

2017.07.25

RA-N0726-4

APPROVAL SHEET

MODEL : 30K
Antenna layout

Review	Consent	Approval

Messrs. SENA Technology Co.,Ltd



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1. Revision History

NO.	Before	After	Reason	Date
1				
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2.Product Information

2.1 General Features

PART NUMBER	GradiANT
ANTENNA TYPE	PCB Pattern Antenna
APPLICATIONS	Bluetooth

2.2 Electrical Specifications

Frequency Range1 (TX)		2400MHz~2485MHz	
Frequency Range1 (RX)		2400MHz~2485MHz	
IMPEDANCE		50 Ω	
V.S.W.R	TX	2400MHz	2485MHz
		3 ↓	3 ↓
	RX	2400MHz	2485MHz
		3 ↓	3 ↓
RADIATION PATTERN		Omni-directional	
POLARIZATION		Linear	

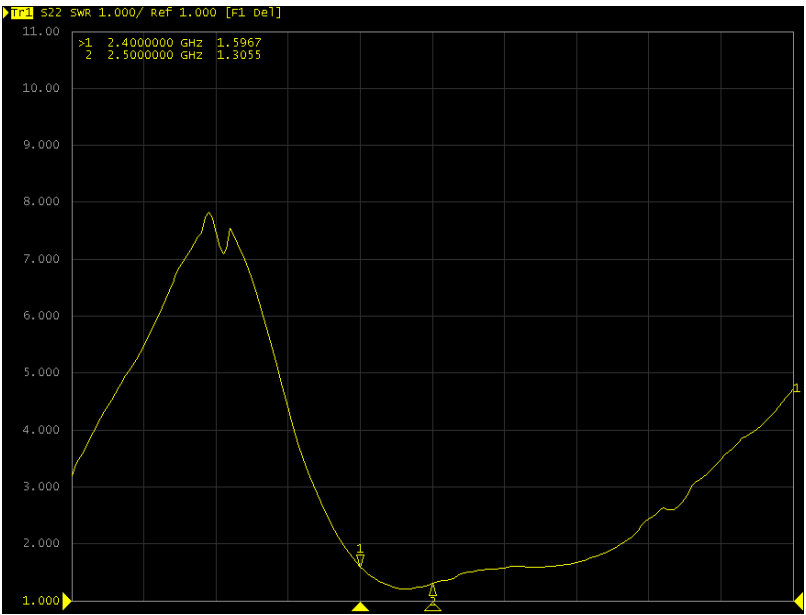
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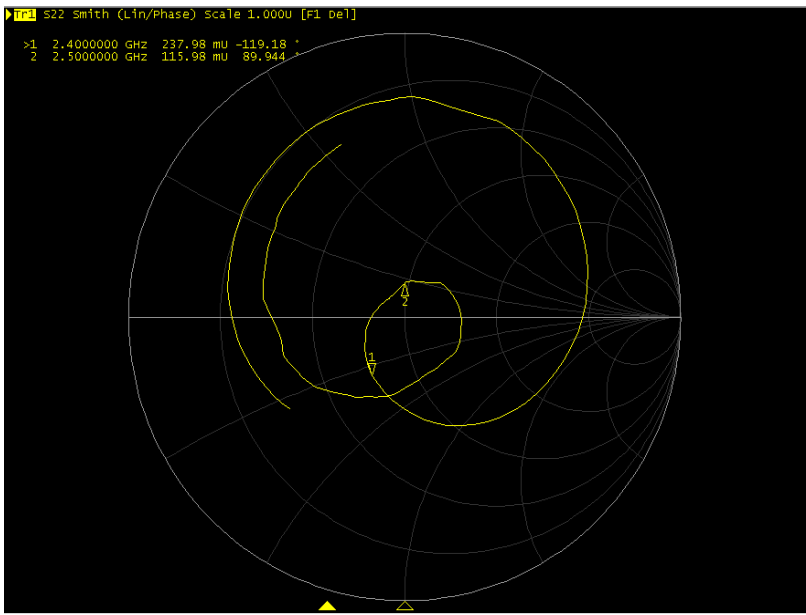
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3. Electrical Characterristics

3.1 VSWR



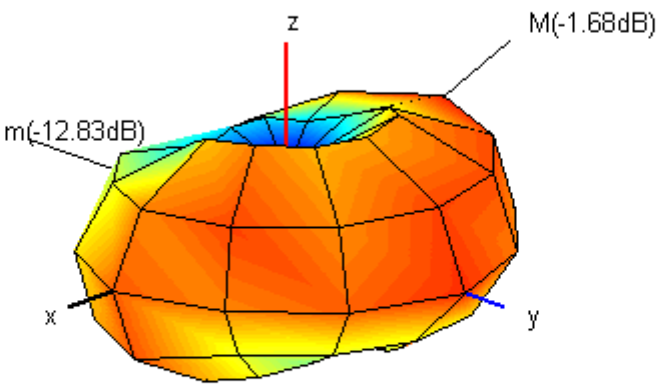
3.2 SMITH CHART



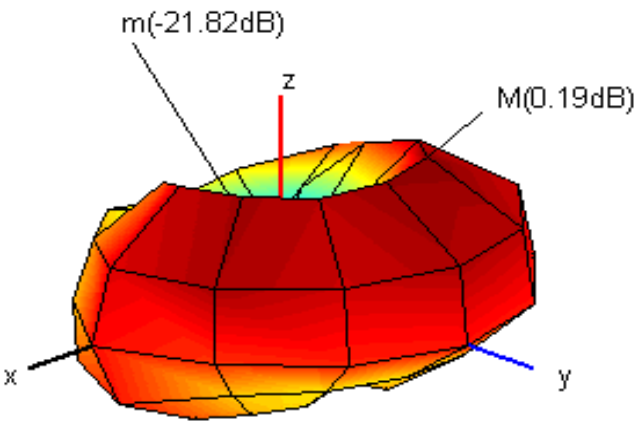
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3.3 3D-PLOTs

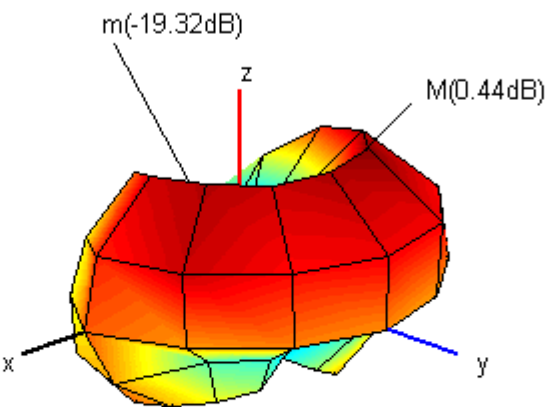
2400MHZ



2445MHZ



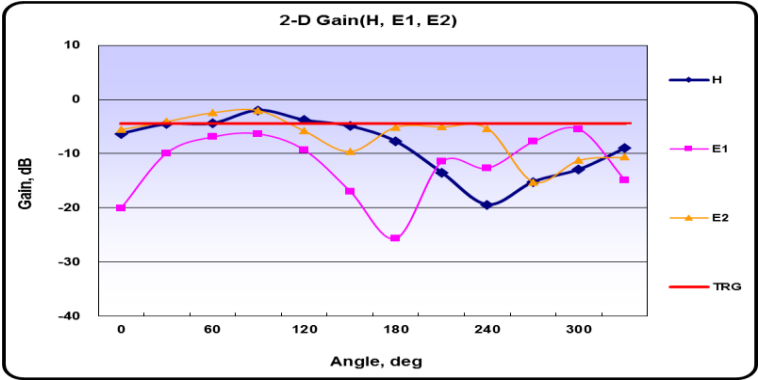
2485MHZ



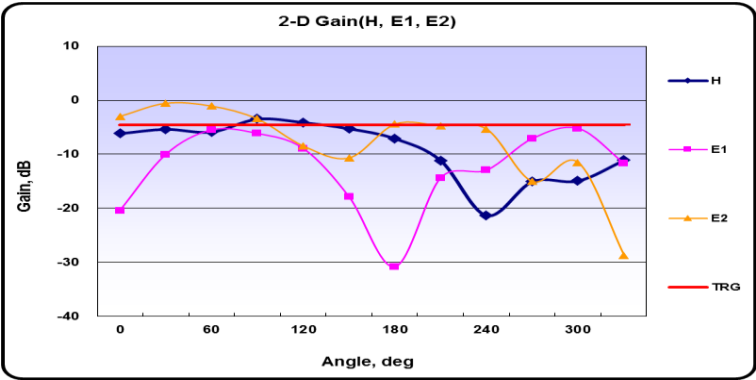
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3.4 2D-GAIN

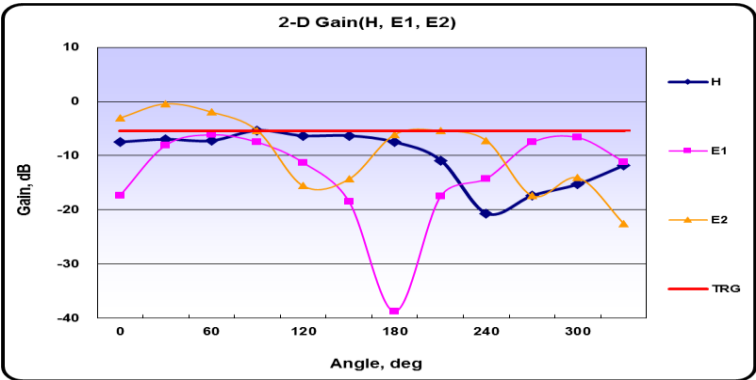
2400MHZ



2445MHZ



2485MHZ



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4. Passive Measurement

	1	2	3	4	5	6	7	8	9	10
Frequency(MHz)	2400	2405	2410	2415	2420	2425	2430	2435	2440	2445
Efficiency(dB)	-4.43	-4.50	-4.38	-4.16	-3.97	-3.89	-3.76	-4.59	-4.52	-4.53
Efficiency(%)	36.09	35.46	36.49	38.39	40.04	40.81	42.10	34.74	35.35	35.25
TRG(dB)	-4.43	-4.50	-4.38	-4.16	-3.97	-3.89	-3.76	-4.59	-4.52	-4.53
TRG _{Theta} (dB)	-7.19	-7.17	-6.99	-6.73	-6.49	-6.40	-6.16	-6.98	-6.91	-6.92
TRG _{Phi} (dB)	-7.70	-7.89	-7.83	-7.66	-7.54	-7.47	-7.48	-8.33	-8.25	-8.25
UHRG(dB)	-7.54	-7.56	-7.34	-7.06	-6.79	-6.60	-6.36	-7.08	-6.93	-6.87
UHRG/TRG(%)	48.86	49.48	50.62	51.28	52.34	53.57	54.91	56.37	57.33	58.30
H-Plane	-6.40	-6.50	-6.34	-6.18	-6.02	-5.99	-5.93	-6.91	-6.97	-7.06
E1-Plane, AVG(dB)	-9.66	-9.64	-9.46	-9.18	-8.99	-8.92	-8.53	-9.38	-9.22	-9.23
E2-Plane, AVG(dB)	-5.52	-5.42	-5.18	-4.93	-4.54	-4.50	-4.20	-5.01	-4.84	-4.84
Peak Gain(dB)	-1.68	-1.81	-1.78	-1.42	-0.89	-0.79	-0.33	-0.64	-0.33	-0.19
Directivity(dB)	2.74	2.69	2.60	2.73	3.09	3.10	3.43	3.95	4.19	4.34
Minimum Gain(dB)	-12.83	-12.96	-13.69	-14.26	-15.40	-16.17	-16.48	-18.51	-19.78	-21.83

	11	12	13	14	15	16	17	18	19	20
Frequency(MHz)	2450	2455	2460	2465	2470	2475	2480	2485	2490	2497
Efficiency(dB)	-4.65	-4.60	-5.07	-5.21	-5.35	-5.35	-5.47	-5.42	-5.47	-5.59
Efficiency(%)	34.25	34.71	31.11	30.16	29.18	29.20	28.39	28.68	28.40	27.62
TRG(dB)	-4.65	-4.60	-5.07	-5.21	-5.35	-5.35	-5.47	-5.42	-5.47	-5.59
TRG _{Theta} (dB)	-7.05	-6.96	-7.47	-7.61	-7.72	-7.74	-7.90	-7.87	-7.94	-8.09
TRG _{Phi} (dB)	-8.38	-8.37	-8.80	-8.92	-9.11	-9.07	-9.14	-9.08	-9.09	-9.18
UHRG(dB)	-6.91	-6.77	-7.20	-7.24	-7.32	-7.26	-7.33	-7.24	-7.22	-7.27
UHRG/TRG(%)	59.51	60.67	61.24	62.61	63.46	64.38	65.19	65.89	66.79	67.85
H-Plane	-7.41	-7.29	-7.89	-8.08	-8.29	-8.25	-8.52	-8.48	-8.65	-8.72
E1-Plane, AVG(dB)	-9.35	-9.29	-9.74	-9.86	-10.00	-9.85	-10.00	-9.97	-10.01	-10.11
E2-Plane, AVG(dB)	-4.93	-4.78	-5.26	-5.43	-5.48	-5.56	-5.70	-5.76	-5.80	-6.02
Peak Gain(dB)	0.13	0.41	0.10	0.24	0.32	0.34	0.30	0.44	0.46	0.34
Directivity(dB)	4.79	5.01	5.17	5.45	5.67	5.69	5.77	5.87	5.93	5.93
Minimum Gain(dB)	-22.75	-20.93	-21.43	-21.33	-20.36	-19.45	-20.44	-19.33	-18.27	-17.34

Average Efficiency	-4.71dBi,	33.82%
Peak Gain	0.46dBi	

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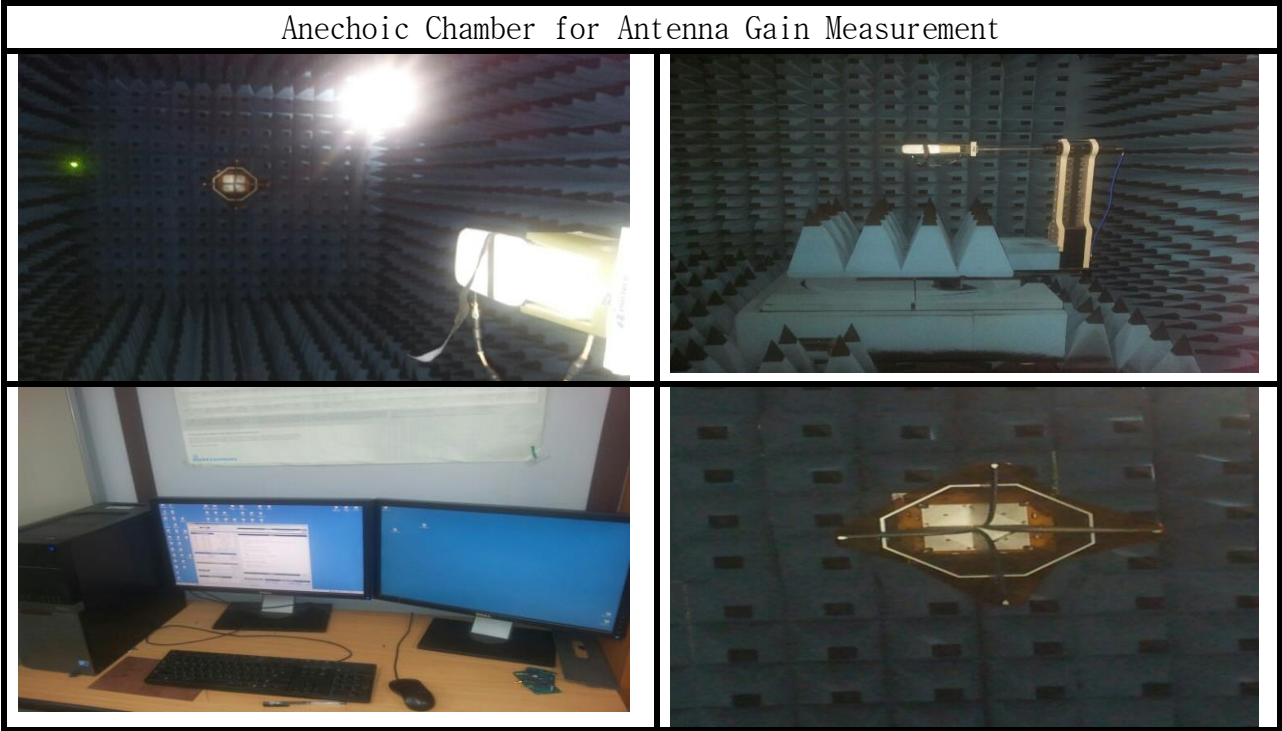
5.Measurement Process

5.1 SWR / Return loss

	Set Condition
Network Analyzer	Agilent 8753ES
Cable	Semi-ridid (40mm, 60mm)
Test condition	

5.2 Gain

Antenna gain is measured in the anechoic chamber of this company.

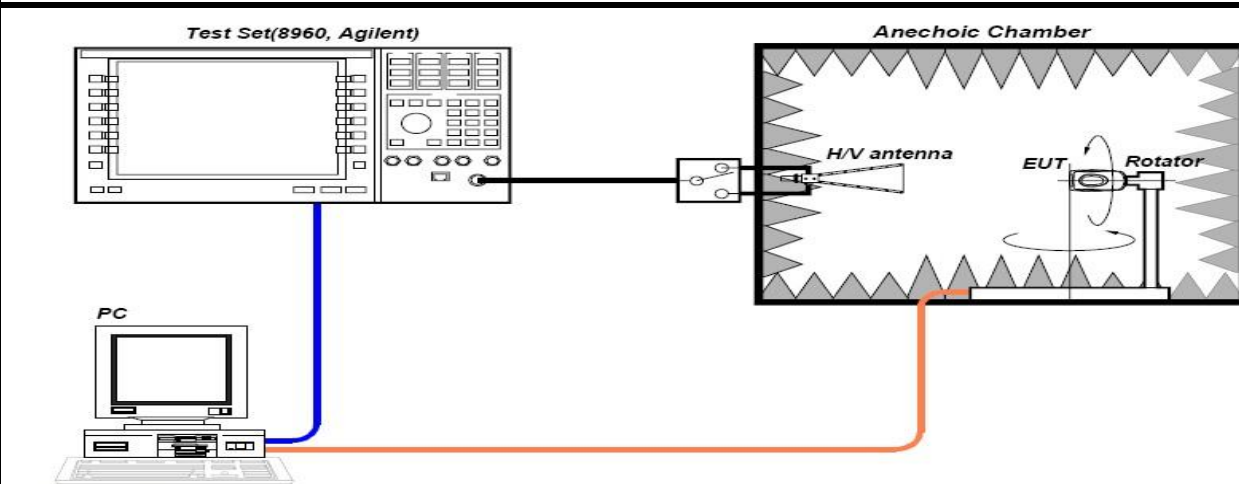


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5.3 Gain test block diagram

Active test Sysetm

- TRP, NHPRP, UHRP
- TIS, NHPIS, UHIS
- Relative Sensitivity



Passiver test Sysetm

- Efficiency
- Peak Gain, Avg, Gain
- Min, Max PWR

