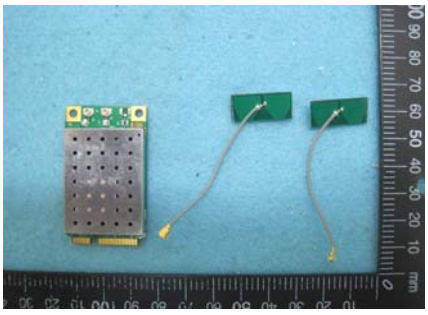
SPORTON International Inc.
No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, TaoYuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

FCC RADIO TEST REPORT

Applicant's company	**Alpha Networks Inc.**
Applicant Address	No.8 Li-shing 7th Rd., Science-based Industrial Park, Hsinchu, Taiwan, R.O.C.
FCC ID	**RRK-2012070022**
Manufacturer's company	**Alpha Networks Inc.**
Manufacturer Address	No.8 Li-shing 7th Rd., Science-based Industrial Park, Hsinchu, Taiwan, R.O.C.
Manufacturer's company	**Alpha Networks (Dongguan) Co., Ltd.**
Manufacturer Address	Xin An District, Chang An Town, DongGuan City, GuangDong Province, China

Product Name	WIRELESS AC MODULE
Brand Name	ALPHA
Model Name	WMC-AC02
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250MHz
Received Date	Jan. 04, 2013
Final Test Date	Jan. 17, 2013
Submission Type	Original Equipment
Operating Mode	Slave



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** and **KDB 662911 D01 v01r02**.

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

TAF
Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR310926AB	Rev. 01	Initial issue of report	Jan. 30, 2013

Certificate No.: CB10201110

1. CERTIFICATE OF COMPLIANCE

Product Name	:	**WIRELESS AC MODULE**
Brand Name	:	**ALPHA**
Model Name	:	**WMC-AC02**
Applicant	:	**Alpha Networks 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. 04, 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	10.70 dB
4.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.13 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.05 dB
4.5	15.407(a)	Peak Excursion	Complies	3.85 dB
4.6	15.407(b)	Radiated Emissions	Complies	4.13 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.19 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 Host System
Modulation	see the below table for IEEE 802.11n
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: MCS0 (20MHz): 17.60 MHz ; MCS0 (40MHz): 37.44 MHz 11ac: MCS0 (80MHz): 75.80 MHz
Maximum Conducted Output Power	11n: MCS0 (20MHz): 16.06 dBm ; MCS0 (40MHz): 16.87dBm 11ac: MCS0 (VHT 20MHz): 15.81 dBm ; MCS0 (VHT 40MHz): 16.85 dBm ; MCS0 (VHT 80MHz): 15.13 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Host System
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	4
Channel Band Width (99%)	16.32 MHz
Maximum Conducted Output Power	15.70 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

Antenna	Two (TX)		
Band width Mode	20 MHz	40 MHz	80 MHz
IEEE 802.11a	V	X	X
IEEE 802.11n	V	V	X
IEEE 802.11ac	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
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5	7.200	15
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0	14.400	30
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5	21.700	45
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0	28.900	60
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0	43.300	90
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0	57.800	120
6	1	64-QAM	3/4	6	312	648	234	486	58.5	121.5	65.000	135
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0	72.200	150
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	2	6-54 Mbps	6Mbps	11A5.2G-20M
n (HT20)	2	MCS 0-15	MCS 0	11N5.2G-20M
n (HT40)	2	MCS 0-15	MCS 0	11N5.2G-40M
ac (VHT20)	2	MCS 0-9	MCS 0-Nss1	11AC5.2G-20M
ac (VHT40)	2	MCS 0-9	MCS 0-Nss1	11AC5.2G-40M
ac (VHT80)	2	MCS 0-9	MCS 0-Nss1	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

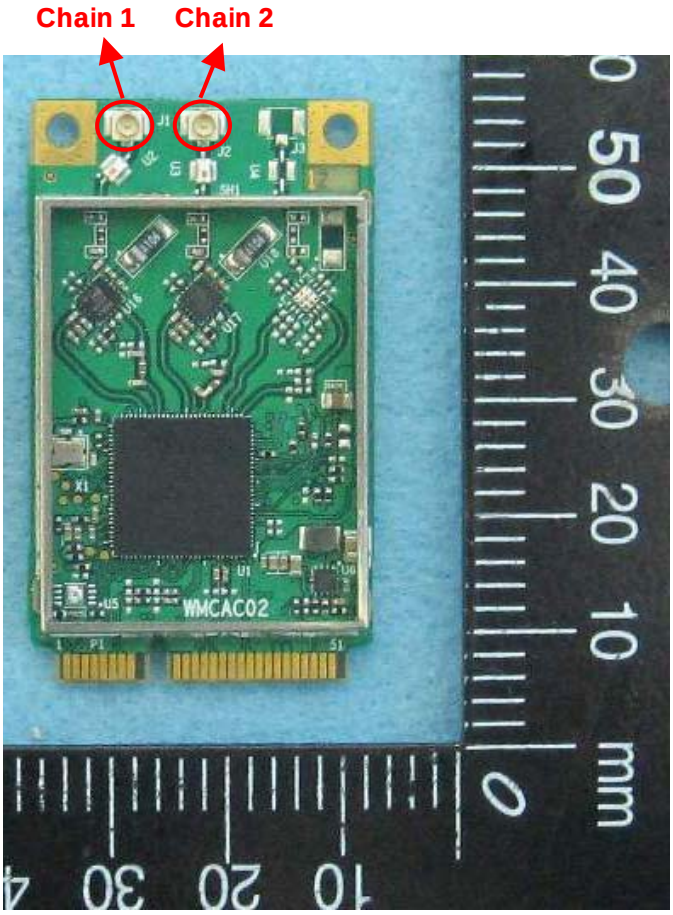
N/A

3.3. Table for Filed Antenna

Chain	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Loss of External Cable (dB)	True Gain (dBi)	Remark
1	WHA YU	SSR-30247	PCB Antenna	I-PEX	4	0.18	3.82	TX / RX
2	WHA YU	SSR-30247	PCB Antenna	I-PEX	4	0.18	3.82	TX / RX

Note: The EUT has two Chains.

Chain 1 and Chain 2 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

For IEEE 802.11a, use Channel 36, 40, 44, 48.

There are two bandwidth systems for IEEE 802.11n.

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

For both 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	Chain
AC Power Conducted Emission	CTX/11a		6Mbps	-	1+2
Max. Conducted Output Power	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2
	11ac 20MHz	Band 1	MCS0	36/40/48	1+2
	11ac 40MHz	Band 1	MCS0	38/46	1+2
	11ac 80MHz	Band 1	MCS0	42	1+2
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2
Power Spectral Density	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2
	11ac 80MHz	Band 1	MCS0	42	1+2
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Peak Excursion	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2
Radiated Emission Below 1GHz	CTX/11a		6Mbps	-	1+2

Radiated Emission Above 1GHz	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2
Band Edge Emission	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2
	11ac 20MHz	Band 1	MCS0	36/40/48	1+2
	11ac 40MHz	Band 1	MCS0	38/46	1+2
	11ac 80MHz	Band 1	MCS0	42	1+2
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2
Frequency Stability	Un-modulation		-	40	N/A

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	VCCI Reg. 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

<For Radiated Emissions, Band Edge Emissions and AC Power Line Conducted Emissions test:>

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	E2K4965AGNM

<For 26dB Spectrum Bandwidth, Maximum Conducted Output Power, Power Spectral Density and Peak Excursion test:>

Support Unit	Brand	Model	FCC ID
Notebook	DELL	M1330	E2KWM3945ABG

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 MCS0 20MHz / Chain 1 + Chain 2 (2TX)

Test Software Version	Manual Tool Version:1.0.0.10		
Frequency	5180 MHz	5200 MHz	5240 MHz
MCS0 20MHz	51	50	49

Power Parameters of IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 (2TX)

Test Software Version	Manual Tool Version:1.0.0.10	
Frequency	5190 MHz	5230 MHz
MCS0 40MHz	53	53

Power Parameters of IEEE 802.11ac MCS0 VHT 20MHz / Chain 1 + Chain 2 (2TX)

Test Software Version	Manual Tool Version:1.0.0.10		
Frequency	5180 MHz	5200 MHz	5240 MHz
MCS0 VHT 20MHz	50	49	49

Power Parameters of IEEE 802.11ac MCS0 VHT 40MHz / Chain 1 + Chain 2 (2TX)

Test Software Version	Manual Tool Version:1.0.0.10	
Frequency	5190 MHz	5230 MHz
MCS0 VHT 40MHz	52	53

Power Parameters of IEEE 802.11ac MCS0 VHT 80MHz / Chain 1 + Chain 2 (2TX)

Test Software Version	Manual Tool Version:1.0.0.10
Frequency	5210 MHz
MCS0 VHT 80MHz	49

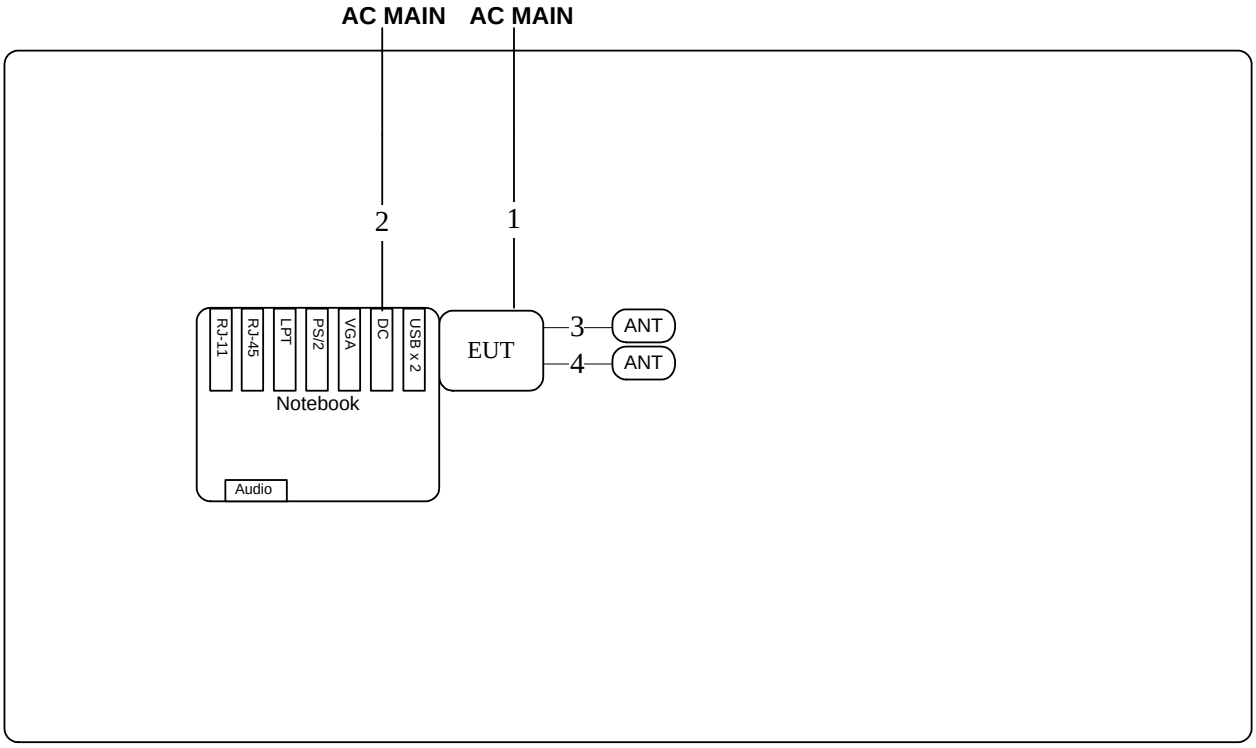
Power Parameters of IEEE 802.11a / Chain 1 + Chain 2 (2TX)

Test Software Version	Manual Tool Version:1.0.0.10		
Frequency	5180 MHz	5200 MHz	5240 MHz
IEEE 802.11a	50	48	47

During the test, "Manual Tool Version:1.0.0.10" under WIN XP was executed the test program to control the EUT continuously transmit RF signal.

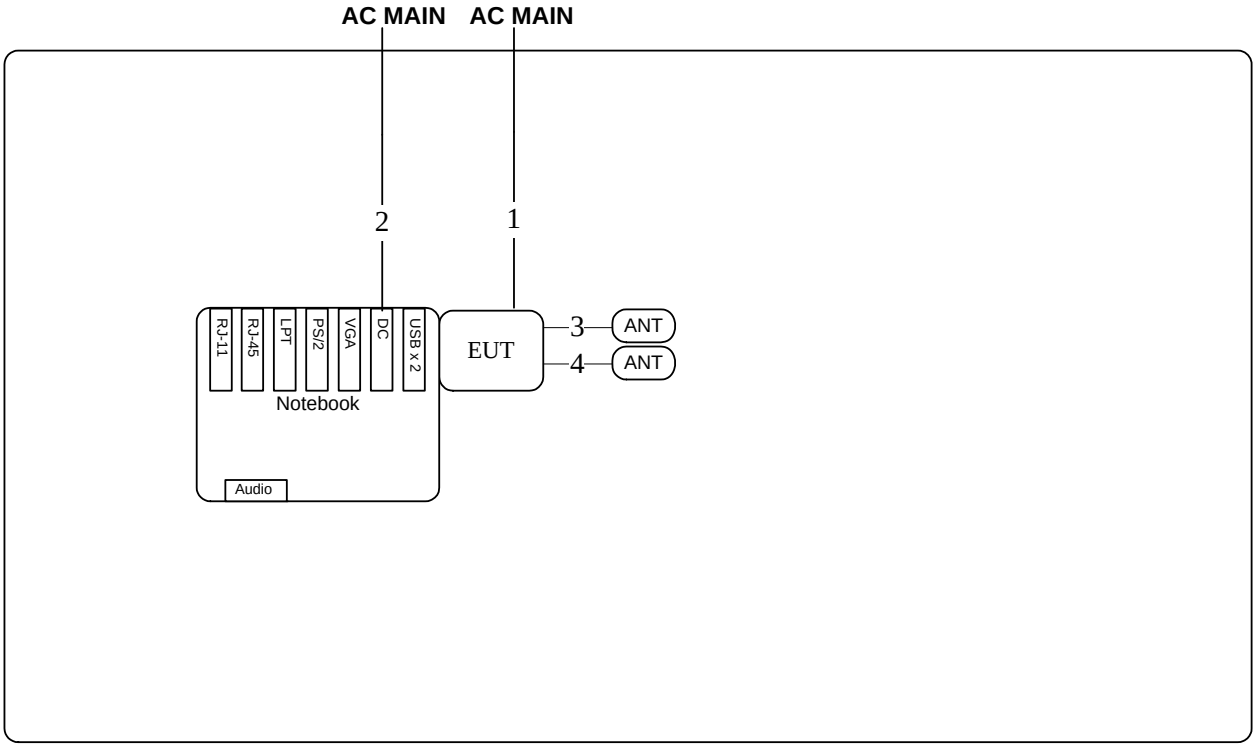
3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration



Item	Connection	Shield	Length
1	Power cable	No	1.5m
2	Power cable	No	2.6m
3	Antnna cable	No	0.09m
4	Antnna cable	No	0.13m

3.9.2. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shield	Length
1	Power cable	No	1.5m
2	Power cable	No	2.6m
3	Antnna cable	No	0.09m
4	Antnna cable	No	0.13m

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

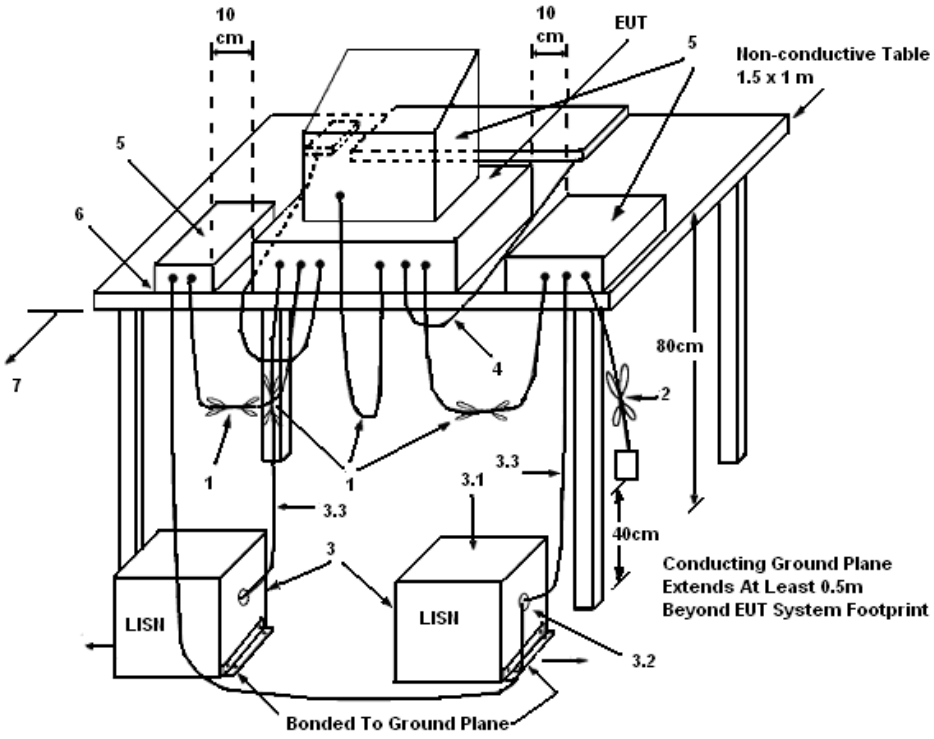
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

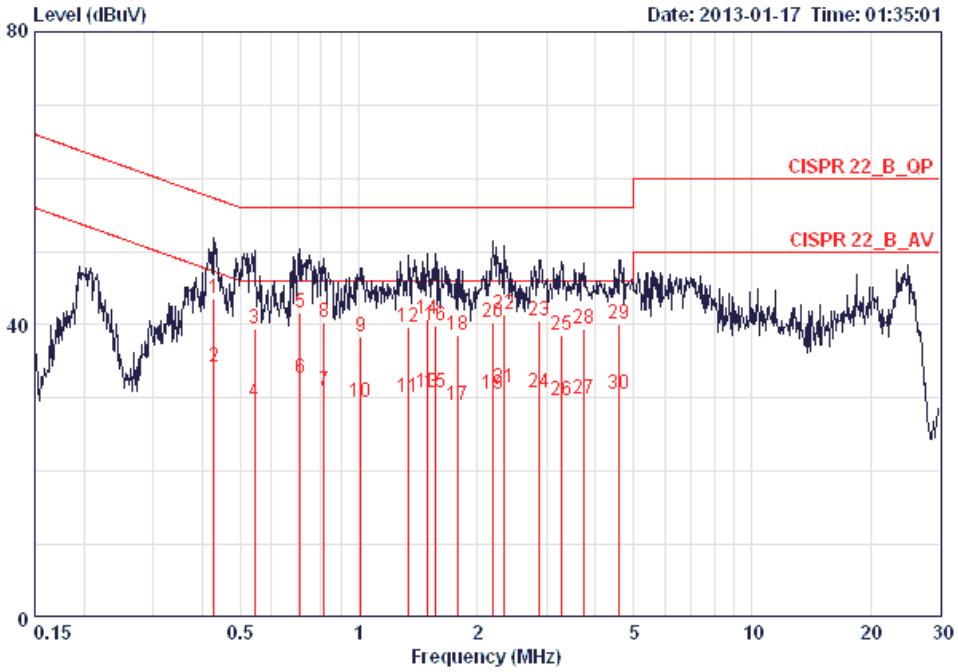
There is no deviation with the original standard.

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

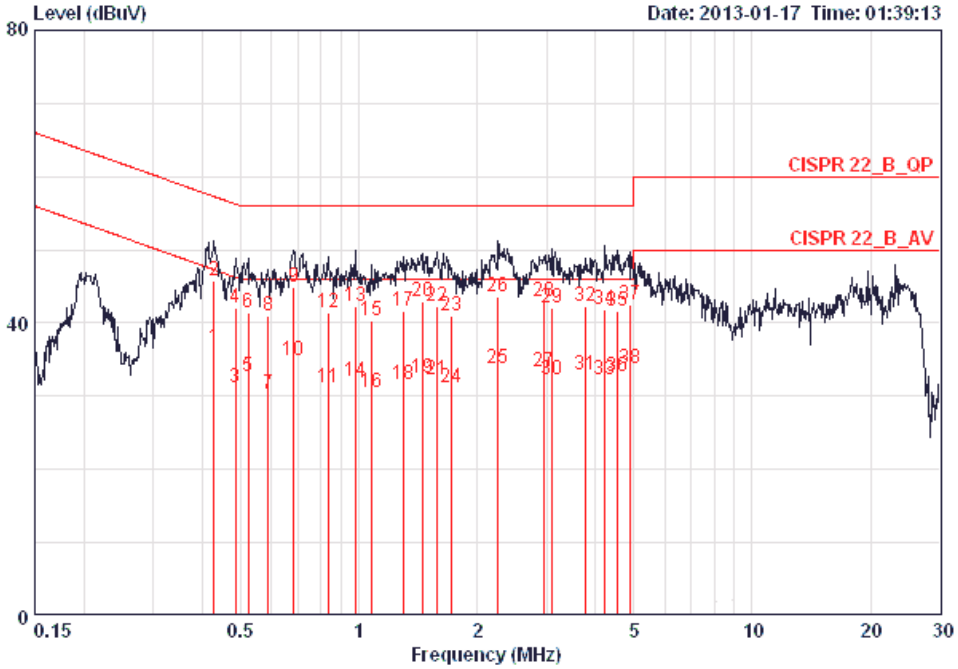
Temperature	24℃	Humidity	60%
Test Engineer	Simon Yang	Phase	Line
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.42825	43.66	-13.63	57.29	43.38	0.08	0.20	QP
2	0.42825	34.32	-12.97	47.29	34.04	0.08	0.20	AVERAGE
3	0.54355	39.41	-16.59	56.00	39.13	0.08	0.20	QP
4	0.54355	29.42	-16.58	46.00	29.14	0.08	0.20	AVERAGE
5	0.70842	41.64	-14.37	56.00	41.35	0.09	0.20	QP
6	0.70842	32.63	-13.38	46.00	32.34	0.09	0.20	AVERAGE
7	0.81737	30.95	-15.05	46.00	30.66	0.09	0.20	AVERAGE
8	0.81737	40.41	-15.59	56.00	40.12	0.09	0.20	QP
9	1.010	38.26	-17.74	56.00	37.97	0.09	0.20	QP
10	1.010	29.49	-16.51	46.00	29.20	0.09	0.20	AVERAGE
11	1.338	30.08	-15.92	46.00	29.77	0.10	0.21	AVERAGE
12	1.338	39.70	-16.30	56.00	39.39	0.10	0.21	QP
13	1.487	30.75	-15.25	46.00	30.43	0.10	0.22	AVERAGE
14	1.487	40.71	-15.29	56.00	40.39	0.10	0.22	QP
15	1.568	30.70	-15.30	46.00	30.38	0.10	0.22	AVERAGE
16	1.568	39.97	-16.03	56.00	39.65	0.10	0.22	QP
17	1.781	28.96	-17.04	46.00	28.63	0.11	0.23	AVERAGE
18	1.781	38.56	-17.44	56.00	38.23	0.11	0.23	QP
19	2.190	30.44	-15.56	46.00	30.09	0.11	0.23	AVERAGE
20	2.190	40.30	-15.70	56.00	39.95	0.11	0.23	QP
21	2.346	31.40	-14.60	46.00	31.05	0.11	0.24	AVERAGE
22	2.346	41.44	-14.56	56.00	41.09	0.11	0.24	QP
23	2.884	40.51	-15.49	56.00	40.14	0.12	0.25	QP
24	2.884	30.65	-15.35	46.00	30.28	0.12	0.25	AVERAGE
25	3.276	38.66	-17.34	56.00	38.27	0.12	0.27	QP

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
26	3.276	29.59	-16.41	46.00	29.20	0.12	0.27	AVERAGE
27	3.740	29.76	-16.24	46.00	29.34	0.13	0.29	AVERAGE
28	3.740	39.42	-16.58	56.00	39.00	0.13	0.29	QP
29	4.598	40.12	-15.88	56.00	39.67	0.14	0.31	QP
30	4.598	30.62	-15.38	46.00	30.17	0.14	0.31	AVERAGE

Temperature	24℃	Humidity	60%
Test Engineer	Simon Yang	Phase	Neutral
Configuration	CTX		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.42825	36.59	-10.70	47.29	36.24	0.15	0.20	AVERAGE
2	0.42825	45.80	-11.49	57.29	45.45	0.15	0.20	QP
3	0.48632	31.14	-15.09	46.23	30.79	0.15	0.20	AVERAGE
4	0.48632	42.14	-14.09	56.23	41.79	0.15	0.20	QP
5	0.52376	32.62	-13.38	46.00	32.27	0.15	0.20	AVERAGE
6	0.52376	41.46	-14.54	56.00	41.11	0.15	0.20	QP
7	0.58851	30.29	-15.71	46.00	29.93	0.16	0.20	AVERAGE
8	0.58851	40.96	-15.04	56.00	40.60	0.16	0.20	QP
9	0.68263	44.86	-11.14	56.00	44.50	0.16	0.20	QP
10	0.68263	34.80	-11.20	46.00	34.44	0.16	0.20	AVERAGE
11	0.83488	31.16	-14.85	46.00	30.79	0.17	0.20	AVERAGE
12	0.83488	41.33	-14.68	56.00	40.96	0.17	0.20	QP
13	0.97871	42.21	-13.79	56.00	41.88	0.17	0.16	QP
14	0.97871	32.13	-13.87	46.00	31.80	0.17	0.16	AVERAGE
15	1.077	40.34	-15.66	56.00	39.96	0.17	0.20	QP
16	1.077	30.53	-15.47	46.00	30.15	0.17	0.20	AVERAGE
17	1.296	41.53	-14.47	56.00	41.14	0.18	0.21	QP
18	1.296	31.52	-14.48	46.00	31.13	0.18	0.21	AVERAGE
19	1.449	32.59	-13.41	46.00	32.19	0.18	0.22	AVERAGE
20	1.449	42.93	-13.07	56.00	42.53	0.18	0.22	QP
21	1.585	32.33	-13.67	46.00	31.93	0.18	0.22	AVERAGE
22	1.585	42.24	-13.76	56.00	41.84	0.18	0.22	QP
23	1.716	41.02	-14.98	56.00	40.61	0.18	0.22	QP
24	1.716	31.26	-14.74	46.00	30.85	0.18	0.22	AVERAGE
25	2.261	33.69	-12.31	46.00	33.26	0.19	0.24	AVERAGE

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
26	2.261	43.50	-12.50	56.00	43.07	0.19	0.24	QP
27	2.946	33.32	-12.68	46.00	32.87	0.20	0.25	AVERAGE
28	2.946	42.84	-13.16	56.00	42.39	0.20	0.25	QP
29	3.090	42.07	-13.93	56.00	41.61	0.21	0.25	QP
30	3.090	32.25	-13.75	46.00	31.79	0.21	0.25	AVERAGE
31	3.759	33.02	-12.98	46.00	32.51	0.22	0.29	AVERAGE
32	3.759	42.31	-13.69	56.00	41.80	0.22	0.29	QP
33	4.224	32.34	-13.66	46.00	31.81	0.22	0.30	AVERAGE
34	4.224	41.81	-14.19	56.00	41.28	0.22	0.30	QP
35	4.525	41.58	-14.42	56.00	41.04	0.23	0.31	QP
36	4.525	32.70	-13.30	46.00	32.16	0.23	0.31	AVERAGE
37	4.900	42.46	-13.54	56.00	41.90	0.24	0.32	QP
38	4.900	33.70	-12.30	46.00	33.14	0.24	0.32	AVERAGE

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

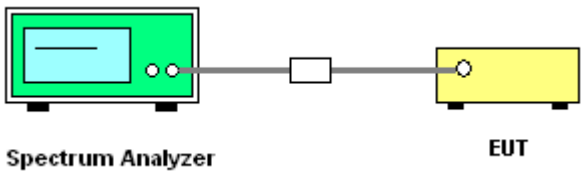
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.16	17.60
40	5200 MHz	20.16	17.44
48	5240 MHz	20.00	17.44

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	41.28	37.12
46	5230 MHz	40.96	37.44

Configuration IEEE 802.11ac MCS0 VHT 80MHz / Chain 1 + Chain 2 (2TX)

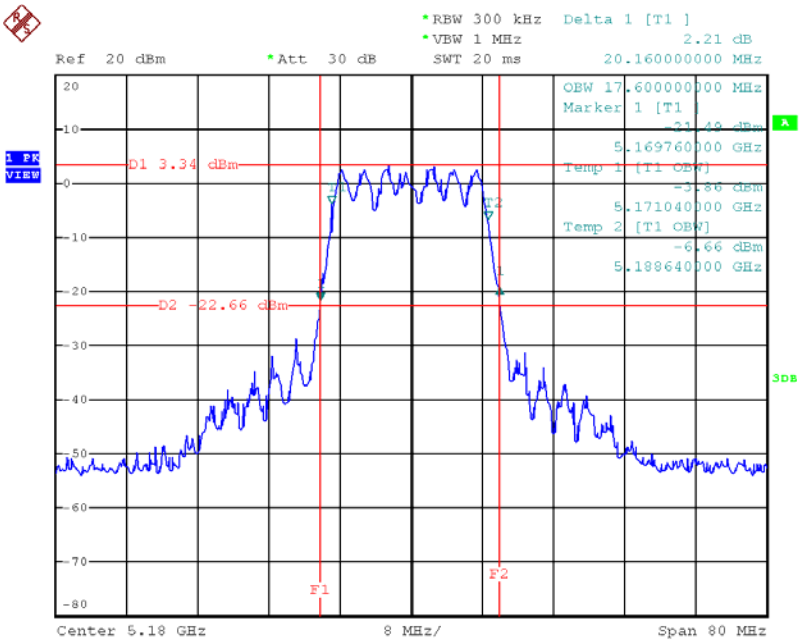
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
42	5210 MHz	80.00	75.80

Temperature	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a

Configuration IEEE 802.11a / Chain 1 + Chain 2 (2TX)

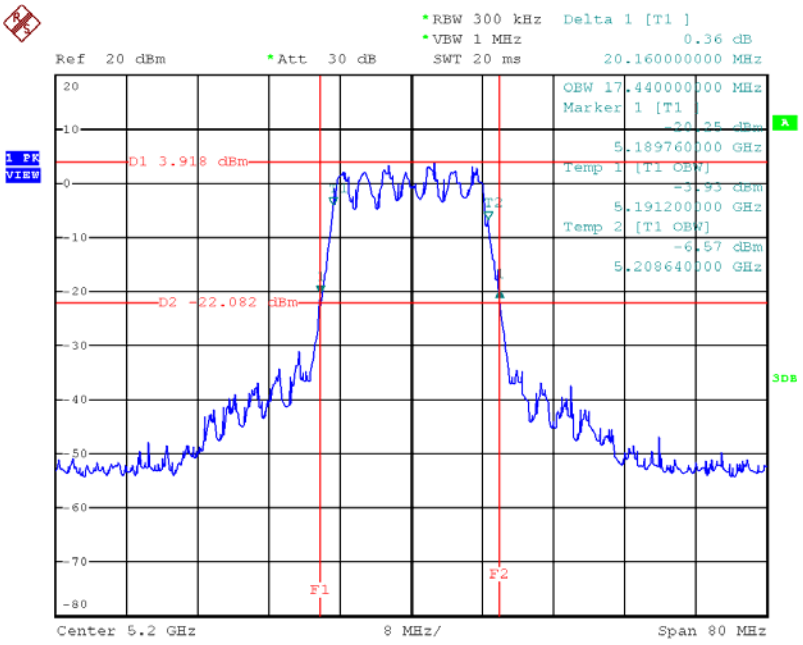
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	19.84	16.32
40	5200 MHz	19.84	16.32
48	5240 MHz	20.00	16.32

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / 5180 MHz / Chain 1 + Chain 2 (2TX)



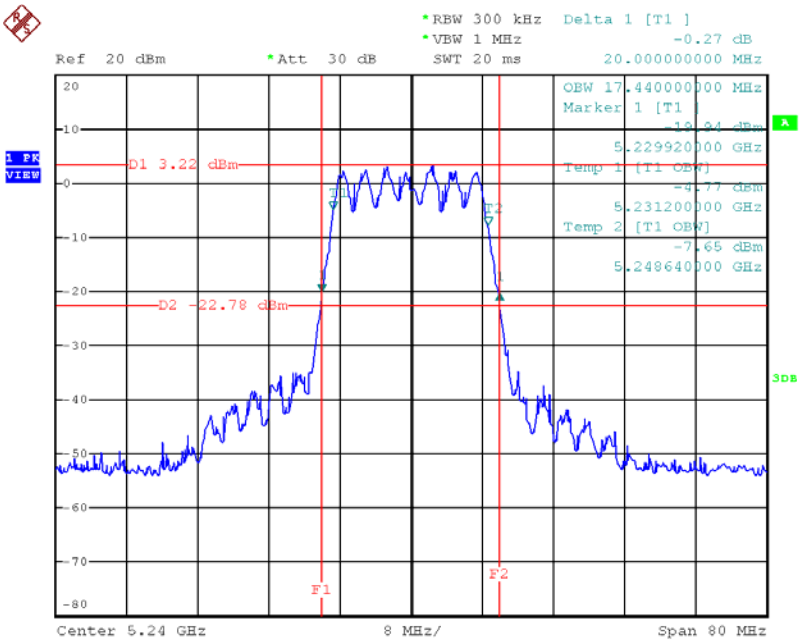
Date: 16.JAN.2013 20:54:44

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / 5200 MHz / Chain 1 + Chain 2 (2TX)



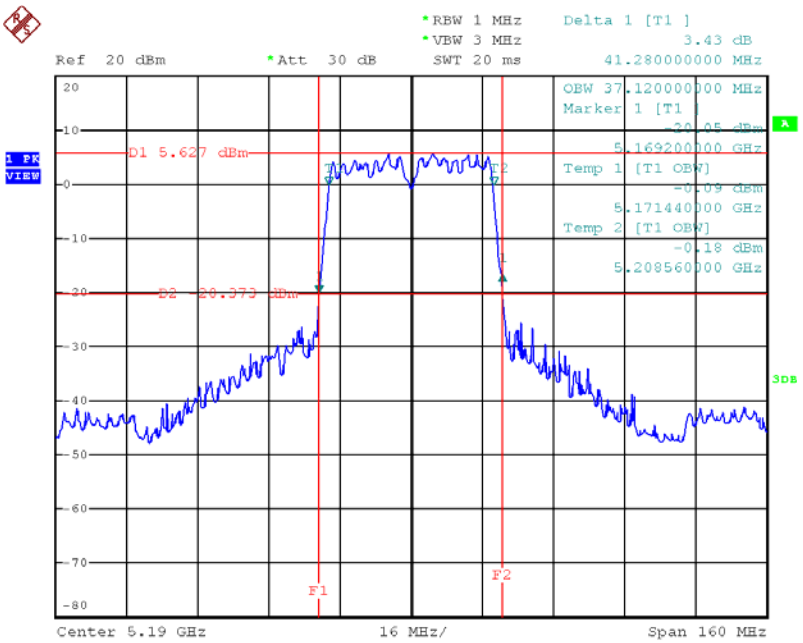
Date: 16.JAN.2013 20:56:47

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / 5240 MHz / Chain 1 + Chain 2 (2TX)



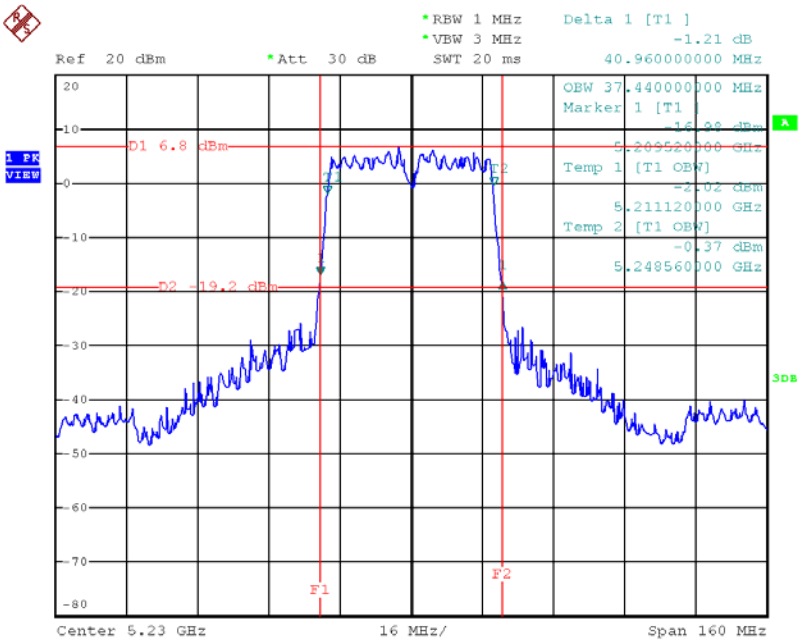
Date: 16.JAN.2013 20:56:04

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / 5190 MHz / Chain 1 + Chain 2 (2TX)



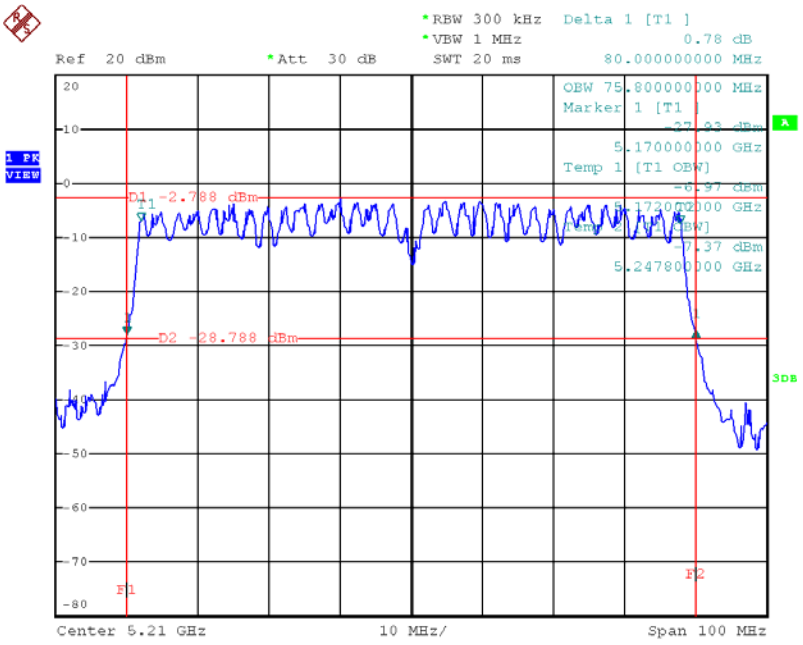
Date: 16.JAN.2013 21:06:51

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / 5230 MHz / Chain 1 + Chain 2 (2TX)



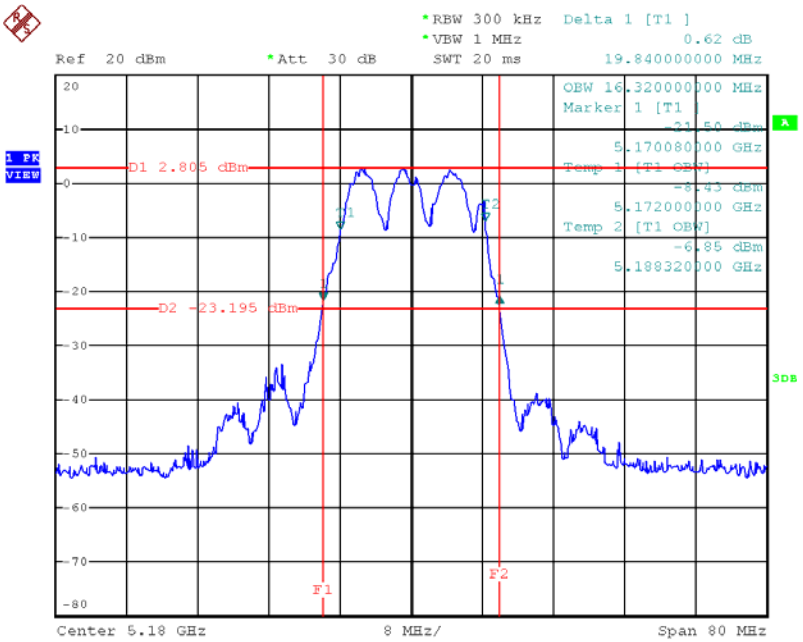
Date: 16.JAN.2013 21:08:05

26 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0 VHT 80MHz / 5210 MHz / Chain 1 + Chain 2 (2TX)



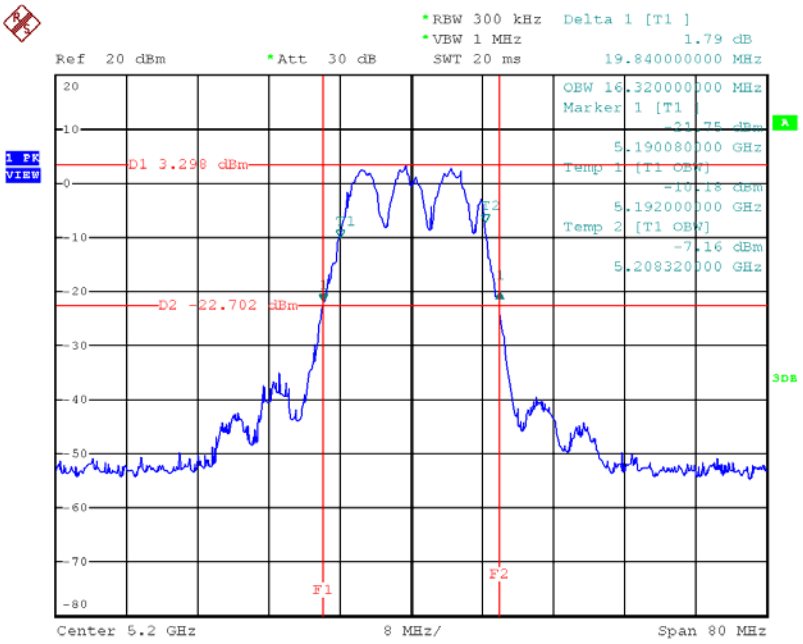
Date: 16.JAN.2013 21:50:29

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5180 MHz / Chain 1 + Chain 2 (2TX)



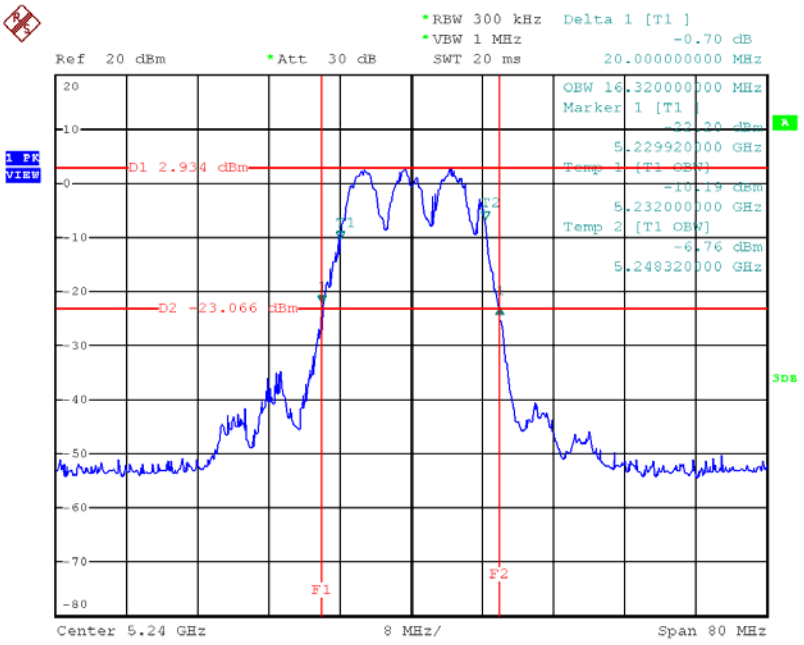
Date: 16.JAN.2013 20:36:28

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5200 MHz / Chain 1 + Chain 2 (2TX)



Date: 16.JAN.2013 20:37:35

26 dB Bandwidth Plot on Configuration IEEE 802.11a / 5240 MHz / Chain 1 + Chain 2 (2TX)



Date: 16.JAN.2013 20:38:42

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

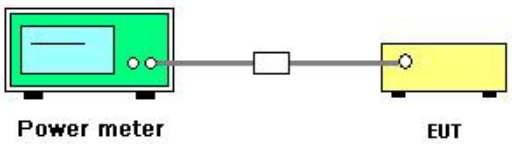
The following table is the setting of the peak power meter.

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	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac
Test Date	Jan. 16, 2013		

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2			
36	5180 MHz	13.22	12.87	16.06	17.00	**Complies**
40	5200 MHz	13.01	12.54	15.79	17.00	**Complies**
48	5240 MHz	12.92	12.55	15.75	17.00	**Complies**

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2			
38	5190 MHz	13.65	13.45	16.56	17.00	**Complies**
46	5230 MHz	13.96	13.75	16.87	17.00	**Complies**

Configuration IEEE 802.11ac MCS0 VHT 20MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2			
36	5180 MHz	12.99	12.61	15.81	17.00	**Complies**
40	5200 MHz	12.80	12.37	15.60	17.00	**Complies**
48	5240 MHz	12.97	12.50	15.75	17.00	**Complies**

Configuration IEEE 802.11ac MCS0 VHT 40MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2			
38	5190 MHz	13.39	13.08	16.25	17.00	**Complies**
46	5230 MHz	14.00	13.68	16.85	17.00	**Complies**

Configuration IEEE 802.11ac MCS0 VHT 80MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2			
42	5210 MHz	12.23	12.01	15.13	17.00	**Complies**

Temperature	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a
Test Date	Jan. 16, 2013		

Configuration IEEE 802.11a / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Conducted Power (dBm)		Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2			
36	5180 MHz	12.82	12.55	15.70	16.98	**Complies**
40	5200 MHz	12.60	12.22	15.42	16.98	**Complies**
48	5240 MHz	12.56	12.26	15.42	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

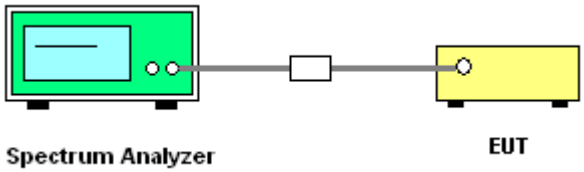
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
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 => (d) Method SA-2 (trace averaging across on and off times of the EUT transmissions, followed by duty cycle correction).
3. Multiple antenna systems was performed in accordance with KDB 662911 in-Band Power Spectral Density (PSD) Measurements (1) Measure and sum the spectra across the outputs.
4. When measuring 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.

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	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac
Test Date	Jan. 16, 2013		

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	3.12	3.17	**Complies**
40	5200 MHz	3.10	3.17	**Complies**
48	5240 MHz	3.07	3.17	**Complies**

Note: $Directional\ gain = G_{ANT} + 10\ log(N_{ANT}/N_{SS})$ = 6.83dBi >6dBi, so Limit =4-(6.83-6) =3.17dBm/MHz.

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	0.98	3.17	**Complies**
46	5230 MHz	1.21	3.17	**Complies**

Note: $Directional\ gain = G_{ANT} + 10\ log(N_{ANT}/N_{SS})$ = 6.83dBi >6dBi, so Limit =4-(6.83-6) =3.17dBm/MHz.

Configuration IEEE 802.11 ac MCS0 VHT 80MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
42	5210 MHz	-3.47	3.17	**Complies**

Note: $Directional\ gain = G_{ANT} + 10\ log(N_{ANT}/N_{SS})$ = 6.83dBi >6dBi, so Limit =4-(6.83-6) =3.17dBm/MHz.

Temperature	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a
Test Date	Jan. 16, 2013		

Configuration IEEE 802.11a / Chain 1 + Chain 2 (2TX)

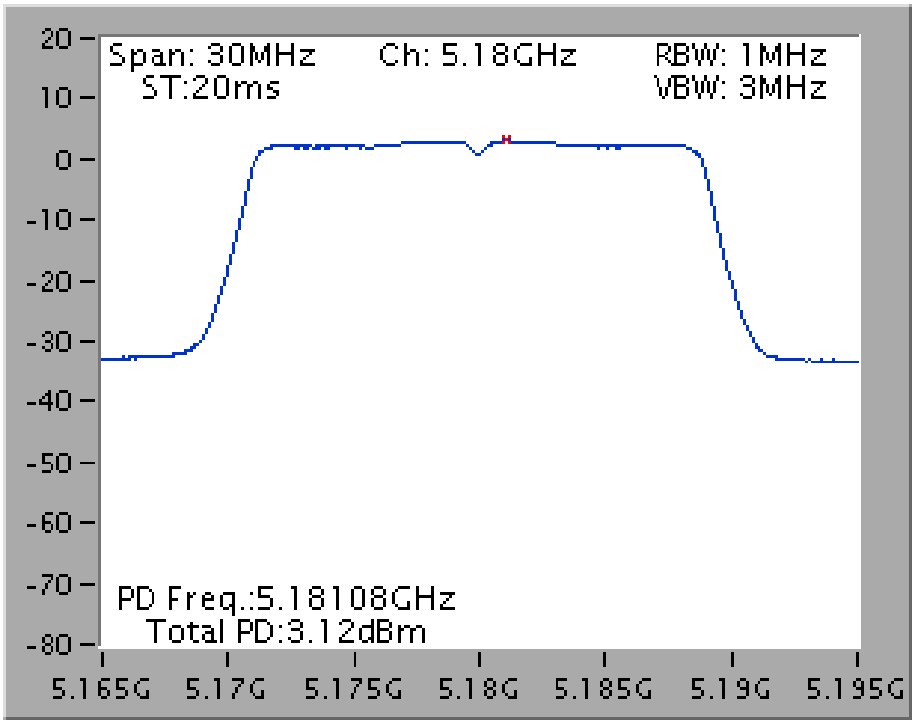
Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	2.96	3.17	**Complies**
40	5200 MHz	2.94	3.17	**Complies**
48	5240 MHz	2.99	3.17	**Complies**

Note: $Directional\ gain = G_{ANT} + 10\ log(N_{ANT}/N_{SS})$ = 6.83dBi >6dBi, so Limit =4-(6.83-6) =3.17dBm/MHz.

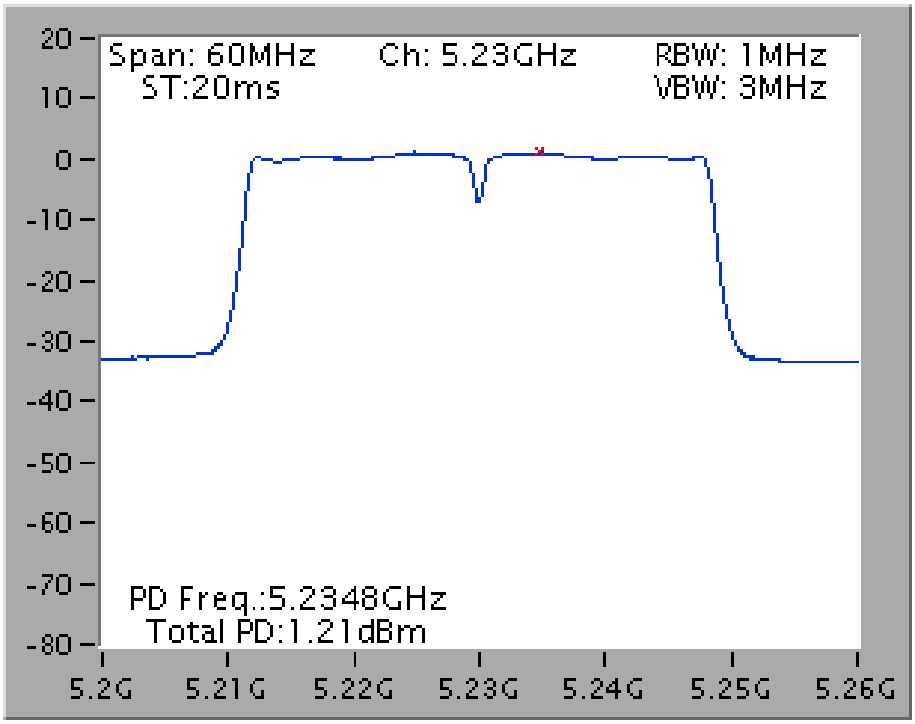
Note: All the test values were listed in the report.

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

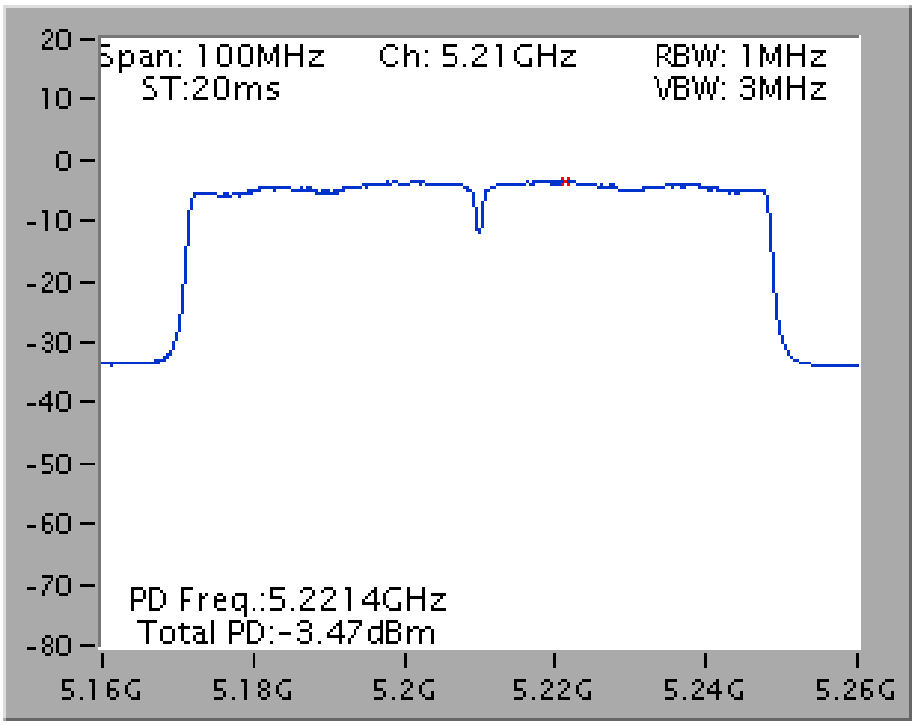
Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / 5180 MHz / Chain 1 + Chain 2 (2TX)



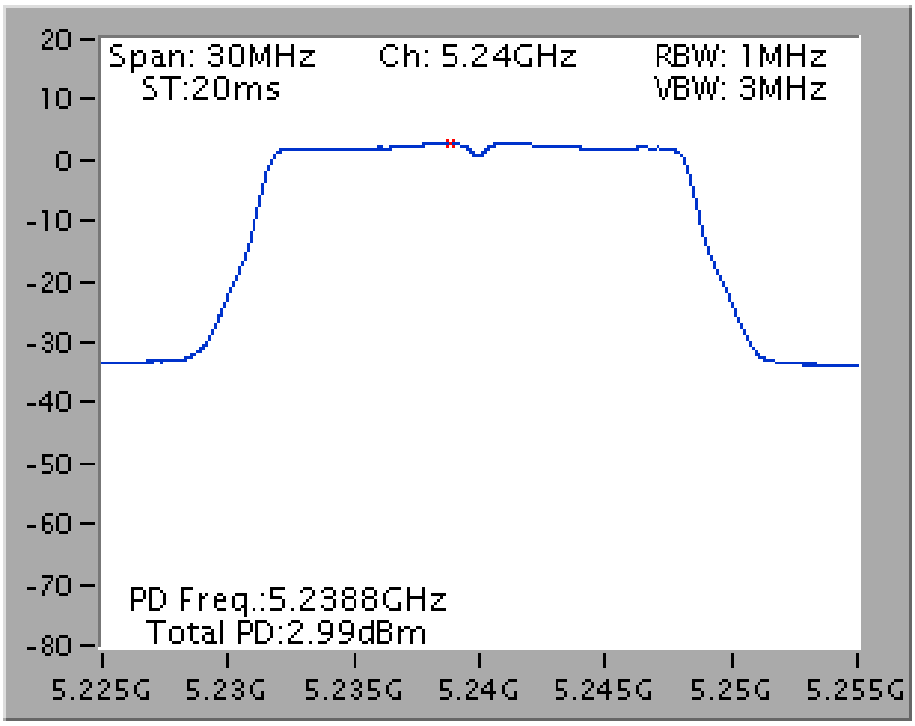
Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / 5230 MHz / Chain 1 + Chain 2 (2TX)



Power Density Plot on Configuration IEEE 802.11ac MCS0 VHT 80MHz / 5210 MHz / Chain 1 + Chain 2 (2TX)



Power Density Plot on Configuration IEEE 802.11a / 5240 MHz / Chain 1 + Chain 2 (2TX)



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	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
36	5180 MHz	8.70	13	**Complies**

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
46	5230 MHz	8.45	13	**Complies**

Configuration IEEE 802.11ac MCS0 VHT 80MHz / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
42	5210 MHz	9.15	13	**Complies**

Temperature	25℃	Humidity	56%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac

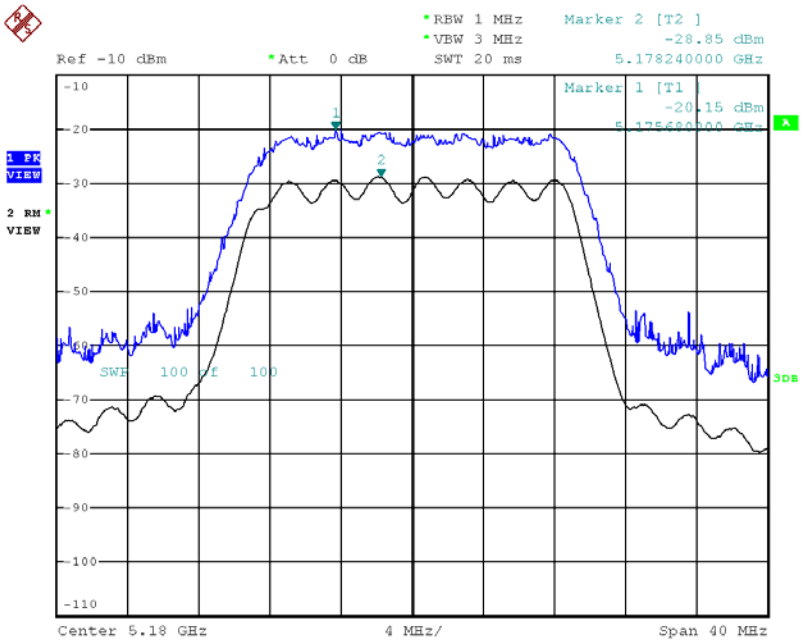
Configuration IEEE 802.11a / Chain 1 + Chain 2 (2TX)

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
36	5180 MHz	8.36	13	**Complies**

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

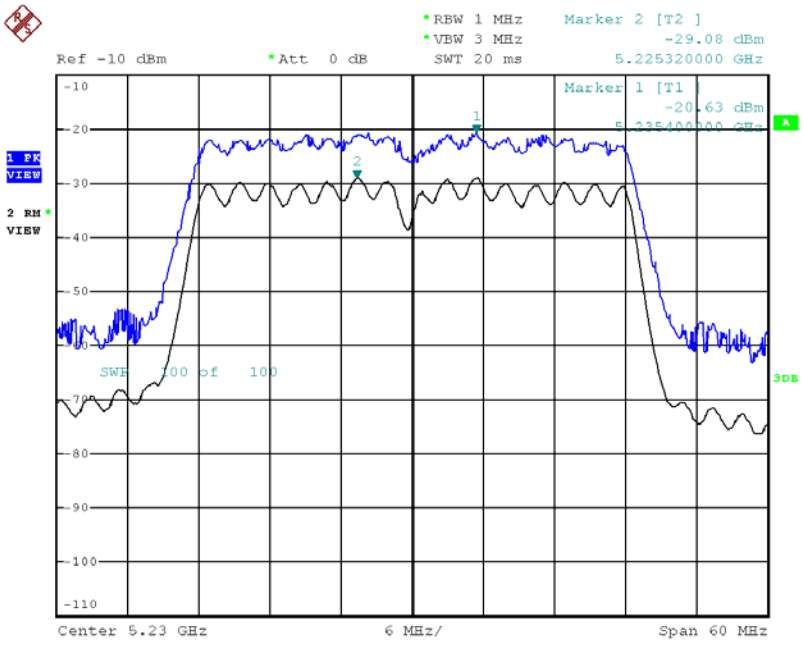
For plots, only the channel with maximum results was shown.

Peak Excursion Plot on Configuration IEEE 802.11n MCS0 20MHz / 5180 MHz / Chain 1 + Chain 2 (2TX)



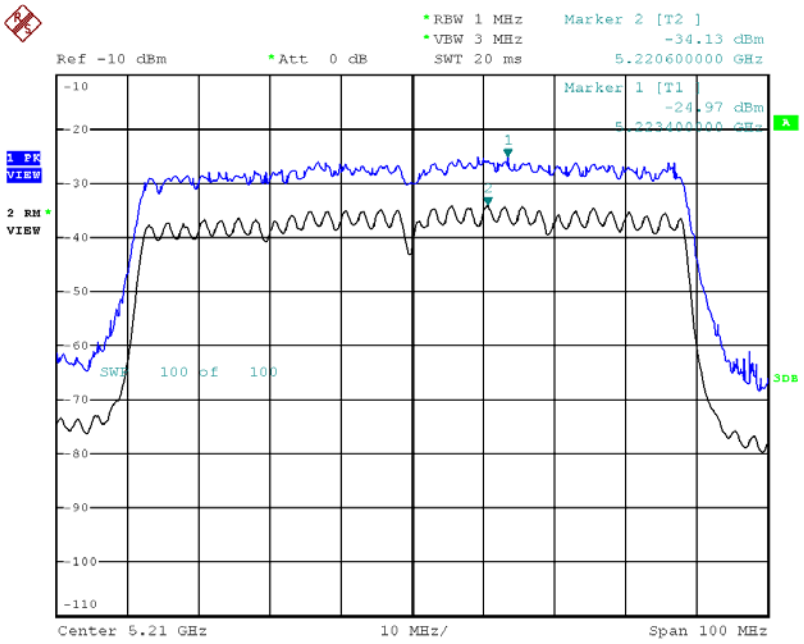
Date: 16.JAN.2013 22:52:50

Peak Excursion Plot on Configuration IEEE 802.11n MCS0 40MHz / 5230 MHz / Chain 1 + Chain 2 (2TX)



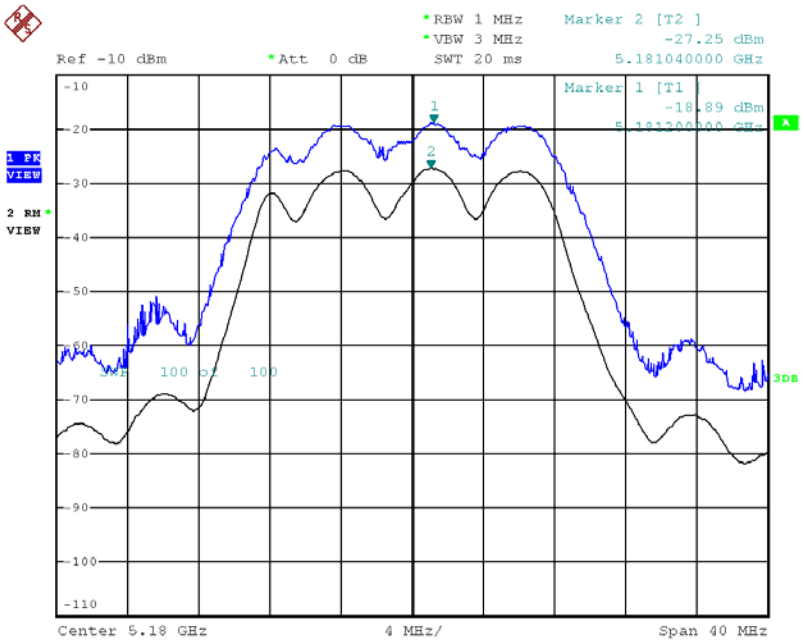
Date: 16.JAN.2013 23:00:42

Peak Excursion Plot on Configuration IEEE 802.11ac MCS0 VHT 80MHz / 5210 MHz / Chain 1 + Chain 2 (2TX)



Date: 16.JAN.2013 23:03:25

Peak Excursion Plot on Configuration IEEE 802.11a / 5180 MHz / Chain 1 + Chain 2 (2TX)



Date: 16.JAN.2013 22:26:17

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

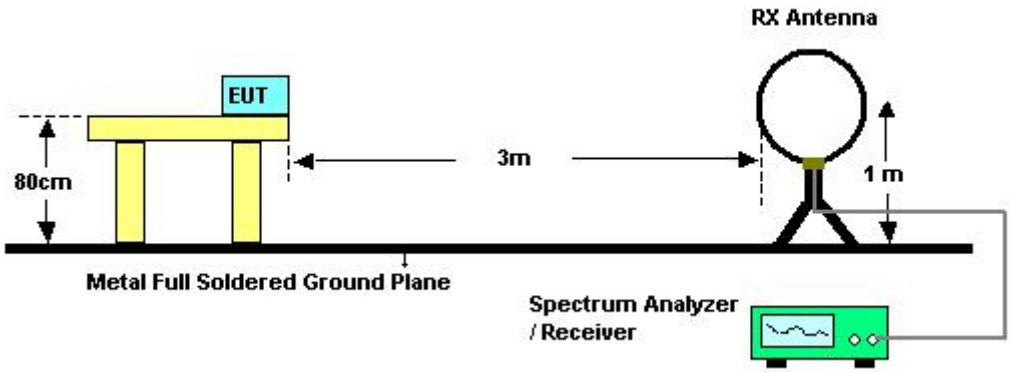
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.6.3. Test Procedures

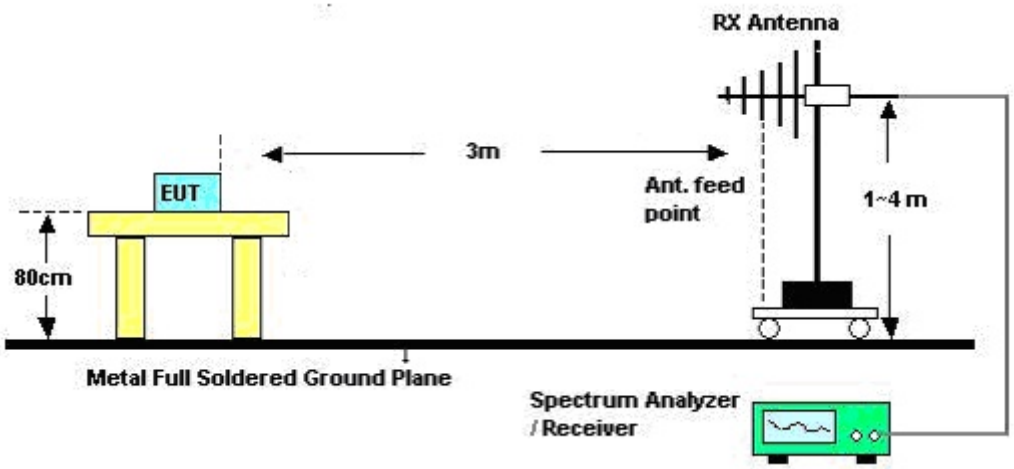
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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	24.5℃	Humidity	60%
Test Engineer	Serway Li	Configurations	CTX
Test Date	Jan. 17, 2013		

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.

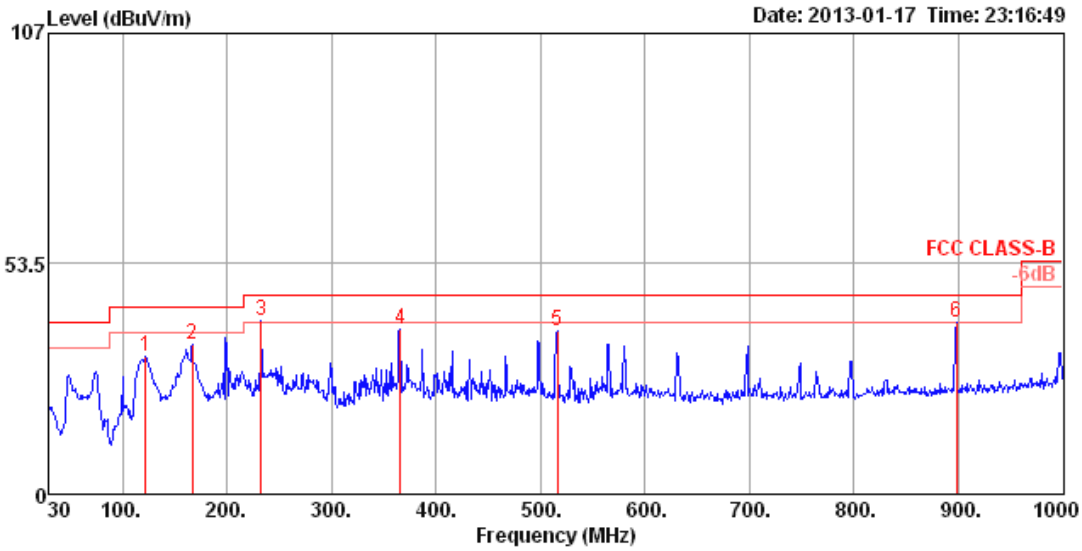
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

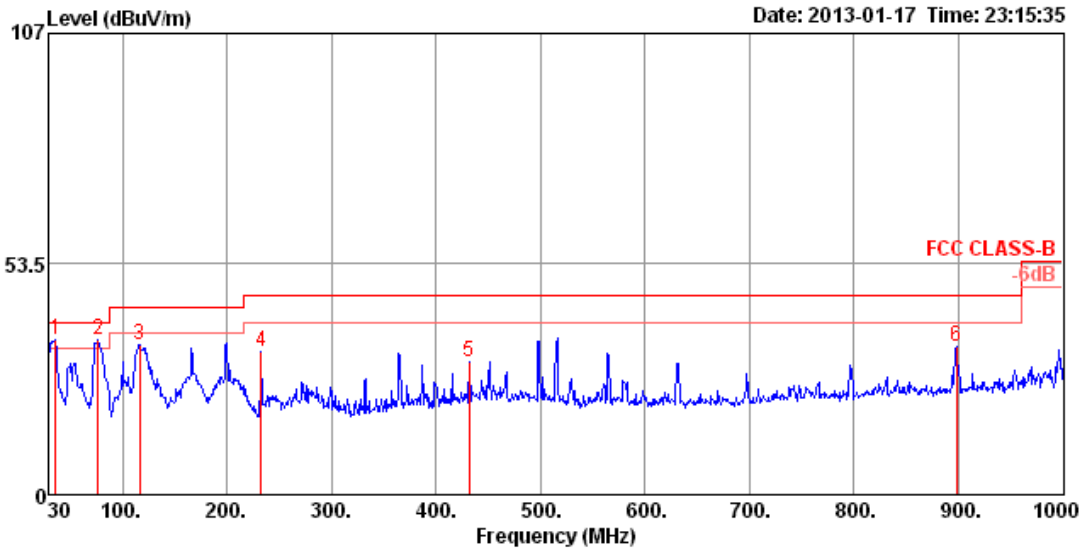
Temperature	24.5℃	Humidity	60%
Test Engineer	Serway Li	Configurations	CTX

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	122.15	31.81	43.50	-11.69	50.41	1.31	11.65	31.56	150	339	HORIZONTAL	Peak
2	166.77	34.90	43.50	-8.60	55.55	1.57	9.32	31.54	200	296	HORIZONTAL	Peak
3 pp	232.73	40.20	46.00	-5.80	59.79	1.84	10.02	31.45	150	117	HORIZONTAL	Peak
4	365.62	38.43	46.00	-7.57	52.66	2.39	14.75	31.37	100	156	HORIZONTAL	Peak
5	515.97	37.76	46.00	-8.24	49.00	2.86	17.31	31.41	150	142	HORIZONTAL	Peak
6	898.15	39.97	46.00	-6.03	46.57	3.97	20.63	31.20	100	264	HORIZONTAL	Peak

Vertical



		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	pp	35.82	35.87	40.00	-4.13	52.43	0.70	14.62	31.88	100	1	VERTICAL	Peak
2	!	76.56	35.84	40.00	-4.16	60.18	1.03	6.32	31.69	150	318	VERTICAL	Peak
3		116.33	34.84	43.50	-8.66	53.60	1.28	11.51	31.55	125	330	VERTICAL	Peak
4		232.73	33.16	46.00	-12.84	52.75	1.84	10.02	31.45	200	146	VERTICAL	Peak
5		431.58	30.96	46.00	-15.04	43.32	2.59	16.21	31.16	125	265	VERTICAL	Peak
6		898.15	34.29	46.00	-11.71	40.89	3.97	20.63	31.20	100	129	VERTICAL	Peak

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	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11n MCS0 20MHz Ch 36 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	10360.00	36.44	54.00	-17.56	28.72	4.97	38.37	35.62	Average	131	316	HORIZONTAL
2	10360.00	47.02	74.00	-26.98	39.30	4.97	38.37	35.62	Peak	131	316	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	10359.84	37.02	54.00	-16.98	29.30	4.97	38.37	35.62	Average	122	221	VERTICAL
2	10359.84	46.76	74.00	-27.24	39.04	4.97	38.37	35.62	Peak	122	221	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11n MCS0 20MHz Ch 40 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15592.85	52.95	74.00	-21.05	44.56	6.13	37.60	35.34	Peak	100	229	HORIZONTAL
2	15599.10	38.79	54.00	-15.21	30.40	6.13	37.60	35.34	Average	100	229	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	15596.96	38.81	54.00	-15.19	30.42	6.13	37.60	35.34	Average	100	147	VERTICAL
2	15600.26	51.96	74.00	-22.04	43.57	6.13	37.60	35.34	Peak	100	147	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11n MCS0 20MHz Ch 48 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15724.33	39.02	54.00	-14.98	30.79	6.14	37.48	35.39	Average	100	255	HORIZONTAL
2	15725.80	52.49	74.00	-21.51	44.28	6.14	37.46	35.39	Peak	100	255	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	15718.94	52.45	74.00	-21.55	44.22	6.14	37.48	35.39	Peak	100	145	VERTICAL
2	15722.47	39.03	54.00	-14.97	30.80	6.14	37.48	35.39	Average	100	145	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11n MCS0 40MHz Ch 38 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15569.92	50.65	74.00	-23.35	42.22	6.13	37.63	35.33	Peak	125	307	HORIZONTAL
2	15570.08	38.78	54.00	-15.22	30.35	6.13	37.63	35.33	Average	125	307	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	15570.08	39.05	54.00	-14.95	30.60	6.13	37.65	35.33	Average	100	235	VERTICAL
2	15570.08	49.94	74.00	-24.06	41.49	6.13	37.65	35.33	Peak	100	235	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11n MCS0 40MHz Ch 46 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15684.68	52.40	74.00	-21.60	44.12	6.14	37.51	35.37	Peak	100	278	HORIZONTAL
2	15699.10	39.07	54.00	-14.93	30.82	6.14	37.49	35.38	Average	100	278	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	15670.26	52.56	74.00	-21.44	44.26	6.14	37.53	35.37	Peak	100	132	VERTICAL
2	15698.46	38.95	54.00	-15.05	30.70	6.14	37.49	35.38	Average	100	132	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11ac MCS0 VHT 80MHz Ch 42 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15628.24	51.81	74.00	-22.19	43.46	6.14	37.56	35.35	Peak	114	146	HORIZONTAL
2	15630.00	39.12	54.00	-14.88	30.77	6.14	37.56	35.35	Average	114	146	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	15628.56	51.25	74.00	-22.75	42.90	6.14	37.56	35.35	Peak	100	214	VERTICAL
2	15630.00	38.72	54.00	-15.28	30.37	6.14	37.56	35.35	Average	100	214	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11a Ch 36 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15540.16	38.31	54.00	-15.69	29.84	6.13	37.65	35.31	Average	100	256	HORIZONTAL
2	15540.16	49.82	74.00	-24.18	41.35	6.13	37.65	35.31	Peak	100	256	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	15540.08	38.62	54.00	-15.38	30.11	6.13	37.69	35.31	Average	100	288	VERTICAL
2	15540.08	49.22	74.00	-24.78	40.71	6.13	37.69	35.31	Peak	100	288	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11a Ch 40 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15592.85	52.95	74.00	-21.05	44.56	6.13	37.60	35.34	Peak	100	229	HORIZONTAL
2	15599.10	38.79	54.00	-15.21	30.40	6.13	37.60	35.34	Average	100	229	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	15596.96	38.81	54.00	-15.19	30.42	6.13	37.60	35.34	Average	100	147	VERTICAL
2	15600.26	51.96	74.00	-22.04	43.57	6.13	37.60	35.34	Peak	100	147	VERTICAL

Temperature	25.6℃	Humidity	62%
Test Engineer	Andre Tak	Configurations	IEEE 802.11a Ch 48 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

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	15724.33	39.02	54.00	-14.98	30.79	6.14	37.48	35.39	Average	100	255	HORIZONTAL
2	15725.80	52.49	74.00	-21.51	44.28	6.14	37.46	35.39	Peak	100	255	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	15718.94	52.45	74.00	-21.55	44.22	6.14	37.48	35.39	Peak	100	145	VERTICAL
2	15722.47	39.03	54.00	-14.97	30.80	6.14	37.48	35.39	Average	100	145	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	25.6℃	Humidity	62%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 20MHz Ch 36, 40, 48 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

Channel 36

	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	5096.00	64.10	74.00	-9.90	27.10	3.42	33.58	0.00	Peak	175	74	HORIZONTAL
2	5100.80	53.81	54.00	-0.19	16.81	3.42	33.58	0.00	Average	175	74	HORIZONTAL
3	5178.80	113.97			76.80	3.44	33.73	0.00	Peak	175	74	HORIZONTAL
4	5181.20	103.68			66.51	3.44	33.73	0.00	Average	175	74	HORIZONTAL

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

Channel 40

	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	5119.23	63.79	74.00	-10.21	26.75	3.43	33.61	0.00	Peak	155	113	HORIZONTAL
2	5121.54	53.74	54.00	-0.26	16.70	3.43	33.61	0.00	Average	155	113	HORIZONTAL
3	5192.64	114.17			77.00	3.44	33.73	0.00	Peak	155	113	HORIZONTAL
4	5199.04	102.84			65.63	3.45	33.76	0.00	Average	155	113	HORIZONTAL

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

Channel 48

	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	5115.43	52.67	74.00	-21.33	15.64	3.42	33.61	0.00	Peak	113	319	VERTICAL
2	5118.11	41.23	54.00	-12.77	4.20	3.42	33.61	0.00	Average	113	319	VERTICAL
3	5240.72	102.91			65.63	3.46	33.82	0.00	Average	113	319	VERTICAL
4	5243.12	113.49			76.21	3.46	33.82	0.00	Peak	113	319	VERTICAL
5	5353.37	43.67	54.00	-10.33	6.15	3.49	34.03	0.00	Average	113	319	VERTICAL
6	5355.77	54.22	74.00	-19.78	16.70	3.49	34.03	0.00	Peak	113	319	VERTICAL

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

Temperature	25.6℃	Humidity	62%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 40MHz Ch 38, 46 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

Channel 38

	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	5148.40	53.50	54.00	-0.50	16.40	3.43	33.67	0.00	Average	174	258	HORIZONTAL
2	5148.40	69.19	74.00	-4.81	32.09	3.43	33.67	0.00	Peak	174	258	HORIZONTAL
3	5176.00	96.12			58.98	3.44	33.70	0.00	Average	174	258	HORIZONTAL
4	5185.20	107.12			69.95	3.44	33.73	0.00	Peak	174	258	HORIZONTAL

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

Channel 46

	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	5144.23	64.38	74.00	-9.62	27.28	3.43	33.67	0.00	Peak	183	252	HORIZONTAL
2	5144.87	53.28	54.00	-0.72	16.18	3.43	33.67	0.00	Average	183	252	HORIZONTAL
3	5224.88	102.42			65.17	3.46	33.79	0.00	Average	183	252	HORIZONTAL
4	5226.96	113.81			76.56	3.46	33.79	0.00	Peak	183	252	HORIZONTAL

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

Temperature	25.6℃	Humidity	62%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 VHT 20MHz Ch 36, 40, 48 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

Channel 36

	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	5098.00	64.81	74.00	-9.19	27.81	3.42	33.58	0.00	Peak	173	236	HORIZONTAL
2	5100.40	53.80	54.00	-0.20	16.80	3.42	33.58	0.00	Average	173	236	HORIZONTAL
3	5178.00	100.92			63.75	3.44	33.73	0.00	Average	173	236	HORIZONTAL
4	5178.40	111.34			74.17	3.44	33.73	0.00	Peak	173	236	HORIZONTAL

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

Channel 40

	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	5118.59	53.65	54.00	-0.35	16.61	3.43	33.61	0.00	Average	177	280	HORIZONTAL
2	5126.28	65.60	74.00	-8.40	28.53	3.43	33.64	0.00	Peak	177	280	HORIZONTAL
3	5199.04	102.75			65.54	3.45	33.76	0.00	Average	177	280	HORIZONTAL
4	5206.41	112.70			75.49	3.45	33.76	0.00	Peak	177	280	HORIZONTAL

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

Channel 48

	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	5237.12	115.91			78.63	3.46	33.82	0.00	Peak	153	98	HORIZONTAL
2	5239.52	105.83			68.55	3.46	33.82	0.00	Average	153	98	HORIZONTAL
3	5352.40	43.91	54.00	-10.09	6.39	3.49	34.03	0.00	Average	153	98	HORIZONTAL
4	5354.33	55.27	74.00	-18.73	17.75	3.49	34.03	0.00	Peak	153	98	HORIZONTAL

Item 1, 2 are the fundamental frequency at 5240 MHz.

Temperature	25.6℃	Humidity	62%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 VHT 40MHz Ch 38, 46 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

Channel 38

	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	5150.00	53.41	54.00	-0.59	16.31	3.43	33.67	0.00	Average	172	267	HORIZONTAL
2	5150.00	68.93	74.00	-5.07	31.83	3.43	33.67	0.00	Peak	172	267	HORIZONTAL
3	5185.20	96.27			59.10	3.44	33.73	0.00	Average	172	267	HORIZONTAL
4	5186.40	107.21			70.04	3.44	33.73	0.00	Peak	172	267	HORIZONTAL

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

Channel 46

	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	5146.80	53.48	54.00	-0.52	16.38	3.43	33.67	0.00	Average	173	89	HORIZONTAL
2	5146.80	66.10	74.00	-7.90	29.00	3.43	33.67	0.00	Peak	173	89	HORIZONTAL
3	5219.10	112.14			74.90	3.45	33.79	0.00	Peak	173	89	HORIZONTAL
4	5224.55	101.09			63.84	3.46	33.79	0.00	Average	173	89	HORIZONTAL

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

Temperature	25.6℃	Humidity	62%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 VHT 80MHz Ch 42 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

Channel 42

	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	5148.00	53.51	54.00	-0.49	16.41	3.43	33.67	0.00	Average	172	278	HORIZONTAL
2	5148.00	67.68	74.00	-6.32	30.58	3.43	33.67	0.00	Peak	172	278	HORIZONTAL
3	5216.00	91.57			54.33	3.45	33.79	0.00	Average	172	278	HORIZONTAL
4	5217.00	104.32			67.08	3.45	33.79	0.00	Peak	172	278	HORIZONTAL

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

Temperature	25.6℃	Humidity	62%
Test Engineer	David Tseng	Configurations	IEEE 802.11a Ch 36, 40, 48 / Chain 1 + Chain 2 (2TX)
Test Date	Jan. 04, 2013		

Channel 36

	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	5102.00	53.30	54.00	-0.70	16.30	3.42	33.58	0.00	Average	202	88	HORIZONTAL
2	5102.40	64.67	74.00	-9.33	27.67	3.42	33.58	0.00	Peak	202	88	HORIZONTAL
3	5182.00	103.18			66.01	3.44	33.73	0.00	Average	202	88	HORIZONTAL
4	5182.40	114.08			76.91	3.44	33.73	0.00	Peak	202	88	HORIZONTAL

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

Channel 40

	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	5124.74	51.19	54.00	-2.81	14.15	3.43	33.61	0.00	Average	100	297	VERTICAL
2	5124.81	61.40	74.00	-12.60	24.36	3.43	33.61	0.00	Peak	100	297	VERTICAL
3	5199.04	103.85			66.64	3.45	33.76	0.00	Average	100	297	VERTICAL
4	5199.04	113.90			76.69	3.45	33.76	0.00	Peak	100	297	VERTICAL

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

Channel 48

	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	5121.15	45.63	54.00	-8.37	8.59	3.43	33.61	0.00	Average	200	247	HORIZONTAL
2	5125.82	58.22	74.00	-15.78	21.18	3.43	33.61	0.00	Peak	200	247	HORIZONTAL
3	5241.20	117.55			80.27	3.46	33.82	0.00	Peak	200	247	HORIZONTAL
4	5241.44	107.65			70.37	3.46	33.82	0.00	Average	200	247	HORIZONTAL
5	5361.54	47.85	54.00	-6.15	10.33	3.49	34.03	0.00	Average	200	247	HORIZONTAL
6	5361.54	59.74	74.00	-14.26	22.22	3.49	34.03	0.00	Peak	200	247	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

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

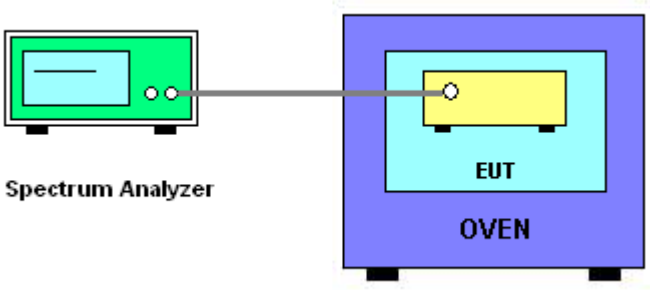
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 -30°C~50°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	5199.9622
110.00	5199.9520
93.50	5199.9584
Max. Deviation (MHz)	**0.048000**
Max. Deviation (ppm)	**9.23**

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	**5200**
-30	5200.0354
-20	5200.0150
-10	5200.0300
0	5199.9784
10	5199.9520
20	5199.9382
30	5199.9376
40	5199.9310
50	5200.0354
Max. Deviation (MHz)	**0.069000**
Max. Deviation (ppm)	**13.27**

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)
Coupling and Decoupling Network	TESEQ	ISN PLC 25-25	26476	0.15MHz~30MHz	Feb. 09, 2012	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 4, 2012	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-----	-----	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2012	Radiation (03CH01-CB)
Horn 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)
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)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 28, 2012	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 27, 2012	Conducted (TH01-CB)

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

N.C.R. 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