SPORTON International Inc.
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FCC RADIO TEST REPORT

Applicant's company	**Netgear Inc.**
Applicant Address	350 East Plumeria Drive San Jose, CA 95134 U.S.A.
FCC ID	**PY312400216**
Manufacturer's company	**Netgear Inc.**
Manufacturer Address	350 East Plumeria Drive San Jose, CA 95134 U.S.A.

Product Name	D6200 WiFi Modem Router
Brand Name	Netgear
Model Name	D6200xxxxx (The "X" in model name can be 0 to 9, A to Z or blank, for marking purpose)
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250MHz
Received Date	Jan. 09, 2013
Final Test Date	Jan. 27, 2013
Submission Type	Original Equipment
Operating Mode	Master

Statement

Test result included is for the IEEE 802.11n and IEEE 802.11a/ac (5150 ~ 5250MHz) of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2009**, **47 CFR FCC Part 15 Subpart E, KDB 789033 D01 v01r02**, **KDB 662911 D01 v01r02** and **KDB644545 D01 v01**.

The test equipment used to perform the test is calibrated and traceable to NML/ROC.

Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR310915AA	Rev. 01	Initial issue of report	Feb. 01, 2013

Certificate No.: CB10201184

1. CERTIFICATE OF COMPLIANCE

Product Name	:	D6200 WiFi Modem Router
Brand Name	:	Netgear
Model Name	:	D6200xxxxx (The "X" in model name can be 0 to 9, A to Z or blank, for marking purpose)
Applicant	:	Netgear Inc.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Jan. 09, 2013 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen

Sam Chen

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart E				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	Complies	6.38 dB
4.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.07 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.32 dB
4.5	15.407(a)	Peak Excursion	Complies	3.19 dB
4.6	15.407(b)	Radiated Emissions	Complies	3.85 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.05 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.5dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
Peak Excursion	±0.5dB	Confidence levels of 95%
26dB Spectrum Bandwidth / Frequency Stability	$\pm 8.5\times10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1000MHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter
Modulation	see the below table for IEEE 802.11n see the below table for IEEE 802.11ac
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM) For 802.11n OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM) For 802.11ac
Data Rate (Mbps)	see the below table for IEEE 802.11n see the below table for IEEE 802.11ac
Frequency Range	5150 ~ 5250MHz
Channel Number	4 for 20MHz bandwidth ; 2 for 40MHz bandwidth 1 for 80MHz bandwidth
Channel Band Width (99%)	11n MCS8 HT 20: 18.08 MHz ; 11n MCS8 HT40: 36.48 MHz; 11ac MCS0-Nss2 VHT 20: 18.08 MHz 11ac MCS0-Nss2 VHT 40: 36.48 MHz 11ac MCS0-Nss2 VHT 80: 76.16 MHz
Maximum Conducted Output Power	11n MCS8 HT20: 16.93 dBm ; 11n MCS8 HT40: 16.90 dBm; 11ac MCS0-Nss2 VHT 20: 16.90 dBm 11ac MCS0-Nss2 VHT 40: 16.81 dBm 11ac MCS0-Nss2 VHT 80: 14.97 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a

Items	Description
Product Type	WLAN (1TX, 1RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter
Modulation	OFDM for IEEE 802.11a
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	OFDM (6/9/12/18/24/36/48/54)
Frequency Range	5150 ~ 5250MHz
Channel Number	11a: 4
Channel Band Width (99%)	11a: 17.12 MHz
Maximum Conducted Output Power	11a: 16.76 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Single (TX)			Two (TX)		
Band width Mode	20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
IEEE 802.11a	V	X	X	X	X	X
IEEE 802.11n	X	X	X	V	V	X
IEEE 802.11ac	X	X	X	V	V	V

IEEE 802.11n spec

MCS Index	Nss	Modulation	R	NBPSC	NCBPS		NDBPS		Datarate(Mbps)			
									800nsGI		400nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
8	2	BPSK	1/2	1	104	216	52	108	13.0	27.0	14.444	30
9	2	QPSK	1/2	2	208	432	104	216	26.0	54.0	28.889	60
10	2	QPSK	3/4	2	208	432	156	324	39.0	81.0	43.333	90
11	2	16-QAM	1/2	4	416	864	208	432	52.0	108.0	57.778	120
12	2	16-QAM	3/4	4	416	864	312	648	78.0	162.0	86.667	180
13	2	64-QAM	2/3	6	624	1296	416	864	104.0	216.0	115.556	240
14	2	64-QAM	3/4	6	624	1296	468	972	117.0	243.0	130.000	270
15	2	64-QAM	5/6	6	624	1296	520	1080	130.0	270.0	144.444	300

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	guard interval

IEEE 802. 11a, 11n and 11ac Spec.

Worst Modulation Used for Conformance Testing				
IEEE 802.11 Protocol	Number of Transmit Chains (N_{TX})	Data Rate / MCS	Worst Data Rate / MCS	Worst Modulation Mode
a	1	6-54 Mbps	6Mbps	11A5.2G-20M
n (HT20)	2	MCS 8-15	MCS 8	11N5.2G-20M
n (HT40)	2	MCS 8-15	MCS 8	11N5.2G-40M
ac (VHT20)	2	MCS 0-9	MCS 0-Nss2	11AC5.2G-20M
ac (VHT40)	2	MCS 0-9	MCS 0-Nss2	11AC5.2G-40M
ac (VHT80)	2	MCS 0-9	MCS 0-Nss2	11AC5.2G-80M
Note 1: IEEE 802.11 modulation consists of IEEE 802.11a.				
Note 2: IEEE 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Worst modulation mode of Guard Interval (GI) is 400ns.				
Note 3: IEEE 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160. Then EUT support VHT80. (VHT: Very High Throughput).				
Note 4: Modulation modes consist of 11A5.2G-20M, 11N5.2G-20M, 11N5.2G-40M, 11AC5.2G-20M, 11AC5.2G-40M, 11AC5.2G-80M				
Note 5: 11A: IEEE 802.11a, 11N: IEEE 802.11n, 11AC: IEEE 802.11ac. 5.2G: 5.15-5.25 GHz band				
Note 6: 20M/40M/80M: Channel Bandwidth 20MHz/40MHz/80MHz				

3.2. Accessories

Power	Brand	Model	P/N	Rating
Adapter 1	NETGEAR	P030WF120B 11200-6LF	332-10200-02	Input:100-240V~50/60Hz 1.0A Output:12V-2.5A
Adapter 2	NETGEAR	MU30-5120250-A1	332-10234-01	Input:100-240V~50/60Hz 0.8A Output:12V-2.5A
Others				
DS RJ-11 Cable Non-Shield, 1.5m *1				
HL RJ-11 Cable Non-Shield, 1.5m *1				
RJ45 Cable Shield, 1.5m*1				
RJ45 Cable Non-Shield, 1.5m*1				

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		
					2.4GHz	5GHz	
1	Wistron NeWeb Corp	D6200	PCB Antenna	I-PEX	3.91	-	
2	Wistron NeWeb Corp	D6200	PCB Antenna	I-PEX	3.37	-	
3	Wistron NeWeb Corp	D6200	PCB Antenna	I-PEX	-	B1	3.87
4	Wistron NeWeb Corp	D6200	PCB Antenna	I-PEX	-	B1	3.42

Note:

For 5GHz Band:

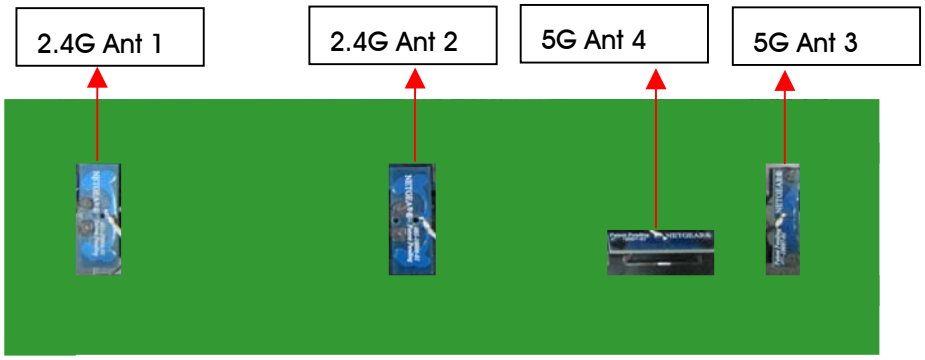
For IEEE 802.11a mode (1TX/1RX):

Only Ant 3 can be used as transmitting/receiving antenna.

For IEEE 802.11n/ac mode (2TX/2RX):

Ant 3 and Ant 4 can be used as transmitting/receiving antennas

Ant 3 and Ant 4 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

The EUT has three bandwidth system.

For 20MHz bandwidth systems, use Channel 36, 40, 44, 48.

For 40MHz bandwidth systems, use Channel 38, 46.

For 80MHz bandwidth systems, use Channel 42.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5250 MHz Band 1	36	5180 MHz	44	5220 MHz
	38	5190 MHz	46	5230 MHz
	40	5200 MHz	48	5240 MHz
	42	5210 MHz	-	-

3.5. Table for Test Modes

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

Test Items	Mode		Data Rate	Channel	Antenna
AC Power Conducted Emission	CTX		-	-	-
Max. Conducted Output Power	11n HT20	Band 1	13Mbps	36/40/48	3+4
	11n HT40	Band 1	27Mbps	38/46	3+4
	11ac VHT20	Band 1	MCS0-NSS2	36/40/48	3+4
	11ac VHT40	Band 1	MCS0-NSS2	38/46	3+4
	11ac VHT80	Band 1	MCS0-NSS2	42	3+4
	11a	Band 1	6Mbps	36/40/48	3
Power Spectral Density	11n HT20	Band 1	13Mbps	36/40/48	3+4
	11n HT40	Band 1	27Mbps	38/46	3+4
	11ac VHT80	Band 1	MCS0-NSS2	42	3+4
	11a	Band 1	6Mbps	36/40/48	3
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Peak Excursion	11n HT20	Band 1	13Mbps	36/40/48	3+4
	11n HT40	Band 1	27Mbps	38/46	3+4
	11ac VHT20	Band 1	MCS0-NSS2	36/40/48	3+4
	11ac VHT40	Band 1	MCS0-NSS2	38/46	3+4
	11ac VHT80	Band 1	MCS0-NSS2	42	3+4
	11a	Band 1	6Mbps	36/40/48	3
Radiated Emission Below 1GHz	CTX		-	-	-
Radiated Emission Above 1GHz	11n HT20	Band 1	13Mbps	36/40/48	3+4
	11n HT40	Band 1	27Mbps	38/46	3+4
	11ac VHT20	Band 1	MCS0-NSS2	36/40/48	3+4
	11ac VHT40	Band 1	MCS0-NSS2	38/46	3+4
	11ac VHT80	Band 1	MCS0-NSS2	42	3+4
	11a	Band 1	6Mbps	36/40/48	3
Band Edge Emission	11n HT20	Band 1	13Mbps	36/40/48	3+4
	11n HT40	Band 1	27Mbps	38/46	3+4
	11ac VHT20	Band 1	MCS0-NSS2	36/40/48	3+4
	11ac VHT40	Band 1	MCS0-NSS2	38/46	3+4
	11ac VHT80	Band 1	MCS0-NSS2	42	3+4
	11a	Band 1	6Mbps	36/40/48	3
Frequency Stability	Un-modulation		-	40	N/A

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. EUT + Adapter 1

Mode 2. EUT + Adapter 2

All test results were recorded in the report.

For Radiated Emission test:

Mode 1. EUT + Adapter 1

Mode 2. EUT + Adapter 2

Due to Mode 1 generated the worst test result, it was recorded in this report.

<For MPE and Co-location Test>:

The EUT could be applied with 2.4GHz WLAN function and 5GHz WLAN function; therefore Maximum Permissible Exposure (Please refer to Appendix B) and Co-location (please refer to Appendix C) tests are added for simultaneously transmit between 2.4GHz WLAN function and 5GHz WLAN function.

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC) Please refer section 6 for Test Site Address.

3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	QDS-BRCM1049LE

3.8. Table for Parameters of Test Software Setting

During testing, Channel & Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. 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.

Power Parameters of IEEE 802.11n MCS8 HT20

Test Software Version	Manual Toov Version 1.0.0.9		
Frequency	5180 MHz	5200 MHz	5240 MHz
MCS8 HT20	52	52	52

Power Parameters of IEEE 802.11n MCS8 HT40

Test Software Version	Manual Toov Version 1.0.0.9	
Frequency	5190 MHz	5230 MHz
MCS8 HT40	51	51

Power Parameters of IEEE 802.11a

Test Software Version	Manual Toov Version 1.0.0.9		
Frequency	5180 MHz	5200 MHz	5240 MHz
11a	64	64	64

Power Parameters of IEEE 802.11ac MCS0-Nss2 VHT20

Test Software Version	Manual Toov Version 1.0.0.9		
Frequency	5180 MHz	5200 MHz	5240 MHz
MCS0-Nss2 VHT20	52	52	52

Power Parameters of IEEE 802.11ac MCS0-Nss2 VHT40

Test Software Version	Manual Toov Version 1.0.0.9	
Frequency	5190 MHz	5230 MHz
MCS0-Nss2 VHT40	50	51

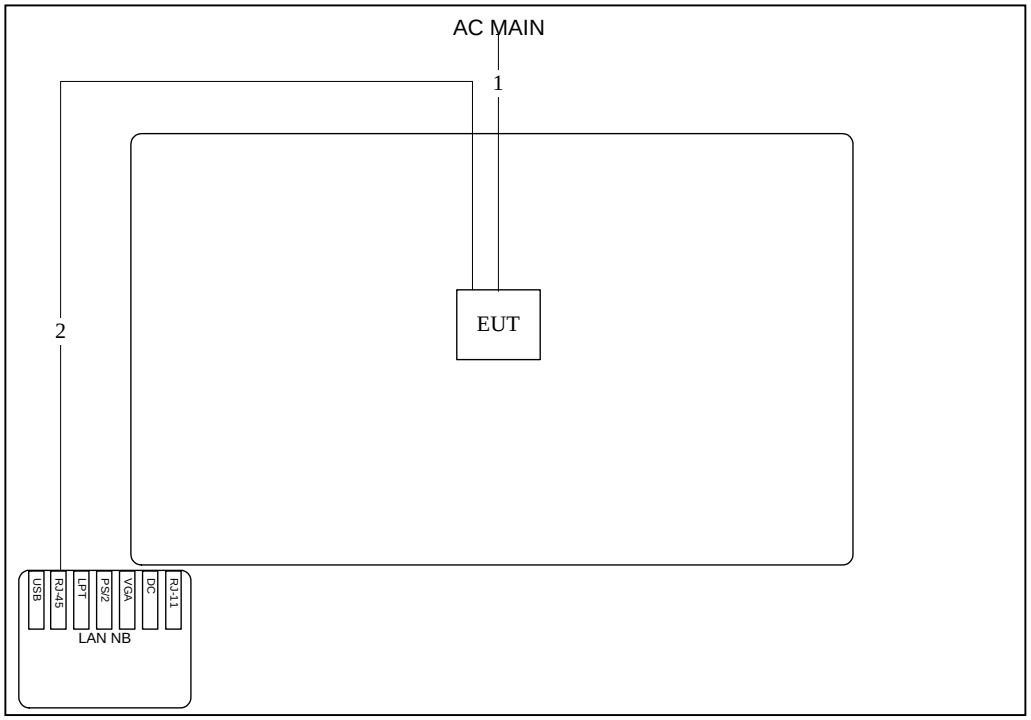
Power Parameters of IEEE 802.11ac MCS0-Nss2 VHT80

Test Software Version	Manual Toov Version 1.0.0.9
Frequency	5210 MHz
MCS0-Nss2 VHT80	46

During the test, “Manual Toov Version 1.0.0.9” under WIN XP was executed the test program to control the EUT continuously transmit RF signal.

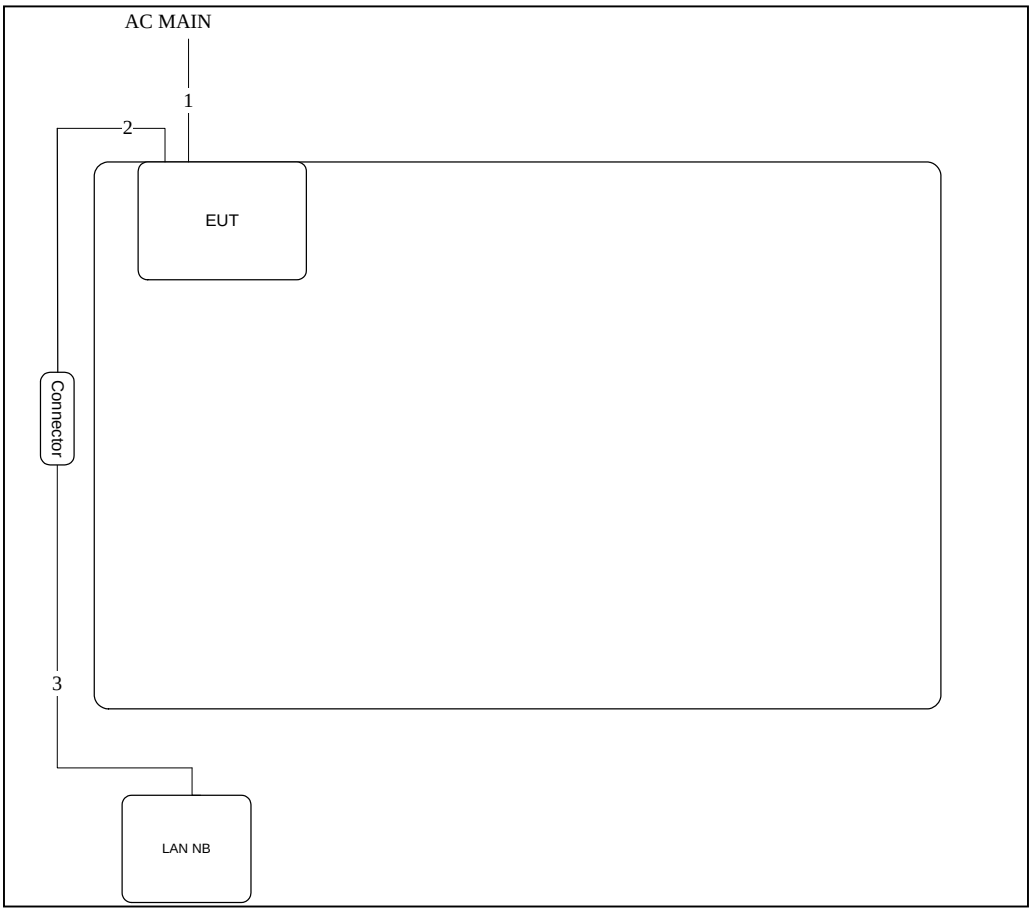
3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration



Item	Connection	Shield	Length
1	Power cable	No	1.8m
2	RJ-45 Cable	No	10m

3.9.2. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shield	Length
1	Power cable	No	1.8m
2	RJ-45 cable	Yes	1.5m
3	RJ-45 cable	Yes	10m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product that is designed to connect to the 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 below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

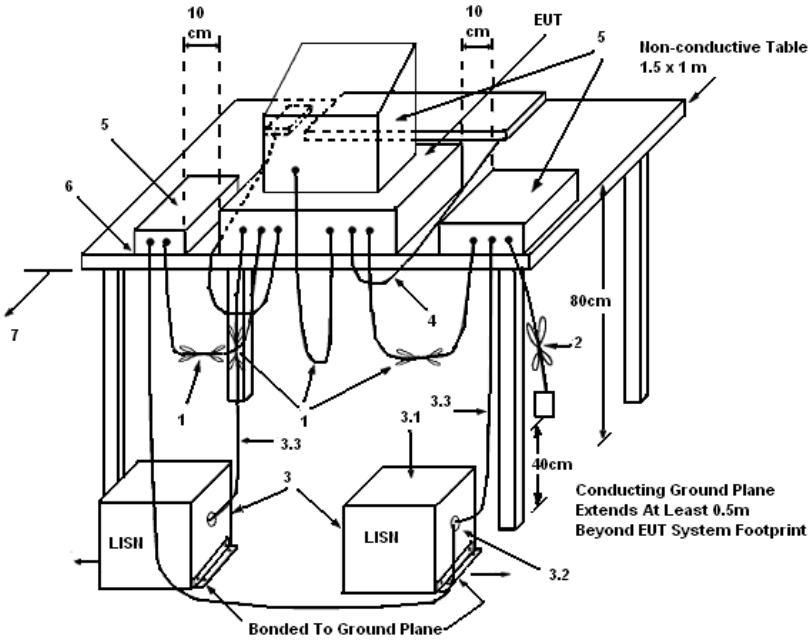
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 KHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 KHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

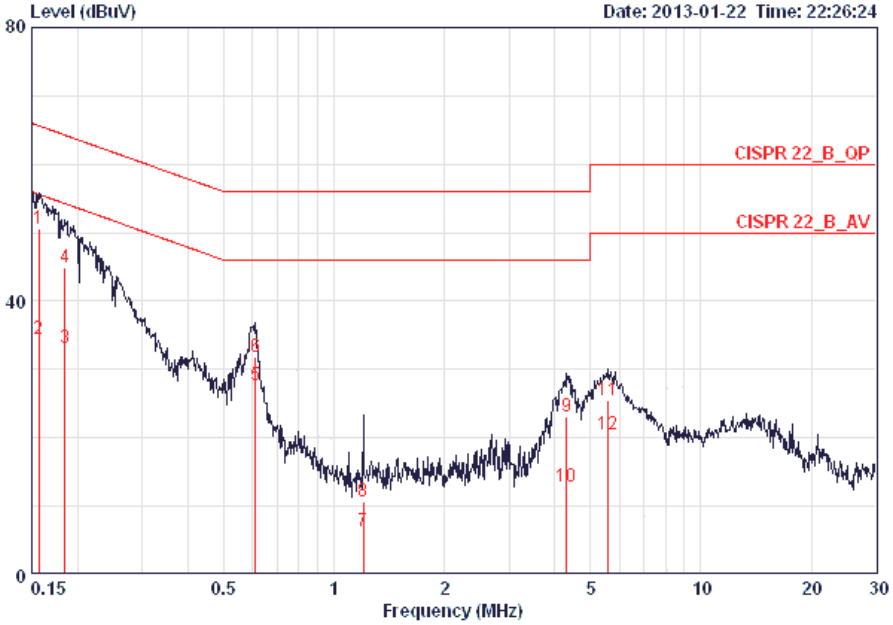
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was placed on the test table and programmed in normal function.

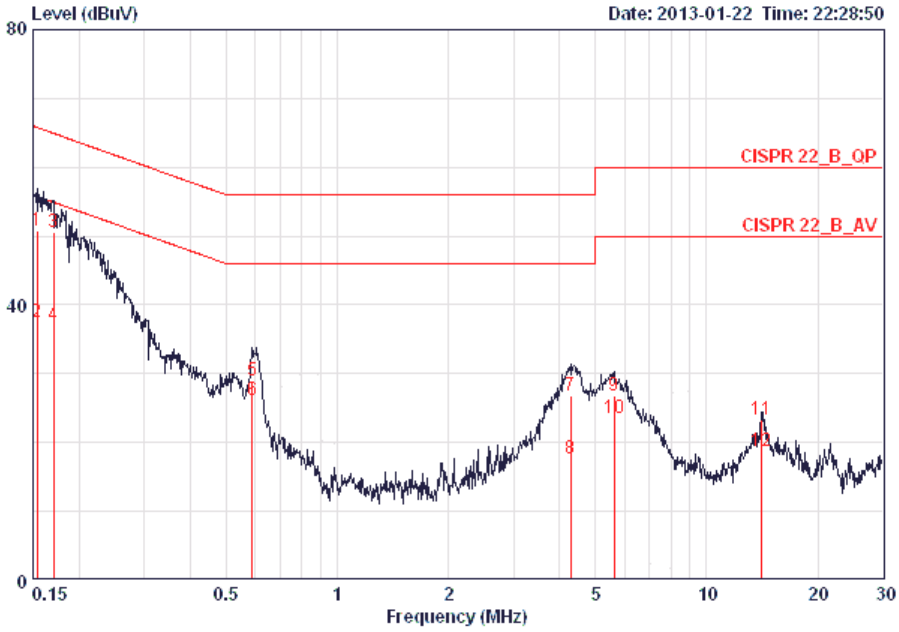
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	60%
Test Engineer	Simon Yang	Phase	Line
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.15650	50.65	-15.00	65.65	50.31	0.16	0.18	QP
2	0.15650	34.35	-21.30	55.65	34.01	0.16	0.18	AVERAGE
3	0.18443	33.03	-21.25	54.28	32.69	0.15	0.19	AVERAGE
4	0.18443	45.00	-19.28	64.28	44.66	0.15	0.19	QP
5	0.61075	27.65	-18.35	46.00	27.29	0.16	0.20	AVERAGE
6	0.61075	31.85	-24.15	56.00	31.49	0.16	0.20	QP
7	1.203	6.22	-39.78	46.00	5.84	0.17	0.21	AVERAGE
8	1.203	10.65	-45.35	56.00	10.27	0.17	0.21	QP
9	4.315	23.04	-32.96	56.00	22.51	0.23	0.31	QP
10	4.315	12.79	-33.21	46.00	12.26	0.23	0.31	AVERAGE
11	5.564	25.41	-34.59	60.00	24.83	0.25	0.33	QP
12	5.564	20.47	-29.53	50.00	19.89	0.25	0.33	AVERAGE

Temperature	24°C	Humidity	60%
Test Engineer	Simon Yang	Phase	Neutral
Configuration	CTX	Test Mode	Mode 1

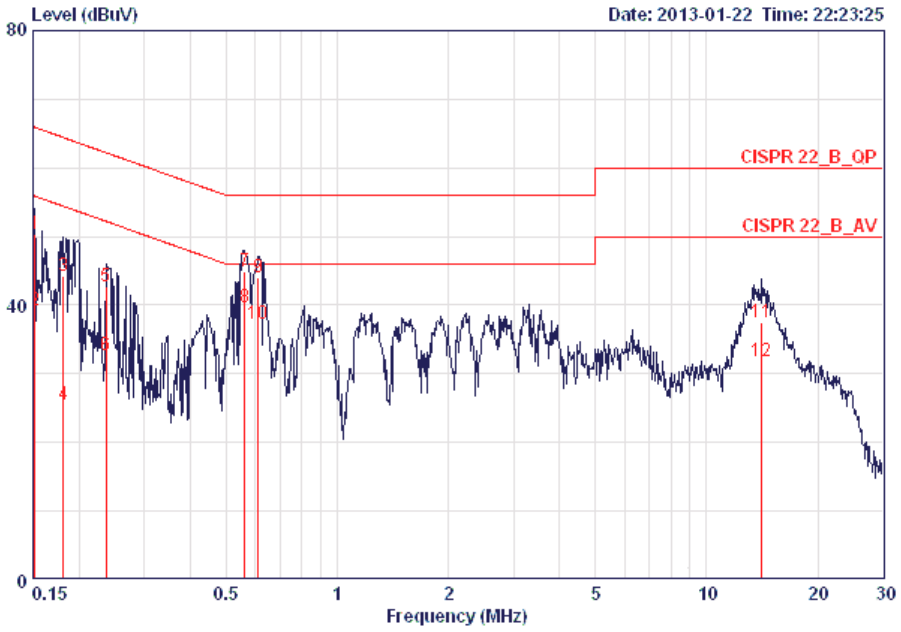


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.15403	50.69	-15.09	65.78	50.43	0.08	0.18	QP
2	0.15403	37.45	-18.33	55.78	37.19	0.08	0.18	AVERAGE
3 @	0.17034	50.47	-14.48	64.94	50.20	0.08	0.19	QP
4	0.17034	36.97	-17.98	54.94	36.70	0.08	0.19	AVERAGE
5	0.58851	29.07	-26.93	56.00	28.79	0.08	0.20	QP
6	0.58851	26.25	-19.75	46.00	25.97	0.08	0.20	AVERAGE
7	4.292	26.77	-29.23	56.00	26.33	0.14	0.31	QP
8	4.292	17.62	-28.38	46.00	17.18	0.14	0.31	AVERAGE
9	5.623	26.88	-33.12	60.00	26.39	0.16	0.33	QP
10	5.623	23.48	-26.52	50.00	22.99	0.16	0.33	AVERAGE
11	14.138	23.33	-36.67	60.00	22.63	0.30	0.40	QP
12	14.138	18.77	-31.23	50.00	18.07	0.30	0.40	AVERAGE

Note:

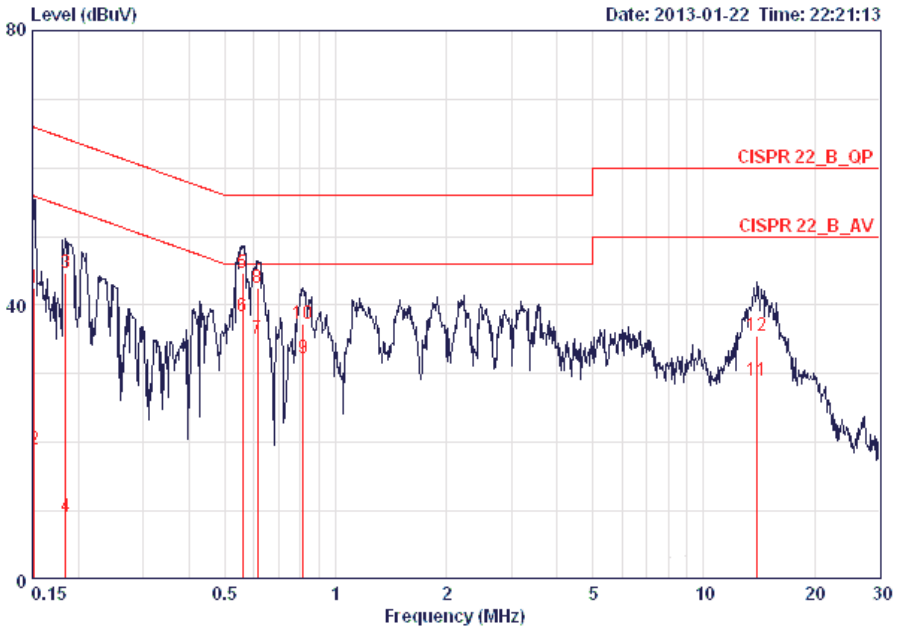
Level = Read Level + LISN Factor + Cable Loss

Temperature	24°C	Humidity	60%
Test Engineer	Simon Yang	Phase	Line
Configuration	CTX	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.15160	50.39	-15.52	65.91	50.05	0.16	0.18	QP
2 @	0.15160	39.30	-16.61	55.91	38.96	0.16	0.18	AVERAGE
3	0.18152	44.20	-20.21	64.42	43.86	0.15	0.19	QP
4	0.18152	25.60	-28.81	54.42	25.26	0.15	0.19	AVERAGE
5	0.23658	42.63	-19.59	62.22	42.28	0.15	0.20	QP
6	0.23658	32.61	-19.61	52.22	32.26	0.15	0.20	AVERAGE
7 @	0.56111	44.83	-11.18	56.00	44.47	0.16	0.20	QP
8 @	0.56111	39.62	-6.38	46.00	39.26	0.16	0.20	AVERAGE
9 @	0.61075	44.12	-11.88	56.00	43.76	0.16	0.20	QP
10 @	0.61075	37.20	-8.80	46.00	36.84	0.16	0.20	AVERAGE
11	14.138	37.58	-22.42	60.00	36.78	0.40	0.40	QP
12	14.138	31.89	-18.11	50.00	31.09	0.40	0.40	AVERAGE

Temperature	24°C	Humidity	60%
Test Engineer	Simon Yang	Phase	Neutral
Configuration	CTX	Test Mode	Mode 2



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15160	42.54	-23.37	65.91	42.28	0.08	0.18	QP
2	0.15160	19.07	-36.84	55.91	18.81	0.08	0.18	AVERAGE
3	0.18443	44.61	-19.67	64.28	44.34	0.08	0.19	QP
4	0.18443	9.22	-45.06	54.28	8.95	0.08	0.19	AVERAGE
5 @	0.55815	44.71	-11.29	56.00	44.43	0.08	0.20	QP
6 @	0.55815	38.34	-7.66	46.00	38.06	0.08	0.20	AVERAGE
7 @	0.61400	35.14	-10.86	46.00	34.86	0.08	0.20	AVERAGE
8 @	0.61400	42.47	-13.53	56.00	42.19	0.08	0.20	QP
9 @	0.81737	32.19	-13.81	46.00	31.90	0.09	0.20	AVERAGE
10	0.81737	37.38	-18.62	56.00	37.09	0.09	0.20	QP
11	13.989	28.98	-21.02	50.00	28.28	0.30	0.40	AVERAGE
12	13.989	35.61	-24.39	60.00	34.91	0.30	0.40	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. 99% Occupied Bandwidth Measurement

4.2.1. Limit

No restriction limits. But resolution bandwidth within band edge measurement is 1% of the 99% occupied bandwidth.

4.2.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RB	Approximately 1% of the emission bandwidth
VB	VBW > RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 300 kHz and the video bandwidth of 1000 kHz were used.
3. Measured the spectrum width with power higher than 26dB below carrier.

4.2.4. Test Setup Layout

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of 99% Occupied Bandwidth

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n / ac

Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.48	17.92
40	5200 MHz	20.32	17.92
48	5240 MHz	20.32	18.08

Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	38.72	36.48
46	5230 MHz	39.04	36.16

Configuration IEEE 802.11ac MCS0-Nss2 VHT 20 / Ant 3 + Ant 4

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.32	17.92
40	5200 MHz	20.32	18.08
48	5240 MHz	20.48	17.92

Configuration IEEE 802.11ac MCS0-Nss2 VHT 40 / Ant 3 + Ant 4

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	39.04	36.48
46	5230 MHz	39.36	36.48

Configuration IEEE 802.11ac MCS0-Nss2 VHT80 / Ant 3 + Ant 4

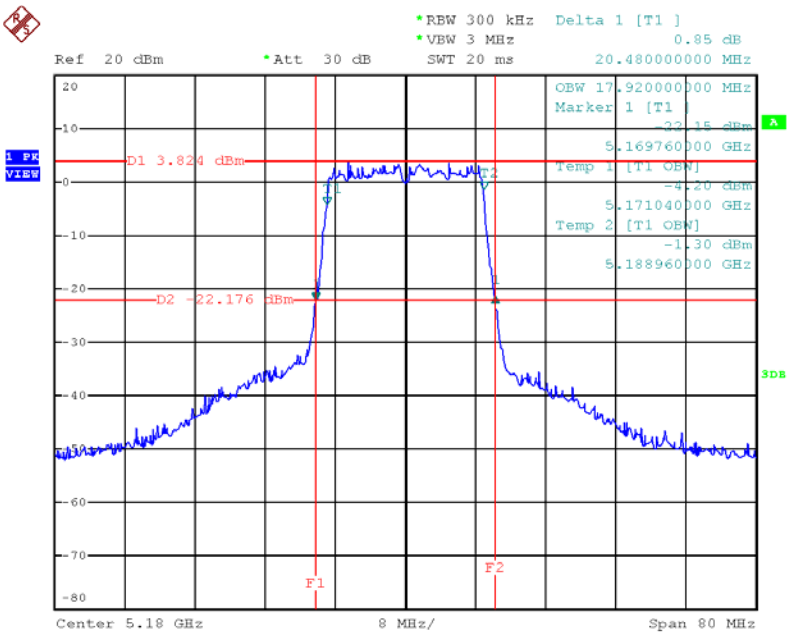
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
42	5210 MHz	80.00	76.16

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a

Configuration IEEE 802.11a / Ant 3

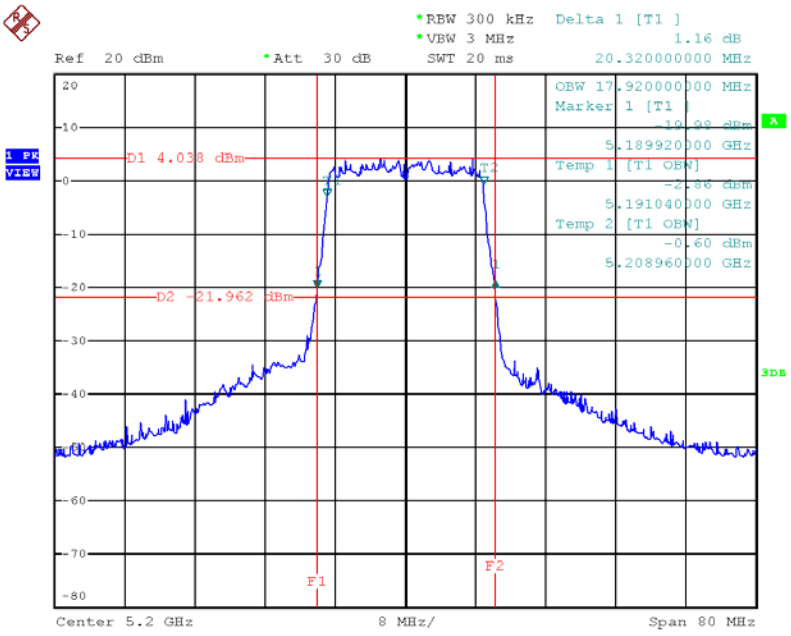
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.48	16.96
40	5200 MHz	20.48	17.12
48	5240 MHz	20.32	17.12

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4 / 5180 MHz



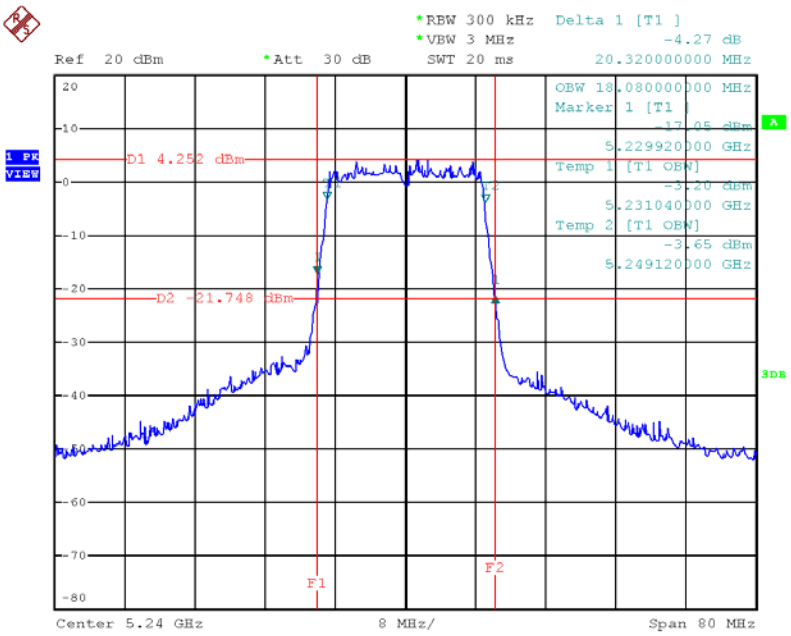
Date: 26.JAN.2013 13:04:36

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4 / 5200 MHz



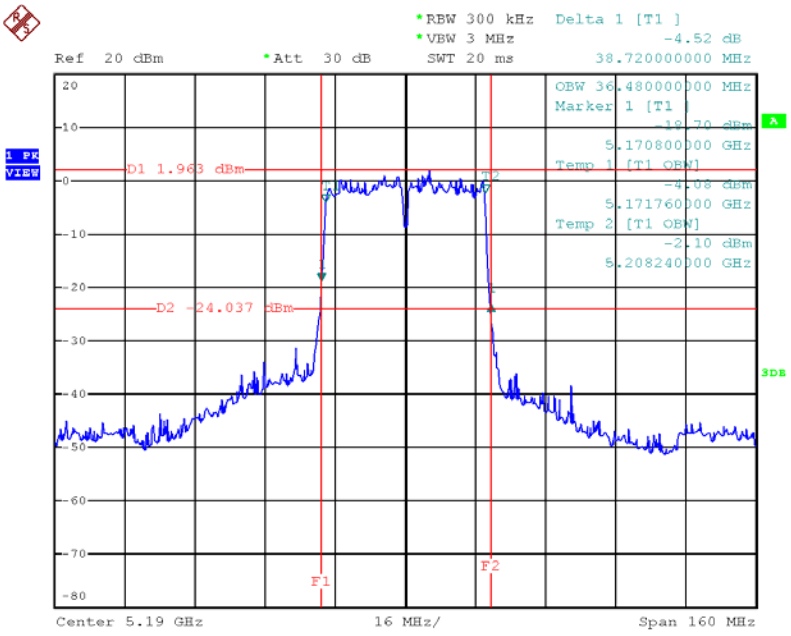
Date: 26.JAN.2013 13:04:00

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4 / 5240 MHz



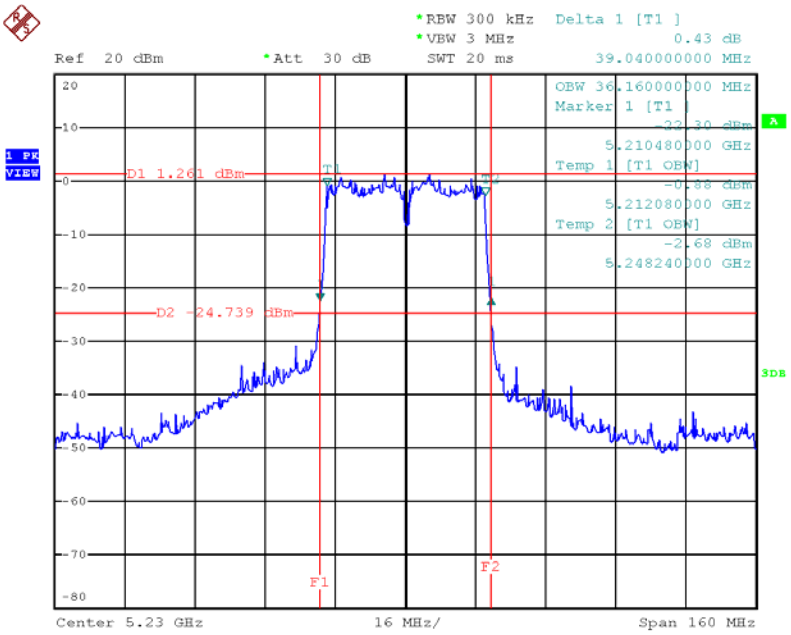
Date: 26.JAN.2013 13:02:15

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4 / 5190 MHz



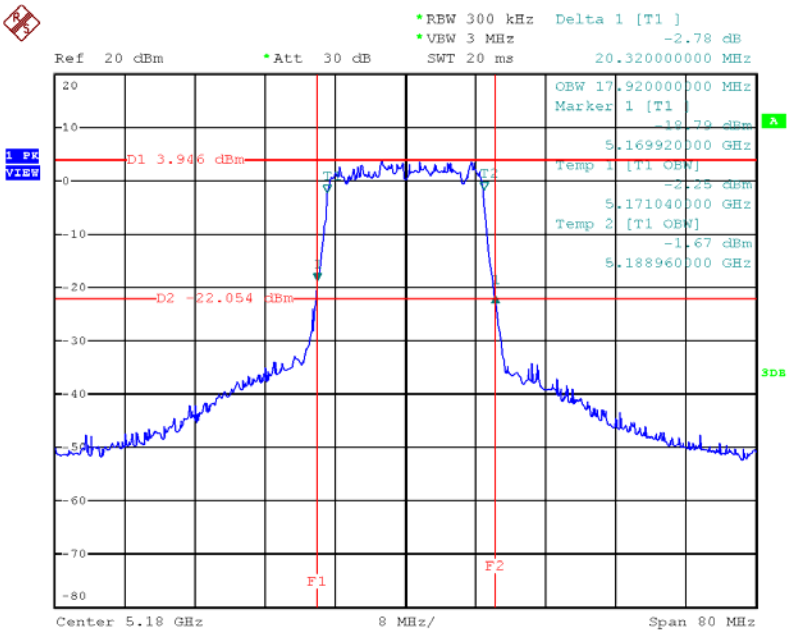
Date: 26.JAN.2013 13:06:15

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4 / 5230 MHz



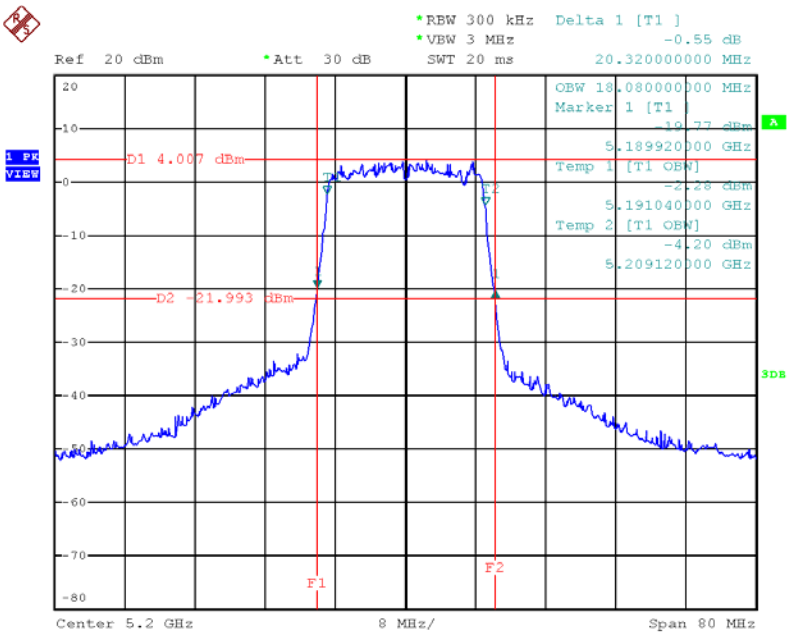
Date: 26.JAN.2013 13:07:02

26 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT20 / Ant 3 + Ant 4 / 5180 MHz



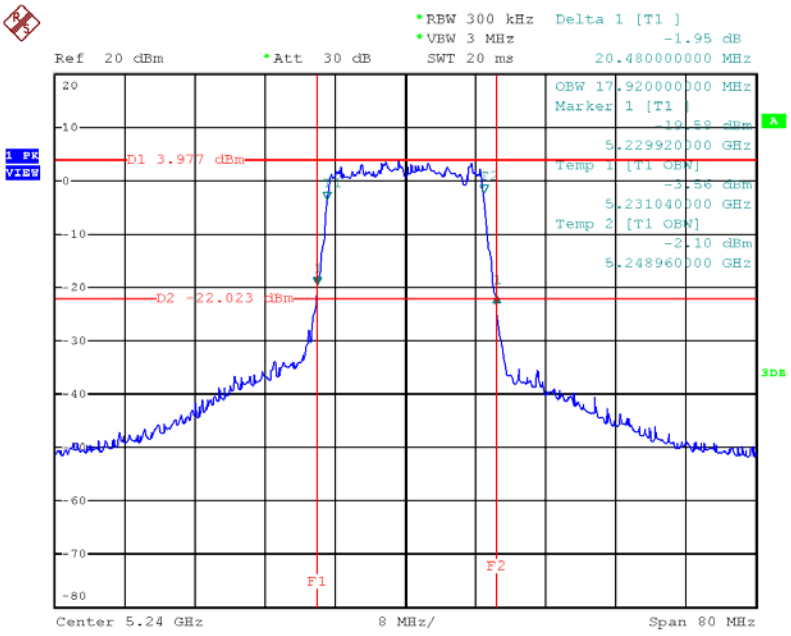
Date: 26.JAN.2013 13:10:42

26 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT20 / Ant 3 + Ant 4 / 5200 MHz



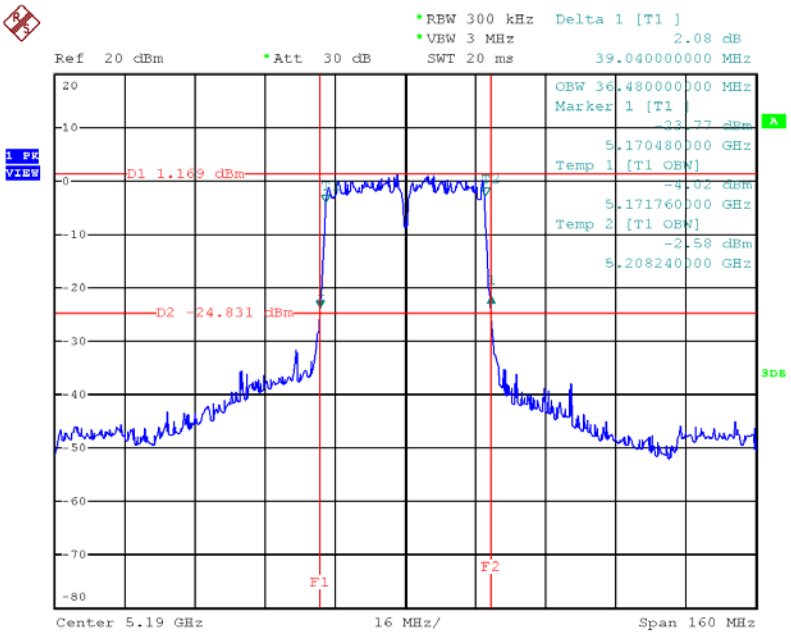
Date: 26.JAN.2013 13:11:17

26 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT20 / Ant 3 + Ant 4 / 5240 MHz



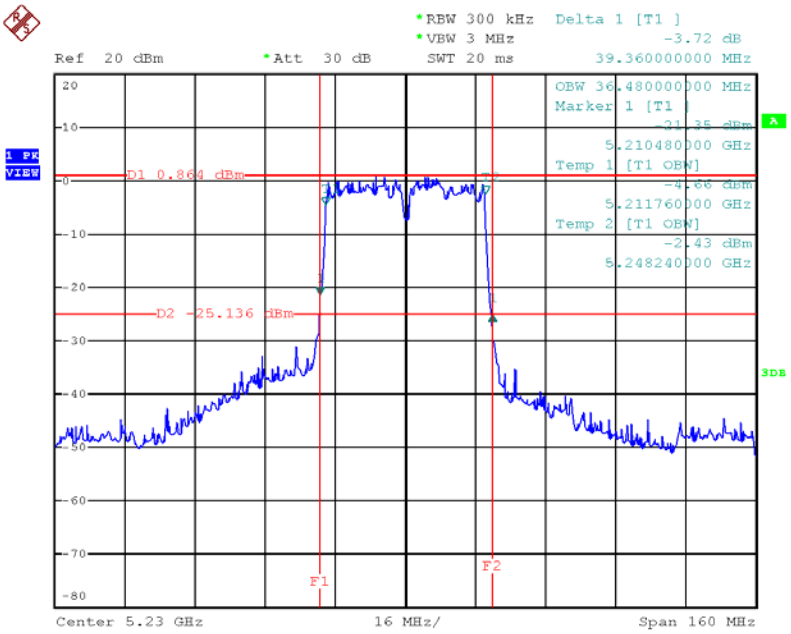
Date: 26.JAN.2013 13:12:49

26 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT40 / Ant 3 + Ant 4 / 5190 MHz



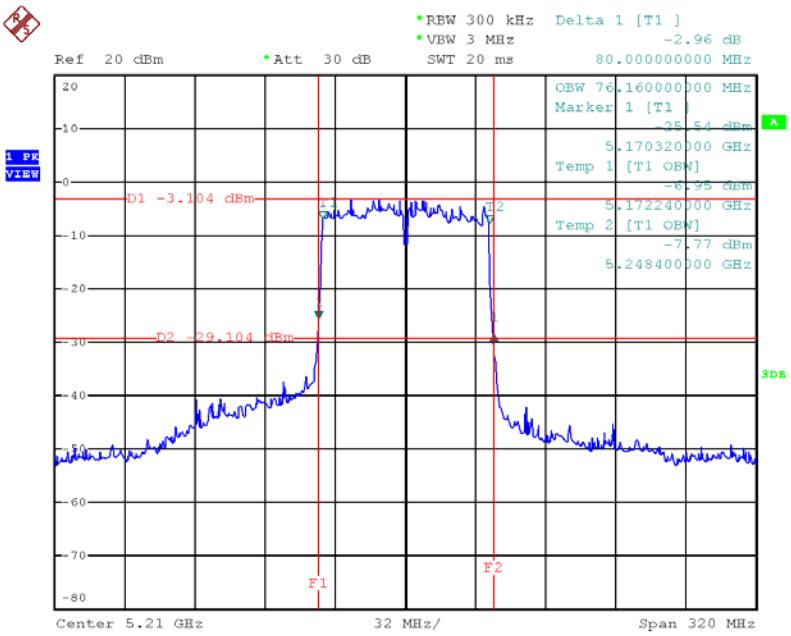
Date: 26.JAN.2013 13:09:10

26 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT40 / Ant 3 + Ant 4 / 5230 MHz



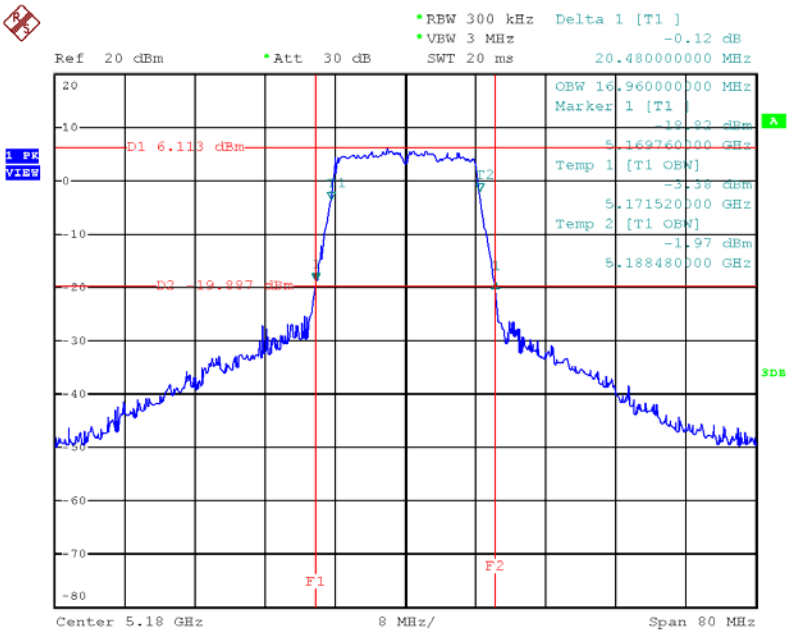
Date: 26.JAN.2013 13:08:26

26 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT80 / Ant 3 + Ant 4 / 5210 MHz



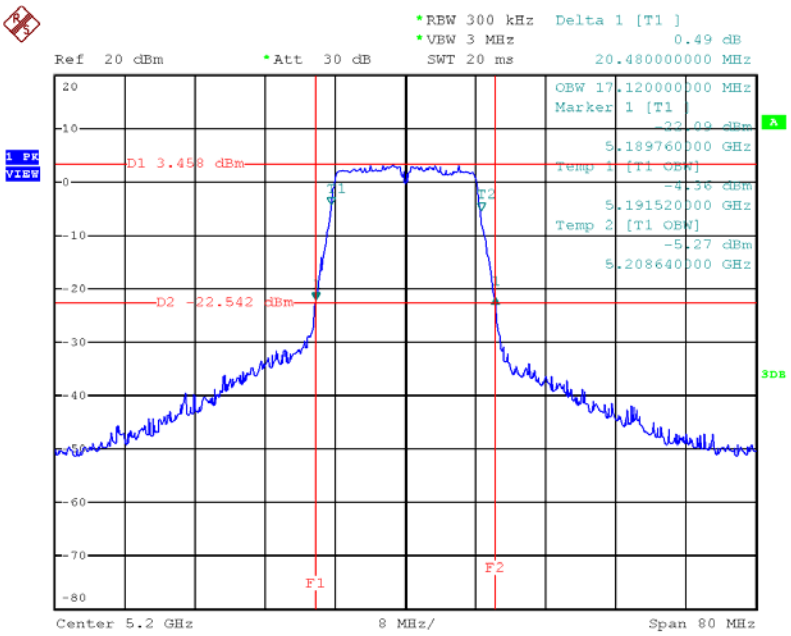
Date: 26.JAN.2013 13:31:22

26 dB Bandwidth Plot on Configuration IEEE 802.11a / Ant 3 / 5180 MHz



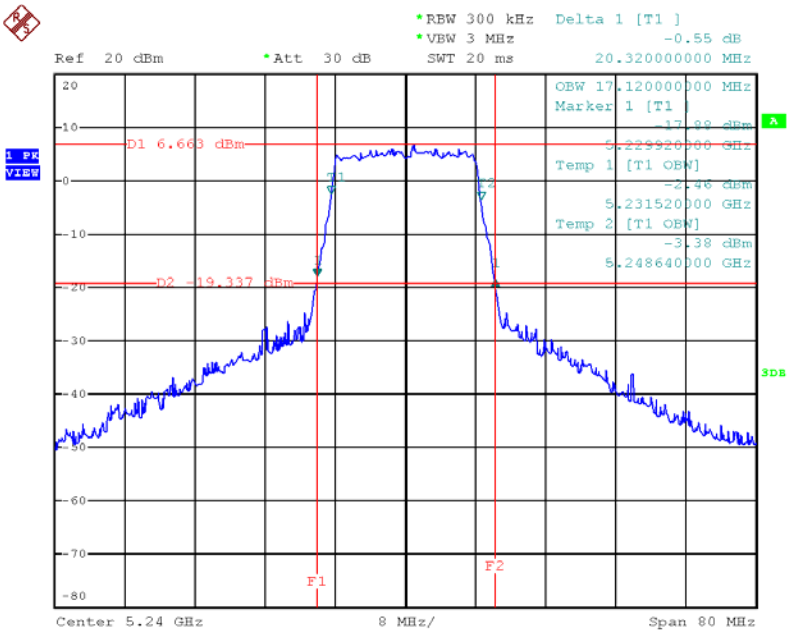
Date: 26.JAN.2013 12:57:50

26 dB Bandwidth Plot on Configuration IEEE 802.11a / Ant 3 / 5200 MHz



Date: 26.JAN.2013 12:58:46

26 dB Bandwidth Plot on Configuration IEEE 802.11a / Ant 3 / 5240 MHz



Date: 26.JAN.2013 12:59:29

4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

For the band 5.15~5.25 GHz, 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, where B is the 26 dB emissions bandwidth in MHz. If transmitting antennas of directional gain greater than 6 dBi are used, 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.

4.3.2. Measuring Instruments and Setting

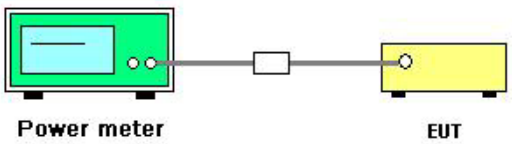
The following table is the setting of the peak power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB 789033 Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - Part 15, Subpart E,section (C) Maximum conducted output power =>(4) Method PM (Measurement using an RF average power meter) Multiple antenna systems was performed in accordance with KDB 662911 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
3. When measuring maximum conducted output power with multiple antenna systems,add every result of the values by mathematic formula.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Maximum Conducted Output Power

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n / ac
Test Date	Jan. 26, 2013		

Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Ant 3	Ant 4			
36	5180 MHz	13.7	14	16.86	17.00	Complies
40	5200 MHz	13.99	13.85	16.93	17.00	Complies
48	5240 MHz	13.95	13.83	16.90	17.00	Complies

Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Ant 3	Ant 4			
38	5190 MHz	13.99	13.79	16.90	17.00	Complies
46	5230 MHz	13.83	13.91	16.88	17.00	Complies

Configuration IEEE 802.11ac MCS0-Nss2 VHT20 / Ant 3 + Ant 4

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Ant 3	Ant 4			
36	5180 MHz	13.83	13.95	16.90	17.00	Complies
40	5200 MHz	13.87	13.86	16.88	17.00	Complies
48	5240 MHz	13.84	13.83	16.85	17.00	Complies

Configuration IEEE 802.11ac MCS0-Nss2 VHT40 / Ant 3 + Ant 4

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Ant 3	Ant 4			
38	5190 MHz	13.42	13.61	16.53	17.00	Complies
46	5230 MHz	13.8	13.79	16.81	17.00	Complies

Configuration IEEE 802.11ac MCS0-Nss2 VHT80 / Ant 3 + Ant 4

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Ant 3	Ant 4			
42	5210 MHz	11.88	12.03	14.97	17.00	Complies

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a
Test Date	Jan. 26, 2013		

Configuration IEEE 802.11a / Ant 3

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
36	5180 MHz	16.74	17.00	Complies
40	5200 MHz	16.64	17.00	Complies
48	5240 MHz	16.76	17.00	Complies

4.4. Power Spectral Density Measurement

4.4.1. Limit

The power spectral density is defined as the highest level of power in dBm per MHz generated by the transmitter within the power envelope. The following table is power spectral density limits and decrease power density limit rule refer to section 4.3.1.

Frequency Range	Power Spectral Density limit (dBm/MHz)
5.15~5.25 GHz	4

4.4.2. Measuring Instruments and Setting

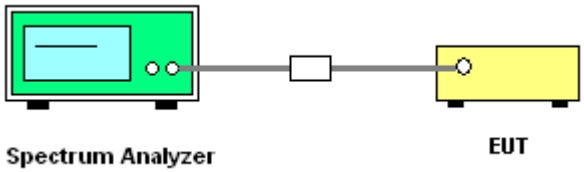
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1000 kHz
VB	3000 kHz
Detector	RMS
Trace	AVERAGE
Sweep Time	Auto
Trace Average	100 times

4.4.3. Test Procedures

1. Trace A, Set RBW =1MHz, VBW = 3MHz, Span >26dB bandwidth, Max. hold.
2. Delta Mark trace A Maximum frequency and trace B same frequency.
3. Repeat the above procedure until measurements for all frequencies were complete.
4. Procedures refer KDB 662911: Measure and sum the spectra across the outputs.
   The first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the Nth output to obtain the value for the first frequency bin of the summed spectrum. The summed spectrum value for each of the other frequency bins is computed in the same way. This will likely require transferring the measured spectra to a computer, where the bin-by-bin summing can be performed.

4.4.4. Test Setup Layout



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of Power Spectral Density

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n / ac
Test Date	Jan. 26, 2013		

Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	3.68	4.00	Complies
40	5200 MHz	3.54	4.00	Complies
48	5240 MHz	3.57	4.00	Complies

Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	0.33	4.00	Complies
46	5230 MHz	0.24	4.00	Complies

Configuration IEEE 802.11ac MCS0-Nss2 VHT 80 / Ant 3 + Ant 4

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
42	5210 MHz	-4.7	4.00	Complies

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a
Test Date	Jan. 26, 2013		

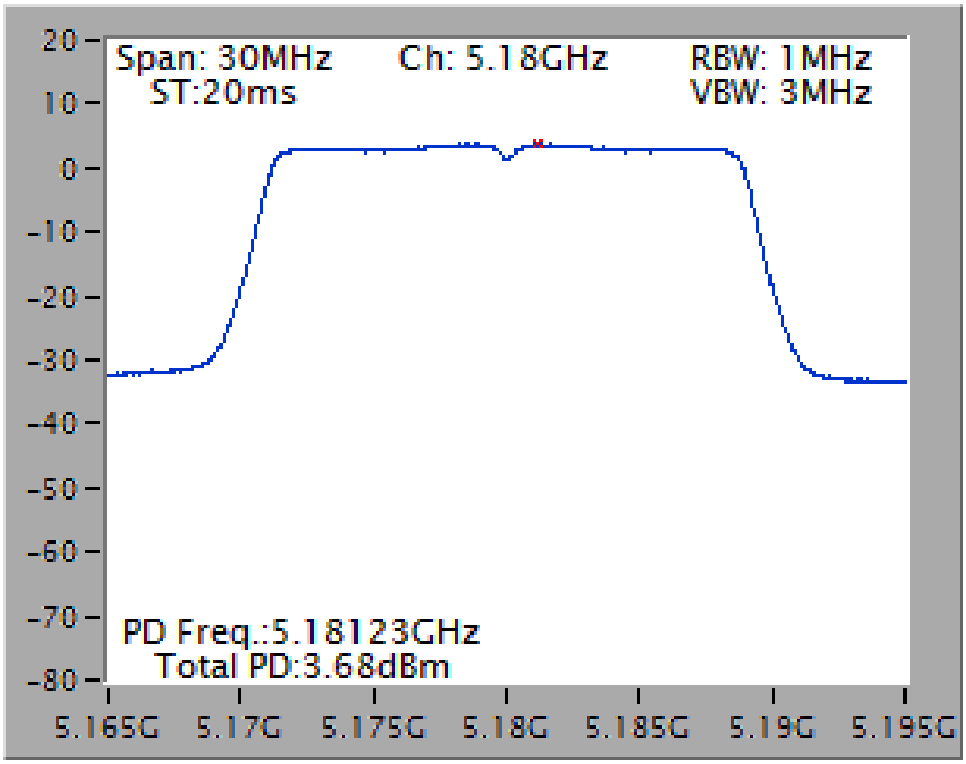
Configuration IEEE 802.11a / Ant 3

Channel	Frequency	Total Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	3.28	4.00	Complies
40	5200 MHz	3.46	4.00	Complies
48	5240 MHz	3.51	4.00	Complies

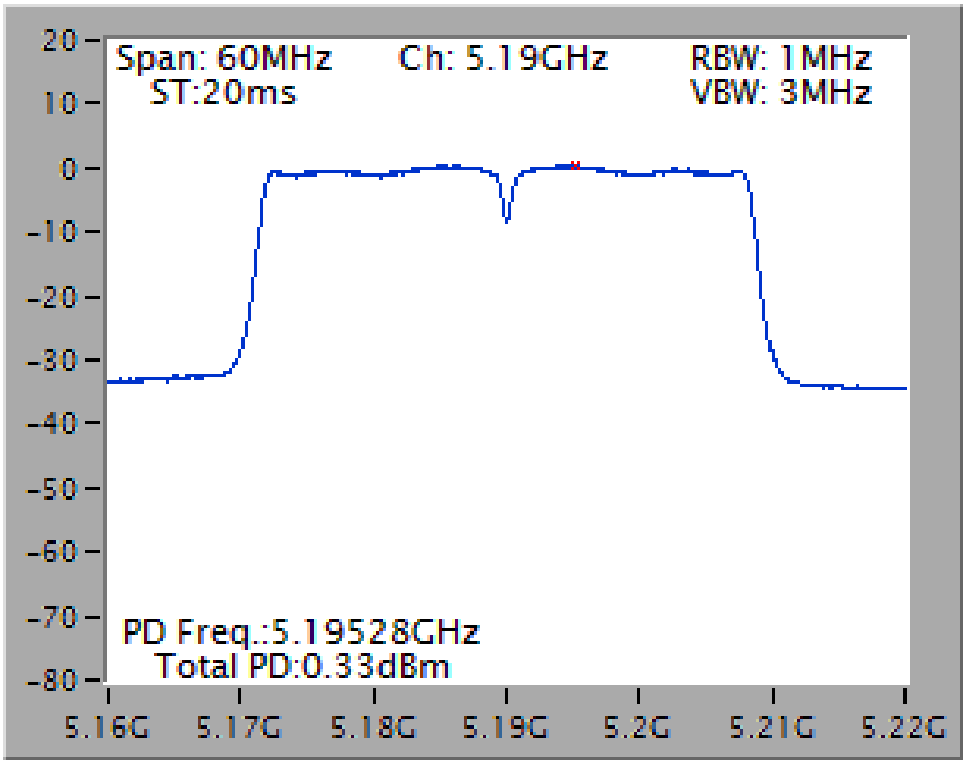
Note: All the test values were listed in the report.

For plots, only the channel with maximum results was shown.

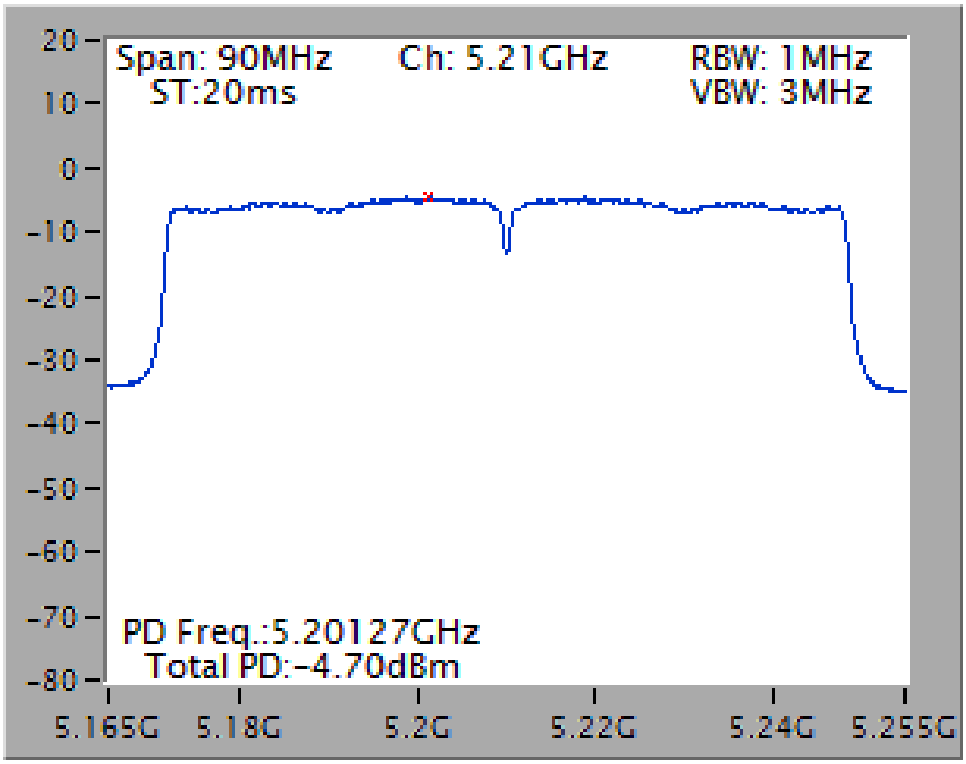
Power Density Plot on Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4 / 5180 MHz



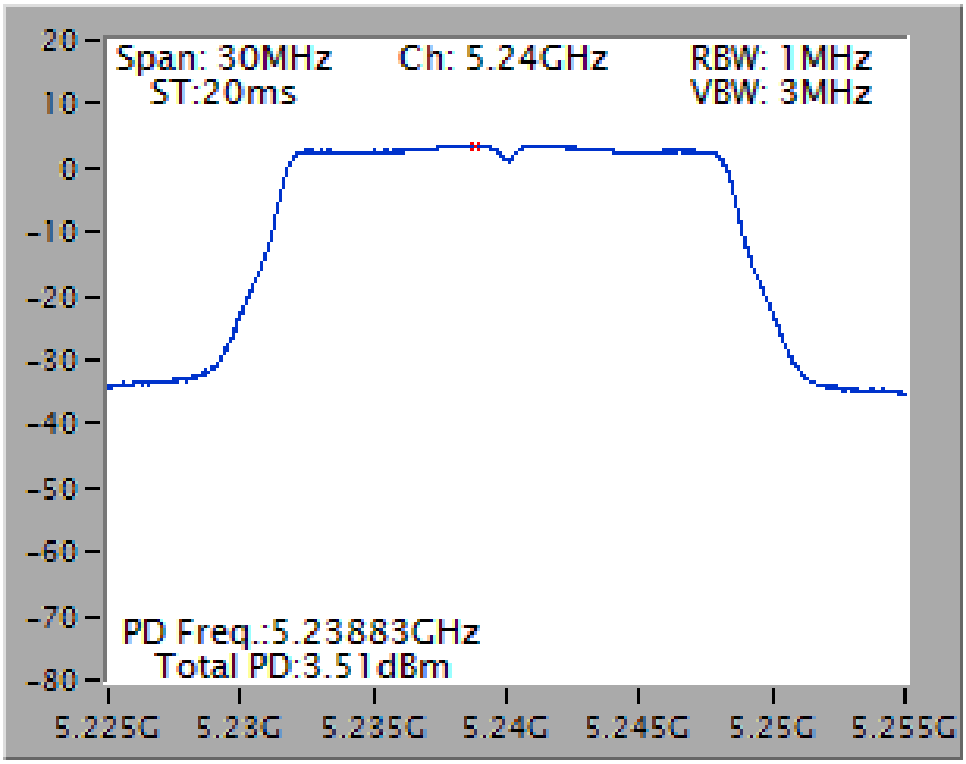
Power Density Plot on Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4 / 5190 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT 80 / Ant 3 + Ant 4 / 5210 MHz



Power Density Plot on Configuration IEEE 802.11a / Ant 3 / 5240 MHz



4.5. Peak Excursion Measurement

4.5.1. Limit

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 emissions bandwidth whichever is less.

4.5.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RB	1MHz (Peak Trace) / 1MHz (Average Trace)
VB	3MHz (Peak Trace) / 3MHz (Average Trace)
Detector	Peak (Peak Trace) / RMS (Average Trace)
Trace	Peak : Trace :Max hold/Average: Trace Average Sweep Count 100
Sweep Time	AUTO

4.5.3. Test Procedures

1. The test procedure is the same as section 4.6.3.
2. Trace A, Set RBW =1MHz, VBW = 3MHz, Span >26dB bandwidth, Max. hold.
3. Delta Mark trace A Maximum frequency and trace B same frequency.
4. Repeat the above procedure until measurements for all frequencies were complete.

4.5.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Peak Excursion

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n / ac

Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
40	5200 MHz	9.81	13	Complies

Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
38	5190 MHz	9.72	13	Complies

Configuration IEEE 802.11ac MCS0-Nss2 VHT80 / Ant 3 + Ant 4

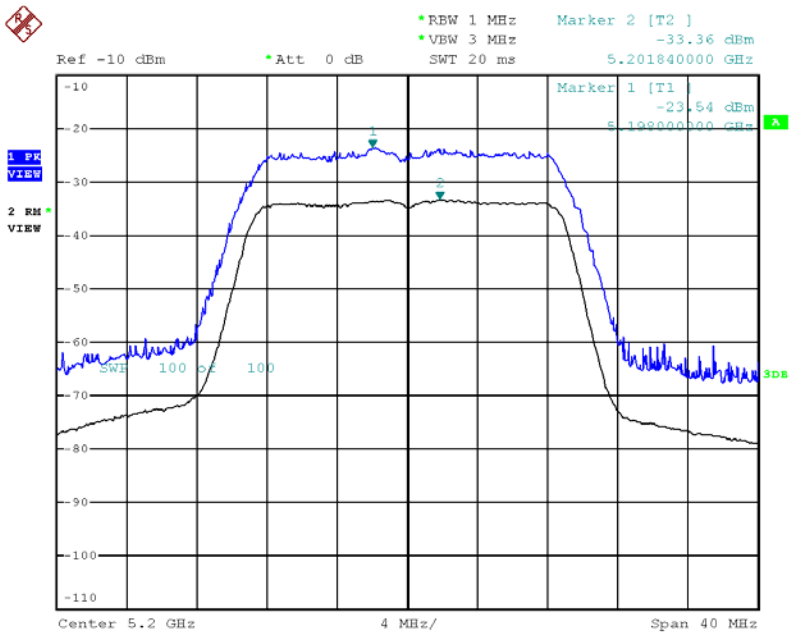
Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
42	5210 MHz	9.60	13	Complies

Temperature	26°C	Humidity	60%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a

Configuration IEEE 802.11a / Ant 3

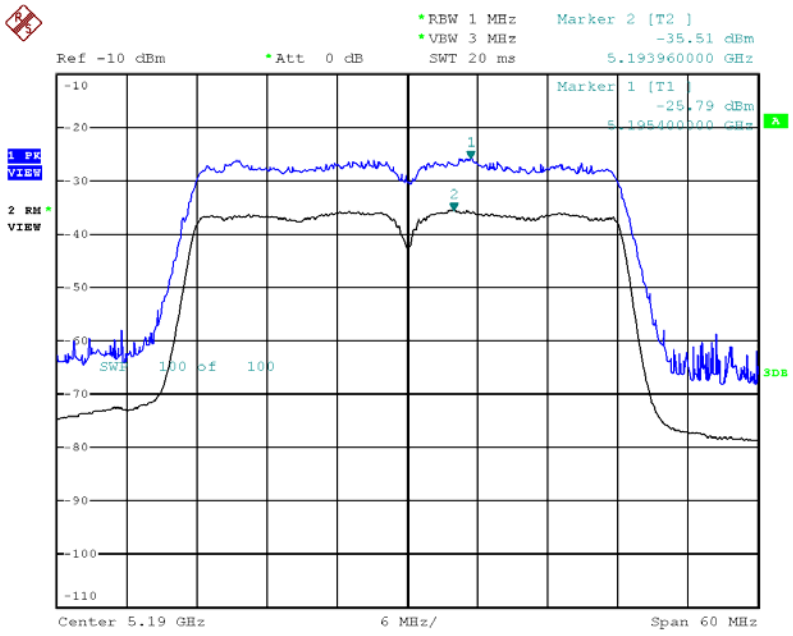
Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
48	5240 MHz	8.55	13	Complies

Peak Excursion Plot on Configuration IEEE 802.11n MCS8 HT20 / Ant 3 + Ant 4 / 5200MHz



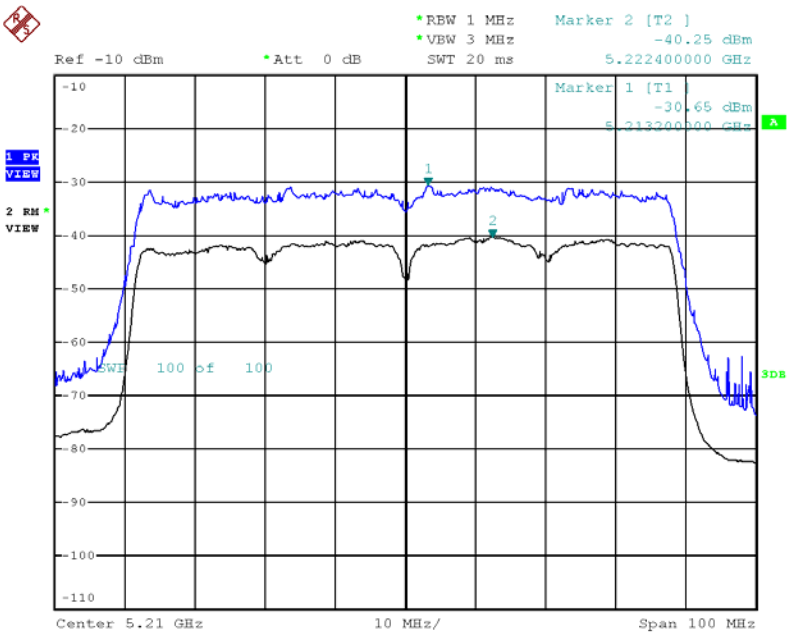
Date: 26.JAN.2013 13:21:41

Peak Excursion Plot on Configuration IEEE 802.11n MCS8 HT40 / Ant 3 + Ant 4 / 5190MHz



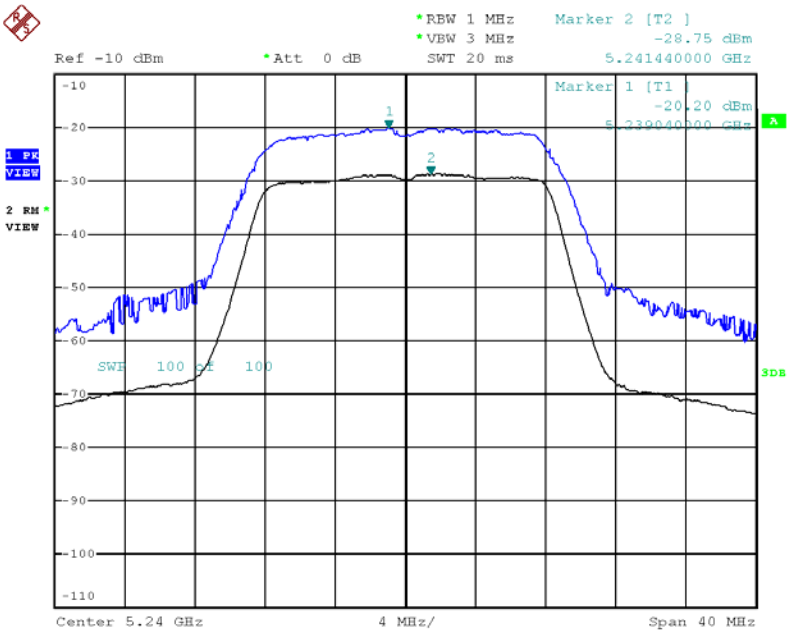
Date: 26.JAN.2013 13:23:42

Peak Excursion Plot on Configuration IEEE 802.11ac MCS0-Nss2 VHT80 / Ant 3+ Ant 4 / 5210MHz



Date: 26.JAN.2013 13:26:06

Peak Excursion Plot on Configuration IEEE 802.11a / Ant 3 / 5240MHz



Date: 26.JAN.2013 13:19:04

4.6. Radiated Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). For transmitters operating in the In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

4.6.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	40 GHz
RB / VB (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 3MHz for peak

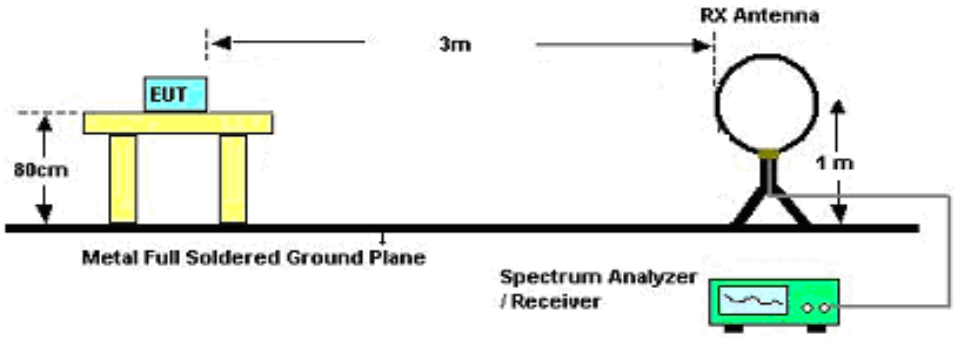
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.6.3. Test Procedures

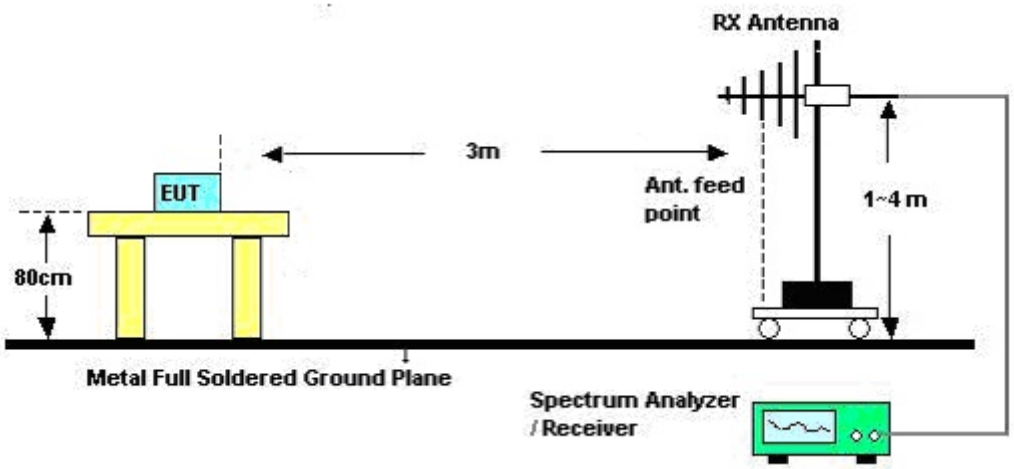
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. When the radiated emissions limits are expressed in terms of the average value of the emissions, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds. As an alternative (provided the transmitter operates for longer than 0.1 seconds) or in cases where the pulse train exceeds 0.1 seconds, the measured field strength shall be determined from the average absolute voltage during a 0.1 second interval during which the field strength is at its maximum value.
8. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
9. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
10. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.6.4. Test Setup Layout

For radiated emissions below 1GHz



For radiated emissions above 1GHz



4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.6.7. Results of Radiated Emissions (9kHz~30MHz)

Temperature	20°C	Humidity	63%
Test Engineer	Serway Li	Configurations	CTX
Test Date	Jan. 27, 2013	Test Mode	Mode 1

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

Note:

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

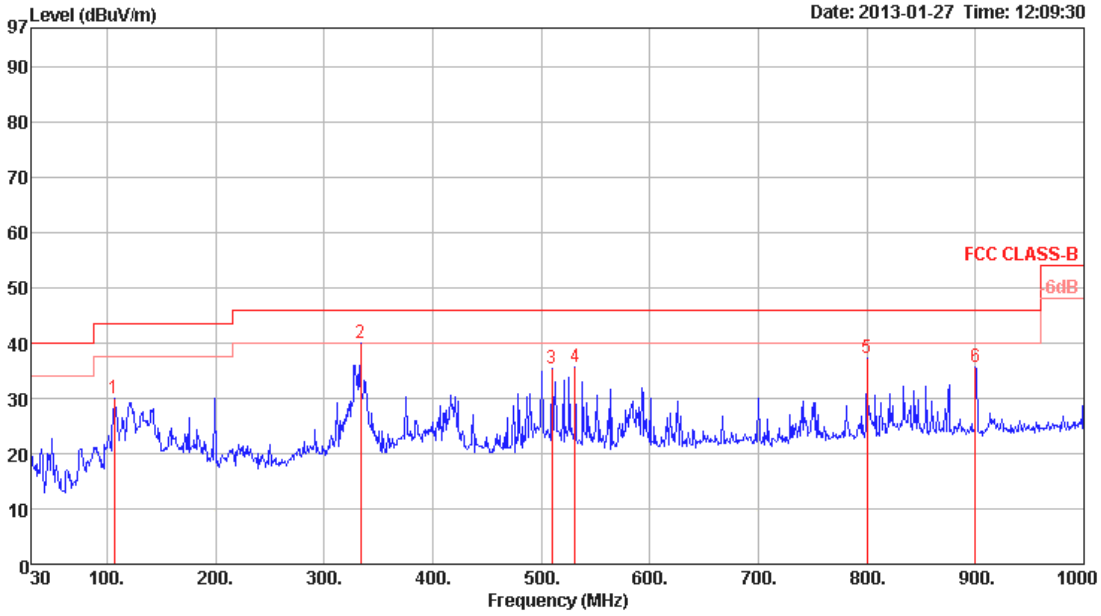
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

4.6.8. Results of Radiated Emissions (30MHz~1GHz)

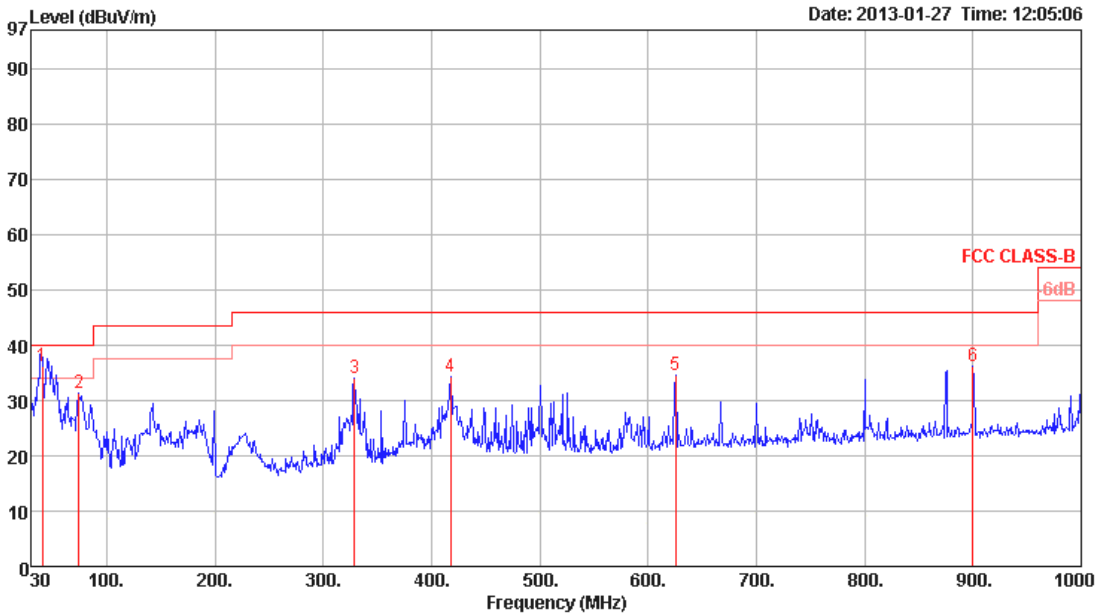
Temperature	20°C	Humidity	63%
Test Engineer	Serway Li	Configurations	CTX
Test Mode	Mode 1		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	106.63	29.86	43.50	-13.64	44.73	1.20	11.50	27.57	Peak	100	0	HORIZONTAL
2	333.61	40.07	46.00	-5.93	50.75	2.17	14.28	27.13	Peak	100	0	HORIZONTAL
3	510.15	35.31	46.00	-10.69	42.95	2.72	17.74	28.10	Peak	100	0	HORIZONTAL
4	531.49	35.72	46.00	-10.28	43.08	2.76	17.98	28.10	Peak	100	0	HORIZONTAL
5	800.18	37.35	46.00	-8.65	41.88	3.30	19.77	27.60	Peak	100	0	HORIZONTAL
6	900.09	35.67	46.00	-10.33	38.94	3.60	20.53	27.40	Peak	100	0	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	40.35	36.15	40.00	-3.85	50.70	0.70	12.55	27.80	QP	100	111	VERTICAL
2	74.62	31.27	40.00	-8.73	51.19	0.90	6.88	27.70	Peak	400	0	VERTICAL
3	328.76	33.94	46.00	-12.06	44.73	2.16	14.15	27.10	Peak	400	0	VERTICAL
4	418.00	34.38	46.00	-11.62	43.31	2.41	16.35	27.69	Peak	400	0	VERTICAL
5	625.58	34.62	46.00	-11.38	40.79	3.05	18.85	28.07	Peak	400	0	VERTICAL
6	900.09	36.33	46.00	-9.67	39.60	3.60	20.53	27.40	Peak	400	0	VERTICAL

Note:

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.6.9. Results for Radiated Emissions (1GHz~40GHz)

Temperature	20°C	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 Ch 36 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15539.85	44.74	54.00	-9.26	33.19	7.85	34.79	38.49	Average	109	100	HORIZONTAL
2	p 15540.05	57.16	74.00	-16.84	45.61	7.85	34.79	38.49	Peak	109	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15539.67	46.53	54.00	-7.47	34.98	7.85	34.79	38.49	Average	273	100	VERTICAL
2	p 15539.78	60.68	74.00	-13.32	49.13	7.85	34.79	38.49	Peak	273	100	VERTICAL

Temperature	20°C	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 Ch 40 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15599.50	44.00	54.00	-10.00	32.50	7.88	34.86	38.48	Average	110	100	HORIZONTAL
2	p 15599.99	57.06	74.00	-16.94	45.56	7.88	34.86	38.48	Peak	110	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15599.50	45.48	54.00	-8.52	33.98	7.88	34.86	38.48	Average	297	100	VERTICAL
2	p 15600.13	58.89	74.00	-15.11	47.39	7.88	34.86	38.48	Peak	297	100	VERTICAL

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 Ch 48 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	p 15719.63	56.40	74.00	-17.60	44.96	7.92	34.94	38.46	Peak	178	100	HORIZONTAL
2	a 15720.33	43.79	54.00	-10.21	32.35	7.92	34.94	38.46	Average	178	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15719.89	44.33	54.00	-9.67	32.89	7.92	34.94	38.46	Average	298	100	VERTICAL
2	p 15720.22	57.51	74.00	-16.49	46.07	7.92	34.94	38.46	Peak	298	100	VERTICAL

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 Ch 38 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15569.52	41.92	54.00	-12.08	30.38	7.86	34.81	38.49	Average	93	100	HORIZONTAL
2	p 15570.22	55.12	74.00	-18.88	43.58	7.86	34.81	38.49	Peak	93	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	p 15569.63	54.21	74.00	-19.79	42.67	7.86	34.81	38.49	Peak	181	100	VERTICAL
2	a 15569.85	42.66	54.00	-11.34	31.12	7.86	34.81	38.49	Average	181	100	VERTICAL

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 Ch 46 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	p 15689.70	55.89	74.00	-18.11	44.45	7.90	34.92	38.46	Peak	273	100	HORIZONTAL
2	a 15690.05	42.60	54.00	-11.40	31.16	7.90	34.92	38.46	Average	273	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15689.92	43.14	54.00	-10.86	31.70	7.90	34.92	38.46	Average	135	100	VERTICAL
2	p 15690.42	55.48	74.00	-18.52	44.04	7.90	34.92	38.46	Peak	135	100	VERTICAL

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11ac MCS0-Nss2 VHT80 Ch 42 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15630.08	42.14	54.00	-11.86	30.66	7.89	34.88	38.47	Average	190	100	HORIZONTAL
2	p 15630.48	55.85	74.00	-18.15	44.37	7.89	34.88	38.47	Peak	190	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	p 15630.43	58.38	74.00	-15.62	46.90	7.89	34.88	38.47	Peak	163	100	VERTICAL
2	a 15630.95	43.95	54.00	-10.05	32.47	7.89	34.88	38.47	Average	163	100	VERTICAL

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11a Ch 36 / Ant 3
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 p	15539.91	54.62	74.00	-19.38	43.07	7.85	34.79	38.49	Peak	154	100	HORIZONTAL
2 a	15539.91	41.27	54.00	-12.73	29.72	7.85	34.79	38.49	Average	154	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	15540.11	43.29	54.00	-10.71	31.74	7.85	34.79	38.49	Average	234	100	VERTICAL
2 p	15540.17	56.16	74.00	-17.84	44.61	7.85	34.79	38.49	Peak	234	100	VERTICAL

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11a Ch 40 / Ant 3
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	15600.00	42.72	54.00	-11.28	31.22	7.88	34.86	38.48	Average	193	100	HORIZONTAL
2 p	15600.08	54.91	74.00	-19.09	43.41	7.88	34.86	38.48	Peak	193	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1 a	15599.88	43.78	54.00	-10.22	32.28	7.88	34.86	38.48	Average	284	100	VERTICAL
2 p	15599.94	56.51	74.00	-17.49	45.01	7.88	34.86	38.48	Peak	284	100	VERTICAL

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11a Ch 48 / Ant 3
Test Date	Jan. 27, 2013	Test Mode	Mode 1

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	p 15720.29	55.25	74.00	-18.75	43.81	7.92	34.94	38.46	Peak	169	100	HORIZONTAL
2	a 15720.35	43.29	54.00	-10.71	31.85	7.92	34.94	38.46	Average	169	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	a 15719.93	44.84	54.00	-9.16	33.40	7.92	34.94	38.46	Average	50	109	VERTICAL
2	p 15720.03	58.01	74.00	-15.99	46.57	7.92	34.94	38.46	Peak	50	109	VERTICAL

Note:

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

Emission level (dBuV/m) = 20 log Emission level (uV/m).

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

4.7. Band Edge Emissions Measurement

4.7.1. Limit

For transmitters operating in the 5.15-5.35 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz (68.3dBuV/m at 3m). In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/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

4.7.2. Measuring Instruments and Setting

Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RB / VB (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 3MHz for peak

4.7.3. Test Procedures

1. The test procedure is the same as section 4.6.3, only the frequency range investigated is limited to 100MHz around bandedges.
2. In case the emission is fail due to the used RB/VB is too wide, marker-delta method of FCC Public Notice DA00-705 will be followed.

4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

4.7.5. Test Deviation

There is no deviation with the original standard.

4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	20°C	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT20 Ch 36, 40, 48 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013		

Channel 36

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	!	5101.28	53.36	54.00	-0.64	15.99	4.31	0.00	33.06	Average	296	100	VERTICAL
2	!	5150.00	69.42	74.00	-4.58	31.94	4.34	0.00	33.14	Peak	296	100	VERTICAL
3	p	5180.00	114.20	74.00			4.36	0.00	33.19	Peak	296	100	VERTICAL
4	a	5181.28	102.20	54.00			4.36	0.00	33.19	Average	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		5118.59	63.31	74.00	-10.69	25.90	4.32	0.00	33.09	Peak	295	100	VERTICAL
2	!	5121.47	52.57	54.00	-1.43	15.16	4.32	0.00	33.09	Average	295	100	VERTICAL
3	p	5200.96	115.02	74.00			4.37	0.00	33.22	Peak	295	100	VERTICAL
4	a	5200.96	102.43	54.00			4.37	0.00	33.22	Average	295	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		5129.97	52.87	74.00	-21.13	15.43	4.33	0.00	33.11	Peak	67	119	HORIZONTAL
2		5150.00	42.10	54.00	-11.90	4.62	4.34	0.00	33.14	Average	67	119	HORIZONTAL
3	p	5237.60	111.56	74.00			4.39	0.00	33.27	Peak	67	119	HORIZONTAL
4	a	5241.60	98.74	54.00			4.40	0.00	33.30	Average	67	119	HORIZONTAL
5		5398.88	45.56	54.00	-8.44	7.52	4.50	0.00	33.54	Average	67	119	HORIZONTAL
6		5400.48	57.62	74.00	-16.38	19.58	4.50	0.00	33.54	Peak	67	119	HORIZONTAL

Item 3, 4 are the fundamental frequency at 5240 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS8 HT40 Ch 38, 46 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013		

Channel 38

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	!	5145.51	68.65	74.00	-5.35	31.17	4.34	0.00	33.14	Peak	296	100	VERTICAL
2	!	5150.00	53.89	54.00	-0.11	16.41	4.34	0.00	33.14	Average	296	100	VERTICAL
3	a	5194.81	95.14	54.00			4.37	0.00	33.22	Average	296	100	VERTICAL
4	p	5195.13	108.74	74.00			4.37	0.00	33.22	Peak	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5190 MHz.

Channel 46

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		5147.76	61.32	74.00	-12.68	23.84	4.34	0.00	33.14	Peak	325	100	VERTICAL
2	!	5147.76	48.20	54.00	-5.80	10.72	4.34	0.00	33.14	Average	325	100	VERTICAL
3	a	5225.19	97.74	54.00			4.39	0.00	33.27	Average	325	100	VERTICAL
4	p	5225.83	110.88	74.00			4.39	0.00	33.27	Peak	325	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5230 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11ac MCS0-Nss2 VHT20 Ch 36, 40, 48 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013		

Channel 36

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	!	5102.24	53.06	54.00	-0.94	15.69	4.31	0.00	33.06	Average	296	100	VERTICAL
2	!	5150.00	71.06	74.00	-2.94	33.58	4.34	0.00	33.14	Peak	296	100	VERTICAL
3	p	5176.80	114.12	74.00			4.36	0.00	33.19	Peak	296	100	VERTICAL
4	a	5177.76	102.35	54.00			4.36	0.00	33.19	Average	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	!	5122.12	53.23	54.00	-0.77	15.82	4.32	0.00	33.09	Average	296	100	VERTICAL
2		5123.08	64.17	74.00	-9.83	26.73	4.33	0.00	33.11	Peak	296	100	VERTICAL
3	a	5197.76	102.65	54.00			4.37	0.00	33.22	Average	296	100	VERTICAL
4	p	5198.08	115.09	74.00			4.37	0.00	33.22	Peak	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		5150.00	52.47	74.00	-21.53	14.99	4.34	0.00	33.14	Peak	326	100	VERTICAL
2		5150.00	43.42	54.00	-10.58	5.94	4.34	0.00	33.14	Average	326	100	VERTICAL
3	a	5239.20	101.53	54.00			4.39	0.00	33.27	Average	326	100	VERTICAL
4	p	5243.21	113.45	74.00			4.40	0.00	33.30	Peak	326	100	VERTICAL
5		5398.08	45.95	54.00	-8.05	7.91	4.50	0.00	33.54	Average	326	100	VERTICAL
6		5402.08	56.98	74.00	-17.02	18.94	4.50	0.00	33.54	Peak	326	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5240 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11ac MCS0-Nss2 VHT40 Ch 38, 46 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013		

Channel 38

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	!	5149.68	68.74	74.00	-5.26	31.26	4.34	0.00	33.14	Peak	296	100	VERTICAL
2	!	5150.00	53.95	54.00	-0.05	16.47	4.34	0.00	33.14	Average	296	100	VERTICAL
3	p	5194.49	108.66	74.00			4.37	0.00	33.22	Peak	296	100	VERTICAL
4	a	5194.81	94.97	54.00			4.37	0.00	33.22	Average	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5190 MHz.

Channel 46

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		5146.47	60.81	74.00	-13.19	23.33	4.34	0.00	33.14	Peak	326	100	VERTICAL
2	!	5147.76	48.65	54.00	-5.35	11.17	4.34	0.00	33.14	Average	326	100	VERTICAL
3	a	5225.19	97.68	54.00			4.39	0.00	33.27	Average	326	100	VERTICAL
4	p	5228.40	110.89	74.00			4.39	0.00	33.27	Peak	326	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5230 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11ac MCS0-Nss2 VHT80 Ch 42 / Ant 3 + Ant 4
Test Date	Jan. 27, 2013		

Channel 42

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	!	5145.19	53.82	54.00	-0.18	16.34	4.34	0.00	33.14	Average	296	100	VERTICAL
2	!	5147.12	69.29	74.00	-4.71	31.81	4.34	0.00	33.14	Peak	296	100	VERTICAL
3	p	5196.06	104.09	74.00			4.37	0.00	33.22	Peak	296	100	VERTICAL
4	a	5198.46	88.93	54.00			4.37	0.00	33.22	Average	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5210 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

Temperature	20℃	Humidity	63%
Test Engineer	Serway Li	Configurations	IEEE 802.11a Ch 36, 40, 48 / Ant 3
Test Date	Jan. 27, 2013		

Channel 36

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	!	5101.60	53.51	54.00	-0.49	16.14	4.31	0.00	33.06	Average	296	100	VERTICAL
2	!	5149.36	68.00	74.00	-6.00	30.52	4.34	0.00	33.14	Peak	296	100	VERTICAL
3	p	5178.40	114.45	74.00			4.36	0.00	33.19	Peak	296	100	VERTICAL
4	a	5181.28	103.23	54.00			4.36	0.00	33.19	Average	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		5121.15	63.84	74.00	-10.16	26.43	4.32	0.00	33.09	Peak	296	100	VERTICAL
2	!	5121.47	53.92	54.00	-0.08	16.51	4.32	0.00	33.09	Average	296	100	VERTICAL
3	p	5198.40	114.47	74.00			4.37	0.00	33.22	Peak	296	100	VERTICAL
4	a	5201.28	103.55	54.00			4.37	0.00	33.22	Average	296	100	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	T/Pos	A/Pos	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1		5143.59	55.09	74.00	-18.91	17.61	4.34	0.00	33.14	Peak	295	109	VERTICAL
2		5150.00	42.60	54.00	-11.40	5.12	4.34	0.00	33.14	Average	295	109	VERTICAL
3	p	5238.40	116.17	74.00			4.39	0.00	33.27	Peak	295	109	VERTICAL
4	a	5239.20	106.54	54.00			4.39	0.00	33.27	Average	295	109	VERTICAL
5		5398.08	59.36	74.00	-14.64	21.32	4.50	0.00	33.54	Peak	295	109	VERTICAL
6	!	5398.08	48.18	54.00	-5.82	10.14	4.50	0.00	33.54	Average	295	109	VERTICAL

Item 3, 4 are the fundamental frequency at 5240 MHz.

Note:

Emission level (dBuV/m) = 20 log Emission level (uV/m)

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

4.8. Frequency Stability Measurement

4.8.1. Limit

Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emissions is maintained within the band of operation under all conditions of normal operation as specified in the user's manual or ±20ppm (IEEE 802.11nspecification).

4.8.2. Measuring Instruments and Setting

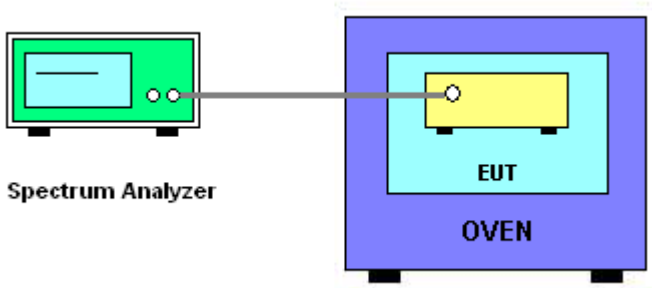
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RB	10 kHz
VB	10 kHz
Sweep Time	Auto

4.8.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature rule is 0°C~40°C.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

4.8.7. Test Result of Frequency Stability

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5200
126.50	5200.0055
110.00	5199.9878
93.50	5199.9589
Max. Deviation (MHz)	0.041100
Max. Deviation (ppm)	7.90

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5200
0	5200.0680
10	5200.0462
20	5200.0238
30	5200.0134
40	5200.0108
Max. Deviation (MHz)	0.068000
Max. Deviation (ppm)	13.08

4.9. Antenna Requirements

4.9.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. 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 provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.9.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100377	9kHz ~ 2.75GHz	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9kHz ~ 30MHz	Jun. 22, 2012	Conduction (CO01-CB)
Impulsbegrenzer Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz~30MHz	Feb. 03, 2012	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 04, 2012	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	-	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
forHorn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2012	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9KHz~40GHz	Oct. 08, 2012	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 05, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	4 Way	0120A04056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

"*" Calibration Interval of instruments listed above is two years.

NCR means Non-Calibration required.

6. TEST LOCATION

SHIJR	ADD	:	6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C.
	TEL	:	886-2-2696-2468
	FAX	:	886-2-2696-2255
HWA YA	ADD	:	No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
	TEL	:	886-3-327-3456
	FAX	:	886-3-318-0055
LINKOU	ADD	:	No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C
	TEL	:	886-2-2601-1640
	FAX	:	886-2-2601-1695
DUNGHU	ADD	:	No. 3, Lane 238, Kangle St., Neihu Chiu, Taipei, Taiwan 114, R.O.C.
	TEL	:	886-2-2631-4739
	FAX	:	886-2-2631-9740
JUNGHE	ADD	:	7Fl., No. 758, Jungjeng Rd., Junghe City, Taipei, Taiwan 235, R.O.C.
	TEL	:	886-2-8227-2020
	FAX	:	886-2-8227-2626
NEIHU	ADD	:	4Fl., No. 339, Hsin Hu 2nd Rd., Taipei 114, Taiwan, R.O.C.
	TEL	:	886-2-2794-8886
	FAX	:	886-2-2794-9777
JHUBEI	ADD	:	No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.
	TEL	:	886-3-656-9065
	FAX	:	886-3-656-9085

Appendix B. Maximum Permissible Exposure

1. Maximum Permissible Exposure

1.1. Applicable Standard

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm²)	Averaging Time |E|², |H|² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

1.2. MPE Calculation Method

E (V/m) = $\frac{\sqrt{30 \times P \times G}}{d}$ Power Density: *Pd* (W/m²) = $\frac{E^2}{377}$

E = Electric field (V/m)

P = Average RF output power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

Pd = $\frac{30 \times P \times G}{377 \times d^2}$

From the EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

1.3. Calculated Result and Limit

For 5GHz UNII Band:

Antenna Type : PCB Antenna

Max Conducted Power for IEEE 802.11n HT20 : 16.93 dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
3.87	2.4378	16.9309	49.3272	0.023935	1	Complies

For 5GHz ISM Band:

Antenna Type : PCB Antenna

Max Conducted Power for IEEE 802.11ac VHT80 : 26.29 dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
4.70	2.9512	26.2868	425.2871	0.249823	1	Complies

For 2.4GHz Band:

Antenna Type : PCB Antenna

Max Conducted Power for IEEE 802.11n HT20 : 20.77 dBm

Antenna Gain (dBi)	Antenna Gain (numeric)	Average Output Power (dBm)	Average Output Power (mW)	Power Density (S) (mW/cm²)	Limit of Power Density (S) (mW/cm²)	Test Result
3.91	2.4604	20.7709	119.4226	0.058484	1	Complies

CONCULSION:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously, the formula of calculatedthe MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ...etc. < 1

CPD = Calculation power density

LPD = Limit of power density

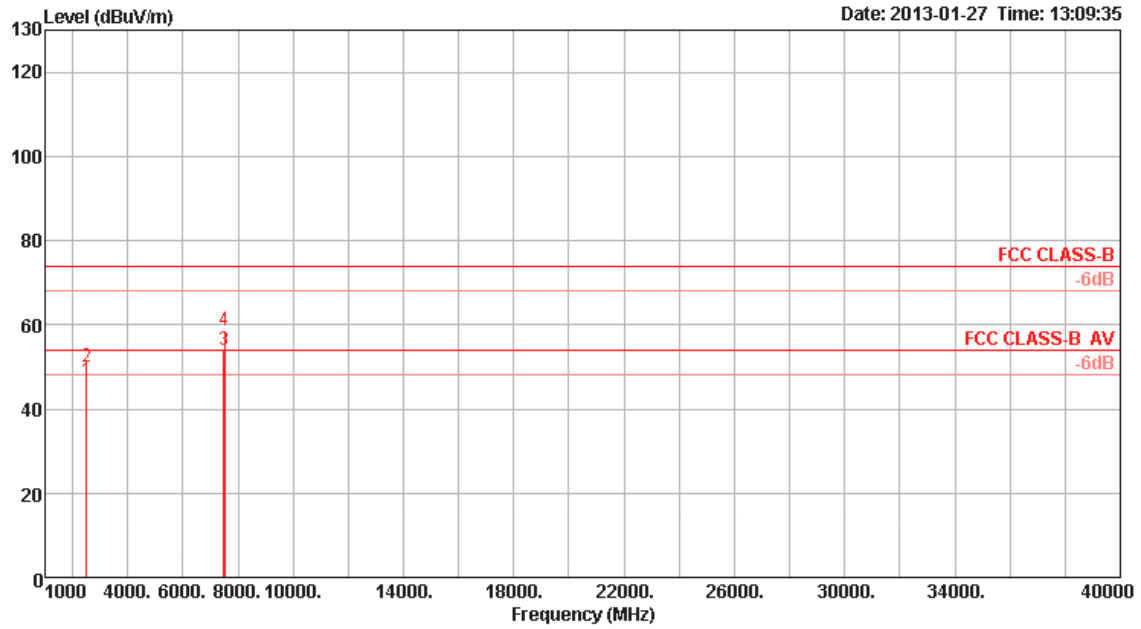
Therefore, the worst-case situation is 0.058484 / 1 + 0.249823 / 1 = 0.308307, which isless than “1”. This confirmed that the device comply with FCC 1.1310 MPE limit.

Appendix C. Co-location

1. Results of Radiated Emissions for Co-located

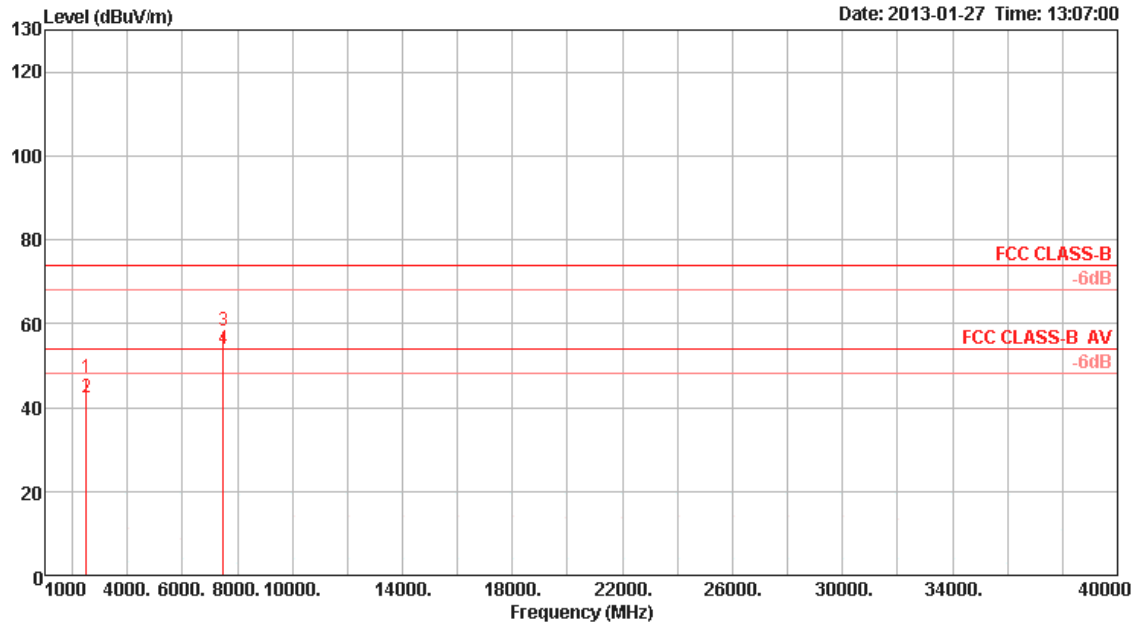
Temperature	20°C	Humidity	63%
Test Engineer	Serway Li	Configurations	2.4G + 5G

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2500.00	46.88	54.00	-7.12	49.16	4.42	28.30	35.00	Average	120	256	HORIZONTAL
2	2500.08	49.90	74.00	-24.10	52.18	4.42	28.30	35.00	Peak	120	256	HORIZONTAL
3	7499.97	53.99	54.00	-0.01	44.92	7.77	36.80	35.50	Average	100	164	HORIZONTAL
4	7500.03	58.55	74.00	-15.45	49.48	7.77	36.80	35.50	Peak	100	164	HORIZONTAL

Vertial



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2499.97	47.19	74.00	-26.81	49.47	4.42	28.30	35.00	Peak	100	259	VERTICAL
2	2499.97	42.31	54.00	-11.69	44.59	4.42	28.30	35.00	Average	100	259	VERTICAL
3	7499.91	58.46	74.00	-15.54	49.39	7.77	36.80	35.50	Peak	103	140	VERTICAL
4	7499.97	53.98	54.00	-0.02	44.91	7.77	36.80	35.50	Average	103	140	VERTICAL