

2018. 1. 10



PAS-K02

UWB tags

Antenna gain



UWB Tags antenna gain

1. Measuring institution: RAPA - NIPA Antenna performance test room 1
2. Date of measurement, number of people measured: 2024.03.06, Song chang gun Senior Researcher
3. Detail: Full-band antenna gain measurement of PAS-K02 UWB TAG
4. Equipment: E8362B PNA Network Analyzer, Far-field 10 m (400MHz~18GHz)
5. Measurement target
 - 1) PT
 - 2) VT
 - 3) EMT
 - 4) SZT
 - 5) FZT

UWB Tags antenna gain

5. Antenna information

- We applied the gerber pattern antenna provided by Qorvo, a UWB IC manufacturer, to our products.

1) PT

- Antenna type : PCB Pattern antenna
- Manufacturing company: KYUNGWOO SYSTECH INC.
- Model name : WB003

UWB Tags antenna gain



5. Antenna information

- We applied the gerber pattern antenna provided by Qorvo, a UWB IC manufacturer, to our products.

2) VT, EMT

- Antenna type : PCB Pattern antenna
- Manufacturing company: KYUNGWOO SYSTECH INC.
- Model name : WB002

UWB Tags antenna gain

5. Antenna information

- We applied the gerber pattern antenna provided by Qorvo, a UWB IC manufacturer, to our products.

3) SZT, FZT

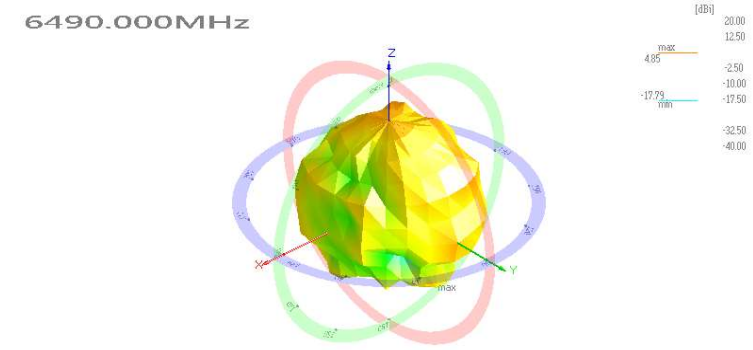
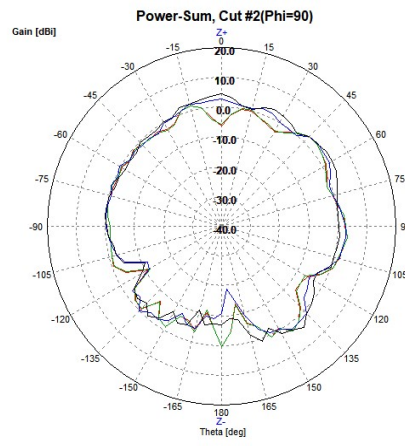
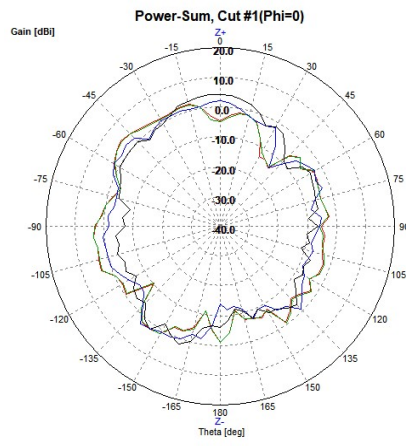
- Antenna type : PCB Pattern antenna
- Manufacturing company: KYUNGWOO SYSTECH INC.
- Model name : WB002

UWB Tags antenna gain- PT

6. Measurement result

1) PT

No.	Freq.[MHz]	Theta-Pol(H)					Phi-Pol(V)					PwrSum				
		Avg.[dBi]	Peak[dBi]	Theta[deg]	Null[dBi]	Theta[deg]	Avg.[dBi]	Peak[dBi]	Theta[deg]	Null[dBi]	Theta[deg]	Avg.[dBi]	Peak[dBi]	Theta[deg]	Null[dBi]	Theta[deg]
1	900	-35.75	-28.88	125	-70.59	-170	-32.84	-26.84	-175	-50.78	45	-31.04	-26.84	-175	-47.07	40
2	1000	-35.07	-27.97	130	-62.99	160	-33.42	-28.87	-35	-55.38	65	-31.16	-27.16	130	-40.46	60
3	1500	-28.34	-21.02	150	-44.01	-60	-24.56	-18.99	-115	-39.91	65	-23.04	-18.44	-120	-37.59	65
4	2400	-23.34	-16.61	-145	-47.5	-15	-12.39	-8.77	-115	-29.53	-170	-12.05	-8.61	-115	-25.91	-170
5	3000	-15.61	-10.89	-70	-30.85	40	-6.61	-0.03	-180	-20.5	-45	-6.1	-0.01	-180	-18.53	45
6	3994	-10.8	-6.09	-110	-30.89	-65	-0.65	3.99	110	-18.18	55	-0.25	4.31	110	-10.89	-55
7	4493	-9.7	-3.61	-55	-28.34	-175	-0.14	5.03	-95	-14.29	65	0.31	5.12	-95	-12.12	65
8	4800	-10	-3.83	-50	-32.51	-175	-0.5	6.73	-100	-15.55	145	-0.04	6.86	-100	-12.78	25
9	5990	-7.65	-2.65	-35	-20.35	40	-1.77	4.07	-50	-21.51	-170	-0.77	4.61	-50	-14.4	40
10	6000	-7.89	-3.07	-35	-19.61	-120	-1.85	3.94	-50	-22	-170	-0.89	4.38	-50	-14.04	40
11	6490	-6.88	0.07	-5	-32.48	100	-3.32	2.31	-140	-21.54	-180	-1.73	4.85	-140	-14.22	40
12	6989	-5.6	1.77	5	-29.13	60	-4.04	1.4	-145	-24.56	170	-1.74	4.41	-5	-11.65	170
13	7488	-5.65	2.34	0	-35.53	65	-5.77	0.79	-5	-51.91	-110	-2.7	4.56	-5	-19.1	95
14	7987	-7.53	-0.98	0	-30.58	-40	-7.43	-1.3	-70	-35.6	110	-4.47	0.87	-5	-20.19	85
15	8486	-8.52	-0.95	15	-36.58	95	-8.1	-2.39	-70	-35.78	145	-5.29	-0.14	20	-16.19	-175
16	10200	-8.52	-0.46	40	-32.19	0	-4.17	3.41	-50	-26.11	95	-2.81	3.79	-50	-15.59	100
17	11000	-6.54	0.97	45	-35.26	-145	-2.41	6.4	-60	-26.58	10	-0.99	6.62	-60	-15.36	-155

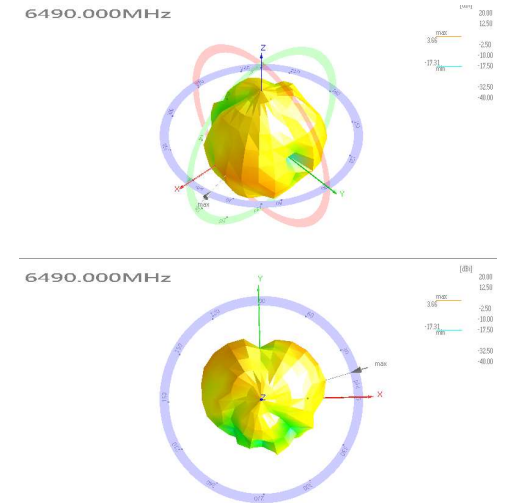
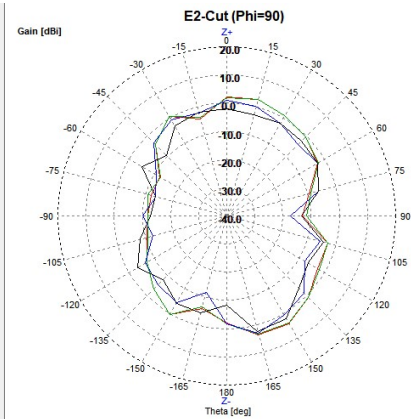
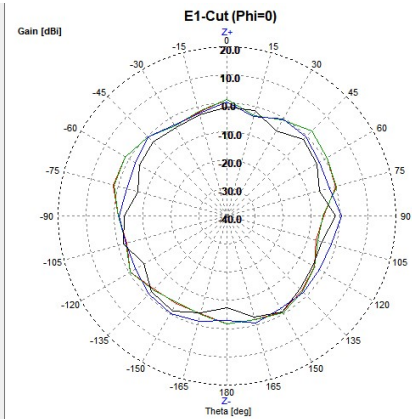
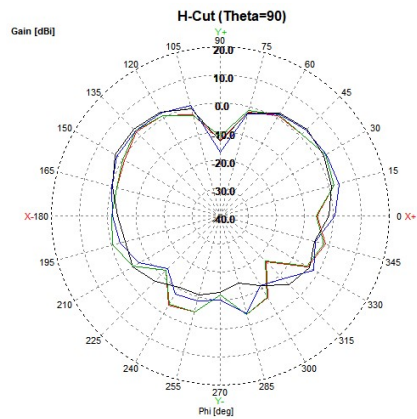


UWB Tags antenna gain- VT

6. Measurement result

1) VT

No.	Freq.	PwrSum					H(Theta=90)					E1(Phi=0)					E2(Phi=90)				
		Eff. [%]	Avg.[dBi]	Peak[dBi]	Theta[deg]	Phi[deg]	Avg.[dBi]	Peak[dBi]	Phi[deg]	BW[deg]	Avg.[dBi]	Peak[dBi]	Theta[deg]	BW[deg]	Avg.[dBi]	Peak[dBi]	Theta[deg]	BW[deg]			
1	900	9.68	-10.14	-4.42	-135	75	-12.53	-9.67	180	59.91	-10	-7.22	-135	13.65	-9.44	-4.94	-135	29.63			
2	1000	8.66	-10.62	-5.26	-135	60	-11.06	-8.39	165	76.09	-10.16	-7.78	-45	272.49	-10.51	-6.55	-135	216.77			
3	1500	34.24	-4.65	-0.81	-135	45	-5.68	-3.04	180	102.33	-3.34	-1.84	-165	480.08	-5.55	-1.68	180	42.83			
4	2400	63.24	-1.99	3.35	-180	75	-4.03	0.6	345	75.26	-0.05	2.28	180	18.81	-1.39	3.3	180	41.14			
5	3000	70.47	-1.52	4.36	-15	60	-3.27	1.05	330	69.85	-0.26	3.3	-15	57.21	-1.97	4.22	-15	55.86			
6	3994	67.66	-1.7	3.54	-120	45	-2.04	1.88	330	54.13	-2.49	2.18	-75	37.52	-3.62	0.84	-30	48.77			
7	4493	82.71	-0.82	4.49	-135	135	-1.79	3.28	330	46.59	-2.04	2.46	-75	77.72	-2.69	3.08	-45	49.88			
8	4800	88.96	-0.51	4.73	-45	75	-1.77	3.64	315	31.18	-0.54	4.3	-75	77.67	-2.46	3.81	-45	42.41			
9	5990	76.97	-1.14	4.11	150	90	-1.54	3.22	30	53.1	-1.04	2.6	45	43.95	-1.14	4.11	150	35.68			
10	6000	77.4	-1.11	3.87	150	90	-1.48	3.15	30	55.97	-1	2.52	45	45.02	-1.15	3.87	150	38.35			
11	6490	71.59	-1.45	3.66	90	15	-0.65	3.66	15	63.78	-1.46	0.58	90	156.64	-2.93	3.13	165	28.56			
12	6989	70.59	-1.51	3.88	105	120	-1.01	3.64	45	52.08	-3.17	-0.82	150	37.64	-3.48	2.48	165	25.88			
13	7488	13.49	-8.7	0.92	150	90	-12.77	-8.33	45	22.29	-10.81	-6.6	-120	46.13	-5.53	0.92	150	25.31			
14	7987	14.14	-8.5	-0.23	-60	60	-10.53	-4.6	270	9.53	-10.97	-6.33	-120	22.51	-7.26	-1.18	-60	16.79			
15	8486	16.36	-7.86	0.99	-60	120	-9.99	-4.77	270	12.94	-10.8	-4.22	-150	9.44	-7.46	-2.39	-60	36.55			
16	10200	15.38	-8.13	-1.36	-30	45	-10.31	-4.94	315	29.16	-11.76	-5.86	-45	10.1	-6.39	-2.2	15	79.49			
17	11000	11.58	-9.36	-0.35	-120	105	-11.53	-6.92	240	24.3	-10.97	-5.09	-150	6.56	-6.91	-2.33	-30	75.66			

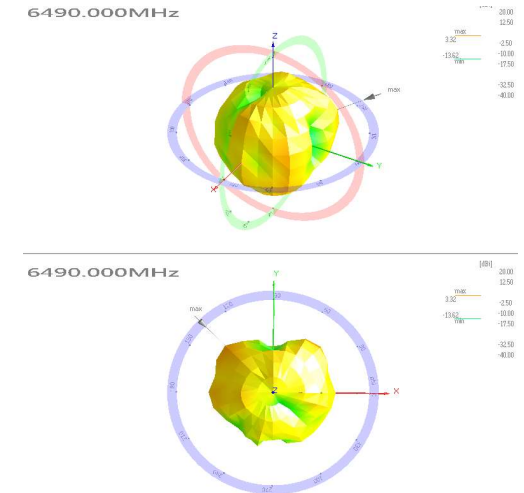
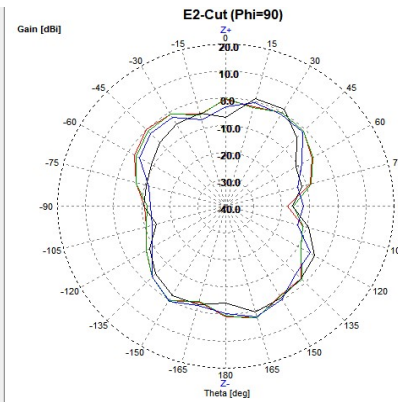
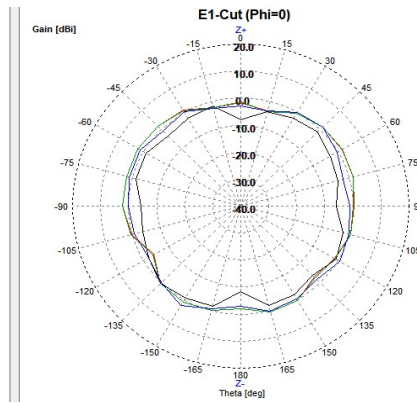
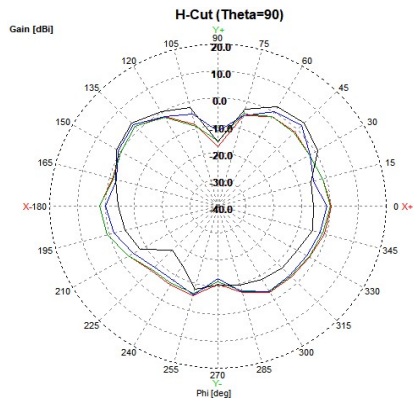


UWB Tags antenna gain – EMT

6. Measurement result

3) EMT

No.	Freq.	PwrSum					H(Theta=90)					E1(Phi=0)					E2(Phi=90)				
		Eff.[%]	Avg.[dB]	Peak[dBi]	Theta[deg]	Phi[deg]	Avg.[dB]	Peak[dBi]	Phi[deg]	BW[deg]	Avg.[dB]	Peak[dBi]	Theta[deg]	BW[deg]	Avg.[dB]	Peak[dBi]	Theta[deg]	BW[deg]			
1	900	11.03	-9.58	-3.97	-135	75	-12.55	-9.91	255	113.71	-9.59	-6.3	-165	190.63	-8.52	-4.5	-135	26.51			
2	1000	10.59	-9.75	-4.72	-135	75	-10.26	-8.27	165	170.35	-9.36	-6.33	180	72.04	-8.36	-5.5	165	111.21			
3	1500	34.22	-4.66	-0.5	-180	105	-6.03	-3.41	165	108.36	-3.29	-0.65	180	50.03	-4.66	-0.58	180	46			
4	2400	77.56	-1.1	4.43	-180	165	-2.97	-0.18	345	102.15	0.5	3.67	180	71.04	-0.35	4.28	180	38.99			
5	3000	52.8	-2.77	4.25	-150	90	-5.52	-1.88	330	87.52	-2.15	1.49	180	10.76	-0.73	4.25	-150	26.87			
6	3994	81.65	-0.88	4.27	-30	90	-2.28	0.73	345	114.49	-0.2	2.18	60	142.85	-1.88	4.27	-30	40.22			
7	4493	86.58	-0.63	3.82	-75	0	-1.07	2	330	102.09	-0.31	3.82	-75	51.29	-1.49	3.09	-30	70.04			
8	4800	90.2	-0.45	4.93	-60	0	-1.03	3.57	180	36.07	0.28	4.93	-60	59.66	-0.63	3.72	-30	65.16			
9	5990	75.79	-1.2	3.1	75	135	-2.02	2.24	180	35.05	0.35	2.34	-60	86.24	-2.39	2.65	165	30			
10	6000	74.94	-1.25	3.03	75	135	-2.17	2.1	180	35.31	0.35	2.4	-60	86.47	-2.4	2.75	165	29.64			
11	6490	70.52	-1.52	3.32	75	135	-2.24	2.62	135	31.52	-0.29	2.54	-150	33.74	-2.98	2.49	165	34.27			
12	6989	65.82	-1.82	3.79	75	45	-2.26	3.33	45	37.89	-2.46	0.31	-135	53.79	-3.79	1.55	30	28.06			
13	7488	12.38	-9.07	-0.29	165	90	-13.07	-7.42	150	20.44	-10.78	-4	-150	16.06	-6.25	-0.29	165	30.8			
14	7987	14.55	-8.37	-1.73	135	165	-9.55	-2.71	270	6.69	-10.13	-4.92	-105	19.78	-7.94	-2.71	-90	30.42			
15	8486	17.28	-7.62	-0.49	-90	90	-8.72	-0.49	270	5.62	-9.45	-3.85	135	19.57	-6.49	-0.49	-90	26.28			
16	10200	9.75	-10.11	-3.02	45	30	-13.2	-8.75	165	31.24	-14.31	-8.8	120	11.34	-8.35	-3.71	165	23.25			
17	11000	7.26	-11.39	-2.01	-135	90	-15.88	-6.58	270	6.24	-14.46	-8.34	-120	11.71	-8.98	-2.01	-135	13.88			

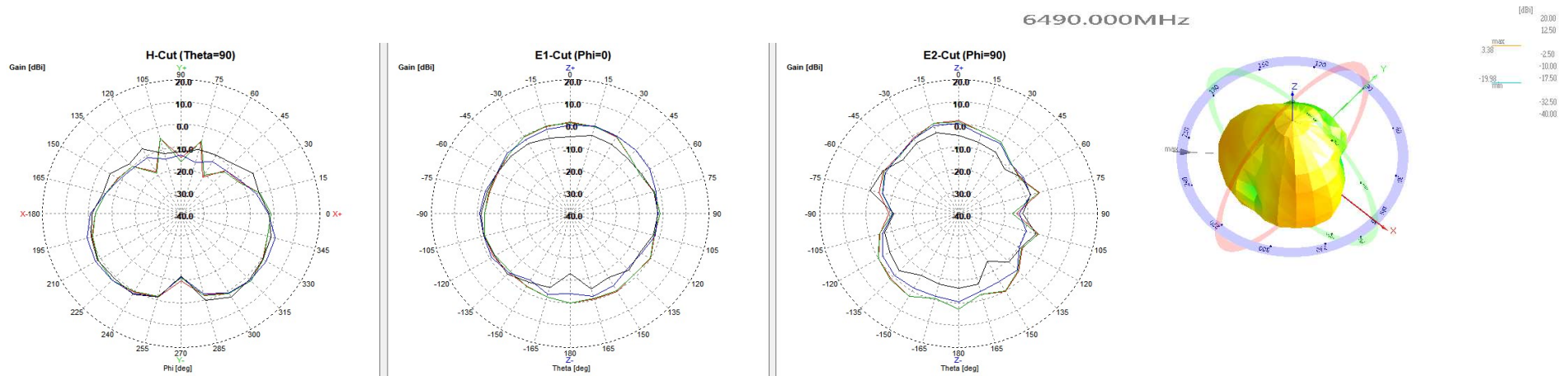


UWB Tags antenna gain – SZT

6. Measurement result

4) SZT

No.	Freq.	PwrSum	Eff.[%]	Avg.[dB]	Peak[dBi]	Theta[deg]	Phi[deg]	H(Theta=90)	Avg.[dBi]	Peak[dBi]	Phi[deg]	BW[deg]	E1(Phi=0)	Avg.[dBi]	Peak[dBi]	Theta[deg]	BW[deg]	E2(Phi=90)	Avg.[dBi]	Peak[dBi]	Theta[deg]	BW[deg]
1	900		7.64	-11.17	-5.9	105	135		-12.25	-9.75	180	122.27		-10.72	-8.63	-120	260.62		-11.99	-9.61	-60	90.99
2	1000		11.99	-9.21	-5.9	-105	150		-10.25	-7.66	135	109.26		-7.89	-6.28	15	85.73		-10.63	-7.02	165	48.79
3	1500		60.19	-2.2	1.49	-180	105		-4.03	-1.46	15	101.26		-0.65	1.21	180	49.8		-2.65	1.42	180	47.15
4	2400		37.18	-4.3	0.75	-180	150		-5.25	-2.71	45	124.26		-3.55	0.13	180	18.02		-4.29	0.41	180	24.3
5	3000		29.47	-5.31	-0.3	150	60		-6.42	-3.5	120	34.95		-5.06	-3.6	-150	312.28		-5.48	-0.96	150	23.93
6	3994		74.52	-1.28	3.58	-120	60		-0.77	2.32	240	54.48		-1.77	0.6	-150	81.69		-2.67	1.89	-60	36.43
7	4493		84.03	-0.76	2.8	-150	15		-0.73	2.01	210	109.8		0.68	2.55	-135	161.46		-2.64	0.64	180	83.09
8	4800		79.56	-0.99	3.79	-75	60		-0.84	3.28	315	44.04		0.2	3.11	150	63.02		-2.97	2.08	180	22.26
9	5990		79.07	-1.02	4.44	-120	120		-2.19	2.56	315	46.01		-1.26	1.15	0	76.92		-1.4	2.9	180	21.07
10	6000		78.34	-1.06	4.45	-120	120		-2.22	2.61	315	46.06		-1.32	0.8	0	82.24		-1.57	2.92	-150	43.59
11	6490		67.49	-1.71	3.38	-105	30		-1.52	2.94	210	63.51		-1.7	0.57	15	157.97		-3.36	0.76	-15	47.44
12	6989		58.8	-2.31	3.13	-90	120		-1.62	3.13	300	61.17		-3.74	-1.33	-105	125.28		-5.89	-0.34	-75	24.16
13	7488		55.97	-2.52	3.79	-90	135		-2.09	3.79	315	25.1		-5.54	-2.33	60	71.72		-6.08	1.04	-75	23.19
14	7987		63.84	-1.95	4.99	-120	45		-1.83	4.9	315	18.26		-6.7	-3.6	120	39.43		-5.61	0.65	-75	12.58
15	8486		65.49	-1.84	6.1	-75	135		-1.37	5.3	315	12.28		-5.85	-2.74	-135	113.92		-6.62	-1.02	-75	10.88
16	10200		48.48	-3.14	3.75	-75	105		-0.92	3.16	300	24.94		-3.74	0.71	-75	52.73		-9.02	-2.26	-75	13.72
17	11000		64.22	-1.92	3.85	-90	120		-0.44	3.85	300	20.88		-0.36	2.8	120	102.35		-7.24	-3.54	-105	65.02



UWB Tags antenna gain – FZT

6. Measurement result

4) FZT

No.	Freq.	PwrSum					H(Theta=90)					E1(Phi=0)					E2(Phi=90)				
		Eff.[%]	Avg.[dBi]	Peak[dBi]	Theta[deg]	Phi[deg]	Avg.[dBi]	Peak[dBi]	Phi[deg]	BW[deg]	Avg.[dBi]	Peak[dBi]	Theta[deg]	BW[deg]	Avg.[dBi]	Peak[dBi]	Theta[deg]	BW[deg]			
1	900	17.88	-7.48	-4.1	-180	165	-9.34	-6.27	15	91.35	-5.91	-4.3	180	87.71	-8.13	-4.14	180	81.91			
2	1000	20.65	-6.85	-2.64	150	120	-8.37	-4.6	15	81	-5.49	-3.44	180	74.13	-7.36	-3.03	165	72.9			
3	1500	25.84	-5.88	0.39	135	135	-7.28	-3.09	30	57.65	-6.83	-2.75	-165	32.88	-6.59	-1.9	45	52.61			
4	2400	8.86	-10.53	-4.74	-180	120	-12.6	-9.63	240	218.55	-11.04	-5.74	180	20.51	-8.92	-5.15	180	34.35			
5	3000	35.52	-4.5	-0.09	-75	165	-4.41	-0.46	360	67.34	-3.46	-0.32	75	88.02	-5.69	-1.1	120	47.07			
6	3994	61.07	-2.14	4.36	-120	120	-2.98	2.34	300	43.06	-2.48	-0.23	135	180.41	-2.92	0.58	-120	32.78			
7	4493	80.26	-0.95	3.59	-150	135	-2.25	1.72	195	23.63	0.07	3.08	-120	33.83	-1.42	3.37	-150	225.66			
8	4800	80.7	-0.93	3.9	-135	135	-2.31	2.05	225	24.3	0.33	2.58	-105	186.42	-1.48	2.95	-150	25.96			
9	5990	71.29	-1.47	4.22	-30	120	-2.17	2.36	300	60.24	-0.98	2.27	0	72.16	-1	2.89	-30	86.26			
10	6000	70.39	-1.53	4.1	-30	135	-2.2	2.42	300	60.42	-0.99	2.34	0	67.56	-1.15	2.65	-30	87.89			
11	6490	66.86	-1.75	4.01	-90	30	-1.57	4.01	210	38.55	-1.41	1.59	0	71.62	-2.92	1.53	-150	213.41			
12	6989	61.86	-2.09	4.16	-105	45	-1.75	3.81	225	37.98	-2.74	-0.11	135	62.45	-4.68	0.3	-30	63.36			
13	7488	51.27	-2.9	4.3	-90	45	-1.67	4.3	225	30.03	-5.41	-1.76	-150	27.24	-7.94	-2.95	-15	66.6			
14	7987	51.15	-2.91	3.74	-105	135	-2.1	2.73	225	39.07	-6.36	-2.16	60	72.9	-7.36	-2.95	15	46.53			
15	8486	66.1	-1.8	4.4	-90	120	-0.9	4.4	300	23.67	-5.65	-0.82	-90	61.53	-4.96	0.34	-150	19.22			
16	10200	39.99	-3.98	4.38	-90	60	-2.39	4.38	240	14.06	-6.78	-0.51	-120	34.69	-8.03	-4.87	75	32.76			
17	11000	51.14	-2.91	2.77	-60	120	-1.68	2.14	300	33.79	-2.22	2.14	75	67.12	-9.21	-5	-75	10.37			

6490.000MHz

