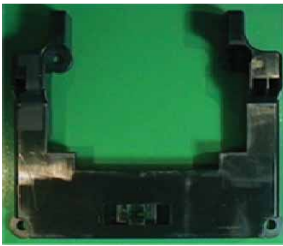
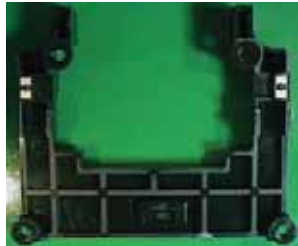


APPROVAL SHEET

Customer	Honeywell		
Supplier	KARAM SOLUTION		
Product Name	Wi-Fi&BT Antenna		
Model Name	PACIFICO		
Maker Code	KRS-PACIFICO-WA		
Date	May 29 , 2013		
Sample Picture	TOP	Bottom	
			
	Width: 52.70 mm , Length: 46.90 mm		
	Engineer	Review	Approved
Circuit			
	Oscar	Clark	
Mechanism			
	Aion	Abel	
Quality			
	Heesun	BCY	Allen

Headquarters : Shin Chang-gu, Gyeonggi-Siheung Eunhaeng Technotown 249, 4 th Floor Seoul, 429-836 Korea
TEL : 82-31-312-9577, FAX : 82-31-312-9670

Reserch : Rm.906, 448 DaeRyung Technotownlll Gasan-dong, Gumcheon-gu, Seoul, 153-772 Korea
TEL : 82-2-1661-9577, FAX : 82-2-2107-7299



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REVISION LIST

REVISION	DATE	CHANGE CONTENTS	CHANGE CAUSE	REMARK
00	2013.02.01		FIRST APPROVAL SPECIFICATION	
00	2013.05.29		APPROVAL SPECIFICATION	

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6.2 Gain	

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1. Technical Items

1.1 Electrical Spec.

Electrical Spec.				
Frequency Range	ANT 1 (Wi-Fi,BT 2.4GHz)		ANT 2 (Wi-Fi 5GHz)	
	2400 MHz	2485 MHz	5030 MHz	5835 MHz
VSWR (Max)	2.0:1	2.0:1	2.5:1	2.5:1
Peak Gain (Max)	1.15dBi	1.75dBi	3.44dBi	2.83dBi
Average Gain (Min)	-5.51dBi	-5.23dBi	-4.77dBi	-4.24dBi
Impedance (Nominal)	50 ohms			
Polarization	Vertical			
Radiation Pattern	Omni-Directional			
Maximum Power	2 Watts			

- * Note1 : ANT1 is combo antenna both Wi-Fi and BT and ANT2 is single antenna for Wi-Fi at 5GHz.
- * Note 2 : Average Gain is average both E1-Plane and E2-Plane.

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1.2 Material Spec.

NO	Part Name	Material	Quantity	Material manufacturers	Processing manufacturers	Other
1	CARRIER	PC (LG SC1004A KPA1)	1	LG Chem	JM	
2	FCCL	FCCL (Halogen Free CCL)	1	INNOX	UNIELFLEX	
3	PSR INK (BLACK)	Ink (YWPSR)	1	YUWON		
4	Marking Ink (WHITE)	Ink (S-200W WITH HD-3)	1	TAIYO INK		
5	TAPE	TAPE (3M 966)	1	3M KOREA		
6	Ag Plating	Liquid (MIKO AUROMERSE II)	1	Y.M.T	YPT	
		Liquid (CF 300A)	1			
		Liquid (CF 300B)	1			
		Liquid (CF 300C)	1			
		Liquid (CF 300M)	1			
		Liquid (Activatoe Additive 10)	1			
		Liquid (CF 300Activator)	1			
		Liquid (SAC161H)	1			

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2. Test Equipment

The test equipments for antenna are as follows

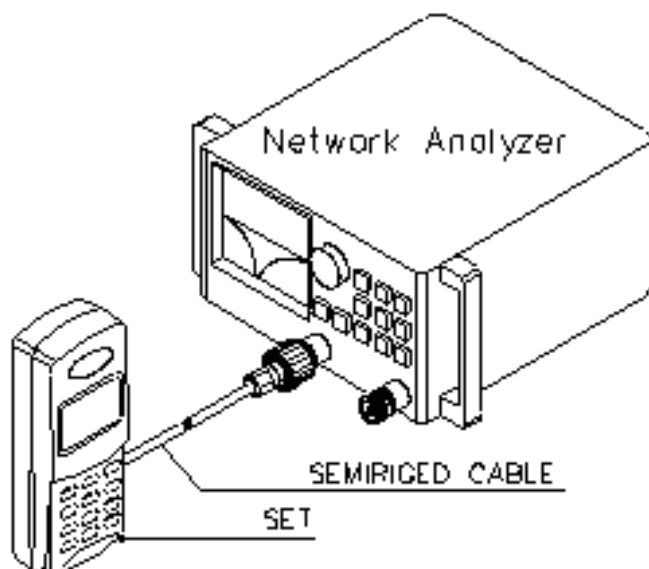
- ◆ Network Analyzer (Agilent 8753ES) to measure the VSWR of antenna
- ◆ Standard Horn antenna that is adjustable in the Wi-Fi and BT band
- ◆ Anechoic Chamber installed the cables, connectors and equipments for measurement
- ◆ Dogmatic Caliper to measure the dimensions
- ◆ Climatic Chamber for environmental test

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3. Electrical Demands

3.1 VSWR

The VSWR characteristics must satisfy the electrical demands. With built-in antenna mounted on a handset, the VSWR of antenna must be less than 2.0:1 (2400~2485MHz) at ANT 1 (WiFi,BT 2.4GHz) band, 2.5:1(5030~5835MHz) at ANT 2 (Wi-Fi 5GHz) band on the free space.



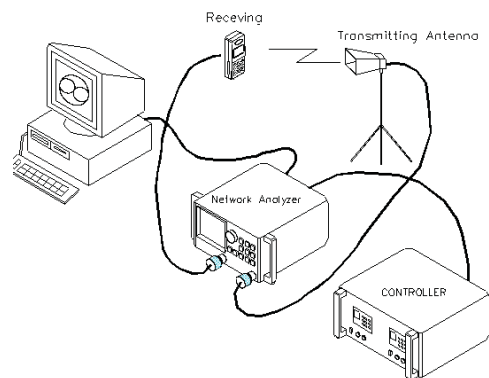
3.2 Radiation Pattern

The radiation pattern must have the Omni-directional characteristic in WiFi&BT band.

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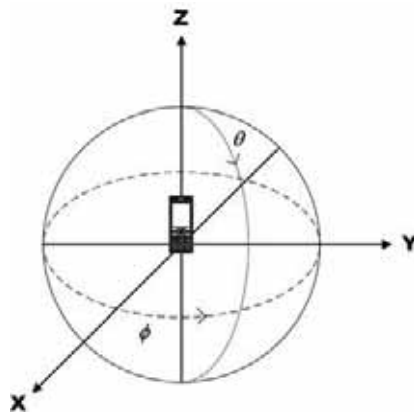
3.3 Gain

The gain is expressed as dBi that standardizes the half-wave length dipole antenna. Built-in antenna mounted on a handset, the peak gain of antenna must be smaller than 2.5dBi in ANT 1 (WiFi,BT 2.4GHz) band, 4.5dBi in ANT 2 (Wi-Fi 5GHz) band.



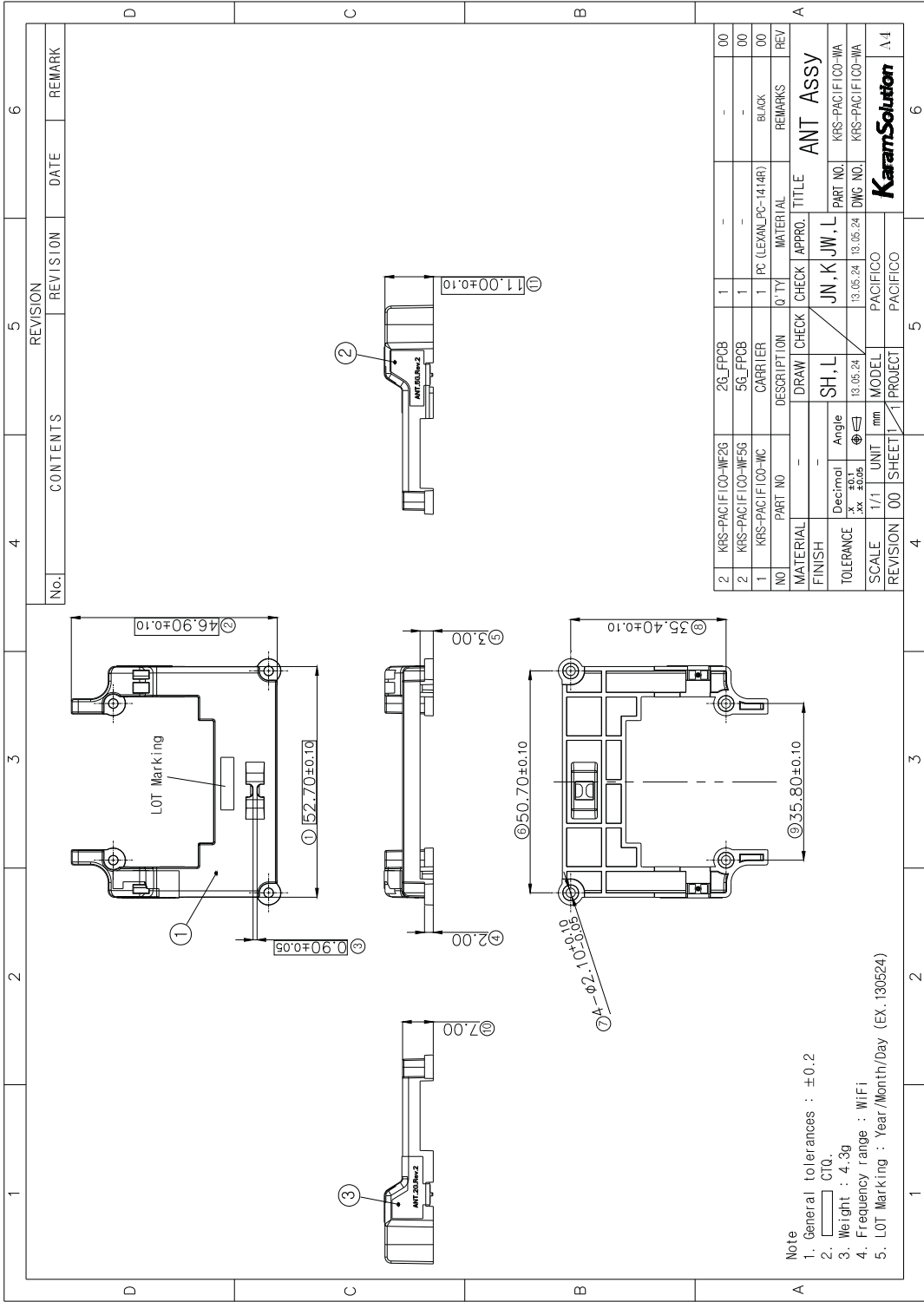
3.4 Test Method

The antenna is tested while mounted on handset with the correct matching circuit in free space. Radiation patterns are measured on at least six different frequencies: 2400 MHz, 2440MHz, 2480MHz, 5030MHz, 5430MHz, 5835MHz. The antenna is measured for three-dimensional. The results of the test will be correlated to the customer handset and the measurement environment.



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4. Antenna Drawing



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5. Environmental Demands

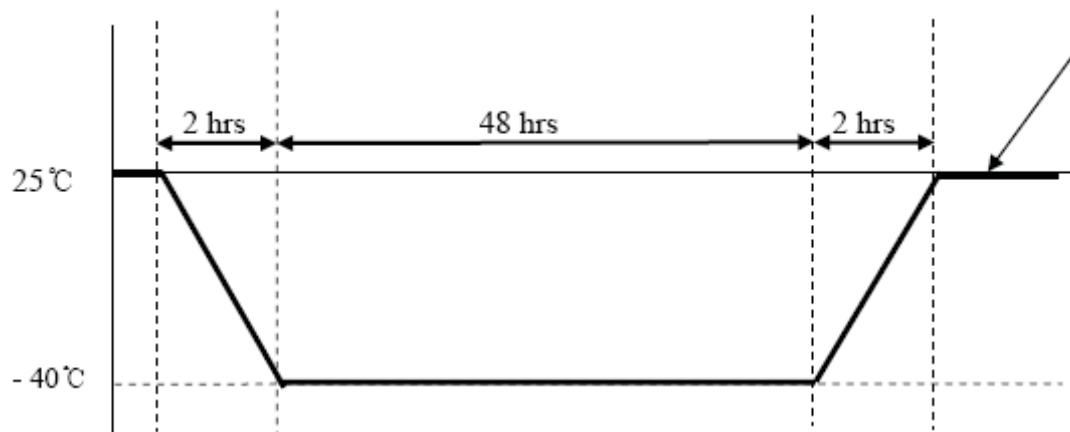
5.1 LOW TEMPERATURE SOAKING

The antenna should be placed in an environmental chamber at -40°C for 48 hours.

Soak antenna at ambient temperature at least 1 hour after the test.

After test is complete, there shall be no visual deterioration or damage.

The antenna should function mechanically. Electrical characteristics should be within the specified range.



Low Temperature soaking

5.2 HIGH TEMPERATURE SOAKING

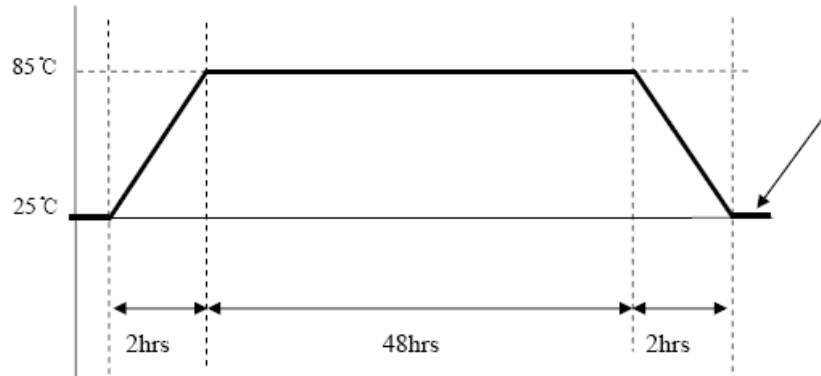
The antenna should be placed in an environmental chamber at $+85^{\circ}\text{C}$ for 48 hours.

Soak antenna at ambient temperature at least 1 hour after the test.

After test is complete, there shall be no visual deterioration or damage.

The antenna should function mechanically. Electrical characteristics should be within the specified range

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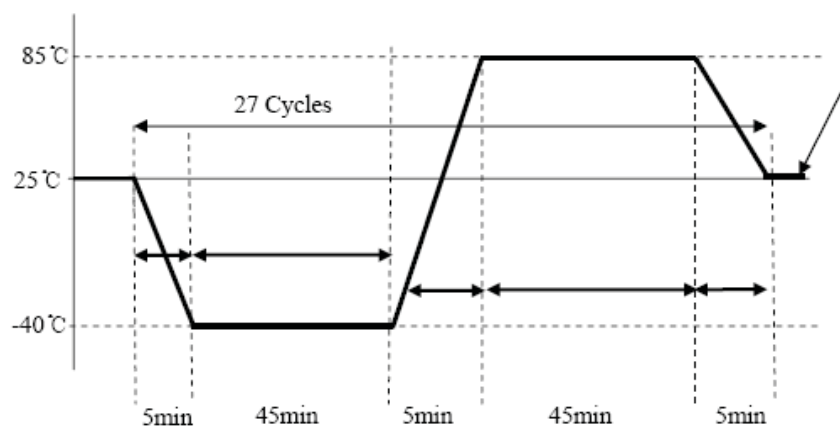


High Temperature soaking

5.3 THERMAL SHOCK TEST

Place the antenna in an environmental chamber at +25°C. Then expose antenna at temperature T1= -40°C during 45 minutes. Then expose antenna at temperature T2=+85°C during 45 minutes. Transfer time is 5 min. Repeat this cycle 27 times. After test is complete, there shall be no visual deterioration or damage.

The antenna should function mechanically. Electrical characteristics should be within the specified range



Thermal Shock Test

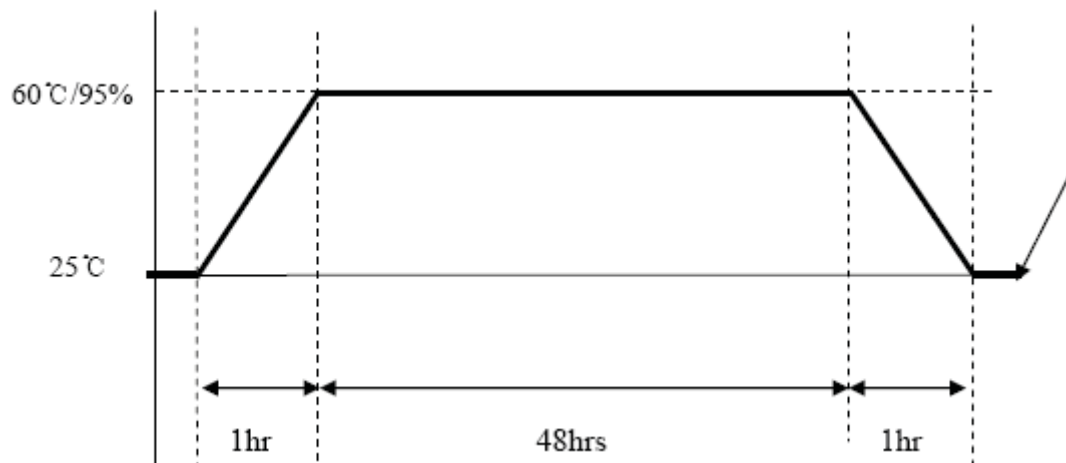
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5.4 STATIC HUMIDITY TEST

Place the complete in an environmental chamber at +25° C. Then increase temperature during 1 hour to +60° C with humidity increasing to 95% RH during 1 hours. Soak antenna with these parameters for 48 hours. After the finish initial ambient parameters should be achieved during 1 hour.

After test is complete, there shall be no visual deterioration or damage.

The antenna should function mechanically. Electrical characteristics should be within the specified range

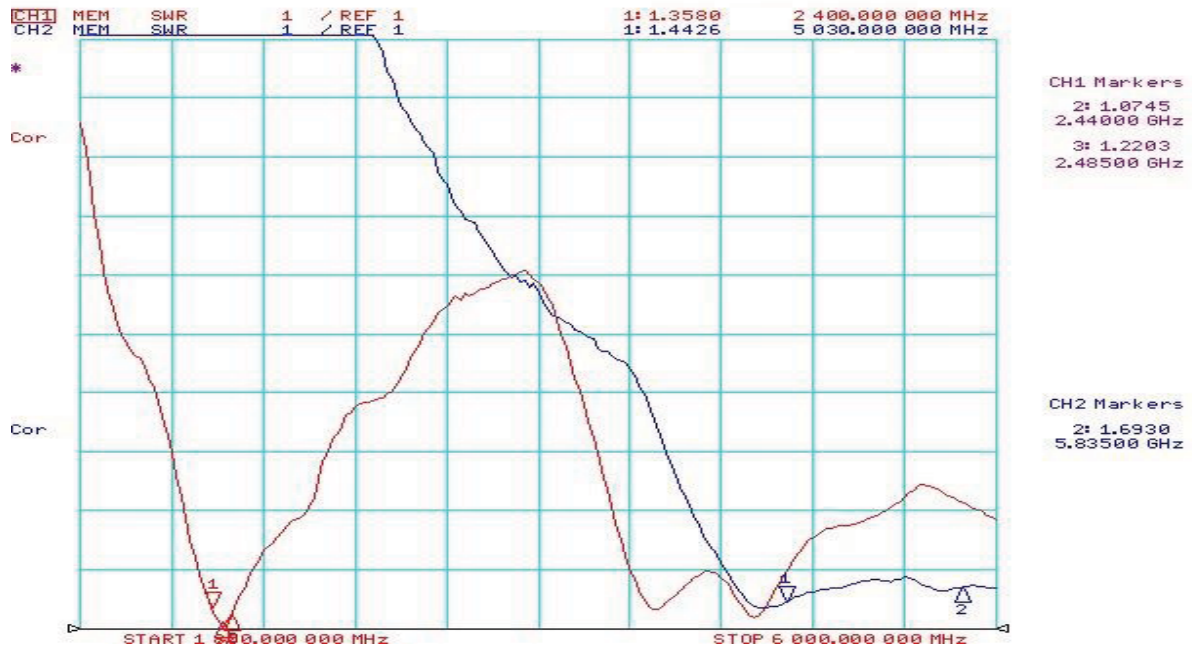


Static Humidity Test

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6. Electrical data

6.1 VSWR

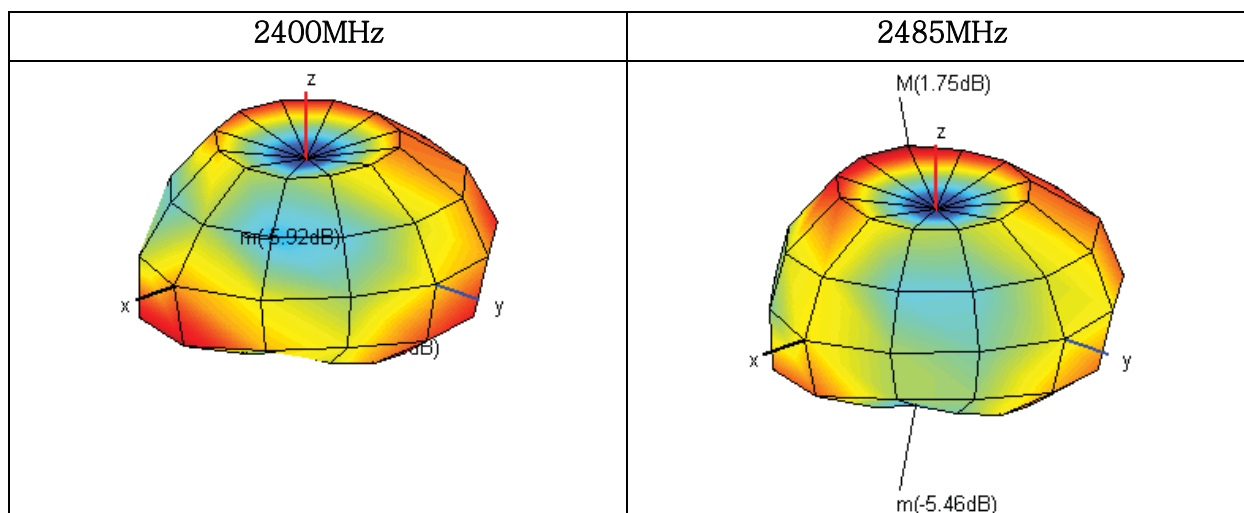


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6.2 3D Gain (with matching circuit)

- ANT 1 (Wi-Fi, BT 2.4GHz)

	1	2	3	4	5
Frequency(MHz)	2400	2420	2440	2460	2485
Efficiency(dB)	-1.71	-1.24	-1.06	-1.18	-1.40
Efficiency(%)	67.38	75.19	78.31	76.23	72.46
TRG(dB)	-1.71	-1.24	-1.06	-1.18	-1.40
TRG _{rhata} (dB)	-5.62	-5.19	-4.98	-4.79	-5.44
TRG _{phi} (dB)	-3.98	-3.47	-3.32	-3.66	-3.58
UHRG(dB)	-5.23	-4.57	-4.26	-4.24	-4.36
UHRG/TRG(%)	44.47	46.42	47.85	49.37	50.56
H-Plane	-7.02	-6.67	-6.42	-6.00	-6.84
E1-Plane, AVG(dB)	-4.88	-4.23	-4.09	-4.00	-4.60
E2-Plane, AVG(dB)	-6.14	-5.73	-5.50	-5.28	-5.87
Peak Gain(dB)	1.15	1.61	1.63	1.45	1.75
Directivity(dB)	2.86	2.85	2.69	2.63	3.14
Minimum Gain(dB)	-5.93	-4.76	-4.68	-5.34	-5.46
Test Condition	FS				
Antenna Type					
Average Efficiency	-1.31 dB, 73.91 %				



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- ANT 2 (Wi-Fi 5GHz)

	1	2	3	4	5
Frequency(MHz)	5030	5230	5430	5630	5835
Efficiency(dB)	-1.71	-1.77	-2.72	-1.72	-2.17
Efficiency(%)	67.51	66.55	53.46	67.24	60.72
TRG(dB)	-1.71	-1.77	-2.72	-1.72	-2.17
TRG _{Tdata} (dB)	-4.78	-4.38	-5.78	-5.04	-5.58
TRG _{Phi} (dB)	-4.65	-5.22	-5.68	-4.45	-4.81
UHRG(dB)	-4.38	-4.55	-5.74	-4.99	-5.16
UHRG/TRG(%)	54.00	52.74	49.86	47.19	50.16
H-Plane	-6.24	-5.42	-6.36	-7.89	-8.77
E1-Plane, AVG(dB)	-3.88	-2.53	-3.71	-3.17	-2.50
E2-Plane, AVG(dB)	-5.66	-4.70	-5.75	-5.15	-5.98
Peak Gain(dB)	3.44	3.55	1.75	3.33	2.83
Directivity(dB)	5.14	5.31	4.47	5.05	5.00
Minimum Gain(dB)	-18.74	-10.38	-10.21	-8.87	-9.67
Test Condition	FS				
Antenna Type					
Average Efficiency	-2.00 dB, 63.10 %				

