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FCC RADIO TEST REPORT

Applicant's company	**Aerohive Networks Inc.**
Applicant Address	330 Gibraltar Drive, Sunnyvale, CA 94089, USA
FCC ID	**WBV-AP1130**
Manufacturer's company	**Wistron NeWeb Corporation**
Manufacturer Address	20 Park Avenue II, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C.

Product Name	Access Point
Brand Name	Aerohive
Model No.	AP1130
Test Rule Part(s)	47 CFR FCC Part 15 Subpart C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz
Received Date	Jul. 22, 2014
Final Test Date	Sep. 22, 2015
Submission Type	Class II Change

Statement

Test result included is only for the IEEE 802.11b/g, IEEE 802.11n and IEEE 802.11ac 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**, **KDB558074 D01 v03r03**, **KDB 662911 D01 v02r01**, **KDB644545 D01 v01r02**.

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

TAF
Testing Laboratory
1190

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR472301-02	Rev. 01	Initial issue of report	Oct. 21, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	Access Point
Brand Name	:	Aerohive
Model No.	:	AP1130
Applicant	:	Aerohive Networks 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 Jul. 22, 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	15.247(b)(3)	Maximum Conducted Output Power	Complies	6.18 dB
4.2	15.247(e)	Power Spectral Density	Complies	8.09 dB
4.3	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.4	15.247(d)	Radiated Emissions	Complies	3.49 dB
4.5	15.247(d)	Band Edge Emissions	Complies	0.13 dB
4.6	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	IEEE 802.11b: WLAN (1TX, 1RX) IEEE 802.11g: WLAN (1TX, 1RX) IEEE 802.11n/ac: WLAN (2TX, 2RX)
Radio Type	Intentional Transceiver
Power Type	From Power Adapter or PoE
Modulation	IEEE 802.11b: DSSS IEEE 802.11g: OFDM IEEE 802.11n/ac: see the below table
Data Modulation	IEEE 802.11b: DSSS (BPSK / QPSK / CCK) IEEE 802.11g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM)
Data Rate (Mbps)	IEEE 802.11b: DSSS (1/ 2/ 5.5/11) IEEE 802.11g: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n/ac: see the below table
Frequency Range	2400 ~ 2483.5MHz
Channel Number	11 for 20MHz bandwidth ; 7 for 40MHz bandwidth
Channel Band Width (99%)	**<For Non-Beamforming Mode>** IEEE 802.11b: 12.24 MHz IEEE 802.11g: 25.80 MHz
Maximum Conducted Output Power	**<For Non-Beamforming Mode>** IEEE 802.11b: 22.93 dBm IEEE 802.11g: 23.82 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/ac for 2.4 G/5GHz.

Antenna and Band width

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

IEEE 802.11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	2	MCS0-15
802.11ac (VHT20)	2	MCS 0-8/Nss1-2

Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT supports HT20 in 2.4GHz.

Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT supports VHT20 in 2.4GHz.

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

3.2. Accessories

N/A

3.3. Table for Filed Antenna

Set	Brand	Model Name	Antenna Type	Connector
1	WNC	Veab-n01	Diople Antenna	N Type
2	WNC	Veab-n01	Diople Antenna	N Type
3	KBT	TDJ-5158BKR X 2A-RZ1	Panel Antenna	N Type

Set	Antenna Gain (dBi)		Cable Loss (dBi)		True Gain (dBi)		Remark
	2.4GHz	5GHz	2.4GHz	5GHz	2.4GHz	5GHz	
1	4.38	-	-	-	4.38	-	P to M
2	-	5.5	-	-	-	5.5	
3	-	18	-	0.9	-	17.1	P to P

Note : 1. The EUT has three set antennas.

2. The panel antenna polarization one is Horizontal and the other one is Vertical. Thus panel antenna doesn't need to evaluate array gain.

3. This product will require professional installation.

<For 2.4GHz Band>

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

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

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

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

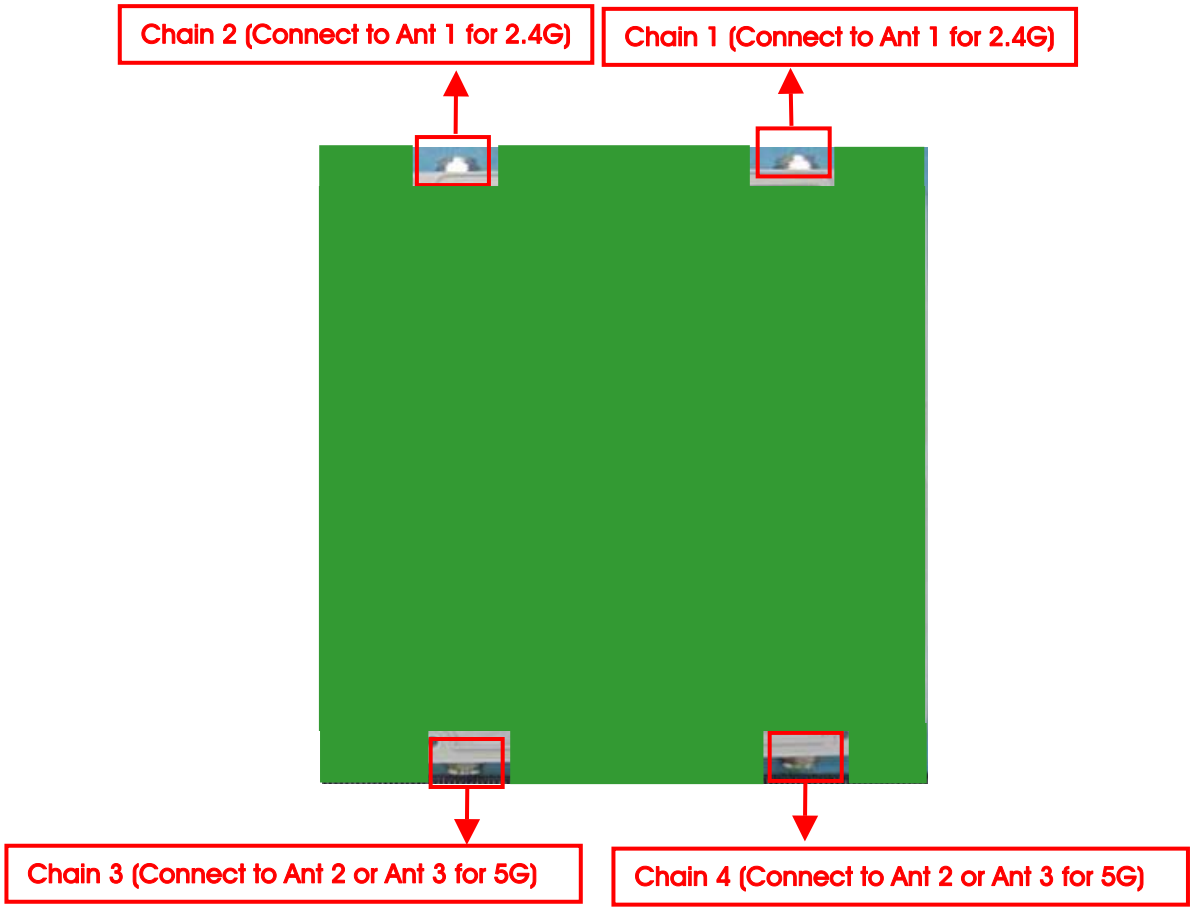
<For 5GHz Band>

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

Only Chain 3 can be used as transmitting/receiving antenna.

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

Both Chain 3 and Chain 4 could transmit/receive simultaneously.


Chain 2 (Connect to Ant 1 for 2.4G)
Chain 1 (Connect to Ant 1 for 2.4G)
Chain 3 (Connect to Ant 2 or Ant 3 for 5G)
Chain 4 (Connect to Ant 2 or Ant 3 for 5G)

3.4. Table for Carrier Frequencies

There is one bandwidth system.

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

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
2400~2483.5MHz	1	2412 MHz	7	2442 MHz
	2	2417 MHz	8	2447 MHz
	3	2422 MHz	9	2452 MHz
	4	2427 MHz	10	2457 MHz
	5	2432 MHz	11	2462 MHz
	6	2437 MHz	-	-

3.5. Table for Test Modes

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

Test Items	Mode	Data Rate	Channel	Chain
Maximum Conducted Output Power	**For Non-Beamforming Mode**			
	11b/CCK	1 Mbps	1/11	1
	11g/BPSK	6 Mbps	1/6	1
Power Spectral Density	**For Non-Beamforming Mode**			
	11b/CCK	1 Mbps	1/11	1
	11g/BPSK	6 Mbps	1/6	1
6dB Spectrum Bandwidth	**For Non-Beamforming Mode**			
	11b/CCK	1 Mbps	1/11	1
	11g/BPSK	6 Mbps	1/6	1
Radiated Emissions Below 1GHz	CTX	-	-	-
Radiated Emissions Above 1GHz	**For Non-Beamforming Mode**			
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11ac VHT20	MCS0/Nss1	1/6/11	1+2
	For Beamforming Mode			
	11ac VHT20	MCS0/Nss1	1/6/11	1+2
Band Edge Emissions	**For Non-Beamforming Mode**			
	11b/CCK	1 Mbps	1/6/11	1
	11g/BPSK	6 Mbps	1/6/11	1
	11ac VHT20	MCS0/Nss1	1/6/11	1+2
	For Beamforming Mode			
	11ac VHT20	MCS0/Nss1	1/6/11	1+2

Note 1: There are two modes of EUT, one is beamforming mode, and the other is non-beamforming mode for 802.11n/ac in 2.4GHz, Beamforming mode and non-beamforming mode has been test and record in this test report.

Note 2: VHT20 covers HT20, due to same modulation. The power setting for 802.11n HT20 is the same or lower than 802.11ac VHT20.

The following test modes were performed for all tests:

For Radiated Emission test <Below 1GHz>:

Mode 1. CTX - EUT in Y axis + PoE (9001GO)

For Radiated Emission test <Above 1GHz>:

Mode 1. CTX - EUT in Y axis + Ant. 1 (2.4GHz)

Note1: The PoE is for measurement only, would not be marketed.

The PoE information as below:

Power	Brand	Model
PoE	PowerDsine	9001GO

Note2: All the specification of test configurations and test modes were based on customer's request.

3.6. Table for Testing Locations

Test Site Location				
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.			
TEL:	886-3-656-9065			
FAX:	886-3-656-9085			
Test Site No.	**Site Category**	**Location**	**FCC Reg. No.**	**IC File No.**
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

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

3.7. Table for Class II Change

This product is an extension of original one reported under Sporton project number: FR472301AA

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

Item	2.4G Filter Information			Performance Checking
	Brand No.	Model name	Specification of Filter	
Original	AVAGO	ACPF-7124-TR1	Attenuation, 800-2300 MHz	1. Radiated Emissions (1GHz~10th Harmonic) 2. Band Edge Emissions
Additional	MAGLAYERS	LTB-2012-2G4H6-F14	30 dB min. at 824 ~ 915 MHz 30 dB min. at 1545 ~ 1605 MHz 35 dB min. at 1710 ~ 1990 MHz 30 dB min. at 4800 ~ 5000 MHz	

Note1: The above test items will be based on original output power to re-test.

Note2: Configuration IEEE 802.11b Channel 1, 11 / IEEE 802.11g Channel 1, 6 power reduced due to limitation of Band Edge Emissions, so the Maximum Conducted Output Power Measurement、Power Spectral Density Measurement and 6dB Spectrum Bandwidth Measurement were retested.

3.8. Table for Supporting Units

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

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
PoE	PowerDsine	9001GO	N/A

<For Non-Beamforming Mode>

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

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
PoE	PowerDsine	9001GO	N/A

<For Beamforming Mode>

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

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
Notebook	DELL	E4300	DoC
WLAN ac Dongle	Belkin	F9L1106v1	K7SF9L1106V1
PoE	PowerDsine	9001GO	N/A

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC
PoE	PowerDsine	9001GO	N/A

3.9. Table for Parameters of Test Software Setting

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

<For Non-Beamforming Mode>

Test Software Version	Putty ver 0.62.0.0		
Mode	Test Frequency (MHz)		
	NCB: 20MHz		
	2412 MHz	2437 MHz	2462 MHz
802.11b	87	-	88
802.11g	72	93	-

3.10. 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%

3.11. Duty Cycle

For non-beamforming mode:

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11b	1.000	1.000	100.00%	0.00	0.01
802.11g	2.058	2.159	95.30%	0.21	0.49
802.11ac MCS0/Nss1 VHT20	1.935	2.022	95.70%	0.19	0.52

For beamforming mode:

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11ac MCS0/Nss1 VHT20	3.836	3.939	97.38%	0.12	0.26

3.12. Maximum Conducted Output Power for original report

<For Non-Beamforming Mode>

Configuration IEEE 802.11b / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	23.52	30.00	Complies
6	2437 MHz	25.29	30.00	Complies
11	2462 MHz	23.11	30.00	Complies

Configuration IEEE 802.11g / Chain 1

Channel	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
1	2412 MHz	18.41	30.00	Complies
6	2437 MHz	24.28	30.00	Complies
11	2462 MHz	17.55	30.00	Complies

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		
1	2412 MHz	15.38	15.49	18.45	30.00	Complies
6	2437 MHz	23.15	23.04	26.11	30.00	Complies
11	2462 MHz	15.96	15.83	18.91	30.00	Complies

<For Beamforming Mode>

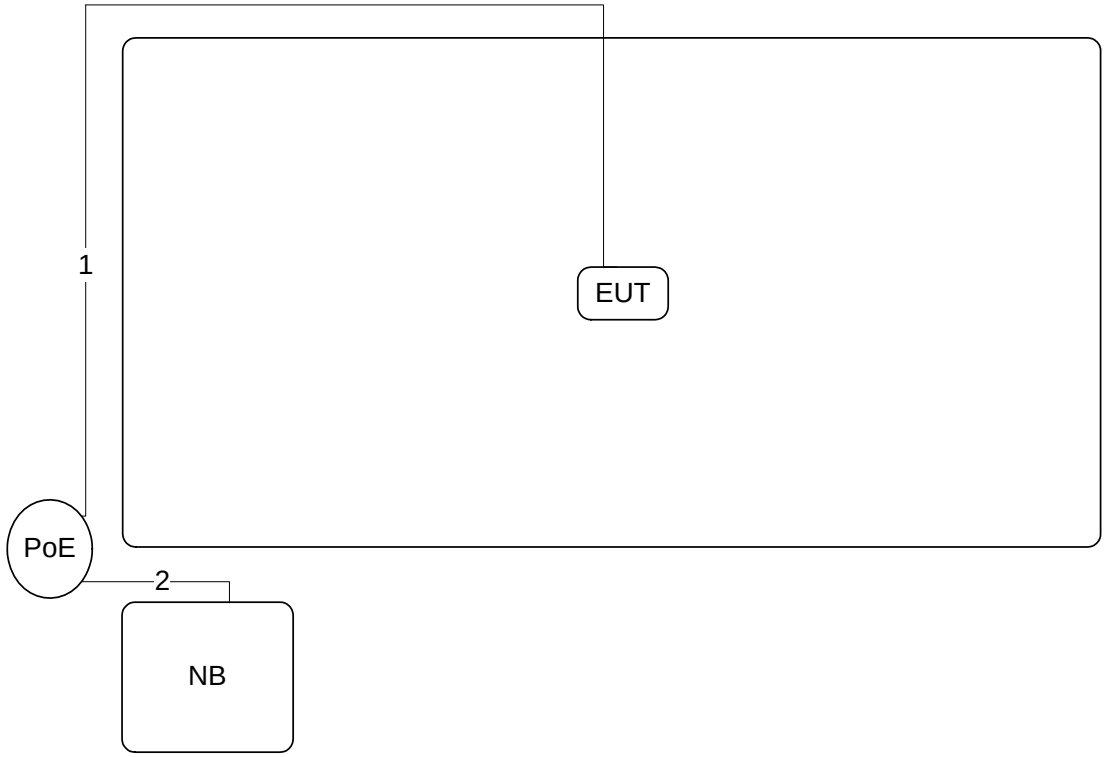
Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 1+Chain 2

Channel	Frequency	Conducted Power (dBm)			Max. Limit (dBm)	Result
		Chain 1	Chain 2	Total		
1	2412 MHz	12.96	12.84	15.91	28.61	Complies
6	2437 MHz	22.55	22.48	25.53	28.61	Complies
11	2462 MHz	12.79	12.68	15.75	28.61	Complies

3.13. Test Configurations

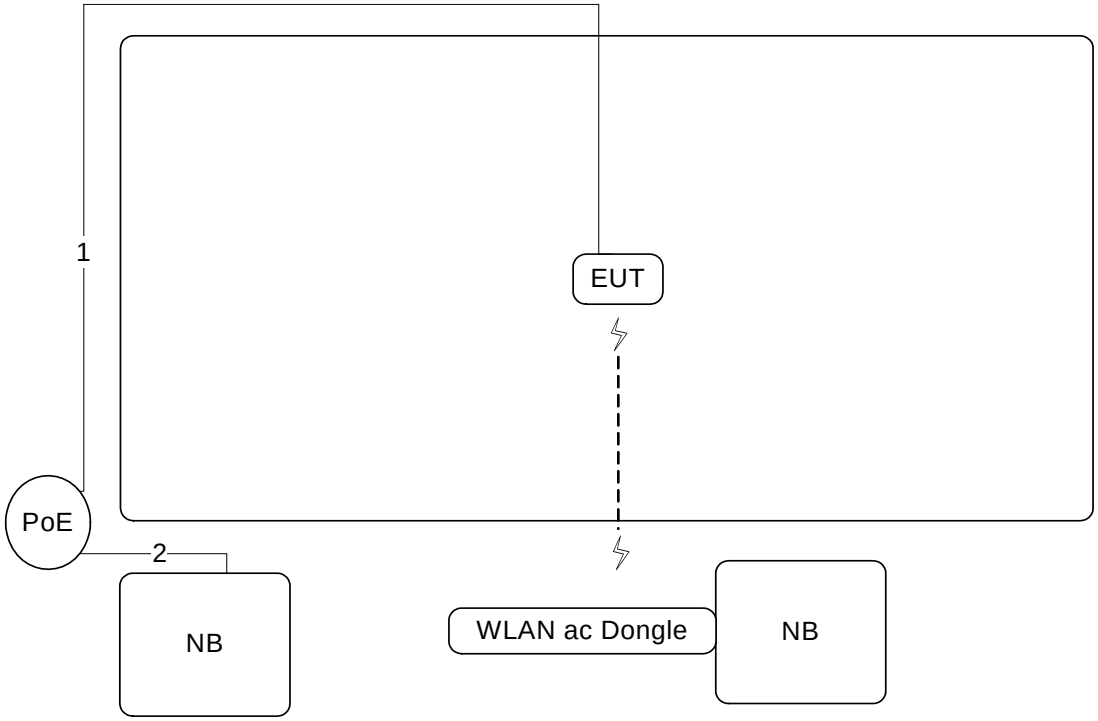
3.13.1. Radiation Emissions Test Configuration

Test Configuration: 30MHz~1GHz and above 1GHz <For Non-Beamforming Mode>



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

Test Configuration: above 1GHz <For Beamforming Mode>



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

4. TEST RESULT

4.1. Maximum Conducted Output Power Measurement

4.1.1. Limit

The limit for output power is 30dBm.

4.1.2. Measuring Instruments and Setting

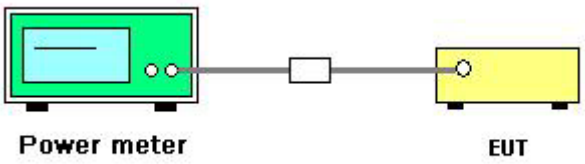
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	Average

4.1.3. Test Procedures

1. Test procedures refer KDB558074 D01 v03r03 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.

4.1.4. Test Setup Layout



4.1.5. Test Deviation

There is no deviation with the original standard.

4.1.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.1.7. Test Result of Maximum Conducted Output Power

Temperature	25°C	Humidity	45%
Test Engineer	Andy Tsai	Test Date	Sep. 22, 2015

<For Non-Beamforming Mode>

Mode	Frequency	Conducted Power (dBm)	Max. Limit (dBm)	Result
		Chain 1		
802.11b	2412 MHz	22.28	30.00	Complies
	2462 MHz	22.93	30.00	Complies
802.11g	2412 MHz	17.12	30.00	Complies
	2437 MHz	23.82	30.00	Complies

4.2. Power Spectral Density Measurement

4.2.1. 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.

4.2.2. Measuring Instruments and Setting

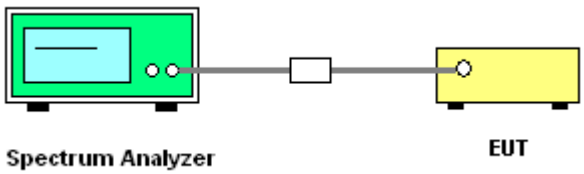
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.2.3. Test Procedures

1. Test was performed in accordance with KDB558074 D01 v03r03 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.

4.2.4. 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 Power Spectral Density

Temperature	25°C	Humidity	45%
Test Engineer	Andy Tsai		

<For Non-Beamforming Mode>

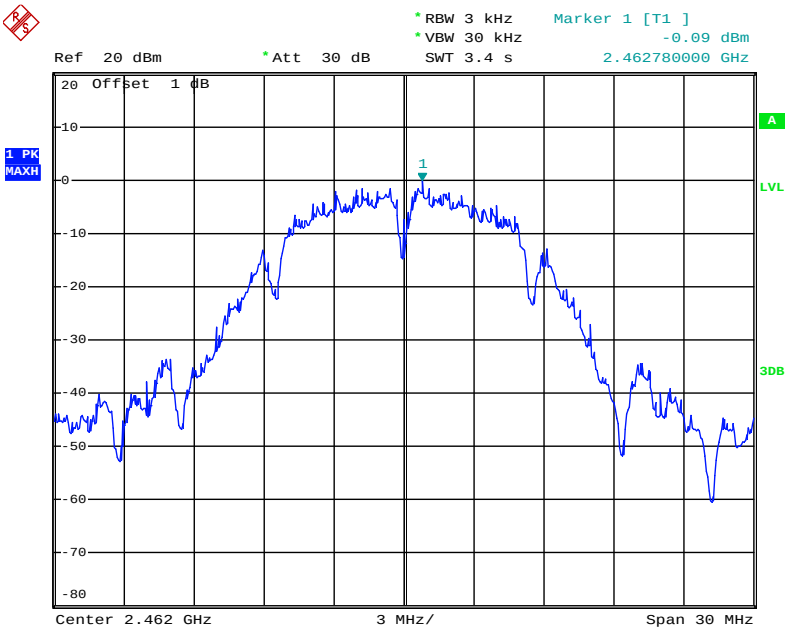
Mode	Frequency	Power Density (dBm/3kHz)	Power Density Limit (dBm/3kHz)	Result
		Chain 1		
802.11b	2412 MHz	-0.41	8.00	Complies
	2462 MHz	-0.09	8.00	Complies
802.11g	2412 MHz	-8.57	8.00	Complies
	2437 MHz	-2.85	8.00	Complies

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

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

<For Non-Beamforming Mode>

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



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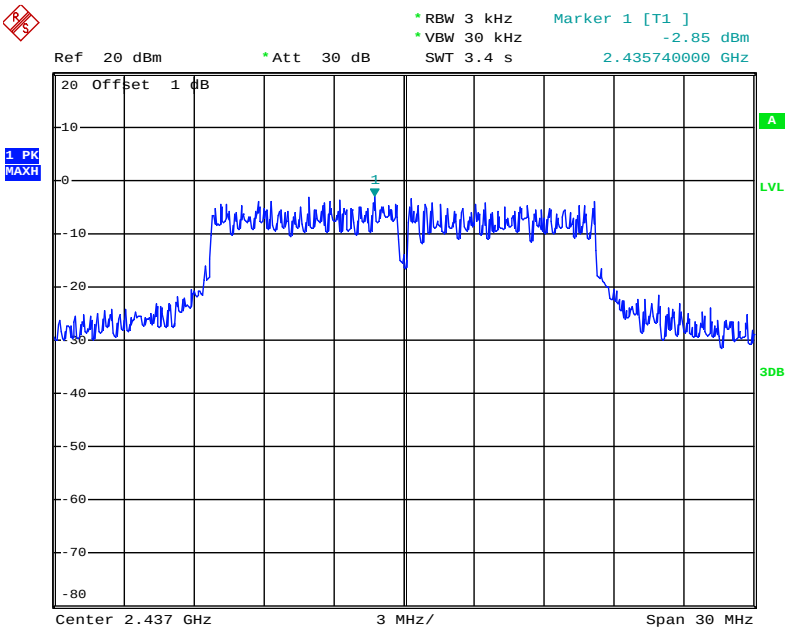
Power Density Plot on Configuration IEEE 802.11g / 2437 MHz / Chain 1



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4.3. 6dB Spectrum Bandwidth Measurement

4.3.1. Limit

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

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 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

4.3.3. 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 KDB558074 D01 v03r03 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.

4.3.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

This test setup layout is the same as that shown in section 4.4.4.

4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of 6dB Spectrum Bandwidth

Temperature	25°C	Humidity	45%
Test Engineer	Andy Tsai		

<For Non-Beamforming Mode>

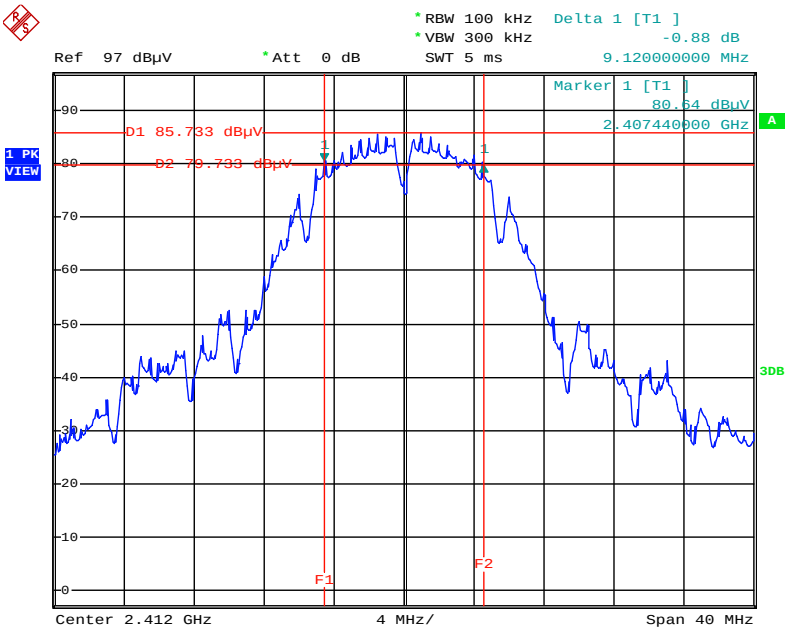
Mode	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11b	2412 MHz	9.12	12.24	500	Complies
	2462 MHz	9.12	12.24	500	Complies
802.11g	2412 MHz	16.40	17.04	500	Complies
	2437 MHz	16.32	25.80	500	Complies

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 802.11b / 2412 MHz / Chain 1



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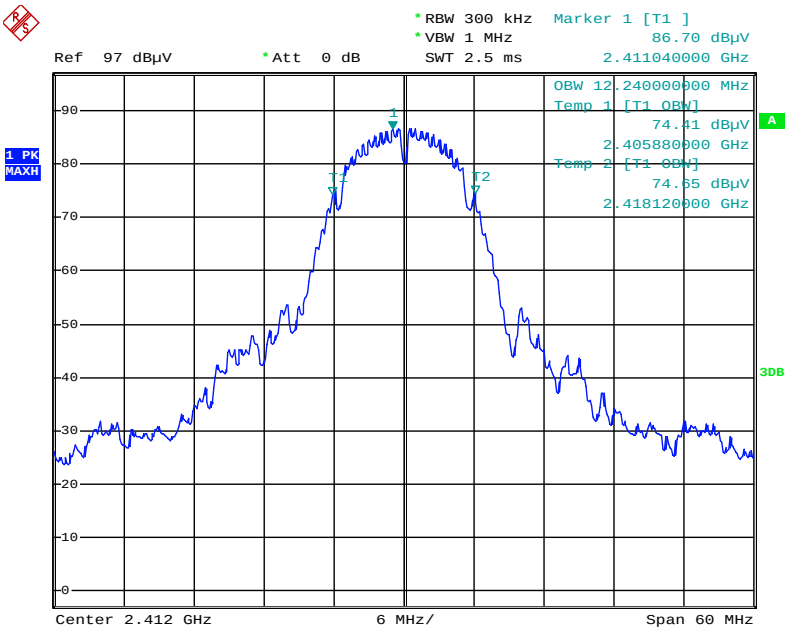
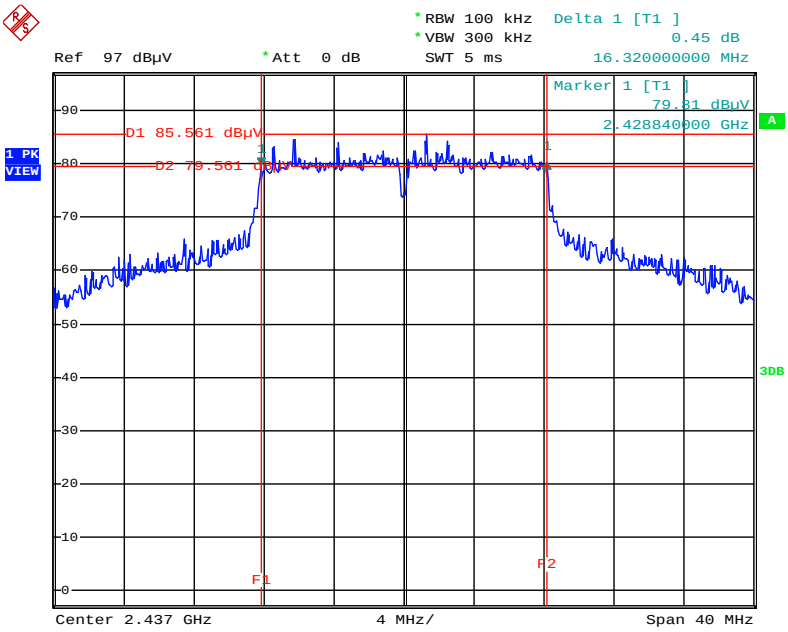
99% Occupied Bandwidth Plot on Configuration IEEE 802.11b / 2412 MHz / Chain 1



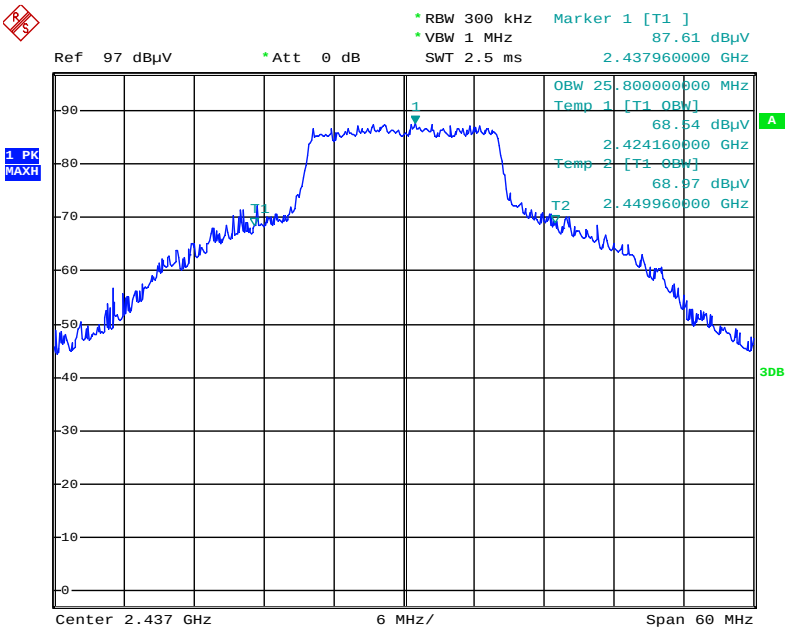
Date: 22.SEP.2015 02:41:53

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



Date: 22.SEP.2015 02:55:57

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



Date: 22.SEP.2015 02:44:31

4.4. Radiated Emissions Measurement

4.4.1. 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

4.4.2. Measuring Instruments and Setting

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

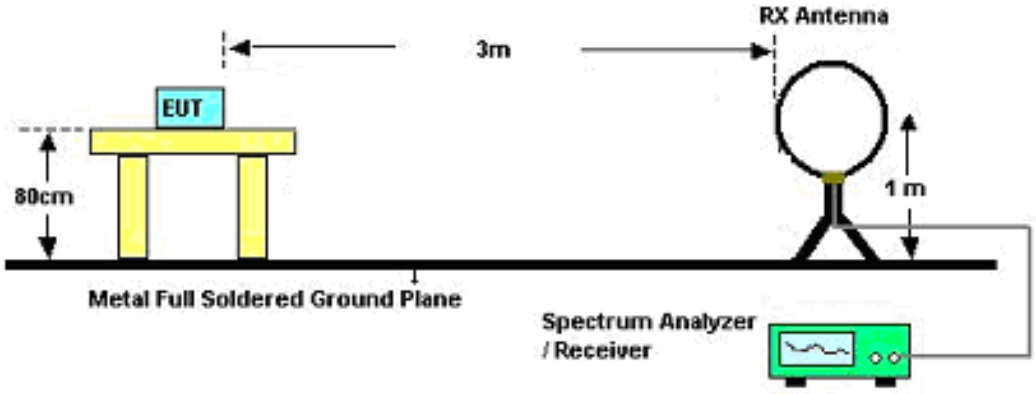
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1GHz / RBW 120kHz for QP

4.4.3. Test Procedures

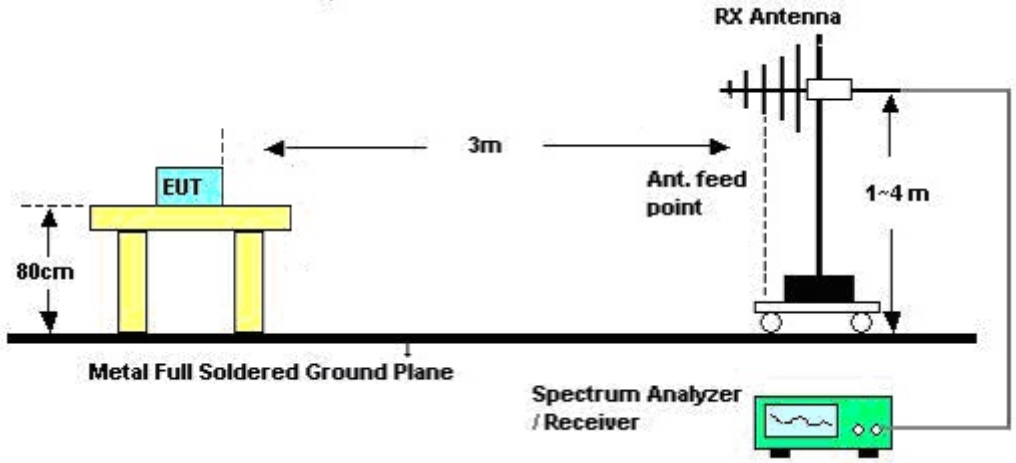
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting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

4.4.4. Test Setup Layout

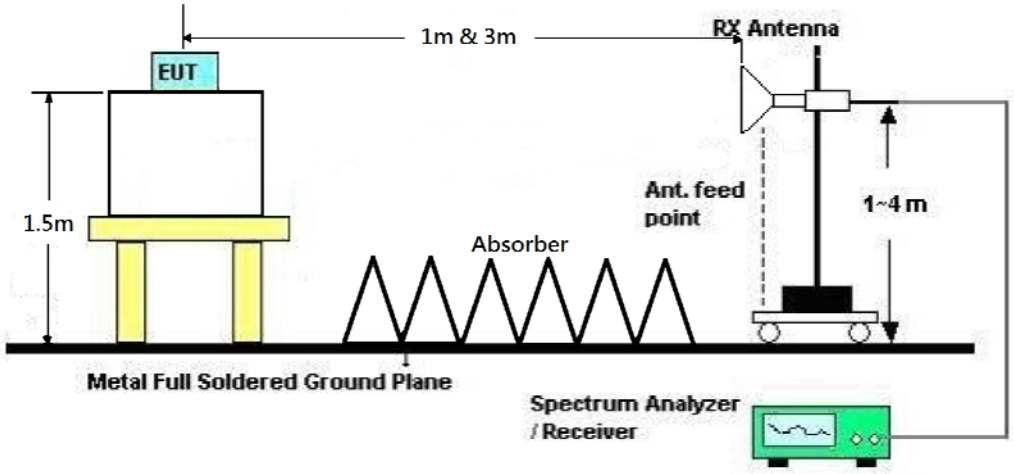
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. 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.

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

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	CTX
Test Date	Sep. 21, 2015		

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.

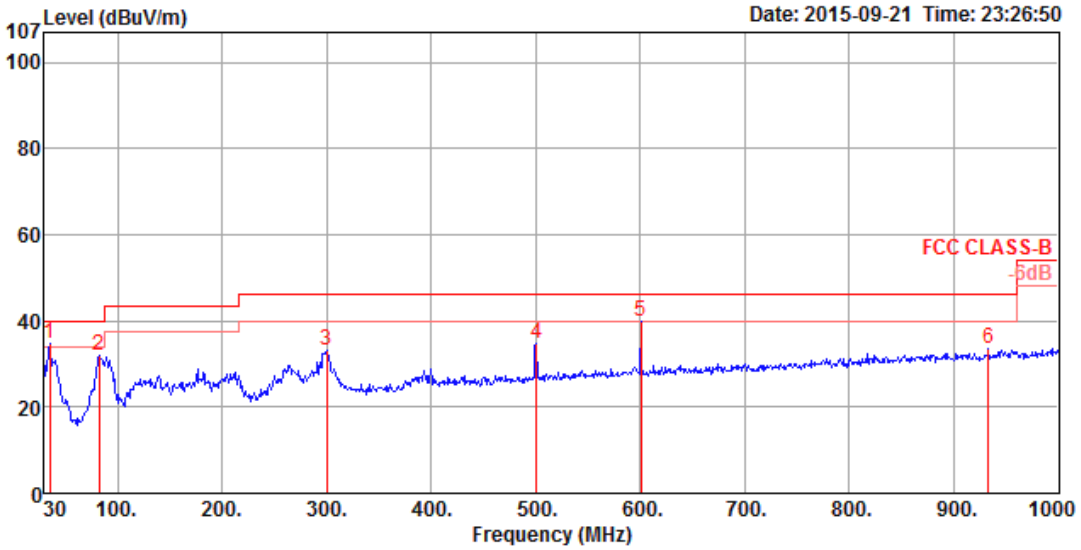
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

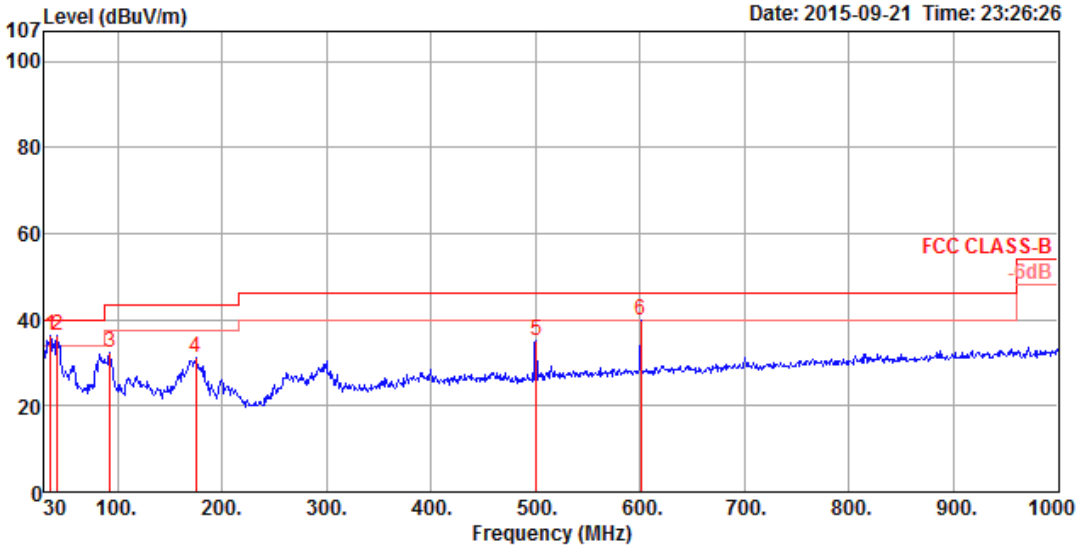
Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	CTX

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	34.85	34.57	40.00	-5.43	49.52	0.62	32.64	17.07	HORIZONTAL	48	125	Peak
2	82.38	31.78	40.00	-8.22	55.47	0.91	32.59	7.99	HORIZONTAL	66	200	Peak
3	299.66	33.22	46.00	-12.78	50.15	1.71	32.52	13.88	HORIZONTAL	221	100	Peak
4	500.45	34.63	46.00	-11.37	47.20	2.21	32.61	17.83	HORIZONTAL	137	150	Peak
5	600.36	39.97	46.00	-6.03	51.26	2.40	32.69	19.00	HORIZONTAL	130	125	Peak
6	933.07	33.60	46.00	-12.40	40.38	3.04	31.62	21.80	HORIZONTAL	357	150	Peak

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	35.82	36.51	40.00	-3.49	52.05	0.63	32.64	16.47	VERTICAL	276	100	Peak
2	42.61	36.37	40.00	-3.63	55.76	0.68	32.63	12.56	VERTICAL	359	100	Peak
3	93.05	32.38	43.50	-11.12	54.17	0.96	32.58	9.83	VERTICAL	276	100	Peak
4	174.53	31.08	43.50	-12.42	52.40	1.29	32.55	9.94	VERTICAL	334	100	Peak
5	500.45	35.31	46.00	-10.69	47.88	2.21	32.61	17.83	VERTICAL	154	100	Peak
6	600.36	39.84	46.00	-6.16	51.13	2.40	32.69	19.00	VERTICAL	168	150	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.

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

<For Non-Beamforming Mode>

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11b CH 1 / Chain 1
Test Date	Sep. 15, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.72	46.93	74.00	-27.07	43.39	5.38	32.55	34.39	149	58	HORIZONTAL	Peak
2	4823.92	34.05	54.00	-19.95	30.51	5.38	32.55	34.39	149	58	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.92	36.84	54.00	-17.16	33.30	5.38	32.55	34.39	154	170	VERTICAL	Average
2	4823.98	47.11	74.00	-26.89	43.57	5.38	32.55	34.39	154	170	VERTICAL	Peak

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11b CH 6 / Chain 1
Test Date	Sep. 15, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4873.97	35.91	54.00	-18.09	32.23	5.40	32.66	34.38	236	296	HORIZONTAL	Average
2	4874.96	47.67	74.00	-26.33	43.99	5.40	32.66	34.38	236	296	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	4873.94	49.49	74.00	-24.51	45.81	5.40	32.66	34.38	151	162	VERTICAL	Peak
2	4873.97	42.95	54.00	-11.05	39.27	5.40	32.66	34.38	151	162	VERTICAL	Average

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11b CH 11 / Chain 1
Test Date	Sep. 15, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4923.33	46.66	74.00	-27.34	42.87	5.42	32.74	34.37	257	130	HORIZONTAL	Peak
2	4924.00	33.91	54.00	-20.09	30.10	5.42	32.76	34.37	257	130	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	4923.98	35.92	54.00	-18.08	32.11	5.42	32.76	34.37	264	353	VERTICAL	Average
2	4923.99	46.40	74.00	-27.60	42.59	5.42	32.76	34.37	264	353	VERTICAL	Peak

Temperature	25℃	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11g CH 1 / Chain 1
Test Date	Sep. 15, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.57	46.33	74.00	-27.67	42.79	5.38	32.55	34.39	153	332	HORIZONTAL	Peak
2	4823.59	32.58	54.00	-21.42	29.04	5.38	32.55	34.39	153	332	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.11	45.54	74.00	-28.46	42.00	5.38	32.55	34.39	155	69	VERTICAL	Peak
2	4823.88	32.56	54.00	-21.44	29.02	5.38	32.55	34.39	155	69	VERTICAL	Average

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11g CH 6 / Chain 1
Test Date	Sep. 15, 2015		

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	4874.68	33.13	54.00	-20.87	29.45	5.40	32.66	34.38	188	285	HORIZONTAL	Average
2	4874.86	46.07	74.00	-27.93	42.39	5.40	32.66	34.38	188	285	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	4873.56	45.70	74.00	-28.30	42.02	5.40	32.66	34.38	155	331	VERTICAL	Peak
2	4874.86	33.24	54.00	-20.76	29.56	5.40	32.66	34.38	155	331	VERTICAL	Average

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11g CH 11 / Chain 1
Test Date	Sep. 15, 2015		

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	4924.29	32.76	54.00	-21.24	28.95	5.42	32.76	34.37	141	215	HORIZONTAL	Average
2	4924.74	45.57	74.00	-28.43	41.76	5.42	32.76	34.37	141	215	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	4924.48	45.88	74.00	-28.12	42.07	5.42	32.76	34.37	254	60	VERTICAL	Peak
2	4924.54	32.62	54.00	-21.38	28.81	5.42	32.76	34.37	254	60	VERTICAL	Average

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 1 / Chain 1 + Chain 2
Test Date	Sep. 15, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.63	46.13	74.00	-27.87	42.59	5.38	32.55	34.39	198	144	HORIZONTAL	Peak
2	4824.49	32.49	54.00	-21.51	28.95	5.38	32.55	34.39	198	144	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.84	46.10	74.00	-27.90	42.56	5.38	32.55	34.39	171	180	VERTICAL	Peak
2	4823.86	32.54	54.00	-21.46	29.00	5.38	32.55	34.39	171	180	VERTICAL	Average

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 6 / Chain 1 + Chain 2
Test Date	Sep. 15, 2015		

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	4874.48	33.20	54.00	-20.80	29.52	5.40	32.66	34.38	155	232	HORIZONTAL	Average
2	4874.86	45.89	74.00	-28.11	42.21	5.40	32.66	34.38	155	232	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	4874.62	46.12	74.00	-27.88	42.44	5.40	32.66	34.38	180	178	VERTICAL	Peak
2	4874.69	33.08	54.00	-20.92	29.40	5.40	32.66	34.38	180	178	VERTICAL	Average

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 11 / Chain 1 + Chain 2
Test Date	Sep. 15, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4923.14	32.63	54.00	-21.37	28.84	5.42	32.74	34.37	147	268	HORIZONTAL	Average
2	4923.78	45.94	74.00	-28.06	42.13	5.42	32.76	34.37	147	268	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4923.89	46.81	74.00	-27.19	43.00	5.42	32.76	34.37	178	306	VERTICAL	Peak
2	4924.40	32.73	54.00	-21.27	28.92	5.42	32.76	34.37	178	306	VERTICAL	Average

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°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 1 / Chain 1 + Chain 2
Test Date	Sep. 15, 2015		

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	4824.47	46.04	74.00	-27.96	42.50	5.38	32.55	34.39	184	181	HORIZONTAL	Peak
2	4824.51	33.25	54.00	-20.75	29.71	5.38	32.55	34.39	184	181	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4823.47	33.15	54.00	-20.85	29.61	5.38	32.55	34.39	159	233	VERTICAL	Average
2	4824.52	46.59	74.00	-27.41	43.05	5.38	32.55	34.39	159	233	VERTICAL	Peak

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 6 / Chain 1 + Chain 2
Test Date	Sep. 15, 2015		

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	4874.86	33.65	54.00	-20.35	29.97	5.40	32.66	34.38	166	242	HORIZONTAL	Average
2	4874.97	46.74	74.00	-27.26	43.06	5.40	32.66	34.38	166	242	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	4873.95	47.38	74.00	-26.62	43.70	5.40	32.66	34.38	146	170	VERTICAL	Peak
2	4874.21	33.53	54.00	-20.47	29.85	5.40	32.66	34.38	146	170	VERTICAL	Average

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 11 / Chain 1 + Chain 2
Test Date	Sep. 15, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4923.83	47.35	74.00	-26.65	43.54	5.42	32.76	34.37	179	281	HORIZONTAL	Peak
2	4924.68	33.26	54.00	-20.74	29.45	5.42	32.76	34.37	179	281	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	4924.32	33.44	54.00	-20.56	29.63	5.42	32.76	34.37	160	325	VERTICAL	Average
2	4924.34	46.87	74.00	-27.13	43.06	5.42	32.76	34.37	160	325	VERTICAL	Peak

Note:

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

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

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

4.5. 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 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

4.5.3. Test Procedures

For Radiated band edges Measurement:

1. The test procedure is the same as section 4.4.3.

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB558074 D01 v03r03 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

4.5.4. Test Setup Layout

For Radiated band edges Measurement:

This test setup layout is the same as that shown in section 4.4.4.

For Radiated Out of Band Emission Measurement:

This test setup layout is the same as that shown in section 4.4.4.

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. Test Result of Band Edge and Fundamental Emissions

<For Non-Beamforming Mode>

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11b CH 1, 6, 11 / Chain 1
Test Date	Sep. 15, 2015		

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	2386.80	61.56	74.00	-12.44	29.91	3.73	27.92	0.00	210	138	VERTICAL	Peak
2	2387.20	53.27	54.00	-0.73	21.62	3.73	27.92	0.00	210	138	VERTICAL	Average
3	2411.20	111.38			79.74	3.75	27.89	0.00	210	138	VERTICAL	Average
4	2412.80	115.52			83.88	3.75	27.89	0.00	210	138	VERTICAL	Peak

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	2377.80	51.28	54.00	-2.72	19.63	3.72	27.93	0.00	213	45	VERTICAL	Average
2	2378.20	61.08	74.00	-12.92	29.43	3.72	27.93	0.00	213	45	VERTICAL	Peak
3	2435.40	113.28			81.64	3.77	27.87	0.00	213	45	VERTICAL	Average
4	2436.20	117.01			85.37	3.77	27.87	0.00	213	45	VERTICAL	Peak
5	2496.20	50.31	54.00	-3.69	18.67	3.83	27.81	0.00	213	45	VERTICAL	Average
6	2496.20	61.23	74.00	-12.77	29.59	3.83	27.81	0.00	213	45	VERTICAL	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	2461.20	111.54			79.91	3.79	27.84	0.00	181	140	VERTICAL	Average
2	2462.80	115.34			83.71	3.79	27.84	0.00	181	140	VERTICAL	Peak
3	2488.00	61.39	74.00	-12.61	29.75	3.82	27.82	0.00	181	140	VERTICAL	Peak
4	2488.40	53.51	54.00	-0.49	21.87	3.82	27.82	0.00	181	140	VERTICAL	Average

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

Temperature	25℃	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11g CH 1, 6, 11 / Chain 1
Test Date	Sep. 14, 2015 ~ Sep. 15, 2015		

Channel 1

	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	2390.00	53.77	54.00	-0.23	21.47	4.09	28.21	0.00	Average	182	354	VERTICAL
2	2390.00	73.31	74.00	-0.69	41.01	4.09	28.21	0.00	Peak	182	354	VERTICAL
3	2418.51	102.57			70.22	4.11	28.24	0.00	Average	182	354	VERTICAL
4	2418.66	113.08			80.73	4.11	28.24	0.00	Peak	182	354	VERTICAL

Item 1, 2 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	2390.00	50.59	54.00	-3.41	18.94	3.73	27.92	0.00	179	52	VERTICAL	Average
2	2390.00	64.89	74.00	-9.11	33.24	3.73	27.92	0.00	179	52	VERTICAL	Peak
3	2429.80	106.73			75.09	3.76	27.88	0.00	179	52	VERTICAL	Average
4	2435.40	117.30			85.66	3.77	27.87	0.00	179	52	VERTICAL	Peak
5	2483.50	48.67	54.00	-5.33	17.03	3.82	27.82	0.00	179	52	VERTICAL	Average
6	2483.80	64.36	74.00	-9.64	32.72	3.82	27.82	0.00	179	52	VERTICAL	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	2462.00	112.11			80.48	3.79	27.84	0.00	188	131	VERTICAL	Peak
2	2462.80	102.09			70.46	3.79	27.84	0.00	188	131	VERTICAL	Average
3	2483.50	53.03	54.00	-0.97	21.39	3.82	27.82	0.00	188	131	VERTICAL	Average
4	2484.00	71.88	74.00	-2.12	40.24	3.82	27.82	0.00	188	131	VERTICAL	Peak

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

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 1, 6, 11 / Chain 1 + Chain 2
Test date	Sep. 14, 2015		

Channel 1

	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	2389.13	53.70	54.00	-0.30	21.40	4.09	28.21	0.00	Average	182	360	VERTICAL
2	2389.28	72.07	74.00	-1.93	39.77	4.09	28.21	0.00	Peak	182	360	VERTICAL
3	2413.88	114.94			82.59	4.11	28.24	0.00	Peak	182	360	VERTICAL
4	2418.95	102.99			70.64	4.11	28.24	0.00	Average	182	360	VERTICAL

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2388.09	72.02	74.00	-1.98	39.72	4.09	28.21	0.00	Peak	176	343	VERTICAL
2	2390.00	53.53	54.00	-0.47	21.23	4.09	28.21	0.00	Average	176	343	VERTICAL
3	2435.55	110.33			77.93	4.12	28.28	0.00	Average	176	343	VERTICAL
4	2435.84	122.01			89.61	4.12	28.28	0.00	Peak	176	343	VERTICAL
5	2483.50	53.29	54.00	-0.71	20.76	4.16	28.37	0.00	Average	176	343	VERTICAL
6	2489.58	67.60	74.00	-6.40	35.03	4.17	28.40	0.00	Peak	176	343	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	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	2462.72	104.47			71.99	4.14	28.34	0.00	Average	174	338	VERTICAL
2	2465.33	114.76			82.28	4.14	28.34	0.00	Peak	174	338	VERTICAL
3	2483.50	53.87	54.00	-0.13	21.34	4.16	28.37	0.00	Average	174	338	VERTICAL
4	2485.59	69.76	74.00	-4.24	37.23	4.16	28.37	0.00	Peak	174	338	VERTICAL

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

<For Beamforming Mode>

Temperature	25°C	Humidity	56%
Test Engineer	Alvin Li	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 1, 6, 11 / Chain 1 + Chain 2
Test date	Sep. 15, 2015		

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	2389.00	69.78	74.00	-4.22	38.13	3.73	27.92	0.00	177	300	VERTICAL	Peak
2	2390.00	52.79	54.00	-1.21	21.14	3.73	27.92	0.00	177	300	VERTICAL	Average
3	2405.00	103.13			71.49	3.74	27.90	0.00	177	300	VERTICAL	Average
4	2407.20	112.61			80.96	3.75	27.90	0.00	177	300	VERTICAL	Peak

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	2389.40	69.68	74.00	-4.32	38.03	3.73	27.92	0.00	180	320	VERTICAL	Peak
2	2389.80	53.46	54.00	-0.54	21.81	3.73	27.92	0.00	180	320	VERTICAL	Average
3	2429.00	110.94			79.30	3.76	27.88	0.00	180	320	VERTICAL	Average
4	2433.00	120.28			88.64	3.77	27.87	0.00	180	320	VERTICAL	Peak
5	2483.50	52.24	54.00	-1.76	20.60	3.82	27.82	0.00	180	320	VERTICAL	Average
6	2483.80	66.68	74.00	-7.32	35.04	3.82	27.82	0.00	180	320	VERTICAL	Peak

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

Channel 11

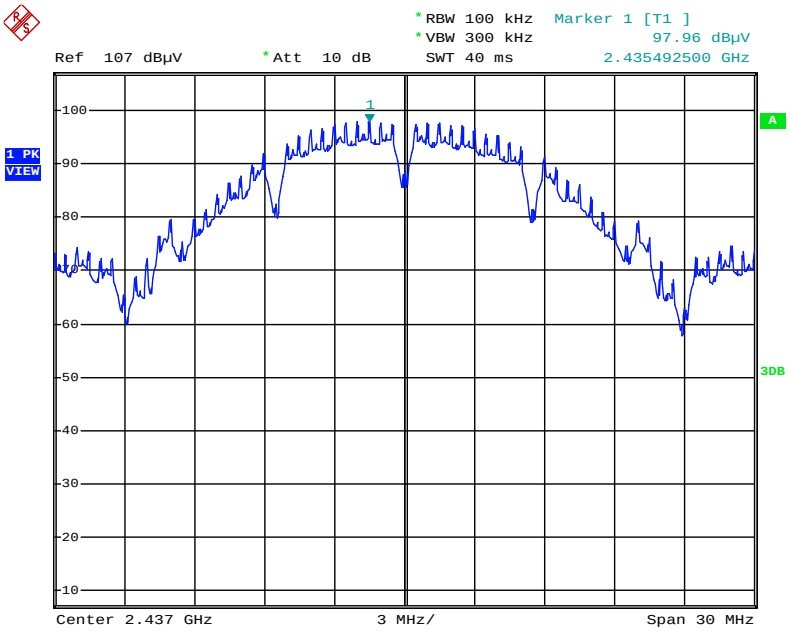
	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2470.00	103.78			72.15	3.80	27.83	0.00	177	32	VERTICAL	Average
2	2470.00	112.53			80.90	3.80	27.83	0.00	177	32	VERTICAL	Peak
3	2484.40	51.96	54.00	-2.04	20.32	3.82	27.82	0.00	177	32	VERTICAL	Average
4	2484.80	65.77	74.00	-8.23	34.13	3.82	27.82	0.00	177	32	VERTICAL	Peak

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

<For Non-Beamforming Mode>

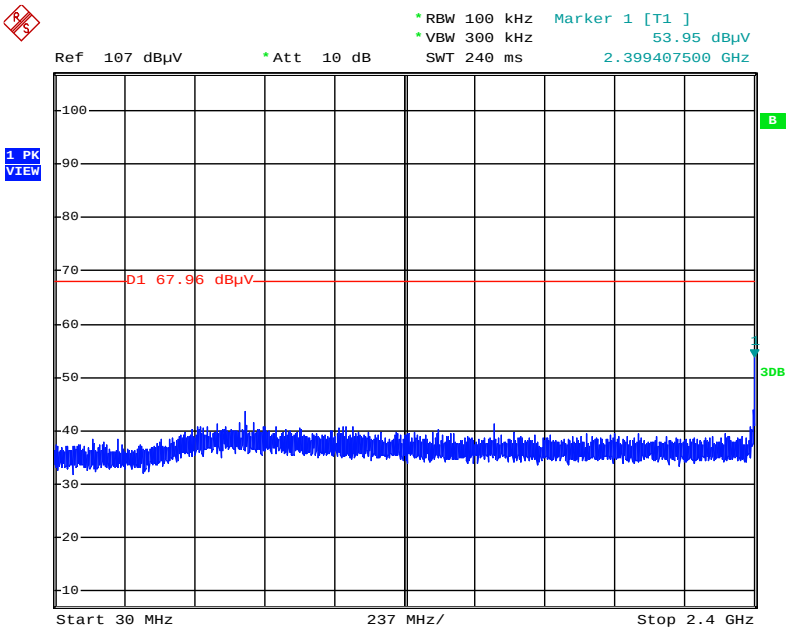
For Emission not in Restricted Band

Plot on Configuration IEEE 802.11b / Reference Level



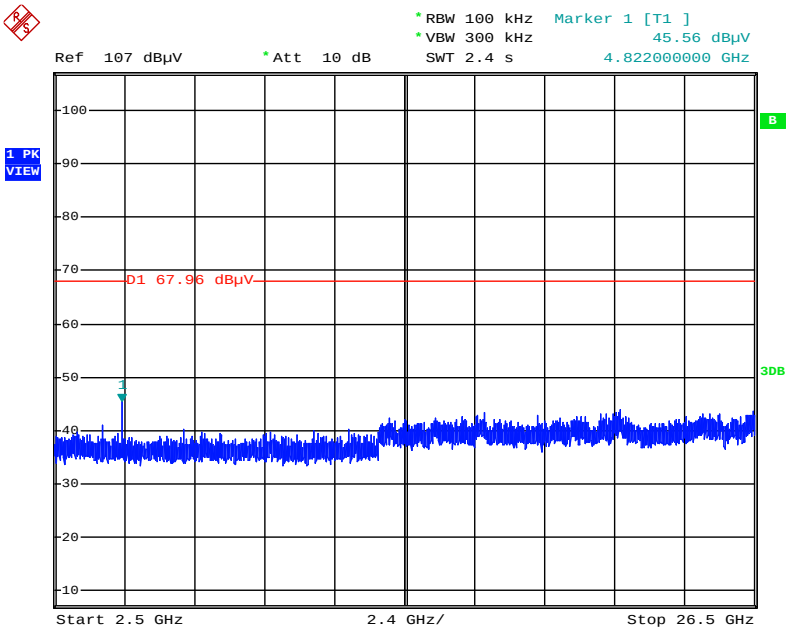
Date: 15.SEP.2015 21:40:32

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



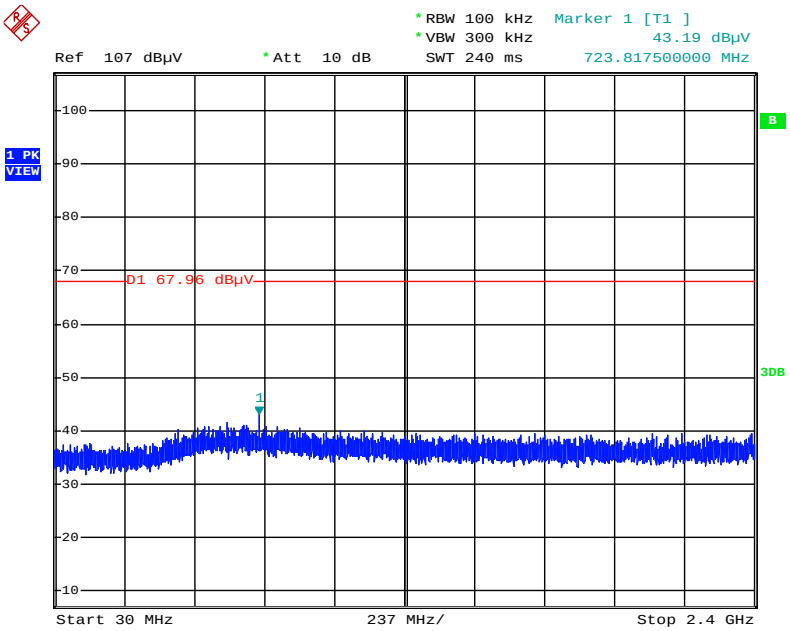
Date: 15.SEP.2015 21:58:01

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



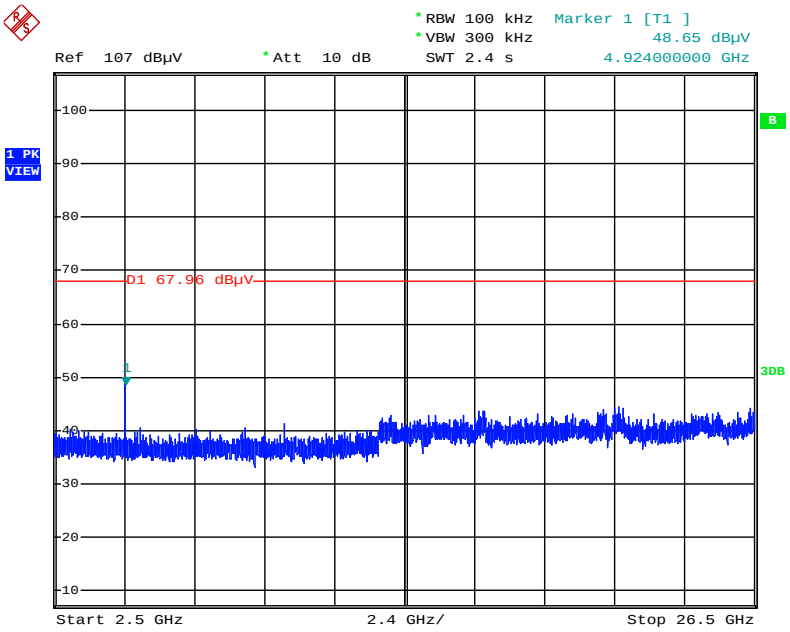
Date: 15.SEP.2015 21:58:53

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



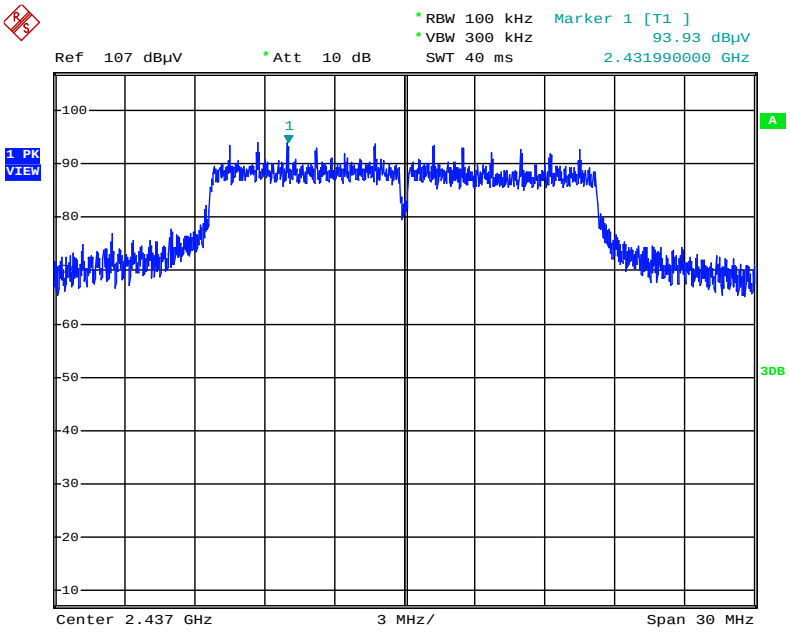
Date: 15.SEP.2015 22:00:03

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



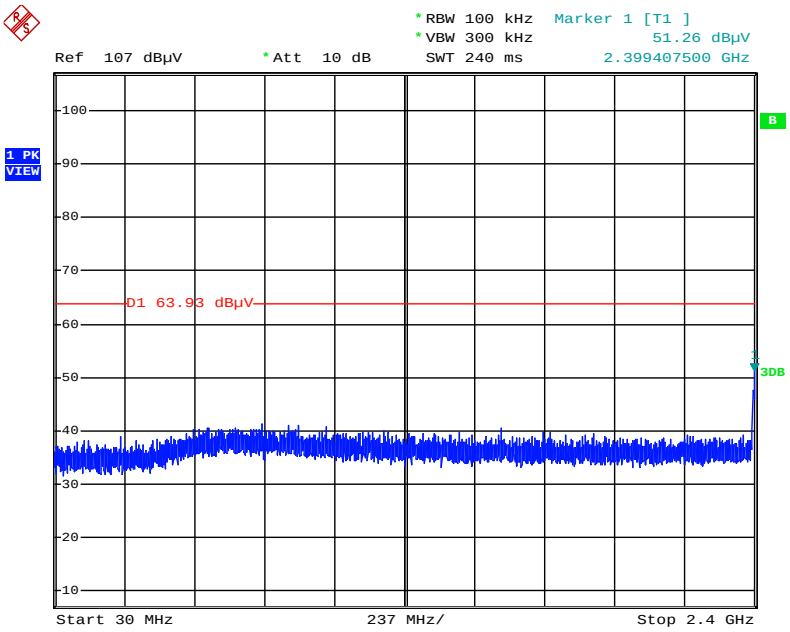
Date: 15.SEP.2015 21:59:32

Plot on Configuration IEEE 802.11g / Reference Level



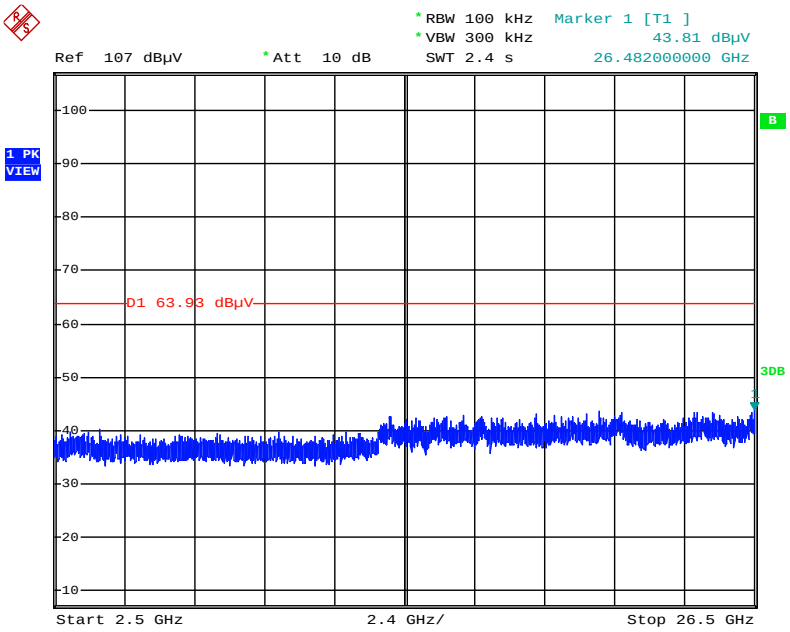
Date: 15.SEP.2015 22:01:14

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



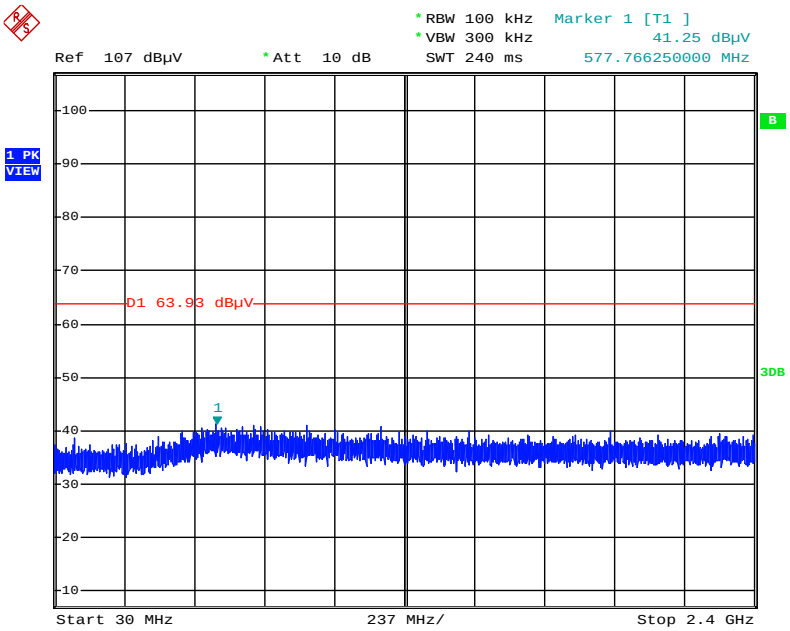
Date: 15.SEP.2015 22:02:37

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



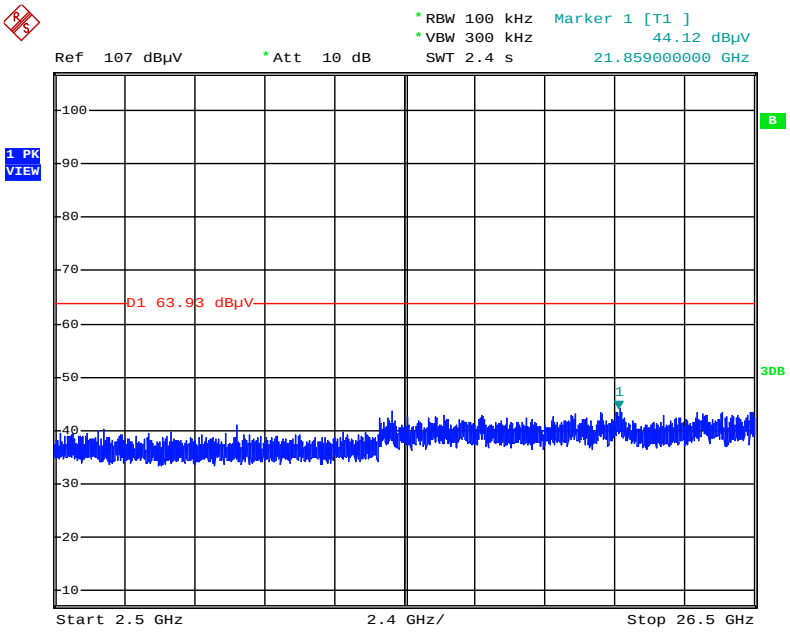
Date: 15.SEP.2015 22:03:17

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



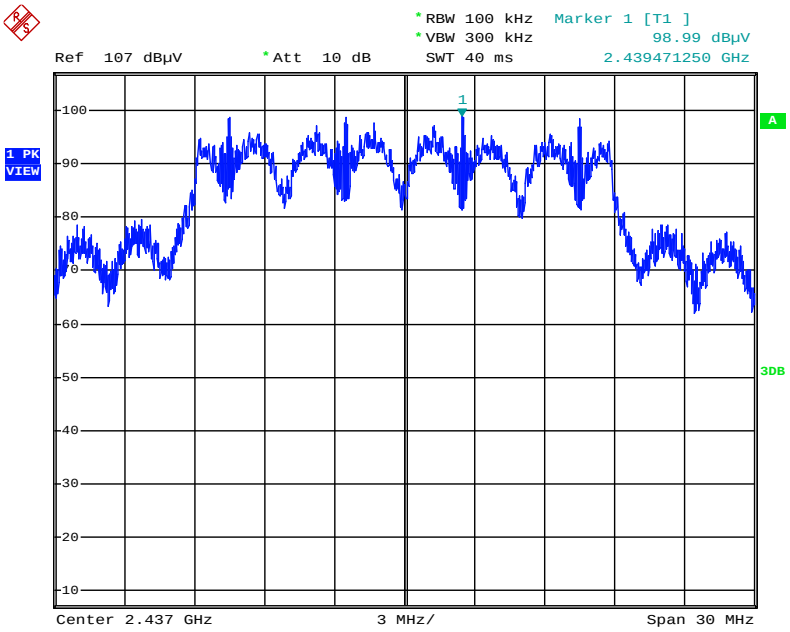
Date: 15.SEP.2015 22:04:14

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



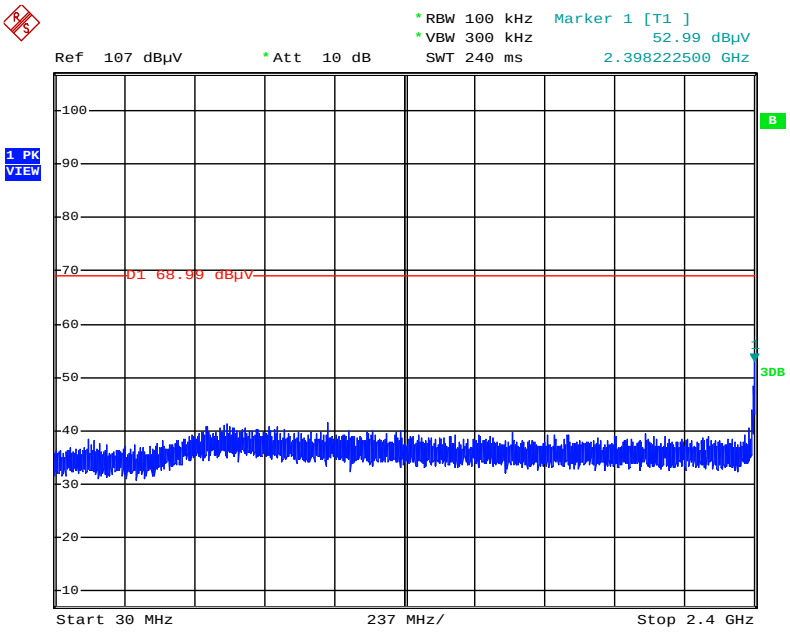
Date: 15.SEP.2015 22:03:50

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



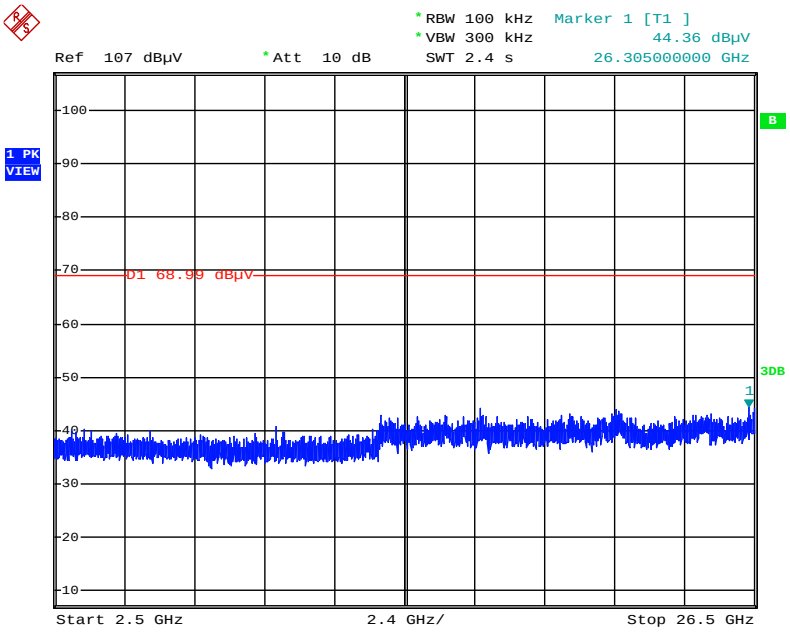
Date: 15.SEP.2015 22:05:38

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 1 / 30MHz~2400MHz (down 30dBc)



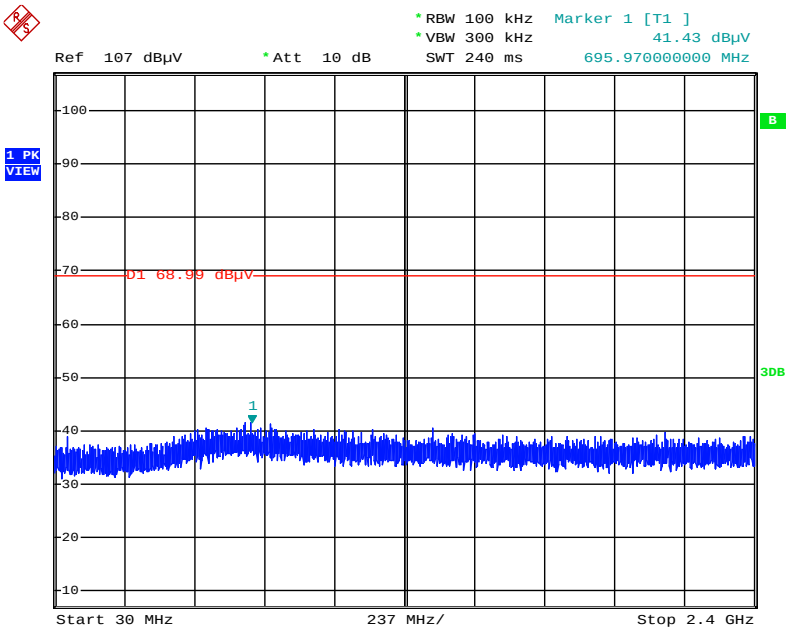
Date: 15.SEP.2015 22:06:42

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 1 / 2500MHz~26500MHz (down 30dBc)



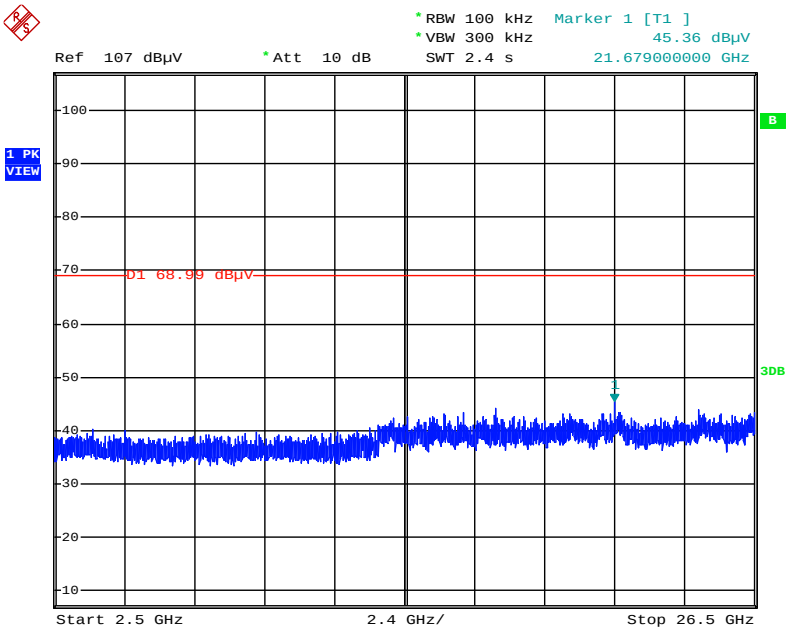
Date: 15.SEP.2015 22:07:12

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 11 / 30MHz~2400MHz (down 30dBc)



Date: 15.SEP.2015 22:08:14

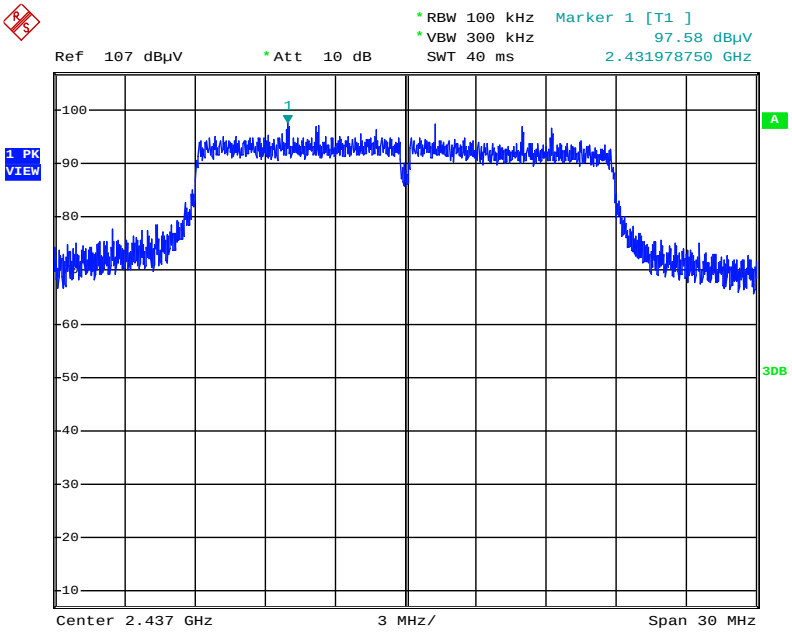
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 11 / 2500MHz~26500MHz (down 30dBc)



Date: 15.SEP.2015 22:07:48

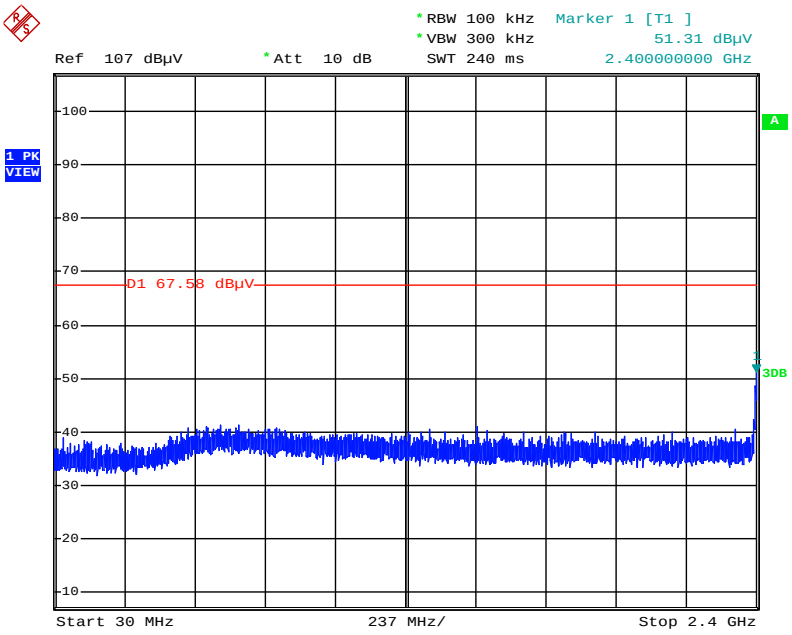
<For Beamforming Mode>

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



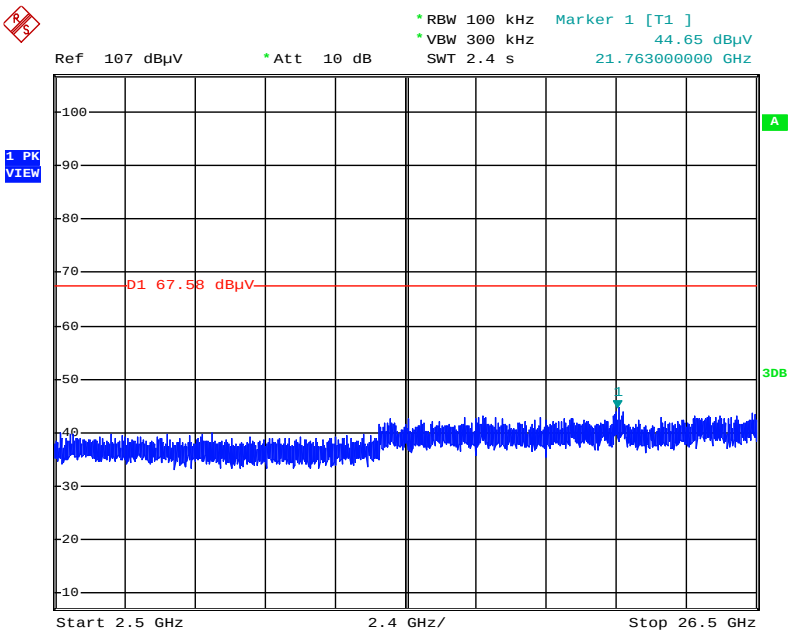
Date: 15.SEP.2015 23:22:37

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 1 / 30MHz~2400MHz (down 30dBc)



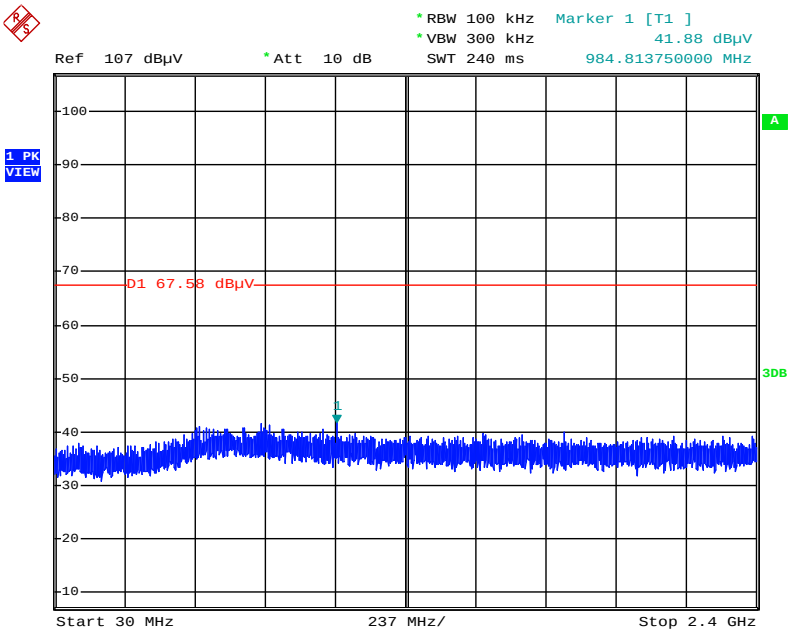
Date: 15.SEP.2015 23:25:30

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 1 / 2500MHz~26500MHz (down 30dBc)



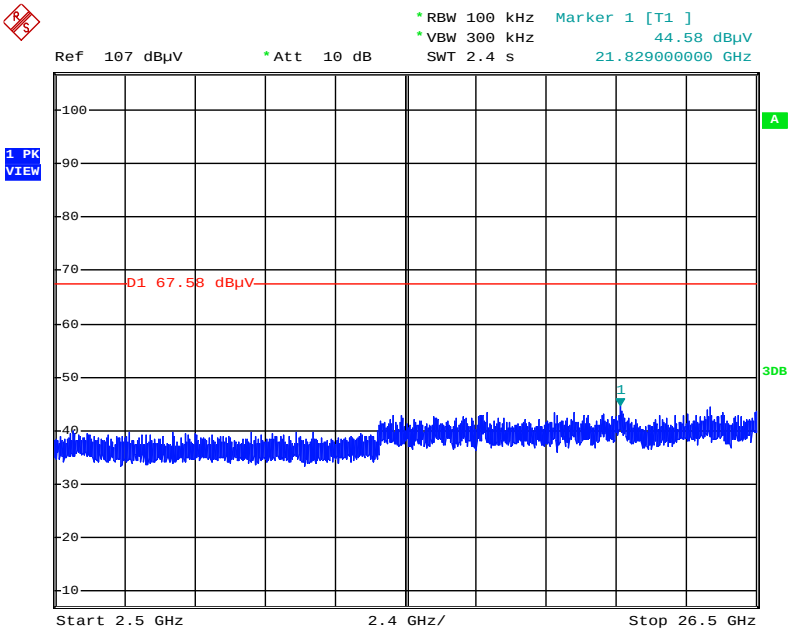
Date: 15.SEP.2015 23:26:09

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 11 / 30MHz~2400MHz (down 30dBc)



Date: 15.SEP.2015 23:27:31

Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 11 / 2500MHz~26500MHz (down 30dBc)



Date: 15.SEP.2015 23:26:56

4.6. Antenna Requirements

4.6.1. 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.

4.6.2. Antenna Connector Construction

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

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 06, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 21, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	1 GHz ~ 40 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSP40	100979	9kHz~40GHz	Dec. 12, 2014	Conducted (TH01-CB)
Temp. and Humidity Chamber	Ten Billion	TTH-D3SP	TBN-931011	-30~100 degree	Jun. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 03, 2014	Conducted (TH01-CB)

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

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

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Radiated Emission (30MHz ~ 1,000MHz)	3.2 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%