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FCC RADIO TEST REPORT

Applicant's company	**Abocom Systems, Inc.**
Applicant Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.
FCC ID	**MQ4WM5800**
Manufacturer's company	**Abocom Systems, Inc.**
Manufacturer Address	No.77, Yu-Yih Rd., Chu-Nan, Miao-Lih County 35059, Taiwan R.O.C.

Product Name	802.11n/b/g Wireless USB Module
Brand Name	AboCom
Model No.	WM5800
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Nov. 20, 2013
Final Test Date	Jan. 29, 2014
Submission Type	Class II Change

Statement

Test result included in this report is for the IEEE 802.11n and IEEE 802.11b/g part 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 v03r01**

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

Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR3N2034-03	Rev. 01	Initial issue of report	Feb. 07, 2014

Certificate No.: CB10302003

1. CERTIFICATE OF COMPLIANCE

Product Name	:	**802.11n/b/g Wireless USB Module**
Brand Name	:	**AboCom**
Model No.	:	**WM5800**
Applicant	:	**Abocom Systems, 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 Nov. 20, 2013 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.

Sam Chen

Sam Chen
SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.247(b)(3)	Maximum Conducted Output Power	Complies	9.42 dB
4.2	15.247(d)	Radiated Emissions	Complies	2.88 dB
4.3	15.247(d)	Band Edge Emissions	Complies	0.25 dB
4.4	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n

Items	Description
Product Type	WLAN (1TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	see the below table for IEEE 802.11n
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth ; 7 for 40MHz bandwidth
Maximum Conducted Output Power	MCS0 (20MHz): 20.58 dBm ; MCS0 (40MHz): 14.81 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11b/g

Items	Description
Product Type	WLAN (1TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From host system
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11g
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
Channel Number	11
Maximum Conducted Output Power	11b: 16.94 dBm ; 11g: 20.02 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Antenna and Band width

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

IEEE 11n Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	1	MCS 0-7
802.11n (HT40)	1	MCS 0-7
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Note 2: Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n		

3.2. Accessories

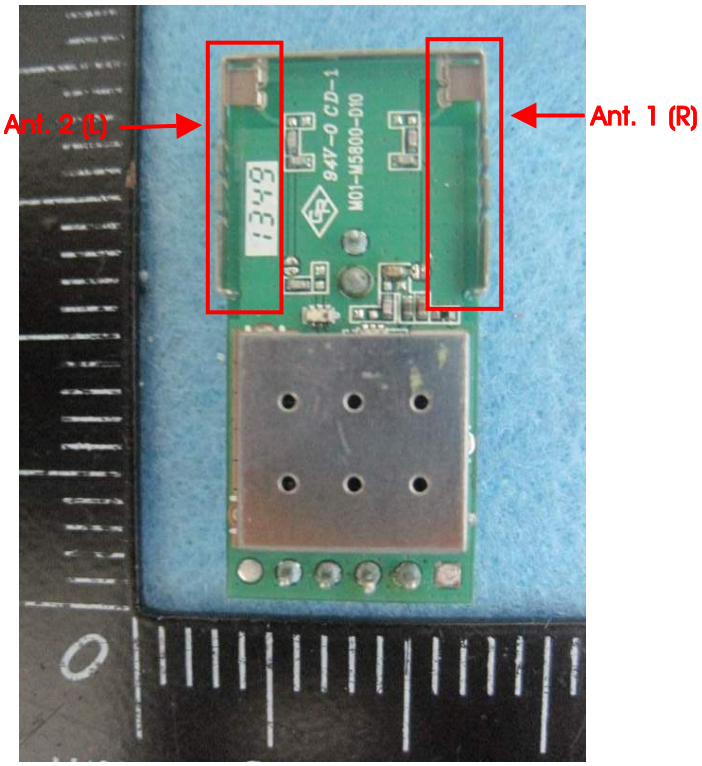
N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model No.	Antenna Type	Connector	Gain (dBi)	Remark
1 (R)	WLISIN	PIFA ANTENNA PIFA-RPAA05 16.6X15.1X4.8mm HUN-PAI LF	PIFA Antenna	N/A	-2.2	TX/RX
2 (L)	WLISIN	PIFA ANTENNA PIFA-RPAA05 16.6X15.1X4.8mm HUN-PAI LF	PIFA Antenna	N/A	-1.59	RX

Note: The EUT has two antennas (1TX, 2RX).

Only Ant. 1 (R) can be used as transmitting, but Ant. 1 (R) and Ant. 2 (L) could receive simultaneously.



3.4. Table for Class II Change

This product is an extension of original report under Sporton project number: FR3N2034

Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
Changing the component location of capacitor (C24, C26, C27, C28, C33) and power Inductor (L2). There is no change in hardware or in existing RF relevant portion.	1. Radiated Emissions 2. Emissions Measurement

3.5. Table for Carrier Frequencies

There are two bandwidth systems.

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

For 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	-	-

3.6. Table for Test Modes

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

Test Items	Mode	Data Rate	Channel	Antenna
Maximum Conducted Output Power	802.11n 20MHz	MCS0	1/6/11	1 (R)
	802.11n 40MHz	MCS0	3/6/9	1 (R)
	11b/BPSK	1 Mbps	1/6/11	1 (R)
	11g/BPSK	6 Mbps	1/6/11	1 (R)
Radiated Emissions 9kHz~1GHz	Normal Link	-	-	-
Radiated Emissions 1GHz~10th Harmonic	802.11n 20MHz	MCS0	1/6/11	1 (R)
	802.11n 40MHz	MCS0	3/6/9	1 (R)
	11b/BPSK	1 Mbps	1/6/11	1 (R)
	11g/BPSK	6 Mbps	1/6/11	1 (R)
Band Edge Emissions	802.11n 20MHz	MCS0	1/6/11	1 (R)
	802.11n 40MHz	MCS0	3/6/9	1 (R)
	11b/BPSK	1 Mbps	1/6/11	1 (R)
	11g/BPSK	6 Mbps	1/6/11	1 (R)

The following test modes were performed for all tests:

For Radiated Emission below 1 GHz test:

Mode 1. Place EUT in X axis

Mode 2. Place EUT in Y axis

Mode 3. Place EUT in Z axis

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

For Radiation Emissions above 1GHz test:

Mode 1. Place EUT in X axis

Mode 2. Place EUT in Y axis

Mode 3. Place EUT in Z axis

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

3.7. Table for Testing Locations

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

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

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB <Below 1GHz>

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC
Mouse	Logitech	M-U0026	DoC
Earphone	E-BOOKI	E-EPC040	N/A
Test Fixture	AboCom	WM5203T-X30	N/A
Wireless ac AP	Netgear	R6300V2	PY31300227

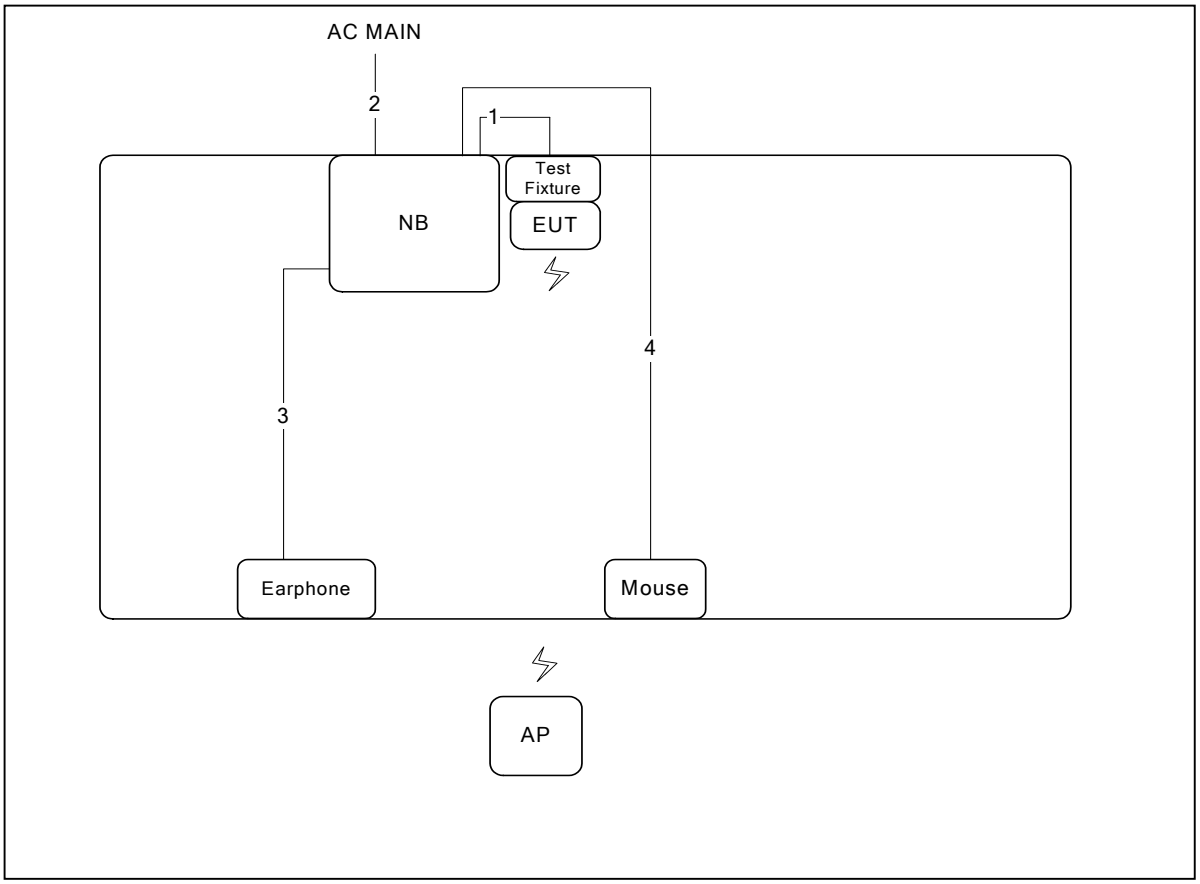
For Test Site No: TH01-CB and 03CH01-CB <Above 1GHz>

Support Unit	Brand	Model	FCC ID
Test Fixture	AboCom	WM5203T-X30	N/A
NB	DELL	E6430	DoC

3.9. Test Configurations

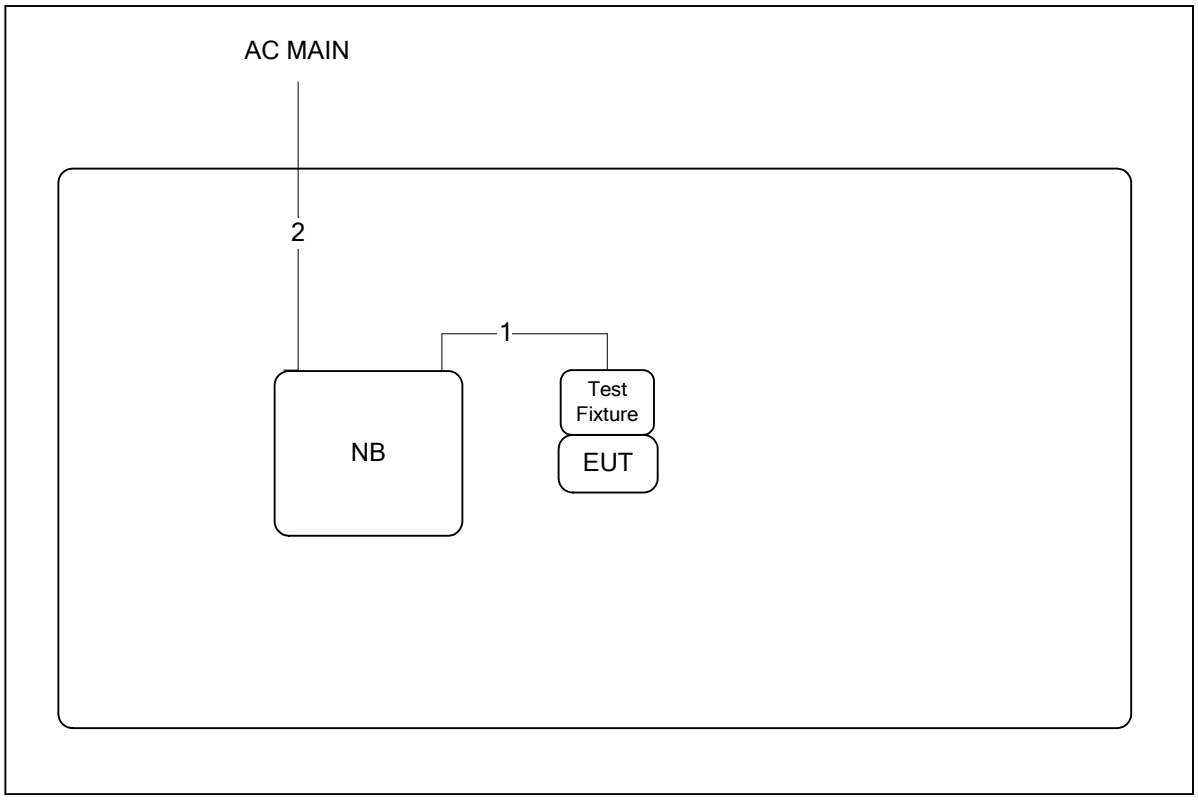
3.9.1. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz



Item	Connection	Shielded	Length(m)
1	USB cable	No	1.8
2	Power cable	No	2.6
3	Audio cable	No	1.1
4	USB cable	No	1.8

Test Configuration: above 1GHz



Item	Connection	Shielded	Length(m)
1	USB cable	No	1.8
2	Power cable	No	2.6

4. TEST RESULT

4.1. Maximum Conducted Output Power Measurement

4.1.1. 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.

4.1.2. Measuring Instruments and Setting

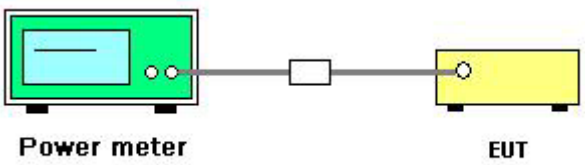
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Bandwidth	50MHz bandwidth is greater than the EUT emission bandwidth
Detector	Average

4.1.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03r01 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.

4.1.4. Test Setup Layout



4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.7. Test Result of Maximum Conducted Output Power

Temperature	19°C	Humidity	62%
Test Engineer	Benson Peng	Configurations	IEEE 802.11n
Test Date	Dec. 23, 2013		

Configuration IEEE 802.11n MCS0 20MHz / Ant. 1 (R)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	11.68	30.00	Complies
6	2437 MHz	20.58	30.00	Complies
11	2462 MHz	15.99	30.00	Complies

Configuration IEEE 802.11n MCS0 40MHz / Ant. 1 (R)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
3	2422 MHz	11.31	30.00	Complies
6	2437 MHz	14.81	30.00	Complies
9	2452 MHz	13.83	30.00	Complies

Temperature	19°C	Humidity	62%
Test Engineer	Benson Peng	Configurations	IEEE 802.11b/g
Test Date	Dec. 23, 2013		

Configuration IEEE 802.11b / Ant. 1 (R)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	14.83	30.00	Complies
6	2437 MHz	15.62	30.00	Complies
11	2462 MHz	16.94	30.00	Complies

Configuration IEEE 802.11g / Ant. 1 (R)

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	12.33	30.00	Complies
6	2437 MHz	20.02	30.00	Complies
11	2462 MHz	17.09	30.00	Complies

4.2. Radiated Emissions Measurement

4.2.1. 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 (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

4.2.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

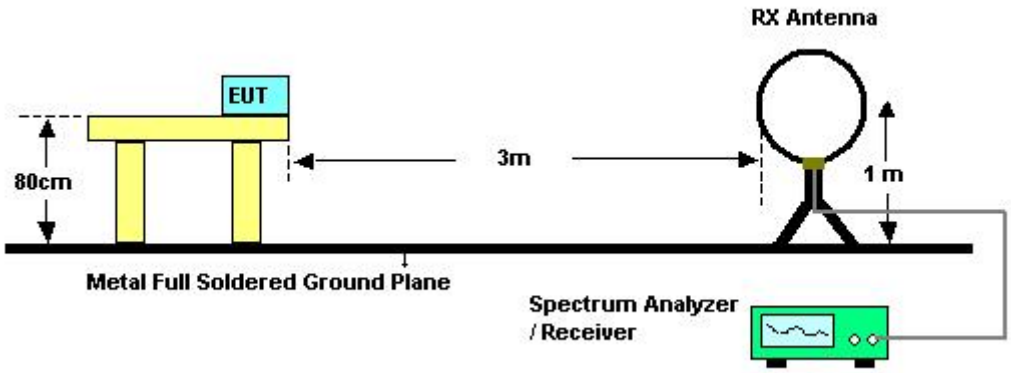
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.2.3. Test Procedures

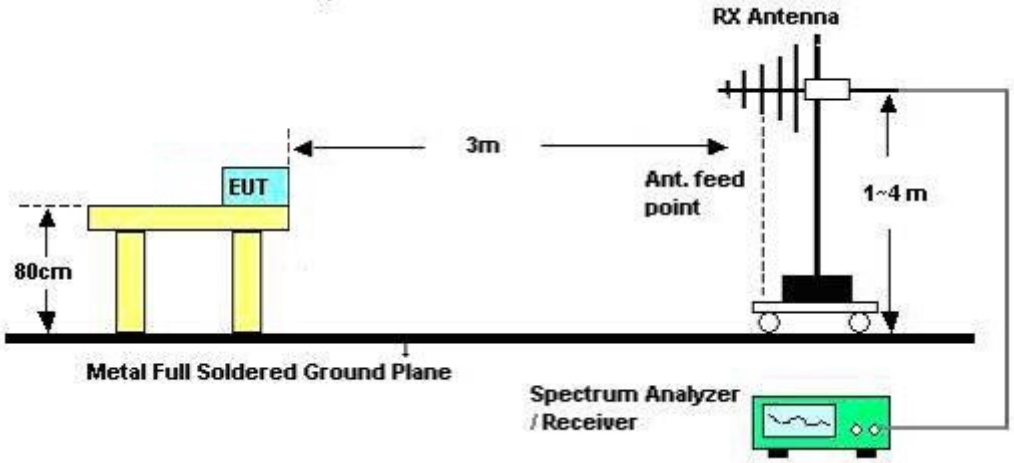
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting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

4.2.4. Test Setup Layout

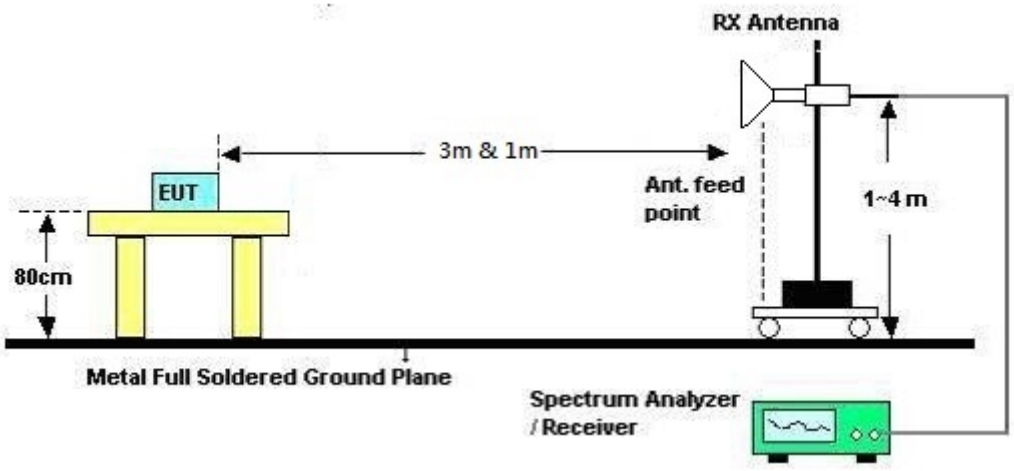
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



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

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	Normal Link
Test Date	Jan. 29, 2014	Test Mode	Mode 2

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

Note:

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

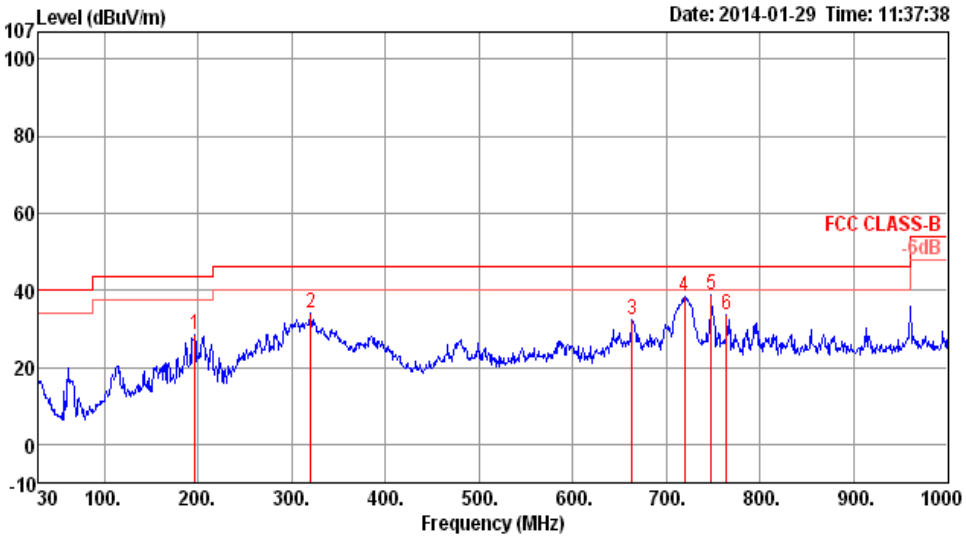
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

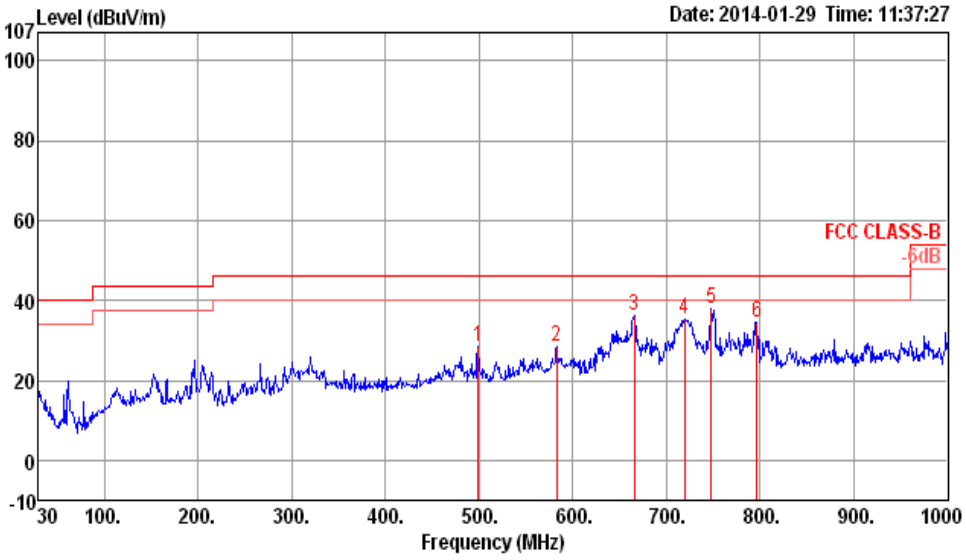
Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	Normal Link
Test Mode	Mode 2		

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	196.84	28.50	43.50	-15.00	49.58	1.69	8.74	31.51	200	151	HORIZONTAL	Peak
2	320.03	34.17	46.00	-11.83	49.81	2.19	13.58	31.41	125	60	HORIZONTAL	Peak
3	663.41	32.36	46.00	-13.64	41.69	3.30	18.78	31.41	150	3	HORIZONTAL	Peak
4	719.67	38.42	46.00	-7.58	46.93	3.45	19.28	31.24	125	198	HORIZONTAL	Peak
5	747.80	38.91	46.00	-7.09	47.07	3.52	19.69	31.37	100	126	HORIZONTAL	Peak
6	764.29	33.49	46.00	-12.51	41.56	3.60	19.70	31.37	100	113	HORIZONTAL	Peak

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	499.48	28.22	46.00	-17.78	39.90	2.82	16.91	31.41	125	191	VERTICAL	Peak
2	582.90	28.40	46.00	-17.60	38.15	3.07	18.37	31.19	100	132	VERTICAL	Peak
3	665.35	36.40	46.00	-9.60	45.70	3.31	18.80	31.41	100	355	VERTICAL	Peak
4	719.67	35.34	46.00	-10.66	43.85	3.45	19.28	31.24	125	143	VERTICAL	Peak
5	747.80	37.86	46.00	-8.14	46.02	3.52	19.69	31.37	100	122	VERTICAL	Peak
6	796.30	34.58	46.00	-11.42	42.45	3.66	19.75	31.28	100	155	VERTICAL	Peak

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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.

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

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 20MHz CH 1 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4820.20	31.43	54.00	-22.57	29.35	4.21	34.69	2.08	Average	123	100	HORIZONTAL
2	4822.76	43.92	74.00	-30.08	41.84	4.21	34.69	2.08	Peak	123	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4824.04	50.34	74.00	-23.66	48.26	4.21	34.69	2.08	Peak	86	112	VERTICAL
2	4824.04	39.02	54.00	-14.98	36.94	4.21	34.69	2.08	Average	86	112	VERTICAL

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 20MHz CH 6 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4867.88	45.80	74.00	-28.20	43.59	4.22	34.67	2.21	Peak	178	111	HORIZONTAL
2	4874.08	32.75	54.00	-21.25	30.54	4.22	34.67	2.21	Average	178	111	HORIZONTAL
3	7305.28	48.12	74.00	-25.88	40.74	5.34	34.93	7.38	Peak	89	100	HORIZONTAL
4	7310.48	36.33	54.00	-17.67	28.95	5.34	34.93	7.38	Average	89	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4872.28	44.59	54.00	-9.41	42.38	4.22	34.67	2.21	Average	108	127	VERTICAL
2	4873.68	58.04	74.00	-15.96	55.83	4.22	34.67	2.21	Peak	108	127	VERTICAL
3	7312.56	46.27	54.00	-7.73	38.90	5.34	34.94	7.37	Average	110	100	VERTICAL
4	7314.08	60.52	74.00	-13.48	53.15	5.34	34.94	7.37	Peak	110	100	VERTICAL

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 20MHz CH 11 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4926.60	43.21	74.00	-30.79	40.87	4.23	34.65	2.34	Peak	226	100	HORIZONTAL
2	4929.28	31.35	54.00	-22.65	29.01	4.23	34.65	2.34	Average	226	100	HORIZONTAL
3	7391.64	49.78	74.00	-24.22	42.30	5.36	34.96	7.48	Peak	142	100	HORIZONTAL
4	7392.40	36.59	54.00	-17.41	29.11	5.36	34.96	7.48	Average	142	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4924.08	41.55	54.00	-12.45	39.21	4.23	34.65	2.34	Average	96	112	VERTICAL
2	4924.12	54.15	74.00	-19.85	51.81	4.23	34.65	2.34	Peak	96	112	VERTICAL
3	7386.08	39.39	54.00	-14.61	31.91	5.36	34.96	7.48	Average	71	112	VERTICAL
4	7388.92	52.40	74.00	-21.60	44.92	5.36	34.96	7.48	Peak	71	112	VERTICAL

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 40MHz CH 3 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4846.64	31.40	54.00	-22.60	29.28	4.21	34.68	2.12	Average	98	100	HORIZONTAL
2	4847.32	44.44	74.00	-29.56	42.32	4.21	34.68	2.12	Peak	98	100	HORIZONTAL
3	7264.04	49.11	74.00	-24.89	41.80	5.33	34.93	7.31	Peak	203	100	HORIZONTAL
4	7272.84	36.50	54.00	-17.50	29.16	5.34	34.93	7.34	Average	203	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4843.40	48.28	74.00	-25.72	46.16	4.21	34.68	2.12	Peak	40	100	VERTICAL
2	4852.20	36.30	54.00	-17.70	34.15	4.21	34.68	2.15	Average	40	100	VERTICAL
3	7267.64	37.50	54.00	-16.50	30.16	5.34	34.93	7.34	Average	118	100	VERTICAL
4	7275.36	50.12	74.00	-23.88	42.78	5.34	34.93	7.34	Peak	118	100	VERTICAL

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 40MHz CH 6 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4874.04	36.17	54.00	-17.83	33.96	4.22	34.67	2.21	Average	80	100	HORIZONTAL
2	4875.44	49.71	74.00	-24.29	47.50	4.22	34.67	2.21	Peak	80	100	HORIZONTAL
3	7311.00	37.35	54.00	-16.65	29.97	5.34	34.93	7.38	Average	143	100	HORIZONTAL
4	7313.16	49.41	74.00	-24.59	42.04	5.34	34.94	7.37	Peak	143	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4865.40	47.73	74.00	-26.27	45.57	4.21	34.67	2.16	Peak	132	100	VERTICAL
2	4874.04	39.22	54.00	-14.78	37.01	4.22	34.67	2.21	Average	132	100	VERTICAL
3	7301.48	38.88	54.00	-15.12	31.50	5.34	34.93	7.38	Average	294	100	VERTICAL
4	7308.12	48.53	74.00	-25.47	41.15	5.34	34.93	7.38	Peak	294	100	VERTICAL

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 40MHz CH 9 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4900.82	31.44	54.00	-22.56	29.19	4.22	34.66	2.25	Average	215	100	HORIZONTAL
2	4901.00	44.36	74.00	-29.64	42.11	4.22	34.66	2.25	Peak	215	100	HORIZONTAL
3	7357.10	49.59	74.00	-24.41	42.16	5.35	34.95	7.43	Peak	97	100	HORIZONTAL
4	7360.88	36.23	54.00	-17.77	28.80	5.35	34.95	7.43	Average	97	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4904.06	49.04	74.00	-24.96	46.75	4.22	34.66	2.29	Peak	80	110	VERTICAL
2	4904.06	38.89	54.00	-15.11	36.60	4.22	34.66	2.29	Average	80	110	VERTICAL
3	7355.94	49.41	74.00	-24.59	41.98	5.35	34.95	7.43	Peak	138	100	VERTICAL
4	7356.00	37.41	54.00	-16.59	29.98	5.35	34.95	7.43	Average	138	100	VERTICAL

Note:

The amplitude of spurious emissions which are attenuated by more than 20 dB 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	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11b CH 1 / Ant. 1 (R)
Test Date	Dec. 27, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.95	46.26	74.00	-27.74	43.11	5.69	32.76	35.30	100	45	HORIZONTAL	Peak
2	4823.96	37.25	54.00	-16.75	34.10	5.69	32.76	35.30	100	45	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.90	52.88	74.00	-21.12	49.73	5.69	32.76	35.30	130	102	VERTICAL	Peak
2	4824.09	48.67	54.00	-5.33	45.52	5.69	32.76	35.30	130	102	VERTICAL	Average

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11b CH 6 / Ant. 1 (R)
Test Date	Dec. 27, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.82	45.08	74.00	-28.92	41.84	5.75	32.80	35.31	101	53	HORIZONTAL	Peak
2	4873.94	36.23	54.00	-17.77	32.99	5.75	32.80	35.31	101	53	HORIZONTAL	Average
3	7311.99	49.93	74.00	-24.07	41.11	7.06	37.12	35.36	100	202	HORIZONTAL	Peak
4	7312.81	38.74	54.00	-15.26	29.92	7.06	37.12	35.36	100	202	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.97	52.74	74.00	-21.26	49.50	5.75	32.80	35.31	132	99	VERTICAL	Peak
2	4874.04	49.41	54.00	-4.59	46.17	5.75	32.80	35.31	132	99	VERTICAL	Average
3	7310.28	42.69	54.00	-11.31	33.87	7.06	37.12	35.36	100	140	VERTICAL	Average
4	7310.41	51.80	74.00	-22.20	42.98	7.06	37.12	35.36	100	140	VERTICAL	Peak

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11b CH 11 / Ant. 1 (R)
Test Date	Dec. 27, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4923.97	53.92	74.00	-20.08	50.60	5.81	32.84	35.33	129	82	HORIZONTAL	Peak
2	4924.04	51.12	54.00	-2.88	47.80	5.81	32.84	35.33	129	82	HORIZONTAL	Average
3	7385.32	43.05	54.00	-10.95	34.12	7.09	37.16	35.32	100	139	HORIZONTAL	Average
4	7387.24	52.19	74.00	-21.81	43.26	7.09	37.16	35.32	100	139	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4923.99	44.08	74.00	-29.92	40.76	5.81	32.84	35.33	100	164	VERTICAL	Peak
2	4926.21	32.76	54.00	-21.24	29.44	5.81	32.84	35.33	100	164	VERTICAL	Average
3	7387.49	39.69	54.00	-14.31	30.76	7.09	37.16	35.32	100	106	VERTICAL	Average
4	7387.71	49.81	74.00	-24.19	40.88	7.09	37.16	35.32	100	106	VERTICAL	Peak

Temperature	22℃	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11g CH 1 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4820.74	44.95	74.00	-29.05	42.87	4.21	34.69	2.08	Peak	178	100	HORIZONTAL
2	4822.54	32.60	54.00	-21.40	30.52	4.21	34.69	2.08	Average	178	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4823.90	40.07	54.00	-13.93	37.99	4.21	34.69	2.08	Average	105	113	VERTICAL
2	4823.98	51.58	74.00	-22.42	49.50	4.21	34.69	2.08	Peak	105	113	VERTICAL

Temperature	22℃	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11g CH 6 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4873.92	44.75	74.00	-29.25	42.54	4.22	34.67	2.21	Peak	224	100	HORIZONTAL
2	4873.92	32.67	54.00	-21.33	30.46	4.22	34.67	2.21	Average	224	100	HORIZONTAL
3	7303.40	49.11	74.00	-24.89	41.73	5.34	34.93	7.38	Peak	162	100	HORIZONTAL
4	7304.96	36.24	54.00	-17.76	28.86	5.34	34.93	7.38	Average	162	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4874.24	45.00	54.00	-9.00	42.79	4.22	34.67	2.21	Average	101	113	VERTICAL
2	4876.00	56.79	74.00	-17.21	54.58	4.22	34.67	2.21	Peak	101	113	VERTICAL
3	7311.32	45.23	54.00	-8.77	37.86	5.34	34.94	7.37	Average	74	100	VERTICAL
4	7313.80	58.39	74.00	-15.61	51.02	5.34	34.94	7.37	Peak	74	100	VERTICAL

Temperature	22℃	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11g CH 11 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4928.16	31.32	54.00	-22.68	28.98	4.23	34.65	2.34	Average	225	100	HORIZONTAL
2	4930.12	43.34	74.00	-30.66	41.00	4.23	34.65	2.34	Peak	225	100	HORIZONTAL
3	7383.92	36.51	54.00	-17.49	29.03	5.36	34.96	7.48	Average	169	100	HORIZONTAL
4	7391.40	50.78	74.00	-23.22	43.30	5.36	34.96	7.48	Peak	169	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4924.00	41.55	54.00	-12.45	39.21	4.23	34.65	2.34	Average	104	112	VERTICAL
2	4926.28	53.95	74.00	-20.05	51.61	4.23	34.65	2.34	Peak	104	112	VERTICAL
3	7383.76	54.34	74.00	-19.66	46.86	5.36	34.96	7.48	Peak	69	100	VERTICAL
4	7386.04	40.37	54.00	-13.63	32.89	5.36	34.96	7.48	Average	69	100	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.

4.3. Emissions Measurement

4.3.1. 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 (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

4.3.2. 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	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100 kHz / 300 kHz for Peak

4.3.3. Test Procedures

For Radiated band edges Measurement:

1. The test procedure is the same as section 4.2.3, only the freqeuncy range investigated is limited to 100MHz around band edges.

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB 558074 D01 v03r01 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10.1 Unwanted Emissions into Non-Restricted Frequency Bands Measurement Procedure.
2. The radiated 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.

4.3.4. Test Setup Layout

For Radiated band edges Measurement:

This test setup layout is the same as that shown in section 4.2.4.

For Radiated Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 4.2.4.

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 Band Edge and Fundamental Emissions

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 20MHz CH 1, 6, 11 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.60	68.87	74.00	-5.13	38.09	2.91	0.00	30.78	Peak	244	135	VERTICAL
2	2390.00	49.71	54.00	-4.29	18.93	2.91	0.00	30.78	Average	244	135	VERTICAL
3	2411.60	103.87			73.11	2.92	0.00	30.76	Peak	244	135	VERTICAL
4	2413.00	93.44			62.68	2.92	0.00	30.76	Average	244	135	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	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.60	71.32	74.00	-2.68	40.54	2.91	0.00	30.78	Peak	246	135	VERTICAL
2	2390.00	53.73	54.00	-0.27	22.95	2.91	0.00	30.78	Average	246	135	VERTICAL
3	2436.00	99.42			68.68	2.93	0.00	30.74	Average	246	135	VERTICAL
4	2436.60	110.05			79.33	2.94	0.00	30.72	Peak	246	135	VERTICAL
5	2483.50	66.24	74.00	-7.76	35.55	2.96	0.00	30.69	Peak	246	135	VERTICAL
6	2483.50	50.35	54.00	-3.65	19.66	2.96	0.00	30.69	Average	246	135	VERTICAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2461.00	94.75			64.04	2.95	0.00	30.71	Average	246	133	VERTICAL
2	2461.20	105.37			74.66	2.95	0.00	30.71	Peak	246	133	VERTICAL
3	2483.50	50.97	54.00	-3.03	20.28	2.96	0.00	30.69	Average	246	133	VERTICAL
4	2483.90	72.70	74.00	-1.30	42.01	2.96	0.00	30.69	Peak	246	133	VERTICAL

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

Temperature	22°C	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11n MCS0 40MHz CH 3, 6, 9 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Channel 3

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.60	51.95	54.00	-2.05	21.17	2.91	0.00	30.78	Average	245	133	VERTICAL
2	2390.00	70.04	74.00	-3.96	39.26	2.91	0.00	30.78	Peak	245	133	VERTICAL
3	2420.00	99.83			69.09	2.93	0.00	30.74	Peak	245	133	VERTICAL
4	2420.00	89.03			58.29	2.93	0.00	30.74	Average	245	133	VERTICAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.20	68.80	74.00	-5.20	37.22	3.68	27.90	0.00	106	269	VERTICAL	Peak
2	2390.00	53.75	54.00	-0.25	22.17	3.68	27.90	0.00	106	269	VERTICAL	Average
3	2435.00	101.29			69.69	3.70	27.90	0.00	106	269	VERTICAL	Peak
4	2435.80	92.89			61.28	3.71	27.90	0.00	106	269	VERTICAL	Average
5	2483.50	49.39	54.00	-4.61	17.76	3.73	27.90	0.00	106	269	VERTICAL	Average
6	2484.30	61.71	74.00	-12.29	30.08	3.73	27.90	0.00	106	269	VERTICAL	Peak

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

Channel 9

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2449.60	101.23			70.51	2.94	0.00	30.72	Peak	262	112	VERTICAL
2	2450.00	90.15			59.43	2.94	0.00	30.72	Average	262	112	VERTICAL
3	2483.50	51.65	54.00	-2.35	20.96	2.96	0.00	30.69	Average	262	112	VERTICAL
4	2483.90	68.31	74.00	-5.69	37.62	2.96	0.00	30.69	Peak	262	112	VERTICAL

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	22℃	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11b CH 1, 6, 11 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.20	56.89			26.11	2.91	0.00	30.78	Peak	261	111	VERTICAL
2	2390.00	44.42			13.64	2.91	0.00	30.78	Average	261	111	VERTICAL
3	2411.20	102.77	54.00	48.77	72.01	2.92	0.00	30.76	Average	261	111	VERTICAL
4	2413.00	106.57	74.00	32.57	75.81	2.92	0.00	30.76	Peak	261	111	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	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2384.40	55.23	74.00	-18.77	24.44	2.90	0.00	30.79	Peak	246	135	VERTICAL
2	2390.00	43.45	54.00	-10.55	12.67	2.91	0.00	30.78	Average	246	135	VERTICAL
3	2436.20	105.40			74.66	2.93	0.00	30.74	Peak	246	135	VERTICAL
4	2436.20	101.65			70.91	2.93	0.00	30.74	Average	246	135	VERTICAL
5	2483.50	43.36	54.00	-10.64	12.67	2.96	0.00	30.69	Average	246	135	VERTICAL
6	2485.50	54.32	74.00	-19.68	23.63	2.96	0.00	30.69	Peak	246	135	VERTICAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2461.20	104.81			74.10	2.95	0.00	30.71	Peak	247	133	VERTICAL
2	2461.20	101.01			70.30	2.95	0.00	30.71	Average	247	133	VERTICAL
3	2483.50	44.34	54.00	-9.66	13.65	2.96	0.00	30.69	Average	247	133	VERTICAL
4	2484.70	54.98	74.00	-19.02	24.29	2.96	0.00	30.69	Peak	247	133	VERTICAL

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

Temperature	22℃	Humidity	64%
Test Engineer	David Tseng	Configurations	IEEE 802.11g CH 1, 6, 11 / Ant. 1 (R)
Test Date	Dec. 28, 2013		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.00	68.17	74.00	-5.83	37.39	2.91	0.00	30.78	Peak	245	138	VERTICAL
2	2390.00	49.94	54.00	-4.06	19.16	2.91	0.00	30.78	Average	245	138	VERTICAL
3	2411.00	105.69			74.93	2.92	0.00	30.76	Peak	245	138	VERTICAL
4	2411.00	94.46			63.70	2.92	0.00	30.76	Average	245	138	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	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.20	71.13	74.00	-2.87	40.35	2.91	0.00	30.78	Peak	244	134	VERTICAL
2	2390.00	52.86	54.00	-1.14	22.08	2.91	0.00	30.78	Average	244	134	VERTICAL
3	2436.20	100.08			69.34	2.93	0.00	30.74	Average	244	134	VERTICAL
4	2437.80	110.80			80.08	2.94	0.00	30.72	Peak	244	134	VERTICAL
5	2483.50	50.10	54.00	-3.90	19.41	2.96	0.00	30.69	Average	244	134	VERTICAL
6	2484.30	66.95	74.00	-7.05	36.26	2.96	0.00	30.69	Peak	244	134	VERTICAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2461.20	95.89			65.18	2.95	0.00	30.71	Average	247	133	VERTICAL
2	2462.20	106.23			75.52	2.95	0.00	30.71	Peak	247	133	VERTICAL
3	2483.50	51.71	54.00	-2.29	21.02	2.96	0.00	30.69	Average	247	133	VERTICAL
4	2483.90	70.49	74.00	-3.51	39.80	2.96	0.00	30.69	Peak	247	133	VERTICAL

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

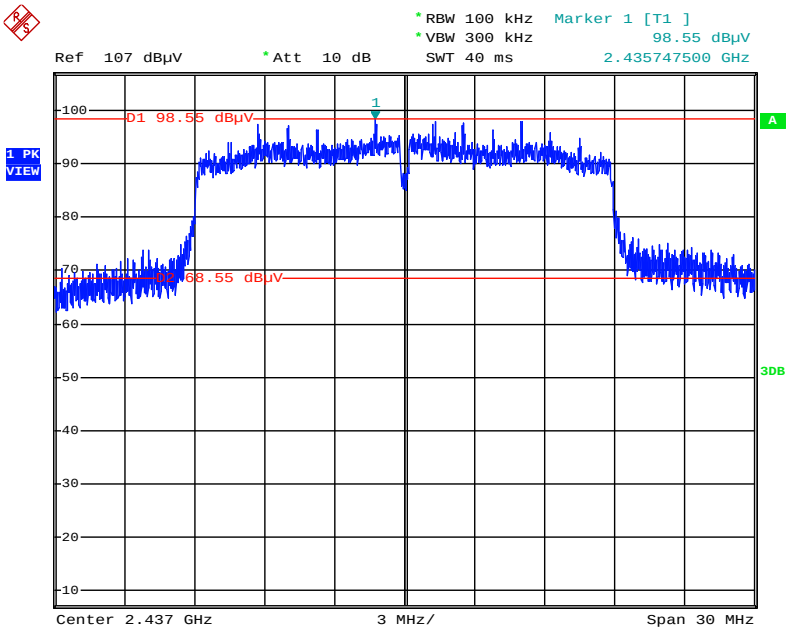
Note:

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

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

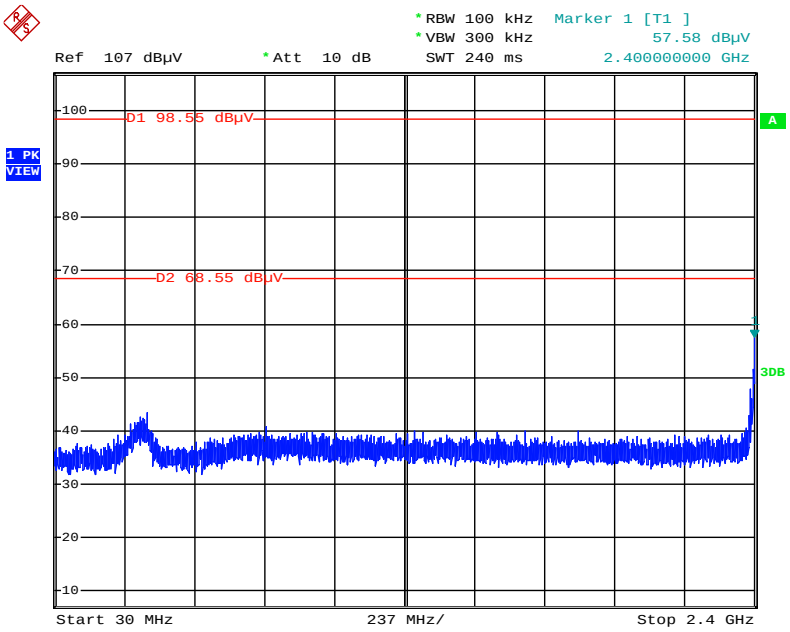
For Emission not in Restricted Band

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



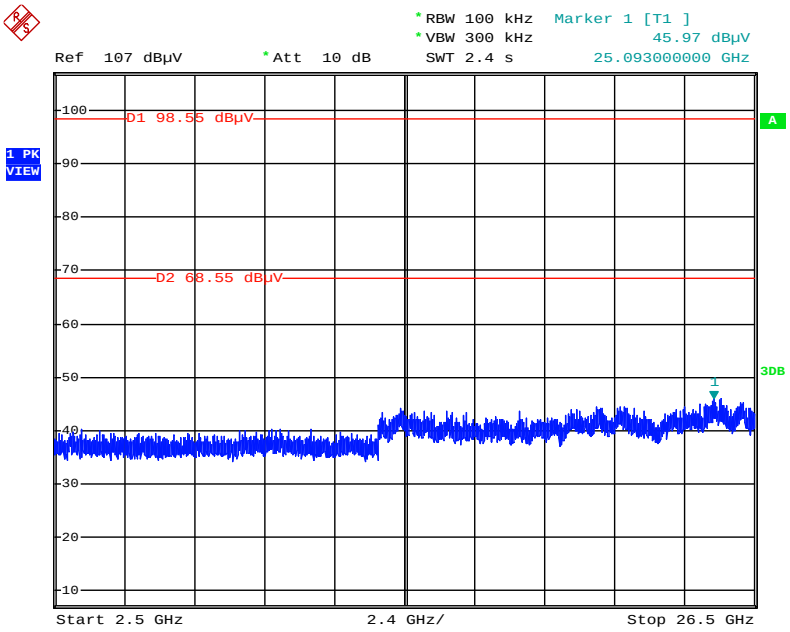
Date: 29.JAN.2014 00:15:18

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 1 / 30MHz~2400MHz (down 30dBc)



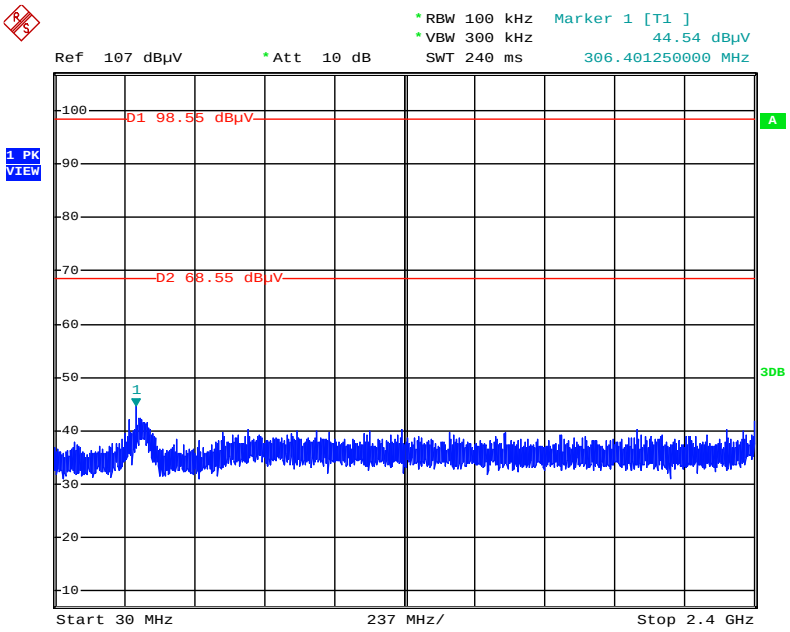
Date: 29.JAN.2014 00:16:34

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 1 / 2500MHz~26500MHz (down 30dBc)



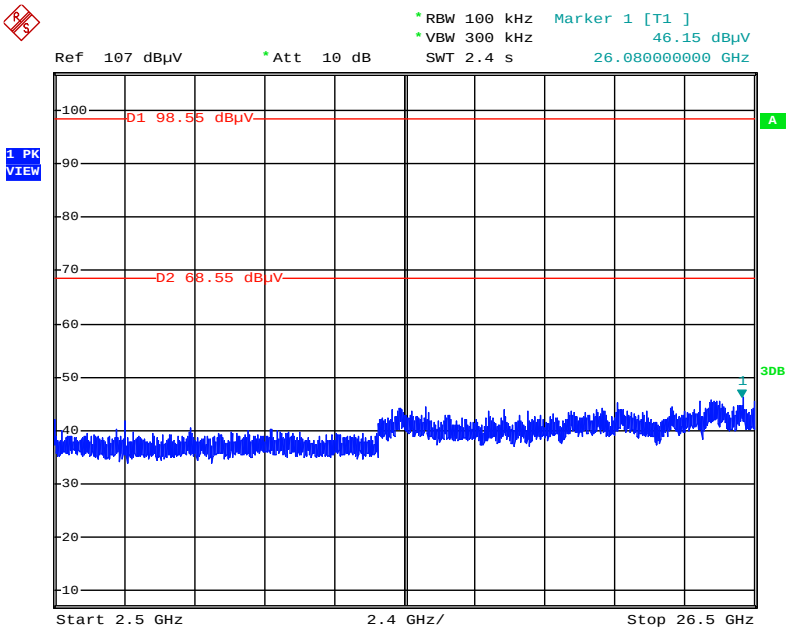
Date: 29.JAN.2014 00:17:15

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 11 / 30MHz~2400MHz (down 30dBc)



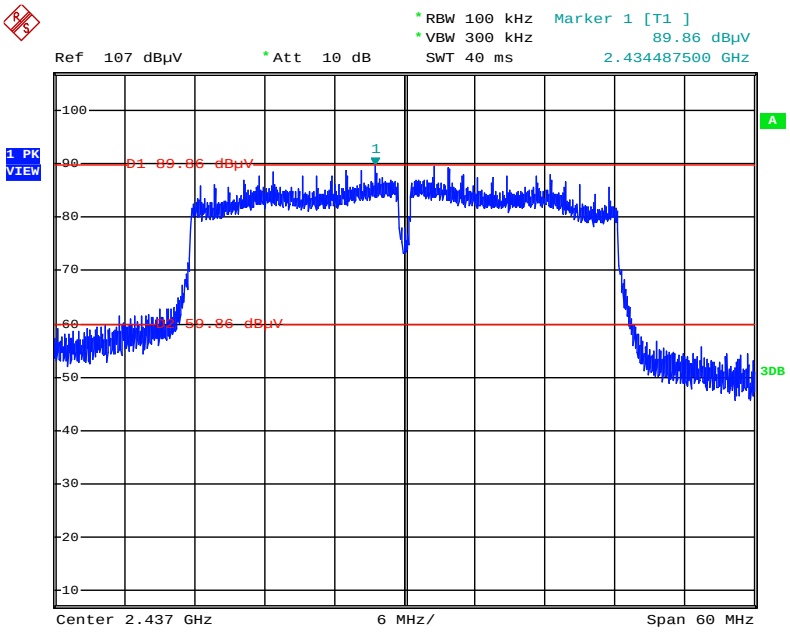
Date: 29.JAN.2014 00:18:23

Plot on Configuration IEEE 802.11n MCS0 20MHz / CH 11 / 2500MHz~26500MHz (down 30dBc)



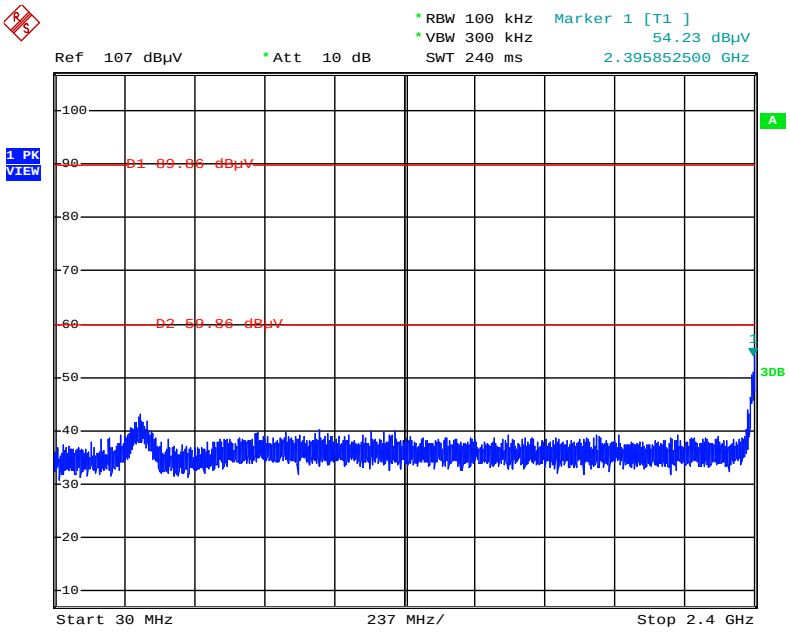
Date: 29.JAN.2014 00:18:03

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



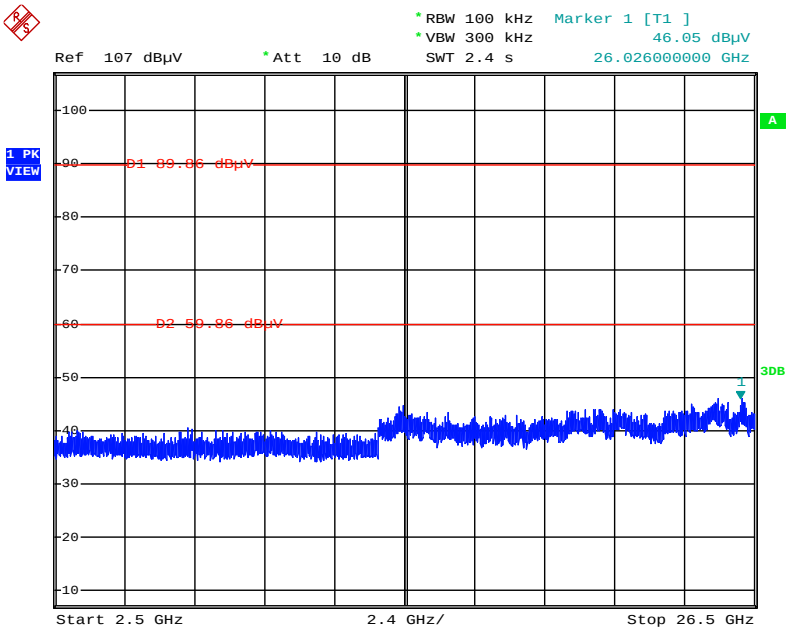
Date: 29.JAN.2014 00:22:27

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 3 / 30MHz~2400MHz (down 30dBc)



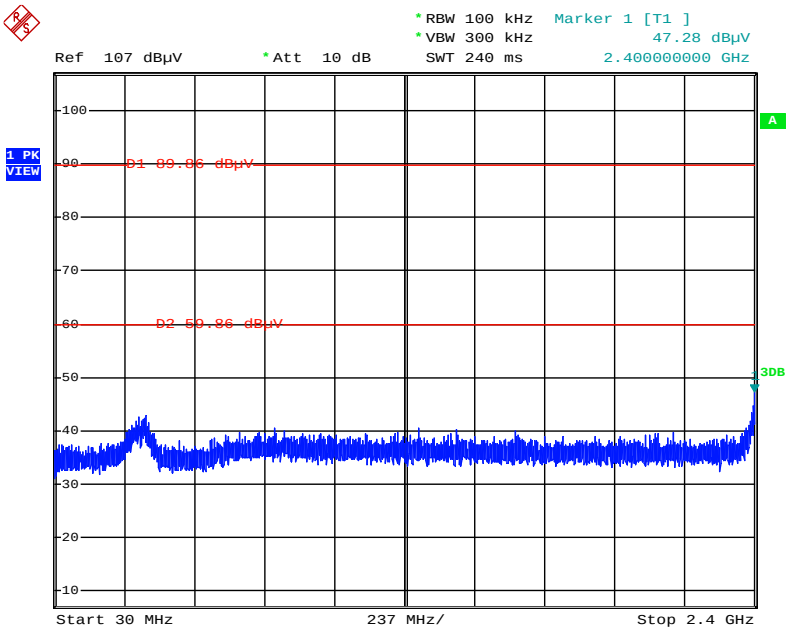
Date: 29.JAN.2014 00:24:23

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 3 / 2500MHz~26500MHz (down 30dBc)



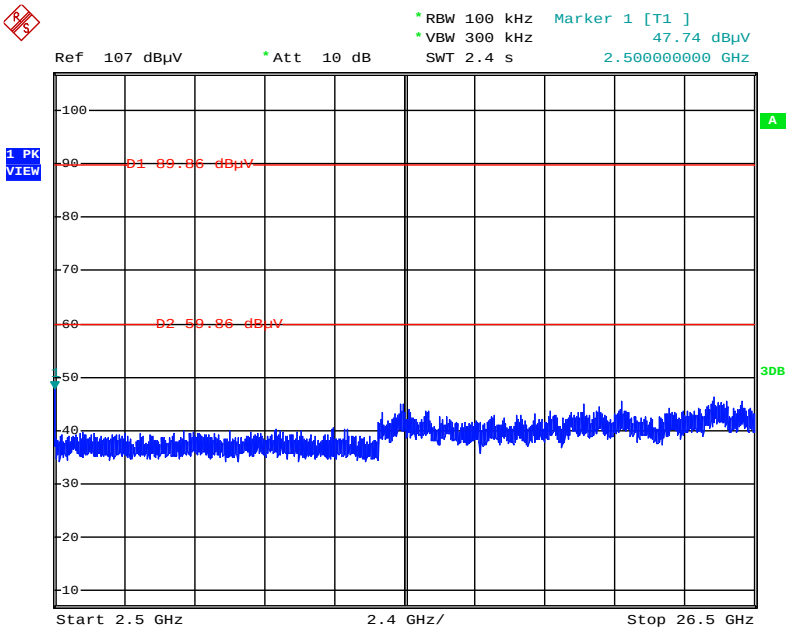
Date: 29.JAN.2014 00:24:57

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 9 / 30MHz~2400MHz (down 30dBc)



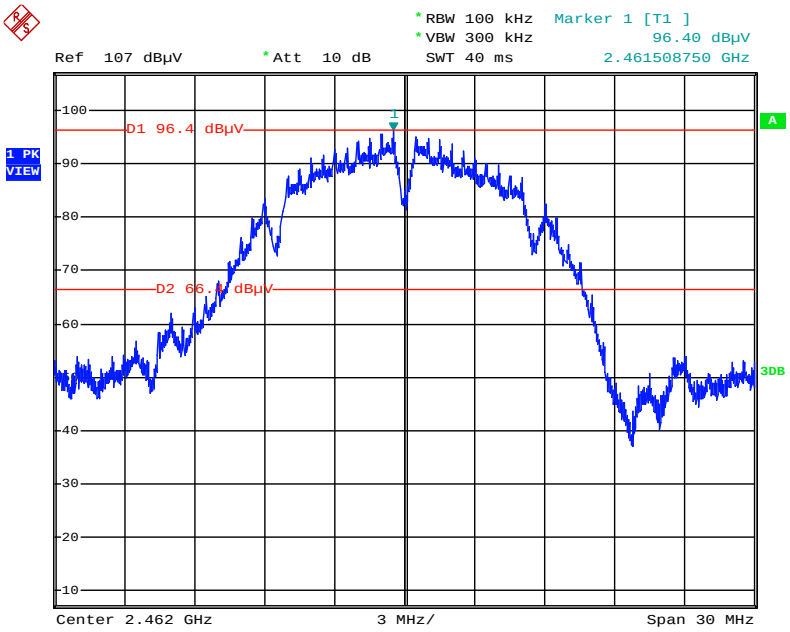
Date: 29.JAN.2014 00:23:50

Plot on Configuration IEEE 802.11n MCS0 40MHz / CH 9 / 2500MHz~26500MHz (down 30dBc)



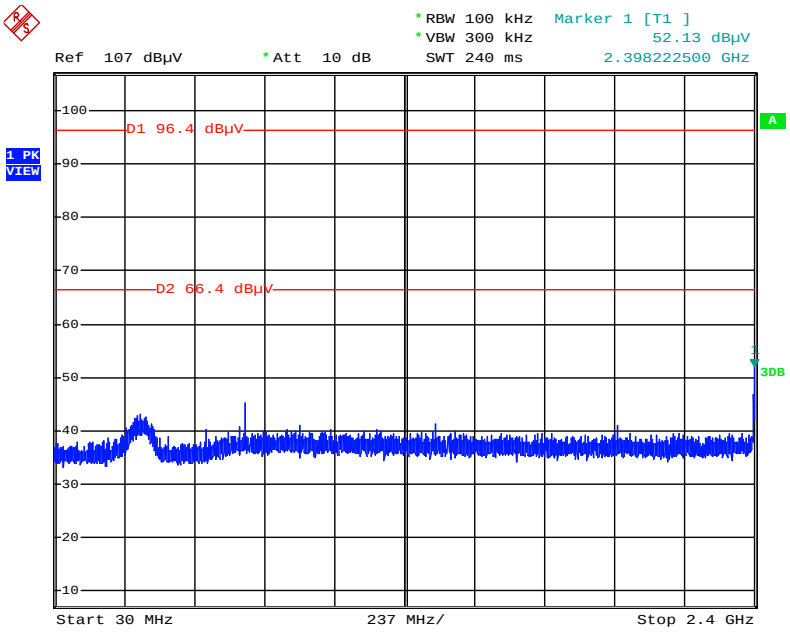
Date: 29.JAN.2014 00:23:27

Plot on Configuration IEEE 802.11b / Reference Level



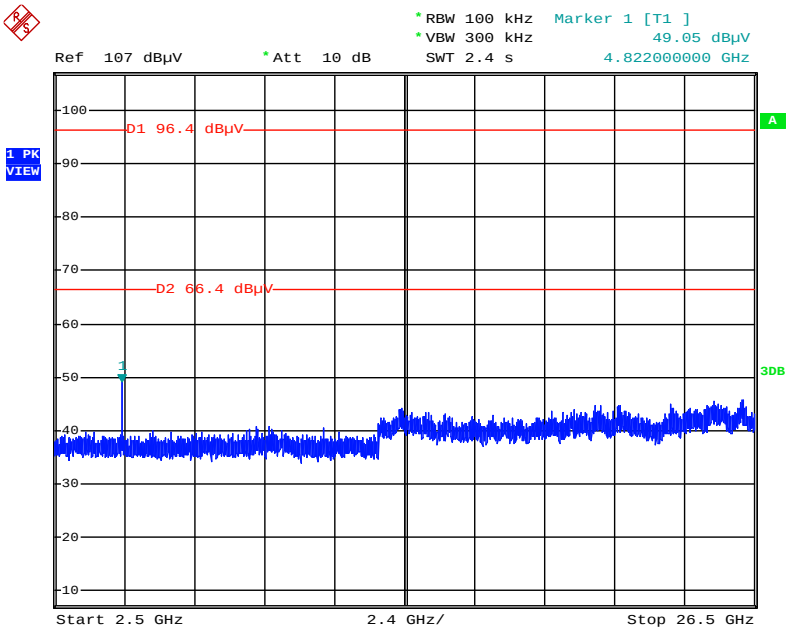
Date: 29.JAN.2014 00:05:35

Plot on Configuration IEEE 802.11b / CH 1 / 30MHz~2400MHz (down 30dBc)



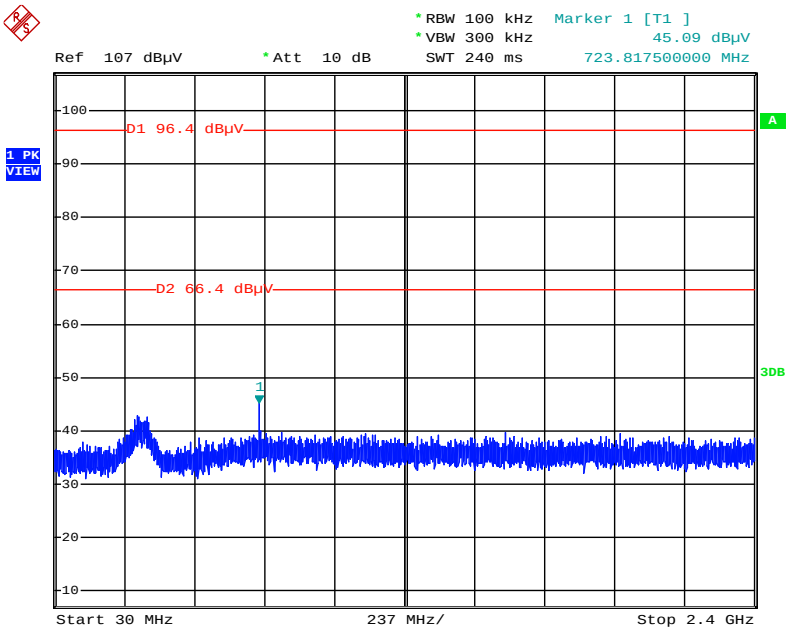
Date: 29.JAN.2014 00:10:28

Plot on Configuration IEEE 802.11b / CH 1 / 2500MHz~26500MHz (down 30dBc)



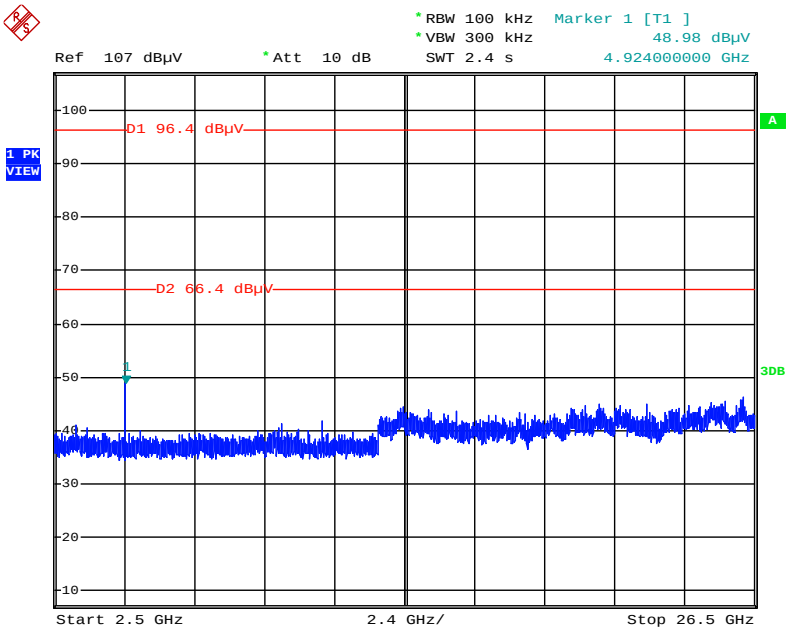
Date: 29.JAN.2014 00:11:06

Plot on Configuration IEEE 802.11b / CH 11 / 30MHz~2400MHz (down 30dBc)



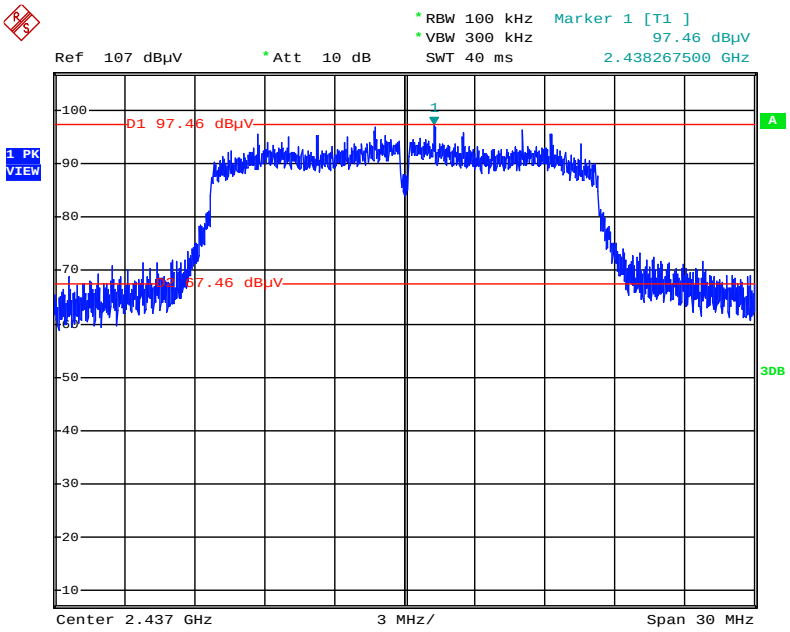
Date: 29.JAN.2014 00:06:17

Plot on Configuration IEEE 802.11b / CH 11 / 2500MHz~26500MHz (down 30dBc)



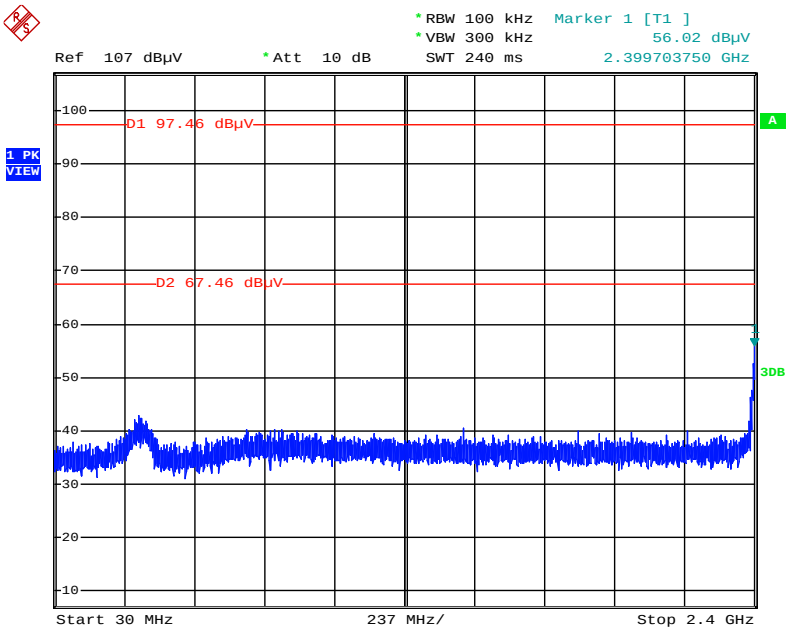
Date: 29.JAN.2014 00:06:55

Plot on Configuration IEEE 802.11g / Reference Level



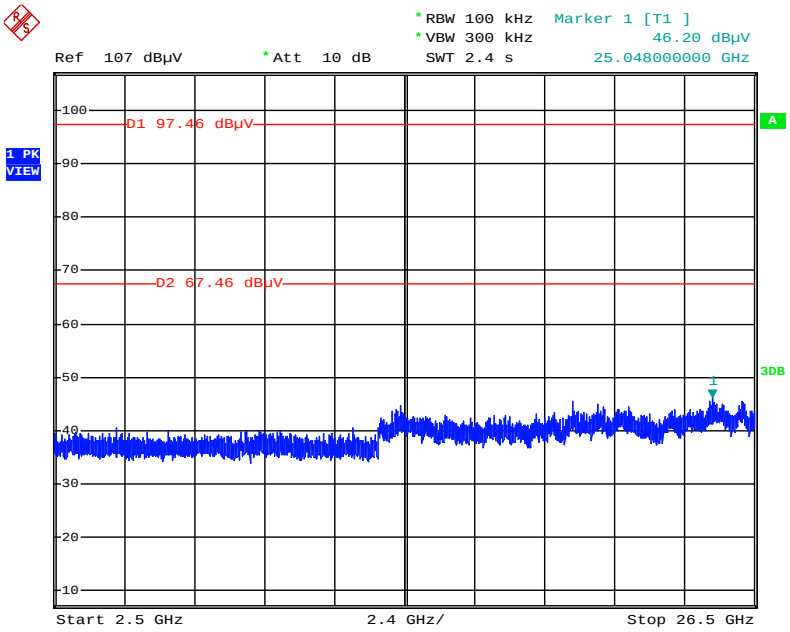
Date: 29.JAN.2014 00:08:27

Plot on Configuration IEEE 802.11g / CH 1 / 30MHz~2400MHz (down 30dBc)



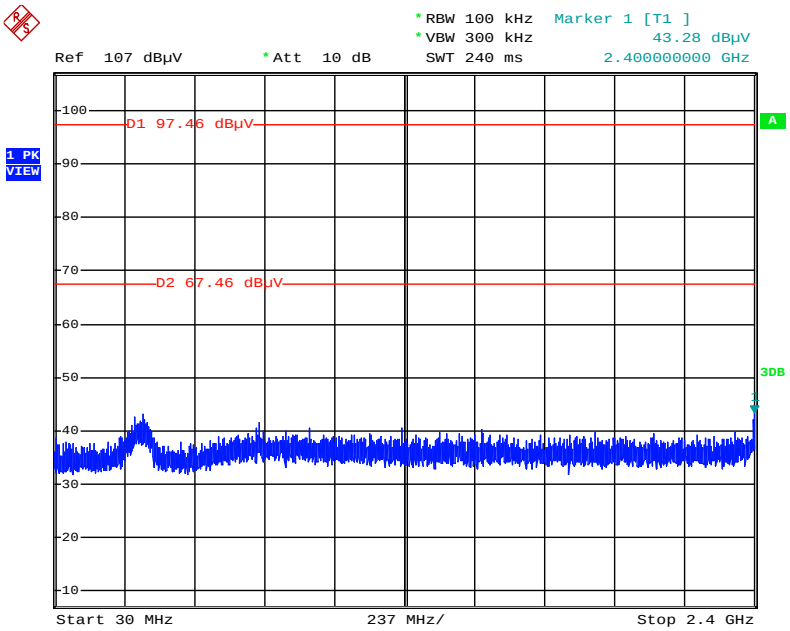
Date: 29.JAN.2014 00:21:14

Plot on Configuration IEEE 802.11g / CH 1 / 2500MHz~26500MHz (down 30dBc)



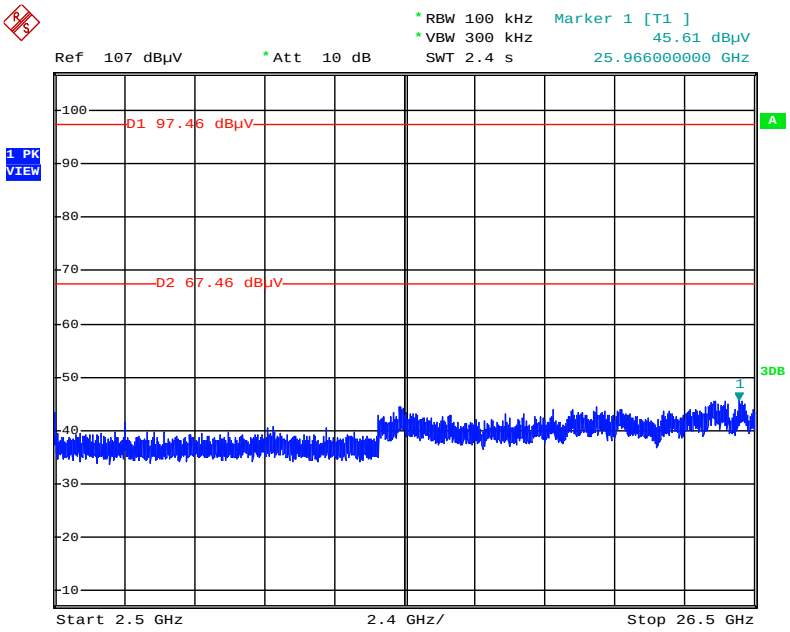
Date: 29.JAN.2014 00:20:52

Plot on Configuration IEEE 802.11g / CH 11 / 30MHz~2400MHz (down 30dBc)



Date: 29.JAN.2014 00:19:41

Plot on Configuration IEEE 802.11g / CH 11 / 2500MHz~26500MHz (down 30dBc)



Date: 29.JAN.2014 00:20:13

4.4. Antenna Requirements

4.4.1. 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.

4.4.2. 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
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	Apr. 16, 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. 01, 2013	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Dec. 17, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 12, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Oct. 23, 2013	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 12, 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. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-1	N/A	1 GHz – 26.5 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-2	N/A	1 GHz – 26.5 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 18, 2013	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. MEASUREMENT UNCERTAINTY

Uncertainty of Radiated Emission Measurement (30MHz ~ 1,000MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.173	dB	K=1	0.086
Cable loss	±0.174	dB	K=2	0.087
Antenna gain	±0.169	dB	K=2	0.084
Site imperfection	±0.433	dB	Triangular	0.214
Pre-amplifier gain	±0.366	dB	K=2	0.183
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.778
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.555

Uncertainty of Radiated Emission Measurement (1GHz ~ 18GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.191	dB	K=1	0.095
Cable loss	±0.169	dB	K=2	0.084
Antenna gain	±0.191	dB	K=2	0.096
Site imperfection	±0.582	dB	Triangular	0.291
Pre-amplifier gain	±0.304	dB	K=2	0.152
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.839
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.678

Uncertainty of Radiated Emission Measurement (18GHz ~ 40GHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	±0.186	dB	K=1	0.093
Cable loss	±0.167	dB	K=2	0.083
Antenna gain	±0.190	dB	K=2	0.095
Site imperfection	±0.488	dB	Triangular	0.244
Pre-amplifier gain	±0.269	dB	K=2	0.134
Transmitter antenna	±1.200	dB	Rectangular	0.600
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				1.771
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				3.541

Uncertainty of Conducted Emission Measurement

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Cable loss	±0.038	dB	K=2	0.019
Attenuator	±0.047	dB	K=2	0.024
Power Meter specification	±0.300	dB	Triangular	0.150
Power Sensor specification	±0.300	dB	Rectangular	0.150
Signal generator	±0.461	dB	Rectangular	0.231
Mismatch	±0.080	dB	U-shape	0.040
Spectrum analyzer	±0.500	dB	Rectangular	0.250
Combined standard uncertainty Uc(y)				0.863
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				1.726