

LTE1 antenna

Porsche P0426

5G-Antenna Datasheet

27.07.2021

M. Düring / M.Schöneberg

Fuba Electrical Engineering

Documentation Of Changes

Date ▼	Chapter ▼	Changes ▼	Author ▼
15.03.2021	1-2	Initial Version	M. Harms
25.03.2021	2	Additional Information	M. Düring
27.07.2021		New measurements C-sample	M.Schöneberg/ M-Düring



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1. Overview

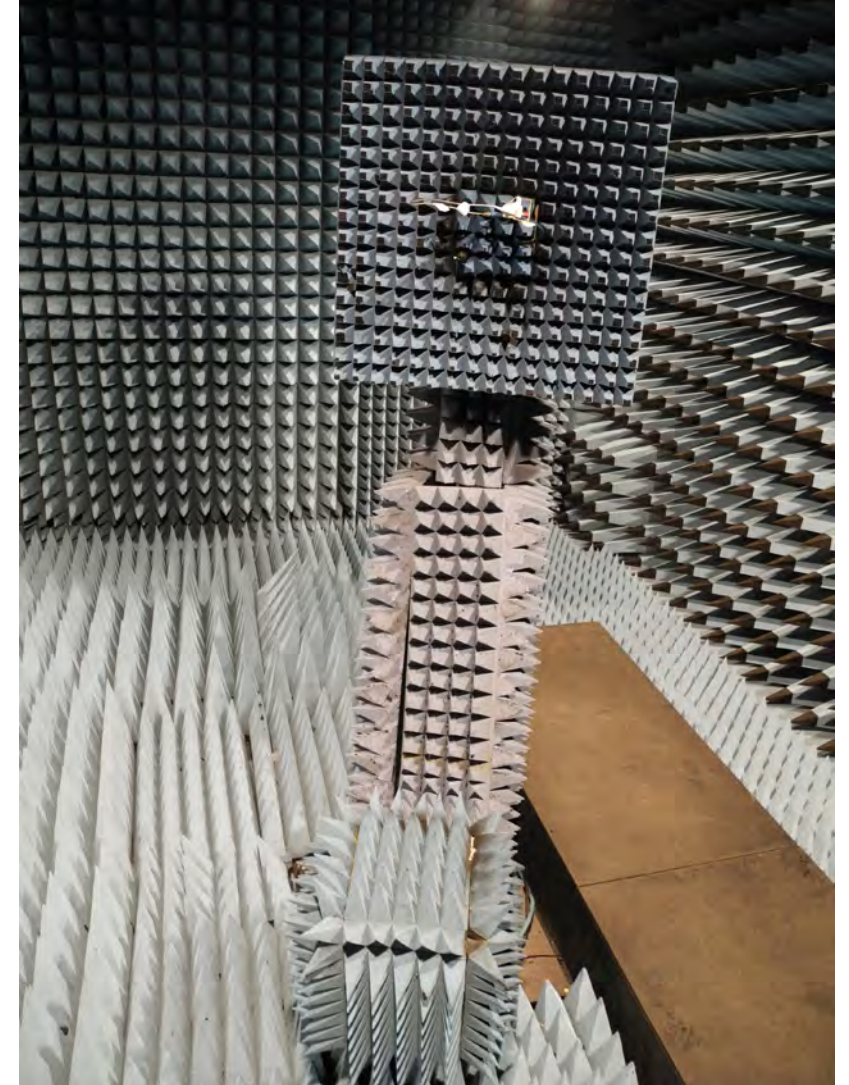
- In this datasheet the typical performance of the PO426 5G-Antenna C-Sample is given
- Data is shown for all 5G frequency-ranges, with 10K diagnosis resistor
- Measurements were taken with direct connection to AUT
- The Sample is C-Sample part from production
- Fuba Part Number and description **30006702/001-ANT-ASM,PO426,5G-ANT**
- Customer Part Number **95C 035 503**



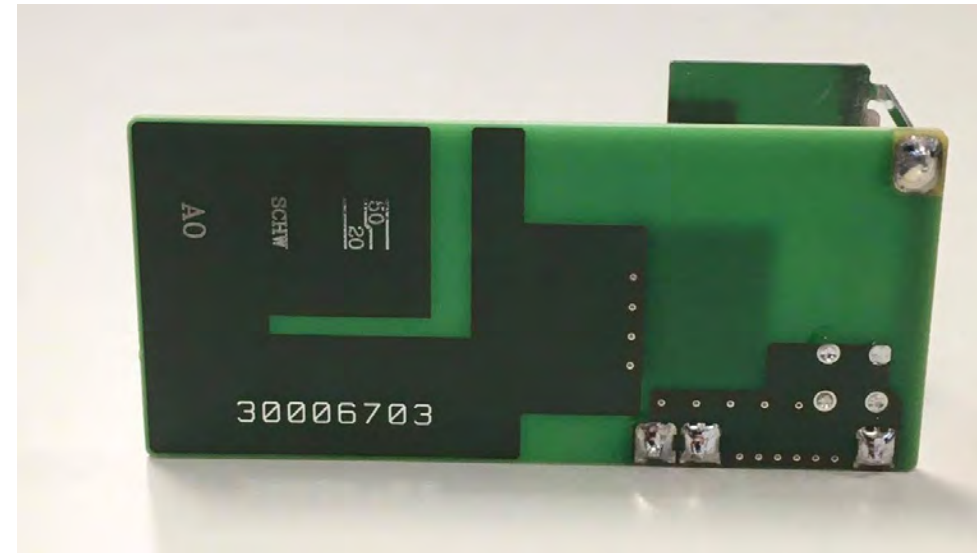
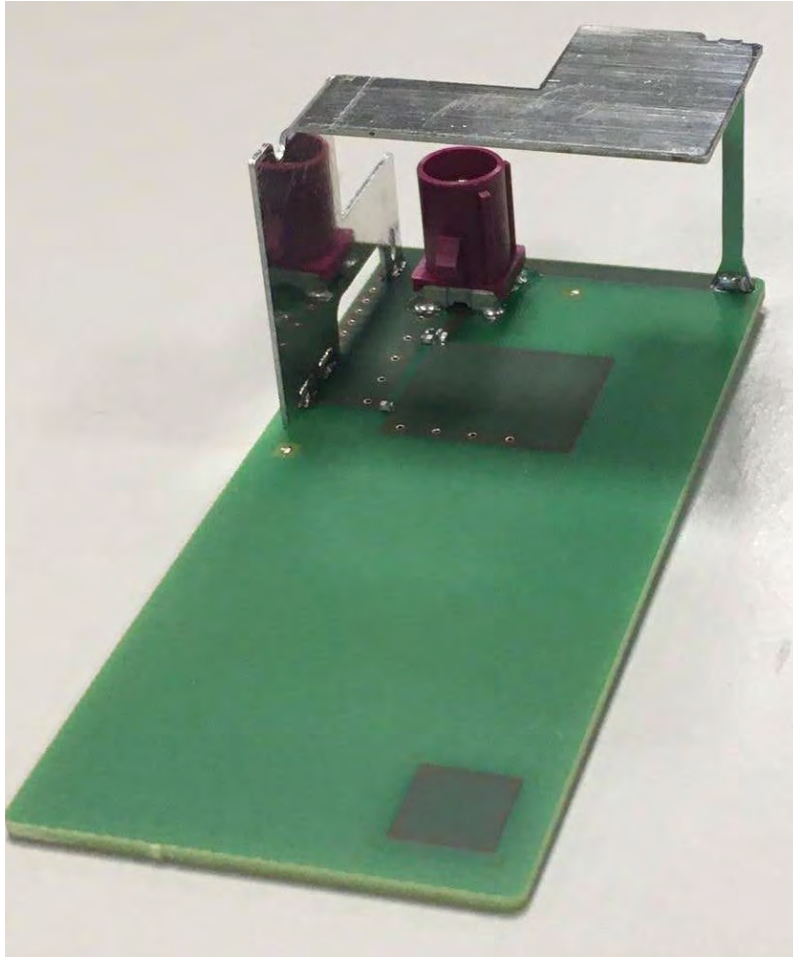
1. Overview

Anechoic Chamber with AUT

- Measurements were done in anechoic chamber
- the antenna under test (AUT) placed on an adapter in the center
- All depicted field data is farfield data calibrated to dBi



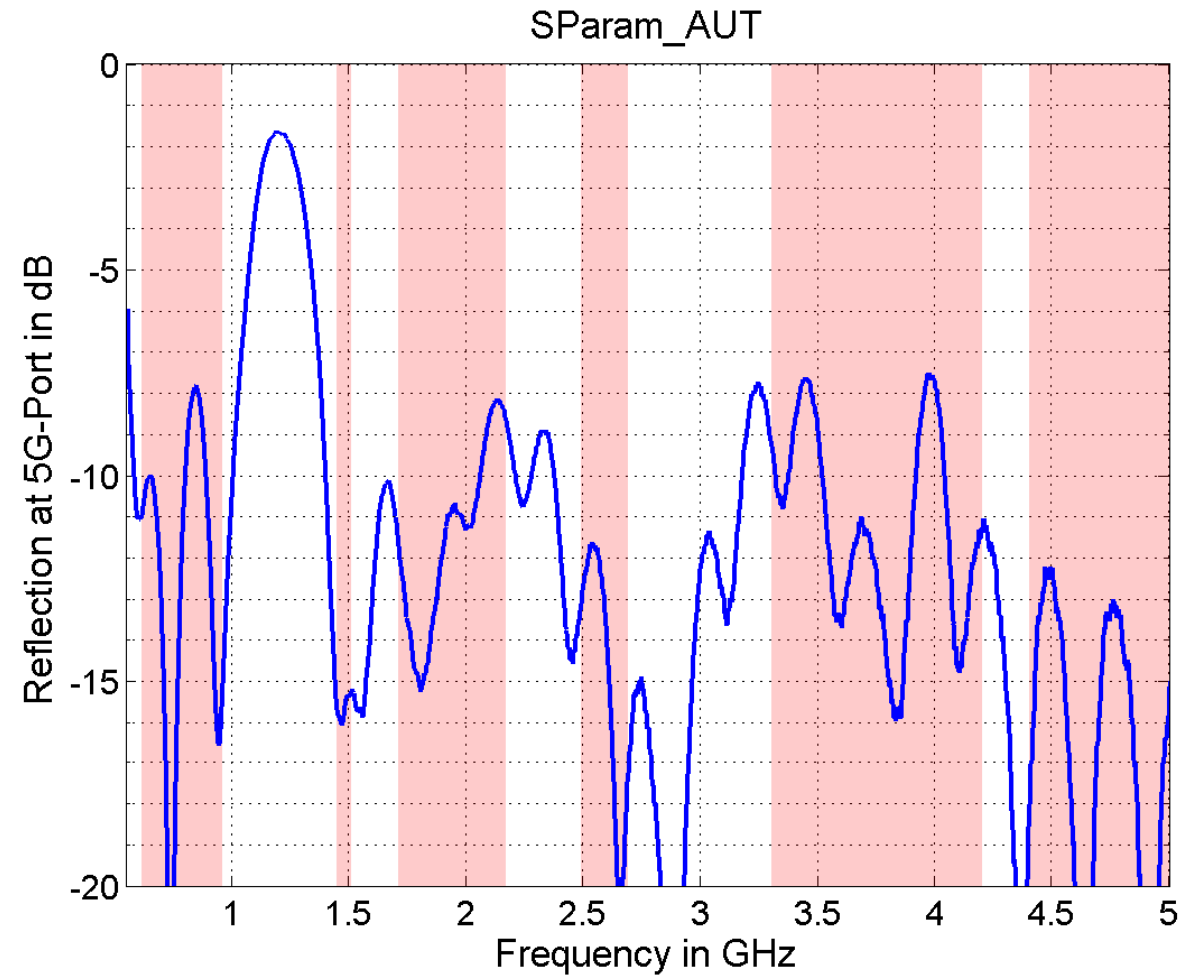
1. Overview AUT



2. 5G Antenna Performance

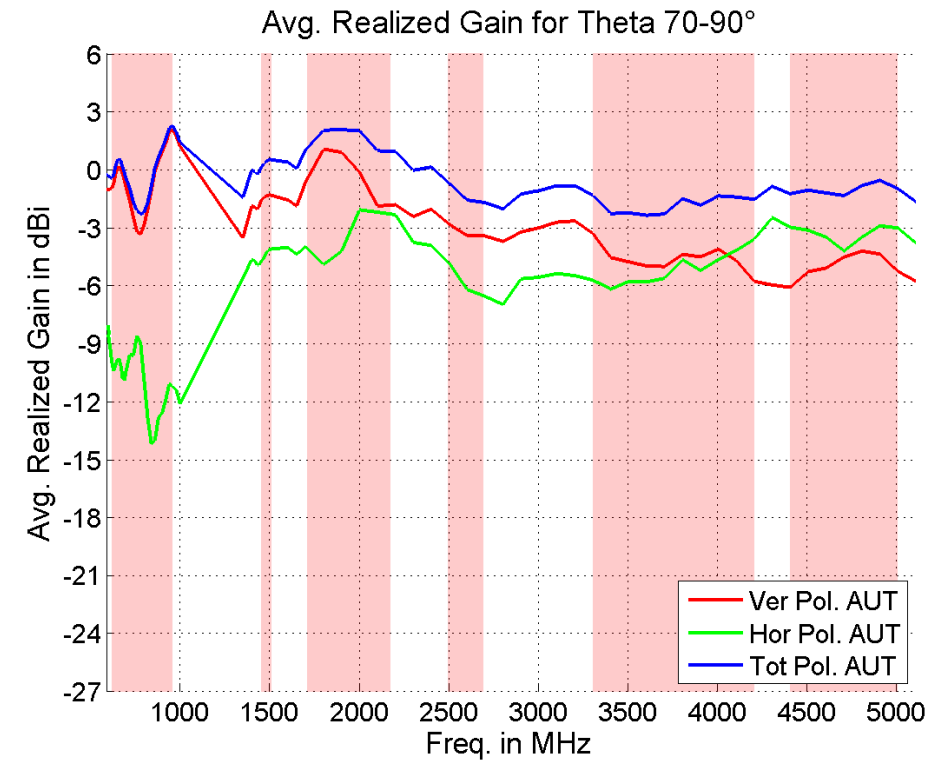
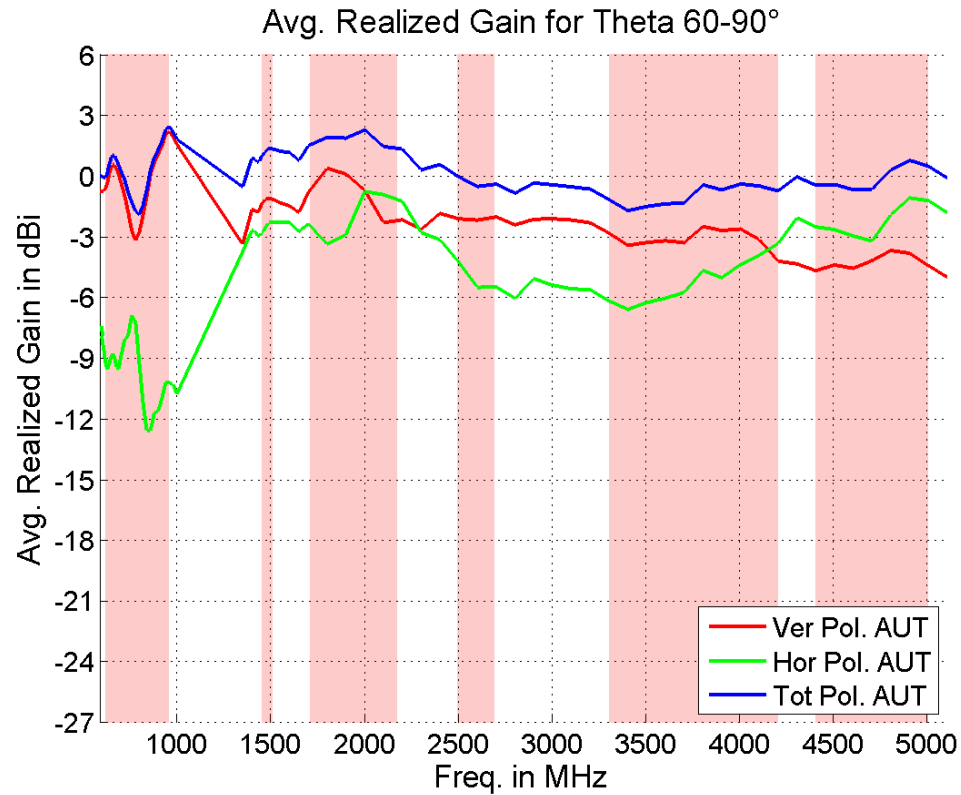


2. 5G Antenna Performance Matching



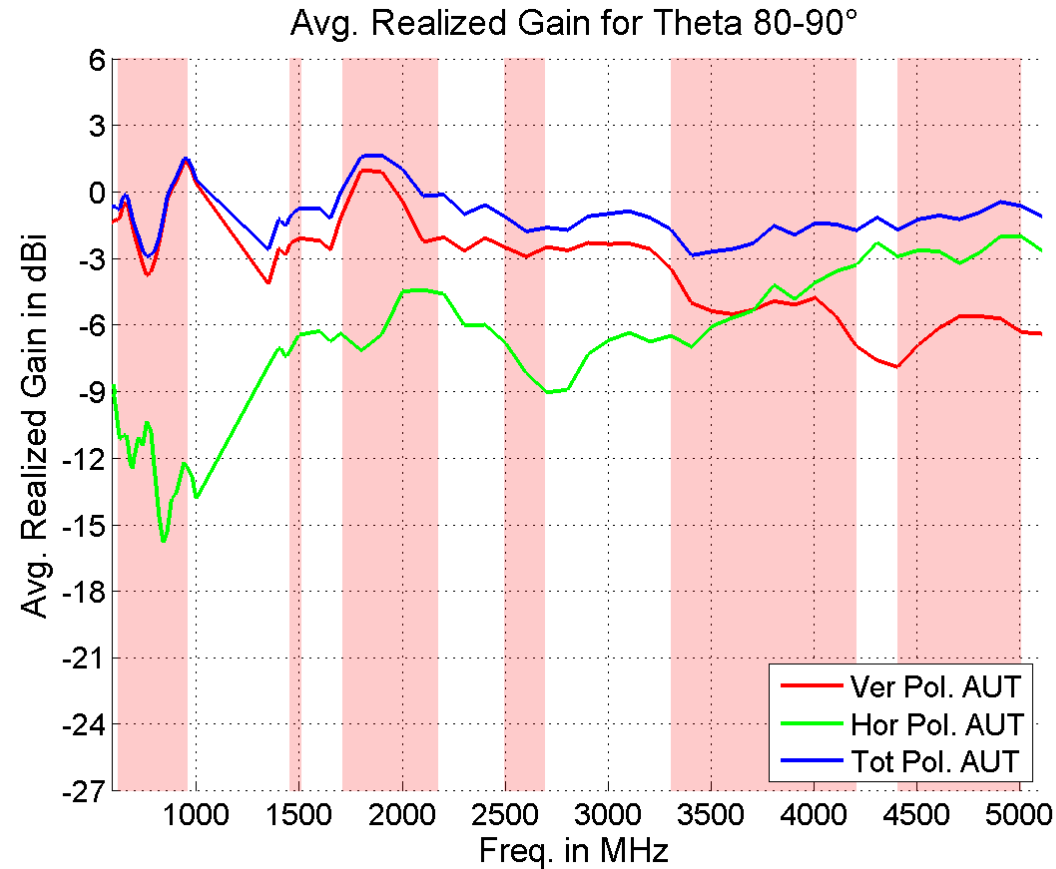
2. 5G Antenna Performance in Chamber

Chamber

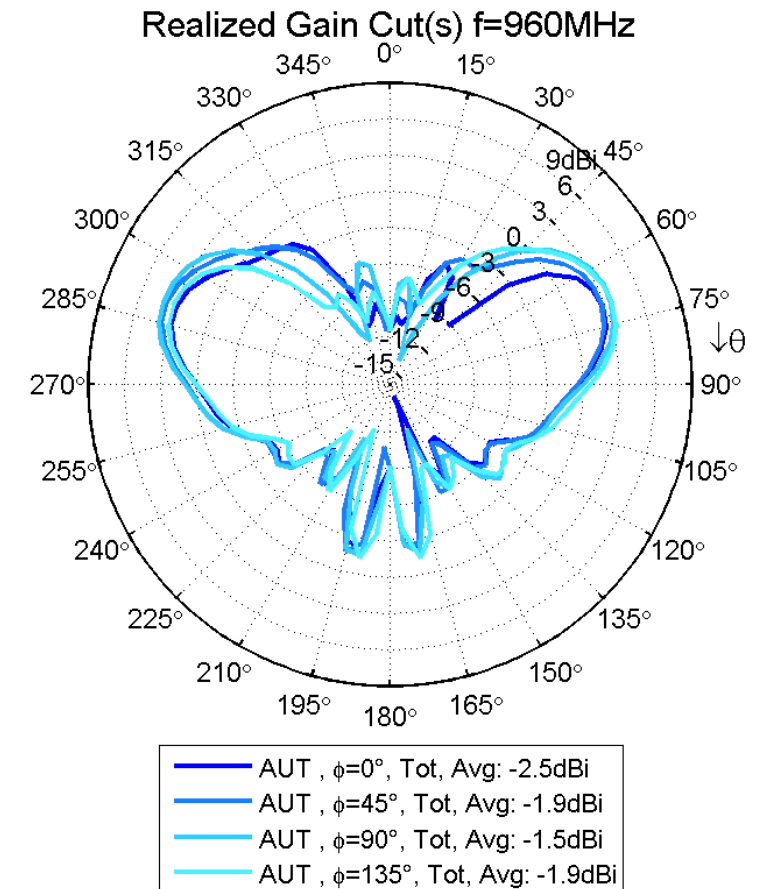
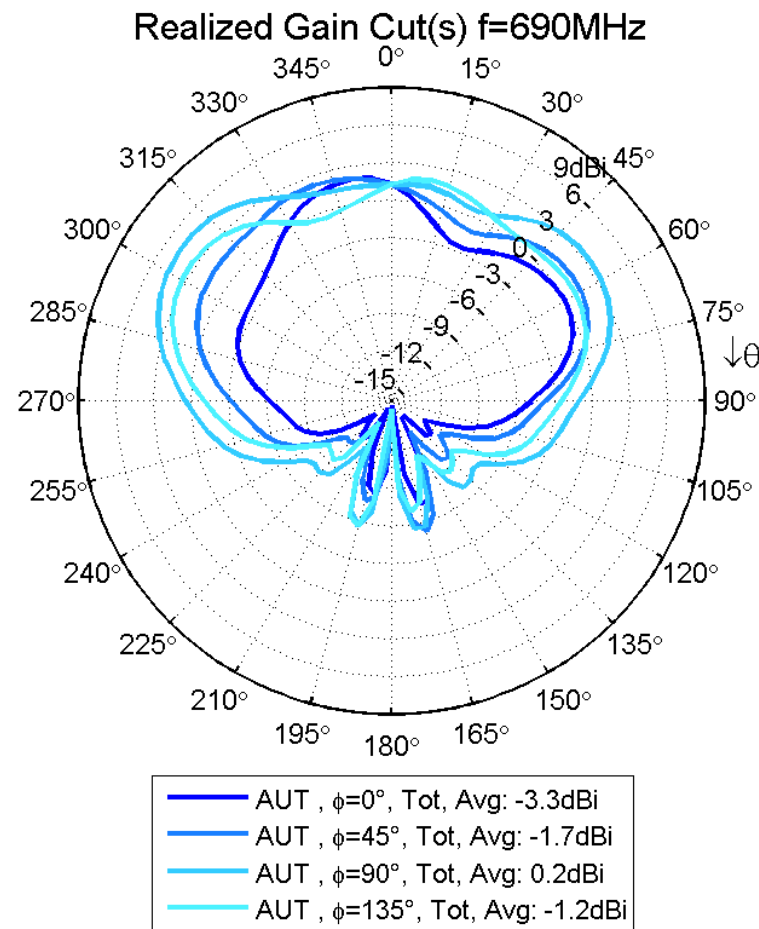
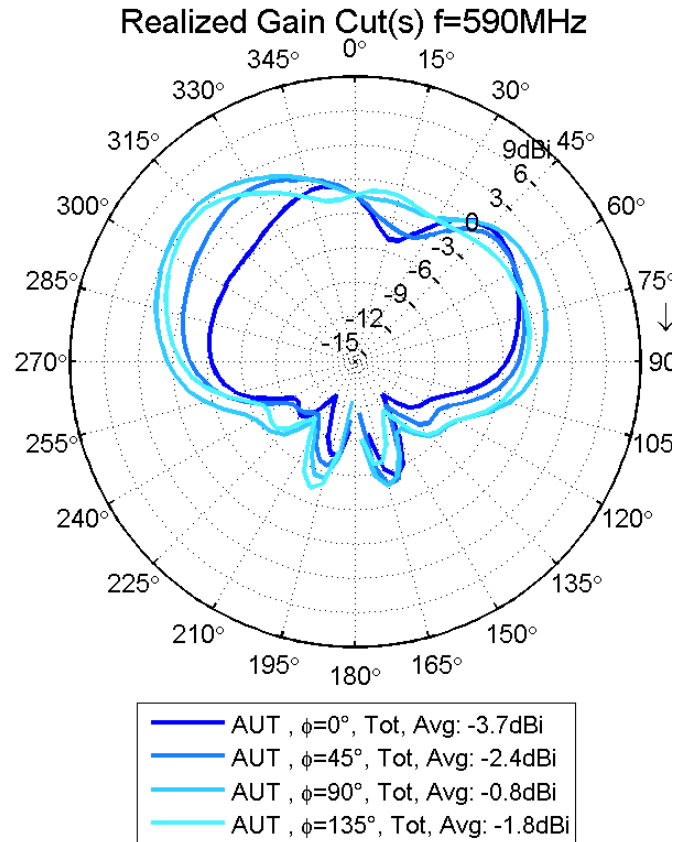


2. 5G Antenna Performance in Chamber

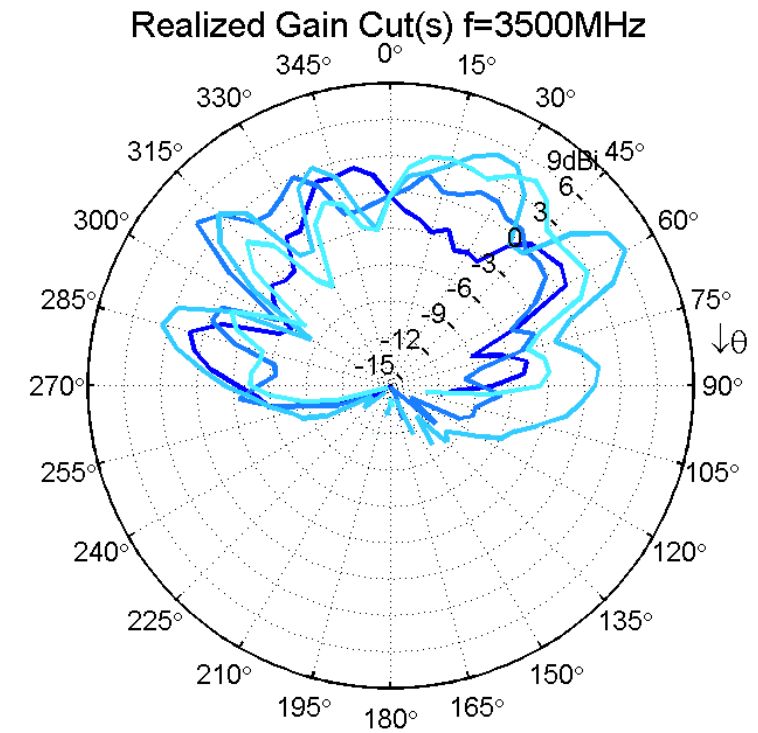
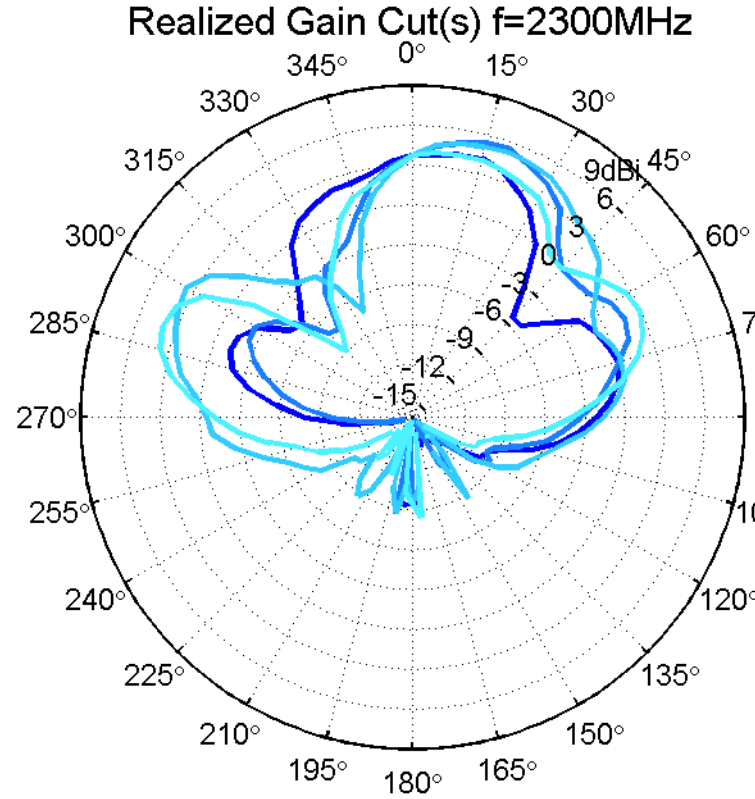
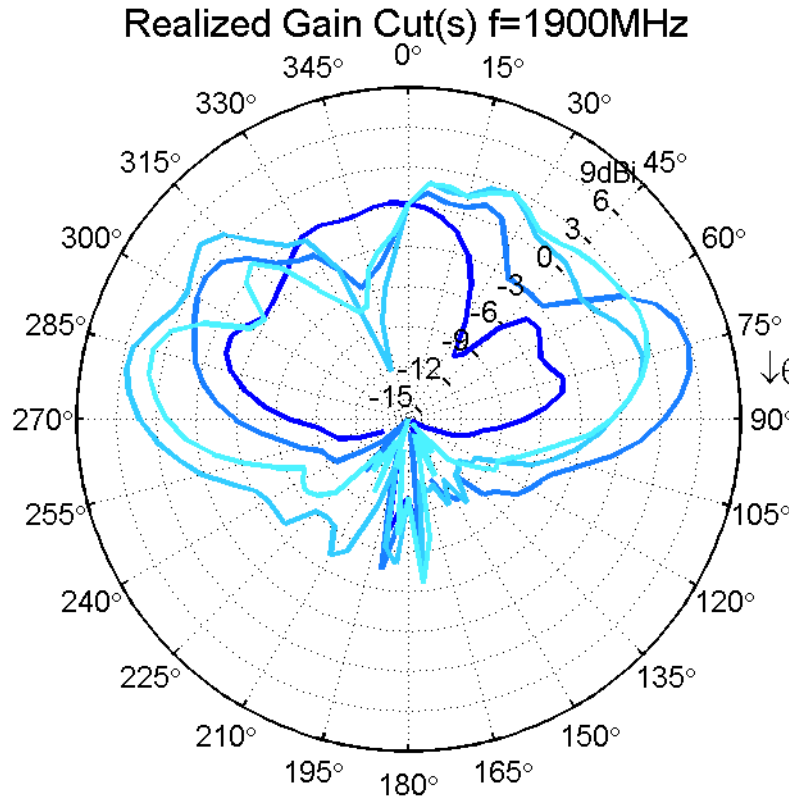
Chamber



2. 5G Antenna Performance in Chamber

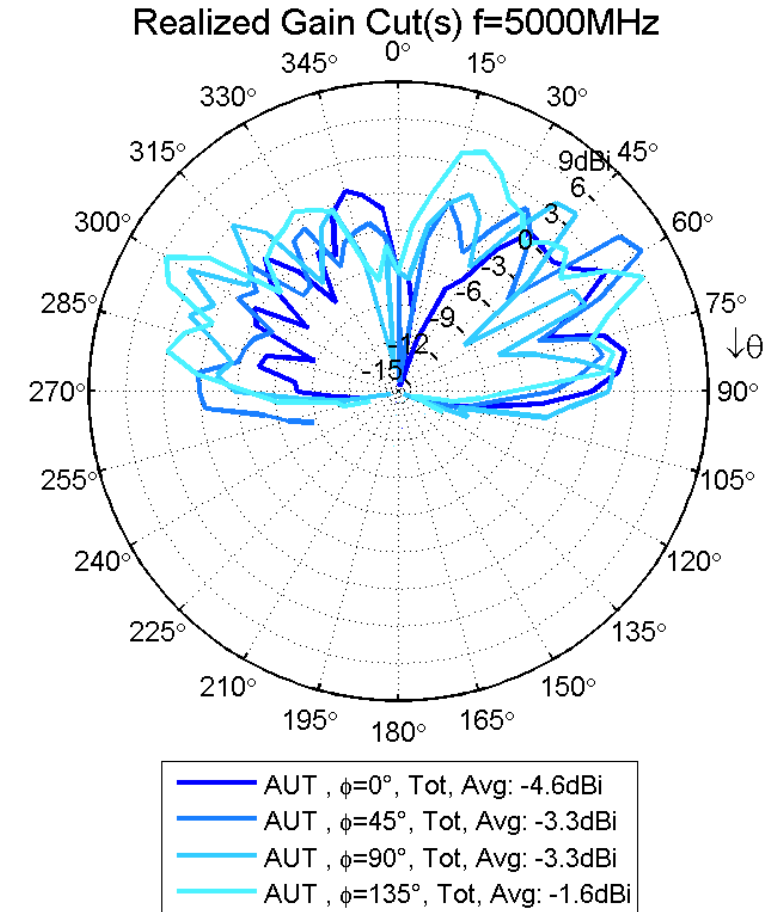
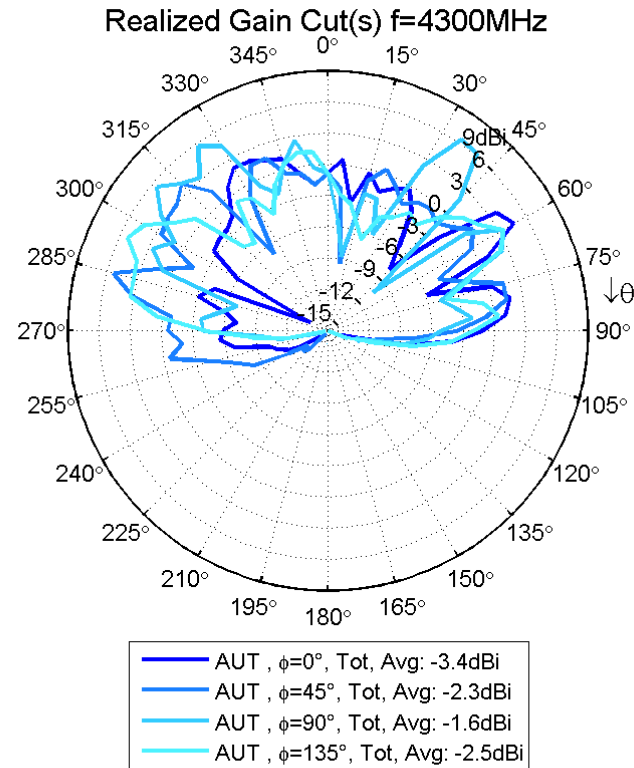
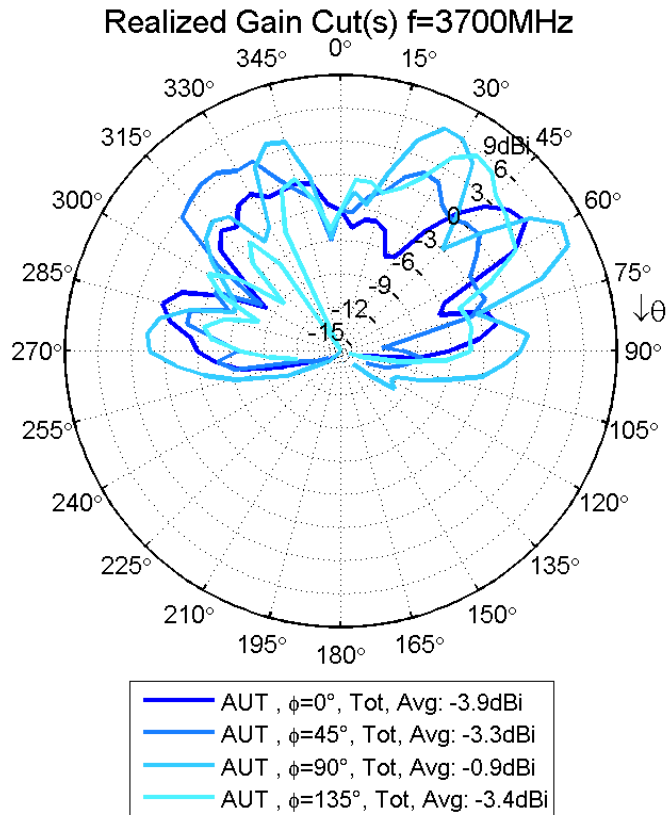


2. 5G Antenna Performance in Chamber



2. 5G Antenna Performance in Chamber

Chamber





ANNEX

Cable: 1.5m RTK031	Frequency(MHz)	MaxGain(dBi)	Theta(°)	Phi(°)
	590	3.50	45	285
	600	2.92	50	285
	610	2.78	50	285
	620	2.83	50	285
	630	3.20	55	280
	640	3.77	55	280
	650	4.80	55	280
	660	4.21	55	280
	670	4.21	55	280
	680	4.18	55	280
	690	4.20	55	280
	700	4.23	55	280
	720	4.53	50	275
	740	4.50	45	270
	760	4.28	40	265
	780	3.84	20	155
	800	2.73	20	165
	820	1.36	15	180
	840	1.60	60	120
	860	1.82	60	245
	880	2.46	60	245
	900	2.20	60	245
	920	2.29	65	250
	940	3.90	70	255
	960	3.43	70	260
	980	3.26	70	260
	1000	3.13	65	110
	1350	3.21	45	265
	1400	3.97	45	265
	1410	3.85	45	265
	1420	3.66	45	265
	1430	3.40	45	265
	1440	3.34	45	265
	1450	3.42	45	265
	1460	3.45	45	265
	1470	3.50	45	265
	1480	3.59	55	125
	1490	3.64	55	125
	1500	3.62	55	125
	1550	3.51	60	345
	1600	3.42	60	345
	1650	3.40	65	340
	1700	3.68	65	110
	1800	5.50	80	265
	1900	5.18	80	260

2000	5.13	75	260
2100	4.37	75	310
2200	5.20	15	45
2300	4.46	20	50
2400	5.30	15	60
2500	4.38	50	90
2600	5.95	50	80
2700	6.81	50	80
2800	6.47	55	90
2900	6.71	55	90
3000	6.16	55	95
3100	5.61	10	160
3200	4.75	55	110
3300	4.51	60	110
3400	4.80	60	110
3500	5.20	60	105
3600	5.64	60	90
3700	5.61	60	90
3800	6.26	65	90
3900	5.76	60	90
4000	4.77	55	0
4100	5.13	50	285
4200	4.60	50	285
4300	5.23	35	80
4400	4.76	35	260
4500	4.43	55	330
4600	4.40	55	330
4700	4.10	55	330
4800	5.22	60	25
4900	5.95	60	330
5000	5.16	60	325
5100	5.17	60	40

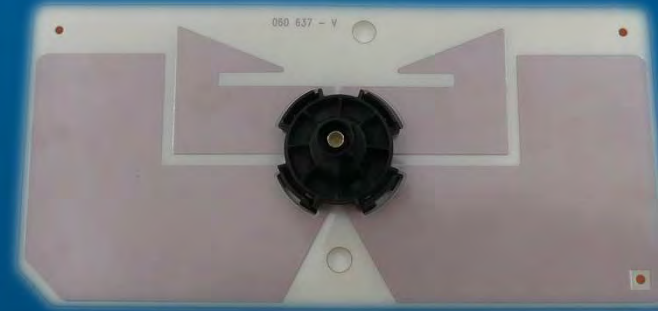
LTE2_LTE4_antenna



Porsche Messkampagne April 2021

3D Messungen: C-Muster Konformitätsmessungen

Porsche Teilenummer: 95C.051.502



Bearbeitet / edit by: Daniel Dogaru
Datum / date: 4_2021

Entwicklungsbegleitende Messungen

Folienantenne 5G – Thema



Es werden Konformitätsmessungen gemacht, mit einem von PAG vorgegebenen Messplatz-Setup (siehe Mail vom 24.02.2021).

Hallo Herr Christ, Hallo Herr Dogaru,

heute morgen hatten wir noch über die Anforderungen bei der Chambermessung gesprochen.
Zwecks Vergleichbarkeit sollte die Messung mit folgenden Einstellungen stattfinden:

- Winkelauflösung
Standard => Theta; Phi => 5°
- Frequenzbereiche entsprechend Fahrzeugmessung
- Frequenzauflösung
 - 600-700 MHz => 10 MHz
 - 700-1000 MHz => 20 MHz
 - 1400-1500 MHz => 10 MHz
 - 1500-1700 MHz => 50MHz
 - 1700-5000 MHz => 100 MHz
- Halbkugel

Mit freundlichen Grüßen

Jan Schmedding

Dr. Ing. h.c. F. Porsche AG

Entwicklungsbegleitende Messungen

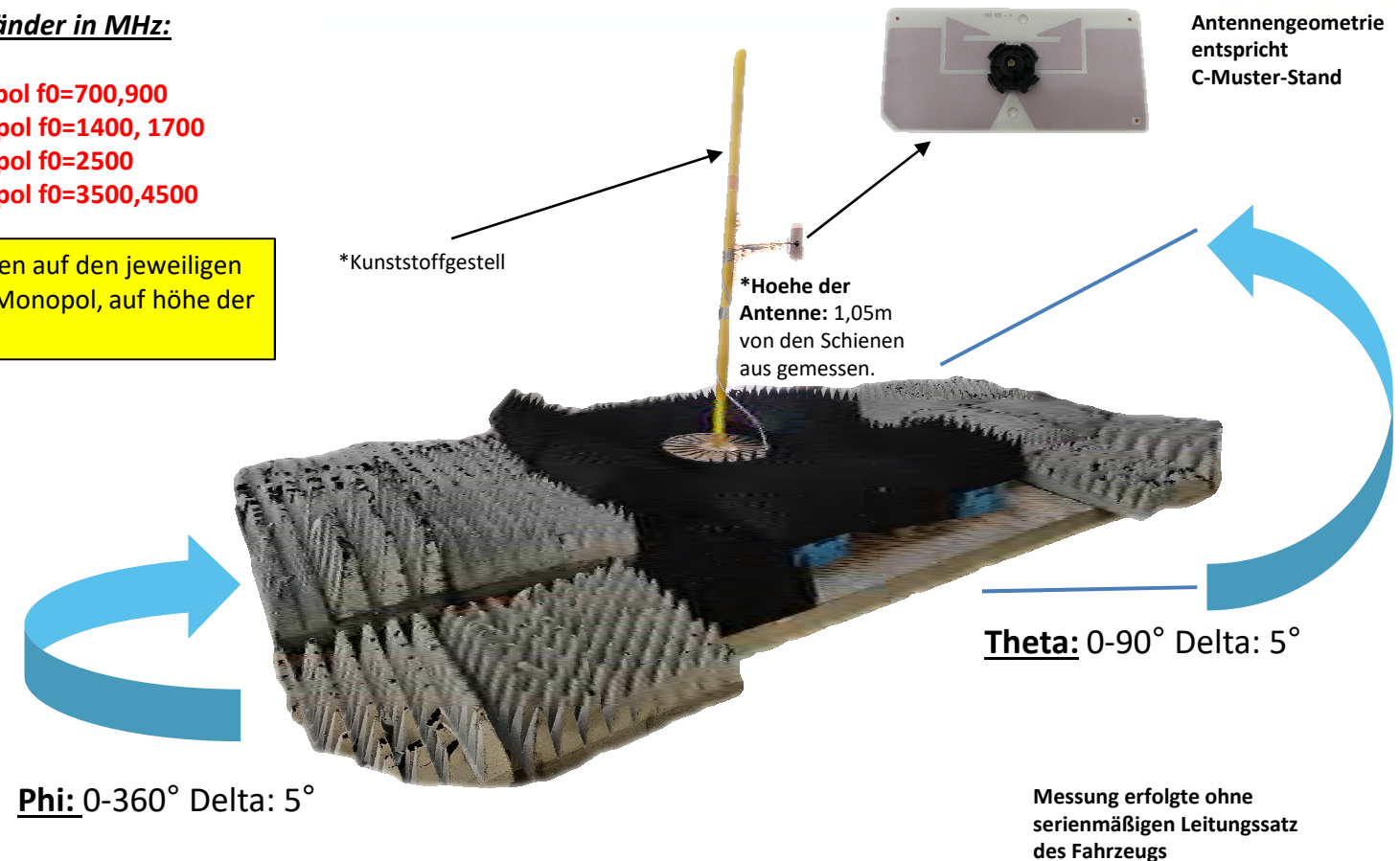
Folienantenne 5G – Messaufbau



Gemessene Frequenzbänder in MHz:

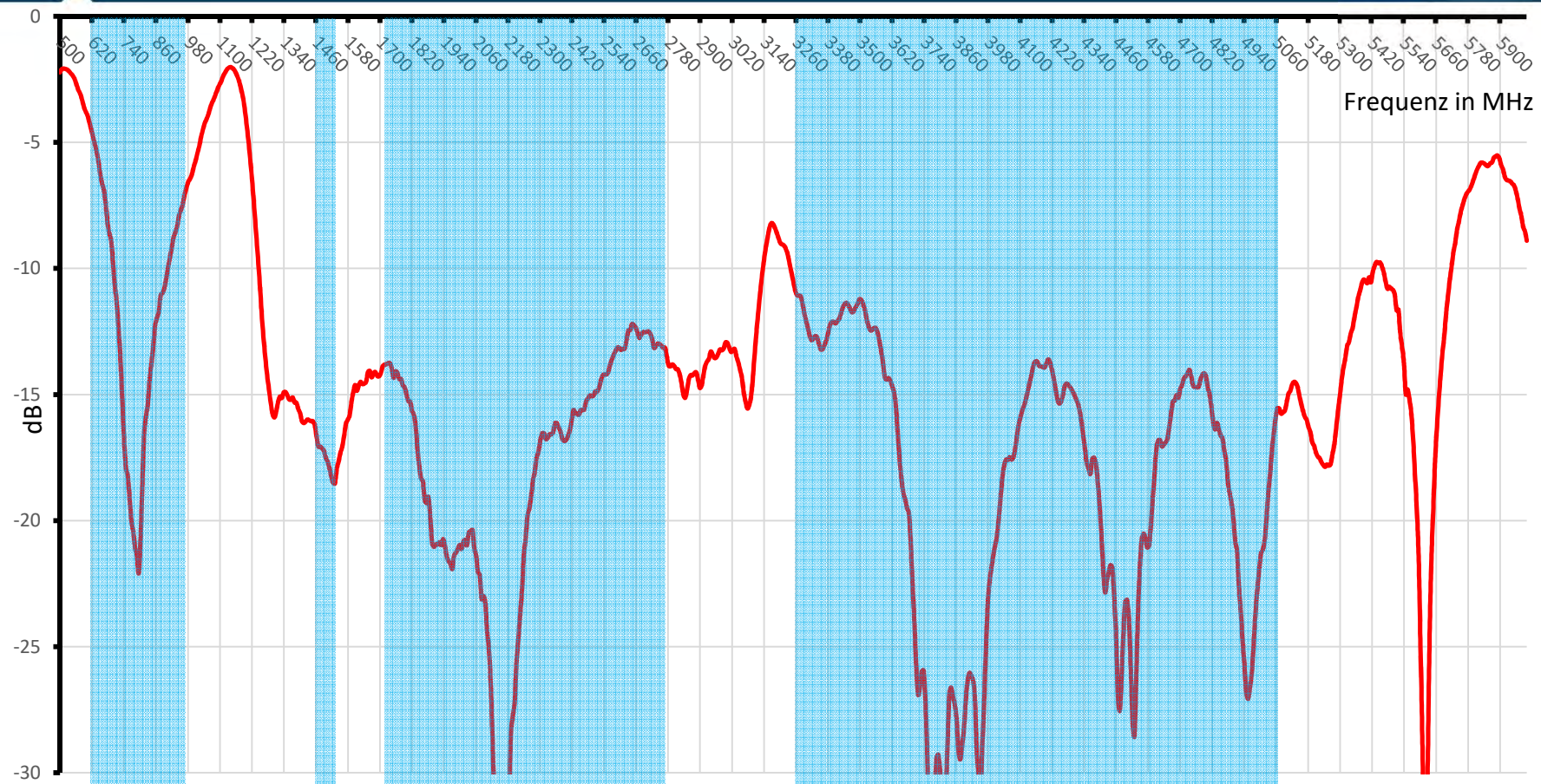
617-1000	Ref = Monopol f0=700,900
1400-2200	Ref = Monopol f0=1400, 1700
2300-2700	Ref = Monopol f0=2500
3300-5000	Ref = Monopol f0=3500,4500

Gemessen wird immer gegen einen auf den jeweiligen Frequenzbereich abgestimmten Monopol, auf Höhe der Testantenne.



Entwicklungsbegleitende Messungen

Folienantenne 5G (B2 Muster auf Halter in Luft– S-Parameter)

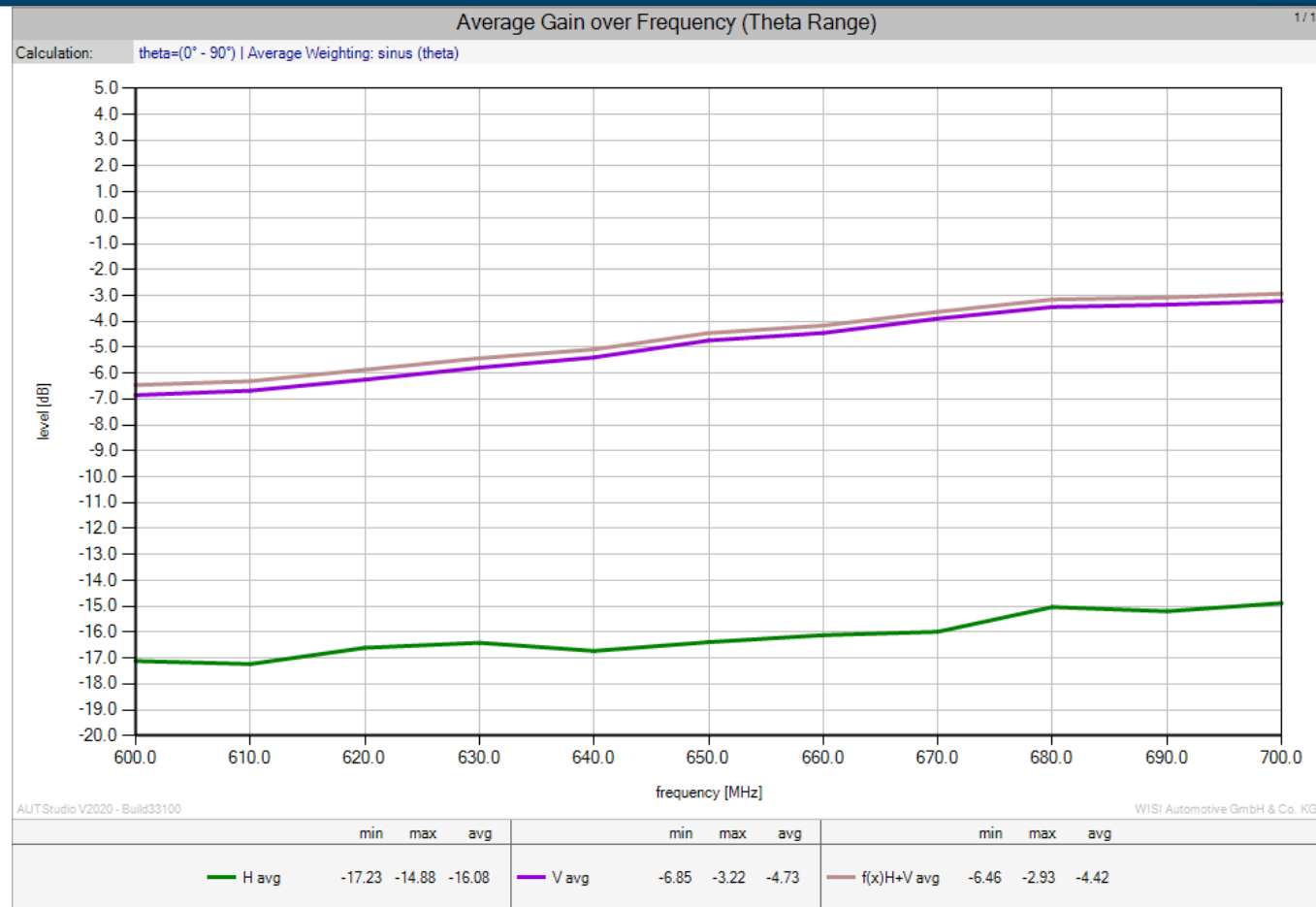




Start der Auswertung

Entwicklungsbegleitende Messungen

Folie B2-Muster Gain total 600-700MHz Avg Gain 0-90°



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4. Mai 2021

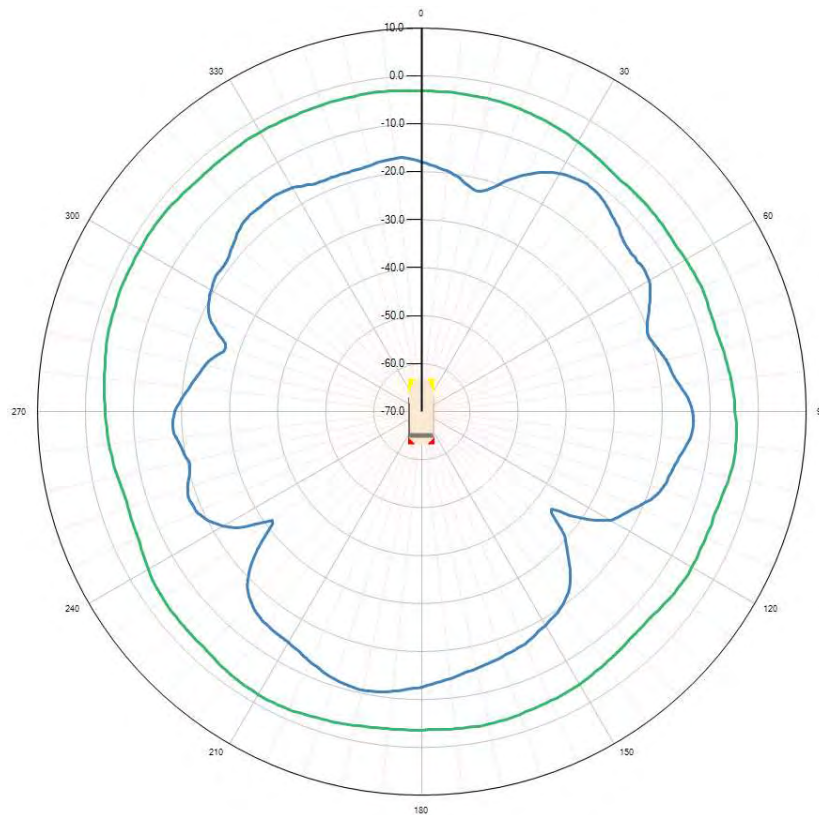
Entwicklungsbegleitende Messungen

Folie B2-Muster Richtdiagramme 0-90°

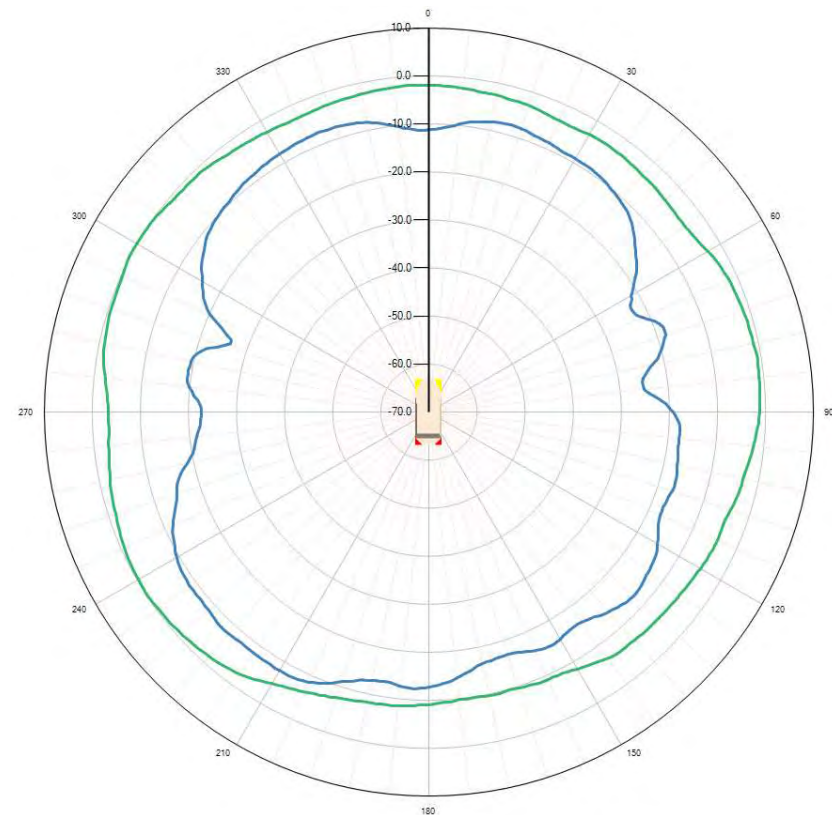
Grün = Vertikale Polarisation
Blau = Horizontale Polarisation



620 MHz @ 45° Elev

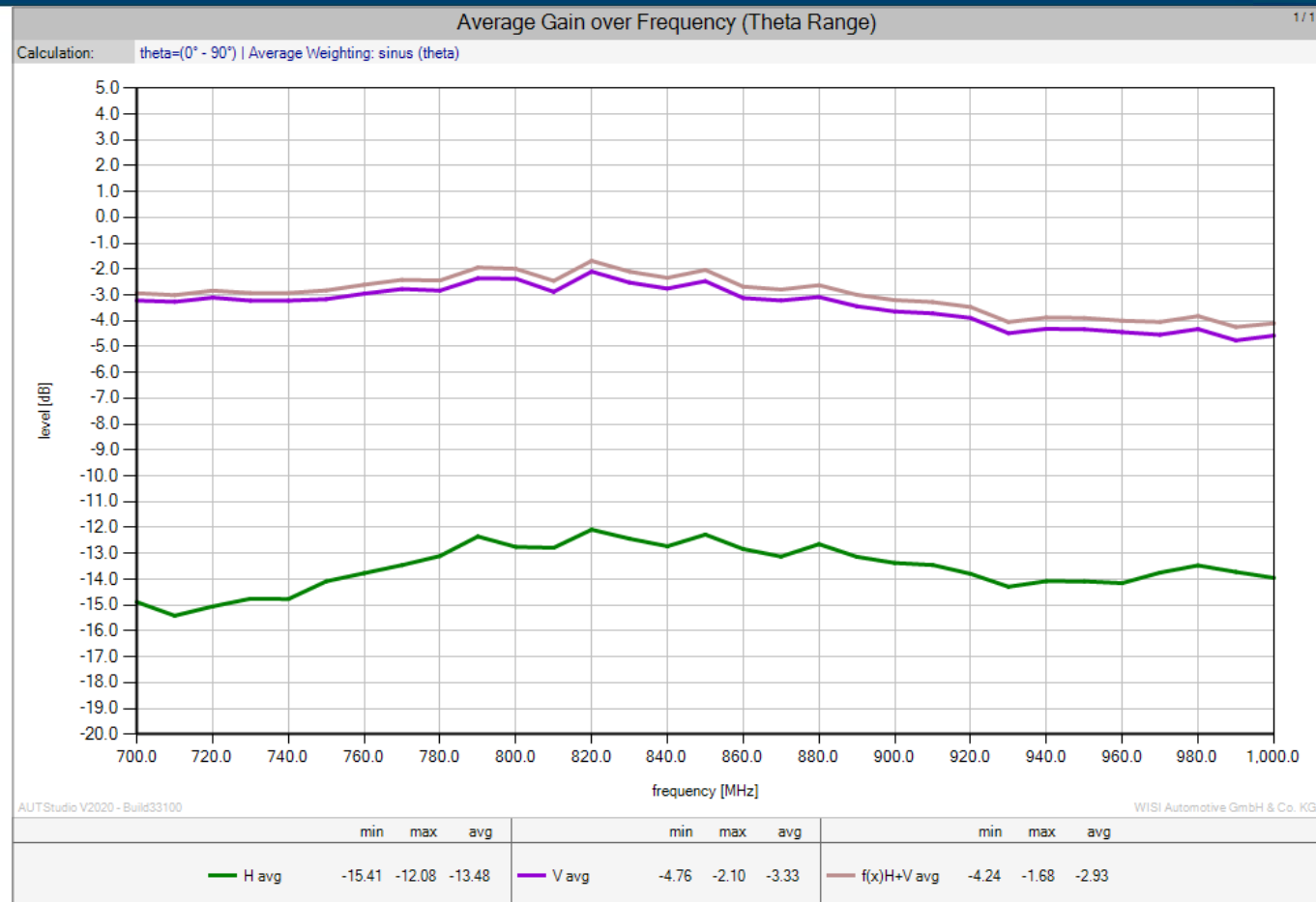


700 MHz @ 45° Elev



Entwicklungsbegleitende Messungen

Folie B2-Muster Gain total 700-1000MHz Avg Gain 0-90°



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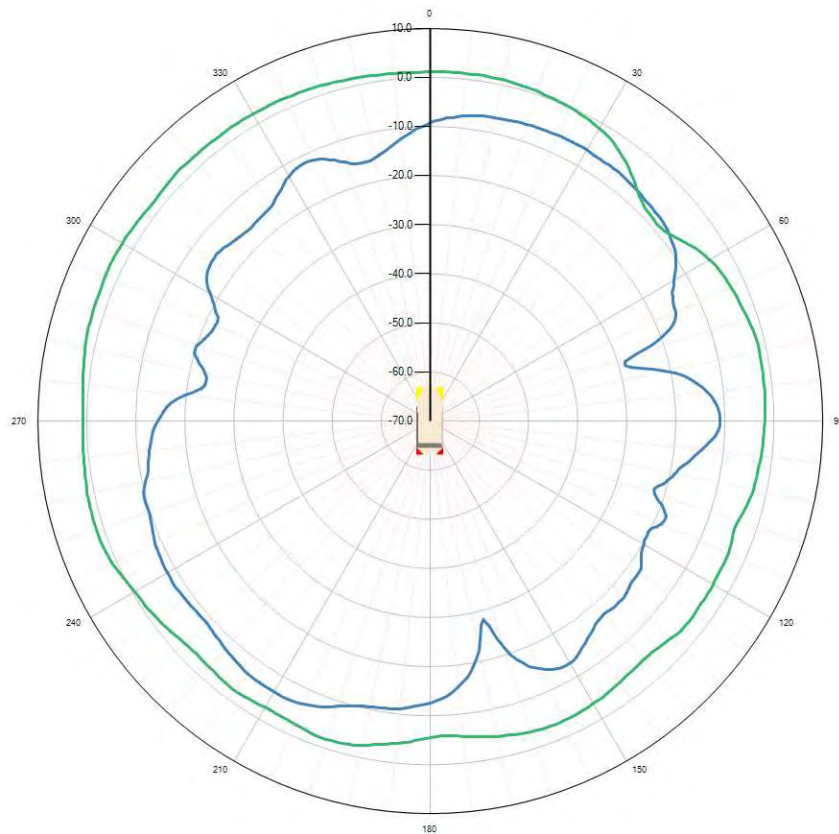
Entwicklungsbegleitende Messungen

Folie B2-Muster Richtdiagramme 0-90°

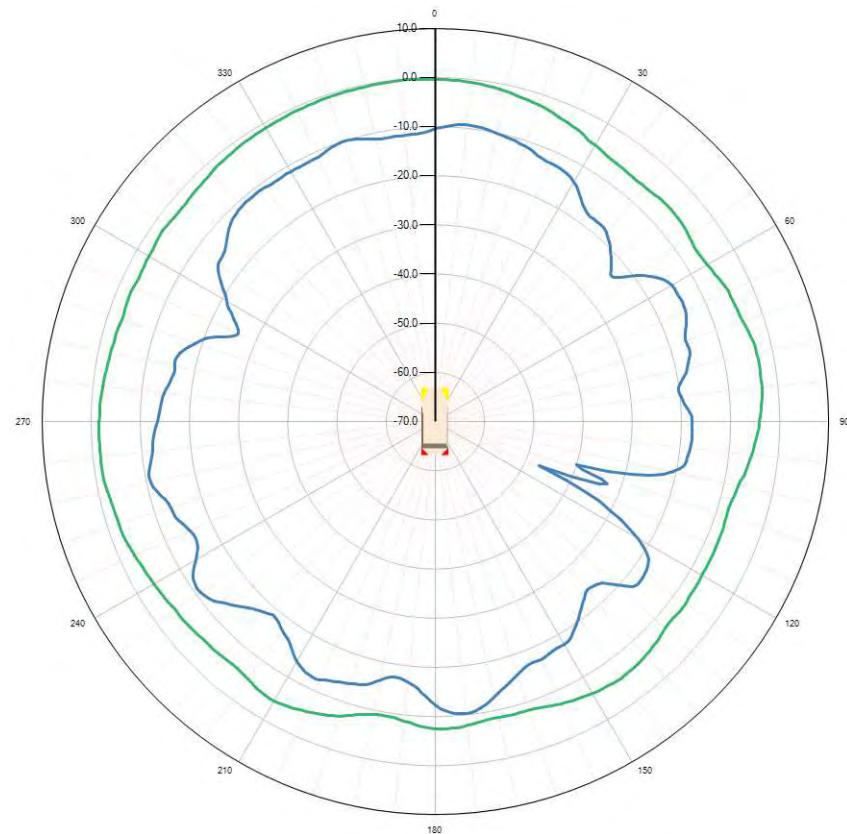
Grün = Vertikale Polarisation
Blau = Horizontale Polarisation



800 MHz @ 45° Elev

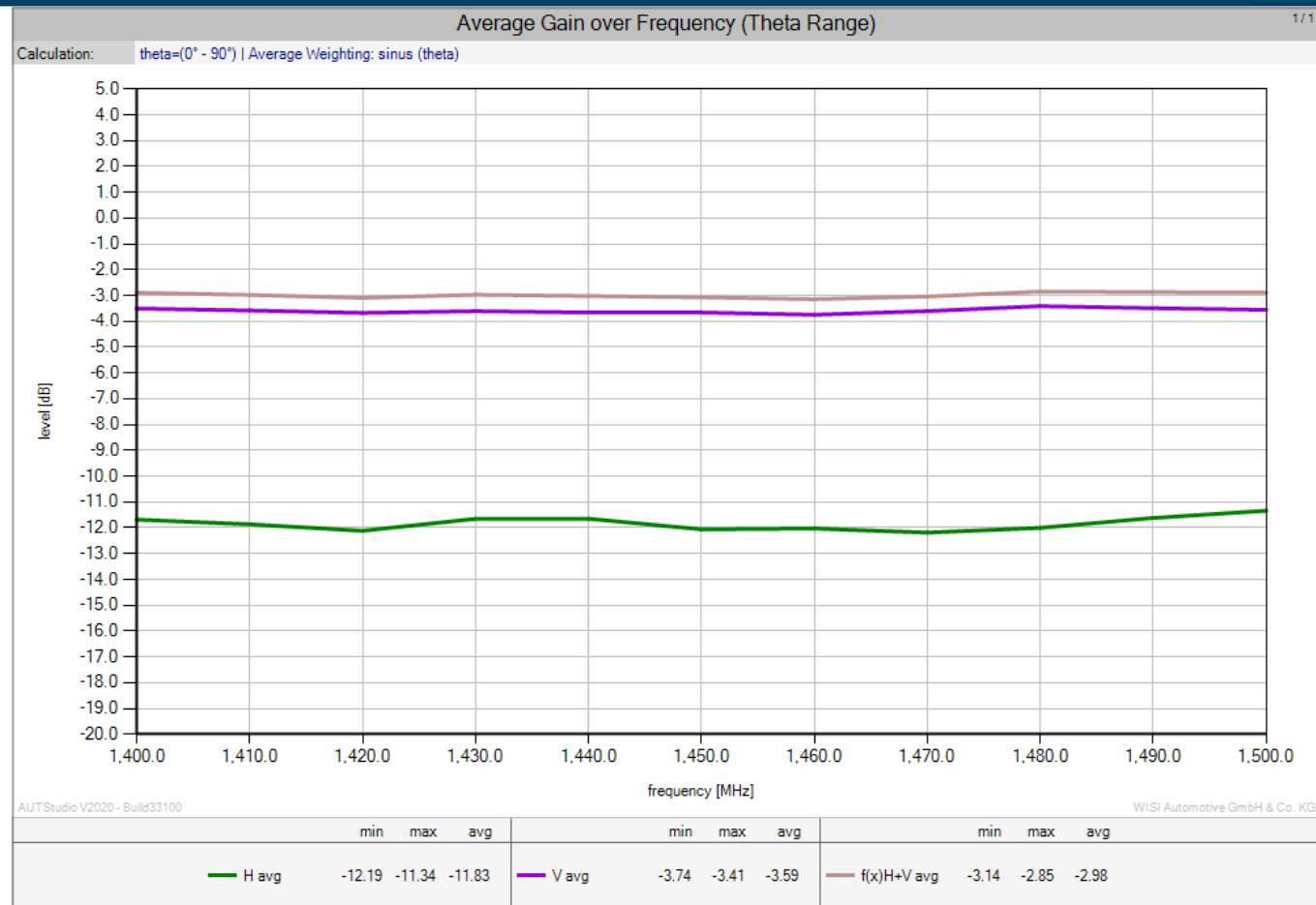


960 MHz @ 45° Elev



Entwicklungsbegleitende Messungen

Folie B2-Muster Gain total 1400-1500MHz Avg Gain 0-90°



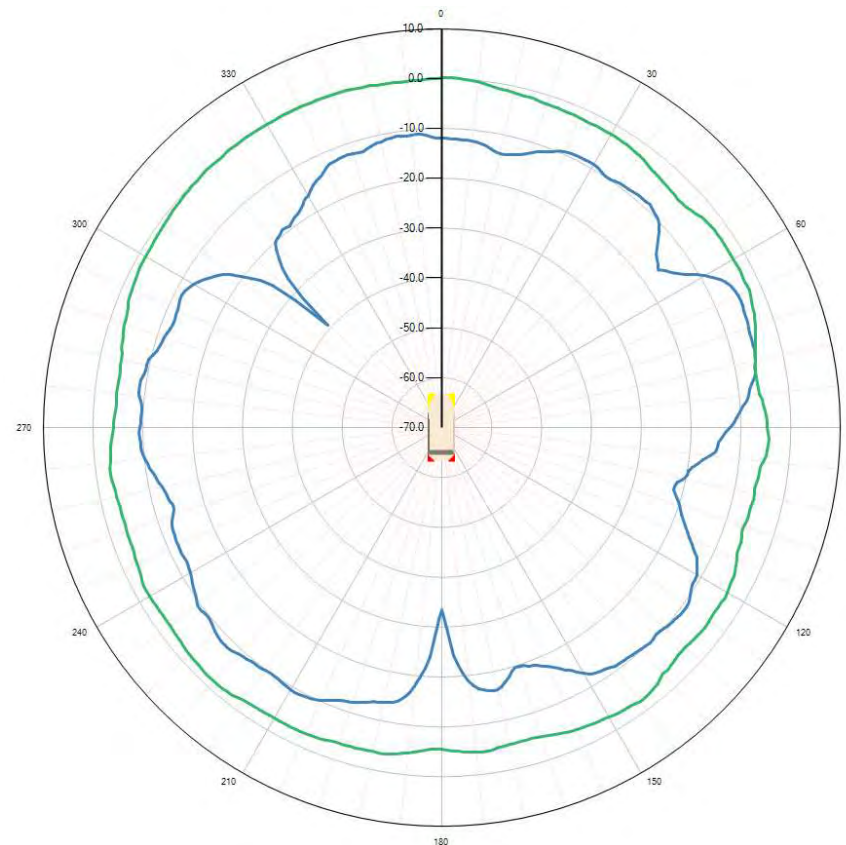
Entwicklungsbegleitende Messungen

Folie B2-Muster Richtdiagramme 0-90°

Grün = Vertikale Polarisation
Blau = Horizontale Polarisation



1450 MHz @ 45° Elev



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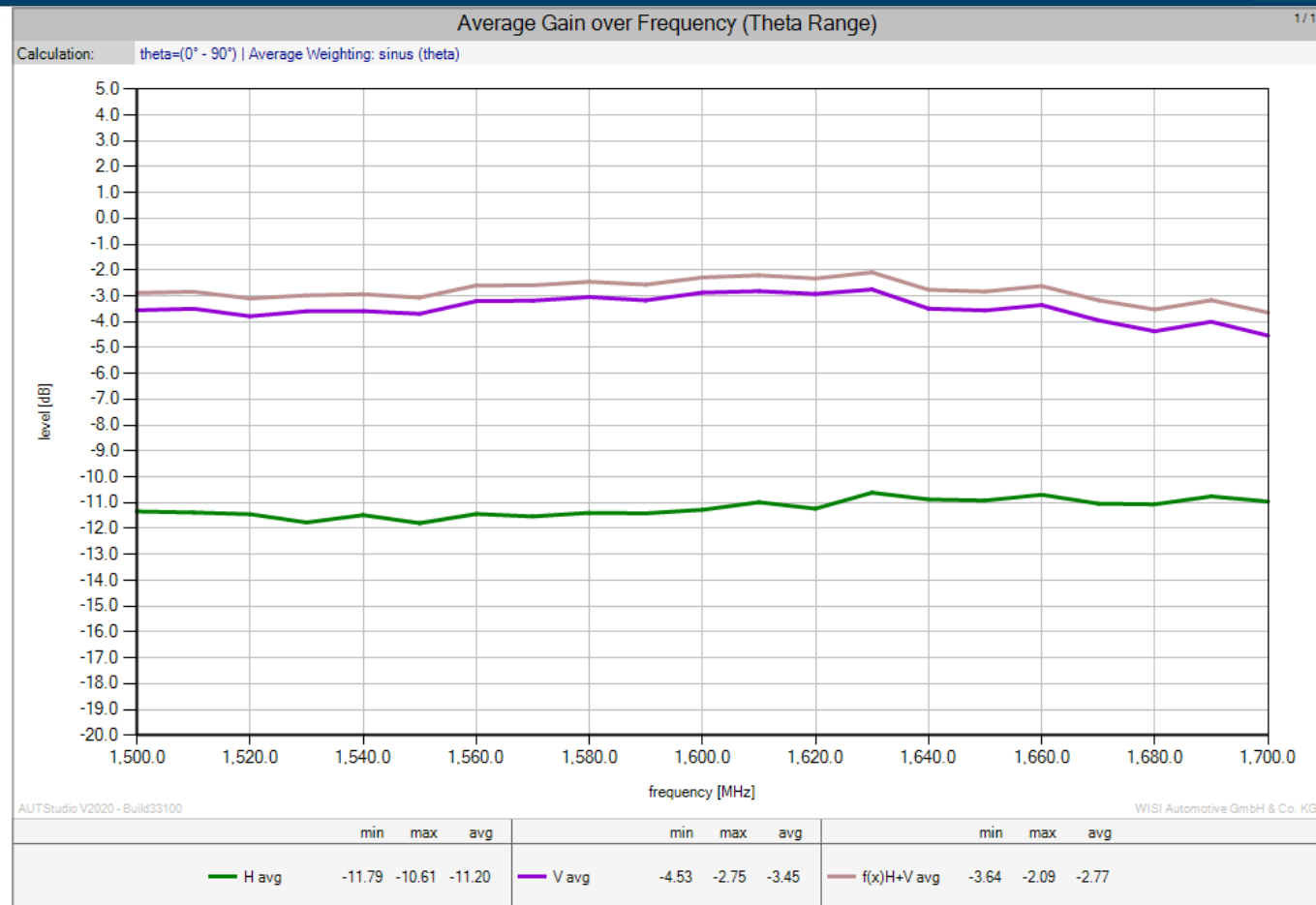
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Entwicklungsbegleitende Messungen

Folie B2-Muster Gain total 1500-1700MHz Avg Gain 0-90°



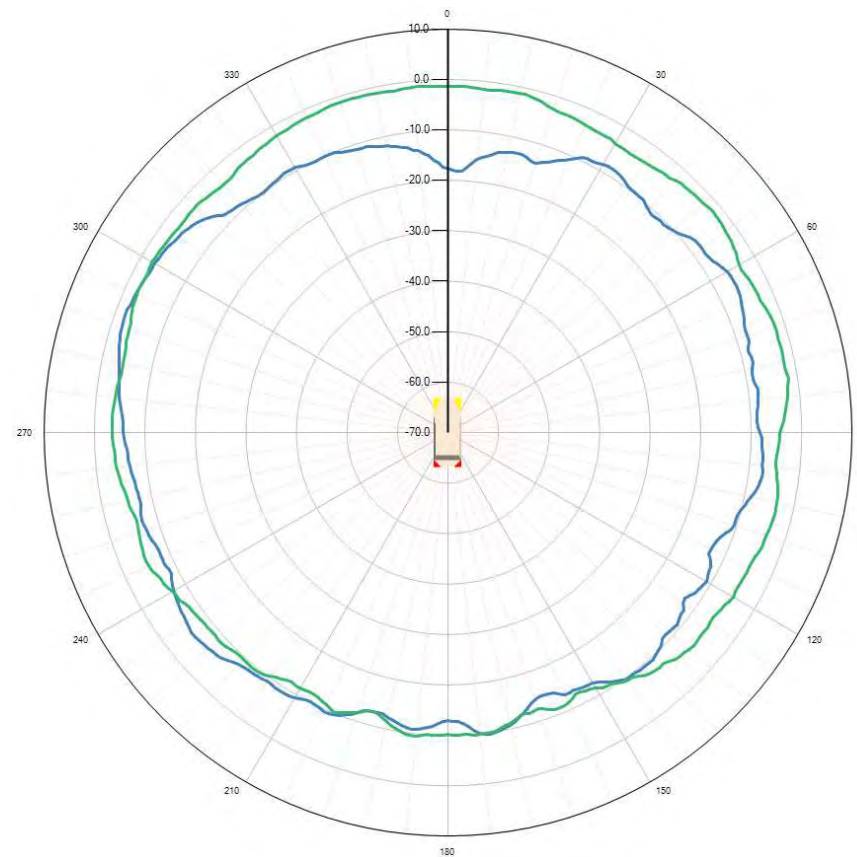
Entwicklungsbegleitende Messungen

Folie B2-Muster Richtdiagramme 0-90°

Grün = Vertikale Polarisation
Blau = Horizontale Polarisation



1700 MHz @ 45° Elev



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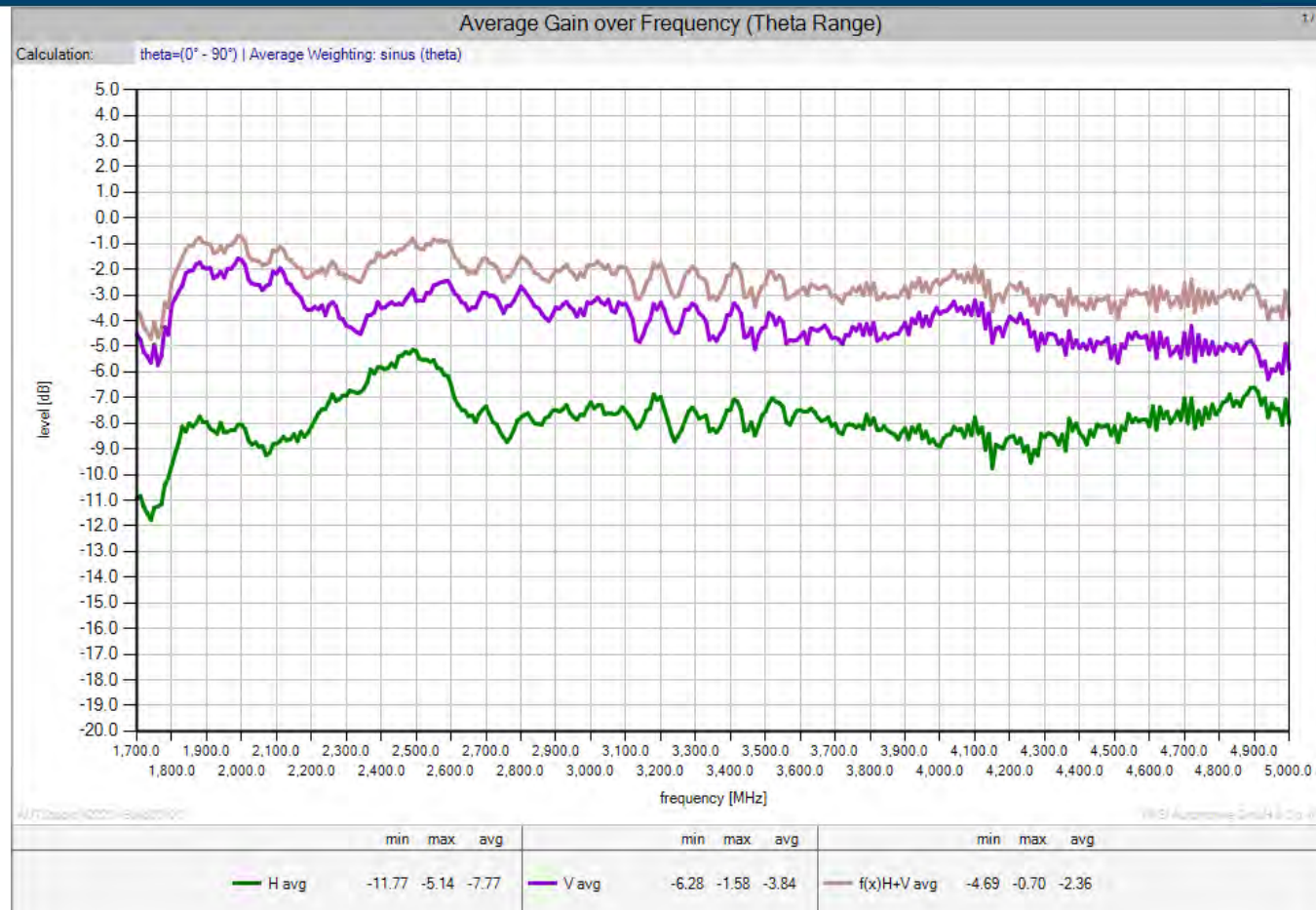
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Entwicklungsbegleitende Messungen

Folie B2-Muster Gain total 1700-5000MHz Avg Gain 0-90°



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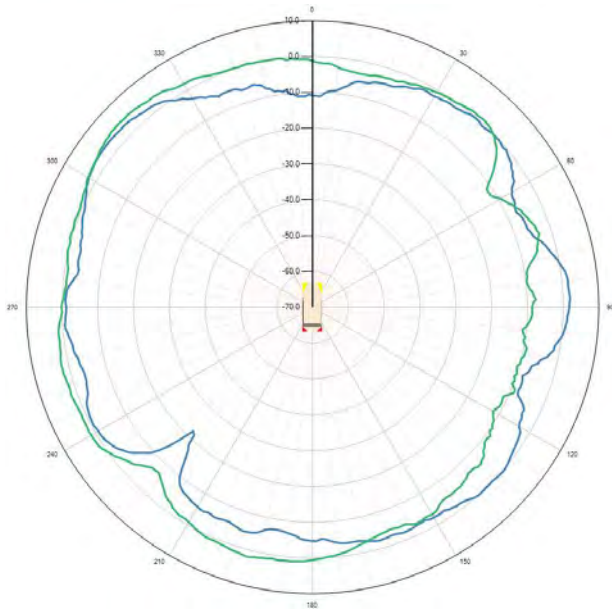
Entwicklungsbegleitende Messungen

Folie B2-Muster Richtdiagramme 0-90°

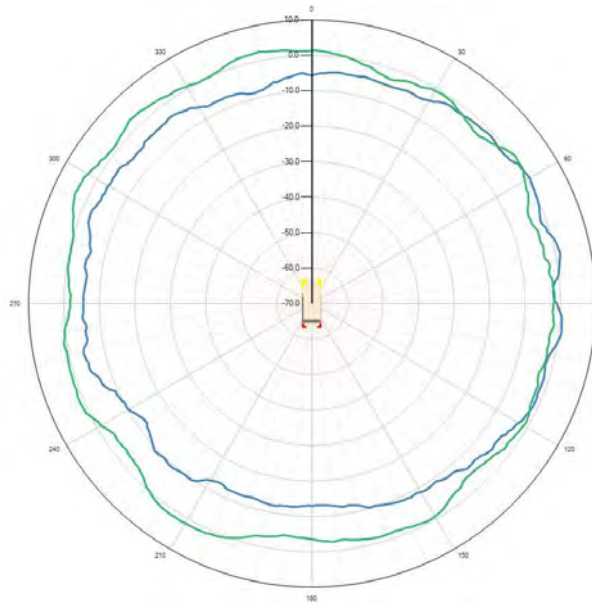
Grün = Vertikale Polarisation
Blau = Horizontale Polarisation



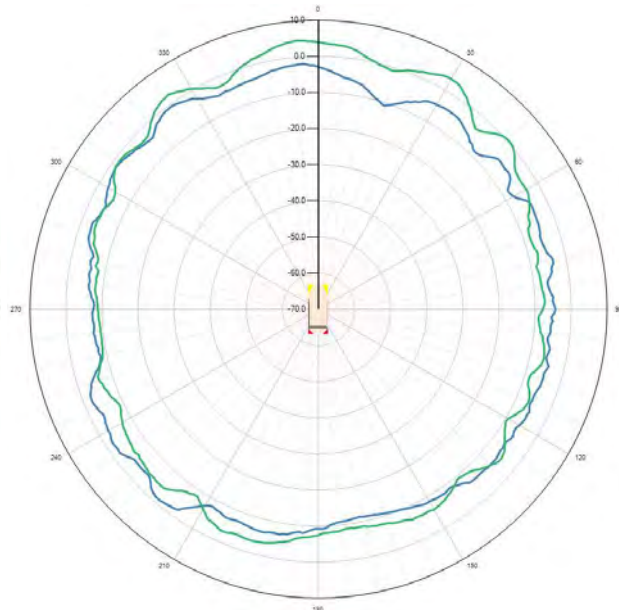
2500 MHz @ 45° Elev



3500 MHz @ 45° Elev



4500 MHz @ 45° Elev



ANNEX

Wandlungsparameter: MeanMean

Für die Berechnung tatsächlich betrachteter Winkelbereich (0-90°)

Frequenz in MHz	Mittelwert V	Mittelwert H	Mittelwert H+V	Maximalwert V	Maximalwert H	Maximalwert H+V
600	-5.93	-15.39	-5.47	-0.08	-5.39	0.13
610	-5.69	-15.27	-5.24	-0.39	-5.26	-0.21
620	-5.26	-14.55	-4.77	0.09	-4.98	0.10
630	-4.73	-13.99	-4.25	0.30	-4.59	0.35
640	-4.32	-13.99	-3.87	1.45	-4.43	1.51
650	-3.68	-13.75	-3.27	1.20	-4.62	1.28
660	-3.45	-13.56	-3.04	1.10	-4.95	1.15
670	-2.91	-13.61	-2.56	1.96	-5.39	2.12
680	-2.56	-13.00	-2.19	2.32	-4.77	2.44
690	-2.47	-13.00	-2.10	3.69	-5.50	3.71
700	-2.32	-12.92	-1.96	3.44	-5.28	3.49
710	-2.40	-13.16	-2.05	3.17	-5.74	3.24
720	-2.29	-12.74	-1.91	2.97	-5.16	3.08
730	-2.35	-12.48	-1.95	3.60	-4.92	3.66
740	-2.32	-12.60	-1.93	3.81	-5.77	3.82
750	-2.25	-12.05	-1.81	3.42	-4.35	3.48
760	-2.05	-11.86	-1.62	4.15	-3.04	4.23
770	-1.92	-11.58	-1.47	3.32	-2.68	3.71
780	-1.97	-11.21	-1.48	3.74	-1.97	3.88
790	-1.49	-10.35	-0.96	4.72	-1.31	4.74
800	-1.57	-10.54	-1.05	4.14	-2.54	4.61
810	-2.04	-10.48	-1.46	3.68	-1.69	3.78
820	-1.25	-9.83	-0.69	4.48	-0.67	5.10
830	-1.70	-10.49	-1.16	3.87	-2.07	4.06
840	-1.96	-10.76	-1.42	4.49	-2.08	4.51
850	-1.69	-10.22	-1.12	4.30	-2.52	4.42
860	-2.39	-10.99	-1.83	3.59	-2.90	3.94
870	-2.45	-11.55	-1.94	3.96	-3.33	4.00
880	-2.32	-11.13	-1.78	3.65	-3.15	3.75
890	-2.71	-11.66	-2.19	3.22	-3.80	3.39
900	-2.93	-11.52	-2.37	3.75	-3.93	3.78
910	-2.95	-11.50	-2.38	2.63	-3.52	2.82
920	-3.16	-12.16	-2.65	4.09	-4.07	4.10
930	-3.77	-12.62	-3.24	3.02	-5.40	3.09
940	-3.60	-12.29	-3.05	2.36	-3.11	2.40
950	-3.61	-12.14	-3.04	2.48	-4.29	2.49
960	-3.71	-12.28	-3.14	2.16	-3.89	2.47
970	-3.75	-11.94	-3.14	2.42	-2.57	2.46
980	-3.56	-11.76	-2.95	3.03	-3.19	3.21
990	-3.97	-12.09	-3.34	2.65	-3.93	2.66
1000	-3.77	-12.49	-3.22	2.79	-2.10	2.81
1010	-4.11	-12.93	-3.58	3.08	-2.62	3.14
1020	-4.43	-13.74	-3.95	1.88	-5.91	2.32
1030	-4.71	-14.18	-4.24	1.24	-6.09	1.25
1040	-4.65	-13.73	-4.14	0.87	-7.27	0.97
1050	-5.07	-13.34	-4.47	0.70	-6.83	0.71
1060	-5.23	-12.67	-4.51	0.71	-5.08	0.73
1070	-5.31	-12.33	-4.52	1.27	-5.53	1.30
1080	-6.25	-12.39	-5.31	-0.20	-5.59	-0.14
1090	-6.62	-11.88	-5.49	0.75	-4.95	0.88
1100	-7.79	-12.25	-6.46	0.19	-5.21	0.24
1110	-9.00	-13.11	-7.58	-0.97	-5.64	-0.67
1120	-9.98	-13.19	-8.29	-1.73	-5.39	-1.63
1130	-10.54	-13.50	-8.76	-1.05	-5.87	-1.00
1140	-11.23	-14.44	-9.53	-2.36	-6.75	-2.26
1150	-11.53	-15.20	-9.98	-2.96	-6.51	-2.95
1160	-10.59	-15.93	-9.48	-3.21	-8.25	-3.13
1170	-8.97	-16.55	-8.27	-1.99	-9.06	-1.86
1180	-7.55	-16.78	-7.06	-1.61	-9.95	-1.51
1190	-5.74	-16.60	-5.39	0.20	-9.44	0.23

1200	-5.02	-16.44	-4.72	1.12	-9.76	1.19
1210	-4.00	-15.70	-3.71	1.64	-9.21	1.65
1220	-3.36	-14.22	-3.02	1.89	-7.43	1.91
1230	-3.47	-13.80	-3.09	1.81	-6.69	1.89
1240	-2.76	-12.89	-2.36	2.42	-5.91	2.49
1250	-2.19	-11.98	-1.76	2.66	-5.38	2.70
1260	-2.94	-12.17	-2.45	2.36	-5.02	2.37
1270	-2.45	-11.38	-1.93	2.42	-4.54	2.46
1280	-2.08	-10.54	-1.50	3.37	-3.45	3.64
1290	-2.17	-10.14	-1.53	3.08	-3.53	3.33
1300	-2.04	-9.41	-1.31	3.76	-2.65	3.95
1310	-2.02	-9.03	-1.23	3.56	-1.88	3.67
1320	-1.90	-9.36	-1.18	3.46	-2.92	3.47
1330	-1.55	-9.05	-0.84	3.62	-1.95	3.78
1340	-1.65	-8.58	-0.85	3.25	-1.20	3.44
1350	-1.93	-8.90	-1.13	3.36	-0.61	3.75
1360	-1.80	-8.86	-1.02	3.39	-1.53	3.71
1370	-1.74	-9.19	-1.02	3.29	-1.35	3.47
1380	-1.91	-9.47	-1.21	3.90	-1.51	4.06
1390	-1.95	-9.12	-1.19	3.23	-2.44	3.55
1400	-2.43	-9.12	-1.59	2.63	-2.05	3.17
1410	-2.48	-9.21	-1.65	3.03	-2.72	3.19
1420	-2.66	-9.36	-1.82	3.08	-2.57	3.24
1430	-2.62	-9.24	-1.76	3.32	-2.52	3.56
1440	-2.70	-9.45	-1.87	2.94	-2.98	3.07
1450	-2.68	-9.94	-1.93	2.78	-2.92	2.99
1460	-2.74	-9.92	-1.98	3.33	-2.94	3.52
1470	-2.60	-10.00	-1.87	2.65	-3.07	2.97
1480	-2.42	-9.64	-1.66	3.51	-2.02	3.65
1490	-2.51	-9.20	-1.67	3.47	-2.55	3.87
1500	-2.55	-8.74	-1.61	3.61	-2.19	3.76
1510	-2.48	-8.62	-1.53	3.48	-1.75	3.68
1520	-2.74	-8.82	-1.78	3.47	-1.77	3.75
1530	-2.54	-9.00	-1.65	3.41	-1.76	3.46
1540	-2.43	-8.91	-1.55	3.13	-1.78	3.26
1550	-2.50	-9.14	-1.65	4.16	-1.73	4.22
1560	-2.03	-8.64	-1.17	3.72	-1.61	3.78
1570	-2.02	-8.81	-1.19	3.68	-1.57	3.68
1580	-1.88	-8.74	-1.06	3.74	-0.97	3.74
1590	-1.96	-8.67	-1.12	3.78	-1.39	3.96
1600	-1.78	-8.49	-0.94	3.69	-0.92	3.85
1610	-1.76	-8.31	-0.89	4.48	-0.95	4.56
1620	-1.90	-8.47	-1.04	4.12	-0.82	4.20
1630	-1.76	-7.88	-0.81	4.38	-0.70	4.43
1640	-2.50	-8.17	-1.46	4.59	-1.15	4.78
1650	-2.62	-8.36	-1.60	3.14	-1.29	3.51
1660	-2.44	-8.02	-1.38	4.48	-0.63	4.54
1670	-3.04	-8.62	-1.98	3.93	-1.35	4.11
1680	-3.39	-8.66	-2.26	4.10	-0.99	4.30
1690	-2.98	-8.38	-1.88	3.85	-0.90	4.11
1700	-3.47	-8.76	-2.35	3.27	-1.42	3.33
1710	-3.54	-8.66	-2.38	3.37	-1.34	3.56
1720	-4.00	-8.91	-2.78	2.05	-1.85	2.12
1730	-4.23	-9.10	-3.01	1.83	-2.55	2.12
1740	-4.41	-9.19	-3.16	2.80	-2.32	2.94
1750	-3.84	-8.59	-2.59	2.75	-1.43	2.95
1760	-4.62	-8.63	-3.17	2.71	-0.98	2.85
1770	-4.32	-8.44	-2.90	2.16	-1.68	2.52
1780	-3.23	-7.94	-1.97	4.07	0.21	4.43
1790	-3.46	-7.86	-2.11	3.20	-0.93	3.30
1800	-2.20	-7.33	-1.04	4.60	-0.28	4.71
1810	-1.85	-6.69	-0.62	4.57	0.84	5.02
1820	-1.57	-6.22	-0.29	4.73	0.90	4.88

1830	-1.31	-5.41	0.12	5.17	2.24	5.39
1840	-0.99	-5.55	0.32	6.87	1.18	7.22
1850	-0.92	-5.27	0.44	6.83	1.96	7.09
1860	-0.76	-5.47	0.50	6.01	1.45	6.31
1870	-0.51	-5.54	0.68	6.33	2.04	6.71
1880	-0.48	-5.45	0.72	7.11	1.25	7.33
1890	-0.56	-5.57	0.63	5.77	1.49	6.27
1900	-0.66	-5.72	0.52	6.25	0.52	6.51
1910	-0.64	-5.76	0.52	6.63	0.50	6.71
1920	-0.93	-5.63	0.34	6.58	2.53	6.64
1930	-0.97	-5.85	0.26	5.27	1.42	5.47
1940	-0.77	-5.39	0.52	6.10	1.82	6.18
1950	-0.98	-5.66	0.29	6.59	1.53	6.82
1960	-0.78	-5.68	0.43	6.08	1.80	6.46
1970	-0.76	-5.66	0.45	6.14	1.93	6.30
1980	-0.58	-5.78	0.56	6.73	2.08	6.77
1990	-0.34	-5.70	0.77	6.62	1.95	6.85
2000	-0.46	-5.72	0.68	6.65	1.39	7.11
2010	-0.56	-5.76	0.59	6.29	2.11	6.43
2020	-1.13	-5.90	0.12	6.86	1.93	6.90
2030	-1.30	-5.92	-0.01	6.19	1.49	6.20
2040	-1.33	-5.82	-0.01	5.71	3.13	5.79
2050	-1.50	-5.79	-0.12	6.50	2.63	6.53
2060	-1.65	-5.64	-0.19	5.81	2.38	6.01
2070	-1.52	-5.97	-0.19	5.69	2.62	5.72
2080	-1.47	-6.19	-0.21	5.78	1.92	5.81
2090	-0.94	-6.21	0.19	5.46	1.06	5.64
2100	-0.91	-6.33	0.19	6.58	1.12	6.60
2110	-0.70	-6.08	0.40	5.60	1.08	5.83
2120	-0.83	-5.72	0.39	5.90	0.72	6.10
2130	-1.19	-5.66	0.14	6.26	1.83	6.54
2140	-1.21	-5.54	0.15	5.50	3.13	5.55
2150	-1.38	-5.21	0.12	6.31	2.85	6.37
2160	-1.61	-5.39	-0.09	6.09	2.47	6.24
2170	-1.65	-5.23	-0.07	5.47	2.33	5.55
2180	-1.79	-5.49	-0.24	5.17	1.95	5.38
2190	-1.74	-5.61	-0.25	5.48	2.04	5.62
2200	-1.73	-5.40	-0.18	4.72	1.34	4.74
2210	-1.60	-5.02	0.03	5.43	1.76	5.60
2220	-1.57	-4.63	0.17	6.68	3.65	6.87
2230	-1.50	-4.22	0.36	6.83	3.67	7.14
2240	-1.88	-4.17	0.13	5.54	3.96	5.65
2250	-1.66	-3.88	0.38	6.15	4.49	6.39
2260	-1.50	-3.72	0.54	6.65	4.46	6.75
2270	-1.62	-4.21	0.29	5.68	2.77	5.91
2280	-2.01	-4.34	-0.01	4.89	3.21	5.51
2290	-2.03	-4.18	0.04	5.30	2.49	5.53
2300	-2.15	-4.24	-0.06	4.59	3.10	5.17
2310	-2.07	-3.99	0.09	5.21	2.90	5.58
2320	-2.24	-3.76	0.07	4.77	3.98	5.70
2330	-2.24	-3.52	0.18	5.19	4.86	5.99
2340	-2.28	-3.48	0.17	5.38	5.58	5.67
2350	-2.00	-3.20	0.45	5.83	5.78	6.56
2360	-1.72	-2.92	0.73	6.05	6.13	6.60
2370	-1.69	-2.69	0.85	4.78	5.88	5.98
2380	-1.56	-3.10	0.75	4.84	4.71	6.21
2390	-1.15	-3.12	0.99	4.87	4.02	6.22
2400	-1.36	-3.13	0.86	4.74	4.76	6.62
2410	-1.32	-3.06	0.90	4.31	4.98	6.15
2420	-1.13	-2.96	1.06	5.40	3.84	7.02
2430	-1.05	-2.82	1.17	5.31	4.64	6.46
2440	-1.15	-2.70	1.16	4.53	5.52	6.86
2450	-1.14	-2.24	1.36	5.04	5.00	7.04

2460	-1.12	-2.25	1.36	5.93	5.46	6.85
2470	-0.92	-2.29	1.46	5.62	5.86	7.30
2480	-0.83	-2.55	1.40	5.65	4.75	6.57
2490	-0.68	-2.46	1.53	5.74	4.63	6.74
2500	-1.07	-2.64	1.22	4.55	4.79	6.86
2510	-1.13	-2.99	1.05	4.47	4.17	6.41
2520	-1.10	-3.11	1.02	5.08	4.24	6.75
2530	-0.98	-3.07	1.11	4.56	3.89	6.30
2540	-0.99	-3.13	1.08	5.10	2.91	6.24
2550	-0.73	-3.14	1.24	5.07	3.80	6.19
2560	-0.80	-3.43	1.09	5.66	3.09	6.10
2570	-0.76	-3.61	1.06	5.41	3.00	6.54
2580	-0.75	-3.83	0.99	5.08	2.88	6.43
2590	-0.68	-3.90	1.01	5.02	2.88	6.24
2600	-0.80	-4.27	0.82	5.26	1.66	5.91
2610	-1.11	-4.60	0.50	4.99	1.63	6.09
2620	-1.19	-4.86	0.36	4.69	3.46	5.55
2630	-1.41	-4.87	0.21	5.54	1.59	6.04
2640	-1.55	-4.93	0.09	4.46	2.40	5.35
2650	-1.84	-5.11	-0.16	4.80	1.32	5.45
2660	-1.73	-5.05	-0.07	5.26	2.12	5.29
2670	-1.76	-5.33	-0.18	5.55	1.52	5.69
2680	-1.52	-5.16	0.04	4.79	2.06	5.74
2690	-1.16	-5.06	0.32	6.33	1.63	6.47
2700	-1.14	-5.06	0.34	6.56	1.37	6.71
2710	-1.17	-5.24	0.27	6.66	1.33	6.82
2720	-1.08	-5.37	0.29	5.63	1.65	5.93
2730	-1.25	-5.30	0.19	5.26	2.10	6.05
2740	-1.55	-5.43	-0.06	5.52	2.67	6.16
2750	-1.85	-5.78	-0.38	4.36	1.56	4.59
2760	-1.55	-5.74	-0.15	4.96	2.62	5.31
2770	-1.47	-5.63	-0.06	5.76	2.50	5.83
2780	-1.28	-5.42	0.14	6.31	2.68	6.35
2790	-0.96	-5.27	0.41	5.90	2.45	6.22
2800	-0.56	-5.34	0.68	7.17	2.06	7.26
2810	-0.66	-5.32	0.62	6.50	1.36	6.73
2820	-0.83	-5.31	0.49	5.47	2.40	6.49
2830	-1.00	-5.37	0.35	6.80	1.60	7.03
2840	-1.24	-5.54	0.13	5.96	1.31	6.27
2850	-1.30	-5.51	0.10	5.47	1.41	5.84
2860	-1.62	-5.53	-0.14	4.32	1.72	5.07
2870	-1.80	-5.37	-0.22	4.10	1.53	4.67
2880	-1.89	-5.34	-0.27	5.21	1.99	5.65
2890	-1.75	-5.38	-0.19	6.26	1.72	6.39
2900	-1.47	-5.48	-0.02	5.72	0.01	5.87
2910	-1.56	-5.39	-0.05	5.26	0.62	5.35
2920	-1.42	-5.16	0.11	6.84	1.02	7.02
2930	-1.27	-5.04	0.25	7.70	1.88	7.86
2940	-1.54	-5.15	0.03	6.96	1.92	7.04
2950	-1.50	-5.24	0.03	6.86	2.35	6.98
2960	-1.75	-5.45	-0.21	6.46	3.90	6.59
2970	-1.48	-5.38	0.00	6.80	2.21	6.89
2980	-1.59	-5.50	-0.11	6.42	1.79	6.61
2990	-1.16	-5.19	0.28	6.39	1.62	6.50
3000	-1.16	-4.97	0.35	7.39	2.89	7.49
3010	-1.16	-5.16	0.30	6.64	2.30	6.89
3020	-1.09	-4.95	0.40	7.16	1.74	7.34
3030	-1.21	-4.81	0.36	7.24	3.16	7.27
3040	-1.30	-5.17	0.20	5.75	2.49	5.99
3050	-1.12	-5.17	0.32	6.23	2.33	6.36
3060	-1.46	-5.27	0.05	5.40	2.00	5.44
3070	-1.55	-5.28	-0.02	4.81	1.72	5.05
3080	-1.22	-5.36	0.20	5.44	0.94	5.74

3090	-1.22	-5.02	0.30	5.45	2.12	5.71
3100	-1.18	-4.91	0.35	5.58	2.67	5.90
3110	-1.37	-4.98	0.20	6.43	2.15	6.46
3120	-1.62	-4.88	0.06	5.91	3.71	5.94
3130	-2.23	-4.96	-0.37	6.17	3.41	6.40
3140	-2.26	-4.86	-0.35	4.81	2.88	5.55
3150	-1.95	-4.48	-0.02	4.42	3.61	5.70
3160	-1.61	-4.04	0.35	5.94	3.61	6.98
3170	-1.41	-4.00	0.50	4.88	3.34	6.50
3180	-0.94	-3.44	1.00	6.52	5.16	6.74
3190	-1.16	-3.73	0.75	5.64	3.85	6.38
3200	-0.92	-3.67	0.93	6.08	4.41	6.72
3210	-1.25	-4.03	0.59	4.96	3.86	5.50
3220	-1.69	-4.51	0.14	5.26	2.60	5.60
3230	-1.99	-4.98	-0.23	4.98	2.51	5.75
3240	-2.14	-5.09	-0.36	5.51	3.15	6.10
3250	-2.07	-4.91	-0.25	6.14	3.09	6.31
3260	-1.70	-4.66	0.08	6.94	3.84	7.03
3270	-1.21	-4.39	0.50	6.93	3.34	7.16
3280	-1.09	-4.18	0.65	7.73	3.40	7.81
3290	-0.93	-4.06	0.79	7.81	4.57	7.95
3300	-1.06	-4.22	0.65	7.34	3.50	7.45
3310	-1.27	-4.53	0.41	7.33	3.30	7.36
3320	-1.45	-4.39	0.33	6.73	5.18	6.76
3330	-1.68	-4.25	0.23	6.99	4.60	7.05
3340	-2.31	-4.87	-0.39	5.84	4.07	5.92
3350	-2.26	-4.79	-0.33	5.54	3.01	5.83
3360	-2.43	-4.98	-0.51	5.63	2.95	5.76
3370	-2.23	-4.96	-0.38	5.65	2.68	5.71
3380	-2.03	-4.73	-0.16	6.05	2.77	6.09
3390	-1.56	-4.40	0.26	5.74	2.73	5.79
3400	-1.55	-4.34	0.29	5.44	3.16	5.62
3410	-1.20	-3.97	0.64	5.69	3.20	5.97
3420	-1.31	-4.18	0.50	5.78	3.37	6.29
3430	-1.65	-4.53	0.15	4.62	2.15	5.47
3440	-2.57	-5.28	-0.70	3.11	2.05	4.65
3450	-2.42	-5.32	-0.62	4.66	1.86	5.60
3460	-2.10	-4.98	-0.29	4.61	2.53	5.06
3470	-2.85	-5.41	-0.93	3.93	1.90	4.24
3480	-2.37	-5.08	-0.50	3.49	3.04	4.53
3490	-2.14	-4.71	-0.23	5.95	3.96	6.22
3500	-1.99	-4.52	-0.07	6.41	2.57	6.64
3510	-1.62	-4.17	0.30	5.49	3.55	5.62
3520	-1.77	-3.93	0.29	5.90	3.51	6.06
3530	-2.05	-4.16	0.03	7.23	3.59	7.32
3540	-1.78	-4.27	0.16	6.67	3.17	6.76
3550	-1.97	-4.37	0.00	6.19	3.05	6.34
3560	-2.73	-4.95	-0.69	5.06	3.02	5.21
3570	-2.65	-4.99	-0.65	4.53	3.03	4.83
3580	-2.66	-4.72	-0.55	5.03	2.15	5.26
3590	-2.68	-4.46	-0.47	4.82	2.54	4.99
3600	-2.50	-4.42	-0.35	3.81	2.86	5.10
3610	-2.36	-4.52	-0.30	3.69	2.45	4.46
3620	-2.84	-4.56	-0.60	4.03	2.90	5.08
3630	-2.30	-4.57	-0.28	4.06	2.23	4.53
3640	-2.34	-4.82	-0.40	4.08	2.43	4.51
3650	-2.40	-5.16	-0.55	4.40	1.73	5.09
3660	-2.34	-5.32	-0.57	4.83	1.37	5.07
3670	-2.17	-5.18	-0.41	5.06	1.98	5.31
3680	-2.36	-5.05	-0.49	4.38	1.92	4.59
3690	-2.59	-5.34	-0.74	4.25	1.79	4.88
3700	-2.51	-5.22	-0.65	5.59	1.86	6.39
3710	-2.63	-5.59	-0.85	5.05	1.48	5.68

3720	-2.78	-5.68	-0.98	4.44	0.73	5.24
3730	-2.40	-5.29	-0.60	4.74	2.22	5.31
3740	-2.50	-5.24	-0.65	3.62	2.04	4.85
3750	-2.17	-5.34	-0.46	4.92	1.57	5.18
3760	-2.33	-5.34	-0.57	4.48	1.98	4.82
3770	-2.17	-5.32	-0.45	5.21	1.46	5.62
3780	-2.59	-5.40	-0.76	4.59	1.75	5.04
3790	-2.13	-4.84	-0.27	5.19	0.90	5.67
3800	-2.55	-5.26	-0.69	4.62	1.21	5.13
3810	-2.12	-4.90	-0.28	4.59	1.67	5.17
3820	-2.82	-5.37	-0.90	3.48	0.95	4.15
3830	-2.79	-5.40	-0.89	4.47	0.89	4.76
3840	-2.60	-5.25	-0.72	4.29	1.58	4.93
3850	-2.82	-5.43	-0.92	4.76	1.94	5.23
3860	-2.76	-5.50	-0.91	4.16	1.97	4.88
3870	-2.63	-5.63	-0.86	5.67	2.11	5.96
3880	-2.68	-5.79	-0.95	4.97	1.79	5.52
3890	-2.50	-5.51	-0.74	5.58	2.38	5.91
3900	-2.29	-5.47	-0.59	6.06	1.58	6.43
3910	-2.70	-5.80	-0.97	4.66	1.23	4.89
3920	-2.09	-5.39	-0.43	5.16	1.41	5.31
3930	-2.25	-5.63	-0.61	5.00	1.79	5.24
3940	-1.96	-5.36	-0.33	5.29	1.12	5.74
3950	-2.50	-5.87	-0.86	4.99	1.08	5.16
3960	-2.10	-5.64	-0.51	5.35	1.88	5.93
3970	-2.54	-5.94	-0.91	5.44	1.89	5.64
3980	-2.13	-5.85	-0.59	6.01	0.86	6.35
3990	-1.85	-6.05	-0.45	5.76	1.32	6.29
4000	-2.08	-6.07	-0.62	6.16	1.01	6.72
4010	-1.97	-5.82	-0.47	6.27	0.63	6.77
4020	-1.87	-5.64	-0.35	5.69	1.73	6.08
4030	-1.76	-5.77	-0.31	6.20	-0.10	6.51
4040	-1.62	-5.57	-0.15	6.45	0.01	6.76
4050	-1.94	-5.54	-0.36	5.66	1.34	6.03
4060	-1.83	-5.45	-0.26	6.13	1.35	6.65
4070	-2.07	-5.74	-0.52	5.84	2.13	6.43
4080	-1.77	-5.29	-0.17	5.54	1.84	6.04
4090	-2.15	-5.72	-0.57	5.57	1.58	6.15
4100	-1.56	-4.97	0.08	6.63	3.47	7.13
4110	-2.10	-5.67	-0.52	5.77	2.13	6.65
4120	-1.71	-5.53	-0.20	6.52	2.49	6.93
4130	-2.70	-6.44	-1.17	5.77	1.43	6.34
4140	-2.08	-5.83	-0.55	7.49	1.46	7.90
4150	-3.26	-7.22	-1.79	5.18	-0.33	5.76
4160	-2.71	-6.35	-1.15	5.66	0.74	6.28
4170	-2.69	-6.38	-1.14	5.55	0.32	5.86
4180	-2.97	-6.34	-1.33	5.46	0.42	5.83
4190	-2.55	-6.00	-0.94	5.96	-0.25	6.31
4200	-2.29	-5.93	-0.73	7.02	1.12	7.27
4210	-2.36	-5.92	-0.77	6.07	0.49	6.74
4220	-2.47	-6.33	-0.98	7.33	0.40	7.73
4230	-2.15	-5.98	-0.65	7.26	1.32	7.55
4240	-2.53	-6.44	-1.05	6.20	0.67	6.82
4250	-2.38	-6.19	-0.87	6.25	1.03	6.74
4260	-3.04	-6.75	-1.50	4.77	0.91	5.17
4270	-2.82	-6.21	-1.18	5.34	1.51	5.98
4280	-3.46	-6.50	-1.71	4.43	0.59	5.04
4290	-2.74	-5.62	-0.94	5.12	2.14	5.73
4300	-3.08	-5.83	-1.23	4.89	2.48	5.81
4310	-2.68	-5.74	-0.94	4.97	1.78	5.89
4320	-2.68	-5.83	-0.97	5.12	1.15	5.75
4330	-2.74	-5.95	-1.05	4.90	1.55	5.84
4340	-3.15	-6.18	-1.39	5.03	0.77	5.65

4350	-3.04	-5.87	-1.22	5.40	0.50	5.92
4360	-3.67	-6.50	-1.85	4.71	1.44	6.06
4370	-2.74	-5.19	-0.79	6.04	2.38	6.76
4380	-3.36	-5.72	-1.37	5.06	0.78	5.87
4390	-3.09	-5.51	-1.13	5.59	0.41	6.64
4400	-3.42	-5.98	-1.51	4.88	0.30	6.09
4410	-3.20	-6.10	-1.41	4.31	1.05	5.21
4420	-3.44	-6.32	-1.63	4.28	0.02	5.10
4430	-3.02	-5.75	-1.16	5.22	0.84	6.26
4440	-3.44	-5.91	-1.49	3.64	1.13	5.12
4450	-3.04	-5.47	-1.08	4.57	1.65	5.57
4460	-3.16	-5.55	-1.18	4.71	1.27	5.82
4470	-3.12	-5.42	-1.11	4.47	2.59	6.38
4480	-2.94	-5.40	-0.99	5.04	2.75	6.56
4490	-3.73	-5.77	-1.62	4.39	1.77	5.40
4500	-3.26	-5.37	-1.18	5.04	2.01	5.78
4510	-3.89	-6.04	-1.83	4.60	1.16	5.19
4520	-3.20	-5.46	-1.17	4.94	1.87	5.95
4530	-3.29	-5.64	-1.30	5.29	1.45	5.85
4540	-2.74	-5.04	-0.73	5.87	3.03	6.78
4550	-2.94	-5.39	-0.98	5.00	2.85	6.34
4560	-2.67	-5.24	-0.76	5.42	2.52	5.92
4570	-2.91	-5.41	-0.97	5.32	1.49	5.92
4580	-2.93	-5.39	-0.98	5.32	1.66	6.76
4590	-2.91	-5.43	-0.98	5.89	1.46	6.48
4600	-3.41	-5.67	-1.39	5.00	0.91	5.56
4610	-2.74	-4.95	-0.69	5.08	2.04	6.14
4620	-3.72	-5.89	-1.66	5.11	0.55	5.67
4630	-2.73	-5.10	-0.74	6.06	1.42	6.78
4640	-3.28	-5.47	-1.23	5.57	2.64	6.25
4650	-3.00	-5.13	-0.92	5.84	1.91	6.51
4660	-3.62	-5.51	-1.45	4.69	1.10	5.25
4670	-3.49	-5.29	-1.29	4.50	1.85	5.54
4680	-3.31	-4.91	-1.03	4.92	1.67	5.91
4690	-3.69	-5.30	-1.41	4.29	2.04	5.41
4700	-2.66	-4.52	-0.48	5.20	2.45	6.34
4710	-3.44	-5.48	-1.33	3.70	1.36	5.12
4720	-2.33	-4.50	-0.27	5.47	3.37	6.37
4730	-3.69	-5.70	-1.57	3.56	1.34	4.93
4740	-2.68	-5.08	-0.71	4.66	1.69	5.47
4750	-3.46	-5.72	-1.44	3.84	1.71	4.83
4760	-2.88	-5.04	-0.82	4.99	2.95	5.26
4770	-3.40	-5.39	-1.27	4.38	1.86	4.87
4780	-2.99	-4.87	-0.82	5.33	2.61	5.68
4790	-3.49	-5.22	-1.26	4.86	1.80	5.33
4800	-3.18	-5.07	-1.01	4.93	2.58	5.37
4810	-3.32	-4.77	-0.98	4.63	1.63	5.13
4820	-3.04	-4.75	-0.80	5.15	1.73	5.50
4830	-3.10	-4.52	-0.74	5.43	3.24	5.88
4840	-3.35	-4.96	-1.07	4.61	2.98	4.95
4850	-3.09	-4.72	-0.82	5.05	2.34	6.22
4860	-3.44	-4.96	-1.12	4.99	2.85	6.05
4870	-3.25	-4.59	-0.86	4.30	2.92	5.43
4880	-3.12	-4.43	-0.72	5.03	2.85	5.73
4890	-3.04	-4.18	-0.56	5.03	3.61	5.74
4900	-3.18	-4.23	-0.67	4.98	2.87	5.42
4910	-3.41	-4.35	-0.84	4.07	1.99	4.97
4920	-3.95	-4.76	-1.32	3.95	1.97	4.78
4930	-3.75	-4.49	-1.10	3.68	2.83	5.00
4940	-4.37	-5.21	-1.76	3.65	1.40	4.46
4950	-3.89	-4.71	-1.27	3.48	1.82	4.94
4960	-3.95	-4.95	-1.41	3.06	3.54	4.56
4970	-3.68	-4.93	-1.25	3.69	2.85	5.16

4980	-4.05	-5.60	-1.74	2.49	1.32	3.52
4990	-2.89	-4.60	-0.65	4.88	2.35	5.41
5000	-3.92	-5.50	-1.63	4.14	1.17	4.66

LTE3 antenna

certification report LTE / eCall antenna

Audi part number	Laird part number	description
4M0 035 504	9 40 08	ecall antenna

manufacturer

Jebsee Electronics Shenzhen Co., Ltd.
NO166, Hang Cheng RD,
Hang Cheng Street,
Baoan Zone,
ShenZhen City,
Postal Code: 518102
PR CHINA

supplier

Laird Hildesheim GmbH
Daimlerring 31
31135 Hildesheim
Deutschland

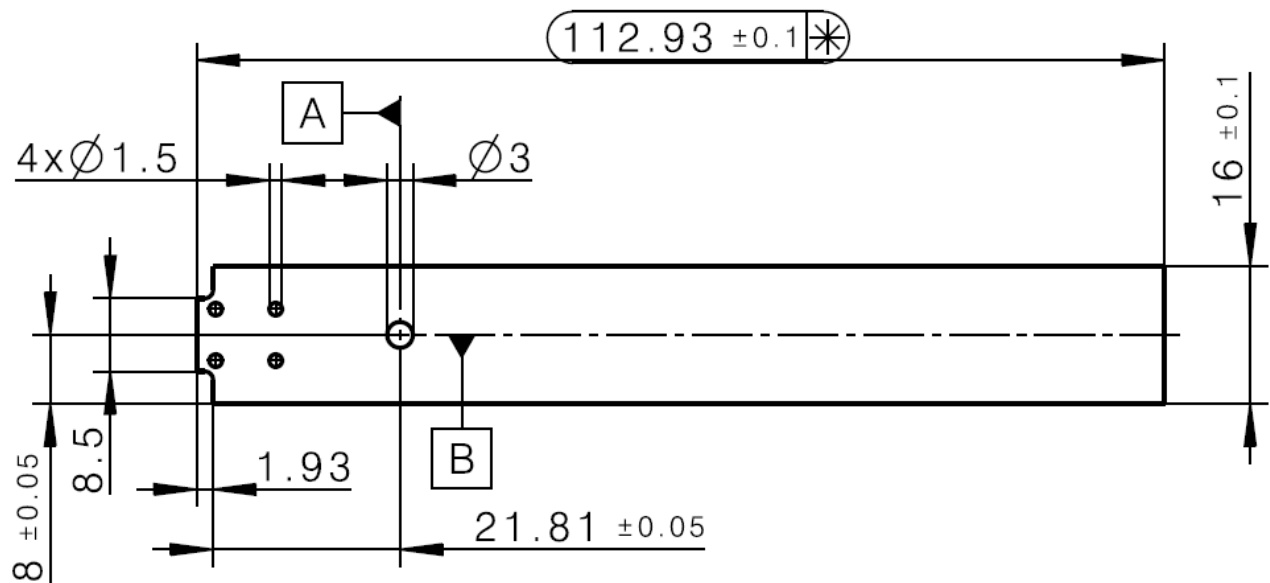
changes

version	author	date
A0	Nima Kiaei-Lochte	21.09.2018

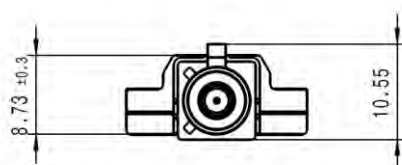
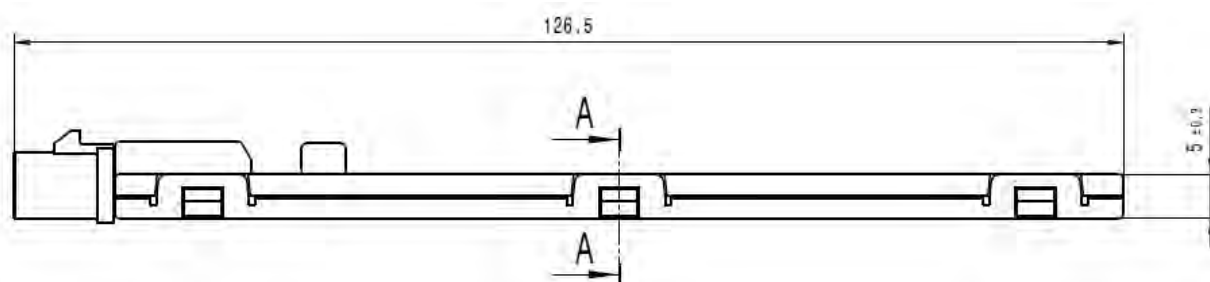
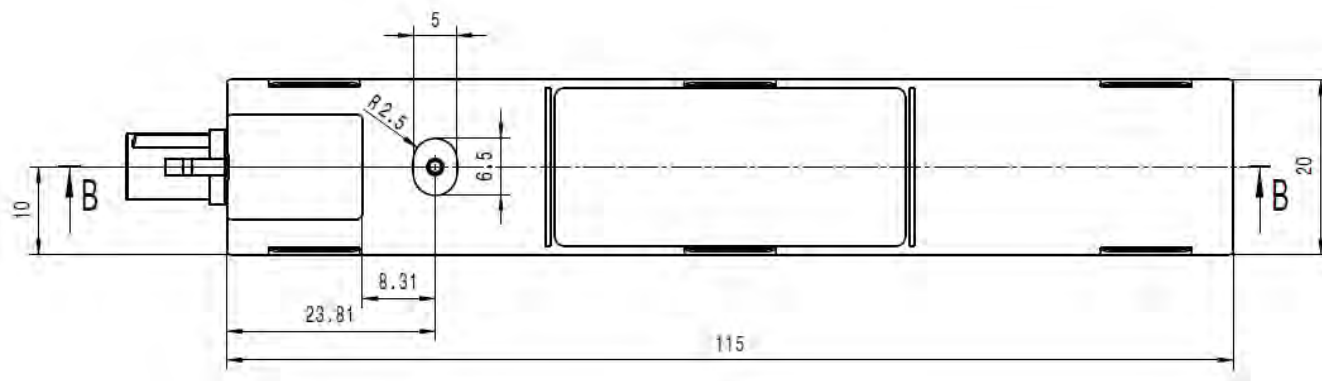
Contents

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supplier	1
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dimensions component	3
antenna electrical characteristics	4
antenna peak values	5

dimensions antenna itself



dimensions component



antenna electrical characteristics

free air mount, distance to ground min. 10mm

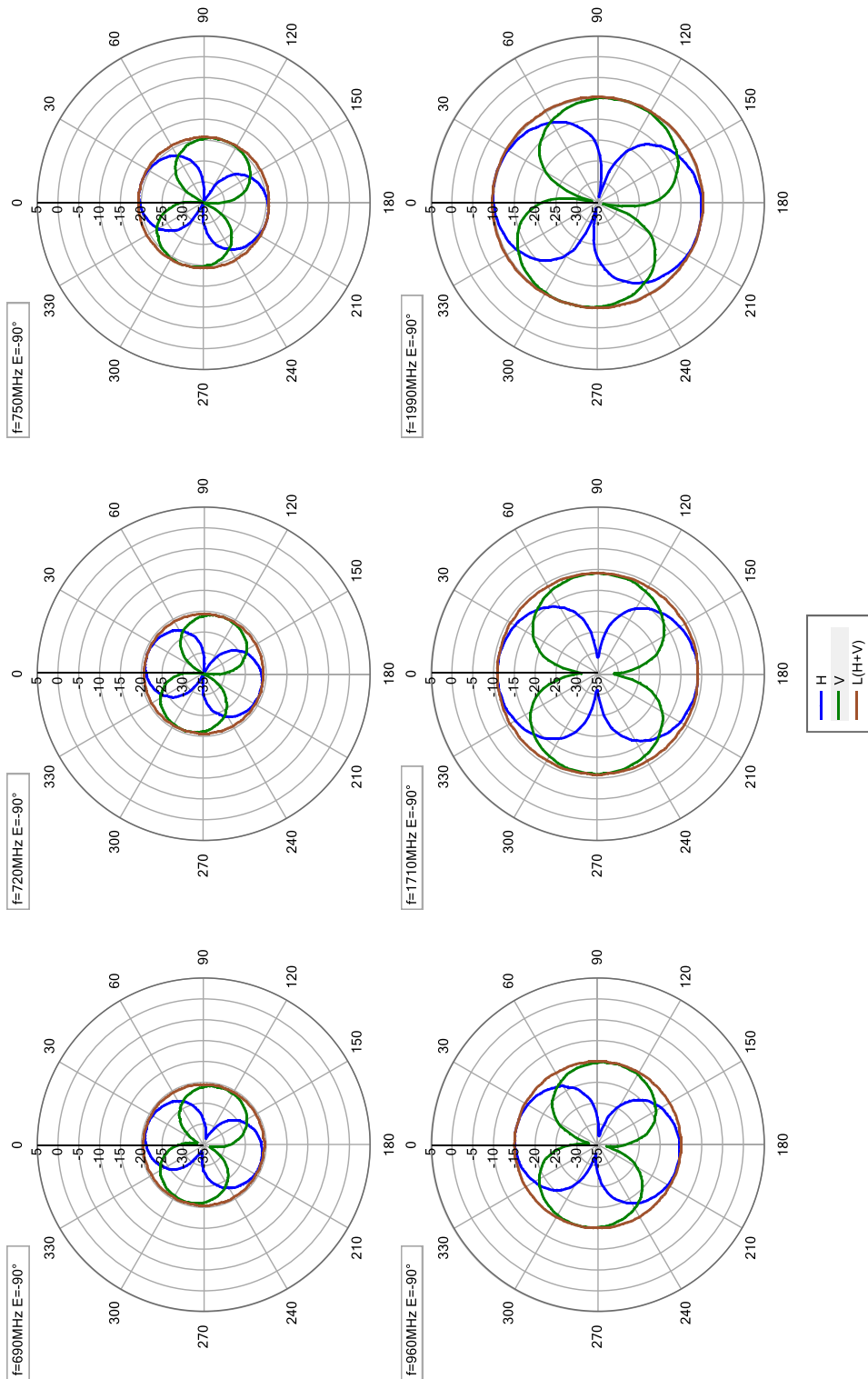
Technische Daten / Technical Data

Frequenzbereich / <i>Frequency Range</i>	698 – 2690 MHz
Impedanz / <i>Impedance</i>	50Ω
Gewinn / <i>Gain</i>	2dB
Max. Gewinn / <i>Peak Gain</i>	2,86dBi
Belastbarkeit / <i>Max. Power</i>	10W gepulst / <i>pulsed</i>
Dimensionen der Antenne / <i>Dimensions of Antenna</i>	126,50 x 20,00 x 10,55mm
Anschluss / <i>Connector</i>	Fakra Kodierung D / <i>code D</i>

Polar Plot Horizontal Cut

Polar Plot Horizontal Cut

Antenna: eCall LTE antenna



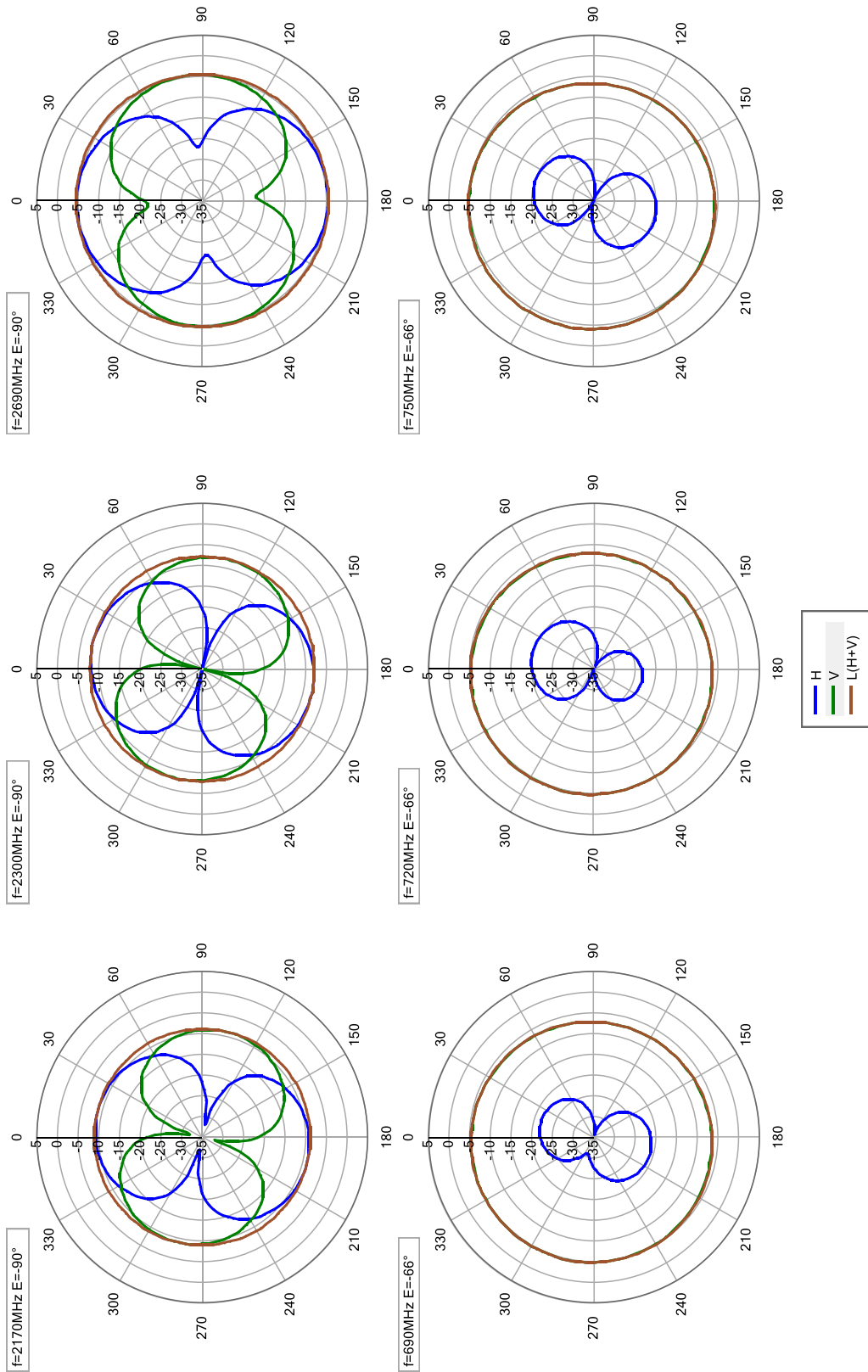
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Figure 1 - eCall LTE antenna, Polar Plot Horizontal Cut, E=-90°

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



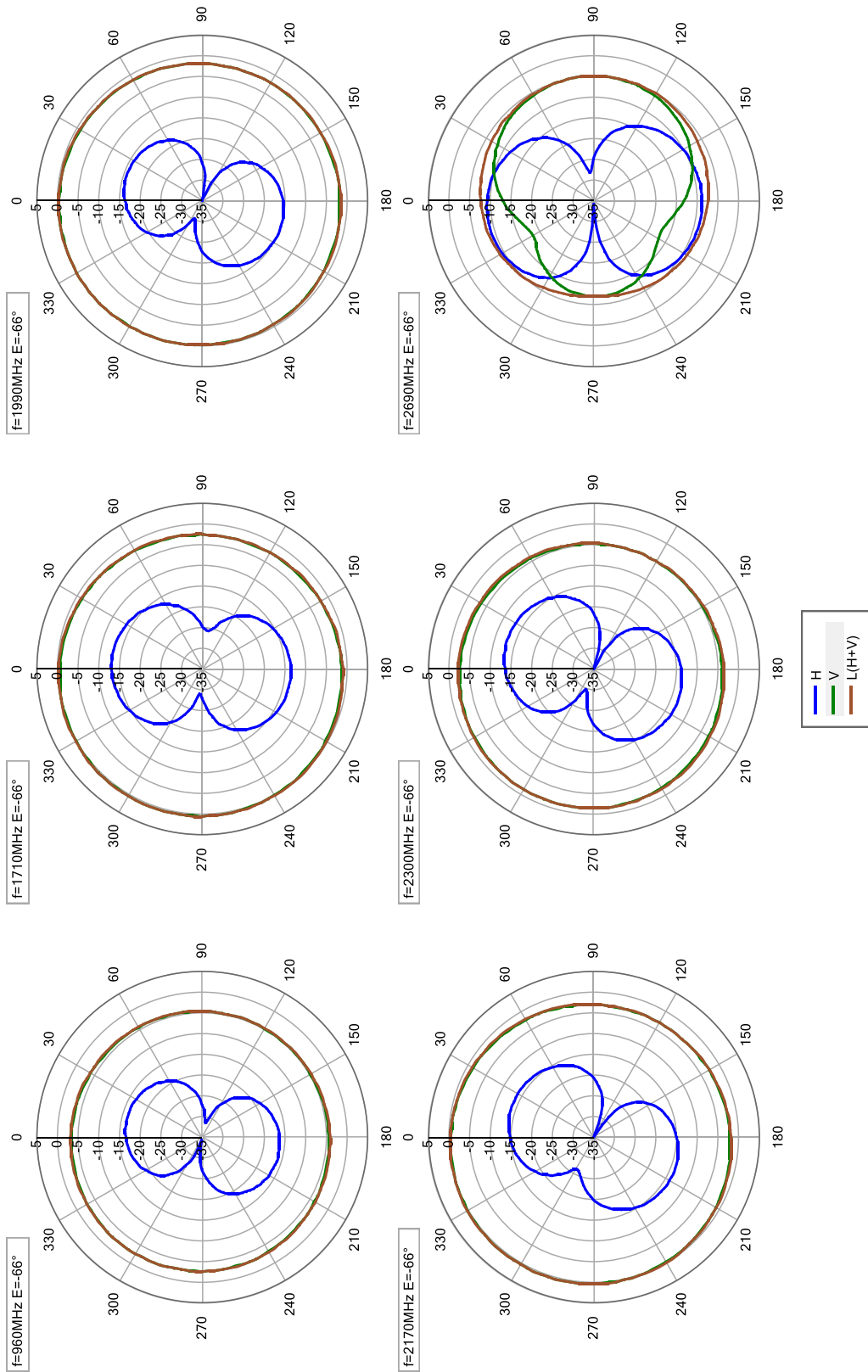
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Figure 2 - eCall LTE antenna, Polar Plot Horizontal Cut

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



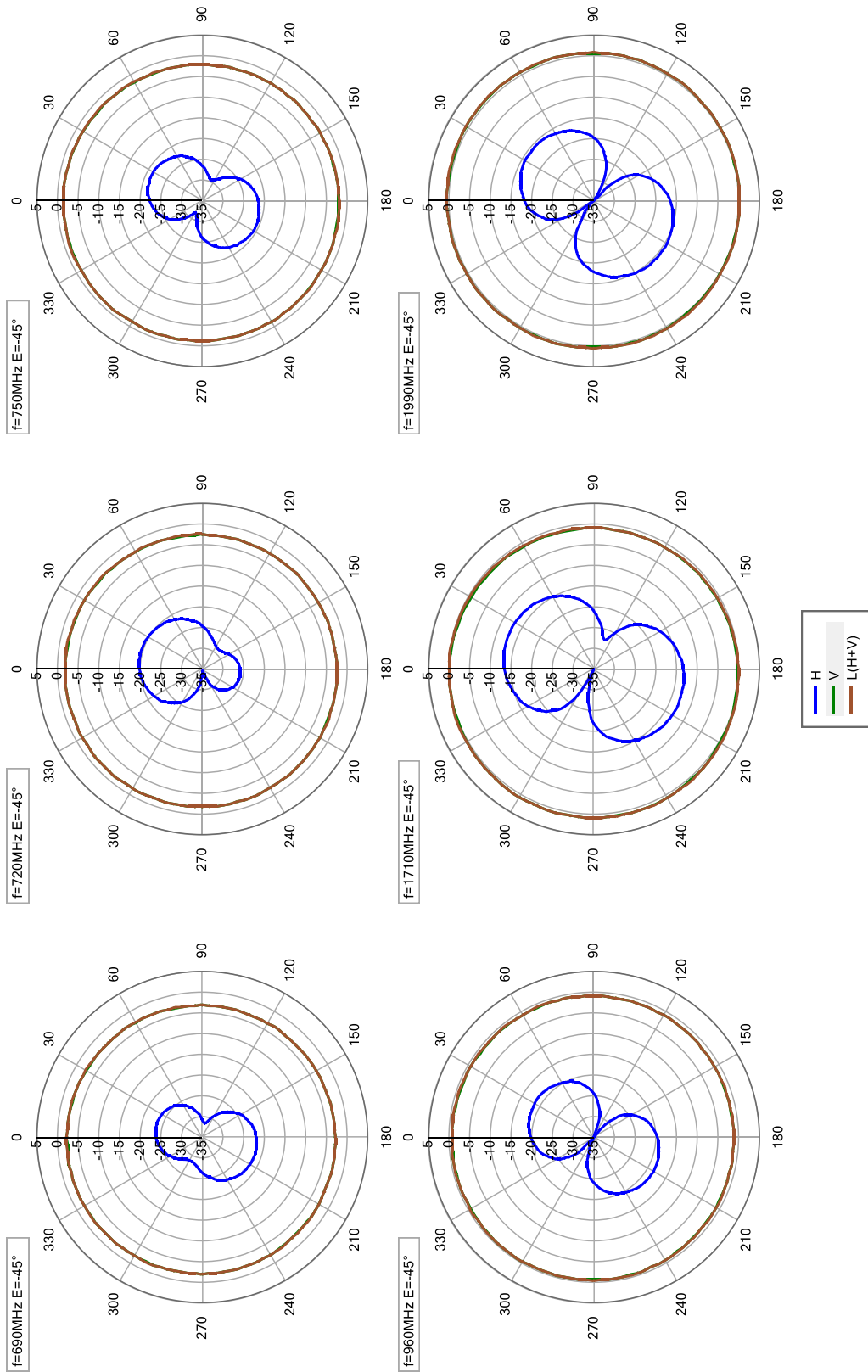
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Figure 3 - eCall LTE antenna, Polar Plot Horizontal Cut, E=-66°

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



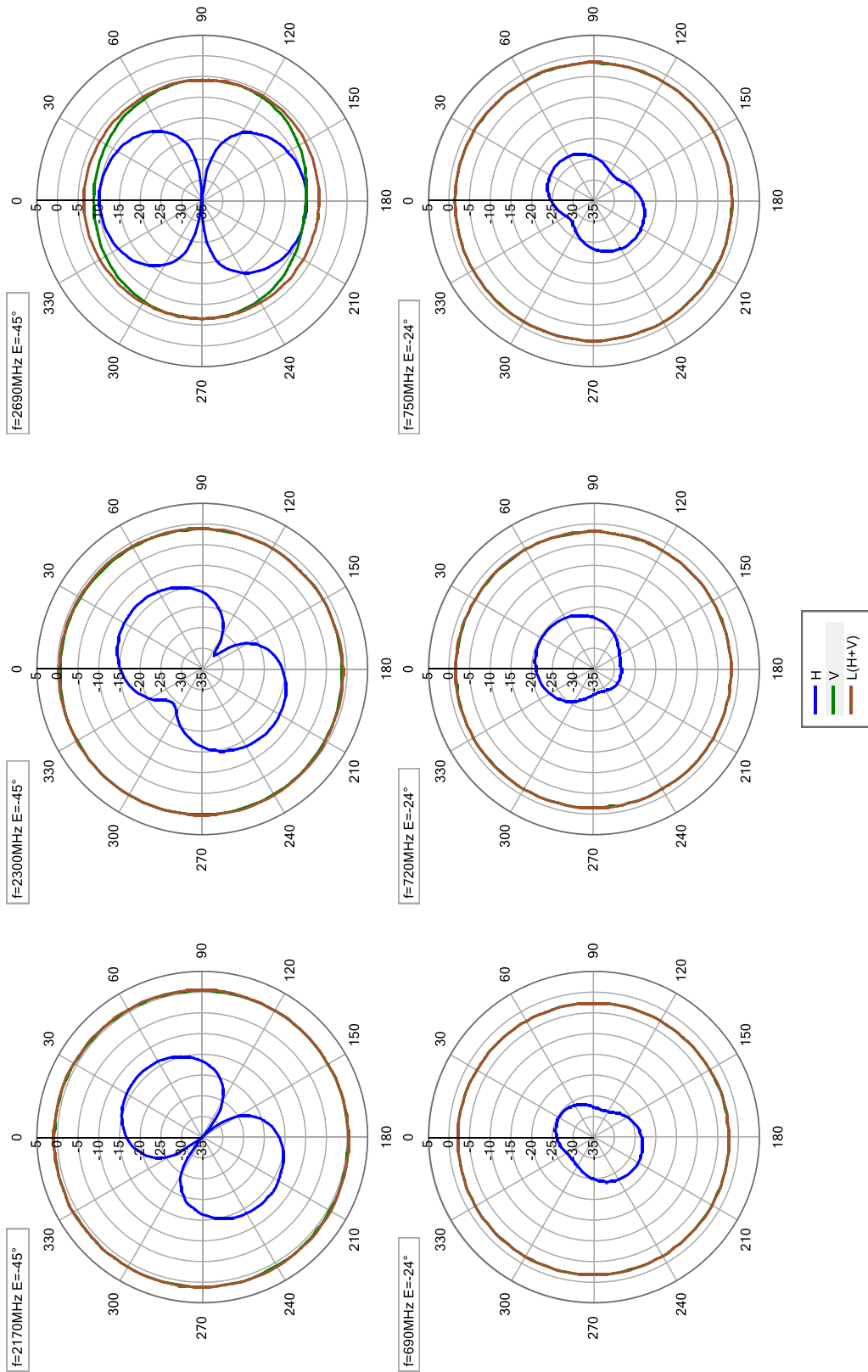
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Figure 4 - eCall LTE antenna, Polar Plot Horizontal Cut, E=-45°

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



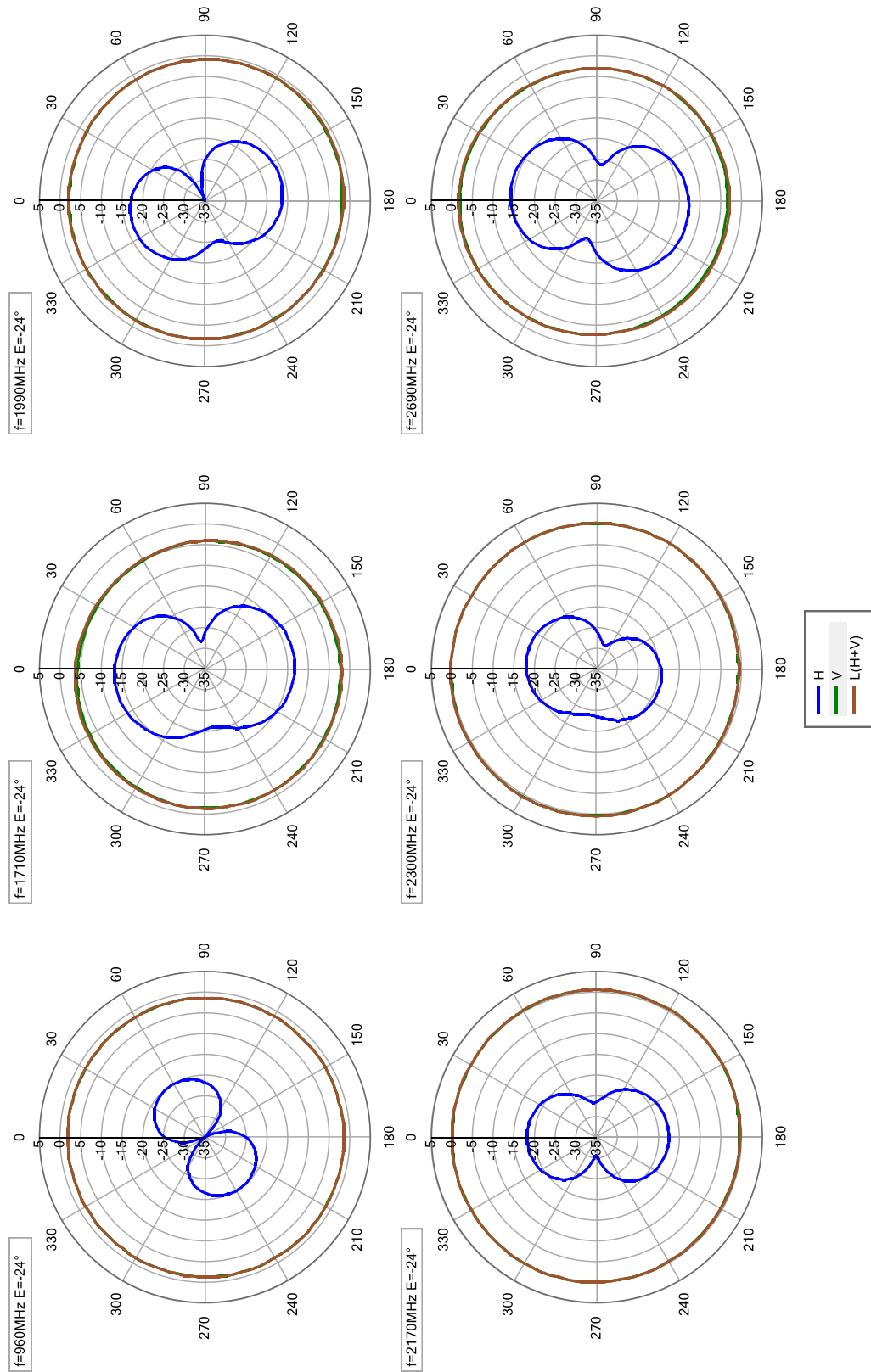
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Figure 5 - eCall LTE antenna, Polar Plot Horizontal Cut

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



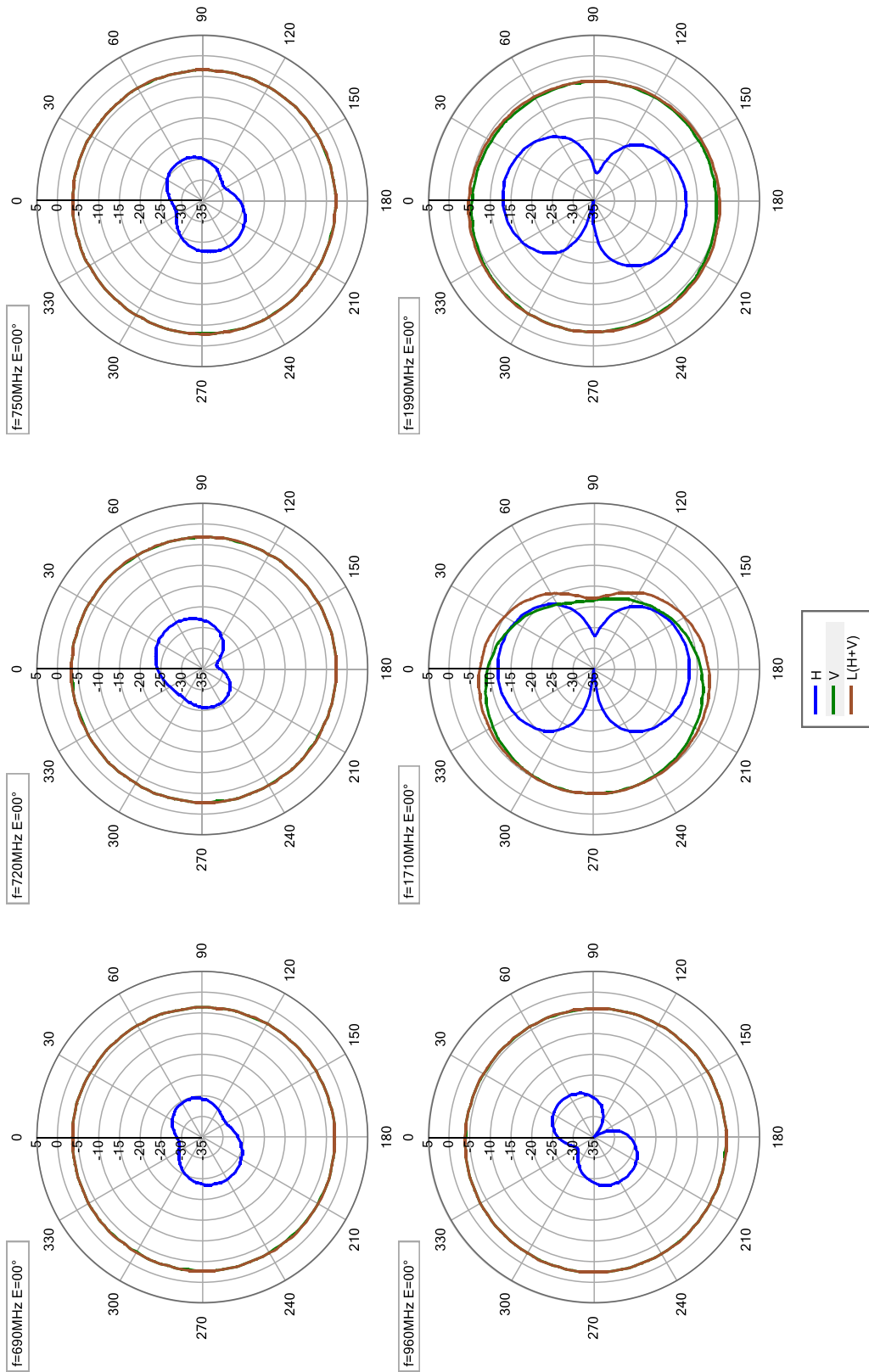
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Figure 6 - eCall LTE antenna, Polar Plot Horizontal Cut, $E=-24^\circ$

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



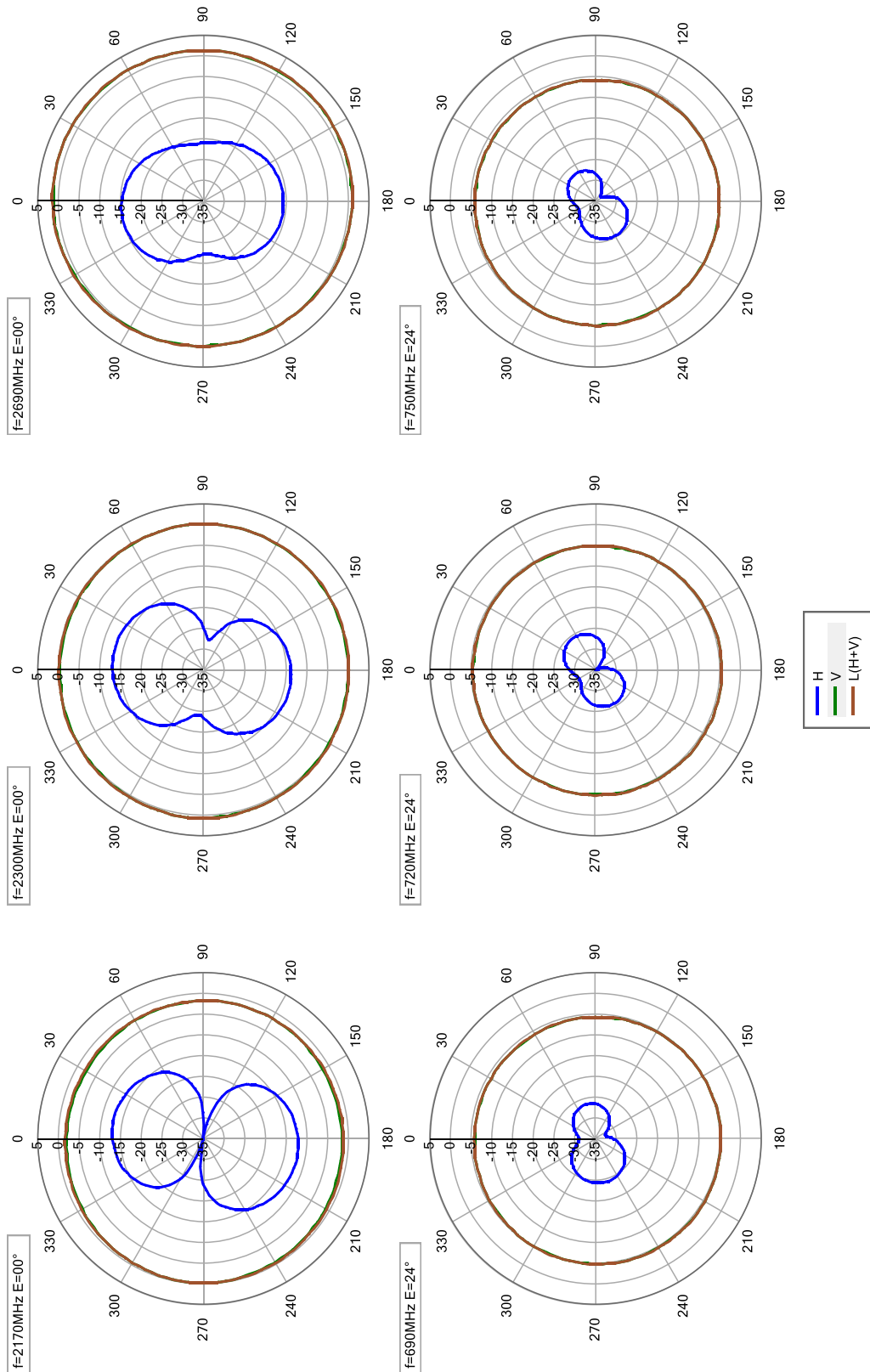
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Figure 7 - eCall LTE antenna, Polar Plot Horizontal Cut, E=0°

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



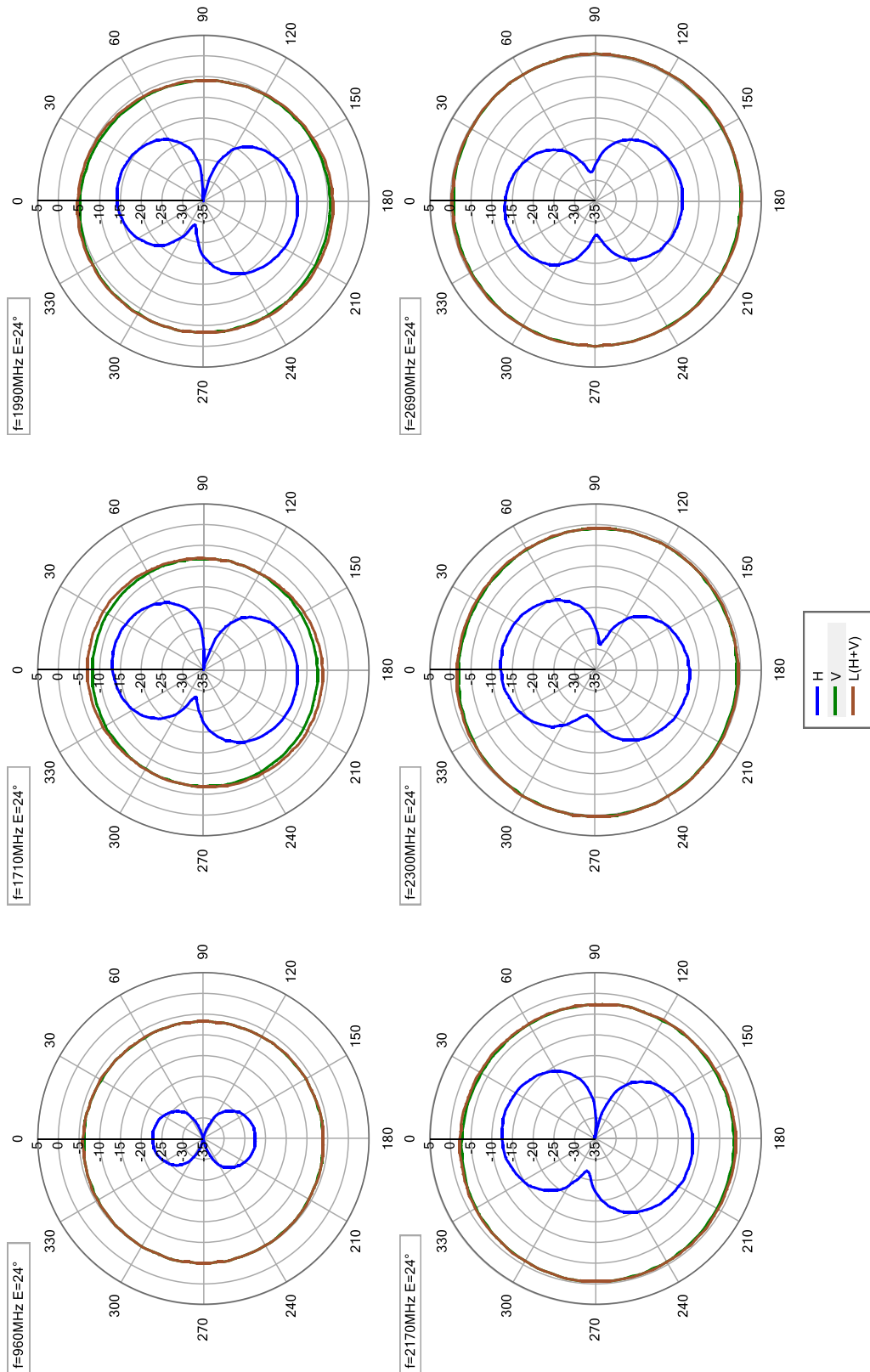
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Figure 8 - eCall LTE antenna, Polar Plot Horizontal Cut

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



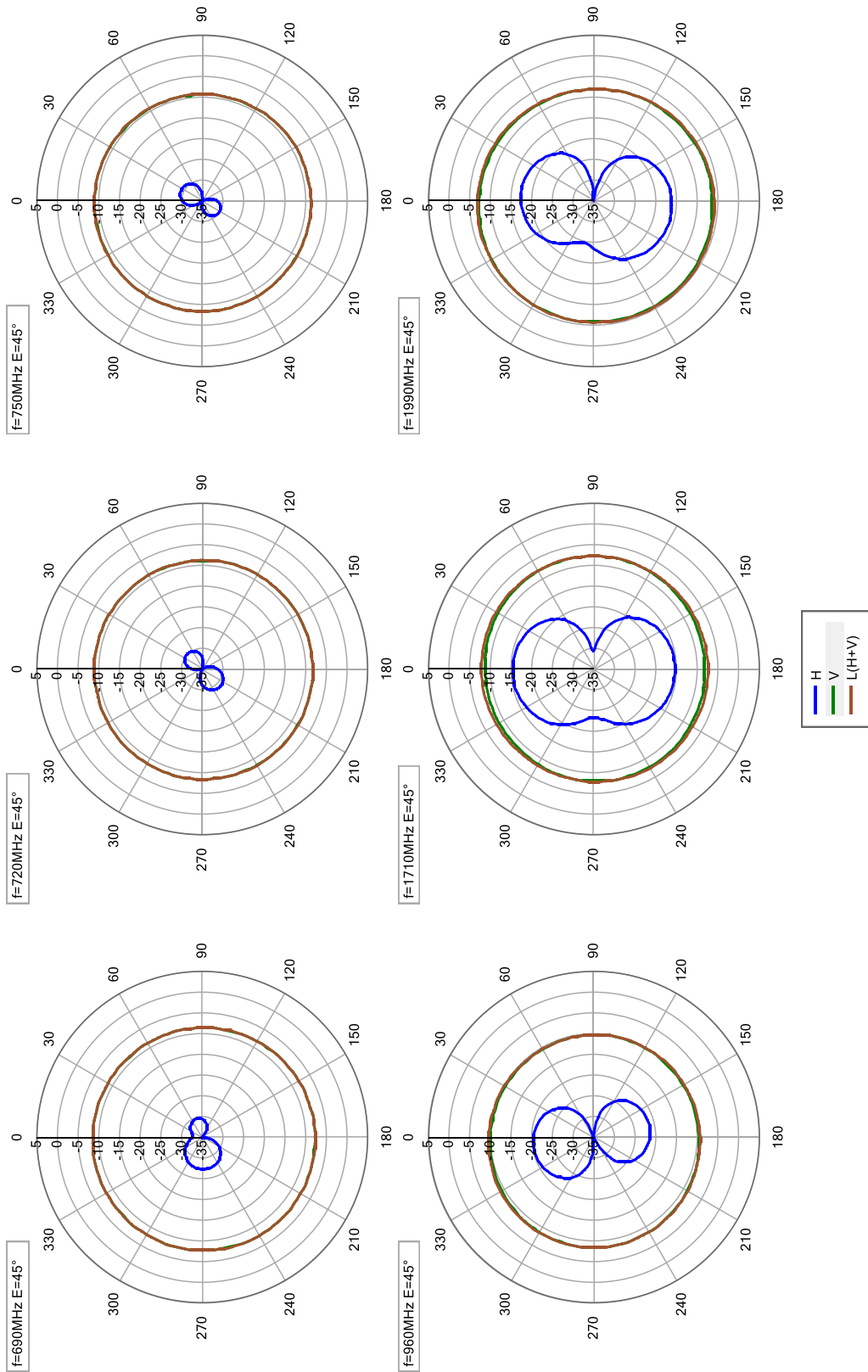
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Figure 9 - eCall LTE antenna, Polar Plot Horizontal Cut, E=24°

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



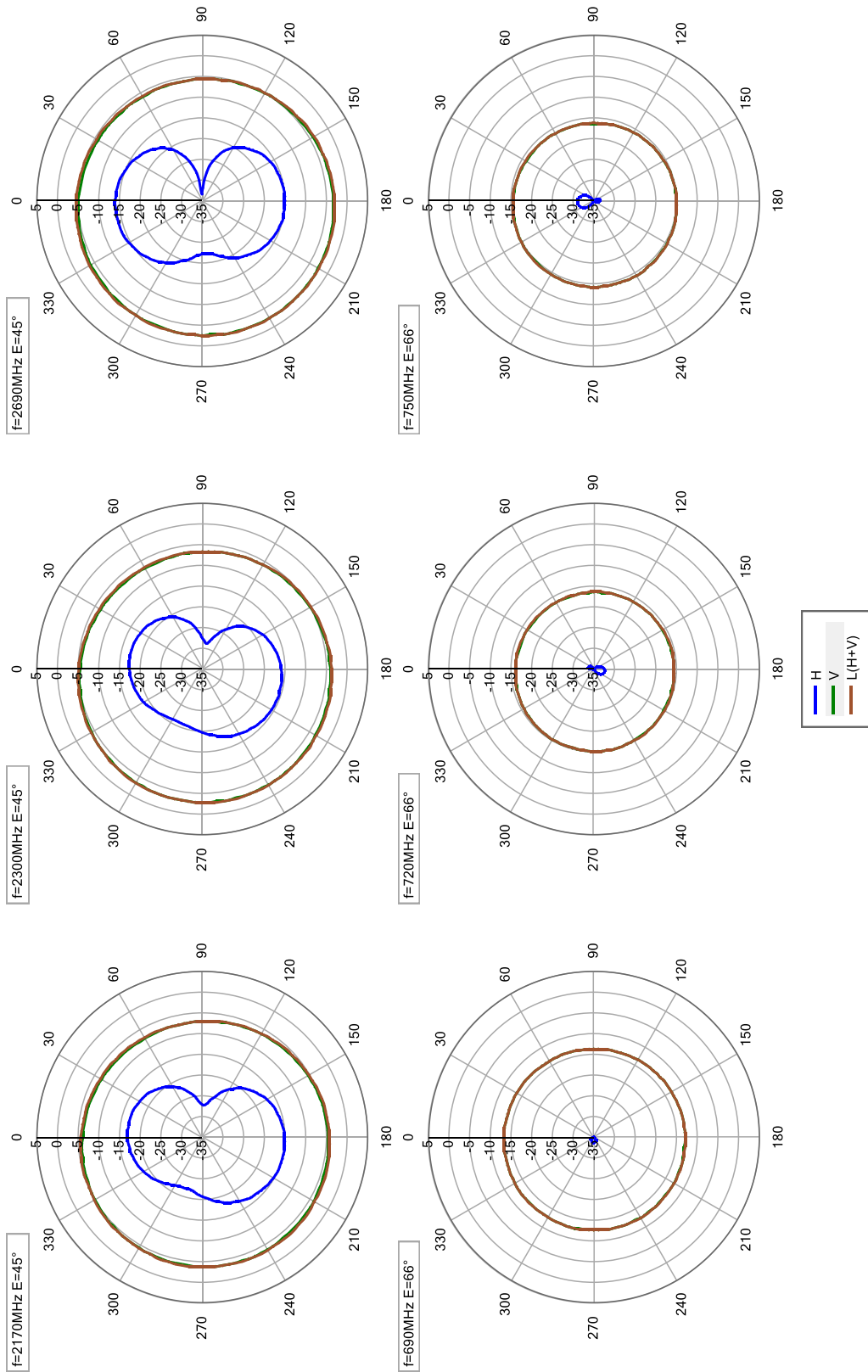
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Figure 10 - eCall LTE antenna, Polar Plot Horizontal Cut, $E=45^\circ$

Polar Plot Horizontal Cut

Antenna:eCall LTE antenna



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Figure 11 - eCall LTE antenna, Polar Plot Horizontal Cut