

2018.10.18

RA-N1062-10

APPROVAL SHEET

MODEL : Tufftalk-M
Antenna layout

Review	Consent	Approval

Messrs. SENA Technology Co.,Ltd



RadiNa Co. ,Ltd

TEL:+82-2-463-0373

FAX:+82-2-463-0374

	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	2 / 12

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		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	3 / 12

1. Revision History

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

	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	4 / 12

2.Product Information

2.1 General Features

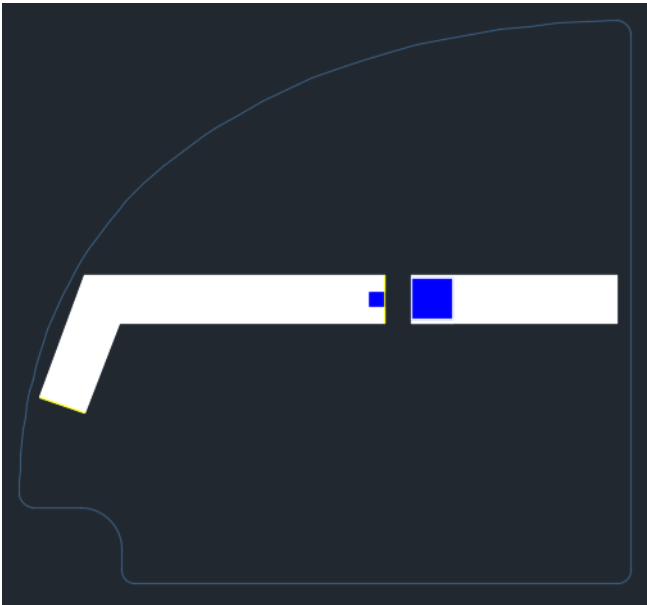
PART NUMBER	GRSNT034PT1
ANTENNA TYPE	PCB Pattern Antenna
APPLICATIONS	MESH

2.2 Electrical Specifications

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

	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	5 / 12

3. Pattern Specifications



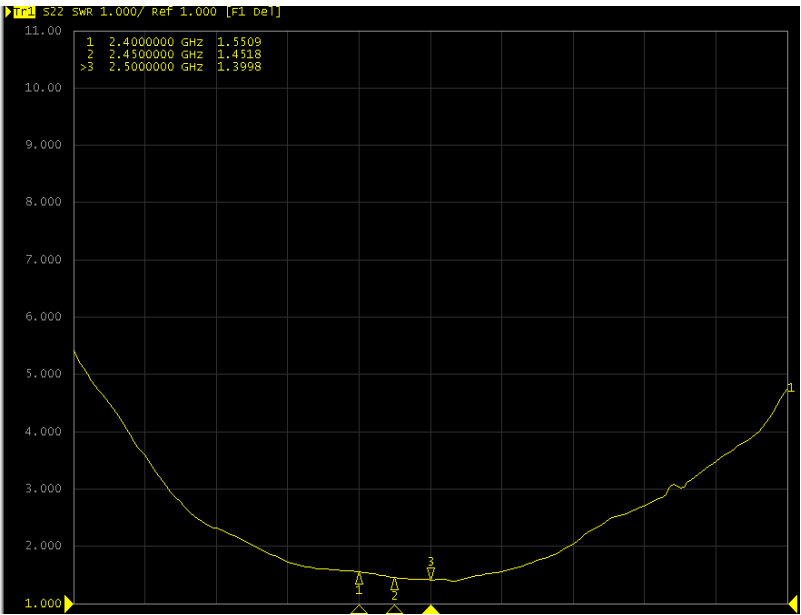
4. Matching Network

Capacitor value can be changed depending on different situation

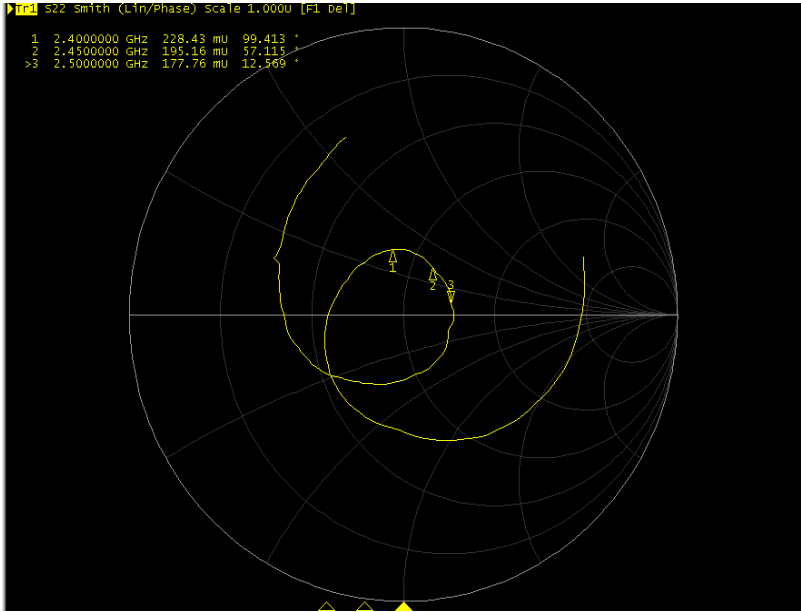
	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	6 / 12

5. Electrical Characterristics

5.1 VSWR



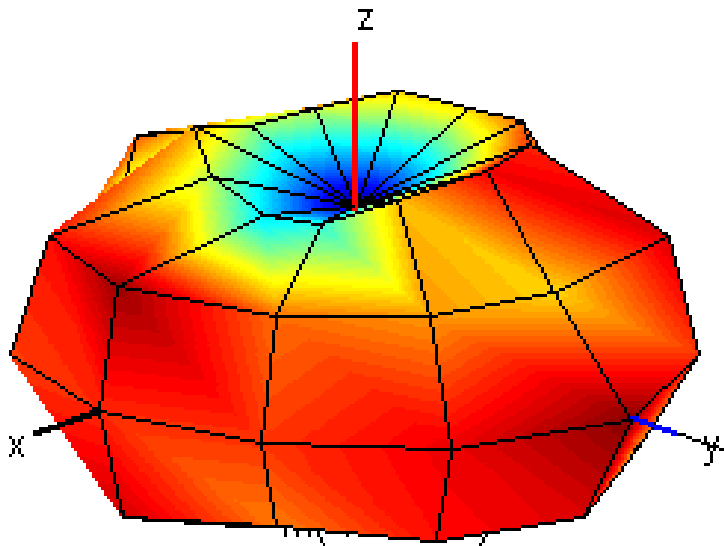
5.2 SMITH CHART



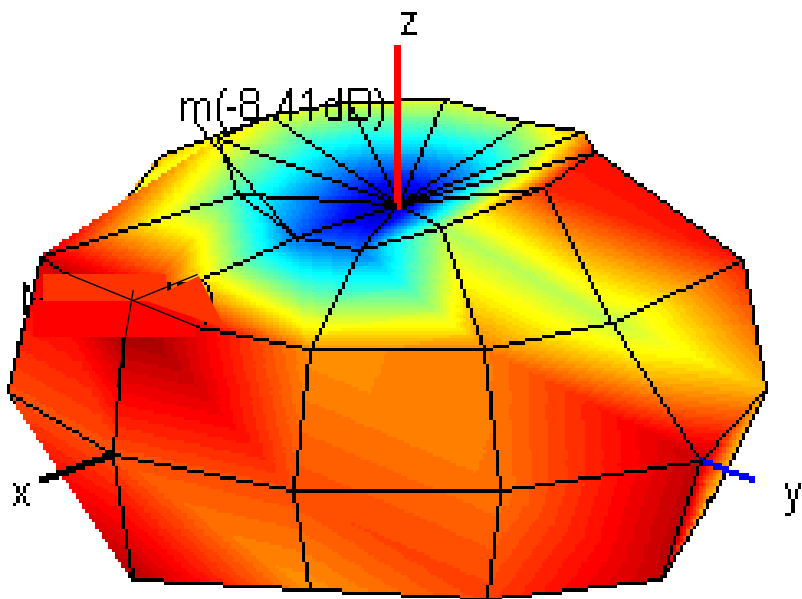
	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	7 / 12

5.3 3D-PLOTs

2400MHz

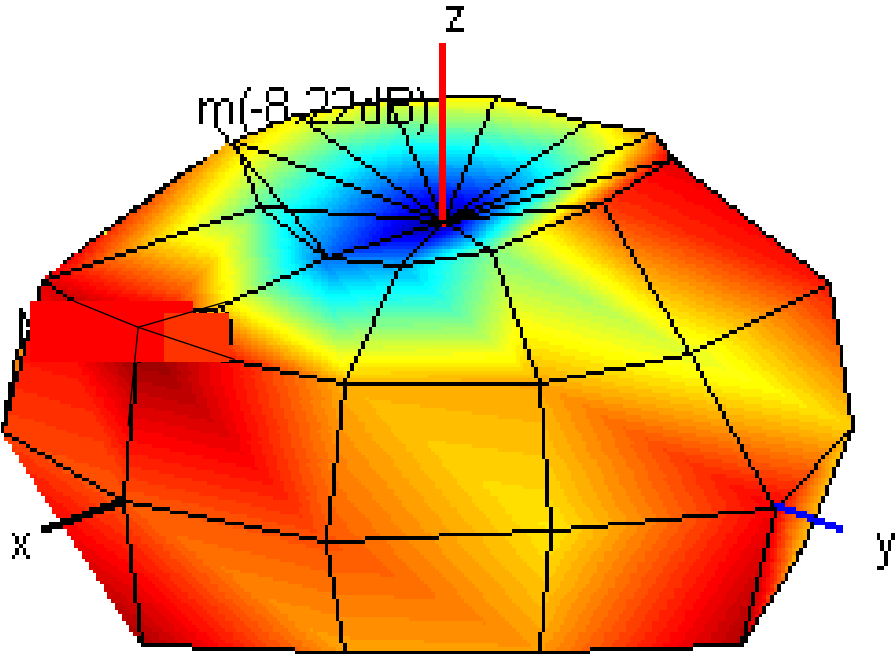


2445MHz



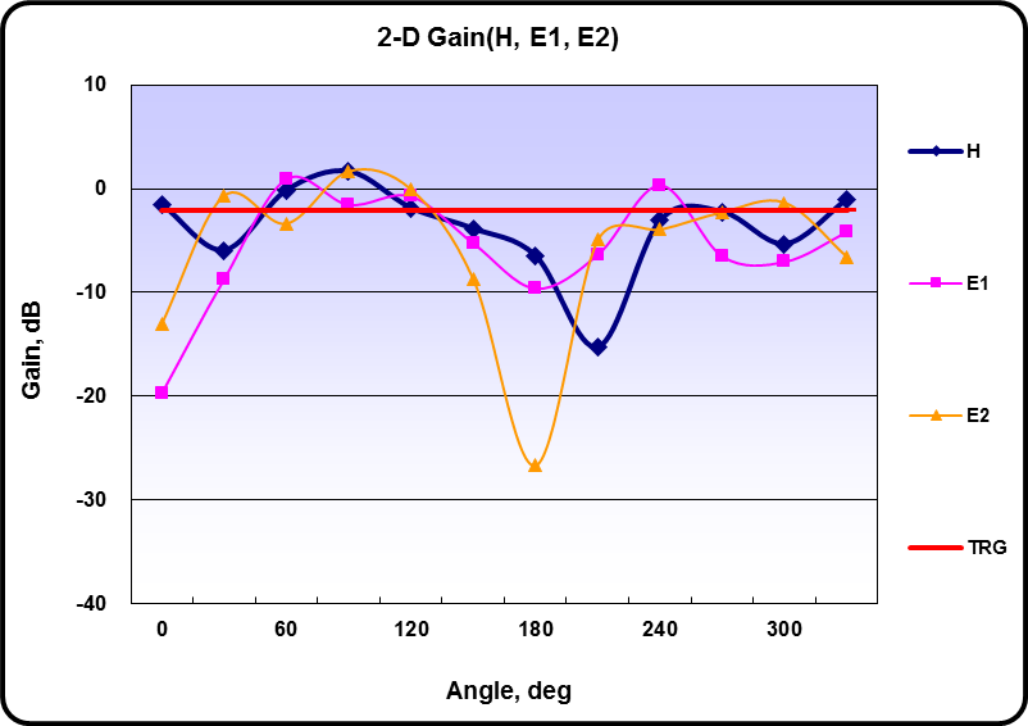
	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	8 / 12

2485MHz



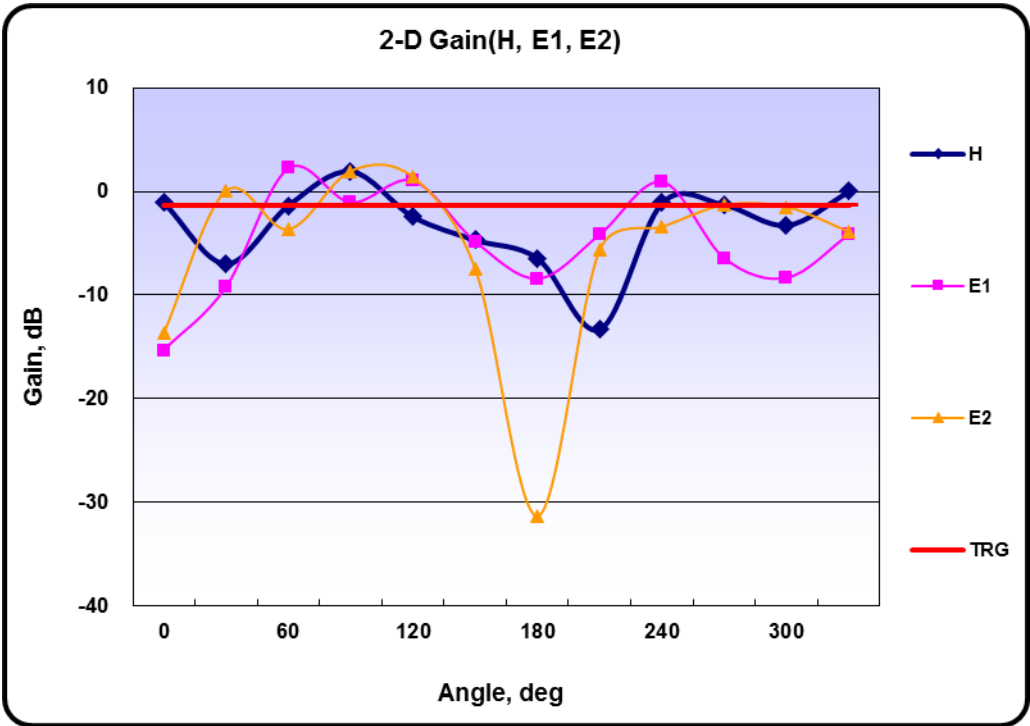
5.4 2D-GAIN

2400MHz

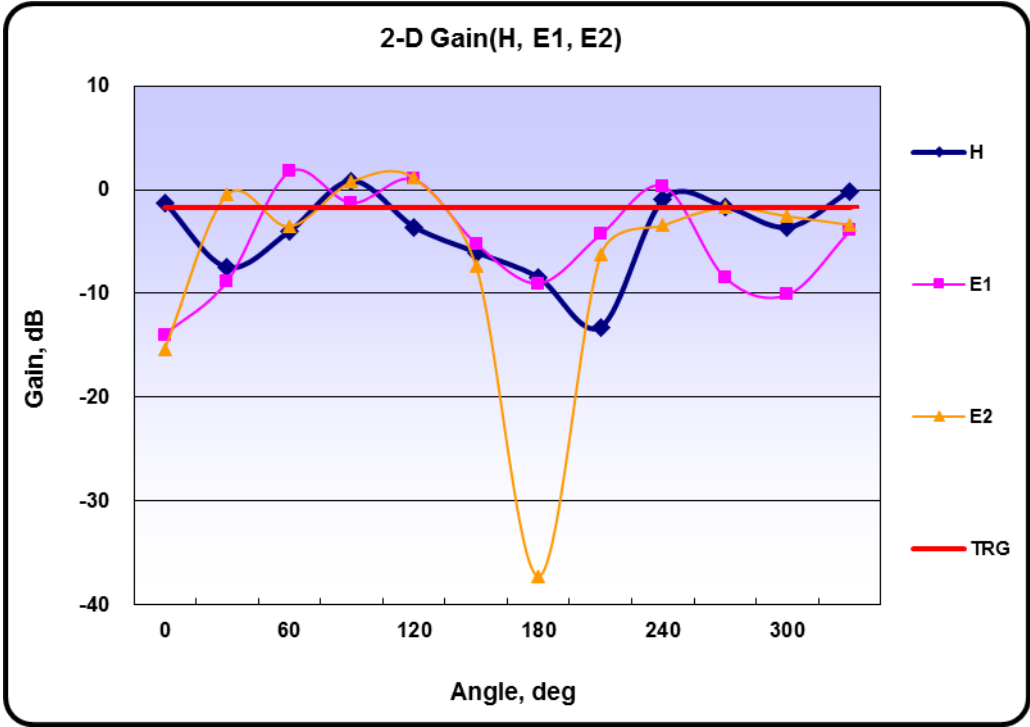


	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	9 / 12

2445MHz



2485MHz



	PRODUCT APPROVAL SHEET		GRSNT034PT1			
	MODEL NAME	Tufftalk-M	REV.	1.0	Page	10 / 12

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)	-2.09	-2.01	-1.95	-1.88	-1.90	-1.69	-1.50	-1.36	-1.39	-1.33
Efficiency(%)	61.87	62.92	63.77	64.92	64.55	67.70	70.73	73.15	72.69	73.58
TRG(dB)	-2.09	-2.01	-1.95	-1.88	-1.90	-1.69	-1.50	-1.36	-1.39	-1.33
TRG _{Theta} (dB)	-3.03	-2.97	-2.92	-2.85	-2.89	-2.71	-2.49	-2.35	-2.39	-2.34
TRG _{Phi} (dB)	-9.17	-9.04	-8.97	-8.83	-8.81	-8.49	-8.44	-8.26	-8.25	-8.18
UHRG(dB)	-5.23	-5.18	-5.14	-5.07	-5.10	-4.90	-4.71	-4.55	-4.57	-4.52
UHRG/TRG(%)	48.47	48.18	48.00	47.90	47.85	47.83	47.85	47.92	47.99	48.01
H-Plane	-2.42	-2.36	-2.33	-2.31	-2.40	-2.25	-2.06	-1.97	-2.06	-2.06
E1-Plane, AVG(dB)	-3.40	-3.30	-3.19	-3.09	-3.09	-2.90	-2.67	-2.52	-2.55	-2.50
E2-Plane, AVG(dB)	-2.86	-2.84	-2.83	-2.79	-2.84	-2.67	-2.43	-2.29	-2.30	-2.24
Peak Gain(dB)	0.12	0.21	0.24	0.30	0.36	0.38	0.41	0.43	0.48	0.52
Directivity(dB)	3.82	3.82	3.80	3.77	3.86	3.92	4.00	4.06	4.09	4.10
Minimum Gain(dB)	-10.75	-10.38	-10.10	-9.67	-9.37	-9.25	-9.03	-8.84	-8.67	-8.41

	11	12	13	14	15	16	17	18	19	20
Frequency(MHz)	2450	2455	2460	2465	2470	2475	2480	2485	2490	2497
Efficiency(dB)	-1.39	-1.24	-1.25	-1.36	-1.55	-1.51	-1.68	-1.71	-1.67	-1.71
Efficiency(%)	72.65	75.24	75.01	73.10	69.97	70.67	67.98	67.38	68.03	67.50
TRG(dB)	-1.39	-1.24	-1.25	-1.36	-1.55	-1.51	-1.68	-1.71	-1.67	-1.71
TRG _{Theta} (dB)	-2.39	-2.24	-2.26	-2.39	-2.57	-2.53	-2.73	-2.78	-2.74	-2.79
TRG _{Phi} (dB)	-8.25	-8.10	-8.06	-8.13	-8.34	-8.27	-8.33	-8.35	-8.31	-8.28
UHRG(dB)	-4.57	-4.41	-4.41	-4.52	-4.70	-4.65	-4.81	-4.85	-4.81	-4.85
UHRG/TRG(%)	48.09	48.15	48.25	48.31	48.39	48.45	48.55	48.54	48.59	48.52
H-Plane	-2.18	-2.08	-2.17	-2.31	-2.54	-2.53	-2.74	-2.81	-2.79	-2.87
E1-Plane, AVG(dB)	-2.54	-2.39	-2.41	-2.54	-2.71	-2.67	-2.84	-2.86	-2.80	-2.79
E2-Plane, AVG(dB)	-2.26	-2.09	-2.10	-2.22	-2.40	-2.37	-2.59	-2.68	-2.68	-2.82
Peak Gain(dB)	0.51	0.62	0.58	0.52	0.49	0.44	0.43	0.37	0.41	0.34
Directivity(dB)	4.14	4.16	4.15	4.14	4.14	4.13	4.10	4.09	4.08	4.04
Minimum Gain(dB)	-8.27	-8.02	-7.92	-7.97	-8.13	-8.05	-8.23	-8.22	-8.21	-8.18

Average Efficiency	-1.60dB,	69.17%
Peak Gain	0.62dB	