




# HBCA-3MM

(Hirose Bluetooth Chip Antenna)

*Company Confidential*


*Preliminary*

*Notice, this is not final specification  
Some parametric factors are subject to change*

결 재	담당	파트장	팀장
			

Antenna Business Team

R&D Part

	<b>Features</b> <ul style="list-style-type: none"> <li>✓ Small, Slim and High Gain</li> <li>✓ Available size : 3.2×2.3×1.0 mm</li> <li>✓ Embodies properties in real device</li> </ul>
	<b>Applications</b> <ul style="list-style-type: none"> <li>✓ Bluetooth, W-LAN, Wi-Fi</li> </ul>
<b>Description</b> <ul style="list-style-type: none"> <li>✓ The chip antenna is intended for use with 2.4 GHz applications.</li> </ul>	

<b>Chip Antenna properties</b>	
ITEM	SPEC.
Product name	HBCA-3MM (Hirose Bluetooth Chip Antenna)
Frequency Range	2400 ~2500 MHz
VSWR	Max 3:1
Peak Gain [dBi]	typ. 1.4
Polarization	Linear
Operating Temperature [°C]	-35 ~ +85
Impedance [ $\Omega$ ]	50
Weight [g]	0.01

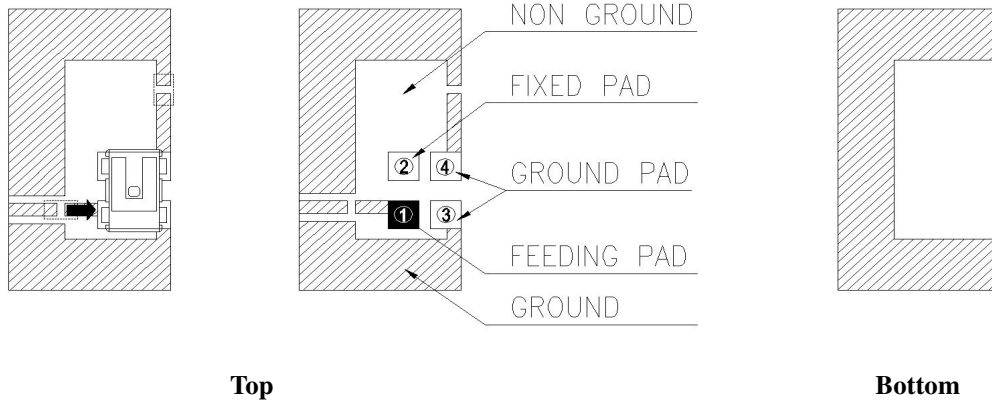
## Test board characteristics

Description		Dimensions										
<p>The HBCA Test board designed for evaluation purpose for SMD.</p> <p>The board is fitted with the SMA connector.</p> <p>The size of board is 50 × 50 mm<sup>2</sup>.</p>												
Comp.	A	B	C	D	E	F	G	H	I	J	K	L
Value	7.0	3.75	3.0	2.6	3.6	0.4	0.8	1.1	1.1	0.4	1.1	1.1
Tolerance	±0.1											

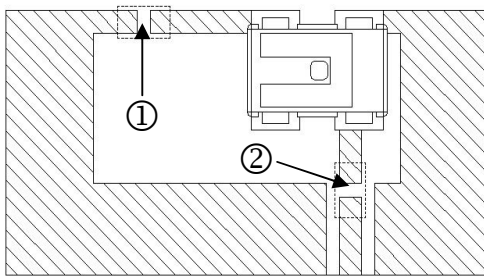
## Antenna Dimensions

Part No	Length(mm)	Width(mm)	Height(mm)	Pad(mm)		Land(mm)	
	(A)	(B)	(C)	(D)	(E)	(F)	(G)
Value	3.2	2.0	1.0	0.9	0.85	2.8	2.3
Tolerance	±0.1						

### Antenna Lay-out(Top view)

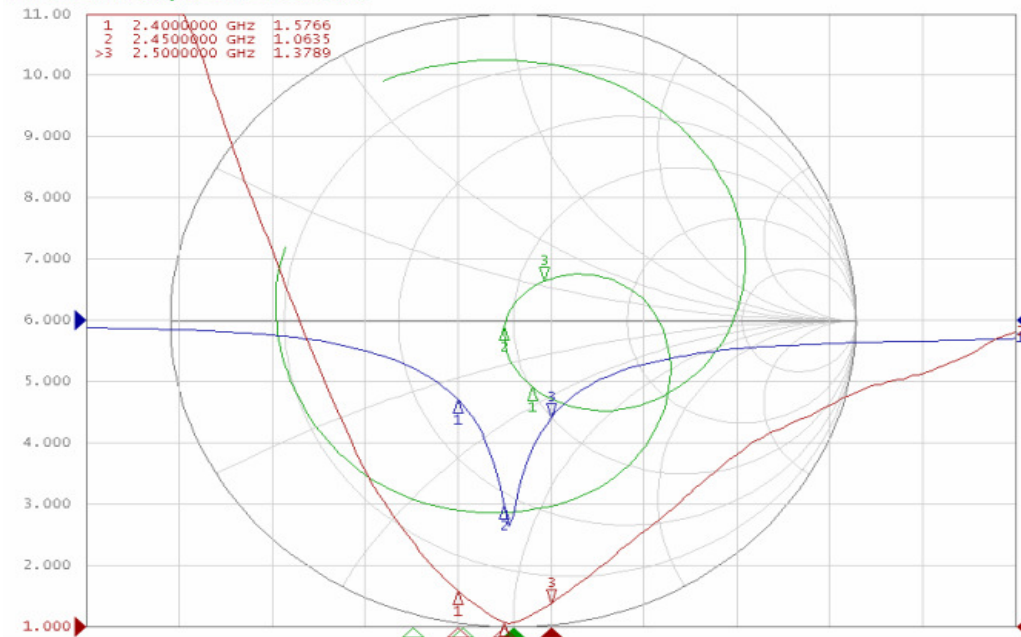


### Electrical Characteristics(VSWR / Smith chart)



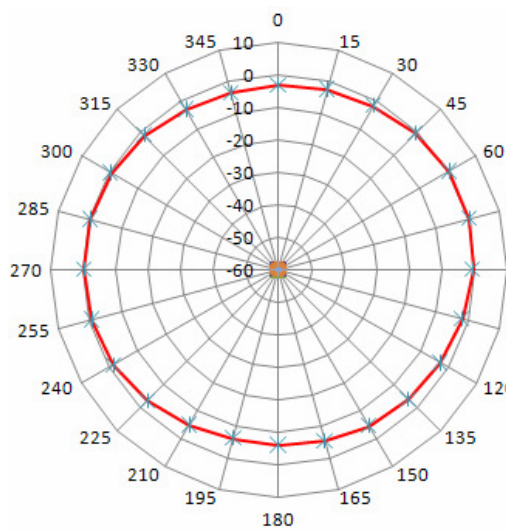
No.	Matching value
①	3pF
②	0.5pF

Tr1 S11 Log Mag 10.00dB/ Ref 0.000dB [F1]  
 Tr2 S11 SWR 1.000/ Ref 1.000 [F1]  
 Tr3 S11 Smith (R+jX) Scale 1.0000 [F1]

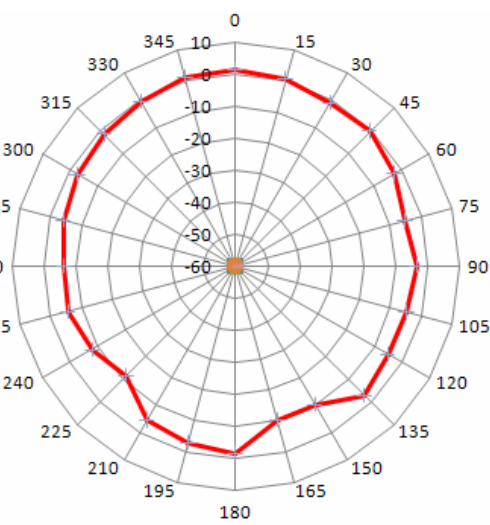


## Electrical Characteristics(Gain / Radiation pattern)

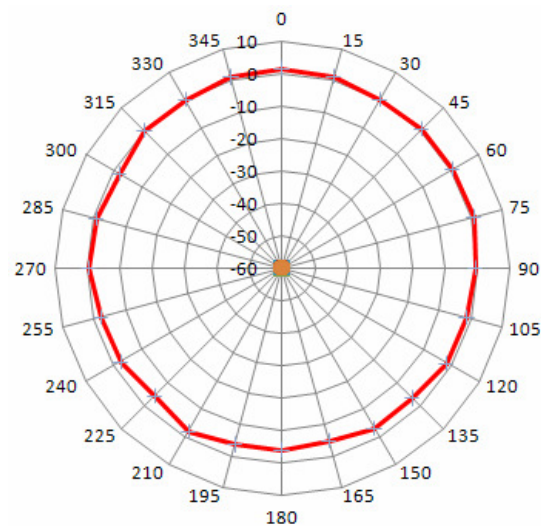
Plane	Avg. Gain (dBi)	Peak Gain (dBi)
H	-1.87	0.6
E1	-2.60	1.4
E2	-0.80	1.4



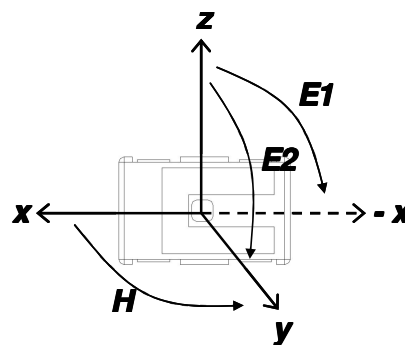
H Plane – 2.45 GHz



E1 Plane – 2.45 GHz



E2 Plane – 2.45 GHz



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# ***Application Report***

<b><i>Customer</i></b>	<b><i>Pantech</i></b>
<b><i>Model</i></b>	리디안
<b><i>Application</i></b>	<b><i>Bluetooth</i></b>
<b><i>Antenna Type</i></b>	<b><i>HBCA- 3MM</i></b>
<b><i>Report No.</i></b>	<b><i># D</i></b>
<b><i>Date</i></b>	<b><i>2010.11.19</i></b>

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# 1. Summary of the antenna test (*Passive Result*)



## 1. Test Condition

Test No	Antenna Type	Condition
#4-0	HBCA- 3MM	SET Matching (Series C = 0.5pF) Coupling Matching (Series C = 3pF)
#4-1	HBCA- 3MM	SET Matching (Series C = 0.5pF) Coupling Matching (Series C = 2pF)

## 2. Radiation Gain Table

Test NO.	Frequency [MHz]	2400	2402	2412	2415	2420	2425	2430	2435	2442	2445	2450	2455	2460	2465	2472	2475	2480	2484	2490	2495
#4-0	Efficiency [dB]	-4.36	-4.12	-4.01	-4.08	-4.28	-4.48	-4.62	-4.68	-4.74	-4.90	-5.09	-5.14	-5.19	-5.39	-5.57	-5.63	-5.66	-5.66	-5.65	-5.63
	Efficiency [%]	36.67	38.71	39.70	39.10	37.36	35.66	34.49	34.07	33.58	32.37	30.98	30.62	30.27	28.91	27.75	27.33	27.16	27.15	27.20	27.33
	Peak Gain [dB]	-0.42	-0.17	-0.04	-0.07	-0.24	-0.45	-0.58	-0.63	-0.69	-0.81	-0.96	-1.00	-1.05	-1.24	-1.38	-1.44	-1.47	-1.42	-1.41	-1.39
Test NO.	Frequency [MHz]	2400	2402	2412	2415	2420	2425	2430	2435	2442	2445	2450	2455	2460	2465	2472	2475	2480	2484	2490	2495
#4-1	Efficiency [dB]	-5.44	-5.15	-4.73	-4.38	-4.17	-4.15	-4.17	-4.18	-4.12	-4.08	-4.11	-4.11	-4.05	-4.10	-4.22	-4.28	-4.32	-4.32	-4.34	-4.18
	Efficiency [%]	28.58	30.56	33.64	36.51	38.30	38.42	38.28	38.17	38.70	39.09	38.81	38.85	39.39	38.90	37.84	37.30	37.02	36.95	36.84	38.21
	Peak Gain [dB]	-2.78	-2.50	-2.06	-1.65	-1.36	-1.26	-1.19	-1.09	-0.96	-0.83	-0.79	-0.75	-0.64	-0.67	-0.73	-0.79	-0.82	-0.80	-0.81	-0.65

# 1. Summary of the antenna test (**Active Result**)



## 3. Active Test Condition

Test No	Antenna Type	Condition
#4-0	HBCA- 3MM	SET Matching (Series C = 0.5pF, R = 0 ohm) Coupling Matching (Series C = 3pF)
#4-1	HBCA- 3MM	SET Matching (Series C = 0.5pF, R = 0 ohm) Coupling Matching ( <b>Series C = 2pF</b> )

## 4. Active Result

Test NO.	Channel	0	39	78	Avg
#4-0	TRP(dBm)	-2.59	-4.18	-6.27	-4.08
	TIS(dBm)	-79.97	-80.10	-80.69	-80.26

Test NO.	Channel	0	39	78	Avg
#4-1	TRP(dBm)	-3.20	-2.45	-3.23	-2.94
	TIS(dBm)	-82.23	-82.43	-83.00	-82.57

## 5. Comment

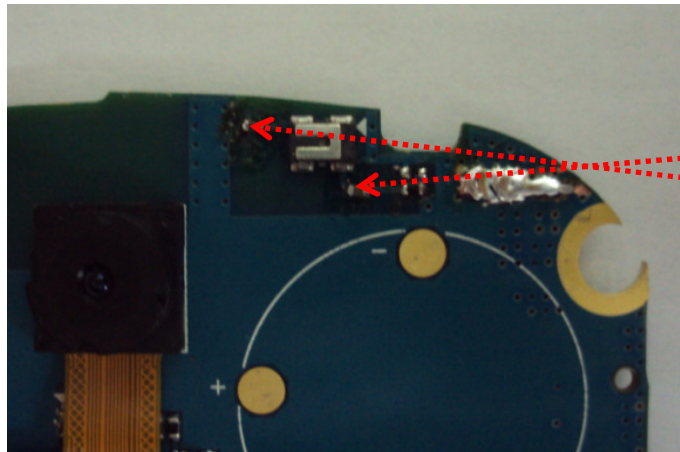
- 1) GPS Antenna 추가 및 주변 조건의 변경으로 Antenna 성능 0.5 ~ 0.6dB 저하
- 2) 카메라 고정 필요
- 3) 추가 성능검토 진행 중



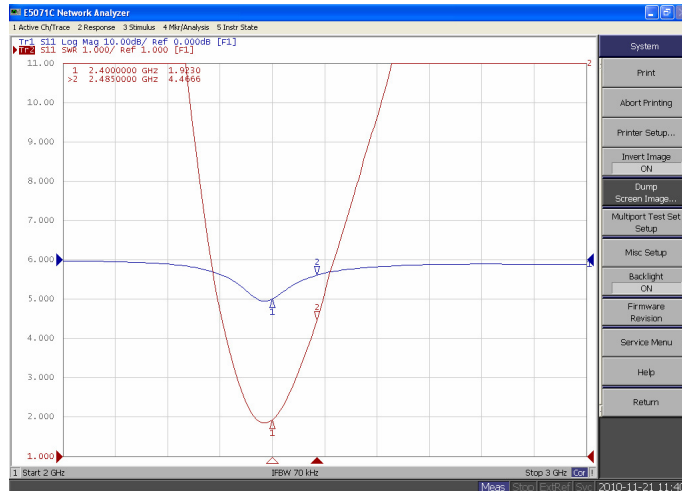
## 2. Test #4- 0 Passive Test (**HBCA- 3MM**)



### 1. Antenna Layout & S11



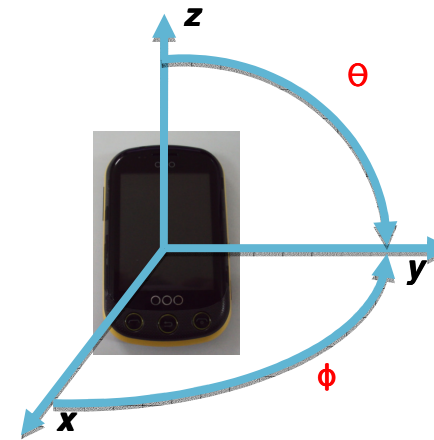
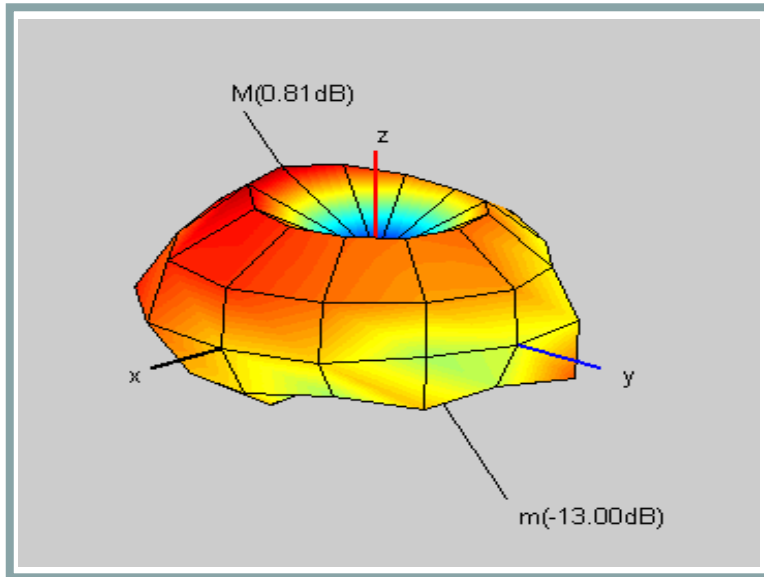
Test NO.	#4- 0
Series C	0.5pF
Series C	3pF
Comment	



## 2. Test #4- 0 Passive Test (HBCA- 3MM)



### 2. Radiation pattern & Passive result

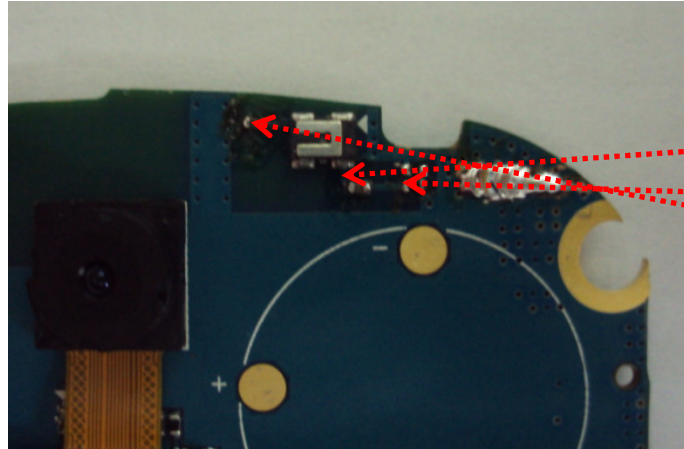


Frequency [MHz]	2400	2402	2412	2415	2420	2425	2430	2435	2442	2445	2450	2455	2460	2465	2472	2475	2480	2484	2490	2495
Efficiency [dB]	-4.36	-4.12	-4.01	-4.08	-4.28	-4.48	-4.62	-4.68	-4.74	-4.90	-5.09	-5.14	-5.19	-5.39	-5.57	-5.63	-5.66	-5.66	-5.65	-5.63
Efficiency [%]	36.67	38.71	39.70	39.10	37.36	35.66	34.49	34.07	33.58	32.37	30.98	30.62	30.27	28.91	27.75	27.33	27.16	27.15	27.20	27.33
Peak Gain [dB]	-0.42	-0.17	-0.04	-0.07	-0.24	-0.45	-0.58	-0.63	-0.69	-0.81	-0.96	-1.00	-1.05	-1.24	-1.38	-1.44	-1.47	-1.42	-1.41	-1.39

※ Anechoic Chamber : 6.0\*2.5\*2.5 m<sup>3</sup>

## 2. Test #4- 0 Active Test (HBCA- 3MM)

### 3. Antenna Layout

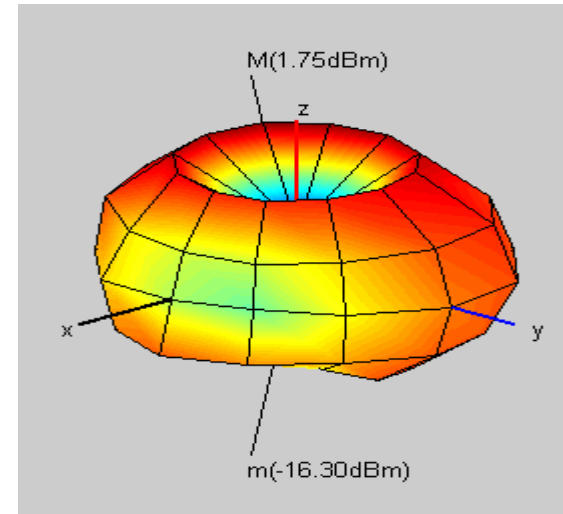


Test NO.	#4- 0
Series C	0.5pF
Series R	0 ohm
Series C	3pF

### 4. Active Test Result (TRP / Radiation Pattern)

Band	Bluetooth	Bluetooth	Bluetooth	
Channel	0	39	78	
TX Frequency(MHz)				Average
TRP(dBm), 30degree	-2.57	-4.18	-6.27	-4.08
TRP Limit(dBm)				
Pass/Fail				
TRP <sub>on</sub> /TRP <sub>AVG</sub> (dB)	1.52	-0.10	-2.18	
Limit(dB)				
Pass/Fail				
Conducted Power(dBm)				
TRP <sub>max</sub> (dBm)	-6.38	-7.89	-9.86	-7.82
TRP <sub>min</sub> (dBm)	-4.90	-6.59	-8.77	-6.47
UHRP(dBm)	-4.85	-6.58	-8.79	-6.45
Peak EIRP(dBm)	1.75	-0.17	-2.67	0.00
Directivity(dBi)	4.32	4.02	3.60	3.99
Efficiency(dB)				
Efficiency(%)				
Gain(dBi)				
NHRP±30(π/6)(dBm)	-6.22	-7.70	-9.68	-7.65
NHRP±45(π/4)(dBm)	-3.88	-5.36	-7.35	-5.31
Minimum Power(dBm)	-16.31	-17.75	-17.77	-17.22
Test Condition	FS	FS	FS	
Antenna Type				

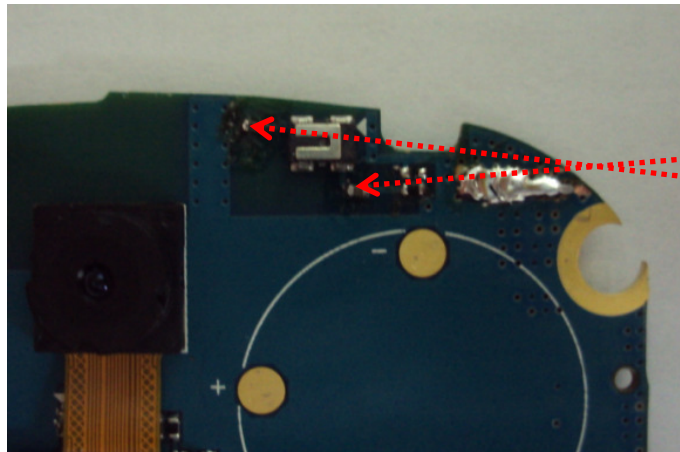
Band	Bluetooth	Bluetooth	Bluetooth	
Channel	0	39	78	
RX Frequency(MHz)				Average
TIS(dBm)	-79.97	-80.10	-80.69	-80.26
TIS Limit(dBm)				
Pass/Fail				
TIS <sub>oh</sub> /TIS <sub>AVG</sub> (dB)	-0.30	-0.16	0.43	
Limit(dB)				
Pass/Fail				
Conducted Sensitivity(dBm)				
TIS <sub>max</sub> (dBm)	-76.46	-76.48	-76.90	-76.62
TIS <sub>min</sub> (dBm)	-77.41	-77.63	-78.34	-77.81
UHIS(dBm)	-77.46	-77.60	-78.27	-77.79
Peak EIS(dBm)	-83.50	-83.98	-84.76	-84.11
Directivity(dBi)	3.53	3.86	4.07	3.83
Efficiency(dB)				
Efficiency(%)				
Gain(dBi)				
NHPIS±30(π/6)(dBm)	-76.57	-76.57	-77.28	-76.82
NHPIS±45(π/4)(dBm)	-78.88	-78.94	-79.56	-79.14
Minimum Sensitivity(dBm)	-67.18	-67.97	-67.82	-67.67
Test Condition	FS	FS	FS	
Antenna Type				



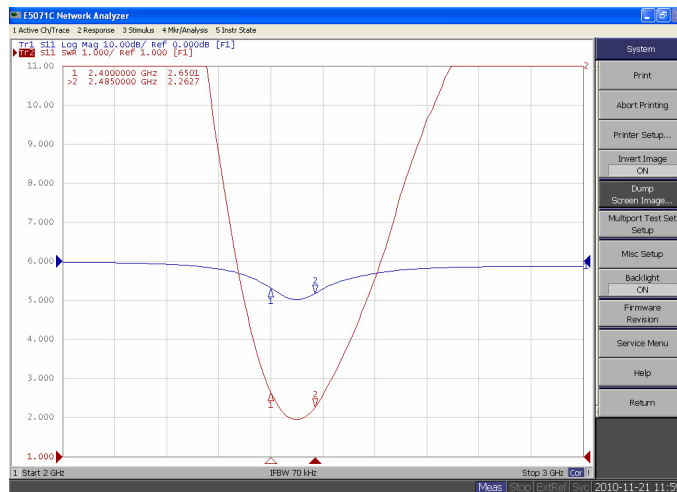
## 2. Test #4- 1 Passive Test (**HBCA- 3MM**)



### 1. Antenna Layout & S11

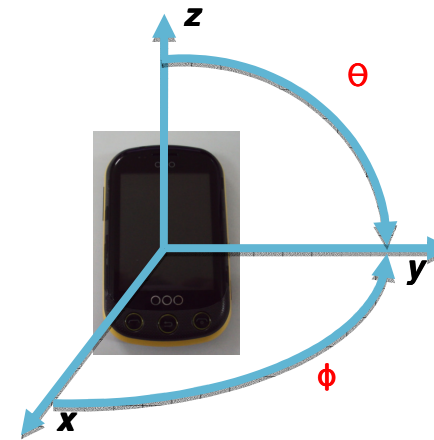
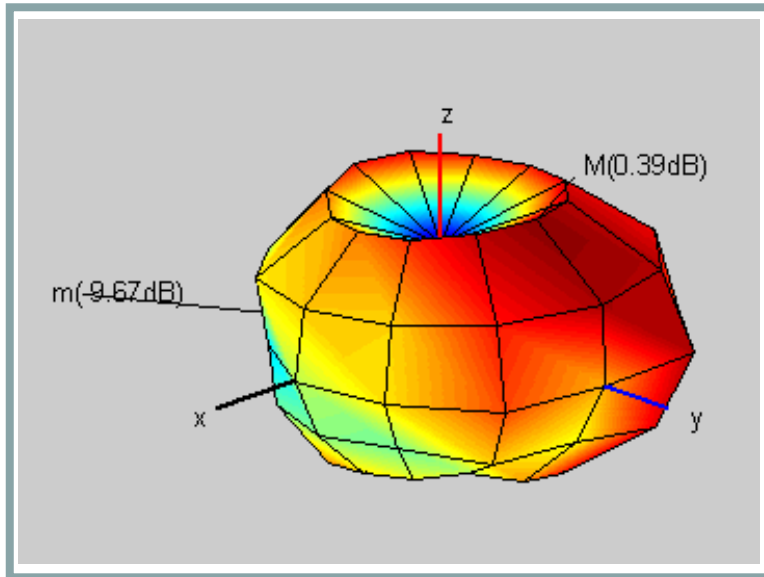


Test NO.	#4- 1
Series C	0.5pF
Series C	2pF
Comment	



## 2. Test #4- 1 Passive Test (HBCA- 3MM)

### 2. Radiation pattern & Passive result

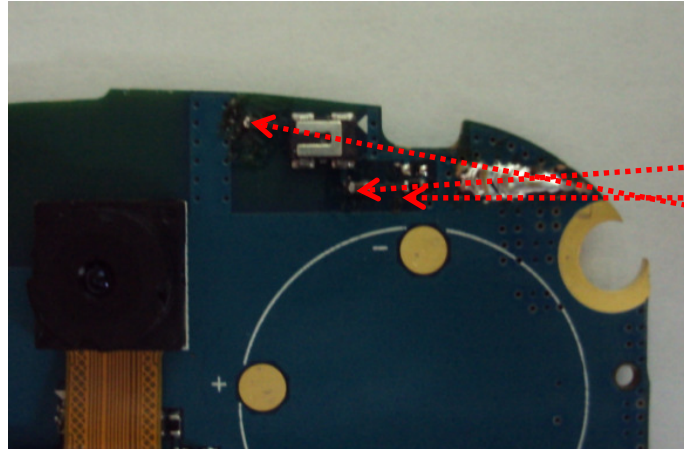


Frequency [MHz]	2400	2402	2412	2415	2420	2425	2430	2435	2442	2445	2450	2455	2460	2465	2472	2475	2480	2484	2490	2495
Efficiency [dB]	-5.44	-5.15	-4.73	-4.38	-4.17	-4.15	-4.17	-4.18	-4.12	-4.08	-4.11	-4.11	-4.05	-4.10	-4.22	-4.28	-4.32	-4.32	-4.34	-4.18
Efficiency [%]	28.58	30.56	33.64	36.51	38.30	38.42	38.28	38.17	38.70	39.09	38.81	38.85	39.39	38.90	37.84	37.30	37.02	36.95	36.84	38.21
Peak Gain [dB]	-2.78	-2.50	-2.06	-1.65	-1.36	-1.26	-1.19	-1.09	-0.96	-0.83	-0.79	-0.75	-0.64	-0.67	-0.73	-0.79	-0.82	-0.80	-0.81	-0.65

※ Anechoic Chamber : 6.0\*2.5\*2.5 m<sup>3</sup>

## 2. Test #4- 1 Active Test (HBCA- 3MM)

### 3. Antenna Layout



Test NO.	#4- 1
Series C	0.5pF
Series R	0 ohm
Series C	2pF

### 4. Active Test Result (TRP / TIS / Radiation Pattern)

Band	Bluetooth	Bluetooth	Bluetooth	
Channel	0	39	78	
TX Frequency(MHz)				Average
TRP(dBm), 30degree	-3.20	-2.45	-3.23	-2.94
TRP Limit(dBm)				
Pass/Fail				
TRP <sub>on</sub> /TRP <sub>AVG</sub> (dB)	-0.26	0.50	-0.29	
Limit(dB)				
Pass/Fail				
Conducted Power(dBm)				
TRP <sub>theb</sub> (dBm)	-7.09	-6.23	-6.89	-6.72
TRP <sub>ph</sub> (dBm)	-5.48	-4.80	-5.68	-5.30
UHRP(dBm)	-5.45	-4.81	-5.69	-5.30
Peak EIRP(dBm)	1.25	1.72	0.60	1.21
Directivity(dBi)	4.45	4.16	3.83	4.16
Efficiency(dB)				
Efficiency(%)				
Gain(dBi)				
NHRP±30(π/6)(dBm)	-6.87	-5.98	-6.68	-6.49
NHRP±45(π/4)(dBm)	-4.57	-3.70	-4.38	-4.20
Minimum Power(dBm)	-20.28	-18.79	-16.50	-18.24
Test Condition	FS	FS	FS	
Antenna Type				

Band	Bluetooth	Bluetooth	Bluetooth	
Channel	0	39	78	
RX Frequency(MHz)				Average
TIS(dBm)	-82.23	-82.43	-83.00	-82.57
TIS Limit(dBm)				
Pass/Fail				
TIS <sub>oh</sub> /TIS <sub>AVG</sub> (dB)	-0.34	-0.13	0.44	
Limit(dB)				
Pass/Fail				
Conducted Sensitivity(dBm)				
TIS <sub>theb</sub> (dBm)	-78.51	-78.61	-79.19	-78.78
TIS <sub>ph</sub> (dBm)	-79.82	-80.10	-80.67	-80.21
UHS(dBm)	-79.83	-80.07	-80.67	-80.20
Peak EIS(dBm)	-86.40	-86.36	-87.47	-86.78
Directivity(dBi)	4.17	3.93	4.47	4.20
Efficiency(dB)				
Efficiency(%)				
Gain(dBi)				
NHPIS±30(π/6)(dBm)	-78.67	-78.91	-79.51	-79.05
NHPIS±45(π/4)(dBm)	-80.96	-81.25	-81.81	-81.35
Minimum Sensitivity(dBm)	-66.13	-65.66	-66.45	-66.09
Test Condition	FS	FS	FS	
Antenna Type				

