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FCC RADIO TEST REPORT

Applicant's company	**AirTies Wireless Networks**
Applicant Address	Gülbahar Mah. Avni Dilligil Sok. Celik Is Merkezi No 5 mecidiyekoy ISTANBUL, 34394 Turkey
FCC ID	**Z3WAIR49200**
Manufacturer's company	**SHENZHEN GONGJIN ELECTRONICS CO.,LTD.**
Manufacturer Address	2F/3F/4F Baiying Building,1019#Naihai RD, Nanshan Dist., Shenzhen, Guangdong, CHINA

Product Name	2 Port Gigabit Ethernet 11ac/11n Wireless Router
Brand Name	AirTies
Model No.	Air 4920
Test Rule Part(s)	47 CFR FCC Part 15 Subpart E § 15.407
Test Freq. Range	5150 ~ 5350 MHz / 5470 ~ 5725 MHz / 5725 ~ 5850 MHz
Received Date	Nov. 25, 2015
Final Test Date	Apr. 13, 2016
Submission Type	Class II Change

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 C63.10-2013**, **47 CFR FCC Part 15 Subpart E, KDB789033 D02 v01r02, KDB662911 D01 v02r01, KDB644545 D03 v01.**

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
FR552501-04AB	Rev. 01	Initial issue of report	Apr. 25, 2016

1. VERIFICATION OF COMPLIANCE

Product Name	:	2 Port Gigabit Ethernet 11ac/11n Wireless Router
Brand Name	:	AirTies
Model No.	:	Air 4920
Applicant	:	AirTies Wireless Networks
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 Nov. 25, 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	18.38 dB
4.2	15.407(a)	26dB Spectrum Bandwidth and 99% Occupied Bandwidth	Complies	-
4.3	15.407(e)	6dB Spectrum Bandwidth	Complies	-
4.4	15.407(a)	Maximum Conducted Output Power	Complies	3.73 dB
4.5	15.407(a)	Power Spectral Density	Complies	19.84 dB
4.6	15.407(b)	Radiated Emissions	Complies	3.43 dB
4.7	15.407(b)	Band Edge Emissions	Complies	0.10 dB
4.8	15.407(g)	Frequency Stability	Complies	-
4.9	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	IEEE 802.11a: WLAN (1TX, 1RX) IEEE 802.11n/ac: WLAN (3TX, 3RX)
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)
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 ~ 5350 MHz / 5470 ~ 5725 MHz / 5725 ~ 5850 MHz
Channel Number	21 for 20MHz bandwidth ; 9 for 40MHz bandwidth 4 for 80MHz bandwidth
Channel Band Width (99%)	IEEE 802.11a: 27.96 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 18.15 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 37.19 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 75.83 MHz
Maximum Conducted Output Power	IEEE 802.11a: 23.06 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 26.27 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 25.39 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 20.44 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
TPC Function	☒ With TPC	☐ Without TPC
Weather Band (5600~5650MHz)	☐ With 5600~5650MHz	☒ Without 5600~5650MHz
Beamforming Function	☒ With beamforming	☐ Without beamforming
	The product has beamforming function for 802.11n/ac in 5GHz.	
Operate Condition	☒ Indoor	☐ Outdoor

Antenna and Band width

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

IEEE 11n/ac Spec.

Protocol	Number of Transmit Chains (NTX)	Data Rate / MCS
802.11n (HT20)	3	MCS 0-23
802.11n (HT40)	3	MCS 0-23
802.11ac (VHT20)	3	MCS 0-9/Nss1-3
802.11ac (VHT40)	3	MCS 0-9/Nss1-3
802.11ac (VHT80)	3	MCS 0-9/Nss1-3

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	MOSO	MSA-C1000IC12.0-12W-US	Input: 100-240Vac, 50/60Hz, 0.5A max. Output: 12.0Vdc, 1A

3.3. Table for Filed Antenna

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	
					2.4GHz	5GHz
1	-	-	PCB Antenna	N/A	2.5	-
2	Airgain	N2420S-T-G50U	PIFA Antenna	I-PEX	2.5	-
3	-	-	PCB Antenna	N/A	-	0
4	-	-	PCB Antenna	N/A	-	0
5	-	-	PCB Antenna	N/A	-	0

Note: The EUT has five antennas. There are two antennas for 2.4GHz and three antennas for 5GHz.

For 2.4GHz band:

For 802.11b/g mode:

Only Chain 1 could transmit/receive simultaneously.

For 802.11n mode:

Chain 1 and Chain 2 could transmit/receive simultaneously.

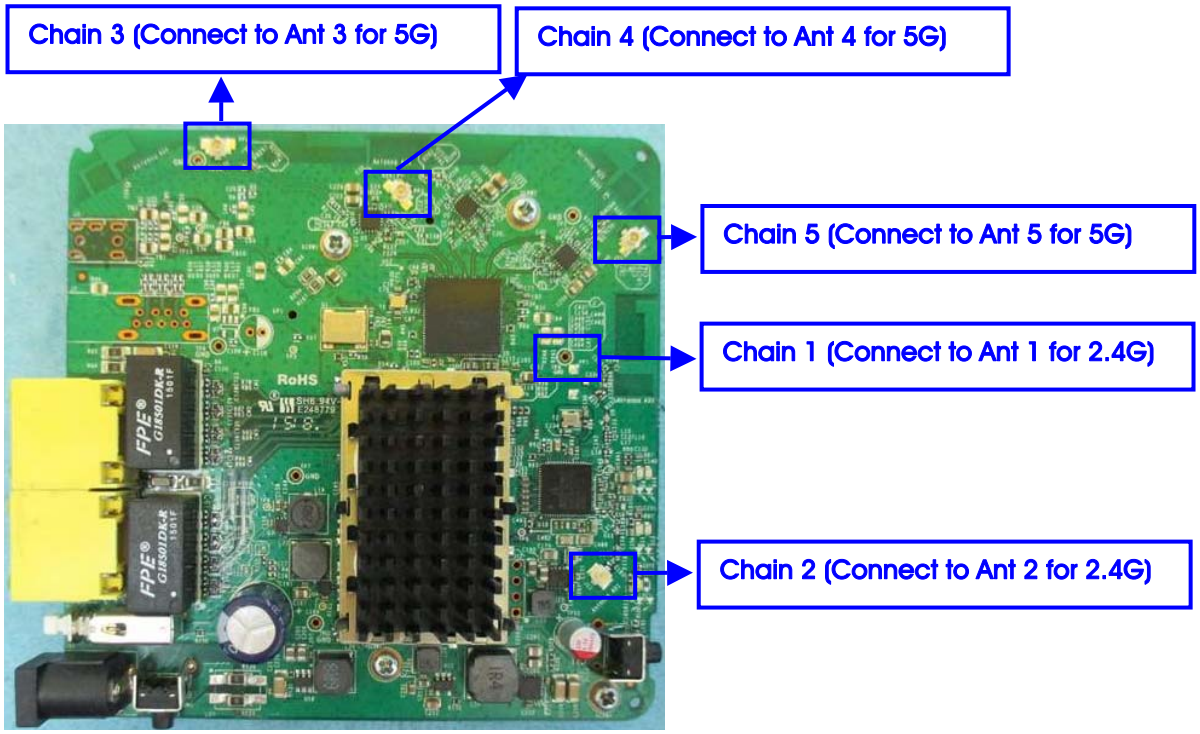
For 5GHz band:

For 802.11a mode:

Only Chain 3 could transmit/receive simultaneously.

For 802.11n/ac mode:

Chain 3, Chain 4 and Chain 5 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, 52, 56, 60, 64, 100, 104, 108, 112, 116, 132, 136, 140, 149, 153, 157, 161, 165.

For 40MHz bandwidth systems, use Channel 38, 46, 54, 62, 102, 110, 134, 151, 159.

For 80MHz bandwidth systems, use Channel 42, 58, 106, 155.

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	-	-
5250~5350 MHz Band 2	52	5260 MHz	60	5300 MHz
	54	5270 MHz	62	5310 MHz
	56	5280 MHz	64	5320 MHz
	58	5290 MHz	-	-
5470~5725 MHz Band 3	100	5500 MHz	112	5560 MHz
	102	5510 MHz	116	5580 MHz
	104	5520 MHz	132	5660 MHz
	106	5530 MHz	134	5670 MHz
	108	5540 MHz	136	5680 MHz
	110	5550 MHz	140	5700 MHz
5725~5850 MHz Band 4	149	5745 MHz	157	5785 MHz
	151	5755 MHz	159	5795 MHz
	153	5765 MHz	161	5805 MHz
	155	5775 MHz	165	5825 MHz

3.5. Table for Test Modes

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

Test Items	Mode		Data Rate	Channel	Chain
AC Power Line Conducted Emissions	Normal Link		-	-	-
Max. Conducted Output Power	11a/BPSK	Band 4	6Mbps	149/157/165	3
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3+4+5
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3+4+5
	11ac VHT80	Band 4	MCS0/Nss1	155	3+4+5
Power Spectral Density	11a/BPSK	Band 4	6Mbps	149/157/165	3
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3+4+5
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3+4+5
	11ac VHT80	Band 4	MCS0/Nss1	155	3+4+5
26dB Spectrum Bandwidth & 99% Occupied Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	3
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3+4+5
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3+4+5
	11ac VHT80	Band 4	MCS0/Nss1	155	3+4+5
6dB Spectrum Bandwidth Measurement	11a/BPSK	Band 4	6Mbps	149/157/165	3
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3+4+5
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3+4+5
	11ac VHT80	Band 4	MCS0/Nss1	155	3+4+5
Radiated Emissions Below 1GHz	Normal Link		-	-	-
Radiated Emission Above 1GHz	11a/BPSK	Band 4	6Mbps	149/157/165	3
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3+4+5
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3+4+5
	11ac VHT80	Band 4	MCS0/Nss1	155	3+4+5
Band Edge Emission	11a/BPSK	Band 4	6Mbps	149/157/165	3
	11ac VHT20	Band 4	MCS0/Nss1	149/157/165	3+4+5
	11ac VHT40	Band 4	MCS0/Nss1	151/159	3+4+5
	11ac VHT80	Band 4	MCS0/Nss1	155	3+4+5
Frequency Stability	20 MHz	Band 4	-	157	3
	40 MHz	Band 4	-	151	3
	80 MHz	Band 4	-	155	3

Note: 1. The EUT can only be used at Y axis position.

2. VHT20/VHT40 covers HT20/HT40, due to same modulation. The power setting for 802.11n HT20 and HT40 are the same or lower than 802.11ac VHT20 and VHT40.

3. There are two functions of EUT, one is beamforming function, and the other is non-beamforming function 802.11n/ac in 5GHz. After evaluating, beamforming function has been evaluated to be the worst case, so it was selected to test and record in this test report.

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 Designation No.**	**IC File No.**	**VCCI Reg. No**
03CH01-CB	SAC	Hsin Chu	TW0006	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 Class II Change

This product is an extension of original one reported under Sporton project number: FR552501, FR552501-01

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

Modifications	Performance Checking
1. Changing the applicant address.	It does not affect the test result.
2. Changing the color of housing.	
3. Changing the adapter to model: MSA-C1000IC12.0-12W-US.	1. AC Power Line Conducted Emissions. 2. Radiated Emissions Below 1GHz.
4. Updating test rule of 5GHz Band 4 (5725~5850 MHz) to "New Rules" from "Old Rules".	For 5GHz Band 4: 1. 26dB Spectrum Bandwidth and 99% Occupied Bandwidth. 2. 6dB Spectrum Bandwidth. 3. Maximum Conducted Output Power. 4. Power Spectral Density. 5. Radiated Emission Above 1GHz. 6. Band Edge Emissions. 7. Frequency Stability.

3.8. Table for Supporting Units

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

Support Unit	Brand	Model	FCC ID
Notebook*3	DELL	E4300	DoC

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

For non-beamforming function:

Support Unit	Brand	Model	FCC ID
Notebook	DELL	E4300	DoC

For beamforming function:

Support Unit	Brand	Model	FCC ID
Notebook*2	DELL	E4300	DoC
WLAN ac Dongle (RX Device)	Broadcom	Bcm4366	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
Notebook*3	DELL	E6430	DoC

For Test Site No: TH01-CB

Support Unit	Brand	Model	FCC ID
Notebook	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.

Test Software Version	Mtool 2.0.0.7		
Mode	Test Frequency (MHz)		
	NCB: 20MHz		
	5745 MHz	5785 MHz	5825 MHz
802.11a	77	88	82
802.11ac MCS0/Nss1 VHT20	68	80	75
Mode	NCB: 40MHz		
802.11ac MCS0/Nss1 VHT40	5755 MHz	5795 MHz	
	65	80	
Mode	NCB: 80MHz		
802.11ac MCS0/Nss1 VHT80	5775 MHz		
	60		

3.10. EUT Operation during Test

For non-beamforming function:

The EUT was programmed to be in continuously transmitting mode.

For beamforming function:

For Conducted Mode:

The EUT was programmed to be in continuously transmitting mode.

For Radiated Mode:

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

The program was executed as follows:

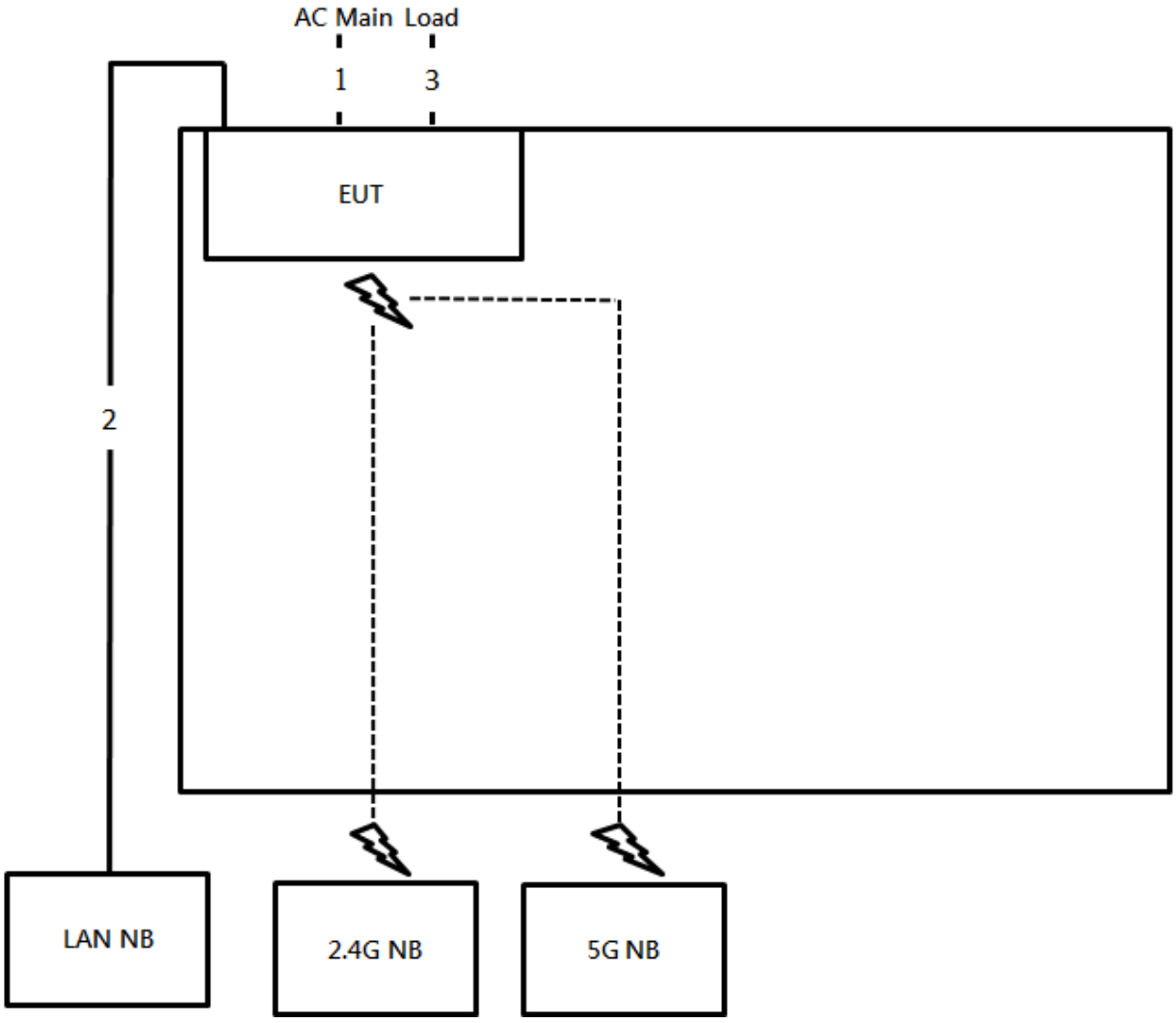
1. During the test, the EUT operation to normal function.
2. Executed command fixed test channel under DOS.
3. Executed "Lantest.exe" to link with the remote workstation to receive and transmit packet by RX Device and transmit duty cycle no less 98%

3.11. Duty Cycle

Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
802.11a	2.070	2.100	98.57	0.06	0.01
802.11ac MCS0/Nss1 VHT20	1.950	2.020	96.53	0.15	0.51
802.11ac MCS0/Nss1 VHT40	4.560	4.640	98.28	0.08	0.01
802.11ac MCS0/Nss1 VHT80	5.060	5.140	98.44	0.07	0.01

3.12. Test Configurations

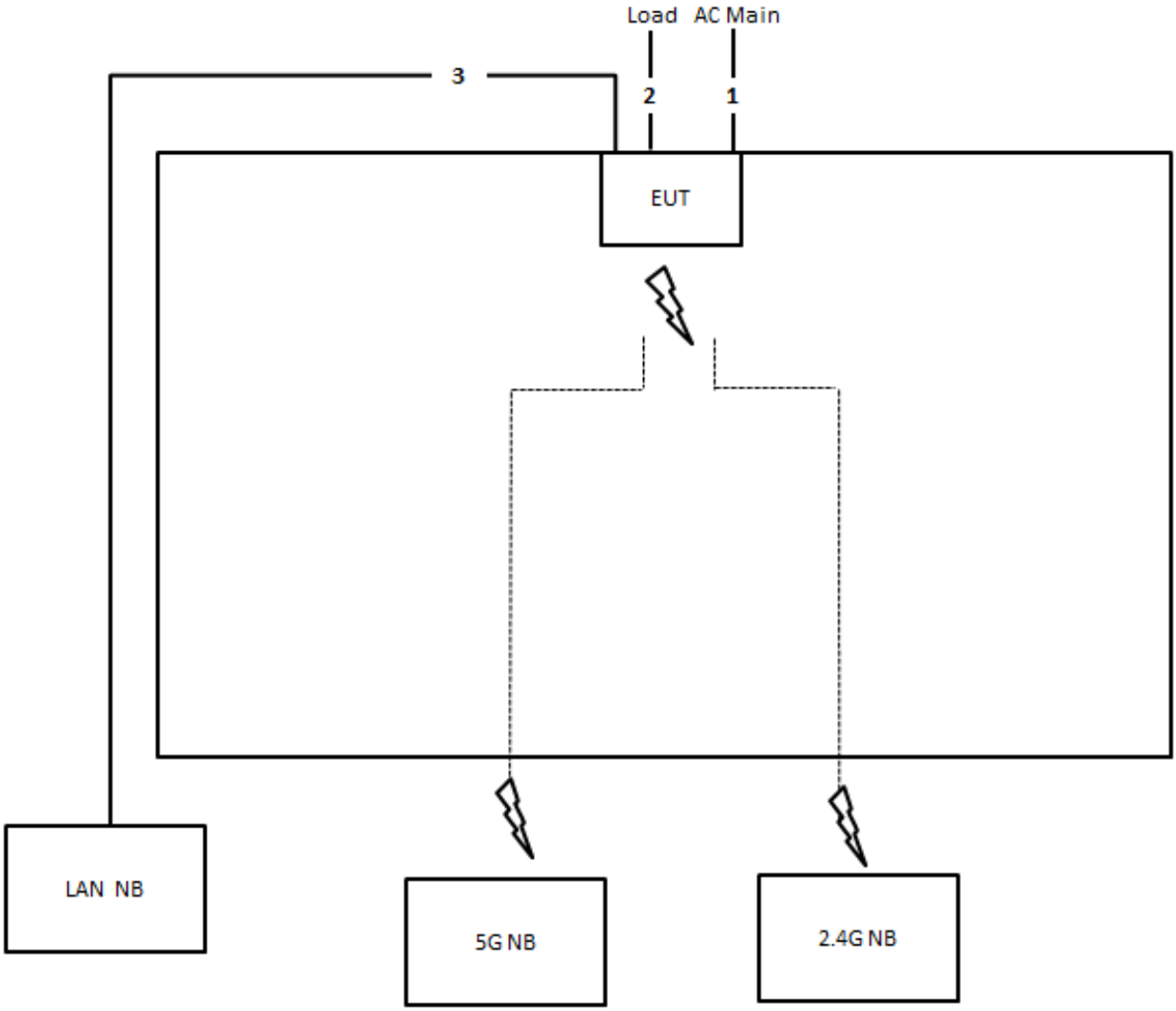
3.12.1. AC Power Line Conduction Emissions Test Configuration



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

3.12.2. Radiation Emissions Test Configuration

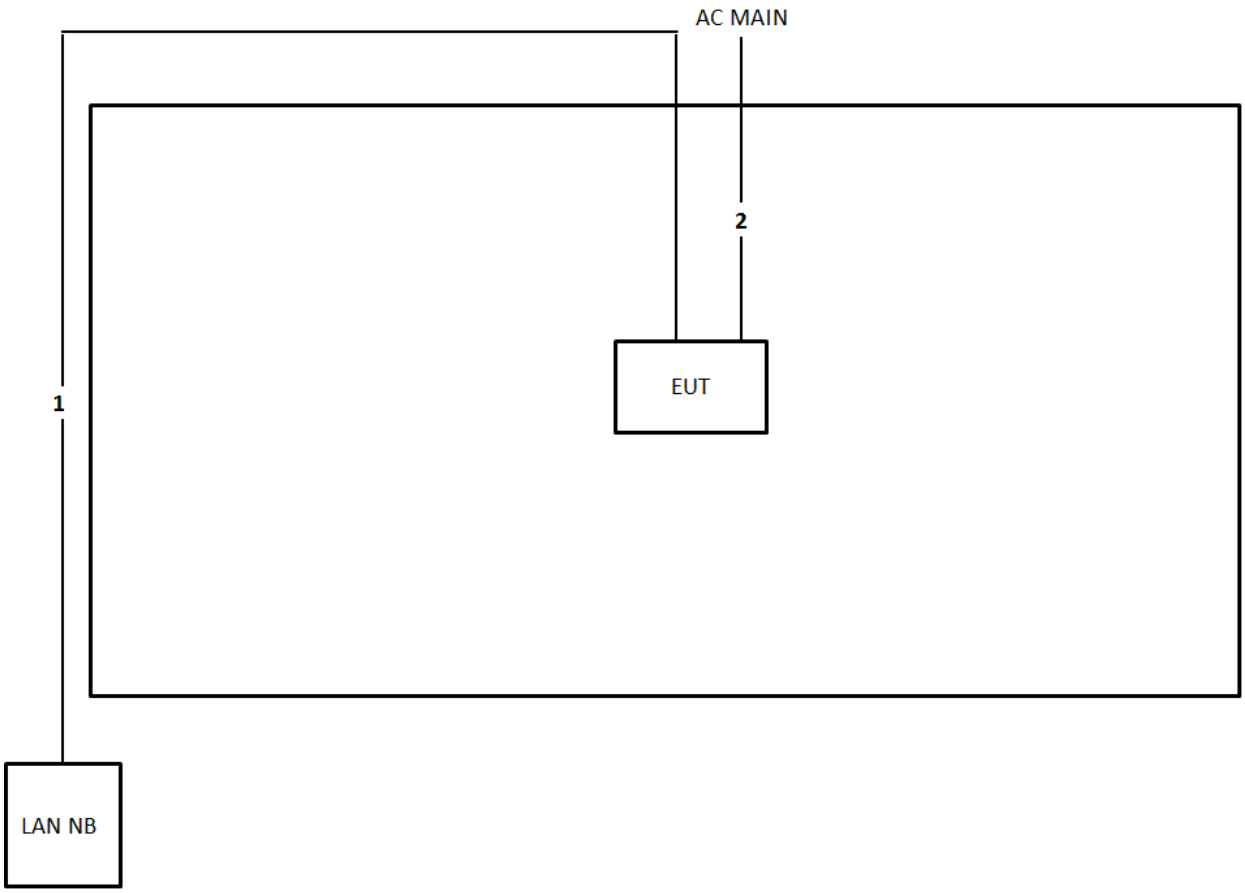
Test Configuration: 30MHz ~1GHz



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

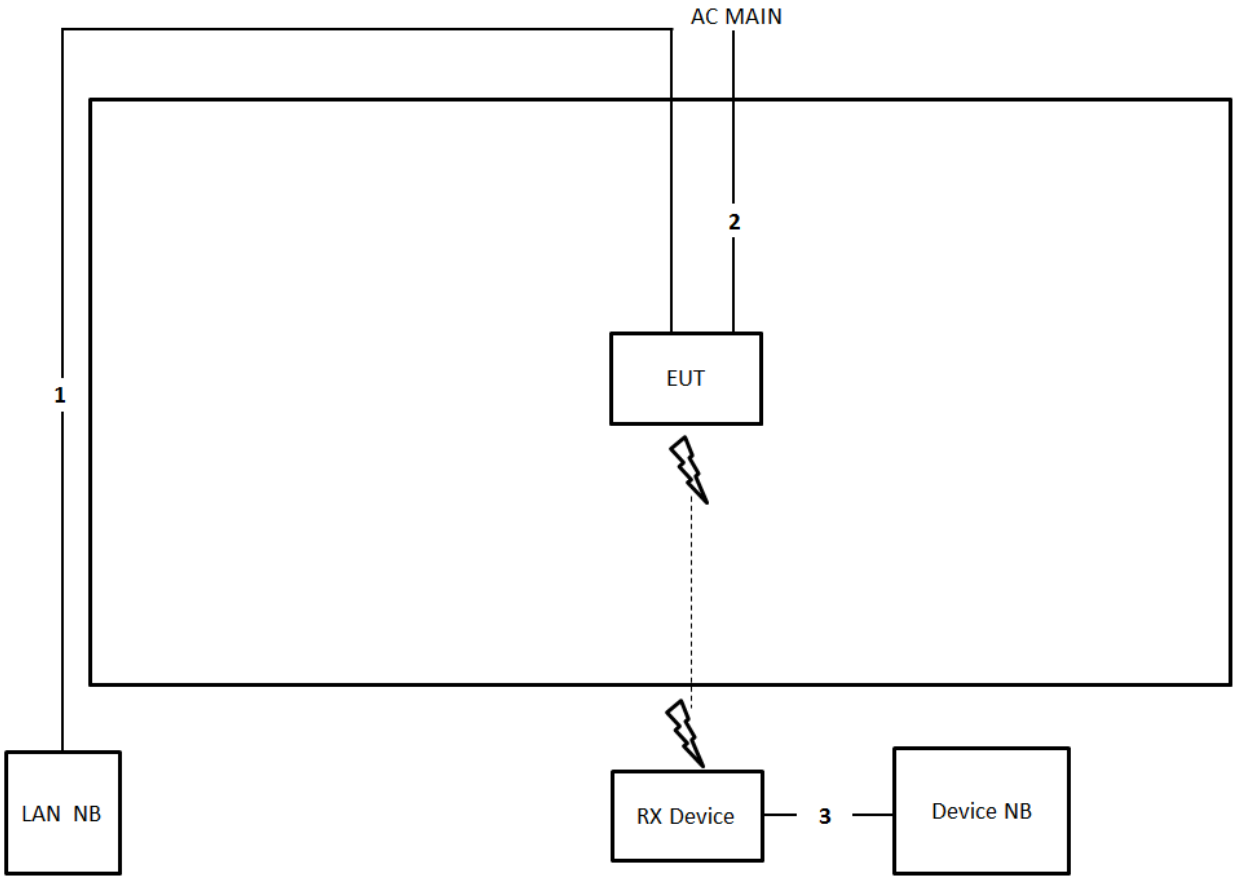
Test Configuration: above 1GHz

For non-beamforming function:



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

For beamforming function:



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

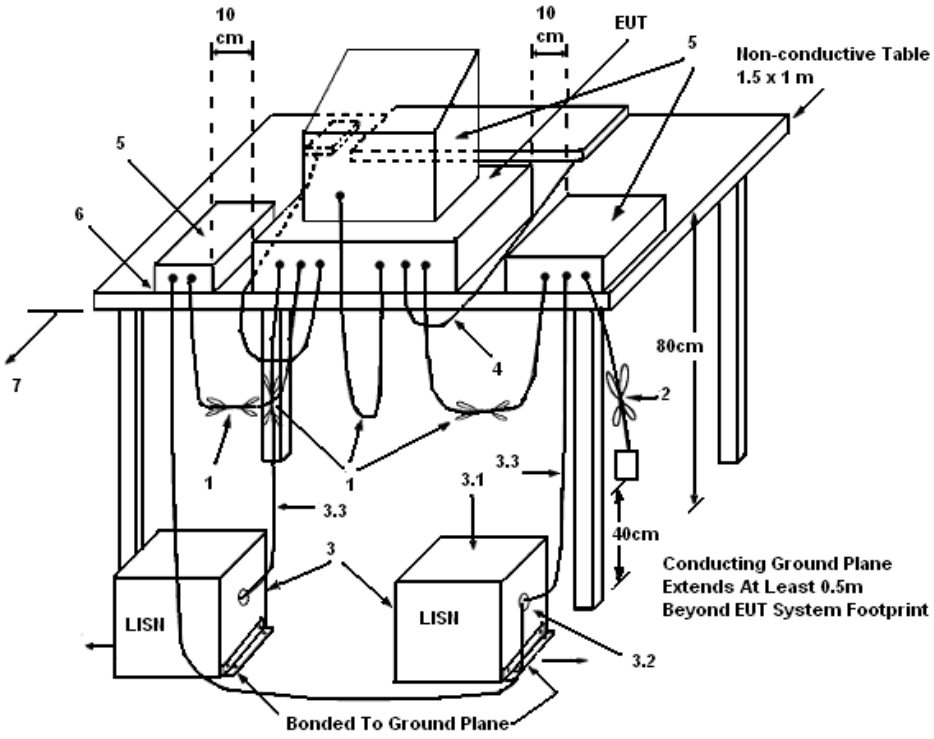
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

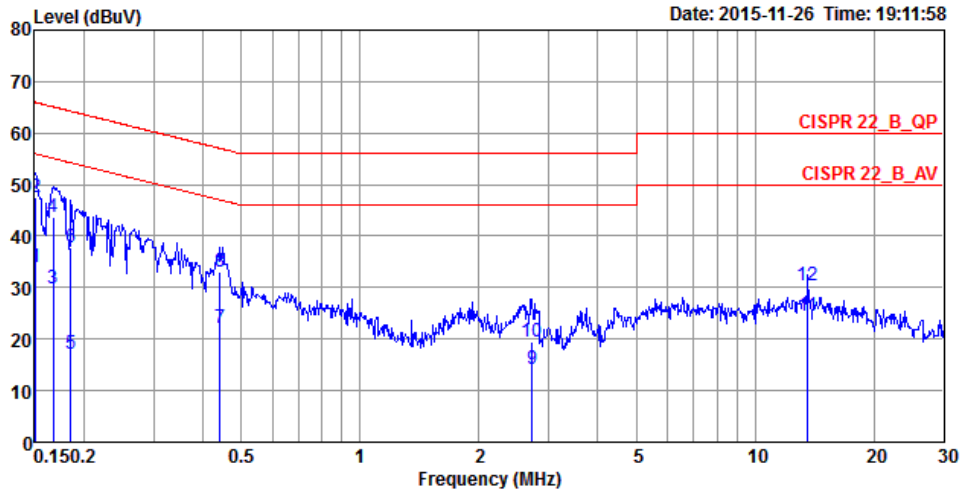
There is no deviation with the original standard.

4.1.6. EUT Operation during Test

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

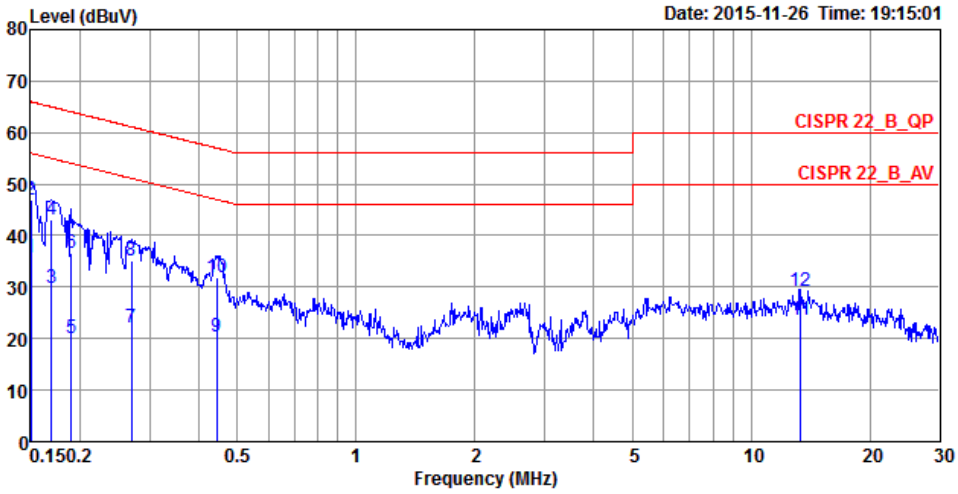
4.1.7. Results of AC Power Line Conducted Emissions Measurement

Temperature	25°C	Humidity	55%
Test Engineer	Ryo Fan	Phase	Line
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1508	33.88	-22.08	55.96	23.93	9.93	0.02	LINE	Average
2	0.1508	47.58	-18.38	65.96	37.63	9.93	0.02	LINE	QP
3	0.1668	29.88	-25.24	55.12	19.93	9.93	0.02	LINE	Average
4	0.1668	43.55	-21.57	65.12	33.60	9.93	0.02	LINE	QP
5	0.1854	17.21	-37.03	54.24	7.26	9.93	0.02	LINE	Average
6	0.1854	37.66	-26.58	64.24	27.71	9.93	0.02	LINE	QP
7	0.4421	22.24	-24.78	47.02	12.27	9.93	0.04	LINE	Average
8	0.4421	32.92	-24.10	57.02	22.95	9.93	0.04	LINE	QP
9	2.7212	14.11	-31.89	46.00	4.06	10.00	0.05	LINE	Average
10	2.7212	19.51	-36.49	56.00	9.46	10.00	0.05	LINE	QP
11	13.6228	24.55	-25.45	50.00	14.00	10.30	0.25	LINE	Average
12	13.6228	30.55	-29.45	60.00	20.00	10.30	0.25	LINE	QP

Temperature	25°C	Humidity	55%
Test Engineer	Ryo Fan	Phase	Neutral
Configuration	Normal Link		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1500	35.72	-20.28	56.00	25.92	9.78	0.02	NEUTRAL	Average
2	0.1500	46.97	-19.03	66.00	37.17	9.78	0.02	NEUTRAL	QP
3	0.1694	29.84	-25.15	54.99	20.04	9.78	0.02	NEUTRAL	Average
4	0.1694	43.13	-21.86	64.99	33.33	9.78	0.02	NEUTRAL	QP
5	0.1904	19.96	-34.06	54.02	10.15	9.79	0.02	NEUTRAL	Average
6	0.1904	36.64	-27.38	64.02	26.83	9.79	0.02	NEUTRAL	QP
7	0.2701	22.10	-29.02	51.12	12.28	9.79	0.03	NEUTRAL	Average
8	0.2701	35.20	-25.92	61.12	25.38	9.79	0.03	NEUTRAL	QP
9	0.4444	20.24	-26.74	46.98	10.41	9.79	0.04	NEUTRAL	Average
10	0.4444	31.94	-25.04	56.98	22.11	9.79	0.04	NEUTRAL	QP
11	13.3372	23.69	-26.31	50.00	13.36	10.08	0.25	NEUTRAL	Average
12	13.3372	29.30	-30.70	60.00	18.97	10.08	0.25	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 4.6.4.

4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

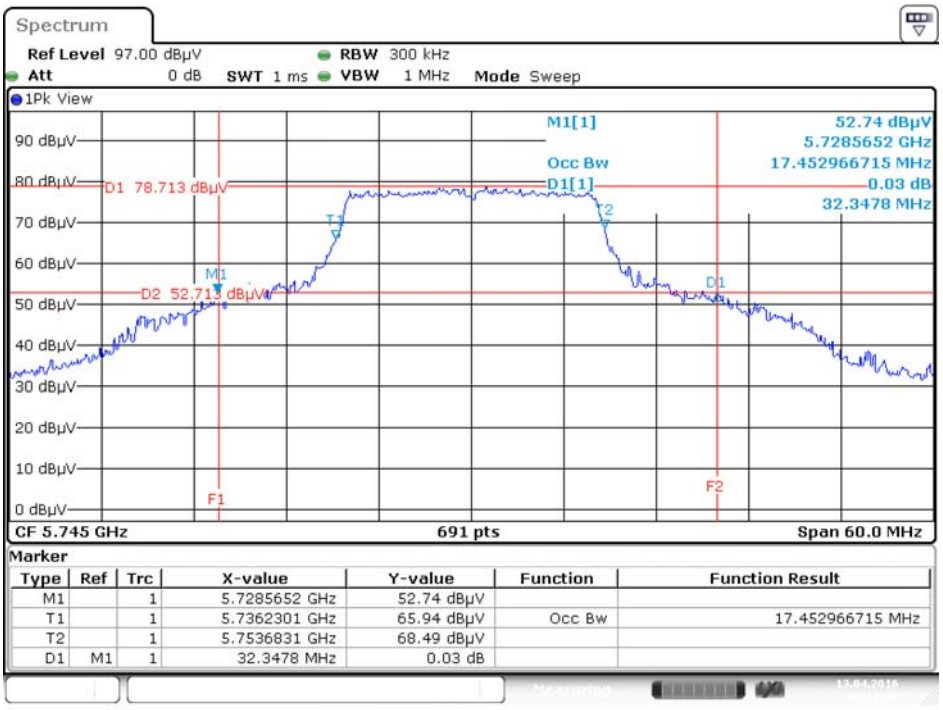
The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of 26dB Bandwidth and 99% Occupied Bandwidth

Temperature	24°C	Humidity	45%
Test Engineer	Wen Chao		

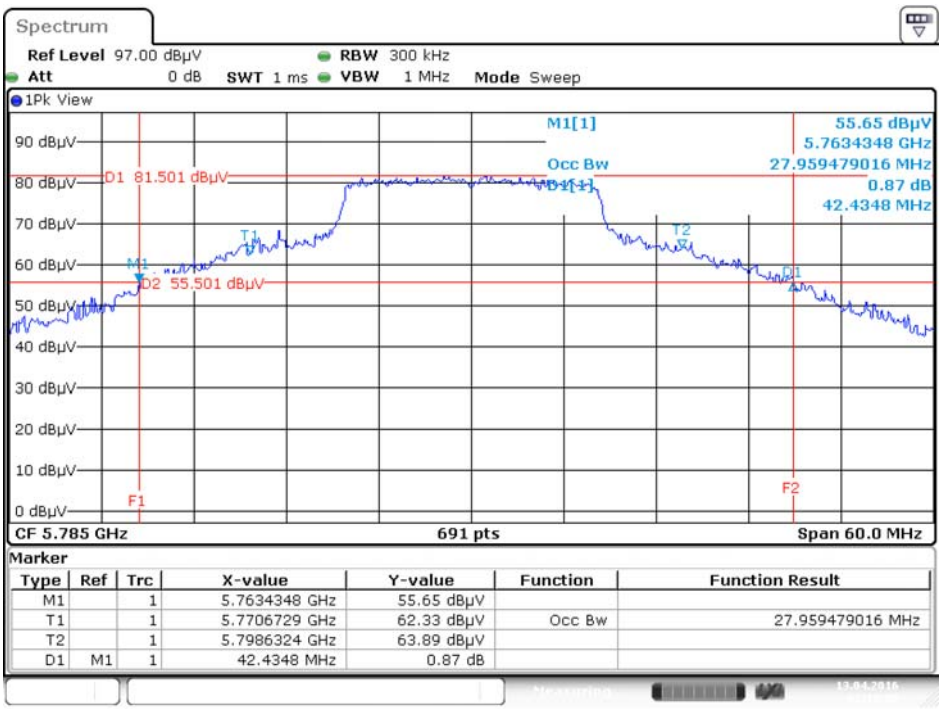
Mode	Frequency	26dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
802.11a	5745 MHz	32.35	17.45
	5785 MHz	42.43	27.96
	5825 MHz	36.35	19.97
802.11ac MCS0/Nss1 VHT20	5745 MHz	20.26	17.80
	5785 MHz	31.04	18.15
	5825 MHz	20.43	17.89
802.11ac MCS0/Nss1 VHT40	5755 MHz	40.58	36.61
	5795 MHz	61.30	37.19
802.11ac MCS0/Nss1 VHT80	5775 MHz	81.16	75.83

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5745 MHz



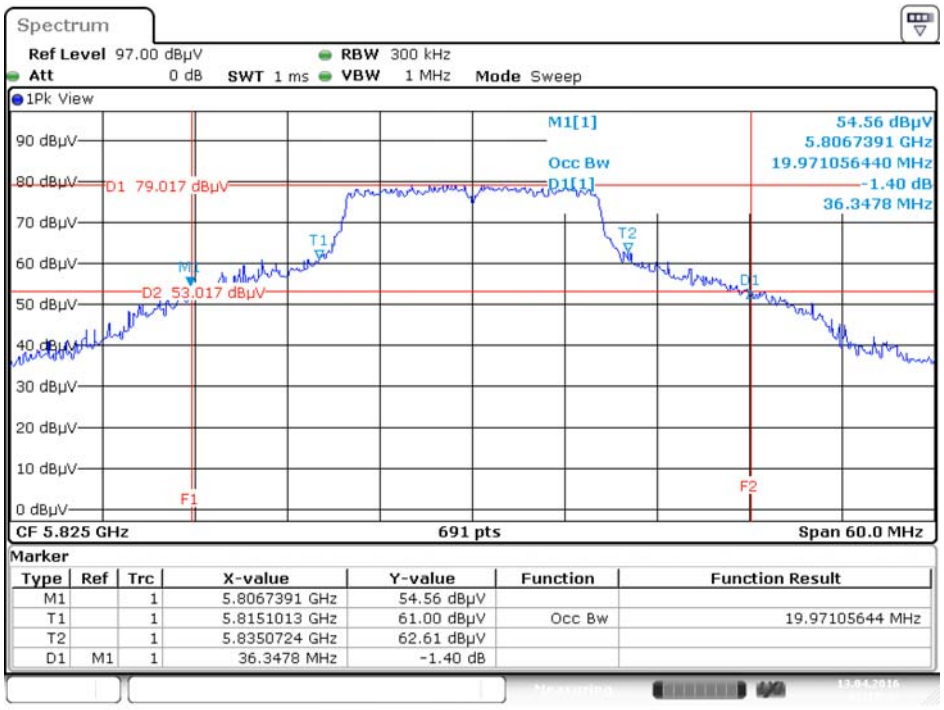
Date: 13.APR.2016 02:12:50

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5785 MHz



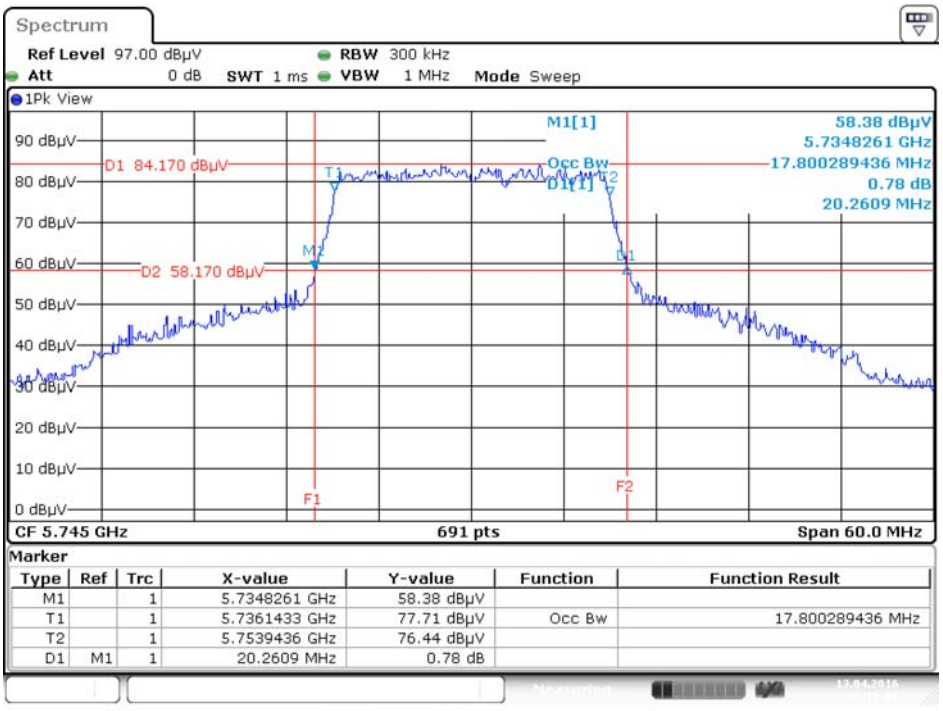
Date: 13.APR.2016 02:13:20

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5825 MHz



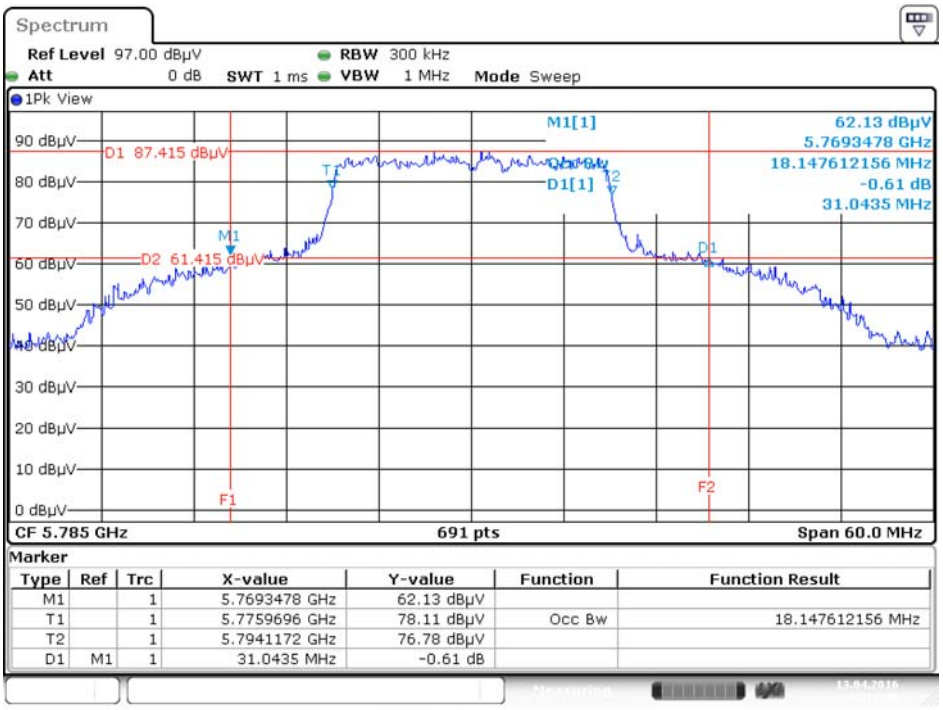
Date: 13.APR.2016 02:13:42

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 + Chain 5 / 5745 MHz



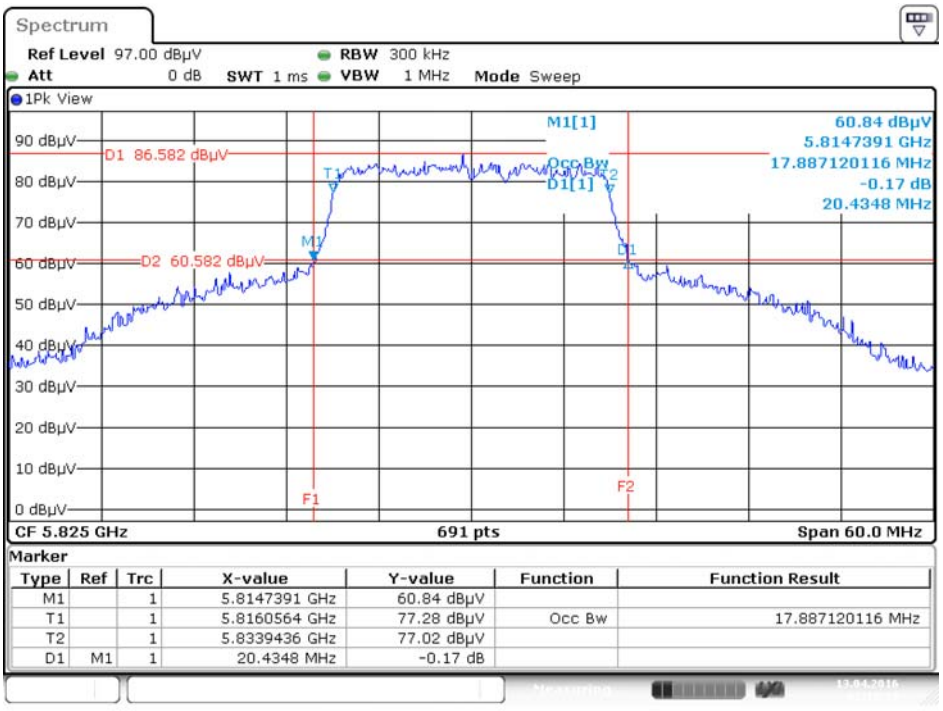
Date: 13.APR.2016 02:16:01

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 + Chain 5 / 5785 MHz



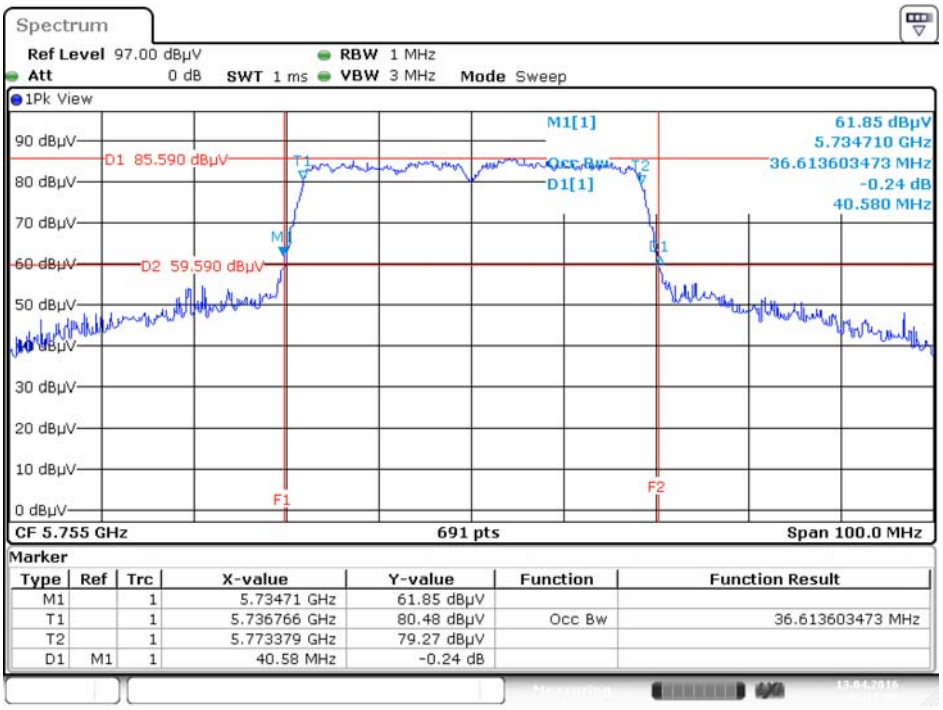
Date: 13.APR.2016 02:15:40

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 + Chain 5 / 5825 MHz



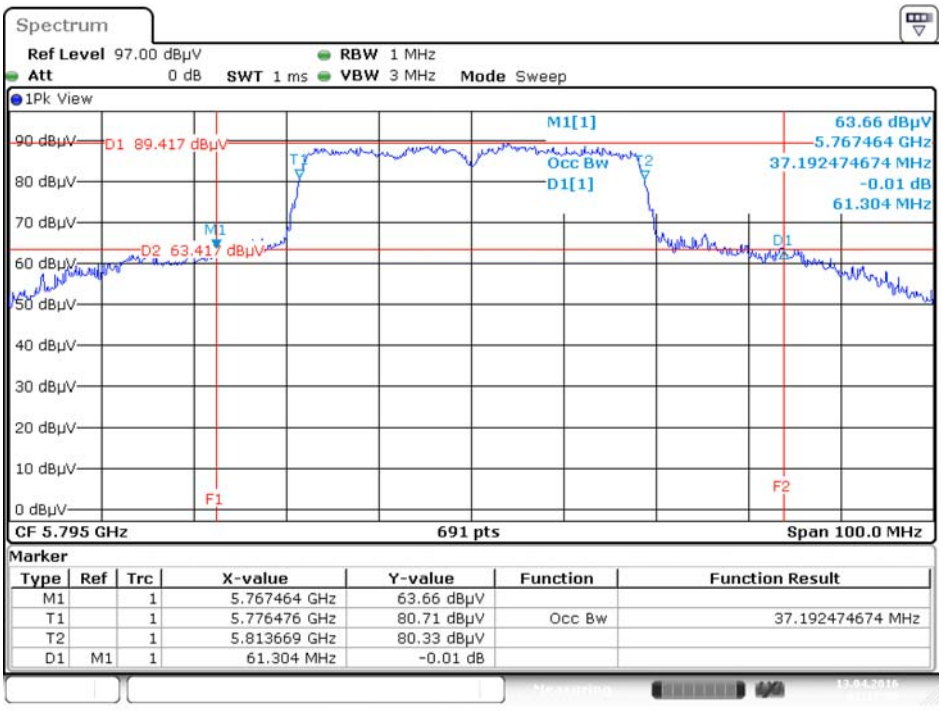
Date: 13.APR.2016 02:15:20

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 + Chain 5 / 5755 MHz



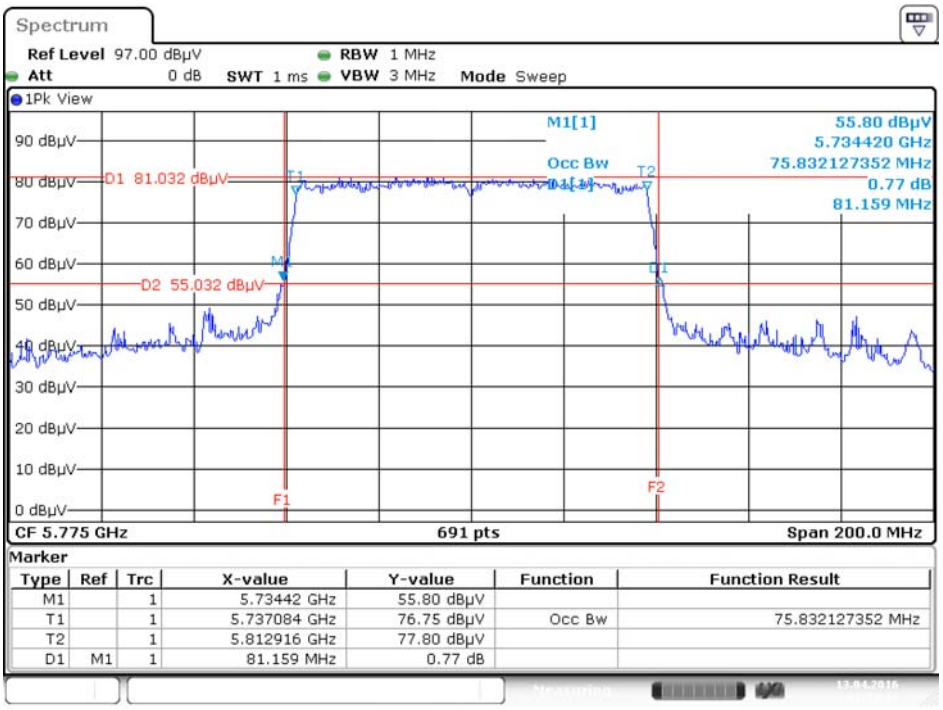
Date: 13.APR.2016 02:17:00

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 + Chain 5 / 5795 MHz



Date: 13.APR.2016 02:17:20

26dB Bandwidth and 99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 + Chain 5 / 5775 MHz



Date: 13.APR.2016 02:23:41

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

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 KDB789033 D02 v01r02 for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices - section (C) Emission Bandwidth.
3. Multiple antenna system was performed in accordance with KDB662911 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 4.6.4.

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

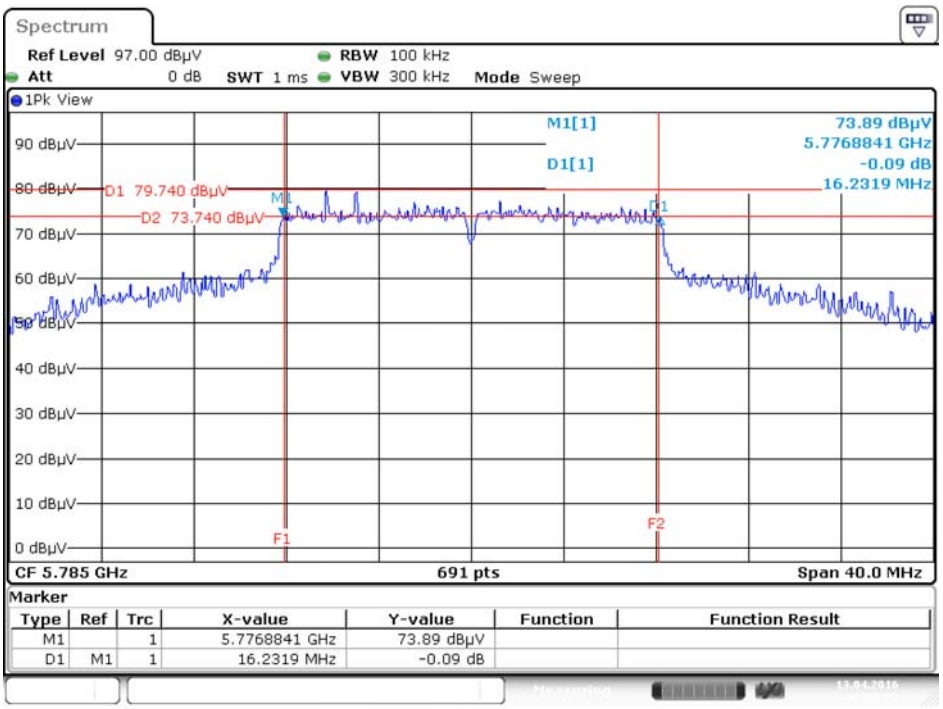
Temperature	24°C	Humidity	45%
Test Engineer	Wen Chao		

Mode	Frequency	6dB Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11a	5745 MHz	16.58	500	Complies
	5785 MHz	16.23	500	Complies
	5825 MHz	16.29	500	Complies
802.11ac MCS0/Nss1 VHT20	5745 MHz	17.62	500	Complies
	5785 MHz	17.28	500	Complies
	5825 MHz	17.51	500	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	36.41	500	Complies
	5795 MHz	36.41	500	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	74.20	500	Complies

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

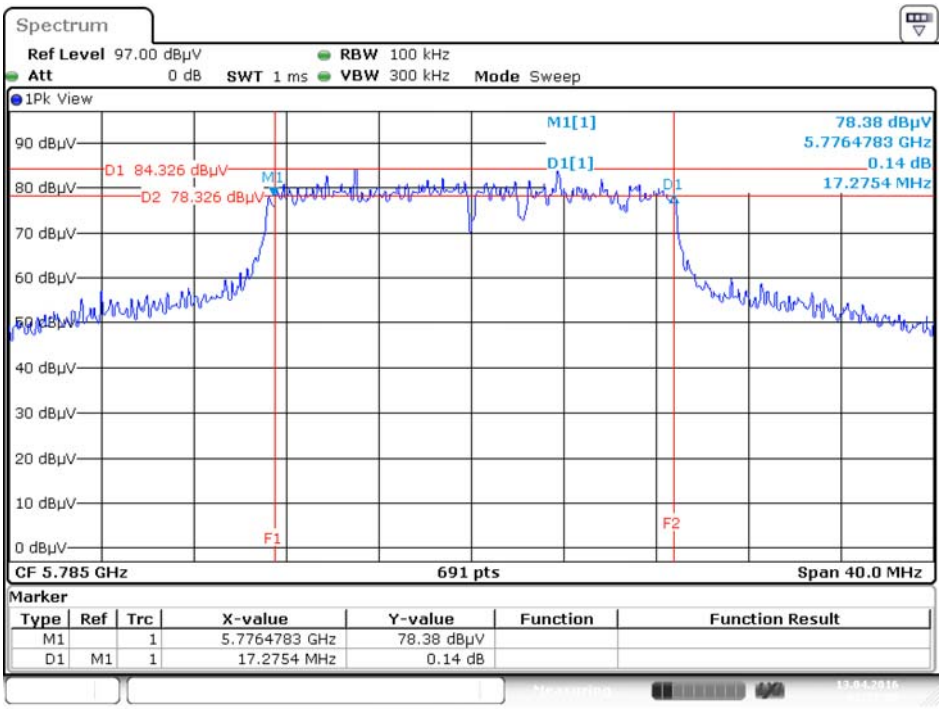
For plots, only the channel with worse result was shown.

6 dB Bandwidth Plot on Configuration IEEE 802.11a / Chain 3 / 5785 MHz



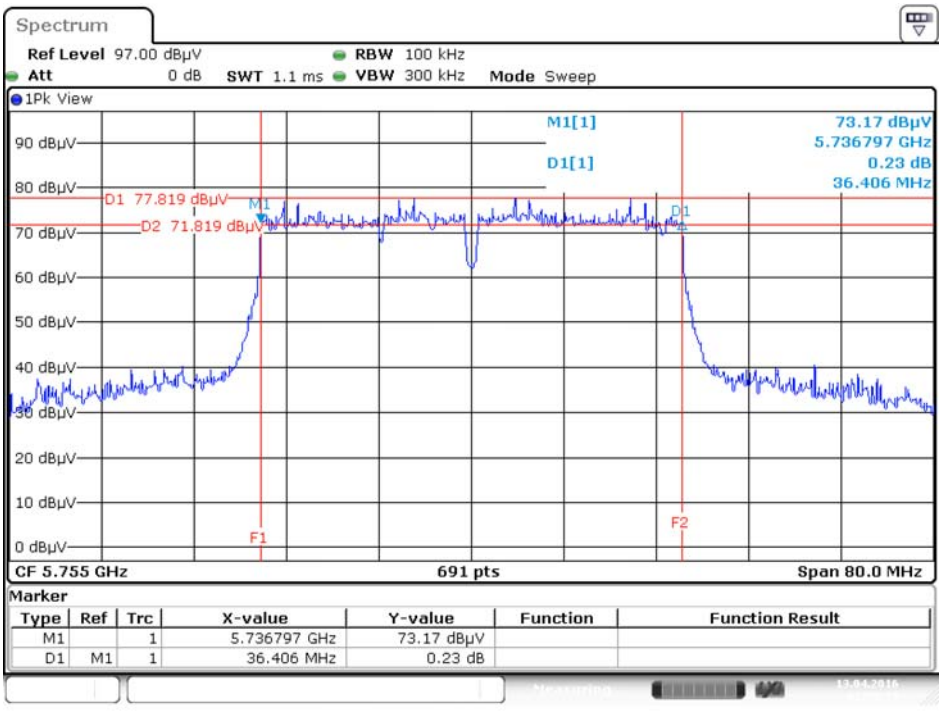
Date: 13.APR.2016 02:28:52

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 + Chain 5 / 5785 MHz



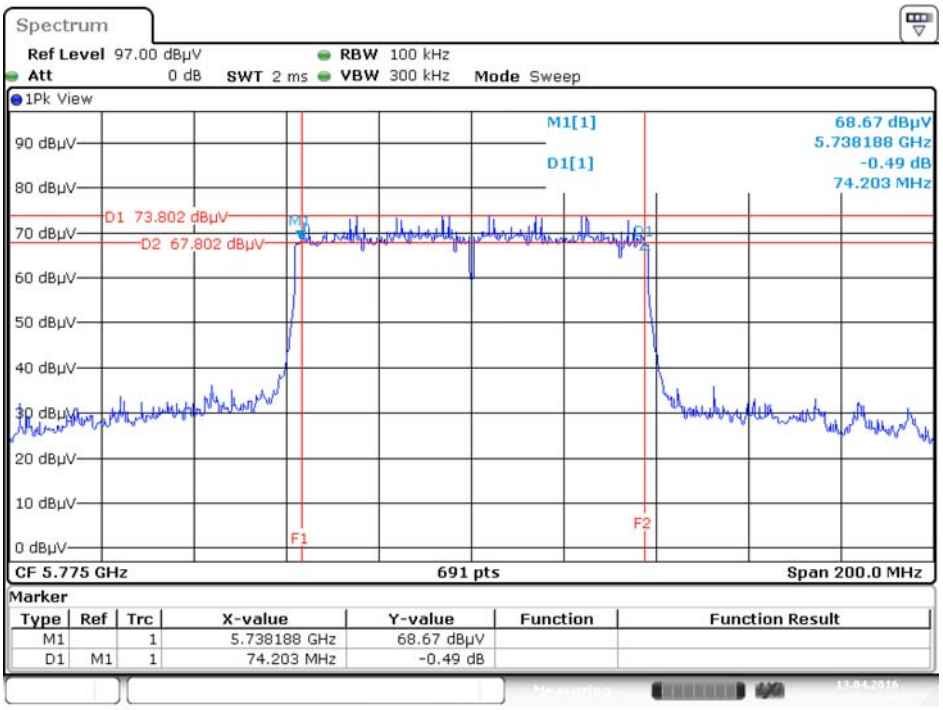
Date: 13.APR.2016 02:27:21

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 + Chain 5 / 5755 MHz



Date: 13.APR.2016 02:25:39

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 + Chain 5 / 5775 MHz



Date: 13.APR.2016 02:24:34

4.4. Maximum Conducted Output Power Measurement

4.4.1. Limit

Frequency Band		Limit
☒	5.725~5.85 GHz	The maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm). 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. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power.

4.4.2. Measuring Instruments and Setting

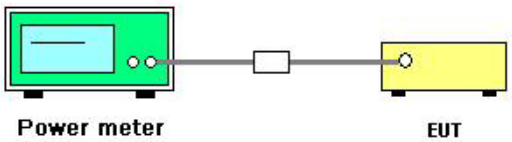
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	AVERAGE

4.4.3. Test Procedures

1. The transmitter output (antenna port) was connected to the power meter.
2. Test was performed in accordance with KDB789033 D02 v01r02 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.

4.4.4. 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 Maximum Conducted Output Power

Temperature	24℃	Humidity	45%
Test Engineer	Wen Chao	Test Date	Apr. 12, 2016

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1					
802.11a	5745 MHz	19.91				30.00	Complies
	5785 MHz	23.06				30.00	Complies
	5825 MHz	21.43				30.00	Complies
Mode	**Frequency**	**Conducted Power (dBm)**				**Max. Limit (dBm)**	**Result**
		Chain 1	**Chain 2**	**Chain 3**	**Total**		
802.11ac MCS0/Nss1 VHT20	5745 MHz	17.67	18.54	17.79	22.79	30.00	Complies
	5785 MHz	21.46	21.68	21.36	26.27	30.00	Complies
	5825 MHz	20.01	18.81	19.65	24.29	30.00	Complies
802.11ac MCS0/Nss1 VHT40	5755 MHz	16.87	17.19	16.78	21.72	30.00	Complies
	5795 MHz	20.75	20.87	20.21	25.39	30.00	Complies
802.11ac MCS0/Nss1 VHT80	5775 MHz	15.52	15.93	15.55	20.44	30.00	Complies

Note: For 802.11ac $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =4.77dBi<6dBi, so the limit doesn't reduce.

4.5. Power Spectral Density Measurement

4.5.1. Limit

The following table is power spectral density limits and decrease power density limit rule refer to section 4.4.1.

Frequency Band		Limit
☒	5.725~5.85 GHz	30 dBm/500kHz

4.5.2. Measuring Instruments and Setting

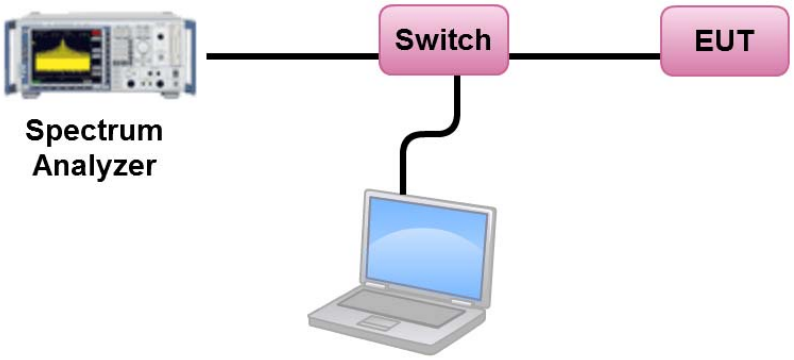
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	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
Note: If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10log(500kHz/RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.	

4.5.3. 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 v01r02 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 and sum the spectra across the outputs.
4. For 5.725~5.85 GHz, the measured result of PSD level must add 10log(500kHz/RBW) and the final result should ≤ 30 dBm.

4.5.4. Test Setup Layout



4.5.5. Test Deviation

There is no deviation with the original standard.

4.5.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.5.7. Test Result of Power Spectral Density

Temperature	24℃	Humidity	45%
Test Engineer	Wen Chao	Test Date	Apr. 12, 2016

Configuration IEEE 802.11a / Chain 3

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	6.86	-3.01	3.85	30.00	Complies
157	5785 MHz	9.92	-3.01	6.91	30.00	Complies
165	5825 MHz	8.34	-3.01	5.33	30.00	Complies

Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 + Chain 5

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
149	5745 MHz	9.68	-3.01	6.67	30.00	Complies
157	5785 MHz	13.17	-3.01	10.16	30.00	Complies
165	5825 MHz	11.24	-3.01	8.23	30.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =4.77dBi<6dBi, so the limit doesn't reduce.

Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 + Chain 5

Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
151	5755 MHz	5.63	-3.01	2.62	30.00	Complies
159	5795 MHz	9.26	-3.01	6.25	30.00	Complies

Note: $Directional\ Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =4.77dBi<6dBi, so the limit doesn't reduce.

Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 + Chain 5

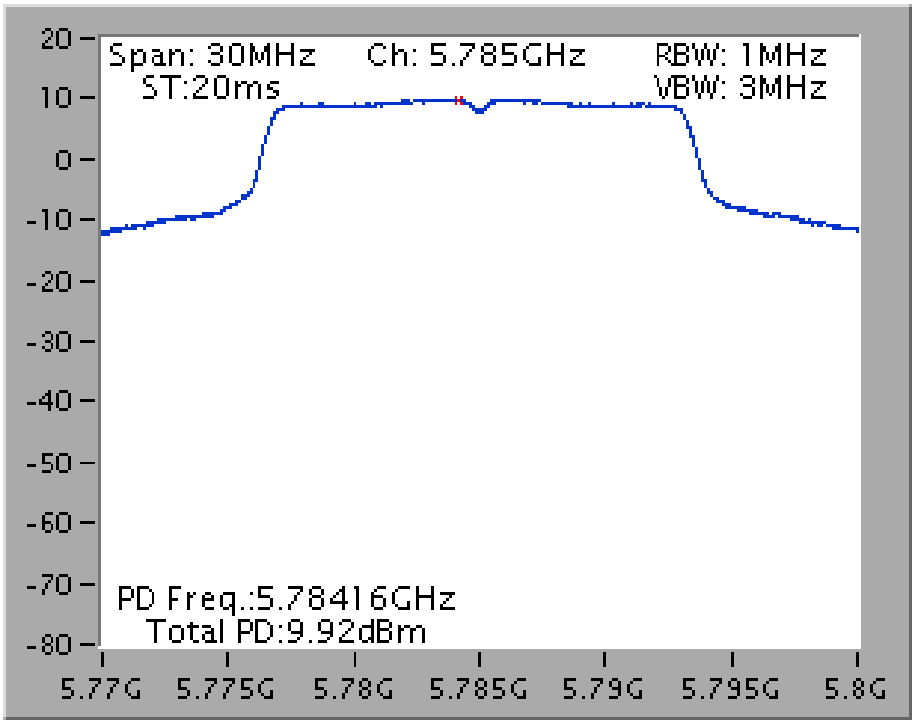
Channel	Frequency	Power Density (dBm/MHz)	10log(500kHz/RBW) Factor (dB)	Power Density (dBm/500kHz)	Power Density Limit (dBm/500kHz)	Result
155	5775 MHz	1.41	-3.01	-1.60	30.00	Complies

Note: $Directional\,Gain = 10\log\left[\frac{\sum_{j=1}^{Nss}\left\{\sum_{K=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =4.77dBi<6dBi, so the limit doesn't reduce.

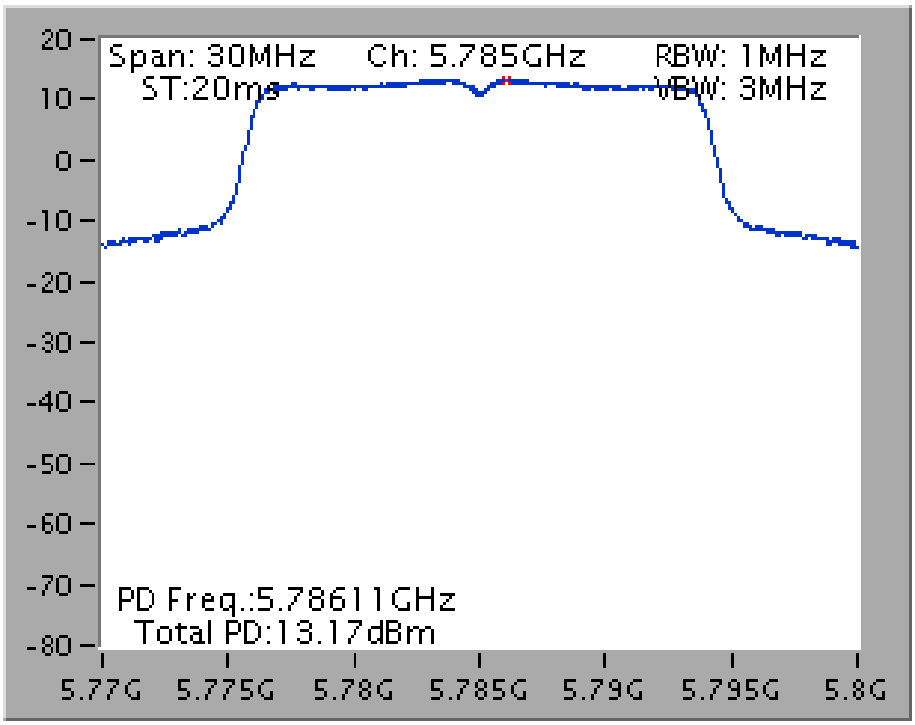
Note: All the test values were listed in the report.

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

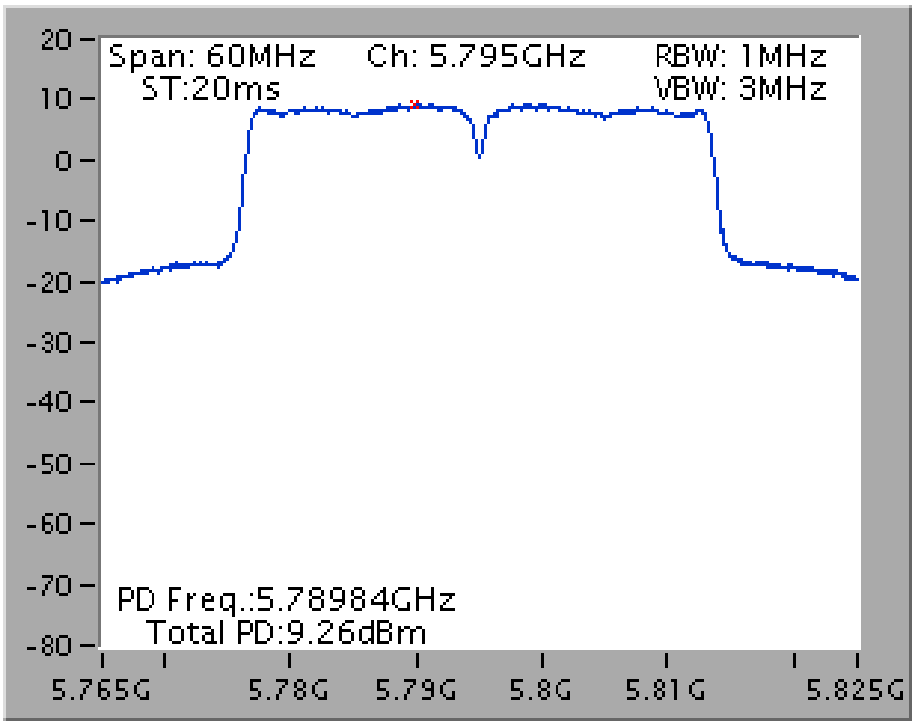
Power Density Plot on Configuration IEEE 802.11a / Chain 3 / 5785 MHz



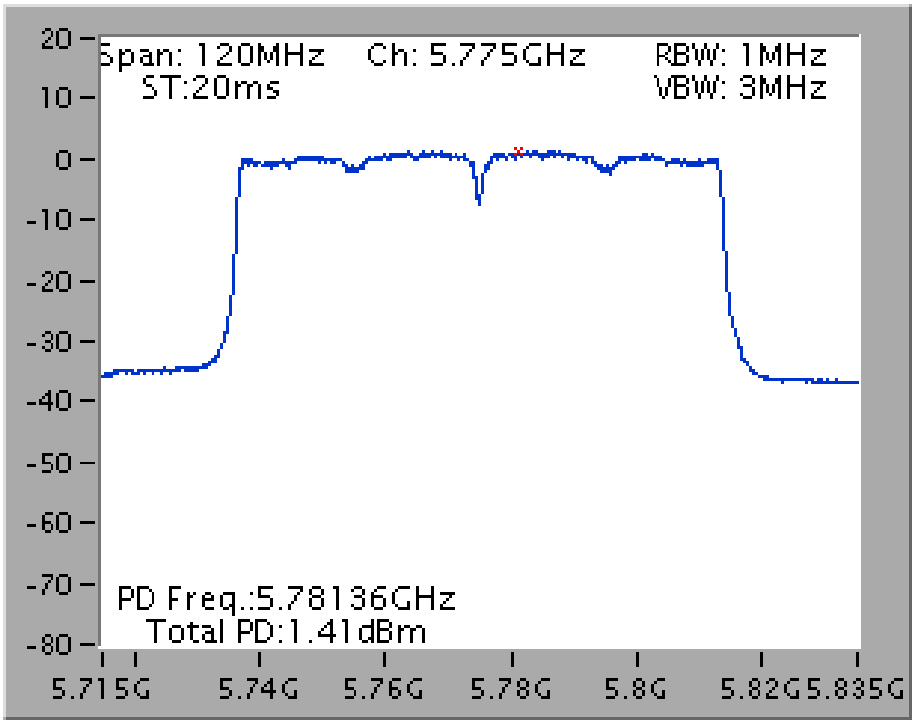
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / Chain 3 + Chain 4 + Chain 5 / 5785 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT40 / Chain 3 + Chain 4 + Chain 5 / 5795 MHz



Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / Chain 3 + Chain 4 + Chain 5 / 5775 MHz



4.6. Radiated Emissions Measurement

4.6.1. Limit

For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions 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 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

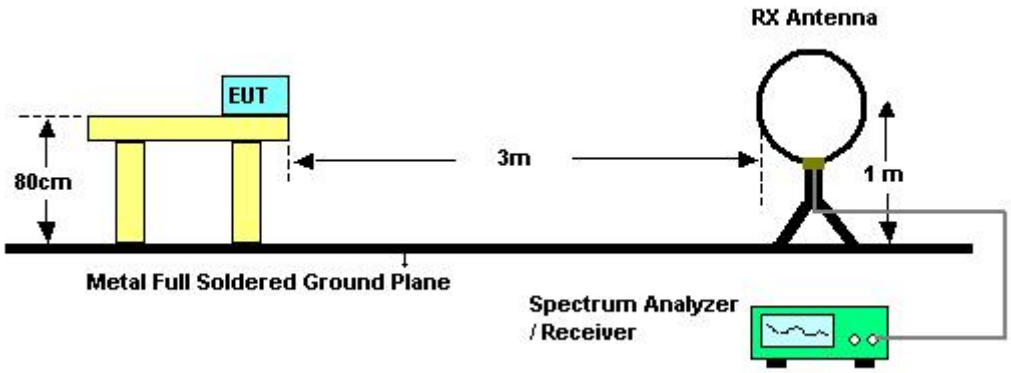
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1000MHz / RBW 120kHz for QP

4.6.3. Test Procedures

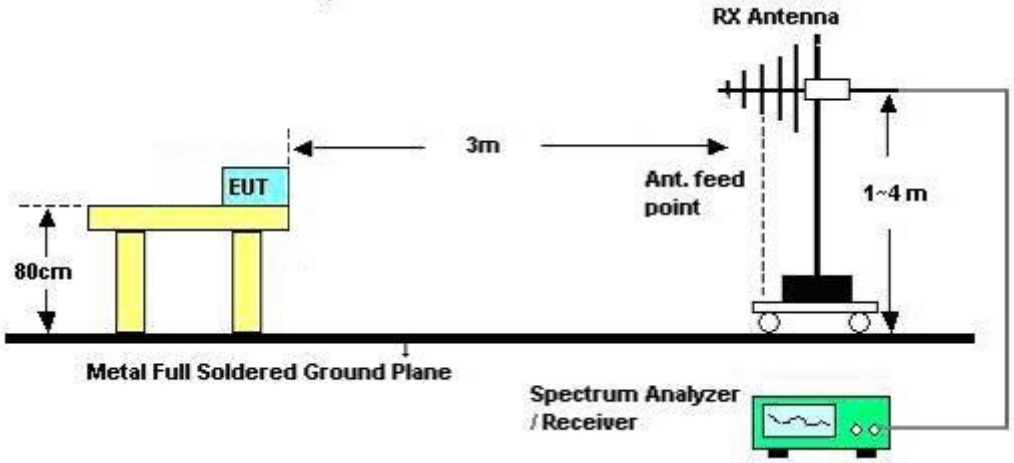
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting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

4.6.4. Test Setup Layout

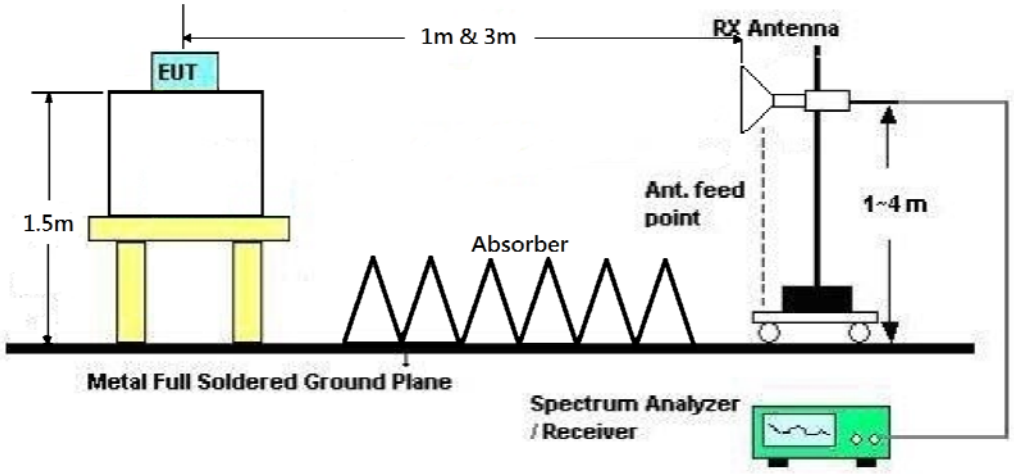
For Radiated Emissions: 9kHz ~30MHz



For Radiated Emissions: 30MHz~1GHz



For Radiated Emissions: Above 1GHz



4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

For non-beamforming function:

The EUT was programmed to be in continuously transmitting mode.

For beamforming function:

The EUT was programmed to be in beamforming transmitting mode.

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

Temperature	22°C	Humidity	55%
Test Engineer	Stim Sung	Configurations	Normal Link
Test Date	Nov. 30, 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.

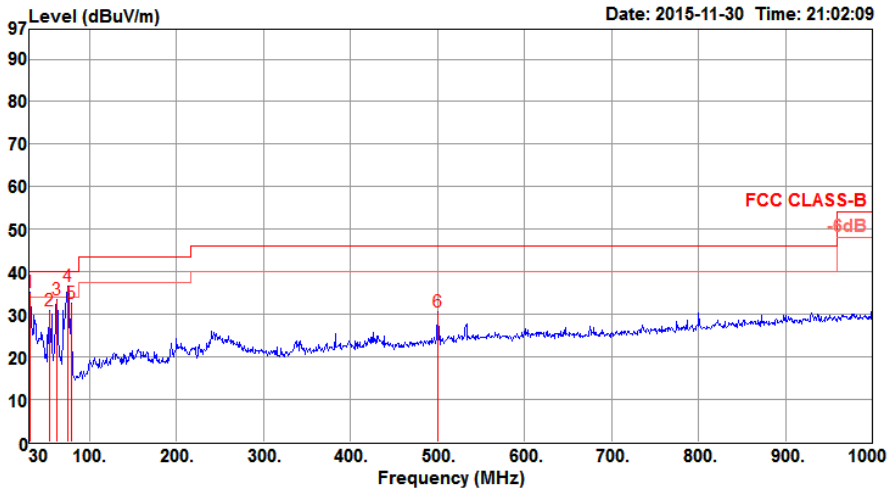
Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

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

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

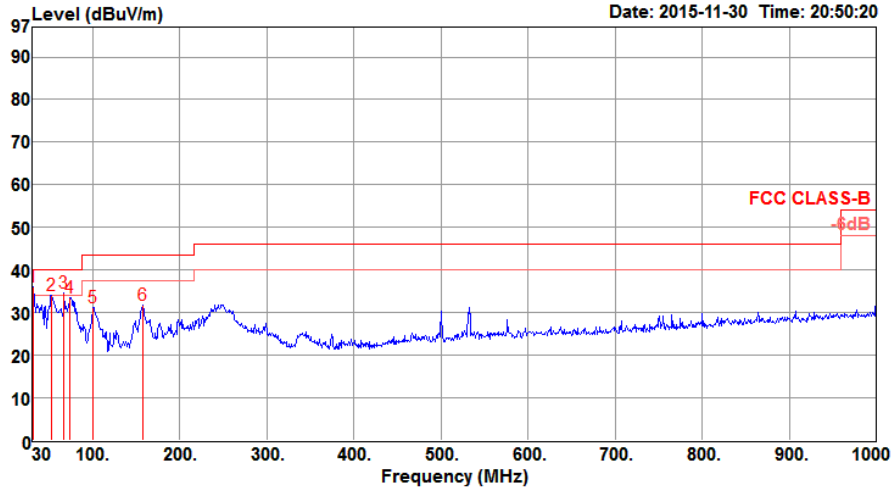
Temperature	22°C	Humidity	55%
Test Engineer	Stim Sung	Configurations	Normal Link

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31.94	35.31	40.00	-4.69	43.66	1.23	18.91	28.49	Peak	400	360	HORIZONTAL
2	53.28	30.97	40.00	-9.03	49.67	1.35	8.40	28.45	Peak	400	360	HORIZONTAL
3	62.01	33.54	40.00	-6.46	53.66	1.41	6.88	28.41	Peak	400	360	HORIZONTAL
4	74.62	36.57	40.00	-3.43	56.28	1.48	7.18	28.37	Peak	400	360	HORIZONTAL
5	78.50	32.69	40.00	-7.31	52.07	1.50	7.47	28.35	Peak	400	360	HORIZONTAL
6	500.45	30.65	46.00	-15.35	38.91	2.58	17.84	28.68	Peak	400	360	HORIZONTAL

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	Remark	A/Pos	T/Pos	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB		cm	deg	
1	31.94	35.98	40.00	-4.02	44.33	1.23	18.91	28.49	Peak	400	360	VERTICAL
2	52.31	34.05	40.00	-5.95	52.55	1.34	8.62	28.46	Peak	400	360	VERTICAL
3	66.86	34.52	40.00	-5.48	54.66	1.43	6.83	28.40	Peak	400	360	VERTICAL
4	73.65	33.53	40.00	-6.47	53.34	1.47	7.09	28.37	Peak	400	360	VERTICAL
5	99.84	31.12	43.50	-12.38	46.63	1.58	11.20	28.29	Peak	400	360	VERTICAL
6	157.07	31.78	43.50	-11.72	47.10	1.69	10.91	27.92	Peak	400	360	VERTICAL

Note:

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

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

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

4.6.9. Results for Radiated Emissions (1GHz~40GHz)

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a CH 149 / Chain 3
Test Date	Mar. 31, 2016		

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	11496.00	45.63	54.00	-8.37	27.95	12.91	40.00	35.23	180	273	Average	HORIZONTAL
2	11497.76	58.24	74.00	-15.76	40.56	12.91	40.00	35.23	180	273	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	11698.00	60.05	74.00	-13.95	42.67	13.00	39.60	35.22	158	215	Peak	VERTICAL
2	11710.00	47.87	54.00	-6.13	30.49	13.00	39.60	35.22	158	215	Average	VERTICAL

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a CH 157 / Chain 3
Test Date	Mar. 31, 2016		

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	11570.84	59.46	74.00	-14.54	41.88	12.94	39.87	35.23	185	233	Peak	HORIZONTAL
2	11579.40	46.72	54.00	-7.28	29.14	12.94	39.87	35.23	185	233	Average	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	11576.88	47.00	54.00	-7.00	29.42	12.94	39.87	35.23	160	181	Average	VERTICAL
2	11576.88	59.47	74.00	-14.53	41.89	12.94	39.87	35.23	160	181	Peak	VERTICAL

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a CH 165 / Chain 3
Test Date	Mar. 31, 2016		

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	11648.12	47.29	54.00	-6.71	29.81	12.97	39.73	35.22	183	254	Average	HORIZONTAL
2	11651.80	60.57	74.00	-13.43	43.14	12.98	39.67	35.22	183	254	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	11648.88	59.58	74.00	-14.42	42.10	12.97	39.73	35.22	157	128	Peak	VERTICAL
2	11657.00	47.36	54.00	-6.64	29.93	12.98	39.67	35.22	157	128	Average	VERTICAL

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

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	11498.10	46.48	54.00	-7.52	28.80	12.91	40.00	35.23	150	69	Average	HORIZONTAL
2	11511.30	58.36	74.00	-15.64	40.68	12.91	40.00	35.23	150	69	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	11481.40	58.40	74.00	-15.60	40.73	12.89	40.01	35.23	150	326	Peak	VERTICAL
2	11483.80	46.16	54.00	-7.84	28.48	12.91	40.00	35.23	150	326	Average	VERTICAL

Temperature	23.2°C	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 157 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

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	11569.30	63.39	74.00	-10.61	45.81	12.94	39.87	35.23	187	238	Peak	HORIZONTAL
2	11571.60	49.39	54.00	-4.61	31.81	12.94	39.87	35.23	187	238	Average	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	11571.70	47.17	54.00	-6.83	29.59	12.94	39.87	35.23	150	0	Average	VERTICAL
2	11574.80	60.77	74.00	-13.23	43.19	12.94	39.87	35.23	150	0	Peak	VERTICAL

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 165 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

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	11647.08	49.40	54.00	-4.60	31.92	12.97	39.73	35.22	182	242	Average	HORIZONTAL
2	11647.32	63.35	74.00	-10.65	45.87	12.97	39.73	35.22	182	242	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	11648.88	60.06	74.00	-13.94	42.58	12.97	39.73	35.22	150	350	Peak	VERTICAL
2	11649.98	47.94	54.00	-6.06	30.46	12.97	39.73	35.22	150	350	Average	VERTICAL

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

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	11508.98	46.06	54.00	-7.94	28.38	12.91	40.00	35.23	150	238	Average	HORIZONTAL
2	11509.68	58.77	74.00	-15.23	41.09	12.91	40.00	35.23	150	238	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	11509.48	59.34	74.00	-14.66	41.66	12.91	40.00	35.23	150	118	Peak	VERTICAL
2	11512.98	45.96	54.00	-8.04	28.28	12.91	40.00	35.23	150	118	Average	VERTICAL

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 159 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

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	11585.86	60.21	74.00	-13.79	42.68	12.95	39.80	35.22	150	193	Peak	HORIZONTAL
2	11591.38	46.93	54.00	-7.07	29.40	12.95	39.80	35.22	150	193	Average	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	11587.82	59.42	74.00	-14.58	41.89	12.95	39.80	35.22	150	77	Peak	VERTICAL
2	11591.40	47.38	54.00	-6.62	29.85	12.95	39.80	35.22	150	77	Average	VERTICAL

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

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	6416.68	45.31	54.00	-8.69	35.17	9.67	33.80	33.33	298	90	Average	HORIZONTAL
2	6416.70	53.25	74.00	-20.75	43.11	9.67	33.80	33.33	298	90	Peak	HORIZONTAL
3	11546.34	46.32	54.00	-7.68	28.70	12.92	39.93	35.23	150	269	Average	HORIZONTAL
4	11552.54	59.01	74.00	-14.99	41.43	12.94	39.87	35.23	150	269	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	6416.72	45.63	54.00	-8.37	35.49	9.67	33.80	33.33	212	176	Average	VERTICAL
2	6416.80	53.73	74.00	-20.27	43.59	9.67	33.80	33.33	212	176	Peak	VERTICAL
3	11545.72	46.22	54.00	-7.78	28.60	12.92	39.93	35.23	150	240	Average	VERTICAL
4	11546.38	58.75	74.00	-15.25	41.13	12.92	39.93	35.23	150	240	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.

4.7. Band Edge Emissions Measurement

4.7.1. Limit

For transmitters operating in the 5.725-5.85 GHz band: all emissions within the frequency range from the band edge to 10 MHz above or below the band edge shall not exceed an e.i.r.p. of −17 dBm/MHz; for frequencies 10 MHz or greater above or below the band edge, emissions 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

4.7.2. 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	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

4.7.3. Test Procedures

1. The test procedure is the same as section 4.6.3.

4.7.4. Test Setup Layout

This test setup layout is the same as that shown in section 4.6.4.

4.7.5. Test Deviation

There is no deviation with the original standard.

4.7.6. EUT Operation during Test

For non-beamforming function:

The EUT was programmed to be in continuously transmitting mode.

For beamforming function:

The EUT was programmed to be in beamforming transmitting mode.

4.7.7. Test Result of Band Edge and Fundamental Emissions

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11a CH 149, 157, 165 / Chain 3 + Chain 4 + Chain 5
Test Date	Mar. 31, 2016		

Channel 149

	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	5714.00	64.90	68.20	-3.30	56.91	8.93	32.06	33.00	245	194	Peak	VERTICAL
2	5724.00	78.10	78.20	-0.10	70.10	8.92	32.08	33.00	245	194	Peak	VERTICAL
3	5744.00	98.69			90.70	8.90	32.10	33.01	245	194	Average	VERTICAL
4	5744.20	106.69			98.70	8.90	32.10	33.01	245	194	Peak	VERTICAL
5	5860.00	58.69	68.20	-9.51	50.58	8.93	32.24	33.06	245	194	Peak	VERTICAL
6	5861.00	60.33	68.20	-7.87	52.22	8.93	32.24	33.06	245	194	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5745 MHz.

Channel 157

	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	5702.00	66.27	68.20	-1.93	58.28	8.95	32.04	33.00	253	190	Peak	VERTICAL
2	5724.00	59.58	78.20	-18.62	51.58	8.92	32.08	33.00	253	190	Peak	VERTICAL
3	5783.00	101.75			93.76	8.88	32.14	33.03	253	190	Average	VERTICAL
4	5783.00	111.78			103.79	8.88	32.14	33.03	253	190	Peak	VERTICAL
5	5850.00	61.20	78.20	-17.00	53.12	8.91	32.22	33.05	253	190	Peak	VERTICAL
6	5867.00	66.68	68.20	-1.52	58.57	8.93	32.24	33.06	253	190	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5785 MHz.

Channel 165

	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	5823.00	110.67			102.62	8.90	32.20	33.05	252	193	Peak	VERTICAL
2	5824.00	100.48			92.43	8.90	32.20	33.05	252	193	Average	VERTICAL
3	5850.00	72.39	78.20	-5.81	64.31	8.91	32.22	33.05	252	193	Peak	VERTICAL
4	5860.00	67.96	68.20	-0.24	59.85	8.93	32.24	33.06	252	193	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5825 MHz.

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 149, 157, 165 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

Channel 149

	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	5672.20	65.20	68.20	-3.00	57.21	8.98	32.00	32.99	250	189	Peak	VERTICAL
2	5725.00	77.66	78.20	-0.54	69.66	8.92	32.08	33.00	250	189	Peak	VERTICAL
3	5747.40	111.08			103.10	8.90	32.10	33.02	250	189	Peak	VERTICAL
4	5751.40	100.91			92.93	8.90	32.10	33.02	250	189	Average	VERTICAL

Item 3, 4 are the fundamental frequency at 5745 MHz.

Channel 157

	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	5706.00	66.50	68.20	-1.70	58.51	8.93	32.06	33.00	250	188	Peak	VERTICAL
2	5722.00	59.44	78.20	-18.76	51.45	8.93	32.06	33.00	250	188	Peak	VERTICAL
3	5783.00	104.22			96.23	8.88	32.14	33.03	250	188	Average	VERTICAL
4	5789.00	115.02			107.03	8.86	32.16	33.03	250	188	Peak	VERTICAL
5	5857.00	67.85	78.20	-10.35	59.73	8.93	32.24	33.05	250	188	Peak	VERTICAL
6	5863.00	68.10	68.20	-0.10	59.99	8.93	32.24	33.06	250	188	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5785 MHz.

Channel 165

	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	5830.60	103.38			95.33	8.90	32.20	33.05	250	188	Average	VERTICAL
2	5833.00	113.80			105.75	8.90	32.20	33.05	250	188	Peak	VERTICAL
3	5850.00	75.77	78.20	-2.43	67.69	8.91	32.22	33.05	250	188	Peak	VERTICAL
4	5906.80	68.03	68.20	-0.17	59.85	8.97	32.28	33.07	250	188	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5825 MHz.

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 151, 159 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

Channel 151

	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	5714.20	70.54	74.00	-3.46	62.55	8.93	32.06	33.00	250	189	Peak	VERTICAL
2	5715.00	53.85	54.00	-0.15	45.86	8.93	32.06	33.00	250	189	Average	VERTICAL
3	5719.00	73.97	78.20	-4.23	65.98	8.93	32.06	33.00	250	189	Peak	VERTICAL
4	5759.80	96.44			88.45	8.89	32.12	33.02	250	189	Average	VERTICAL
5	5763.80	107.73			99.74	8.89	32.12	33.02	250	189	Peak	VERTICAL

Item 4, 5 are the fundamental frequency at 5755 MHz.

Channel 159

	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	5785.00	111.83			103.84	8.88	32.14	33.03	250	186	Peak	VERTICAL
2	5790.20	100.31			92.32	8.86	32.16	33.03	250	186	Average	VERTICAL
3	5851.20	67.06	78.20	-11.14	58.98	8.91	32.22	33.05	250	186	Peak	VERTICAL
4	5860.00	67.76	68.20	-0.44	59.65	8.93	32.24	33.06	250	186	Peak	VERTICAL

Item 1, 2 are the fundamental frequency at 5795 MHz.

Temperature	23.2℃	Humidity	51%
Test Engineer	Wen Chao	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 3 + Chain 4 + Chain 5
Test Date	Apr. 01, 2016		

Channel 155

	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	5714.00	68.10	68.20	-0.10	60.11	8.93	32.06	33.00	250	194	Peak	VERTICAL
2	5723.00	70.49	78.20	-7.71	62.49	8.92	32.08	33.00	250	194	Peak	VERTICAL
3	5763.00	92.95			84.96	8.89	32.12	33.02	250	194	Average	VERTICAL
4	5787.00	105.97			97.98	8.88	32.14	33.03	250	194	Peak	VERTICAL
5	5850.00	66.51	78.20	-11.69	58.43	8.91	32.22	33.05	250	194	Peak	VERTICAL
6	5861.00	64.48	68.20	-3.72	56.37	8.93	32.24	33.06	250	194	Peak	VERTICAL

Item 3, 4 are the fundamental frequency at 5775 MHz.

Note:

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

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

4.8. Frequency Stability Measurement

4.8.1. 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).

4.8.2. Measuring Instruments and Setting

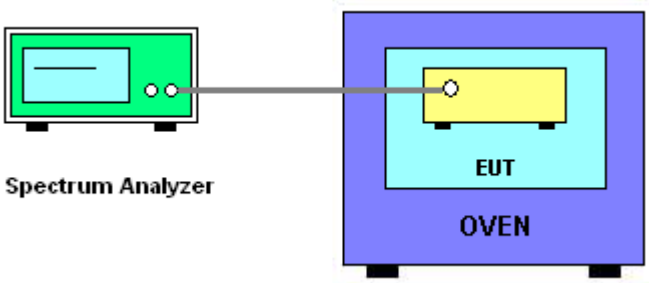
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

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

4.8.3. 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. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
7. The test extreme voltage is to change the primary supply voltage from 85 to 115 percent of the nominal value
8. Extreme temperature is 0°C~40°C.

4.8.4. Test Setup Layout



4.8.5. Test Deviation

There is no deviation with the original standard.

4.8.6. EUT Operation during Test

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

4.8.7. Test Result of Frequency Stability

Temperature	24℃	Humidity	45%
Test Engineer	Wen Chao	Test Date	Apr. 12, 2016

Mode: 20 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5785.0127	5785.0123	5785.0120	5785.0113
110.00	5785.0125	5785.0119	5785.0111	5785.0105
93.50	5785.0121	5785.0116	5785.0112	5785.0102
Max. Deviation (MHz)	0.0127	0.0123	0.0120	0.0113
Max. Deviation (ppm)	2.20	2.13	2.07	1.95
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(℃)	5785 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5785.0147	5785.0146	5785.0143	5785.0138
10	5785.0140	5785.0139	5785.0131	5785.0124
20	5785.0125	5785.0118	5785.0116	5785.0108
30	5785.0017	5785.0009	5785.0003	5784.9996
40	5785.0000	5784.9993	5784.9988	5784.9983
Max. Deviation (MHz)	0.0147	0.0146	0.0143	0.0138
Max. Deviation (ppm)	2.54	2.52	2.47	2.39
Result	Complies			

Mode: 40 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5755.0129	5755.0127	5755.0123	5755.0122
110.00	5755.0125	5755.0118	5755.0117	5755.0111
93.50	5755.0116	5755.0111	5755.0103	5755.0097
Max. Deviation (MHz)	0.0129	0.0127	0.0123	0.0122
Max. Deviation (ppm)	2.24	2.21	2.14	2.12
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5755 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5755.0145	5755.0140	5755.0136	5755.0135
10	5755.0129	5755.0128	5755.0122	5755.0116
20	5755.0125	5755.0123	5755.0116	5755.0107
30	5755.0017	5755.0011	5755.0002	5754.9996
40	5754.9997	5754.9996	5754.9986	5754.9985
Max. Deviation (MHz)	0.0145	0.0140	0.0136	0.0135
Max. Deviation (ppm)	2.52	2.43	2.36	2.35
Result	Complies			

Mode: 80 MHz / Chain 3

Voltage vs. Frequency Stability

Voltage	Measurement Frequency (MHz)			
(V)	5775 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
126.50	5775.0129	5775.0128	5775.0121	5775.0112
110.00	5775.0125	5775.0124	5775.0118	5775.0114
93.50	5775.0123	5775.0122	5775.0115	5775.0105
Max. Deviation (MHz)	0.0129	0.0128	0.0121	0.0114
Max. Deviation (ppm)	2.23	2.22	2.10	1.97
Result	Complies			

Temperature vs. Frequency Stability

Temperature	Measurement Frequency (MHz)			
(°C)	5775 MHz			
	0 Minute	2 Minute	5 Minute	10 Minute
0	5775.0153	5775.0151	5775.0145	5775.0142
10	5775.0137	5775.0130	5775.0126	5775.0119
20	5775.0125	5775.0123	5775.0120	5775.0117
30	5775.0017	5775.0013	5775.0004	5775.0003
40	5775.0015	5775.0007	5775.0001	5774.9991
Max. Deviation (MHz)	0.0153	0.0151	0.0145	0.0142
Max. Deviation (ppm)	2.65	2.61	2.51	2.46
Result	Complies			

4.9. Antenna Requirements

4.9.1. 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.

4.9.2. 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	6.120210n	-	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA	Schaffner	CBL6112D	37880	20MHz ~ 2GHz	Sep 03, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	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. 18, 2016	Radiation (03CH01-CB)
Pre-Amplifier	WM	TF-130N-R1	923365	26GHz ~ 40GHz	Nov. 13, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Oct. 27, 2015	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-17	N/A	1 GHz ~ 18 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-1	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G-2	N/A	18GHz ~ 40 GHz	Nov. 02, 2015	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (10CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 09, 2015	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-6	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 02, 2015	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 02, 2015	Conducted (TH01-CB)

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

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

N.C.R. means Non-Calibration required.

6. MEASUREMENT UNCERTAINTY

Test Items	Uncertainty	Remark
Conducted Emission (150kHz ~ 30MHz)	3.2 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%