



# FCC RF Test Report

**APPLICANT** : PEGATRON CORPORATION  
**EQUIPMENT** : Tablet  
**BRAND NAME** : TOSHIBA, Excite  
**MODEL NAME** : TOSHIBA AT330, Excite 13 AT330, Excite 13 AT335  
**FCC ID** : VUIPDT4330LBNFC  
**STANDARD** : FCC Part 15 Subpart C §15.247  
**CLASSIFICATION** : (DTS) Digital Transmission System

The product was received on Mar. 16, 2012 and completely tested on Apr. 02, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.4-2003 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 INC., the test report shall not be reproduced except in full.

Reviewed by:

Jones Tsai / Manager



## SPORTON INTERNATIONAL INC.

No. 52, Hwa Ya 1<sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



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### REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR232266-05B	Rev. 01	Initial issue of report	May 04, 2012

## SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	$\geq 0.5\text{MHz}$	Pass	-
3.2	15.247(b)	A8.4	Power Output	$\leq 30\text{dBm}$	Pass	-
3.3	15.247(d)	A8.5	Frequency Band Edges	$\leq 20\text{dBc}$	Pass	-
3.4	15.247(d)	A8.5	Spurious Emission	$< 20\text{ dBc}$	Pass	-
3.5	15.247(e)	A8.2(b)	Power Spectral Density	$\leq 8\text{dBm}$	Pass	-
3.6	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 9.20 dB at 0.190 MHz
3.7	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 1.79 dB at 2483.500 MHz
3.8	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

# 1 General Description

## 1.1 Applicant

**PEGATRON CORPORATION**

No. 76, Ligong St., Beitou District, Taipei City 11261

## 1.2 Manufacturer

**PEGATRON CORPORATION**

No. 76, Ligong St., Beitou District, Taipei City 11261

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Tablet
Brand Name	TOSHIBA, EXCITE
Model Name	TOSHIBA AT330, EXCITE 13 AT330, EXCITE 13 AT335
FCC ID	VUIPDT4330LBNFC
Sample 1	EUT with 32G eMMC(NFC)
Sample 2	EUT with 16G eMMC
Sample 3	EUT with 32G eMMC
Sample 4	EUT with 64G eMMC
Tx/Rx Frequency Range	WLAN : 2400 MHz ~ 2483.5 MHz NFC : 13.56 MHz
Number of Channels	11
Carrier Frequency of Each Channel	2412+(n-1)*5 MHz; n=1~11
Channel Spacing	5 MHz
Maximum Output Power to Antenna	802.11b : 15.42 dBm (0.0348 W) 802.11g : 18.38 dBm (0.0689 W) 802.11g/n (BW 20MHz) : 16.04 dBm (0.0402 W)
Duty Cycle	802.11b : 97.64% 802.11g : 86.89% 802.11g/n (BW 20MHz) : 86.04%
Antenna Type	Chip Antenna with gain 4.20 dBi
HW Version	1.02
SW Version	Android 4.0.3
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
EUT Stage	Identical Prototype

**Remark:**

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. The model names (TOSHIBA AT330, Excite 13 AT330, Excite 13 AT335) are identical on hardware. The only difference is the label of different branding for different customer.

### 1.4 Testing Site

<b>Test Site</b>	SPORTON INTERNATIONAL INC.		
<b>Test Site Location</b>	No. 52, Hwa Ya 1 <sup>st</sup> Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
<b>Test Site No.</b>	<b>Sporton Site No.</b>		<b>FCC/IC Registration No.</b>
	CO05-HY	03CH07-HY	722060/4086B-1

### 1.5 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 v01
- ♦ ANSI C63.4-2003
- ♦ IC RSS-210 Issue 8
- ♦ IC RSS-Gen Issue 3

**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.



### 1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	GPS Station	T&E	GS-50	N/A	N/A	Unshielded, 1.8 m
2.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
3.	Bluetooth Earphone	Sony Ericsson	MW600	PY70DA2029	N/A	N/A
4.	LCD Monitor	HANNspree	ST19Z00_CN4	N/A	Shielded, 1.6 m	Unshielded, 1.8 m
5.	Notebook	DELL	P20G	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
6.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
7.	iPod Earphone	Apple	N/A	FCC DoC	Unshielded, 1.0 m	N/A
8.	Earphone	Kolin	Kit-7460E	FCC DoC	Unshielded, 1.6 m	N/A

## 2 Test Configuration of Equipment Under Test

### 2.1 Pre-Scanned RF Power

Preliminary tests were performed in different data rate as below table and the highest power data rates (11b, 11g, 11g/n (BW 20MHz), 11g/n (BW 40MHz) modes) were chosen for full test in the following sections to demonstrate compliance to the FCC limit line.

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	15.42	15.35	15.27	14.80

2.4GHz 802.11g mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Peak Power (dBm)	18.38	18.14	17.92	17.63	17.64	16.78	16.38	15.89

2.4GHz 802.11g/n (BW 20MHz) mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	16.04	15.44	15.17	15.02	14.47	13.96	13.62	13.43

### 2.2 Maximum Peak Conducted Output Power:

Band	2.4GHz 802.11b RF Power (dBm)			2.4GHz 802.11g RF Power (dBm)		
	Channel	1	6	11	1	6
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Peak Power	15.20	15.31	15.42	18.10	17.89	18.38

Band	2.4GHz 802.11g/n (BW 20MHz) RF Power (dBm)		
	Channel	1	6
Frequency (MHz)	2412	2437	2462
Peak Power	15.65	15.76	16.04

**Remark:**

The data rates of WLAN 802.11b/g/n were set in 1Mbps for 802.11b, 6Mbps for 802.11g, MCS0 for 802.11g/n (BW 20MHz), for all the test cases due to the highest RF output power.



### 2.3 Maximum Average Conducted Output Power:

Band	2.4GHz 802.11b RF Power (dBm)			2.4GHz 802.11g RF Power (dBm)		
	Channel	1	6	11	1	6
Frequency (MHz)	2412	2437	2462	2412	2437	2462
Average Power	12.42	12.68	12.91	12.09	11.92	12.35

Band	2.4GHz 802.11g/n (BW 20MHz) RF Power (dBm)		
Channel	1	6	11
Frequency (MHz)	2412	2437	2462
Average Power	9.61	9.63	10.05

**Remark:**

1. The average power, which is used by the test method, AVG2, in DTS Meas. Guidance v01, is reporting only.
2. The EUT is programmed to transmit signals continuously.

## 2.4 Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 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), radiated emission (30 MHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

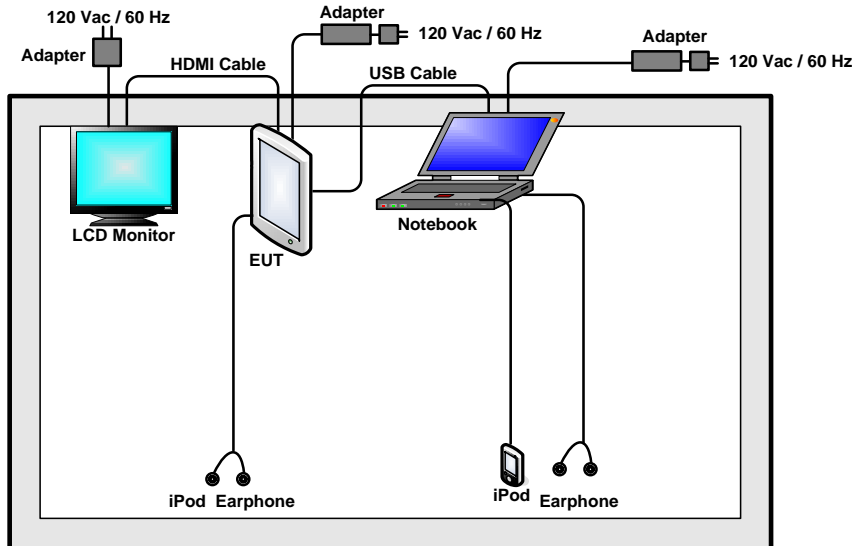
Pre-scanned tests, X, Y, Z in three orthogonal panels, were conducted to determine the final configuration from all possible combinations, laptop / tablet modes.

The following tables are showing the test modes as the worst cases (X plane) and recorded in this report.

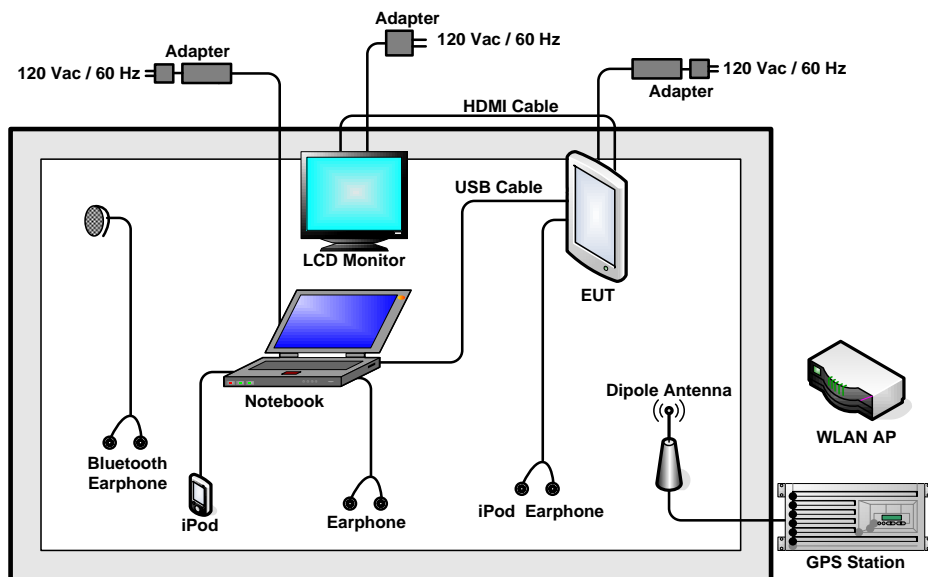
Test Cases		
Test Item	802.11b (Modulation : DSSS)	802.11g/n (Modulation : OFDM)
<b>Conducted TCs</b>	Mode 1 : 802.11b CH01_2412 MHz Mode 2 : 802.11b CH06_2437 MHz Mode 3 : 802.11b CH11_2462 MHz	Mode 4: 802.11g_CH01_2412 MHz Mode 5: 802.11g_CH06_2437 MHz Mode 6: 802.11g_CH11_2462 MHz Mode 7: 802.11g/n (BW 20M)_CH01_2412 MHz Mode 8: 802.11g/n (BW 20M)_CH06_2437 MHz Mode 9: 802.11g/n (BW 20M)_CH11_2462 MHz
<b>Radiated TCs</b>	Mode 1 : 802.11b CH01_2412 MHz Mode 2 : 802.11b CH06_2437 MHz Mode 3 : 802.11b CH11_2462 MHz	Mode 4: 802.11g_CH01_2412 MHz Mode 5: 802.11g_CH06_2437 MHz Mode 6: 802.11g_CH11_2462 MHz Mode 7: 802.11g/n (BW 20M)_CH01_2412 MHz Mode 8: 802.11g/n (BW 20M)_CH06_2437 MHz Mode 9: 802.11g/n (BW 20M)_CH11_2462 MHz
<b>AC Conducted Emission</b>	Mode 1 : WLAN Link + Bluetooth Link + GPS Rx + Adapter 1 + TC for Sample 1 Mode 2 : WLAN Link + Bluetooth Link + MPEG4 + Adapter 2 + NFC On + TC for Sample 1 Mode 3 : WLAN Link + Bluetooth Link + Camera + Adapter 3 + NFC On + TC for Sample 1 Mode 4 : WLAN Link + Bluetooth Link + H-Pattern + Adapter 4 + NFC On + TC for Sample 1	
<b>Remark:</b>		
<ol style="list-style-type: none"> <li>TC stands for Test Configuration, and consists of HDMI Cable, iPod earphone, USB Cable (Data Link with NB), and SD Card.</li> <li>The worst case of conducted emission is mode 1; only the test data of it was reported.</li> <li>For radiated TCs, all the tests were performance with TC, Adapter 1, and Sample 1.</li> </ol>		

## 2.5 Connection Diagram of Test System

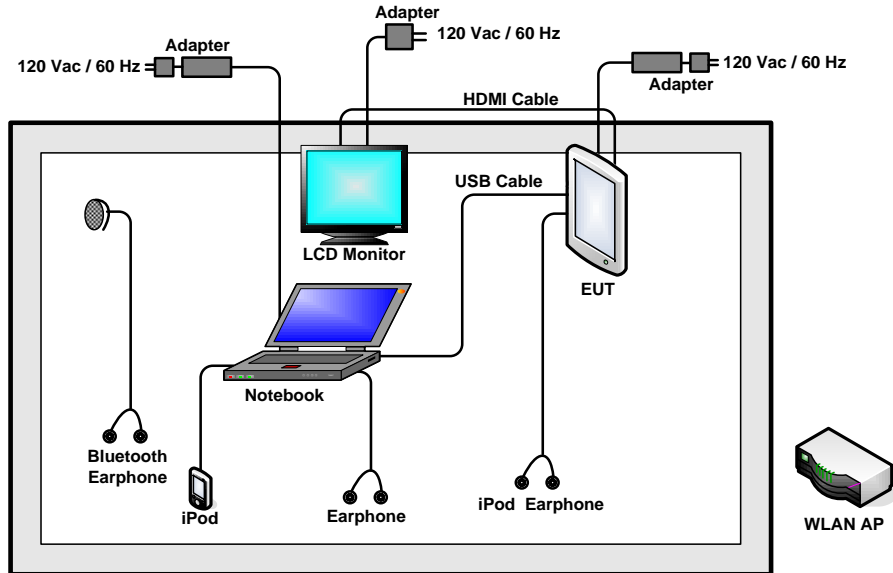
### <WLAN Tx Mode>



### <AC Conducted Emission in GPS Rx Mode>



<AC Conducted Emission Mode>



## 2.6 RF Utility

The programmed RF utility, execute “ADB” is installed in EUT to provide channel selection, power level, data rate and the application type. RF Utility can send transmitting signal for all testing. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

### 3 Test Result

#### 3.1 6dB Bandwidth Measurement

##### 3.1.1 Limit of 6dB Bandwidth

The minimum 6 dB bandwidth shall be at least 500 KHz.

##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v01.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable. The path loss was compensated to the results for each measurement.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 1-5% of the emission bandwidth (EBW). Set the Video bandwidth (VBW)  $\geq 3 * RBW$ . In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 KHz.
4. The marker-delta reading at this point is the 6 dB bandwidth of the emission.

##### 3.1.4 Test Setup



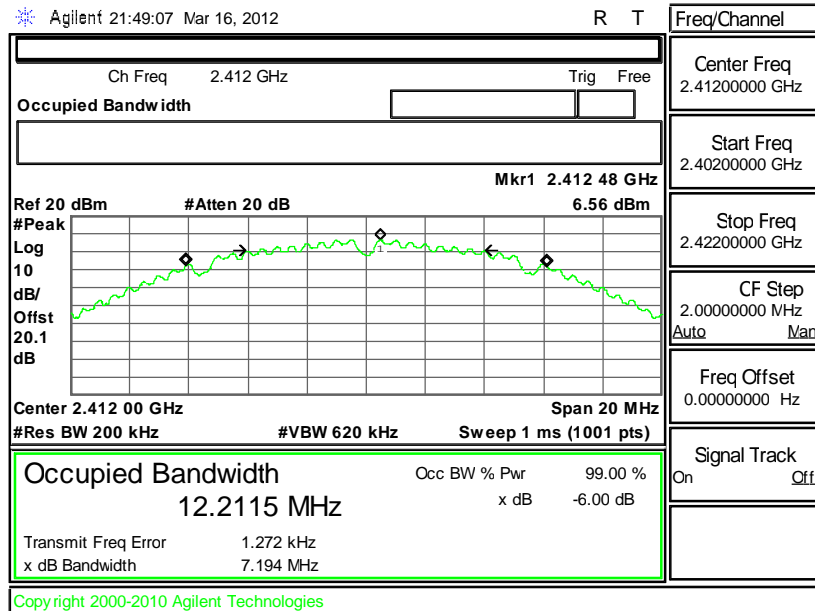


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

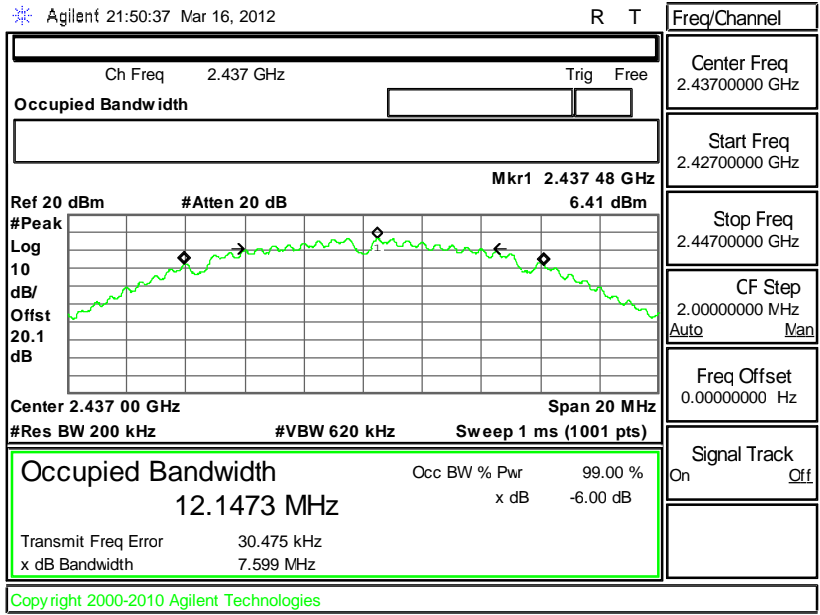
Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	7.194	0.5	Pass
06	2437	7.599	0.5	Pass
11	2462	7.156	0.5	Pass

Mode 1 : 6 dB Bandwidth Plot on 802.11b Channel 01

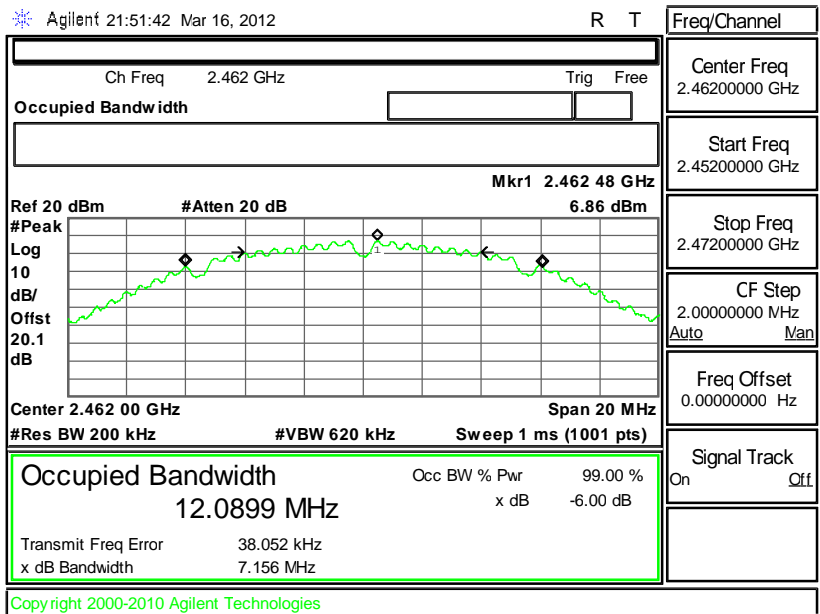




**Mode 2 : 6 dB Bandwidth Plot on 802.11b Channel 06**



**Mode 3 : 6 dB Bandwidth Plot on 802.11b Channel 11**

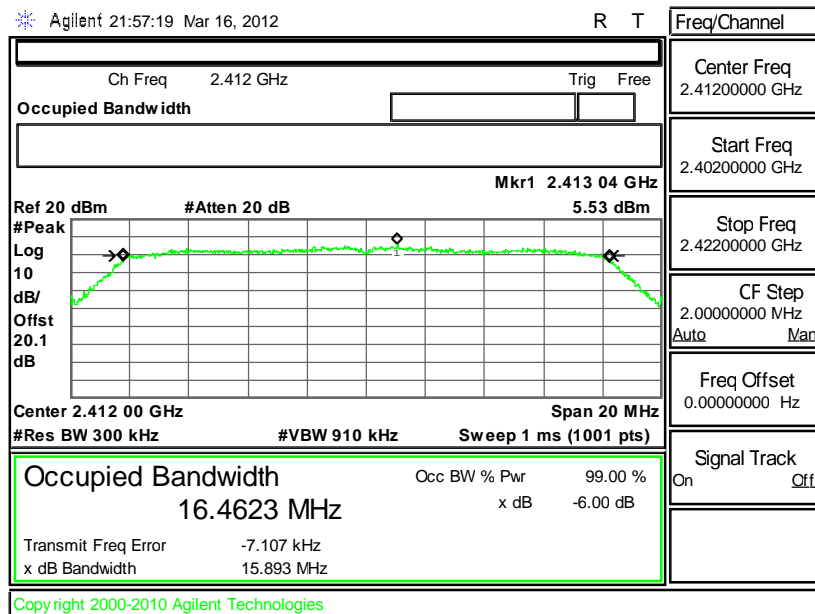




Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	15.893	0.5	Pass
06	2437	16.049	0.5	Pass
11	2462	15.883	0.5	Pass

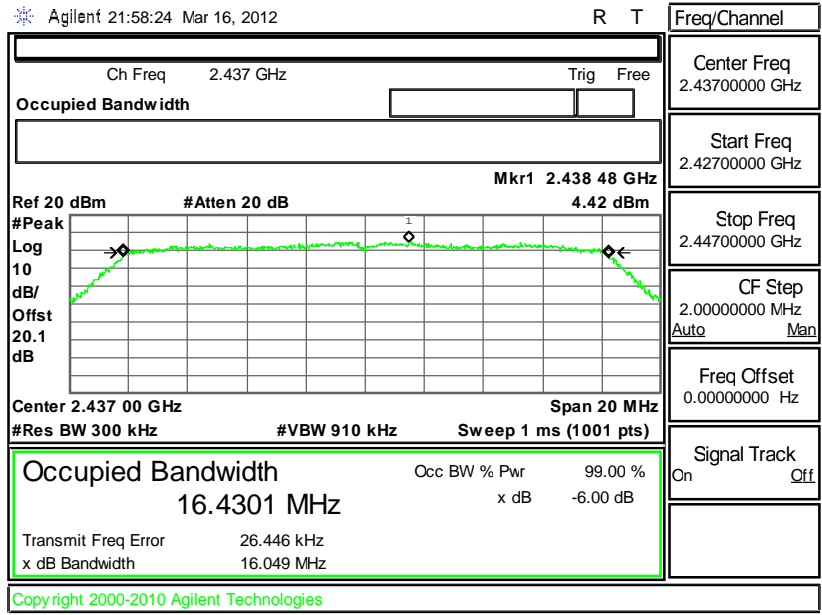
Mode 4 : 6 dB Bandwidth Plot on 802.11g Channel 01



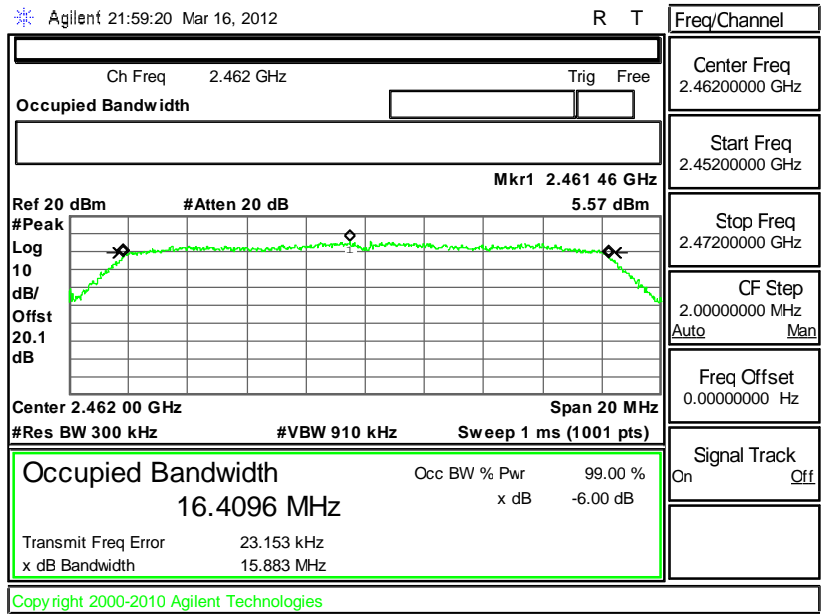




**Mode 5 : 6 dB Bandwidth Plot on 802.11g Channel 06**



**Mode 6 : 6 dB Bandwidth Plot on 802.11g Channel 11**



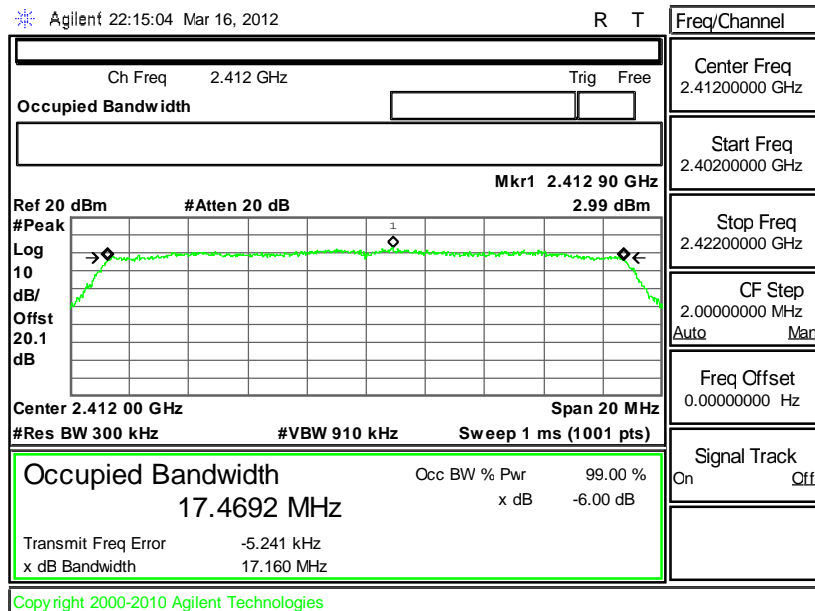


Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g/n (BW 20MHz) 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	17.160	0.5	Pass
06	2437	17.350	0.5	Pass
11	2462	17.353	0.5	Pass

Mode 7 : 6 dB Bandwidth Plot on 802.11g/n(BW 20MHz) Channel

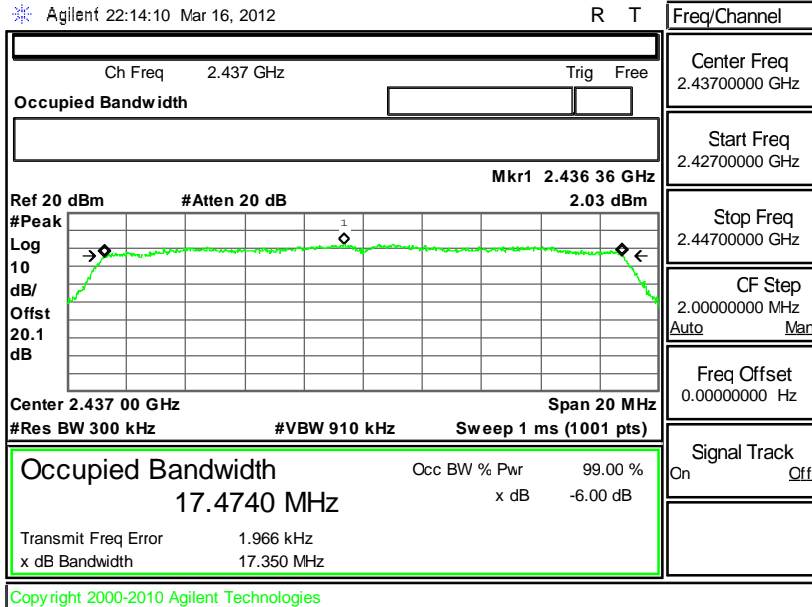
01





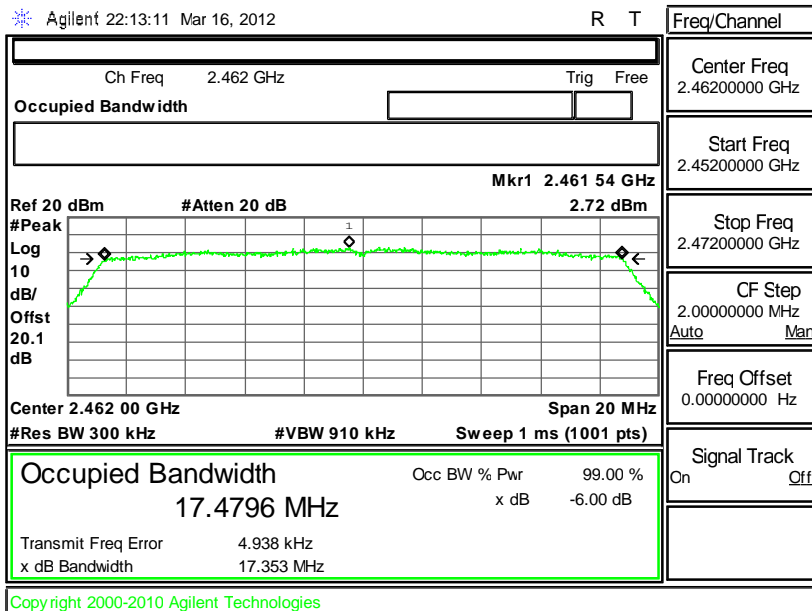
Mode 8 : 6 dB Bandwidth Plot on 802.11g/n(BW 20MHz) Channel

06



Mode 9 : 6 dB Bandwidth Plot on 802.11g/n(BW 20MHz) Channel

11



## 3.2 Output Power Measurement

### 3.2.1 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.

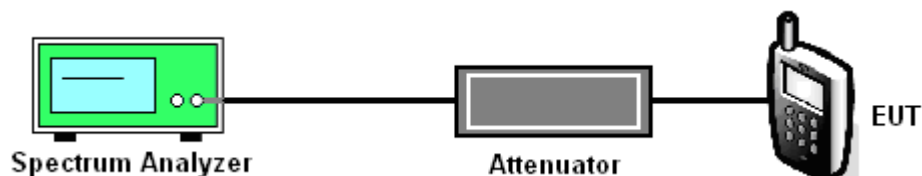
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The testing follows the Measurement Procedure PK2 of FCC KDB No. 558074 DTS Meas. Guidance v01.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable. The path loss was compensated to the results for each measurement.
3. The spectrum analyzer's settings are Resolution bandwidth (RBW) = 1MHz, Video bandwidth (VBW) = 3MHz, Peak Detector, auto sweep time, and the frequency span to a value that is 5-30 % greater than the EBW.
4. The spectrum analyzer's integrated band power measurement function is used to measure the peak power and the test results are demonstrated to compliance to the limit line as following plots.

### 3.2.4 Test Setup



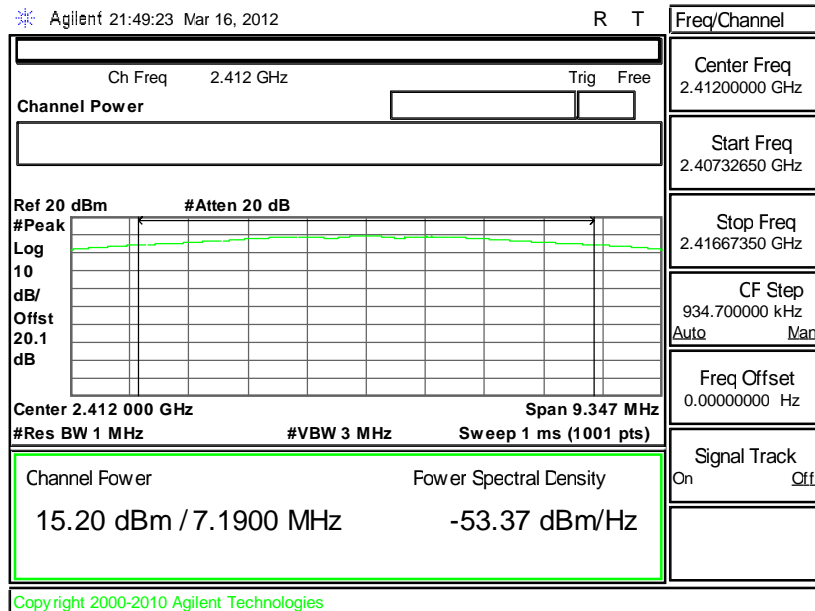


3.2.5 Test Result of Output Power

Test Mode :	Mode 1, 2, 3	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

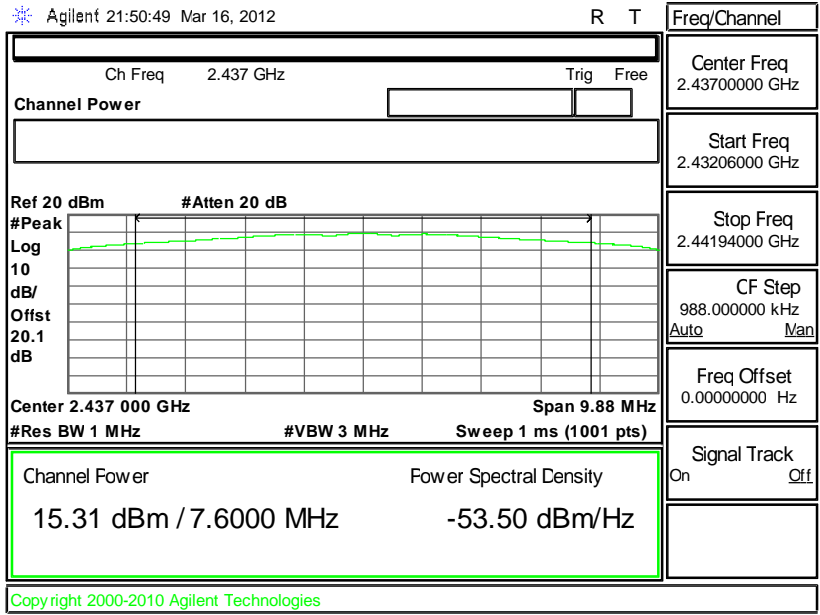
Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	15.20	30	Pass
06	2437	15.31	30	Pass
11	2462	15.42	30	Pass

Mode 1 : Output Power Plot on 802.11b Channel 01

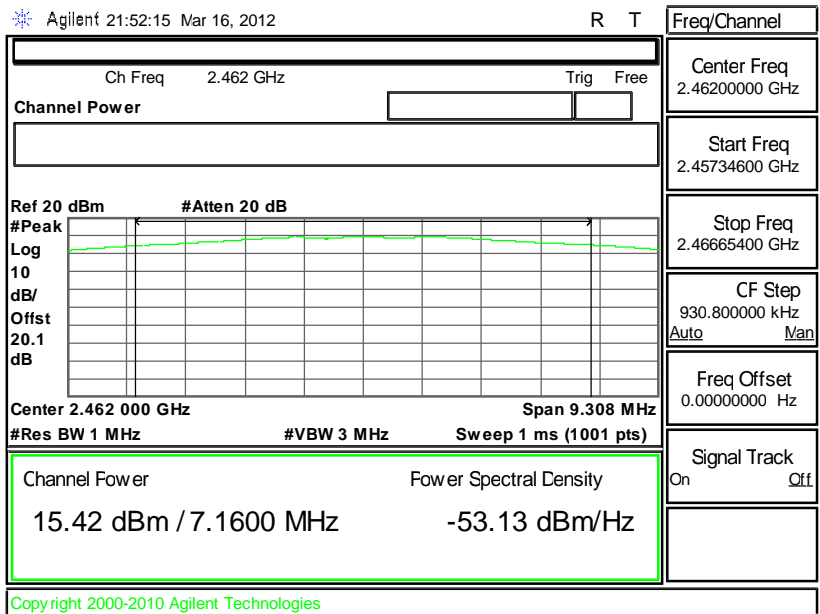




**Mode 2 : Output Power Plot on 802.11b Channel 06**



**Mode 3 : Output Power Plot on 802.11b Channel 11**

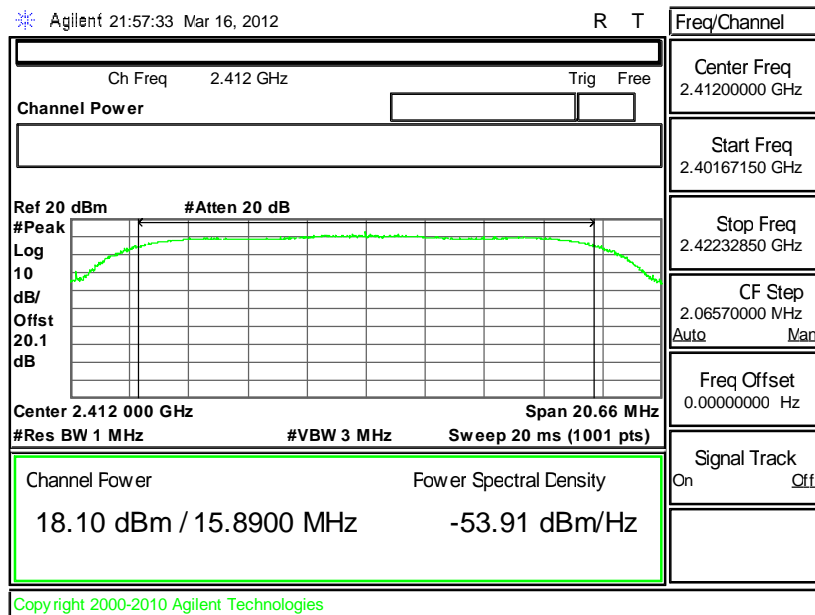




Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

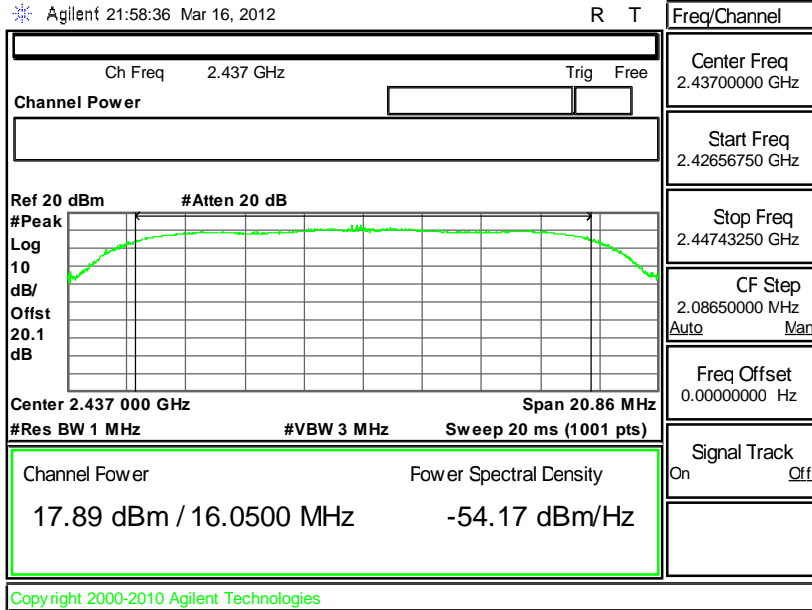
Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	18.10	30	Pass
06	2437	17.89	30	Pass
11	2462	18.38	30	Pass

Mode 4 : Output Power Plot on 802.11g Channel 01

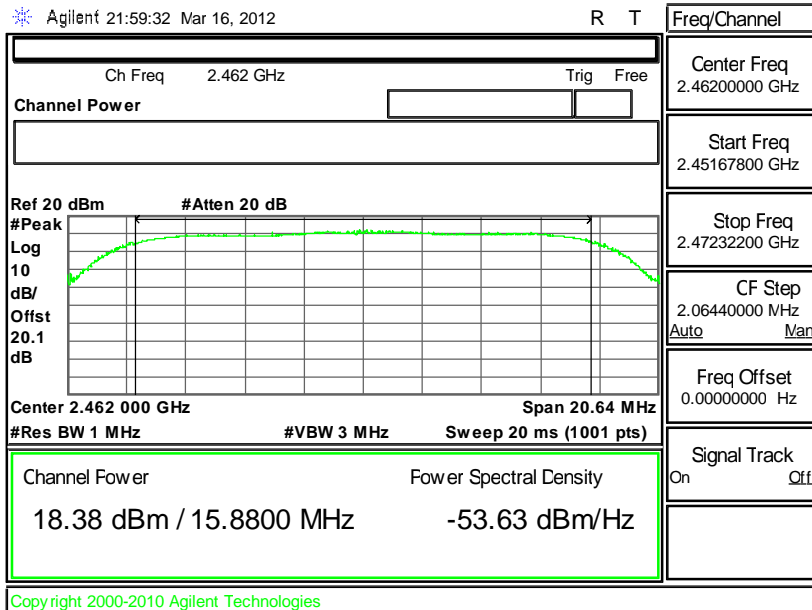




**Mode 5 : Output Power Plot on 802.11g Channel 06**



**Mode 6 : Output Power Plot on 802.11g Channel 11**



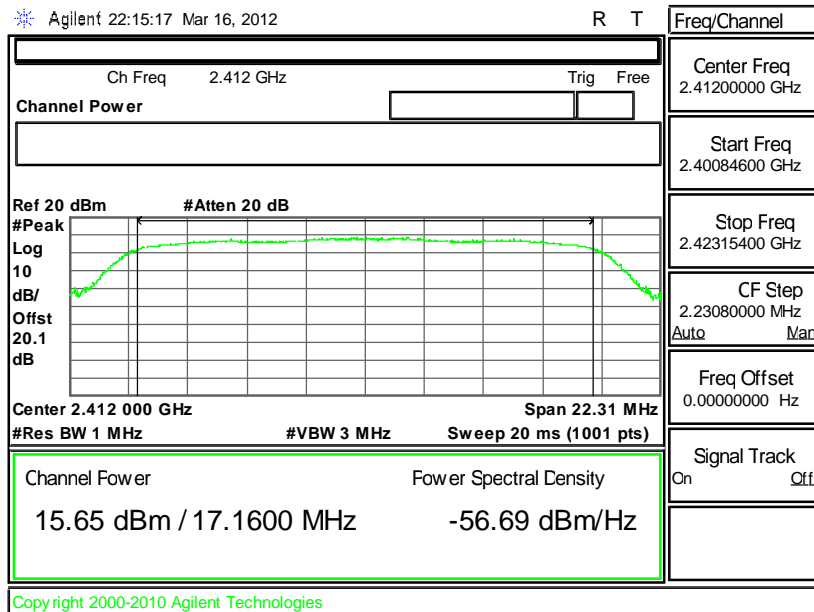




Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

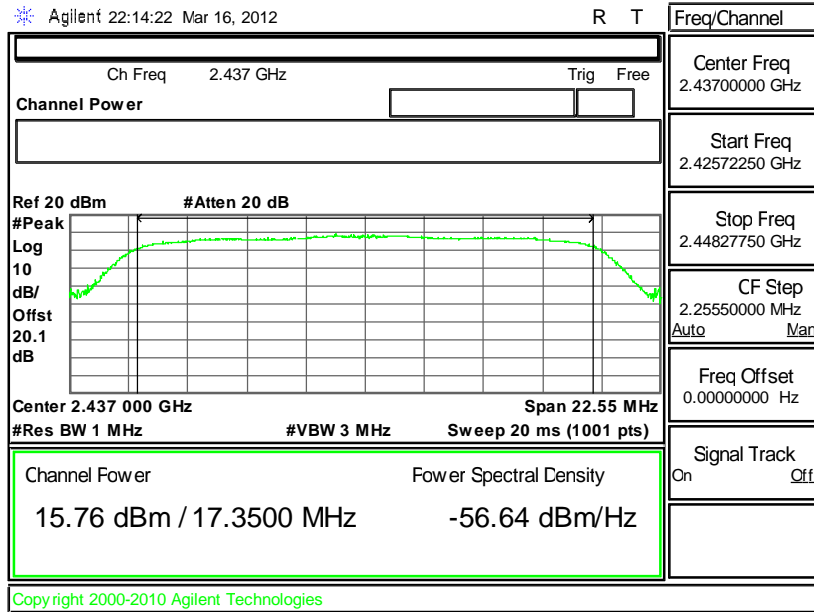
Channel	Frequency (MHz)	802.11g/n (BW 20MHz) Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	15.65	30	Pass
06	2437	15.76	30	Pass
11	2462	16.04	30	Pass

Mode 7: Output Power Plot on 802.11g/n (BW 20MHz) channel 01

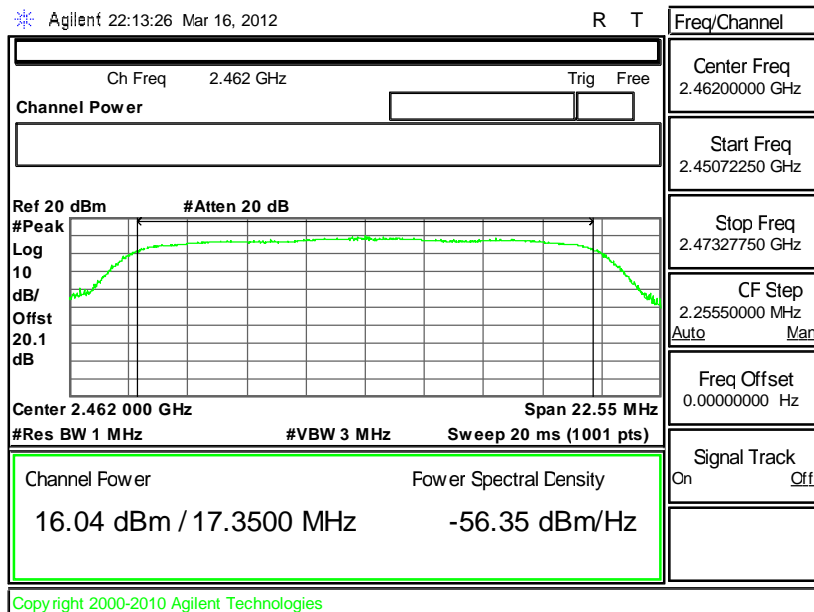




**Mode 8 : Output Power Plot on 802.11g/n (BW 20MHz) Channel 06**



**Mode 9 : Output Power Plot on 802.11g/n (BW 20MHz) Channel 11**





### **3.3 Band Edges Measurement**

#### **3.3.1 Limit of Band Edges**

In any 100 KHz bandwidth outside the intentional radiation frequency band, the radio frequency power shall be at least 20 dB below the highest level of the radiated power. 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.

#### **3.3.2 Measuring Instruments**

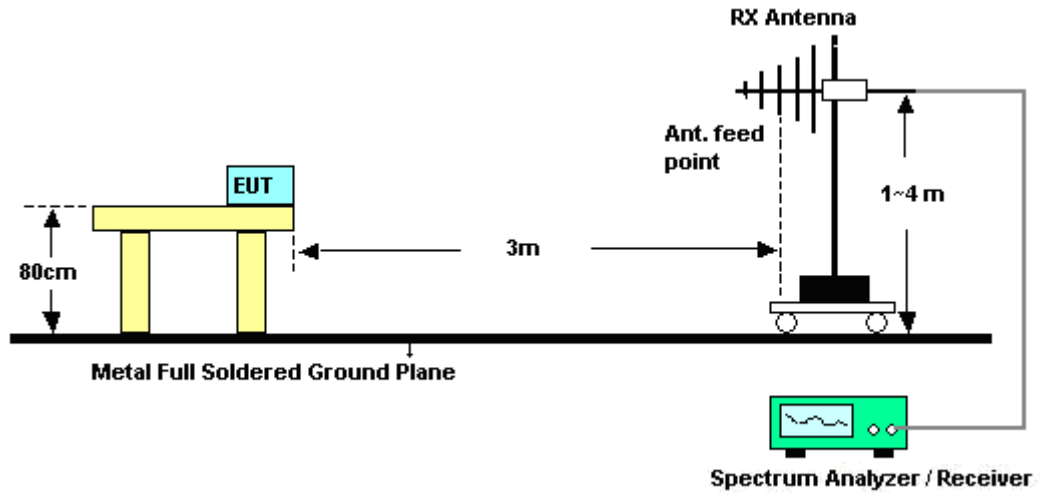
See list of measuring instruments of this test report.

#### **3.3.3 Test Procedures**

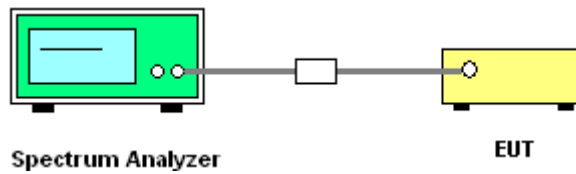
1. The testing follows the guidelines in ANSI C63.4-2003 and the Measurement Procedure of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v01.
2. Conducted emission test: Set RBW = 100 KHz, Video bandwidth (VBW)  $\geq$  RBW. Out of the authorized frequency band emissions must be at least 20 dB lower than the highest emission level within the authorized band as measured with a 100 KHz RBW. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d).
3. Radiated emission test: Apply to band edge emissions that falling on the restricted bands listed in FCC Section 15.205. The maximum permitted average field strength is listed in FCC Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep=Auto. If the emission is pulsed, then modify the unit for continuous operation. Use the settings in this paragraph to correct the reading level by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation per 15.35(b) and (c).

### 3.3.4 Test Setup

#### <Radiated Band Edges>



#### <Conducted Band Edges>





3.3.5 Test Result of Radiated Band Edges

Test Mode :	Mode 1	Temperature :	22~24°C
Test Band :	802.11b	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Kyle Zhuang

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
2385.05	54.9	-19.1	74	50.8	32.03	6.03	33.96	100	52	Peak
2385.05	43.28	-10.72	54	39.18	32.03	6.03	33.96	100	52	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
2385.62	50.95	-23.05	74	46.82	32.06	6.03	33.96	110	287	Peak
2385.62	39	-15	54	34.87	32.06	6.03	33.96	110	287	Average

Test Mode :	Mode 3	Temperature :	22~24°C
Test Band :	802.11b	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Kyle Zhuang

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
2485.94	59.39	-14.61	74	55.03	32.18	6.18	34	100	53	Peak
2485.94	50.27	-3.73	54	45.91	32.18	6.18	34	100	53	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
2485.18	59.51	-14.49	74	55.15	32.18	6.18	34	106	283	Peak
2485.18	49.46	-4.54	54	45.1	32.18	6.18	34	106	283	Average



Test Mode :	Mode 4	Temperature :	22~24°C
Test Band :	802.11g	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Kyle Zhuang

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
2389.99	69.5	-4.5	74	65.37	32.06	6.03	33.96	100	53	Peak
2389.99	48.3	-5.7	54	44.17	32.06	6.03	33.96	100	53	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
2389.99	66.8	-7.2	74	62.67	32.06	6.03	33.96	105	285	Peak
2389.99	43.69	-10.31	54	39.56	32.06	6.03	33.96	105	285	Average

Test Mode :	Mode 6	Temperature :	22~24°C
Test Band :	802.11g	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Kyle Zhuang

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	72.21	-1.79	74	67.85	32.18	6.18	34	100	57	Peak
2483.5	48.69	-5.31	54	44.33	32.18	6.18	34	100	57	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
2483.5	72.11	-1.89	74	67.75	32.18	6.18	34	106	283	Peak
2483.5	47.48	-6.52	54	43.12	32.18	6.18	34	106	283	Average



Test Mode :	Mode 7	Temperature :	22~24°C
Test Band :	802.11g/n (BW 20MHz)	Relative Humidity :	53~55%
Test Channel :	01	Test Engineer :	Kyle Zhuang

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
2389.42	64.26	-9.74	74	60.13	32.06	6.03	33.96	100	55	Peak
2389.42	39.12	-14.88	54	34.99	32.06	6.03	33.96	100	55	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
2389.99	59.37	-14.63	74	55.24	32.06	6.03	33.96	134	282	Peak
2389.99	37.6	-16.4	54	33.47	32.06	6.03	33.96	134	282	Average

Test Mode :	Mode 9	Temperature :	22~24°C
Test Band :	802.11g/n (BW 20MHz)	Relative Humidity :	53~55%
Test Channel :	11	Test Engineer :	Kyle Zhuang

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
2484.42	68.69	-5.31	74	64.33	32.18	6.18	34	100	60	Peak
2484.42	39.86	-14.14	54	35.5	32.18	6.18	34	100	60	Average

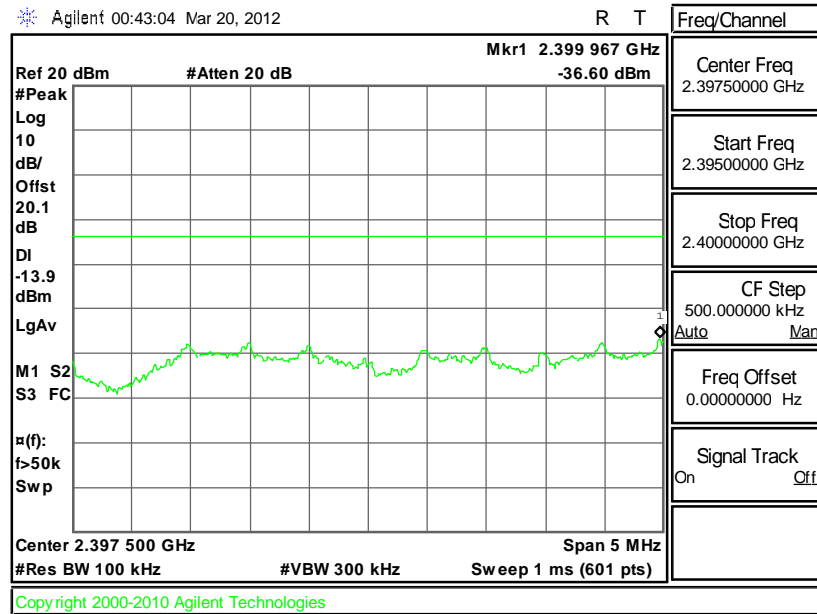
ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBμV/m )	Over Limit ( dB )	Limit Line ( dBμV/m )	Read Level ( dBμV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2485.18	64.73	-9.27	74	60.37	32.18	6.18	34	107	280	Peak
2485.18	38.21	-15.79	54	33.85	32.18	6.18	34	107	280	Average



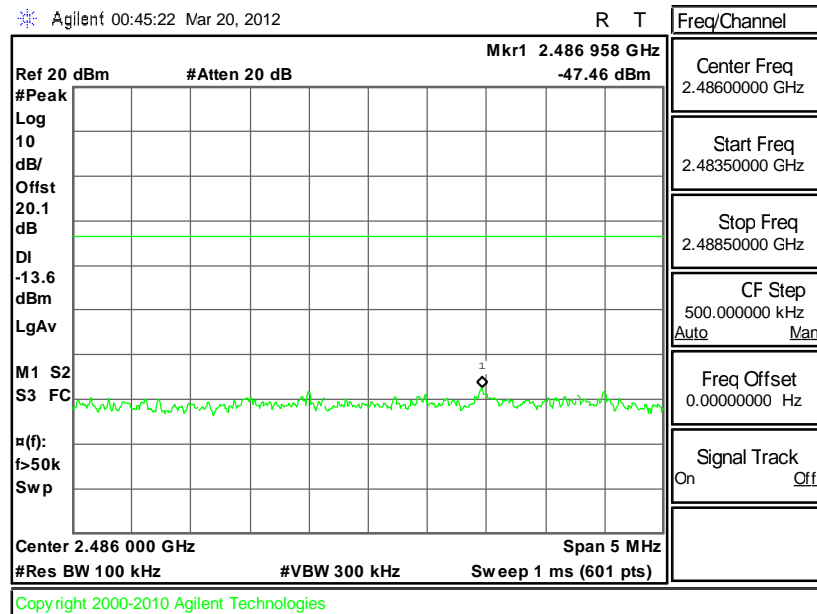
3.3.6 Test Plots of Conducted Band Edges

Test Mode :	Mode 1 and 3	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Book Lin

Low Band Edge Plot on 802.11b Channel 01



High Band Edge Plot on 802.11b Channel 11

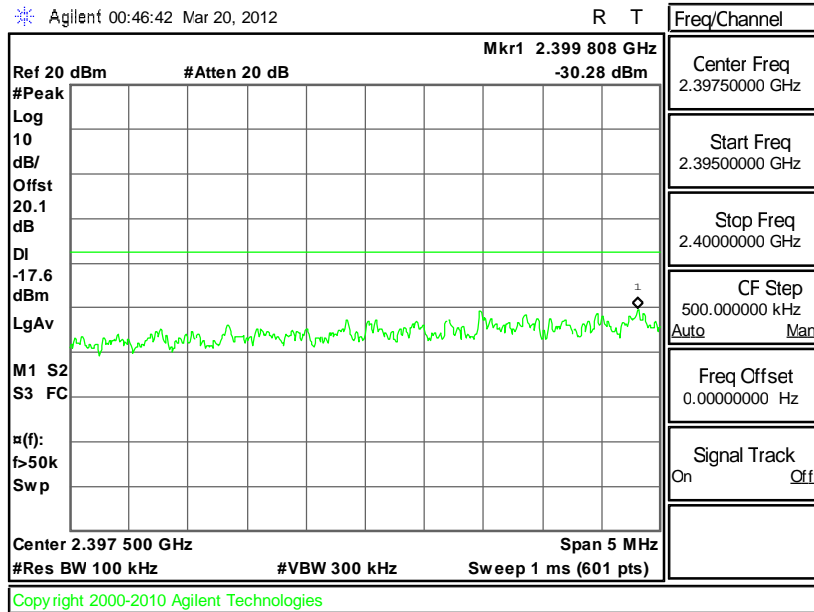




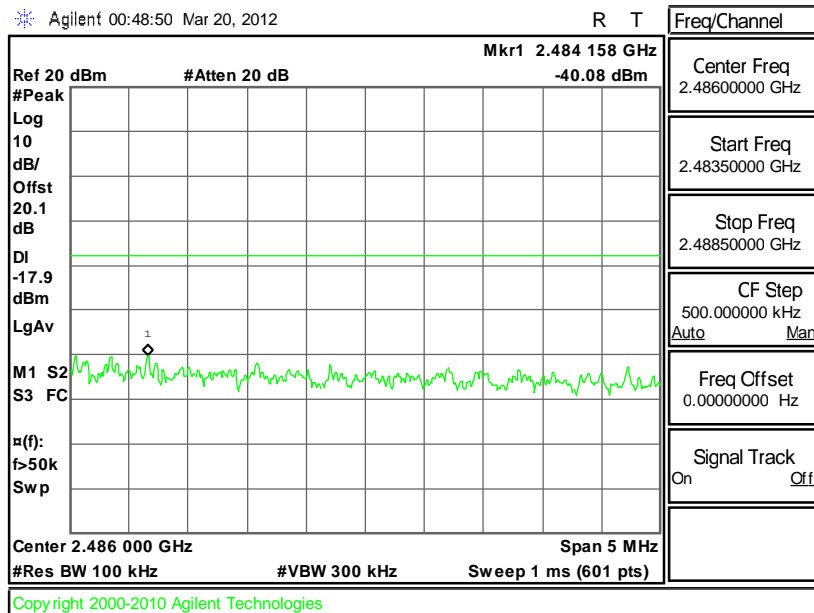


Test Mode :	Mode 4 and 6	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Book Lin

Low Band Edge Plot on 802.11g Channel 01



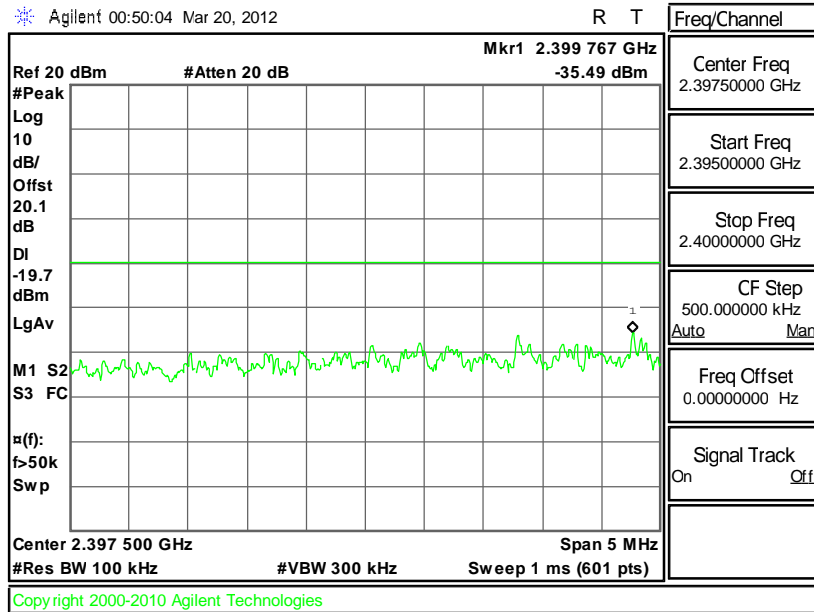
High Band Edge Plot on 802.11g Channel 11



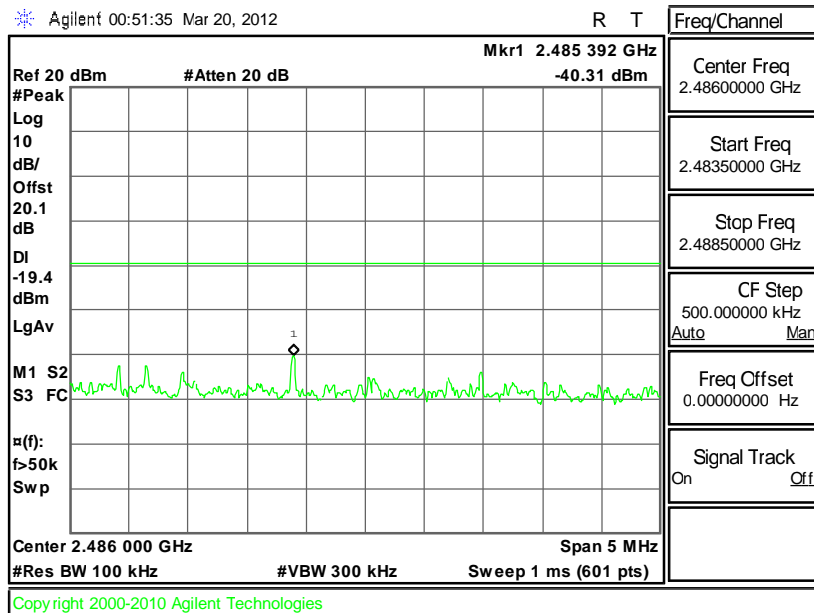


Test Mode :	Mode 7 and 9	Temperature :	24~26°C
Test Band :	802.11g/n (BW 20MHz)	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Book Lin

Low Band Edge Plot on 802.11g/n (BW 20MHz) Channel 01



High Band Edge Plot on 802.11g/n (BW 20MHz) Channel 11



## 3.4 Spurious Emission Measurement

### 3.4.1 Limit of Spurious Emission Measurement

All harmonics/spurious must be at least 20 dB down from the highest emission level within the authorized band.

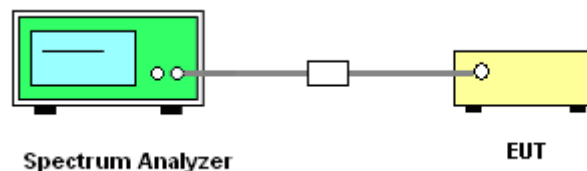
### 3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.4.3 Test Procedure

1. The transmitter output was connected to the spectrum analyzer via a low lose cable. The path loss was compensated to the results for each measurement.
2. Set RBW = 100 KHz, Video bandwidth (VBW)  $\geq$  RBW, scan up through 10th harmonic. All harmonics/spurs must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 KHz RBW.

### 3.4.4 Test Setup

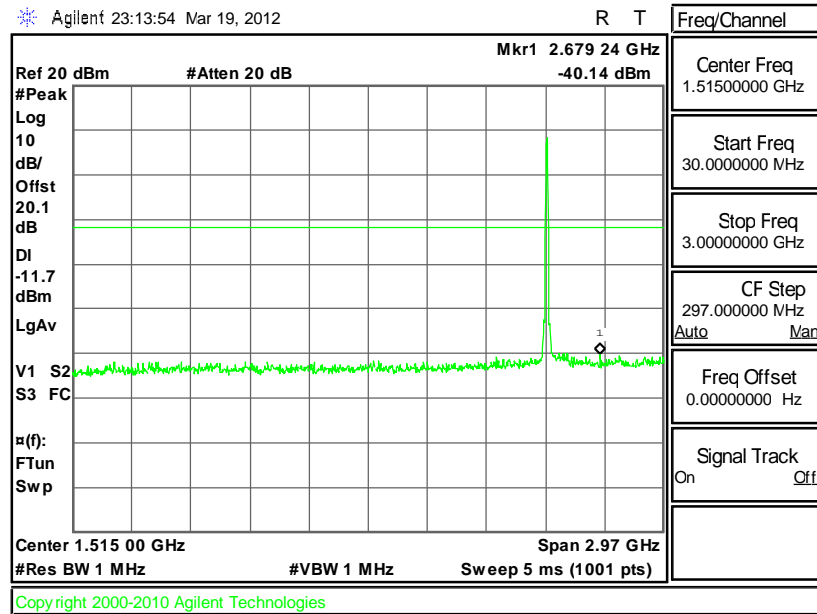




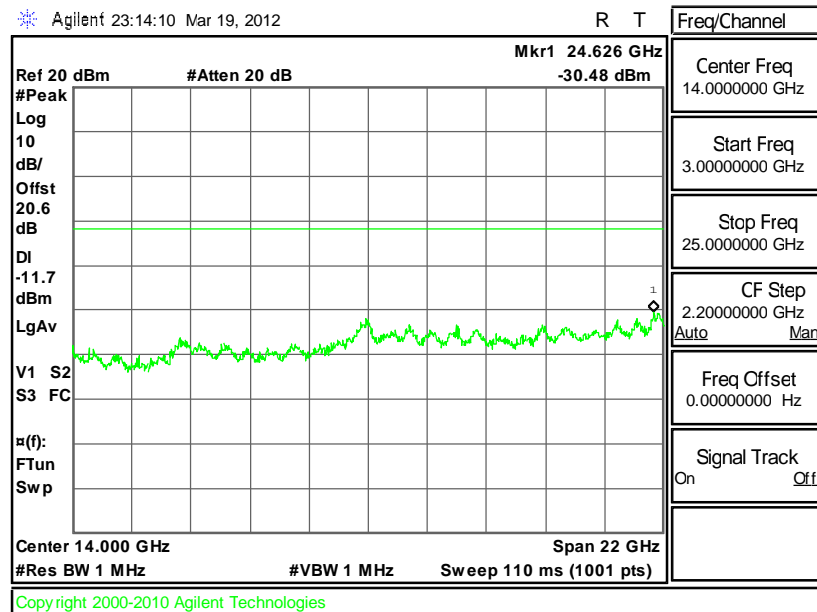
### 3.4.5 Test Plots of Spurious Emission

Test Mode :	Mode 1	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



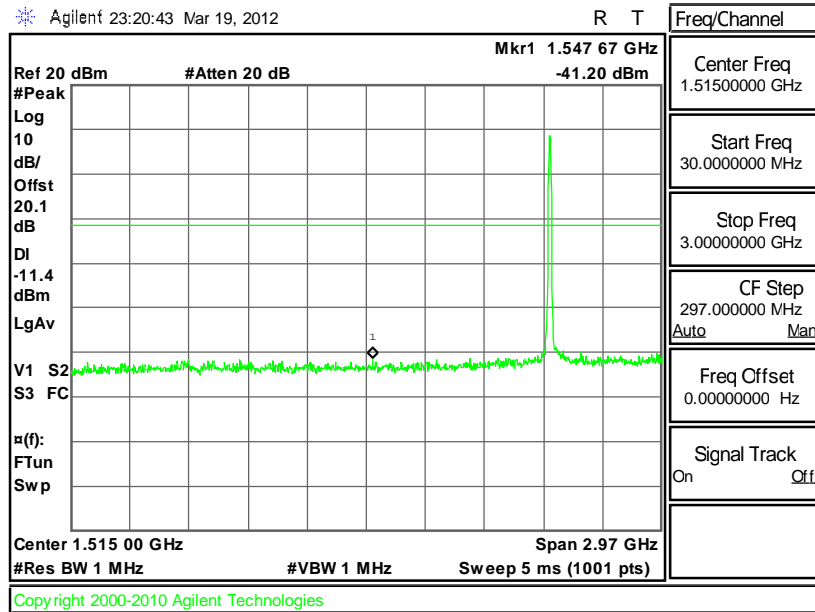
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



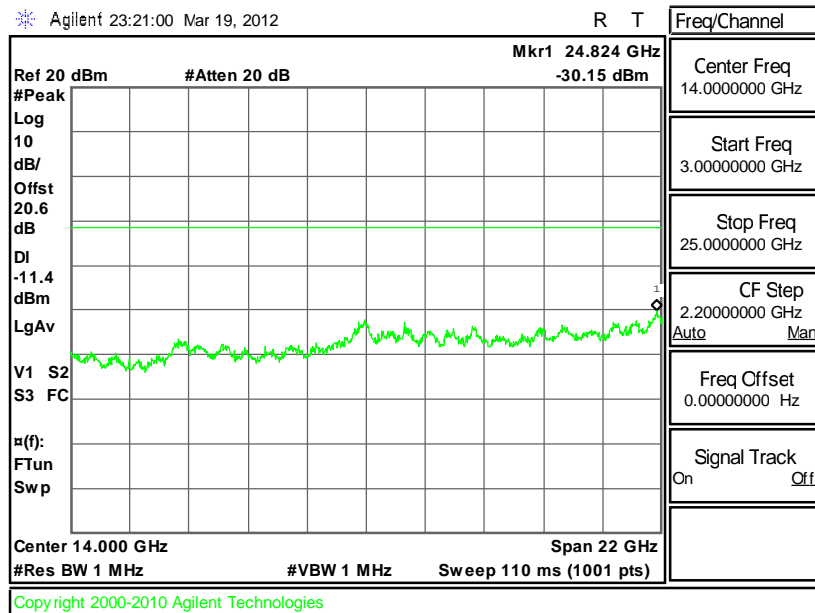


Test Mode :	Mode 2	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



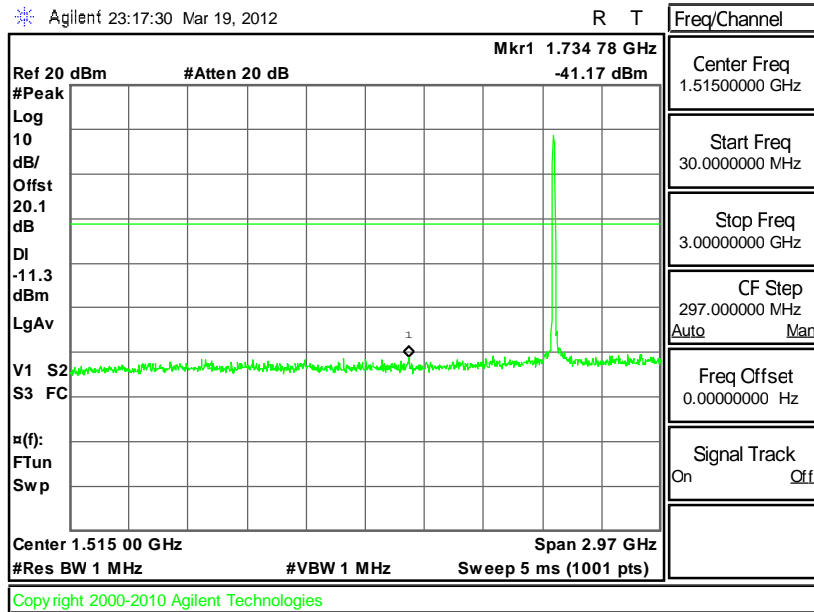
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



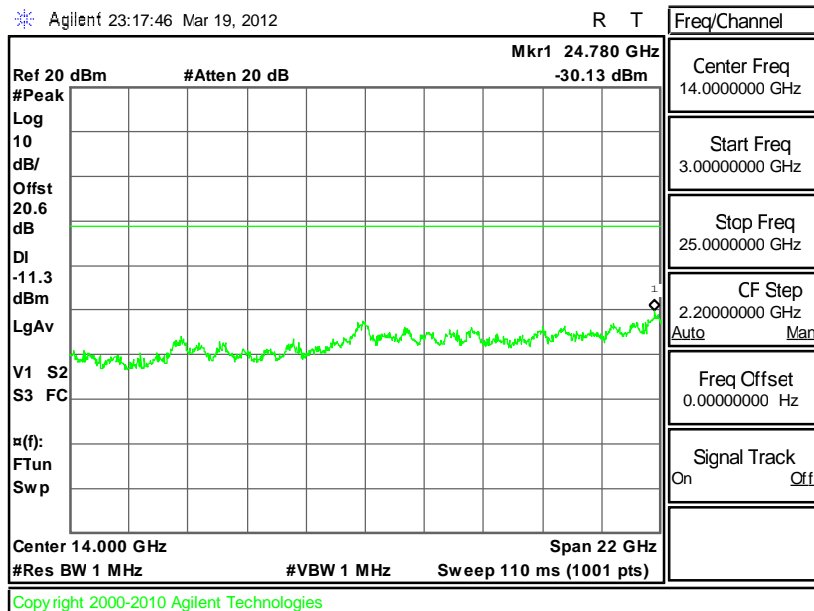


Test Mode :	Mode 3	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



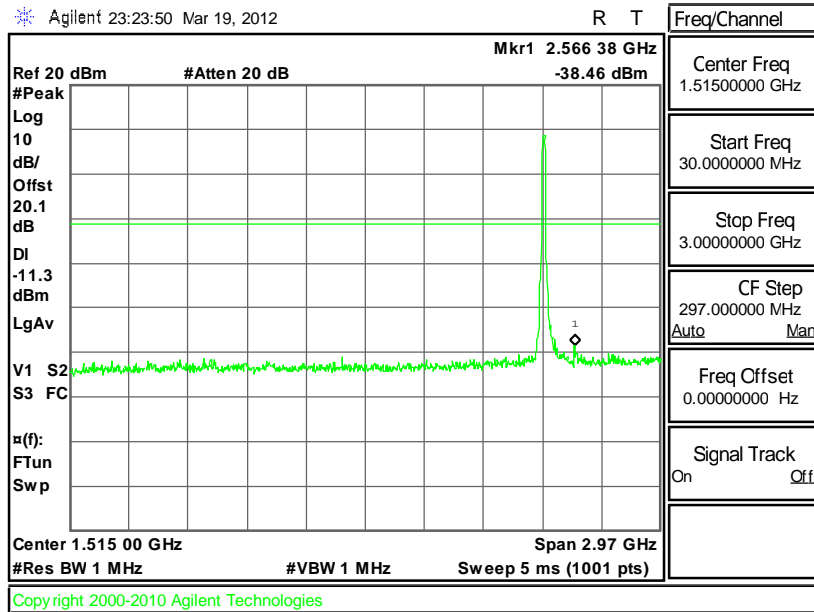
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



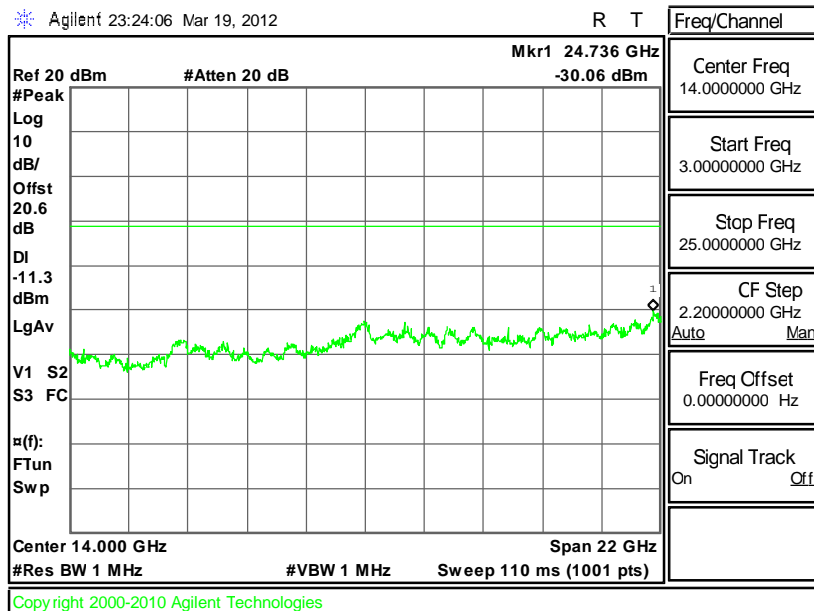


Test Mode :	Mode 4	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



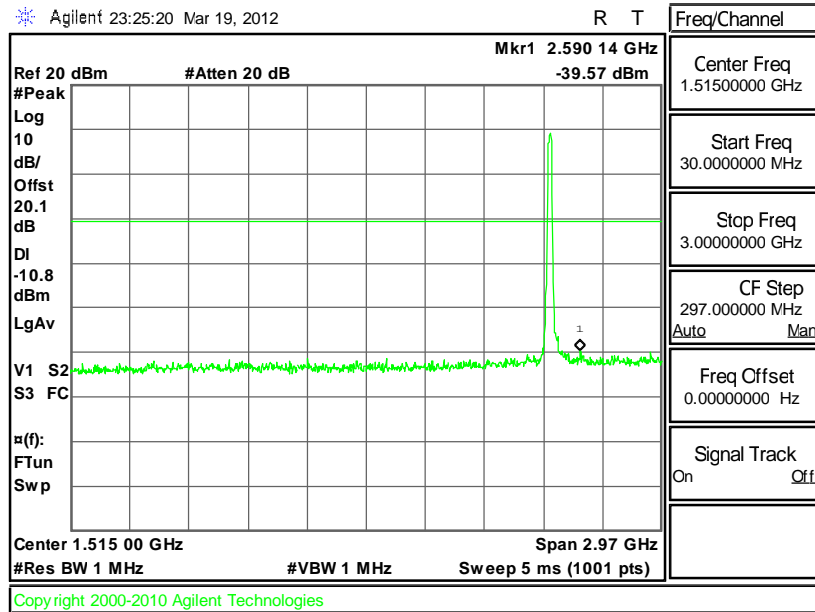
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



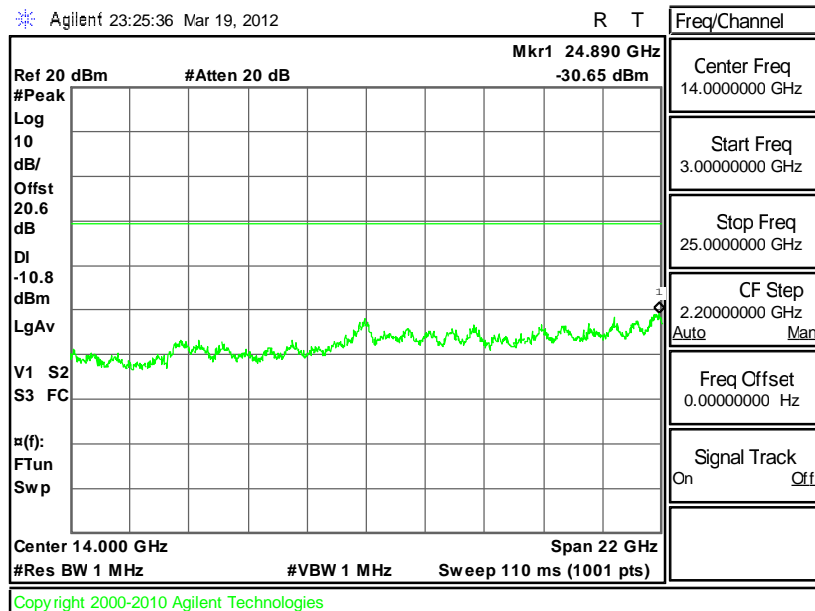


Test Mode :	Mode 5	Temperature :	24~26
Test Band :	802.11g	Relative Humidity :	50~53
Test Channel :	06	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

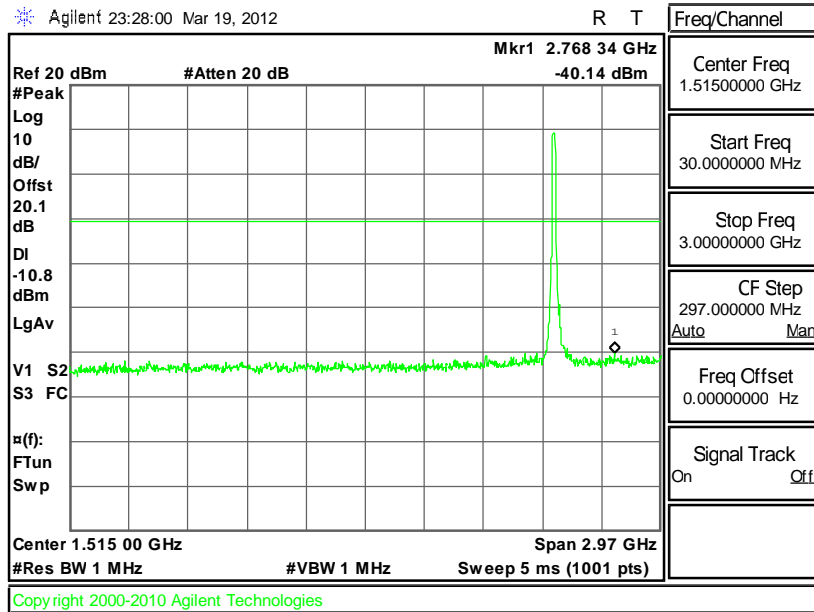




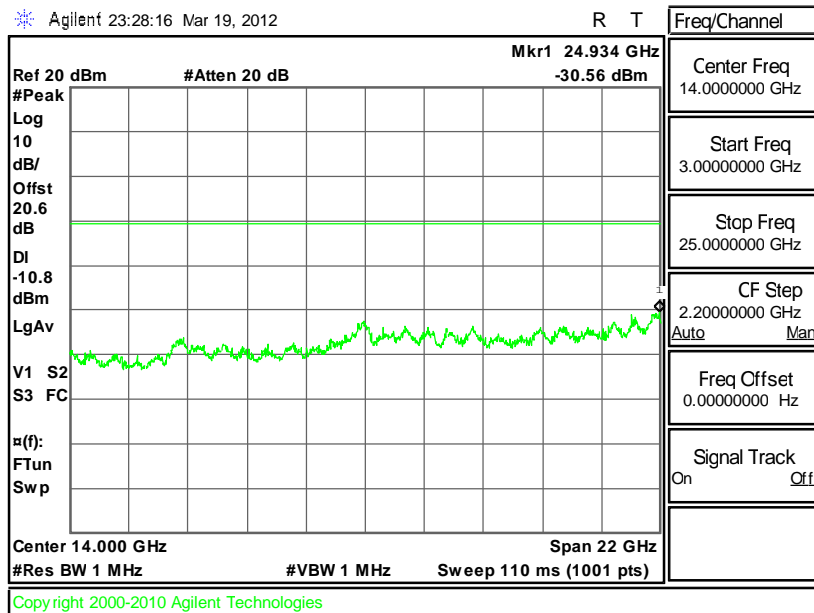


Test Mode :	Mode 6	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



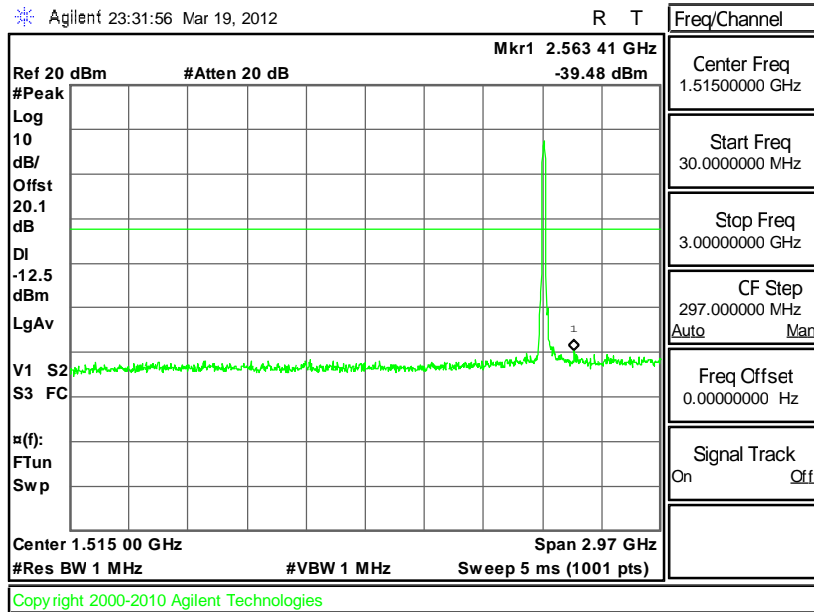
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



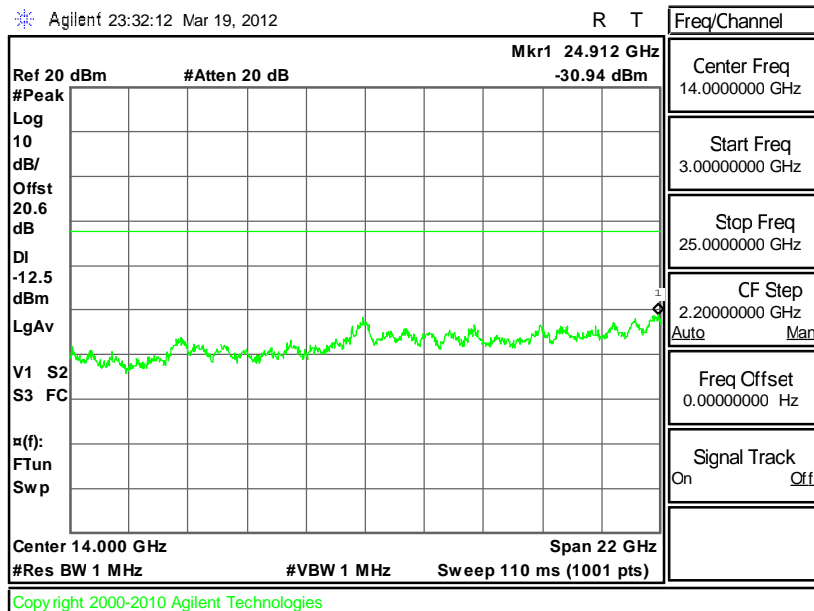


Test Mode :	Mode 7	Temperature :	24~26°C
Test Band :	802.11g/n (BW 20MHz)	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



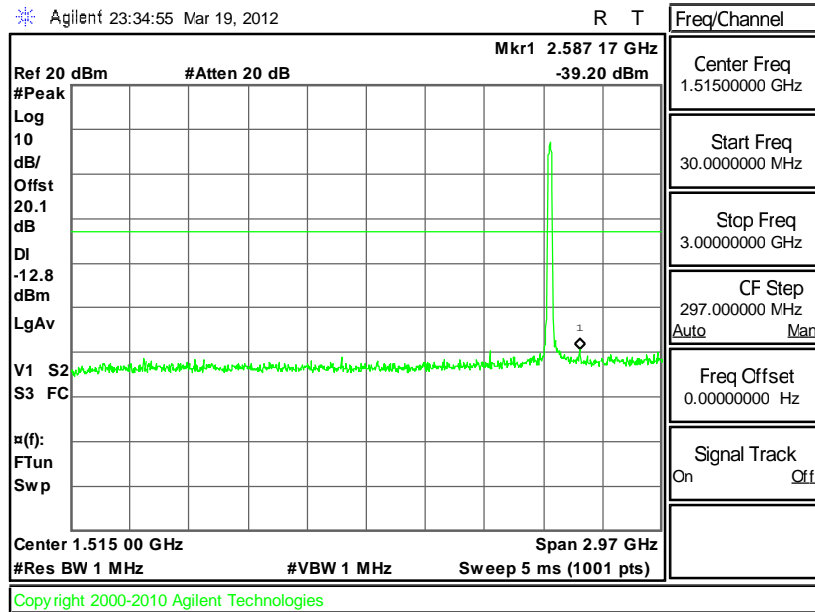
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



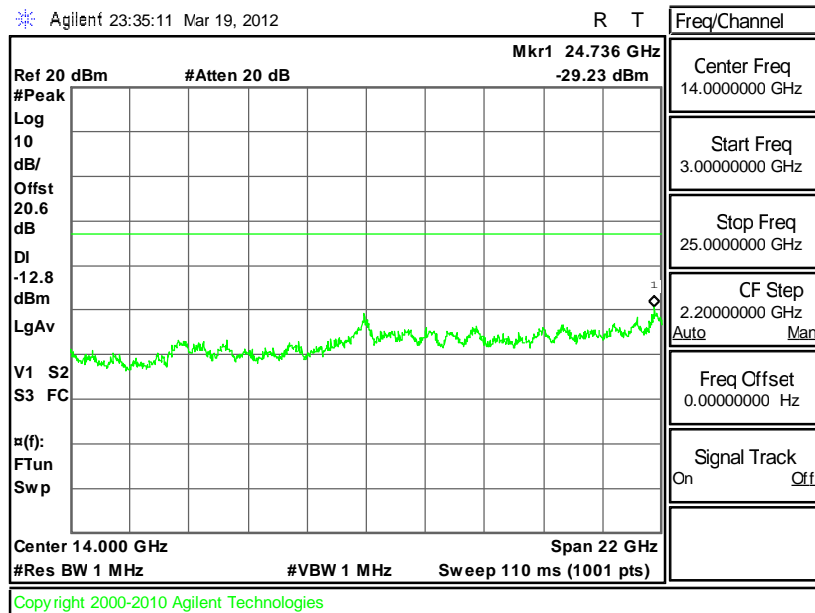


Test Mode :	Mode 8	Temperature :	24~26°C
Test Band :	802.11g/n (BW 20MHz)	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



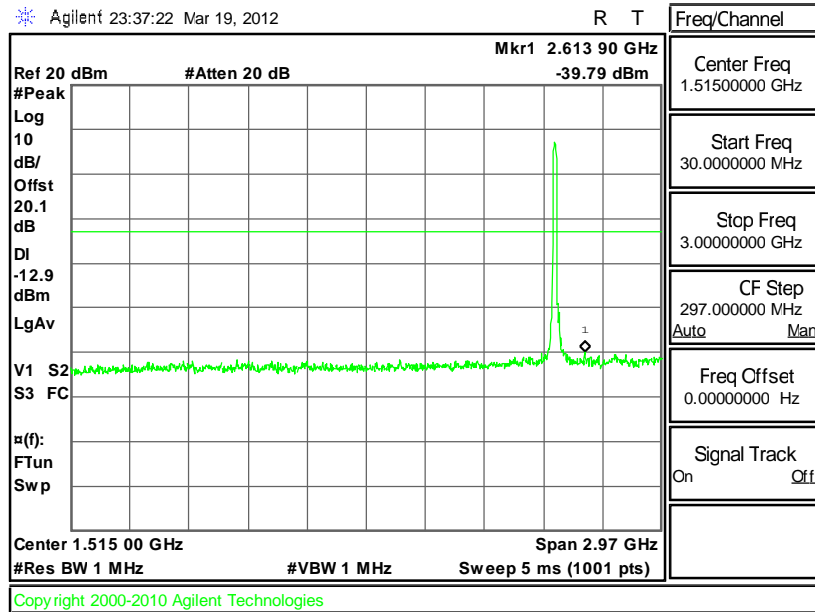
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



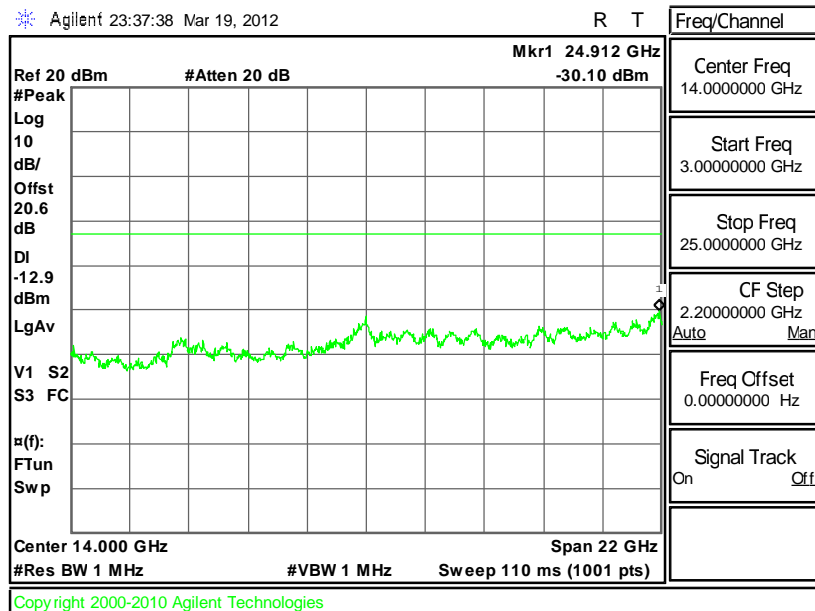


Test Mode :	Mode 9	Temperature :	24~26°C
Test Band :	802.11g/n (BW 20MHz)	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Book Lin

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz



## 3.5 Power Spectral Density Measurement

### 3.5.1 Limit of Power Spectral Density

The peak power spectral density shall not be greater than 8dBm in any 3KHz band at any time interval of continuous transmission.

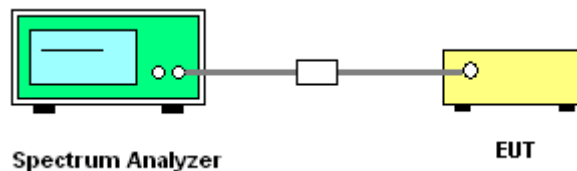
### 3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.5.3 Test Procedures

1. The testing follows Measurement Procedure PKPSD of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v01.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable. The path loss was compensated to the results for each measurement.
3. Record the measurement data derived from spectrum analyzer.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 KHz. Video bandwidth (VBW)  $\geq$  300 KHz In order to make an accurate measurement, set the span to 5-30% greater than Emission Bandwidth (EBW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.
6. Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where  $BWCF = 10\log(3\text{ kHz}/100\text{ kHz} = -15.2\text{ dB})$ .

### 3.5.4 Test Setup





### 3.5.5 Test Result of Power Spectral Density

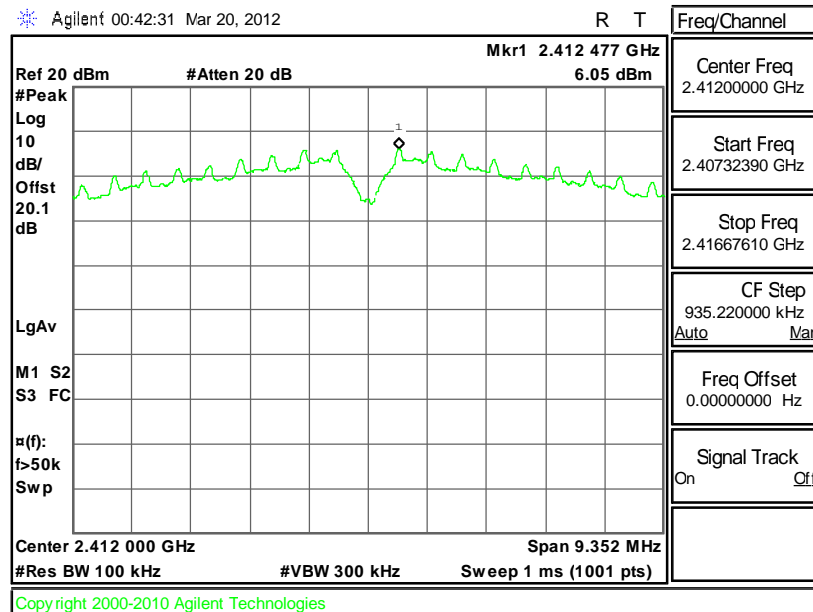
Test Mode :	Mode 1, 2, 3	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	6.05	-9.15	8	Pass
06	2437	6.10	-9.10	8	Pass
11	2462	6.42	-8.78	8	Pass

**Note:**

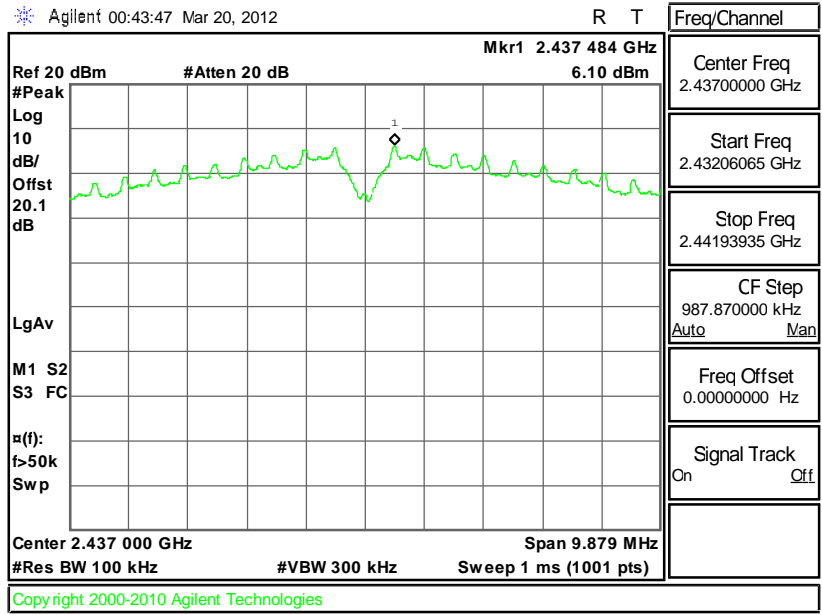
1. Measured power density (dBm) has offset with cable loss.
2. BWCF (dB) =  $10 \log (3k/100k) = -15.2 \text{ dB}$
3. Power Density/ 3kHz (dBm) = Measured power density/ 100KHz (dBm) + BWCF (dB)

#### Mode 1 : PSD Plot on 802.11b Channel 01

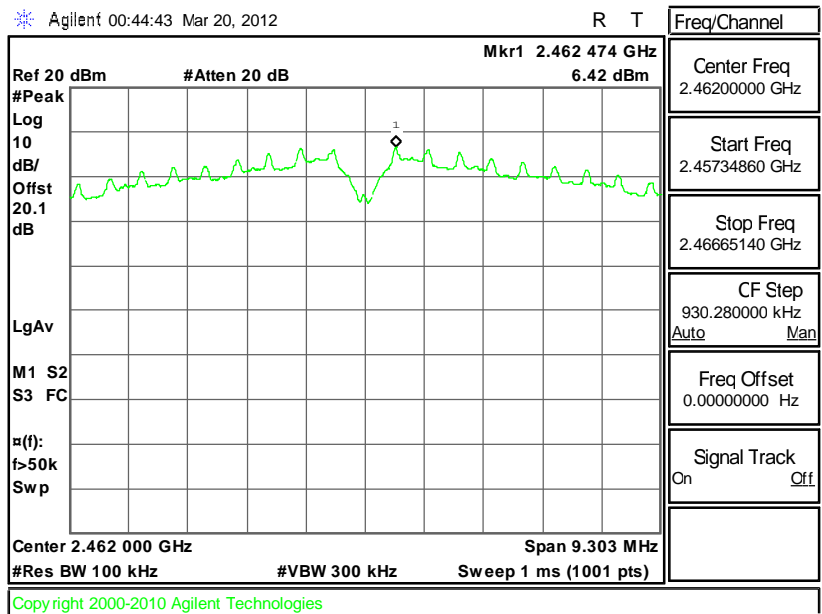




Mode 2 : PSD Plot on 802.11b Channel 06



Mode 3 : PSD Plot on 802.11b Channel 11





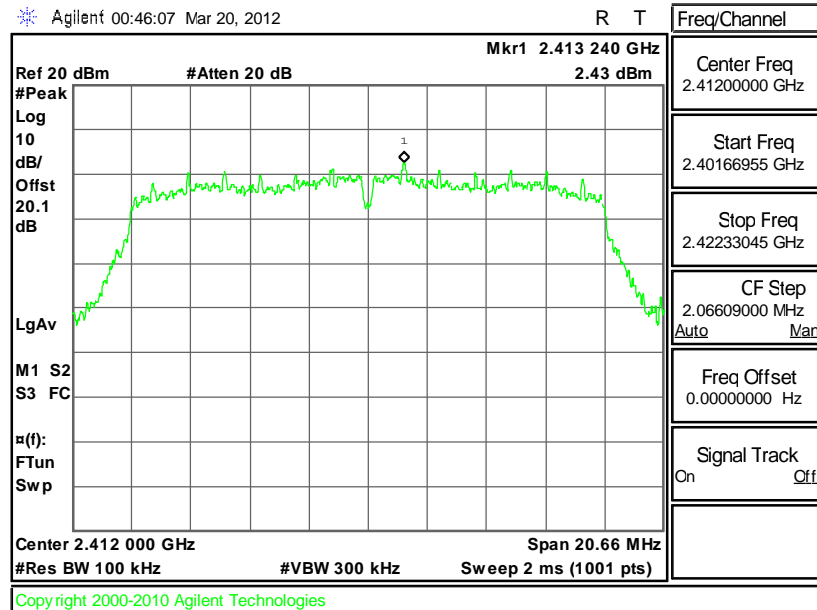
Test Mode :	Mode 4, 5, 6	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	2.43	-12.77	8	Pass
06	2437	2.52	-12.68	8	Pass
11	2462	2.14	-13.06	8	Pass

Note:

1. Measured power density (dBm) has offset with cable loss.
2. BWCF (dB) =  $10 \log (3k/100k) = -15.2 \text{ dB}$
3. Power Density/ 3KHz (dBm) = Measured power density/ 100KHz (dBm) + BWCF (dB)

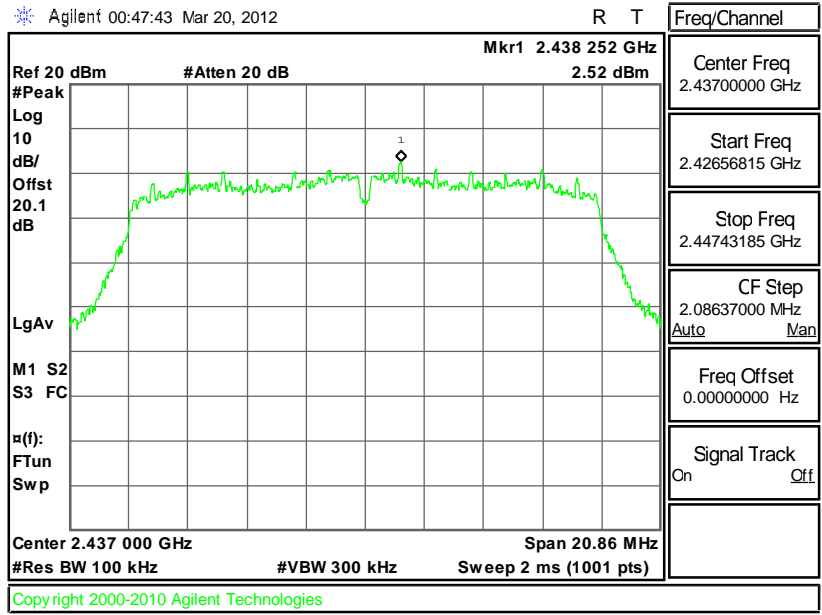
Mode 4 : PSD Plot on 802.11g Channel 01



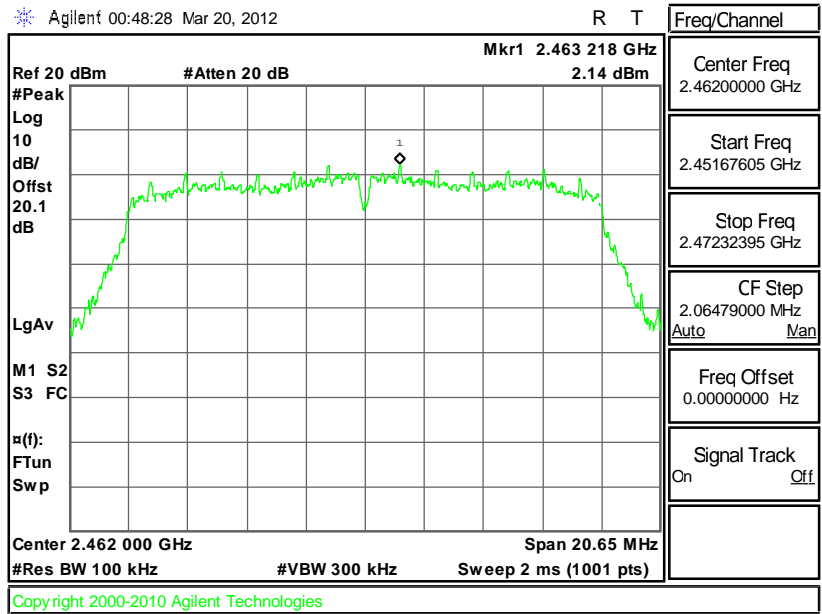




Mode 5 : PSD Plot on 802.11g Channel 06



Mode 6 : PSD Plot on 802.11g Channel 11





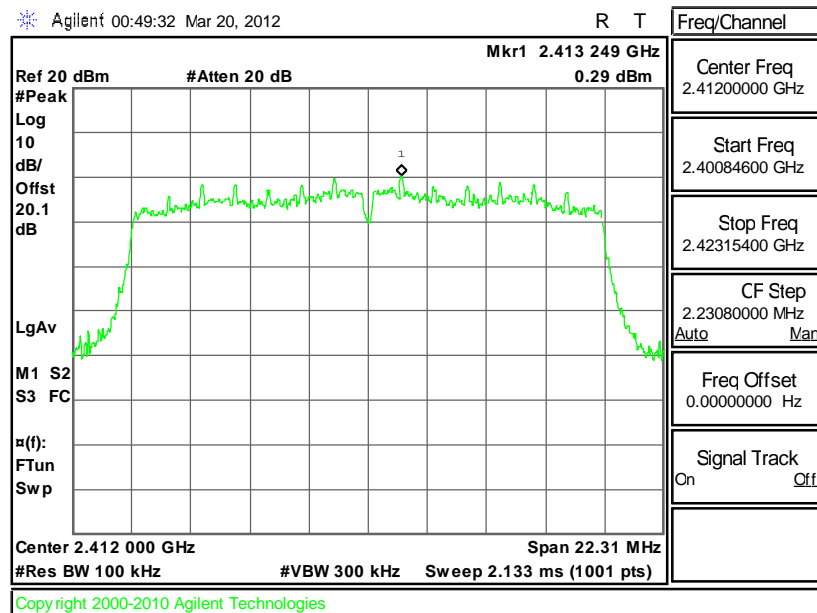
Test Mode :	Mode 7, 8, 9	Temperature :	24~26°C
Test Engineer :	Book Lin	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g/n (BW 20MHz) Power Density		Max. Limits (dBm)	Pass/Fail
		Measured PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	0.29	-14.91	8	Pass
06	2437	0.15	-15.05	8	Pass
11	2462	0.58	-14.62	8	Pass

Note:

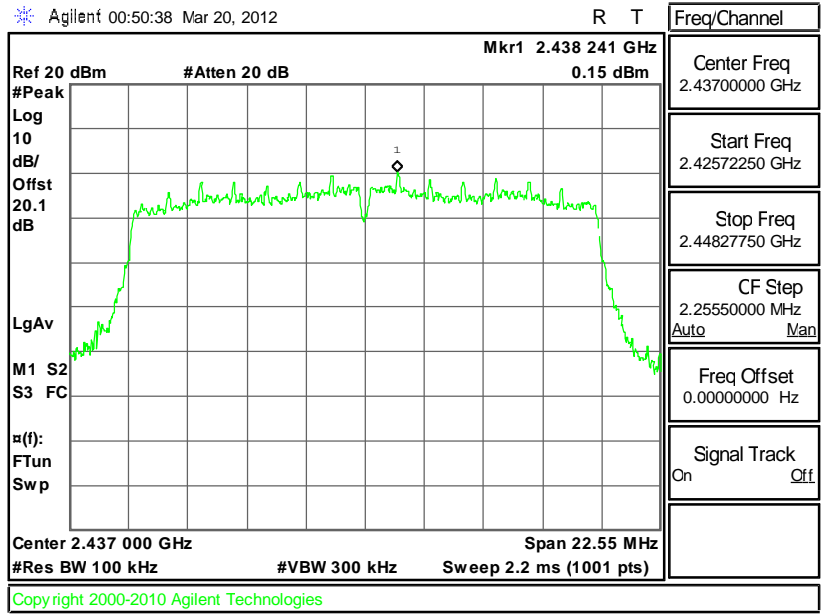
1. Measured power density (dBm) has offset with cable loss.
2. BWCF (dB) =  $10 \log (3k/100k) = -15.2 \text{ dB}$
3. Power Density/ 3KHz (dBm) = Measured power density/ 100KHz (dBm) + BWCF (dB)

Mode 7 : PSD Plot on 802.11g/n (BW 20MHz) Channel 01

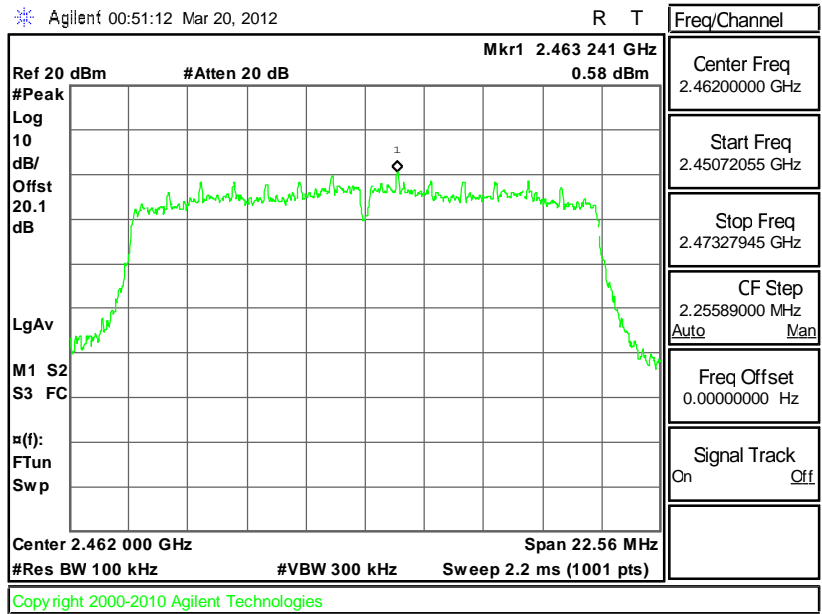




Mode 8 : PSD Plot on 802.11g/n (BW 20MHz) Channel 06



Mode 9 : PSD Plot on 802.11g/n (BW 20MHz) Channel 11



## 3.6 AC Conducted Emission Measurement

### 3.6.1 Limit of AC Conducted Emission

For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 KHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

\*Decreases with the logarithm of the frequency.

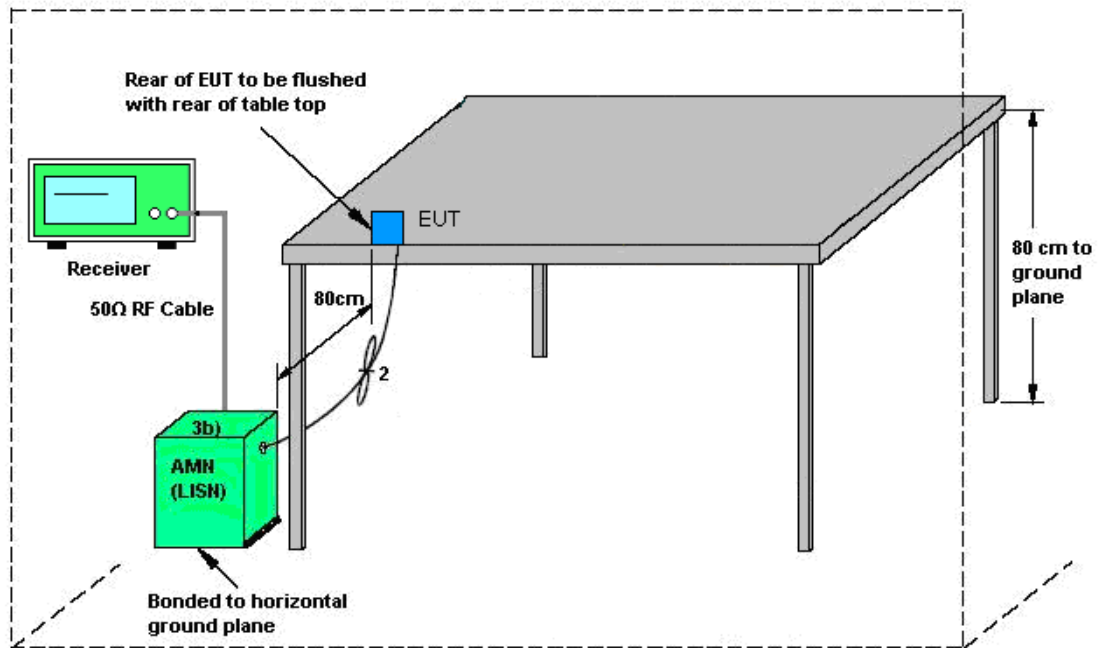
### 3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.6.3 Test Procedures

1. The testing follows the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 KHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

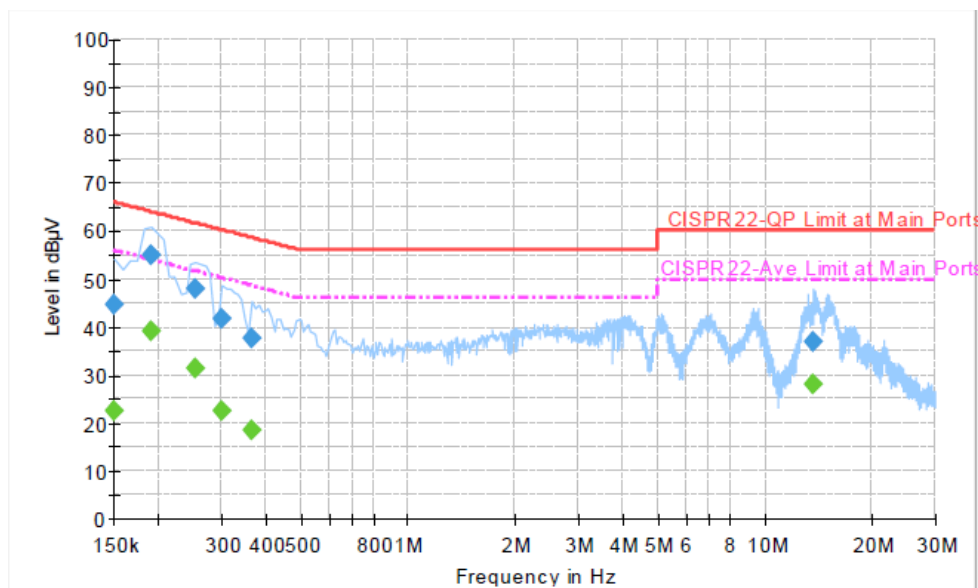
### 3.6.4 Test Setup



AMN = Artificial mains network (LISN)  
AE = Associated equipment  
EUT = Equipment under test  
ISN = Impedance stabilization network

### 3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + Bluetooth Link + GPS Rx + Adapter 1 + TC for Sample 1		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



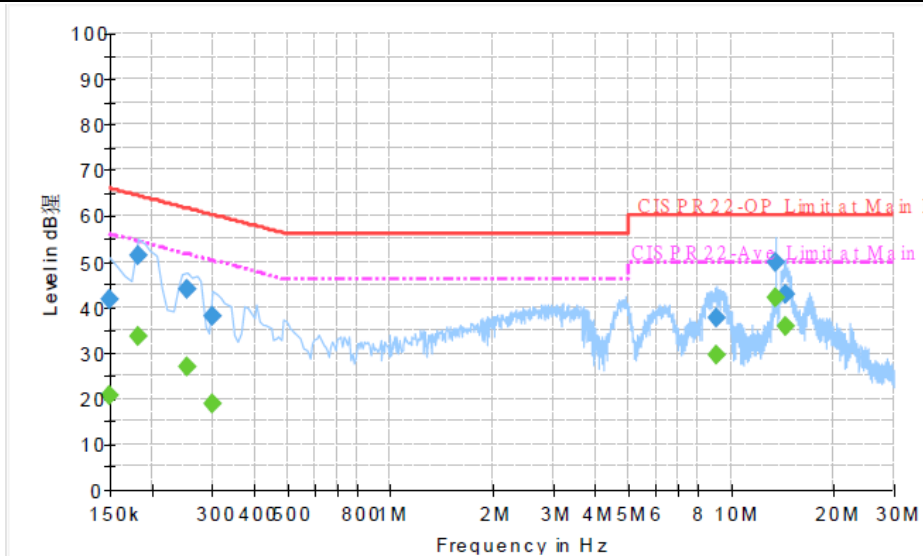
#### Final Result : QuasiPeak

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	44.7	Off	L1	19.4	21.3	66.0
0.190000	54.8	Off	L1	19.4	9.2	64.0
0.254000	48.0	Off	L1	19.3	13.6	61.6
0.302000	41.6	Off	L1	19.3	18.6	60.2
0.366000	37.6	Off	L1	19.3	21.0	58.6
13.726000	36.8	Off	L1	19.6	23.2	60.0

#### Final Result : Average

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	22.6	Off	L1	19.4	33.4	56.0
0.190000	39.0	Off	L1	19.4	15.0	54.0
0.254000	31.3	Off	L1	19.3	20.3	51.6
0.302000	22.7	Off	L1	19.3	27.5	50.2
0.366000	18.6	Off	L1	19.3	30.0	48.6
13.726000	28.2	Off	L1	19.6	21.8	50.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Slash Huang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + Bluetooth Link + GPS Rx + Adapter 1 + TC for Sample 1		
Remark :	1. All emissions not reported here are more than 10 dB below the prescribed limit. 2. 13.558 MHz is fundamental signal of RFID which can be ignored.		



**Final Result : QuasiPeak**

Frequency (MHz)	QuasiPeak (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	41.8	Off	N	19.4	24.2	66.0
0.182000	51.4	Off	N	19.4	13.0	64.4
0.254000	43.7	Off	N	19.4	17.9	61.6
0.302000	37.9	Off	N	19.3	22.3	60.2
9.078000	37.7	Off	N	19.6	22.3	60.0
13.558000	49.7	Off	N	19.8	10.3	60.0
14.486000	42.9	Off	N	19.8	17.1	60.0

**Final Result : Average**

Frequency (MHz)	Average (dBµV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.150000	20.6	Off	N	19.4	35.4	56.0
0.182000	33.7	Off	N	19.4	20.7	54.4
0.254000	27.1	Off	N	19.4	24.5	51.6
0.302000	18.7	Off	N	19.3	31.5	50.2
9.078000	29.4	Off	N	19.6	20.6	50.0
13.558000	42.0	Off	N	19.8	8.0	50.0
14.486000	35.9	Off	N	19.8	14.1	50.0

### 3.7 Radiated Emission Measurement

#### 3.7.1 Limit of Radiated 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

#### 3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

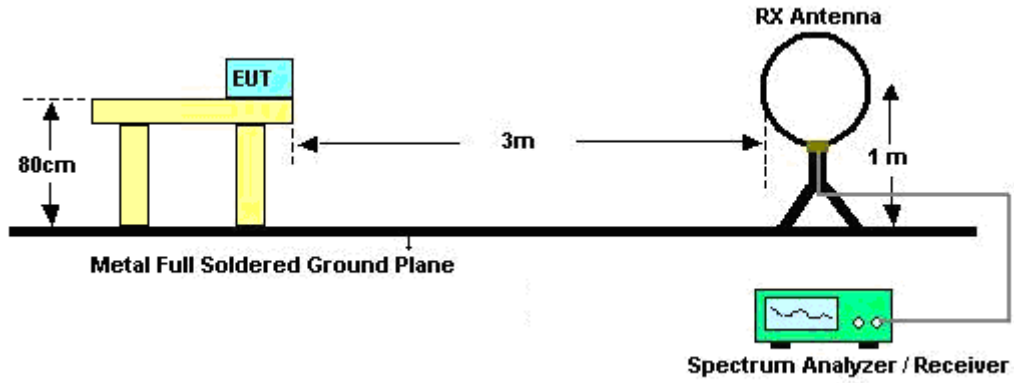
#### 3.7.3 Test Procedures

1. Use the following spectrum analyzer settings:
  - (1) Span shall wide enough to fully capture the emission being measured;
  - (2) Set RBW = 1 MHz for  $f \geq 1$  GHz, 100 KHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold;
  - (3) Measurement above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB per decade from 3m to 1m.  
 Distance extrapolation factor =  $20 \log(\text{specific distance [3m]} / \text{test distance [1m]})$  (dB)
2. Maximize the emission by rotating the EUT for three orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for the test in order to get better signal level to comply with the guidelines in ANSI C63.4-2003.

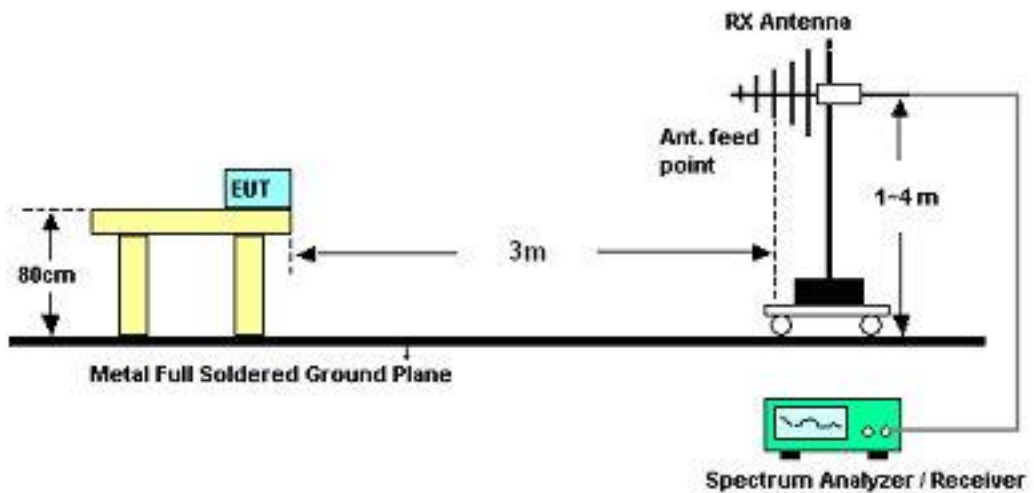


### 3.7.4 Test Setup

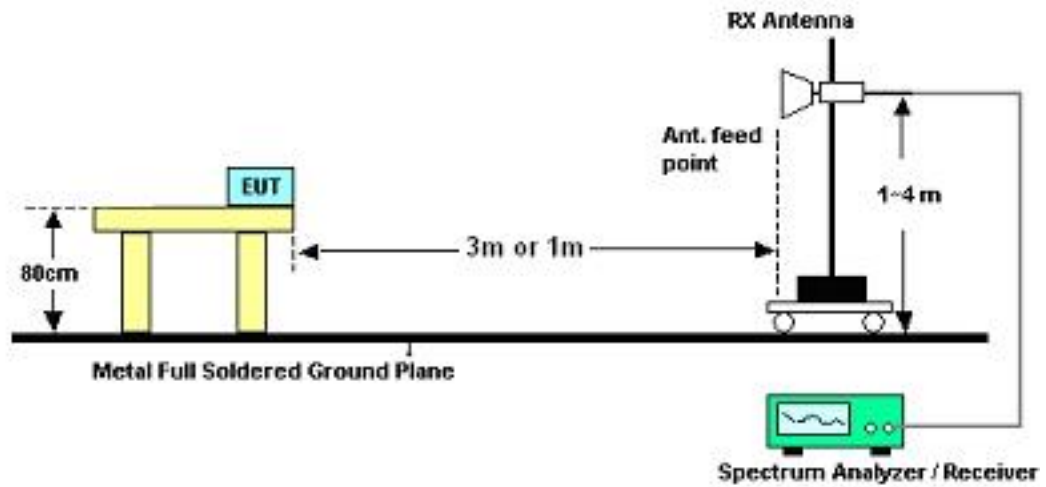
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



### 3.7.5 Test Results of Radiated Emissions (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.



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

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2412 MHz is fundamental signal which can be ignored.		

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
2385.05	54.9	-19.1	74	50.8	32.03	6.03	33.96	100	52	Peak
2385.05	43.28	-10.72	54	39.18	32.03	6.03	33.96	100	52	Average
2412	109.37	-	-	105.19	32.08	6.07	33.97	100	52	Peak
2412	104.59	-	-	100.41	32.08	6.07	33.97	100	52	Average
2492	40.97	-13.03	54	36.59	32.2	6.18	34	100	52	Average
2492	52.49	-21.51	74	48.11	32.2	6.18	34	100	52	Peak

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2412 MHz is fundamental signal which can be ignored. 2. 7236 MHz is not within a restricted band, and its limit line is 20dB below the highest emission level. For example, 107.02 dBuV/m - 20dB = 87.02 dBuV/m.		

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
2385.62	50.95	-23.05	74	46.82	32.06	6.03	33.96	110	287	Peak
2385.62	39	-15	54	34.87	32.06	6.03	33.96	110	287	Average
2412	107.02	-	-	102.84	32.08	6.07	33.97	110	287	Peak
2412	102.3	-	-	98.12	32.08	6.07	33.97	110	287	Average
2492	40.5	-13.5	54	36.12	32.2	6.18	34	110	287	Average
2492	51.44	-22.56	74	47.06	32.2	6.18	34	110	287	Peak
7236	45.28	-41.74	87.02	57.66	35.7	10.03	58.11	100	0	Peak



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2437 MHz is fundamental signal which can be ignored.		

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
2390	50.74	-23.26	74	46.61	32.06	6.03	33.96	100	56	Peak
2390	39.04	-14.96	54	34.91	32.06	6.03	33.96	100	56	Average
2437	104.87	-	-	100.61	32.13	6.11	33.98	100	56	Average
2437	109.61	-	-	105.35	32.13	6.11	33.98	100	56	Peak
2500	54.42	-19.58	74	50.04	32.2	6.18	34	100	56	Peak
2500	43.25	-10.75	54	38.87	32.2	6.18	34	100	56	Average

<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2437 MHz is fundamental signal which can be ignored.		

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
2390	47.1	-26.9	74	42.97	32.06	6.03	33.96	102	297	Peak
2390	35.84	-18.16	54	31.71	32.06	6.03	33.96	102	297	Average
2437	106.53	-	-	102.3	32.1	6.11	33.98	102	297	Peak
2437	101.92	-	-	97.66	32.13	6.11	33.98	102	297	Average
2484	53.14	-20.86	74	48.78	32.18	6.18	34	102	297	Peak
2484	41.34	-12.66	54	36.98	32.18	6.18	34	102	297	Average
7311	47.37	-26.63	74	59.74	35.7	10.06	58.13	100	0	Peak



<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2462 MHz is fundamental signal which can be ignored.		

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
2390	49.02	-24.98	74	44.89	32.06	6.03	33.96	100	53	Peak
2390	38.01	-15.99	54	33.88	32.06	6.03	33.96	100	53	Average
2462	110.98	-	-	106.68	32.15	6.14	33.99	100	53	Peak
2462	106.21	-	-	101.91	32.15	6.14	33.99	100	53	Average
2485.94	59.39	-14.61	74	55.03	32.18	6.18	34	100	53	Peak
2485.94	50.27	-3.73	54	45.91	32.18	6.18	34	100	53	Average
7386	47.75	-26.25	74	60.12	35.7	10.1	58.17	100	0	Peak

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2462 MHz is fundamental signal which can be ignored.		

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
2390	46.51	-27.49	74	42.38	32.06	6.03	33.96	106	283	Peak
2390	35.61	-18.39	54	31.48	32.06	6.03	33.96	106	283	Average
2462	110.77	-	-	106.47	32.15	6.14	33.99	106	283	Peak
2462	106.04	-	-	101.74	32.15	6.14	33.99	106	283	Average
2485.18	59.51	-14.49	74	55.15	32.18	6.18	34	106	283	Peak
2485.18	49.46	-4.54	54	45.1	32.18	6.18	34	106	283	Average
7386	47.59	-26.41	74	59.96	35.7	10.1	58.17	100	0	Peak



<b>Test Mode :</b>	Mode 4	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2412 MHz is fundamental signal which can be ignored. 2. 2564 MHz is not within a restricted band.		

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
48.09	29.6	-10.4	40	51.54	8.9	0.68	31.52	133	254	Peak
194.7	16.49	-27.01	43.5	37.63	9.05	1.3	31.49	-	-	Peak
292.98	18.89	-27.11	46	35.3	13.2	1.71	31.32	-	-	Peak
304.9	20.1	-25.9	46	36.22	13.43	1.78	31.33	-	-	Peak
542.9	19.59	-26.41	46	29.21	18.83	2.54	30.99	-	-	Peak
757.8	23.02	-22.98	46	29.19	21.46	3.07	30.7	-	-	Peak
2389.99	48.3	-5.7	54	44.17	32.06	6.03	33.96	100	53	Average
2389.99	69.5	-4.5	74	65.37	32.06	6.03	33.96	100	53	Peak
2412	92.7	-	-	88.52	32.08	6.07	33.97	100	53	Average
2412	110.08	-	-	105.9	32.08	6.07	33.97	100	53	Peak
2484	39.57	-14.43	54	35.21	32.18	6.18	34	100	53	Average
2484	54.29	-19.71	74	49.93	32.18	6.18	34	100	53	Peak
2564	56.16	-33.92	90.08	51.62	32.27	6.26	33.99	100	0	Peak



<b>Test Mode :</b>	Mode 4	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2412 MHz is fundamental signal which can be ignored. 2. 2564 MHz and 7236 MHz are not within a restricted band.		

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	26.52	-13.48	40	37.45	20	0.53	31.46	100	312	Peak
45.93	26.26	-13.74	40	47.01	10.1	0.66	31.51	-	-	Peak
101.01	24.15	-19.35	43.5	44.8	9.89	1	31.54	-	-	Peak
316.1	22.42	-23.58	46	38.19	13.75	1.8	31.32	-	-	Peak
536.6	20.47	-25.53	46	30.24	18.71	2.52	31	-	-	Peak
761.3	23.23	-22.77	46	29.33	21.52	3.08	30.7	-	-	Peak
2389.99	43.69	-10.31	54	39.56	32.06	6.03	33.96	105	285	Average
2389.99	66.8	-7.2	74	62.67	32.06	6.03	33.96	105	285	Peak
2412	90.84	-	-	86.66	32.08	6.07	33.97	105	285	Average
2412	108.44	-	-	104.26	32.08	6.07	33.97	105	285	Peak
2484	41.03	-12.97	54	36.67	32.18	6.18	34	105	285	Average
2484	56.06	-17.94	74	51.7	32.18	6.18	34	105	285	Peak
2564	57.5	-30.94	88.44	52.96	32.27	6.26	33.99	100	0	Peak
7236	46.17	-42.27	88.44	58.55	35.7	10.03	58.11	100	0	Peak



<b>Test Mode :</b>	Mode 5	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2437 MHz is fundamental signal which can be ignored.		

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
47.82	29.4	-10.6	40	50.95	9.3	0.67	31.52	120	144	Peak
194.97	16.71	-26.79	43.5	37.85	9.05	1.3	31.49	-	-	Peak
298.38	18.93	-27.07	46	35.21	13.29	1.76	31.33	-	-	Peak
304.9	20.08	-25.92	46	36.2	13.43	1.78	31.33	-	-	Peak
514.9	20.12	-25.88	46	30.33	18.35	2.48	31.04	-	-	Peak
780.9	23.07	-22.93	46	28.84	21.81	3.11	30.69	-	-	Peak
2390	55.86	-18.14	74	51.73	32.06	6.03	33.96	101	57	Peak
2390	39.55	-14.45	54	35.42	32.06	6.03	33.96	101	57	Average
2437	92.75	-	-	88.49	32.13	6.11	33.98	101	57	Average
2437	110.57	-	-	106.31	32.13	6.11	33.98	101	57	Peak
2492	58.5	-15.5	74	54.12	32.2	6.18	34	101	57	Peak
2492	41.05	-12.95	54	36.67	32.2	6.18	34	101	57	Average





<b>Test Mode :</b>	Mode 5	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2437 MHz is fundamental signal which can be ignored. 2. 2590 MHz is not within a restricted band.		

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	26.37	-13.63	40	37.3	20	0.53	31.46	-	-	Peak
45.93	26.62	-13.38	40	47.37	10.1	0.66	31.51	112	183	Peak
101.01	24.23	-19.27	43.5	44.88	9.89	1	31.54	-	-	Peak
313.3	20.35	-25.65	46	36.2	13.67	1.8	31.32	-	-	Peak
484.1	19.29	-26.71	46	30.2	17.76	2.39	31.06	-	-	Peak
766.9	22.57	-23.43	46	28.57	21.6	3.09	30.69	-	-	Peak
2390	52.16	-21.84	74	48.03	32.06	6.03	33.96	129	288	Peak
2390	36.31	-17.69	54	32.18	32.06	6.03	33.96	129	288	Average
2437	91.79	-	-	87.53	32.13	6.11	33.98	129	288	Average
2437	109.27	-	-	105.01	32.13	6.11	33.98	129	288	Peak
2492	56.78	-17.22	74	52.4	32.2	6.18	34	129	288	Peak
2492	40.84	-13.16	54	36.46	32.2	6.18	34	129	288	Average
2590	51.55	-37.72	89.27	46.95	32.3	6.28	33.98	100	0	Peak
7311	45.58	-28.42	74	57.95	35.7	10.06	58.13	100	0	Peak



<b>Test Mode :</b>	Mode 6	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. 2614 MHz is not within a restricted band.		

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
47.82	29.18	-10.82	40	50.73	9.3	0.67	31.52	130	207	Peak
194.97	16.82	-26.68	43.5	37.96	9.05	1.3	31.49	-	-	Peak
296.49	19.03	-26.97	46	35.35	13.26	1.75	31.33	-	-	Peak
304.9	19.93	-26.07	46	36.05	13.43	1.78	31.33	-	-	Peak
552	19.44	-26.56	46	28.89	18.97	2.56	30.98	-	-	Peak
788.6	24.25	-21.75	46	29.88	21.93	3.12	30.68	-	-	Peak
2390	50	-24	74	45.87	32.06	6.03	33.96	100	57	Peak
2390	37.71	-16.29	54	33.58	32.06	6.03	33.96	100	57	Average
2462	111.79	-	-	107.49	32.15	6.14	33.99	100	57	Peak
2462	94.41	-	-	90.11	32.15	6.14	33.99	100	57	Average
2483.5	72.21	-1.79	74	67.85	32.18	6.18	34	100	57	Peak
2483.5	48.69	-5.31	54	44.33	32.18	6.18	34	100	57	Average
2614	51.52	-40.27	91.79	46.87	32.32	6.31	33.98	100	0	Peak



<b>Test Mode :</b>	Mode 6	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2462 MHz is fundamental signal which can be ignored.		

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	27	-13	40	37.93	20	0.53	31.46	103	114	Peak
45.66	26.23	-13.77	40	46.98	10.1	0.66	31.51	-	-	Peak
101.82	24.36	-19.14	43.5	44.92	9.98	1	31.54	-	-	Peak
309.8	22.63	-23.37	46	38.61	13.56	1.79	31.33	-	-	Peak
466.6	18.52	-27.48	46	29.86	17.39	2.34	31.07	-	-	Peak
750.8	22.21	-23.79	46	28.49	21.36	3.06	30.7	-	-	Peak
2388	48.02	-25.98	74	43.89	32.06	6.03	33.96	106	283	Peak
2388	35.32	-18.68	54	31.19	32.06	6.03	33.96	106	283	Average
2462	110.23	-	-	105.93	32.15	6.14	33.99	106	283	Peak
2462	93.13	-	-	88.83	32.15	6.14	33.99	106	283	Average
2483.5	72.11	-1.89	74	67.75	32.18	6.18	34	106	283	Peak
2483.5	47.48	-6.52	54	43.12	32.18	6.18	34	106	283	Average
7386	48.25	-25.75	74	60.62	35.7	10.1	58.17	100	0	Peak



<b>Test Mode :</b>	Mode 7	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2412 MHz is fundamental signal which can be ignored. 2. 2564 MHz is not within a restricted band.		

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
2389.42	64.26	-9.74	74	60.13	32.06	6.03	33.96	100	55	Peak
2389.42	39.12	-14.88	54	34.99	32.06	6.03	33.96	100	55	Average
2412	109.33	-	-	105.15	32.08	6.07	33.97	100	55	Peak
2412	67.82	-	-	63.64	32.08	6.07	33.97	100	55	Average
2492	35.68	-18.32	54	31.3	32.2	6.18	34	100	55	Average
2492	52.54	-21.46	74	48.16	32.2	6.18	34	100	55	Peak
2564	55.65	-33.68	89.33	51.11	32.27	6.26	33.99	100	0	Peak

<b>Test Mode :</b>	Mode 7	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2412 MHz is fundamental signal which can be ignored. 2. 2564 MHz is not within a restricted band.		

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
2389.99	59.37	-14.63	74	55.24	32.06	6.03	33.96	134	282	Peak
2389.99	37.6	-16.4	54	33.47	32.06	6.03	33.96	134	282	Average
2412	106.2	-	-	102.02	32.08	6.07	33.97	134	282	Peak
2412	65.47	-	-	61.29	32.08	6.07	33.97	134	282	Average
2486	35.19	-18.81	54	30.83	32.18	6.18	34	134	282	Average
2486	51.34	-22.66	74	46.98	32.18	6.18	34	134	282	Peak
2564	54.31	-31.89	86.2	49.77	32.27	6.26	33.99	100	0	Peak



<b>Test Mode :</b>	Mode 8	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	1. 2437 MHz is fundamental signal which can be ignored. 2. 2588 MHz is not within a restricted band.		

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
2390	50.89	-23.11	74	46.76	32.06	6.03	33.96	100	58	Peak
2390	35.47	-18.53	54	31.34	32.06	6.03	33.96	100	58	Average
2437	109.69	-	-	105.43	32.13	6.11	33.98	100	58	Peak
2437	67.34	-	-	63.08	32.13	6.11	33.98	100	58	Average
2484	56.08	-17.92	74	51.72	32.18	6.18	34	100	58	Peak
2484	36.87	-17.13	54	32.51	32.18	6.18	34	100	58	Average
2588	54.36	-35.33	89.69	49.78	32.28	6.28	33.98	100	0	Peak

<b>Test Mode :</b>	Mode 8	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2437 MHz is fundamental signal which can be ignored. 2. 2590 MHz is not within a restricted band.		

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
2390	48.91	-25.09	74	44.78	32.06	6.03	33.96	133	271	Peak
2390	34.17	-19.83	54	30.04	32.06	6.03	33.96	133	271	Average
2437	106.52	-	-	102.26	32.13	6.11	33.98	133	271	Peak
2437	63.62	-	-	59.36	32.13	6.11	33.98	133	271	Average
2486	54.8	-19.2	74	50.44	32.18	6.18	34	133	271	Peak
2486	36.22	-17.78	54	31.86	32.18	6.18	34	133	271	Average
2590	53	-33.52	86.52	48.4	32.3	6.28	33.98	100	0	Peak



<b>Test Mode :</b>	Mode 9	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2462 MHz is fundamental signal which can be ignored.		

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
2388	47.8	-26.2	74	43.67	32.06	6.03	33.96	100	60	Peak
2388	34.64	-19.36	54	30.51	32.06	6.03	33.96	100	60	Average
2462	68.82	-	-	64.52	32.15	6.14	33.99	100	60	Average
2462	111.07	-	-	106.77	32.15	6.14	33.99	100	60	Peak
2484.42	68.69	-5.31	74	64.33	32.18	6.18	34	100	60	Peak
2484.42	39.86	-14.14	54	35.5	32.18	6.18	34	100	60	Average
7386	42.97	-31.03	74	55.34	35.7	10.1	58.17	100	0	Peak

<b>Test Mode :</b>	Mode 9	<b>Temperature :</b>	22~24°C
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	53~55%
<b>Test Engineer :</b>	Kyle Zhuang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	1. 2462 MHz is fundamental signal which can be ignored. 2. 2614 MHz is not within a restricted band.		

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
2382	46.45	-27.55	74	42.35	32.03	6.03	33.96	107	280	Peak
2382	33.46	-20.54	54	29.36	32.03	6.03	33.96	107	280	Average
2462	65.97	-	-	61.67	32.15	6.14	33.99	107	280	Average
2462	108.34	-	-	104.04	32.15	6.14	33.99	107	280	Peak
2485.18	64.73	-9.27	74	60.37	32.18	6.18	34	107	280	Peak
2485.18	38.21	-15.79	54	33.85	32.18	6.18	34	107	280	Average
2614	53.82	-34.52	88.34	49.17	32.32	6.31	33.98	100	0	Peak
7386	45.71	-28.29	74	58.08	35.7	10.1	58.17	100	0	Peak



## **3.8 Antenna Requirements**

### **3.8.1 Standard Applicable**

If directional gain of transmitting antennas is greater than 6dBi, the power shall be reduced by the same level in dB comparing to gain minus 6dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

### **3.8.2 Antenna Connected Construction**

The antennas type used in this product is Chip Antenna without connector and it is considered to meet antenna requirement.

### **3.8.3 Antenna Gain**

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.



## 4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	Agilent	E4446A	MY501801 36	3Hz~44GHz	Apr. 03, 2011	Mar. 16, 2012 ~ Mar. 20, 2012	Apr. 02, 2012	Conducted (TH02-HY)
EMI Test Receiver	R&S	ESCS 30	100356	9KHz ~ 2.75GHz	Oct. 27, 2011	Apr. 02, 2012	Oct. 26, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz ~ 30MHz	Dec. 09, 2011	Apr. 02, 2012	Dec. 08, 2012	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz ~ 30MHz	Dec. 06, 2011	Apr. 02, 2012	Dec. 05, 2012	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	Apr. 02, 2012	N/A	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	Apr. 02, 2012	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 22, 2011	Apr. 02, 2012	Oct. 21, 2012	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	Apr. 02, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 10, 2011	Apr. 02, 2012	Aug. 09, 2012	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A023 62	1GHz ~ 26.5GHz	Dec. 05, 2011	Apr. 02, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32 dB.GAIN	Feb. 27, 2012	Apr. 02, 2012	Feb. 26, 2013	Radiation (03CH07-HY)
EMI TEST RECEIVER	R&S	ESCI 7	100724	9kHz ~ 7GHz	Aug. 22, 2011	Apr. 02, 2012	Aug. 21, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-0010 1800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Apr. 02, 2012	Mar. 09, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/00 1	9 kHz~30 MHz	Jul. 29, 2010	Apr. 02, 2012	Jul. 28, 2012	Radiation (03CH07-HY)



## 5 Uncertainty of Evaluation

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

Contribution	Uncertainty of $X_i$		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.10	Normal (k=2)	0.05
Cable Loss	0.10	Normal (k=2)	0.05
AMN Insertion Loss	2.50	Rectangular	0.63
Receiver Specification	1.50	Rectangular	0.43
Site Imperfection	1.39	Rectangular	0.80
Mismatch	+0.34 / -0.35	U-Shape	0.24
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.13</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.26</b>		

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

Contribution	Uncertainty of $X_i$		$u(X_i)$
	dB	Probability Distribution	
Receiver Reading	0.41	Normal (k=2)	0.21
Antenna Factor Calibration	0.83	Normal (k=2)	0.42
Cable Loss Calibration	0.25	Normal (k=2)	0.13
Pre-Amplifier Gain Calibration	0.27	Normal (k=2)	0.14
RCV/SPA Specification	2.50	Rectangular	0.72
Antenna Factor Interpolation for Frequency	1.00	Rectangular	0.29
Site Imperfection	1.43	Rectangular	0.83
Mismatch	+0.39 / -0.41	U-Shape	0.28
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>1.27</b>		
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>2.54</b>		

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

Contribution	Uncertainty of $X_i$		$u(X_i)$	$C_i$	$C_i * u(X_i)$
	dB	Probability Distribution			
Receiver Reading	±0.10	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	±1.70	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	±0.50	Normal (k=2)	0.25	1	0.25
Receiver Correction	±2.00	Rectangular	1.15	1	1.15
Antenna Factor Directional	±1.50	Rectangular	0.87	1	0.87
Site Imperfection	±2.80	Triangular	1.14	1	1.14
Mismatch Receiver VSWR $\Gamma_1 = 0.197$ Antenna VSWR $\Gamma_2 = 0.194$ Uncertainty = $20\text{Log}(1-\Gamma_1*\Gamma_2)$	+0.34 / -0.35	U-Shape	0.244	1	0.244
<b>Combined Standard Uncertainty <math>U_c(y)</math></b>	<b>2.36</b>				
<b>Measuring Uncertainty for a Level of Confidence of 95% (<math>U = 2U_c(y)</math>)</b>	<b>4.72</b>				



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

Please refer to Sporton report number EP232266-05 as below.