



Microchip 433MHz PCB Antenna Testing

Made by Jason Lin
2025/01/13

Antenna Measurement Report

Model	ATA8510
Antenna manufacturer	Microchip
Applicant	Microchip 6 F., No. 24-2, Gongye E. 4th Rd., East Dist., Hsinchu City 30077, Taiwan
Manufacturer	Microchip 6 F., No. 24-2, Gongye E. 4th Rd., East Dist., Hsinchu City 30077, Taiwan
Antenna Type	PCB Loop Antenna
Max. Antenna Gain	-1.8dBi

Contents

- Summary
- Test Setup
- Antenna Testing
- Antenna Dimension



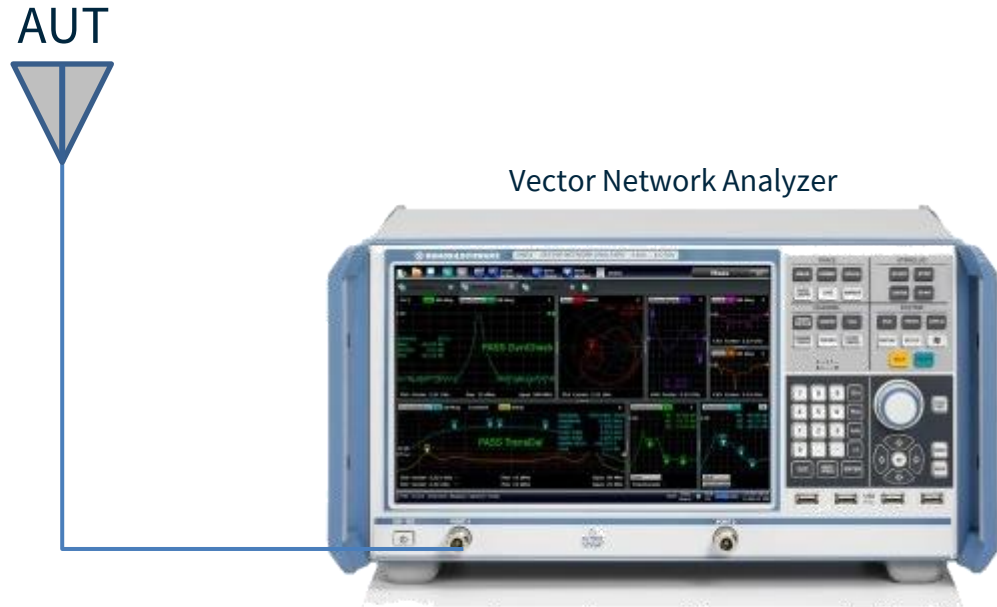
Summary Antenna Testing Result

		410MHz 410-430 MHz	433MHz 430-435 MHz	450MHz 450-470 MHz
Return Loss max for the freq. band	Free Space	-2.8	-12.2	-13.5
	On GND	-3.1	-10.3	-7.2
VSWR max for the freq. band	Free Space	6.3	1.6	1.5
	On GND	5.7	1.9	2.6
Efficiency avg. for the freq. band	Free Space	15.25	22.54	9.26
	On GND	7.25	14.06	4.53
Avg. Gain avg. for the freq. band	Free Space	-8.45	-6.47	-10.38
	On GND	-11.77	-8.53	-13.70
Peak Gain for Gtotal	Free Space	-1.60	-1.8	-2.63
	On GND	-4.61	-4.19	-6.88



Test Setup S_{11} / VSWR / Return Loss

AUT



Vector Network Analyzer



AUT

AUT Photo /
Block Diagram



Test Setup S_{11} / VSWR / Return Loss

AUT



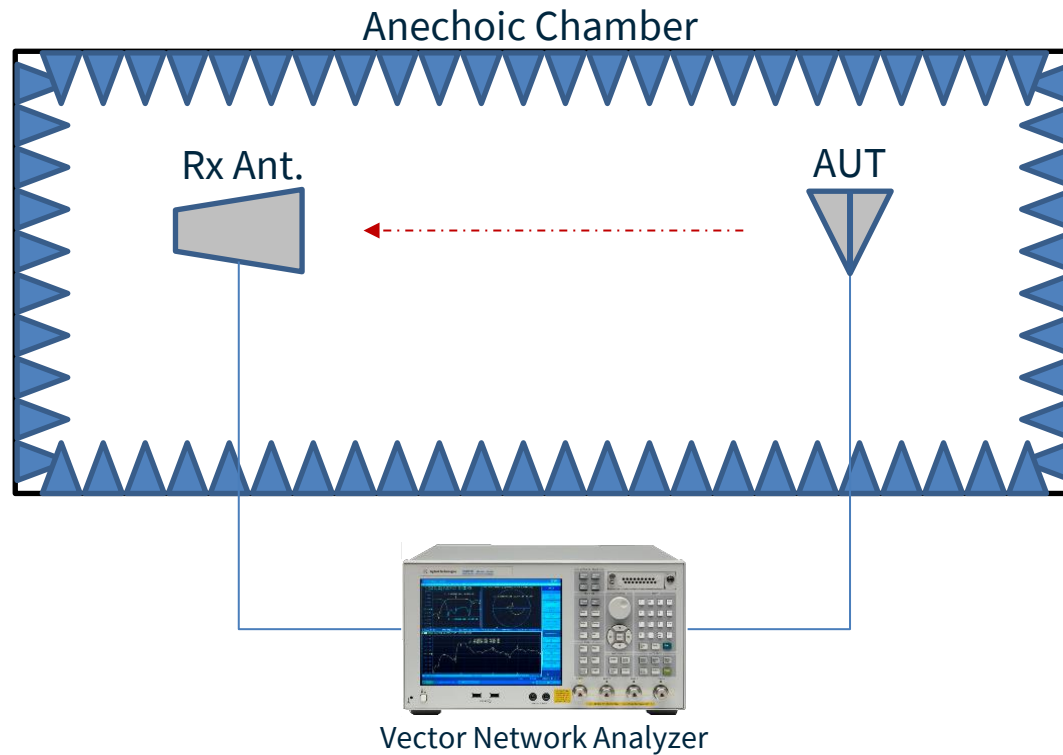
Vector Network Analyzer



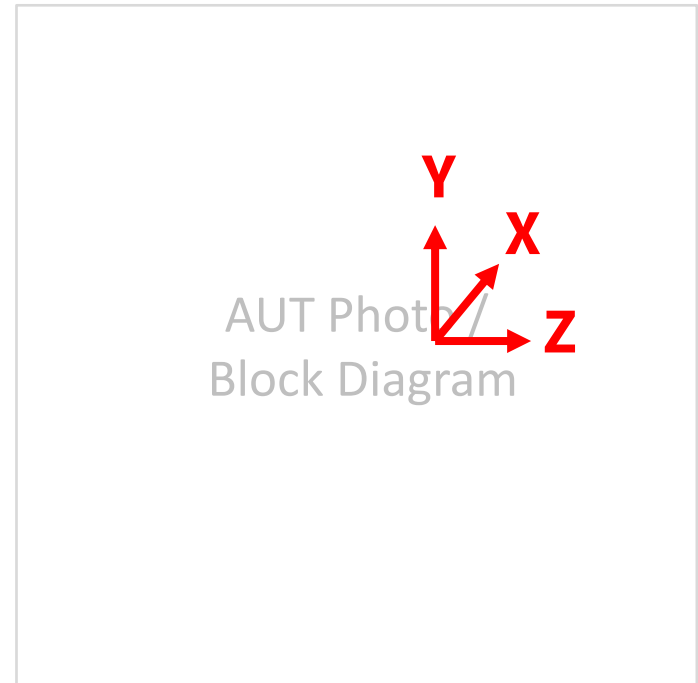
AUT

AUT Photo /
Block Diagram

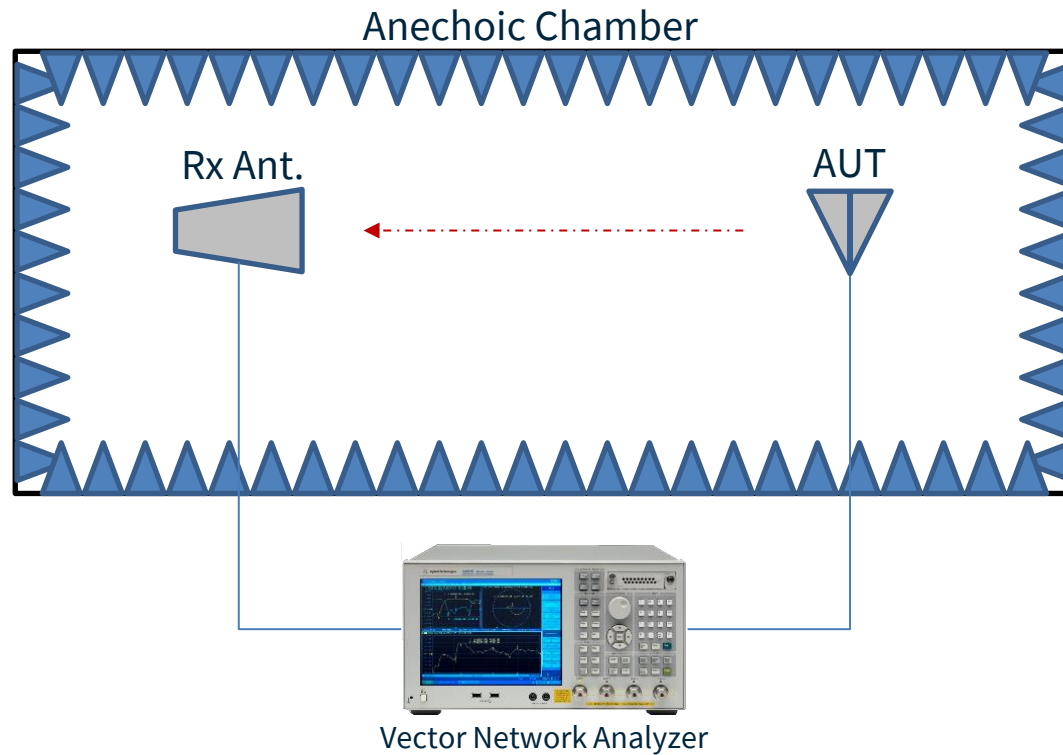
Test Setup Radiation Performance



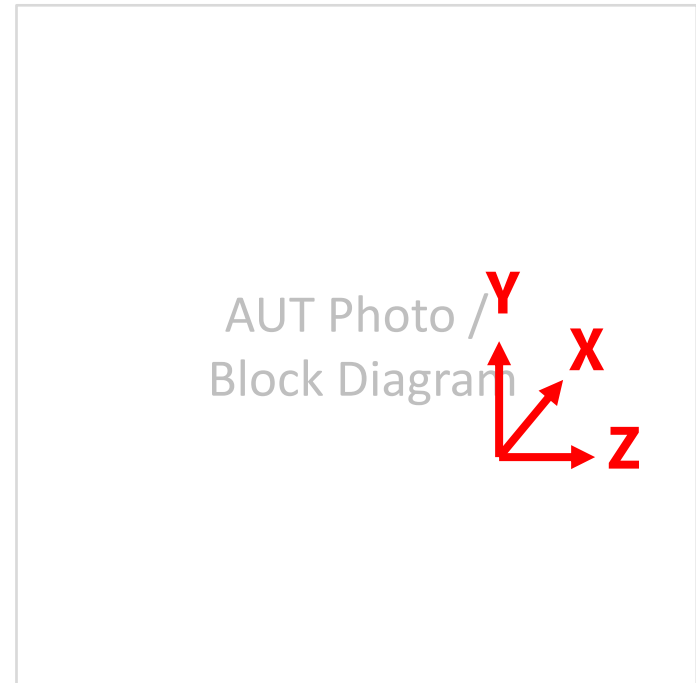
AUT



Test Setup Radiation Performance

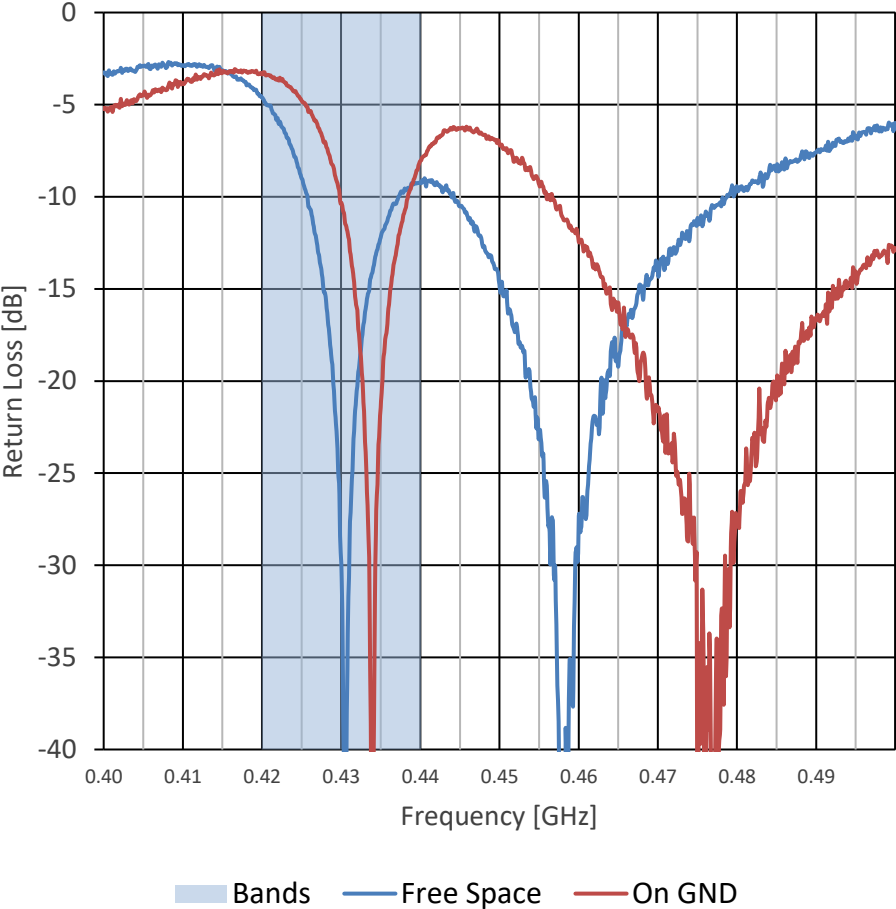


AUT



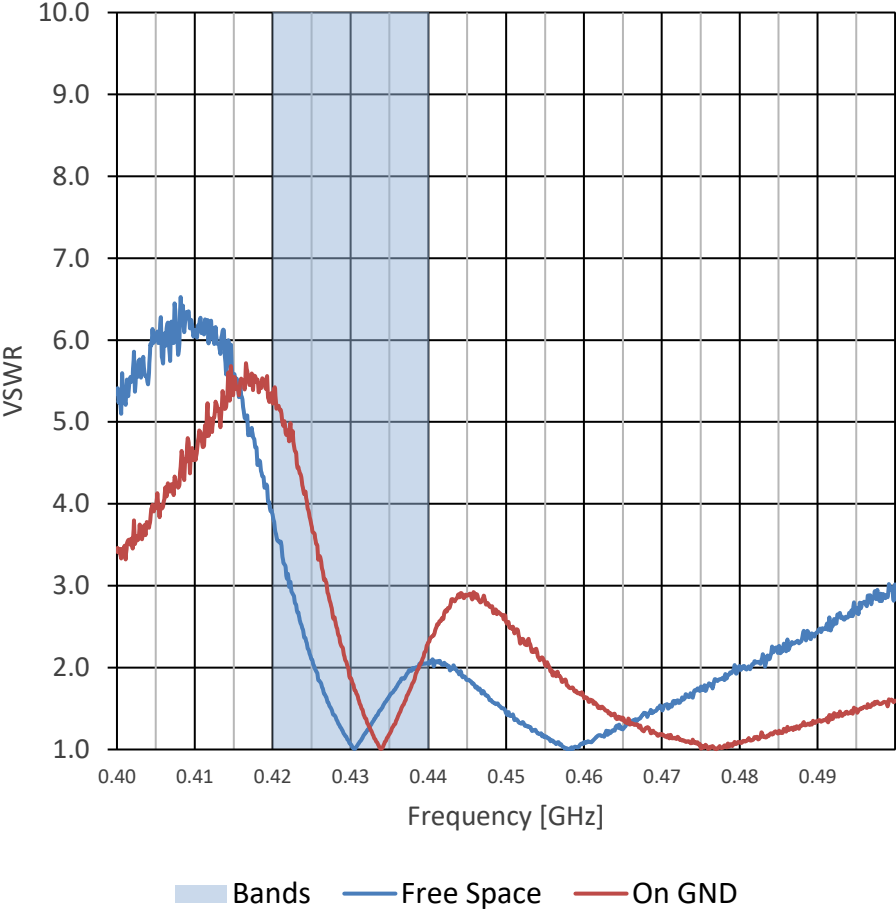
433MHz Antenna Testing

Return Loss 433MHz



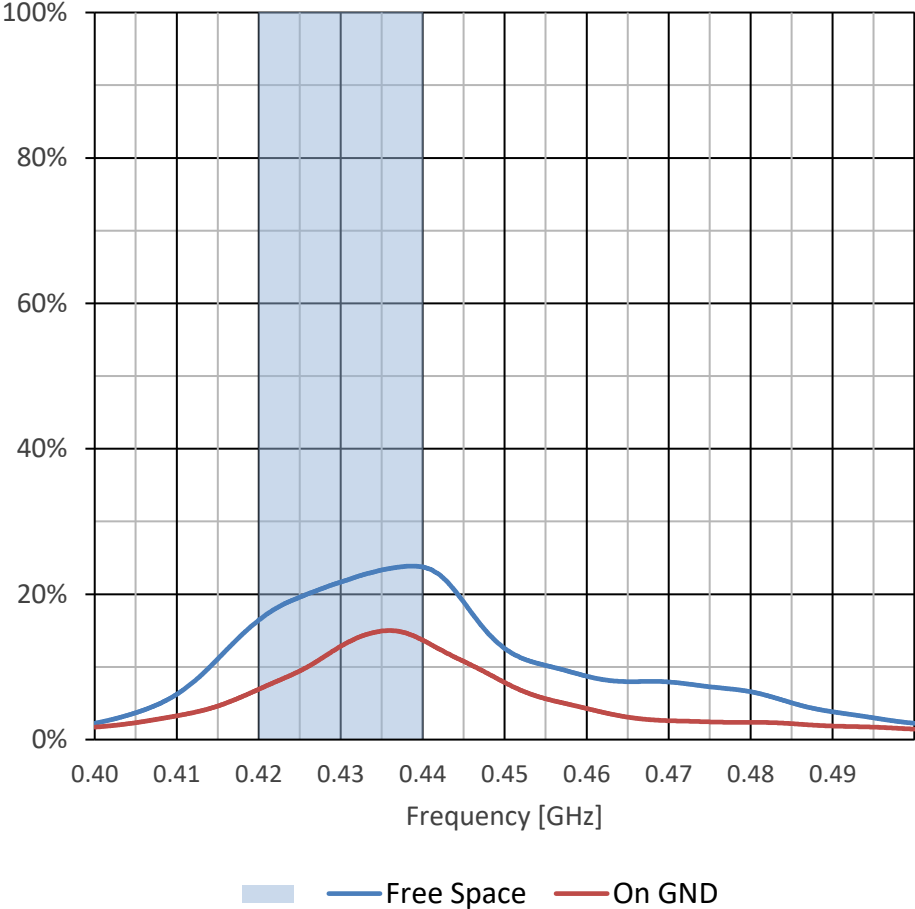
	Free Space			On GND		
Band	Max	Mean	Min	Max	Mean	Min
410MHz 410-430 MHz	-2.8	-7.1	-29.6	-3.1	-4.4	-10.4
433MHz 430-435 MHz	-12.2	-21.8	-51.0	-10.3	-21.3	-50.5
450MHz 450-470 MHz	-13.5	-22.5	-53.2	-7.2	-12.9	-22.3

VSWR 433MHz



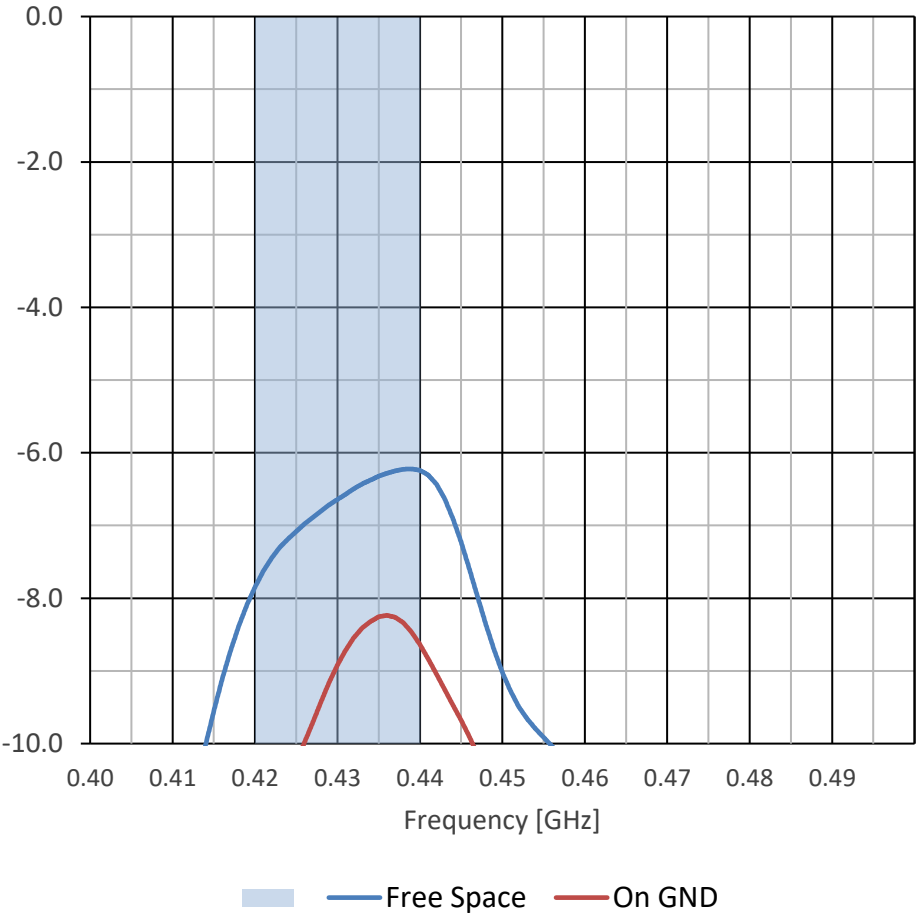
	Free Space			On GND		
Band	Max	Mean	Min	Max	Mean	Min
410MHz 410-430 MHz	6.27	3.81	1.07	5.72	4.49	1.87
433MHz 430-435 MHz	1.65	1.29	1.01	1.87	1.33	1.01
450MHz 450-470 MHz	1.54	1.24	1.01	2.56	1.73	1.17

Efficiency Antenna Testing



	Free Space			On GND		
Band	Max	Mean	Min	Max	Mean	Min
410MHz 410-430 MHz	21.7%	15.2%	6.2%	12.8%	7.3%	3.3%
433MHz 430-435 MHz	23.3%	22.5%	21.7%	14.9%	14.1%	12.8%
450MHz 450-470 MHz	12.5%	9.3%	7.9%	7.9%	4.5%	2.6%

Average Gain Antenna Testing

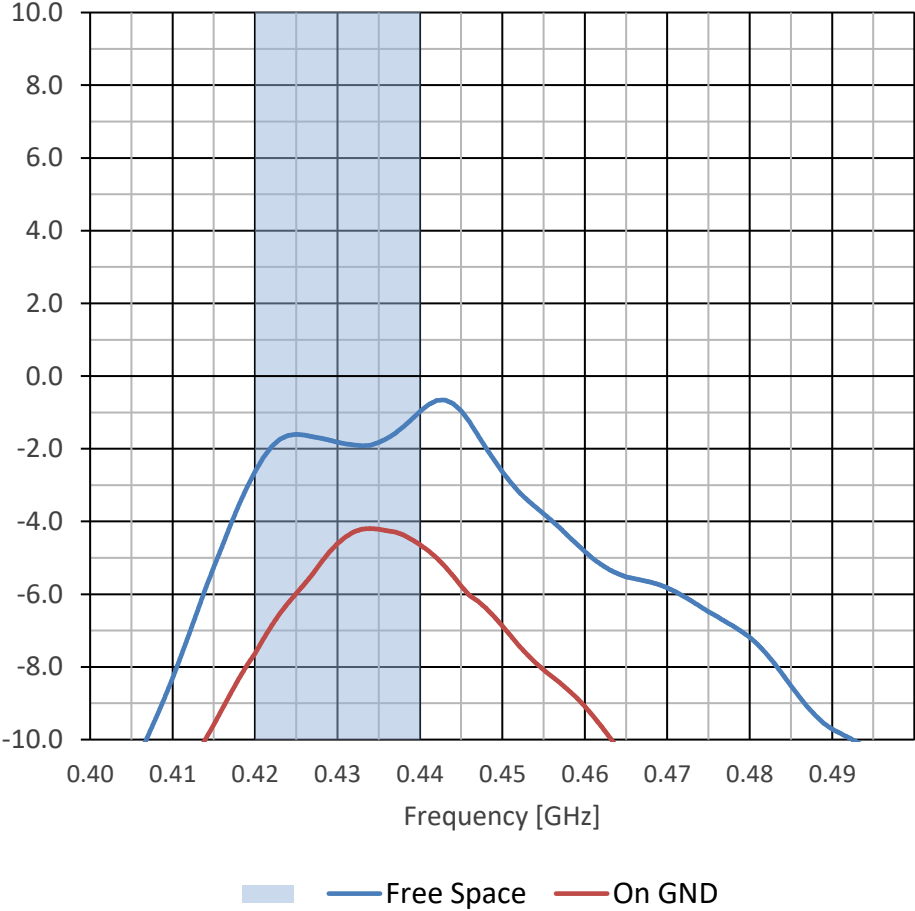


	Free Space			On GND		
Band	Max	Mean	Min	Max	Mean	Min
410MHz 410-430 MHz	-6.6 dB	-8.5 dB	-12.0 dB	-8.9 dB	-11.8 dB	-14.9 dB
433MHz 430-435 MHz	-6.3 dB	-6.5 dB	-6.6 dB	-8.3 dB	-8.5 dB	-8.9 dB
450MHz 450-470 MHz	-9.0 dB	-10.4 dB	-11.0 dB	-11.1 dB	-13.7 dB	-15.9 dB



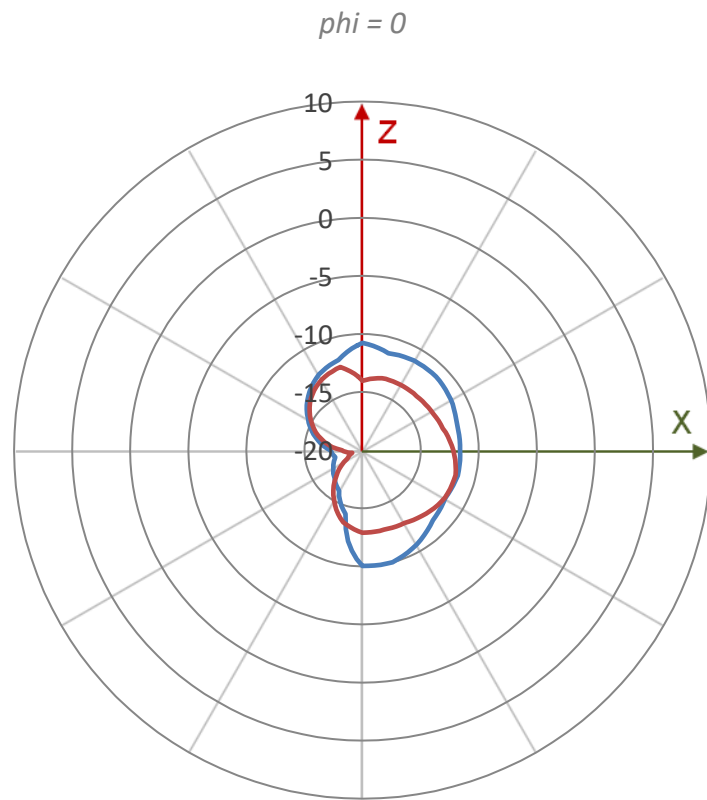
Peak Gain

Antenna Testing for Gtotal

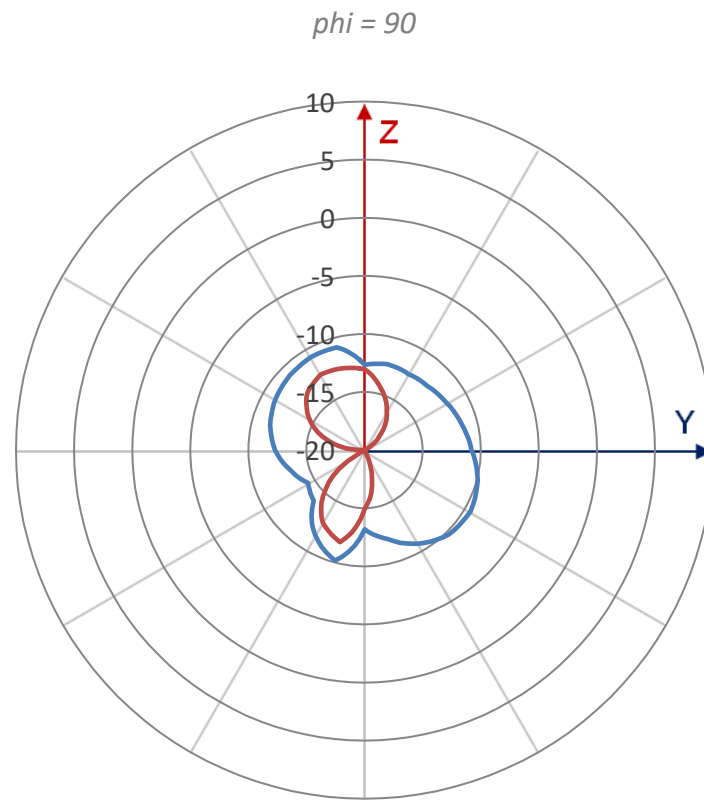


	Free Space			On GND		
Band	Max	Mean	Min	Max	Mean	Min
410MHz 410-430 MHz	-1.6 dBi	-3.6 dBi	-8.3 dBi	-4.6 dBi	-7.8 dBi	-11.3 dBi
433MHz 430-435 MHz	-1.8 dBi	-1.9 dBi	-1.9 dBi	-4.2 dBi	-4.3 dBi	-4.6 dBi
450MHz 450-470 MHz	-2.6 dBi	-4.6 dBi	-5.8 dBi	-6.9 dBi	-9.2 dBi	-11.7 dBi

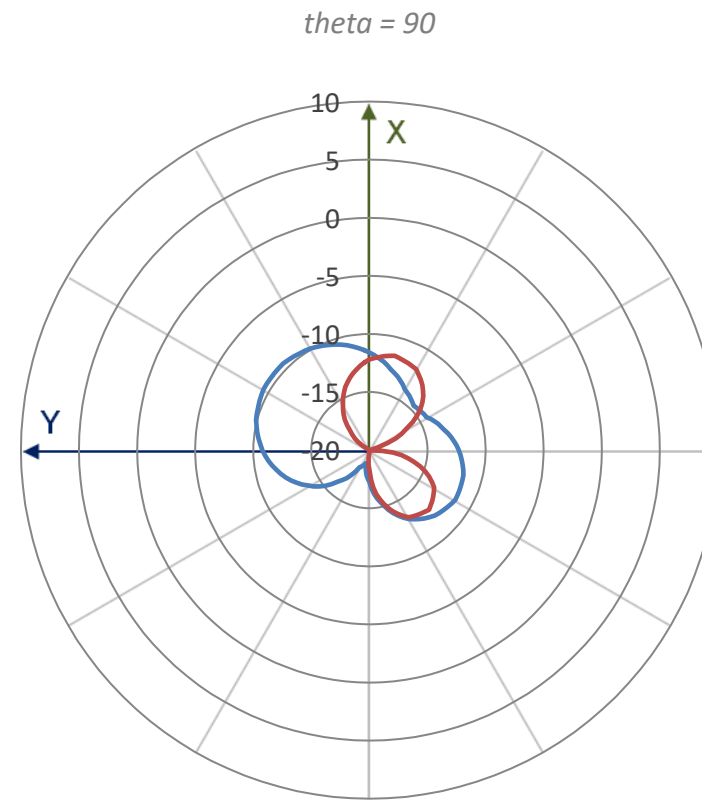
Radiation Pattern Antenna Testing @410MHz for Gtotal



— Free Space — On GND

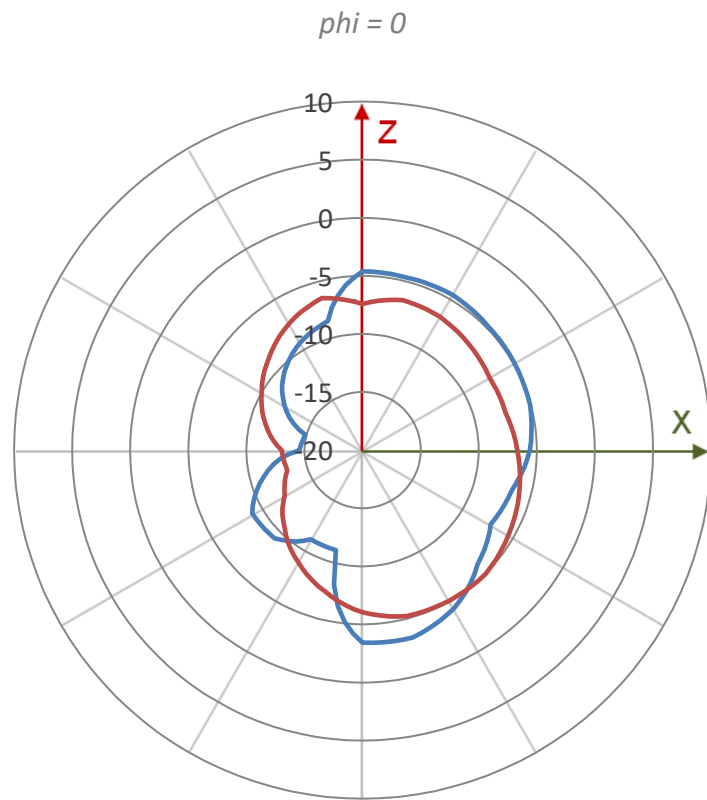


— Free Space — On GND

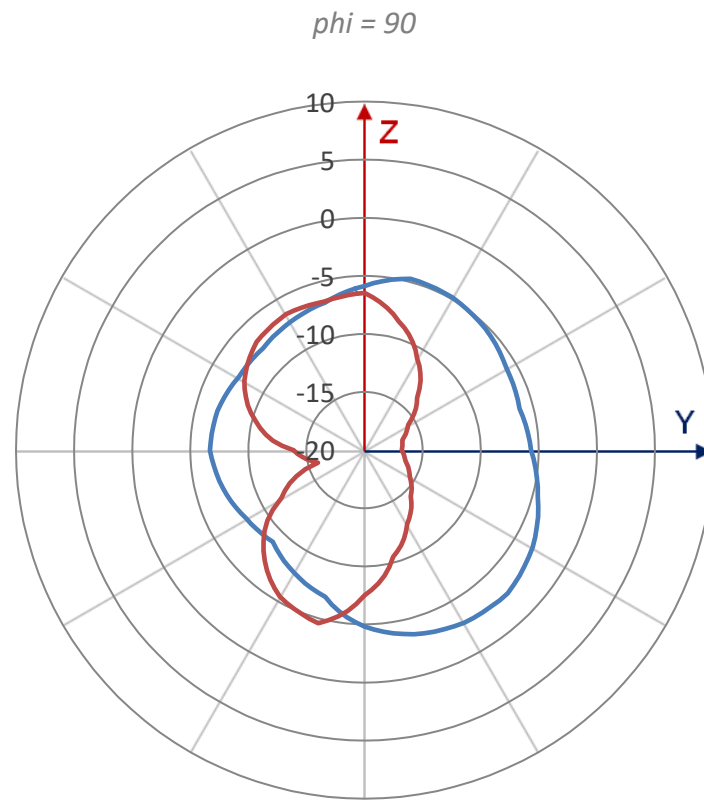


— Free Space — On GND

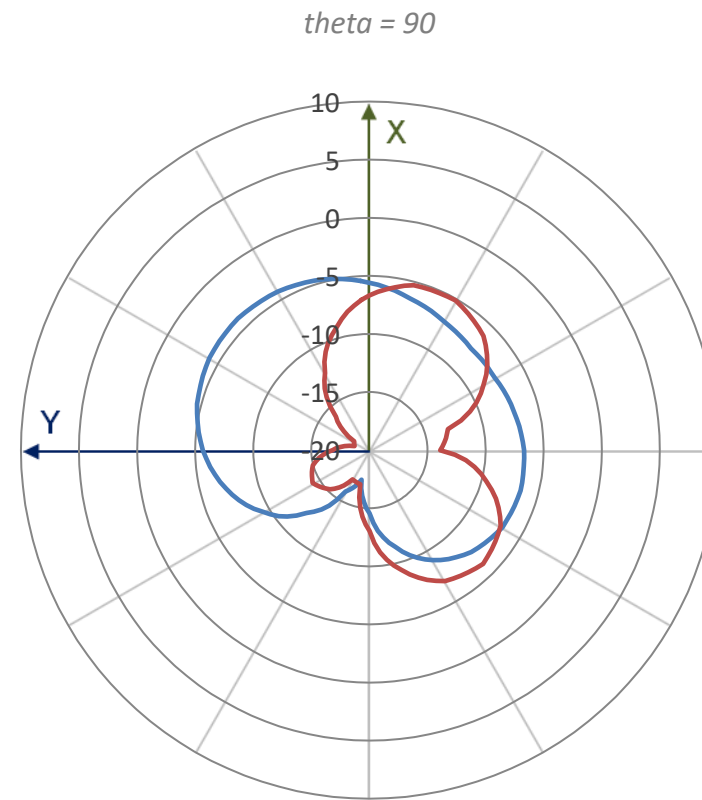
Radiation Pattern Antenna Testing @433MHz for Gtotal



— Free Space — On GND

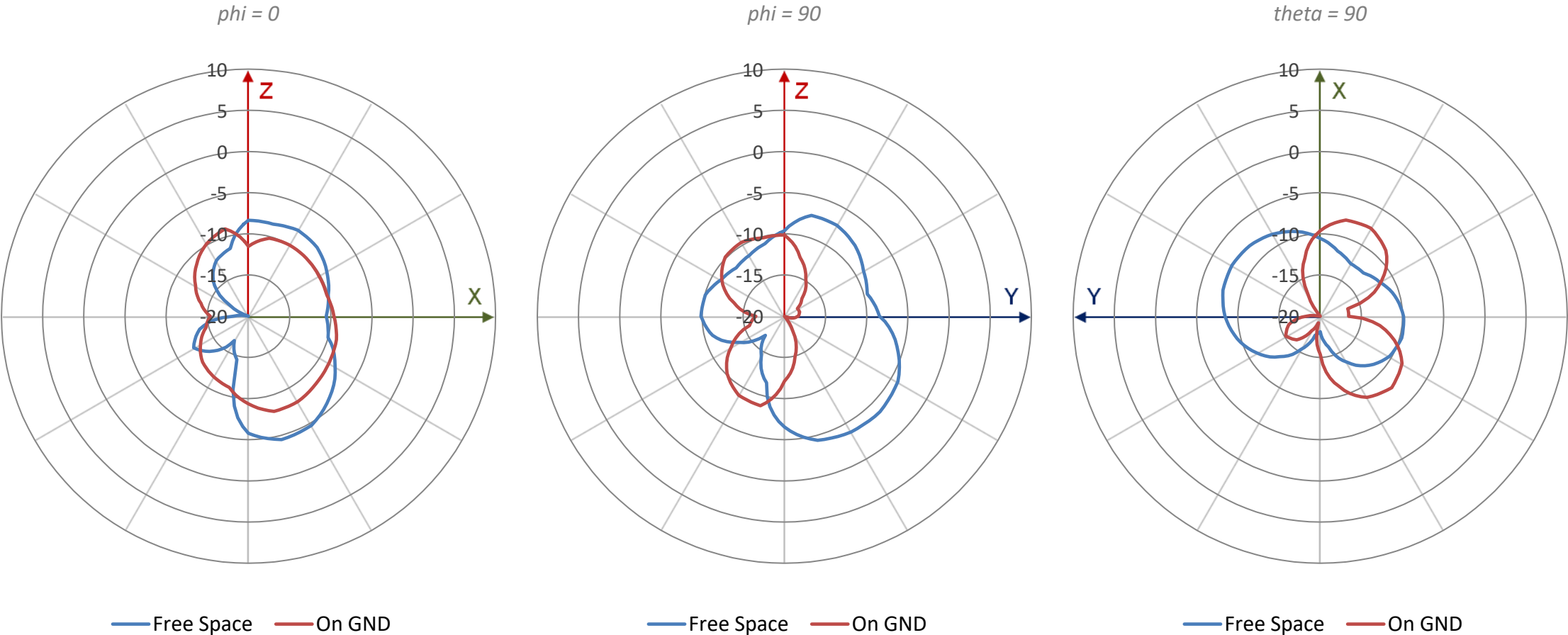


— Free Space — On GND



— Free Space — On GND

Radiation Pattern Antenna Testing @450MHz for Gtotal



Antenna Dimension

All the dimensions are in millimeter

