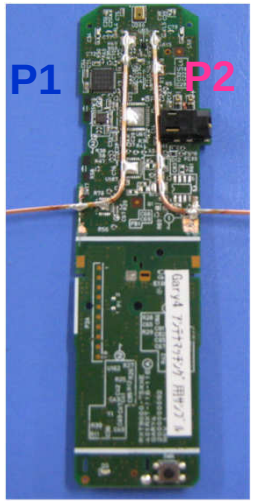
TDK Antenna Measurement Report

- ANT016008LCD2442MA1

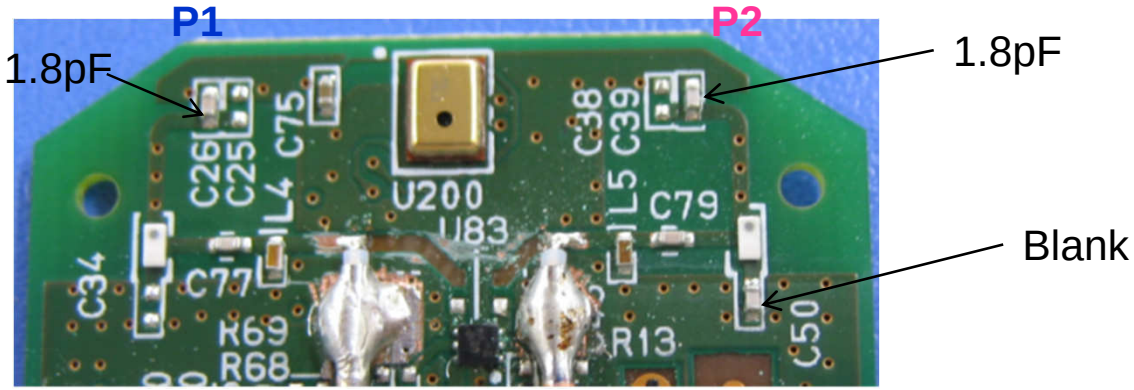
Systems Acoustics Waves BG
TDK Corporation
Apr,2016

Setup & Tuning results

Cable Setup



Tuning results



* Other components are initial condition

* This picture shows in initial condition

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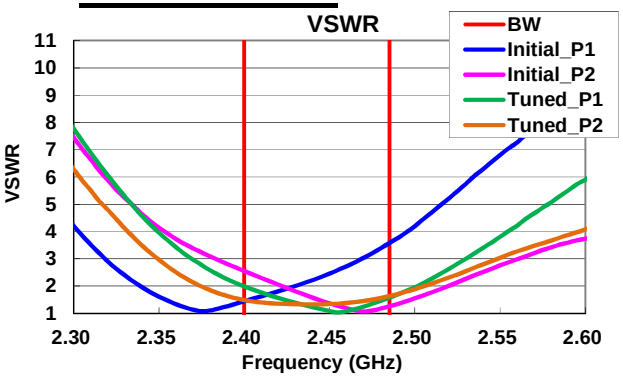
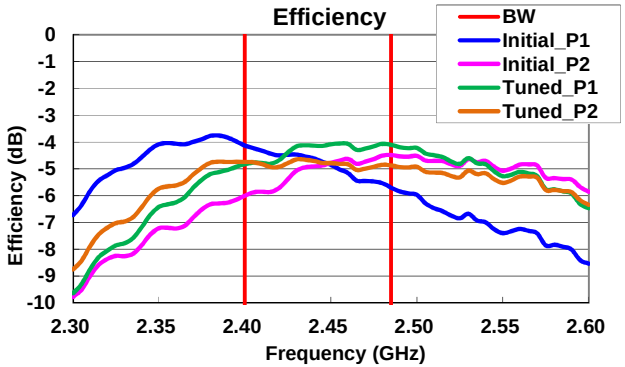
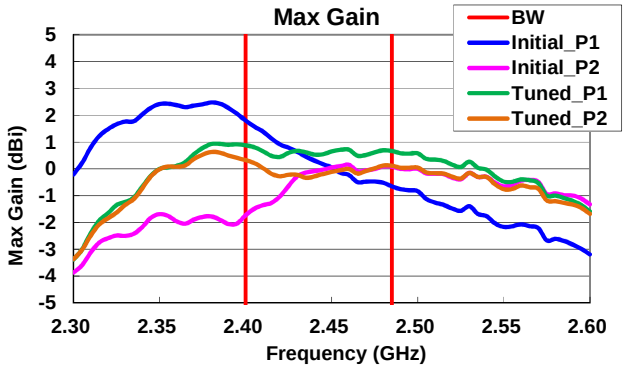
TDK Measurement results VSWR, Efficiency & Max Gain

2.4GHz band

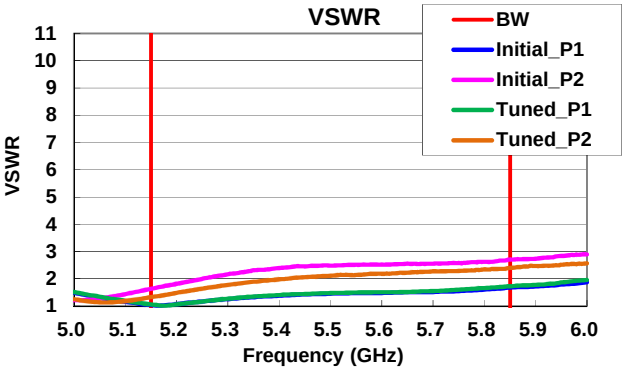


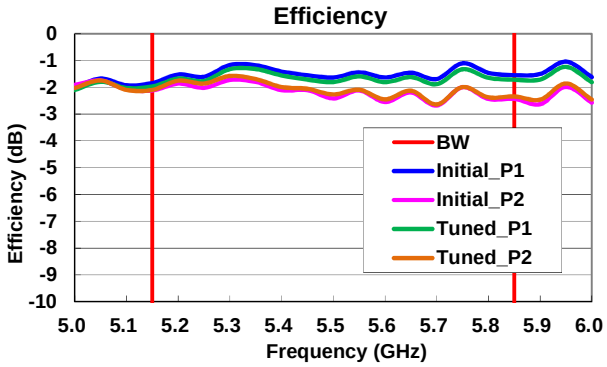


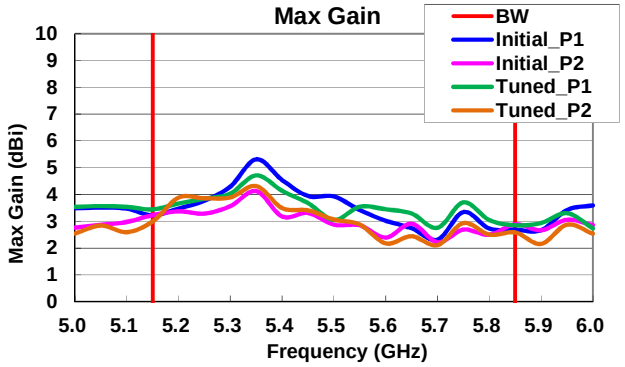


	Initial_P1			Initial_P2			Tuned_P1			Tuned_P2		
Frequency[GHz]	2.4	2.442	2.485	2.4	2.442	2.485	2.4	2.442	2.485	2.4	2.442	2.485
VSWR	1.44	2.26	3.58	2.55	1.53	1.26	1.99	1.20	1.57	1.49	1.33	1.63
Total Efficiency[dB]	−4.13	−4.66	−5.70	−6.00	−4.89	−4.48	−4.82	−4.14	−4.10	−4.74	−4.73	−4.87
Max Gain [dBi]	1.81	0.25	−0.65	−1.73	−0.06	0.08	0.88	0.54	0.67	0.33	−0.24	0.12

5 GHz band







	Initial_P1			Initial_P2			Tuned_P1			Tuned_P2		
Frequency[GHz]	5.15	5.5	5.85	5.15	5.5	5.85	5.15	5.5	5.85	5.15	5.5	5.85
VSWR	1.04	1.46	1.68	1.64	2.49	2.71	1.06	1.48	1.72	1.33	2.11	2.40
Total Efficiency[dB]	−1.85	−1.64	−1.55	−2.12	−2.41	−2.43	−1.97	−1.80	−1.72	−2.10	−2.27	−2.34
Max Gain [dBi]	3.22	3.93	2.69	3.23	2.87	2.89	3.44	3.05	2.85	2.99	3.06	2.58

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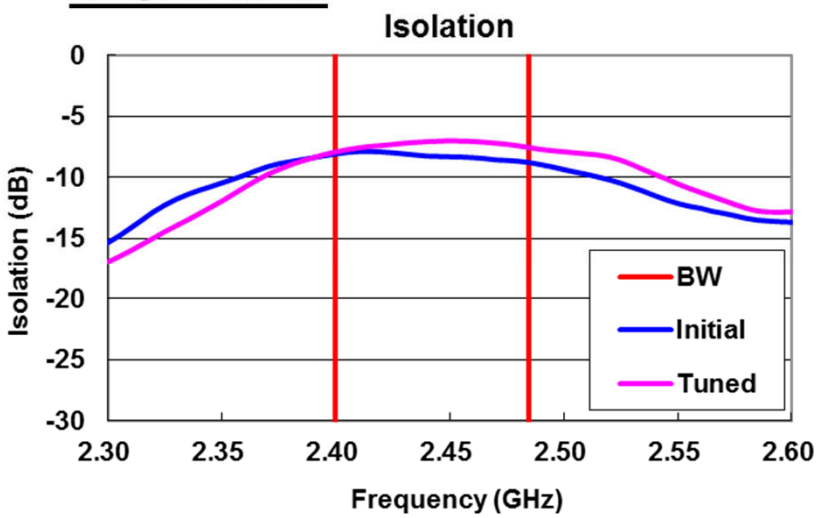
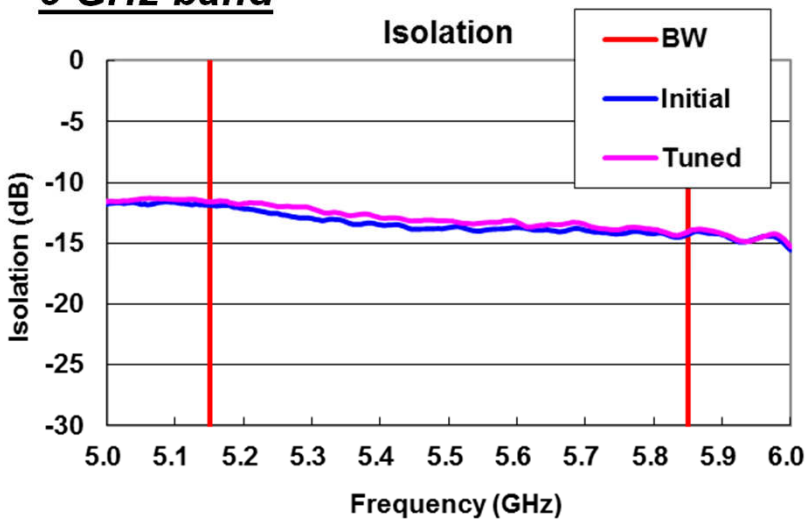
Measurement results Isolation

2.4GHz band



5 GHz band



Summary

- Measured the performance in Initial condition and Tuned condition.
- Please see recommend tuning component value if needed.

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Radiation Pattern

Initial

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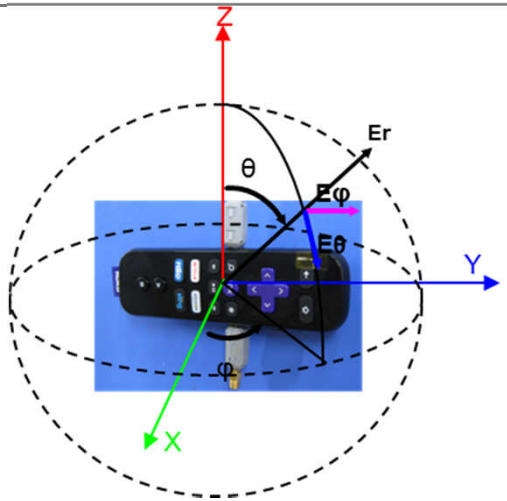
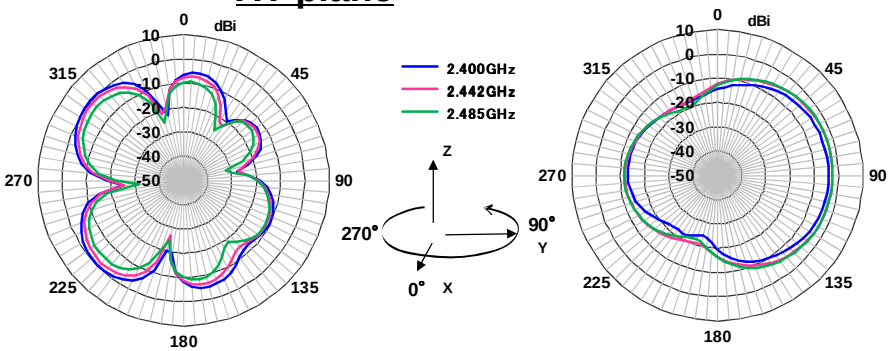
Radiation pattern 2.4GHz band V&H Polarization

Initial

P1



XY plane



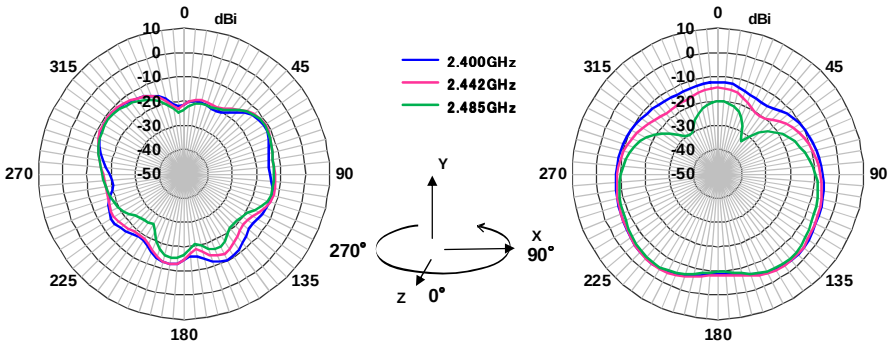
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.6	-7.2	-9.5
Maximum[dBi]	0.7	-0.9	-3.1
Minimum[dBi]	-27.7	-27.2	-31.9

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-9.3	-7.4	-7.3
Maximum[dBi]	-4.1	-2.4	-2.4
Minimum[dBi]	-24.6	-20.8	-22.3

ZX plane



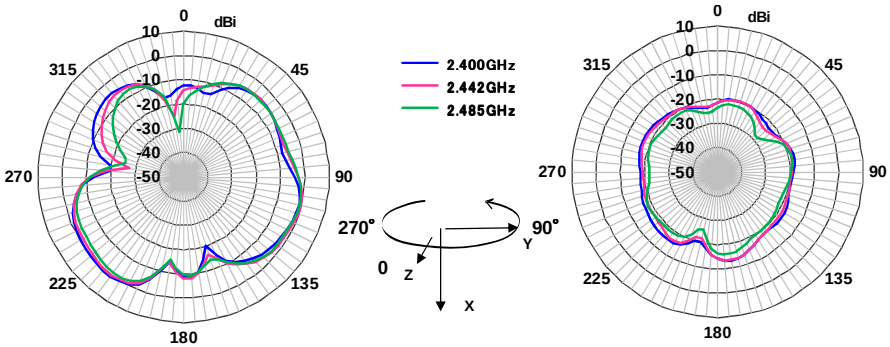
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-14.2	-14.3	-15.5
Maximum[dBi]	-10.2	-10.7	-11.0
Minimum[dBi]	-21.9	-22.8	-25.6

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-7.36	-7.76	-9.12
Maximum[dBi]	-3.00	-3.00	-4.09
Minimum[dBi]	-15.59	-20.60	-33.31

ZY plane



Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-4.7	-4.7	-5.5
Maximum[dBi]	0.9	0.2	-0.7
Minimum[dBi]	-20.0	-27.3	-31.2

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-17.7	-18.4	-20.4
Maximum[dBi]	-13.1	-13.2	-15.8
Minimum[dBi]	-23.2	-23.8	-28.7

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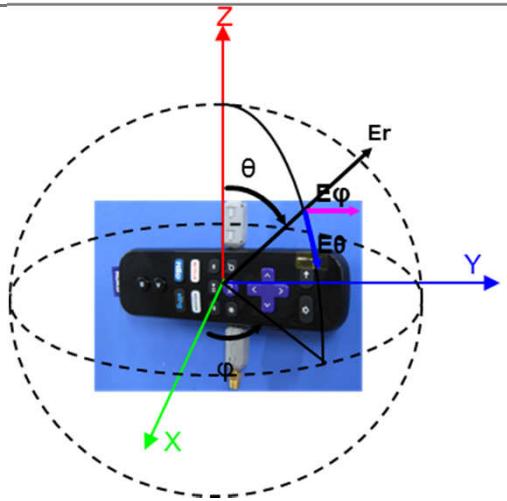
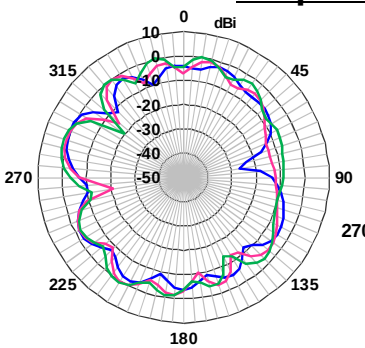
Radiation pattern 5GHz band V&H Polarization

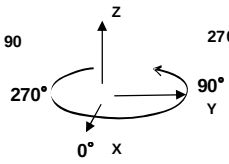
Initial

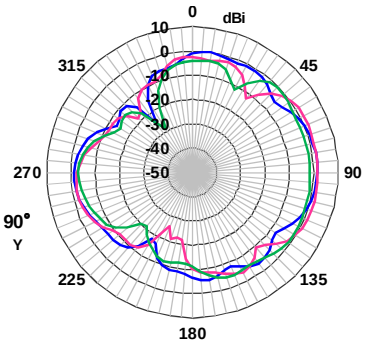
P1



XY plane







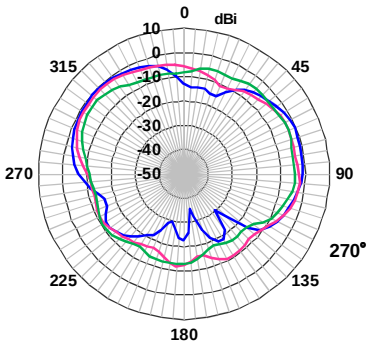
Horizontal Polarization

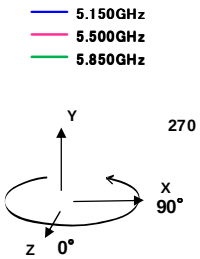
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-4.9	-4.2	-3.2
Maximum[dBi]	0.7	0.9	1.8
Minimum[dBi]	-26.6	-20.6	-19.6

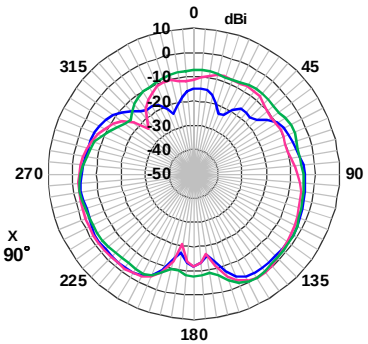
Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-3.3	-3.2	-4.6
Maximum[dBi]	1.6	1.9	-0.5
Minimum[dBi]	-25.4	-26.0	-28.5

ZX plane







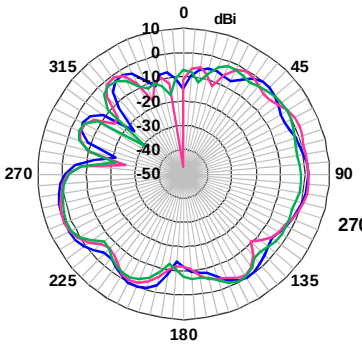
Horizontal Polarization

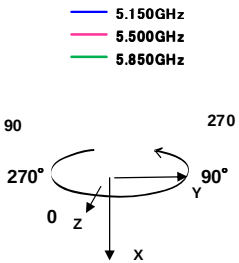
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.1	-5.8	-7.2
Maximum[dBi]	0.0	-1.1	-3.1
Minimum[dBi]	-35.6	-17.0	-18.4

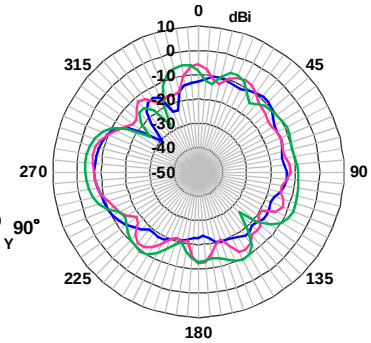
Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.60	-5.04	-4.86
Maximum[dBi]	-1.85	0.11	0.07
Minimum[dBi]	-23.65	-23.31	-15.67

ZY plane







Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.0	-2.2	-3.0
Maximum[dBi]	3.0	3.0	2.0
Minimum[dBi]	-23.1	-46.9	-30.5

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-12.8	-11.6	-9.2
Maximum[dBi]	-7.0	-5.7	-3.0
Minimum[dBi]	-31.0	-21.3	-27.8

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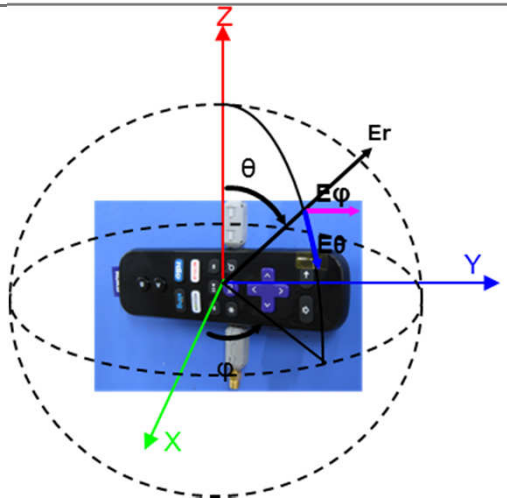
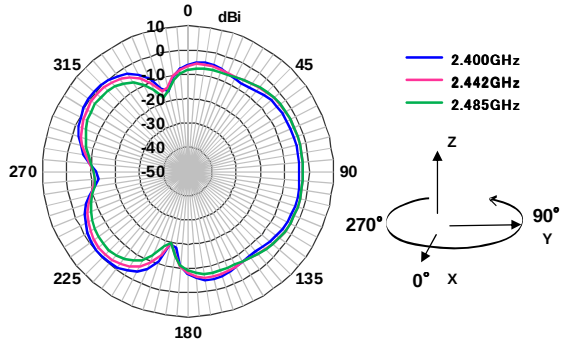
Radiation pattern 2.4GHz band Total power

Initial

P1



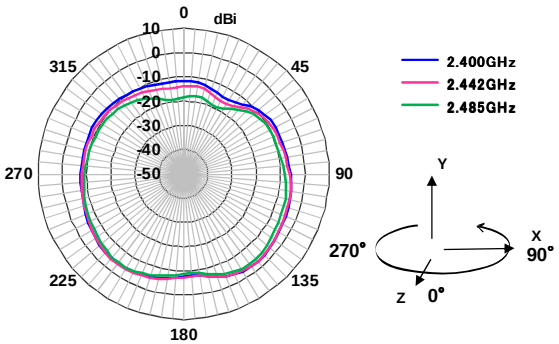
XY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-4.0	-4.3	-5.3
Maximum[dBi]	0.8	-0.7	-2.3
Minimum[dBi]	-19.0	-19.6	-19.8

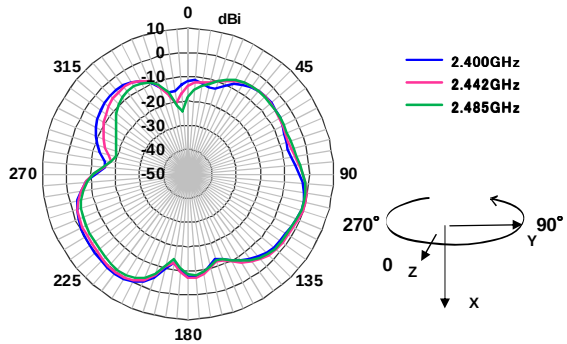
ZX plane



Total Power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.5	-6.9	-8.2
Maximum[dBi]	-2.5	-2.8	-4.0
Minimum[dBi]	-14.4	-16.3	-19.3

ZY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-4.5	-4.5	-5.4
Maximum[dBi]	1.0	0.3	-0.7
Minimum[dBi]	-15.7	-20.7	-23.9

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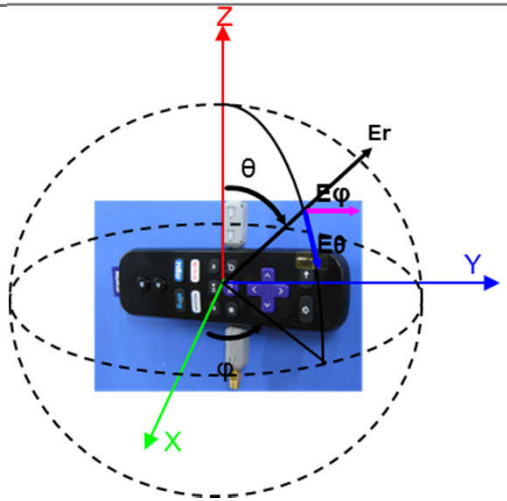
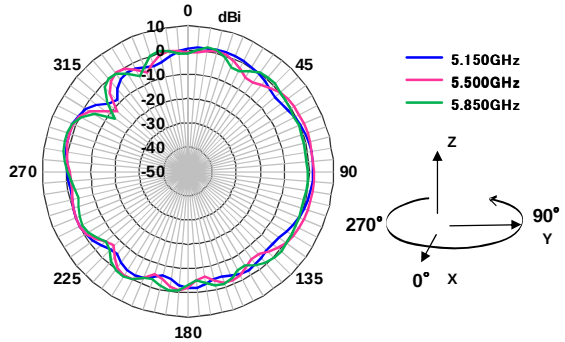
Radiation pattern 5GHz band Total power

Initial

P1



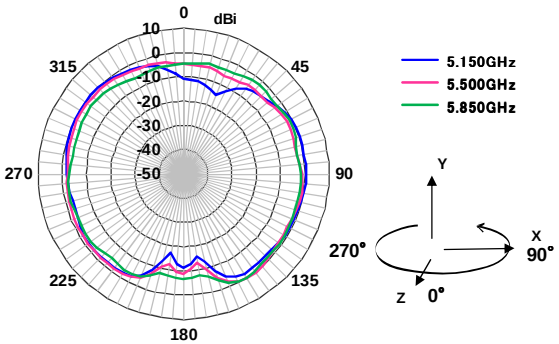
XY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.0	-0.7	-0.8
Maximum[dBi]	1.7	2.1	2.3
Minimum[dBi]	-8.5	-11.8	-13.1

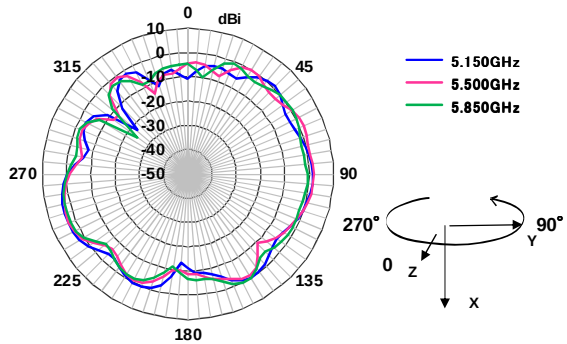
ZX plane



Total Power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.4	-2.4	-2.9
Maximum[dBi]	0.7	0.4	0.2
Minimum[dBi]	-16.9	-13.1	-7.9

ZY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.7	-1.8	-2.1
Maximum[dBi]	3.2	3.1	2.3
Minimum[dBi]	-22.4	-14.1	-24.4

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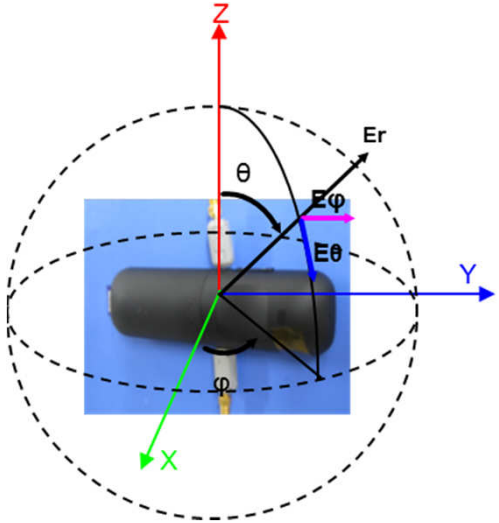
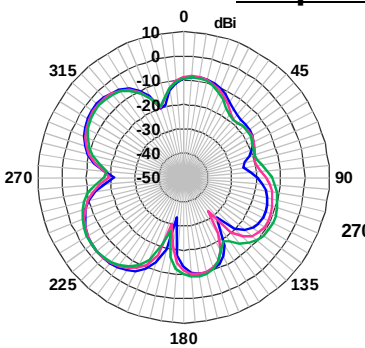
Radiation pattern 2.4GHz band V&H Polarization

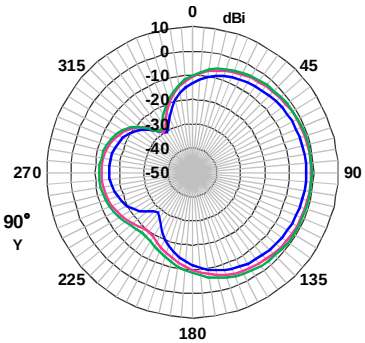
Initial

P2



XY plane





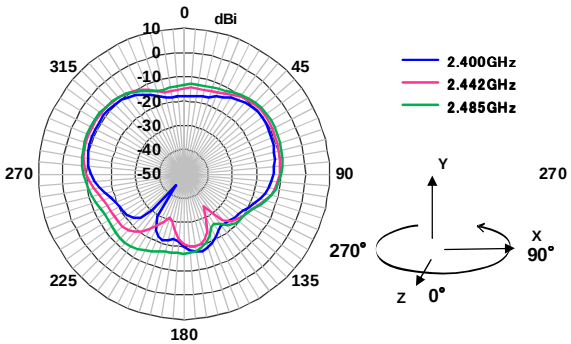
Horizontal Polarization

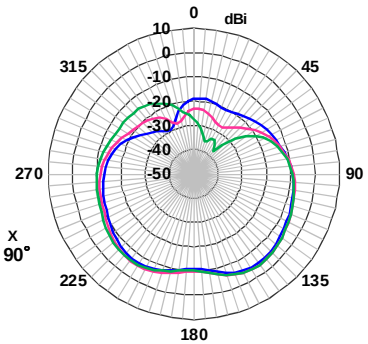
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-8.9	-9.1	-9.0
Maximum[dBi]	-3.0	-3.3	-3.2
Minimum[dBi]	-33.5	-32.8	-26.9

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-8.0	-5.7	-5.1
Maximum[dBi]	-3.0	-1.0	-0.7
Minimum[dBi]	-30.4	-29.3	-28.3

ZX plane





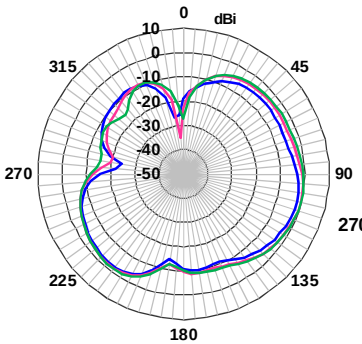
Horizontal Polarization

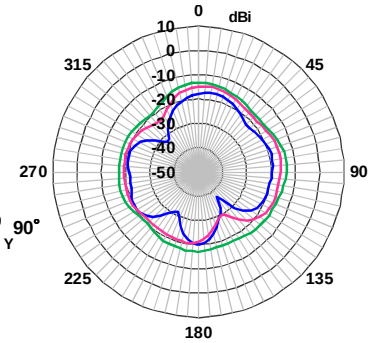
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-13.9	-12.1	-11.0
Maximum[dBi]	-9.0	-7.6	-7.0
Minimum[dBi]	-44.6	-34.3	-26.0

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-10.17	-9.29	-9.21
Maximum[dBi]	-4.56	-3.55	-3.71
Minimum[dBi]	-29.70	-28.46	-37.53

ZY plane





Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.4	-5.0	-4.7
Maximum[dBi]	-1.8	-0.2	-0.1
Minimum[dBi]	-26.2	-34.9	-27.2

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-21.4	-18.5	-16.2
Maximum[dBi]	-17.2	-14.5	-13.1
Minimum[dBi]	-37.0	-29.7	-20.3

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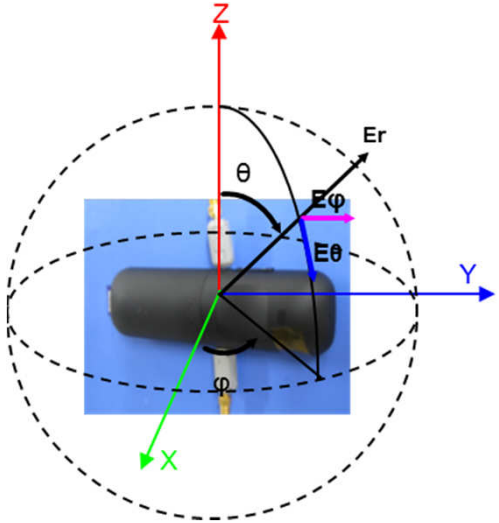
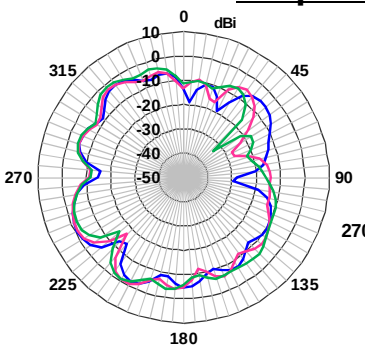
Radiation pattern 5GHz band V&H Polarization

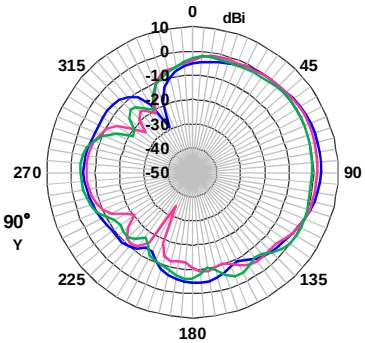
Initial

P2



XY plane





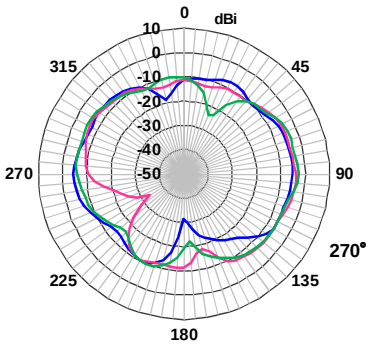
Horizontal Polarization

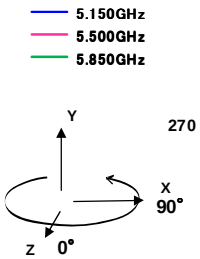
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-6.7	-6.5	-6.1
Maximum[dBi]	-0.8	-0.7	-0.7
Minimum[dBi]	-29.3	-27.7	-33.6

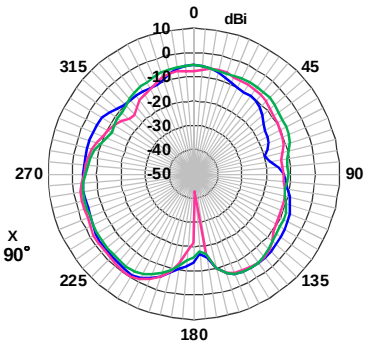
Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.5	-3.2	-3.7
Maximum[dBi]	3.2	2.1	0.5
Minimum[dBi]	-28.9	-34.6	-21.7

ZX plane







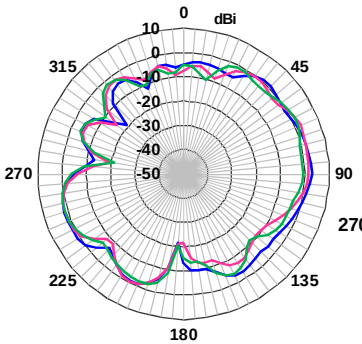
Horizontal Polarization

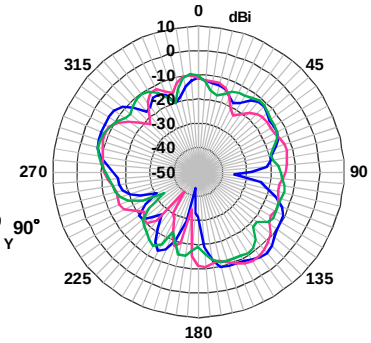
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-8.5	-8.6	-7.9
Maximum[dBi]	-4.6	-3.6	-2.7
Minimum[dBi]	-31.3	-33.7	-23.9

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-6.24	-6.22	-6.43
Maximum[dBi]	-1.23	-0.43	-2.59
Minimum[dBi]	-19.80	-42.61	-17.96

ZY plane





Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.1	-2.9	-3.2
Maximum[dBi]	2.9	2.3	1.3
Minimum[dBi]	-21.5	-21.6	-20.9

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-12.3	-12.8	-13.1
Maximum[dBi]	-6.0	-6.9	-7.3
Minimum[dBi]	-43.1	-39.8	-33.4

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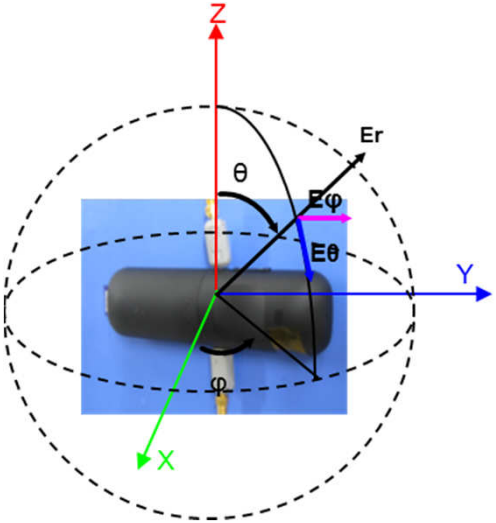
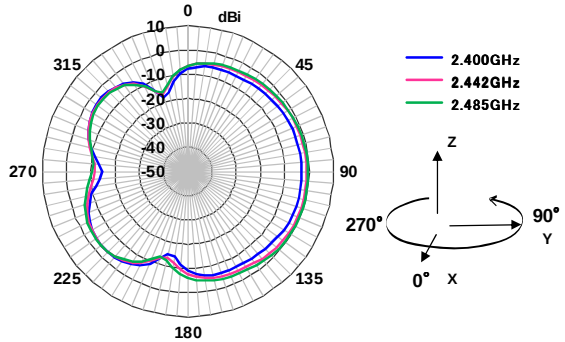
Radiation pattern 2.4GHz band Total power

Initial

P2



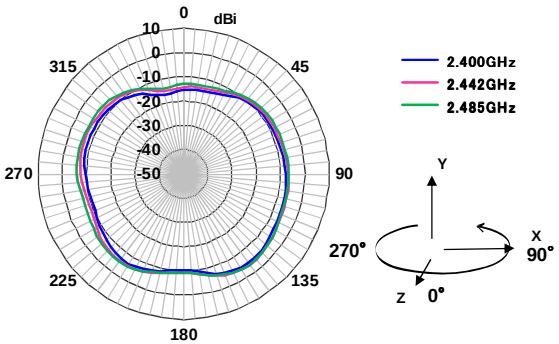
XY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.4	-4.1	-3.6
Maximum[dBi]	-2.9	-0.9	-0.3
Minimum[dBi]	-18.0	-16.6	-15.5

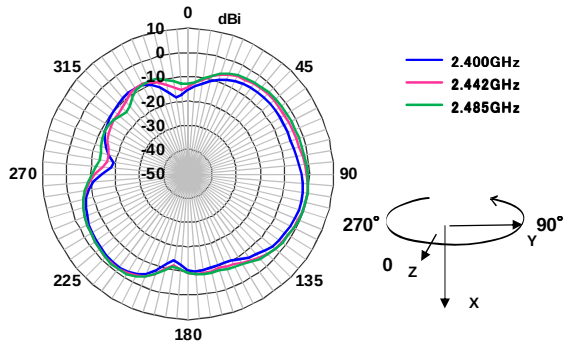
ZX plane



Total Power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-8.6	-7.5	-7.0
Maximum[dBi]	-4.5	-3.5	-3.7
Minimum[dBi]	-16.6	-15.1	-13.7

ZY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.3	-4.8	-4.4
Maximum[dBi]	-1.7	-0.1	0.1
Minimum[dBi]	-18.9	-16.6	-14.1

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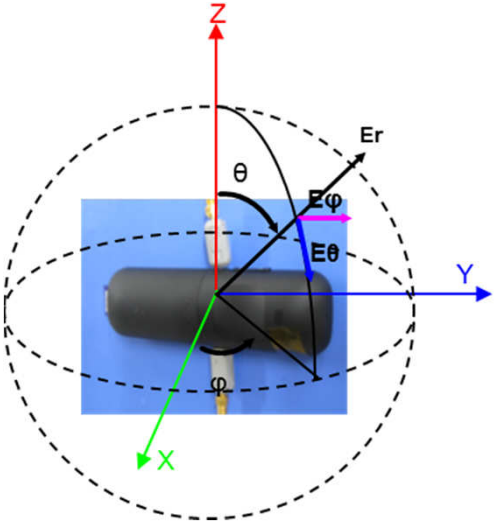
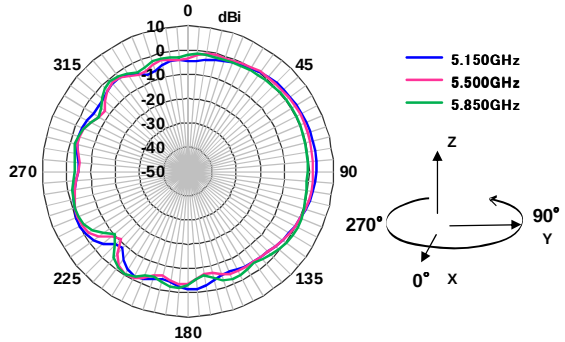
Radiation pattern 5GHz band Total power

Initial

P2



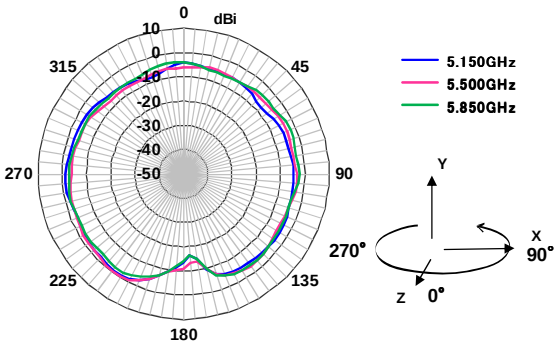
XY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.1	-1.5	-1.7
Maximum[dBi]	3.2	2.1	0.9
Minimum[dBi]	-8.4	-10.9	-10.6

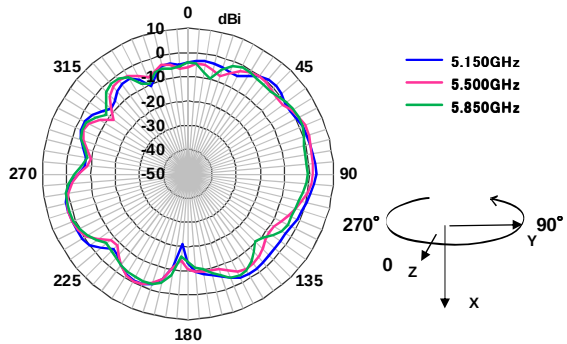
ZX plane



Total Power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-4.2	-4.3	-4.1
Maximum[dBi]	-0.8	-0.1	-2.0
Minimum[dBi]	-16.5	-13.4	-16.5

ZY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.7	-2.5	-2.8
Maximum[dBi]	2.9	2.4	1.5
Minimum[dBi]	-21.2	-14.4	-15.7

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Radiation Pattern

Tuned

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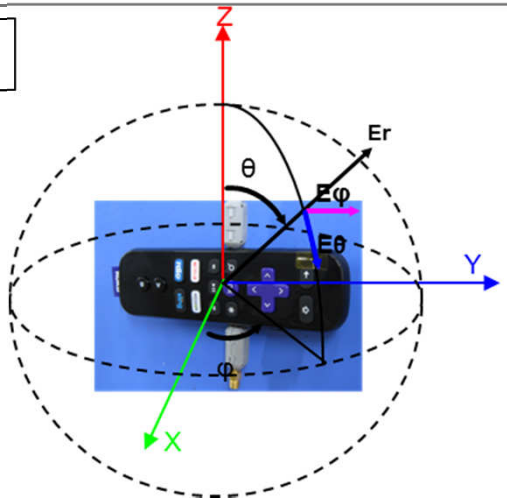
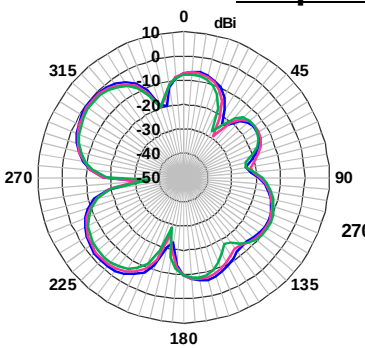
Radiation pattern 2.4GHz band V&H Polarization

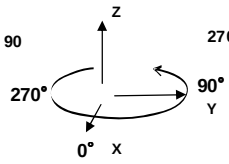
Tuned

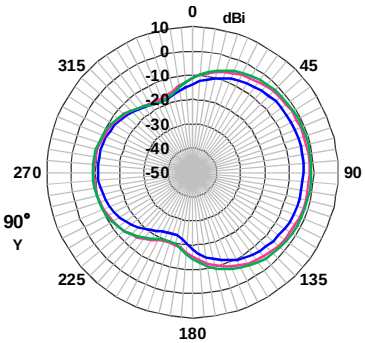
P1



XY plane







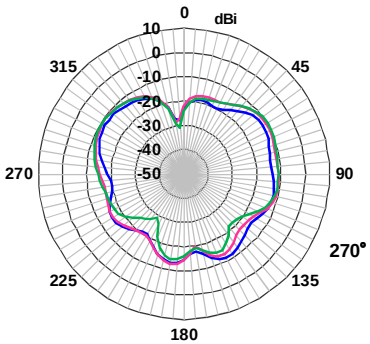
Horizontal Polarization

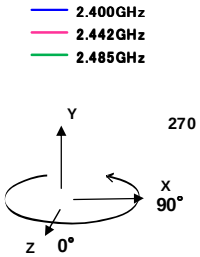
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.7	-7.3	-8.2
Maximum[dBi]	-0.3	-0.8	-1.6
Minimum[dBi]	-32.1	-31.4	-35.7

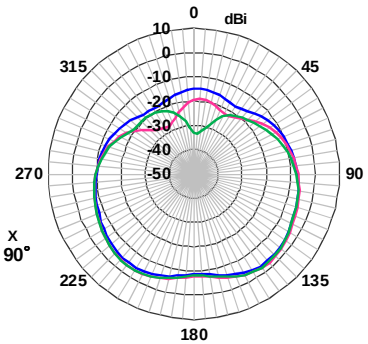
Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-8.7	-6.2	-5.4
Maximum[dBi]	-4.2	-1.6	-0.8
Minimum[dBi]	-23.4	-19.7	-20.2

ZX plane







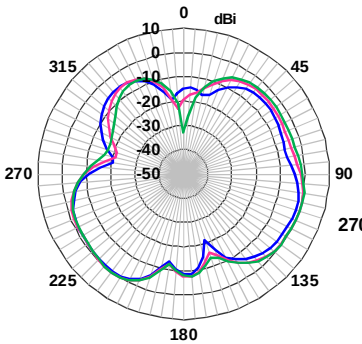
Horizontal Polarization

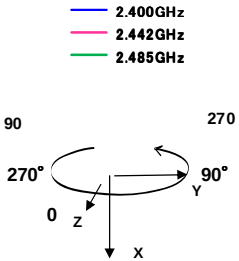
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-14.6	-13.7	-14.1
Maximum[dBi]	-11.2	-10.0	-9.6
Minimum[dBi]	-27.5	-28.3	-30.6

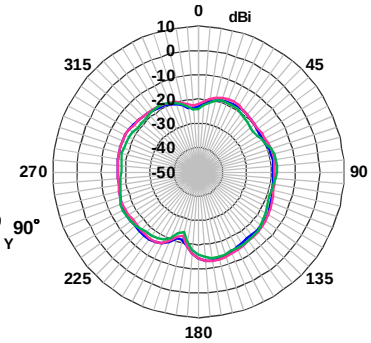
Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-7.89	-7.33	-7.53
Maximum[dBi]	-2.89	-2.02	-2.20
Minimum[dBi]	-18.55	-27.75	-33.26

ZY plane







Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.3	-4.1	-3.9
Maximum[dBi]	-0.2	0.4	0.6
Minimum[dBi]	-21.3	-23.2	-32.9

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-17.2	-16.9	-17.7
Maximum[dBi]	-13.1	-12.8	-14.1
Minimum[dBi]	-23.7	-22.8	-24.4

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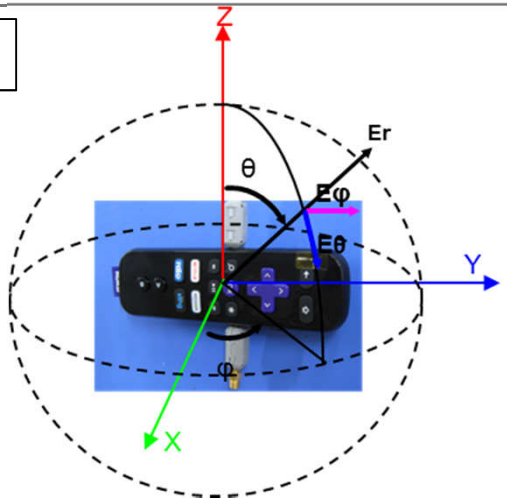
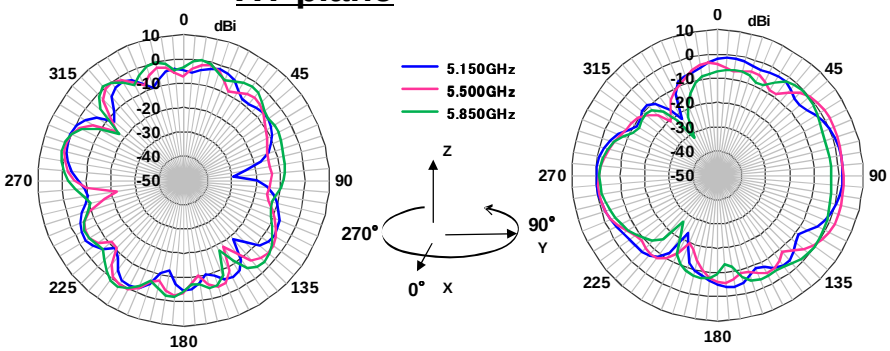
Radiation pattern 5GHz band V&H Polarization

Tuned

P1



XY plane



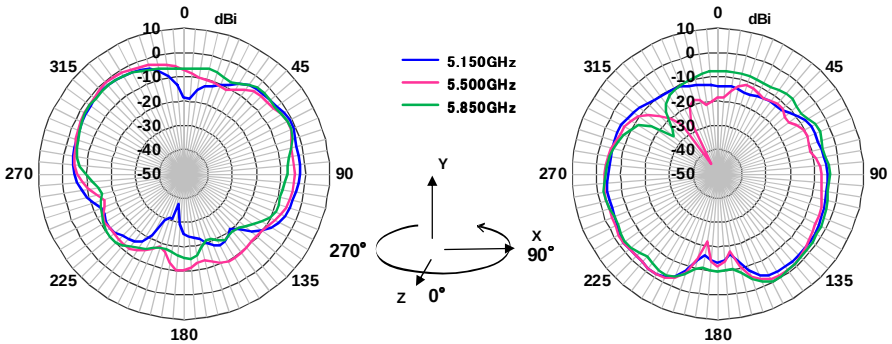
Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.3	-4.7	-3.3
Maximum[dBi]	0.3	0.5	1.5
Minimum[dBi]	-29.2	-21.9	-17.7

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-3.1	-2.6	-4.5
Maximum[dBi]	1.8	2.4	0.0
Minimum[dBi]	-23.6	-20.4	-31.5

ZX plane



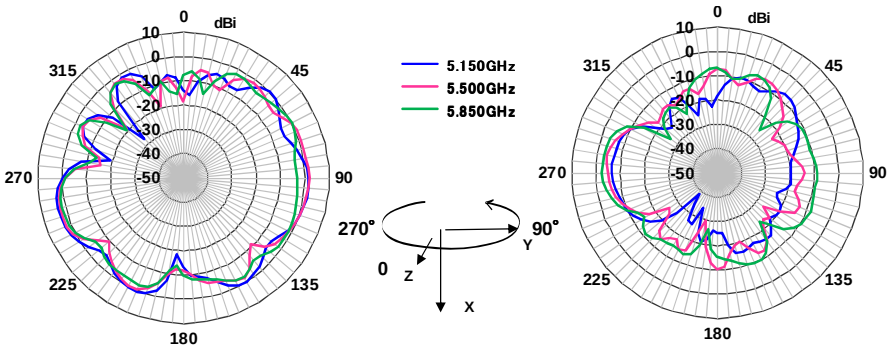
Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.8	-5.7	-6.5
Maximum[dBi]	-1.0	-0.5	-1.8
Minimum[dBi]	-37.6	-18.6	-21.0

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.73	-5.81	-4.94
Maximum[dBi]	-1.60	-0.76	-0.26
Minimum[dBi]	-16.74	-44.91	-26.15

ZY plane



Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.0	-2.4	-3.2
Maximum[dBi]	3.2	2.4	1.7
Minimum[dBi]	-27.4	-19.2	-19.4

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-12.7	-11.3	-9.2
Maximum[dBi]	-6.3	-4.1	-2.4
Minimum[dBi]	-38.6	-30.0	-26.5

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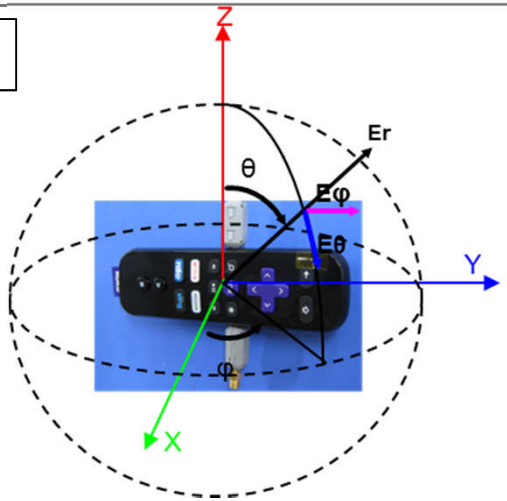
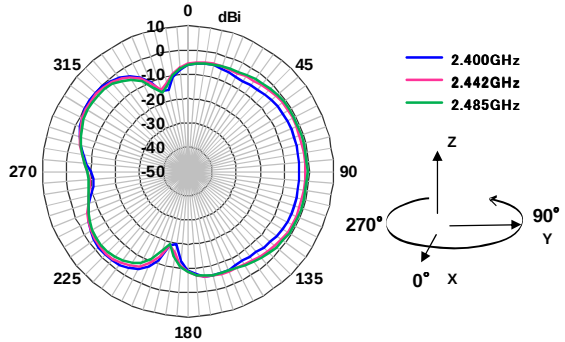
Radiation pattern 2.4GHz band Total power

Tuned

P1



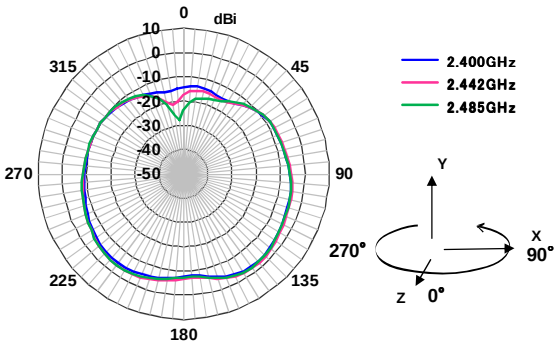
XY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-4.6	-3.7	-3.6
Maximum[dBi]	-0.1	-0.5	-0.7
Minimum[dBi]	-19.6	-18.6	-19.1

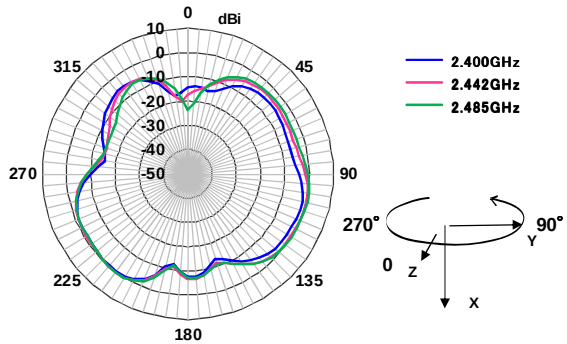
ZX plane



Total Power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-7.1	-6.4	-6.7
Maximum[dBi]	-2.5	-1.9	-2.1
Minimum[dBi]	-15.5	-21.2	-27.6

ZY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.0	-3.9	-3.7
Maximum[dBi]	-0.1	0.4	0.7
Minimum[dBi]	-17.6	-19.7	-23.4

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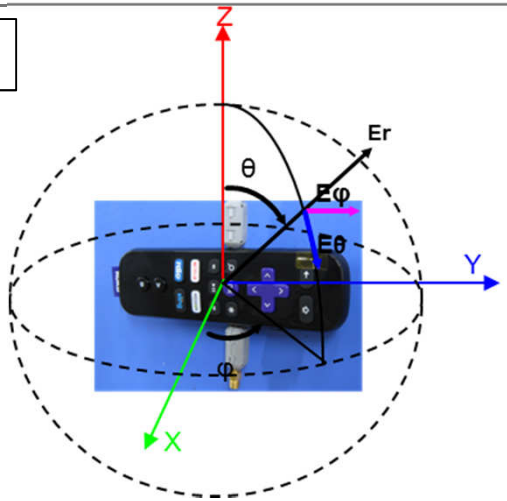
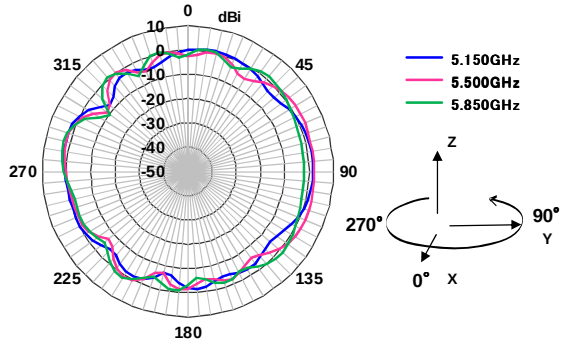
Radiation pattern 5GHz band Total power

Tuned

P1



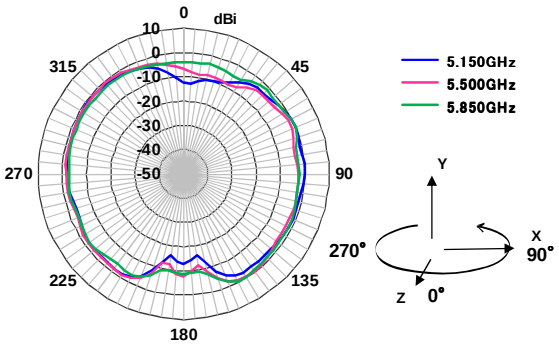
XY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.0	-0.5	-0.9
Maximum[dBi]	1.9	2.6	2.7
Minimum[dBi]	-7.6	-8.8	-10.5

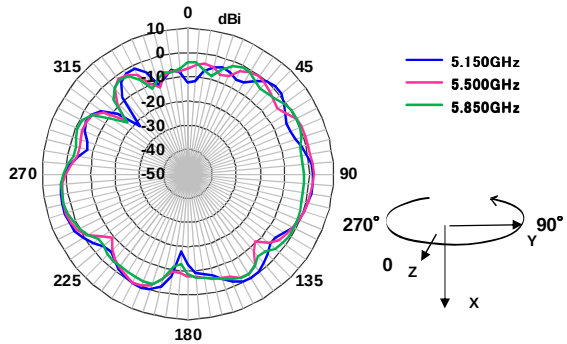
ZX plane



Total Power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.7	-2.7	-2.6
Maximum[dBi]	0.0	-0.2	0.1
Minimum[dBi]	-16.0	-12.3	-9.9

ZY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.7	-1.9	-2.3
Maximum[dBi]	3.4	2.8	2.6
Minimum[dBi]	-22.2	-15.7	-17.3

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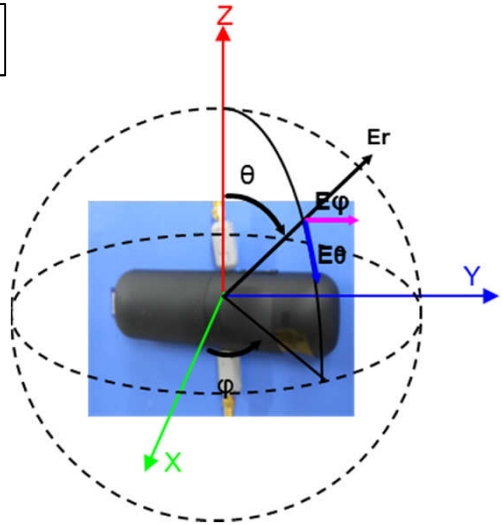
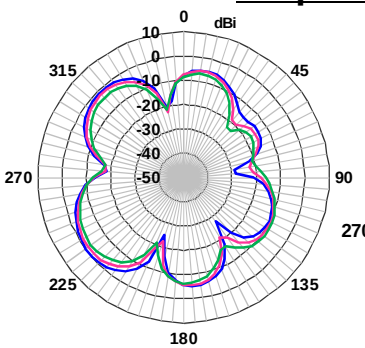
Radiation pattern 2.4GHz band V&H Polarization

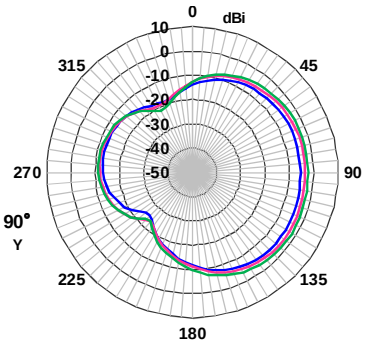
Tuned

P2



XY plane





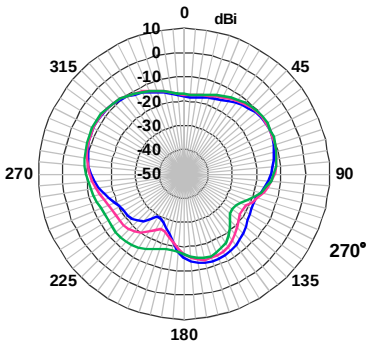
Horizontal Polarization

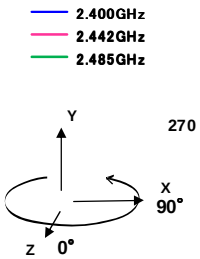
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.3	-7.1	-8.4
Maximum[dBi]	-0.3	-1.3	-2.9
Minimum[dBi]	-28.9	-22.5	-22.6

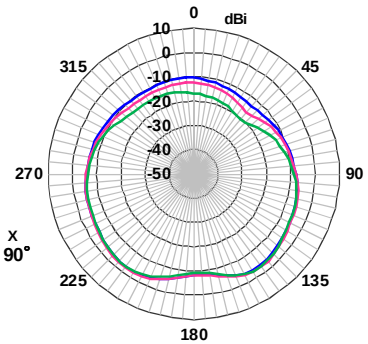
Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-9.0	-7.5	-6.3
Maximum[dBi]	-4.8	-3.2	-1.9
Minimum[dBi]	-25.3	-23.4	-23.4

ZX plane







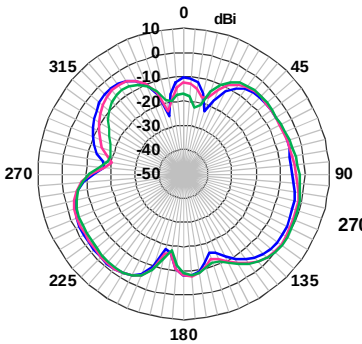
Horizontal Polarization

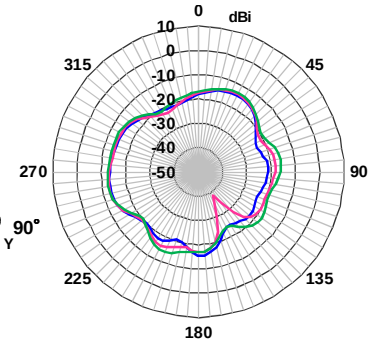
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-13.2	-12.9	-12.3
Maximum[dBi]	-8.3	-8.0	-7.8
Minimum[dBi]	-29.2	-25.2	-25.5

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.59	-6.48	-7.28
Maximum[dBi]	-2.51	-2.06	-2.75
Minimum[dBi]	-13.20	-16.46	-20.36

ZY plane





Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.5	-5.1	-5.1
Maximum[dBi]	-1.3	-0.3	0.0
Minimum[dBi]	-25.4	-23.4	-22.0

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-17.5	-17.1	-16.2
Maximum[dBi]	-13.0	-12.6	-12.4
Minimum[dBi]	-24.8	-38.4	-24.5

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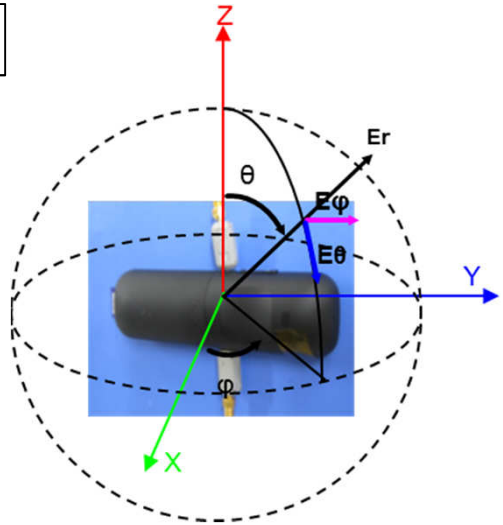
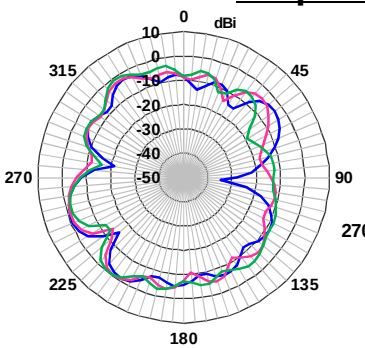
Radiation pattern 5GHz band V&H Polarization

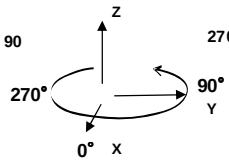
Tuned

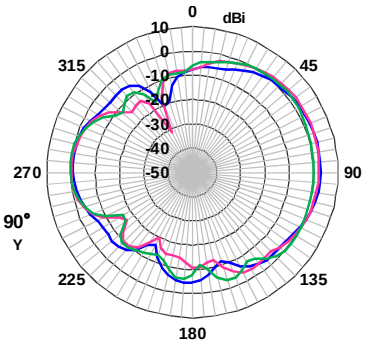
P2



XY plane







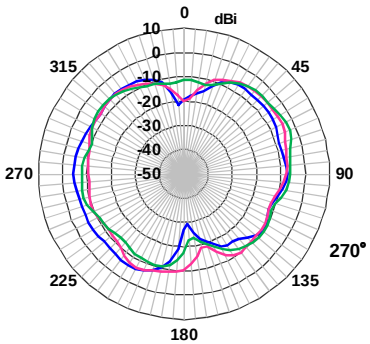
Horizontal Polarization

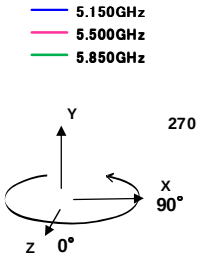
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-6.4	-6.0	-5.7
Maximum[dBi]	-0.7	-0.3	-0.3
Minimum[dBi]	-34.7	-17.5	-19.2

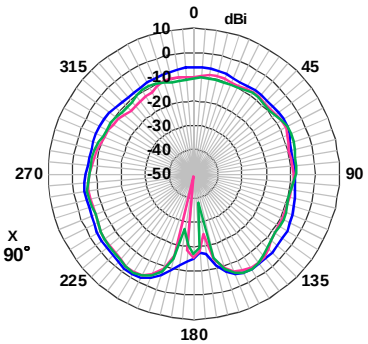
Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.0	-1.9	-2.5
Maximum[dBi]	3.0	2.9	1.4
Minimum[dBi]	-20.5	-31.6	-17.2

ZX plane







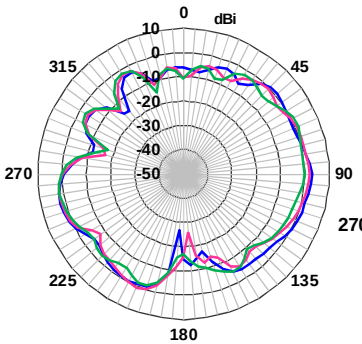
Horizontal Polarization

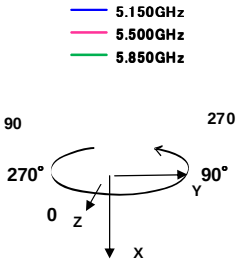
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-8.2	-8.7	-8.3
Maximum[dBi]	-4.6	-4.6	-2.7
Minimum[dBi]	-29.2	-19.8	-23.1

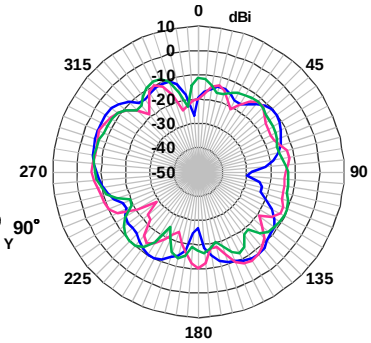
Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.92	-7.86	-7.53
Maximum[dBi]	-1.49	-2.59	-2.25
Minimum[dBi]	-17.35	-49.15	-38.01

ZY plane







Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.0	-2.5	-3.2
Maximum[dBi]	2.9	2.2	1.8
Minimum[dBi]	-26.5	-25.5	-17.5

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-11.0	-11.7	-11.8
Maximum[dBi]	-5.1	-5.9	-6.7
Minimum[dBi]	-30.0	-28.8	-24.7

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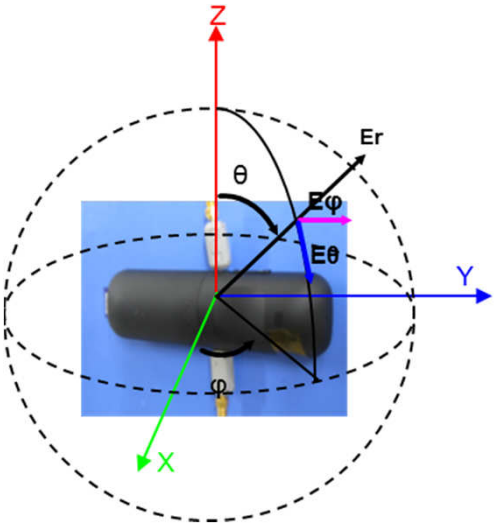
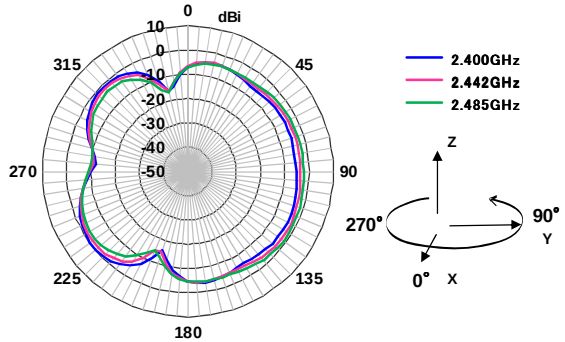
Radiation pattern 2.4GHz band Total power

Tuned

P2



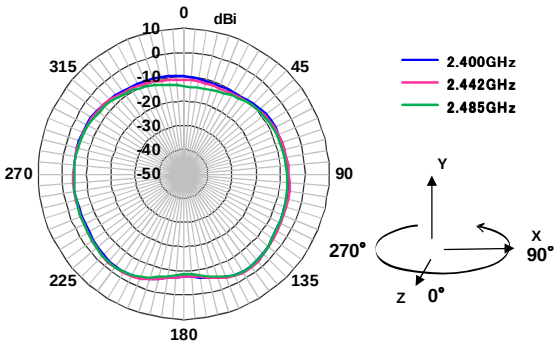
XY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-4.4	-4.3	-4.2
Maximum[dBi]	-0.2	-1.3	-1.1
Minimum[dBi]	-16.0	-15.9	-16.6

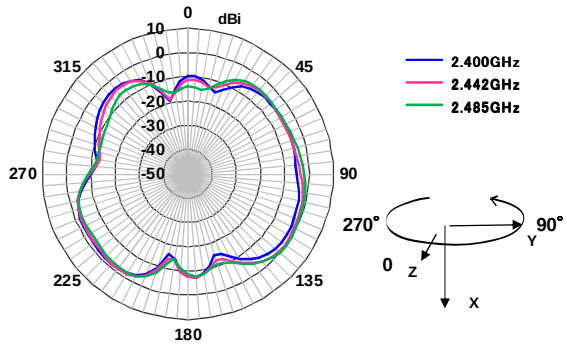
ZX plane



Total Power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.7	-5.6	-6.1
Maximum[dBi]	-2.5	-2.0	-2.4
Minimum[dBi]	-10.8	-11.7	-14.1

ZY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.3	-4.8	-4.8
Maximum[dBi]	-1.3	-0.3	0.1
Minimum[dBi]	-19.4	-18.5	-15.8

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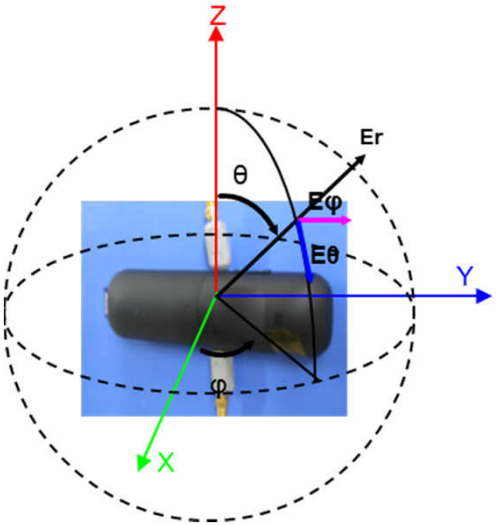
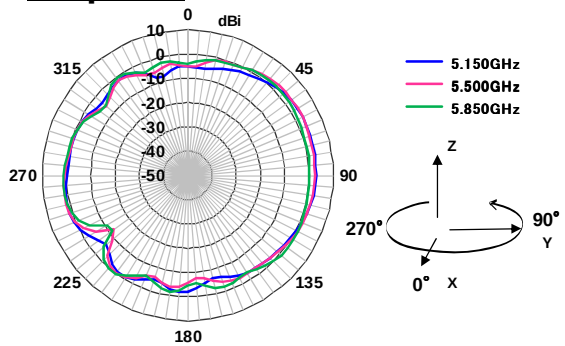
Radiation pattern 5GHz band Total power

Tuned

P2



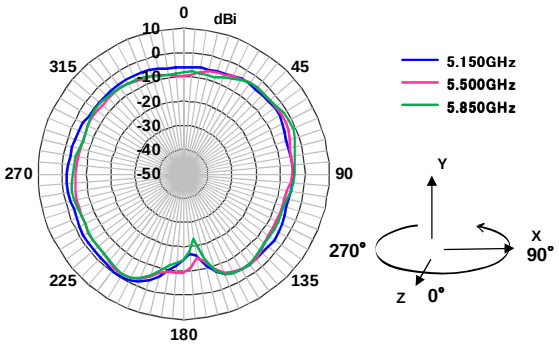
XY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-0.7	-0.5	-0.8
Maximum[dBi]	3.0	3.1	1.7
Minimum[dBi]	-7.9	-12.0	-11.3

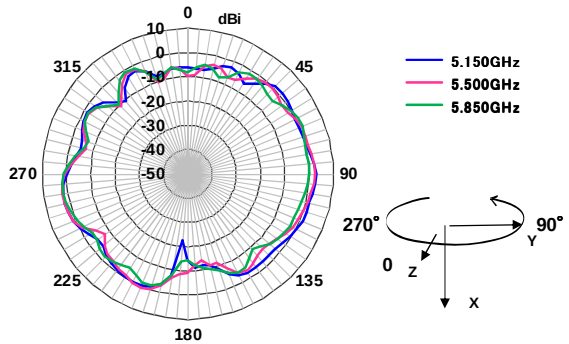
ZX plane



Total Power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-3.9	-5.3	-4.9
Maximum[dBi]	-0.1	-1.3	-1.2
Minimum[dBi]	-17.1	-15.1	-23.0

ZY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.5	-2.0	-2.6
Maximum[dBi]	2.9	2.4	2.1
Minimum[dBi]	-22.4	-14.0	-14.4

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