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FCC RADIO TEST REPORT

Applicant's company	**NETGEAR, Inc.**
Applicant Address	350 East Plumeria Drive, San Jose, California 95134, USA
FCC ID	**PY314100258**

Product Name	AC2350 Smart WiFi Router
Brand Name	NETGEAR
Model No.	R7500
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Mar. 30, 2014
Final Test Date	May 29, 2014
Submission Type	Original Equipment

Statement

Test result included is only for the IEEE 802.11n, IEEE 802.11b/g and IEEE 802.11a/ac 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 C63.10-2013**, **47 CFR FCC Part 15 Subpart C**, **KDB 558074 D01 v03r01**, **KDB 662911 D01 v02r01**, **KDB644545 D01v01r02.**

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

Testing Laboratory
1190

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 5
3.3. Table for Filed Antenna 6
3.4. Table for Carrier Frequencies 7
3.5. Table for Test Modes 8
3.6. Table for Testing Locations 10
3.7. Table for Supporting Units 11
3.8. Table for Parameters of Test Software Setting 12
3.9. EUT Operation during Test 13
3.10. Duty Cycle 14
3.11. Test Configurations 18

4. TEST RESULT 21

4.1. AC Power Line Conducted Emissions Measurement 21
4.2. Maximum Conducted Output Power Measurement 25
4.3. Power Spectral Density Measurement 29
4.4. 6dB Spectrum Bandwidth Measurement 48
4.5. Radiated Emissions Measurement 57
4.6. Emissions Measurement 84
4.7. Antenna Requirements 113

5. LIST OF MEASURING EQUIPMENTS 114

6. MEASUREMENT UNCERTAINTY 115

APPENDIX A. TEST PHOTOS ..... A1 ~ A5

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
FR433001AA	Rev. 01	Initial issue of report	Jun. 04, 2014

Certificate No.: CB10305243

1. CERTIFICATE OF COMPLIANCE

Product Name	:	AC2350 Smart WiFi Router
Brand Name	:	NETGEAR
Model No.	:	R7500
Applicant	:	NETGEAR, 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 Mar. 30, 2014 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	15.207	AC Power Line Conducted Emissions	Complies	15.04 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	0.05 dB
4.3	15.247(e)	Power Spectral Density	Complies	2.71 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	0.10 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.17 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	For 2.4GHz Band: WLAN (3TX, 3RX) For 5GHz Band: WLAN (4TX, 4RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	see the below table for IEEE 802.11n/ac
Data Modulation	For 802.11n: OFDM (BPSK / QPSK / 16QAM / 64QAM) For 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n/ac
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth For 5GHz Band: 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth ; 1 for 80MHz bandwidth
Channel Band Width (99%)	For 2.4GHz Band: MCS0 (HT20): 18.16 MHz ; MCS0 (HT40): 36.64 MHz For 5GHz Band: 802.11ac MCS0/Nss1 (VHT20): 17.76 MHz ; 802.11ac MCS0/Nss1 (VHT40): 36.32 MHz ; 802.11ac MCS0/Nss1 (VHT80): 75.20 MHz
Maximum Conducted Output Power	For 2.4GHz Band: MCS0 (HT20): 28.85 dBm ; MCS0 (HT40): 22.10 dBm For 5GHz Band: 802.11ac MCS0/Nss1 (VHT20): 26.47 dBm ; 802.11ac MCS0/Nss1 (VHT40): 26.39 dBm ; 802.11ac MCS0/Nss1 (VHT80): 27.03 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a/b/g

Items	Description
Product Type	802.11a: WLAN (4TX, 4RX) 802.11b/g: WLAN (3TX, 3RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	DSSS for IEEE 802.11b ; OFDM for IEEE 802.11a/g
Data Modulation	DSSS (BPSK / QPSK / CCK) ; OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	DSSS (1/ 2/ 5.5/11) ; OFDM (6/9/12/18/24/36/48/54)
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	11b/g: 11 ; 11a: 5
Channel Band Width (99%)	11b: 13.52 MHz ; 11g: 16.48 MHz ; 11a: 20.48 MHz
Maximum Conducted Output Power	11b: 28.68 dBm ; 11g: 29.07 dBm ; 11a: 28.75 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Beamforming Function (IEEE 802.11a/b/g/n)	☐ With beamforming	☒ Without beamforming
Beamforming Function (IEEE 802.11ac)	☒ With beamforming	☐ Without beamforming

Antenna and Band width

Antenna	Three (TX)		Four (TX)		
Band width Mode	20 MHz	40 MHz	20 MHz	40 MHz	80 MHz
IEEE 802.11a	X	X	V	X	X
IEEE 802.11b	V	X	X	X	X
IEEE 802.11g	V	X	X	X	X
For 2.4GHz Band: IEEE 802.11n	V	V	X	X	X
For 5GHz Band: IEEE 802.11n	X	X	V	V	X
IEEE 802.11ac	X	X	V	V	V

Note : The product has beamforming function for 802.11ac.

IEEE 11n/ac Spec.

Protocol		Number of Transmit Chains (NTX)	Data Rate / MCS
2.4GHz Band	802.11n (HT20)	3	MCS0-23
	802.11n (HT40)	3	MCS0-23
5GHz Band	802.11n (HT20)	4	MCS0-31
	802.11n (HT40)	4	MCS0-31
802.11ac (VHT20)		4	MCS 0-9/Nss1-4
802.11ac (VHT40)		4	MCS 0-9/Nss1-4
802.11ac (VHT80)		4	MCS 0-9/Nss1-4

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40.

Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT support VHT20, VHT40 and VHT80.

Note 3: Modulation modes consist of below configuration:
HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80: IEEE 802.11ac

3.2. Accessories

Power	Brand	Model No.	P/N	Rating
Adapter 1	NETGEAR	AD898F20	332-10613-01	Input: 100-240Vac, 50/60Hz, 1.0A Output: 12Vdc, 3.5A
Adapter 2	LEI	MU42-1120350-A1	332-10728-01	Input: 100-240Vac, 50/60Hz, 1.5A Output: 12Vdc, 3.5A

3.3. Table for Filed Antenna

Ant.	Brand	Model No.	Antenna Type	Connector
1	NETGEAR	R7500	Dipole Antenna	Reversed-SMA

Note: The EUT has four external antennas.

2.4GHz Band			
Frequency	Gain (dBi)	Frequency	Gain (dBi)
2412 MHz	0.9	2452 MHz	0.9
2422 MHz	1.1	2462 MHz	0.8
2437 MHz	1.1	-	-

5GHz Band 1		5GHz Band 4	
Frequency	Gain (dBi)	Frequency	Gain (dBi)
5180 MHz	2.0	5745 MHz	3.0
5190 MHz	2.1	5755 MHz	3.0
5200 MHz	2.1	5775 MHz	2.9
5210 MHz	2.2	5785 MHz	2.9
5230 MHz	2.3	5795 MHz	3.0
5240 MHz	2.3	5825 MHz	3.0

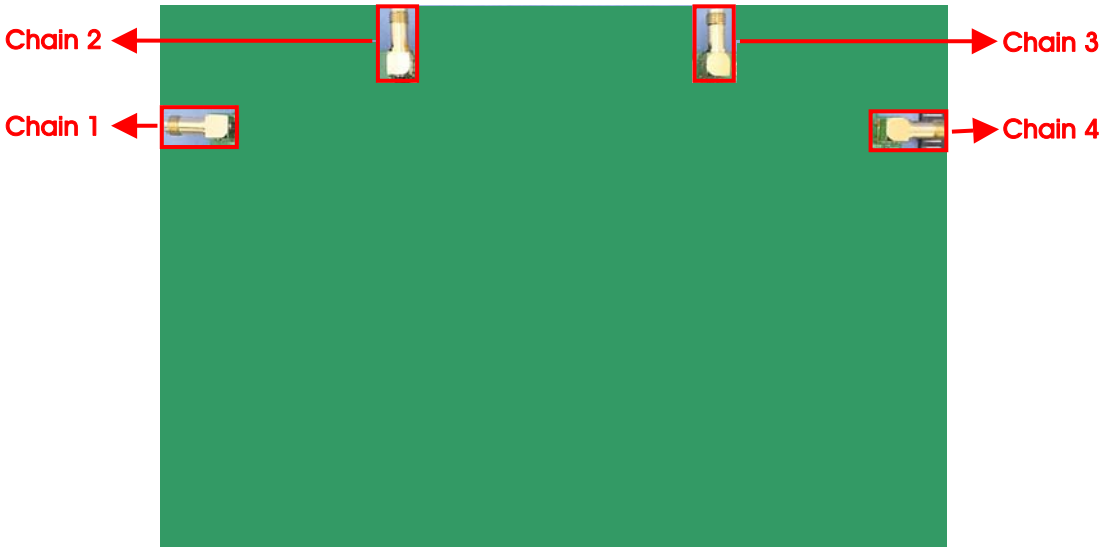
Note: There is one set of antenna provided to this EUT and them can be used as transmitting and receiving antenna.

For 2.4GHz Band (3TX/3RX)

Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.

For 5GHz Band (4TX/4RX)

Chain 1, Chain 2, Chain 3 and Chain 4 could transmit/receive simultaneously.



3.4. Table for Carrier Frequencies

For 2.4GHz Band:

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	-	-

For 5GHz Band:

There are three bandwidth systems.

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

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

For 80MHz bandwidth systems, use Channel 155.

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

3.5. Table for Test Modes

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

For 2.4GHz Band:

Test Items	Mode	Data Rate	Channel	Chain
AC Power Line Conducted Emissions	CTX	-	-	-
Maximum Conducted Output Power	11n HT20	MCS0	1/6/11	2+3+4
	11n HT40	MCS0	3/6/9	2+3+4
	11b/CCK	1 Mbps	1/6/11	2+3+4
	11g/BPSK	6 Mbps	1/6/11	2+3+4
Power Spectral Density	11n HT20	MCS0	1/6/11	2+3+4
	11n HT40	MCS0	3/6/9	2+3+4
	11b/CCK	1 Mbps	1/6/11	2+3+4
	11g/BPSK	6 Mbps	1/6/11	2+3+4
6dB Spectrum Bandwidth	11n HT20	MCS0	1/6/11	2+3+4
	11n HT40	MCS0	3/6/9	2+3+4
	11b/CCK	1 Mbps	1/6/11	2+3+4
	11g/BPSK	6 Mbps	1/6/11	2+3+4
Radiated Emissions Below 1GHz	CTX	-	-	-
Radiated Emissions Above 1GHz	11n HT20	MCS0	1/6/11	2+3+4
	11n HT40	MCS0	3/6/9	2+3+4
	11b/CCK	1 Mbps	1/6/11	2+3+4
	11g/BPSK	6 Mbps	1/6/11	2+3+4
Band Edge Emissions	11n HT20	MCS0	1/6/11	2+3+4
	11n HT40	MCS0	3/6/9	2+3+4
	11b/CCK	1 Mbps	1/6/11	2+3+4
	11g/BPSK	6 Mbps	1/6/11	2+3+4

For 5GHz Band:

Test Items	Mode	Data Rate	Channel	Chain
AC Power Line Conducted Emissions	CTX	-	-	-
Maximum Conducted Output Power	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
Power Spectral Density	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
6dB Spectrum Bandwidth	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
Radiated Emissions Below 1GHz	CTX	-	-	-
Radiated Emissions Above 1GHz	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
Band Edge Emissions	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4

Note: VHT20/VHT40 covers HT20/HT40, due to same modulation.

There are two modes of EUT, one is beamforming mode, and the other is non-beamforming mode for 802.11ac 20/40/80, after evaluating, beamforming mode has been evaluated to be the worst case, so it was selected to test and record in this test report.

The following test modes were performed for all tests:

For AC Power Line Conducted Emissions test:

Mode 1. EUT + Adapter 1

Mode 2. EUT + Adapter 2

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

For Radiated Emission below 1GHz test:

Mode 1. Laying of EUT+ Adapter 1

Mode 2. Stand of EUT+ Adapter 1

Mode 1 has been evaluated to be the worst case among Mode 1~2, thus measurement for Mode 3 will follow this same test mode.

Mode 3. Laying of EUT+ Adapter 2

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

For Radiated Emission above 1GHz and Radiated Emission Co-location tests:

There are two modes of EUT, one is Laying of EUT, and the other is Stand of EUT.

After evaluating, Laying of EUT has been evaluated to be the worst case.

Consequently, measurement for Radiated Emission above 1GHz and Radiated Emission Co-location tests will follow this same test mode.

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

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
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

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

3.7. Table for Supporting Units

Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

Test Site No: 03CH01-CB (below 1GHz)

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

Test Site No: 03CH01-CB (above 1GHz)

For IEEE 802.11a/b/g/n mode (non-beamforming function):

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

For IEEE 802.11ac mode (beamforming function):

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC
NB	DELL	M1330	DoC
WiFi USB Adapter	NETGEAR	A6200	PY312200200

Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6220	DoC

3.8. 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.

For 2.4GHz Band

Power Parameters of IEEE 802.11n MCS0 HT20

Test Software Version	DOS		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 HT20	15	24	17

Power Parameters of IEEE 802.11n MCS0 HT40

Test Software Version	DOS		
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 HT40	13	17	11.5

Power Parameters of IEEE 802.11b/g

Test Software Version	DOS		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	21	24	22
IEEE 802.11g	16.5	24	18.5

For 5GHz Band

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT20

Test Software Version	DOS		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0/Nss1 VHT20	19	19	19

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT40

Test Software Version	DOS	
Frequency	5755 MHz	5795 MHz
MCS0/Nss1 VHT40	19	19

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT80

Test Software Version	DOS
Frequency	5775 MHz
MCS0/Nss1 VHT80	20

Power Parameters of IEEE 802.11a

Test Software Version	DOS		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	23	23	23

3.9. EUT Operation during Test

For IEEE 802.11a/b/g/n mode (non-beamforming function):

The EUT was programmed to be in continuously transmitting mode.

For IEEE 802.11ac mode (beamforming function):

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

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

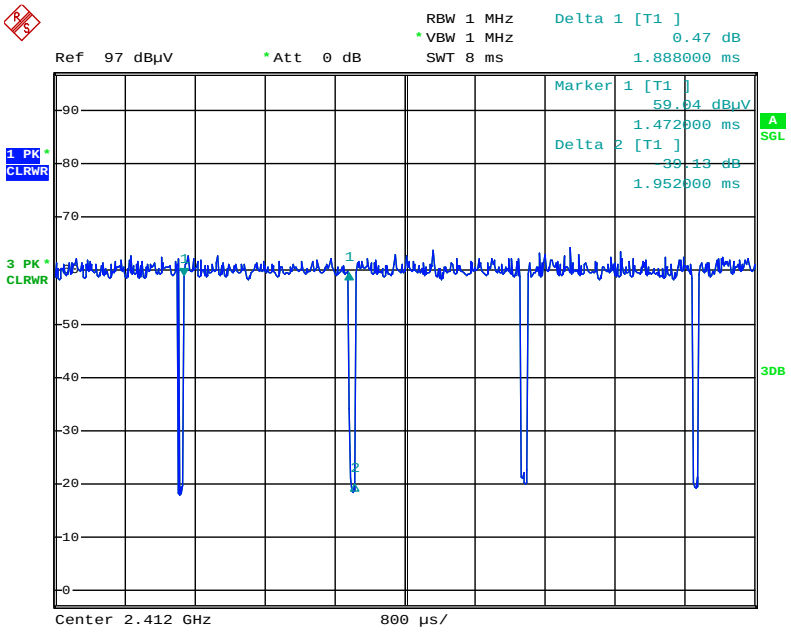
The program was executed as follows:

1. During the test, the EUT operation to normal function.
2. Executed command fixed test channel under DOS.
3. Executed "Lantest.exe" to link with the remote workstation to receive and transmit packet by WiFi USB Adapter and transmit duty cycle no less 98%

3.10. Duty Cycle

For 2.4GHz Band:

IEEE 802.11n MCS0 HT20



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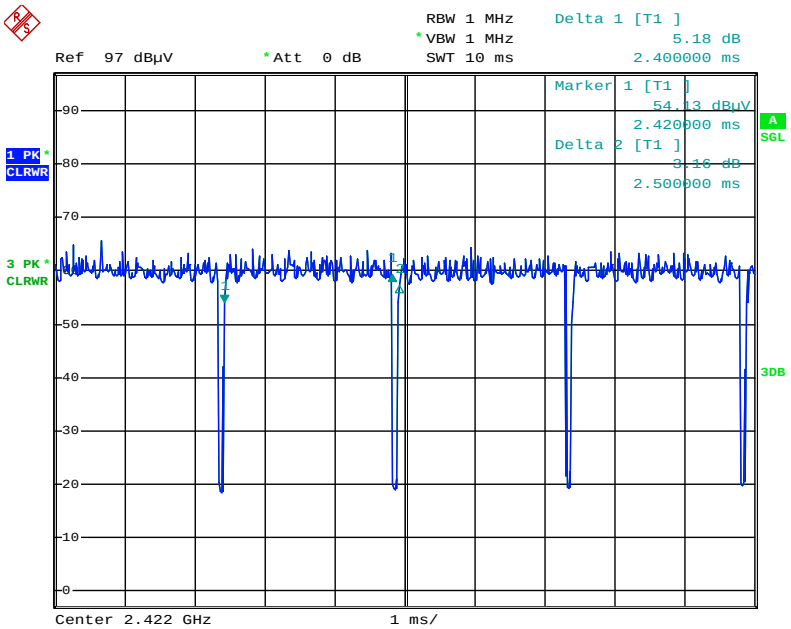
IEEE 802.11n MCS0 HT40



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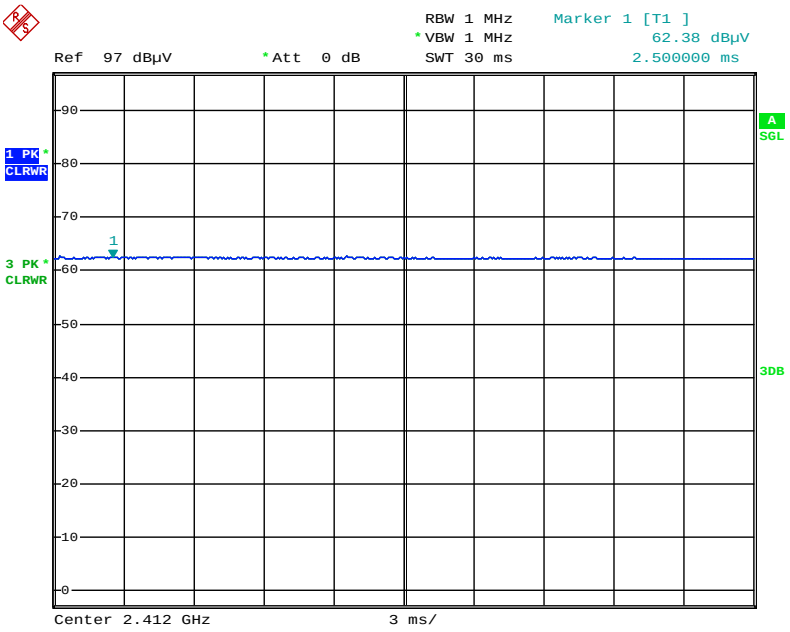
IEEE 802.11b



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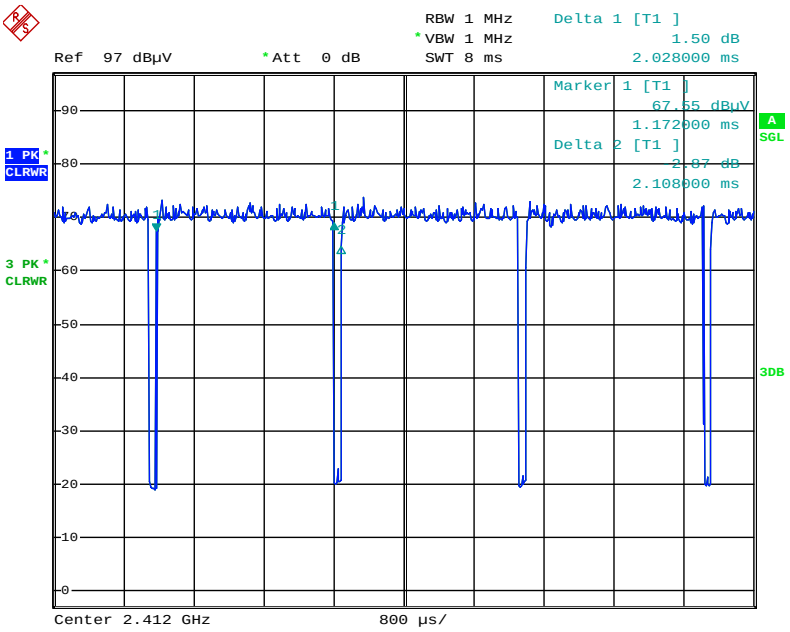
IEEE 802.11g



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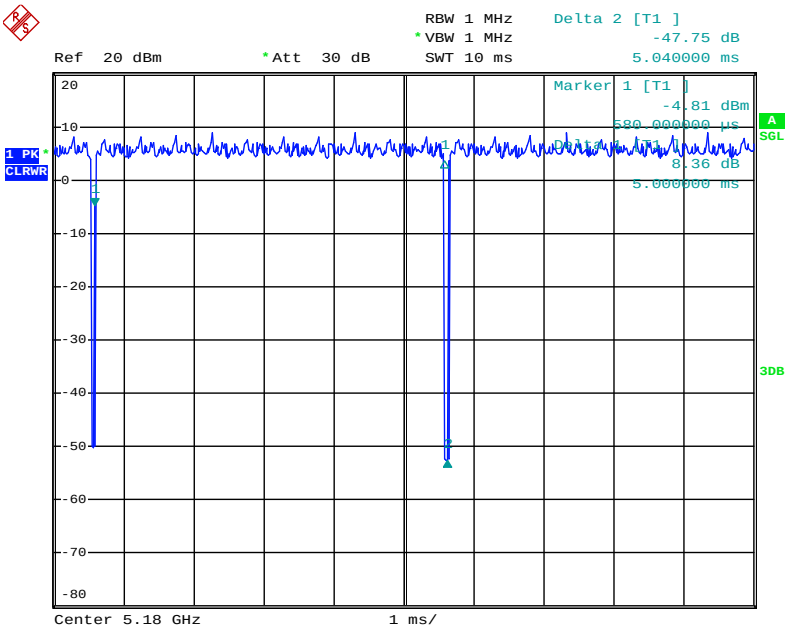
For 5GHz Band:

IEEE 802.11ac MCS0/Nss1 VHT20



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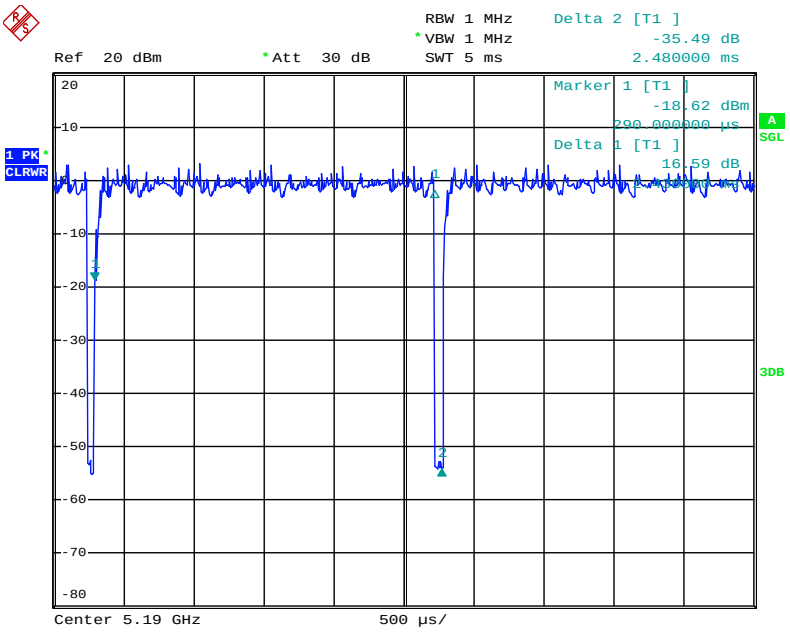
IEEE 802.11ac MCS0/Nss1 VHT40



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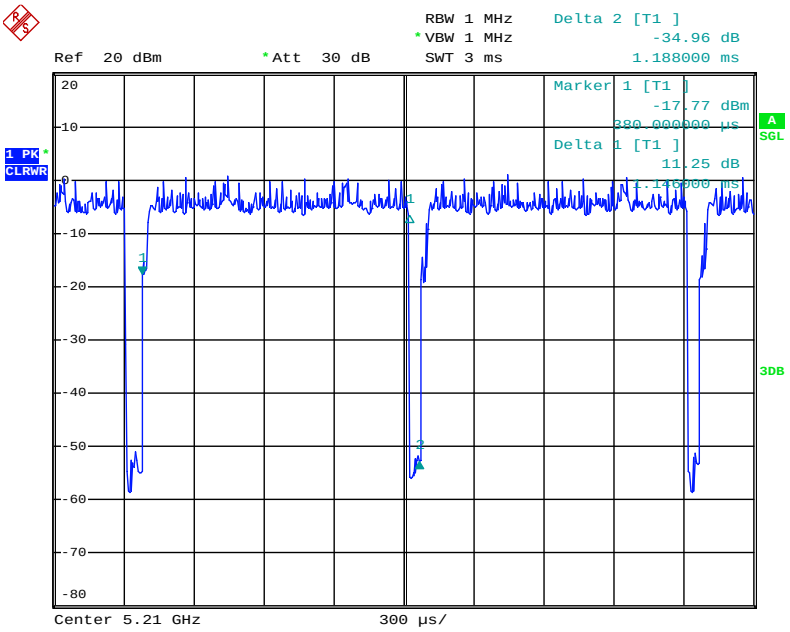
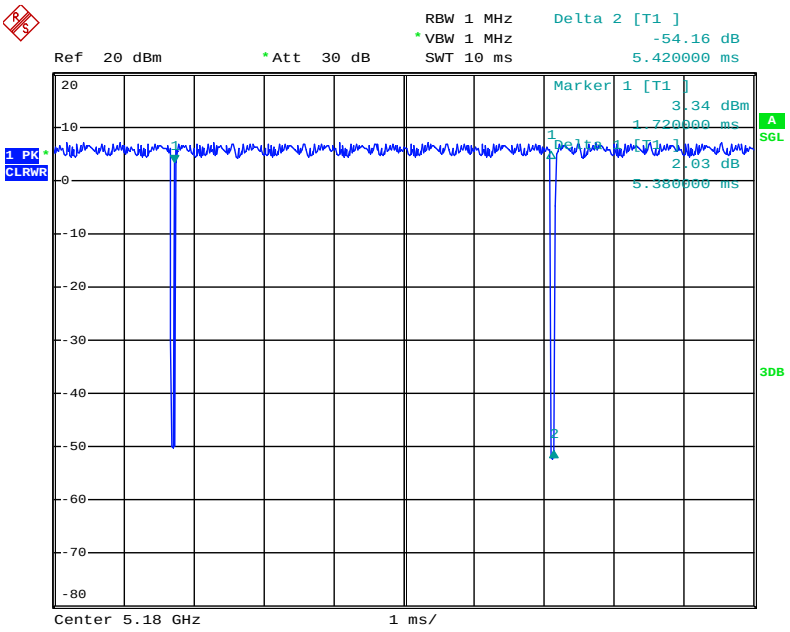
IEEE 802.11ac MCS0/Nss1 VHT80



Date: 9.MAY.2014 23:34:29

IEEE 802.11a



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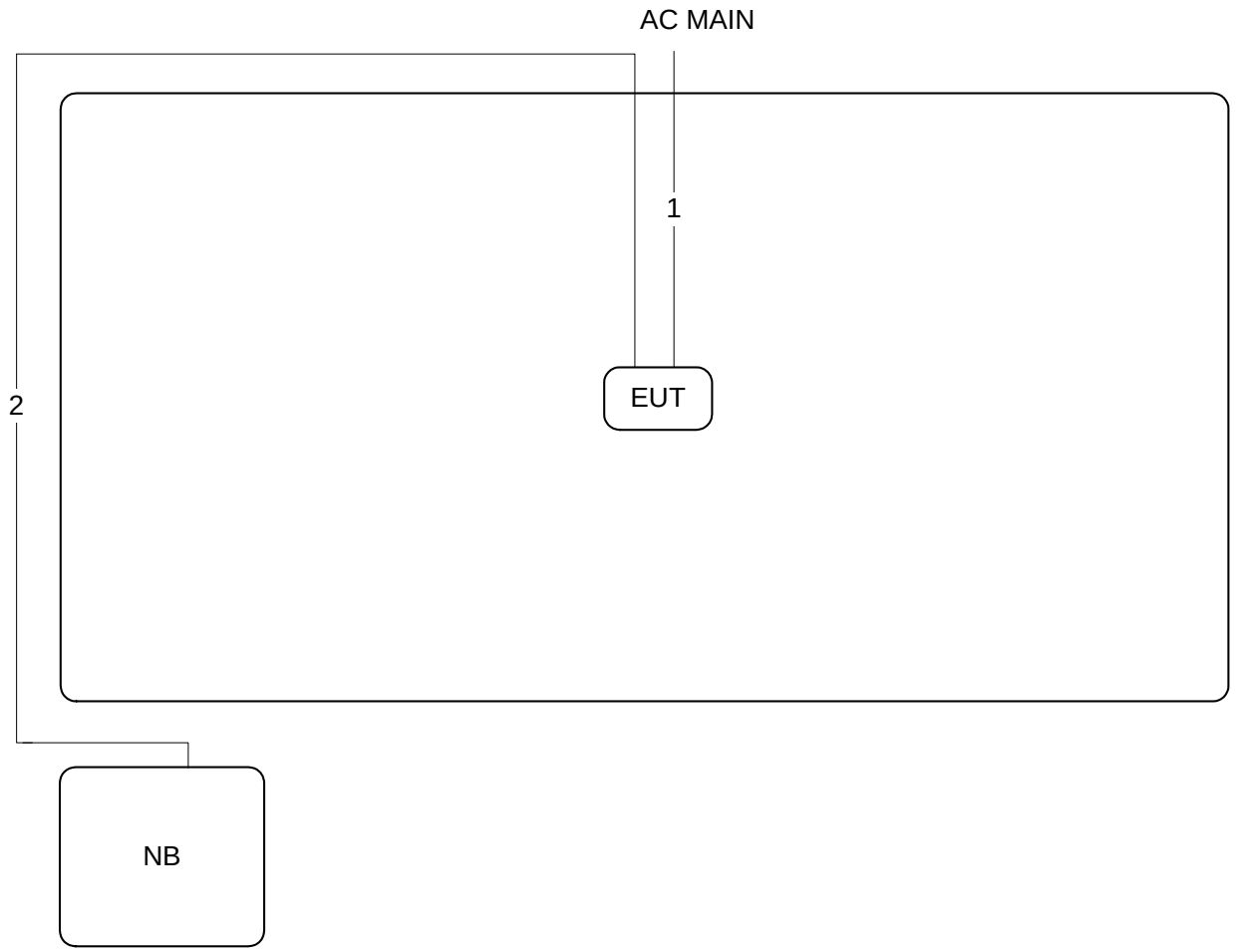
3.11. Test Configurations

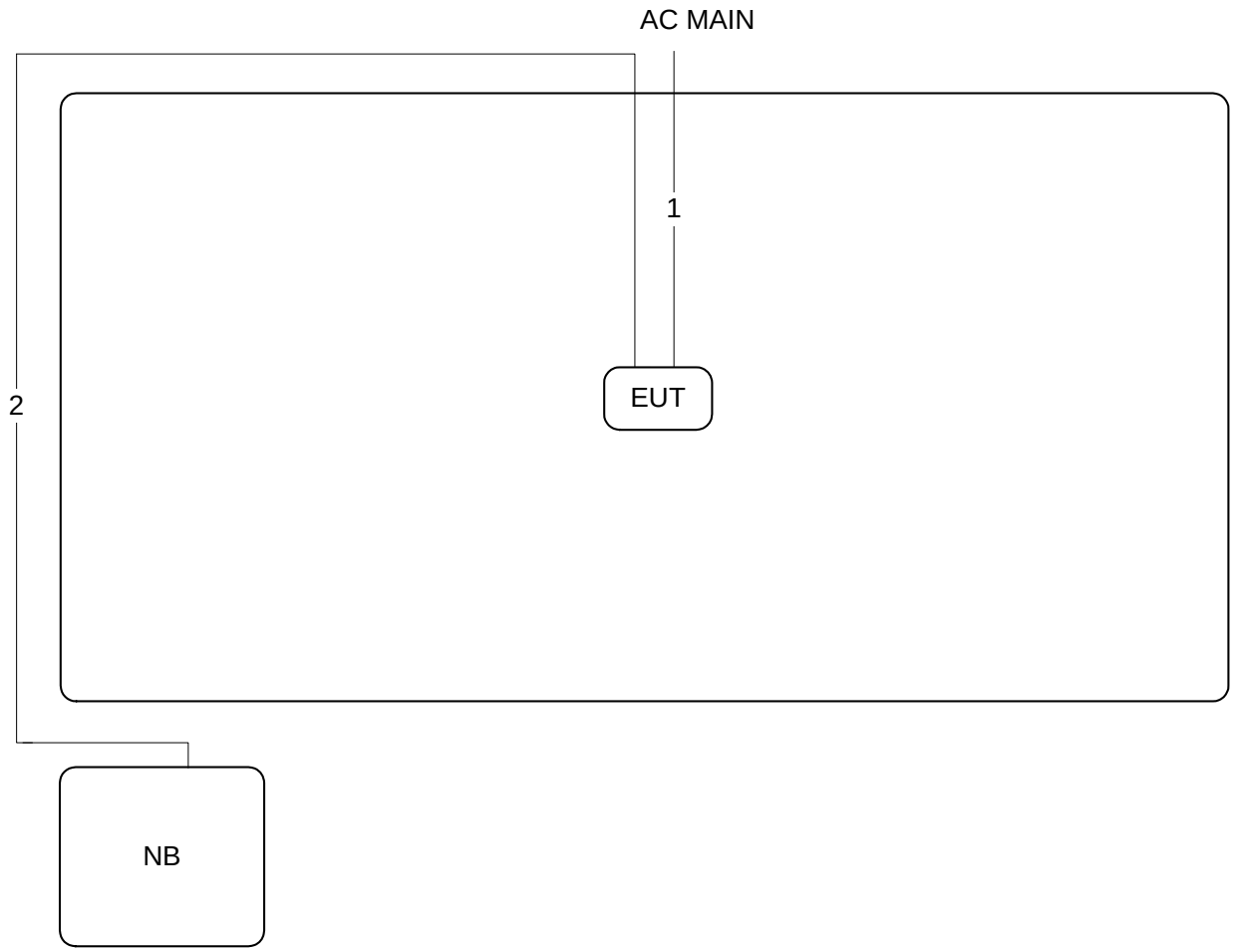
3.11.1. AC Power Line Conduction Emissions and Radiation Emissions Below 1GHz Test Configuration



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

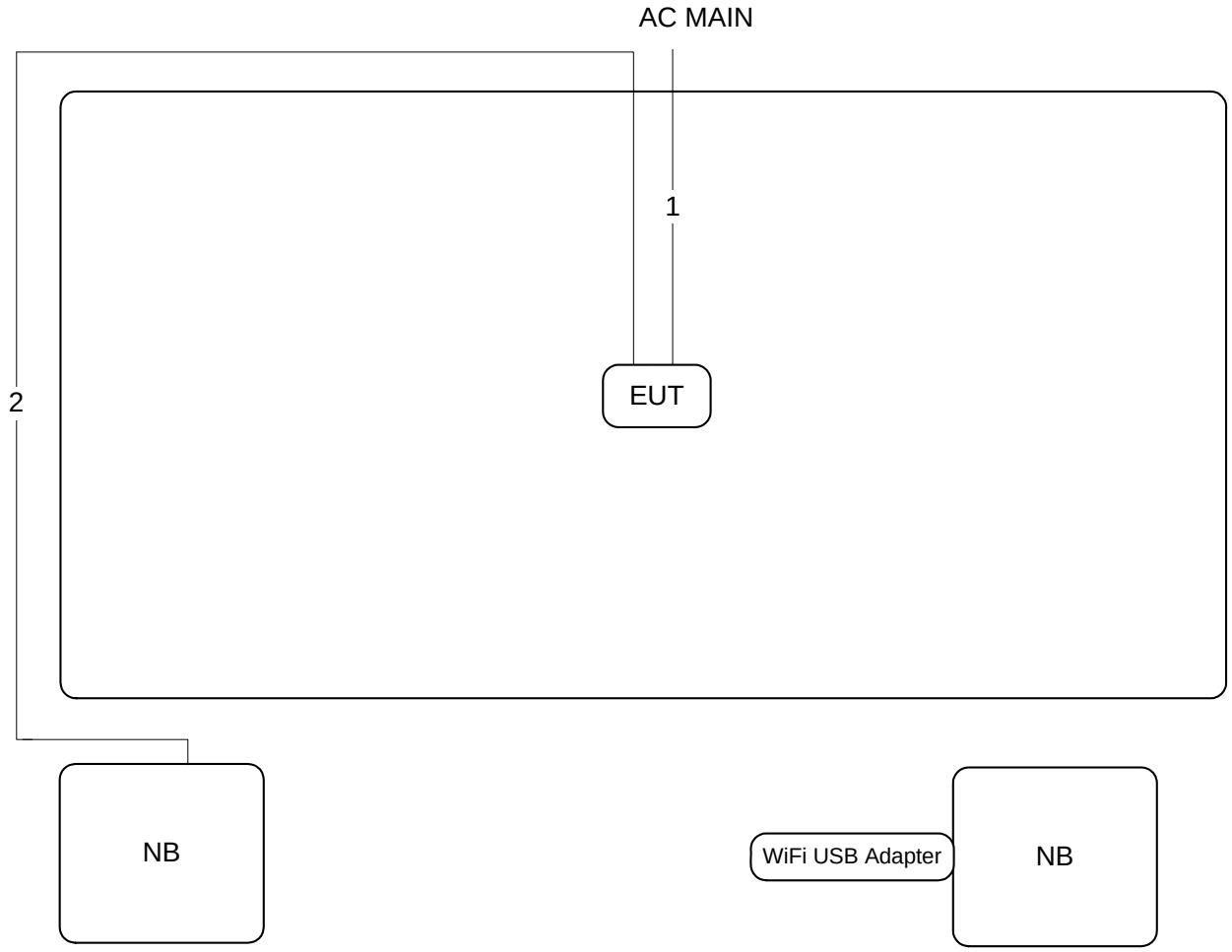
3.11.2. Radiation Emissions Above 1GHz Test Configuration

For IEEE 802.11a/b/g/n mode (non-beamforming function):



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

For IEEE 802.11ac mode (beamforming function):



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

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

For this product which is designed to be connected to the AC power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed below limits table.

Frequency (MHz)	QP Limit (dBuV)	AV Limit (dBuV)
0.15~0.5	66~56	56~46
0.5~5	56	46
5~30	60	50

4.1.2. Measuring Instruments and Setting

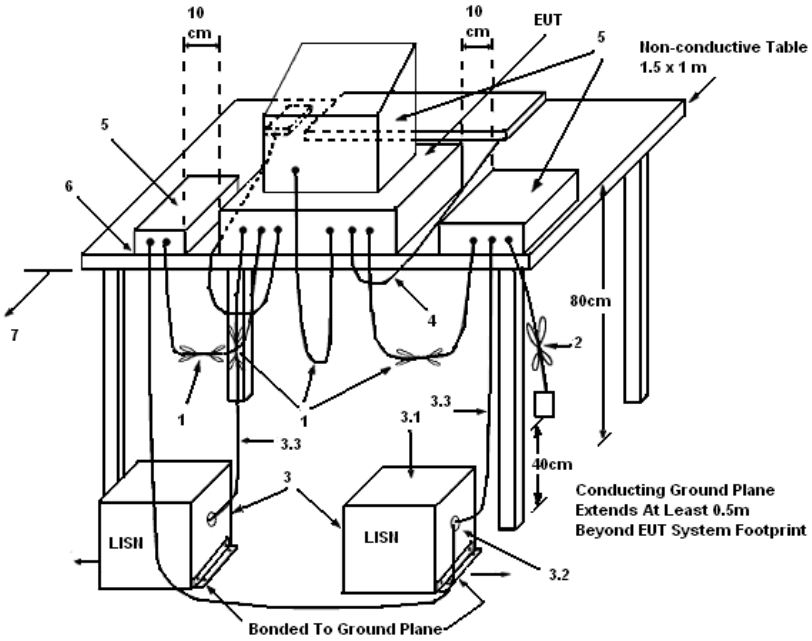
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

Receiver Parameters	Setting
Attenuation	10 dB
Start Frequency	0.15 MHz
Stop Frequency	30 MHz
IF Bandwidth	9 kHz

4.1.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT or host of EUT has to be placed 0.4 meter far from the conducting wall of the shielding room and at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT or host of EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connected to the other LISNs. The LISN should provide 50uH/50ohms coupling impedance.
4. The frequency range from 150 kHz to 30 MHz was searched.
5. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. The measurement has to be done between each power line and ground at the power terminal.

4.1.4. Test Setup Layout



LEGEND:

(1) Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.

(2) I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

(3) EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50 Ω. LISN can be placed on top of, or immediately beneath, reference ground plane.

(3.1) All other equipment powered from additional LISN(s).

(3.2) Multiple outlet strip can be used for multiple power cords of non-EUT equipment.

(3.3) LISN at least 80 cm from nearest part of EUT chassis.

(4) Cables of hand-operated devices, such as keyboards, mice, etc., shall be placed as for normal use.

(5) Non-EUT components of EUT system being tested.

(6) Rear of EUT, including peripherals, shall all be aligned and flush with rear of tabletop.

(7) Rear of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.

4.1.5. Test Deviation

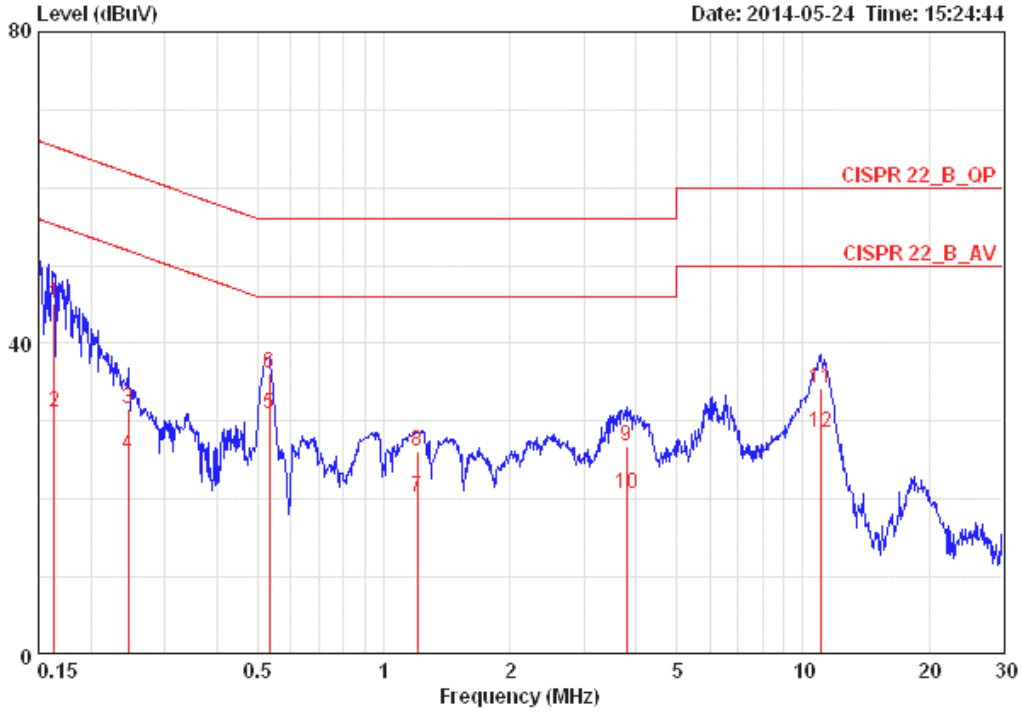
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

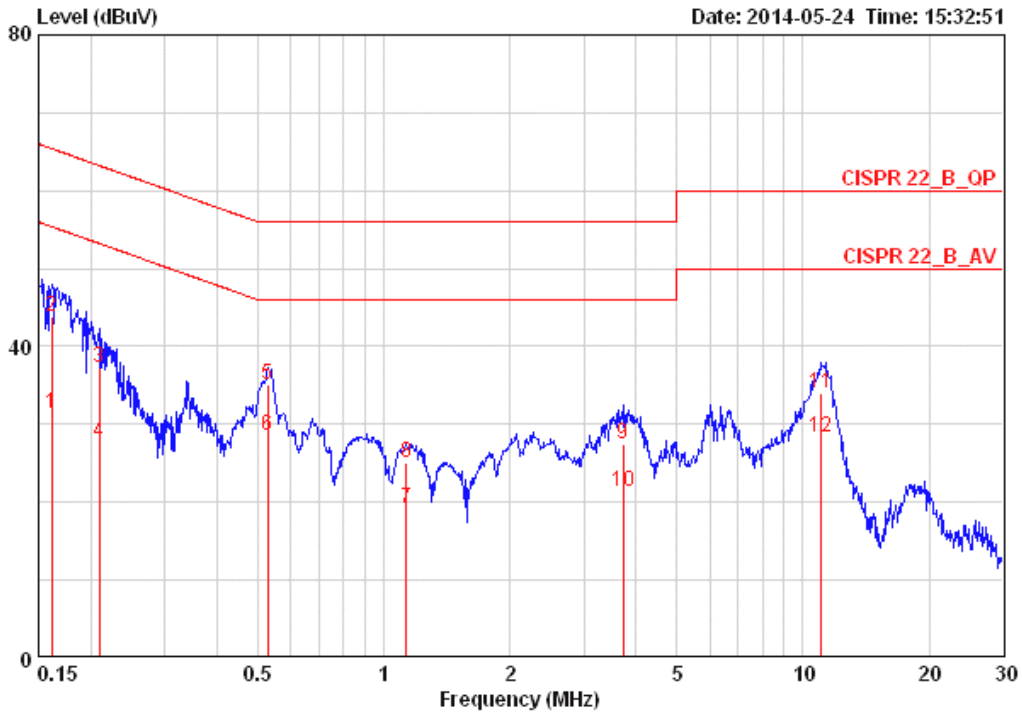
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	51%
Test Engineer	Parody Lin	Phase	Line
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.16327	45.15	-20.15	65.30	0.08	44.91	0.16	LINE	QP
2	0.16327	31.28	-24.02	55.30	0.08	31.04	0.16	LINE	AVERAGE
3	0.24552	31.50	-30.41	61.91	0.08	31.25	0.17	LINE	QP
4	0.24552	25.71	-26.20	51.91	0.08	25.46	0.17	LINE	AVERAGE
5 @	0.53215	30.96	-15.04	46.00	0.08	30.69	0.19	LINE	AVERAGE
6	0.53215	36.21	-19.79	56.00	0.08	35.94	0.19	LINE	QP
7	1.203	20.27	-25.73	46.00	0.10	19.96	0.21	LINE	AVERAGE
8	1.203	26.24	-29.76	56.00	0.10	25.93	0.21	LINE	QP
9	3.799	26.78	-29.22	56.00	0.15	26.34	0.30	LINE	QP
10	3.799	20.63	-25.37	46.00	0.15	20.19	0.30	LINE	AVERAGE
11	11.080	34.23	-25.77	60.00	0.27	33.57	0.39	LINE	QP
12	11.080	28.61	-21.39	50.00	0.27	27.95	0.39	LINE	AVERAGE

Temperature	24°C	Humidity	51%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.16155	31.34	-24.04	55.38	0.08	31.10	0.16	NEUTRAL	AVERAGE
2	0.16155	43.91	-21.47	65.38	0.08	43.67	0.16	NEUTRAL	QP
3	0.20944	37.27	-25.96	63.23	0.08	37.02	0.17	NEUTRAL	QP
4	0.20944	27.72	-25.51	53.23	0.08	27.47	0.17	NEUTRAL	AVERAGE
5	0.52934	35.12	-20.88	56.00	0.09	34.84	0.19	NEUTRAL	QP
6	0.52934	28.59	-17.41	46.00	0.09	28.31	0.19	NEUTRAL	AVERAGE
7	1.129	19.26	-26.74	46.00	0.09	18.96	0.21	NEUTRAL	AVERAGE
8	1.129	25.04	-30.96	56.00	0.09	24.74	0.21	NEUTRAL	QP
9	3.720	27.54	-28.46	56.00	0.15	27.09	0.29	NEUTRAL	QP
10	3.720	21.32	-24.68	46.00	0.15	20.87	0.29	NEUTRAL	AVERAGE
11	11.080	34.03	-25.97	60.00	0.27	33.37	0.39	NEUTRAL	QP
12	11.080	28.42	-21.58	50.00	0.27	27.76	0.39	NEUTRAL	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter output power.

4.2.2. Measuring Instruments and Setting

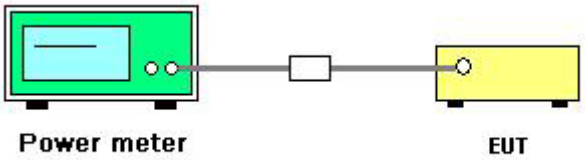
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	Average

4.2.3. Test Procedures

1. Test procedures refer KDB 558074 D01 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.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

Temperature	20°C	Humidity	53%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n/ac
Test Date	May 23, 2014		

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 HT20

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 2	Chain 3	Chain 4	Total		
1	2412 MHz	15.86	15.32	14.82	20.13	30.00	Complies
6	2437 MHz	24.36	24.11	23.75	28.85	30.00	Complies
11	2462 MHz	17.23	17.03	17.72	22.11	30.00	Complies

Configuration IEEE 802.11n MCS0 HT40

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 2	Chain 3	Chain 4	Total		
3	2422 MHz	13.73	12.86	13.24	18.06	30.00	Complies
6	2437 MHz	17.42	17.25	17.31	22.10	30.00	Complies
9	2452 MHz	12.02	11.61	11.81	16.59	30.00	Complies

For 5GHz Band

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
149	5745 MHz	20.22	20.33	20.58	20.64	26.47	26.98	Complies
157	5785 MHz	20.08	20.30	20.03	20.27	26.19	27.08	Complies
165	5825 MHz	20.23	20.68	20.36	20.42	26.45	26.98	Complies

Note: CH149 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=9.02dBi >6dBi, so limit=30 – (9.02 – 6)=26.98dBm.

CH157 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=8.92dBi >6dBi, so limit=30 – (8.92 – 6)=27.08dBm.

CH165 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=9.02dBi >6dBi, so limit=30 – (9.02 – 6)=26.98dBm.

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
151	5755 MHz	20.42	20.39	20.12	20.53	26.39	26.98	Complies
159	5795 MHz	20.21	20.41	20.3	20.32	26.33	26.98	Complies

Note: CH151, CH159 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=9.02dBi >6dBi, so limit=30 – (9.02 – 6)=26.98dBm.

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
155	5775 MHz	21.18	21.02	21.08	20.76	27.03	27.08	Complies

Note: CH155 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=8.92dBi >6dBi, so limit=30 – (8.92 – 6)=27.08dBm.

Temperature	20°C	Humidity	53%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a/b/g
Test Date	May 23, 2014		

Configuration IEEE 802.11b

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 2	Chain 3	Chain 4	Total		
1	2412 MHz	22.15	21.54	21.23	26.43	30.00	Complies
6	2437 MHz	24.45	23.71	23.51	28.68	30.00	Complies
11	2462 MHz	23.21	22.45	22.46	27.49	30.00	Complies

Configuration IEEE 802.11g

Channel	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 2	Chain 3	Chain 4	Total		
1	2412 MHz	17.48	16.76	16.49	21.70	30.00	Complies
6	2437 MHz	24.52	24.26	24.12	29.07	30.00	Complies
11	2462 MHz	19.53	18.84	19.02	23.91	30.00	Complies

Configuration IEEE 802.11a

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
149	5745 MHz	22.95	22.55	21.72	23.01	28.61	30.00	Complies
157	5785 MHz	23.26	22.82	21.86	22.86	28.75	30.00	Complies
165	5825 MHz	23.07	23.22	21.94	22.51	28.73	30.00	Complies

4.3. Power Spectral Density Measurement

4.3.1. Limit

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

4.3.2. Measuring Instruments and Setting

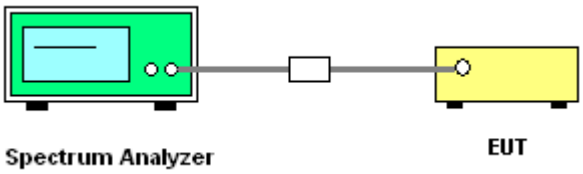
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RBW	3 kHz ≤ RBW ≤ 100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

4.3.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03r01 section 10.2 Method PKPSD (peak PSD) and KDB 662911 D01 v02r01 section In-Band Power Spectral Density (PSD) Measurements option (b) Measure and sum spectral maximal across the outputs.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be ≤ 8 dBm.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Power Spectral Density

Temperature	20°C	Humidity	53%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n/ac

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 HT20

Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 2	Chain 3	Chain 4	Total		
1	2412 MHz	-10.81	-10.54	-10.81	-5.95	8.00	Complies
6	2437 MHz	-2.76	-2.75	-2.43	2.13	8.00	Complies
11	2462 MHz	-9.32	-8.66	-8.92	-4.19	8.00	Complies

Configuration IEEE 802.11n MCS0 HT40

Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 2	Chain 3	Chain 4	Total		
3	2422 MHz	-16.57	-14.77	-15.76	-10.87	8.00	Complies
6	2437 MHz	-12.56	-12.20	-11.58	-7.32	8.00	Complies
9	2452 MHz	-17.17	-17.97	-18.06	-12.94	8.00	Complies

For 5GHz Band

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
149	5745 MHz	-7.30	-7.55	-7.38	-7.76	-1.47	4.98	Complies
157	5785 MHz	-7.27	-7.56	-6.81	-7.18	-1.18	5.08	Complies
165	5825 MHz	-6.83	-8.27	-7.28	-7.39	-1.39	4.98	Complies

Note: CH149 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=9.02dBi >6dBi, so limit=8 – (9.02 – 6)=4.98dBm/3kHz.

CH157 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=8.92dBi >6dBi, so limit=8 – (8.92 – 6)=5.08dBm/3kHz.

CH165 directional gain=G_{ANT}T+10log(N_{ANT}/Nss)=9.02dBi >6dBi, so limit=8 – (9.02 – 6)=4.98dBm/3kHz.

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
151	5755 MHz	-8.89	-9.74	-9.49	-9.00	-3.25	4.98	Complies
159	5795 MHz	-9.35	-9.62	-9.04	-9.72	-3.40	4.98	Complies

Note: CH151, CH159 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=9.02dBi >6dBi, so limit=8 – (9.02 – 6)=4.98dBm/3kHz.

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
155	5775 MHz	-10.59	-10.61	-11.58	-11.91	-5.11	5.08	Complies

Note: CH155 directional gain=G_{ANT}+10log(N_{ANT}/Nss)=8.92dBi >6dBi, so limit=8 – (8.92 – 6)=5.08dBm/3kHz.

Temperature	20°C	Humidity	53%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a/b/g

Configuration IEEE 802.11b

Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 2	Chain 3	Chain 4	Total		
1	2412 MHz	-3.28	-3.29	-2.00	1.96	8.00	Complies
6	2437 MHz	-0.06	1.07	0.48	5.29	8.00	Complies
11	2462 MHz	-2.97	-1.84	-2.87	2.24	8.00	Complies

Configuration IEEE 802.11g

Channel	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 2	Chain 3	Chain 4	Total		
1	2412 MHz	-8.98	-9.37	-9.16	-4.40	8.00	Complies
6	2437 MHz	-1.93	-2.14	-1.85	2.80	8.00	Complies
11	2462 MHz	-5.64	-6.96	-6.95	-1.70	8.00	Complies

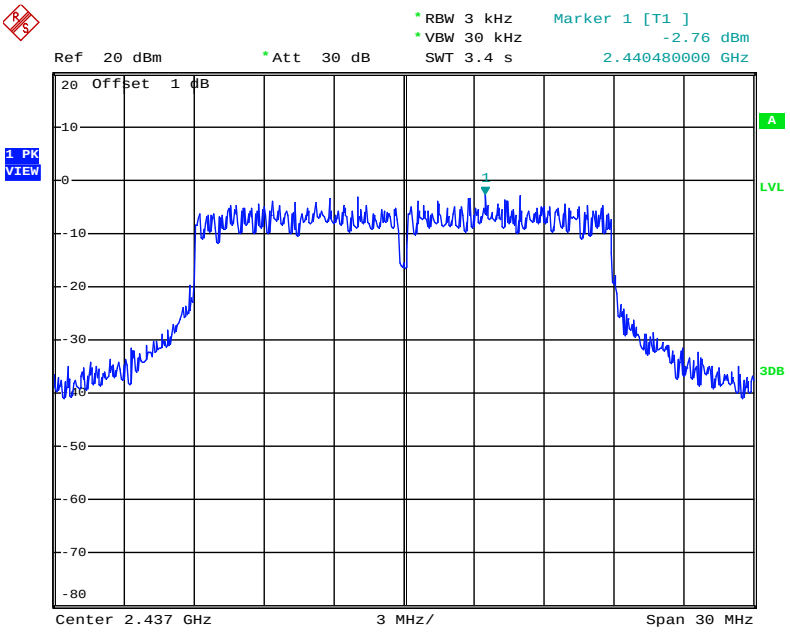
Configuration IEEE 802.11a

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Chain 4	Total		
149	5745 MHz	-4.99	-4.73	-4.67	-4.76	1.23	8.00	Complies
157	5785 MHz	-4.98	-4.60	-5.05	-4.93	1.13	8.00	Complies
165	5825 MHz	-5.11	-4.73	-4.87	-5.28	1.03	8.00	Complies

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

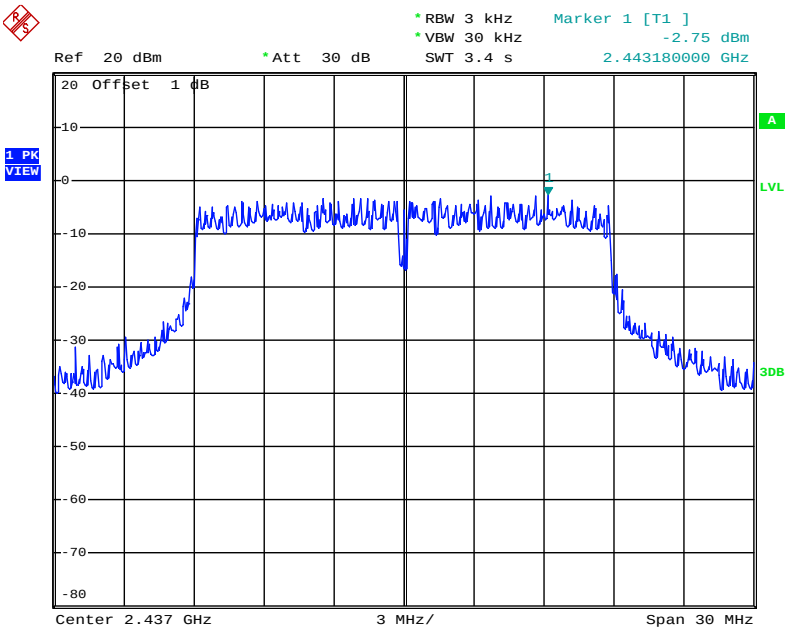
For plots, only the channel with worse result was shown.

Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 2



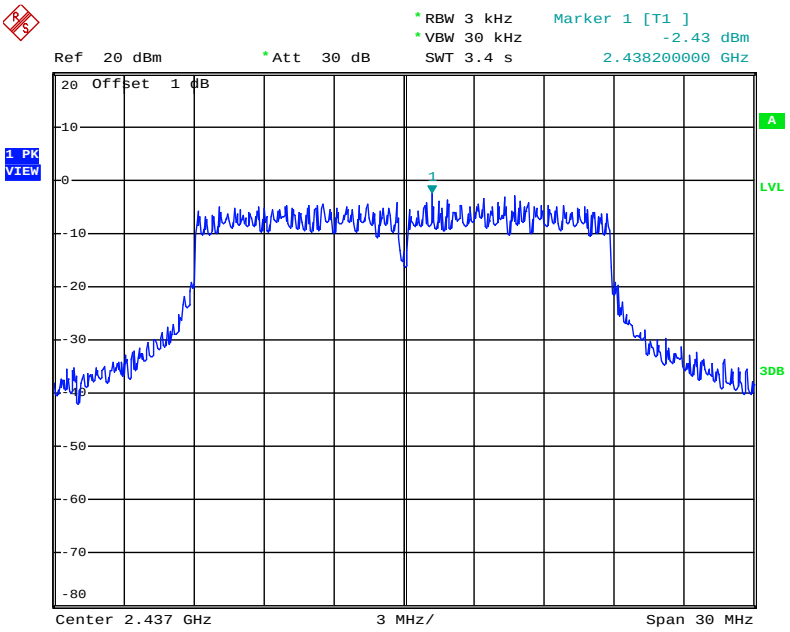
Date: 23.MAY.2014 22:00:19

Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 3



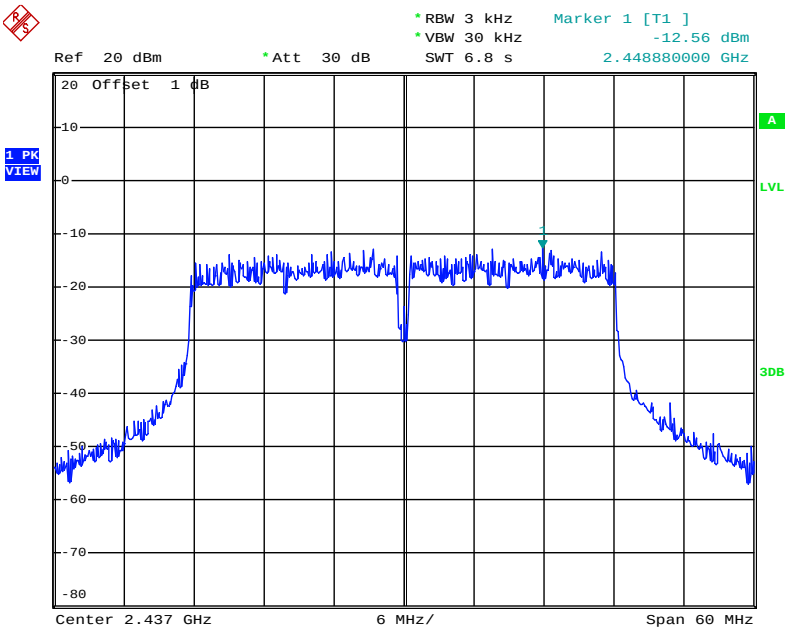
Date: 23.MAY.2014 22:01:09

Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 4



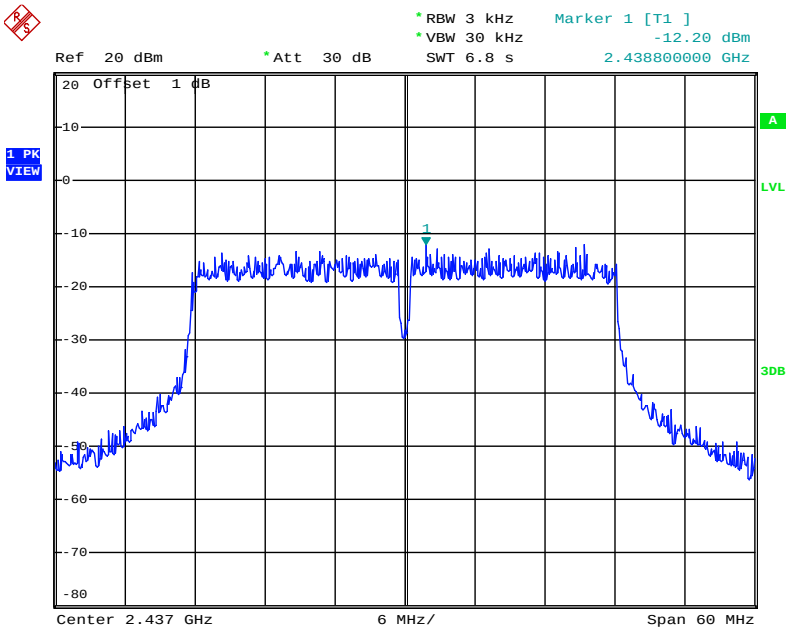
Date: 23.MAY.2014 22:01:49

Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 2



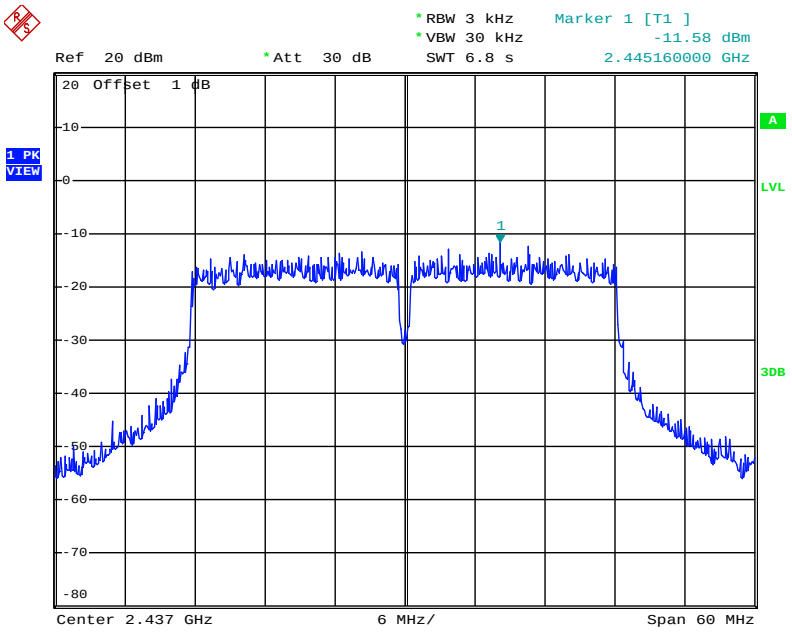
Date: 23.MAY.2014 22:12:17

Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 3



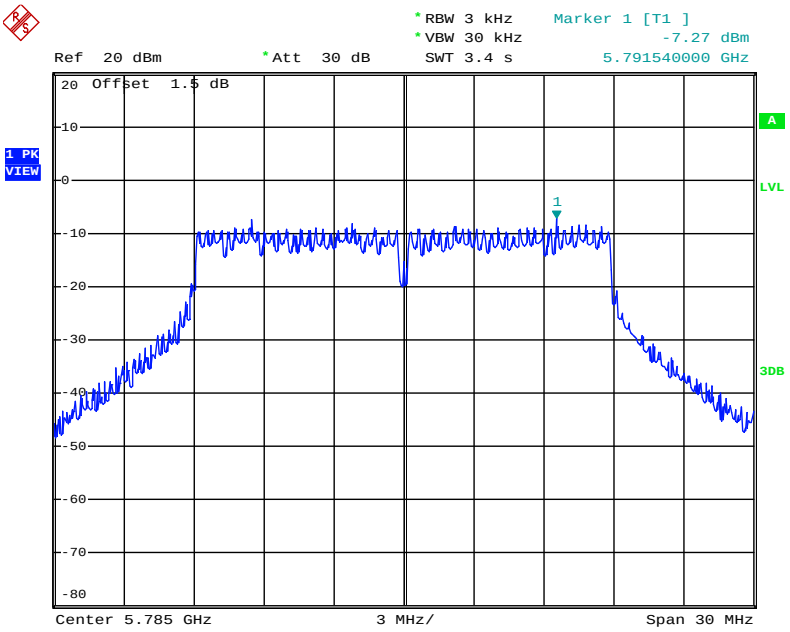
Date: 23.MAY.2014 22:11:27

Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 4



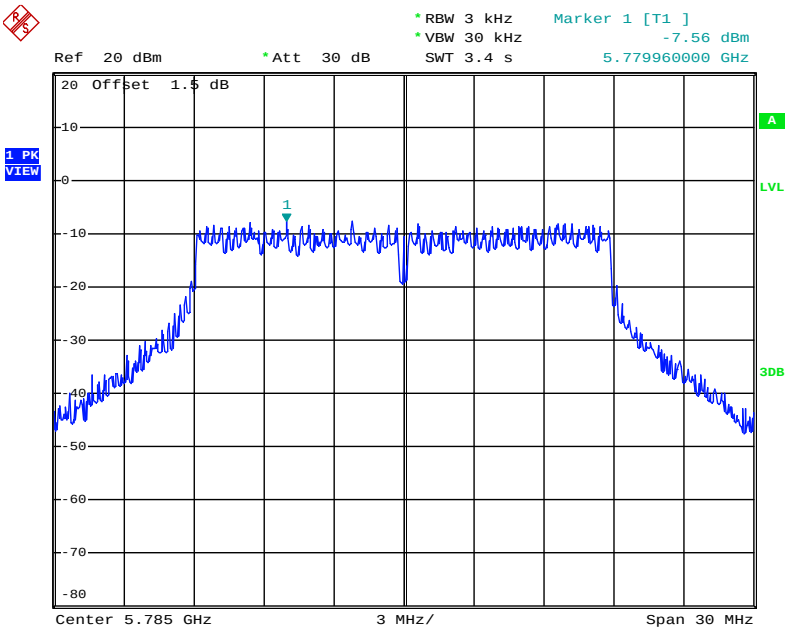
Date: 23.MAY.2014 22:10:45

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 1



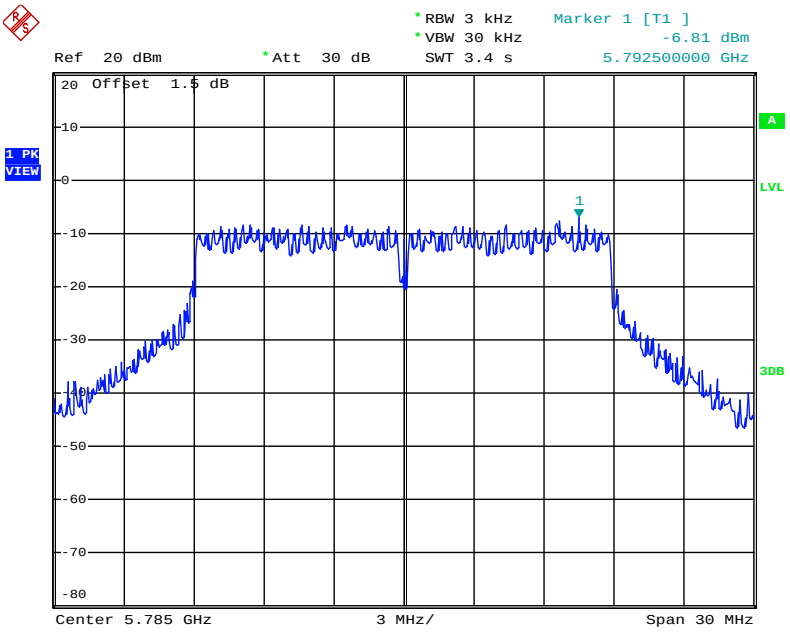
Date: 24.MAY.2014 02:52:57

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 2



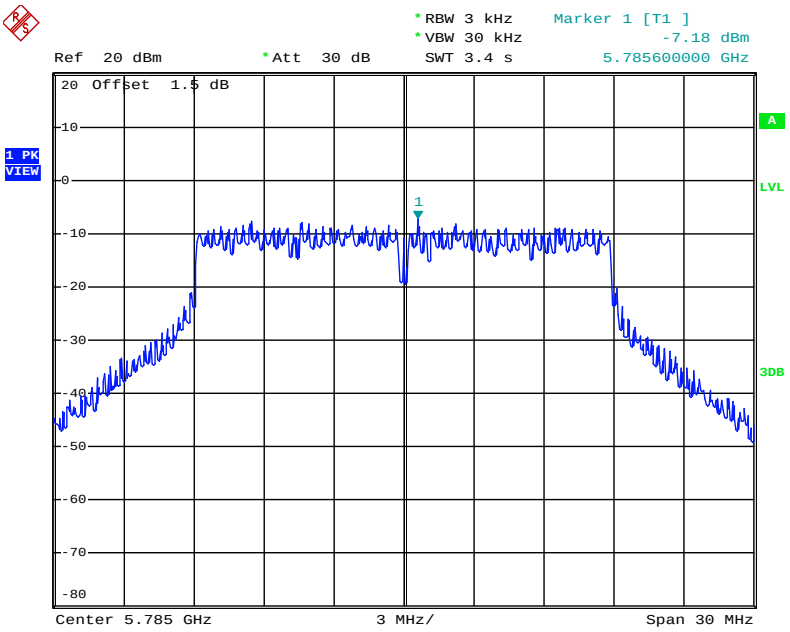
Date: 24.MAY.2014 02:52:10

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 3



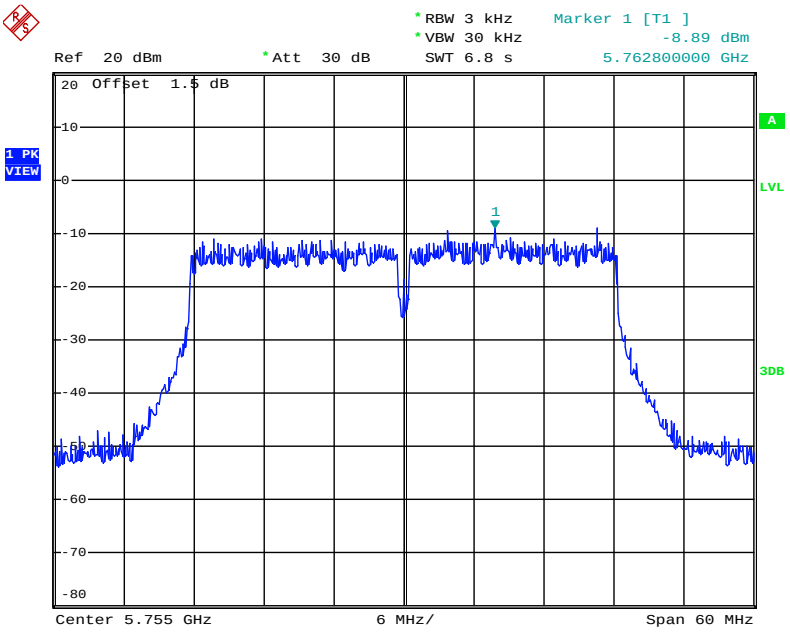
Date: 24.MAY.2014 02:51:10

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 4



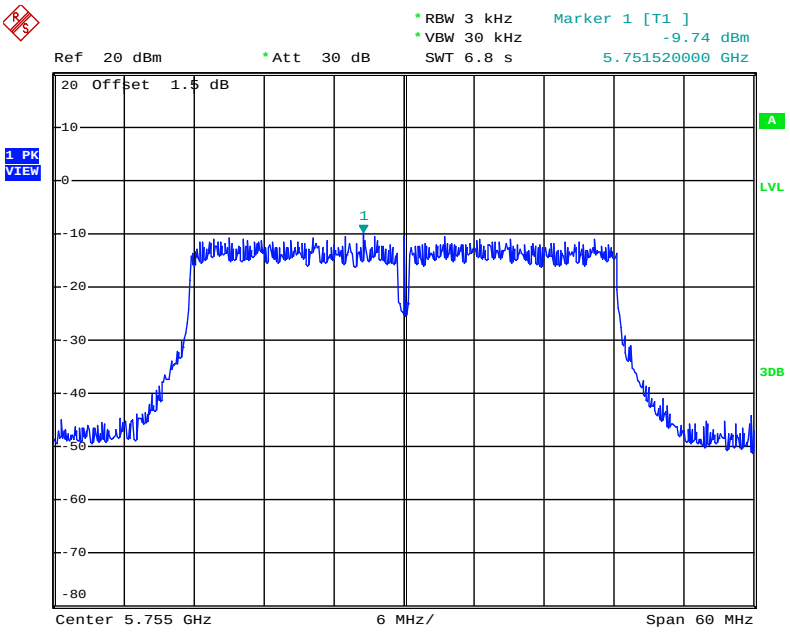
Date: 24.MAY.2014 02:50:15

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 1



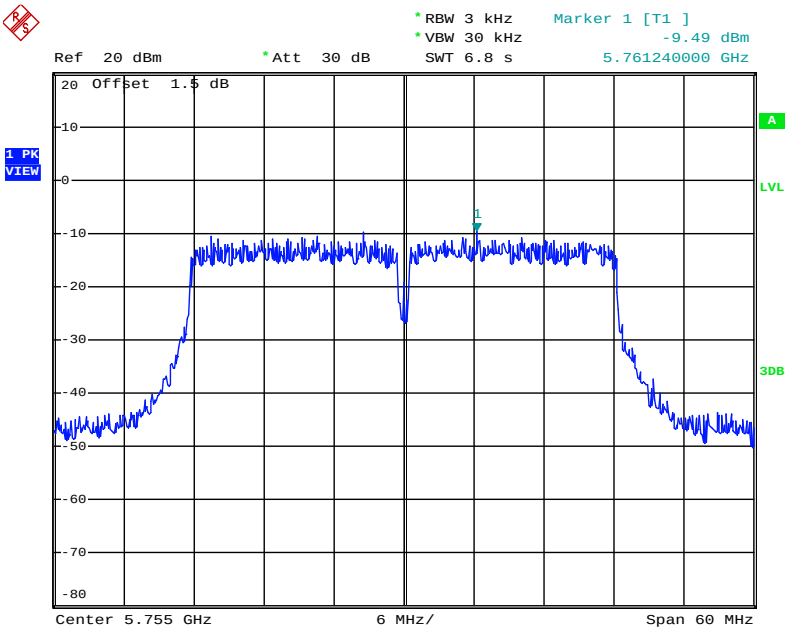
Date: 24.MAY.2014 03:04:16

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 2



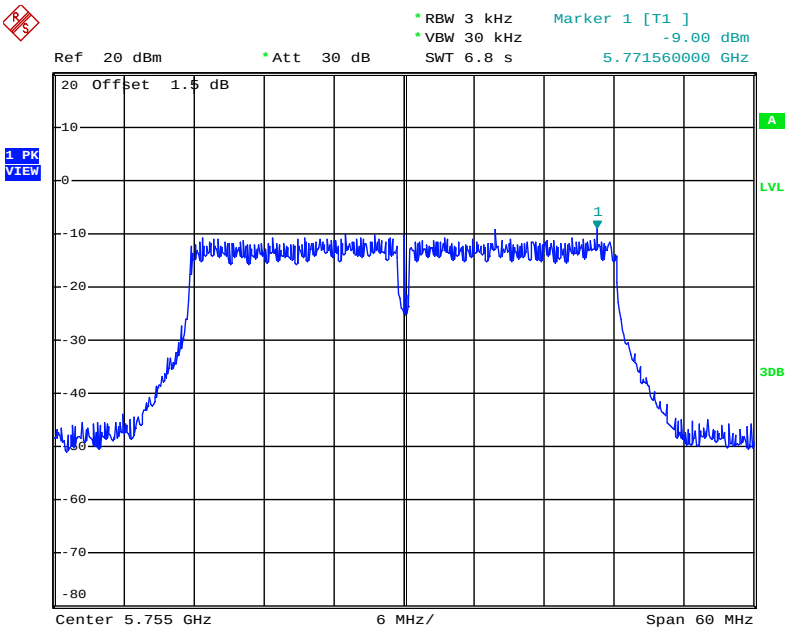
Date: 24.MAY.2014 03:01:41

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 3



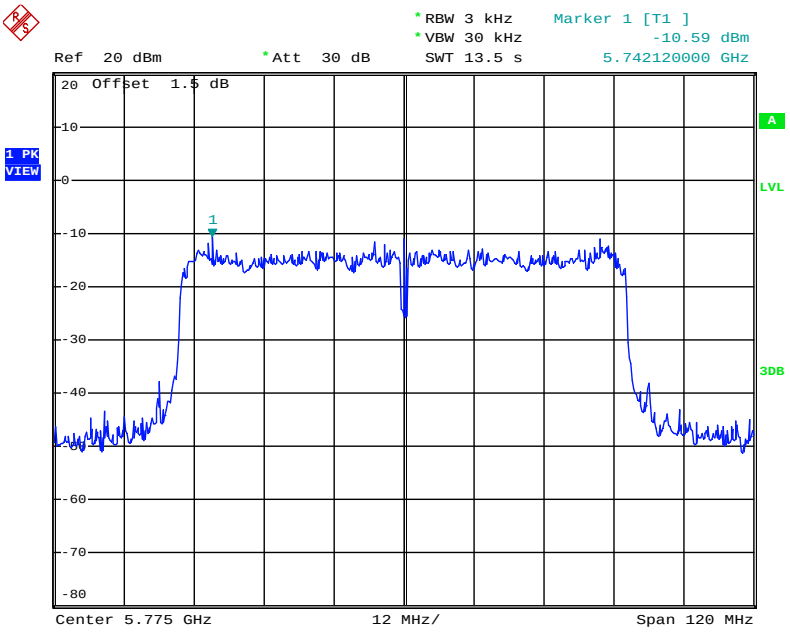
Date: 24.MAY.2014 03:03:12

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 4



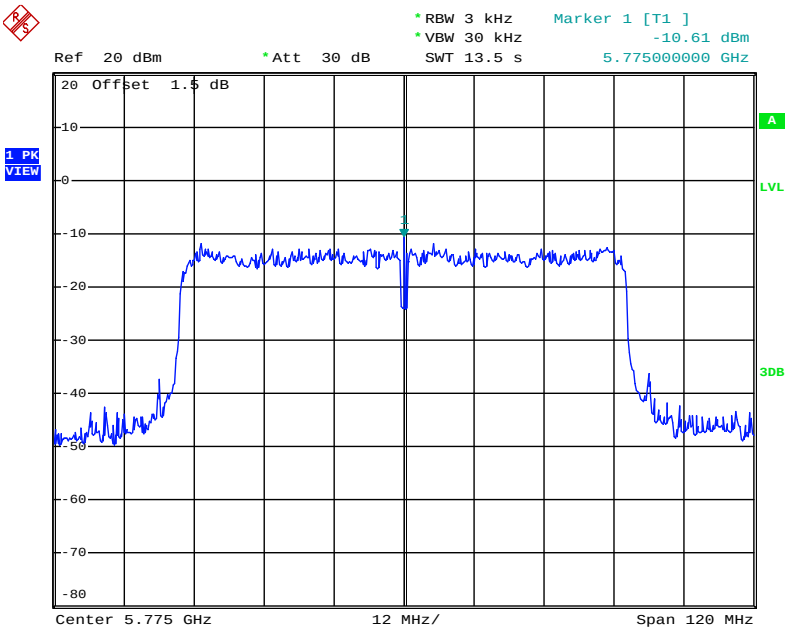
Date: 24.MAY.2014 02:59:00

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 1



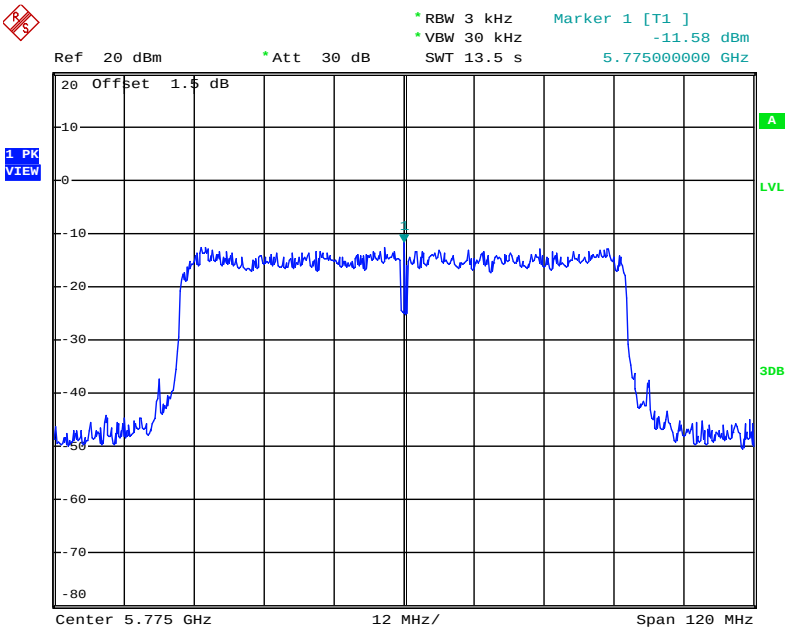
Date: 24.MAY.2014 03:24:57

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 2



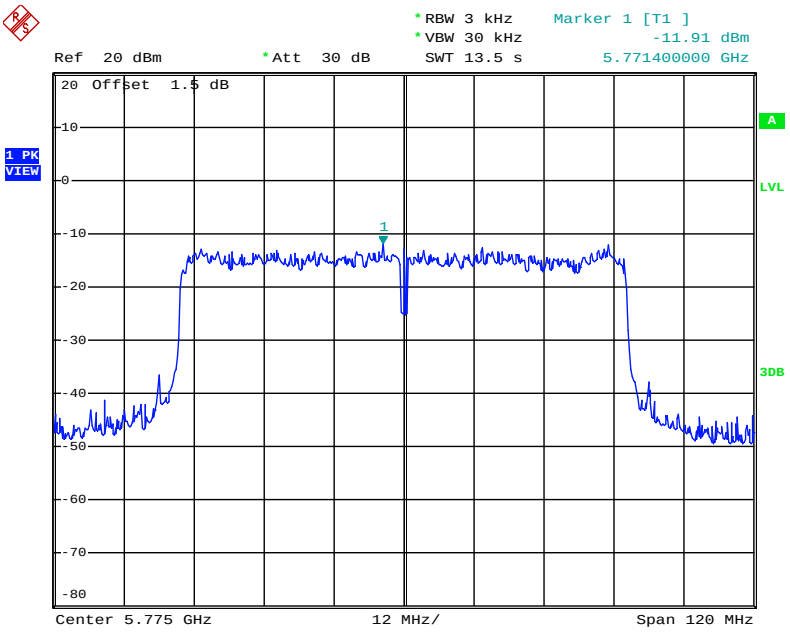
Date: 24.MAY.2014 03:31:17

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 3



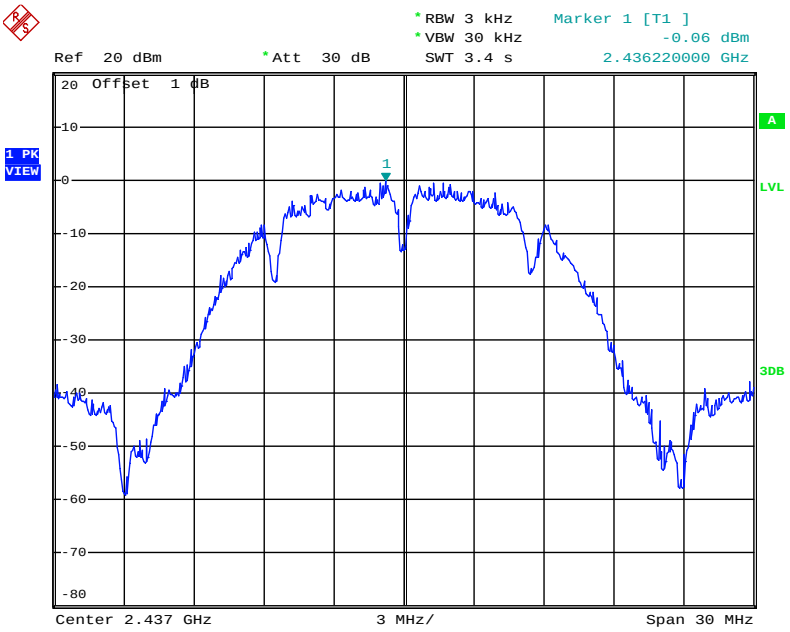
Date: 24.MAY.2014 03:32:06

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 4



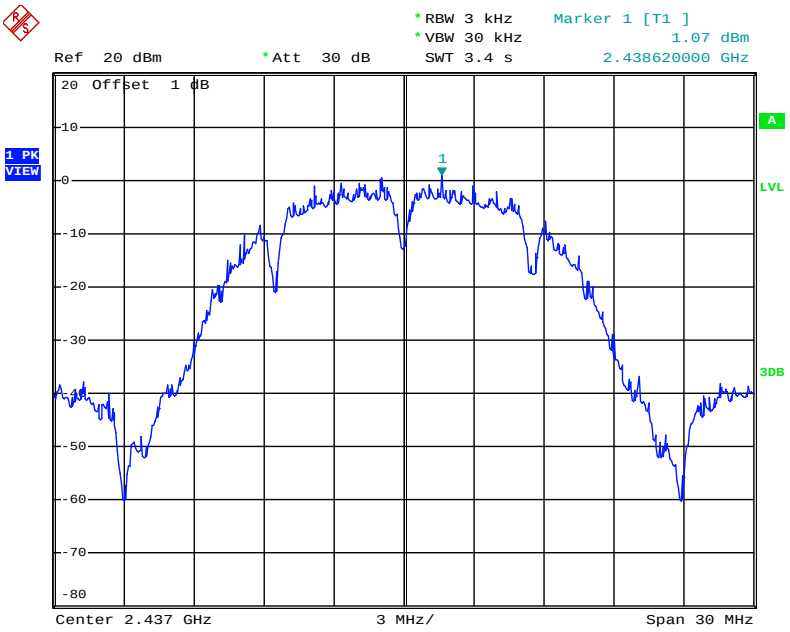
Date: 24.MAY.2014 03:15:41

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



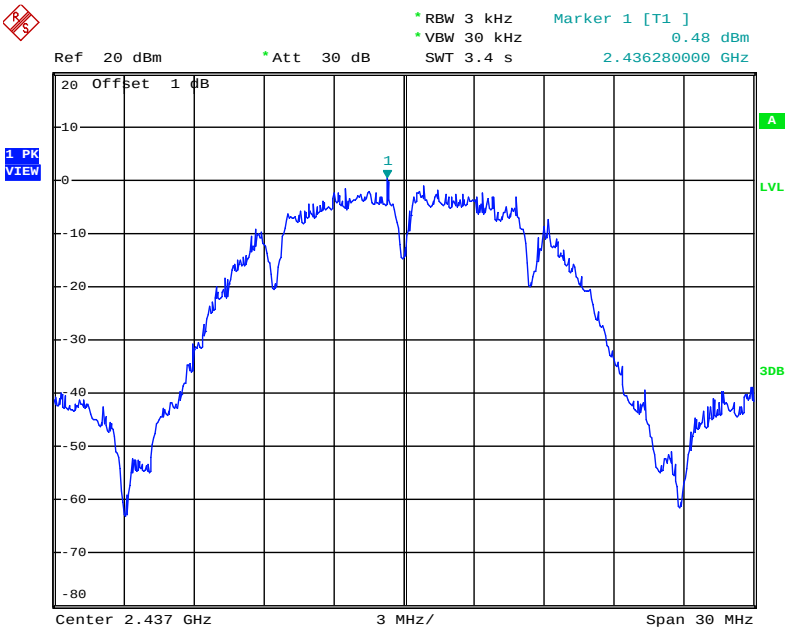
Date: 23.MAY.2014 21:38:57

Power Density Plot on Configuration IEEE 802.11b / 2437 MHz / Chain 3



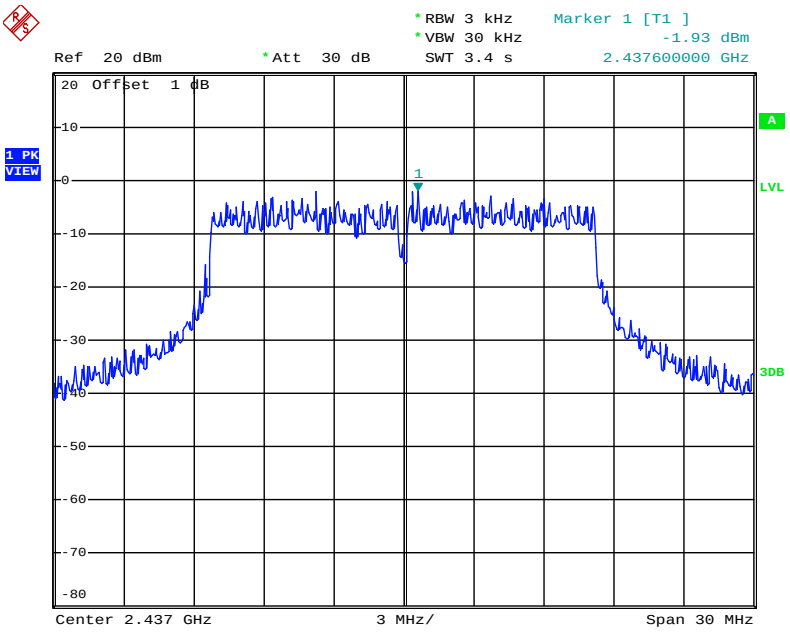
Date: 23.MAY.2014 21:40:27

Power Density Plot on Configuration IEEE 802.11b / 2437 MHz / Chain 4



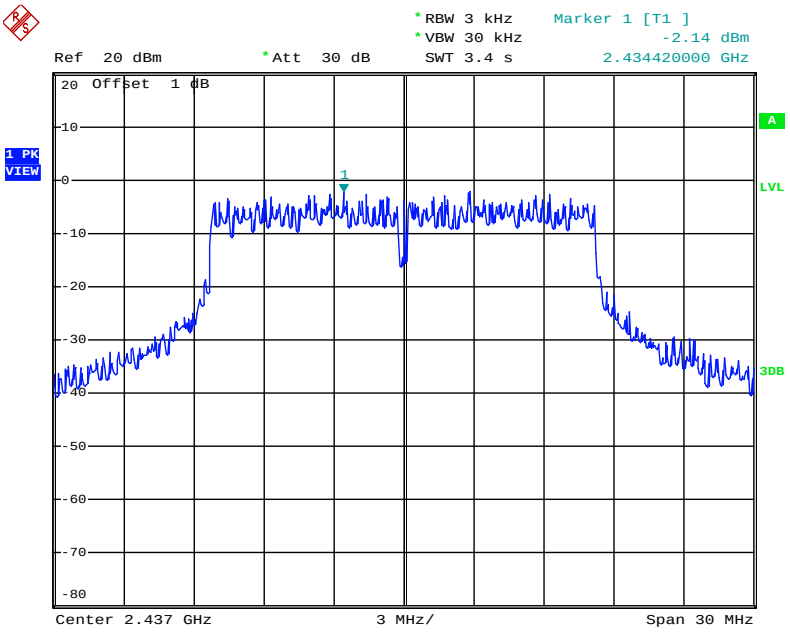
Date: 23.MAY.2014 21:36:39

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



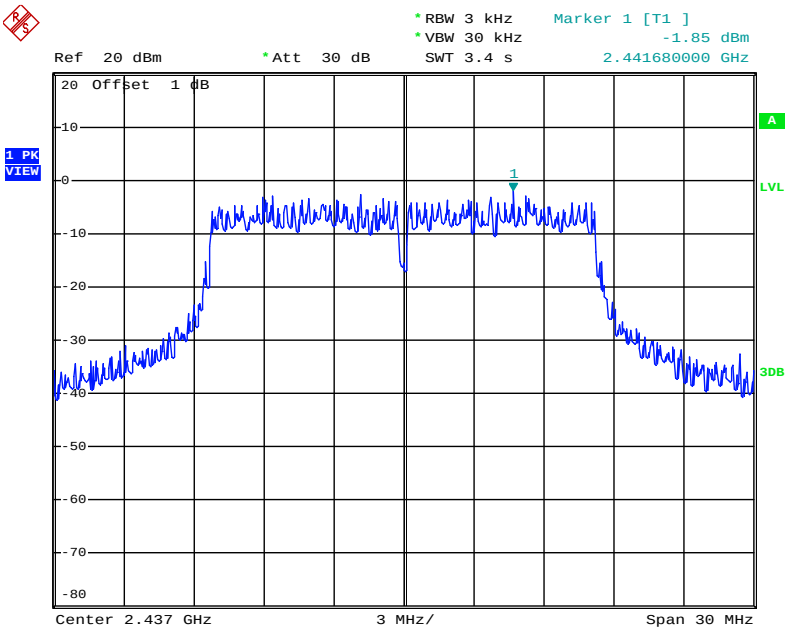
Date: 23.MAY.2014 21:49:07

Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 3



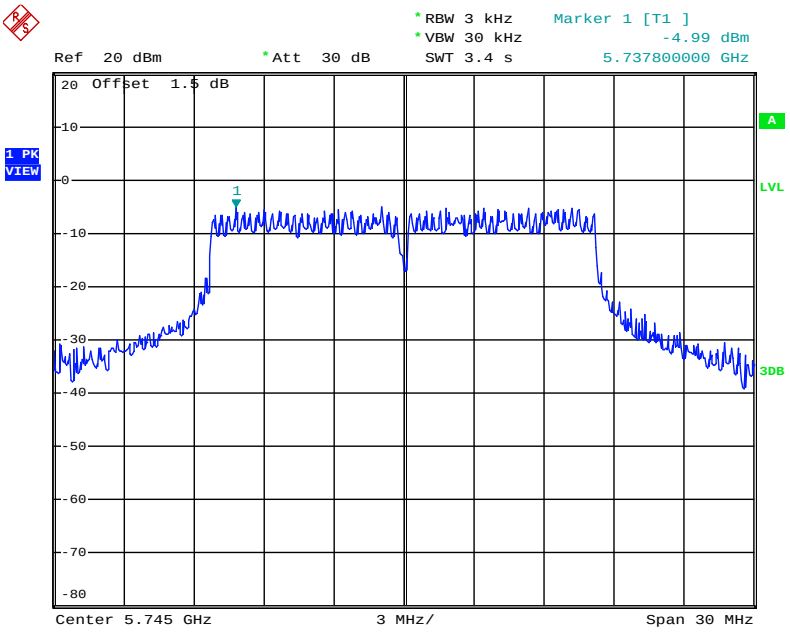
Date: 23.MAY.2014 21:51:19

Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 4



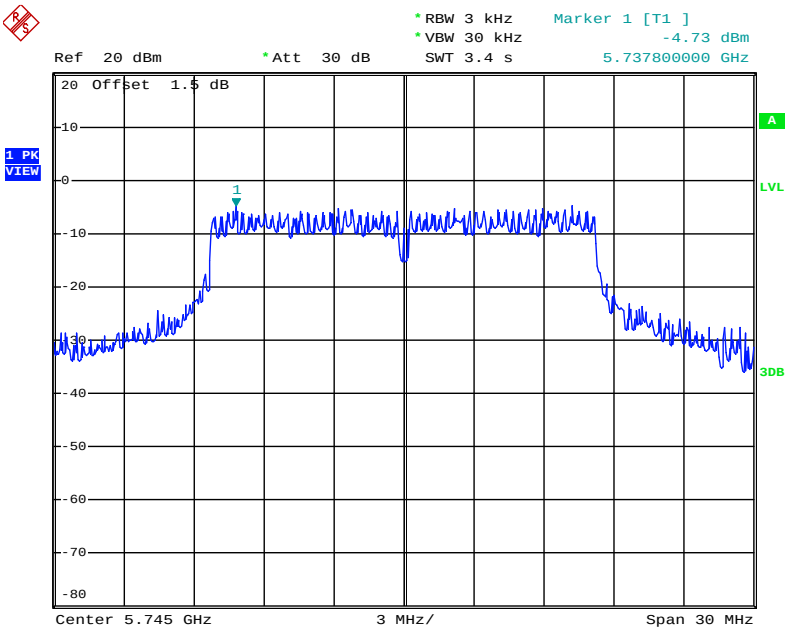
Date: 23.MAY.2014 21:50:00

Power Density Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 1



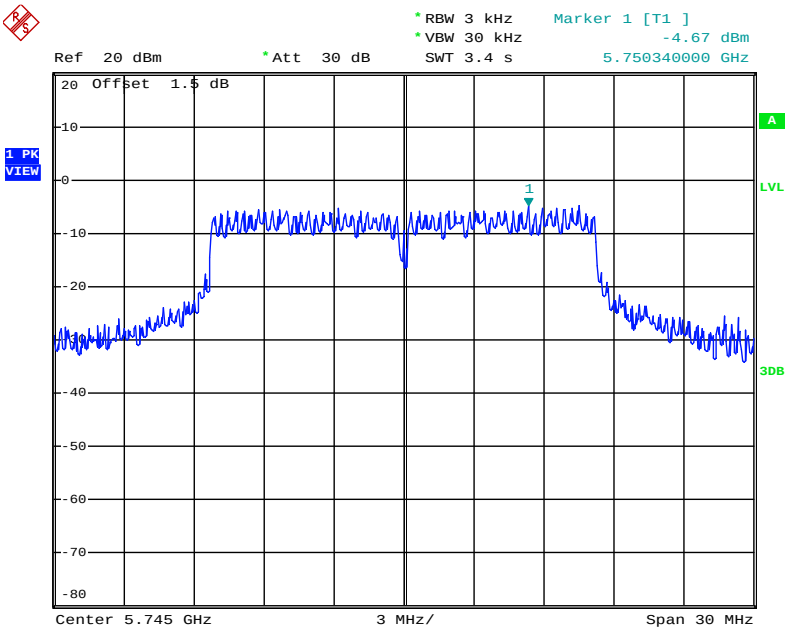
Date: 24.MAY.2014 02:33:19

Power Density Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 2



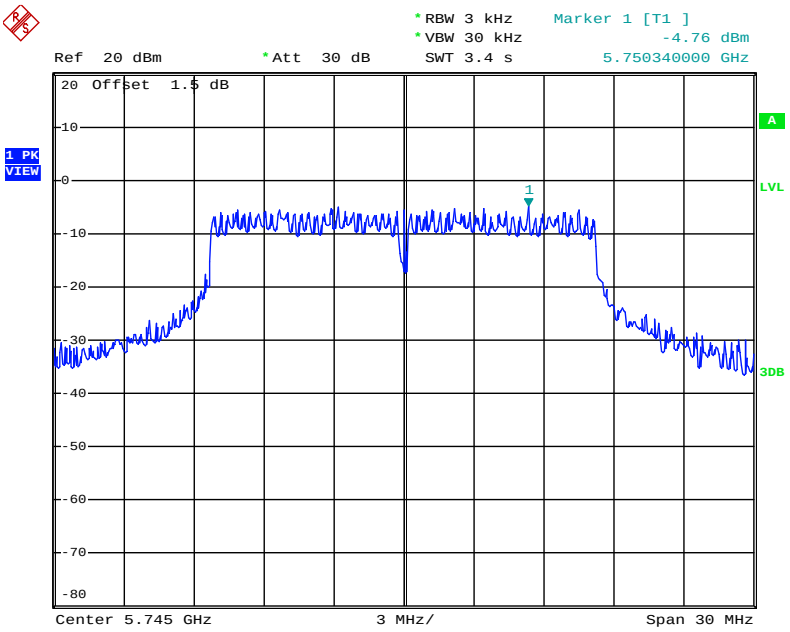
Date: 24.MAY.2014 02:32:18

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



Date: 24.MAY.2014 02:31:29

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



Date: 24.MAY.2014 02:30:30

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

4.4.2. Measuring Instruments and Setting

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

Spectrum Parameters	Setting
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto

4.4.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB 558074 D01 v03r01 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 8.0 DTS 6-dB signal bandwidth option 1.
3. Multiple antenna system was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. Measured the spectrum width with power higher than 6dB below carrier.

4.4.4. Test Deviation

There is no deviation with the original standard.

4.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.6. Test Result of 6dB Spectrum Bandwidth

Temperature	20°C	Humidity	53%
Test Engineer	Robert Chang	Configurations	IEEE 802.11n/ac

For 2.4GHz Band

Configuration IEEE 802.11n MCS0 HT20 / Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.84	17.92	500	Complies
6	2437 MHz	17.68	18.16	500	Complies
11	2462 MHz	15.84	17.28	500	Complies

Configuration IEEE 802.11n MCS0 HT40 / Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.48	36.48	500	Complies
6	2437 MHz	36.48	36.48	500	Complies
9	2452 MHz	36.48	36.64	500	Complies

For 5GHz Band

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1 + Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	17.60	17.76	500	Complies
157	5785 MHz	16.72	17.76	500	Complies
165	5825 MHz	17.52	17.76	500	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 1 + Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	33.76	36.16	500	Complies
159	5795 MHz	33.92	36.32	500	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 1 + Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
155	5775 MHz	72.64	75.20	500	Complies

Temperature	20°C	Humidity	53%
Test Engineer	Robert Chang	Configurations	IEEE 802.11a/b/g

Configuration IEEE 802.11b / Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	5.60	12.48	500	Complies
6	2437 MHz	11.20	13.52	500	Complies
11	2462 MHz	5.60	13.52	500	Complies

Configuration IEEE 802.11g / Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	12.32	16.48	500	Complies
6	2437 MHz	13.84	15.76	500	Complies
11	2462 MHz	12.72	15.68	500	Complies

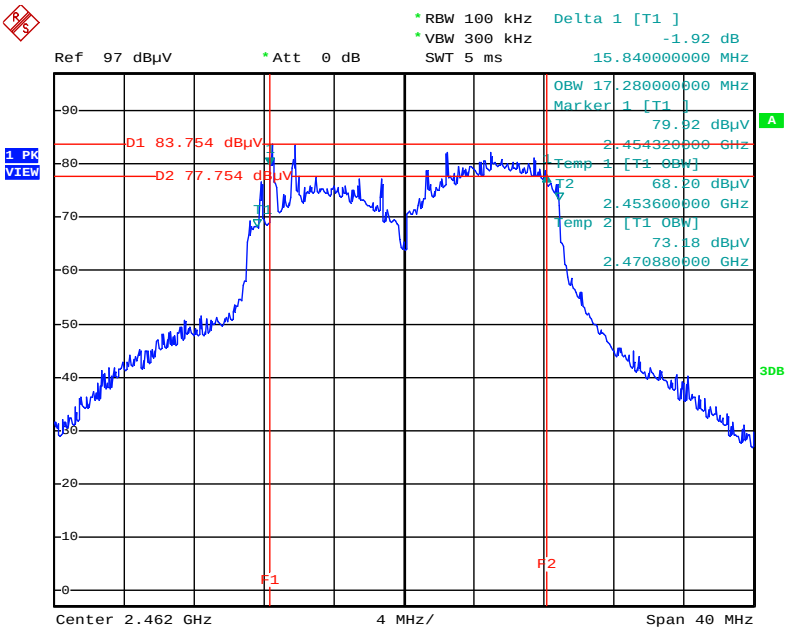
Configuration IEEE 802.11a / Chain 1 + Chain 2 + Chain 3 + Chain 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	12.08	19.60	500	Complies
157	5785 MHz	12.00	20.16	500	Complies
165	5825 MHz	13.36	20.48	500	Complies

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

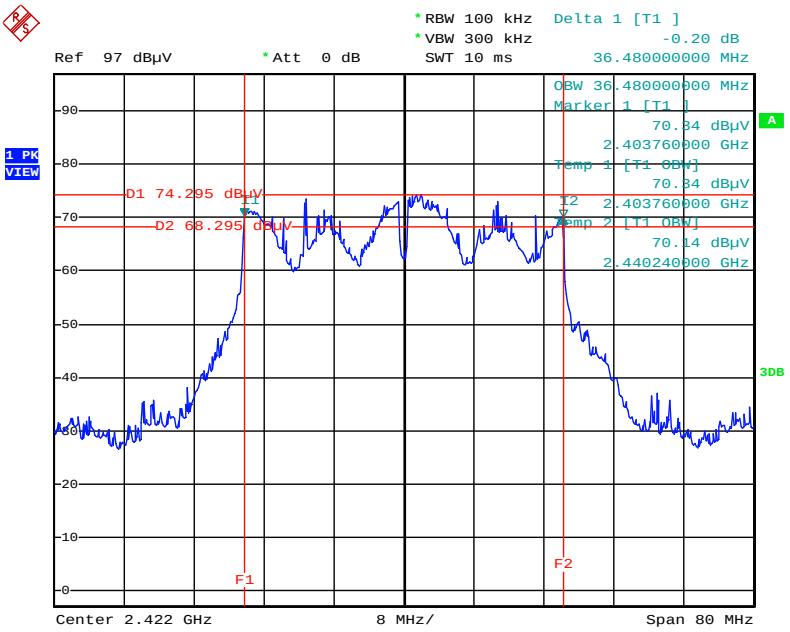
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2462 MHz / Chain 2 + Chain 3 + Chain 4



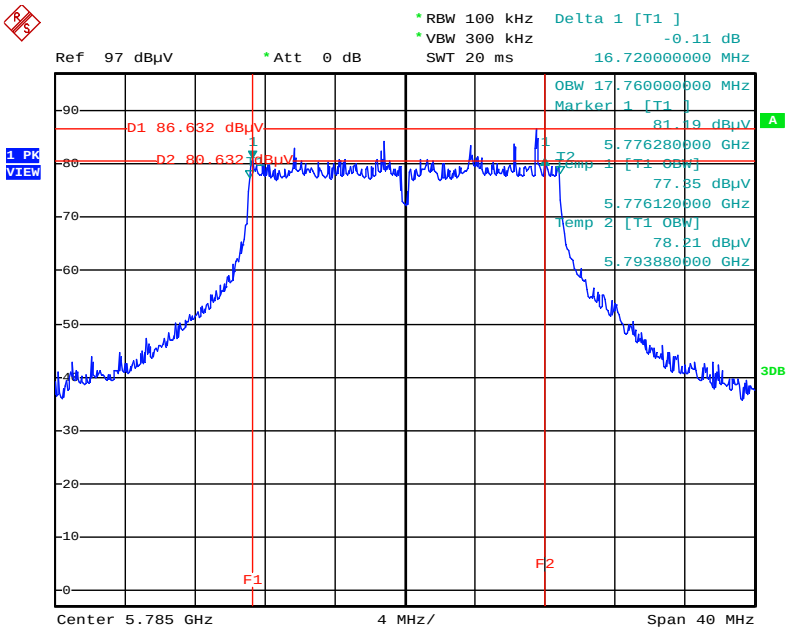
Date: 23.MAY.2014 22:33:19

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / 2422 MHz / Chain 2 + Chain 3 + Chain 4



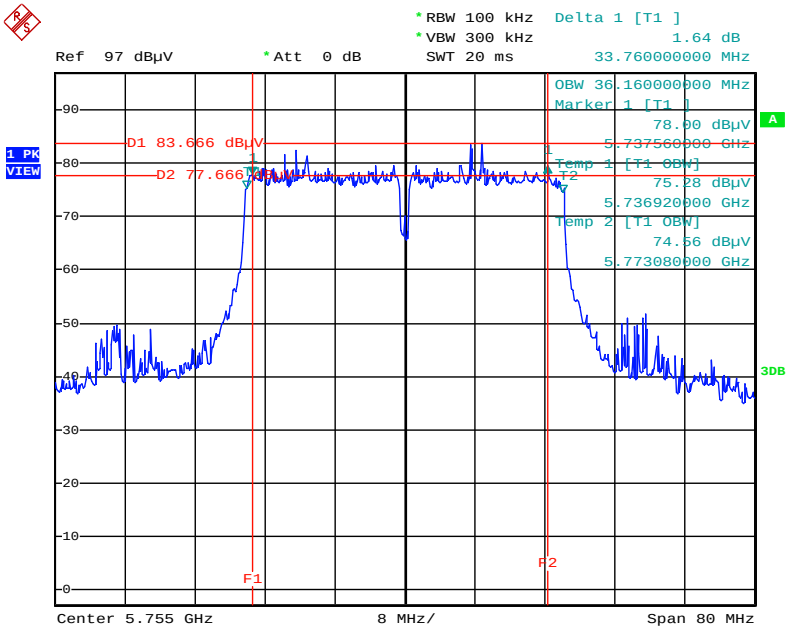
Date: 23.MAY.2014 22:34:07

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 1 + Chain 2 + Chain 3 + Chain 4



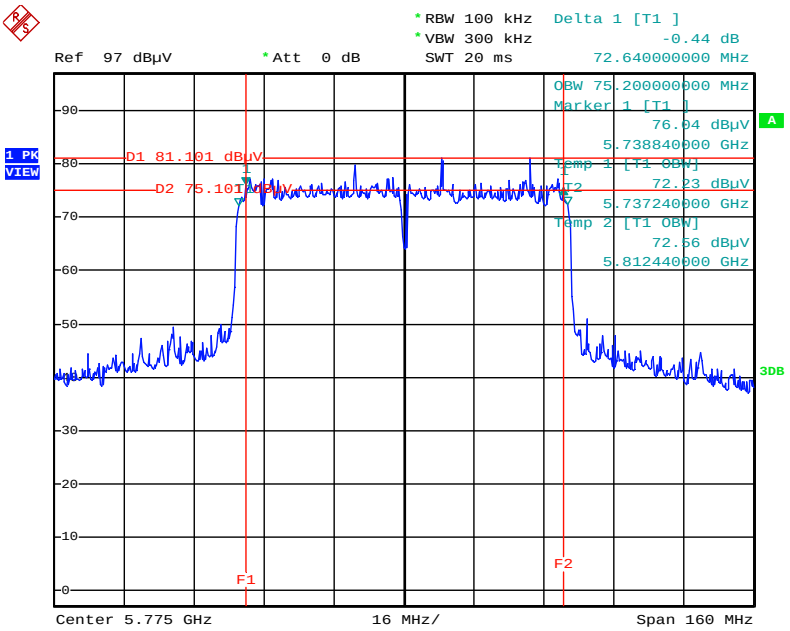
Date: 23.MAY.2014 22:59:20

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755 MHz / Chain 1 + Chain 2 + Chain 3 + Chain 4



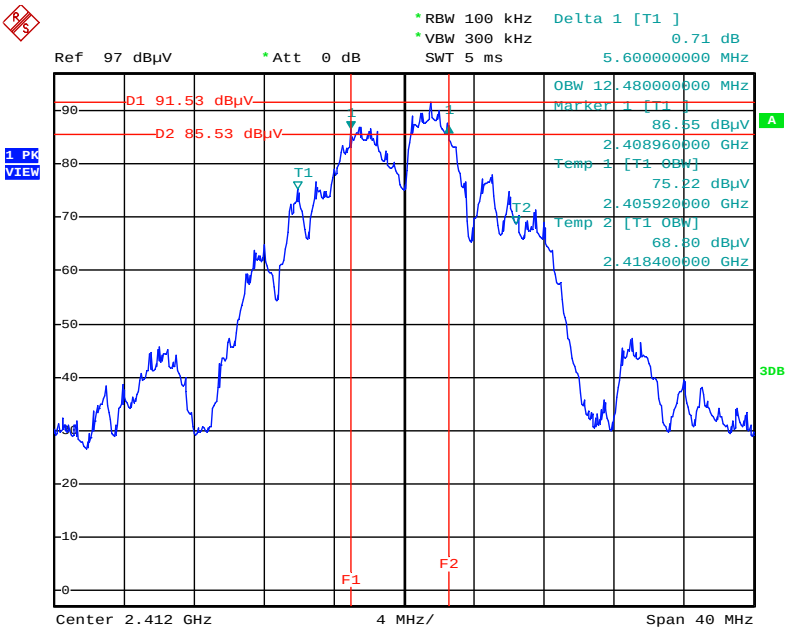
Date: 23.MAY.2014 23:02:51

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 1 + Chain 2 + Chain 3 + Chain 4



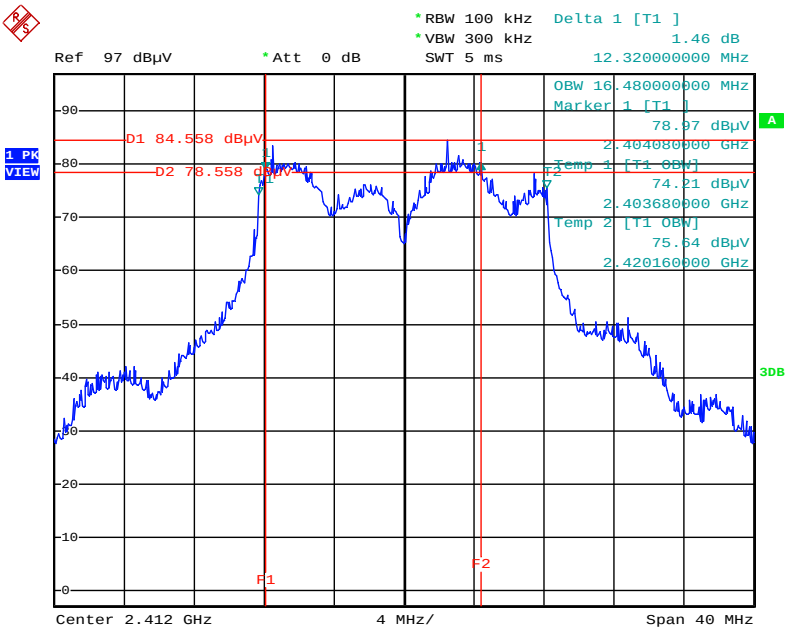
Date: 23.MAY.2014 23:06:36

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz / Chain 2 + Chain 3 + Chain 4



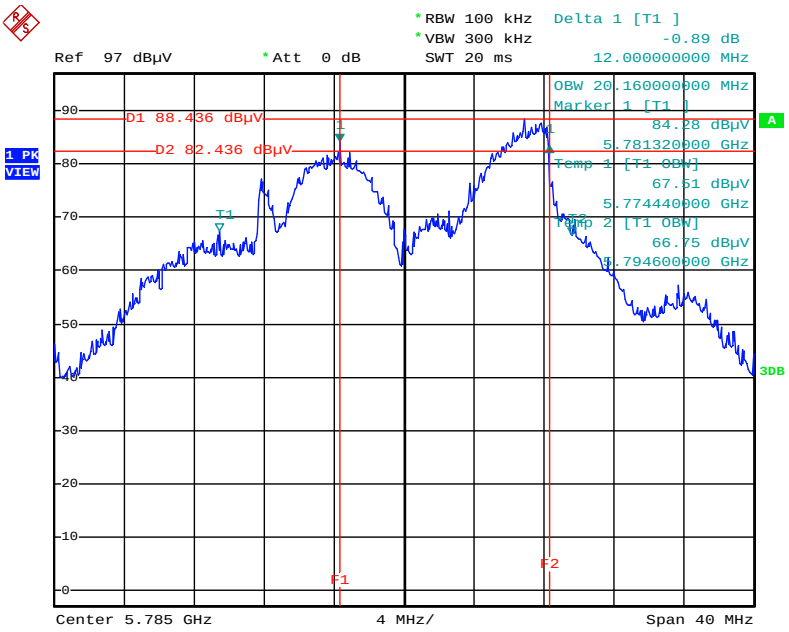
Date: 23.MAY.2014 22:26:22

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2412 MHz / Chain 2 + Chain 3 + Chain 4



Date: 23.MAY.2014 22:30:44

6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5785 MHz / Chain 1 + Chain 2 + Chain 3 + Chain 4



Date: 23.MAY.2014 22:56:44

4.5. Radiated Emissions Measurement

4.5.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.5.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1GHz
Stop Frequency	10th carrier harmonic
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~1GHz / RBW 120kHz for QP

4.5.3. Test Procedures

1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. 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.

4.5.4. Test Deviation

There is no deviation with the original standard.

4.5.5. EUT Operation during Test

Radiated Emissions below 1GHz:

The EUT was programmed to be in continuously transmitting mode.

Radiated Emissions above 1GHz:

For IEEE 802.11a/b/g/n mode (non-beamforming function):

The EUT was programmed to be in continuously transmitting mode.

For IEEE 802.11ac mode (beamforming function):

The EUT was programmed to be in beamforming transmitting mode.

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

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	CTX
Test Date	May 27, 2014		

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

Note:

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

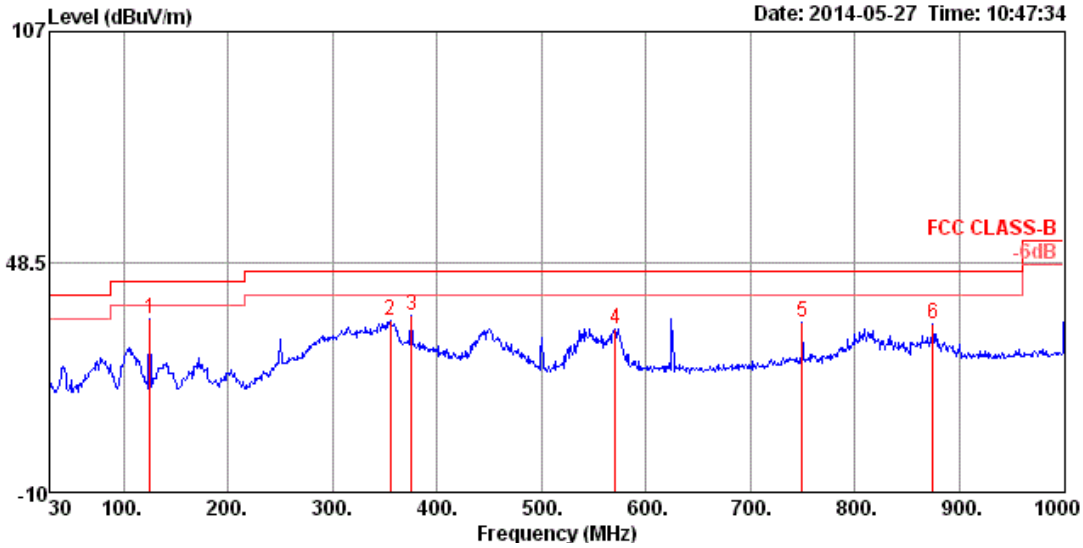
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

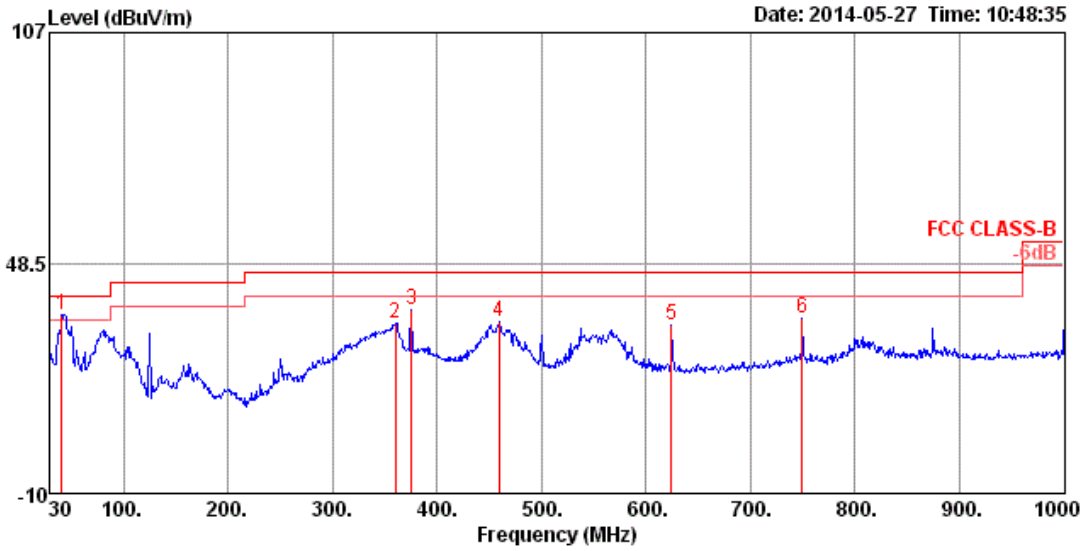
Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	CTX

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	125.06	33.91	43.50	-9.59	52.42	1.33	11.73	31.57	300	268	HORIZONTAL	Peak
2	354.95	33.62	46.00	-12.38	48.14	2.33	14.49	31.34	100	327	HORIZONTAL	Peak
3	375.32	34.78	46.00	-11.22	48.84	2.44	14.93	31.43	100	122	HORIZONTAL	Peak
4	570.29	31.57	46.00	-14.43	41.41	3.00	18.37	31.21	150	140	HORIZONTAL	Peak
5	749.74	33.02	46.00	-12.98	41.17	3.53	19.69	31.37	100	215	HORIZONTAL	Peak
6	874.87	32.60	46.00	-13.40	39.62	3.89	20.24	31.15	100	110	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	40.67	35.51	40.00	-4.49	54.78	0.75	11.85	31.87	100	89	VERTICAL	Peak
2	359.80	33.17	46.00	-12.83	47.49	2.35	14.66	31.33	100	185	VERTICAL	Peak
3	375.32	36.80	46.00	-9.20	50.86	2.44	14.93	31.43	125	205	VERTICAL	Peak
4	459.71	33.48	46.00	-12.52	45.66	2.68	16.33	31.19	125	97	VERTICAL	Peak
5	624.61	32.56	46.00	-13.44	42.17	3.18	18.61	31.40	100	5	VERTICAL	Peak
6	749.74	34.56	46.00	-11.44	42.71	3.53	19.69	31.37	150	18	VERTICAL	Peak

Note:

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

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

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

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

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT20 CH 1 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4821.89	44.82	74.00	-29.18	42.74	4.21	32.56	34.69	Peak	80	100	HORIZONTAL
2	4826.16	31.09	54.00	-22.91	29.01	4.21	32.56	34.69	Average	80	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	4820.46	31.41	54.00	-22.59	29.33	4.21	32.56	34.69	Average	212	100	VERTICAL
2	4823.33	44.12	74.00	-29.88	42.04	4.21	32.56	34.69	Peak	212	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT20 CH 6 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4872.61	31.71	54.00	-22.29	29.50	4.22	32.66	34.67	Average	248	100	HORIZONTAL
2	4872.70	44.87	74.00	-29.13	42.66	4.22	32.66	34.67	Peak	248	100	HORIZONTAL
3	7310.79	37.14	54.00	-16.86	29.66	5.34	37.07	34.93	Average	122	100	HORIZONTAL
4	7312.59	50.54	74.00	-23.46	43.07	5.34	37.07	34.94	Peak	122	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	4880.64	48.19	74.00	-25.81	45.98	4.22	32.66	34.67	Peak	76	247	VERTICAL
2	4881.28	34.46	54.00	-19.54	32.25	4.22	32.66	34.67	Average	76	247	VERTICAL
3	7309.72	42.64	54.00	-11.36	35.16	5.34	37.07	34.93	Average	212	209	VERTICAL
4	7312.38	56.55	74.00	-17.45	49.08	5.34	37.07	34.94	Peak	212	209	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT20 CH 11 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4924.45	44.98	74.00	-29.02	42.64	4.23	32.76	34.65	Peak	66	100	HORIZONTAL
2	4926.53	31.34	54.00	-22.66	29.00	4.23	32.76	34.65	Average	66	100	HORIZONTAL
3	7376.67	50.10	74.00	-23.90	42.54	5.36	37.16	34.96	Peak	100	100	HORIZONTAL
4	7381.87	36.51	54.00	-17.49	28.95	5.36	37.16	34.96	Average	100	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	4927.53	32.31	54.00	-21.69	29.97	4.23	32.76	34.65	Average	120	100	VERTICAL
2	4929.61	45.62	74.00	-28.38	43.28	4.23	32.76	34.65	Peak	120	100	VERTICAL
3	7384.17	49.97	74.00	-24.03	42.39	5.36	37.18	34.96	Peak	206	100	VERTICAL
4	7385.20	37.20	54.00	-16.80	29.62	5.36	37.18	34.96	Average	206	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT40 CH 3 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4838.17	31.17	54.00	-22.83	29.05	4.21	32.59	34.68	Average	117	100	HORIZONTAL
2	4862.72	44.13	74.00	-29.87	41.98	4.21	32.62	34.68	Peak	117	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	4834.26	44.53	74.00	-29.47	42.42	4.21	32.59	34.69	Peak	227	100	VERTICAL
2	4837.27	31.42	54.00	-22.58	29.31	4.21	32.59	34.69	Average	227	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT40 CH 6 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4858.30	30.72	54.00	-23.28	28.57	4.21	32.62	34.68	Average	198	100	HORIZONTAL
2	4877.97	43.62	74.00	-30.38	41.41	4.22	32.66	34.67	Peak	198	100	HORIZONTAL
3	7318.05	49.00	74.00	-25.00	41.50	5.35	37.09	34.94	Peak	63	100	HORIZONTAL
4	7321.13	36.62	54.00	-17.38	29.12	5.35	37.09	34.94	Average	63	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	4858.36	30.91	54.00	-23.09	28.76	4.21	32.62	34.68	Average	228	100	VERTICAL
2	4881.82	43.34	74.00	-30.66	41.13	4.22	32.66	34.67	Peak	228	100	VERTICAL
3	7315.36	49.35	74.00	-24.65	41.88	5.34	37.07	34.94	Peak	137	100	VERTICAL
4	7317.99	36.49	54.00	-17.51	28.99	5.35	37.09	34.94	Average	137	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT40 CH 9 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4920.47	43.77	74.00	-30.23	41.43	4.23	32.76	34.65	Peak	258	100	HORIZONTAL
2	4921.56	31.12	54.00	-22.88	28.78	4.23	32.76	34.65	Average	258	100	HORIZONTAL
3	7343.82	36.59	54.00	-17.41	29.08	5.35	37.11	34.95	Average	163	100	HORIZONTAL
4	7360.74	49.44	74.00	-24.56	41.91	5.35	37.13	34.95	Peak	163	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	4913.68	43.91	74.00	-30.09	41.62	4.22	32.73	34.66	Peak	178	100	VERTICAL
2	4921.95	31.37	54.00	-22.63	29.03	4.23	32.76	34.65	Average	178	100	VERTICAL
3	7362.60	50.03	74.00	-23.97	42.51	5.35	37.13	34.96	Peak	6	100	VERTICAL
4	7370.81	36.85	54.00	-17.15	29.29	5.36	37.16	34.96	Average	6	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	11490.11	44.36	54.00	-9.64	33.98	6.74	38.30	34.66	Average	133	179	HORIZONTAL
2	11490.43	57.54	74.00	-16.46	47.16	6.74	38.30	34.66	Peak	133	179	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	11489.52	62.20	74.00	-11.80	51.82	6.74	38.30	34.66	Peak	318	115	VERTICAL
2	11490.50	48.88	54.00	-5.12	38.50	6.74	38.30	34.66	Average	318	115	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	11570.14	57.45	74.00	-16.55	47.04	6.77	38.33	34.69	Peak	220	174	HORIZONTAL
2	11570.29	45.08	54.00	-8.92	34.67	6.77	38.33	34.69	Average	220	174	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	11569.66	64.00	74.00	-10.00	53.58	6.77	38.33	34.68	Peak	321	201	VERTICAL
2	11570.38	50.00	54.00	-4.00	39.59	6.77	38.33	34.69	Average	321	201	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	11649.13	56.74	74.00	-17.26	46.30	6.80	38.36	34.72	Peak	204	100	HORIZONTAL
2	11649.76	43.33	54.00	-10.67	32.89	6.80	38.36	34.72	Average	204	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	11651.89	49.58	54.00	-4.42	39.14	6.80	38.36	34.72	Average	104	100	VERTICAL
2	11652.47	63.97	74.00	-10.03	53.53	6.80	38.36	34.72	Peak	104	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	11509.96	54.20	74.00	-19.80	43.81	6.75	38.30	34.66	Peak	135	100	HORIZONTAL
2	11510.03	40.95	54.00	-13.05	30.56	6.75	38.30	34.66	Average	135	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	11510.09	58.44	74.00	-15.56	48.05	6.75	38.30	34.66	Peak	313	103	VERTICAL
2	11510.29	45.75	54.00	-8.25	35.36	6.75	38.30	34.66	Average	313	103	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	11589.97	53.36	74.00	-20.64	42.94	6.78	38.33	34.69	Peak	132	100	HORIZONTAL
2	11590.47	40.64	54.00	-13.36	30.22	6.78	38.33	34.69	Average	132	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	11587.68	59.45	74.00	-14.55	49.03	6.78	38.33	34.69	Peak	80	110	VERTICAL
2	11590.32	46.44	54.00	-7.56	36.02	6.78	38.33	34.69	Average	80	110	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	11549.86	41.01	54.00	-12.99	30.60	6.77	38.32	34.68	Average	38	100	HORIZONTAL
2	11549.99	53.87	74.00	-20.13	43.46	6.77	38.32	34.68	Peak	38	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	11550.00	42.37	54.00	-11.63	31.96	6.77	38.32	34.68	Average	318	109	VERTICAL
2	11550.28	55.49	74.00	-18.51	45.08	6.77	38.32	34.68	Peak	318	109	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11b CH 1 / Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 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	4823.99	48.53	54.00	-5.47	46.34	4.21	32.56	34.58	Average	117	113	HORIZONTAL
2	4823.99	52.51	74.00	-21.49	50.32	4.21	32.56	34.58	Peak	117	113	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	4823.99	56.27	74.00	-17.73	54.08	4.21	32.56	34.58	Peak	46	215	VERTICAL
2	4824.00	53.90	54.00	-0.10	51.71	4.21	32.56	34.58	Average	46	215	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11b CH 6 / Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 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	4874.19	44.66	54.00	-9.34	42.35	4.22	32.66	34.57	Average	144	116	HORIZONTAL
2	4874.26	48.29	74.00	-25.71	45.98	4.22	32.66	34.57	Peak	144	116	HORIZONTAL
3	7309.81	53.28	74.00	-20.72	45.69	5.34	37.07	34.82	Peak	101	108	HORIZONTAL
4	7310.06	45.69	54.00	-8.31	38.10	5.34	37.07	34.82	Average	101	108	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	4874.15	46.47	54.00	-7.53	44.16	4.22	32.66	34.57	Average	94	100	VERTICAL
2	4874.29	50.59	74.00	-23.41	48.28	4.22	32.66	34.57	Peak	94	100	VERTICAL
3	7309.78	57.78	74.00	-16.22	50.19	5.34	37.07	34.82	Peak	35	225	VERTICAL
4	7313.06	52.04	54.00	-1.96	44.46	5.34	37.07	34.83	Average	35	225	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11b CH 11 / Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 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	4924.10	46.54	54.00	-7.46	44.10	4.23	32.76	34.55	Average	119	100	HORIZONTAL
2	4924.30	50.09	74.00	-23.91	47.65	4.23	32.76	34.55	Peak	119	100	HORIZONTAL
3	7382.91	48.92	74.00	-25.08	41.24	5.36	37.16	34.84	Peak	263	100	HORIZONTAL
4	7386.85	40.59	54.00	-13.41	32.89	5.36	37.18	34.84	Average	263	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	4924.13	53.59	74.00	-20.41	51.15	4.23	32.76	34.55	Peak	94	100	VERTICAL
2	4924.16	51.04	54.00	-2.96	48.60	4.23	32.76	34.55	Average	94	100	VERTICAL
3	7385.28	53.52	74.00	-20.48	45.82	5.36	37.18	34.84	Peak	38	100	VERTICAL
4	7385.46	46.86	54.00	-7.14	39.16	5.36	37.18	34.84	Average	38	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11g CH 1 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4820.41	31.16	54.00	-22.84	29.08	4.21	32.56	34.69	Average	73	100	HORIZONTAL
2	4823.25	44.42	74.00	-29.58	42.34	4.21	32.56	34.69	Peak	73	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	4822.05	44.18	74.00	-29.82	42.10	4.21	32.56	34.69	Peak	254	100	VERTICAL
2	4824.31	31.73	54.00	-22.27	29.65	4.21	32.56	34.69	Average	254	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11g CH 6 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4874.96	45.57	74.00	-28.43	43.36	4.22	32.66	34.67	Peak	139	166	HORIZONTAL
2	4875.31	32.75	54.00	-21.25	30.54	4.22	32.66	34.67	Average	139	166	HORIZONTAL
3	7309.37	51.39	74.00	-22.61	43.91	5.34	37.07	34.93	Peak	126	100	HORIZONTAL
4	7310.07	38.57	54.00	-15.43	31.09	5.34	37.07	34.93	Average	126	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	4877.08	49.47	74.00	-24.53	47.26	4.22	32.66	34.67	Peak	70	107	VERTICAL
2	4877.69	36.39	54.00	-17.61	34.18	4.22	32.66	34.67	Average	70	107	VERTICAL
3	7307.44	56.58	74.00	-17.42	49.10	5.34	37.07	34.93	Peak	173	100	VERTICAL
4	7307.70	43.58	54.00	-10.42	36.10	5.34	37.07	34.93	Average	173	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11g CH 11 / Chain 2 + Chain 3 + Chain 4
Test Date	May 15, 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	4925.99	31.64	54.00	-22.36	29.30	4.23	32.76	34.65	Average	142	100	HORIZONTAL
2	4931.53	44.50	74.00	-29.50	42.16	4.23	32.76	34.65	Peak	142	100	HORIZONTAL
3	7377.96	36.85	54.00	-17.15	29.29	5.36	37.16	34.96	Average	243	100	HORIZONTAL
4	7388.02	50.57	74.00	-23.43	42.99	5.36	37.18	34.96	Peak	243	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	4924.43	44.28	74.00	-29.72	41.94	4.23	32.76	34.65	Peak	174	100	VERTICAL
2	4926.74	32.34	54.00	-21.66	30.00	4.23	32.76	34.65	Average	174	100	VERTICAL
3	7386.00	50.33	74.00	-23.67	42.75	5.36	37.18	34.96	Peak	72	100	VERTICAL
4	7387.96	37.79	54.00	-16.21	30.21	5.36	37.18	34.96	Average	72	100	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11a CH 149 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 16, 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	11488.14	57.42	74.00	-16.58	47.20	6.74	38.30	34.82	Peak	266	186	HORIZONTAL
2	11488.21	43.91	54.00	-10.09	33.69	6.74	38.30	34.82	Average	266	186	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	11490.16	49.01	54.00	-4.99	38.79	6.74	38.30	34.82	Average	121	105	VERTICAL
2	11490.24	61.62	74.00	-12.38	51.40	6.74	38.30	34.82	Peak	121	105	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11a CH 157 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 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	11572.70	45.91	54.00	-8.09	35.50	6.77	38.33	34.69	Average	288	195	HORIZONTAL
2	11573.20	58.21	74.00	-15.79	47.80	6.77	38.33	34.69	Peak	288	195	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	11572.70	51.11	54.00	-2.89	40.70	6.77	38.33	34.69	Average	121	110	VERTICAL
2	11573.20	62.93	74.00	-11.07	52.52	6.77	38.33	34.69	Peak	121	110	VERTICAL

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11a CH 165 / Chain 1 + Chain 2 + Chain 3 + Chain 4
Test Date	May 16, 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	11643.78	43.62	54.00	-10.38	33.32	6.80	38.36	34.86	Average	259	188	HORIZONTAL
2	11644.17	57.42	74.00	-16.58	47.12	6.80	38.36	34.86	Peak	259	188	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	11650.06	49.14	54.00	-4.86	38.85	6.80	38.36	34.87	Average	119	105	VERTICAL
2	11651.73	62.85	74.00	-11.15	52.56	6.80	38.36	34.87	Peak	119	105	VERTICAL

Note:

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

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

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

4.6. Emissions Measurement

4.6.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies (MHz)	Field Strength (micorvolts/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

4.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1 MHz / 10Hz for Average
RBW / VBW (Emission in non-restricted band)	100 kHz / 300 kHz for Peak

4.6.3. Test Procedures

For Radiated band edges Measurement:

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

For 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.

4.6.4. Test Deviation

There is no deviation with the original standard.

4.6.5. EUT Operation during Test

For IEEE 802.11a/b/g/n mode (non-beamforming function):

The EUT was programmed to be in continuously transmitting mode.

For IEEE 802.11ac mode (beamforming function):

The EUT was programmed to be in beamforming transmitting mode.

4.6.6. Test Result of Band Edge and Fundamental Emissions

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT20 CH 1, 6, 11 / Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 2014		

Channel 1

	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	2390.00	70.68	74.00	-3.32	39.85	2.91	27.92	0.00	Peak	184	257	VERTICAL
2	2390.00	53.72	54.00	-0.28	22.89	2.91	27.92	0.00	Average	184	257	VERTICAL
3	2410.25	102.33			71.51	2.92	27.90	0.00	Average	184	257	VERTICAL
4	2410.38	114.60			83.78	2.92	27.90	0.00	Peak	184	257	VERTICAL

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

Channel 6

	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	2390.00	66.74	74.00	-7.26	35.91	2.91	27.92	0.00	Peak	215	210	VERTICAL
2	2390.00	53.44	54.00	-0.56	22.61	2.91	27.92	0.00	Average	215	210	VERTICAL
3	2431.50	121.58			90.77	2.93	27.88	0.00	Peak	215	210	VERTICAL
4	2431.75	109.59			78.78	2.93	27.88	0.00	Average	215	210	VERTICAL
5	2489.90	63.49	74.00	-10.51	32.72	2.97	27.80	0.00	Peak	215	210	VERTICAL
6	2490.70	49.68	54.00	-4.32	18.91	2.97	27.80	0.00	Average	215	210	VERTICAL

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

Channel 11

	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	2465.13	101.84			71.05	2.95	27.84	0.00	Average	132	100	VERTICAL
2	2465.63	112.97			82.18	2.95	27.84	0.00	Peak	132	100	VERTICAL
3	2483.50	53.30	54.00	-0.70	22.52	2.96	27.82	0.00	Average	132	100	VERTICAL
4	2484.50	68.56	74.00	-5.44	37.78	2.96	27.82	0.00	Peak	132	100	VERTICAL

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

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11n MCS0 HT40 CH 3, 6, 9 / Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 2014		

Channel 3

	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	2388.40	68.39	74.00	-5.61	37.56	2.91	27.92	0.00	Peak	192	223	VERTICAL
2	2389.60	53.66	54.00	-0.34	22.83	2.91	27.92	0.00	Average	192	223	VERTICAL
3	2428.25	96.09			65.28	2.93	27.88	0.00	Average	192	223	VERTICAL
4	2430.00	107.35			76.54	2.93	27.88	0.00	Peak	192	223	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	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2388.40	67.18	74.00	-6.82	36.35	2.91	27.92	0.00	Peak	248	206	VERTICAL
2	2390.00	53.71	54.00	-0.29	22.88	2.91	27.92	0.00	Average	248	206	VERTICAL
3	2448.50	112.28			81.48	2.94	27.86	0.00	Peak	248	206	VERTICAL
4	2448.50	100.08			69.28	2.94	27.86	0.00	Average	248	206	VERTICAL
5	2486.70	64.26	74.00	-9.74	33.48	2.96	27.82	0.00	Peak	248	206	VERTICAL
6	2487.10	50.65	54.00	-3.35	19.87	2.96	27.82	0.00	Average	248	206	VERTICAL

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

Channel 9

	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	2464.50	106.16			75.37	2.95	27.84	0.00	Peak	328	201	VERTICAL
2	2465.00	94.72			63.93	2.95	27.84	0.00	Average	328	201	VERTICAL
3	2485.50	53.83	54.00	-0.17	23.05	2.96	27.82	0.00	Average	328	201	VERTICAL
4	2487.50	68.71	74.00	-5.29	37.94	2.97	27.80	0.00	Peak	328	201	VERTICAL

Item 3, 4 are the fundamental frequency at 2452 MHz.

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11b CH 1, 6, 11 / Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 2014		

Channel 1

	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	2387.20	60.86	74.00	-13.14	30.03	2.91	27.92	0.00	Peak	132	126	VERTICAL
2	2387.20	52.77	54.00	-1.23	21.94	2.91	27.92	0.00	Average	132	100	VERTICAL
3	2409.50	115.67			84.85	2.92	27.90	0.00	Peak	132	126	VERTICAL
4	2409.75	111.57			80.75	2.92	27.90	0.00	Average	132	126	VERTICAL

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

Channel 6

	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	2388.00	59.87	74.00	-14.13	29.04	2.91	27.92	0.00	Peak	191	255	VERTICAL
2	2388.00	51.58	54.00	-2.42	20.75	2.91	27.92	0.00	Average	191	255	VERTICAL
3	2437.75	119.98			89.18	2.94	27.86	0.00	Average	191	255	VERTICAL
4	2438.00	124.08			93.28	2.94	27.86	0.00	Peak	191	255	VERTICAL
5	2487.50	60.69	74.00	-13.31	29.92	2.97	27.80	0.00	Peak	191	255	VERTICAL
6	2487.50	53.60	54.00	-0.40	22.83	2.97	27.80	0.00	Average	191	255	VERTICAL

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

Channel 11

	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	2464.00	116.30			85.51	2.95	27.84	0.00	Peak	131	100	VERTICAL
2	2464.25	112.61			81.82	2.95	27.84	0.00	Average	131	100	VERTICAL
3	2486.90	60.37	74.00	-13.63	29.59	2.96	27.82	0.00	Peak	131	100	VERTICAL
4	2487.30	53.11	54.00	-0.89	22.33	2.96	27.82	0.00	Average	131	100	VERTICAL

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

Temperature	24°C	Humidity	57%
Test Engineer	James Chou	Configurations	IEEE 802.11g CH 1, 6, 11 / Chain 2 + Chain 3 + Chain 4
Test Date	Apr. 04, 2014		

Channel 1

	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	2389.80	70.63	74.00	-3.37	39.80	2.91	27.92	0.00	Peak	191	217	VERTICAL
2	2390.00	53.53	54.00	-0.47	22.70	2.91	27.92	0.00	Average	217	217	VERTICAL
3	2410.63	113.27			82.45	2.92	27.90	0.00	Peak	191	217	VERTICAL
4	2419.75	101.58			70.77	2.93	27.88	0.00	Average	191	217	VERTICAL

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

Channel 6

	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	2390.00	67.64	74.00	-6.36	36.81	2.91	27.92	0.00	Peak	233	216	VERTICAL
2	2390.00	53.77	54.00	-0.23	22.94	2.91	27.92	0.00	Average	233	216	VERTICAL
3	2430.00	122.50			91.69	2.93	27.88	0.00	Peak	233	216	VERTICAL
4	2430.50	110.67			79.86	2.93	27.88	0.00	Average	233	216	VERTICAL
5	2489.90	49.59	54.00	-4.41	18.82	2.97	27.80	0.00	Average	233	216	VERTICAL
6	2491.50	63.65	74.00	-10.35	32.88	2.97	27.80	0.00	Peak	233	216	VERTICAL

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

Channel 11

	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	2455.88	115.06			84.27	2.95	27.84	0.00	Peak	130	100	VERTICAL
2	2465.88	102.96			72.17	2.95	27.84	0.00	Average	130	100	VERTICAL
3	2484.70	53.77	54.00	-0.23	22.99	2.96	27.82	0.00	Average	130	100	VERTICAL
4	2484.90	68.17	74.00	-5.83	37.39	2.96	27.82	0.00	Peak	130	100	VERTICAL

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

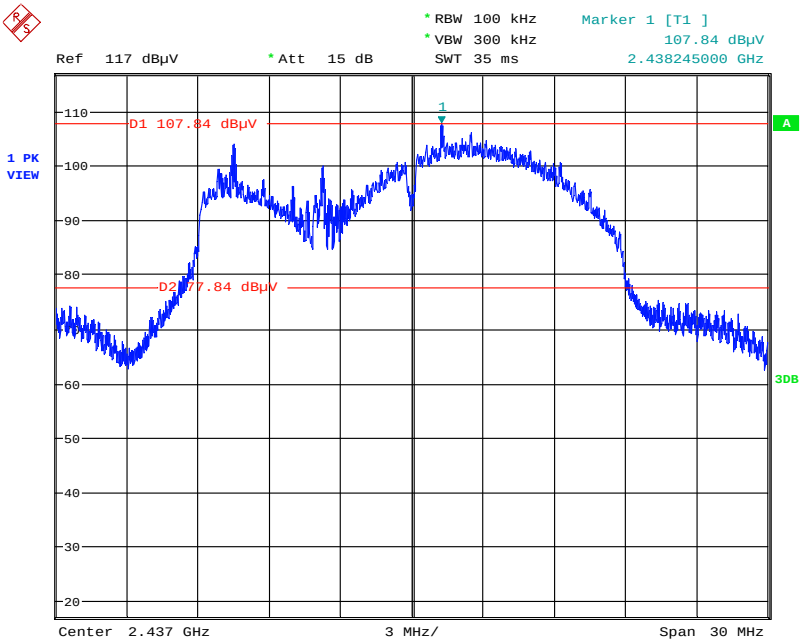
Note:

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

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

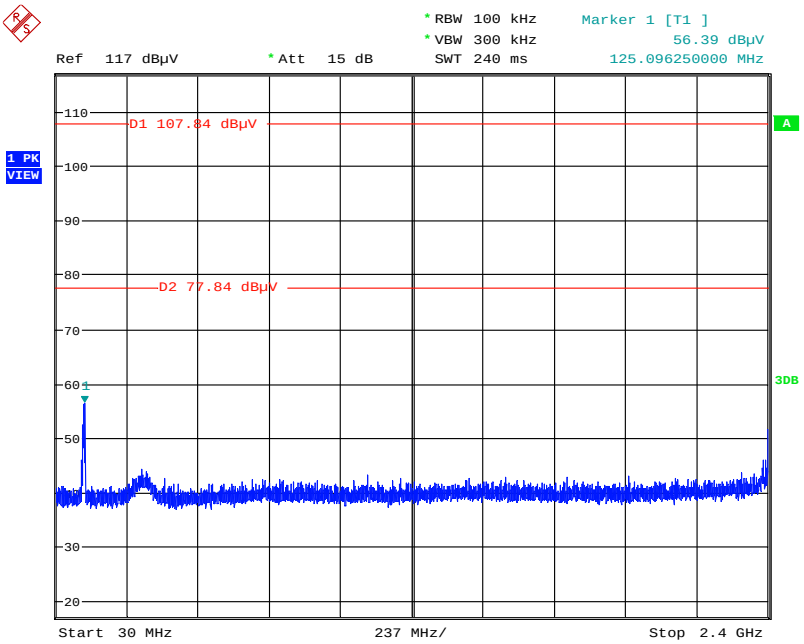
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11n MCS0 HT20 / Reference Level



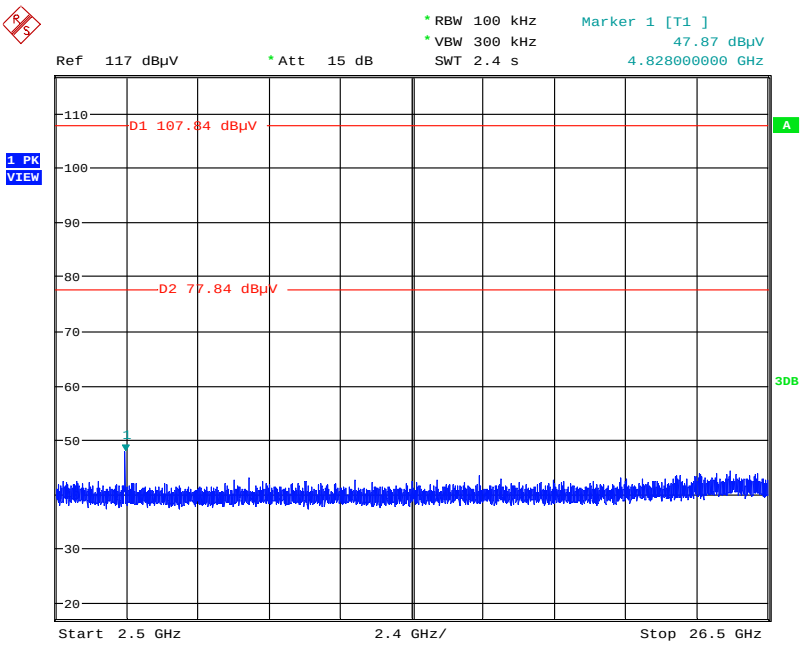
Date: 28.MAY.2014 23:54:55

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



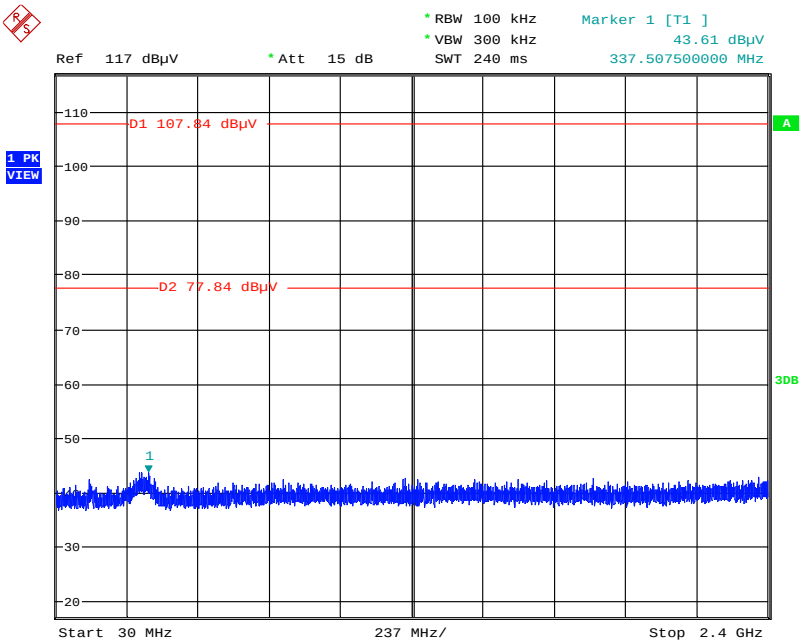
Date: 28.MAY.2014 23:56:10

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



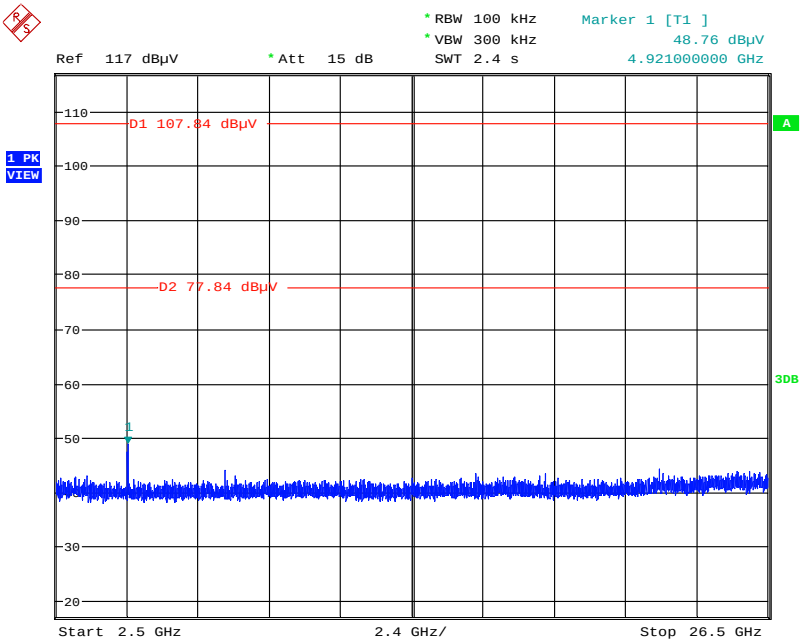
Date: 28.MAY.2014 23:56:42

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



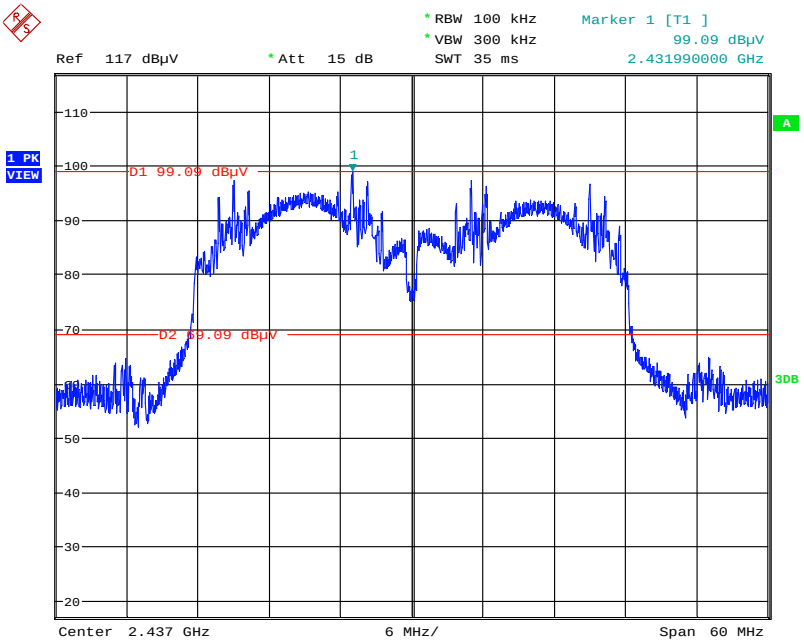
Date: 28.MAY.2014 23:58:01

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



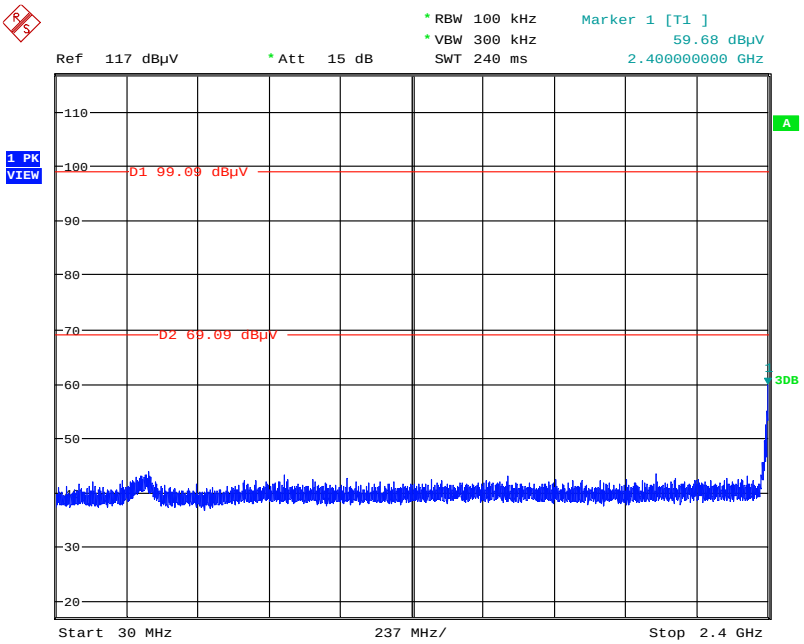
Date: 28.MAY.2014 23:59:01

Plot on Configuration IEEE 802.11n MCS0 HT40 / Reference Level



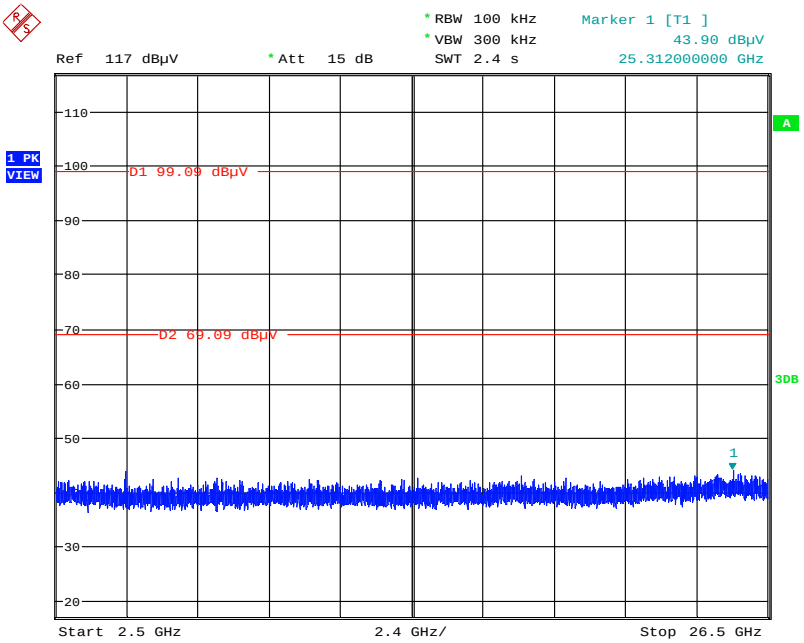
Date: 29.MAY.2014 00:05:38

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



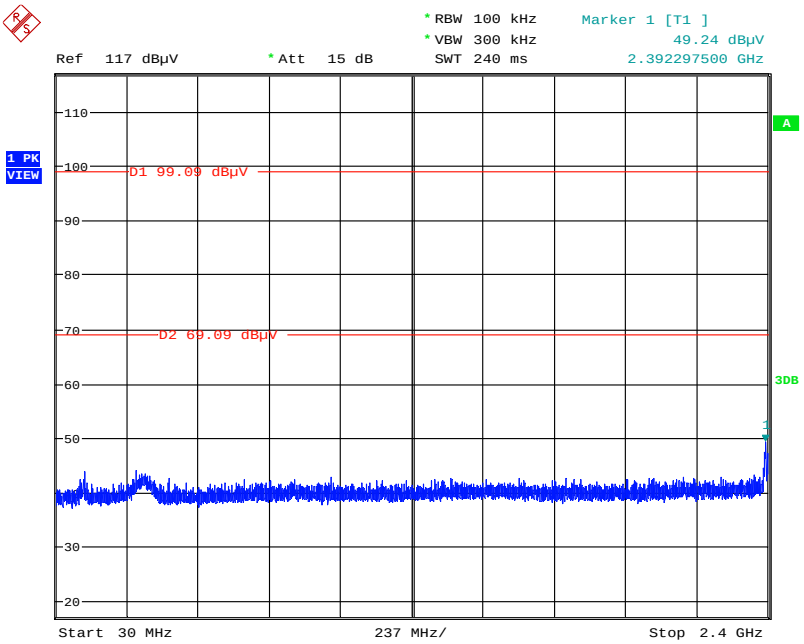
Date: 29.MAY.2014 00:08:52

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



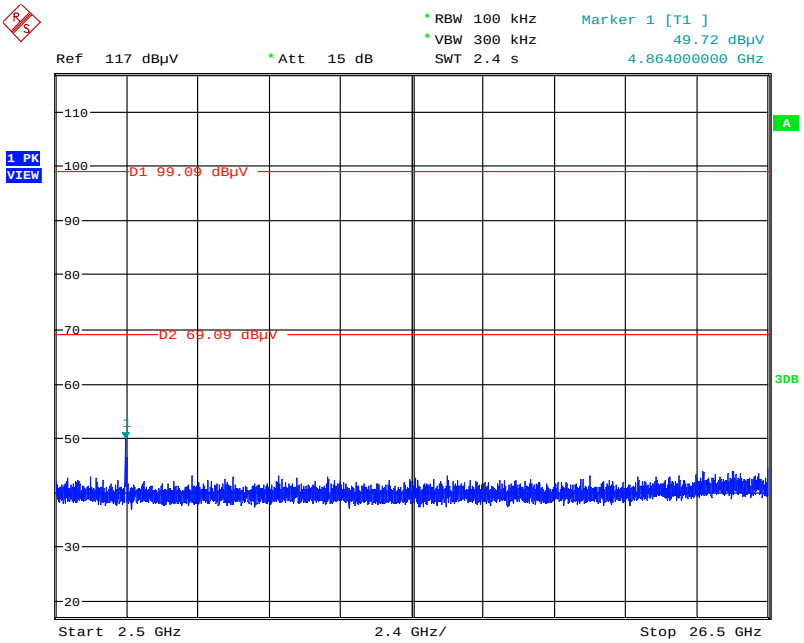
Date: 29.MAY.2014 00:09:35

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



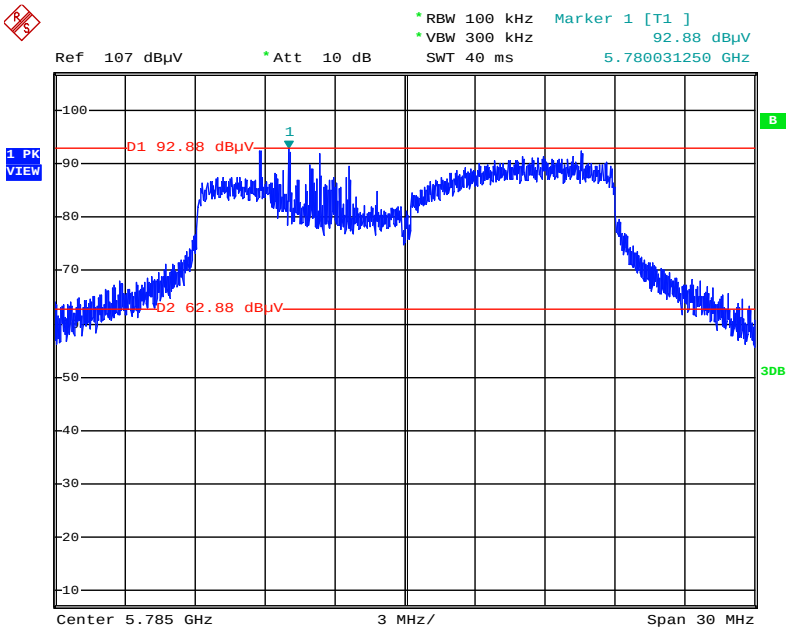
Date: 29.MAY.2014 00:07:17

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



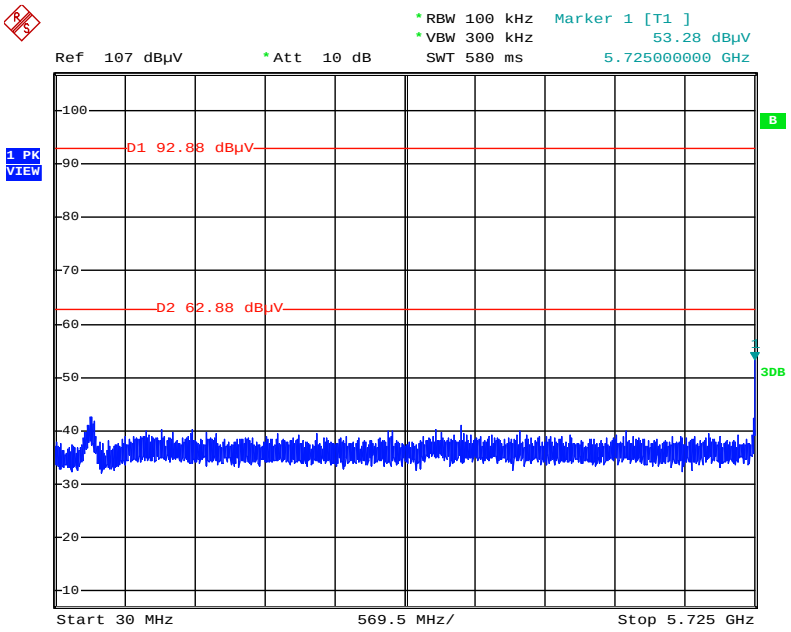
Date: 29.MAY.2014 00:07:47

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Reference Level



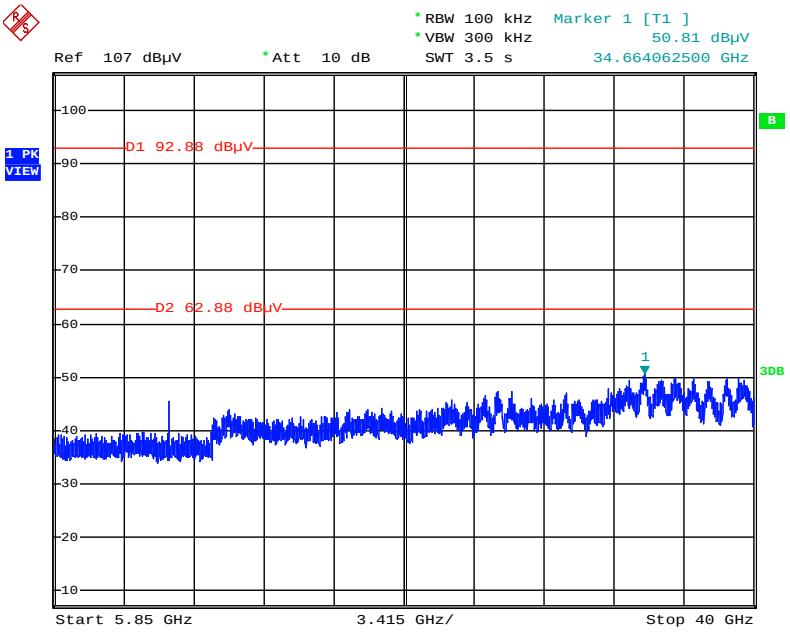
Date: 15.MAY.2014 04:31:24

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 149 / 30MHz~5725MHz (down 30dBc)



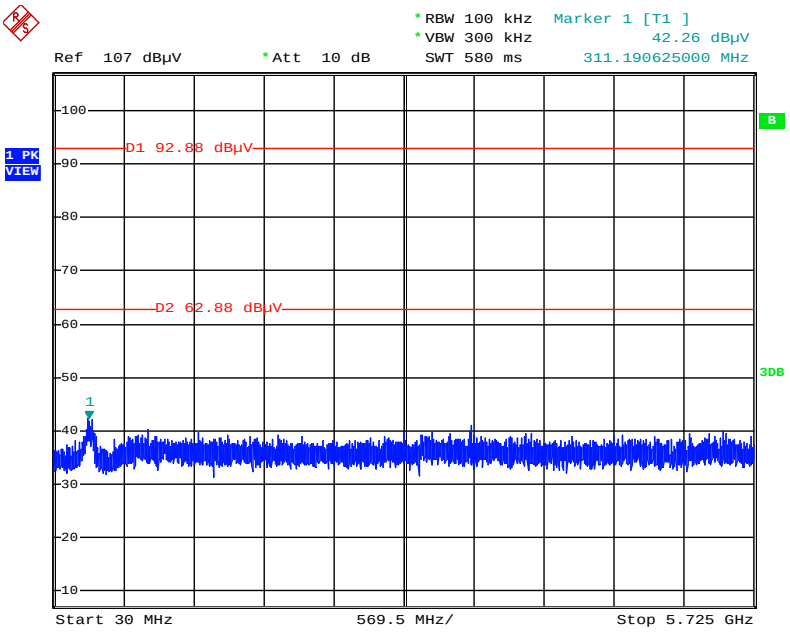
Date: 15.MAY.2014 04:40:32

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 149 / 5850MHz~40000MHz (down 30dBc)



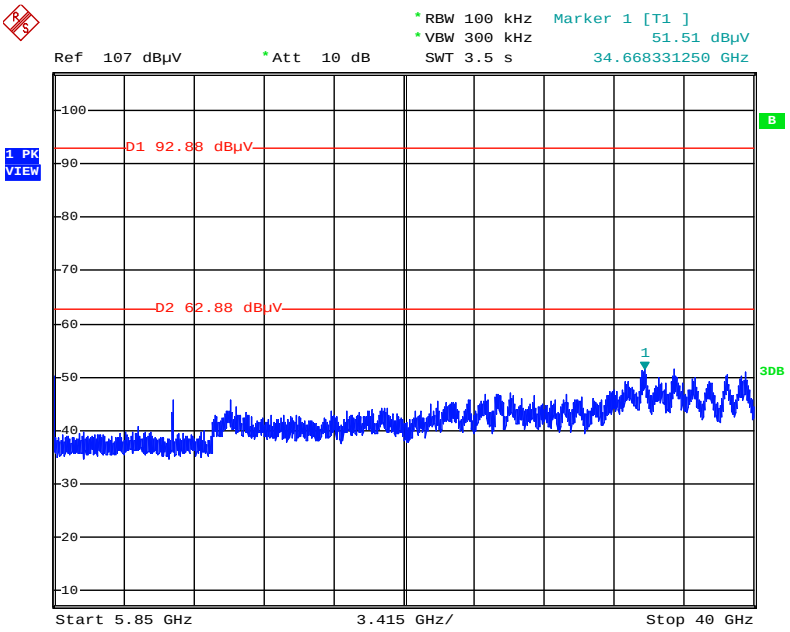
Date: 15.MAY.2014 04:39:48

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 165 / 30MHz~5725MHz (down 30dBc)



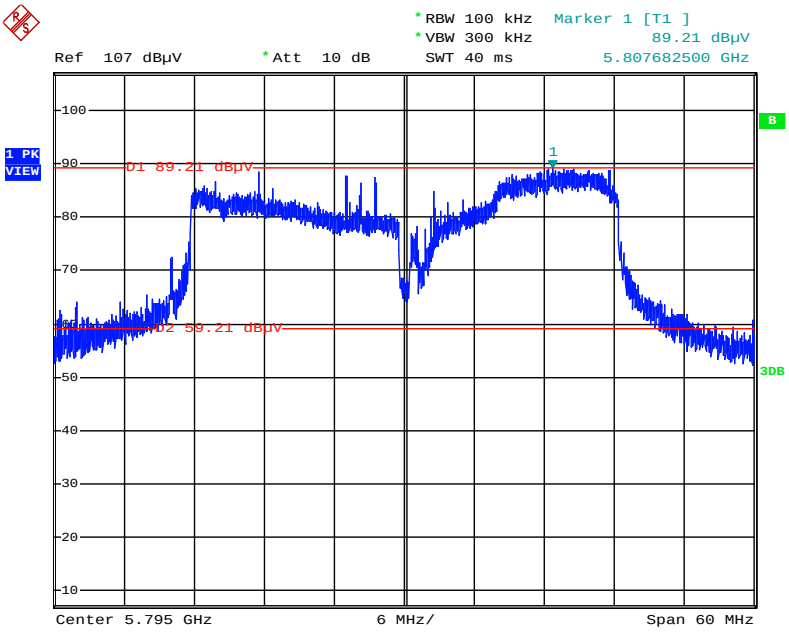
Date: 15.MAY.2014 04:34:16

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 165 / 5850MHz~40000MHz (down 30dBc)



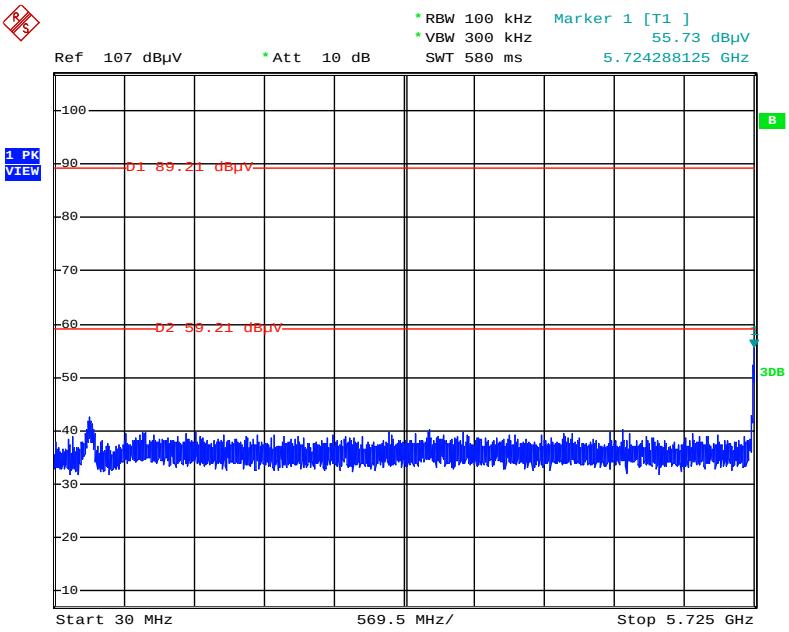
Date: 15.MAY.2014 04:35:16

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Reference Level



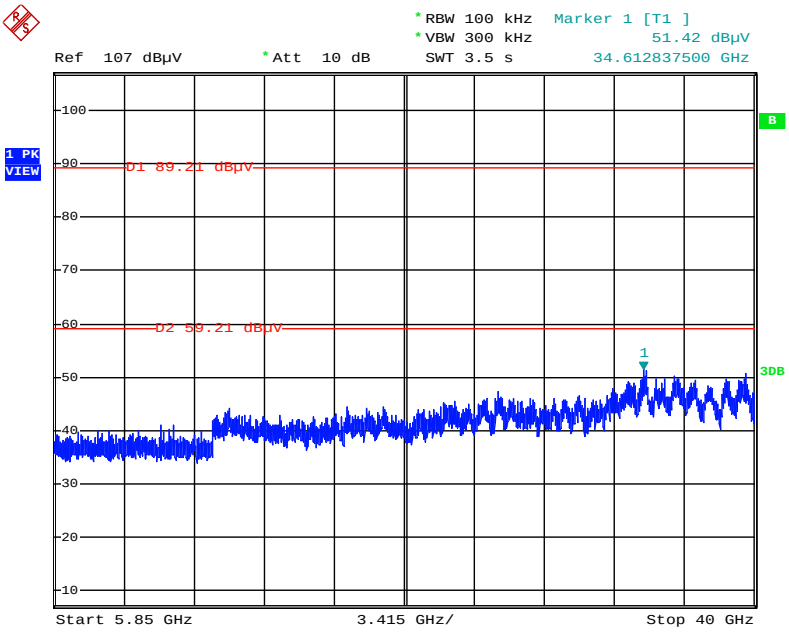
Date: 15.MAY.2014 04:49:20

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / CH 151 / 30MHz~5725MHz (down 30dBc)



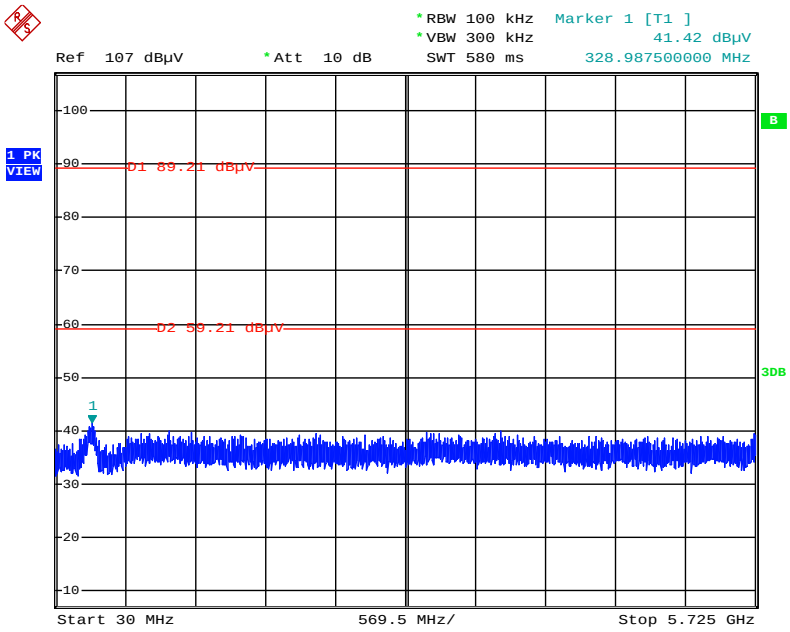
Date: 15.MAY.2014 04:54:45

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / CH 151 / 5850MHz~40000MHz (down 30dBc)



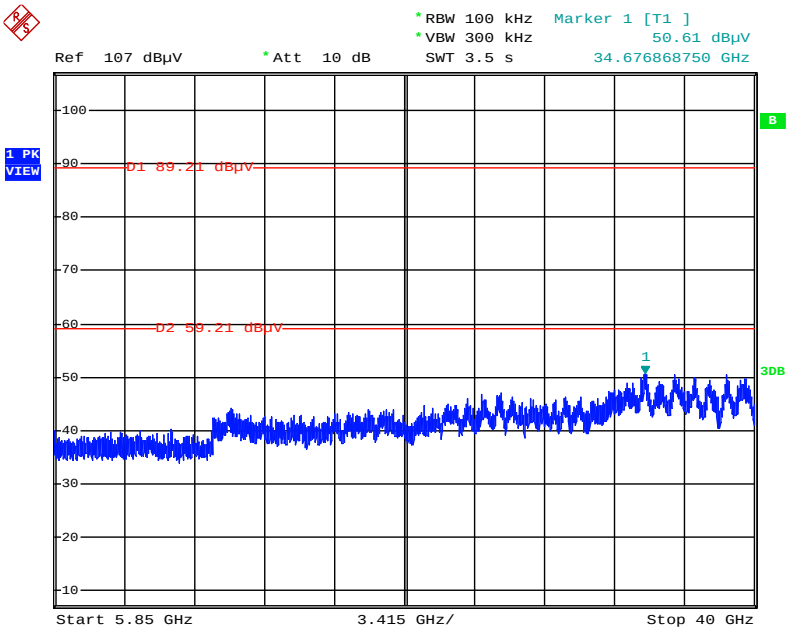
Date: 15.MAY.2014 04:54:05

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / CH 159 / 30MHz~5725MHz (down 30dBc)



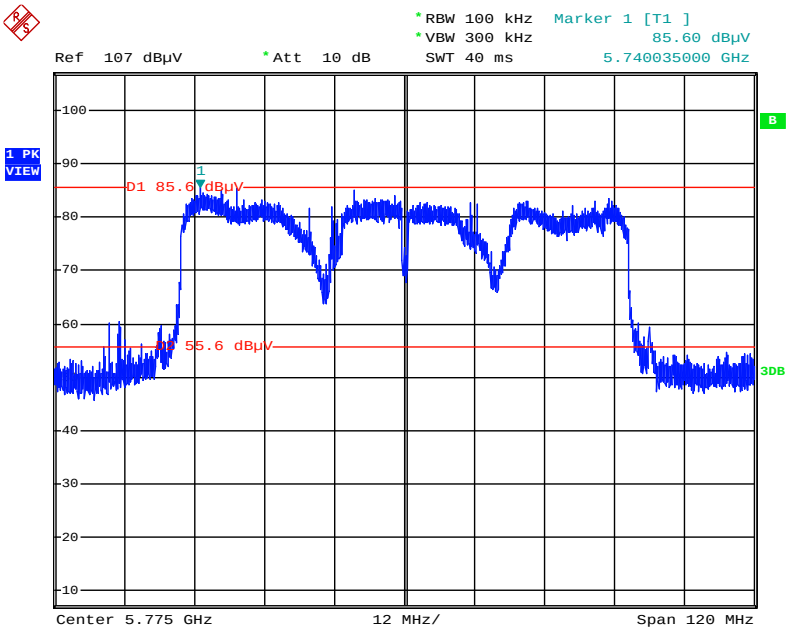
Date: 15.MAY.2014 04:49:47

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / CH 159 / 5850MHz~40000MHz (down 30dBc)



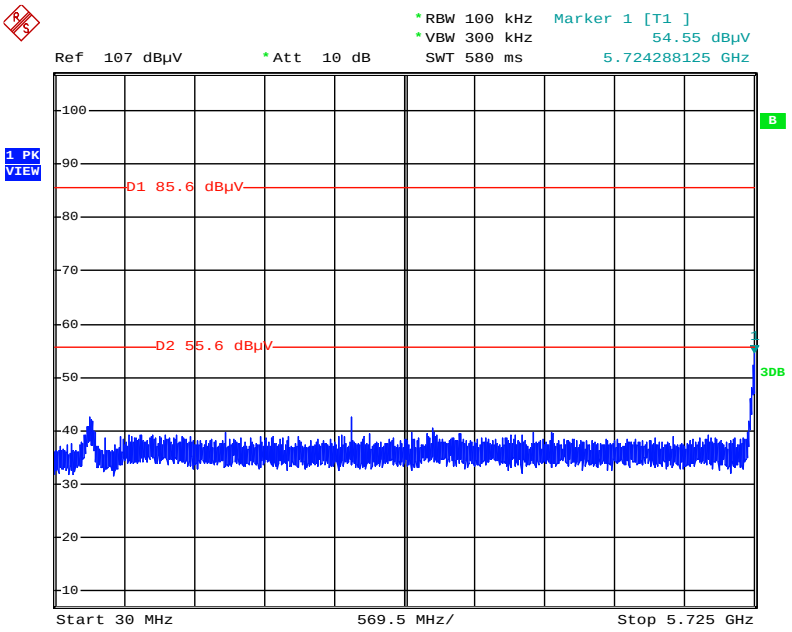
Date: 15.MAY.2014 04:50:40

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Reference Level



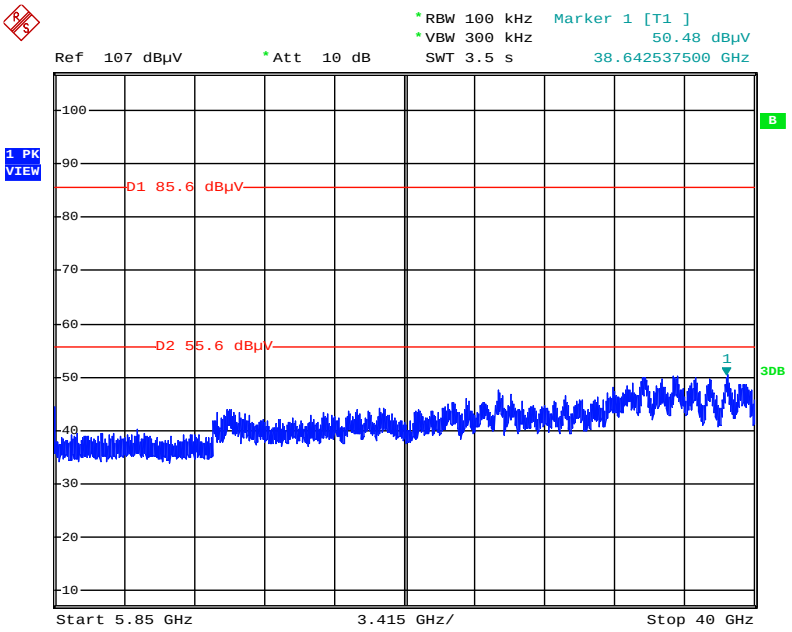
Date: 15.MAY.2014 05:04:53

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / CH 155 / 30MHz~5725MHz (down 30dBc)



Date: 15.MAY.2014 05:07:34

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / CH 155 / 5850MHz~40000MHz (down 30dBc)

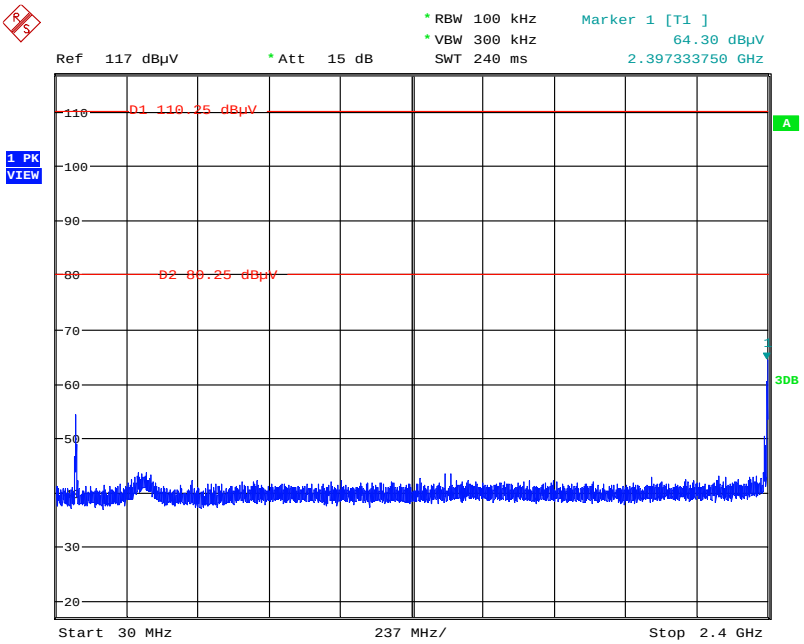


Date: 15.MAY.2014 05:08:27

Plot on Configuration IEEE 802.11b / Reference Level

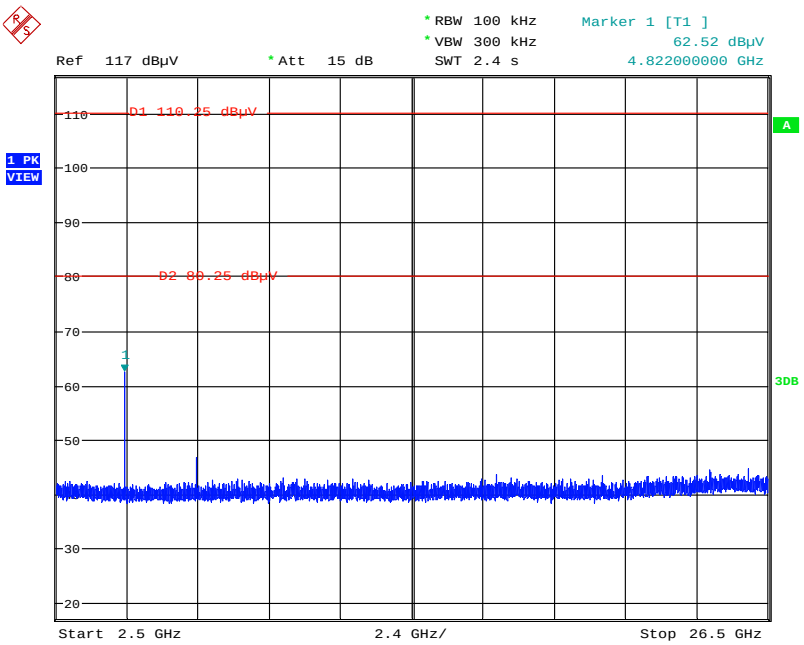
Date: 29.MAY.2014 00:17:09

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



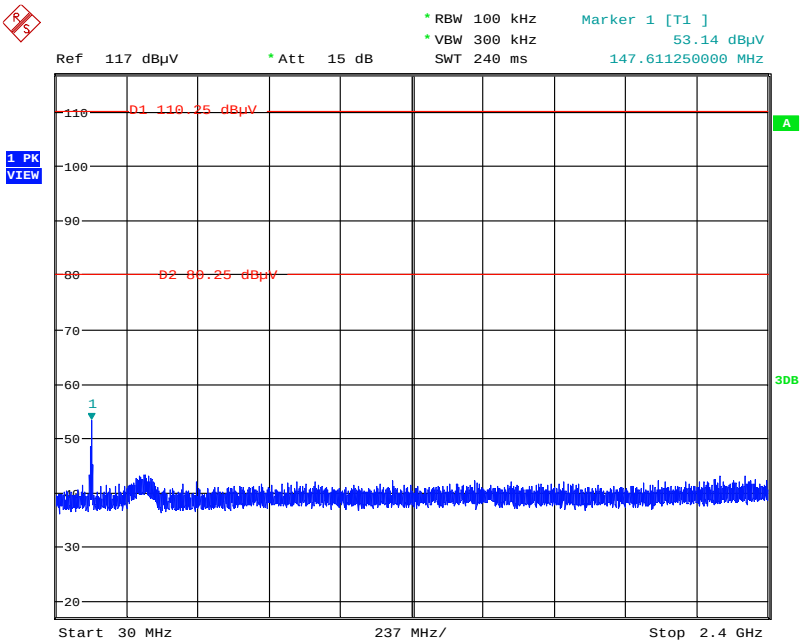
Date: 29.MAY.2014 00:18:17

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



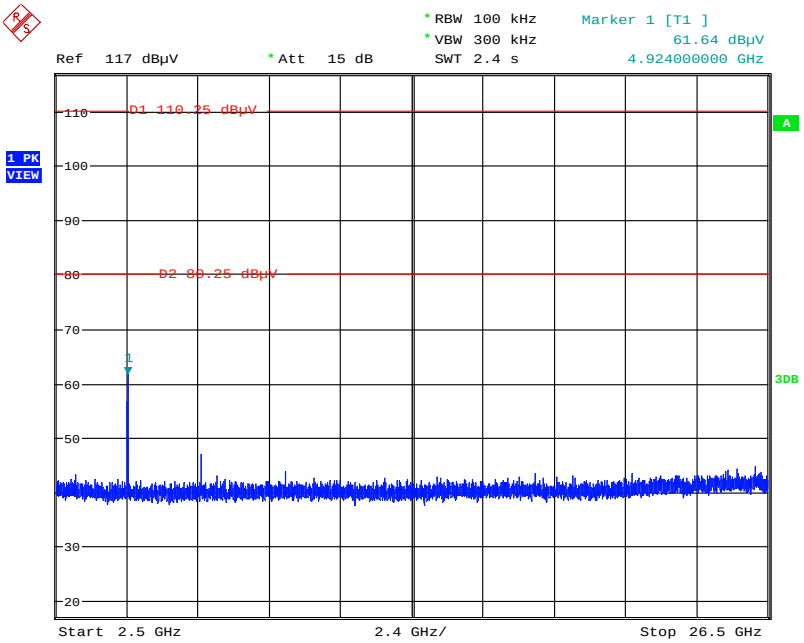
Date: 29.MAY.2014 00:19:20

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



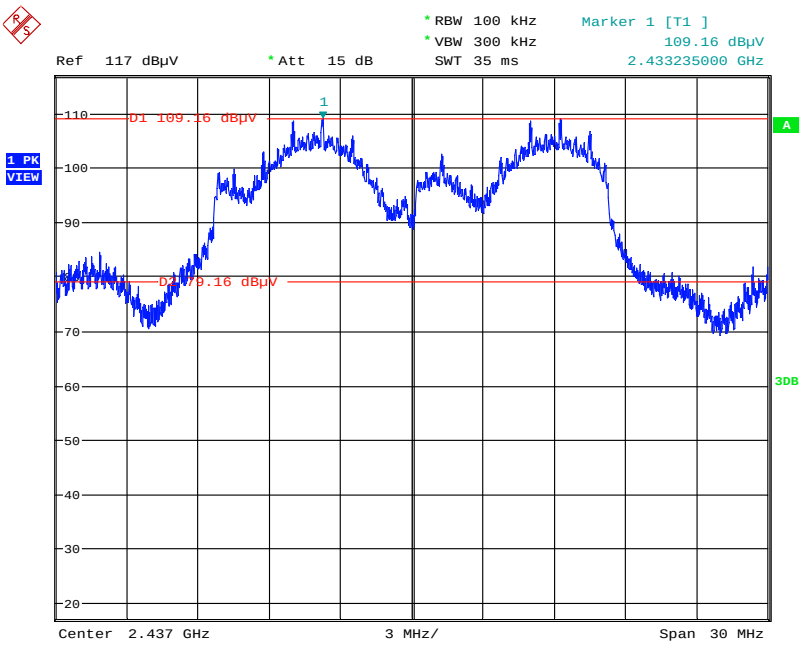
Date: 29.MAY.2014 00:21:54

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



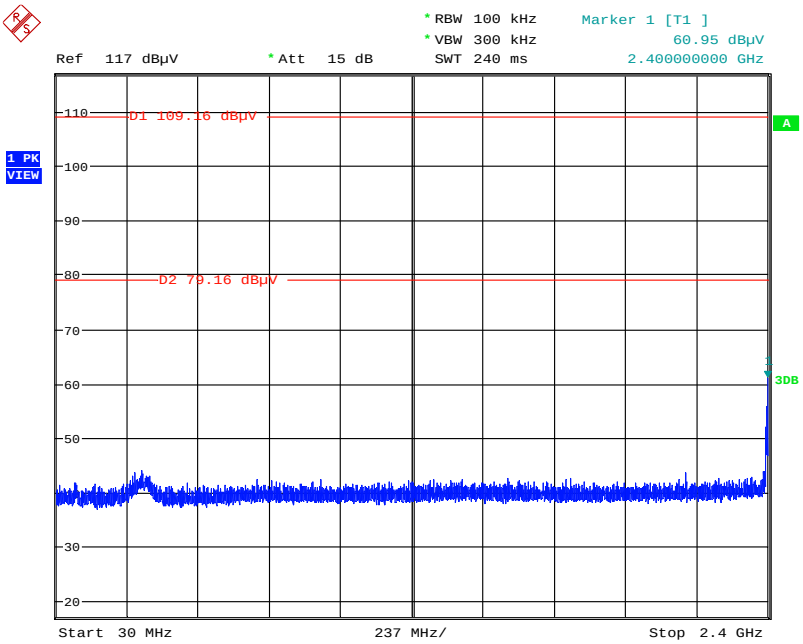
Date: 29.MAY.2014 00:22:49

Plot on Configuration IEEE 802.11g / Reference Level



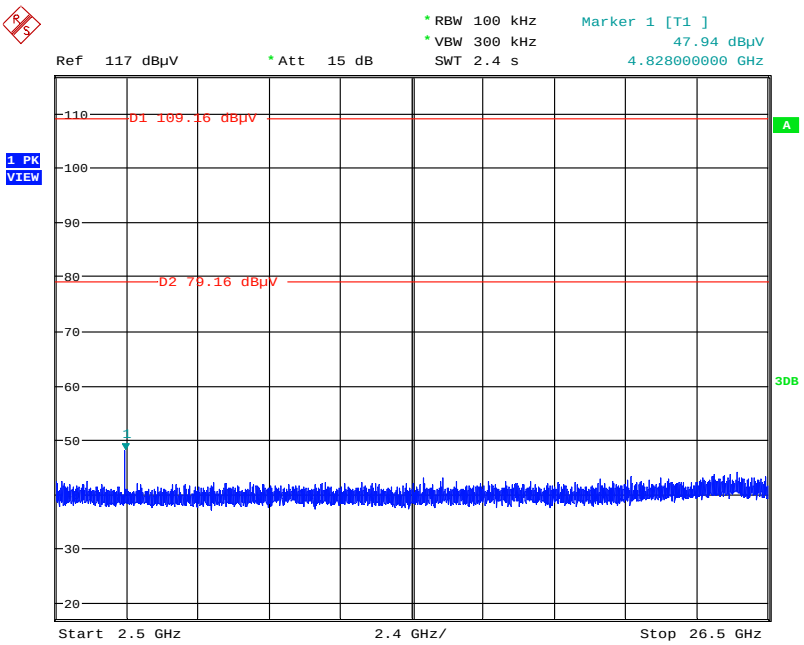
Date: 28.MAY.2014 23:38:58

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



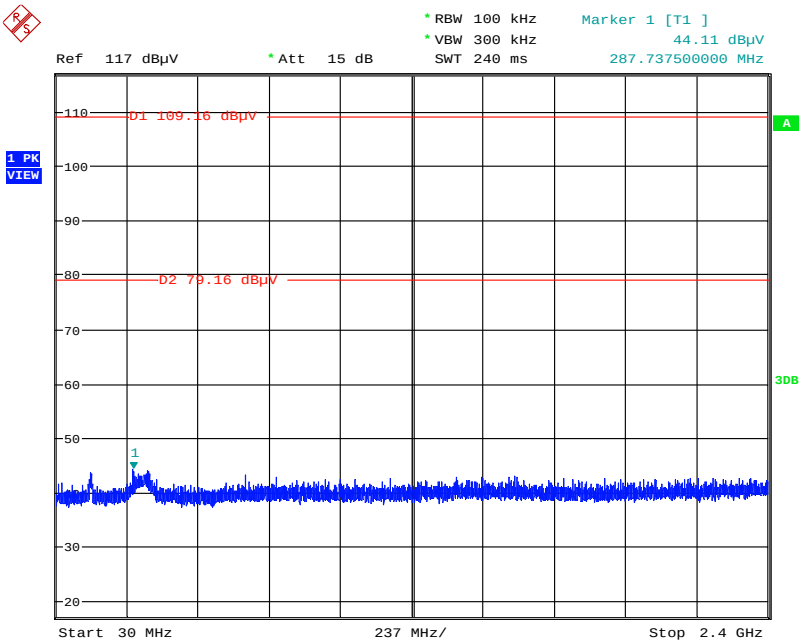
Date: 28.MAY.2014 23:40:10

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



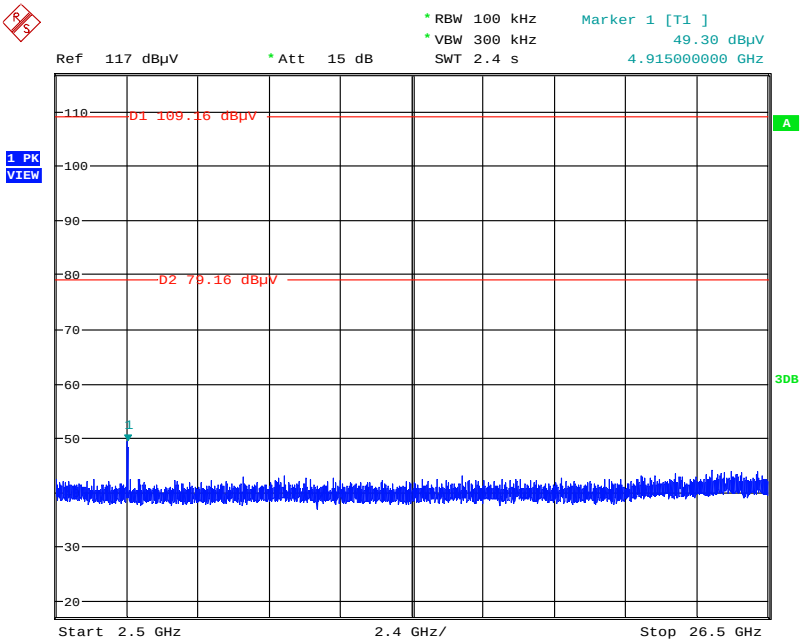
Date: 28.MAY.2014 23:41:25

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



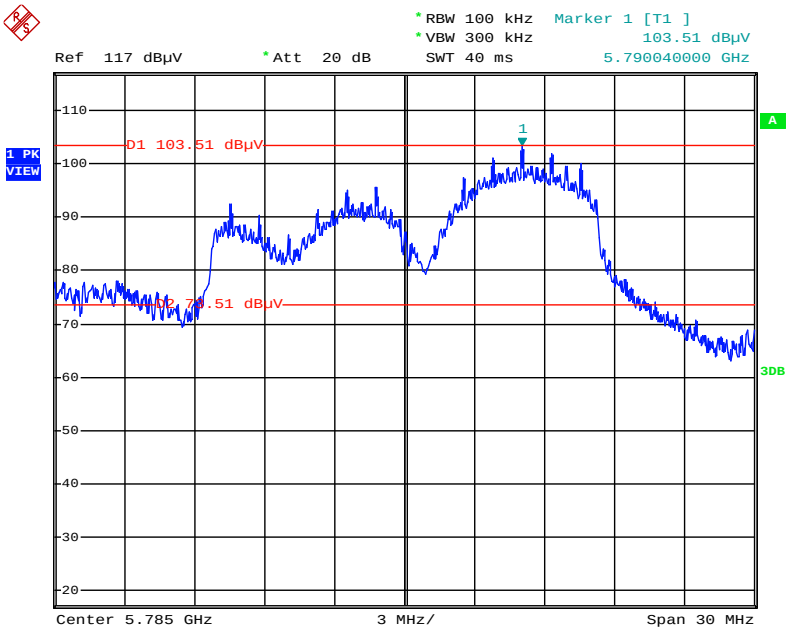
Date: 28.MAY.2014 23:42:53

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



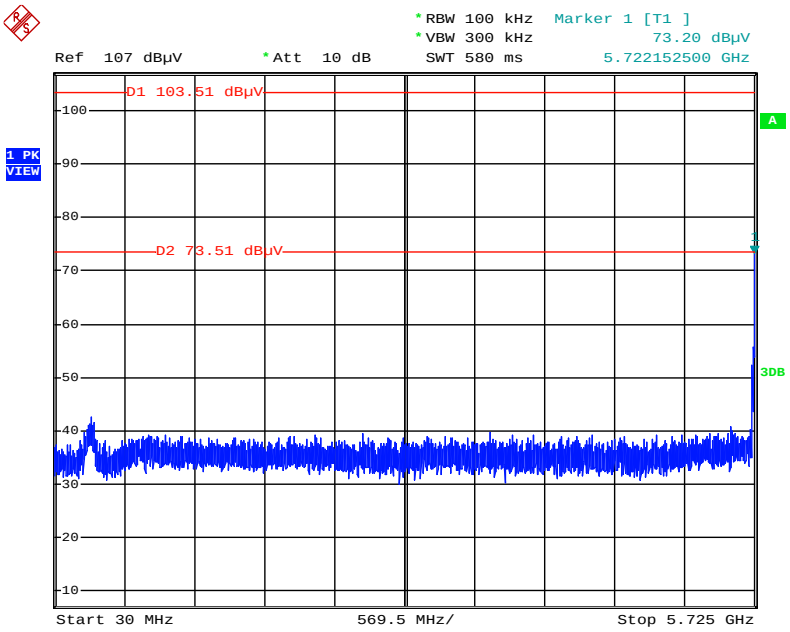
Date: 28.MAY.2014 23:43:26

Plot on Configuration IEEE 802.11a / Reference Level



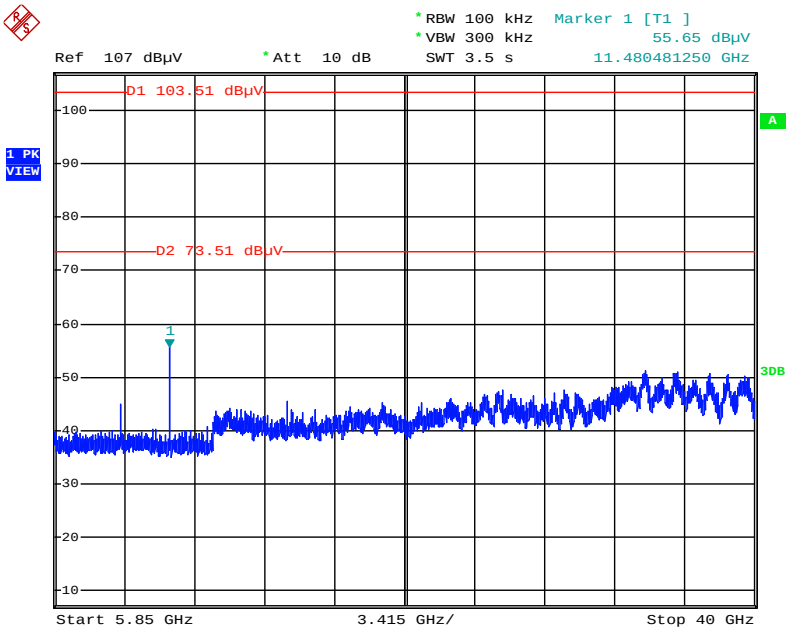
Date: 16.MAY.2014 03:00:48

Plot on Configuration IEEE 802.11a / CH 149 / 30MHz~5725MHz (down 30dBc)



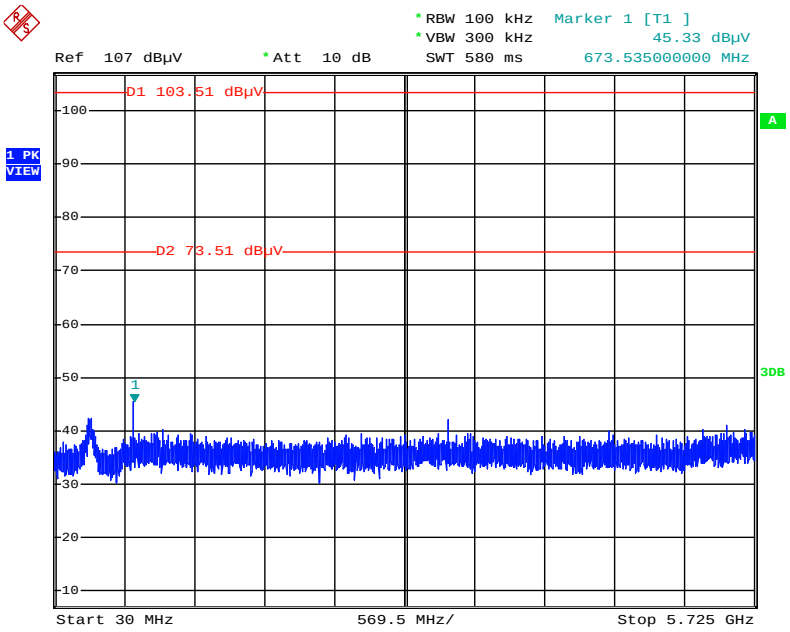
Date: 16.MAY.2014 03:03:27

Plot on Configuration IEEE 802.11a / CH 149 / 5850MHz~40000MHz (down 30dBc)



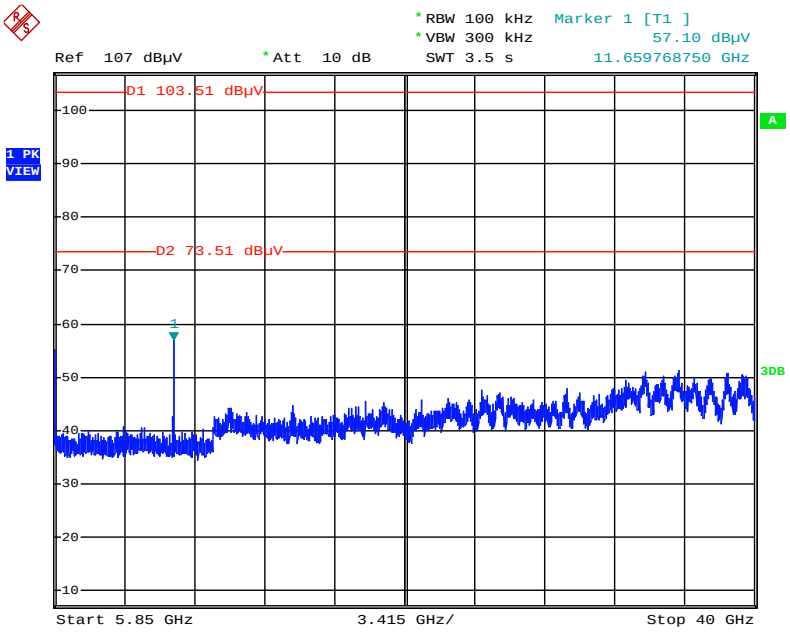
Date: 16.MAY.2014 03:02:48

Plot on Configuration IEEE 802.11a / CH 165 / 30MHz~5725MHz (down 30dBc)



Date: 16.MAY.2014 03:04:04

Plot on Configuration IEEE 802.11a / CH 165 / 5850MHz~40000MHz (down 30dBc)



Date: 16.MAY.2014 03:04:29

4.7. Antenna Requirements

4.7.1. Limit

Except for special regulations, the Low-power Radio-frequency Devices must not be equipped with any jacket for installing an antenna with extension cable. An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed.

4.7.2. Antenna Connector Construction

Please refer to section 3.3 in this test report; antenna connector complied with the requirements.

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
MXE EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8 GHz	Dec. 25, 2013	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150 kHz ~ 100 MHz	Nov. 23, 2013	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 11, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150 kHz ~ 30 MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Teseq GmbH	CBL 6112D	35236	30MHz ~ 2GHz	Nov. 29, 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 Conducted Emission Measurement (150kHz ~ 30MHz)

Contribution	Uncertainty of x_i			$u(x_i)$
	Value	Unit	Probability Distribution k	
Receiver reading	0.026	dB	normal(k=2)	0.013
Cable loss	0.002	dB	normal(k=2)	0.001
AMN/LISN specification	1.200	dB	normal(k=2)	0.600
Mismatch Receiver VSWR 1= AMN/LISN VSWR 2=	-0.080	dB	U-shaped	0.060
Combined standard uncertainty Uc(y)				1.2
Measuring uncertainty for a level of confidence of 95% U=2Uc(y)				2.4

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