24.11.26

RA-N2411-72

APPROVAL SHEET

MODEL :NTT-Easy

ANTENNA

Antenna layout

Review	Consent	Approval

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Table of contents

1. Revision History

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

2. Product Information

2.1 General Features

PART NUMBER	GRSN24831MS72
ANTENNA TYPE	PCB pattern Antenna
APPLICATIONS	-
Dimensions (L x W x H)	9.0 x 3.0 x 1.2 mm
Operating Temperature	-40~ +85 ° C

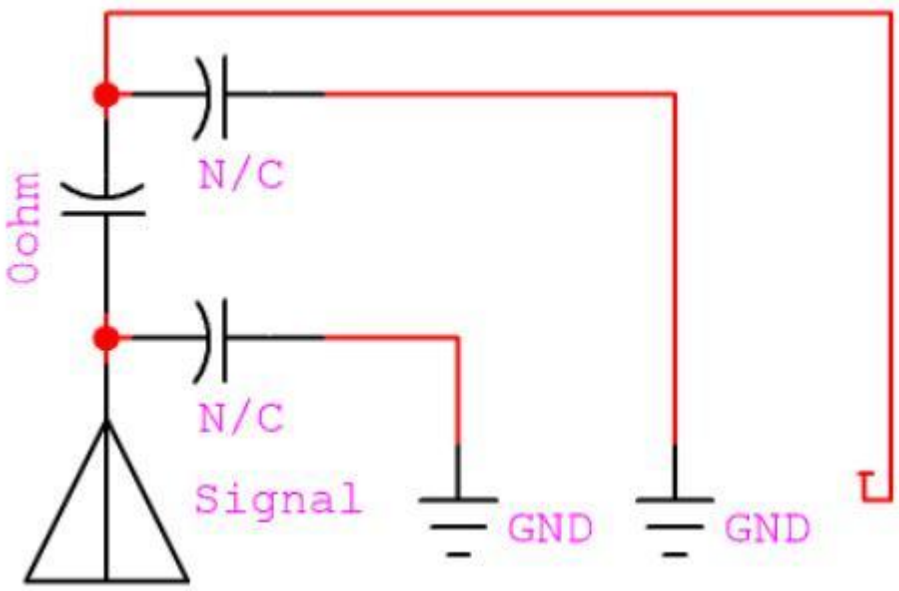
2.2 Electrical Specifications

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	

3. Pattern Specifications

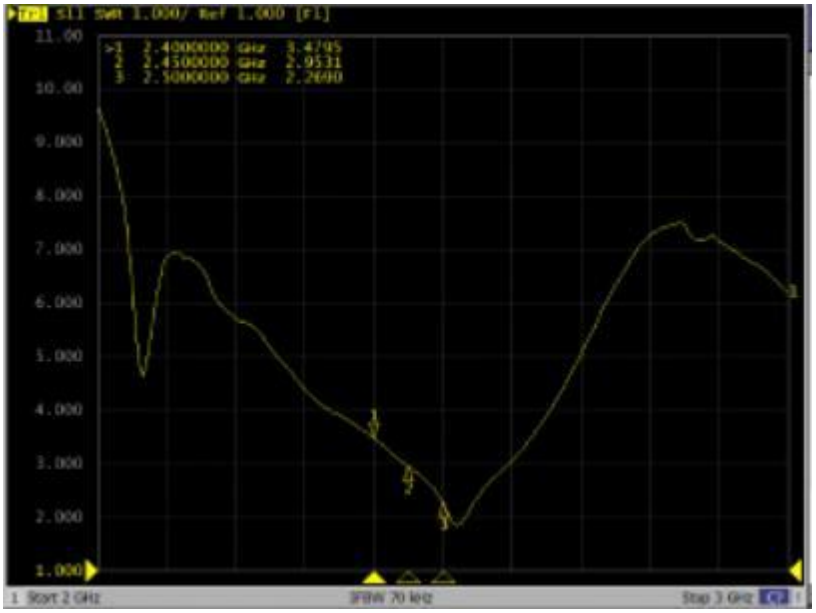
4. Matching Network

Capacitor value can be changed depending on different situation

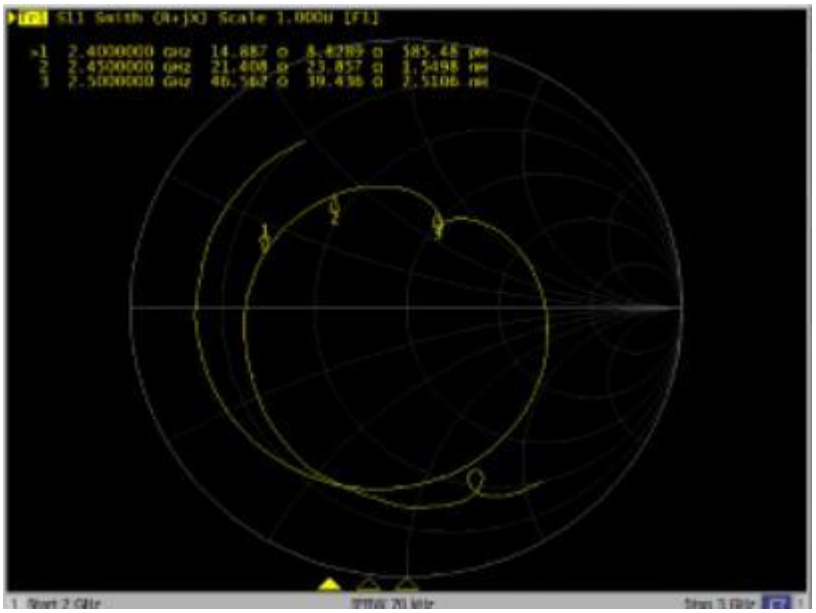


5. Electrical Characterristics

5.1 VSWR

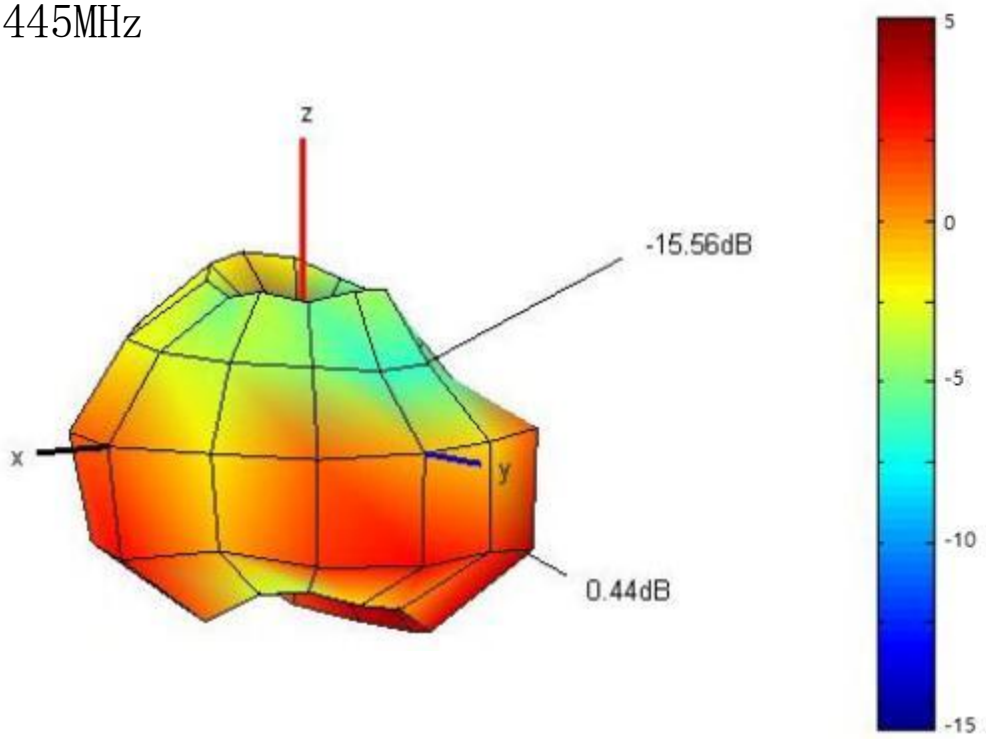


5.2 SMITH CHART

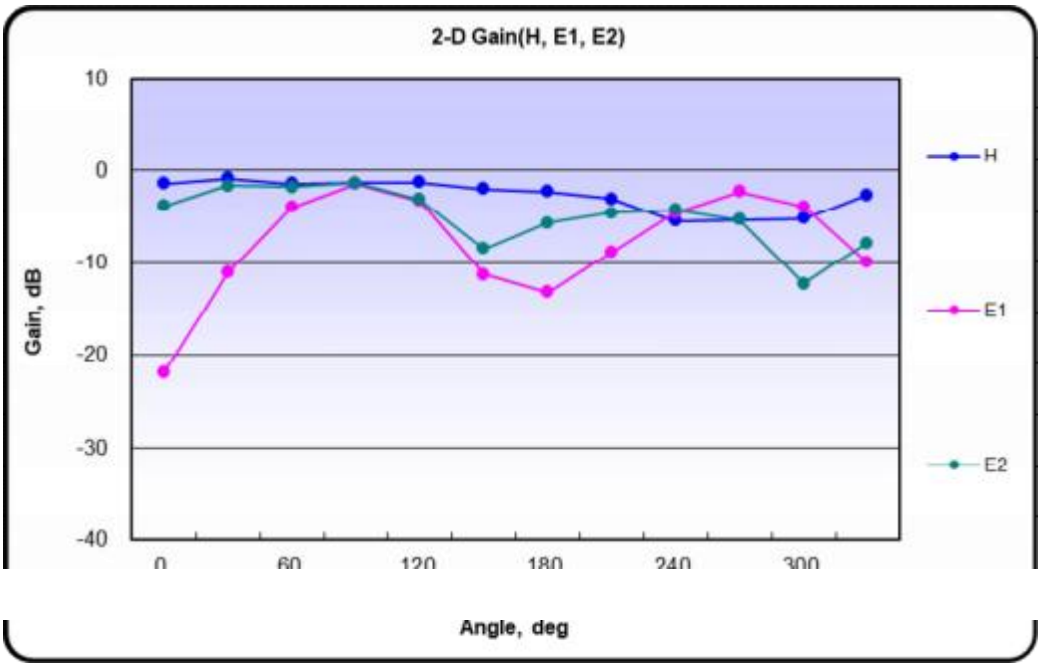


5.3 3D-PLOTs

2445MHz



5.4 2D-GAIN



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]	**-5.66**	**-5.76**	**-5.67**	**-5.59**	**-5.41**	**-5.44**	**-5.53**	**-5.53**	**-5.57**	**-5.31**
Efficiency [%]	**27.2**	**26.6**	**27.1**	**27.6**	**28.7**	**28.6**	**28.0**	**28.0**	**27.7**	**29.4**
TRG_θ [dB]	-6.93	-6.99	-6.94	-6.86	-6.70	-6.78	-6.85	-6.84	-6.92	-6.74
$Gain_{\theta\ Peak}$ [dB]	0.24	0.62	0.61	0.63	0.69	0.61	0.34	0.55	0.48	0.36
$Gain_{\theta\ Min}$ [dB]	-32.36	-29.23	-32.41	-27.49	-28.60	-31.20	-32.62	-28.69	-29.75	-29.60
TRG_φ [dB]	-11.63	-11.81	-11.65	-11.54	-11.33	-11.19	-11.35	-11.37	-11.31	-10.83
$Gain_{\varphi\ Peak}$ [dB]	-7.11	-7.54	-7.08	-7.20	-6.80	-6.96	-6.48	-7.12	-7.17	-6.45
$Gain_{\varphi\ Min}$ [dB]	-24.27	-45.63	-24.44	-26.91	-28.66	-26.52	-29.43	-44.75	-23.85	-40.78
UHRG [dB]	-11.22	-11.39	-11.27	-11.24	-10.97	-10.87	-10.99	-11.01	-11.10	-10.54
UHRG/TRG [%]	27.8	27.3	27.5	27.2	27.8	28.7	28.5	28.3	28.0	30.0
H-Plane	-7.54	-7.57	-7.65	-7.43	-7.45	-7.31	-7.47	-7.61	-7.64	-7.45
E1-Plane, AVG [dB]	-4.89	-4.82	-4.92	-4.85	-4.74	-4.87	-4.86	-4.97	-4.88	-4.85
E2-Plane, AVG [dB]	-9.99	-9.55	-9.36	-9.49	-9.21	-9.17	-9.28	-9.32	-9.12	-8.74
Peak Gain [dB]	0.26	0.32	0.33	0.24	0.30	0.24	0.35	0.38	0.41	0.44
Directivity [dB]	5.91	6.08	6.00	5.83	5.72	5.68	5.88	5.90	5.98	5.75
Minimum Gain [dB]	-14.26	-18.20	-16.65	-17.33	-17.38	-16.55	-16.33	-15.59	-14.77	-15.56

	11	12	13	14	15	16	17	18	19	20
Frequency [MHz]	**2450**	**2455**	**2460**	**2465**	**2470**	**2475**	**2480**	**2485**	**2490**	**2497**
Efficiency [dB]	**-5.21**	**-4.97**	**-5.21**	**-5.36**	**-5.19**	**-5.04**	**-4.80**	**-5.17**	**-5.47**	**-5.46**
Efficiency [%]	**30.2**	**31.8**	**30.1**	**29.1**	**30.2**	**31.3**	**33.1**	**30.4**	**28.4**	**28.4**
TRG_θ [dB]	-6.66	-6.38	-6.67	-6.90	-6.71	-6.59	-6.39	-6.72	-7.11	-7.11
$Gain_{\theta\ Peak}$ [dB]	0.80	1.26	0.59	0.24	0.34	0.69	0.82	-0.02	-0.24	-0.50
$Gain_{\theta\ Min}$ [dB]	-24.17	-25.53	-27.93	-32.81	-28.20	-28.74	-22.41	-23.96	-32.67	-27.44
TRG_φ [dB]	-10.68	-10.55	-10.66	-10.62	-10.51	-10.29	-9.93	-10.40	-10.48	-10.46
$Gain_{\varphi\ Peak}$ [dB]	-5.53	-5.75	-6.52	-5.52	-6.16	-5.87	-4.84	-5.36	-5.36	-5.15
$Gain_{\varphi\ Min}$ [dB]	-36.60	-27.50	-26.64	-27.41	-29.41	-30.57	-23.09	-21.56	-37.01	-29.11
UHRG [dB]	-10.49	-10.35	-10.50	-10.54	-10.47	-10.20	-9.97	-10.33	-10.47	-10.39
UHRG/TRG [%]	29.6	29.0	29.6	30.3	29.6	30.5	30.4	30.5	31.6	32.2
H-Plane	-7.41	-7.29	-7.36	-7.83	-7.65	-7.45	-7.30	-7.51	-7.95	-7.83
E1-Plane, AVG [dB]	-4.67	-4.36	-4.69	-5.13	-4.98	-4.77	-4.49	-4.91	-5.21	-5.32
E2-Plane, AVG [dB]	-8.90	-8.38	-8.77	-8.84	-8.79	-8.74	-8.28	-8.60	-8.78	-8.58
Peak Gain [dB]	0.47	0.37	0.35	0.36	0.26	0.30	0.38	0.17	-0.11	-0.27
Directivity [dB]	5.68	5.35	5.56	5.72	5.45	5.34	5.18	5.35	5.36	5.19
Minimum Gain [dB]	-13.34	-15.97	-14.76	-13.38	-14.60	-12.78	-15.18	-13.58	-15.21	-15.32

Average Efficiency	**-5.36dBi**	**29.10%**
Peak Gain	**0.47dBi**	

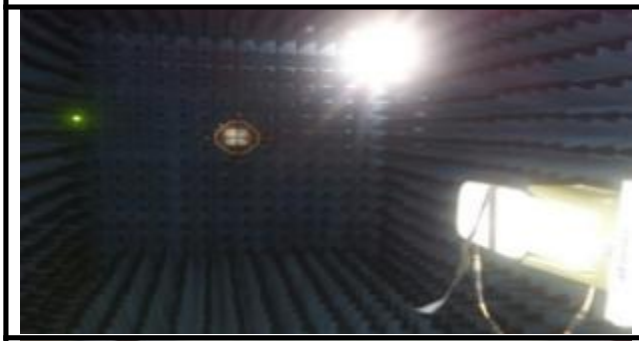
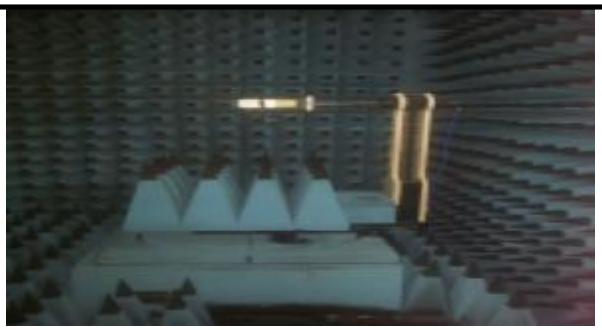
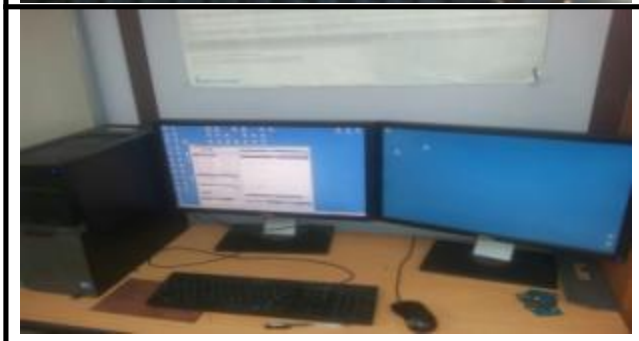
7. Measurement Process

7.1 SWR / Return loss

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

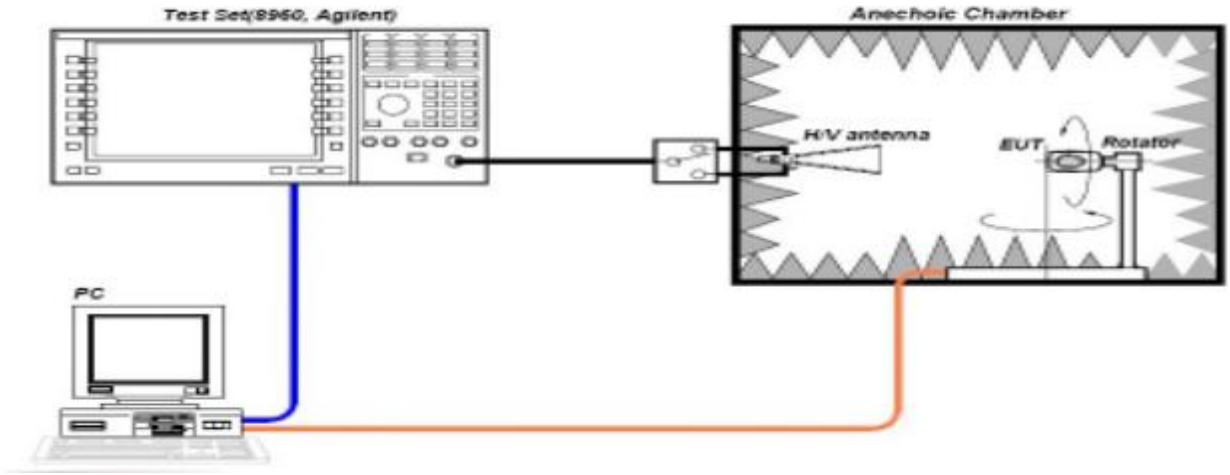
7.2 Gain

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

Anechoic Chamber for Antenna Gain Measurement	
	
	

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