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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-RTGW00**
Manufacturer's company (1)	**ASKEY TECHNOLOGY (JIANG SU) LTD**
Manufacturer Address	NO1388, Jiao Tong Road, Wujiang Economic Technological Development Area Jiangsu Province 215200 China
Manufacturer's company (2)	**Compal Networking (KunShan) Co., LTD.**
Manufacturer Address	No. 520, Nabbang Rd., Economic & Technical Development Zone Kunshan, Jiangsu Province China

Product Name	Wireless-AC3100 Dual Band Gigabit Router
Brand Name	ASUS
Model No.	RT-AC3100,RT-AC88R,RT-AC88U
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5250MHz
Received Date	Apr. 10, 2015
Final Test Date	May 22, 2015
Submission Type	Original Equipment

Statement

Test result included is for the IEEE 802.11n and IEEE 802.11a/ac of the product.

The test result in this report refers exclusively to the presented test model / sample.

Without written approval of SPORTON International Inc., the test report shall not be reproduced except in full.

The measurements and test results shown in this test report were made in accordance with the procedures and found in compliance with the limit given in **ANSI C63.10-2009**, **47 CFR FCC Part 15 Subpart E, KDB789033 D02 v01, KDB662911 D01 v02r01, KDB644545 D03 v01.**

Note: Using 1.5m table as an alternative was permitted by the FCC per TCBC conference call of Dec. 2, 2014.

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
FR531828AB	Rev. 01	Initial issue of report	May 25, 2015

1. VERIFICATION OF COMPLIANCE

Product Name	:	Wireless-AC3100 Dual Band Gigabit Router
Brand Name	:	ASUS
Model No.	:	RT-AC3100,RT-AC88R,RT-AC88U
Applicant	:	ASUSTeK COMPUTER INC.
Test Rule Part(s)	:	47 CFR FCC Part 15 Subpart E § 15.407

Sporton International as requested by the applicant to evaluate the EMC performance of the product sample received on Apr. 10, 2015 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 E				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	5.79 dB
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.3	15.407(a)	Maximum Conducted Output Power	Complies	0.08 dB
4.4	15.407(a)	Power Spectral Density	Complies	0.02 dB
4.5	15.407(b)	Radiated Emissions	Complies	4.01 dB
4.6	15.407(b)	Band Edge Emissions	Complies	0.04 dB
4.7	15.407(g)	Frequency Stability	Complies	-
4.8	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	WLAN (4TX, 4RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	IEEE 802.11a: OFDM IEEE 802.11n/ac: see the below table
Data Modulation	IEEE 802.11a/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM, 1024QAM)
Data Rate (Mbps)	IEEE 802.11a: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n/ac: see the below table
Frequency Range	5150 ~ 5250MHz
Channel Number	4 for 20MHz bandwidth ; 2 for 40MHz bandwidth 1 for 80MHz bandwidth
Channel Band Width (99%)	For Non-Beamforming Mode IEEE 802.11a: 16.15 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 17.62 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.33 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.12 MHz IEEE 802.11ac MCS0/Nss4 (VHT40): 36.76 MHz IEEE 802.11ac MCS0/Nss4 (VHT80): 76.12 MHz For Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT20): 18.06 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 36.90 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.12 MHz

Maximum Conducted Output Power	For Non-Beamforming Mode IEEE 802.11a: 26.88 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 26.89 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 29.73 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 24.24 dBm IEEE 802.11ac MCS0/Nss4 (VHT40): 26.33 dBm IEEE 802.11ac MCS0/Nss4 (VHT80): 25.98 dBm For Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT20): 26.53 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 26.49 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 26.45 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Communication Mode	☒ IP Based (Load Based)	☐ Frame Based
Beamforming Function	☒ With beamforming for 802.11n/ac in 2.4GHz/5GHz	☐ Without beamforming
Operating Mode	☐ Outdoor access point	
	☒ Indoor access point	
	☐ Fixed point-to-point access points	
	☐ Mobile and portable client devices	

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	MCS 0-31
802.11n (HT40)	4	MCS 0-31
802.11ac (VHT20)	4	MCS0-11/Nss1-4
802.11ac (VHT40)	4	MCS0-11/Nss1-4
802.11ac (VHT80)	4	MCS0-11/Nss1-4
Note 1: IEEE Std. 802.11n modulation consists of HT20 and HT40 (HT: High Throughput). Then EUT supports HT20 and HT40. Note 2: IEEE Std. 802.11ac modulation consists of VHT20, VHT40, VHT80 and VHT160 (VHT: Very High Throughput). Then EUT supports 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	ASUS	ADP-45BW B	Input: 100-240V ~ 50-60Hz 1.2A Output: 19V, 2.37A
Adapter 2	ASUS	AD883J20	Input: 100-240V ~ 50-60Hz 1.0A Output: 19V, 2.37A
Adapter 3	ASUS	ADP-65DW B	Input: 100-240V ~ 50-60Hz 1.5A Output: 19V, 3.42A
Others			
RJ-45 Cable*1: Non-Shielded, 1.5m			

3.3. Table for Filed Antenna

Set	Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)	
						2.4GHz	5GHz
1	1	PSA	RFDPA171300SBLB809	Dipole Antenna	Reversed-SMA	2.25	3.37
	2	PSA	RFDPA171300SBLB809	Dipole Antenna	Reversed-SMA	2.25	3.37
	3	PSA	RFDPA171300SBLB809	Dipole Antenna	Reversed-SMA	2.25	3.37
	4	PSA	RFDPA171300SBLB809	Dipole Antenna	Reversed-SMA	2.25	3.37
2	5	PSA	RFDPA171300SBLB810	Dipole Antenna	Reversed-SMA	2.25	3.37
	6	PSA	RFDPA171300SBLB810	Dipole Antenna	Reversed-SMA	2.25	3.37
	7	PSA	RFDPA171300SBLB810	Dipole Antenna	Reversed-SMA	2.25	3.37
	8	PSA	RFDPA171300SBLB810	Dipole Antenna	Reversed-SMA	2.25	3.37

Note: The EUT has two sets of antenna and there are four antennas for each set. First set includes Ant.1~4, and second set includes Ant.5~8. The difference between set 1 & set 2 is just model name and color, so there's only set 1 selected and recorded in the report.

For 2.4GHz function (4TX/4RX):

For IEEE 802.11b/g/n/ac mode:

Ant. 1, Ant. 2, Ant. 3 and Ant. 4 can be used as transmitting/receiving antenna.

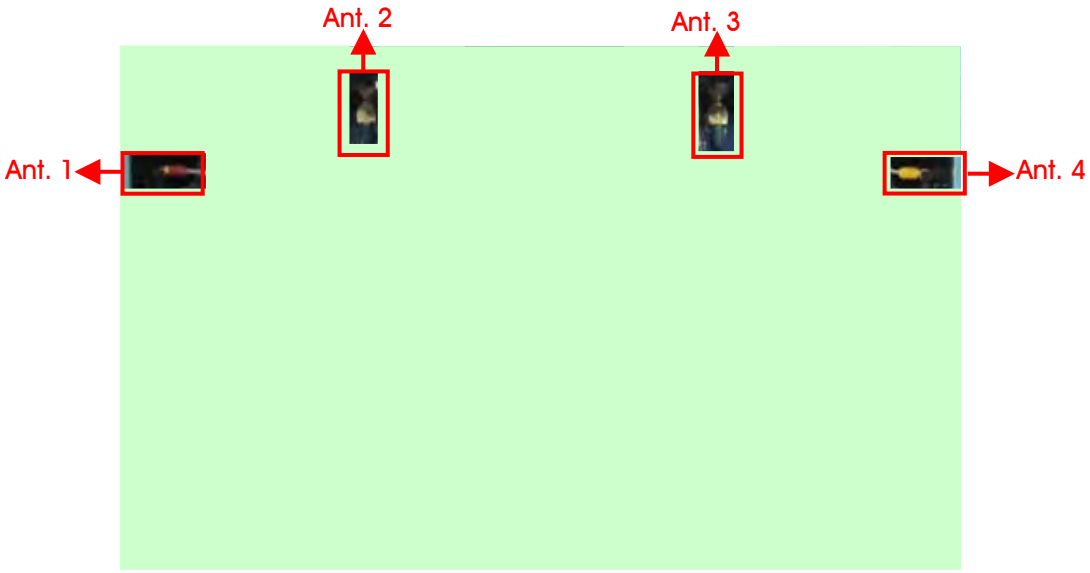
Ant. 1, Ant. 2, Ant. 3 and Ant. 4 could transmit/receive simultaneously.

For 5Hz function (4TX/4RX):

For IEEE 802.11a/n/ac mode:

Ant. 1, Ant. 2, Ant. 3 and Ant. 4 can be used as transmitting/receiving antenna.

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 36, 40, 44, 48.

For 40MHz bandwidth systems, use Channel 38, 46.

For 80MHz bandwidth systems, use Channel 42.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5150~5250 MHz Band 1	36	5180 MHz	44	5220 MHz
	38	5190 MHz	46	5230 MHz
	40	5200 MHz	48	5240 MHz
	42	5210 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	Ant.
AC Power Conducted Emission	CTX		-	-	-
Max. Conducted Output Power	For Non-Beamforming Mode				
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss4	38	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss4	42	1+2+3+4
	For Beamforming Mode				
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
Power Spectral Density	For Non-Beamforming Mode				
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss4	38	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss4	42	1+2+3+4
	For Beamforming Mode				
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4

26dB Spectrum Bandwidth 99% Occupied Bandwidth Measurement	For Non-Beamforming Mode				
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss4	38	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss4	42	1+2+3+4
	For Beamforming Mode				
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
Radiated Emission Below 1GHz	CTX		-	-	-
Radiated Emission Above 1GHz	For Non-Beamforming Mode				
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss4	38	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss4	42	1+2+3+4
	For Beamforming Mode				
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
Band Edge Emission	For Non-Beamforming Mode				
	11a/BPSK	Band 1	6Mbps	36/40/48	1+2+3+4
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38/46	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss4	38	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss4	42	1+2+3+4
	For Beamforming Mode				
	11ac VHT20	Band 1	MCS0/Nss1	36/40/48	1+2+3+4
	11ac VHT40	Band 1	MCS0/Nss1	38	1+2+3+4
	11ac VHT80	Band 1	MCS0/Nss1	42	1+2+3+4

Frequency Stability	20 MHz	Band 1	-	40	1+2+3+4
	40 MHz	Band 1	-	38	1+2+3+4
	80 MHz	Band 1	-	42	1+2+3+4

Note 1: VHT20/VHT40 covers HT20/HT40, due to same modulation.

Note 2: There are two modes of EUT, one is beamforming mode, and the other is non-beamforming mode for 802.11n/ac.All test results were recorded in the report.

Note 3: The EUT is used for laying only.

The following test modes were performed for all tests:

For Conducted Emission and Radiated Emission test (Below 1GHz) test:

Mode 1. EUT With Adapter 1+ 2.4GHz

Mode 2. EUT With Adapter 1+5GHz

Mode 2 has been evaluated to be the worst case between Mode 1～2, thus measurement for Mode 3 ～ 4 will follow this same test mode.

Mode 3. EUT With Adapter 2+ 5GHz

Mode 4. EUT With Adapter 3+ 5GHz

Mode 2 is the worst case, so it was selected to record in this test report.

For Radiated Emission test (Above 1GHz):

Mode 1. CTX

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

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

3.6. Table for Testing Locations

Test Site Location					
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.				
TEL:	886-3-656-9065				
FAX:	886-3-656-9085				
Test Site No.	**Site Category**	**Location**	**FCC Reg. No.**	**IC File No.**	**VCCI Reg. 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 Multiple Listing

The EUT has three model names, which are identical to each other in all aspects except for the following table:

Equipment Name	Brand Name	Model No.	LAN Port	Description
Wireless-AC3100 Dual Band Gigabit Router	ASUS	RT-AC88U	8 LAN ports	All the models are identical except for the numbers of LAN ports and Heat sink color; the different model names served as marketing strategy.
		RT-AC3100	4 LAN ports	
		RT-AC88R	8 LAN ports	

From the above models, model: RT-AC88U was selected as representative model for the test and its data was recorded in this report.

3.8. Table for Supporting Units

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

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC

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

For Non-Beamforming Mode:

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC

For Beamforming Mode:

Support Unit	Brand	Model	FCC ID
NB*2	DELL	E4300	DoC
RX Device	Broadcom	BCM4366	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC

3.9. Table for Parameters of Test Software Setting

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

For Non-Beamforming Mode

Test Software Version	Mtool 2.0.2.6		
Mode	Test Frequency (MHz)		
	NCB: 20MHz		
	5180 MHz	5200 MHz	5240 MHz
802.11a	80	83	83
802.11ac MCS0/Nss1 VHT20	83	83	83
Mode	NCB: 40MHz		
802.11ac MCS0/Nss1 VHT40	5190 MHz	5230 MHz	
	77	95	
Mode	NCB: 80MHz		
802.11ac MCS0/Nss1 VHT80	5210 MHz		
	73		

Test Software Version	Mtool 2.0.2.6
Mode	Test Frequency (MHz)
802.11ac MCS0/Nss4 VHT40	NCB: 40MHz
	5190 MHz
	78
802.11ac MCS0/Nss4 VHT80	NCB: 80MHz
	5210 MHz
	79

For Beamforming Mode

Test Software Version	Mtool 2.0.2.6		
Mode	Test Frequency (MHz)		
	NCB: 20MHz		
	5180 MHz	5200 MHz	5240 MHz
802.11ac MCS0/Nss1 VHT20	80	80	80
Mode	NCB: 40MHz		
802.11ac MCS0/Nss1 VHT40	5190 MHz	5230 MHz	
	77	80	
Mode	NCB: 80MHz		
802.11ac MCS0/Nss1 VHT80	5210 MHz		
	80		

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 RX Device and transmit duty cycle no less 98%

3.11. Duty Cycle

For Non-Beamforming Mode

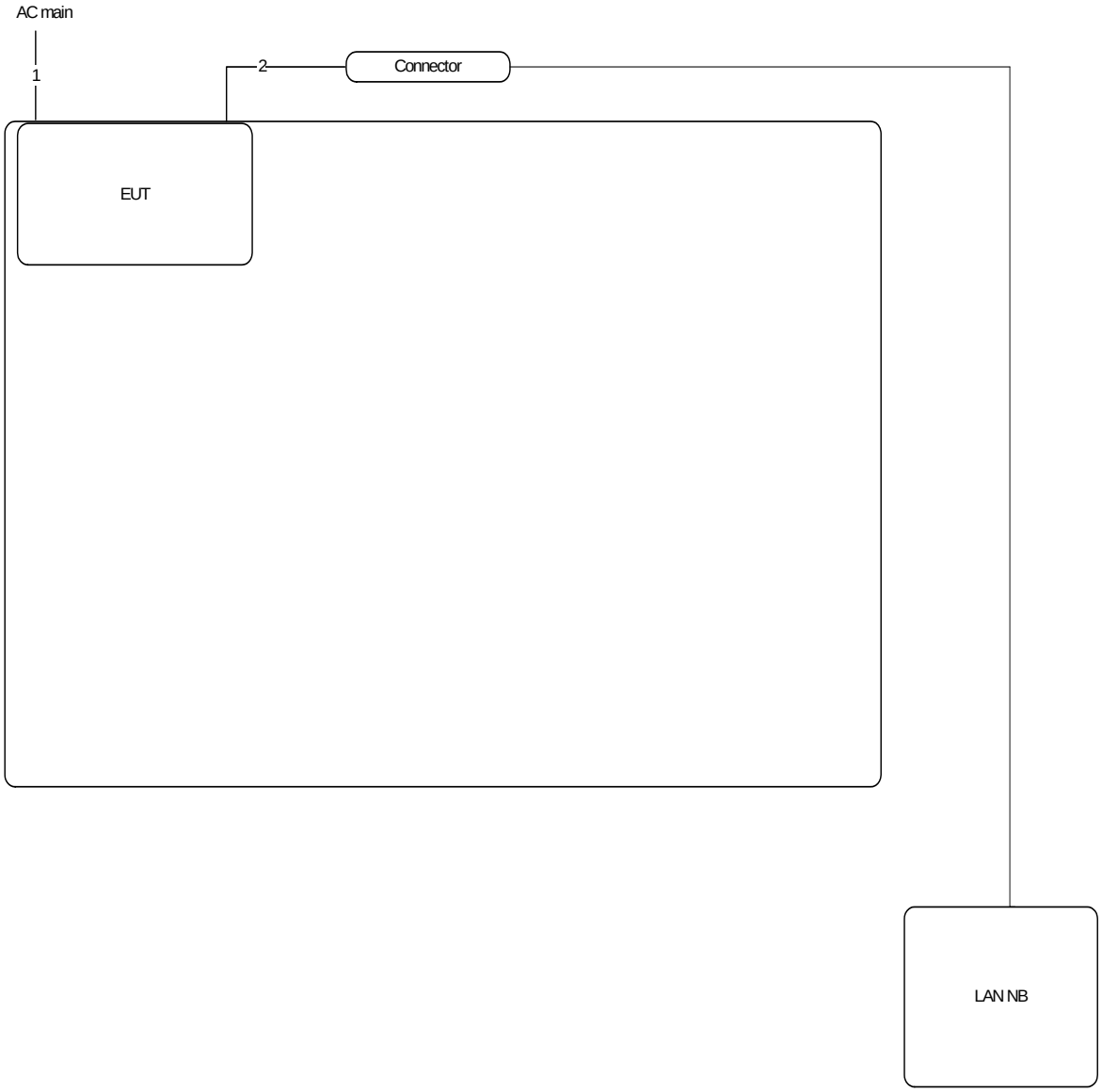
Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.057	2.080	98.91%	0.05	0.01
802.11ac MCS0/Nss1 VHT20	1.921	1.944	98.80%	0.05	0.01
802.11ac MCS0/Nss1 VHT40	0.954	0.964	98.95%	0.05	0.01
802.11ac MCS0/Nss1 VHT80	0.463	0.485	95.40%	0.20	2.16
802.11ac MCS0/Nss4 VHT40	0.279	0.307	90.88%	0.42	3.58
802.11ac MCS0/Nss4 VHT80	0.126	0.186	67.74%	1.69	7.94

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	4.246	4.435	95.75%	0.19	0.24
802.11ac MCS0/Nss1 VHT40	2.231	2.449	91.11%	0.40	0.45
802.11ac MCS0/Nss1 VHT80	5.797	6.816	85.05%	0.70	0.17

3.12. Test Configurations

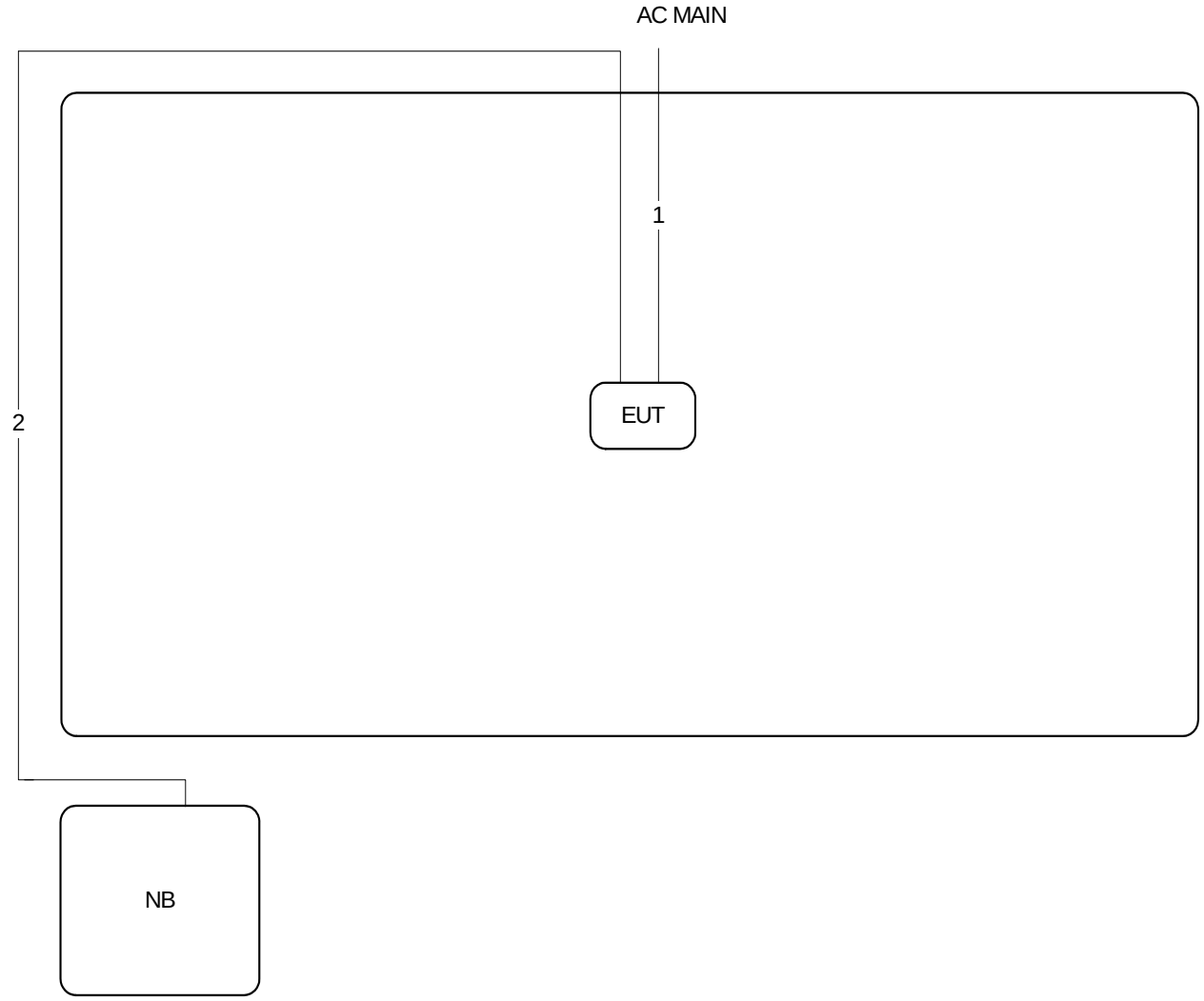
3.12.1. AC Power Line Conduction Emissions Test Configuration



Item	Connection	Shielded	Length
1	Power cable	No	2.3m
2	RJ-45 cable	No	1.5m
3	RJ-45 cable	No	10m

3.12.2. Radiation Emissions Test Configuration

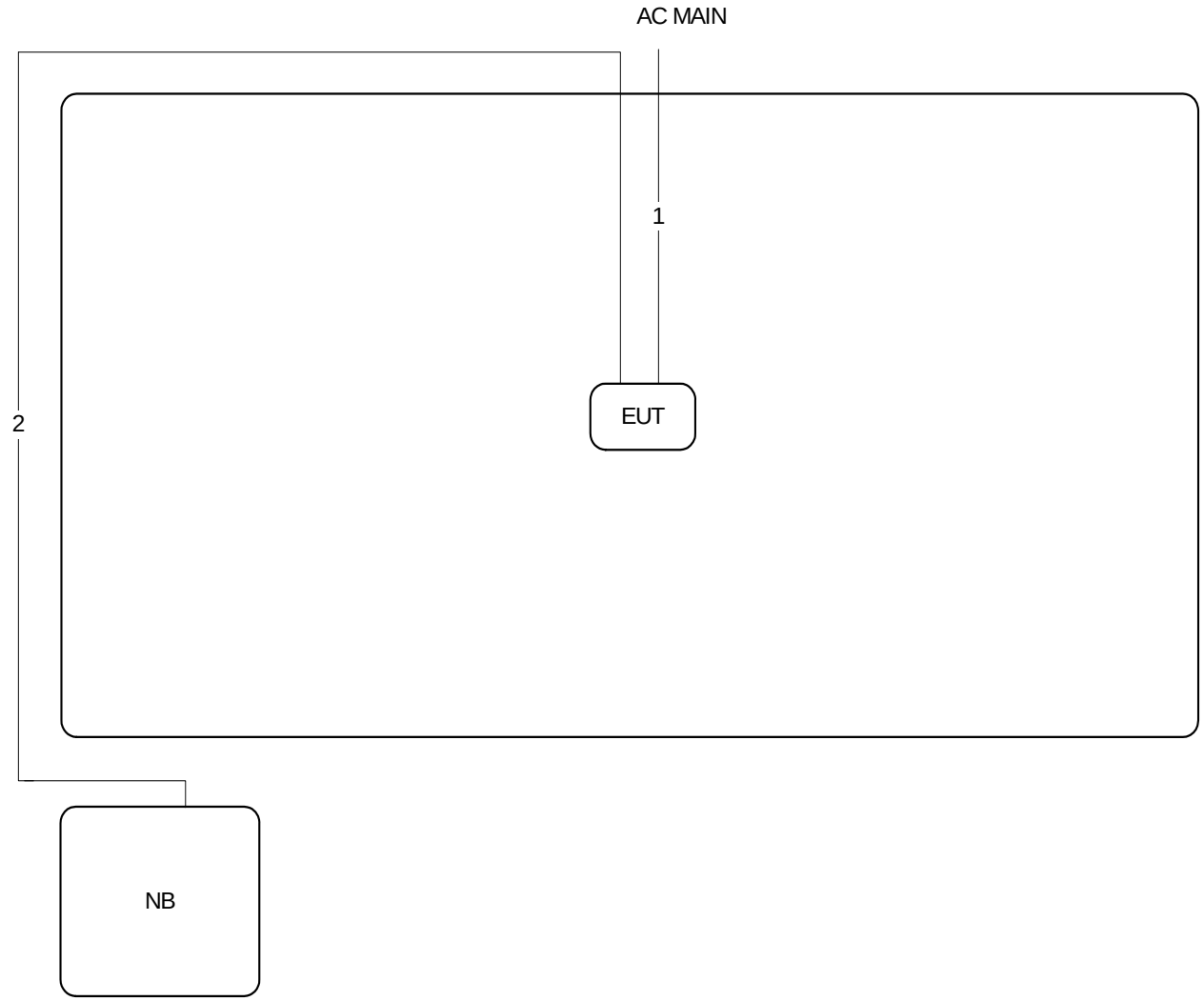
Test Configuration: 30MHz ~1GHz



Item	Connection	Shielded	Length
1	Power Cable	No	2.3m
2	RJ-45 Cable	No	10m

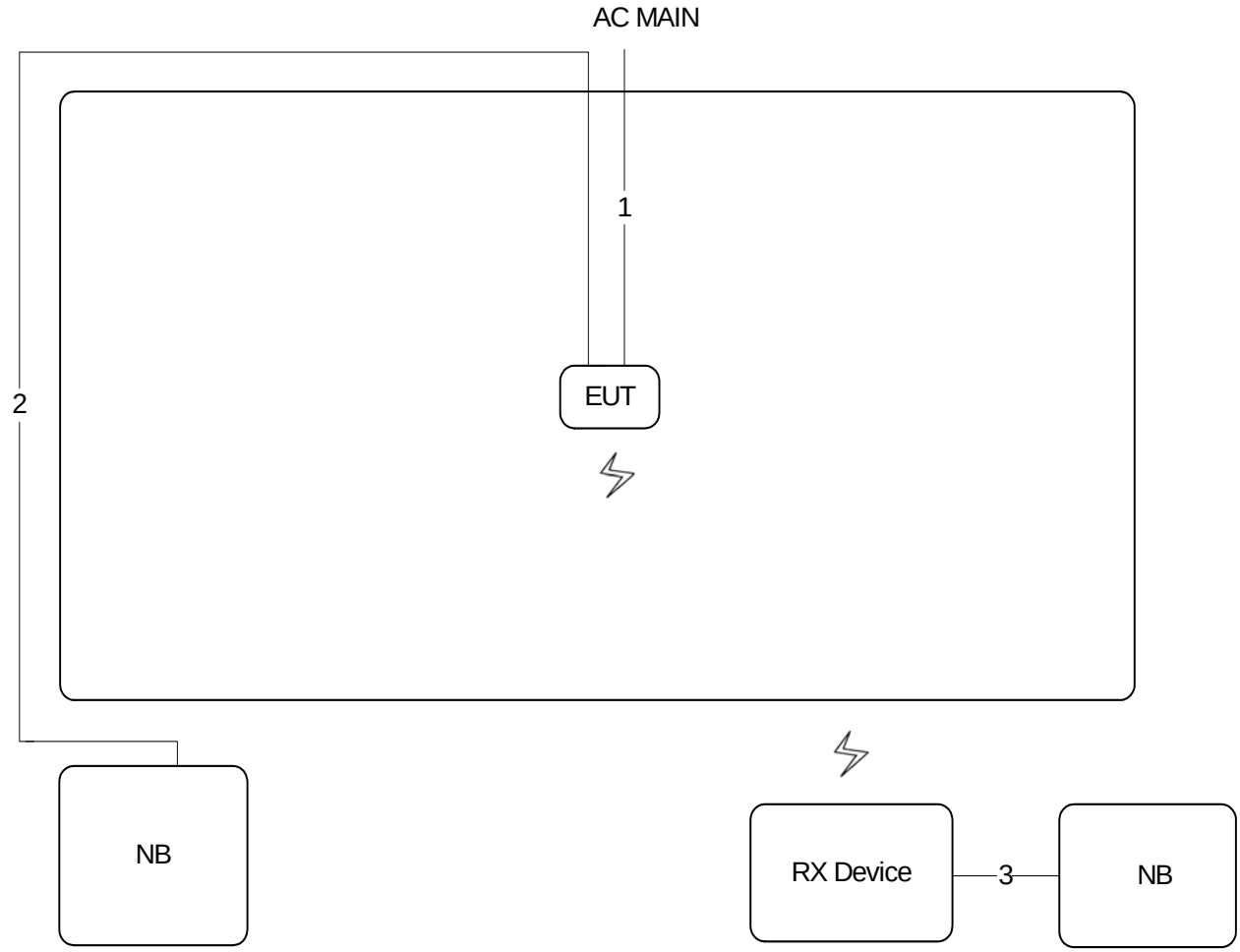
Test Configuration: above 1GHz

For Non-Beamforming Mode



Item	Connection	Shielded	Length
1	Power Cable	No	2.3m
2	RJ-45 Cable	No	10m

For Beamforming Mode



Item	Connection	Shielded	Length
1	Power Cable	No	2.3m
2	RJ-45 Cable	No	10m
3	RJ-45 Cable	No	1.5m

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

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

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

4.1.2. Measuring Instruments and Setting

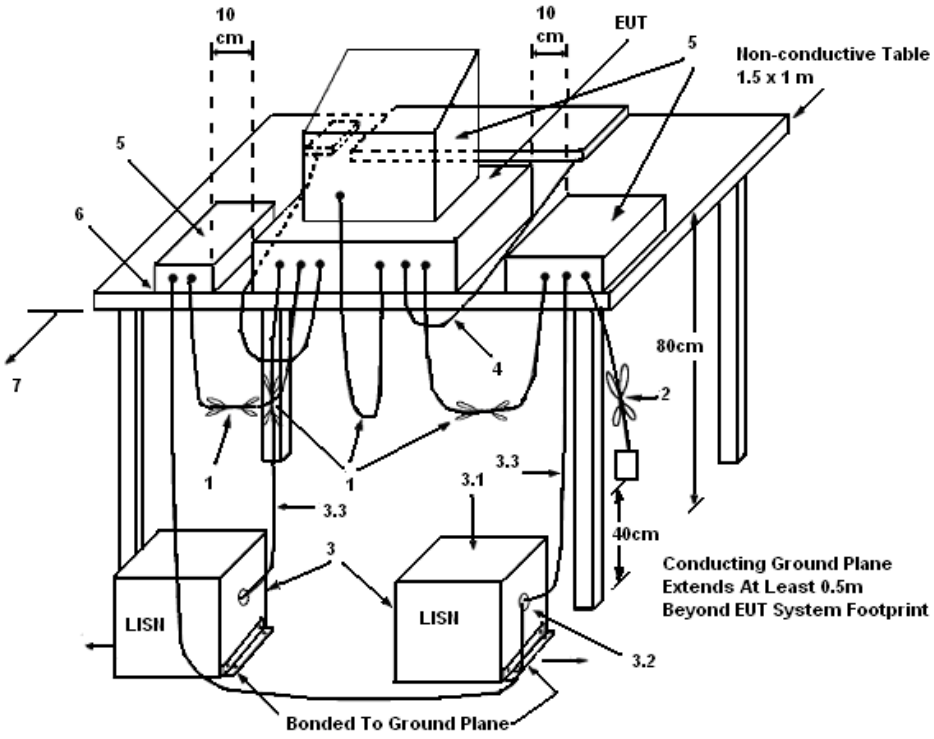
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

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

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

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

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

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

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

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

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

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

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

4.1.5. Test Deviation

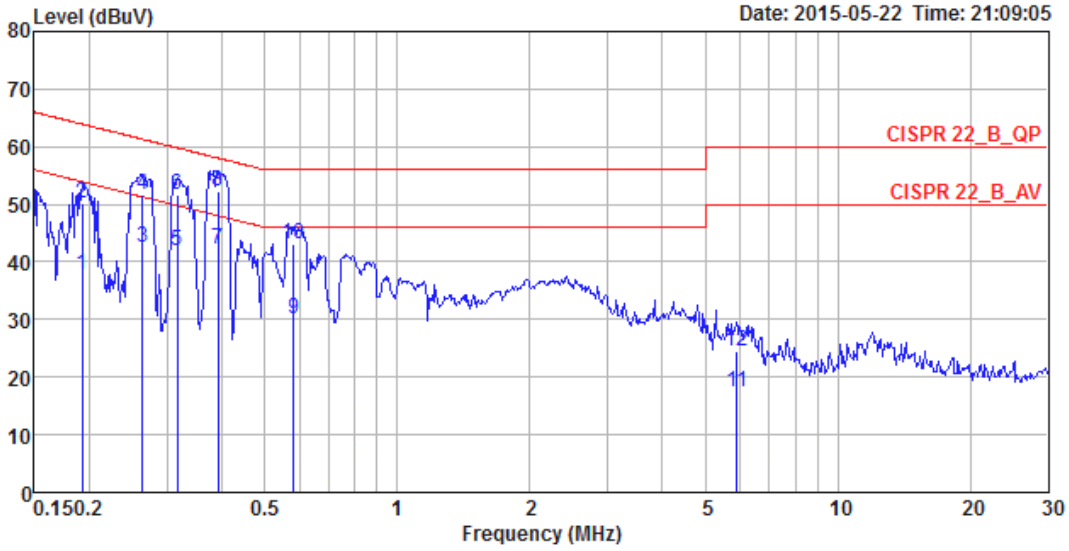
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

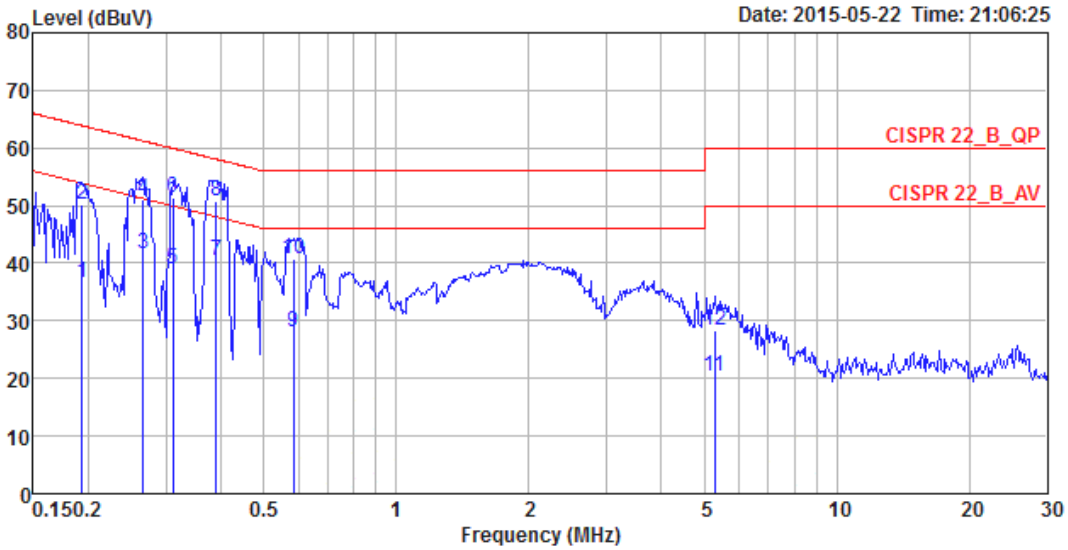
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	24°C	Humidity	56%
Test Engineer	Parody Lin	Phase	Line
Configuration	CTX / Mode 2		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.19	37.89	-16.04	53.93	27.94	9.93	0.02	LINE	Average
2	0.19	50.20	-13.73	63.93	40.25	9.93	0.02	LINE	QP
3	0.26	42.65	-8.64	51.29	32.69	9.93	0.03	LINE	Average
4	0.26	51.68	-9.61	61.29	41.72	9.93	0.03	LINE	QP
5	0.32	41.83	-7.97	49.80	31.86	9.93	0.04	LINE	Average
6	0.32	51.64	-8.16	59.80	41.67	9.93	0.04	LINE	QP
7	0.39	42.24	-5.79	48.03	32.27	9.93	0.04	LINE	Average
8	0.39	52.17	-5.86	58.03	42.20	9.93	0.04	LINE	QP
9	0.58	30.12	-15.88	46.00	20.14	9.94	0.04	LINE	Average
10	0.58	43.07	-12.93	56.00	33.09	9.94	0.04	LINE	QP
11	5.90	17.28	-32.72	50.00	7.06	10.09	0.13	LINE	Average
12	5.90	24.37	-35.63	60.00	14.15	10.09	0.13	LINE	QP

Temperature	24°C	Humidity	56%
Test Engineer	Parody Lin	Phase	Neutral
Configuration	CTX / Mode 2		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.19	36.69	-17.20	53.89	26.88	9.79	0.02	NEUTRAL	Average
2	0.19	50.10	-13.79	63.89	40.29	9.79	0.02	NEUTRAL	QP
3	0.27	41.73	-9.52	51.25	31.91	9.79	0.03	NEUTRAL	Average
4	0.27	51.14	-10.11	61.25	41.32	9.79	0.03	NEUTRAL	QP
5	0.31	39.11	-10.82	49.93	29.28	9.79	0.04	NEUTRAL	Average
6	0.31	51.22	-8.71	59.93	41.39	9.79	0.04	NEUTRAL	QP
7	0.39	40.36	-7.72	48.08	30.53	9.79	0.04	NEUTRAL	Average
8	0.39	50.79	-7.29	58.08	40.96	9.79	0.04	NEUTRAL	QP
9	0.59	27.90	-18.10	46.00	18.06	9.80	0.04	NEUTRAL	Average
10	0.59	40.87	-15.13	56.00	31.03	9.80	0.04	NEUTRAL	QP
11	5.28	20.42	-29.58	50.00	10.40	9.91	0.11	NEUTRAL	Average
12	5.28	28.45	-31.55	60.00	18.43	9.91	0.11	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss.

4.2. 26dB Bandwidth and 99% Occupied Bandwidth Measurement

4.2.1. Limit

No restriction limits.

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.

26dB Bandwidth	
Spectrum Parameters	**Setting**
Attenuation	Auto
Span Frequency	> 26dB Bandwidth
RBW	Approximately 1% of the emission bandwidth
VBW	VBW > 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

4.2.3. Test Procedures

For Radiated 26dB Bandwidth and 99% Occupied Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.2.4. Test Setup Layout

For Radiated 26dB Bandwidth and 99% Occupied Bandwidth Measurement:

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

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 26dB Bandwidth and 99% Occupied Bandwidth

For Non-Beamforming Mode

Temperature	20℃	Humidity	59%
Test Engineer	Mars Lin		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5180 MHz	20.43	16.15
	5200 MHz	20.52	16.06
	5240 MHz	20.78	16.15
802.11ac MCS0/Nss1 VHT20	5180 MHz	21.21	17.62
	5200 MHz	21.13	17.62
	5240 MHz	21.21	17.62
802.11ac MCS0/Nss1 VHT40	5190 MHz	40.58	36.90
	5230 MHz	65.21	37.33
802.11ac MCS0/Nss1 VHT80	5210 MHz	82.31	76.12
802.11ac MCS0/Nss4 VHT40	5190 MHz	40.73	36.76
802.11ac MCS0/Nss4 VHT80	5210 MHz	82.03	76.12

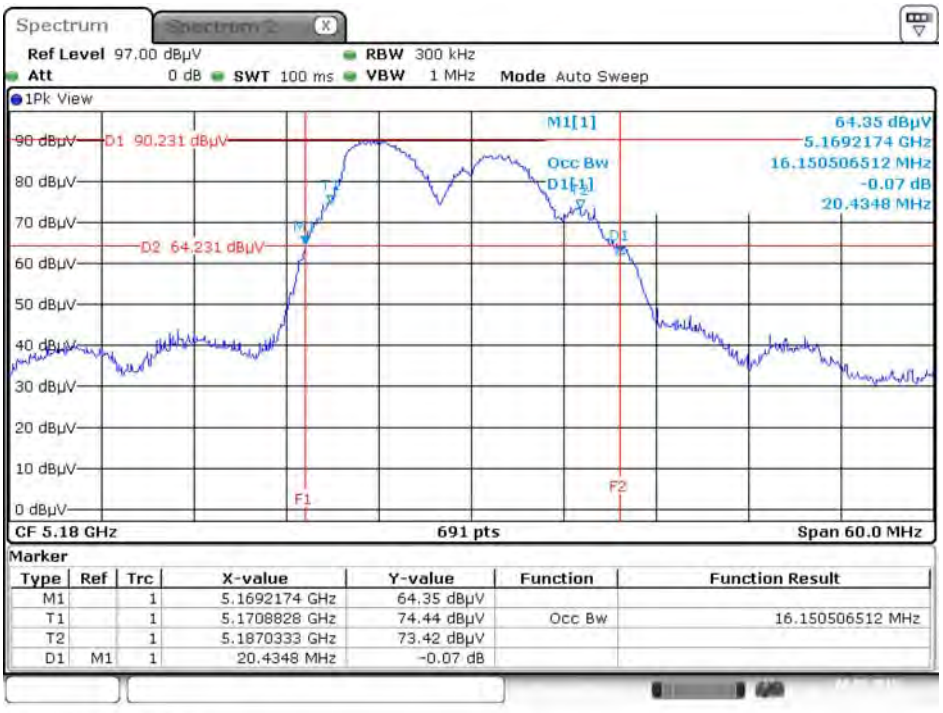
For Beamforming Mode

Temperature	20℃	Humidity	59%
Test Engineer	Serway Li		

Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11ac MCS0/Nss1 VHT20	5180 MHz	21.39	17.97
	5200 MHz	21.48	18.06
	5240 MHz	21.48	17.97
802.11ac MCS0/Nss1 VHT40	5190 MHz	40.73	36.61
	5230 MHz	40.44	36.90
802.11ac MCS0/Nss1 VHT80	5210 MHz	81.74	76.12

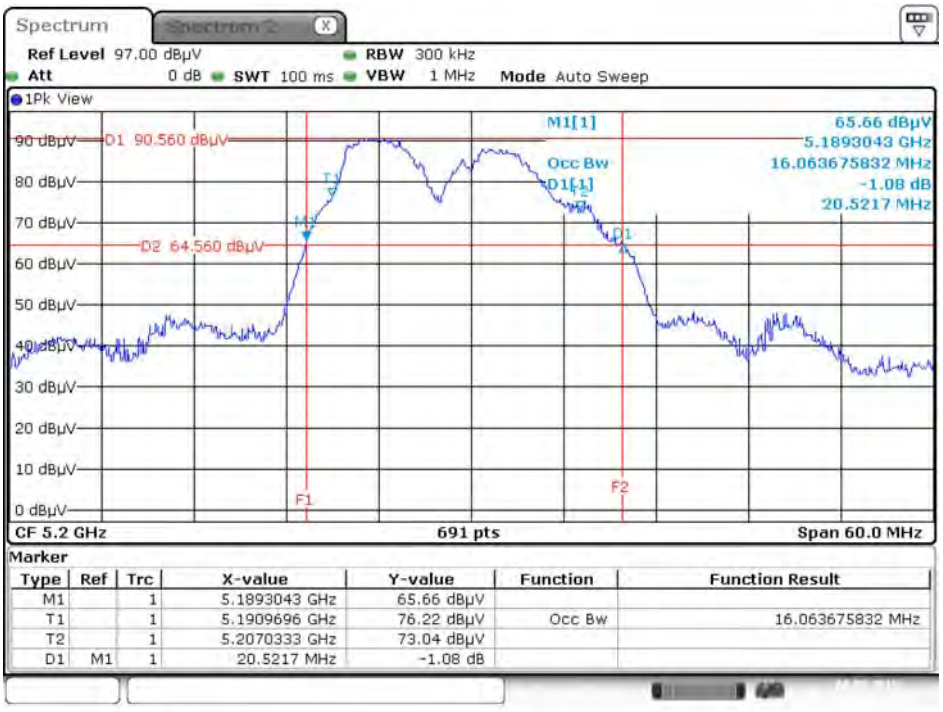
For Non-Beamforming Mode

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5180 MHz



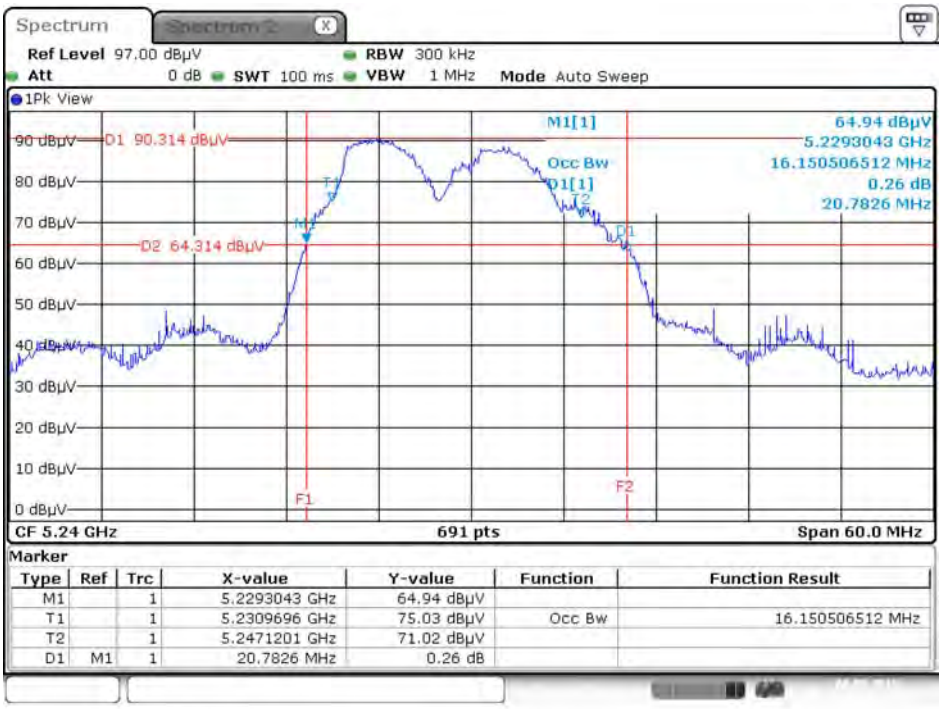
Date: 8.MAY.2015 20:45:51

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5200 MHz



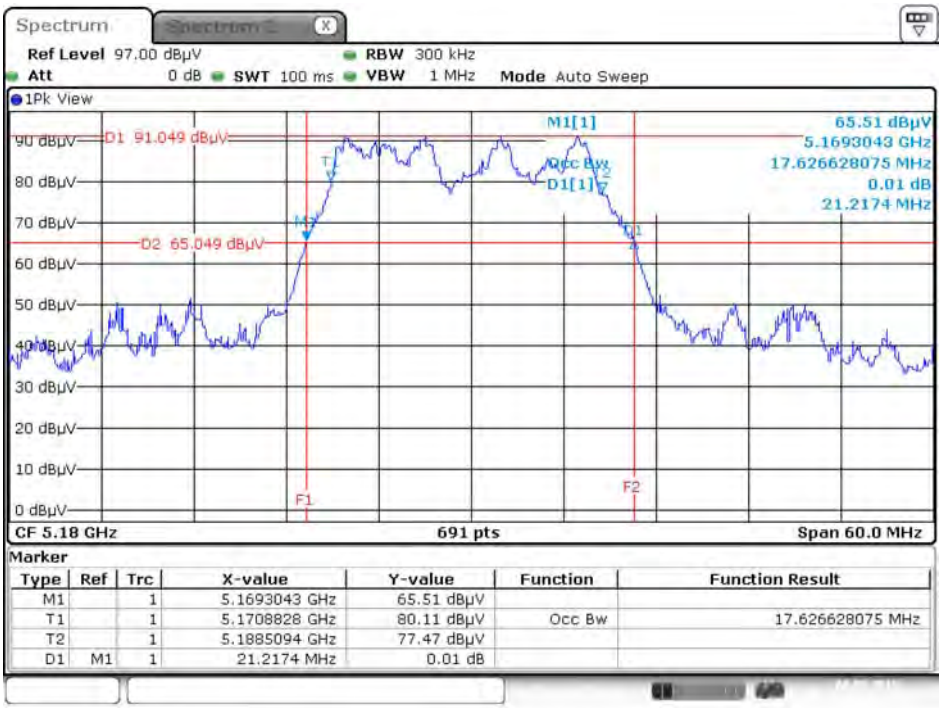
Date: 8.MAY.2015 20:47:40

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5240 MHz



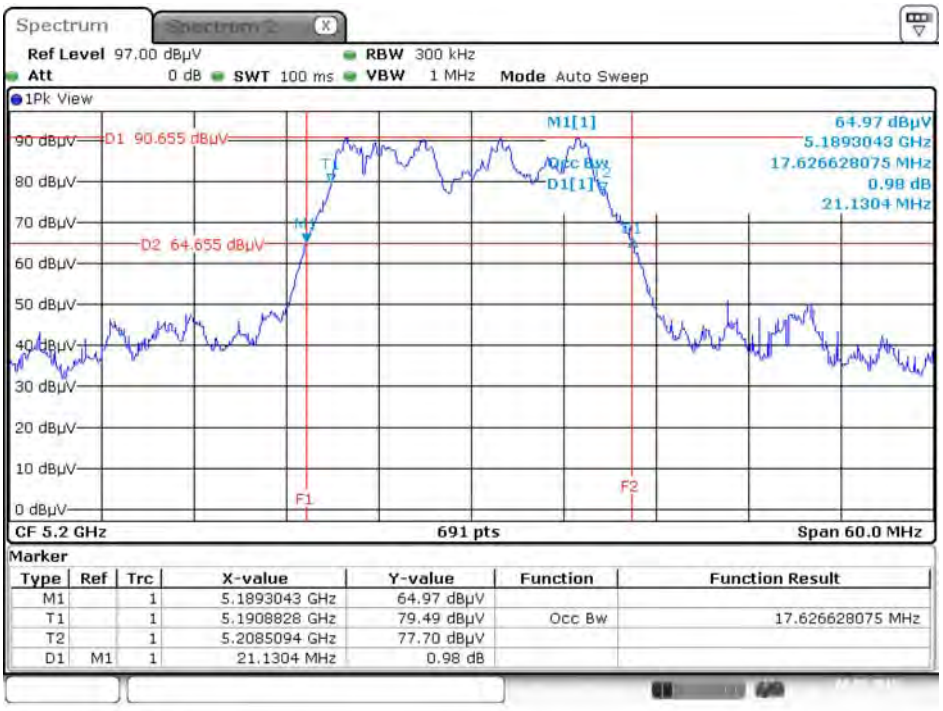
Date: 8.MAY.2015 20:49:29

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5180 MHz



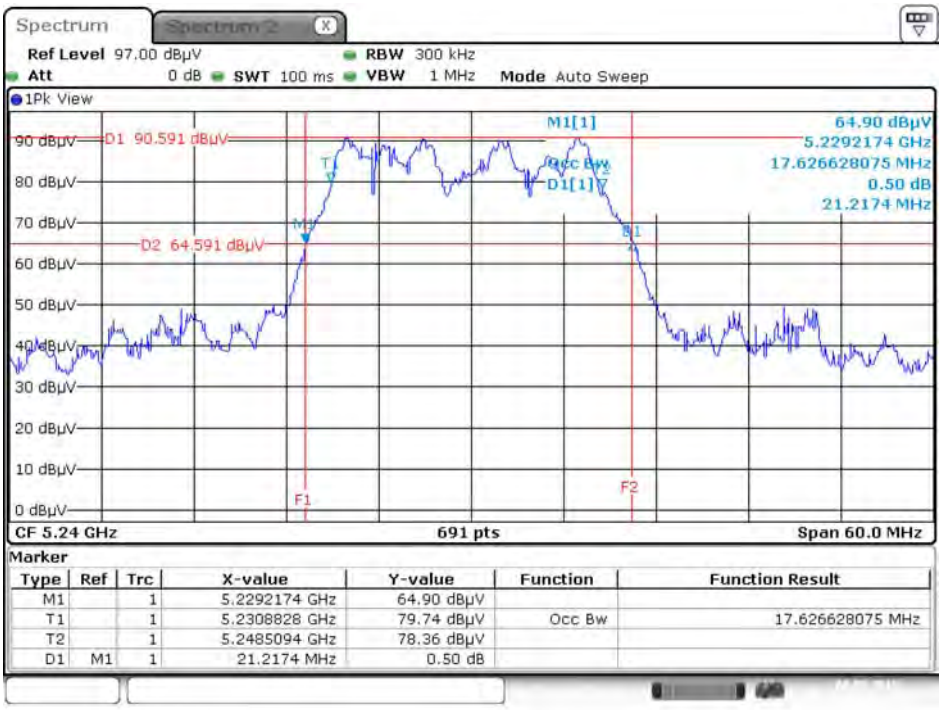
Date: 8.MAY.2015 20:50:47

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5200 MHz



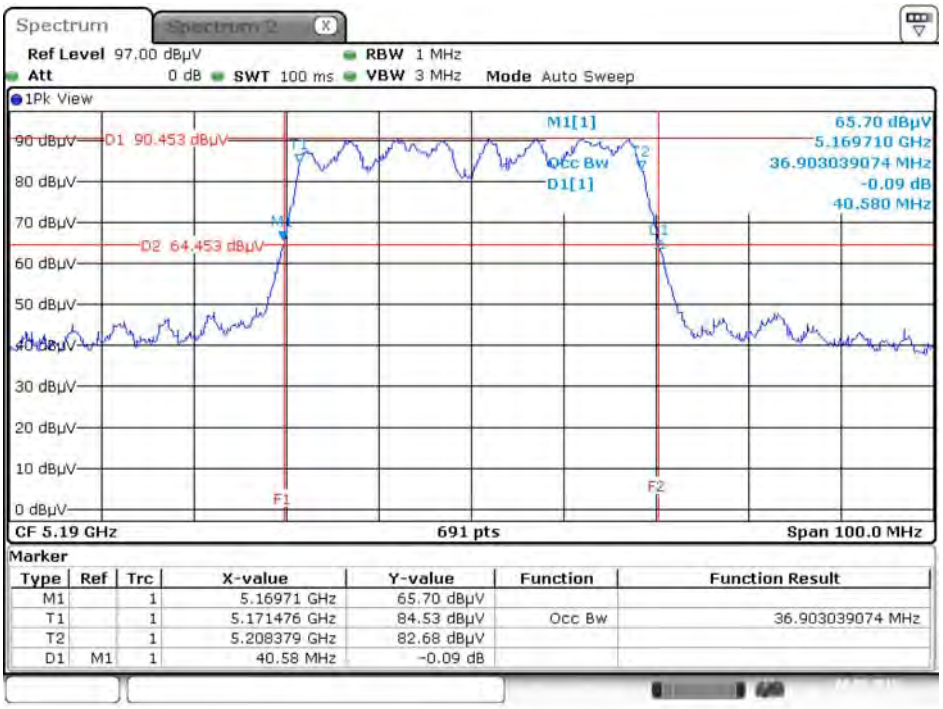
Date: 8.MAY.2015 20:51:42

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5240 MHz



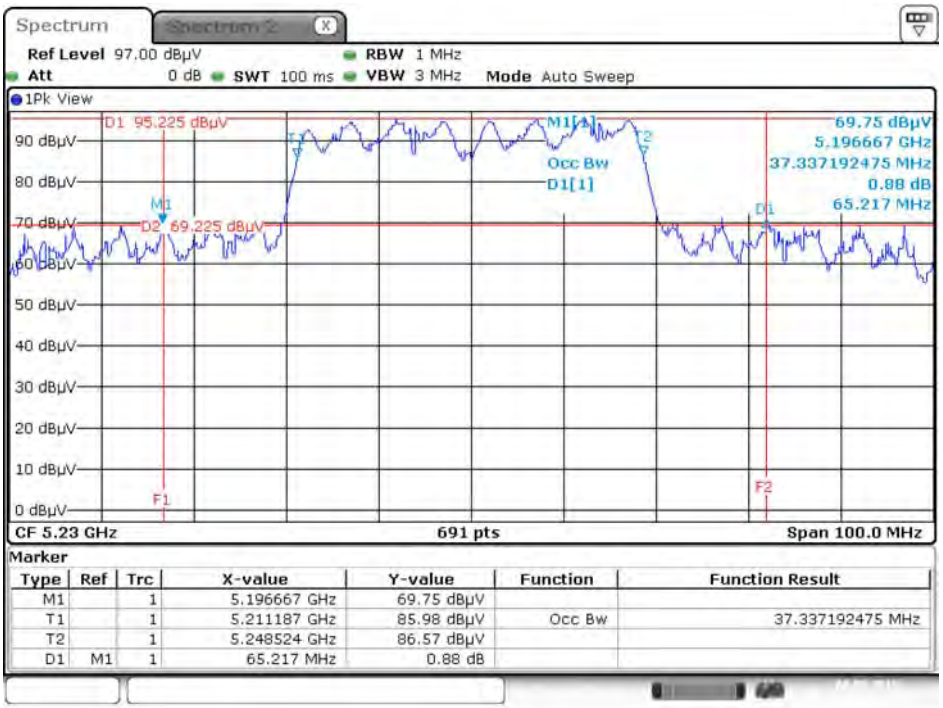
Date: 8.MAY.2015 20:52:35

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5190 MHz



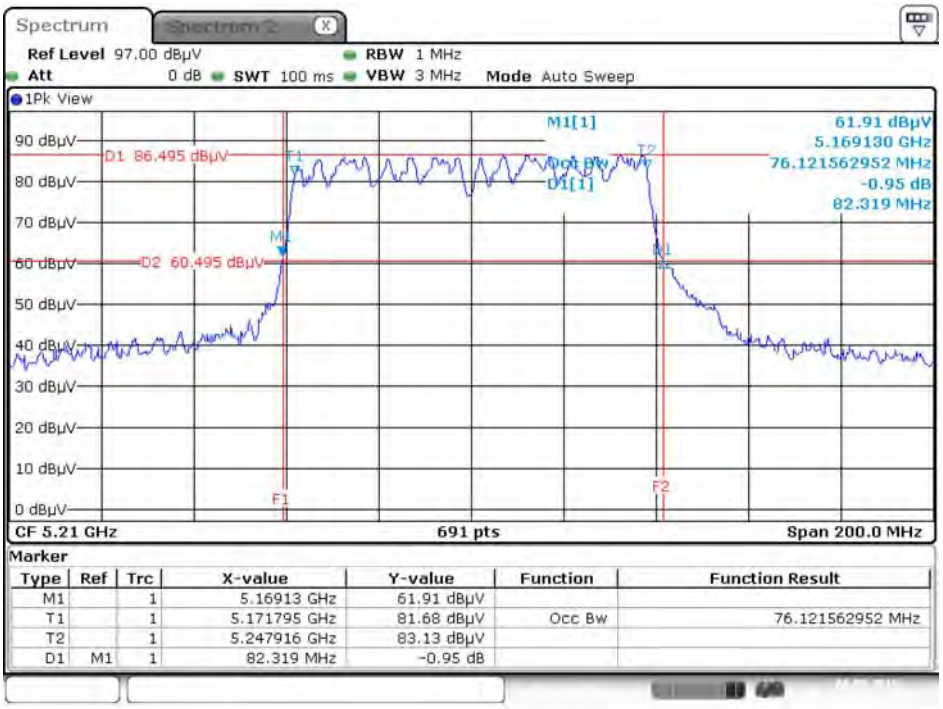
Date: 8.MAY.2015 20:54:39

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5230 MHz

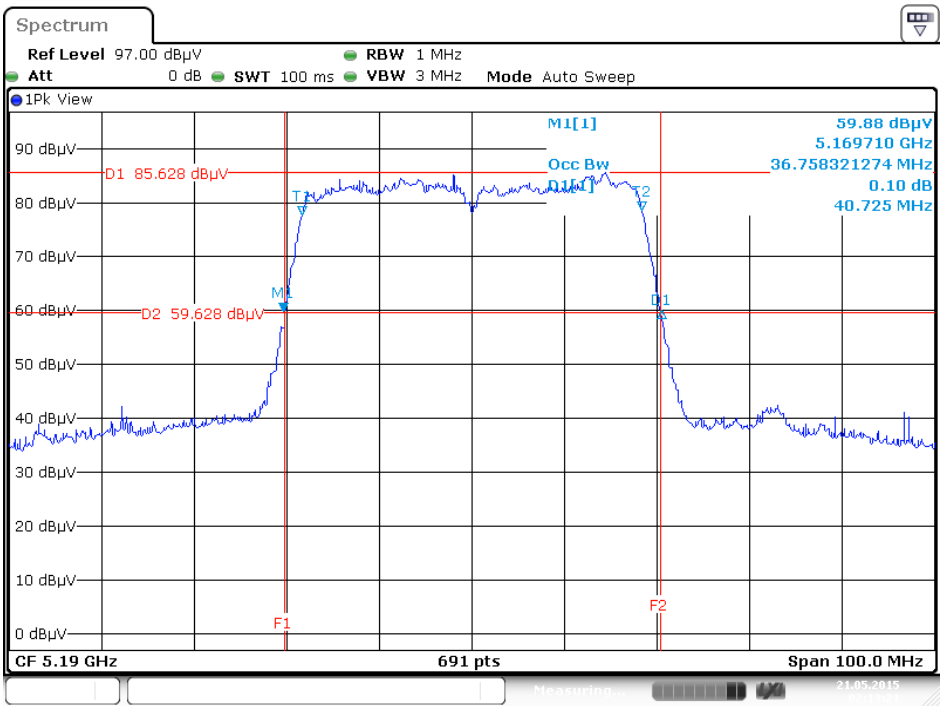


Date: 8.MAY.2015 20:56:17

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5210 MHz

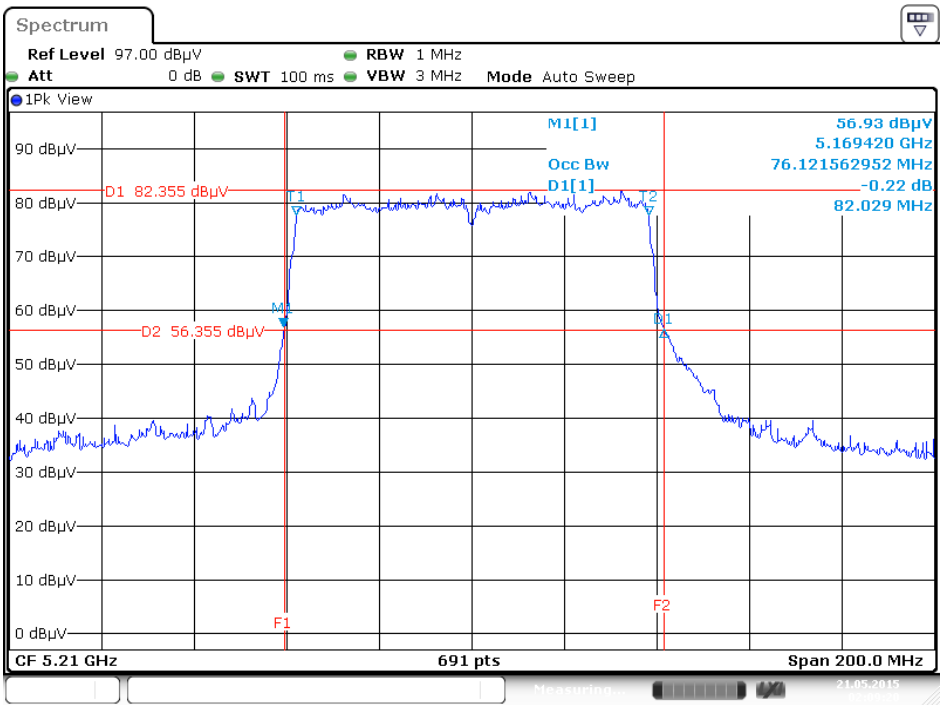


26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss4 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5190 MHz



Date: 21.MAY.2015 02:13:21

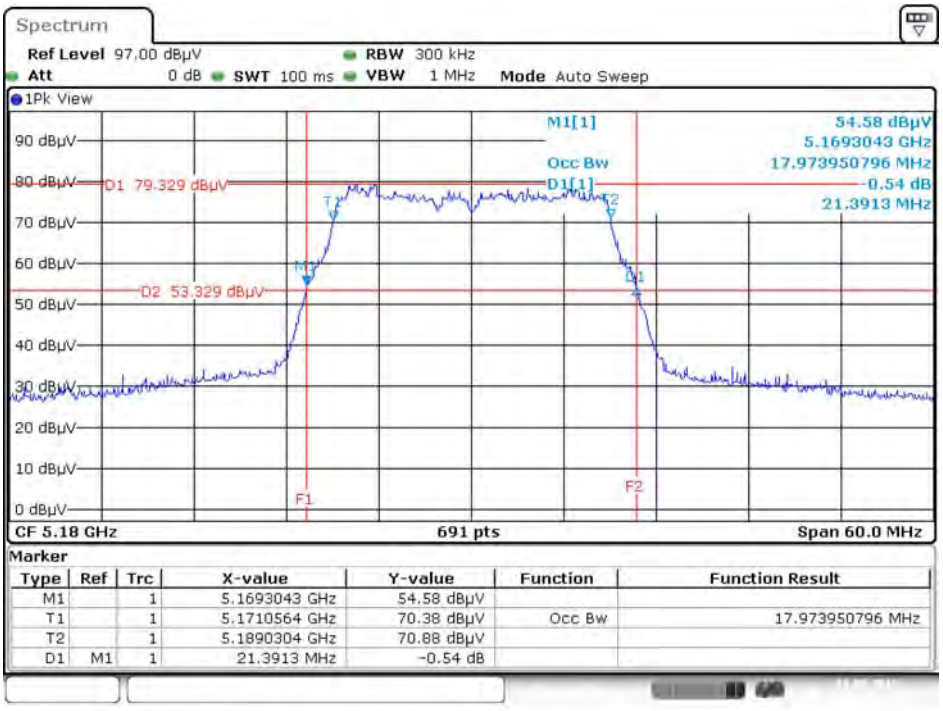
26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss4 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5210 MHz



Date: 21.MAY.2015 02:09:20

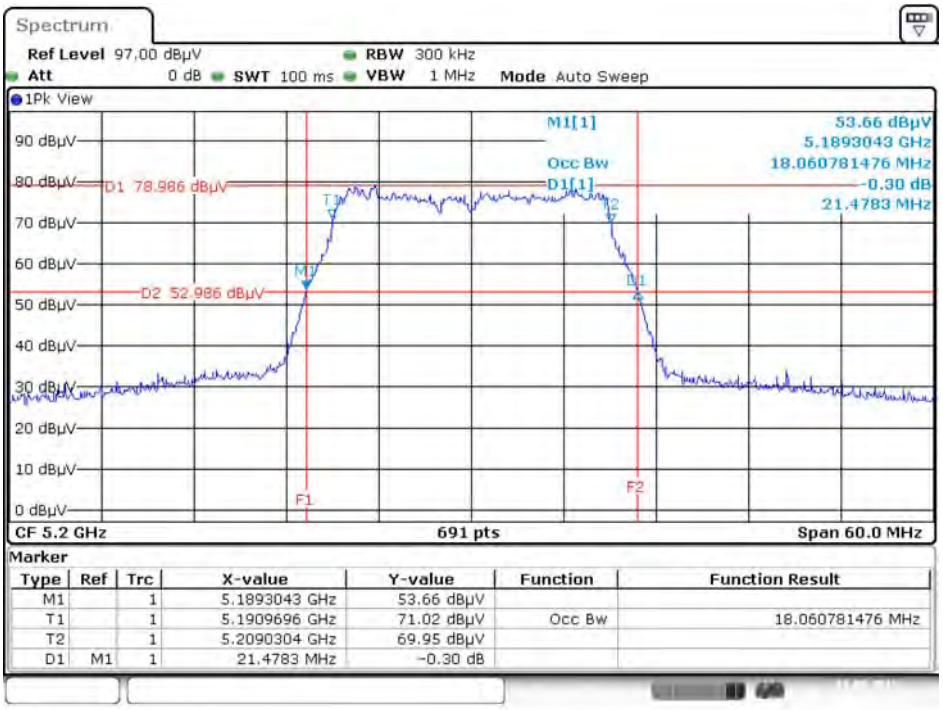
For Beamforming Mode

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5180 MHz



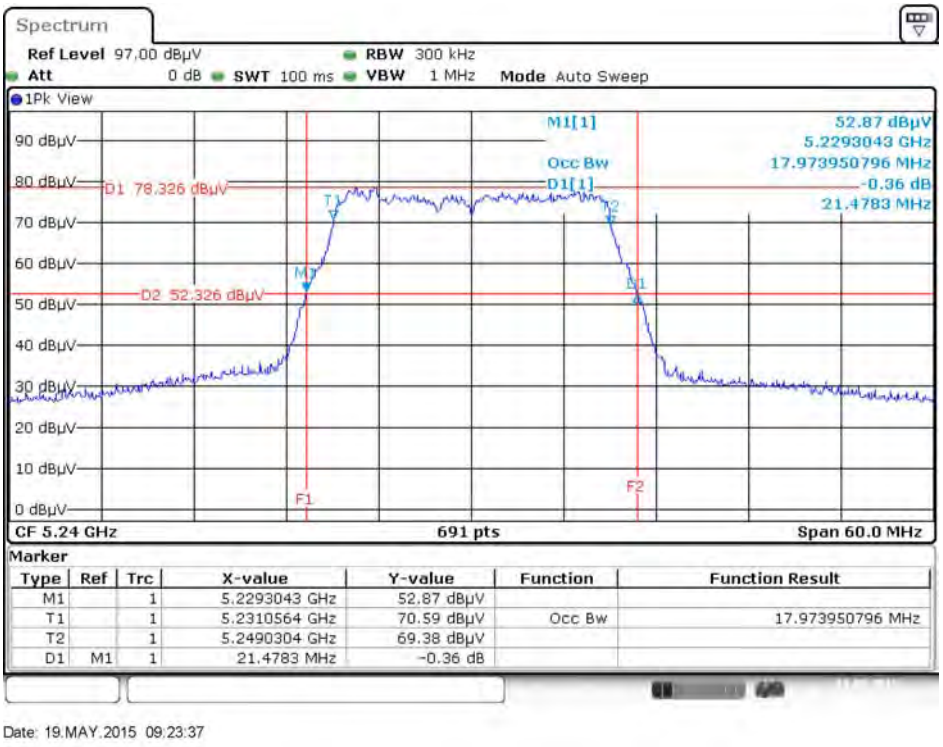
Date: 19.MAY.2015 09:21:34

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5200 MHz

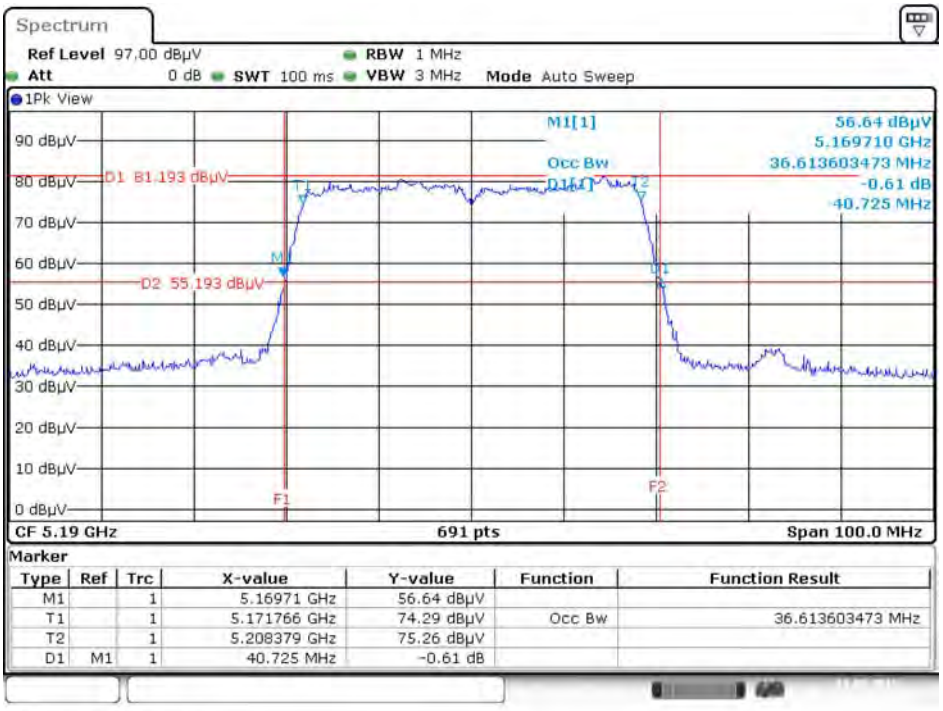


Date: 19.MAY.2015 09:22:47

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5240 MHz

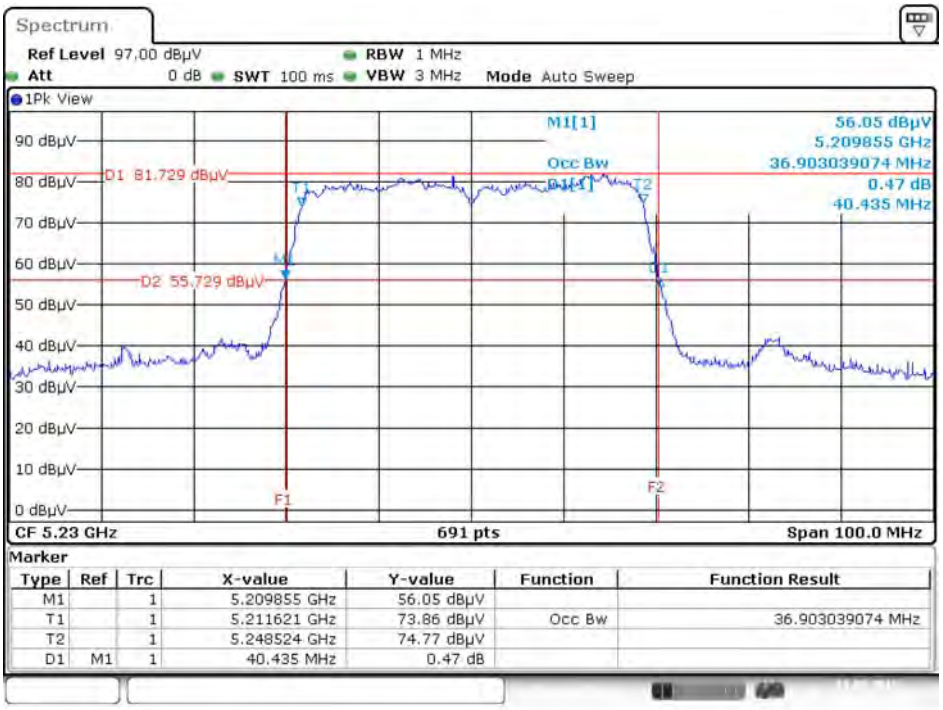


26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5190 MHz



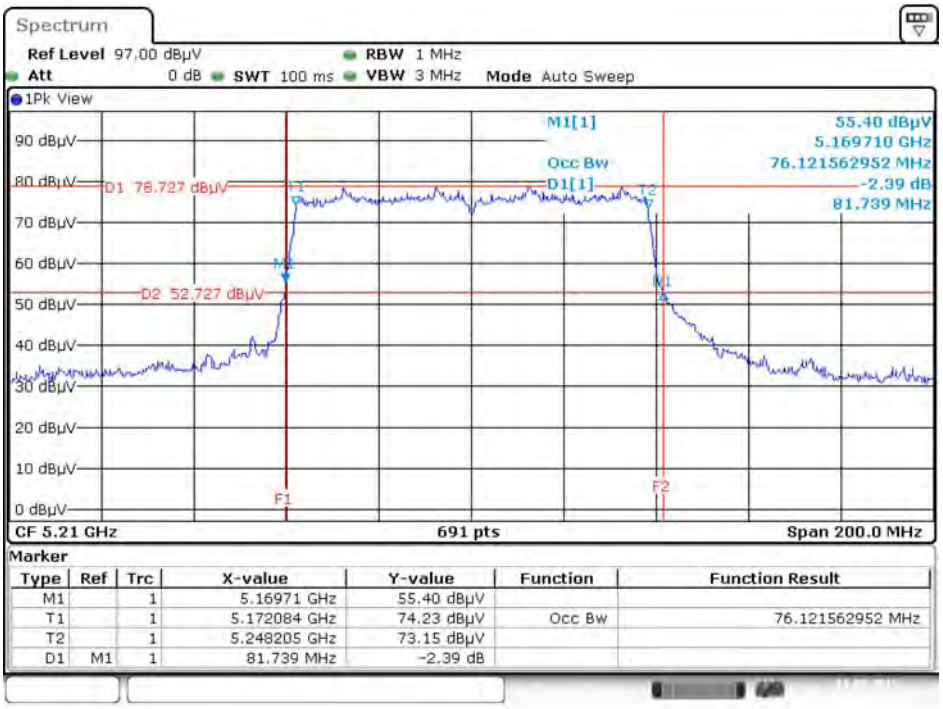
Date: 19.MAY.2015 09:25:17

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5230 MHz



Date: 19.MAY.2015 09:26:14

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4 / 5210 MHz



4.3. Maximum Conducted Output Power Measurement

4.3.1. Limit

Frequency Band		Limit
5.15~5.25 GHz		
Operating Mode		
☐	Outdoor access point	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
☒	Indoor access point	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
☐	Fixed point-to-point access points	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.
☐	Mobile and portable client devices	The maximum conducted output power over the frequency band of operation shall not exceed 250 mW (24dBm) provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

4.3.2. Measuring Instruments and Setting

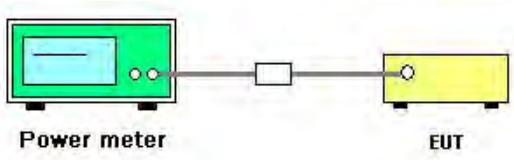
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.3.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (E) Maximum conducted output power =>3. Measurement using a Power Meter (PM) =>b) Method PM-G (Measurement using a gated RF average power meter).
3. Multiple antenna systems was performed in accordance with KDB662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. When measuring maximum conducted output power with multiple antenna systems,add every result of the values by mathematic formula.

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 Maximum Conducted Output Power

For Non-Beamforming Mode

Temperature	20°C	Humidity	59%
Test Engineer	Mars Lin	Test Date	May 08, 2015

Mode	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
802.11a	5180 MHz	20.19	19.81	20.08	20.37	26.14	30.00	Complies
	5200 MHz	20.82	20.56	20.67	21.09	26.81	30.00	Complies
	5240 MHz	20.83	20.76	20.85	20.98	26.88	30.00	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	20.53	20.35	20.41	20.67	26.51	30.00	Complies
	5200 MHz	20.59	20.64	20.62	21.01	26.74	30.00	Complies
	5240 MHz	20.89	20.73	20.78	21.07	26.89	30.00	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	19.13	19.04	19.23	19.15	25.16	30.00	Complies
	5230 MHz	23.78	23.63	23.65	23.79	29.73	30.00	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	18.26	18.24	18.22	18.17	24.24	30.00	Complies
802.11ac MCS0/Nss4 VHT40	5190 MHz	20.38	20.43	20.17	20.25	26.33	30.00	Complies
802.11ac MCS0/Nss4 VHT80	5210 MHz	19.96	20.09	19.93	19.84	25.98	30.00	Complies

For Beamforming Mode

Temperature	20°C	Humidity	59%
Test Engineer	Serway Li	Test Date	May 18, 2015

Mode	Frequency	Conducted Power (dBm)					Max. Limit (dBm)	Result
		Ant. 1	Ant. 2	Ant. 3	Ant. 4	Total		
802.11ac MCS0/Nss1 VHT20	5180 MHz	20.61	20.51	20.34	20.56	26.53	26.61	Complies
	5200 MHz	20.52	20.32	20.36	20.52	26.45	26.61	Complies
	5240 MHz	20.48	20.38	20.25	20.67	26.47	26.61	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	19.55	19.54	19.52	19.58	25.57	26.61	Complies
	5230 MHz	20.41	20.45	20.43	20.59	26.49	26.61	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	20.39	20.33	20.41	20.58	26.45	26.61	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =9.39dBi, so limit=30-(9.39-6)=26.61 dBm

4.4. Power Spectral Density Measurement

4.4.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.3.1.

Frequency Band		Limit
5.15~5.25 GHz		
Operating Mode		
☐	Outdoor access point	17 dBm/MHz
☒	Indoor access point	17 dBm/MHz
☐	Fixed point-to-point access points	17 dBm/MHz
☐	Mobile and portable client devices	11 dBm/MHz

4.4.2. Measuring Instruments and Setting

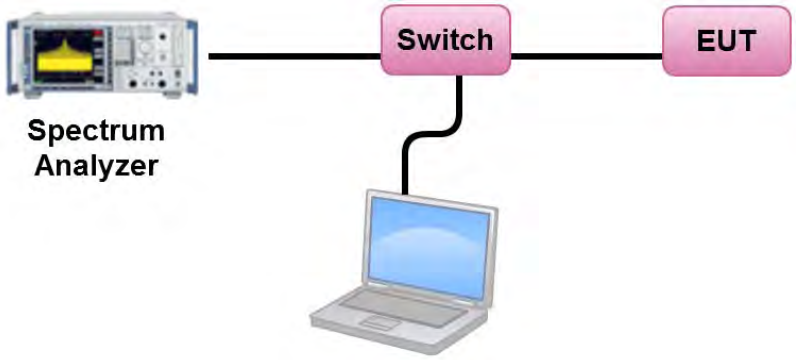
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Encompass the entire emissions bandwidth (EBW) of the signal
RBW	1000 kHz
VBW	3000 kHz
Detector	RMS
Trace	AVERAGE
Sweep Time	Auto
Trace Average	100 times

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected RF switch to the spectrum analyzer.
2. Test was performed in accordance with KDB789033 D02 v01 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (F) Maximum Power Spectral Density (PSD).
3. Multiple antenna systems was performed in accordance KDB662911 D01 v02r01 in-Band Power Spectral Density (PSD) Measurements (a) Measure and sum the spectra across the outputs.
4. When measuring first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3 and so on up to the Nth output to obtain the value for the first frequency bin of the summed spectrum. The summed spectrum value for each of the other frequency bins is computed in the same way.

4.4.4. Test Setup Layout



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 Power Spectral Density

For Non-Beamforming Mode

Temperature	20°C	Humidity	59%
Test Engineer	Mars Lin		

Mode	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
802.11a	5180 MHz	12.81	13.61	Complies
	5200 MHz	13.42	13.61	Complies
	5240 MHz	13.59	13.61	Complies
802.11ac MCS0/Nss1 VHT20	5180 MHz	13.30	13.61	Complies
	5200 MHz	13.43	13.61	Complies
	5240 MHz	13.53	13.61	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	9.04	13.61	Complies
	5230 MHz	13.59	13.61	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	5.08	13.61	Complies

Note:

$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$ =9.39dBi, so limit=17-(9.39-6)=13.61 dBm/MHz

Mode	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
802.11ac MCS0/Nss4 VHT40	5190 MHz	8.99	17.00	Complies
802.11ac MCS0/Nss4 VHT80	5210 MHz	5.68	17.00	Complies

Note: MCS0/Nss4 test mode is not necessary to evaluate directional gain.

For Beamforming Mode

Temperature	20°C	Humidity	59%
Test Engineer	Serway Li		

Mode	Frequency	Power Density (dBm/MHz)	Max. Limit (dBm/MHz)	Result
802.11ac MCS0/Nss1 VHT20	5180 MHz	12.81	13.61	Complies
	5200 MHz	12.85	13.61	Complies
	5240 MHz	12.60	13.61	Complies
802.11ac MCS0/Nss1 VHT40	5190 MHz	9.01	13.61	Complies
	5230 MHz	9.67	13.61	Complies
802.11ac MCS0/Nss1 VHT80	5210 MHz	6.61	13.61	Complies

Note:

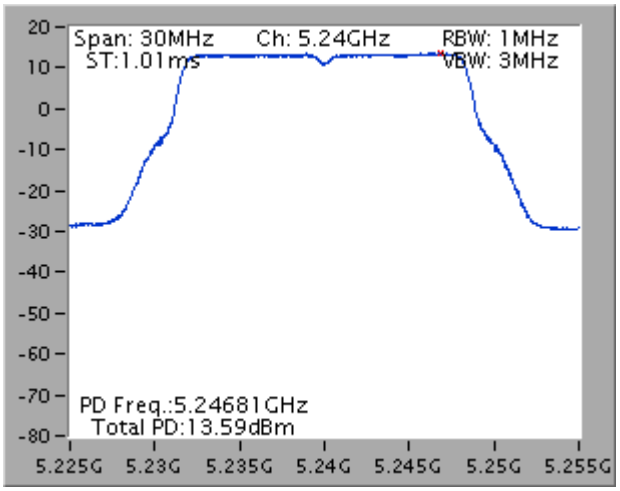
$$DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$$ =9.39dBi, so limit=17-(9.39-6)=13.61 dBm/MHz

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

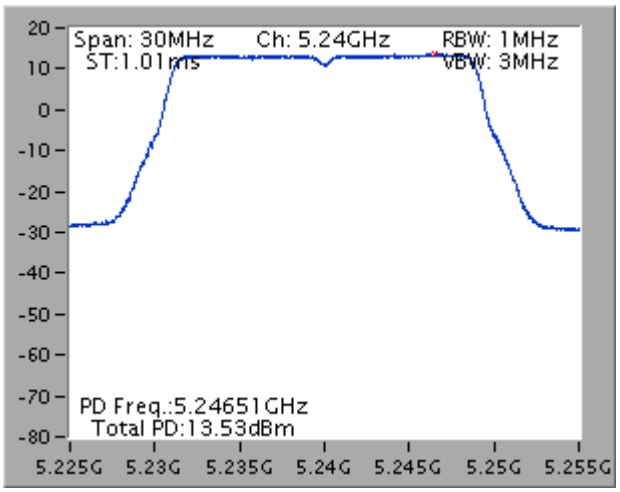
For plots, only the channel with worse result was shown.

For Non-Beamforming Mode

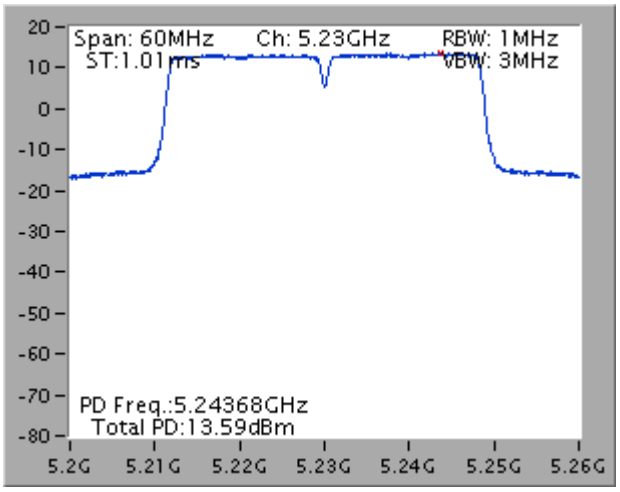
Power Density Plot on Configuration IEEE 802.11a / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5240 MHz



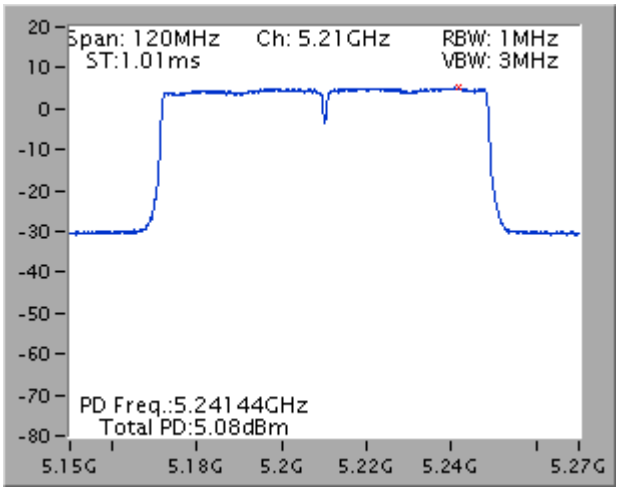
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5240 MHz



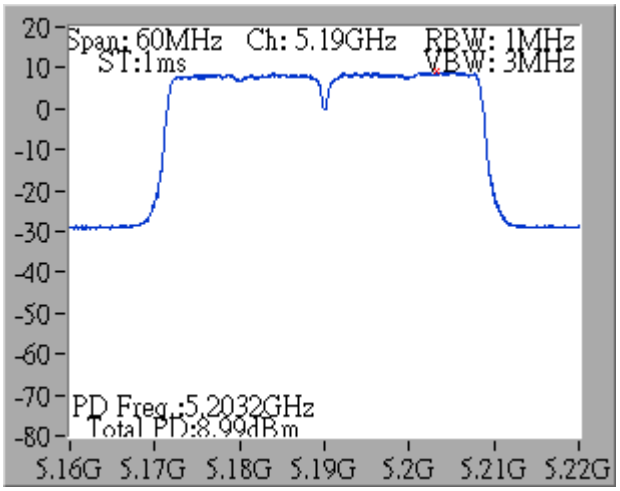
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5230 MHz



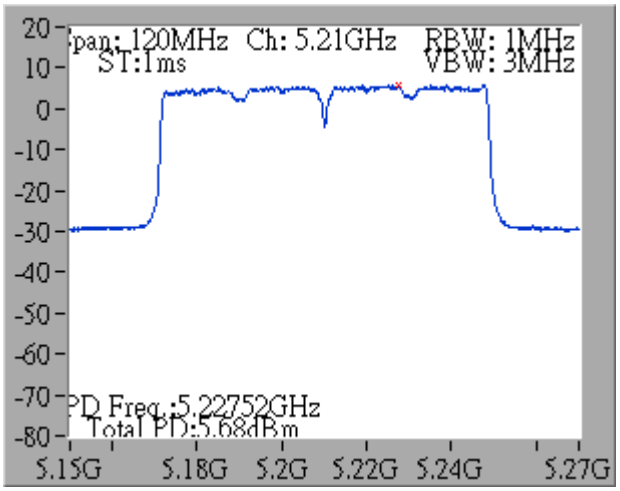
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5210 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss4 VHT40 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5190 MHz

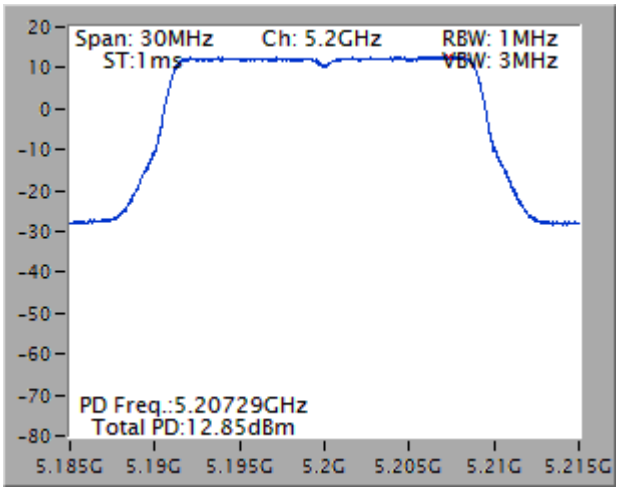


Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss4 VHT80 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5210 MHz

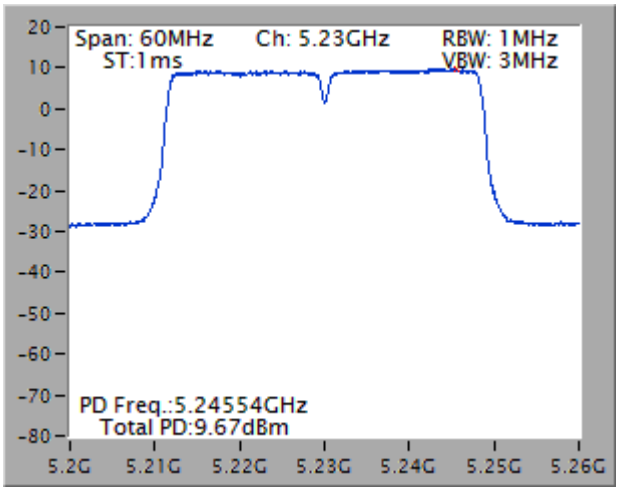


For Beamforming Mode

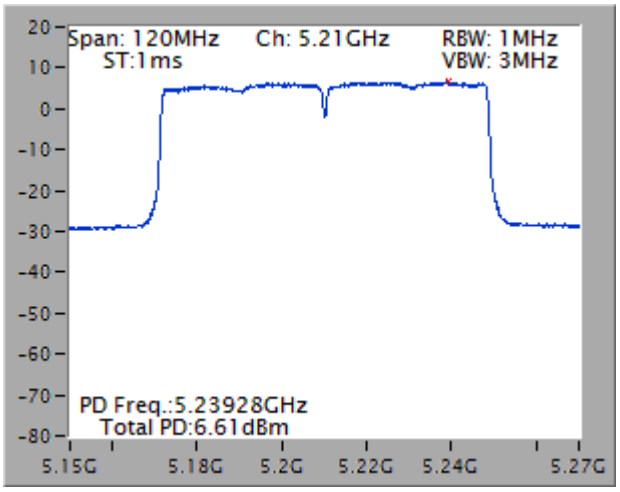
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5200 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5230 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Ant. 1 + Ant. 2 + Ant. 3+ Ant. 4 / 5210 MHz



4.5. Radiated Emissions Measurement

4.5.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

In addition, 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	40 GHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (Emission in non-restricted band)	1MHz / 3MHz for peak

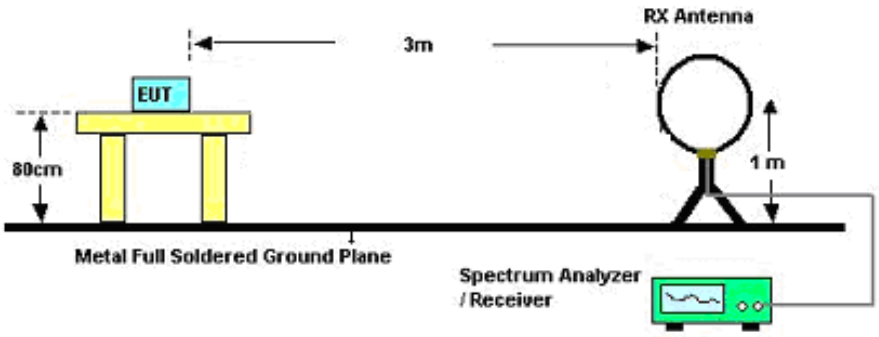
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.5.3. Test Procedures

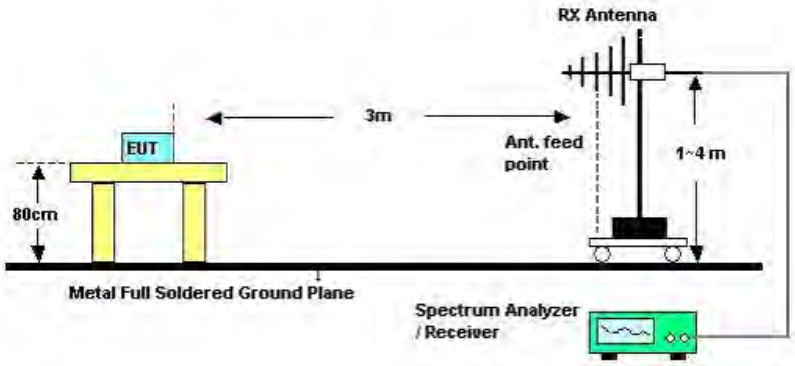
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting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

4.5.4. Test Setup Layout

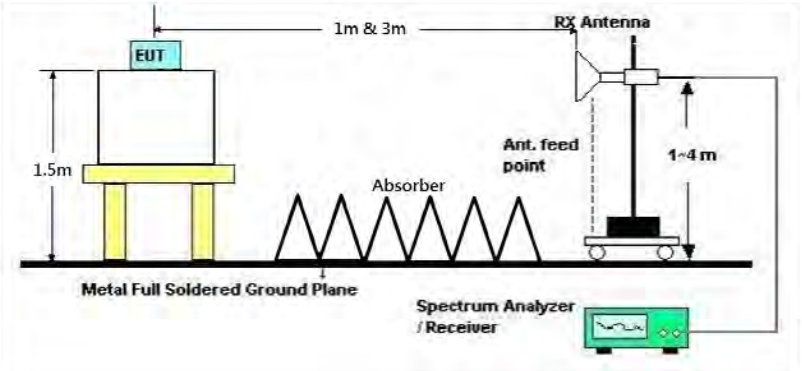
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

For Non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

The EUT was programmed to be in beamforming transmitting mode.

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

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	CTX / Mode 2
Test Date	May 13, 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 20dB below the permissible value has no need to be reported.

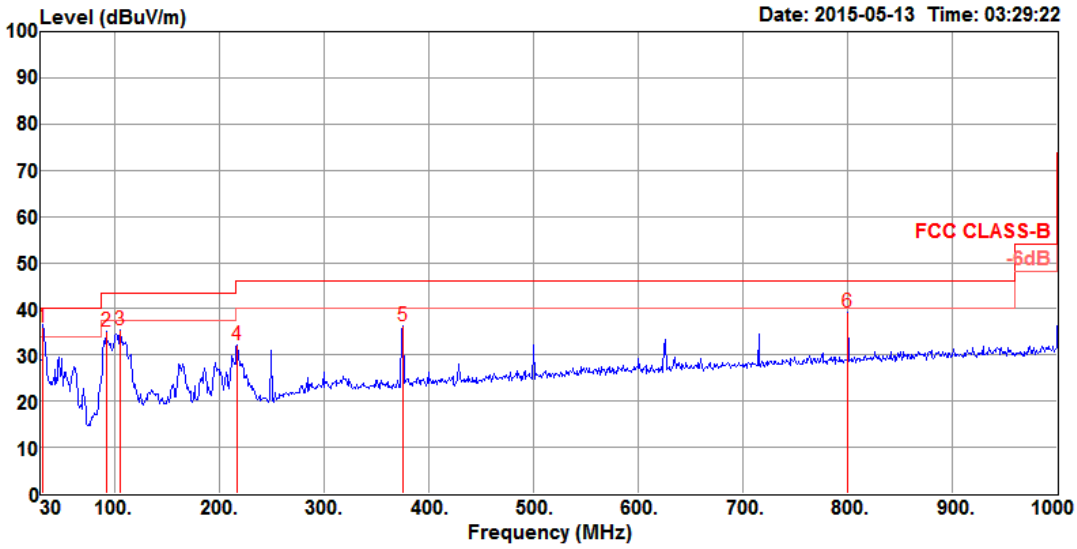
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

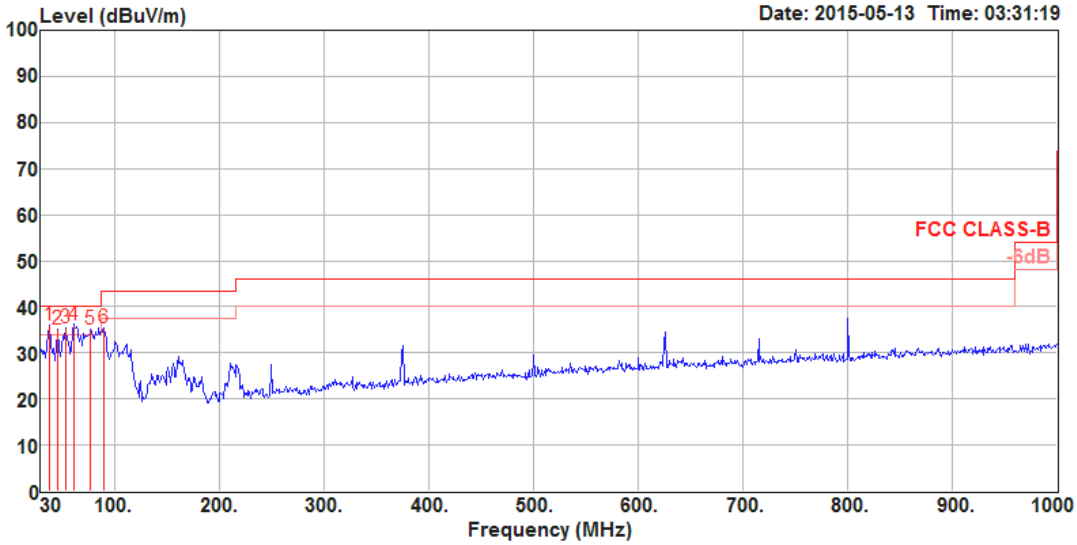
Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	CTX / Mode 2

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	31.94	35.99	40.00	-4.01	48.69	0.64	18.90	32.24	125	310	Peak	HORIZONTAL
2	92.08	35.07	43.50	-8.43	56.77	0.92	9.58	32.20	300	118	Peak	HORIZONTAL
3	105.66	35.36	43.50	-8.14	54.84	0.96	11.82	32.26	200	259	Peak	HORIZONTAL
4	217.21	32.09	46.00	-13.91	52.13	1.30	10.73	32.07	150	107	Peak	HORIZONTAL
5	375.32	36.38	46.00	-9.62	50.88	1.68	15.91	32.09	100	187	Peak	HORIZONTAL
6	800.18	39.26	46.00	-6.74	48.24	2.30	20.80	32.08	125	227	Peak	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	37.76	35.96	40.00	-4.04	52.19	0.66	15.39	32.28	100	344	Peak	VERTICAL
2	46.49	34.98	40.00	-5.02	55.96	0.69	10.59	32.26	125	314	Peak	VERTICAL
3	53.28	35.45	40.00	-4.55	58.75	0.74	8.27	32.31	200	352	Peak	VERTICAL
4	61.04	35.99	40.00	-4.01	60.62	0.78	6.89	32.30	200	173	Peak	VERTICAL
5	77.53	35.00	40.00	-5.00	58.92	0.84	7.41	32.17	150	181	Peak	VERTICAL
6	90.14	35.37	43.50	-8.13	57.45	0.92	9.23	32.23	100	95	Peak	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~40GHz)

For Non-Beamforming Mode

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 36 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15539.96	46.64	54.00	-7.36	29.31	12.58	38.45	33.70	179	199	Average	HORIZONTAL
2	15539.99	59.18	74.00	-14.82	41.85	12.58	38.45	33.70	179	199	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15539.65	60.23	74.00	-13.77	42.90	12.58	38.45	33.70	253	199	Peak	VERTICAL
2	15540.17	46.63	54.00	-7.37	29.30	12.58	38.45	33.70	253	199	Average	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15599.25	60.78	74.00	-13.22	43.62	12.58	38.36	33.78	77	199	Peak	HORIZONTAL
2	15599.99	46.67	54.00	-7.33	29.51	12.58	38.36	33.78	77	199	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15599.25	46.75	54.00	-7.25	29.59	12.58	38.36	33.78	179	202	Average	VERTICAL
2	15600.38	59.70	74.00	-14.30	42.54	12.58	38.36	33.78	179	202	Peak	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 48 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15719.83	60.45	74.00	-13.55	43.57	12.57	38.19	33.88	46	202	Peak	HORIZONTAL
2	15720.03	47.15	54.00	-6.85	30.27	12.57	38.19	33.88	46	202	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15719.70	59.52	74.00	-14.48	42.64	12.57	38.19	33.88	345	202	Peak	VERTICAL
2	15719.83	46.84	54.00	-7.16	29.96	12.57	38.19	33.88	345	202	Average	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15539.67	59.84	74.00	-14.16	42.51	12.58	38.45	33.70	116	202	Peak	HORIZONTAL
2	15539.90	46.70	54.00	-7.30	29.37	12.58	38.45	33.70	116	202	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15540.04	59.23	74.00	-14.77	41.90	12.58	38.45	33.70	109	202	Peak	VERTICAL
2	15540.28	47.13	54.00	-6.87	29.80	12.58	38.45	33.70	109	202	Average	VERTICAL

Temperature	26℃	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15595.00	46.62	54.00	-7.38	29.43	12.58	38.36	33.75	92	202	Average	HORIZONTAL
2	15600.04	59.52	74.00	-14.48	42.36	12.58	38.36	33.78	92	202	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15600.00	46.48	54.00	-7.52	29.32	12.58	38.36	33.78	340	202	Average	VERTICAL
2	15600.03	58.86	74.00	-15.14	41.70	12.58	38.36	33.78	340	202	Peak	VERTICAL

Temperature	26℃	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15719.06	60.32	74.00	-13.68	43.44	12.57	38.19	33.88	316	202	Peak	HORIZONTAL
2	15719.94	46.92	54.00	-7.08	30.04	12.57	38.19	33.88	316	202	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15719.48	60.33	74.00	-13.67	43.45	12.57	38.19	33.88	90	202	Peak	VERTICAL
2	15719.99	46.91	54.00	-7.09	30.03	12.57	38.19	33.88	90	202	Average	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15570.00	46.74	54.00	-7.26	29.49	12.58	38.40	33.73	159	202	Average	HORIZONTAL
2	15570.00	58.99	74.00	-15.01	41.74	12.58	38.40	33.73	159	202	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15570.00	46.61	54.00	-7.39	29.36	12.58	38.40	33.73	247	202	Average	VERTICAL
2	15570.06	59.31	74.00	-14.69	42.06	12.58	38.40	33.73	247	202	Peak	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15689.87	59.57	74.00	-14.43	42.61	12.58	38.23	33.85	244	202	Peak	HORIZONTAL
2	15690.00	46.74	54.00	-7.26	29.78	12.58	38.23	33.85	244	202	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15689.78	59.91	74.00	-14.09	42.95	12.58	38.23	33.85	47	202	Peak	VERTICAL
2	15690.04	46.90	54.00	-7.10	29.94	12.58	38.23	33.85	47	202	Average	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15629.90	59.30	74.00	-14.70	42.21	12.58	38.31	33.80	254	202	Peak	HORIZONTAL
2	15630.01	46.71	54.00	-7.29	29.62	12.58	38.31	33.80	254	202	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15629.67	60.25	74.00	-13.75	43.16	12.58	38.31	33.80	52	202	Peak	VERTICAL
2	15629.90	46.55	54.00	-7.45	29.46	12.58	38.31	33.80	52	202	Average	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss4 VHT40 CH 38 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 20, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15572.60	62.82	74.00	-11.18	45.57	12.58	38.40	33.73	297	176	Peak	HORIZONTAL
2	15574.72	49.57	54.00	-4.43	32.34	12.58	38.40	33.75	297	176	Average	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15568.84	49.59	54.00	-4.41	32.34	12.58	38.40	33.73	44	169	Average	VERTICAL
2	15579.40	62.16	74.00	-11.84	44.95	12.58	38.38	33.75	44	169	Peak	VERTICAL

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss4 VHT80 CH 42 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 20, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15623.16	49.47	54.00	-4.53	32.34	12.58	38.33	33.78	71	168	Average	HORIZONTAL
2	15638.60	62.68	74.00	-11.32	45.59	12.58	38.31	33.80	71	168	Peak	HORIZONTAL

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	15622.72	61.71	74.00	-12.29	44.58	12.58	38.33	33.78	301	166	Peak	VERTICAL
2	15625.28	49.51	54.00	-4.49	32.40	12.58	38.33	33.80	301	166	Average	VERTICAL

For Beamforming Mode

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 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	15544.84	57.47	74.00	-16.53	43.18	10.03	38.78	34.52	183	153	HORIZONTAL	Peak
2	15545.64	44.74	54.00	-9.26	30.45	10.03	38.78	34.52	183	153	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	15533.04	57.72	74.00	-16.28	43.42	10.03	38.78	34.51	202	229	VERTICAL	Peak
2	15538.49	45.41	54.00	-8.59	31.11	10.03	38.78	34.51	202	229	VERTICAL	Average

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 40 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 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	15591.25	43.73	54.00	-10.27	29.50	10.04	38.77	34.58	191	156	HORIZONTAL	Average
2	15592.40	58.49	74.00	-15.51	44.26	10.04	38.77	34.58	191	156	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	15590.64	57.36	74.00	-16.64	43.13	10.04	38.77	34.58	194	188	VERTICAL	Peak
2	15591.70	43.77	54.00	-10.23	29.54	10.04	38.77	34.58	194	188	VERTICAL	Average

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 48 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 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	15718.09	58.10	74.00	-15.90	44.05	10.07	38.72	34.74	197	259	HORIZONTAL	Peak
2	15719.76	43.84	54.00	-10.16	29.79	10.07	38.72	34.74	197	259	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	15714.79	43.94	54.00	-10.06	29.88	10.07	38.72	34.73	188	265	VERTICAL	Average
2	15716.37	59.33	74.00	-14.67	45.28	10.07	38.72	34.74	188	265	VERTICAL	Peak

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 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	15568.80	43.94	54.00	-10.06	29.69	10.03	38.77	34.55	200	309	HORIZONTAL	Average
2	15571.99	59.02	74.00	-14.98	44.77	10.03	38.77	34.55	200	309	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	15570.87	43.90	54.00	-10.10	29.65	10.03	38.77	34.55	170	191	VERTICAL	Average
2	15571.27	58.37	74.00	-15.63	44.12	10.03	38.77	34.55	170	191	VERTICAL	Peak

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 46 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 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	15689.17	43.86	54.00	-10.14	29.76	10.07	38.73	34.70	201	74	HORIZONTAL	Average
2	15691.10	58.33	74.00	-15.67	44.24	10.07	38.72	34.70	201	74	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	15689.89	58.95	74.00	-15.05	44.85	10.07	38.73	34.70	177	101	VERTICAL	Peak
2	15692.31	43.88	54.00	-10.12	29.80	10.07	38.72	34.71	177	101	VERTICAL	Average

Temperature	26℃	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 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	15627.68	58.11	74.00	-15.89	43.93	10.05	38.75	34.62	198	137	HORIZONTAL	Peak
2	15631.35	43.49	54.00	-10.51	29.32	10.05	38.75	34.63	198	137	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	15631.88	58.13	74.00	-15.87	43.96	10.05	38.75	34.63	185	135	VERTICAL	Peak
2	15632.32	43.54	54.00	-10.46	29.37	10.05	38.75	34.63	185	135	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.

4.6. Band Edge Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.15-5.25 GHz band: all emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.

In addition, In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

4.6.2. Measuring Instruments and Setting

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

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

4.6.3. Test Procedures

1. The test procedure is the same as section 4.5.3.

4.6.4. Test Setup Layout

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

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

For Non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For beamforming mode:

The EUT was programmed to be in beamforming transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

For Non-Beamforming Mode

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11a CH 36, 40, 48 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 05, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5146.09	53.92	54.00	-0.08	46.65	6.21	34.11	33.05	191	198	Average	VERTICAL
2	5146.09	69.90	74.00	-4.10	62.63	6.21	34.11	33.05	191	198	Peak	VERTICAL
3	5186.51	108.28			100.93	6.24	34.16	33.05	191	198	Average	VERTICAL
4	5186.51	118.70			111.35	6.24	34.16	33.05	191	198	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5141.75	68.09	74.00	-5.91	60.86	6.17	34.11	33.05	183	200	Peak	VERTICAL
2	5149.57	53.84	54.00	-0.16	46.57	6.21	34.11	33.05	183	200	Average	VERTICAL
3	5202.60	113.40			106.00	6.27	34.18	33.05	183	200	Average	VERTICAL
4	5203.47	123.05			115.65	6.27	34.18	33.05	183	200	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5148.26	63.71	74.00	-10.29	56.44	6.21	34.11	33.05	176	201	Peak	VERTICAL
2	5150.00	49.34	54.00	-4.66	42.07	6.21	34.11	33.05	176	201	Average	VERTICAL
3	5236.09	112.14			104.66	6.30	34.23	33.05	176	201	Average	VERTICAL
4	5236.96	122.63			115.15	6.30	34.23	33.05	176	201	Peak	VERTICAL
5	5351.74	63.43	74.00	-10.57	55.63	6.47	34.39	33.06	176	201	Peak	VERTICAL
6	5356.51	49.80	54.00	-4.20	42.00	6.47	34.39	33.06	176	201	Average	VERTICAL

Item 3, 4 are the fundamental frequency at 5240 MHz.

Temperature	26℃	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 05, 2015		

Channel 36

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5145.22	71.00	74.00	-3.00	63.73	6.21	34.11	33.05	181	195	Peak	VERTICAL
2	5149.57	53.66	54.00	-0.34	46.39	6.21	34.11	33.05	181	195	Average	VERTICAL
3	5174.79	107.22			99.87	6.24	34.16	33.05	181	195	Average	VERTICAL
4	5174.79	117.63			110.28	6.24	34.16	33.05	181	195	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5147.83	68.63	74.00	-5.37	61.36	6.21	34.11	33.05	187	196	Peak	VERTICAL
2	5148.26	53.55	54.00	-0.45	46.28	6.21	34.11	33.05	187	196	Average	VERTICAL
3	5197.83	110.84			103.44	6.27	34.18	33.05	187	196	Average	VERTICAL
4	5198.26	121.47			114.07	6.27	34.18	33.05	187	196	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	T/Pos	A/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	deg	cm		
1	5149.57	49.74	54.00	-4.26	42.47	6.21	34.11	33.05	181	208	Average	VERTICAL
2	5150.00	62.54	74.00	-11.46	55.27	6.21	34.11	33.05	181	208	Peak	VERTICAL
3	5234.79	113.20			105.72	6.30	34.23	33.05	181	208	Average	VERTICAL
4	5235.22	122.91			115.43	6.30	34.23	33.05	181	208	Peak	VERTICAL
5	5350.00	50.34	54.00	-3.66	42.54	6.47	34.39	33.06	181	208	Average	VERTICAL
6	5350.00	62.24	74.00	-11.76	54.44	6.47	34.39	33.06	181	208	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5240 MHz.

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Channel 38

	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	5146.09	53.49	54.00	-0.51	50.38	5.50	33.02	35.41	250	296	VERTICAL	Average
2	5147.05	65.51	74.00	-8.49	62.39	5.51	33.02	35.41	250	296	VERTICAL	Peak
3	5201.54	102.26			99.11	5.53	33.05	35.43	250	296	VERTICAL	Average
4	5206.35	114.37			111.21	5.53	33.06	35.43	250	296	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 5190 MHz.

Channel 46

	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	5146.35	53.52	54.00	-0.48	50.41	5.50	33.02	35.41	250	296	VERTICAL	Average
2	5147.63	66.74	74.00	-7.26	63.62	5.51	33.02	35.41	250	296	VERTICAL	Peak
3	5236.41	117.79			114.61	5.54	33.09	35.45	250	296	VERTICAL	Peak
4	5246.67	105.84			102.66	5.54	33.09	35.45	250	296	VERTICAL	Average

Item 3, 4 are the fundamental frequency at 5230 MHz.

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 06, 2015		

Channel 42

	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	5143.49	64.48	74.00	-9.52	61.37	5.50	33.02	35.41	250	296	VERTICAL	Peak
2	5145.90	53.89	54.00	-0.11	50.78	5.50	33.02	35.41	250	296	VERTICAL	Average
3	5201.19	100.63			97.48	5.53	33.05	35.43	250	296	VERTICAL	Average
4	5201.19	110.42			107.27	5.53	33.05	35.43	250	296	VERTICAL	Peak
5	5362.24	47.09	54.00	-6.91	43.53	5.60	33.45	35.49	250	296	VERTICAL	Average
6	5377.47	58.49	74.00	-15.51	54.89	5.60	33.50	35.50	250	296	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 5210 MHz.

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 20, 2015		

Channel 38

	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	5147.97	68.92	74.00	-5.08	63.65	7.33	33.58	31.52	VERTICAL	256	141	Peak
2	5150.00	53.70	54.00	-0.30	48.43	7.33	33.58	31.52	VERTICAL	256	141	Average
3	5196.66	101.61			96.24	7.37	33.56	31.56	VERTICAL	256	141	Average
4	5207.66	114.19			108.80	7.38	33.56	31.57	VERTICAL	256	141	Peak

Item 3, 4 are the fundamental frequency at 5190 MHz.

Temperature	25.6℃	Humidity	56%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 20, 2015		

Channel 42

	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	5138.42	66.94	74.00	-7.06	61.70	7.32	33.59	31.51	VERTICAL	172	200	Peak
2	5145.66	53.92	54.00	-0.08	48.66	7.32	33.58	31.52	VERTICAL	172	200	Average
3	5213.62	102.00			96.60	7.39	33.56	31.57	VERTICAL	172	200	Average
4	5218.68	113.01			107.59	7.40	33.56	31.58	VERTICAL	172	200	Peak
5	5354.34	51.75	54.00	-2.25	46.04	7.52	33.50	31.69	VERTICAL	172	200	Average
6	5368.81	63.97	74.00	-10.03	58.24	7.54	33.50	31.69	VERTICAL	172	200	Peak

Item 3, 4 are the fundamental frequency at 5210 MHz.

For Beamforming Mode

Temperature	26℃	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 36, 40, 48 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 2015		

Channel 36

	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	5104.81	66.58	74.00	-7.42	63.51	5.49	32.98	35.40	254	287	VERTICAL	Peak
2	5107.89	53.57	54.00	-0.43	50.50	5.49	32.98	35.40	254	287	VERTICAL	Average
3	5186.73	110.25			107.11	5.52	33.05	35.43	254	287	VERTICAL	Average
4	5186.73	120.07			116.93	5.52	33.05	35.43	254	287	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 5180 MHz.

Channel 40

	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	5111.54	66.43	74.00	-7.57	63.36	5.49	32.98	35.40	245	292	VERTICAL	Peak
2	5126.92	53.84	54.00	-0.16	50.74	5.50	33.01	35.41	245	292	VERTICAL	Average
3	5200.48	120.76			117.61	5.53	33.05	35.43	245	292	VERTICAL	Peak
4	5205.29	110.78			107.62	5.53	33.06	35.43	245	292	VERTICAL	Average

Item 3, 4 are the fundamental frequency at 5200 MHz.

Channel 48

	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	5150.00	49.51	54.00	-4.49	46.39	5.51	33.02	35.41	261	54	VERTICAL	Average
2	5150.00	59.74	74.00	-14.26	56.62	5.51	33.02	35.41	261	54	VERTICAL	Peak
3	5231.83	113.84			110.65	5.54	33.09	35.44	261	54	VERTICAL	Average
4	5233.75	122.34			119.15	5.54	33.09	35.44	261	54	VERTICAL	Peak
5	5353.94	48.14	54.00	-5.86	44.64	5.59	33.40	35.49	261	54	VERTICAL	Average
6	5366.44	60.66	74.00	-13.34	57.10	5.60	33.45	35.49	261	54	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 5240 MHz.

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 38, 46 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 2015		

Channel 38

	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	5141.92	64.68	74.00	-9.32	61.57	5.50	33.02	35.41	252	289	VERTICAL	Peak
2	5150.00	53.62	54.00	-0.38	50.50	5.51	33.02	35.41	252	289	VERTICAL	Average
3	5204.42	105.93			102.77	5.53	33.06	35.43	252	289	VERTICAL	Average
4	5204.42	115.97			112.81	5.53	33.06	35.43	252	289	VERTICAL	Peak

Item 3, 4 are the fundamental frequency at 5190 MHz.

Channel 46

	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	5148.27	68.54	74.00	-5.46	65.42	5.51	33.02	35.41	221	103	VERTICAL	Peak
2	5150.00	53.94	54.00	-0.06	50.82	5.51	33.02	35.41	221	103	VERTICAL	Average
3	5242.50	117.16			113.98	5.54	33.09	35.45	221	103	VERTICAL	Peak
4	5246.35	107.93			104.75	5.54	33.09	35.45	221	103	VERTICAL	Average

Item 3, 4 are the fundamental frequency at 5230 MHz.

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 42 / Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4
Test Date	May 16, 2015		

Channel 42

	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	5140.29	68.76	74.00	-5.24	65.66	5.50	33.01	35.41	236	289	VERTICAL	Peak
2	5141.89	53.96	54.00	-0.04	50.85	5.50	33.02	35.41	236	289	VERTICAL	Average
3	5203.59	104.92			101.76	5.53	33.06	35.43	236	289	VERTICAL	Average
4	5204.39	114.44			111.28	5.53	33.06	35.43	236	289	VERTICAL	Peak
5	5367.85	60.53	74.00	-13.47	56.97	5.60	33.45	35.49	236	289	VERTICAL	Peak
6	5376.67	47.36	54.00	-6.64	43.76	5.60	33.50	35.50	236	289	VERTICAL	Average

Item 3, 4 are the fundamental frequency at 5210 MHz.

Note:

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

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

4.7. Frequency Stability Measurement

4.7.1. Limit

In-band emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

The transmitter center frequency tolerance shall be ± 20 ppm maximum for the 5 GHz band (IEEE 802.11n specification).

4.7.2. Measuring Instruments and Setting

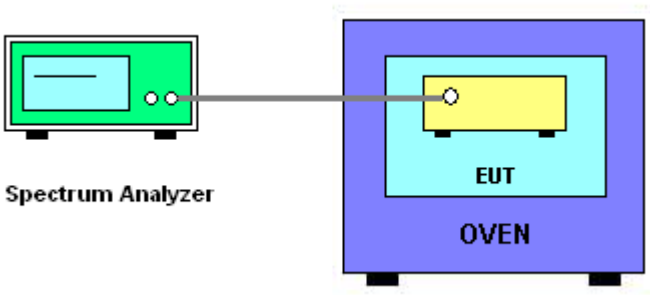
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Entire absence of modulation emissions bandwidth
RBW	10 kHz
VBW	10 kHz
Sweep Time	Auto

4.7.3. Test Procedures

1. The transmitter output (antenna port) was connected to the spectrum analyzer.
2. EUT have transmitted absence of modulation signal and fixed channelize.
3. Set the spectrum analyzer span to view the entire absence of modulation emissions bandwidth.
4. Set RBW = 10 kHz, VBW = 10 kHz with peak detector and maxhold settings.
5. fc is declaring of channel frequency. Then the frequency error formula is (fc-f)/fc × 10^6 ppm and the limit is less than ±20ppm (IEEE 802.11nspecification).
6. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
7. Extreme temperature is -30°C~50°C.

4.7.4. Test Setup Layout



4.7.5. Test Deviation

There is no deviation with the original standard.

4.7.6. EUT Operation during Test

The EUT was programmed to be in continuously un-modulation transmitting mode.

4.7.7. Test Result of Frequency Stability

Temperature	20°C	Humidity	59%
Test Engineer	Mars Lin	Test Date	May 08, 2015

Mode: 20 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5200 MHz
126.50	5199.9936
110.00	5199.9912
93.50	5199.9900
Max. Deviation (MHz)	**0.010000**
Max. Deviation (ppm)	**1.92**

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5200 MHz
-30	5200.0036
-20	5200.0021
-10	5199.9989
0	5199.9964
10	5199.9932
20	5199.9912
30	5199.9900
40	5199.9892
50	5199.9888
Max. Deviation (MHz)	**0.011200**
Max. Deviation (ppm)	**2.15**

Mode: 40 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5190 MHz
126.50	5189.9828
110.00	5189.9824
93.50	5189.9812
Max. Deviation (MHz)	**0.018800**
Max. Deviation (ppm)	**3.62**

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5190 MHz
-30	5189.9942
-20	5189.9936
-10	5189.9912
0	5189.9872
10	5189.9862
20	5189.9824
30	5189.9812
40	5189.9804
50	5189.9800
Max. Deviation (MHz)	**0.020000**
Max. Deviation (ppm)	**3.85**

Mode: 80 MHz

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)
(V)	5210 MHz
126.50	5209.9654
110.00	5209.9632
93.50	5209.9612
Max. Deviation (MHz)	**0.038800**
Max. Deviation (ppm)	**7.45**

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)
(°C)	5210 MHz
-30	5209.9821
-20	5209.9772
-10	5209.9762
0	5209.9732
10	5209.9724
20	5209.9632
30	5209.9622
40	5209.9614
50	5209.9608
Max. Deviation (MHz)	**0.039200**
Max. Deviation (ppm)	**7.52**

4.8. Antenna Requirements

4.8.1. 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.

4.8.2. Antenna Connector Construction

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

5. LIST OF MEASURING EQUIPMENTS

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 02, 2014	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 02, 2014	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	Dec. 03, 2014	Conduction (CO01-CB)
Software	Audix	E3	5.410e	-	N.C.R.	Conduction (CO01-CB)
EMI Test Receiver	R&S	ESCS 30	100355	9kHz ~ 2.75GHz	Apr. 22, 2015	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 26, 2014	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 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	Aug. 22, 2014	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)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 25, 2014	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
EMI Test Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8GHz	Jan. 21, 2015	Radiation (03CH01-CB)
Turn Table	INN CO	CO 2000	N/A	0 ~ 360 degree	N.C.R.	Radiation (03CH01-CB)
Antenna Mast	INN CO	CO 2000	N/A	1 m ~ 4 m	N.C.R.	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-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)
Thermometer	HTC-1	HTC-1	TP-1	-50℃~70℃	Mar. 11, 2015	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 12, 2014	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	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)

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

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%