

# FCC RF Test Report

APPLICANT : Zipit Wireless, Inc.  
EQUIPMENT : Z3 Wireless Messenger 3  
BRAND NAME : Zipit  
MODEL NAME : Z3  
FCC ID : VGUZWP1  
STANDARD : FCC Part 15 Subpart C §15.247  
CLASSIFICATION : Digital Transmission System (DTS)

The product was received on Dec. 06, 2010 and completely tested on Dec. 07, 2010. 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:



Anderson Chiu / Deputy 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
FR0D0647	Rev. 01	Initial issue of report	Dec. 16, 2010

## 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 7.2.2	AC Conducted Emission	15.207(a)	Pass	Under limit 13.1 dB at 0.198 MHz
3.7	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 8.7 dB at 45.93 MHz
3.8	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

# 1 General Description

## 1.1 Applicant

**Zipit Wireless, Inc.**

200 N. Main St. Suite 300, Greenville SC 29601, U.S.A.

## 1.2 Manufacturer

**Zipit Wireless, Inc.**

200 N. Main St. Suite 300, Greenville SC 29601, U.S.A.

## 1.3 Feature of Equipment Under Test

Product Feature & Specification	
<b>Equipment</b>	Z3 Wireless Messenger 3
<b>Brand Name</b>	Zipit
<b>Model Name</b>	Z3
<b>FCC ID</b>	VGUZWP1
<b>Tx/Rx Frequency Range</b>	2400 MHz ~ 2483.5 MHz
<b>Number of Channels</b>	11
<b>Carrier Frequency of Each Channel</b>	2412+(n-1)*5 MHz; n=1~11
<b>Channel Spacing</b>	5 MHz
<b>Maximum Output Power to Antenna</b>	802.11b : 16.06 dBm (0.040 W) 802.11g : 17.66 dBm (0.058 W)
<b>Antenna Type</b>	Chip Antenna with gain 1.64 dBi
<b>HW Version</b>	V21
<b>SW Version</b>	2010/11/26 10.11
<b>Type of Modulation</b>	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g : OFDM (BPSK / QPSK / 16QAM / 64QAM)
<b>EUT Stage</b>	Identical Prototype

### Remark:

1. For other wireless features of this EUT, test report will be issued separately.
2. This test report recorded only product characteristics and test results of Digital Transmission System (DTS).
3. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

## 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 (Measurement Guidelines of DTS)
- ANSI C63.4-2003
- IC RSS-210 Issue 7

### 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 (DoC), recorded in a separate test report.

## 1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DIR-628	KA2DIR628A2	N/A	Unshielded, 1.8 m
2.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m

## 2 Test Configuration of Equipment Under Test

### 2.1 RF Power

Preliminary tests were performed in different data rate and recorded the RF power output in the following table:

Channel	Frequency	2.4GHz 802.11b RF Power (dBm)			
		At DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	16.06	15.89	15.40	15.85
CH 06	2437 MHz	15.28	-	-	-
CH 11	2462 MHz	15.89	-	-	-

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		At OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412 MHz	17.66	17.16	17.28	16.70	17.64	17.50	17.47	16.73
CH 06	2437 MHz	16.77	-	-	-	-	-	-	-
CH 11	2462 MHz	17.04	-	-	-	-	-	-	-

**Remark:**

1. The data rates of WLAN 802.11b/g were set in 1Mbps for 802.11b and 6Mbps for 802.11g, for all the test cases due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.

## 2.2 Test Mode

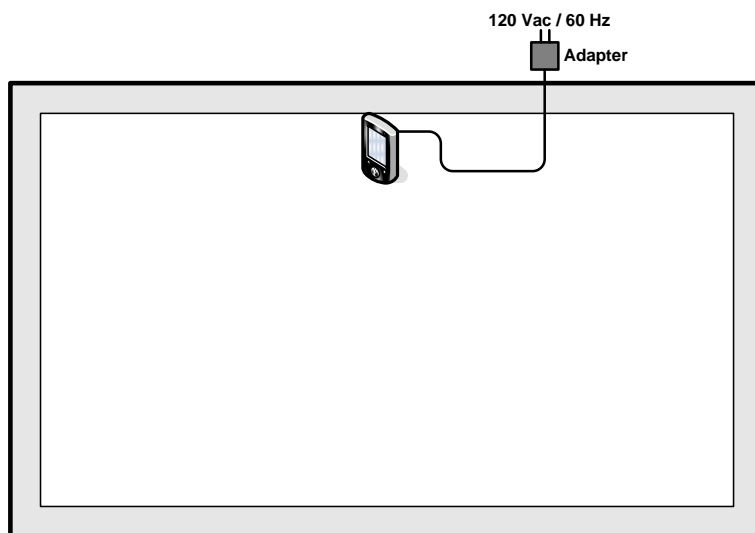
The EUT has been associated with peripherals pursuant to ANSI C63.4-2003 and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: conducted emission (150 kHz to 30 MHz), radiated emission (30 MHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

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

Test Cases		
Test Item	802.11b	802.11g
Conducted TCs	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
Radiated TCs	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
AC Conducted Emission	Mode 1 : WLAN Link + Adapter	

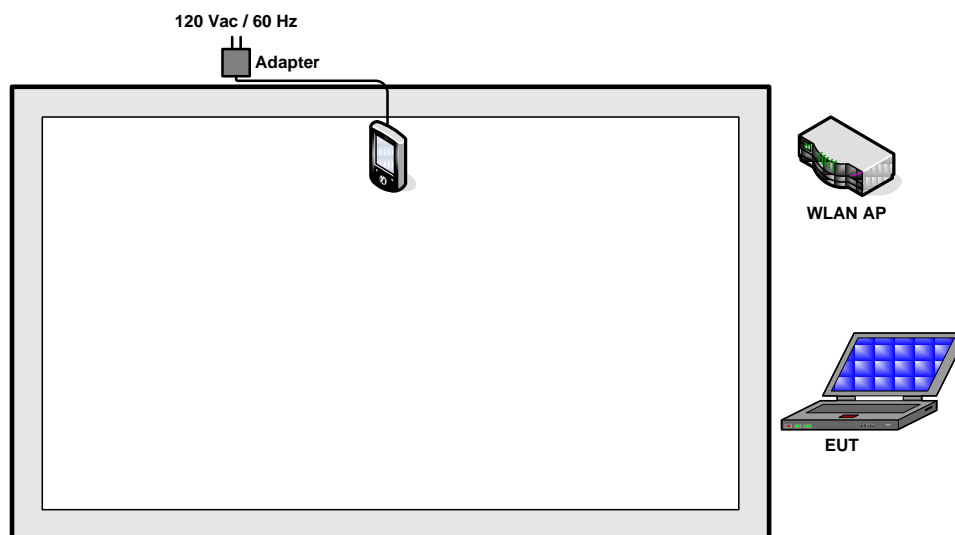
## 2.3 Connection Diagram of Test System

<WLAN Tx Mode>





## &lt;Conduction&gt;



## 2.4 RF Utility

The programmed RF utility, "Hyper Terminal" 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.

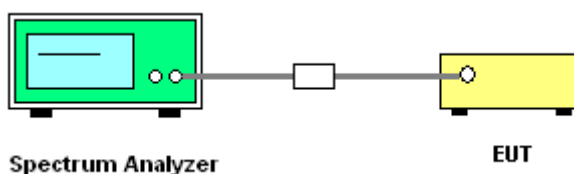
##### 3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

##### 3.1.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz.  
In order to make an accurate measurement, set the span greater than RBW. 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

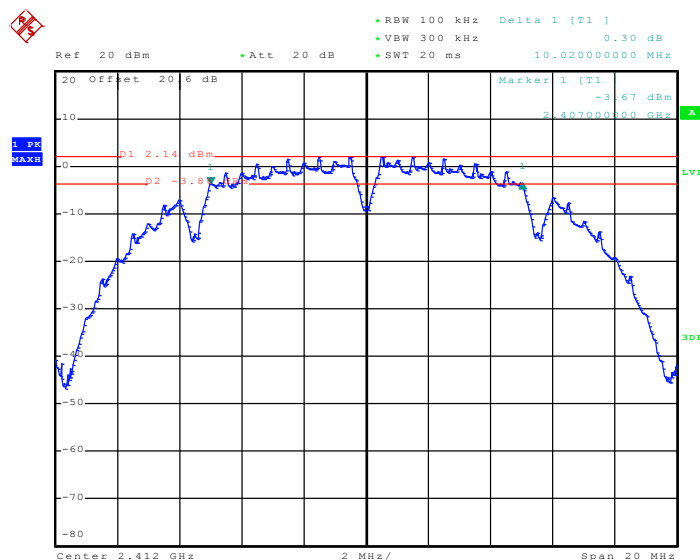


### 3.1.5 Test Result of 6dB Bandwidth

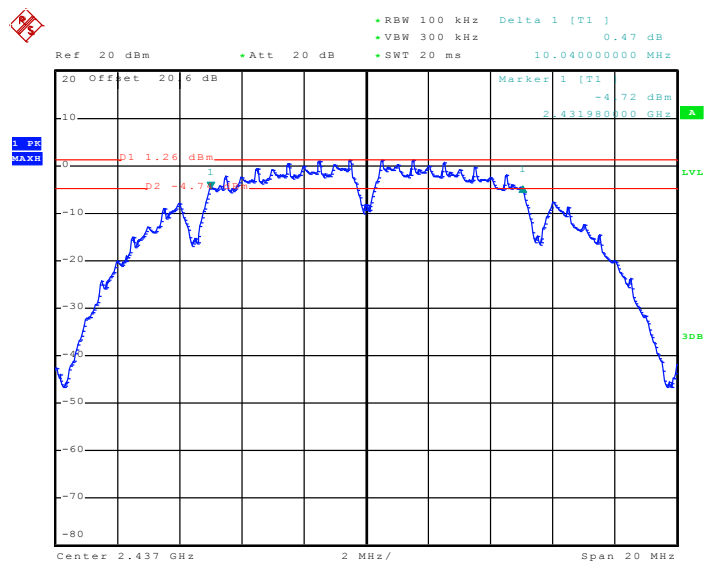
<b>Test Mode :</b>	Mode 1, 2, 3	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Ken Hsu	<b>Relative Humidity :</b>	50~53%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	10.02	0.5	Pass
06	2437	10.04	0.5	Pass
11	2462	10.06	0.5	Pass

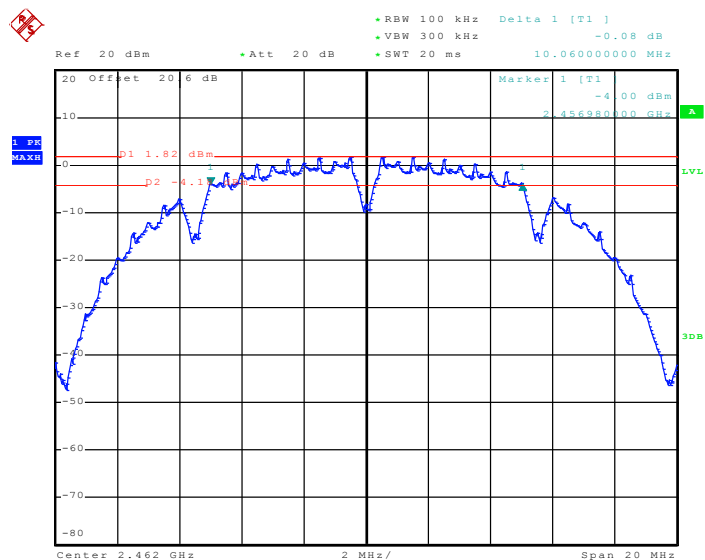
**Mode 1 : 6 dB Bandwidth Plot on 802.11b Channel 01**



Date: 6.DEC.2010 14:53:36

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


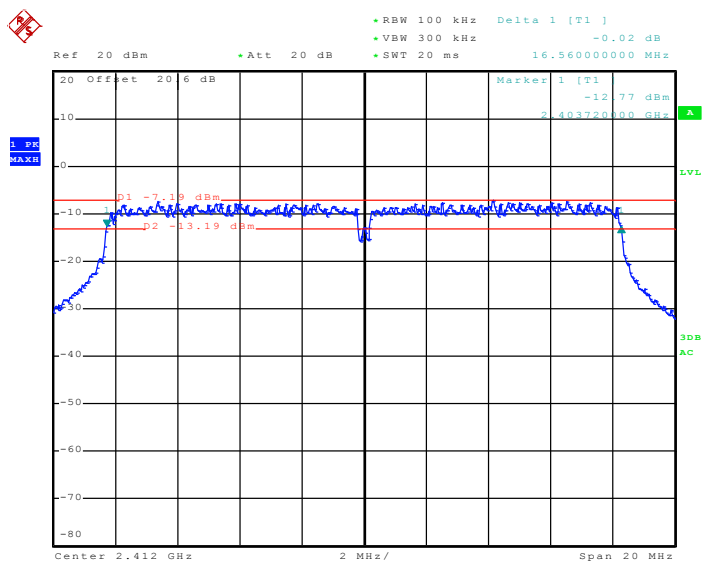
Date: 6.DEC.2010 14:57:32

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


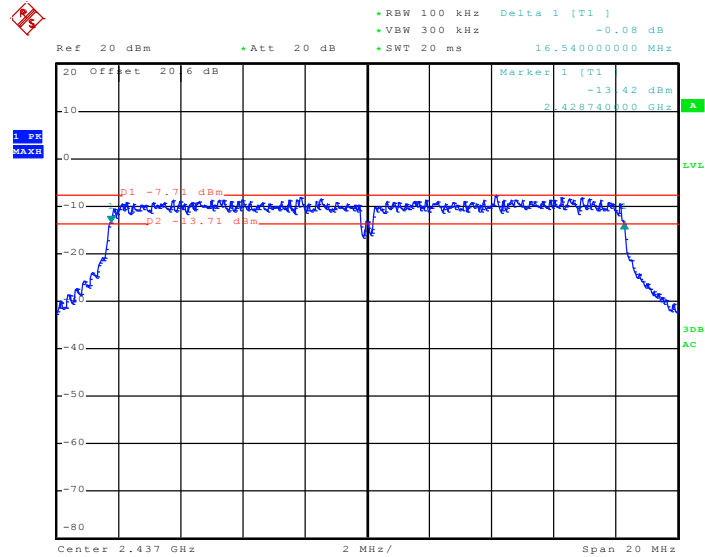
Date: 6.DEC.2010 15:00:56

<b>Test Mode :</b>	Mode 4, 5, 6	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Ken Hsu	<b>Relative Humidity :</b>	50~53%

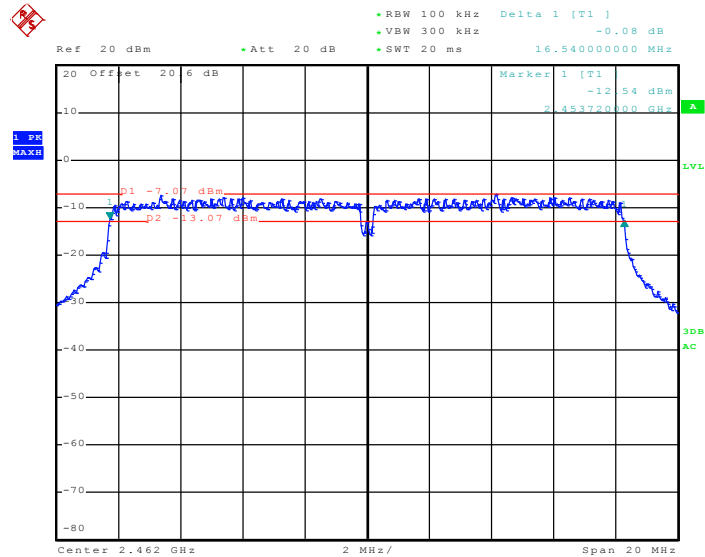
Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	16.56	0.5	Pass
06	2437	16.54	0.5	Pass
11	2462	16.54	0.5	Pass

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


Date: 6.DEC.2010 05:25:34

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


Date: 6.DEC.2010 05:30:27

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


Date: 6.DEC.2010 05:45:28

## 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.

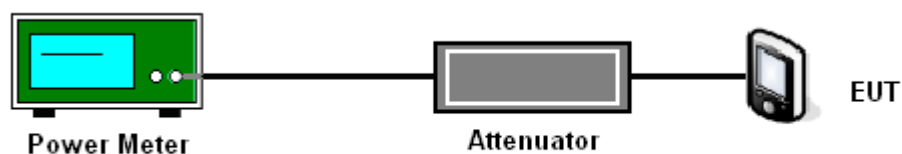
### 3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.2.3 Test Procedures

1. The testing follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the power meter by a low loss cable.
3. Measure the power by power meter.

### 3.2.4 Test Setup



**3.2.5 Test Result of Output Power**

<b>Test Mode :</b>	Mode 1, 2, 3	<b>Temperature :</b>	24~26℃
<b>Test Engineer :</b>	Ken Hsu	<b>Relative Humidity :</b>	50~53%

Channel	Frequency (MHz)	802.11b Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	16.06	30	Pass
06	2437	15.28	30	Pass
11	2462	15.89	30	Pass

<b>Test Mode :</b>	Mode 4, 5, 6	<b>Temperature :</b>	24~26℃
<b>Test Engineer :</b>	Ken Hsu	<b>Relative Humidity :</b>	50~53%

Channel	Frequency (MHz)	802.11g Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	17.66	30	Pass
06	2437	16.77	30	Pass
11	2462	17.04	30	Pass



### **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**

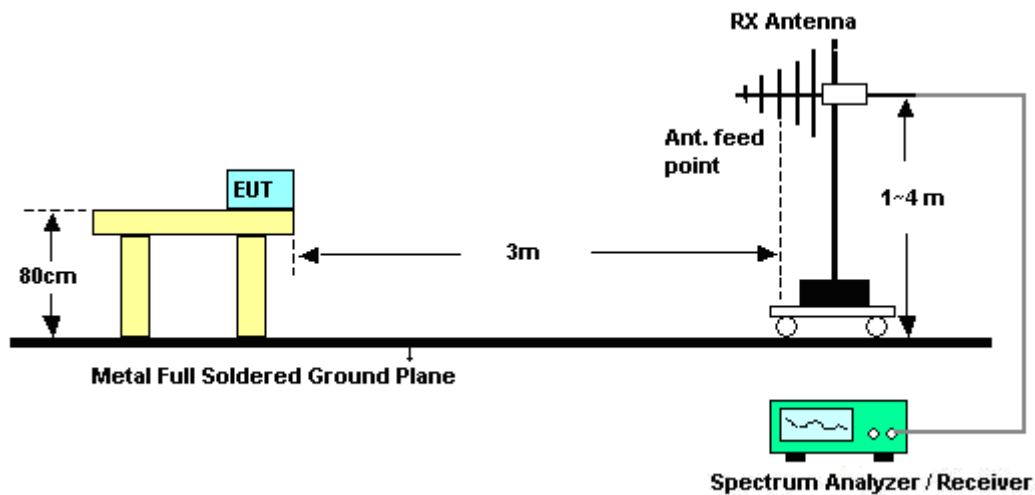
See list of measuring instruments of this test report.

#### **3.3.3 Test Procedures**

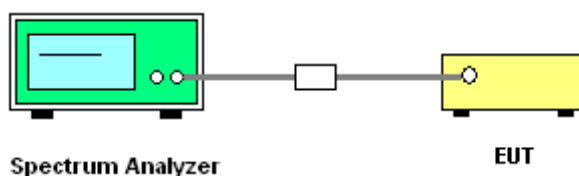
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW)  $\geq$  RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized band as measured with a 100 kHz RBW. Note: If the device complies with the use of power option 2 the attenuation under this paragraph shall be 30 dB instead of 20 dB.
3. Radiated emission test: Apply to band edge emissions that fall in 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 measurements above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep=Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation as in FCC Section 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

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	24.1~25.8℃
<b>Test Band :</b>	802.11b	<b>Relative Humidity :</b>	49~55%
<b>Test Channel :</b>	01	<b>Test Engineer :</b>	Jason Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2385.81	54.35	-19.65	74	49.99	32.18	6.03	33.85	103	354	Peak
2385.81	42.15	-11.85	54	37.79	32.18	6.03	33.85	103	354	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2388.85	49.45	-24.55	74	45.09	32.18	6.03	33.85	100	262	Peak
2388.85	37.04	-16.96	54	32.68	32.18	6.03	33.85	100	262	Average

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	24.1~25.8℃
<b>Test Band :</b>	802.11b	<b>Relative Humidity :</b>	49~55%
<b>Test Channel :</b>	11	<b>Test Engineer :</b>	Jason Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2489.74	57.81	-16.19	74	53.23	32.3	6.18	33.9	104	334	Peak
2489.74	44.76	-9.24	54	40.18	32.3	6.18	33.9	104	334	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2483.66	54.92	-19.08	74	50.36	32.28	6.18	33.9	121	290	Peak
2483.66	41.71	-12.29	54	37.15	32.28	6.18	33.9	121	290	Average



<b>Test Mode :</b>	Mode 4	<b>Temperature :</b>	24.1~25.8℃
<b>Test Band :</b>	802.11g	<b>Relative Humidity :</b>	49~55%
<b>Test Channel :</b>	01	<b>Test Engineer :</b>	Jason Wang

ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2384.86	55.12	-18.88	74	50.78	32.16	6.03	33.85	105	354	Peak
2384.86	42.55	-11.45	54	38.21	32.16	6.03	33.85	105	354	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2385.62	49.62	-24.38	74	45.26	32.18	6.03	33.85	100	311	Peak
2385.62	37.15	-16.85	54	32.79	32.18	6.03	33.85	100	311	Average

<b>Test Mode :</b>	Mode 6	<b>Temperature :</b>	24.1~25.8℃
<b>Test Band :</b>	802.11g	<b>Relative Humidity :</b>	49~55%
<b>Test Channel :</b>	11	<b>Test Engineer :</b>	Jason Wang

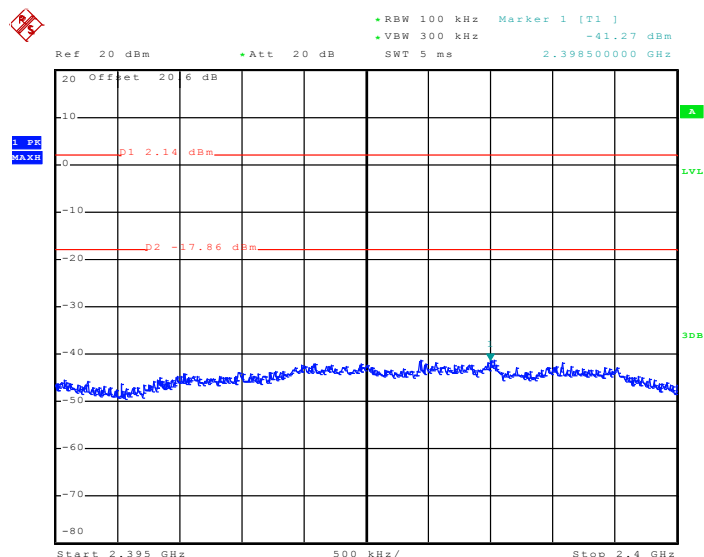
ANTENNA POLARITY : HORIZONTAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2484.42	56.11	-17.89	74	51.55	32.28	6.18	33.9	130	345	Peak
2484.42	43.3	-10.7	54	38.74	32.28	6.18	33.9	130	345	Average

ANTENNA POLARITY : VERTICAL										
Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level ( dBuV )	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
2486.7	52.97	-21.03	74	48.41	32.28	6.18	33.9	123	291	Peak
2486.7	40.27	-13.73	54	35.71	32.28	6.18	33.9	123	291	Average

### 3.3.6 Test Plots of Conducted Band Edges

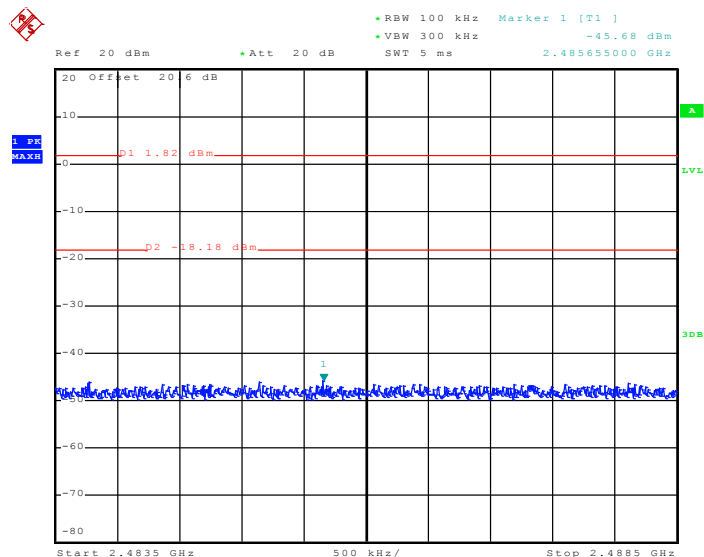
<b>Test Mode :</b>	Mode 1 and 3	<b>Temperature :</b>	24~26°C
<b>Test Band :</b>	802.11b	<b>Relative Humidity :</b>	50~53%
<b>Test Channel :</b>	01 and 11	<b>Test Engineer :</b>	Ken Hsu

**Low Band Edge Plot on 802.11b Channel 01**



Date: 6.DEC.2010 14:54:48

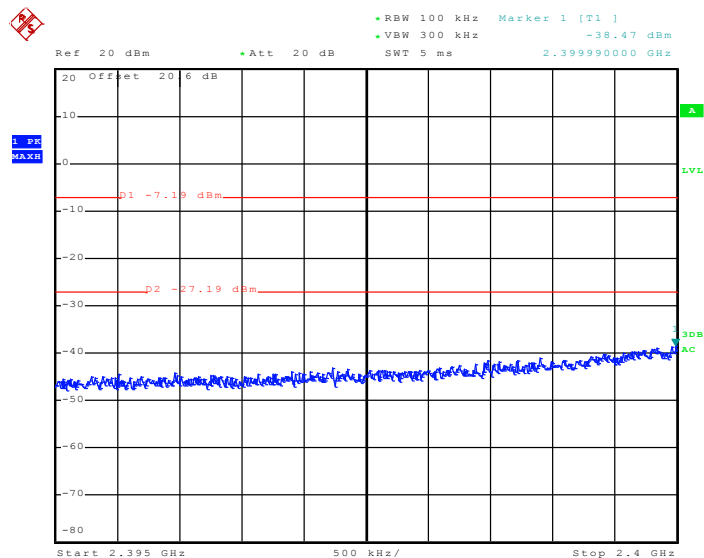
**High Band Edge Plot on 802.11b Channel 11**



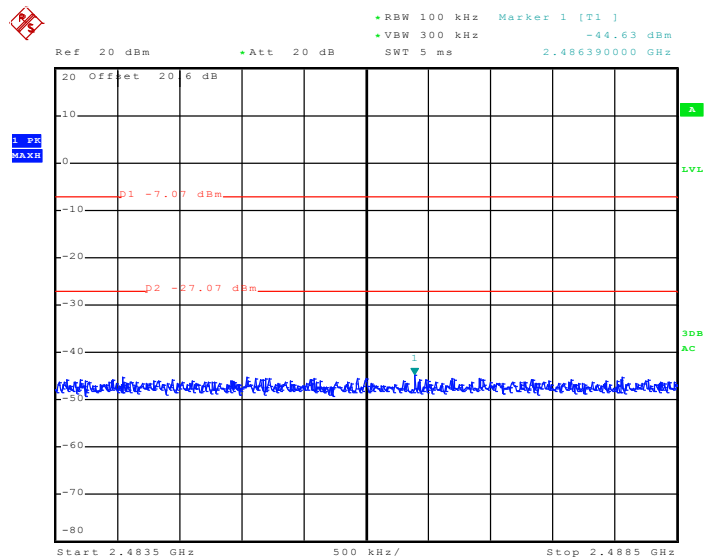
Date: 6.DEC.2010 15:01:43



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 :	Ken Hsu

**Low Band Edge Plot on 802.11g Channel 01**

Date: 6.DEC.2010 05:27:15

**High Band Edge Plot on 802.11g Channel 11**

Date: 6.DEC.2010 05:46:45

### 3.4 Spurious Emission Measurement

#### 3.4.1 Limit of Spurious Emission Measurement

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

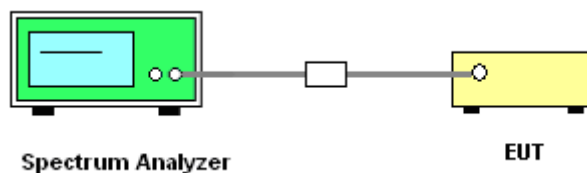
#### 3.4.2 Measuring Instruments

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.
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.

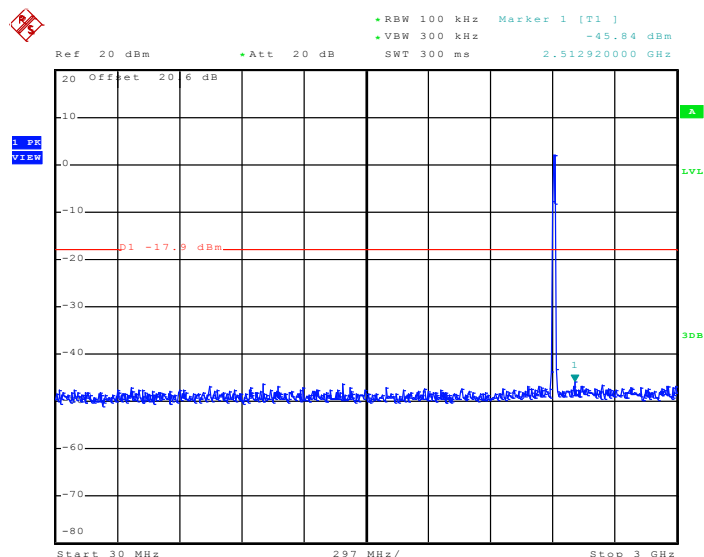
#### 3.4.4 Test Setup



### 3.4.5 Test Plots of Spurious Emission

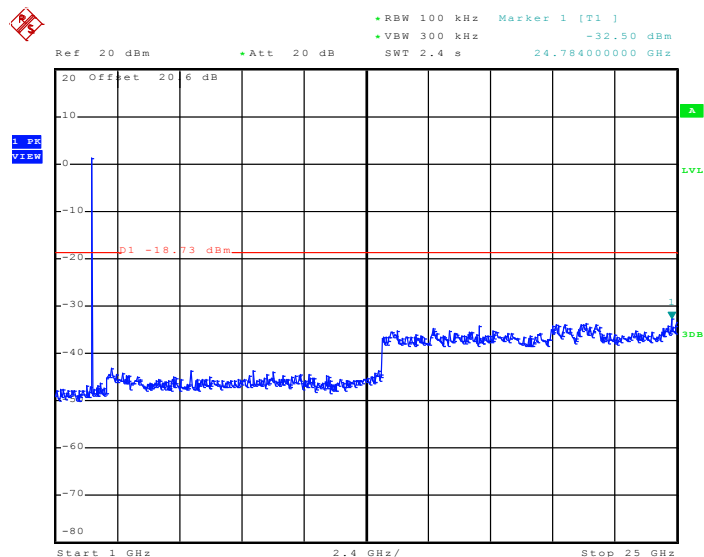
Test Mode :	Mode 1	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Ken Hsu

**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**



Date: 6.DEC.2010 14:51:54

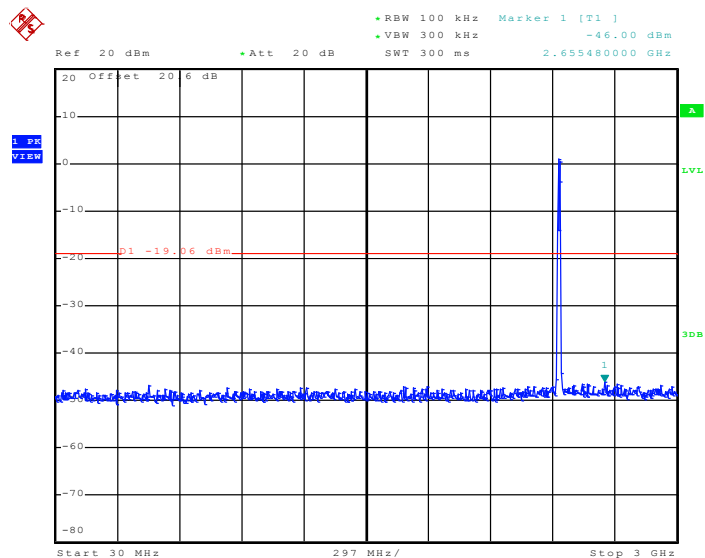
**Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz**



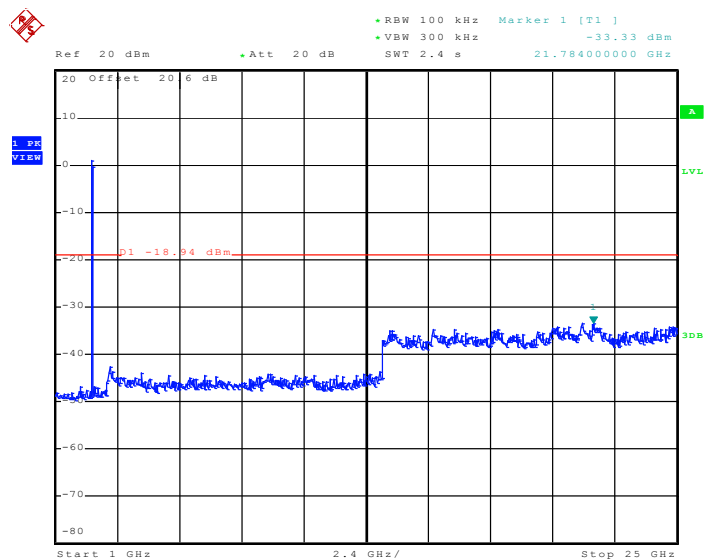
Date: 6.DEC.2010 14:52:11



<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	24~26°C
<b>Test Band :</b>	802.11b	<b>Relative Humidity :</b>	50~53%
<b>Test Channel :</b>	06	<b>Test Engineer :</b>	Ken Hsu

**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**


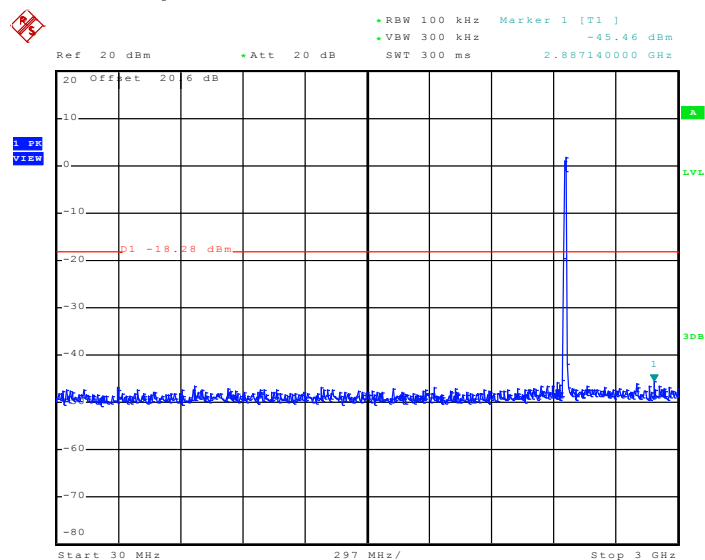
Date: 6.DEC.2010 14:56:19

**Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz**


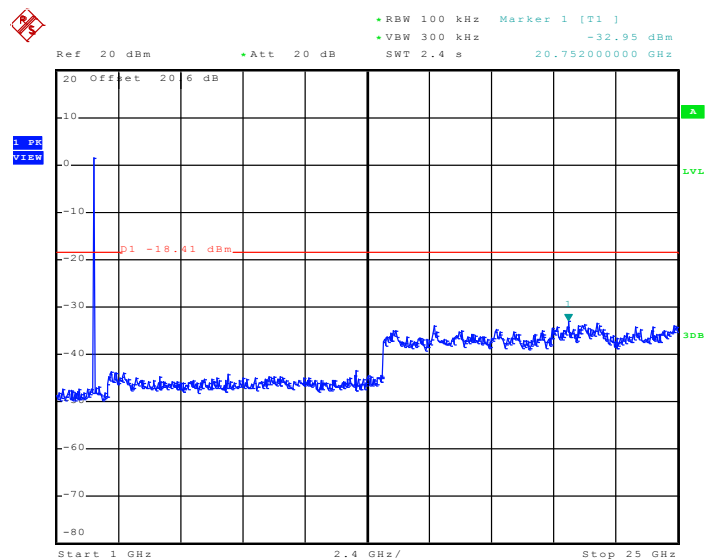
Date: 6.DEC.2010 14:56:36



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

**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**

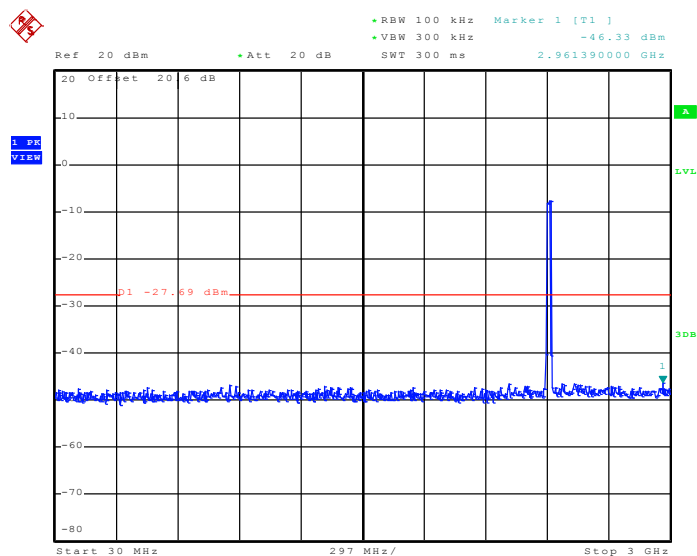
Date: 6.DEC.2010 14:59:25

**Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz**

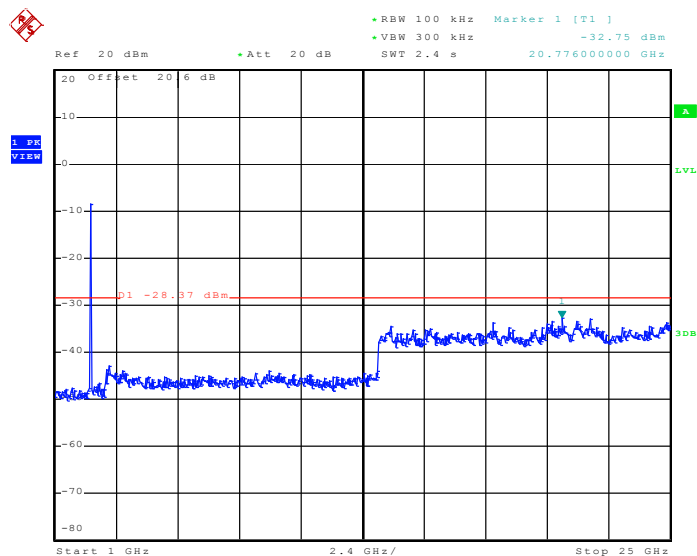
Date: 6.DEC.2010 14:59:42



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

**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**

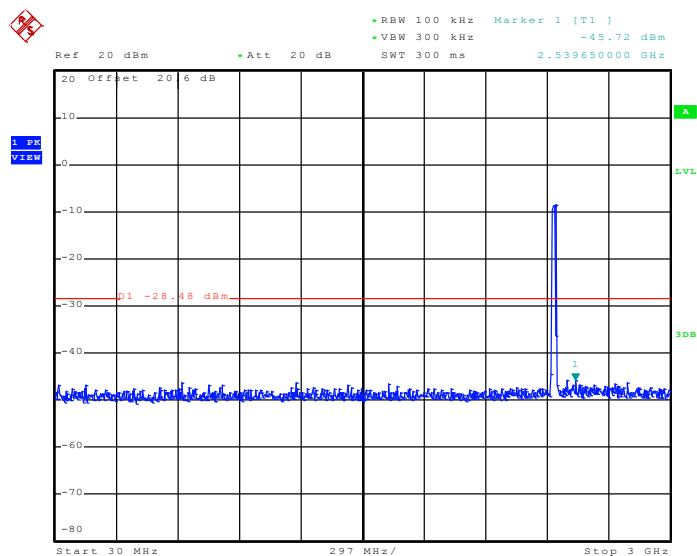
Date: 6.DEC.2010 14:48:32

**Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz**

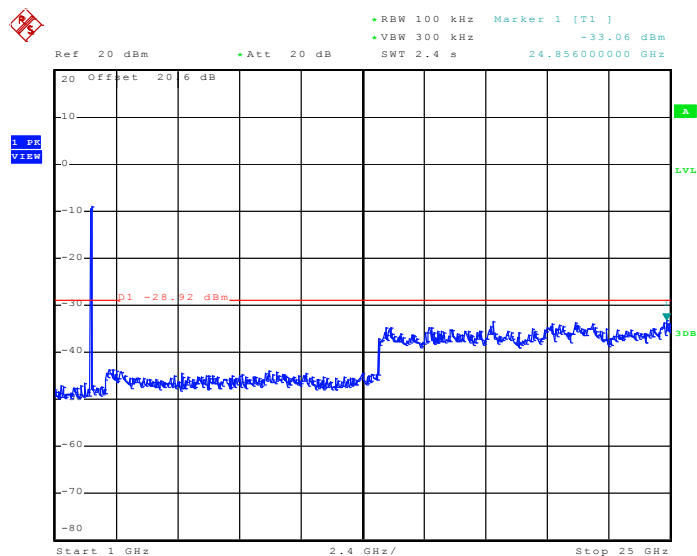
Date: 6.DEC.2010 14:48:49



Test Mode :	Mode 5	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Ken Hsu

**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**

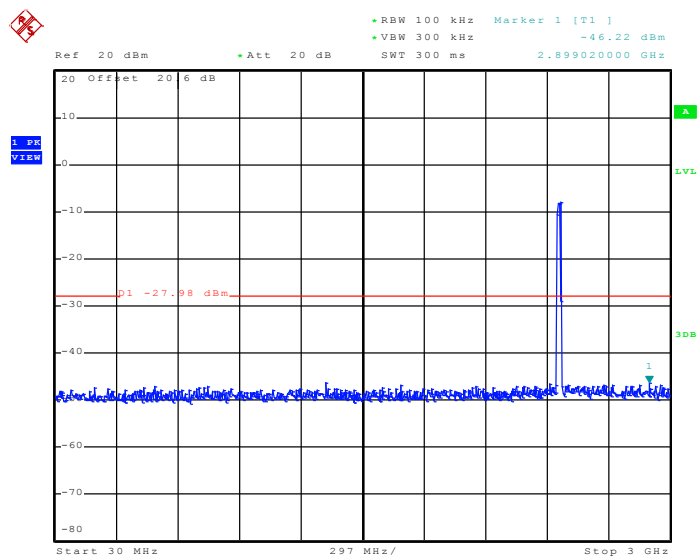
Date: 6.DEC.2010 14:49:54

**Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz**

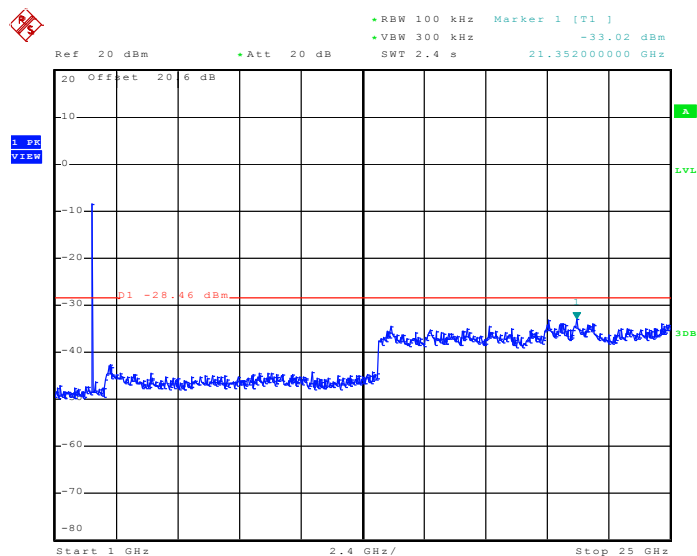
Date: 6.DEC.2010 14:50:11



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

**Conducted Spurious Emission Plot between 30MHz ~ 3 GHz**

Date: 6.DEC.2010 14:46:51

**Conducted Spurious Emission Plot between 1 GHz ~ 25 GHz**

Date: 6.DEC.2010 14:47:08

### 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.

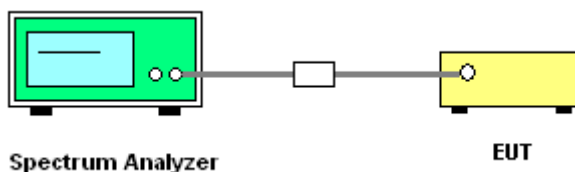
#### 3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

#### 3.5.3 Test Procedures

1. The test follows FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Take the measured data from spectrum analyzer.

#### 3.5.4 Test Setup

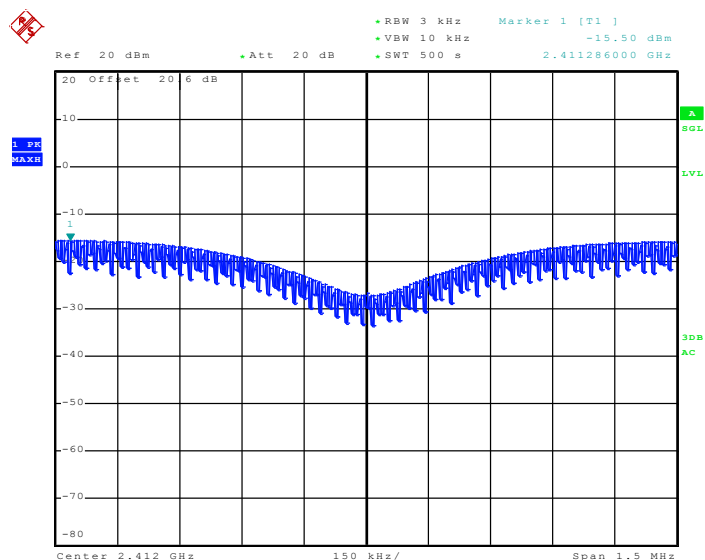


### 3.5.5 Test Result of Power Spectral Density

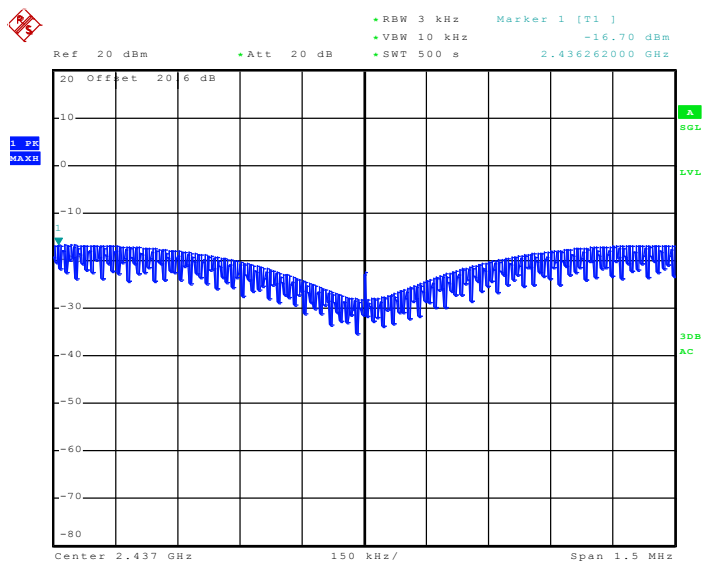
<b>Test Mode :</b>	Mode 1, 2, 3	<b>Temperature :</b>	24~26℃
<b>Test Engineer :</b>	Ken Hsu	<b>Relative Humidity :</b>	50~53%

Channel	Frequency (MHz)	802.11b Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-15.50	8	Pass
06	2437	-16.70	8	Pass
11	2462	-16.12	8	Pass

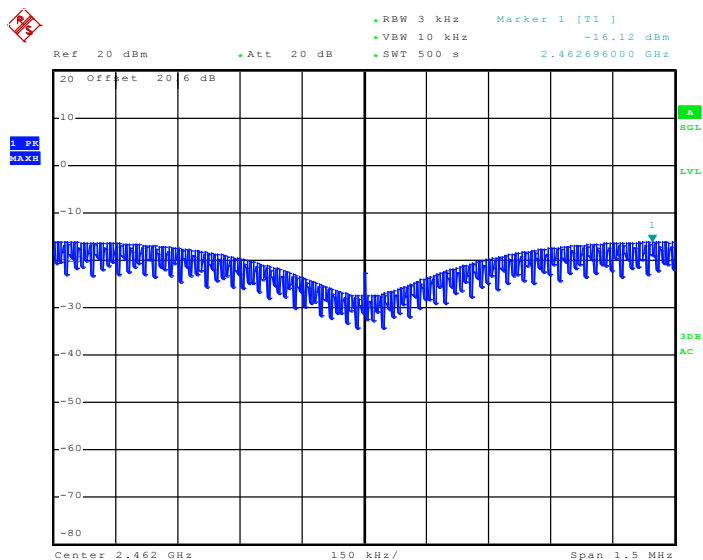
**Mode 1 : PSD Plot on 802.11b Channel 01**



Date: 6.DEC.2010 04:17:49

**Mode 2 : PSD Plot on 802.11b Channel 06**


Date: 6.DEC.2010 04:26:56

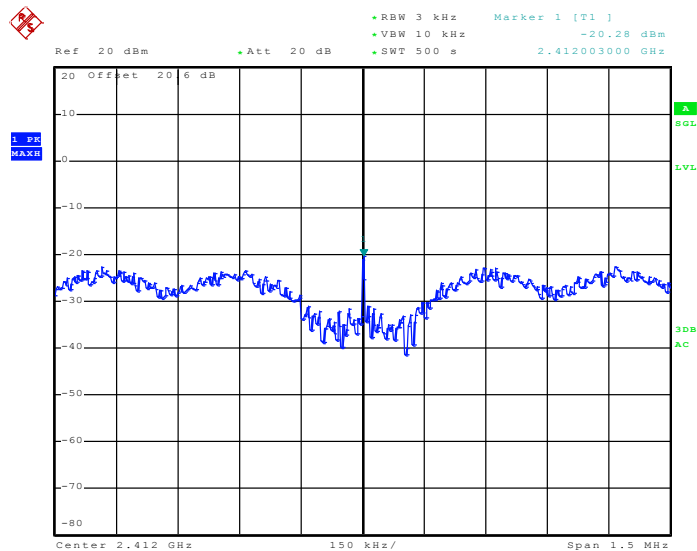
**Mode 3 : PSD Plot on 802.11b Channel 11**


Date: 6.DEC.2010 04:40:42

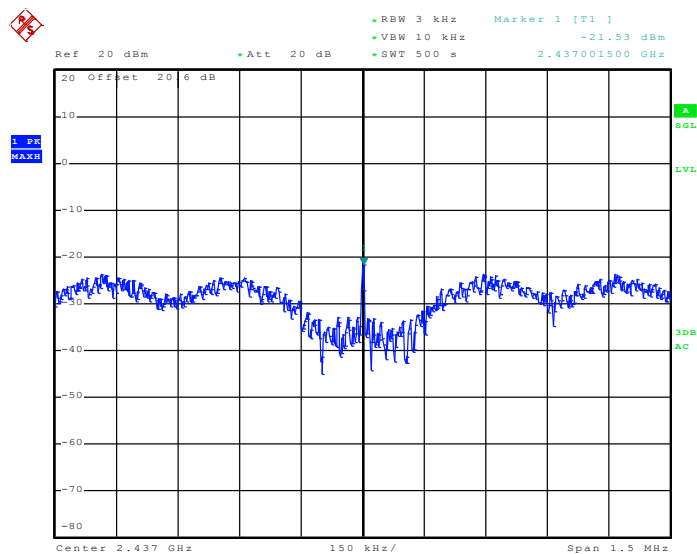


<b>Test Mode :</b>	Mode 4, 5, 6	<b>Temperature :</b>	24~26°C
<b>Test Engineer :</b>	Ken Hsu	<b>Relative Humidity :</b>	50~53%

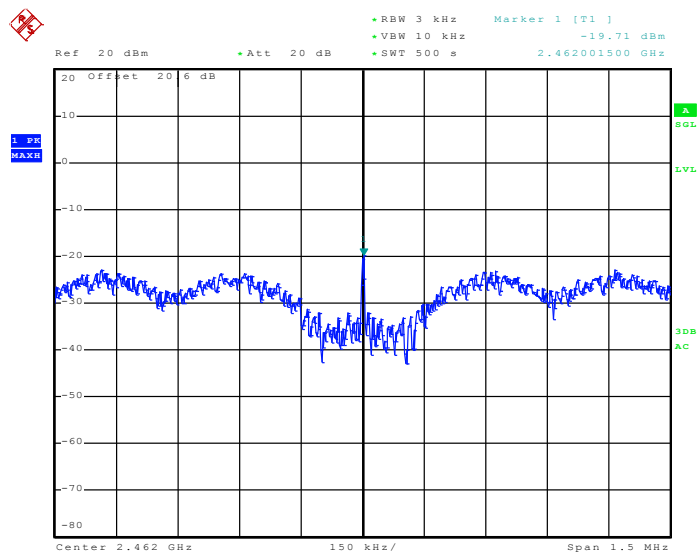
Channel	Frequency (MHz)	802.11g Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-20.28	8	Pass
06	2437	-21.53	8	Pass
11	2462	-19.71	8	Pass

**Mode 4 : PSD Plot on 802.11g Channel 01**


Date: 6.DEC.2010 05:24:13

**Mode 5 : PSD Plot on 802.11g Channel 06**


Date: 6.DEC.2010 05:42:09

**Mode 6 : PSD Plot on 802.11g Channel 11**


Date: 6.DEC.2010 05:56:47

## 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.

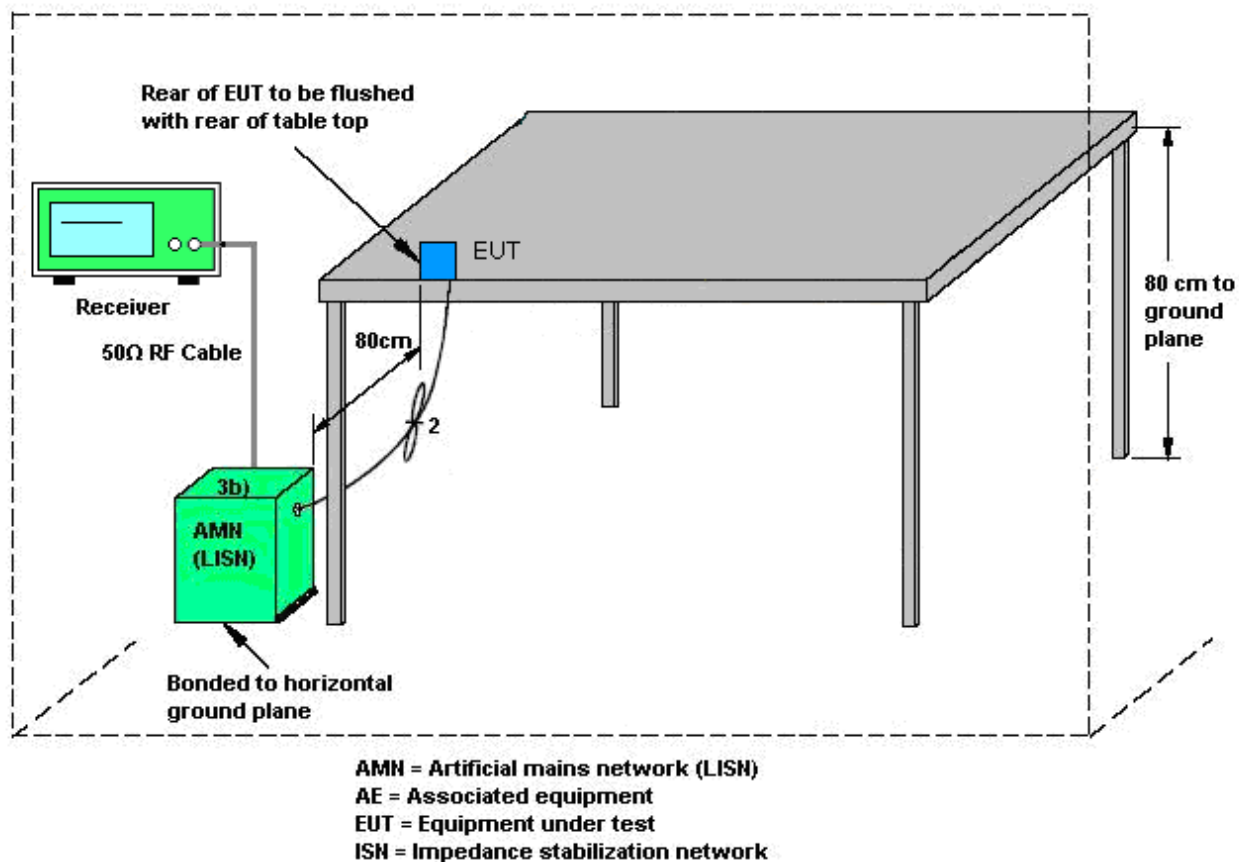
### 3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

### 3.6.3 Test Procedures

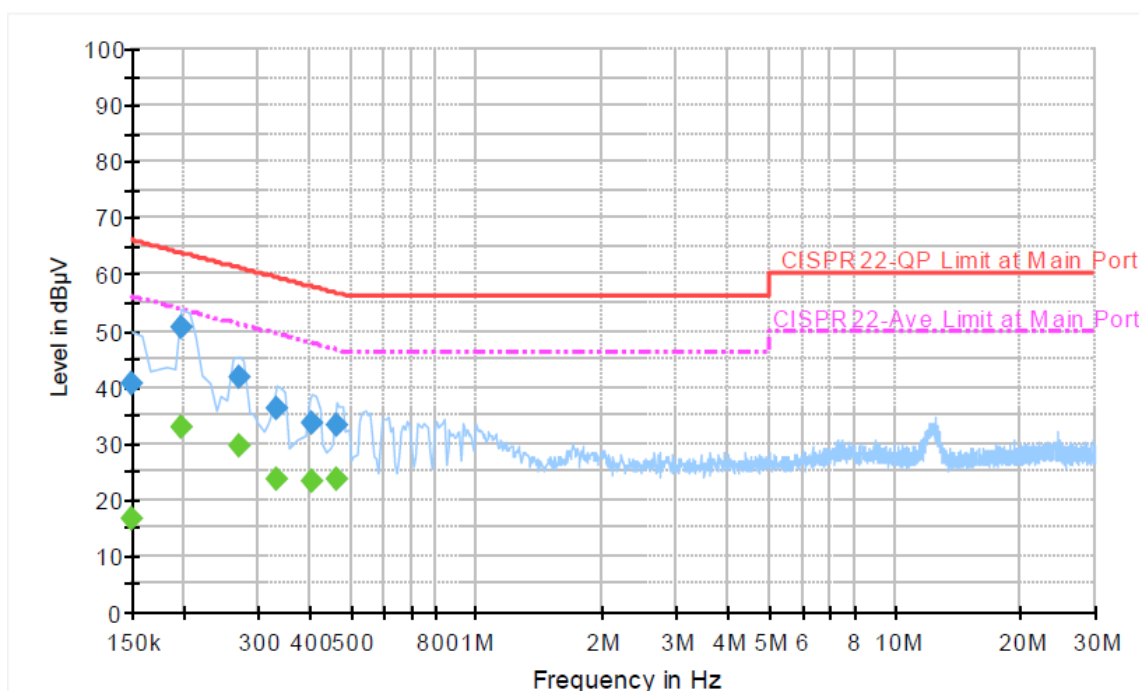
1. The testing follows the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (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



### 3.6.5 Test Result of AC Conducted Emission

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	20~22°C
<b>Test Engineer :</b>	Novic Chiang	<b>Relative Humidity :</b>	42~44%
<b>Test Voltage :</b>	120Vac / 60Hz	<b>Phase :</b>	Line
<b>Function Type :</b>	WLAN Link + Adapter		
<b>Remark :</b>	All emissions not reported here are more than 10 dB below the prescribed limit.		



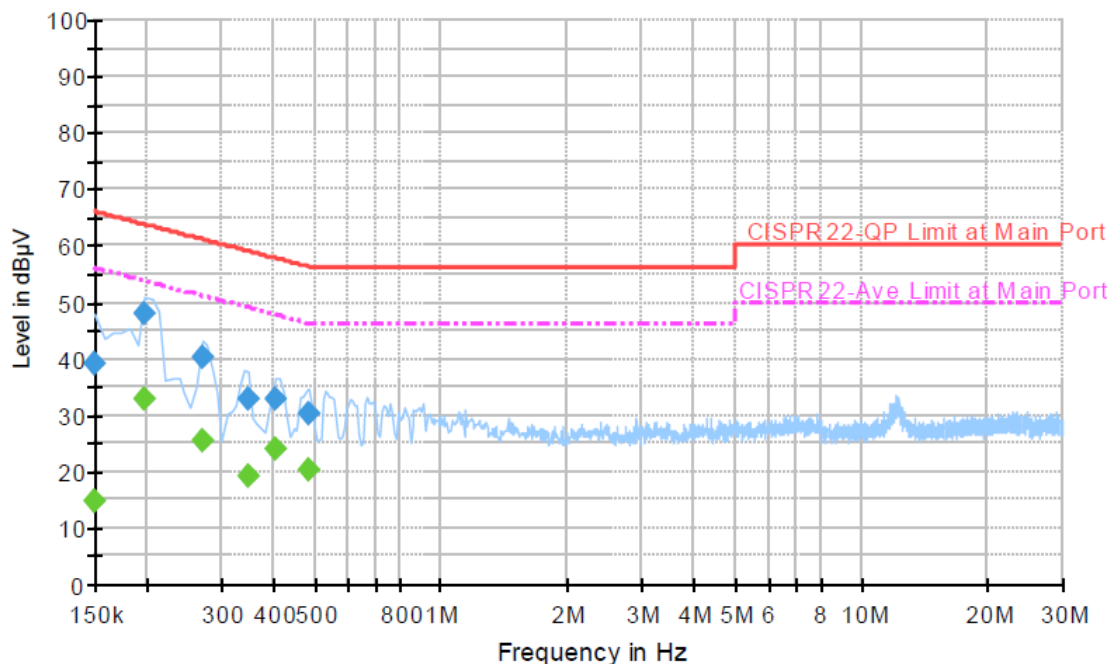
#### Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	40.6	Off	L1	19.4	25.4	66.0
0.198000	50.6	Off	L1	19.3	13.1	63.7
0.270000	41.6	Off	L1	19.3	19.5	61.1
0.334000	36.1	Off	L1	19.3	23.3	59.4
0.406000	33.4	Off	L1	19.4	24.3	57.7
0.462000	33.1	Off	L1	19.3	23.6	56.7

#### Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	16.6	Off	L1	19.4	39.4	56.0
0.198000	33.0	Off	L1	19.3	20.7	53.7
0.270000	29.4	Off	L1	19.3	21.7	51.1
0.334000	23.4	Off	L1	19.3	26.0	49.4
0.406000	23.4	Off	L1	19.4	24.3	47.7
0.462000	23.7	Off	L1	19.3	23.0	46.7

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	20~22°C
<b>Test Engineer :</b>	Novic Chiang	<b>Relative Humidity :</b>	42~44%
<b>Test Voltage :</b>	120Vac / 60Hz	<b>Phase :</b>	Neutral
<b>Function Type :</b>	WLAN Link + Adapter		
<b>Remark :</b>	All emissions not reported here are more than 10 dB below the prescribed limit.		


**Final Result 1**

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	39.2	Off	N	19.4	26.8	66.0
0.198000	48.0	Off	N	19.3	15.7	63.7
0.270000	40.0	Off	N	19.3	21.1	61.1
0.350000	33.0	Off	N	19.3	26.0	59.0
0.406000	32.7	Off	N	19.4	25.0	57.7
0.486000	30.3	Off	N	19.4	25.9	56.2

**Final Result 2**

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	14.6	Off	N	19.4	41.4	56.0
0.198000	33.0	Off	N	19.3	20.7	53.7
0.270000	25.6	Off	N	19.3	25.5	51.1
0.350000	19.3	Off	N	19.3	29.7	49.0
0.406000	23.8	Off	N	19.4	23.9	47.7
0.486000	20.5	Off	N	19.4	25.7	46.2

## 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.

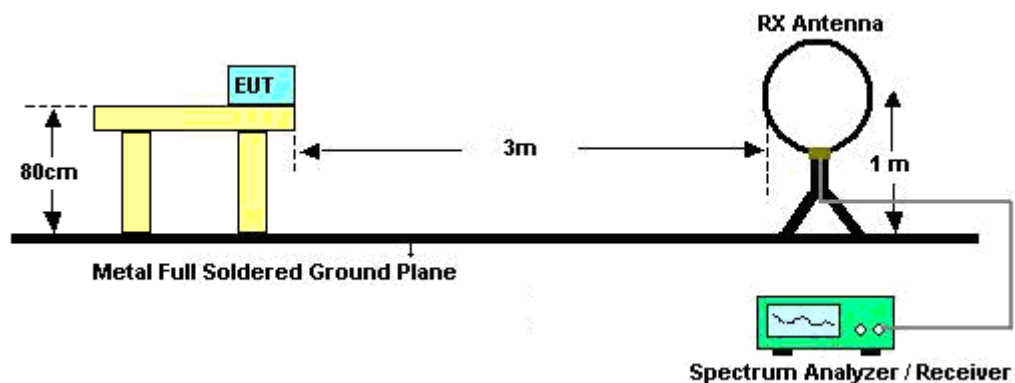
### 3.7.3

### 3.7.4 Test Procedures

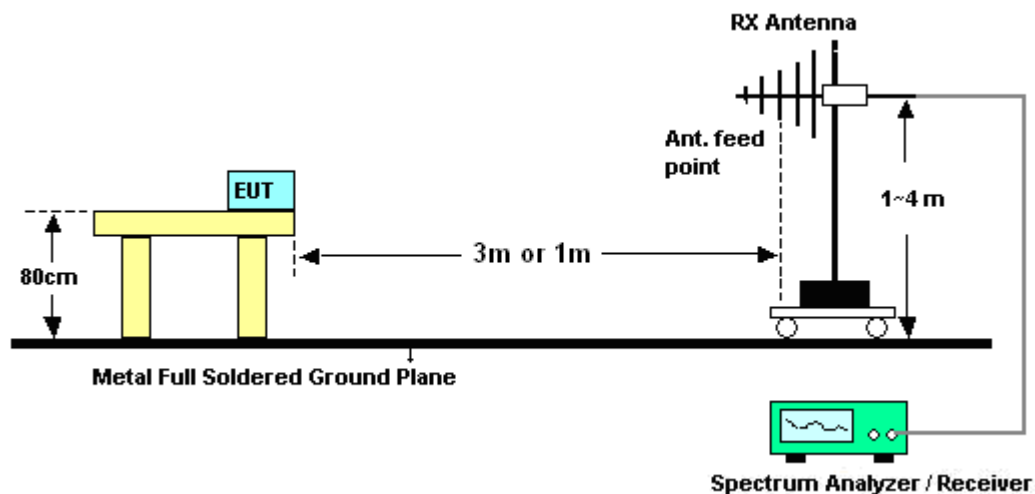
- The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
- Use the following spectrum analyzer settings:
  - Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for  $f \geq 1$  GHz, 100 kHz for  $f < 1$  GHz; VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold.
  - Above 18 GHz shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade from 3m to 1m.  
Distance extrapolation factor =  $20 \log (\text{specific distance [3m]} / \text{test distance [1m]})$  (dB)
- Follow the guidelines in ANSI C63.4-2003 with respect to maximizing the emission by rotating the EUT, measuring the emission for three EUT orthogonal planes, and adjusting the measurement antenna height and polarization. A pre-amp and a high pass filter are used for this test in order to get the good signal level.

### 3.7.5 Test Setup

For radiated emissions below 30MHz



For radiated emissions above 30MHz





**3.7.6 Test Results of Radiated Emissions (9 kHz ~ 30 MHz)**

Test Engineer :	Jason Wang	Temperature :	24.1~25.8℃	
		Relative Humidity :	49~55%	

Frequency (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

**Note:**

The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

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

<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2412 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
32.97	22.18	-17.82	40	37.29	15.8	0.56	31.47	102	63	Peak
42.42	18.2	-21.8	40	37.47	11.59	0.64	31.5	-	-	Peak
150.42	17.98	-25.52	43.5	37.23	11.1	1.21	31.56	-	-	Peak
792.1	24.83	-21.17	46	30.03	22.35	3.13	30.68	-	-	Peak
937.7	26.56	-19.44	46	29.62	24.11	3.43	30.6	-	-	Peak
996.5	27.54	-26.46	54	29.77	24.84	3.51	30.58	-	-	Peak
2385.81	42.15	-11.85	54	37.79	32.18	6.03	33.85	103	354	Average
2385.81	54.35	-19.65	74	49.99	32.18	6.03	33.85	103	354	Peak
2412	108.94	-	-	104.54	32.2	6.07	33.87	103	354	Peak
2412	105.43	-	-	101.03	32.2	6.07	33.87	103	354	Average
2500	43.75	-10.25	54	39.17	32.3	6.18	33.9	103	354	Average
2500	55.54	-18.46	74	50.96	32.3	6.18	33.9	103	354	Peak



<b>Test Mode :</b>	Mode 1	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2412 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
30.54	25.84	-14.16	40	40.49	16.27	0.54	31.46	105	99	Peak
35.67	24.9	-15.1	40	40.93	14.86	0.59	31.48	-	-	Peak
66.18	22.16	-17.84	40	46.85	6.04	0.81	31.54	-	-	Peak
769	24.65	-21.35	46	30.27	21.98	3.09	30.69	-	-	Peak
855.8	25.85	-20.15	46	30.19	23.11	3.28	30.73	-	-	Peak
976.2	27.88	-26.12	54	30.39	24.58	3.49	30.58	-	-	Peak
2388.85	37.04	-16.96	54	32.68	32.18	6.03	33.85	100	262	Average
2388.85	49.45	-24.55	74	45.09	32.18	6.03	33.85	100	262	Peak
2412	101.32	-	-	96.92	32.2	6.07	33.87	100	262	Peak
2412	97.39	-	-	92.99	32.2	6.07	33.87	100	262	Average
2484	37.73	-16.27	54	33.17	32.28	6.18	33.9	100	262	Average
2484	49.68	-24.32	74	45.12	32.28	6.18	33.9	100	262	Peak

<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2437 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
31.89	21.19	-18.81	40	36.06	16.04	0.55	31.46	105	169	Peak
45.93	16.78	-23.22	40	37.36	10.27	0.66	31.51	-	-	Peak
149.34	18	-25.5	43.5	37.2	11.15	1.21	31.56	-	-	Peak
696.9	23.21	-22.79	46	30.24	20.86	2.93	30.82	-	-	Peak
864.2	26.14	-19.86	46	30.36	23.21	3.29	30.72	-	-	Peak
965	27.79	-26.21	54	30.43	24.45	3.48	30.57	-	-	Peak
2390	52.24	-21.76	74	47.88	32.18	6.03	33.85	102	351	Peak
2390	40.17	-13.83	54	35.81	32.18	6.03	33.85	102	351	Average
2437	107.24	-	-	102.77	32.24	6.11	33.88	102	351	Peak
2437	103.35	-	-	98.88	32.24	6.11	33.88	102	351	Average
2484	56.42	-17.58	74	51.86	32.28	6.18	33.9	102	351	Peak
2484	44.41	-9.59	54	39.85	32.28	6.18	33.9	102	351	Average

<b>Test Mode :</b>	Mode 2	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2437 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
31.89	18.64	-21.36	40	33.51	16.04	0.55	31.46	-	-	Peak
49.17	17.39	-22.61	40	39.55	8.68	0.69	31.53	-	-	Peak
264.09	14.11	-31.89	46	31.01	12.89	1.61	31.4	-	-	Peak
780.2	25.5	-20.5	46	30.93	22.15	3.11	30.69	-	-	Peak
872.6	26.42	-19.58	46	30.53	23.31	3.3	30.72	152	230	Peak
979	27.58	-26.42	54	30.05	24.62	3.49	30.58	-	-	Peak
2382	49.25	-24.75	74	44.91	32.16	6.03	33.85	100	291	Peak
2382	37.26	-16.74	54	32.92	32.16	6.03	33.85	100	291	Average
2437	100.66	-	-	96.21	32.22	6.11	33.88	100	291	Peak
2437	96.84	-	-	92.37	32.24	6.11	33.88	100	291	Average
2500	50.06	-23.94	74	45.48	32.3	6.18	33.9	100	291	Peak
2500	38.18	-15.82	54	33.6	32.3	6.18	33.9	100	291	Average

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2462 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
30.27	24.78	-15.22	40	39.2	16.51	0.53	31.46	128	331	Peak
54.57	22.65	-17.35	40	46.24	7.24	0.72	31.55	-	-	Peak
158.25	23.37	-20.13	43.5	43.16	10.52	1.22	31.53	-	-	Peak
825	25.17	-20.83	46	29.91	22.76	3.21	30.71	-	-	Peak
937	26.01	-19.99	46	29.09	24.09	3.43	30.6	-	-	Peak
998.6	27.34	-26.66	54	29.53	24.88	3.51	30.58	-	-	Peak
2374	40.63	-13.37	54	36.32	32.16	5.99	33.84	104	334	Average
2374	52.1	-21.9	74	47.79	32.16	5.99	33.84	104	334	Peak
2462	104.51	-	-	100	32.26	6.14	33.89	104	334	Average
2462	108.29	-	-	103.78	32.26	6.14	33.89	104	334	Peak
2489.74	44.76	-9.24	54	40.18	32.3	6.18	33.9	104	334	Average
2489.74	57.81	-16.19	74	53.23	32.3	6.18	33.9	104	334	Peak

<b>Test Mode :</b>	Mode 3	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2462 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
33.78	24.91	-15.09	40	40.24	15.57	0.57	31.47	-	-	Peak
49.17	28.25	-11.75	40	50.41	8.68	0.69	31.53	114	104	Peak
66.18	20.93	-19.07	40	45.62	6.04	0.81	31.54	-	-	Peak
783	25.72	-20.28	46	31.11	22.19	3.11	30.69	-	-	Peak
862.1	26.57	-19.43	46	30.81	23.19	3.29	30.72	-	-	Peak
995.8	27.78	-26.22	54	30.01	24.84	3.51	30.58	-	-	Peak
2382	49.15	-24.85	74	44.81	32.16	6.03	33.85	121	290	Peak
2382	37.84	-16.16	54	33.5	32.16	6.03	33.85	121	290	Average
2462	101.04	-	-	96.53	32.26	6.14	33.89	121	290	Peak
2462	97.43	-	-	92.92	32.26	6.14	33.89	121	290	Average
2483.66	41.71	-12.29	54	37.15	32.28	6.18	33.9	121	290	Average
2483.66	54.92	-19.08	74	50.36	32.28	6.18	33.9	121	290	Peak

<b>Test Mode :</b>	Mode 4	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2412 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
36.48	28.58	-11.42	40	45.09	14.38	0.6	31.49	157	120	Peak
95.34	25.43	-18.07	43.5	46.74	9.24	0.98	31.53	-	-	Peak
167.97	26.96	-16.54	43.5	47.36	9.89	1.23	31.52	-	-	Peak
750.1	24.05	-21.95	46	30.02	21.67	3.06	30.7	-	-	Peak
881	26.61	-19.39	46	30.61	23.4	3.31	30.71	-	-	Peak
993.7	27.99	-26.01	54	30.25	24.82	3.5	30.58	-	-	Peak
2384.86	42.55	-11.45	54	38.21	32.16	6.03	33.85	105	354	Average
2384.86	55.12	-18.88	74	50.78	32.16	6.03	33.85	105	354	Peak
2412	104.75	-	-	100.35	32.2	6.07	33.87	105	354	Peak
2412	95.73	-	-	91.33	32.2	6.07	33.87	105	354	Average
2484	43.1	-10.9	54	38.54	32.28	6.18	33.9	105	354	Average
2484	55.93	-18.07	74	51.37	32.28	6.18	33.9	105	354	Peak



<b>Test Mode :</b>	Mode 4	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	01	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2412 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
35.94	29	-11	40	45.03	14.86	0.59	31.48	153	221	Peak
42.15	27.6	-12.4	40	46.87	11.59	0.64	31.5	-	-	Peak
130.98	23.46	-20.04	43.5	42.3	11.58	1.15	31.57	-	-	Peak
721.4	23.59	-22.41	46	30.14	21.23	2.99	30.77	-	-	Peak
892.9	26.53	-19.47	46	30.35	23.55	3.33	30.7	-	-	Peak
995.8	27.63	-26.37	54	29.86	24.84	3.51	30.58	-	-	Peak
2385.62	37.15	-16.85	54	32.79	32.18	6.03	33.85	100	311	Average
2385.62	49.62	-24.38	74	45.26	32.18	6.03	33.85	100	311	Peak
2412	98.34	-	-	93.94	32.2	6.07	33.87	100	311	Peak
2412	88.97	-	-	84.57	32.2	6.07	33.87	100	311	Average
2486	36.46	-17.54	54	31.9	32.28	6.18	33.9	100	311	Average
2486	48.14	-25.86	74	43.58	32.28	6.18	33.9	100	311	Peak

<b>Test Mode :</b>	Mode 5	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2437 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
41.61	21.92	-18.08	40	40.76	12.04	0.63	31.51	-	-	Peak
156.9	25.32	-18.18	43.5	45.03	10.6	1.22	31.53	-	-	Peak
299.73	15.03	-30.97	46	31.13	13.46	1.77	31.33	-	-	Peak
449.8	19.66	-26.34	46	31.06	17.4	2.3	31.1	-	-	Peak
822.9	25.5	-20.5	46	30.27	22.73	3.2	30.7	-	-	Peak
903.4	33.26	-12.74	46	36.93	23.67	3.35	30.69	100	55	Peak
2382	51.89	-22.11	74	47.55	32.16	6.03	33.85	102	350	Peak
2382	40.02	-13.98	54	35.68	32.16	6.03	33.85	102	350	Average
2437	103.19	-	-	98.72	32.24	6.11	33.88	102	350	Peak
2437	93.89	-	-	89.42	32.24	6.11	33.88	102	350	Average
2500	55.47	-18.53	74	50.89	32.3	6.18	33.9	102	350	Peak
2500	44.14	-9.86	54	39.56	32.3	6.18	33.9	102	350	Average

<b>Test Mode :</b>	Mode 5	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	06	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2437 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
45.93	31.3	-8.7	40	51.88	10.27	0.66	31.51	100	74	Peak
87.78	29.44	-10.56	40	51.65	8.39	0.93	31.53	-	-	Peak
274.62	14.82	-31.18	46	31.48	13.06	1.64	31.36	-	-	Peak
486.9	21.05	-24.95	46	31.7	18.01	2.4	31.06	-	-	Peak
668.2	23.01	-22.99	46	30.45	20.53	2.88	30.85	-	-	Peak
945.4	27.02	-18.98	46	29.95	24.2	3.45	30.58	-	-	Peak
2374	49.07	-24.93	74	44.76	32.16	5.99	33.84	121	291	Peak
2374	37.3	-16.7	54	32.99	32.16	5.99	33.84	121	291	Average
2437	96.75	-	-	92.28	32.24	6.11	33.88	121	291	Peak
2437	87.17	-	-	82.7	32.24	6.11	33.88	121	291	Average
2486	52.78	-21.22	74	48.22	32.28	6.18	33.9	121	291	Peak
2486	40.58	-13.42	54	36.02	32.28	6.18	33.9	121	291	Average

<b>Test Mode :</b>	Mode 6	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Horizontal
<b>Remark :</b>	2462 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
33.78	20.16	-19.84	40	35.49	15.57	0.57	31.47	100	32	Peak
128.01	18.32	-25.18	43.5	37.18	11.57	1.14	31.57	-	-	Peak
223.86	15.07	-30.93	46	34.26	10.82	1.44	31.45	-	-	Peak
486.9	20.69	-25.31	46	31.34	18.01	2.4	31.06	-	-	Peak
680.1	22.57	-23.43	46	29.85	20.66	2.9	30.84	-	-	Peak
985.3	27.06	-26.94	54	29.43	24.71	3.5	30.58	-	-	Peak
2380	52.71	-21.29	74	48.37	32.16	6.03	33.85	130	345	Peak
2380	40.36	-13.64	54	36.02	32.16	6.03	33.85	130	345	Average
2462	103.18	-	-	98.67	32.26	6.14	33.89	130	345	Peak
2462	93.67	-	-	89.16	32.26	6.14	33.89	130	345	Average
2484.42	43.3	-10.7	54	38.74	32.28	6.18	33.9	130	345	Average
2484.42	56.11	-17.89	74	51.55	32.28	6.18	33.9	130	345	Peak



<b>Test Mode :</b>	Mode 6	<b>Temperature :</b>	24.1~25.8℃
<b>Test Channel :</b>	11	<b>Relative Humidity :</b>	49~55%
<b>Test Engineer :</b>	Jason Wang	<b>Polarization :</b>	Vertical
<b>Remark :</b>	2462 MHz is Fundamental Signals which can be ignored.		

Frequency ( MHz )	Level ( dBuV/m )	Over Limit ( dB )	Limit Line ( dBuV/m )	Read Level (dBuV)	Antenna Factor ( dB )	Cable Loss ( dB )	Preamp Factor ( dB )	Ant Pos ( cm )	Table Pos ( deg )	Remark
37.29	28.49	-11.51	40	45.47	13.91	0.6	31.49	100	88	Peak
106.41	20.54	-22.96	43.5	40.69	10.37	1.03	31.55	-	-	Peak
289.74	14.93	-31.07	46	31.25	13.31	1.69	31.32	-	-	Peak
582.1	20.35	-25.65	46	29.16	19.49	2.64	30.94	-	-	Peak
757.8	23.07	-22.93	46	28.9	21.8	3.07	30.7	-	-	Peak
903.4	29.56	-16.44	46	33.23	23.67	3.35	30.69	-	-	Peak
2380	49.42	-24.58	74	45.08	32.16	6.03	33.85	123	291	Peak
2380	37.66	-16.34	54	33.32	32.16	6.03	33.85	123	291	Average
2462	98.81	-	-	94.3	32.26	6.14	33.89	123	291	Peak
2462	88.75	-	-	84.24	32.26	6.14	33.89	123	291	Average
2486.7	40.27	-13.73	54	35.71	32.28	6.18	33.9	123	291	Average
2486.7	52.97	-21.03	74	48.41	32.28	6.18	33.9	123	291	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	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101329	9kHz~30GHz	Apr. 26, 2010	Apr. 25, 2011	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	0932001	N/A	Sep. 13, 2010	Sep. 12, 2011	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	0846202	N/A	Sep. 14, 2010	Sep. 13, 2011	Conducted (TH02-HY)
EMI Test Receive	R&S	ESCS 30	100356	9KHz – 2.75GHz	Aug. 16, 2010	Aug. 15, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100081	9KHz – 30MHz	Dec. 03, 2010	Dec. 02, 2011	Conduction (CO05-HY)
Two-LISN	R&S	ENV216	11-100080	9KHz – 30MHz	Dec. 01, 2010	Nov. 30, 2011	Conduction (CO05-HY)
AC Power Source	APC	APC-1000W	N/A	N/A	N/A	N/A	Conduction (CO05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2726	30MHz ~ 1GHz	Oct. 31, 2010	Oct. 30, 2011	Radiation (03CH07-HY)
Spectrum Analyzer	R&S	FSP	101067	9KHz ~ 30GHz	Dec. 03, 2010	Dec. 02, 2011	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 19, 2010	Aug. 18, 2011	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec.06,2010	Dec. 05, 2011	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32dB.GAIN	Mar. 27, 2010	Mar. 26, 2011	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	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	$\pm 0.10$	Normal (k=2)	0.10	1	0.10
Antenna Factor Calibration	$\pm 1.70$	Normal (k=2)	0.85	1	0.85
Cable Loss Calibration	$\pm 0.50$	Normal (k=2)	0.25	1	0.25
Receiver Correction	$\pm 2.00$	Rectangular	1.15	1	1.15
Antenna Factor Directional	$\pm 1.50$	Rectangular	0.87	1	0.87
Site Imperfection	$\pm 2.80$	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 EP0D0647 as below.