

FCC RF Test Report

APPLICANT : Sharp Corporation
EQUIPMENT : Mobile Terminal Equipment
BRAND NAME : SHARP
MODEL NAME : EB-W71LJ-H
FCC ID : APYNAR0075
STANDARD : FCC Part 15 Subpart C §15.247
CLASSIFICATION : Digital Transmission System (DTS)

The product was received on May 18, 2011 and completely tested on May 25, 2011. 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 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.



TABLE OF CONTENTS

REVISION HISTORY	3
SUMMARY OF TEST RESULT	4
1 GENERAL DESCRIPTION	5
1.1 Applicant	5
1.2 Manufacturer	5
1.3 Feature of Equipment Under Test	5
1.4 Testing Site	6
1.5 Applied Standards	6
1.6 Ancillary Equipment List	6
2 TEST CONFIGURATION OF EQUIPMENT UNDER TEST	7
2.1 RF Power	7
2.2 Test Mode	8
2.3 Connection Diagram of Test System	9
2.4 RF Utility	10
3 TEST RESULT	11
3.1 6dB Bandwidth Measurement	11
3.2 Output Power Measurement	18
3.3 Band Edges Measurement	20
3.4 Spurious Emission Measurement	28
3.5 Power Spectral Density Measurement	38
3.6 AC Conducted Emission Measurement	45
3.7 Radiated Emission Measurement	49
3.8 Antenna Requirements	70
4 LIST OF MEASURING EQUIPMENT	71
5 UNCERTAINTY OF EVALUATION	73
APPENDIX A. PHOTOGRAPHS OF EUT	
APPENDIX B. SETUP PHOTOGRAPHS	



REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR151805-01B	Rev. 01	Initial issue of report	Jun. 14, 2011

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 6.5 dB at 0.17 MHz
3.7	15.247(d)	A8.5	Transmitter Radiated Emission	15.209(a) & 15.247(d)	Pass	Under limit 3.25 dB at 2483.5 MHz
3.8	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

Sharp Corporation

22-22 Nagaike-cho, Abeno-ku Osaka, 545-8522, Japan

1.2 Manufacturer

Chi Mei Communication Systems, Inc.

No. 4, Mingsheng Street, Tucheng City, Taipei County 23678, Taiwan

1.3 Feature of Equipment Under Test

Product Feature & Specification	
Equipment	Mobile Terminal EQUIPMENT
Brand Name	SHARP
Model Name	EB-W71LJ-H
FCC ID	APYNAR0075
Tx/Rx Frequency Range	2400 MHz ~ 2483.5 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 : 19.53 dBm (0.090 W) 802.11g : 22.94 dBm (0.197 W) 802.11n (BW 20MHz) : 22.63 dBm (0.183 W)
Antenna Type	PIFA Antenna with gain -3.61 dBi
HW Version	PR1
SW Version	1.06
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)
EUT Stage	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

Test Site	SPORTON INTERNATIONAL INC.		
Test Site Location	No. 52, Hwa Ya 1 st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL: +886-3-3273456 / FAX: +886-3-3284978		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	CO05-HY	03CH05-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 8

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.	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.	Notebook	DELL	Vostro 1510	FCC DoC	N/A	AC I/P: Unshielded, 1.2 m DC O/P: Shielded, 1.8 m
4.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
5.	Bluetooth Base Station	R&S	CBT32	N/A	N/A	Unshielded, 1.8 m
6.	LCD TV	Dell	U2410	FCC DoC	Shielded, 1.6 m	Unshielded, 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)			
		DSSS Data Rate			
		1 Mbps	2 Mbps	5.5 Mbps	11 Mbps
CH 01	2412 MHz	18.62	-	-	19.01
CH 06	2437 MHz	18.81	-	-	19.15
CH 11	2462 MHz	19.25	19.42	19.51	19.53

Channel	Frequency	2.4GHz 802.11g RF Power (dBm)							
		OFDM Data Rate							
		6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
CH 01	2412 MHz	22.25	-	-	-	-	-	-	-
CH 06	2437 MHz	22.28	-	-	-	-	-	-	-
CH 11	2462 MHz	22.94	22.88	22.85	22.87	22.81	22.83	22.8	22.93

Channel	Frequency	2.4GHz 802.11n (BW 20MHz) RF Power (dBm)							
		OFDM Data Rate							
		MCS=0	MCS=1	MCS=2	MCS=3	MCS=4	MCS=5	MCS=6	MCS=7
		6.5 Mbps	13 Mbps	19.5 Mbps	26 Mbps	39 Mbps	52 Mbps	58.5 Mbps	65 Mbps
CH 01	2412 MHz	22.08	-	-	-	-	-	-	-
CH 06	2437 MHz	22.25	-	-	-	-	-	-	-
CH 11	2462 MHz	22.63	22.39	22.28	22.23	22.36	22.16	22.35	22.56

Remark:

1. The data rates of WLAN 802.11b/g/n were set in 11Mbps for 802.11b, 54Mbps for 802.11g, and 6.5Mbps for 802.11n (BW 20MHz) for all the test cases due to the highest RF output power.
2. The EUT is programmed to transmit signals continuously for all testing.
3. Pre-scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports.

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).

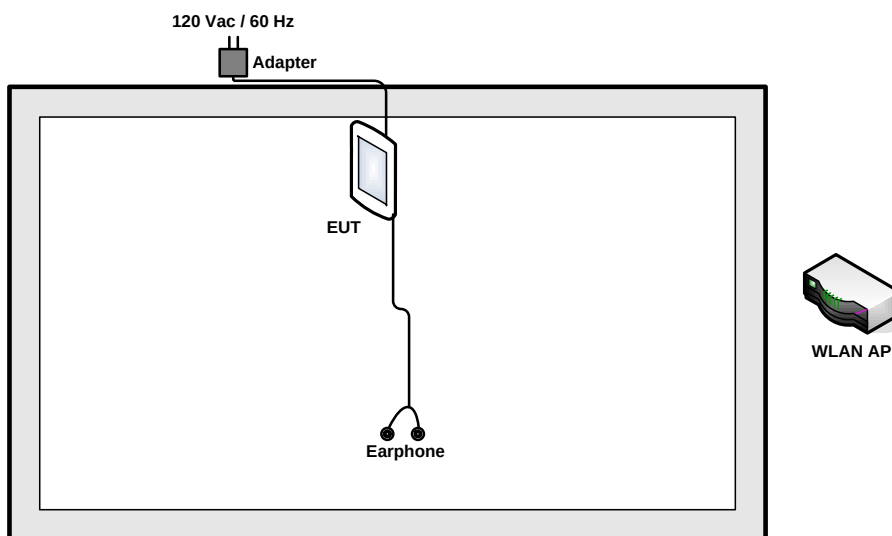
Pre-scanned tests were conducted to determine the final configuration from all possible combinations.

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

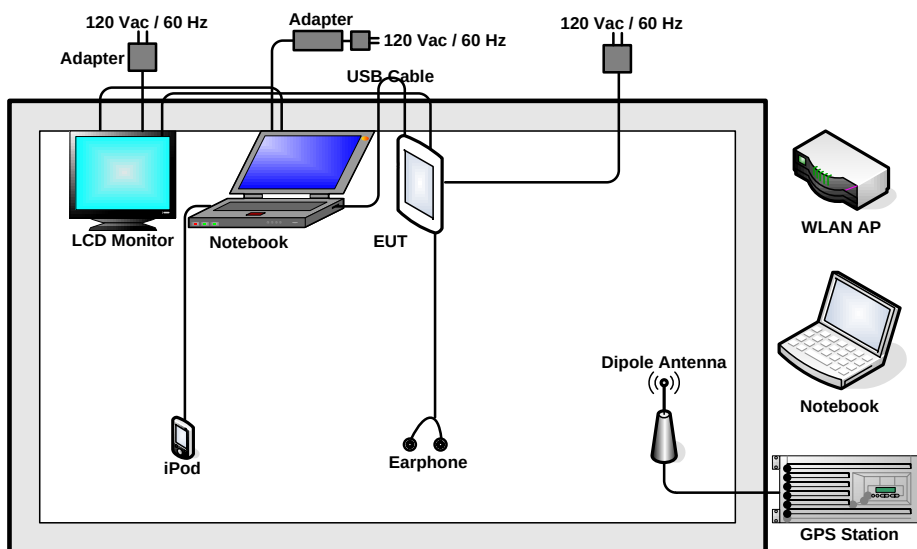
Test Cases		
Test Item	802.11b (Modulation : DSSS)	802.11g/n (Modulation : OFDM)
Conducted TCs	Mode 1 : 802.11b CH01_2412 MHz Mode 2 : 802.11b CH06_2437 MHz Mode 3 : 802.11b CH11_2462 MHz	Mode 4: 802.11g_CH01_2412 MHz Mode 5: 802.11g_CH06_2437 MHz Mode 6: 802.11g_CH11_2462 MHz Mode 7: 802.11n (BW 20M)_CH01_2412 MHz Mode 8: 802.11n (BW 20M)_CH06_2437 MHz Mode 9: 802.11n (BW 20M)_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 Mode 7: 802.11n (BW 20M)_CH01_2412 MHz Mode 8: 802.11n (BW 20M)_CH06_2437 MHz Mode 9: 802.11n (BW 20M)_CH11_2462 MHz
AC Conducted Emission	Mode 1 :WLAN Link + Bluetooth Link + USB Link + Battery + HDMI Cable + GPS Rx + HDMI TV + Earphone + USB Cable (Charging from Adapter)	
Remark: The worst case of conducted emission is mode 1; only the test data of it was reported.		

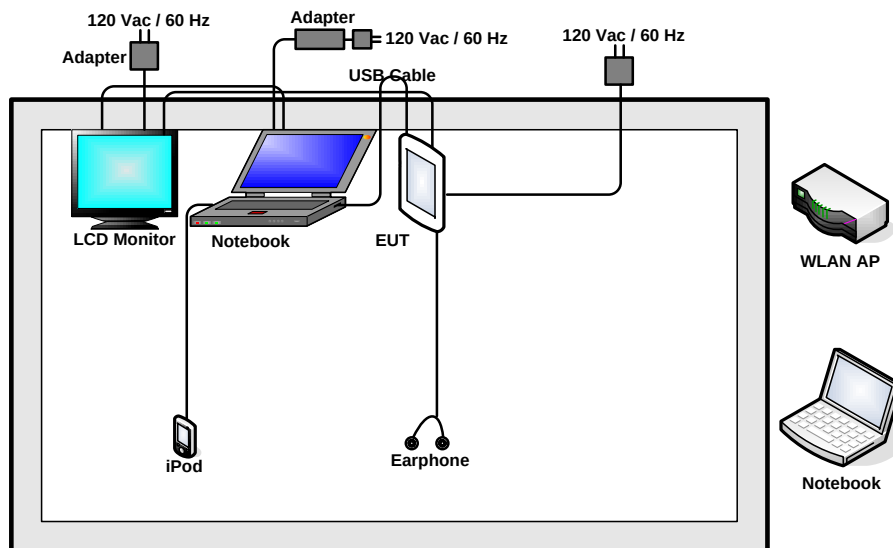
2.3 Connection Diagram of Test System

< WLAN Tx Mode >



<EUT with GPS Rx Mode>



<EUT without GPS Rx Mode>


2.4 RF Utility

The programmed RF utility "WLAN RF Test" 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.

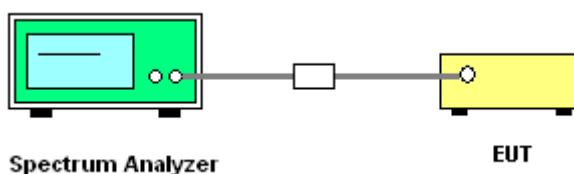
3.1.2 Measuring Instruments

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



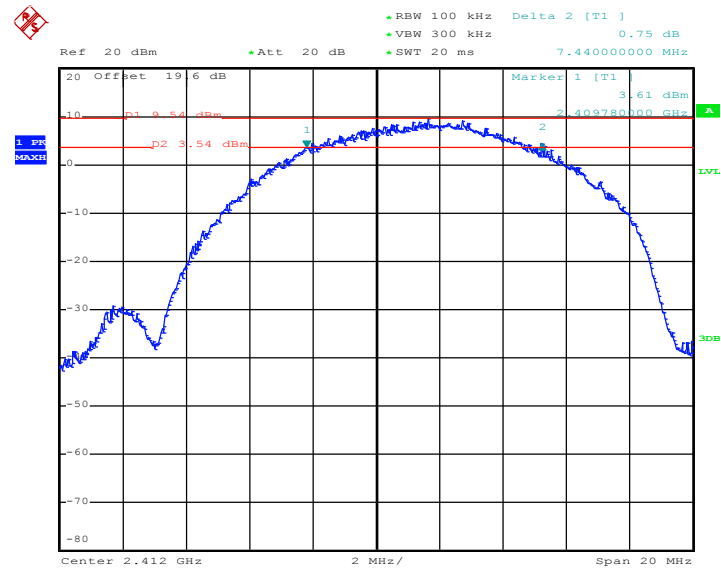
3.1.5 Test Result of 6dB Bandwidth

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	7.44	0.5	Pass
06	2437	7.56	0.5	Pass
11	2462	7.60	0.5	Pass

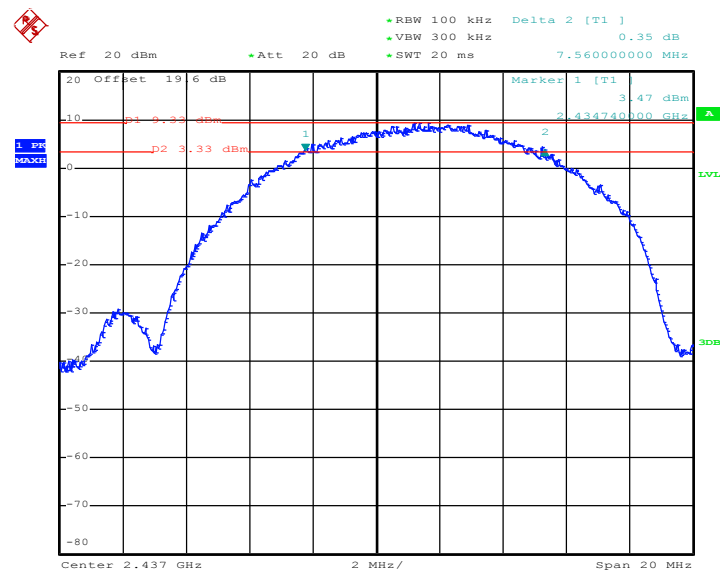


Mode 1 : 6 dB Bandwidth Plot on 802.11b Channel 01



Date: 18.MAY.2011 23:24:52

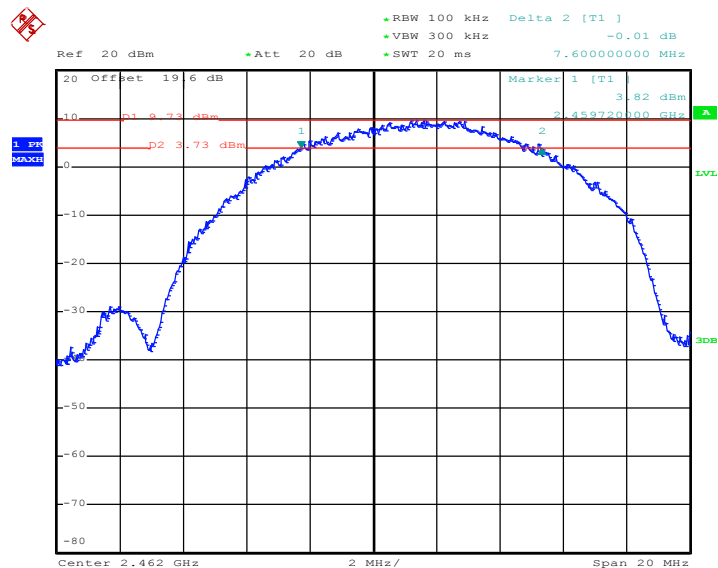
Mode 2 : 6 dB Bandwidth Plot on 802.11b Channel 06



Date: 18.MAY.2011 23:06:07



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

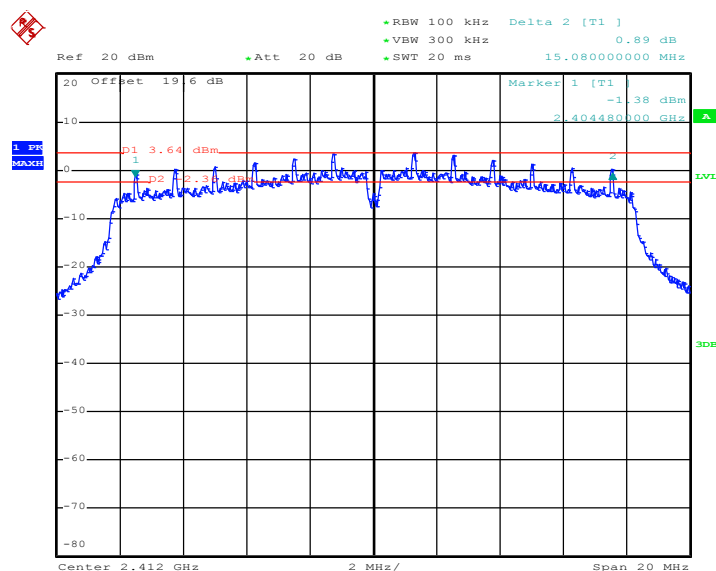


Date: 18.MAY.2011 23:02:12



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

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	15.08	0.5	Pass
06	2437	15.12	0.5	Pass
11	2462	15.08	0.5	Pass

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

Date: 18.MAY.2011 22:51:08



Ref 20 dBm Att 20 dB RBW 100 kHz VBW 300 kHz Delta 2 [T1] 0.24 dB 15.12000000 MHz

20 Offset 19.6 dB

Marker 1 [T1] -2.12 dBm 2.429460000 GHz

P1 3.59 dBm P2 -2.12 dBm

1.5% RASCH

Center 2.437 GHz 2 MHz Span 20 MHz

Date: 18.MAY.2011 22:46:52

1.9%
P0.000

Ref 20 dBm Att 20 dB RBW 100 kHz Delta 2 [T1] -0.18 dB VBW 300 kHz 15.08000000 MHz SWT 20 ms

20 Offset 19.6 dB

Marker 1 [T1] -0.16 dBm 2.454480000 GHz

p1 4.15 dBm

p2 -1.16 dBm

Center 2.462 GHz 2 MHz/ Span 20 MHz

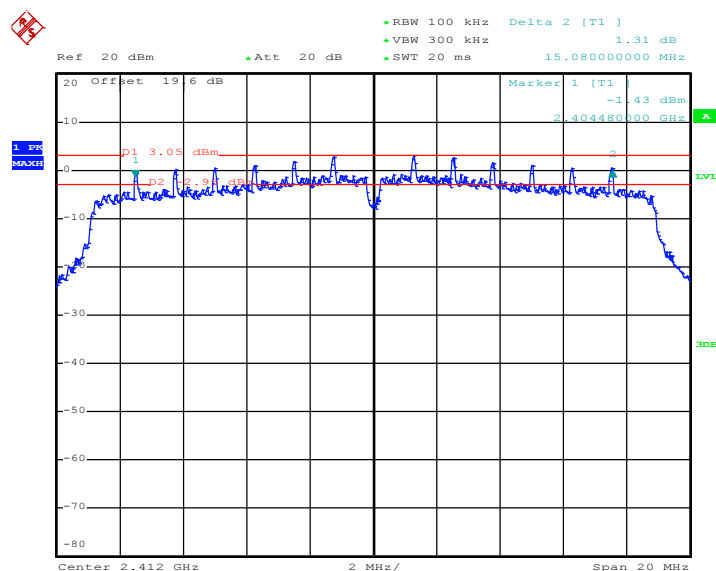
Date: 18.MAY.2011 22:56:20



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

Channel	Frequency (MHz)	802.11n (BW 20MHz) 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	15.08	0.5	Pass
06	2437	15.12	0.5	Pass
11	2462	15.12	0.5	Pass

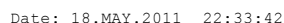
Mode 7 : 6 dB Bandwidth Plot on 802.11n(BW 20MHz) Channel 01



Date: 18.MAY.2011 22:39:34



Mode 9 : 6 dB Bandwidth Plot on 802.11n(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.

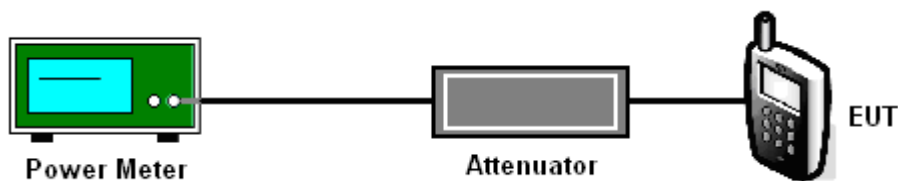
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows 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

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	19.01	30	Pass
06	2437	19.15	30	Pass
11	2462	19.53	30	Pass

Test Mode :	Mode 4, 5, 6	Temperature :	24~26℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	22.25	30	Pass
06	2437	22.28	30	Pass
11	2462	22.94	30	Pass

Test Mode :	Mode 7, 8, 9	Temperature :	24~26℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	22.08	30	Pass
06	2437	22.25	30	Pass
11	2462	22.63	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

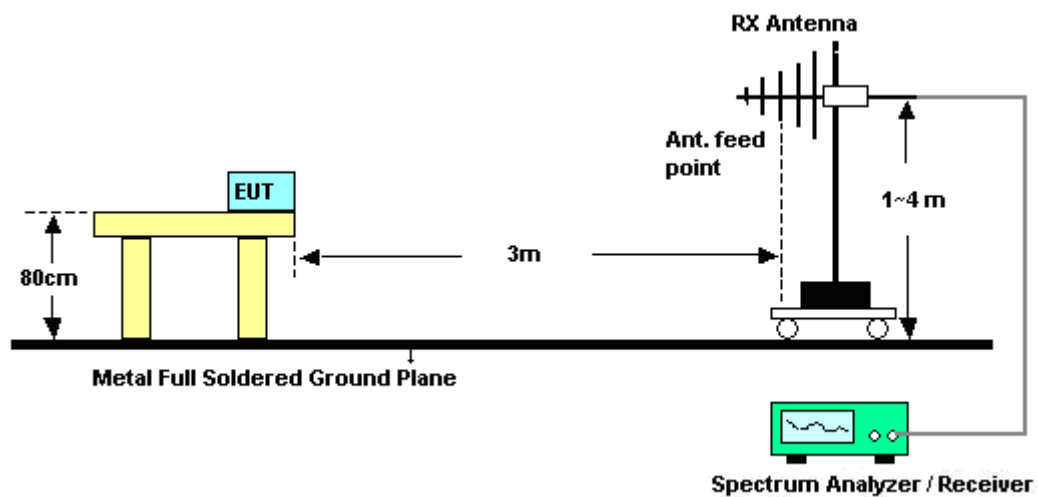
See list of measuring instruments of this test report.

3.3.3 Test Procedures

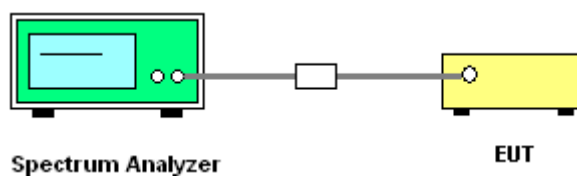
1. The testing follows the guidelines in ANSI C63.4-2003 and FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
2. Conducted emission test: Set RBW = 100 kHz, Video bandwidth (VBW) $\geq$ RBW. Band edge emissions must be at least 20 dB down from the highest emission level within the authorized 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

Test Mode :	Mode 1	Temperature :	23~25°C
Test Band :	802.11b	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Brian Chang

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
2390	53.08	-20.92	74	50.96	31.7	4.5	34.08	100	227	Peak
2390	40.29	-13.71	54	38.17	31.7	4.5	34.08	100	227	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
2390	49.9	-24.1	74	47.78	31.7	4.5	34.08	100	66	Peak
2390	38.42	-15.58	54	36.3	31.7	4.5	34.08	100	66	Average

Test Mode :	Mode 3	Temperature :	23~25°C
Test Band :	802.11b	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Brian Chang

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
2483.5	54.56	-19.44	74	52.27	31.78	4.59	34.08	102	240	Peak
2483.5	42.54	-11.46	54	40.25	31.78	4.59	34.08	102	240	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
2483.5	54.91	-19.09	74	52.62	31.78	4.59	34.08	100	19	Peak
2483.5	42.73	-11.27	54	40.44	31.78	4.59	34.08	100	19	Average



Test Mode :	Mode 4	Temperature :	23~25°C
Test Band :	802.11g	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Brian Chang

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
2389.8	68.7	-5.3	74	66.58	31.7	4.5	34.08	121	318	Peak
2389.8	47.29	-6.71	54	45.17	31.7	4.5	34.08	121	318	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
2389.99	65.58	-8.42	74	63.46	31.7	4.5	34.08	101	27	Peak
2389.99	43.28	-10.72	54	41.16	31.7	4.5	34.08	101	27	Average

Test Mode :	Mode 6	Temperature :	23~25°C
Test Band :	802.11g	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Brian Chang

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
2483.5	70.75	-3.25	74	68.46	31.78	4.59	34.08	177	290	Peak
2483.5	48.56	-5.44	54	46.27	31.78	4.59	34.08	177	290	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
2483.5	69.54	-4.46	74	67.25	31.78	4.59	34.08	123	326	Peak
2483.5	47.12	-6.88	54	44.83	31.78	4.59	34.08	123	326	Average



Test Mode :	Mode 7	Temperature :	23~25°C
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	49~51%
Test Channel :	01	Test Engineer :	Brian Chang

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
2390	67.31	-6.69	74	65.19	31.7	4.5	34.08	100	58	Peak
2390	47.5	-6.5	54	45.38	31.7	4.5	34.08	100	58	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
2390	60.68	-13.32	74	58.56	31.7	4.5	34.08	100	270	Peak
2390	41.35	-12.65	54	39.23	31.7	4.5	34.08	100	270	Average

Test Mode :	Mode 9	Temperature :	23~25°C
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	49~51%
Test Channel :	11	Test Engineer :	Brian Chang

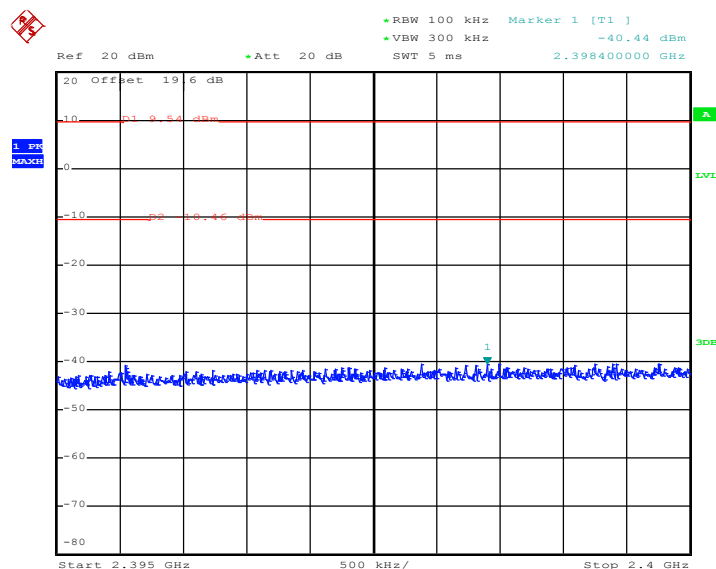
ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBuV/m)	Over Limit (dB)	Limit Line (dBuV/m)	Read Level (dBuV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.66	66.57	-7.43	74	64.28	31.78	4.59	34.08	167	318	Peak
2483.66	46.12	-7.88	54	43.83	31.78	4.59	34.08	167	318	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	60.7	-13.3	74	58.41	31.78	4.59	34.08	100	26	Peak
2483.66	40.66	-13.34	54	38.37	31.78	4.59	34.08	100	26	Average

3.3.6 Test Plots of Conducted Band Edges

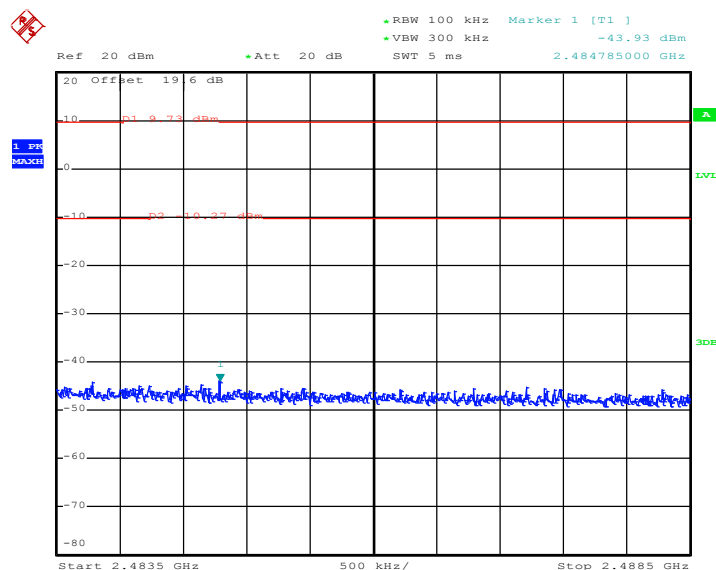
Test Mode :	Mode 1 and 3	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Hank Yu

Low Band Edge Plot on 802.11b Channel 01



Date: 18.MAY.2011 23:26:00

High Band Edge Plot on 802.11b Channel 11



Date: 18.MAY.2011 23:02:58



Report No. : FR151805-01B

Test Mode :	Mode 4 and 6	Temperature :	24~26℃
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Hank Yu

RBW 100 kHz
 VBW 300 kHz
 Marker 1 [T1]
 -31.75 dBm
 Ref 20 dBm
 Att 20 dB
 SWT 5 ms
 2.396970000 GHz

20 Offset 19.6 dB
 p1 3.64 dBm
 p2 -16.36 dBm
 1.5%
 30dB

Start 2.395 GHz
 500 kHz/
 Stop 2.4 GHz

Date: 18.MAY.2011 22:52:17

• RBW 100 kHz Marker 1 [T1]
 • VBW 300 kHz -42.11 dBm
 Ref 20 dBm • Att 20 dB SWT 5 ms 2.483840000 GHz

20 Offset 19.6 dB
 10
 0
 -10
 -20
 -30
 -40
 -50
 -60
 -70
 -80

1.5%
 ERROR

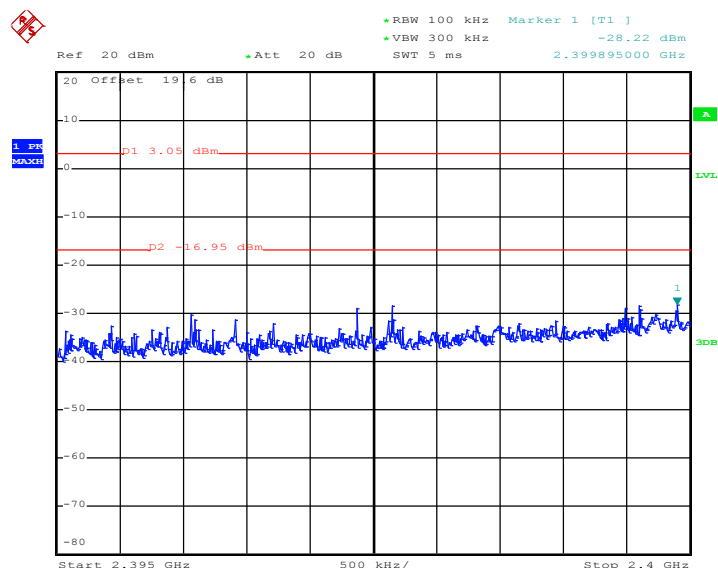
p1 -4.15 dBm
 p2 -15.85 dBm
 1
 2.4835 GHz 500 kHz/ 2.4885 GHz

Date: 18.MAY.2011 22:57:07



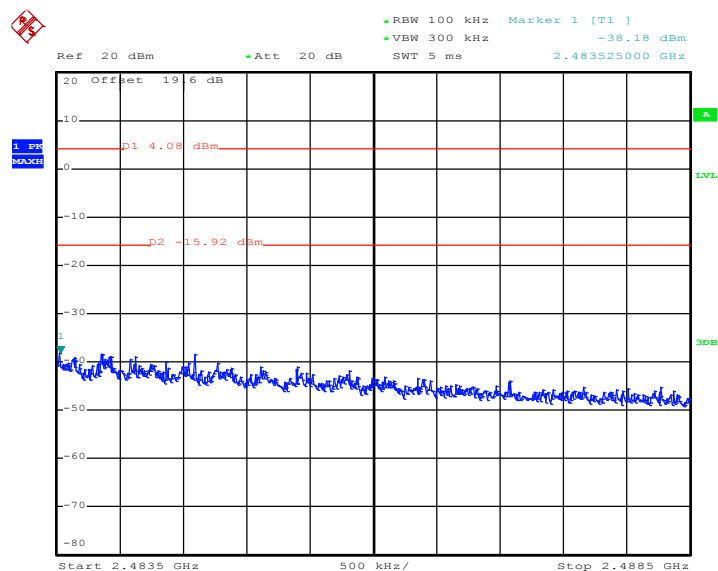
Test Mode :	Mode 7 and 9	Temperature :	24~26°C
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Hank Yu

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



Date: 18.MAY.2011 22:40:42

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



Date: 18.MAY.2011 22:34:29

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.

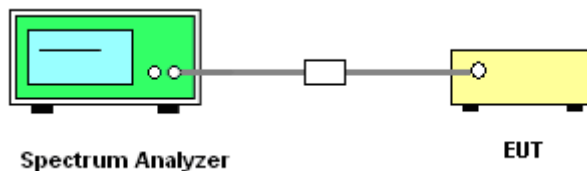
3.4.2 Measuring Instruments

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.
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.

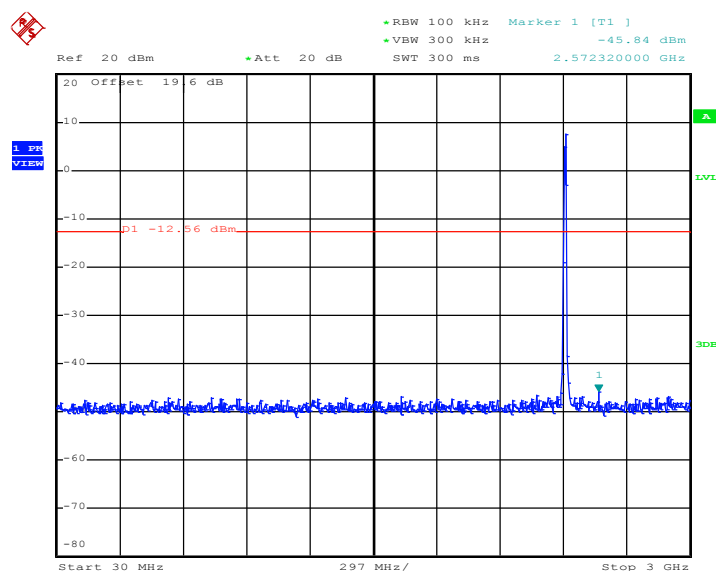
3.4.4 Test Setup



3.4.5 Test Plots of Spurious Emission

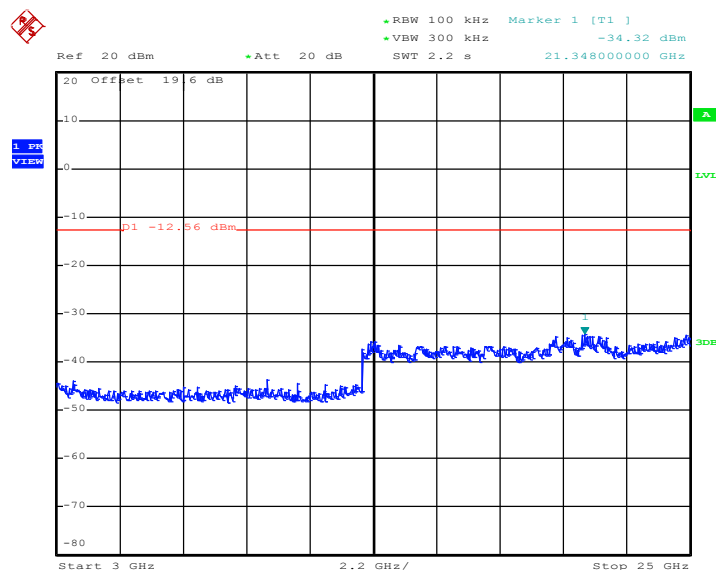
Test Mode :	Mode 1	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



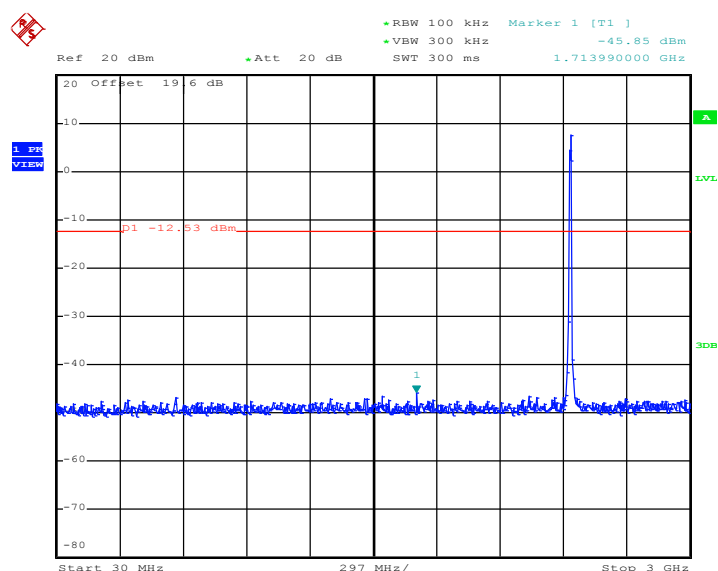
Date: 18.MAY.2011 23:26:46

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

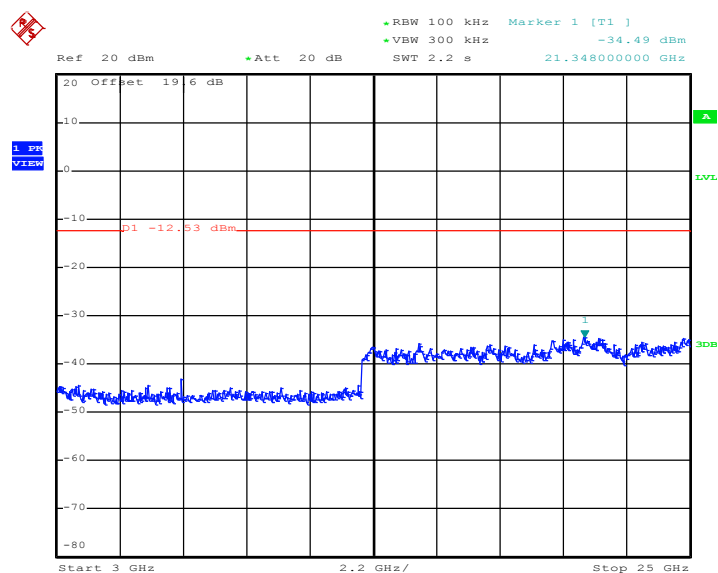


Date: 18.MAY.2011 23:27:03

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

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz


Date: 18.MAY.2011 23:22:46

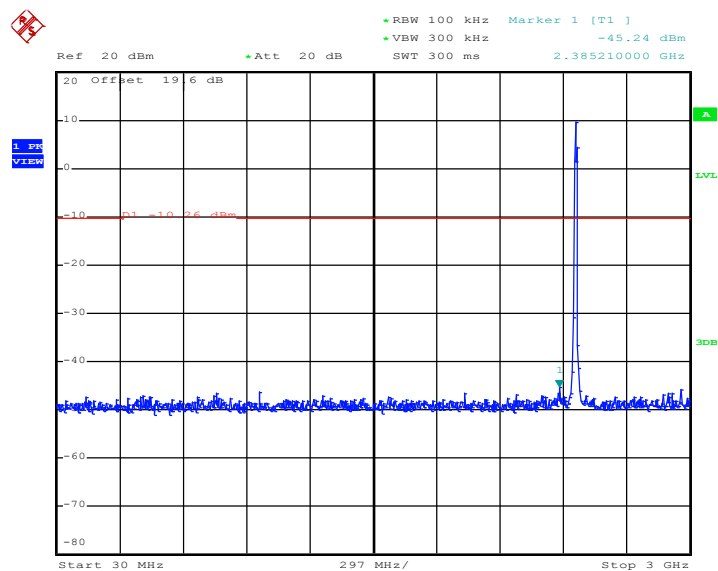
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz


Date: 18.MAY.2011 23:23:03



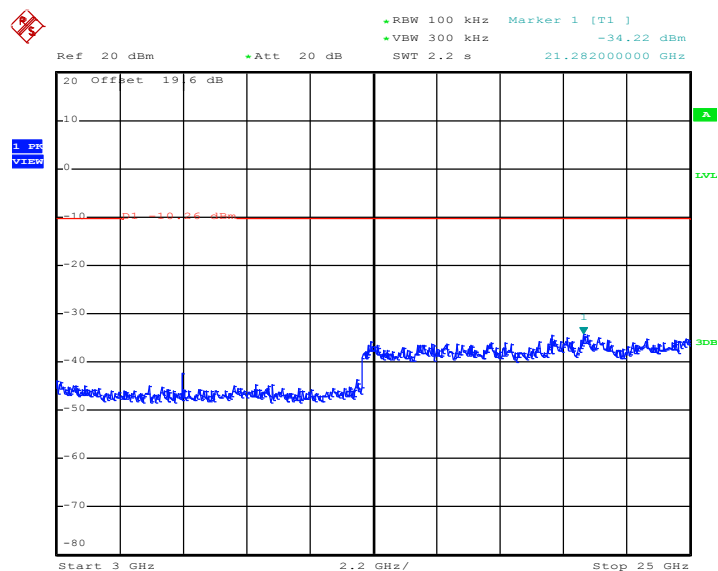
Test Mode :	Mode 3	Temperature :	24~26°C
Test Band :	802.11b	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



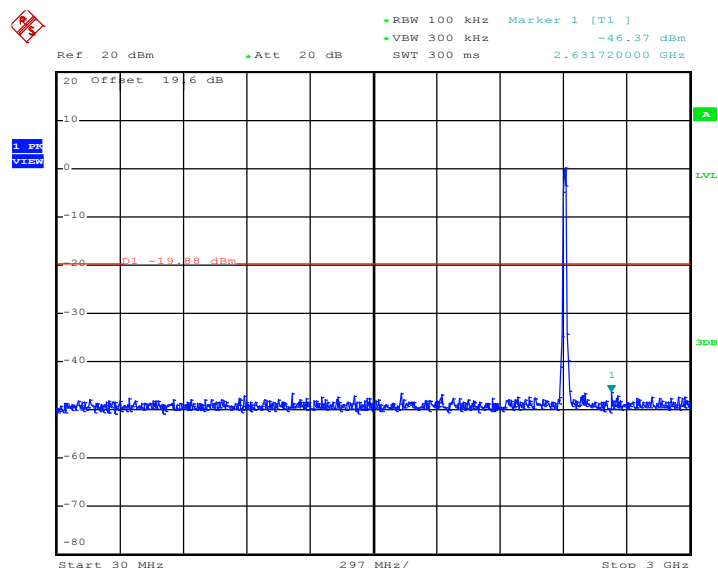
Date: 18.MAY.2011 23:03:45

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

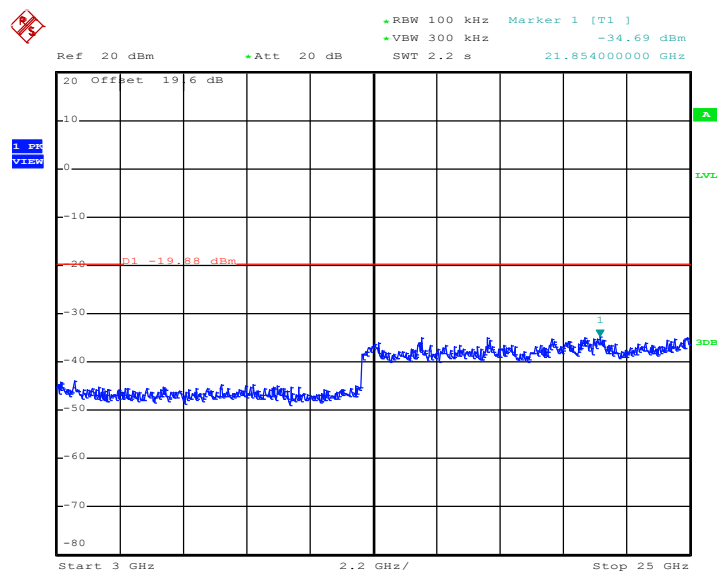


Date: 18.MAY.2011 23:04:02

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

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz


Date: 18.MAY.2011 22:53:03

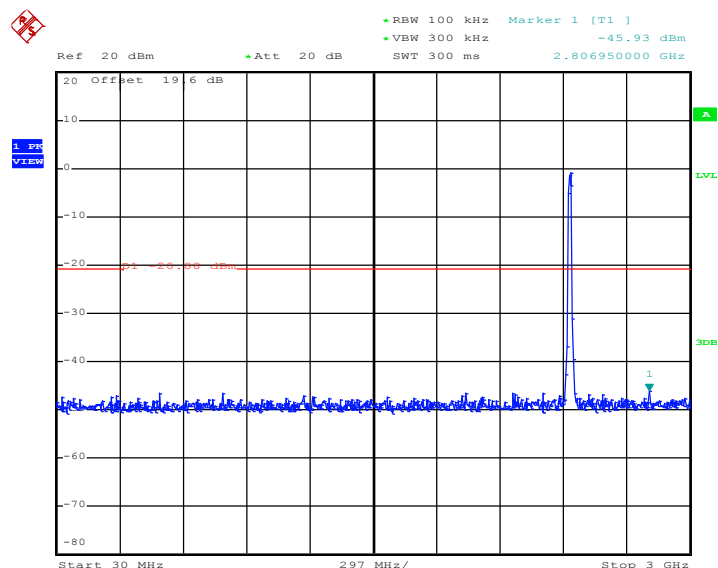
Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz


Date: 18.MAY.2011 22:53:20



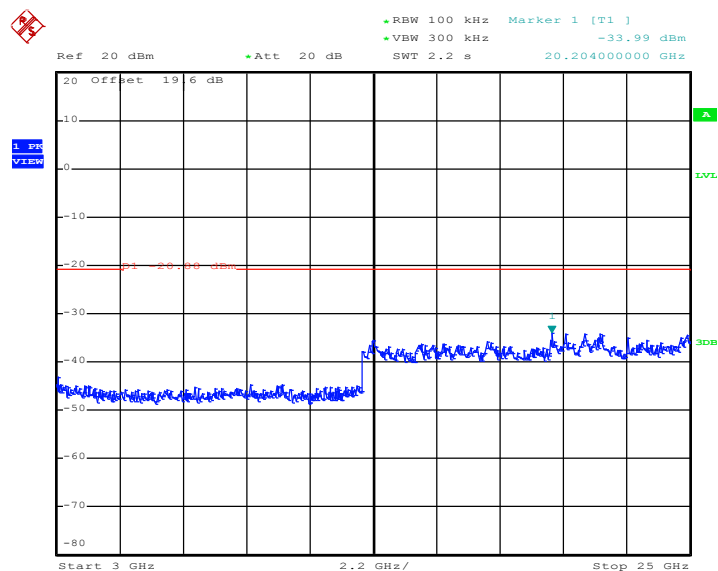
Test Mode :	Mode 5	Temperature :	24~26
Test Band :	802.11g	Relative Humidity :	50~53
Test Channel :	06	Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 18.MAY.2011 22:47:43

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

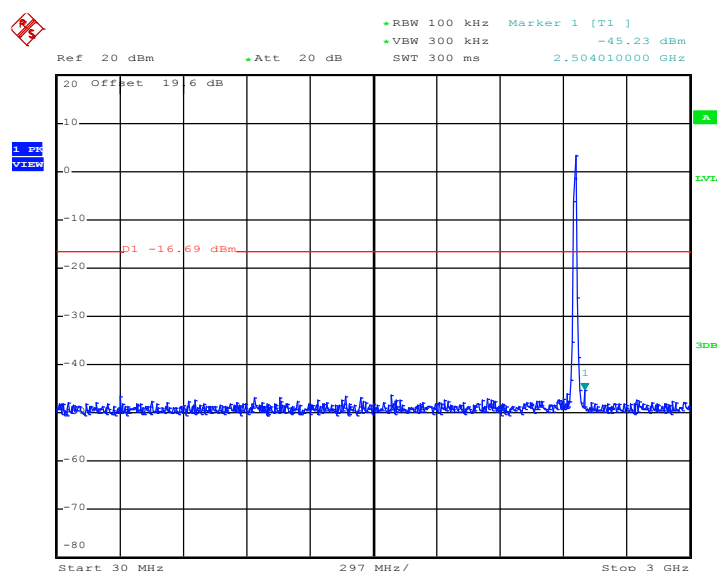


Date: 18.MAY.2011 22:48:00



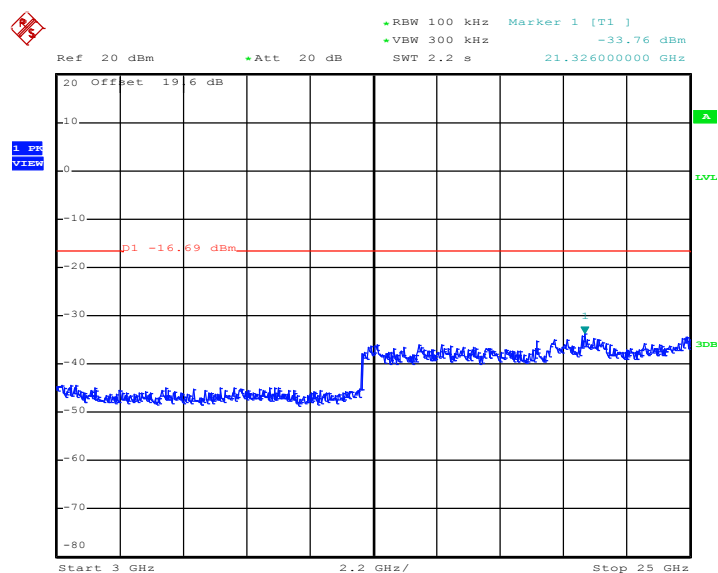
Test Mode :	Mode 6	Temperature :	24~26°C
Test Band :	802.11g	Relative Humidity :	50~53%
Test Channel :	11	Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 18.MAY.2011 22:58:20

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

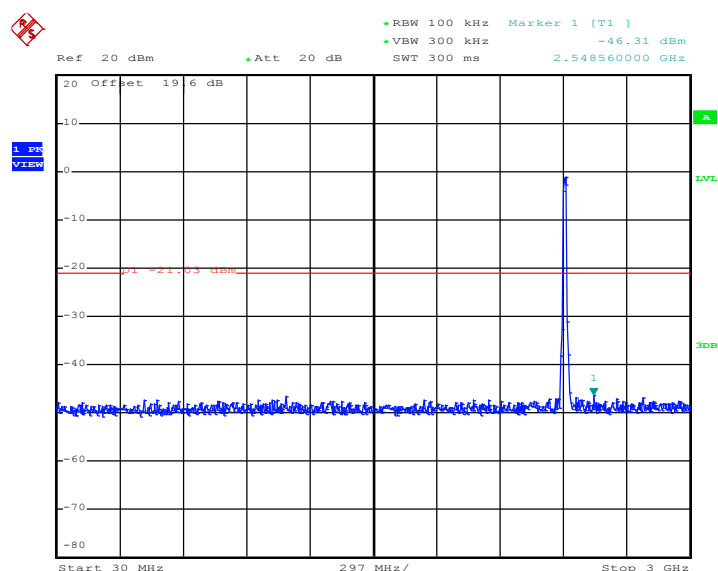


Date: 18.MAY.2011 22:58:36



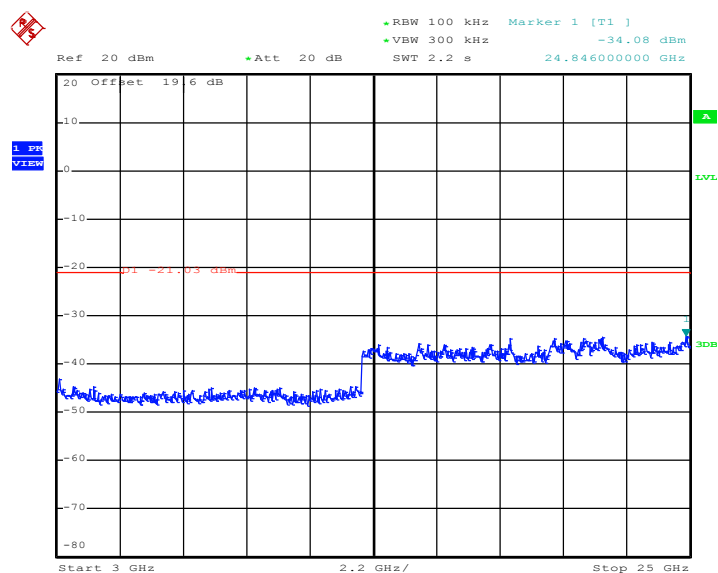
Test Mode :	Mode 7	Temperature :	24~26°C
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	50~53%
Test Channel :	01	Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



Date: 18.MAY.2011 22:41:28

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

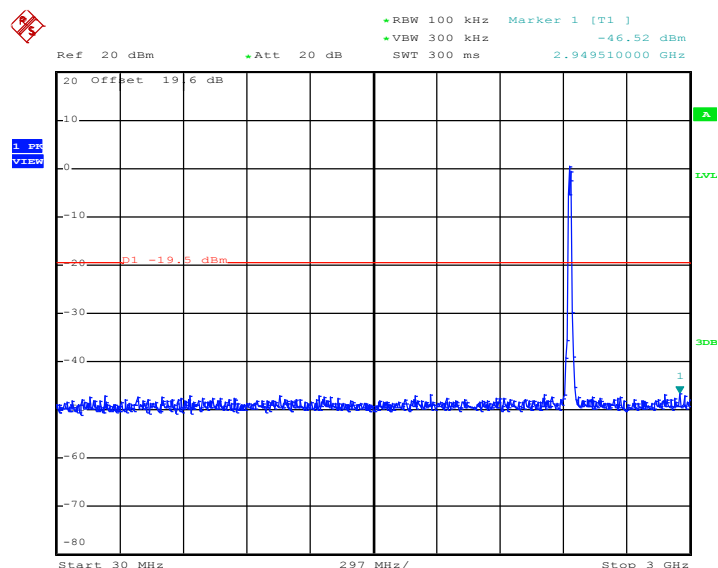


Date: 18.MAY.2011 22:41:45



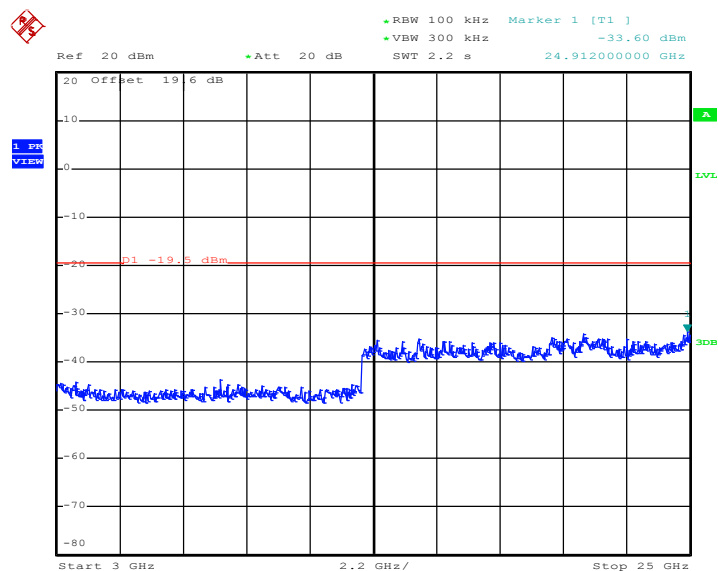
Test Mode :	Mode 8	Temperature :	24~26°C
Test Band :	802.11n (BW 20MHz)	Relative Humidity :	50~53%
Test Channel :	06	Test Engineer :	Hank Yu

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz



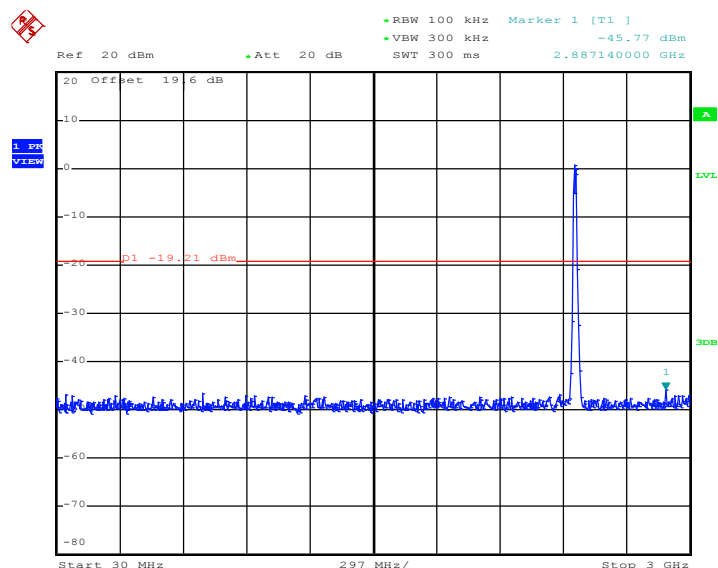
Date: 18.MAY.2011 22:44:30

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz

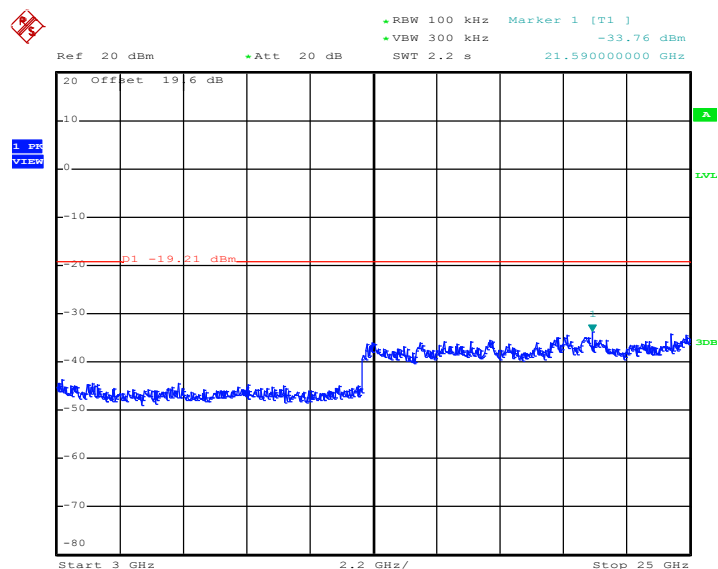


Date: 18.MAY.2011 22:44:47

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

Conducted Spurious Emission Plot between 30MHz ~ 3 GHz


Date: 18.MAY.2011 22:35:16

Conducted Spurious Emission Plot between 3 GHz ~ 25 GHz


Date: 18.MAY.2011 22:35:33

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.

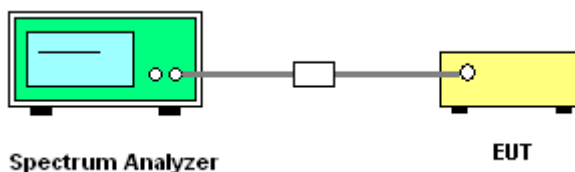
3.5.2 Measuring Instruments

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

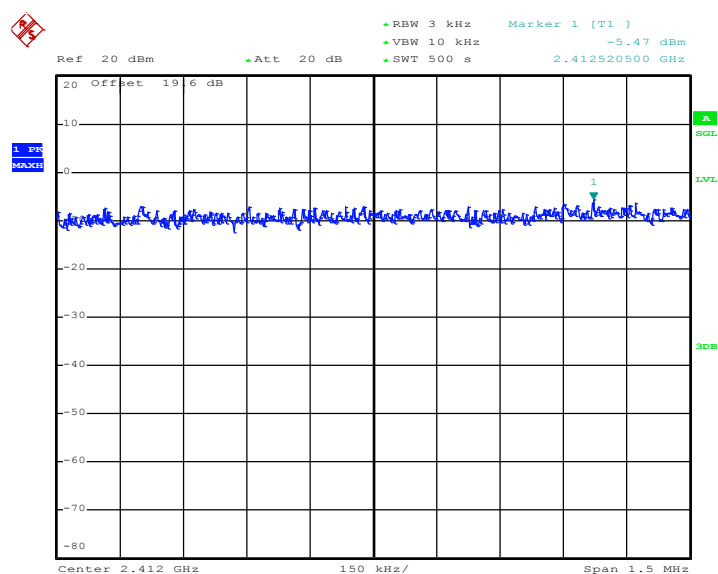


3.5.5 Test Result of Power Spectral Density

Test Mode :	Mode 1, 2, 3	Temperature :	24~26℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

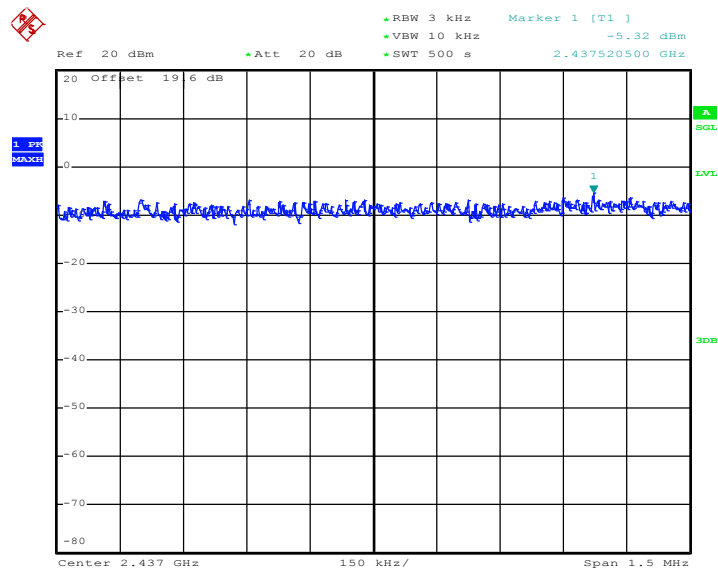
Channel	Frequency (MHz)	802.11b Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-5.47	8	Pass
06	2437	-5.32	8	Pass
11	2462	-5.09	8	Pass

Mode 1 : PSD Plot on 802.11b Channel 01



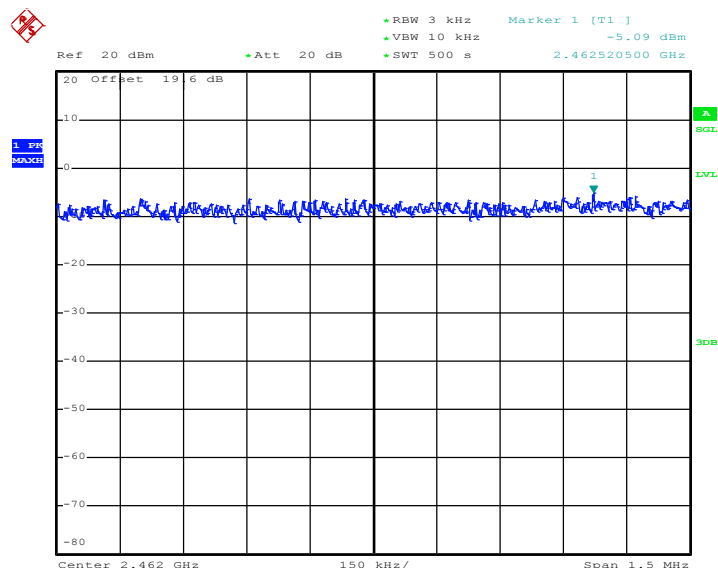
Date: 19.MAY.2011 00:45:55

Mode 2 : PSD Plot on 802.11b Channel 06



Date: 19.MAY.2011 00:37:02

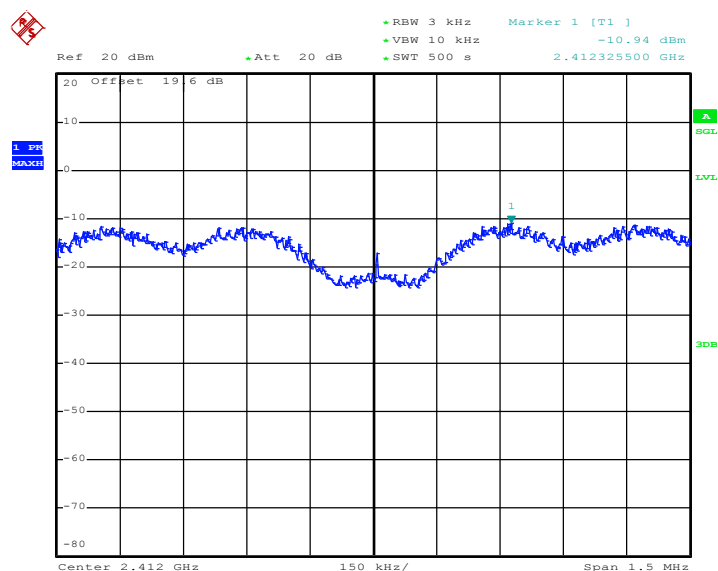
Mode 3 : PSD Plot on 802.11b Channel 11



Date: 19.MAY.2011 00:55:00

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

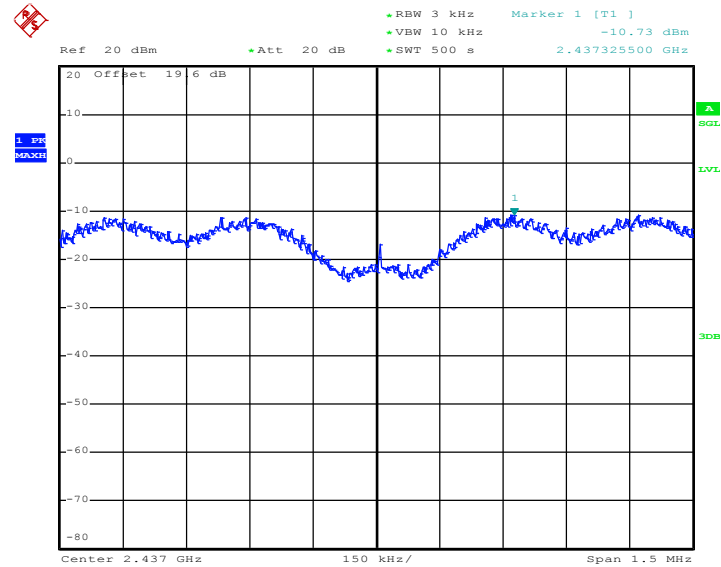
Channel	Frequency (MHz)	802.11g Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-10.94	8	Pass
06	2437	-10.73	8	Pass
11	2462	-10.08	8	Pass

Mode 4 : PSD Plot on 802.11g Channel 01


Date: 19.MAY.2011 00:19:13

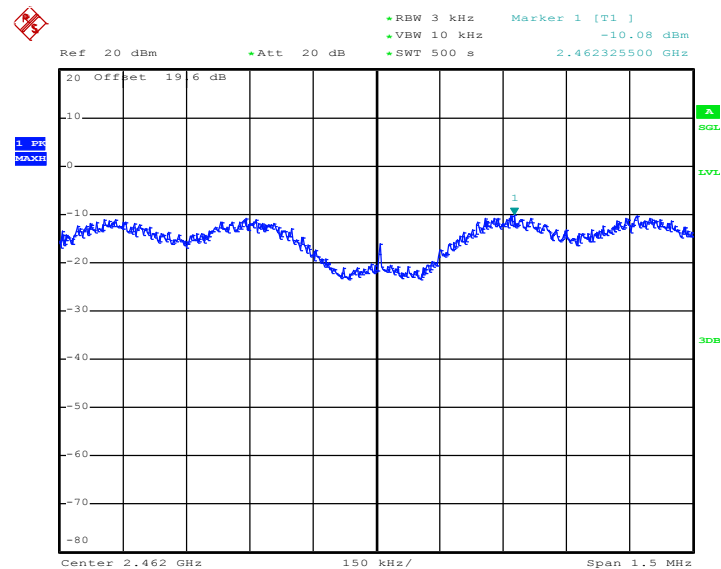


Mode 5 : PSD Plot on 802.11g Channel 06



Date: 19.MAY.2011 00:28:00

Mode 6 : PSD Plot on 802.11g Channel 11

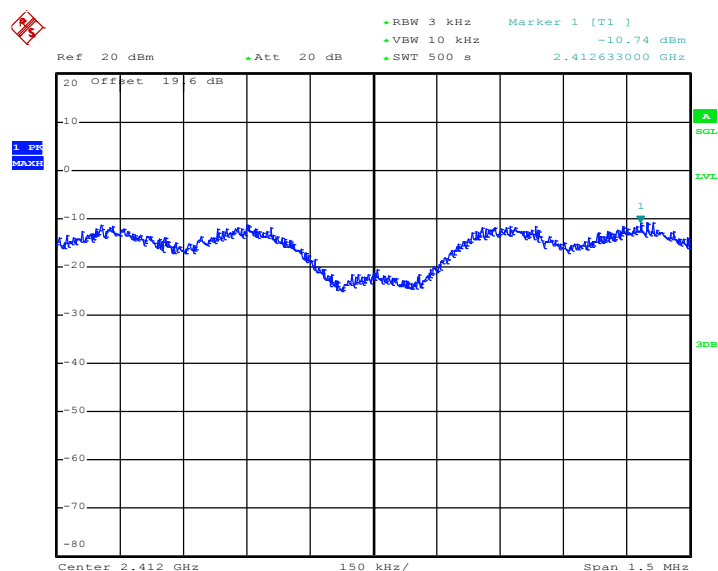


Date: 19.MAY.2011 00:10:18

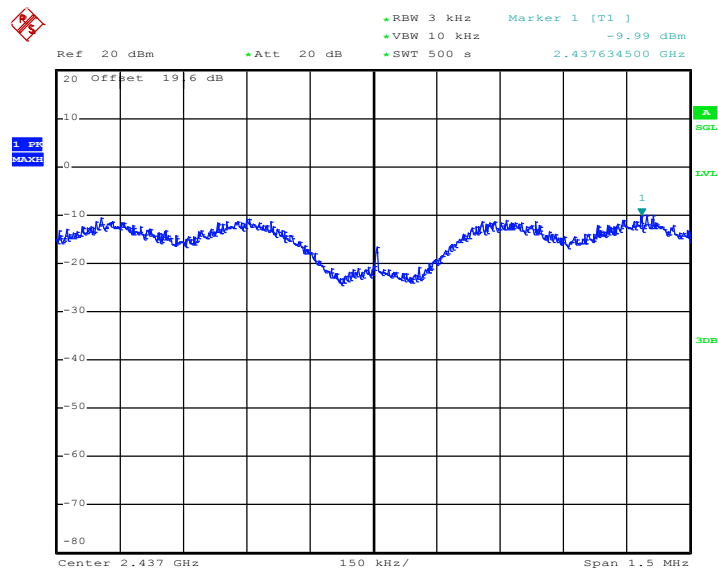


Test Mode :	Mode 7, 8, 9	Temperature :	24~26℃
Test Engineer :	Hank Yu	Relative Humidity :	50~53%

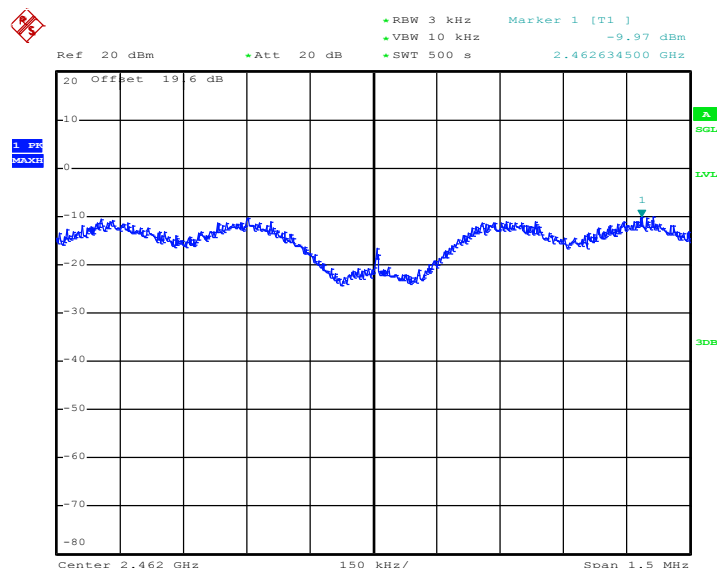
Channel	Frequency (MHz)	802.11n (BW 20MHz) Measured PSD (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	-10.74	8	Pass
06	2437	-9.99	8	Pass
11	2462	-9.97	8	Pass

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

Date: 18.MAY.2011 23:40:36

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


Date: 18.MAY.2011 23:51:20

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


Date: 19.MAY.2011 00:01:19

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.

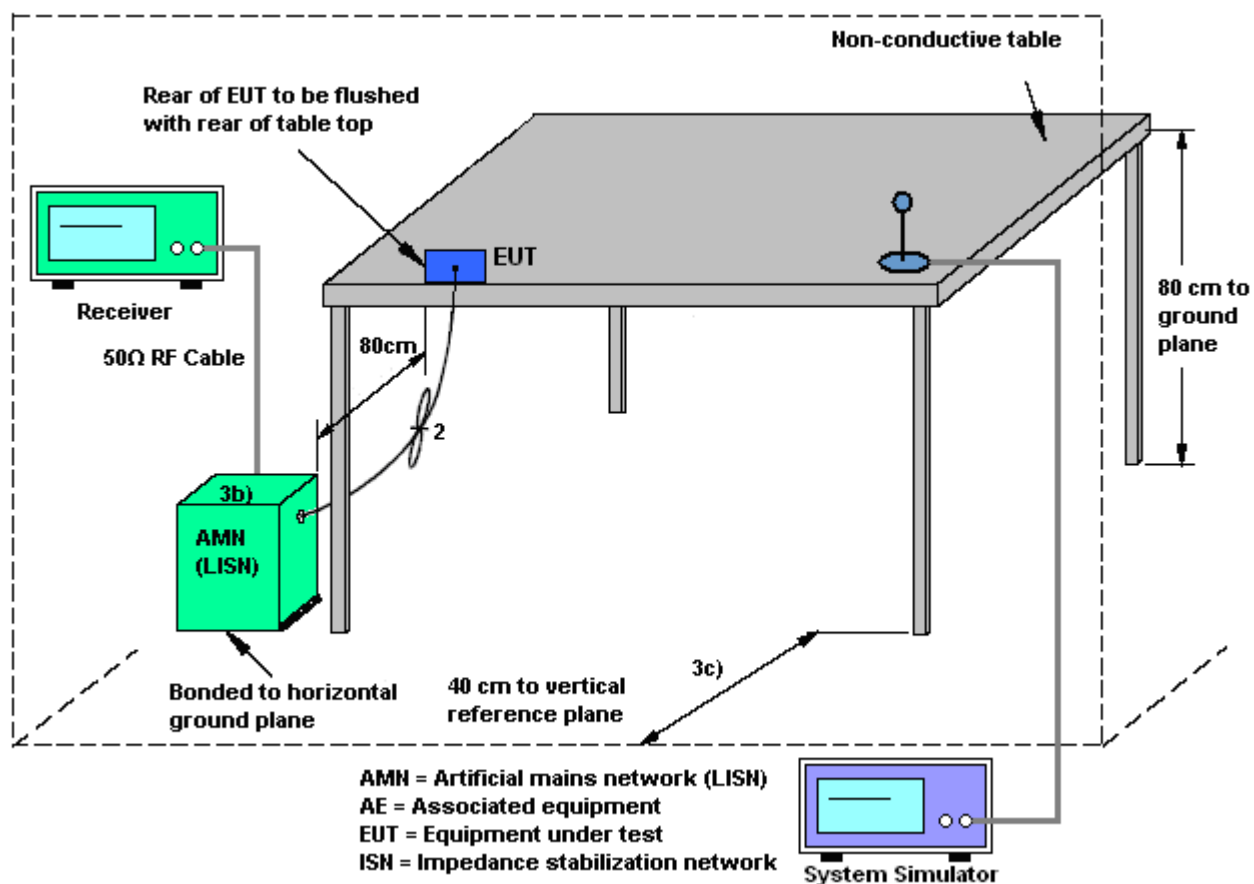
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

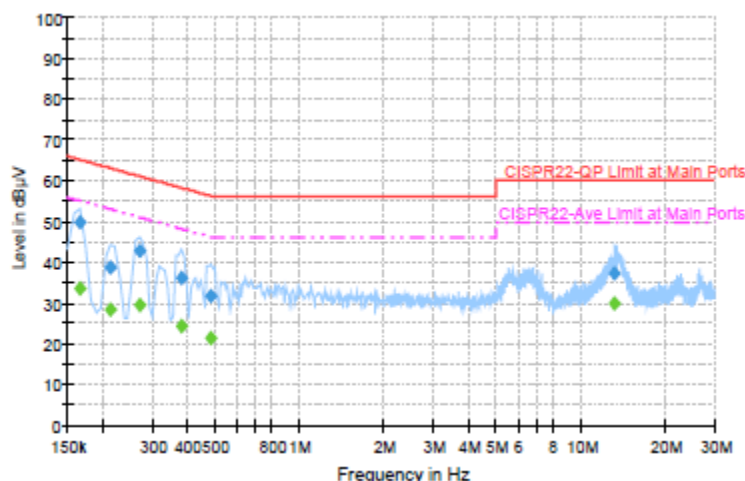
1. The testing follows the guidelines in ANSI C63.4-2003.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network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

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Chiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	WLAN Link + Bluetooth Link + USB Link + Battery + HDMI Cable + GPS Rx + HDMI TV + Earphone + USB Cable (Charging from Adapter)		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



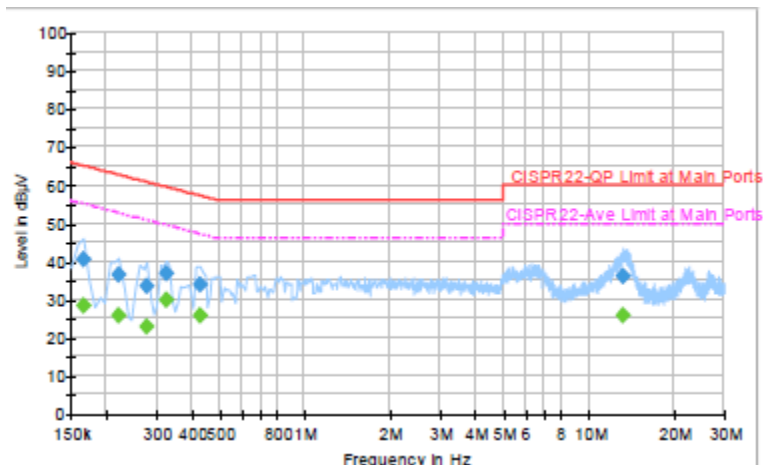
Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	49.8	Off	L1	19.4	15.8	65.6
0.214000	38.6	Off	L1	19.4	24.4	63.0
0.270000	42.7	Off	L1	19.4	18.2	60.9
0.382000	36.3	Off	L1	19.4	22.1	58.4
0.486000	31.6	Off	L1	19.4	24.6	56.2
13.190000	37.4	Off	L1	19.6	22.6	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	33.5	Off	L1	19.4	22.1	55.6
0.214000	28.2	Off	L1	19.4	24.8	53.0
0.270000	29.6	Off	L1	19.4	21.3	50.9
0.382000	24.5	Off	L1	19.4	23.9	48.4
0.486000	21.5	Off	L1	19.4	24.7	46.2
13.190000	30.0	Off	L1	19.6	20.0	50.0

Test Mode :	Mode 1	Temperature :	20~22°C
Test Engineer :	Novic Chiang	Relative Humidity :	40~42%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + Bluetooth Link + USB Link + Battery + HDMI Cable + GPS Rx + HDMI TV + Earphone + USB Cable (Charging from Adapter)		
Remark :	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)
0.166000	40.5	Off	N	19.4	25.1	65.6
0.222000	36.5	Off	N	19.4	26.5	63.0
0.278000	33.6	Off	N	19.4	27.8	61.4
0.326000	36.9	Off	N	19.4	22.7	59.6
0.430000	34.0	Off	N	19.5	23.3	57.3
13.262000	36.0	Off	N	19.7	24.0	60.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.166000	28.5	Off	N	19.4	27.1	55.6
0.222000	25.7	Off	N	19.4	27.3	53.0
0.278000	22.7	Off	N	19.4	28.7	51.4
0.326000	29.9	Off	N	19.4	19.7	49.6
0.430000	26.0	Off	N	19.5	21.3	47.3
13.262000	25.9	Off	N	19.7	24.1	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

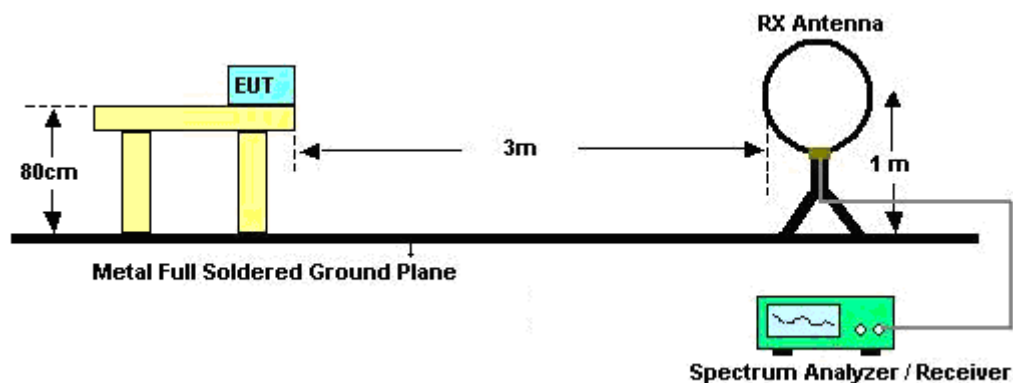
See list of measuring instruments of this test report.

3.7.3 Test Procedures

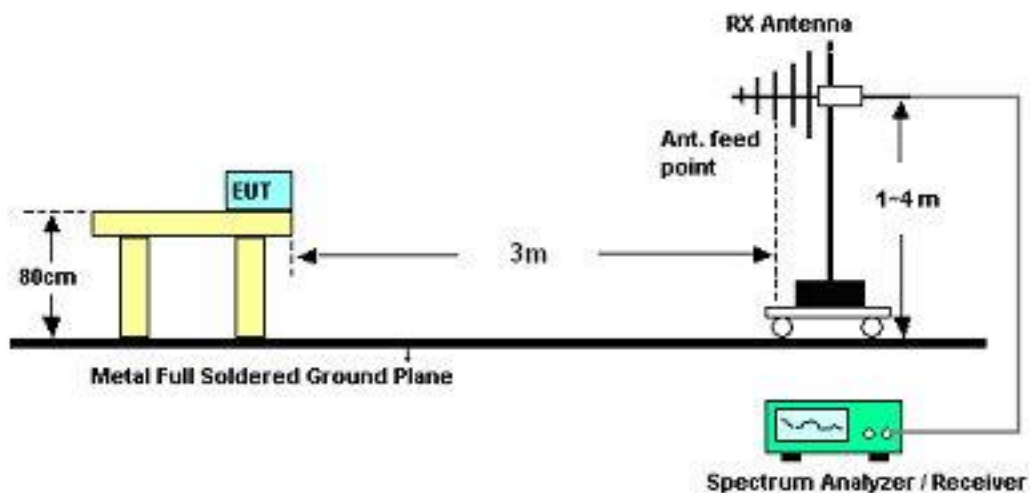
- The testing follows the guidelines in FCC KDB Publication No. 558074 (Measurement Guidelines of DTS).
- Use the following spectrum analyzer settings:
 - Span = wide enough to fully capture the emission being measured; RBW = 1 MHz for $f \geq 1$ GHz, 100 kHz for $f < 1$ GHz; VBW $\geq$ RBW; Sweep = 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.

3.7.4 Test Setup

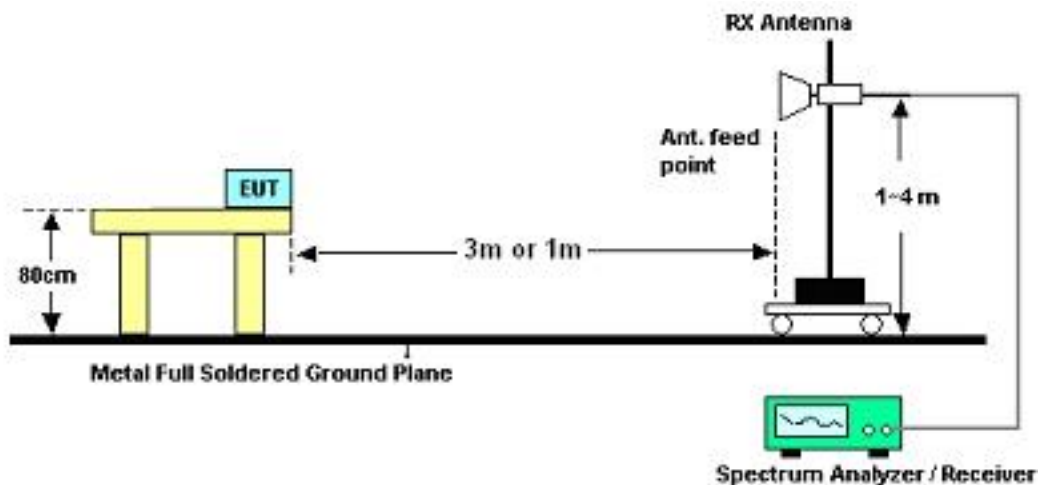
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



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

Test Engineer :	Brian Chang	Temperature :	23~25℃	
		Relative Humidity :	49~51%	

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.

3.7.6 Test Result of Radiated Emission (30 MHz ~ 10th Harmonic)

Test Mode :	Mode 1	Temperature :	23~25℃
Test Channel :	01	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	30.49	-15.51	46	51.41	9.3	1.26	31.48	-	-	Peak
227.64	27.93	-18.07	46	47.97	10.11	1.34	31.49	-	-	Peak
259.23	30.84	-15.16	46	49.14	11.76	1.42	31.48	-	-	Peak
302.1	33.85	-12.15	46	51.33	12.24	1.55	31.27	-	-	Peak
345.5	31	-15	46	47.25	13.35	1.71	31.31	-	-	Peak
388.2	34.7	-11.3	46	49.68	14.46	1.77	31.21	141	18	Peak
2390	40.29	-13.71	54	38.17	31.7	4.5	34.08	100	227	Average
2390	53.08	-20.92	74	50.96	31.7	4.5	34.08	100	227	Peak
2412	96.17	-	-	94.04	31.71	4.5	34.08	100	227	Average
2412	108.46	-	-	106.33	31.71	4.5	34.08	100	227	Peak
2496	35.64	-18.36	54	33.3	31.8	4.62	34.08	100	227	Average
2496	47.26	-26.74	74	44.92	31.8	4.62	34.08	100	227	Peak



Test Mode :	Mode 1	Temperature :	23~25℃
Test Channel :	01	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
62.67	35.81	-4.19	40	61.15	5.46	0.73	31.53	193	318	Peak
131.79	25.11	-18.39	43.5	44.72	10.84	1.07	31.52	-	-	Peak
216.03	30.22	-15.78	46	51.14	9.3	1.26	31.48	-	-	Peak
345.5	28.6	-17.4	46	44.85	13.35	1.71	31.31	-	-	Peak
388.9	26.98	-19.02	46	41.94	14.48	1.77	31.21	-	-	Peak
431.6	27	-19	46	40.79	15.5	1.87	31.16	-	-	Peak
2390	38.42	-15.58	54	36.3	31.7	4.5	34.08	100	66	Average
2390	49.9	-24.1	74	47.78	31.7	4.5	34.08	100	66	Peak
2412	93.52	-	-	91.39	31.71	4.5	34.08	100	66	Average
2412	105.29	-	-	103.16	31.71	4.5	34.08	100	66	Peak
2492	37.5	-16.5	54	35.16	31.8	4.62	34.08	100	66	Average
2492	49.61	-24.39	74	47.27	31.8	4.62	34.08	100	66	Peak



Test Mode :	Mode 2	Temperature :	23~25℃
Test Channel :	06	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	31.32	-14.68	46	52.24	9.3	1.26	31.48	-	-	Peak
235.47	29.29	-16.71	46	48.81	10.65	1.34	31.51	-	-	Peak
259.23	30.95	-15.05	46	49.25	11.76	1.42	31.48	-	-	Peak
302.1	34.32	-11.68	46	51.8	12.24	1.55	31.27	-	-	Peak
345.5	32.59	-13.41	46	48.84	13.35	1.71	31.31	-	-	Peak
388.9	34.8	-11.2	46	49.76	14.48	1.77	31.21	103	110	Peak
2350	40.39	-13.61	54	38.4	31.64	4.44	34.09	125	327	Average
2350	49.35	-24.65	74	47.36	31.64	4.44	34.09	125	327	Peak
2437	96.48	-	-	94.28	31.75	4.53	34.08	125	327	Average
2437	107.54	-	-	105.34	31.75	4.53	34.08	125	327	Peak
2484	37.46	-16.54	54	35.17	31.78	4.59	34.08	125	327	Average
2484	49.84	-24.16	74	47.55	31.78	4.59	34.08	125	327	Peak



Test Mode :	Mode 2	Temperature :	23~25℃
Test Channel :	06	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
62.4	35.27	-4.73	40	60.67	5.41	0.73	31.54	150	33	Peak
134.76	24.07	-19.43	43.5	43.72	10.79	1.07	31.51	-	-	Peak
216.03	31.29	-14.71	46	52.21	9.3	1.26	31.48	-	-	Peak
302.1	27.12	-18.88	46	44.6	12.24	1.55	31.27	-	-	Peak
345.5	28.24	-17.76	46	44.49	13.35	1.71	31.31	-	-	Peak
431.6	27.12	-18.88	46	40.91	15.5	1.87	31.16	-	-	Peak
2360	40.68	-13.32	54	38.66	31.66	4.44	34.08	100	16	Average
2360	51.39	-22.61	74	49.37	31.66	4.44	34.08	100	16	Peak
2437	94.28	-	-	92.08	31.75	4.53	34.08	100	16	Average
2437	106.4	-	-	104.2	31.75	4.53	34.08	100	16	Peak
2488	38	-16	54	35.69	31.8	4.59	34.08	100	16	Average
2488	49.78	-24.22	74	47.47	31.8	4.59	34.08	100	16	Peak



Test Mode :	Mode 3	Temperature :	23~25℃
Test Channel :	11	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	31.64	-14.36	46	52.56	9.3	1.26	31.48	-	-	Peak
242.22	27.87	-18.13	46	46.92	11.13	1.34	31.52	-	-	Peak
259.23	30.6	-15.4	46	48.9	11.76	1.42	31.48	-	-	Peak
302.1	33.92	-12.08	46	51.4	12.24	1.55	31.27	-	-	Peak
345.5	31.88	-14.12	46	48.13	13.35	1.71	31.31	-	-	Peak
388.9	34.79	-11.21	46	49.75	14.48	1.77	31.21	173	58	Peak
2386	42.23	-11.77	54	40.14	31.7	4.47	34.08	102	240	Average
2386	52.28	-21.72	74	50.19	31.7	4.47	34.08	102	240	Peak
2462	97.75	-	-	95.5	31.77	4.56	34.08	102	240	Average
2462	109.89	-	-	107.64	31.77	4.56	34.08	102	240	Peak
2483.5	42.54	-11.46	54	40.25	31.78	4.59	34.08	102	240	Average
2483.5	54.56	-19.44	74	52.27	31.78	4.59	34.08	102	240	Peak



Test Mode :	Mode 3	Temperature :	23~25℃
Test Channel :	11	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
62.13	34.64	-5.36	40	60.04	5.41	0.73	31.54	100	291	Peak
134.76	24	-19.5	43.5	43.65	10.79	1.07	31.51	-	-	Peak
216.03	30.16	-15.84	46	51.08	9.3	1.26	31.48	-	-	Peak
302.1	26.5	-19.5	46	43.98	12.24	1.55	31.27	-	-	Peak
345.5	28.43	-17.57	46	44.68	13.35	1.71	31.31	-	-	Peak
431.6	27.61	-18.39	46	41.4	15.5	1.87	31.16	-	-	Peak
2384	43.11	-10.89	54	41.04	31.68	4.47	34.08	100	19	Average
2384	53.62	-20.38	74	51.55	31.68	4.47	34.08	100	19	Peak
2462	95.91	-	-	93.66	31.77	4.56	34.08	100	19	Average
2462	108.01	-	-	105.76	31.77	4.56	34.08	100	19	Peak
2483.5	42.73	-11.27	54	40.44	31.78	4.59	34.08	100	19	Average
2483.5	54.91	-19.09	74	52.62	31.78	4.59	34.08	100	19	Peak



Test Mode :	Mode 4	Temperature :	23~25℃
Test Channel :	01	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	31.52	-14.48	46	52.44	9.3	1.26	31.48	-	-	Peak
239.79	28.76	-17.24	46	48	10.93	1.34	31.51	-	-	Peak
259.23	31.64	-14.36	46	49.94	11.76	1.42	31.48	-	-	Peak
302.1	34.38	-11.62	46	51.86	12.24	1.55	31.27	247	352	Peak
345.5	31.87	-14.13	46	48.12	13.35	1.71	31.31	-	-	Peak
388.9	34.21	-11.79	46	49.17	14.48	1.77	31.21	-	-	Peak
2389.8	47.29	-6.71	54	45.17	31.7	4.5	34.08	121	318	Average
2389.8	68.7	-5.3	74	66.58	31.7	4.5	34.08	121	318	Peak
2412	94.99	-	-	92.86	31.71	4.5	34.08	121	318	Average
2412	107.81	-	-	105.68	31.71	4.5	34.08	121	318	Peak
2494	41.09	-12.91	54	38.75	31.8	4.62	34.08	121	318	Average
2494	53.05	-20.95	74	50.71	31.8	4.62	34.08	121	318	Peak



Test Mode :	Mode 4	Temperature :	23~25℃
Test Channel :	01	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
61.59	34.42	-5.58	40	59.82	5.41	0.73	31.54	109	12	Peak
120.99	23.68	-19.82	43.5	43.23	10.9	1.07	31.52	-	-	Peak
216.03	30.68	-15.32	46	51.6	9.3	1.26	31.48	-	-	Peak
345.5	27.44	-18.56	46	43.69	13.35	1.71	31.31	-	-	Peak
388.9	27.26	-18.74	46	42.22	14.48	1.77	31.21	-	-	Peak
431.6	27.5	-18.5	46	41.29	15.5	1.87	31.16	-	-	Peak
2389.99	43.28	-10.72	54	41.16	31.7	4.5	34.08	101	27	Average
2389.99	65.58	-8.42	74	63.46	31.7	4.5	34.08	101	27	Peak
2412	91.38	-	-	89.25	31.71	4.5	34.08	101	27	Average
2412	104.3	-	-	102.17	31.71	4.5	34.08	101	27	Peak
2490	35.21	-18.79	54	32.87	31.8	4.62	34.08	101	27	Average
2490	47.62	-26.38	74	45.28	31.8	4.62	34.08	101	27	Peak



Test Mode :	Mode 5	Temperature :	23~25℃
Test Channel :	06	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	29.78	-16.22	46	50.7	9.3	1.26	31.48	-	-	Peak
235.47	28.35	-17.65	46	47.87	10.65	1.34	31.51	-	-	Peak
259.23	31.43	-14.57	46	49.73	11.76	1.42	31.48	-	-	Peak
302.1	35.19	-10.81	46	52.67	12.24	1.55	31.27	183	49	Peak
345.5	31.73	-14.27	46	47.98	13.35	1.71	31.31	-	-	Peak
388.9	34.24	-11.76	46	49.2	14.48	1.77	31.21	-	-	Peak
2356	40.57	-13.43	54	38.56	31.66	4.44	34.09	123	329	Average
2356	51.89	-22.11	74	49.88	31.66	4.44	34.09	123	329	Peak
2437	93.69	-	-	91.49	31.75	4.53	34.08	123	329	Average
2437	106.27	-	-	104.04	31.75	4.56	34.08	123	329	Peak
2484	37.33	-16.67	54	35.04	31.78	4.59	34.08	123	329	Average
2484	50.02	-23.98	74	47.73	31.78	4.59	34.08	123	329	Peak



Test Mode :	Mode 5	Temperature :	23~25°C
Test Channel :	06	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
61.59	34.55	-5.45	40	59.95	5.41	0.73	31.54	129	8	Peak
132.06	23.01	-20.49	43.5	42.62	10.84	1.07	31.52	-	-	Peak
216.03	30.62	-15.38	46	51.54	9.3	1.26	31.48	-	-	Peak
345.5	28.33	-17.67	46	44.58	13.35	1.71	31.31	-	-	Peak
388.9	26.23	-19.77	46	41.19	14.48	1.77	31.21	-	-	Peak
431.6	27.25	-18.75	46	41.04	15.5	1.87	31.16	-	-	Peak
2358	34.7	-19.3	54	32.68	31.66	4.44	34.08	102	41	Average
2358	47.48	-26.52	74	45.46	31.66	4.44	34.08	102	41	Peak
2437	89.67	-	-	87.47	31.75	4.53	34.08	102	41	Average
2437	103.03	-	-	100.83	31.75	4.53	34.08	102	41	Peak
2490	32.84	-21.16	54	30.5	31.8	4.62	34.08	102	41	Average
2490	45.62	-28.38	74	43.28	31.8	4.62	34.08	102	41	Peak



Test Mode :	Mode 6	Temperature :	23~25℃
Test Channel :	11	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	30.09	-15.91	46	51.01	9.3	1.26	31.48	-	-	Peak
232.77	28.73	-17.27	46	48.44	10.45	1.34	31.5	-	-	Peak
259.23	31.08	-14.92	46	49.38	11.76	1.42	31.48	-	-	Peak
302.1	33.98	-12.02	46	51.46	12.24	1.55	31.27	-	-	Peak
345.5	32.54	-13.46	46	48.79	13.35	1.71	31.31	-	-	Peak
388.9	34.55	-11.45	46	49.51	14.48	1.77	31.21	144	59	Peak
2382	41.6	-12.4	54	39.53	31.68	4.47	34.08	177	290	Average
2382	53.08	-20.92	74	51.01	31.68	4.47	34.08	177	290	Peak
2462	95.87	-	-	93.62	31.77	4.56	34.08	177	290	Average
2462	108.5	-	-	106.25	31.77	4.56	34.08	177	290	Peak
2483.5	48.56	-5.44	54	46.27	31.78	4.59	34.08	177	290	Average
2483.5	70.75	-3.25	74	68.46	31.78	4.59	34.08	177	290	Peak



Test Mode :	Mode 6	Temperature :	23~25℃
Test Channel :	11	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
61.32	33.89	-6.11	40	59.34	5.37	0.73	31.55	171	310	Peak
121.8	24.02	-19.48	43.5	43.56	10.91	1.07	31.52	-	-	Peak
216.03	31.03	-14.97	46	51.95	9.3	1.26	31.48	-	-	Peak
302.1	27.76	-18.24	46	45.24	12.24	1.55	31.27	-	-	Peak
345.5	27.74	-18.26	46	43.99	13.35	1.71	31.31	-	-	Peak
431.6	26.87	-19.13	46	40.66	15.5	1.87	31.16	-	-	Peak
2382	40.77	-13.23	54	38.7	31.68	4.47	34.08	123	326	Average
2382	52.92	-21.08	74	50.85	31.68	4.47	34.08	123	326	Peak
2462	93.37	-	-	91.12	31.77	4.56	34.08	123	326	Average
2462	105.78	-	-	103.53	31.77	4.56	34.08	123	326	Peak
2483.5	47.12	-6.88	54	44.83	31.78	4.59	34.08	123	326	Average
2483.5	69.54	-4.46	74	67.25	31.78	4.59	34.08	123	326	Peak



Test Mode :	Mode 7	Temperature :	23~25℃
Test Channel :	01	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	30.34	-15.66	46	51.26	9.3	1.26	31.48	-	-	Peak
227.37	28.46	-17.54	46	48.56	10.05	1.34	31.49	-	-	Peak
259.23	30.47	-15.53	46	48.77	11.76	1.42	31.48	-	-	Peak
302.1	34.06	-11.94	46	51.54	12.24	1.55	31.27	100	18	Peak
345.5	32.38	-13.62	46	48.63	13.35	1.71	31.31	-	-	Peak
388.9	34.04	-11.96	46	49	14.48	1.77	31.21	-	-	Peak
2390	47.5	-6.5	54	45.38	31.7	4.5	34.08	100	58	Average
2390	67.31	-6.69	74	65.19	31.7	4.5	34.08	100	58	Peak
2412	92.7	-	-	90.57	31.71	4.5	34.08	100	58	Average
2412	105.43	-	-	103.3	31.71	4.5	34.08	100	58	Peak
2494	39.82	-14.18	54	37.48	31.8	4.62	34.08	100	58	Average
2494	51.73	-22.27	74	49.39	31.8	4.62	34.08	100	58	Peak



Test Mode :	Mode 7	Temperature :	23~25℃
Test Channel :	01	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
62.94	33.42	-6.58	40	58.76	5.46	0.73	31.53	116	321	Peak
120.99	24.42	-19.08	43.5	43.97	10.9	1.07	31.52	-	-	Peak
216.03	29.29	-16.71	46	50.21	9.3	1.26	31.48	-	-	Peak
302.1	26.56	-19.44	46	44.04	12.24	1.55	31.27	-	-	Peak
345.5	27.84	-18.16	46	44.09	13.35	1.71	31.31	-	-	Peak
431.6	27.4	-18.6	46	41.19	15.5	1.87	31.16	-	-	Peak
2390	41.35	-12.65	54	39.23	31.7	4.5	34.08	100	270	Average
2390	60.68	-13.32	74	58.56	31.7	4.5	34.08	100	270	Peak
2412	89.81	-	-	87.68	31.71	4.5	34.08	100	270	Average
2412	102.95	-	-	100.82	31.71	4.5	34.08	100	270	Peak
2492	39.18	-14.82	54	36.84	31.8	4.62	34.08	100	270	Average
2492	50.99	-23.01	74	48.65	31.8	4.62	34.08	100	270	Peak



Test Mode :	Mode 8	Temperature :	23~25℃
Test Channel :	06	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	30.39	-15.61	46	51.31	9.3	1.26	31.48	-	-	Peak
238.17	28.4	-17.6	46	47.71	10.86	1.34	31.51	-	-	Peak
259.23	30.69	-15.31	46	48.99	11.76	1.42	31.48	-	-	Peak
302.1	33.87	-12.13	46	51.35	12.24	1.55	31.27	-	-	Peak
345.5	32.27	-13.73	46	48.52	13.35	1.71	31.31	-	-	Peak
388.2	34.4	-11.6	46	49.38	14.46	1.77	31.21	145	201	Peak
2358	41.98	-12.02	54	39.96	31.66	4.44	34.08	103	57	Average
2358	53.24	-20.76	74	51.22	31.66	4.44	34.08	103	57	Peak
2437	92.32	-	-	90.12	31.75	4.53	34.08	103	57	Average
2437	104.57	-	-	102.37	31.75	4.53	34.08	103	57	Peak
2500	38.14	-15.86	54	35.8	31.8	4.62	34.08	103	57	Average
2500	49.82	-24.18	74	47.48	31.8	4.62	34.08	103	57	Peak



Test Mode :	Mode 8	Temperature :	23~25℃
Test Channel :	06	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
62.94	34.24	-5.76	40	59.58	5.46	0.73	31.53	132	67	Peak
120.99	23.73	-19.77	43.5	43.28	10.9	1.07	31.52	-	-	Peak
216.03	30.16	-15.84	46	51.08	9.3	1.26	31.48	-	-	Peak
302.1	27.02	-18.98	46	44.5	12.24	1.55	31.27	-	-	Peak
345.5	28.41	-17.59	46	44.66	13.35	1.71	31.31	-	-	Peak
431.6	27.04	-18.96	46	40.83	15.5	1.87	31.16	-	-	Peak
2356	40.4	-13.6	54	38.39	31.66	4.44	34.09	100	278	Average
2356	51.39	-22.61	74	49.38	31.66	4.44	34.09	100	278	Peak
2437	89.17	-	-	86.97	31.75	4.53	34.08	100	278	Average
2437	101.29	-	-	99.09	31.75	4.53	34.08	100	278	Peak
2486	38.27	-15.73	54	35.98	31.78	4.59	34.08	100	278	Average
2486	49.4	-24.6	74	47.11	31.78	4.59	34.08	100	278	Peak



Test Mode :	Mode 9	Temperature :	23~25℃
Test Channel :	11	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Horizontal
Remark :	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
216.03	30.21	-15.79	46	51.13	9.3	1.26	31.48	-	-	Peak
235.74	29.35	-16.65	46	48.87	10.65	1.34	31.51	-	-	Peak
259.23	30.98	-15.02	46	49.28	11.76	1.42	31.48	-	-	Peak
302.1	33.82	-12.18	46	51.3	12.24	1.55	31.27	-	-	Peak
345.5	32.55	-13.45	46	48.8	13.35	1.71	31.31	-	-	Peak
388.9	34.66	-11.34	46	49.62	14.48	1.77	31.21	202	339	Peak
2380	35.95	-18.05	54	33.88	31.68	4.47	34.08	167	318	Average
2380	48.36	-25.64	74	46.29	31.68	4.47	34.08	167	318	Peak
2462	92.23	-	-	89.98	31.77	4.56	34.08	167	318	Average
2462	104.95	-	-	102.7	31.77	4.56	34.08	167	318	Peak
2483.66	46.12	-7.88	54	43.83	31.78	4.59	34.08	167	318	Average
2483.66	66.57	-7.43	74	64.28	31.78	4.59	34.08	167	318	Peak



Test Mode :	Mode 9	Temperature :	23~25℃
Test Channel :	11	Relative Humidity :	49~51%
Test Engineer :	Brian Chang	Polarization :	Vertical
Remark :	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
61.59	33.8	-6.2	40	59.2	5.41	0.73	31.54	176	55	Peak
120.72	23.42	-20.08	43.5	42.97	10.9	1.07	31.52	-	-	Peak
216.03	30.67	-15.33	46	51.59	9.3	1.26	31.48	-	-	Peak
302.1	26.73	-19.27	46	44.21	12.24	1.55	31.27	-	-	Peak
345.5	28.3	-17.7	46	44.55	13.35	1.71	31.31	-	-	Peak
431.6	26.91	-19.09	46	40.7	15.5	1.87	31.16	-	-	Peak
2384	34.6	-19.4	54	32.53	31.68	4.47	34.08	100	26	Average
2384	46.74	-27.26	74	44.67	31.68	4.47	34.08	100	26	Peak
2462	89.4	-	-	87.15	31.77	4.56	34.08	100	26	Average
2462	101.74	-	-	99.49	31.77	4.56	34.08	100	26	Peak
2483.66	40.66	-13.34	54	38.37	31.78	4.59	34.08	100	26	Average
2483.66	60.7	-13.3	74	58.41	31.78	4.59	34.08	100	26	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 PIFA 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
System Simulator	R&S	CMU200	117995	N/A	Jun. 08, 2009	Jun. 07, 2011	Conducted (TH02-HY)
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 11, 2010	Jun. 10, 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)
Power Meter	Agilent	E4416A	GB41292344	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Power Sensor	Agilent	E9327A	US40441548	N/A	Feb. 18, 2011	Feb. 17, 2012	Conducted (TH02-HY)
Thermal Chamber	Ten Billion	TTH-D35P	TBN-930701	N/A	Jul. 30, 2010	Jul. 29, 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)
ISN	Teseq GmbH	ISN T400A	25696	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
ISN	Teseq GmbH	ISN T800	27134	N/A	Jun. 19, 2010	Jun. 18, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000485	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
DC- LISN	R&S	ESH3-26	1000484	0.1MHz~200MHz	Jun. 17, 2010	Jun. 16, 2011	Conduction (CO05-HY)
GPS Station	T&E	GS-50	N/A	N/A	N/A	N/A	Conduction (CO05-HY)



Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP30	101352	9KHz-40GHz	Nov. 03, 2010	Nov. 02, 2011	Radiation (03CH05-HY)
Amplifier	COM-POWER	PA-103	161075	1KHz - 1GHz	Mar. 29, 2011	Mar. 28, 2012	Radiation (03CH05-HY)
Bilog Antenna	SCHAFFNER	CBL6111C	2725	30MHz ~ 1GHz	Nov. 06, 2010	Nov. 05, 2011	Radiation (03CH05-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz- 40GHz	Oct. 18, 2010	Oct. 17, 2011	Radiation (03CH05-HY)
Pre Amplifier	Agilent	8449B	3008A01917	1GHz- 26.5GHz	Apr. 14, 2011	Apr. 13, 2012	Radiation (03CH05-HY)
Turn Table	HD	Deis HD 2000	420/611	0 - 360 degree	N/A	N/A	Radiation (03CH05-HY)
Antenna Mast	HD	MA 240	240/666	1 m - 4 m	N/A	N/A	Radiation (03CH05-HY)
Horn Antenna	ESCO	3117	00066584	1GHz ~ 18GHz	Aug. 05, 2010	Aug. 04, 2011	Radiation (03CH05-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 29, 2010	Jul. 28, 2011	Radiation (03CH05-HY)
Bluetooth Base Station	R&S	CBT32	100522	N/A	Jan.13, 2011	Jan.13, 2013	Radiation (03CH05-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
Combined Standard Uncertainty $U_c(y)$	1.13		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.26		

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
Combined Standard Uncertainty $U_c(y)$	1.27		
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	2.54		

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
Combined Standard Uncertainty $U_c(y)$	2.36				
Measuring Uncertainty for a Level of Confidence of 95% ($U = 2U_c(y)$)	4.72				



Appendix A. Photographs of EUT

Please refer to Sporton report number EP151805-01 as below.