

25.01.10

RA-N2501-12

APPROVAL SHEET

**MODEL :NTT-Easy
SUB ANTENNA
Antenna layout**

Review	Consent	Approval

Messrs. SENA Technology Co.,Ltd



19, Heolleung-ro 569-gil, Gangnam-gu,
Seoul, 06376, South Korea
Tel: +82-2-576-7362
Fax: +82-2-573-7710
Website: <http://www.sena.com>

	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	2 / 10

Table of contents

1. Revision History

2. Product Information

2.1 General Features

2.2 Electrical Specifications

3. Pattern Specifications

4. Matching Network

5. Electrical Characteristics

5.1 VSWR

5.2 Smith Chart

5.3 3D-PLOT

5.4 2D-GAIN

6. Passive Measurement

7. Measurement Process

	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	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				

	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	4 / 10

2.Product Information

2.1 General Features

PART NUMBER	GRSN24831MS72
ANTENNA TYPE	PCB pattern Antenna
APPLICATIONS	MESH

2.2 Electrical Specifications

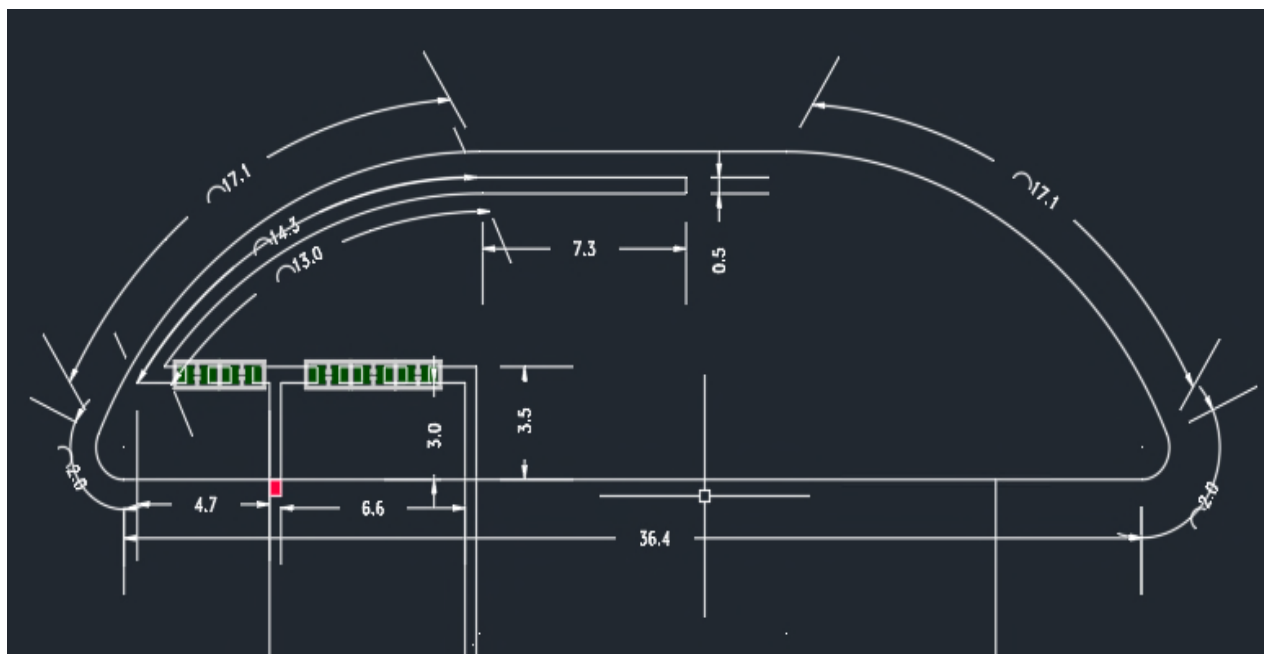
Frequency Range1 (TX)		2400MHz~2485MHz	
Frequency Range1 (RX)		2400MHz~2485MHz	
IMPEDANCE		50 Ω	
V.S.W.R	TX	2400MHz	2485MHz
		5 ↓	5 ↓
	RX	2400MHz	2485MHz
		5 ↓	5 ↓
RADIATION PATTERN		Omni-directional	
POLARIZATION		Linear	

RADINA. Co., LTD / CONFIDENTIAL

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

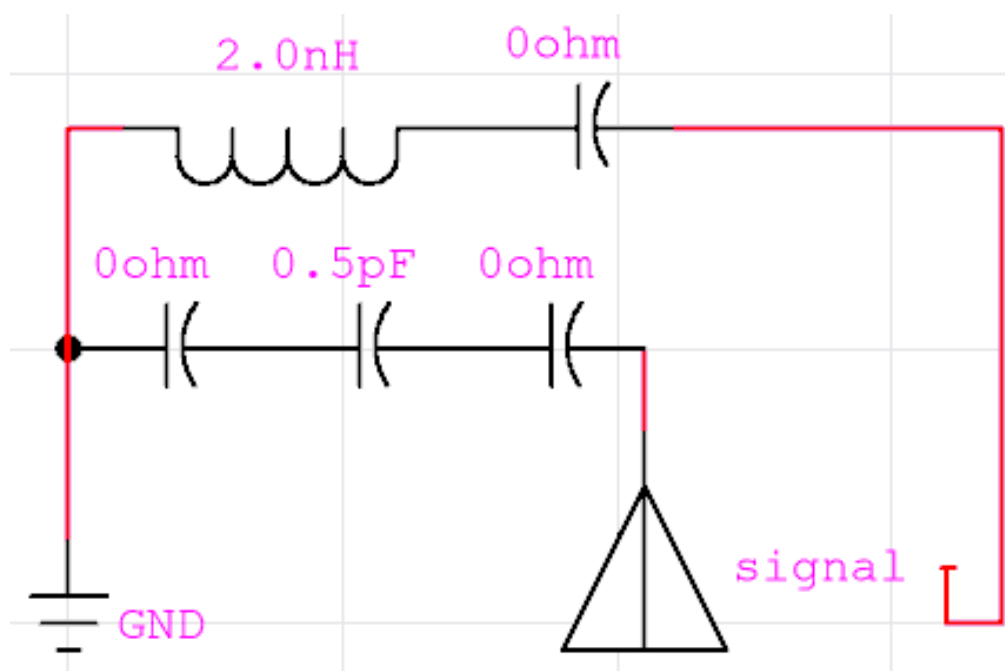
	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	5 / 10

3. Pattern Specifications



4. Matching Network

Capacitor value can be changed depending on different situation



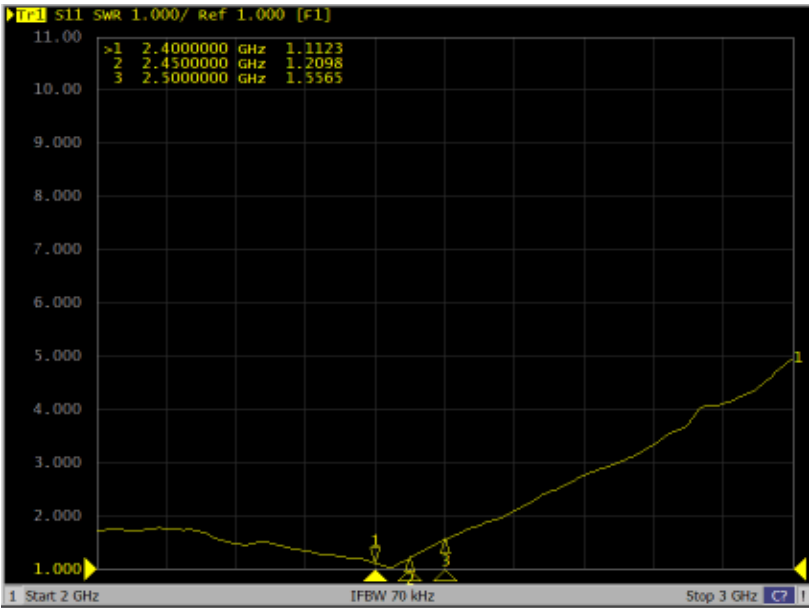
RADINA. Co., LTD / CONFIDENTIAL

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

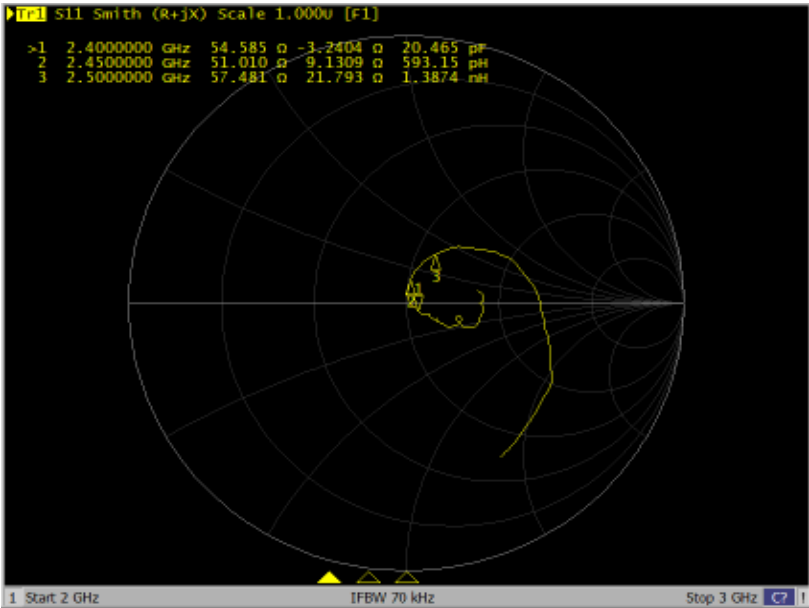
	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	6 / 10

5. Electrical Characterristics

5.1 VSWR



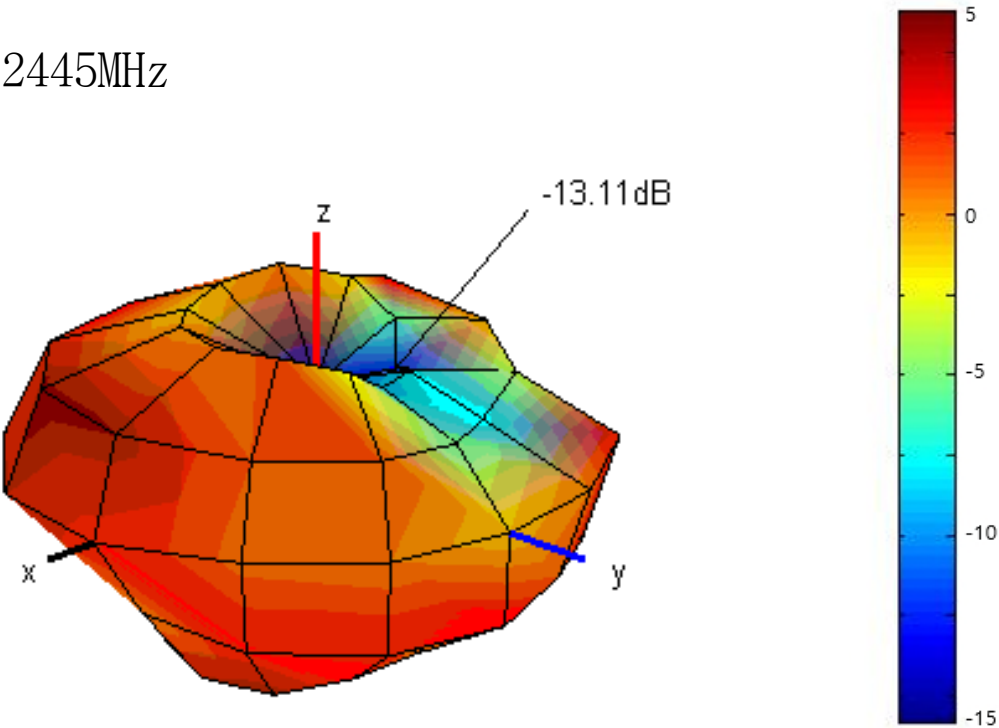
5.2 SMITH CHART



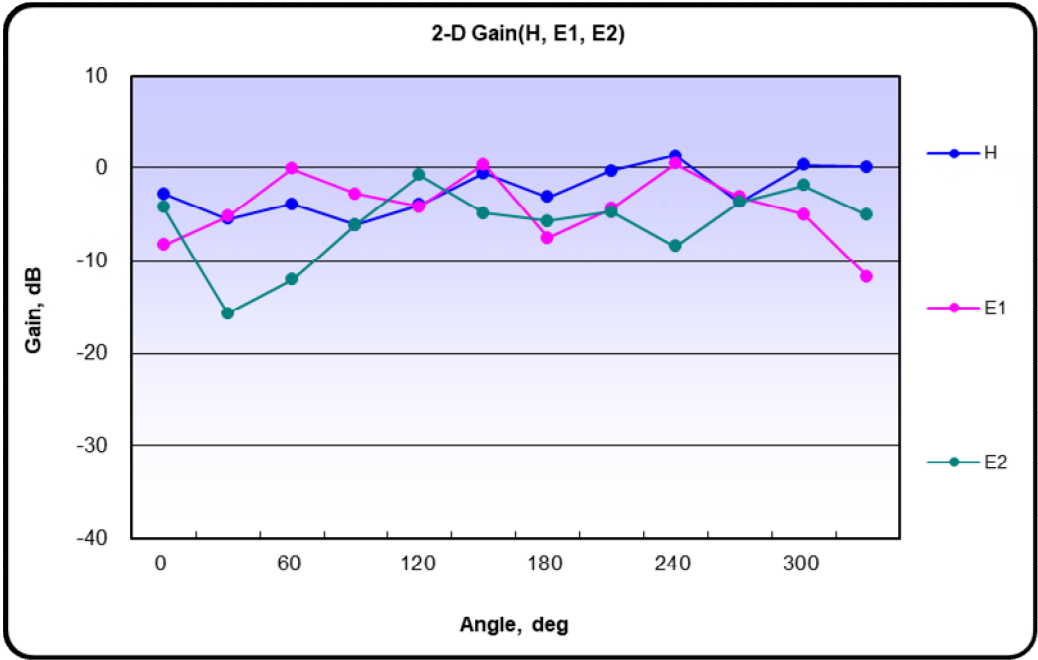
	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	7 / 10

5.3 3D-PLOTs

2445MHz



5.4 2D-GAIN



	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	8 / 10

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]	-1.56	-1.61	-1.70	-1.71	-1.96	-1.98	-1.73	-1.79	-1.86	-1.77
Efficiency [%]	69.8	69.0	67.6	67.5	63.6	63.4	67.2	66.3	65.2	66.6
TRG _θ [dB]	-2.68	-2.67	-2.82	-2.80	-3.08	-3.08	-2.82	-2.88	-2.95	-2.87
Gain _{θ Peak} [dB]	1.57	1.75	1.61	1.60	1.43	1.37	1.71	1.53	1.51	1.33
Gain _{θ Min} [dB]	-26.25	-21.15	-22.57	-18.56	-24.64	-22.76	-18.76	-18.05	-18.10	-18.62
TRG _φ [dB]	-7.99	-8.24	-8.12	-8.23	-8.41	-8.48	-8.26	-8.31	-8.39	-8.26
Gain _{φ Peak} [dB]	-3.58	-2.82	-3.32	-3.57	-3.42	-3.18	-3.43	-3.27	-3.34	-3.12
Gain _{φ Min} [dB]	-19.44	-22.24	-20.17	-20.45	-23.19	-21.36	-19.58	-23.40	-21.56	-24.25
UHRG [dB]	-4.78	-4.83	-4.95	-4.98	-5.25	-5.23	-5.08	-5.11	-5.20	-5.12
UHRG/TRG [%]	47.6	47.7	47.3	47.1	46.9	47.3	46.2	46.5	46.3	46.2
H-Plane	-1.32	-1.34	-1.40	-1.50	-1.76	-1.70	-1.59	-1.72	-1.75	-1.77
E1-Plane, AVG [dB]	-3.03	-3.13	-3.26	-3.24	-3.49	-3.48	-3.21	-3.16	-3.20	-3.08
E2-Plane, AVG [dB]	-4.55	-4.42	-4.50	-4.37	-4.93	-4.96	-4.89	-4.80	-4.74	-4.79
Peak Gain [dB]	0.34	0.39	0.43	0.38	0.15	0.05	0.39	0.20	0.22	-0.03
Directivity [dB]	1.90	2.00	2.12	2.08	2.11	2.03	2.12	1.99	2.08	1.74
Minimum Gain [dB]	-13.22	-11.94	-11.27	-11.62	-12.86	-12.93	-13.00	-11.54	-12.89	-13.11

	11	12	13	14	15	16	17	18	19	20
Frequency [MHz]	2450	2455	2460	2465	2470	2475	2480	2485	2490	2497
Efficiency [dB]	-1.93	-1.89	-2.08	-2.07	-1.87	-1.81	-1.81	-2.25	-2.41	-2.49
Efficiency [%]	64.2	64.7	62.0	62.1	65.0	65.9	65.9	59.5	57.4	56.4
TRG _θ [dB]	-3.03	-2.98	-3.18	-3.16	-2.94	-2.87	-2.89	-3.30	-3.45	-3.50
Gain _{θ Peak} [dB]	1.13	1.39	1.27	0.73	1.48	0.98	1.81	0.69	0.32	0.65
Gain _{θ Min} [dB]	-17.55	-19.49	-17.54	-18.89	-19.69	-16.97	-17.97	-15.96	-15.37	-17.31
TRG _φ [dB]	-8.41	-8.45	-8.59	-8.59	-8.48	-8.45	-8.40	-8.95	-9.13	-9.30
Gain _{φ Peak} [dB]	-3.39	-3.40	-3.48	-3.22	-3.93	-3.57	-3.09	-3.76	-3.64	-3.57
Gain _{φ Min} [dB]	-22.58	-27.10	-25.91	-39.16	-43.21	-31.18	-31.50	-35.36	-29.83	-30.85
UHRG [dB]	-5.27	-5.30	-5.47	-5.44	-5.29	-5.28	-5.25	-5.76	-5.98	-6.06
UHRG/TRG [%]	46.3	45.6	45.8	46.0	45.5	45.0	45.3	44.6	44.0	43.9
H-Plane	-1.98	-1.93	-2.08	-2.12	-1.91	-1.82	-1.86	-2.23	-2.40	-2.39
E1-Plane, AVG [dB]	-3.24	-3.08	-3.56	-3.41	-3.14	-3.08	-2.98	-3.42	-3.73	-3.83
E2-Plane, AVG [dB]	-4.93	-4.80	-5.01	-5.04	-4.81	-4.64	-4.80	-5.12	-5.07	-5.32
Peak Gain [dB]	-0.16	0.06	-0.06	-0.50	0.22	-0.14	0.58	-0.45	-0.69	-0.49
Directivity [dB]	1.76	1.96	2.01	1.57	2.09	1.57	2.39	1.80	1.72	2.00
Minimum Gain [dB]	-12.36	-13.80	-12.72	-11.58	-11.53	-10.77	-11.46	-11.90	-11.19	-11.21

Average Efficiency	-1.91dBi	64.46%
Peak Gain	0.58dBi	

RADINA. Co., LTD / CONFIDENTIAL

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

	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	9 / 10

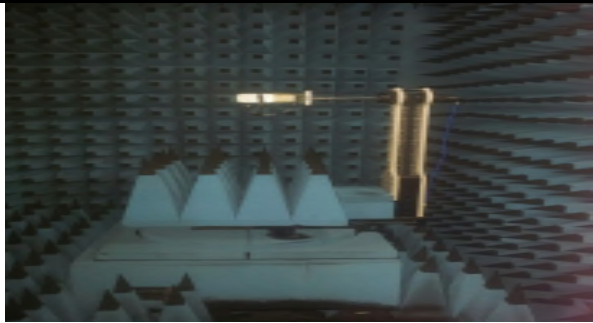
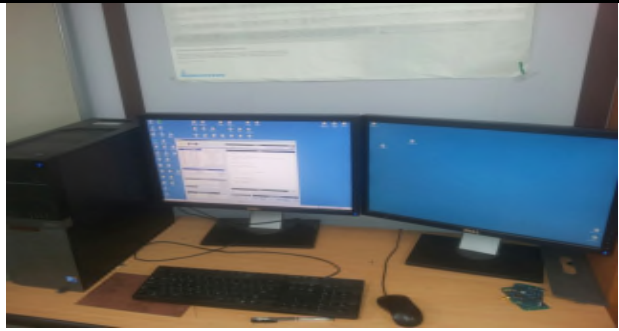
7.Measurement Process

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.

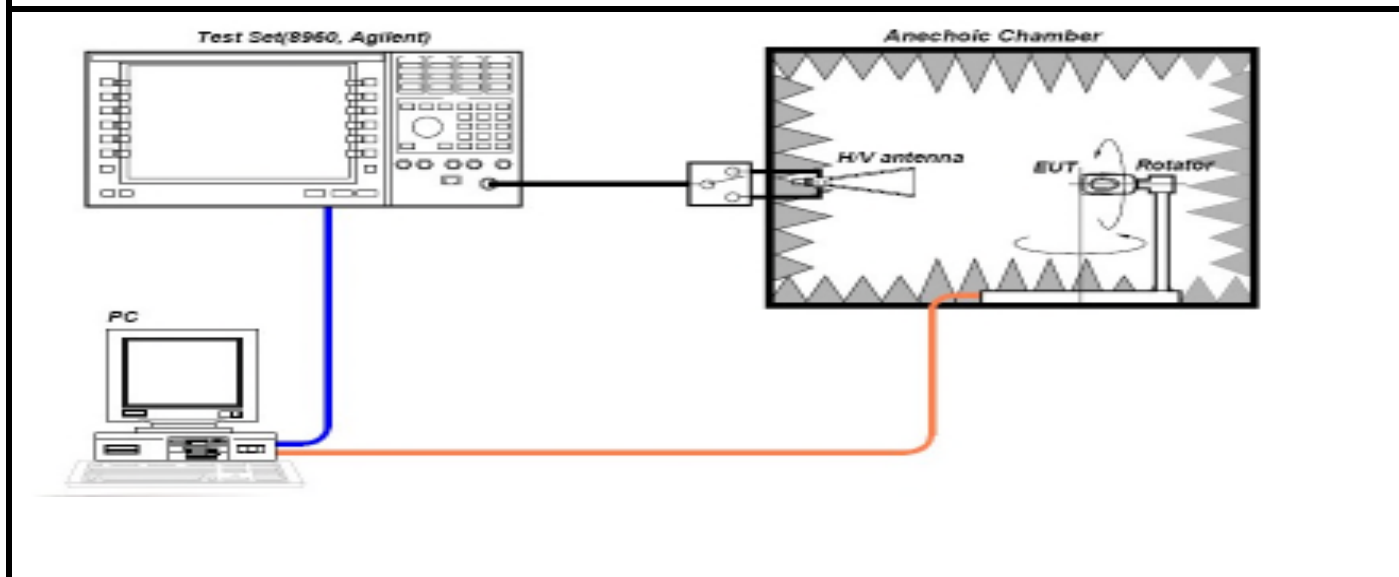
Anechoic Chamber for Antenna Gain Measurement	
	
	

	PRODUCT APPROVAL SHEET		GRSN25031MS12			
	MODEL NAME	NTT-EASY	REV.	1.0	Page	10 / 10

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

