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FCC RADIO TEST REPORT

Applicant's company	**Proxim Wireless Corporation**
Applicant Address	1561 Buckeye Drive, Milpitas, CA 95035, USA
FCC ID	**HZB-MB83HP5**
Manufacturer's company	**Proxim Wireless Corporation**
Manufacturer Address	1561 Buckeye Drive, Milpitas, CA 95035, USA

Product Name	802.11 a/b/g/n Mini-PCI module
Brand Name	Proxim
Model Name	MB82HP
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250MHz
Received Date	Jun. 14, 2012
Final Test Date	Aug. 09, 2012
Submission Type	Original Equipment
Operating Mode	Master / Slave

Statement

Test result included is for the IEEE 802.11n and IEEE 802.11a (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** and **47 CFR FCC Part 15 Subpart E** and KDB 789033 – 20120305.

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

Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR062219-03AA	Rev. 01	Initial issue of report	Oct. 09, 2012

Certificate No.: CB10109002

1. CERTIFICATE OF COMPLIANCE

Product Name	:	802.11 a/b/g/n Mini-PCI module
Brand Name	:	Proxim
Model Name	:	MB82HP
Applicant	:	Proxim Wireless Corporation
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 Jun. 14, 2012 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.

Jordan Hsiao

Jordan Hsiao
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	7.87 dB
4.2	15.407(a)	26dB Spectrum Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.10dB
4.4	15.407(a)	Power Spectral Density	Complies	0.01 dB
4.5	15.407(a)	Peak Excursion	Complies	3.16 dB
4.6	15.407(b)	Radiated Emissions	Complies	5.72 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.49 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

Note 1: The module (Model number: MB82HP) is Limited Module Approval and only limited to install to the AP (Proxim / MP 8200).

Note 2: During operating, the different antenna is placed in different direction. Therefore, it will not be affected by array gain.

Note 3: This EUT supports only 4.9G and 5GHz 11a/n without other frequency band. The 2.4GHz band is disabled by firmware.

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

Items	Description
Product Type	WLAN (2/3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From DC power supply
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	5150 ~ 5250MHz
Channel Number	4 for 20MHz bandwidth ; 2 for 40MHz bandwidth
Channel Band Width (99%)	MCS0 (20MHz): 18.72 MHz ; MCS0 (40MHz): 36.48 MHz
Conducted Output Power	MCS0 (20MHz): 16.90 dBm ; MCS0 (40MHz): 16.83 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a

Items	Description
Product Type	WLAN (2/3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From DC power supply
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%)	11a: 16.80 MHz
Conducted Output Power	11a: 16.84 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

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

IEEE 802.11n spec

MCS index	Spatial streams	Modulation type	Coding rate	Data rate (Mbit/s)			
				20 MHz channel		40 MHz channel	
				800 ns GI	400 ns GI	800 ns GI	400 ns GI
0	1	BPSK	1/2	6.5	7.2	13.5	15
1	1	QPSK	1/2	13	14.4	27	30
2	1	QPSK	3/4	19.5	21.7	40.5	45
3	1	16-QAM	1/2	26	28.9	54	60
4	1	16-QAM	3/4	39	43.3	81	90
5	1	64-QAM	2/3	52	57.8	108	120
6	1	64-QAM	3/4	58.5	65	121.5	135
7	1	64-QAM	5/6	65	72.2	135	150
8	2	BPSK	1/2	13	14.4	27	30
9	2	QPSK	1/2	26	28.9	54	60
10	2	QPSK	3/4	39	43.3	81	90
11	2	16-QAM	1/2	52	57.8	108	120
12	2	16-QAM	3/4	78	86.7	162	180
13	2	64-QAM	2/3	104	115.6	216	240
14	2	64-QAM	3/4	117	130	243	270
15	2	64-QAM	5/6	130	144.4	270	300
16	3	BPSK	1/2	19.5	21.7	40.5	45
17	3	QPSK	1/2	39	43.3	81	90
18	3	QPSK	3/4	58.5	65	121.5	135
19	3	16-QAM	1/2	78	86.7	162	180
20	3	16-QAM	3/4	117	130	243	270
21	3	64-QAM	2/3	156	173.3	324	360
22	3	64-QAM	3/4	175.5	195	364.5	405
23	3	64-QAM	5/6	195	216.7	405	450

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

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Chain	Attenuator (dBi)	Connector	Antenna Gain	Cable loss	Test Ant Gain (dBi)
1	MARS	MA-WA55-30	Panel	1/2/3	20	N-Type, Female	30	2	8
2	MARS	MA-WB55-20	Sector	1/2/3	10	N-Type, Female	20	2	8
3	SmartAnt	USI05-220170	Dipole	1/2/3	-	RP SMA Plug	5	1	4
4	MARS	MA-WO55-10NH	Ommi	1/2/3	-	N-Type, Female / N-Type, Male (optional)	10	2	8
5	CommScope	PX3F-52-N7A	Dish	1/3	20	N Female	34	2	12
6	MARS	MA-WA56-DP25N	Panel	1/3	20	N-Type, Female	23.5	2	1.5
7	MARS	MA-WD56-DP16	Sector	1/3	10	N-Type, Female	16	2	4

Note: There are 7 antennas in the antenna table list.

Only Ant 3 is used for 5GHz band 1, so it was selected to test and recorded in the report.

Table of TX/RX Function in each antenna:

Item			Module					
			Chain 1		Chain 2		Chain 3	
			TX	RX	TX	RX	TX	RX
Ant.3	5GHz	11a	V	V	V	V	V	V
		11n	V	V	V	V	V	V

Note : The EUT can support both 2TX and 3TX functions.

Ant. 1~Ant. 4 for 3TX functions.

IEEE 802.11a/n mode (3TX, 3RX)

Chain 1, Chain 2 and Chain 3 can be used as transmitting/receiving antennas.

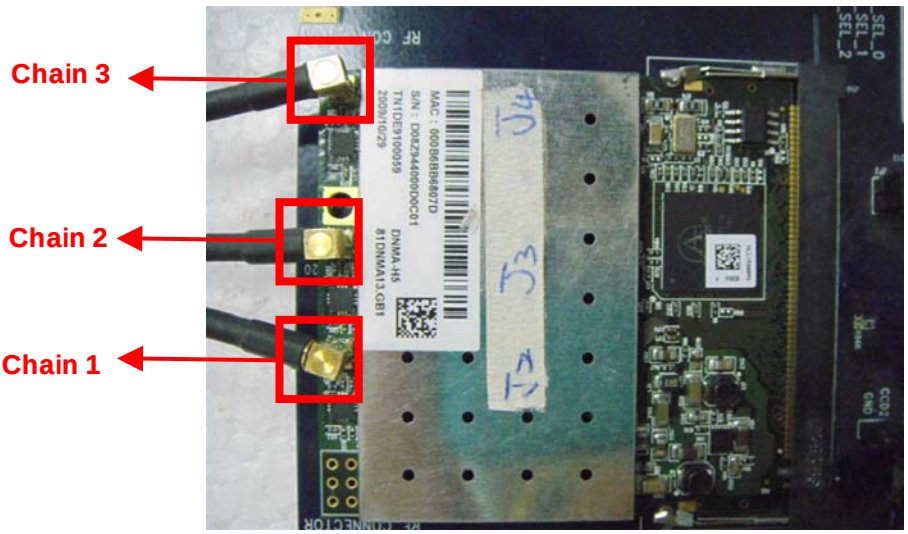
Chain 1, Chain 2 and Chain 3 could transmit/receive simultaneously.

Ant. 5~Ant. 7 for 2TX functions.

IEEE 802.11a/n mode (2TX, 2RX)

Chain 1 and Chain 3 can be used as transmitting/receiving antennas.

Chain 1 and Chain 3 could transmit/receive simultaneously.



Module	Required 2TX Port
5G	Chain 1 and Chain 3

Module	Required 3TX Port
5G	Chain 1 and Chain 2 and Chain 3

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.

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

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		Auto	-	-
Max. Conducted Output Power Power Spectral Density	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1/2/3/1+2+3
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1/2/3/1+2+3
	11a/BPSK	Band 1	6Mbps	36/40/48	1/2/3/1+2+3
26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement Peak Excursion	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2+3
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2+3
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3
Radiated Emission Below 1GHz	CTX		Auto	-	-
Radiated Emission Above 1GHz	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2+3
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2+3
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3
Band Edge Emission	MCS0/20MHz	Band 1	7.2Mbps	36/40/48	1+2+3
	MCS0/40MHz	Band 1	14.4Mbps	38/46	1+2+3
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3
Frequency Stability	Un-modulation		-	40	N/A

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1: Module + Ant. 1 (3TX)

Mode 2: Module + Ant. 5 (2TX)

All test results were recorded in the report.

For Radiated Emission test below 1GHz:

Mode 1: Module + Ant. 1 (3TX)

Mode 2: Module + Ant. 5 (2TX)

All test results were recorded in the report.

For Radiated Emission test above1GHz:

Mode 1: Module + Ant. 3 (3TX)

All test results were recorded in the report.

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

Support Unit	Brand	Model	FCC ID
Notebook	DELL	PP20L	E2KWM3945ABG
Mouse	iCooky	AMS0706W	DoC
Earphone	SHYARO CHI	MIC-04	N/A
Notebook	DELL	1200	E2K4965AGNM
Notebook	DELL	D520	E2KWM3945ABG
Power Supply	Gwinstek	GPC-60300	N/A

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

Test Software Version	Revision 0.9 BUILD #16 ART_11n		
Frequency	5180 MHz	5200 MHz	5240 MHz
Ant. 3	11	11	10.50

Power Parameters of IEEE 802.11n MCS0 40MHz

Test Software Version	Revision 0.9 BUILD #16 ART_11n	
Frequency	5190 MHz	5230 MHz
Ant. 3	9	10

Power Parameters of IEEE 802.11a

Test Software Version	Revision 0.9 BUILD #16 ART_11n		
Frequency	5180 MHz	5200 MHz	5240 MHz
Ant. 3	10	10.50	10.50

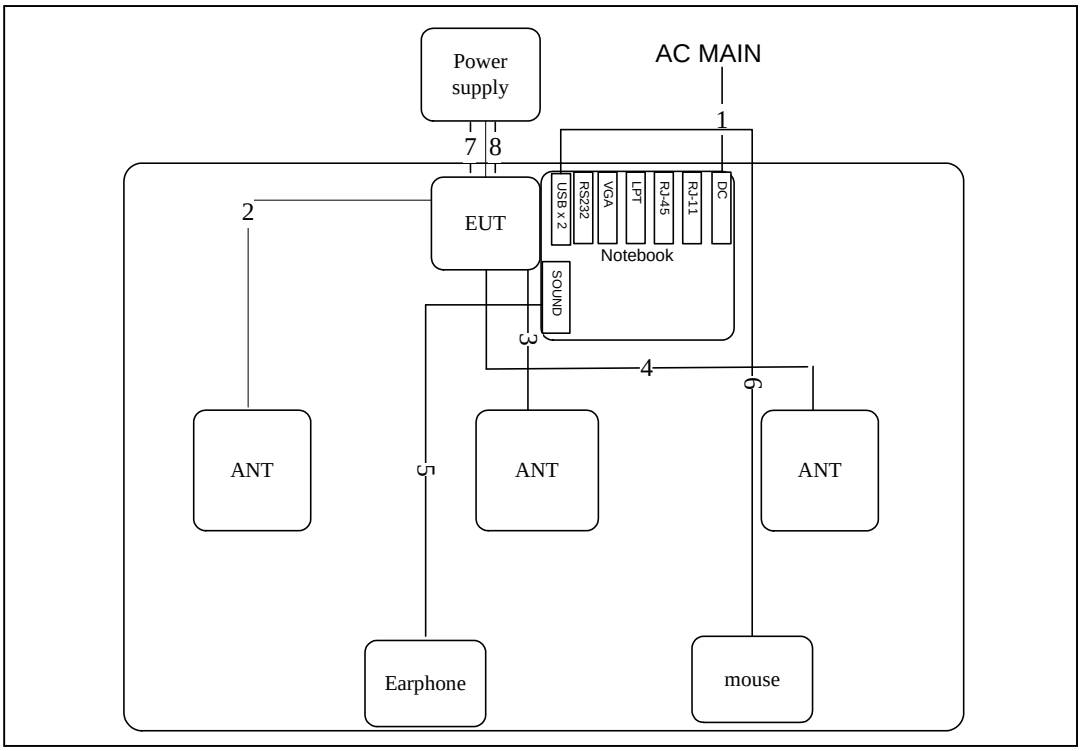
During the test, "**Revision 0.9 BUILD #16 ART_11n**" under WIN XP was executed the test program to control the EUT continuously transmit RF signal.

3.9. Test Configurations

3.9.1. Radiation Emissions Test Configuration

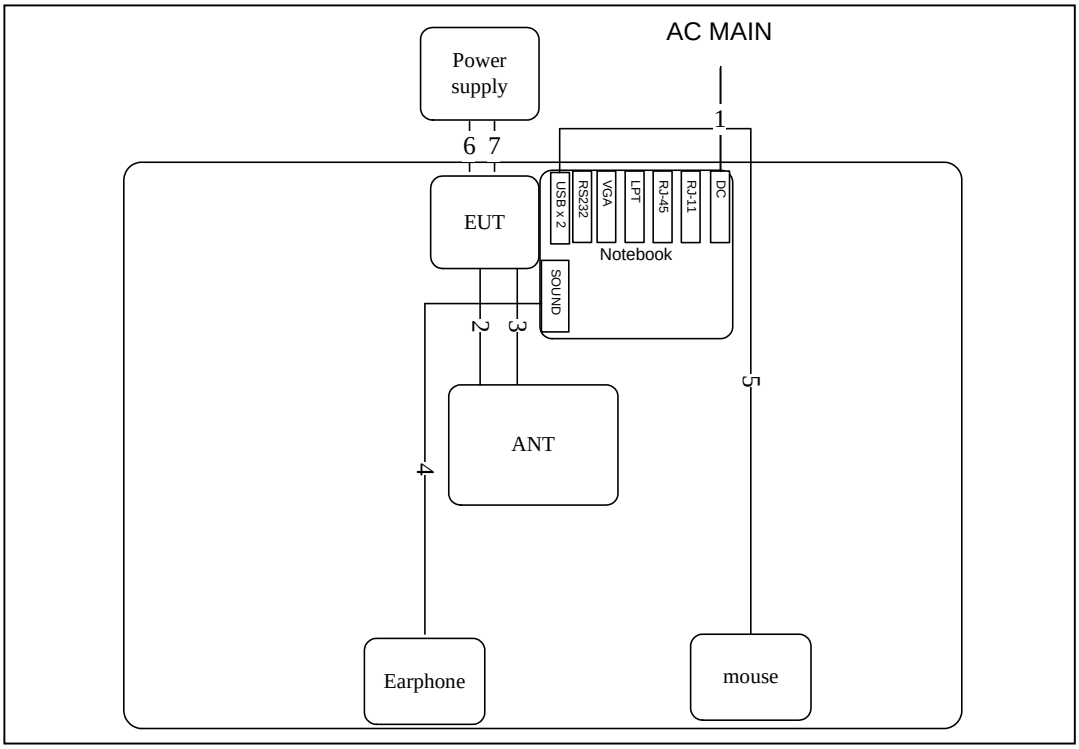
Test Configuration: 30MHz ~1GHz

Test Mode : Mode 1



Item	Connection	Shield	Length
1	Power cable	No	2.6M
2	ANT cable	Yes	1M
3	ANT cable	Yes	1M
4	ANT cable	Yes	1M
5	USB cable	No	1.8M
6	Earphone cable	No	1.1M
7	Power cable	Yes	1M
8	Power cable	No	1M

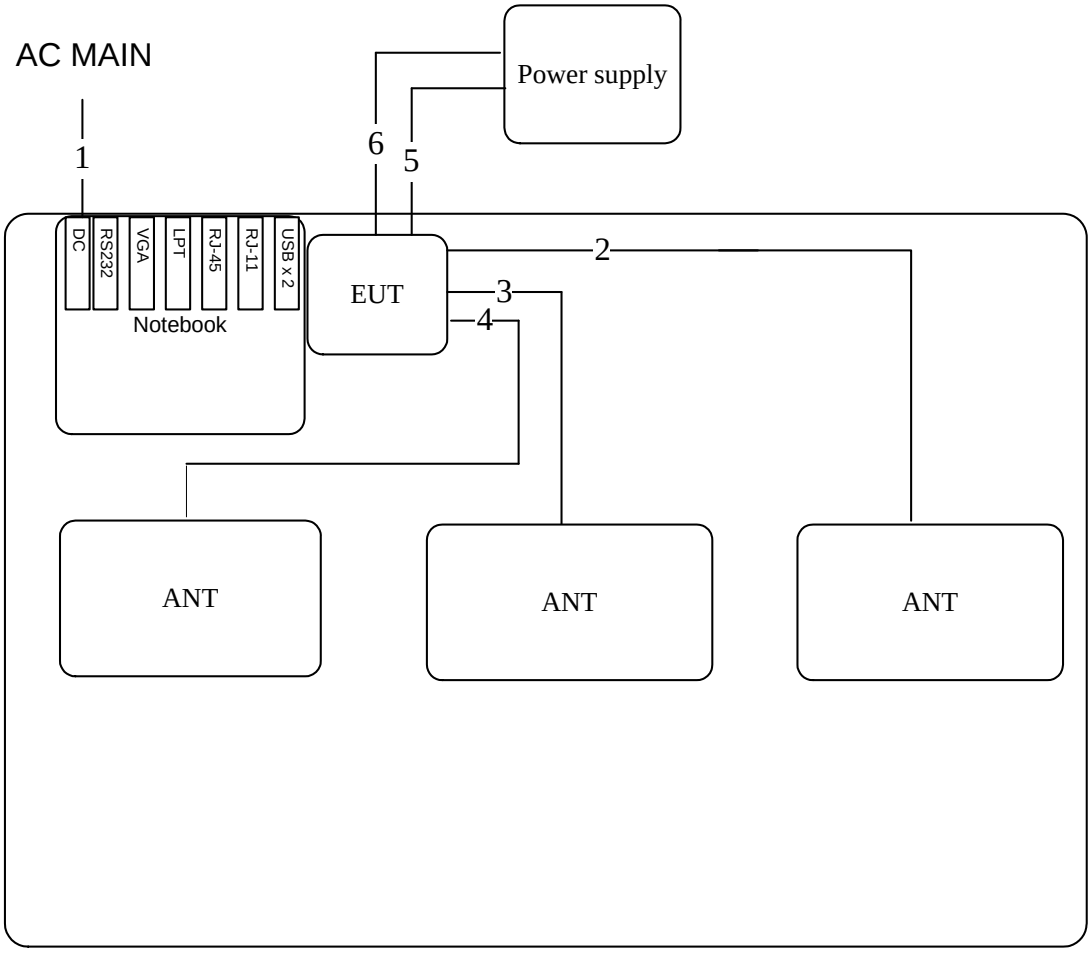
Test Mode : Mode 2



Item	Connection	Shield	Length
1	Power cable	No	2.6M
2	ANT cable	Yes	1M
L3	ANT cable	Yes	1M
4	USB cable	No	1.8M
5	Earphone cable	No	1.1M
6	Power cable	Yes	1M
7	Power cable	No	1M

Test Configuration: above 1GHz

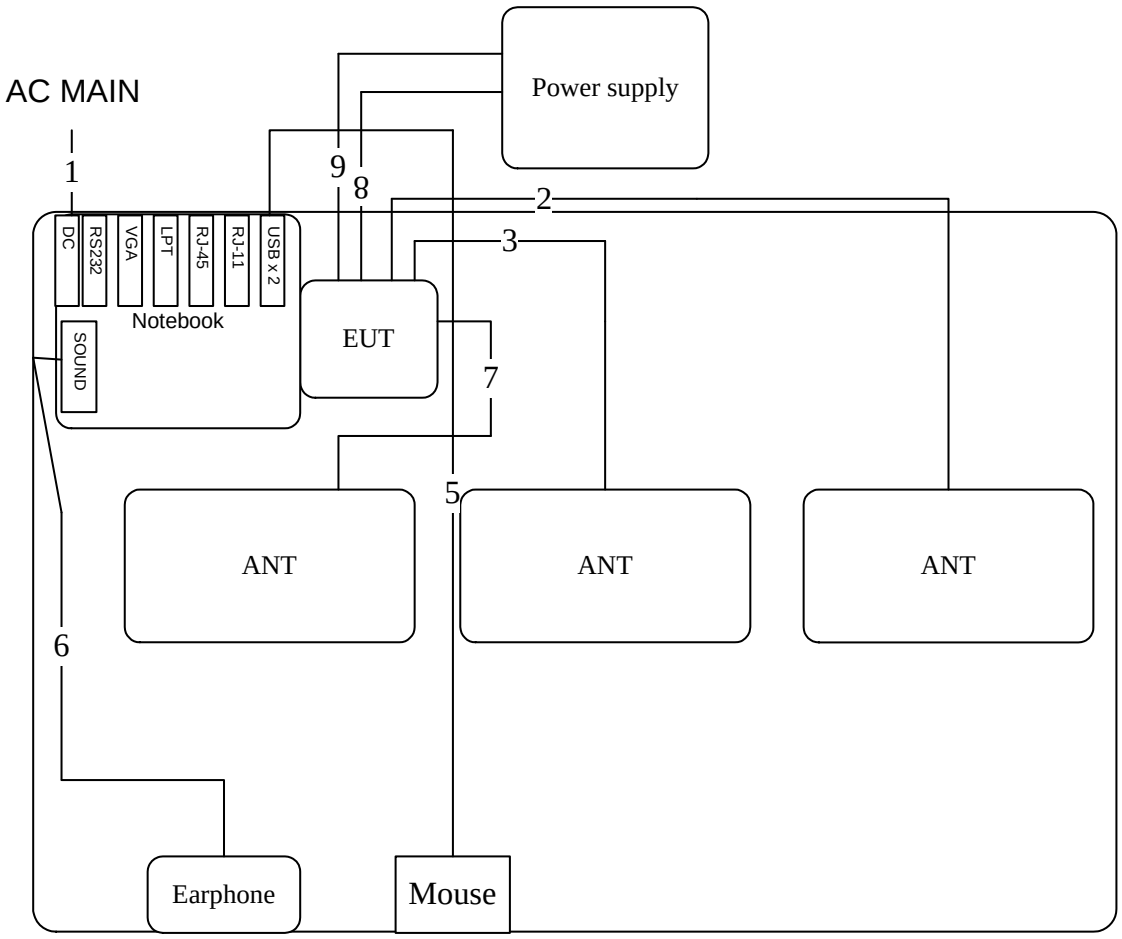
Test Mode : Mode 1



Item	Connection	Shield	Length
1	Power cable	No	2.6M
2	ANT cable	Yes	1M
3	ANT cable	Yes	1M
4	ANT cable	Yes	1M
5	Power cable	No	1M
6	Power cable	No	1M

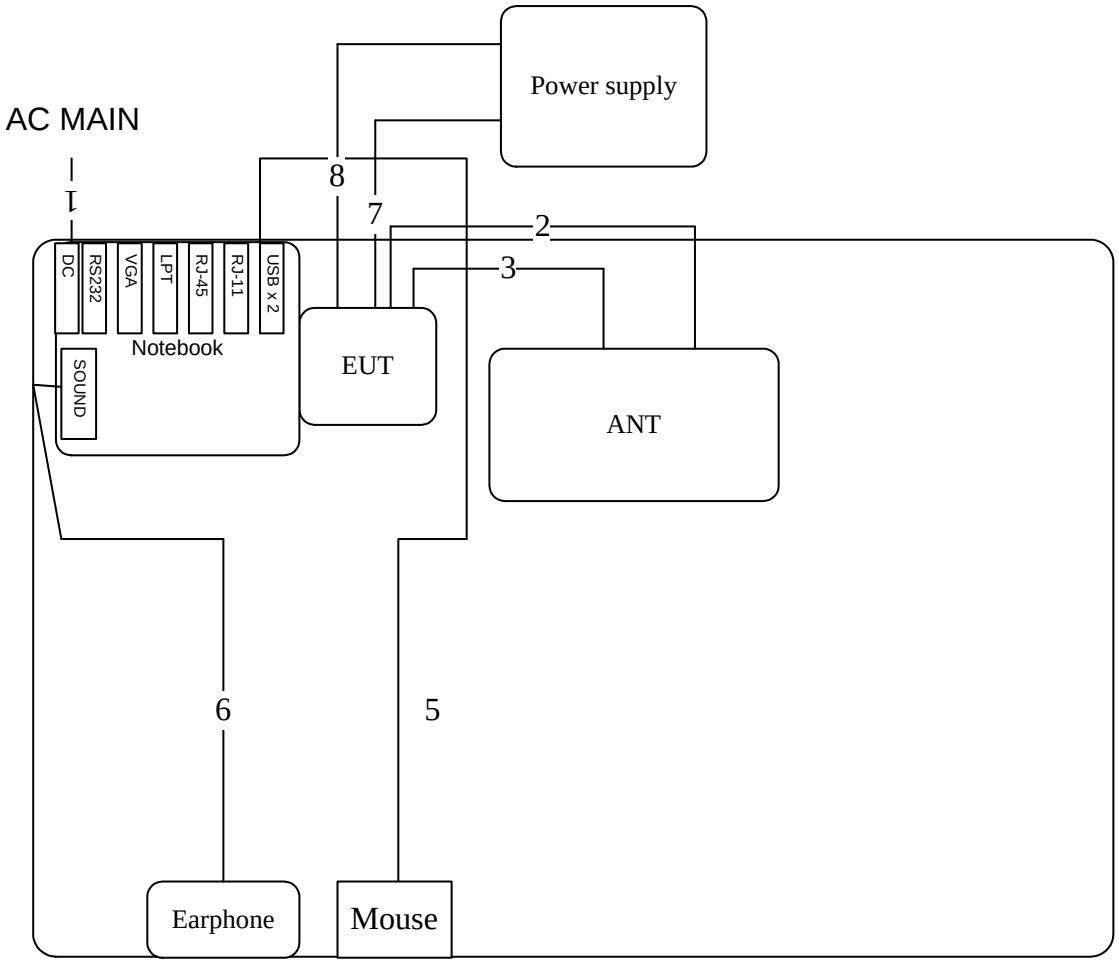
3.9.2. AC Power Line Conduction Emissions Test Configuration

Test Mode: Mode1



Item	Connection	Shield	Length
1	Power cable	No	2.6M
2	ANT cable	Yes	1M
3	ANT cable	Yes	1M
4	RJ-45 cable	No	10M
5	USB cable	No	1.8M
6	Earphone cable	No	1.1M
7	ANT cable	Yes	1M
8	Power cable	No	1M
9	Power cable	No	1M

Test Mode: Mode 2



Item	Connection	Shield	Length
1	Power cable	No	2.6M
2	ANT cable	Yes	1M
3	ANT cable	Yes	1M
4	RJ-45 cable	No	10M
5	USB cable	No	1.8M
6	Earphone cable	No	1.1M
7	Power cable	Yes	1M
8	Power cable	No	1M

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

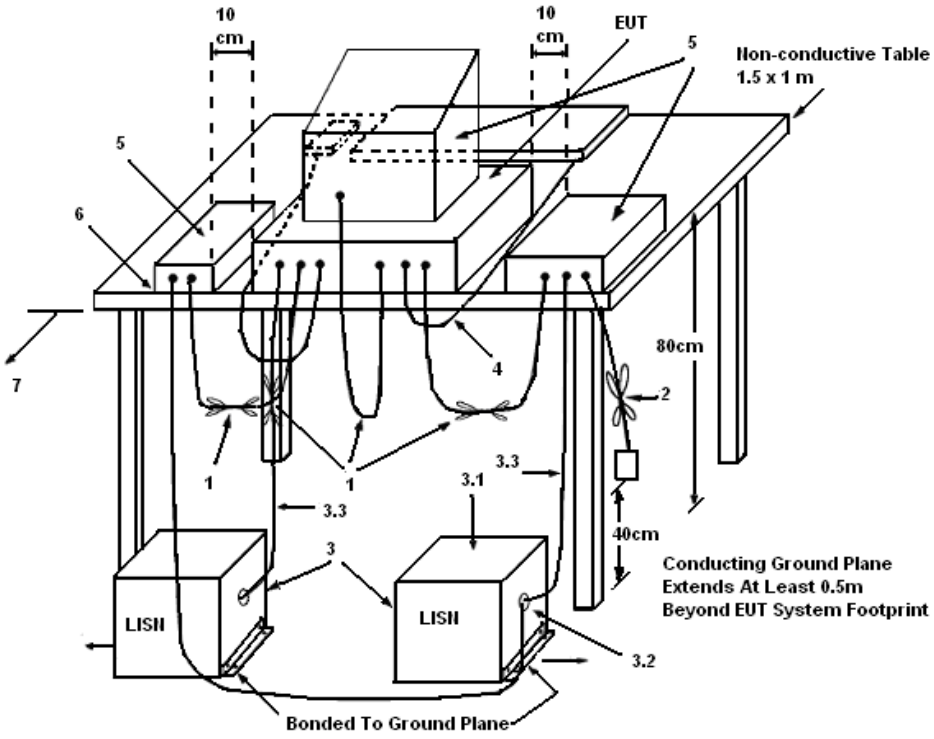
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

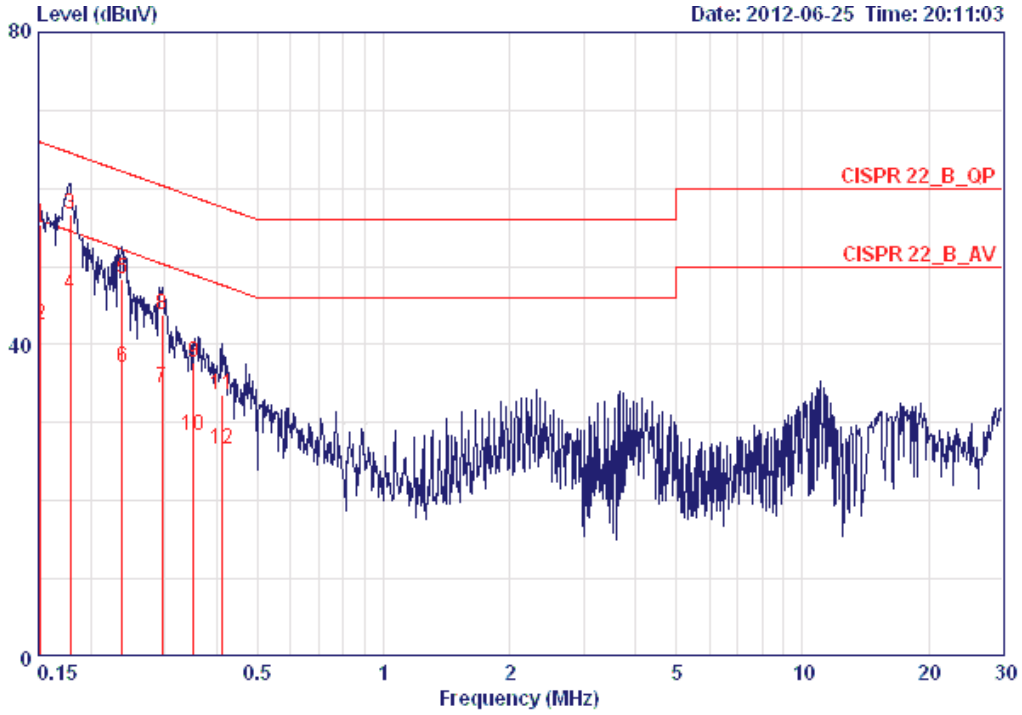
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

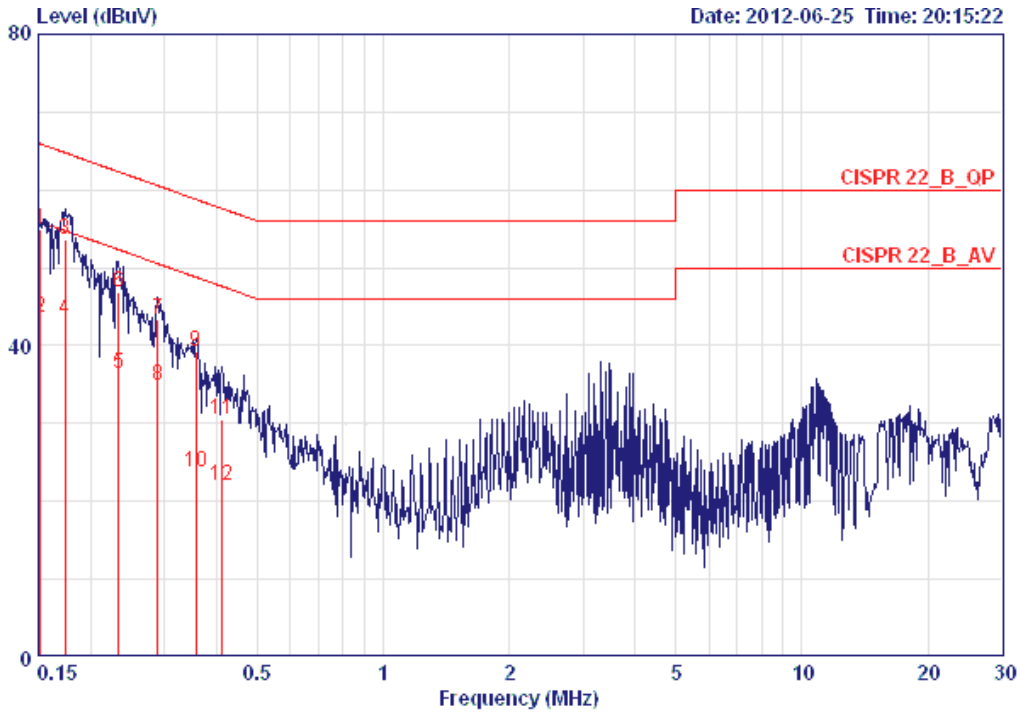
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	26℃	Humidity	58%
Test Engineer	Kane Liu	Phase	Line
Configuration	CTX	Test Mode	Mode 1



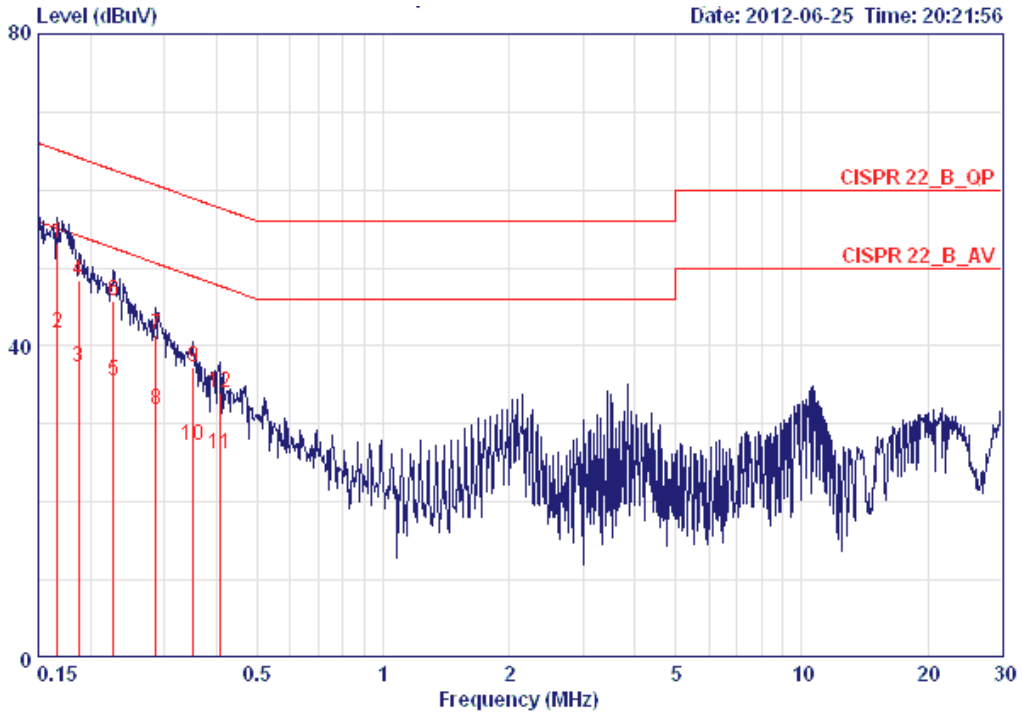
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.15160	55.42	-10.49	65.91	55.16	0.06	0.20	QP
2	0.15160	42.55	-13.36	55.91	42.29	0.06	0.20	AVERAGE
3 @	0.17866	56.67	-7.87	64.55	56.42	0.05	0.20	QP
4 @	0.17866	46.35	-8.19	54.55	46.10	0.05	0.20	AVERAGE
5	0.23784	48.32	-13.85	62.17	48.08	0.04	0.20	QP
6	0.23784	37.15	-15.02	52.17	36.91	0.04	0.20	AVERAGE
7	0.29555	34.51	-15.86	50.37	34.28	0.03	0.20	AVERAGE
8	0.29555	43.83	-16.54	60.37	43.60	0.03	0.20	QP
9	0.35201	37.76	-21.16	58.91	37.54	0.02	0.20	QP
10	0.35201	28.32	-20.60	48.91	28.10	0.02	0.20	AVERAGE
11	0.41048	33.60	-24.04	57.64	33.39	0.01	0.20	QP
12	0.41048	26.54	-21.10	47.64	26.33	0.01	0.20	AVERAGE

Temperature	26℃	Humidity	60%
Test Engineer	Kane Liu	Phase	Neutral
Configuration	CTX	Test Mode	Mode 1



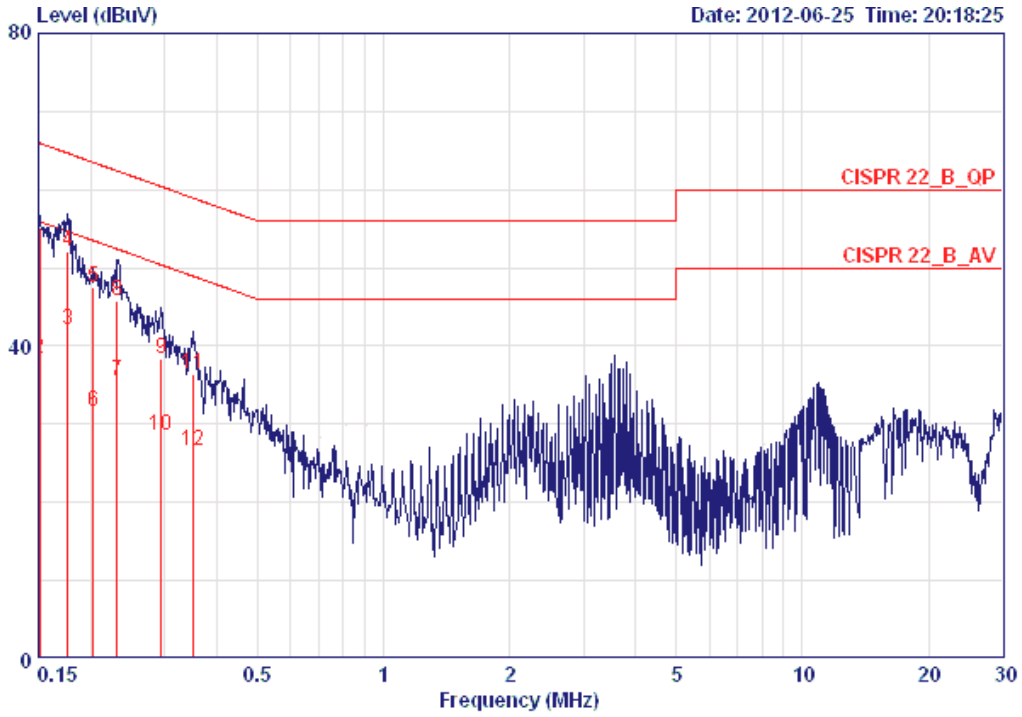
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.15160	54.98	-10.93	65.91	54.72	0.06	0.20	QP
2	0.15160	43.57	-12.34	55.91	43.31	0.06	0.20	AVERAGE
3 @	0.17399	53.52	-11.24	64.77	53.27	0.05	0.20	QP
4 @	0.17399	43.30	-11.46	54.77	43.05	0.05	0.20	AVERAGE
5	0.23285	36.37	-15.98	52.35	36.12	0.05	0.20	AVERAGE
6	0.23285	46.85	-15.50	62.35	46.60	0.05	0.20	QP
7	0.28935	43.35	-17.19	60.54	43.10	0.05	0.20	QP
8	0.28935	34.77	-15.77	50.54	34.52	0.05	0.20	AVERAGE
9	0.35765	39.32	-19.46	58.78	39.07	0.05	0.20	QP
10	0.35765	23.79	-24.99	48.78	23.54	0.05	0.20	AVERAGE
11	0.41266	30.46	-27.13	57.59	30.21	0.05	0.20	QP
12	0.41266	21.96	-25.63	47.59	21.71	0.05	0.20	AVERAGE

Temperature	26℃	Humidity	58%
Test Engineer	Kane Liu	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 @	0.16677	53.22	-11.90	65.12	52.96	0.06	0.20	QP
2	0.16677	41.71	-13.41	55.12	41.45	0.06	0.20	AVERAGE
3	0.18739	37.24	-16.91	54.15	36.99	0.05	0.20	AVERAGE
4	0.18739	48.34	-15.81	64.15	48.09	0.05	0.20	QP
5	0.22676	35.60	-16.96	52.57	35.36	0.04	0.20	AVERAGE
6	0.22676	45.86	-16.70	62.57	45.62	0.04	0.20	QP
7	0.28630	41.39	-19.24	60.63	41.16	0.03	0.20	QP
8	0.28630	31.76	-18.87	50.63	31.53	0.03	0.20	AVERAGE
9	0.35201	37.32	-21.60	58.91	37.10	0.02	0.20	QP
10	0.35201	27.18	-21.74	48.91	26.96	0.02	0.20	AVERAGE
11	0.40615	26.14	-21.59	47.73	25.93	0.01	0.20	AVERAGE
12	0.40615	34.05	-23.68	57.73	33.84	0.01	0.20	QP

Temperature	26℃	Humidity	60%
Test Engineer	Kane Liu	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 @	0.15080	55.22	-10.74	65.96	54.96	0.06	0.20	QP
2	0.15080	38.35	-17.61	55.96	38.09	0.06	0.20	AVERAGE
3	0.17584	42.15	-12.53	54.68	41.90	0.05	0.20	AVERAGE
4	0.17584	52.06	-12.62	64.68	51.81	0.05	0.20	QP
5	0.20289	47.43	-16.06	63.49	47.18	0.05	0.20	QP
6	0.20289	31.50	-21.99	53.49	31.25	0.05	0.20	AVERAGE
7	0.23162	35.57	-16.82	52.39	35.32	0.05	0.20	AVERAGE
8	0.23162	45.80	-16.59	62.39	45.55	0.05	0.20	QP
9	0.29398	38.39	-22.02	60.41	38.14	0.05	0.20	QP
10	0.29398	28.65	-21.76	50.41	28.40	0.05	0.20	AVERAGE
11	0.35015	36.36	-22.60	58.96	36.11	0.05	0.20	QP
12	0.35015	26.57	-22.39	48.96	26.32	0.05	0.20	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

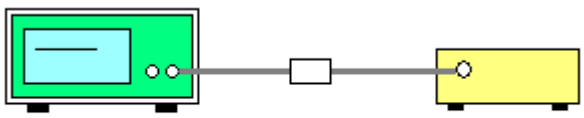
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RB	300 kHz
VB	1000 kHz
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	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	23.52	18.56
40	5200 MHz	23.52	18.56
48	5240 MHz	23.84	18.72

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3

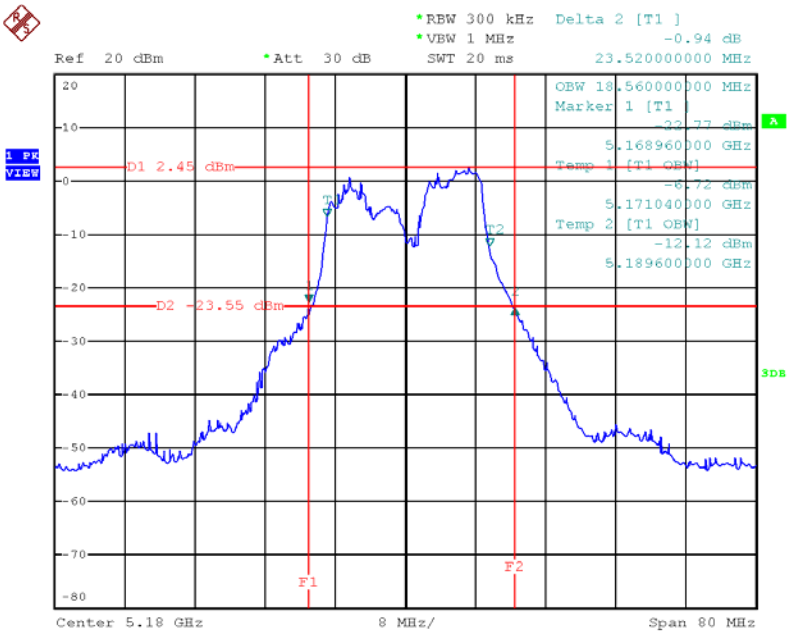
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
38	5190 MHz	41.28	35.84
46	5230 MHz	43.52	36.48

Temperature	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a

Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3

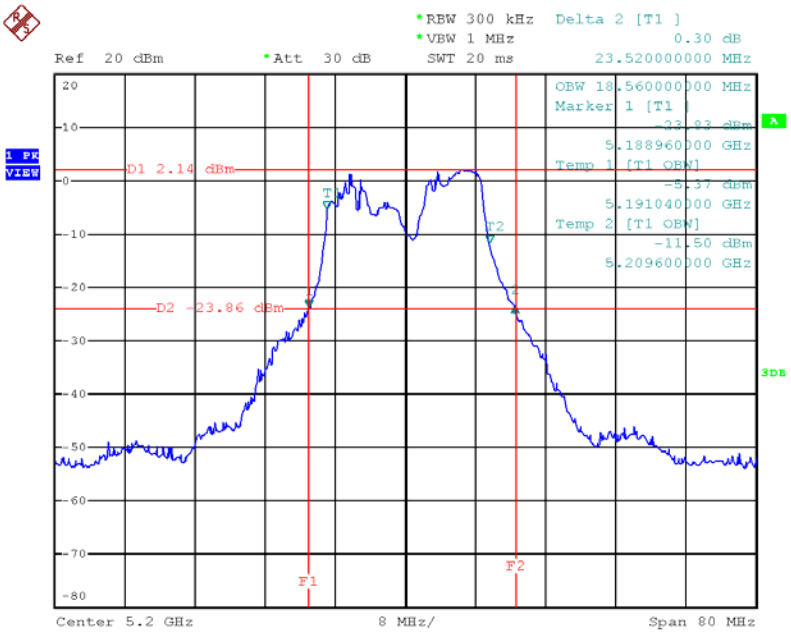
Channel	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
36	5180 MHz	20.96	16.80
40	5200 MHz	21.12	16.64
48	5240 MHz	21.60	16.48

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3 / 5180 MHz



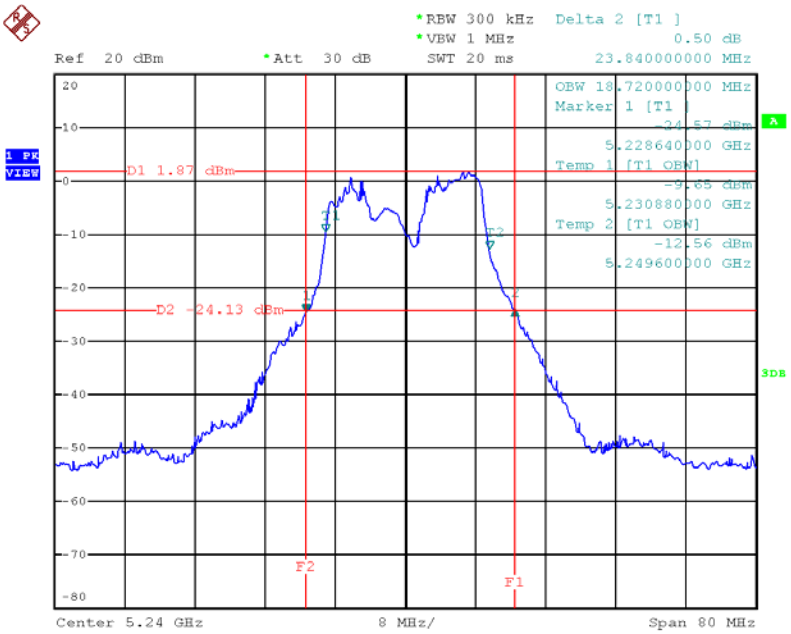
Date: 20.JUL.2012 10:58:16

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3 / 5200 MHz



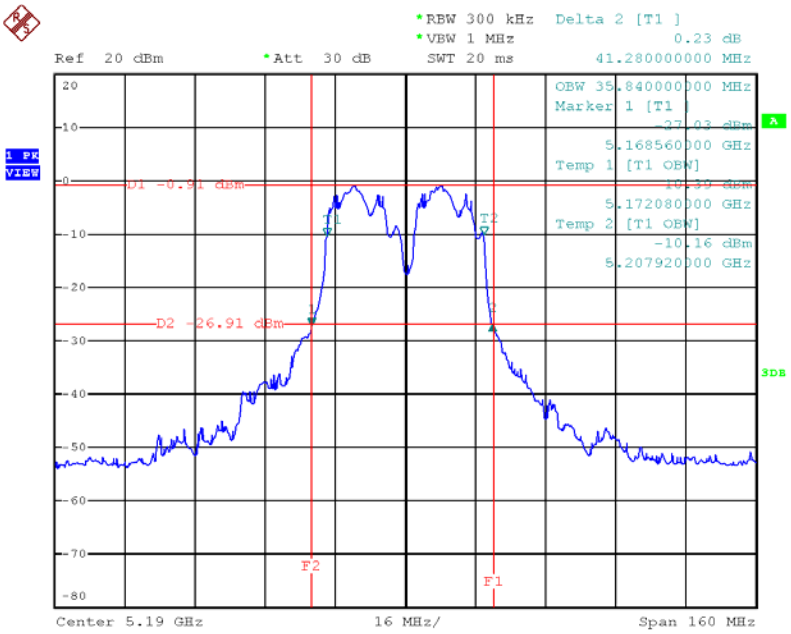
Date: 20.JUL.2012 10:55:02

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3 / 5240 MHz



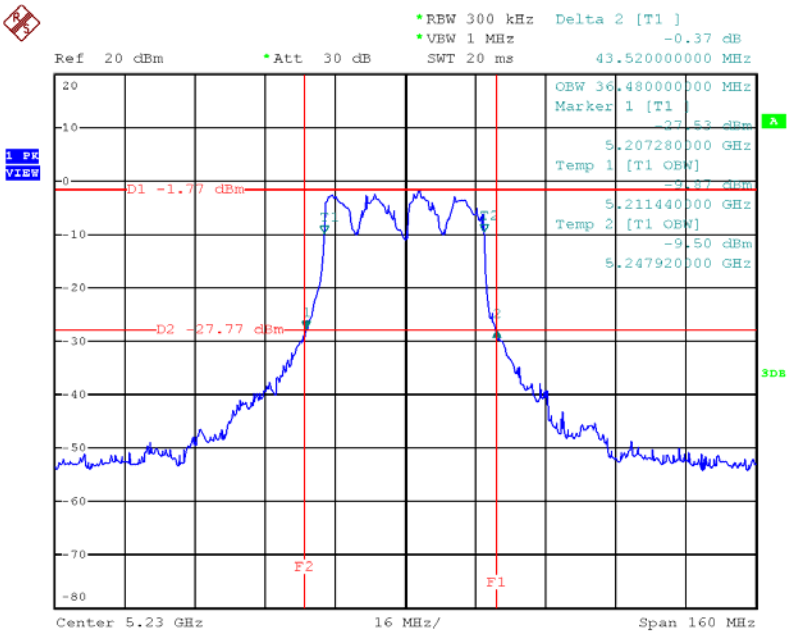
Date: 20.JUL.2012 11:00:59

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3 / 5190 MHz



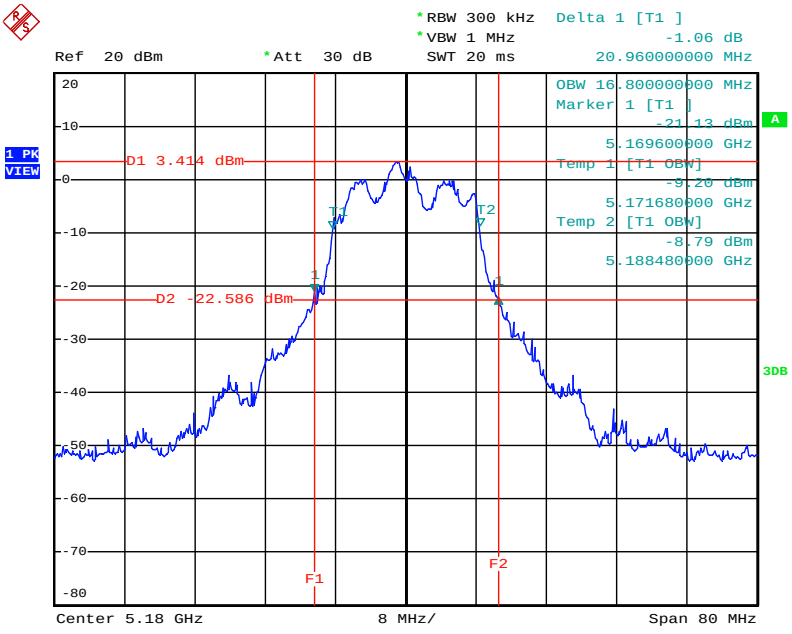
Date: 20.JUL.2012 09:57:34

26 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3 / 5230 MHz



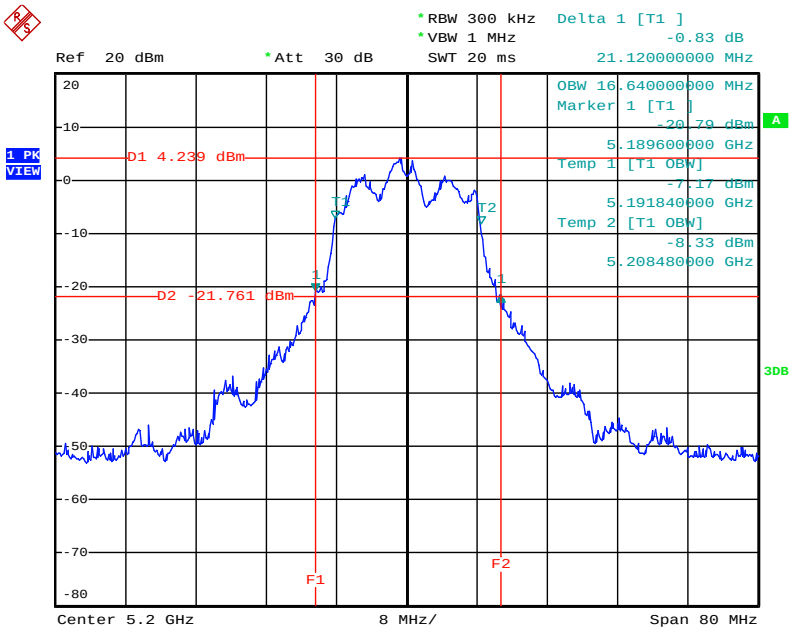
Date: 20.JUL.2012 10:00:56

26 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5180MHz



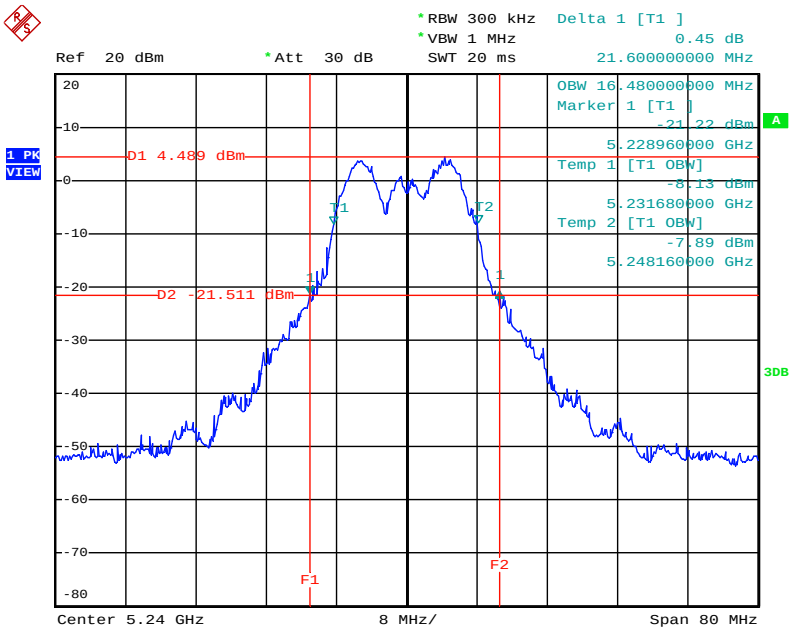
Date: 9.AUG.2012 21:39:18

26 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5200MHz



Date: 9.AUG.2012 21:40:19

26 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5240 MHz



Date: 9.AUG.2012 21:40:46

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

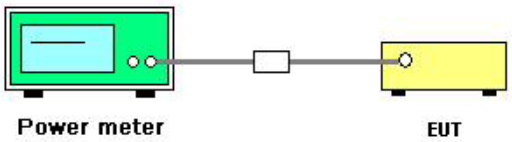
The following table is the setting of the peak power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
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	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n
Test Date	Jul. 20, 2012		

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain.1	Chain.2	Chain.3			
36	5180 MHz	13.11	11.03	11.83	16.85	17.00	**Complies**
40	5200 MHz	12.90	11.28	12.05	16.90	17.00	**Complies**
48	5240 MHz	12.59	10.55	11.79	16.49	17.00	**Complies**

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain.1	Chain.2	Chain.3			
38	5190 MHz	11.92	9.62	10.83	15.66	17.00	**Complies**
46	5230 MHz	13.02	11.12	11.81	16.83	17.00	**Complies**

Temperature	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a
Test Date	Jul. 20, 2012		

Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Conducted Power (dBm)			Total Conducted Output Power (dBm)	Max. Limit (dBm)	Result
		Chain.1	Chain.2	Chain.3			
36	5180 MHz	12.48	10.80	11.30	16.36	17.00	**Complies**
40	5200 MHz	12.96	11.24	11.84	16.84	17.00	**Complies**
48	5240 MHz	12.61	10.81	11.65	16.52	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

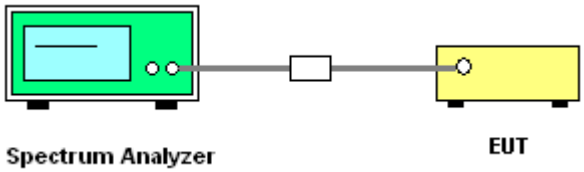
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n
Test Date	Jul. 20, 2012		

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	1.78	4.00	**Complies**
40	5200 MHz	1.53	4.00	**Complies**
48	5240 MHz	0.94	4.00	**Complies**

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
38	5190 MHz	-2.54	4.00	**Complies**
46	5230 MHz	-1.93	4.00	**Complies**

Temperature	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a
Test Date	Jul. 20, 2012		

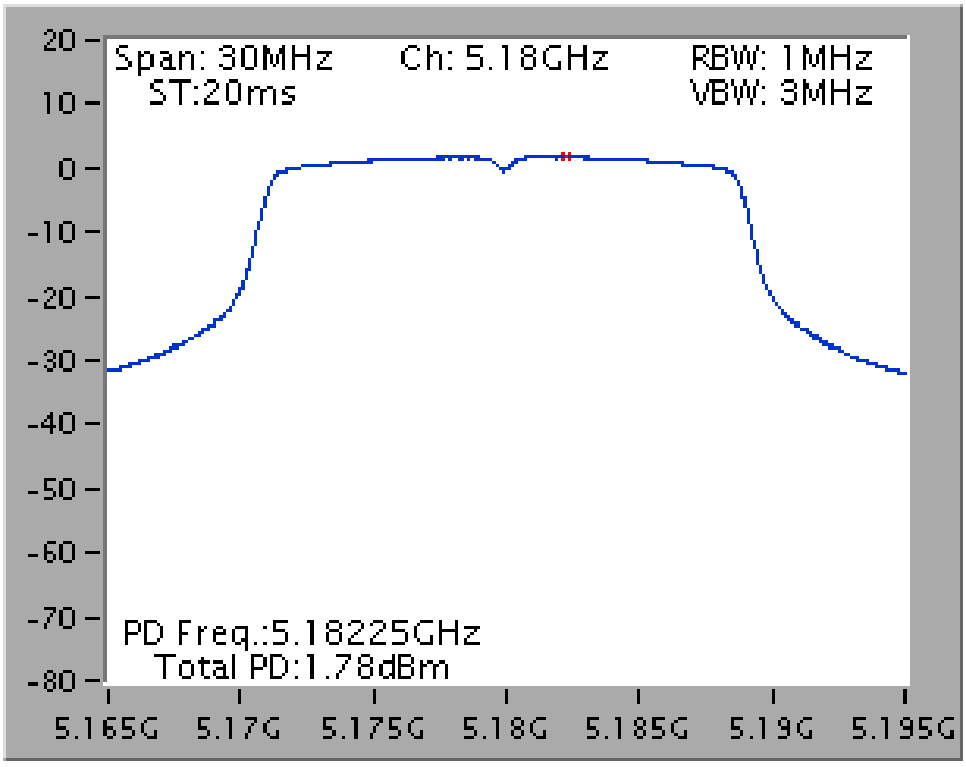
Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
36	5180 MHz	3.47	4.00	**Complies**
40	5200 MHz	3.99	4.00	**Complies**
48	5240 MHz	3.71	4.00	**Complies**

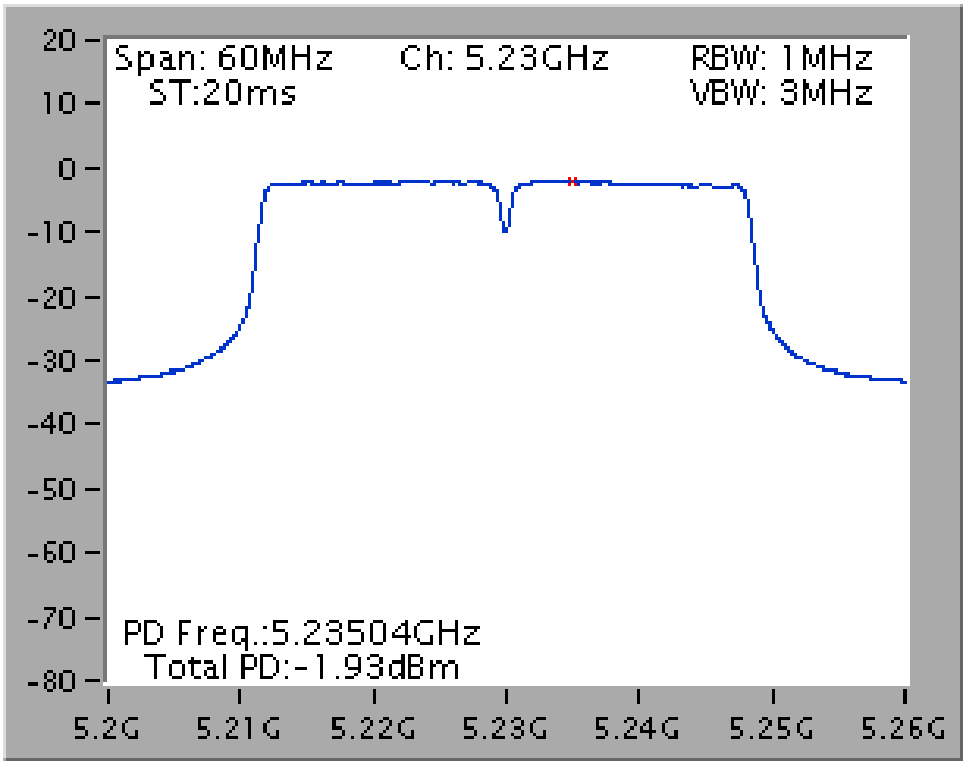
Note: All the test values were listed in the report.

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

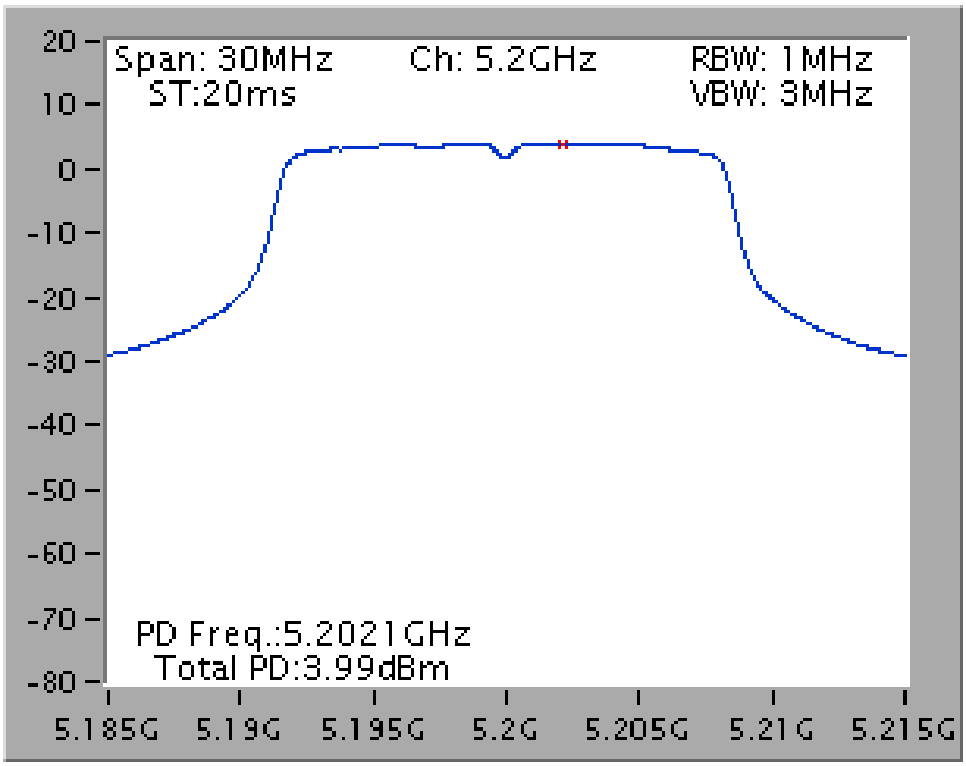
Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3 / 5180 MHz



Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3 / 5230 MHz



Power Density Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5200 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
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	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n

Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
36	5180 MHz	9.44	13	**Complies**
40	5200 MHz	8.96	13	**Complies**
48	5240 MHz	8.86	13	**Complies**

Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
38	5190 MHz	9.84	13	**Complies**
46	5230 MHz	8.87	13	**Complies**

Temperature	23℃	Humidity	60%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a

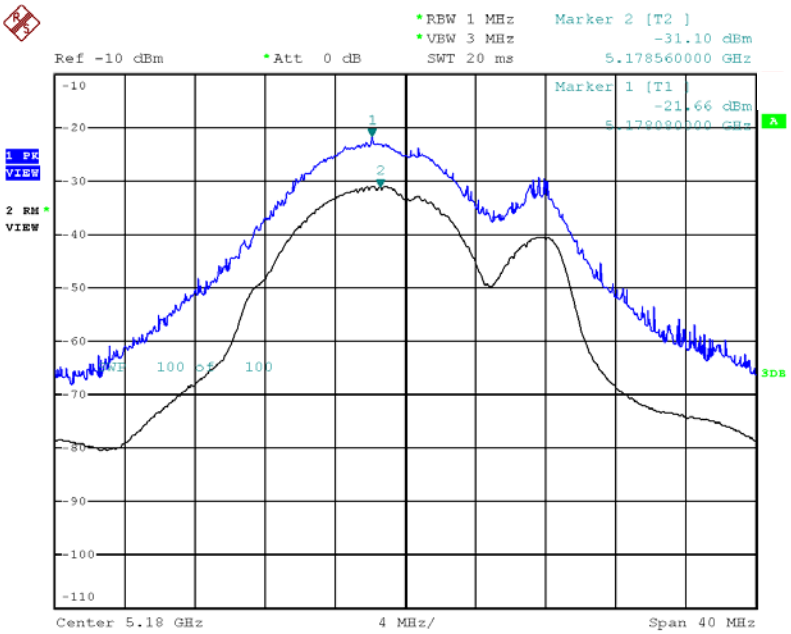
Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3

Channel	Frequency	Peak Excursion (dB)	Max. Limit (dB)	Result
36	5180 MHz	8.24	13	**Complies**
40	5200 MHz	8.87	13	**Complies**
48	5240 MHz	8.20	13	**Complies**

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

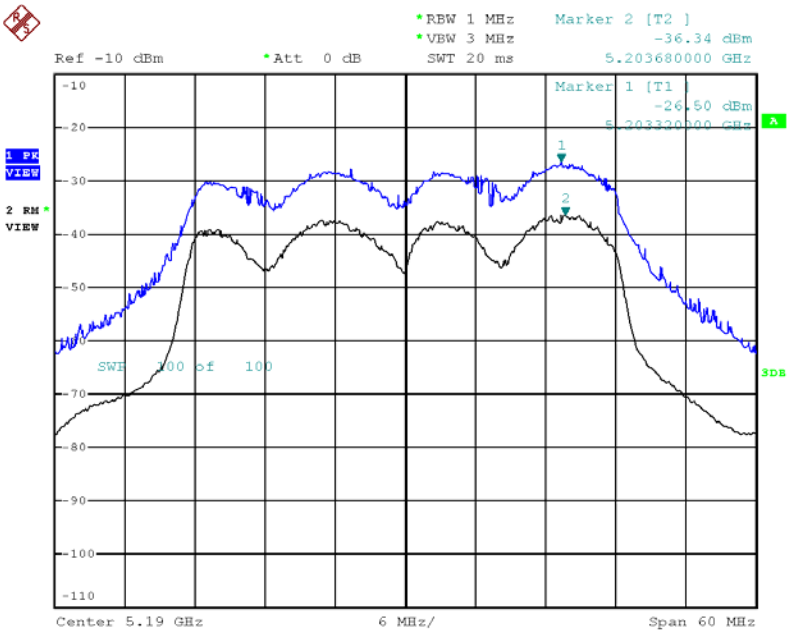
For plots, only the channel with maximum results was shown.

Peak Excursion Plot on Configuration IEEE 802.11n MCS0 20MHz / Chain 1 + Chain 2 + Chain 3 / 5180 MHz



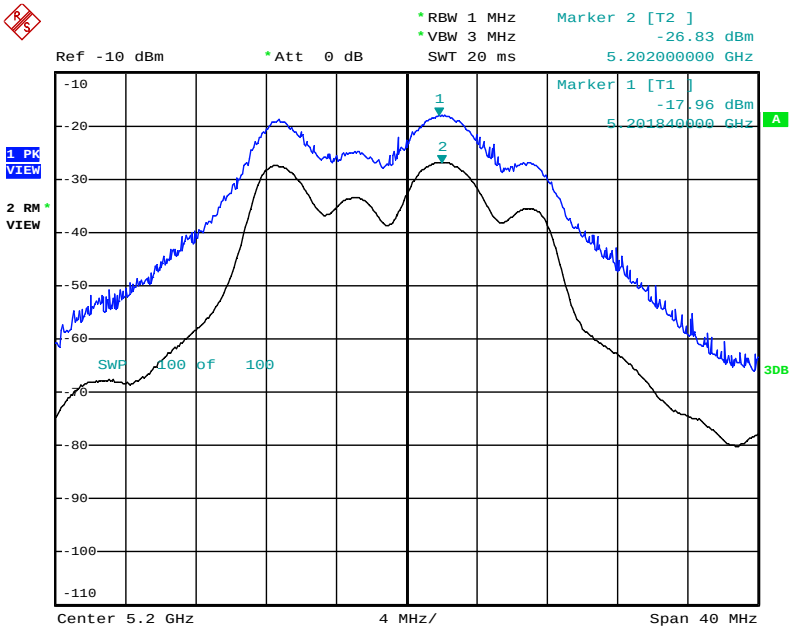
Date: 20.JUL.2012 16:39:43

Peak Excursion Plot on Configuration IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3 / 5190 MHz



Date: 20.JUL.2012 17:01:10

Peak Excursion Plot on Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 / 5200 MHz



Date: 9.AUG.2012 22:57:35

4.6. Radiated Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.25 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

4.6.2. 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

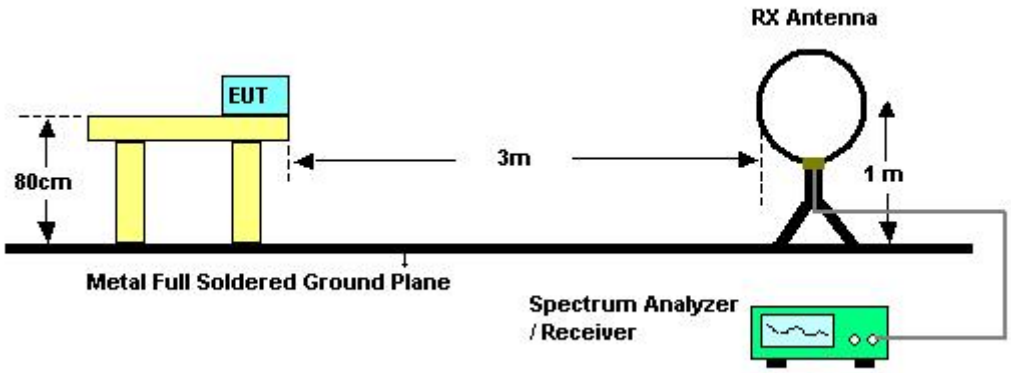
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RB 120kHz for QP

4.6.3. Test Procedures

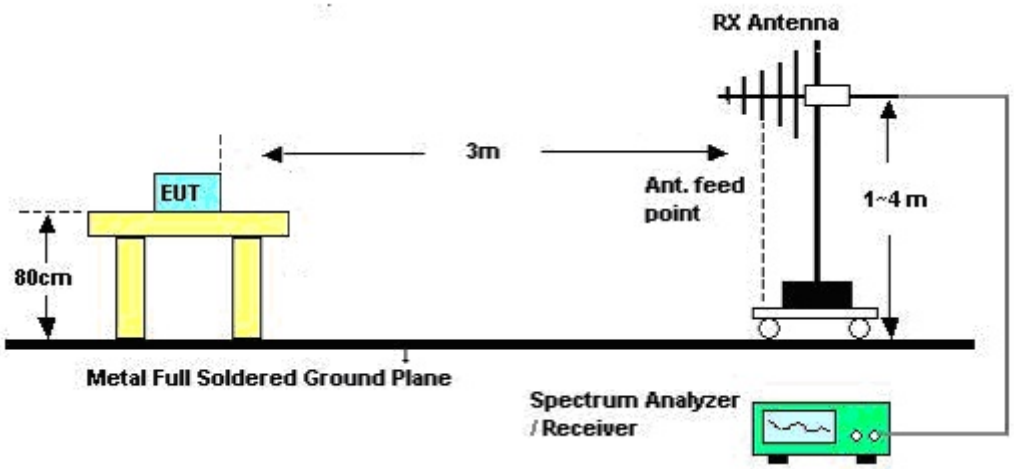
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	CTX
Test Date	Jul. 18, 2012		

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.

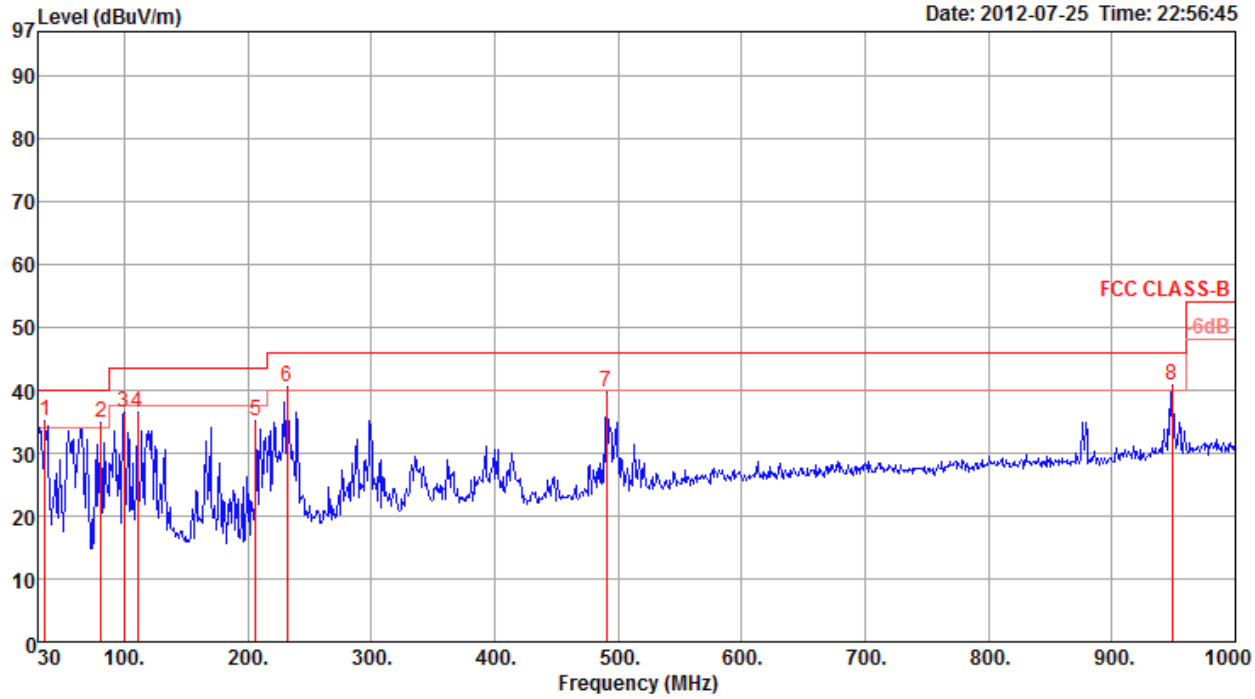
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

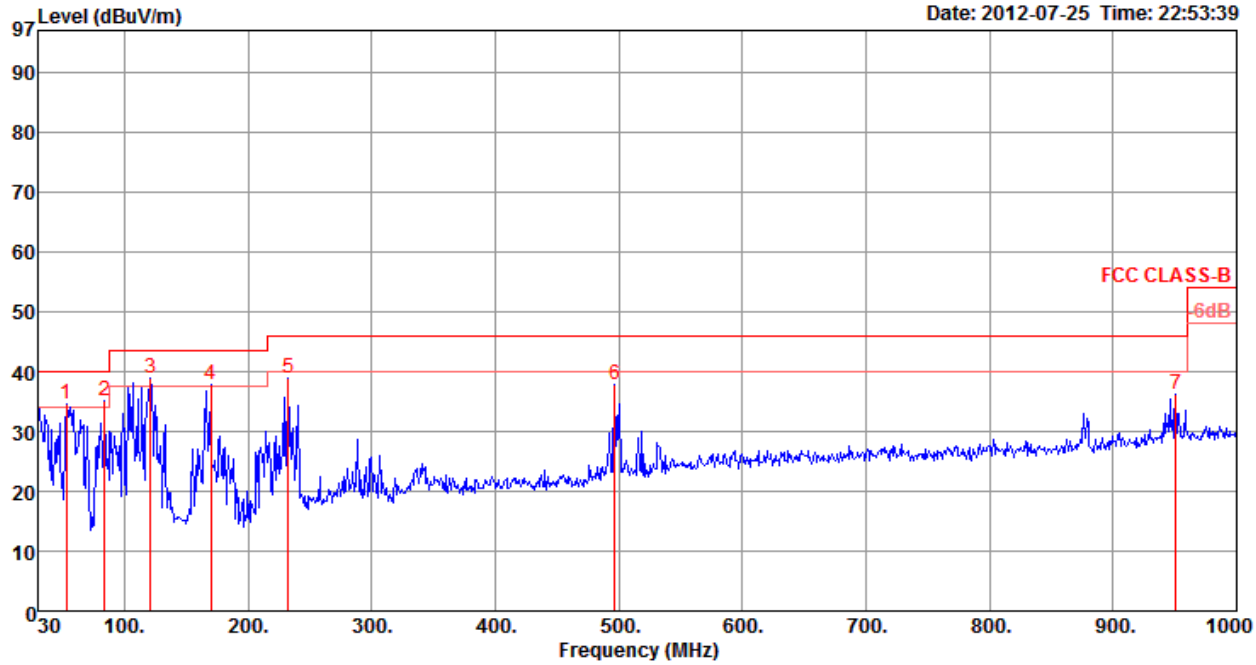
Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	CTX
Test Mode	Mode 1		

Horizontal



		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Pol/Phase	T/Pos	A/Pos
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m			deg	cm
1	p	35.82	35.21	40.00	-4.79	46.02	0.93	28.00	16.26	Peak	HORIZONTAL	0	100
2	!	81.41	34.94	40.00	-5.06	53.81	1.35	27.90	7.68	Peak	HORIZONTAL	0	100
3		99.84	36.57	43.50	-6.93	51.49	1.50	27.82	11.40	Peak	HORIZONTAL	0	100
4		110.51	36.48	43.50	-7.02	50.00	1.57	27.73	12.64	Peak	HORIZONTAL	0	100
5		206.54	35.10	43.50	-8.40	49.62	2.15	27.20	10.53	Peak	HORIZONTAL	0	100
6	!	231.76	40.59	46.00	-5.41	53.86	2.29	27.02	11.46	Peak	HORIZONTAL	0	100
7		490.75	39.79	46.00	-6.21	46.70	3.36	27.92	17.65	Peak	HORIZONTAL	0	100
8	!	948.59	40.77	46.00	-5.23	40.55	4.85	26.52	21.89	Peak	HORIZONTAL	0	100

Vertical



		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Pol/Phase	T/Pos	A/Pos
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m			deg	cm
1	!	53.28	34.71	40.00	-5.29	53.36	1.10	27.91	8.16	Peak	VERTICAL	208	100
2	!	84.32	35.14	40.00	-4.86	53.44	1.37	27.89	8.22	Peak	VERTICAL	208	100
3	p	121.18	38.88	43.50	-4.62	51.94	1.64	27.68	12.98	Peak	VERTICAL	208	100
4	!	169.68	37.91	43.50	-5.59	53.08	1.94	27.41	10.30	Peak	VERTICAL	208	100
5		232.73	38.94	46.00	-7.06	52.12	2.29	27.01	11.54	Peak	VERTICAL	208	100
6		496.57	37.78	46.00	-8.22	44.59	3.37	27.92	17.74	Peak	VERTICAL	208	100
7		950.53	36.14	46.00	-9.86	35.87	4.86	26.50	21.91	Peak	VERTICAL	208	100

Note:

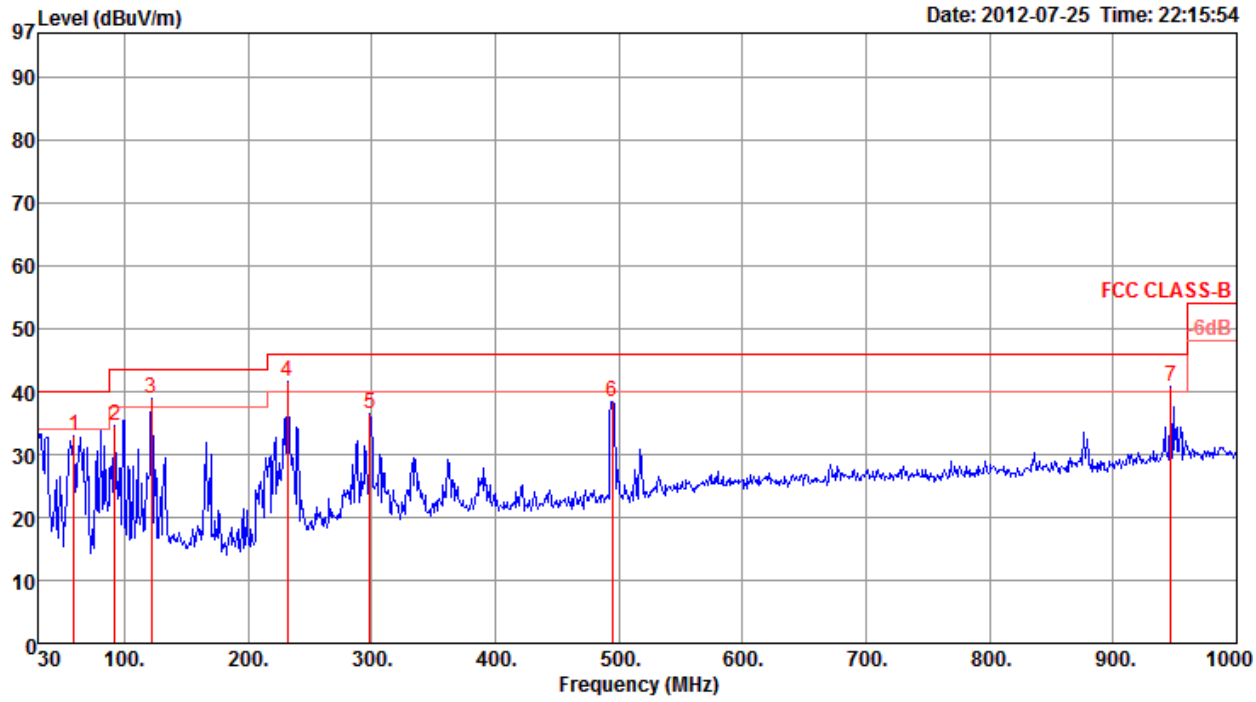
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

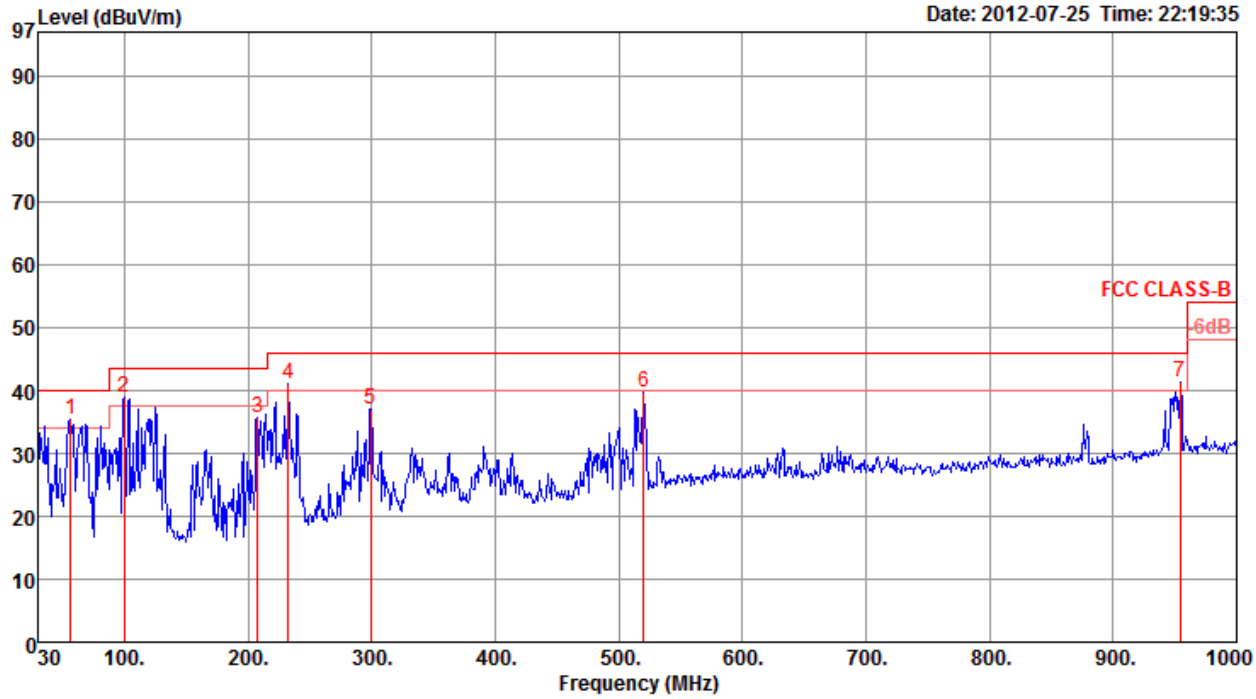
Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	CTX
Test Mode	Mode 2		

Horizontal



		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Pol/Phase	T/Pos	A/Pos
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m			deg	cm
1		59.10	32.97	40.00	-7.03	52.69	1.16	27.96	7.08	Peak	HORIZONTAL	0	100
2		92.08	34.56	43.50	-8.94	51.28	1.42	27.86	9.72	Peak	HORIZONTAL	0	100
3	!	122.15	38.92	43.50	-4.58	52.00	1.64	27.68	12.96	Peak	HORIZONTAL	0	100
4	p	231.76	41.59	46.00	-4.41	54.86	2.29	27.02	11.46	Peak	HORIZONTAL	0	100
5		298.69	36.48	46.00	-9.52	47.00	2.51	26.83	13.80	Peak	HORIZONTAL	0	100
6		494.63	38.37	46.00	-7.63	45.21	3.37	27.92	17.71	Peak	HORIZONTAL	0	100
7	!	946.65	40.80	46.00	-5.20	40.61	4.84	26.53	21.88	Peak	HORIZONTAL	0	100

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Remark	Pol/Phase	T/Pos	A/Pos
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m			deg	cm
1 !	56.19	35.29	40.00	-4.71	54.45	1.14	27.92	7.62	Peak	VERTICAL	0	400
2 p	99.84	38.91	43.50	-4.59	53.83	1.50	27.82	11.40	Peak	VERTICAL	0	100
3	207.51	35.56	43.50	-7.94	50.05	2.15	27.19	10.55	Peak	VERTICAL	0	400
4 !	232.73	41.17	46.00	-4.83	54.35	2.29	27.01	11.54	Peak	VERTICAL	0	400
5	299.66	37.04	46.00	-8.96	47.56	2.51	26.83	13.80	Peak	VERTICAL	0	400
6	519.85	39.62	46.00	-6.38	45.89	3.45	27.91	18.19	Peak	VERTICAL	0	400
7 !	954.41	41.35	46.00	-4.65	41.04	4.86	26.48	21.93	Peak	VERTICAL	0	400

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	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n MCS0 20MHz Ch 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15522.13	36.76	54.00	-17.24	28.25	6.13	37.67	35.29	Average	100	164	HORIZONTAL
2	15556.75	50.98	74.00	-23.02	42.53	6.13	37.63	35.31	Peak	100	164	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	15538.56	53.21	74.00	-20.79	44.70	6.13	37.69	35.31	Peak	103	171	VERTICAL
2	15541.04	40.08	54.00	-13.92	31.57	6.13	37.69	35.31	Average	103	171	VERTICAL

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n MCS0 20MHz Ch 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15598.64	55.86	74.00	-18.14	47.47	6.13	37.60	35.34	Peak	100	82	HORIZONTAL
2	15599.44	41.96	54.00	-12.04	33.57	6.13	37.60	35.34	Average	100	82	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	15599.04	63.77	74.00	-10.23	55.38	6.13	37.60	35.34	Peak	100	321	VERTICAL
2	15600.64	48.28	54.00	-5.72	39.89	6.13	37.60	35.34	Average	100	321	VERTICAL

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n MCS0 20MHz Ch 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15715.43	41.56	54.00	-12.44	33.32	6.14	37.48	35.38	Average	100	81	HORIZONTAL
2	15717.04	54.83	74.00	-19.17	46.60	6.14	37.48	35.39	Peak	100	81	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	15723.53	47.32	54.00	-6.68	39.09	6.14	37.48	35.39	Average	100	320	VERTICAL
2	15724.81	62.22	74.00	-11.78	53.99	6.14	37.48	35.39	Peak	100	320	VERTICAL

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n MCS0 40MHz Ch 38 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15548.61	50.54	74.00	-23.46	42.07	6.13	37.65	35.31	Peak	100	265	HORIZONTAL
2	15565.67	37.01	54.00	-16.99	28.58	6.13	37.63	35.33	Average	100	265	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	15556.46	50.30	74.00	-23.70	41.83	6.13	37.65	35.31	Peak	100	198	VERTICAL
2	15561.59	37.04	54.00	-16.96	28.57	6.13	37.65	35.31	Average	100	198	VERTICAL

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n MCS0 40MHz Ch 46 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15688.48	37.02	54.00	-16.98	28.74	6.14	37.51	35.37	Average	100	192	HORIZONTAL
2	15705.87	49.36	74.00	-24.64	41.11	6.14	37.49	35.38	Peak	100	192	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	15669.73	54.74	74.00	-19.26	46.44	6.14	37.53	35.37	Peak	107	171	VERTICAL
2	15688.24	41.74	54.00	-12.26	33.46	6.14	37.51	35.37	Average	107	171	VERTICAL

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a Ch 36 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15538.96	36.82	54.00	-17.18	28.35	6.13	37.65	35.31	Average	100	241	HORIZONTAL
2	15544.09	49.96	74.00	-24.04	41.49	6.13	37.65	35.31	Peak	100	241	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	15537.31	40.54	54.00	-13.46	31.97	6.13	37.73	35.29	Average	100	171	VERTICAL
2	15537.79	55.36	74.00	-18.64	46.83	6.13	37.69	35.29	Peak	100	171	VERTICAL

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a Ch 40 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15595.59	57.45	74.00	-16.55	49.06	6.13	37.60	35.34	Peak	100	75	HORIZONTAL
2	15596.79	42.06	54.00	-11.94	33.67	6.13	37.60	35.34	Average	100	75	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	15596.55	46.53	54.00	-7.47	38.14	6.13	37.60	35.34	Average	100	80	VERTICAL
2	15596.71	62.92	74.00	-11.08	54.53	6.13	37.60	35.34	Peak	100	80	VERTICAL

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a Ch 48 / Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 12, 2012	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	15718.88	38.90	54.00	-15.10	30.67	6.14	37.48	35.39	Average	100	81	HORIZONTAL
2	15728.25	52.04	74.00	-21.96	43.83	6.14	37.46	35.39	Peak	100	81	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	15719.52	45.88	54.00	-8.12	37.65	6.14	37.48	35.39	Average	100	319	VERTICAL
2	15720.40	60.45	74.00	-13.55	52.22	6.14	37.48	35.39	Peak	100	319	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 5.15-5.25 GHz band: all emissions outside of the 5.15-5.25 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.

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	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n MCS0 20MHz Ch 36/40/48 Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 11, 2012		

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	5149.84	71.52	74.00	-2.48	34.42	3.43	33.67	0.00	Peak	114	318	VERTICAL
2	5150.00	53.47	54.00	-0.53	16.37	3.43	33.67	0.00	Average	114	318	VERTICAL
3	5178.88	116.32				3.44	33.73	0.00	Peak	114	318	VERTICAL
4	5179.04	106.76				3.44	33.73	0.00	Average	114	318	VERTICAL

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	5144.23	65.81	74.00	-8.19	28.71	3.43	33.67	0.00	Peak	114	351	VERTICAL
2	5150.00	48.77	54.00	-5.23	11.67	3.43	33.67	0.00	Average	114	351	VERTICAL
3	5202.24	112.63				3.45	33.76	0.00	Average	114	351	VERTICAL
4	5202.56	122.66				3.45	33.76	0.00	Peak	114	351	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	5150.00	45.58	54.00	-8.42	8.48	3.43	33.67	0.00	Average	112	342	VERTICAL
2	5150.00	57.80	74.00	-16.20	20.70	3.43	33.67	0.00	Peak	112	342	VERTICAL
3	5241.44	122.91				3.46	33.82	0.00	Peak	112	342	VERTICAL
4	5241.92	113.03				3.46	33.82	0.00	Average	112	342	VERTICAL
5	5350.00	46.57	54.00	-7.43	9.05	3.49	34.03	0.00	Average	112	342	VERTICAL
6	5353.85	59.50	74.00	-14.50	21.98	3.49	34.03	0.00	Peak	112	342	VERTICAL

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

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11n MCS0 40MHz Ch 38/46 Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 11, 2012		

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	5149.68	67.25	74.00	-6.75	30.15	3.43	33.67	0.00	Peak	114	344	VERTICAL
2	5150.00	52.19	54.00	-1.81	15.09	3.43	33.67	0.00	Average	114	344	VERTICAL
3	5172.69	99.05				3.44	33.70	0.00	Average	114	344	VERTICAL
4	5192.56	110.15				3.44	33.73	0.00	Peak	114	344	VERTICAL

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	5149.04	70.60	74.00	-3.40	33.50	3.43	33.67	0.00	Peak	119	336	VERTICAL
2	5149.68	53.38	54.00	-0.62	16.28	3.43	33.67	0.00	Average	119	336	VERTICAL
3	5247.31	118.06				3.46	33.85	0.00	Peak	119	336	VERTICAL
4	5247.63	107.61				3.46	33.85	0.00	Average	119	336	VERTICAL

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

Temperature	24℃	Humidity	56%
Test Engineer	Sean Ku	Configurations	IEEE 802.11a 20MHz Ch 36/40/48 Chain 1 + Chain 2 + Chain 3
Test Date	Jul. 11, 2012		

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	5149.52	69.78	74.00	-4.22	32.68	3.43	33.67	0.00	Peak	124	315	VERTICAL
2	5150.00	53.51	54.00	-0.49	16.41	3.43	33.67	0.00	Average	124	315	VERTICAL
3	5181.28	110.77				3.44	33.73	0.00	Average	124	315	VERTICAL
4	5181.60	121.30				3.44	33.73	0.00	Peak	124	315	VERTICAL

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	5148.72	49.87	54.00	-4.13	12.77	3.43	33.67	0.00	Average	123	323	VERTICAL
2	5149.04	68.89	74.00	-5.11	31.79	3.43	33.67	0.00	Peak	123	323	VERTICAL
3	5197.44	123.31				3.45	33.76	0.00	Peak	123	323	VERTICAL
4	5198.40	112.28				3.45	33.76	0.00	Average	123	323	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	5133.17	47.52	54.00	-6.48	10.45	3.43	33.64	0.00	Average	118	335	VERTICAL
2	5138.94	60.54	74.00	-13.46	23.47	3.43	33.64	0.00	Peak	118	335	VERTICAL
3	5242.89	122.46				3.46	33.82	0.00	Peak	118	335	VERTICAL
4	5243.37	112.18				3.46	33.82	0.00	Average	118	335	VERTICAL
5	5383.65	59.73	74.00	-14.27	22.14	3.50	34.09	0.00	Peak	118	335	VERTICAL
6	5386.54	47.56	54.00	-6.44	9.97	3.50	34.09	0.00	Average	118	335	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

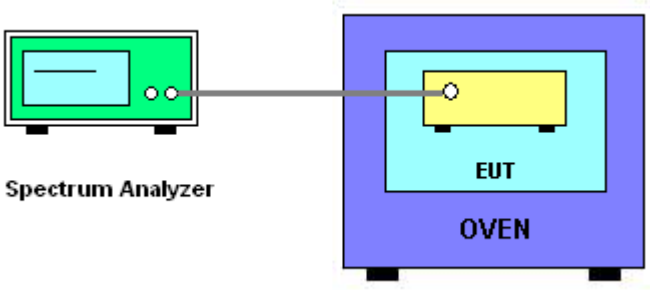
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 -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**
5.75	5199.9648
5	5199.9632
4.25	5199.9611
Max. Deviation (MHz)	0.038900
Max. Deviation (ppm)	7.48

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	**5200**
-40	5199.9647
-30	5199.9732
-20	5199.9714
-10	5199.9688
0	5199.9672
10	5199.9658
20	5199.9630
30	5199.9624
40	5199.9599
50	5199.9536
60	5199.9324
Max. Deviation (MHz)	0.067600
Max. Deviation (ppm)	13.0000

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	Sep. 14, 2011	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 14, 2011	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9K ~ 30MHz	Jun. 22, 2012	Conduction (CO01-CB)
PULSE LIMITER	R&S	ESH3-Z2	100430	9K~30MHz	Feb. 03, 2012	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 4, 2011	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2012	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 25, 2011	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 22, 2011	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 29, 2011	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2011	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2012	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Sep. 09, 2010*	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N/A	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N/A	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2011	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2011	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9KHz~40GHz	Sep. 26, 2011	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 05, 2012	Conducted (TH01-CB)
Thermo-Hygro Meter	N/A	HC 520	#1	15~70 degree	Nov. 02, 2011	Conducted (TH01-CB)
Signal Generator	R&S	SMR40	100302	10MHz-40GHz	Nov. 22, 2011	Conducted (TH01-CB)
RF Power Divider	HP	11636A	00306	2GHz ~ 18GHz	N/A	Conducted (TH01-CB)
RF Power Splitter	Anaren	44100	1839	2GHz ~ 18GHz	N/A	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Power Splitter	Anaren	42100	17930	2GHz ~ 18GHz	N/A	Conducted (TH01-CB)
Signal generator	R&S	SMU200A	102782	10MHz-40GHz	Jun. 07, 2012	Conducted (TH01-CB)
Horn Antenna	COM-POWER	AH-118	071187	1GHz – 18GHz	May 09, 2012	Conducted (TH01-CB)
Horn Antenna	COM-POWER	AH-118	071042	1GHz – 18GHz	Nov. 01, 2011	Radiation (05CH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-12	-	1 GHz – 26.5 GHz	Nov. 17, 2011	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-13	-	1 GHz – 26.5 GHz	Nov. 17, 2011	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 01, 2011	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 01, 2011	Conducted (TH01-CB)

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

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

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

7. TAF CERTIFICATE OF ACCREDITATION

Certificate No. : L1190-110702

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Sporton International Inc.
EMC & Wireless Communications Laboratory
No.52, Hwa Ya 1st Road, Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2005
Accreditation Number	:	1190
Originally Accredited	:	December 15, 2003
Effective Period	:	January 10, 2010 to January 09, 2013
Accredited Scope	:	Testing Field, see described in the Appendix
Specific Accreditation Program	:	Accreditation Program for Designated Testing Laboratory for Commodities Inspection Accreditation Program for Telecommunication Equipment Testing Laboratory Accreditation Program for BSMI Mutual Recognition Arrangment with Foreign Authorities

Jay-San Chen
President, Taiwan Accreditation Foundation
Date : July 02, 2011

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The Appendix forms an integral part of this Certificate, which shall be invalid when use without the Appendix