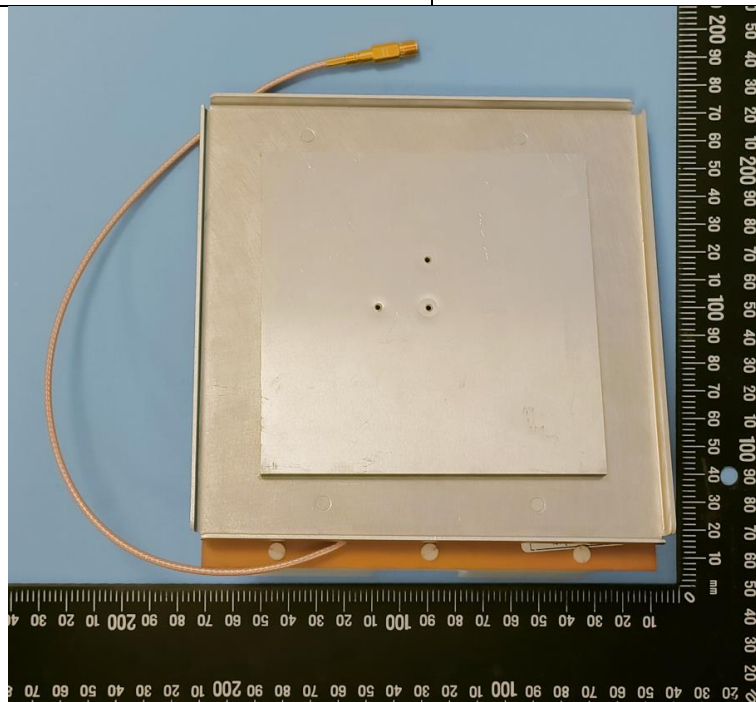


Antenna information ASSY UHF RFTEST R2 MCX

Manufacturer	Nedap N.V.
Brand	Nedap
Model name	ANT R23SINGLE
Operating frequency	918MHz
Number / Type of Antenna(s)	Circular polarized single patch antenna
Antenna Gain (peak, max.)	5 dBi
HPBW	82.1°



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HISTORY OF THIS TEST REPORT

Revision	Description	Date Issued
R01	Original Release	2024-11-21

1 Test Environment

Date of testing:	2024/11/21
Ambient temperature:	22.4 °C
Relative humidity:	65 %
Reference standard:	ANS/IEEE Std 149, CTIA Test Plan for Wireless Device Over-the- Air
Performance	
Kind of test site:	OTA chamber WPTC-L

2 Test Results

Model name	ASSY UHF RFTEST R1 MCX		
Postion	2D		
Test Axis	H	E1	E2
Peak Realized Gain (DBi)	5	4.84	-6.09
Note			

3 Test information

918MHz_2D-H

Test Information

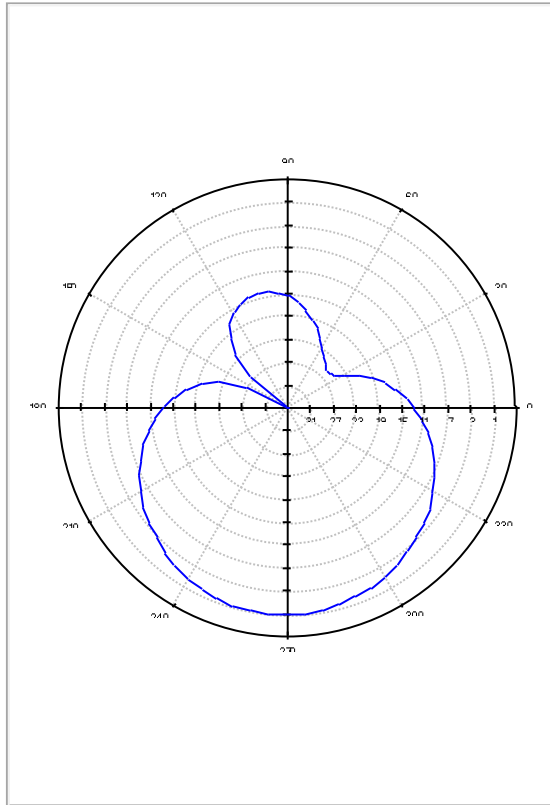
Test Method:	Antenna Measurement
Test Condition:	FS: Free Space
Frequency:	918.000000 MHz
Test Time:	Start: 15/11/2024 2:28:39 PM; Stop: 15/11/2024 2:29:38 PM
Cal Data Phi:	42.18 dB (PL_Hor_Passive_1206)
Cal Data Theta:	41.00 dB (PL_Ver_Passive_1206)

OTA Evaluation Results

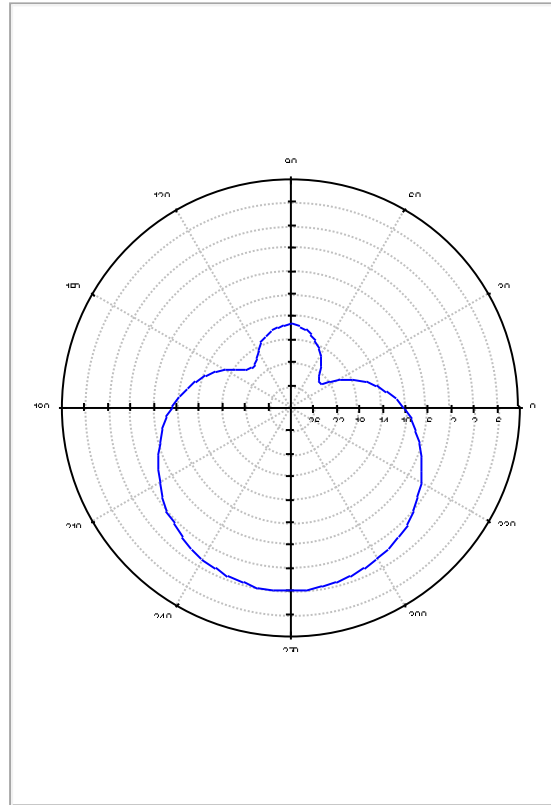
Directivity	5.00 dBi
Total Efficiency	100.00 %
Peak Realized Gain	5.00 dBi
NHPRP 45°X / TRP	100.00 %
NHPRP 30°X / TRP	100.00 %
NHPRP 22.5°X / TRP	100.00 %
UHRP / TRP	100.00 %
LHRP / TRP	100.00 %
Front/Back Ratio	17.67
PhiBW	82.1 deg
PhiBW Up	44.7 deg
PhiBW Down	37.4 deg
ThetaBW	61.1 deg
ThetaBW Up	30.6 deg
ThetaBW Down	30.6 deg
Boresight Phi	265 deg
Boresight Theta	90 deg
Maximum Power	5.00 dBm
Minimum Power	-20.92 dBm
Average Power	-1.04 dBm
Max/Min Ratio	25.92 dB
Max/Avg Ratio	6.04 dB
Min/Avg Ratio	-19.88 dB
Worst Single Value	-34.67 dBm
Worst Position	Azi = 150 deg; Elev = 90 deg; Pol = Phi
Best Single Value	2.34 dBm
Best Position	Azi = 265 deg; Elev = 90 deg; Pol = Theta

RP_918MHz_2D-H_tot				RP_918MHz_2D-H_phi				RP_918MHz_2D-H_theta			
Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg
(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)
0	-8.12	185	-6.34	0	-12.55	185	-11.43	0	-10.06	185	-7.96
5	-9.53	190	-5.15	5	-14.03	190	-9.91	5	-11.43	190	-6.92
10	-10.96	195	-4.06	10	-15.66	195	-8.65	10	-12.76	195	-5.91
15	-12.67	200	-3	15	-17.3	200	-7.29	15	-14.5	200	-5.02
20	-14.39	205	-1.98	20	-19.41	205	-6.2	20	-16.03	205	-4.04
25	-16.35	210	-0.99	25	-21.31	210	-5.05	25	-18.02	210	-3.15
30	-18.21	215	0.01	30	-23.29	215	-4	30	-19.83	215	-2.2
35	-19.95	220	0.87	35	-24.77	220	-2.97	35	-21.69	220	-1.45
40	-20.91	225	1.62	40	-25.26	225	-2.18	40	-22.89	225	-0.72
45	-20.92	230	2.34	45	-25.3	230	-1.35	45	-22.89	230	-0.08
50	-20.19	235	2.99	50	-24.56	235	-0.64	50	-22.17	235	0.53
55	-18.77	240	3.55	55	-23.42	240	0.03	55	-20.59	240	1
60	-17.56	245	4.03	60	-22.45	245	0.53	60	-19.26	245	1.46
65	-16.32	250	4.41	65	-21.13	250	0.94	65	-18.06	250	1.81
70	-15.25	255	4.71	70	-19.79	255	1.27	70	-17.13	255	2.09
75	-14.3	260	4.89	75	-18.59	260	1.47	75	-16.33	260	2.25
80	-13.41	265	5	80	-17.28	265	1.6	80	-15.71	265	2.34
85	-12.67	270	4.99	85	-16.09	270	1.6	85	-15.3	270	2.33
90	-12.11	275	4.9	90	-15.16	275	1.48	90	-15.08	275	2.26
95	-11.76	280	4.73	95	-14.49	280	1.27	95	-15.07	280	2.12
100	-11.63	285	4.46	100	-14.04	285	0.95	100	-15.34	285	1.89
105	-11.82	290	4.09	105	-14.02	290	0.49	105	-15.81	290	1.6
110	-12.21	295	3.69	110	-14.27	295	0.04	110	-16.44	295	1.23
115	-12.88	300	3.17	115	-14.78	300	-0.61	115	-17.39	300	0.8
120	-13.9	305	2.62	120	-15.81	305	-1.15	120	-18.37	305	0.25
125	-15.02	310	1.96	125	-16.99	310	-1.93	125	-19.39	310	-0.32
130	-16.59	315	1.3	130	-19.22	315	-2.67	130	-20.02	315	-0.93
135	-17.73	320	0.5	135	-21.7	320	-3.53	135	-19.95	320	-1.68
140	-18.48	325	-0.34	140	-26.45	325	-4.38	140	-19.24	325	-2.52
145	-17.72	330	-1.26	145	-34.52	330	-5.39	145	-17.81	330	-3.38
150	-16.4	335	-2.18	150	-34.67	335	-6.3	150	-16.47	335	-4.32
155	-14.75	340	-3.21	155	-26.52	340	-7.42	155	-15.05	340	-5.28
160	-13.07	345	-4.36	160	-21.72	345	-8.61	160	-13.71	345	-6.41
165	-11.51	350	-5.5	165	-18.9	350	-9.84	165	-12.39	350	-7.49
170	-10.13	355	-6.71	170	-16.53	355	-11.1	170	-11.25	355	-8.67
175	-8.79	360	-8.02	175	-14.64	360	-12.55	175	-10.1	360	-9.9
180	-7.58			180	-12.92			180	-9.08		

RP_918.000000_phi



RP_918.000000_theta



918MHz_2D-E1

Test Information

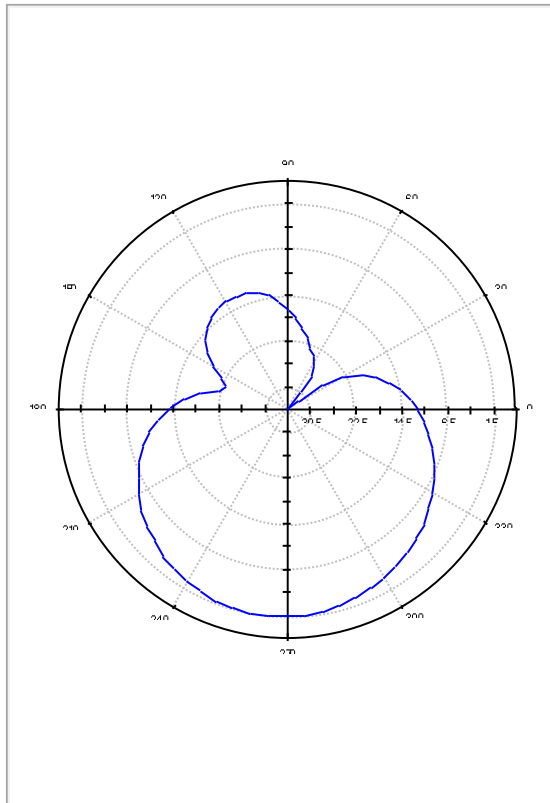
Test Method:	Antenna Measurement
Test Condition:	FS: Free Space
Frequency:	918.000000 MHz
Test Time:	Start: 15/11/2024 4:21:59 PM; Stop: 15/11/2024 4:22:59 PM
Cal Data Phi:	42.18 dB (PL_Hor_Passive_1206)
Cal Data Theta:	41.00 dB (PL_Ver_Passive_1206)

OTA Evaluation Results

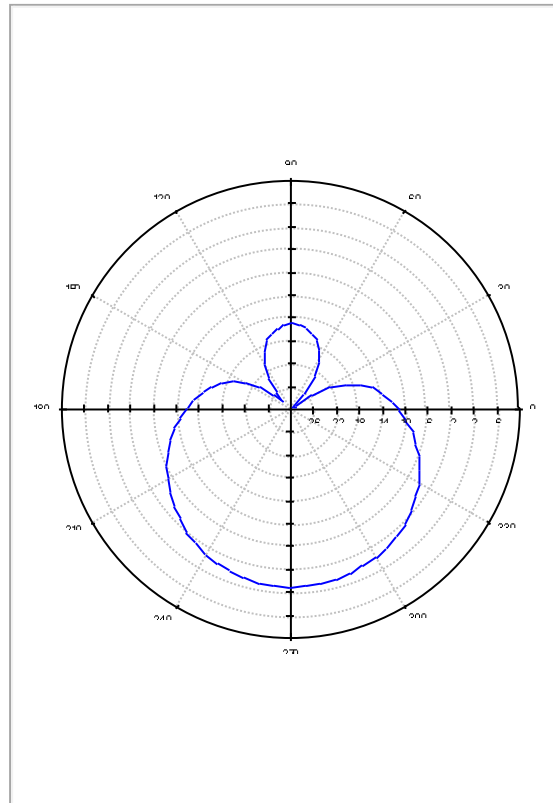
Directivity	4.84 dBi
Total Efficiency	100.00 %
Peak Realized Gain	4.84 dBi
NHPRP 45°X / TRP	100.00 %
NHPRP 30°X / TRP	100.00 %
NHPRP 22.5°X / TRP	100.00 %
UHRP / TRP	100.00 %
LHRP / TRP	100.00 %
Front/Back Ratio	17.30
PhiBW	81.1 deg
PhiBW Up	39.6 deg
PhiBW Down	41.5 deg
ThetaBW	62.4 deg
ThetaBW Up	31.2 deg
ThetaBW Down	31.2 deg
Boresight Phi	270 deg
Boresight Theta	90 deg
Maximum Power	4.84 dBm
Minimum Power	-28.17 dBm
Average Power	-1.26 dBm
Max/Min Ratio	33.01 dB
Max/Avg Ratio	6.10 dB
Min/Avg Ratio	-26.91 dB
Worst Single Value	-34.16 dBm
Worst Position	Azi = 45 deg; Elev = 90 deg; Pol = Phi
Best Single Value	2.17 dBm
Best Position	Azi = 265 deg; Elev = 90 deg; Pol = Phi

RP_918MHz_2D-E1_tot				RP_918MHz_2D-E1_phi				RP_918MHz_2D-E1_theta			
Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg
(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)
0	-8.01	185	-7.71	0	-11.42	185	-11.26	0	-10.65	185	-10.24
5	-9.42	190	-6.34	5	-12.85	190	-9.58	5	-12.05	190	-9.13
10	-10.83	195	-5.08	10	-14.22	195	-8.14	10	-13.49	195	-8.04
15	-12.58	200	-3.72	15	-15.92	200	-6.57	15	-15.29	200	-6.91
20	-14.43	205	-2.56	20	-17.98	205	-5.34	20	-16.97	205	-5.8
25	-16.67	210	-1.42	25	-19.99	210	-4.08	25	-19.38	210	-4.82
30	-19.42	215	-0.46	30	-23.14	215	-3.05	30	-21.83	215	-3.93
35	-23.05	220	0.45	35	-27.05	220	-2.08	35	-25.26	220	-3.1
40	-27.09	225	1.32	40	-31.77	225	-1.21	40	-28.89	225	-2.24
45	-28.17	230	2.07	45	-34.16	230	-0.44	45	-29.42	230	-1.5
50	-24.54	235	2.72	50	-30.19	235	0.19	50	-25.92	235	-0.82
55	-20.94	240	3.32	55	-26.77	240	0.82	55	-22.26	240	-0.26
60	-18.72	245	3.8	60	-25.23	245	1.23	60	-19.82	245	0.29
65	-17.04	250	4.21	65	-23.66	250	1.66	65	-18.11	250	0.68
70	-15.7	255	4.51	70	-22.52	255	1.95	70	-16.71	255	0.99
75	-14.65	260	4.71	75	-21.24	260	2.09	75	-15.72	260	1.27
80	-13.83	265	4.83	80	-19.72	265	2.17	80	-15.12	265	1.43
85	-13.14	270	4.84	85	-18.13	270	2.13	85	-14.8	270	1.5
90	-12.46	275	4.75	90	-16.55	275	1.98	90	-14.61	275	1.48
95	-11.99	280	4.57	95	-15.16	280	1.71	95	-14.85	280	1.4
100	-11.62	285	4.31	100	-14.03	285	1.36	100	-15.33	285	1.23
105	-11.37	290	3.95	105	-13.17	290	0.91	105	-16.07	290	0.97
110	-11.25	295	3.55	110	-12.56	295	0.46	110	-17.11	295	0.63
115	-11.5	300	3.03	115	-12.39	300	-0.18	115	-18.82	300	0.21
120	-11.69	305	2.43	120	-12.3	305	-0.89	120	-20.57	305	-0.3
125	-12.32	310	1.79	125	-12.69	310	-1.58	125	-23.09	310	-0.89
130	-13.12	315	1.12	130	-13.35	315	-2.31	130	-25.94	315	-1.51
135	-13.97	320	0.32	135	-14.17	320	-3.23	135	-27.45	320	-2.21
140	-15.13	325	-0.51	140	-15.54	325	-4.02	140	-25.59	325	-3.07
145	-16.09	330	-1.4	145	-17.11	330	-4.96	145	-22.87	330	-3.92
150	-16.77	335	-2.33	150	-19.25	335	-5.87	150	-20.37	335	-4.88
155	-16.6	340	-3.39	155	-21.51	340	-6.91	155	-18.29	340	-5.94
160	-15.69	345	-4.43	160	-22.61	345	-7.9	160	-16.68	345	-7.02
165	-14.3	350	-5.55	165	-21.59	350	-9.07	165	-15.2	350	-8.11
170	-12.55	355	-6.82	170	-18.39	355	-10.24	170	-13.86	355	-9.45
175	-10.83	360	-7.96	175	-15.7	360	-11.39	175	-12.55	360	-10.58
180	-9.24			180	-13.35			180	-11.37		

RP_918.000000_phi



RP_918.000000_theta



918MHz_2D-E2

Test Information

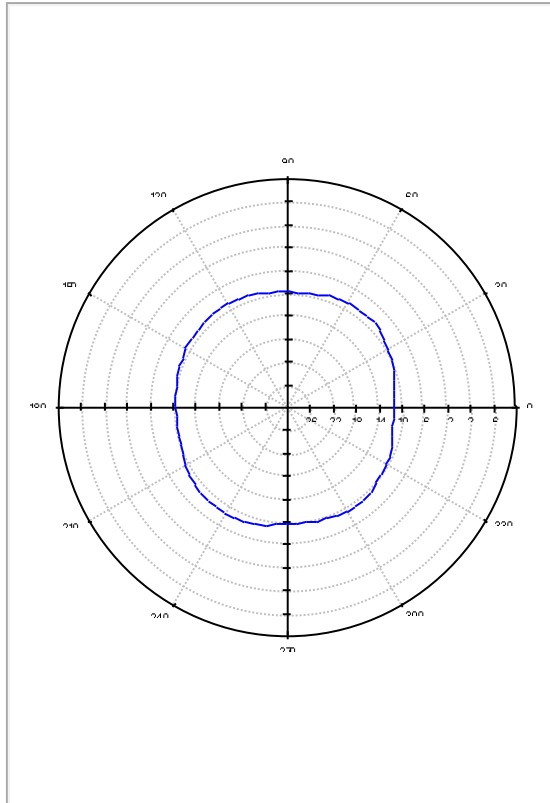
Test Method:	Antenna Measurement
Test Condition:	FS: Free Space
Frequency:	918.000000 MHz
Test Time:	Start: 15/11/2024 4:33:27 PM; Stop: 15/11/2024 4:34:26 PM
Cal Data Phi:	42.18 dB (PL_Hor_Passive_1206)
Cal Data Theta:	41.00 dB (PL_Ver_Passive_1206)

OTA Evaluation Results

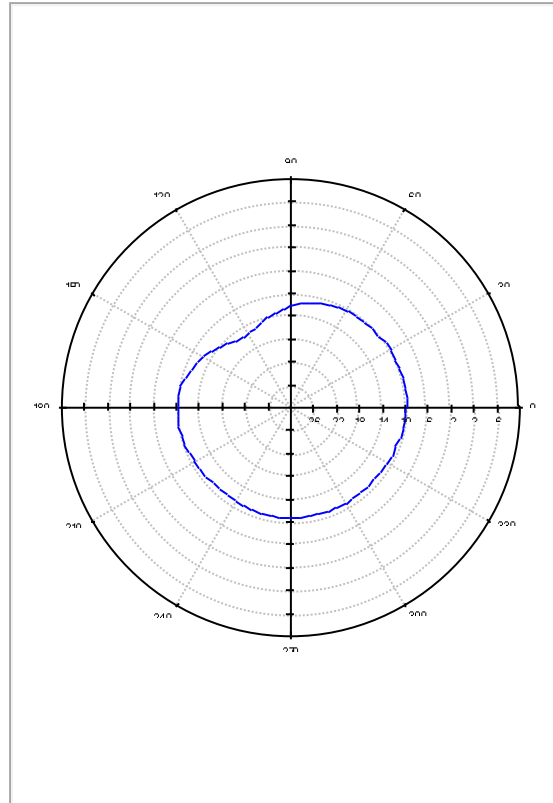
Directivity	-6.09 dBi
Total Efficiency	100.00 %
Peak Realized Gain	-6.09 dBi
NHPRP 45°X / TRP	100.00 %
NHPRP 30°X / TRP	100.00 %
NHPRP 22.5°X / TRP	100.00 %
UHRP / TRP	100.00 %
LHRP / TRP	100.00 %
Front/Back Ratio	0.25
PhiBW	360.0 deg
PhiBW Up	360.0 deg
PhiBW Down	360.0 deg
ThetaBW	180.0 deg
ThetaBW Up	180.0 deg
ThetaBW Down	180.0 deg
Boresight Phi	45 deg
Boresight Theta	90 deg
Maximum Power	-6.09 dBm
Minimum Power	-7.81 dBm
Average Power	-6.86 dBm
Max/Min Ratio	1.71 dB
Max/Avg Ratio	0.77 dB
Min/Avg Ratio	-0.95 dB
Worst Single Value	-14.80 dBm
Worst Position	Azi = 125 deg; Elev = 90 deg; Pol = Theta
Best Single Value	-8.05 dBm
Best Position	Azi = 235 deg; Elev = 90 deg; Pol = Phi

RP_918MHz_2D-E2_tot				RP_918MHz_2D-E2phi				RP_918MHz_2D-E2_theta			
Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg	Azimuth	Elevation 90 deg
(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)	(deg)	(dB)
0	-7.23	185	-7.01	0	-11.17	185	-10.21	0	-9.47	185	-9.84
5	-7.13	190	-6.91	5	-11.07	190	-10.05	5	-9.38	190	-9.79
10	-7.01	195	-6.92	10	-10.78	195	-9.92	10	-9.37	195	-9.94
15	-6.88	200	-6.88	15	-10.42	200	-9.72	15	-9.41	200	-10.06
20	-6.69	205	-6.83	20	-9.96	205	-9.47	20	-9.45	205	-10.25
25	-6.53	210	-6.62	25	-9.58	210	-8.99	25	-9.49	210	-10.38
30	-6.37	215	-6.52	30	-9.22	215	-8.72	30	-9.55	215	-10.52
35	-6.25	220	-6.35	35	-8.92	220	-8.39	35	-9.64	220	-10.61
40	-6.14	225	-6.34	40	-8.62	225	-8.31	40	-9.76	225	-10.72
45	-6.09	230	-6.25	45	-8.45	230	-8.18	45	-9.87	230	-10.7
50	-6.17	235	-6.15	50	-8.51	235	-8.05	50	-9.97	235	-10.65
55	-6.23	240	-6.26	55	-8.51	240	-8.15	55	-10.11	240	-10.78
60	-6.33	245	-6.3	60	-8.58	245	-8.27	60	-10.25	245	-10.69
65	-6.58	250	-6.41	65	-8.87	250	-8.49	65	-10.45	250	-10.61
70	-6.68	255	-6.44	70	-8.91	255	-8.63	70	-10.63	255	-10.47
75	-6.97	260	-6.55	75	-9.23	260	-8.74	75	-10.89	260	-10.57
80	-7.19	265	-6.68	80	-9.36	265	-9.08	80	-11.25	265	-10.4
85	-7.33	270	-6.74	85	-9.45	270	-9.15	85	-11.46	270	-10.45
90	-7.36	275	-6.74	90	-9.27	275	-9.2	90	-11.83	275	-10.4
95	-7.57	280	-6.74	95	-9.36	280	-9.21	95	-12.29	280	-10.37
100	-7.7	285	-6.63	100	-9.3	285	-8.99	100	-12.8	285	-10.42
105	-7.74	290	-6.66	105	-9.11	290	-9.09	105	-13.4	290	-10.34
110	-7.71	295	-6.58	110	-8.9	295	-8.91	110	-13.94	295	-10.39
115	-7.81	300	-6.42	115	-8.86	300	-8.69	115	-14.47	300	-10.32
120	-7.79	305	-6.51	120	-8.77	305	-8.74	120	-14.72	305	-10.48
125	-7.76	310	-6.42	125	-8.71	310	-8.69	125	-14.8	310	-10.32
130	-7.7	315	-6.6	130	-8.69	315	-8.99	130	-14.61	315	-10.34
135	-7.64	320	-6.78	135	-8.78	320	-9.33	135	-13.99	320	-10.31
140	-7.56	325	-6.78	140	-8.88	325	-9.37	140	-13.37	325	-10.25
145	-7.47	330	-6.92	145	-9.04	330	-9.83	145	-12.65	330	-10.04
150	-7.32	335	-7.03	150	-9.13	335	-10.01	150	-12	335	-10.08
155	-7.22	340	-7.23	155	-9.36	340	-10.4	155	-11.33	340	-10.09
160	-7.13	345	-7.22	160	-9.53	345	-10.71	160	-10.85	345	-9.8
165	-7.03	350	-7.33	165	-9.74	350	-10.98	165	-10.36	350	-9.78
170	-7	355	-7.33	170	-9.94	355	-11.12	170	-10.07	355	-9.68
175	-7.01	360	-7.32	175	-10.11	360	-11.19	175	-9.94	360	-9.62
180	-7.01			180	-10.19			180	-9.86		

RP_918.000000_phi

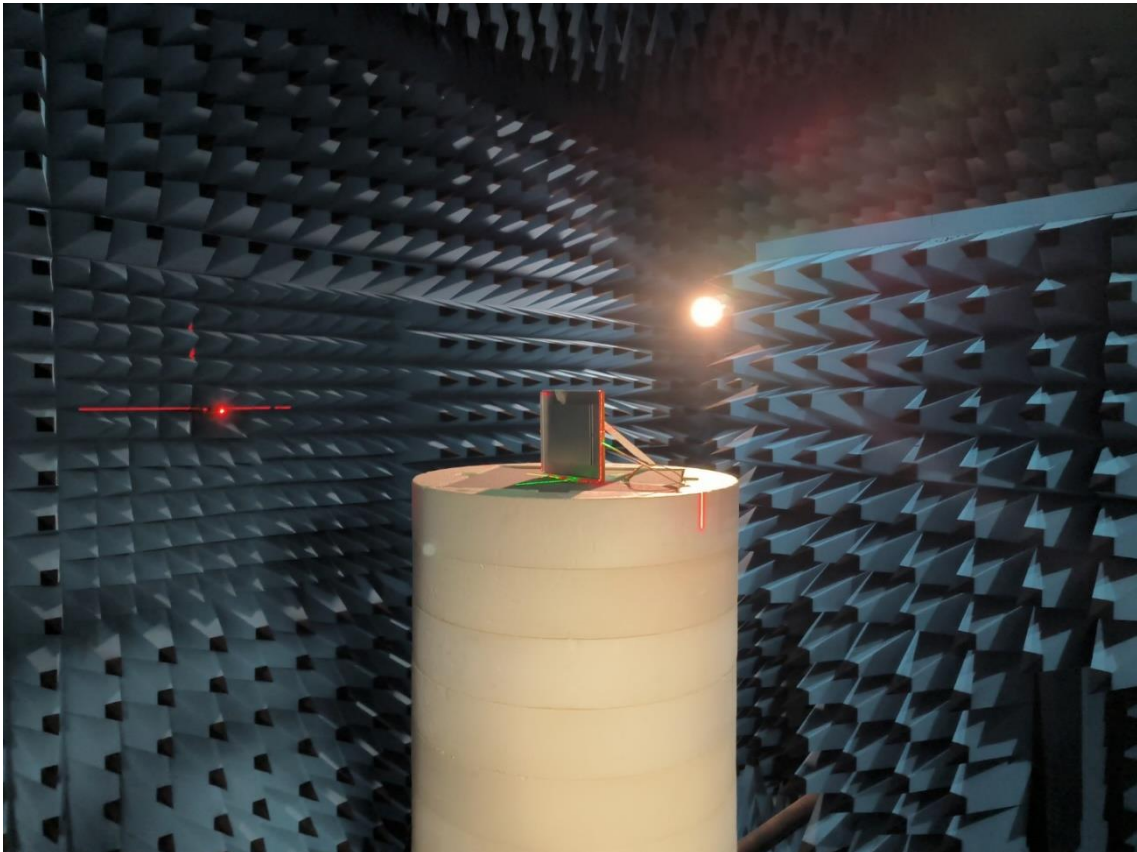


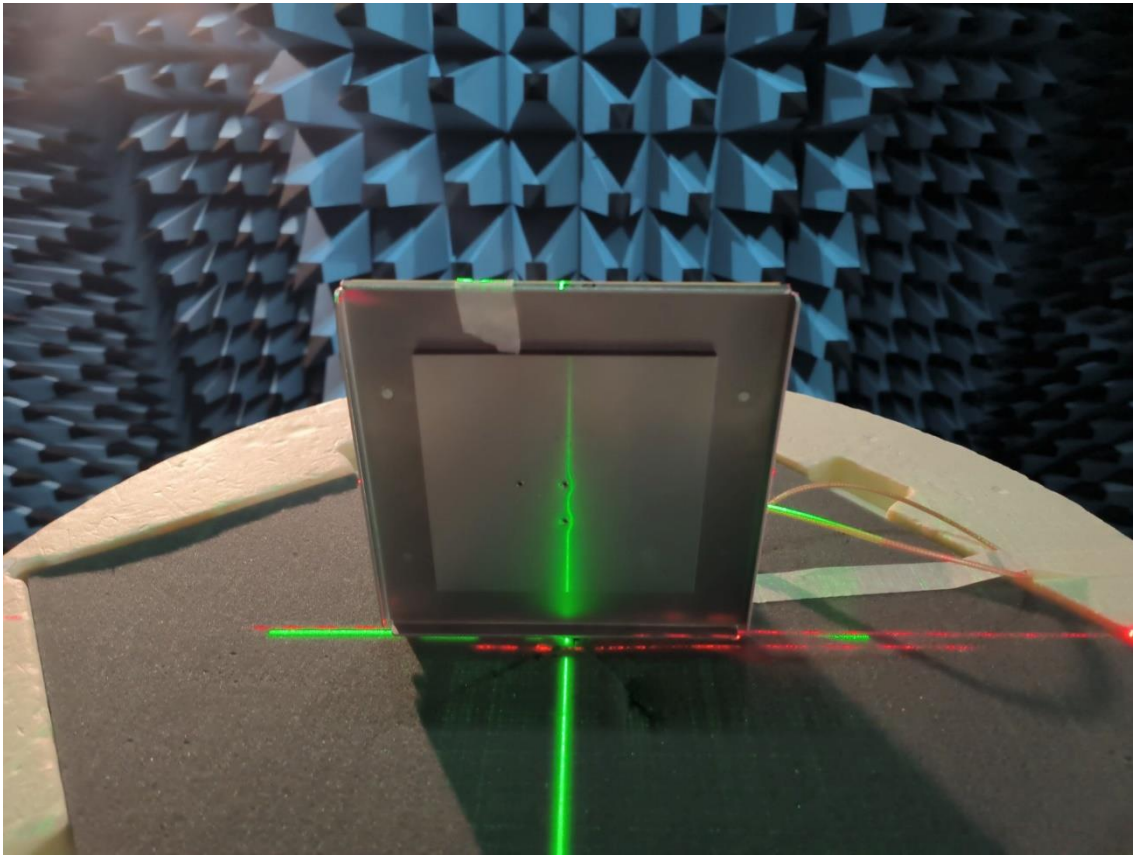
RP_918.000000_theta



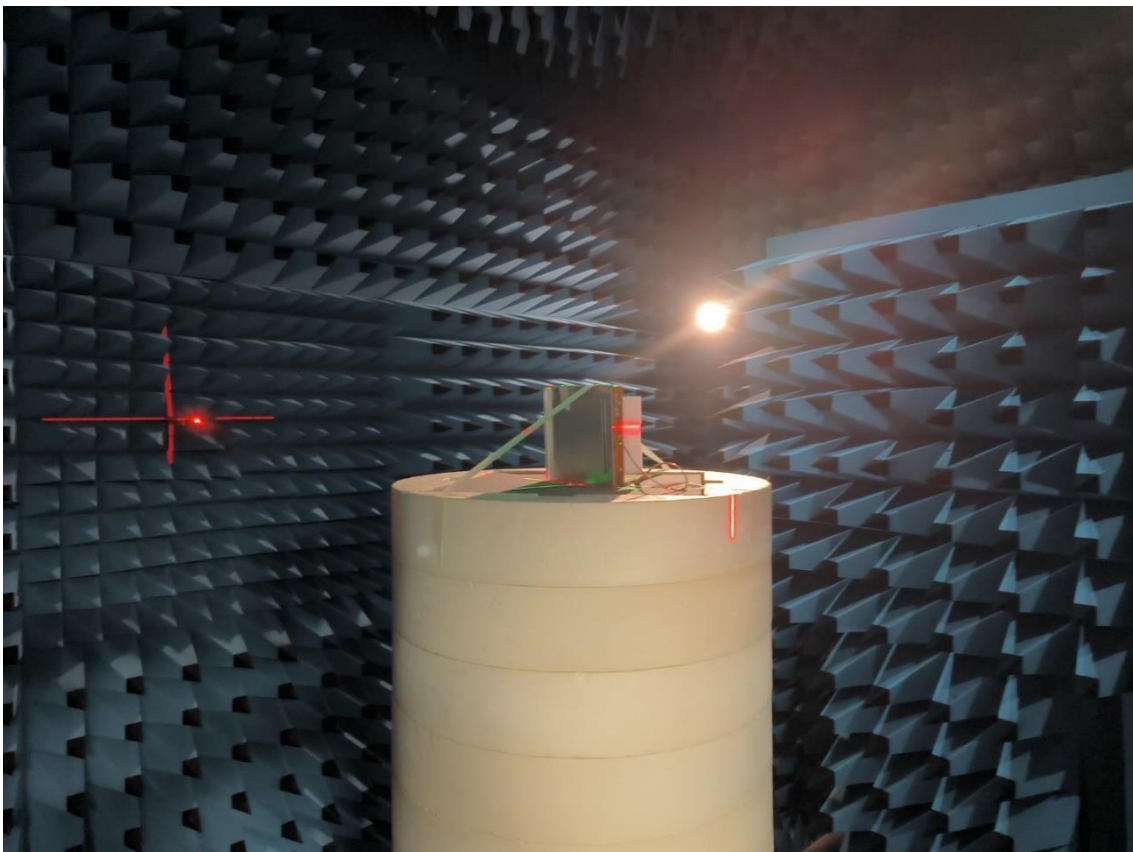
4 PHOTO DOCUMENTATION

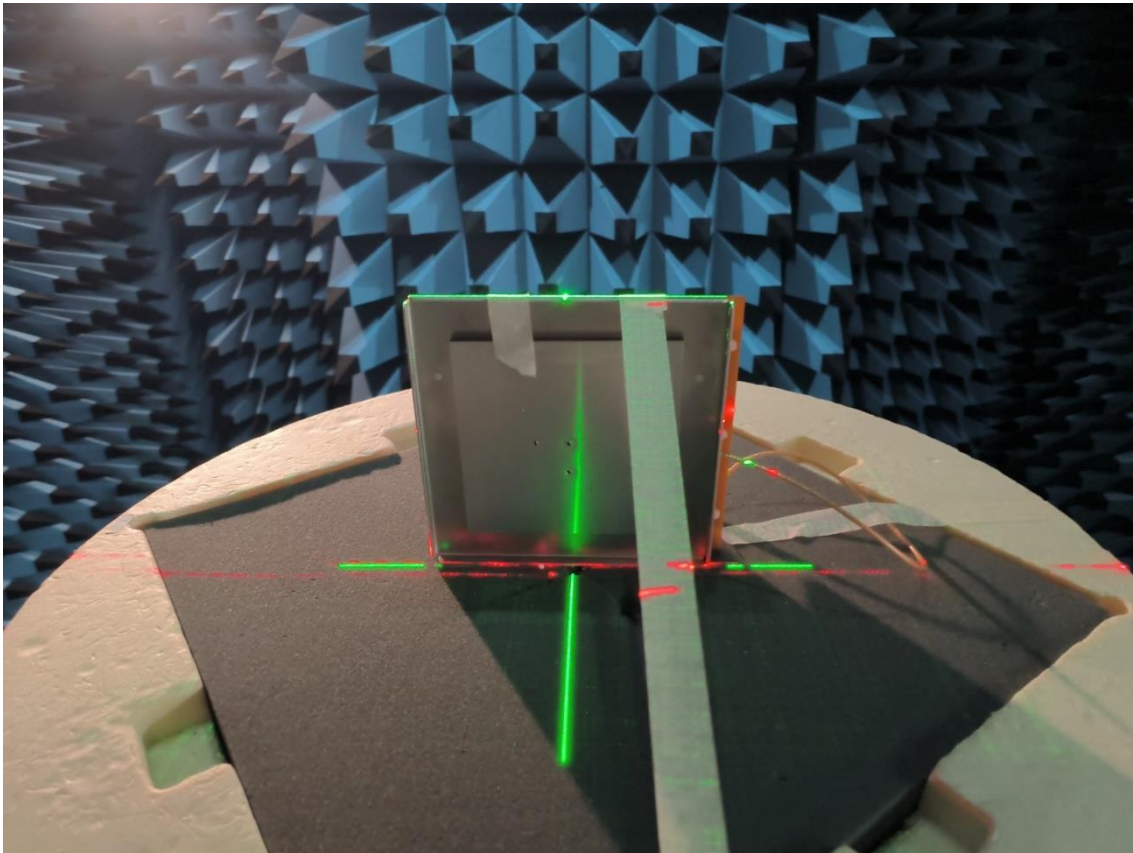
Test Axis : H





Test Axis : E1





Test Axis : E2

