Calamari
Antenna Report

Cheng Uei Precision Industry Co., LTD.

RF Technology Center

No. 18, Chung Shan Rd., Tu Cheng City, Taipei Hsien, 23680,

Taiwan, R. O. C.

Tel: 886-2-2269-9888

Fax: 886-2-2267-3672

Contents

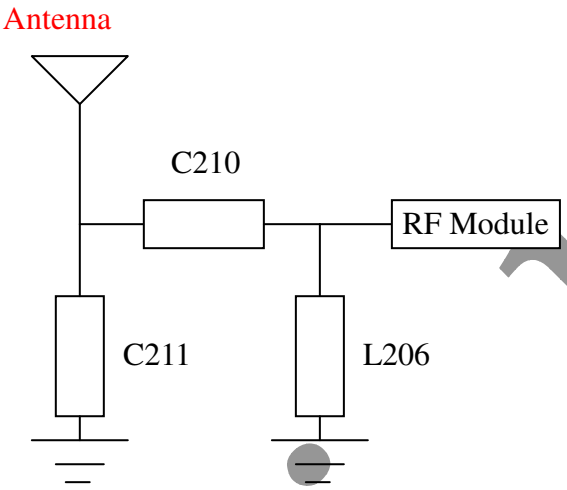
Evaluation History

REV. No.	DATE	CHANGES	Other
1	2012/10/8	Initial study.	
2	2012/11/2	Mockup sample confirm	
3	2012/12/12	POC2 sample confirm	
4	2013/3/8	EV1 sample confirm	
5	2013/4/1	EV1-2 sample (Second source) confirm	
6	2013/4/18	EV2 sample confirm	

Antenna Placement

Antenna dimensions: 5.5 X 24.4(mm) – antenna on board (middle layer)

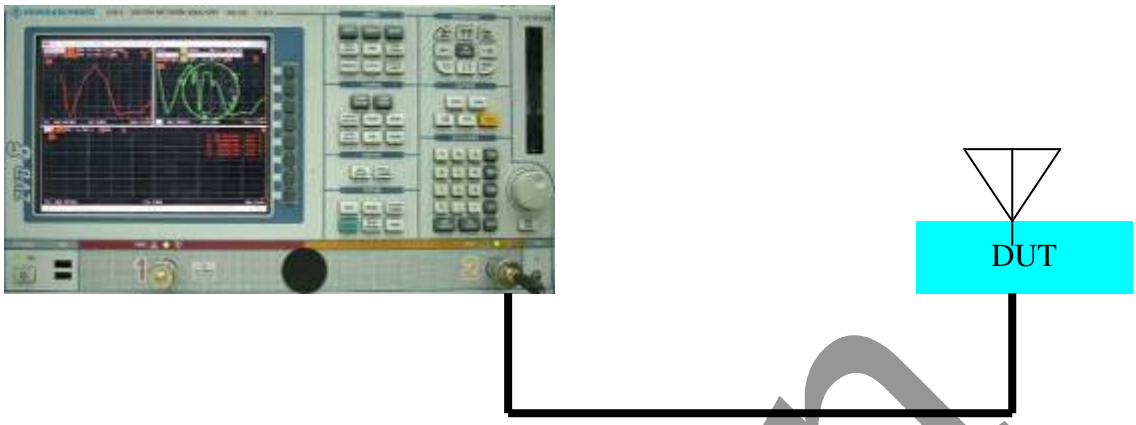
Matching Circuit



Component	Sample219	Sample233	Sample406
L206	NA	NA	NA
C210	0Ω	0Ω	0Ω
C211	NA	NA	NA

S11 Test Setup

1.Equipment Setup



2.Test Procedure

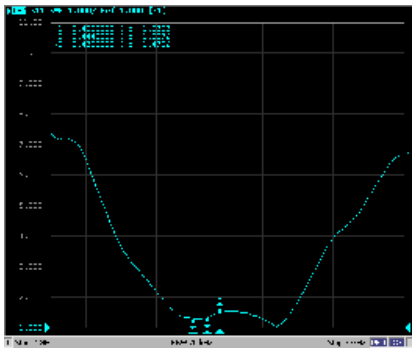
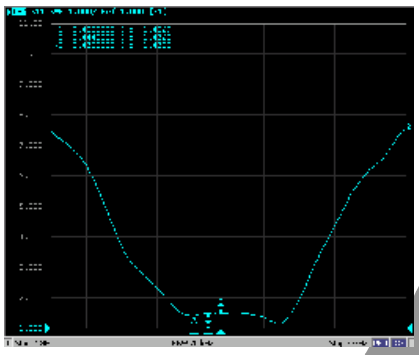
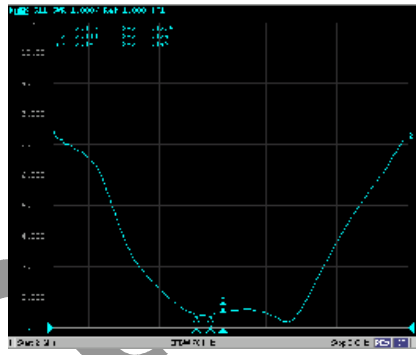
2.1 Set start and stop frequency and Calibrate the NA with 50 ohm calibration kit

2.2 Connect the NA cable to DUT antenna via SMA or I-PAX connector.

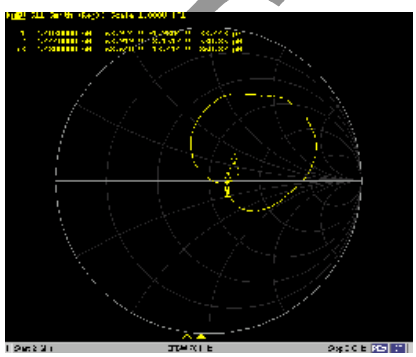
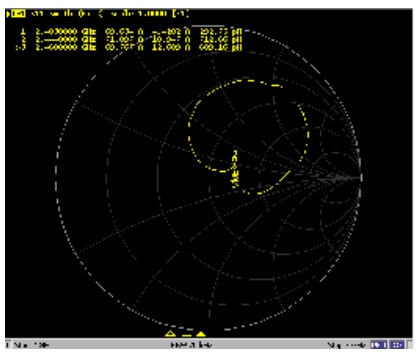
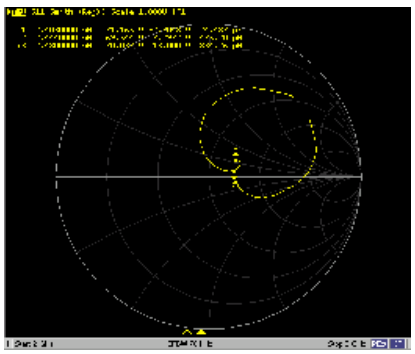
2.3 Measure the DUT antenna performance in the free space and record the s11.

3.Test Result(VSWR, Smith Chart , Return loss)

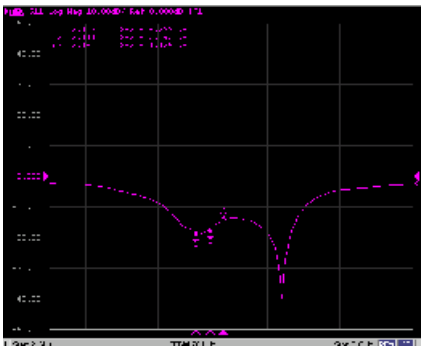
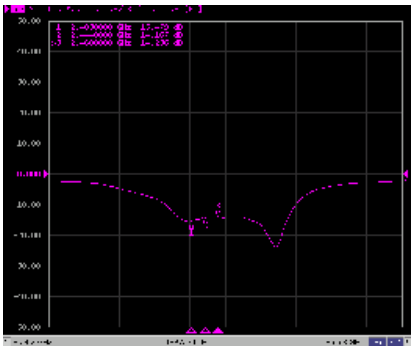
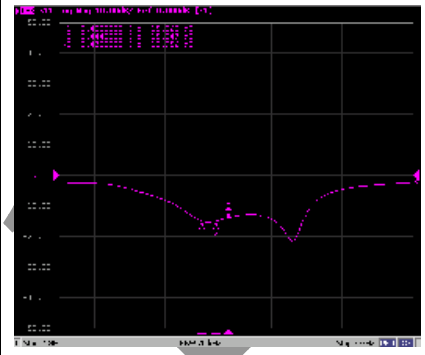
- **VSWR**

Sample219		Sample233		Sample406	
					
2403 MHz	< 2	2403 MHz	< 2	2403 MHz	< 2
2444 MHz	< 2	2444 MHz	< 2	2444 MHz	< 2
2480 MHz	< 2	2480 MHz	< 2	2480 MHz	< 2

- **Smith Chart**

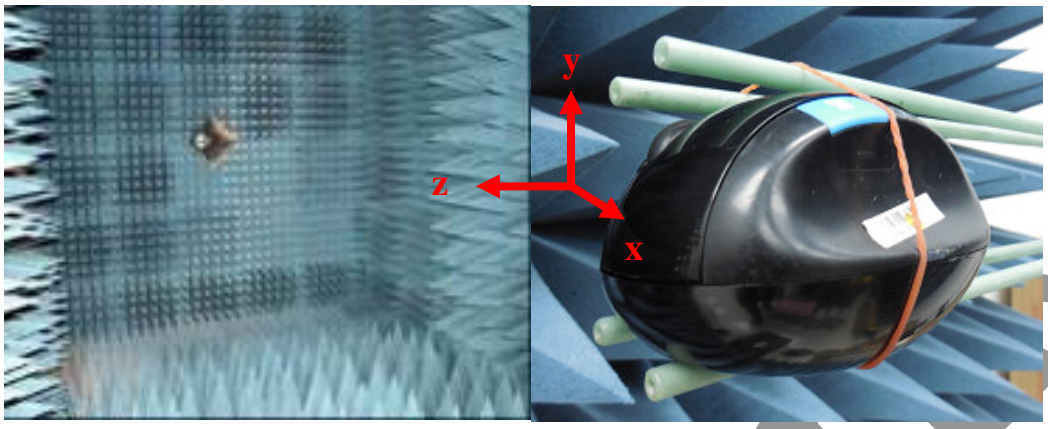
Sample219	Sample233	Sample406
		

- **Return loss**

Sample219		Sample233		Sample406	
					
2403 MHz	< -18	2403 MHz	< -15	2403 MHz	< -15
2444 MHz	< -17	2444 MHz	< -14	2444 MHz	< -15
2480 MHz	< -14	2480 MHz	< -14	2480 MHz	< -13

S21 Test Setup

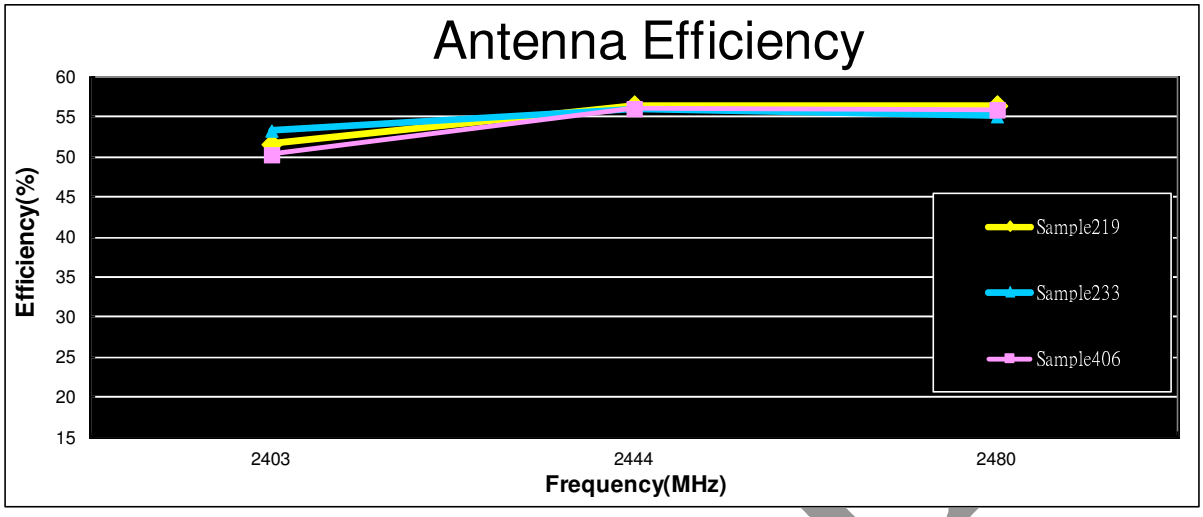
1. Testing Environment



- **Lab standard:** 3D Chamber for CTIA standard
- **Chamber size:** 7.2 * 3.6 * 3.6(meter)
- **Chamber type:** Fully anechoic Chamber
- **Chamber usable frequency range:** 700~6000MHz
- **Measurement instrument:** Network Analyzer
- **Measurement Software:** EMQuest (ETS-Lindgren)
- **DUT：Calamari EV2**

ETS-Lindgren
AMS-8500

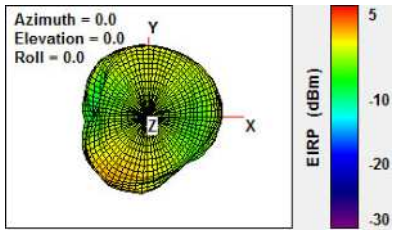
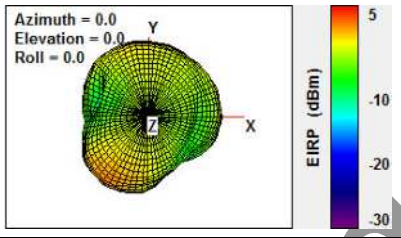
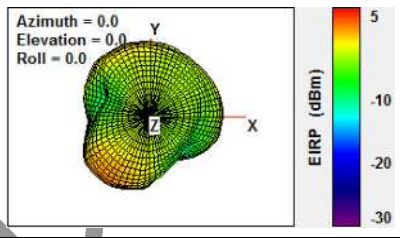
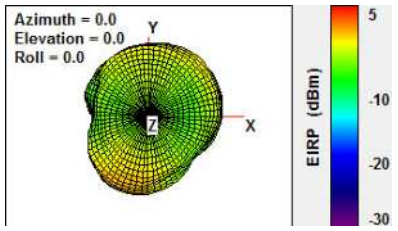
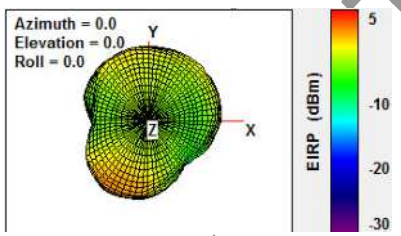
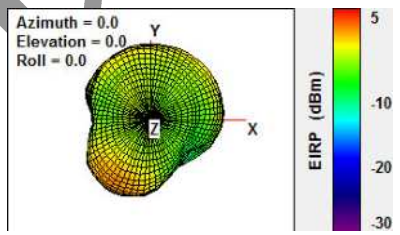
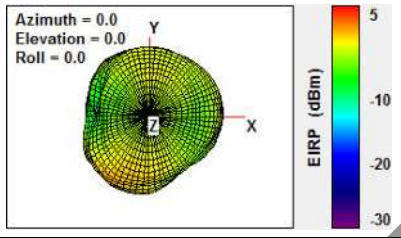
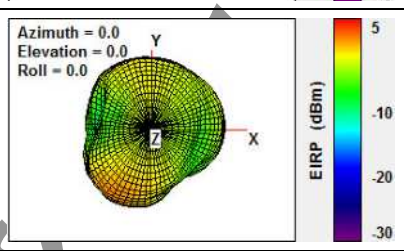
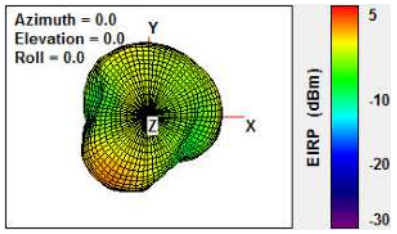
2. Antenna Performance

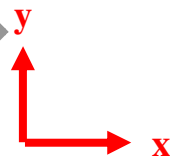


3. Experiment Result

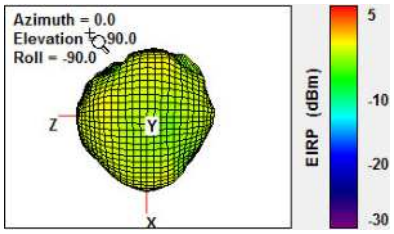
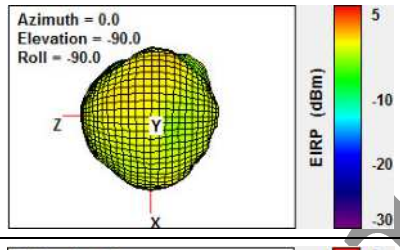
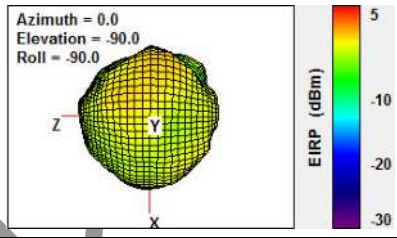
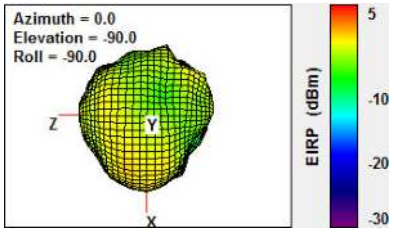
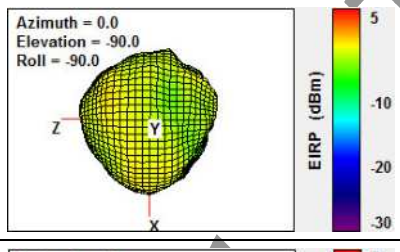
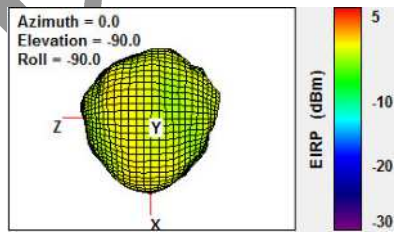
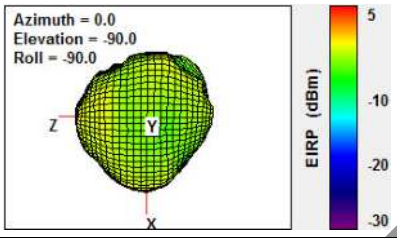
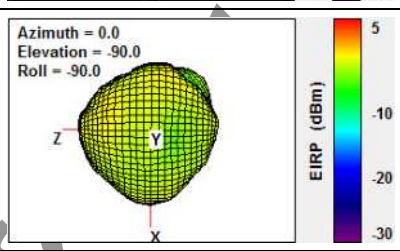
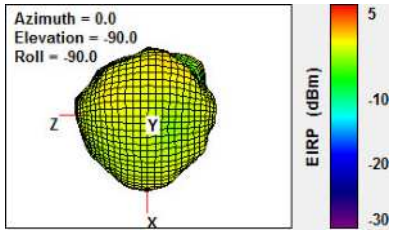
Calamari		2403	2444	2480
Sample219	Total Rad. Power(dBi)	-2.87	-2.48	-2.48
	Peak EIRP(dBi)	1.42	2.10	2.17
	Efficiency(%)	51.63	56.45	56.45
	Average Efficiency(%)	54.84		
Sample233	Total Rad. Power(dBi)	-2.73	-2.52	-2.59
	Peak EIRP(dBi)	1.23	2.10	2.25
	Efficiency(%)	53.32	55.97	55.09
	Average Efficiency(%)	54.79		
Sample406	Total Rad. Power(dBi)	-2.98	-2.51	-2.52
	Peak EIRP(dBi)	1.19	2.12	2.08
	Efficiency(%)	50.29	56.07	55.93
	Average Efficiency(%)	54.10		

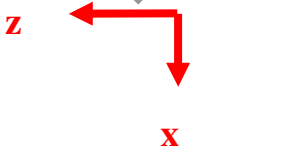
4. Antenna Pattern—3D (X-Y Cut)

	2403 MHz	2444MHz	2480 MHz
Sample 219			
Sample 233			
Sample 406			

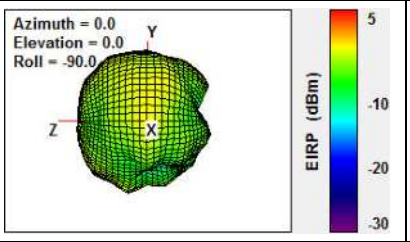
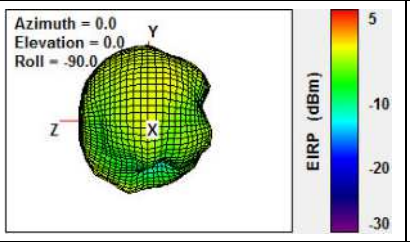
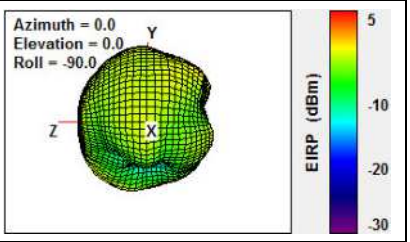
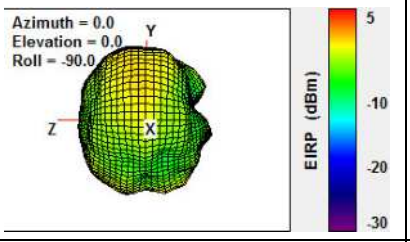
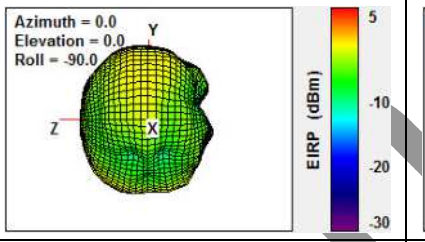
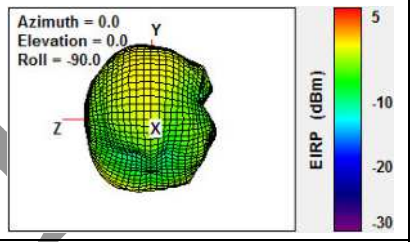
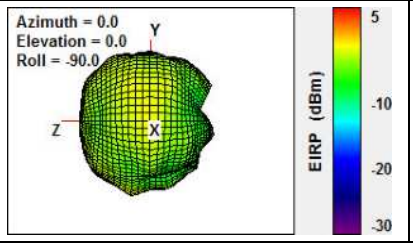
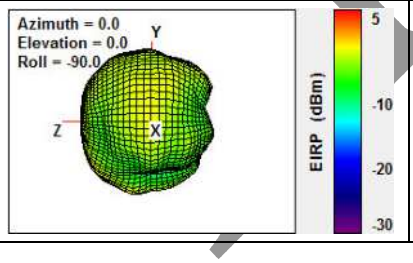
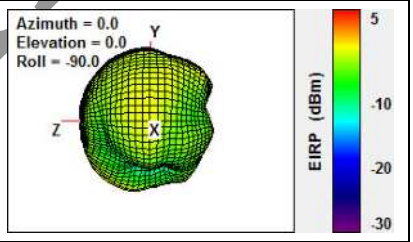


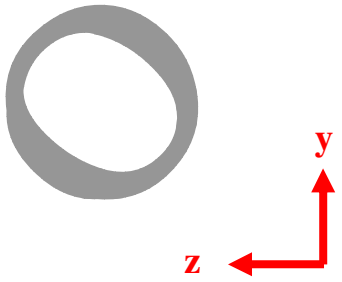
4. Antenna Pattern—3D (X-Z Cut)

	2403 MHz	2444MHz	2480 MHz
Sample 219			
Sample 233			
Sample 406			



4. Antenna Pattern—3D (Y-Z Cut)

	2403 MHz	2444MHz	2480 MHz
Sample 219			
Sample 233			
Sample 406			



Conclusion

This report provides the experiment of calamari comparison between two different PCB manufactures. The matching circuits of three different samples are same, and antenna efficiency is about 54% .