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

FCC RADIO TEST REPORT

Applicant's company	**Realtek Semiconductor Corp.**
Applicant Address	No. 2,Innovation Road II, Hsinchu Science Park, Hsinchu 300,Taiwan
FCC ID	**TX2RTL8812AENF**
Manufacturer's company	**Realtek Semiconductor Corp.**
Manufacturer Address	No. 2,Innovation Road II, Hsinchu Science Park, Hsinchu 300,Taiwan

Product Name	802.11a/b/g/n/ac RTL8812AENF Combo module
Brand Name	REALTEK
Model No.	RTL8812AENF
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Mar. 07, 2014
Final Test Date	Nov. 28, 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 v03r02**, **KDB 662911 D01 v02r01**, **KDB644545 D01 v01r02.**

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

Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR422118AA	Rev. 01	Initial issue of report	Jan. 13, 2015

Certificate No.: CB10312065

1. CERTIFICATE OF COMPLIANCE

Product Name	:	802.11a/b/g/n/ac RTL8812AENF Combo module
Brand Name	:	REALTEK
Model No.	:	RTL8812AENF
Applicant	:	Realtek Semiconductor Corp.
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. 07, 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

SPORTON INTERNATIONAL INC.

2. SUMMARY OF THE TEST RESULT

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	14.29 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	7.02 dB
4.3	15.247(e)	Power Spectral Density	Complies	11.64 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	3.15 dB
4.6	15.247(d)	Band Edge Emissions	Complies	1.51 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (1TX/2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From host system
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): 18.06 MHz ; MCS0 (HT40): 37.33 MHz For 5GHz Band: 802.11ac MCS0/Nss1 (VHT20): 18.06 MHz ; 802.11ac MCS0/Nss1 (VHT40): 37.25 MHz ; 802.11ac MCS0/Nss1 (VHT80): 67.03 MHz
Maximum Conducted Output Power	For 2.4GHz Band: MCS0 (HT20): 20.95 dBm ; MCS0 (HT40): 17.26 dBm For 5GHz Band: 802.11ac MCS0/Nss1 (VHT20): 20.96 dBm ; 802.11ac MCS0/Nss1 (VHT40): 20.97 dBm ; 802.11ac MCS0/Nss1 (VHT80): 20.80 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	802.11b: WLAN (1TX, 1RX) 802.11a/g: WLAN (1TX/2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From host system
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%)	For 1TX: 11b: 15.07 MHz ; 11g: 18.45 MHz ; 11a: 17.01 MHz For 2TX: 11g: 20.36 MHz ; 11a: 17.06 MHz
Maximum Conducted Output Power	For 1TX: 11b: 17.95 dBm ; 11g: 17.71 dBm ; 11a: 17.92 dBm For 2TX: 11g: 20.95 dBm ; 11a: 20.79 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Beamforming Function	☒ With beamforming	☐ Without beamforming

Note: The product has beamforming function for 802.11n in 2.4G and 11n/ac in 5GHz.

Antenna and Band width

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

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	1 / 2	MCS 0-7 / 0-15
802.11n (HT40)	1 / 2	MCS 0-7 / 0-15
802.11ac (VHT20)	1 / 2	MCS 0-8/Nss1 / MCS 0-8/Nss1-2
802.11ac (VHT40)	1 / 2	MCS 0-9/Nss1 / MCS 0-9/Nss1-2
802.11ac (VHT80)	1 / 2	MCS 0-9/Nss1 / MCS 0-9/Nss1-2
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

N/A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz
1	LYNwave	ALA110-222050-300011	PIFA Antenna	IPEX MHF4	3.5	5

<For 2.4GHz Band>

For IEEE 802.11b mode (1TX, 1RX)

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

For IEEE 802.11g mode (1TX/2TX, 2RX)

The EUT can support both 1TX and 2TX functions.

For 1TX

Only Chain 1 can be used as transmitting antenna.

Chain 1 and Chain 2 could receive simultaneously.

For 2TX

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna.

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

For IEEE 802.11n mode (1TX/2TX, 2RX)

The EUT can support both 1TX and 2TX functions.

For 1TX

Only Chain 1 can be used as transmitting antenna.

Chain 1 and Chain 2 could receive simultaneously.

For 2TX

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna.

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

Only 2TX function was selected to test and record in the report, the 1TX test results were covered by 2TX test results.

<For 5GHz Band>

For IEEE 802.11a mode (1TX/2TX, 2RX):

The EUT can support both 1TX and 2TX functions.

For 1TX

Only Chain 1 can be used as transmitting antenna.

Chain 1 and Chain 2 could receive simultaneously.

For 2TX

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna.

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

For IEEE 802.11n/ac mode (1TX/2TX, 2RX):

The EUT can support both 1TX and 2TX functions.

For 1TX

Only Chain 1 can be used as transmitting antenna.

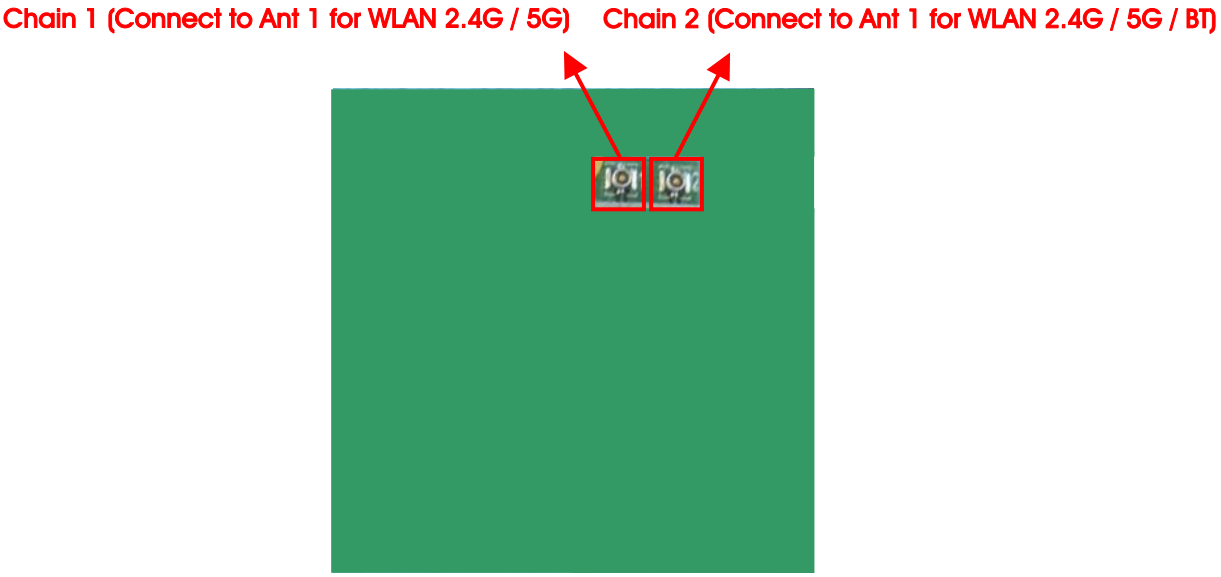
Chain 1 and Chain 2 could receive simultaneously.

For 2TX

Both Chain 1 and Chain 2 can be used as transmitting/receiving antenna.

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

Only 2TX function was selected to test and record in the report, the 1TX test results were covered by 2TX test results.



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	Normal Link	-	-	-
Maximum Conducted Output Power	For beamforming mode			
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
	For non-beamforming mode			
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1 1+2
Power Spectral Density	For beamforming mode			
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
	For non-beamforming mode			
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1 1+2
6dB Spectrum Bandwidth	For beamforming mode			
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
	For non-beamforming mode			
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1 1+2
Radiated Emissions Below 1GHz	Normal Link	-	-	-
Radiated Emissions Above 1GHz	For beamforming mode			
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
	For non-beamforming mode			
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1 1+2

Band Edge Emissions	For beamforming mode			
	11n HT20	MCS0	1/6/11	1+2
	11n HT40	MCS0	3/6/9	1+2
	For non-beamforming mode			
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1 1+2

For 5GHz Band:

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

Band Edge Emissions	For beamforming mode			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2
	11ac VHT40	MCS0/Nss1	151/159	1+2
	11ac VHT80	MCS0/Nss1	155	1+2
	For non-beamforming mode			
	11a/BPSK	6 Mbps	149/157/165	1 1+2

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

Note: There are two modes of EUT, one is beamforming mode, and the other is non-beamforming mode for n/ac, 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 Conducted Emission test:

Mode 1. Normal Link

For Radiated Emission below 1GHz test:

Mode 1. Normal Link

For Radiated Emission above 1GHz test:

Mode 1. CTX

For Radiated Emission Co-location Test:

Mode 1. EUT- 2.4G WLAN + Bluetooth

Mode 2. EUT- 5G WLAN + Bluetooth

For Co-location MPE:

The EUT could be applied with 2.4GHz WLAN+Bluetooth function and 5GHz WLAN+Bluetooth functiontherefore; 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 among 2.4GHz WLAN+Bluetooth function and 5GHz WLAN+Bluetooth 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

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
Notebook*2	DELL	E6430	DoC
AP Router	Planex	GW-AP54SGX	KA220030603014-1
Mouse	Logitech	M-U0026	DoC
Earphone	SHYARO CHI	MIC-04	N/A
Device	REALTEK	RTL8812AENF	TX2RTL8812AENF
Test Fixture*2	Realtek	NGFF Adapter	N/A

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Test Fixture	Realtek	NGFF Adapter	N/A

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

Support Unit	Brand	Model	FCC ID
Notebook*2	DELL	E6430	DoC
AP Router	Planex	GW-AP54SGX	KA220030603014-1
Mouse	Logitech	M-U0026	DoC
Earphone	E-BOOKI	E-EPC040	N/A
Device	REALTEK	RTL8812AENF	TX2RTL8812AENF
Test Fixture*2	Realtek	NGFF Adapter	N/A

For Test Site No: 03CH01-CB <Above 1GHz test / For non-beamforming mode>

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Test Fixture	Realtek	N/A	N/A

For Test Site No: 03CH01-CB <Above 1GHz test / For beamforming mode>

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC
Notebook	DELL	D420	DoC
AP Router	Planex	GW-AP54SGX	KA220030603014-1
Test Fixture	Realtek	NGFF Adapter	N/A

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 non-beamforming mode>

Power Parameters of IEEE 802.11b

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11b	44	43	42

Power Parameters of IEEE 802.11g

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110		
Frequency	2412 MHz	2437 MHz	2462 MHz
IEEE 802.11g / 1TX	50	56	49
IEEE 802.11g / 2TX	51/54	56/62	46/51

Power Parameters of IEEE 802.11a

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a / 1TX	46	45	45
IEEE 802.11a / 2TX	47/47	47/48	46/48

<For beamforming mode>

For 2.4GHz Band

Power Parameters of IEEE 802.11n MCS0 HT20

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110		
Frequency	2412 MHz	2437 MHz	2462 MHz
MCS0 HT20	50/55	51/56	46/51

Power Parameters of IEEE 802.11n MCS0 HT40

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110		
Frequency	2422 MHz	2437 MHz	2452 MHz
MCS0 HT40	46/50	47/52	44/50

For 5GHz Band

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT20

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0/Nss1 VHT20	48/48	47/48	47/50

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT40

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110	
Frequency	5755 MHz	5795 MHz
MCS0/Nss1 VHT40	49/50	48/50

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT80

Test Software Version	Realtek 11ac 8812A PCIE WLAN MP Diagnostic Program 0.0057.02.20140110
Frequency	5775 MHz
MCS0/Nss1 VHT80	50/51

3.9. EUT Operation during Test

For non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

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 Wireless AP and transmit duty cycle no less 98%

3.10. Duty Cycle

For non-beamforming mode:

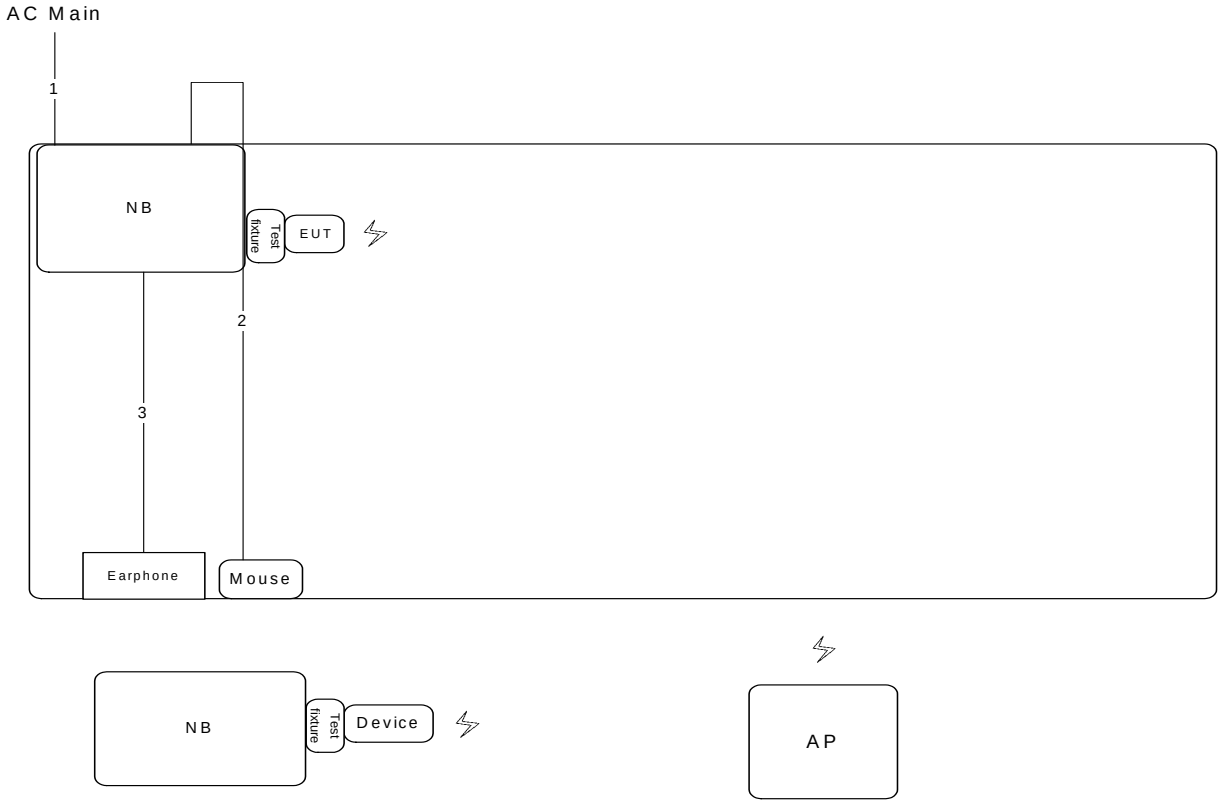
Band	Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
2.4G	802.11b	1.000	1.000	100	0.00	0.01
	802.11g	1.000	1.000	100	0.00	0.01
5G	802.11a	1.000	1.000	100	0.00	0.01

For beamforming mode:

Band	Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
2.4G	802.11n MCS0 HT20	1.942	2.130	91.16	0.40	0.51
	802.11n MCS0 HT40	0.935	1.029	90.84	0.42	1.07
5G	802.11ac MCS0/Nss1 VHT20	1.930	2.085	92.57	0.34	0.52
	802.11ac MCS0/Nss1 VHT40	0.896	1.032	86.82	0.61	1.12
	802.11ac MCS0/Nss1 VHT80	1.715	1.85	92.70	0.33	0.58

3.11. Test Configurations

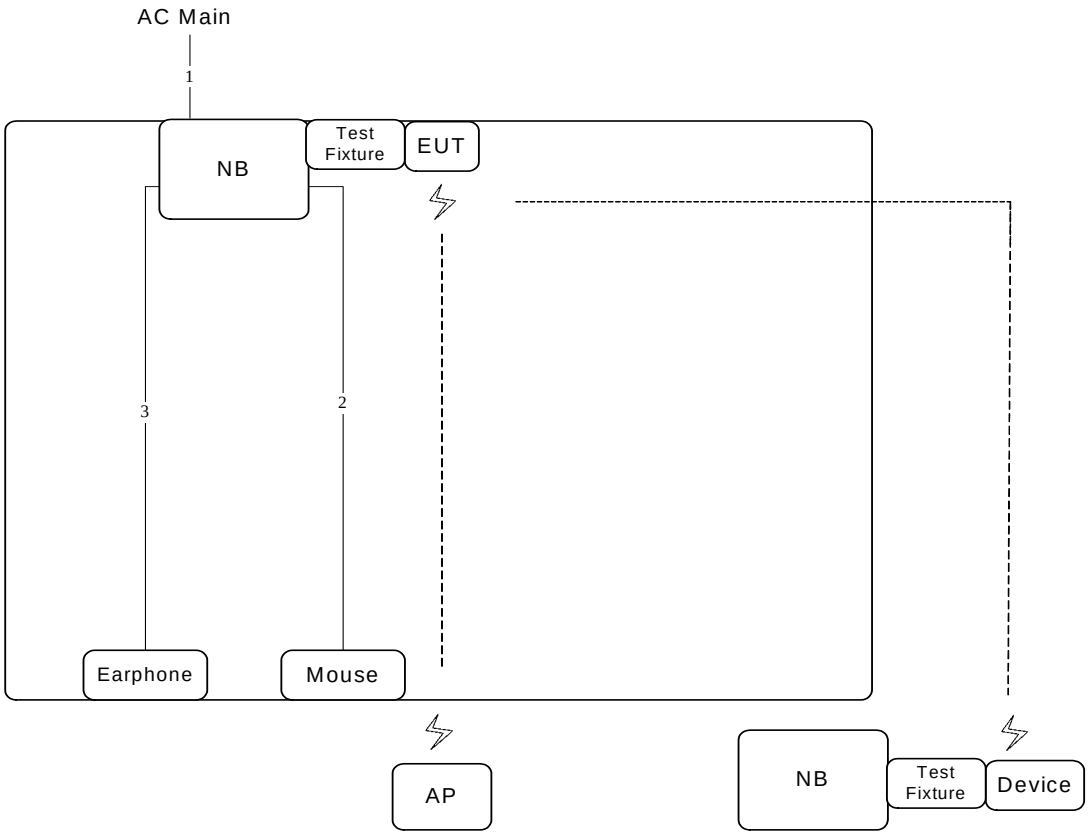
3.11.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	1.8m
3	Audio cable	No	1.5m

3.11.2. Radiation Emissions Test Configuration

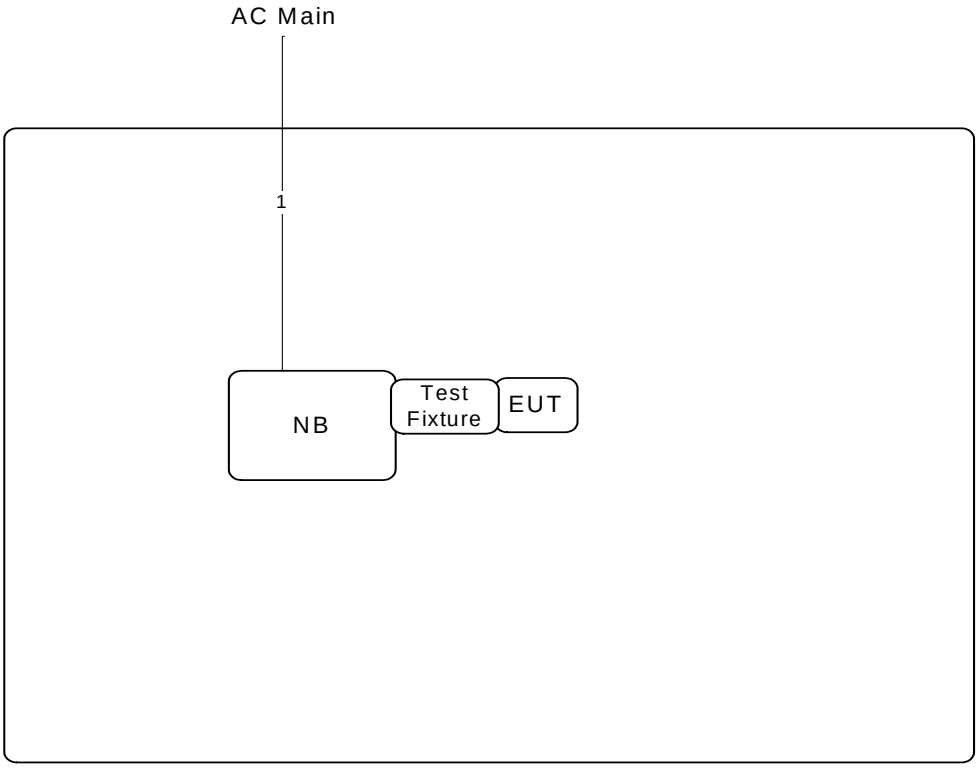
Test Configuration: 30MHz~1GHz



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	1.8m
3	Audio cable	No	1.5m

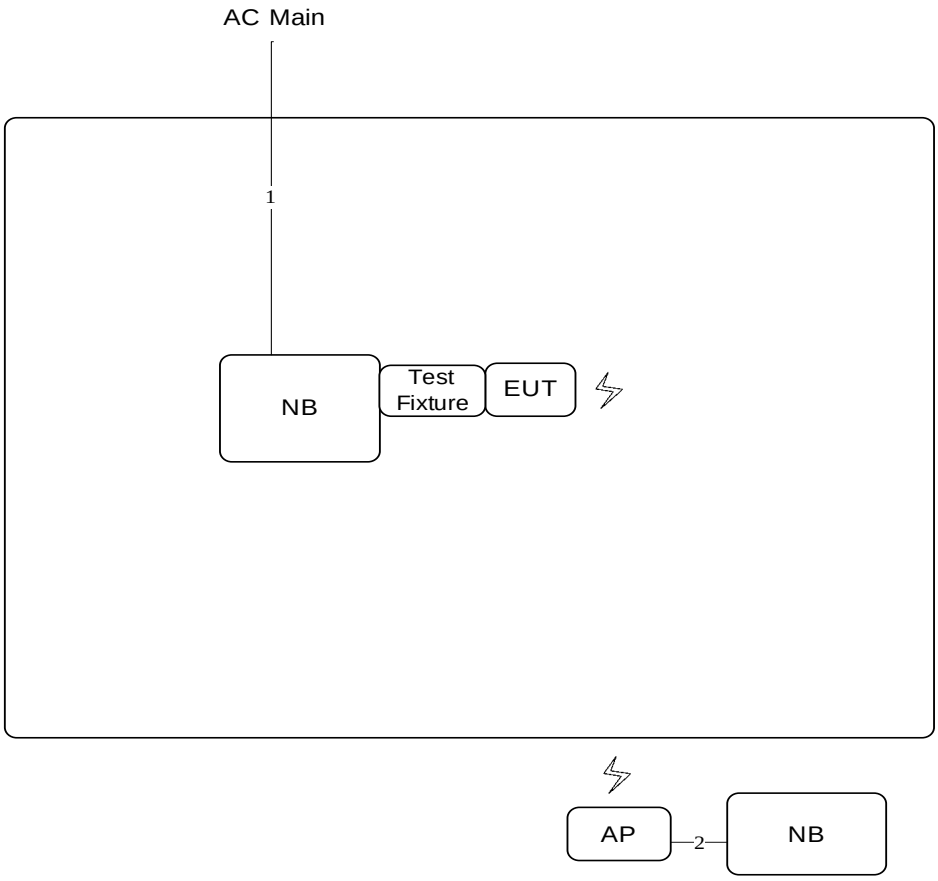
Test Configuration: above 1GHz

For non-beamforming mode



Item	Connection	Shielded	Length
1	Power cable	No	2.6m

For beamforming mode



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	RJ-45 cable	No	1.5m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

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

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

4.1.2. Measuring Instruments and Setting

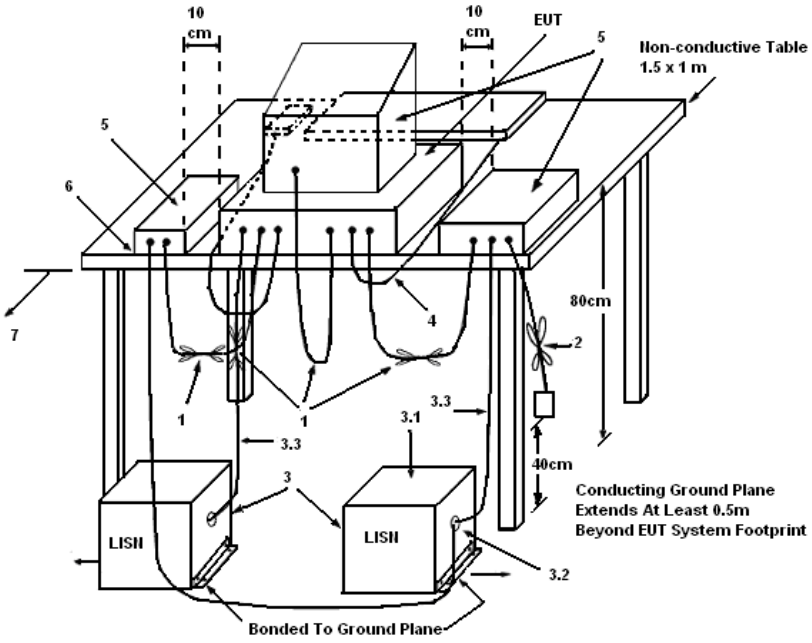
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

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

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

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

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

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

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

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

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

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

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

4.1.5. Test Deviation

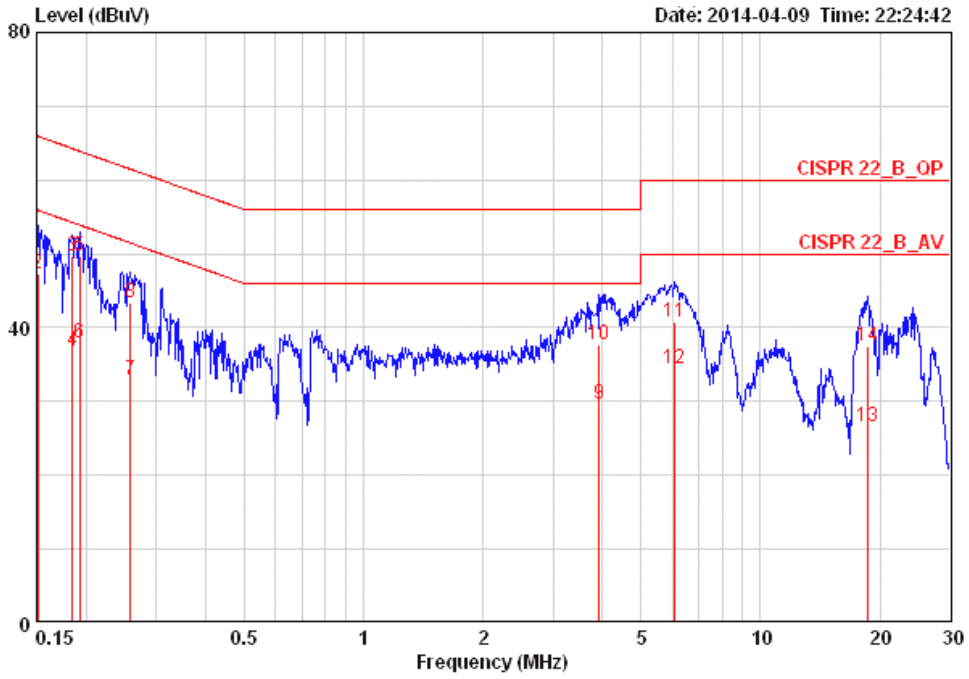
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

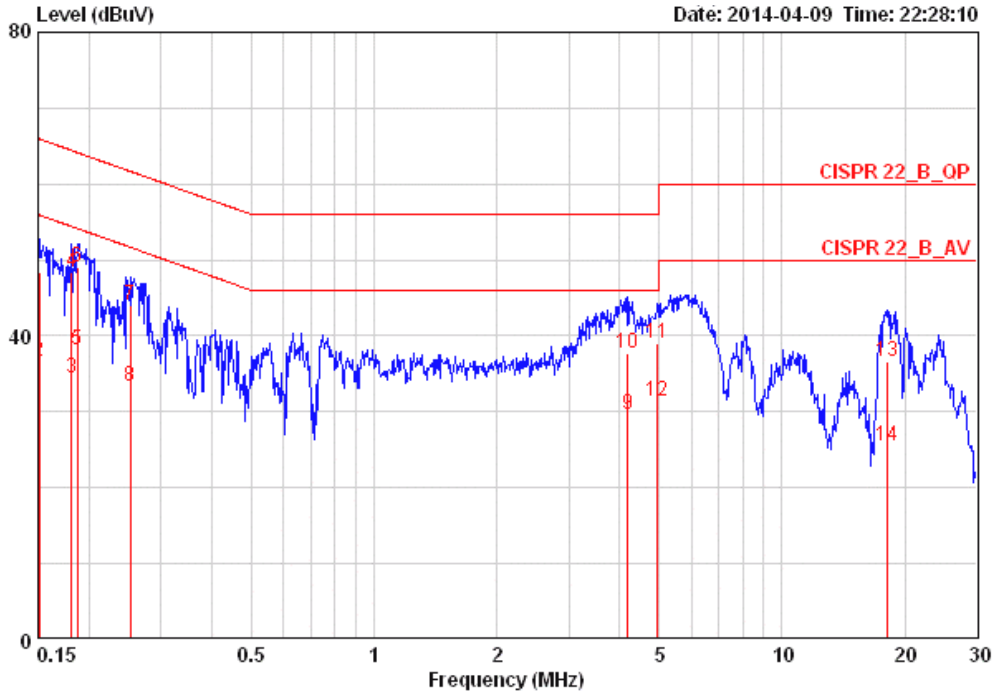
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.15080	34.93	-21.03	55.96	0.15	34.60	0.18	LINE	AVERAGE
2	0.15080	47.41	-18.55	65.96	0.15	47.08	0.18	LINE	QP
3 @	0.18443	49.79	-14.49	64.28	0.15	49.45	0.19	LINE	QP
4	0.18443	36.73	-17.55	54.28	0.15	36.39	0.19	LINE	AVERAGE
5 @	0.19242	49.64	-14.29	63.93	0.15	49.29	0.20	LINE	QP
6	0.19242	37.91	-16.02	53.93	0.15	37.56	0.20	LINE	AVERAGE
7	0.25888	32.88	-18.59	51.47	0.15	32.53	0.20	LINE	AVERAGE
8	0.25888	43.47	-18.00	61.47	0.15	43.12	0.20	LINE	QP
9	3.922	29.68	-16.32	46.00	0.28	29.11	0.30	LINE	AVERAGE
10	3.922	37.68	-18.32	56.00	0.28	37.11	0.30	LINE	QP
11	6.056	40.86	-19.14	60.00	0.31	40.22	0.33	LINE	QP
12	6.056	34.40	-15.60	50.00	0.31	33.76	0.33	LINE	AVERAGE
13	18.622	26.57	-23.43	50.00	0.57	25.51	0.49	LINE	AVERAGE
14	18.622	37.44	-22.56	60.00	0.57	36.38	0.49	LINE	QP

Temperature	25°C	Humidity	52%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.15080	48.43	-17.53	65.96	0.07	48.18	0.18	NEUTRAL	QP
2	0.15080	36.52	-19.44	55.96	0.07	36.27	0.18	NEUTRAL	AVERAGE
3	0.18152	34.34	-20.07	54.42	0.07	34.08	0.19	NEUTRAL	AVERAGE
4	0.18152	48.39	-16.02	64.42	0.07	48.13	0.19	NEUTRAL	QP
5	0.18739	38.26	-15.90	54.15	0.07	37.99	0.20	NEUTRAL	AVERAGE
6	0.18739	48.98	-15.18	64.15	0.07	48.71	0.20	NEUTRAL	QP
7	0.25211	44.06	-17.63	61.69	0.07	43.79	0.20	NEUTRAL	QP
8	0.25211	33.45	-18.24	51.69	0.07	33.18	0.20	NEUTRAL	AVERAGE
9	4.180	29.73	-16.27	46.00	0.13	29.29	0.30	NEUTRAL	AVERAGE
10	4.180	37.82	-18.18	56.00	0.13	37.38	0.30	NEUTRAL	QP
11	4.952	38.97	-17.03	56.00	0.15	38.50	0.32	NEUTRAL	QP
12 @	4.952	31.34	-14.66	46.00	0.15	30.87	0.32	NEUTRAL	AVERAGE
13	18.039	36.63	-23.37	60.00	0.41	35.73	0.48	NEUTRAL	QP
14	18.039	25.46	-24.54	50.00	0.41	24.56	0.48	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

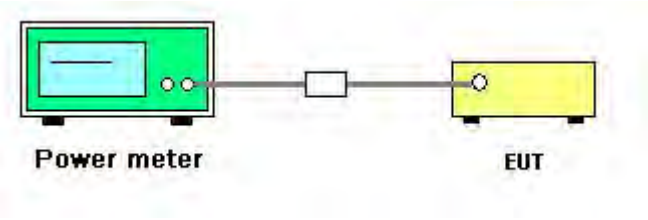
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	Average

4.2.3. Test Procedures

1. Test procedures refer KDB 558074 D01 v03r02 section 9.2.3.2 Measurement using a power meter (PM).
2. Multiple antenna system was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
3. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

4.2.4. 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	52%
Test Engineer	Nick Peng / Lucas Huang	Configurations	IEEE 802.11a/b/g
Test Date	Nov. 26, 2014		

<For non-beamforming mode>

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	17.95	30.00	Complies
6	2437 MHz	17.88	30.00	Complies
11	2462 MHz	17.93	30.00	Complies

Configuration IEEE 802.11g / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	15.22	30.00	Complies
6	2437 MHz	17.71	30.00	Complies
11	2462 MHz	15.68	30.00	Complies

Configuration IEEE 802.11g / Chain 1 + Chain 2

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
1	2412 MHz	15.29	15.63	18.47	30.00	Complies
6	2437 MHz	17.90	17.98	20.95	30.00	Complies
11	2462 MHz	14.57	14.36	17.48	30.00	Complies

Configuration IEEE 802.11a / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
149	5745 MHz	17.71	30.00	Complies
157	5785 MHz	17.60	30.00	Complies
165	5825 MHz	17.92	30.00	Complies

Configuration IEEE 802.11a / Chain 1 + Chain 2

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
149	5745 MHz	17.63	17.89	20.77	30.00	Complies
157	5785 MHz	17.75	17.80	20.79	30.00	Complies
165	5825 MHz	17.84	17.65	20.76	30.00	Complies

Temperature	20°C	Humidity	52%
Test Engineer	Nick Peng / Lucas Huang	Configurations	IEEE 802.11n/ac
Test Date	Nov. 26, 2014		

<For beamforming mode>

For 2.4GHz Band

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

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
1	2412 MHz	16.88	16.94	19.92	29.49	Complies
6	2437 MHz	17.97	17.91	20.95	29.49	Complies
11	2462 MHz	14.89	14.53	17.72	29.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} x_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.51dBi > 6dBi,So Power Limit =30-(6.51-6)=29.49dBm

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

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
3	2422 MHz	12.79	13.39	16.11	29.49	Complies
6	2437 MHz	14.38	14.12	17.26	29.49	Complies
9	2452 MHz	13.53	13.38	16.47	29.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} x_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.51dBi > 6dBi,So Power Limit =30-(6.51-6)=29.49dBm

For 5GHz Band

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

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
149	5745 MHz	17.83	17.84	20.85	27.99	Complies
157	5785 MHz	17.72	17.74	20.74	27.99	Complies
165	5825 MHz	17.95	17.94	20.96	27.99	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} x_{j,k}\right\}^2}{N_{ANT}}\right]$ =8.01dBi > 6dBi,So Power Limit =30-(8.01-6)=27.99dBm

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

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
151	5755 MHz	17.95	17.96	20.97	27.99	Complies
159	5795 MHz	17.93	17.68	20.82	27.99	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} x_{j,k}\right\}^2}{N_{ANT}}\right]$ =8.01dBi > 6dBi,So Power Limit =30-(8.01-6)=27.99dBm

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

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
155	5775 MHz	17.90	17.67	20.80	27.99	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ANT}}\left\{\sum_{k=1}^{N_{SS}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.01dBi > 6dBi,So Power Limit =30-(8.01-6)=27.99dBm

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

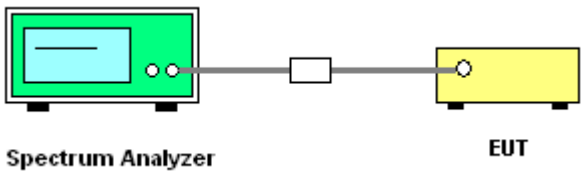
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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 was performed in accordance with KDB 558074 D01 v03r02 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - 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	52%
Test Engineer	Nick Peng / Lucas Huang	Configurations	IEEE 802.11a/b/g

<For non-beamforming mode>

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
1	2412 MHz	-10.62	8.00	Complies
6	2437 MHz	-10.67	8.00	Complies
11	2462 MHz	-10.59	8.00	Complies

Configuration IEEE 802.11g / Chain 1

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
1	2412 MHz	-13.04	8.00	Complies
6	2437 MHz	-8.85	8.00	Complies
11	2462 MHz	-11.39	8.00	Complies

Configuration IEEE 802.11g / Chain 1 + Chain 2

Channel	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Total		
1	2412 MHz	-11.57	-11.53	-8.54	7.49	Complies
6	2437 MHz	-9.25	-9.6	-6.41	7.49	Complies
11	2462 MHz	-12.96	-13.01	-9.97	7.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =6.51dBi > 6dBi,So PSD Limit =8-(6.51-6)=7.49dBm/3kHz

Configuration IEEE 802.11a / Chain 1

Channel	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
149	5745 MHz	-10.78	8.00	Complies
157	5785 MHz	-10.46	8.00	Complies
165	5825 MHz	-10.30	8.00	Complies

Configuration IEEE 802.11a / Chain 1 + Chain 2

Channel	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Total		
149	5745 MHz	-10.63	-11.16	-7.88	5.99	Complies
157	5785 MHz	-10.18	-11.08	-7.60	5.99	Complies
165	5825 MHz	-10.48	-11.68	-8.03	5.99	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ANT}}\left\{\sum_{k=1}^{N_{SS}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.01dBi > 6dBi,So PSD Limit =8-(8.01-6)=5.99dBm/3kHz

Temperature	20°C	Humidity	52%
Test Engineer	Nick Peng / Lucas Huang	Configurations	IEEE 802.11n/ac

<For beamforming mode>

For 2.4GHz Band

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

Channel	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Total		
1	2412 MHz	-10.09	-10.33	-7.20	7.49	Complies
6	2437 MHz	-9.63	-9.9	-6.75	7.49	Complies
11	2462 MHz	-11.69	-11.69	-8.68	7.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ANT}}\left\{\sum_{k=1}^{N_{SS}} w_{j,k}\right\}^2}{N_{ANT}}\right]$=6.51dBi > 6dBi,So PSD Limit =8-(6.51-6)=7.49dBm/3kHz

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

Channel	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Total		
3	2422 MHz	-14.76	-15.58	-12.14	7.49	Complies
6	2437 MHz	-15.02	-13.36	-11.10	7.49	Complies
9	2452 MHz	-15.08	-14.59	-11.82	7.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ANT}}\left\{\sum_{k=1}^{N_{SS}} w_{j,k}\right\}^2}{N_{ANT}}\right]$=6.51dBi > 6dBi,So PSD Limit =8-(6.51-6)=7.49dBm/3kHz

For 5GHz Band

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

Channel	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Total		
149	5745 MHz	-9.49	-7.97	-5.65	5.99	Complies
157	5785 MHz	-9.15	-10.53	-6.78	5.99	Complies
165	5825 MHz	-9.21	-10.97	-6.99	5.99	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ANT}}\left\{\sum_{k=1}^{N_{SS}} w_{j,k}\right\}^2}{N_{ANT}}\right]$=8.01dBi > 6dBi,So PSD Limit =8-(8.01-6)=5.99dBm/3kHz

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

Channel	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Total		
151	5755 MHz	-11.9	-12.96	-9.39	5.99	Complies
159	5795 MHz	-12.59	-13.92	-10.19	5.99	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{ANT}}\left\{\sum_{k=1}^{N_{SS}} w_{j,k}\right\}^2}{N_{ANT}}\right]$=8.01dBi > 6dBi,So PSD Limit =8-(8.01-6)=5.99dBm/3kHz

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

Channel	Frequency	Power Density (dBm/3kHz)			Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Total		
155	5775 MHz	-13.71	-13.99	-10.84	5.99	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{sp}}\left\{\sum_{i=1}^{N_{seq}} g_{j,i}\right\}^2}{N_{ANT}}\right]$=8.01dBi > 6dBi,So PSD Limit =8-(8.01-6)=5.99dBm/3kHz

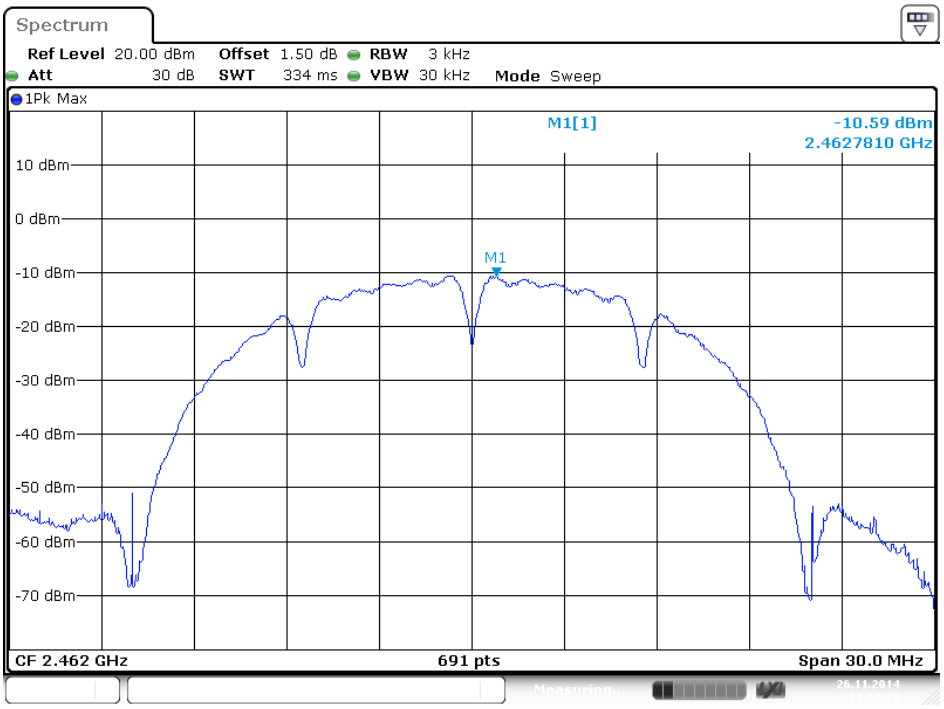
Note: All the test values were listed in the report.

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

<For non-beamforming mode>

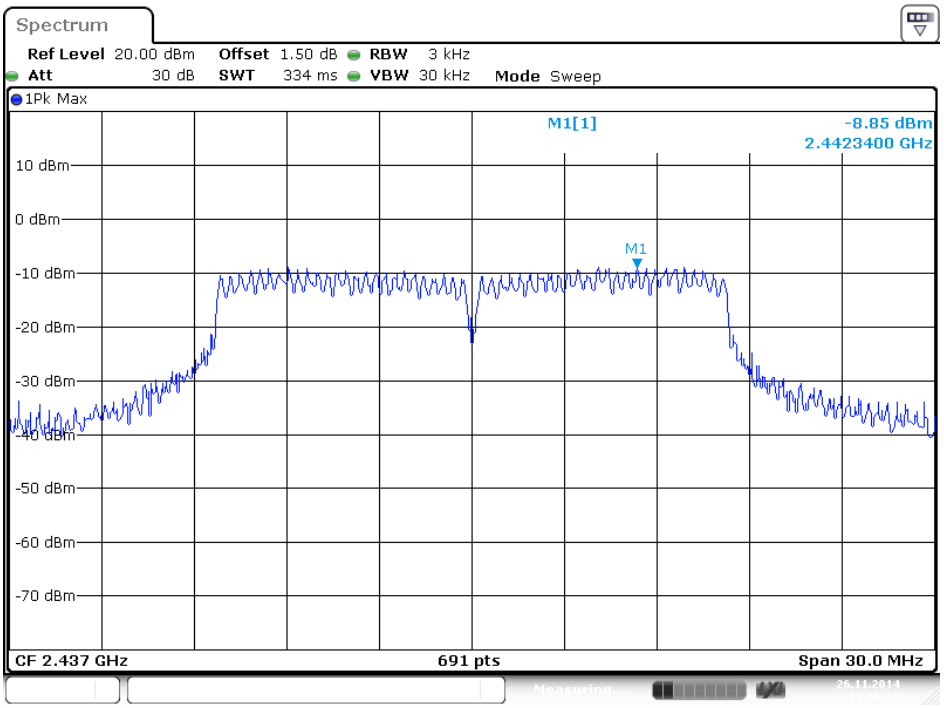
For 1TX

Power Density Plot on Configuration IEEE 802.11b / 2462 MHz / Chain 1



Date: 26.NOV.2014 13:03:26

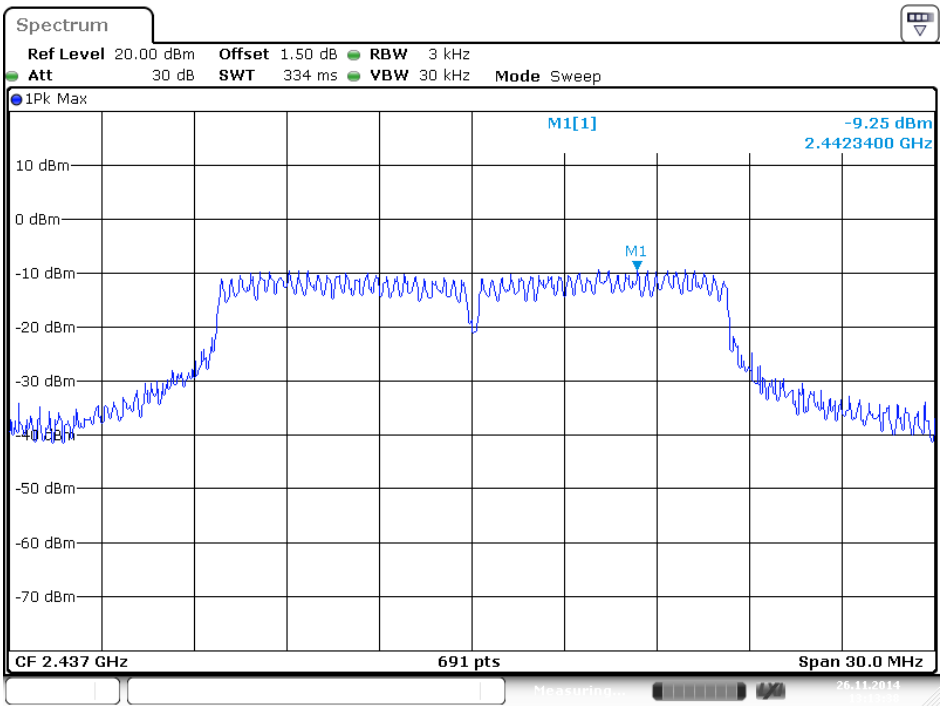
Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 1



Date: 26.NOV.2014 13:06:15

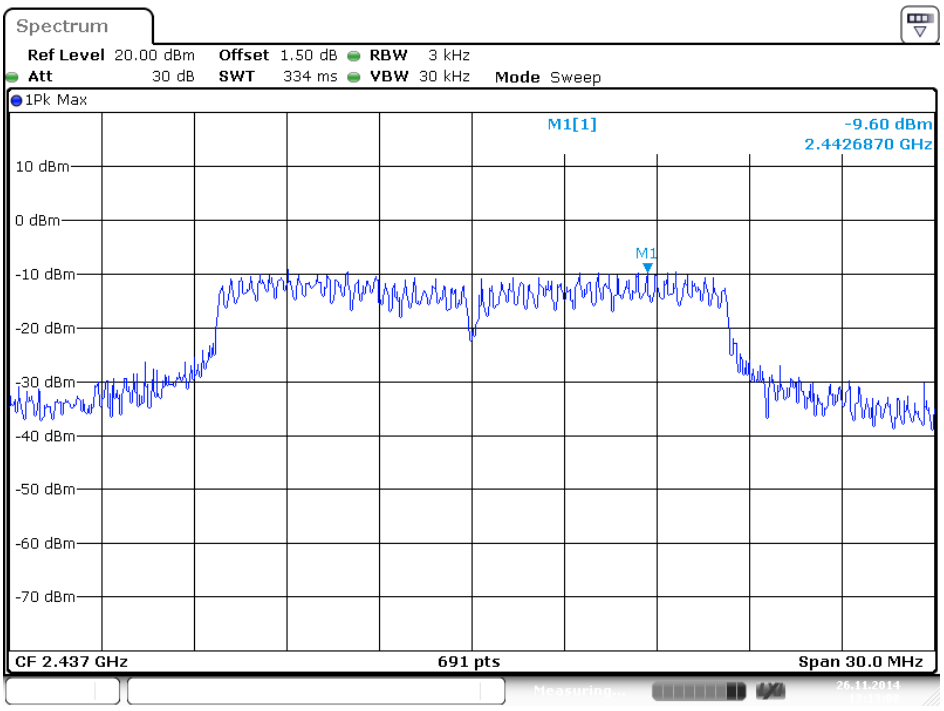
For 2TX

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



Date: 26.NOV.2014 13:13:38

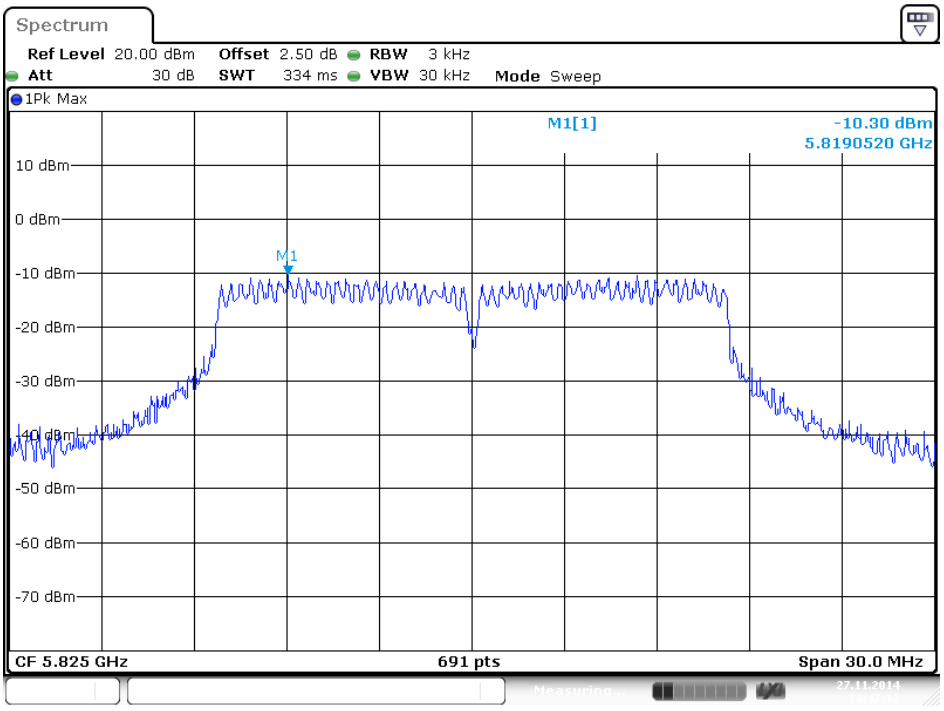
Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 2



Date: 26.NOV.2014 13:13:09

For 1TX

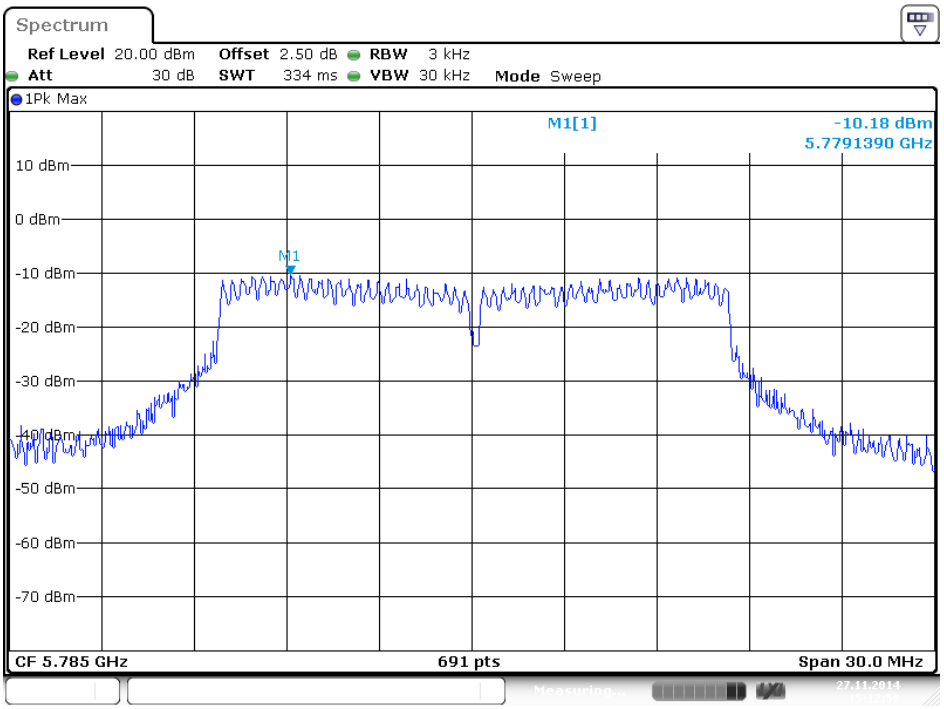
Power Density Plot on Configuration IEEE 802.11a / 5825 MHz / Chain 1



Date: 27.NOV.2014 14:47:12

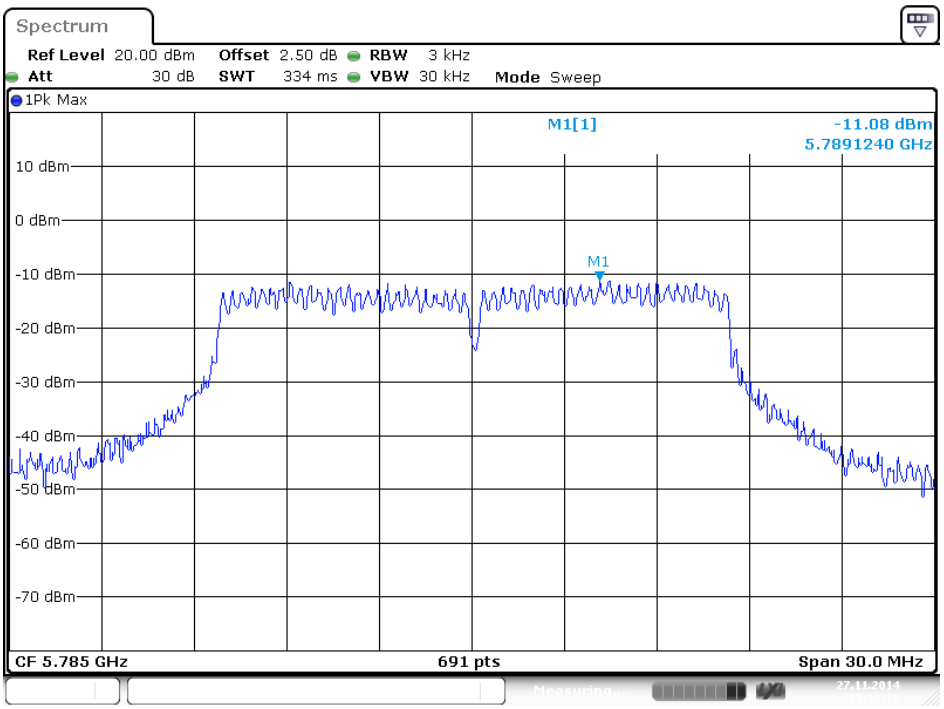
For 2TX

Power Density Plot on Configuration IEEE 802.11a / 5785 MHz / Chain 1



Date: 27.NOV.2014 15:12:59

Power Density Plot on Configuration IEEE 802.11a / 5785 MHz / Chain 2

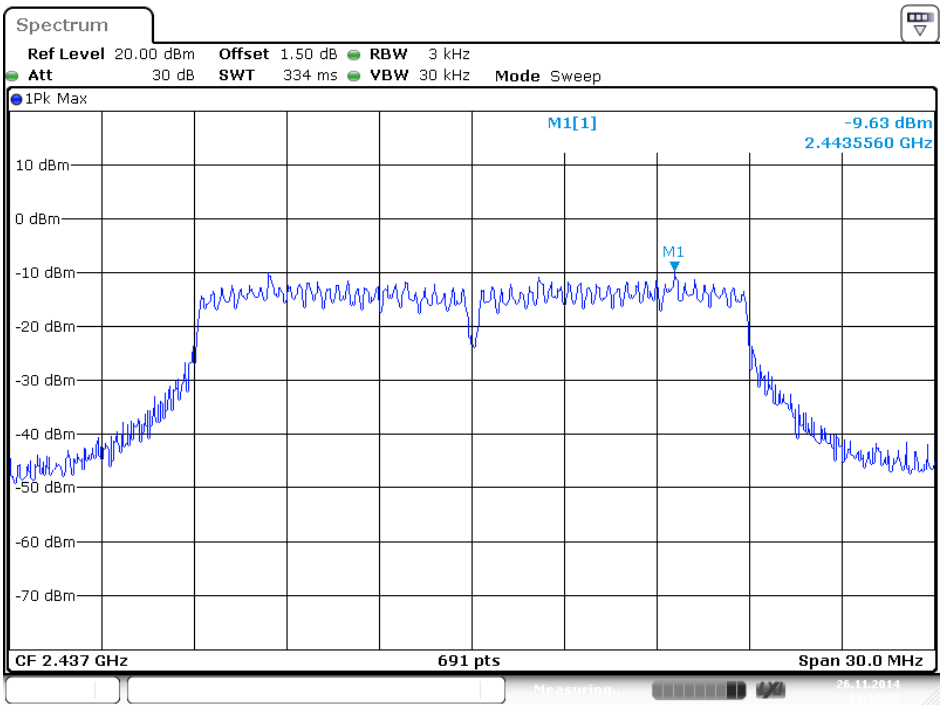


Date: 27.NOV.2014 15:12:19

<For beamforming mode>

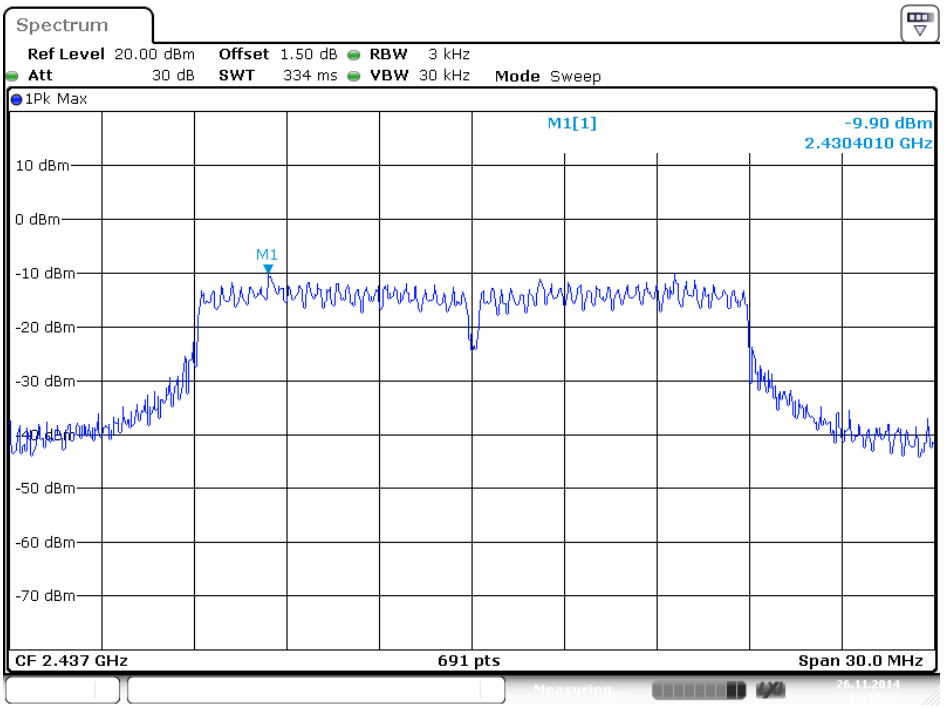
For 2.4GHz Band

Power Density Plot on Configuration IEEE 802.11n MCS0 HT20 / 2437 MHz / Chain 1



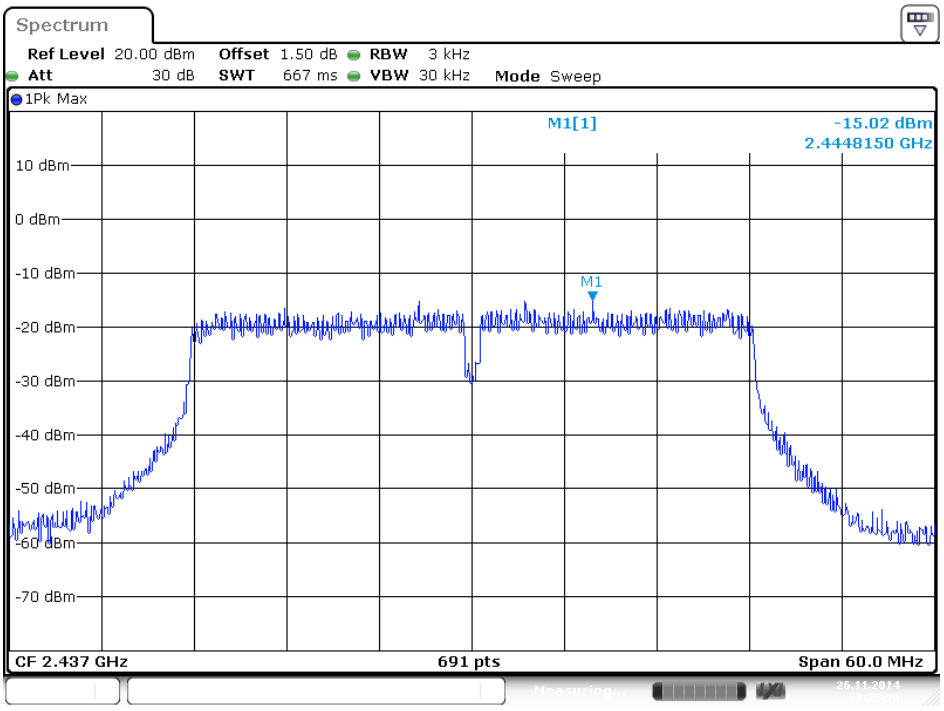
Date: 26.NOV.2014 13:18:38

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



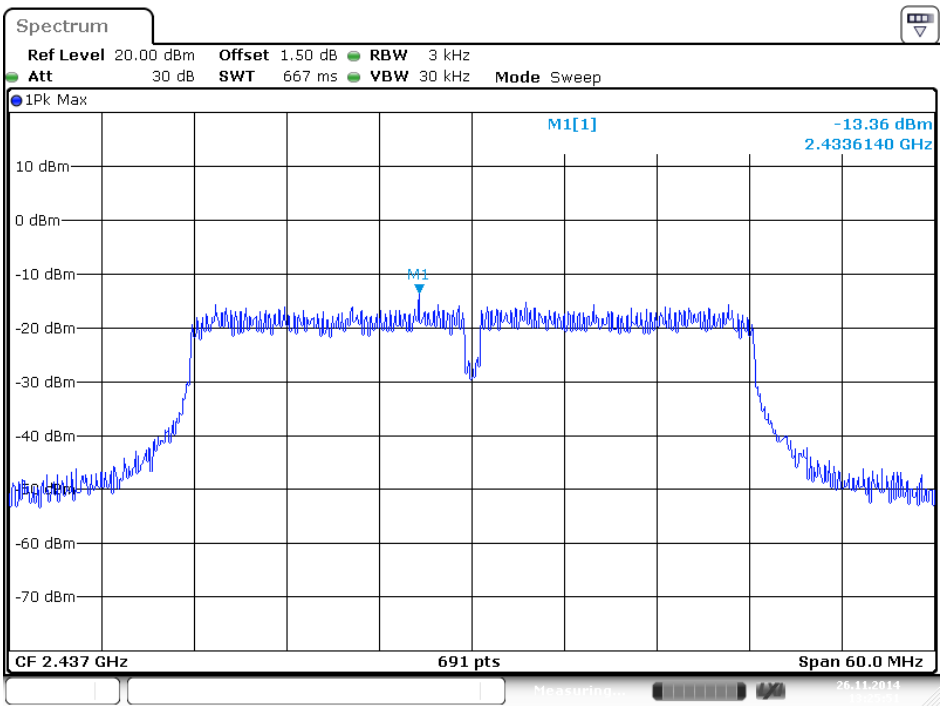
Date: 26.NOV.2014 13:19:17

Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 1



Date: 26.NOV.2014 13:25:20

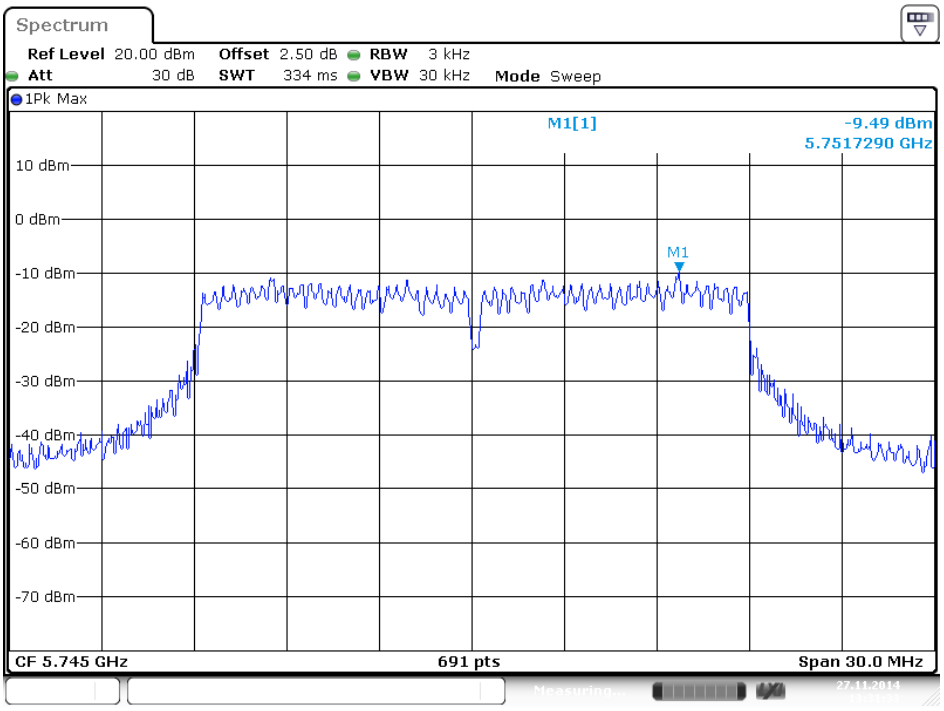
Power Density Plot on Configuration IEEE 802.11n MCS0 HT40 / 2437 MHz / Chain 2



Date: 26.NOV.2014 13:25:51

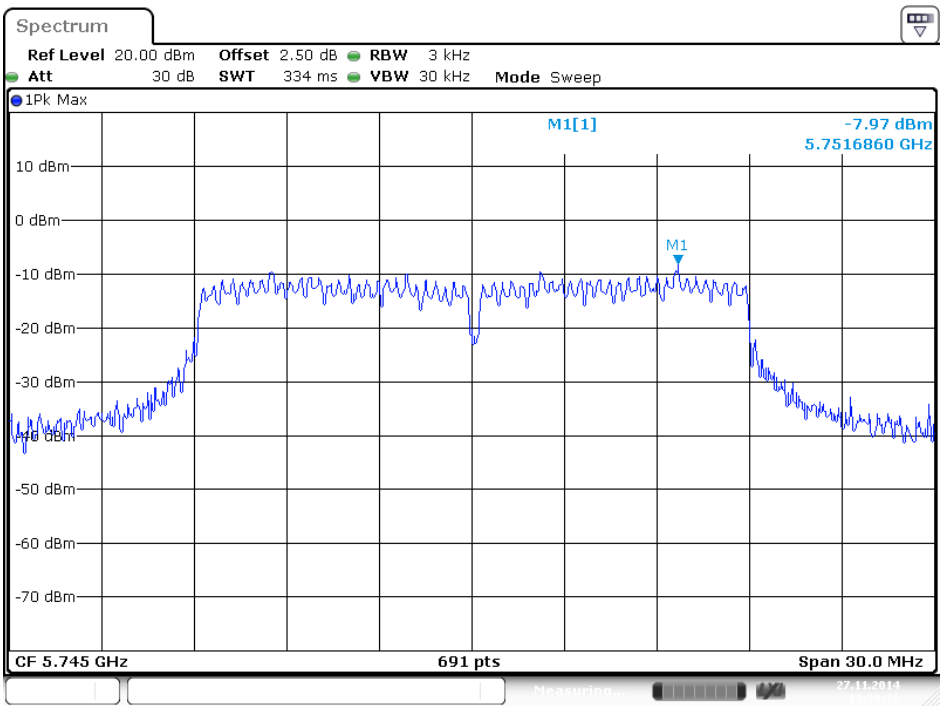
For 5GHz Band

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5745 MHz / Chain 1



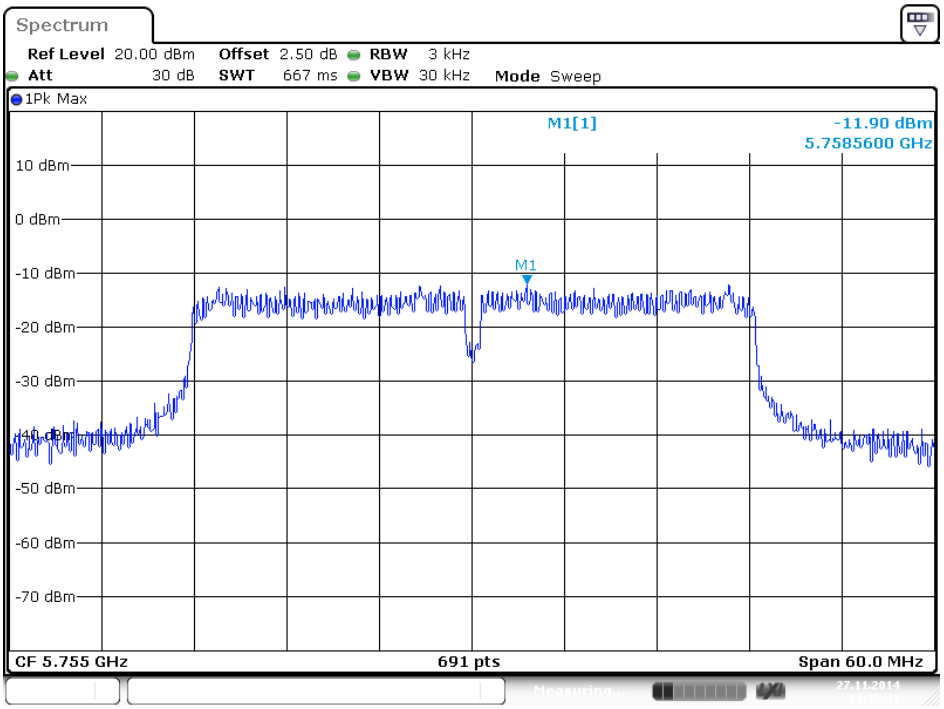
Date: 27.NOV.2014 13:31:33

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5745 MHz / Chain 2



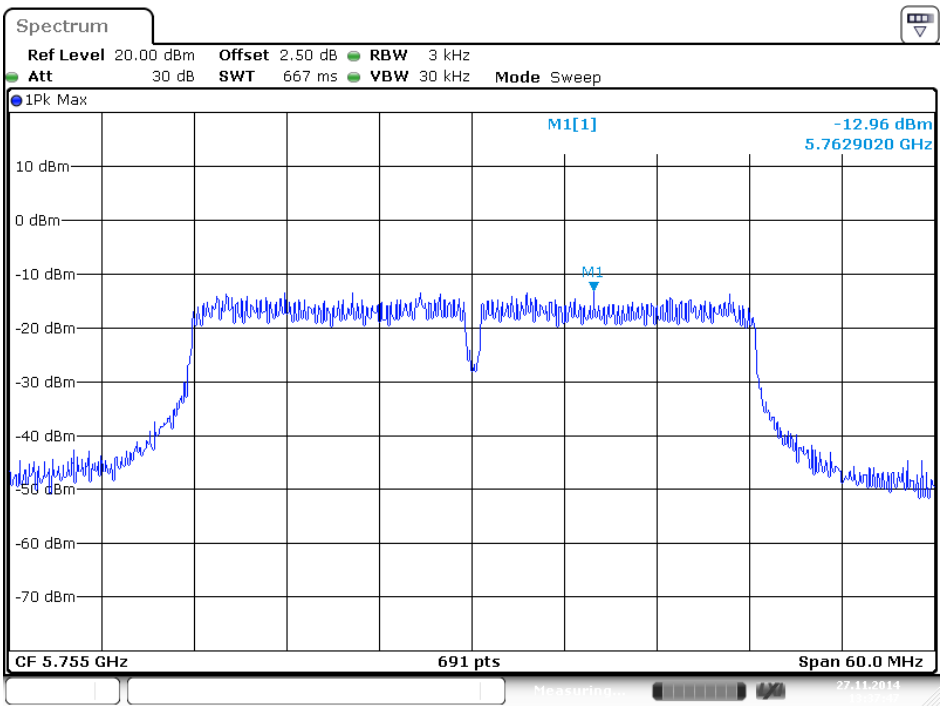
Date: 27.NOV.2014 13:30:17

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



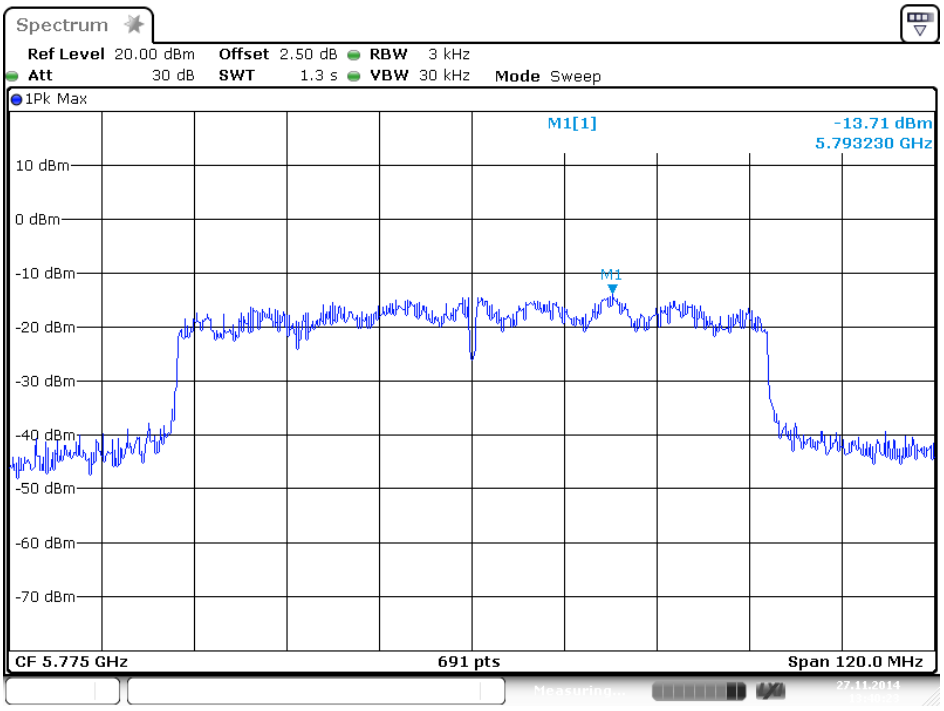
Date: 27.NOV.2014 13:36:41

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



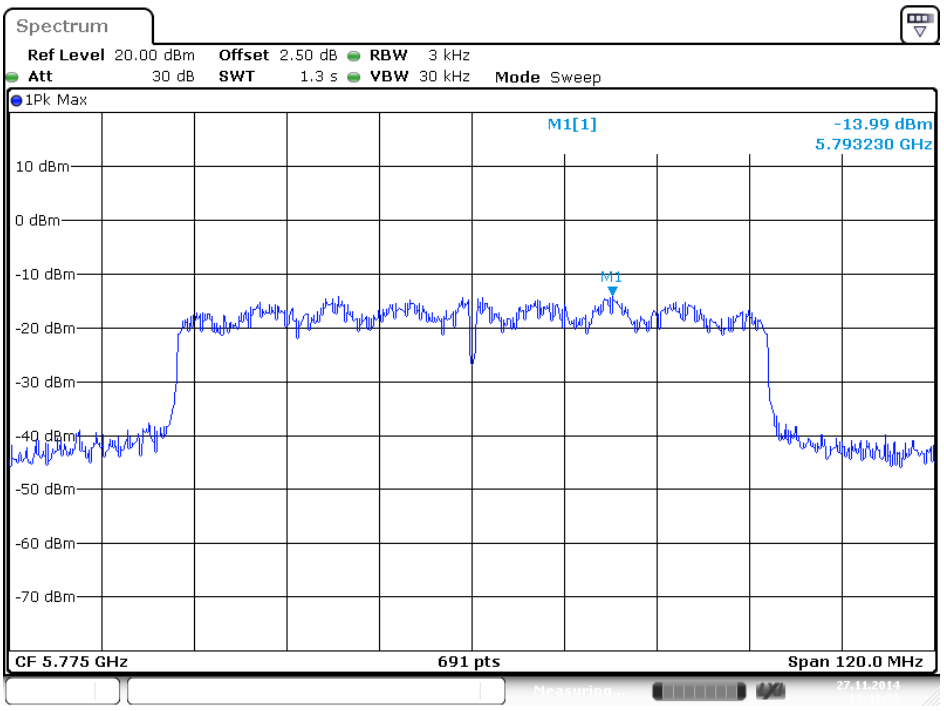
Date: 27.NOV.2014 13:37:48

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



Date: 27.NOV.2014 13:40:23

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



Date: 27.NOV.2014 13:41:23

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.

6dB Spectrum Bandwidth	
Spectrum Parameters	**Setting**
Attenuation	Auto
Span Frequency	> 6dB Bandwidth
RBW	100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto
99% Occupied Bandwidth	
Spectrum Parameters	**Setting**
Span	1.5 times to 5.0 times the OBW
RBW	1 % to 5 % of the OBW
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold

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 v03r02 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 8.0 DTS bandwidth=> 8.1 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 Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of 6dB Spectrum Bandwidth

Temperature	20°C	Humidity	52%
Test Engineer	Nick Peng / Lucas Huang	Configurations	IEEE 802.11a/b/g

<For non-beamforming mode>

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.08	15.02	500	Complies
6	2437 MHz	10.08	15.07	500	Complies
11	2462 MHz	10.08	15.07	500	Complies

Configuration IEEE 802.11g / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	16.57	16.88	500	Complies
6	2437 MHz	16.52	18.45	500	Complies
11	2462 MHz	16.88	16.57	500	Complies

Configuration IEEE 802.11g / Chain 1 + Chain 2

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	10.84	16.15	500	Complies
6	2437 MHz	15.94	20.36	500	Complies
11	2462 MHz	16.46	16.19	500	Complies

Configuration IEEE 802.11a / Chain 1

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	16.52	17.01	500	Complies
157	5785 MHz	16.52	16.97	500	Complies
165	5825 MHz	16.57	17.01	500	Complies

Configuration IEEE 802.11a / Chain 1 + Chain 2

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	9.27	17.06	500	Complies
157	5785 MHz	9.27	16.97	500	Complies
165	5825 MHz	9.21	16.97	500	Complies

Temperature	20°C	Humidity	52%
Test Engineer	Nick Peng / Lucas Huang	Configurations	IEEE 802.11n/ac

<For beamforming mode>

For 2.4GHz Band

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
1	2412 MHz	17.73	17.97	500	Complies
6	2437 MHz	17.79	18.06	500	Complies
11	2462 MHz	17.73	17.88	500	Complies

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
3	2422 MHz	36.52	37.25	500	Complies
6	2437 MHz	36.52	36.72	500	Complies
9	2452 MHz	40.23	37.33	500	Complies

For 5GHz Band

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	17.68	17.97	500	Complies
157	5785 MHz	17.68	18.06	500	Complies
165	5825 MHz	17.68	17.97	500	Complies

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	34.89	37.25	500	Complies
159	5795 MHz	32.34	36.98	500	Complies

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
155	5775 MHz	48.00	67.03	500	Complies

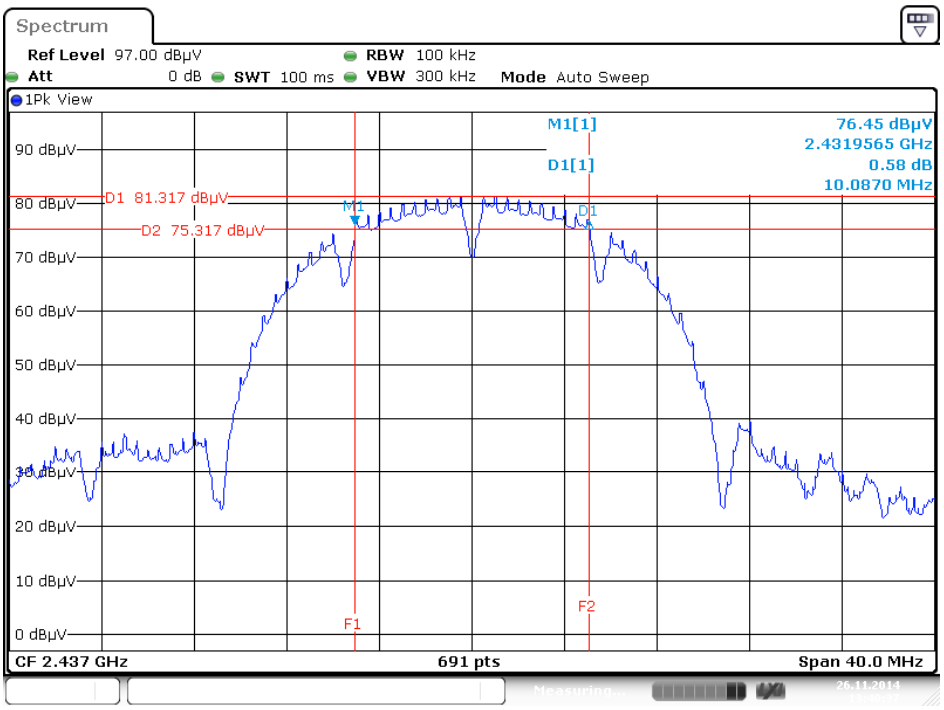
Note: All the test values were listed in the report.

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

<For non-beamforming mode>

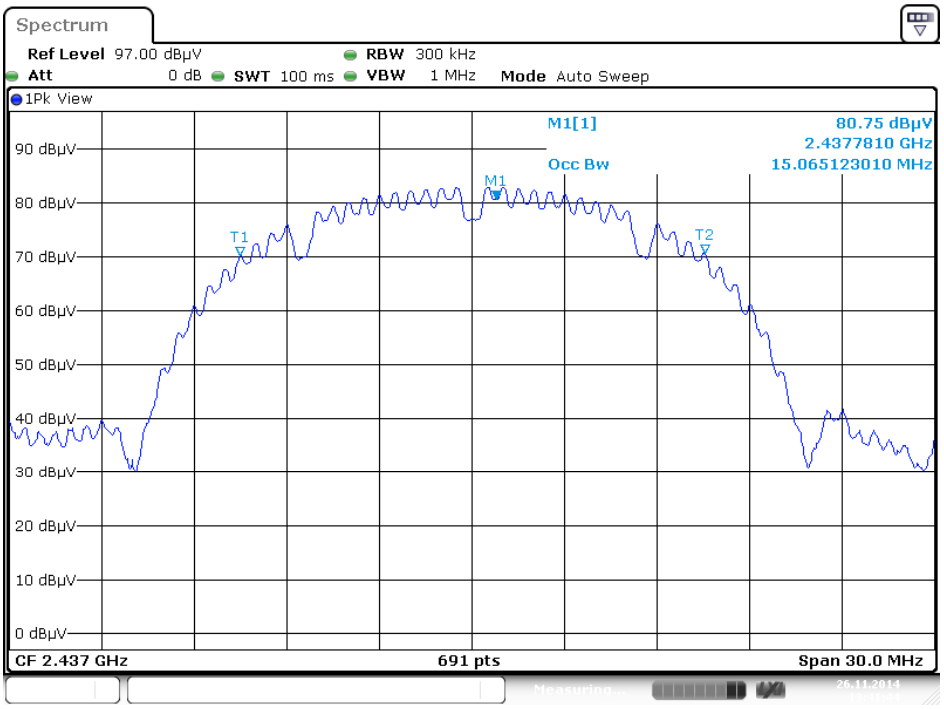
For 1TX

6 dB Bandwidth Plot on Configuration IEEE 802.11b / 2437 MHz / Chain 1



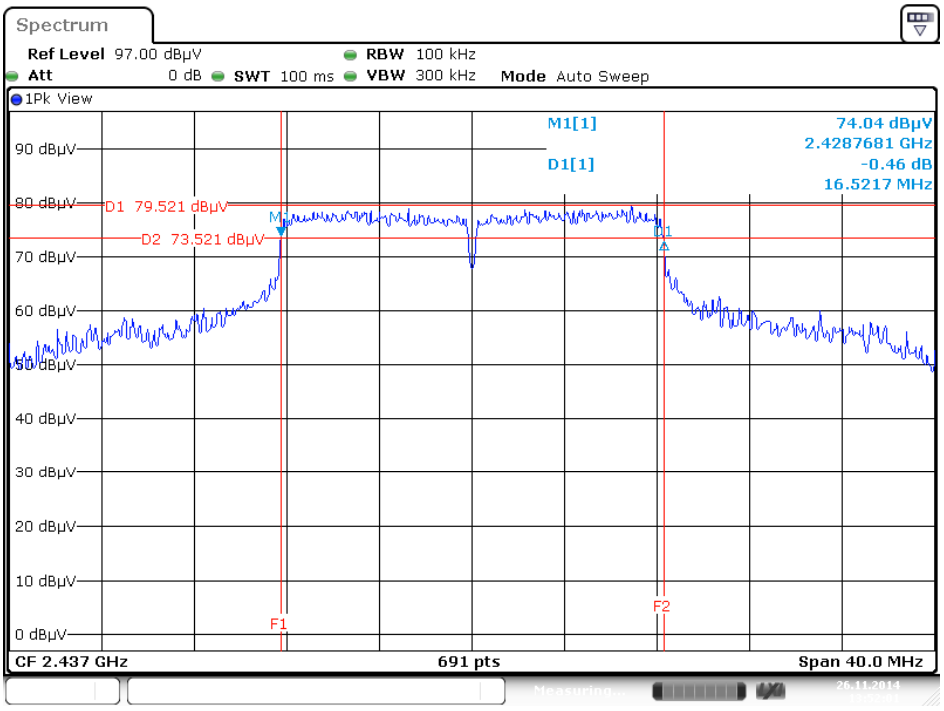
Date: 26.NOV.2014 13:40:37

99% Occupied Bandwidth Plot on Configuration IEEE 802.11b / 2437 MHz / Chain 1



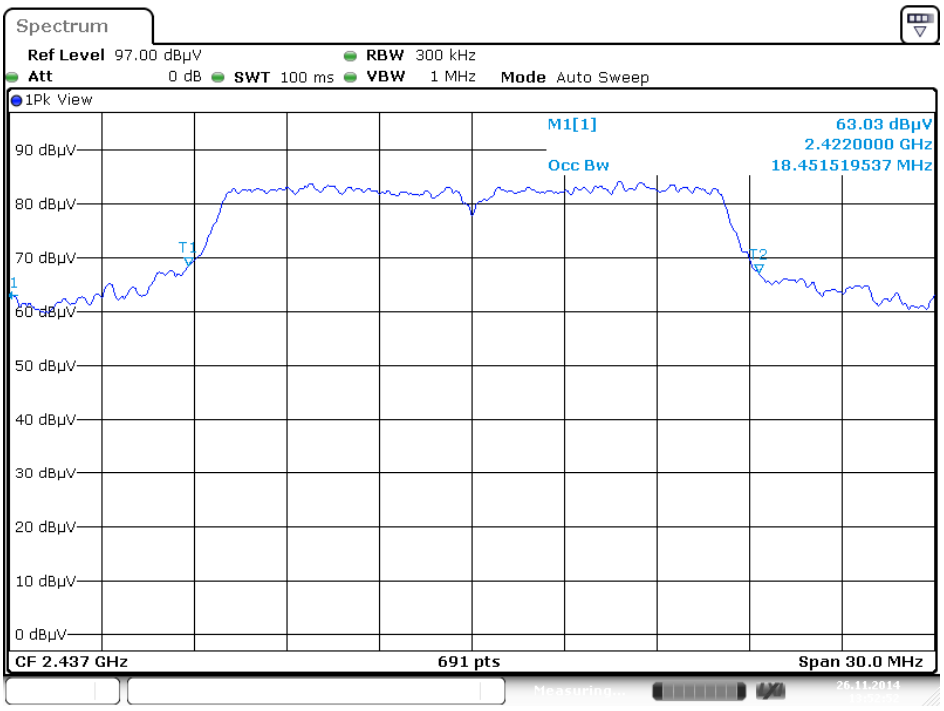
Date: 26.NOV.2014 13:41:44

6 dB Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 1



Date: 26.NOV.2014 13:52:00

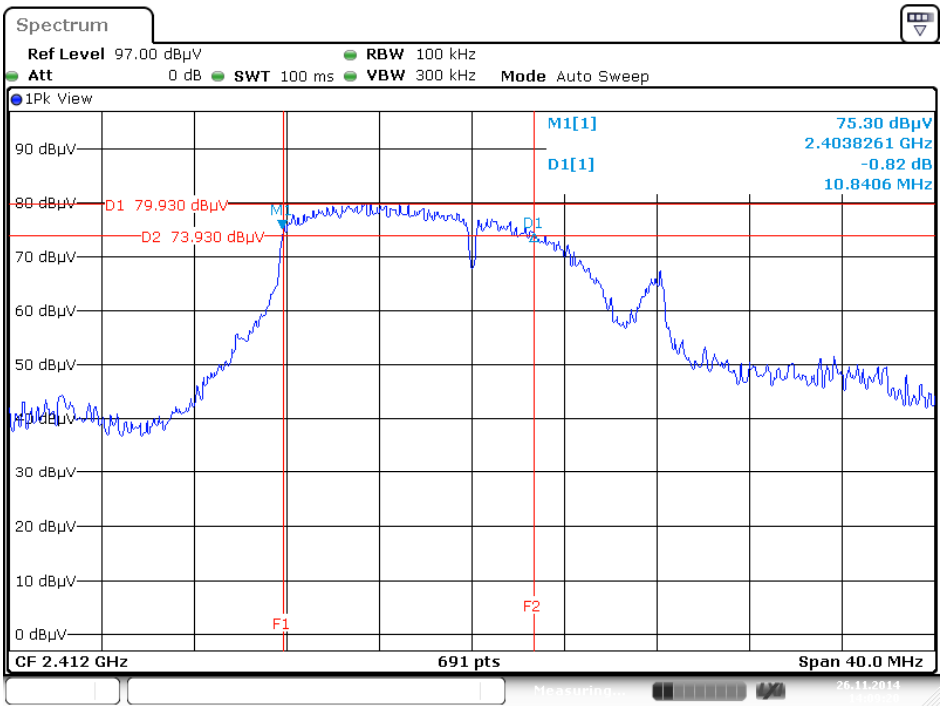
99% Occupied Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 1



Date: 26.NOV.2014 13:52:52

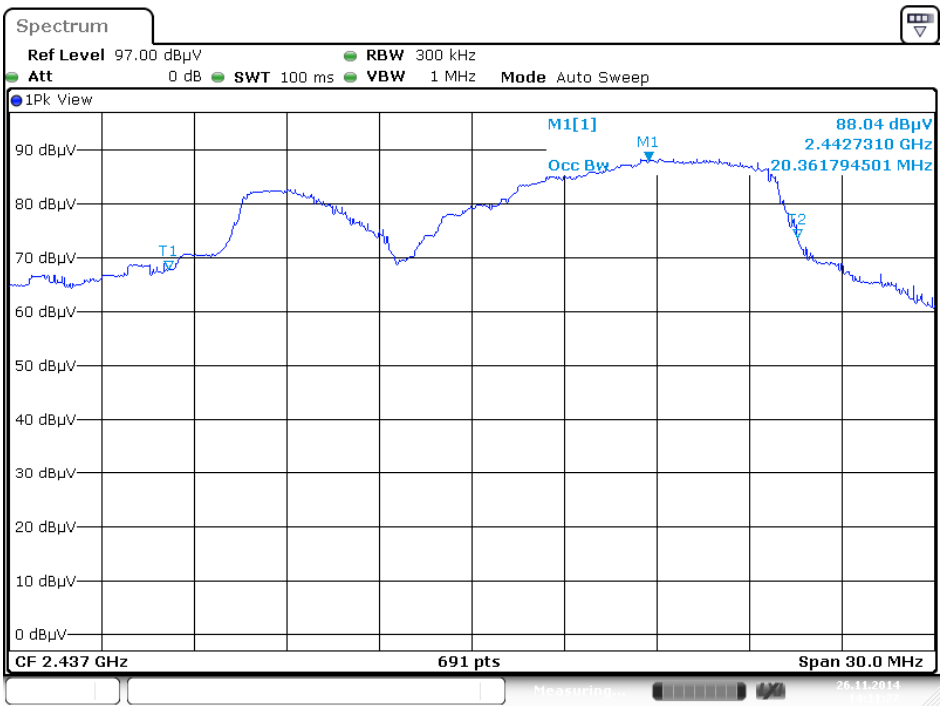
For 2TX

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



Date: 26.NOV.2014 14:09:20

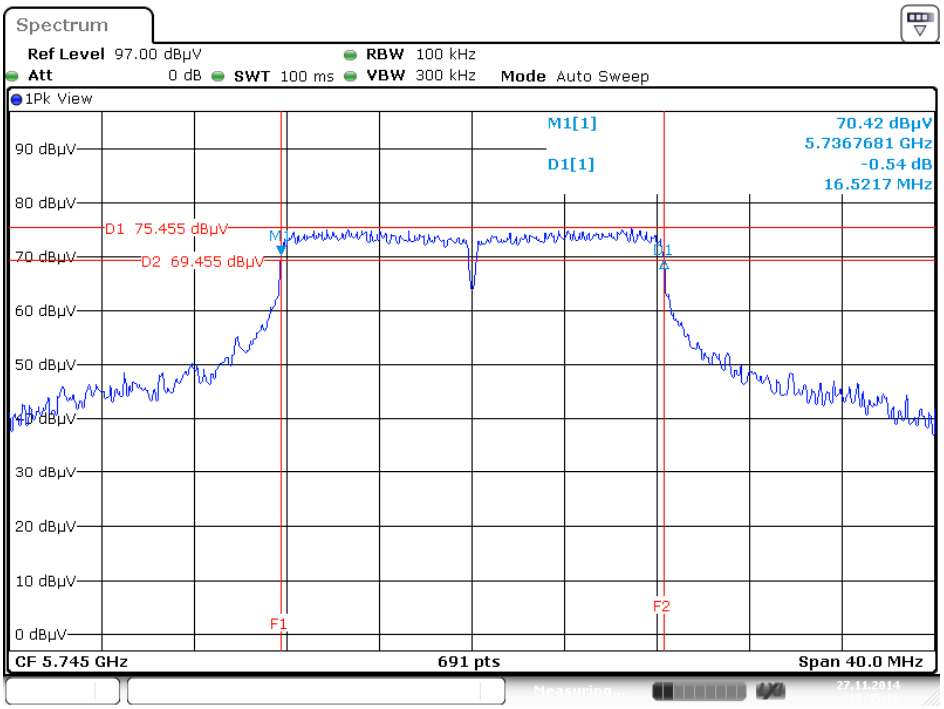
99% Occupied Bandwidth Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 1 + Chain 2



Date: 26.NOV.2014 14:11:27

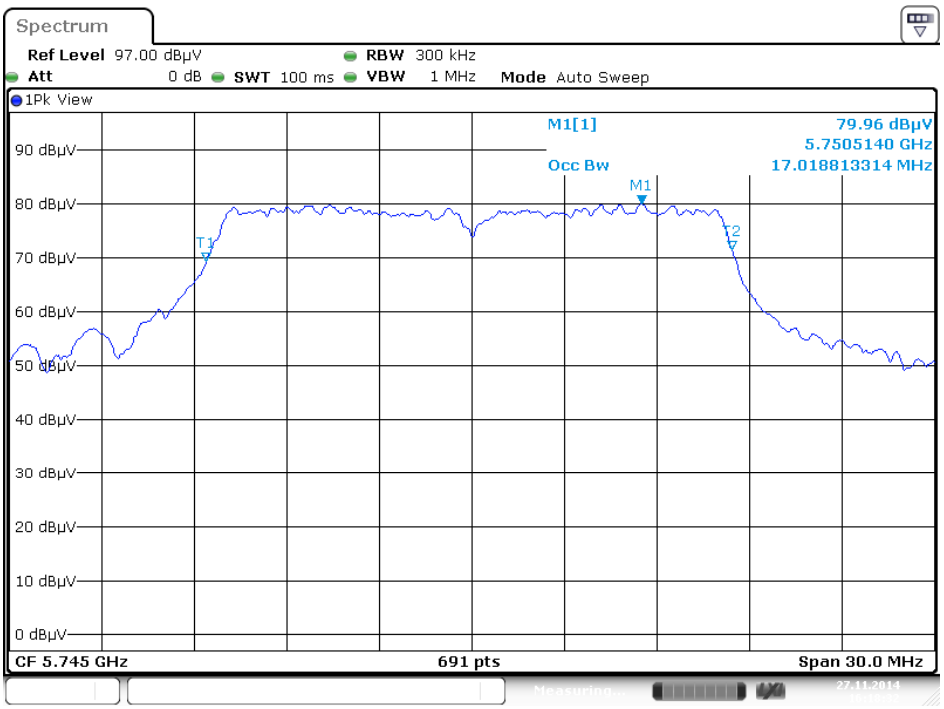
For 1TX

6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 1



Date: 27.NOV.2014 15:45:16

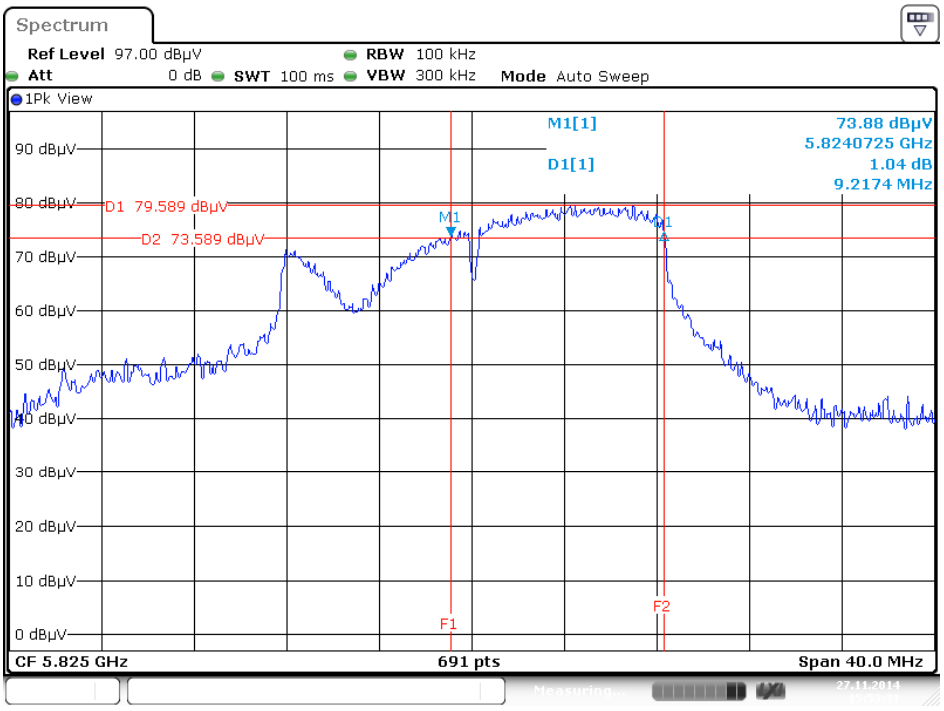
99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 1



Date: 27.NOV.2014 16:18:32

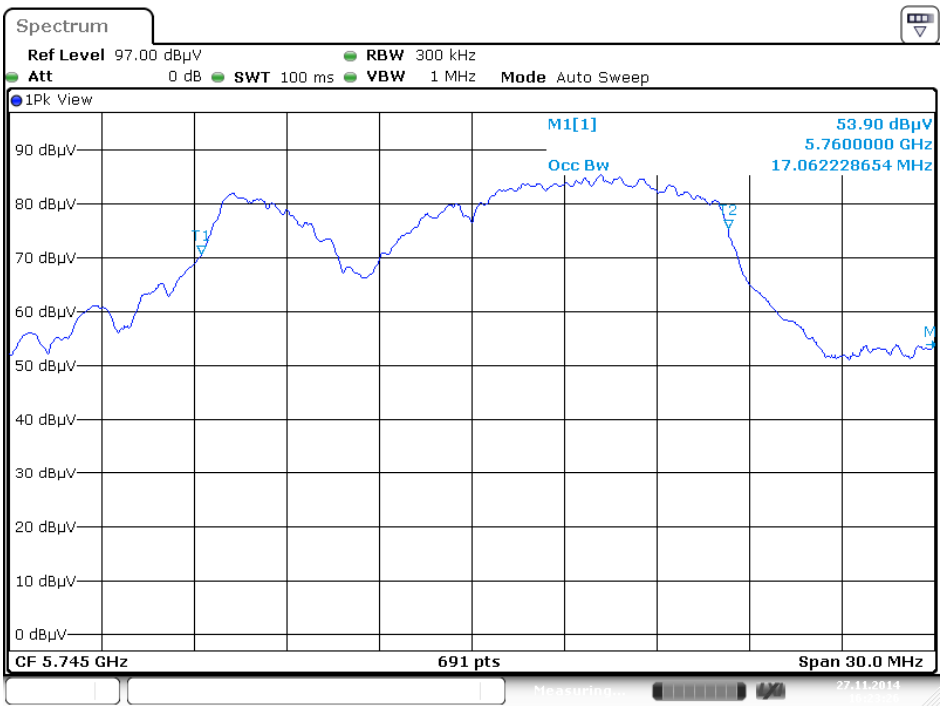
For 2TX

6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5825 MHz / Chain 1 + Chain 2



Date: 27.NOV.2014 15:53:31

99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / 5745 MHz / Chain 1 + Chain 2

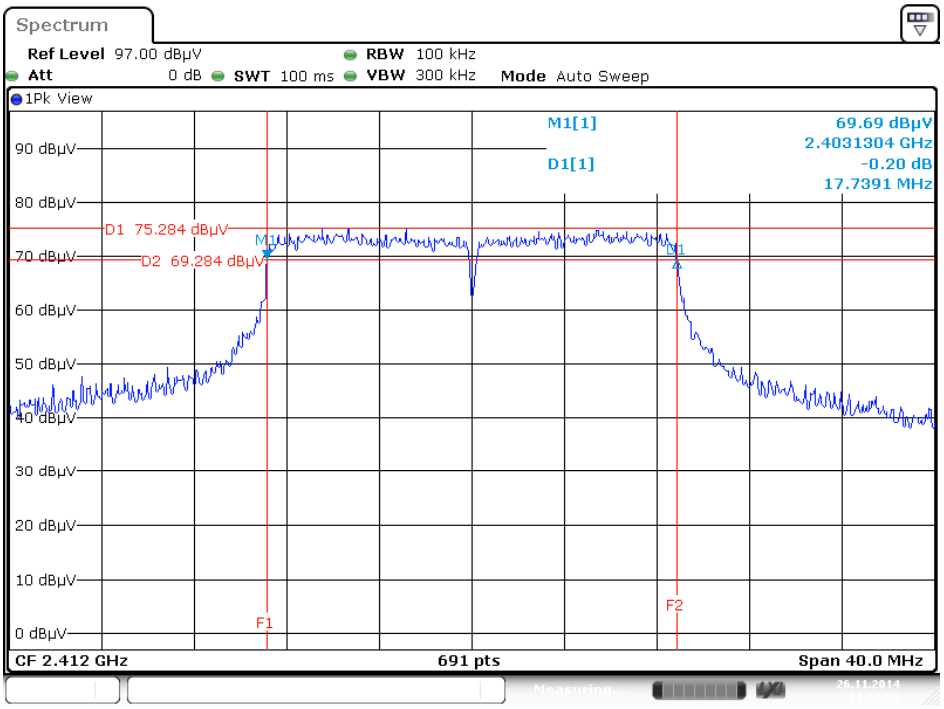


Date: 27.NOV.2014 16:23:26

<For beamforming mode>

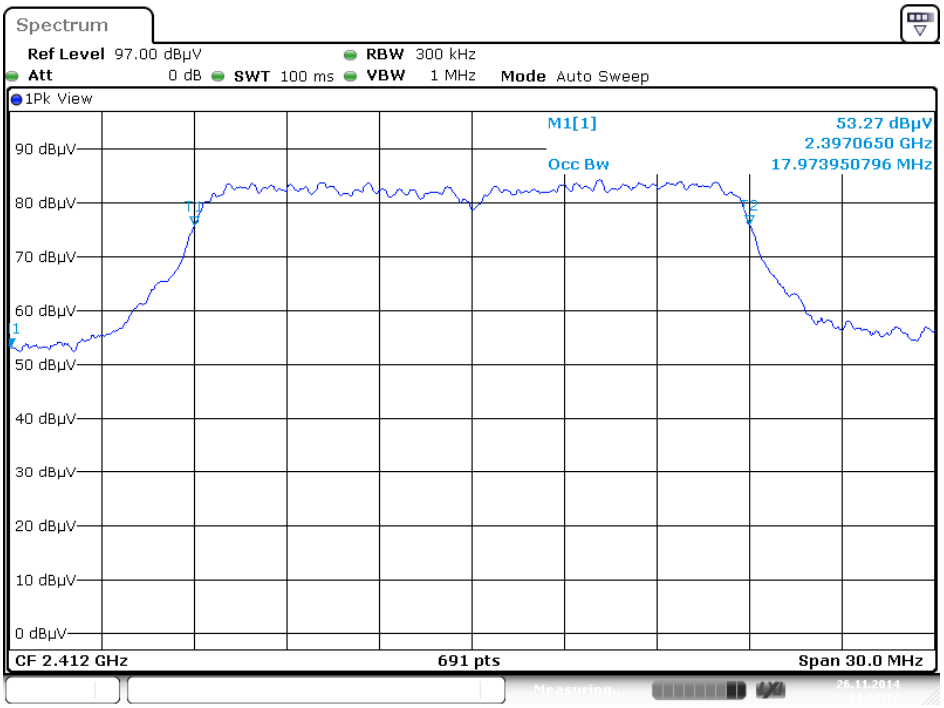
For 2.4GHz Band

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2412 MHz / Chain 1 + Chain 2



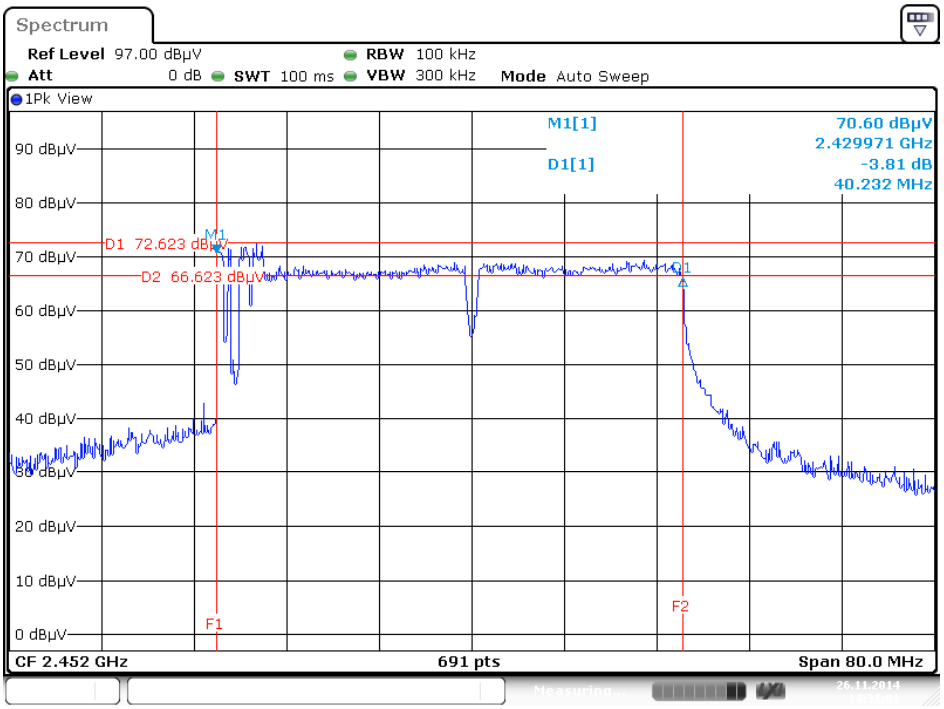
Date: 26.NOV.2014 14:23:56

99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT20 / 2412 MHz / Chain 1 + Chain 2



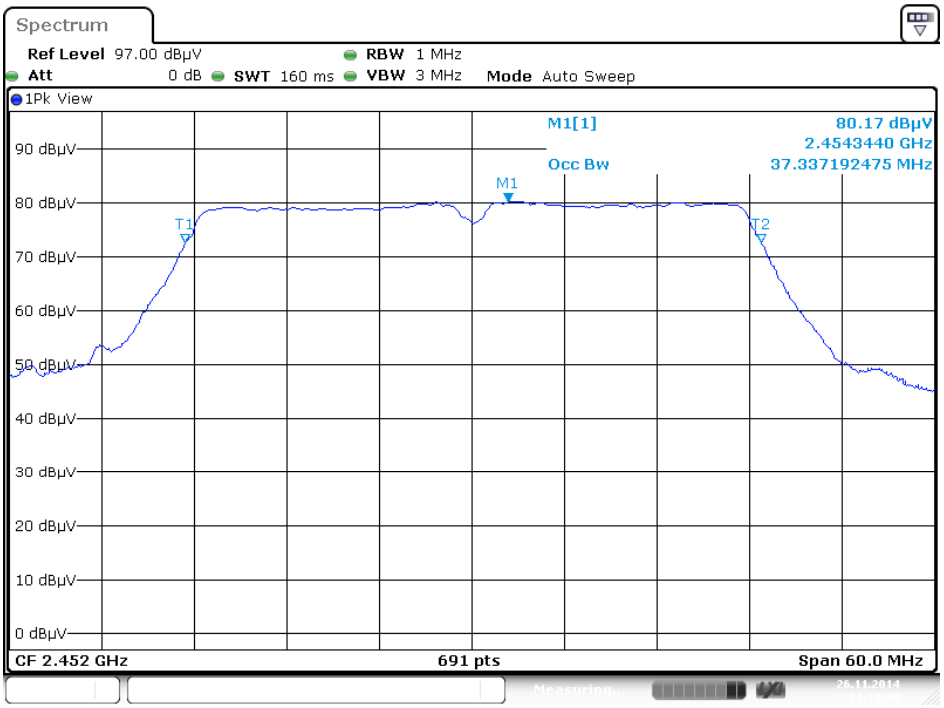
Date: 26.NOV.2014 14:22:17

6 dB Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / 2452 MHz / Chain 1 + Chain 2



Date: 26.NOV.2014 14:31:01

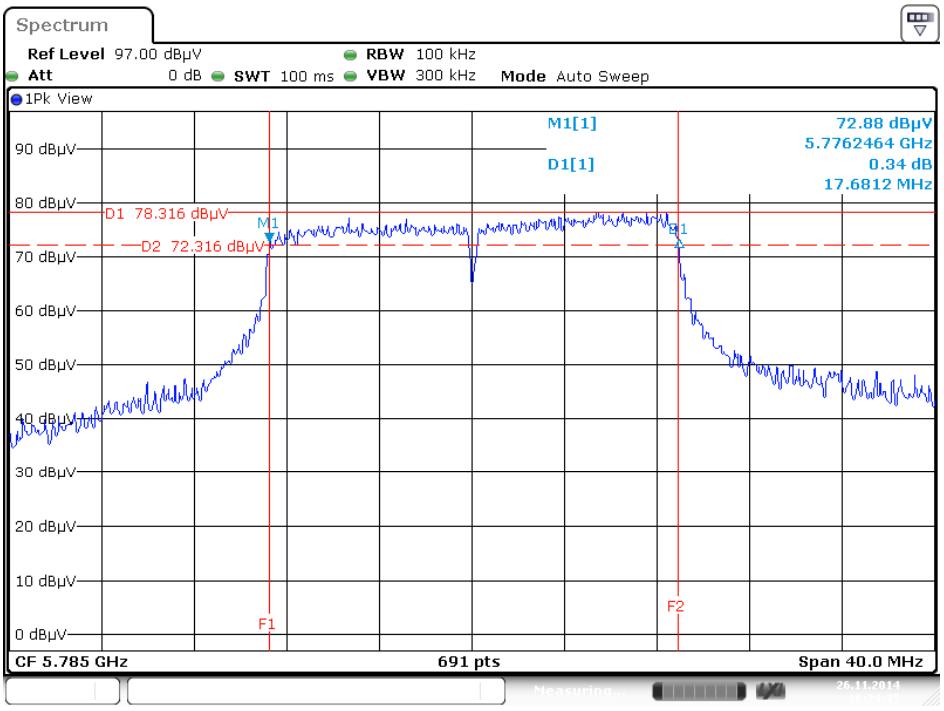
99% Occupied Bandwidth Plot on Configuration IEEE 802.11n MCS0 HT40 / 2452 MHz / Chain 1 + Chain 2



Date: 26.NOV.2014 14:31:49

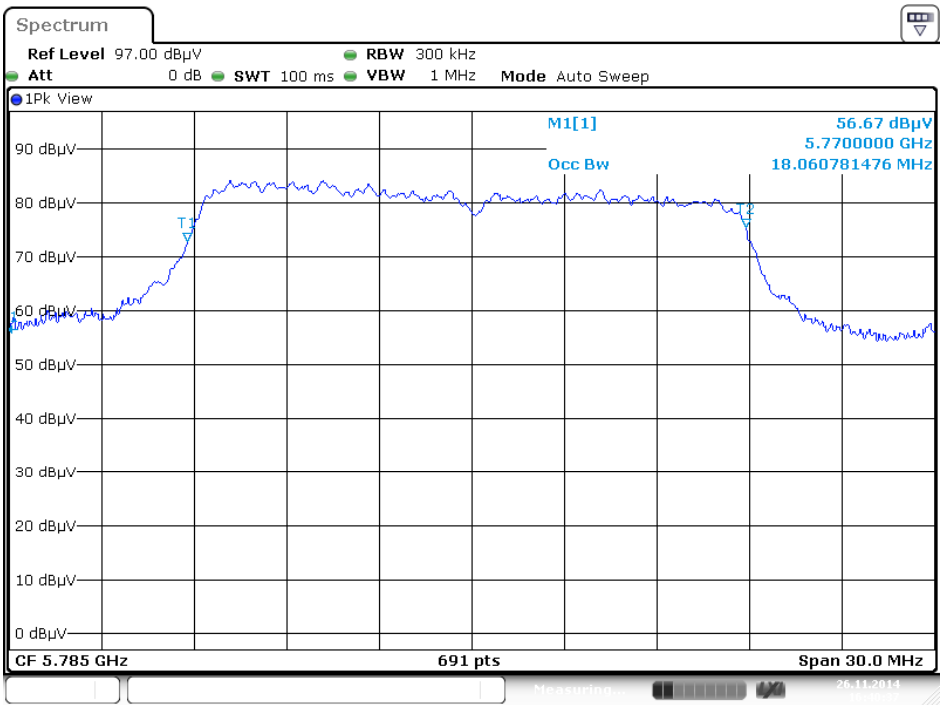
For 5GHz Band

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



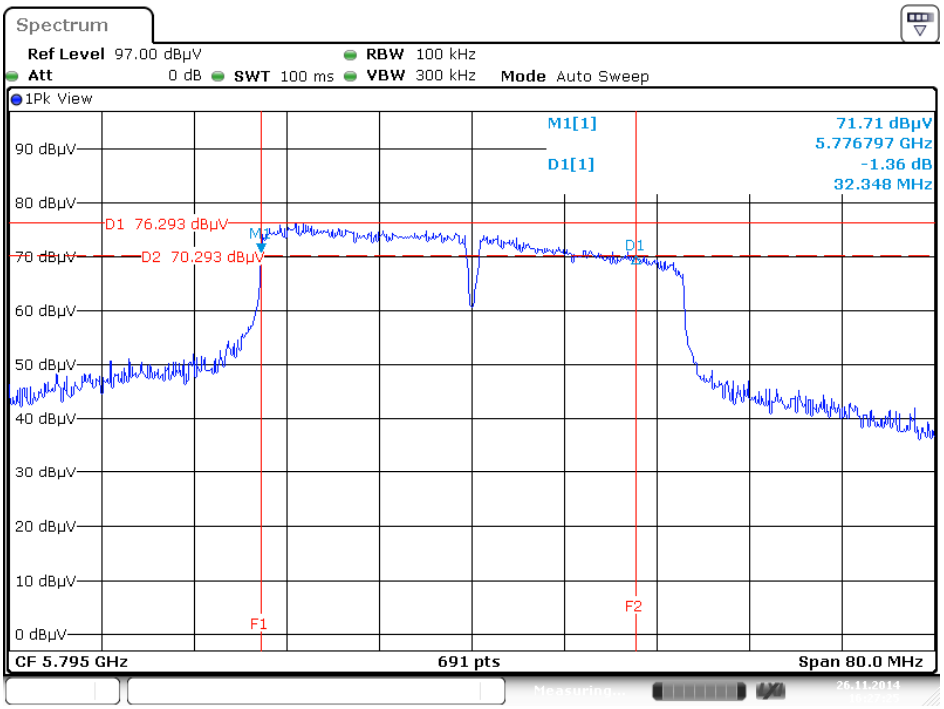
Date: 26.NOV.2014 16:24:36

99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5785 MHz / Chain 1 + Chain 2



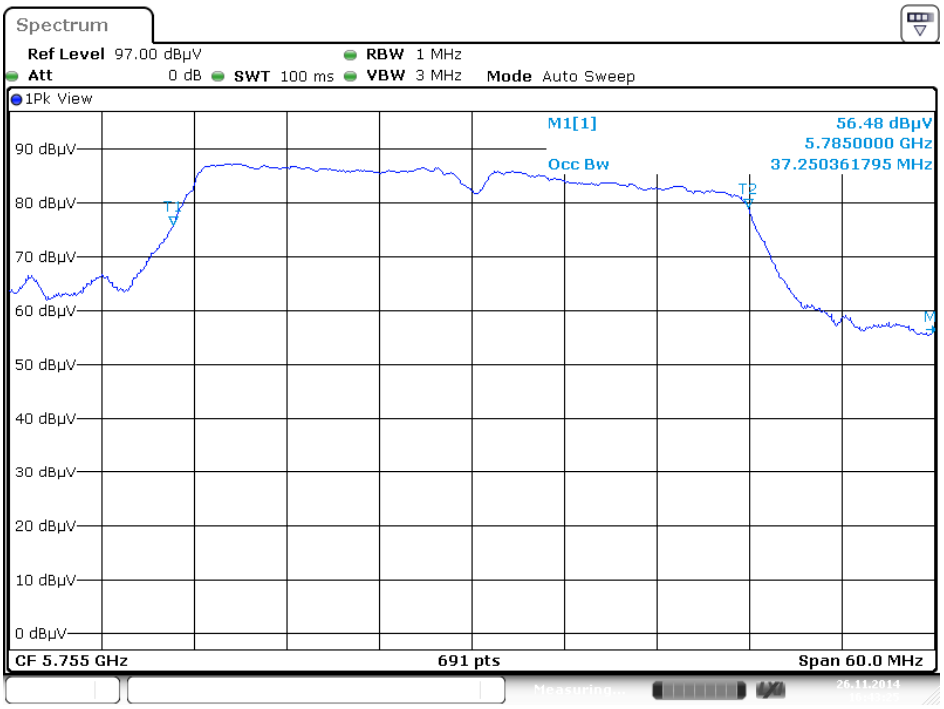
Date: 26.NOV.2014 16:40:37

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795MHz / Chain 1 + Chain 2



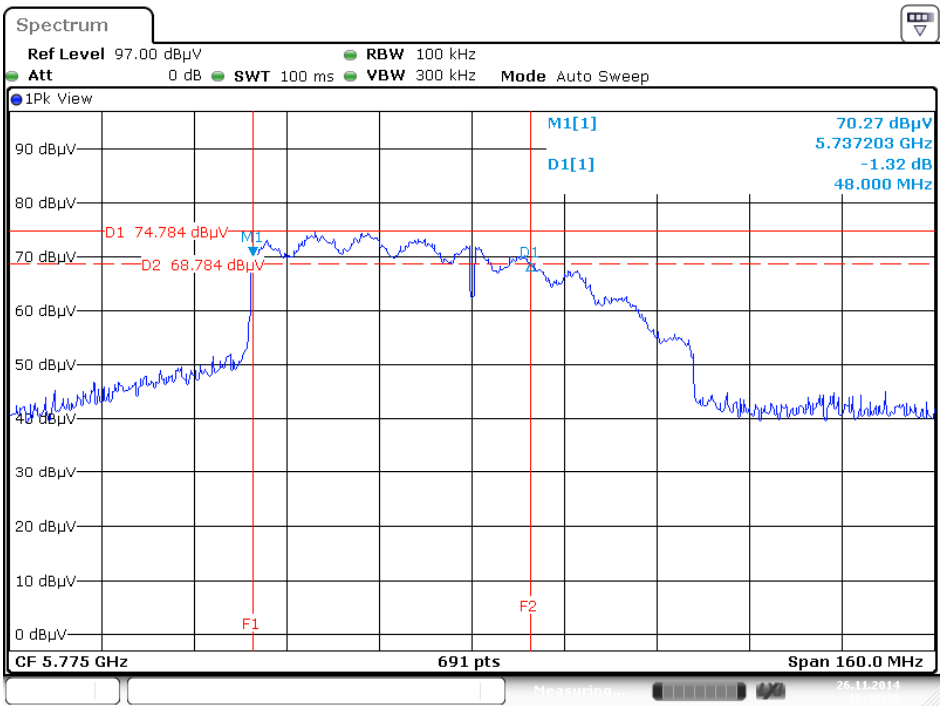
Date: 26.NOV.2014 16:27:25

99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5755MHz / Chain 1 + Chain 2



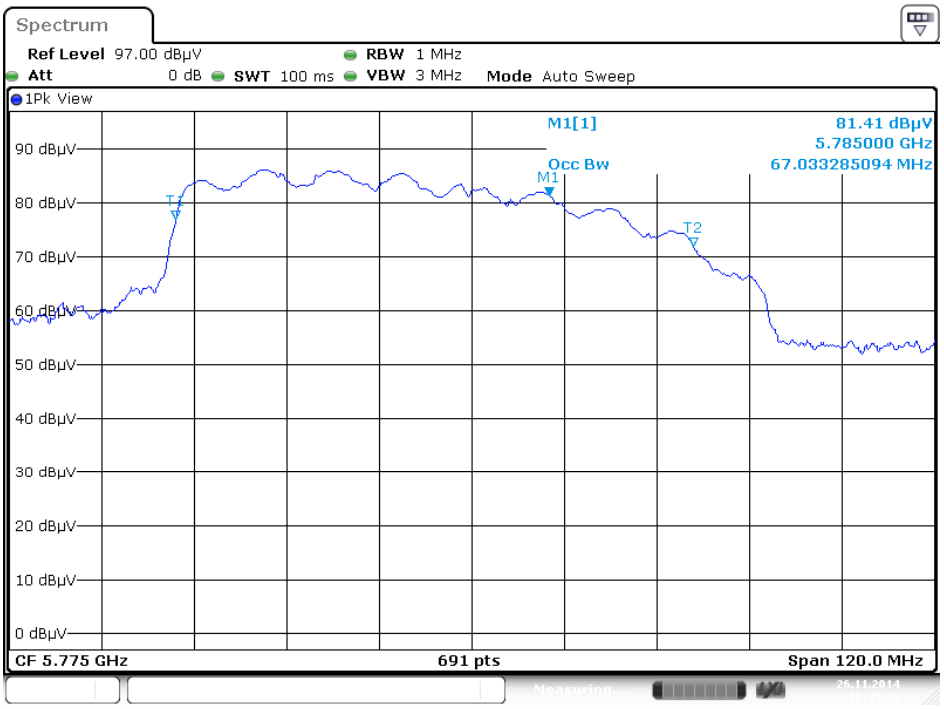
Date: 26.NOV.2014 16:43:25

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



Date: 26.NOV.2014 16:32:38

99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 1 + Chain 2



Date: 26.NOV.2014 16:45:27

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	1000 MHz
Stop Frequency	10th carrier harmonic
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

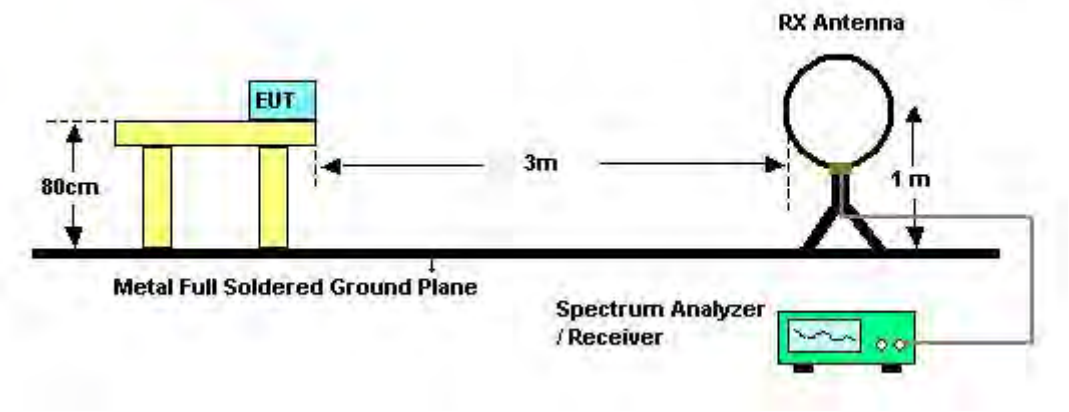
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1GHz / RBW 120kHz for QP

4.5.3. Test Procedures

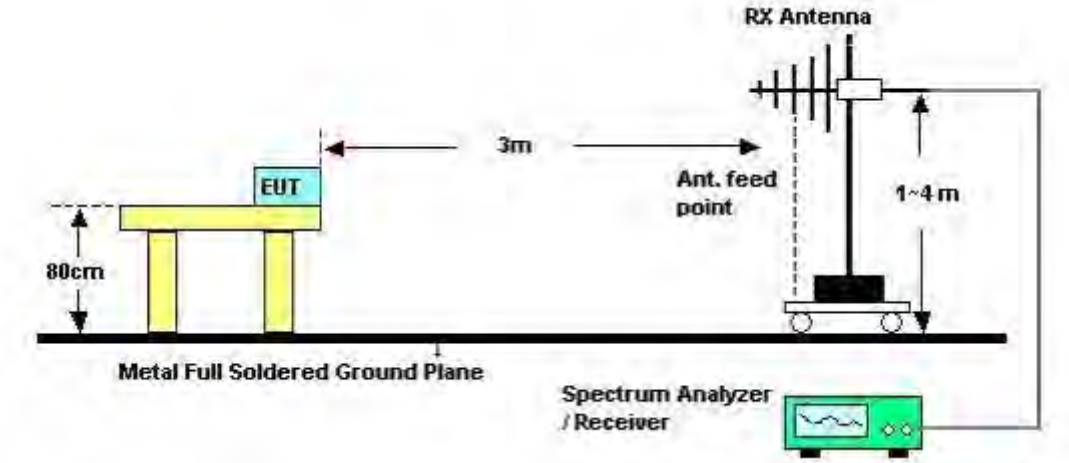
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting 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 1/T 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 Setup Layout

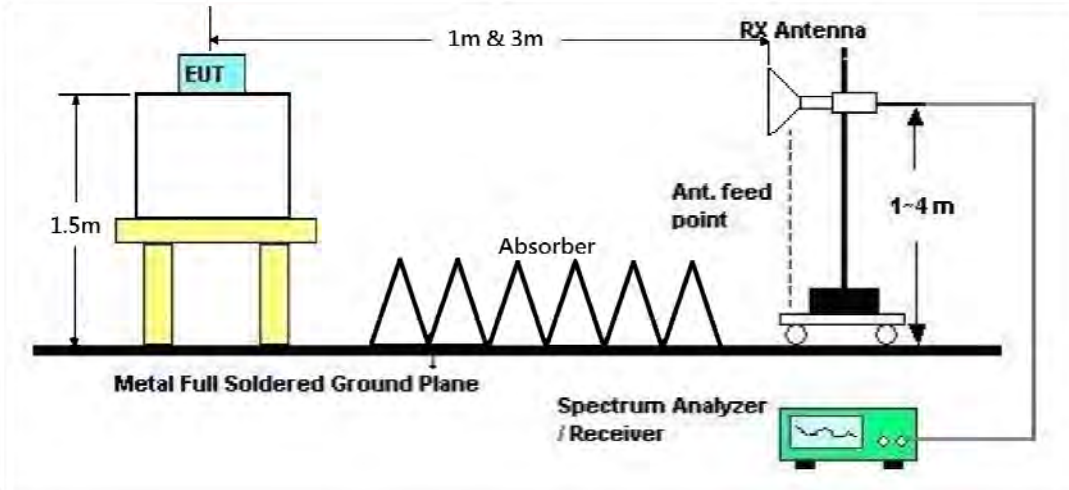
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

For non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

The EUT was programmed to be in beamforming transmitting mode.

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

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	Normal Link
Test Date	Nov. 28, 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.

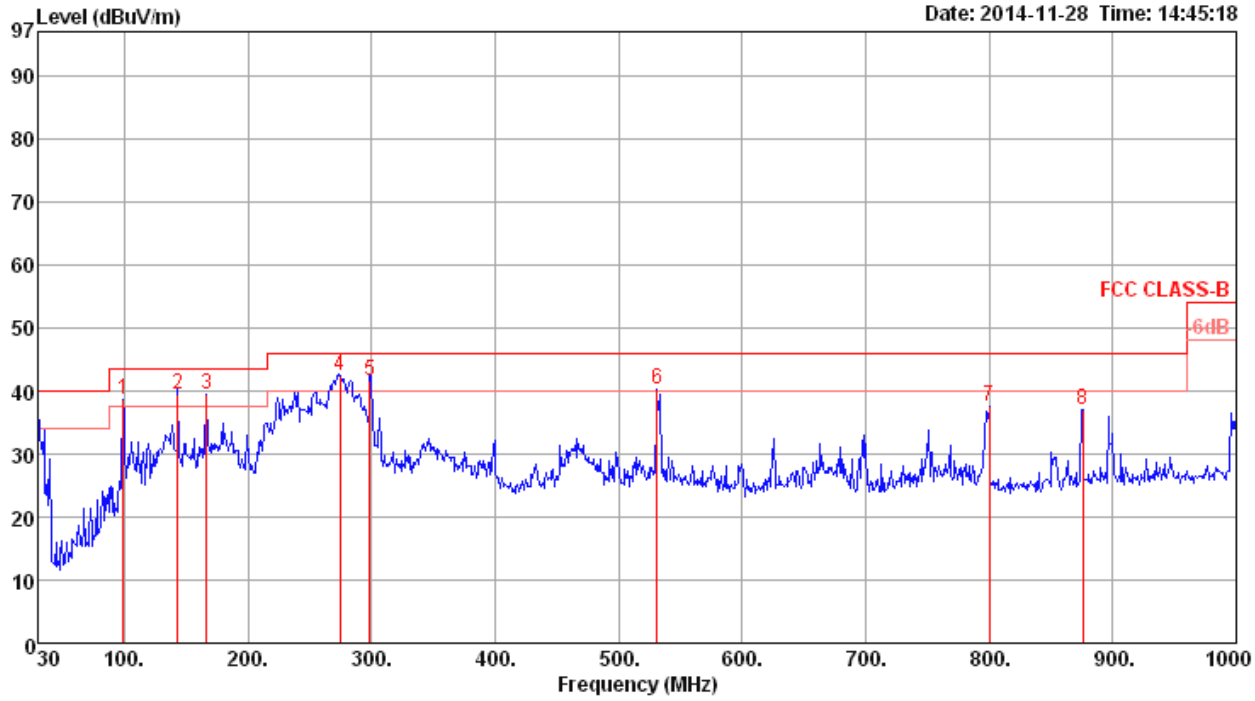
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

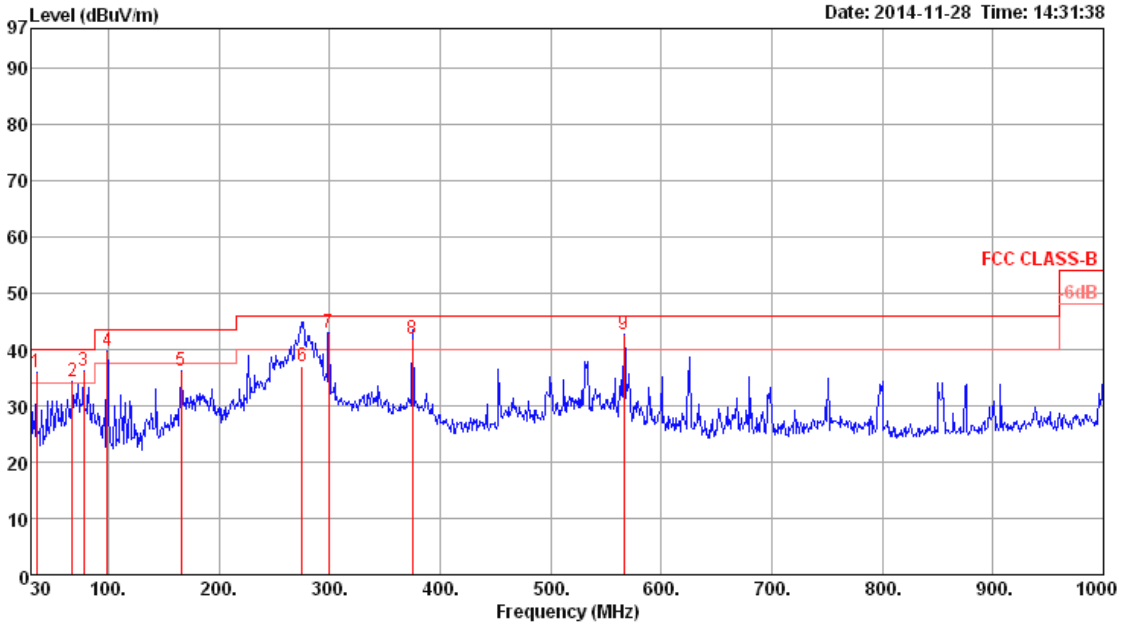
Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	Normal Link

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	98.87	38.76	43.50	-4.74	54.41	1.17	10.79	27.61	Peak	100	0	HORIZONTAL
2	143.49	39.55	43.50	-3.95	53.34	1.42	12.17	27.38	Peak	100	0	HORIZONTAL
3	166.77	39.33	43.50	-4.17	52.60	1.46	12.54	27.27	Peak	100	0	HORIZONTAL
4	274.44	42.52	46.00	-3.48	54.51	1.90	13.06	26.95	Peak	100	0	HORIZONTAL
5	298.69	41.67	46.00	-4.33	53.19	2.03	13.35	26.90	Peak	100	0	HORIZONTAL
6	531.49	40.14	46.00	-5.86	47.52	2.74	17.98	28.10	Peak	100	0	HORIZONTAL
7	800.18	37.47	46.00	-8.53	42.08	3.22	19.77	27.60	Peak	100	0	HORIZONTAL
8	875.84	37.10	46.00	-8.90	40.74	3.46	20.35	27.45	Peak	100	0	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	34.85	36.04	40.00	-3.96	47.06	0.70	16.08	27.80	Peak	400	0	VERTICAL
2	67.83	34.26	40.00	-5.74	54.35	0.97	6.67	27.73	Peak	400	0	VERTICAL
3	77.53	36.33	40.00	-3.67	56.04	0.95	7.03	27.69	Peak	400	0	VERTICAL
4	98.87	39.75	43.50	-3.75	55.40	1.17	10.79	27.61	Peak	400	0	VERTICAL
5	165.80	36.21	43.50	-7.29	49.56	1.45	12.47	27.27	Peak	400	0	VERTICAL
6	275.41	36.90	46.00	-9.10	48.87	1.91	13.07	26.95	QP	298	360	VERTICAL
7	299.66	42.85	46.00	-3.15	54.36	2.03	13.36	26.90	Peak	400	0	VERTICAL
8	375.32	42.00	46.00	-4.00	51.83	2.20	15.40	27.43	QP	159	224	VERTICAL
9	566.41	42.75	46.00	-3.25	49.68	2.79	18.38	28.10	Peak	400	0	VERTICAL

Note:

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

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

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

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

<For non-beamforming mode>

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11b CH 1 / Chain 1
Test Date	Oct. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4823.78	49.93	74.00	-24.07	47.85	4.21	32.56	34.69	Peak	59	111	HORIZONTAL
2	4824.03	45.77	54.00	-8.23	43.69	4.21	32.56	34.69	Average	59	111	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	4824.00	43.98	54.00	-10.02	41.90	4.21	32.56	34.69	Average	15	100	VERTICAL
2	4824.03	49.14	74.00	-24.86	47.06	4.21	32.56	34.69	Peak	15	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11b CH 6 / Chain 1
Test Date	Oct. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4874.01	43.47	54.00	-10.53	41.26	4.22	32.66	34.67	Average	64	100	HORIZONTAL
2	4874.23	49.10	74.00	-24.90	46.89	4.22	32.66	34.67	Peak	64	100	HORIZONTAL
3	7313.50	36.96	54.00	-17.04	29.49	5.34	37.07	34.94	Average	194	100	HORIZONTAL
4	7314.27	50.26	74.00	-23.74	42.79	5.34	37.07	34.94	Peak	194	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	4873.88	49.46	74.00	-24.54	47.25	4.22	32.66	34.67	Peak	339	100	VERTICAL
2	4874.01	44.22	54.00	-9.78	42.01	4.22	32.66	34.67	Average	339	100	VERTICAL
3	7310.10	39.71	54.00	-14.29	32.23	5.34	37.07	34.93	Average	302	100	VERTICAL
4	7310.90	50.71	74.00	-23.29	43.23	5.34	37.07	34.93	Peak	302	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11b CH 11 / Chain 1
Test Date	Oct. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4924.00	42.07	54.00	-11.93	39.73	4.23	32.76	34.65	Average	62	100	HORIZONTAL
2	4924.19	47.86	74.00	-26.14	45.52	4.23	32.76	34.65	Peak	62	100	HORIZONTAL
3	7384.21	50.15	74.00	-23.85	42.57	5.36	37.18	34.96	Peak	8	100	HORIZONTAL
4	7385.22	37.96	54.00	-16.04	30.38	5.36	37.18	34.96	Average	8	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	4923.93	47.51	74.00	-26.49	45.17	4.23	32.76	34.65	Peak	341	100	VERTICAL
2	4924.06	43.51	54.00	-10.49	41.17	4.23	32.76	34.65	Average	341	100	VERTICAL
3	7385.49	50.85	74.00	-23.15	43.27	5.36	37.18	34.96	Peak	300	100	VERTICAL
4	7386.81	39.94	54.00	-14.06	32.36	5.36	37.18	34.96	Average	300	100	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 1 / Chain 1
Test Date	Oct. 20, 2014		

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	4827.62	33.12	54.00	-20.88	29.96	5.69	32.77	35.30	100	63	HORIZONTAL	Average
2	4830.37	46.26	74.00	-27.74	43.10	5.69	32.77	35.30	100	63	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	4822.96	33.53	54.00	-20.47	30.39	5.68	32.76	35.30	162	234	VERTICAL	Average
2	4826.29	46.48	74.00	-27.52	43.32	5.69	32.77	35.30	162	234	VERTICAL	Peak

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 6 / Chain 1
Test Date	Oct. 20, 2014		

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	4870.50	46.91	74.00	-27.09	43.68	5.74	32.80	35.31	100	148	HORIZONTAL	Peak
2	4880.54	33.32	54.00	-20.68	30.08	5.76	32.80	35.32	100	148	HORIZONTAL	Average
3	7306.72	51.59	74.00	-22.41	42.78	7.05	37.12	35.36	129	214	HORIZONTAL	Peak
4	7314.24	38.83	54.00	-15.17	30.01	7.06	37.12	35.36	129	214	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4869.17	46.64	74.00	-27.36	43.41	5.74	32.80	35.31	110	157	VERTICAL	Peak
2	4873.97	33.83	54.00	-20.17	30.59	5.75	32.80	35.31	110	157	VERTICAL	Average
3	7318.35	52.05	74.00	-21.95	43.22	7.06	37.13	35.36	108	226	VERTICAL	Peak
4	7319.57	38.92	54.00	-15.08	30.08	7.06	37.13	35.35	108	226	VERTICAL	Average

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 11 / Chain 1
Test Date	Oct. 20, 2014		

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	4916.39	33.36	54.00	-20.64	30.06	5.80	32.83	35.33	155	124	HORIZONTAL	Average
2	4931.90	46.58	74.00	-27.42	43.26	5.82	32.84	35.34	155	124	HORIZONTAL	Peak
3	7386.52	52.15	74.00	-21.85	43.22	7.09	37.16	35.32	100	178	HORIZONTAL	Peak
4	7389.71	38.86	54.00	-15.14	29.92	7.09	37.16	35.31	100	178	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4924.23	33.46	54.00	-20.54	30.14	5.81	32.84	35.33	100	102	VERTICAL	Average
2	4930.46	46.79	74.00	-27.21	43.46	5.82	32.84	35.33	100	102	VERTICAL	Peak
3	7390.81	38.95	54.00	-15.05	30.01	7.09	37.16	35.31	135	195	VERTICAL	Average
4	7390.89	52.16	74.00	-21.84	43.22	7.09	37.16	35.31	135	195	VERTICAL	Peak

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 1 / Chain 1 + Chain 2
Test Date	Oct. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4819.51	45.84	74.00	-28.16	43.76	4.21	32.56	34.69	Peak	215	100	HORIZONTAL
2	4824.00	34.48	54.00	-19.52	32.40	4.21	32.56	34.69	Average	215	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	4818.99	45.05	74.00	-28.95	42.97	4.21	32.56	34.69	Peak	160	100	VERTICAL
2	4824.32	33.26	54.00	-20.74	31.18	4.21	32.56	34.69	Average	160	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 6 / Chain 1 + Chain 2
Test Date	Oct. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4868.21	46.72	74.00	-27.28	44.51	4.22	32.66	34.67	Peak	225	100	HORIZONTAL
2	4870.59	34.23	54.00	-19.77	32.02	4.22	32.66	34.67	Average	225	100	HORIZONTAL
3	7308.08	50.57	74.00	-23.43	43.09	5.34	37.07	34.93	Peak	303	100	HORIZONTAL
4	7314.18	37.69	54.00	-16.31	30.22	5.34	37.07	34.94	Average	303	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	4869.02	45.48	74.00	-28.52	43.27	4.22	32.66	34.67	Peak	262	100	VERTICAL
2	4872.41	32.63	54.00	-21.37	30.42	4.22	32.66	34.67	Average	262	100	VERTICAL
3	7309.12	52.83	74.00	-21.17	45.35	5.34	37.07	34.93	Peak	112	100	VERTICAL
4	7314.13	39.82	54.00	-14.18	32.35	5.34	37.07	34.94	Average	112	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 11 / Chain 1 + Chain 2
Test Date	Oct. 14, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	4918.30	32.48	54.00	-21.52	30.18	4.22	32.73	34.65	Average	166	100	HORIZONTAL
2	4926.78	46.32	74.00	-27.68	43.98	4.23	32.76	34.65	Peak	166	100	HORIZONTAL
3	7389.73	50.68	74.00	-23.32	43.10	5.36	37.18	34.96	Peak	60	100	HORIZONTAL
4	7394.77	37.47	54.00	-16.53	29.89	5.36	37.18	34.96	Average	60	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	4914.13	32.05	54.00	-21.95	29.76	4.22	32.73	34.66	Average	267	100	VERTICAL
2	4915.93	45.24	74.00	-28.76	42.94	4.22	32.73	34.65	Peak	267	100	VERTICAL
3	7378.30	37.43	54.00	-16.57	29.87	5.36	37.16	34.96	Average	322	100	VERTICAL
4	7383.14	50.80	74.00	-23.20	43.24	5.36	37.16	34.96	Peak	322	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11a CH 149 / Chain 1
Test Date	Nov. 27, 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	11480.59	51.86	74.00	-22.14	41.69	6.53	38.30	34.66	Peak	188	161	HORIZONTAL
2	11481.87	38.95	54.00	-15.05	28.78	6.53	38.30	34.66	Average	188	161	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	11480.39	38.60	54.00	-15.40	28.43	6.53	38.30	34.66	Average	345	155	VERTICAL
2	11486.21	51.72	74.00	-22.28	41.55	6.53	38.30	34.66	Peak	345	155	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11a CH 157 / Chain 1
Test Date	Nov. 27, 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	11563.20	52.32	74.00	-21.68	42.13	6.55	38.32	34.68	Peak	250	156	HORIZONTAL
2	11570.70	39.35	54.00	-14.65	29.16	6.55	38.33	34.69	Average	250	156	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	11576.80	52.12	74.00	-21.88	41.93	6.55	38.33	34.69	Peak	4	161	VERTICAL
2	11579.96	39.16	54.00	-14.84	28.97	6.55	38.33	34.69	Average	4	161	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11a CH 165 / Chain 1
Test Date	Nov. 27, 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	11652.95	40.26	54.00	-13.74	30.06	6.56	38.36	34.72	Average	331	160	HORIZONTAL
2	11654.69	54.03	74.00	-19.97	43.83	6.56	38.36	34.72	Peak	331	160	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	11655.01	53.80	74.00	-20.20	43.60	6.56	38.36	34.72	Peak	145	157	VERTICAL
2	11658.57	39.85	54.00	-14.15	29.65	6.56	38.36	34.72	Average	145	157	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11a CH 149 / Chain 1 + Chain 2
Test Date	Nov. 27, 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	11482.24	39.02	54.00	-14.98	28.85	6.53	38.30	34.66	Average	5	160	HORIZONTAL
2	11488.61	51.69	74.00	-22.31	41.52	6.53	38.30	34.66	Peak	5	160	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	11480.85	38.75	54.00	-15.25	28.58	6.53	38.30	34.66	Average	227	160	VERTICAL
2	11490.46	51.92	74.00	-22.08	41.75	6.53	38.30	34.66	Peak	227	160	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11a CH 157 / Chain 1 + Chain 2
Test Date	Nov. 27, 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	11570.35	39.45	54.00	-14.55	29.26	6.55	38.33	34.69	Average	66	160	HORIZONTAL
2	11576.69	52.41	74.00	-21.59	42.22	6.55	38.33	34.69	Peak	66	160	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	11570.20	39.01	54.00	-14.99	28.82	6.55	38.33	34.69	Average	244	155	VERTICAL
2	11577.00	52.34	74.00	-21.66	42.15	6.55	38.33	34.69	Peak	244	155	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11a CH 165 / Chain 1 + Chain 2
Test Date	Nov. 27, 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	11651.62	40.41	54.00	-13.59	30.21	6.56	38.36	34.72	Average	162	100	HORIZONTAL
2	11651.97	53.09	74.00	-20.91	42.89	6.56	38.36	34.72	Peak	162	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	11649.33	53.06	74.00	-20.94	42.86	6.56	38.36	34.72	Peak	335	160	VERTICAL
2	11653.82	39.82	54.00	-14.18	29.62	6.56	38.36	34.72	Average	335	160	VERTICAL

<For beamforming mode>

For 2.4GHz Band

Temperature	26°C	**Humidity**	68%
Test Engineer	Lucas Huang / Andy Tsai	**Configurations**	IEEE 802.11n MCS0 HT20 CH 1 / Chain 1 + Chain 2
Test Date	Nov. 10, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4819.20	46.39	74.00	-27.61	43.24	5.68	35.29	32.76	HORIZONTAL	82	100	Peak
2	4819.40	32.17	54.00	-21.83	29.02	5.68	35.29	32.76	HORIZONTAL	82	100	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	4824.00	33.00	54.00	-21.00	29.85	5.69	35.30	32.76	VERTICAL	270	175	Average
2	4827.84	46.36	74.00	-27.64	43.20	5.69	35.30	32.77	VERTICAL	270	175	Peak

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11n MCS0 HT20 CH 6 / Chain 1 + Chain 2 + Chain 3
Test Date	Oct. 18, 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	4876.08	30.54	54.00	-23.46	28.33	4.22	32.66	34.67	Average	60	120	HORIZONTAL
2	4882.39	43.80	74.00	-30.20	41.59	4.22	32.66	34.67	Peak	60	120	HORIZONTAL
3	7303.68	52.66	74.00	-21.34	45.18	5.34	37.07	34.93	Peak	21	100	HORIZONTAL
4	7314.30	40.87	54.00	-13.13	33.40	5.34	37.07	34.94	Average	21	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	4871.48	31.28	54.00	-22.72	29.07	4.22	32.66	34.67	Average	312	100	VERTICAL
2	4876.08	44.19	74.00	-29.81	41.98	4.22	32.66	34.67	Peak	312	100	VERTICAL
3	7307.47	36.71	54.00	-17.29	29.23	5.34	37.07	34.93	Average	54	100	VERTICAL
4	7308.80	49.49	74.00	-24.51	42.01	5.34	37.07	34.93	Peak	54	100	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11n MCS0 HT20 CH 11 / Chain 1 + Chain 2
Test Date	Oct. 18, 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	4914.77	44.48	74.00	-29.52	42.18	4.22	32.73	34.65	Peak	70	100	HORIZONTAL
2	4925.16	31.42	54.00	-22.58	29.08	4.23	32.76	34.65	Average	70	100	HORIZONTAL
3	7383.28	36.72	54.00	-17.28	29.16	5.36	37.16	34.96	Average	141	100	HORIZONTAL
4	7385.19	49.32	74.00	-24.68	41.74	5.36	37.18	34.96	Peak	141	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	4915.90	44.14	74.00	-29.86	41.84	4.22	32.73	34.65	Peak	132	100	VERTICAL
2	4919.11	31.49	54.00	-22.51	29.15	4.23	32.76	34.65	Average	132	100	VERTICAL
3	7379.43	36.38	54.00	-17.62	28.82	5.36	37.16	34.96	Average	87	100	VERTICAL
4	7384.41	50.21	74.00	-23.79	42.63	5.36	37.18	34.96	Peak	87	100	VERTICAL

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11n MCS0 HT40 CH 3 / Chain 1 + Chain 2
Test Date	Oct. 17, 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	4843.88	44.00	74.00	-30.00	41.88	4.21	32.59	34.68	Peak	74	100	HORIZONTAL
2	4848.02	31.23	54.00	-22.77	29.11	4.21	32.59	34.68	Average	74	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	4841.92	44.43	74.00	-29.57	42.31	4.21	32.59	34.68	Peak	108	100	VERTICAL
2	4852.28	31.35	54.00	-22.65	29.20	4.21	32.62	34.68	Average	108	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11n MCS0 HT40 CH 6 / Chain 1 + Chain 2
Test Date	Oct. 17, 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	4866.48	31.25	54.00	-22.75	29.09	4.21	32.62	34.67	Average	171	100	HORIZONTAL
2	4869.22	44.41	74.00	-29.59	42.20	4.22	32.66	34.67	Peak	171	100	HORIZONTAL
3	7301.45	49.57	74.00	-24.43	42.09	5.34	37.07	34.93	Peak	240	100	HORIZONTAL
4	7306.86	36.61	54.00	-17.39	29.13	5.34	37.07	34.93	Average	240	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	4874.72	44.13	74.00	-29.87	41.92	4.22	32.66	34.67	Peak	197	100	VERTICAL
2	4879.62	31.31	54.00	-22.69	29.10	4.22	32.66	34.67	Average	197	100	VERTICAL
3	7310.60	36.87	54.00	-17.13	29.39	5.34	37.07	34.93	Average	278	100	VERTICAL
4	7312.22	50.32	74.00	-23.68	42.85	5.34	37.07	34.94	Peak	278	100	VERTICAL

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11n MCS0 HT40 CH 9 / Chain 1 + Chain 2
Test Date	Oct. 17, 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	4909.82	44.69	74.00	-29.31	42.40	4.22	32.73	34.66	Peak	216	100	HORIZONTAL
2	4912.63	31.55	54.00	-22.45	29.26	4.22	32.73	34.66	Average	216	100	HORIZONTAL
3	7347.95	50.43	74.00	-23.57	42.92	5.35	37.11	34.95	Peak	274	100	HORIZONTAL
4	7363.32	37.05	54.00	-16.95	29.53	5.35	37.13	34.96	Average	274	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	4906.23	45.17	74.00	-28.83	42.88	4.22	32.73	34.66	Peak	331	100	VERTICAL
2	4913.67	31.59	54.00	-22.41	29.30	4.22	32.73	34.66	Average	331	100	VERTICAL
3	7347.95	36.52	54.00	-17.48	29.01	5.35	37.11	34.95	Average	8	100	VERTICAL
4	7362.60	49.82	74.00	-24.18	42.30	5.35	37.13	34.96	Peak	8	100	VERTICAL

For 5GHz Band

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 1 + Chain 2
Test Date	Jul. 24, 2014		

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	11488.64	53.76	74.00	-20.24	40.42	9.09	39.10	34.85	100	351	HORIZONTAL	Peak
2	11490.34	43.40	54.00	-10.60	30.06	9.09	39.10	34.85	100	351	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11490.75	56.23	74.00	-17.77	42.89	9.09	39.10	34.85	121	116	VERTICAL	Peak
2	11492.05	44.82	54.00	-9.18	31.48	9.09	39.10	34.85	121	116	VERTICAL	Average

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 1 + Chain 2
Test Date	Jul. 24, 2014		

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	11571.56	43.38	54.00	-10.62	30.11	9.11	39.01	34.85	100	164	HORIZONTAL	Average
2	11577.44	54.34	74.00	-19.66	41.07	9.11	39.01	34.85	100	164	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	11565.86	53.54	74.00	-20.46	40.27	9.11	39.01	34.85	100	59	VERTICAL	Peak
2	11572.72	44.36	54.00	-9.64	31.09	9.11	39.01	34.85	100	59	VERTICAL	Average

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 1 + Chain 2
Test Date	Jul. 24, 2014		

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	11650.60	44.30	54.00	-9.70	31.11	9.11	38.93	34.85	100	206	HORIZONTAL	Average
2	11657.30	54.34	74.00	-19.66	41.19	9.11	38.89	34.85	100	206	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	11649.62	45.49	54.00	-8.51	32.30	9.11	38.93	34.85	100	78	VERTICAL	Average
2	11657.58	55.35	74.00	-18.65	42.20	9.11	38.89	34.85	100	78	VERTICAL	Peak

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 1 + Chain 2
Test Date	Jul. 25, 2014		

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	11512.74	54.22	74.00	-19.78	40.87	9.10	39.10	34.85	100	146	HORIZONTAL	Peak
2	11517.02	43.51	54.00	-10.49	30.20	9.10	39.06	34.85	100	146	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11506.64	53.42	74.00	-20.58	40.07	9.10	39.10	34.85	100	52	VERTICAL	Peak
2	11509.92	44.88	54.00	-9.12	31.53	9.10	39.10	34.85	100	52	VERTICAL	Average

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 1 + Chain 2
Test Date	Jul. 25, 2014		

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	11594.40	54.75	74.00	-19.25	41.52	9.11	38.97	34.85	100	341	HORIZONTAL	Peak
2	11614.95	42.88	54.00	-11.12	29.65	9.11	38.97	34.85	100	341	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	11608.55	43.73	54.00	-10.27	30.50	9.11	38.97	34.85	100	170	VERTICAL	Average
2	11613.30	54.67	74.00	-19.33	41.44	9.11	38.97	34.85	100	170	VERTICAL	Peak

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 1 + Chain 2
Test Date	Jul. 25, 2014		

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	11549.18	42.04	54.00	-11.96	28.73	9.10	39.06	34.85	100	156	HORIZONTAL	Average
2	11549.59	54.56	74.00	-19.44	41.25	9.10	39.06	34.85	100	156	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	11550.10	42.77	54.00	-11.23	29.46	9.10	39.06	34.85	100	30	VERTICAL	Average
2	11556.10	55.33	74.00	-18.67	42.07	9.10	39.01	34.85	100	30	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.

4.6. 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, 1MHz / 1/T for Average
RBW / VBW (30dBc in any 100 kHz bandwidth emission)	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 v03r02 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10.1 Unwanted Emissions into Non-Restricted Frequency Bands Measurement Procedure

4.6.4. Test Setup Layout

For Radiated band edges Measurement:

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

For Radiated Out of Band Emission Measurement:

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

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

For non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

The EUT was programmed to be in beamforming transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

<For non-beamforming mode>

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11b CH 1, 6, 11 / Chain 1
Test Date	Oct. 14, 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	2386.38	59.23	74.00	-14.77	28.40	2.91	27.92	0.00	Peak	346	100	HORIZONTAL
2	2386.38	46.77	54.00	-7.23	15.94	2.91	27.92	0.00	Average	346	100	HORIZONTAL
3	2411.28	101.94			71.12	2.92	27.90	0.00	Average	346	100	HORIZONTAL
4	2412.00	104.79			73.97	2.92	27.90	0.00	Peak	346	100	HORIZONTAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2388.26	57.51	74.00	-16.49	26.68	2.91	27.92	0.00	Peak	2	100	VERTICAL
2	2390.00	44.40	54.00	-9.60	13.57	2.91	27.92	0.00	Average	2	100	VERTICAL
3	2436.13	100.28			69.47	2.93	27.88	0.00	Average	2	100	VERTICAL
4	2437.00	103.13			72.33	2.94	27.86	0.00	Peak	2	100	VERTICAL
5	2487.55	45.06	54.00	-8.94	14.29	2.97	27.80	0.00	Average	2	100	VERTICAL
6	2490.16	57.64	74.00	-16.36	26.87	2.97	27.80	0.00	Peak	2	100	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	2462.00	103.35			72.56	2.95	27.84	0.00	Peak	0	100	HORIZONTAL
2	2462.72	100.52			69.73	2.95	27.84	0.00	Average	0	100	HORIZONTAL
3	2487.41	60.08	74.00	-13.92	29.30	2.96	27.82	0.00	Peak	0	100	HORIZONTAL
4	2487.99	46.25	54.00	-7.75	15.48	2.97	27.80	0.00	Average	0	100	HORIZONTAL

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

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 1, 6, 11 / Chain 1
Test Date	Oct. 20, 2014		

Channel 1

	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	2390.00	51.99	54.00	-2.01	20.41	3.68	27.90	0.00	212	261	HORIZONTAL	Average
2	2390.00	69.98	74.00	-4.02	38.40	3.68	27.90	0.00	212	261	HORIZONTAL	Peak
3	2405.63	108.24			76.65	3.69	27.90	0.00	212	261	HORIZONTAL	Peak
4	2405.92	98.40			66.81	3.69	27.90	0.00	212	261	HORIZONTAL	Average

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.71	61.79	74.00	-12.21	30.21	3.68	27.90	0.00	182	272	HORIZONTAL	Peak
2	2390.00	46.20	54.00	-7.80	14.62	3.68	27.90	0.00	182	272	HORIZONTAL	Average
3	2430.34	99.06			67.46	3.70	27.90	0.00	182	272	HORIZONTAL	Average
4	2430.63	109.02			77.42	3.70	27.90	0.00	182	272	HORIZONTAL	Peak
5	2483.50	46.94	54.00	-7.06	15.31	3.73	27.90	0.00	182	272	HORIZONTAL	Average
6	2485.53	61.14	74.00	-12.86	29.51	3.73	27.90	0.00	182	272	HORIZONTAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2455.63	105.98			74.36	3.72	27.90	0.00	225	83	HORIZONTAL	Peak
2	2455.92	95.70			64.08	3.72	27.90	0.00	225	83	HORIZONTAL	Average
3	2483.50	51.52	54.00	-2.48	19.89	3.73	27.90	0.00	225	83	HORIZONTAL	Average
4	2484.22	68.02	74.00	-5.98	36.39	3.73	27.90	0.00	225	83	HORIZONTAL	Peak

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

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11g CH 1, 6, 11 / Chain 1 + Chain 2
Test Date	Oct. 14, 2014 ~ Oct. 20, 2014		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2389.57	69.63	74.00	-4.37	38.05	3.68	27.90	0.00	219	94	HORIZONTAL	Peak
2	2390.00	51.32	54.00	-2.68	19.74	3.68	27.90	0.00	219	94	HORIZONTAL	Average
3	2405.20	109.70			78.11	3.69	27.90	0.00	219	94	HORIZONTAL	Peak
4	2405.92	100.11			68.52	3.69	27.90	0.00	219	94	HORIZONTAL	Average

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2386.82	58.88	74.00	-15.12	27.30	3.68	27.90	0.00	213	280	HORIZONTAL	Peak
2	2390.00	45.05	54.00	-8.95	13.47	3.68	27.90	0.00	213	280	HORIZONTAL	Average
3	2430.05	109.06			77.46	3.70	27.90	0.00	213	280	HORIZONTAL	Peak
4	2430.34	99.47			67.87	3.70	27.90	0.00	213	280	HORIZONTAL	Average
5	2483.50	45.20	54.00	-8.80	13.57	3.73	27.90	0.00	213	280	HORIZONTAL	Average
6	2483.79	58.72	74.00	-15.28	27.09	3.73	27.90	0.00	213	280	HORIZONTAL	Peak

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	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2455.63	107.74			76.12	3.72	27.90	0.00	212	85	HORIZONTAL	Peak
2	2455.92	98.58			66.96	3.72	27.90	0.00	212	85	HORIZONTAL	Average
3	2483.50	52.49	54.00	-1.51	20.86	3.73	27.90	0.00	212	85	HORIZONTAL	Average
4	2483.64	68.35	74.00	-5.65	36.72	3.73	27.90	0.00	212	85	HORIZONTAL	Peak

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 beamforming mode>

Temperature	26°C	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11n MCS0 HT20 CH 1, 6, 11 / Chain 1 + Chain 2
Test date	Oct. 17, 2014 ~ Nov. 10, 2014		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Preamp Factor	Antenna Factor	Pol/Phase	T/Pos	A/Pos	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB	dB/m		deg	cm	
1	2389.28	70.75	74.00	-3.25	39.17	3.68	0.00	27.90	HORIZONTAL	269	100	Peak
2	2390.00	52.28	54.00	-1.72	20.70	3.68	0.00	27.90	HORIZONTAL	269	100	Average
3	2406.36	104.60			73.01	3.69	0.00	27.90	HORIZONTAL	269	100	Peak
4	2406.65	93.73			62.14	3.69	0.00	27.90	HORIZONTAL	269	100	Average

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	2385.37	60.45	74.00	-13.55	29.61	2.90	27.94	0.00	Peak	314	204	HORIZONTAL
2	2390.00	46.58	54.00	-7.42	15.75	2.91	27.92	0.00	Average	314	204	HORIZONTAL
3	2441.34	101.86			71.06	2.94	27.86	0.00	Average	314	204	HORIZONTAL
4	2443.37	110.50			79.70	2.94	27.86	0.00	Peak	314	204	HORIZONTAL
5	2483.50	48.43	54.00	-5.57	17.65	2.96	27.82	0.00	Average	314	204	HORIZONTAL
6	2485.24	61.40	74.00	-12.60	30.62	2.96	27.82	0.00	Peak	314	204	HORIZONTAL

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	T/Pos	A/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		deg	cm	
1	2468.22	107.88			77.09	2.95	27.84	0.00	Peak	83	175	HORIZONTAL
2	2468.51	98.01			67.22	2.95	27.84	0.00	Average	83	175	HORIZONTAL
3	2483.50	51.67	54.00	-2.33	20.89	2.96	27.82	0.00	Average	83	175	HORIZONTAL
4	2484.37	68.67	74.00	-5.33	37.89	2.96	27.82	0.00	Peak	83	175	HORIZONTAL

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

Temperature	26℃	Humidity	68%
Test Engineer	Lucas Huang / Andy Tsai	Configurations	IEEE 802.11n MCS0 HT40 CH 3, 6, 9 / Chain 1 + Chain 2
Test date	Oct. 17, 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	2384.50	67.22	74.00	-6.78	36.38	2.90	27.94	0.00	Peak	274	122	HORIZONTAL
2	2390.00	52.37	54.00	-1.63	21.54	2.91	27.92	0.00	Average	274	122	HORIZONTAL
3	2423.45	104.43			73.62	2.93	27.88	0.00	Peak	274	122	HORIZONTAL
4	2423.74	94.15			63.34	2.93	27.88	0.00	Average	274	122	HORIZONTAL

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	2388.26	64.90	74.00	-9.10	34.07	2.91	27.92	0.00	Peak	58	198	HORIZONTAL
2	2390.00	50.69	54.00	-3.31	19.86	2.91	27.92	0.00	Average	58	198	HORIZONTAL
3	2439.32	95.67			64.87	2.94	27.86	0.00	Average	58	198	HORIZONTAL
4	2443.37	106.08			75.28	2.94	27.86	0.00	Peak	58	198	HORIZONTAL
5	2483.50	52.34	54.00	-1.66	21.56	2.96	27.82	0.00	Average	58	198	HORIZONTAL
6	2485.82	69.11	74.00	-4.89	38.33	2.96	27.82	0.00	Peak	58	198	HORIZONTAL

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	2438.40	94.83			64.03	2.94	27.86	0.00	Average	100	175	HORIZONTAL
2	2443.90	104.87			74.07	2.94	27.86	0.00	Peak	100	175	HORIZONTAL
3	2483.50	52.29	54.00	-1.71	21.51	2.96	27.82	0.00	Average	100	175	HORIZONTAL
4	2492.18	67.34	74.00	-6.66	36.57	2.97	27.80	0.00	Peak	100	175	HORIZONTAL

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

Note:

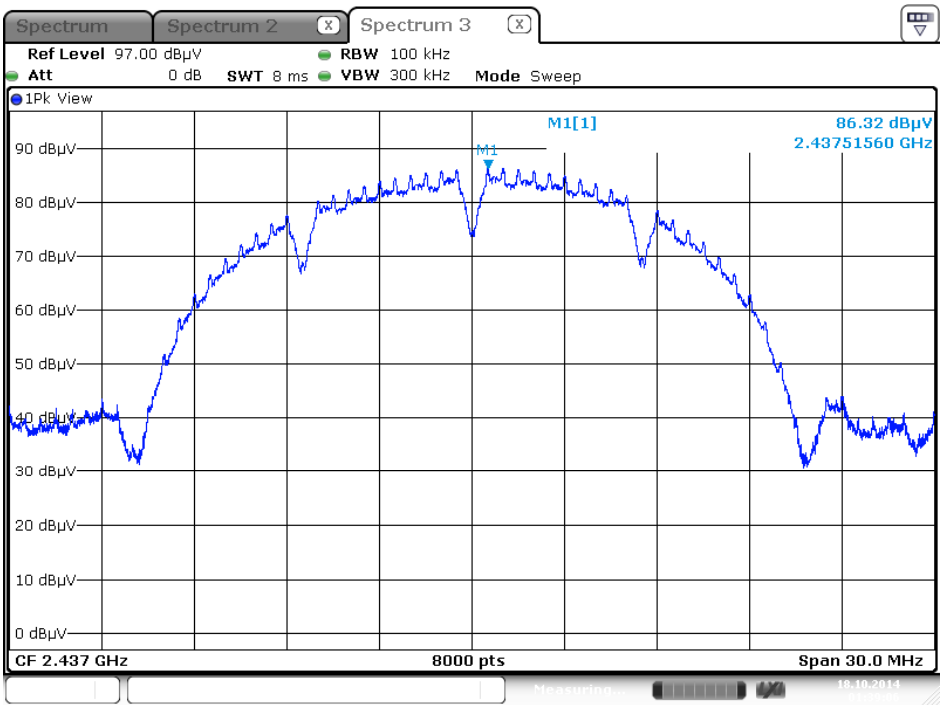
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

For Emission not in Restricted Band

<For non-beamforming mode>

Plot on Configuration IEEE 802.11b / Reference Level



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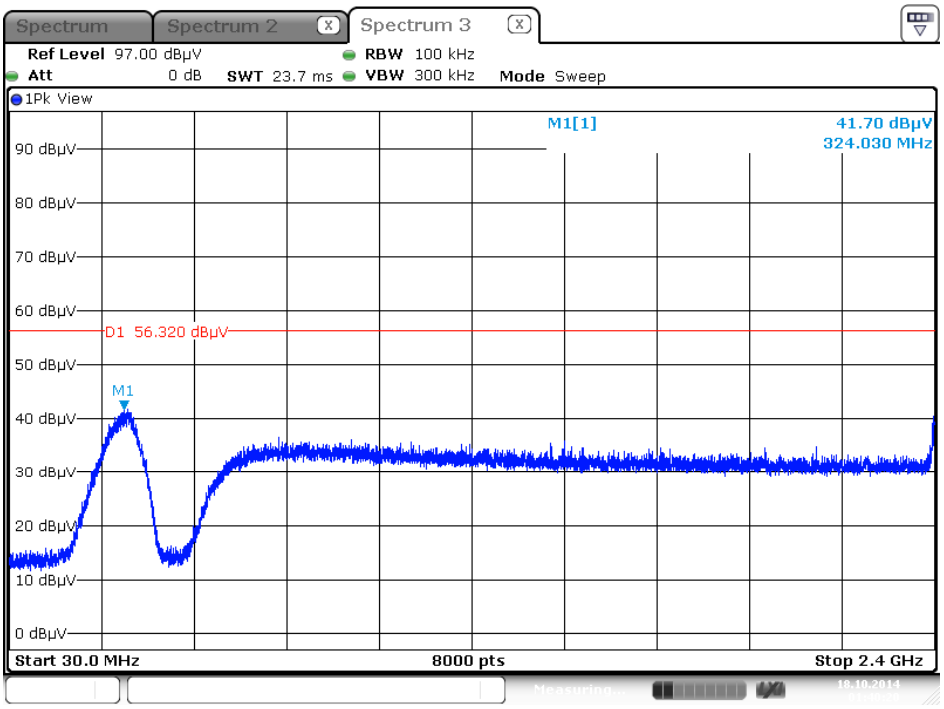
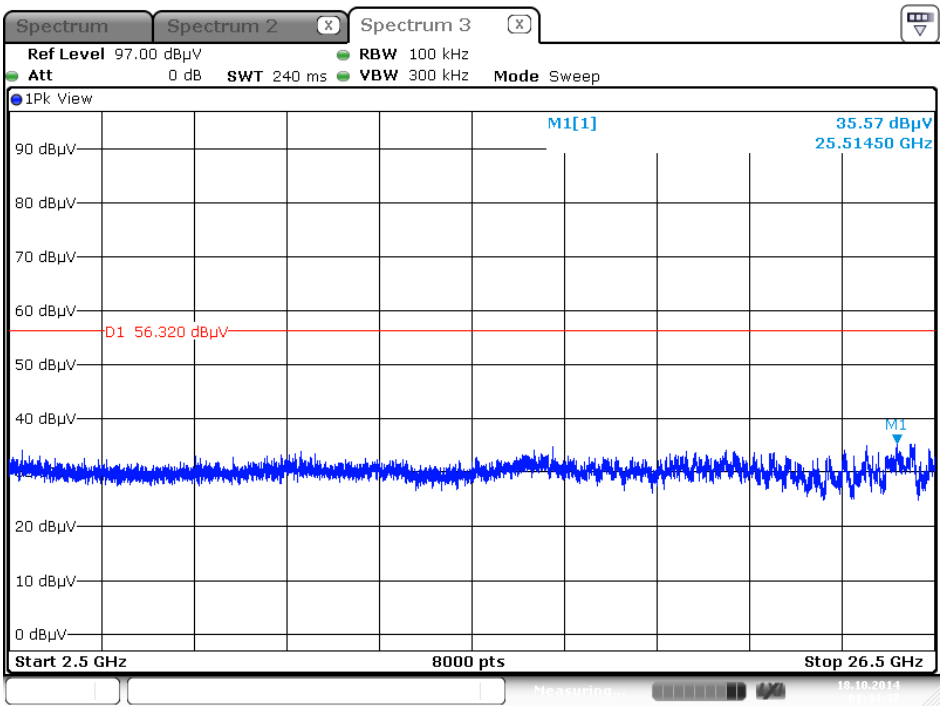
Plot on Configuration IEEE 802.11b / CH 1 / 30MHz~2400MHz (down 30dBc)



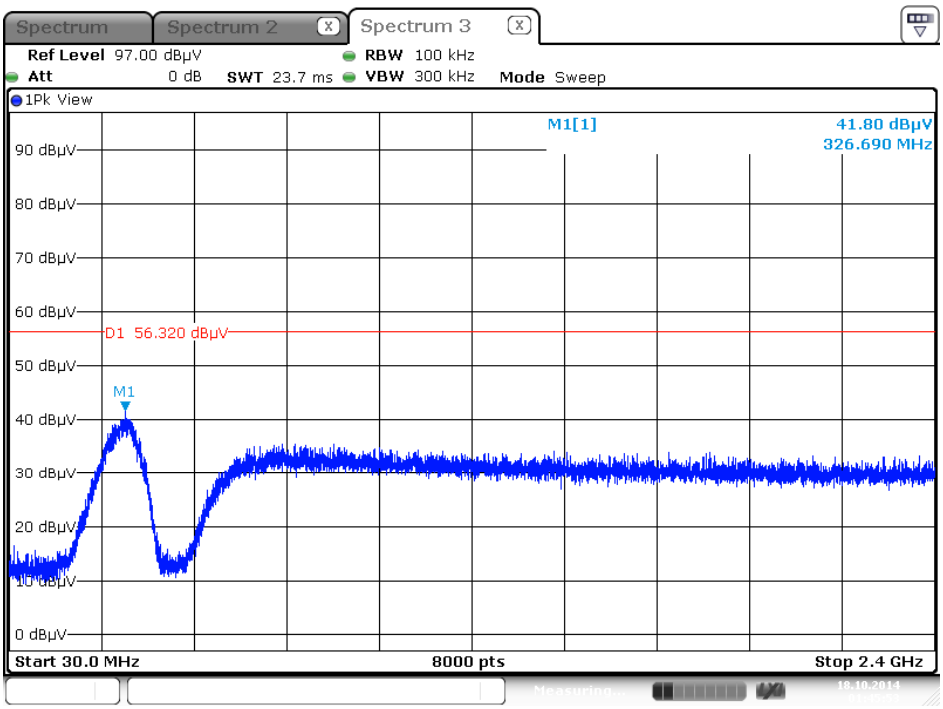
Date: 18.OCT.2014 01:40:21

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



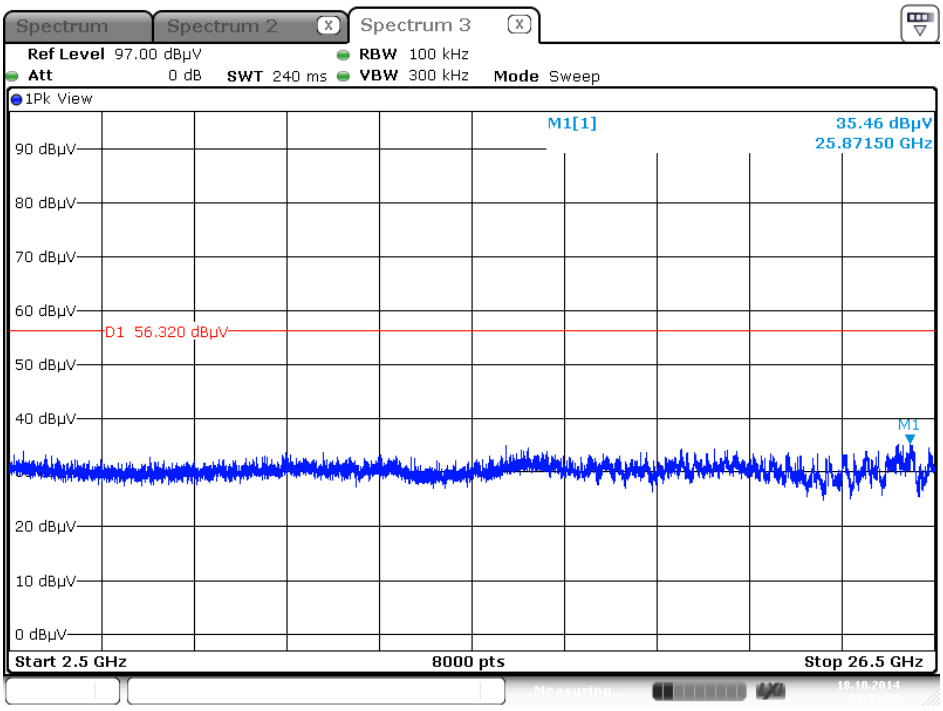
Date: 18.OCT.2014 01:44:38

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



Date: 18.OCT.2014 01:45:53

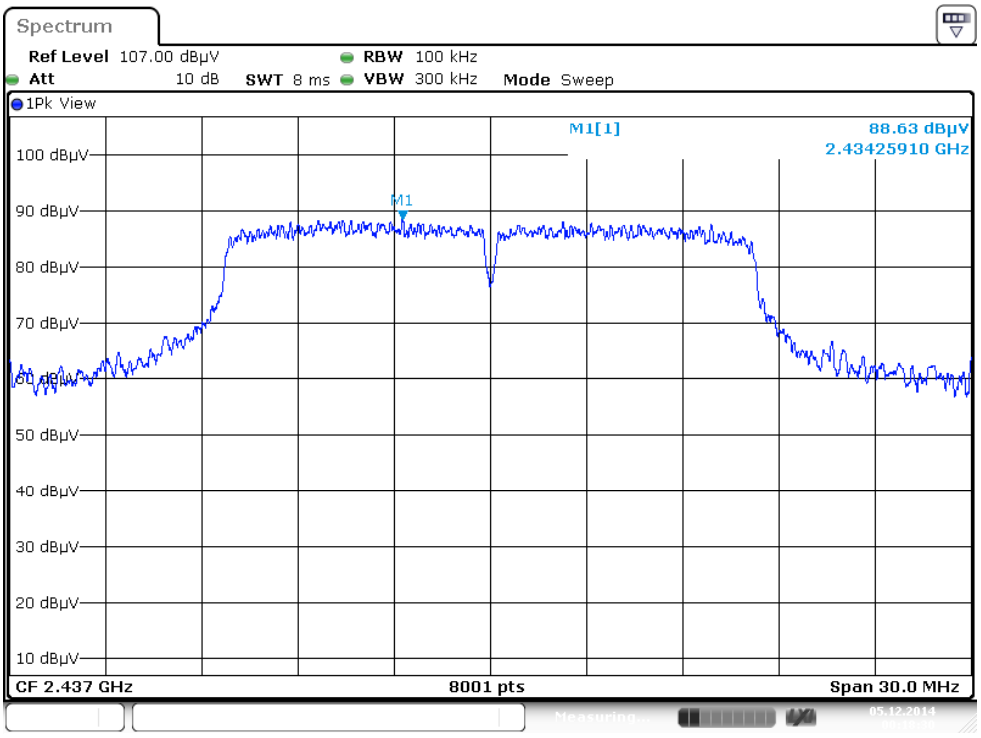
Plot on Configuration IEEE 802.11b / CH 11 / 2500MHz~26500MHz (down 30dBc)



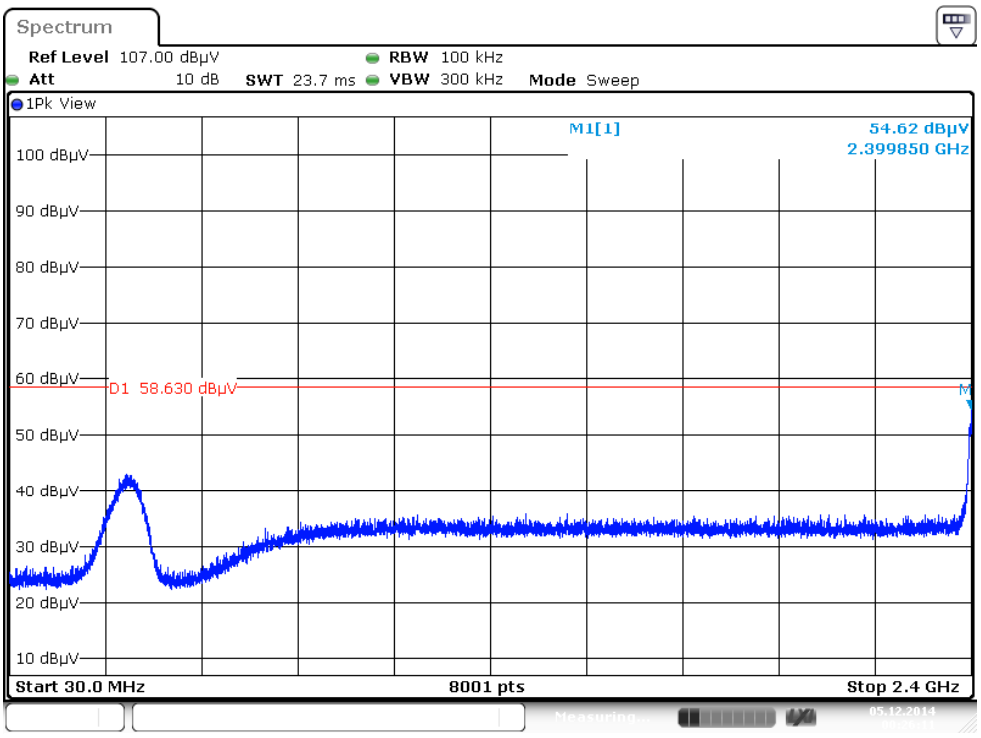
Date: 18.OCT.2014 01:45:13

For 1TX

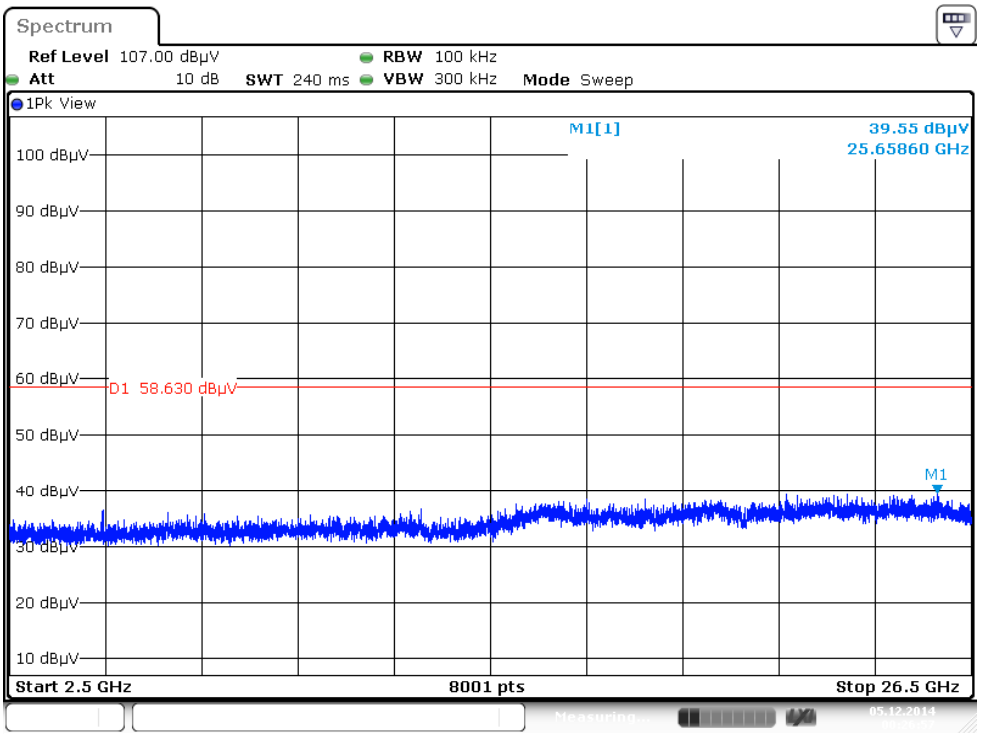
Plot on Configuration IEEE 802.11g / Reference Level



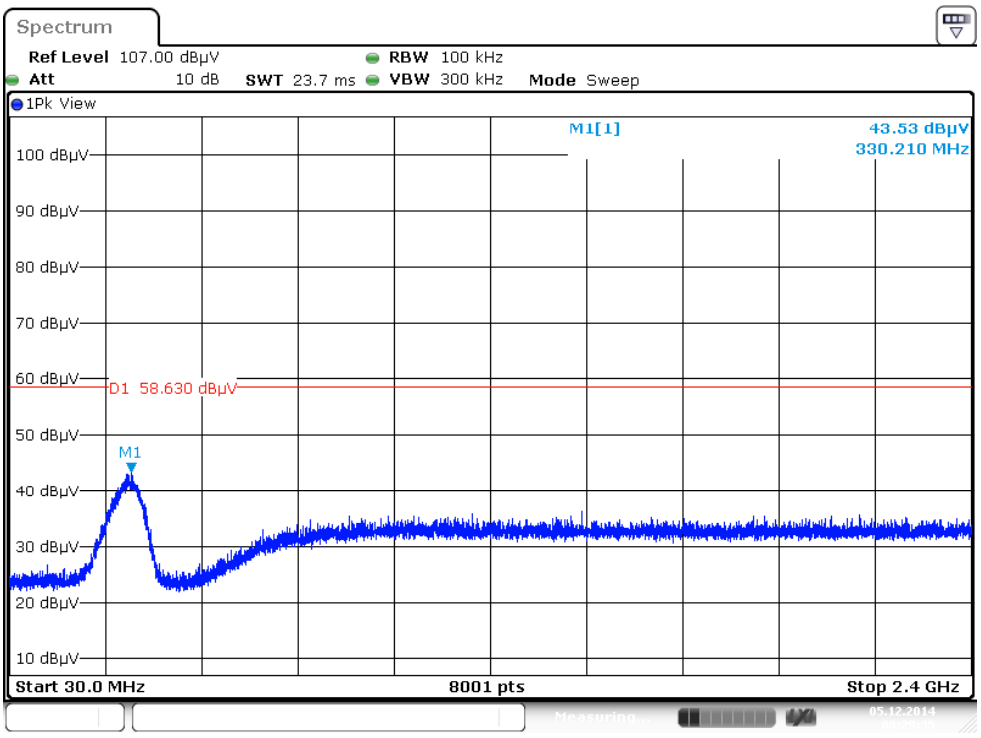
Plot on Configuration IEEE 802.11g / CH 1 / 30MHz~2400MHz (down 30dBc)



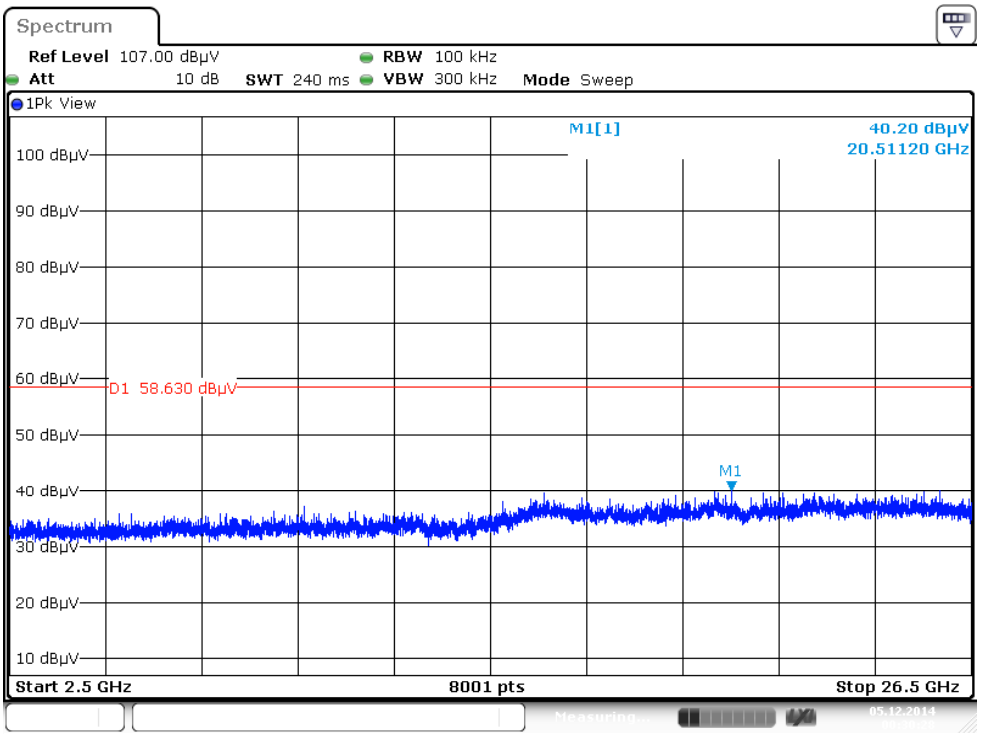
Plot on Configuration IEEE 802.11g / CH 1 / 2500MHz~26500MHz (down 30dBc)



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

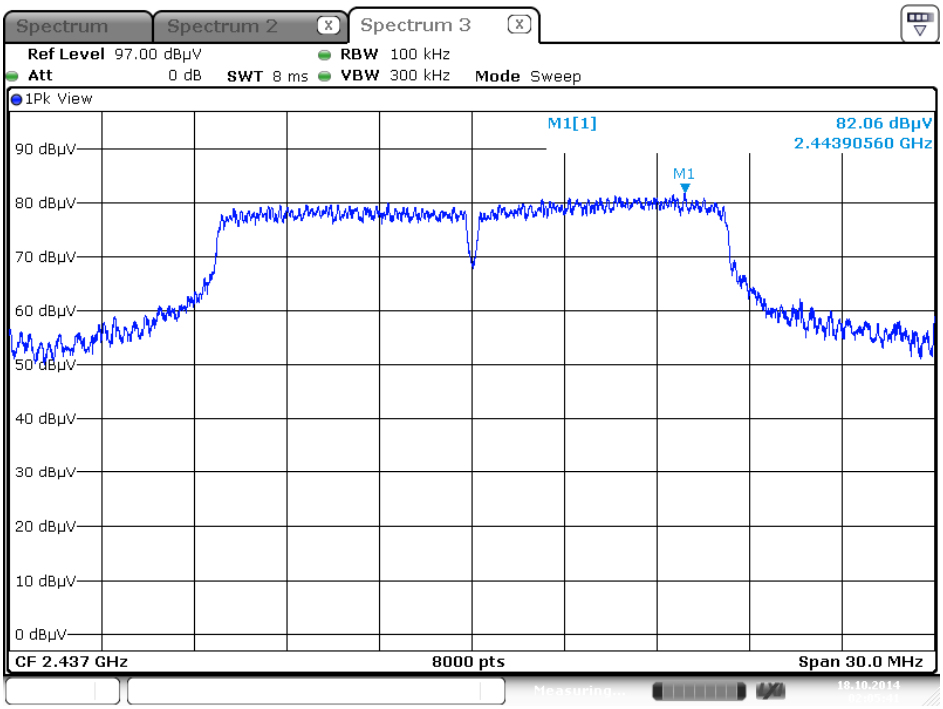


Plot on Configuration IEEE 802.11g / CH 11 / 2500MHz~26500MHz (down 30dBc)



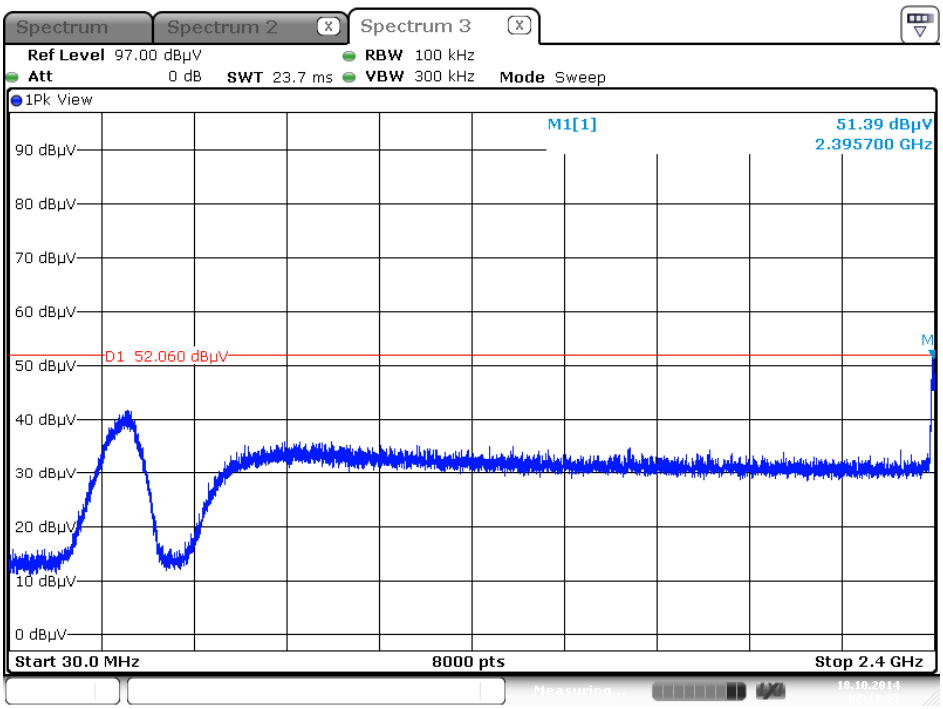
For 2TX

Plot on Configuration IEEE 802.11g / Reference Level



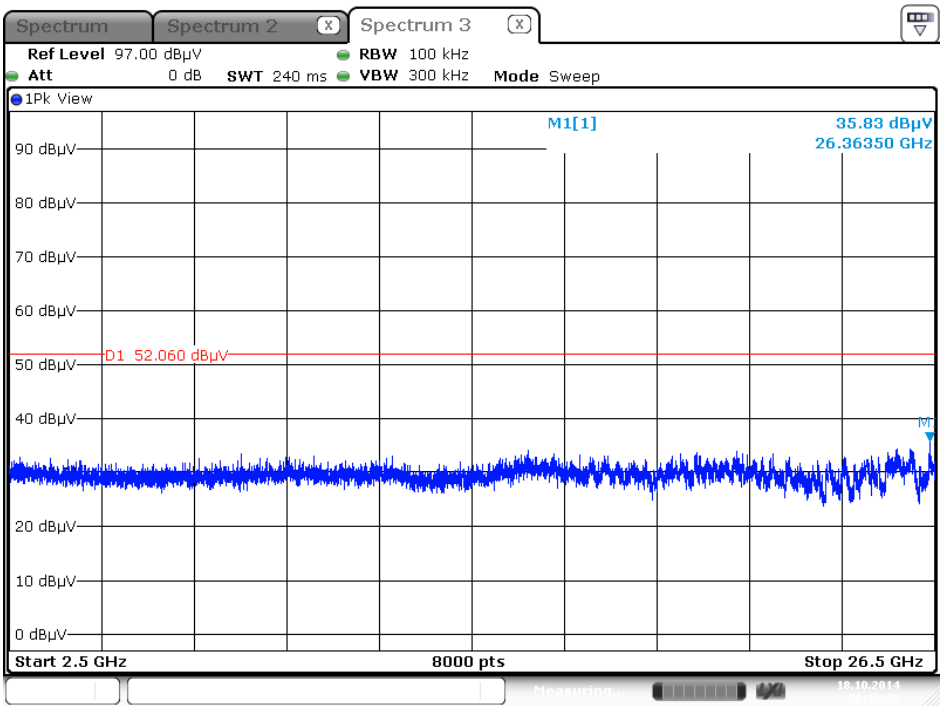
Date: 18.OCT.2014 02:05:41

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



Date: 18.OCT.2014 02:11:55

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



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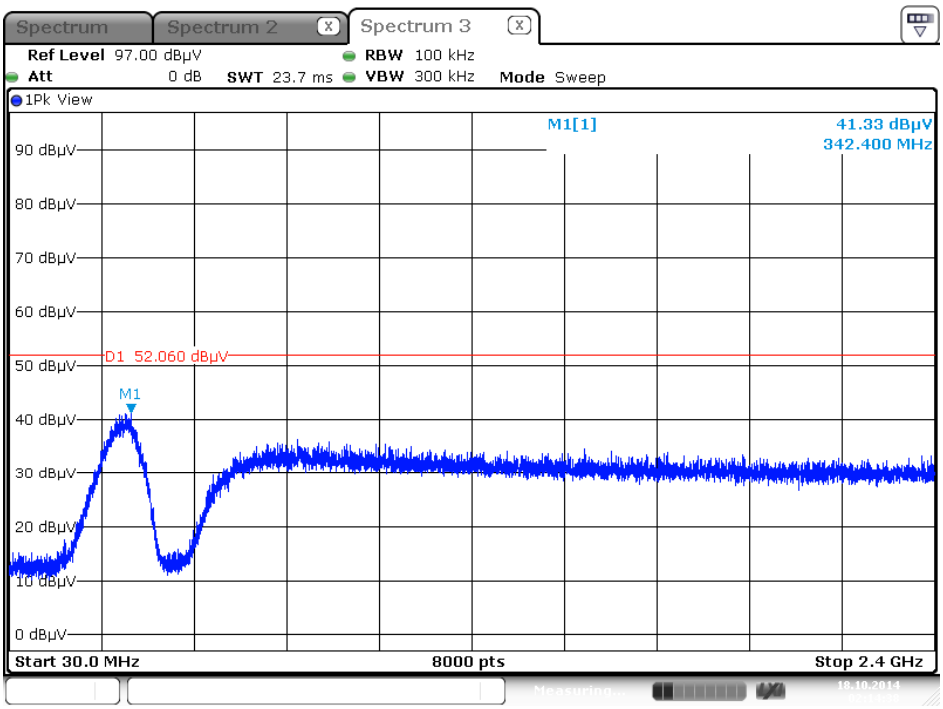
Plot on Configuration IEEE 802.11g / CH 11 / 30MHz~2400MHz (down 30dBc)



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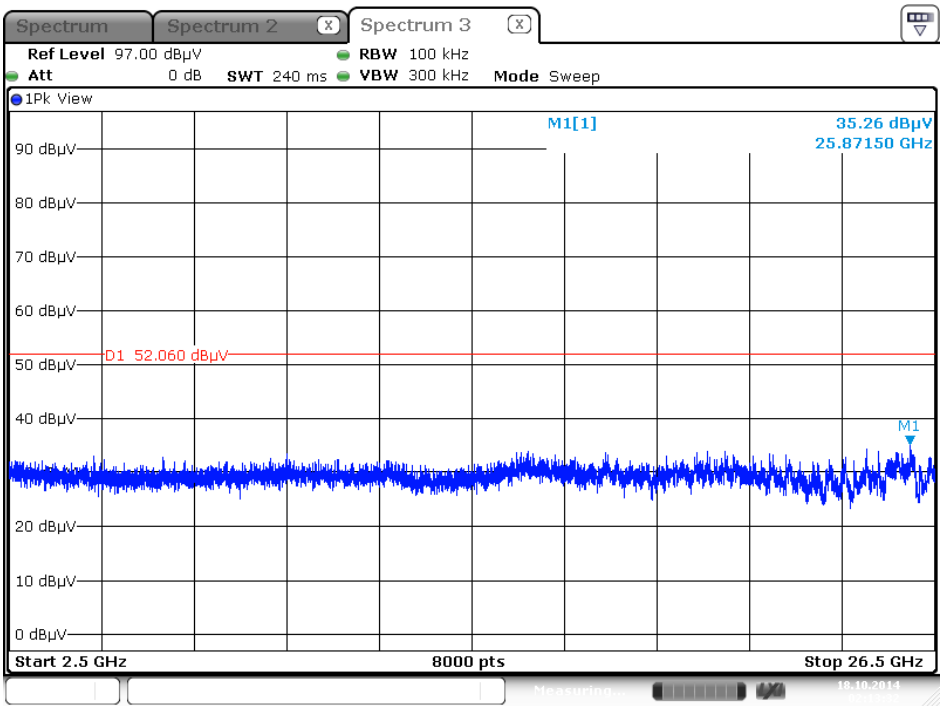
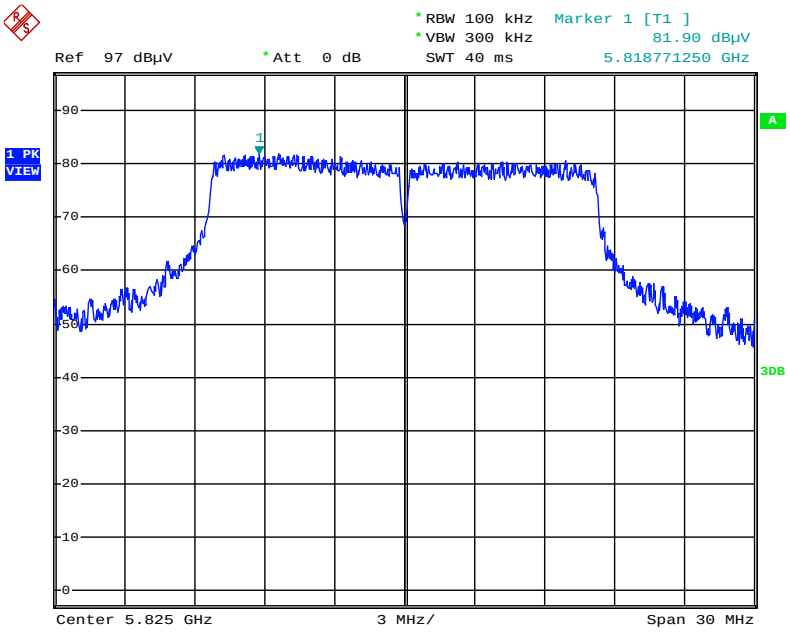
Plot on Configuration IEEE 802.11g / CH 11 / 2500MHz~26500MHz (down 30dBc)



Date: 18.OCT.2014 02:13:32

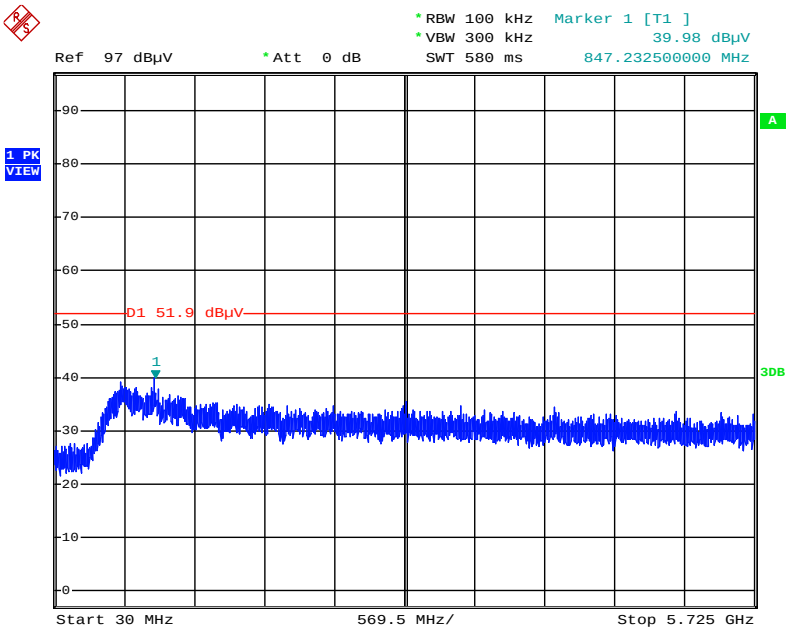
For 1TX

Plot on Configuration IEEE 802.11a / Reference Level



Date: 27.NOV.2014 02:07:53

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



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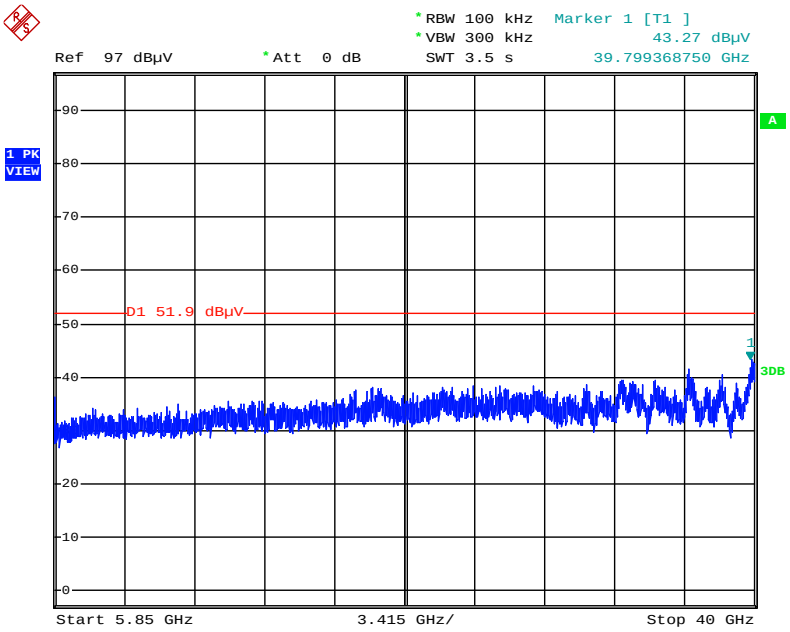
Plot on Configuration IEEE 802.11a / CH 149 / 5850MHz~40000MHz (down 30dBc)



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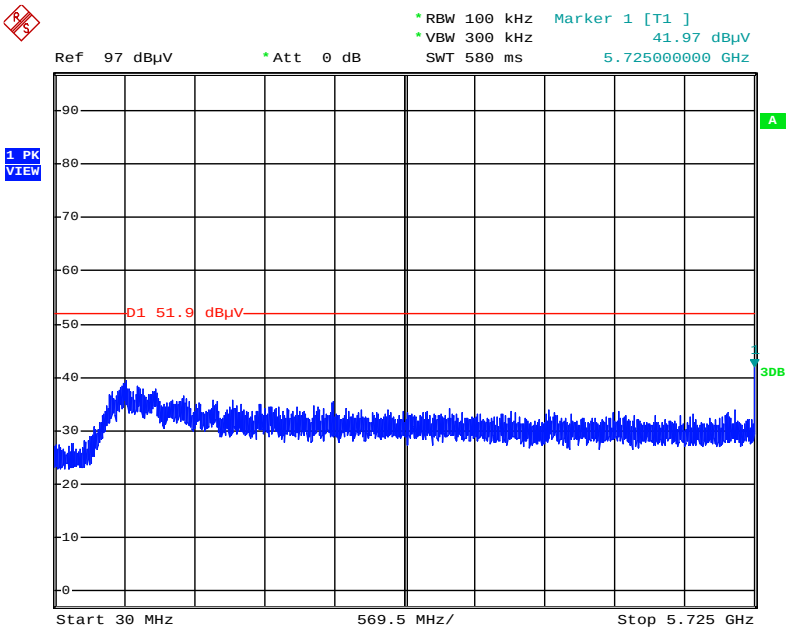
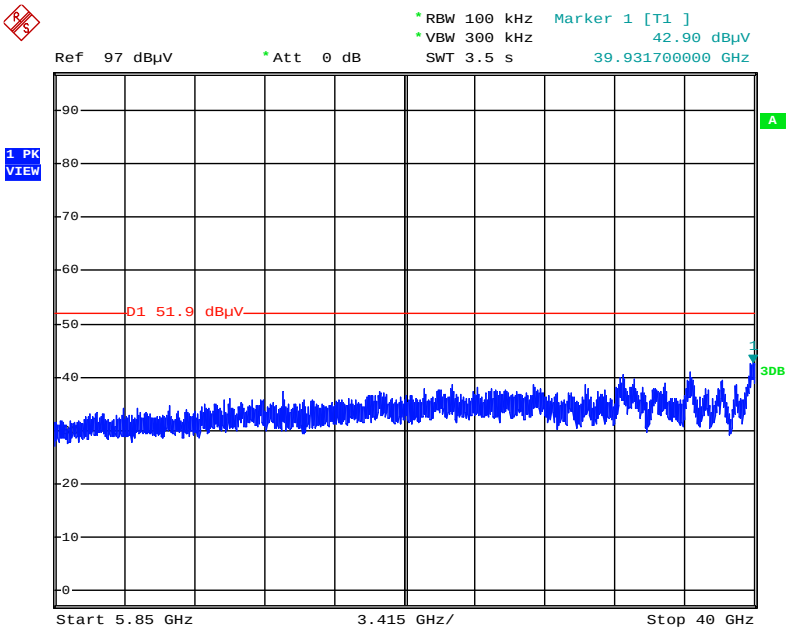
Plot on Configuration IEEE 802.11a / CH 165 / 30MHz~5725MHz (down 30dBc)



Date: 27.NOV.2014 02:10:01

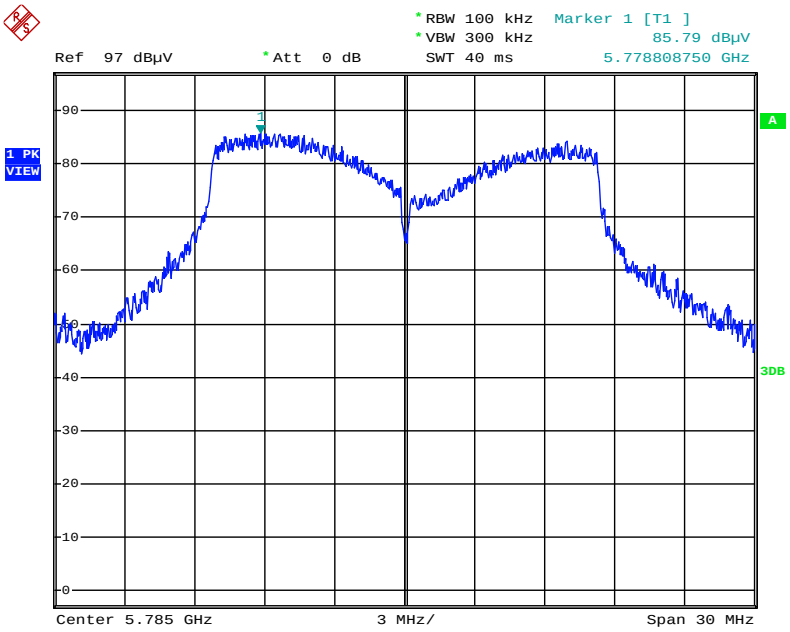
Plot on Configuration IEEE 802.11a / CH 165 / 5850MHz~40000MHz (down 30dBc)



Date: 27.NOV.2014 02:10:27

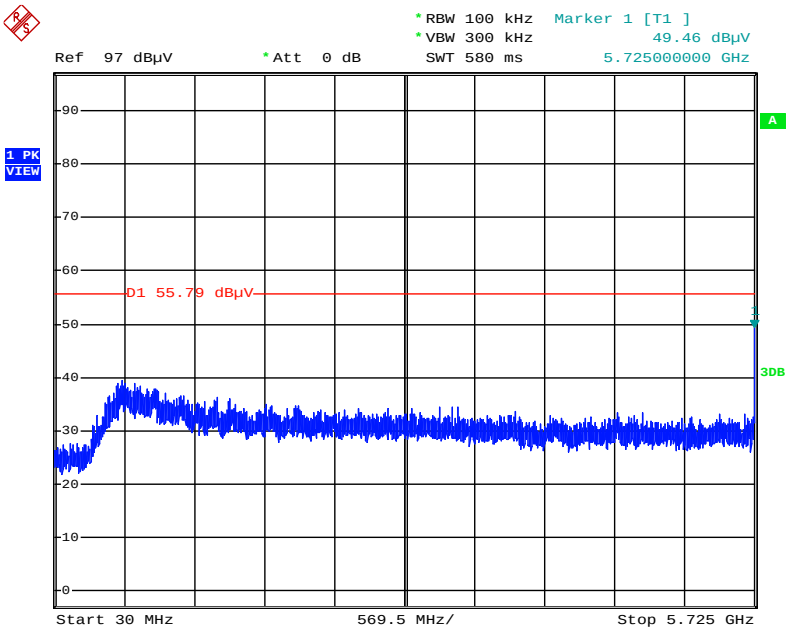
For 2TX

Plot on Configuration IEEE 802.11a / Reference Level



Date: 27.NOV.2014 01:55:18

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



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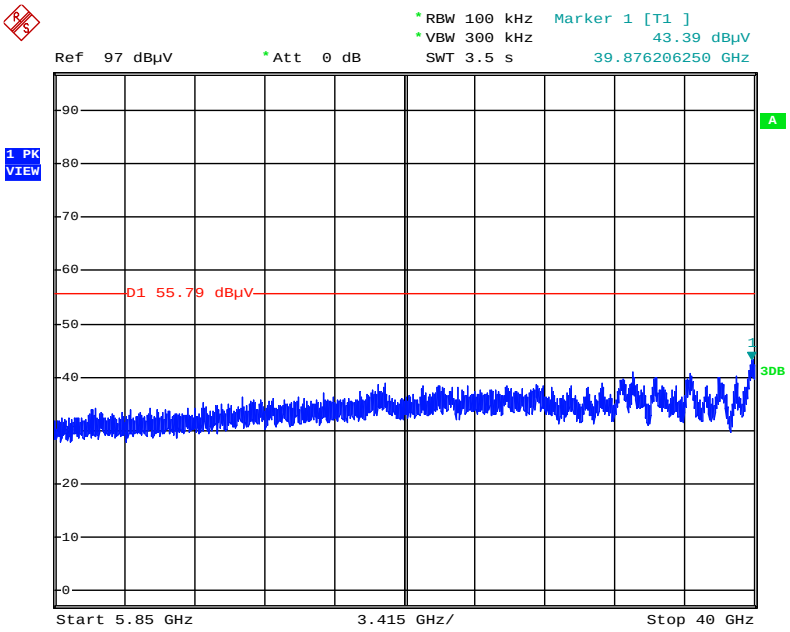
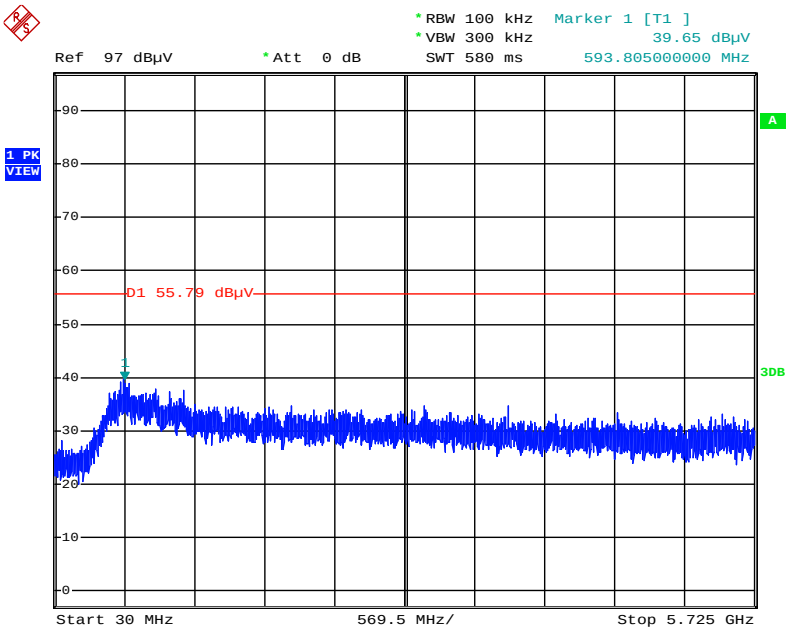
Plot on Configuration IEEE 802.11a / CH 149 / 5850MHz~40000MHz (down 30dBc)



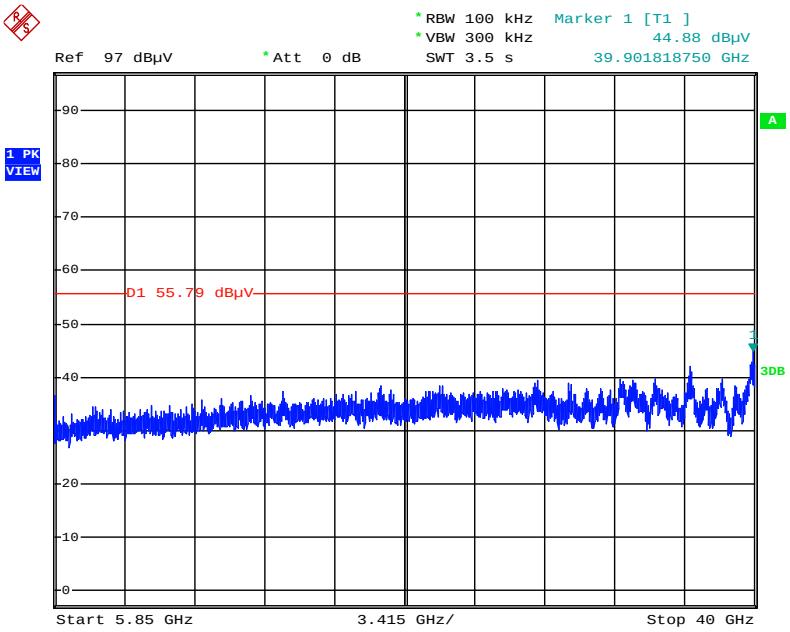
Date: 27.NOV.2014 01:59:50

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



Date: 27.NOV.2014 01:57:41

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

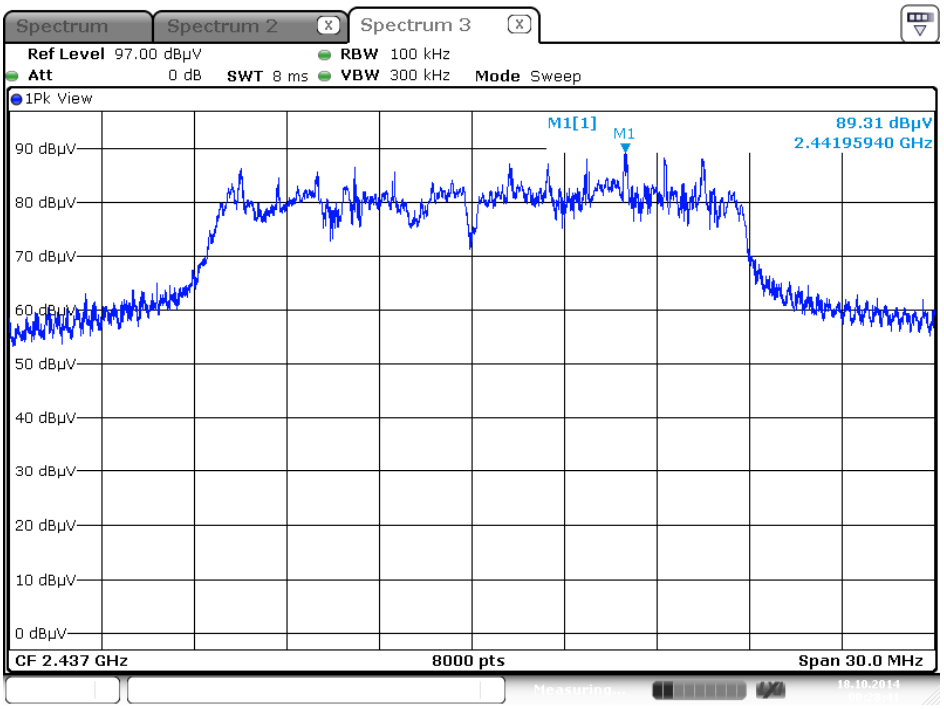


Date: 27.NOV.2014 01:58:23

<For beamforming mode>

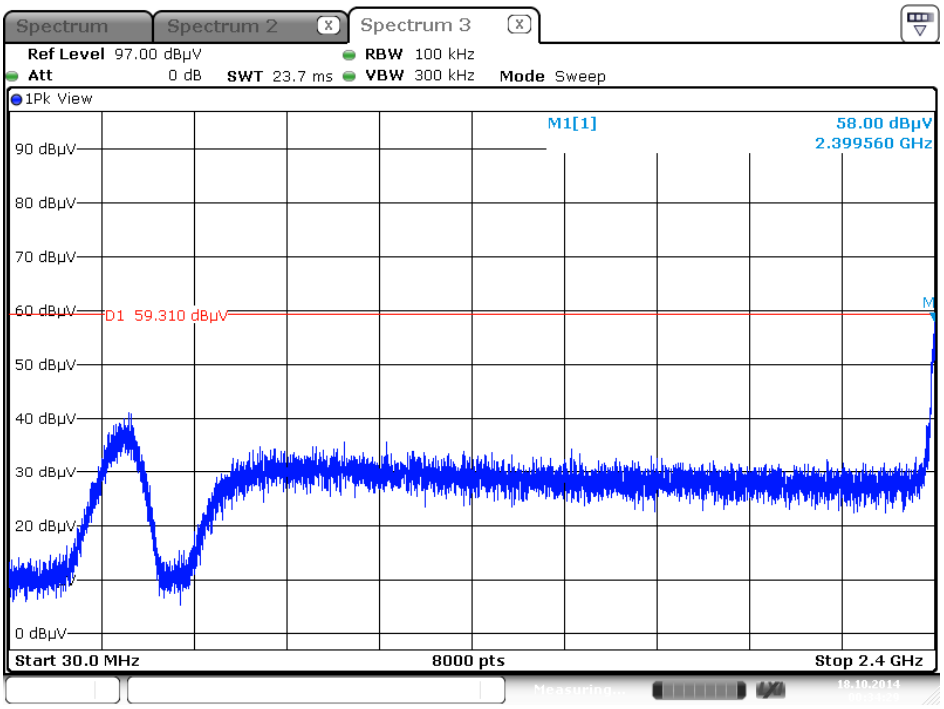
For 2.4GHz Band

Plot on Configuration IEEE 802.11n MCS0 HT20 / Reference Level



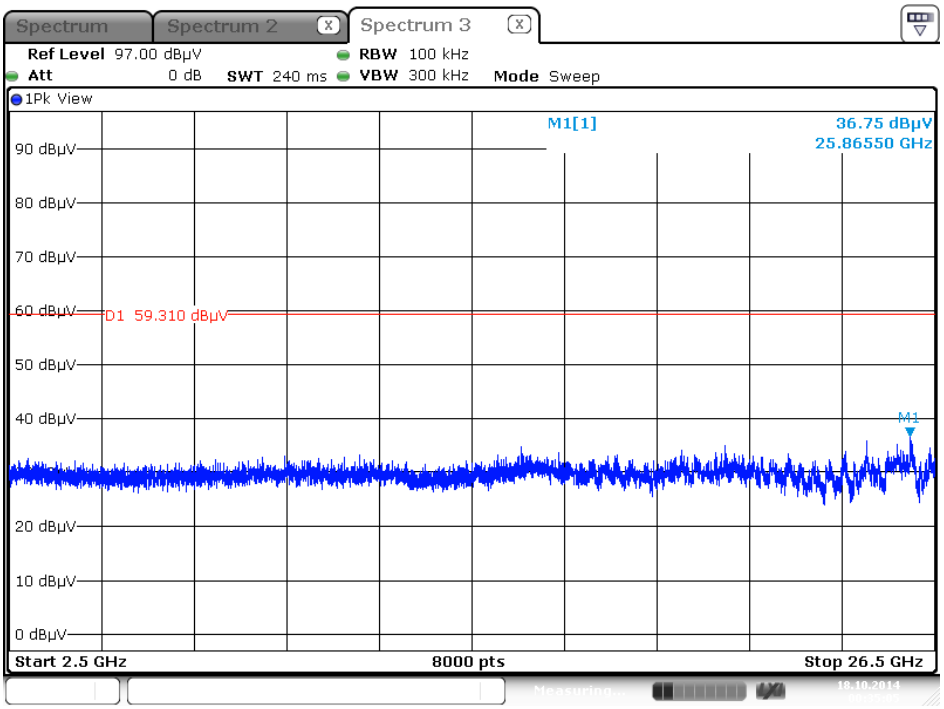
Date: 18.OCT.2014 00:28:41

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



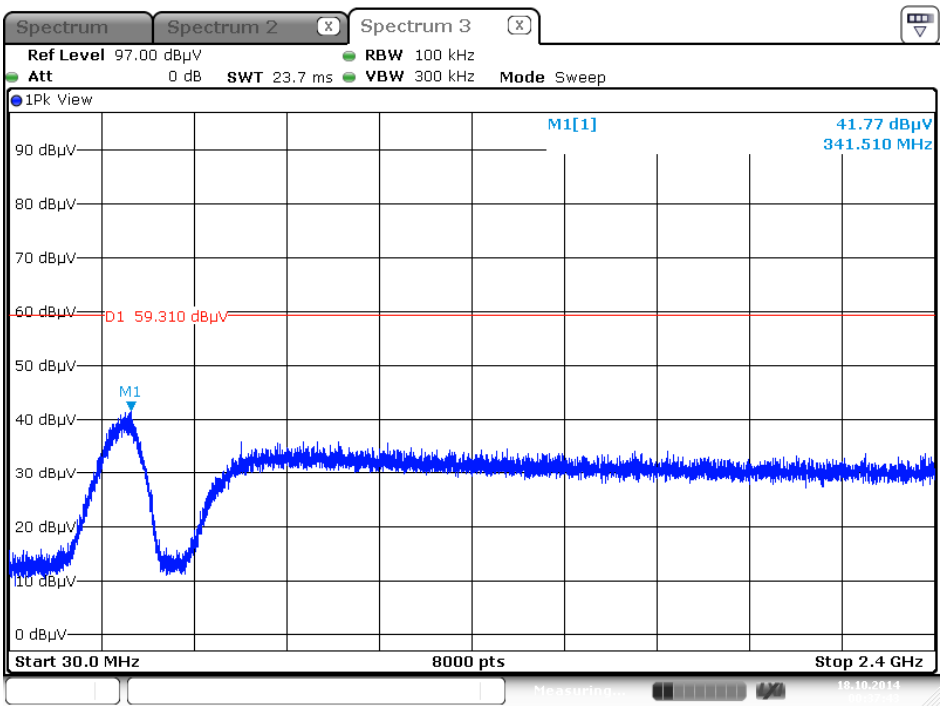
Date: 18.OCT.2014 00:34:30

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



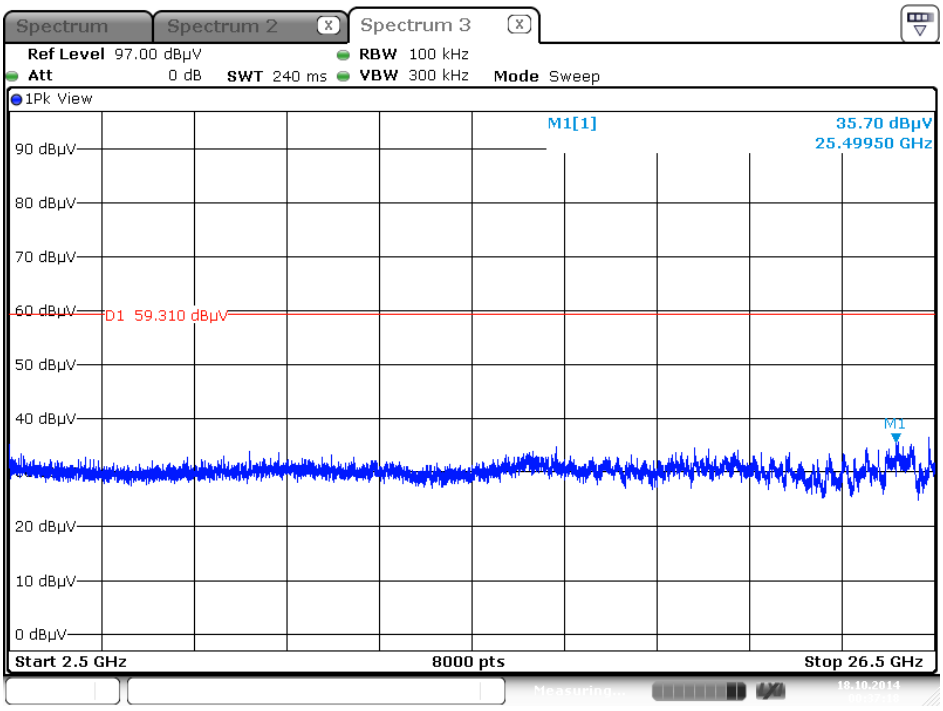
Date: 18.OCT.2014 00:35:05

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



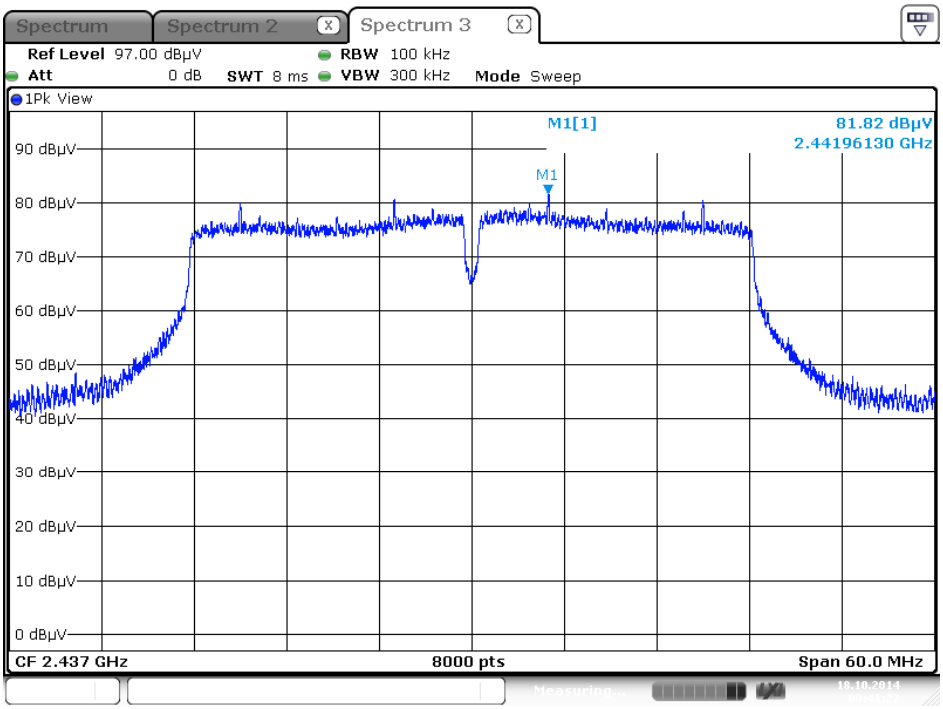
Date: 18.OCT.2014 00:37:44

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



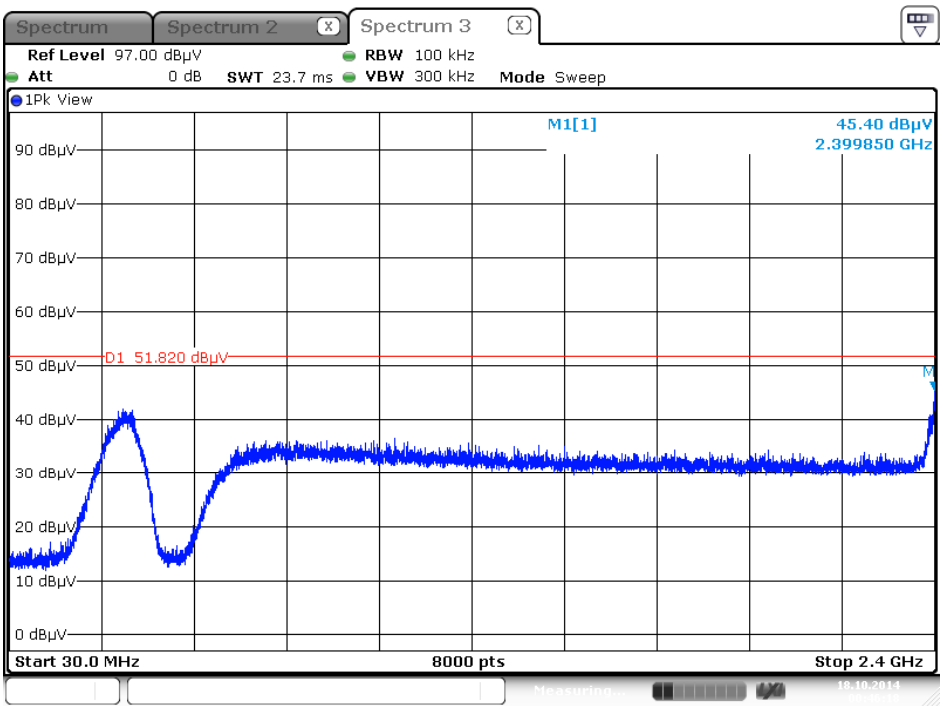
Date: 18.OCT.2014 00:37:18

Plot on Configuration IEEE 802.11n MCS0 HT40 / Reference Level



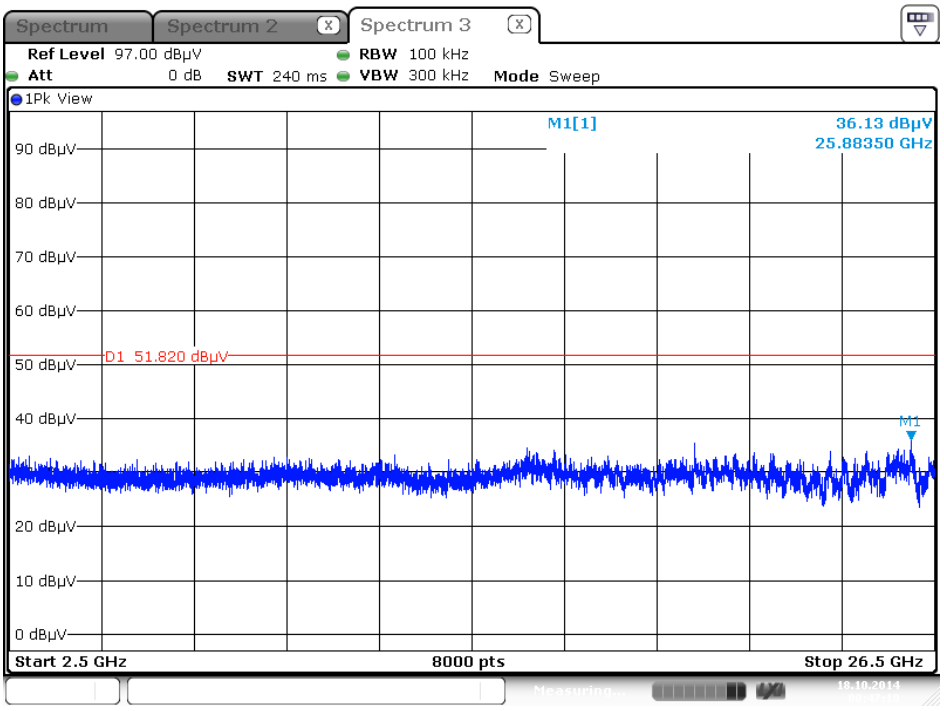
Date: 18.OCT.2014 00:41:22

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



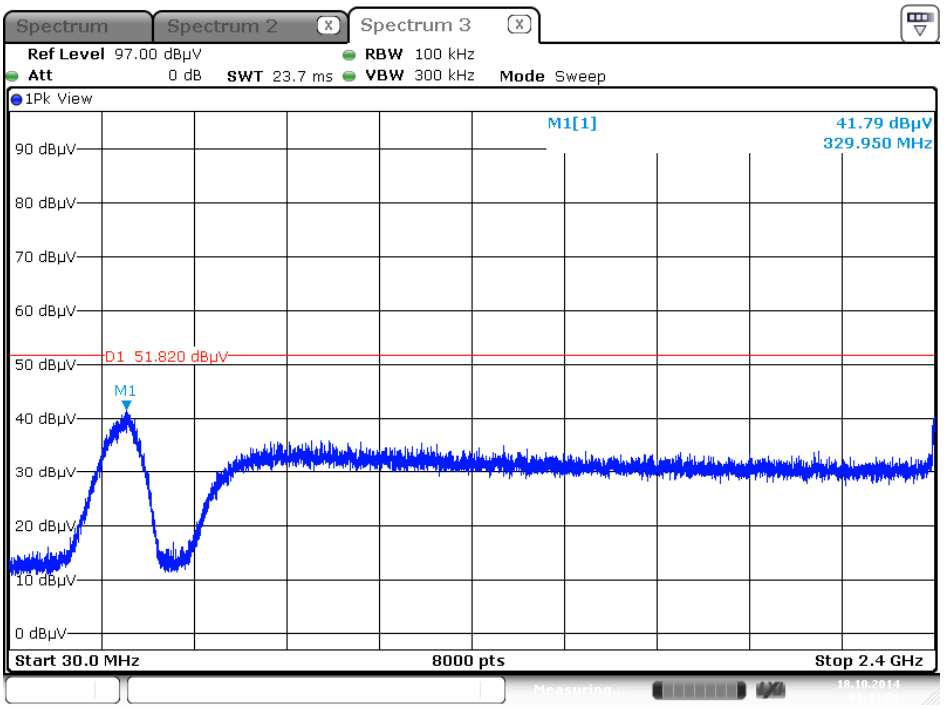
Date: 18.OCT.2014 00:46:18

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



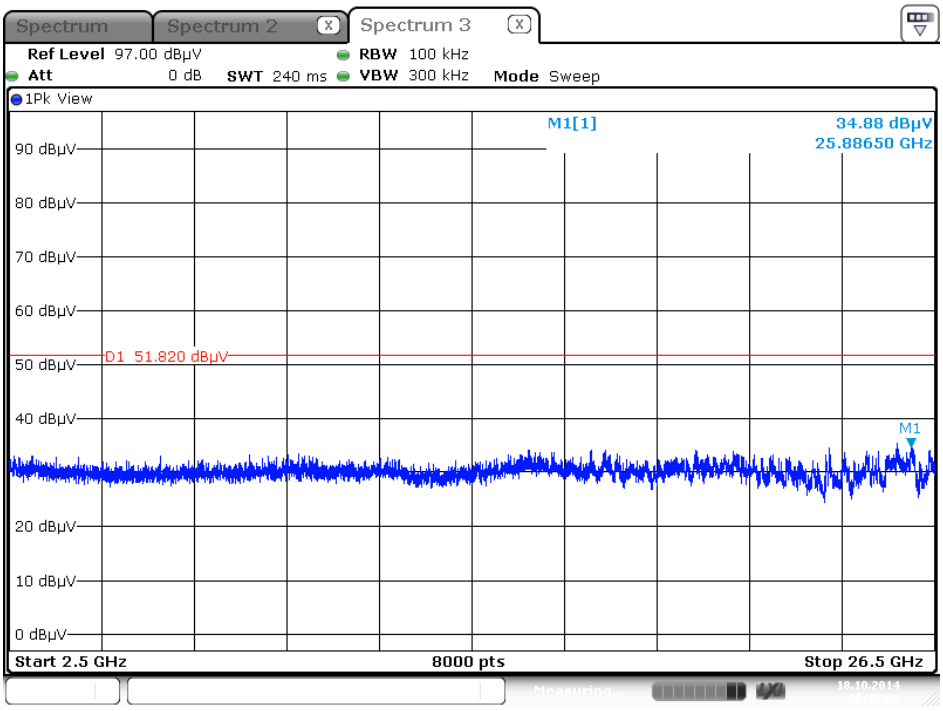
Date: 18.OCT.2014 00:47:10

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



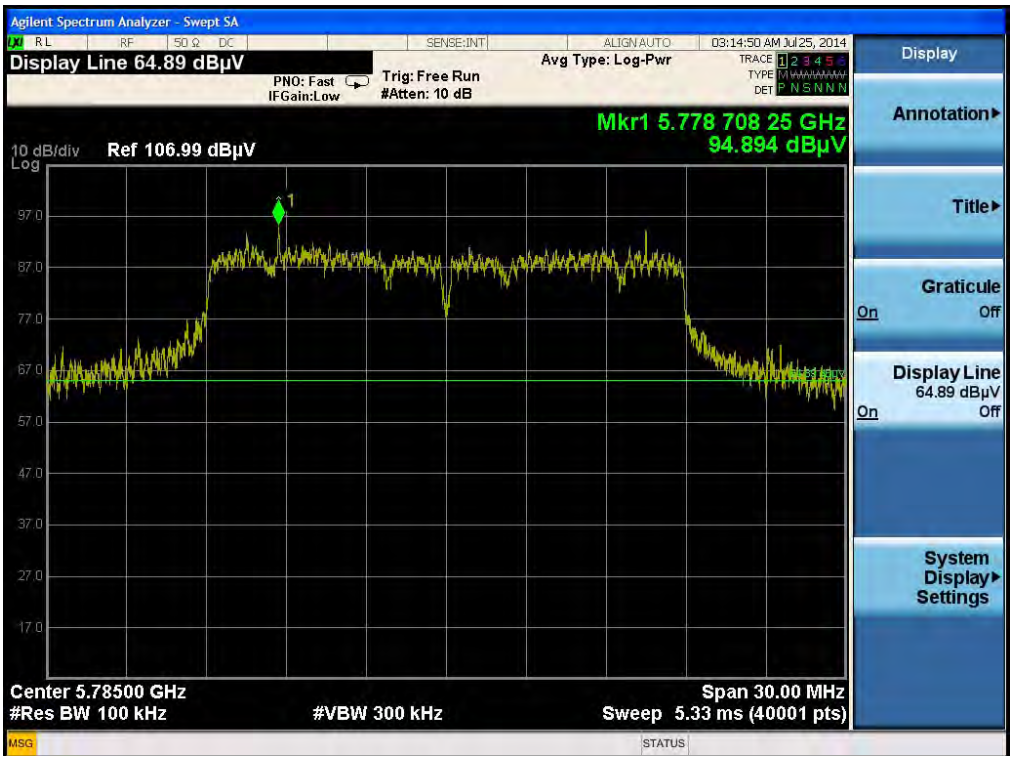
Date: 18.OCT.2014 01:43:02

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

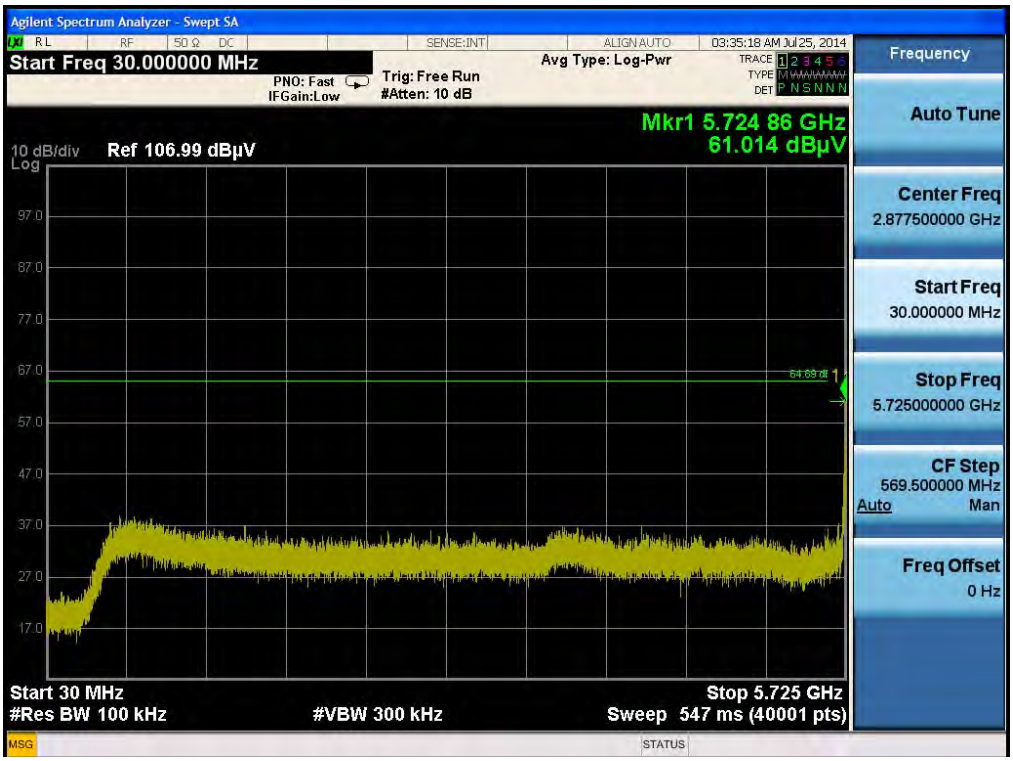


For 5GHz Band

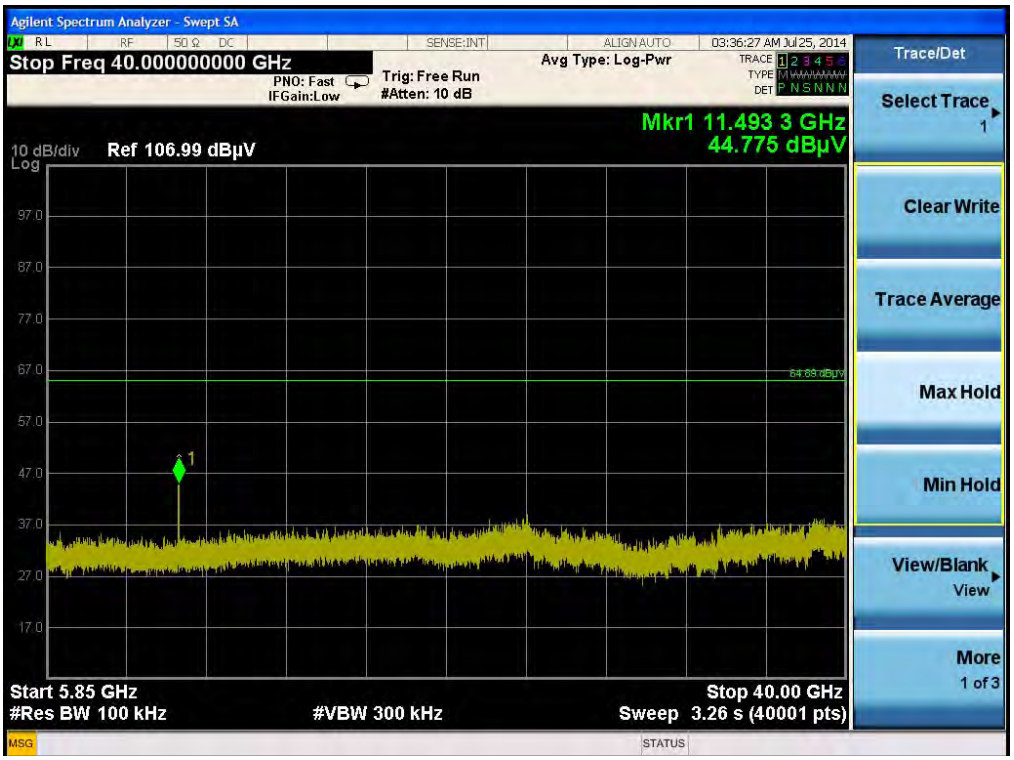
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Reference Level



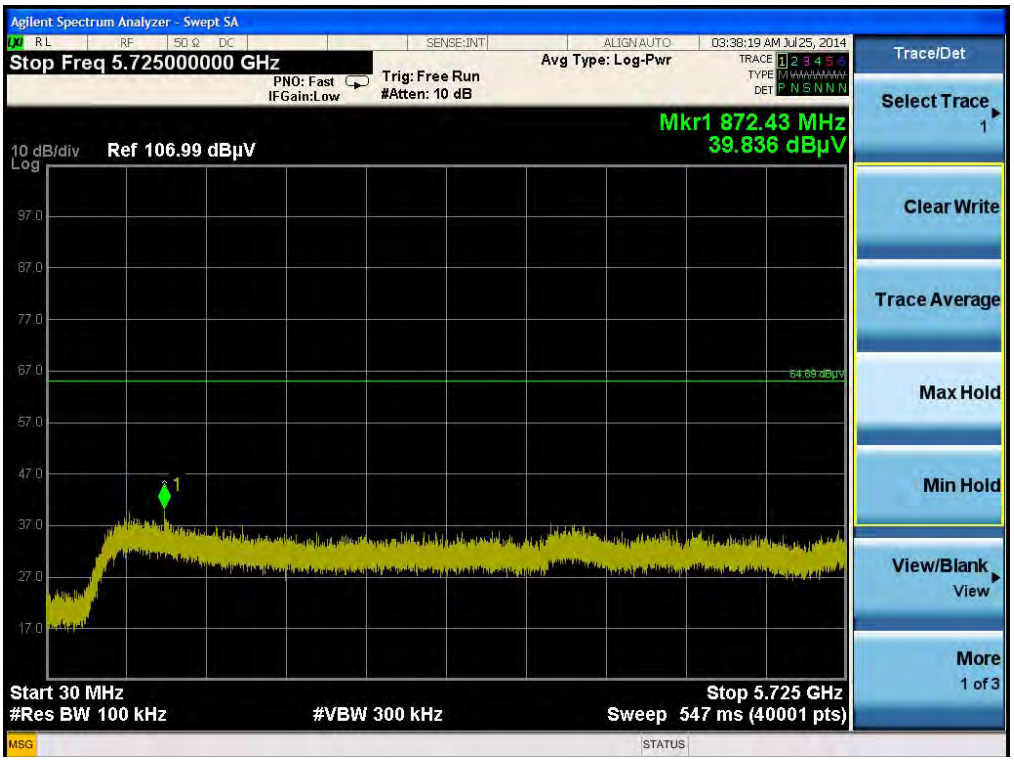
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 149 / 30MHz~5725MHz (down 30dBc)



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

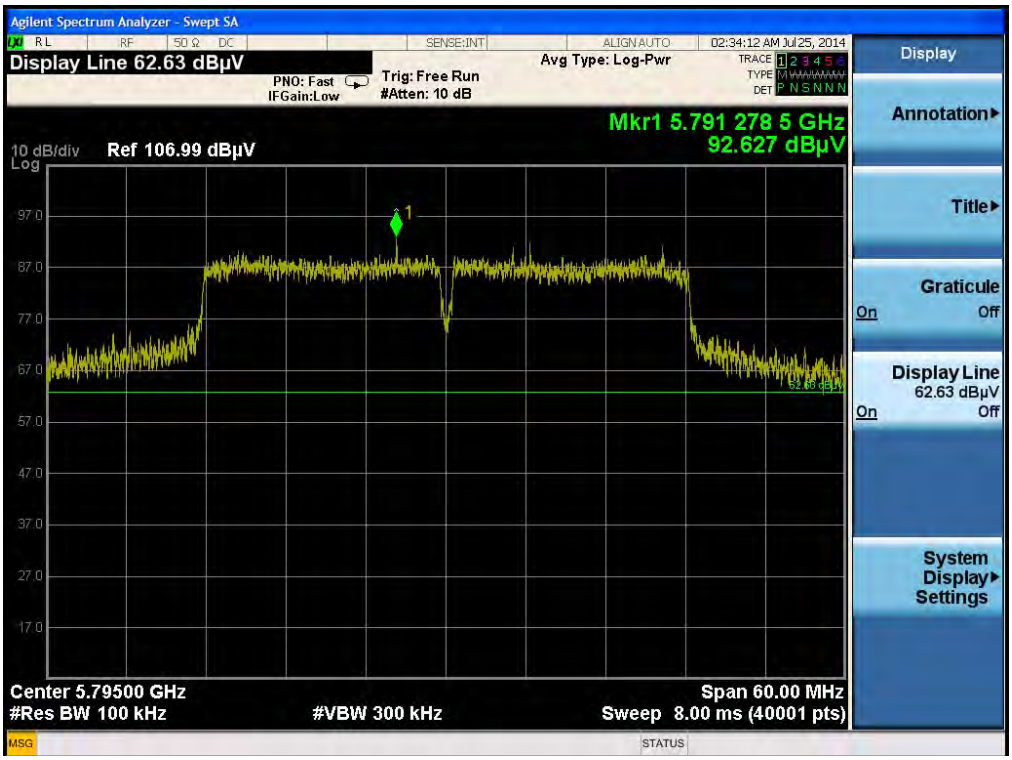


Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 165 / 30MHz~5725MHz (down 30dBc)

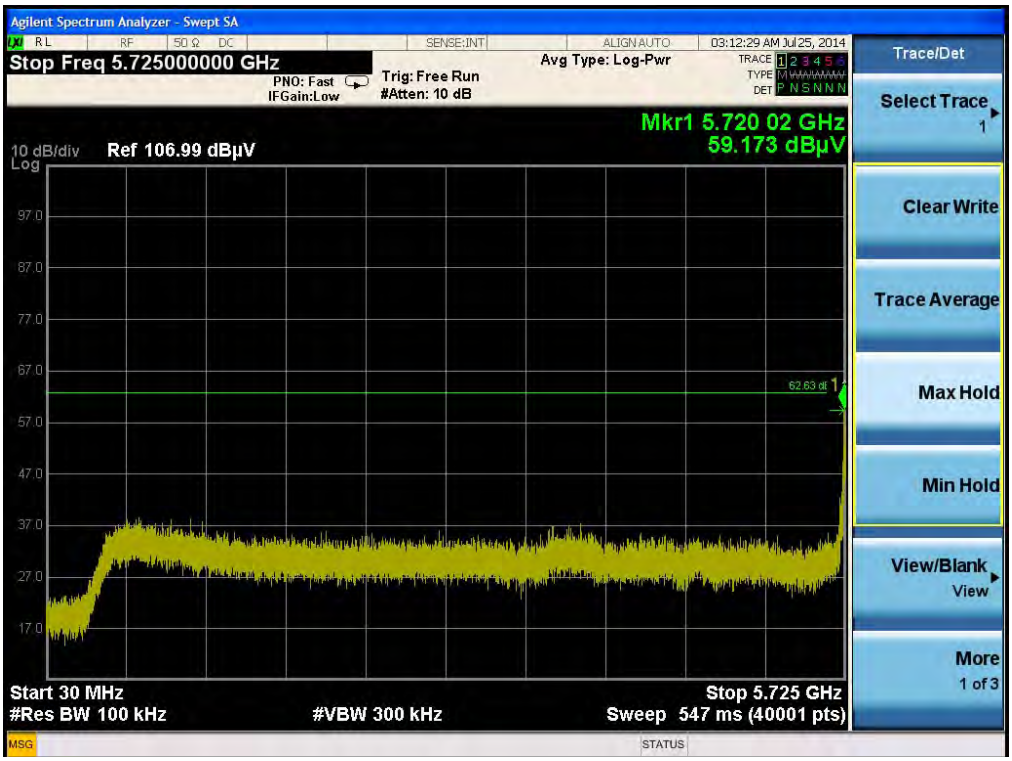


Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 165 / 5850MHz~40000MHz (down 30dBc)

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



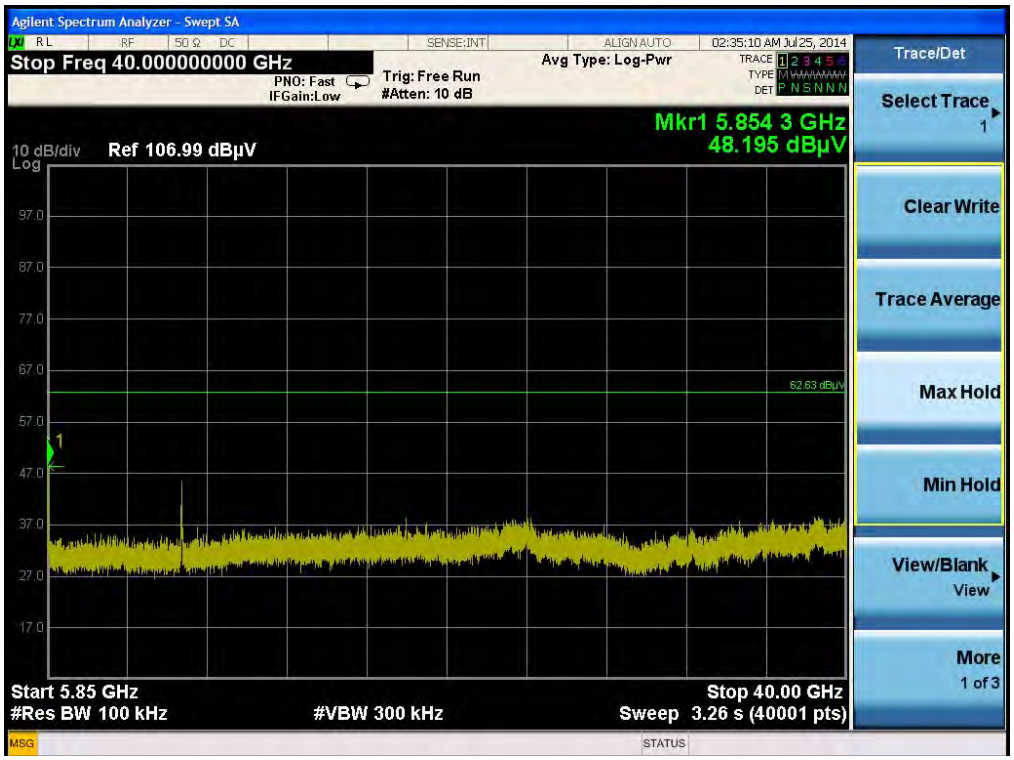
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / CH 151 / 30MHz~5725MHz (down 30dBc)



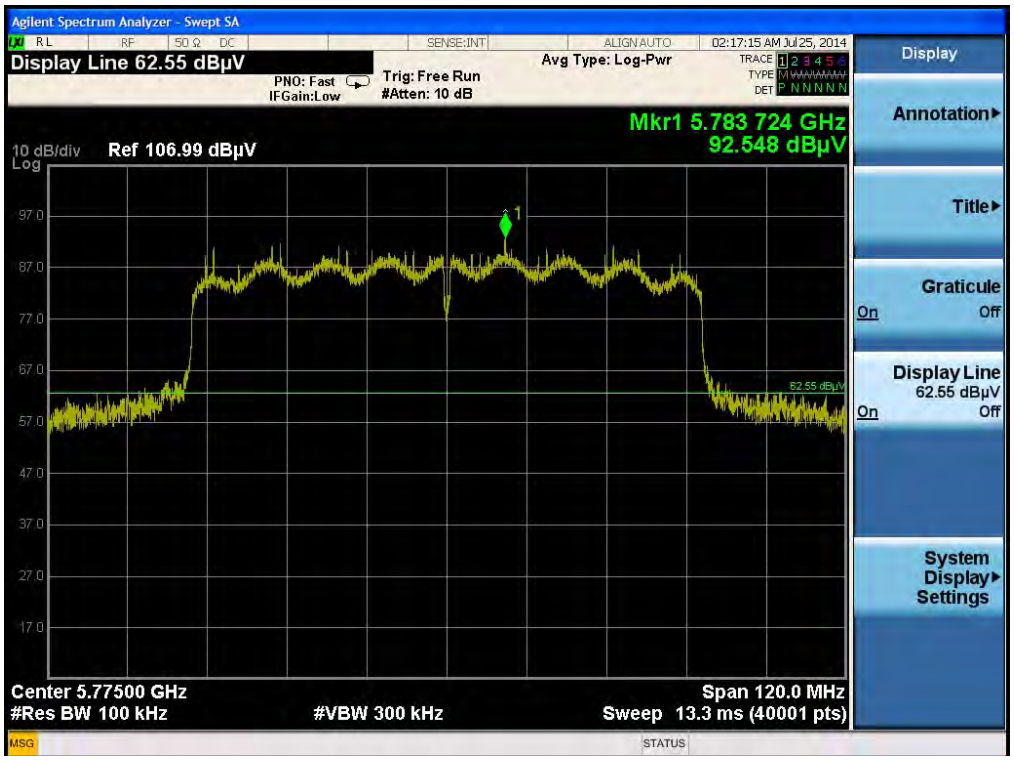
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / CH 151 / 5850MHz~40000MHz (down 30dBc)

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

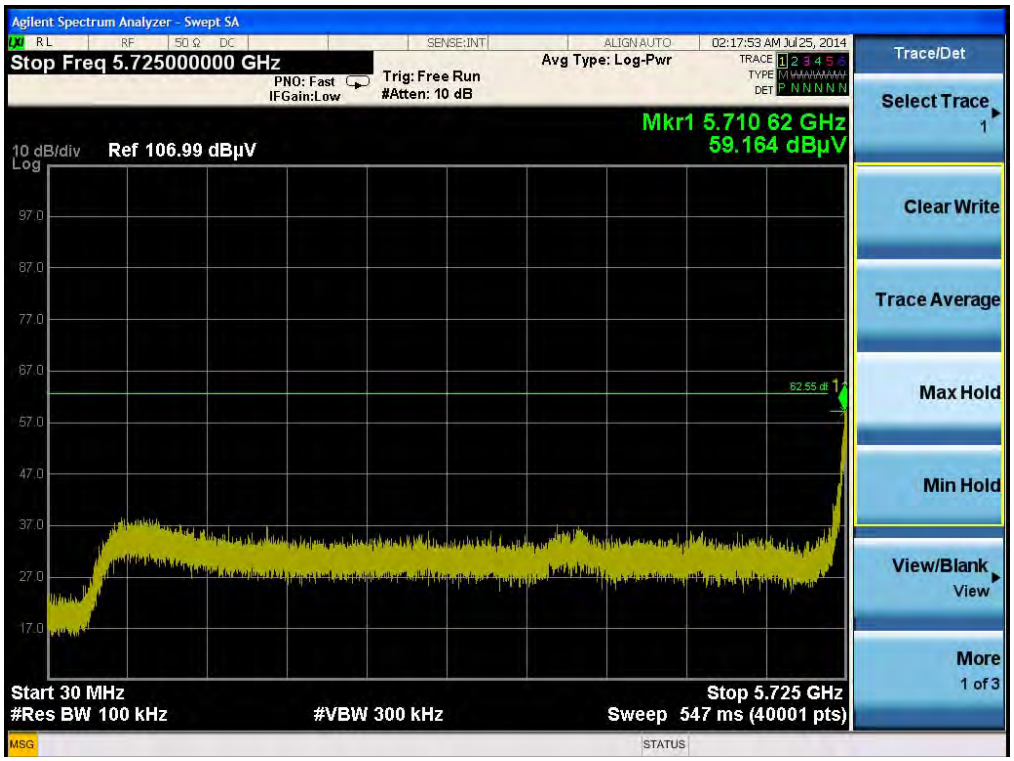
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / CH 159 / 5850MHz~40000MHz (down 30dBc)



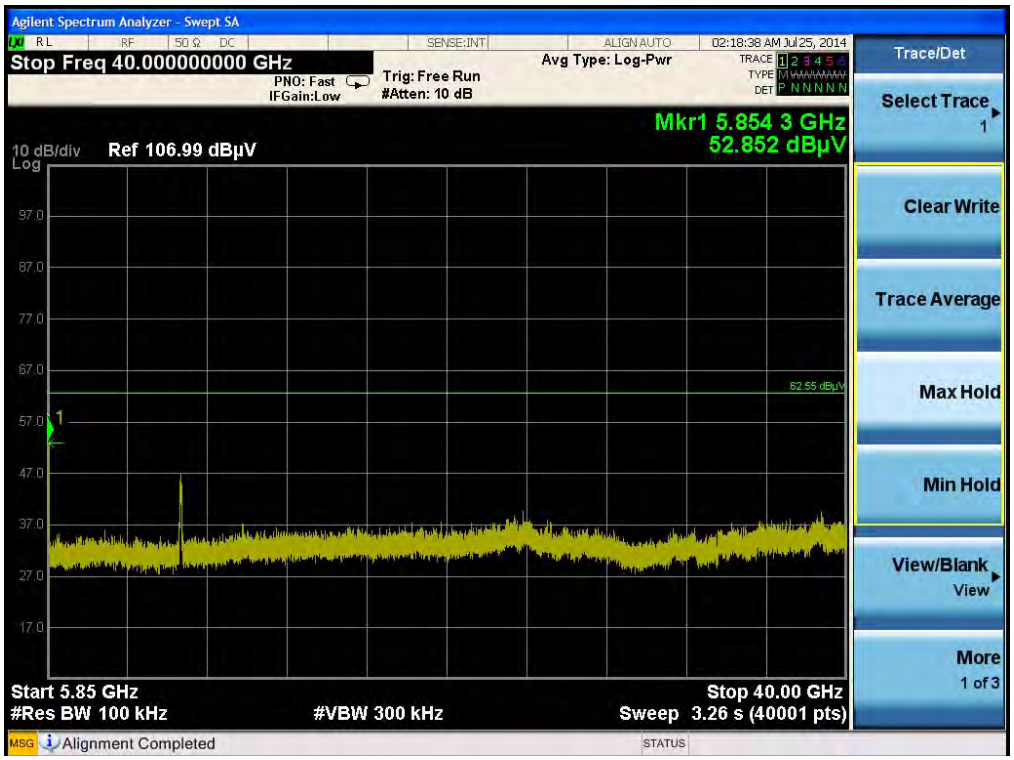
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Reference Level



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



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



4.7. Antenna Requirements

4.7.1. Limit

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

4.7.2. Antenna Connector Construction

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

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 12, 2013	Conduction (CO01-CB)
MXE EMI Receiver	Agilent	N9038A	MY52260140	9kHz ~ 8GHz	Dec. 25, 2013	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Nov. 23, 2013	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Nov. 23, 2013	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 26, 2014	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	EMCO	3115	00075790	750MHz~18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Dec. 17, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	--	26GHz ~ 40GHz	Feb. 17, 2014	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-HG	1864479	18GHz ~ 40GHz	Apr. 22, 2014	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	CO 2000	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. 15, 2014	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-3	N/A	1 GHz - 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	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. 15, 2014	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
Signal analyzer	R&S	FSV40	101026	9kHz~40GHz	Aug. 28, 2014	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Conducted (TH01-CB)
Signal analyzer	Agilent	N9010A	MY52220519	10Hz~44GHz	Dec. 11, 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-7	-	1 GHz – 26.5 GHz	Nov. 15, 2014	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-8	-	1 GHz – 26.5 GHz	Nov. 15, 2014	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-9	-	1 GHz – 26.5 GHz	Nov. 15, 2014	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-10	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Agilent	E9327A	US40442088	50MHz~18GHz	Dec. 02, 2013	Conducted (TH01-CB)
Power Meter	Agilent	E4416A	GB41291199	50MHz~18GHz	Dec. 02, 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

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	2.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%