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FCC RADIO TEST REPORT

Applicant's company	**Belkin International, Inc.**
Applicant Address	12045 East Waterfront Drive, Playa Vista, CA 90094
FCC ID	**K7SF9K1112V1**

Product Name	AC1000 DB Wi-Fi Dual-Band AC+ Gigabit Router
Brand Name	Belkin
Model Name	F9K1112v1
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Apr. 18, 2012
Final Test Date	Apr. 30, 2012
Submission Type	Original Equipment

Statement

Test result included is only for the IEEE 802.11n, IEEE 802.11ac, IEEE 802.11b/g part and IEEE 802.11a (5725 ~ 5850MHz) 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 C**.

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

TAF
Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR241816AB	Rev. 01	Initial issue of report	May 09, 2012

Certificate No.: CB10105047

1. CERTIFICATE OF COMPLIANCE

Product Name	:	AC1000 DB Wi-Fi Dual-Band AC+ Gigabit Router
Brand Name	:	Belkin
Model Name	:	F9K1112v1
Applicant	:	Belkin International, Inc.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Apr. 18, 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 C				
Part	Rule Section	Description of Test	Result	Under Limit
4.1	15.207	AC Power Line Conducted Emissions	Complies	7.96 dB
4.2	15.247(b)(3)	Conducted Output Power	Complies	1.41 dB
4.3	15.247(e)	Power Spectral Density	Complies	16.72 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	3.08 dB
4.6	15.247(d)	Band Edge Emissions	Complies	1.04 dB
4.7	15.203	Antenna Requirements	Complies	-

Test Items	Uncertainty	Remark
AC Power Line Conducted Emissions	±2.3dB	Confidence levels of 95%
Maximum Conducted Output Power	±0.8dB	Confidence levels of 95%
Power Spectral Density	±0.5dB	Confidence levels of 95%
6dB Spectrum Bandwidth	$\pm 8.5\times 10^{-8}$	Confidence levels of 95%
Radiated Emissions (9kHz~30MHz)	±0.8dB	Confidence levels of 95%
Radiated Emissions (30MHz~1GHz)	±1.9dB	Confidence levels of 95%
Radiated / Band Edge Emissions (1GHz~18GHz)	±1.9dB	Confidence levels of 95%
Radiated Emissions (18GHz~40GHz)	±1.9dB	Confidence levels of 95%
Temperature	±0.7℃	Confidence levels of 95%
Humidity	±3.2%	Confidence levels of 95%
DC / AC Power Source	±1.4%	Confidence levels of 95%

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter
Modulation	see the below table for IEEE 802.11n/ac
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth For 5GHz Band: 10 for 20MHz bandwidth ; 4 for 40MHz bandwidth ; 1 for 80MHz bandwidth
Channel Band Width (99%)	For 2.4GHz Band: MCS0 (20MHz): 17.12 MHz ; MCS0 (40MHz): 36.16 MHz For 5GHz Band: MCS0 (20MHz): 17.72 MHz ; MCS0 (40MHz): 36.24 MHz MCS0 (80MHz): 75.52 MHz
Conducted Output Power	For 2.4GHz Band: MCS0 (20MHz): 22.30 dBm ; MCS0 (40MHz): 19.89 dBm For 5GHz Band: MCS0 (20MHz): 25.86 dBm ; MCS0 (40MHz): 26.47 dBm MCS0 (80MHz): 21.74 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

802.11a/b/g

Items	Description
Product Type	802.11b (1TX, 1RX) 802.11a/g (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Channel Band Width (99%)	11b: 10.24 MHz ; 11g: 15.88 MHz ; 11a: 16.52 MHz
Conducted Output Power	11b: 22.94 dBm ; 11g: 23.01 dBm ; 11a: 25.70 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

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

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

Worst Modulation Used for Conformance Testing				
Power Level		1		
IEEE 802.11 Protocol	Number of Transmit Chains (N_{TX})	Data Rate / MCS	Worst Data Rate / MCS	Worst Modulation Mode
a	3	6-54 Mbps	6Mbps	11A5.2G-20M
n (HT20)	3	MCS 0-15	MCS 0	11N5.2G-20M
n (HT40)	3	MCS 0-15	MCS 0	11N5.2G-40M
ac (VHT80)	3	MCS 0-9	MCS 0-Nss1	11AC5.2G-80M

Note 1: IEEE Std. 802.11-2007 modulation consists of IEEE Std. 802.11a-1999.

Note 2: IEEE Std. 802.11n-2009 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: draft IEEE Std. 802.11ac-2012 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, 11A5.3G-20M, 11A5.6G-20M, 11N5.2G-20M, 11N5.3G-20M, 11N5.6G-20M, 11N5.2G-40M, 11N5.3G-40M, 11N5.6G-40M, 11AC5.2G-80M, 11AC5.3G-80M, 11AC5.6G-80M:

11A: IEEE 802.11a, 11N: IEEE 802.11n, 11AC: IEEE 802.11ac. 5.2G: 5.15-5.25 GHz band, 5.3G: 5.25-5.35 GHz band, 5.6G: 5.47-5.725 GHz band.

20M/40M/80M: Channel Bandwidth 20MHz/40MHz/80MHz

3.2. Accessories

Power	Brand	Model	Rating
Adapter 1	Belkin	ML30-V120250-A1	INPUT: 120V～60Hz, 0.8A OUTPUT: 12V, 2.5A
Adapter 2	Belkin	DSA-30PFB-12 FUS 120250	INPUT: 100-240V～50/60Hz, 0.8A OUTPUT: ＋12V, 2.5A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		Remark
					2.4GHz	5GHz	
1	Airgain	T2-G230S1	PCB Antenna	NA	1.87	-	TX/RX
2	Airgain	M2445J-T0-G190S1	PCB Antenna	NA	2.80	-	TX/RX
3	Airgain	N5X20SC-T1-G190U	PCB Antenna	NA	-	5.49	TX/RX
4	Airgain	N5X20SC-T-G100U	PCB Antenna	NA	-	6.25	TX/RX

Note: The EUT has four antennas

For 2.4GHz:

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

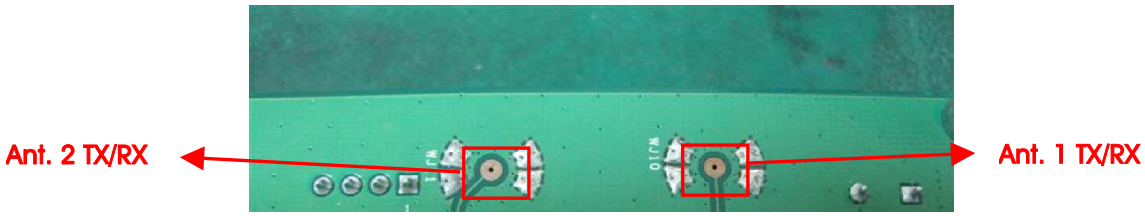
Ant. 1 was fixed to use as transmitting antenna.

For IEEE 802.11g mode (2TX/2RX):

Ant. 1 and Ant. 2 could transmit/receive simultaneously.

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

Ant. 1 and Ant. 2 could transmit/receive simultaneously.



For5GHz:

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

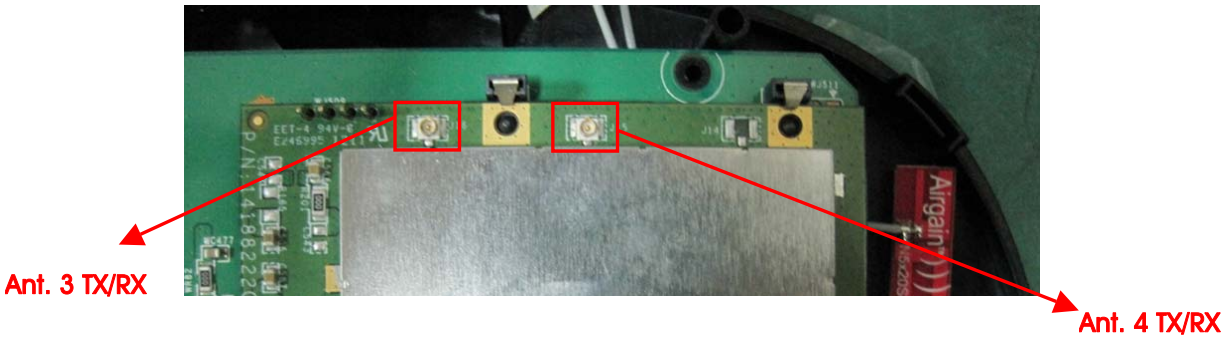
Ant. 3 and Ant. 4 could transmit/receive simultaneously.

For IEEE 802.11a mode (2TX/2RX):

Ant. 3 and Ant. 4 could transmit/receive simultaneously.

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

Ant. 3 and Ant. 4 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

For 2.4GHz Band:

For IEEE 802.11b/g, use Channel 1~Channel 11.

There are two bandwidth systems for IEEE 802.11n.

For both 20MHz bandwidth systems, use Channel 1~Channel 11.

For both 40MHz bandwidth systems, use Channel 3~Channel 9.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz	-	-

For 5GHz Band:

There are three bandwidth systems for IEEE 802.11n.

For 20MHz bandwidth systems, use Channel 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 151, 159.

For 80MHz bandwidth systems, use Channel 155.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5725~5850 MHz Band 4	149	5745 MHz	157	5785 MHz
	151	5755 MHz	159	5795 MHz
	153	5765 MHz	161	5805 MHz
	155	5775MHz	165	5825 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.

For 2.4GHz Band

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Conducted Output Power Power Spectral Density	MCS0/20MHz	7.2 Mbps	1/6/11	1/2/1+2
	MCS0/40MHz	15 Mbps	3/6/9	1/2/1+2
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1/2/1+2
6dB Spectrum Bandwidth	MCS0/20MHz	7.2 Mbps	1/6/11	1+2
	MCS0/40MHz	15 Mbps	3/6/9	1+2
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1+2
Radiated Emissions Below 1GHz	Normal Link	Auto	-	-
Radiated Emissions Above 1GHz	MCS0/20MHz	7.2 Mbps	1/6/11	1+2
	MCS0/40MHz	15 Mbps	3/6/9	1+2
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1/ 2/1+2
Band Edge Emissions	MCS0/20MHz	7.2 Mbps	1/11	1+2
	MCS0/40MHz	15 Mbps	3/9	1+2
	11b/CCK	1 Mbps	1/11	1
	11g/BPSK	6 Mbps	1/11	1/ 2/1+2

For 5GHz Band

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Conducted Output Power Power Spectral Density	MCS0/20MHz	7.2 Mbps	149/157/165	3/4/3+4
	MCS0/40MHz	15 Mbps	151/159	3/4/3+4
	MCS0/80MHz	MCS0	155	3/4/3+4
	11a/BPSK	6 Mbps	149/157/165	3/4/3+4
6dB Spectrum Bandwidth	MCS0/20MHz	7.2 Mbps	149/157/165	3+4
	MCS0/40MHz	15 Mbps	151/159	3+4
	MCS0/80MHz	MCS0	155	3/4/3+4
	11a/BPSK	6 Mbps	149/157/165	3+4
Radiated Emissions Below 1GHz	Normal Link	Auto	-	-
Radiated Emissions Above 1GHz	MCS0/20MHz	7.2 Mbps	149/157/165	3+4
	MCS0/40MHz	15 Mbps	151/159	3+4
	MCS0/80MHz	MCS0	155	3/4/3+4
	11a/BPSK	6 Mbps	149/157/165	3+4
Band Edge Emissions	MCS0/20MHz	7.2 Mbps	149/157/165	3+4
	MCS0/40MHz	15 Mbps	151/159	3+4
	MCS0/80MHz	MCS0	155	3/4/3+4
	11a/BPSK	6 Mbps	149/157/165	3+4

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. Put EUT upright with Adapter 1.

Mode 2. Put EUT upright with Adapter 2.

For Radiated Emission below 1GHz test:

Mode 1. Put EUT upright with Adapter 1.

Mode 2. Put EUT upright with Adapter 2.

For Radiated Emission above 1GHz test

Mode 1. Put EUT upright with Adapter 1 as representative.

<For MPE and Co-location Test>:

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

3.6. Table for Testing Locations

Test Site No.	Site Category	Location	FCC Reg. No.	IC File No.	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); Fully Anechoic Chamber (FAC).

Please refer section 6 for Test Site Address.

3.7. Table for Supporting Units

Support Unit	Brand	Model	FCC ID
Flash Disk	Silicon	I-Series	DoC
Flash Disk	Silicon	I-Series	DoC
Notebook	DELL	PP25L	E2K24GBRL
Notebook	DELL	M1330	E2K4965AGNM
Notebook	DELL	D400	QDS-BRCM1005-D
Notebook	DELL	D400	QDS-BRCM1005-D
Notebook	DELL	D505	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.

For 2.4GHz Band

Power Parameters of IEEE 802.11n MCS0 20MHz

Test Software Version	DOS		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 20MHz	94	90	94

Power Parameters of IEEE 802.11n MCS0 40MHz

Test Software Version	DOS		
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 40MHz	58	70	58

Power Parameters of IEEE 802.11b/g

Test Software Version	DOS		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	94	90	94
IEEE 802.11g	72	84	68

During the test, "**DOS**" under WIN XP was executed the test program to control the EUT continuously transmit RF signal.

For 5GHz Band

Power Parameters of IEEE 802.11n MCS0 20MHz

Test Software Version	Manual Tool Version 0.0.0.9		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0 20MHz	96	96	96

Power Parameters of IEEE 802.11n MCS0 40MHz

Test Software Version	Manual Tool Version 0.0.0.9	
Frequency	5755 MHz	5795 MHz
MCS0 40MHz	90	100

Power Parameters of IEEE 802.11ac MCS0 80MHz

Test Software Version	Manual Tool Version 0.0.0.9
Frequency	5775 MHz
MCS0 40MHz	80

Power Parameters of IEEE 802.11a

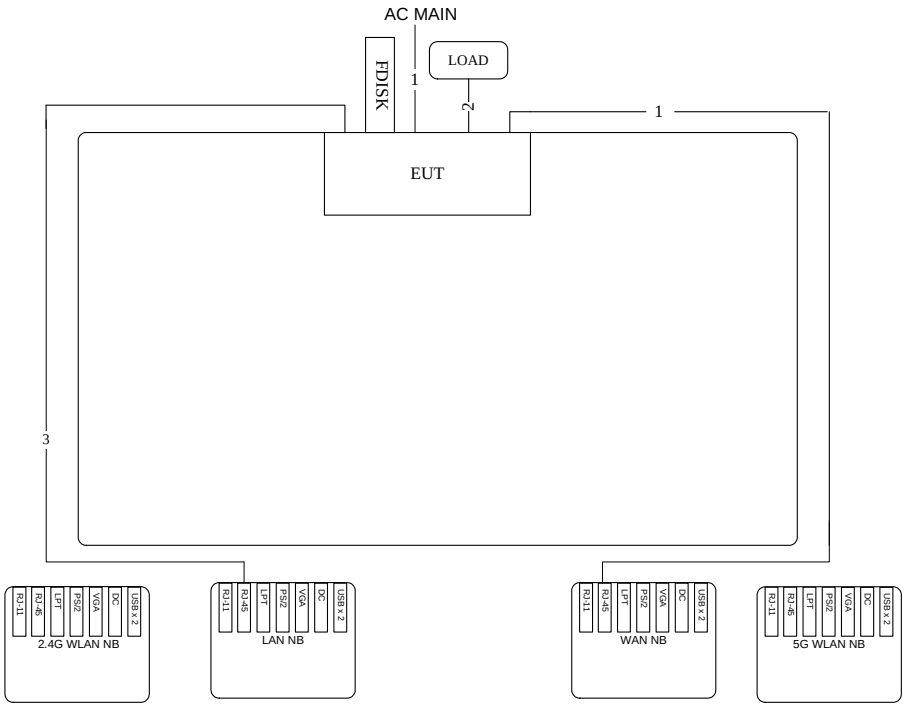
Test Software Version	Manual Tool Version 0.0.0.9		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	96	96	94

During the test, "**Manual Tool Version 0.0.0.9**" under WIN XP was executed the test program to control the EUT continuously transmit RF signal.

3.9. Test Configurations

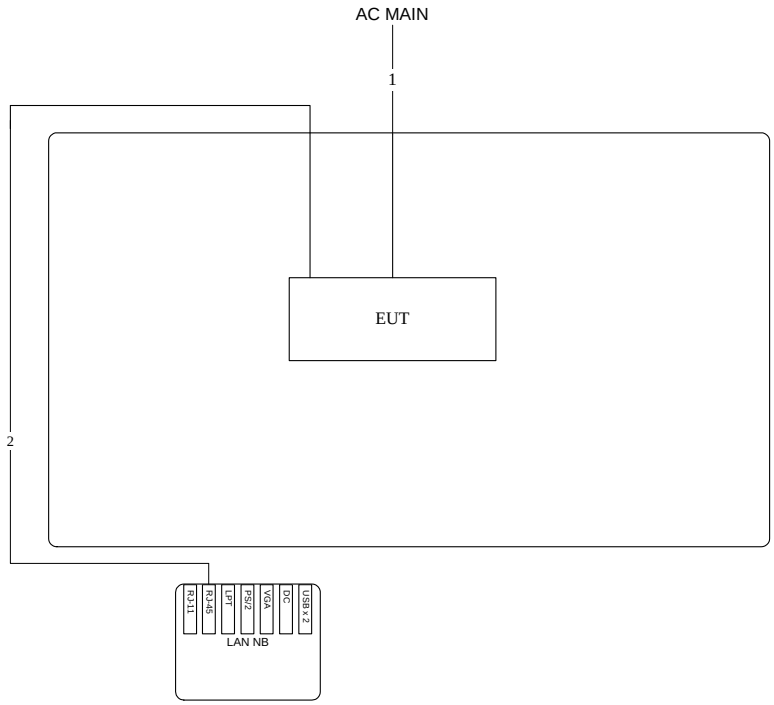
3.9.1. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



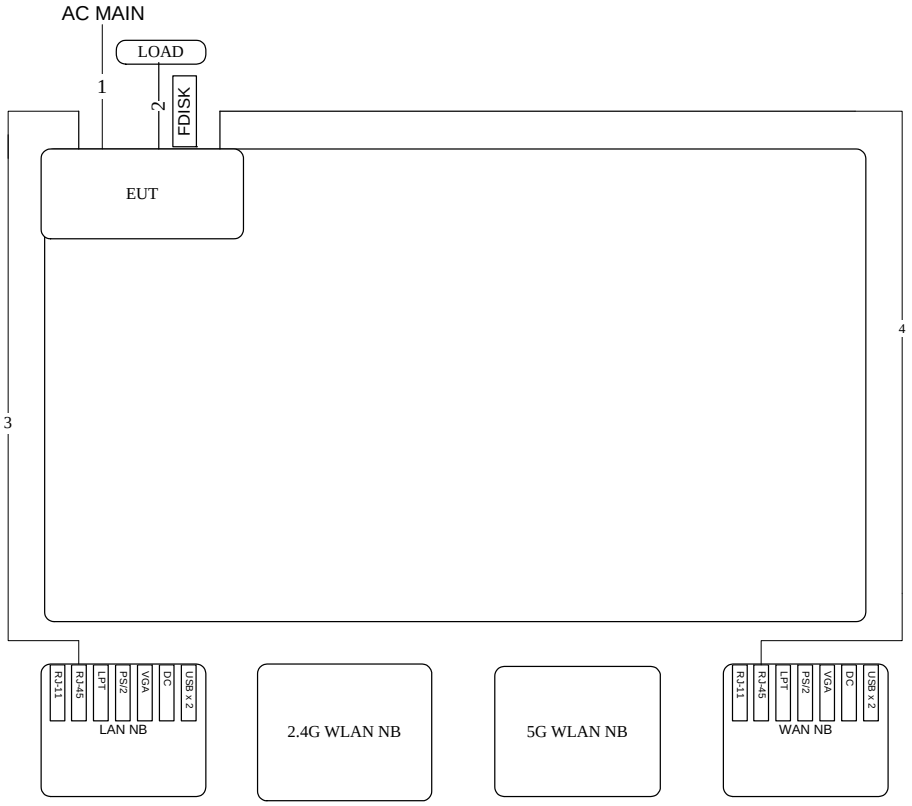
Item	Connection	Shield	Length
1	Power cable	No	1.5M
2	RJ-45 cable*3	No	1.5M
3	RJ-45 cable	No	10M
4	RJ-45 cable	No	10M

Test Configuration: above 1GHz



Item	Connection	Shield	Length
1	Power cable	No	1.5M
2	RJ-45 cable	No	10M

3.9.2. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shield	Length
1	Power cable	No	1.5M
2	RJ-45 cable	No	10M
3	RJ-45 cable	No	10M
4	RJ-45 cable*3	No	1.5M

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected 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

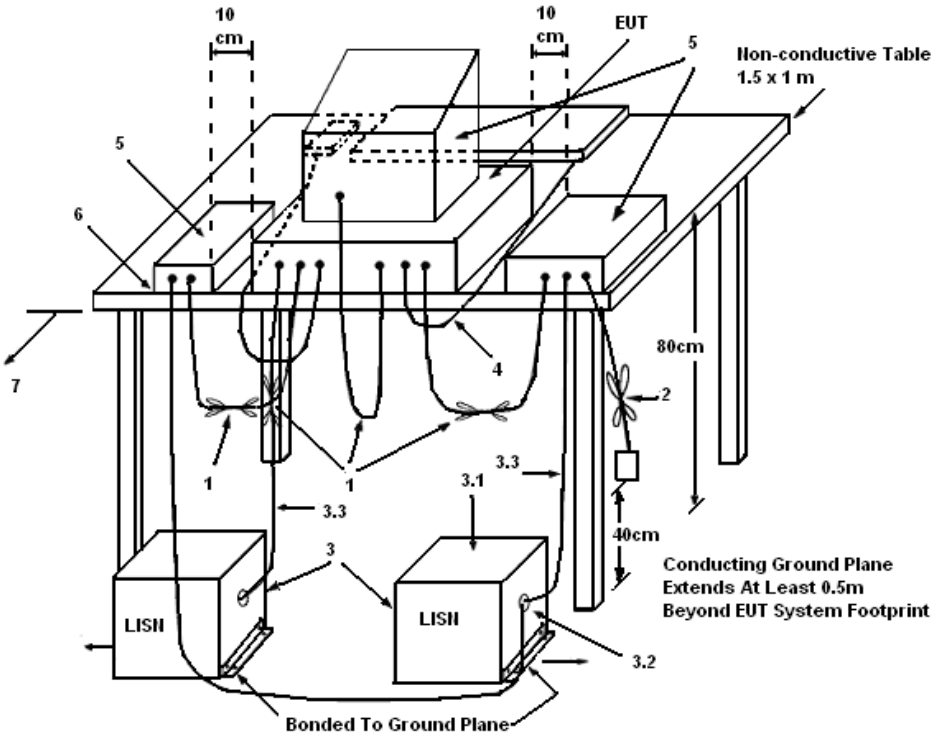
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

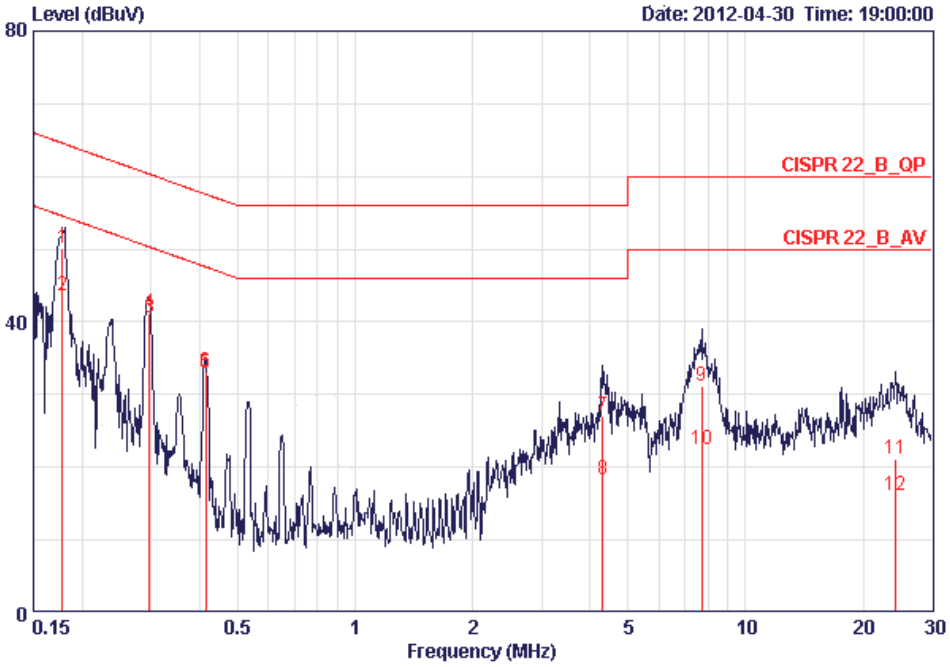
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

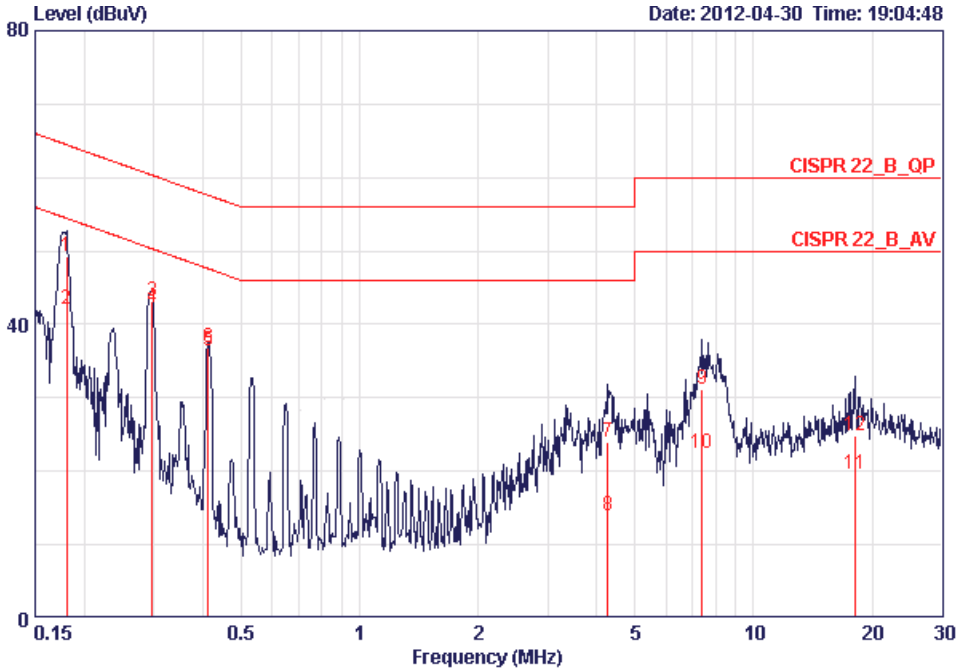
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	63%
Test Engineer	Ryo Fan	Phase	Line
Configuration	Normal Link, Mode 1		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.17772	50.21	-14.38	64.59	49.95	0.06	0.20	QP
2 @	0.17772	43.61	-10.98	54.59	43.35	0.06	0.20	AVERAGE
3 @	0.29712	40.44	-9.88	50.32	40.20	0.04	0.20	AVERAGE
4 @	0.29712	41.15	-19.17	60.32	40.91	0.04	0.20	QP
5 @	0.41485	33.00	-14.55	47.55	32.77	0.03	0.20	AVERAGE
6	0.41485	33.19	-24.36	57.55	32.96	0.03	0.20	QP
7	4.315	27.07	-28.93	56.00	26.65	0.12	0.30	QP
8	4.315	18.22	-27.78	46.00	17.80	0.12	0.30	AVERAGE
9	7.728	31.20	-28.80	60.00	30.52	0.28	0.40	QP
10	7.728	22.48	-27.52	50.00	21.80	0.28	0.40	AVERAGE
11	24.271	21.22	-38.78	60.00	19.61	1.10	0.51	QP
12	24.271	16.12	-33.88	50.00	14.51	1.10	0.51	AVERAGE

Temperature	23°C	Humidity	63%
Test Engineer	Ryo Fan	Phase	Neutral
Configuration	Normal Link, Mode 1		

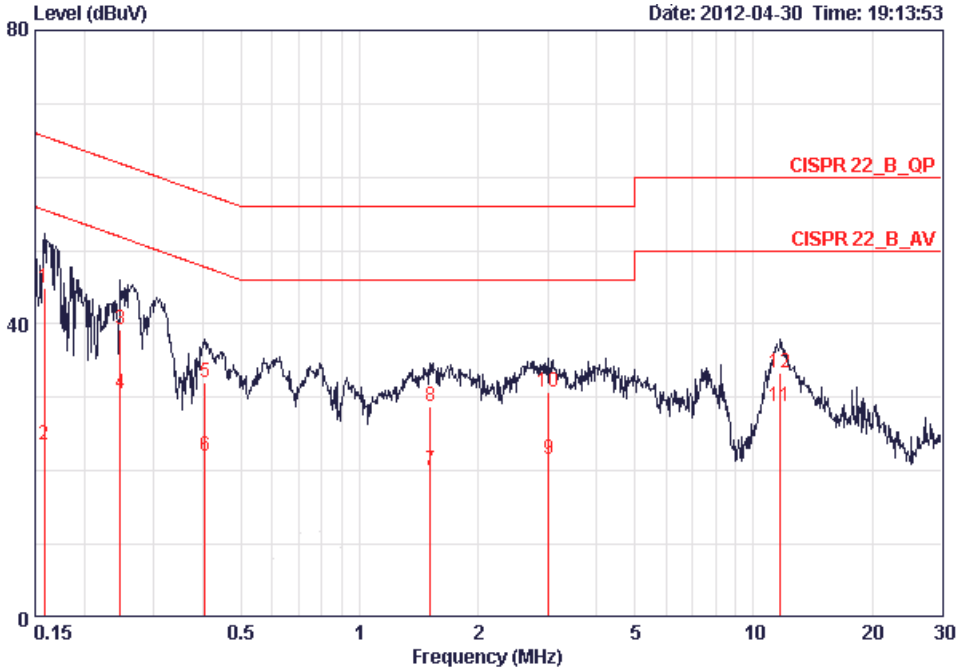


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.18056	49.23	-15.23	64.46	48.94	0.09	0.20	QP
2 @	0.18056	42.07	-12.39	54.46	41.78	0.09	0.20	AVERAGE
3 @	0.29712	43.15	-17.17	60.32	42.88	0.07	0.20	QP
4 @	0.29712	42.36	-7.96	50.32	42.09	0.07	0.20	AVERAGE
5	0.41266	36.44	-21.15	57.59	36.17	0.07	0.20	QP
6 @	0.41266	36.83	-10.76	47.59	36.56	0.07	0.20	AVERAGE
7	4.269	23.89	-32.11	56.00	23.43	0.16	0.30	QP
8	4.269	13.95	-32.05	46.00	13.49	0.16	0.30	AVERAGE
9	7.407	31.17	-28.83	60.00	30.47	0.31	0.39	QP
10	7.407	22.53	-27.47	50.00	21.83	0.31	0.39	AVERAGE
11	18.039	19.71	-30.29	50.00	18.49	0.72	0.50	AVERAGE
12	18.039	24.86	-35.14	60.00	23.64	0.72	0.50	QP

Note:

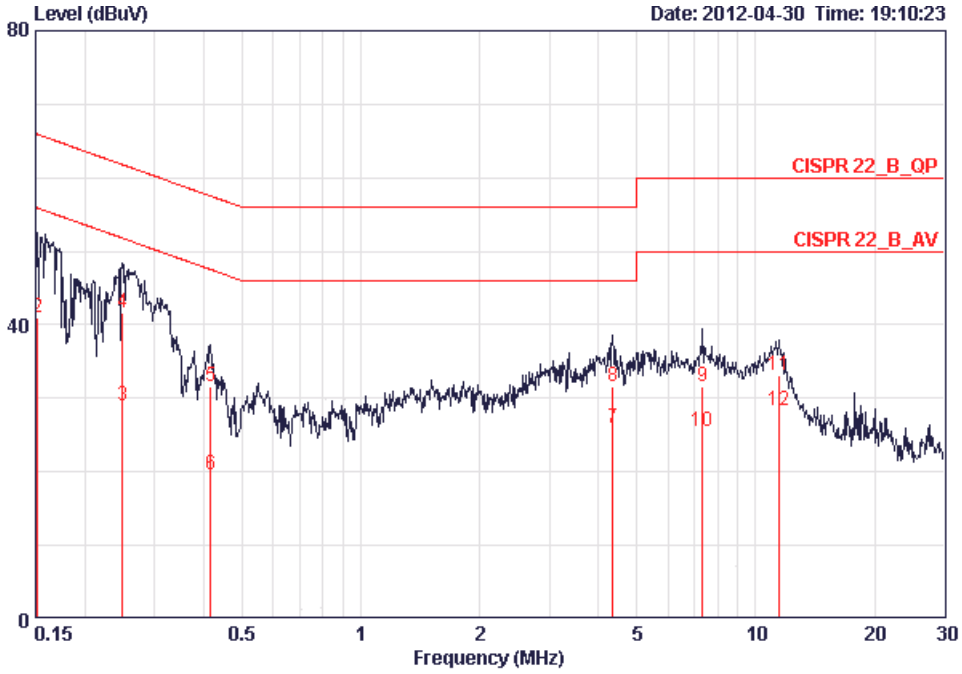
Level = Read Level + LISN Factor + Cable Loss.

Temperature	23°C	Humidity	63%
Test Engineer	Ryo Fan	Phase	Line
Configuration	Normal Link, Mode 2		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1 @	0.15816	44.80	-20.76	65.56	44.53	0.07	0.20	QP
2	0.15816	23.57	-31.99	55.56	23.30	0.07	0.20	AVERAGE
3	0.24682	39.20	-22.66	61.86	38.96	0.04	0.20	QP
4	0.24682	30.43	-21.43	51.86	30.19	0.04	0.20	AVERAGE
5	0.40400	32.01	-25.76	57.77	31.78	0.03	0.20	QP
6	0.40400	21.97	-25.80	47.77	21.74	0.03	0.20	AVERAGE
7	1.511	20.12	-25.88	46.00	19.97	0.04	0.11	AVERAGE
8	1.511	28.83	-27.17	56.00	28.68	0.04	0.11	QP
9	3.025	21.65	-24.35	46.00	21.36	0.08	0.21	AVERAGE
10	3.025	30.71	-25.29	56.00	30.42	0.08	0.21	QP
11	11.683	28.82	-21.18	50.00	27.99	0.43	0.40	AVERAGE
12	11.683	33.37	-26.63	60.00	32.54	0.43	0.40	QP

Temperature	23°C	Humidity	63%
Test Engineer	Ryo Fan	Phase	Neutral
Configuration	Normal Link, Mode 2		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.15160	20.18	-35.73	55.91	19.88	0.10	0.20	AVERAGE
2	0.15160	40.99	-24.92	65.91	40.69	0.10	0.20	QP
3	0.24945	28.90	-22.88	51.78	28.62	0.08	0.20	AVERAGE
4 @	0.24945	41.65	-20.13	61.78	41.37	0.08	0.20	QP
5	0.41705	31.54	-25.97	57.51	31.27	0.07	0.20	QP
6	0.41705	19.55	-27.96	47.51	19.28	0.07	0.20	AVERAGE
7 @	4.338	26.03	-19.97	46.00	25.57	0.16	0.30	AVERAGE
8	4.338	31.52	-24.48	56.00	31.06	0.16	0.30	QP
9	7.329	31.63	-28.37	60.00	30.96	0.31	0.36	QP
10	7.329	25.55	-24.45	50.00	24.88	0.31	0.36	AVERAGE
11	11.438	33.07	-26.93	60.00	32.22	0.45	0.40	QP
12	11.438	28.35	-21.65	50.00	27.50	0.45	0.40	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for peak output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi.

4.2.2. Measuring Instruments and Setting

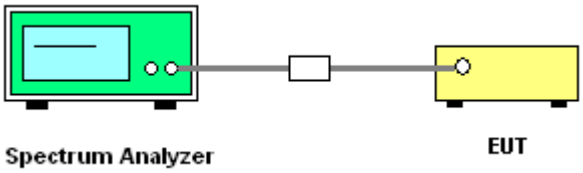
Please refer to section 5 of equipments list in this report. The following table is the setting of the peak power meter.

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

4.2.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. Test was performed in accordance with Measurement of Digital Transmission Systems Operating under Section 15.247 March 23, 2005.
3. When measuring maximum conducted output power with multiple antenna systems, add every result of the values by mathematic formula.

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 Conducted Output Power

Temperature	23°C	Humidity	61%
Test Engineer	Allen Liu	Configurations	IEEE 802.11n
Test Date	Apr. 24, 2012		

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1	Ant. 2			
1	2412 MHz	15.31	16.45	18.93	30.00	Complies
6	2437 MHz	19.05	19.52	22.30	30.00	Complies
11	2462 MHz	14.36	15.00	17.70	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1	Ant. 2			
3	2422 MHz	12.40	14.61	16.65	30.00	Complies
6	2437 MHz	15.72	17.80	19.89	30.00	Complies
9	2452 MHz	12.28	14.26	16.39	30.00	Complies

For 5GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 3	Ant. 4			
149	5745 MHz	22.92	22.77	25.86	30.00	Complies
157	5785 MHz	22.74	22.29	25.53	30.00	Complies
165	5825 MHz	22.54	21.92	25.25	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 3	Ant. 4			
151	5755 MHz	21.63	21.21	24.44	30.00	Complies
159	5795 MHz	23.78	23.12	26.47	30.00	Complies

Configuration IEEE 802.11ac MCS0 80MHz

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 3	Ant. 4			
155	5775 MHz	18.95	18.50	21.74	30.00	Complies

Temperature	23°C	Humidity	61%
Test Engineer	Allen Liu	Configurations	IEEE 802.11a/b/g
Test Date	Apr. 24, 2012		

Configuration IEEE 802.11b / Ant. 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	22.94	30.00	Complies
6	2437 MHz	21.55	30.00	Complies
11	2462 MHz	22.29	30.00	Complies

Configuration IEEE 802.11g / Ant. 1+ Ant. 2

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 1	Ant. 2			
1	2412 MHz	16.27	17.09	19.71	30.00	Complies
6	2437 MHz	19.62	20.35	23.01	30.00	Complies
11	2462 MHz	14.76	15.53	18.17	30.00	Complies

Note: $\text{Directional gain} = 10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N]\ \text{dBi}$

=5.81dBi < 6dBi, so the conducted power limit =30dBm.

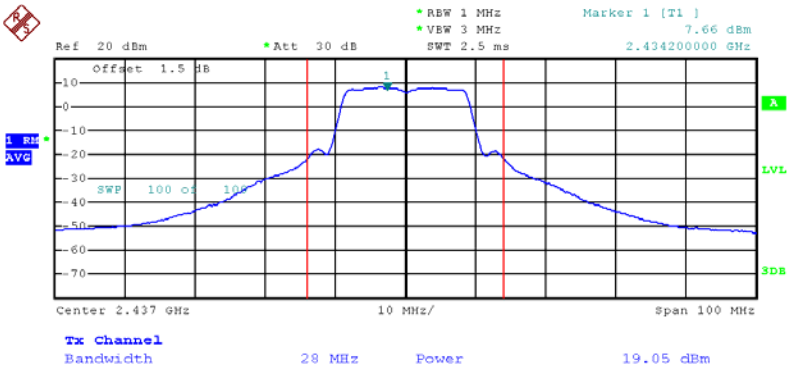
Configuration IEEE 802.11a / Ant. 3 + Ant. 4

Channel	Frequency	Conducted Power (dBm)		Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Ant. 3	Ant. 4			
149	5745 MHz	22.88	22.49	25.70	27.11	Complies
157	5785 MHz	22.68	22.20	25.46	27.11	Complies
165	5825 MHz	22.04	21.34	24.71	27.11	Complies

Note: $\text{Directional gain} = 10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N]\ \text{dBi}$

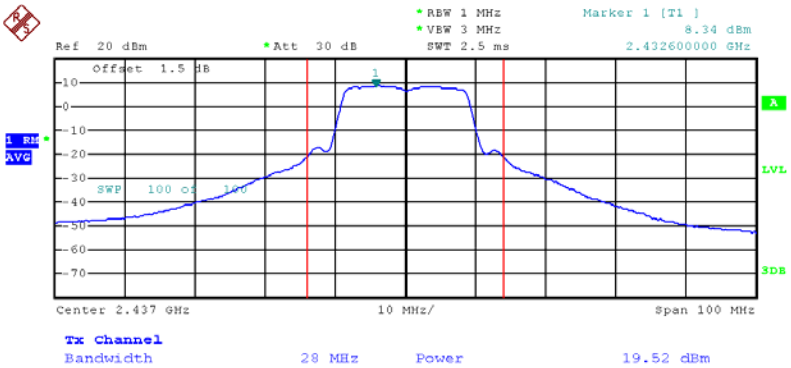
=8.89dBi > 6dBi, so the conducted power limit =30-(8.89-6)=27.11dBm.

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 20MHz / 2437 MHz / ANT. 1



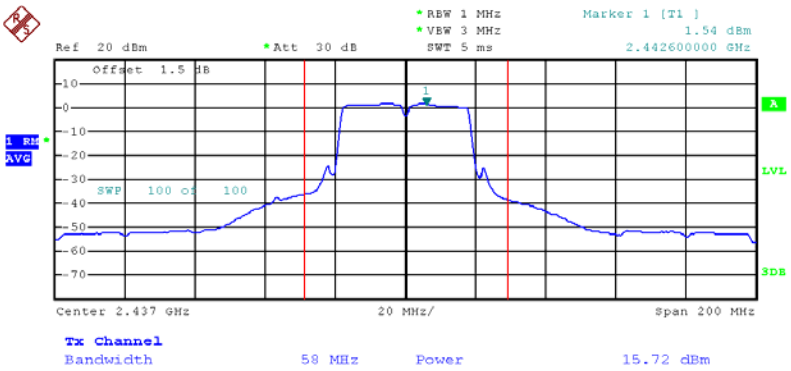
Date: 24.APR.2012 05:31:33

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 20MHz / 2437 MHz/ ANT. 2



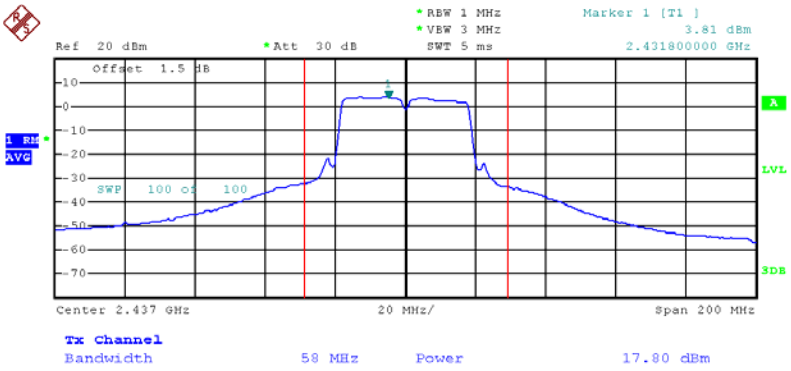
Date: 24.APR.2012 05:32:15

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 40MHz / 2437 MHz/ ANT. 1



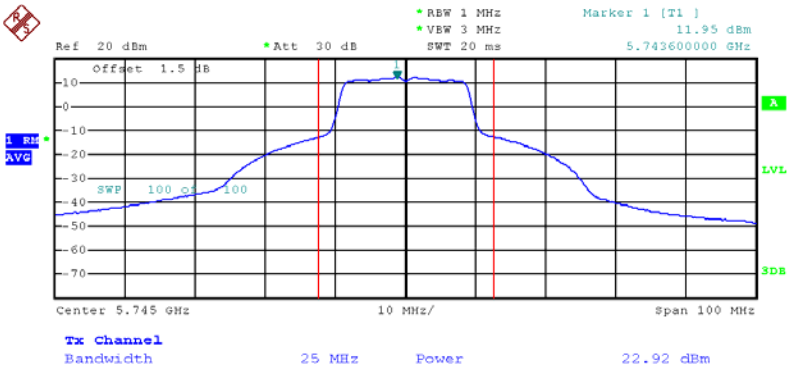
Date: 24.APR.2012 05:38:56

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 40MHz / 2437 MHz/ ANT.2



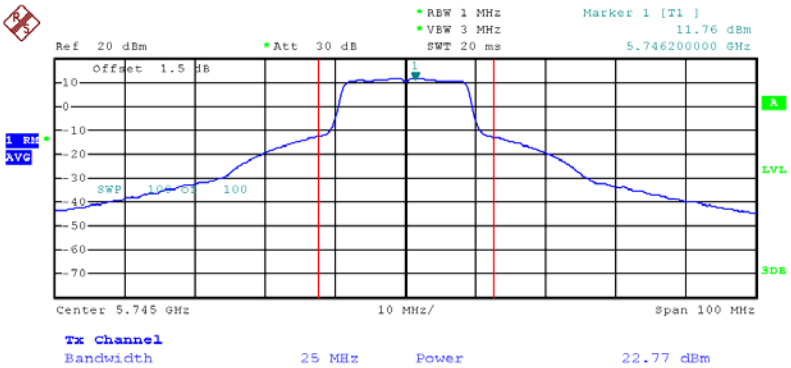
Date: 24.APR.2012 05:38:23

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 20MHz / 5745 MHz / ANT. 3



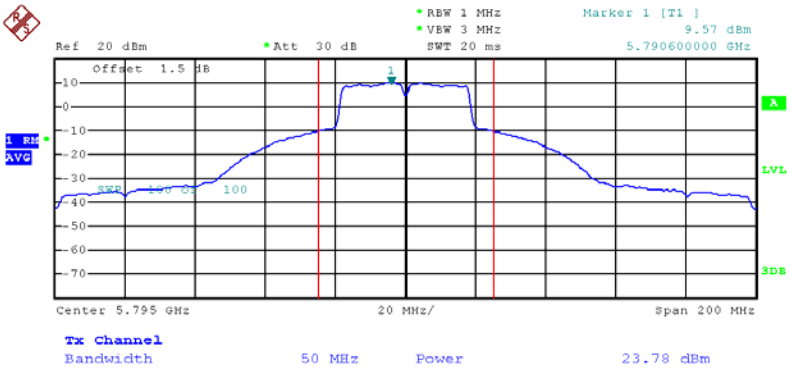
Date: 27.APR.2012 15:24:06

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 20MHz / 5745 MHz/ ANT. 4



Date: 27.APR.2012 15:23:44

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 40MHz / 5795 MHz/ ANT. 3



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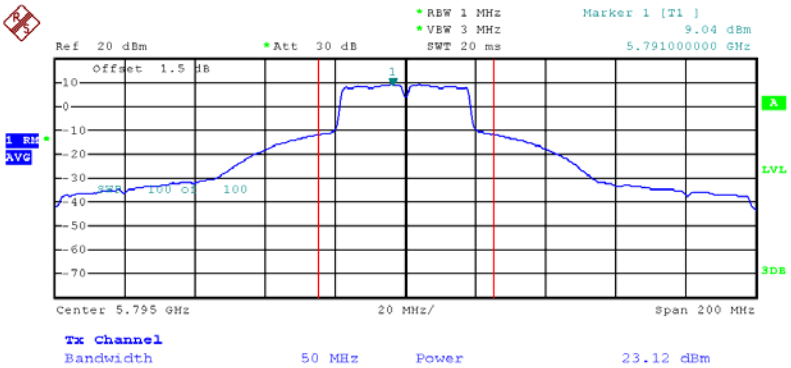
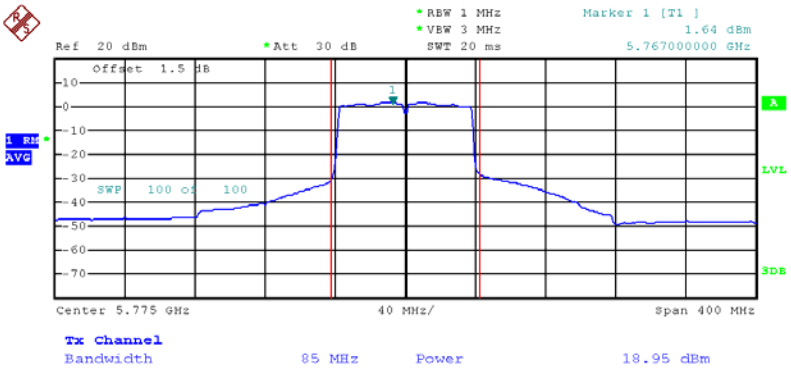
Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 40MHz / 5795 MHz/ ANT. 4



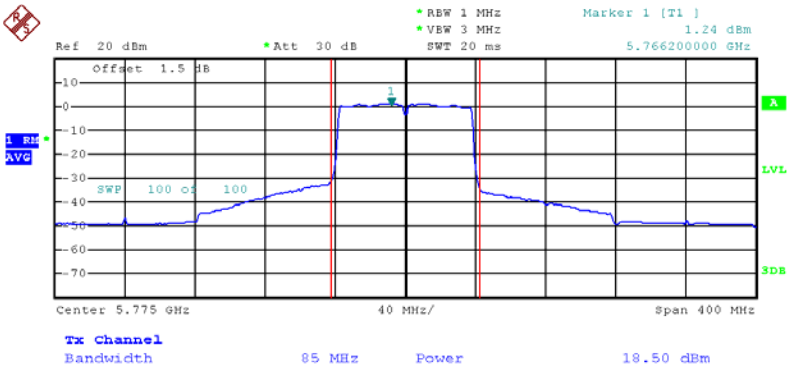
Date: 27.APR.2012 15:43:56

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 80MHz / 5775 MHz/ ANT. 3



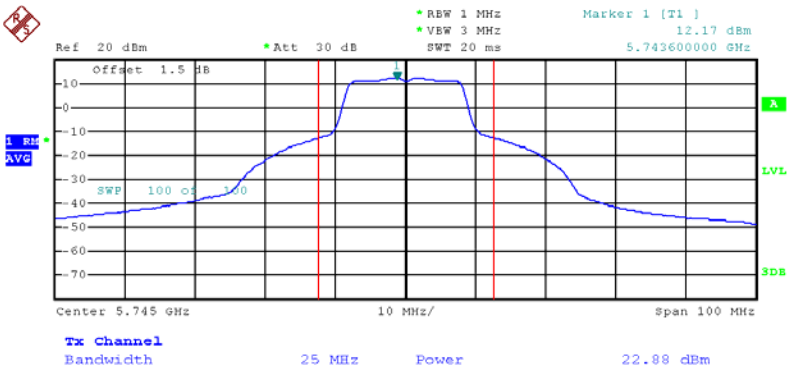
Date: 27.APR.2012 15:47:24

Conducted Output Power Plot on Configuration IEEE 802.11n MCS0 80MHz / 5775 MHz/ ANT. 4



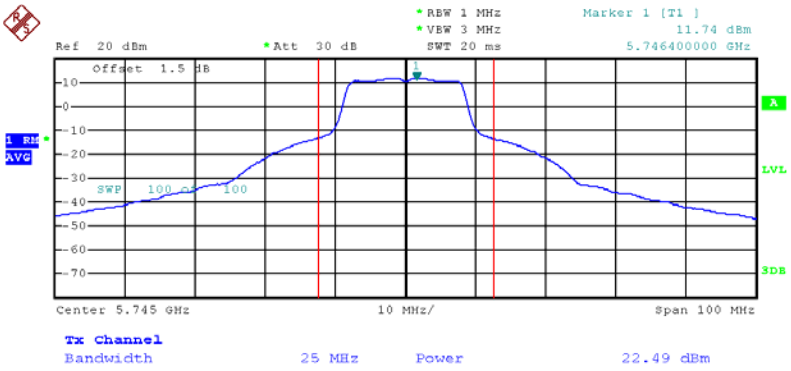
Date: 27.APR.2012 15:47:44

Conducted Output Power Plot on Configuration IEEE 802.11a / 5745 MHz/ ANT. 3



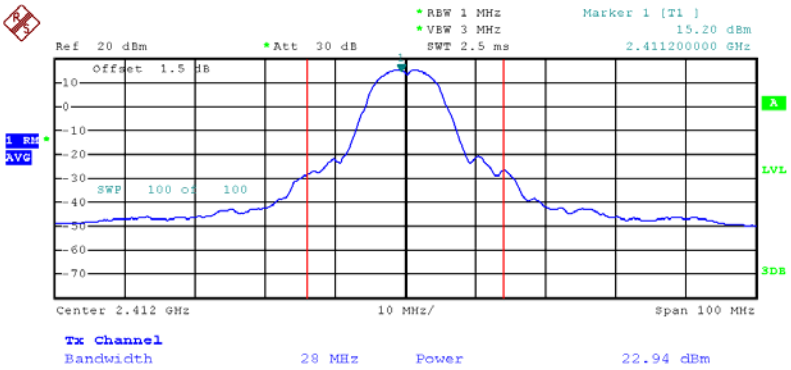
Date: 27.APR.2012 14:55:23

Conducted Output Power Plot on Configuration IEEE 802.11a / 5745 MHz/ ANT. 4



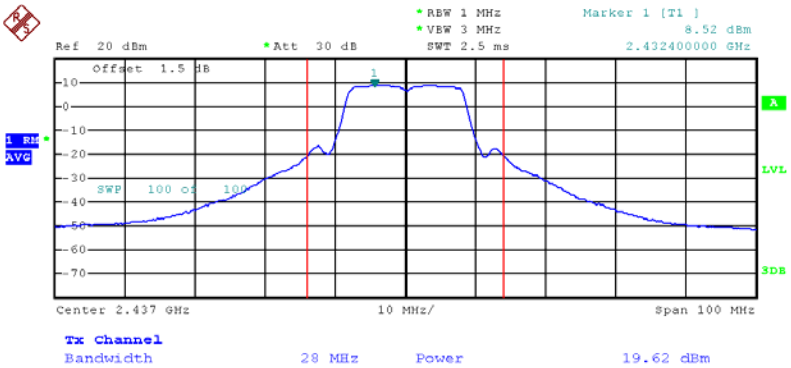
Date: 27.APR.2012 14:56:42

Conducted Output Power Plot on Configuration IEEE 802.11b / 2412 MHz/ ANT. 1



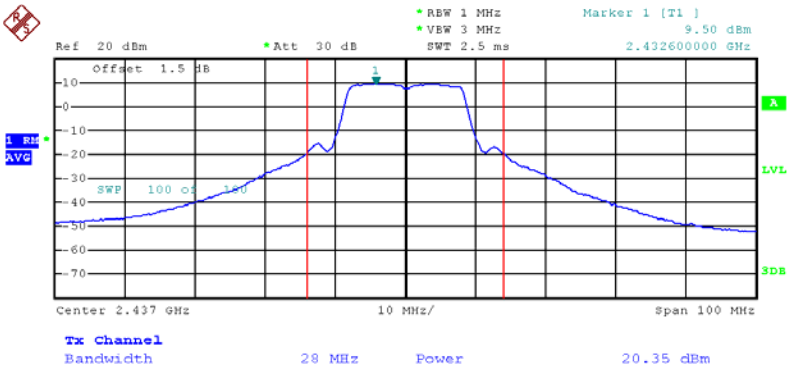
Date: 24.APR.2012 05:21:12

Conducted Output Power Plot on Configuration IEEE 802.11g / 2437 MHz/ ANT.1



Date: 24.APR.2012 05:27:11

Conducted Output Power Plot on Configuration IEEE 802.11g / 2437 MHz/ ANT. 2



Date: 24.APR.2012 05:26:32

4.3. Power Spectral Density Measurement

4.3.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

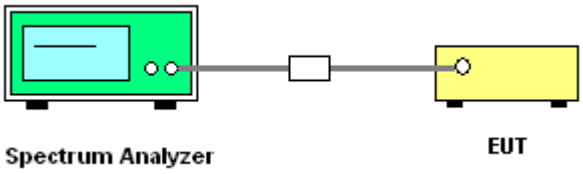
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the analyzer span to 5-30% greater than the EBW.
RB	100 kHz
VB	300 kHz
Detector	RMS
Trace	Single Sweep
Sweep Time	≥ 10 x (number of measurement points in sweep) x (transmission symbol period).

4.3.3. Test Procedures

1. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
2. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW (use of a greater number of measurement points than this minimum requirement is recommended).
3. Use the peak marker function to determine the maximum level in any 100 kHz band segment within the fundamental EBW.
4. Scale the observed power level to an equivalent level in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where: BWCF = 10log (3 kHz/100 kHz = -15.2 dB).
5. The resulting PSD level must be ≤ 8 dBm.
6. When measuring power spectral density 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 Power Spectral Density

Temperature	23°C	Humidity	61%
Test Engineer	Allen Liu	Configurations	IEEE 802.11n
Test Date	Apr. 24, 2012		

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Power Density (dBm/100kHz)		Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2					
1	2412 MHz	-4.32	-3.71	-0.99	-15.23	-16.22	8.00	Complies
6	2437 MHz	-1.06	-0.59	2.19	-15.23	-13.04	8.00	Complies
11	2462 MHz	-5.89	-4.86	-2.33	-15.23	-17.56	8.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Power Density (dBm/100kHz)		Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2					
3	2422 MHz	-10.11	-8.34	-6.13	-15.23	-21.35	8.00	Complies
6	2437 MHz	-7.49	-4.57	-2.78	-15.23	-18.01	8.00	Complies
9	2452 MHz	-10.07	-8.12	-5.98	-15.23	-21.20	8.00	Complies

For 5GHz Band

Configuration IEEE 802.11n MCS0 20MHz

Channel	Frequency	Power Density (dBm/100kHz)		Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Ant. 3	Ant. 4					
149	5745 MHz	2.67	2.66	5.68	-15.23	-9.55	8.00	Complies
157	5785 MHz	2.35	2.26	5.32	-15.23	-9.91	8.00	Complies
165	5825 MHz	2.34	1.50	4.95	-15.23	-10.28	8.00	Complies

Configuration IEEE 802.11n MCS0 40MHz

Channel	Frequency	Power Density (dBm/100kHz)		Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Ant. 3	Ant. 4					
151	5755 MHz	-0.80	-1.48	1.88	-15.23	-13.35	8.00	Complies
159	5795 MHz	0.49	0.13	3.32	-15.23	-11.90	8.00	Complies

Configuration IEEE 802.11ac MCS0 80MHz

Channel	Frequency	Power Density (dBm/100kHz)		Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Ant. 3	Ant. 4					
155	5775 MHz	-6.45	-7.04	-3.72	-15.23	-18.95	8.00	Complies

Temperature	23°C	Humidity	60%
Test Engineer	Allen Liu	Configurations	IEEE 802.11a/b/g
Test Date	Apr. 24, 2012		

Configuration IEEE 802.11b / Ant. 1

Channel	Frequency	Power Density (dBm/100kHz)	Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
1	2412 MHz	6.51	6.51	-15.23	-8.72	8.00	Complies
6	2437 MHz	5.37	5.37	-15.23	-9.86	8.00	Complies
11	2462 MHz	6.21	6.21	-15.23	-9.02	8.00	Complies

Configuration IEEE 802.11g / Ant. 1+ Ant. 2

Channel	Frequency	Power Density (dBm/100kHz)		Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2					
1	2412 MHz	-3.46	-2.42	0.10	-15.23	-15.13	8.00	Complies
6	2437 MHz	-0.36	0.54	3.12	-15.23	-12.11	8.00	Complies
11	2462 MHz	-5.05	-4.26	-1.63	-15.23	-16.86	8.00	Complies

Note: $\text{Directional gain} = 10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N]\ \text{dBi}$

=5.81dBi < 6dBi, so the power density limit =8dBm.

Configuration IEEE 802.11a / Ant. 3 Ant. 4

Channel	Frequency	Power Density (dBm/100kHz)		Total Power Density (dBm/100kHz)	BWCF factor (100KHz to 3KHz	Total Power Density (dBm/3kHz)	Max. Limit (dBm/3kHz)	Result
		Ant. 3	Ant. 4					
149	5745 MHz	3.61	3.08	6.36	-15.23	-8.87	5.11	Complies
157	5785 MHz	3.27	2.55	5.94	-15.23	-9.29	5.11	Complies
165	5825 MHz	2.53	1.78	5.18	-15.23	-10.05	5.11	Complies

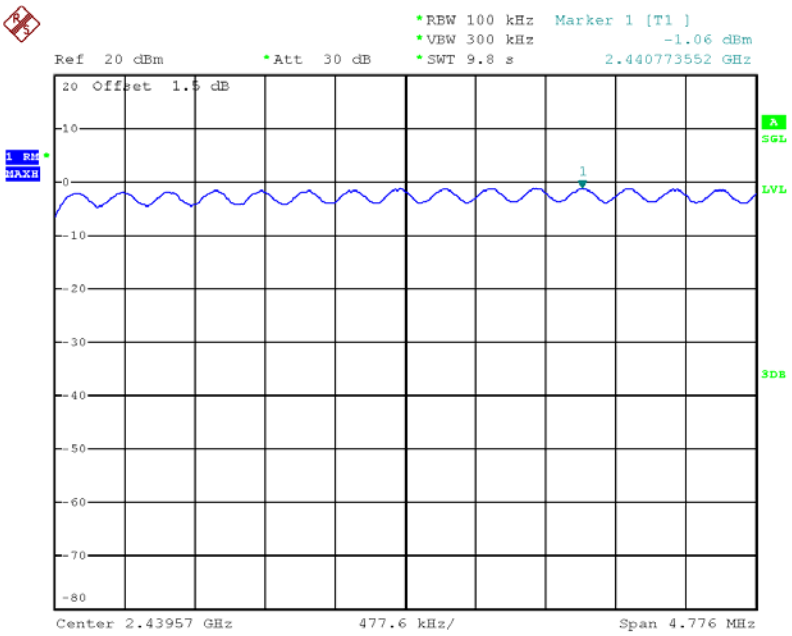
Note: $\text{Directional gain} = 10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2/N]\ \text{dBi}$

=8.89dBi > 6dBi, so the power density limit =8-(8.89-6)=5.11dBm.

All the test values were listed in the report.

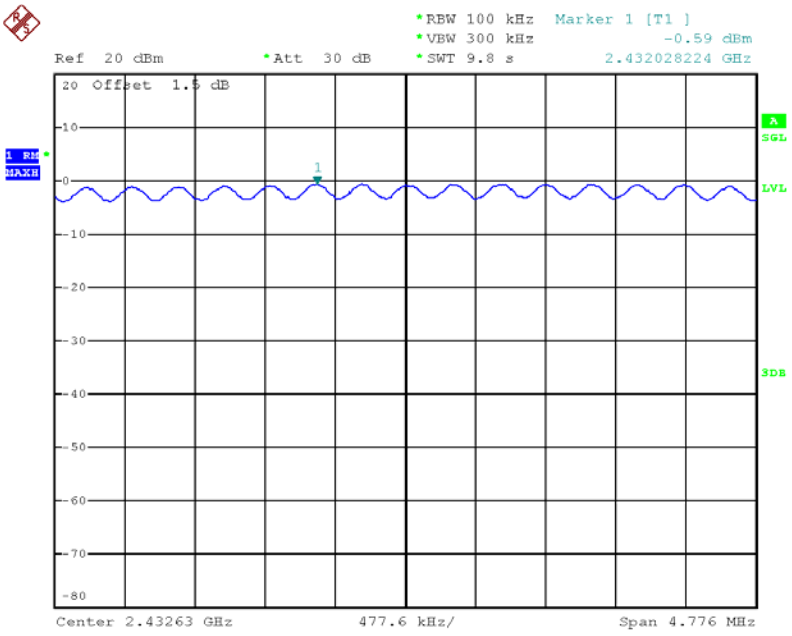
For plots, only the channel with maximum results was shown.

Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 1 / 2437 MHz



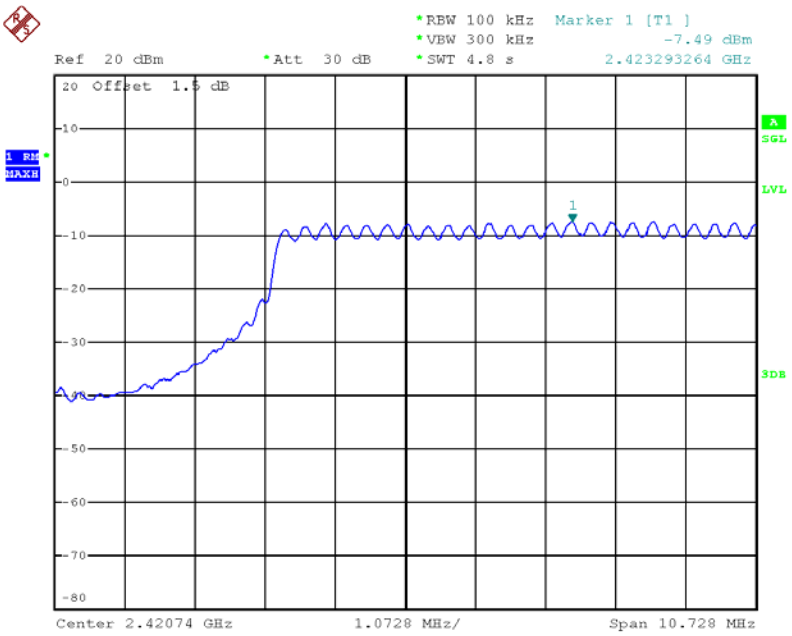
Date: 24.APR.2012 07:20:10

Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 2 / 2437 MHz



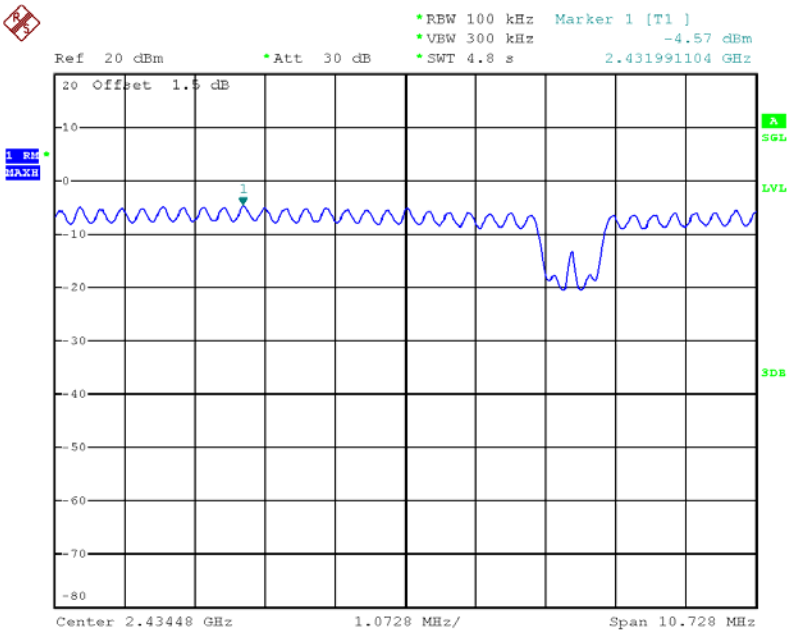
Date: 24.APR.2012 07:21:01

Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 1 / 2437 MHz



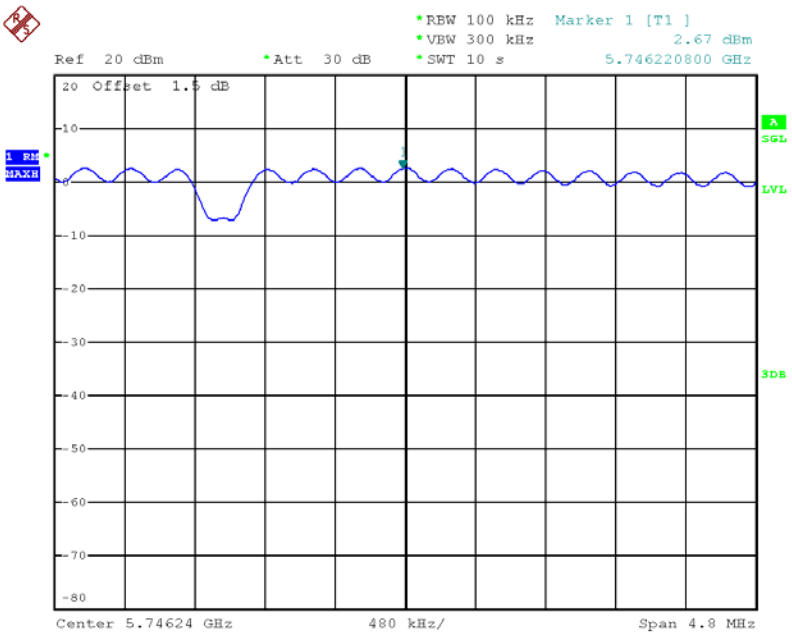
Date: 24.APR.2012 07:26:58

Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 2 / 2437 MHz



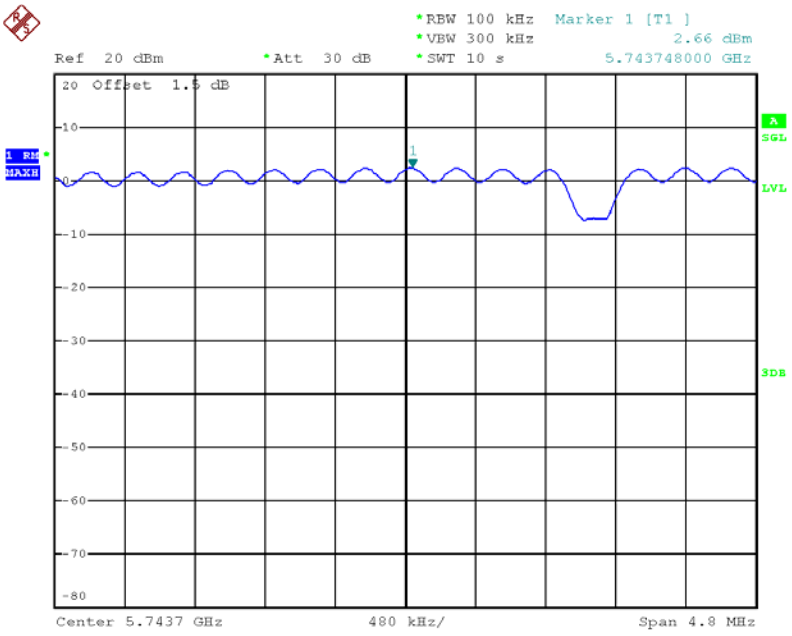
Date: 24.APR.2012 07:26:17

Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 3 / 5745 MHz



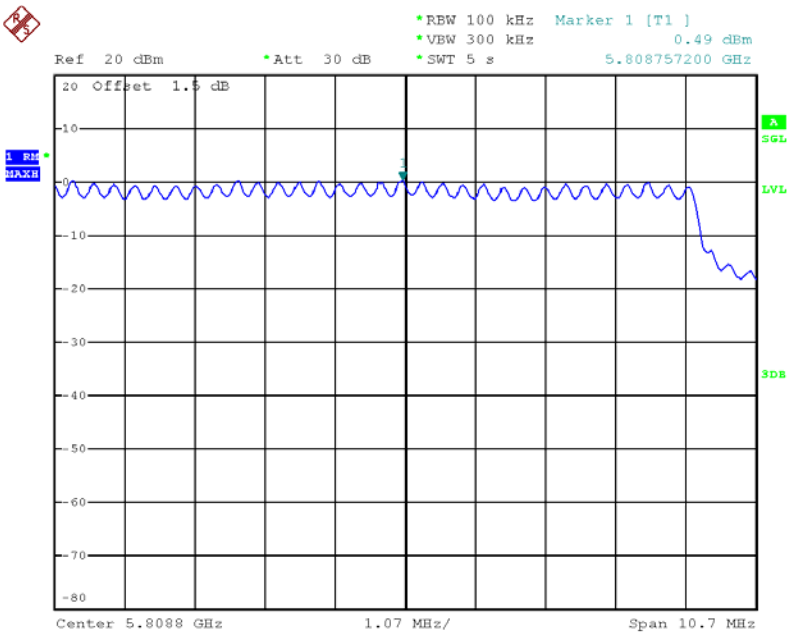
Date: 27.APR.2012 17:13:38

Power Density Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 4 / 5745 MHz



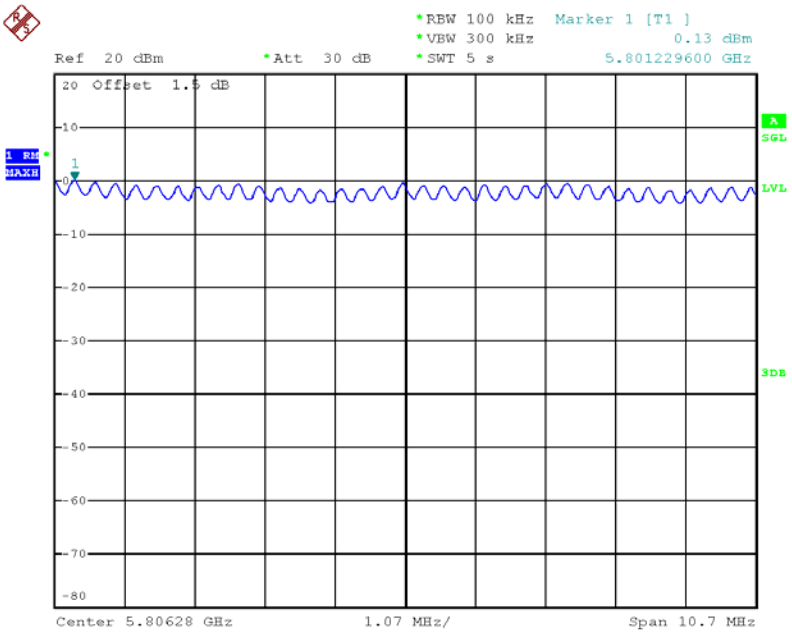
Date: 27.APR.2012 17:13:09

Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 3 / 5795 MHz



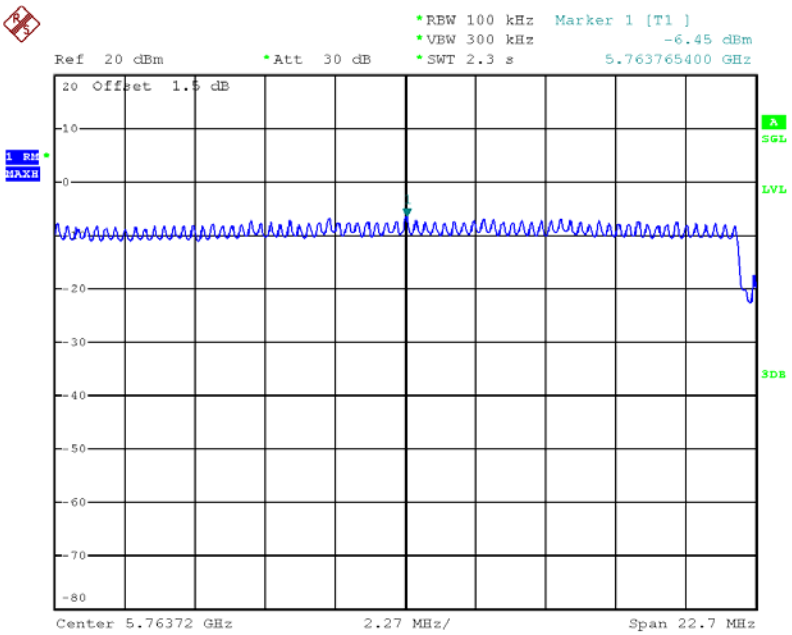
Date: 27.APR.2012 17:16:33

Power Density Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 4 / 5795 MHz



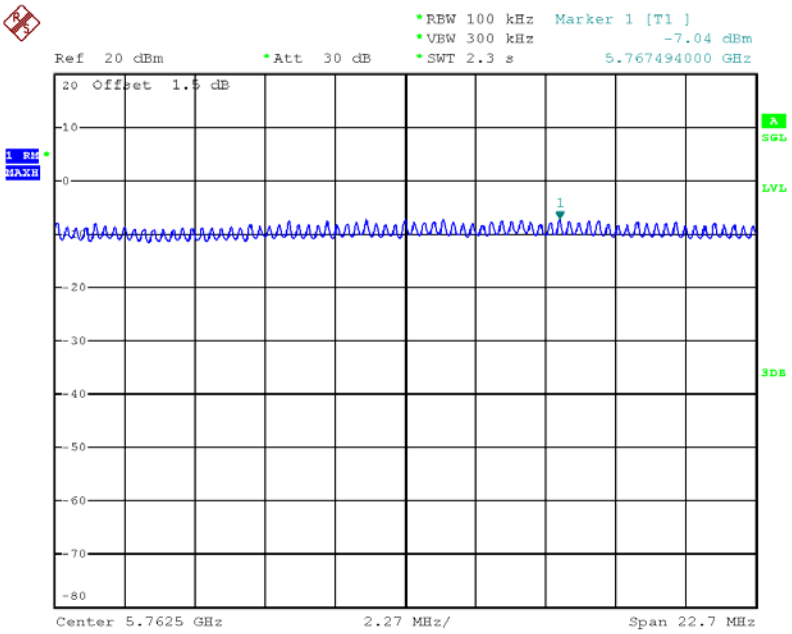
Date: 27.APR.2012 17:16:03

Power Density Plot on Configuration IEEE 802.11n MCS0 8MHz / Ant. 3 / 5775 MHz



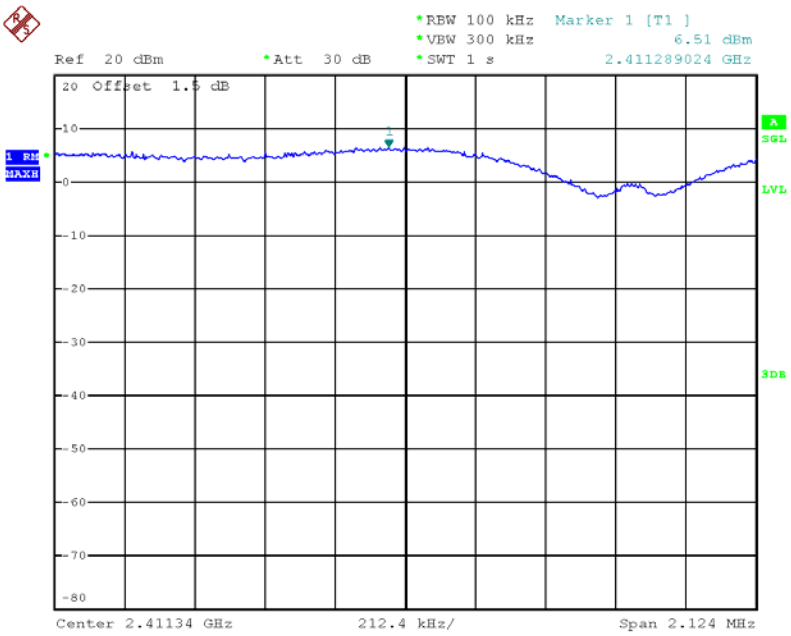
Date: 27.APR.2012 17:18:27

Power Density Plot on Configuration IEEE 802.11n MCS0 8MHz / Ant. 4 / 5775 MHz



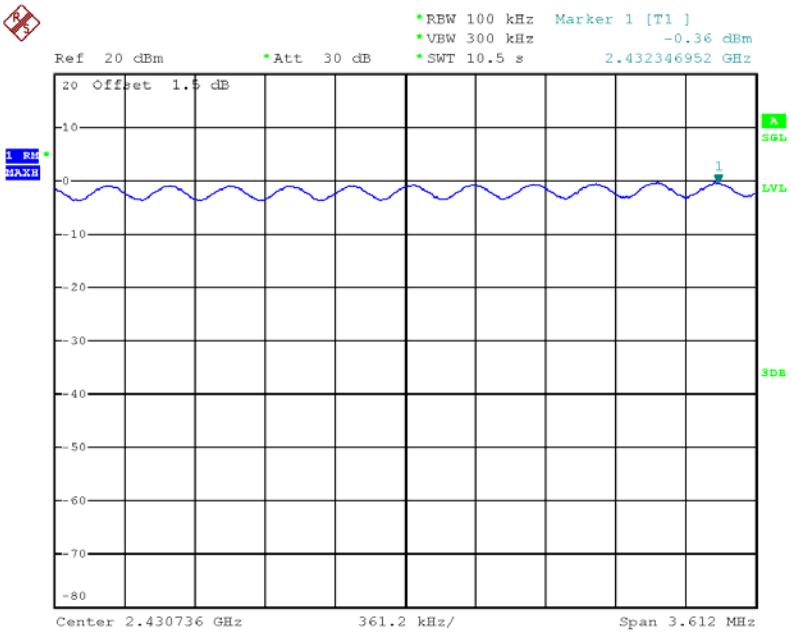
Date: 27.APR.2012 17:20:28

Power Density Plot on Configuration IEEE 802.11b / Ant. 1 / 2412 MHz



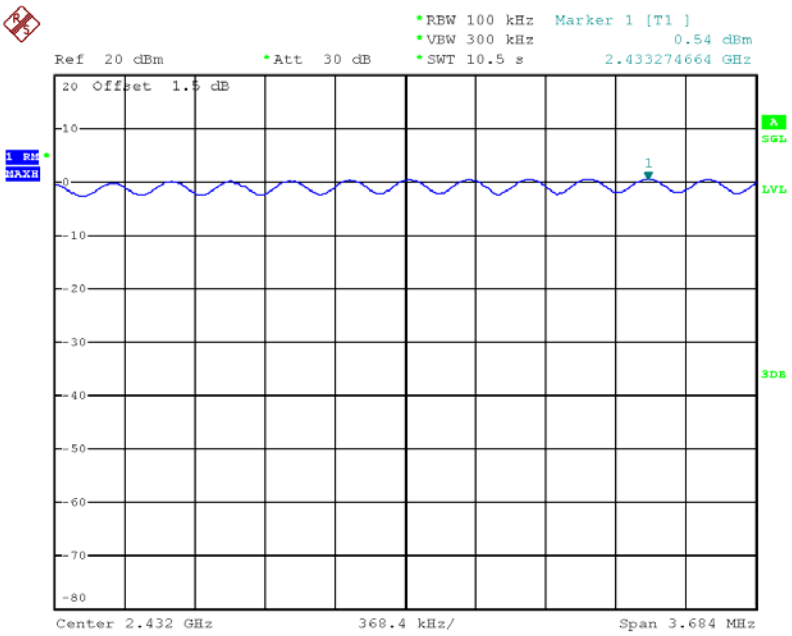
Date: 24.APR.2012 06:32:33

Power Density Plot on Configuration IEEE 802.11g / Ant. 1 / 2437 MHz



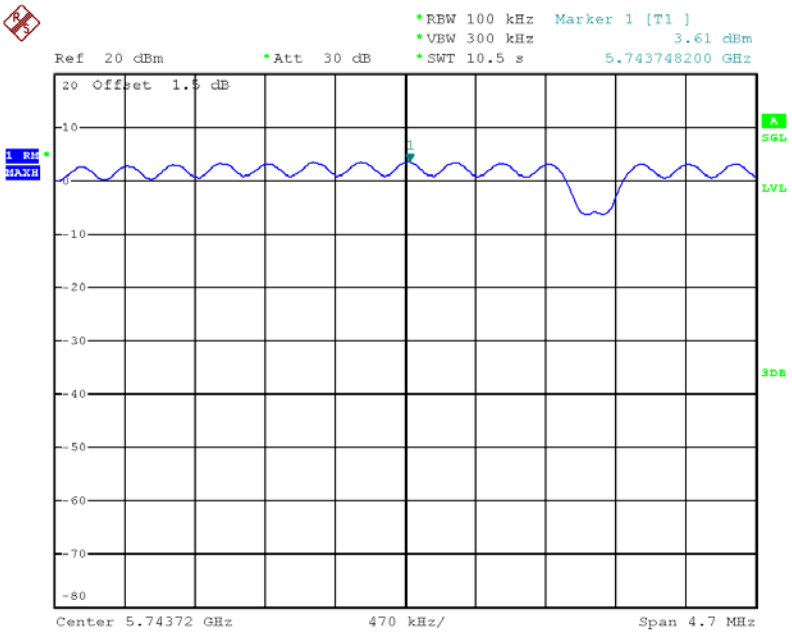
Date: 24.APR.2012 06:45:24

Power Density Plot on Configuration IEEE 802.11g / Ant. 2 / 2437 MHz



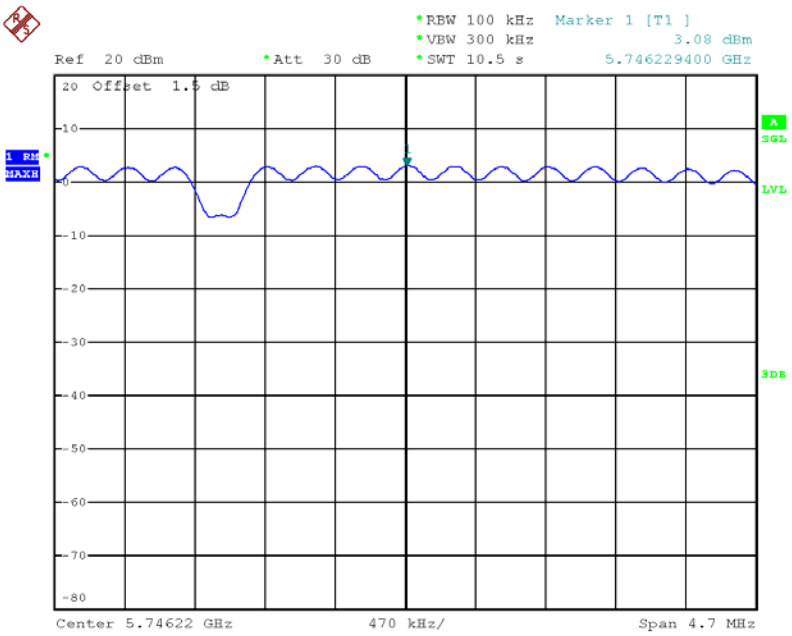
Date: 24.APR.2012 06:44:20

Power Density Plot on Configuration IEEE 802.11a / Ant. 3 / 5745 MHz



Date: 27.APR.2012 17:04:16

Power Density Plot on Configuration IEEE 802.11a / Ant. 4 / 5745 MHz



Date: 27.APR.2012 17:05:06

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

For digital modulation systems, the minimum 6dB bandwidth shall be at least 500 kHz.

4.4.2. Measuring Instruments and Setting

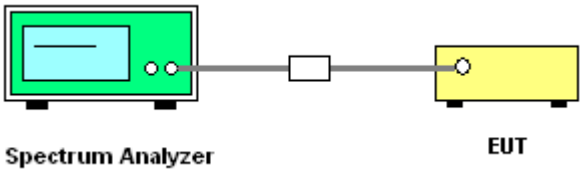
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	100 kHz
VB	100 kHz
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
2. The resolution bandwidth of 100 kHz and the video bandwidth of 100 kHz were used.
3. Measured the spectrum width with power higher than 6dB below carrier.

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 6dB Spectrum Bandwidth

Temperature	23°C	Humidity	61%
Test Engineer	Allen Liu	Configurations	IEEE 802.11n
Test Date	Apr. 24, 2012		

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 20MHz / Ant. 1 + Ant. 2

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	15.84	17.12	500	Complies
6	2437 MHz	15.92	17.00	500	Complies
11	2462 MHz	16.12	16.92	500	Complies

Configuration IEEE 802.11n MCS0 40MHz / Ant. 1 + Ant. 2

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	35.76	36.16	500	Complies
6	2437 MHz	35.76	36.16	500	Complies
9	2452 MHz	35.84	36.16	500	Complies

For 5GHz Band

Configuration IEEE 802.11n MCS0 20MHz / Ant. 3+ Ant. 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	16.04	17.72	500	Complies
157	5785 MHz	16.36	17.72	500	Complies
165	5825 MHz	16.32	17.72	500	Complies

Configuration IEEE 802.11n MCS0 40MHz / Ant. 3+ Ant. 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	35.84	36.00	500	Complies
159	5795 MHz	35.68	36.24	500	Complies

Configuration IEEE 802.11ac MCS0 80MHz / Ant. 3+ Ant. 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
155	5775 MHz	75.84	75.52	500	Complies

Temperature	23℃	Humidity	60%
Test Engineer	Allen Liu	Configurations	IEEE 802.11a/b/g
Test Date	Apr. 24, 2012		

Configuration IEEE 802.11b / Ant. 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	7.08	10.24	500	Complies
6	2437 MHz	7.56	10.16	500	Complies
11	2462 MHz	8.04	10.24	500	Complies

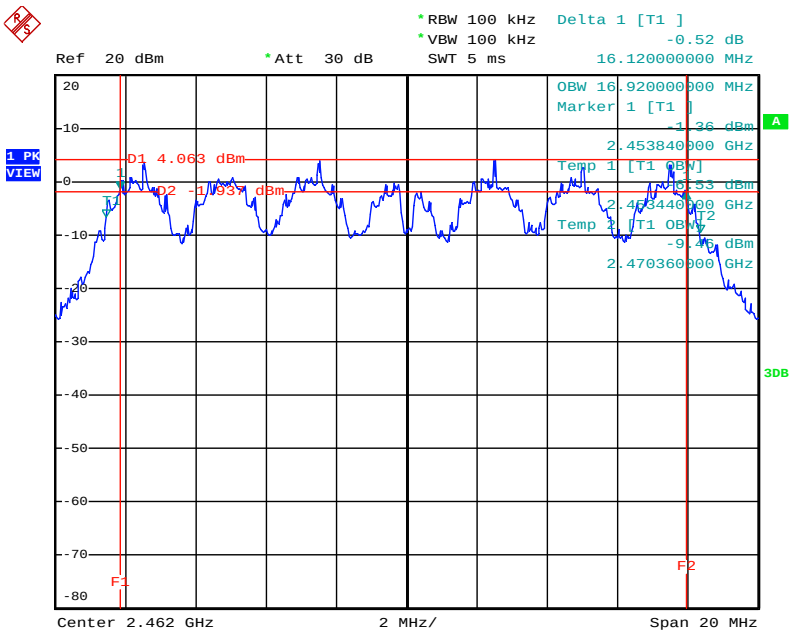
Configuration IEEE 802.11g / Ant. 1+ Ant. 2

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	12.56	15.88	500	Complies
6	2437 MHz	12.28	15.84	500	Complies
11	2462 MHz	12.04	15.76	500	Complies

Configuration IEEE 802.11a / Ant. 3+ Ant. 4

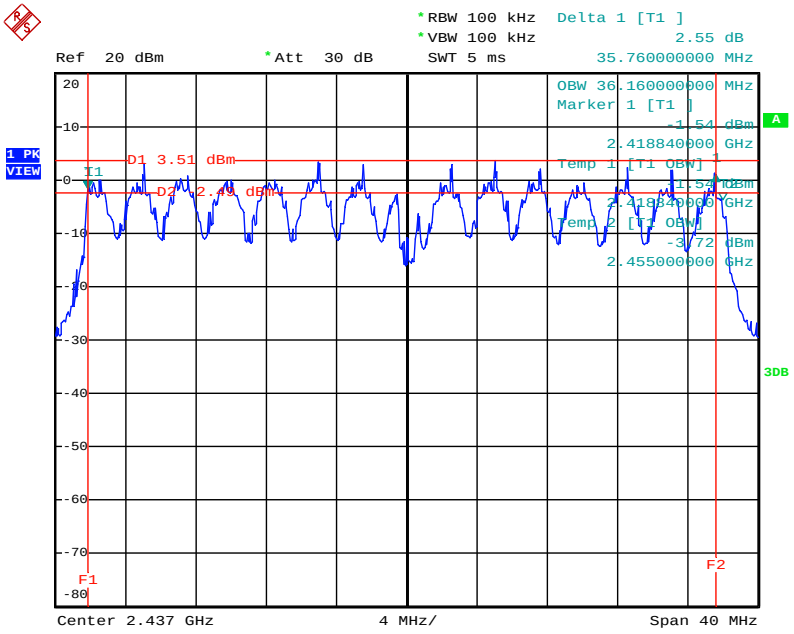
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	15.72	16.52	500	Complies
157	5785 MHz	15.68	16.52	500	Complies
165	5825 MHz	15.72	16.48	500	Complies

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 1 + Ant. 2 / 2462 MHz



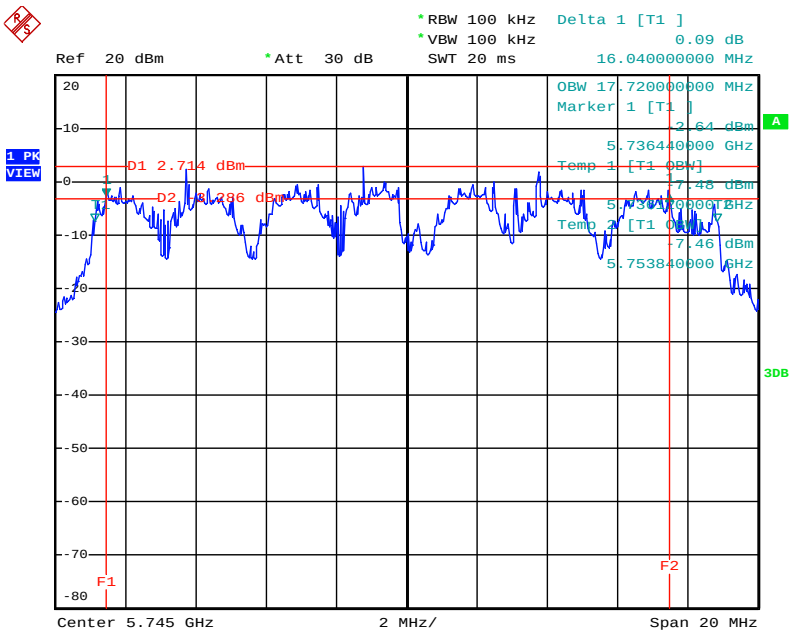
Date: 24.APR.2012 06:05:38

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 1 + Ant. 2 / 2437 MHz



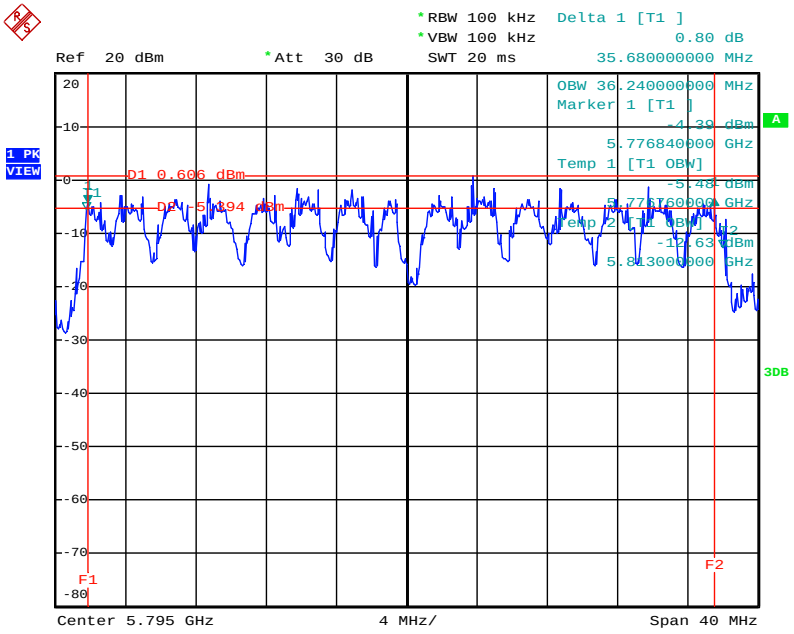
Date: 24.APR.2012 06:07:19

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 3+ Ant. 4 / 5745 MHz



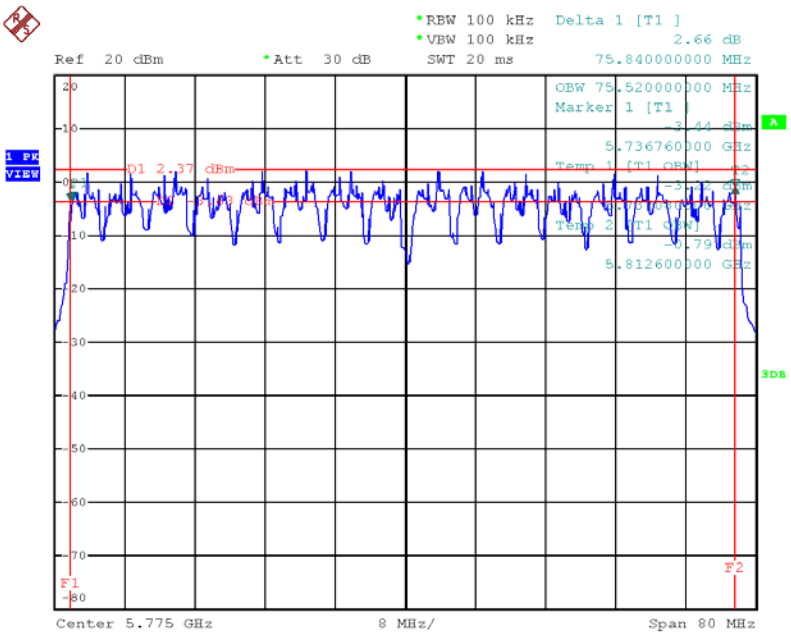
Date: 27.APR.2012 16:44:18

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 3+ Ant. 4 / 5795 MHz



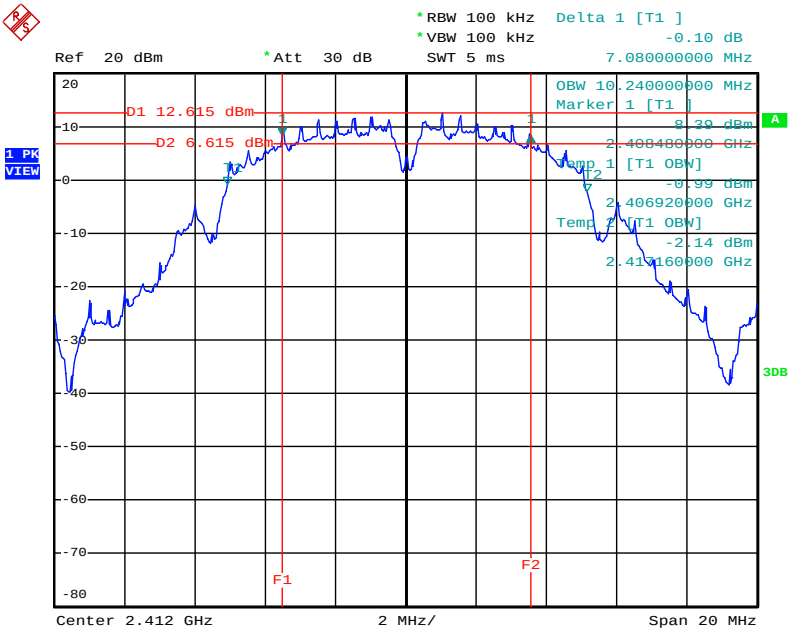
Date: 27.APR.2012 16:48:30

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0 80MHz / Ant. 3+ Ant. 4 / 5775 MHz



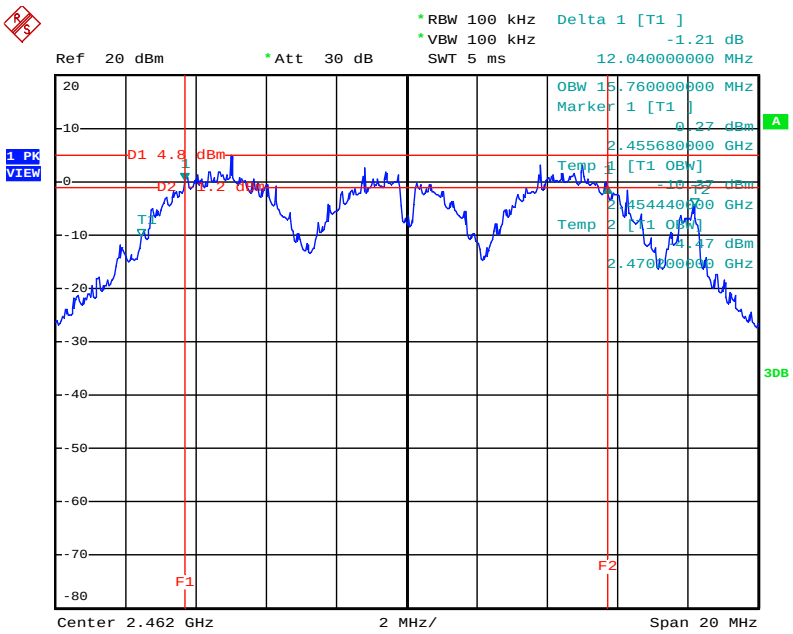
Date: 27.APR.2012 16:51:10

6 dB Bandwidth Plot on Configuration IEEE 802.11b / Ant. 1 / 2412 MHz



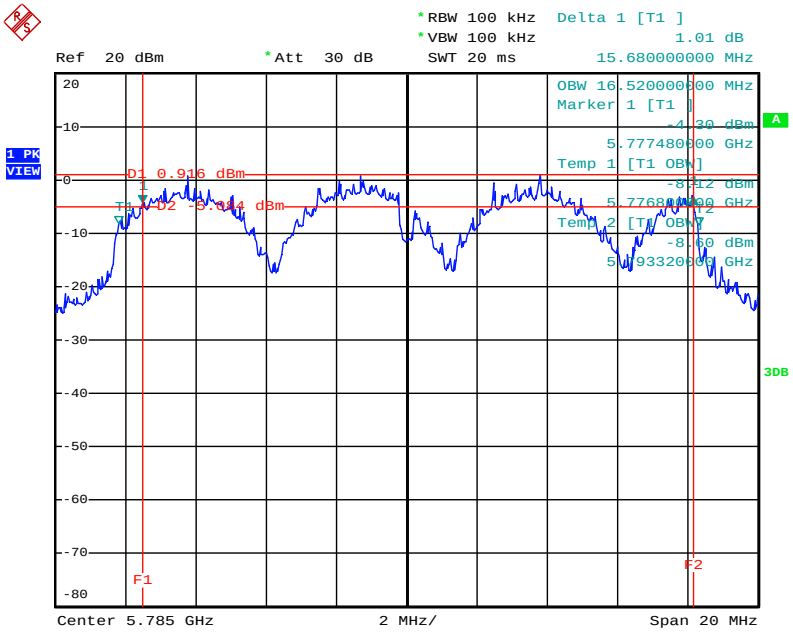
Date: 24.APR.2012 05:43:24

6 dB Bandwidth Plot on Configuration IEEE 802.11g / Ant. 1+ Ant. 2 / 2462 MHz



Date: 24.APR.2012 06:02:13

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Ant. 3+ Ant. 4 / 5785 MHz



Date: 27.APR.2012 16:42:15

4.5. Radiated Emissions Measurement

4.5.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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

4.5.2. 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	1GHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 3MHz for peak

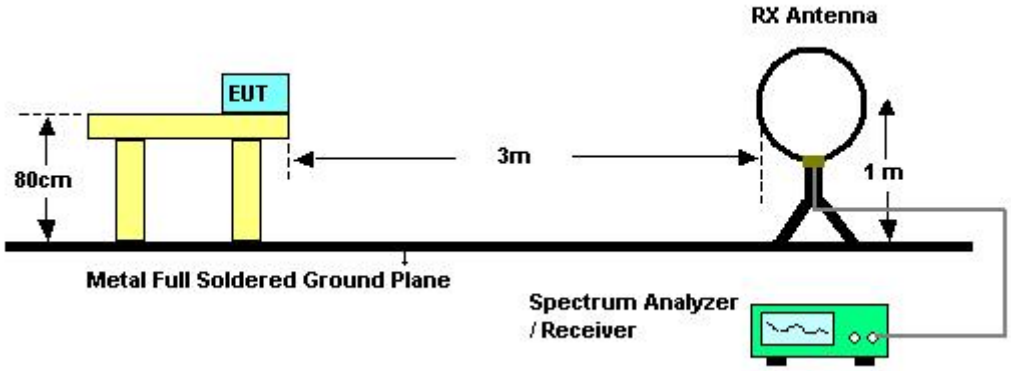
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1GHz / RB 120kHz for QP

4.5.3. Test Procedures

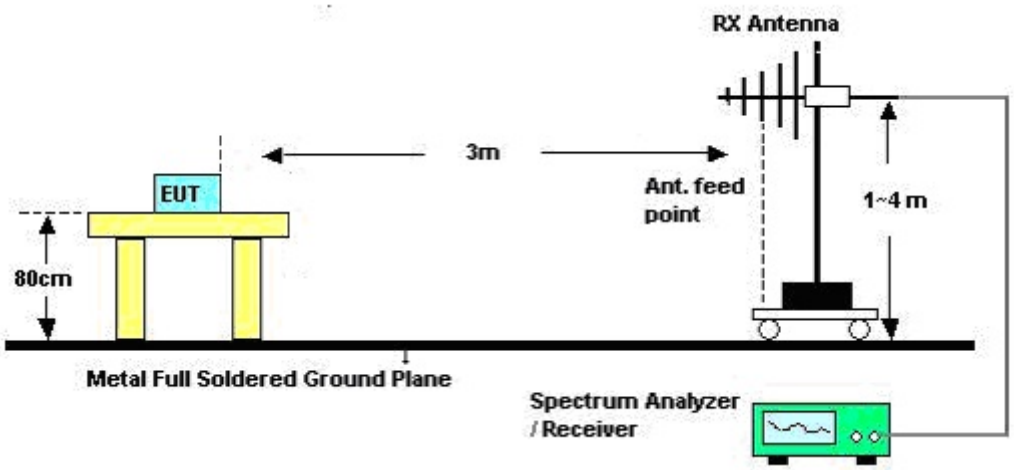
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 3MHz 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.

4.5.4. Test Setup Layout

For radiated emissions below 1GHz



For radiated emissions above 1GHz



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

Temperature	21℃	Humidity	56.4%
Test Engineer	Serway Lee	Configurations	Normal
Test Date	Apr. 28, 202		

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 20 dB below the permissible value has no need to be reported.

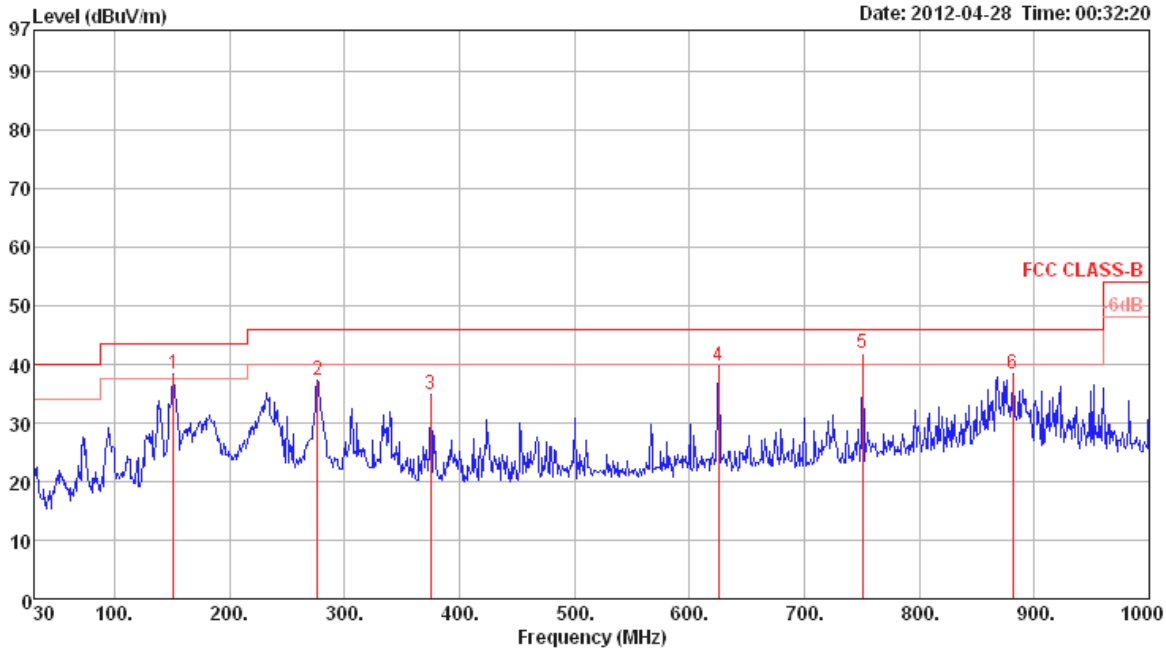
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

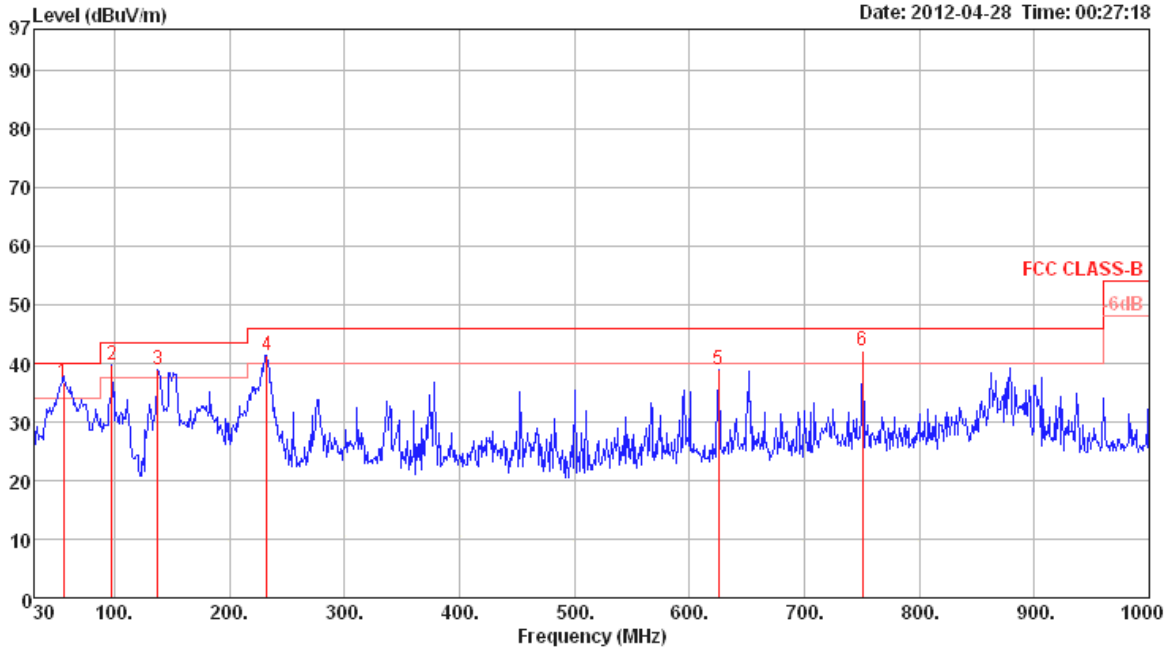
Temperature	21°C	Humidity	56.4%
Test Engineer	Serway Lee	Configurations	Normal Link/ Mode 1

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	151.25	38.44	43.50	-5.06	52.45	1.46	11.87	27.34	Peak	100	0	HORIZONTAL
2	276.38	37.29	46.00	-8.71	49.15	2.01	13.08	26.95	Peak	100	0	HORIZONTAL
3	375.32	34.83	46.00	-11.17	44.61	2.25	15.40	27.43	Peak	100	0	HORIZONTAL
4	625.58	39.68	46.00	-6.32	45.85	3.05	18.85	28.07	Peak	100	0	HORIZONTAL
5	750.71	41.93	46.00	-4.07	46.80	3.50	19.43	27.80	Peak	100	0	HORIZONTAL
6	881.66	38.40	46.00	-7.60	41.92	3.53	20.39	27.44	Peak	100	0	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	55.89	36.79	40.00	-3.21	56.30	0.80	7.47	27.78	QP	100	129	VERTICAL
2	97.90	39.62	43.50	-3.88	55.48	1.16	10.59	27.61	Peak	400	0	VERTICAL
3	137.67	38.83	43.50	-4.67	52.53	1.38	12.33	27.41	Peak	400	0	VERTICAL
4	232.73	41.46	46.00	-4.54	55.18	1.83	11.48	27.03	Peak	400	0	VERTICAL
5	625.58	38.79	46.00	-7.21	44.96	3.05	18.85	28.07	Peak	400	0	VERTICAL
6	750.71	42.17	46.00	-3.83	47.04	3.50	19.43	27.80	Peak	400	0	VERTICAL

Note:

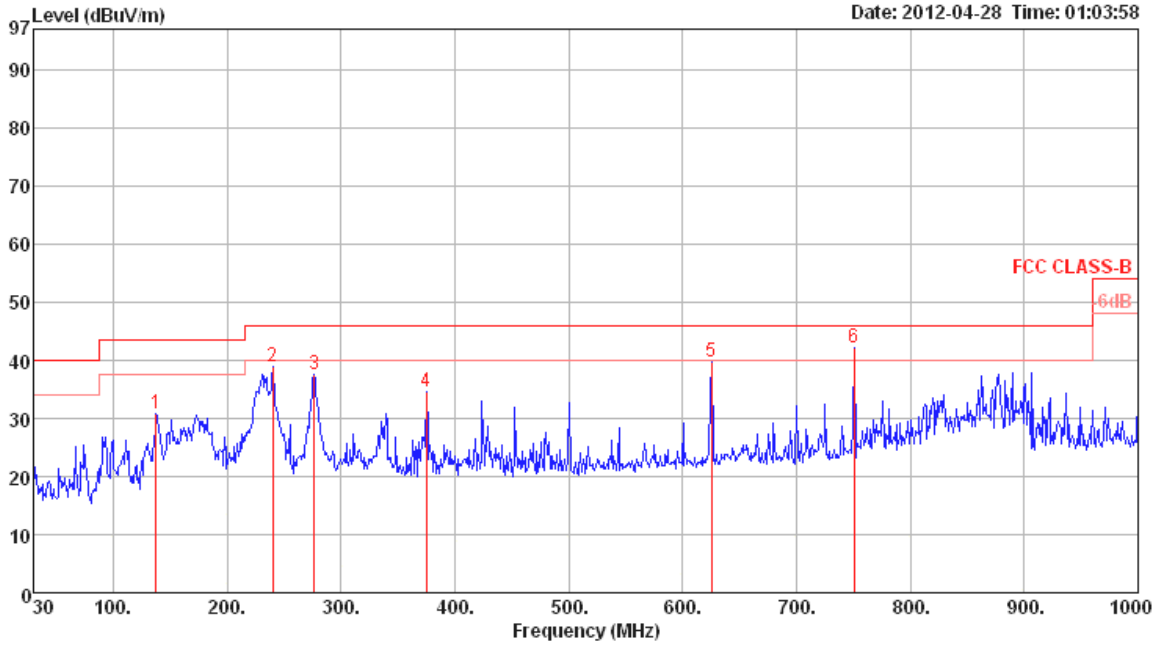
The amplitude of spurious emissions that are attenuated by more than 20dB below the permissible value has no need to be reported.

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

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

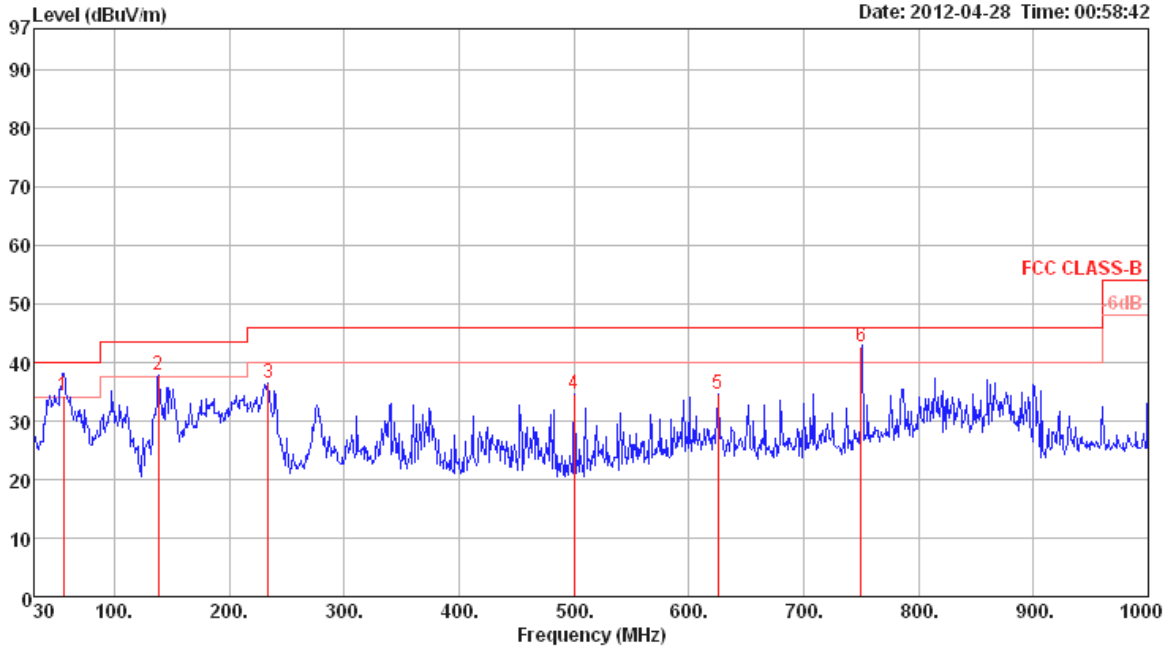
Temperature	21°C	Humidity	56.4%
Test Engineer	Serway Lee	Configurations	Normal Link/ Mode 2

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	137.67	30.70	43.50	-12.80	44.40	1.38	12.33	27.41	Peak	100	0	HORIZONTAL
2	240.49	38.94	46.00	-7.06	52.05	1.86	12.05	27.02	Peak	100	0	HORIZONTAL
3	276.38	37.43	46.00	-8.57	49.29	2.01	13.08	26.95	Peak	100	0	HORIZONTAL
4	375.32	34.58	46.00	-11.42	44.36	2.25	15.40	27.43	Peak	100	0	HORIZONTAL
5	625.58	39.74	46.00	-6.26	45.91	3.05	18.85	28.07	Peak	100	0	HORIZONTAL
6	750.71	42.23	46.00	-3.77	47.10	3.50	19.43	27.80	Peak	100	0	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	55.89	34.22	40.00	-5.78	53.73	0.80	7.47	27.78	QP	100	201	VERTICAL
2	138.64	37.73	43.50	-5.77	51.41	1.39	12.34	27.41	Peak	400	0	VERTICAL
3	233.70	36.35	46.00	-9.65	50.00	1.83	11.55	27.03	Peak	400	0	VERTICAL
4	500.45	34.46	46.00	-11.54	42.23	2.70	17.63	28.10	Peak	400	0	VERTICAL
5	625.58	34.53	46.00	-11.47	40.70	3.05	18.85	28.07	Peak	400	0	VERTICAL
6	750.00	42.73	46.00	-3.27	47.60	3.50	19.43	27.80	QP	100	324	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.

4.5.9. Results for Radiated Emissions (1GHz~10th Harmonic)

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz Ch 1 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4821.48	44.82	74.00	-29.18	40.40	6.23	33.39	35.20	Peak	100	197	HORIZONTAL
2	4825.10	33.61	54.00	-20.39	29.19	6.23	33.39	35.20	Average	100	197	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	4821.16	44.55	74.00	-29.45	40.13	6.23	33.39	35.20	Peak	100	334	VERTICAL
2	4823.98	34.53	54.00	-19.47	30.11	6.23	33.39	35.20	Average	100	334	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz Ch 6 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4873.60	34.73	54.00	-19.27	30.16	6.29	33.48	35.20	Average	100	195	HORIZONTAL
2	4878.60	46.39	74.00	-27.61	41.82	6.29	33.48	35.20	Peak	100	195	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	4873.84	49.04	74.00	-24.96	44.47	6.29	33.48	35.20	Peak	143	256	VERTICAL
2	4874.16	37.29	54.00	-16.71	32.72	6.29	33.48	35.20	Average	143	256	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz Ch11 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4916.64	45.57	74.00	-28.43	40.89	6.34	33.54	35.20	Peak	100	254	HORIZONTAL
2	4921.40	33.74	54.00	-20.26	29.06	6.34	33.54	35.20	Average	100	254	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	4922.80	34.00	54.00	-20.00	29.28	6.34	33.58	35.20	Average	100	191	VERTICAL
2	4931.92	44.93	74.00	-29.07	40.21	6.34	33.58	35.20	Peak	100	191	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz Ch 3 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4847.32	32.74	54.00	-21.26	28.26	6.26	33.42	35.20	Average	100	47	HORIZONTAL
2	4847.68	45.65	74.00	-28.35	41.17	6.26	33.42	35.20	Peak	100	47	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	4843.96	32.81	54.00	-21.19	28.33	6.26	33.42	35.20	Average	100	263	VERTICAL
2	4847.68	45.43	74.00	-28.57	40.95	6.26	33.42	35.20	Peak	100	263	VERTICAL

Temperature	21℃	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz Ch 6 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4875.24	34.55	54.00	-19.45	29.98	6.29	33.48	35.20	Average	100	252	HORIZONTAL
2	4882.60	45.93	74.00	-28.07	41.36	6.29	33.48	35.20	Peak	100	252	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	4874.08	34.16	54.00	-19.84	29.59	6.29	33.48	35.20	Average	100	20	VERTICAL
2	4879.60	46.05	74.00	-27.95	41.48	6.29	33.48	35.20	Peak	100	20	VERTICAL

Temperature	21℃	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz Ch 9 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4902.84	45.38	74.00	-28.62	40.76	6.31	33.51	35.20	Peak	100	181	HORIZONTAL
2	4903.96	33.12	54.00	-20.88	28.50	6.31	33.51	35.20	Average	100	181	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	4906.04	33.22	54.00	-20.78	28.57	6.31	33.54	35.20	Average	100	70	VERTICAL
2	4907.88	45.18	74.00	-28.82	40.53	6.31	33.54	35.20	Peak	100	70	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz CH 149 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11490.52	48.92	54.00	-5.08	34.57	9.93	39.50	35.08	Average	121	53	HORIZONTAL
2	11490.64	62.16	74.00	-11.84	47.81	9.93	39.50	35.08	Peak	121	53	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	11492.80	63.21	74.00	-10.79	48.86	9.93	39.50	35.08	Peak	172	97	VERTICAL
2	11492.96	50.32	54.00	-3.68	35.97	9.93	39.50	35.08	Average	172	97	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz CH 157 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11566.48	63.79	74.00	-10.21	49.45	9.95	39.48	35.09	Peak	118	51	HORIZONTAL
2	11567.88	50.72	54.00	-3.28	36.39	9.95	39.47	35.09	Average	118	51	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	11570.26	50.54	54.00	-3.46	36.21	9.95	39.47	35.09	Average	179	96	VERTICAL
2	11572.40	65.16	74.00	-8.84	50.82	9.95	39.47	35.08	Peak	179	96	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz CH 165 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11650.16	50.36	54.00	-3.64	36.01	9.98	39.44	35.07	Average	150	107	HORIZONTAL
2	11652.40	63.74	74.00	-10.26	49.39	9.98	39.44	35.07	Peak	150	107	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	11648.06	64.76	74.00	-9.24	50.41	9.98	39.44	35.07	Peak	191	99	VERTICAL
2	11650.42	50.66	54.00	-3.34	36.31	9.98	39.44	35.07	Average	191	99	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz CH 151 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11508.08	58.86	74.00	-15.14	44.53	9.93	39.50	35.10	Peak	122	57	HORIZONTAL
2	11510.38	46.55	54.00	-7.45	32.22	9.93	39.50	35.10	Average	122	57	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	11510.17	47.78	54.00	-6.22	33.45	9.93	39.50	35.10	Average	180	96	VERTICAL
2	11512.39	61.19	74.00	-12.81	46.86	9.93	39.50	35.10	Peak	180	96	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz CH 159 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11597.76	44.81	54.00	-9.19	30.46	9.96	39.47	35.08	Average	125	281	HORIZONTAL
2	11600.00	56.74	74.00	-17.26	42.39	9.96	39.47	35.08	Peak	125	281	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	11580.88	59.54	74.00	-14.46	45.20	9.95	39.47	35.08	Peak	187	96	VERTICAL
2	11599.96	47.36	54.00	-6.64	33.01	9.96	39.47	35.08	Average	187	96	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 80MHz CH 155 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11546.94	54.76	74.00	-19.24	40.42	9.94	39.49	35.09	Peak	100	297	HORIZONTAL
2	11548.50	42.55	54.00	-11.45	28.21	9.94	39.49	35.09	Average	100	297	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	11549.04	42.68	54.00	-11.32	28.34	9.94	39.49	35.09	Average	100	2	VERTICAL
2	11553.32	55.10	74.00	-18.90	40.77	9.94	39.48	35.09	Peak	100	2	VERTICAL

Temperature	21℃	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11b CH 1 / Ant. 1
Test Date	Apr. 21, 2012		

Horizontal

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	a	4823.98	42.17	54.00	-11.83	37.75	6.23	35.20	33.39	62	131	Average	HORIZONTAL
2	p	4824.01	51.11	74.00	-22.89	46.69	6.23	35.20	33.39	62	131	Peak	HORIZONTAL

Vertical

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	a	4823.96	45.80	54.00	-8.20	41.38	6.23	35.20	33.39	257	101	Average	VERTICAL
2	p	4823.97	51.62	74.00	-22.38	47.20	6.23	35.20	33.39	257	101	Peak	VERTICAL

Temperature	21℃	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11b CH 6 / Ant. 1
Test Date	Apr. 21, 2012		

Horizontal

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p	4873.88	49.14	74.00	-24.86	44.57	6.29	35.20	33.48	53	125	Peak	HORIZONTAL
2	a	4873.94	44.70	54.00	-9.30	40.13	6.29	35.20	33.48	53	125	Average	HORIZONTAL

Vertical

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p	4873.82	48.80	74.00	-25.20	44.23	6.29	35.20	33.48	257	101	Peak	VERTICAL
2	a	4873.97	44.39	54.00	-9.61	39.82	6.29	35.20	33.48	257	101	Average	VERTICAL

Temperature	21℃	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11b CH 11 / Ant. 1
Test Date	Apr. 21, 2012		

Horizontal

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	a	4923.97	48.06	54.00	-5.94	43.34	6.34	35.20	33.58	47	119	Average	HORIZONTAL
2	p	4924.09	52.08	74.00	-21.92	47.36	6.34	35.20	33.58	47	119	Peak	HORIZONTAL

Vertical

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p	4923.88	51.56	74.00	-22.44	46.84	6.34	35.20	33.58	278	100	Peak	VERTICAL
2	a	4923.95	47.14	54.00	-6.86	42.42	6.34	35.20	33.58	278	100	Average	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11g CH 1 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4824.16	34.52	54.00	-19.48	30.10	6.23	33.39	35.20	Average	100	150	HORIZONTAL
2	4830.76	46.30	74.00	-27.70	41.88	6.23	33.39	35.20	Peak	100	150	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	4823.84	35.99	54.00	-18.01	31.57	6.23	33.39	35.20	Average	100	254	VERTICAL
2	4824.36	48.01	74.00	-25.99	43.59	6.23	33.39	35.20	Peak	100	254	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11g CH 6 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4872.92	50.35	74.00	-23.65	45.78	6.29	33.48	35.20	Peak	128	42	HORIZONTAL
2	4877.00	38.94	54.00	-15.06	34.37	6.29	33.48	35.20	Average	128	42	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	4873.44	38.17	54.00	-15.83	33.60	6.29	33.48	35.20	Average	115	266	VERTICAL
2	4874.12	51.28	74.00	-22.72	46.71	6.29	33.48	35.20	Peak	115	266	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11g CH 11 / Ant. 1 + Ant. 2
Test Date	Apr. 21, 2012		

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	4922.08	46.12	74.00	-27.88	41.40	6.34	33.58	35.20	Peak	100	124	HORIZONTAL
2	4923.98	33.81	54.00	-20.19	29.09	6.34	33.58	35.20	Average	100	124	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	4923.36	45.13	74.00	-28.87	40.41	6.34	33.58	35.20	Peak	100	232	VERTICAL
2	4927.10	35.27	54.00	-18.73	30.55	6.34	33.58	35.20	Average	100	232	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 149 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11486.24	62.50	74.00	-11.50	48.16	9.92	39.50	35.08	Peak	119	48	HORIZONTAL
2	11490.72	50.29	54.00	-3.71	35.94	9.93	39.50	35.08	Average	119	48	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	11489.00	61.42	74.00	-12.58	47.07	9.93	39.50	35.08	Peak	181	99	VERTICAL
2	11489.72	50.85	54.00	-3.15	36.50	9.93	39.50	35.08	Average	181	99	VERTICAL

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 157 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11571.00	50.36	54.00	-3.64	36.03	9.95	39.47	35.09	Average	119	50	HORIZONTAL
2	11571.44	63.81	74.00	-10.19	49.48	9.95	39.47	35.09	Peak	119	50	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	11570.36	64.86	74.00	-9.14	50.53	9.95	39.47	35.09	Peak	180	98	VERTICAL
2	11570.44	50.92	54.00	-3.08	36.59	9.95	39.47	35.09	Average	180	98	VERTICAL

Temperature	21℃	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a CH 165 / Ant. 3 + Ant. 4
Test Date	Apr. 21, 2012		

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	11646.16	50.86	54.00	-3.14	36.51	9.98	39.44	35.07	Average	129	51	HORIZONTAL
2	11646.16	63.13	74.00	-10.87	48.78	9.98	39.44	35.07	Peak	129	51	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	11645.96	63.74	74.00	-10.26	49.39	9.98	39.44	35.07	Peak	183	94	VERTICAL
2	11650.40	50.68	54.00	-3.32	36.33	9.98	39.44	35.07	Average	183	94	VERTICAL

Note:

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

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

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

4.6. Band Edge Emissions Measurement

4.6.1. Limit

20dBc in any 100 kHz bandwidth outside the operating frequency band. 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 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)	100 KHz /100 KHz for Peak

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3, 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.

4.6.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.5.4.

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. Test Result of Band Edge and Fundamental Emissions

Temperature	21℃	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 20MHz Ch 1, 6, 11 / Ant. 1 + Ant. 2

Channel 1

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	2387.83	71.49	74.00	-2.51	39.30	4.14	0.00	28.05	200	134	Peak	HORIZONTAL
2	!	2390.00	52.96	54.00	-1.04	20.77	4.14	0.00	28.05	200	134	Average	HORIZONTAL
3	p	2407.80	110.61				4.14	0.00	28.09	200	134	Peak	HORIZONTAL
4	a	2415.33	100.15				4.16	0.00	28.09	200	134	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	2377.84	52.14	54.00	-1.86	20.02	4.11	0.00	28.01	222	103	Average	HORIZONTAL
2		2378.13	59.53	74.00	-14.47	27.41	4.11	0.00	28.01	222	103	Peak	HORIZONTAL
3	a	2429.47	105.02				4.16	0.00	28.13	222	103	Average	HORIZONTAL
4	p	2432.66	114.26				4.16	0.00	28.13	222	103	Peak	HORIZONTAL
5		2500.00	53.94	74.00	-20.06	21.41	4.23	0.00	28.30	222	103	Peak	HORIZONTAL
6		2500.00	44.49	54.00	-9.51	11.96	4.23	0.00	28.30	222	103	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 11

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	a	2453.90	97.00				4.18	0.00	28.22	184	101	Average	VERTICAL
2	p	2458.96	107.92				4.18	0.00	28.22	184	101	Peak	VERTICAL
3	!	2483.50	52.72	54.00	-1.28	20.25	4.21	0.00	28.26	184	101	Average	VERTICAL
4	!	2483.64	70.04	74.00	-3.96	37.57	4.21	0.00	28.26	184	101	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n MCS0 40MHz Ch 3, 6, 9 / Ant. 1 + Ant. 2

Channel 3

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	2390.00	68.21	74.00	-5.79	36.02	4.14	0.00	28.05	203	132	Peak	HORIZONTAL
2	!	2390.00	52.68	54.00	-1.32	20.49	4.14	0.00	28.05	203	132	Average	HORIZONTAL
3	p	2409.84	106.65				4.14	0.00	28.09	203	132	Peak	HORIZONTAL
4	a	2417.66	95.23				4.16	0.00	28.13	203	132	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2422 MHz.

Channel 6

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	2388.84	70.14	74.00	-3.86	37.95	4.14	0.00	28.05	221	101	Peak	HORIZONTAL
2	!	2389.42	52.74	54.00	-1.26	20.55	4.14	0.00	28.05	221	101	Average	HORIZONTAL
3	a	2431.79	98.30				4.16	0.00	28.13	221	101	Average	HORIZONTAL
4	p	2432.08	110.18				4.16	0.00	28.13	221	101	Peak	HORIZONTAL
5	!	2484.08	50.91	54.00	-3.09	18.44	4.21	0.00	28.26	221	101	Average	HORIZONTAL
6		2484.37	66.20	74.00	-7.80	33.73	4.21	0.00	28.26	221	101	Peak	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437MHz.

Channel 9

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p	2437.82	106.17				4.18	0.00	28.18	204	133	Peak	HORIZONTAL
2	a	2447.95	95.70				4.18	0.00	28.18	204	133	Average	HORIZONTAL
3		2485.24	66.43	74.00	-7.57	33.92	4.21	0.00	28.30	204	133	Peak	HORIZONTAL
4	!	2485.24	52.67	54.00	-1.33	20.16	4.21	0.00	28.30	204	133	Average	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2452 MHz.

Note:

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

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

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11b CH 1, 6, 11 / Ant. 1

Channel 1

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1		2389.71	61.04	74.00	-12.96	28.85	4.14	0.00	28.05	82	100	Peak	VERTICAL
2	!	2390.00	51.99	54.00	-2.01	19.80	4.14	0.00	28.05	82	100	Average	VERTICAL
3	a	2411.13	107.24				4.14	0.00	28.09	82	100	Average	VERTICAL
4	p	2412.00	110.20				4.14	0.00	28.09	82	100	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	2377.84	52.33	54.00	-1.67	20.21	4.11	0.00	28.01	5	124	Average	HORIZONTAL
2		2378.42	58.92	74.00	-15.08	26.80	4.11	0.00	28.01	5	124	Peak	HORIZONTAL
3	a	2436.13	111.24				4.16	0.00	28.18	5	124	Average	HORIZONTAL
4	p	2437.00	114.17				4.16	0.00	28.18	5	124	Peak	HORIZONTAL
5		2499.71	55.56	74.00	-18.44	23.03	4.23	0.00	28.30	5	124	Peak	HORIZONTAL
6		2499.71	45.89	54.00	-8.11	13.36	4.23	0.00	28.30	5	124	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437 MHz.

Channel 11

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	p	2462.00	115.33				4.18	0.00	28.22	22	122	Peak	HORIZONTAL
2	a	2462.58	112.61				4.21	0.00	28.22	22	122	Average	HORIZONTAL
3		2483.79	63.32	74.00	-10.68	30.85	4.21	0.00	28.26	22	122	Peak	HORIZONTAL
4	!	2483.79	51.72	54.00	-2.28	19.25	4.21	0.00	28.26	22	122	Average	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11g CH 1, 6, 11 / Ant. 1 + Ant. 2

Channel 1

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	2389.42	72.75	74.00	-1.25	40.56	4.14	0.00	28.05	219	100	Peak	VERTICAL
2	!	2390.00	50.87	54.00	-3.13	18.68	4.14	0.00	28.05	219	100	Average	VERTICAL
3	p	2404.91	110.83				4.14	0.00	28.09	219	100	Peak	VERTICAL
4	a	2409.83	100.16				4.14	0.00	28.09	219	100	Average	VERTICAL

Item 3, 4 are the fundamental frequency at 2412 MHz.

Channel 6

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	!	2377.84	52.79	54.00	-1.21	20.67	4.11	0.00	28.01	217	132	Average	HORIZONTAL
2		2378.13	60.10	74.00	-13.90	27.98	4.11	0.00	28.01	217	132	Peak	HORIZONTAL
3	p	2432.08	116.04				4.16	0.00	28.13	217	132	Peak	HORIZONTAL
4	a	2432.37	105.24				4.16	0.00	28.13	217	132	Average	HORIZONTAL
5		2483.50	57.70	74.00	-16.30	25.23	4.21	0.00	28.26	217	132	Peak	HORIZONTAL
6		2483.50	45.33	54.00	-8.67	12.86	4.21	0.00	28.26	217	132	Average	HORIZONTAL

Item 3, 4 are the fundamental frequency at 2437 MHz.

Channel 11

		Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	T/Pos	A/Pos	Remark	Pol/Phase
		MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m	deg	cm		
1	a	2457.80	101.43				4.18	0.00	28.22	224	160	Average	HORIZONTAL
2	p	2457.95	112.28				4.18	0.00	28.22	224	160	Peak	HORIZONTAL
3	!	2483.50	70.13	74.00	-3.87	37.66	4.21	0.00	28.26	224	160	Peak	HORIZONTAL
4	!	2483.50	52.45	54.00	-1.55	19.98	4.21	0.00	28.26	224	160	Average	HORIZONTAL

Item 1, 2 are the fundamental frequency at 2462 MHz.

Temperature	21°C	Humidity	56.4%
Test Engineer	Magic Lai	Configurations	IEEE 802.11ac CH 155 / Ant. 3 + Ant. 4

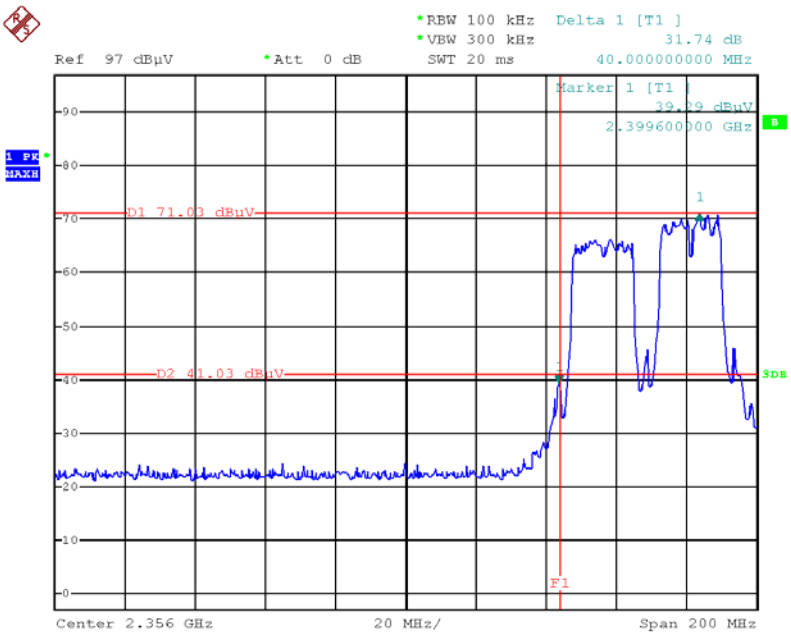
Channel 155

	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	5133.22	60.18	74.00	-13.82	19.73	6.47	33.98	0.00	Peak	113	321	VERTICAL
2	5133.32	51.81	54.00	-2.19	11.36	6.47	33.98	0.00	Average	113	321	VERTICAL
3	5766.52	100.90				6.75	34.91	0.00	Average	113	321	VERTICAL
4	5781.88	112.81				6.75	34.93	0.00	Peak	113	321	VERTICAL

Item 3, 4 are the fundamental frequency at 5775 MHz.

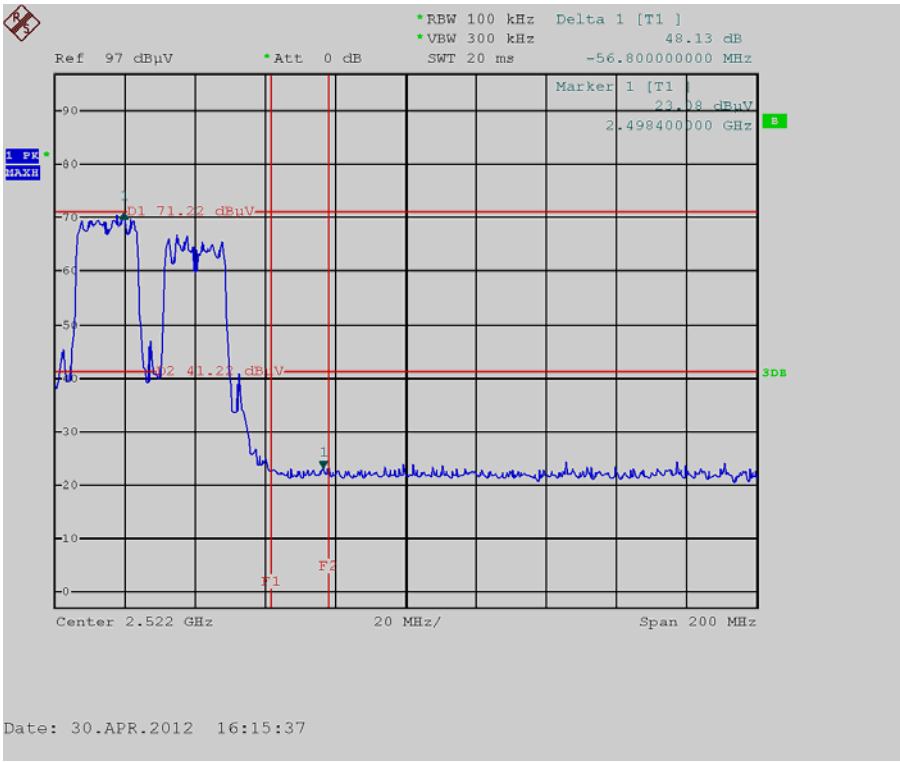
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 1 + Ant. 2 / 2412 MHz



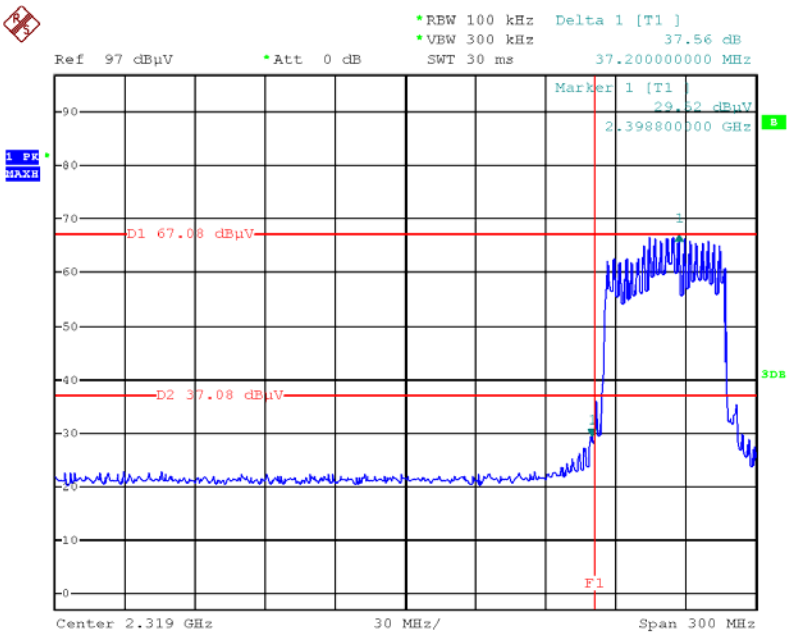
Date: 30.APR.2012 16:13:53

Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 1 + Ant. 2 / 2462 MHz



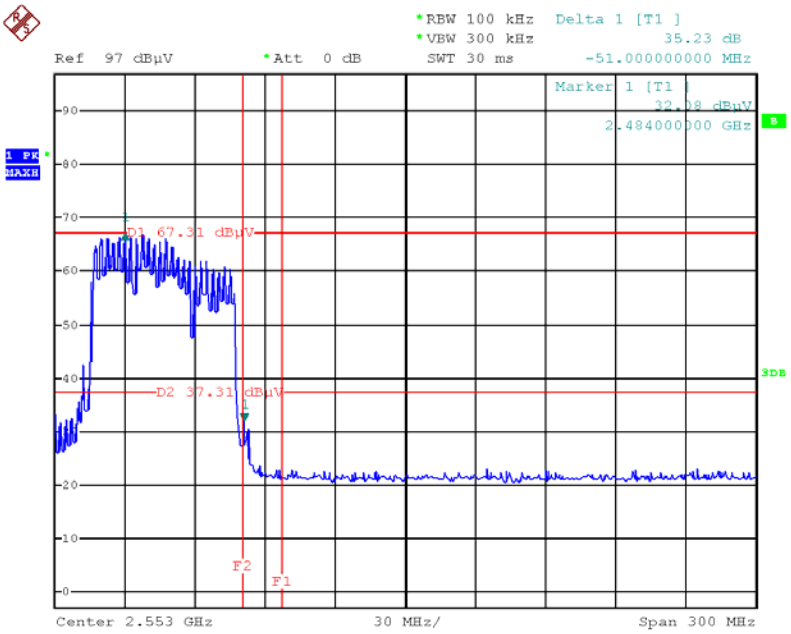
Date: 30.APR.2012 16:15:37

Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 1 + Ant. 2 / 2422 MHz



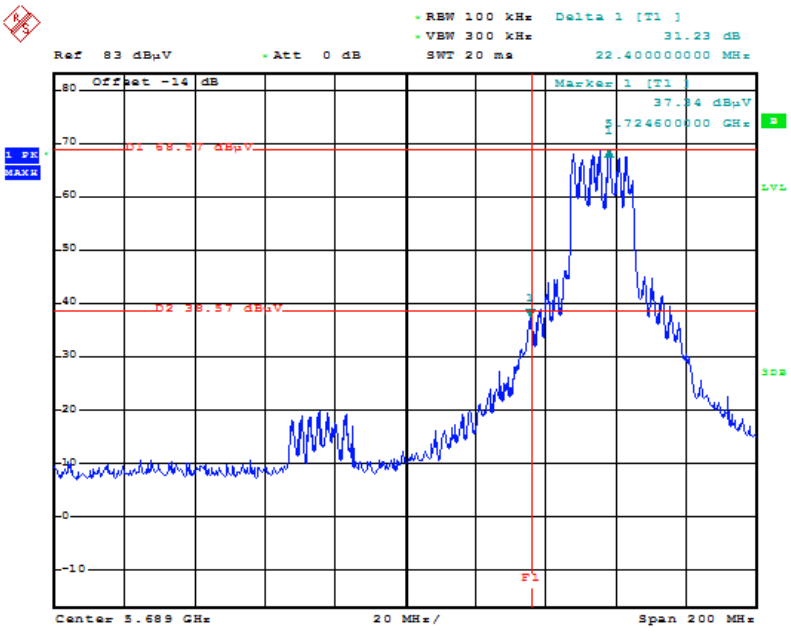
Date: 30.APR.2012 16:19:57

Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 1 + Ant. 2 / 2452 MHz



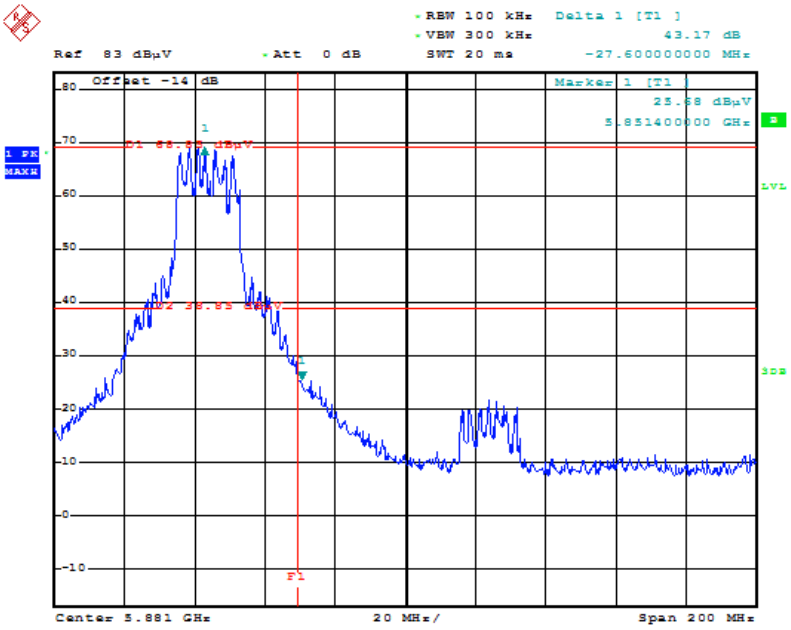
Date: 30.APR.2012 16:21:49

Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 3 + Ant. 4 / 5745 MHz



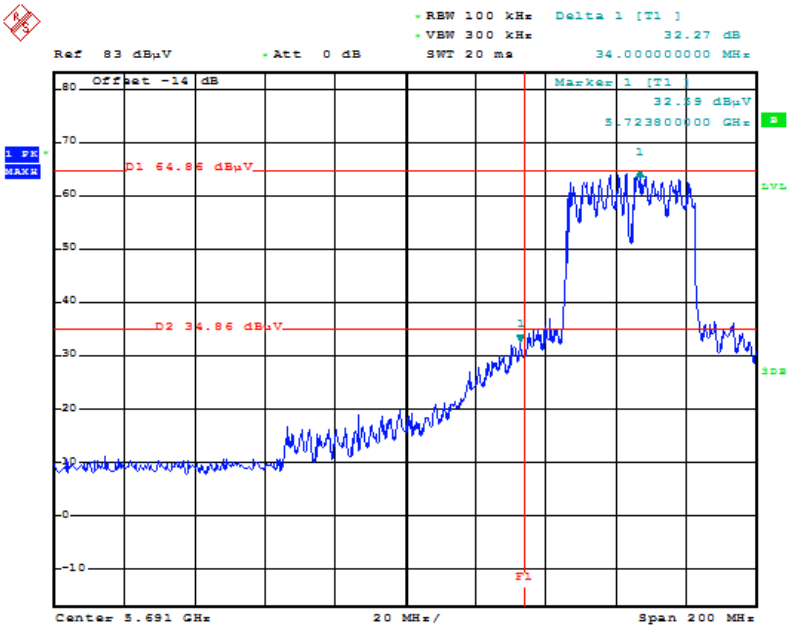
Date: 21.APR.2012 14:10:51

Plot on Configuration IEEE 802.11n MCS0 20MHz / Ant. 3 + Ant. 4 / 5825 MHz



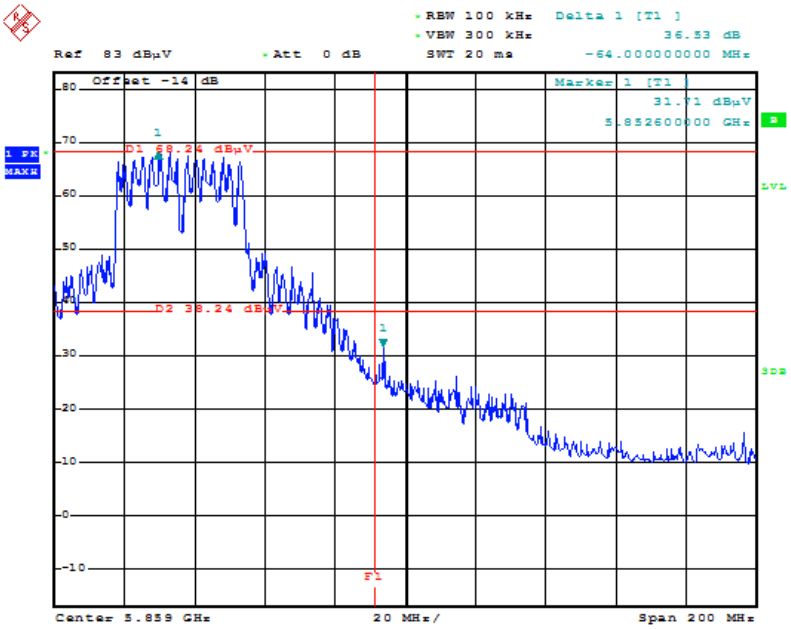
Date: 21.APR.2012 14:13:02

Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 3 + Ant. 4 / 5755 MHz



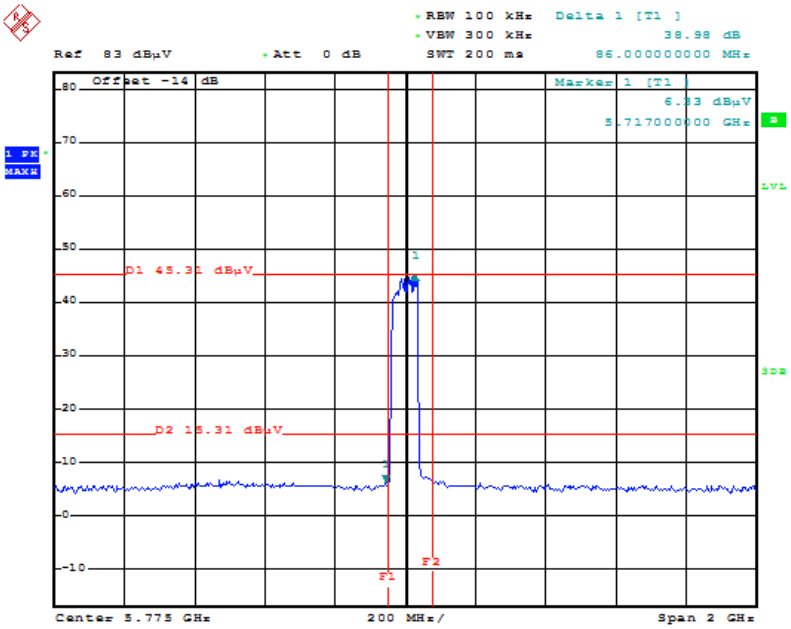
Date: 21.APR.2012 14:20:11

Plot on Configuration IEEE 802.11n MCS0 40MHz / Ant. 3 + Ant. 4 / 5795 MHz



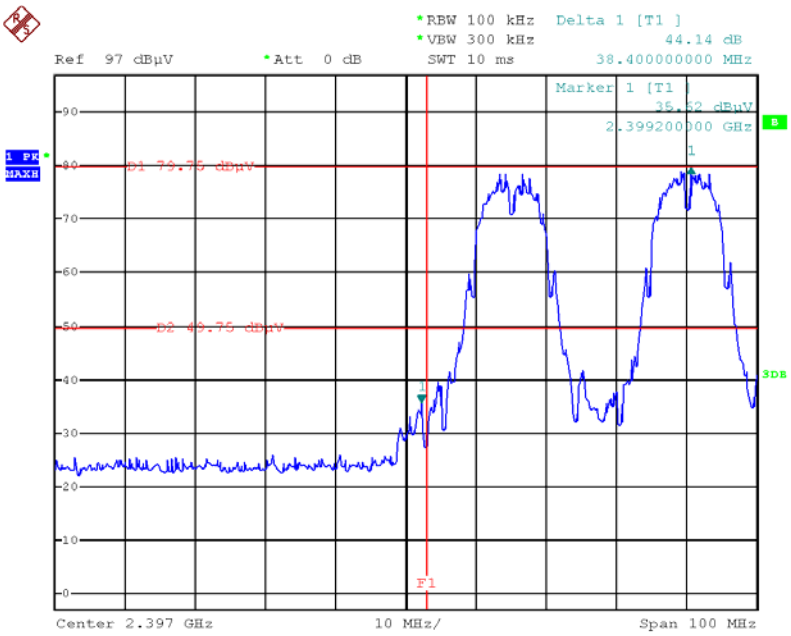
Date: 21.APR.2012 14:26:03

Band Edge Plot on Configuration IEEE 802.11ac MCS0 80MHz / Ant. 3 + Ant. 4 / 5775 MHz



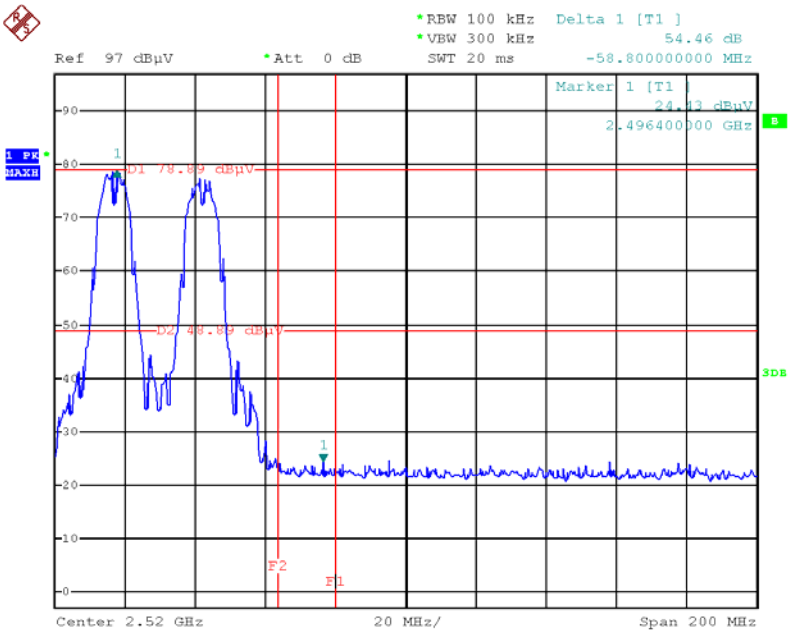
Date: 21.APR.2012 13:52:28

Plot on Configuration IEEE 802.11b / Ant. 1 / 2412 MHz



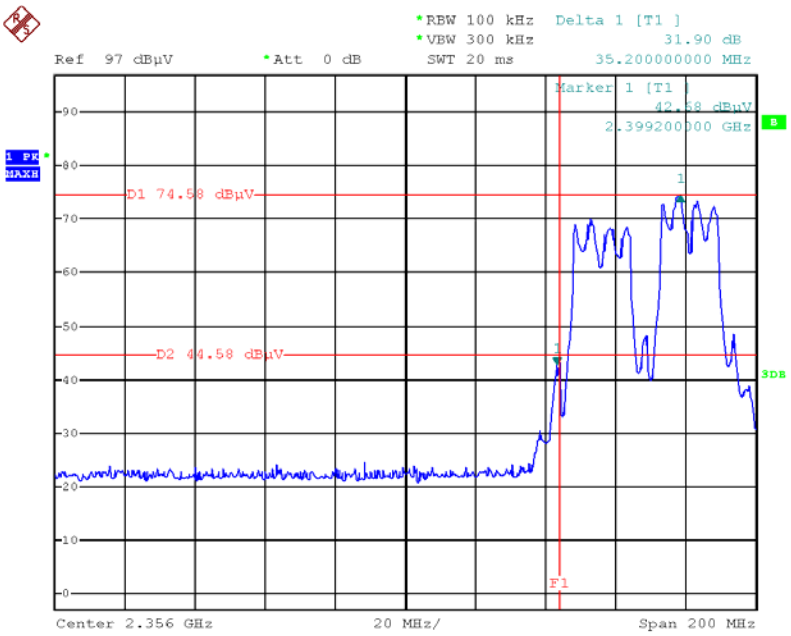
Date: 30.APR.2012 16:01:54

Plot on Configuration IEEE 802.11b / Ant. 1 / 2462 MHz



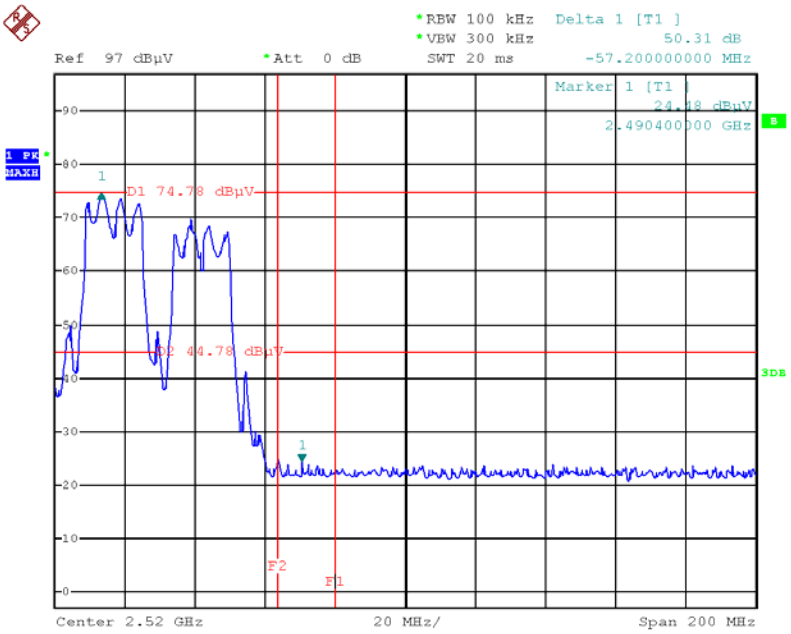
Date: 30.APR.2012 16:04:42

Plot on Configuration IEEE 802.11g / Ant. 1 + Ant. 2 / 2412 MHz



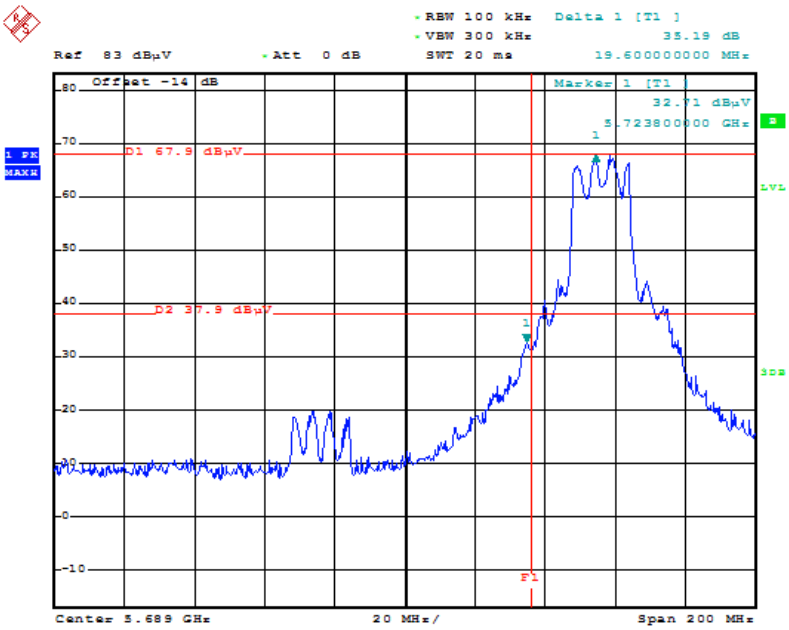
Date: 30.APR.2012 16:10:29

Plot on Configuration IEEE 802.11g / Ant. 1 + Ant. 2 / 2462 MHz



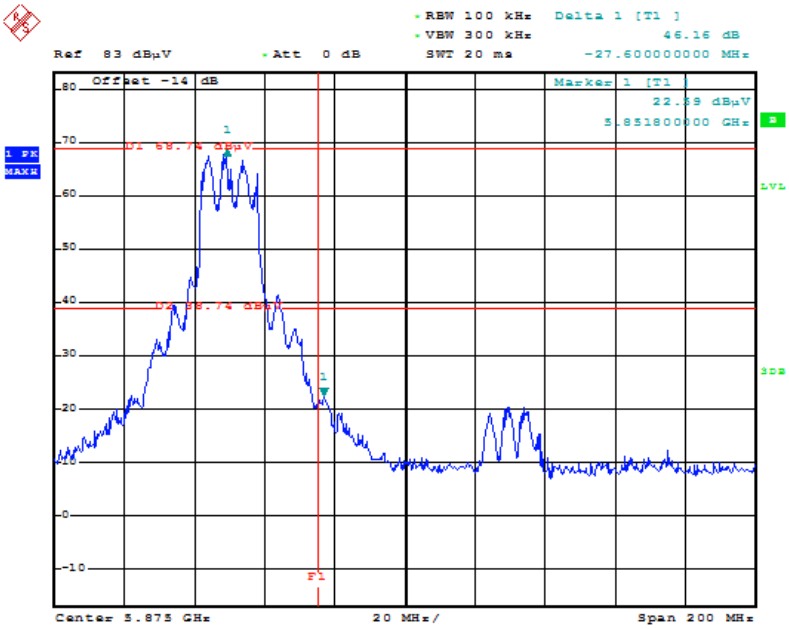
Date: 30.APR.2012 16:08:40

Plot on Configuration IEEE 802.11a / Ant. 3 + Ant. 4 / 5745 MHz



Date: 21.APR.2012 14:02:09

Plot on Configuration IEEE 802.11a / Ant. 3 + Ant. 4 / 5825 MHz



Date: 21.APR.2012 14:06:39

4.7. Antenna Requirements

4.7.1. 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.

4.7.2. 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	Nov. 30, 2011	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	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 17, 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. 29, 2011	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 03, 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)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	May 20, 2011	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)
RF Power Splitter	Anaren	42100	17930	2GHz ~ 18GHz	N/A	Conducted (TH01-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.

Note: "*" 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

TAF

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