



Volvo GPA WiFi Antenna

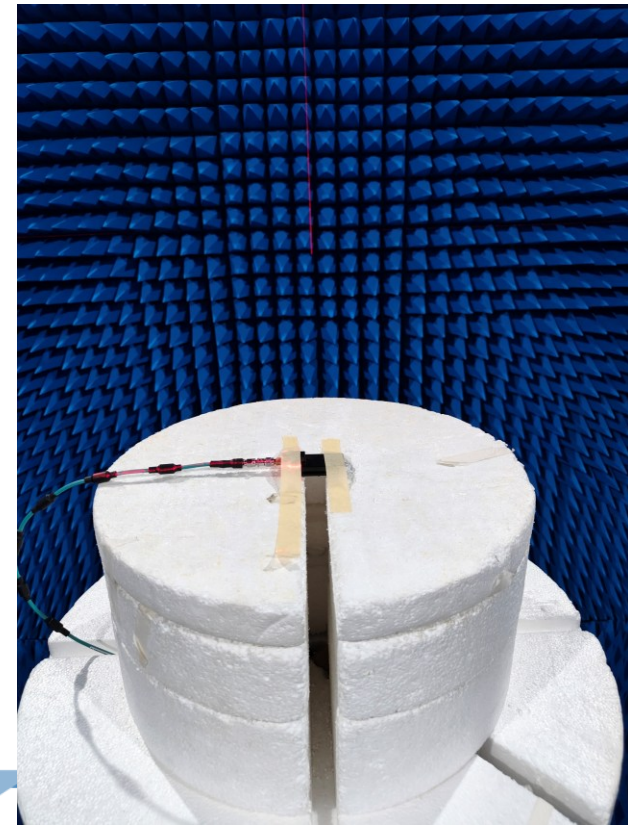
2025-12-18: Antenna sample report – VP-13

Document History

Date	Version	Comment	Editor
240913	1	Document created	S.Radzijewski
241212	2	Added XY, XZ and YZ Plane data and coordinate system clarification	S.Radzijewski
250106	3	coordinate system plane indications	S.Radzijewski
250108	4	Added Theta 0-180° evaluation and corrected Theta 0-90° evaluation	S.Radzijewski
251217	5	Added Measurement information	S.Radzijewski

Antenna Data

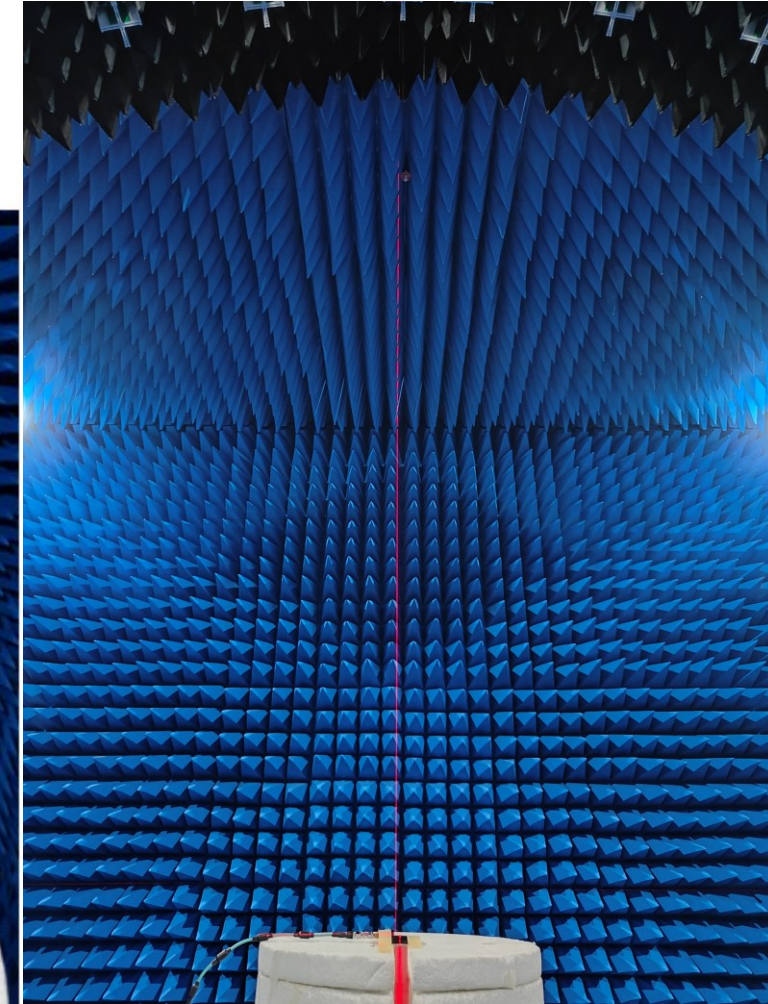
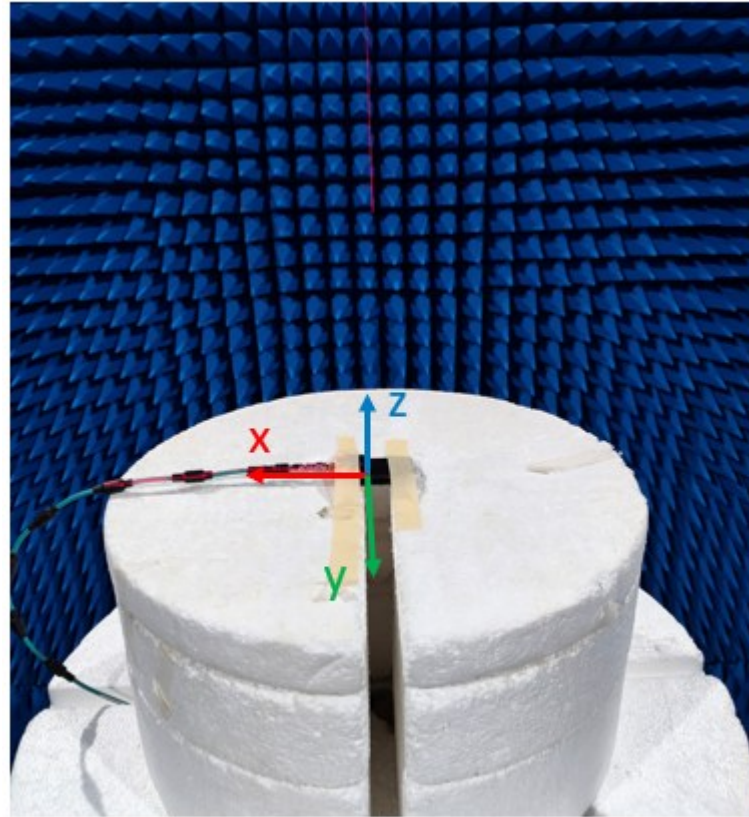
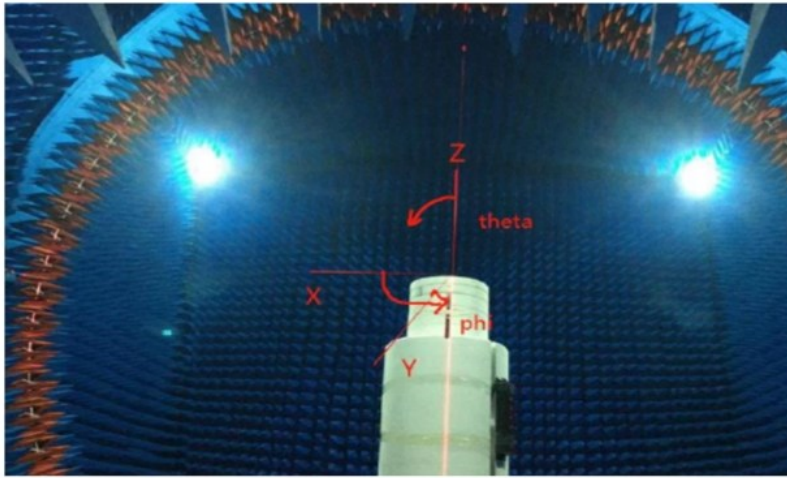
VP Samples - Chamber Measurement – VP-13



Measurement Setup VP

For the antenna measurement up to 7125MHz the antenna was placed in the anechoic chamber in Huizhou.

VP Build samples were measured.



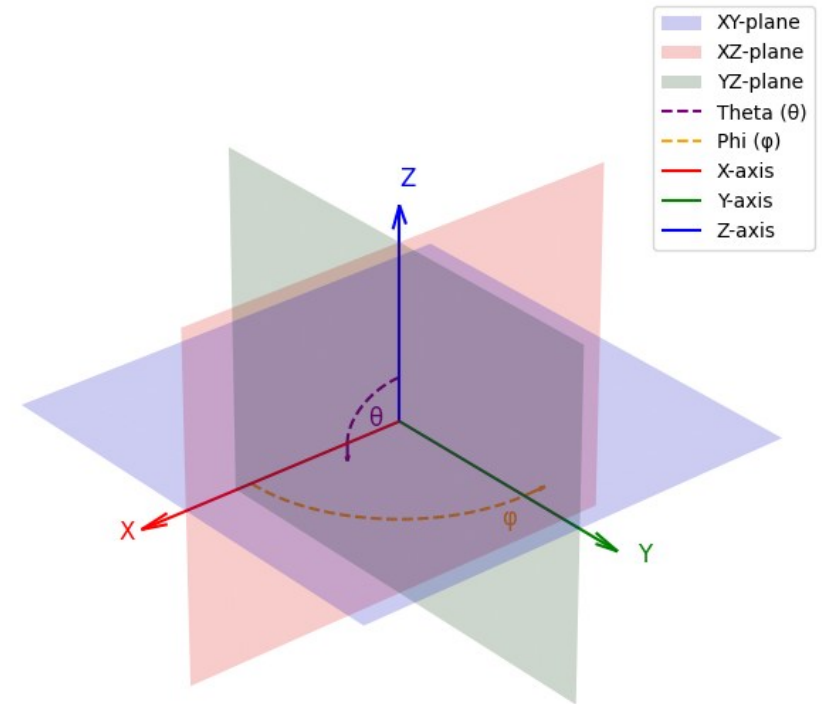
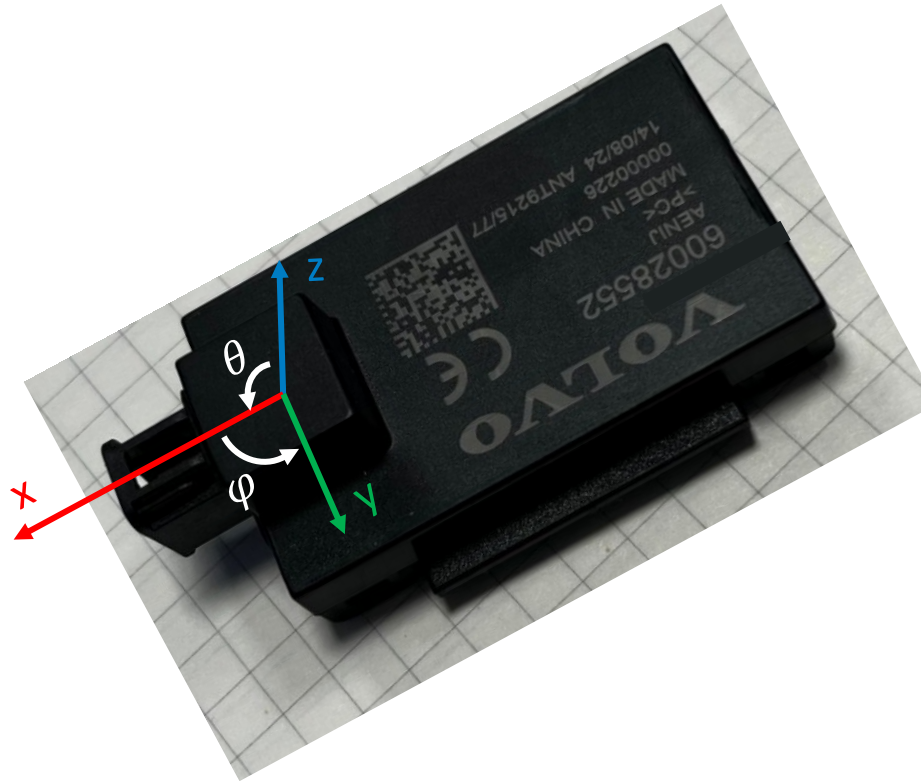
Measurement Information

Measurement Environment	Anechoic chamber
System Description	Multiprobe antenna measurement system
Measured Date	2024.07.17
Measured Software	Quick OTA
Measured Method	Gain Transfer and NF-FF Transformation
Measurement by	J. Yan
Report by	Dr.-Ing. S. Radziejewski

List of active Instruments

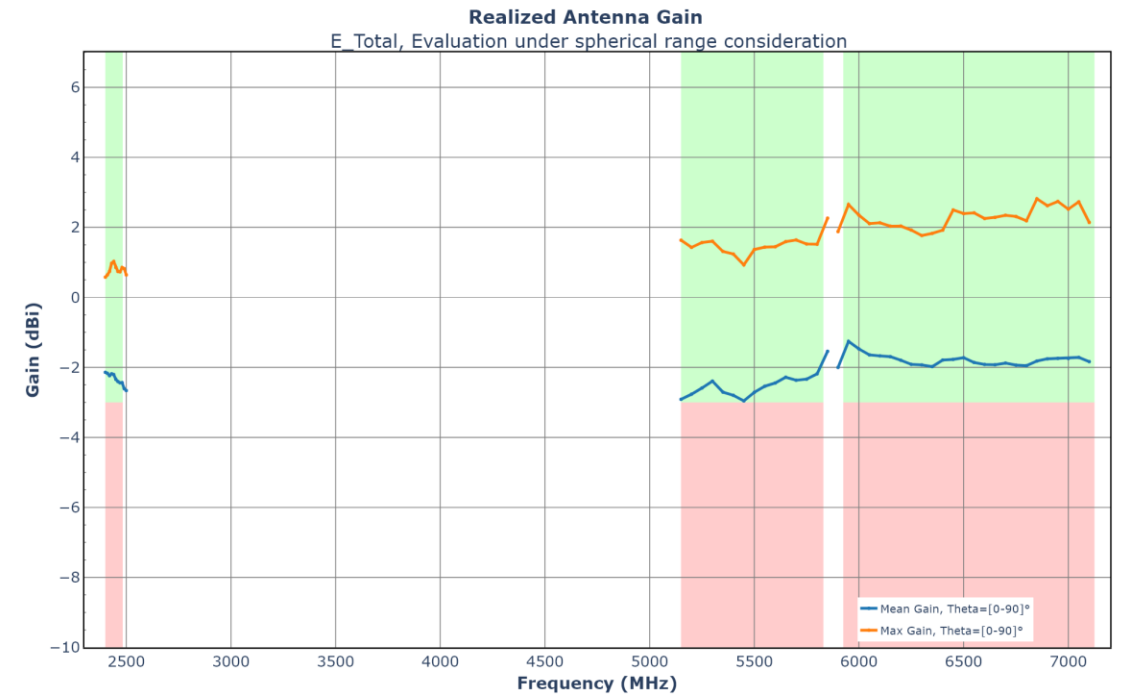
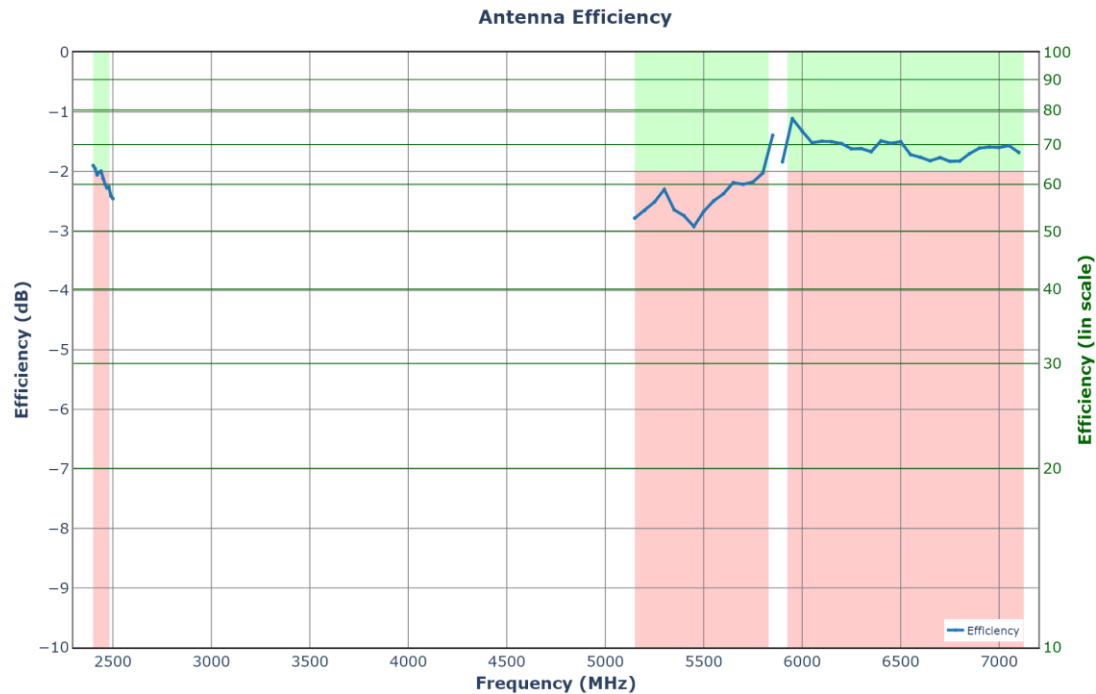
Item	Description	Calibrated Date
1.	VNA KEYSIGHT E5071C	2022.09.07
2.	RF Switch Box	2022.09.07

Coordinate System clarification



Antenna Efficiency and Max Gain

VP-13

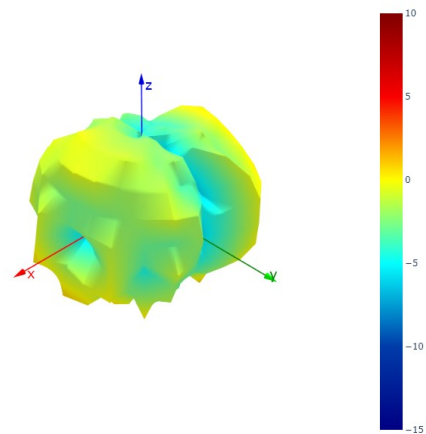


measurement results

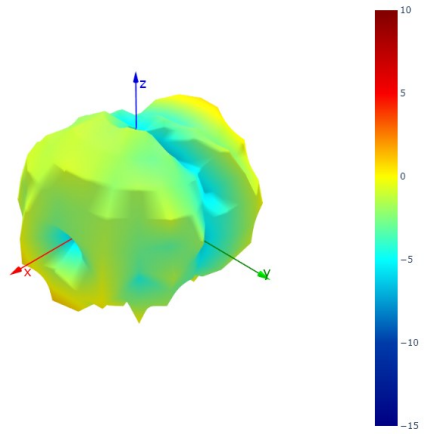
3D Radiation patterns

VP-13

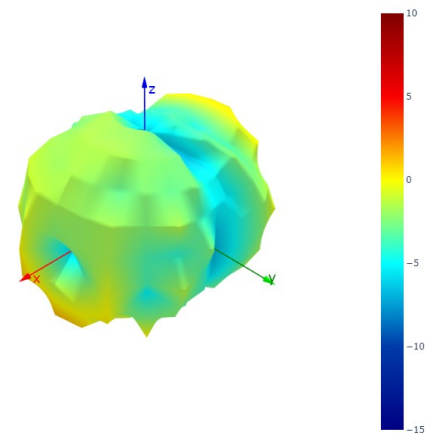
Spherical 3D Pattern Diagramm
Realized Gain E_total, 2400.0MHz



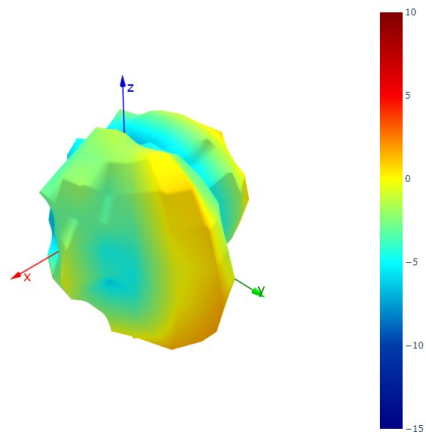
Spherical 3D Pattern Diagramm
Realized Gain E_total, 2450.0MHz



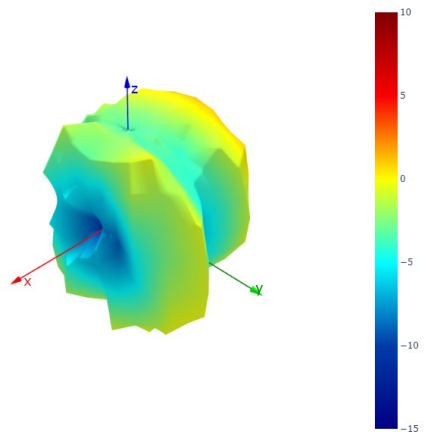
Spherical 3D Pattern Diagramm
Realized Gain E_total, 2500.0MHz



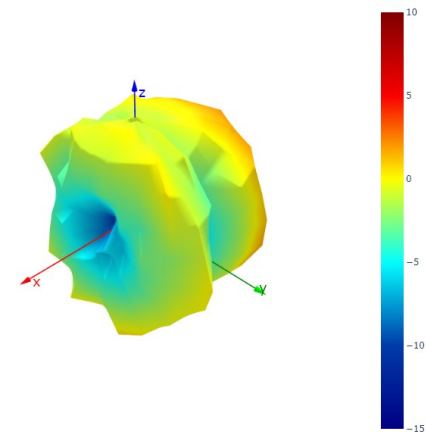
Spherical 3D Pattern Diagramm
Realized Gain E_total, 5150.0MHz



Spherical 3D Pattern Diagramm
Realized Gain E_total, 5500.0MHz



Spherical 3D Pattern Diagramm
Realized Gain E_total, 5850.0MHz



measurement results

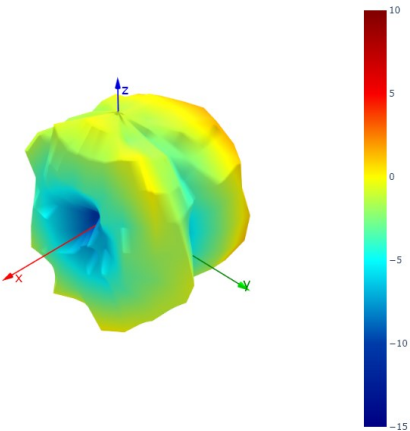
3D Radiation patterns

Measured maximum total Gain [dBi]

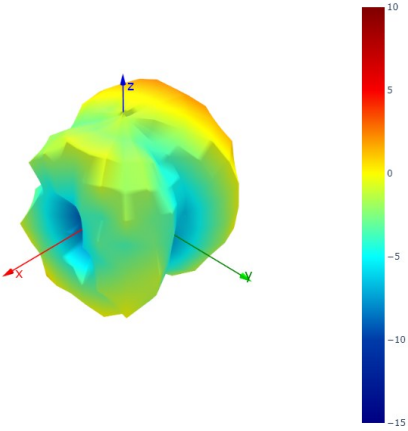
Freq Range	2400 - 2500 MHz	5150 - 5850MHz	5925 - 7125MHz
Max Gain [dB]	3.2	2.3	2.9
Mean Antenna Eff [dB]	-2.2	-2.4	-1.6

VP-13

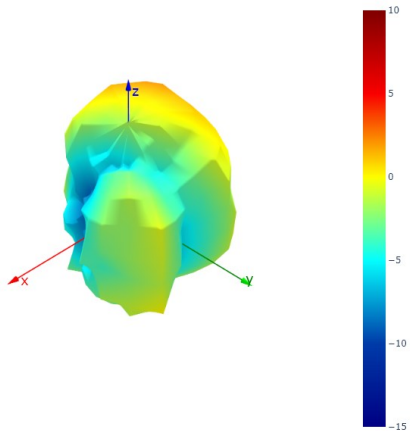
Spherical 3D Pattern Diagramm
Realized Gain E_total, 5900.0MHz



Spherical 3D Pattern Diagramm
Realized Gain E_total, 6500.0MHz



Spherical 3D Pattern Diagramm
Realized Gain E_total, 7100.0MHz



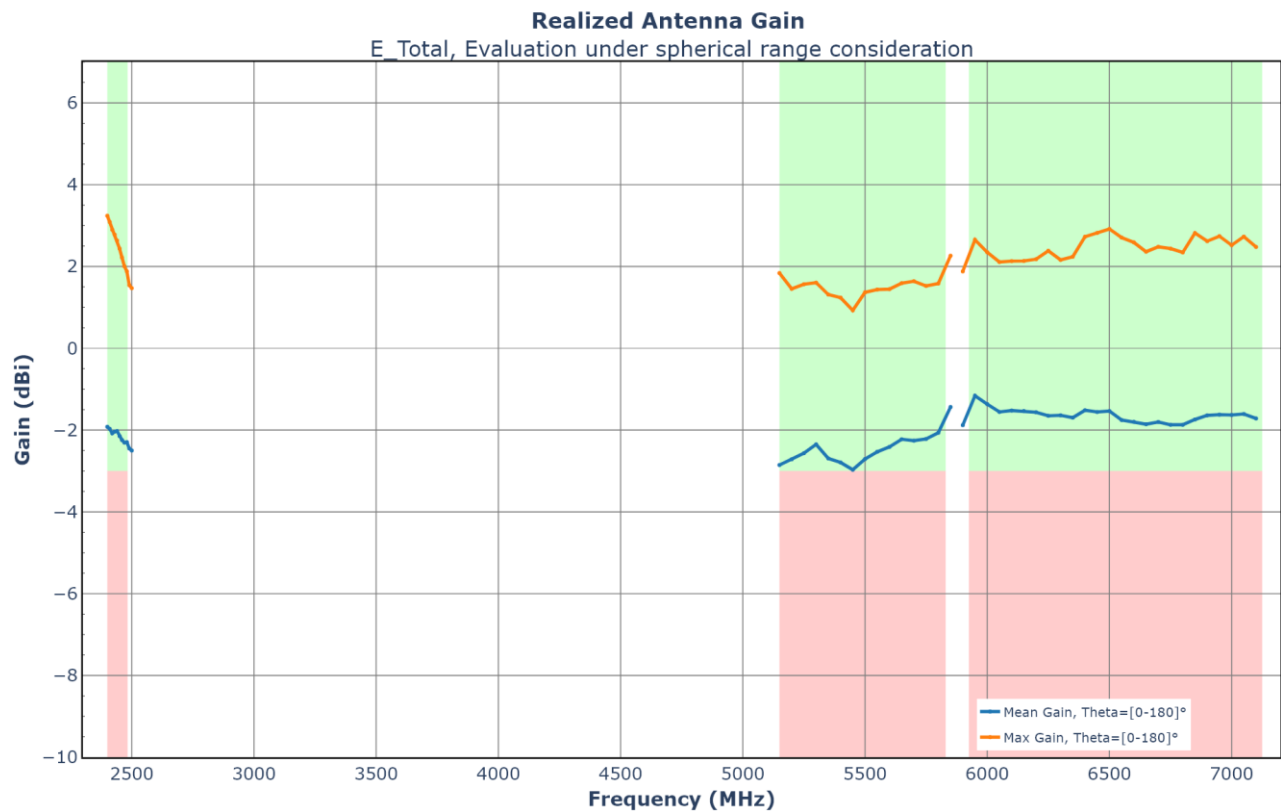
Solid Angle Range , Theta = [0, 90]°, Phi = [0, 360]°

Frequency [MHz]		2400	2450	2500	5150	5500	5850	5950	6600	7100
Max Gain	E_total [dBi]	0.6	0.9	0.6	1.6	1.4	2.3	2.7	2.3	2.1
	E_vert	0.4	0.6	0.3	-1.4	-1.1	-0.1	0.0	-0.5	-0.4
	E_hori	0.3	0.0	0.0	1.6	0.0	1.7	2.5	0.5	0.8
Efficiency	[%]	64.5	61.4	56.8	52.6	54.0	72.5	77.4	66.6	67.9
	[db]	-1.9	-2.1	-2.5	-2.8	-2.7	-1.4	-1.1	-1.8	-1.7

measurement results

Theta 0-180° evaluation

VP-13



Solid Angle Range , Theta = [0, 180]°, Phi = [0, 360]°

Frequency [MHz]		2400	2450	2500	5150	5500	5850	5950	6600	7100
Max Gain	E_total [dBi]	3.2	2.4	1.5	1.8	1.3	2.3	2.7	2.6	2.5
	E_vert	2.6	1.7	1.3	-0.4	-1.1	-0.1	0.1	0.3	-0.4
	E_hori	0.3	0.2	0.0	1.6	0.7	1.9	2.5	0.8	0.9
Efficiency	[%]	64.5	61.4	56.8	52.6	54.0	72.5	77.4	66.6	67.9
	[db]	-1.9	-2.1	-2.5	-2.8	-2.7	-1.4	-1.1	-1.8	-1.7

measurement results

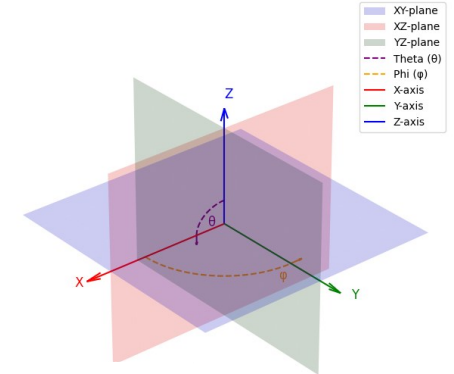
Gain in coordinate system axis directions

VP-13

Gain in main Axis directions										
Axis Direction	Field Comp	Freq [MHz]								
		2400	2450	2500	5150	5500	5850	5950	6600	7100
+X	E_total [dBi]	-6.0	-6.6	-6.2	-4.4	-10.2	-10.9	-12.0	-12.7	-9.6
	E_vert [dBi]	-7.9	-8.6	-8.9	-14.3	-14.1	-12.7	-14.2	-17.6	-14.0
	E_hori [dBi]	-10.7	-11.1	-9.5	-4.9	-12.5	-15.5	-16.0	-14.4	-11.6
+Y	E_total [dBi]	-6.1	-6.1	-7.0	-0.5	-3.6	-2.8	-3.0	-6.5	-5.7
	E_vert [dBi]	-20.1	-22.1	-19.6	-17.8	-20.7	-17.9	-17.9	-21.5	-19.1
	E_hori [dBi]	-6.3	-6.2	-7.2	-0.6	-3.7	-3.0	-3.2	-6.7	-5.9
+Z	E_total [dBi]	-4.7	-6.6	-7.1	-6.8	-3.7	-1.1	-0.3	-3.0	-1.6
	E_vert [dBi]	-4.7	-6.8	-7.3	-9.4	-5.2	-2.8	-2.7	-6.5	-3.2
	E_hori [dBi]	-24.1	-21.8	-22.5	-10.3	-9.0	-5.9	-4.0	-5.6	-6.8
-X	E_total [dBi]	-14.8	-16.8	-20.2	0.5	-0.8	0.1	0.4	0.3	0.3
	E_vert [dBi]	-19.5	-17.7	-21.3	-13.0	-15.3	-14.9	-15.6	-12.7	-20.0
	E_hori [dBi]	-16.6	-23.8	-26.6	0.3	-1.0	-0.1	0.3	0.1	0.3
-Y	E_total [dBi]	-5.4	-6.2	-5.3	-9.6	-6.4	-6.6	-6.1	-4.1	-2.4
	E_vert [dBi]	-20.2	-18.5	-18.0	-20.1	-24.8	-23.0	-27.0	-27.9	-33.4
	E_hori [dBi]	-5.6	-6.4	-5.5	-10.0	-6.4	-6.7	-6.1	-4.1	-2.4
-Z	E_total [dBi]	-8.4	-8.5	-9.1	-17.0	-14.5	-13.2	-13.2	-14.4	-14.2
	E_vert [dBi]	-11.9	-12.2	-12.5	-21.1	-17.5	-15.6	-15.6	-16.0	-16.6
	E_hori [dBi]	-11.1	-10.9	-11.8	-19.2	-17.5	-16.8	-17.0	-19.5	-18.0

measurement results

Gain figures in antenna pattern cut planes



*Gain Data on Planes

Frequency [MHz]			2400	2450	2500	5150	5500	5850	5950	6550	7150
XY-Plane Theta=90° cut	E_vert	Peak [dBi]	-7.8	-8.5	-8.0	-13.0	-12.7	-12.3	-13.3	-12.5	-13.6
		Avg [dBi]	-13.2	-13.3	-13.4	-17.7	-17.1	-15.9	-16.8	-16.1	-17.5
	E_hori	Peak [dBi]	0.3	0.0	0.0	1.6	0.0	1.7	2.5	0.4	1.3
		Avg [dBi]	-2.8	-2.9	-3.1	-2.8	-3.6	-2.5	-2.1	-3.0	-2.5
XZ-Plane Phi=0° cut	E_vert	Peak [dBi]	0.7	1.0	1.3	-2.8	-1.1	-0.9	-0.5	0.6	-0.9
		Avg [dBi]	-2.7	-2.9	-3.2	-8.1	-6.1	-3.9	-3.6	-4.3	-6.4
	E_hori	Peak [dBi]	-10.4	-10.2	-9.5	0.3	-0.5	-0.1	0.3	0.5	0.4
		Avg [dBi]	-14.8	-15.1	-15.0	-4.2	-5.0	-4.3	-3.9	-3.9	-3.5
YZ-Plane Phi=90° cut	E_vert	Peak [dBi]	-8.0	-9.4	-11.1	-8.5	-5.5	-3.0	-3.3	-3.5	-1.4
		Avg [dBi]	-16.8	-17.1	-17.1	-13.1	-10.2	-8.5	-8.1	-7.7	-7.1
	E_hori	Peak [dBi]	-2.3	-3.7	-4.8	-0.6	-3.6	-1.7	-1.5	-3.8	-1.9
		Avg [dBi]	-4.5	-5.3	-6.4	-5.4	-5.7	-4.7	-4.6	-6.3	-4.5

measurement results



Thank you

Follow us

[LinkedIn](#)

[YouTube](#)

[facebook](#)

[Instagram](#)