

2017.07.25

RA-N0726-4

APPROVAL SHEET

MODEL : 30K
Antenna layout

Review	Consent	Approval

Messrs. SENA Technology Co.,Ltd



RadiNa Co. ,Ltd

TEL : +82-2-463-0373

FAX : +82-2-463-0374

	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	2 / 10

Table of contents

1. Revision History

2. Product Information

2.1 General Features

2.2 Electrical Specifications

3. Electrical Characteristics

3.1 VSWR

3.2 Smith Chart

3.3 3D-PLOT

3.4 2D-GAIN

4. Passive Measurement

5. Measurement Process

	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	3 / 10

1. Revision History

NO.	Before	After	Reason	Date
1				
2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				

RADINA. Co., LTD / CONFIDENTIAL

This Document contains confidential and proprietary information, cannot discourse to third party without the prior written Authorization.

	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	4 / 10

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	

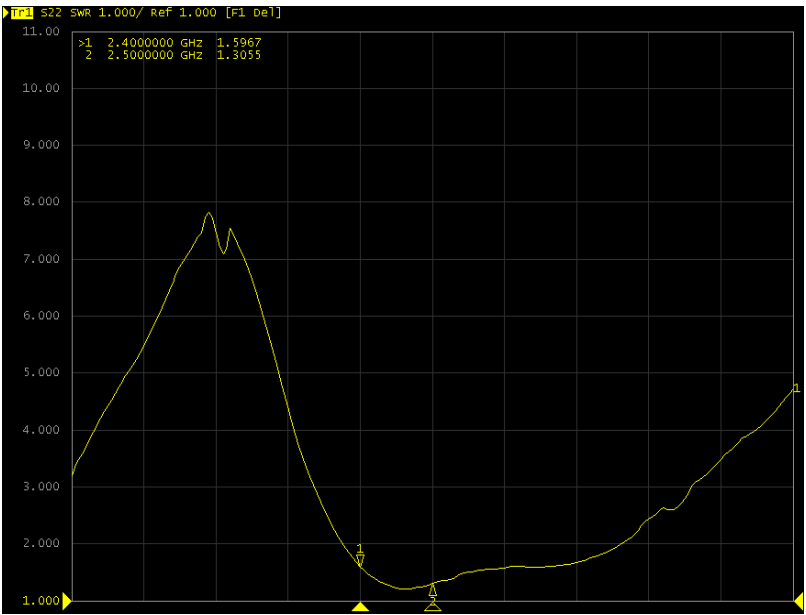
RADINA. Co., LTD / CONFIDENTIAL

This Document contains confidential and proprietary information, cannot discourse to third party without the prior written Authorization.

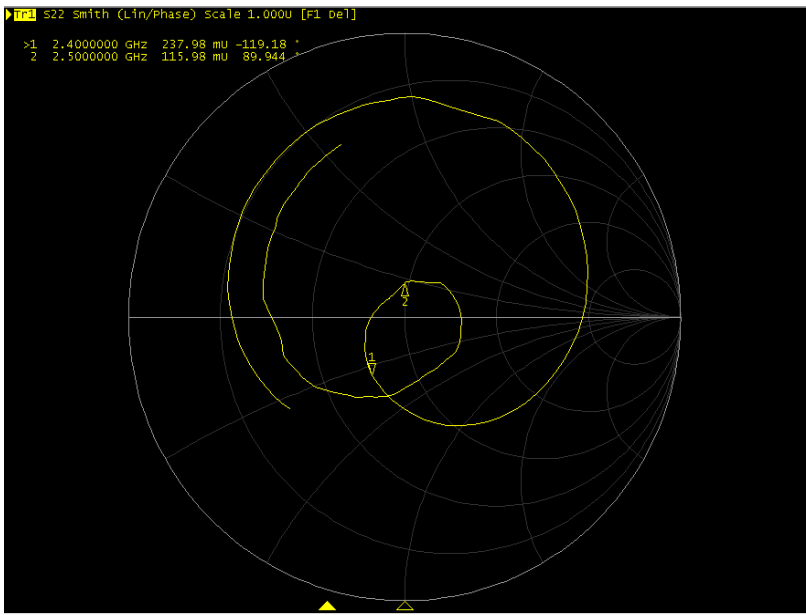
	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	5 / 10

3. Electrical Characterristics

3.1 VSWR



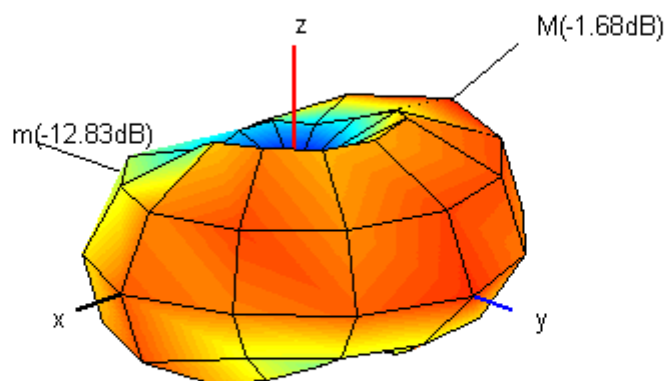
3.2 SMITH CHART



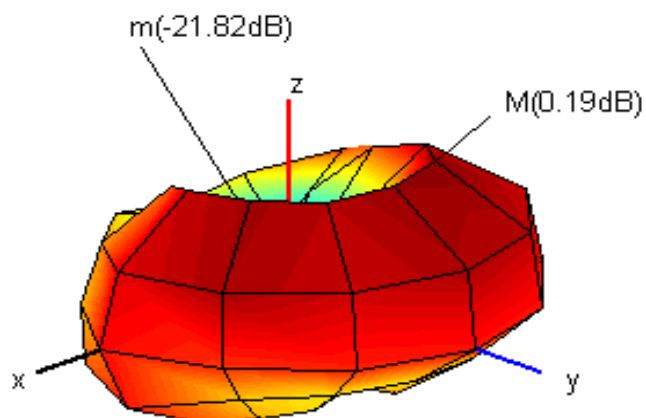
	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	6 / 10

3.3 3D-PLOTs

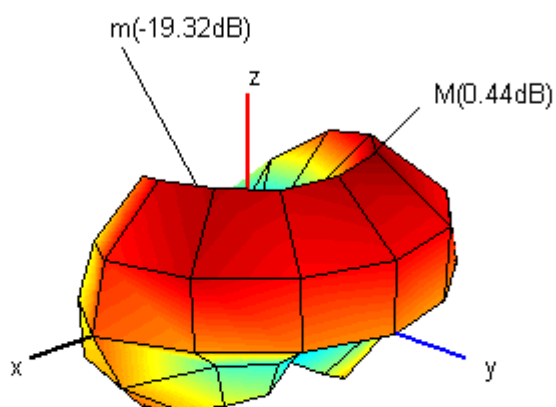
2400MHZ



2445MHZ



2485MHZ



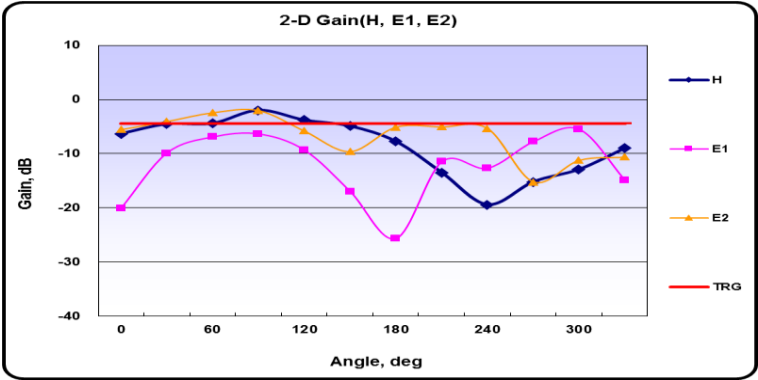
RADINA. Co., LTD / CONFIDENTIAL

This Document contains confidential and proprietary information, cannot discourse to third party without the prior written Authorization.

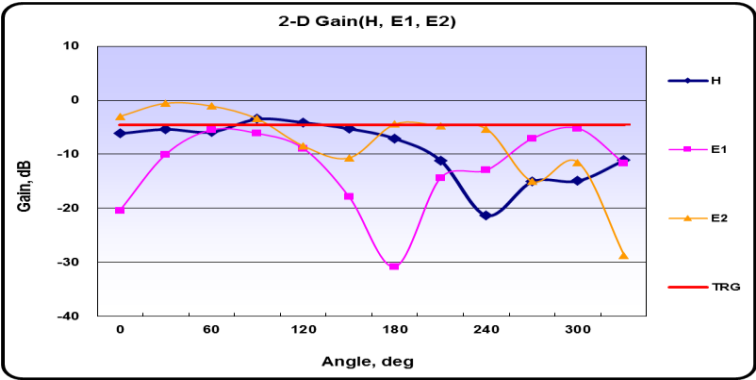
	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	7 / 10

3.4 2D-GAIN

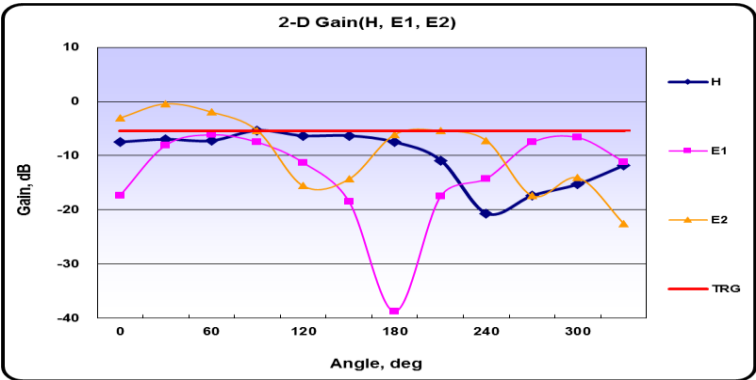
2400MHZ



2445MHZ



2485MHZ



	PRODUCT APPROVAL SHEET				GRSNT001DP1			
	MODEL NAME	30K			REV.	1.0	Page	8 / 10

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	

RADINA. Co., LTD / CONFIDENTIAL

This Document contains confidential and proprietary information, cannot discourse to third party without the prior written Authorization.

	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	9 / 10

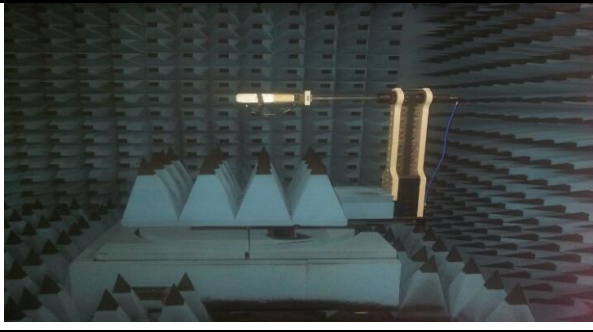
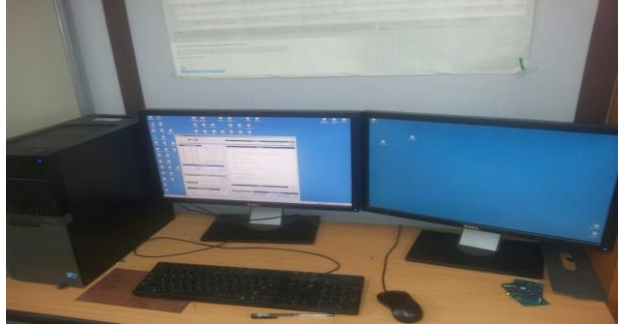
5.Measurement Process

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.

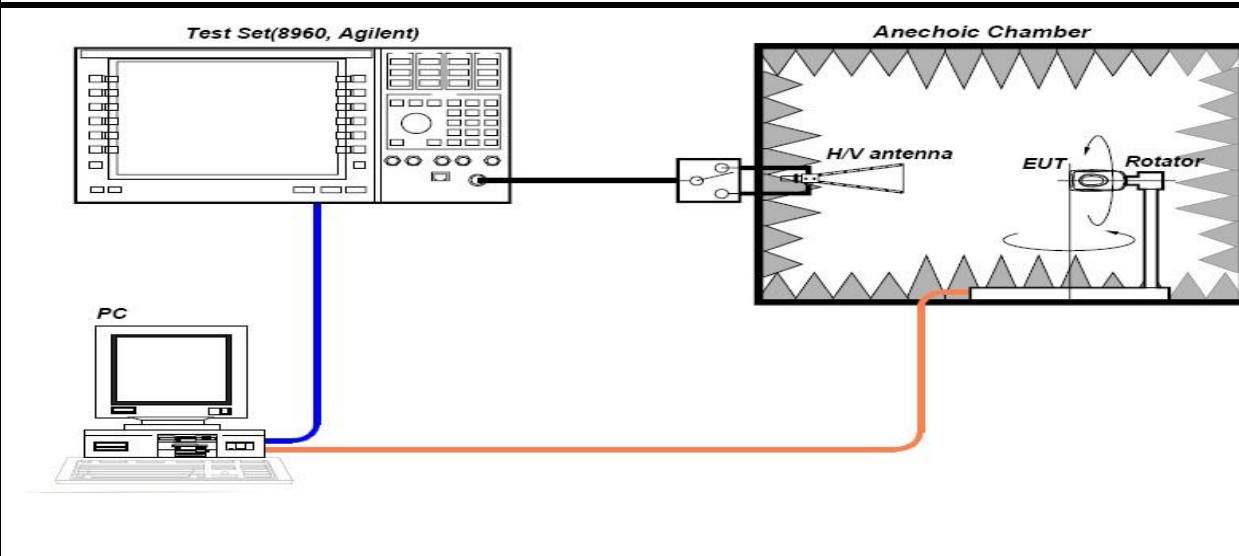
Anechoic Chamber for Antenna Gain Measurement	
	
	

	PRODUCT APPROVAL SHEET		GRSNT001DP1			
	MODEL NAME	30K	REV.	1.0	Page	10 / 10

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

