

202.03.21

RA-N2203-01

# APPROVAL SHEET

MODEL : C1  
ANTENNA  
**Antenna layout**

Review	Consent	Approval


**Messrs. SENA Technology Co.,Ltd**



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1. Revision History

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

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## 2. Product Information

### 2.1 General Features

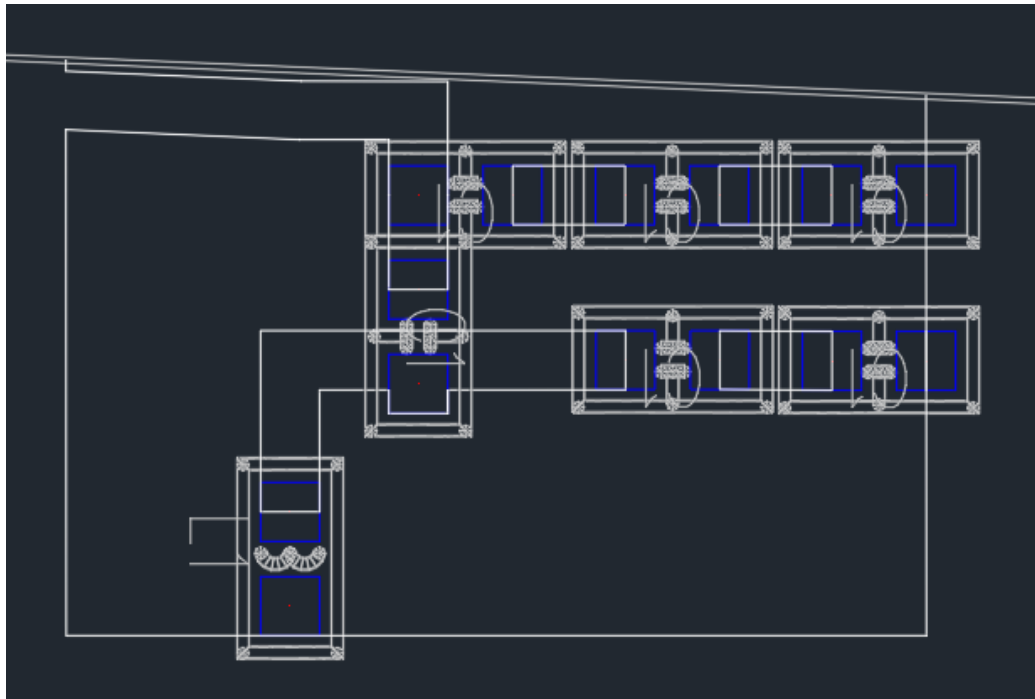
PART NUMBER	GradiANT
ANTENNA TYPE	PCB pattern Antenna
APPLICATIONS	Bluetooth

### 2.2 Electrical Specifications

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

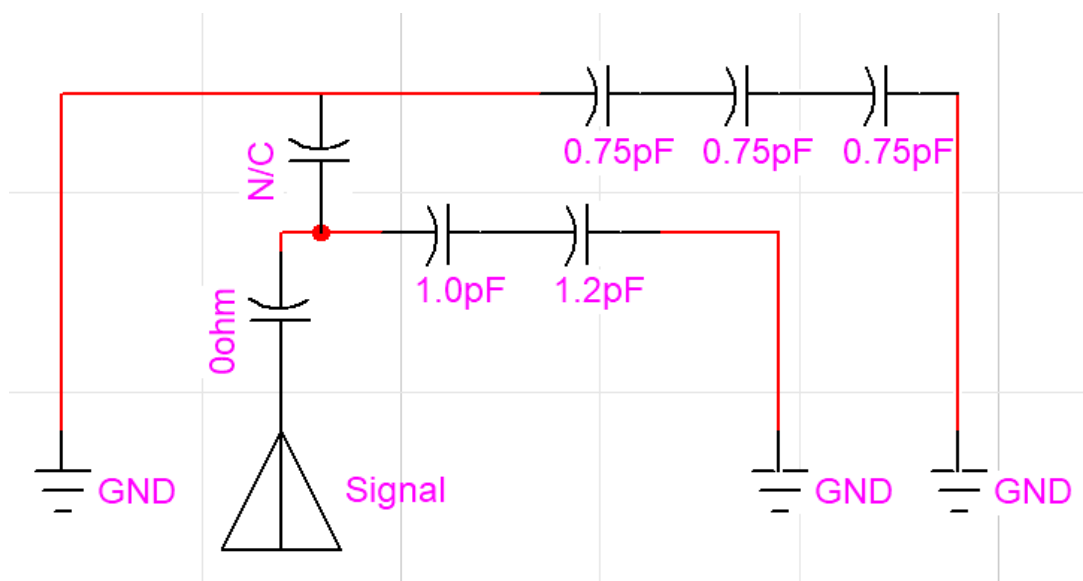
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### 3. Pattern Specifications



### 4. Matching Network

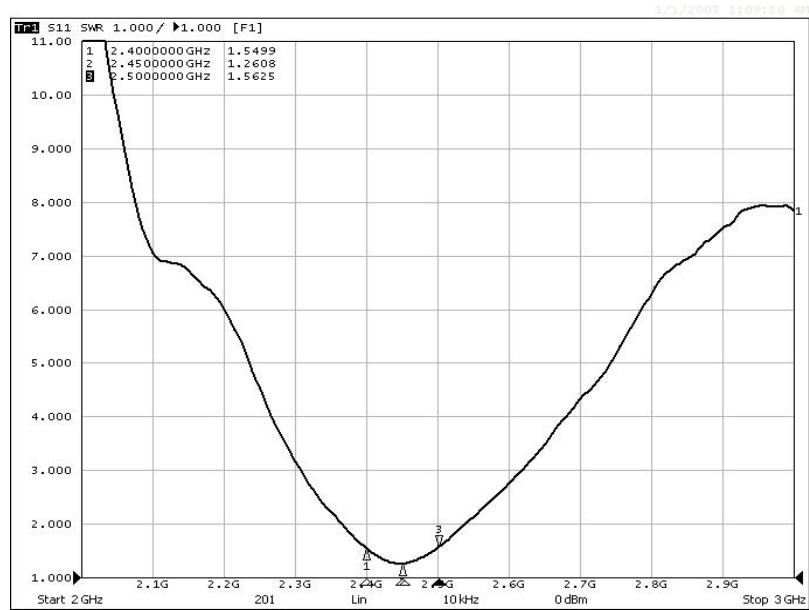
Capacitor value can be changed depending on different situation



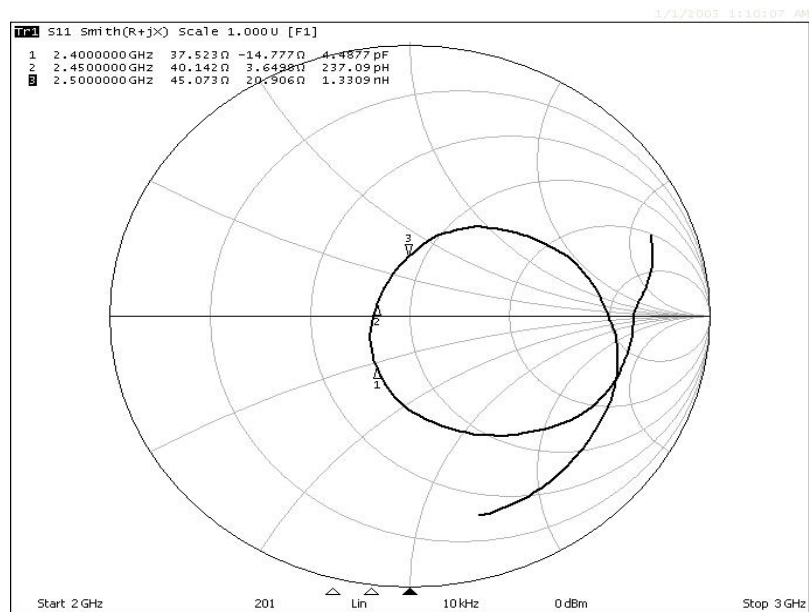


## 5. Electrical Characteristics

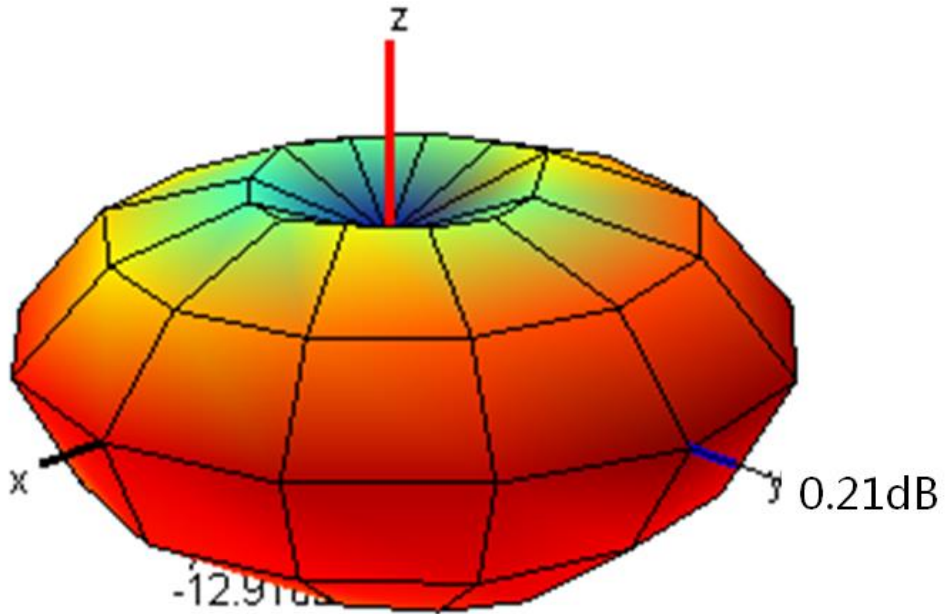
### 5.1 VSWR



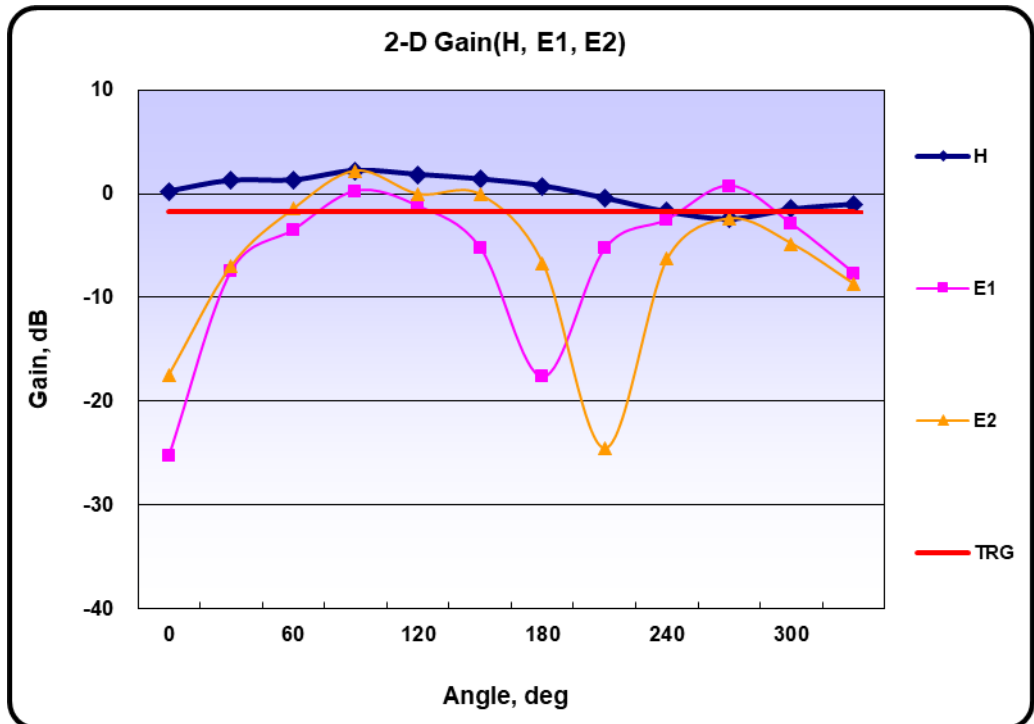
### 5.2 SMITH CHART




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)	-2.14	-2.09	-1.90	-1.78	-1.95	-1.99	-1.76	-1.71	-1.81	-1.74
Efficiency(%)	61.12	61.83	64.57	66.36	63.81	63.20	66.64	67.38	65.99	67.05
TRG(dB)	-2.14	-2.09	-1.90	-1.78	-1.95	-1.99	-1.76	-1.71	-1.81	-1.74
TRG <sub>Theta</sub> (dB)	-2.42	-2.37	-2.19	-2.08	-2.24	-2.31	-2.07	-2.03	-2.13	-2.07
TRG <sub>Phi</sub> (dB)	-14.12	-14.13	-13.77	-13.55	-13.94	-13.58	-13.37	-13.24	-13.17	-13.08
UHRG(dB)	-5.73	-5.66	-5.50	-5.33	-5.56	-5.60	-5.32	-5.38	-5.47	-5.36
UHRG/TRG(%)	43.73	43.91	43.61	44.12	43.54	43.60	44.06	42.99	43.03	43.42
H-Plane	0.10	0.18	0.35	0.44	0.30	0.29	0.53	0.48	0.37	0.40
E1-Plane, AVG(dB)	-3.77	-3.78	-3.43	-3.43	-3.60	-3.67	-3.41	-3.26	-3.54	-3.40
E2-Plane, AVG(dB)	-3.50	-3.46	-3.14	-3.11	-3.24	-3.31	-3.08	-2.97	-2.97	-2.98
Peak Gain(dB)	-0.72	-0.65	-0.19	-0.17	-0.32	-0.19	0.00	0.14	0.21	0.21
Directivity(dB)	1.41	1.43	1.71	1.61	1.63	1.81	1.76	1.86	2.02	1.94
Minimum Gain(dB)	-14.52	-15.05	-16.32	-14.05	-15.44	-16.51	-14.41	-12.56	-13.14	-12.91

	11	12	13	14	15	16	17	18	19	20
Frequency(MHz)	2450	2455	2460	2465	2470	2475	2480	2485	2490	2497
Efficiency(dB)	-1.77	-1.72	-1.62	-1.78	-1.94	-1.82	-2.08	-2.18	-2.05	-2.22
Efficiency(%)	66.60	67.23	68.87	66.34	64.04	65.78	61.95	60.48	62.42	59.93
TRG(dB)	-1.77	-1.72	-1.62	-1.78	-1.94	-1.82	-2.08	-2.18	-2.05	-2.22
TRG <sub>Theta</sub> (dB)	-2.09	-2.03	-1.93	-2.09	-2.25	-2.12	-2.39	-2.49	-2.37	-2.56
TRG <sub>Phi</sub> (dB)	-13.19	-13.40	-13.21	-13.40	-13.52	-13.50	-13.64	-13.82	-13.53	-13.50
UHRG(dB)	-5.44	-5.42	-5.32	-5.51	-5.70	-5.62	-5.90	-6.00	-5.92	-6.14
UHRG/TRG(%)	42.94	42.73	42.65	42.41	42.03	41.64	41.52	41.54	40.95	40.62
H-Plane	0.37	0.37	0.44	0.23	0.05	0.06	-0.20	-0.31	-0.25	-0.39
E1-Plane, AVG(dB)	-3.46	-3.33	-3.35	-3.48	-3.63	-3.49	-3.72	-3.77	-3.63	-3.93
E2-Plane, AVG(dB)	-2.94	-2.81	-2.75	-2.88	-3.01	-2.91	-3.21	-3.33	-3.12	-3.35
Peak Gain(dB)	0.08	0.24	0.40	0.22	-0.06	0.18	-0.04	-0.10	0.11	-0.09
Directivity(dB)	1.85	1.96	2.02	2.00	1.88	2.00	2.04	2.09	2.16	2.14
Minimum Gain(dB)	-13.08	-13.54	-12.84	-13.50	-14.23	-13.61	-13.87	-13.43	-15.73	-15.80


Average Efficiency	-1.90dBi,	64.58%
Peak Gain	0.40dBi	



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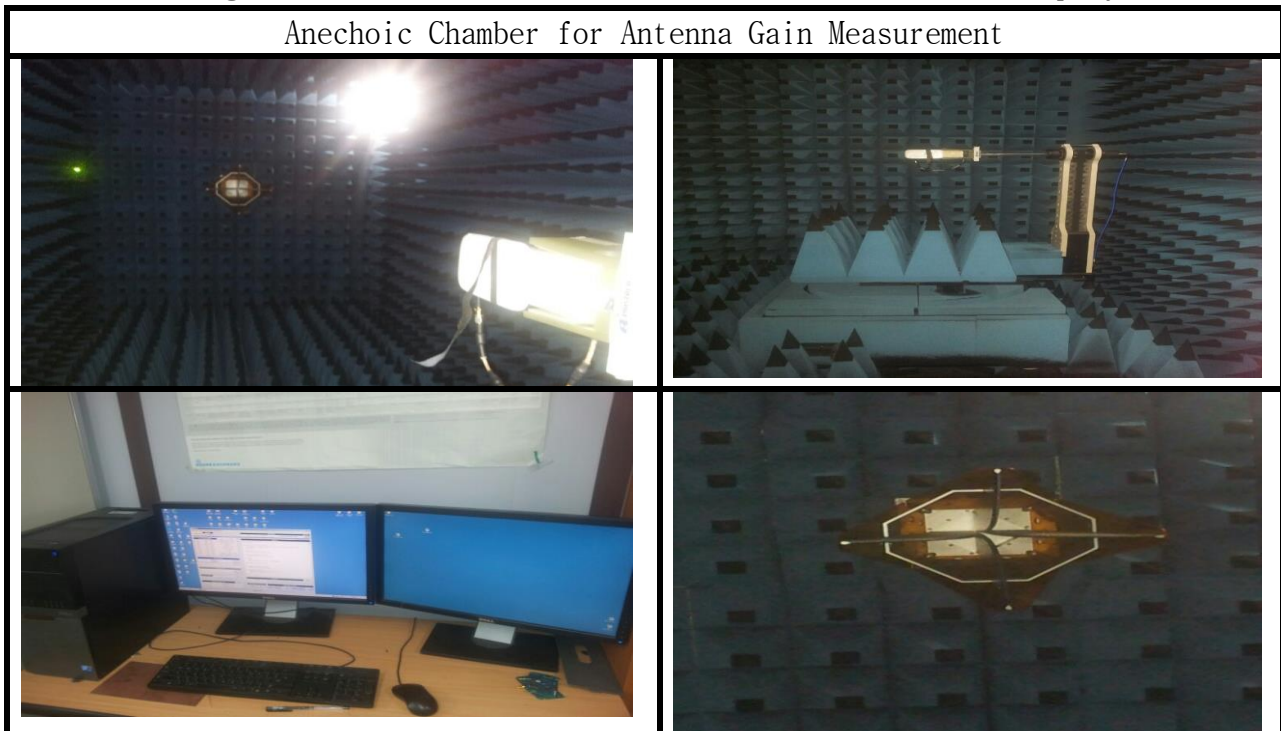
## 7. Measurement Process

### 7.1 SWR / Return loss

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

### 7.2 Gain

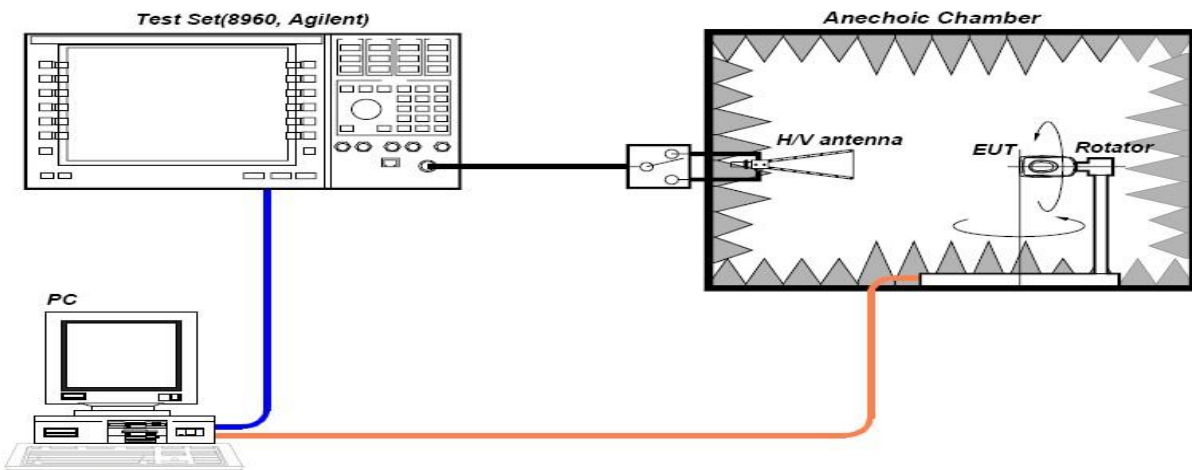
Antenna gain is measured in the anechoic chamber of this company.



7.3 Gain test block diagram

Active test System

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



Passiver test System

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

