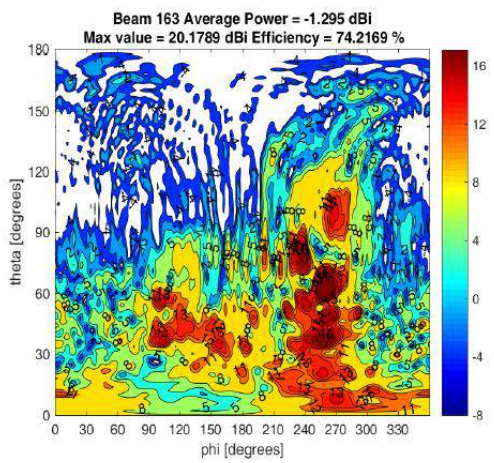
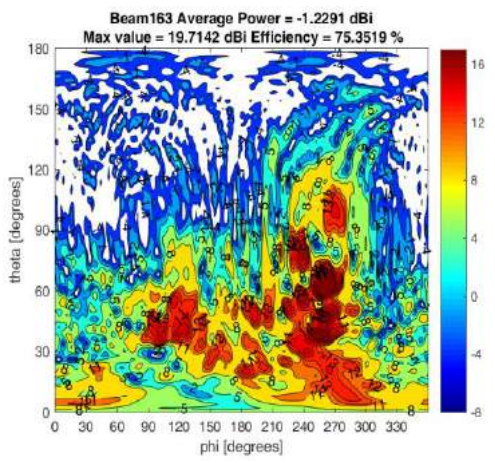
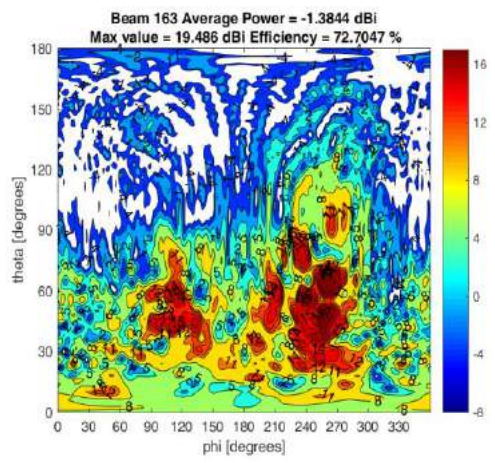
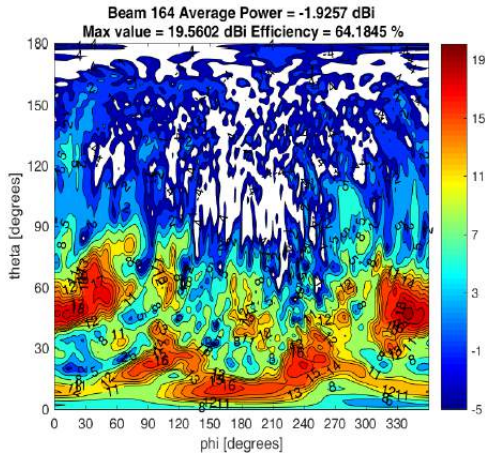
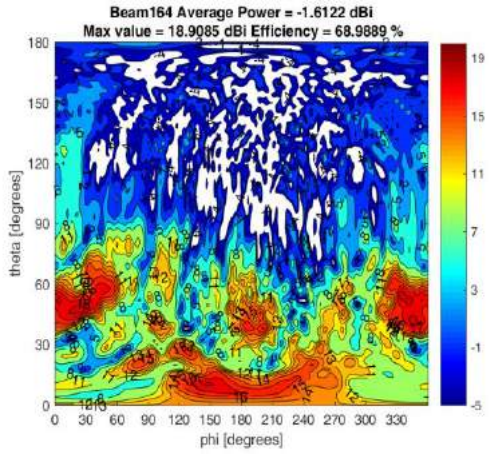
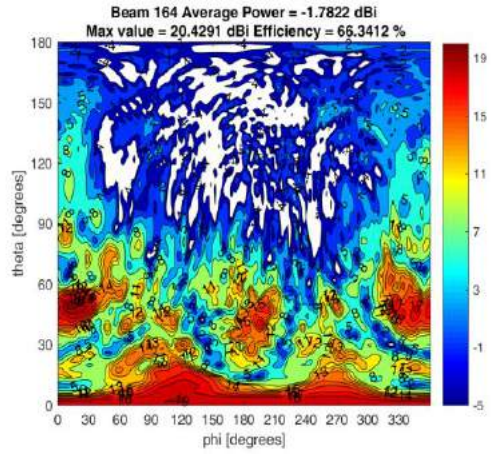
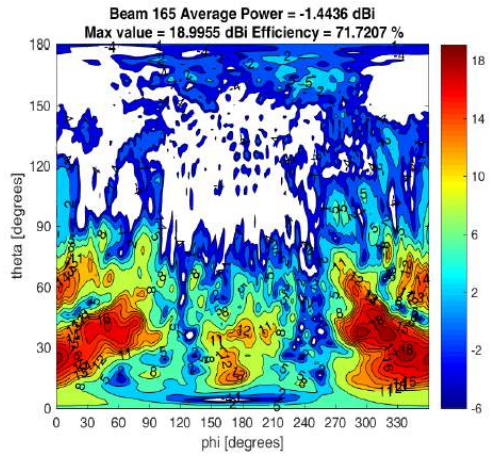
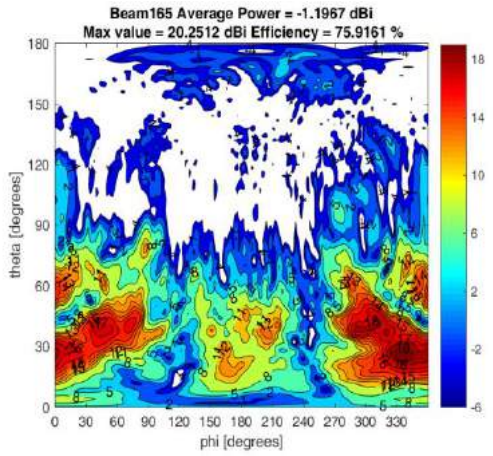
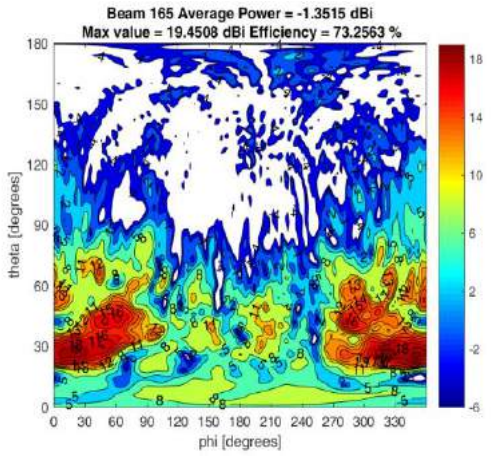
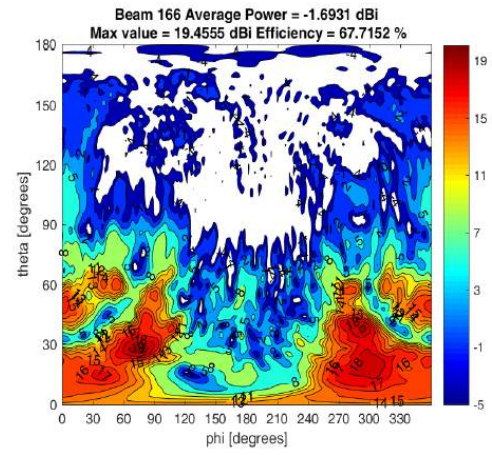
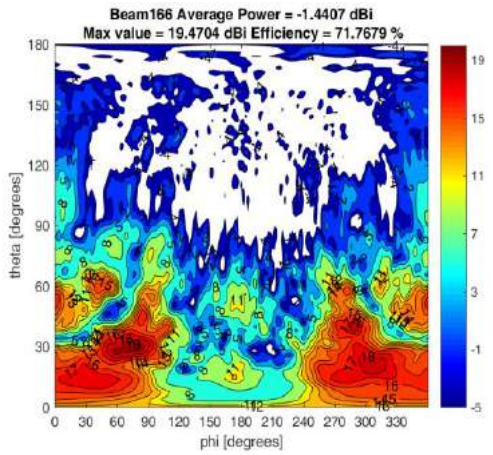
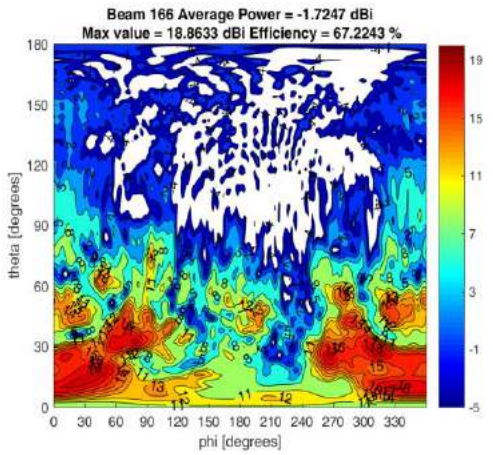
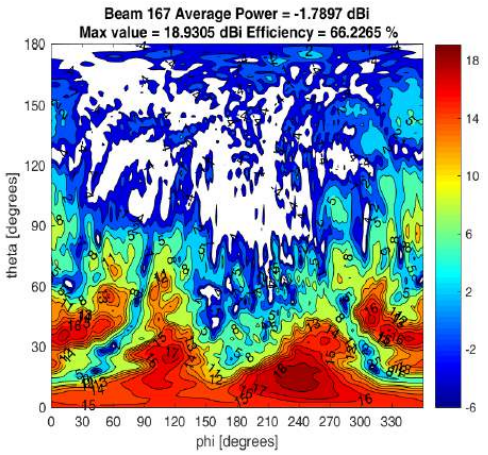
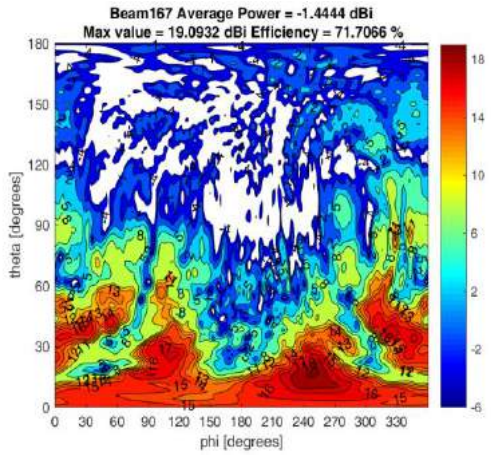
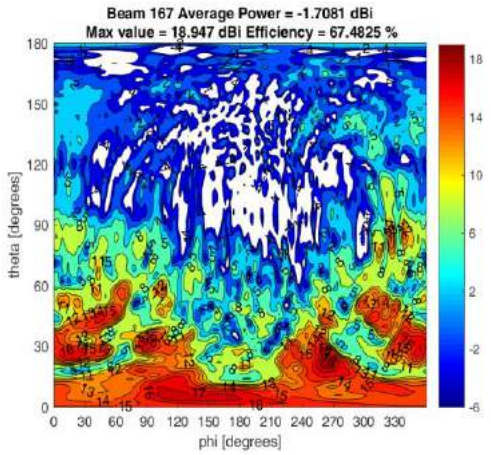
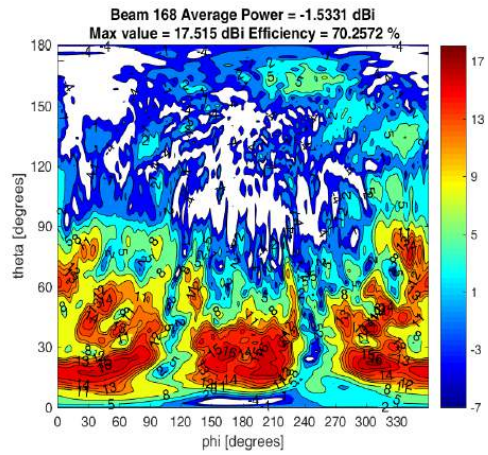
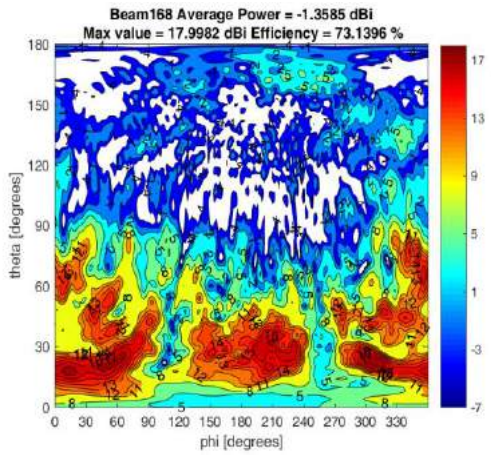
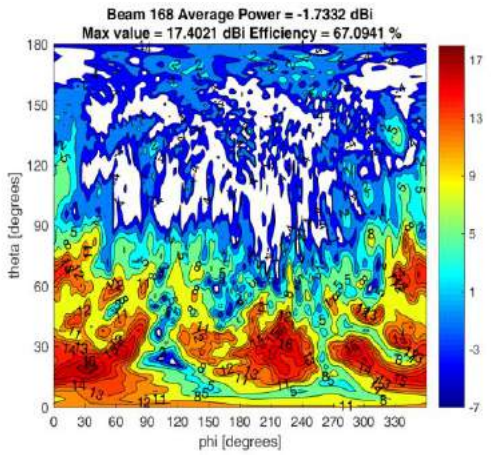
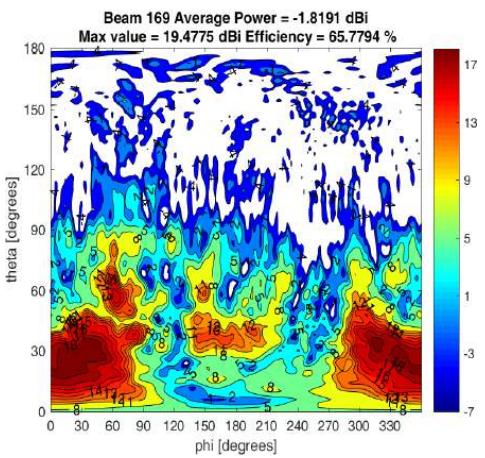
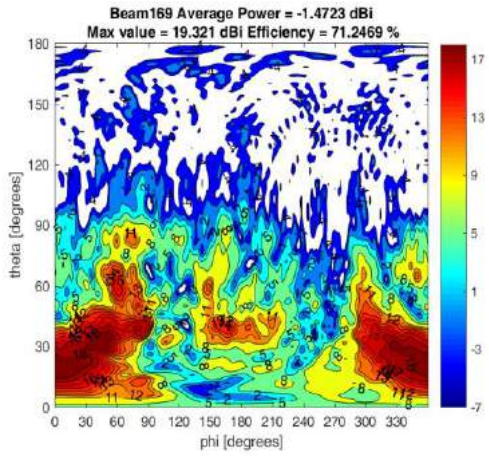
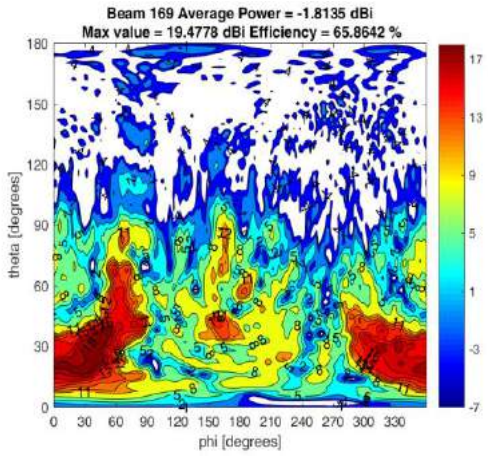
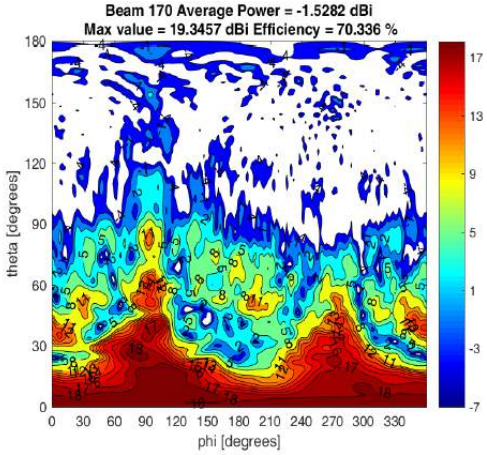
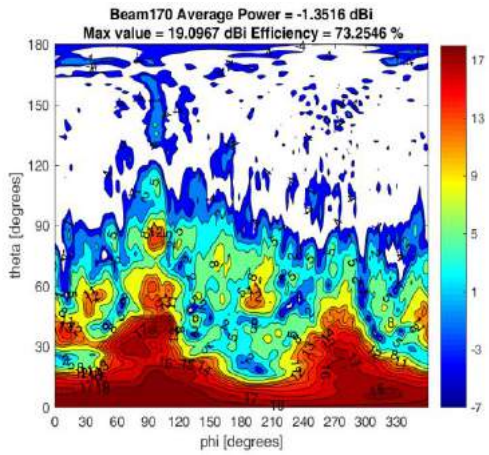
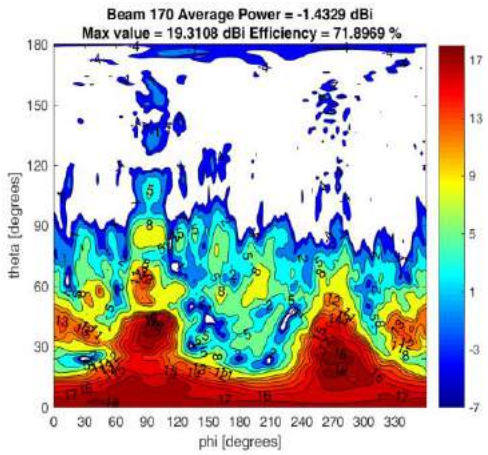
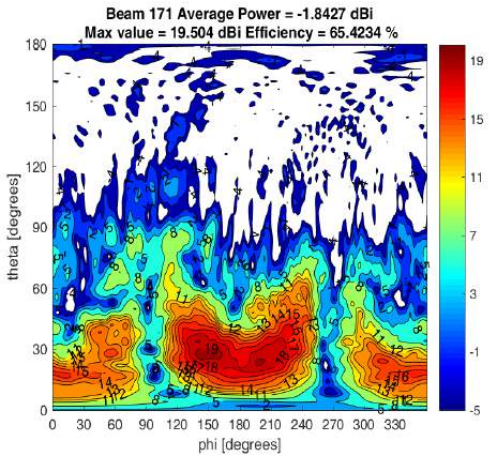
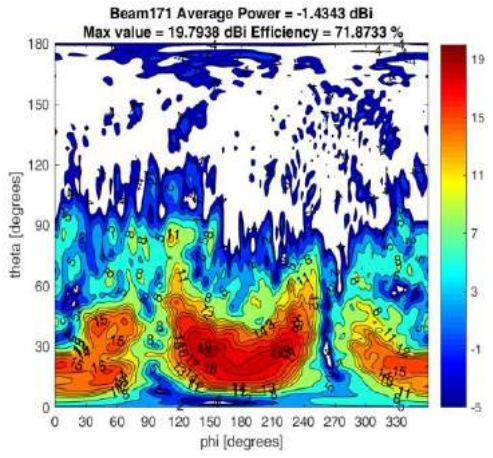
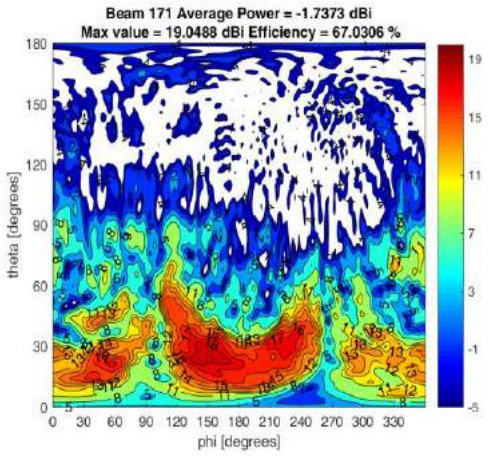
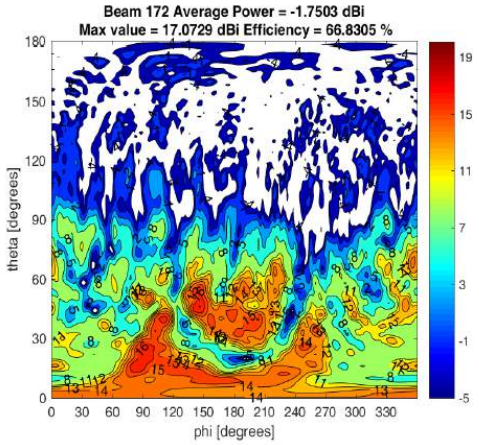
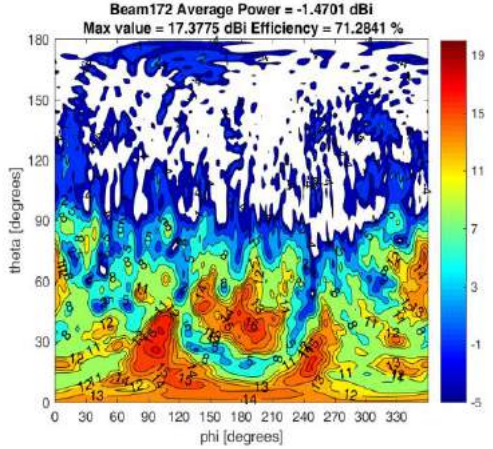
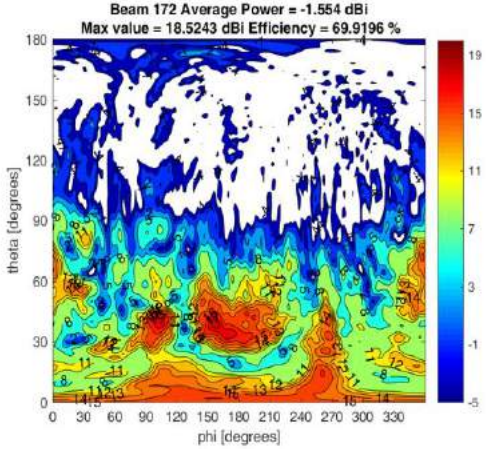
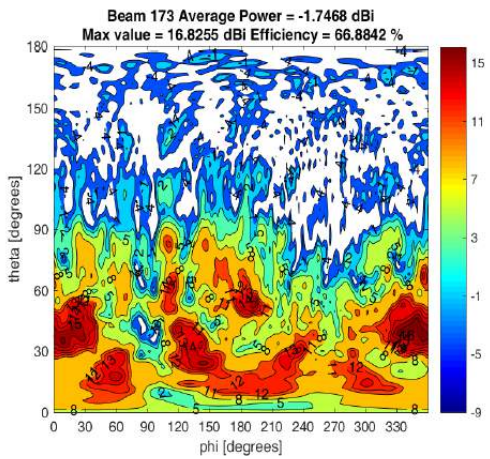
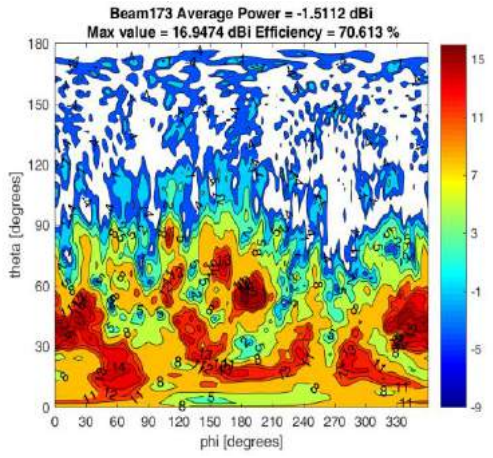
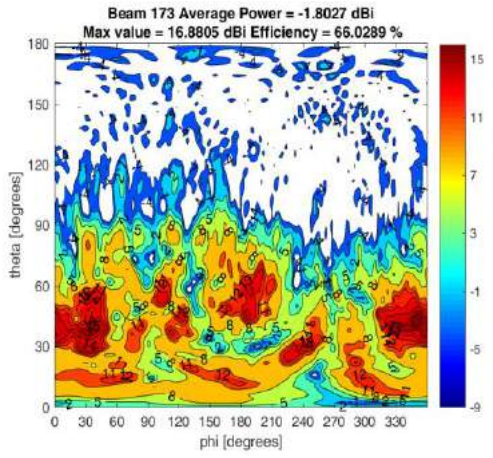
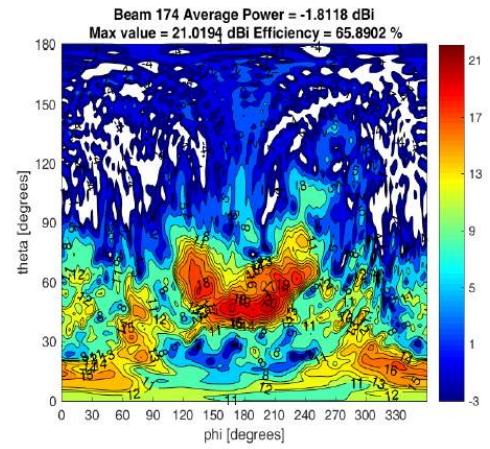
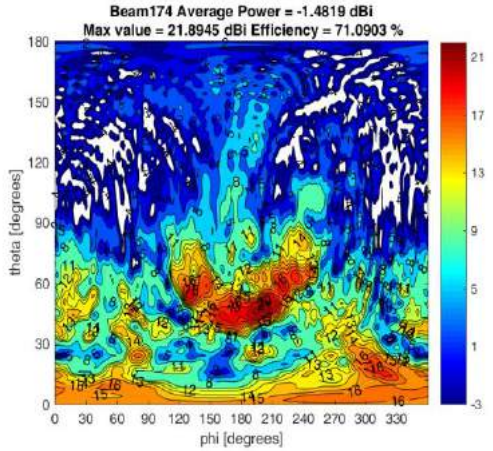
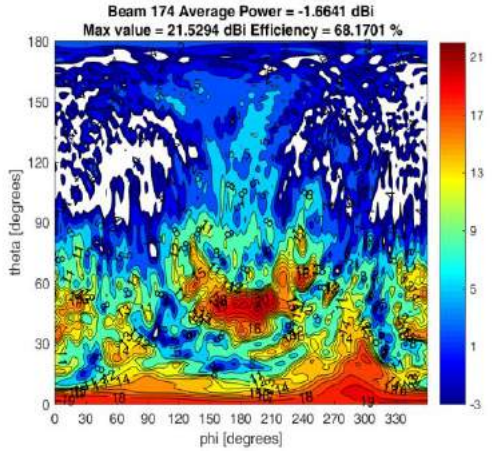
163	 Beam 163 Average Power = -1.295 dBi Max value = 20.1789 dBi Efficiency = 74.2169 % theta [degrees] phi [degrees]	 Beam163 Average Power = -1.2291 dBi Max value = 19.7142 dBi Efficiency = 75.3519 % theta [degrees] phi [degrees]	 Beam 163 Average Power = -1.3844 dBi Max value = 19.486 dBi Efficiency = 72.7047 % theta [degrees] phi [degrees]
164	 Beam 164 Average Power = -1.9257 dBi Max value = 19.5602 dBi Efficiency = 64.1845 % theta [degrees] phi [degrees]	 Beam164 Average Power = -1.6122 dBi Max value = 18.9085 dBi Efficiency = 68.9889 % theta [degrees] phi [degrees]	 Beam 164 Average Power = -1.7822 dBi Max value = 20.4291 dBi Efficiency = 66.3412 % theta [degrees] phi [degrees]

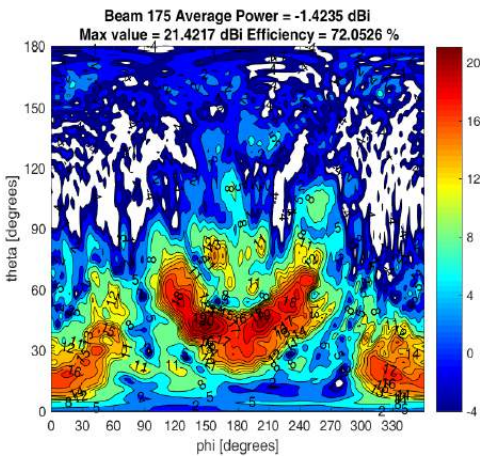
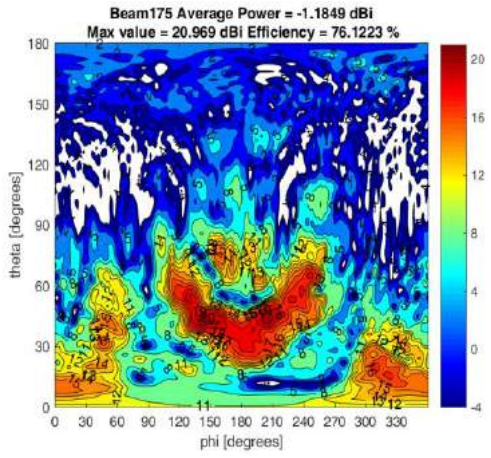
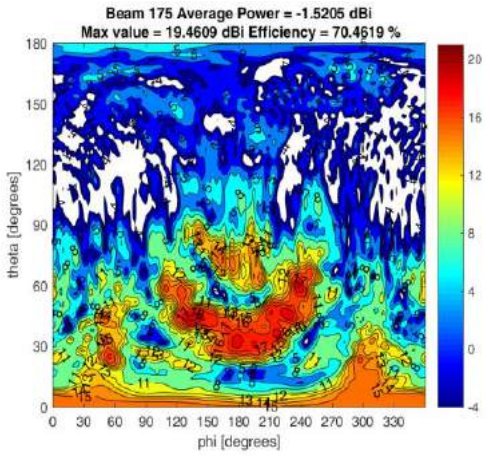
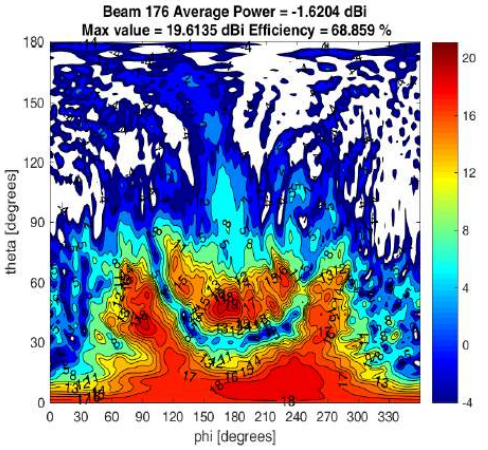
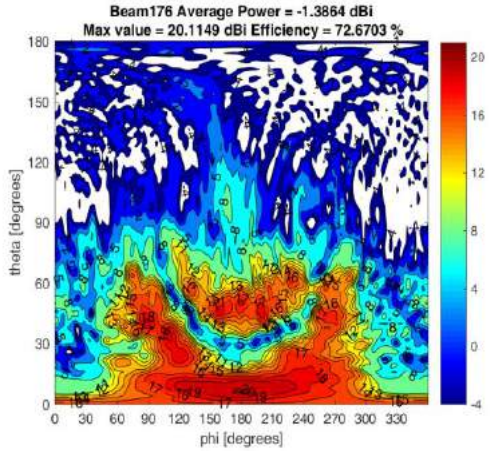
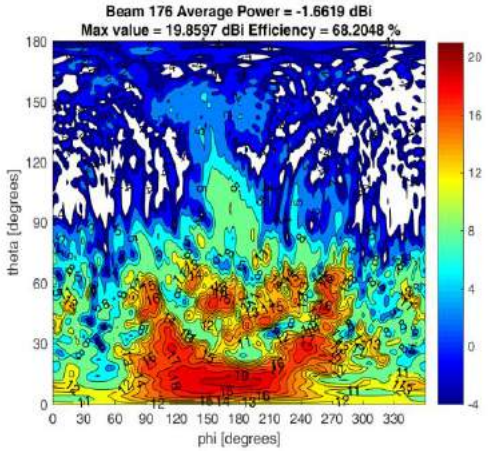
165	 Beam 165 Average Power = -1.4436 dBi Max value = 18.9955 dBi Efficiency = 71.7207 % theta [degrees] phi [degrees]	 Beam165 Average Power = -1.1967 dBi Max value = 20.2512 dBi Efficiency = 75.9161 % theta [degrees] phi [degrees]	 Beam 165 Average Power = -1.3515 dBi Max value = 19.4508 dBi Efficiency = 73.2563 % theta [degrees] phi [degrees]
166	 Beam 166 Average Power = -1.6931 dBi Max value = 19.4555 dBi Efficiency = 67.7152 % theta [degrees] phi [degrees]	 Beam166 Average Power = -1.4407 dBi Max value = 19.4704 dBi Efficiency = 71.7679 % theta [degrees] phi [degrees]	 Beam 166 Average Power = -1.7247 dBi Max value = 18.8633 dBi Efficiency = 67.2243 % theta [degrees] phi [degrees]

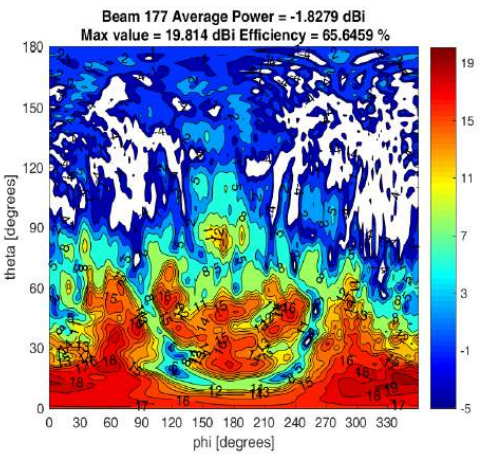
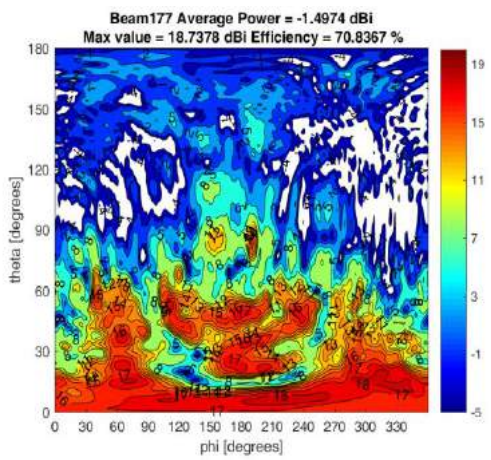
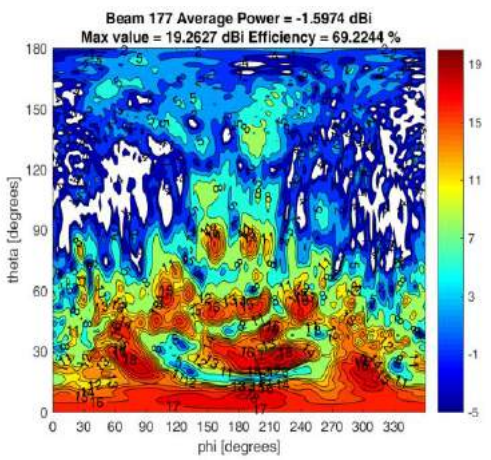
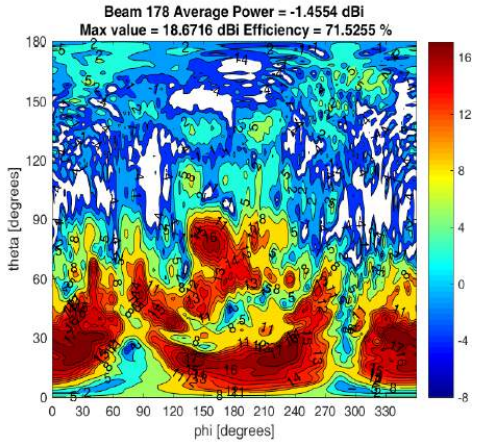
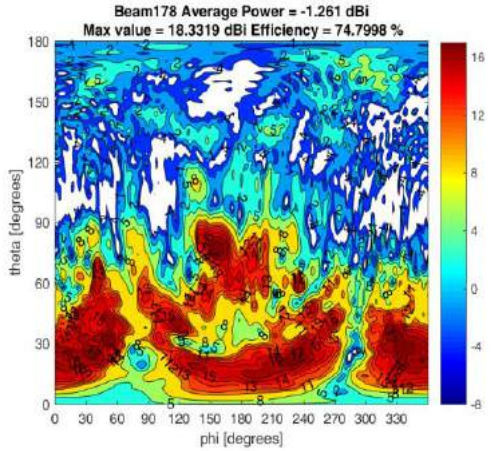
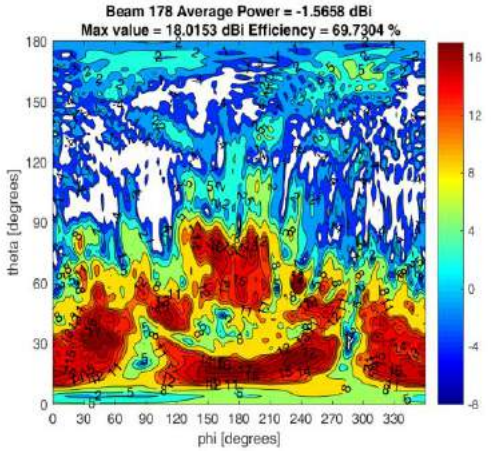
167	 Beam 167 Average Power = -1.7897 dBi Max value = 18.9305 dBi Efficiency = 66.2265 % theta [degrees] phi [degrees]	 Beam167 Average Power = -1.4444 dBi Max value = 19.0932 dBi Efficiency = 71.7066 % theta [degrees] phi [degrees]	 Beam 167 Average Power = -1.7081 dBi Max value = 18.947 dBi Efficiency = 67.4825 % theta [degrees] phi [degrees]
168	 Beam 168 Average Power = -1.5331 dBi Max value = 17.515 dBi Efficiency = 70.2572 % theta [degrees] phi [degrees]	 Beam168 Average Power = -1.3585 dBi Max value = 17.9982 dBi Efficiency = 73.1396 % theta [degrees] phi [degrees]	 Beam 168 Average Power = -1.7332 dBi Max value = 17.4021 dBi Efficiency = 67.0941 % theta [degrees] phi [degrees]

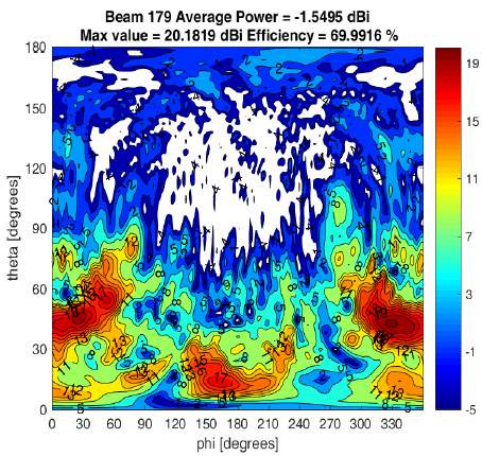
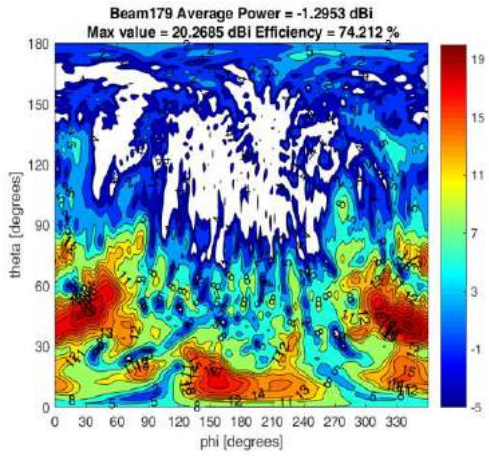
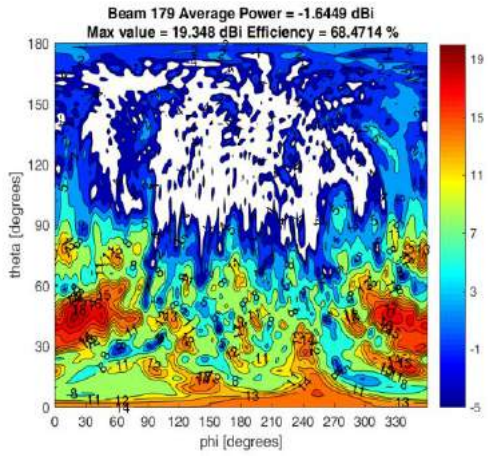
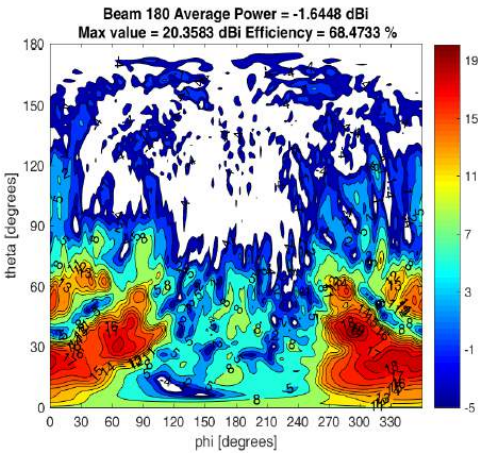
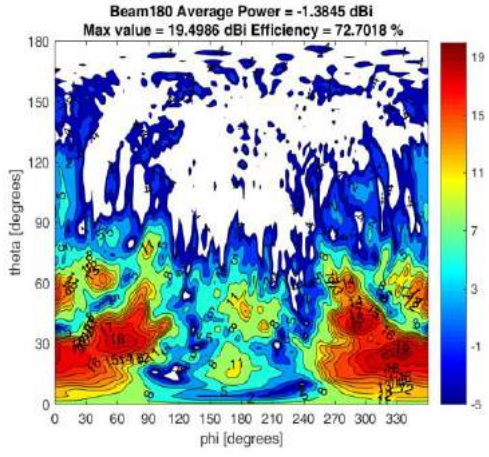
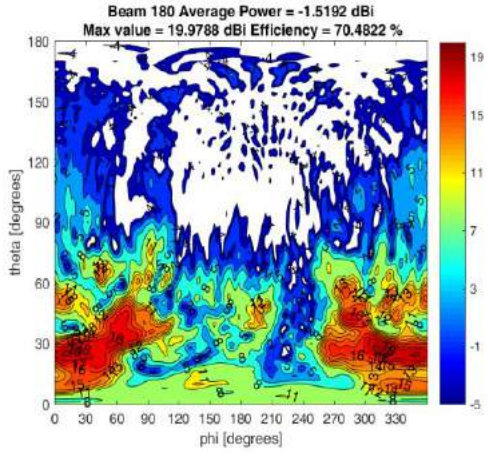
169	 Beam 169 Average Power = -1.8191 dBi Max value = 19.4775 dBi Efficiency = 65.7794 % theta [degrees] phi [degrees]	 Beam169 Average Power = -1.4723 dBi Max value = 19.321 dBi Efficiency = 71.2469 % theta [degrees] phi [degrees]	 Beam 169 Average Power = -1.8135 dBi Max value = 19.4778 dBi Efficiency = 65.8642 % theta [degrees] phi [degrees]
170	 Beam 170 Average Power = -1.5282 dBi Max value = 19.3457 dBi Efficiency = 70.336 % theta [degrees] phi [degrees]	 Beam170 Average Power = -1.3516 dBi Max value = 19.0967 dBi Efficiency = 73.2546 % theta [degrees] phi [degrees]	 Beam 170 Average Power = -1.4329 dBi Max value = 19.3108 dBi Efficiency = 71.8969 % theta [degrees] phi [degrees]

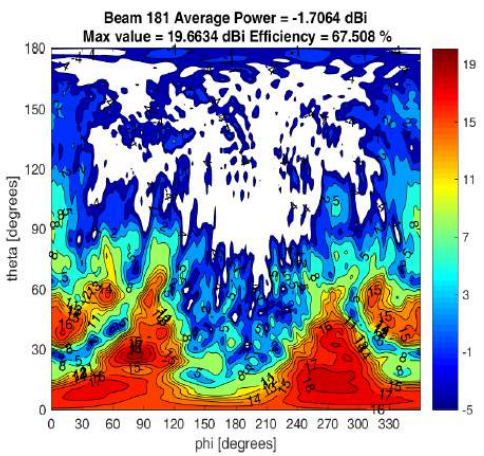
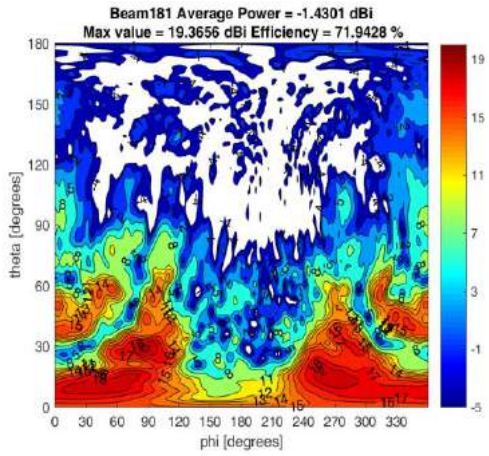
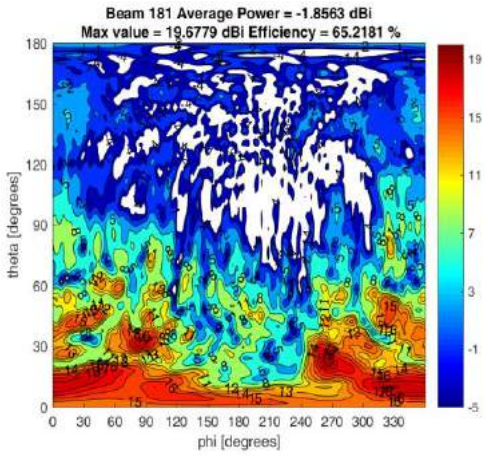
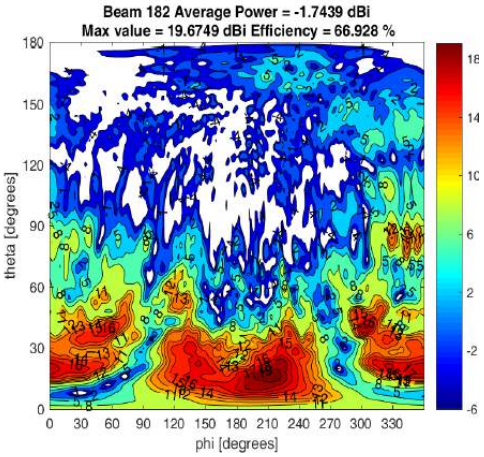
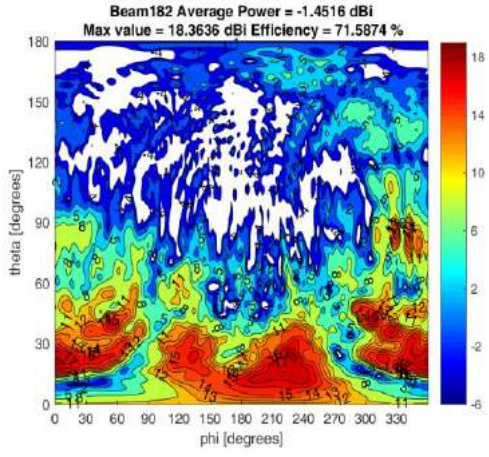
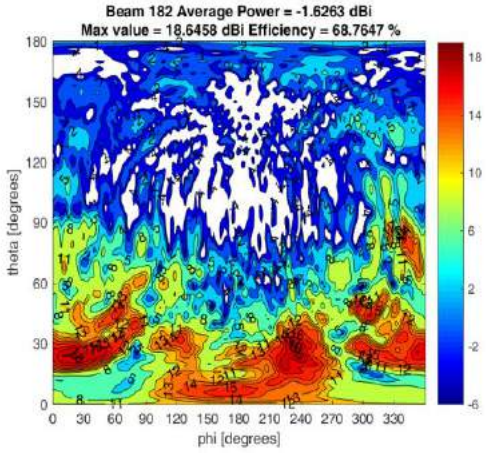
171	 Beam 171 Average Power = -1.8427 dBi Max value = 19.504 dBi Efficiency = 65.4234 % theta [degrees] phi [degrees]	 Beam171 Average Power = -1.4343 dBi Max value = 19.7938 dBi Efficiency = 71.8733 % theta [degrees] phi [degrees]	 Beam 171 Average Power = -1.7373 dBi Max value = 19.0488 dBi Efficiency = 67.0306 % theta [degrees] phi [degrees]
172	 Beam 172 Average Power = -1.7503 dBi Max value = 17.0729 dBi Efficiency = 66.8305 % theta [degrees] phi [degrees]	 Beam172 Average Power = -1.4701 dBi Max value = 17.3775 dBi Efficiency = 71.2841 % theta [degrees] phi [degrees]	 Beam 172 Average Power = -1.554 dBi Max value = 18.5243 dBi Efficiency = 69.9196 % theta [degrees] phi [degrees]

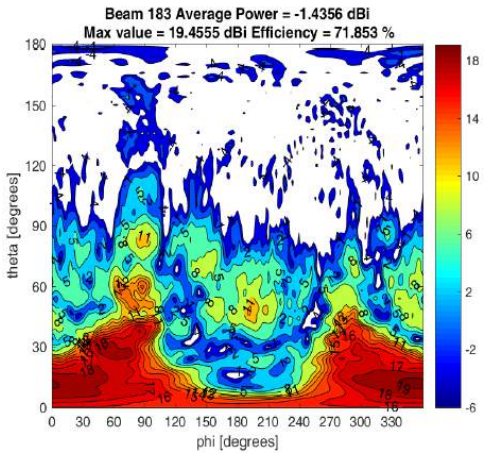
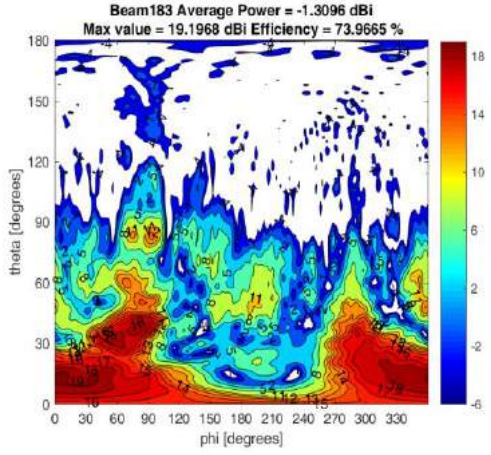
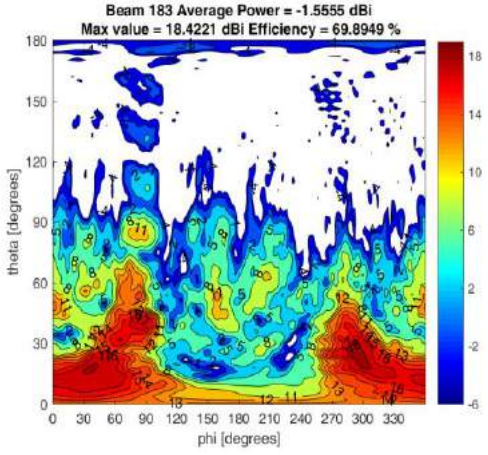
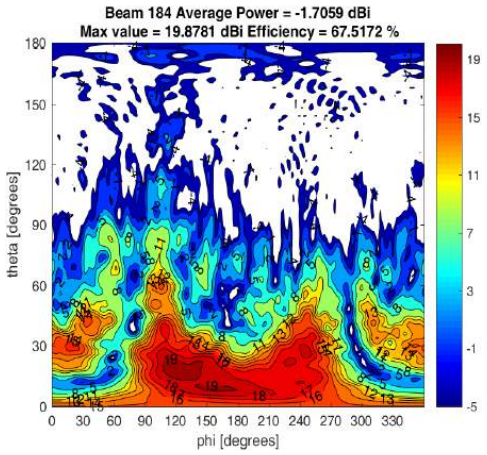
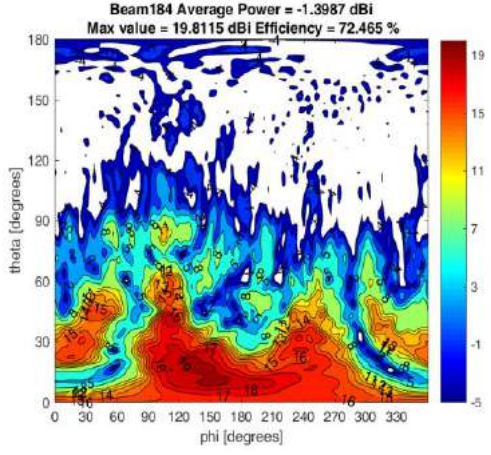
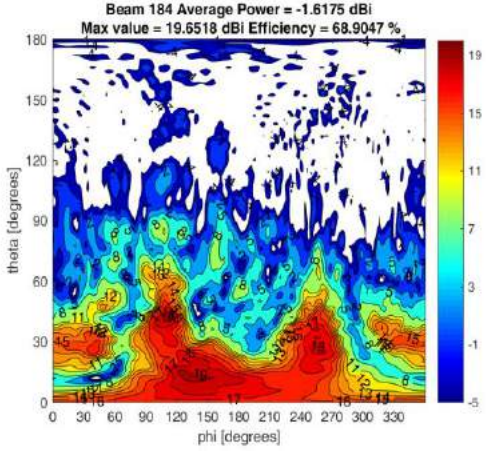
173	 Beam 173 Average Power = -1.7468 dBi Max value = 16.8255 dBi Efficiency = 66.8842 % theta [degrees] phi [degrees]	 Beam173 Average Power = -1.5112 dBi Max value = 16.9474 dBi Efficiency = 70.613 % theta [degrees] phi [degrees]	 Beam 173 Average Power = -1.8027 dBi Max value = 16.8805 dBi Efficiency = 66.0289 % theta [degrees] phi [degrees]
174	 Beam 174 Average Power = -1.8118 dBi Max value = 21.0194 dBi Efficiency = 65.8902 % theta [degrees] phi [degrees]	 Beam174 Average Power = -1.4819 dBi Max value = 21.8945 dBi Efficiency = 71.0903 % theta [degrees] phi [degrees]	 Beam 174 Average Power = -1.6641 dBi Max value = 21.5294 dBi Efficiency = 68.1701 % theta [degrees] phi [degrees]

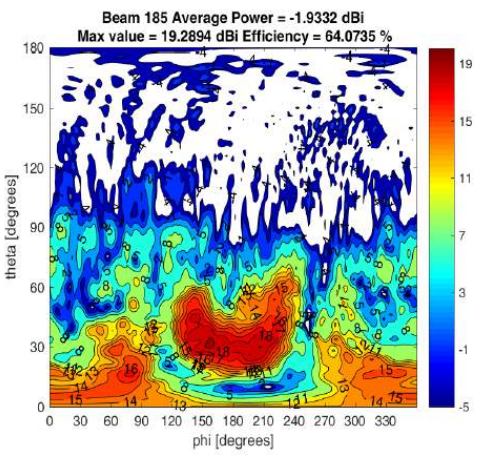
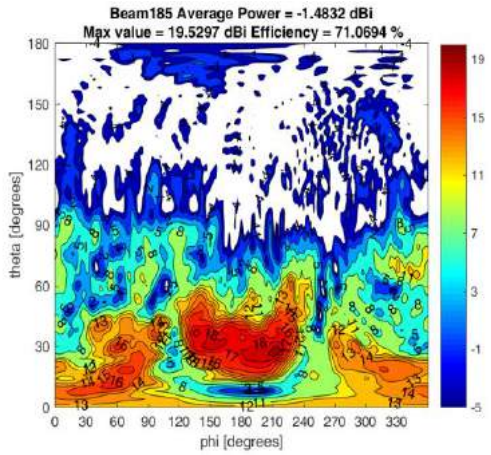
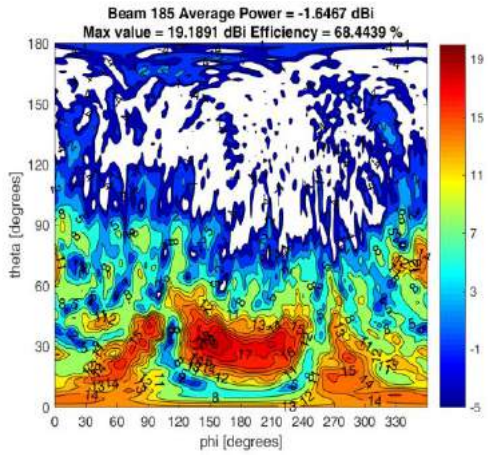
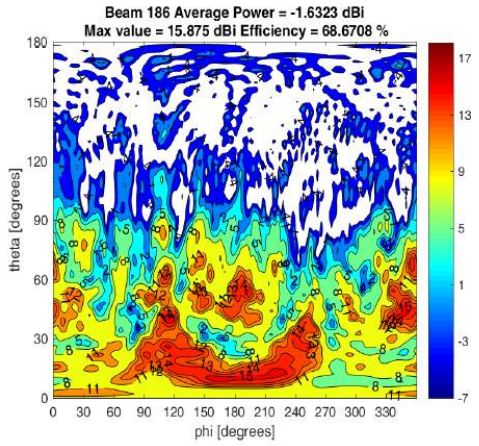
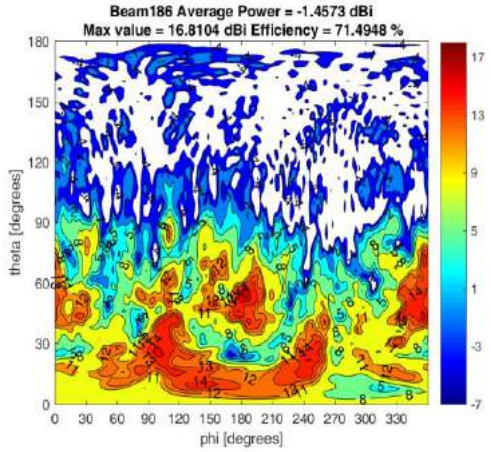
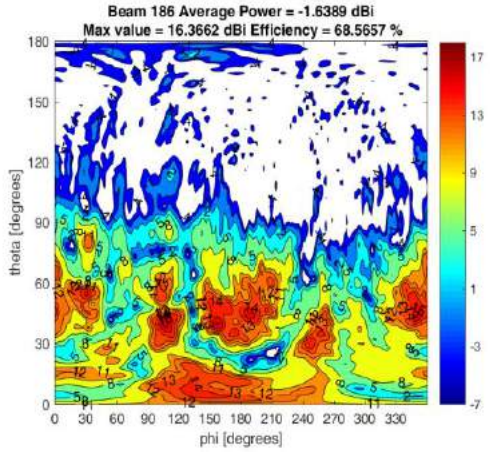
175	 Beam 175 Average Power = -1.4235 dBi Max value = 21.4217 dBi Efficiency = 72.0526 % theta [degrees] phi [degrees]	 Beam175 Average Power = -1.1849 dBi Max value = 20.969 dBi Efficiency = 76.1223 % theta [degrees] phi [degrees]	 Beam 175 Average Power = -1.5205 dBi Max value = 19.4609 dBi Efficiency = 70.4619 % theta [degrees] phi [degrees]
176	 Beam 176 Average Power = -1.6204 dBi Max value = 19.6135 dBi Efficiency = 68.859 % theta [degrees] phi [degrees]	 Beam176 Average Power = -1.3864 dBi Max value = 20.1149 dBi Efficiency = 72.6703 % theta [degrees] phi [degrees]	 Beam 176 Average Power = -1.6619 dBi Max value = 19.8597 dBi Efficiency = 68.2048 % theta [degrees] phi [degrees]

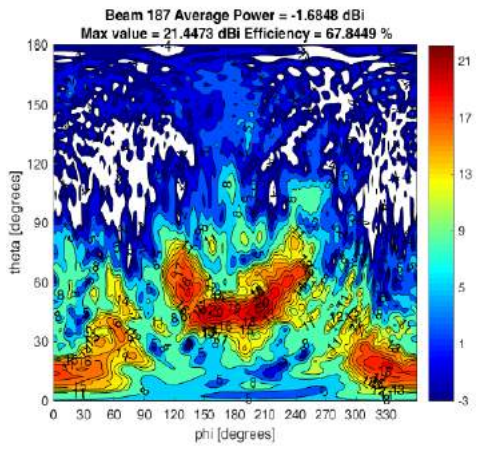
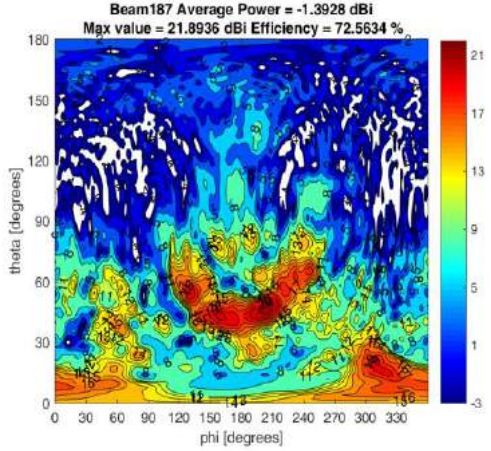
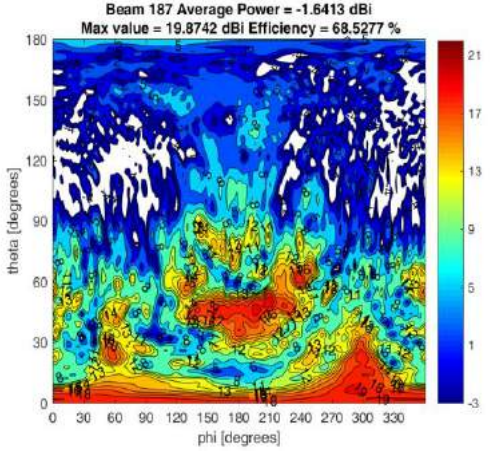
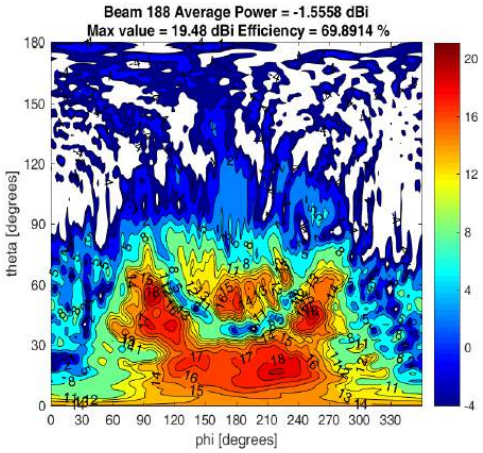
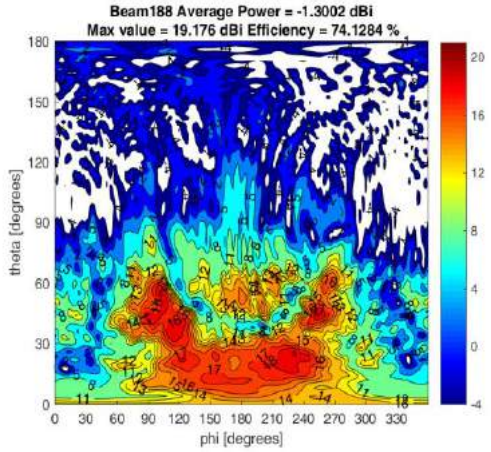
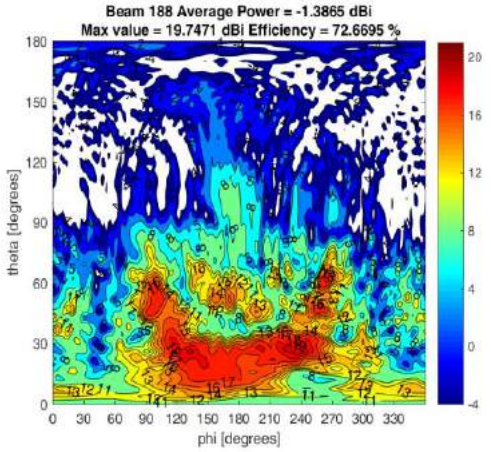
177	 Beam 177 Average Power = -1.8279 dBi Max value = 19.814 dBi Efficiency = 65.6459 % theta [degrees] phi [degrees]	 Beam177 Average Power = -1.4974 dBi Max value = 18.7378 dBi Efficiency = 70.8367 % theta [degrees] phi [degrees]	 Beam 177 Average Power = -1.5974 dBi Max value = 19.2627 dBi Efficiency = 69.2244 % theta [degrees] phi [degrees]
178	 Beam 178 Average Power = -1.4554 dBi Max value = 18.6716 dBi Efficiency = 71.5255 % theta [degrees] phi [degrees]	 Beam178 Average Power = -1.261 dBi Max value = 18.3319 dBi Efficiency = 74.7998 % theta [degrees] phi [degrees]	 Beam 178 Average Power = -1.5658 dBi Max value = 18.0153 dBi Efficiency = 69.7304 % theta [degrees] phi [degrees]

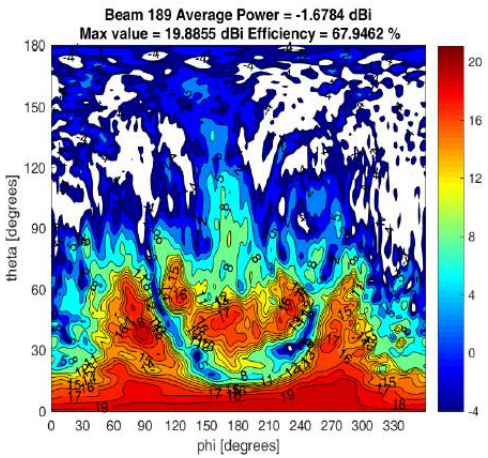
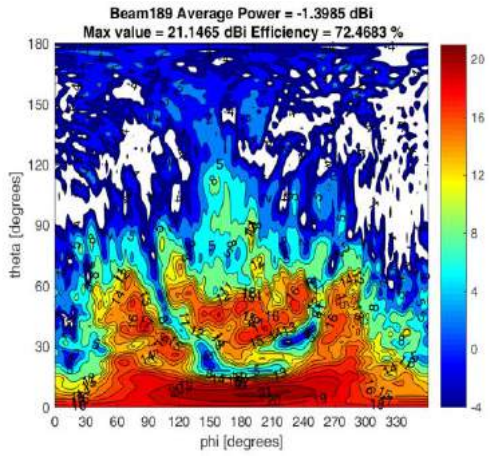
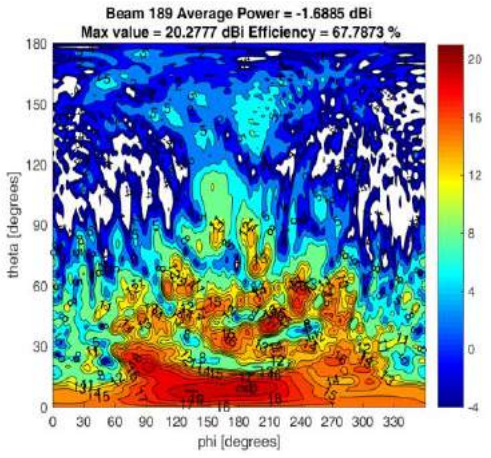
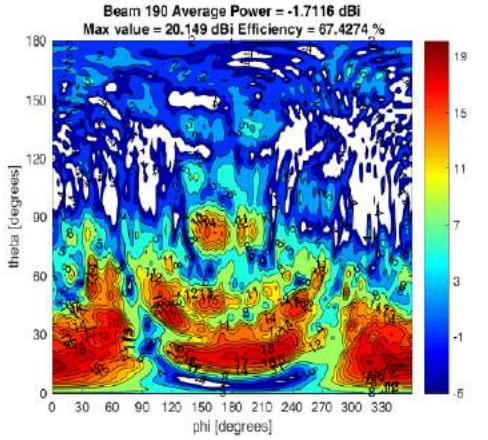
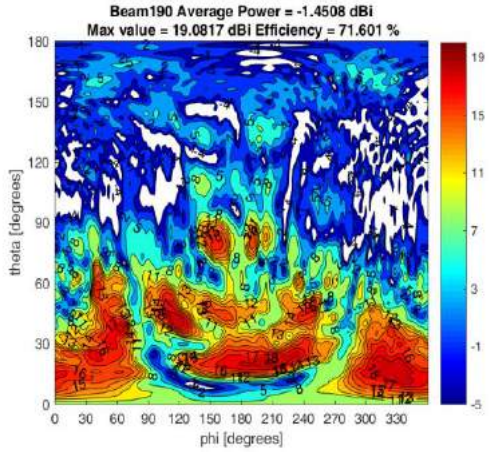
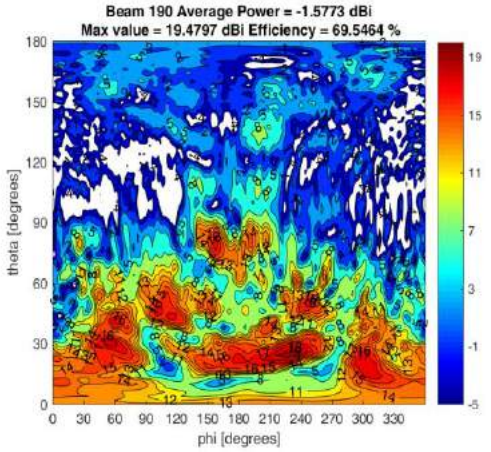
179	 Beam 179 Average Power = -1.5495 dBi Max value = 20.1819 dBi Efficiency = 69.9916 % theta [degrees] phi [degrees]	 Beam179 Average Power = -1.2953 dBi Max value = 20.2685 dBi Efficiency = 74.212 % theta [degrees] phi [degrees]	 Beam 179 Average Power = -1.6449 dBi Max value = 19.348 dBi Efficiency = 68.4714 % theta [degrees] phi [degrees]
180	 Beam 180 Average Power = -1.6448 dBi Max value = 20.3583 dBi Efficiency = 68.4733 % theta [degrees] phi [degrees]	 Beam180 Average Power = -1.3845 dBi Max value = 19.4986 dBi Efficiency = 72.7018 % theta [degrees] phi [degrees]	 Beam 180 Average Power = -1.5192 dBi Max value = 19.9788 dBi Efficiency = 70.4822 % theta [degrees] phi [degrees]

181	 Beam 181 Average Power = -1.7064 dBi Max value = 19.6634 dBi Efficiency = 67.508 % theta [degrees] phi [degrees]	 Beam181 Average Power = -1.4301 dBi Max value = 19.3656 dBi Efficiency = 71.9428 % theta [degrees] phi [degrees]	 Beam 181 Average Power = -1.8563 dBi Max value = 19.6779 dBi Efficiency = 65.2181 % theta [degrees] phi [degrees]
182	 Beam 182 Average Power = -1.7439 dBi Max value = 19.6749 dBi Efficiency = 66.928 % theta [degrees] phi [degrees]	 Beam182 Average Power = -1.4516 dBi Max value = 18.3636 dBi Efficiency = 71.5874 % theta [degrees] phi [degrees]	 Beam 182 Average Power = -1.6263 dBi Max value = 18.6458 dBi Efficiency = 68.7647 % theta [degrees] phi [degrees]

183	 Beam 183 Average Power = -1.4356 dBi Max value = 19.4555 dBi Efficiency = 71.853 % theta [degrees] phi [degrees]	 Beam183 Average Power = -1.3096 dBi Max value = 19.1968 dBi Efficiency = 73.9665 % theta [degrees] phi [degrees]	 Beam 183 Average Power = -1.5555 dBi Max value = 18.4221 dBi Efficiency = 69.8949 % theta [degrees] phi [degrees]
184	 Beam 184 Average Power = -1.7059 dBi Max value = 19.8781 dBi Efficiency = 67.5172 % theta [degrees] phi [degrees]	 Beam184 Average Power = -1.3987 dBi Max value = 19.8115 dBi Efficiency = 72.465 % theta [degrees] phi [degrees]	 Beam 184 Average Power = -1.6175 dBi Max value = 19.6518 dBi Efficiency = 68.9047 % theta [degrees] phi [degrees]

185	 Beam 185 Average Power = -1.9332 dBi Max value = 19.2894 dBi Efficiency = 64.0735 % theta [degrees] phi [degrees]	 Beam185 Average Power = -1.4832 dBi Max value = 19.5297 dBi Efficiency = 71.0694 % theta [degrees] phi [degrees]	 Beam 185 Average Power = -1.6467 dBi Max value = 19.1891 dBi Efficiency = 68.4439 % theta [degrees] phi [degrees]
186	 Beam 186 Average Power = -1.6323 dBi Max value = 15.875 dBi Efficiency = 68.6708 % theta [degrees] phi [degrees]	 Beam186 Average Power = -1.4573 dBi Max value = 16.8104 dBi Efficiency = 71.4948 % theta [degrees] phi [degrees]	 Beam 186 Average Power = -1.6389 dBi Max value = 16.3662 dBi Efficiency = 68.5657 % theta [degrees] phi [degrees]

187	 Beam 187 Average Power = -1.6848 dBi Max value = 21.4473 dBi Efficiency = 67.8449 % theta [degrees] phi [degrees]	 Beam187 Average Power = -1.3928 dBi Max value = 21.8936 dBi Efficiency = 72.5634 % theta [degrees] phi [degrees]	 Beam 187 Average Power = -1.6413 dBi Max value = 19.8742 dBi Efficiency = 68.5277 % theta [degrees] phi [degrees]
188	 Beam 188 Average Power = -1.5558 dBi Max value = 19.48 dBi Efficiency = 69.8914 % theta [degrees] phi [degrees]	 Beam188 Average Power = -1.3002 dBi Max value = 19.176 dBi Efficiency = 74.1284 % theta [degrees] phi [degrees]	 Beam 188 Average Power = -1.3865 dBi Max value = 19.7471 dBi Efficiency = 72.6695 % theta [degrees] phi [degrees]

189	 Beam 189 Average Power = -1.6784 dBi Max value = 19.8855 dBi Efficiency = 67.9462 % theta [degrees] phi [degrees]	 Beam189 Average Power = -1.3985 dBi Max value = 21.1465 dBi Efficiency = 72.4683 % theta [degrees] phi [degrees]	 Beam 189 Average Power = -1.6885 dBi Max value = 20.2777 dBi Efficiency = 67.7873 % theta [degrees] phi [degrees]
190	 Beam 190 Average Power = -1.7116 dBi Max value = 20.149 dBi Efficiency = 67.4274 % theta [degrees] phi [degrees]	 Beam190 Average Power = -1.4508 dBi Max value = 19.0817 dBi Efficiency = 71.601 % theta [degrees] phi [degrees]	 Beam 190 Average Power = -1.5773 dBi Max value = 19.4797 dBi Efficiency = 69.5464 % theta [degrees] phi [degrees]

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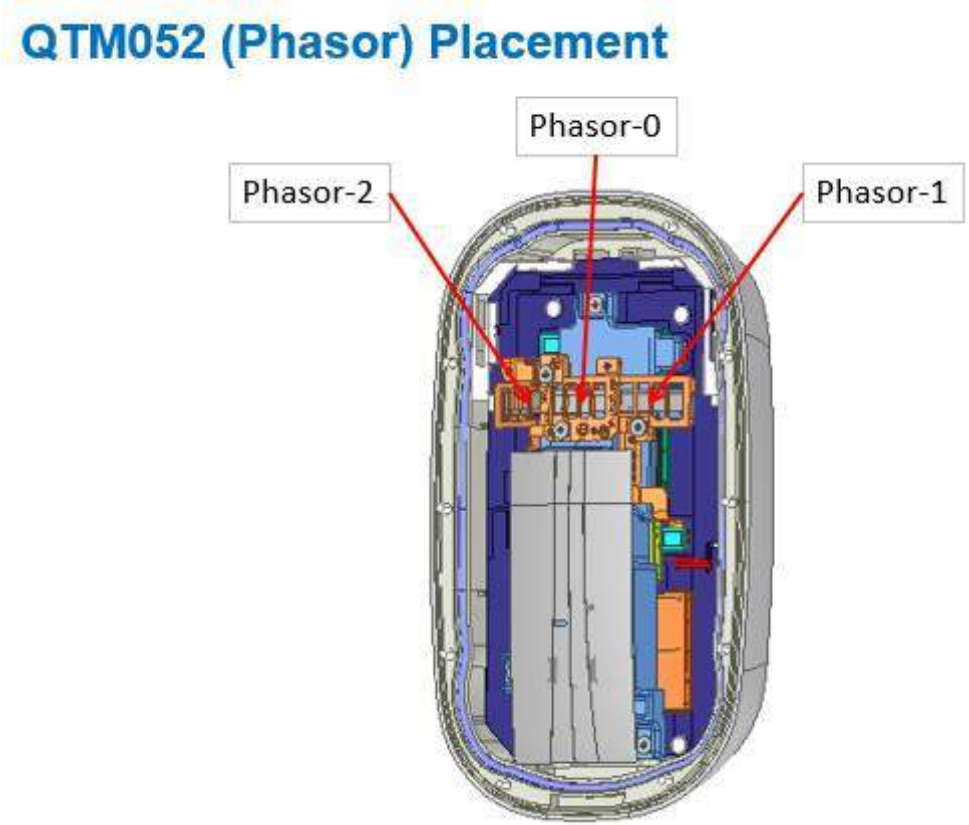
EUT information:

- **QTM052_1, 2, 3 :** 5G : n260/n261 (29/39 GHz)
- There are three QTM's 5G array antenna modules, and each 5G array antenna module consists of two sub-arrays.

These three 5G arrays antenna modules do not operate simultaneously of each other. The purpose of the three spatially separated 5G arrays is for spatial diversity. As for beam-steering/beam-forming mechanism, the wide beam-width on the best array, sweeps begin to improve link, and beam-width then reduces on best beam location.



Test Standard

Item	Standard List	Remark
1	FCC Part 30	NR Band: n260 & n261

2. Test Plan

Test Item	FCC Part Section(s)	Measurement Procedure	Test Condition
Occupied Bandwidth	**2.1094**	ANSI C63.26:2015 -Far-field mmWave Procedure (See following radiated measurement process)	Radiated (See Figure-1)
RF Output power/ EIRP	**2.1046 / 30.202**	ANSI C63.26:2015 -Far-field mmWave Procedure	
Spurious Emission	**2.1051 / 30.203**	ANSI C63.26:2015-Far-field mmWave Procedure	
Frequency Stability	**2.1055**	ANSI C63.26:2015-Far-field mmWave Procedure	

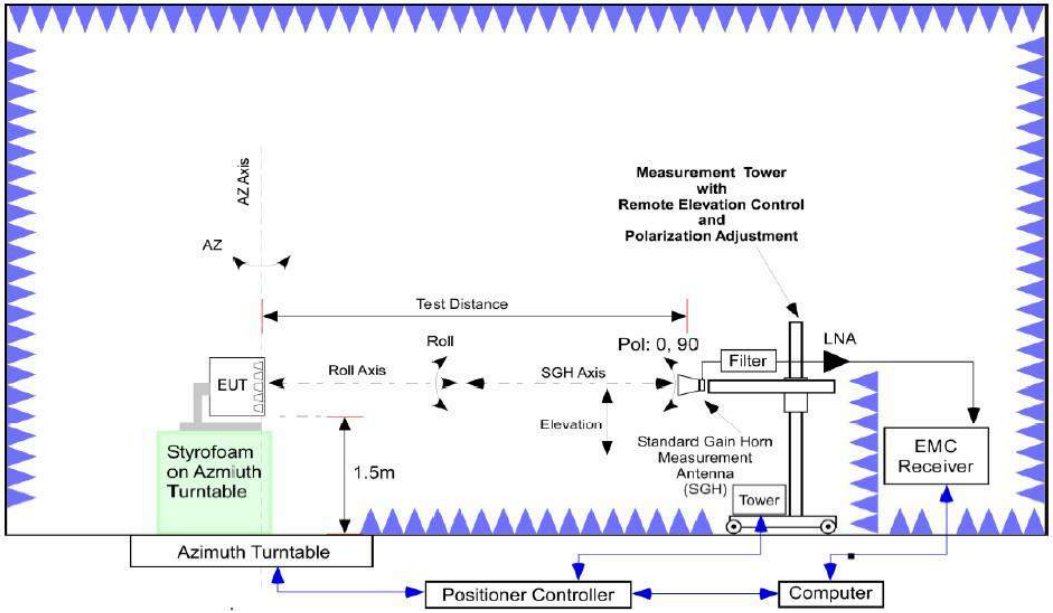
Radiated Measurement process (Far-field mmWave Procedure)

1. The radiated measurement will perform at an indoor 3 meter semic-anechoic chamber for final measurement.
2. Absorbers are arranged on the floor between the turn table and the antenna master for measurement above 1GHz.
3. Propose to adopt procedure from ANSI C63.26:2015 and KDB 842590 D01
4. The EUT is placed on turntable and receiver measurement antenna is located 3m (or less than 3m) from the EUT which is in the far field of the EUT per formula (2*D^2)/wavelength.

Table 2 – Measurement Distance

Measurement Frequency range	Far Field calculation distance	Measurement Distance (Far field)
Below 18GHz	0.05m	3m
18GHz to 40GHz	0.12m	1m
40GHz to 200GHz	0.12m to 0.59m	0.6m
Note: EUT Antenna Dimension is 21mm length, 2.2mm think and 6.7mm high.		

5. The EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on spectrum. (see Figure-1 Test configuration)
6. Radiated power levels are investigated with the receiver antenna horizontally and vertically polarized.
7. The maximized power level is rescored using the spectrum analyzer channel power function with the integration band set to emission's occupied bandwidth. The EIRP is calculated from the raw power level measured with the spectrum.
8. For band edge : The requirements in 30.203 are expressed in terms of conductive power, and then conducted power will be calculated by EIRP-Array Gain.
9. For out-of-band emission (NOT include band edge), the EIRP will be measured to demonstrate compliance with the requirement in section 30.203.



Firgure-1: Test Configuration