FCC RF Test Report

APPLICANT	:	ZTE CORPORATION
EQUIPMENT	:	Vodafone Mobile Wi-Fi
BRAND NAME	:	ZTE
MODEL NAME	:	R212
FCC ID	:	Q78-R212
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was received on Jan. 23, 2013 and completely tested on Apr. 16, 2013. We, SPORTON INTERNATIONAL (KUNSHAN) INC., would like to declare that the tested sample has been evaluated in accordance with the procedures and shown the compliance with the applicable technical standards.

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

Jones Tsai / Manager

Testing Laboratory 2627

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

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APPENDIX A. PHOTOGRAPHS OF EUT

APPENDIX B. SETUP PHOTOGRAPHS

REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR312313B	Rev. 01	Initial issue of report	Apr. 26, 2013

SUMMARY OF TEST RESULT

Report Section	FCC Rule	IC Rule	Description	Limit	Result	Remark
3.1	15.403(i)	RSS-210 A9.2	26dB Bandwidth	-	Pass	-
3.2	15.407(a)	RSS-210 A9.2	Maximum Conducted Output Power	≤ 17 dBm	Pass	-
3.3	15.407(a)	RSS-210 A9.2	Power Spectral Density	≤ 4 dBm	Pass	-
3.4	15.407(a)(6)	RSS-210 A9.3	Peak Excursion Ratio	≤ 13dB	Pass	-
3.5	15.407(b)	RSS-210 A9.3	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass	Under limit 0.17 dB at 5149.850 MHz
3.6	15.207	RSS-Gen 7.2.4	AC Conducted Emission	15.207(a)	Pass	Under limit 9.57 dB at 0.360 MHz
3.7	15.407(g)	RSS-210 A9.5	Frequency Stability	Within Operation Band	Pass	-
3.8	15.407(c)	RSS-210 A9.5	Automatically Discontinue Transmission	Discontinue Transmission	Pass	-
3.9	15.203 & 15.407(a)	RSS-210 A9.2	Antenna Requirement	N/A	Pass	-

1 General Description

1.1 Applicant

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.2 Manufacturer

ZTE CORPORATION

ZTE Plaza, Keji Road South, Hi-Tech, Industrial Park, Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

1.3 Feature of Equipment Under Test

Product Feature	
Equipment	Vodafone Mobile Wi-Fi
Brand Name	ZTE
Model Name	R212
FCC ID	Q78-R212
EUT supports Radios application	GPRS/EGPRS/WCDMA/HSPA/HSPA+(Downlink Only)/ DC-HSDPA/LTE/WLAN 11abgn
HW Version	T3
SW Version	BD_R212V2.0
EUT Stage	Identical Prototype

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

1.4 Product Specification of Equipment Under Test

<table>
<tr><th colspan="2">Product Specification subjective to this standard</th></tr>
<tr><td>Tx/Rx Channel Frequency Range</td><td>5180 MHz ~ 5240 MHz</td></tr>
<tr><td>Maximum Output Power</td><td><5180 MHz ~ 5240 MHz for MIMO Ant 1+2>
802.11a : 10.44 dBm / 0.0111 W
802.11n HT20 : 13.51 dBm / 0.0224 W
802.11n HT40 : 12.59 dBm / 0.0182 W</td></tr>
<tr><td>Antenna Type</td><td><Ant.1>
802.11a : Monopole Antenna with gain 0.40 dBi
<Ant.2>
802.11a : Monopole Antenna with gain 2.40 dBi
<Ant.1+2>
802.11a/n : Monopole Antenna with gain 4.52 dBi</td></tr>
<tr><td>Type of Modulation</td><td>OFDM (BPSK / QPSK / 16QAM / 64QAM)</td></tr>
<tr><td>Antenna Function Description</td><td>
<table>
<tr><td></td><td>Ant.1</td><td>Ant.2</td></tr>
<tr><td>802.11 a</td><td>V</td><td>V</td></tr>
<tr><td>802.11 n SISO</td><td>-</td><td>-</td></tr>
<tr><td>802.11 n MIMO</td><td>V</td><td>V</td></tr>
</table>
Note: MIMO mode is completely uncorrelated.
</td></tr>
</table>

1.5 Testing Site

Test Site	SPORTON INTERNATIONAL (KUNSHAN) INC.		
Test Site Location	No. 3-2, PingXiang Road, Kunshan, Jiangsu Province, P.R.C. TEL: +86-0512-5790-0158 FAX: +86-0512-5790-0958		
Test Site No.	Sporton Site No.		FCC/IC Registration No.
	TH01-KS	CO01-KS	149928/4086E-1

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.
	03CH07-HY	722060/4086B-1

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

1.6 Applied Standards

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

- FCC Part 15 Subpart E
- FCC KDB 789033 D01 General UNII Test Procedures v01r03
- FCC KDB 662911 D01 Multiple Transmitter Output v01r02.
- ANSI C63.10-2009

Remark:

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

2 Test Configuration of Equipment Under Test

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

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
5150-5250 MHz Band 1	36	5180	44	5220
	38	**5190**	**46**	**5230**
	40	5200	48	5240

Note: The above Frequency and Channel in boldface were 802.11n HT40.

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.

Ch.	Freq. (MHz)	Ant. Chain	802.11a RF Power (dBm)							
			OFDM Data Rate							
			6 Mbps	9 Mbps	12 Mbps	18 Mbps	24 Mbps	36 Mbps	48 Mbps	54 Mbps
36	5180	1	9.87	9.92	9.98	9.89	9.90	10.07	10.05	10.03
44	5220	1	9.97	9.86	10.01	9.92	9.87	9.68	9.98	9.95
48	5240	1	10.25	10.15	10.04	9.96	10.08	9.81	10.18	**10.44**
36	5180	2	8.88	8.84	8.46	8.95	8.41	8.85	8.92	9.01
44	5220	2	9.06	8.70	8.74	8.99	9.00	9.08	9.22	9.18
48	5240	2	8.89	9.10	9.15	8.98	9.01	9.09	9.15	9.21

Ch.	Freq. (MHz)	Ant. Chain	WLAN 5.2GHz 802.11n HT-20 RF Power (dBm)							
			OFDM Data Rate							
			MCS=8	MCS=9	MCS=10	MCS=11	MCS=12	MCS=13	MCS=14	MCS=15
			13 Mbps	26 Mbps	39 Mbps	52 Mbps	78 Mbps	104 Mbps	117 Mbps	130 Mbps
36	5180	MIMO Ant.1	10.42	10.56	11.04	10.92	10.54	10.51	10.95	10.66
		MIMO Ant.2	9.47	9.75	9.63	9.70	9.51	9.79	9.56	9.88
		MIMO Ant.1+2	12.98	13.18	13.40	13.36	13.07	13.18	13.32	13.30
44	5220	MIMO Ant.1	10.77	10.75	10.93	10.72	10.70	10.71	10.95	10.83
		MIMO Ant.2	9.86	9.93	9.86	9.60	9.94	10.07	9.83	10.14
		MIMO Ant.1+2	13.35	13.37	13.43	13.21	13.35	13.41	13.44	**13.51**
48	5240	MIMO Ant.1	10.75	10.63	10.70	10.83	10.85	10.79	10.76	10.79
		MIMO Ant.2	9.76	10.06	10.06	9.90	9.99	10.03	9.98	10.11
		MIMO Ant.1+2	13.29	13.36	13.40	13.40	13.45	13.44	13.40	13.47

Ch.	Freq. (MHz)	Ant. Chain	WLAN 5.2GHz 802.11n HT-40 RF Power (dBm)							
			OFDM Data Rate							
			MCS=8	MCS=9	MCS=10	MCS=11	MCS=12	MCS=13	MCS=14	MCS=15
			27 Mbps	54 Mbps	81 Mbps	108 Mbps	162 Mbps	216 Mbps	243 Mbps	270 Mbps
38	5190	MIMO Ant.1	10.04	9.90	9.97	10.23	9.55	9.93	9.63	10.13
		MIMO Ant.2	9.06	8.53	8.74	8.64	8.88	8.88	8.73	8.55
		MIMO Ant.1+2	**12.59**	12.28	12.41	12.52	12.24	12.45	12.21	12.42
46	5230	MIMO Ant.1	9.95	10.03	10.04	9.89	9.99	9.86	10.13	9.90
		MIMO Ant.2	9.02	8.81	8.88	9.05	8.83	8.93	8.59	8.86
		MIMO Ant.1+2	12.52	12.48	12.51	12.50	12.46	12.43	12.44	12.42

Remark: MIMO Ant.1+2 is a calculated result from sum of the power MIMO Ant.1 and MIMO Ant.2

.

2.3 Test Mode

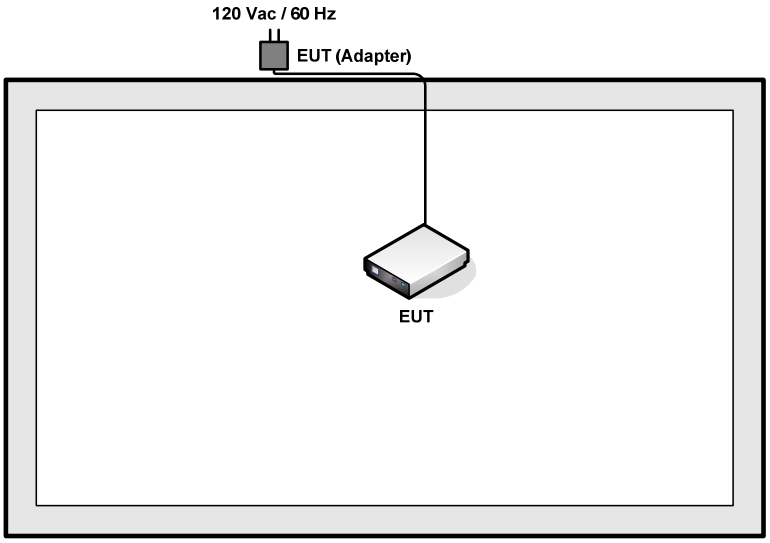
Final results of test modes, data rates and test channels are shown as following table.

Test Cases				
	Test Items	Mode	Data rate	Test Channel
Conducted TCs	26dB BW Power Spectral Density	802.11a	54 Mbps	L/M/H
		802.11n HT20	130 Mbps	L/M/H
		802.11n HT40	27 Mbps	L/M/H
	Output Power	802.11a	54 Mbps	L/M/H
		802.11n HT20	130 Mbps	L/M/H
		802.11n HT40	27 Mbps	L/M/H
	Peak Excursion	802.11a	54 Mbps	L/M/H
		802.11n HT20	130 Mbps	L/M/H
		802.11n HT40	27 Mbps	L/M/H
	Frequency Stability	802.11a	54 Mbps	L/M/H
		802.11n HT20	130 Mbps	L/M/H
		802.11n HT40	27 Mbps	L/M/H
Radiated TCs	Radiated Band Edge	802.11a	54 Mbps	L/H
		802.11n HT20	130 Mbps	L/H
		802.11n HT40	27 Mbps	L/H
	Radiated Spurious Emission	802.11a	54 Mbps	L/M/H
		802.11n HT20	130 Mbps	L/M/H
		802.11n HT40	27 Mbps	L/M/H
AC Conducted Emission	Mode 1 : GSM850 Idle + WLAN 5GHz Link + Adapter			

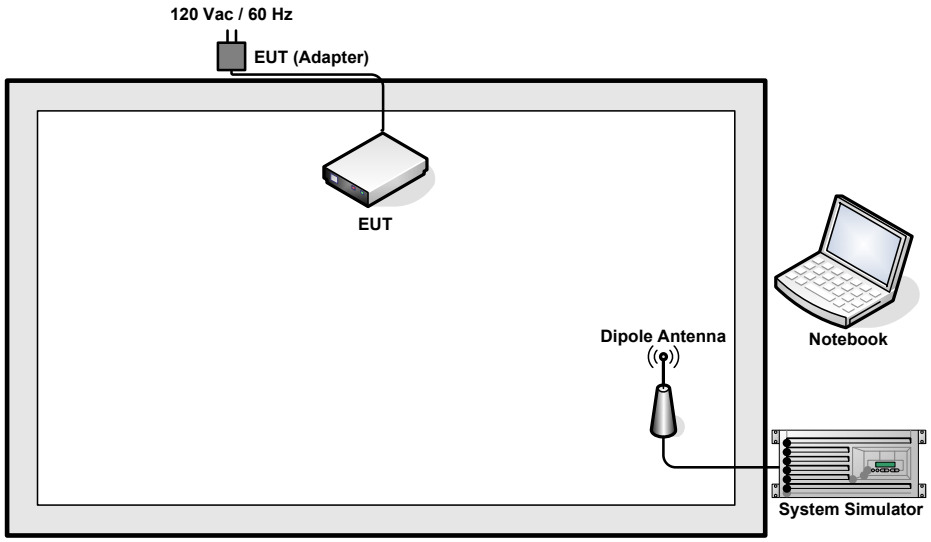
Ch. #		Band I : 5150-5250 MHz		
		802.11a	802.11n HT20	802.11n HT40
L	Low	36	36	38
M	Middle	44	44	-
H	High	48	48	46

2.4 Connection Diagram of Test System

<WLAN Tx Mode>



<AC Conducted Emission Mode>



2.5 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	R&S	CMU 200	N/A	N/A	Unshielded, 1.8 m
2.	DC Power Supply	GWINSTEK	GPS-3030D	N/A	N/A	Unshielded, 1.8 m
3.	Notebook	DELL	P08S	QDS-BRCM1030	N/A	AC I/P: Unshielded, 0.9 m DC O/P: Shielded, 1.8 m

2.6 Description of RF Function Operation Test Setup

For WLAN function, programmed RF utility, “ADB” installed in the PC make the EUT provides functions like channel selection and power level for continuous transmitting and receiving signals.

2.7 Measurement Results Explanation Example

For all conducted test items:

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

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

Offset = RF cable loss + attenuator factor.

Following shows an offset computation example with cable loss 5.6 dB and 10dB attenuator.

Example :

Offset(dB) = RF cable loss(dB) + attenuator factor(dB).

= 5.6 + 10 = 15.6 (dB)

3 Test Result

3.1 26dB Bandwidth Measurement

3.1.1 Description of 26dB Bandwidth

There is no restriction limits for bandwidth. The maximum conducted output power can be limited by measured emission bandwidth (B). For the band 5150-5250 MHz, the maximum conducted output power over the frequency band of operation shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B.

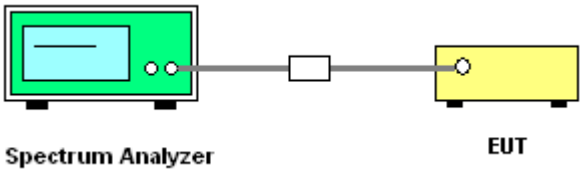
3.1.2 Measuring Instruments

See list of measuring instruments of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D01 General UNII Test Procedures v01r03. Section C) Emission bandwidth
2. Set RBW = approximately 1% of the emission bandwidth.
3. Set the VBW > RBW.
4. Detector = Peak.
5. Trace mode = max hold
6. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.
7. Measure and record the results in the test report.

3.1.4 Test Setup



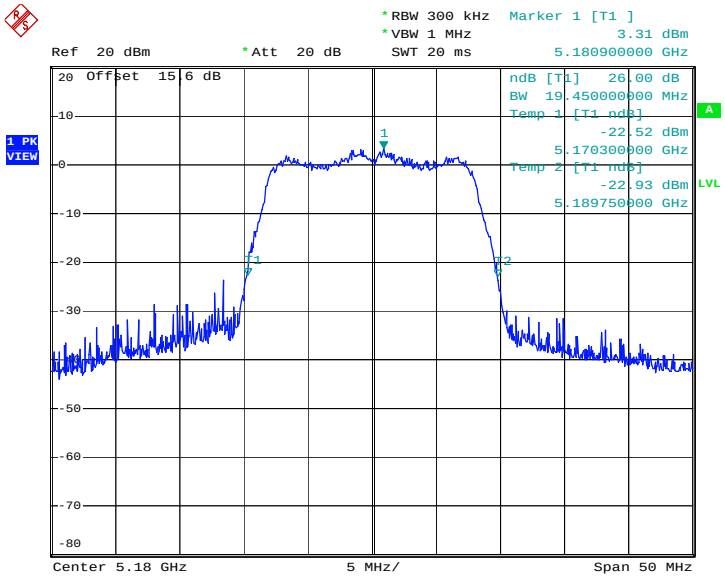
3.1.5 Test Result of 26dB Bandwidth

Test Mode :	802.11a	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

Channel	Frequency (MHz)	802.11a 26dB Bandwidth (MHz)	Pass/Fail
		Ant.1	
36	5180	19.450	N/A
44	5220	19.500	N/A
48	5240	19.450	N/A

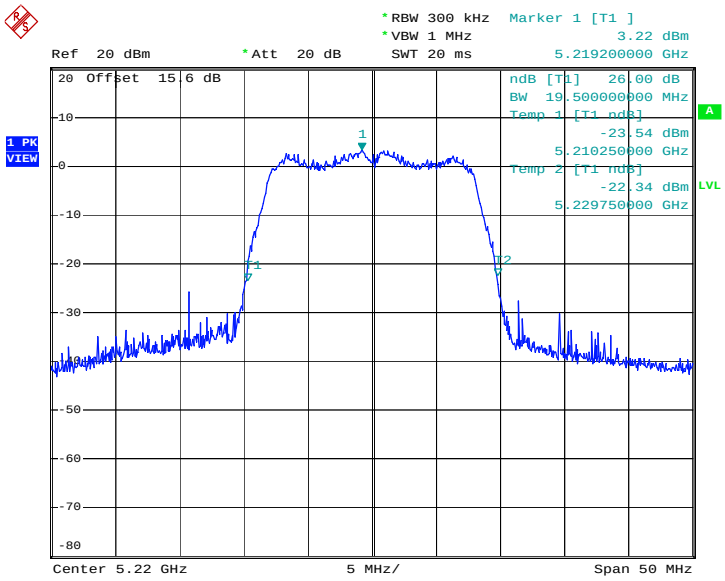
802.11a – Ant.1

26 dB Bandwidth Plot on 802.11a Channel 36



802.11a – Ant.1

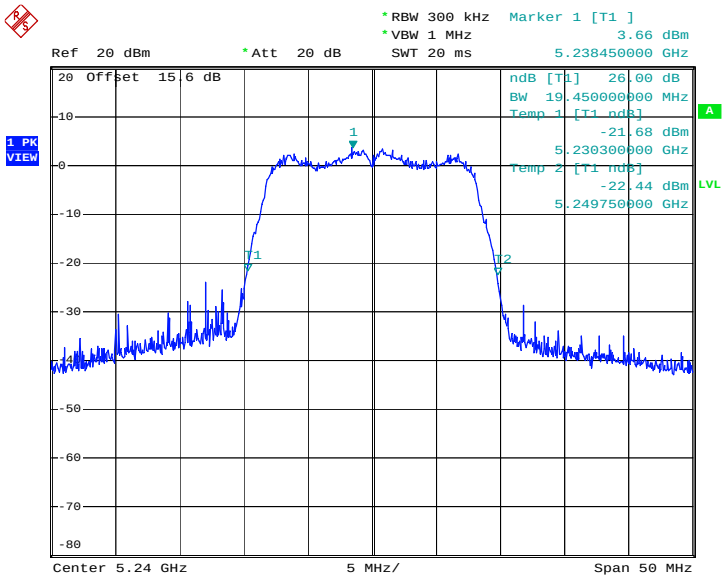
26 dB Bandwidth Plot on 802.11a Channel 44



Date: 3.APR.2013 04:35:14

802.11a – Ant.1

26 dB Bandwidth Plot on 802.11a Channel 48



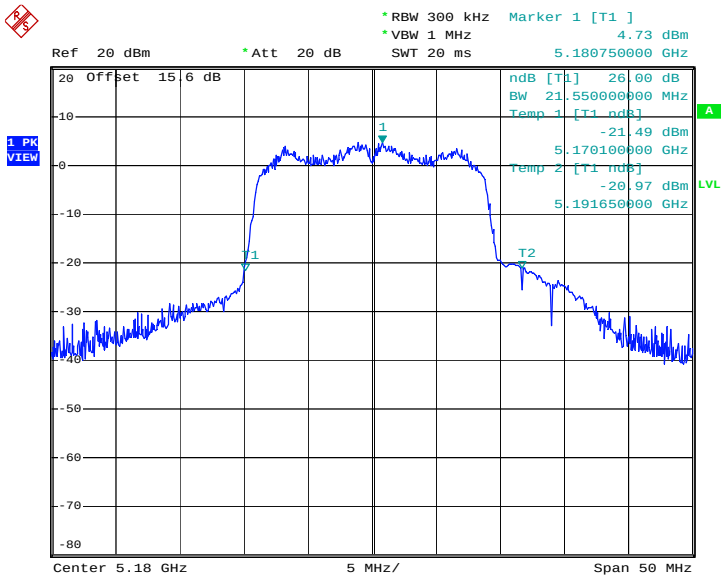
Date: 3.APR.2013 04:39:37

Test Mode :	802.11n HT20	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

Channel	Frequency (MHz)	802.11n HT20 26dB Bandwidth (MHz)		Pass/Fail
		MIMO Ant.1	MIMO Ant.2	
36	5180	21.550	20.300	N/A
44	5220	20.150	19.600	N/A
48	5240	19.900	19.800	N/A

802.11n HT20 — MIMO Ant.1

26 dB Bandwidth Plot on Channel 36



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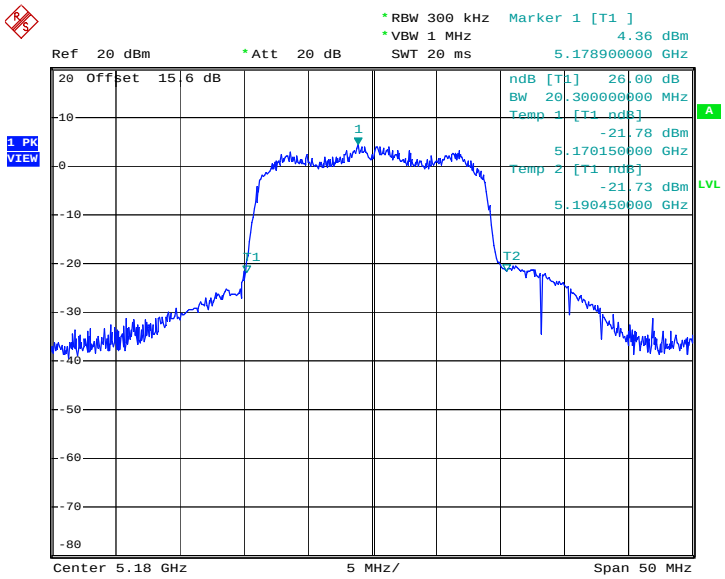
802.11n HT20 – MIMO Ant.2

26 dB Bandwidth Plot on Channel 36



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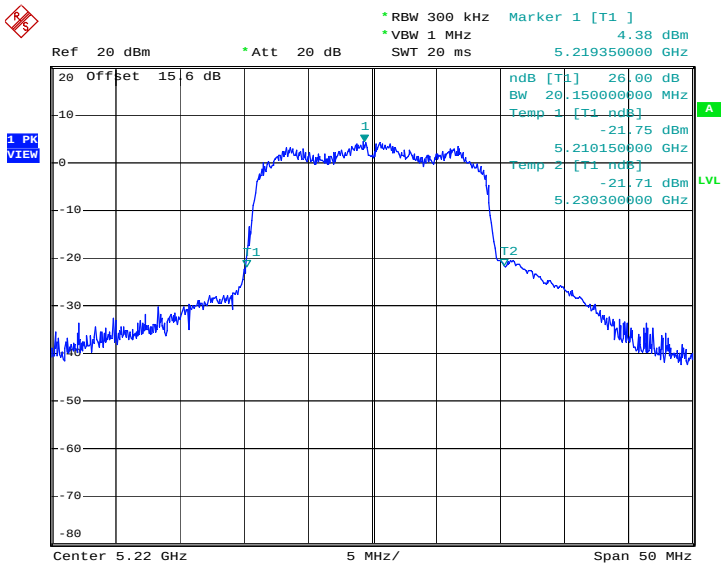
802.11n HT20 – MIMO Ant.1

26 dB Bandwidth Plot on Channel 44



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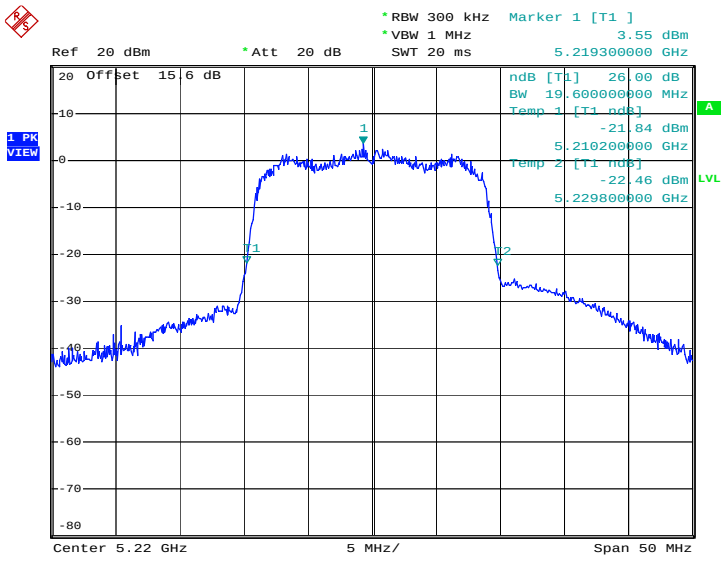
802.11n HT20 – MIMO Ant.2

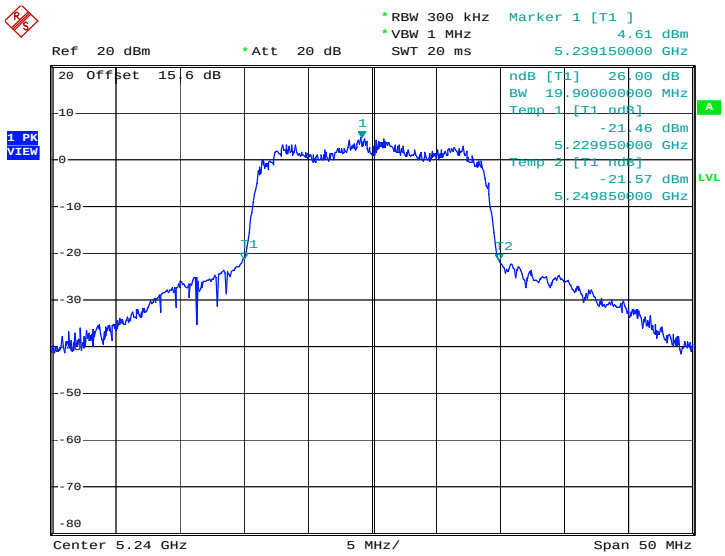
26 dB Bandwidth Plot on Channel 44



Date: 3.APR.2013 05:01:03

802.11n HT20 – MIMO Ant.1

26 dB Bandwidth Plot on Channel 48



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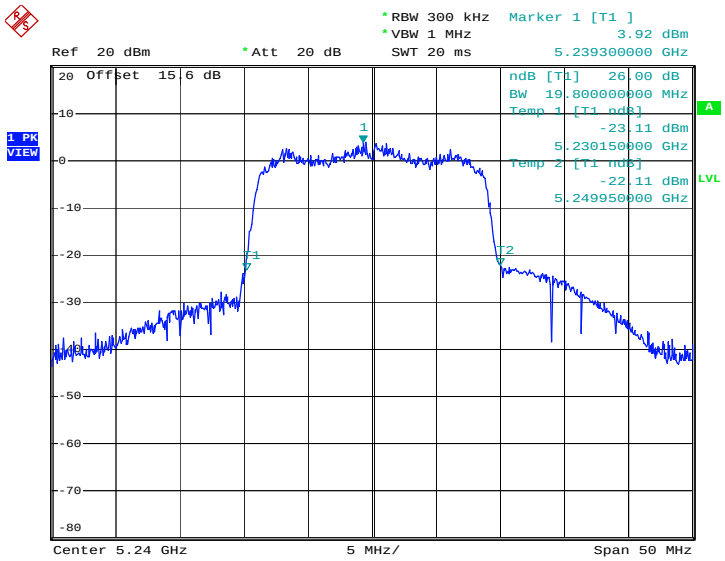
802.11n HT20 – MIMO Ant.2

26 dB Bandwidth Plot on Channel 48



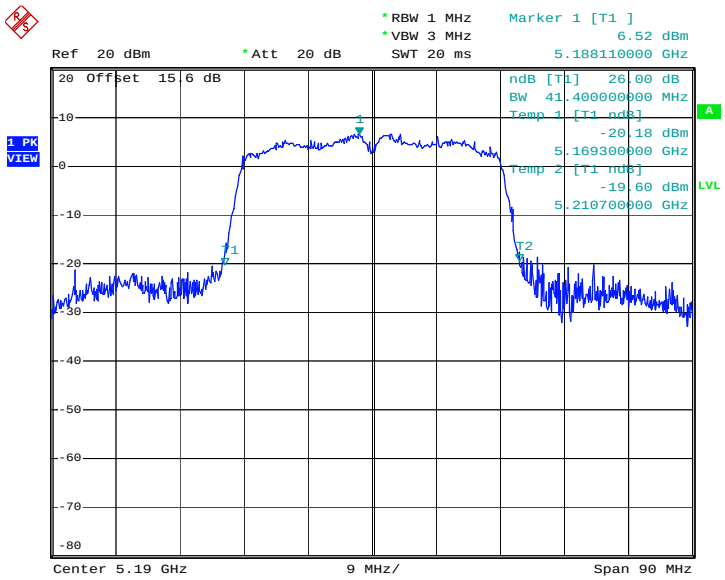
Date: 3.APR.2013 05:05:44

Test Mode :	802.11n HT40	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

Channel	Frequency (MHz)	802.11n HT40 26dB Bandwidth (MHz)		Pass/Fail
		MIMO Ant.1	MIMO Ant.2	
38	5190	41.400	41.130	N/A
46	5230	41.400	40.950	N/A

802.11n HT40 – MIMO Ant.1

26 dB Bandwidth Plot on Channel 38



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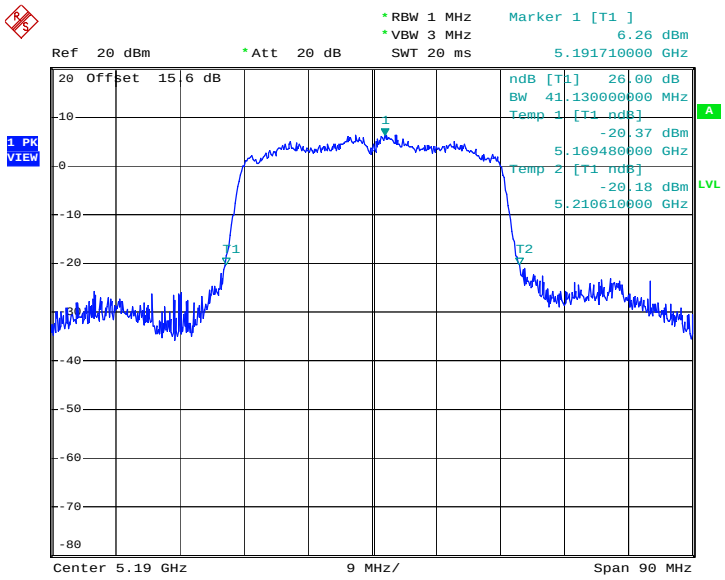
802.11n HT40 – MIMO Ant.2

26 dB Bandwidth Plot on Channel 38



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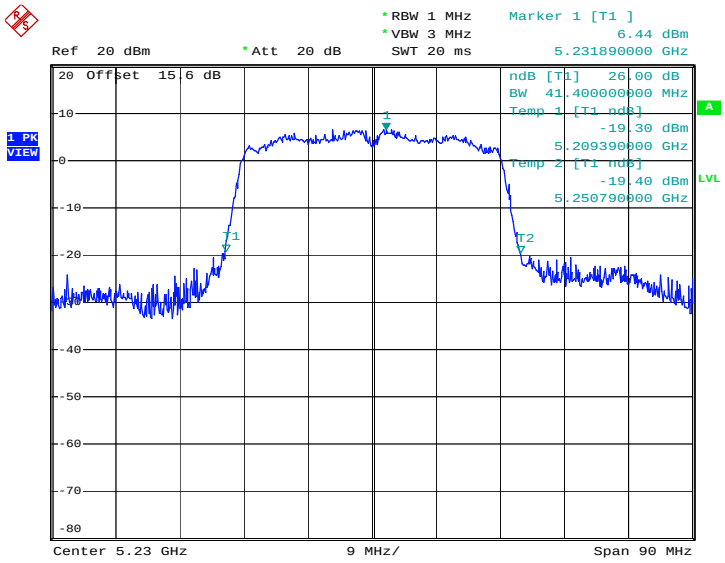
802.11n HT40 – MIMO Ant.1

26 dB Bandwidth Plot on Channel 46



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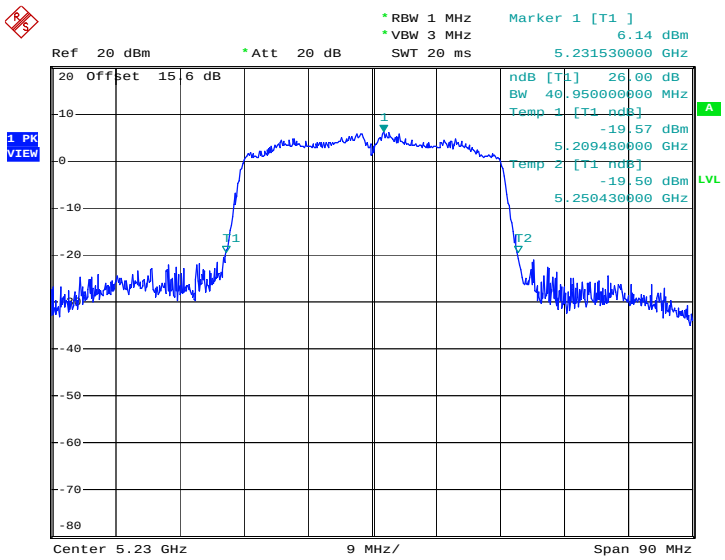
802.11n HT40 – MIMO Ant.2

26 dB Bandwidth Plot on Channel 46



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3.2 Maximum Conducted Output Power Measurement

3.2.1 Limit of Maximum Conducted Output Power

For the band 5150-5250 MHz, the maximum conducted output power shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log B, where B is the 26 dB emissions bandwidth in 1-MHz. If transmitting antenna directional gain is greater than 6 dBi, the peak output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Measuring Instruments

See list of measuring instruments of this test report.

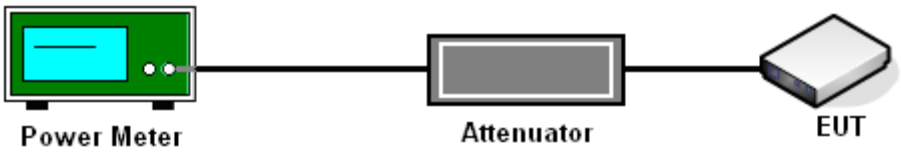
3.2.3 Test Procedures

The testing follows Method PM of FCC KDB 789033 D01 General UNII Test Procedures v01r03.

Method PM (Measurement using an RF average power meter):

1. Measurement is performed using a wideband RF power meter.
2. The EUT is configured to transmit continuously with a consistent duty cycle at its maximum power control level.
3. Measure the average power of the transmitter, and the average power is corrected with duty factor, 10 log(1/x), where x is the duty cycle.

3.2.4 Test Setup



3.2.5 Test Result of Maximum Conducted Output Power

Test Mode :	802.11a	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle :	72.41% for Ant.1	Duty Factor :	1.40dB for Ant.1

Channel	Frequency (MHz)	802.11a Output Power (dBm)		Max. Limits (dBm)	Pass/Fail
		Measured	Final		
		Ant.1	Ant.1		
36	5180	8.63	10.03	17	Pass
44	5220	8.55	9.95	17	Pass
48	5240	9.04	10.44	17	Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. For the band 5150-5250 MHz, the maximum conducted output power shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log (26dB BW).

Test Mode :	802.11n HT20	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle :	59.32% for MIMO Ant.1 57.63% for MIMO Ant.2	Duty Factor :	2.27dB for MIMO Ant.1 2.39dB for MIMO Ant.2

Channel	Frequency (MHz)	802.11n HT20 Output Power (dBm)					Max. Limits (dBm)	Pass/Fail
		Measured		Final				
		MIMO Ant.1	MIMO Ant.2	MIMO Ant.1	MIMO Ant.2	MIMO Ant.1+2		
36	5180	8.39	7.49	10.66	9.88	13.30	17	Pass
44	5220	8.56	7.75	10.83	10.14	13.51	17	Pass
48	5240	8.52	7.72	10.79	10.11	13.47	17	Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. MIMO Ant.1+2 is a calculated result from sum of the power MIMO Ant.1 and MIMO An.2.
3. For the band 5150-5250 MHz, the maximum conducted output power shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log (26dB BW).

Test Mode :	802.11n HT40	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle :	83.33% for MIMO Ant.1 83.33% for MIMO Ant.2	Duty Factor :	0.79dB for MIMO Ant.1 0.79dB for MIMO Ant.2

Channel	Frequency (MHz)	802.11n HT40 Output Power (dBm)					Max. Limits (dBm)	Pass/Fail
		Measured		Final				
		MIMO Ant.1	MIMO Ant.2	MIMO Ant.1	MIMO Ant.2	MIMO Ant.1+2		
38	5190	9.25	8.27	10.04	9.06	12.59	17	Pass
46	5230	9.16	8.23	9.95	9.02	12.52	17	Pass

Note:

1. Final Output Power equals to Measured Output Power adds the duty factor.
2. MIMO Ant.1+2 is a calculated result from sum of the power MIMO Ant.1 and MIMO An.2.
3. For the band 5150-5250 MHz, the maximum conducted output power shall not exceed the lesser of 50 mW (17dBm) or 4 dBm + 10log (26dB BW).

3.3 Power Spectral Density Measurement

3.3.1 Limit of Power Spectral Density

For the band 5150-5250 MHz, the peak power spectral density shall not exceed 4 dBm in any 1-MHz band. If transmitting antenna directional gain is greater than 6 dBi, both the maximum conducted output power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.3.2 Measuring Instruments

See list of measuring instruments of this test report.

3.3.3 Test Procedures

The testing follows FCC KDB 789033 D01 General UNII Test Procedures v01r03.

Section F) Peak power spectral density (PPSD).

Note: Though the rule refers to “peak power spectral density”, the intent is to measure the maximum value of the time average of the power spectral density measured during a period of continuous transmission.

 # Method SA-2 #

(trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).

1. The testing follows Method SA-2 of FCC KDB 789033 D01 General UNII Test Procedures v01r03.
   - Measure the duty cycle.
   - Set span to encompass the entire emission bandwidth (EBW) of the signal.
   - Set RBW = 1 MHz.
   - Set VBW ≥ 3 MHz.
   - Number of points in sweep ≥ 2 Span / RBW.
   - Sweep time = auto.
   - Detector = RMS
   - Trace average at least 100 traces in power averaging mode.
   - Add 10 log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times. For example, add 10 log(1/0.25) = 6 dB if the duty cycle is 25 percent.
2. The RF output of EUT was connected to the spectrum analyzer by a low loss cable.
3. Each plot has already offset with cable loss, and attenuator loss. Measure the PPSD and record it.

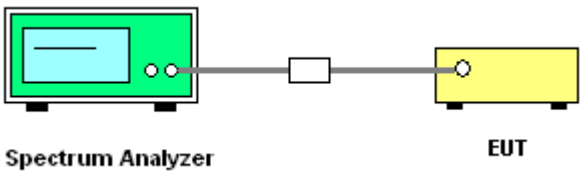
4. For MIMO mode, calculation method follows FCC KDB 662911 D01 Multiple Transmitter Output v01r02.

Method (2) Measure and add 10 log(NANT) dB.

Method (1): Measure and sum the spectra across the outputs.

The total final Power Spectral Density is from a device with 2 transmitter outputs. The spectrum measurements of the individual outputs are all performed with the same span and number of points, the spectrum value in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 to obtain the value for the first frequency bin of the summed spectrum.

3.3.4 Test Setup



3.3.5 Test Result of Power Spectral Density

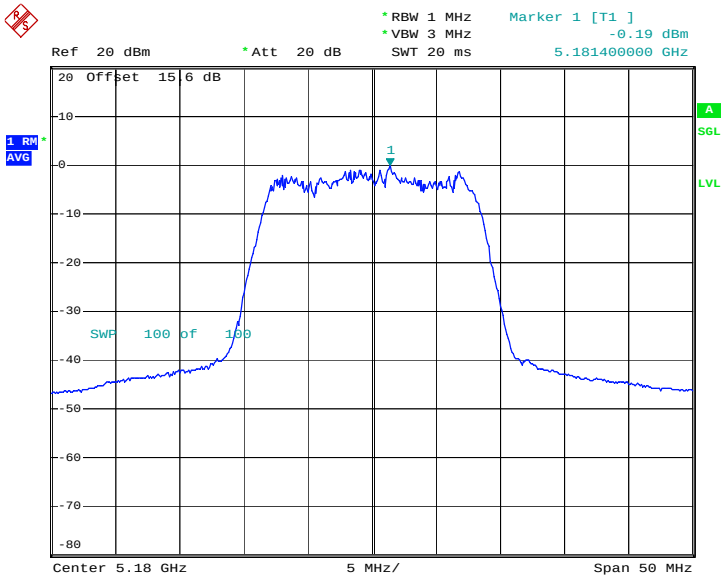
Test Mode :	802.11a	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle :	72.41% for Ant 1	Duty Factor :	1.40dB for Ant 1

Channel	Frequency (MHz)	802.11a PSD (dBm)		Max. Limits (dBm)	Pass/Fail
		Measured	Final		
		Ant.1	Ant.1		
36	5180	-0.19	1.21	4	Pass
44	5220	-0.60	0.80	4	Pass
48	5240	-0.39	1.01	4	Pass

Note: Result of Final PSD equals to Measured PSD adds the duty factor.

802.11a - Ant 1

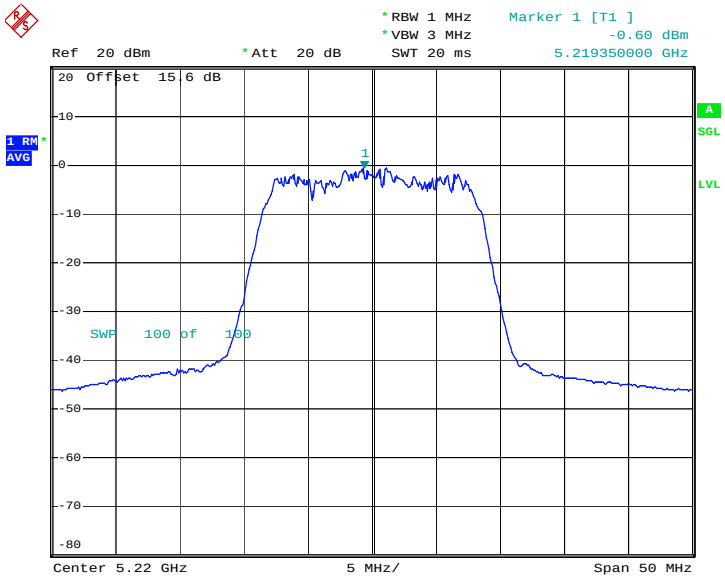
PSD Plot on Channel 36



Date: 3.APR.2013 04:31:34

802.11a - Ant 1

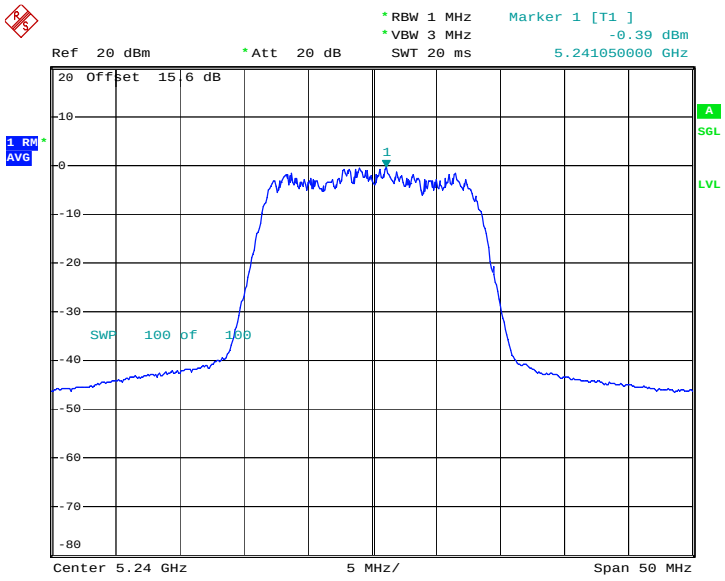
PSD Plot on Channel 44



Date: 3.APR.2013 04:35:30

802.11a - Ant 1

PSD Plot on Channel 48



Date: 3.APR.2013 04:39:53

Test Mode :	802.11n HT20	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle:	59.32% for MIMO Ant.1 57.63% for MIMO Ant.2	Duty Factor:	2.27dB for MIMO Ant.1 2.39dB for MIMO Ant.2

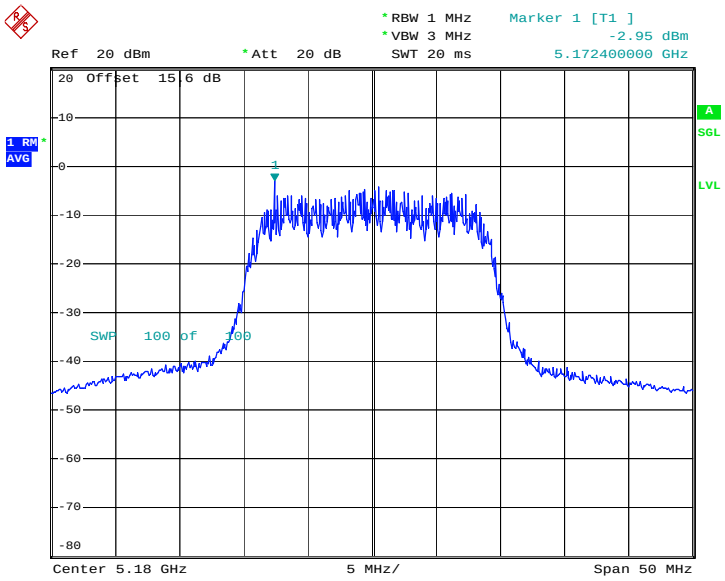
Channel	Frequency (MHz)	802.11n HT20 PSD (dBm)			Max. Limits (dBm)	Pass /Fail
		Measured		Final		
		MIMO Ant.1	MIMO Ant.2	MIMO Ant.1+2		
36	5180	-2.95	-3.54	2.33	4	Pass
44	5220	-3.86	-7.93	1.42	4	Pass
48	5240	-3.19	-3.99	2.09	4	Pass

Note:

1. Result of Final PSD equals to Measured PSD adds the duty factor.
2. Final MIMO Ant.1+2 is the maximum value that result from MIMO Ant.1 and MIMO Ant.2 adds 10log(2) = 3.01.

802.11n HT20 – MIMO Ant.1

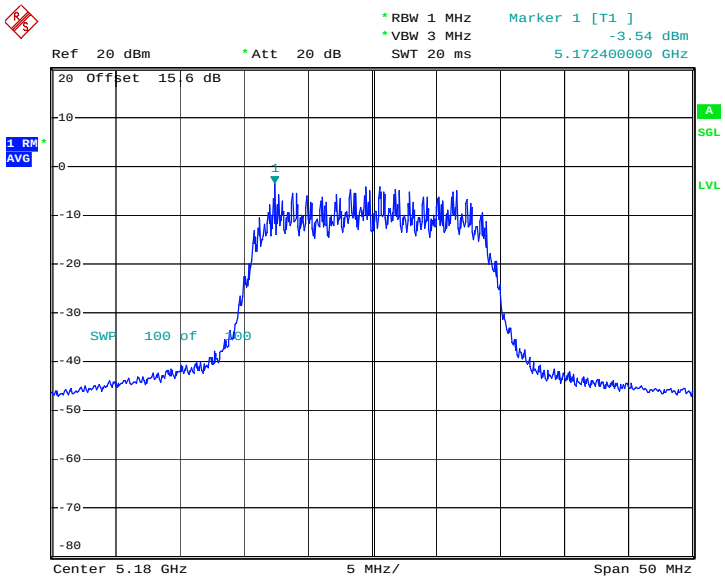
PSD Plot on Channel 36



Date: 3.APR.2013 05:46:53

802.11n HT20 – MIMO Ant.2

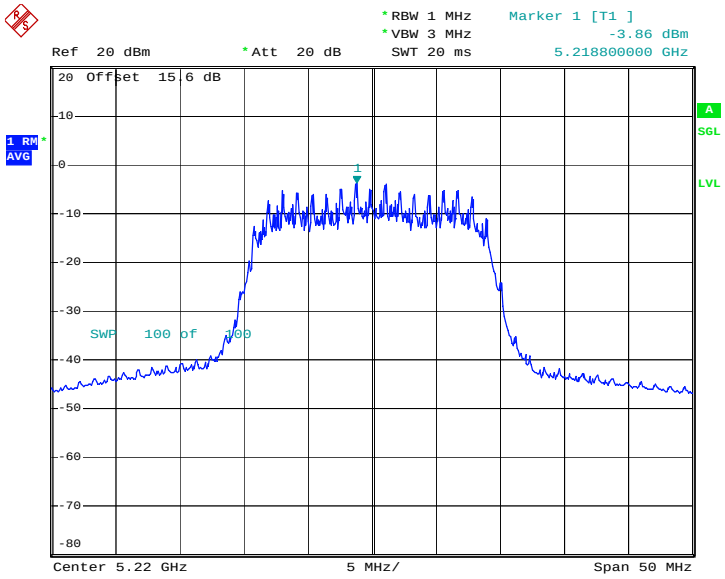
PSD Plot on Channel 36



Date: 3.APR.2013 04:55:44

802.11n HT20 – MIMO Ant.1

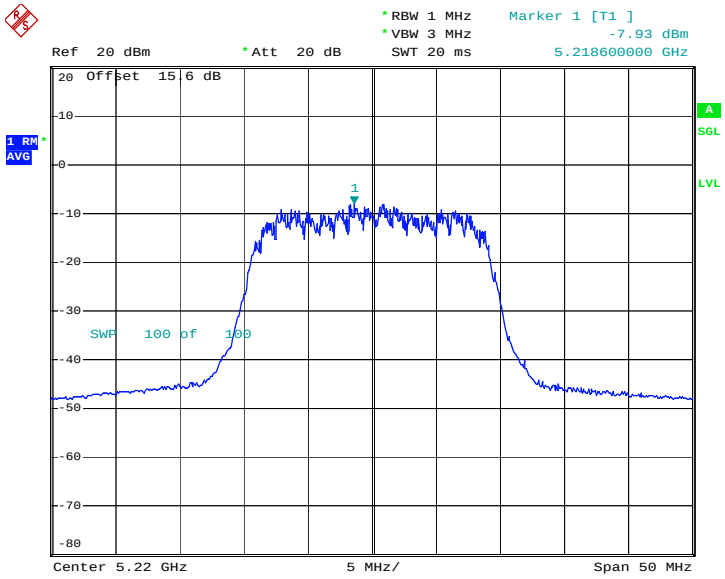
PSD Plot on Channel 44



Date: 3.APR.2013 05:38:46

802.11n HT20 – MIMO Ant.2

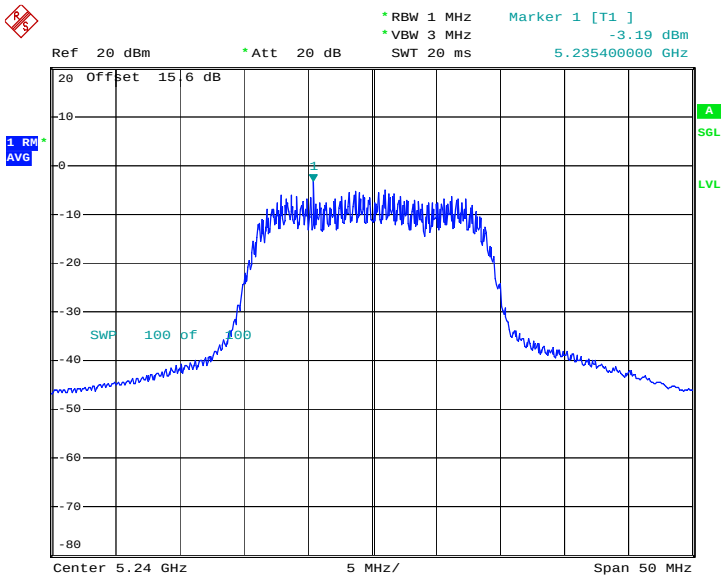
PSD Plot on Channel 44



Date: 3.APR.2013 05:01:19

802.11n HT20 – MIMO Ant.1

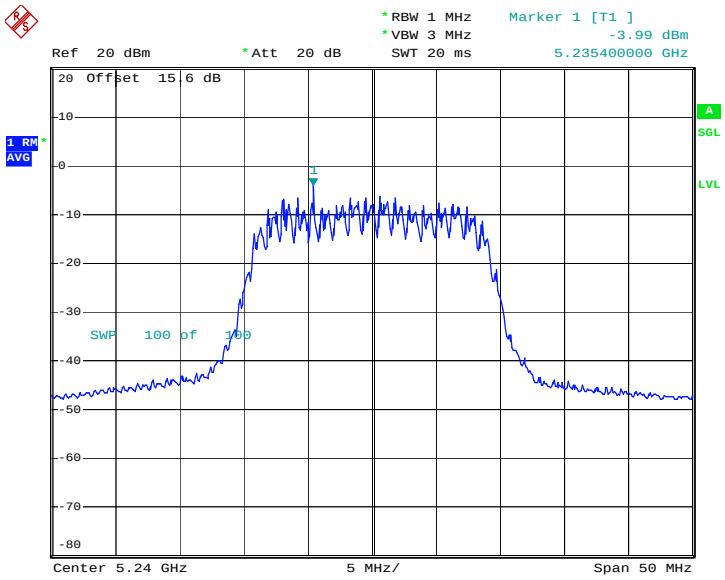
PSD Plot on Channel 48



Date: 3.APR.2013 05:28:30

802.11n HT20 – MIMO Ant.2

PSD Plot on Channel 48



Date: 3.APR.2013 05:06:00

Test Mode :	802.11n HT40	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%
Duty Cycle :	83.33% for MIMO Ant.1 83.33% for MIMO Ant.2	Duty Factor :	0.79dB for MIMO Ant.1 0.79dB for MIMO Ant.2

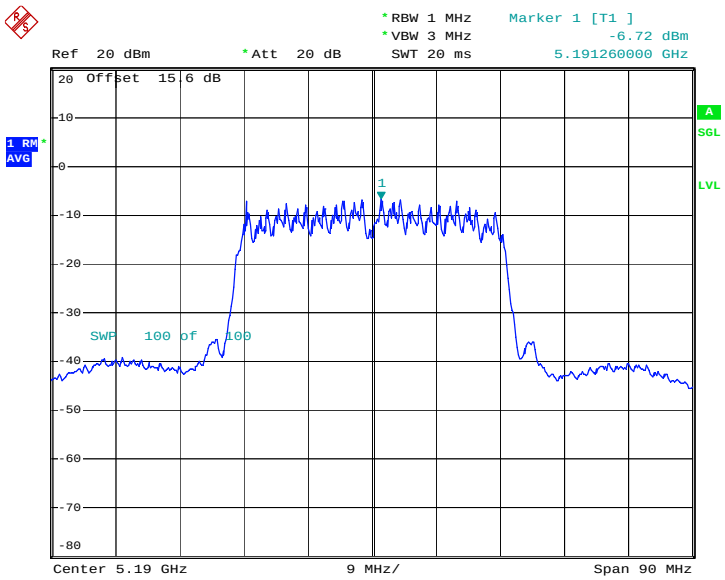
Channel	Frequency (MHz)	802.11n HT40 PSD (dBm)			Max. Limits (dBm)	Pass /Fail
		Measured		Final		
		MIMO Ant.1	MIMO Ant.2	MIMO Ant.1+2		
38	5190	-6.72	-8.26	-2.92	4	Pass
46	5230	-5.10	-6.55	-1.30	4	Pass

Note:

1. Result of Final PSD equals to Measured PSD adds the duty factor.
2. Final MIMO Ant.1+2 is the maximum value that result from MIMO Ant.1 and MIMO Ant.2 adds 10log(2) = 3.01.

802.11n HT40 – MIMO Ant.1

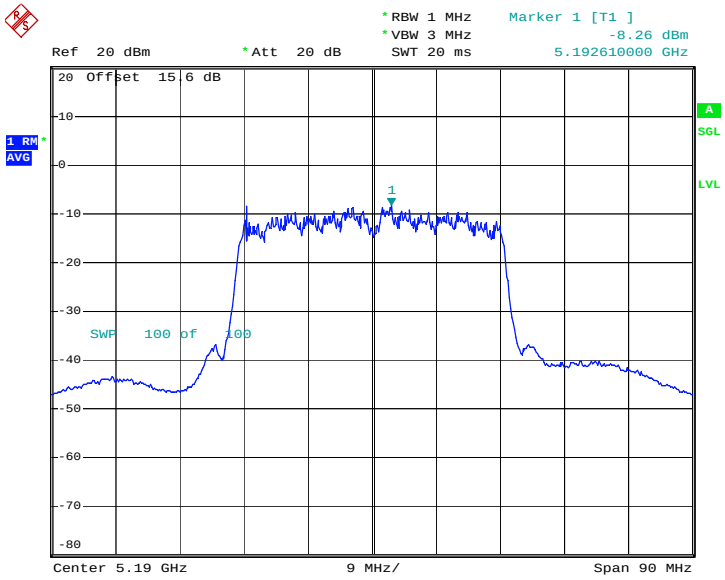
PSD Plot on Channel 38



Date: 3.APR.2013 05:53:30

802.11n HT40 – MIMO Ant.2

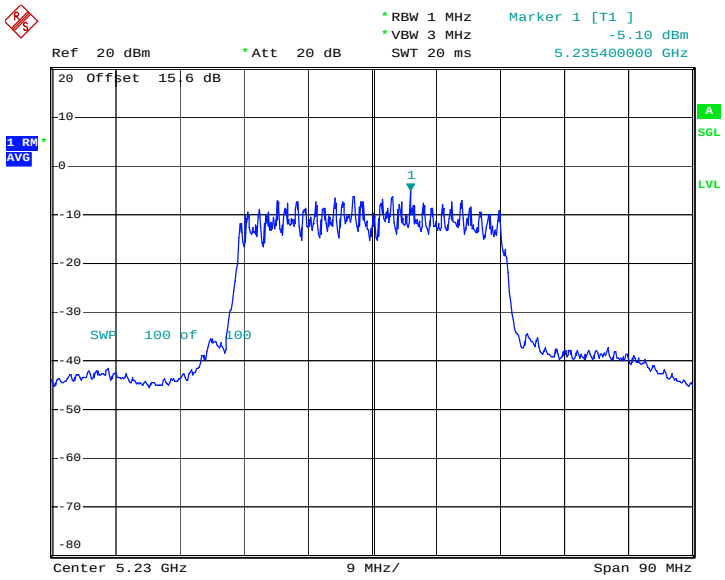
PSD Plot on Channel 38



Date: 3.APR.2013 06:00:47

802.11n HT40 – MIMO Ant.1

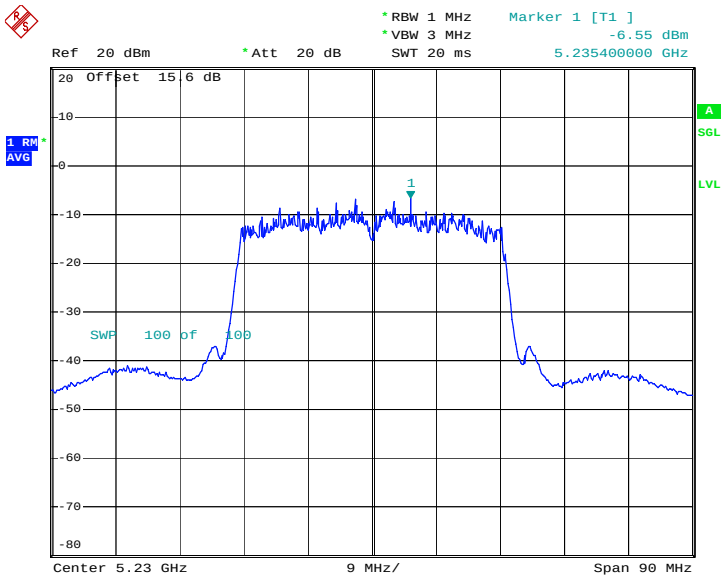
PSD Plot on Channel 46



Date: 3.APR.2013 06:09:37

802.11n HT40 – MIMO Ant.2

PSD Plot on Channel 46



Date: 3.APR.2013 06:03:14

3.4 Peak Excursion Ratio Measurement

3.4.1 Limit of Peak Excursion Ratio

The ratio of the peak excursion of the modulation envelope (measured using a peak hold function) to the maximum conducted output power (measured as specified above) shall not exceed 13 dB across any 1 MHz bandwidth or the emission bandwidth whichever is less.

3.4.2 Measuring Instruments

See list of measuring instruments of this test report.

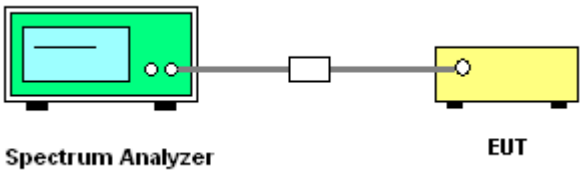
3.4.3 Test Procedures

The testing follows FCC KDB 789033 D01 General UNII Test Procedures v01r03.

Section G) Peak excursion measurement

1. The transmitter output is connected to the spectrum analyzer.
2. Set the spectrum analyzer span to view the entire emission bandwidth.
3. Find the maximum of the peak-max-hold spectrum.
   *Set RBW = 1MHz.
   *Set VBW ≥ 3MHz.
   *Detector = peak.
   *Trace mode = max-hold.
   *Allow the sweeps to continue until the trace stabilizes.
   *Use the peak search function to find the peak of the spectrum.
4. Use the procedure found under section 3.3 to measure the PPSD.
5. Compute the ratio of the maximum of the peak-max-hold spectrum to the PPSD.

3.4.4 Test Setup

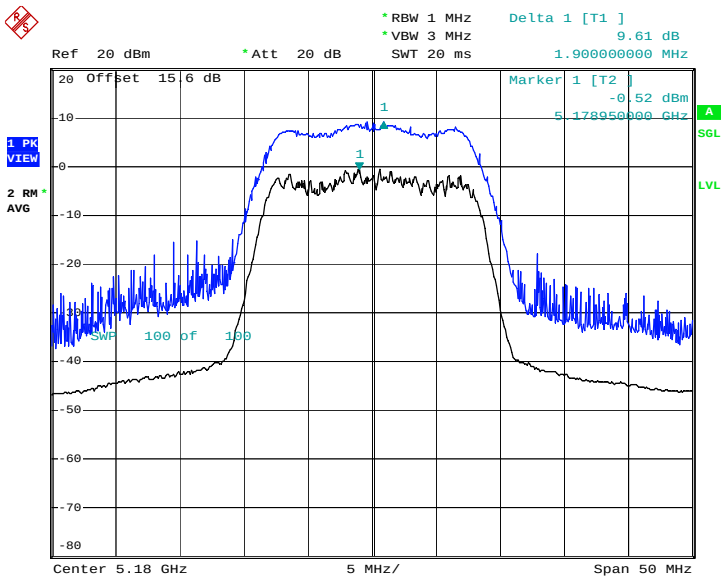


3.4.5 Test Result of Peak Excursion Ratio

Test Mode :	802.11a	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

802.11a – Ant.1

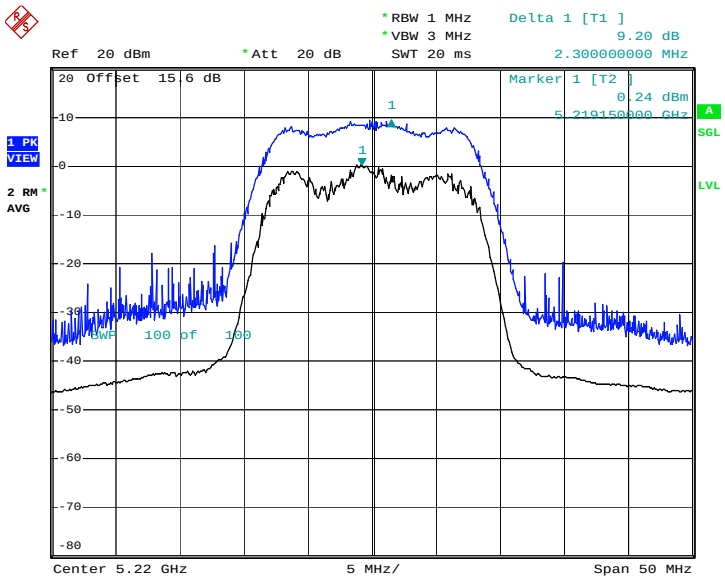
Peak Excursion Ratio Plot on Channel 36



Date: 3.APR.2013 04:32:01

802.11a – Ant.1

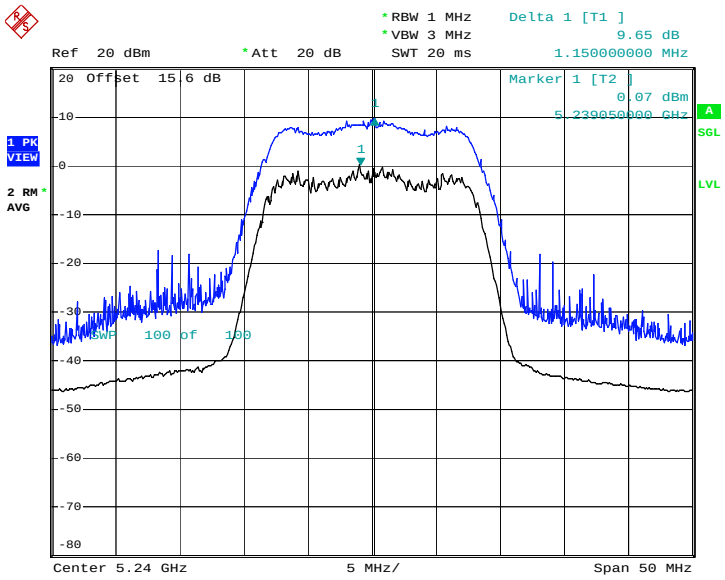
Peak Excursion Ratio Plot on Channel 44



Date: 3.APR.2013 04:35:47

802.11a – Ant.1

Peak Excursion Ratio Plot on Channel 48

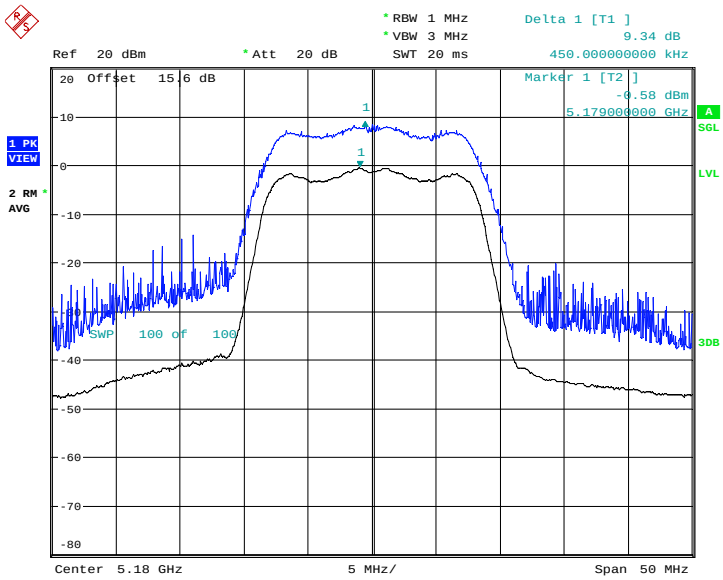


Date: 3.APR.2013 04:40:10

Test Mode :	802.11n HT20	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

802.11n HT20 – MIMO Ant.1

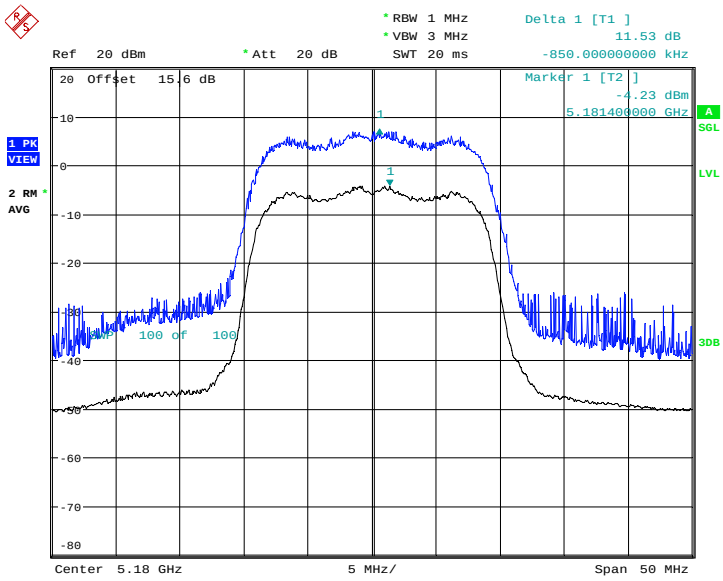
Peak Excursion Ratio Plot on Channel 36



Date: 16.APR.2013 22:28:04

802.11n HT20 – MIMO Ant.2

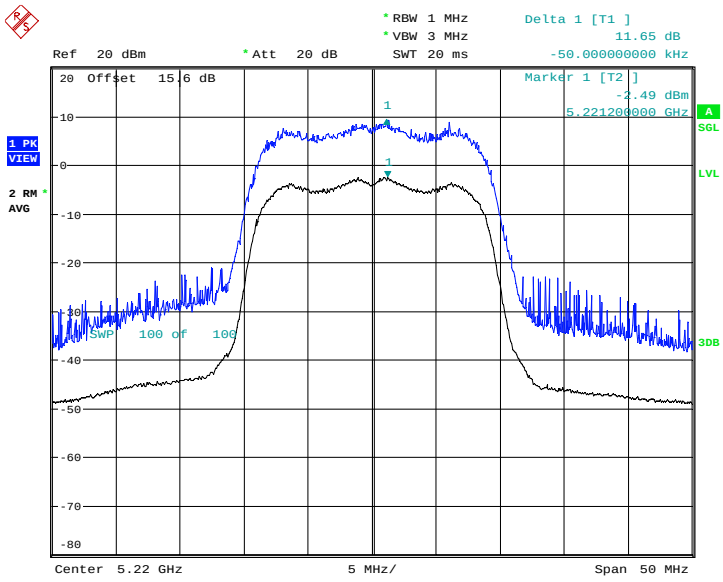
Peak Excursion Ratio Plot on Channel 36



Date: 16.APR.2013 22:33:59

802.11n HT20 – MIMO Ant.1

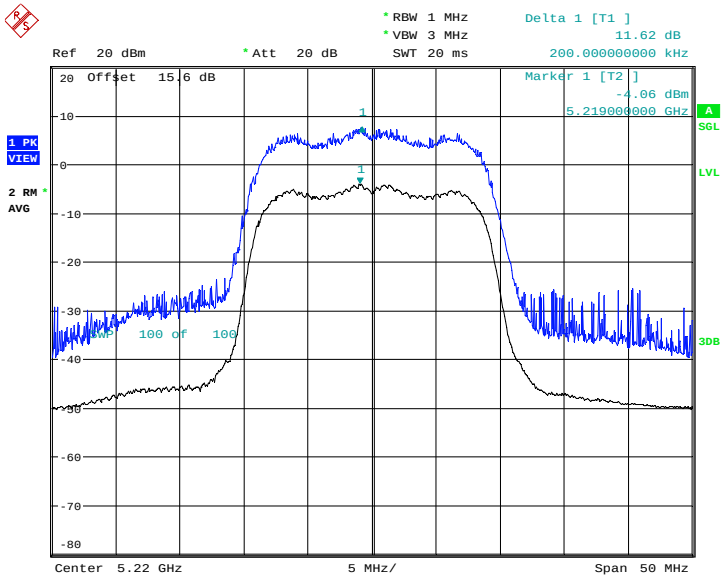
Peak Excursion Ratio Plot on Channel 44



Date: 16.APR.2013 22:29:09

802.11n HT20 – MIMO Ant.2

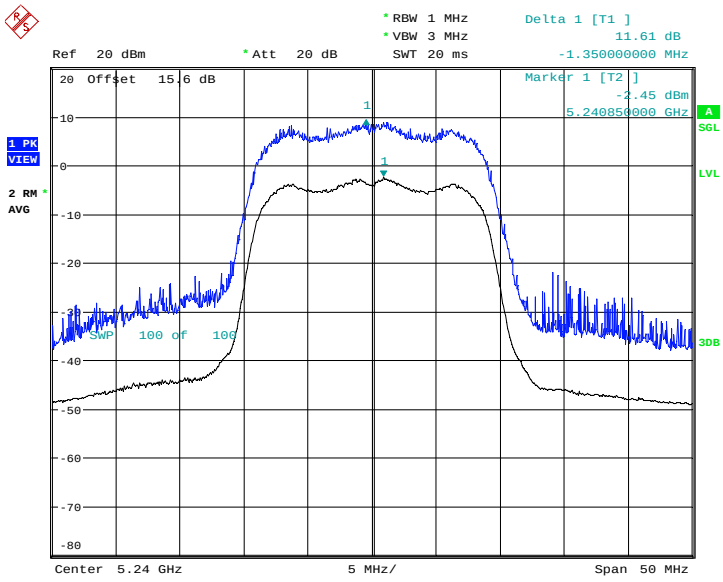
Peak Excursion Ratio Plot on Channel 44



Date: 16.APR.2013 22:33:19

802.11n HT20 – MIMO Ant.1

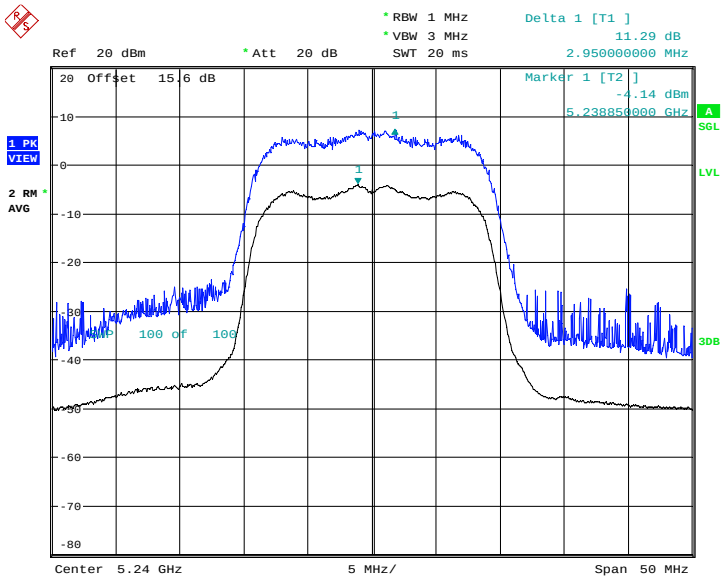
Peak Excursion Ratio Plot on Channel 48



Date: 16.APR.2013 22:30:01

802.11n HT20 – MIMO Ant.2

Peak Excursion Ratio Plot on Channel 48

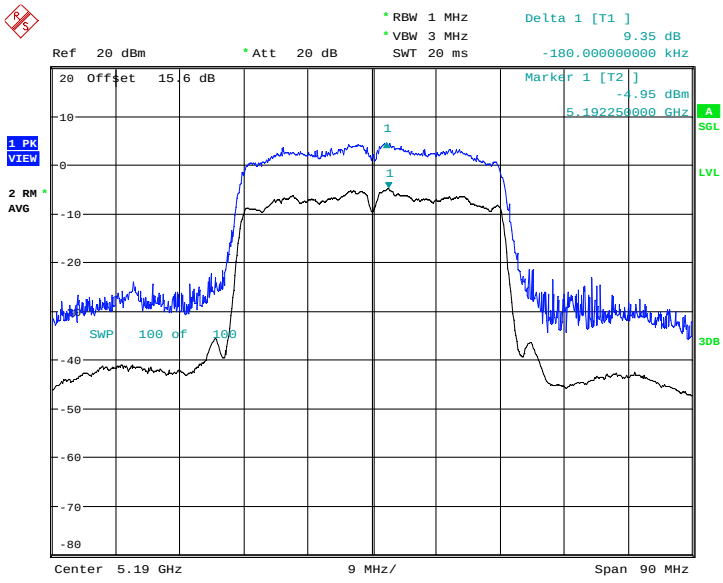


Date: 16.APR.2013 22:32:16

Test Mode :	802.11n HT40	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

802.11n HT40 – MIMO Ant.1

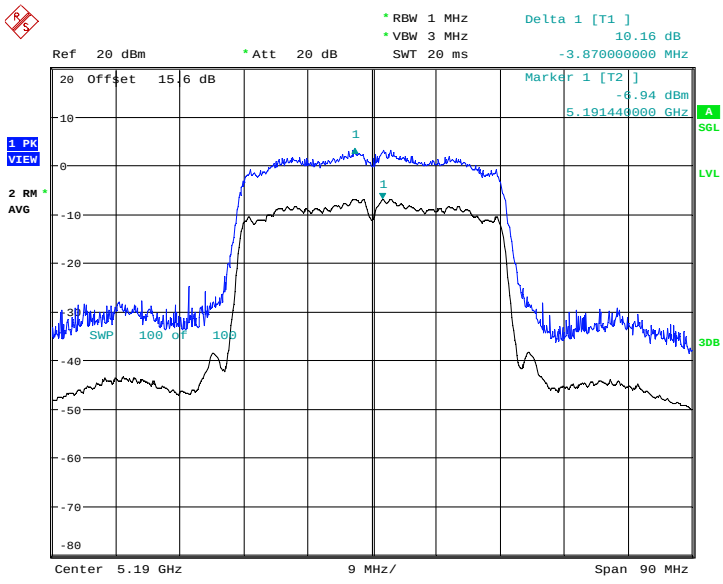
Peak Excursion Ratio Plot on Channel 38



Date: 16.APR.2013 22:42:04

802.11n HT40 – MIMO Ant.2

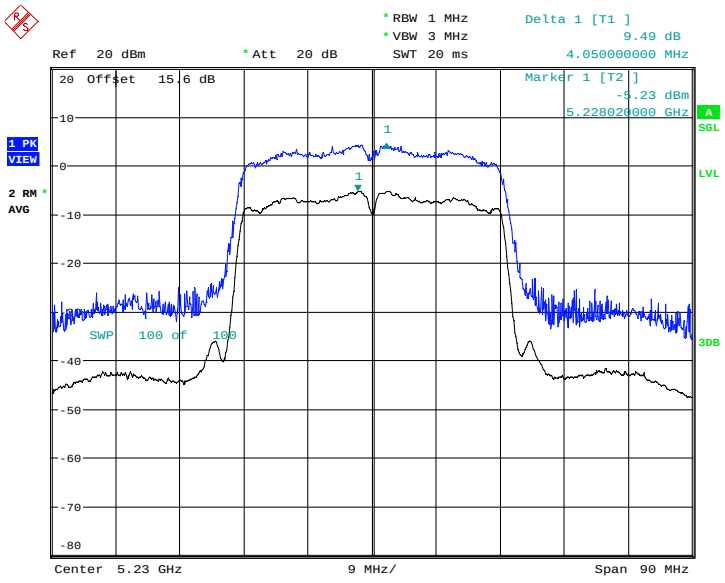
Peak Excursion Ratio Plot on Channel 38



Date: 16.APR.2013 22:38:04

802.11n HT40 – MIMO Ant.1

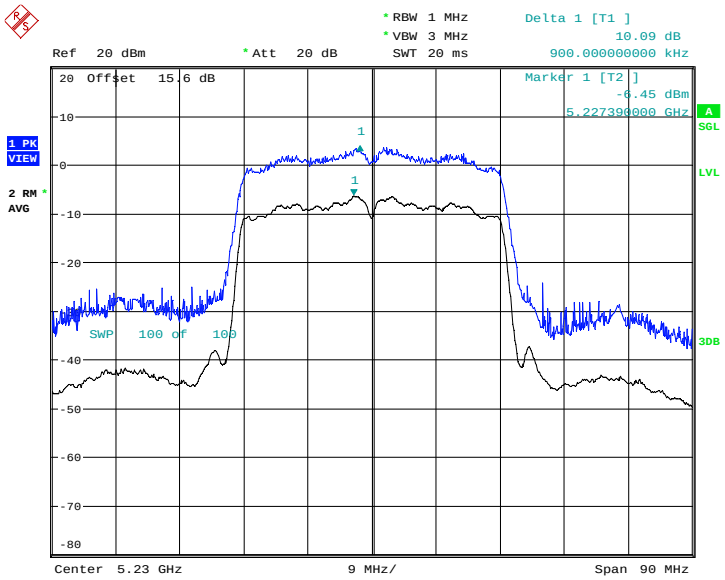
Peak Excursion Ratio Plot on Channel 46



Date: 16.APR.2013 22:40:38

802.11n HT40 – MIMO Ant.2

Peak Excursion Ratio Plot on Channel 46



Date: 16.APR.2013 22:38:53

3.5 Unwanted Emissions Measurement

This section as specified in FCC Part 15.407(b) is to measure unwanted emissions through radiated measurement for band edge spurious emissions and out of band emissions measurement. The unwanted emissions shall comply with 15.407(b)(1) to (6), and restricted bands per FCC Part15.205.

3.5.1 Limit of Unwanted Emissions

(1) For transmitters operating in the 5150-5250 MHz band: all emissions outside of the 5150-5350 MHz band shall not exceed an EIRP of –27dBm/MHz.

(2) Unwanted spurious emissions fallen in restricted bands per FCC Part15.205 shall comply with the general field strength limits set forth in § 15.209 as below table,

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

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBμV/m)
-17	78.3
- 27	68.3

(3) KDB789033 v01r03 H)2)c)(i) As specified in 15.407(b), emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz (or -17 dBm/MHz as specified in 15.407(b)(4)). However, an out-of-band emission that complies with both the average and peak limits of 15.209 is not required to satisfy the -27 dBm/MHz or -17 dBm/MHz peak emission limit.

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 test site requirement and FCC KDB 789033 D01 General UNII Test Procedures v01r03.

   Section H) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 KHz
   - VBW = 300 KHz
   - Detector = Peak
   - Trace mode = max hold

   (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

   - The setting follows the H) 5) of FCC KDB 789033.
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep time = auto
   - Trace mode = max hold

   (3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

   - The setting follows H) 6) of FCC KDB 789033.
   - RBW = 1 MHz
   - 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.

Antenna	Band	Duty Cycle(%)	T(ms)	1/T(KHz)	VBW Setting
Ant.1	802.11a	72.41	0.252	3.97	10K
MIMO Ant.1+2	802.11n HT20	59.32	0.14	7.14	10K
MIMO Ant.1+2	802.11n HT40	83.33	0.50	2.00	3K

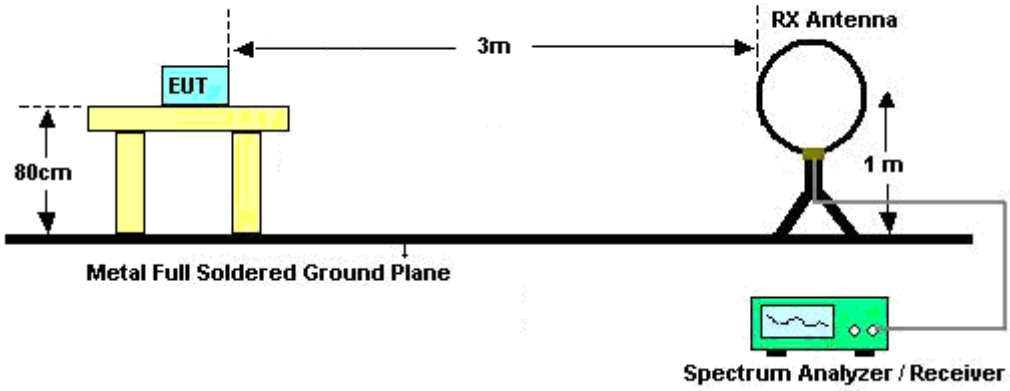
2. The EUT was placed on a rotatable table top 0.8 meter above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the

antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.

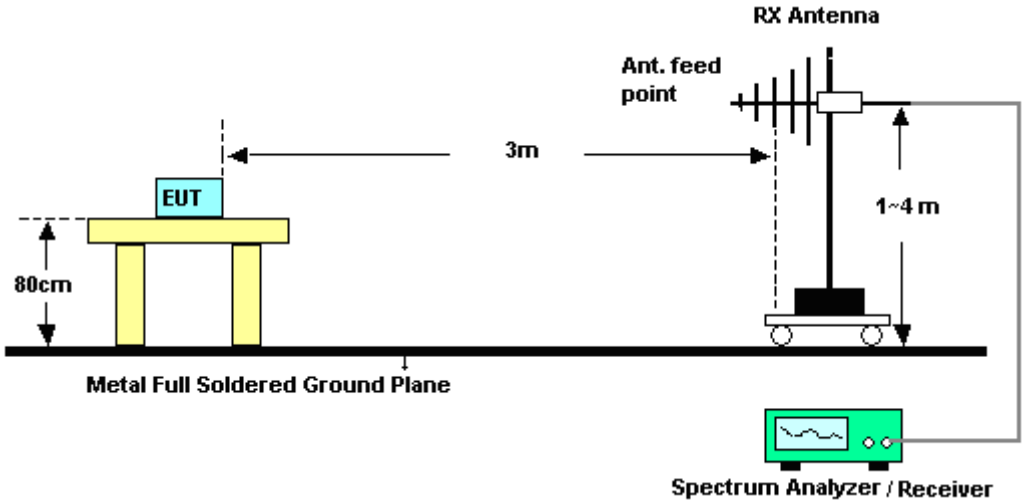
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.5.4 Test Setup

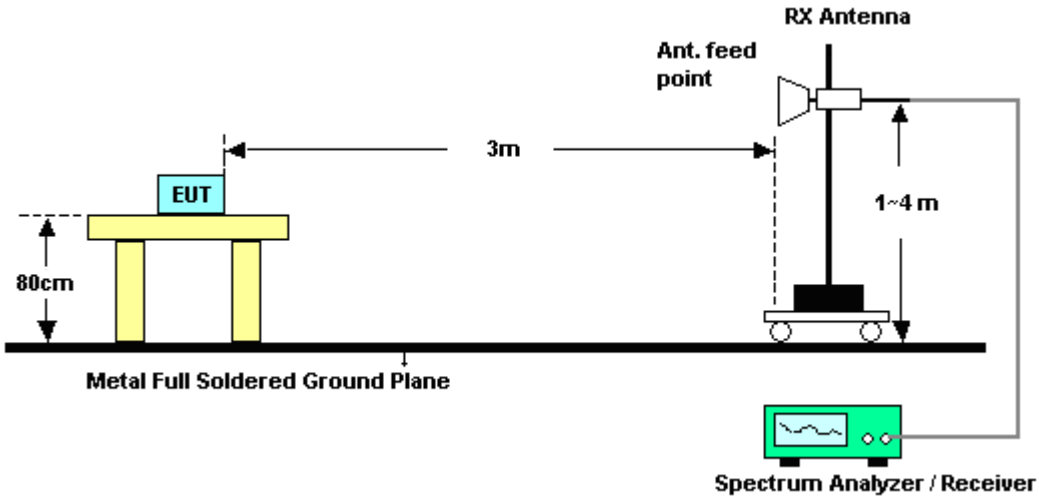
For radiated emissions below 30MHz



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 :	802.11a - Ant.1	**Temperature :**	21~23°C
Test Band :	Low	**Relative Humidity :**	51~53%
Test Channel :	36	**Test Engineer :**	Marlboro Chang

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
5148.35	72.51	-1.49	74	61.49	34.29	9.22	32.49	116	176	Peak
5149.7	53.42	-0.58	54	42.4	34.29	9.22	32.49	116	176	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
5147.45	63.38	-10.62	74	52.36	34.29	9.22	32.49	172	279	Peak
5150	47.16	-6.84	54	36.14	34.29	9.22	32.49	172	279	Average

Test Mode :	802.11a - Ant.1	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	51~53%
Test Channel :	48	Test Engineer :	Marlboro Chang

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
5137.55	55.56	-18.44	74	44.58	34.25	9.18	32.45	140	182	Peak
5150	43.79	-10.21	54	32.77	34.29	9.22	32.49	140	182	Average
5399.94	57.01	-16.99	74	45.81	34.94	9.65	33.39	140	182	Peak
5400.93	45.3	-8.7	54	34.1	34.94	9.65	33.39	140	182	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
5073.35	53.46	-20.54	74	42.63	34.12	9.1	32.39	200	292	Peak
5044.7	40.88	-13.12	54	30.15	34.03	9.05	32.35	200	292	Average
5362.54	54.41	-19.59	74	43.13	34.85	9.61	33.18	200	292	Peak
5353.85	41.46	-12.54	54	30.27	34.81	9.56	33.18	200	292	Average

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	51~53%
Test Channel :	36	Test Engineer :	Marlboro Chang

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
5149.85	73.83	-0.17	74	62.81	34.29	9.22	32.49	157	178	Peak
5150	53.42	-0.58	54	42.4	34.29	9.22	32.49	157	178	Average
5375.74	54.42	-19.58	74	43.24	34.85	9.61	33.28	157	178	Peak
5427	42.16	-11.84	54	30.97	34.98	9.69	33.48	157	178	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
5150	65.5	-8.5	74	54.48	34.29	9.22	32.49	155	232	Peak
5150	47.34	-6.66	54	36.32	34.29	9.22	32.49	155	232	Average
5372.33	53.63	-20.37	74	42.35	34.85	9.61	33.18	155	232	Peak
5351.65	41.32	-12.68	54	30.13	34.81	9.56	33.18	155	232	Average

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	51~53%
Test Channel :	48	Test Engineer :	Marlboro Chang

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
5086.85	57.18	-16.82	74	46.35	34.12	9.1	32.39	141	179	Peak
5086.55	44.94	-9.06	54	34.11	34.12	9.1	32.39	141	179	Average
5401.92	58.89	-15.11	74	47.69	34.94	9.65	33.39	141	179	Peak
5398.4	48.26	-5.74	54	36.95	34.94	9.65	33.28	141	179	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
5082.35	53.58	-20.42	74	42.75	34.12	9.1	32.39	200	237	Peak
5079.5	41.01	-12.99	54	30.18	34.12	9.1	32.39	200	237	Average
5400.6	54.5	-19.5	74	43.3	34.94	9.65	33.39	200	237	Peak
5400.82	43.4	-10.6	54	32.2	34.94	9.65	33.39	200	237	Average

Test Mode :	802.11n HT40 – MIMO Ant.1+2	Temperature :	21~23°C
Test Band :	Low	Relative Humidity :	51~53%
Test Channel :	38	Test Engineer :	Marlboro Chang

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
5147.9	66.06	-7.94	74	55.04	34.29	9.22	32.49	141	177	Peak
5149.85	49.79	-4.21	54	38.77	34.29	9.22	32.49	141	177	Average
5354.18	56.07	-17.93	74	44.88	34.81	9.56	33.18	141	177	Peak
5352.42	45.08	-8.92	54	33.89	34.81	9.56	33.18	141	177	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
5148.05	56.01	-17.99	74	44.99	34.29	9.22	32.49	171	275	Peak
5149.1	43.41	-10.59	54	32.39	34.29	9.22	32.49	171	275	Average
5354.84	54.28	-19.72	74	43.09	34.81	9.56	33.18	171	275	Peak
5352.75	42.16	-11.84	54	30.97	34.81	9.56	33.18	171	275	Average

Test Mode :	802.11n HT40 – MIMO Ant.1+2	Temperature :	21~23°C
Test Band :	High	Relative Humidity :	51~53%
Test Channel :	46	Test Engineer :	Marlboro Chang

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
5081.45	55.73	-18.27	74	44.9	34.12	9.1	32.39	140	174	Peak
5148.35	43.88	-10.12	54	32.86	34.29	9.22	32.49	140	174	Average
5386.63	58.54	-15.46	74	47.27	34.9	9.65	33.28	140	174	Peak
5388.17	47.56	-6.44	54	36.29	34.9	9.65	33.28	140	174	Average

ANTENNA POLARITY : VERTICAL										
Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Remark
5017.4	53.18	-20.82	74	42.59	33.94	8.97	32.32	153	246	Peak
5003.6	41.49	-12.51	54	30.87	33.94	8.97	32.29	153	246	Average
5394.11	54.79	-19.21	74	43.52	34.9	9.65	33.28	153	246	Peak
5393.34	43.39	-10.61	54	32.12	34.9	9.65	33.28	153	246	Average

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

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

Test Mode :	802.11a – Ant.1	**Temperature :**	21~23°C
Test Channel :	36	**Relative Humidity :**	51~53%
Test Engineer :	Marlboro Chang	**Polarization :**	Horizontal
Remark :	1. 5180 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
165	25.86	-17.64	43.5	45.93	10.03	1.23	31.33	100	94	Peak
240.06	14.9	-31.1	46	32.64	11.93	1.53	31.2	-	-	Peak
294.6	20.31	-25.69	46	36.7	13.23	1.73	31.35	-	-	Peak
332.2	15.84	-30.16	46	31.08	14.19	1.86	31.29	-	-	Peak
599.6	21.22	-24.78	46	29.29	19.78	2.69	30.54	-	-	Peak
800.5	24.42	-21.58	46	29.34	22.1	3.14	30.16	-	-	Peak
5180	103.38	-	-	92.25	34.38	9.27	32.52	116	176	Average
5180	112.95	-	-	101.82	34.38	9.27	32.52	116	176	Peak
10359	44.38	-23.92	68.3	51.94	37.29	13.71	58.56	100	0	Peak

Test Mode :	802.11a – Ant.1	Temperature :	21~23°C
Test Channel :	36	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5179 MHz is fundamental signal which can be ignored. 2. 10368 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
31.89	20.95	-19.05	40	33.71	18.56	0.55	31.87	100	19	Peak
100.2	13.43	-30.07	43.5	34.3	9.8	0.99	31.66	-	-	Peak
259.23	14.16	-31.84	46	31.11	12.72	1.58	31.25	-	-	Peak
514.9	19.16	-26.84	46	29.33	18.35	2.48	31	-	-	Peak
737.5	21.92	-24.08	46	28.26	21.15	3.03	30.52	-	-	Peak
860.7	24.53	-21.47	46	29.15	22.7	3.28	30.6	-	-	Peak
5179	95.64	-	-	84.51	34.38	9.27	32.52	172	279	Average
5179	104.33	-	-	93.2	34.38	9.27	32.52	172	279	Peak
10368	46.83	-21.47	68.3	54.39	37.29	13.71	58.56	100	0	Peak

Test Mode :	802.11a – Ant.1	Temperature :	21~23°C
Test Channel :	44	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Horizontal
Remark :	1. 5218 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5218	103.29	-	-	92.03	34.46	9.35	32.55	127	177	Average
5218	113.01	-	-	101.75	34.46	9.35	32.55	127	177	Peak
10440	45.43	-22.87	68.3	52.99	37.35	13.71	58.62	100	0	Peak

Test Mode :	802.11a – Ant.1	Temperature :	21~23°C
Test Channel :	44	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5218 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5218	95.12	-	-	83.86	34.46	9.35	32.55	186	288	Average
5218	104.55	-	-	93.29	34.46	9.35	32.55	186	288	Peak
10440	44.26	-24.04	68.3	51.82	37.35	13.71	58.62	100	0	Peak

Test Mode :	802.11a – Ant.1	Temperature :	21~23°C
Test Channel :	48	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Horizontal
Remark :	1. 5238 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5238	103.44	-	-	92.19	34.51	9.39	32.65	140	182	Average
5238	112.65	-	-	101.4	34.51	9.39	32.65	140	182	Peak
10479	44.5	-23.8	68.3	52.05	37.39	13.72	58.66	100	0	Peak

Test Mode :	802.11a – Ant.1	Temperature :	21~23°C
Test Channel :	48	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5238 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5238	94.67	-	-	83.42	34.51	9.39	32.65	200	292	Average
5238	104.12	-	-	92.87	34.51	9.39	32.65	200	292	Peak
10479	44.7	-23.6	68.3	52.25	37.39	13.72	58.66	100	0	Peak

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	36	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Horizontal
Remark :	1. 5182 MHz is fundamental signal which can be ignored. 2. 10359 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
81.84	9.72	-30.28	40	32.76	7.79	0.89	31.72	-	-	Peak
132.6	12.64	-30.86	43.5	31.48	11.54	1.16	31.54	-	-	Peak
197.67	13.74	-29.76	43.5	34.66	9.08	1.31	31.31	-	-	Peak
433.7	16.98	-29.02	46	29.18	16.71	2.26	31.17	-	-	Peak
655.6	22.56	-23.44	46	29.84	20.24	2.85	30.37	-	-	Peak
804.7	24.93	-21.07	46	29.83	22.15	3.15	30.2	100	20	Peak
5182	105.54	-	-	94.41	34.38	9.27	32.52	157	178	Average
5182	115.08	-	-	103.95	34.38	9.27	32.52	157	178	Peak
10359	45.03	-23.27	68.3	52.59	37.29	13.71	58.56	100	0	Peak

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	36	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5180 MHz is fundamental signal which can be ignored. 2. 10356 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
31.62	21.25	-18.75	40	34.01	18.56	0.55	31.87	100	87	Peak
81.57	11.39	-28.61	40	34.43	7.79	0.89	31.72	-	-	Peak
190.38	13.32	-30.18	43.5	34.36	9	1.28	31.32	-	-	Peak
476.4	17.99	-28.01	46	29.01	17.6	2.37	30.99	-	-	Peak
577.9	20.73	-25.27	46	29.54	19.42	2.63	30.86	-	-	Peak
766.9	22.87	-23.13	46	28.58	21.6	3.09	30.4	-	-	Peak
5180	97.27	-	-	86.14	34.38	9.27	32.52	155	232	Average
5180	106.7	-	-	95.57	34.38	9.27	32.52	155	232	Peak
10356	48.05	-20.25	68.3	55.61	37.28	13.71	58.55	100	0	Peak

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	44	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Horizontal
Remark :	1. 5220 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5220	105.67	-	-	94.41	34.46	9.35	32.55	128	173	Average
5220	115.03	-	-	103.77	34.46	9.35	32.55	128	173	Peak
10440	45.04	-23.26	68.3	52.6	37.35	13.71	58.62	100	0	Peak

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	44	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5222 MHz is fundamental signal which can be ignored. 2. 10440 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5222	97.77	-	-	86.61	34.46	9.35	32.65	153	216	Average
5222	107.64	-	-	96.48	34.46	9.35	32.65	153	216	Peak
10440	44.26	-24.04	68.3	51.82	37.35	13.71	58.62	100	0	Peak

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	48	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Horizontal
Remark :	1. 5242 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5242	104.26	-	-	92.97	34.55	9.39	32.65	141	179	Average
5242	113.5	-	-	102.21	34.55	9.39	32.65	141	179	Peak
10479	45.18	-23.12	68.3	52.73	37.39	13.72	58.66	100	0	Peak

Test Mode :	802.11n HT20 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	48	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5240 MHz is fundamental signal which can be ignored. 2. 10479 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5240	97.96	-	-	86.71	34.51	9.39	32.65	200	237	Average
5240	106.13	-	-	94.88	34.51	9.39	32.65	200	237	Peak
10479	44.5	-23.8	68.3	52.05	37.39	13.72	58.66	100	0	Peak

Test Mode :	802.11n HT40 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	38	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Horizontal
Remark :	1. 5192 MHz is fundamental signal which can be ignored. 2. 10380 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
132.6	12.95	-30.55	43.5	31.79	11.54	1.16	31.54	-	-	Peak
236.55	18.75	-27.25	46	36.78	11.66	1.51	31.2	-	-	Peak
276.78	18.07	-27.93	46	34.83	12.97	1.64	31.37	-	-	Peak
451.2	19.15	-26.85	46	30.93	17.07	2.3	31.15	-	-	Peak
653.5	21.69	-24.31	46	28.97	20.23	2.85	30.36	-	-	Peak
885.9	24.27	-21.73	46	28.75	22.95	3.32	30.75	100	75	Peak
5192	95.35	-	-	84.14	34.42	9.31	32.52	141	177	Average
5192	103.32	-	-	92.11	34.42	9.31	32.52	141	177	Peak
10380	44.53	-23.77	68.3	52.08	37.31	13.71	58.57	100	0	Peak

Test Mode :	802.11n HT40 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	38	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5188 MHz is fundamental signal which can be ignored. 2. 10380 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
73.47	11.93	-28.07	40	36.04	6.81	0.85	31.77	-	-	Peak
143.67	10.99	-32.51	43.5	29.89	11.33	1.2	31.43	-	-	Peak
282.45	17.78	-28.22	46	34.49	13.05	1.65	31.41	-	-	Peak
491.1	18.39	-27.61	46	28.99	17.9	2.42	30.92	-	-	Peak
710.9	22.03	-23.97	46	28.8	20.76	2.97	30.5	-	-	Peak
825.7	24.37	-21.63	46	29.17	22.35	3.21	30.36	100	36	Peak
5188	86.71	-	-	75.58	34.38	9.27	32.52	171	275	Average
5188	95.69	-	-	84.56	34.38	9.27	32.52	171	275	Peak
10380	43.59	-24.71	68.3	51.14	37.31	13.71	58.57	100	0	Peak

Test Mode :	802.11n HT40 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	46	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Horizontal
Remark :	1. 5228 MHz is fundamental signal which can be ignored. 2. 10461 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5228	98.3	-	-	87.09	34.51	9.35	32.65	140	174	Average
5228	106.75	-	-	95.54	34.51	9.35	32.65	140	174	Peak
10461	45.33	-22.97	68.3	52.88	37.37	13.72	58.64	100	0	Peak

Test Mode :	802.11n HT40 – MIMO Ant.1+2	Temperature :	21~23°C
Test Channel :	46	Relative Humidity :	51~53%
Test Engineer :	Marlboro Chang	Polarization :	Vertical
Remark :	1. 5232 MHz is fundamental signal which can be ignored. 2. 10461 MHz is not within a restricted band, and satisfies 68.3 dBμV /m peak emission 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
5232	89.74	-	-	78.53	34.51	9.35	32.65	153	246	Average
5232	99.46	-	-	88.25	34.51	9.35	32.65	153	246	Peak
10461	46.3	-22	68.3	53.85	37.37	13.72	58.64	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 (dBμV)	
	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.

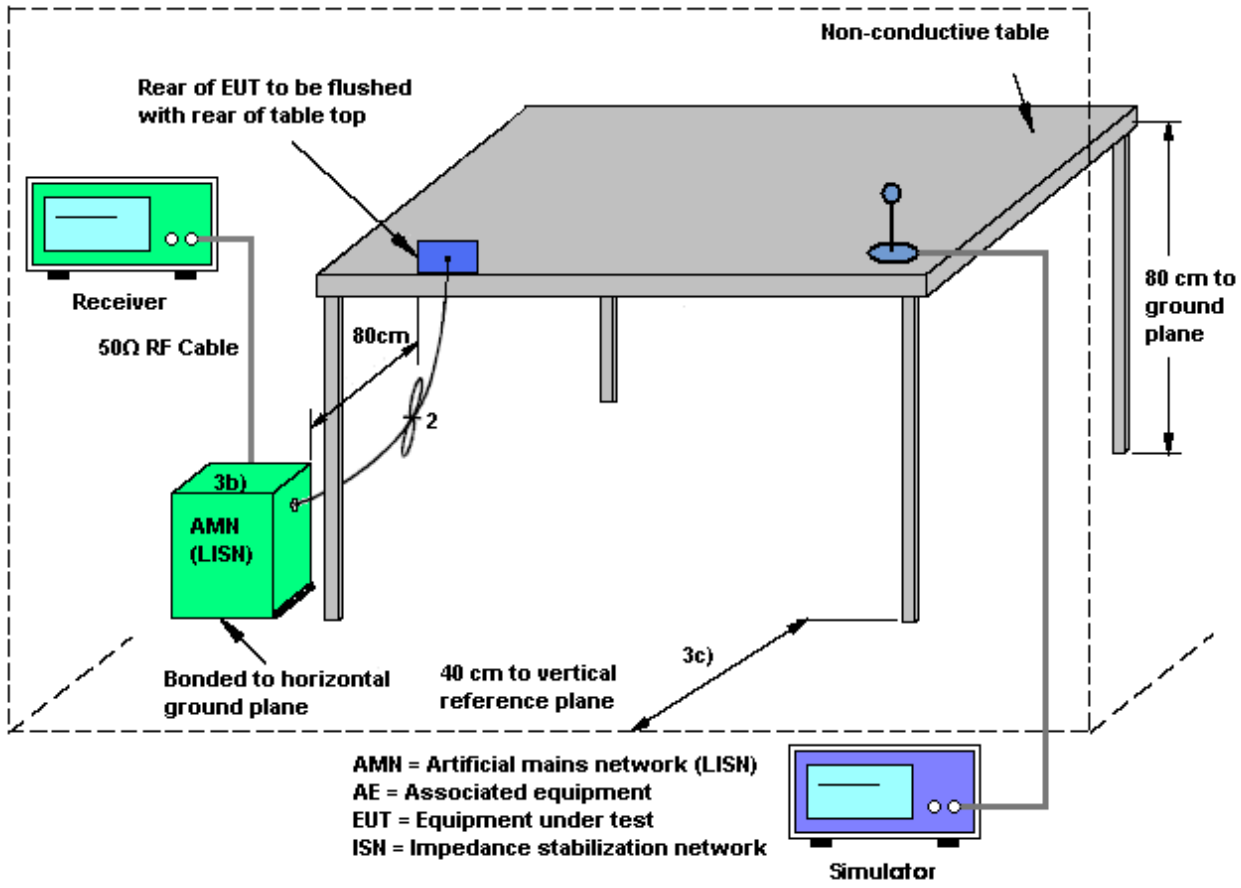
3.6.2 Measuring Instruments

See list of measuring instruments of this test report.

3.6.3 Test Procedures

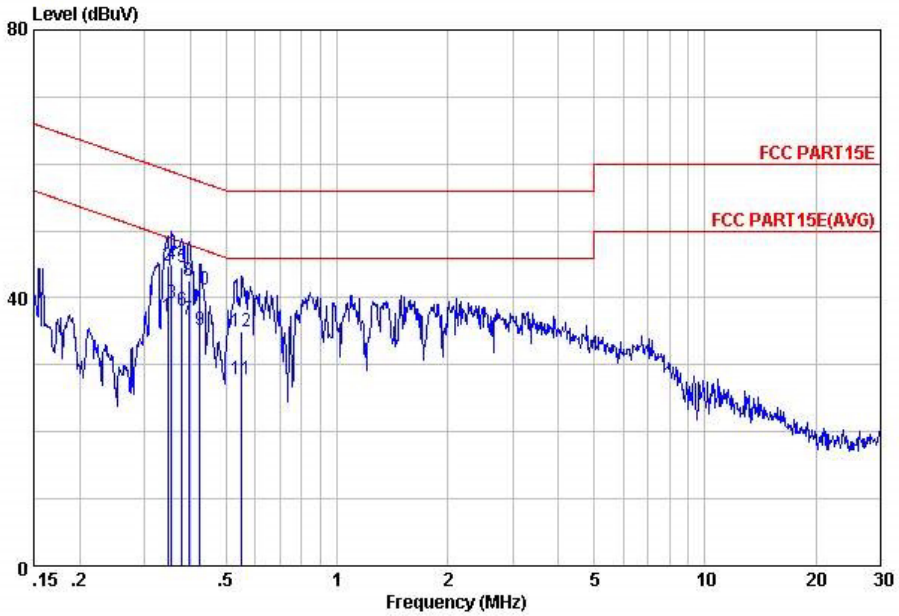
1. The testing follows the guidelines in ANSI C63.10-2009 test site requirement.
2. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
3. Connect EUT to the power mains through a line impedance stabilization 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

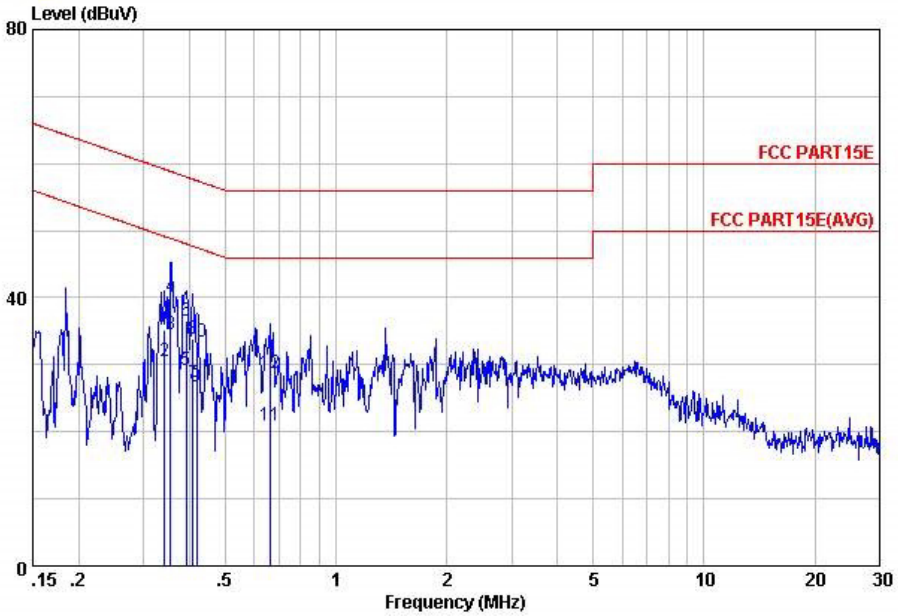
Test Mode :	Mode 1	Temperature :	19~20℃
Test Engineer :	Tom Wang	Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Line
Function Type :	GSM850 Idle + WLAN 5GHz Link + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : C001-KS
Condition: FCC PART15E LISN-L20130306 LINE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.35	37.29	-11.76	49.05	26.59	0.45	10.25	Average
2	0.35	44.79	-14.26	59.05	34.09	0.45	10.25	QP
3	0.36	39.26	-9.57	48.83	28.59	0.42	10.25	Average
4	0.36	44.96	-13.87	58.83	34.29	0.42	10.25	QP
5	0.38	44.51	-13.79	58.30	33.90	0.36	10.25	QP
6	0.38	38.11	-10.19	48.30	27.50	0.36	10.25	Average
7	0.40	36.88	-11.07	47.95	26.30	0.33	10.25	Average
8	0.40	42.58	-15.37	57.95	32.00	0.33	10.25	QP
9	0.42	35.23	-12.14	47.37	24.70	0.28	10.25	Average
10	0.42	41.23	-16.14	57.37	30.70	0.28	10.25	QP
11	0.55	27.96	-18.04	46.00	17.50	0.20	10.26	Average
12	0.55	34.96	-21.04	56.00	24.50	0.20	10.26	QP

Test Mode :	Mode 1	Temperature :	19~20℃
Test Engineer :	Tom Wang	Relative Humidity :	39~40%
Test Voltage :	120Vac / 60Hz	Phase :	Neutral
Function Type :	GSM850 Idle + WLAN 5GHz Link + Adapter		
Remark :	All emissions not reported here are more than 10 dB below the prescribed limit.		



Site : CO01-KS
Condition: FCC PART15E LISN-N20130306 NEUTRAL

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.34	35.27	-23.86	59.13	24.49	0.53	10.25	QP
2	0.34	30.57	-18.56	49.13	19.79	0.53	10.25	Average
3	0.36	34.54	-14.29	48.83	23.80	0.49	10.25	Average
4	0.36	40.04	-18.79	58.83	29.30	0.49	10.25	QP
5	0.39	29.17	-18.86	48.03	18.50	0.42	10.25	Average
6	0.39	36.47	-21.56	58.03	25.80	0.42	10.25	QP
7	0.41	27.14	-20.54	47.68	16.50	0.39	10.25	Average
8	0.41	33.84	-23.84	57.68	23.20	0.39	10.25	QP
9	0.42	26.83	-20.63	47.46	16.20	0.38	10.25	Average
10	0.42	33.53	-23.93	57.46	22.90	0.38	10.25	QP
11	0.66	20.88	-25.12	46.00	10.40	0.21	10.27	Average
12	0.66	28.68	-27.32	56.00	18.20	0.21	10.27	QP

3.7 Frequency Stability Measurement

3.7.1 Limit of Frequency Stability

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

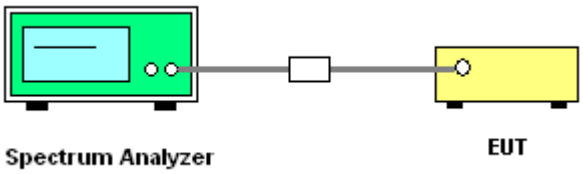
3.7.2 Measuring Instruments

See list of measuring instruments of this test report.

3.7.3 Test Procedures

1. To ensure emission at the band edge is maintained within the authorized band, those values shall be measured by radiation emissions at upper and lower frequency points, and finally compensated by frequency deviation as procedures below.
2. The EUT was operated at the maximum output power, and connected to the spectrum analyzer, which is set to maximum hold function and peak detector. The peak value of the power envelope was measured and noted. The upper and lower frequency points were respectively measured relatively 10dB lower than the measured peak value.
3. The frequency deviation was calculated by adding the upper frequency point and the lower frequency point divided by two. Those detailed values of frequency deviation are provided in table below.

3.7.4 Test Setup



3.7.5 Test Result of Frequency Stability

Test Mode :	802.11a	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

Channel	Frequency (MHz)	Low Frequency (Fl)	High Frequency (Fh)	Frequency Stability (ppm)
		Ant.1	Ant.1	Ant.1
36	5180	5171.85	5188.15	0.00
44	5220	5211.80	5228.15	-4.79
48	5240	5231.85	5248.15	0.00

Test Mode :	802.11n HT-20	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		MIMO Ant.1	MIMO Ant.2	MIMO Ant.1	MIMO Ant.2	MIMO Ant.1	MIMO Ant.2
36	5180	5171.15	5171.15	5188.85	5188.85	0.00	0.00
44	5220	5211.15	5211.10	5228.85	5228.80	0.00	-9.58
48	5240	5231.15	5231.15	5248.85	5248.85	0.00	0.00

Test Mode :	802.11n HT-40	Temperature :	23~24℃
Test Engineer :	Lizy Li	Relative Humidity :	47~48%

Channel	Frequency (MHz)	Low Frequency (Fl)		High Frequency (Fh)		Frequency Stability (ppm)	
		MIMO Ant.1	MIMO Ant.2	MIMO Ant.1	MIMO Ant.2	MIMO Ant.1	MIMO Ant.2
38	5190	5171.82	5171.82	5208.36	5208.36	17.34	17.34
46	5230	5211.82	5211.82	5248.18	5248.18	0.00	0.00

3.8 Automatically Discontinue Transmission

3.8.1 Limit of Automatically Discontinue Transmission

The device shall automatically discontinue transmission in case of either absence of information to transmit or operational failure. These provisions are not intended to preclude the transmission of control or signaling information or the use of repetitive codes used by certain digital technologies to complete frame or burst intervals. Applicants shall include in their application for equipment authorization to describe how this requirement is met.

3.8.2 Measuring Instruments

See list of measuring instruments of this test report.

3.8.3 Test Result of Automatically Discontinue Transmission

During no any information transmission, the EUT can automatically discontinue transmission and become standby mode for power saving. The EUT can detect the controlling signal of ACK message transmitting from remote device and verify whether it shall resend or discontinue transmission.

3.9 Antenna Requirements

3.9.1 Standard Applicable

According to FCC 47 CFR Section 15.407(a)(1)(2) ,if transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.9.2 Antenna Connected Construction

Non-standard connector used.

3.9.3 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. The EUT supports MIMO mode. The composite antenna gain is as following table.

FCC KDB 662911 D01 Multiple Transmitter Output v01r02

For CDD transmissions, directional gain is calculated as

Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

For power spectral density (PSD) measurements on all devices,

Array Gain = 10 log(N_{ANT}/N_{SS}=1) dB.

For power measurements on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

4 List of Measuring Equipments

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Spectrum Analyzer	R&S	FSP40	100319	9kHz~40GHz	Dec. 29, 2012	Mar. 24, 2013~ Apr. 16, 2013	Dec. 28, 2013	Conducted (TH01-KS)
Spectrum Analyzer	R&S	FSV30	100845	9kHz~30GHz	Nov. 06, 2012	Mar. 24, 2013~ Apr. 16, 2013	Nov. 05, 2013	Conducted (TH01-KS)
Power Meter	Agilent	E4416A	MY45101555	N/A	Aug. 22, 2012	Mar. 24, 2013~ Apr. 16, 2013	Aug. 21, 2013	Conducted (TH01-KS)
Power Sensor	Agilent	E9327A	MY44421198	N/A	Aug. 22, 2012	Mar. 24, 2013~ Apr. 16, 2013	Aug. 21, 2013	Conducted (TH01-KS)
DC Power Supply	GWINSTEK	GPS-3030D	E1884515	N/A	Aug. 22, 2012	Mar. 24, 2013~ Apr. 16, 2013	Aug. 21, 2013	Conducted (TH01-KS)
Thermal Chamber	Ten Billion	TTC-B3S	TBN-960502	N/A	Dec. 29, 2012	Mar. 24, 2013~ Apr. 16, 2013	Dec. 28, 2013	Conducted (TH01-KS)
Bilog Antenna	Schaffner	CBL6111C	2726	30MHz ~ 1GHz	Oct. 06, 2012	Apr. 05, 2013~ Apr. 06, 2013	Oct. 05, 2013	Radiation (03CH07-HY)
Spectrum Analyzer	Rohde & Schwarz	FSP30	101067	9KHz ~ 30GHz	Nov. 30, 2012	Apr. 05, 2013~ Apr. 06, 2013	Nov. 29, 2013	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Aug. 22, 2012	Apr. 05, 2013~ Apr. 06, 2013	Aug. 21, 2013	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~ 26.5GHz	Dec. 01, 2012	Apr. 05, 2013~ Apr. 06, 2013	Nov. 30, 2013	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	159088	1GHz ~ 18GHz	Feb. 27, 2013	Apr. 05, 2013~ Apr. 06, 2013	Feb. 26, 2014	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10-1000MHz. 32dB.GAIN	Feb. 26, 2013	Apr. 05, 2013~ Apr. 06, 2013	Feb. 25, 2014	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESCI 7	100724	9kHz~7GHz	Sep. 03, 2012	Apr. 05, 2013~ Apr. 06, 2013	Sep. 02, 2013	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170251	15GHz ~ 40GHz	Sep. 28, 2012	Apr. 05, 2013~ Apr. 06, 2013	Sep. 27, 2013	Radiation (03CH07-HY)
Loop Antenna	R&S	HFH2-Z2	860004/001	9 kHz~30 MHz	Jul. 03, 2012	Apr. 04, 2013~ Apr. 06, 2013	Jul. 02, 2013	Radiation (03CH07-HY)
EMI Receiver	R&S	ESCI7	100768	9kHz~7GHz	Jun. 01, 2012	Apr. 18, 2013	May 31, 2013	Conduction (CO01-KS)
LISN	MessTec	AN3016	60103	9kHz~30MHz	Dec. 29, 2012	Apr. 18, 2013	Dec. 28, 2013	Conduction (CO01-KS)
LISN	MessTec	AN3016	60105	9kHz~30MHz	Dec. 29, 2012	Apr. 18, 2013	Dec. 28, 2013	Conduction (CO01-KS)
AC Power Source	Chroma	61602	ABP000000811	N/A	Nov. 15, 2012	Apr. 18, 2013	Nov. 14, 2013	Conduction (CO01-KS)
System Simulator	R&S	CMU200	837587/066	2G Full-Band	Dec. 29, 2012	Apr. 18, 2013	Dec. 28, 2013	Conduction (CO01-KS)

5 Uncertainty of Evaluation

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

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

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

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

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

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 EP312313 as below.