



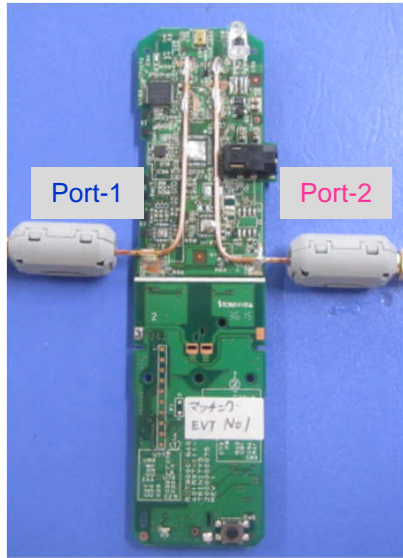
TDK Antenna Tuning report

- ANT016008LCD2442MA1

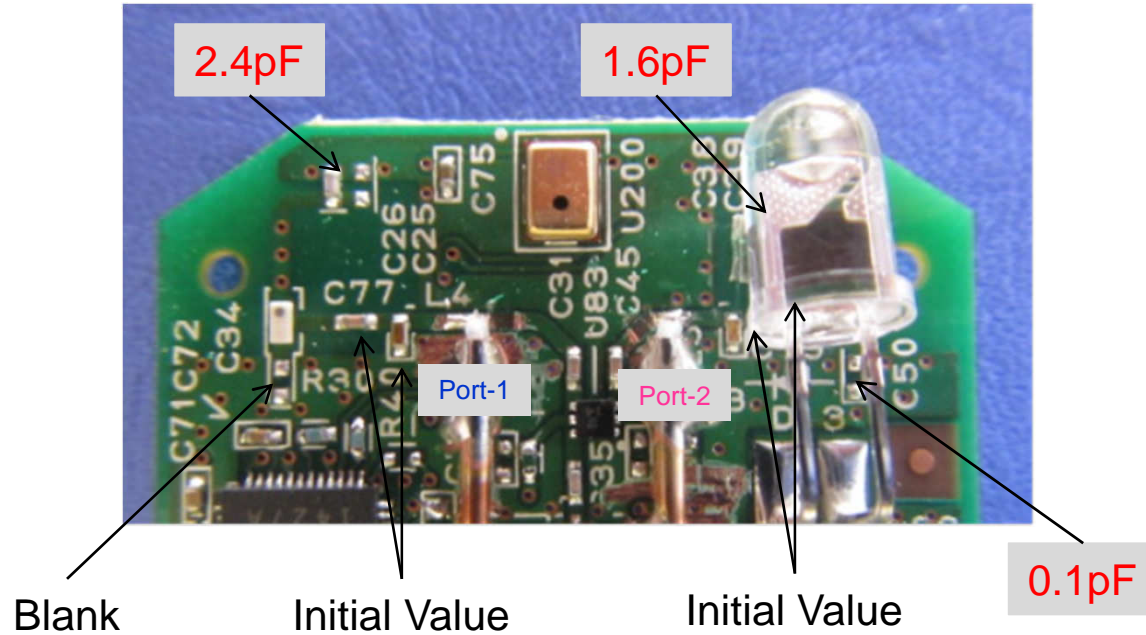
**Antenna product section
Systems Acoustics Waves BG
TDK-EPC Corporation
Sep,2015**

TDK Setup & Summary

Measurement setup



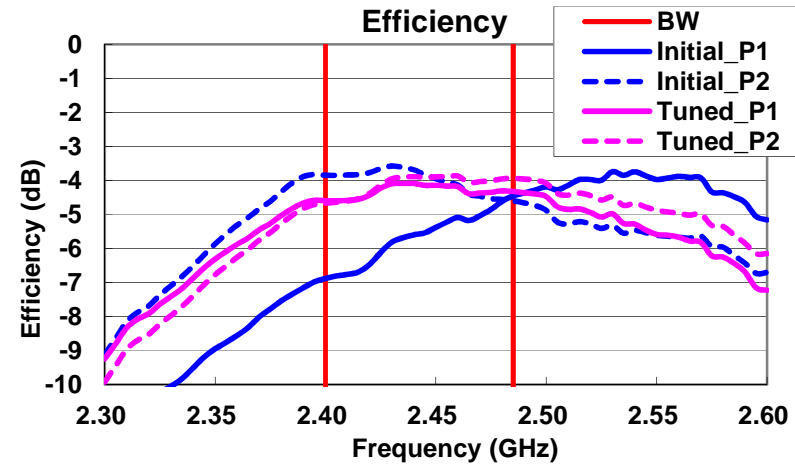
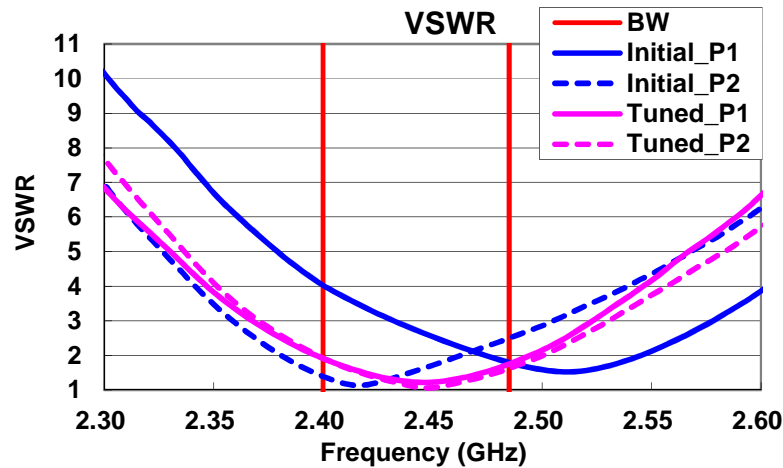
Tuning Results



Port-1			Port-2		
No	Value	P/N	No	Value	P/N
C34	Blank	-	C50	0.1pF	GJM1554C1HR10BB01
C77	Initial		C79	Initial	
C25	Blank	-	C38	Blank	-
C26	2.4pF	GJM1553C1H2R4CB01	C39	1.6pF	GJM1554C1H1R6CB01
L4	Initial	-	L5	Initial	-

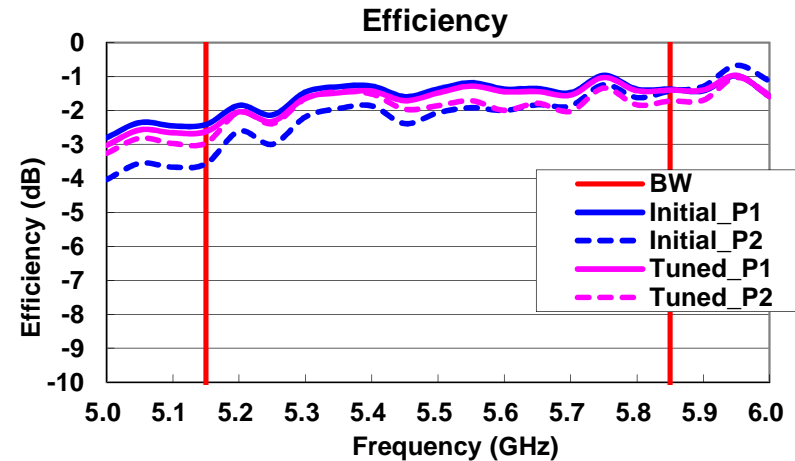
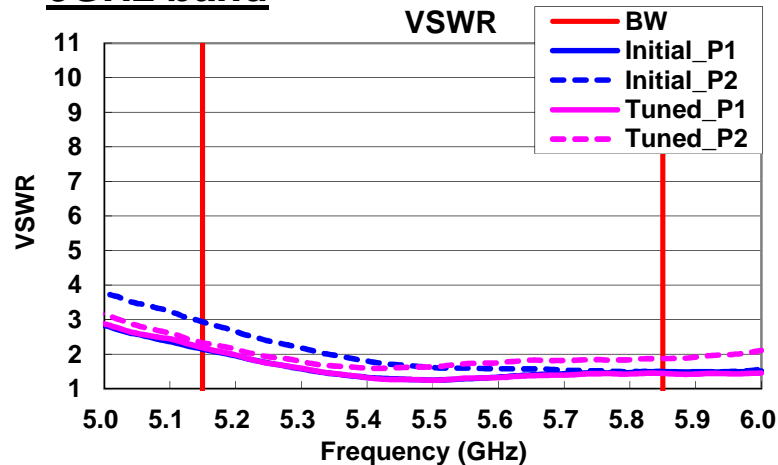
TDK Measurement results VSWR & Efficiency

2.4GHz band



Frequency[GHz]	Initial P1			Initial P2			Tuned P1			Tuned P2		
	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	4.03	2.75	1.79	1.39	1.55	2.50	1.91	1.23	1.75	1.92	1.10	1.62
Total Efficiency[dB]	-6.88	-5.58	-4.46	-3.85	-3.74	-4.60	-4.59	-4.11	-4.32	-4.67	-3.90	-3.94

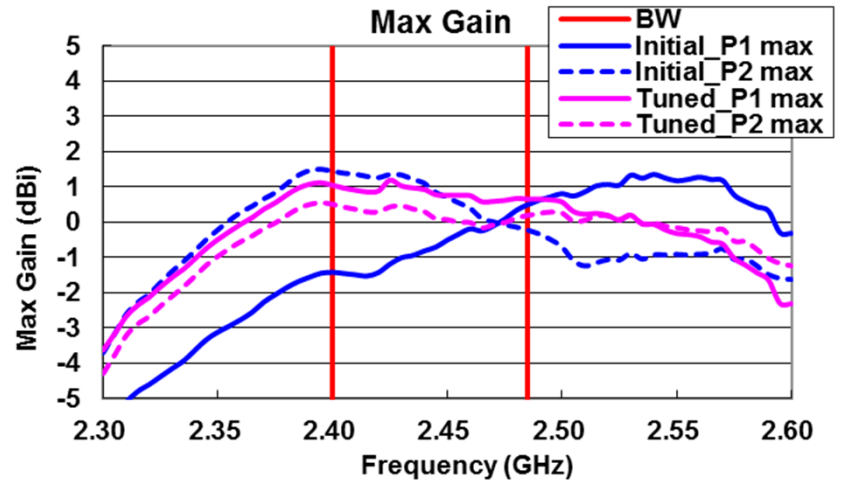
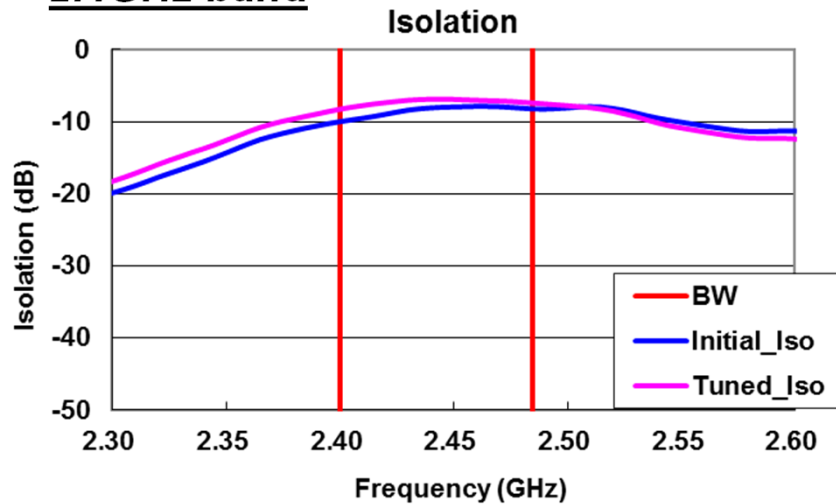
5GHz band



Frequency[GHz]	Initial P1			Initial P2			Tuned P1			Tuned P2		
	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	2.15	1.26	1.50	2.94	1.61	1.49	2.19	1.25	1.45	2.33	1.63	1.87
Total Efficiency[dB]	-2.41	-1.37	-1.37	-3.56	-2.06	-1.43	-2.62	-1.48	-1.40	-2.96	-1.86	-1.72

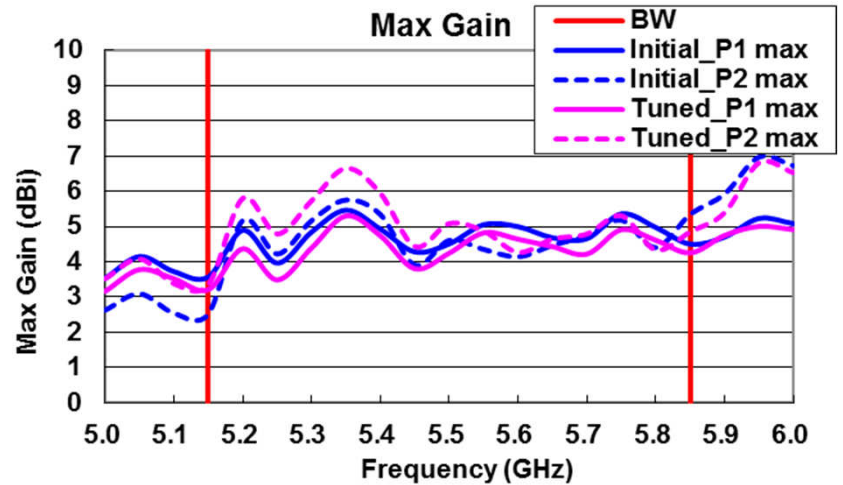
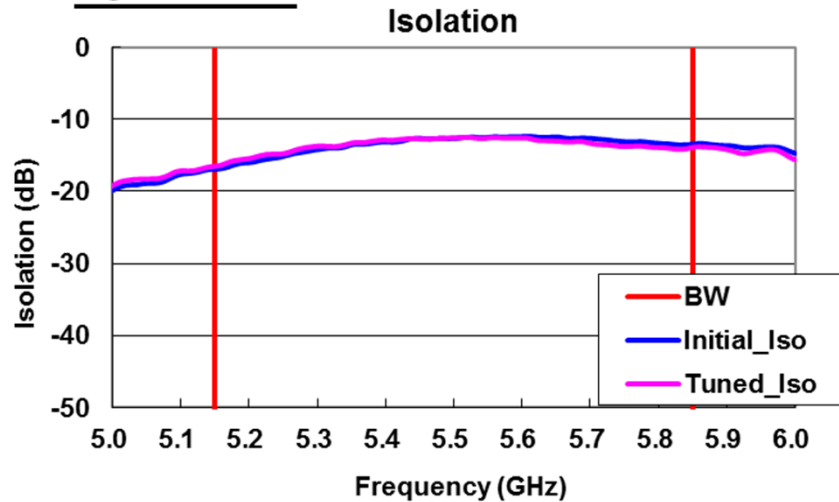
TDK Measurement results Isolation & Max Gain

2.4GHz band



Frequency[GHz]	Initial_P1 max			Initial_P2 max			Tuned_P1 max			Tuned_P2 max		
	2.4	2.442	2.485	2.4	2.442	2.485	2.4	2.442	2.485	2.4	2.442	2.485
Max Gain[dBi]	-1.42	-0.77	0.49	1.44	1.00	-0.23	1.05	0.87	0.66	0.50	0.22	0.19

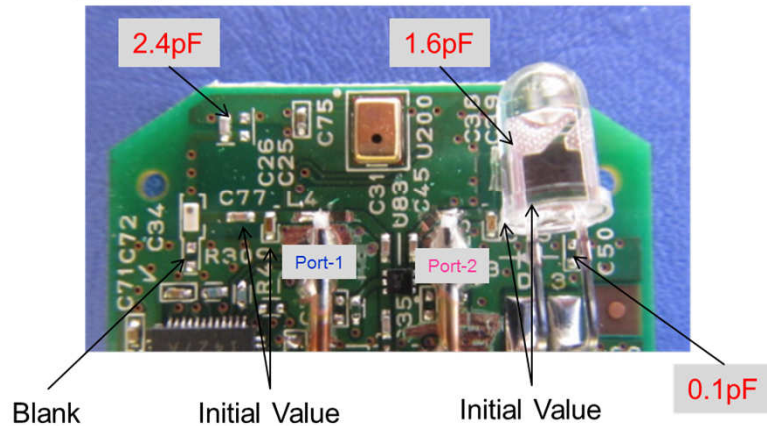
5GHz band



Frequency[GHz]	Initial_P1 max			Initial_P2 max			Tuned_P1 max			Tuned_P2 max		
	5.15	5.5	5.85	5.15	5.5	5.85	5.15	5.5	5.85	5.15	5.5	5.85
Max Gain[dBi]	3.57	4.51	4.50	2.52	4.61	5.34	3.21	4.25	4.25	3.35	5.08	4.85

- We recommend these tuning component.

Tuning Results

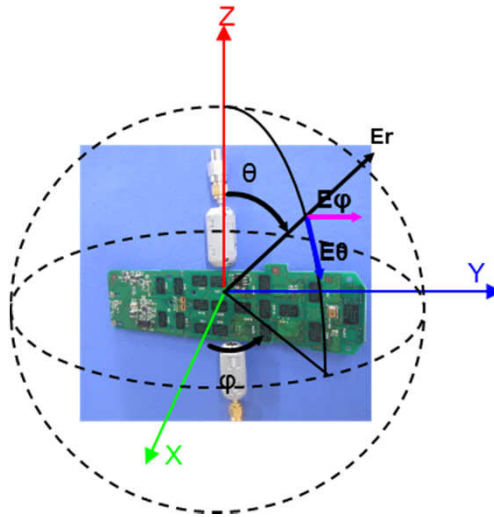


Port-1			Port-2		
No	Value	P/N	No	Value	P/N
C34	Blank	-	C50	0.1pF	GJM1554C1HR10BB01
C77	Initial		C79	Initial	
C25	Blank	-	C38	Blank	-
C26	2.4pF	GJM1553C1H2R4CB01	C39	1.6pF	GJM1554C1H1R6CB01
L4	Initial	-	L5	Initial	-

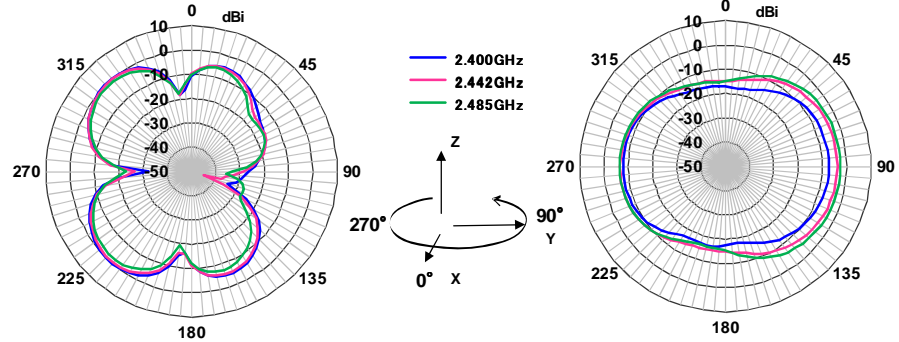
- IR LED does not make affect to radiation performance.
*Radiation performance seems almost same as Trinity-2.

Radiation Pattern Tuned

Tuned
Port-1



XY plane



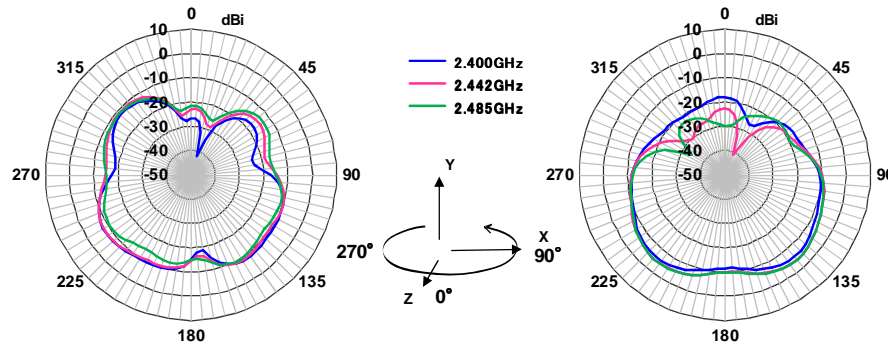
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.4	-5.8	-7.0
Maximum[dBi]	0.4	0.2	-0.7
Minimum[dBi]	-34.2	-44.9	-35.7

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-10.6	-7.9	-6.7
Maximum[dBi]	-7.2	-3.9	-2.5
Minimum[dBi]	-18.1	-14.9	-16.3

ZX plane



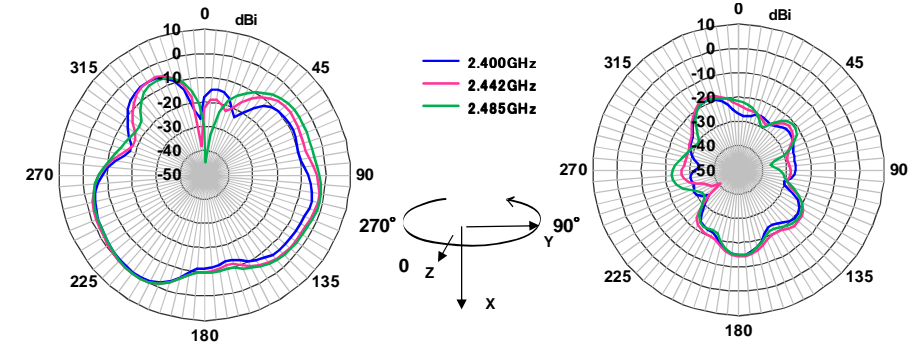
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-12.4	-12.1	-13.3
Maximum[dBi]	-7.6	-7.8	-9.7
Minimum[dBi]	-41.6	-28.8	-26.1

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-10.57	-9.45	-9.44
Maximum[dBi]	-5.63	-4.16	-4.08
Minimum[dBi]	-27.01	-41.22	-34.36

ZY plane



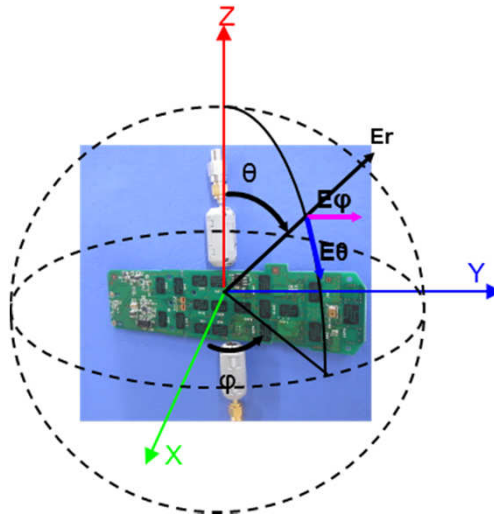
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.3	-5.0	-4.7
Maximum[dBi]	0.0	0.7	0.6
Minimum[dBi]	-26.7	-38.1	-44.6

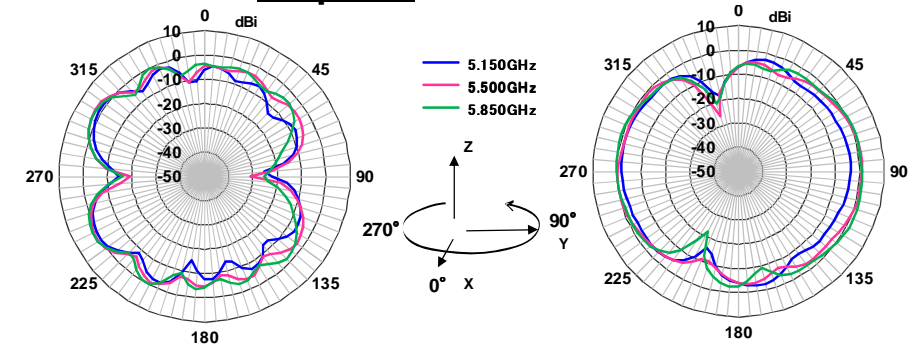
Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-22.3	-21.1	-21.6
Maximum[dBi]	-14.8	-14.3	-14.8
Minimum[dBi]	-34.3	-40.7	-36.3

Tuned
Port-1



XY plane



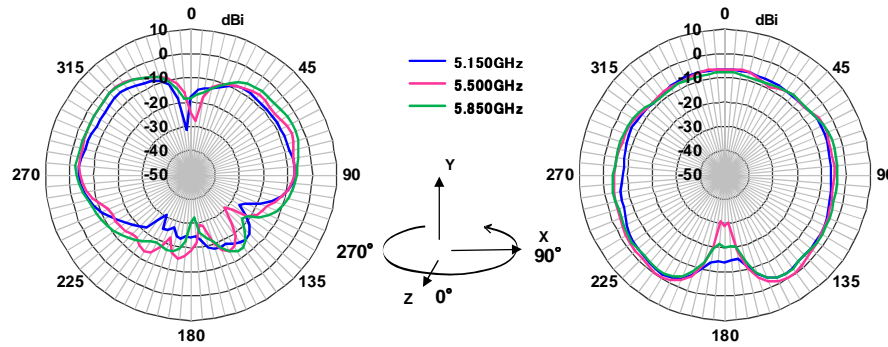
Horizontal Polarization

Frequency (GHz)	5.15	5.5	5.85
Average[dBi]	-5.1	-3.4	-3.2
Maximum[dBi]	1.3	2.8	2.4
Minimum[dBi]	-25.2	-31.2	-25.5

Vertical Polarization

Frequency (GHz)	5.15	5.5	5.85
Average[dBi]	-4.2	-2.4	-1.8
Maximum[dBi]	-1.5	1.0	1.5
Minimum[dBi]	-18.0	-25.9	-21.9

ZX plane



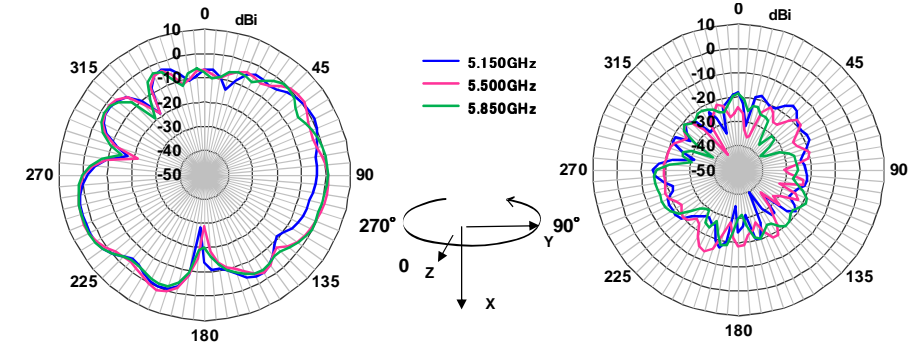
Horizontal Polarization

Frequency (GHz)	5.15	5.5	5.85
Average[dBi]	-9.5	-8.0	-6.9
Maximum[dBi]	-3.8	-2.4	-2.4
Minimum[dBi]	-31.6	-30.8	-32.6

Vertical Polarization

Frequency (GHz)	5.15	5.5	5.85
Average[dBi]	-5.60	-4.54	-5.01
Maximum[dBi]	-1.70	-0.15	-2.01
Minimum[dBi]	-15.22	-30.79	-21.34

ZY plane



Horizontal Polarization

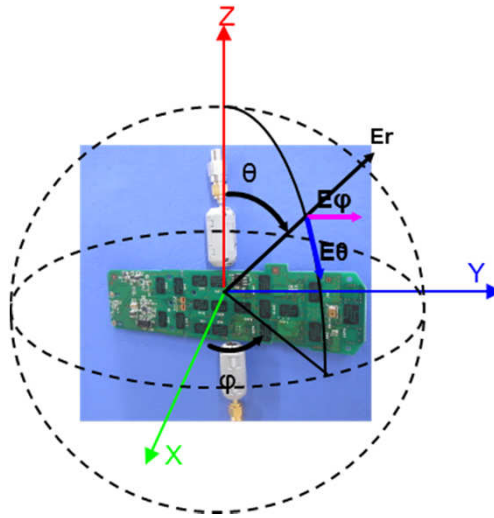
Frequency (GHz)	5.15	5.5	5.85
Average[dBi]	-2.8	-1.9	-2.1
Maximum[dBi]	3.0	3.7	3.4
Minimum[dBi]	-28.2	-29.1	-20.3

Vertical Polarization

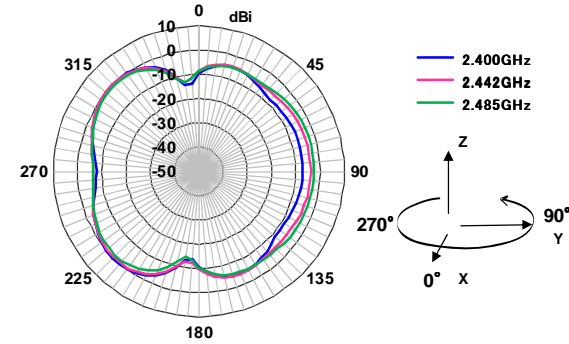
Frequency (GHz)	5.15	5.5	5.85
Average[dBi]	-20.9	-21.5	-21.7
Maximum[dBi]	-15.0	-13.8	-15.1
Minimum[dBi]	-39.8	-42.6	-39.2

Tuned

Port-1



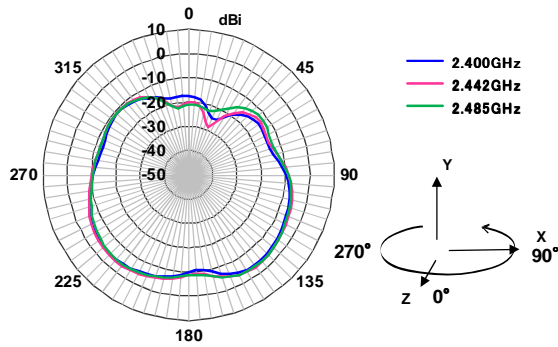
XY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-4.2	-3.7	-3.8
Maximum[dBi]	0.7	0.5	-0.2
Minimum[dBi]	-14.1	-12.8	-14.5

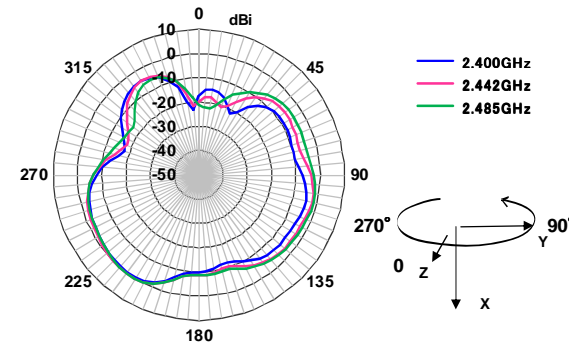
ZX plane



Total Power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-8.4	-7.6	-7.9
Maximum[dBi]	-3.8	-3.0	-3.2
Minimum[dBi]	-24.9	-28.6	-22.4

ZY plane

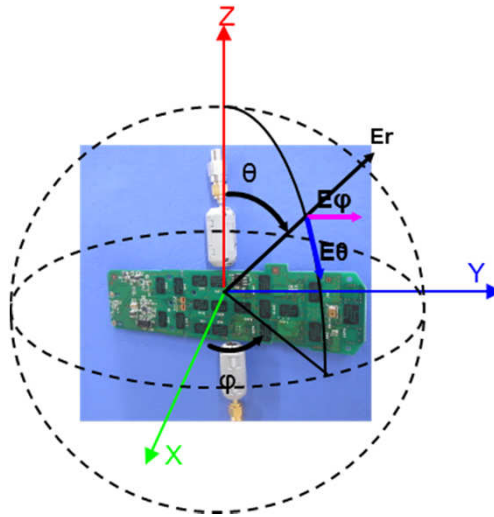


Total power

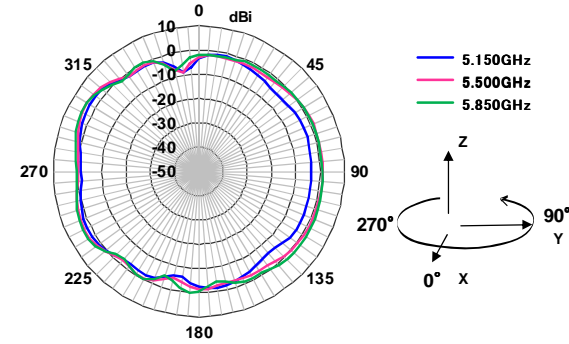
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.2	-4.9	-4.6
Maximum[dBi]	0.0	0.7	0.6
Minimum[dBi]	-22.8	-21.6	-22.5

Tuned

Port-1



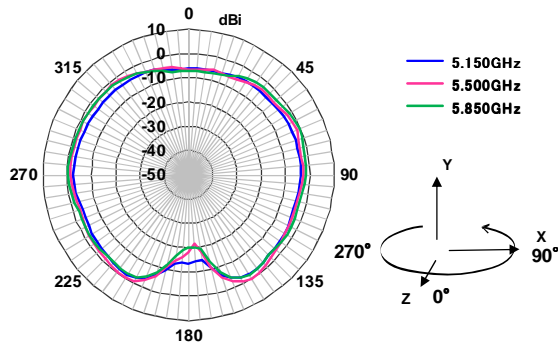
XY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-1.6	0.1	0.5
Maximum[dBi]	2.9	4.2	4.2
Minimum[dBi]	-8.7	-8.8	-7.4

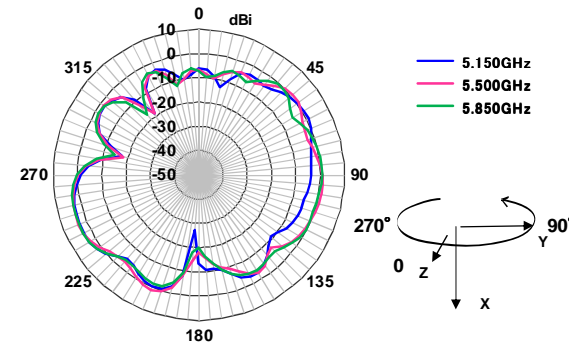
ZX plane



Total Power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-4.1	-2.9	-2.9
Maximum[dBi]	-1.7	0.0	-0.3
Minimum[dBi]	-14.5	-21.3	-20.1

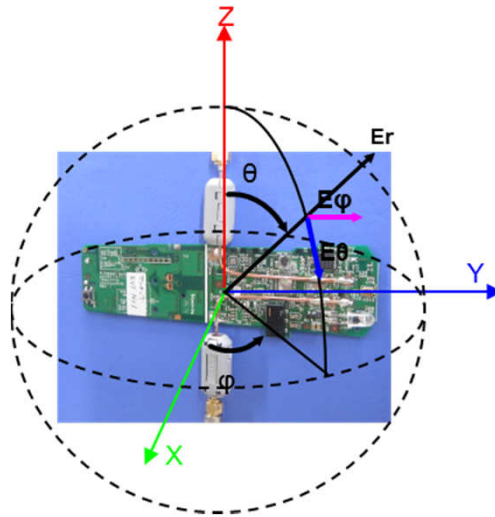
ZY plane



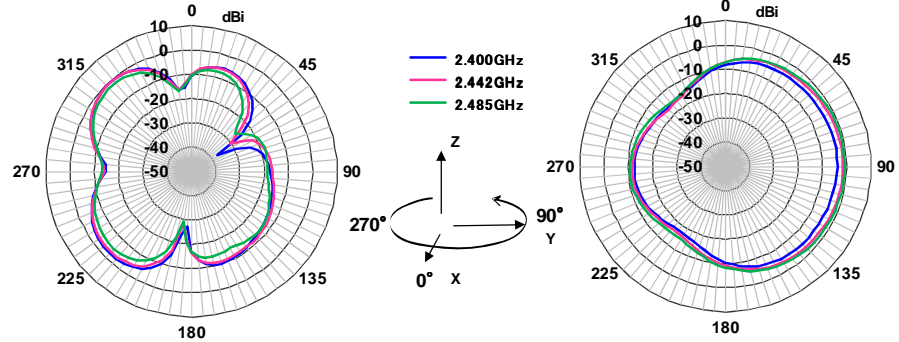
Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.7	-1.9	-2.0
Maximum[dBi]	3.1	3.7	3.5
Minimum[dBi]	-27.3	-19.0	-19.8

Tuned
Port-2



XY plane



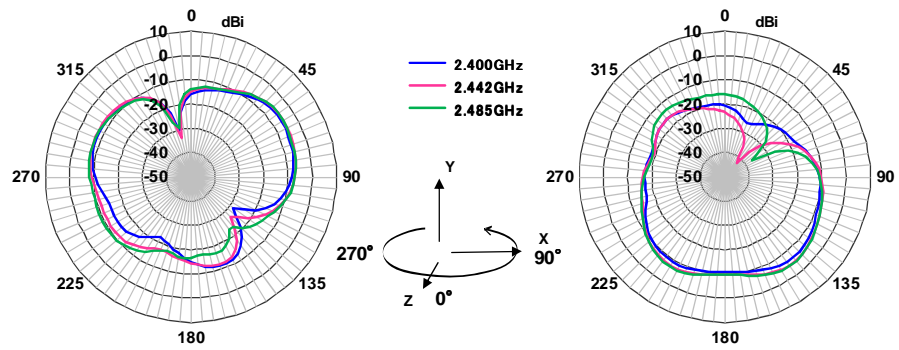
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.8	-7.1	-8.6
Maximum[dBi]	-0.3	-0.4	-1.7
Minimum[dBi]	-37.5	-30.7	-29.3

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-7.5	-5.7	-4.9
Maximum[dBi]	-3.8	-1.6	-0.7
Minimum[dBi]	-17.5	-16.8	-15.4

ZX plane



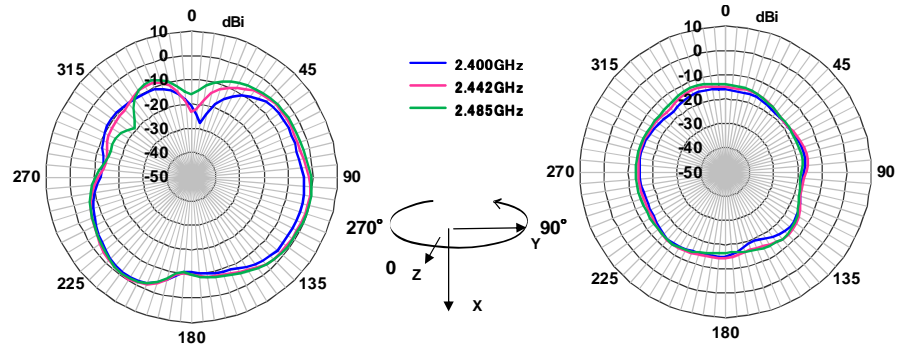
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-11.0	-10.0	-10.0
Maximum[dBi]	-6.1	-5.5	-5.4
Minimum[dBi]	-30.6	-33.7	-29.4

Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-11.87	-10.62	-10.26
Maximum[dBi]	-6.40	-4.73	-4.43
Minimum[dBi]	-25.65	-42.22	-36.83

ZY plane



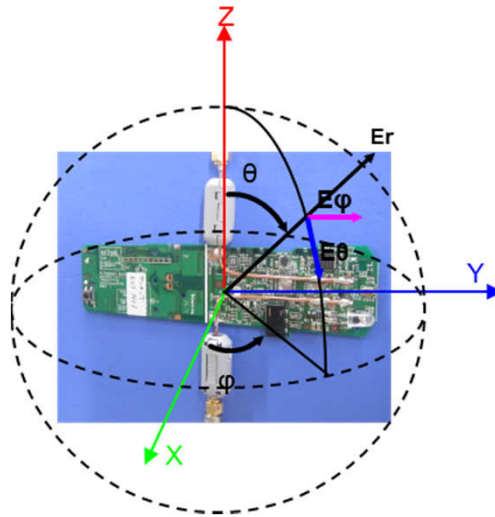
Horizontal Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-6.3	-4.9	-4.5
Maximum[dBi]	-1.3	-0.5	0.1
Minimum[dBi]	-27.4	-23.3	-19.2

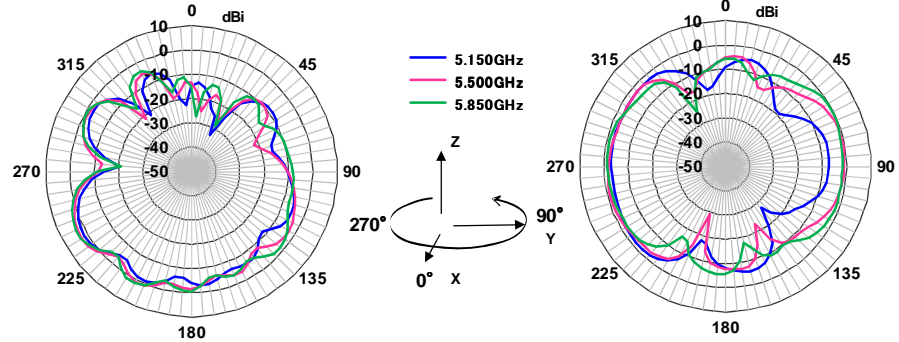
Vertical Polarization

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-15.9	-14.8	-14.7
Maximum[dBi]	-13.6	-12.8	-12.5
Minimum[dBi]	-19.1	-18.2	-18.8

Tuned
Port-2



XY plane



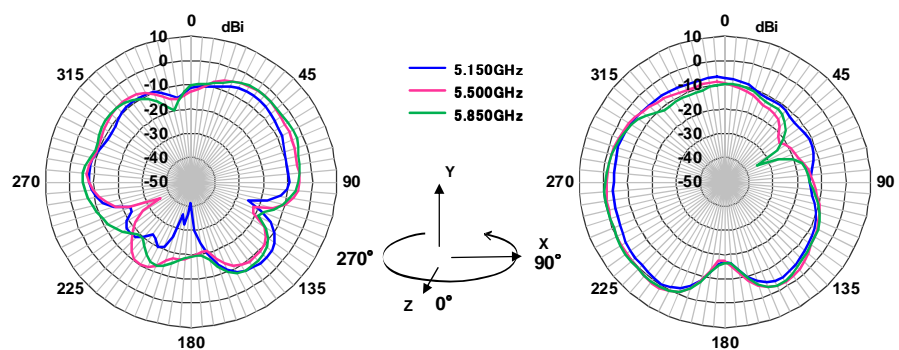
Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.4	-4.0	-3.6
Maximum[dBi]	1.6	2.9	3.4
Minimum[dBi]	-33.1	-26.7	-29.0

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.8	-4.3	-4.1
Maximum[dBi]	-1.6	-0.6	-0.4
Minimum[dBi]	-27.4	-29.4	-24.8

ZX plane



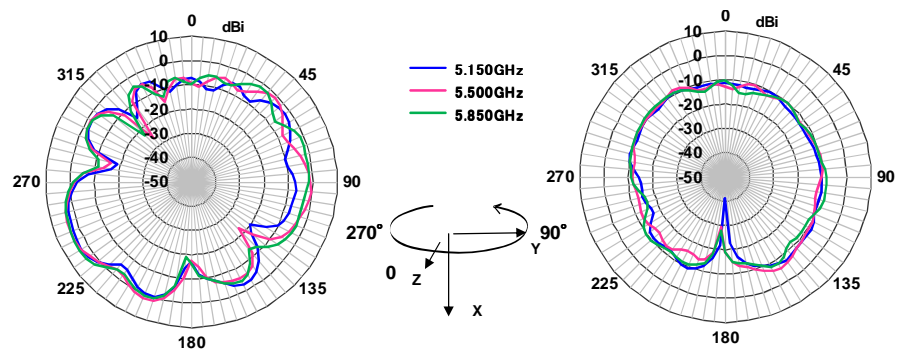
Horizontal Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-10.2	-8.5	-7.7
Maximum[dBi]	-5.8	-3.2	-2.8
Minimum[dBi]	-41.0	-35.8	-19.7

Vertical Polarization

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-5.80	-4.36	-4.47
Maximum[dBi]	-0.61	1.43	1.13
Minimum[dBi]	-16.93	-22.31	-34.98

ZY plane



Horizontal Polarization

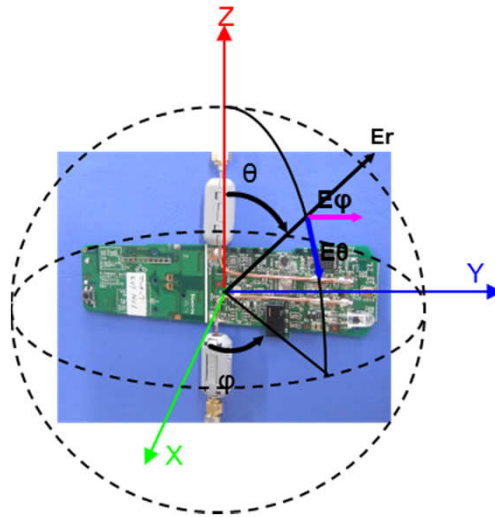
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-3.7	-2.6	-2.4
Maximum[dBi]	3.2	3.9	4.4
Minimum[dBi]	-20.1	-26.1	-22.6

Vertical Polarization

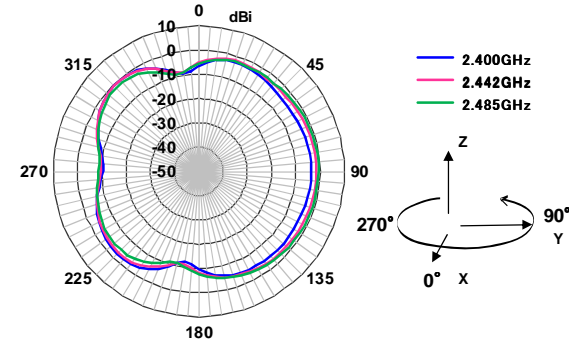
Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-11.0	-10.8	-10.8
Maximum[dBi]	-7.4	-6.0	-8.1
Minimum[dBi]	-41.0	-29.4	-27.8

Tuned

Port-2



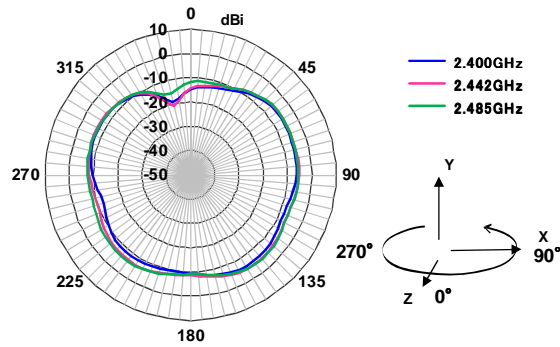
XY plane



Total power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-4.2	-3.3	-3.3
Maximum[dBi]	-0.2	-0.3	-0.6
Minimum[dBi]	-12.6	-11.2	-11.2

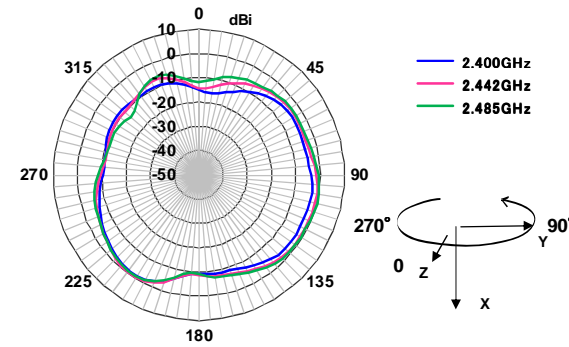
ZX plane



Total Power

Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-8.4	-7.3	-7.1
Maximum[dBi]	-5.8	-4.6	-4.4
Minimum[dBi]	-19.3	-20.8	-15.5

ZY plane

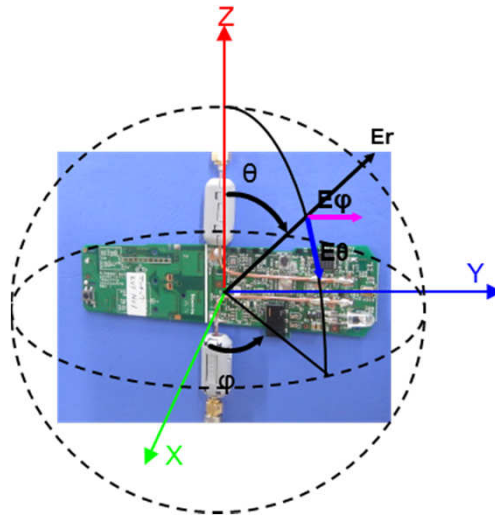


Total power

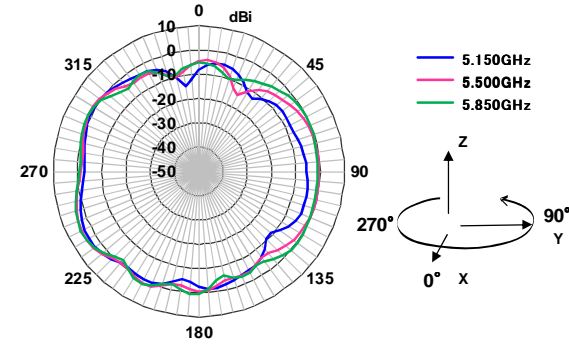
Frequency(GHz)	2.4	2.442	2.485
Average[dBi]	-5.8	-4.5	-4.1
Maximum[dBi]	-1.0	-0.3	0.1
Minimum[dBi]	-16.0	-14.4	-13.1

Tuned

Port-2



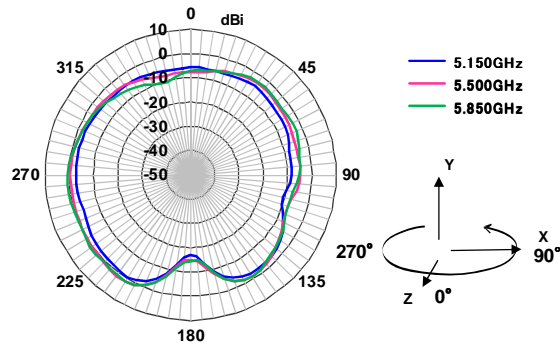
XY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-2.6	-1.1	-0.8
Maximum[dBi]	3.1	4.1	4.4
Minimum[dBi]	-14.6	-14.5	-9.9

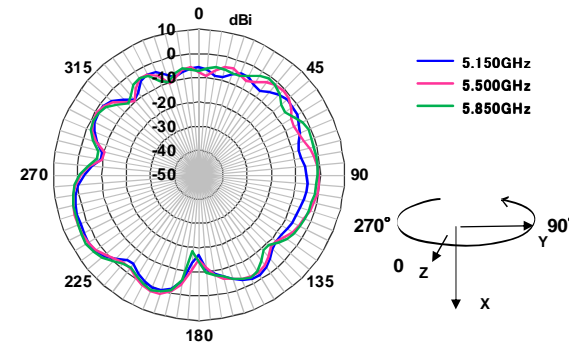
ZX plane



Total Power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-4.5	-2.9	-2.8
Maximum[dBi]	-0.6	1.7	1.2
Minimum[dBi]	-16.9	-15.1	-14.6

ZY plane



Total power

Frequency(GHz)	5.15	5.5	5.85
Average[dBi]	-3.0	-2.0	-1.8
Maximum[dBi]	3.3	4.0	4.5
Minimum[dBi]	-16.9	-15.1	-18.4



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