SPORTON International Inc.
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FCC RADIO TEST REPORT

Applicant's company	**ASUSTeK COMPUTER INC.**
Applicant Address	4F, No. 150, Li-Te Rd., Peitou, Taipei 112, Taiwan
FCC ID	**MSQ-EAAC87**
Manufacturer's company	**Compal Networking (KunShan) Co., LTD.**
Manufacturer Address	No. 520, Nabbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China

Product Name	EA-AC87 Wireless-AC1800 Gigabit Access Point / Media Bridge
Brand Name	ASUS
Model No.	EA-AC87
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	5725 ~ 5850MHz
Received Date	May 05, 2014
Final Test Date	Aug. 05, 2014
Submission Type	Original Equipment

Statement

Test result included is only for the IEEE 802.11n, 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 C63.10-2009**, **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
FR450534AA	Rev. 01	Initial issue of report	Aug. 27, 2014

Certificate No.: CB10308010

1. CERTIFICATE OF COMPLIANCE

Product Name	:	EA-AC87 Wireless-AC1800 Gigabit Access Point / Media Bridge
Brand Name	:	ASUS
Model No.	:	EA-AC87
Applicant	:	ASUSTeK COMPUTER INC.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart C § 15.247

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on May 05, 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	8.97 dB
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	1.02 dB
4.3	15.247(e)	Power Spectral Density	Complies	5.57 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	4.00 dB
4.6	15.247(d)	Band Edge Emissions	Complies	-
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

IEEE 802.11n/ac

Items	Description
Product Type	WLAN (4TX, 4RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	see the below table for IEEE 802.11n/ac
Data Modulation	For 802.11n: OFDM (BPSK / QPSK / 16QAM / 64QAM) For 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	see the below table for IEEE 802.11n/ac
Frequency Range	5725 ~ 5850MHz
Channel Number	5 for 20MHz bandwidth ; 2 for 40MHz bandwidth ; 1 for 80MHz bandwidth
Channel Band Width (99%)	**For non-beamforming mode** 802.11ac MCS0/Nss1 (VHT20): 16.96 MHz ; 802.11ac MCS0/Nss1 (VHT40): 35.20 MHz ; 802.11ac MCS0/Nss1 (VHT80): 76.16 MHz **For beamforming mode** 802.11ac MCS0/Nss1 (VHT20): 17.84 MHz ; 802.11ac MCS0/Nss1 (VHT40): 36.32 MHz ; 802.11ac MCS0/Nss1 (VHT80): 75.52 MHz
Maximum Conducted Output Power	**For non-beamforming mode** 802.11ac MCS0/Nss1 (VHT20): 28.86 dBm ; 802.11ac MCS0/Nss1 (VHT40): 28.64 dBm ; 802.11ac MCS0/Nss1 (VHT80): 28.43 dBm **For beamforming mode** 802.11ac MCS0/Nss1 (VHT20): 26.47 dBm ; 802.11ac MCS0/Nss1 (VHT40): 26.14 dBm ; 802.11ac MCS0/Nss1 (VHT80): 26.47 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

IEEE 802.11a

Items	Description
Product Type	WLAN (4TX, 4RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	OFDM for IEEE 802.11a
Data Modulation	OFDM (BPSK / QPSK / 16QAM / 64QAM)
Data Rate (Mbps)	OFDM (6/9/12/18/24/36/48/54)
Frequency Range	5725 ~ 5850MHz
Channel Number	11a: 5
Channel Band Width (99%)	**For non-beamforming mode** 11a: 15.76 MHz
Maximum Conducted Output Power	**For non-beamforming mode** 11a: 28.71 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 802.11ac VHT20/40/80.

Antenna and Band width

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

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	4	MCS0-31
802.11n (HT40)	4	MCS0-31
802.11ac (VHT20)	4	MCS 0-9/Nss1-4
802.11ac (VHT40)	4	MCS 0-9/Nss1-4
802.11ac (VHT80)	4	MCS 0-9/Nss1-4
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT support HT20 and HT40. Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT support VHT20, VHT40 and VHT80. Note 3: Modulation modes consist of below configuration: HT20/HT40: IEEE 802.11n, VHT20/VHT40/VHT80: IEEE 802.11ac		

3.2. Accessories

Power	Brand	Model	Rating
Adapter 1	CWT	CAP018121	INPUT: 100-240V, 47-63Hz 0.6A OUTPUT: 12V, 1.5A
Adapter 2	LEI	MU18-R120150-A1	INPUT: 100-240V, 50/60Hz 0.6A OUTPUT: 12V, 1.5A
Others			
RJ-45 Cable*1, Non-Shield, 1.5m			

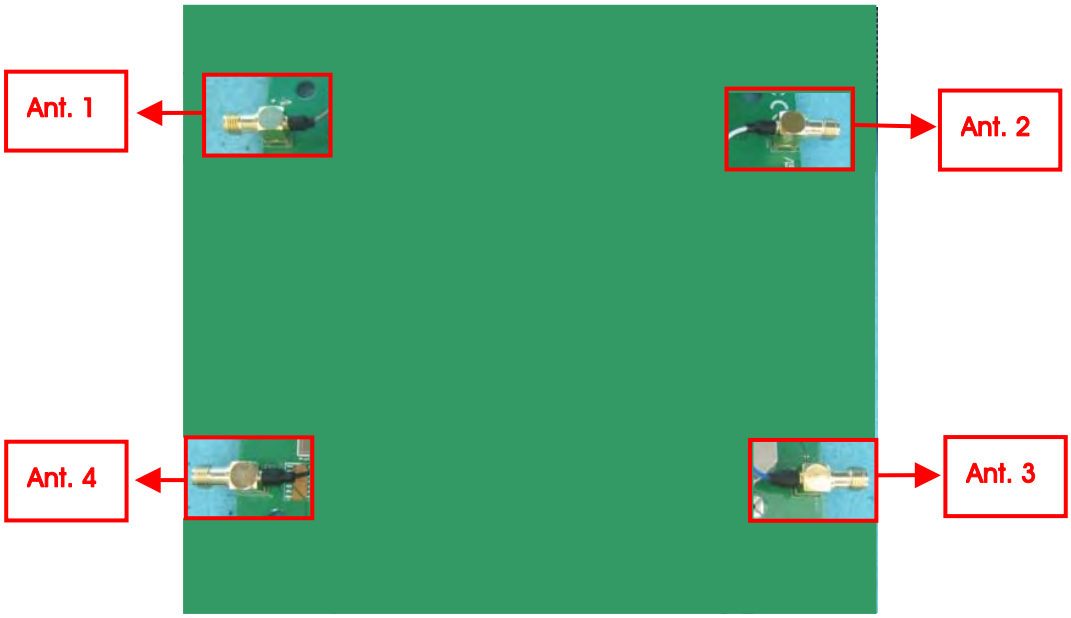
3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
1	PSA	RFDPA801000SB5B802	Dipole Antenna	Reversed-SMA	5GHz B1	1.81
					5GHz B4	2.49
2	PSA	RFDPA801000SB5B802	Dipole Antenna	Reversed-SMA	5GHz B1	1.81
					5GHz B4	2.49
3	PSA	RFDPA801000SB5B802	Dipole Antenna	Reversed-SMA	5GHz B1	1.81
					5GHz B4	2.49
4	PSA	RFDPA801000SB5B802	Dipole Antenna	Reversed-SMA	5GHz B1	1.81
					5GHz B4	2.49

Note:

For IEEE 802.11a/n/ac mode (4TX/4RX):

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



3.4. Table for Carrier Frequencies

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.

Test Items	Mode	Data Rate	Channel	Antenna
AC Power Line Conducted Emissions	CTX	-	-	-
Maximum Conducted Output Power	**For non-beamforming mode**			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
	For beamforming mode			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
Power Spectral Density	**For non-beamforming mode**			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
	For beamforming mode			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
6dB Spectrum Bandwidth	**For non-beamforming mode**			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
	For beamforming mode			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4

Radiated Emissions Below 1GHz	CTX	-	-	-
Radiated Emissions Above 1GHz	**For non-beamforming mode**			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
	For beamforming mode			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
Band Edge Emissions	**For non-beamforming mode**			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4
	For beamforming mode			
	11ac VHT20	MCS0/Nss1	149/157/165	1+2+3+4
	11ac VHT40	MCS0/Nss1	151/159	1+2+3+4
	11ac VHT80	MCS0/Nss1	155	1+2+3+4

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

The following test modes were performed for all tests:

For Conducted Emission test:

Mode 1: CTX-EUT + Adapter 1

Mode 2: CTX-EUT + Adapter 2

Mode 1 generated the worst test result, so it was recorded in this report.

For Radiated Emission Below test:

The EUT was performed at X axis, Y axis and Z axis position for Radiated emission above 1GHz test, and the worst case was found at Y axis. So the measurement will follow this same test configuration.

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: 03CH01-CB (non-beamforming mode)

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	DoC

For Test Site No: 03CH01-CB (beamforming mode)

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6220	DoC
Notebook	DELL	E6220	DoC
WLAN ac Dongle	Netgear	A6200	PY31220200

For Test Site No: CO01-CB and TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E6430	DoC

3.8. Table for Parameters of Test Software Setting

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

For non-beamforming mode:

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT20

Test Software Version	DOS		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0/Nss1 VHT20	23	23	24

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT40

Test Software Version	DOS	
Frequency	5755 MHz	5795 MHz
MCS0/Nss1 VHT40	23	23

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT80

Test Software Version	DOS
Frequency	5775 MHz
MCS0/Nss1 VHT80	24

Power Parameters of IEEE 802.11a

Test Software Version	DOS		
Frequency	5745 MHz	5785 MHz	5825 MHz
IEEE 802.11a	23	24	25

For beamforming mode:

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT20

Test Software Version	DOS		
Frequency	5745 MHz	5785 MHz	5825 MHz
MCS0/Nss1 VHT20	21	21	21

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT40

Test Software Version	DOS	
Frequency	5755 MHz	5795 MHz
MCS0/Nss1 VHT40	20	20

Power Parameters of IEEE 802.11ac MCS0/Nss1 VHT80

Test Software Version	DOS
Frequency	5775 MHz
MCS0/Nss1 VHT80	21

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:

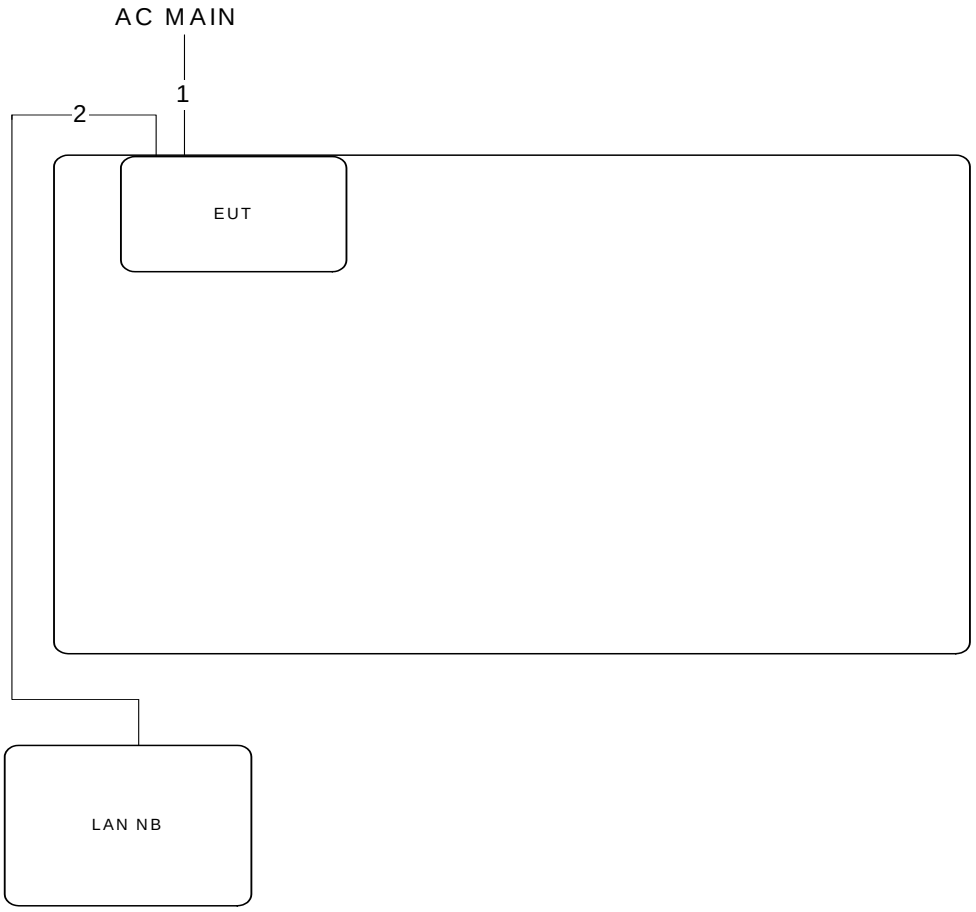
1. During the test, the EUT operation to normal function.
2. Executed command fixed test channel under DOS.
3. Executed "Lantest.exe " to link with the remote workstation to receive and transmit packet by WLAN ac Dongle and transmit duty cycle no less 98%

3.10. Duty Cycle

Mode	On Time(ms)	On+Off Time(ms)	Duty Cycle(%)	1/T Minimum VBW (kHz)
802.11ac MCS0/Nss1 VHT20	12.390	12.420	99.76	0.01
802.11ac MCS0/Nss1 VHT40	6.000	6.040	99.34	0.01
802.11ac MCS0/Nss1 VHT80	2.790	2.850	97.89	0.36
802.11a	2.440	2.470	98.79	0.01

3.11. Test Configurations

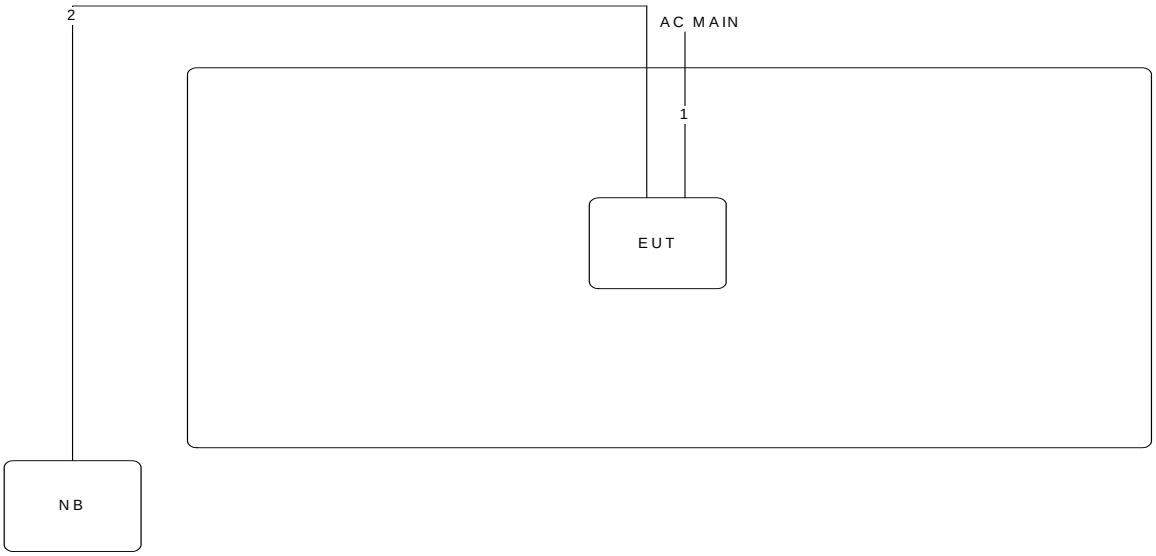
3.11.1. AC Power Line Conduction Test Configuration



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

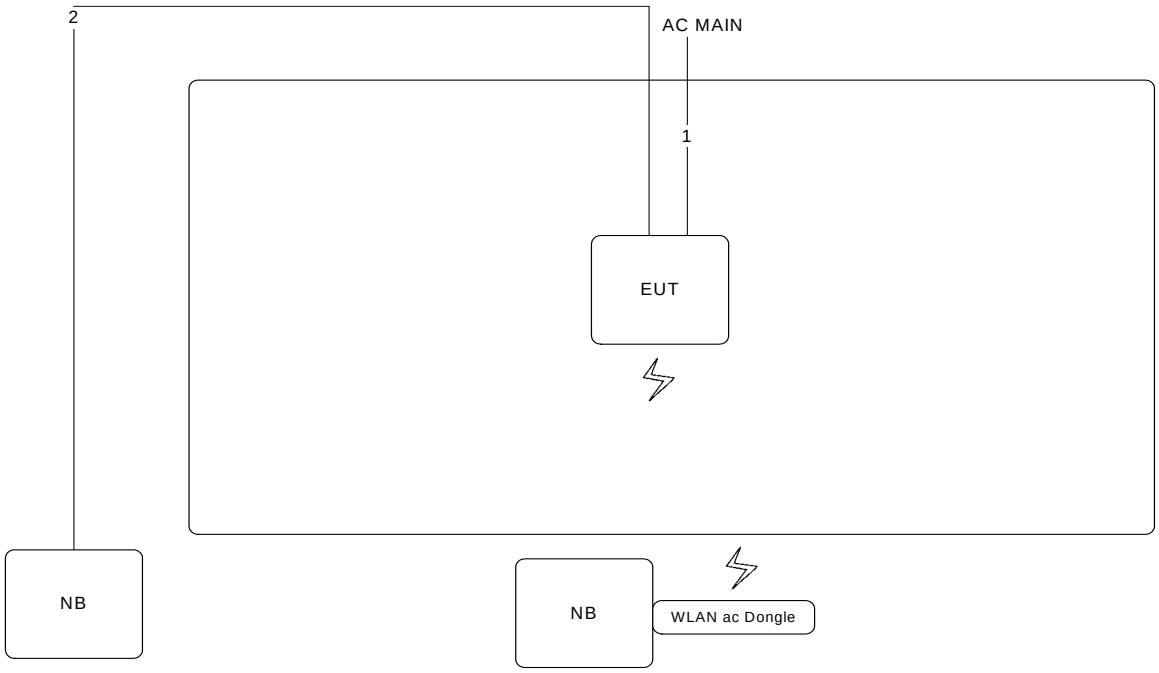
3.11.2. Radiation Emissions Test Configuration

For non-beamforming mode: Test Configuration: below and above 1GHz



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

For beamforming mode: Test Configuration: above 1GHz



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

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

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

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

4.1.2. Measuring Instruments and Setting

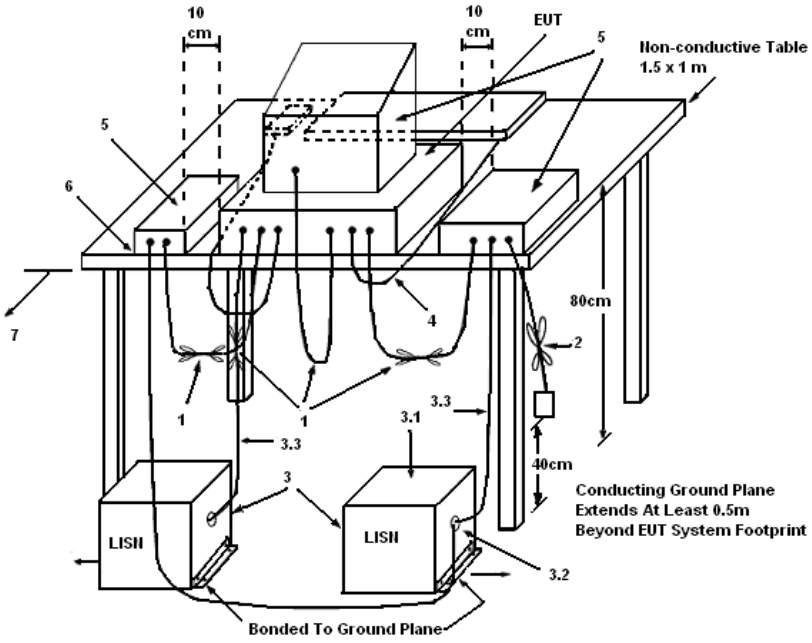
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

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

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

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

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

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

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

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

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

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

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

4.1.5. Test Deviation

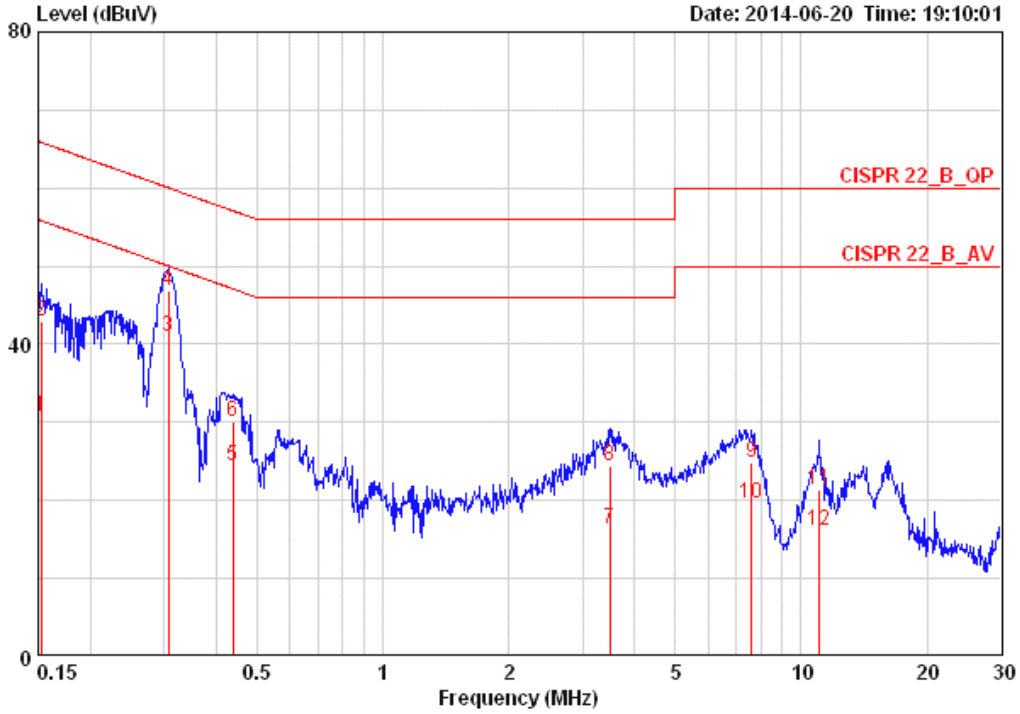
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

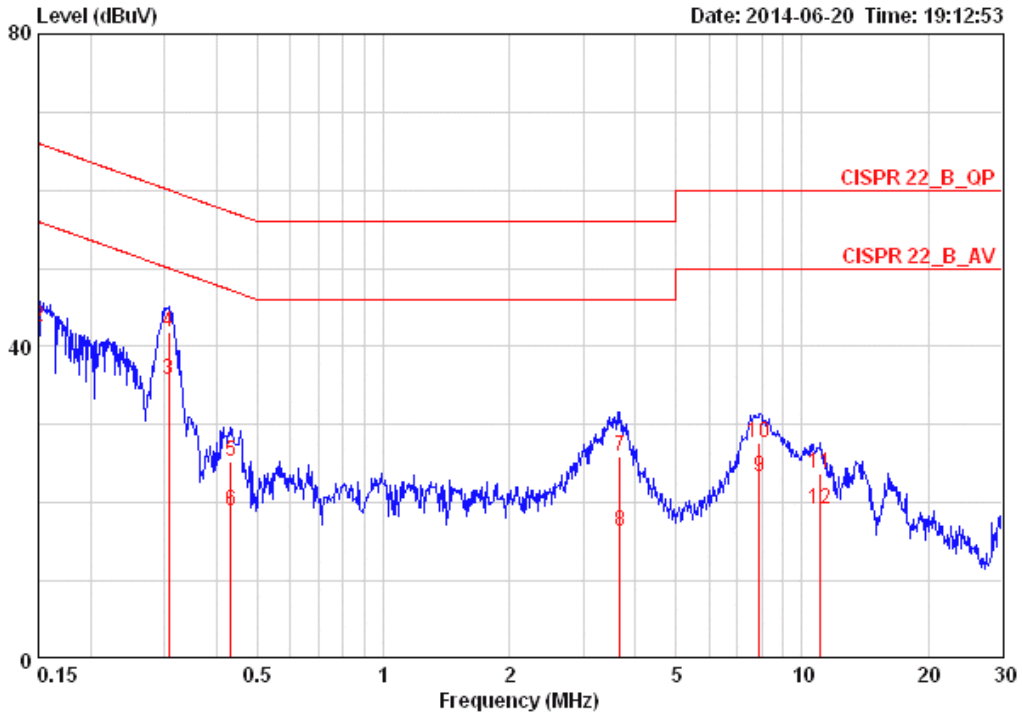
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	23°C	Humidity	47%
Test Engineer	Hank Yang	Phase	Line
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.15240	30.79	-25.08	55.87	0.08	30.55	0.16	LINE	AVERAGE
2	0.15240	42.84	-23.03	65.87	0.08	42.60	0.16	LINE	QP
3 @	0.30671	41.08	-8.97	50.06	0.08	40.83	0.17	LINE	AVERAGE
4	0.30671	46.77	-13.28	60.06	0.08	46.52	0.17	LINE	QP
5	0.43742	24.44	-22.67	47.11	0.08	24.18	0.18	LINE	AVERAGE
6	0.43742	30.10	-27.01	57.11	0.08	29.84	0.18	LINE	QP
7	3.491	16.27	-29.73	46.00	0.14	15.84	0.29	LINE	AVERAGE
8	3.491	24.49	-31.51	56.00	0.14	24.06	0.29	LINE	QP
9	7.606	24.79	-35.21	60.00	0.22	24.22	0.36	LINE	QP
10	7.606	19.66	-30.34	50.00	0.22	19.09	0.36	LINE	AVERAGE
11	11.080	21.35	-38.65	60.00	0.27	20.69	0.39	LINE	QP
12	11.080	16.09	-33.91	50.00	0.27	15.43	0.39	LINE	AVERAGE

Temperature	23°C	Humidity	47%
Test Engineer	Hank Yang	Phase	Neutral
Configuration	CTX	Test Mode	Mode 1



	Freq	Level	Over Limit	Limit Line	LISN Factor	Read Level	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dB	dBuV	dB		
1	0.15000	26.27	-29.73	56.00	0.08	26.03	0.16	NEUTRAL	AVERAGE
2	0.15000	42.48	-23.52	66.00	0.08	42.24	0.16	NEUTRAL	QP
3	0.30671	35.77	-14.29	50.06	0.09	35.51	0.17	NEUTRAL	AVERAGE
4	0.30671	41.94	-18.12	60.06	0.09	41.68	0.17	NEUTRAL	QP
5	0.43281	25.18	-32.02	57.20	0.09	24.91	0.18	NEUTRAL	QP
6	0.43281	19.02	-28.18	47.20	0.09	18.75	0.18	NEUTRAL	AVERAGE
7	3.681	25.84	-30.16	56.00	0.15	25.39	0.29	NEUTRAL	QP
8	3.681	16.44	-29.56	46.00	0.15	15.99	0.29	NEUTRAL	AVERAGE
9	7.893	23.29	-26.71	50.00	0.23	22.70	0.36	NEUTRAL	AVERAGE
10	7.893	27.71	-32.29	60.00	0.23	27.12	0.36	NEUTRAL	QP
11	11.080	23.68	-36.32	60.00	0.27	23.02	0.39	NEUTRAL	QP
12	11.080	19.12	-30.88	50.00	0.27	18.46	0.39	NEUTRAL	AVERAGE

Note:

Level = Read Level + LISN Factor + Cable Loss

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For Systems 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

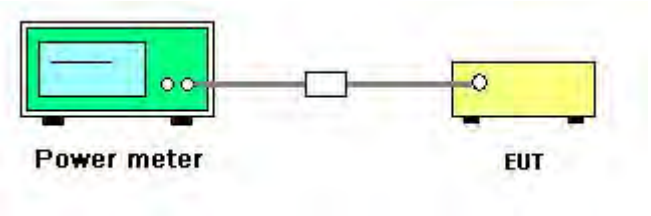
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

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	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a/ac
Test Date	Jun. 17, 2014		

For non-beamforming mode:

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
149	5745 MHz	22.15	22.23	22.17	21.95	28.15	30.00	Complies
157	5785 MHz	22.12	22.24	22.25	21.96	28.16	30.00	Complies
165	5825 MHz	22.94	22.75	22.83	22.82	28.86	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
151	5755 MHz	22.52	22.75	22.74	22.44	28.64	30.00	Complies
159	5795 MHz	22.57	22.64	22.52	22.24	28.52	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
155	5775 MHz	22.45	22.44	22.24	22.5	28.43	30.00	Complies

Configuration IEEE 802.11a

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
149	5745 MHz	22.28	22.24	22.33	21.99	28.23	30.00	Complies
157	5785 MHz	22.37	22.33	22.1	21.93	28.21	30.00	Complies
165	5825 MHz	23.00	22.50	22.63	22.60	28.71	30.00	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac
Test Date	Jun. 17, 2014		

For beamforming mode:

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
149	5745 MHz	20.36	20.19	20.74	20.46	26.46	27.49	Complies
157	5785 MHz	20.41	20.31	20.43	20.45	26.42	27.49	Complies
165	5825 MHz	20.35	20.34	20.58	20.52	26.47	27.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.51dBi >6dBi,So Band4 Limit =30-(8.51-6)=-27.49dBm

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
151	5755 MHz	19.91	19.85	20.18	20.16	26.05	27.49	Complies
159	5795 MHz	20.17	20.04	20.26	20.01	26.14	27.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.51dBi >6dBi,So Band4 Limit =30-(8.51-6)=-27.49dBm

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
155	5775 MHz	20.38	20.52	20.49	20.41	26.47	27.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.51dBi >6dBi,So Band4 Limit =30-(8.51-6)=-27.49dBm

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

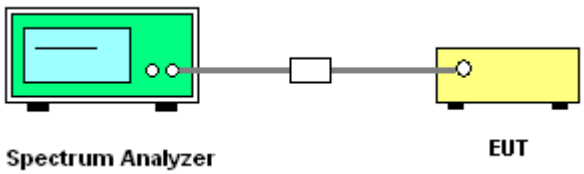
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a/ac

For non-beamforming mode:

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
149	5745 MHz	-5.94	-6.79	-6.17	-5.81	-0.14	5.49	Complies
157	5785 MHz	-6.96	-6.89	-6.70	-6.41	-0.71	5.49	Complies
165	5825 MHz	-6.40	-6.52	-6.07	-5.42	-0.08	5.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.51dBi >6dBi,So Band4 Limit =8-(8.51-6)=5.49dBm/3kHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
151	5755 MHz	-8.87	-8.33	-9.10	-10.36	-3.08	5.49	Complies
159	5795 MHz	-9.26	-9.53	-8.68	-10.45	-3.41	5.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.51dBi >6dBi,So Band4 Limit =8-(8.51-6)=5.49dBm/3kHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
155	5775 MHz	-11.67	-10.29	-7.83	-11.58	-4.02	5.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.51dBi >6dBi,So Band4 Limit =8-(8.51-6)=5.49dBm/3kHz

Configuration IEEE 802.11a

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
149	5745 MHz	-8.08	-7.58	-7.89	-7.82	-1.82	5.49	Complies
157	5785 MHz	-7.38	-8.06	-8.19	-7.89	-1.85	5.49	Complies
165	5825 MHz	-7.43	-7.32	-7.21	-6.72	-1.14	5.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$=8.51dBi >6dBi,So Band4 Limit =8-(8.51-6)=5.49dBm/3kHz

Temperature	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac

For beamforming mode:

Configuration IEEE 802.11ac MCS0/Nss1 VHT20

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
149	5745 MHz	-7.53	-7.40	-7.62	-7.47	-1.48	5.49	Complies
157	5785 MHz	-6.92	-9.04	-7.59	-8.56	-1.93	5.49	Complies
165	5825 MHz	-7.98	-7.77	-7.87	-7.47	-1.75	5.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} 10^{\frac{PSD_{j,k}}{10}}\right\}^2}{N_{ANT}}\right]$ =8.51dBi >6dBi,So Band4 Limit =8-(8.51-6)=5.49dBm/3kHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT40

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
151	5755 MHz	-8.75	-8.05	-11.76	-11.76	-3.73	5.49	Complies
159	5795 MHz	-8.08	-8.39	-11.61	-11.62	-3.58	5.49	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} 10^{\frac{PSD_{j,k}}{10}}\right\}^2}{N_{ANT}}\right]$ =8.51dBi >6dBi,So Band4 Limit =8-(8.51-6)=5.49dBm/3kHz

Configuration IEEE 802.11ac MCS0/Nss1 VHT80

Channel	Frequency	Power Density (dBm/3kHz)					Power Density Limit (dBm/3kHz)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
155	5775 MHz	-8.02	-7.27	-14.01	-14.55	-3.77	5.49	Complies

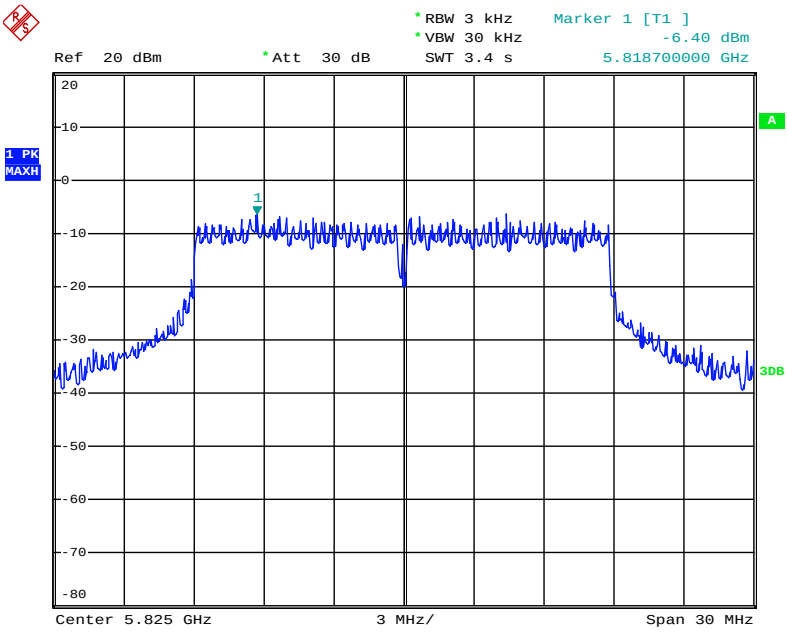
Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} 10^{\frac{PSD_{j,k}}{10}}\right\}^2}{N_{ANT}}\right]$ =8.51dBi >6dBi,So Band4 Limit =8-(8.51-6)=5.49dBm/3kHz

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

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

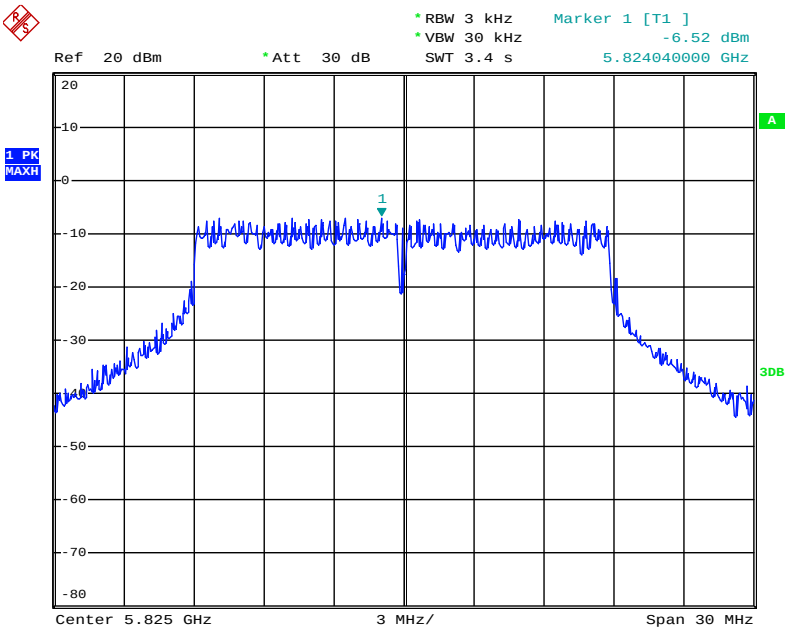
For non-beamforming mode:

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Ant. 1



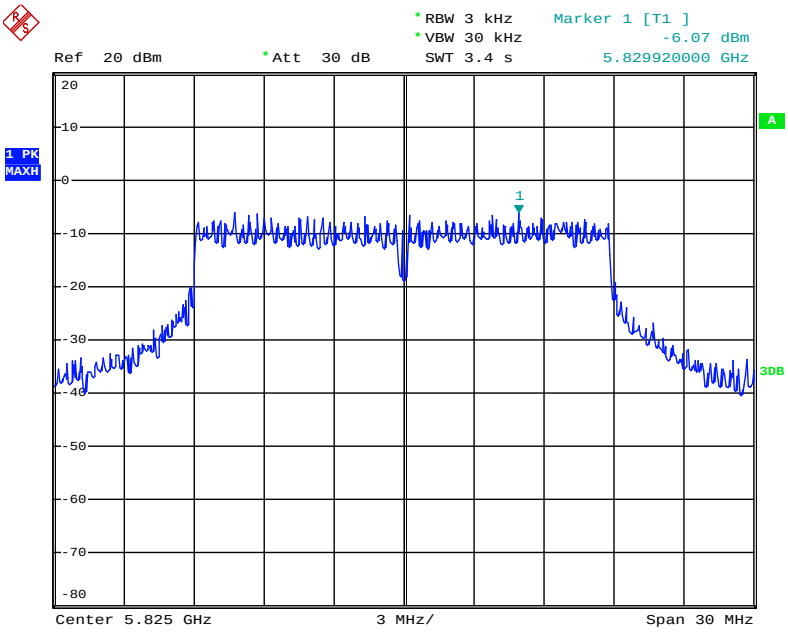
Date: 17.JUN.2014 12:40:06

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Ant. 2



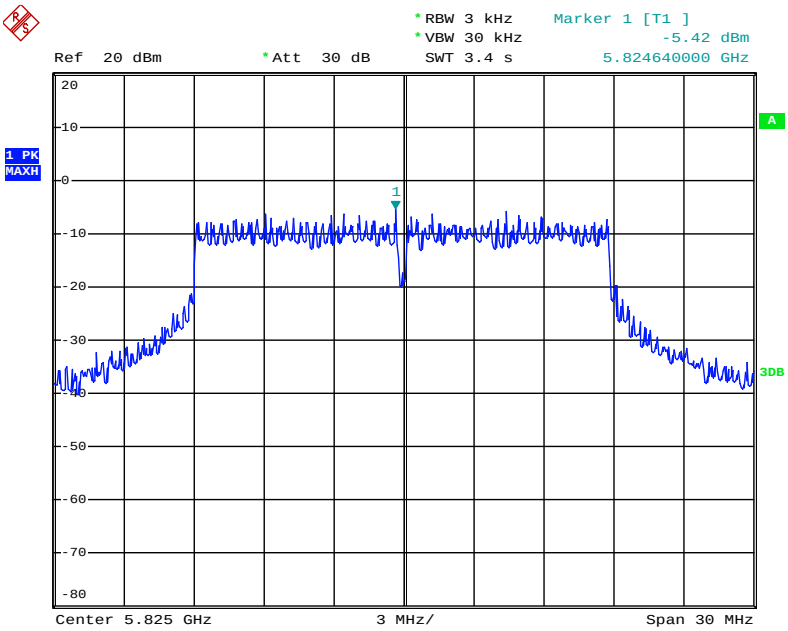
Date: 17.JUN.2014 12:39:01

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Ant. 3



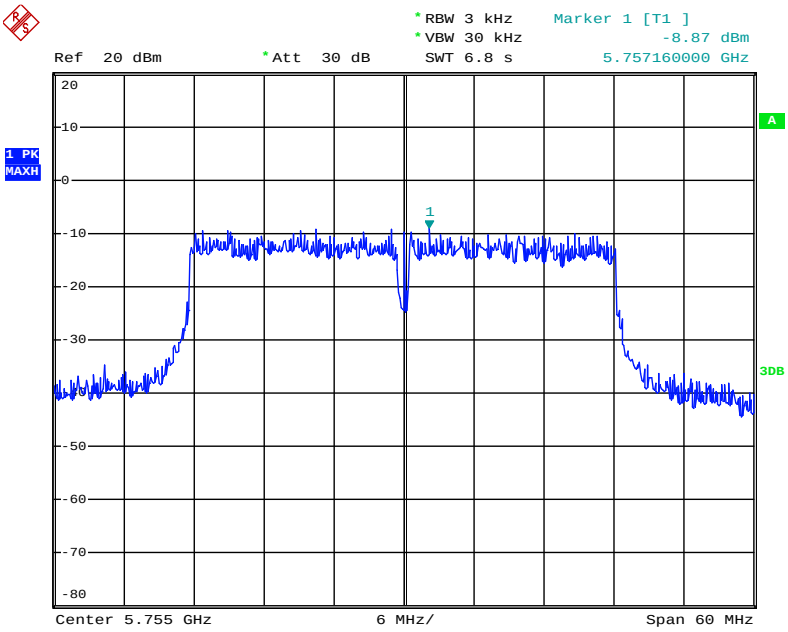
Date: 17.JUN.2014 12:38:11

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Ant. 4



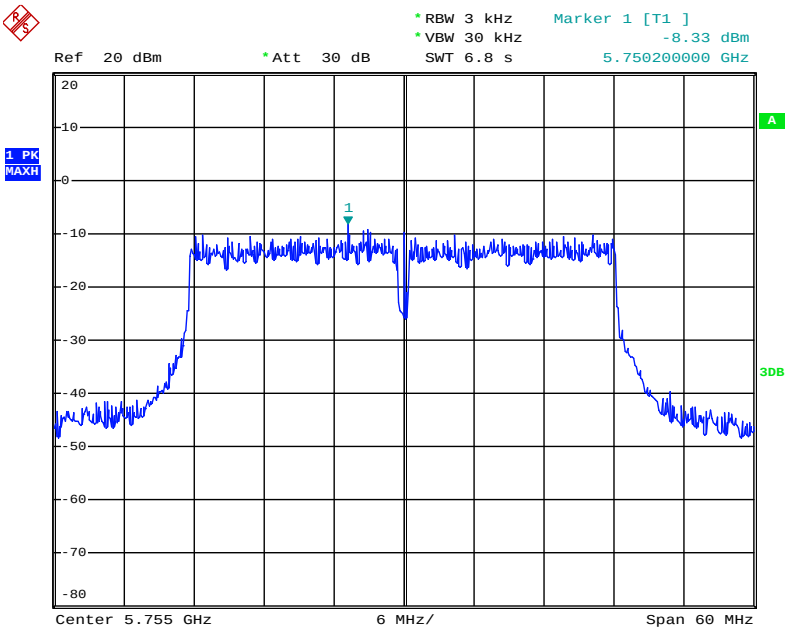
Date: 17.JUN.2014 12:37:22

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



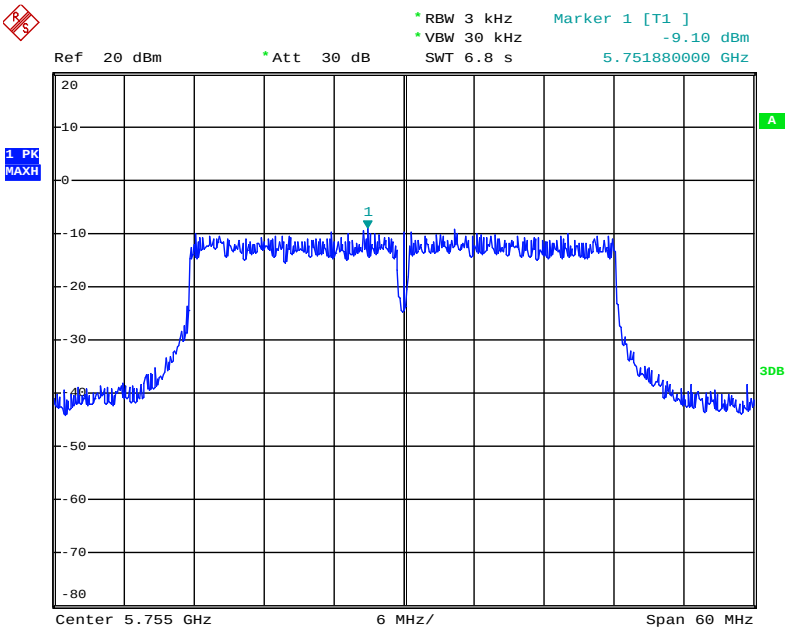
Date: 17.JUN.2014 12:40:57

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



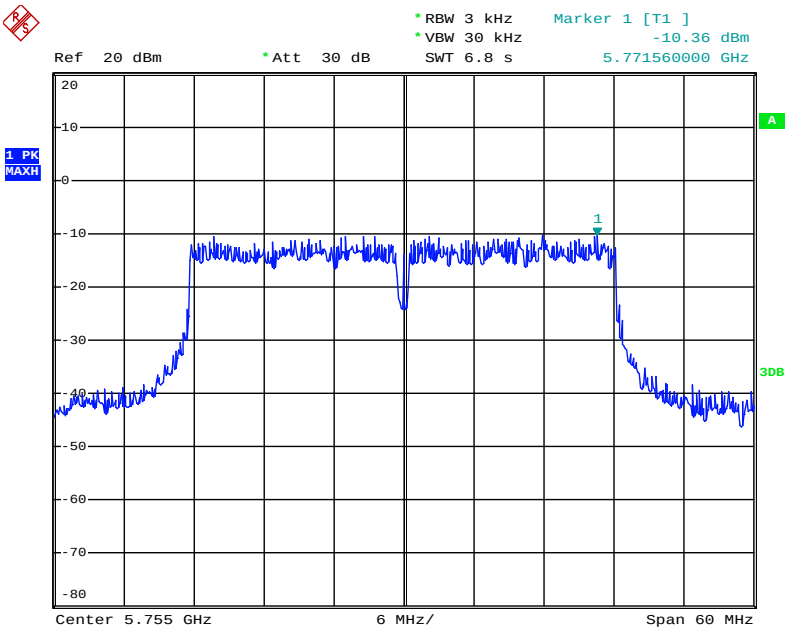
Date: 17.JUN.2014 12:41:46

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



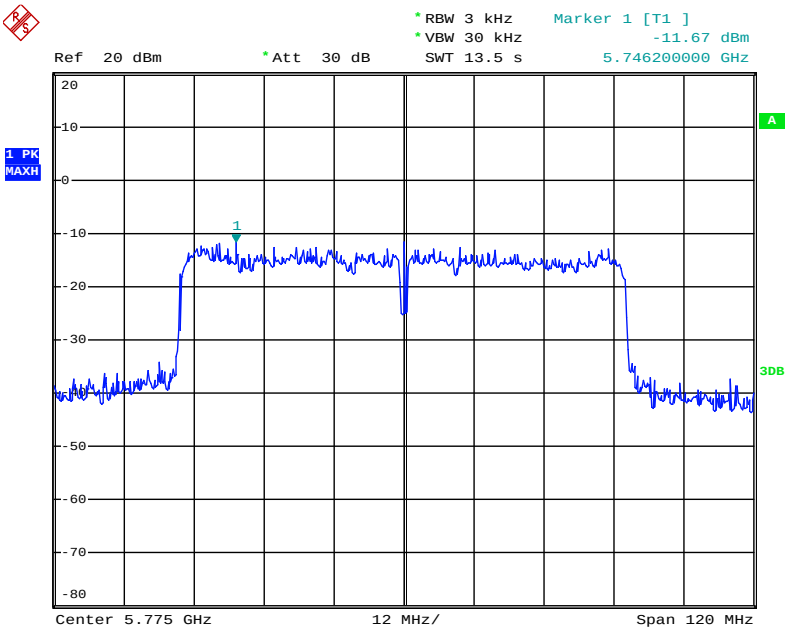
Date: 17.JUN.2014 12:42:53

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



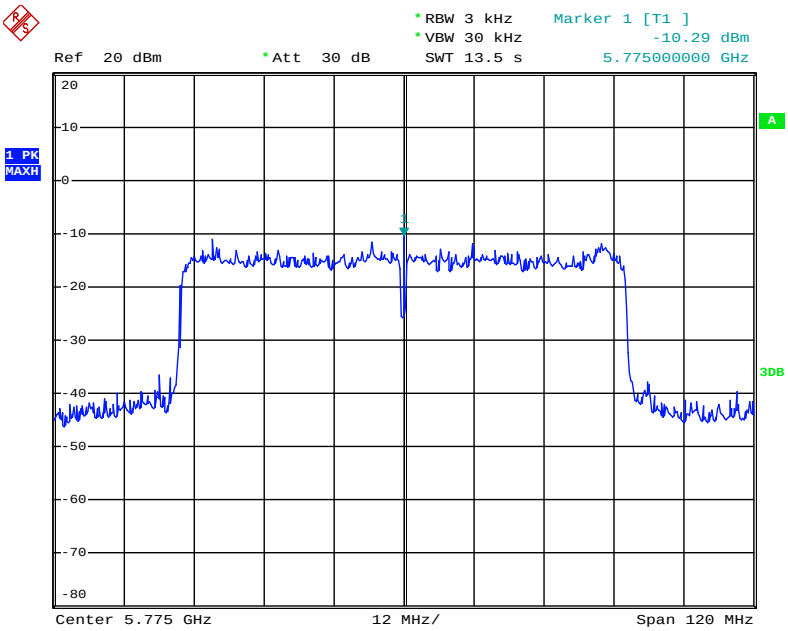
Date: 17.JUN.2014 12:43:57

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



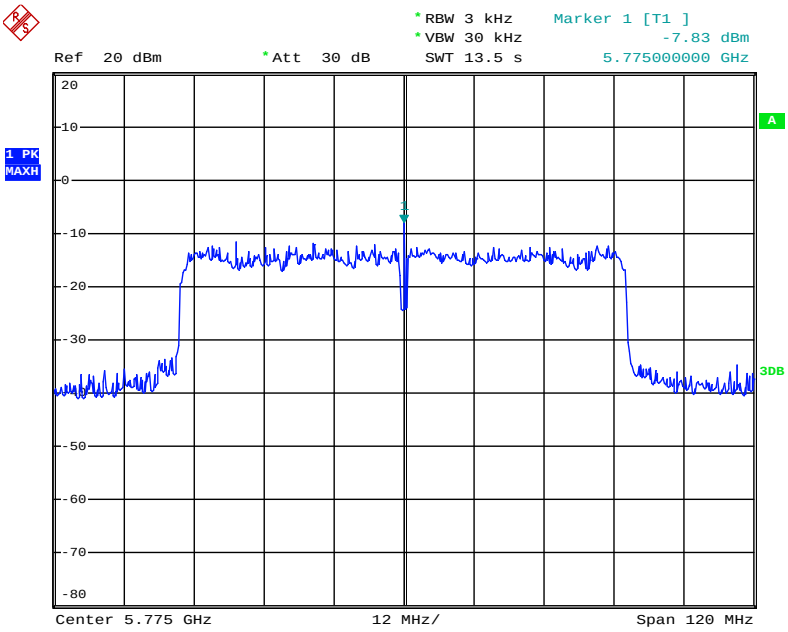
Date: 17.JUN.2014 12:48:44

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



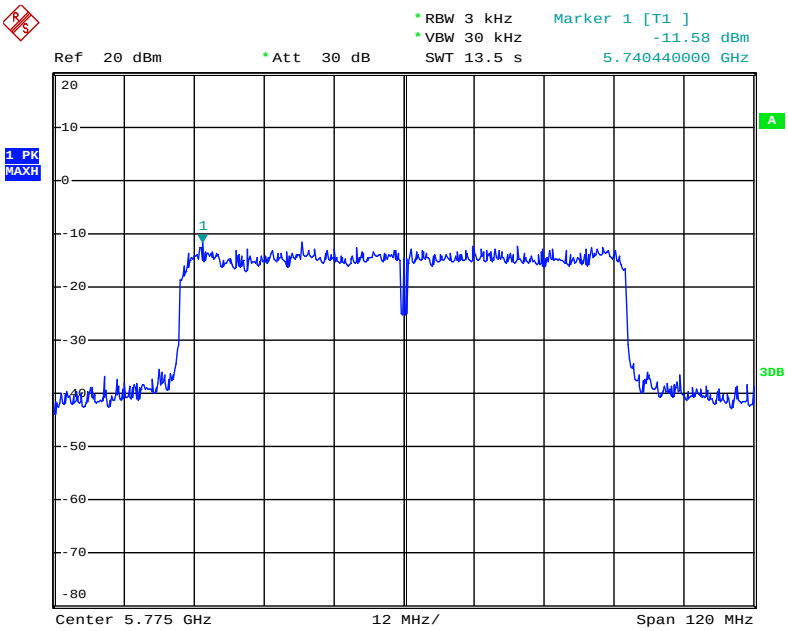
Date: 17.JUN.2014 12:49:48

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



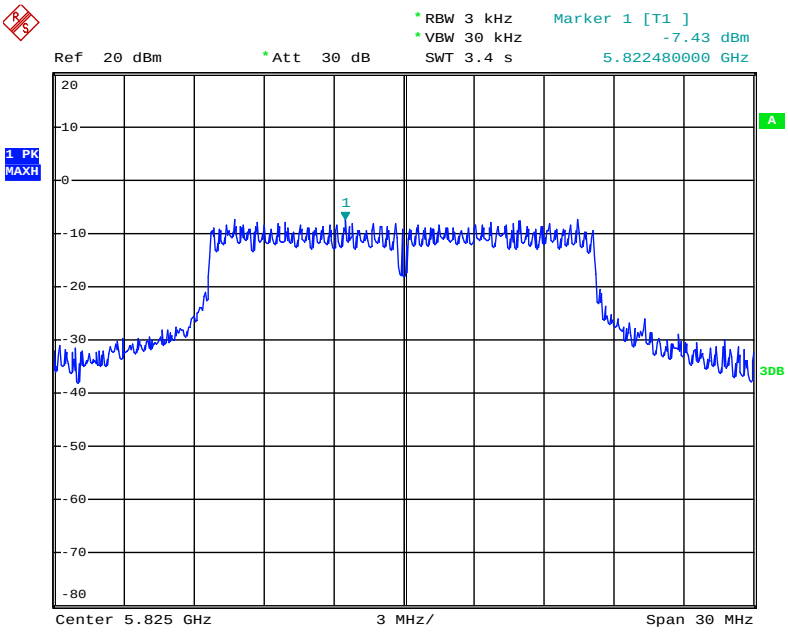
Date: 17.JUN.2014 12:50:46

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



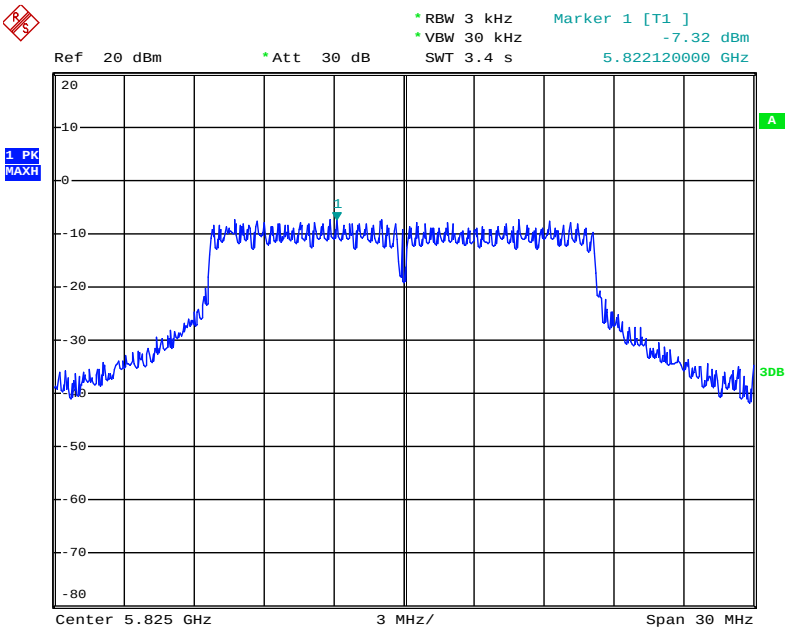
Date: 17.JUN.2014 12:51:56

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



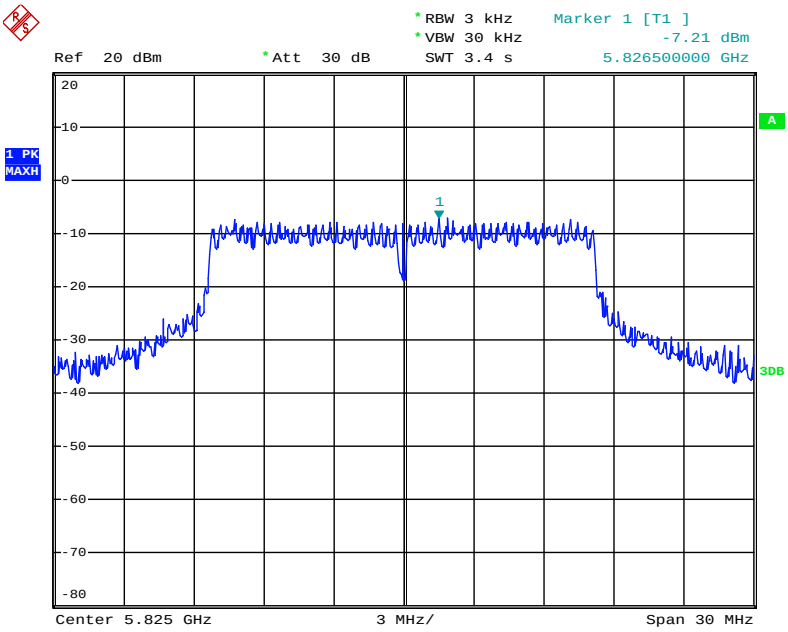
Date: 17.JUN.2014 12:15:07

Power Density Plot on Configuration IEEE 802.11a / 5825 MHz / Ant. 2



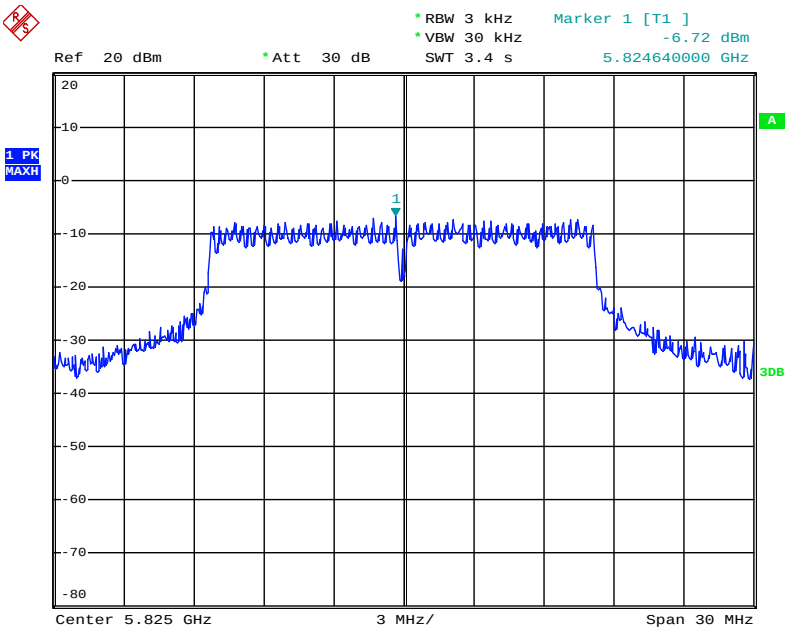
Date: 17.JUN.2014 12:16:03

Power Density Plot on Configuration IEEE 802.11a / 5825 MHz / Ant. 3



Date: 17.JUN.2014 12:17:02

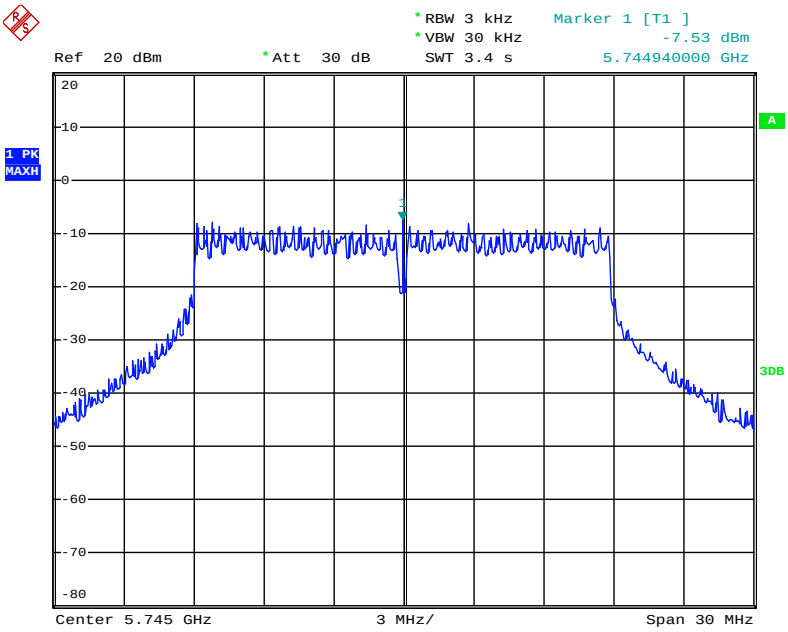
Power Density Plot on Configuration IEEE 802.11a / 5825 MHz / Ant. 4



Date: 17.JUN.2014 12:18:06

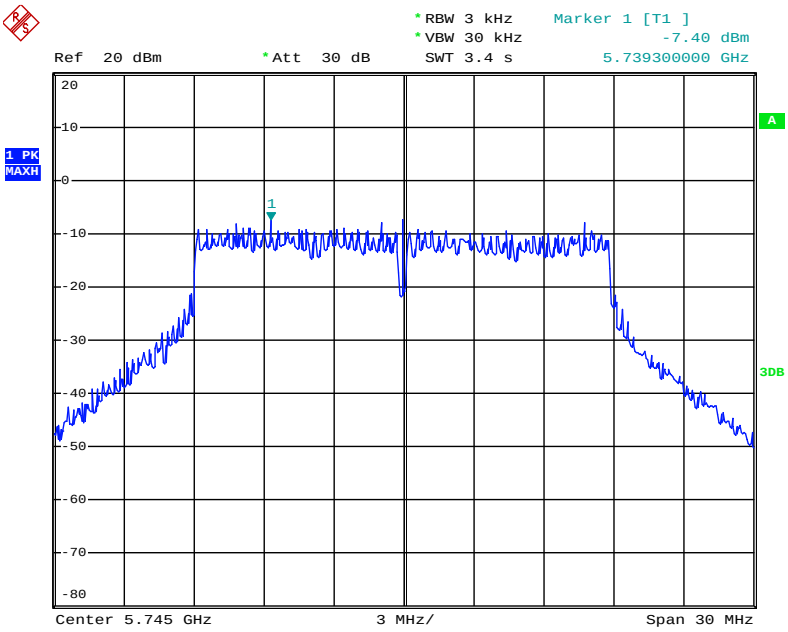
For beamforming mode:

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



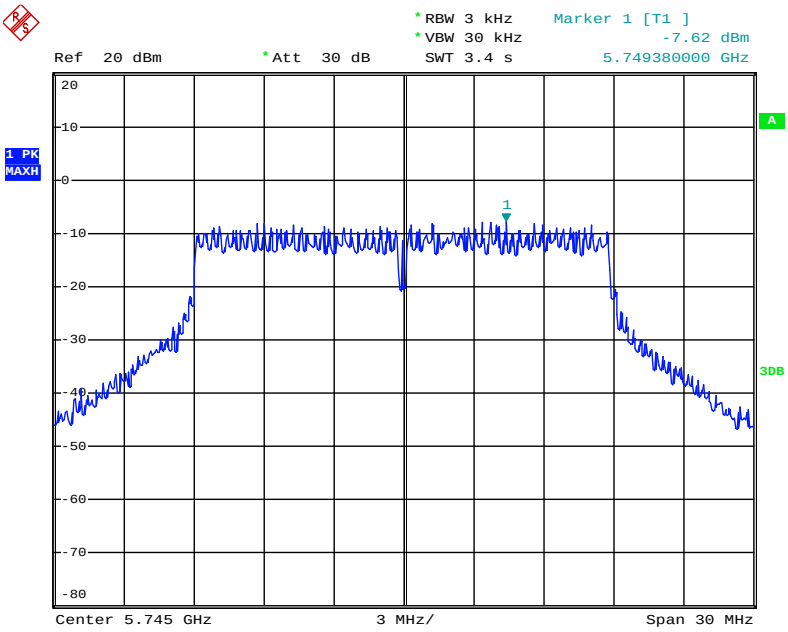
Date: 17.JUN.2014 14:43:38

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



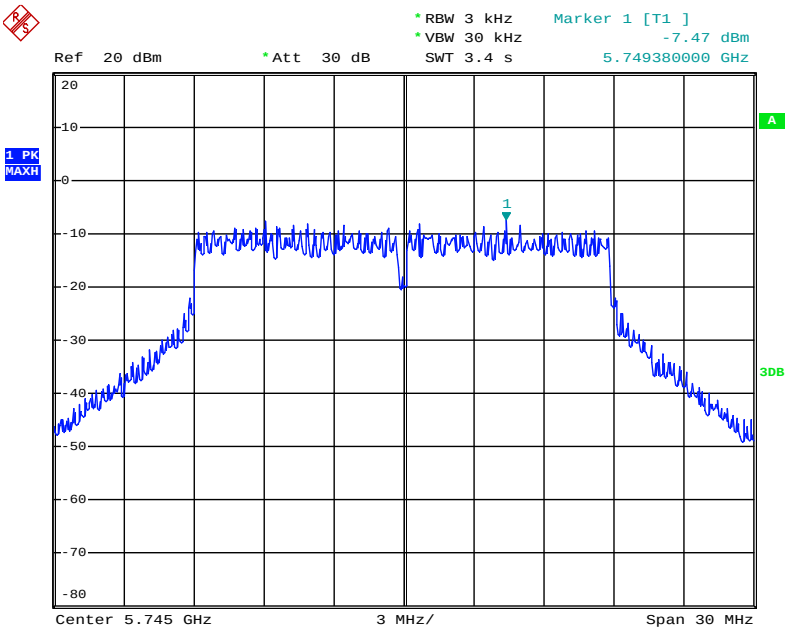
Date: 17.JUN.2014 14:44:47

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5745 MHz / Ant. 3



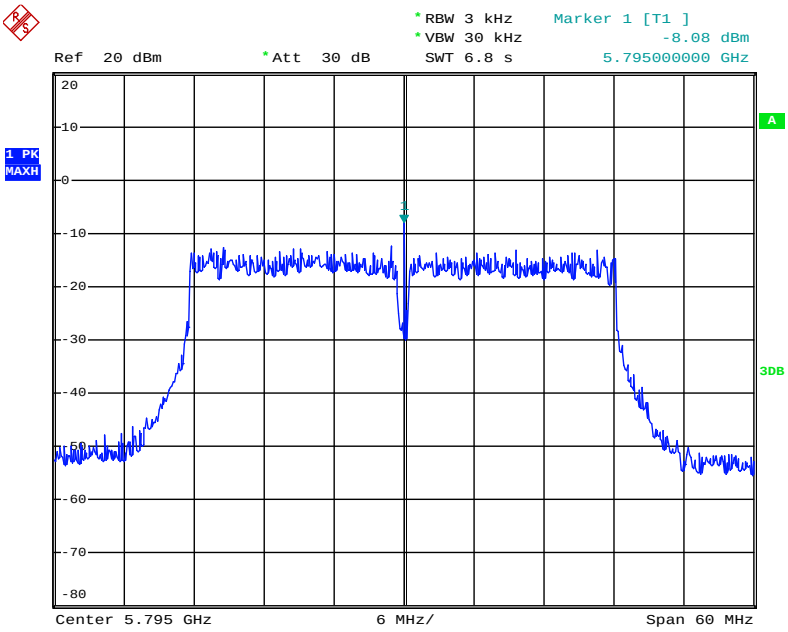
Date: 17.JUN.2014 14:45:44

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5745 MHz / Ant. 4



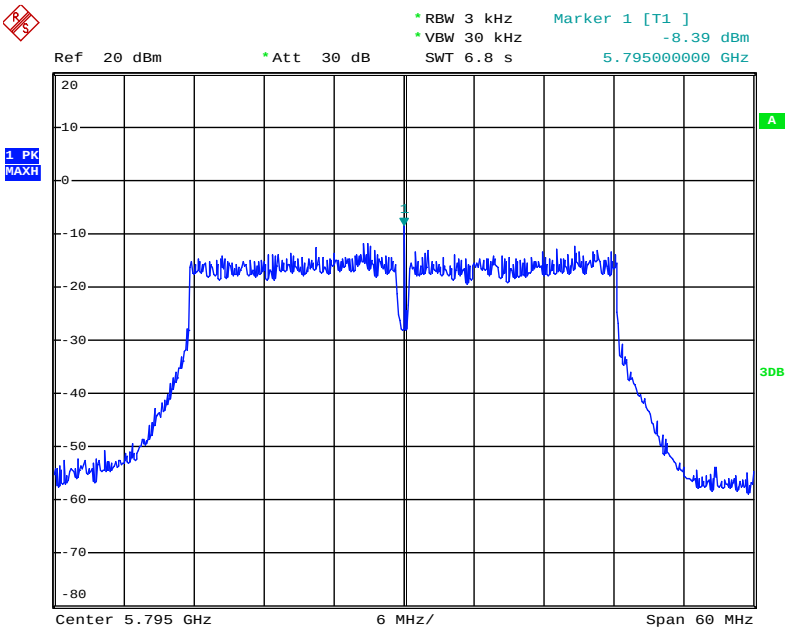
Date: 17.JUN.2014 14:46:35

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795 MHz / Ant. 1



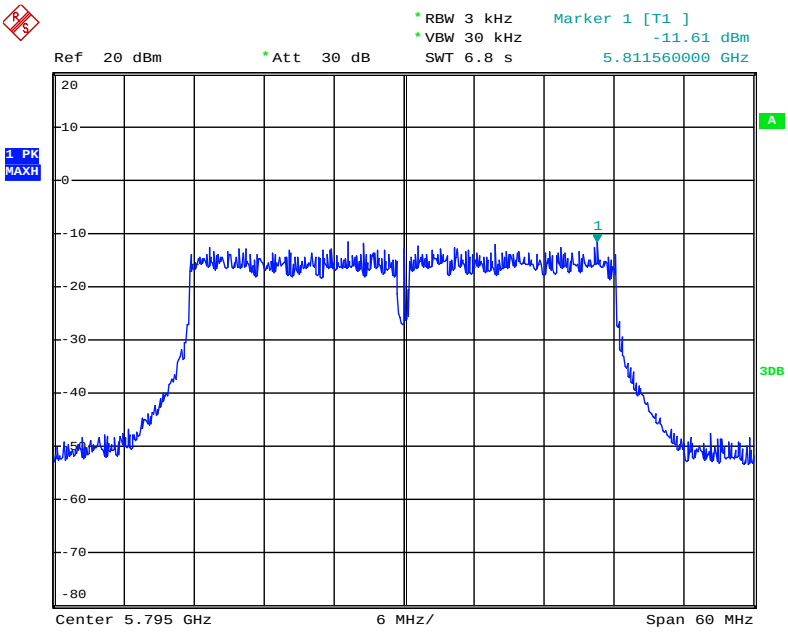
Date: 17.JUN.2014 12:58:15

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795 MHz / Ant. 2



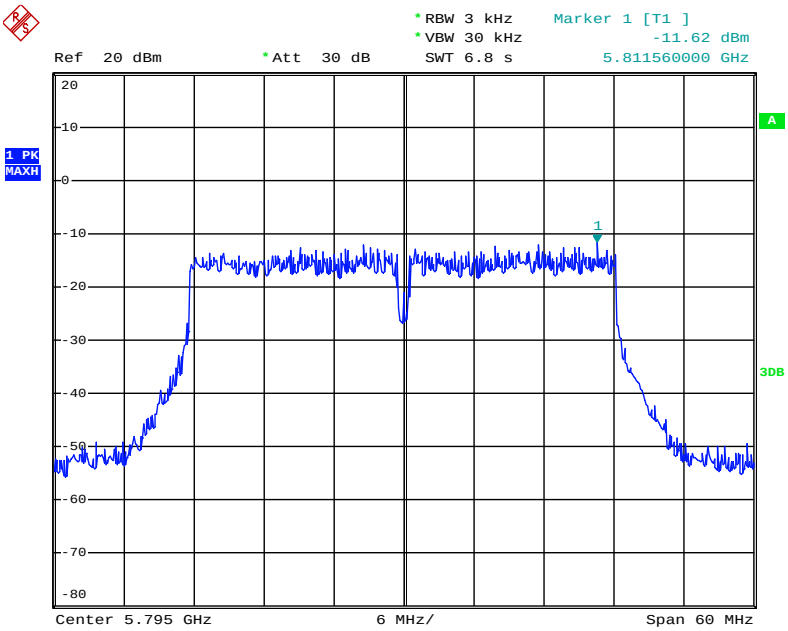
Date: 17.JUN.2014 12:59:22

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795 MHz / Ant. 3



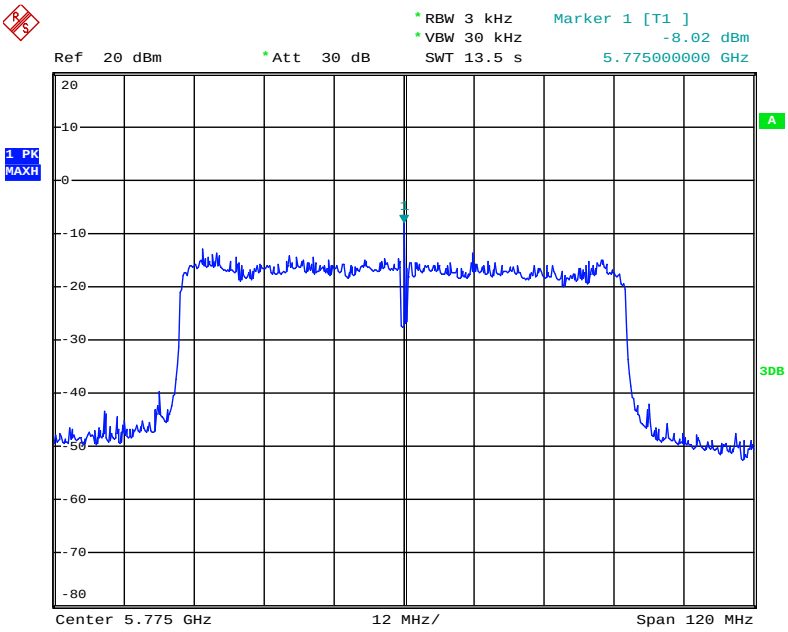
Date: 17.JUN.2014 13:00:17

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / 5795 MHz / Ant. 4



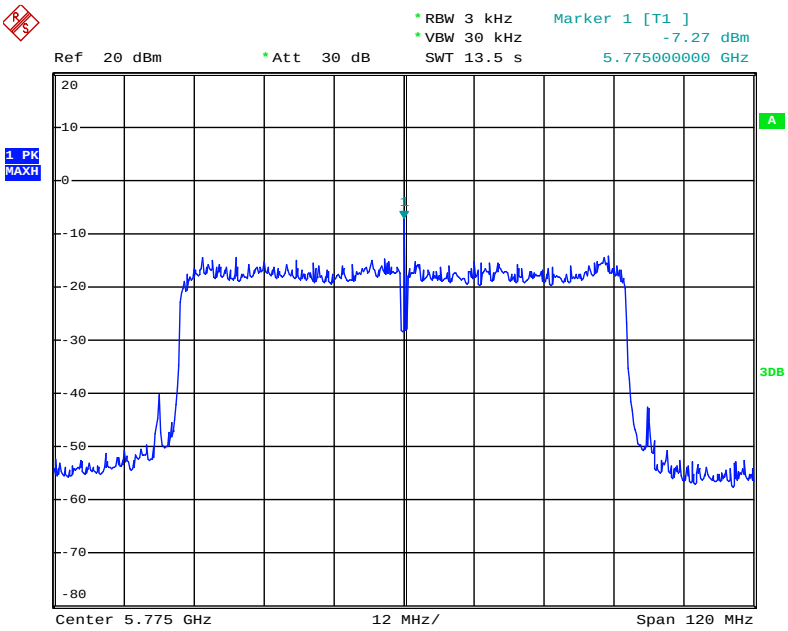
Date: 17.JUN.2014 13:01:13

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



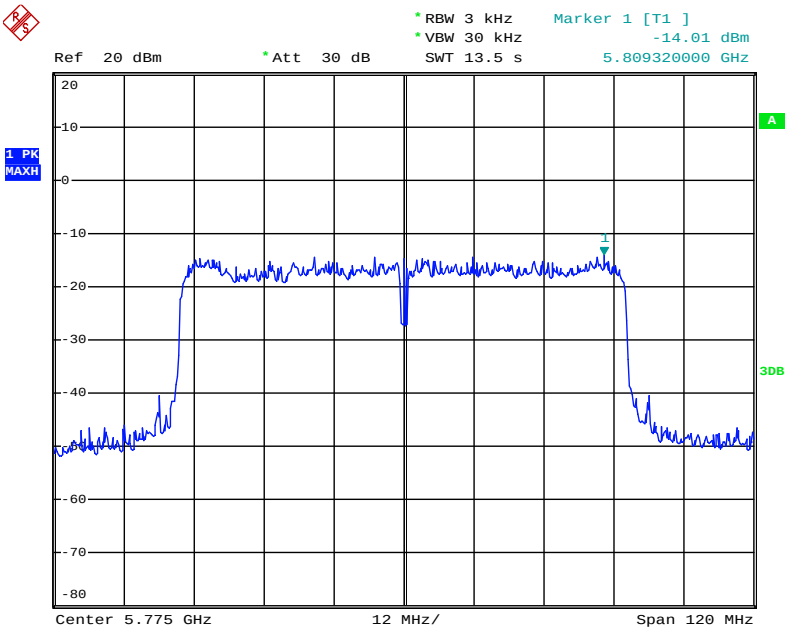
Date: 17.JUN.2014 12:57:31

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



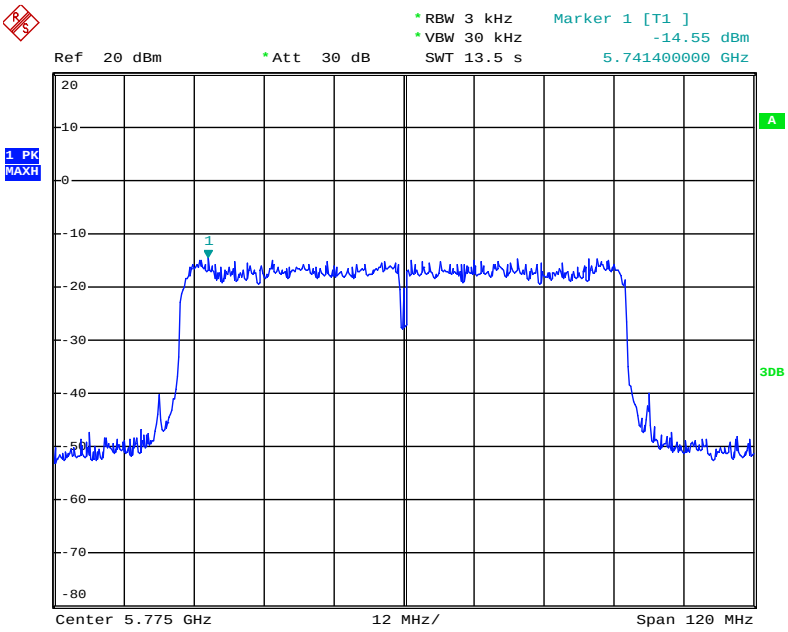
Date: 17.JUN.2014 12:56:27

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



Date: 17.JUN.2014 12:55:21

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



Date: 17.JUN.2014 12:53:43

4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

4.4.2. Measuring Instruments and Setting

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

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

4.4.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB 558074 D01 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	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a/ac

For non-beamforming mode:

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	11.04	15.68	500	Complies
157	5785 MHz	12.96	16.96	500	Complies
165	5825 MHz	12.40	16.72	500	Complies

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	34.08	35.20	500	Complies
159	5795 MHz	34.56	35.20	500	Complies

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

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

Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	11.84	15.76	500	Complies
157	5785 MHz	11.60	15.36	500	Complies
165	5825 MHz	11.68	14.72	500	Complies

Temperature	26°C	Humidity	63%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac

For beamforming mode:

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
149	5745 MHz	17.60	17.76	500	Complies
157	5785 MHz	17.68	17.84	500	Complies
165	5825 MHz	17.36	17.76	500	Complies

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

Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
151	5755 MHz	34.40	36.32	500	Complies
159	5795 MHz	35.36	36.32	500	Complies

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

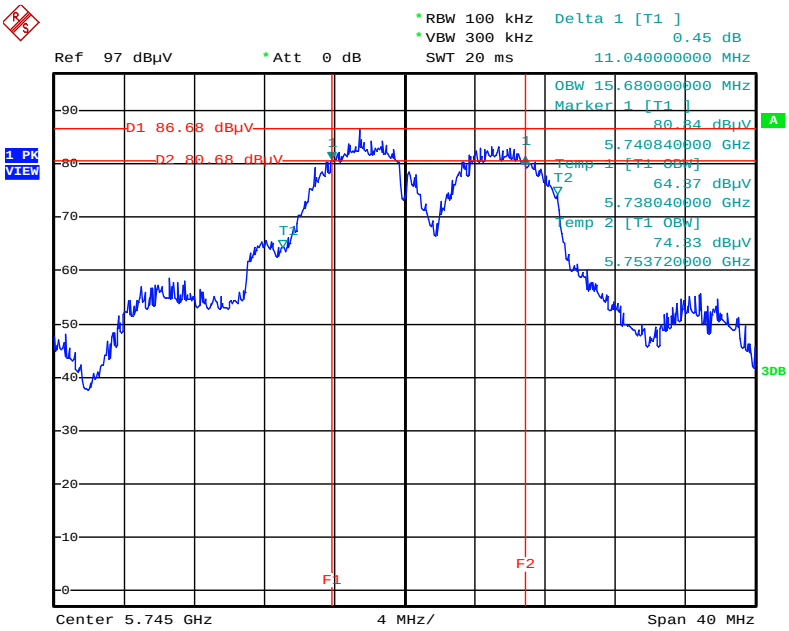
Channel	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
155	5775 MHz	74.24	75.52	500	Complies

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

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

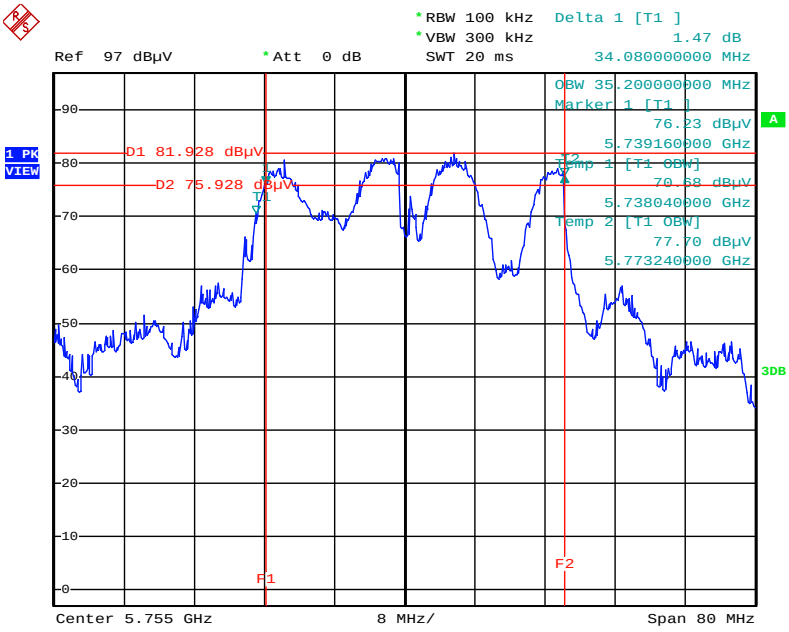
For non-beamforming mode:

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5745 MHz / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4



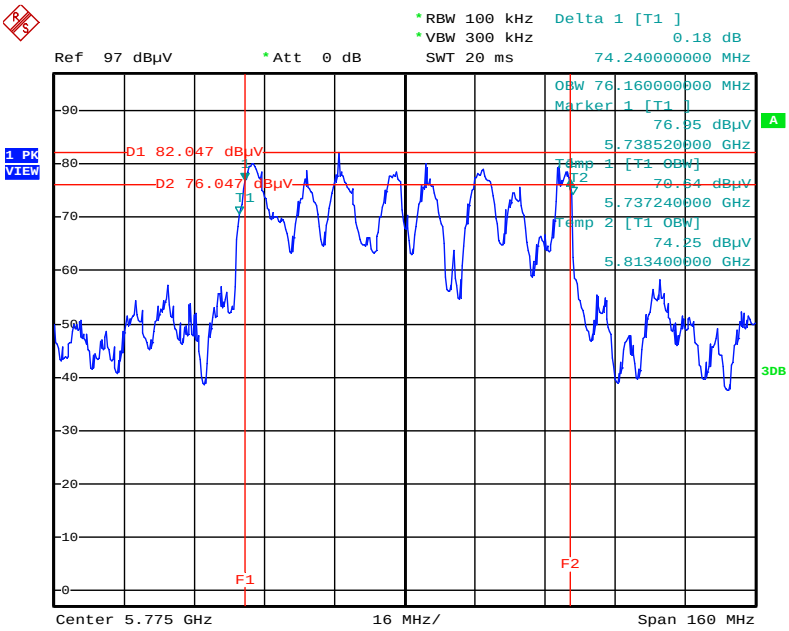
Date: 17.JUN.2014 15:15:49

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



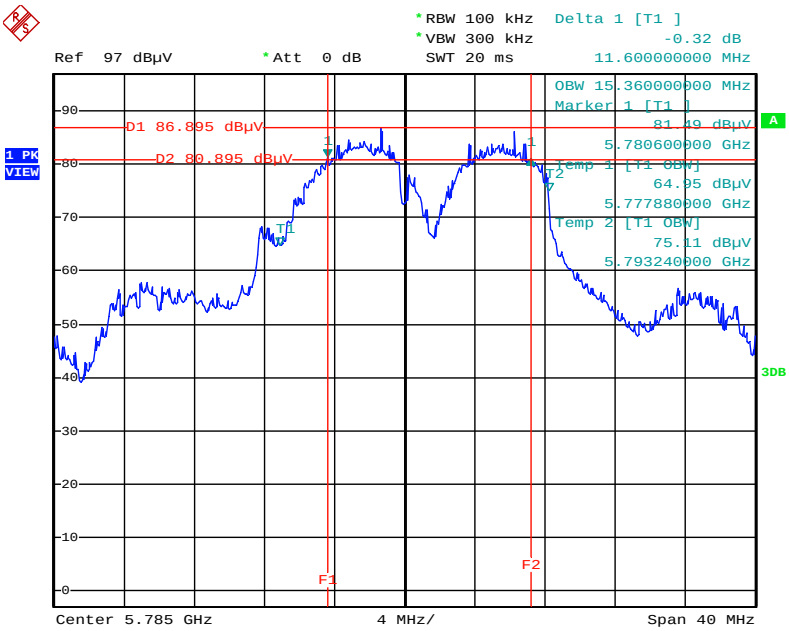
Date: 17.JUN.2014 15:19:32

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



Date: 17.JUN.2014 15:20:40

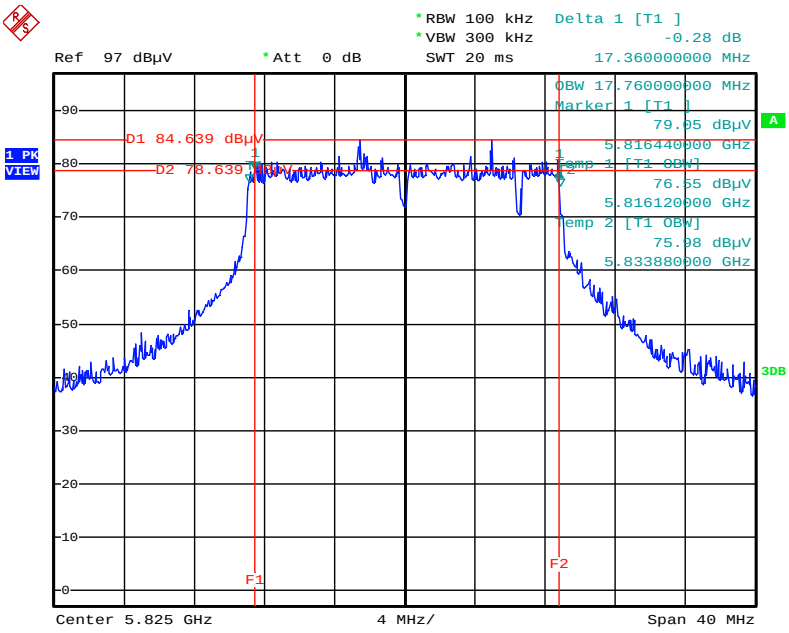
6 dB Bandwidth Plot on Configuration IEEE 802.11a / 5785 MHz / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4



Date: 17.JUN.2014 15:18:20

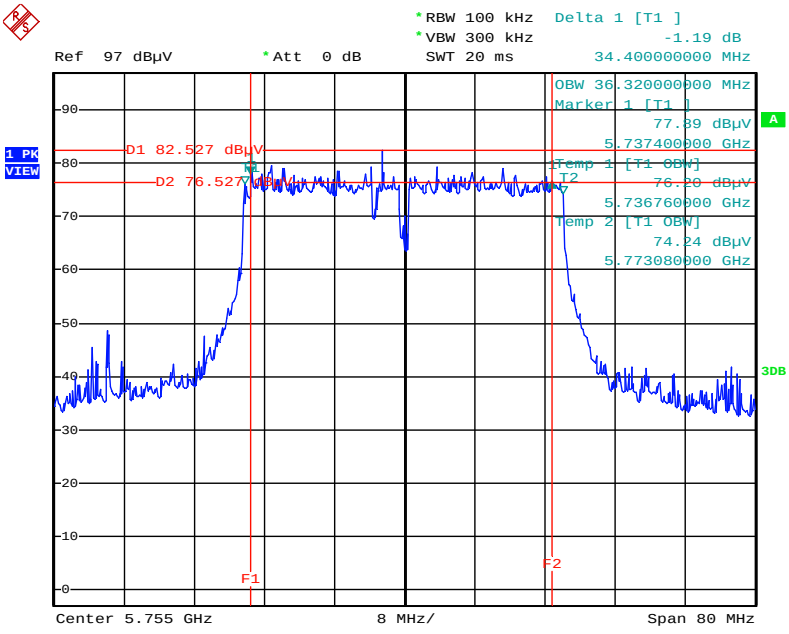
For beamforming mode:

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 5825 MHz / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4



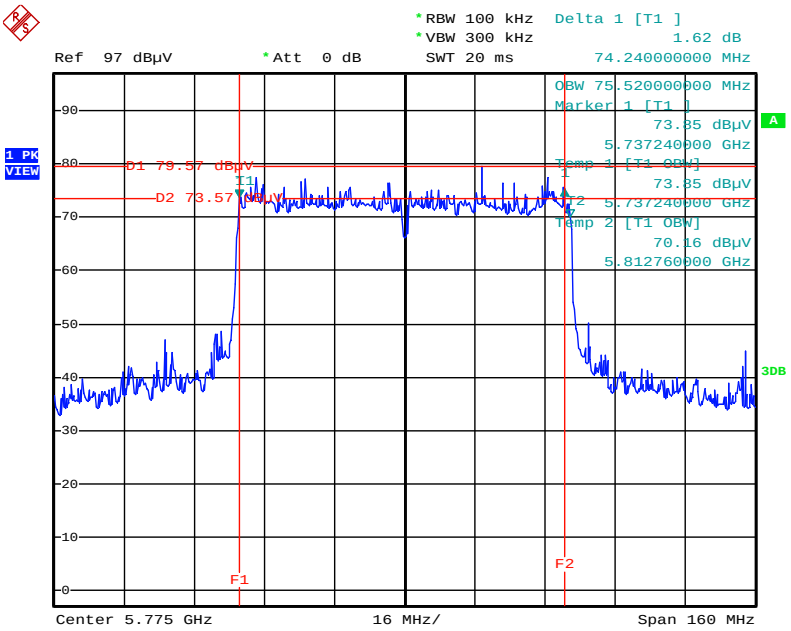
Date: 17.JUN.2014 15:01:54

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



Date: 17.JUN.2014 15:00:52

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



Date: 17.JUN.2014 14:59:51

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, Please refer to section 3.10 for Average
RBW / VBW (Emission in non-restricted band)	100kHz / 300kHz for peak

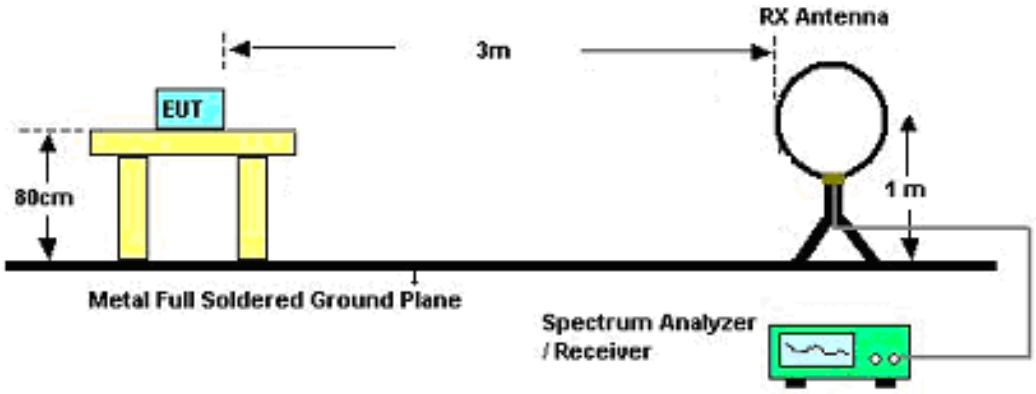
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1GHz / RBW 120kHz for QP

4.5.3. Test Procedures

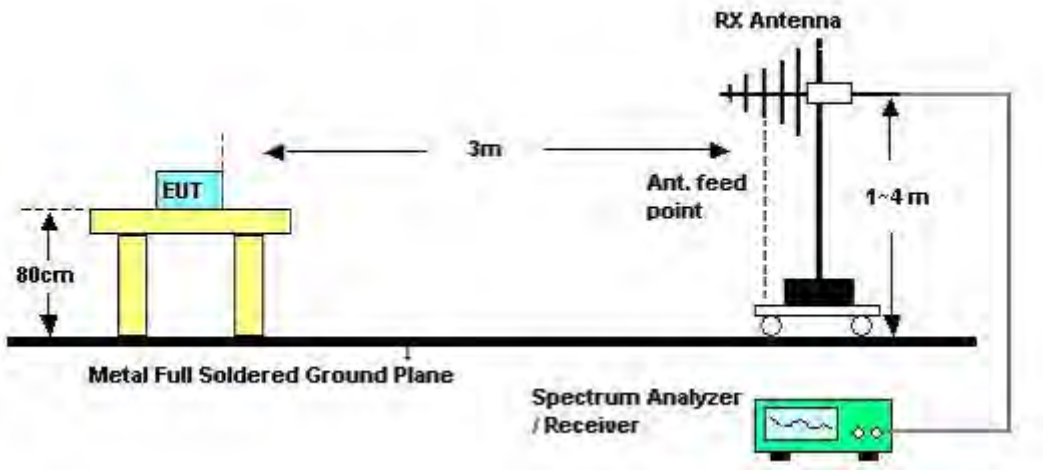
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. For emissions above 1GHz, use 1MHz VBW and 3MHz RBW for peak reading. Then 1MHz RBW and 10Hz VBW for average reading in spectrum analyzer.
7. If the emissions level of the EUT in peak mode was 3 dB lower than the average limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method for below 1GHz.
8. For testing above 1GHz, the emissions level of the EUT in peak mode was lower than average limit (that means the emissions level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
9. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High – Low scan is not required in this case.

4.5.4. Test Setup Layout

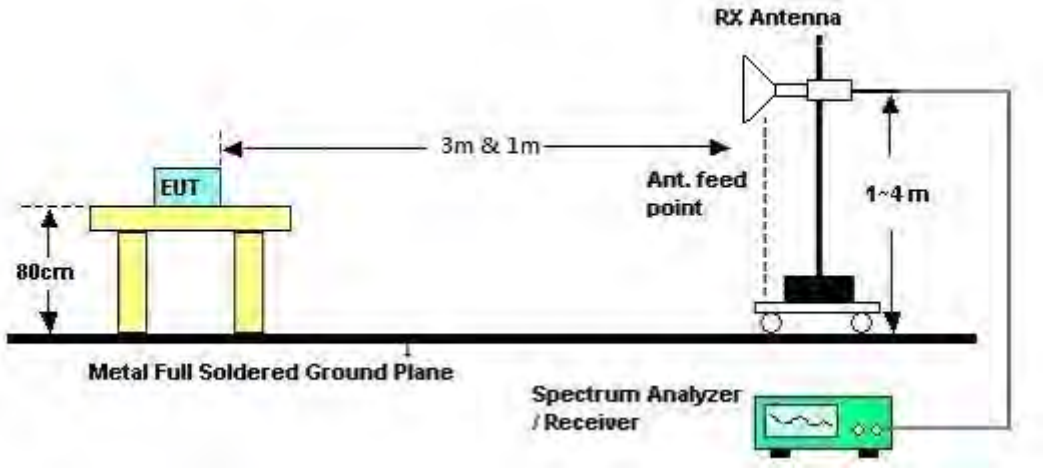
For Radiated Emissions: 9kHz ~30MHz



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	25°C	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	CTX
Test Date	Jun. 20, 2014	Test Mode	Mode 1

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.

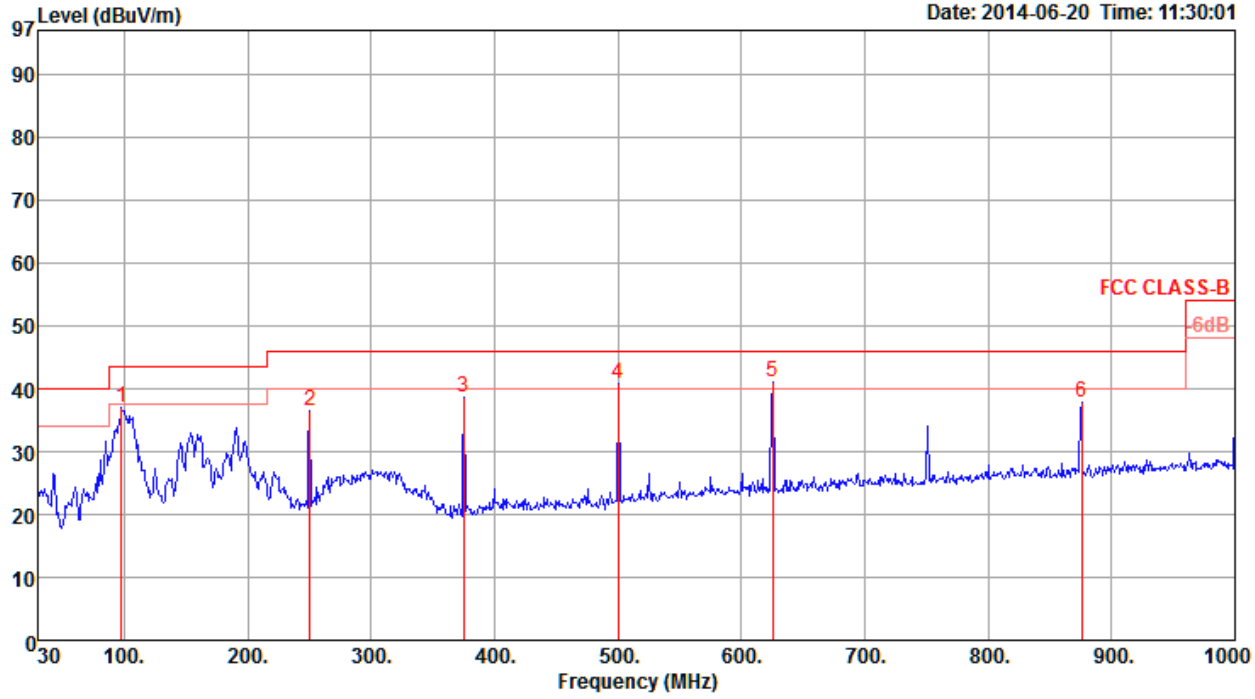
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

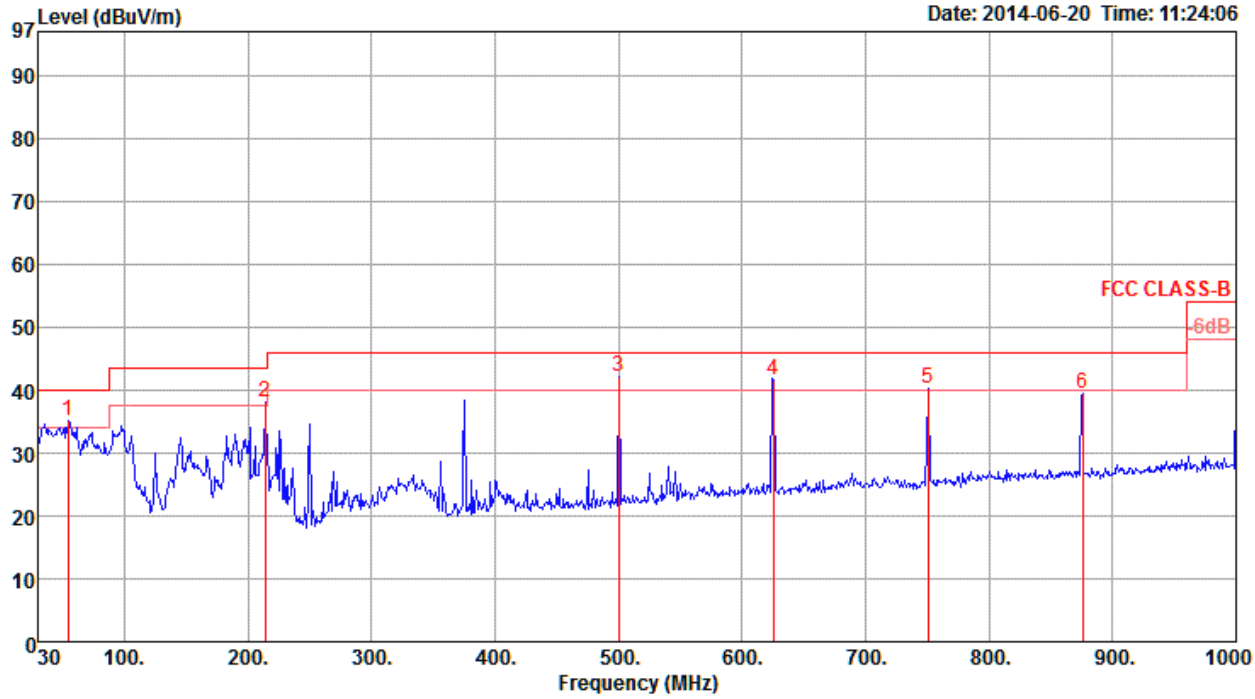
Temperature	25°C	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	CTX
Test Mode	Mode 1		

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	97.90	37.04	43.50	-6.46	52.41	1.48	10.98	27.83	Peak	0	100	HORIZONTAL
2	250.19	36.40	46.00	-9.60	48.07	2.38	12.90	26.95	Peak	0	100	HORIZONTAL
3	375.32	38.69	46.00	-7.31	47.15	2.89	15.91	27.26	Peak	0	100	HORIZONTAL
4	500.45	40.80	46.00	-5.20	47.55	3.38	17.80	27.93	Peak	0	100	HORIZONTAL
5	625.58	41.05	46.00	-4.95	45.36	3.82	19.45	27.58	Peak	0	100	HORIZONTAL
6	875.84	37.78	46.00	-8.22	38.77	4.51	21.36	26.86	Peak	0	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	54.25	35.12	40.00	-4.88	53.92	1.12	7.98	27.90	Peak	0	400	VERTICAL
2	214.30	38.11	43.50	-5.39	52.45	2.21	10.60	27.15	Peak	0	400	VERTICAL
3	500.45	42.00	46.00	-4.00	48.75	3.38	17.80	27.93	Peak	0	400	VERTICAL
4	625.58	41.67	46.00	-4.33	45.98	3.82	19.45	27.58	Peak	0	400	VERTICAL
5	750.71	40.17	46.00	-5.83	42.87	4.21	20.21	27.12	Peak	0	400	VERTICAL
6	875.84	39.42	46.00	-6.58	40.41	4.51	21.36	26.86	Peak	0	400	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	25°C	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11487.70	52.68	74.00	-21.32	43.23	5.11	39.39	35.05	Peak	123	357	HORIZONTAL
2	11489.89	40.02	54.00	-13.98	30.57	5.11	39.39	35.05	Average	123	357	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	11489.78	42.94	74.00	-31.06	33.49	5.11	39.39	35.05	Peak	103	1	VERTICAL
2	11489.96	40.57	54.00	-13.43	31.12	5.11	39.39	35.05	Average	103	1	VERTICAL

Temperature	25°C	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11569.84	52.97	74.00	-21.03	43.45	5.14	39.44	35.06	Peak	122	22	HORIZONTAL
2	11569.89	40.71	54.00	-13.29	31.19	5.14	39.44	35.06	Average	122	22	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	11570.26	40.82	54.00	-13.18	31.30	5.14	39.44	35.06	Average	114	1	VERTICAL
2	11571.21	53.04	74.00	-20.96	43.52	5.14	39.44	35.06	Peak	114	1	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11649.89	54.90	74.00	-19.10	45.34	5.16	39.48	35.08	Peak	122	24	HORIZONTAL
2	11649.93	42.03	54.00	-11.97	32.47	5.16	39.48	35.08	Average	122	24	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	11648.11	55.59	74.00	-18.41	46.03	5.16	39.48	35.08	Peak	100	5	VERTICAL
2	11649.89	42.48	54.00	-11.52	32.92	5.16	39.48	35.08	Average	100	5	VERTICAL

Temperature	25°C	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11509.07	51.47	74.00	-22.53	42.00	5.12	39.40	35.05	Peak	120	24	HORIZONTAL
2	11509.84	39.16	54.00	-14.84	29.69	5.12	39.40	35.05	Average	120	24	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	11508.07	52.10	74.00	-21.90	42.63	5.12	39.40	35.05	Peak	101	324	VERTICAL
2	11510.10	39.39	54.00	-14.61	29.92	5.12	39.40	35.05	Average	101	324	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	11589.92	51.79	74.00	-22.21	42.26	5.14	39.45	35.06	Peak	100	330	HORIZONTAL
2	11590.08	39.78	54.00	-14.22	30.25	5.14	39.45	35.06	Average	100	330	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	11590.15	51.38	74.00	-22.62	41.85	5.14	39.45	35.06	Peak	100	27	VERTICAL
2	11590.17	39.94	54.00	-14.06	30.41	5.14	39.45	35.06	Average	100	27	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11549.55	50.79	74.00	-23.21	41.29	5.13	39.43	35.06	Peak	100	325	HORIZONTAL
2	11549.92	38.38	54.00	-15.62	28.88	5.13	39.43	35.06	Average	100	325	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	11549.18	51.10	74.00	-22.90	41.60	5.13	39.43	35.06	Peak	108	1	VERTICAL
2	11550.14	38.71	54.00	-15.29	29.21	5.13	39.43	35.06	Average	108	1	VERTICAL

Temperature	25°C	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a CH 149 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11488.46	53.00	74.00	-21.00	43.55	5.11	39.39	35.05	Peak	124	2	HORIZONTAL
2	11489.88	40.25	54.00	-13.75	30.80	5.11	39.39	35.05	Average	124	2	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	11489.09	53.98	74.00	-20.02	44.53	5.11	39.39	35.05	Peak	101	357	VERTICAL
2	11489.87	41.70	54.00	-12.30	32.25	5.11	39.39	35.05	Average	101	357	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a CH 157 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11569.98	41.03	54.00	-12.97	31.51	5.14	39.44	35.06	Average	100	351	HORIZONTAL
2	11570.17	53.81	74.00	-20.19	44.29	5.14	39.44	35.06	Peak	100	351	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	11569.98	41.38	54.00	-12.62	31.86	5.14	39.44	35.06	Average	120	359	VERTICAL
2	11570.39	54.59	74.00	-19.41	45.07	5.14	39.44	35.06	Peak	120	359	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11a CH 165 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 30, 2014		

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	11649.85	41.67	54.00	-12.33	32.11	5.16	39.48	35.08	Average	101	318	HORIZONTAL
2	11651.91	54.09	74.00	-19.91	44.52	5.16	39.49	35.08	Peak	101	318	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	11648.78	55.23	74.00	-18.77	45.67	5.16	39.48	35.08	Peak	101	5	VERTICAL
2	11649.76	43.01	54.00	-10.99	33.45	5.16	39.48	35.08	Average	101	5	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.

For beamforming mode:

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	Jun. 08, 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	11493.64	50.29	74.00	-23.71	39.91	6.74	38.30	34.66	Peak	339	100	HORIZONTAL
2	11497.08	37.91	54.00	-16.09	27.53	6.74	38.30	34.66	Average	339	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	11485.16	50.34	74.00	-23.66	39.96	6.74	38.30	34.66	Peak	95	100	VERTICAL
2	11491.32	38.03	54.00	-15.97	27.65	6.74	38.30	34.66	Average	95	100	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	Jun. 08, 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	11569.96	51.89	74.00	-22.11	41.48	6.77	38.33	34.69	Peak	354	100	HORIZONTAL
2	11570.00	39.55	54.00	-14.45	29.14	6.77	38.33	34.69	Average	354	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	11572.76	39.87	54.00	-14.13	29.46	6.77	38.33	34.69	Average	74	100	VERTICAL
2	11578.80	51.78	74.00	-22.22	41.37	6.77	38.33	34.69	Peak	74	100	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	Jun. 08, 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	11648.08	54.45	74.00	-19.55	44.01	6.80	38.36	34.72	Peak	81	120	HORIZONTAL
2	11650.00	41.74	54.00	-12.26	31.30	6.80	38.36	34.72	Average	81	120	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	11654.40	53.83	74.00	-20.17	43.39	6.80	38.36	34.72	Peak	5	100	VERTICAL
2	11657.08	41.20	54.00	-12.80	30.76	6.80	38.36	34.72	Average	5	100	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	Jun. 08, 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	11516.08	50.17	74.00	-23.83	39.76	6.76	38.31	34.66	Peak	290	100	HORIZONTAL
2	11529.12	37.99	54.00	-16.01	27.59	6.76	38.31	34.67	Average	290	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	11512.40	50.13	74.00	-23.87	39.74	6.75	38.30	34.66	Peak	207	100	VERTICAL
2	11529.84	38.16	54.00	-15.84	27.76	6.76	38.31	34.67	Average	207	100	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	Jun. 08, 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	11580.96	51.80	74.00	-22.20	41.39	6.77	38.33	34.69	Peak	287	100	HORIZONTAL
2	11609.28	39.33	54.00	-14.67	28.90	6.79	38.34	34.70	Average	287	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	11586.08	52.41	74.00	-21.59	41.99	6.78	38.33	34.69	Peak	153	100	VERTICAL
2	11595.36	39.36	54.00	-14.64	28.95	6.78	38.33	34.70	Average	153	100	VERTICAL

Temperature	25℃	Humidity	58%
Test Engineer	Kenneth Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	Jun. 08, 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	11567.30	50.86	74.00	-23.14	40.44	6.77	38.33	34.68	Peak	323	100	HORIZONTAL
2	11575.00	38.98	54.00	-15.02	28.57	6.77	38.33	34.69	Average	323	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	11547.10	50.96	74.00	-23.04	40.57	6.76	38.31	34.68	Peak	204	100	VERTICAL
2	11572.90	38.86	54.00	-15.14	28.45	6.77	38.33	34.69	Average	204	100	VERTICAL

Note:

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

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

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

4.6. 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, Please refer to section 3.10 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
2. The radiated emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.
   Only worst data of each operating mode is presented.

4.6.4. Test 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:

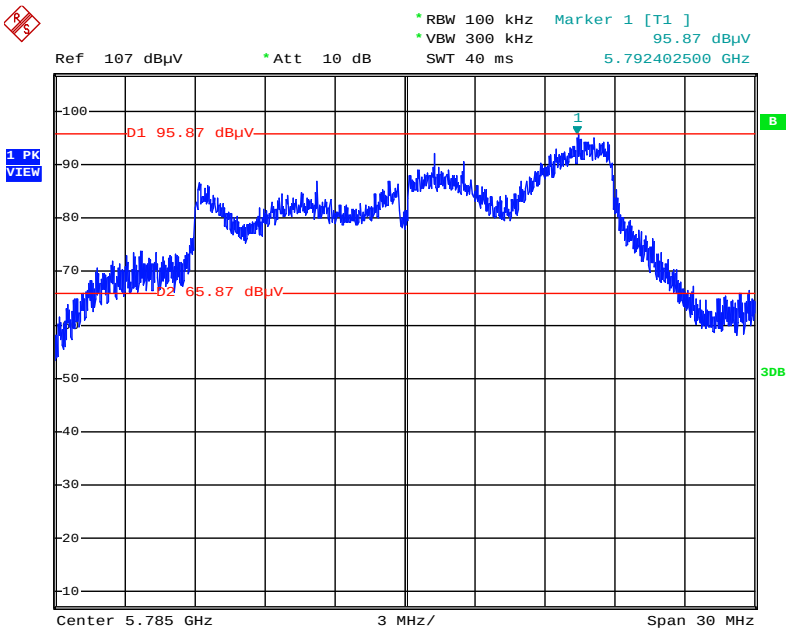
The EUT was programmed to be in beamforming transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

For Emission not in Restricted Band

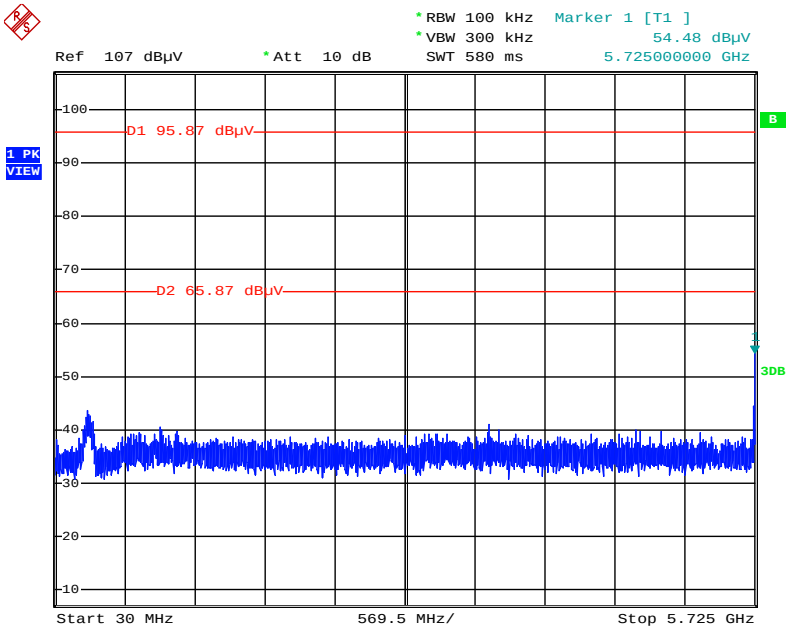
For non-beamforming mode:

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



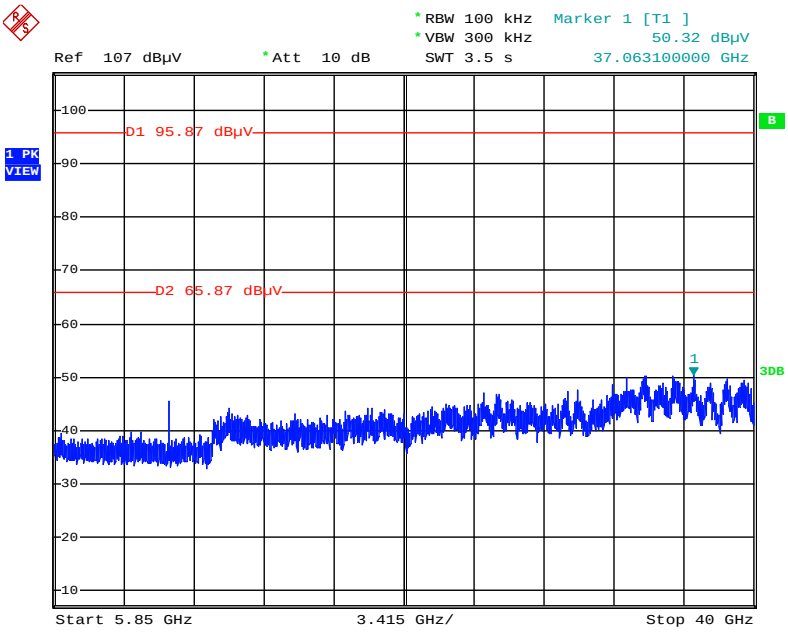
Date: 30.MAY.2014 23:14:32

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



Date: 30.MAY.2014 23:15:06

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



Date: 30.MAY.2014 23:15:38

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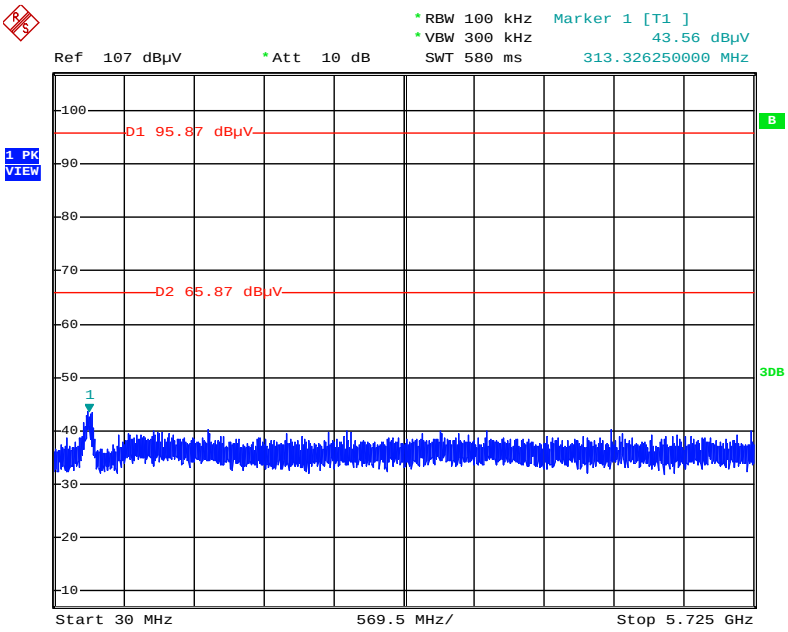
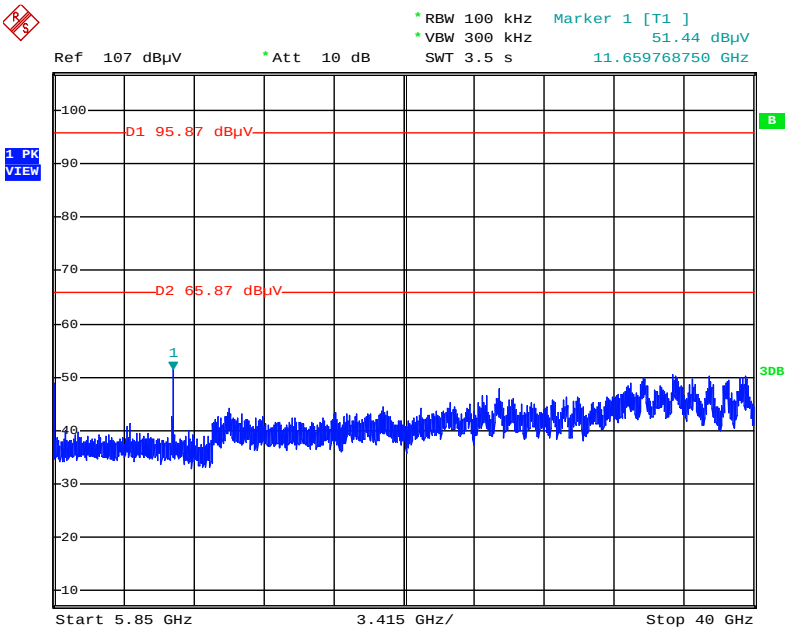


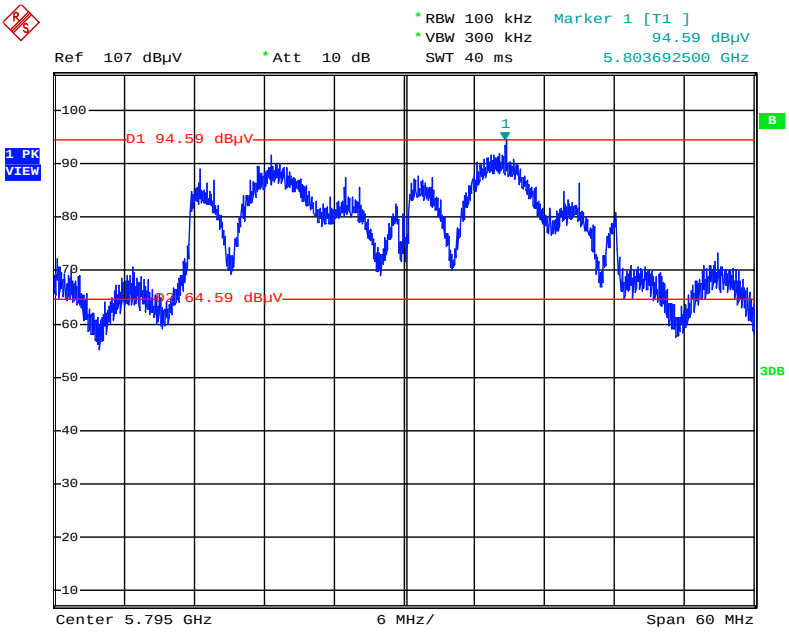
Date: 30.MAY.2014 23:19:37

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



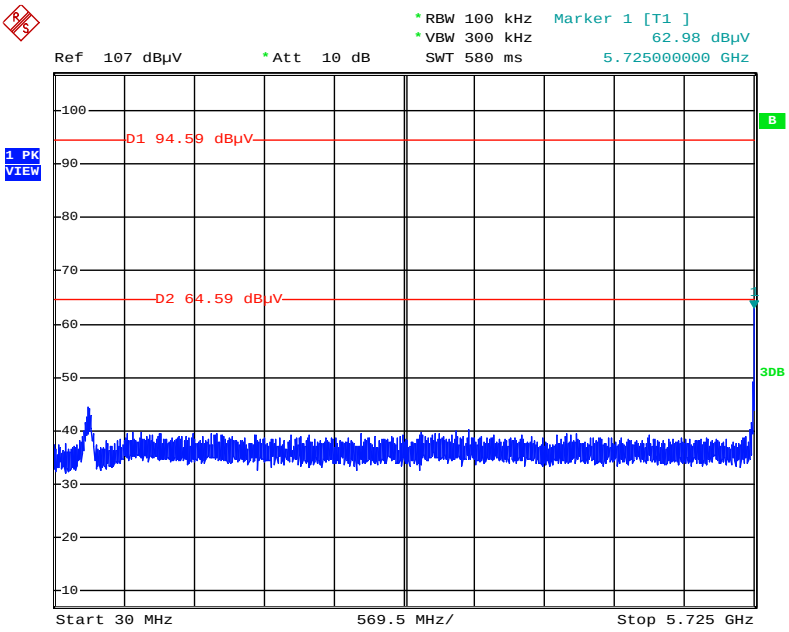
Date: 30.MAY.2014 23:18:47

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



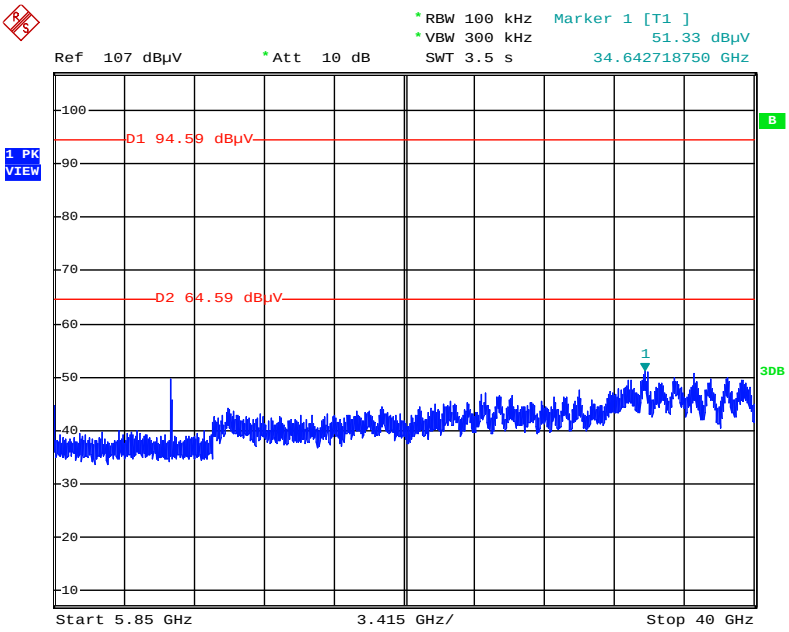
Date: 30.MAY.2014 23:24:04

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



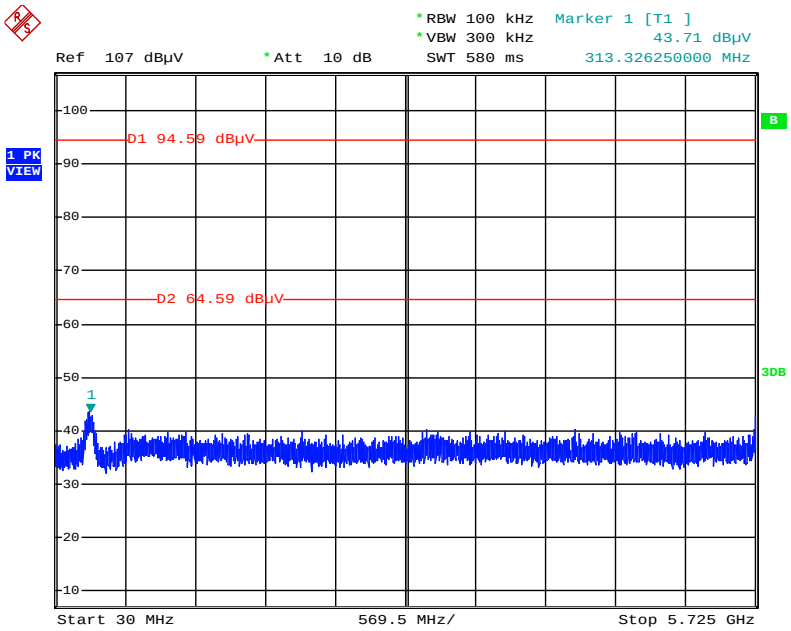
Date: 30.MAY.2014 23:27:37

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



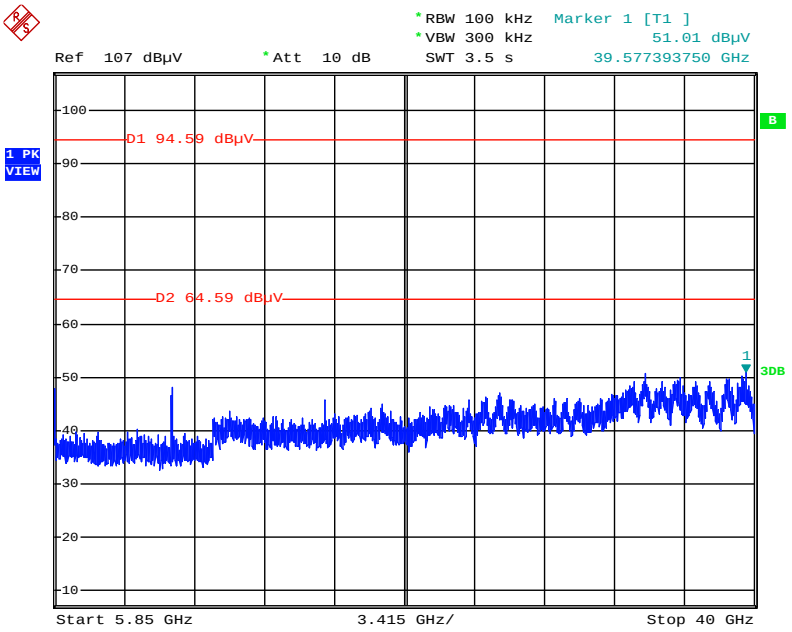
Date: 30.MAY.2014 23:26:03

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



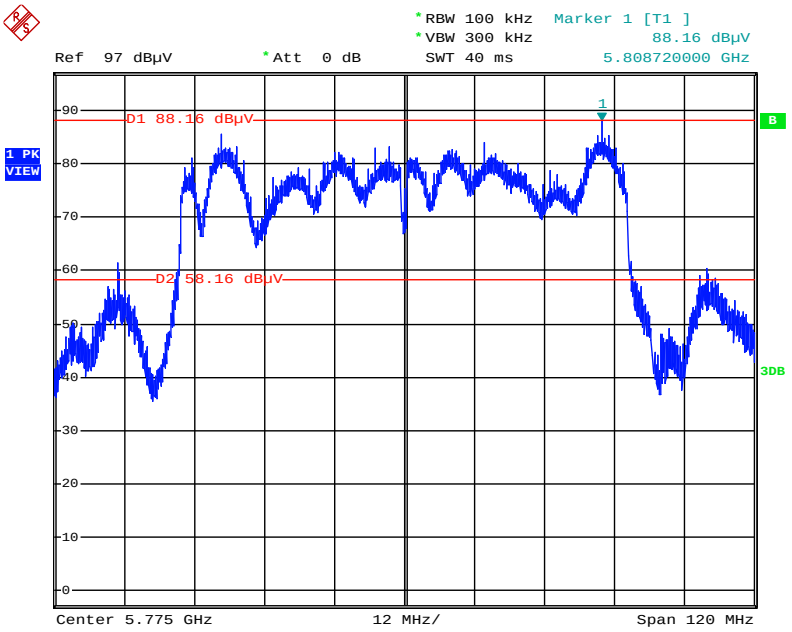
Date: 30.MAY.2014 23:24:49

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



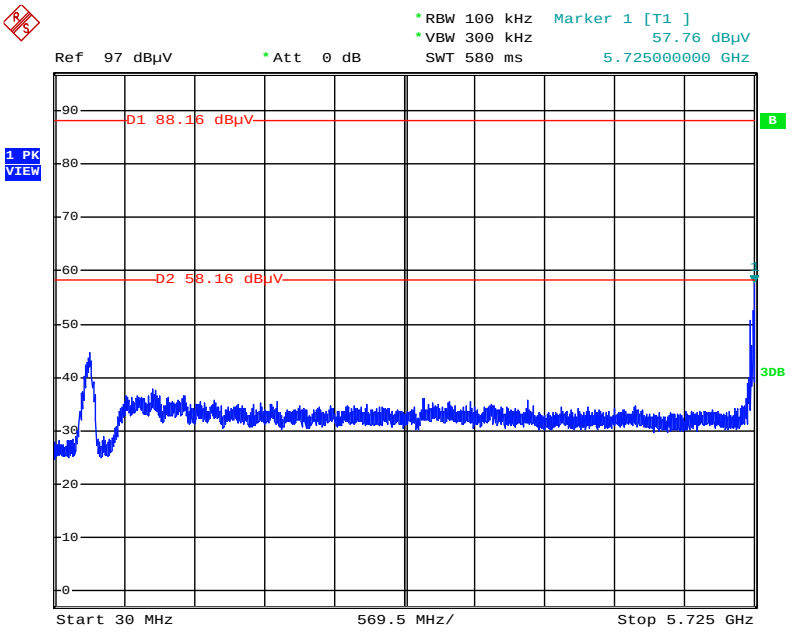
Date: 30.MAY.2014 23:25:13

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



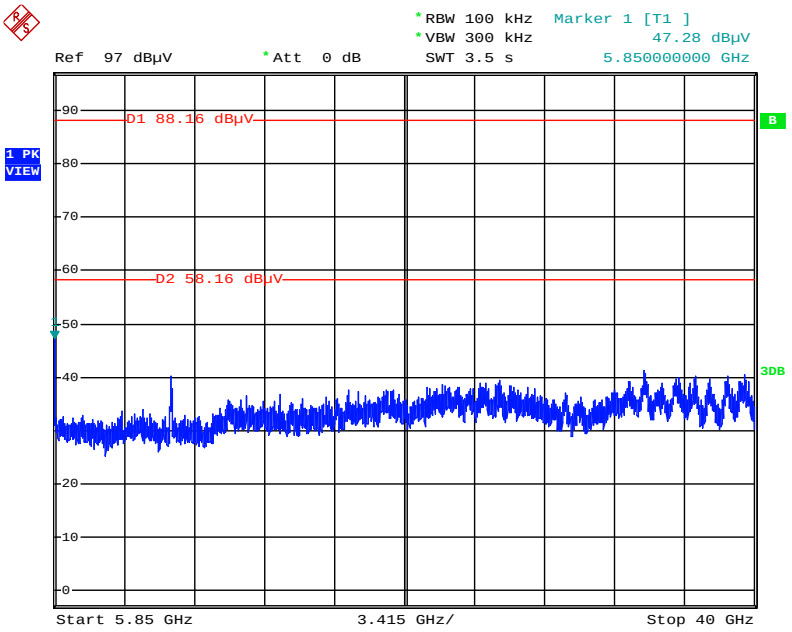
Date: 30.MAY.2014 23:32:26

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



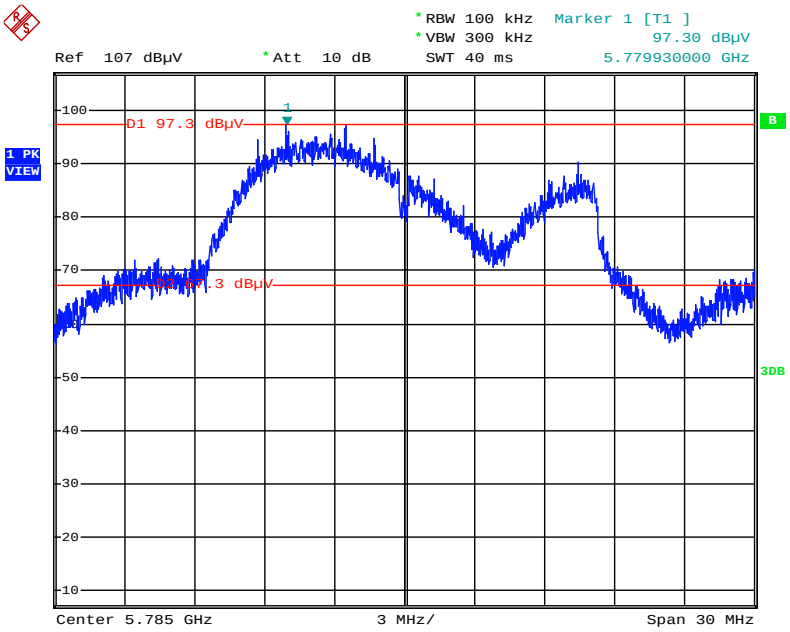
Date: 30.MAY.2014 23:34:54

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



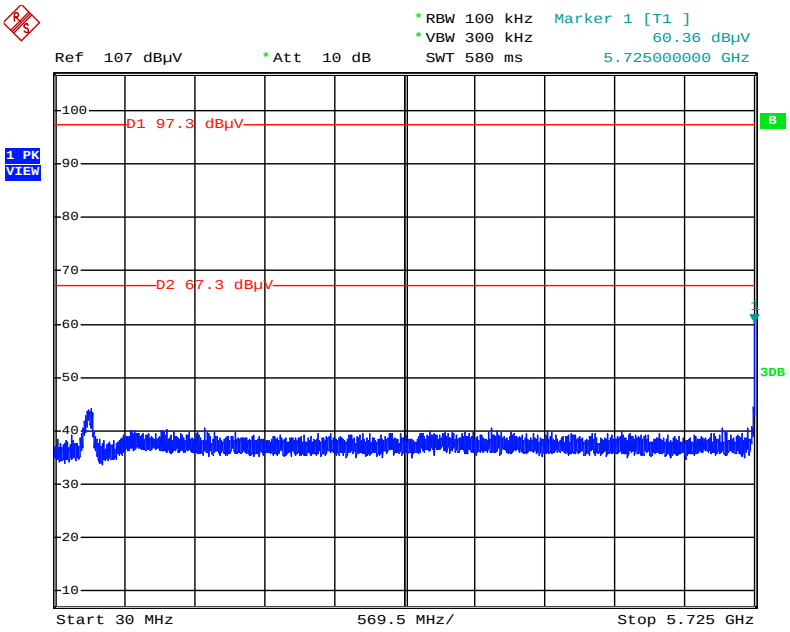
Date: 30.MAY.2014 23:35:35

Plot on Configuration IEEE 802.11a / Reference Level



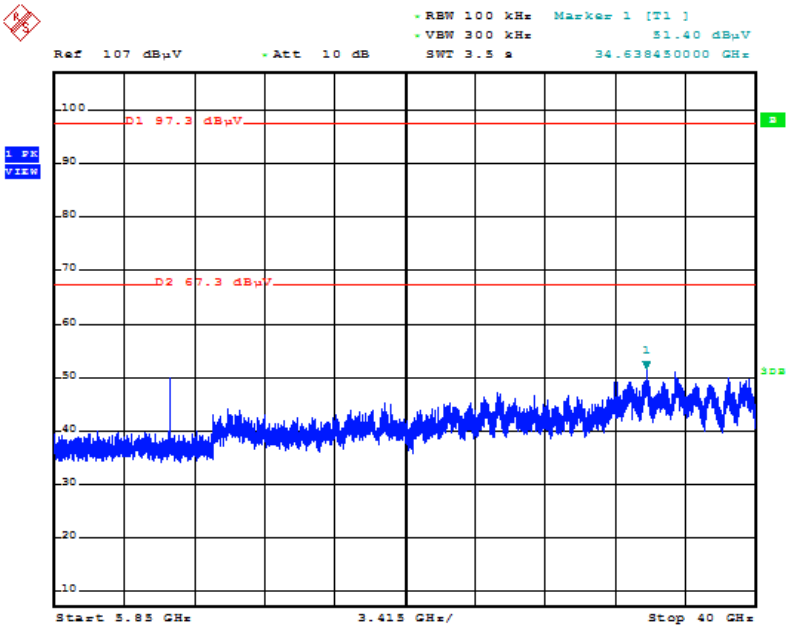
Date: 30.MAY.2014 23:05:35

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



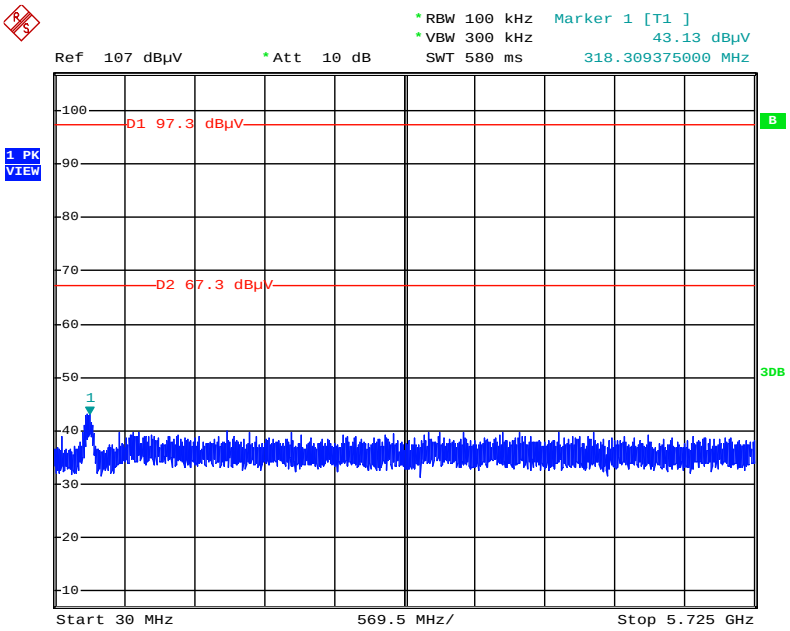
Date: 30.MAY.2014 23:08:30

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



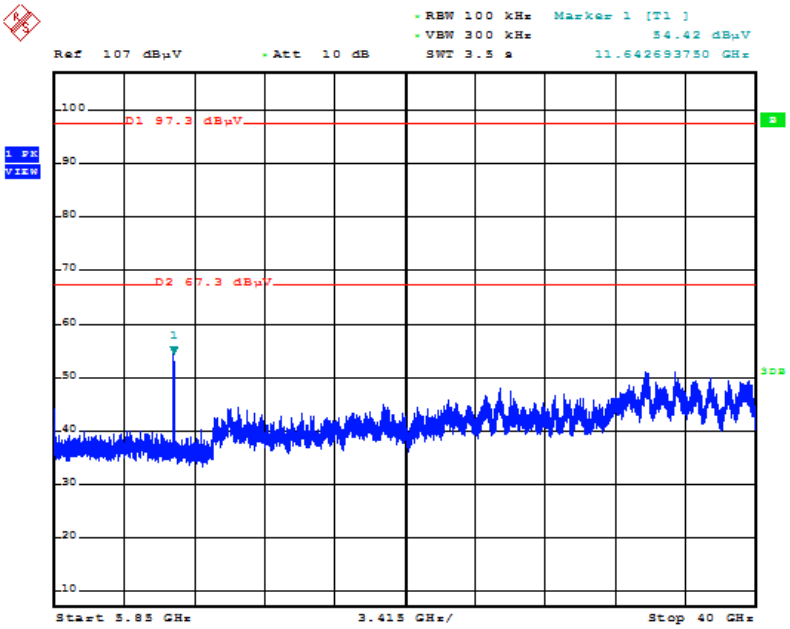
Date: 30.MAY.2014 23:10:39

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



Date: 30.MAY.2014 23:11:34

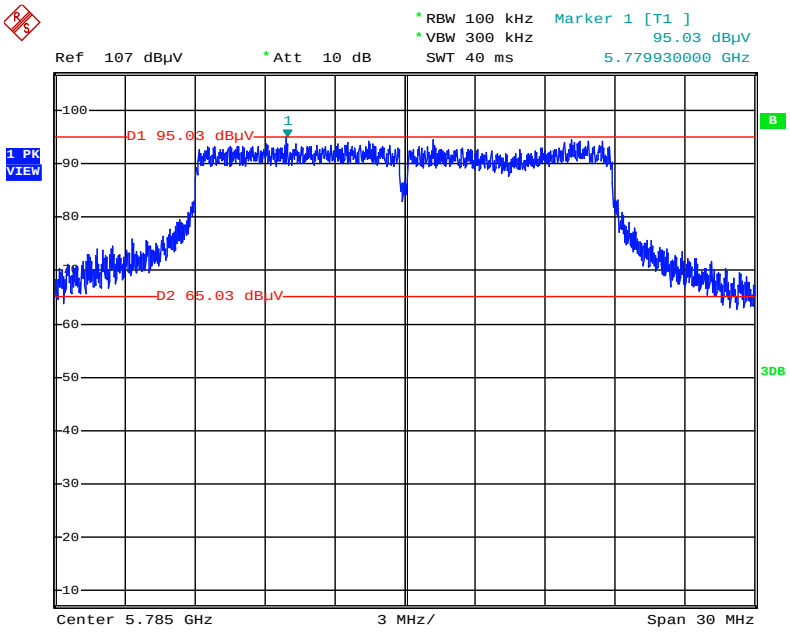
Plot on Configuration IEEE 802.11a / CH 165 / 5850MHz~40000MHz (down 30dBc)



Date: 30.MAY.2014 23:11:11

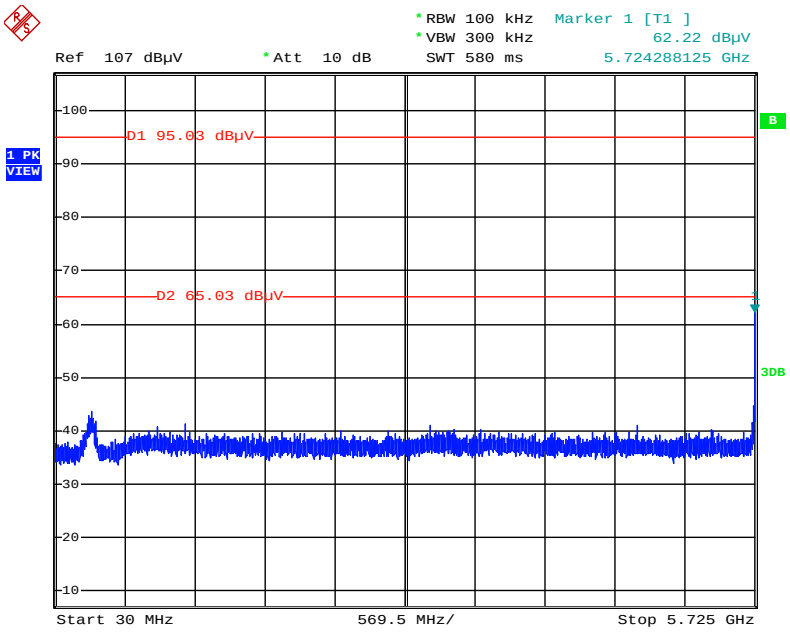
For beamforming mode:

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



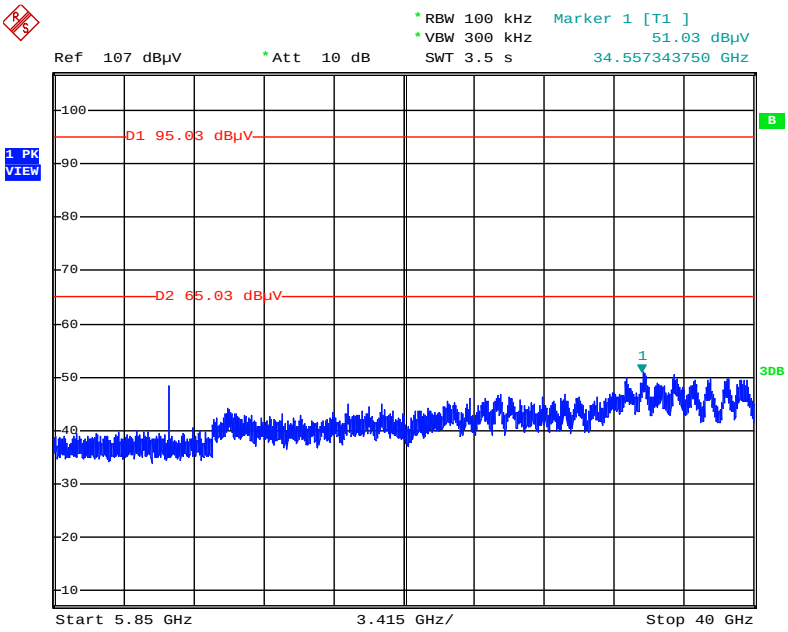
Date: 8.JUN.2014 13:47:08

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



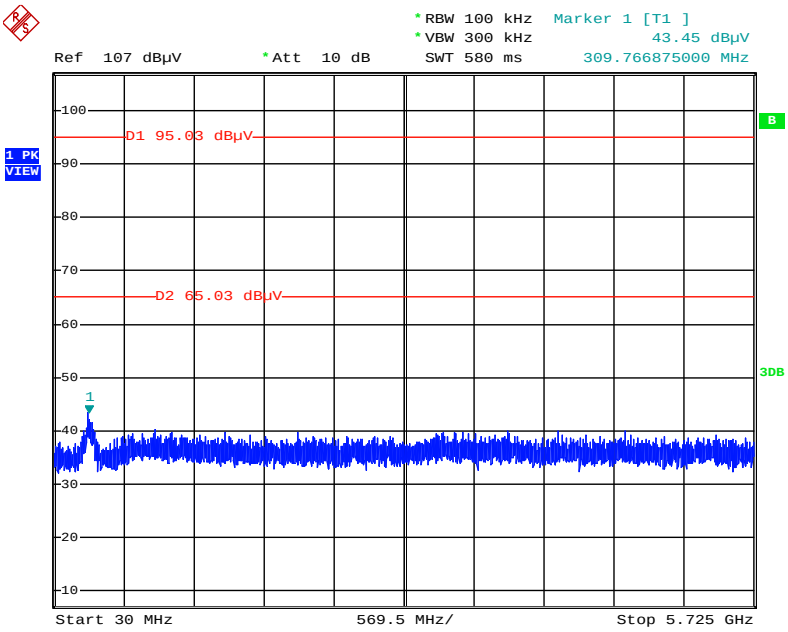
Date: 8.JUN.2014 13:48:38

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



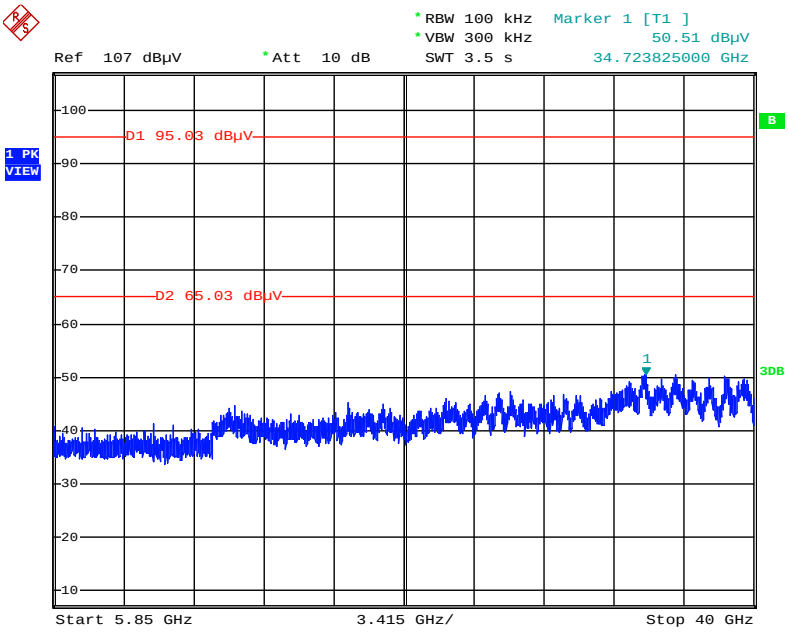
Date: 8.JUN.2014 13:49:11

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



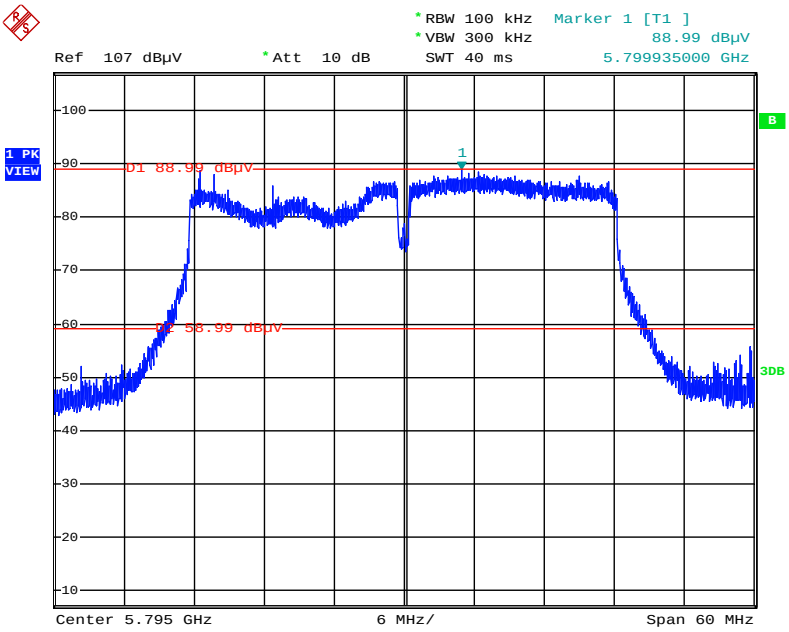
Date: 8.JUN.2014 13:52:46

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



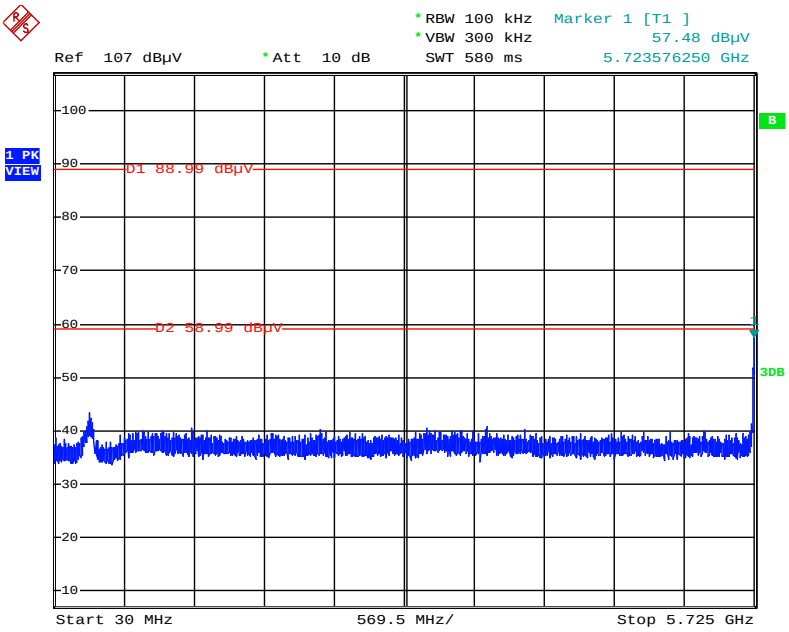
Date: 8.JUN.2014 13:52:17

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



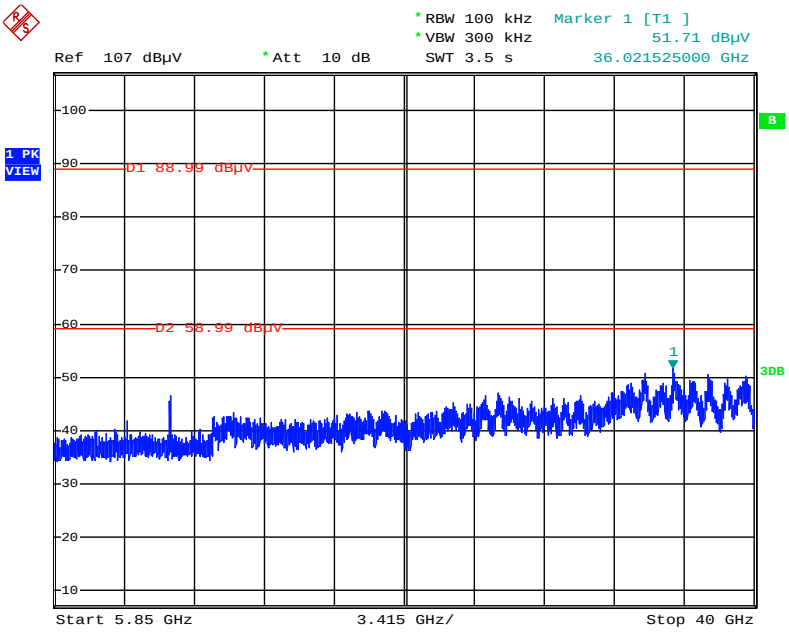
Date: 8.JUN.2014 14:41:42

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



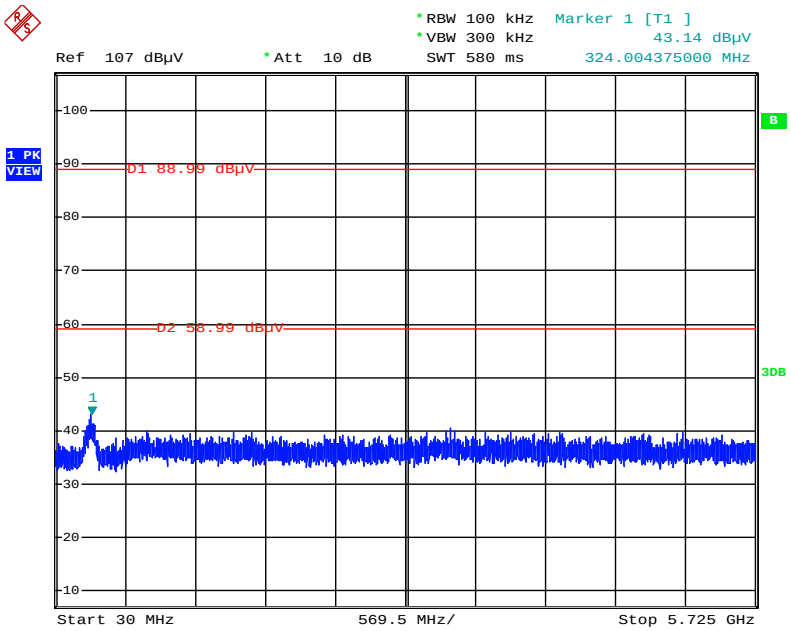
Date: 8.JUN.2014 14:49:35

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



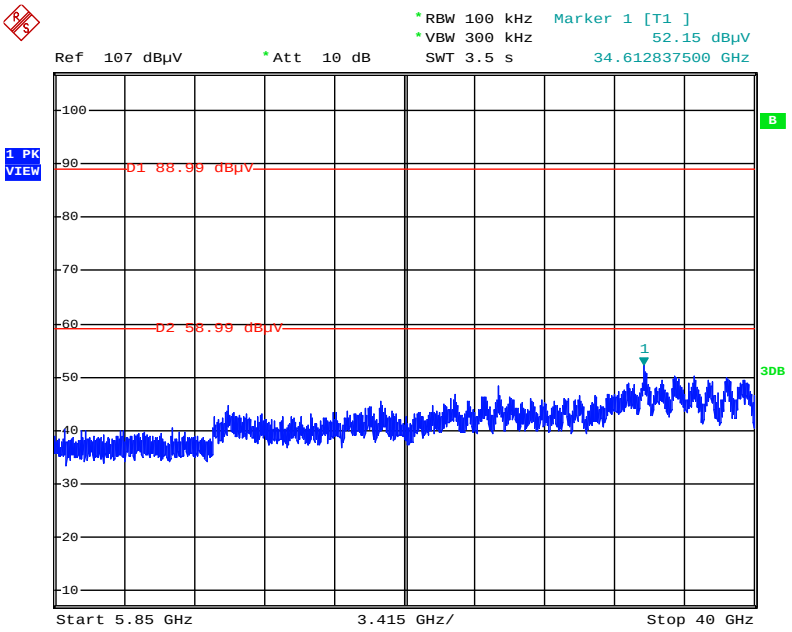
Date: 8.JUN.2014 14:45:49

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



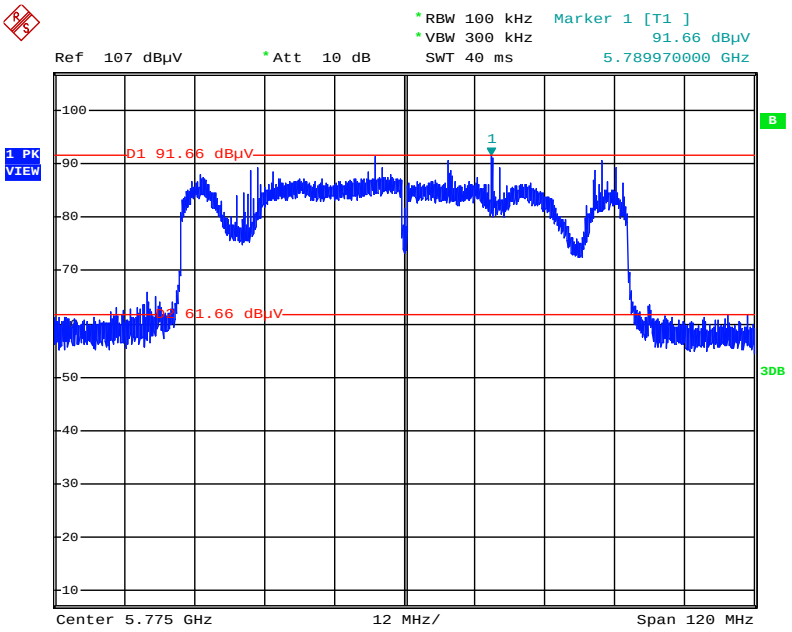
Date: 8.JUN.2014 14:42:09

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



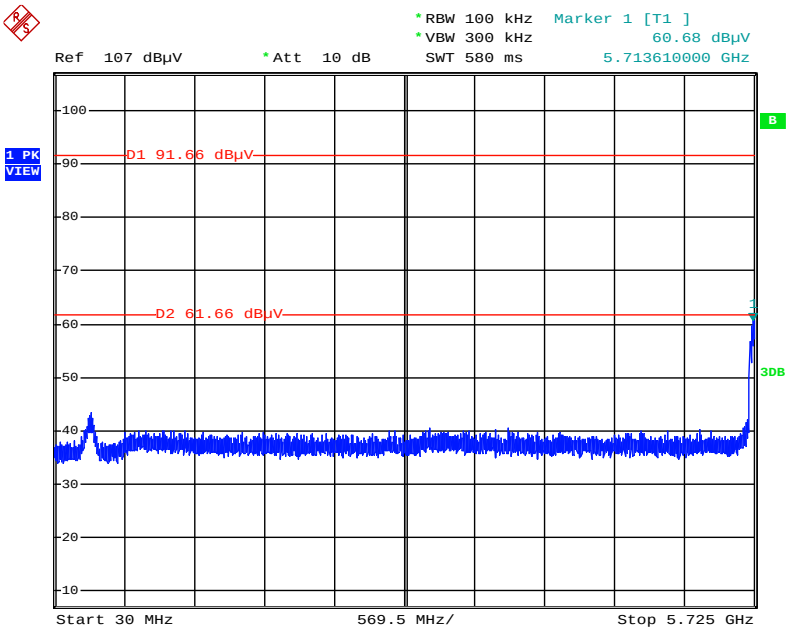
Date: 8.JUN.2014 14:42:43

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



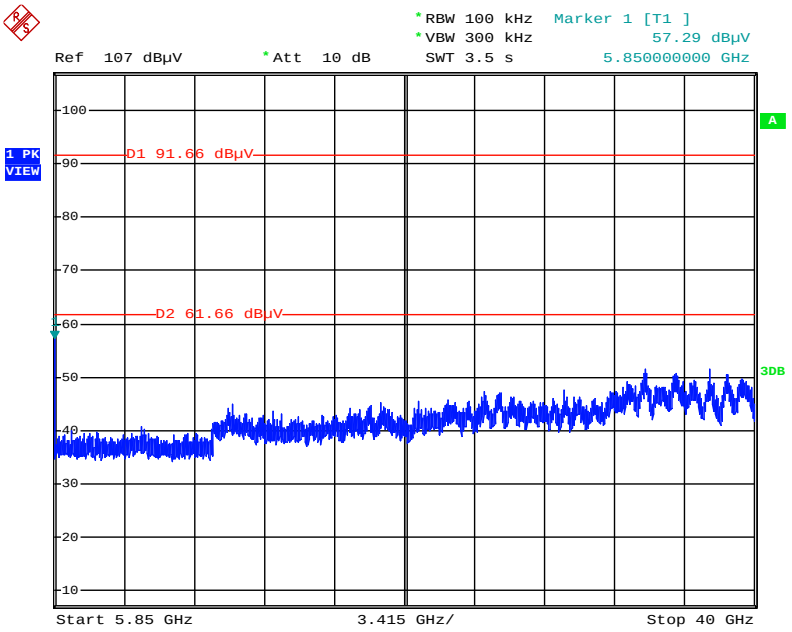
Date: 8.JUN.2014 15:45:16

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



Date: 8.JUN.2014 15:46:25

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



Date: 5.AUG.2014 00:21:17

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	9 kHz ~ 2.75 GHz	Apr. 23, 2014	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150 kHz ~ 100 MHz	Nov. 23, 2013	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127478	9kHz ~ 30MHz	Nov. 11, 2013	Conduction (CO01-CB)
Impulsbegrenzer Pulse Limiter	Rohde&Schwarz	ESH3-Z2	100430	9 kHz ~ 30 MHz	Feb. 25, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150 kHz ~ 30 MHz	Dec. 04, 2013	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112B	2928	30MHz ~ 2GHz	Dec. 27, 2013	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9 kHz - 30 MHz	Nov. 05, 2012*	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz~18GHz	Nov. 01, 2013	Radiation (03CH01-CB)
Horn Antenna	SCHWARZBEAK	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Dec. 17, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Nov. 12, 2013	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Dec. 16, 2013	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Oct. 23, 2013	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100019	9kHz~40GHz	Dec. 02, 2013	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Dec. 12, 2013	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO2000	N/A	1 m - 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz - 1 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-3	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-4	N/A	1 GHz - 40 GHz	Nov. 17, 2013	Radiation (03CH01-CB)
Signal analyzer	R&S	FSV40	100979	9kHz~40GHz	Nov. 29, 2013	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 03, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-7	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-8	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-9	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
RF Cable-high	Woken	High Cable-10	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
RF Cable-high	Woken	High Cable-11	-	1 GHz – 26.5 GHz	Nov. 17, 2013	Conducted (TH01-CB)
Power Sensor	Anritsu	MA2411B	0917223	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)
Power Meter	Anritsu	ML2495A	1035008	300MHz~40GHz	Sep. 18, 2013	Conducted (TH01-CB)

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

"*" Calibration Interval of instruments listed above is two years.

NCR means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
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%