

26.08.05

RA-N2608-02

APPROVAL SHEET

**MODEL : Wireless Pro
Main BT
Antenna layout**

Review	Consent	Approval

Messrs. SENA Technology Co.,Ltd



RadiNa Co. ,Ltd

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1. Revision History

NO.	Before	After	Reason	Date
1				
2				
3				
4				
5				
6				
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12				
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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
		5 ↓	5 ↓
	RX	2400MHz	2485MHz
		5 ↓	5 ↓
RADIATION PATTERN		Omni-directional	
POLARIZATION		Linear	

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3. Pattern Specifications

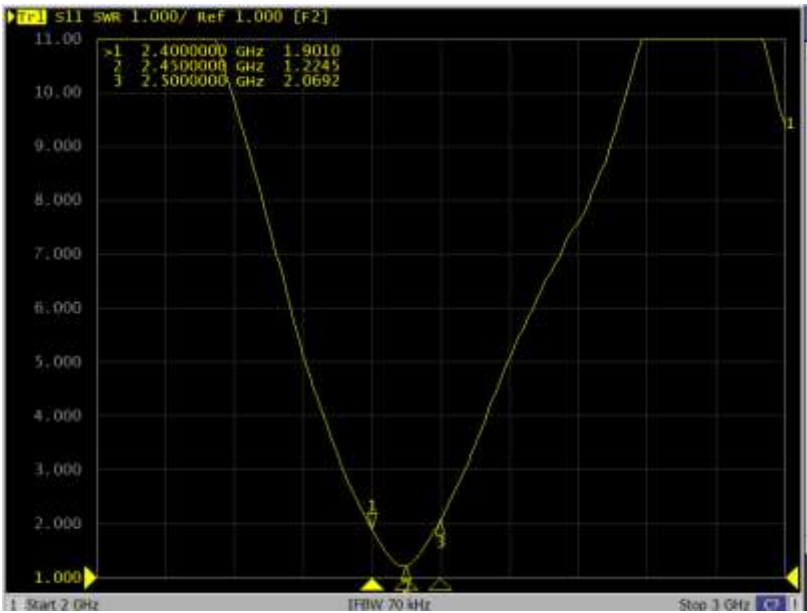
4. Matching Network

Capacitor value can be changed depending on different situation

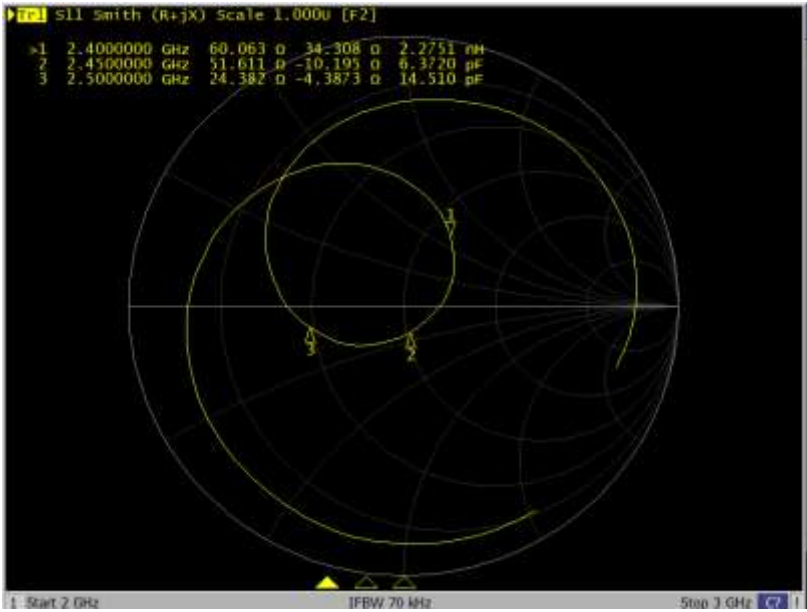
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5. Electrical Characterristics

5.1 VSWR

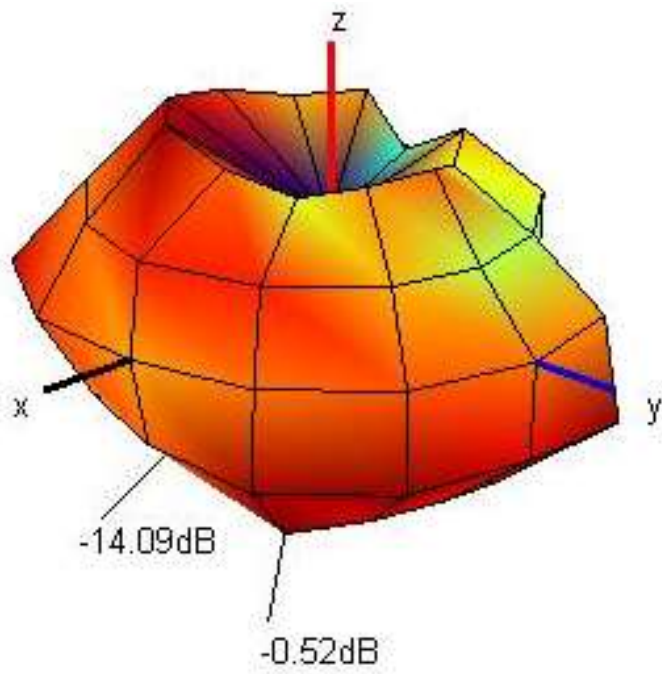


5.2 SMITH CHART

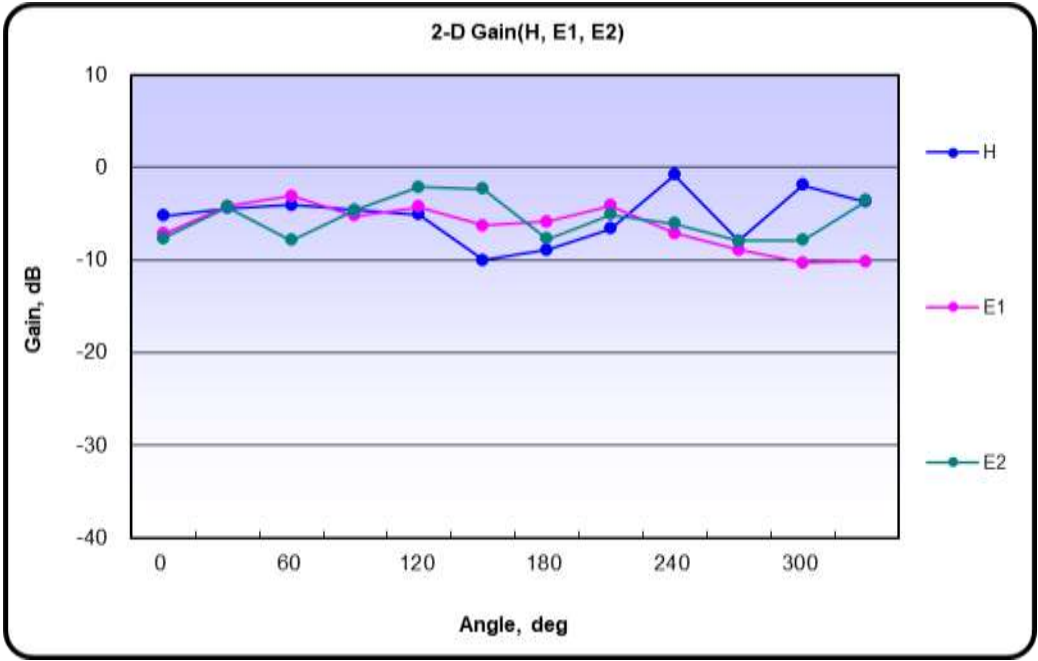


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5.3 3D-PLOTs



5.4 2D-Gain



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6. 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]	-4.45	-4.26	-4.32	-4.23	-4.42	-4.49	-4.50	-4.46	-4.39	-4.49
Efficiency [%]	35.9	37.5	37.0	37.8	36.2	35.6	35.5	35.8	36.4	35.5
Peak Gain [dBi]	-0.04	-0.16	0.05	0.30	-0.41	-0.69	-0.46	-0.45	-0.45	-0.52
TRG _θ [dB]	-8.57	-8.22	-8.31	-8.27	-8.34	-8.63	-8.60	-8.38	-8.33	-8.47
Gain _{θ Peak} [dBi]	-1.47	-1.74	-1.51	-1.16	-1.35	-1.28	-1.32	-1.15	-1.48	-1.16
Gain _{θ Min} [dBi]	-28.11	-27.06	-24.83	-32.00	-22.78	-26.35	-29.10	-24.31	-25.23	-22.57
TRG _φ [dB]	-6.58	-6.49	-6.53	-6.40	-6.67	-6.60	-6.64	-6.72	-6.63	-6.71
Gain _{φ Peak} [dBi]	-0.53	-0.61	-0.27	-0.29	-1.13	-0.92	-0.95	-1.33	-1.39	-1.12
Gain _{φ Min} [dBi]	-17.89	-18.36	-19.45	-19.55	-23.98	-21.45	-20.23	-23.56	-20.86	-25.57
UHRG [dB]	-8.16	-7.94	-7.96	-7.86	-8.04	-8.18	-8.15	-8.10	-8.00	-8.17
UHRG/TRG [%]	42.6	42.9	43.3	43.3	43.4	42.8	43.2	43.3	43.5	42.8
H-Plane	-4.34	-4.20	-4.14	-4.15	-4.34	-4.54	-4.55	-4.63	-4.32	-4.56
E1-Plane, AVG [dB]	-6.03	-5.50	-5.51	-5.56	-5.73	-5.93	-5.87	-5.53	-5.52	-5.84
E2-Plane, AVG [dB]	-4.84	-4.95	-4.78	-4.69	-5.06	-4.93	-5.03	-4.91	-4.84	-5.07
Peak Gain [dBi]	-0.04	-0.16	0.05	0.30	-0.41	-0.69	-0.46	-0.45	-0.45	-0.52
Directivity [dB]	4.41	4.10	4.37	4.52	4.01	3.79	4.04	4.01	3.94	3.97
Minimum Gain [dBi]	-14.96	-16.79	-14.76	-15.46	-13.79	-14.08	-14.94	-14.83	-16.65	-14.09

	11	12	13	14	15	16	17	18	19	20
Frequency [MHz]	2450	2455	2460	2465	2470	2475	2480	2485	2490	2497
Efficiency [dB]	-4.64	-4.56	-4.71	-4.86	-4.92	-4.89	-4.82	-4.84	-5.80	-5.29
Efficiency [%]	34.3	35.0	33.8	32.6	32.2	32.4	33.0	32.8	26.3	29.6
Peak Gain [dBi]	-0.41	-0.62	-0.74	-0.57	-0.45	-0.93	-1.03	-0.86	-1.66	-1.40
TRG _θ [dB]	-8.67	-8.54	-8.75	-9.14	-9.20	-9.06	-8.73	-8.84	-10.13	-9.23
Gain _{θ Peak} [dBi]	-1.32	-1.48	-1.18	-2.00	-1.79	-1.68	-1.41	-1.79	-3.19	-2.29
Gain _{θ Min} [dBi]	-25.71	-22.07	-25.60	-24.05	-25.02	-24.47	-26.90	-39.59	-27.63	-42.71
TRG _φ [dB]	-6.83	-6.77	-6.89	-6.89	-6.94	-6.99	-7.08	-7.04	-7.79	-7.53
Gain _{φ Peak} [dBi]	-0.74	-1.15	-1.26	-1.00	-0.94	-1.43	-1.39	-1.36	-1.95	-1.83
Gain _{φ Min} [dBi]	-25.63	-24.65	-21.87	-28.72	-28.47	-32.12	-26.58	-27.18	-27.45	-27.30
UHRG [dB]	-8.19	-8.14	-8.19	-8.43	-8.48	-8.31	-8.27	-8.33	-9.29	-8.76
UHRG/TRG [%]	44.2	43.8	44.8	44.0	44.0	45.5	45.1	44.7	44.8	45.0
H-Plane	-4.68	-4.68	-4.66	-4.75	-4.84	-4.77	-4.83	-4.93	-5.53	-5.31
E1-Plane, AVG [dB]	-5.75	-5.66	-6.01	-6.41	-6.14	-6.04	-5.69	-6.04	-7.11	-6.53
E2-Plane, AVG [dB]	-5.37	-4.91	-5.06	-5.15	-5.06	-4.68	-4.98	-4.64	-5.74	-5.16
Peak Gain [dBi]	-0.41	-0.62	-0.74	-0.57	-0.45	-0.93	-1.03	-0.86	-1.66	-1.40
Directivity [dB]	4.24	3.94	3.97	4.29	4.47	3.96	3.78	3.97	4.14	3.89
Minimum Gain [dBi]	-15.51	-17.52	-18.63	-17.36	-15.16	-16.63	-16.76	-19.54	-20.06	-16.26

Average Efficiency	-4.65dBi	34.26%
Peak Gain	0.30dBi	

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7.Measurement Process

7.1 SWR / Return loss

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

7.2 Gain

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

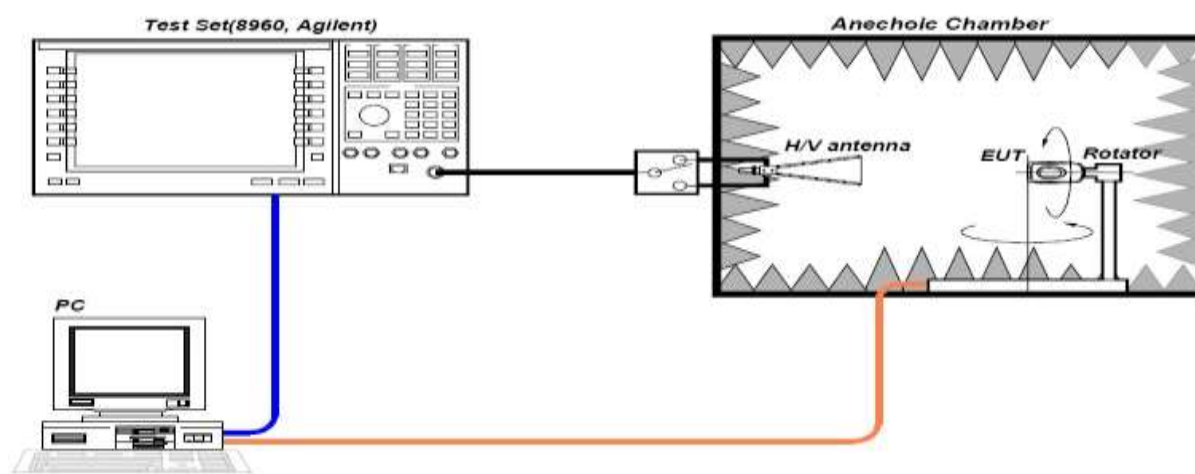
Anechoic Chamber for Antenna Gain Measurement	
	
	

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7.3 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

