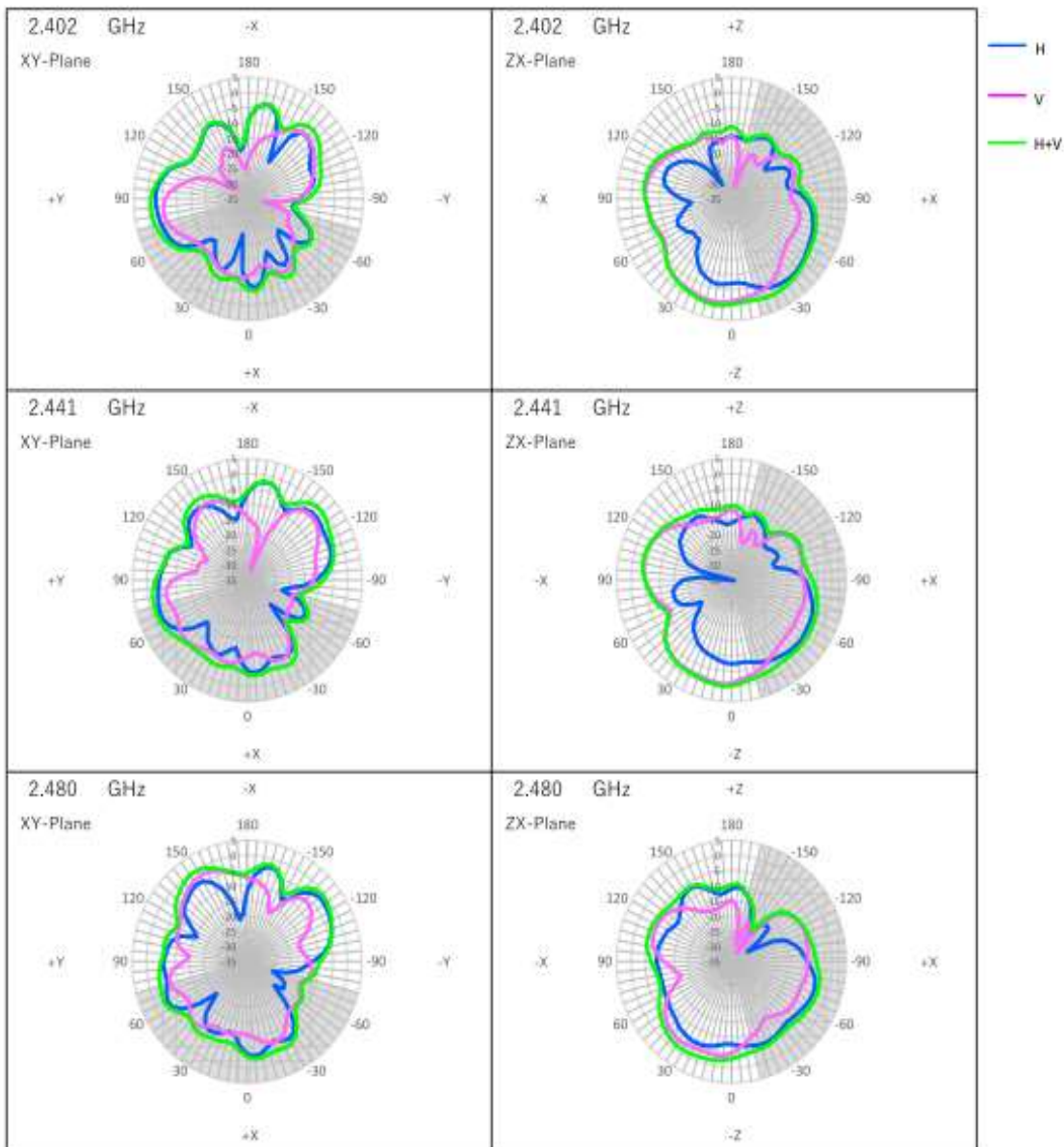
3-3. Ant1 (5GHz-Band4)

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]
5.735	XY	H	-0.93	-6.01	0.25	0.36	-4.47	-15.92	12.61
		V	-4.91	-9.74	0.11				
	ZX	H	-5.09	-9.13	0.12	0.69	-1.61	-11.58	8.27
		V	1.42	-2.45	0.57				
5.785	XY	H	-1.71	-6.11	0.24	0.34	-4.73	-14.59	11.27
		V	-7.53	-10.35	0.09				
	ZX	H	-5.58	-9.43	0.11	0.61	-2.17	-14.18	10.87
		V	1.08	-3.07	0.49				
5.835	XY	H	-2.50	-7.22	0.19	0.27	-5.61	-19.16	15.85
		V	-6.44	-10.70	0.09				
	ZX	H	-5.56	-10.04	0.10	0.53	-2.73	-10.56	7.25
		V	1.20	-3.63	0.43				
Average Gain[dBi]			-3.31		Max.Peak[dBi]		1.42		



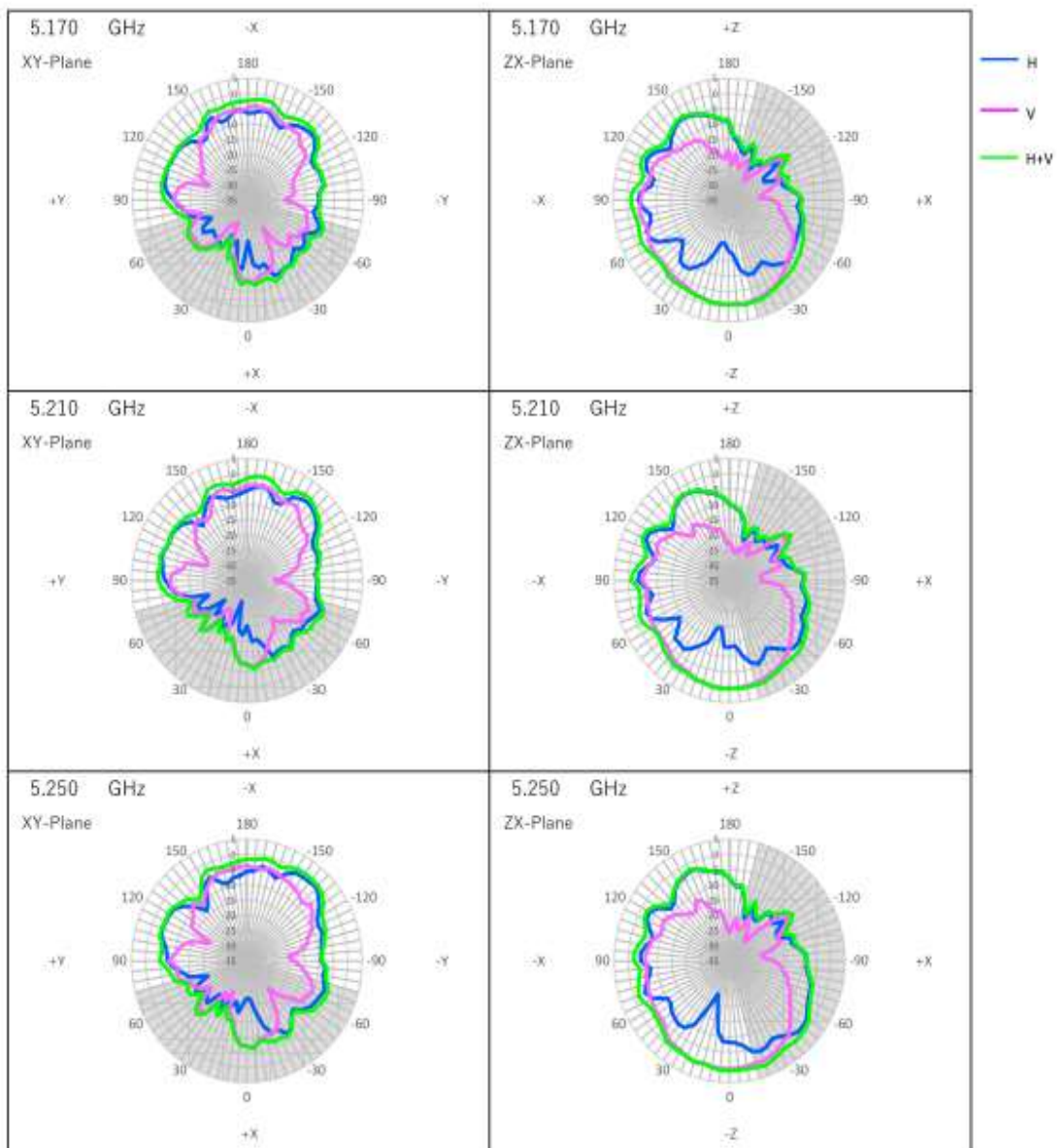
3-4. Ant2 (2.4GHz-Band)

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	-2.60	-7.42	0.18	0.26	-5.84	-19.14	14.64
		V	-5.06	-11.01	0.08				
	ZX	H	-6.42	-11.87	0.06	0.37	-4.30	-13.42	8.93
		V	-0.56	-5.14	0.31				
2.441	XY	H	-2.13	-5.88	0.26	0.38	-4.21	-13.72	9.22
		V	-4.26	-9.17	0.12				
	ZX	H	-7.43	-12.44	0.06	0.37	-4.27	-11.92	7.42
		V	-0.67	-4.99	0.32				
2.480	XY	H	-2.04	-6.12	0.24	0.42	-3.73	-11.01	6.51
		V	-2.42	-7.46	0.18				
	ZX	H	-5.52	-8.50	0.14	0.32	-4.92	-11.07	6.58
		V	-3.13	-7.42	0.18				
Average Gain[dBi]			-4.49		Max.Peak[dBi]		-0.56		



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	-3.92	-6.91	0.20	0.33	-4.75	-10.06	6.88
		V	-3.82	-8.83	0.13				
	ZX	H	-3.66	-7.33	0.19	0.50	-2.99	-14.20	11.02
		V	-0.38	-4.99	0.32				
5.210	XY	H	-1.71	-5.94	0.25	0.41	-3.83	-11.01	7.83
		V	-3.37	-7.98	0.16				
	ZX	H	-2.72	-6.64	0.22	0.56	-2.50	-12.05	8.87
		V	0.42	-4.61	0.35				
5.250	XY	H	-0.90	-5.40	0.29	0.46	-3.36	-9.00	5.82
		V	-3.69	-7.63	0.17				
	ZX	H	-2.27	-6.28	0.24	0.61	-2.15	-10.17	6.99
		V	0.60	-4.28	0.37				
Average Gain[dBi]			-3.18		Max.Peak[dBi]		0.60		



3-6. Ant2 (5GHz-Band4)

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]
5.735	XY	H	-1.33	-6.99	0.20	0.32	-4.95	-15.47	13.72
		V	-5.82	-9.23	0.12				
	ZX	H	-2.93	-5.78	0.26	1.12	0.50	-13.14	11.40
		V	3.40	-0.66	0.86				
5.785	XY	H	-0.60	-7.60	0.17	0.28	-5.51	-14.37	12.62
		V	-6.00	-9.69	0.11				
	ZX	H	-2.53	-6.29	0.23	1.08	0.33	-16.54	14.79
		V	2.99	-0.74	0.84				
5.835	XY	H	-2.09	-8.16	0.15	0.25	-6.00	-16.43	14.68
		V	-5.42	-10.07	0.10				
	ZX	H	-2.89	-6.74	0.21	0.96	-0.17	-18.80	17.06
		V	2.53	-1.25	0.75				
Average Gain[dBi]			-1.74		Max.Peak[dBi]		3.40		

