

FCC RADIO TEST REPORT

Applicant's company	BUFFALO INC.
Applicant Address	Akamon-dori Bldg 30-20, Ohsu 3-chome Naka-ku, Nagoya 460-8315 Japan
FCC ID	FDI000000009
Manufacturer's company	BUFFALO INC.
Manufacturer Address	Akamon-dori Bldg 30-20, Ohsu 3-chome Naka-ku, Nagoya 460-8315 Japan

Product Name	AirStation
Brand Name	BUFFALO INC.
Model Name	WZR-1750DHP
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Jan. 23, 2013
Final Test Date	May 15, 2013
Submission Type	Original Equipment



Statement

Test result included is only for the IEEE 802.11n, IEEE 802.11b/g part and IEEE 802.11a/ac (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**,

47 CFR FCC Part 15 Subpart C, KDB 558074 D01 v03 and **KDB 662911 D01 v01r02**.

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

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR312341AA	Rev. 01	Initial issue of report	May 15, 2013



1. CERTIFICATE OF COMPLIANCE

Product Name : AirStation
Brand Name : BUFFALO INC.
Model Name : WZR-1750DHP
Applicant : BUFFALO 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 Jan. 23, 2013 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

A handwritten signature in blue ink, appearing to read 'Sam Chen', is written over a horizontal line.

Sam Chen

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	14.46 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	0.03 dB
4.3	15.247(e)	Power Spectral Density	Complies	2.03 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	3.01 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.51 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	±8.5×10 ⁻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°C	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 (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter
Modulation	see the below table for IEEE 802.11n/ac
Data Modulation	For 802.11n: OFDM (BPSK / QPSK / 16QAM / 64QAM) For 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n see the below table for IEEE 802.11ac
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth For 5GHz Band: 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth ; 1 for 80MHz bandwidth
Channel Band Width (99%)	For 2.4GHz Band: MCS0 (20MHz): 17.04 MHz ; MCS0 (40MHz): 35.84 MHz For 5GHz Band: IEEE 802.11ac: MCS0 (20MHz): 19.60 MHz ; MCS0 (40MHz): 36.96 MHz ; MCS0 (80MHz): 76.16 MHz
Maximum Conducted Output Power	For 2.4GHz Band: MCS0 (20MHz): 27.46 dBm ; MCS0 (40MHz): 22.11 dBm For 5GHz Band: IEEE 802.11ac: MCS0 (20MHz): 29.47 dBm ; MCS0 (40MHz): 29.48 dBm ; MCS0 (80MHz): 29.26 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Note: The product has beamforming function for 802.11a/n/ac in 5150-5250MHz and 5725-5850MHz.

802.11a/b/g

Items	Description
Product Type	WLAN (3TX, 3RX)
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)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Channel Band Width (99%)	11b: 10.24 MHz ; 11g: 16.40 MHz ; 11a: 18.80 MHz
Maximum Conducted Output Power	11b: 29.49 dBm ; 11g: 27.92 dBm ; 11a: 29.97 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna & Band width

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

Note: The product has beamforming function for 802.11a/n/ac in 5150-5250MHz and 5725-5850MHz.

IEEE 802.11n spec

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

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

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

Worst Modulation Used for Conformance Testing				
Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS	Worst Data Rate / MCS	Worst Modulation Mode
802.11a	3	6-54 Mbps	6Mbps	11A5.8G-20M
802.11n 20MHz	3	MCS 0-23	MCS 0	11N5.8G-20M
802.11n 40MHz	3	MCS 0-23	MCS 0	11N5.8G-40M
802.11ac 20MHz	3	MCS 0-9-Nss1-3	MCS 0, Nss1	11AC5.8G-20M
802.11ac 40MHz	3	MCS 0-9-Nss1-3	MCS 0, Nss1	11AC5.8G-40M
802.11ac 80MHz	3	MCS 0-9-Nss1-3	MCS 0, Nss1	11AC5.8G-80M
Note 1: IEEE 802.11 modulation consists of IEEE 802.11a.				
Note 2: IEEE 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Worst modulation mode of Guard Interval (GI) is 400ns.				
Note 3: IEEE 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160. Then EUT support VHT20, VHT40, VHT80. (VHT: Very High Throughput).				
Note 4: Modulation modes consist of 11A5.8G-20M, 11N5.8G-20M, 11N5.8G-40M, 11AC5.8G-20M, 11AC5.8G-40M, 11AC5.8G-80M				
Note 5: 11A: IEEE 802.11a, 11N: IEEE 802.11n, 11AC: IEEE 802.11ac. 5.8G: 5.725-5.850GHz band				
Note 6: 20M/40M/80M: Channel Bandwidth 20MHz/40MHz/80MHz				

3.2. Accessories

Power	Brand Holder	Model	Rating
Adapter	Asian Power Devices Inc.	DA-48Q12	INPUT: 100~240Vac, 50-60Hz, 1.2A Max OUTPUT: 12Vdc, 4A
Others			
Cradle *2			
Power Cable*1: Shielded, 1.75m			
RJ-45 Cable*1: Non-Shielded, 2m			

3.3. Table for Filed Antenna

Chain	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz
1	Arcadyan	120800010300J	PIFA Antenna	I-PEX	-0.16	-
2	Arcadyan	120800010200J	PIFA Antenna	I-PEX	0.41	-
3	Arcadyan	120800010800J	PIFA Antenna	I-PEX	0.69	-
4	Arcadyan	120300037100J	PIFA Antenna	I-PEX	-	1.14
5	Arcadyan	120300037200J	PIFA Antenna	I-PEX	-	-0.60
6	Arcadyan	120300037300J	PIFA Antenna	I-PEX	-	1.92

Note: The EUT has six antennas

<For 2.4GHz Band:>

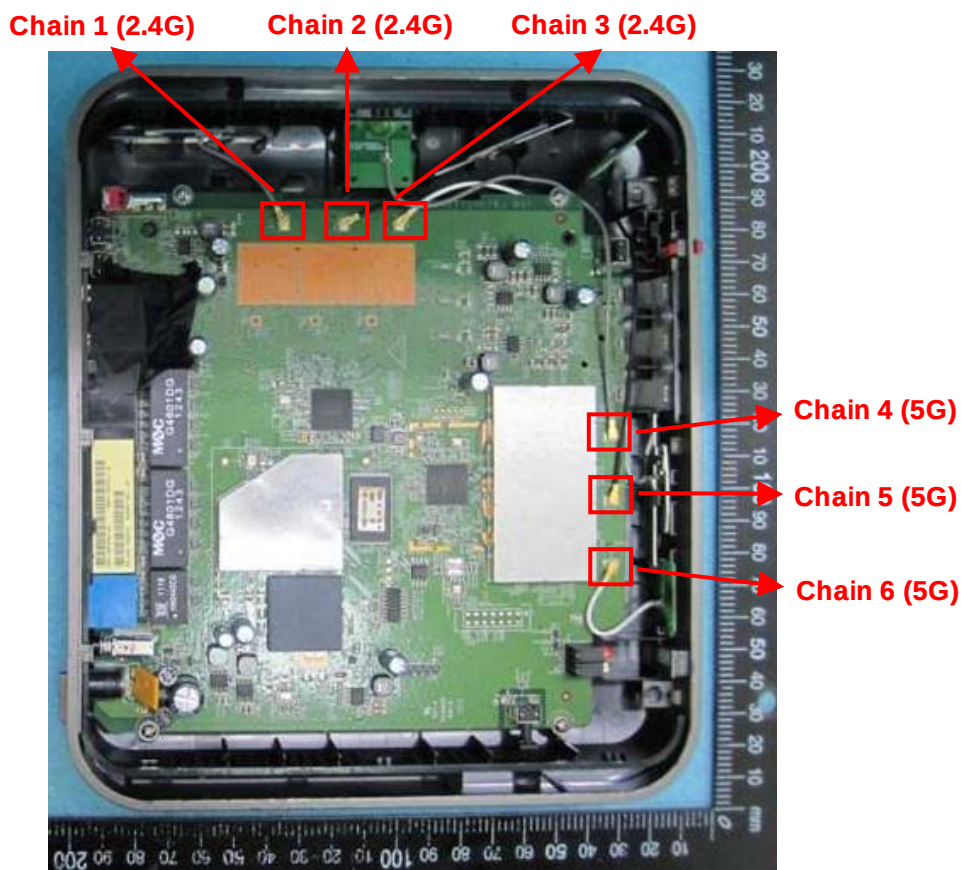
For IEEE 802.11b/g/n mode (3TX/3RX)

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

<For 5GHz Band:>

For IEEE 802.11a/n/ac mode (3TX/3RX):

Chain 4, Chain 5 and Chain 6 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

For 2.4GHz Band:

There are two bandwidth systems.

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 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	5775 MHz	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	Chain
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Maximum Conducted Output Power	11n 20MHz	MCS 0	1/6/11	1+2+3
	11n 40MHz	MCS 0	3/6/9	1+2+3
	11b/CCK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3
Power Spectral Density	11n 20MHz	MCS 0	1/6/11	1&2&3
	11n 40MHz	MCS 0	3/6/9	1&2&3
	11b/CCK	1 Mbps	1/6/11	1&2&3
	11g/BPSK	6 Mbps	1/6/11	1&2&3
6dB Spectrum Bandwidth	11n 20MHz	MCS 0	1/6/11	1+2+3
	11n 40MHz	MCS 0	3/6/9	1+2+3
	11b/CCK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3
Radiated Emissions Below 1GHz	Normal Link	Auto	-	-
Radiated Emissions Above 1GHz	11n 20MHz	MCS 0	1/6/11	1+2+3
	11n 40MHz	MCS 0	3/6/9	1+2+3
	11b/CCK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3
Band Edge Emissions	11n 20MHz	MCS 0	1/6/11	1+2+3
	11n 40MHz	MCS 0	3/6/9	1+2+3
	11b/CCK	1 Mbps	1/6/11	1+2+3
	11g/BPSK	6 Mbps	1/6/11	1+2+3

For 5GHz Band

Test Items	Mode	Data Rate	Channel	Chain
AC Power Line Conducted Emissions	Normal Link	Auto	-	-
Maximum Conducted Output Power	11ac 20MHz	MCS 0, Nss1	149/157/165	4+5+6
	11ac 40MHz	MCS 0, Nss1	151/159	4+5+6
	11ac 80MHz	MCS 0, Nss1	155	4+5+6
	11a/BPSK	6 Mbps	149/157/165	4+5+6
Power Spectral Density	11ac 20MHz	MCS 0, Nss1	149/157/165	4&5&6
	11ac 40MHz	MCS 0, Nss1	151/159	4&5&6
	11ac 80MHz	MCS 0, Nss1	155	4&5&6
	11a/BPSK	6 Mbps	149/157/165	4&5&6
6dB Spectrum Bandwidth	11ac 20MHz	MCS 0, Nss1	149/157/165	4+5+6
	11ac 40MHz	MCS 0, Nss1	151/159	4+5+6
	11ac 80MHz	MCS 0, Nss1	155	4+5+6
	11a/BPSK	6 Mbps	149/157/165	4+5+6
Radiated Emissions Below 1GHz	Normal Link	Auto	-	-
Radiated Emissions Above 1GHz	11ac 20MHz	MCS 0, Nss1	149/157/165	4+5+6
	11ac 40MHz	MCS 0, Nss1	151/159	4+5+6
	11ac 80MHz	MCS 0, Nss1	155	4+5+6
	11a/BPSK	6 Mbps	149/157/165	4+5+6
Band Edge Emissions	11ac 20MHz	MCS 0, Nss1	149/157/165	4+5+6
	11ac 40MHz	MCS 0, Nss1	151/159	4+5+6
	11ac 80MHz	MCS 0, Nss1	155	4+5+6
	11a/BPSK	6 Mbps	149/157/165	4+5+6

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1. AP function

Mode 2. Repeater function

Mode 2 is the worst case, so it was selected to record in this test report.

For Radiated Emission below 1GHz test:

Mode 1. AP function

Mode 2. Repeater function

Mode 1 is the worst case, so it was selected to record in this test report.

<For MPE and Co-location Test>:

The EUT could be applied with 2.4GHz WLAN function and 5GHz WLAN function; therefore Maximum Permissible Exposure (Please refer to Appendix 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. EUT Operation during Test

1. For non-beamforming mode

The EUT was programmed to be in continuously transmitting mode.

2. For beamforming mode

2.1 For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

2.2 For Radiated Mode:

During the test, the following programs under WIN XP were executed.

The program was executed as follows:

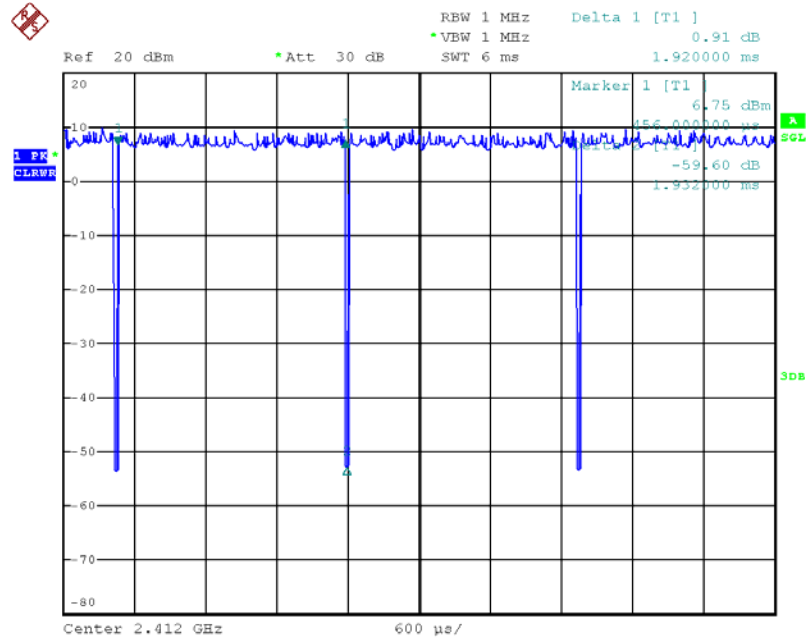
2.2.1. During the test, the EUT operation to normal function.

2.2.2. Executed command fixed test channel under DOS.

2.2.3. Executed "Lan test.exe " to link with the remote workstation to receive and transmit packet by Wireless AP and transmit duty cycle no less 98%

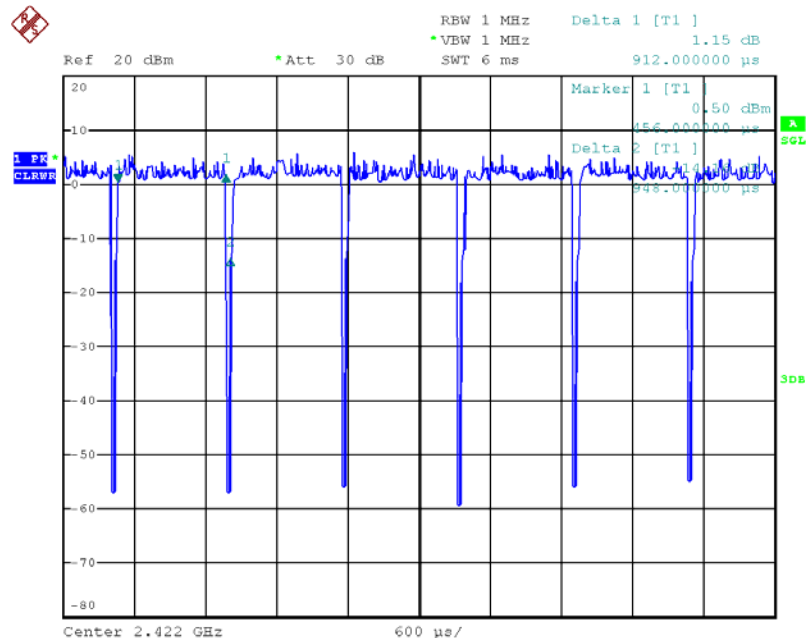
3.7. Duty Cycle

IEEE 802.11n MCS0 20MHz



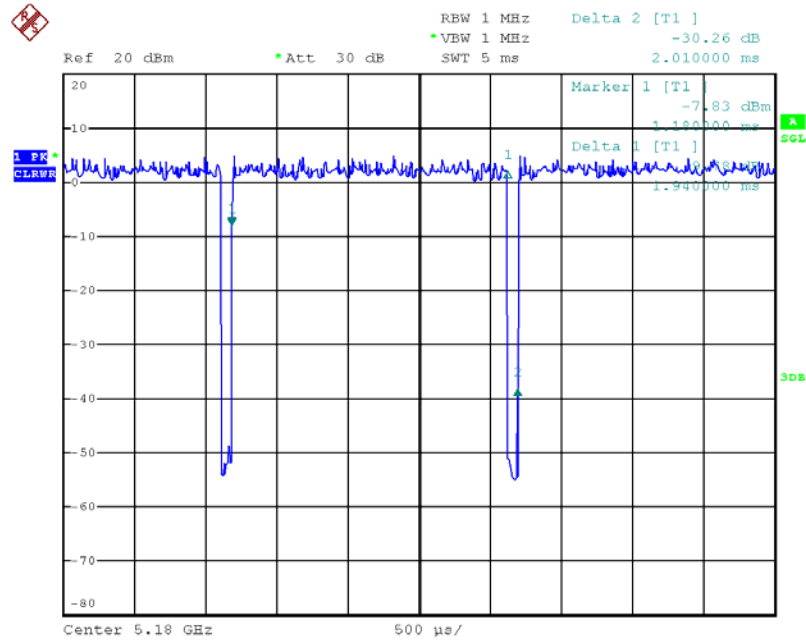
Date: 4.MAR.2013 23:21:21

IEEE 802.11n MCS0 40MHz



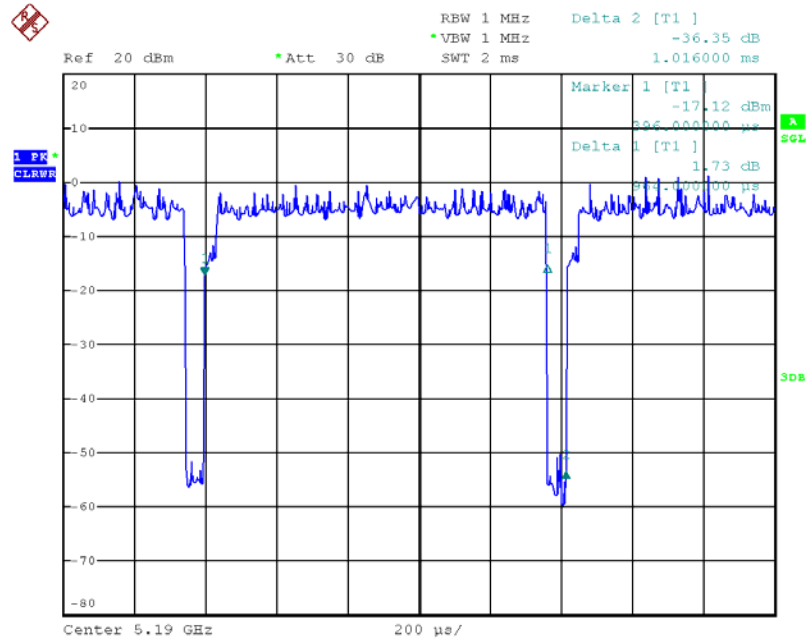
Date: 4.MAR.2013 23:24:18

IEEE 802.11ac MCS0 20MHz



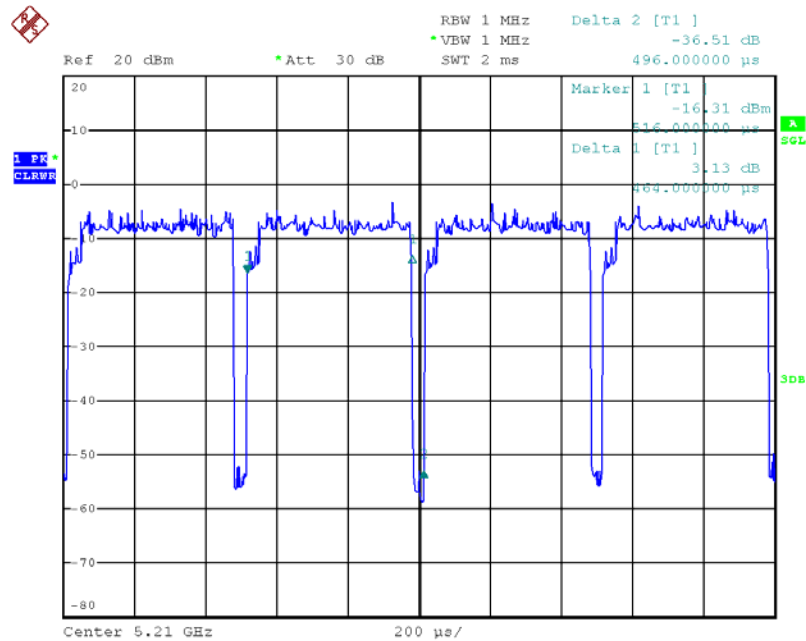
Date: 16.MAR.2013 20:12:24

IEEE 802.11ac MCS0 40MHz



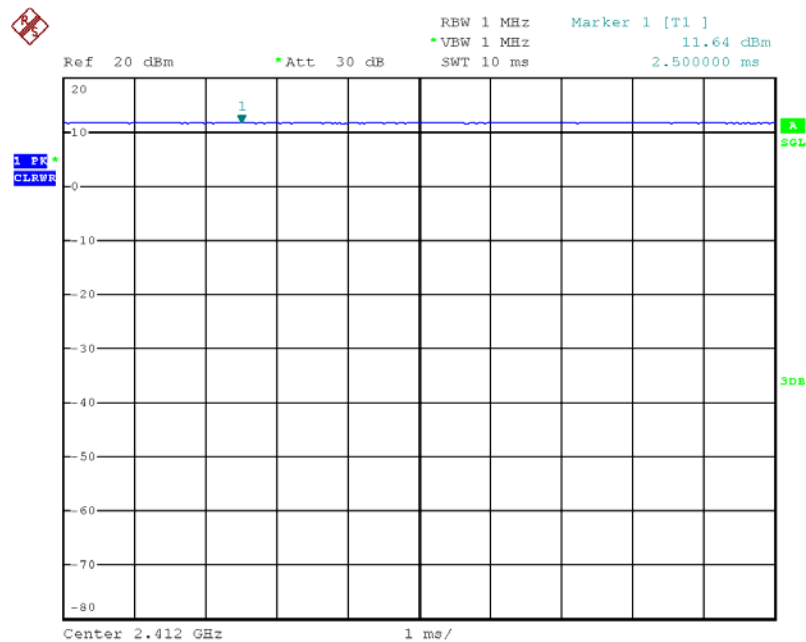
Date: 16.MAR.2013 20:13:23

IEEE 802.11ac MCS0 80MHz



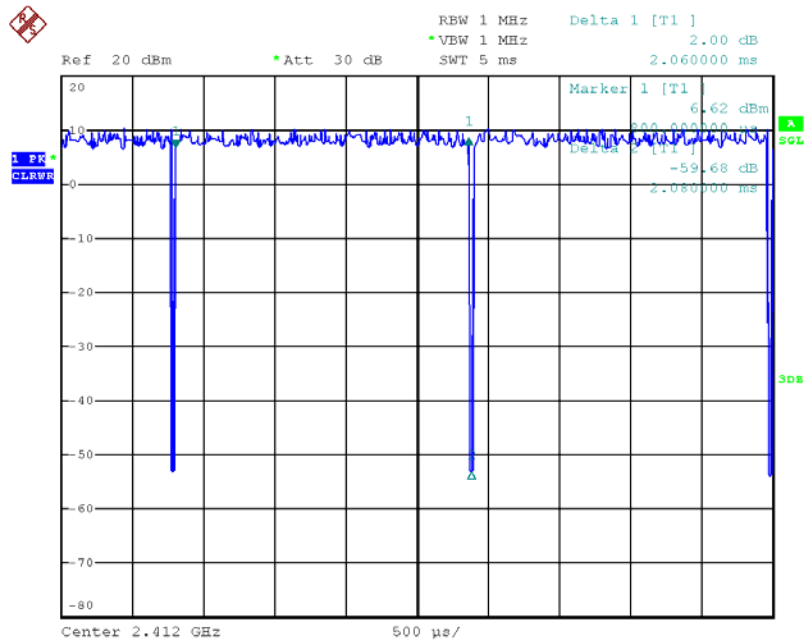
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IEEE 802.11b



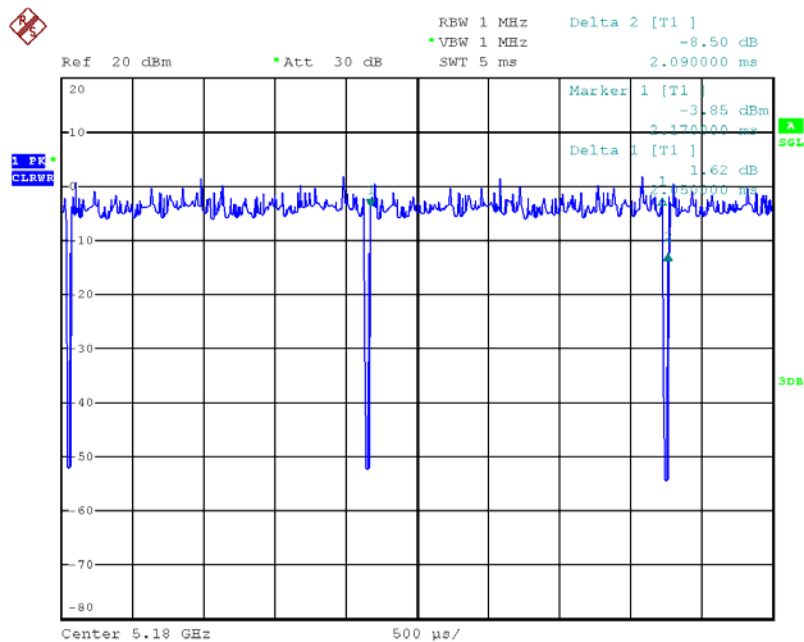
Date: 4.MAR.2013 23:19:05

IEEE 802.11g



Date: 4.MAR.2013 23:20:00

IEEE 802.11a



Date: 28.MAR.2013 22:00:47

3.8. Table for Testing Locations

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

Open Area Test Site (OATS); Semi Anechoic Chamber (SAC).

Please refer section 6 for Test Site Address.

3.9. Table for Supporting Units

AC Power Conducted Emission and Radiated Emission below 1GHz tests:

For Mode 1. AP function

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	QDS-BRCM1049LE
Mouse	Logitech M90	M-U0026	DoC
Printer	EPSON	LQ-300+	N/A
Earphone	SHYARO CHI	MIC-04	N/A
Flash Disk	ADATA	C103	DoC
Flash Disk	pqi	U262	N/A
Notebook	DELL	E6220	QDS-BRCM1049LE
Notebook	DELL	E6430	QDS-BRCM1049LE
Notebook	DELL	E6430	QDS-BRCM1049LE

For Mode 2. Repeater function

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	QDS-BRCM1049LE
Mouse	Logitech M90	M-U0026	DoC
Printer	EPSON	LQ-300+	N/A
Earphone	SHYARO CHI	MIC-04	N/A
Flash Disk	ADATA	C103	DoC
Flash Disk	pqi	U262	N/A
Notebook	DELL	E6220	QDS-BRCM1049LE
Notebook	DELL	E6430	QDS-BRCM1049LE
Notebook	DELL	E6430	QDS-BRCM1049LE
AP Router	Planex	GW-AP54SGX	N/A

Maximum Conducted Output Power, Power Spectral Density, 6dB Spectrum Bandwidth, Radiated Emissions above 1GHz and Band Edge Emissions tests:

For non-beamforming mode

Support Unit	Brand	Model	FCC ID
Notebook	DELL	D520	E2KWM3945ABG

For beamforming mode

Support Unit	Brand	Model	FCC ID
Notebook	DELL	D520	E2KWM3945ABG
Notebook	DELL	D520	E2KWM3945ABG
WiFi USB Adapter	NETGEAR	A6200	PY312200200

3.10. 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 / Chain 1 + Chain 2 + Chain 3 (3TX)

Test Software Version	MTool v1.0.0.10		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 20MHz	48	92	48

Power Parameters of IEEE 802.11n MCS0 40MHz / Chain 1 + Chain 2 + Chain 3 (3TX)

Test Software Version	MTool v1.0.0.10		
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 40MHz	36	64	39

Power Parameters of IEEE 802.11b/g / Chain 1 + Chain 2 + Chain 3 (3TX)

Test Software Version	MTool v1.0.0.10		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	84	100	82
IEEE 802.11g	45	94	58

For 5GHz Band

Power Parameters of IEEE 802.11ac MCS0 20MHz / Chain 4 + Chain 5 + Chain 6 (3TX)

Test Software Version	Telnet		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0 20MHz	97	96	96

Power Parameters of IEEE 802.11ac MCS0 40MHz / Chain 4 + Chain 5 + Chain 6 (3TX)

Test Software Version	Telnet	
Frequency	5755 MHz	5795 MHz
MCS0 40MHz	97	97

Power Parameters of IEEE 802.11ac MCS0 80MHz / Chain 4 + Chain 5 + Chain 6 (3TX)

Test Software Version	Telnet
Frequency	5775 MHz
MCS0 80MHz	98

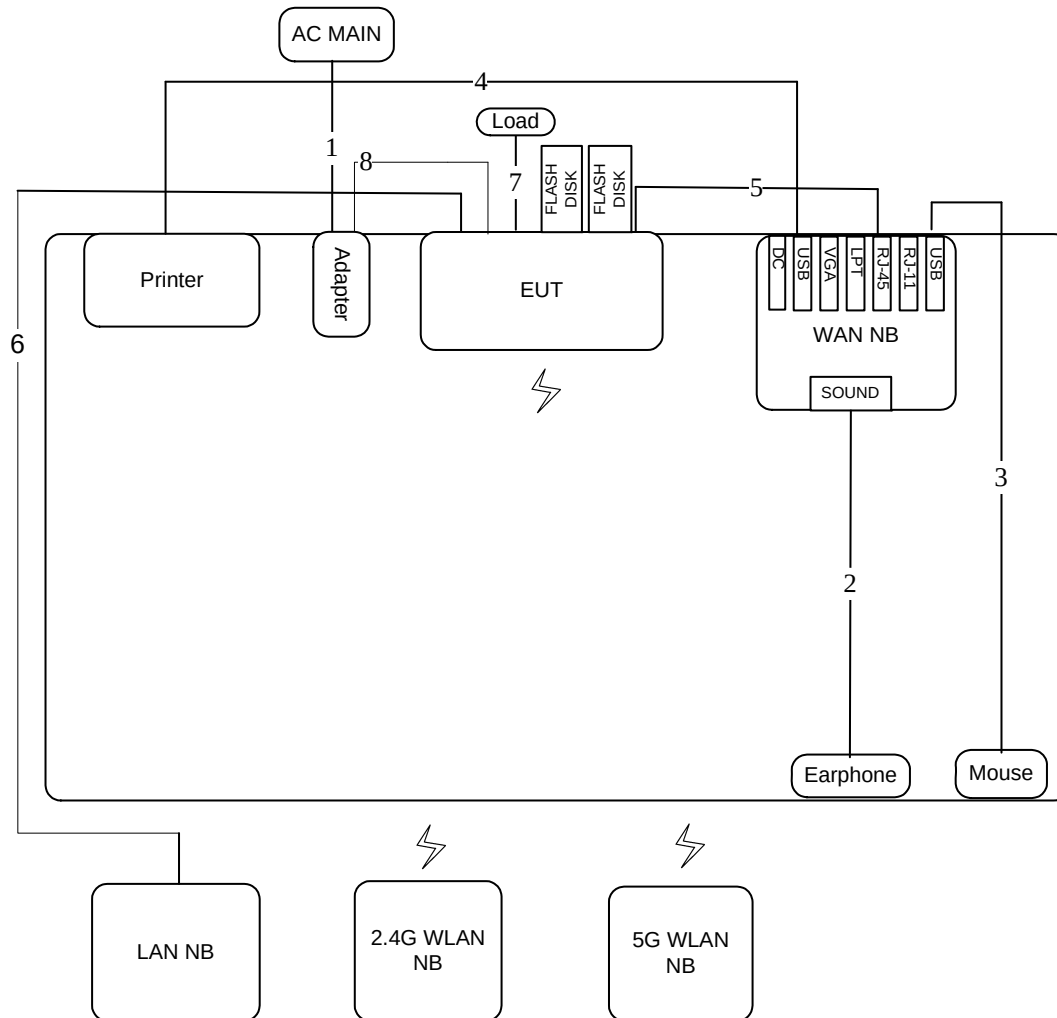
Power Parameters of IEEE 802.11a / Chain 4 + Chain 5 + Chain 6 (3TX)

Test Software Version	Telnet		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	99	99	99

3.11. Test Configurations

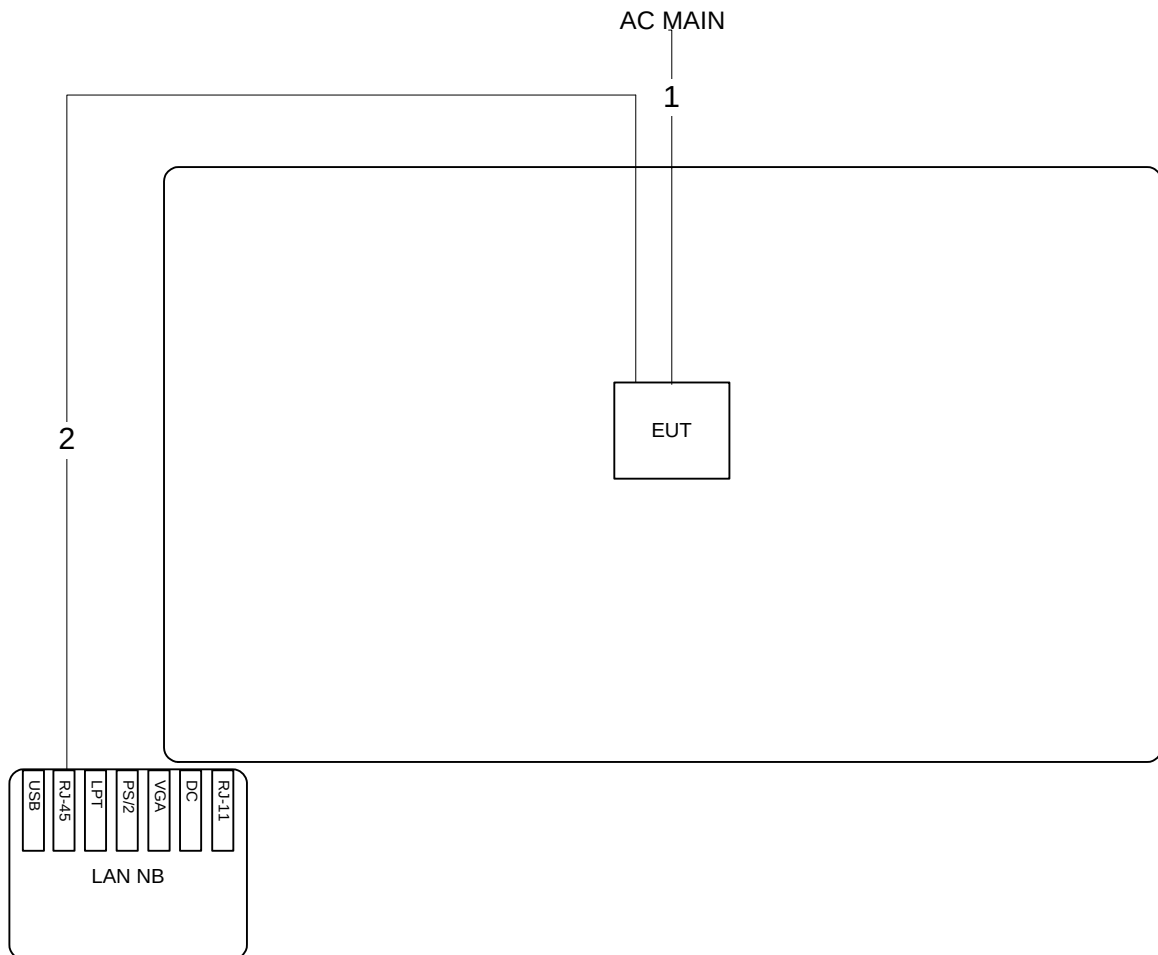
3.11.1. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz / Test Mode: Mode 1. AP function



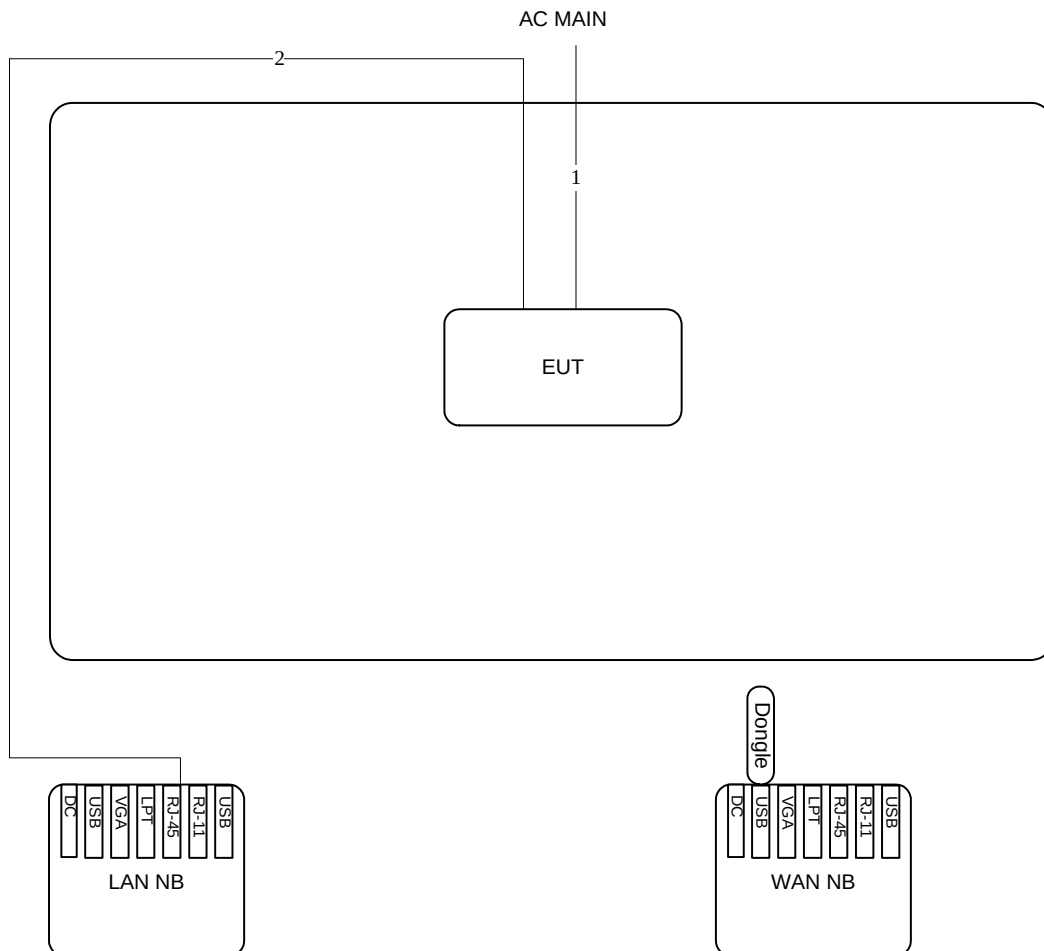
Item	Connection	Shield	Length
1	AC Power cable	No	1.8m
2	Audio cable	No	1.1m
3	USB cable	No	1.8m
4	USB cable	No	1.8m
5	RJ-45 cable	No	2.1m
6	RJ-45 cable	No	10m
7	RJ-45 cable*3	No	0.8m
8	DC Power cable	No	1.2m

Test Configuration: above 1GHz / For non-beamforming mode



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

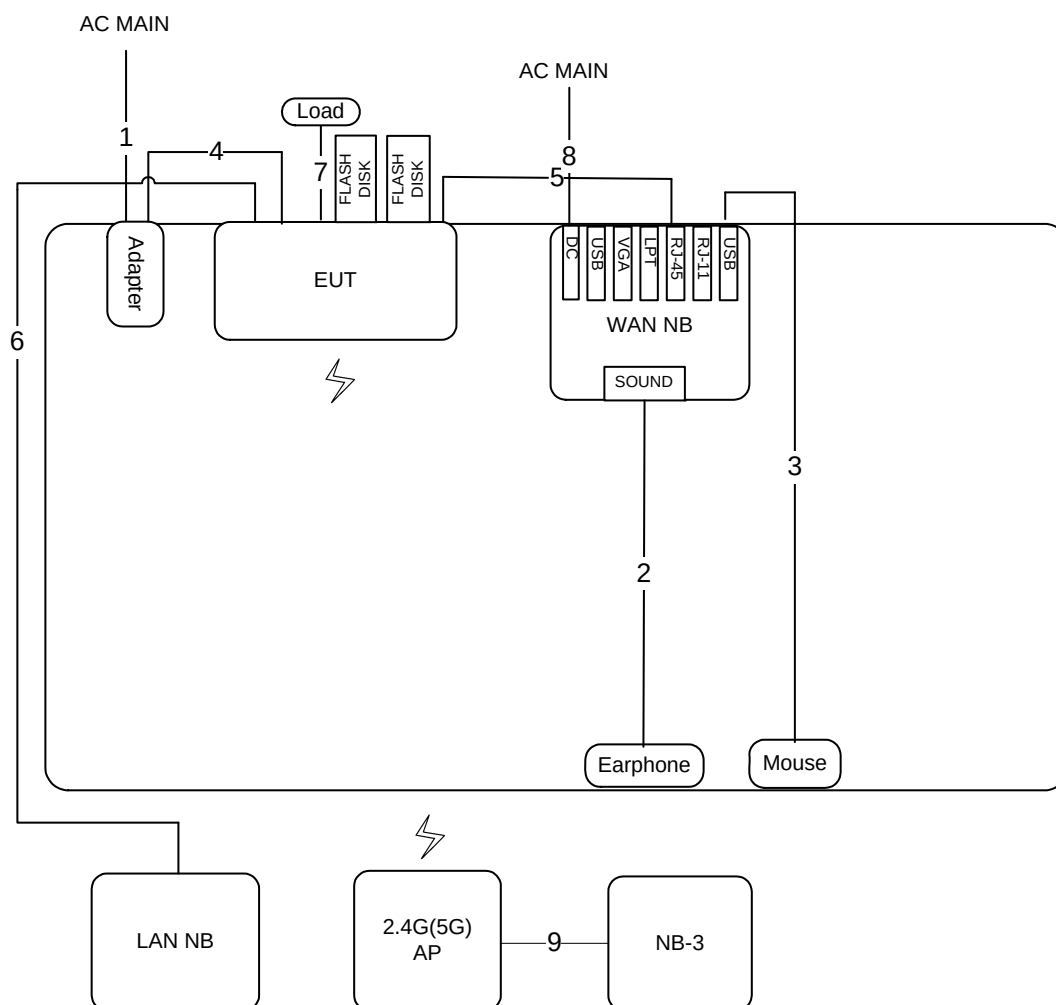
Test Configuration: above 1GHz / For beamforming mode



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

3.11.2. AC Power Line Conduction Emissions Test Configuration

Test Mode: Mode 2. Repeater function



Item	Connection	Shield	Length
1	AC Power cable	No	1.8m
2	Audio cable	No	1.1m
3	USB cable	Yes	1.8m
4	DC Power cable	No	1.2m
5	RJ-45 cable	No	2.1m
6	RJ-45 cable	No	10m
7	RJ-45 cable*3	No	0.8m
8	AC Power cable	No	1.8m
9	RJ-45 cable	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

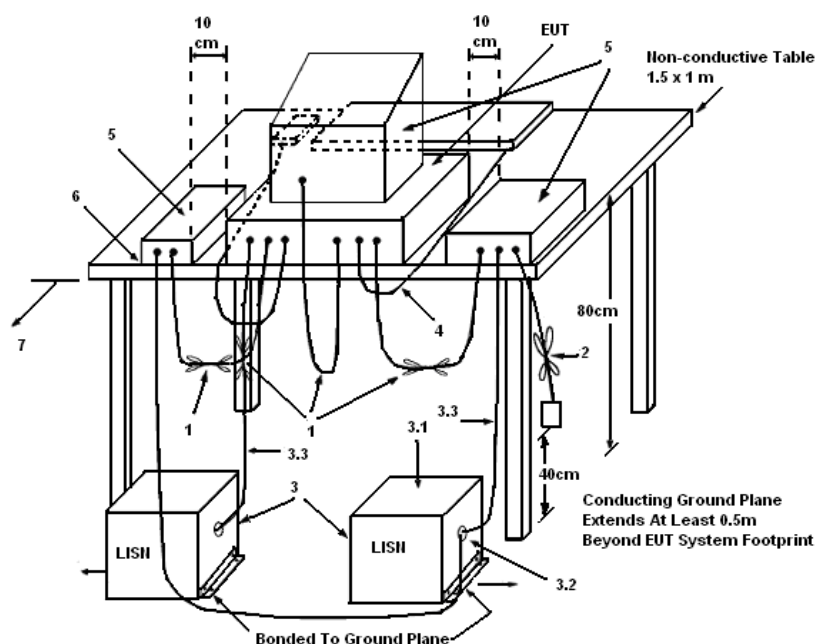
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

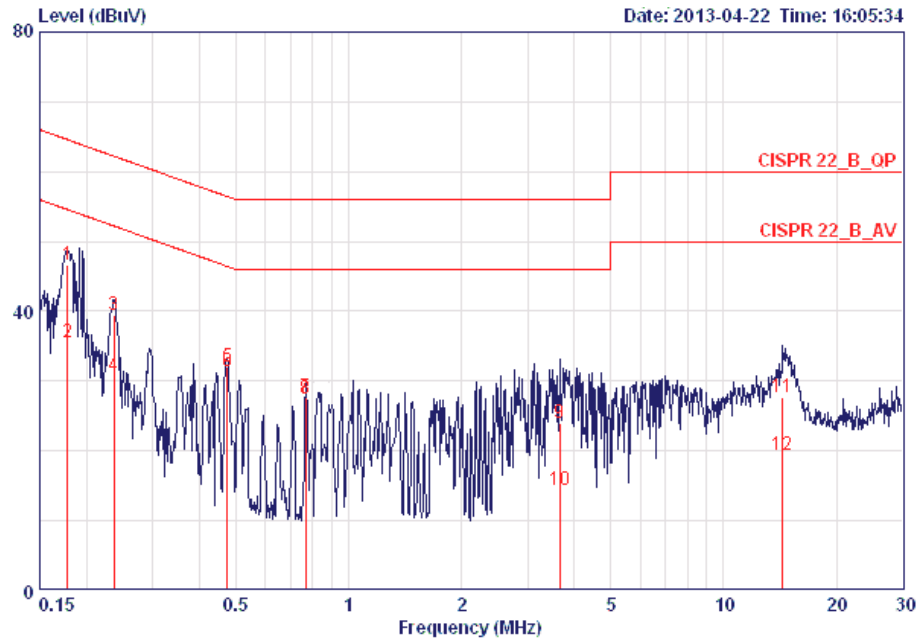
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

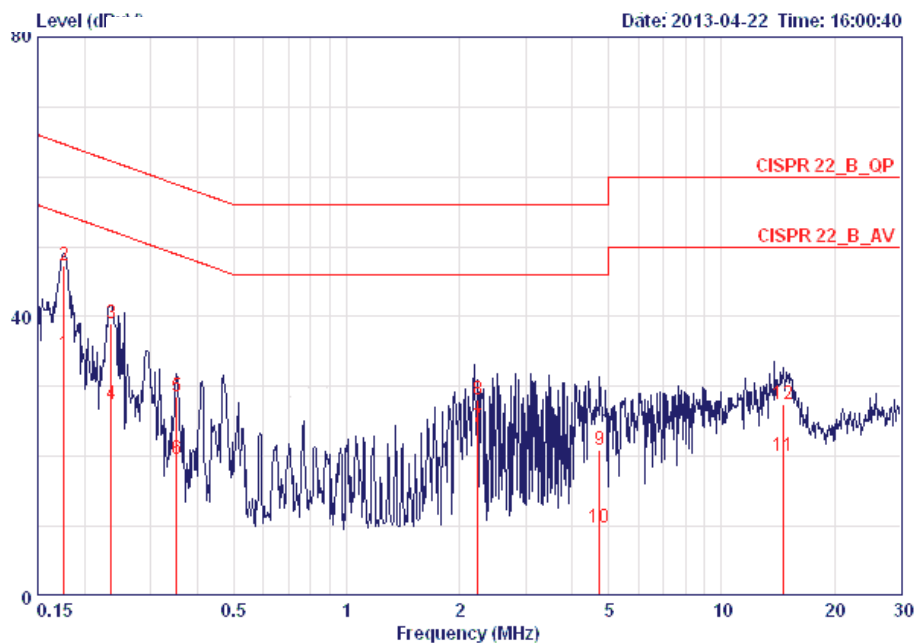
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	50%
Test Engineer	Parody Lin	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.17772	46.64	-17.95	64.59	46.30	0.15	0.19	LINE	QP
2	0.17772	35.52	-19.07	54.59	35.18	0.15	0.19	LINE	AVERAGE
3	0.23658	39.53	-22.69	62.22	39.18	0.15	0.20	LINE	QP
4	0.23658	30.63	-21.59	52.22	30.28	0.15	0.20	LINE	AVERAGE
5	0.47360	31.99	-14.46	46.45	31.64	0.15	0.20	LINE	AVERAGE
6	0.47360	31.46	-24.99	56.45	31.11	0.15	0.20	LINE	QP
7	0.76702	27.67	-18.33	46.00	27.31	0.16	0.20	LINE	AVERAGE
8	0.76702	27.44	-28.56	56.00	27.08	0.16	0.20	LINE	QP
9	3.661	24.01	-31.99	56.00	23.51	0.22	0.28	LINE	QP
10	3.661	14.42	-31.58	46.00	13.92	0.22	0.28	LINE	AVERAGE
11	14.364	27.61	-32.39	60.00	26.80	0.40	0.40	LINE	QP
12	14.364	19.32	-30.68	50.00	18.51	0.40	0.40	LINE	AVERAGE

Temperature	24°C	Humidity	50%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBμV	dB	dBμV	dBμV	dB	dB		
1	0.17584	34.66	-20.02	54.68	34.39	0.08	0.19	NEUTRAL	AVERAGE
2	0.17584	47.37	-17.31	64.68	47.10	0.08	0.19	NEUTRAL	QP
3	0.23533	38.97	-23.29	62.26	38.69	0.08	0.20	NEUTRAL	QP
4	0.23533	27.42	-24.84	52.26	27.14	0.08	0.20	NEUTRAL	AVERAGE
5	0.35201	28.53	-30.38	58.91	28.25	0.08	0.20	NEUTRAL	QP
6	0.35201	19.51	-29.40	48.91	19.23	0.08	0.20	NEUTRAL	AVERAGE
7	2.236	24.24	-21.76	46.00	23.89	0.11	0.24	NEUTRAL	AVERAGE
8	2.236	28.16	-27.84	56.00	27.81	0.11	0.24	NEUTRAL	QP
9	4.721	21.00	-35.00	56.00	20.54	0.14	0.31	NEUTRAL	QP
10	4.721	9.81	-36.19	46.00	9.35	0.14	0.31	NEUTRAL	AVERAGE
11	14.672	19.99	-30.01	50.00	19.27	0.31	0.41	NEUTRAL	AVERAGE
12	14.672	27.55	-32.45	60.00	26.83	0.31	0.41	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for 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. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter output power.

4.2.2. Measuring Instruments and Setting

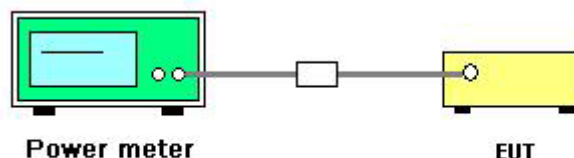
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	Average

4.2.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03 section 9.2.2. Measurement using a power meter (PM).
2. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

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 Maximum Conducted Output Power

Temperature	25°C	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac
Test Date	Mar. 04, 2013		

For 2.4GHz Band

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

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	12.78	13.37	13.49	18.00	30.00	Complies
6	2437 MHz	22.87	22.48	22.70	27.46	30.00	Complies
11	2462 MHz	12.88	13.62	13.66	18.17	30.00	Complies

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

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
3	2422 MHz	8.25	10.18	9.99	14.33	30.00	Complies
6	2437 MHz	17.05	17.12	17.81	22.11	30.00	Complies
9	2452 MHz	10.55	11.04	11.54	15.83	30.00	Complies

For 5GHz Band

Configuration IEEE 802.11ac MCS0 20MHz / Chain 4 + Chain 5 + Chain 6 (3TX)

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
149	5745 MHz	24.92	24.81	24.31	29.46	30.00	Complies
157	5785 MHz	25.02	24.69	24.36	29.47	30.00	Complies
165	5825 MHz	25.00	24.62	24.41	29.45	30.00	Complies

Note: Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

Configuration IEEE 802.11ac MCS0 40MHz / Chain 4 + Chain 5 + Chain 6 (3TX)

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
151	5755 MHz	24.86	24.43	24.11	29.25	30.00	Complies
159	5795 MHz	25.13	24.63	24.33	29.48	30.00	Complies

Note: Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

Configuration IEEE 802.11ac MCS0 80MHz / Chain 4 + Chain 5 + Chain 6 (3TX)

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
155	5775 MHz	24.83	24.33	24.28	29.26	30.00	Complies

Note: Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

Temperature	25°C	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a/b/g
Test Date	Mar. 04, 2013		

Configuration IEEE 802.11b / Chain 1 + Chain 2 + Chain 3 (3TX)

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	20.73	20.81	20.47	25.44	30.00	Complies
6	2437 MHz	24.57	24.78	24.81	29.49	30.00	Complies
11	2462 MHz	20.44	20.43	20.05	25.08	30.00	Complies

Configuration IEEE 802.11g / Chain 1 + Chain 2 + Chain 3 (3TX)

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3			
1	2412 MHz	12.11	12.65	12.72	17.27	30.00	Complies
6	2437 MHz	23.33	23.17	22.94	27.92	30.00	Complies
11	2462 MHz	15.71	15.34	15.44	20.27	30.00	Complies

Configuration IEEE 802.11a / Chain 4 + Chain 5 + Chain 6 (3TX)

Channel	Frequency	Conducted Power (dBm)			Total Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 4	Chain 5	Chain 6			
149	5745 MHz	25.14	25.16	25.30	29.97	30.00	Complies
157	5785 MHz	25.07	25.15	25.04	29.86	30.00	Complies
165	5825 MHz	25.19	25.19	25.22	29.97	30.00	Complies

Note: Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

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

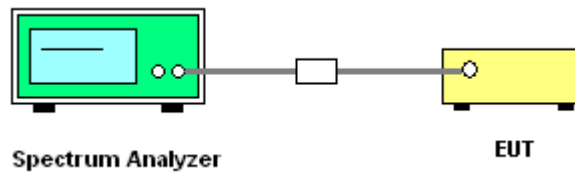
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RB	$3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
VB	$\geq 3 \times \text{RBW}$
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

4.3.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03 section 10.2 Method PKPSD (peak PSD) & KDB 662911 D01 v01r02 section In-Band Power Spectral Density (PSD) Measurements option (2) Measure and add $10 \log(\text{NANT})$ dB.
2. 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.
3. Ensure that the number of measurement points in the sweep $\geq 2 \times \text{span/RBW}$ (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be $\leq 8 \text{ dBm}$.

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	25°C	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac

For 2.4GHz Band

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

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3		
1	2412 MHz	-13.86	-11.35	-13.21	3.23	Complies
6	2437 MHz	-3.40	-3.85	-3.69	3.23	Complies
11	2462 MHz	-13.32	-12.60	-13.03	3.23	Complies

Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

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

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3		
3	2422 MHz	-18.38	-17.24	-19.39	3.23	Complies
6	2437 MHz	-10.59	-10.51	-11.68	3.23	Complies
9	2452 MHz	-18.10	-17.71	-17.51	3.23	Complies

Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

For 5GHz Band

Configuration IEEE 802.11ac MCS0 20MHz / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 4	Chain 5	Chain 6		
149	5745 MHz	-2.48	-2.93	-1.59	3.23	Complies
157	5785 MHz	-2.36	-3.30	-3.04	3.23	Complies
165	5825 MHz	-2.87	-2.44	-2.38	3.23	Complies

Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

Configuration IEEE 802.11ac MCS0 40MHz / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 4	Chain 5	Chain 6		
151	5755 MHz	-5.62	-6.30	-6.05	3.23	Complies
159	5795 MHz	-5.42	-5.50	-4.70	3.23	Complies

Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

Configuration IEEE 802.11ac MCS0 80MHz / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 4	Chain 5	Chain 6		
155	5775 MHz	-8.31	-8.74	-8.79	3.23	Complies

Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

Temperature	25°C	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a/b/g

Configuration IEEE 802.11b / Chain 1+Chain 2+Chain 3 (3TX)

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3		
1	2412 MHz	-4.17	-3.84	-4.36	3.23	Complies
6	2437 MHz	1.20	-0.02	0.28	3.23	Complies
11	2462 MHz	-2.16	-2.41	-3.17	3.23	Complies

Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

Configuration IEEE 802.11g / Chain 1+Chain 2+Chain 3 (3TX)

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3		
1	2412 MHz	-13.51	-13.47	-14.22	3.23	Complies
6	2437 MHz	-3.54	-2.73	-3.92	3.23	Complies
11	2462 MHz	-10.54	-10.93	-10.57	3.23	Complies

Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

Configuration IEEE 802.11a / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	Power Density (dBm/3kHz)			Single Port Limit (dBm/3kHz)	Result
		Chain 4	Chain 5	Chain 6		
149	5745 MHz	-1.89	-1.80	-2.45	3.23	Complies
157	5785 MHz	-1.81	-1.95	-2.34	3.23	Complies
165	5825 MHz	-1.34	-1.92	-1.93	3.23	Complies

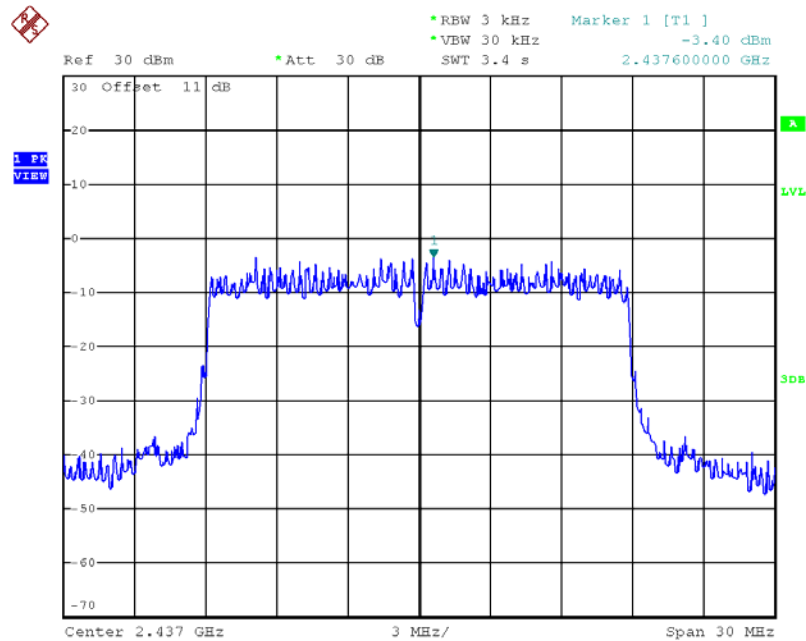
Note: Limit = 8dBm/3KHz -(10log(3))=8dBm/3KHz -4.77dB=3.23dBm/3KHz.

Directional gain=GANT+10log(NANT/Nss) =5.71dBi <6dBi, so the limit doesn't reduce.

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

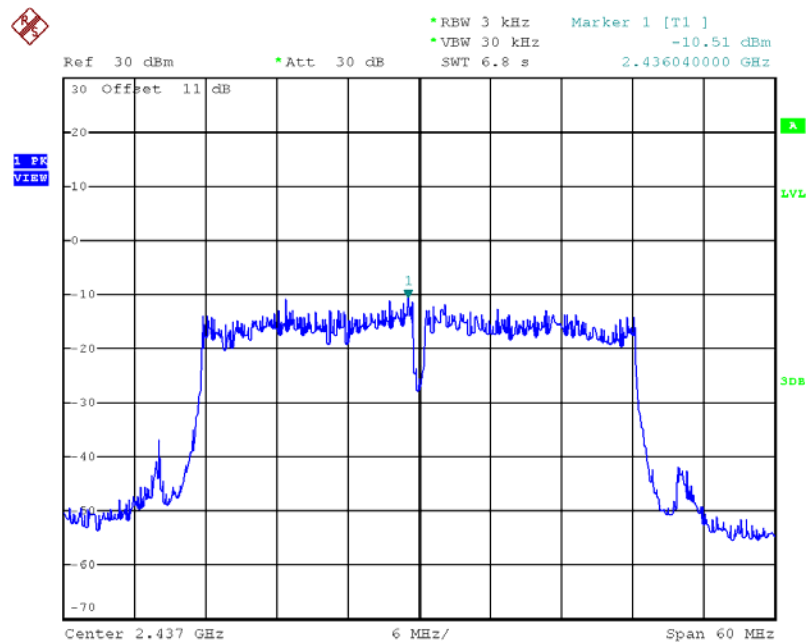
For plots, only the channel with maximum results was shown.

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



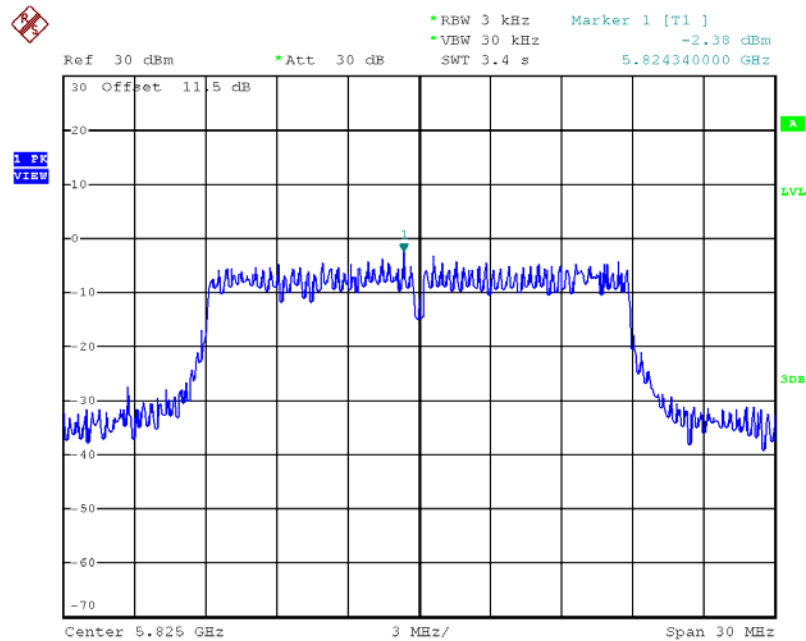
Date: 15.MAY.2013 12:55:05

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



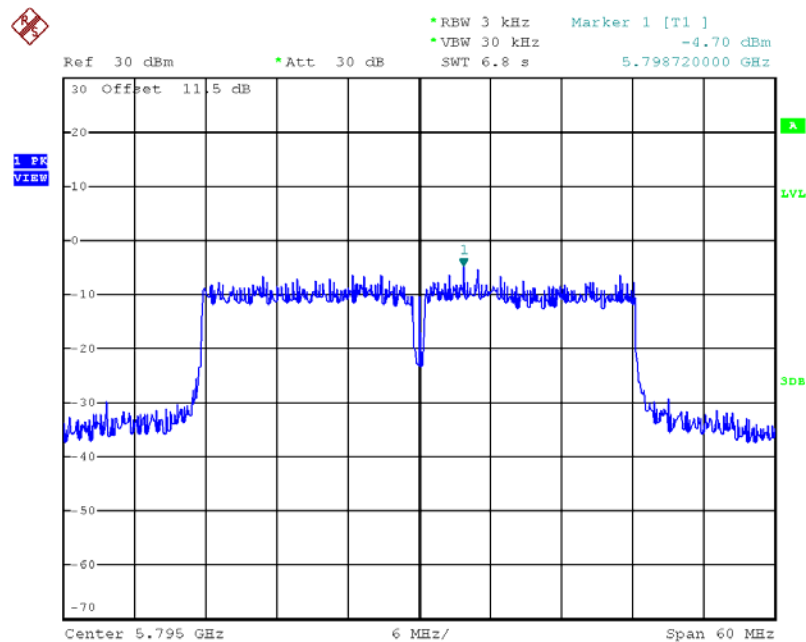
Date: 15.MAY.2013 13:07:37

Power Density Plot on Configuration IEEE 802.11ac MCS0 20MHz / Chain 6 / 5825 MHz



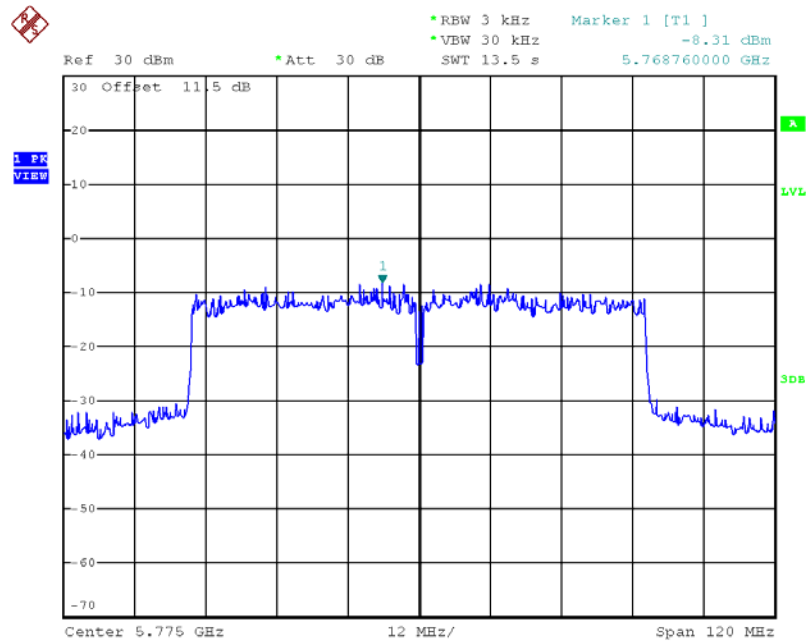
Date: 15.MAY.2013 13:41:40

Power Density Plot on Configuration IEEE 802.11ac MCS0 40MHz / Chain 6 / 5795 MHz



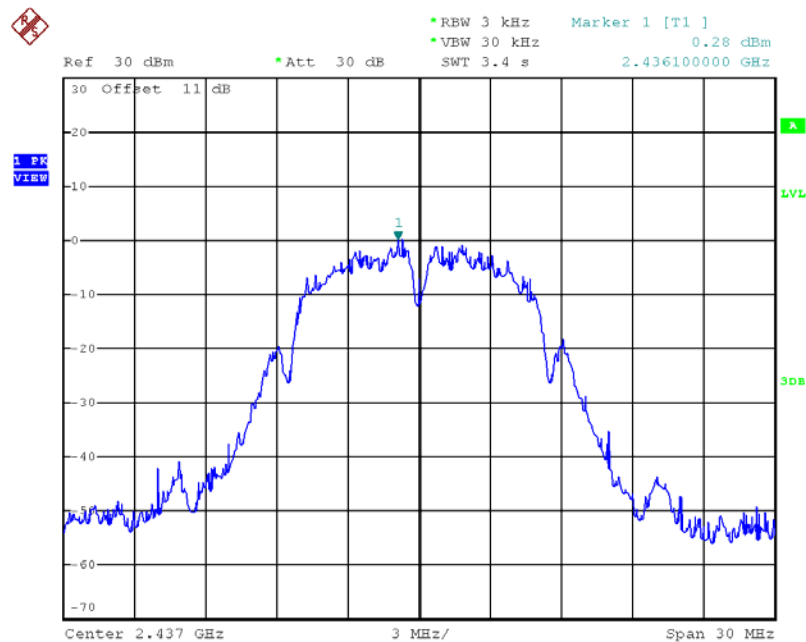
Date: 15.MAY.2013 13:53:33

Power Density Plot on Configuration IEEE 802.11ac MCS0 80MHz / Chain 4 / 5775 MHz



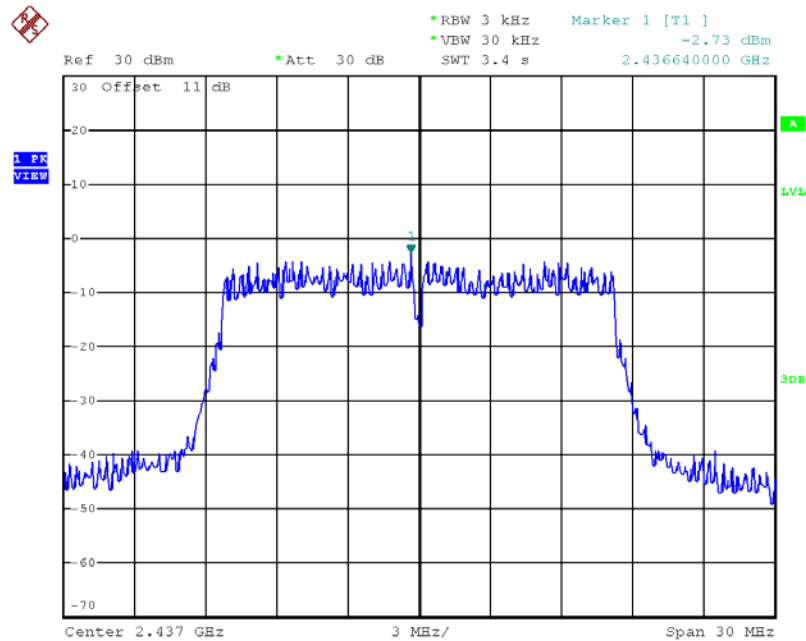
Date: 15.MAY.2013 13:57:51

Power Density Plot on Configuration IEEE 802.11b / Chain 1 / 2437 MHz



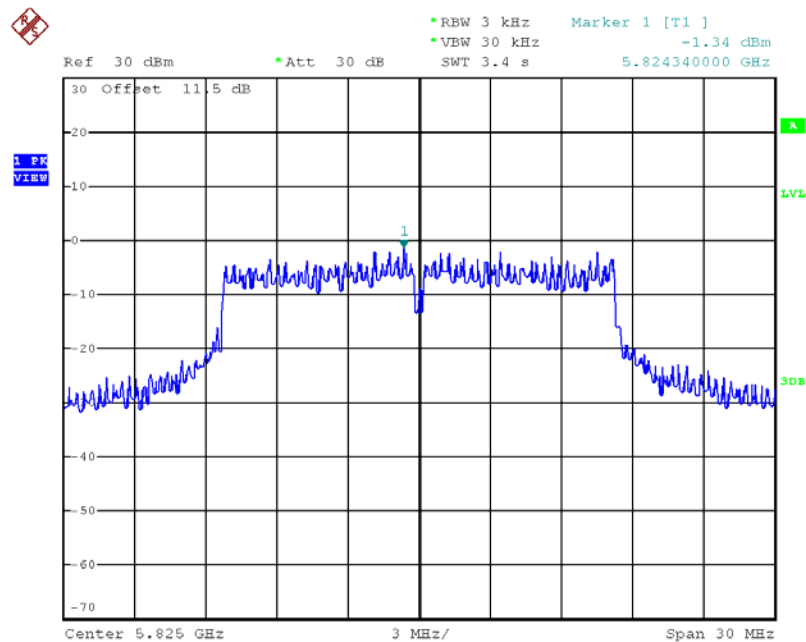
Date: 15.MAY.2013 12:21:12

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



Date: 15.MAY.2013 12:38:49

Power Density Plot on Configuration IEEE 802.11a / Chain 4 / 5825 MHz



Date: 15.MAY.2013 13:34:38

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

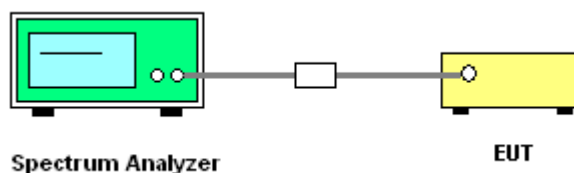
Please refer to section 5 of equipments list in this report. The following table is the setting of spectrum analyzer.

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RB	Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
VB	$\geq 3 \times$ RBW
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. Test was performed in accordance with KDB 558074 D01 v03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8.0 DTS 6-dB signal bandwidth option 1 Measurement Procedure
3. Multiple antenna system was performed in accordance with KDB 662911 D01 v01r02 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. 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	25°C	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11n/ac

For 2.4GHz Band

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	11.76	17.04	500	Complies
6	2437 MHz	11.84	17.04	500	Complies
11	2462 MHz	11.76	17.04	500	Complies

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	30.88	35.52	500	Complies
6	2437 MHz	31.04	35.68	500	Complies
9	2452 MHz	31.36	35.84	500	Complies

For 5GHz Band

Configuration IEEE 802.11ac MCS0 20MHz / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	15.20	19.60	500	Complies
157	5785 MHz	15.52	18.96	500	Complies
165	5825 MHz	15.44	18.64	500	Complies

Configuration IEEE 802.11ac MCS0 40MHz / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	33.92	36.96	500	Complies
159	5795 MHz	33.92	36.80	500	Complies

Configuration IEEE 802.11ac MCS0 80MHz / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
155	5775 MHz	74.24	76.16	500	Complies

Temperature	25°C	Humidity	60%
Test Engineer	Magic Lai	Configurations	IEEE 802.11a/b/g

Configuration IEEE 802.11b / Chain 1+Chain 2+Chain 3 (3TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	7.52	10.08	500	Complies
6	2437 MHz	8.08	10.24	500	Complies
11	2462 MHz	8.08	10.24	500	Complies

Configuration IEEE 802.11g / Chain 1+Chain 2+Chain 3 (3TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	13.76	16.40	500	Complies
6	2437 MHz	14.24	16.40	500	Complies
11	2462 MHz	14.24	16.40	500	Complies

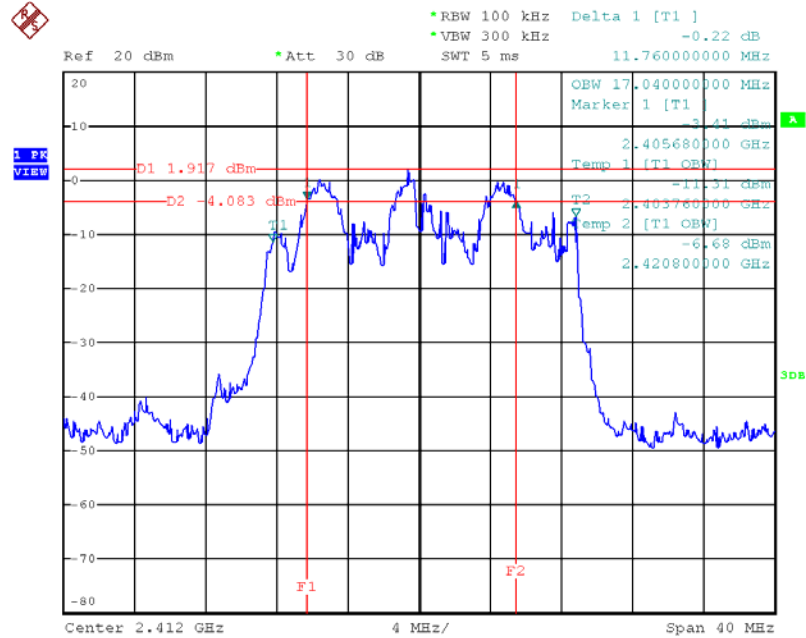
Configuration IEEE 802.11a / Chain 4+Chain 5+Chain 6 (3TX)

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	14.48	18.72	500	Complies
157	5785 MHz	14.48	18.80	500	Complies
165	5825 MHz	14.48	18.48	500	Complies

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

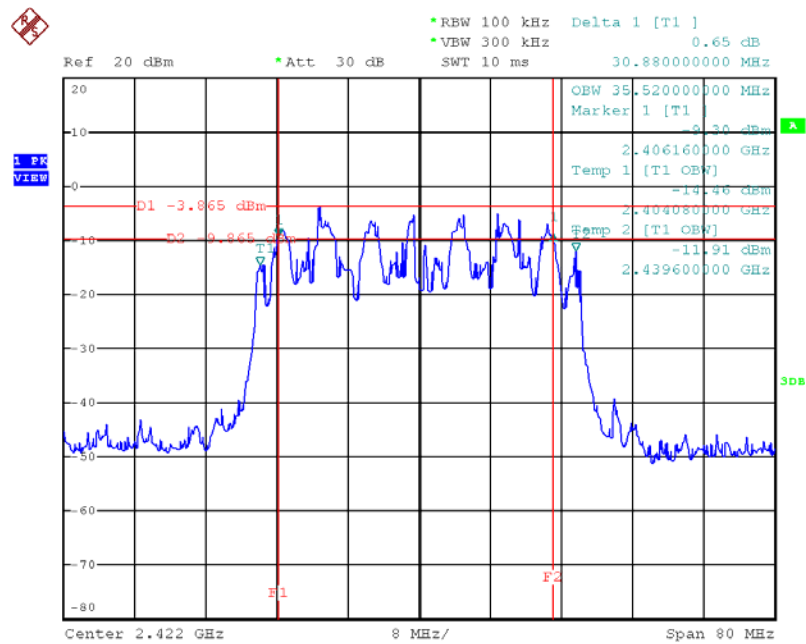
For plots, only the channel with maximum results was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 20MHz / Chain 1+Chain 2+Chain 3 (3TX) / 2412 MHz



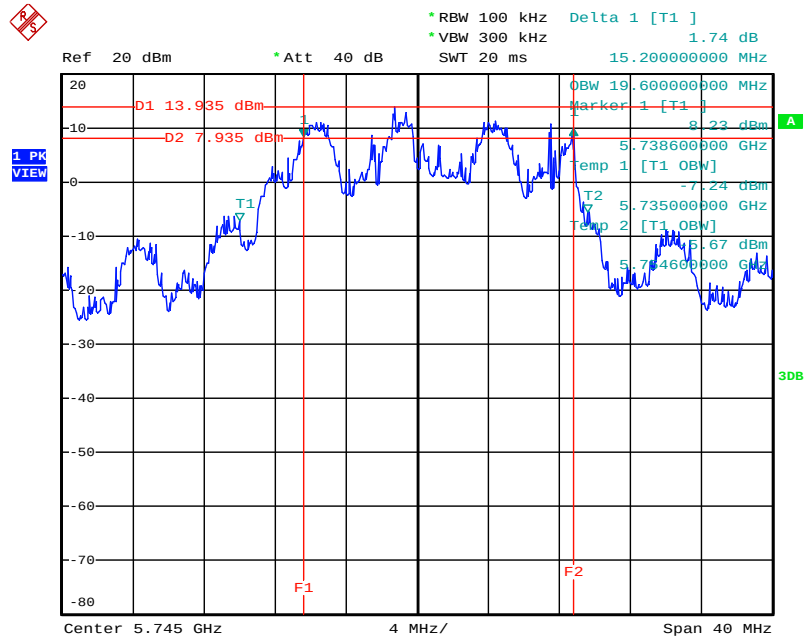
Date: 5.MAR.2013 02:12:50

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 40MHz / Chain 1+Chain 2+Chain 3 (3TX) / 2422 MHz



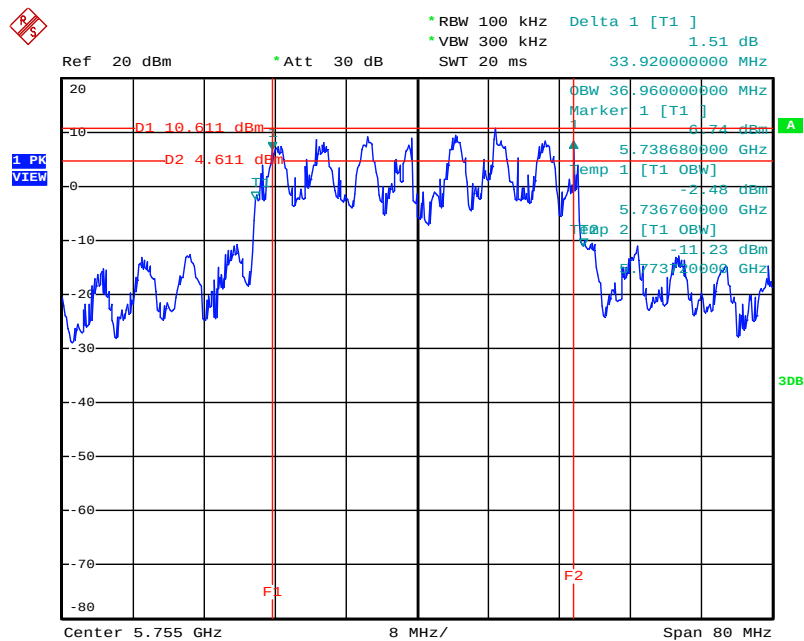
Date: 5.MAR.2013 02:17:49

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0 20MHz / Chain 4+Chain 5+Chain 6 (3TX) / 5745 MHz



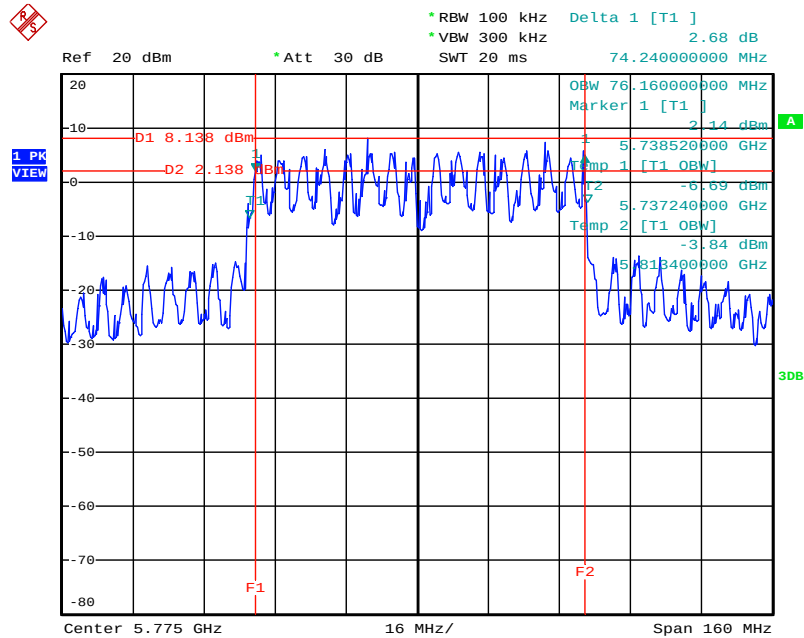
Date: 5.MAR.2013 22:56:24

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0 40MHz / Chain 4+Chain 5+Chain 6 (3TX) / 5755 MHz



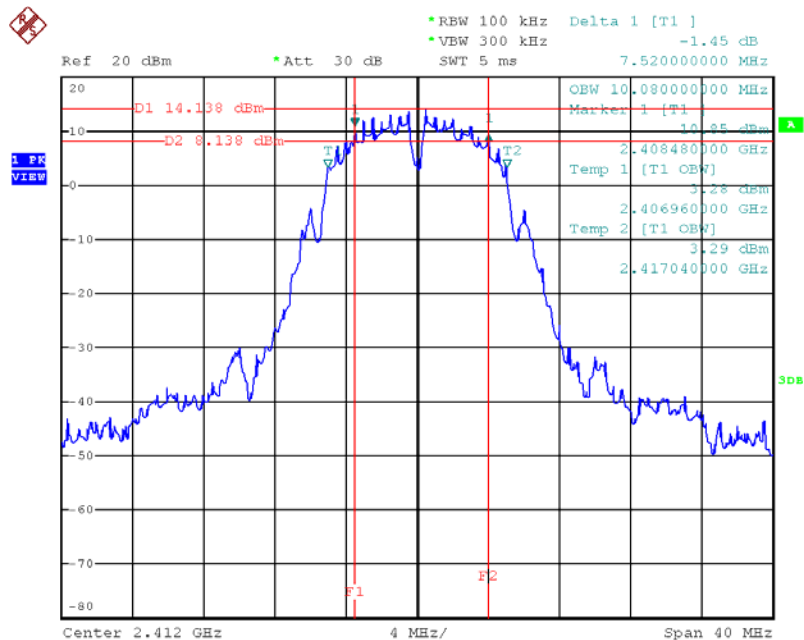
Date: 5.MAR.2013 22:52:03

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0 80MHz / Chain 4+Chain 5+Chain 6 (3TX) / 5775 MHz



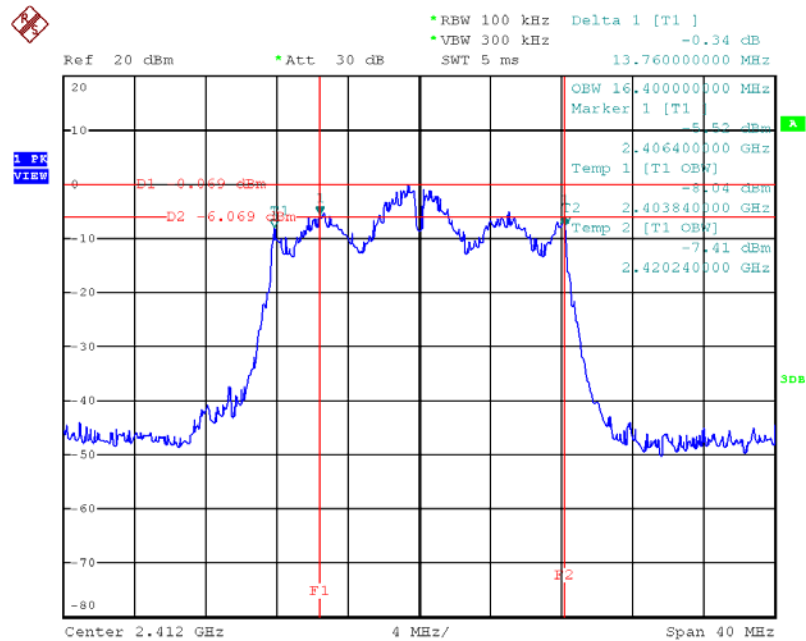
Date: 5.MAR.2013 22:50:44

6 dB Bandwidth Plot on Configuration IEEE 802.11b / Chain 1+Chain 2+Chain 3 (3TX) / 2412 MHz



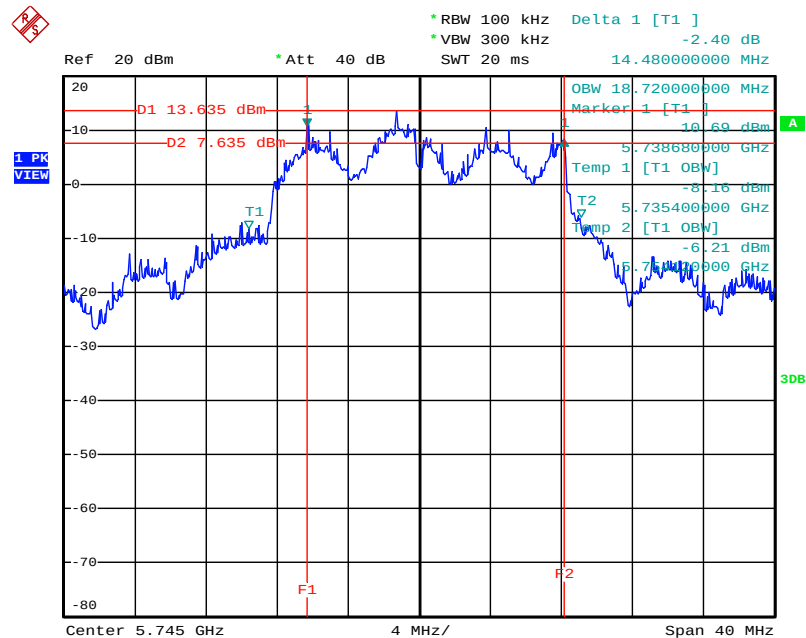
Date: 5.MAR.2013 02:03:15

6 dB Bandwidth Plot on Configuration IEEE 802.11g / Chain 1+Chain 2+Chain 3 (3TX) / 2412 MHz



Date: 5.MAR.2013 02:07:51

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 4+Chain 5+Chain 6 (3TX) / 5745 MHz



Date: 5.MAR.2013 23:00:37

4.5. Radiated Emissions Measurement

4.5.1. Limit

30dBc 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 (microvolt/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)	100kHz / 300kHz for peak

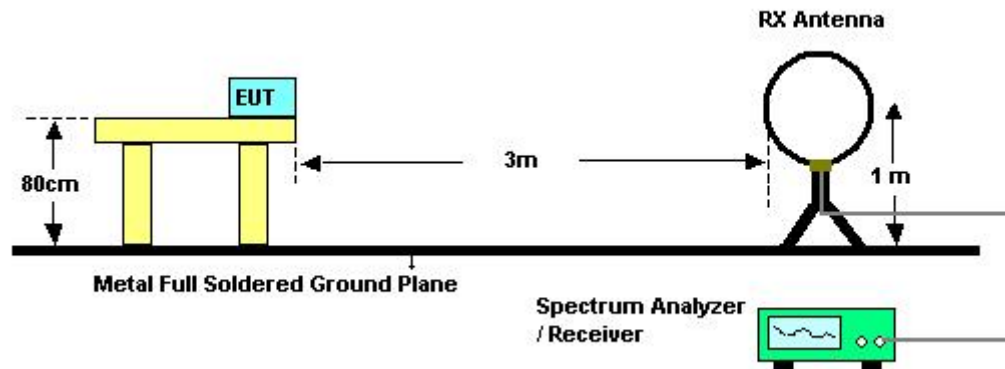
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RB 9kHz for QP
Start ~ Stop Frequency	30MHz~1GHz / RB 120kHz for QP

4.5.3. Test Procedures

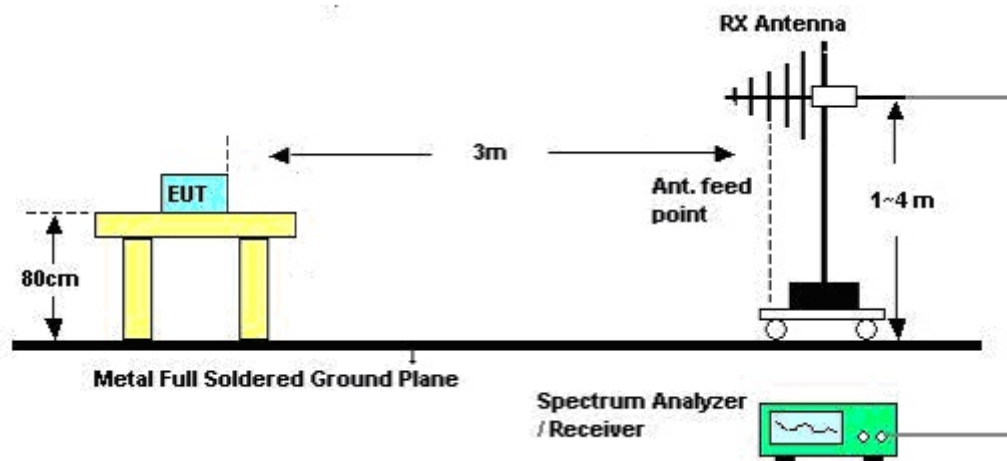
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

For 2.4GHz Band:

Non-beamforming mode

The EUT was programmed to be in continuously transmitting mode.

For 5GHz Band:

Beamforming mode

The EUT was programmed to be in beamforming transmitting mode.

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

Temperature	24.5°C	Humidity	57%
Test Engineer	David Tseng	Configurations	Normal Link
Test Date	Feb. 23, 2013		

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

Note:

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

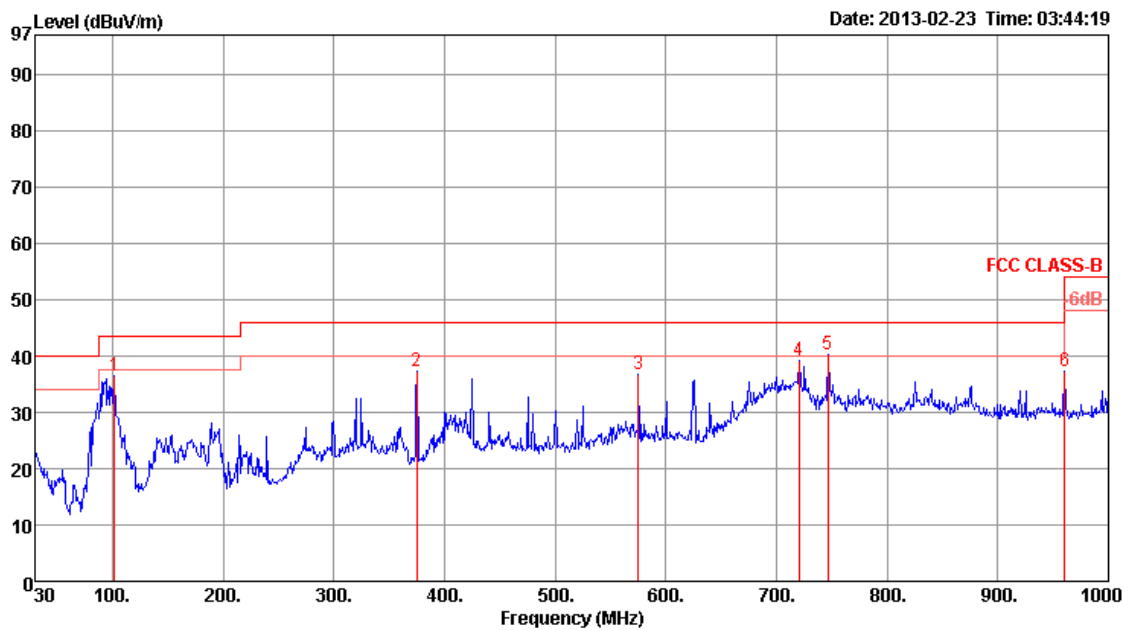
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

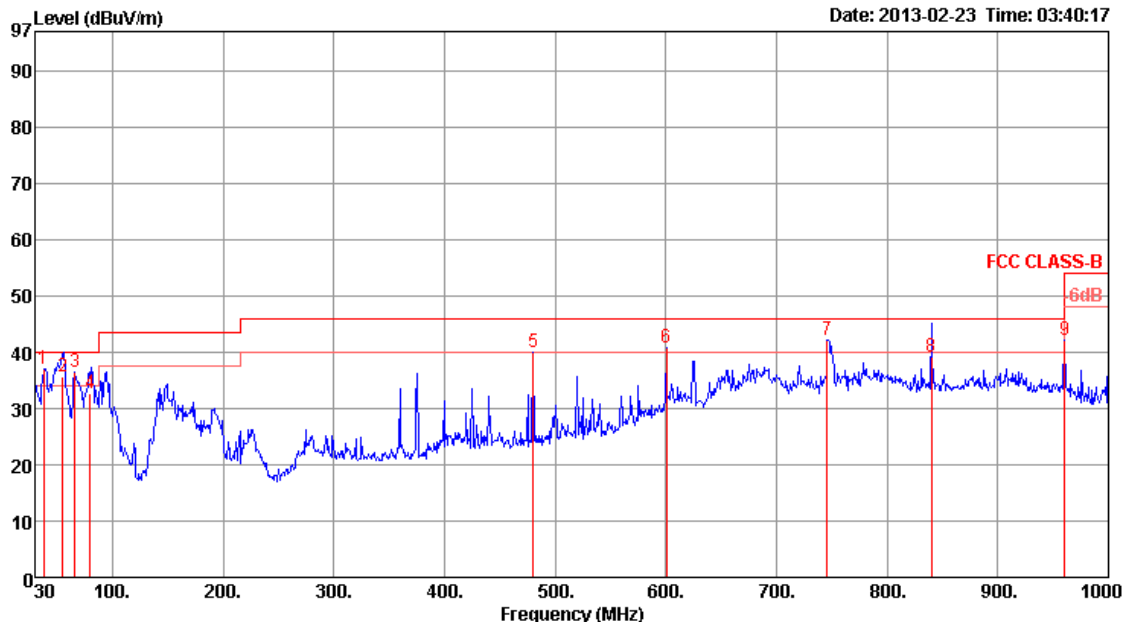
Temperature	24.5°C	Humidity	57%
Test Engineer	David Tseng	Configurations	Normal Link
Test Mode	Mode 1. AP function		

Horizontal



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	101.78	36.39	43.50	-7.11	51.66	1.18	11.14	27.59 Peak	100	0	HORIZONTAL
2	375.32	37.29	46.00	-8.71	47.12	2.20	15.40	27.43 Peak	100	0	HORIZONTAL
3	575.14	36.87	46.00	-9.13	43.69	2.80	18.48	28.10 Peak	100	0	HORIZONTAL
4	720.64	39.26	46.00	-6.74	44.80	3.14	19.23	27.91 Peak	100	0	HORIZONTAL
5	746.83	40.22	46.00	-5.78	45.43	3.19	19.41	27.81 Peak	100	0	HORIZONTAL
6	960.23	37.19	54.00	-16.81	39.80	3.56	20.99	27.16 Peak	100	0	HORIZONTAL

Vertical



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	Remark	cm	deg	Pol/Phase
1	37.76	36.99	40.00	-3.01	49.81	0.68	14.30	27.80	Peak	400	0	VERTICAL
2	55.25	35.61	40.00	-4.39	54.90	0.84	7.65	27.78	QP	100	208	VERTICAL
3	65.89	36.52	40.00	-3.48	56.62	0.95	6.69	27.74	Peak	400	0	VERTICAL
4	79.75	32.71	40.00	-7.29	52.31	0.96	7.12	27.68	QP	100	170	VERTICAL
5	480.08	40.01	46.00	-5.99	48.11	2.59	17.31	28.00	Peak	400	0	VERTICAL
6	600.36	40.76	46.00	-5.24	47.28	2.81	18.77	28.10	Peak	400	0	VERTICAL
7	745.86	42.04	46.00	-3.96	47.27	3.19	19.40	27.82	Peak	400	0	VERTICAL
8	840.00	39.19	46.00	-6.81	43.30	3.34	20.07	27.52	QP	144	228	VERTICAL
9	960.23	42.19	54.00	-11.81	44.80	3.56	20.99	27.16	Peak	400	0	VERTICAL

Note:

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

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

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

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

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 20MHz Ch 1 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4820.76	32.19	54.00	-21.81	27.73	6.27	33.39	35.20	Average	100	135 HORIZONTAL
2	4821.05	45.23	74.00	-28.77	40.77	6.27	33.39	35.20	Peak	100	135 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4816.82	44.56	74.00	-29.44	40.13	6.27	33.36	35.20	Peak	100	210 VERTICAL
2	4820.12	32.16	54.00	-21.84	27.70	6.27	33.39	35.20	Average	100	210 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 20MHz Ch 6 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4869.10	45.10	74.00	-28.90	40.54	6.31	33.45	35.20	Peak	100	150 HORIZONTAL
2	4878.17	32.37	54.00	-21.63	27.78	6.31	33.48	35.20	Average	100	150 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4869.67	44.85	74.00	-29.15	40.29	6.31	33.45	35.20	Peak	100	345 VERTICAL
2	4877.69	32.44	54.00	-21.56	27.85	6.31	33.48	35.20	Average	100	345 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 20MHz Ch 11 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4915.54	46.19	74.00	-27.81	41.50	6.35	33.54	35.20	Peak	100	240 HORIZONTAL
2	4919.42	32.88	54.00	-21.12	28.19	6.35	33.54	35.20	Average	100	240 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4919.74	32.83	54.00	-21.17	28.14	6.35	33.54	35.20	Average	100	316 VERTICAL
2	4924.55	46.07	74.00	-27.93	41.34	6.35	33.58	35.20	Peak	100	316 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 40MHz Ch 3 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4843.93	45.16	74.00	-28.84	40.65	6.29	33.42	35.20	Peak	100	138 HORIZONTAL
2	4844.01	31.99	54.00	-22.01	27.48	6.29	33.42	35.20	Average	100	138 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4844.23	45.48	74.00	-28.52	40.97	6.29	33.42	35.20	Peak	100	189 VERTICAL
2	4844.49	32.13	54.00	-21.87	27.62	6.29	33.42	35.20	Average	100	189 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 40MHz Ch 6 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4874.30	44.95	74.00	-29.05	40.36	6.31	33.48	35.20	Peak	100	221 HORIZONTAL
2	4874.36	32.21	54.00	-21.79	27.62	6.31	33.48	35.20	Average	100	221 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4874.16	45.30	74.00	-28.70	40.71	6.31	33.48	35.20	Peak	100	134 VERTICAL
2	4874.25	32.11	54.00	-21.89	27.52	6.31	33.48	35.20	Average	100	134 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 40MHz Ch 9 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
1	4903.93	31.75	54.00	-22.25	27.11	6.33	33.51	35.20	Average	100	61 HORIZONTAL
2	4904.23	45.48	74.00	-28.52	40.84	6.33	33.51	35.20	Peak	100	61 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
1	4904.23	45.06	74.00	-28.94	40.42	6.33	33.51	35.20	Peak	100	266 VERTICAL
2	4904.37	32.10	54.00	-21.90	27.46	6.33	33.51	35.20	Average	100	266 VERTICAL

Temperature	25.6°C	Humidity	56%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 20MHz Ch 149 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	Feb. 26, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
						dB	dB/m	dB			Pol/Phase
1	11489.52	62.55	74.00	-11.45	53.94	5.11	38.78	35.28	Peak	116	342 HORIZONTAL
2	11489.62	48.77	54.00	-5.23	40.16	5.11	38.78	35.28	Average	116	342 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
						dB	dB/m	dB			Pol/Phase
1	11490.00	48.25	54.00	-5.75	39.64	5.11	38.78	35.28	Average	121	241 VERTICAL
2	11495.77	62.34	74.00	-11.66	53.72	5.12	38.78	35.28	Peak	121	241 VERTICAL

Temperature	25.6°C	Humidity	56%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 20MHz Ch 157 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	Feb. 26, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11567.92	46.73	54.00	-7.27	38.07	5.13	38.83	35.30	Average	100	208	HORIZONTAL
2	11568.08	59.78	74.00	-14.22	51.12	5.13	38.83	35.30	Peak	100	208	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11567.84	45.72	54.00	-8.28	37.06	5.13	38.83	35.30	Average	101	312	VERTICAL
2	11568.08	58.33	74.00	-15.67	49.67	5.13	38.83	35.30	Peak	101	312	VERTICAL

Temperature	25.6°C	Humidity	56%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 20MHz Ch 165 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	Feb. 26, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11648.33	60.18	74.00	-13.82	51.46	5.16	38.86	35.30	Peak	100	244	HORIZONTAL
2	11650.26	47.04	54.00	-6.96	38.32	5.16	38.86	35.30	Average	100	244	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	11649.36	61.16	74.00	-12.84	52.44	5.16	38.86	35.30	Peak	120	241	VERTICAL
2	11649.42	47.91	54.00	-6.09	39.19	5.16	38.86	35.30	Average	120	241	VERTICAL

Temperature	25.6°C	Humidity	56%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 40MHz Ch 151 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	Feb. 26, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11493.01	46.05	54.00	-7.95	37.44	5.11	38.78	35.28	Average	101	205	HORIZONTAL
2	11509.92	57.10	74.00	-16.90	48.47	5.12	38.79	35.28	Peak	101	205	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	11489.33	47.33	54.00	-6.67	38.72	5.11	38.78	35.28	Average	122	241	VERTICAL
2	11510.08	60.47	74.00	-13.53	51.84	5.12	38.79	35.28	Peak	122	241	VERTICAL

Temperature	25.6°C	Humidity	56%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 40MHz Ch 159 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	Feb. 26, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11589.68	44.07	54.00	-9.93	35.40	5.14	38.83	35.30	Average	100	177	HORIZONTAL
2	11589.92	57.23	74.00	-16.77	48.56	5.14	38.83	35.30	Peak	100	177	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	11589.60	45.29	54.00	-8.71	36.62	5.14	38.83	35.30	Average	132	240	VERTICAL
2	11589.60	57.33	74.00	-16.67	48.66	5.14	38.83	35.30	Peak	132	240	VERTICAL

Temperature	25.6°C	Humidity	56%
Test Engineer	David Tseng	Configurations	IEEE 802.11ac MCS0 80MHz CH 155 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	Feb. 26, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg
1	11542.15	52.26	74.00	-21.74	43.62	5.13	38.81	35.30	Peak	100	255 HORIZONTAL
2	11547.92	40.27	54.00	-13.73	31.63	5.13	38.81	35.30	Average	100	255 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg
1	11515.87	52.36	74.00	-21.64	43.74	5.12	38.79	35.29	Peak	115	257 VERTICAL
2	11569.39	42.29	54.00	-11.71	33.63	5.13	38.83	35.30	Average	115	257 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11b CH 1 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4824.00	36.11	54.00	-17.89	31.65	6.27	33.39	35.20	Average	135	27 HORIZONTAL
2	4824.08	47.12	74.00	-26.88	42.66	6.27	33.39	35.20	Peak	135	27 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4823.88	49.17	74.00	-24.83	44.71	6.27	33.39	35.20	Peak	100	70 VERTICAL
2	4824.01	38.35	54.00	-15.65	33.89	6.27	33.39	35.20	Average	100	70 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11b CH 6 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4873.89	47.89	74.00	-26.11	43.30	6.31	33.48	35.20	Peak	100	328 HORIZONTAL
2	4873.90	36.67	54.00	-17.33	32.08	6.31	33.48	35.20	Average	100	328 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4874.00	48.90	74.00	-25.10	44.31	6.31	33.48	35.20	Peak	100	66 VERTICAL
2	4874.02	40.10	54.00	-13.90	35.51	6.31	33.48	35.20	Average	100	66 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11b CH 11 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	4923.89	47.27	74.00	-26.73	42.54	6.35	33.58	35.20	Peak	111	60	HORIZONTAL
2	4923.98	37.13	54.00	-16.87	32.40	6.35	33.58	35.20	Average	111	60	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	4923.73	48.60	74.00	-25.40	43.87	6.35	33.58	35.20	Peak	107	37	VERTICAL
2	4923.98	37.68	54.00	-16.32	32.95	6.35	33.58	35.20	Average	107	37	VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11g CH 1 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4823.57	31.92	54.00	-22.08	27.46	6.27	33.39	35.20	Average	100	162 HORIZONTAL
2	4824.35	44.35	74.00	-29.65	39.89	6.27	33.39	35.20	Peak	100	162 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4823.87	45.18	74.00	-28.82	40.72	6.27	33.39	35.20	Peak	100	256 VERTICAL
2	4824.17	31.81	54.00	-22.19	27.35	6.27	33.39	35.20	Average	100	256 VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11g CH 6 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	4873.94	45.05	74.00	-28.95	40.46	6.31	33.48	35.20	Peak	100	143	HORIZONTAL
2	4874.14	32.08	54.00	-21.92	27.49	6.31	33.48	35.20	Average	100	143	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg	Pol/Phase
1	4874.14	45.04	74.00	-28.96	40.45	6.31	33.48	35.20	Peak	100	286	VERTICAL
2	4874.19	32.96	54.00	-21.04	28.37	6.31	33.48	35.20	Average	100	286	VERTICAL

Temperature	24.5°C	Humidity	57%
Test Engineer	Serway Li	Configurations	IEEE 802.11g CH 11 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 31, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4923.63	32.69	54.00	-21.31	27.96	6.35	33.58	35.20	Average	100	249 HORIZONTAL
2	4923.83	46.05	74.00	-27.95	41.32	6.35	33.58	35.20	Peak	100	249 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	4924.02	45.37	74.00	-28.63	40.64	6.35	33.58	35.20	Peak	100	69 VERTICAL
2	4924.46	32.99	54.00	-21.01	28.26	6.35	33.58	35.20	Average	100	69 VERTICAL

Temperature	25°C	Humidity	56%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a CH 149 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	May 08, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	11491.44	49.46	54.00	-4.54	39.04	6.74	34.82	38.50	Average	210	100	HORIZONTAL
2 p	11491.96	65.33	74.00	-8.67	54.91	6.74	34.82	38.50	Peak	210	100	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 p	11491.67	60.15	74.00	-13.85	49.73	6.74	34.82	38.50	Peak	245	104	VERTICAL
2 a	11492.21	46.88	54.00	-7.12	36.46	6.74	34.82	38.50	Average	245	104	VERTICAL

Temperature	25°C	Humidity	56%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a CH 157 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	May 08, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	11571.07	49.92	54.00	-4.08	39.50	6.77	34.85	38.50	Average	207	111	HORIZONTAL
2 p	11571.57	64.99	74.00	-9.01	54.57	6.77	34.85	38.50	Peak	207	111	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	11573.56	47.37	54.00	-6.63	36.95	6.77	34.85	38.50	Average	249	124	VERTICAL
2 p	11574.10	61.77	74.00	-12.23	51.35	6.77	34.85	38.50	Peak	249	124	VERTICAL

Temperature	25°C	Humidity	56%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a CH 165 / Chain 4+Chain 5+Chain 6 (3TX)
Test Date	May 08, 2013		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	11651.01	49.56	54.00	-4.44	39.13	6.80	34.87	38.50	Average	208	111	HORIZONTAL
2 p	11651.84	65.73	74.00	-8.27	55.30	6.80	34.87	38.50	Peak	208	111	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Preamp	Antenna		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1 a	11651.89	46.96	54.00	-7.04	36.53	6.80	34.87	38.50	Average	219	106	VERTICAL
2 p	11652.10	61.15	74.00	-12.85	50.72	6.80	34.87	38.50	Peak	219	106	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. Emissions Measurement

4.6.1. Limit

30dBc 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 (micровolts/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 / 300 kHz for Peak

4.6.3. Test Procedures

For Radiated band edges Measurement:

1. The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around band edges.

For Conducted Out of Band Emission Measurement:

1. Test was performed in accordance with KDB 558074 v04 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 11.0 Emissions in non-restricted frequency bands Measurement Procedure.
2. The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.
Only worst data of each operating mode is presented.

4.6.4. Test Setup Layout

For Radiated band edges Measurement:

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

For Conducted Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 4.4.4.

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

For 2.4GHz Band:

Non-beamforming mode

The EUT was programmed to be in continuously transmitting mode.

For 5GHz Band:

Beamforming mode

The EUT was programmed to be in beamforming transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

Temperature	24.5°C	Humidity	57%
Test Engineer	Denis Su	Configurations	IEEE 802.11n MCS0 20MHz Ch 1, 6, 11 I Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 17, 2013		

Channel 1

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
						dB	dB/m	dB			Pol/Phase
1	2388.72	66.92	74.00	-7.08	34.53	4.34	28.05	0.00	Peak	144	276 HORIZONTAL
2	2389.04	53.29	54.00	-0.71	20.90	4.34	28.05	0.00	Average	144	276 HORIZONTAL
3	2403.83	102.87			70.44	4.34	28.09	0.00	Average	144	276 HORIZONTAL
4	2408.80	113.68			81.25	4.34	28.09	0.00	Peak	144	276 HORIZONTAL

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

Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
						dB	dB/m	dB			Pol/Phase
1	2382.31	66.58	74.00	-7.42	34.25	4.32	28.01	0.00	Peak	143	276 HORIZONTAL
2	2388.72	53.48	54.00	-0.52	21.09	4.34	28.05	0.00	Average	143	276 HORIZONTAL
3	2438.60	112.06			79.50	4.38	28.18	0.00	Average	143	276 HORIZONTAL
4	2443.41	122.29			89.73	4.38	28.18	0.00	Peak	143	276 HORIZONTAL

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

Channel 11

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	cm	deg
						dB	dB/m	dB			Pol/Phase
1	2463.76	103.02			70.40	4.40	28.22	0.00	Average	142	274 HORIZONTAL
2	2469.05	113.70			81.04	4.40	28.26	0.00	Peak	142	274 HORIZONTAL
3	2483.50	53.49	54.00	-0.51	20.83	4.40	28.26	0.00	Average	142	274 HORIZONTAL
4	2483.98	65.48	74.00	-8.52	32.82	4.40	28.26	0.00	Peak	142	274 HORIZONTAL

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

Temperature	24.5°C	Humidity	57%
Test Engineer	Denis Su	Configurations	IEEE 802.11n MCS0 40MHz Ch 3, 6, 9 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 17, 2013		

Channel 3

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2386.15	68.90	74.00	-5.10	36.53	4.32	28.05	0.00	Peak	147	281	HORIZONTAL
2	2388.40	52.84	54.00	-1.16	20.45	4.34	28.05	0.00	Average	147	281	HORIZONTAL
3	2423.28	106.87			74.38	4.36	28.13	0.00	Peak	147	281	HORIZONTAL
4	2423.92	95.14			62.65	4.36	28.13	0.00	Average	147	281	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2385.83	68.47	74.00	-5.53	36.10	4.32	28.05	0.00	Peak	100	219	HORIZONTAL
2	2390.00	53.48	54.00	-0.52	21.09	4.34	28.05	0.00	Average	100	219	HORIZONTAL
3	2438.28	100.14			67.58	4.38	28.18	0.00	Average	100	219	HORIZONTAL
4	2438.28	111.07			78.51	4.38	28.18	0.00	Peak	100	219	HORIZONTAL
5	2483.50	49.45	54.00	-4.55	16.79	4.40	28.26	0.00	Average	100	219	HORIZONTAL
6	2483.82	62.39	74.00	-11.61	29.73	4.40	28.26	0.00	Peak	100	219	HORIZONTAL

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

Channel 9

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2448.80	97.62			65.06	4.38	28.18	0.00	Average	143	276	HORIZONTAL
2	2448.80	108.89			76.33	4.38	28.18	0.00	Peak	143	276	HORIZONTAL
3	2484.46	67.01	74.00	-6.99	34.35	4.40	28.26	0.00	Peak	143	276	HORIZONTAL
4	2488.63	53.31	54.00	-0.69	20.59	4.42	28.30	0.00	Average	143	276	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	24.5°C	Humidity	57%
Test Engineer	Denis Su	Configurations	IEEE 802.11b CH 1, 6, 11 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 17, 2013		

Channel 1

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	2389.04	62.71	74.00	-11.29	30.32	4.34	28.05	0.00	Peak	119	210 HORIZONTAL
2	2390.00	53.19	54.00	-0.81	20.80	4.34	28.05	0.00	Average	119	210 HORIZONTAL
3	2411.20	113.52			81.09	4.34	28.09	0.00	Average	119	210 HORIZONTAL
4	2412.96	117.36			84.91	4.36	28.09	0.00	Peak	119	210 HORIZONTAL

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

Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	2356.67	64.14	74.00	-9.86	31.87	4.30	27.97	0.00	Peak	100	270 VERTICAL
2	2356.99	52.29	54.00	-1.71	20.02	4.30	27.97	0.00	Average	100	270 VERTICAL
3	2437.64	114.77			82.21	4.38	28.18	0.00	Average	100	270 VERTICAL
4	2437.96	118.70			86.14	4.38	28.18	0.00	Peak	100	270 VERTICAL

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

Channel 11

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		A/Pos	T/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark	cm	deg
			dBuV/m	dB	dBuV	dB	dB/m	dB			Pol/Phase
1	2462.80	114.74			82.12	4.40	28.22	0.00	Average	141	254 HORIZONTAL
2	2462.96	118.72			86.10	4.40	28.22	0.00	Peak	141	254 HORIZONTAL
3	2483.50	53.41	54.00	-0.59	20.75	4.40	28.26	0.00	Average	141	254 HORIZONTAL
4	2484.62	63.52	74.00	-10.48	30.86	4.40	28.26	0.00	Peak	141	254 HORIZONTAL

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

Temperature	24.5°C	Humidity	57%
Test Engineer	Denis Su	Configurations	IEEE 802.11g CH 1, 6, 11 / Chain 1+Chain 2+Chain 3 (3TX)
Test Date	Jan. 17, 2013		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.68	53.37	54.00	-0.63	20.98	4.34	28.05	0.00	Average	147	278	HORIZONTAL
2	2389.84	68.19	74.00	-5.81	35.80	4.34	28.05	0.00	Peak	147	278	HORIZONTAL
3	2407.83	103.55			71.12	4.34	28.09	0.00	Average	147	278	HORIZONTAL
4	2408.96	114.37			81.94	4.34	28.09	0.00	Peak	147	278	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2375.26	53.47	54.00	-0.53	21.14	4.32	28.01	0.00	Average	143	278	HORIZONTAL
2	2379.10	66.88	74.00	-7.12	34.55	4.32	28.01	0.00	Peak	143	278	HORIZONTAL
3	2433.15	113.38			80.89	4.36	28.13	0.00	Average	143	278	HORIZONTAL
4	2433.15	123.95			91.46	4.36	28.13	0.00	Peak	143	278	HORIZONTAL
5	2483.50	52.24	54.00	-1.76	19.58	4.40	28.26	0.00	Average	143	278	HORIZONTAL
6	2483.82	65.60	74.00	-8.40	32.94	4.40	28.26	0.00	Peak	143	278	HORIZONTAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2468.09	105.80			73.14	4.40	28.26	0.00	Average	144	278	HORIZONTAL
2	2468.25	116.15			83.49	4.40	28.26	0.00	Peak	144	278	HORIZONTAL
3	2483.50	53.49	54.00	-0.51	20.83	4.40	28.26	0.00	Average	144	278	HORIZONTAL
4	2483.50	65.31	74.00	-8.69	32.65	4.40	28.26	0.00	Peak	144	278	HORIZONTAL

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

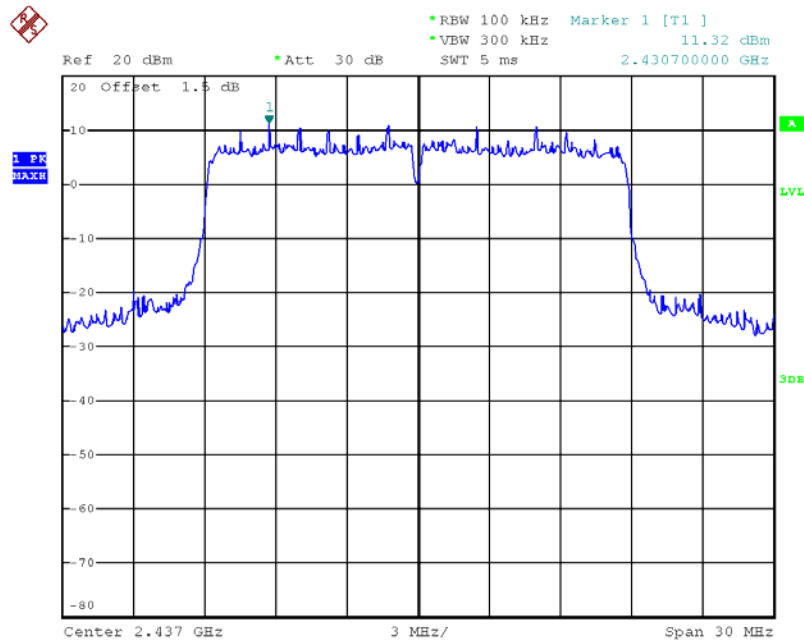
Note:

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

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

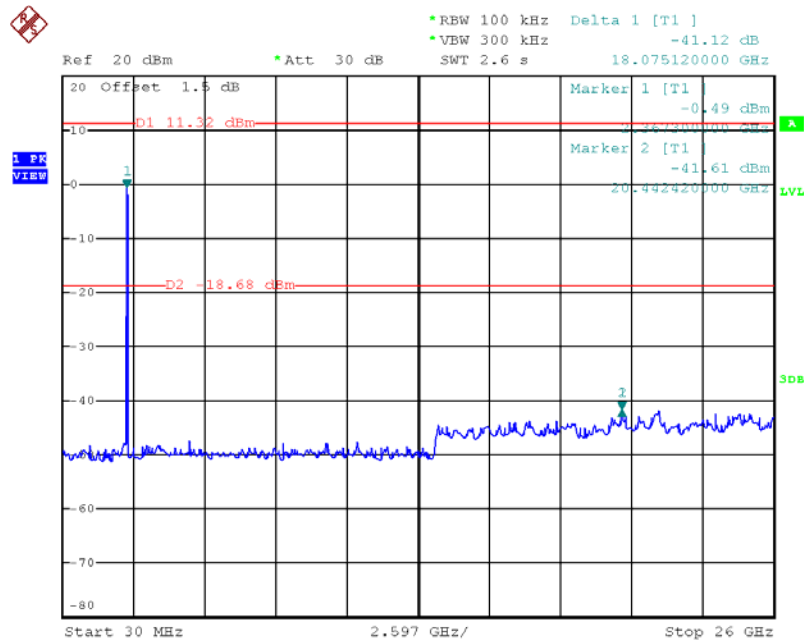
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11n MCS0 20MHz / Reference Level



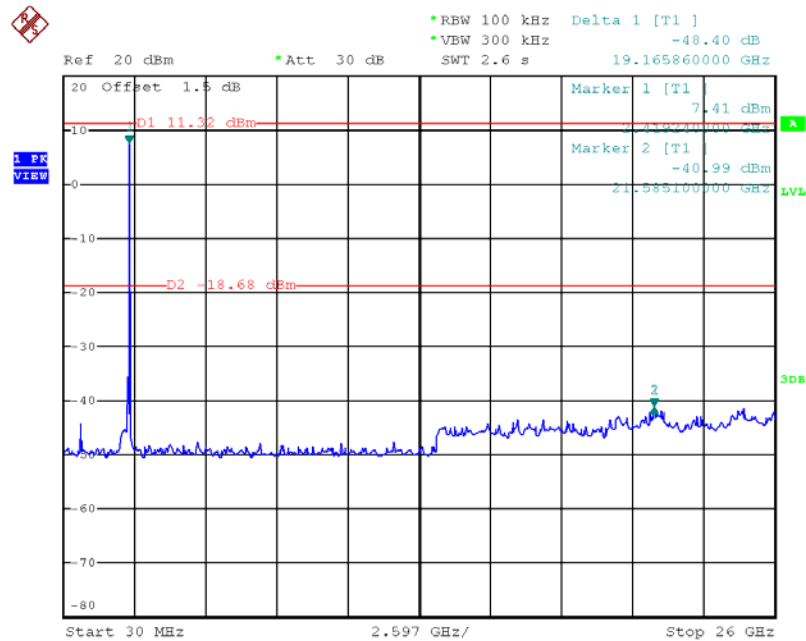
Date: 5.MAR.2013 00:08:36

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 1 (down 30dBc)



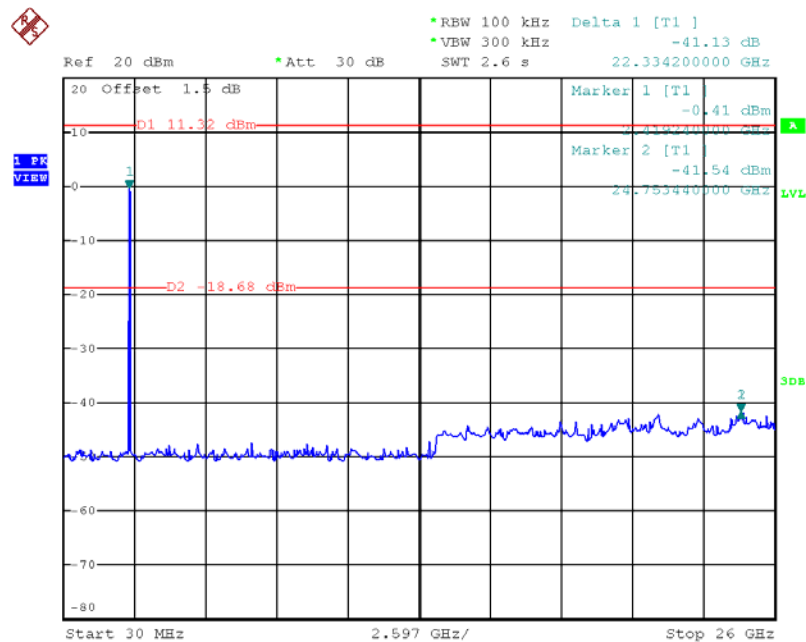
Date: 5.MAR.2013 02:48:12

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 6 (down 30dBc)



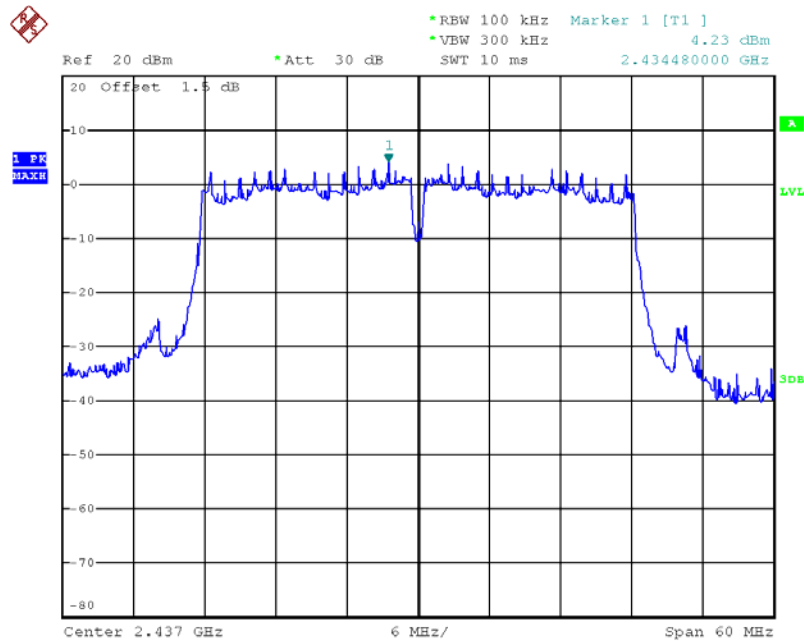
Date: 5.MAR.2013 02:49:10

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 11 (down 30dBc)



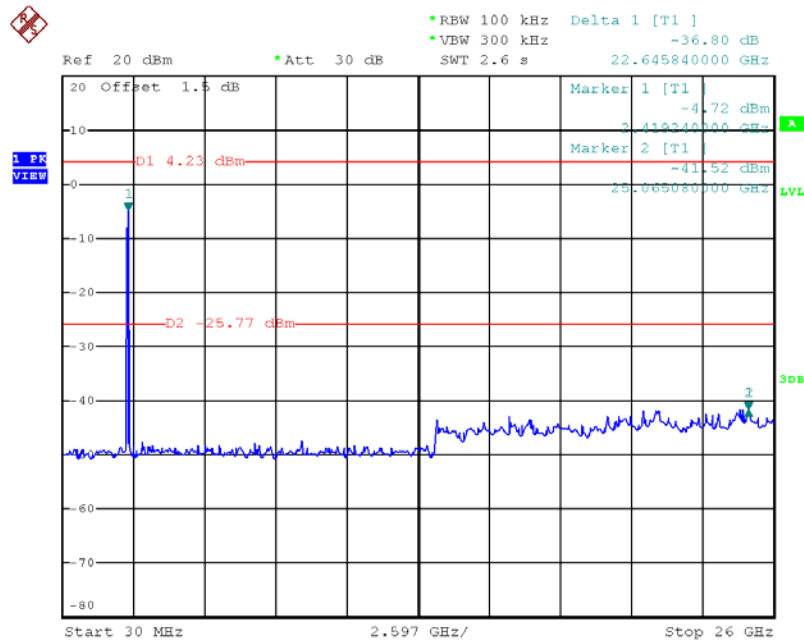
Date: 5.MAR.2013 02:50:19

Plot on Configuration IEEE 802.11n MCS0 40MHz / Reference Level



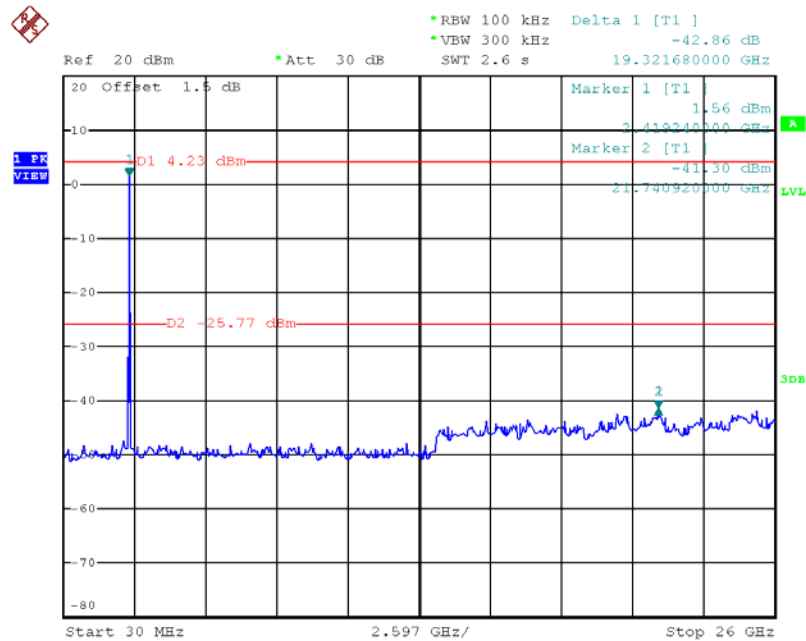
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Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 3 (down 30dBc)



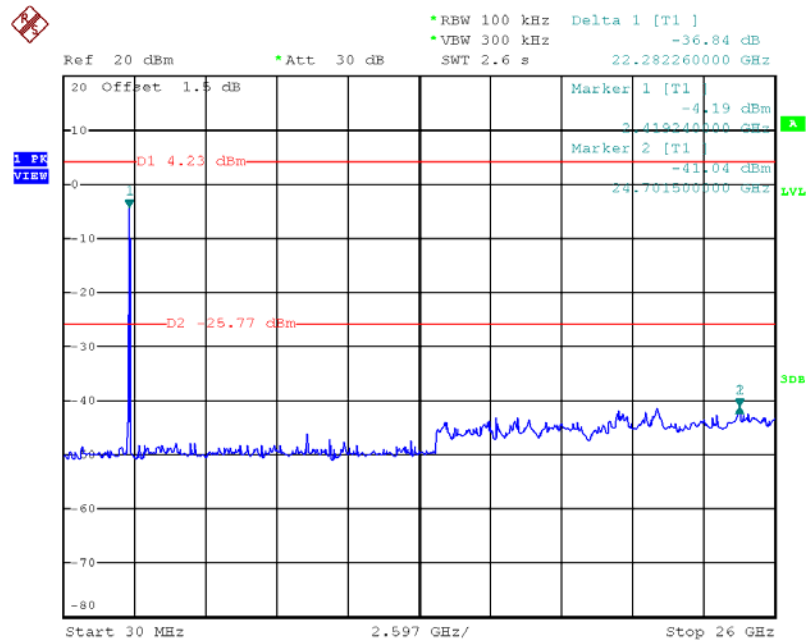
Date: 5.MAR.2013 02:52:21

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 6 (down 30dBc)



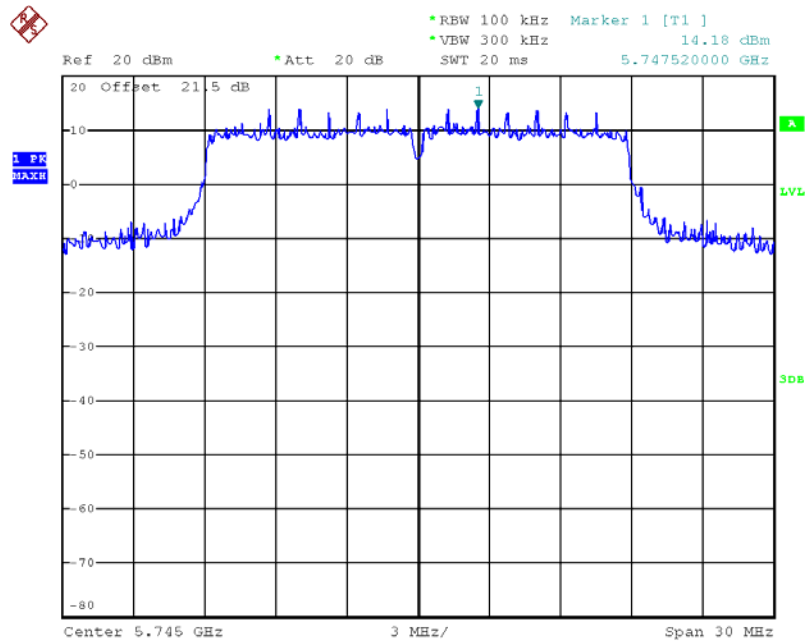
Date: 5.MAR.2013 02:53:15

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 9 (down 30dBc)



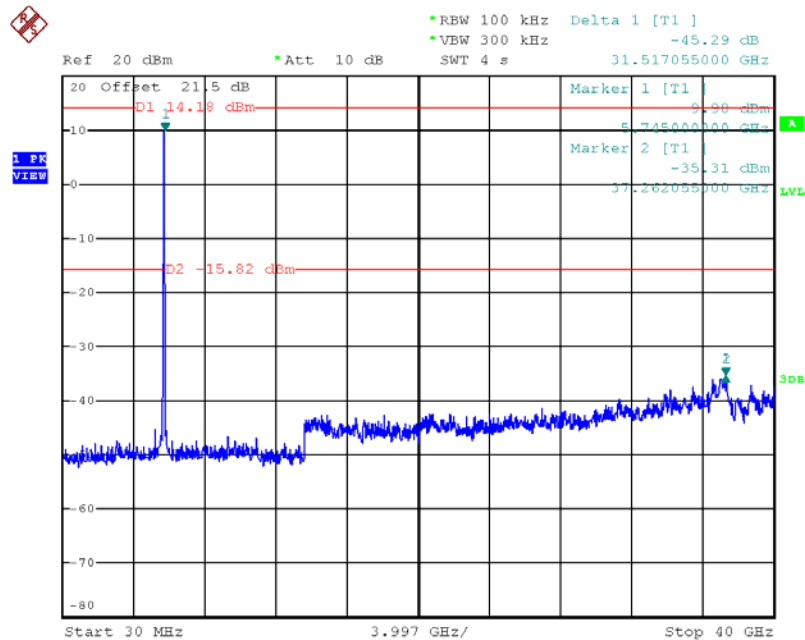
Date: 5.MAR.2013 02:54:19

Plot on Configuration IEEE 802.11ac MCS0 20MHz / Reference Level



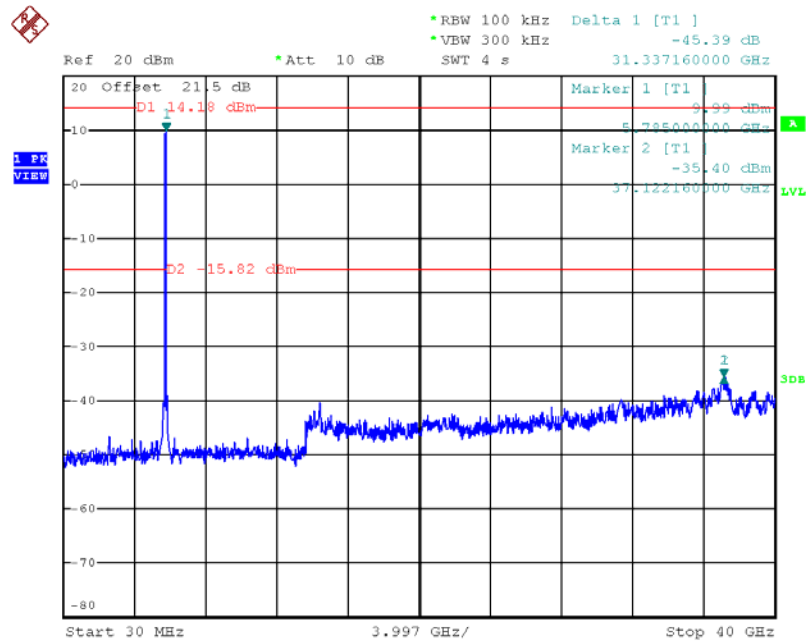
Date: 5.MAR.2013 23:34:19

Plot on Configuration IEEE 802.11ac MCS0 20MHz / CH 149 (down 30dBc)



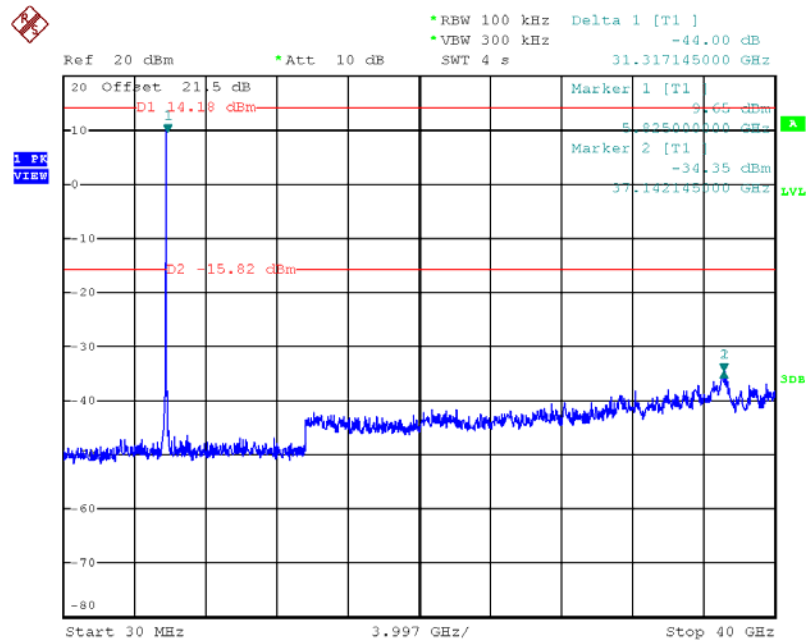
Date: 5.MAR.2013 23:59:17

Plot on Configuration IEEE 802.11ac MCS0 20MHz / CH 157 (down 30dBc)



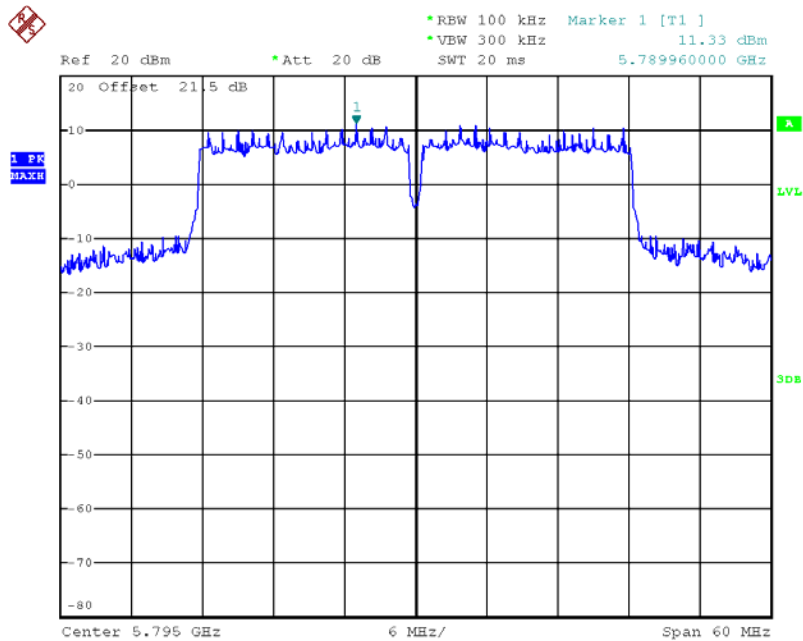
Date: 5.MAR.2013 23:58:46

Plot on Configuration IEEE 802.11ac MCS0 20MHz / CH 165 (down 30dBc)



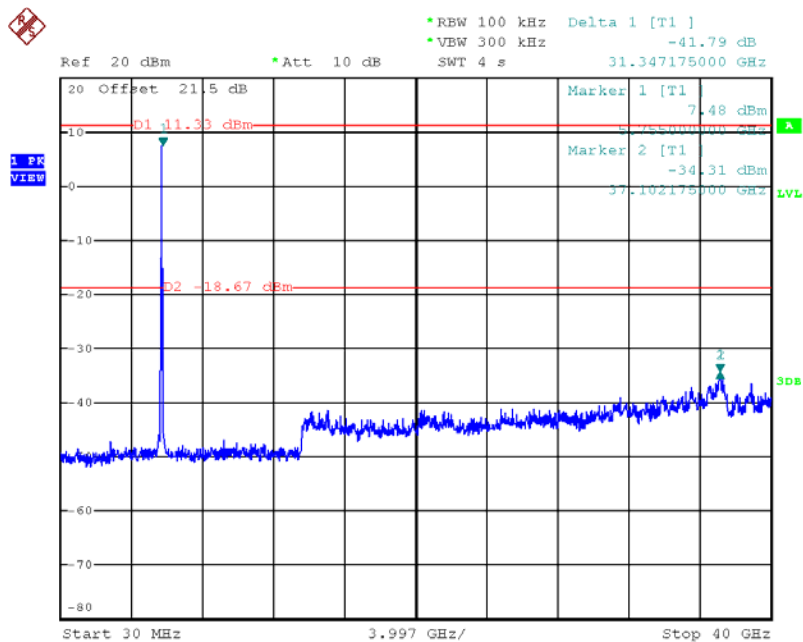
Date: 5.MAR.2013 23:57:45

Plot on Configuration IEEE 802.11ac MCS0 40MHz / Reference Level



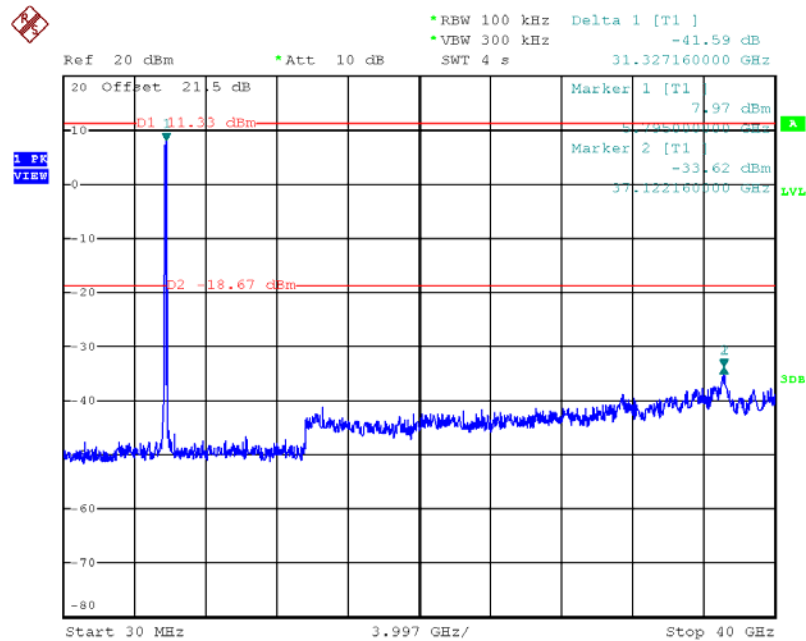
Date: 5.MAR.2013 23:42:10

Plot on Configuration IEEE 802.11ac MCS0 40MHz / CH 151 (down 30dBc)



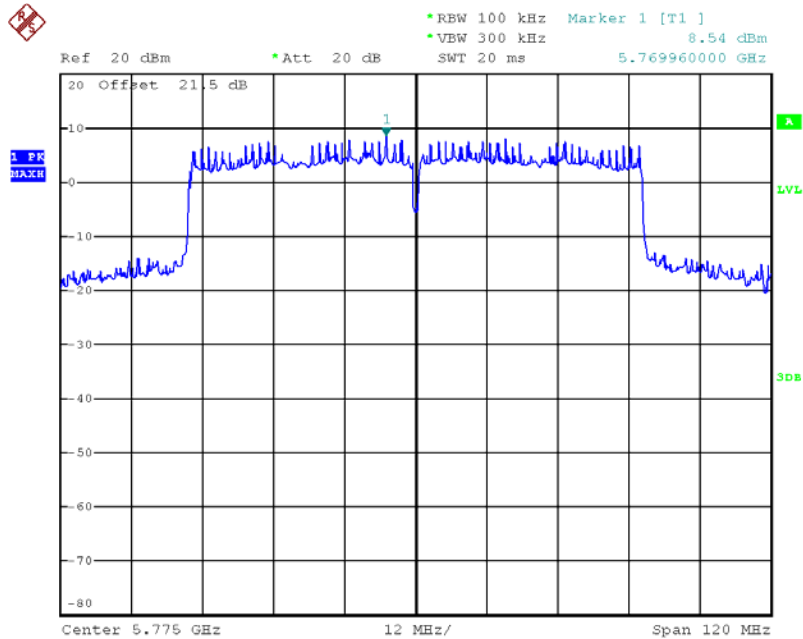
Date: 6.MAR.2013 00:00:26

Plot on Configuration IEEE 802.11ac MCS0 40MHz / CH 159 (down 30dBc)



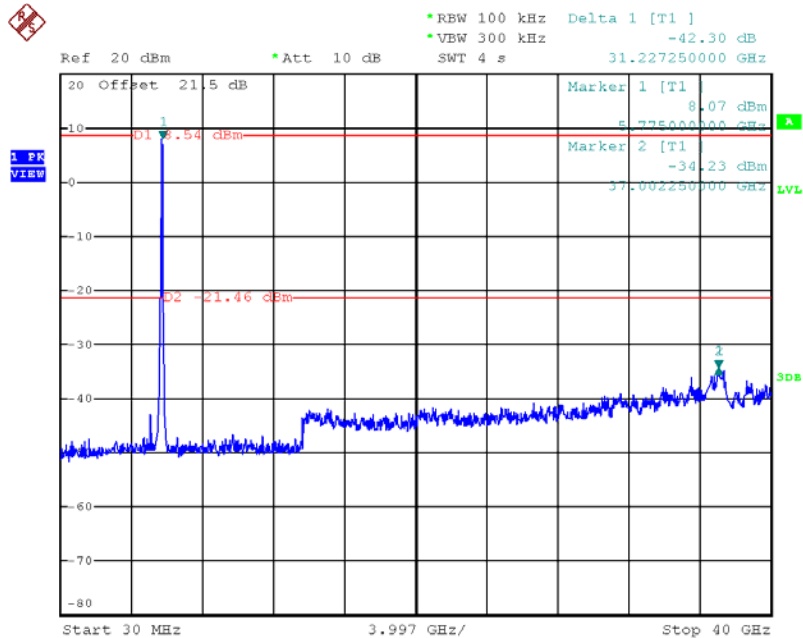
Date: 6.MAR.2013 00:01:07

Plot on Configuration IEEE 802.11ac MCS0 80MHz / Reference Level



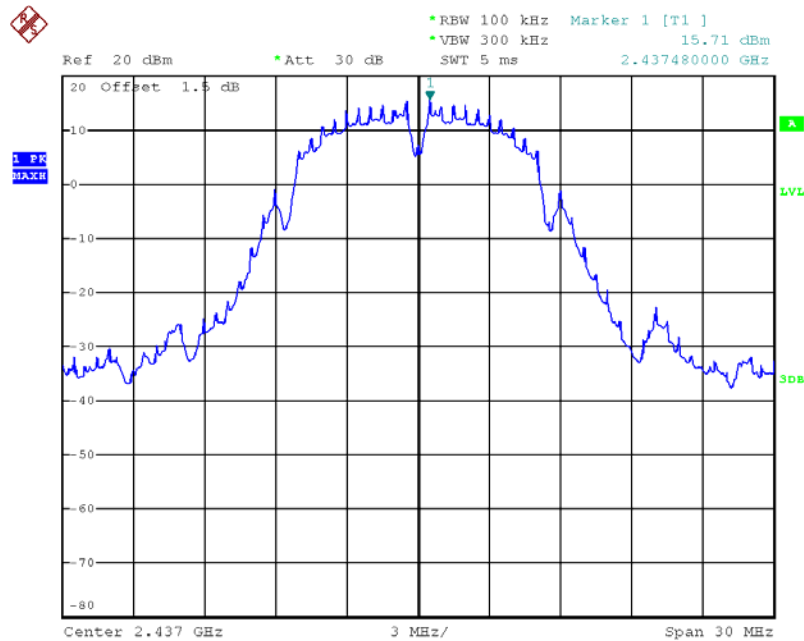
Date: 5.MAR.2013 23:29:47

Plot on Configuration IEEE 802.11ac MCS0 80MHz / CH 155 (down 30dBc)



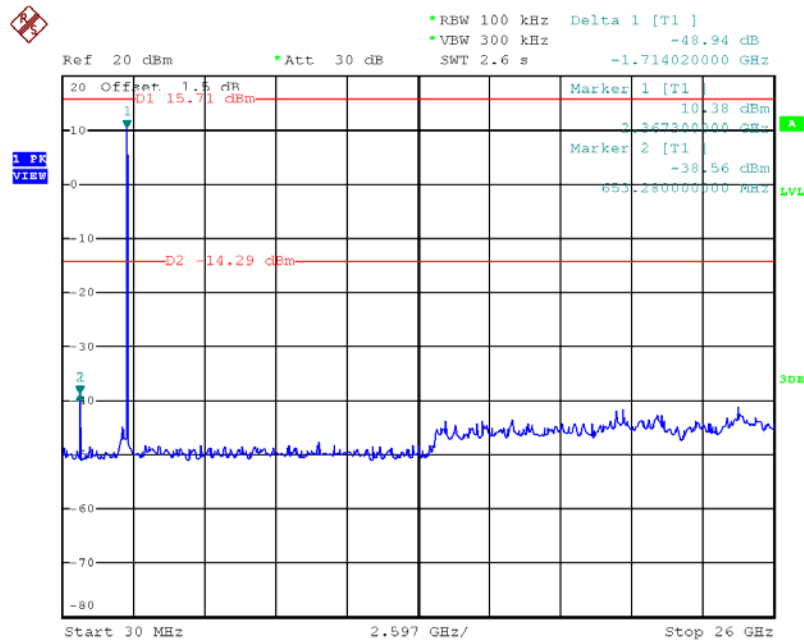
Date: 6.MAR.2013 00:02:37

Plot on Configuration IEEE 802.11b / Reference Level



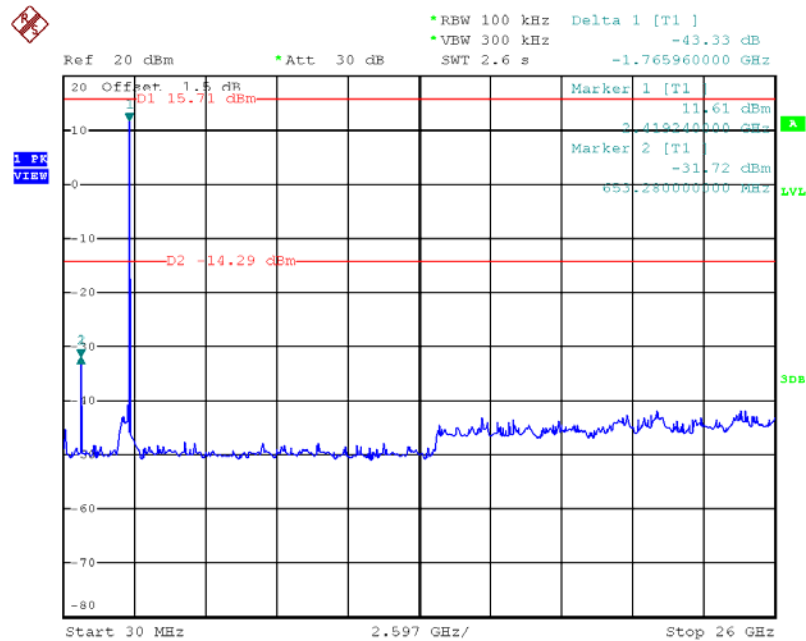
Date: 4.MAR.2013 23:34:13

Plot on Configuration IEEE 802.11b / CH 1 (down 30dBc)



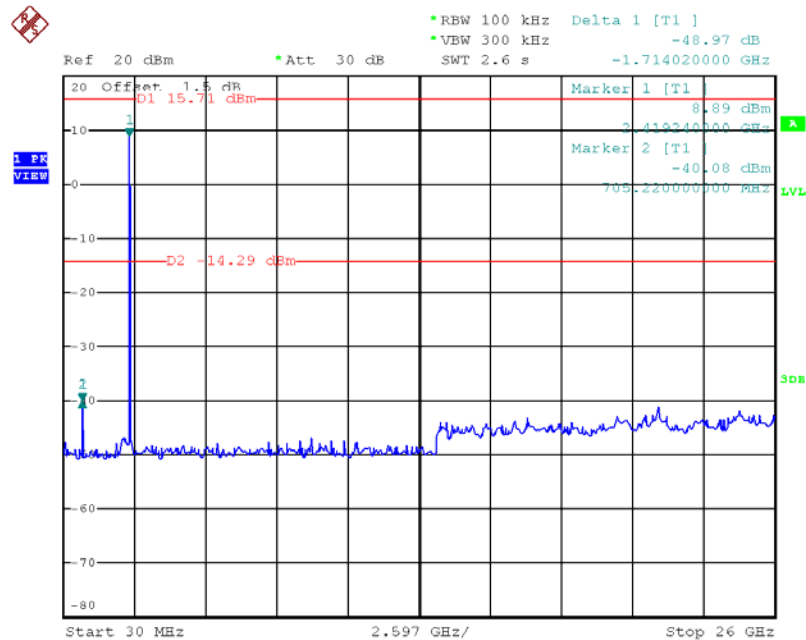
Date: 5.MAR.2013 02:39:10

Plot on Configuration IEEE 802.11b / CH 6 (down 30dBc)



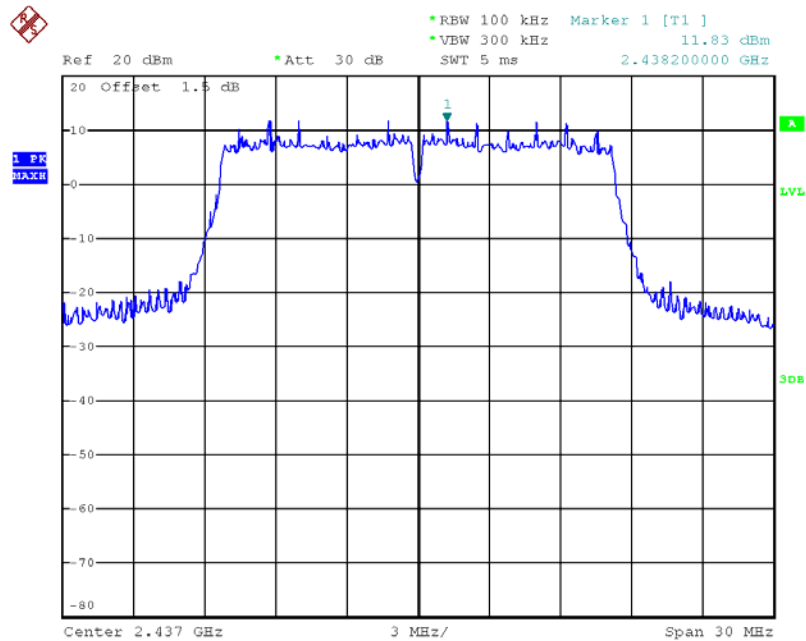
Date: 5.MAR.2013 02:41:13

Plot on Configuration IEEE 802.11b / CH 11 (down 30dBc)



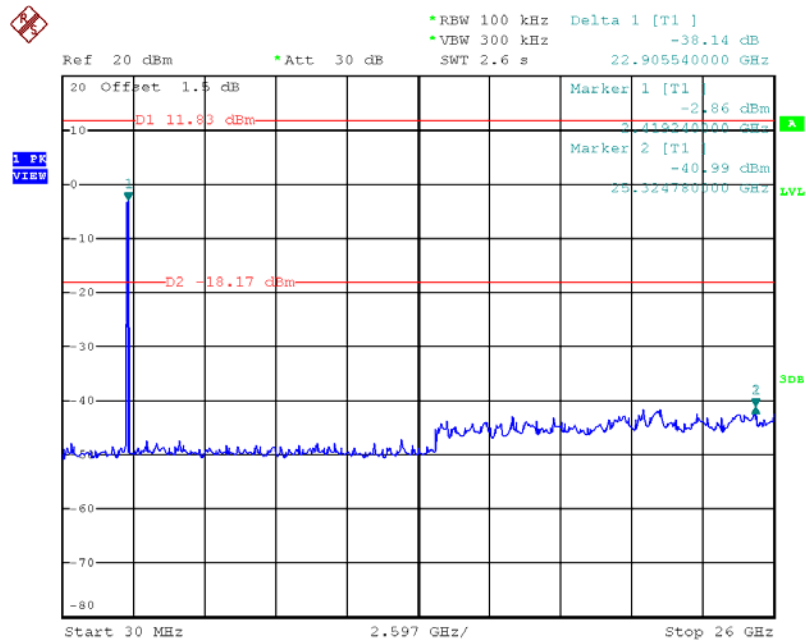
Date: 5.MAR.2013 02:42:14

Plot on Configuration IEEE 802.11g / Reference Level



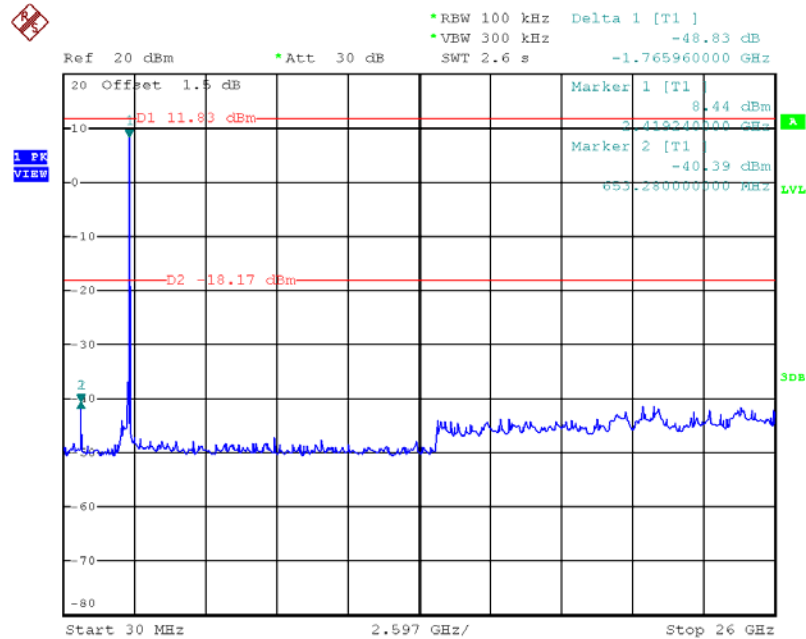
Date: 4.MAR.2013 23:56:56

Plot on Configuration IEEE 802.11g / CH 1 (down 30dBc)



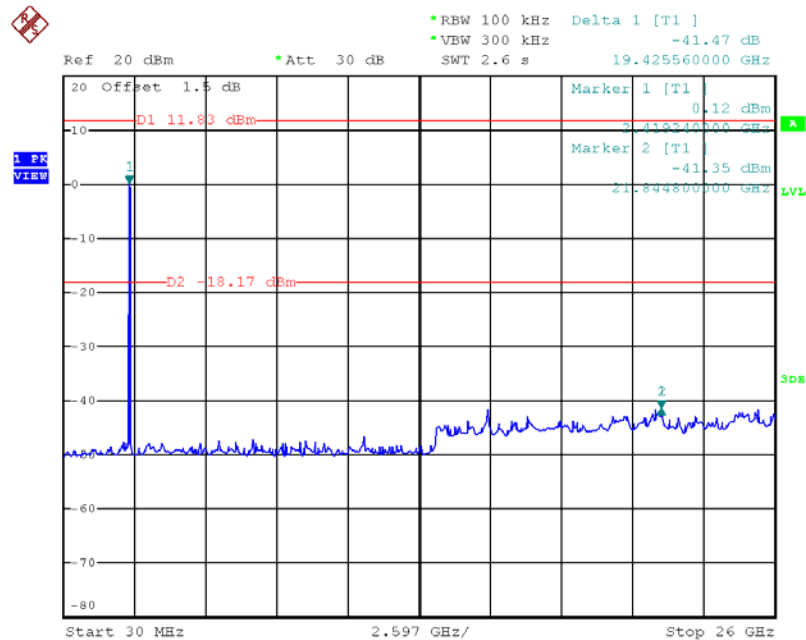
Date: 5.MAR.2013 02:43:31

Plot on Configuration IEEE 802.11g / CH 6 (down 30dBc)



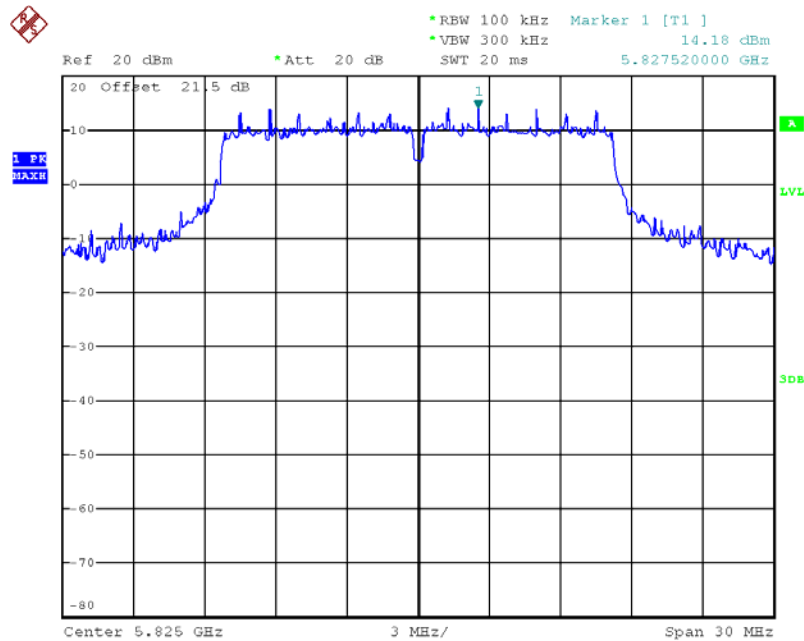
Date: 5.MAR.2013 02:44:32

Plot on Configuration IEEE 802.11g / CH 11 (down 30dBc)



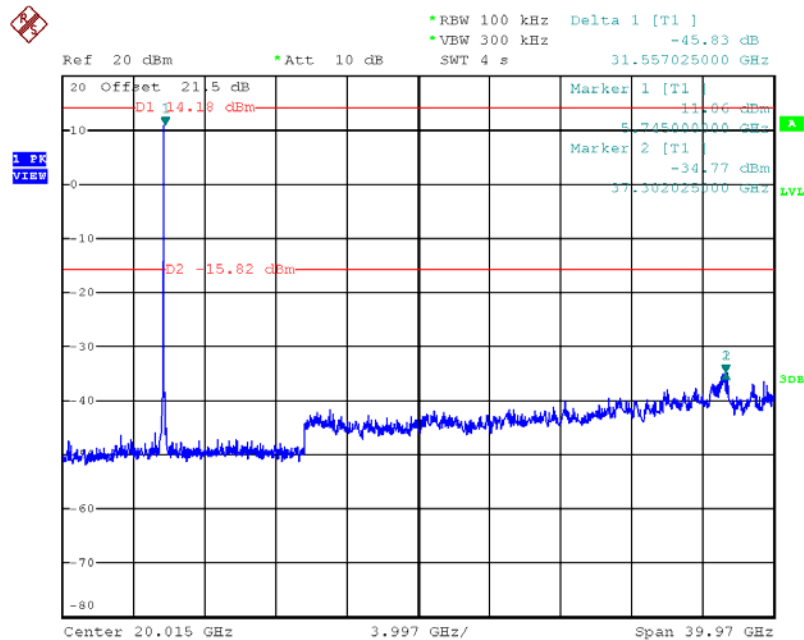
Date: 5.MAR.2013 02:46:48

Plot on Configuration IEEE 802.11a / Reference Level



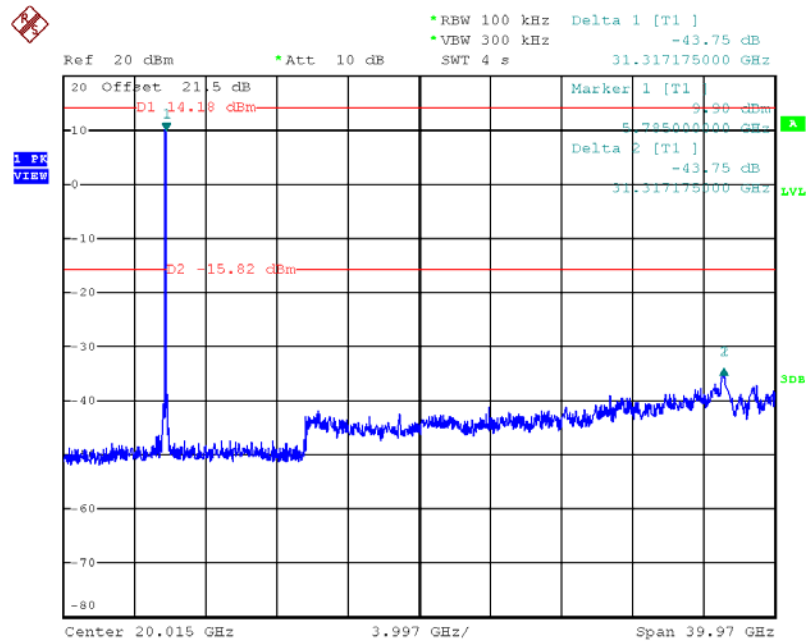
Date: 5.MAR.2013 23:36:07

Plot on Configuration IEEE 802.11a / CH 149 (down 30dBc)



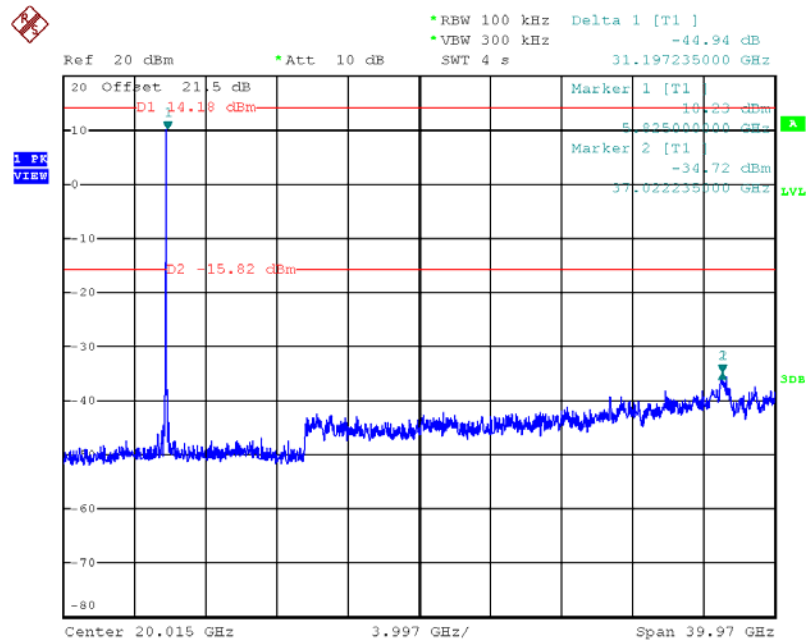
Date: 5.MAR.2013 23:54:10

Plot on Configuration IEEE 802.11a / CH 157 (down 30dBc)



Date: 5.MAR.2013 23:55:10

Plot on Configuration IEEE 802.11a / CH 165 (down 30dBc)



Date: 5.MAR.2013 23:56:14

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	Oct. 23, 2012	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov.26, 2012	Conduction (CO01-CB)
V- LISN	Schwarzbeck	NSLK 8127	8127-478	9kHz ~ 30MHz	Jun. 22, 2012	Conduction (CO01-CB)
PULSE LIMITER	R&S	ESH3-Z2	100430	9K~30MHz	Feb. 03, 2013	Conduction (CO01-CB)
Capacitive Voltage Probe	SCHAFFNER	CVP2200A	18697	150kHz~30MHz	Oct. 23, 2012	Conduction (CO01-CB)
RF Current Probe	SOLAR.	9208-1	041039	9kHz~30MHz	Sep. 18, 2012	Conduction (CO01-CB)
Impulsbegrenzer Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9kHz~30MHz	Feb. 03, 2012	Conduction (CO01-CB)
Impedance stabilization network	TESEQ	ISN T800	24557	150kHz ~ 230MHz	Oct. 22, 2012	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	0.15MHz~30MHz	Dec. 4, 2012	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	-	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Jan. 11, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 27, 2012	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Nov. 23, 2012	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26.5GHz ~ 40GHz	Jul. 31, 2012	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100056	9KHz~40GHz	Nov. 16, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2012	Radiation (03CH01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9KHz ~ 2.75GHz	Mar. 20, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 18, 2012	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9KHz~40GHz	Oct. 08, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	2 Way	0120A02056002D	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Power Divider	Woken	3 Way	MDC2366	2GHz ~ 18GHz	Nov. 18, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 19, 2012	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Nov. 28, 2012	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Nov. 27, 2012	Conducted (TH01-CB)

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

“*” Calibration Interval of instruments listed above is two years.

N.C.R. means Non-Calibration required.

6. TEST LOCATION

SHIJR	ADD : 6Fl., No. 106, Sec. 1, Shintai 5th Rd., Shijr City, Taipei, Taiwan 221, R.O.C. TEL : 886-2-2696-2468 FAX : 886-2-2696-2255
HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C. TEL : 886-3-327-3456 FAX : 886-3-318-0055
LINKOU	ADD : No. 30-2, Dingfu Tsuen, Linkou Shiang, Taipei, Taiwan 244, R.O.C TEL : 886-2-2601-1640 FAX : 886-2-2601-1695
DUNGHU	ADD : No. 3, Lane 238, Kangle St., Neihs 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 2 nd 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