FCC RF Test Report

APPLICANT	:	ASUSTeK COMPUTER INC.
EQUIPMENT	:	ASUS MeMO Pad
BRAND NAME	:	ASUS
MODEL NAME	:	K0W
FCC ID	:	MSQK0W
STANDARD	:	FCC Part 15 Subpart C §15.247
CLASSIFICATION	:	(DTS) Digital Transmission System

The product was received on Oct. 24, 2012 and completely tested on Nov. 15, 2012. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Reviewed by:

Jones Tsai

Jones Tsai / Manager

Testing Laboratory 1190

SPORTON INTERNATIONAL INC.
No. 52, Hwa Ya 1st 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
FR2O2431	Rev. 01	Initial issue of report	Nov. 23, 2012

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.247(a)(2)	A8.2(a)	6dB Bandwidth	≥ 0.5MHz	Pass	-
3.1	-	Gen 4.6.1	99% Bandwidth	-	Pass	-
3.2	15.247(b)	A8.4	Power Output Measurement	≤ 30dBm	Pass	-
3.3	15.247(e)	A8.2(b)	Power Spectral Density	≤ 8dBm/3kHz	Pass	-
3.4	15.247(d)	A8.5	Conducted Band Edges	≤ 20dBc	Pass	-
			Conducted Spurious Emission		Pass	-
3.5	15.247(d)	A8.5	Radiated Band Edges	15.209(a) & 15.247(d)	Pass	-
			Radiated Spurious Emission		Pass	Under limit 3.28 dB at 2390.000 MHz
3.6	15.207	Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 5.26 dB at 8.020 MHz
3.7	15.203 & 15.247(b)	A8.4	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

ASUSTeK COMPUTER INC.
4F., No. 150, LI-TE RD., PEITOU, TAIPEI, TAIWAN

1.2 Manufacturer

TECH-COM (SHANGHAI) COMPUTER CO, LTD.
68 SANZHUANG RD, SONGJIANG EXPORT PROCESSING ZONE, SHANGHAI 201613, CHINA

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	ASUS MeMO Pad
Brand Name	ASUS
Model Name	K0W
FCC ID	MSQK0W
EUT supports Radios application	WLAN 11bgn
HW Version	4.0.3
SW Version	3.0.8
EUT Stage	Production Unit

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

Product Specification subjective to this standard	
Tx/Rx Frequency Range	2412 MHz ~ 2462 MHz
Number of Channels	11
Carrier Frequency of Each Channel	2412+(n-1)*5 MHz; n=1~11
Maximum Output Power to Antenna	802.11b : 17.66 dBm (0.0583 W) 802.11g : 22.84 dBm (0.1923 W) 802.11n HT20 : 21.92 dBm (0.1556 W)
99% Occupied Bandwidth	802.11b : 13.05MHz 802.11g : 17.10MHz 802.11n HT20 : 17.95MHz
Antenna Type	PIFA Antenna type with gain 1.04 dBi
Type of Modulation	802.11b : DSSS (BPSK / QPSK / CCK) 802.11g/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.4 Testing Site

Test Site	SPORTON INTERNATIONAL INC.			
Test Site Location	No. 52, Hwa Ya 1st 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.
	TH02-HY	CO01-HY	03CH07-HY	722060/4086B-1

1.5 Applied Standards

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

- FCC Part 15 Subpart C §15.247
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02
- ANSI C63.4-2003 and ANSI C63.10-2009
- IC RSS-210 Issue 8
- IC RSS-Gen Issue 3

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

1.6 Ancillary Equipment List

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	WLAN AP	D-Link	DNS-G120	N/A	N/A	Unshielded, 1.5 m
2.	PC	HP	DC7700	N/A	N/A	Unshielded, 1.8 m
3.	LCD Monitor	Dell	U2410f	FCC DoC	Shielded, 1.5 m	Unshielded, 1.8 m
4.	(USB) Keyboard	Microsoft	1366	FCC DoC	Shielded, 2.0 m	N/A
5.	(USB) Mouse	Microsoft	1113	FCC DoC	Shielded, 1.8 m	N/A
6.	Printer	EPSON	LQ300+	FCC DoC	Shielded, 1.7 m	N/A
7.	Earphone	INTOPIC	JAZZ-368	FCC DoC	Unshielded, 1.7 m	N/A
8.	Micro SD Card	Transcend	8GB	N/A	N/A	N/A
9.	Modem	ACEEX	DM1414	IFAXDM1414	D-Shielded, 1.15 m	Unshielded, 1.8 m

2 Test Configuration of Equipment Under Test

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

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

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

2.1 Carrier Frequency Channel

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

2.2 Pre-Scanned RF Power

Preliminary tests were performed in different data rate and antenna configurations as following table and the highest power data rates were chosen for full test in the following tables. Final Output Power equals to Measured Output Power adds the duty factor.

2.4GHz 802.11b mode				
Data Rate (MHz)	1M bps	2M bps	5.5M bps	11M bps
Peak Power (dBm)	17.66	17.65	17.63	17.64

2.4GHz 802.11g mode								
Data Rate (MHz)	6M bps	9M bps	12M bps	18M bps	24M bps	36M bps	48M bps	54M bps
Peak Power (dBm)	22.84	22.40	22.17	22.18	22.26	22.69	22.28	22.26

2.4GHz 802.11n HT20 mode								
Data Rate (MHz)	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7
Peak Power (dBm)	21.92	21.76	21.56	21.48	21.42	21.33	21.58	21.75

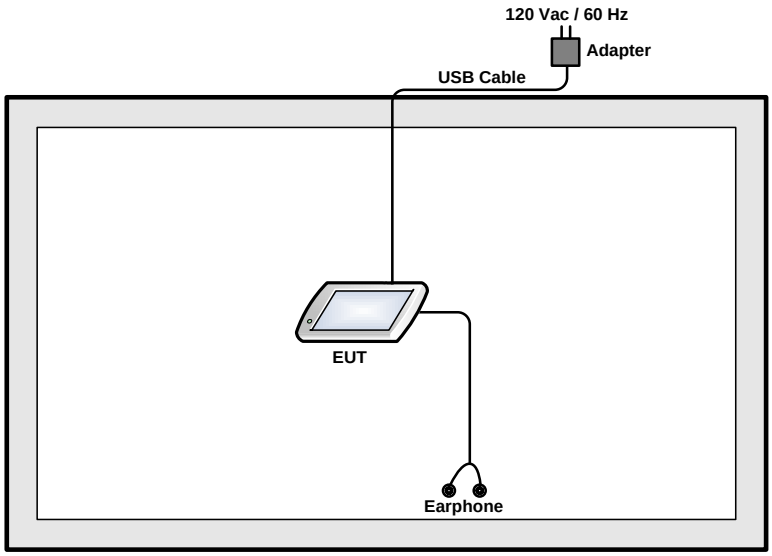
2.3 Test Mode

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

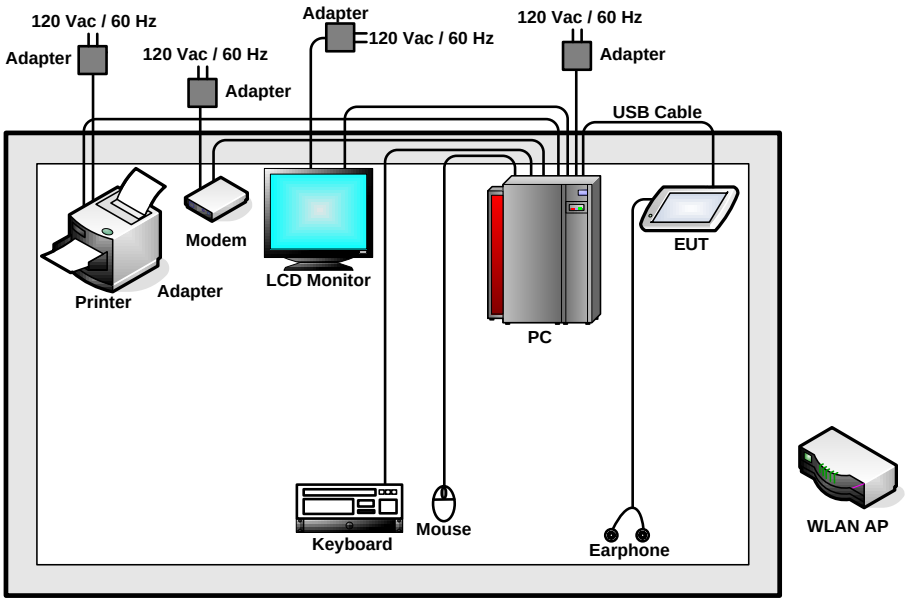
Test Cases				
	Test Items	**Mode**	**Data Rate**	**Test Channel**
Conducted TCs	**6dB and 99% BW Power Spectral Density**	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**6.5 Mbps**	**1/6/11**
	Output Power	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**6.5 Mbps**	**1/6/11**
	Conducted Band Edge	**802.11b**	**1 Mbps**	**1/11**
		802.11g	**6 Mbps**	**1/11**
		802.11n HT20	**6.5 Mbps**	**1/11**
	Conducted Spurious Emission	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**6.5 Mbps**	**1/6/11**
Radiated TCs	**Radiated Band Edge**	**802.11b**	**1 Mbps**	**1/11**
		802.11g	**6 Mbps**	**1/11**
		802.11n HT20	**6.5 Mbps**	**1/11**
	Radiated Spurious Emission	**802.11b**	**1 Mbps**	**1/6/11**
		802.11g	**6 Mbps**	**1/6/11**
		802.11n HT20	**6.5 Mbps**	**1/6/11**
AC Conducted Emission	Mode 1 ： WLAN Link + USB Cable (Data Link with PC) + MP3 + H-Pattern + Earphone			
Remark: For Radiated TCs and AC Conducted Emission was performance with SKU2. For Conducted TCs was performance with SKU1.				

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<EUT with USB Cable (Data link with PC) Mode>



2.5 RF Utility

The programmed RF utility “WIFI RF test tool” 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 and 99% Bandwidth Measurement

3.1.1 Limit of 6dB and 99% Bandwidth

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

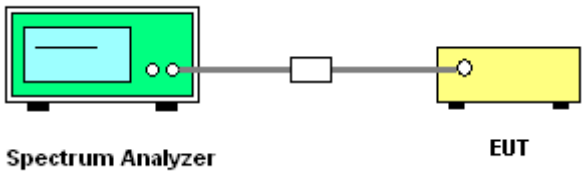
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6 dB bandwidth must be greater than 500 KHz.
5. For 99% Bandwidth Measurement, the spectrum analyzer's resolution bandwidth (RBW) is set 1MHz and set the Video bandwidth (VBW) = 3MHz.
6. Measure and record the results in the test report.

3.1.4 Test Setup

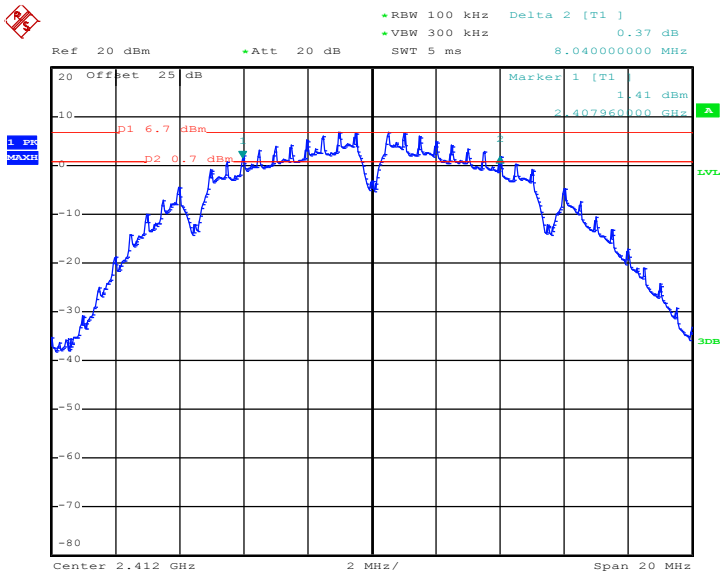


3.1.5 Test Result of 6dB Bandwidth

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	8.04	0.5	Pass
06	2437	8.04	0.5	Pass
11	2462	8.04	0.5	Pass

6 dB Bandwidth Plot on 802.11b Channel 01



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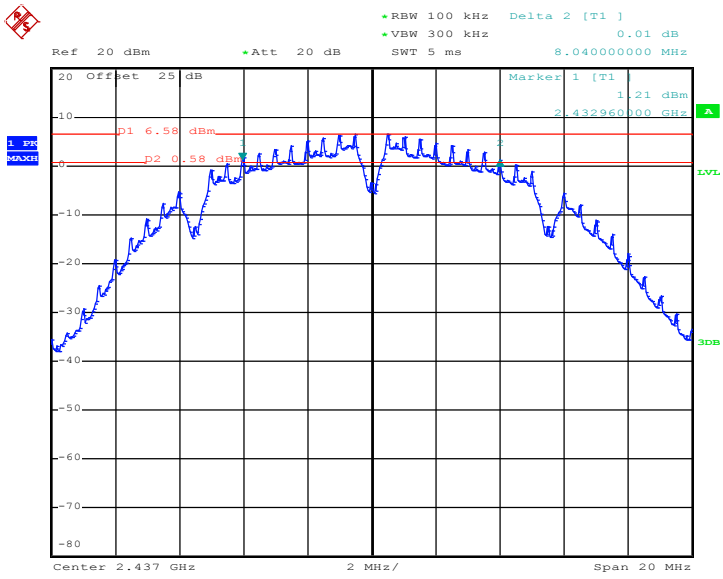
6 dB Bandwidth Plot on 802.11b Channel 06



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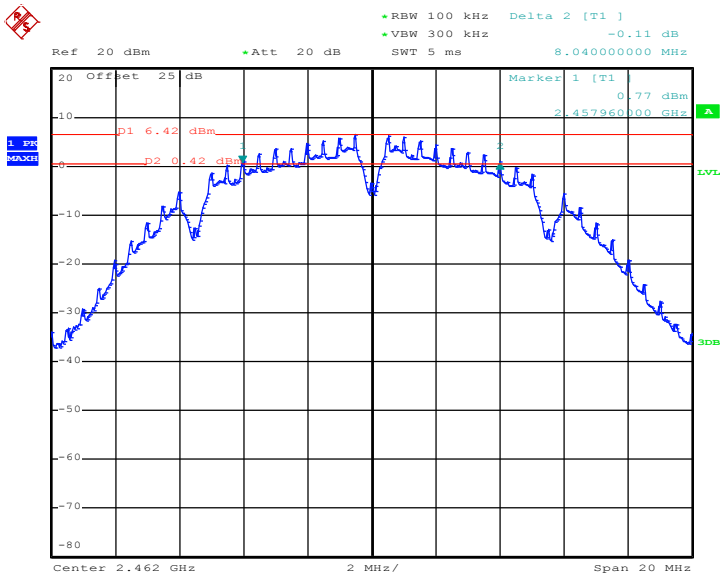
6 dB Bandwidth Plot on 802.11b Channel 11



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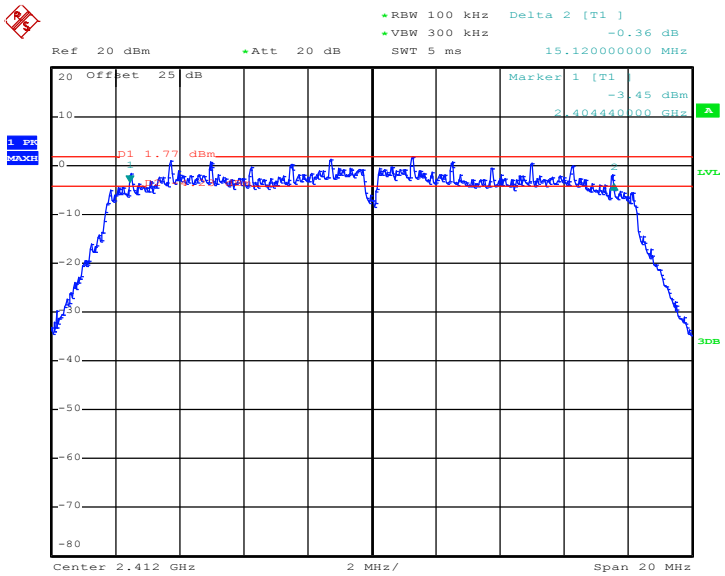
Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	15.12	0.5	Pass
06	2437	15.32	0.5	Pass
11	2462	15.32	0.5	Pass

6 dB Bandwidth Plot on 802.11g Channel 01



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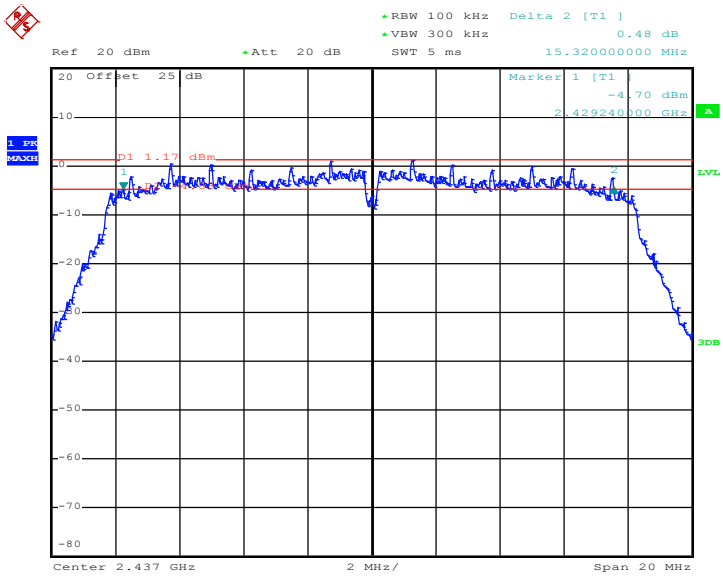
6 dB Bandwidth Plot on 802.11g Channel 06



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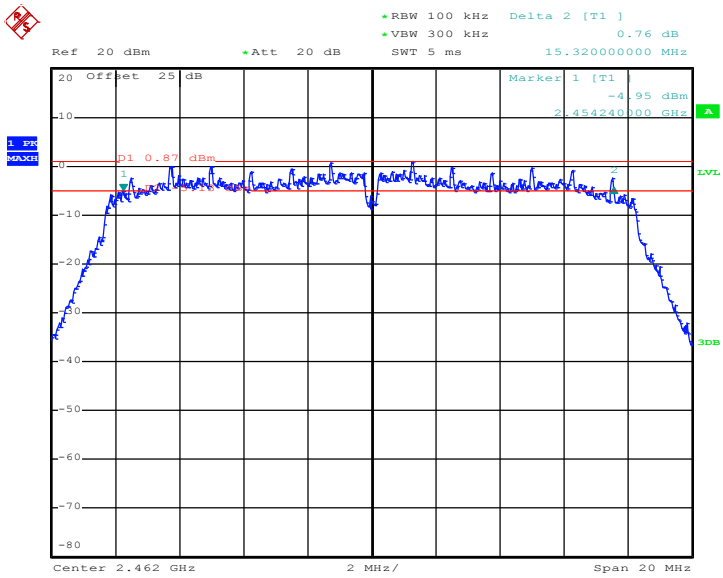
6 dB Bandwidth Plot on 802.11g Channel 11

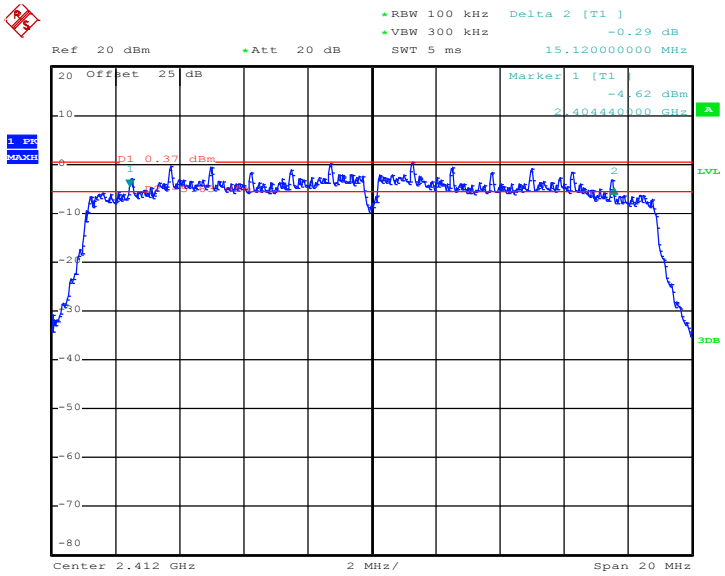


Date: 15.NOV.2012 19:06:56

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 6dB Bandwidth (MHz)	6dB Bandwidth Min. Limit (MHz)	Pass/Fail
01	2412	15.12	0.5	Pass
06	2437	15.12	0.5	Pass
11	2462	15.12	0.5	Pass

6 dB Bandwidth Plot on 802.11n HT20 Channel 01



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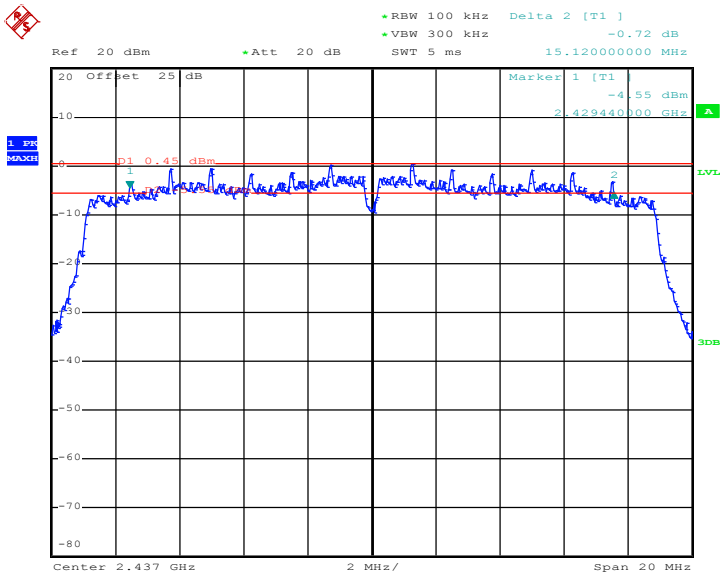
6 dB Bandwidth Plot on 802.11n HT20 Channel 06



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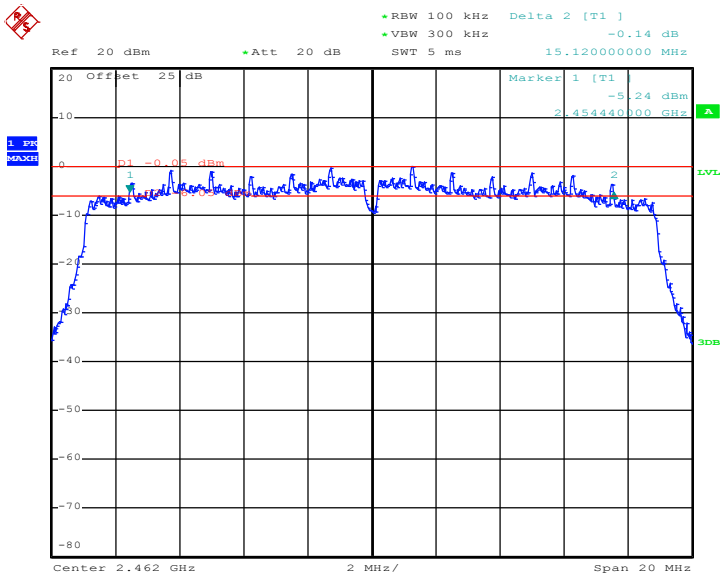
6 dB Bandwidth Plot on 802.11n HT20 Channel 11



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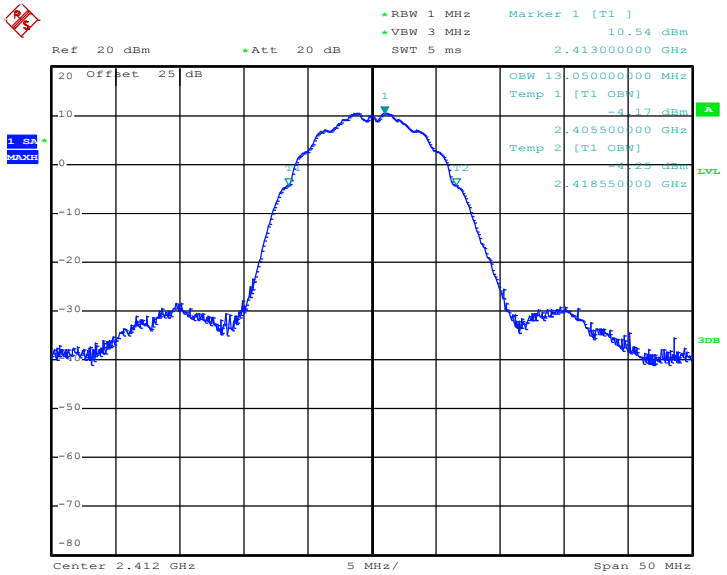
3.1.6 Test Result of 99% Occupied Bandwidth

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b 99% Occupied Bandwidth (MHz)	Pass/Fail
01	2412	13.05	Pass
06	2437	12.85	Pass
11	2462	12.85	Pass

99% Occupied Bandwidth Plot on 802.11b Channel 01



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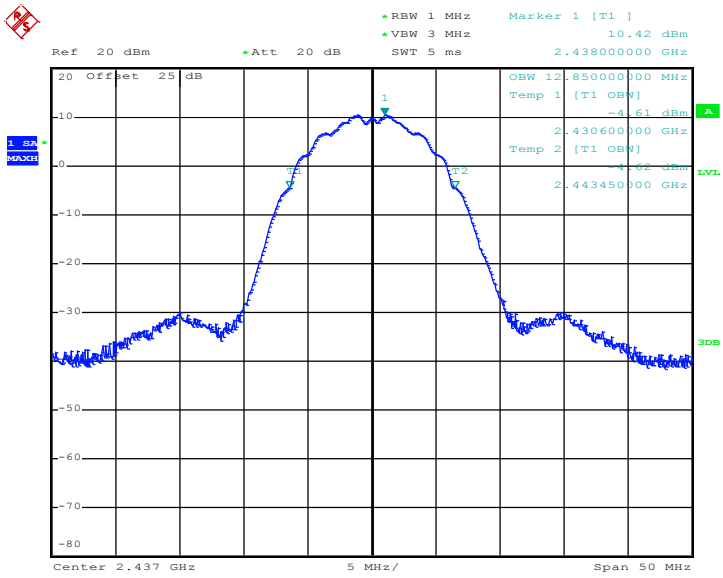
99% Occupied Bandwidth Plot on 802.11b Channel 06



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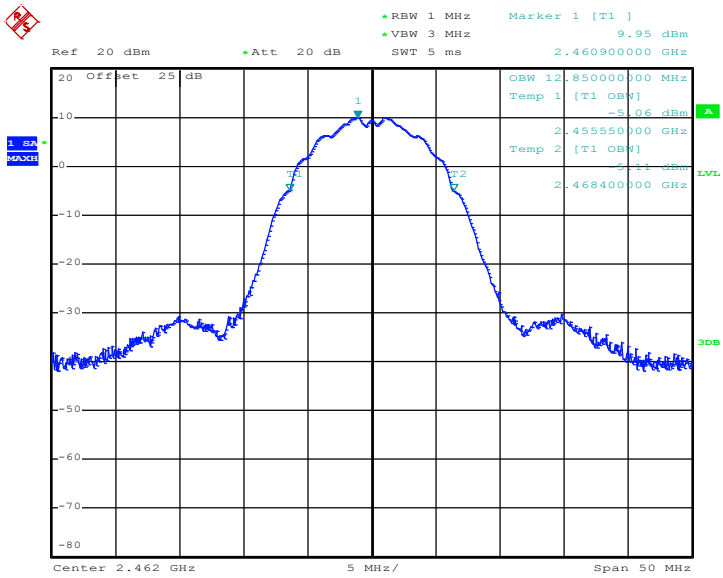
99% Occupied Bandwidth Plot on 802.11b Channel 11



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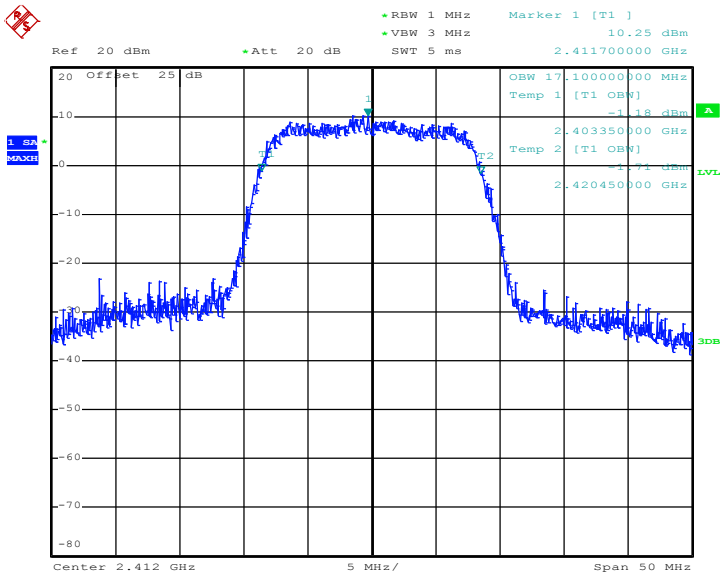
Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g 99% Occupied Bandwidth (MHz)	Pass/Fail
01	2412	17.10	Pass
06	2437	17.00	Pass
11	2462	17.00	Pass

99% Occupied Bandwidth Plot on 802.11g Channel 01



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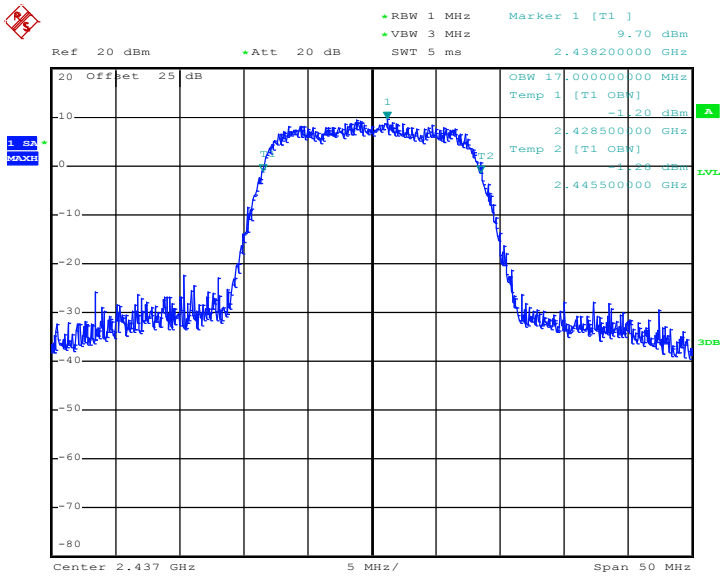
99% Occupied Bandwidth Plot on 802.11g Channel 06



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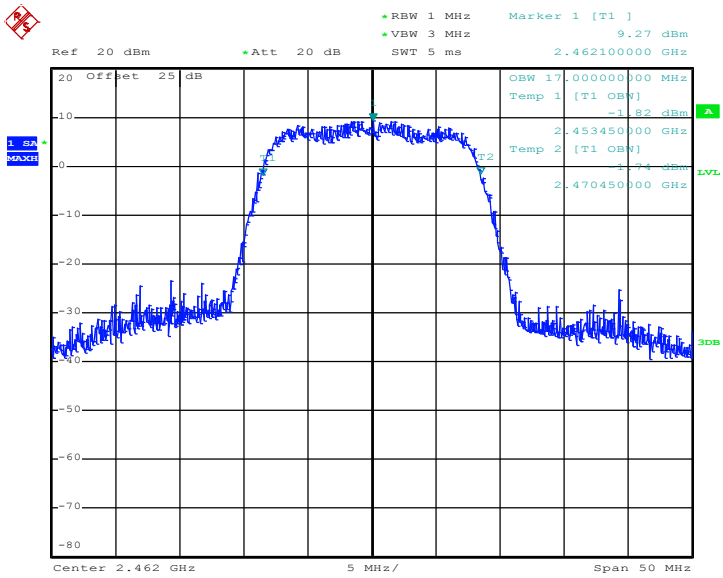
99% Occupied Bandwidth Plot on 802.11g Channel 11



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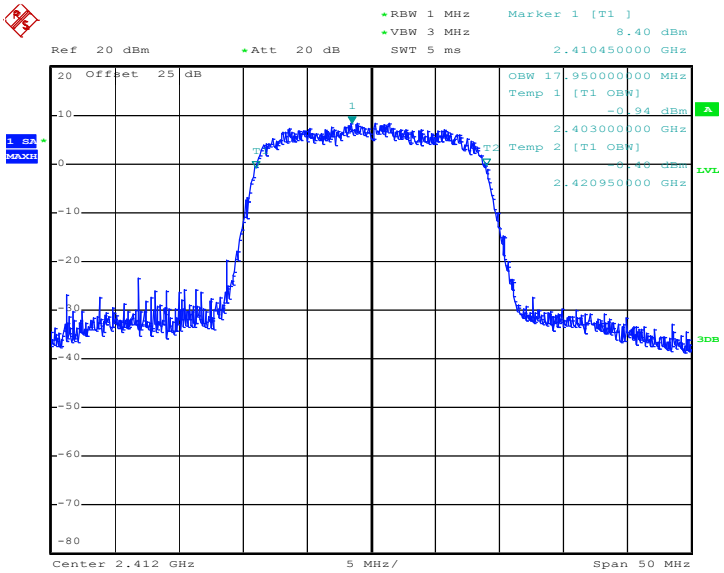
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 99% Occupied Bandwidth (MHz)	Pass/Fail
01	2412	17.95	Pass
06	2437	17.90	Pass
11	2462	17.95	Pass

99% Occupied Bandwidth Plot 802.11n HT20 Channel 01



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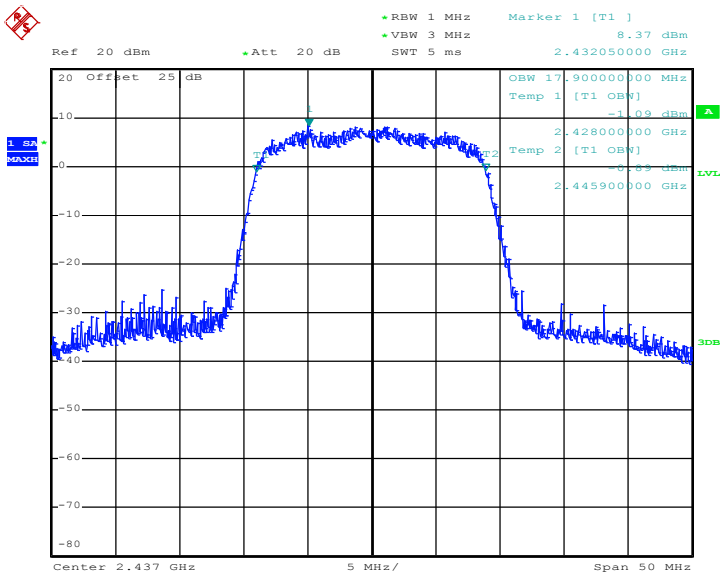
99% Occupied Bandwidth Plot 802.11n HT20 Channel 06



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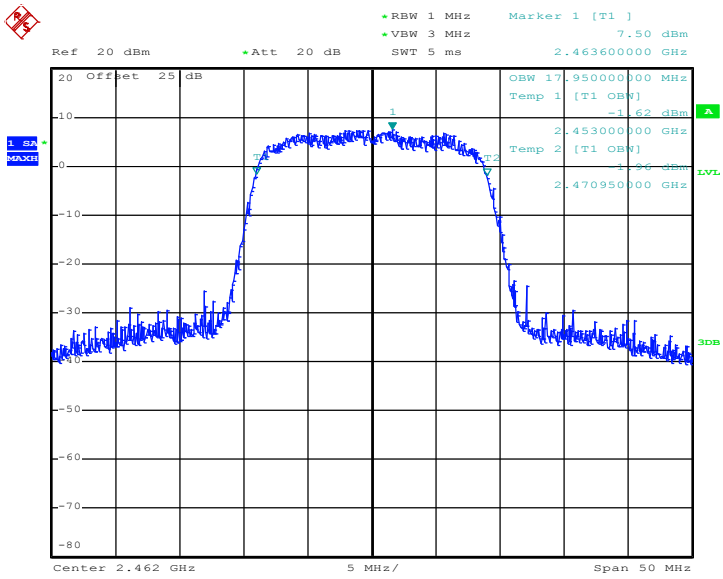
99% Occupied Bandwidth Plot 802.11n HT20 Channel 11



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3.2 Output Power Measurement

3.2.1 Limit of Output Power

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

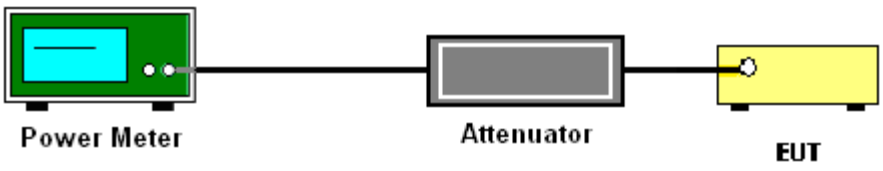
3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

3.2.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Measure the conducted output power and record the results in the test report.

3.2.4 Test Setup



3.2.5 Test Result of Peak Output Power

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	17.66	30	Pass
06	2437	17.30	30	Pass
11	2462	17.22	30	Pass

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	22.84	30	Pass
06	2437	22.39	30	Pass
11	2462	21.46	30	Pass

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	2.4GHz 802.11n HT20 Peak Output Power (dBm)	Max. Limits (dBm)	Pass/Fail
01	2412	21.92	30	Pass
06	2437	21.16	30	Pass
11	2462	21.06	30	Pass

3.2.6 Test Result of Average output Power (Reporting Only)

Test Mode :	802.11b	Temperature :	24~26
Test Engineer :	Bill Kuo	Relative Humidity :	50~53
Duty Cycle:	100.00%	Duty Factor:	0.00dB

Channel	Frequency (MHz)	802.11b Average Output Power (dBm)
01	2412	14.77
06	2437	14.46
11	2462	14.26

Test Mode :	802.11g	Temperature :	24~26
Test Engineer :	Bill Kuo	Relative Humidity :	50~53
Duty Cycle:	98.10%	Duty Factor:	0.08dB

Channel	Frequency (MHz)	802.11g Average Output Power (dBm)
01	2412	12.65
06	2437	12.01
11	2462	11.51

Test Mode :	802.11n HT20	Temperature :	24~26
Test Engineer :	Bill Kuo	Relative Humidity :	50~53
Duty Cycle:	98.47%	Duty Factor:	0.07dB

Channel	Frequency (MHz)	802.11n HT20 Average Output Power (dBm)
01	2412	11.39
06	2437	10.50
11	2462	10.43

3.3 Power Spectral Density Measurement

3.3.1 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.

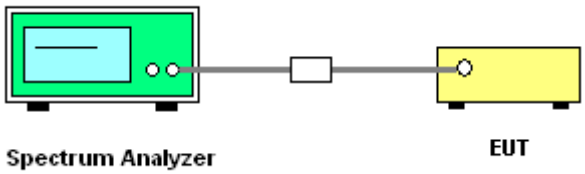
3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

1. The testing follows Measurement Procedure 9.1 Option 1 of FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v02
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 3 kHz. Video bandwidth VBW = 10 kHz In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW)
5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level.
6. Measure and record the results in the test report.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

Test Mode :	802.11b	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11b Power Density		Max. Limits (dBm/3KHz)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	6.46	-7.13	8	Pass
06	2437	6.67	-8.24	8	Pass
11	2462	6.28	-7.48	8	Pass

Test Mode :	802.11g	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

Channel	Frequency (MHz)	802.11g Power Density		Max. Limits (dBm/3KHz)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	1.22	-12.30	8	Pass
06	2437	0.92	-12.70	8	Pass
11	2462	0.84	-12.25	8	Pass

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Engineer :	Bill Kuo	Relative Humidity :	50~53%

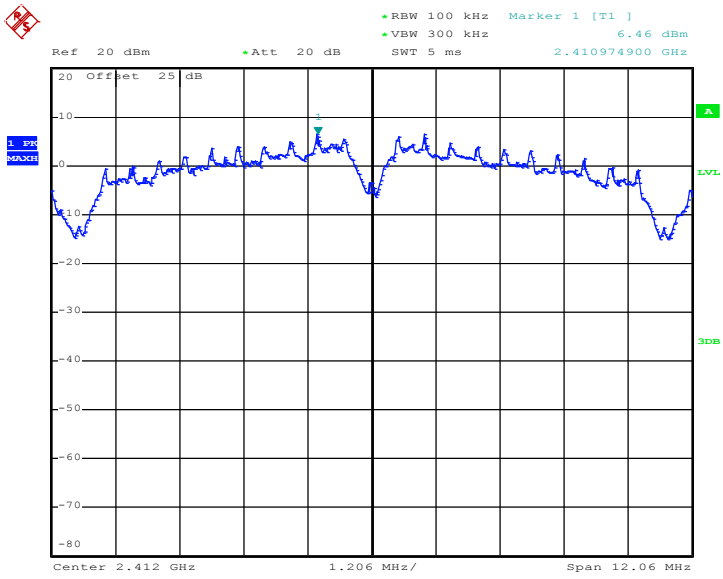
Channel	Frequency (MHz)	802.11n HT20 Power Density		Max. Limits (dBm/3KHz)	Pass/Fail
		PSD/100KHz (dBm)	PSD/3KHz (dBm)		
01	2412	0.39	-13.68	8	Pass
06	2437	0.01	-13.29	8	Pass
11	2462	-1.28	-14.94	8	Pass

Note:

1. *Measured power density (dBm) has offset with cable loss.*
2. *The Measured power density (dBm)/ 100KHz is reference level and used as 20dBc down for Conducted Band Edges and Conducted Spurious Emission limit line.*

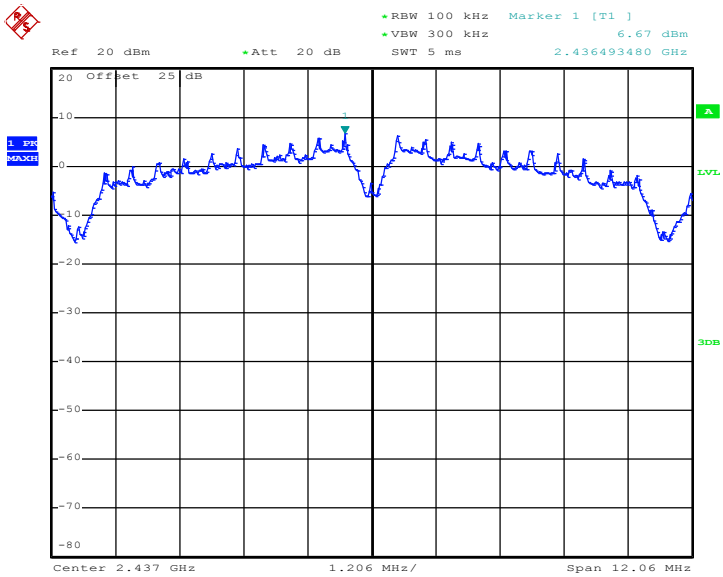
3.3.6 Test Result of Power Spectral Density Plots (100kHz)

PSD 100kHz Plot on 802.11b Channel 01



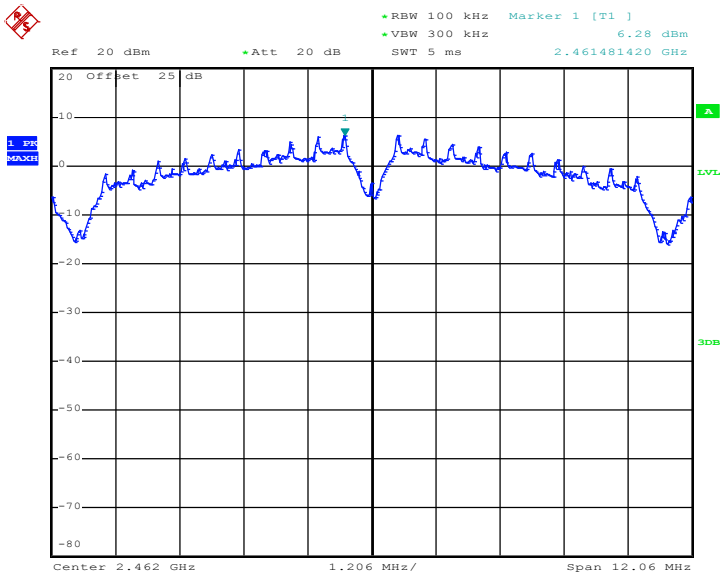
Date: 15.NOV.2012 18:42:20

PSD 100kHz Plot on 802.11b Channel 06



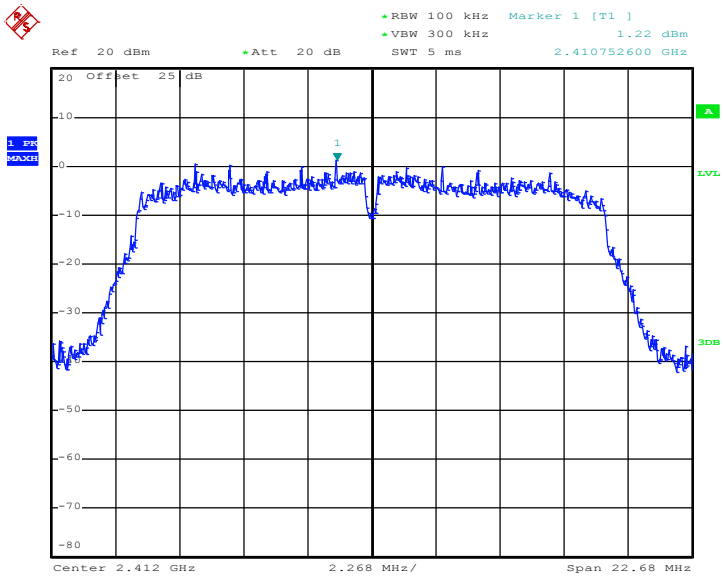
Date: 15.NOV.2012 18:51:07

PSD 100kHz Plot on 802.11b Channel 11



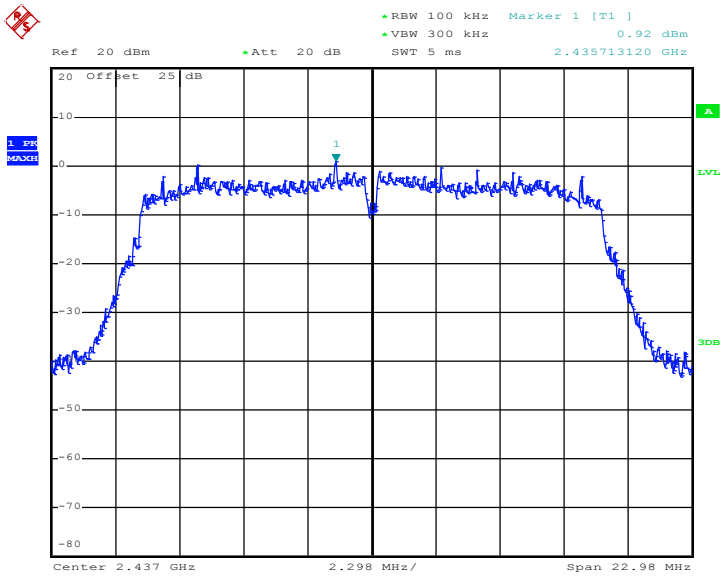
Date: 15.NOV.2012 18:58:10

PSD 100kHz Plot on 802.11g Channel 01



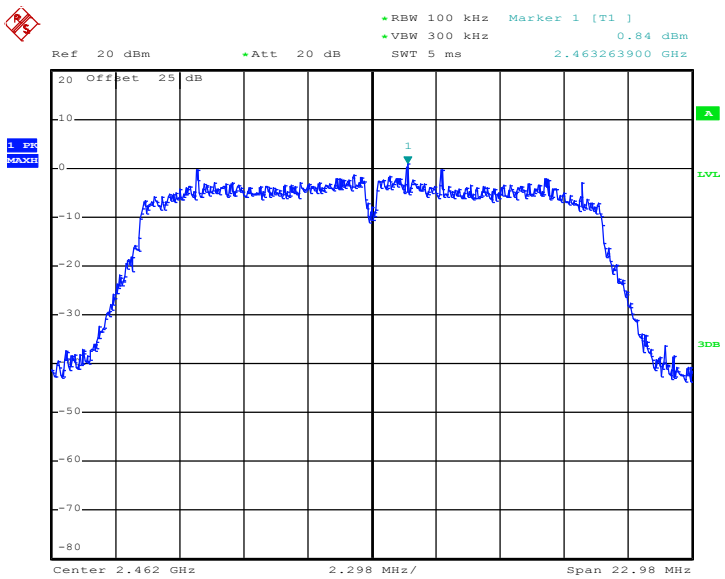
Date: 15.NOV.2012 19:14:53

PSD 100kHz Plot on 802.11g Channel 06



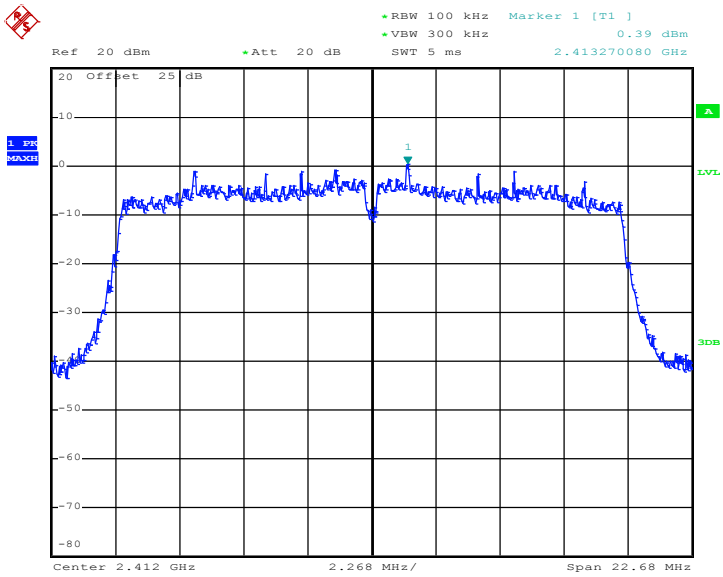
Date: 15.NOV.2012 19:11:46

PSD 100kHz Plot on 802.11g Channel 11



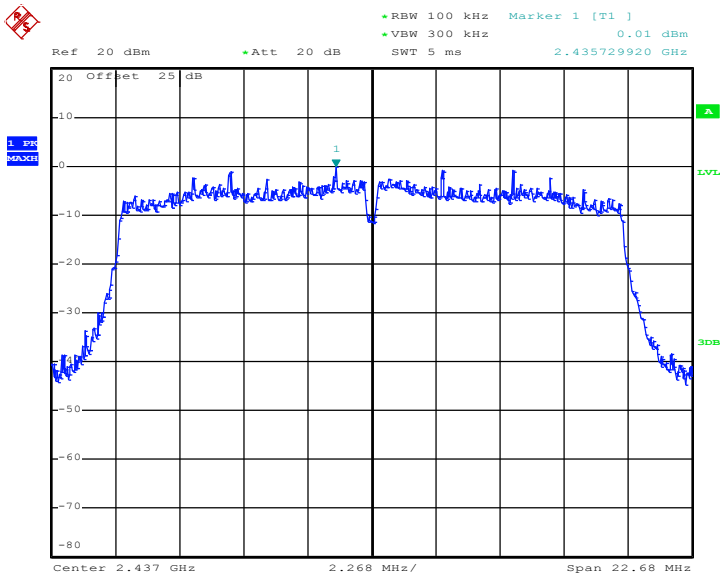
Date: 15.NOV.2012 19:07:29

PSD 100kHz Plot on 802.11n HT20 Channel 01



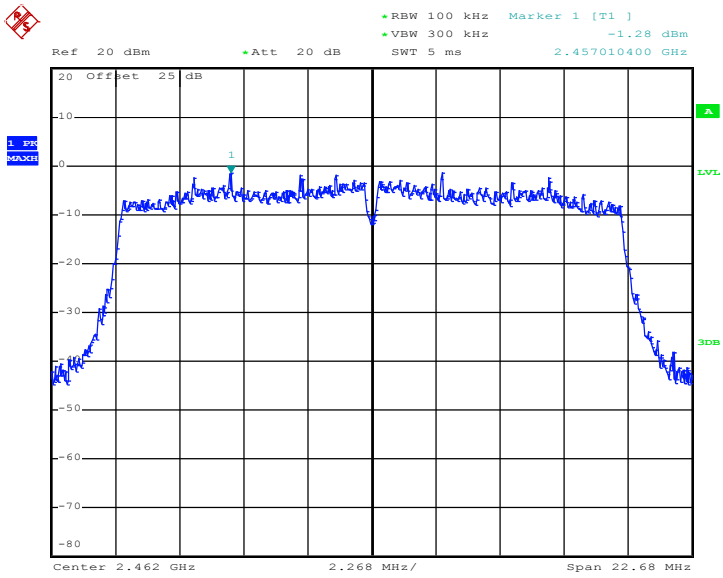
Date: 15.NOV.2012 19:18:46

PSD 100kHz Plot on 802.11n HT20 Channel 06



Date: 15.NOV.2012 19:22:11

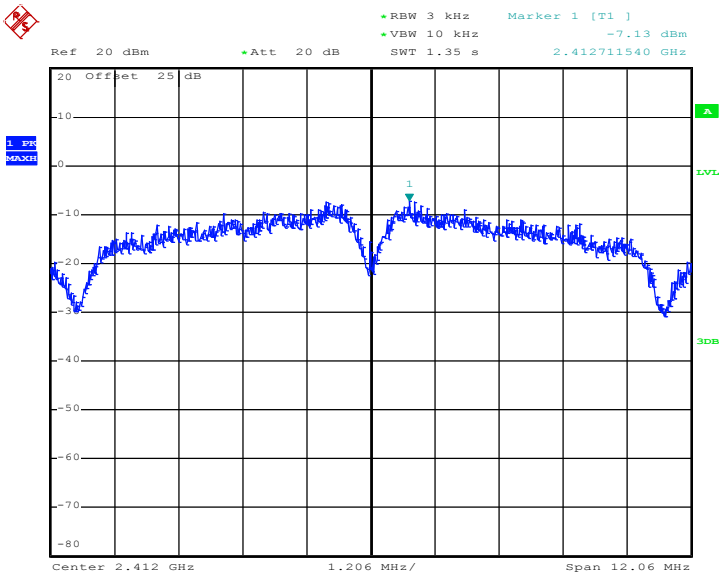
PSD 100kHz Plot on 802.11n HT20 Channel 11



Date: 15.NOV.2012 19:25:48

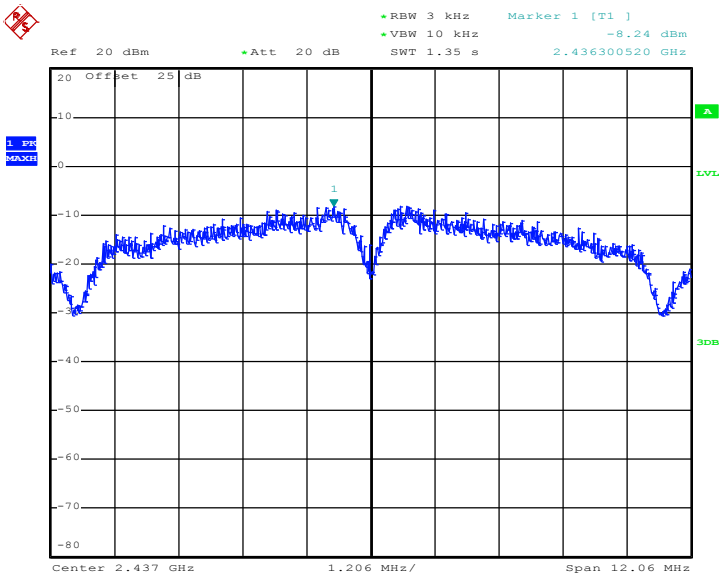
3.3.7 Test Result of Power Spectral Density Plots (3kHz)

PSD 3kHz Plot on 802.11b Channel 01



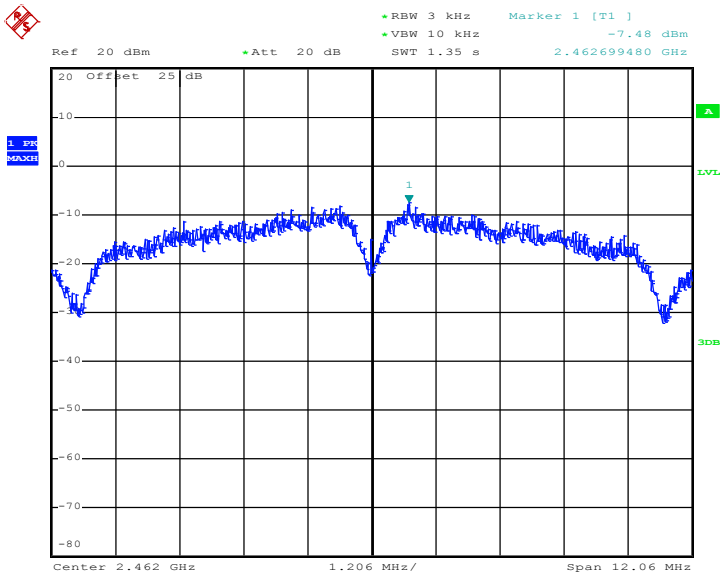
Date: 15.NOV.2012 18:42:10

PSD 3kHz Plot on 802.11b Channel 06



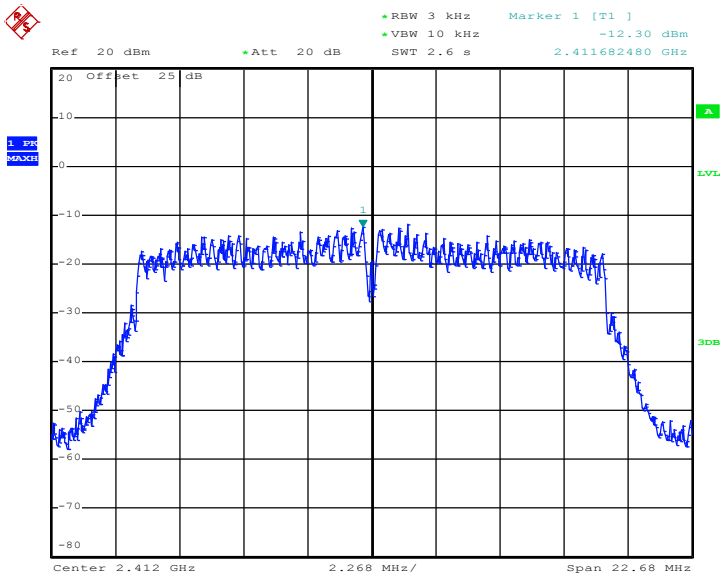
Date: 15.NOV.2012 18:50:56

PSD 3kHz Plot on 802.11b Channel 11



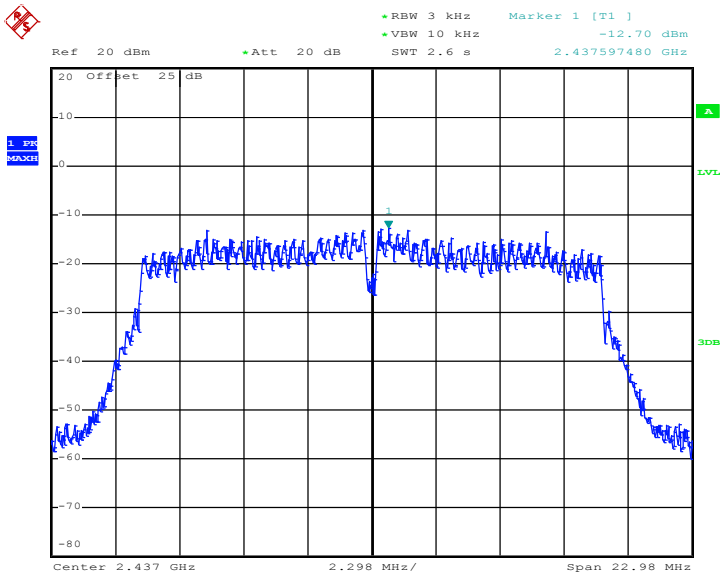
Date: 15.NOV.2012 18:57:59

PSD 3kHz Plot on 802.11g Channel 01



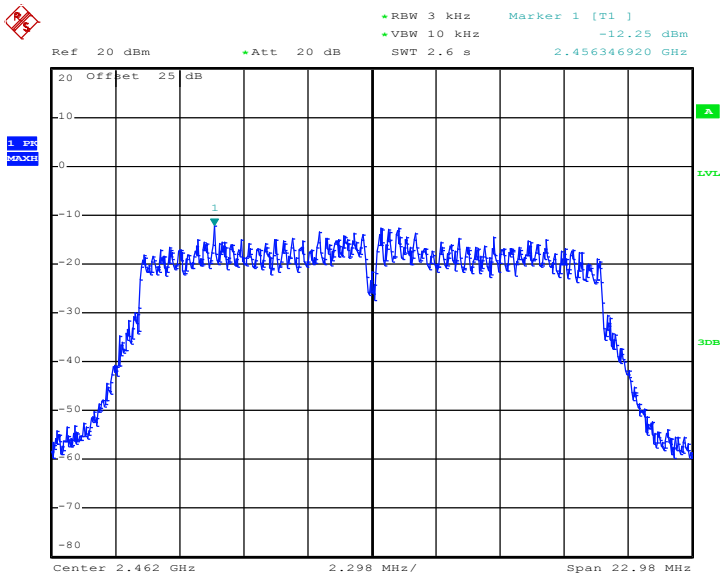
Date: 15.NOV.2012 19:14:42

PSD 3kHz Plot on 802.11g Channel 06



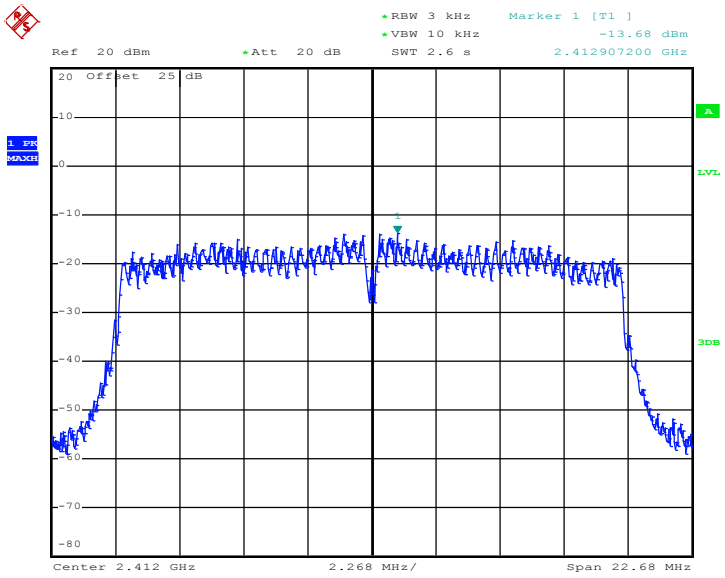
Date: 15.NOV.2012 19:11:36

PSD 3kHz Plot on 802.11g Channel 11



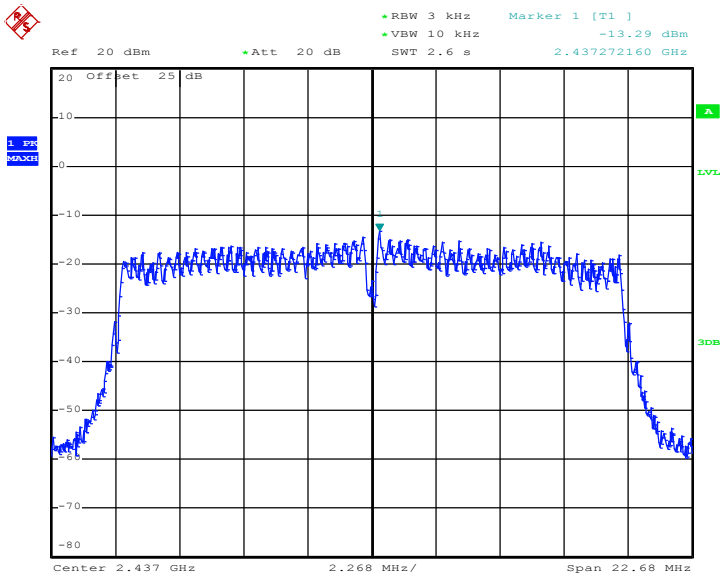
Date: 15.NOV.2012 19:07:18

PSD 3kHz Plot on 802.11n HT20 Channel 01



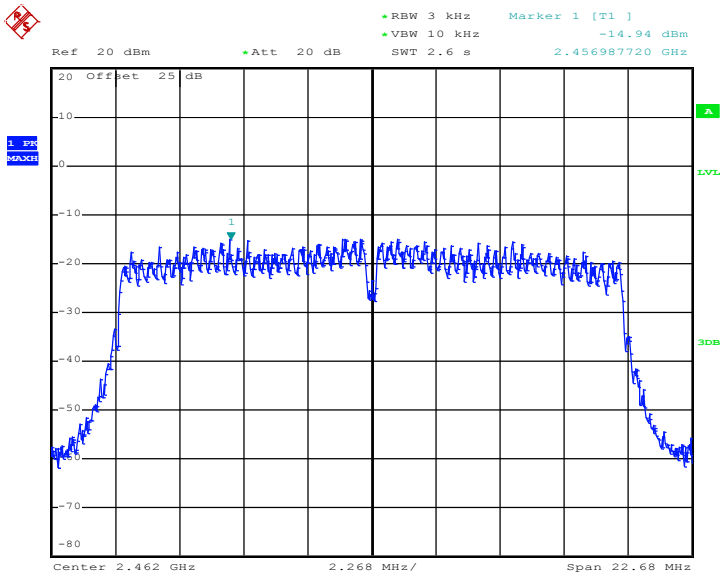
Date: 15.NOV.2012 19:18:36

PSD 3kHz Plot on 802.11n HT20 Channel 06



Date: 15.NOV.2012 19:22:00

PSD 3kHz Plot on 802.11n HT20 Channel 11



Date: 15.NOV.2012 19:25:38

3.4 Conducted Band Edges and Spurious Emission Measurement

3.4.1 Limit of Conducted Band Edges and Spurious Emission Measurement

In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).

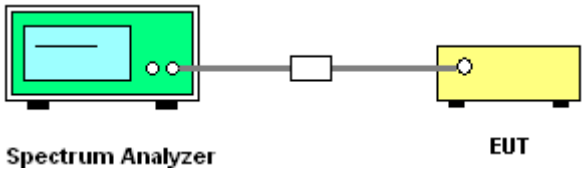
3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

3.4.3 Test Procedures

1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v02.
2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
3. Set to the maximum power setting and enable the EUT transmit continuously.
4. Set RBW = 100 KHz, VBW=300 KHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz, when maximum peak conducted output power procedure is used. The attenuation is set to 30dB, when maximum conducted output power procedure is used.
5. Measure and record the results in the test report.

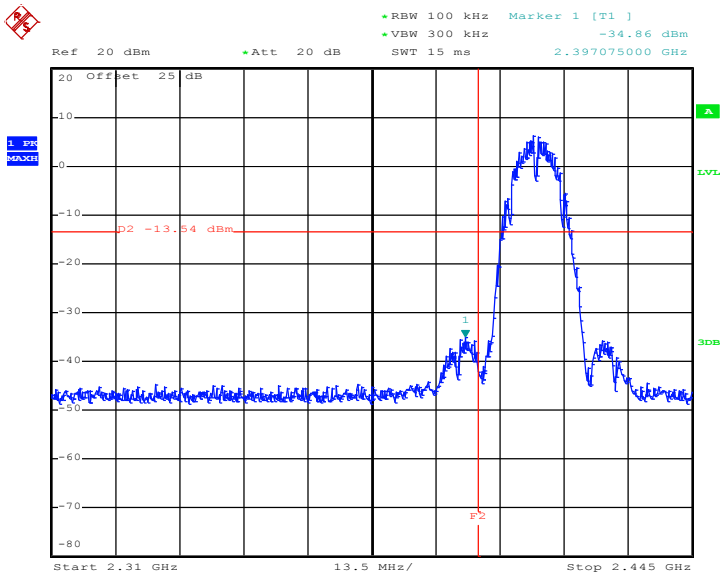
3.4.4 Test Setup



3.4.5 Test Plots of Conducted Band Edges

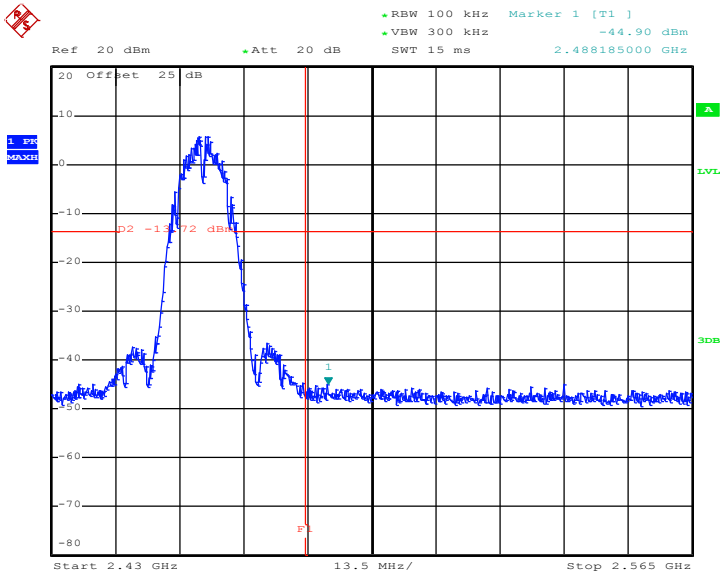
Test Mode :	802.11b	**Temperature :**	24~26℃
Test Band :	Low and High	**Relative Humidity :**	50~53%
Test Channel :	01 and 11	**Test Engineer :**	Bill Kuo

Low Band Edge Plot on 802.11b Channel 01



Date: 15.NOV.2012 18:42:37

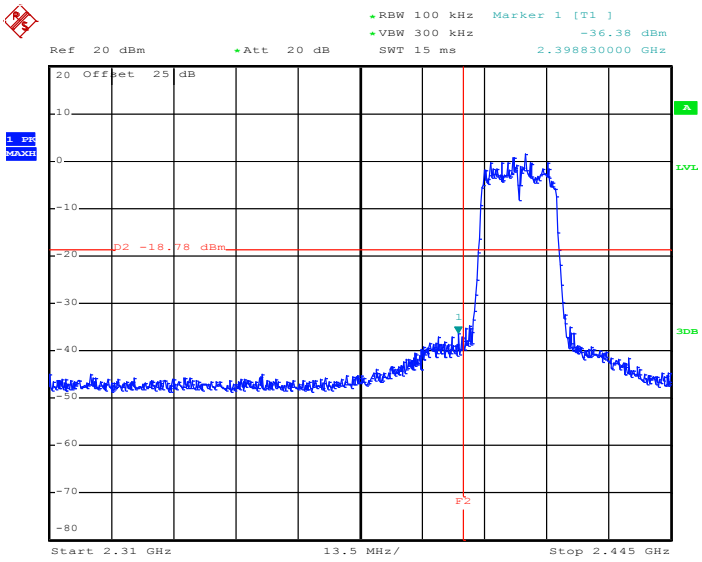
High Band Edge Plot on 802.11b Channel 11



Date: 15.NOV.2012 18:58:26

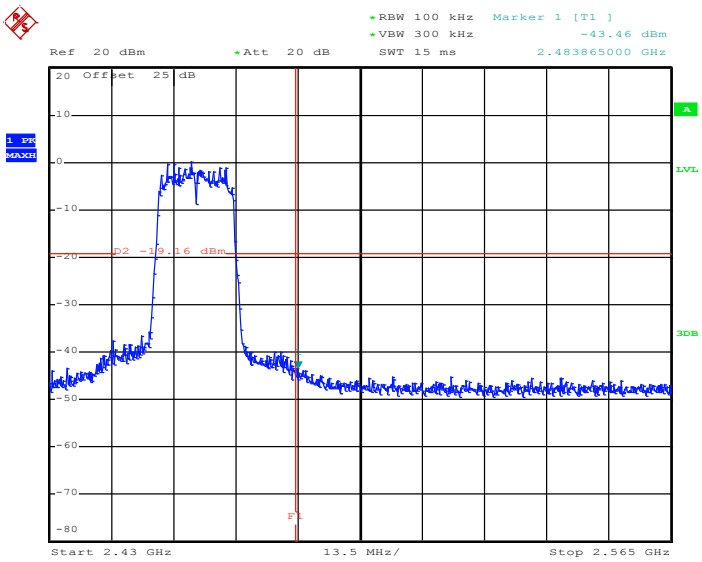
Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Bill Kuo

Low Band Edge Plot on 802.11g Channel 01



Date: 15.NOV.2012 19:15:10

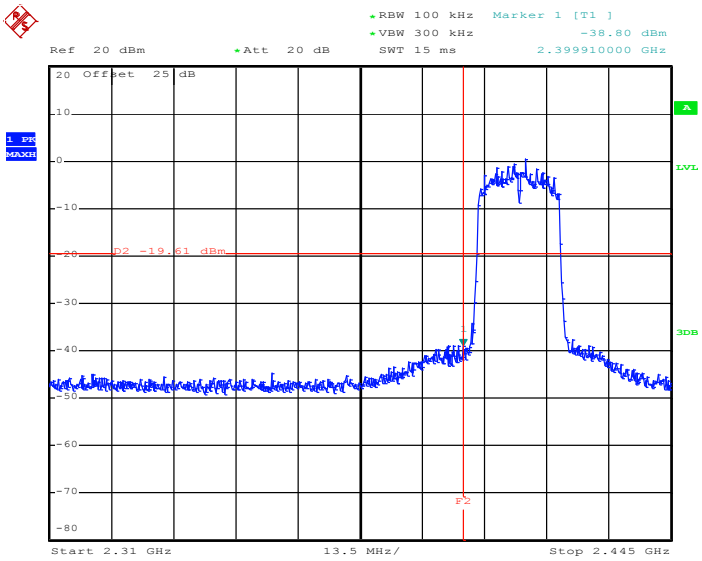
High Band Edge Plot on 802.11g Channel 11



Date: 15.NOV.2012 19:07:45

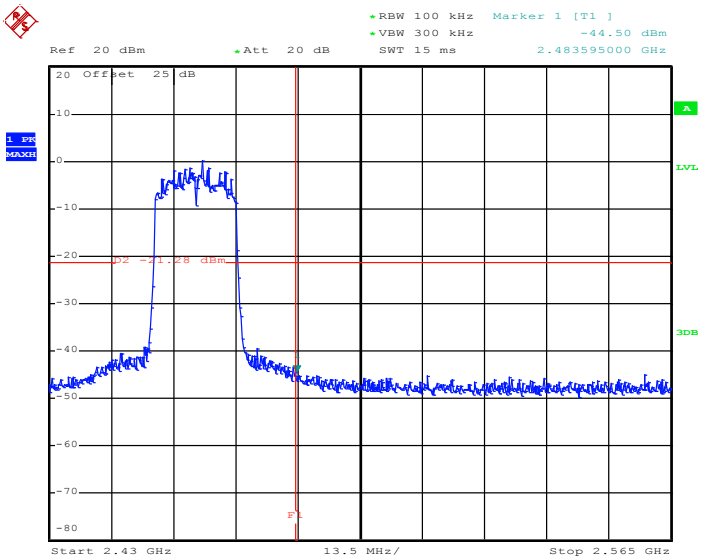
Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	Low and High	Relative Humidity :	50~53%
Test Channel :	01 and 11	Test Engineer :	Bill Kuo

Low Band Edge Plot on 802.11n HT20 Channel 01



Date: 15.NOV.2012 19:19:03

High Band Edge Plot on 802.11n HT20 Channel 11



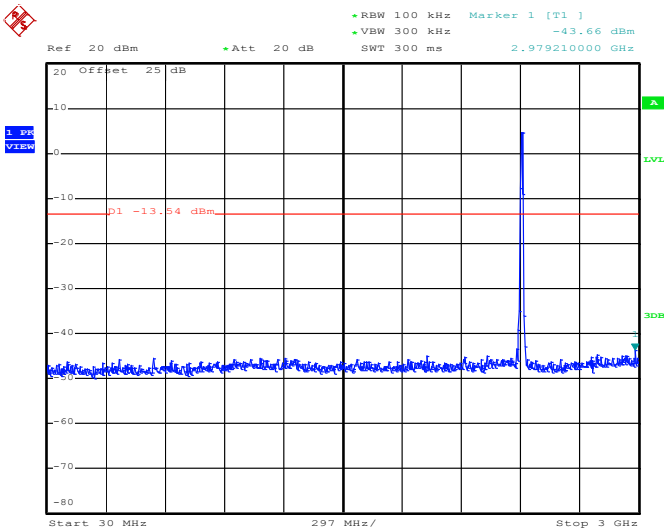
Date: 15.NOV.2012 19:26:05

3.4.6 Test Plots of Spurious Emission

Test Mode :	802.11b	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Bill Kuo

802.11b 30 MHz~3 GHz

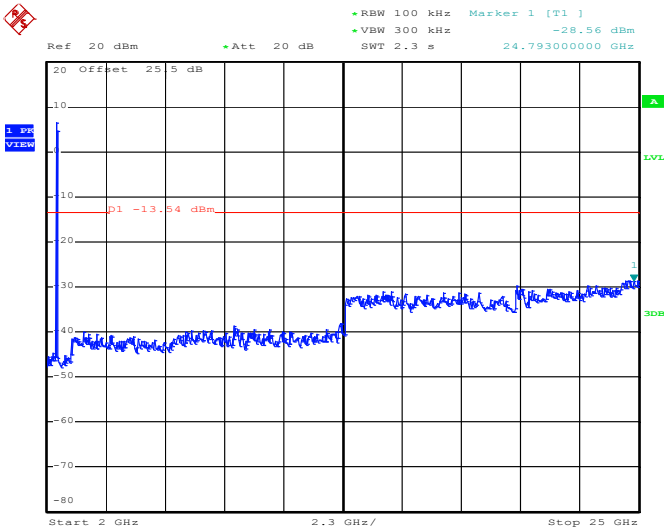
Conducted Spurious Emission Plot on Channel 01



Date: 15.NOV.2012 19:34:10

802.11b 2 GHz~25 GHz

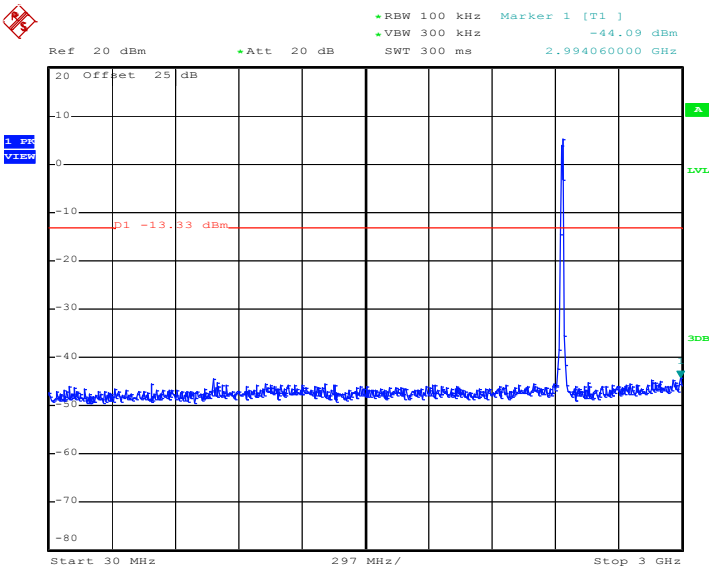
Conducted Spurious Emission Plot on Channel 01



Date: 15.NOV.2012 19:34:29

802.11b 30 MHz~3 GHz

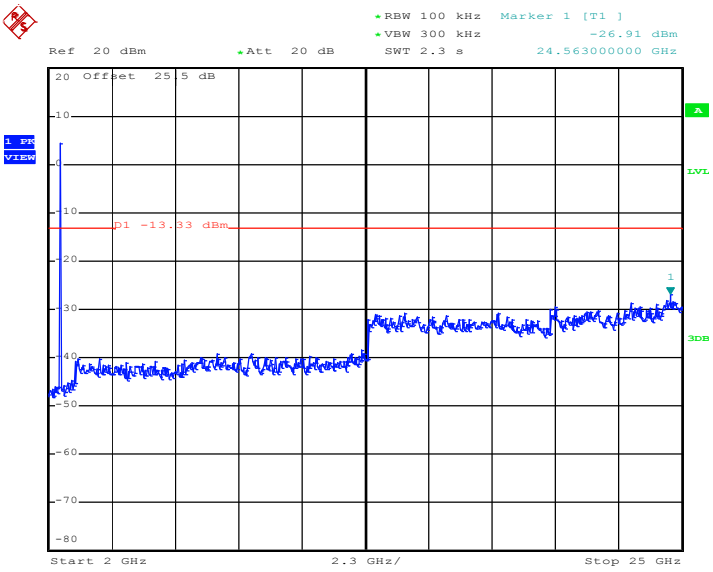
Conducted Spurious Emission Plot on Channel 06



Date: 15.NOV.2012 18:51:29

802.11b 2 GHz~25 GHz

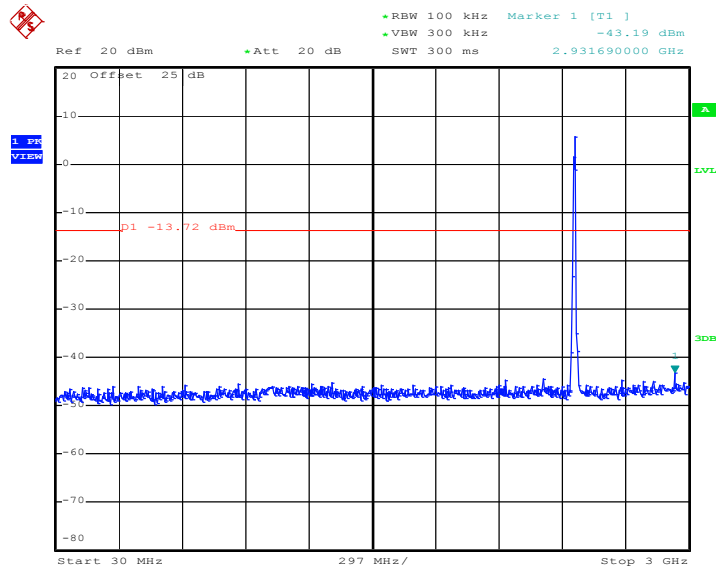
Conducted Spurious Emission Plot on Channel 06



Date: 15.NOV.2012 18:51:48

802.11b 30 MHz~3 GHz

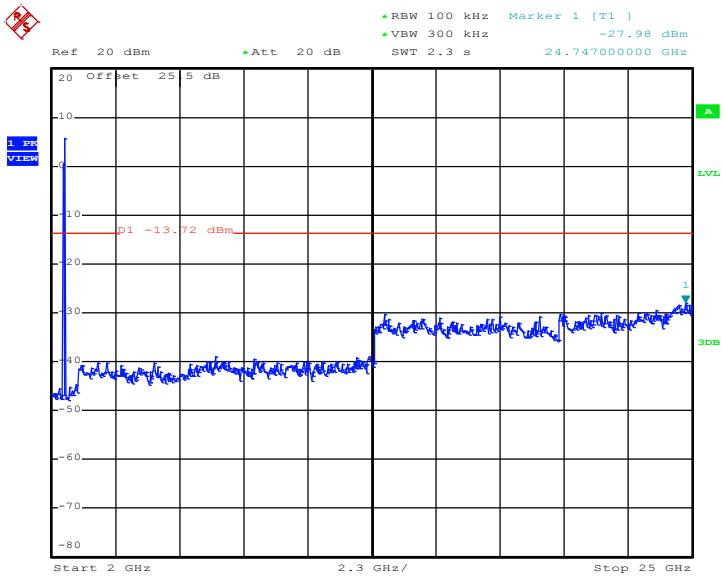
Conducted Spurious Emission Plot on Channel 11



Date: 15.NOV.2012 18:58:45

802.11b 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11

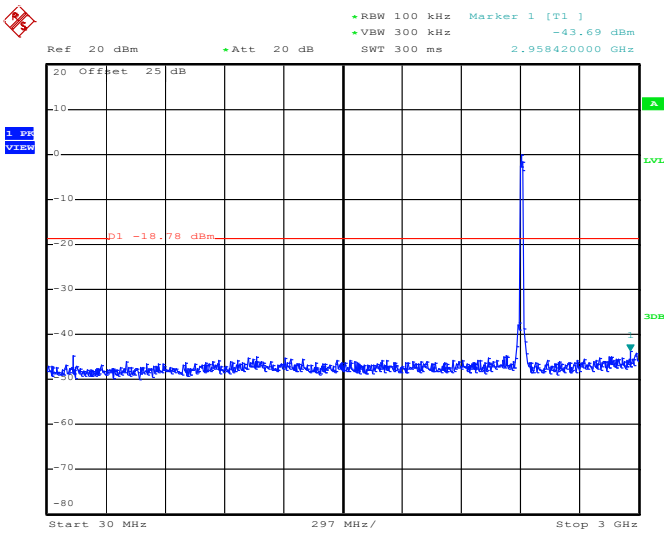


Date: 15.NOV.2012 18:59:05

Test Mode :	802.11g	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Bill Kuo

802.11g 30 MHz~3 GHz

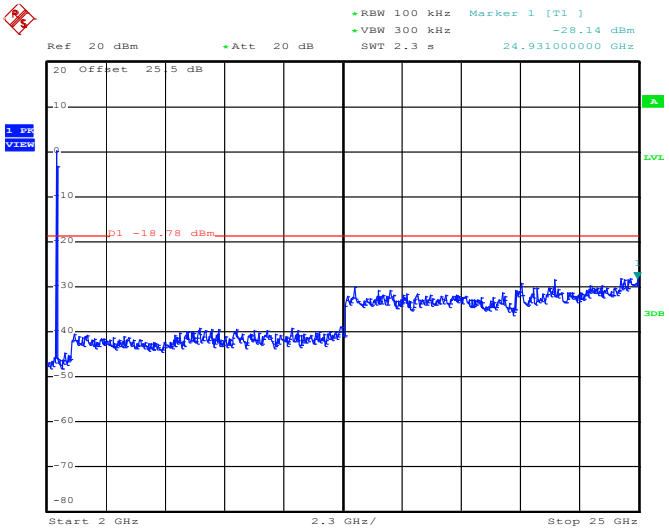
Conducted Spurious Emission Plot on Channel 01



Date: 15.NOV.2012 19:15:29

802.11g 2 GHz~25 GHz

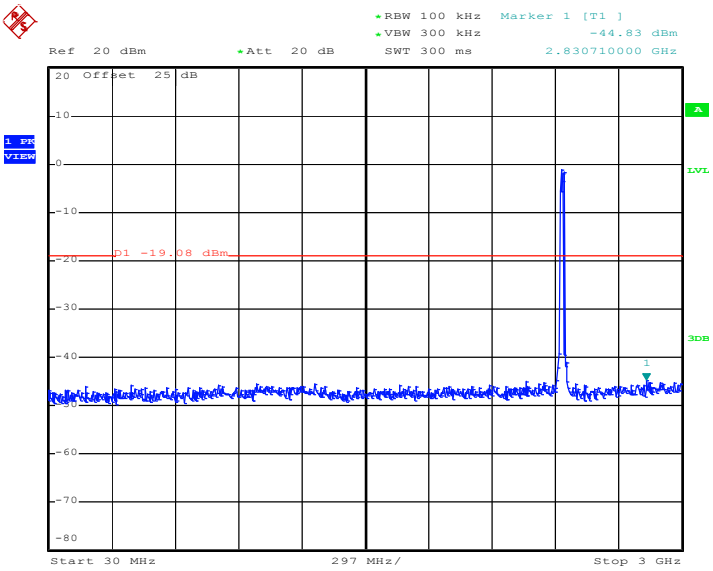
Conducted Spurious Emission Plot on Channel 01



Date: 15.NOV.2012 19:15:48

802.11g 30 MHz~3 GHz

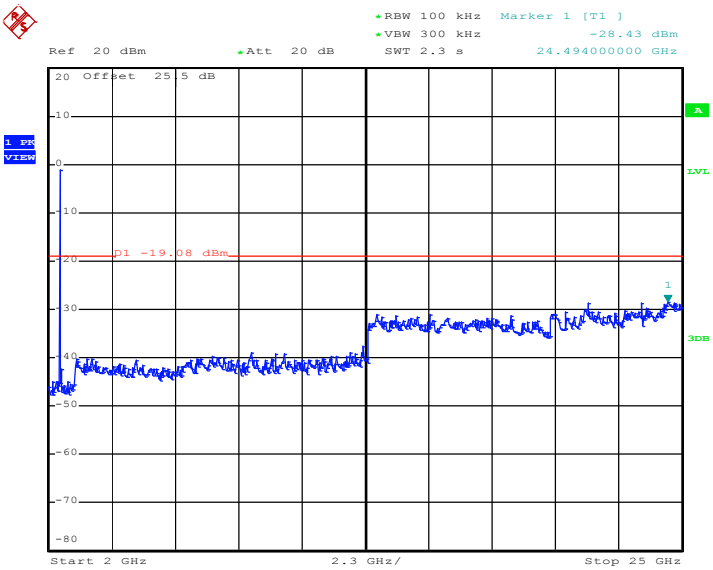
Conducted Spurious Emission Plot on Channel 06



Date: 15.NOV.2012 19:12:09

802.11g 2 GHz~25 GHz

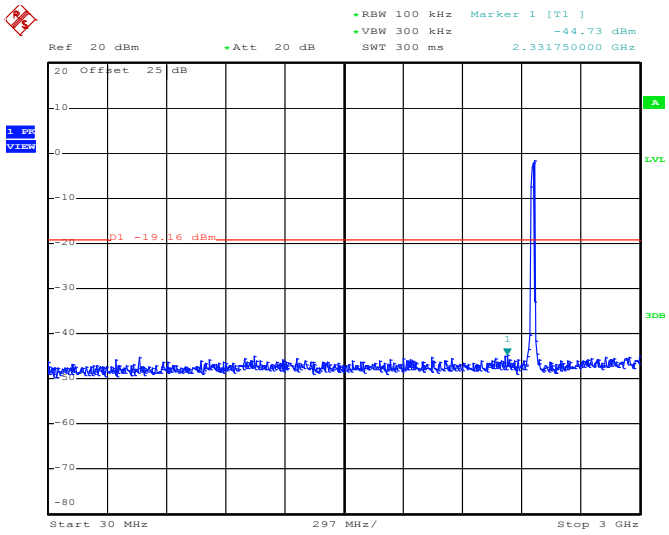
Conducted Spurious Emission Plot on Channel 06



Date: 15.NOV.2012 19:12:28

802.11g 30 MHz~3 GHz

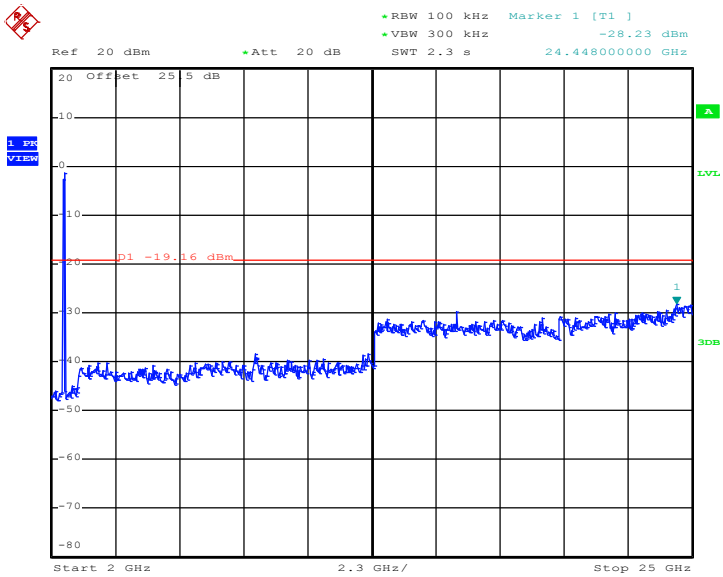
Conducted Spurious Emission Plot on Channel 11



Date: 15.NOV.2012 19:09:03

802.11g 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11

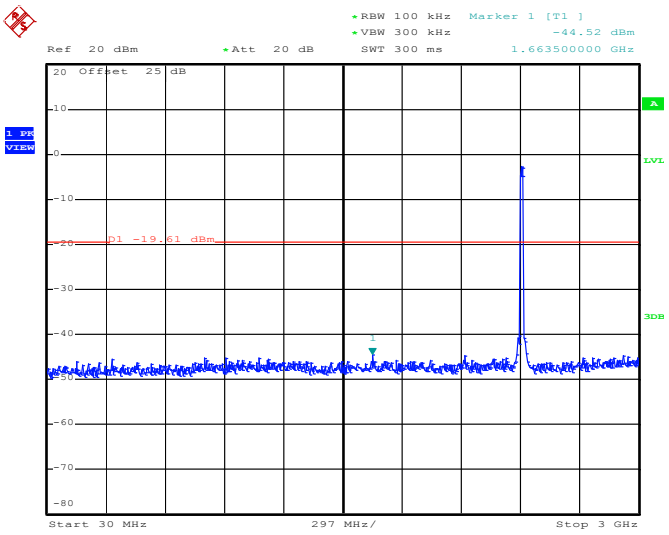


Date: 15.NOV.2012 19:09:23

Test Mode :	802.11n HT20	Temperature :	24~26℃
Test Band :	30MHz-3GHz and 2G-25GHz	Relative Humidity :	50~53%
Test Channel :	01, 06, 11	Test Engineer :	Bill Kuo

802.11n HT20 30 MHz~3 GHz

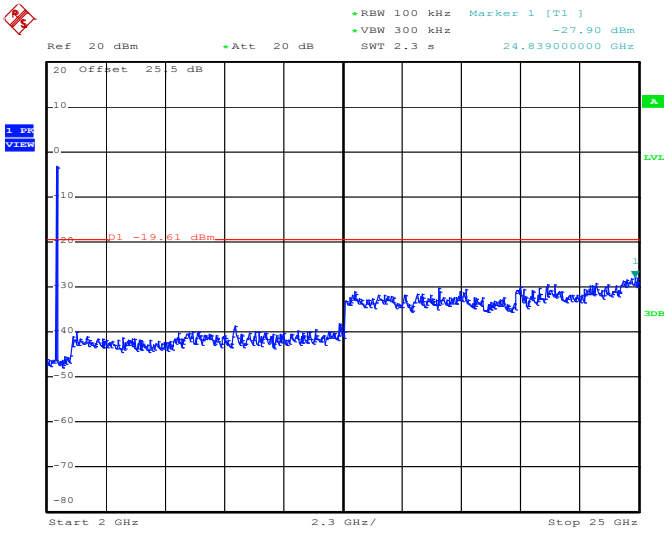
Conducted Spurious Emission Plot on Channel 01



Date: 15.NOV.2012 19:19:22

802.11n HT20 2 GHz~25 GHz

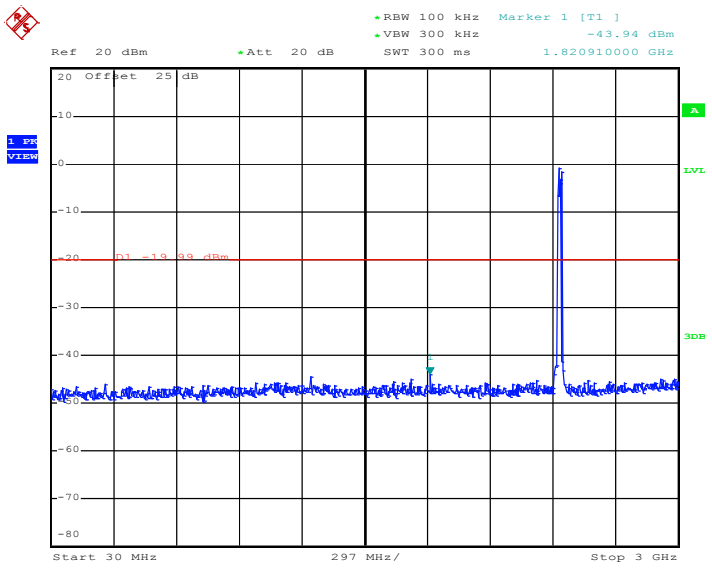
Conducted Spurious Emission Plot on Channel 01



Date: 15.NOV.2012 19:19:41

802.11n HT20 30 MHz~3 GHz

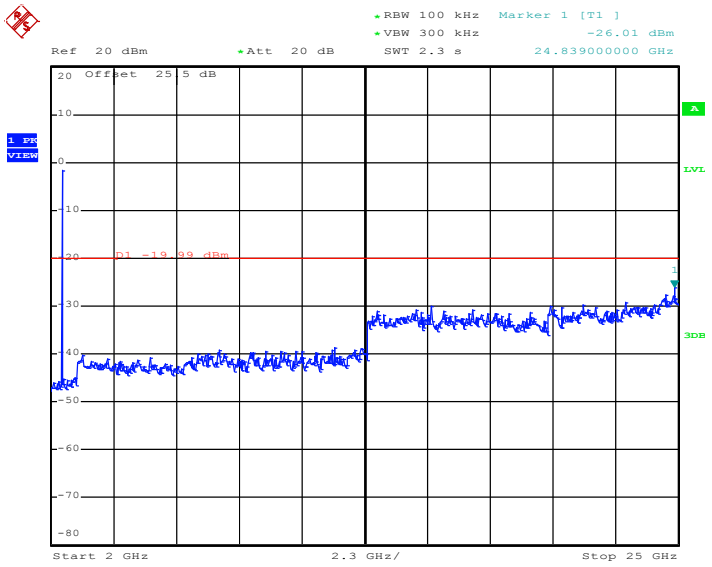
Conducted Spurious Emission Plot on Channel 06



Date: 15.NOV.2012 19:22:33

802.11n HT20 2 GHz~25 GHz

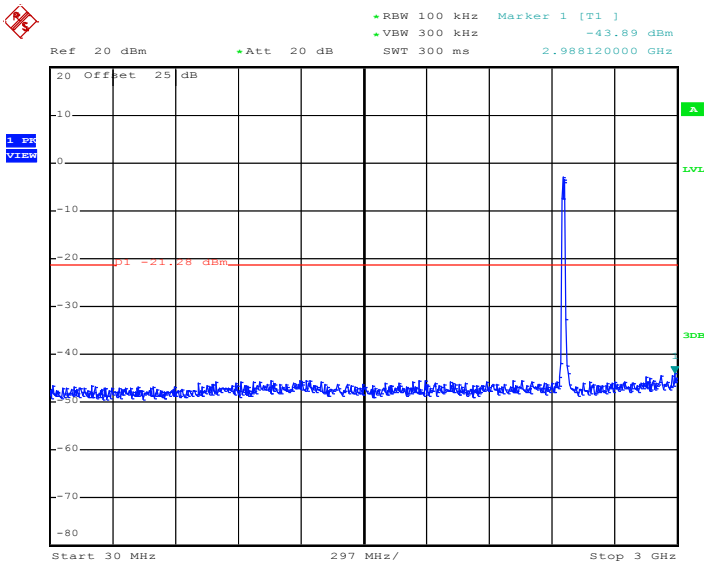
Conducted Spurious Emission Plot on Channel 06



Date: 15.NOV.2012 19:22:52

802.11n HT20 30 MHz~3 GHz

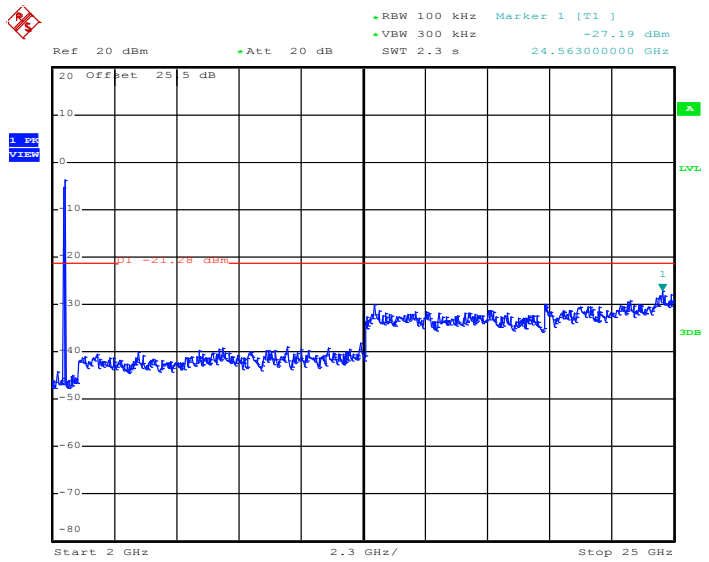
Conducted Spurious Emission Plot on Channel 11



Date: 15.NOV.2012 19:26:24

802.11n HT20 2 GHz~25 GHz

Conducted Spurious Emission Plot on Channel 11



Date: 15.NOV.2012 19:26:43

3.5 Radiated Emission Measurement

3.5.1 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

3.5.2 Measuring Instruments

See list of measuring instruments of this test report.

3.5.3 Test Procedures

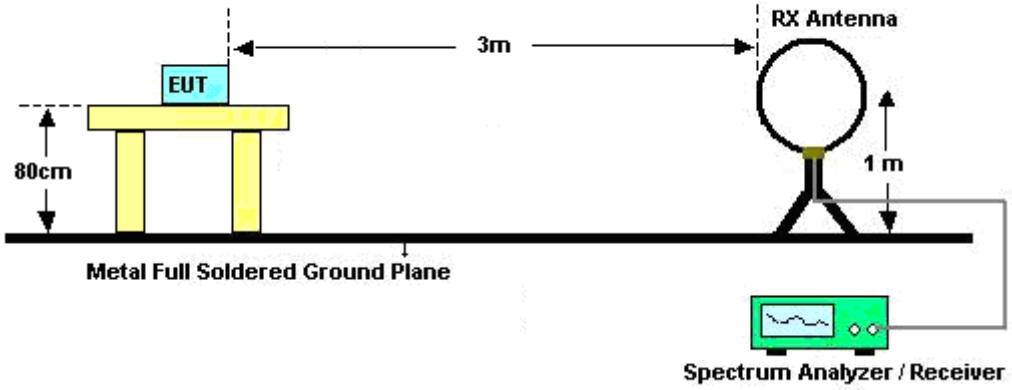
1. The testing follows the guidelines in ANSI C63. 10-2009
2. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high pass filter are used for the test in order to get better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

Band	Duty Cycle(%)	T(us)	1/T(KHz)	VBW Setting
802.11b	100.00	-	-	10Hz
802.11g	98.10	-	-	10Hz
2.4G 802.11n HT20	98.47	-	-	10Hz

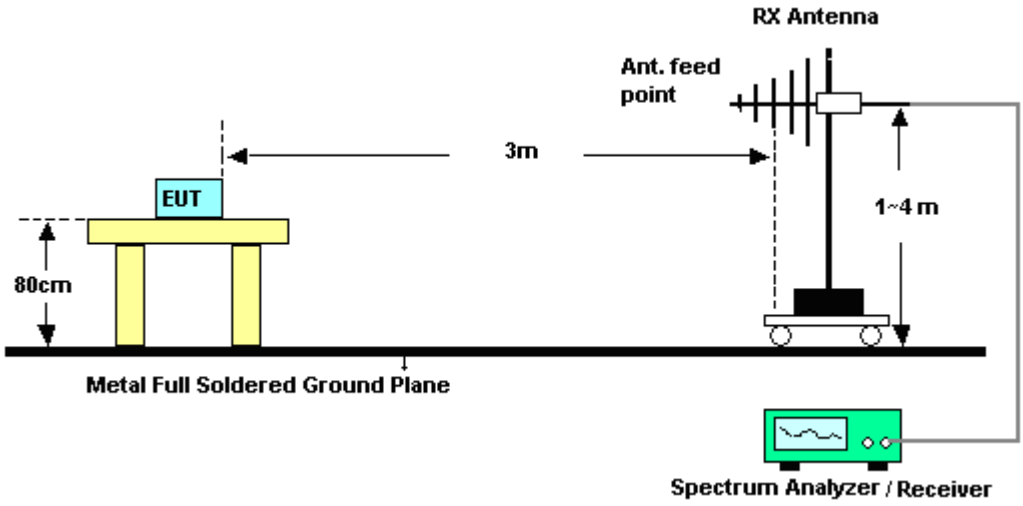
Note: For average measurement with duty cycle < 98%, use reduced VBW measurement method 4.2.3.2.3 in ANSI C63.10.

3.5.4 Test Setup

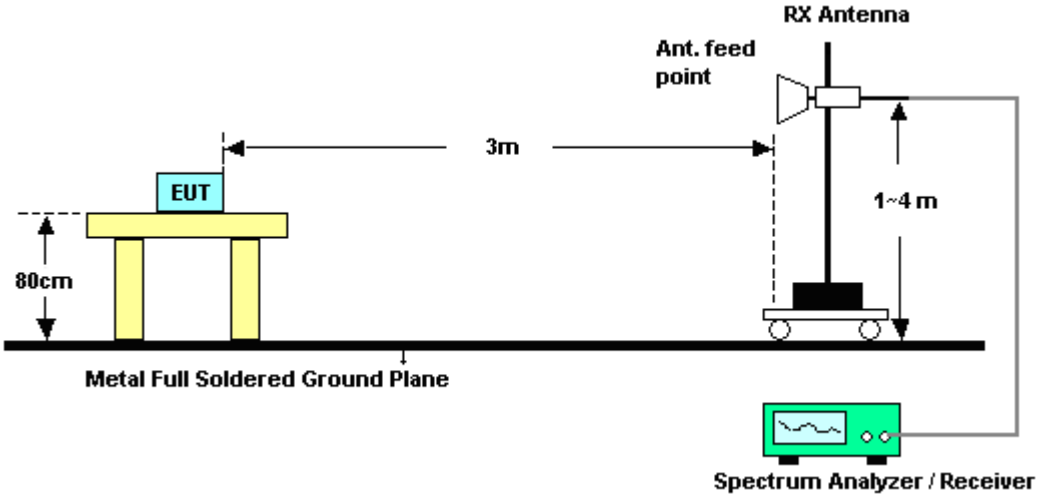
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.5.5 Test Results of Radiated Emissions (9 KHz ~ 30 MHz)

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

3.5.6 Test Result of Radiated Band Edges

Test Mode :	802.11b	**Temperature :**	20~22℃
Test Band :	Low	**Relative Humidity :**	50~52%
Test Channel :	01	**Test Engineer :**	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBμV/m)**	**Over Limit (dB)**	**Limit Line (dBμV/m)**	**Read Level (dBμV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2389.47	59.08	-14.92	74	54.71	32.3	6.03	33.96	118	89	Peak
2386.77	45.49	-8.51	54	41.12	32.3	6.03	33.96	118	89	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	**Level (dBμV/m)**	**Over Limit (dB)**	**Limit Line (dBμV/m)**	**Read Level (dBμV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2389.47	57.08	-16.92	74	52.71	32.3	6.03	33.96	118	89	Peak
2386.32	43.42	-10.58	54	39.05	32.3	6.03	33.96	106	241	Average

Test Mode :	802.11b	**Temperature :**	20~22℃
Test Band :	High	**Relative Humidity :**	50~52%
Test Channel :	11	**Test Engineer :**	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	**Level (dBμV/m)**	**Over Limit (dB)**	**Limit Line (dBμV/m)**	**Read Level (dBμV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2487.86	56.59	-17.41	74	52.01	32.4	6.18	34	135	91	Peak
2483.5	44.63	-9.37	54	40.07	32.38	6.18	34	135	91	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	**Level (dBμV/m)**	**Over Limit (dB)**	**Limit Line (dBμV/m)**	**Read Level (dBμV)**	**Antenna Factor (dB)**	**Cable Loss (dB)**	**Preamp Factor (dB)**	**Ant Pos (cm)**	**Table Pos (deg)**	**Remark**
2483.68	56.82	-17.18	74	52.26	32.38	6.18	34	103	239	Peak
2483.5	42.9	-11.1	54	38.34	32.38	6.18	34	103	239	Average

Test Mode :	802.11g	Temperature :	20~22℃
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2387.31	70.51	-3.49	74	66.14	32.3	6.03	33.96	157	233	Peak
2390	50.52	-3.48	54	46.15	32.3	6.03	33.96	157	233	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	64.87	-9.13	74	60.5	32.3	6.03	33.96	100	215	Peak
2390	47.58	-6.42	54	43.21	32.3	6.03	33.96	100	215	Average

Test Mode :	802.11g	Temperature :	20~22℃
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.68	66.43	-7.57	74	61.87	32.38	6.18	34	100	238	Peak
2483.5	47.58	-6.42	54	43.02	32.38	6.18	34	100	238	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2483.74	62.88	-11.12	74	58.32	32.38	6.18	34	100	236	Peak
2483.5	43.32	-10.68	54	38.76	32.38	6.18	34	100	236	Average

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Band :	Low	Relative Humidity :	50~52%
Test Channel :	01	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2389.92	68.5	-5.5	74	64.13	32.3	6.03	33.96	115	93	Peak
2390	50.72	-3.28	54	46.35	32.3	6.03	33.96	115	93	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2390	63.52	-10.48	74	59.15	32.3	6.03	33.96	106	238	Peak
2390	47.01	-6.99	54	42.64	32.3	6.03	33.96	106	238	Average

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Band :	High	Relative Humidity :	50~52%
Test Channel :	11	Test Engineer :	Kyle Jhuang

ANTENNA POLARITY : HORIZONTAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2485.22	67.88	-6.12	74	63.32	32.38	6.18	34	112	91	Peak
2483.5	50.49	-3.51	54	45.93	32.38	6.18	34	112	91	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2484.44	65.16	-8.84	74	60.6	32.38	6.18	34	101	239	Peak
2483.5	47.36	-6.64	54	42.8	32.38	6.18	34	101	239	Average

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

Test Mode :	802.11b	Temperature :	20~22℃
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	103.98	-	-	99.57	32.31	6.07	33.97	106	241	Average
2412	108.43	-	-	104.02	32.31	6.07	33.97	106	241	Peak
4824	45.65	-28.35	74	60.03	33.97	9.12	57.47	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22℃
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	103.33	-	-	98.92	32.31	6.07	33.97	118	89	Average
2412	107.88	-	-	103.47	32.31	6.07	33.97	118	89	Peak
4824	44.6	-29.4	74	58.98	33.97	9.12	57.47	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22℃
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	104.2	-	-	99.72	32.35	6.11	33.98	156	300	Average
2437	108.76	-	-	104.28	32.35	6.11	33.98	156	300	Peak
4875	45.87	-28.13	74	60.27	33.95	9.13	57.48	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22℃
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	103.16	-	-	98.68	32.35	6.11	33.98	126	283	Average
2437	107.93	-	-	103.45	32.35	6.11	33.98	126	283	Peak
4875	45.13	-28.87	74	59.53	33.95	9.13	57.48	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22℃
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	105.41	-	-	100.89	32.37	6.14	33.99	103	239	Average
2462	110.03	-	-	105.51	32.37	6.14	33.99	103	239	Peak
4923	42.04	-31.96	74	66.71	0	9.14	33.81	100	0	Peak

Test Mode :	802.11b	Temperature :	20~22℃
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	104.95	-	-	100.43	32.37	6.14	33.99	135	91	Average
2462	109.8	-	-	105.28	32.37	6.14	33.99	135	91	Peak
4923	44.74	-29.26	74	69.41	0	9.14	33.81	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22℃
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	96.78	-	-	92.37	32.31	6.07	33.97	157	233	Average
2412	108.18	-	-	103.77	32.31	6.07	33.97	157	233	Peak
4824	42.56	-31.44	74	67.25	0	9.12	33.81	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22℃
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2412	93.16	-	-	88.75	32.31	6.07	33.97	100	215	Average
2412	104.6	-	-	100.19	32.31	6.07	33.97	100	215	Peak
4824	41.68	-32.32	74	56.06	33.97	9.12	57.47	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22℃
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	99.73	-	-	95.25	32.35	6.11	33.98	156	236	Average
2437	110.73	-	-	106.25	32.35	6.11	33.98	156	236	Peak
4875	43.07	-30.93	74	67.75	0	9.13	33.81	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22℃
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	94.8	-	-	90.32	32.35	6.11	33.98	100	223	Average
2437	105.88	-	-	101.4	32.35	6.11	33.98	100	223	Peak
4875	43.49	-30.51	74	68.17	0	9.13	33.81	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22℃
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	96.53	-	-	92.01	32.37	6.14	33.99	100	238	Average
2462	106.72	-	-	102.2	32.37	6.14	33.99	100	238	Peak
4875	41.31	-32.69	74	55.71	33.95	9.13	57.48	100	0	Peak

Test Mode :	802.11g	Temperature :	20~22℃
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	91.86	-	-	87.34	32.37	6.14	33.99	100	236	Average
2462	101.12	-	-	96.6	32.37	6.14	33.99	100	236	Peak
4875	41.28	-32.72	74	55.68	33.95	9.13	57.48	100	0	Peak

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
62.94	17.4	-22.6	40	42.23	6.16	0.78	31.77	-	-	Peak
112.35	23.22	-20.28	43.5	42.9	10.98	1.06	31.72	-	-	Peak
216.3	37.44	-8.56	46	57.1	10.24	1.4	31.3	-	-	Peak
442.1	27.08	-18.92	46	39.04	16.89	2.28	31.13	-	-	Peak
629.7	41.03	-4.97	46	48.65	20.03	2.78	30.43	100	56	Peak
810.3	30.88	-15.12	46	35.75	22.2	3.17	30.24	-	-	Peak
2412	96.63	-	-	92.22	32.31	6.07	33.97	115	93	Average
2412	107.4	-	-	102.99	32.31	6.07	33.97	115	93	Peak
4824	41.35	-32.65	74	55.73	33.97	9.12	57.47	100	0	Peak

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Channel :	01	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2412 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
31.08	33.17	-6.83	40	45.22	19.28	0.54	31.87	-	-	Peak
92.64	23.83	-19.67	43.5	45.57	8.96	0.96	31.66	-	-	Peak
214.14	31.51	-11.99	43.5	51.36	10.11	1.38	31.34	-	-	Peak
449.8	24.52	-21.48	46	36.32	17.05	2.3	31.15	-		Peak
629.7	39.66	-6.34	46	47.28	20.03	2.78	30.43	100	89	Peak
855.1	33.7	-12.3	46	38.34	22.65	3.28	30.57	-	-	Peak
2412	95.5	-	-	91.09	32.31	6.07	33.97	106	238	Average
2412	106.73	-	-	102.32	32.31	6.07	33.97	106	238	Peak
4824	41.28	-32.72	74	55.66	33.97	9.12	57.47	100	0	Peak

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	97	-	-	92.52	32.35	6.11	33.98	155	300	Average
2437	107.41	-	-	102.93	32.35	6.11	33.98	155	300	Peak
4869	43.5	-30.5	74	57.9	33.95	9.13	57.48	100	0	Peak

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Channel :	06	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2437 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2437	95.89	-	-	91.41	32.35	6.11	33.98	127	282	Average
2437	106.9	-	-	102.42	32.35	6.11	33.98	127	282	Peak
4872	42.75	-31.25	74	57.15	33.95	9.13	57.48	100	0	Peak

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Horizontal
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	96.57	-	-	92.05	32.37	6.14	33.99	101	239	Average
2462	108.02	-	-	103.5	32.37	6.14	33.99	101	239	Peak
4923	42.05	-31.95	74	56.46	33.93	9.14	57.48	100	0	Peak

Test Mode :	802.11n HT20	Temperature :	20~22℃
Test Channel :	11	Relative Humidity :	50~52%
Test Engineer :	Kyle Jhuang	Polarization :	Vertical
Remark :	1. 2462 MHz is fundamental signal which can be ignored. 2. Average measurement was not performed if peak level went lower than the average limit.		

Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
2462	96.17	-	-	91.65	32.37	6.14	33.99	112	91	Average
2462	107.53	-	-	103.01	32.37	6.14	33.99	112	91	Peak
4923	42.19	-31.81	74	56.6	33.93	9.14	57.48	100	0	Peak

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.

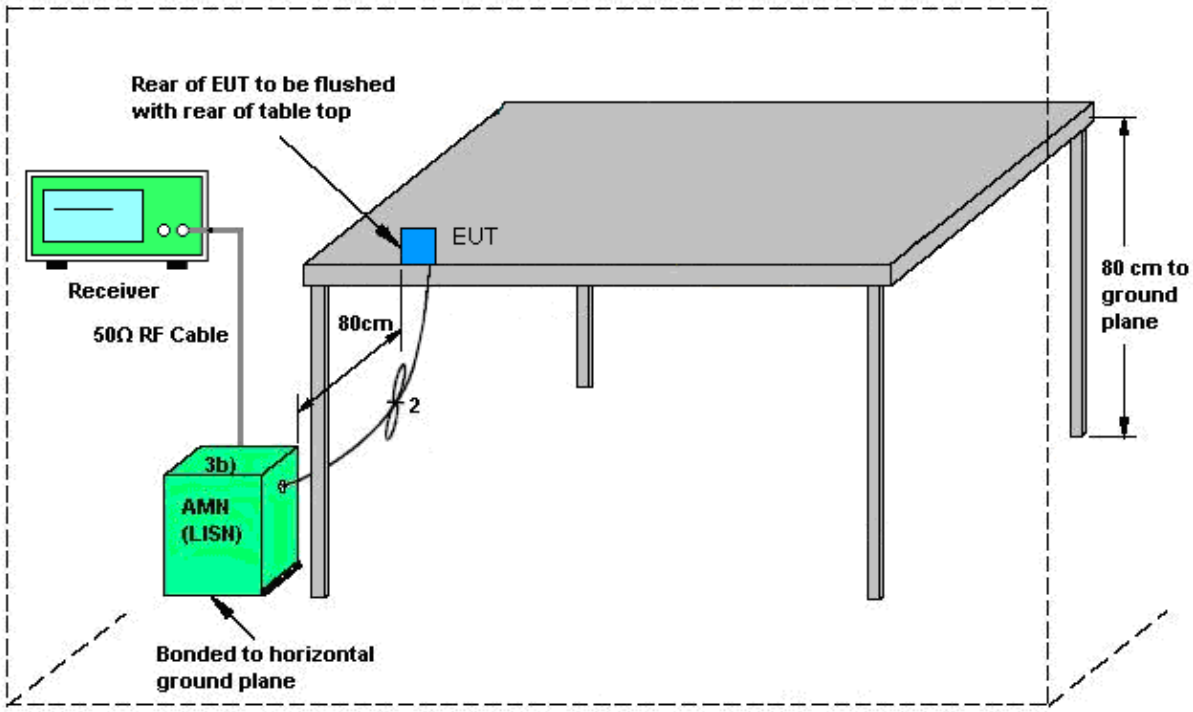
3.6.2 Measuring Instruments

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 and ANSI C63.10-2009.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room, and it was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization network (LISN).
4. All the support units are connecting to the other LISN.
5. The LISN provides 50 ohm coupling impedance for the measuring instrument.
6. The FCC states that a 50 ohm, 50 microhenry LISN should be used.
7. Both sides of AC line were checked for maximum conducted interference.
8. The frequency range from 150 KHz to 30 MHz was searched.
9. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode.

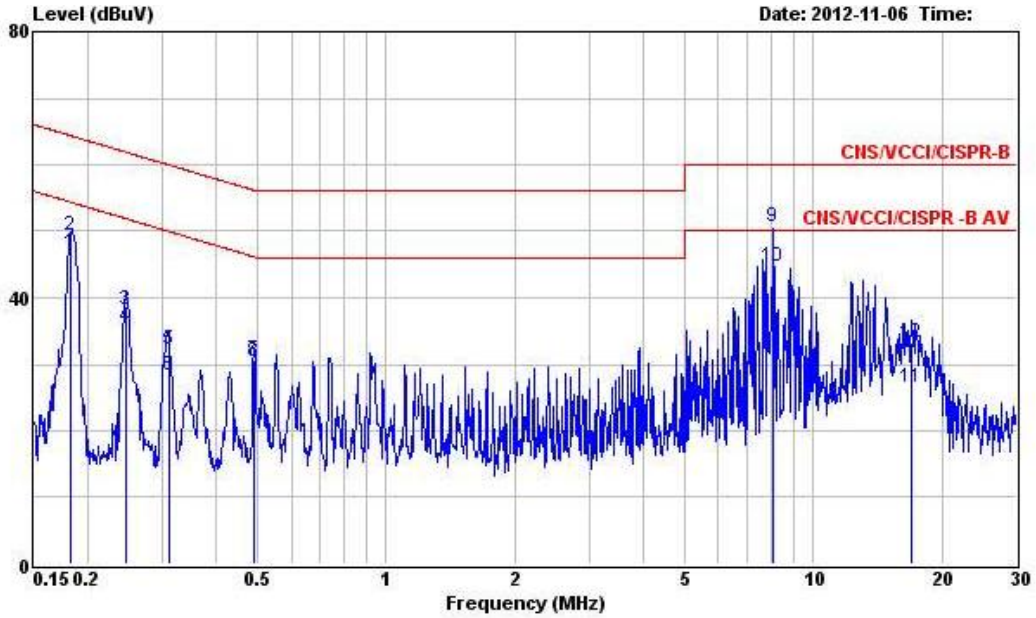
3.6.4 Test Setup



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

3.6.5 Test Result of AC Conducted Emission

Test Mode :	Mode 1	**Temperature :**	25~26℃
Test Engineer :	David Du	**Relative Humidity :**	43~44%
Test Voltage :	120Vac / 60Hz	**Phase :**	Line
Function Type :	WLAN Link + USB Cable (Data Link with PC) + MP3 + H-Pattern + Earphone		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		

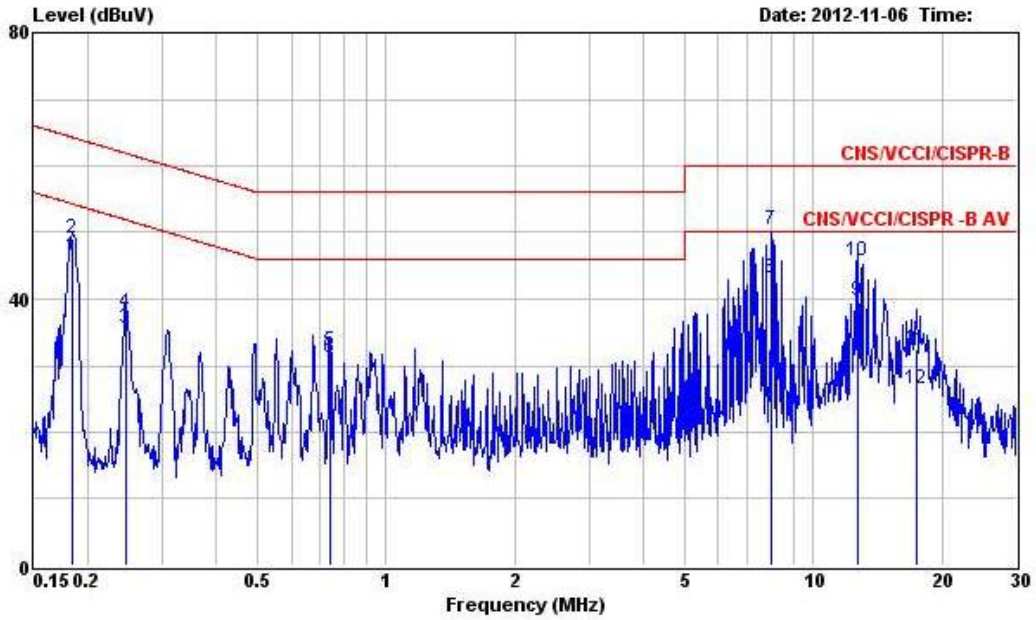


Site : CO01-HY
Condition : CNS/VCCI/CISPR-B LISN 2001/004-120112 LINE

Power : 120V/60Hz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.183	46.66	-7.69	54.35	46.48	0.08	0.10	Average
2	0.183	49.22	-15.13	64.35	49.04	0.08	0.10	QP
3	0.247	38.18	-23.68	61.86	37.97	0.08	0.13	QP
4	0.247	35.52	-16.34	51.86	35.31	0.08	0.13	Average
5	0.310	32.25	-27.72	59.97	32.00	0.09	0.16	QP
6	0.310	28.27	-21.70	49.97	28.02	0.09	0.16	Average
7	0.489	30.55	-25.63	56.18	30.27	0.10	0.18	QP
8	0.489	30.45	-15.73	46.18	30.17	0.10	0.18	Average
9	8.020	50.56	-9.44	60.00	50.12	0.26	0.18	QP
10	8.020	44.74	-5.26	50.00	44.30	0.26	0.18	Average
11	17.020	26.46	-23.54	50.00	25.90	0.35	0.21	Average
12	17.020	33.21	-26.79	60.00	32.65	0.35	0.21	QP

Test Mode :	Mode 1	Temperature :	25~26℃
Test Engineer :	David Du	Relative Humidity :	43~44%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	WLAN Link + USB Cable (Data Link with PC) + MP3 + H-Pattern + Earphone		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-HY
Condition : CNS/VCCI/CISPR-B LISN 2001/004-120112 NEUTRAL

Power : 120V/60Hz

	Freq	Level	Over Limit	Limit Line	Read Level	Probe Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.184	46.54	-7.76	54.30	46.32	0.12	0.10	Average
2	0.184	49.12	-15.18	64.30	48.90	0.12	0.10	QP
3	0.246	35.56	-16.33	51.89	35.31	0.12	0.13	Average
4	0.246	38.02	-23.87	61.89	37.77	0.12	0.13	QP
5	0.739	32.16	-23.84	56.00	31.89	0.14	0.13	QP
6	0.739	31.16	-14.84	46.00	30.89	0.14	0.13	Average
7	7.978	50.49	-9.51	60.00	50.02	0.29	0.18	QP
8	7.980	43.21	-6.79	50.00	42.74	0.29	0.18	Average
9	12.700	39.84	-10.16	50.00	39.22	0.36	0.26	Average
10	12.701	45.73	-14.27	60.00	45.11	0.36	0.26	QP
11	17.470	32.44	-27.56	60.00	31.83	0.42	0.19	QP
12	17.470	26.44	-23.56	50.00	25.83	0.42	0.19	Average

3.7 Antenna Requirements

3.7.1 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.

3.7.2 Antenna Connected Construction

Non-standard connector used.

3.7.3 Antenna Gain

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

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100055	9kHz~40GHz	Jun. 06, 2012	Nov. 08, 2012 ~ Nov. 15, 2012	Jun. 05, 2013	Conducted (TH02-HY)
Power Meter	Anritsu	ML2495A	1036004	300MHz~40GHz	Sep. 08, 2012	Nov. 08, 2012 ~ Nov. 15, 2012	Sep. 07, 2013	Conducted (TH02-HY)
Power Sensor	Anritsu	MA2411B	1027253	300MHz~40GHz	Sep. 08, 2012	Nov. 08, 2012 ~ Nov. 15, 2012	Sep. 07, 2013	Conducted (TH02-HY)
EMC Receiver	R&S	ESCS 30	100132	9kHz ~ 2.75GHz	Feb. 08, 2012	Nov. 06, 2012	Feb. 07, 2013	Conduction (CO01-HY)
LISN	TESEQ	NNB-52	27380	9kHz ~ 30MHz	Apr. 09, 2012	Nov. 06, 2012	Apr. 08, 2013	Conduction (CO01-HY)
LISN (Support Unit)	MessTec	NNB-2/16Z	2001/009	9kHz~30MHz	Feb. 20, 2012	Nov. 06, 2012	Feb. 19, 2013	Conduction (CO01-HY)
EMI Filter	LINDGREN	LRE-2060	1004	< 450Hz	N/A	Nov. 06, 2012	N/A	Conduction (CO01-HY)
EMI Filter	LINDGREN	N6006	201052	0~60Hz	N/A	Nov. 06, 2012	N/A	Conduction (CO01-HY)
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832010001	9kHz~30MHz	Mar. 02, 2012	Nov. 06, 2012	Mar. 01, 2013	Conduction (CO01-HY)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 06, 2012	Nov. 12, 2012	Oct. 05, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9KHz ~ 30GHz	Dec. 06, 2011	Nov. 12, 2012	Dec. 05, 2012	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Nov. 12, 2012	Aug. 21, 2013	Radiation (03CH07-HY)
Pre Amplifier	Agilent	8449B	3008A02362	1GHz ~ 26.5GHz	Dec. 05, 2011	Nov. 12, 2012	Dec. 04, 2012	Radiation (03CH07-HY)
Pre Amplifier	MITEQ	AMF-7D-00101800-30-10P	159088	1GHz ~ 18GHz	Mar. 10, 2012	Nov. 12, 2012	Mar. 09, 2013	Radiation (03CH07-HY)
Pre Amplifier	COM-POWER	PA-103A	161241	10-1000MHz.32dB.GAIN	Feb. 27, 2012	Nov. 12, 2012	Feb. 26, 2013	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Nov. 12, 2012	Sep. 02, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Nov. 12, 2012	Sep. 27, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9KHz ~ 30MHz	Jul. 03, 2012	Nov. 12, 2012	Jul. 02, 2014	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

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

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

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

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

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

Appendix A. Photographs of EUT

Please refer to Sporton report number EP2O2431 as below.