



SPORTON International Inc.

No. 52, Hwa Ya 1st Rd., Hwa Ya Technology Park, Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.
Ph: 886-3-327-3456 / FAX: 886-3-327-0973 / www.sporton.com.tw

FCC RADIO TEST REPORT

Applicant's company	BELKIN INTERNATIONAL, INC.
Applicant Address	12045 East Waterfront Drive Playa Vista California 90094 United States
FCC ID	K7SF9K1117V2

Product Name	AC1200 DB Wi-Fi Dual-Band AC+ Gigabit Router
Brand Name	Belkin
Model No.	F9K1113V4
Test Rule	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Oct. 25, 2012
Final Test Date	Aug. 06, 2014
Submission Type	Class II Change

Statement

Test result included in this report is for the IEEE 802.11n and IEEE 802.11b/g 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 v03r02 and KDB 662911 D01 v02r01.**

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



Table of Contents

1. CERTIFICATE OF COMPLIANCE	1
2. SUMMARY OF THE TEST RESULT	2
3. GENERAL INFORMATION	3
3.1. Product Details.....	3
3.2. Accessories.....	4
3.3. Table for Filed Antenna.....	5
3.4. Table for Carrier Frequencies	6
3.5. Table for Test Modes	7
3.6. Table for Testing Locations.....	8
3.7. Table for Class II Change	8
3.8. Table for Supporting Units	8
3.9. Table for Parameters of Test Software Setting	9
3.10. EUT Operation during Test	9
3.11. Duty Cycle.....	9
3.12. Test Configurations	10
4. TEST RESULT	11
4.1. Maximum Conducted Output Power Measurement.....	11
4.2. Radiated Emissions Measurement	14
4.3. Emissions Measurement	33
4.4. Antenna Requirements	51
5. LIST OF MEASURING EQUIPMENTS	52
6. MEASUREMENT UNCERTAINTY.....	53
APPENDIX A. TEST PHOTOS	A1 ~ A4
APPENDIX B. MAXIMUM PERMISSIBLE EXPOSURE	B1 ~ B3
APPENDIX C. RADIATED EMISSION CO-LOCATION REPORT	C1 ~ C3

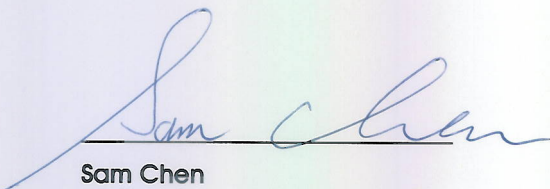
History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR2O2519-03AA	Rev. 01	Initial issue of report	Sep. 05, 2014

1. CERTIFICATE OF COMPLIANCE

Product Name : AC1200 DB Wi-Fi Dual-Band AC+ Gigabit Router
Brand Name : Belkin
Model No. : F9K1113V4
Applicant : BELKIN INTERNATIONAL, INC.
Test Rule Part(s) : 47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Oct. 25, 2012 would like to declare that the tested sample has been evaluated and found to be in compliance with the tested rule parts. The data recorded as well as the test configuration specified is true and accurate for showing the sample's EMC nature.



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	7.50 dB
4.2	15.247(d)	Radiated Emissions	Complies	0.50 dB
4.3	15.247(d)	Band Edge Emissions	Complies	1.02 dB
4.4	15.203	Antenna Requirements	Complies	-

Note: The output power is lower than original, thus Power Spectral Density Measurement and 6dB Spectrum Bandwidth Measurement doesn't necessary to re-test.

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n

Items	Description
Product Type	WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	see the below table for IEEE 802.11n
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 (HT20): 20.49 dBm ; MCS0 (HT40): 17.02 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, 1RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
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: 22.50 dBm ; 11g: 19.70 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Beamforming Function	☐ With beamforming	☒ Without beamforming

Antenna and Band width

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

IEEE 11n Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	2	MCS 0-15
802.11n (HT40)	2	MCS 0-15
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

Power	Brand	Model	Rating
Adapter	belkin	DSA-18PFG-12 FUS 120150	INPUT: 100-240V, 50-60Hz 0.6A OUTPUT: 12V, 1.5A
Other			
RJ-45 Cable*1, Non-Shielded, 1.2m			

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz
1	SERCOM	AC1200	PCB Antenna	I-PEX	3.71	4.03
2	SERCOM	AC1200	PCB Antenna	I-PEX	3.69	4.11

Note: The EUT has two Antennas.

<For 2.4GHz Band>

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

Only Chain 1 can be used as transmitting/receiving antenna.

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

Both Chain 1 and Chain 2 could transmit/receive simultaneously.

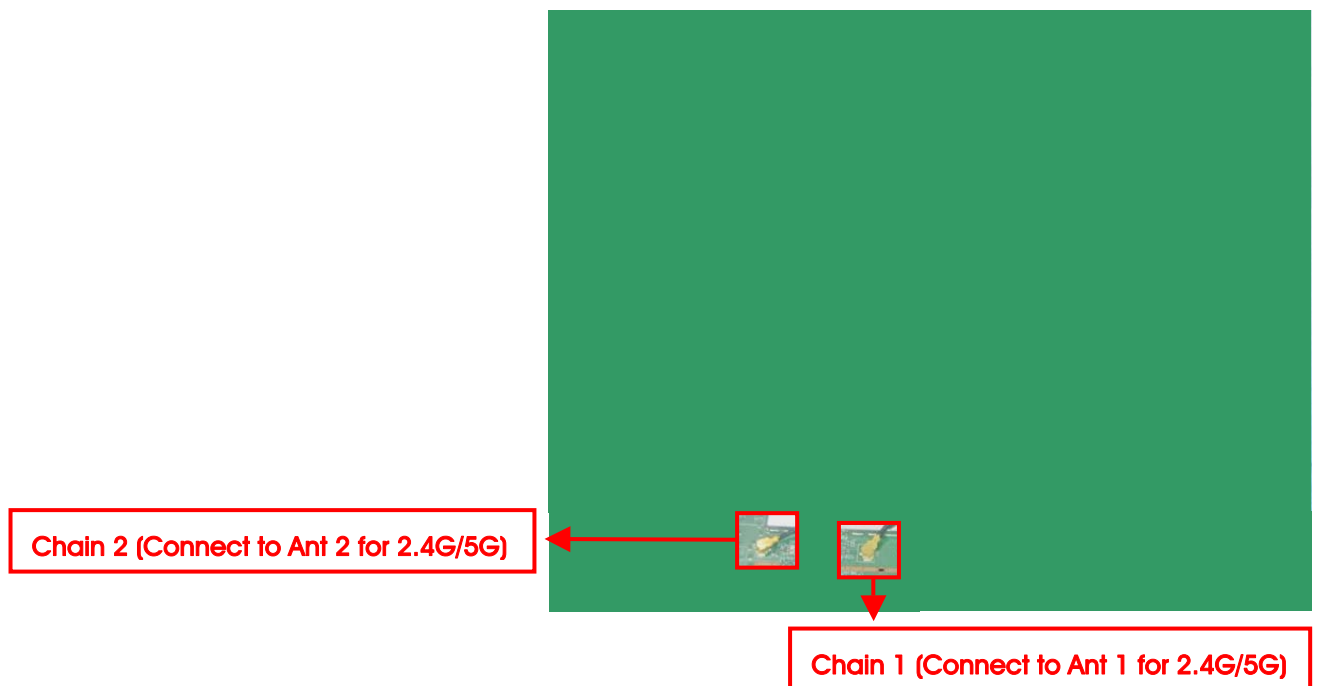
<For 5GHz Band>

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

Only Chain 1 can be used as transmitting/receiving antenna.

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

Both Chain 1 and Chain 2 could transmit/receive simultaneously.



3.4. 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	-	-

3.5. Table for Test Modes

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

Test Items	Mode	Data Rate	Channel	Chain
Maximum Conducted Output Power	802.11n HT20	MCS0	1/6/11	1+2
	802.11n HT40	MCS0	3/6/9	1+2
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Radiated Emissions 9kHz~1GHz	CTX	-	-	-
Radiated Emissions 1GHz~10 th Harmonic	802.11n HT20	MCS0	1/6/11	1+2
	802.11n HT40	MCS0	3/6/9	1+2
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
Band Edge Emissions	802.11n HT20	MCS0	1/6/11	1+2
	802.11n HT40	MCS0	3/6/9	1+2
	11b/BPSK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1

The following test modes were performed for all tests:

For Radiated Emission test:

Test Mode : EUT standing + Adapter

For Co-location MPE and Radiated Emission Co-location Test:

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

3.6. 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).

3.7. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR2O2519AA

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

Modifications	Performance Checking
1. Changing antenna type and position of antenna. 2. Removing one adapter (Model: DSA-12PFE-12 BUS 120100) 3. Adding model No.: F9K1113V4 and equipment name: AC1200 DB Wi-Fi Dual-Band AC+ Gigabit Router for this application due to the modifications above. 4. Changing 5GHz Band 1 and Band 4 to "New Rules" from "Old Rules".	1. Maximum Conducted Output Power Measurement 2. Radiated Emissions Measurement 3. Emissions Measurement 4. Maximum Permissible Exposure 5. Radiated Emission Co-location

Note: There is no change in hardware or in existing RF relevant portion

3.8. Table for Supporting Units

For Test Site No: 03CH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	M1330	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC

3.9. Table for Parameters of Test Software Setting

During testing, Channel and Power Controlling Software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product.

Power Parameters of IEEE 802.11n

Test Software Version	RTL819x 2.2.1-12/09/28		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 HT20	52/50	63/61	49/48
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 HT40	48/46	54/52	45/43

Power Parameters of IEEE 802.11b/g

Test Software Version	RTL819x 2.2.1-12/09/28		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	51	61	49
IEEE 802.11g	51	63	49

3.10. EUT Operation during Test

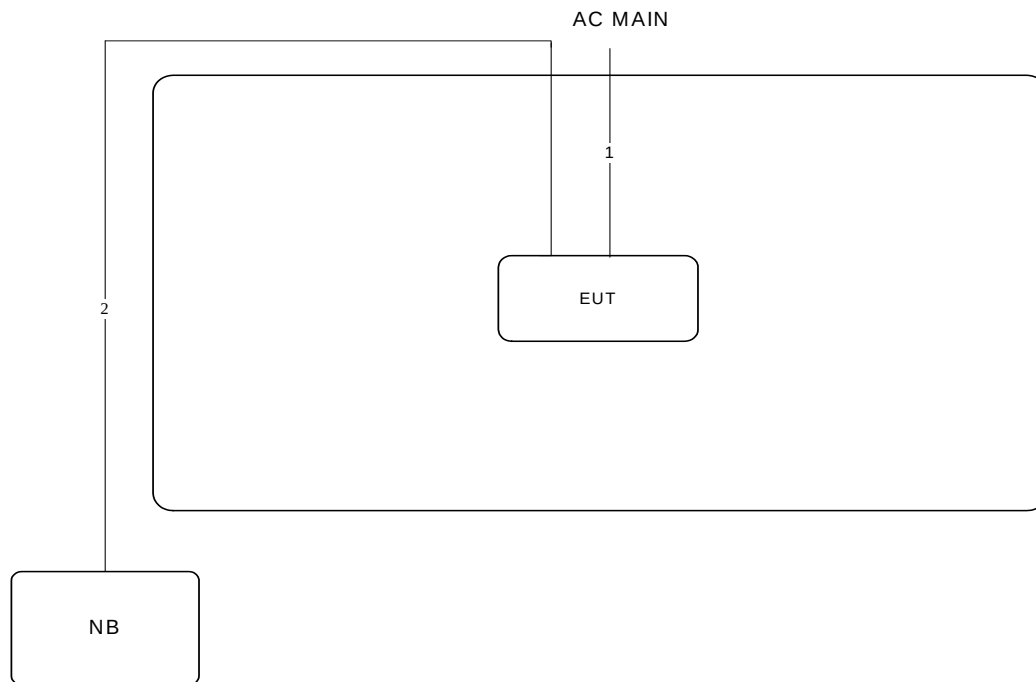
The EUT was programmed to be in continuously transmitting mode.

3.11. Duty Cycle

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11n MCS0 HT20	1.000	1.000	100	0.01
802.11n MCS0 HT40	1.000	1.000	100	0.01
802.11b	1.000	1.000	100	0.01
802.11g	1.000	1.000	100	0.01

3.12. Test Configurations

3.12.1. Radiation Emissions Test Configuration



Item	Connection	Shielded	Length(m)
1	Power cable	No	1.5m
2	RJ-45 cable	No	10m

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

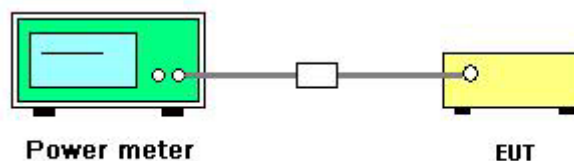
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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 v03r02 section 9.2.3.2 Measurement using a power meter (PM).
2. Multiple antenna systems was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
3. 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	22°C	Humidity	60%
Test Engineer	Jim Huang	Configurations	IEEE 802.11n
Test Date	Aug. 05, 2014		

Configuration IEEE 802.11n MCS0 HT20 / Chain 1 + Chain 2

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
1	2412 MHz	13.52	13.42	16.48	30.00	Complies
6	2437 MHz	17.43	17.53	20.49	30.00	Complies
11	2462 MHz	12.15	12.50	15.34	30.00	Complies

Configuration IEEE 802.11n MCS0 HT40 / Chain 1 + Chain 2

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
3	2422 MHz	10.89	10.92	13.92	30.00	Complies
6	2437 MHz	14.03	13.98	17.02	30.00	Complies
9	2452 MHz	10.10	9.62	12.88	30.00	Complies

Temperature	22°C	Humidity	60%
Test Engineer	Jim Huang	Configurations	IEEE 802.11b/g
Test Date	Aug. 05, 2014		

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	18.50	30.00	Complies
6	2437 MHz	22.50	30.00	Complies
11	2462 MHz	17.85	30.00	Complies

Configuration IEEE 802.11g / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	14.52	30.00	Complies
6	2437 MHz	19.70	30.00	Complies
11	2462 MHz	13.88	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 (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

4.2.2. 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, Please refer to section 3.11 for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

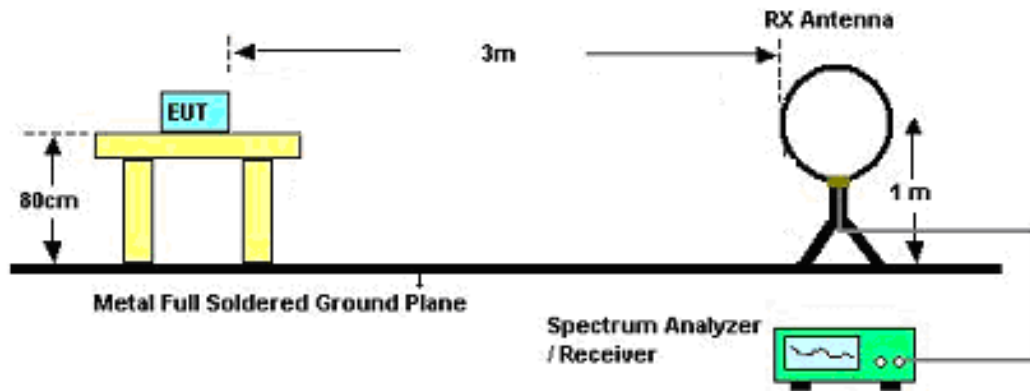
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.2.3. Test Procedures

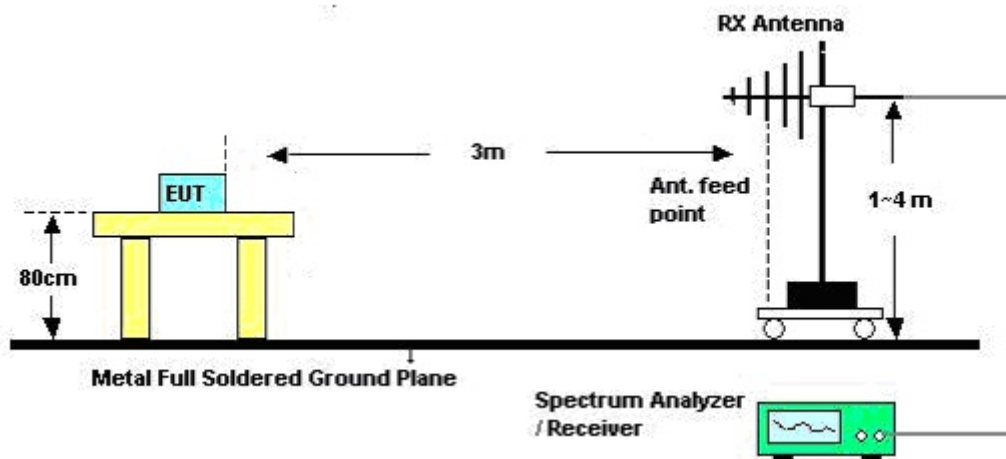
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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. 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.
8. 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.
9. 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

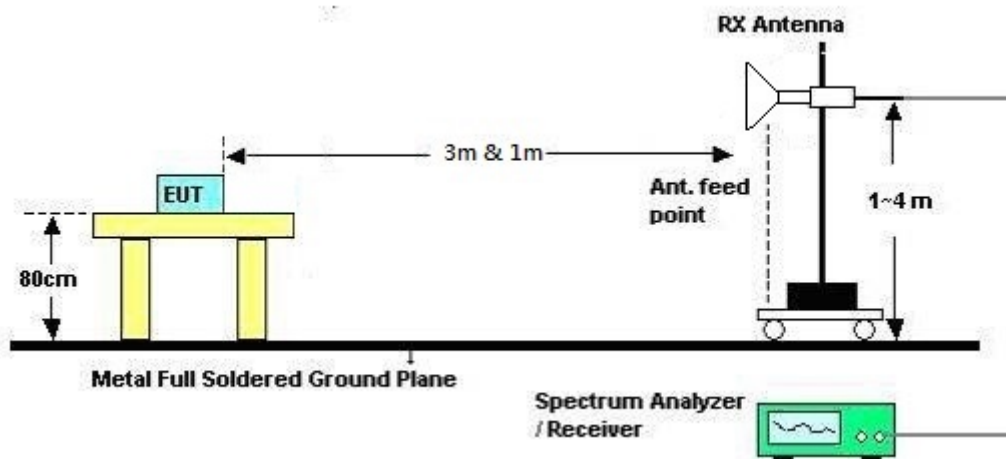
For Radiated Emissions: 9kHz ~30MHz



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	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	CTX
Test Date	Jul. 18, 2014		

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.

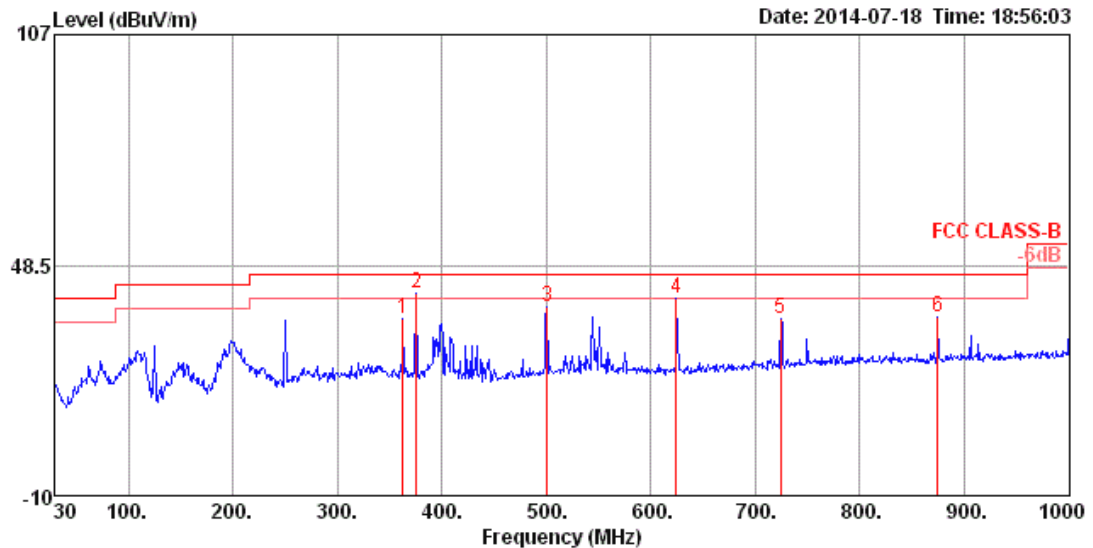
Distance extrapolation factor = $40 \log (\text{specific distance} / \text{test distance})$ (dB);

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

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

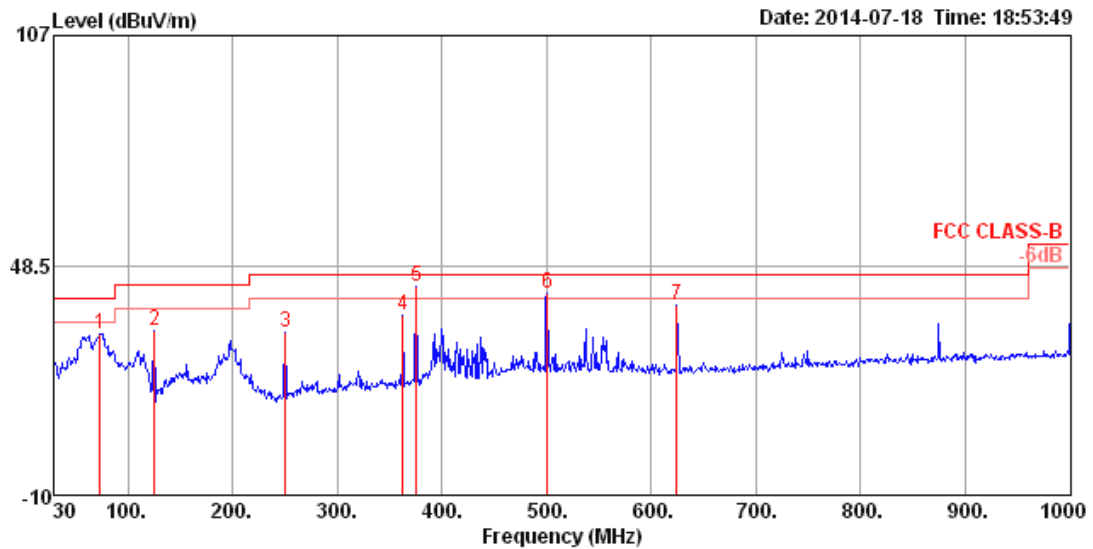
Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	CTX

Horizontal



	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	362.71	35.07	46.00	-10.93	49.35	2.37	14.70	31.35	100	226	HORIZONTAL	Peak
2	375.32	41.25	46.00	-4.75	55.31	2.44	14.93	31.43	100	241	HORIZONTAL	QP
3	500.45	37.87	46.00	-8.13	49.54	2.82	16.92	31.41	150	141	HORIZONTAL	Peak
4	624.61	40.08	46.00	-5.92	49.69	3.18	18.61	31.40	125	151	HORIZONTAL	QP
5	724.52	35.00	46.00	-11.00	43.42	3.45	19.40	31.27	100	17	HORIZONTAL	Peak
6	874.87	35.33	46.00	-10.67	42.35	3.89	20.24	31.15	100	54	HORIZONTAL	Peak

Vertical



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	73.65	31.07	40.00	-8.93	55.95	1.02	5.80	31.70	150	34 VERTICAL	Peak
2	125.06	32.07	43.50	-11.43	50.58	1.33	11.73	31.57	100	164 VERTICAL	Peak
3	250.19	31.39	46.00	-14.61	49.07	1.90	11.91	31.49	200	316 VERTICAL	Peak
4	362.71	35.70	46.00	-10.30	49.98	2.37	14.70	31.35	150	279 VERTICAL	Peak
5	375.32	42.98	46.00	-3.02	57.04	2.44	14.93	31.43	112	174 VERTICAL	QP
6	500.45	41.41	46.00	-4.59	53.08	2.82	16.92	31.41	102	2 VERTICAL	QP
7	624.61	38.54	46.00	-7.46	48.15	3.18	18.61	31.40	150	170 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	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 1 / Chain 1 + Chain 2
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4822.22	44.15	74.00	-29.85	41.96	4.21	32.56	34.58	Peak	89	100	HORIZONTAL
2	4824.18	30.67	54.00	-23.33	28.48	4.21	32.56	34.58	Average	89	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4822.87	30.17	54.00	-23.83	27.98	4.21	32.56	34.58	Average	264	100	VERTICAL
2	4826.29	44.61	74.00	-29.39	42.42	4.21	32.56	34.58	Peak	264	100	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 6 / Chain 1 + Chain 2
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	4871.20	34.03	54.00	-19.97	31.72	4.22	32.66	34.57	Average	140	100	HORIZONTAL
2	4872.96	49.04	74.00	-24.96	46.73	4.22	32.66	34.57	Peak	140	100	HORIZONTAL
3	7305.88	38.71	54.00	-15.29	31.12	5.34	37.07	34.82	Average	284	135	HORIZONTAL
4	7320.56	53.59	74.00	-20.41	45.98	5.35	37.09	34.83	Peak	284	135	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	4872.32	51.63	74.00	-22.37	49.32	4.22	32.66	34.57	Peak	318	115	VERTICAL
2	4873.96	36.44	54.00	-17.56	34.13	4.22	32.66	34.57	Average	318	115	VERTICAL
3	7306.16	53.17	74.00	-20.83	45.58	5.34	37.07	34.82	Peak	110	111	VERTICAL
4	7306.68	38.25	54.00	-15.75	30.66	5.34	37.07	34.82	Average	110	111	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 11 / Chain 1 + Chain 2
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableLoss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4919.46	31.66	54.00	-22.34	29.22	4.23	32.76	34.55	Average	28	100	HORIZONTAL
2	4921.84	45.13	74.00	-28.87	42.69	4.23	32.76	34.55	Peak	28	100	HORIZONTAL
3	7381.20	48.12	74.00	-25.88	40.44	5.36	37.16	34.84	Peak	92	100	HORIZONTAL
4	7390.54	34.87	54.00	-19.13	27.17	5.36	37.18	34.84	Average	92	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	4927.80	32.45	54.00	-21.55	30.01	4.23	32.76	34.55	Average	78	100	VERTICAL
2	4929.08	46.37	74.00	-27.63	43.93	4.23	32.76	34.55	Peak	78	100	VERTICAL
3	7384.76	35.15	54.00	-18.85	27.45	5.36	37.18	34.84	Average	258	100	VERTICAL
4	7389.22	48.75	74.00	-25.25	41.05	5.36	37.18	34.84	Peak	258	100	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 3 / Chain 1 + Chain 2
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm	
1	4843.96	30.21	54.00	-23.79	27.99	4.21	32.59	34.58	Average	168	100 HORIZONTAL
2	4848.00	43.79	74.00	-30.21	41.57	4.21	32.59	34.58	Peak	168	100 HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm	
1	4839.56	30.23	54.00	-23.77	28.01	4.21	32.59	34.58	Average	241	100 VERTICAL
2	4842.94	44.14	74.00	-29.86	41.92	4.21	32.59	34.58	Peak	241	100 VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 6 / Chain 1 + Chain 2
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	CableLoss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4872.50	44.50	74.00	-29.50	42.19	4.22	32.66	34.57	Peak	270	100	HORIZONTAL
2	4874.22	31.22	54.00	-22.78	28.91	4.22	32.66	34.57	Average	270	100	HORIZONTAL
3	7306.04	48.64	74.00	-25.36	41.05	5.34	37.07	34.82	Peak	357	100	HORIZONTAL
4	7314.36	35.30	54.00	-18.70	27.72	5.34	37.07	34.83	Average	357	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase	
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	4874.14	44.66	74.00	-29.34	42.35	4.22	32.66	34.57	Peak	66	100	VERTICAL
2	4879.00	31.55	54.00	-22.45	29.24	4.22	32.66	34.57	Average	66	100	VERTICAL
3	7306.38	48.57	74.00	-25.43	40.98	5.34	37.07	34.82	Peak	121	100	VERTICAL
4	7314.18	35.19	54.00	-18.81	27.61	5.34	37.07	34.83	Average	121	100	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 9 / Chain 1 + Chain 2
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4903.80	45.17	74.00	-28.83	42.78	4.22	32.73	34.56	Peak	213	100	HORIZONTAL
2	4908.28	30.88	54.00	-23.12	28.49	4.22	32.73	34.56	Average	213	100	HORIZONTAL
3	7351.96	34.88	54.00	-19.12	27.23	5.35	37.13	34.83	Average	343	100	HORIZONTAL
4	7352.76	48.74	74.00	-25.26	41.09	5.35	37.13	34.83	Peak	343	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4905.48	44.46	74.00	-29.54	42.07	4.22	32.73	34.56	Peak	192	100	VERTICAL
2	4908.46	30.99	54.00	-23.01	28.60	4.22	32.73	34.56	Average	192	100	VERTICAL
3	7351.12	34.92	54.00	-19.08	27.27	5.35	37.13	34.83	Average	271	100	VERTICAL
4	7360.24	48.25	74.00	-25.75	40.60	5.35	37.13	34.83	Peak	271	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	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11b CH 1 / Chain 1
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark		Pol/Phase
				dB	dBuV	dB	dB/m	dB		deg	cm
1	4823.88	46.48	74.00	-27.52	44.29	4.21	32.56	34.58	Peak	111	117 HORIZONTAL
2	4823.98	37.39	54.00	-16.61	35.20	4.21	32.56	34.58	Average	111	117 HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	
	MHz	dBuV/m	Line	Limit	Level	Loss	Factor	Factor	Remark		Pol/Phase
				dB	dBuV	dB	dB/m	dB		deg	cm
1	4823.94	35.67	54.00	-18.33	33.48	4.21	32.56	34.58	Average	107	112 VERTICAL
2	4824.01	46.75	74.00	-27.25	44.56	4.21	32.56	34.58	Peak	107	112 VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11b CH 6 / Chain 1
Test Date	Jun. 13, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4873.93	48.28	54.00	-5.72	45.97	4.22	32.66	34.57	Average	258	104	HORIZONTAL
2	4873.95	52.24	74.00	-21.76	49.93	4.22	32.66	34.57	Peak	258	104	HORIZONTAL
3	7311.67	46.94	54.00	-7.06	39.36	5.34	37.07	34.83	Average	111	135	HORIZONTAL
4	7311.89	54.90	74.00	-19.10	47.32	5.34	37.07	34.83	Peak	111	135	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4873.87	49.70	74.00	-24.30	47.39	4.22	32.66	34.57	Peak	105	125	VERTICAL
2	4873.89	44.99	54.00	-9.01	42.68	4.22	32.66	34.57	Average	105	125	VERTICAL
3	7311.65	53.50	54.00	-0.50	45.92	5.34	37.07	34.83	Average	100	106	VERTICAL
4	7311.84	59.01	74.00	-14.99	51.43	5.34	37.07	34.83	Peak	100	106	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11b CH 11 / Chain 1
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4923.93	45.30	54.00	-8.70	42.86	4.23	32.76	34.55	Average	237	100	HORIZONTAL
2	4924.03	50.39	74.00	-23.61	47.95	4.23	32.76	34.55	Peak	237	100	HORIZONTAL
3	7385.18	37.95	54.00	-16.05	30.25	5.36	37.18	34.84	Average	278	131	HORIZONTAL
4	7387.28	50.36	74.00	-23.64	42.66	5.36	37.18	34.84	Peak	278	131	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4923.83	47.39	74.00	-26.61	44.95	4.23	32.76	34.55	Peak	78	117	VERTICAL
2	4923.93	38.71	54.00	-15.29	36.27	4.23	32.76	34.55	Average	78	117	VERTICAL
3	7385.18	41.55	54.00	-12.45	33.85	5.36	37.18	34.84	Average	102	189	VERTICAL
4	7387.93	52.03	74.00	-21.97	44.33	5.36	37.18	34.84	Peak	102	189	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11g CH 1 / Chain 1
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4822.76	30.17	54.00	-23.83	27.98	4.21	32.56	34.58	Average	66	100	HORIZONTAL
2	4825.59	44.10	74.00	-29.90	41.91	4.21	32.56	34.58	Peak	66	100	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4823.15	30.18	54.00	-23.82	27.99	4.21	32.56	34.58	Average	241	100	VERTICAL
2	4826.23	44.19	74.00	-29.81	42.00	4.21	32.56	34.58	Peak	241	100	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11g CH 6 / Chain 1
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4927.80	32.45	54.00	-21.55	30.01	4.23	32.76	34.55	Average	78	100	VERTICAL
2	4929.08	46.37	74.00	-27.63	43.93	4.23	32.76	34.55	Peak	78	100	VERTICAL
3	7384.76	35.15	54.00	-18.85	27.45	5.36	37.18	34.84	Average	258	100	VERTICAL
4	7389.22	48.75	74.00	-25.25	41.05	5.36	37.18	34.84	Peak	258	100	VERTICAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4876.14	31.11	54.00	-22.89	28.80	4.22	32.66	34.57	Average	84	100	VERTICAL
2	4876.20	45.23	74.00	-28.77	42.92	4.22	32.66	34.57	Peak	84	100	VERTICAL
3	7309.24	41.62	54.00	-12.38	34.03	5.34	37.07	34.82	Average	97	191	VERTICAL
4	7310.88	56.04	74.00	-17.96	48.45	5.34	37.07	34.82	Peak	97	191	VERTICAL

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11g CH 11 / Chain 1
Test Date	Jun. 14, 2014		

Horizontal

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1	4924.31	31.88	54.00	-22.12	29.44	4.23	32.76	34.55	Average	255	100	HORIZONTAL
2	4925.98	46.00	74.00	-28.00	43.56	4.23	32.76	34.55	Peak	255	100	HORIZONTAL
3	7384.50	49.37	74.00	-24.63	41.67	5.36	37.18	34.84	Peak	199	100	HORIZONTAL
4	7387.73	34.74	54.00	-19.26	27.04	5.36	37.18	34.84	Average	199	100	HORIZONTAL

Vertical

	Freq	Level	Limit	Over	Read	Cable	Antenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm	
1	4922.66	31.06	54.00	-22.94	28.62	4.23	32.76	34.55	Average	0	100	VERTICAL
2	4926.34	44.87	74.00	-29.13	42.43	4.23	32.76	34.55	Peak	0	100	VERTICAL
3	7383.68	49.47	74.00	-24.53	41.77	5.36	37.18	34.84	Peak	80	100	VERTICAL
4	7387.46	35.22	54.00	-18.78	27.52	5.36	37.18	34.84	Average	80	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, Please refer to section 3.11 for Average
RBW / VBW (30dBc in any 100 kHz bandwidth emission)	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 frequency 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 v03r02 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	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT20 CH 1, 6, 11 / Chain 1 + Chain 2
Test Date	Jun. 13, 2014		

Channel 1

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm
1	2390.00	70.38	74.00	-3.62	39.55	2.91	27.92	0.00	Peak	90	171 HORIZONTAL
2	2390.00	52.94	54.00	-1.06	22.11	2.91	27.92	0.00	Average	90	171 HORIZONTAL
3	2406.20	102.88			72.06	2.92	27.90	0.00	Average	90	171 HORIZONTAL
4	2406.60	112.73			81.91	2.92	27.90	0.00	Peak	90	171 HORIZONTAL

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

Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm
1	2388.40	61.89	74.00	-12.11	31.06	2.91	27.92	0.00	Peak	91	169 HORIZONTAL
2	2390.00	45.24	54.00	-8.76	14.41	2.91	27.92	0.00	Average	91	169 HORIZONTAL
3	2439.00	118.46			87.66	2.94	27.86	0.00	Peak	91	169 HORIZONTAL
4	2439.80	108.56			77.76	2.94	27.86	0.00	Average	91	169 HORIZONTAL
5	2483.50	68.03	74.00	-5.97	37.25	2.96	27.82	0.00	Peak	91	169 HORIZONTAL
6	2483.50	48.60	54.00	-5.40	17.82	2.96	27.82	0.00	Average	91	169 HORIZONTAL

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

Channel 11

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	Remark	deg	cm
1	2465.00	103.46			72.67	2.95	27.84	0.00	Average	90	167 HORIZONTAL
2	2465.20	113.22			82.43	2.95	27.84	0.00	Peak	90	167 HORIZONTAL
3	2483.50	68.76	74.00	-5.24	37.98	2.96	27.82	0.00	Peak	90	167 HORIZONTAL
4	2483.50	52.94	54.00	-1.06	22.16	2.96	27.82	0.00	Average	90	167 HORIZONTAL

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

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11n MCS0 HT40 CH 3, 6, 9 / Chain 1 + Chain 2
Test Date	Jun. 13, 2014		

Channel 3

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	deg	cm	
1	2390.00	64.86	74.00	-9.14	34.03	2.91	27.92	0.00	92	167	HORIZONTAL
2	2390.00	52.89	54.00	-1.11	22.06	2.91	27.92	0.00	92	167	HORIZONTAL
3	2432.40	98.57			67.76	2.93	27.88	0.00	92	167	HORIZONTAL
4	2433.20	108.24			77.43	2.93	27.88	0.00	92	167	HORIZONTAL

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

Channel 6

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	deg	cm	
1	2389.20	63.50	74.00	-10.50	32.67	2.91	27.92	0.00	91	165	HORIZONTAL
2	2390.00	48.79	54.00	-5.21	17.96	2.91	27.92	0.00	91	165	HORIZONTAL
3	2438.60	101.30			70.50	2.94	27.86	0.00	91	165	HORIZONTAL
4	2441.00	110.76			79.96	2.94	27.86	0.00	91	165	HORIZONTAL
5	2483.50	52.97	54.00	-1.03	22.19	2.96	27.82	0.00	91	165	HORIZONTAL
6	2483.90	67.81	74.00	-6.19	37.03	2.96	27.82	0.00	91	165	HORIZONTAL

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

Channel 9

	Freq	Level	Limit	Over	Read	CableAntenna	Preamp		T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	Loss	Factor	Factor	deg	cm	
1	2461.20	97.67			66.88	2.95	27.84	0.00	95	163	HORIZONTAL
2	2462.40	107.00			76.21	2.95	27.84	0.00	95	163	HORIZONTAL
3	2483.50	64.37	74.00	-9.63	33.59	2.96	27.82	0.00	95	163	HORIZONTAL
4	2483.50	52.93	54.00	-1.07	22.15	2.96	27.82	0.00	95	163	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	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11b CH 1, 6, 11 / Chain 1
Test Date	Jun. 13, 2014 ~ Jun. 14, 2014		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2386.20	51.48	54.00	-2.52	20.65	2.91	27.92	0.00	Average	82	151	HORIZONTAL
2	2386.60	60.15	74.00	-13.85	29.32	2.91	27.92	0.00	Peak	82	151	HORIZONTAL
3	2411.20	111.06			80.24	2.92	27.90	0.00	Average	82	151	HORIZONTAL
4	2413.00	115.04			84.22	2.92	27.90	0.00	Peak	82	151	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2388.80	48.40	54.00	-5.60	17.57	2.91	27.92	0.00	Average	92	136	HORIZONTAL
2	2389.20	58.09	74.00	-15.91	27.26	2.91	27.92	0.00	Peak	92	136	HORIZONTAL
3	2437.80	114.33			83.53	2.94	27.86	0.00	Average	92	136	HORIZONTAL
4	2438.20	118.31			87.51	2.94	27.86	0.00	Peak	92	136	HORIZONTAL
5	2483.50	59.40	74.00	-14.60	28.62	2.96	27.82	0.00	Peak	92	136	HORIZONTAL
6	2483.90	50.52	54.00	-3.48	19.74	2.96	27.82	0.00	Average	92	136	HORIZONTAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2461.20	111.13			80.34	2.95	27.84	0.00	Average	99	145	HORIZONTAL
2	2463.00	114.92			84.13	2.95	27.84	0.00	Peak	99	145	HORIZONTAL
3	2483.50	60.28	74.00	-13.72	29.50	2.96	27.82	0.00	Peak	99	145	HORIZONTAL
4	2483.50	52.98	54.00	-1.02	22.20	2.96	27.82	0.00	Average	99	145	HORIZONTAL

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

Temperature	23°C	Humidity	61%
Test Engineer	Serway Li	Configurations	IEEE 802.11g CH 1, 6, 11 / Chain 1
Test Date	Jun. 14, 2014		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2390.00	69.19	74.00	-4.81	38.36	2.91	27.92	0.00	Peak	86	151	HORIZONTAL
2	2390.00	52.93	54.00	-1.07	22.10	2.91	27.92	0.00	Average	86	151	HORIZONTAL
3	2406.60	99.70			68.88	2.92	27.90	0.00	Average	86	151	HORIZONTAL
4	2407.20	111.59			80.77	2.92	27.90	0.00	Peak	86	151	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2390.00	65.44	74.00	-8.56	34.61	2.91	27.92	0.00	Peak	86	150	HORIZONTAL
2	2390.00	48.02	54.00	-5.98	17.19	2.91	27.92	0.00	Average	86	150	HORIZONTAL
3	2438.60	106.35			75.55	2.94	27.86	0.00	Average	86	150	HORIZONTAL
4	2439.00	117.88			87.08	2.94	27.86	0.00	Peak	86	150	HORIZONTAL
5	2483.50	68.50	74.00	-5.50	37.72	2.96	27.82	0.00	Peak	86	150	HORIZONTAL
6	2483.50	50.61	54.00	-3.39	19.83	2.96	27.82	0.00	Average	86	150	HORIZONTAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamplifier Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2457.00	112.61			81.82	2.95	27.84	0.00	Peak	96	143	HORIZONTAL
2	2458.60	101.19			70.40	2.95	27.84	0.00	Average	96	143	HORIZONTAL
3	2483.50	52.46	54.00	-1.54	21.68	2.96	27.82	0.00	Average	96	143	HORIZONTAL
4	2483.70	72.31	74.00	-1.69	41.53	2.96	27.82	0.00	Peak	96	143	HORIZONTAL

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

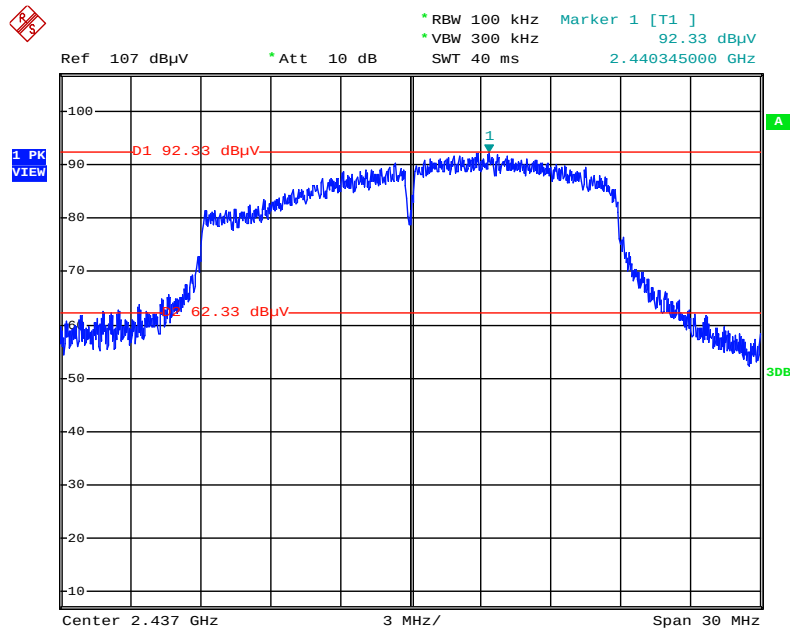
Note:

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

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

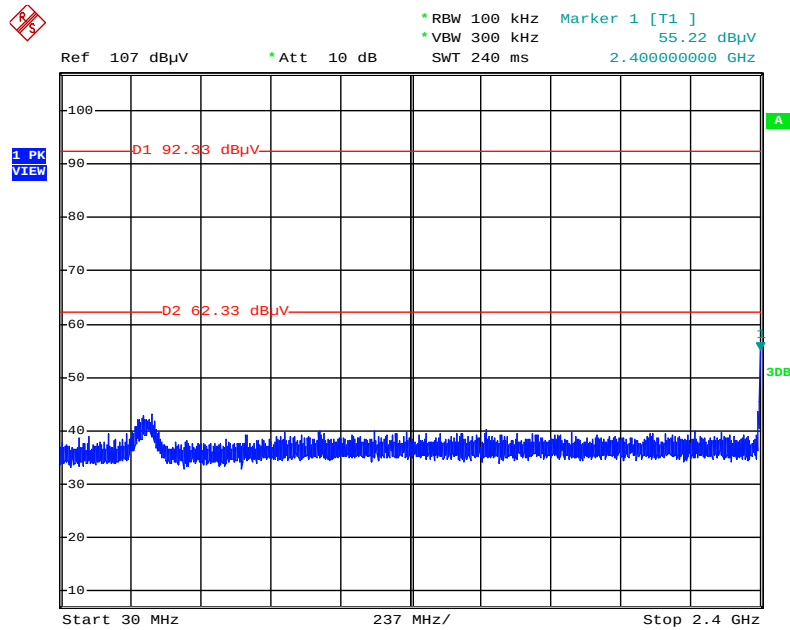
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11n MCS0 HT20 / Reference Level



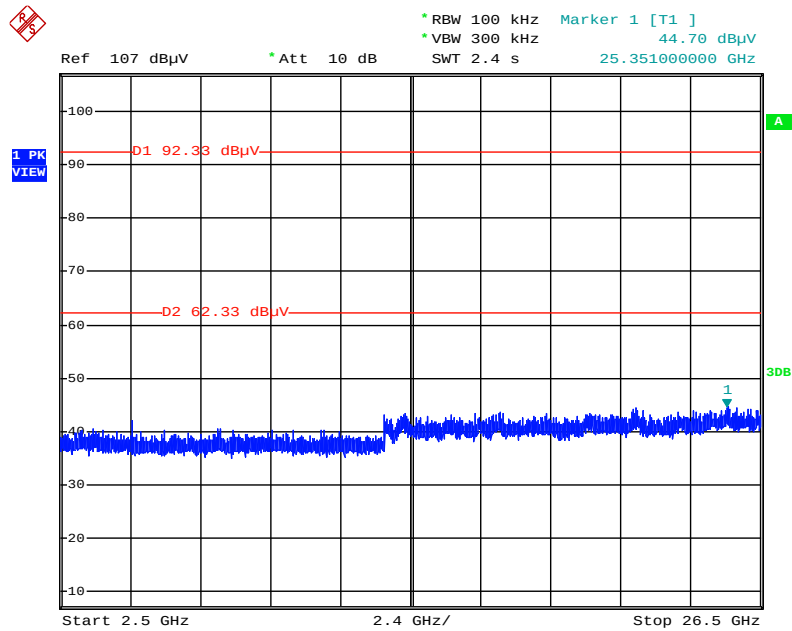
Date: 16.JUN.2014 23:06:12

Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 1 / 30MHz~2400MHz (down 30dBc)



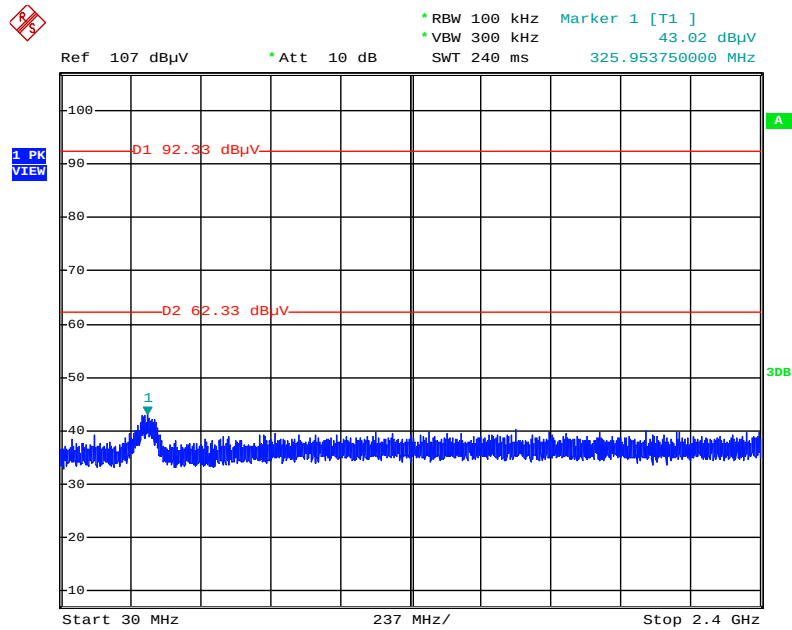
Date: 16.JUN.2014 23:07:17

Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 1 / 2500MHz~26500MHz (down 30dBc)



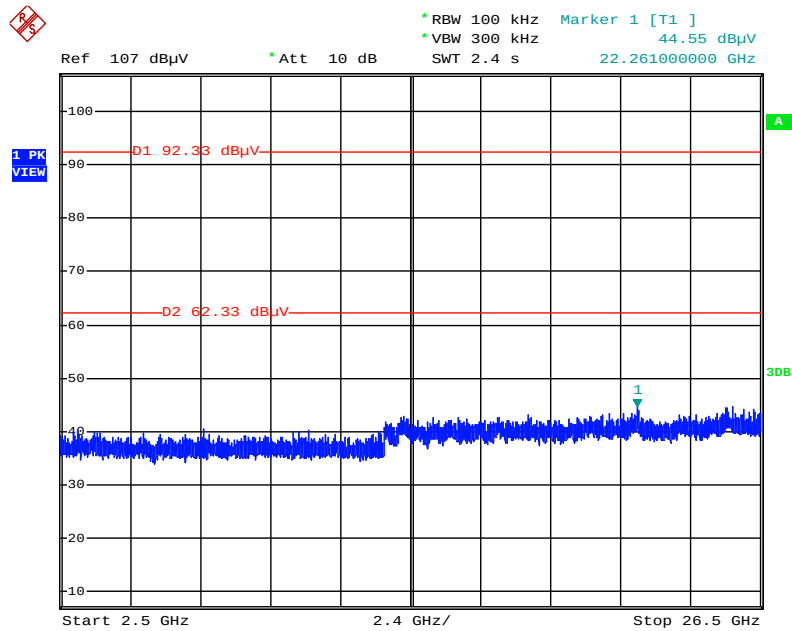
Date: 16.JUN.2014 23:08:25

Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 11 / 30MHz~2400MHz (down 30dBc)



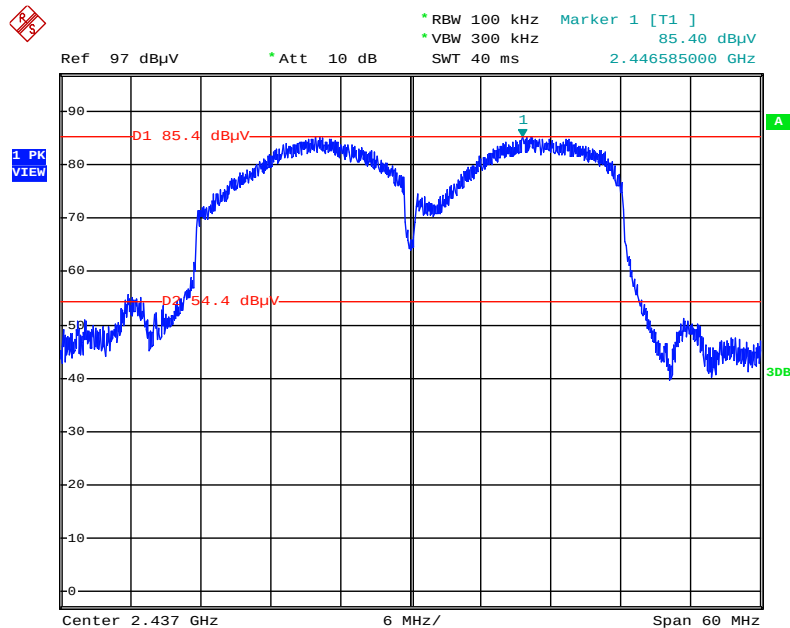
Date: 16.JUN.2014 23:09:10

Plot on Configuration IEEE 802.11n MCS0 HT20 / CH 11 / 2500MHz~26500MHz (down 30dBc)



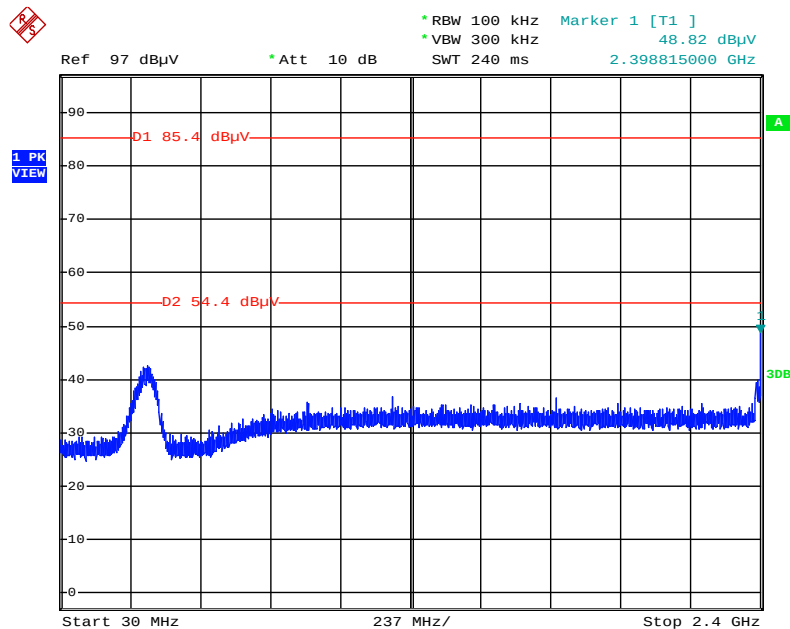
Date: 16.JUN.2014 23:09:45

Plot on Configuration IEEE 802.11n MCS0 HT40 / Reference Level



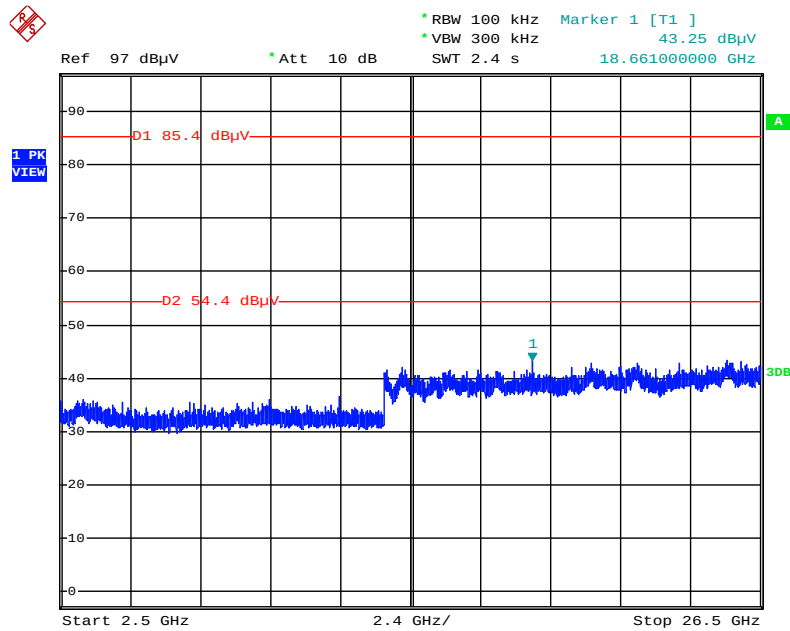
Date: 16.JUN.2014 23:18:25

Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 3 / 30MHz~2400MHz (down 30dBc)



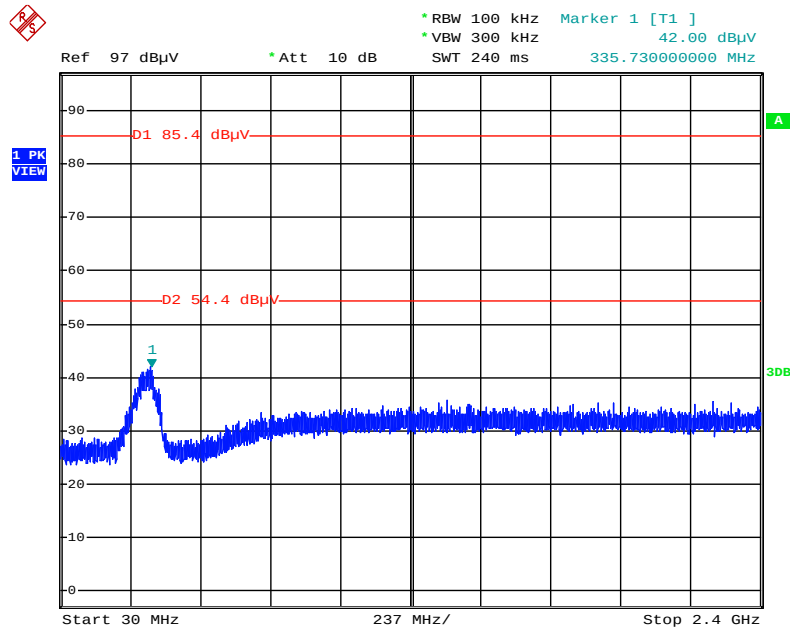
Date: 16.JUN.2014 23:20:02

Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 3 / 2500MHz~26500MHz (down 30dBc)



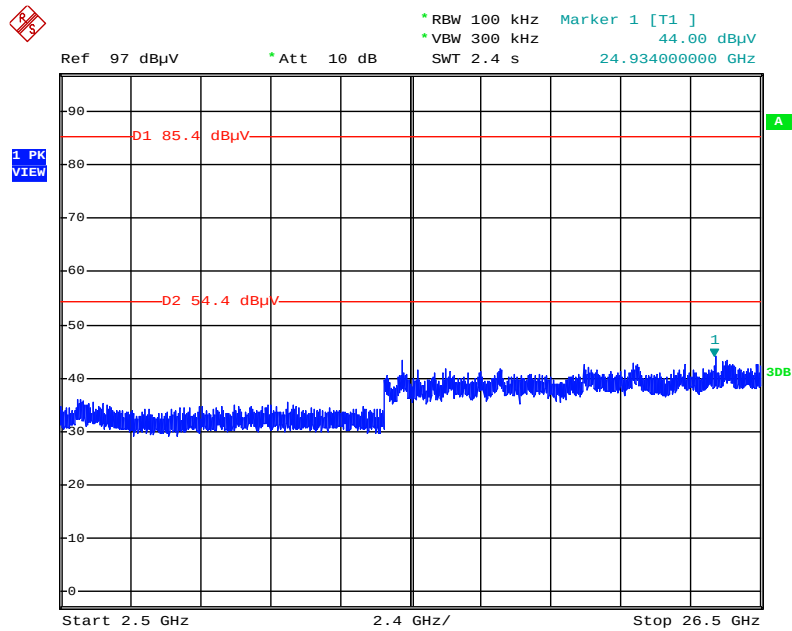
Date: 16.JUN.2014 23:20:51

Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 9 / 30MHz~2400MHz (down 30dBc)



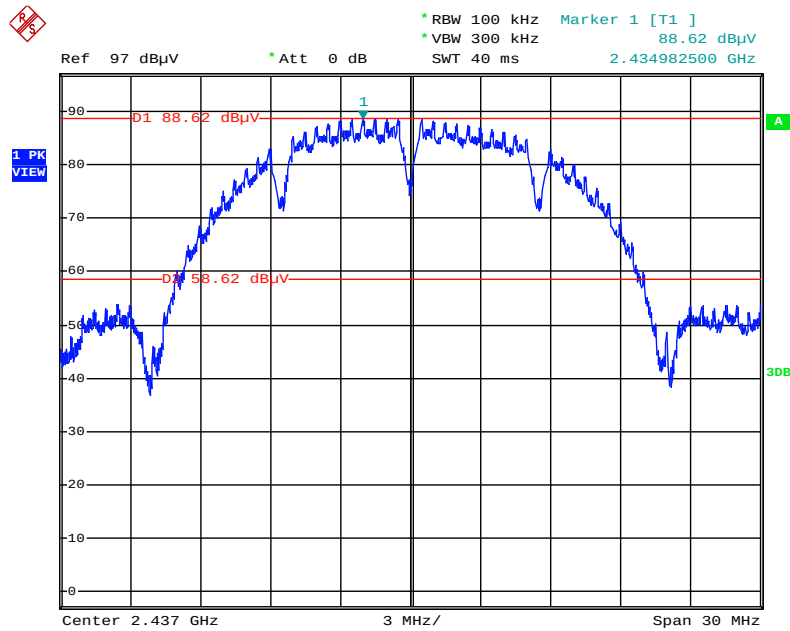
Date: 16.JUN.2014 23:21:37

Plot on Configuration IEEE 802.11n MCS0 HT40 / CH 9 / 2500MHz~26500MHz (down 30dBc)



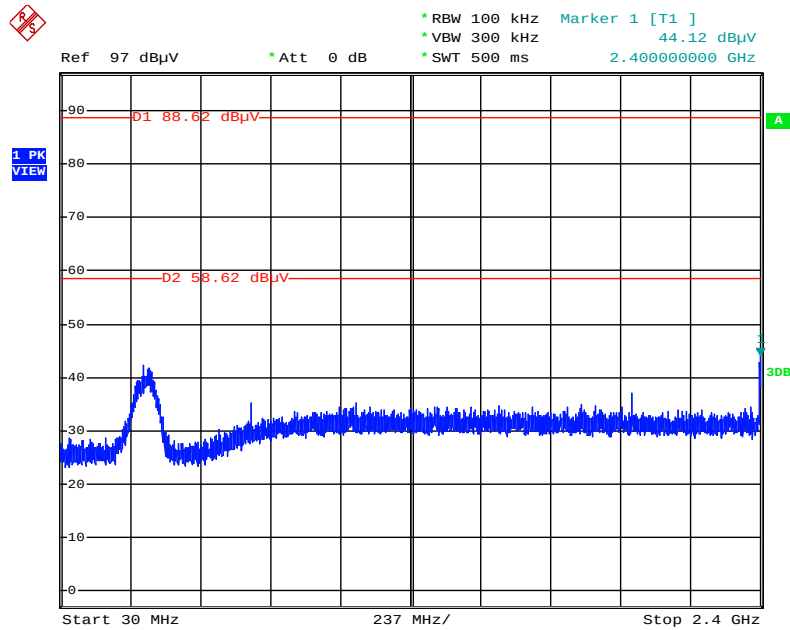
Date: 16.JUN.2014 23:22:12

Plot on Configuration IEEE 802.11b / Reference Level



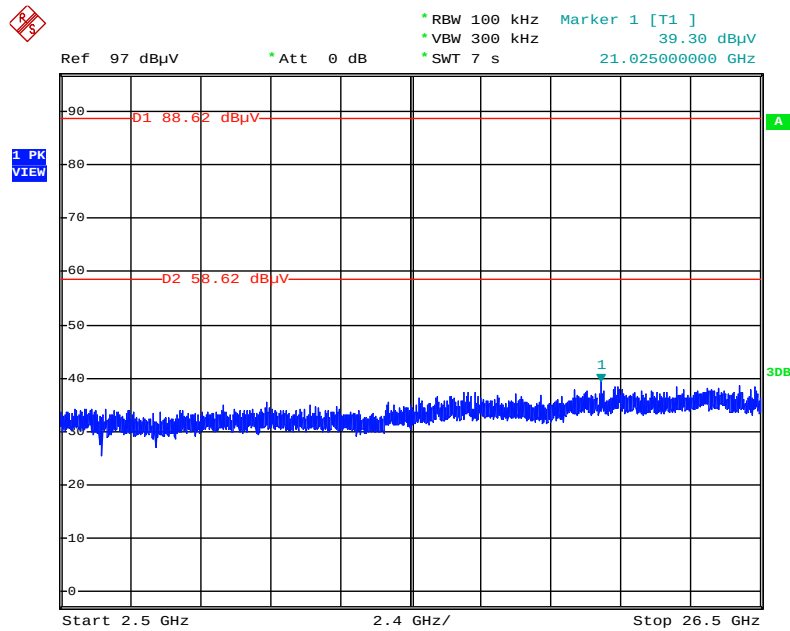
Date: 16.JUN.2014 22:47:14

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



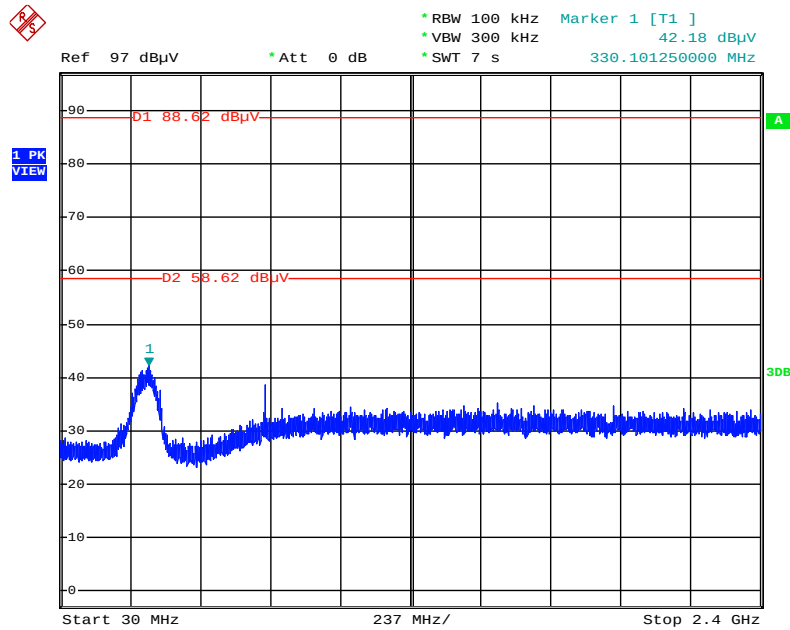
Date: 16.JUN.2014 22:56:25

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



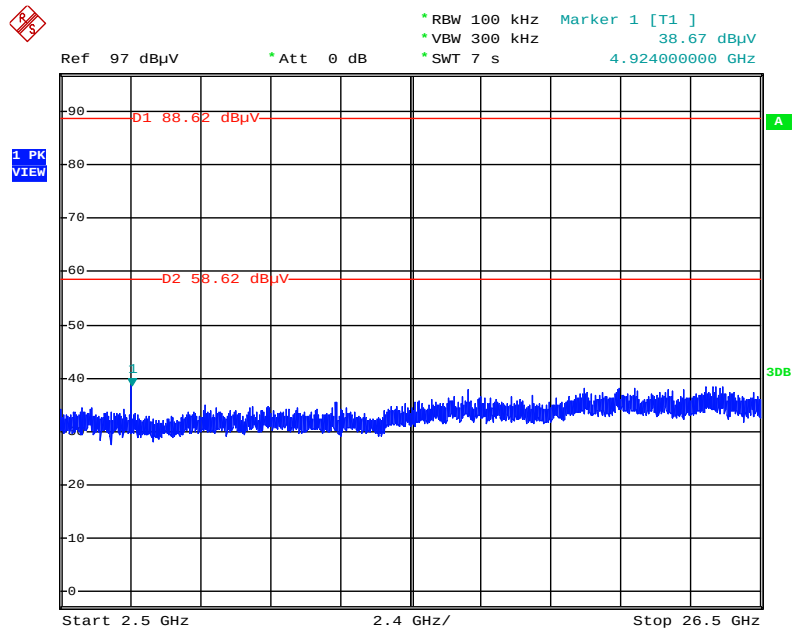
Date: 16.JUN.2014 23:03:36

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



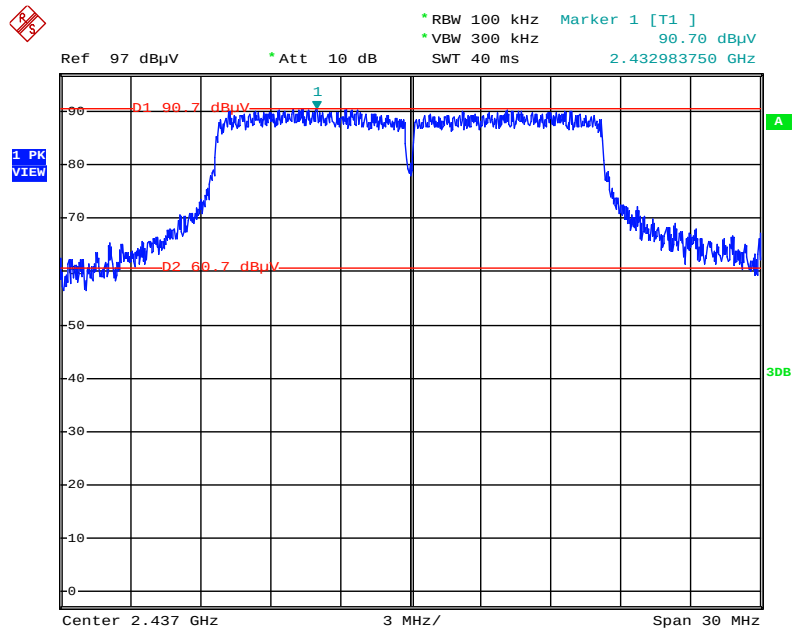
Date: 16.JUN.2014 23:09:10

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



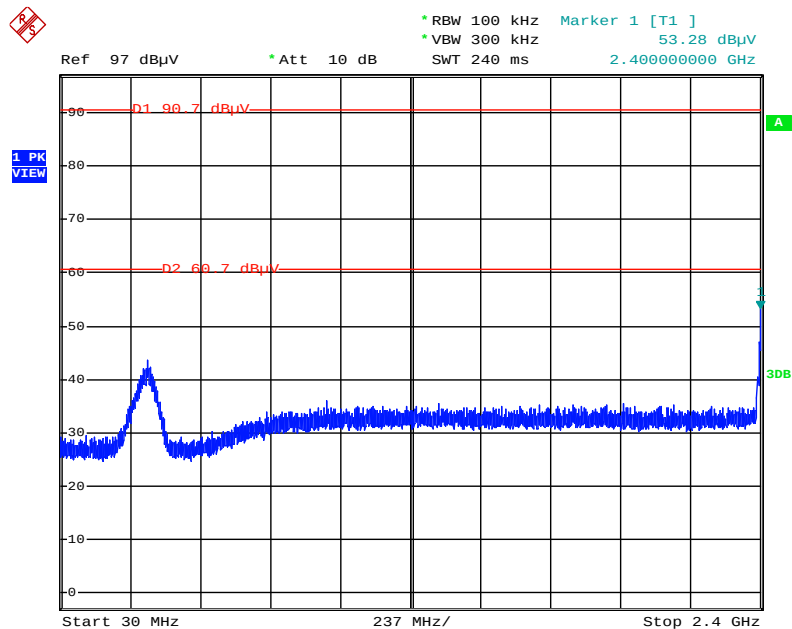
Date: 16.JUN.2014 23:07:42

Plot on Configuration IEEE 802.11g / Reference Level



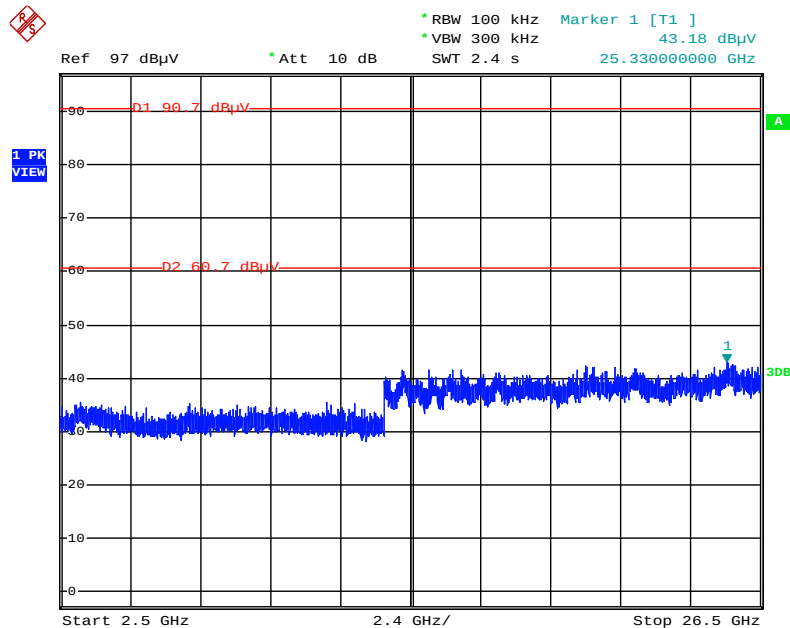
Date: 16.JUN.2014 22:55:42

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



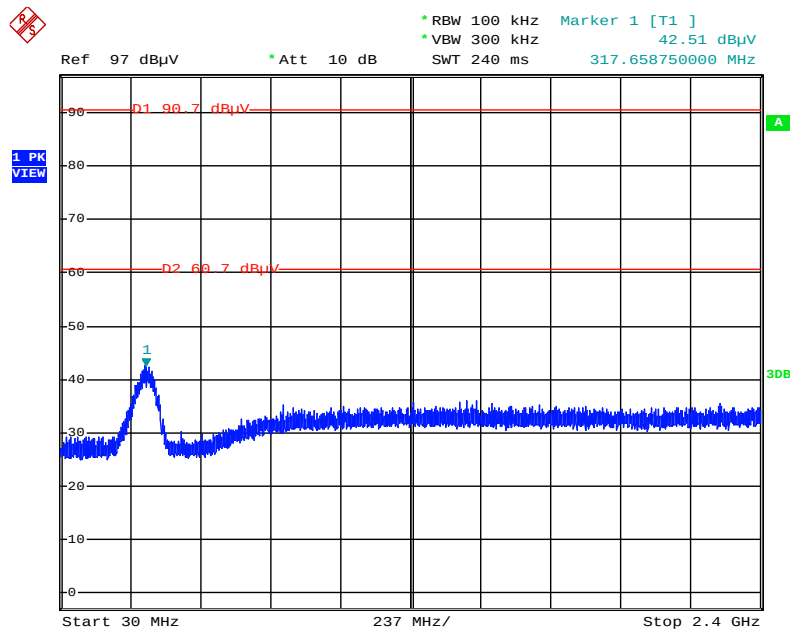
Date: 16.JUN.2014 22:57:17

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



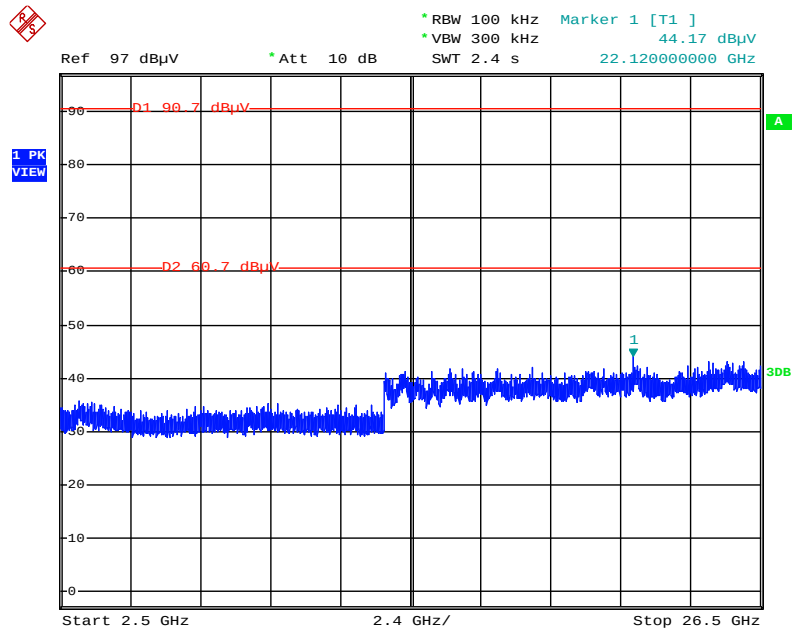
Date: 16.JUN.2014 23:23:06

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



Date: 16.JUN.2014 22:59:20

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



Date: 16.JUN.2014 23:23:57

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	CBL6112B	2928	30MHz ~ 2GHz	Dec. 27, 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-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)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2014	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.

NCR means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%