

2022.12.08

RA-N2212-01

# APPROVAL SHEET

MODEL : KANE2  
**Antenna layout**

Review	Consent	Approval


**Messrs. THINKWARE Co. , Ltd**



**RadiNa Co. ,Ltd**

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1. Revision History

NO.	Before	After	Reason	Date
1				
2				
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## 2. Product Information

### 2.1 General Features

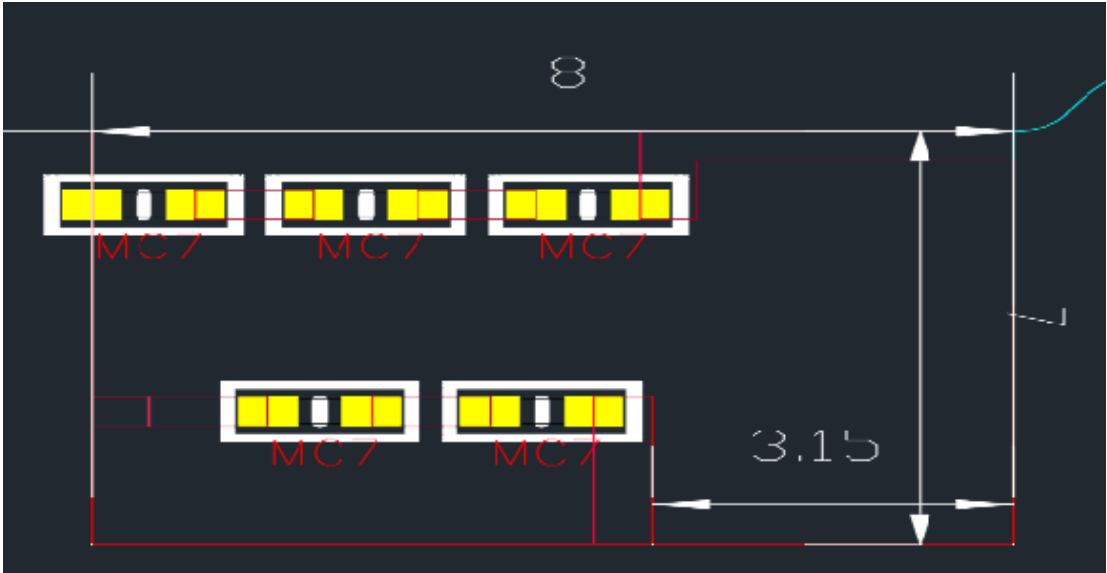
PART NUMBER	GradiANT
ANTENNA TYPE	PCB Pattern Antenna
APPLICATIONS	bluetooth

### 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	

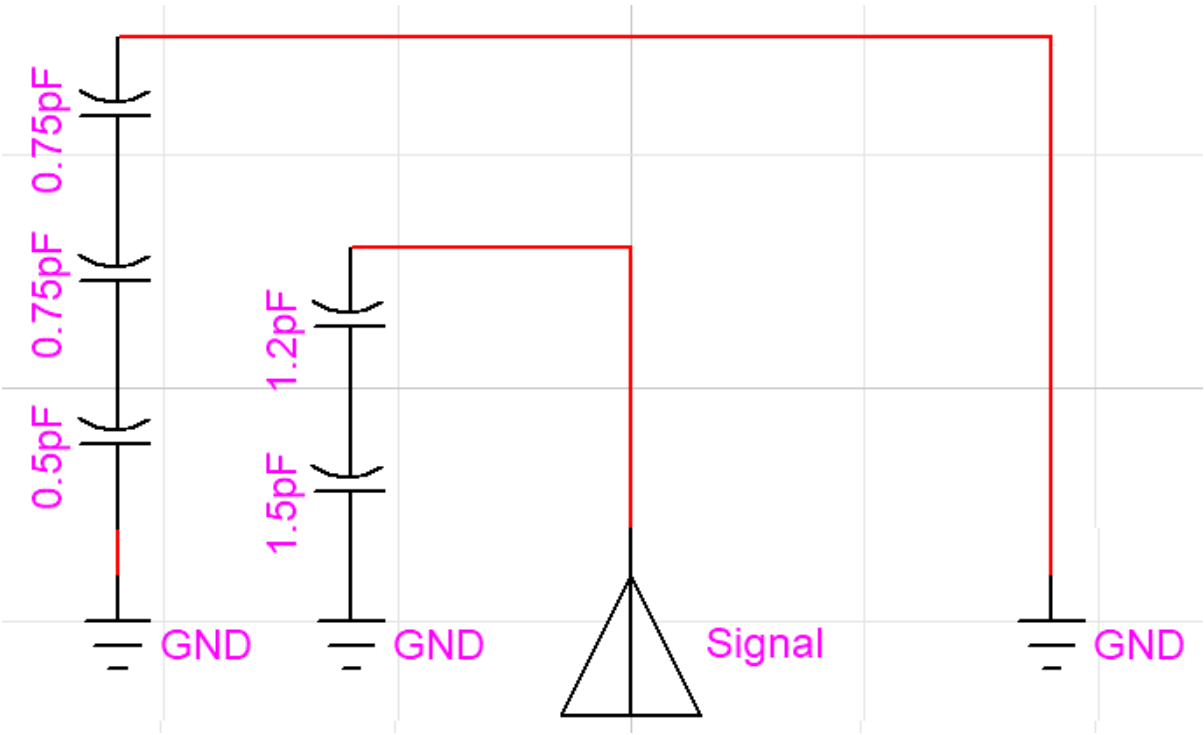
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### 3. Pattern Specifications



### 4. Matching Network

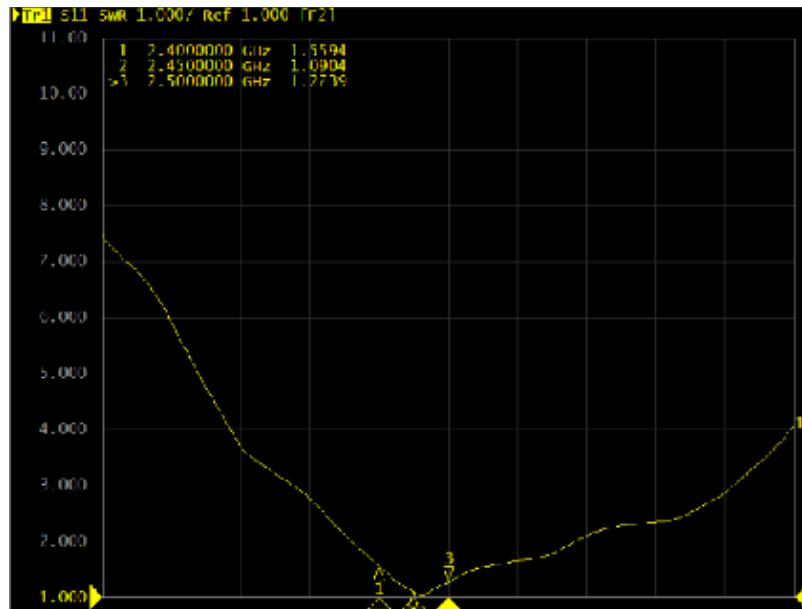
Capacitor value can be changed depending on different situation



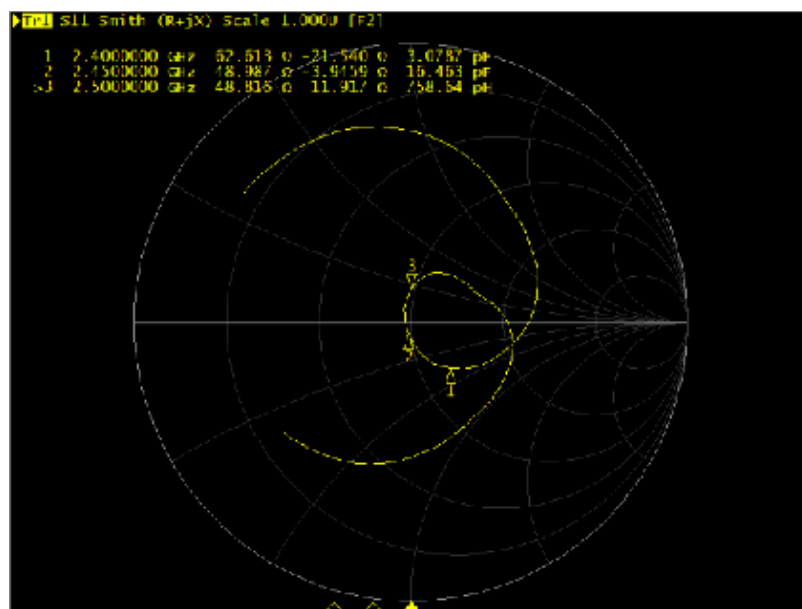
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## 5. Electrical Characteristics

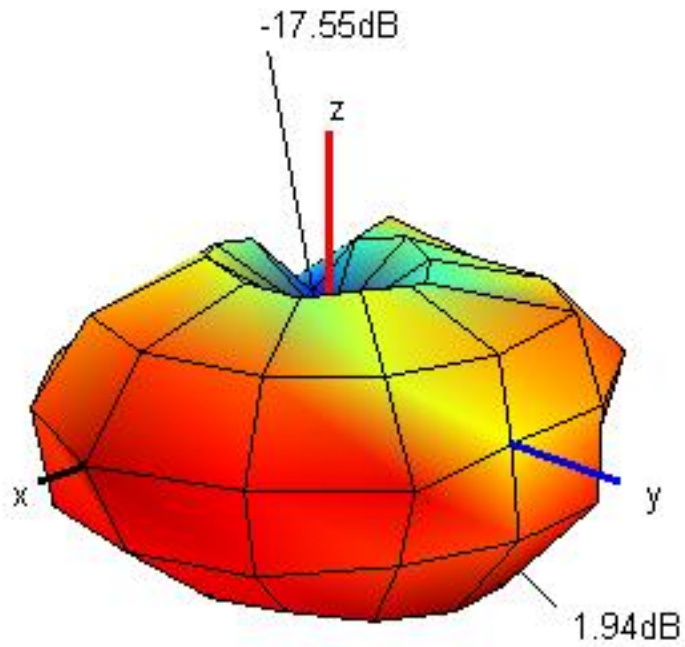
### 5.1 VSWR



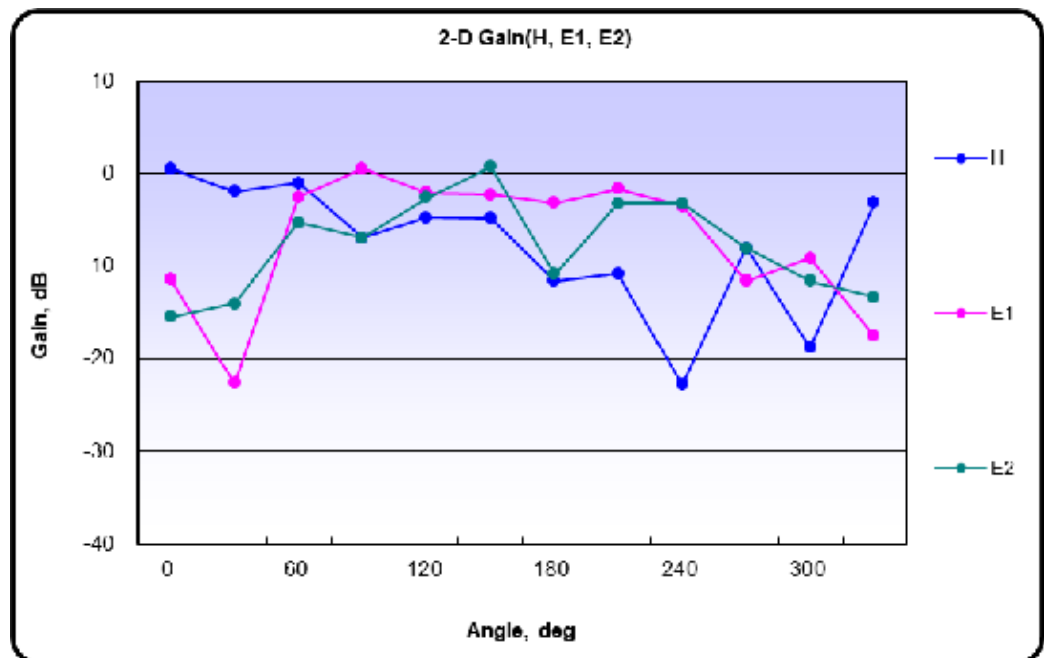
### 5.2 SMITH CHART




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]	-3.35	-3.38	-3.46	-3.42	-3.41	-3.43	-3.18	-3.11	-3.16	-3.06
Efficiency [%]	46.3	45.9	45.1	45.5	45.6	45.4	48.1	48.9	48.3	49.4
TRG <sub>θ</sub> [dB]	-4.39	-4.40	-4.48	-4.45	-4.43	-4.48	-4.18	-4.13	-4.20	-4.11
Gain <sub>θ Peak</sub> [dB]	1.04	0.81	0.81	0.75	0.72	0.78	1.26	1.40	1.27	1.55
Gain <sub>θ Min</sub> [dB]	-25.84	-23.91	-22.12	-24.24	-26.38	-23.29	-21.98	-21.06	-23.32	-22.86
TRG <sub>φ</sub> [dB]	-10.04	-10.18	-10.24	-10.17	-10.20	-10.10	-10.04	-9.88	-9.89	-9.75
Gain <sub>φ Peak</sub> [dB]	-2.37	-2.53	-2.51	-2.41	-2.49	-2.03	-1.98	-2.25	-2.14	-1.86
Gain <sub>φ Min</sub> [dB]	-24.79	-28.97	-28.76	-28.40	-30.20	-39.58	-44.40	-27.85	-27.55	-34.79
UHRG [dB]	-8.62	-8.65	-8.78	-8.82	-8.76	-8.91	-8.72	-8.65	-8.67	-8.68
UHRG/TRG [%]	29.7	29.7	29.4	28.8	29.1	28.3	27.9	27.9	28.1	27.4
H-Plane	-5.67	-5.56	-5.57	-5.50	-5.33	-5.39	-4.98	-4.85	-4.73	-4.52
E1-Plane, AVG [dB]	-4.31	-4.34	-4.42	-4.41	-4.29	-4.39	-4.05	-3.99	-4.03	-3.98
E2-Plane, AVG [dB]	-5.50	-5.45	-5.65	-5.52	-5.56	-5.67	-5.32	-5.27	-5.31	-5.24
Peak Gain [dB]	1.38	1.19	1.17	1.21	1.11	1.29	1.72	1.75	1.65	1.94
Directivity [dB]	4.73	4.57	4.62	4.63	4.52	4.72	4.89	4.86	4.81	5.00
Minimum Gain [dB]	-18.18	-17.35	-17.35	-17.16	-16.69	-16.67	-17.85	-18.74	-18.34	-17.55
	11	12	13	14	15	16	17	18	19	20
Frequency [MHz]	2450	2455	2460	2465	2470	2475	2480	2485	2490	2497
Efficiency [dB]	-3.16	-3.08	-3.20	-3.21	-3.05	-3.02	-2.92	-3.37	-3.61	-3.48
Efficiency [%]	48.3	49.2	47.8	47.7	49.5	49.8	51.1	46.1	43.5	44.9
TRG <sub>θ</sub> [dB]	-4.20	-4.09	-4.24	-4.28	-4.09	-4.07	-3.96	-4.43	-4.68	-4.52
Gain <sub>θ Peak</sub> [dB]	1.33	1.30	1.17	1.24	1.43	1.32	1.44	0.74	0.63	0.65
Gain <sub>θ Min</sub> [dB]	-23.37	-26.22	-31.62	-34.50	-33.29	-45.63	-35.79	-30.57	-24.59	-23.60
TRG <sub>φ</sub> [dB]	-9.87	-9.90	-9.93	-9.82	-9.79	-9.72	-9.64	-10.00	-10.24	-10.19
Gain <sub>φ Peak</sub> [dB]	-2.28	-1.99	-2.15	-2.27	-2.25	-1.92	-2.09	-2.54	-2.76	-2.74
Gain <sub>φ Min</sub> [dB]	-29.34	-30.52	-29.65	-26.24	-29.46	-28.95	-28.24	-29.42	-29.65	-39.79
UHRG [dB]	-8.79	-8.76	-8.95	-8.99	-8.86	-8.89	-8.76	-9.21	-9.49	-9.35
UHRG/TRG [%]	27.4	27.0	26.7	26.4	26.3	25.9	26.0	26.0	25.8	25.9
H-Plane	-4.70	-4.51	-4.67	-4.62	-4.39	-4.38	-4.14	-4.49	-4.73	-4.50
E1-Plane, AVG [dB]	-4.12	-3.94	-4.21	-4.12	-4.03	-4.03	-3.91	-4.37	-4.64	-4.48
E2-Plane, AVG [dB]	-5.38	-5.31	-5.38	-5.42	-5.16	-5.18	-5.02	-5.46	-5.73	-5.47
Peak Gain [dB]	1.74	1.71	1.59	1.71	1.86	1.89	<b>2.00</b>	1.32	1.20	1.32
Directivity [dB]	4.90	4.78	4.79	4.92	4.92	4.91	4.91	4.69	4.81	4.80
Minimum Gain [dB]	-17.68	-17.35	-16.28	-16.56	-16.08	-16.39	-16.97	-16.32	-18.77	-18.64


Average Efficiency	-3.25dBi	47.33%
Peak Gain	2.00dBi	



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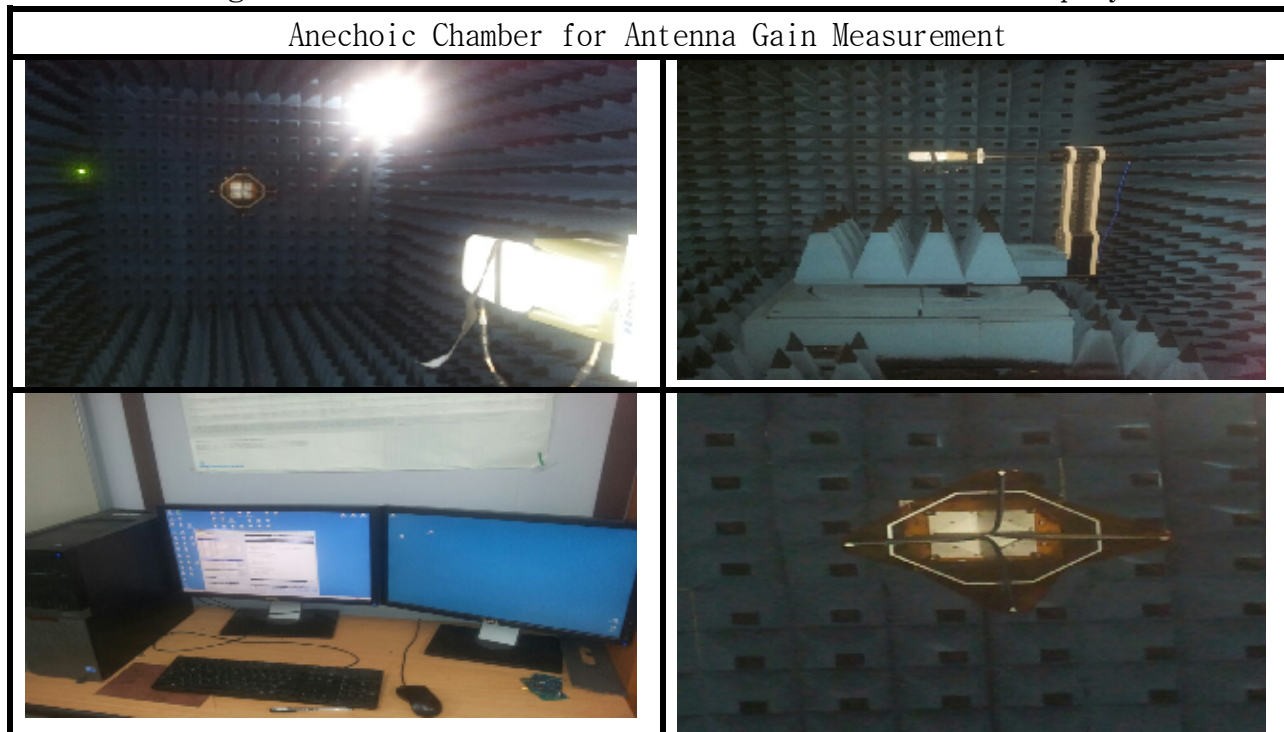
## 7. Measurement Process

### 7.1 SWR / Return loss

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

### 7.2 Gain

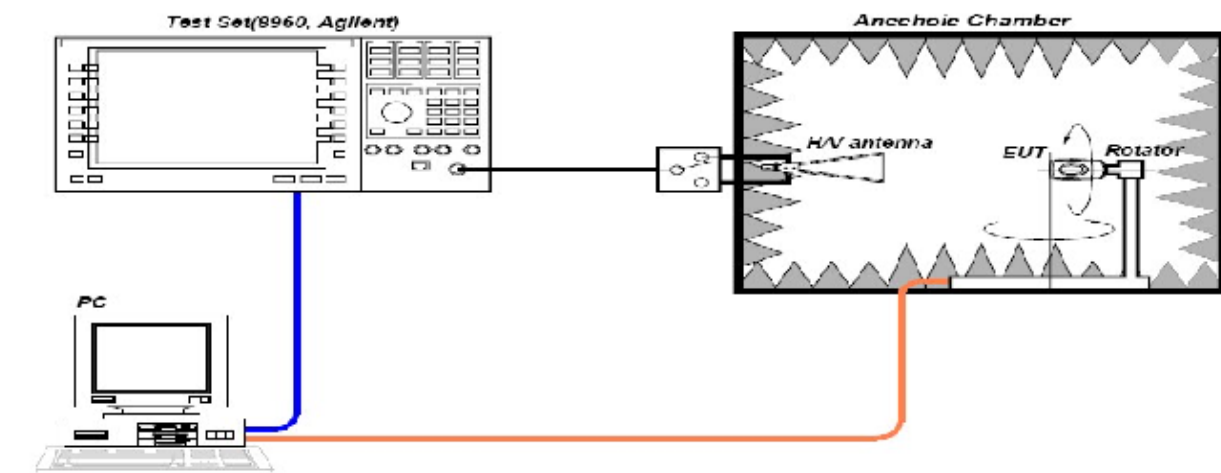
Antenna gain is measured in the anechoic chamber of this company.



### 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

