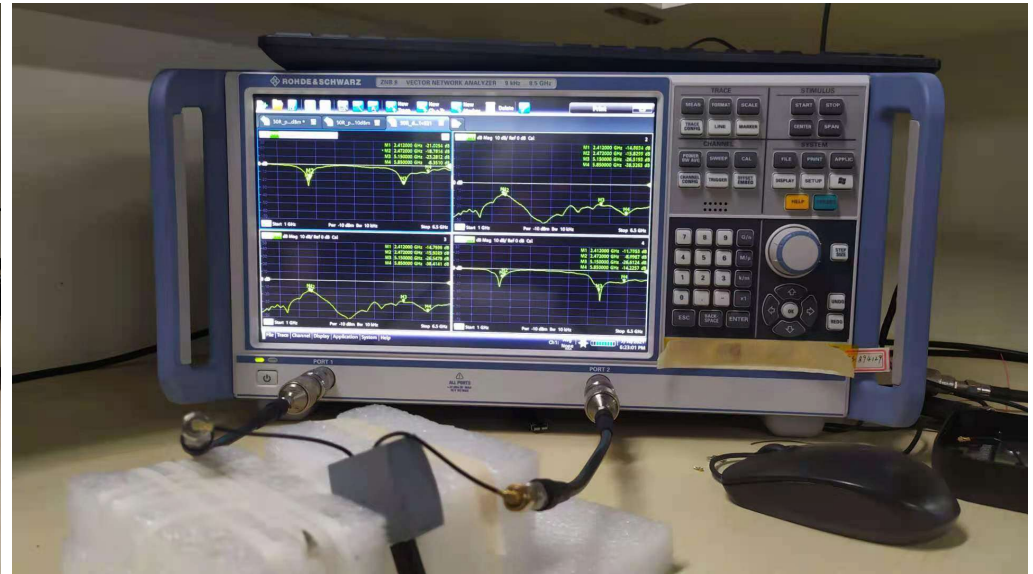
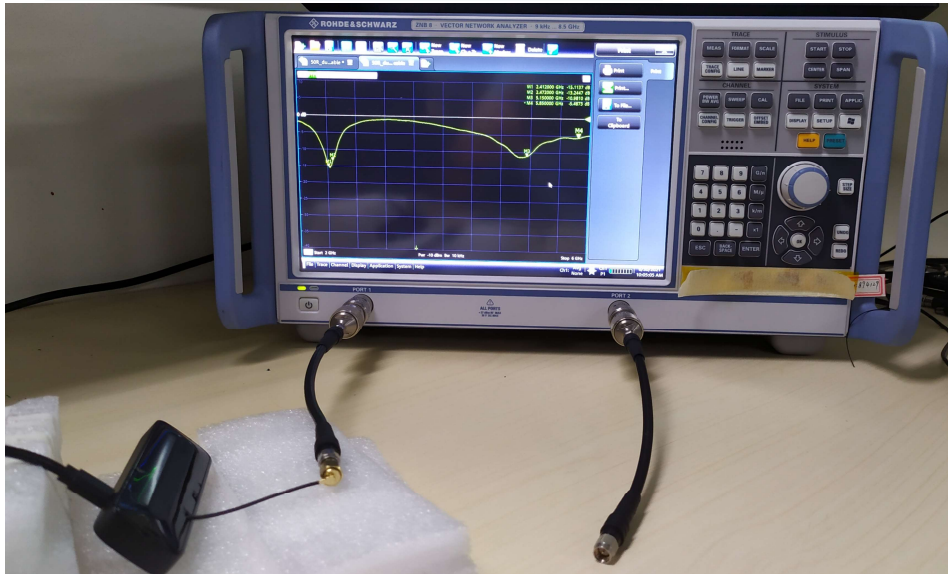


Antenna specifications



HP46D Antenna OTA Passive Test

Passive S-parameter test environment:



Note:

1. This test uses the latest design optimized PCB, the test uses RF Cable length of 7cm; according to the actual use scene with USB Cable;
2. ANT1 is the antenna on the bottom of the PCB, and ANT2 is the antenna on the left side (Micro USB port side) of the PCB;

Test Conclusion:

1. The return loss (S11) of ANT1 in the 2.4GHz band is less than -14.5dB, and in the 5GHz bands is less than -9.5dB;
2. The return loss (S11) of ANT2 in the 2.4GHz band is less than -19.8dB, and in the 5GHz bands, it is less than -6.6dB;
3. The isolation of ANT1 and ANT2 (S21) is better than -15.0dB in the 2.4GHz band and better than -25.5dB in the 5GHz bands;
4. The efficiency of ANT1 is about 53% in the 2.4GHz band and more than 58% in the 5GHz band.
5. The efficiency of ANT2 is between 56% and 61% in the 2.4 GHz band, greater than 51% in the 5150 GHz to 5650 GHz range, with an average of more than 60%, and between 38% and 43% in the high-frequency range of 5700 GHz to 5850 GHz.

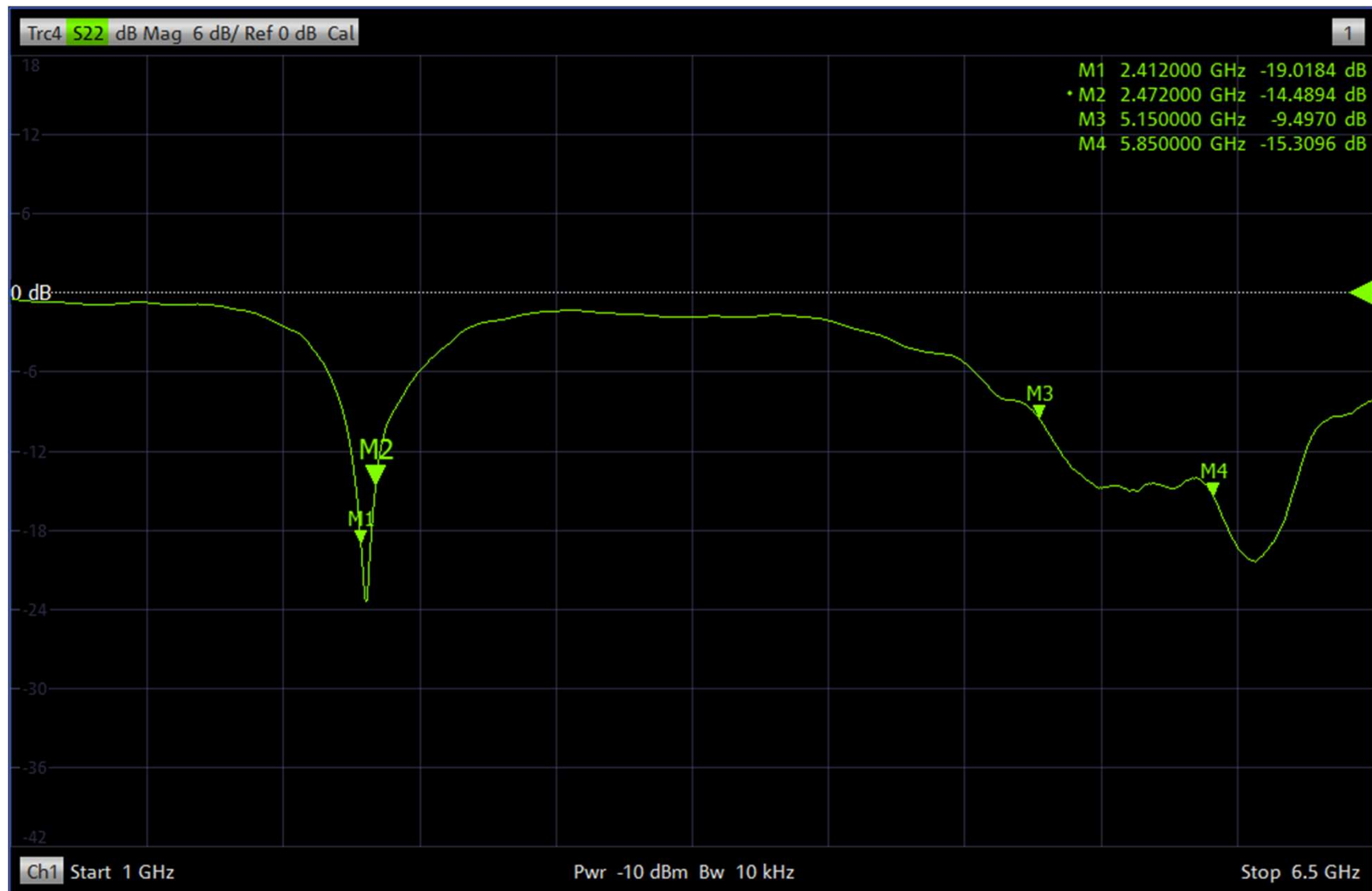
Antenna OTA Passive Testing

OTA testing environment:



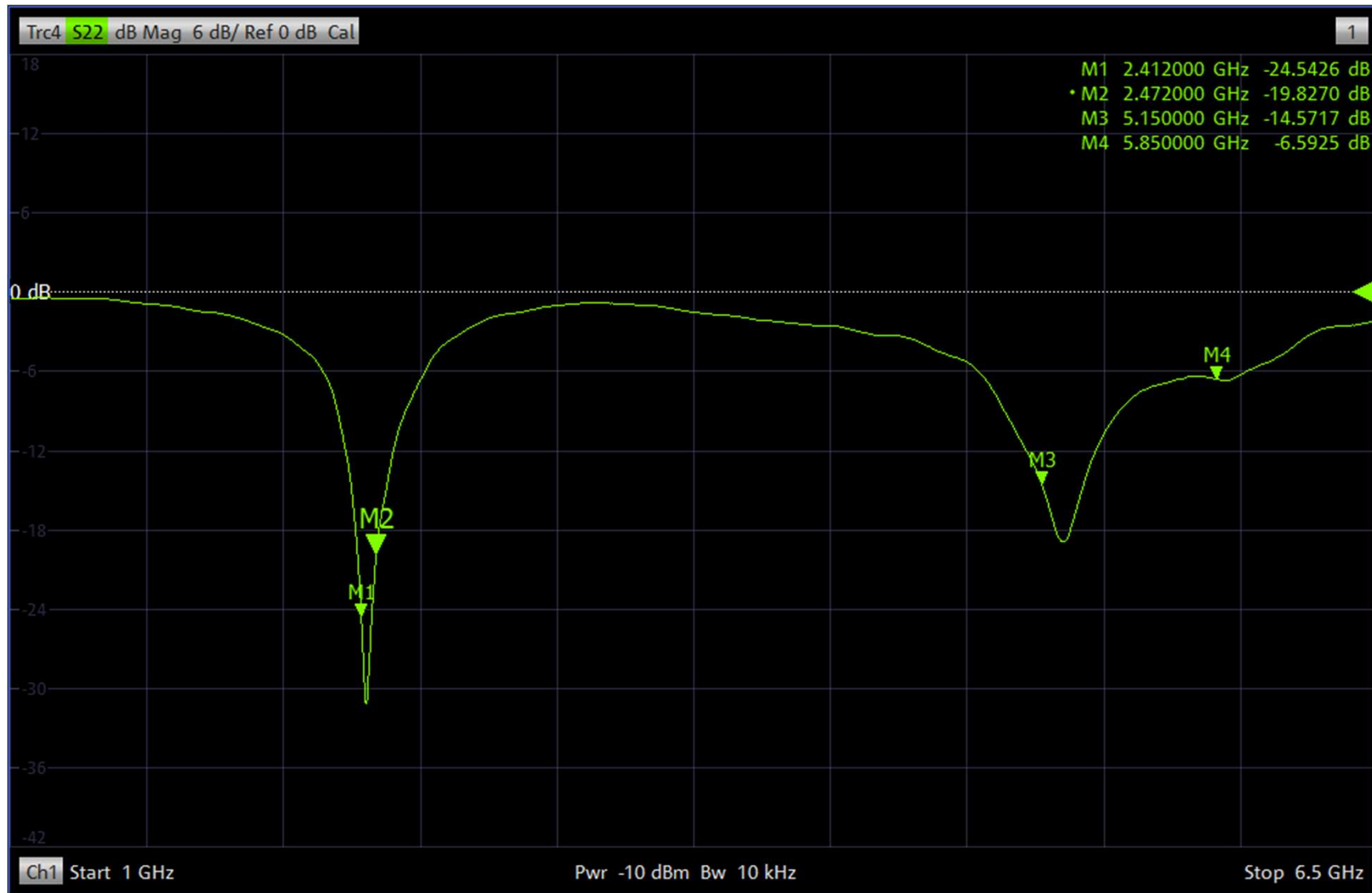
Antenna OTA Passive Testing

S11 Return Loss Parameters _ ANT2: 2.4GHz and 5GHz Bands



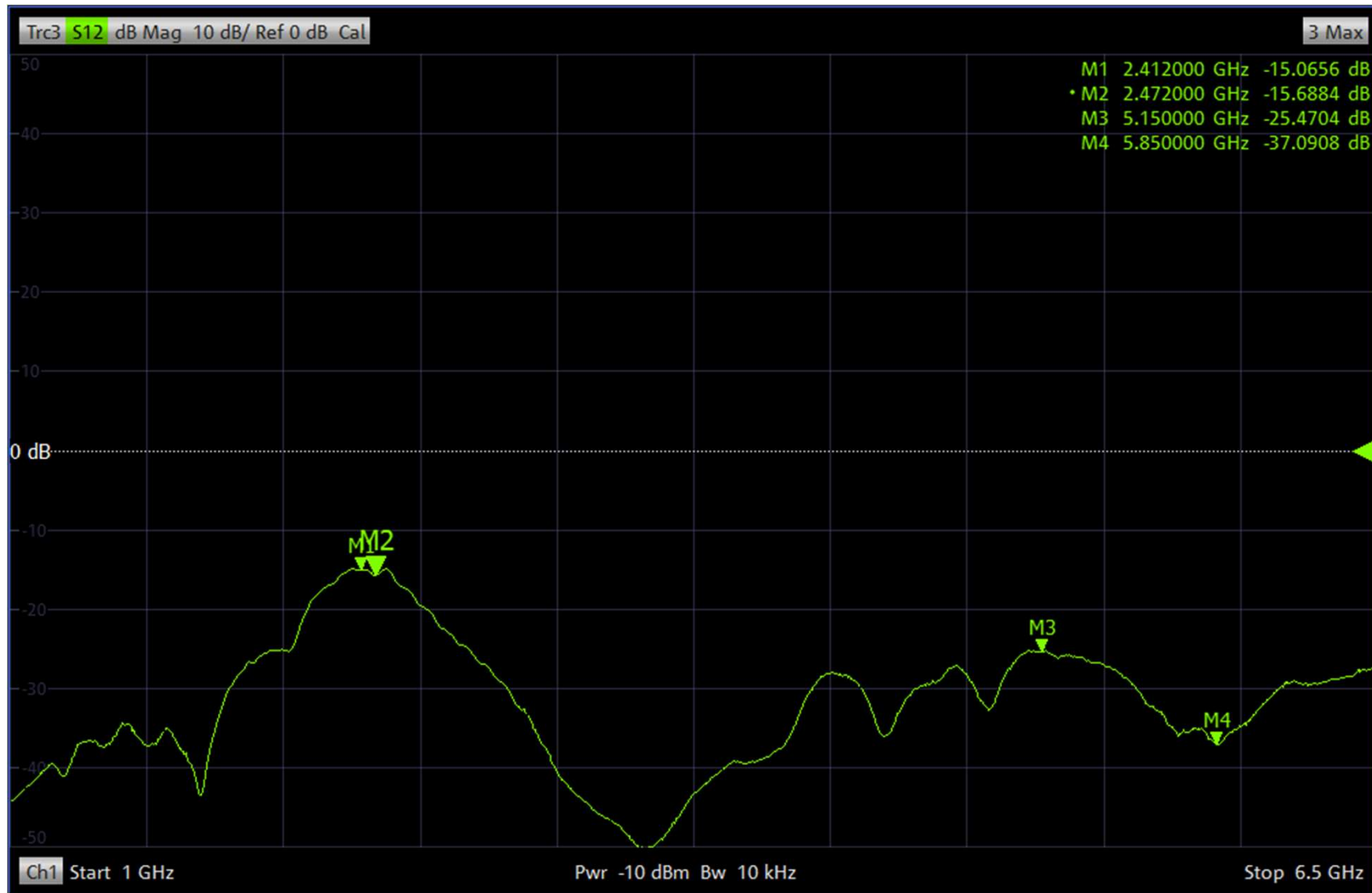
Antenna OTA Passive Testing

S11 Return Loss Parameters _ ANT1: 2.4GHz and 5GHz Bands



Antenna OTA Passive Testing

Isolation S12 or S21 Return Loss Parameters_ANT1 & ANT2: 2.4GHz and 5GHz Bands



Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

efficiency, gain 2.4GHz Band ANT2

Point Values	Ant. Port Input Pwr. (dBm)	Tot. Rad. Pwr. (dBm)	Peak EIRP (dBm)	Directivity (dBi)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
Frequency [MHz]							
2400	0	-2.69327	1.94148	4.63476	-2.69327	53.7864	1.94148
2410	0	-2.61561	1.93843	4.55404	-2.61561	54.7569	1.93843
2420	0	-2.70935	1.60925	4.3186	-2.70935	53.5877	1.60925
2430	0	-2.74516	1.22867	3.97382	-2.74516	53.1477	1.22867
2440	0	-2.76578	1.15158	3.91736	-2.76578	52.8959	1.15158
2450	0	-2.797	1.07441	3.87141	-2.797	52.517	1.07441
2460	0	-2.73079	1.30215	4.03294	-2.73079	53.3237	1.30215
2470	0	-2.73238	1.81068	4.54306	-2.73238	53.3043	1.81068
2480	0	-2.69293	2.02696	4.71989	-2.69293	53.7907	2.02696
2490	0	-2.688	2.35329	5.04129	-2.688	53.8517	2.35329

Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

efficiency, gain 5GHz Bands ANT2

Point Values	Ant. Port Input Pwr. (dBm)	Tot. Rad. Pwr. (dBm)	Peak EIRP (dBm)	Directivity (dBi)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
Frequency (MHz)							
5000	0	-2.64169	3.61933	6.26102	-2.64169	54.4291	3.61933
5050	0	-2.09213	4.00277	6.09491	-2.09213	61.7713	4.00277
5100	0	-2.06636	3.8102	5.87656	-2.06636	62.139	3.8102
5150	0	-2.37043	3.39393	5.76436	-2.37043	57.9372	3.39393
5200	0	-2.21457	3.52259	5.73716	-2.21457	60.0541	3.52259
5250	0	-1.65278	3.9811	5.63388	-1.65278	68.3474	2.5578
5300	0	-1.50479	4.33101	5.8358	-1.50479	70.7165	4.33101
5350	0	-1.21828	4.56157	5.77985	-1.21828	75.5391	4.56157
5400	0	-1.0094	5.00191	6.01131	-1.0094	79.261	5.00191
5450	0	-0.67006	5.11467	5.78473	-0.67006	85.7026	5.11467
5500	0	-0.569711	5.06482	5.63453	-0.569711	87.7059	5.06482
5550	0	-0.605597	5.07861	5.68421	-0.605597	86.9842	5.07861
5600	0	-0.293799	5.49645	5.79025	-0.293799	93.4588	5.49645
5650	0	-0.420287	5.46734	5.88763	-0.420287	90.776	5.46734
5700	0	-0.840678	5.33788	6.17856	-0.840678	82.4009	5.33788
5750	0	-1.21286	5.21751	6.43037	-1.21286	75.6334	5.21751
5800	0	-1.18981	5.38299	6.5728	-1.18981	76.036	5.38299
5850	0	-1.00164	5.80534	6.80698	-1.00164	79.4028	5.8045
5900	0	-1.30881	5.4216	6.73041	-1.30881	73.9807	5.4216

Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

efficiency, gain 2.4GHz Band ANT1

Point Values	Ant. Port Input Pwr. (dBm)	Tot. Rad. Pwr. (dBm)	Peak EIRP (dBm)	Directivity (dBi)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
Frequency (MHz)							
2400	0	-2.48865	4.34557	6.83422	-2.48865	56.3813	4.34557
2410	0	-2.42178	4.27912	6.7009	-2.42178	57.2562	4.27912
2420	0	-2.39941	4.3508	6.7502	-2.39941	57.5518	4.3508
2430	0	-2.30645	4.38367	6.69013	-2.30645	58.7969	4.38367
2440	0	-2.19739	4.62513	6.82252	-2.19739	60.2922	4.62513
2450	0	-2.1688	4.67342	6.84222	-2.1688	60.6904	4.67342
2460	0	-2.10454	4.77275	6.8773	-2.10454	61.595	4.77275
2470	0	-2.10109	4.83372	6.93481	-2.10109	61.644	4.83372
2480	0	-2.12974	4.79969	6.92943	-2.12974	61.2387	4.79969
2490	0	-2.17376	4.70949	6.88325	-2.17376	60.6211	4.70949
2500	0	-2.21869	4.56778	6.78646	-2.21869	59.9973	4.56778

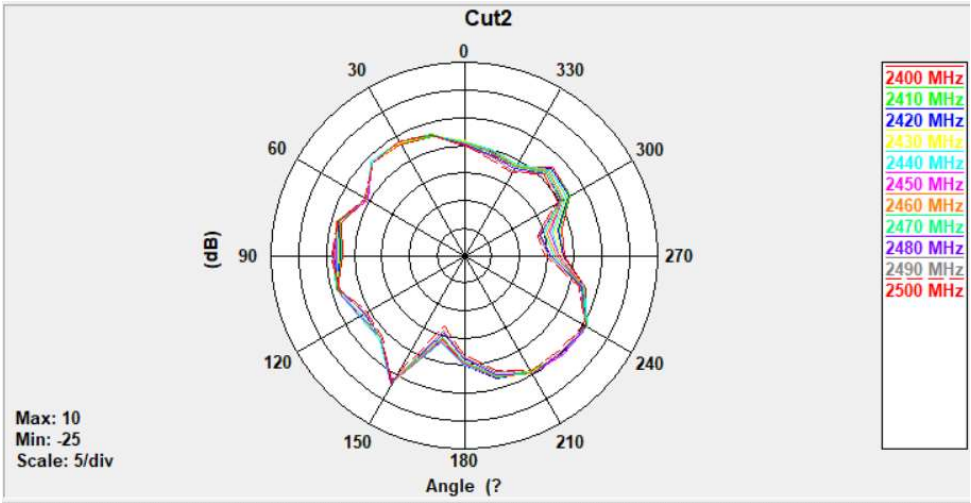
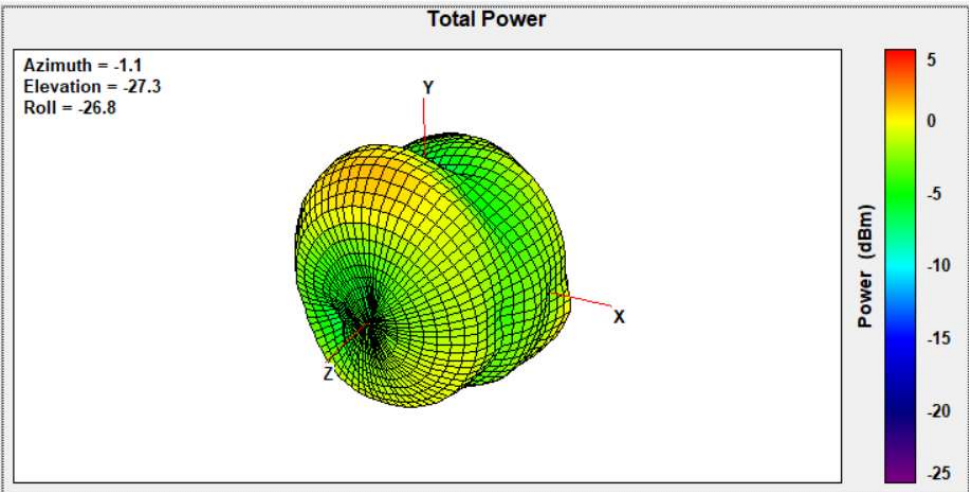
Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

efficiency, gain 5GHz Bands ANT1

Point Values	Ant. Port Input Pwr. (dBm)	Tot. Rad. Pwr. (dBm)	Peak EIRP (dBm)	Directivity (dBi)	Efficiency (dB)	Efficiency (%)	Gain (dBi)
Frequency (MHz)							
5000	0	-2.57879	3.11085	5.68964	-2.57879	55.2231	3.11085
5050	0	-2.00309	3.8253	5.82839	-2.00309	63.0509	3.8253
5100	0	-2.06962	3.41106	5.48068	-2.06962	62.0924	3.41106
5150	0	-2.49035	2.92005	5.4104	-2.49035	56.3593	2.92005
5200	0	-2.46185	3.2306	5.69246	-2.46185	56.7303	3.2306
5250	0	-2.07385	3.76621	5.84006	-2.07385	62.0319	4.0724
5300	0	-2.09615	3.9249	6.02105	-2.09615	61.7142	3.9249
5350	0	-1.97335	4.06707	6.04043	-1.97335	63.484	4.06707
5400	0	-1.88124	4.33178	6.21302	-1.88124	64.8449	4.33178
5450	0	-1.71942	4.38197	6.10139	-1.71942	67.3066	4.38197
5500	0	-1.89078	4.14737	6.03815	-1.89078	64.7026	4.14737
5550	0	-2.34336	3.59149	5.93485	-2.34336	58.2994	3.59149
5600	0	-2.43774	3.21185	5.64959	-2.43774	57.0461	3.21185
5650	0	-2.9255	2.60396	5.52945	-2.9255	50.9859	2.60396
5700	0	-3.66366	2.36763	6.03129	-3.66366	43.0164	2.36763
5750	0	-4.18255	2.21245	6.395	-4.18255	38.172	2.21245
5800	0	-4.19256	2.44362	6.63618	-4.19256	38.0841	2.44362
5850	0	-4.12293	2.63281	6.75574	-4.12293	38.6996	2.63281
5900	0	-4.54717	2.29816	6.84533	-4.54717	35.098	2.29816

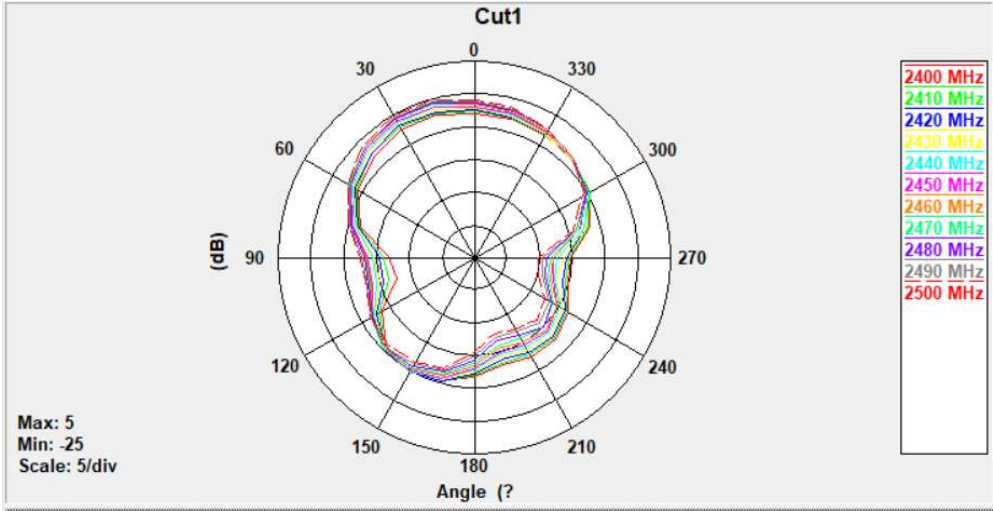
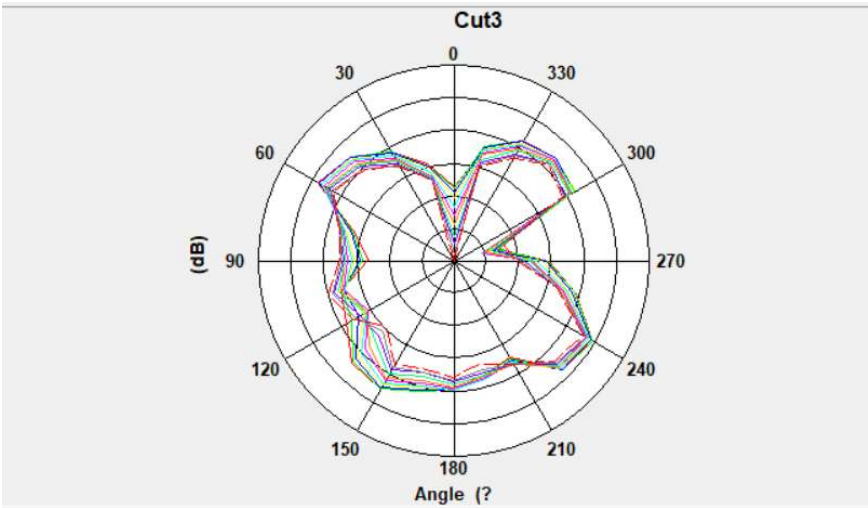
Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

direction diagram2.4GHz Band ANT2



3D

E1

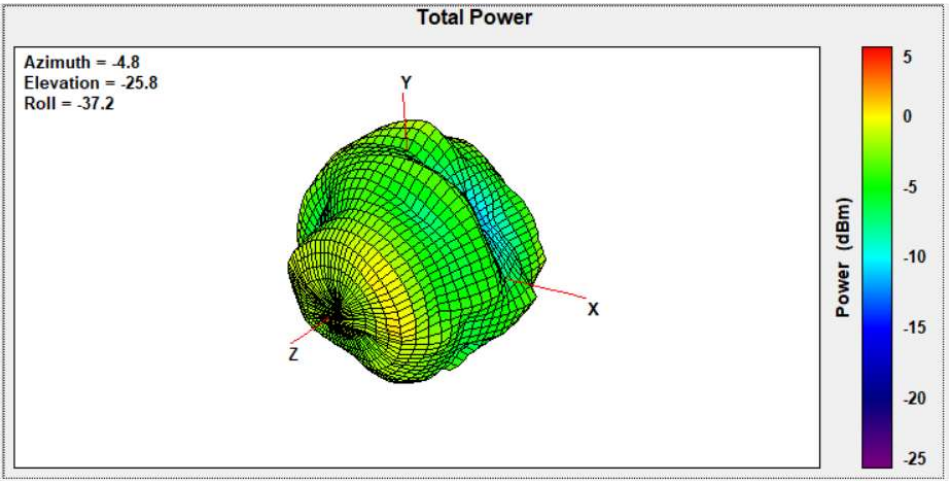


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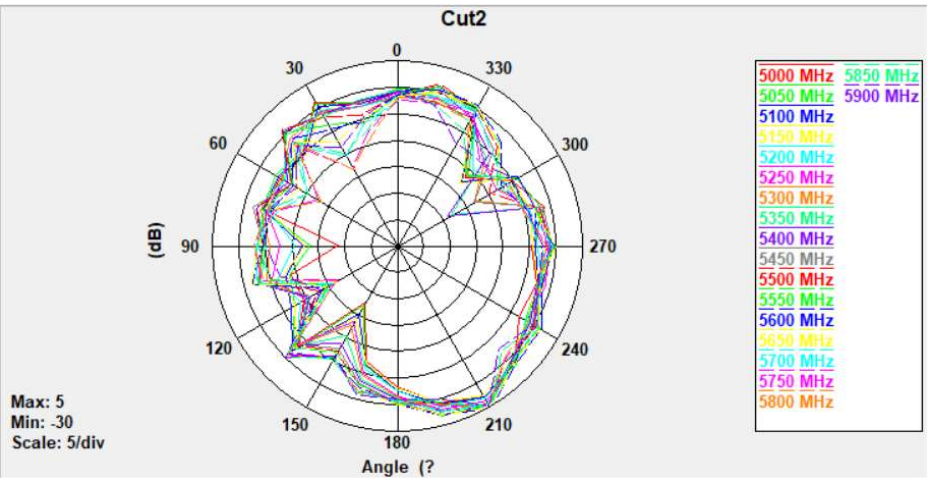
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Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

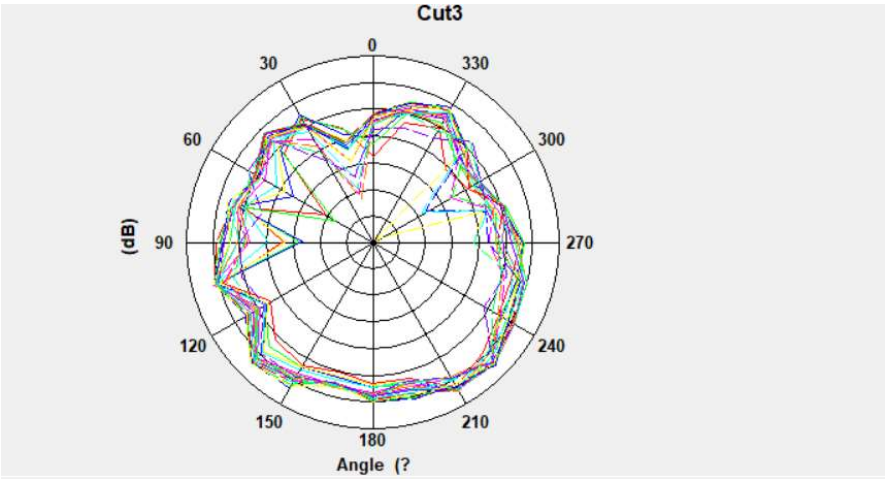
direction diagram5GHz Bands ANT2



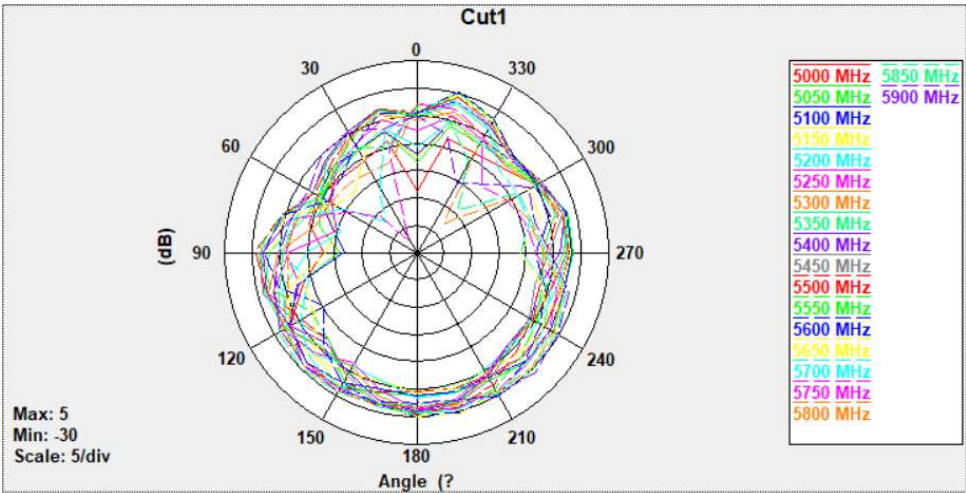
3D



E1



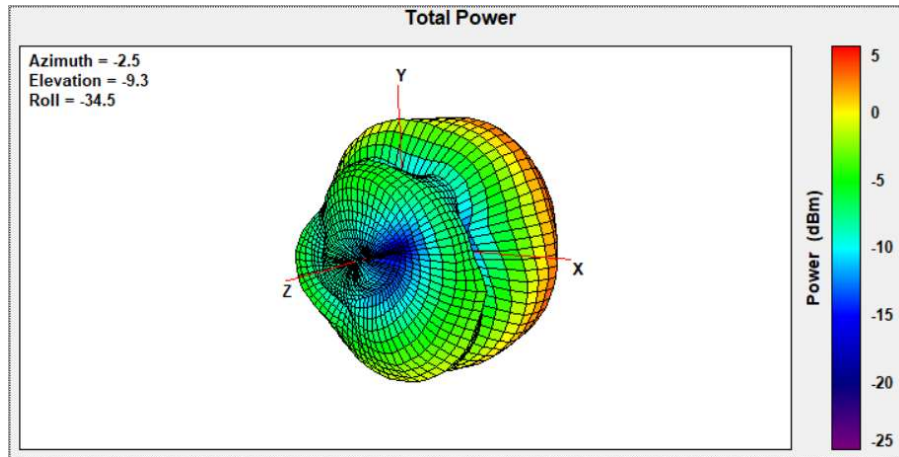
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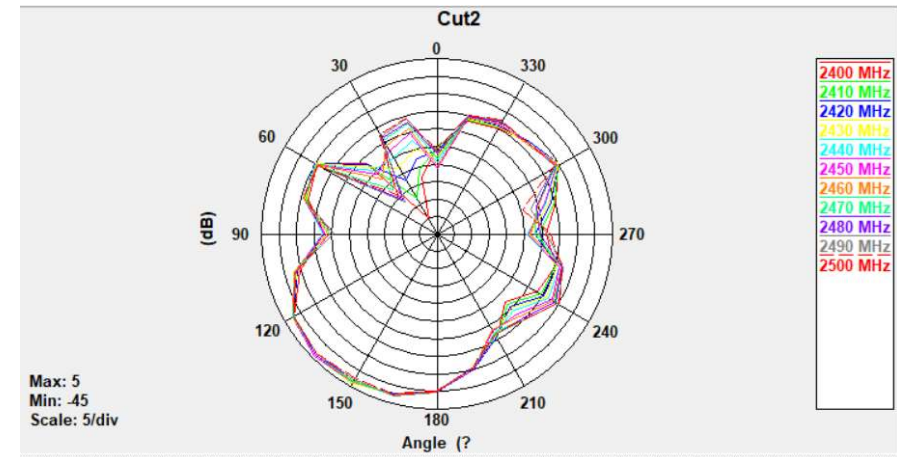
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Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

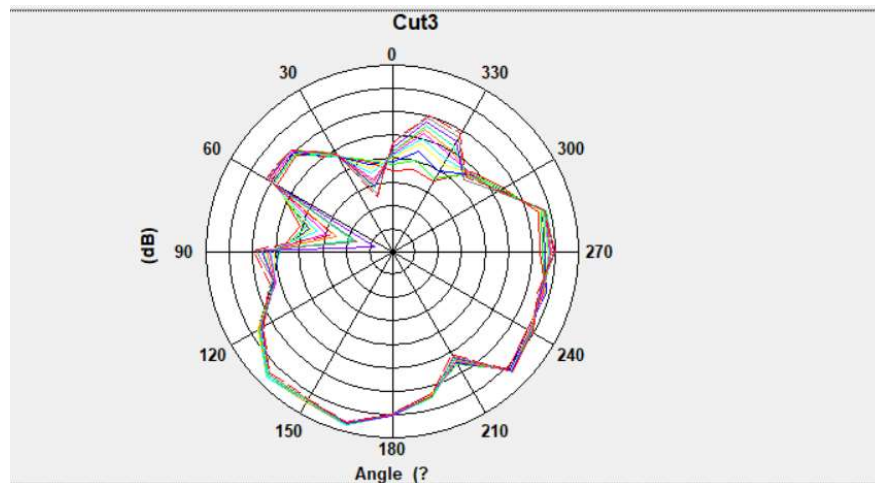
direction diagram 2.4GHz Band ANT1



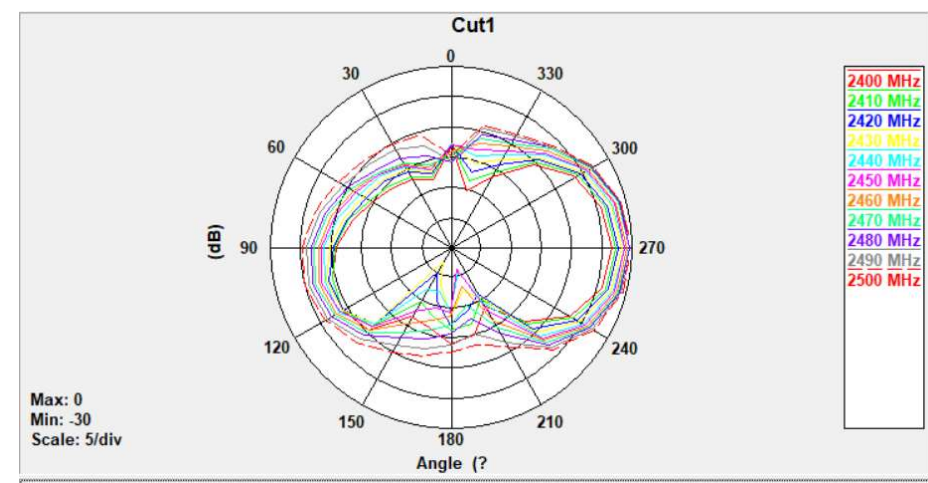
3D



E1



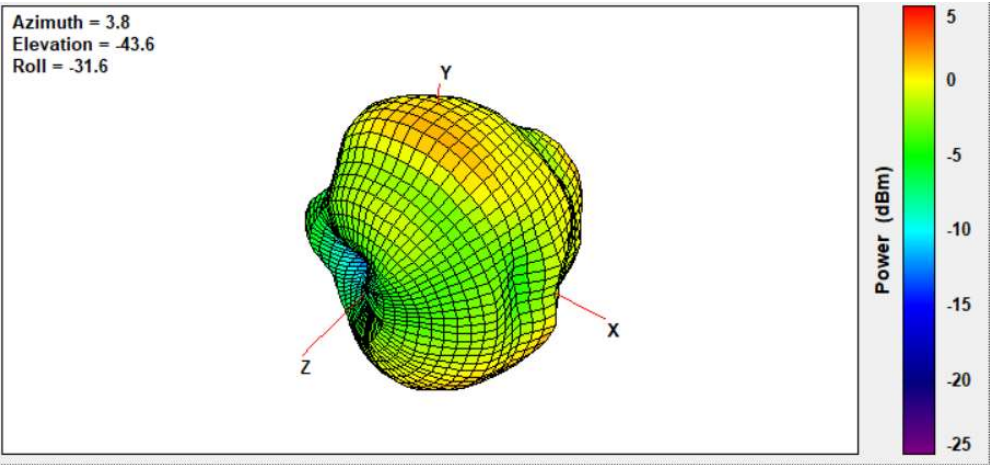
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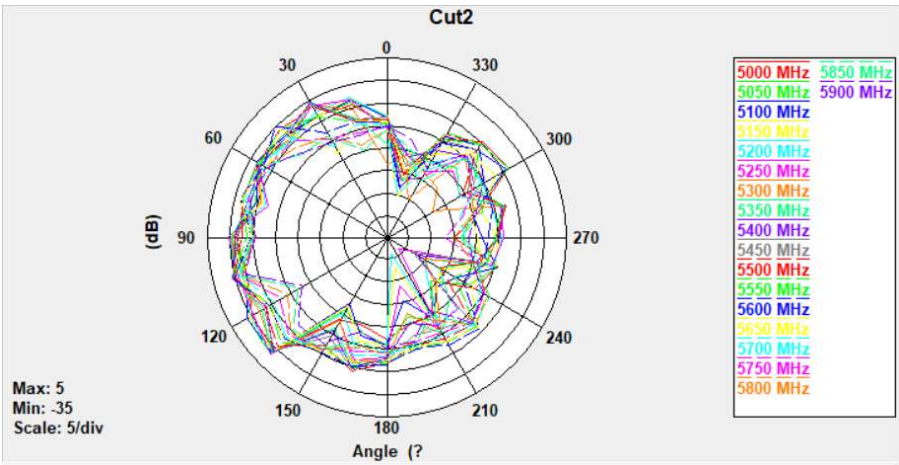
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Comparison of antenna OTA passive parameters (efficiency, gain, direction diagram)

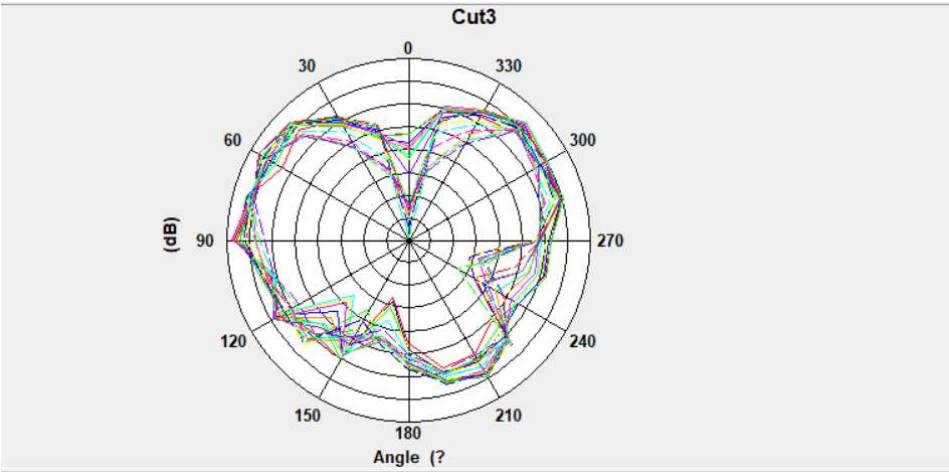
direction diagram : GHz Bands ANT1



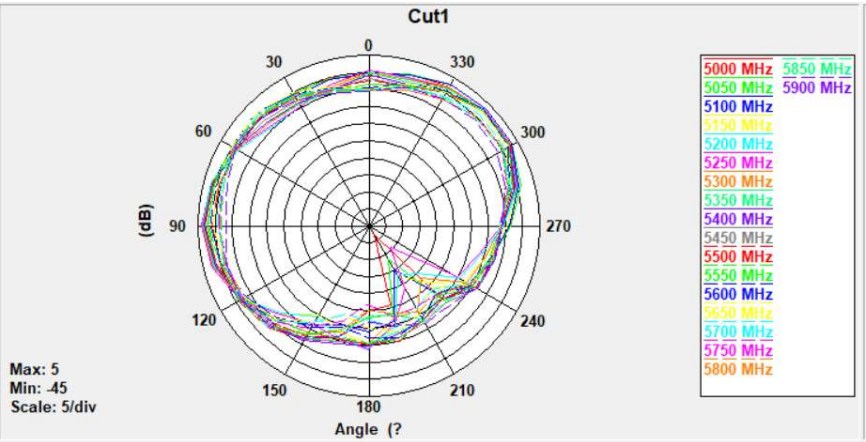
3D



E1



E2



H