



# Variant FCC RF Test Report

**APPLICANT** : Lenovo (Shanghai) Electronics Technology Co., Ltd.  
**EQUIPMENT** : Tablet PC IdeaTab A3000-F  
**BRAND NAME** : lenovo  
**MODEL NAME** : 60029, Z0A2  
**FCC ID** : O57A3000F  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DTS) Digital Transmission System

This is a variant report which is only valid together with the original test report. The product was received on May 13, 2013 and completely tested on May 24, 2013. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL (KUNSHAN) INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai / Manager



**SPORTON INTERNATIONAL (KUNSHAN) INC.**  
**No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C.**



## TABLE OF CONTENTS

<b>REVISION HISTORY</b> .....	<b>3</b>
<b>SUMMARY OF TEST RESULT</b> .....	<b>4</b>
<b>1 GENERAL DESCRIPTION</b> .....	<b>5</b>
1.1 Applicant.....	5
1.2 Manufacturer.....	5
1.3 Feature of Equipment Under Test .....	5
1.4 Product Specification of Equipment Under Test.....	5
1.5 Testing Site.....	6
1.6 Applied Standards .....	6
<b>2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST</b> .....	<b>7</b>
2.1 Carrier Frequency Channel .....	7
2.2 Pre-Scanned RF Power.....	8
2.3 Test Mode.....	9
2.4 Connection Diagram of Test System.....	10
2.5 Support Unit used in test configuration and system .....	10
2.6 RF Utility .....	10
2.7 Measurement Results Explanation Example.....	11
<b>3 TEST RESULT</b> .....	<b>12</b>
3.1 Output Power Measurement.....	12
3.2 Radiated Band Edges and Spurious Emission Measurement .....	15
<b>4 LIST OF MEASURING EQUIPMENT</b> .....	<b>25</b>
<b>5 UNCERTAINTY OF EVALUATION</b> .....	<b>26</b>
<b>APPENDIX A. PHOTOGRAPHS OF EUT</b>	
<b>APPENDIX B. SETUP PHOTOGRAPHS</b>	
<b>APPENDIX C. PRODUCT EQUALITY DECLARATION</b>	



## REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR322704-05C	Rev. 01	This is a variant report for 60029, Z0A2. The product equality declaration could be referred to Appendix C. All the test cases were performed on original report which can be referred to Sporton Report Number FR322704-01C. Based on the original test report, only the Conducted Power and the worst case of Radiated Spurious Emissions were verified for the differences.	Jun. 13, 2013



### SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result	Remark
3.1	15.247(b)	Power Output Measurement	$\leq 30\text{dBm}$	Pass	-
3.2	15.247(d)	Radiated Band Edges	15.209(a) &	Pass	Under limit 3.4 dB at 2489.650 MHz
		Radiated Spurious Emission	15.247(d)		

# 1 General Description

## 1.1 Applicant

**Lenovo (Shanghai) Electronics Technology Co., Ltd.**  
 No.68 Building, 199 Fenju Road, Wai Gao Qiao FTZ, Shanghai, China

## 1.2 Manufacturer

**Lenovo PC HK Limited**  
 23/F, Lincoln House, Taikoo Place 979 King's Road, Quarry Bay, Hong Kong

## 1.3 Feature of Equipment Under Test

Product Feature	
<b>Equipment</b>	Tablet PC IdeaTab A3000-F
<b>Brand Name</b>	lenovo
<b>Model Name</b>	60029, Z0A2
<b>FCC ID</b>	O57A3000F
<b>EUT supports Radios application</b>	WLAN 11bgn / Bluetooth EDR/ Bluetooth v4.0-LE
<b>HW Version</b>	LepadA3000-F
<b>SW Version</b>	A3000_130428
<b>EUT Stage</b>	Identical Prototype

**Remark:** The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 1.4 Product Specification of Equipment Under Test

Product Specification subjective to this standard	
<b>Tx/Rx Frequency Range</b>	2412 MHz ~ 2462 MHz
<b>Number of Channels</b>	11
<b>Carrier Frequency of Each Channel</b>	2412+(n-1)*5 MHz; n=1~11
<b>Maximum Output Power to Antenna</b>	802.11b : 17.15 dBm (0.0519 W) 802.11g : 19.02 dBm (0.0798 W) 802.11n HT20 : 20.30 dBm (0.1072 W)
<b>Antenna Type</b>	Fixed Internal Antenna with gain 3.10 dBi
<b>Type of Modulation</b>	802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)



### 1.5 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL (KUNSHAN) INC.		
<b>Test Site Location</b>	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	TH01-KS	03CH01-KS	149928/4086E-1

The test site complies with ANSI C63.4 2003 requirement.

### 1.6 Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC Part 15 Subpart C §15.247
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r01
- ♦ ANSI C63.10-2009

**Remark:**

1. All test items were verified and recorded according to the standards and without any deviation during the test.
2. This EUT has also been tested and complied with the requirements of FCC Part 15, Subpart B, recorded in a separate test report.



## 2 Test Configuration of Equipment Under Test

The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 KHz to 30 MHz) and radiated emission (9 KHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in three orthogonal panels, X, Y, Z. The worst cases (Z plane) were recorded in this report.

The final configuration from all the combinations and the worst-case data rates were investigated by measuring the maximum power across all the data rates and modulation modes under section 2.2.

Based on the worst configuration found above, the RF power setting is set individually to meet FCC compliance limit for the final conducted and radiated tests shown in section 2.3.

### 2.1 Carrier Frequency Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz	1	2412	7	2442
	2	2417	8	2447
	3	2422	9	2452
	4	2427	10	2457
	5	2432	11	2462
	6	2437	-	-



## 2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and antenna configurations as following table and the highest power data rates were chosen for full test in the following tables.

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	16.98	16.90	16.88	16.95
CH 06	2437 MHz	17.15	17.08	17.12	17.09
CH 11	2462 MHz	17.08	17.06	17.03	16.99

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412 MHz	18.78	18.75	18.68	18.48	18.58	18.67	18.65	18.82
CH 06	2437 MHz	18.76	18.75	18.79	18.85	18.72	18.60	18.61	19.02
CH 11	2462 MHz	18.26	18.56	18.66	18.48	18.52	18.39	18.45	18.69

Channel	Frequency	2.4GHz 802.11n HT20 RF Power (dBm)							
		OFDM Data Rate							
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
CH 01	2412 MHz	20.25	20.29	20.16	20.08	20.10	20.05	19.98	19.86
CH 06	2437 MHz	20.30	20.22	20.18	20.10	20.08	19.98	19.96	20.07
CH 11	2462 MHz	20.19	20.06	19.98	19.95	19.88	19.87	19.75	19.60





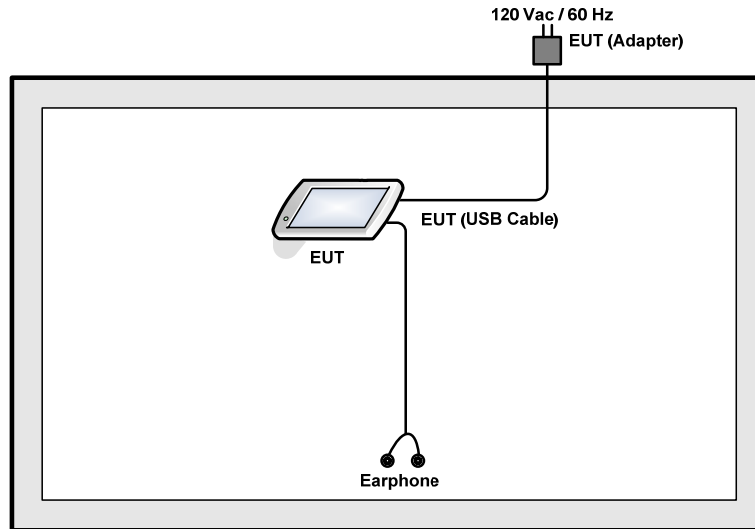
### 2.3 Test Mode

Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	Mode	Data Rate	Test Channel
Conducted TCs	Output Power	802.11b	1 Mbps	1/6/11
		802.11g	54 Mbps	1/6/11
		802.11n HT20	6.5 Mbps	1/6/11
Radiated TCs	Radiated Band Edge	802.11b	1 Mbps	11
		802.11g	54Mbps	11
		802.11n HT20	6.5 Mbps	11
	Radiated Spurious Emission	802.11b	1 Mbps	11
		802.11g	54Mbps	11
		802.11n HT20	6.5 Mbps	11

## 2.4 Connection Diagram of Test System

<WLAN Tx Mode>



## 2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m

## 2.6 RF Utility

For WLAN function, key in “\* # \* # 3646633 # \* # \*” on the EUT directly. Then, the EUT will get into the engineering modes to contact with WLAN AP for continuous transmitting and receiving signals.



## **2.7 Measurement Results Explanation Example**

**For conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and 10dB attenuator between EUT conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

The spectrum analyzer offset is derived from RF cable loss and 10dB attenuator factor.

*Offset = RF cable loss + attenuator factor.*

Following table shows an offset computation example with cable loss 5.6 dB.

Example :

$$\begin{aligned} \text{Offset(dB)} &= \text{RF cable loss(dB)} + \text{attenuator factor(dB)}. \\ &= 5.6 + 10 = 15.6 \text{ (dB)} \end{aligned}$$

### 3 Test Result

#### 3.1 Output Power Measurement

##### 3.1.1 Limit of Output Power

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. If transmitting antenna of directional gain greater than 6dBi are used the peak output power from the intentional radiator shall be reduced below the above stated value by the amount in dB that the directional gain of the antenna exceeds 6 dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

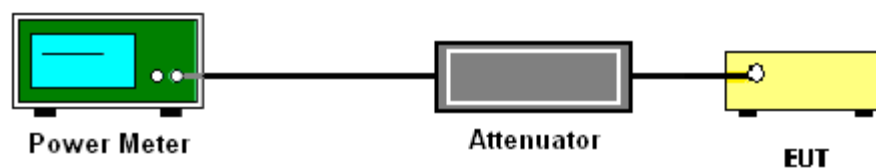
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 D01 DTS Meas. Guidance v03r01.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

##### 3.1.4 Test Setup





### 3.1.5 Test Result of Peak Output Power

Test Mode :	802.11b	Temperature :	23~24°C
Test Engineer :	Lizy Li	Relative Humidity :	41~42%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	17.38	30	Pass
06	2437	17.76	30	Pass
11	2462	17.55	30	Pass

Test Mode :	802.11g	Temperature :	23~24°C
Test Engineer :	Lizy Li	Relative Humidity :	41~42%

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	19.81	30	Pass
06	2437	19.92	30	Pass
11	2462	19.89	30	Pass

Test Mode :	802.11n HT20	Temperature :	23~24°C
Test Engineer :	Lizy Li	Relative Humidity :	41~42%

Channel	Frequency (MHz)	802.11n HT20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	21.05	30	Pass
06	2437	21.33	30	Pass
11	2462	21.57	30	Pass



3.1.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	23~24°C
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle:	94.38%	Duty Factor:	0.25dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	14.15
06	2437	14.38
11	2462	14.04

Test Mode :	802.11g	Temperature :	23~24°C
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle:	92.05%	Duty Factor:	0.36dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	10.15
06	2437	10.48
11	2462	10.14

Test Mode :	802.11n HT20	Temperature :	23~24°C
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle:	91.50%	Duty Factor:	0.39dB

Channel	Frequency (MHz)	802.11n HT20 Average Output Power (dBm)
01	2412	10.42
06	2437	10.54
11	2462	10.52



### 3.2 Radiated Band Edges and Spurious Emission Measurement

#### 3.2.1 Limit of Radiated Band Edges and Spurious Emission

In any 100 KHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

#### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.



### 3.2.3 Test Procedures

1. The testing follows the guidelines in ANSI C63. 10-2009
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better signal level.
3. The EUT was placed on a turntable with 0.8 meter above ground.
4. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
5. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level
6. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.
7. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW=100 KHz for  $f < 1$  GHz;  $VBW \geq RBW$ ; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Set RBW = 1 MHz,  $VBW = 3$ MHz for  $f \geq 1$  GHz for peak measurement.  
For average measurement:
    - $VBW = 10$  Hz, when duty cycle is no less than 98 percent.
    - $VBW \geq 1/T$ , when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.

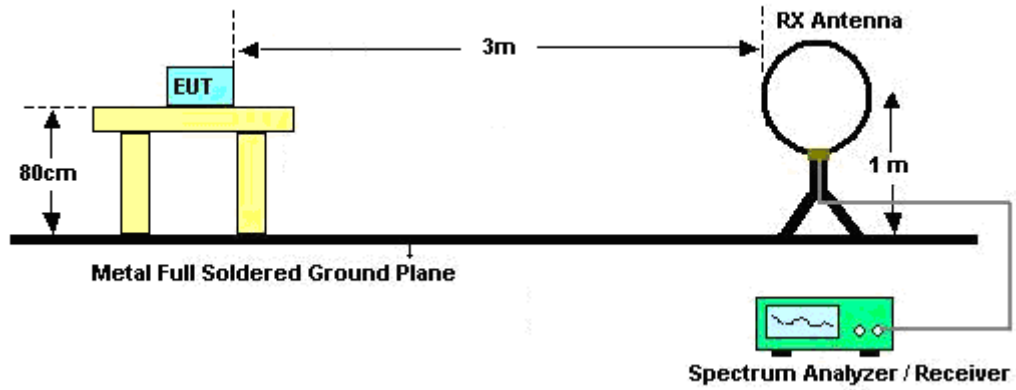
Band	Duty Cycle(%)	T(ms)	1/T(KHz)	VBW Setting
802.11b	98.59	-	-	10Hz
802.11g	61.54	0.176	5.682	10KHz
802.11n HT20	91.50	1.292	0.774	1KHz

**Note:** For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

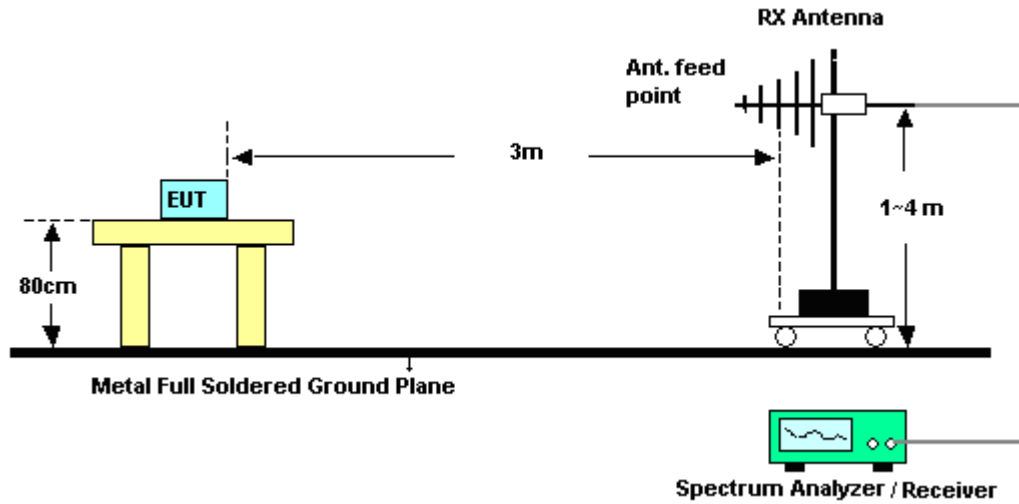


### 3.2.4 Test Setup

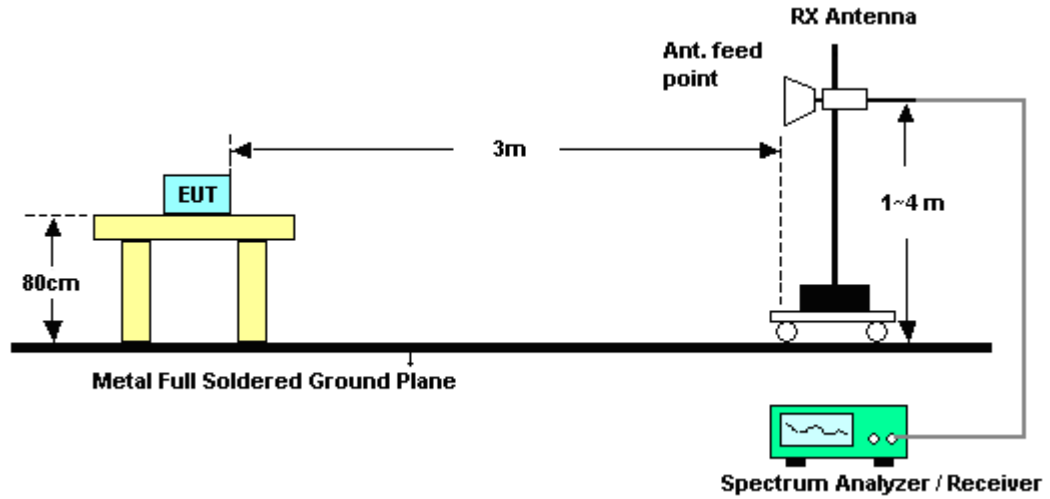
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.2.5 Test Results of Radiated Spurious Emission (9 KHz ~ 30 MHz)

The low frequency, which started from 9 KHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported.



3.2.6 Test Result of Radiated Band Edges

Test Mode :	802.11b	Temperature :	22~23°C
Test Band :	High	Relative Humidity :	41~42%
Test Channel :	11	Test Engineer :	Steven Hao

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.71	57.74	-16.26	74	53.28	33.01	2.96	31.51	119	126	Peak
2483.5	48.79	-5.21	54	44.33	33.01	2.96	31.51	119	126	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.8	55.87	-18.13	74	51.41	33.01	2.96	31.51	100	92	Peak
2483.5	47	-7	54	42.54	33.01	2.96	31.51	100	92	Average

Test Mode :	802.11g	Temperature :	22~23°C
Test Band :	High	Relative Humidity :	41~42%
Test Channel :	11	Test Engineer :	Steven Hao

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.5	59.16	-14.84	74	54.7	33.01	2.96	31.51	100	171	Peak
2483.5	45.35	-8.65	54	40.89	33.01	2.96	31.51	100	171	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.62	58.36	-15.64	74	53.9	33.01	2.96	31.51	100	114	Peak
2483.5	42.53	-11.47	54	38.07	33.01	2.96	31.51	100	114	Average



<b>Test Mode :</b>	802.11n HT20	<b>Temperature :</b>	22~23°C
<b>Test Band :</b>	High	<b>Relative Humidity :</b>	41~42%
<b>Test Channel :</b>	11	<b>Test Engineer :</b>	Steven Hao

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2489.65	70.6	-3.4	74	66.1	33.05	2.96	31.51	100	174	Peak
2483.5	47.16	-6.84	54	42.7	33.01	2.96	31.51	100	174	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2484.13	66.43	-7.57	74	61.97	33.01	2.96	31.51	100	113	Peak
2483.5	44.56	-9.44	54	40.1	33.01	2.96	31.51	100	113	Average

### 3.2.7 Test Result of Radiated Spurious Emission (30 MHz ~ 10<sup>th</sup> Harmonic)

**Note:** Below 1GHz for radiated emission measurement, pre-scanned all test modes and only choose the worst case mode was recorded in the report.

<b>Test Mode :</b>	802.11b	<b>Temperature :</b>	22~23°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	41~42%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2462	108.98	-	-	104.57	32.98	2.94	31.51	121	124	Peak
2462	103.41	-	-	99	32.98	2.94	31.51	121	124	Average
4924	48.63	-25.37	74	40.67	35.19	4.28	31.51	110	101	Peak
7386	50.22	-23.78	74	39.4	36.24	5.51	30.93	100	245	Peak

<b>Test Mode :</b>	802.11b	<b>Temperature :</b>	22~23°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	41~42%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dB $\mu$ V/m )	Over Limit ( dB )	Limit Line ( dB $\mu$ V/m )	Read Level ( dB $\mu$ V )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2462	107.52	-	-	103.11	32.98	2.94	31.51	124	95	Peak
2462	102.07	-	-	97.66	32.98	2.94	31.51	124	95	Average
4924	48.35	-25.65	74	40.39	35.19	4.28	31.51	124	97	Peak
7386	50.27	-23.73	74	39.45	36.24	5.51	30.93	100	231	Peak



<b>Test Mode :</b>	802.11g	<b>Temperature :</b>	22~23°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	41~42%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2462	107.48	-	-	103.07	32.98	2.94	31.51	135	237	Peak
2462	96.72	-	-	92.31	32.98	2.94	31.51	135	237	Average
4924	48.36	-25.64	74	40.4	35.19	4.28	31.51	100	125	Peak
7386	50.89	-23.11	74	39.07	36.24	5.51	30.93	110	124	Peak

<b>Test Mode :</b>	802.11g	<b>Temperature :</b>	22~23°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	41~42%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2462	107.74	-	-	103.33	32.98	2.94	31.51	100	274	Peak
2462	97.08	-	-	92.67	32.98	2.94	31.51	100	274	Average
4924	49.4	-24.6	74	41.44	35.19	4.28	31.51	100	167	Peak
7386	50.79	-23.21	74	39.97	36.24	5.51	30.93	100	129	Peak



<b>Test Mode :</b>	802.11n HT20	<b>Temperature :</b>	22~23°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	41~42%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
101.78	20.16	-23.34	43.5	42.45	10.74	0.58	33.61	-	-	Peak
165.8	30.3	-13.2	43.5	53.76	9.36	0.75	33.57	150	264	Peak
250.19	29.44	-16.56	46	49.96	12	0.92	33.44	-	-	Peak
309.36	30.68	-15.32	46	49.82	13.22	1.01	33.37	-	-	Peak
356.89	31.41	-14.59	46	49.02	14.65	1.1	33.36	-	-	Peak
663.41	22.81	-23.19	46	35.28	18.99	1.47	32.93	-	-	Peak
2462	105.81	-	-	101.4	32.98	2.94	31.51	111	197	Peak
2462	94.51	-	-	90.1	32.98	2.94	31.51	111	197	Average
4924	48.81	-25.19	74	40.85	35.19	4.28	31.51	100	125	Peak
7386	50.96	-23.04	74	40.14	36.24	5.51	30.93	100	264	Peak



<b>Test Mode :</b>	802.11n HT20	<b>Temperature :</b>	22~23°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	41~42%
<b>Test Engineer :</b>	Steven Hao	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level (dBμV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
30.97	20.39	-19.61	40	36.34	17.29	0.34	33.58	100	96	Peak
100.81	20.87	-22.63	43.5	43.28	10.62	0.58	33.61	-	-	Peak
165.8	18.56	-24.94	43.5	42.02	9.36	0.75	33.57	-	-	Peak
326.82	20.61	-25.39	46	39.09	13.84	1.05	33.37	-	-	Peak
362.71	24.01	-21.99	46	41.45	14.8	1.11	33.35	-	-	Peak
561.56	26.38	-19.62	46	39.52	18.52	1.34	33	-	-	Peak
2462	106.88	-	-	102.47	32.98	2.94	31.51	100	274	Peak
2462	95.64	-	-	91.23	32.98	2.94	31.51	100	274	Average
4924	48.85	-25.15	74	40.89	35.19	4.28	31.51	100	126	Peak
7386	50.99	-23.01	74	40.17	36.24	5.51	30.93	100	261	Peak





## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 29, 2012	May 24, 2013	Dec. 28, 2013	Conducted (TH01-KS)
Power Meter	Agilent	E4416A	MY45101555	N/A	Aug. 22, 2012	May 24, 2013	Aug. 21, 2013	Conducted (TH01-KS)
Power Sensor	Agilent	E9327A	MY44421198	N/A	Aug. 22, 2012	May 24, 2013	Aug. 21, 2013	Conducted (TH01-KS)
DC Power Supply	GWINSTEK	GPS-3030D	E1884515	N/A	Aug. 22, 2012	May 24, 2013	Aug. 21, 2013	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	N/A	Dec. 29, 2012	May 24, 2013	Dec. 28, 2013	Conducted (TH01-KS)
EMI Test Receiver	R&S	ESCI	100534	9kHz~3GHz	Nov. 08, 2012	May 21, 2013	Nov. 07, 2013	Radiation (03CH01-KS)
Spectrum Analyzer	R&S	FSP30	100400	9kHz~30GHz	Jun. 01, 2012	May 21, 2013	May 31, 2013	Radiation (03CH01-KS)
Bilog Antenna	SCHAFFNER	CBL6112D	23182	25MHz~2GHz	Dec. 07, 2012	May 21, 2013	Dec. 06, 2013	Radiation (03CH01-KS)
HFH2-Z2 Loop Antenna	R&S	HFH2-Z2	100321	9KHZ-30MHZ	Oct. 22, 2012	May 21, 2013	Oct. 21, 2013	Radiation (03CH01-KS)
Double Ridge Horn Antenna	ETS-Lindgren	1908/7/13	00075957	1GHz~18GHz	Dec. 07, 2012	May 21, 2013	Dec. 06, 2013	Radiation (03CH01-KS)
Amplifier	com-power	PA-103A	161069	1MHz~1GHz	Jun. 01, 2012	May 21, 2013	May 31, 2013	Radiation (03CH01-KS)
Amplifier	Agilent	8449B	3008A02370	1GHz~26.5GHz	Dec. 29, 2012	May 21, 2013	Dec. 28, 2013	Radiation (03CH01-KS)
Active Horn Antenna	com-power	AHA-118	701023	1GHz~18GHz	Nov. 07, 2012	May 21, 2013	Nov. 06, 2013	Radiation (03CH01-KS)
SHF-EHF Horn	Schwarzbeck	BBHA 9170	9170249	15GHz~40GHz	Nov. 23, 2012	May 21, 2013	Nov. 22, 2013	Radiation (03CH01-KS)



## 5 Uncertainty of Evaluation

### Uncertainty of Conducted Emission Measurement (150 KHz ~ 30 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.26
---	------

### Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	2.54
---	------

### Uncertainty of Radiated Emission Measurement (1 GHz ~ 40 GHz)

Measuring Uncertainty for a Level of Confidence of 95% ( $U = 2Uc(y)$ )	4.72
---	------



## **Appendix A. Photographs of EUT**

Please refer to Sporton report number EP322704-05 as below.



## **Appendix C. Product Equality Declaration**