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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 C § 15.247
Test Freq. Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Received Date	Apr. 10, 2015
Final Test Date	Oct. 28, 2015
Submission Type	Class II Change

Statement

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

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

Testing Laboratory
1190

Table of Contents

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR531828-03AA	Rev. 01	Initial issue of report	Nov. 05, 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 C § 15.247

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

For adding Adapter 4 ~ 6 and Second Red, Black Heat sink test record

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.1	15.207	AC Power Line Conducted Emissions	Complies	3.21 dB
4.5	15.247(d)	Radiated Emissions	Complies	4.09 dB
4.7	15.203	Antenna Requirements	Complies	-

For EUT Rev 5.01 test record

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.5	15.247(d)	Radiated Emissions	Complies	4.89 dB
4.7	15.203	Antenna Requirements	Complies	-

For adding 3TX/3RX function test record

Applied Standard: 47 CFR FCC Part 15 Subpart C				
Part	**Rule Section**	**Description of Test**	**Result**	**Under Limit**
4.2	15.247(b)(3)	Maximum Conducted Output Power	Complies	0.04 dB
4.3	15.247(e)	Power Spectral Density	Complies	1.37 dB
4.4	15.247(a)(2)	6dB Spectrum Bandwidth	Complies	-
4.5	15.247(d)	Radiated Emissions	Complies	9.14 dB
4.6	15.247(d)	Band Edge Emissions	Complies	0.11 dB
4.7	15.203	Antenna Requirements	Complies	-

3. GENERAL INFORMATION

3.1. Product Details

Items	Description
Product Type	For 2.4GHz Band: WLAN (3TX/3RX, 4TX/4RX) For 5GHz Band: WLAN (3TX/3RX, 4TX/4RX)
Radio Type	Intentional Transceiver
Power Type	From power adapter
Modulation	IEEE 802.11b: DSSS IEEE 802.11a/g: OFDM IEEE 802.11n/ac: see the below table
Data Modulation	IEEE 802.11b: DSSS (BPSK / QPSK / CCK) IEEE 802.11a/g/n: OFDM (BPSK / QPSK / 16QAM / 64QAM) IEEE 802.11ac: OFDM (BPSK / QPSK / 16QAM / 64QAM / 256QAM, 1024QAM)
Data Rate (Mbps)	IEEE 802.11b: DSSS (1/ 2/ 5.5/11) IEEE 802.11a/g: OFDM (6/9/12/18/24/36/48/54) IEEE 802.11n/ac: see the below table
Frequency Range	2400 ~ 2483.5MHz / 5725 ~ 5850MHz
Channel Number	For 2.4GHz Band: 11 for 20MHz bandwidth ; 7 for 40MHz bandwidth For 5GHz Band: 5 for 20MHz bandwidth ; 2 for 40MHz bandwidth 1 for 80MHz bandwidth

Channel Band Width (99%)	For 2.4GHz Band: 3TX For Non-Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT20): 18.23 MHz 4TX For Non-Beamforming Mode IEEE 802.11b: 11.89 MHz IEEE 802.11g: 18.49 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 17.88 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 36.46 MHz For Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT20): 17.71 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 36.76 MHz IEEE 802.11ac MCS0/Nss2 (VHT20): 17.80 MHz IEEE 802.11ac MCS0/Nss2 (VHT40): 36.61 MHz For 5GHz Band: 3TX For Non-Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT80): 76.99 MHz 4TX For Non-Beamforming Mode IEEE 802.11a: 24.57 MHz IEEE 802.11ac MCS0/Nss1 (VHT20): 25.00 MHz IEEE 802.11ac MCS0/Nss1 (VHT40): 46.88 MHz IEEE 802.11ac MCS0/Nss1 (VHT80): 76.41 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 IEEE 802.11ac MCS0/Nss2 (VHT20): 18.32 MHz IEEE 802.11ac MCS0/Nss2 (VHT40): 37.34 MHz IEEE 802.11ac MCS0/Nss2 (VHT80): 76.70 MHz

Maximum Conducted Output Power	For 2.4GHz Band: 3TX For Non-Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT20): 29.96 dBm 4TX For Non-Beamforming Mode IEEE 802.11b: 29.85 dBm IEEE 802.11g: 29.65 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 29.97 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 23.09 dBm For Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT20): 27.49 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 23.25 dBm IEEE 802.11ac MCS0/Nss2 (VHT20): 29.98 dBm IEEE 802.11ac MCS0/Nss2 (VHT40): 25.48 dBm For 5GHz Band: 3TX For Non-Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT80): 27.36 dBm 4TX For Non-Beamforming Mode IEEE 802.11a: 29.84 dBm IEEE 802.11ac MCS0/Nss1 (VHT20): 29.84 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 29.95 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 27.74 dBm For Beamforming Mode IEEE 802.11ac MCS0/Nss1 (VHT20): 26.46 dBm IEEE 802.11ac MCS0/Nss1 (VHT40): 26.53 dBm IEEE 802.11ac MCS0/Nss1 (VHT80): 26.44 dBm IEEE 802.11ac MCS0/Nss2 (VHT20): 29.47 dBm IEEE 802.11ac MCS0/Nss2 (VHT40): 29.50 dBm IEEE 802.11ac MCS0/Nss2 (VHT80): 29.43 dBm
Carrier Frequencies	Please refer to section 3.4
Antenna	Please refer to section 3.3

Items	Description	
Beamforming Function	☒ With beamforming for 802.11n/ac in 2.4GHz/5GHz.	☐ Without beamforming

Antenna and Band width

Antenna		Three (TX)			Four (TX)		
Band width Mode		20 MHz	40 MHz	80 MHz	20 MHz	40 MHz	80 MHz
2.4G	IEEE 802.11b	V	X	X	V	X	X
	IEEE 802.11g	V	X	X	V	X	X
	IEEE 802.11n	V	V	X	V	V	X
	IEEE 802.11ac	V	V	X	V	V	X
5G	IEEE 802.11a	V	X	X	V	X	X
	IEEE 802.11n	V	V	X	V	V	X
	IEEE 802.11ac	V	V	V	V	V	V

IEEE 802.11ac/ac Spec.

Protocol		Number of Transmit Chains (NTX)	Data Rate / MCS
2.4G	802.11n (HT20)	3, 4	MCS0-23, MCS0-31
	802.11n (HT40)	3, 4	MCS0-23, MCS0-31
	802.11ac (VHT20)	3, 4	MCS0-11/Nss1-3, MCS0-11/Nss1-4
	802.11ac (VHT40)	3, 4	MCS0-11/Nss1-3, MCS0-11/Nss1-4
5G	802.11n (HT20)	3, 4	MCS0-23, MCS0-31
	802.11n (HT40)	3, 4	MCS0-23, MCS0-31
	802.11ac (VHT20)	3, 4	MCS0-11/Nss1-3, MCS0-11/Nss1-4
	802.11ac (VHT40)	3, 4	MCS0-11/Nss1-3, MCS0-11/Nss1-4
	802.11ac (VHT80)	3, 4	MCS0-11/Nss1-3, 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 in 2.4GHz and supports VHT20, VHT40, VHT80 in 5GHz.

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
Adapter 4	ASUS	ADP-45BW B	Input: 100-240V ~ 50-60Hz 1.2A Output: 19V, 2.37A
Adapter 5	ASUS	AD883J20	Input: 100-240V ~ 50-60Hz 1.0A Output: 19V, 2.37A
Adapter 6	ASUS	ADP-65DW B	Input: 100-240V ~ 50-60Hz 1.5A Output: 19V, 3.42A
Other			
RJ-45 Cable*1: Non-Shielded, 1.5m			

3.3. Table for Filed Antenna

Set	Brand	P/N	Antenna Type	Connector	Gain (dBi)		Color Ring
					2.4GHz	5GHz	
1	PSA	RFDPA171300SBLB809	Dipole Antenna	Reversed-SMA	2.25	3.37	Red
2	PSA	RFDPA171300SBLB810	Dipole Antenna	Reversed-SMA	2.25	3.37	Black
3	PSA	RFDPA171300SBLB811	Dipole Antenna	Reversed-SMA	2.20	3.36	Black
4	PSA	RFDPA171300SBLB812	Dipole Antenna	Reversed-SMA	2.18	3.19	Black
5	PSA	RFDPA171300SBLB813	Dipole Antenna	Reversed-SMA	2.20	3.36	Red
6	PSA	RFDPA171300SBLB814	Dipole Antenna	Reversed-SMA	2.18	3.19	Red
7	WHA YU	C660-510345-A(SRF2015719)	Dipole Antenna	Reversed-SMA	2.25	3.20	Red
8	WHA YU	C660-510346-A(SRF2015720)	Dipole Antenna	Reversed-SMA	2.25	3.20	Black
9	WHA YU	C660-510364-A(SRF20151386)	Dipole Antenna	Reversed-SMA	1.9	3.3	Black
10	WHA YU	C660-510365-A(SRF20151717)	Dipole Antenna	Reversed-SMA	1.9	3.3	Black

Note: 1. The EUT has ten sets of antenna and there are four antennas for each set.

2. Both antennas above are the same type. Besides, only set 1 antenna was selected to perform the test and written in this report due to the highest gain.

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

For 2.4GHz and 5GHz (3TX/3RX) function:

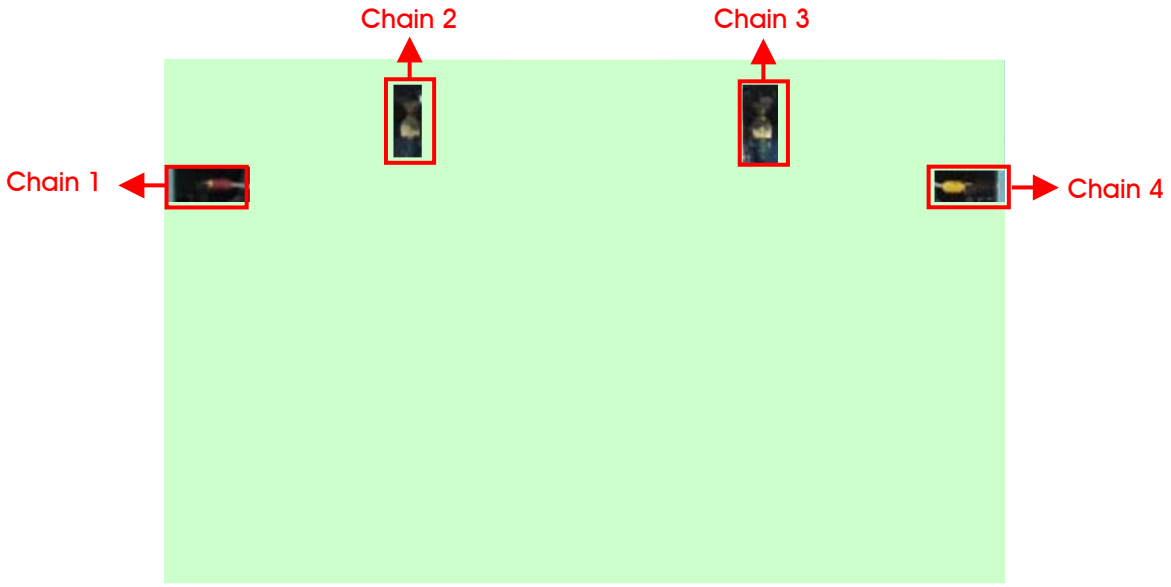
Chain 1, Chain 2 and Chain 3 can be used as transmitting/receiving antenna.

Chain 1, Chain 2 and Chain 3 could transmit/receive simultaneously.

For 2.4GHz and 5GHz (4TX/4RX) function:

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

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



3.4. Table for Carrier Frequencies

For 2.4GHz Band:

There are two bandwidth systems.

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

For 40MHz bandwidth systems, use Channel 3~Channel 9.

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

For 5GHz Band:

There are three bandwidth systems.

For 20MHz bandwidth systems, use Channel 149, 153, 157, 161, and 165.

For 40MHz bandwidth systems, use Channel 151, 159.

For 80MHz bandwidth systems, use Channel 155.

Frequency Band	Channel No.	Frequency	Channel No.	Frequency
5725~5850 MHz Band 4	149	5745 MHz	157	5785 MHz
	151	5755 MHz	159	5795 MHz
	153	5765 MHz	161	5805 MHz
	155	5775 MHz	165	5825 MHz

3.5. Table for Test Modes

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

Verify below items for adding Second Red, Black Heat sink

For 2.4GHz Band:

Test Items	Mode	Data Rate	Channel	Chain
Radiated Emissions Above 1GHz	For Non-Beamforming Mode			
	11b/CCK	1 Mbps	6	1+2+3+4
	11g/BPSK	6 Mbps	1	1+2+3+4
	11ac VHT20	MCS0/Nss1	11	1+2+3+4
	11ac VHT40	MCS0/Nss1	3	1+2+3+4

For 5GHz Band:

Verify below items for adding Adapter 4 ~ 6

Test Items	Mode	Data Rate	Channel	Chain
AC Power Line Conducted Emissions	CTX	-	-	-

Verify below items for adding Adapter 4 ~ 6 and Second Red, Black Heat sink

Test Items	Mode	Data Rate	Channel	Chain
Radiated Emissions Below 1GHz	CTX	-	-	-

Verify below items for adding Second Red, Black Heat sink

Test Items	Mode	Data Rate	Channel	Chain
Radiated Emissions Above 1GHz	For Non-Beamforming Mode			
	11a/BPSK	6 Mbps	149/157/165	1+2+3+4

Note: 1. 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.

2. The EUT can only be used at laying position.

The following test modes were performed for all tests:

For Conducted Emission and Radiated Emissions Below 1GHz test:

There are two modes of EUT, one is EUT With 2.4GHz mode, and the other is EUT With 5GHz mode, after evaluating, EUT With 5GHz mode has been evaluated to be the worst case for original test report.

Consequently, measurement for Conducted Emission and Radiated Emissions Below 1GHz will follow this same test mode.

Mode 1. EUT (Rev4.01) With Adapter 4+ 5GHz

Mode 2. EUT (Rev4.01) With Adapter 5+ 5GHz

Mode 3. EUT (Rev4.01) With Adapter 6+ 5GHz

Mode 1 is the worst case, so it was selected to record in this test report.

For Radiated Emissions Above 1GHz test:

From the above modes has been evaluated to be the worst case for original test report.

Consequently, measurement for Radiated Emissions Above 1GHz test will follow this same test mode.

Verify below items for EUT Rev 5.01

For 2.4GHz and 5GHz Band:

Test Items	Mode	Data Rate	Channel	Chain
Radiated Emissions Below 1GHz	CTX	-	-	-

For Radiated Emissions Below 1GHz test:

Mode 1. EUT (Rev5.01) With Adapter 1+ 2.4GHz

Mode 2. EUT (Rev5.01) 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 (Rev5.01) With Adapter 2+ 5GHz

Mode 4. EUT (Rev5.01) With Adapter 3+ 5GHz

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

Verify below items for 3TX/3RX Function

For 2.4GHz and 5GHz Band:

Test Items	Mode	Data Rate	Channel	Chain
Maximum Conducted Output Power	11ac VHT20	MCS0/Nss1	1/6/11	1+2+3
	11ac VHT80	MCS0/Nss1	155	1+2+3
Power Spectral Density	11ac VHT20	MCS0/Nss1	1/6/11	1+2+3
	11ac VHT80	MCS0/Nss1	155	1+2+3
6dB Spectrum Bandwidth	11ac VHT20	MCS0/Nss1	1/6/11	1+2+3
	11ac VHT80	MCS0/Nss1	155	1+2+3
Radiated Emissions Above 1GHz	11ac VHT20	MCS0/Nss1	1/6/11	1+2+3
	11ac VHT80	MCS0/Nss1	155	1+2+3
Band Edge Emissions	11ac VHT20	MCS0/Nss1	1/6/11	1+2+3
	11ac VHT80	MCS0/Nss1	155	1+2+3

Note: 1. The EUT is used for laying only.

2. The test configuration, test mode and test software were written in this test report are designated by the applicant.

The following test modes were performed for all tests:

For Radiated Emission test (Above 1GHz):

Mode 1. CTX

3.6. Table for Testing Locations

Test Site Location				
Address:	No.8, Lane 724, Bo-ai St., Jhubei City, Hsinchu County 302, Taiwan, R.O.C.			
TEL:	886-3-656-9065			
FAX:	886-3-656-9085			
Test Site No.	**Site Category**	**Location**	**FCC Reg. No.**	**IC File No.**
03CH01-CB	SAC	Hsin Chu	262045	IC 4086D
CO01-CB	Conduction	Hsin Chu	262045	IC 4086D
TH01-CB	OVEN Room	Hsin Chu	-	-

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

3.7. Table for Multiple List

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

Model No.	LAN Port	Heat sink color
RT-AC88U	8 LAN ports	Silver, Red
RT-AC88R	8 LAN ports	Silver, Red
RT-AC3100	4 LAN ports	Silver, Black

Note 1: From the above models, model: RT-AC88U was selected as representative model for the test and its data was recorded in this report.

Note 2: Red and Black Heat sink each of the three groups, the diffent just appearance.

3.8. Table for Class II Change

This product is an extension of original report under Sporton project number: FR531828AA
Below is the table for the change of the product with respect to the original one.

Modifications	Performance Checking
1. Adding eight set same type of Dipole antenna (set 3~set 10) with lower gains than the original. (Please refer to the table for filed antenna for detail)	It's not necessary to re-test.
2. Adding the Second Red Heat sink, for model number: RT-AC88R, RT-AC88U. 3. Adding the Second Black Heat sink, only for model number: RT-AC3100.	Radiated emission
4. Adding three adapters. (Adapter 4~Adapter 6)(Please refer to below table for adapter detail)	AC Power Port Conducted emission. Radiated emission Below 1GHz
5. Updating EUT version to "Rev 5.01" from "Rev 4.01". (1) Adding smaller size of the heat sink of color (red for Model No.: RT-AC88U and RT-AC88R, black for Model No.: T-AC3100.) (2) Adding pulse protector (3) Adding Set Line Parts (4) Removing EEPROM IC (UA 51, UA 52) (5) Changing SDRAM DDR3 2GB (256MB) -> 4GB (512MB)	Radiated emission Below 1GHz
6. Adding 3TX / 3RX function	1. Maximum Conducted Output Power 2. Power Spectral Density 3. 6dB Spectrum Bandwidth 4. Radiated Emissions Above 1GHz 5. Band Edge Emissions
Description	
Adding 3TX / 3RX function only verify non-beamforming mode 11ac VHT 20 Channel 1, 6, 11 and 11ac VHT80 Channel 155. The 3TX powers of the rest of the test modes were based on the 3TX powers out of 4TX.	

1. Table for Adapter detail

(1) The difference between adapter 1 and adapter 4 as below:

Adapter1 (model: ADP-45BW B)			
Design No	**MFG TITLE**	**MFG PART**	**DESCRIPTION**
Q1	AUK	SMK0760F	FET 600V 7A 1.2ohm TO-220F-3P
Q1	ST	STP6NK60ZFP	FET 600V 6A 1.2ohm TO-220FP-3P
Q1	TOSHIBA	TK10A60DR(STA4,X)	FET 600V 10A 750mohm TO-220SIS-3P
D101	ST	STPS20S100CT	DIO SBD 20A 100V TO-220AB-3P C.C.
D101	ST	STPS20SM100ST	DIO SBD 20A 100V TO-220AB-3P
D101	ST	STPS30SM100ST	DIO SBD 30A 100V TO-220AB-3P
IC31	ON	DAP022ASN65T1G	IC ASIC PWM CURRENT MODE TSOP-6P SMD
IC131	TI	TL432BIDBZR	IC VOL REF ADJ 2.495V 100mA 0.5%
IC131	NXP	TL431BMFDT	IC VOL REF ADJ 2.495V 100mA 0.5%
IC131	DIODES	AS431ANTR-G1	IC VOL REF ADJ 2.5V 100mA 0.5% SOT-23-3P
IC32	EVERLIGHT	EL816M(Y)(D)-VG	PHOTO TR 50mA 80V DIP-4P 150%-300%
IC32	SHARP	PC123Y92FZ0F	PHOTO TR 50mA 70V DIP-4P 160%-300%
IC32	Renesas	PS2561DL1-1Y-V-A(G)	EOL PHOTO TR 40mA 80V DIP-4P 150%-300%
CX1	EUROPTRONIC	MPX2224K30B15LXD20	CAP X2 MP PC 305VAC 0.22uF K S15
CX1	OKAYA	LE224-MX-30-C3.2	CAP X2 MP PC 300VAC 0.22uF K S15
CX1	HUA	MKP-224K0275AB115S-G	CAP X2 MP PC 275VAC 0.22uF K S15
FL1	DELTA	HFV-MP13202	LINE FILTER T14 14mH MIN
FL101	DELTA	LFV-MP13303	LINE FILTER T10 17uH MIN
T1	DELTA	MV-MP13167	TRANSFORMER MAIN RM10 1mH +/-5%
C1	NICHICON	UPT2G680MHD3	CAP AL 400V 68uF M 16*25 P7.5
C1	NCC	EKMG401ELL680ML25S	CAP AL 400V 68uF M 16*25 P7.5
C1	L-Tec	TYJ2GM680K25O	CAP AL 400V 68uF M 16*25 P7.5
CY1	MURATA	DE1B3KX221KNHAN99F	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
CY1	TDK	CD70-B2GA221KYVK	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
CY1	WALSIN	YP0AH221K061DASDAB	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
Adapter4 (model: ADP-45BW B)			
Design No	**MFG TITLE**	**MFG PART**	**DESCRIPTION**
Q1	TOSHIBA	TK10A60DR(STA4,X)	FET 600V 10A 750mohm TO-220SIS-3P
Q1	FUJI	FMV11N60ES	FET 600V 11A 750mohm TO-220F-3P
D101	ST	STPS20S100CT	DIO SBD 20A 100V TO-220AB-3P C.C.
D101	ST	STPS20H100CT	DIO SBD 20A 100V TO-220AB-3P C.C.
D101	ST	STPS30H100CT	DIO SBD 30A 100V TO-220AB-3P C.C.

IC31	NeoEnergy	DAP022AT	IC ASIC PWM CURRENT MODE SOT-26-6P SMD
IC131	LITE-ON	LA431OCRPA	IC REGU ADJ 2.495V 100mA 0.4% SOT-23R-3P
IC131	TI	TL432BIDBZR	IC VOL REF ADJ 2.495V 100mA 0.5%
IC131	NXP	TL431BMFDT	IC VOL REF ADJ 2.495V 100mA 0.5%
IC32	EVERLIGHT	EL816M(Y)(D)-VG	PHOTO TR 50mA 80V DIP-4P 150%-300%
IC32	SHARP	PC123Y92FZ0F	PHOTO TR 50mA 70V DIP-4P 160%-300%
IC32	TOSHIBA	TLP785F(D4-GRH,F	PHOTO TR 60mA 80V DIP-4P 150%-300%
CX1	HUA	MKP-334K0275AB115S-G	CAP X2 MP PC 275VAC 0.33uF K S15
CX1	HUA	MKP-334K0275AB115S-P	CAP X2 MP PC 275VAC 0.33uF K S15
CX1	EUROPTRONIC	MPX2334K30B15LXD31	CAP X2 MP PC 305VAC 0.33uF K S15
FL1	DELTA	HFV-MP15027	LINE FILTER T16 12.7mH MIN
FL101	DELTA	LFV-MP13171	LINE FILTER T6 1.55uH MIN
T1	DELTA	MV-MP15037	TRANSFORMER MAIN RM10 1000uH +/-5%
C1	NCC	EKMG401ELL680ML25S	CAP AL 400V 68uF M 16*25 P7.5
CY1	MURATA	DE1B3KX221KNHAN99F	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
CY1	WALSIN	YP0AH221K061DASDAB	CAP Y1/X1 CD 250VAC 220pF K B TP VI10

(2) The difference between adapter 2 and adapter 5 as below:

Adapter 2 (model: AD883J20)	Adapter 5 (model: AD883J20)
Type: 010KLF BAH	Type: 010K-3LF

(3) The difference between adapter 3 and adapter 6 as below:

Adapter 3 (model: ADP-65DW B)			
Design No	**MFG TITLE**	**MFG PART**	**DESCRIPTION**
Q1	AUK	SMK0760F	FET 600V 7A 1.2ohm TO-220F-3P
Q1	ST	STP6NK60ZFP	FET 600V 6A 1.2ohm TO-220FP-3P
Q1	TOSHIBA	TK10A60DR(STA4,X)	FET 600V 10A 750mohm TO-220SIS-3P
D101	ST	STPS20S100CT	DIO SBD 20A 100V TO-220AB-3P C.C.
D101	ST	STPS20SM100ST	DIO SBD 20A 100V TO-220AB-3P
D101	ST	STPS30SM100ST	DIO SBD 30A 100V TO-220AB-3P
IC31	ON	DAP022ASN65T1G	IC ASIC PWM CURRENT MODE TSOP-6P SMD
IC131	TI	TL432BIDBZR	IC VOL REF ADJ 2.495V 100mA 0.5%
IC131	NXP	TL431BMFDT	IC VOL REF ADJ 2.495V 100mA 0.5%
IC131	DIODES	AS431ANTR-G1	IC VOL REF ADJ 2.5V 100mA 0.5% SOT-23-3P
IC32	EVERLIGHT	EL816M(Y)(D)-VG	PHOTO TR 50mA 80V DIP-4P 150%-300%
IC32	SHARP	PC123Y92FZ0F	PHOTO TR 50mA 70V DIP-4P 160%-300%
IC32	Renesas	PS2561DL1-1Y-V-A(G)	EOL PHOTO TR 40mA 80V DIP-4P 150%-300%
CX1	EUROPTRONIC	MPX2224K30B15LXD20	CAP X2 MP PC 305VAC 0.22uF K S15
CX1	OKAYA	LE224-MX-30-C3.2	CAP X2 MP PC 300VAC 0.22uF K S15

CX1	HUA	MKP-224K0275AB115S-G	CAP X2 MP PC 275VAC 0.22uF K S15
FL1	DELTA	HFV-MP13202	LINE FILTER T14 14mH MIN
FL101	DELTA	LFV-MP13303	LINE FILTER T10 17uH MIN
T1	DELTA	MV-MP13167	TRANSFORMER MAIN RM10 1mH +/-5%
C1	NICHICON	UPT2G680MHD3	CAP AL 400V 68uF M 16*25 P7.5
C1	NCC	EKMG401ELL680ML25S	CAP AL 400V 68uF M 16*25 P7.5
C1	L-Tec	TYJ2GM680K25O	CAP AL 400V 68uF M 16*25 P7.5
CY1	MURATA	DE1B3KX221KNHAN99F	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
CY1	TDK	CD70-B2GA221KYVK	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
CY1	WALSIN	YP0AH221K061DASDAB	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
Adapter 6 (model: ADP-65DW B)			
Design No	**MFG TITLE**	**MFG PART**	**DESCRIPTION**
Q1	TOSHIBA	TK10A60DR(STA4,X)	FET 600V 10A 750mohm TO-220SIS-3P
Q1	FUJI	FMV11N60ES	FET 600V 11A 750mohm TO-220F-3P
D101	ST	STPS20S100CT	DIO SBD 20A 100V TO-220AB-3P C.C.
D101	ST	STPS20H100CT	DIO SBD 20A 100V TO-220AB-3P C.C.
D101	ST	STPS30H100CT	DIO SBD 30A 100V TO-220AB-3P C.C.
IC31	NeoEnergy	DAP022AT	IC ASIC PWM CURRENT MODE SOT-26-6P SMD
IC131	LITE-ON	LA431OCRPA	IC REGU ADJ 2.495V 100mA 0.4% SOT-23R-3P
IC131	TI	TL432BIDBZR	IC VOL REF ADJ 2.495V 100mA 0.5%
IC131	NXP	TL431BMFDT	IC VOL REF ADJ 2.495V 100mA 0.5%
IC32	EVERLIGHT	EL816M(Y)(D)-VG	PHOTO TR 50mA 80V DIP-4P 150%-300%
IC32	SHARP	PC123Y92FZ0F	PHOTO TR 50mA 70V DIP-4P 160%-300%
IC32	TOSHIBA	TLP785F(D4-GRH,F	PHOTO TR 60mA 80V DIP-4P 150%-300%
CX1	HUA	MKP-334K0275AB115S-G	CAP X2 MP PC 275VAC 0.33uF K S15
CX1	HUA	MKP-334K0275AB115S-P	CAP X2 MP PC 275VAC 0.33uF K S15
CX1	EUROPTRONIC	MPX2334K30B15LXD31	CAP X2 MP PC 305VAC 0.33uF K S15
FL1	DELTA	HFV-MP15027	LINE FILTER T16 12.7mH MIN
FL101	DELTA	LFV-MP13171	LINE FILTER T6 1.55uH MIN
T1	DELTA	MV-MP15037	TRANSFORMER MAIN RM10 1000uH +/-5%
C1	NCC	EKMG401ELL680ML25S	CAP AL 400V 68uF M 16*25 P7.5
CY1	MURATA	DE1B3KX221KNHAN99F	CAP Y1/X1 CD 250VAC 220pF K B TP VI10
CY1	WALSIN	YP0AH221K061DASDAB	CAP Y1/X1 CD 250VAC 220pF K B TP VI10

3.9. Table for Supporting Units

For Test Site No: 03CH01-CB and TH01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E4300	DoC

For Test Site No: CO01-CB

Support Unit	Brand	Model	FCC ID
NB	DELL	E6430	DoC

3.10. 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 4TX/4RX Function:

For 2.4GHz Band

For Non-Beamforming Mode

Test Software Version	Mtool 2.0.2.6					
Mode	Test Frequency (MHz)					
	NCB: 20MHz			NCB: 40MHz		
	2412 MHz	2437 MHz	2462 MHz	2422 MHz	2437 MHz	2452 MHz
802.11b	100	101	98	-	-	-
802.11g	83	98	74	-	-	-
802.11ac MCS0/Nss1 VHT20	80	98	73	-	-	-
802.11ac MCS0/Nss1 VHT40	-	-	-	61	69	55

For Beamforming Mode

Test Software Version	Mtool 2.0.2.6					
Mode	Test Frequency (MHz)					
	NCB: 20MHz			NCB: 40MHz		
	2412 MHz	2437 MHz	2462 MHz	2422 MHz	2437 MHz	2452 MHz
802.11ac MCS0/Nss1 VHT20	81	85	71	-	-	-
802.11ac MCS0/Nss1 VHT40	62	68	56	-	-	-
Mode	Test Frequency (MHz)					
	NCB: 20MHz			NCB: 40MHz		
	2437 MHz			2437 MHz		
802.11ac MCS0/Nss2 VHT20	96			-		
802.11ac MCS0/Nss2 VHT40	-			77		

For 5GHz Band

For Non-Beamforming Mode

Mode	Mtool 2.0.2.6					
	Test Frequency (MHz)					
	NCB: 20MHz			NCB: 40MHz		NCB: 80MHz
	5745 MHz	5785 MHz	5825 MHz	5755 MHz	5795 MHz	5775 MHz
802.11a	97	97	98	-	-	-
802.11ac MCS0/Nss1 VHT20	97	97	97	-	-	-
802.11ac MCS0/Nss1 VHT40	-	-	-	94	97	-
802.11ac MCS0/Nss1 VHT80	-	-	-	-	-	88

For Beamforming Mode

Test Software Version	Mtool 2.0.2.6					
Mode	Test Frequency (MHz)					
	NCB: 20MHz			NCB: 40MHz		NCB: 80MHz
	5745 MHz	5785 MHz	5825 MHz	5755 MHz	5795 MHz	5775 MHz
802.11ac MCS0/Nss1 VHT20	81	81	81	-	-	-
802.11ac MCS0/Nss1 VHT40	-	-	-	81	81	-
802.11ac MCS0/Nss1 VHT80	-	-	-	-	-	80
802.11ac MCS0/Nss2 VHT20	93	93	93	-	-	-
802.11ac MCS0/Nss2 VHT40	-	-	-	93	93	-
802.11ac MCS0/Nss2 VHT80	-	-	-	-	-	92

For 3X/3X Function:

For 2.4GHz and 5GHz Band

Test Software Version	Mtool 2.0.2.6			
Mode	Test Frequency (MHz)			Test Frequency (MHz)
	NCB: 20MHz			NCB: 80MHz
	2412 MHz	2437 MHz	2462 MHz	5775 MHz
802.11ac MCS0/Nss1 VHT20	81	101	76	-
802.11ac MCS0/Nss1 VHT80	-	-	-	90

3.11. Maximum Conducted Output Power for original report

4TX/4RX

For Non-Beamforming Mode

For 2.4GHz Band

Mode	Frequency	Conducted Power (dBm)				
		Chain 1	Chain 2	Chain 3	Chain 4	Total
802.11b	2412 MHz	23.54	23.89	24.12	23.45	29.78
	2437 MHz	23.64	23.76	24.22	23.66	29.85
	2462 MHz	21.65	22.21	22.66	21.94	28.15
802.11g	2412 MHz	20.92	20.58	20.75	20.5	26.71
	2437 MHz	23.59	23.58	23.45	23.88	29.65
	2462 MHz	18.14	18.55	18.22	18.41	24.35
802.11ac MCS0/Nss1 VHT20	2412 MHz	20.07	19.84	19.76	19.94	25.92
	2437 MHz	24.04	23.88	23.92	23.96	29.97
	2462 MHz	17.53	18.62	17.56	17.89	23.94
802.11ac MCS0/Nss1 VHT40	2422 MHz	15.52	15.25	15.43	15.14	21.36
	2437 MHz	17.26	17.01	17.05	16.97	23.09
	2452 MHz	14.13	13.94	13.62	13.71	19.88

For 5GHz Band

Mode	Frequency	Conducted Power (dBm)				
		Chain 1	Chain 2	Chain 3	Chain 4	Total
802.11a	5745 MHz	23.71	23.64	23.93	23.73	29.77
	5785 MHz	23.72	23.71	23.61	24.01	29.79
	5825 MHz	23.83	23.72	23.94	23.79	29.84
802.11ac MCS0/Nss1 VHT20	5745 MHz	23.78	23.67	23.91	23.79	29.81
	5785 MHz	23.83	23.84	23.67	23.92	29.84
	5825 MHz	23.81	23.72	23.93	23.79	29.83
802.11ac MCS0/Nss1 VHT40	5755 MHz	23.21	23.14	23.19	23.25	29.22
	5795 MHz	23.76	23.85	23.93	24.16	29.95
802.11ac MCS0/Nss1 VHT80	5775 MHz	21.63	21.74	21.65	21.84	27.74

For Beamforming Mode

For 2.4GHz Band

Mode	Frequency	Conducted Power (dBm)				
		Chain 1	Chain 2	Chain 3	Chain 4	Total
802.11ac MCS0/Nss1 VHT20	2412 MHz	20.65	20.62	20.53	20.32	26.55
	2437 MHz	21.51	21.48	21.52	21.38	27.49
	2462 MHz	17.68	18.15	17.91	17.62	23.87
802.11ac MCS0/Nss1 VHT40	2422 MHz	15.83	15.92	15.72	15.82	21.84
	2437 MHz	17.23	17.37	17.12	17.18	23.25
	2452 MHz	14.38	14.66	14.32	14.32	20.44
802.11ac MCS0/Nss2 VHT20	2437 MHz	23.91	24.02	23.89	24.01	29.98
802.11ac MCS0/Nss2 VHT40	2437 MHz	19.37	19.68	19.32	19.46	25.48

For 5GHz Band

Mode	Frequency	Conducted Power (dBm)				
		Chain 1	Chain 2	Chain 3	Chain 4	Total
802.11ac MCS0/Nss1 VHT20	5745 MHz	20.36	20.38	20.44	20.42	26.42
	5785 MHz	20.39	20.38	20.43	20.48	26.44
	5825 MHz	20.48	20.45	20.41	20.42	26.46
802.11ac MCS0/Nss1 VHT40	5755 MHz	20.51	20.26	20.65	20.61	26.53
	5795 MHz	20.42	20.40	20.56	20.65	26.53
802.11ac MCS0/Nss1 VHT80	5775 MHz	20.41	20.35	20.37	20.53	26.44
802.11ac MCS0/Nss2 VHT20	5745 MHz	23.28	23.43	23.45	23.61	29.46
	5785 MHz	23.42	23.35	23.32	23.59	29.44
	5825 MHz	23.49	23.42	23.44	23.46	29.47
802.11ac MCS0/Nss2 VHT40	5755 MHz	23.42	23.45	23.48	23.57	29.50
	5795 MHz	23.46	23.38	23.42	23.56	29.48
802.11ac MCS0/Nss2 VHT80	5775 MHz	23.31	23.32	23.46	23.56	29.43

3.12. 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%

3.13. Duty Cycle

For 4TX/4RX Function:

For Non-Beamforming Mode

Band	Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
2.4G	802.11b	1.000	1.000	100.00%	0.00	0.01
	802.11g	2.058	2.080	98.94%	0.05	0.01
	802.11ac MCS0/Nss1 VHT20	1.921	1.944	98.82%	0.05	0.01
	802.11ac MCS0/Nss1 VHT40	0.957	0.979	97.76%	0.10	1.04
5G	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

For Beamforming Mode

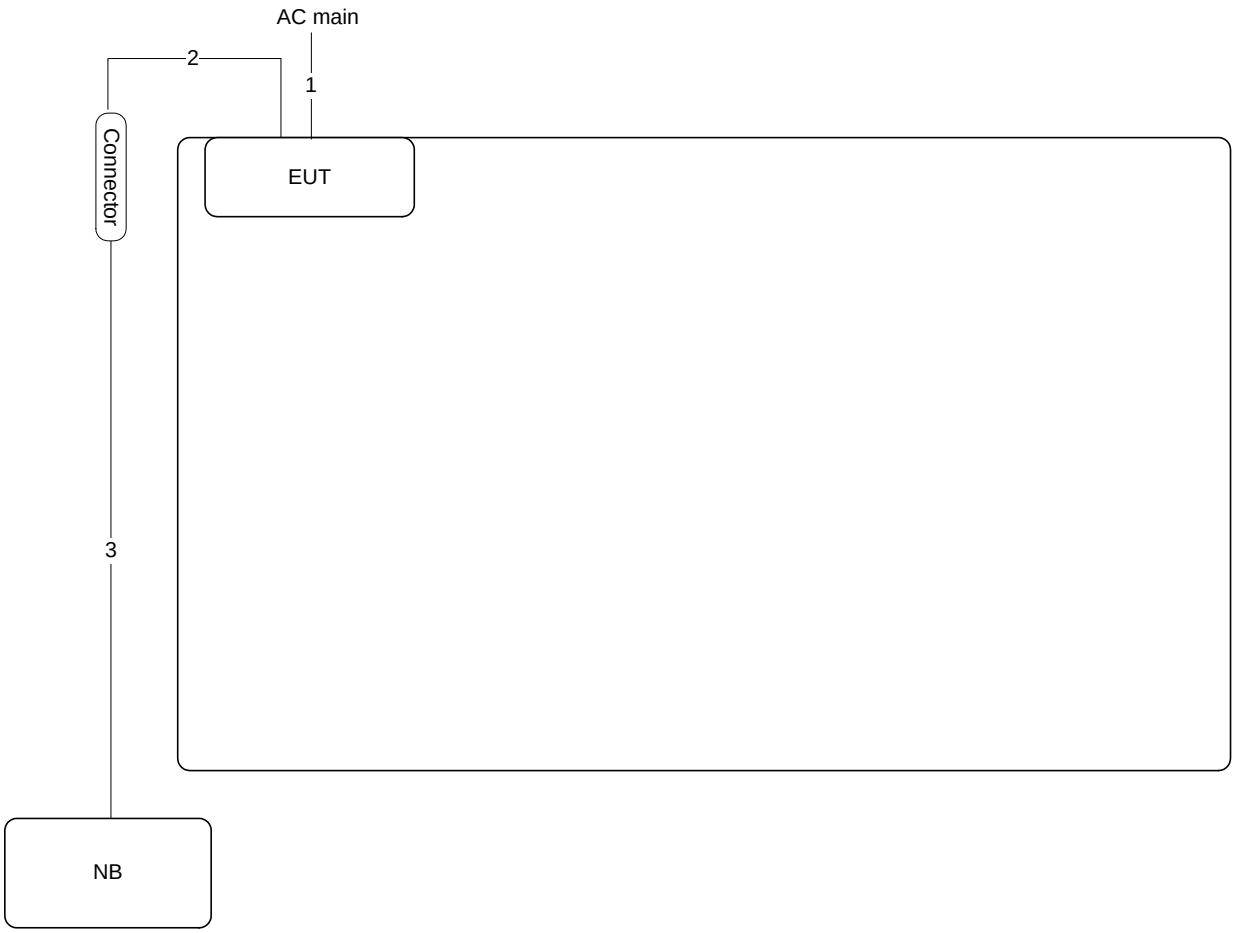
Band	Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
2.4G	802.11ac MCS0/Nss1 VHT20	3.841	4.145	92.66%	0.33	0.26
	802.11ac MCS0/Nss1 VHT40	4.601	5.373	85.65%	0.67	0.22
	802.11ac MCS0/Nss2 VHT20	4.783	5.406	88.47%	0.53	0.21
	802.11ac MCS0/Nss2 VHT40	4.591	4.904	93.62%	0.29	0.22
5G	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
	802.11ac MCS0/Nss2 VHT20	4.788	5.473	87.50%	0.58	0.21
	802.11ac MCS0/Nss2 VHT40	5.044	5.751	87.70%	0.57	0.20
	802.11ac MCS0/Nss2 VHT80	5.797	6.816	85.05%	0.70	0.17

For 3X/3X Function:

Band	Mode	On Time (ms)	On+Off Time (ms)	Duty Cycle (%)	Duty Factor (dB)	1/T Minimum VBW (kHz)
2.4G	802.11n MCS0/Nss1 VHT20	1.928	1.949	98.90%	0.05	0.01
5G	802.11ac MCS0/Nss1 VHT80	1.921	1.944	98.80%	0.05	0.01

3.14. Test Configurations

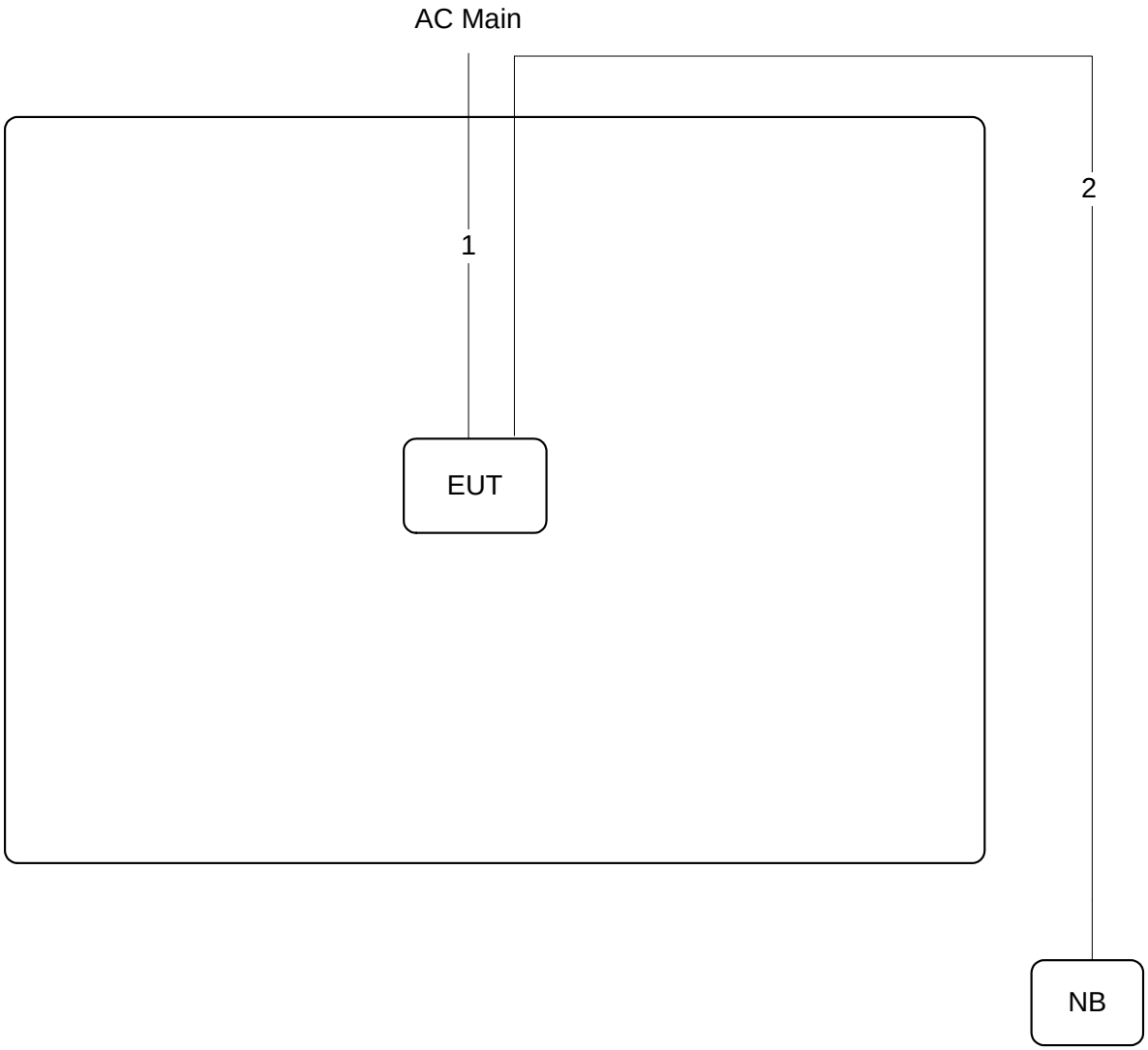
3.14.1. AC Power Line Conduction Emissions Test Configuration



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

3.14.2. Radiation Emissions Test Configuration

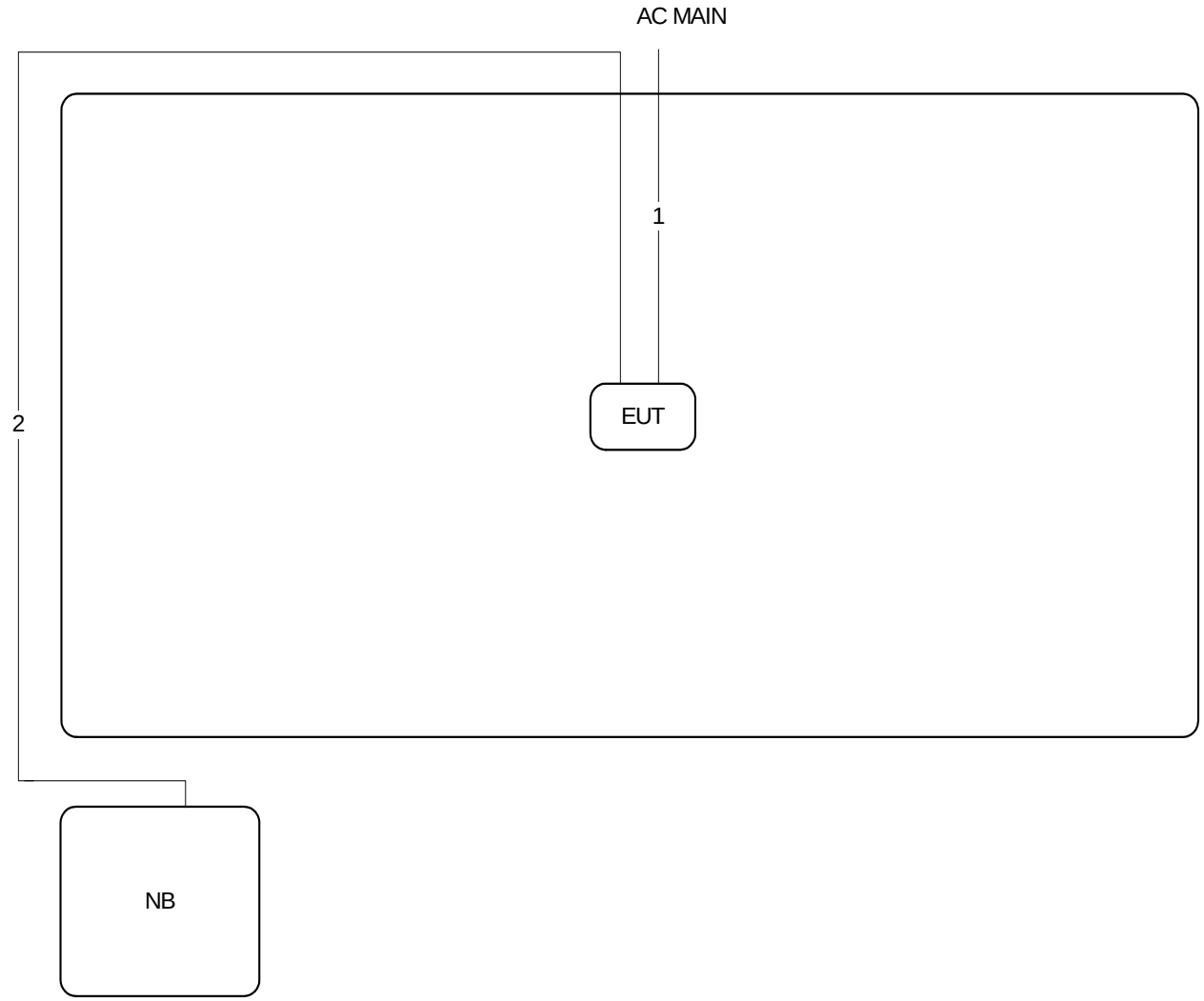
Test Configuration: 30MHz ~1GHz



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

4. TEST RESULT

4.1. AC Power Line Conducted Emissions Measurement

4.1.1. Limit

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

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

4.1.2. Measuring Instruments and Setting

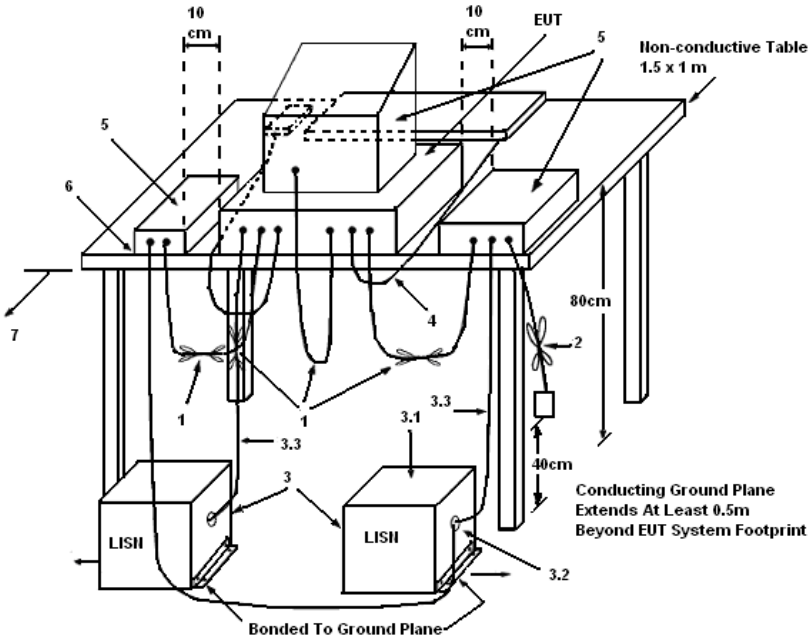
Please refer to section 5 of equipments list in this report. The following table is the setting of the receiver.

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

4.1.3. Test Procedures

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

4.1.4. Test Setup Layout



LEGEND:

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

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

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

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

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

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

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

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

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

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

4.1.5. Test Deviation

There is no deviation with the original standard.

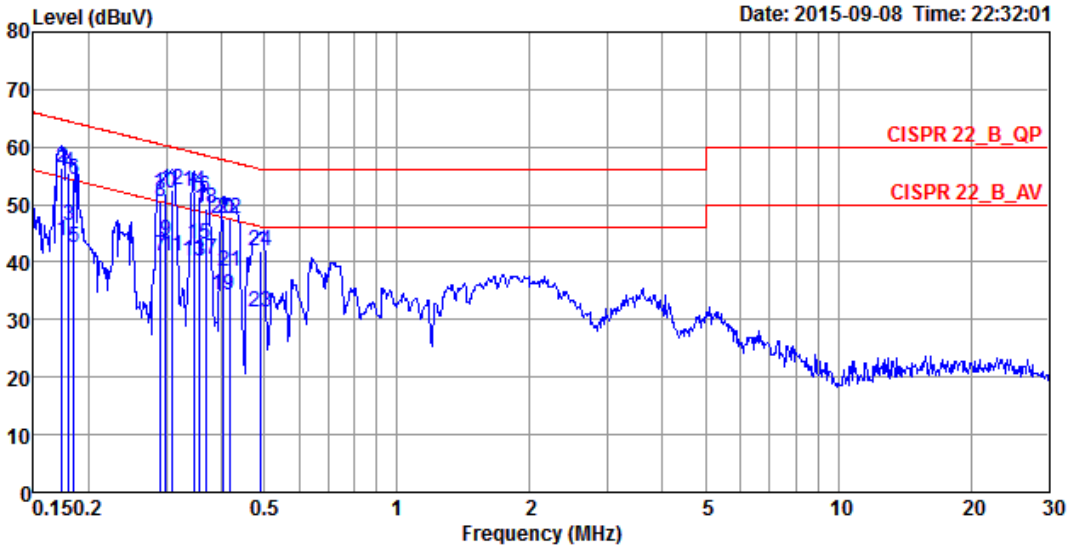
4.1.6. EUT Operation during Test

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

4.1.7. Results of AC Power Line Conducted Emissions Measurement

For adding Adapter 4 ~ 6 test record

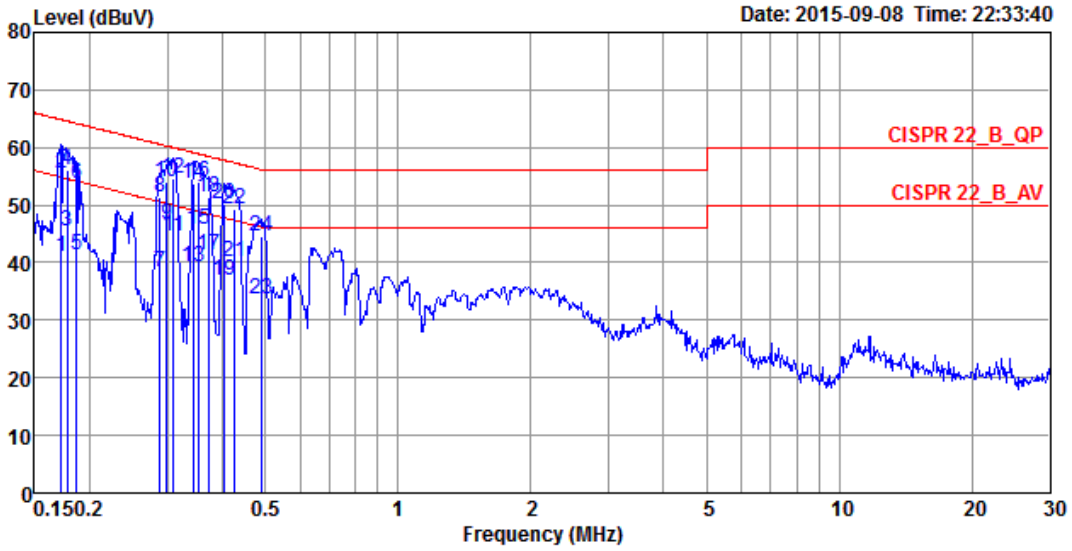
Temperature	25℃	Humidity	56%
Test Engineer	Edison Lin	Phase	Line
Configuration	CTX / Mode 1		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1740	43.73	-11.04	54.77	33.78	9.93	0.02	LINE	Average
2	0.1740	56.35	-8.42	64.77	46.40	9.93	0.02	LINE	QP
3	0.1806	46.34	-8.12	54.46	36.39	9.93	0.02	LINE	Average
4	0.1806	55.56	-8.90	64.46	45.61	9.93	0.02	LINE	QP
5	0.1854	42.64	-11.60	54.24	32.69	9.93	0.02	LINE	Average
6	0.1854	54.20	-10.04	64.24	44.25	9.93	0.02	LINE	QP
7	0.2909	40.91	-9.59	50.50	30.94	9.93	0.04	LINE	Average
8	0.2909	50.49	-10.01	60.50	40.52	9.93	0.04	LINE	QP
9	0.2987	43.74	-6.54	50.28	33.77	9.93	0.04	LINE	Average
10	0.2987	52.04	-8.24	60.28	42.07	9.93	0.04	LINE	QP
11	0.3100	41.15	-8.82	49.97	31.18	9.93	0.04	LINE	Average
12	0.3100	52.53	-7.44	59.97	42.56	9.93	0.04	LINE	QP
13	0.3465	40.23	-8.82	49.05	30.26	9.93	0.04	LINE	Average
14	0.3465	52.30	-6.75	59.05	42.33	9.93	0.04	LINE	QP
15	0.3577	43.12	-5.66	48.78	33.15	9.93	0.04	LINE	Average
16	0.3577	51.47	-7.31	58.78	41.50	9.93	0.04	LINE	QP
17	0.3692	40.57	-7.95	48.52	30.60	9.93	0.04	LINE	Average

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
18	0.3692	49.44	-9.08	58.52	39.47	9.93	0.04	LINE	QP
19	0.4040	34.23	-13.54	47.77	24.26	9.93	0.04	LINE	Average
20	0.4040	47.54	-10.23	57.77	37.57	9.93	0.04	LINE	QP
21	0.4171	38.47	-9.04	47.51	28.50	9.93	0.04	LINE	Average
22	0.4171	47.47	-10.04	57.51	37.50	9.93	0.04	LINE	QP
23	0.4915	31.44	-14.70	46.14	21.46	9.94	0.04	LINE	Average
24	0.4915	41.94	-14.20	56.14	31.96	9.94	0.04	LINE	QP

Temperature	25°C	Humidity	56%
Test Engineer	Edison Lin	Phase	Neutral
Configuration	CTX / Mode 1		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
1	0.1722	41.07	-13.79	54.86	31.27	9.78	0.02	NEUTRAL	Average
2	0.1722	55.44	-9.42	64.86	45.64	9.78	0.02	NEUTRAL	QP
3	0.1777	45.55	-9.04	54.59	35.74	9.79	0.02	NEUTRAL	Average
4	0.1777	56.13	-8.46	64.59	46.32	9.79	0.02	NEUTRAL	QP
5	0.1864	41.41	-12.79	54.20	31.60	9.79	0.02	NEUTRAL	Average
6	0.1864	53.68	-10.52	64.20	43.87	9.79	0.02	NEUTRAL	QP
7	0.2878	38.52	-12.07	50.59	28.69	9.79	0.04	NEUTRAL	Average
8	0.2878	51.33	-9.26	60.59	41.50	9.79	0.04	NEUTRAL	QP
9	0.2987	46.69	-3.59	50.28	36.86	9.79	0.04	NEUTRAL	Average
10	0.2987	54.02	-6.26	60.28	44.19	9.79	0.04	NEUTRAL	QP
11	0.3100	44.64	-5.33	49.97	34.81	9.79	0.04	NEUTRAL	Average
12	0.3100	54.71	-5.26	59.97	44.88	9.79	0.04	NEUTRAL	QP
13	0.3446	39.17	-9.92	49.09	29.34	9.79	0.04	NEUTRAL	Average
14	0.3446	53.75	-5.34	59.09	43.92	9.79	0.04	NEUTRAL	QP
15	0.3539	45.66	-3.21	48.87	35.83	9.79	0.04	NEUTRAL	Average
16	0.3539	54.04	-4.83	58.87	44.21	9.79	0.04	NEUTRAL	QP
17	0.3712	41.26	-7.21	48.47	31.43	9.79	0.04	NEUTRAL	Average

	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Pol/Phase	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB		
18	0.3712	51.34	-7.13	58.47	41.51	9.79	0.04	NEUTRAL	QP
19	0.4040	37.00	-10.77	47.77	27.17	9.79	0.04	NEUTRAL	Average
20	0.4040	50.18	-7.59	57.77	40.35	9.79	0.04	NEUTRAL	QP
21	0.4237	40.15	-7.22	47.37	30.32	9.79	0.04	NEUTRAL	Average
22	0.4237	49.28	-8.09	57.37	39.45	9.79	0.04	NEUTRAL	QP
23	0.4915	33.72	-12.42	46.14	23.89	9.79	0.04	NEUTRAL	Average
24	0.4915	44.47	-11.67	56.14	34.64	9.79	0.04	NEUTRAL	QP

Note:

Level = Read Level + LISN Factor + Cable Loss

4.2. Maximum Conducted Output Power Measurement

4.2.1. Limit

For systems using digital modulation in the 2400-2483.5MHz, the limit for output power is 30dBm. The limited has to be reduced by the amount in dB that the gain of the antenna exceed 6dBi. In case of point-to-point operation, the limit has to be reduced by 1dB for every 3dB that the directional gain of the antenna exceeds 6dBi. Systems operating in the 5725-5850 MHz band that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter output power.

4.2.2. Measuring Instruments and Setting

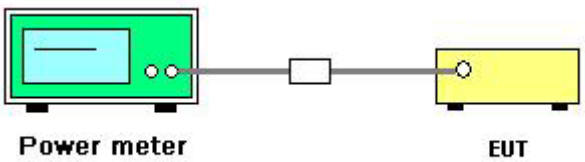
Please refer to section 5 of equipments list in this report. The following table is the setting of the power meter.

Power Meter Parameter	Setting
Detector	Average

4.2.3. Test Procedures

1. Test procedures refer KDB558074 D01 v03r03 section 9.2.3.2 Measurement using a power meter (PM).
2. Multiple antenna system was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
3. This procedure provides an alternative for determining the RMS output power using a broadband RF average power meter with a thermocouple detector.

4.2.4. Test Setup Layout



4.2.5. Test Deviation

There is no deviation with the original standard.

4.2.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.2.7. Test Result of Maximum Conducted Output Power

For adding 3TX/3RX function test record

Temperature	26℃	Humidity	58%
Test Engineer	Peter Wu	Test Date	Oct. 28, 2015

For 2.4GHz Band

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11ac MCS0/Nss1 VHT20	2412 MHz	20.13	20.44	20.02	24.97	30.00	Complies
	2437 MHz	25.26	25.33	24.96	29.96	30.00	Complies
	2462 MHz	18.63	18.97	18.68	23.53	30.00	Complies

For 5GHz Band

Mode	Frequency	Conducted Power (dBm)				Max. Limit (dBm)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11ac MCS0/Nss1 VHT80	5775 MHz	22.58	22.72	22.47	27.36	30.00	Complies

4.3. Power Spectral Density Measurement

4.3.1. Limit

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3 kHz band during any time interval of continuous transmission.

4.3.2. Measuring Instruments and Setting

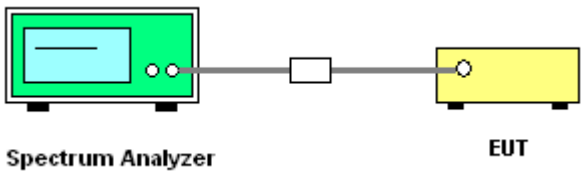
Please refer to section 5 of equipments list in this report. The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	Set the span to 1.5 times the DTS channel bandwidth.
RBW	3 kHz ≤ RBW ≤ 100kHz
VBW	≥ 3 x RBW
Detector	Peak
Trace	Max Hold
Sweep Time	Auto couple

4.3.3. Test Procedures

1. Test was performed in accordance with KDB558074 D01 v03r03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 10.2 Method PKPSD (peak PSD) and KDB 662911 D01 v02r01 section In-Band Power Spectral Density (PSD) Measurements option (b) Measure and sum spectral maximal across the outputs.
2. Use this procedure when the maximum conducted output power in the fundamental emission is used to demonstrate compliance. The EUT must be configured to transmit continuously at full power over the measurement duration.
3. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW (use of a greater number of measurement points than this minimum requirement is recommended).
4. Use the peak marker function to determine the maximum level in any 3 kHz band segment within the fundamental EBW.
5. The resulting PSD level must be ≤ 8 dBm.

4.3.4. Test Setup Layout



4.3.5. Test Deviation

There is no deviation with the original standard.

4.3.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.3.7. Test Result of Power Spectral Density

For adding 3TX/3RX function test record

Temperature	26℃	Humidity	58%
Test Engineer	Peter Wu	Test Date	Oct. 28, 2015

For 2.4GHz Band

Mode	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11ac MCS0/Nss1 VHT20	2412 MHz	-4.78	-4.01	-3.02	0.89	6.98	Complies
	2437 MHz	0.67	1.32	0.48	5.61	6.98	Complies
	2462 MHz	-6.61	-5.71	-5.70	-1.22	6.98	Complies

Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =7.02dBi, so limit=8-(7.02-6)=6.98 dBm/3kHz

For 5GHz Band

Mode	Frequency	Power Density (dBm/3kHz)				Power Density Limit (dBm/3kHz)	Result
		Chain 1	Chain 2	Chain 3	Total		
802.11ac MCS0/Nss1 VHT80	5775 MHz	-8.73	-8.77	-9.36	-4.17	5.86	Complies

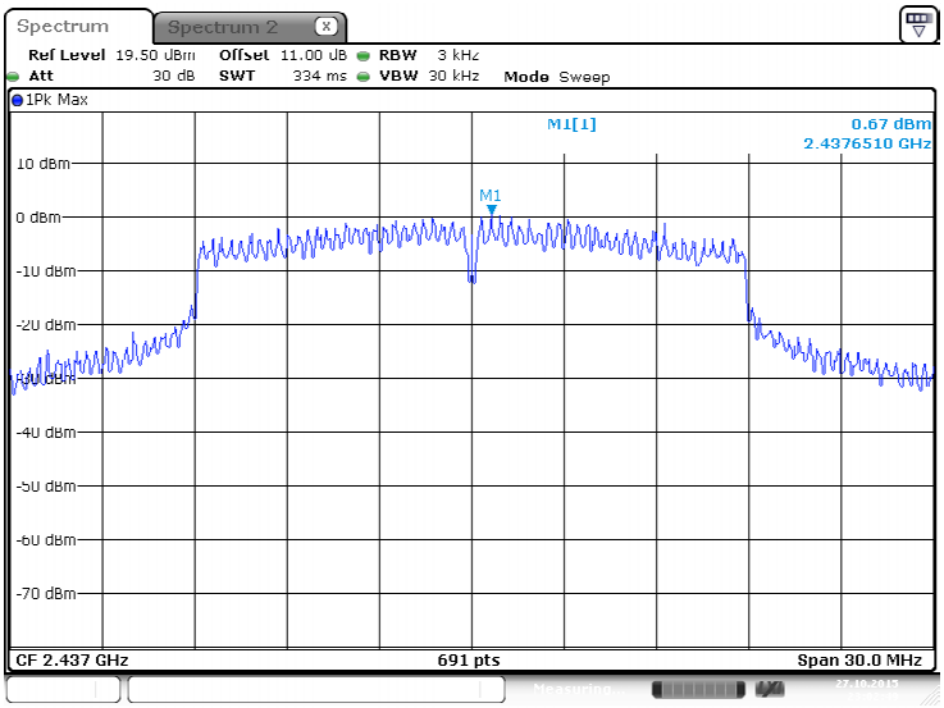
Note: $DirectionalGain = 10 \cdot \log\left[\frac{\sum_{j=1}^{N_{SS}}\left\{\sum_{k=1}^{N_{ANT}} g_{j,k}\right\}^2}{N_{ANT}}\right]$ =8.14dBi, so limit=8-(8.14-6)=5.86 dBm/3kHz

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

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

For 2.4GHz Band

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 2437 MHz / Chain 1



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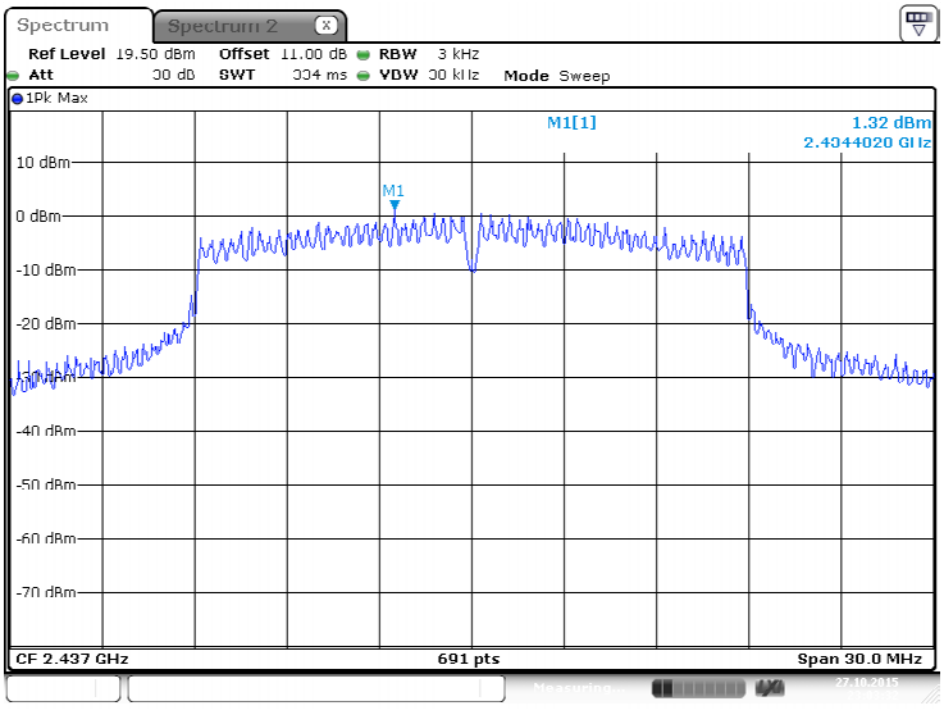
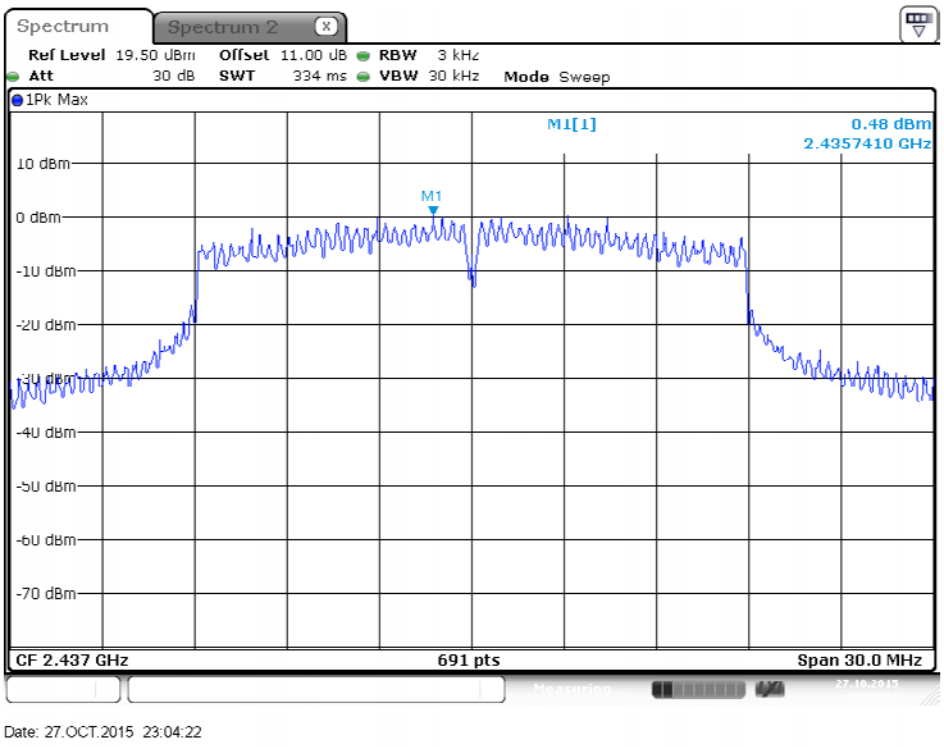
Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 2437 MHz / Chain 2



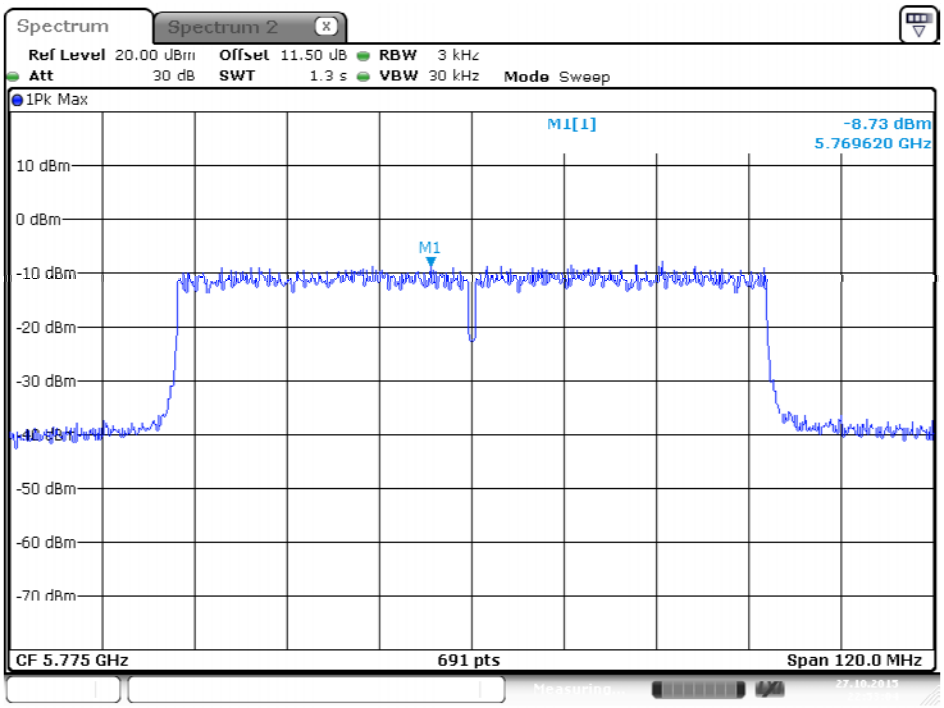
Date: 27.OCT.2015 23:03:32

Power Density Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 2437 MHz / Chain 3



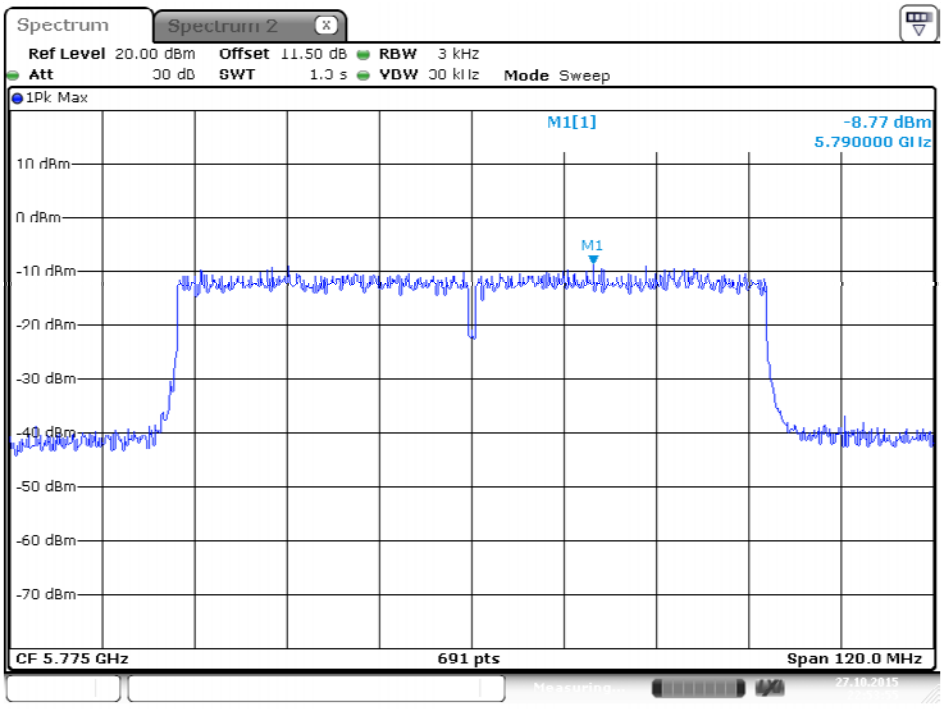
For 5GHz Band

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



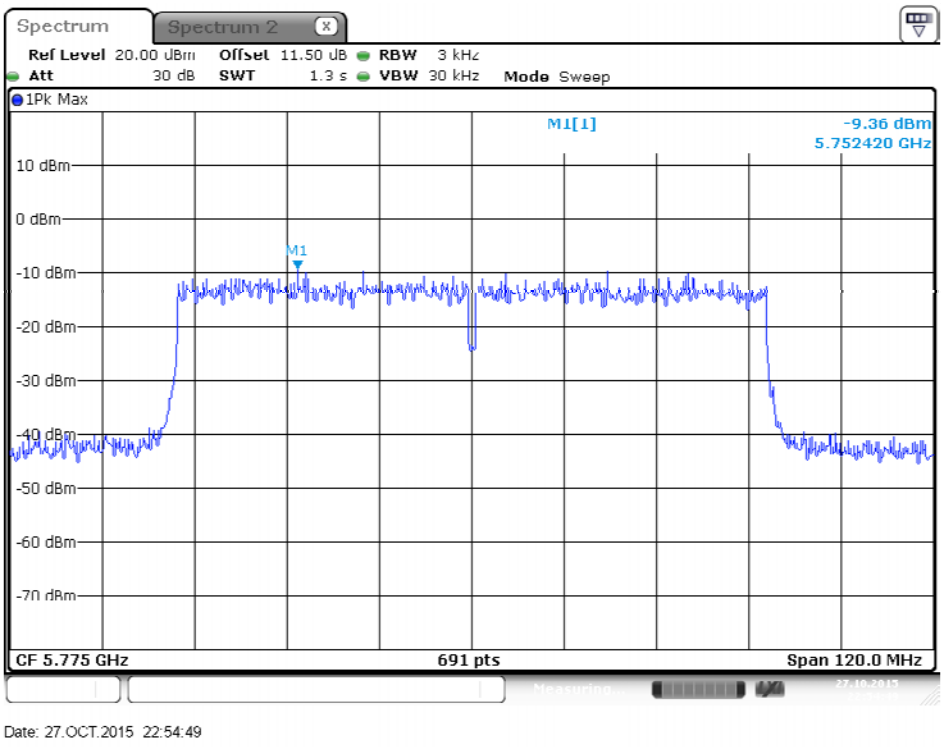
Date: 27.OCT.2015 22:53:04

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



Date: 27.OCT.2015 22:53:56

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



4.4. 6dB Spectrum Bandwidth Measurement

4.4.1. Limit

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

4.4.2. Measuring Instruments and Setting

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

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

4.4.3. Test Procedures

For Radiated 6dB Bandwidth Measurement:

1. The transmitter was radiated to the spectrum analyzer in peak hold mode.
2. Test was performed in accordance with KDB558074 D01 v03r03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) - section 8.0 DTS bandwidth=> 8.1 Option 1.
3. Multiple antenna system was performed in accordance with KDB 662911 D01 v02r01 Emissions Testing of Transmitters with Multiple Outputs in the Same Band.
4. Measured the spectrum width with power higher than 6dB below carrier.

4.4.4. Test Setup Layout

For Radiated 6dB Bandwidth Measurement:

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

4.4.5. Test Deviation

There is no deviation with the original standard.

4.4.6. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

4.4.7. Test Result of 6dB Spectrum Bandwidth

Temperature	26℃	Humidity	58%
Test Engineer	Peter Wu		

For 2.4GHz Band

Mode	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11ac MCS0/Nss1 VHT20	2412 MHz	15.07	17.71	500	Complies
	2437 MHz	15.42	18.23	500	Complies
	2462 MHz	16.64	17.54	500	Complies

For 5GHz Band

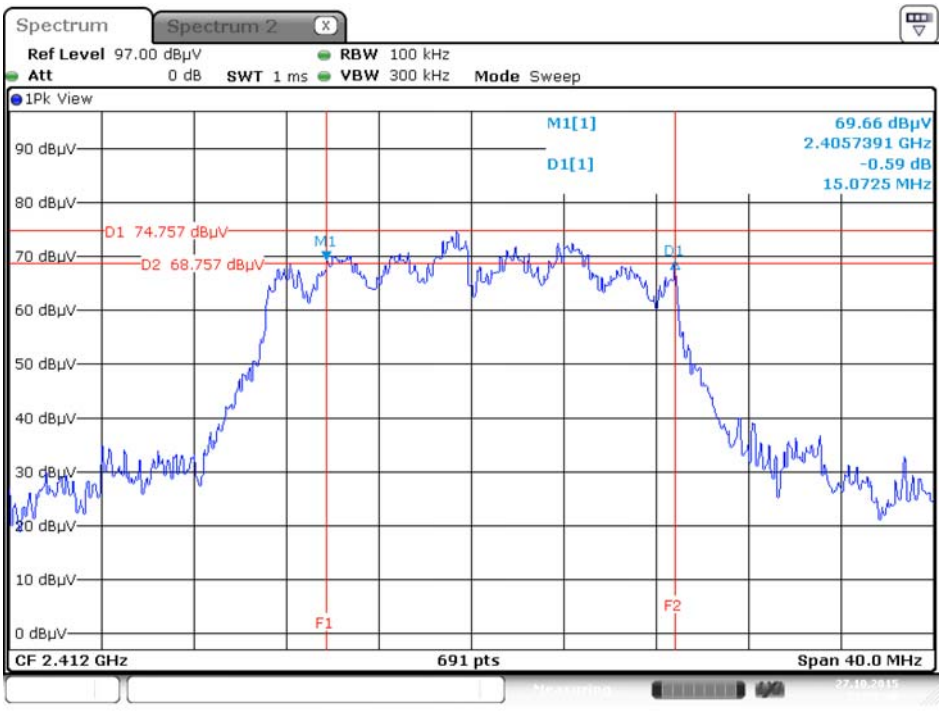
Mode	Frequency	6dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)	Min. Limit (kHz)	Test Result
802.11ac MCS0/Nss1 VHT80	5775 MHz	76.23	76.99	500	Complies

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

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

For 2.4GHz Band

6 dB Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 2412 MHz / Chain 1 + Chain 2 + Chain 3



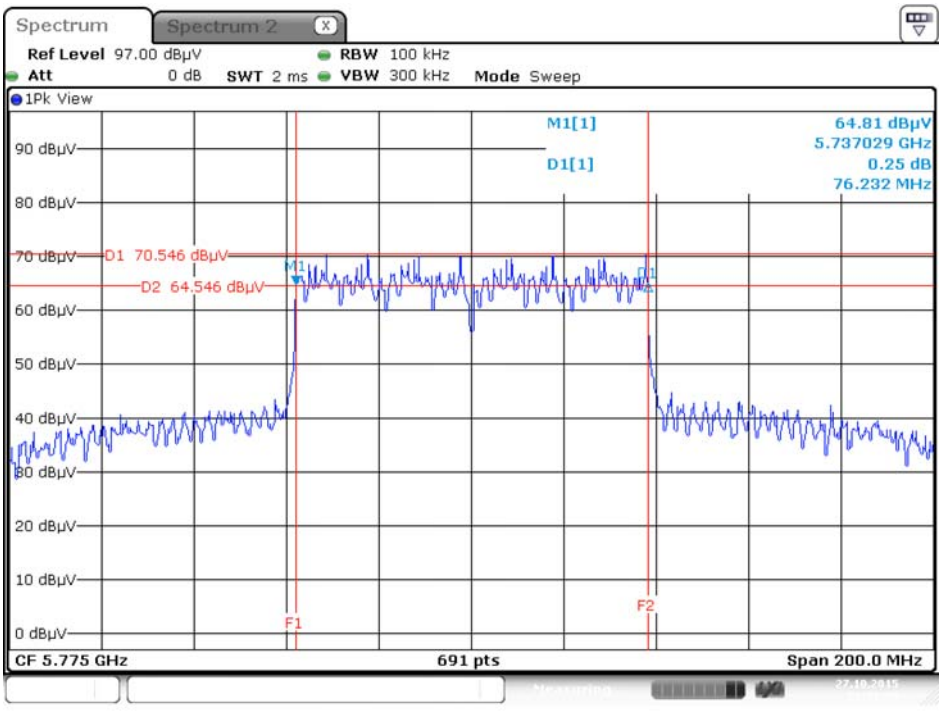
Date: 27.OCT.2015 23:58:47

99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / 2437 MHz / Chain 1 + Chain 2 + Chain 3

Date: 27.OCT.2015 23:12:35

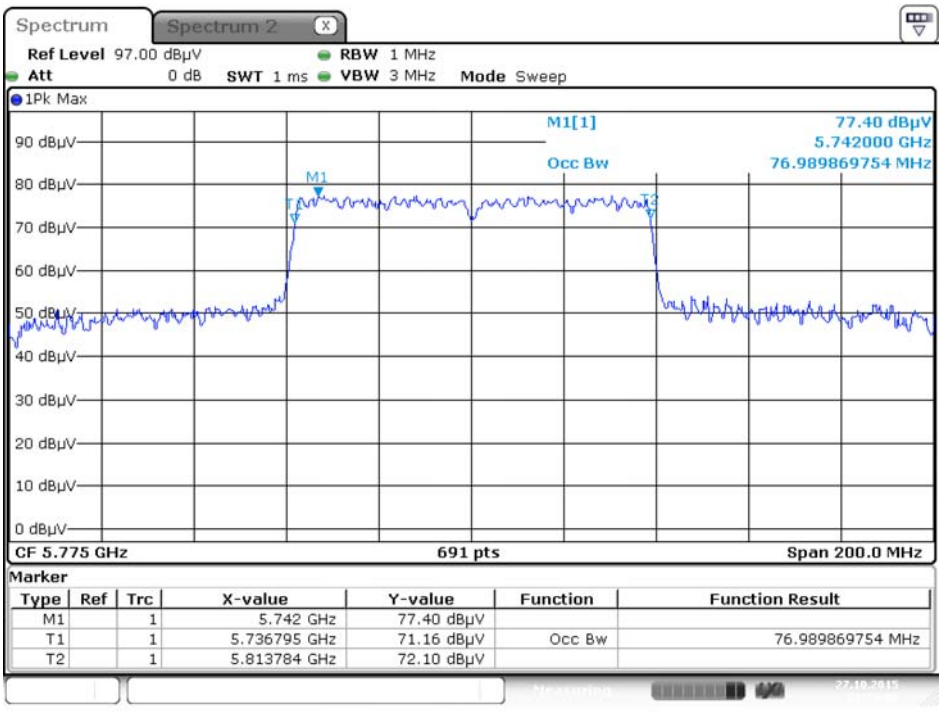
For 5GHz Band

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



Date: 27.OCT.2015 23:51:29

99% Occupied Bandwidth Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT80 / 5775 MHz / Chain 1 + Chain 2 + Chain 3



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4.5. Radiated Emissions Measurement

4.5.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

4.5.2. Measuring Instruments and Setting

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

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

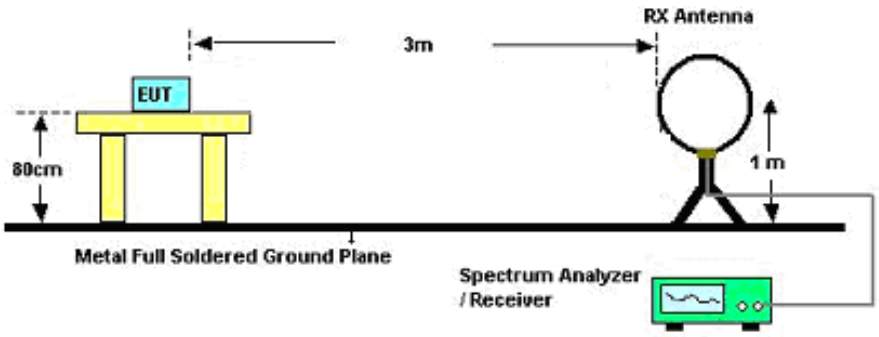
Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RBW 200Hz for QP
Start ~ Stop Frequency	150kHz~30MHz / RBW 9kHz for QP
Start ~ Stop Frequency	30MHz~1GHz / RBW 120kHz for QP

4.5.3. Test Procedures

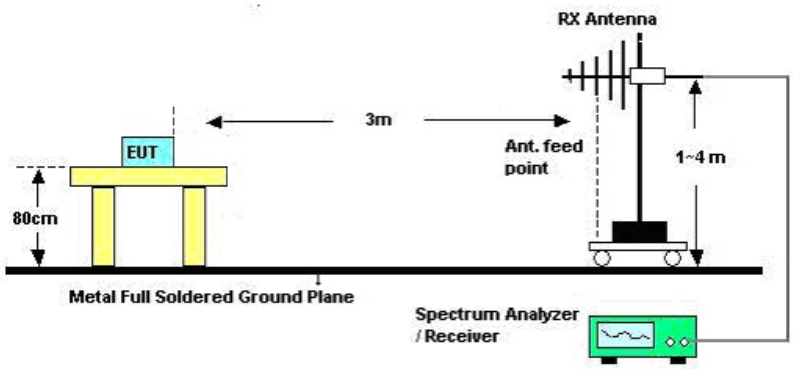
1. Configure the EUT according to ANSI C63.10. The EUT was placed on the top of the turntable 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 1m & 3m far away from the turntable.
2. Power on the EUT and all the supporting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

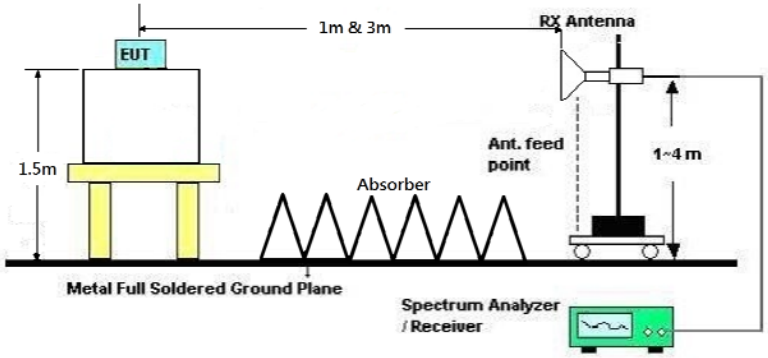
For Radiated Emissions: 9kHz ~30MHz



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)

For adding Adapter 4 ~ 6 and Second Red, Black Heat sink test record

Temperature	26°C	Humidity	55%
Test Engineer	Eric Fu	Configurations	CTX / Mode 1
Test Date	Jul. 07, 2015		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

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

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

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

For EUT Rev 5.01 test record

Temperature	24°C	Humidity	55%
Test Engineer	Gary Chu	Configurations	CTX / Mode 2
Test Date	Aug. 25, 2015		

Freq. (MHz)	Level (dBuV)	Over Limit (dB)	Limit Line (dBuV)	Remark
-	-	-	-	See Note

Note:

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

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

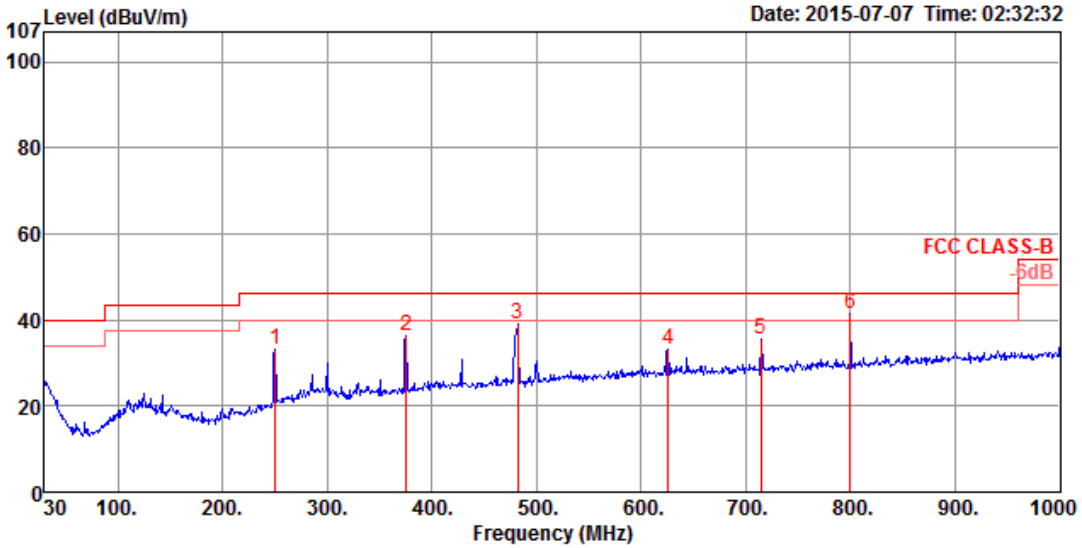
Limit line = specific limits (dBuV) + distance extrapolation factor.

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

For adding Adapter 4 ~ 6 and Second Red, Black Heat sink test record

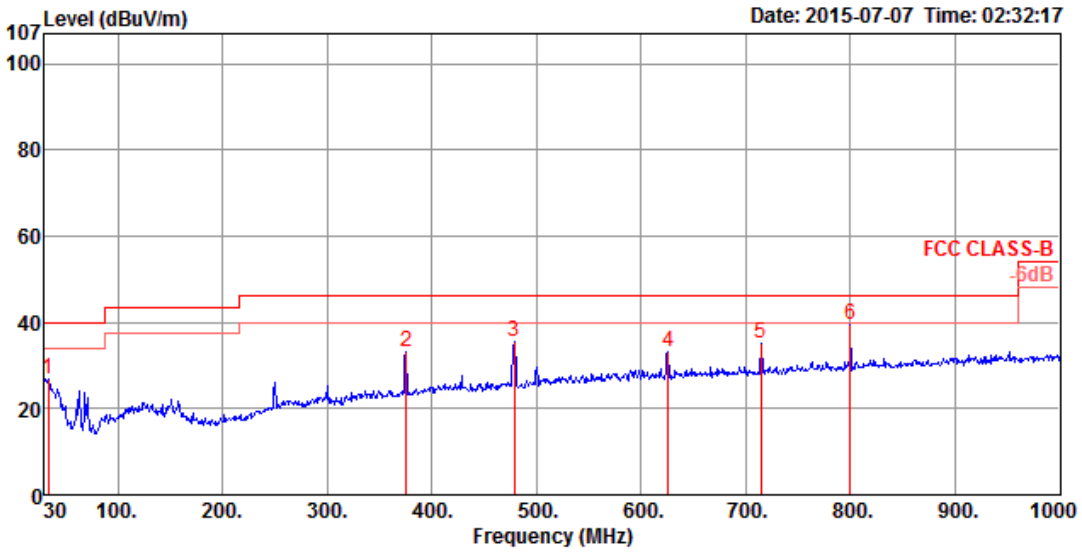
Temperature	26°C	Humidity	55%
Test Engineer	Eric Fu	Configurations	CTX / Mode 1

Horizontal



	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	250.19	33.26	46.00	-12.74	51.22	13.00	1.57	32.53	150	189	HORIZONTAL	Peak
2	375.32	36.39	46.00	-9.61	51.07	15.93	1.93	32.54	100	185	HORIZONTAL	Peak
3	482.02	39.01	46.00	-6.99	51.87	17.57	2.17	32.60	100	100	HORIZONTAL	Peak
4	625.58	33.14	46.00	-12.86	44.09	19.26	2.46	32.67	150	211	HORIZONTAL	Peak
5	714.82	35.73	46.00	-10.27	45.80	19.85	2.64	32.56	150	121	HORIZONTAL	Peak
6	800.18	41.32	46.00	-4.68	50.30	20.60	2.81	32.39	125	219	HORIZONTAL	Peak

Vertical



	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	33.88	26.97	40.00	-13.03	41.41	17.61	0.59	32.64	100	332	VERTICAL	Peak
2	375.32	33.18	46.00	-12.82	47.86	15.93	1.93	32.54	150	290	VERTICAL	Peak
3	479.11	35.38	46.00	-10.62	48.29	17.52	2.17	32.60	100	249	VERTICAL	Peak
4	625.58	33.26	46.00	-12.74	44.21	19.26	2.46	32.67	125	135	VERTICAL	Peak
5	714.82	35.30	46.00	-10.70	45.37	19.85	2.64	32.56	200	359	VERTICAL	Peak
6	800.18	39.31	46.00	-6.69	48.29	20.60	2.81	32.39	100	23	VERTICAL	Peak

Note:

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

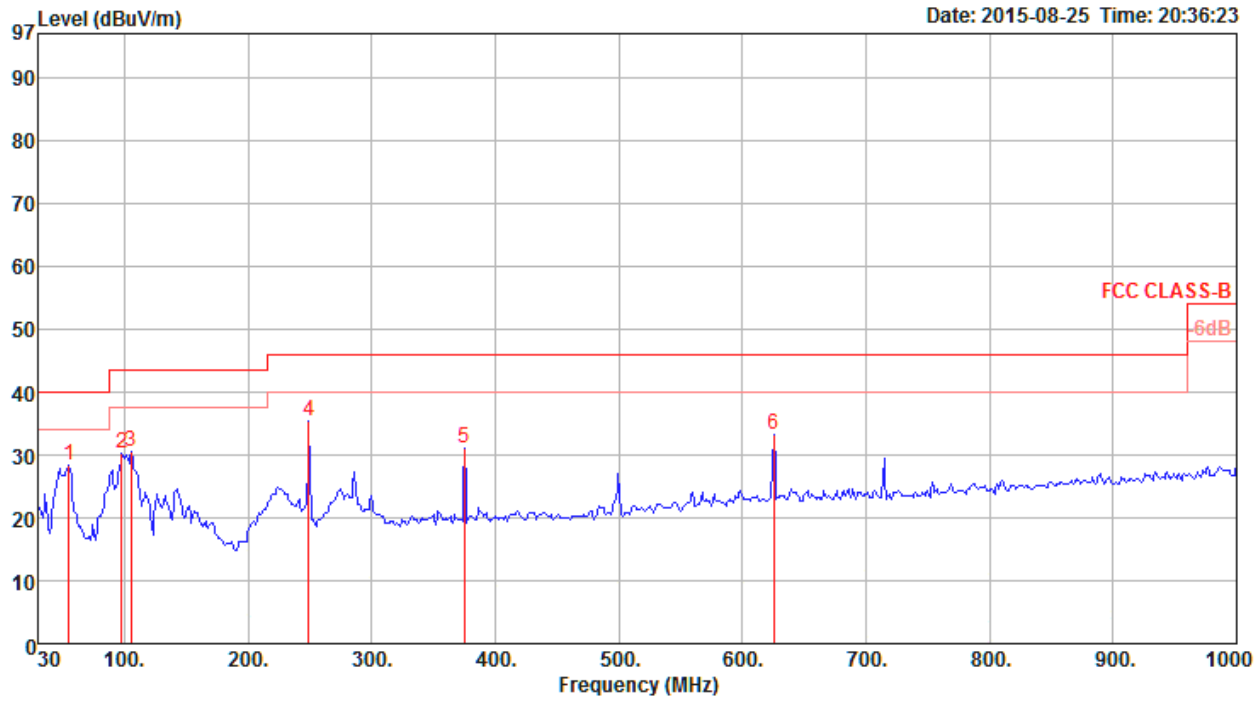
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

For EUT Rev 5.01 test record

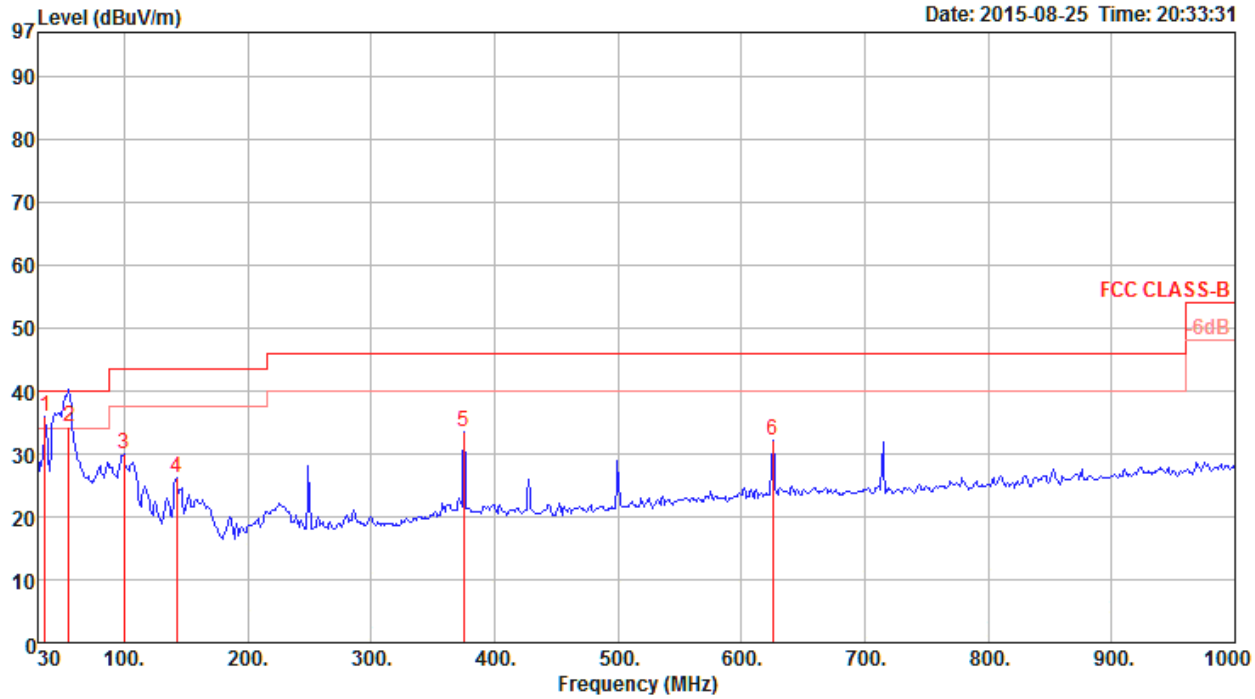
Temperature	24°C	Humidity	55%
Test Engineer	Gary Chu	Configurations	CTX / Mode 2

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	55.22	28.43	40.00	-11.57	49.30	0.67	7.90	29.44	360	150	Peak	HORIZONTAL
2	97.90	30.25	43.50	-13.25	47.81	0.84	10.88	29.28	360	150	Peak	HORIZONTAL
3	105.66	30.45	43.50	-13.05	46.72	0.89	12.08	29.24	360	150	Peak	HORIZONTAL
4	249.22	35.28	46.00	-10.72	49.70	1.32	12.84	28.58	360	150	Peak	HORIZONTAL
5	375.32	31.11	46.00	-14.89	42.44	1.58	15.96	28.87	360	150	Peak	HORIZONTAL
6	625.58	33.36	46.00	-12.64	40.74	2.02	19.71	29.11	360	150	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	35.82	35.91	40.00	-4.09	48.62	0.61	16.18	29.50	0	150	Peak	VERTICAL
2	55.22	34.18	40.00	-5.82	55.05	0.67	7.90	29.44	24	147	QP	VERTICAL
3	99.84	29.90	43.50	-13.60	47.02	0.85	11.30	29.27	0	150	Peak	VERTICAL
4	142.52	26.25	43.50	-17.25	42.47	1.01	11.85	29.08	0	150	Peak	VERTICAL
5	375.32	33.43	46.00	-12.57	44.76	1.58	15.96	28.87	0	150	Peak	VERTICAL
6	625.58	32.20	46.00	-13.80	39.58	2.02	19.71	29.11	0	150	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~10th Harmonic)

For adding Second Red, Black Heat sink test record

For Non-Beamforming Mode

Temperature	26℃	Humidity	55%
Test Engineer	Eric Fu	Configurations	IEEE 802.11b CH 6 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Jul. 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4873.94	38.04	54.00	-15.96	32.78	31.18	7.09	33.01	215	14	HORIZONTAL	Average
2	4874.04	47.93	74.00	-26.07	42.67	31.18	7.09	33.01	215	14	HORIZONTAL	Peak
3	7310.52	54.40	74.00	-19.60	43.67	36.05	8.86	34.18	146	360	HORIZONTAL	Peak
4	7311.75	41.14	54.00	-12.86	30.41	36.05	8.86	34.18	146	360	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4874.00	50.67	74.00	-23.33	45.41	31.18	7.09	33.01	100	302	VERTICAL	Peak
2	4874.00	43.87	54.00	-10.13	38.61	31.18	7.09	33.01	100	302	VERTICAL	Average
3	7310.20	45.84	54.00	-8.16	35.11	36.05	8.86	34.18	223	51	VERTICAL	Average
4	7311.06	55.52	74.00	-18.48	44.79	36.05	8.86	34.18	223	51	VERTICAL	Peak

Temperature	26℃	Humidity	55%
Test Engineer	Eric Fu	Configurations	IEEE 802.11g CH 1 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Jul. 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4821.97	46.00	74.00	-28.00	40.90	31.08	7.05	33.03	152	62	HORIZONTAL	Peak
2	4825.72	32.82	54.00	-21.18	27.68	31.11	7.06	33.03	152	62	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4823.47	45.68	74.00	-28.32	40.58	31.08	7.05	33.03	157	343	VERTICAL	Peak
2	4824.49	32.93	54.00	-21.07	27.83	31.08	7.05	33.03	157	343	VERTICAL	Average

Temperature	26℃	Humidity	55%
Test Engineer	Eric Fu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 11 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Jul. 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4921.87	45.68	74.00	-28.32	48.10	31.25	0.00	33.67	157	249	HORIZONTAL	Peak
2	4922.52	32.41	54.00	-21.59	34.83	31.25	0.00	33.67	157	249	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4925.35	32.50	54.00	-21.50	27.07	31.28	7.13	32.98	166	330	VERTICAL	Average
2	4925.91	45.81	74.00	-28.19	40.38	31.28	7.13	32.98	166	330	VERTICAL	Peak

Temperature	26℃	Humidity	55%
Test Engineer	Eric Fu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT40 CH 3 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Jul. 06, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4899.73	33.07	54.00	-20.93	27.72	31.23	7.11	32.99	160	328	HORIZONTAL	Average
2	4902.83	46.36	74.00	-27.64	41.01	31.23	7.11	32.99	160	328	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	4900.04	33.11	54.00	-20.89	27.76	31.23	7.11	32.99	152	56	VERTICAL	Average
2	4902.47	45.96	74.00	-28.04	40.61	31.23	7.11	32.99	152	56	VERTICAL	Peak

Temperature	26℃	Humidity	55%
Test Engineer	Eric Fu	Configurations	IEEE 802.11a CH 149 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Jul. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11489.50	45.78	54.00	-8.22	30.08	39.90	11.03	35.23	191	274	HORIZONTAL	Average
2	11490.34	58.88	74.00	-15.12	43.18	39.90	11.03	35.23	191	274	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11489.29	45.60	54.00	-8.40	29.90	39.90	11.03	35.23	182	200	VERTICAL	Average
2	11490.85	58.57	74.00	-15.43	42.87	39.90	11.03	35.23	182	200	VERTICAL	Peak

Temperature	26℃	Humidity	55%
Test Engineer	Eric Fu	Configurations	IEEE 802.11a CH 157 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Jul. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11570.25	58.74	74.00	-15.26	43.13	39.77	11.07	35.23	166	162	HORIZONTAL	Peak
2	11570.51	45.64	54.00	-8.36	30.03	39.77	11.07	35.23	166	162	HORIZONTAL	Average

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11570.46	45.60	54.00	-8.40	29.99	39.77	11.07	35.23	173	118	VERTICAL	Average
2	11570.78	59.01	74.00	-14.99	43.40	39.77	11.07	35.23	173	118	VERTICAL	Peak

Temperature	26℃	Humidity	55%
Test Engineer	Eric Fu	Configurations	IEEE 802.11a CH 165 / Chain 1 + Chain 2 + Chain 3+ Chain 4
Test Date	Jul. 07, 2015		

Horizontal

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11650.21	45.78	54.00	-8.22	30.27	39.63	11.10	35.22	184	135	HORIZONTAL	Average
2	11650.82	59.11	74.00	-14.89	43.66	39.57	11.10	35.22	184	135	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Antenna Factor	Cable Loss	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m	dB	dB	cm	deg		
1	11649.50	45.82	54.00	-8.18	30.31	39.63	11.10	35.22	197	278	VERTICAL	Average
2	11650.66	59.45	74.00	-14.55	43.94	39.63	11.10	35.22	197	278	VERTICAL	Peak

Note:

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

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

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

For adding 3TX/3RX function test record

Temperature	24°C	Humidity	58%
Test Engineer	Roki Liu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 1 / Chain 1 + Chain 2 + Chain 3
Test Date	Oct. 23, 2015 ~ Oct. 28, 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	4821.55	32.93	54.00	-21.07	28.66	6.11	32.55	34.39	150	166	HORIZONTAL	Average
2	4821.90	46.20	74.00	-27.80	41.93	6.11	32.55	34.39	150	166	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	4823.34	33.11	54.00	-20.89	28.84	6.11	32.55	34.39	150	99	VERTICAL	Average
2	4824.83	46.39	74.00	-27.61	42.12	6.11	32.55	34.39	150	99	VERTICAL	Peak

Temperature	24°C	Humidity	58%
Test Engineer	Roki Liu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 6 / Chain 1 + Chain 2 + Chain 3
Test Date	Oct. 23, 2015 ~ Oct. 28, 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	4875.35	33.99	54.00	-20.01	29.57	6.14	32.66	34.38	150	239	HORIZONTAL	Average
2	4875.63	47.21	74.00	-26.79	42.79	6.14	32.66	34.38	150	239	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	4872.63	50.92	74.00	-23.08	46.52	6.12	32.66	34.38	147	92	VERTICAL	Peak
2	4872.99	36.29	54.00	-17.71	31.89	6.12	32.66	34.38	147	92	VERTICAL	Average

Temperature	24°C	Humidity	58%
Test Engineer	Roki Liu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 11 / Chain 1 + Chain 2 + Chain 3
Test Date	Oct. 23, 2015 ~ Oct. 28, 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	4921.74	33.23	54.00	-20.77	28.70	6.16	32.74	34.37	150	27	HORIZONTAL	Average
2	4925.52	46.41	74.00	-27.59	41.84	6.18	32.76	34.37	150	27	HORIZONTAL	Peak

Vertical

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	4924.59	46.40	74.00	-27.60	41.85	6.16	32.76	34.37	148	62	VERTICAL	Peak
2	4924.73	33.43	54.00	-20.57	28.88	6.16	32.76	34.37	148	62	VERTICAL	Average

Temperature	24℃	Humidity	58%
Test Engineer	Roki Liu	Configurations	IEEE 802.11ac MCS0/Nss1 VHT80 CH 155 / Chain 1 + Chain 2 + Chain 3
Test Date	Oct. 23, 2015 ~ Oct. 28, 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	11549.26	44.65	54.00	-9.35	30.19	9.64	39.19	34.37	150	252	HORIZONTAL	Average
2	11550.12	58.04	74.00	-15.96	43.58	9.64	39.19	34.37	150	252	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	11548.50	44.86	54.00	-9.14	30.40	9.64	39.19	34.37	150	191	VERTICAL	Average
2	11550.91	58.20	74.00	-15.80	43.76	9.64	39.17	34.37	150	191	VERTICAL	Peak

Note:

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

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

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

4.6. Emissions Measurement

4.6.1. Limit

30dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

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

4.6.2. Measuring Instruments and Setting

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

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	100 MHz
RBW / VBW (Emission in restricted band)	1MHz / 3MHz for Peak, 1MHz / 1/T for Average
RBW / VBW (30dBc in any 100 kHz bandwidth emission)	100 kHz / 300 kHz for Peak

4.6.3. Test Procedures

For Radiated band edges Measurement:

1. The test procedure is the same as section 4.5.3, only the frequency range investigated is limited to 100MHz around band edges.

For Radiated Out of Band Emission Measurement:

1. Test was performed in accordance with KDB558074 D01 v03r03 for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 section 10.1 Unwanted Emissions into Non-Restricted Frequency Bands Measurement Procedure

4.6.4. Test Setup Layout

For Radiated band edges Measurement:

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

For Radiated Out of Band Emission Measurement:

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

4.6.5. Test Deviation

There is no deviation with the original standard.

4.6.6. EUT Operation during Test

For Non-beamforming mode:

The EUT was programmed to be in continuously transmitting mode.

For Beamforming mode:

The EUT was programmed to be in beamforming transmitting mode.

4.6.7. Test Result of Band Edge and Fundamental Emissions

For adding 3TX/3RX function test record

Temperature	26°C	Humidity	55%
Test Engineer	Gino Huang	Configurations	IEEE 802.11ac MCS0/Nss1 VHT20 CH 1, 6, 11 / Chain 1 + Chain 2 + Chain 3
Test date	May 05, 2015, May 09, 2015		

Channel 1

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2388.60	53.64	54.00	-0.36	21.74	3.98	27.92	0.00	173	206	VERTICAL	Average
2	2389.20	73.58	74.00	-0.42	41.68	3.98	27.92	0.00	173	206	VERTICAL	Peak
3	2413.20	110.67			78.77	4.01	27.89	0.00	173	206	VERTICAL	Average
4	2413.40	121.52			89.62	4.01	27.89	0.00	173	206	VERTICAL	Peak

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

Channel 6

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2390.00	51.54	54.00	-2.46	19.64	3.98	27.92	0.00	173	185	VERTICAL	Average
2	2390.00	66.95	74.00	-7.05	35.05	3.98	27.92	0.00	173	185	VERTICAL	Peak
3	2435.00	114.36			82.45	4.04	27.87	0.00	173	185	VERTICAL	Average
4	2435.00	125.45			93.54	4.04	27.87	0.00	173	185	VERTICAL	Peak

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

Channel 11

	Freq	Level	Limit Line	Over Limit	Read Level	Cable Loss	Antenna Factor	Preamp Factor	A/Pos	T/Pos	Pol/Phase	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg		
1	2463.20	107.65			75.75	4.06	27.84	0.00	170	205	VERTICAL	Average
2	2463.20	119.40			87.50	4.06	27.84	0.00	170	205	VERTICAL	Peak
3	2483.50	53.89	54.00	-0.11	22.01	4.06	27.82	0.00	170	205	VERTICAL	Average
4	2484.10	71.73	74.00	-2.27	39.85	4.06	27.82	0.00	170	205	VERTICAL	Peak

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

Note:

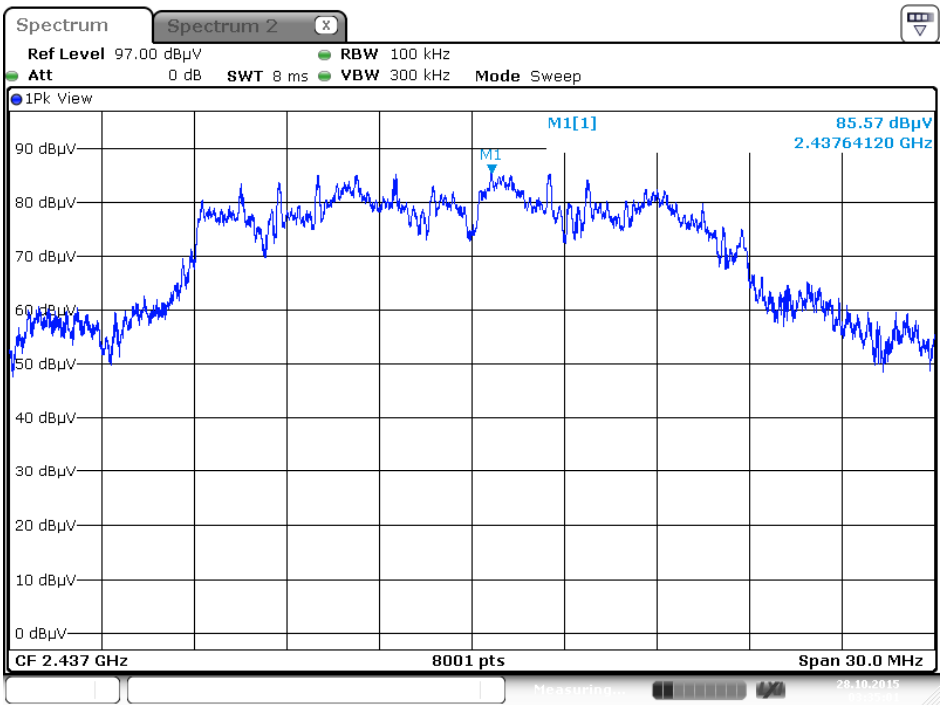
Emission level (dBuV/m) = 20 log Emission level (uV/m).

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

For Emission not in Restricted Band

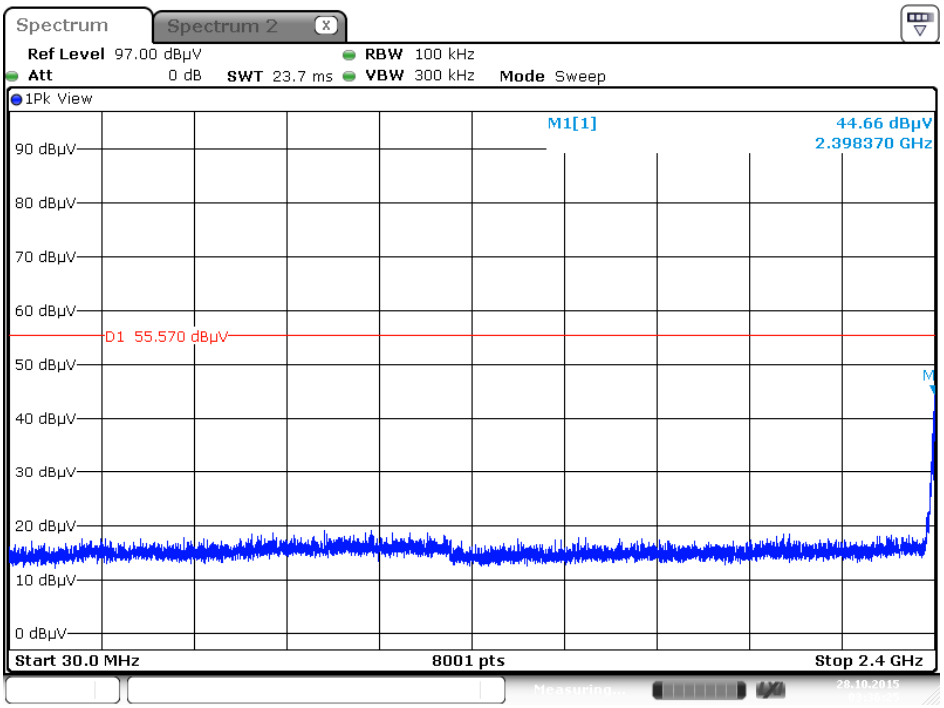
For 2.4G Band

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



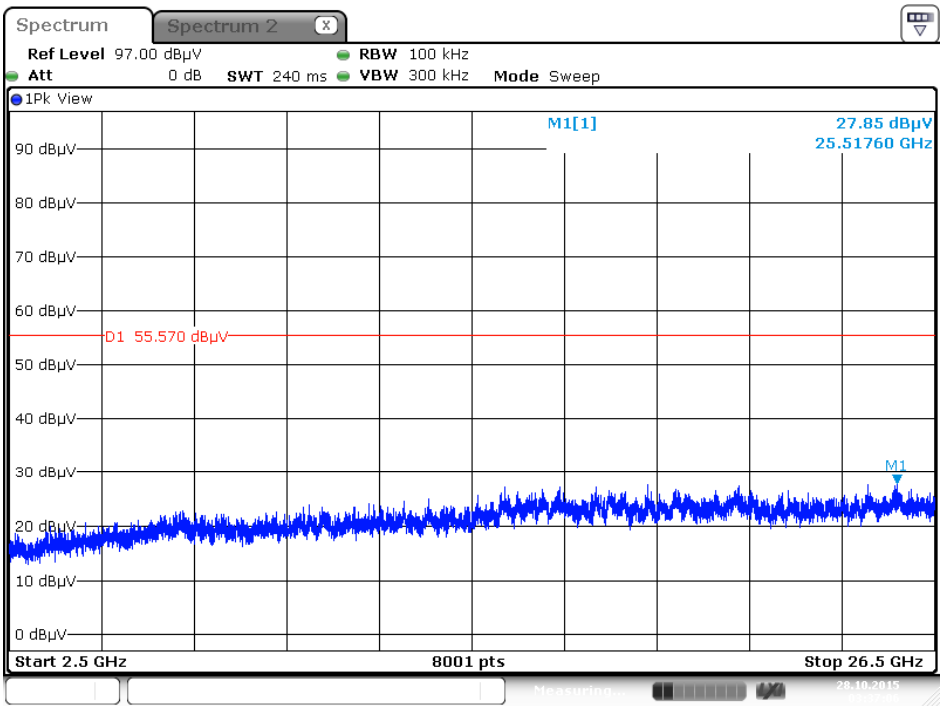
Date: 28.OCT.2015 03:35:01

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



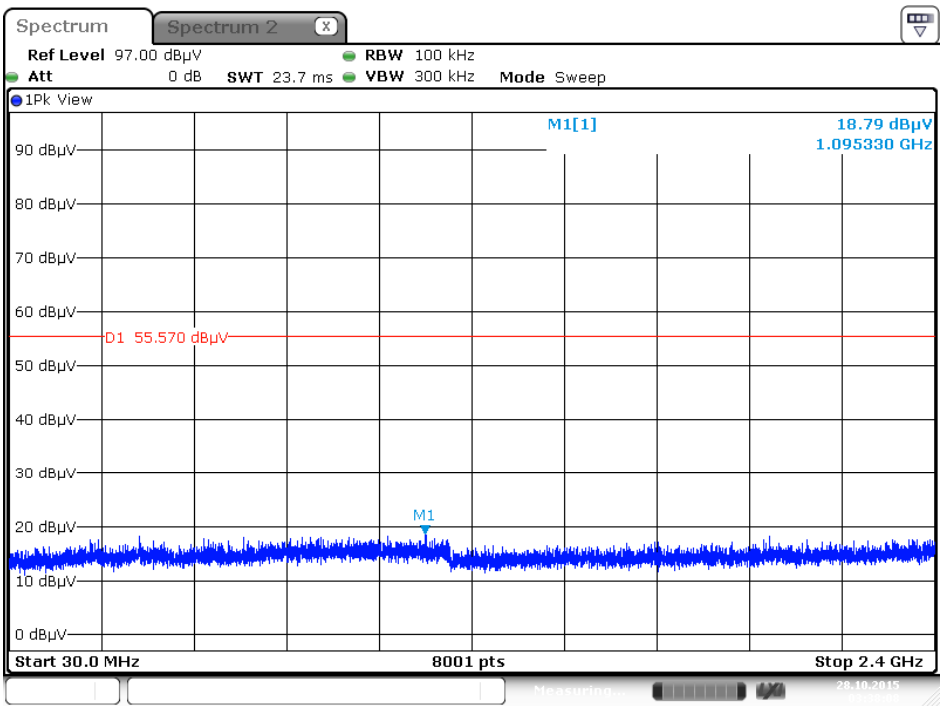
Date: 28.OCT.2015 03:36:25

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



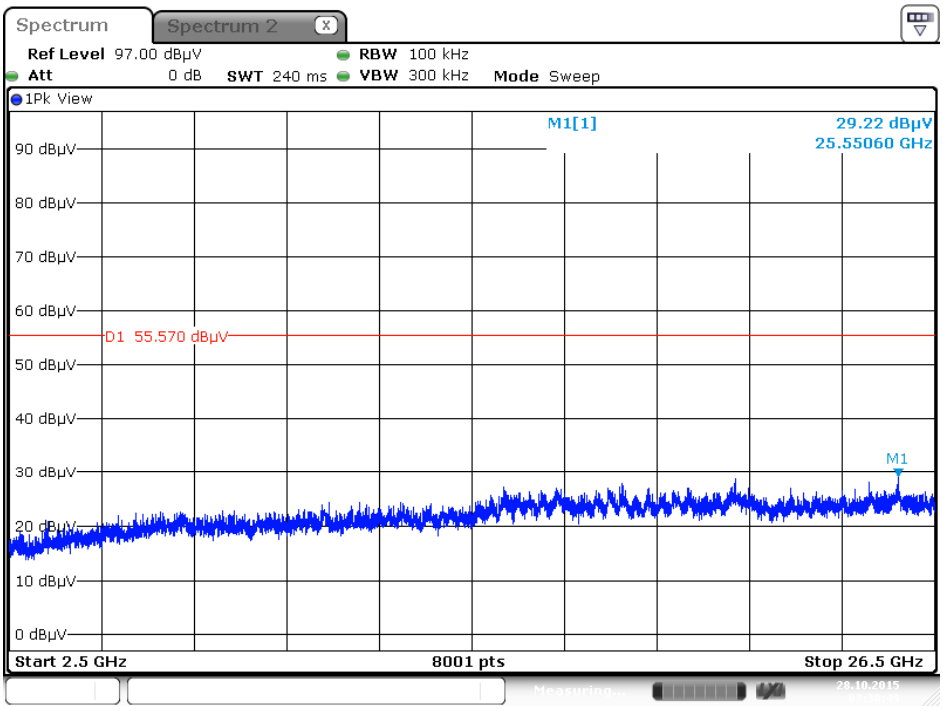
Date: 28.OCT.2015 03:37:06

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



Date: 28.OCT.2015 03:38:09

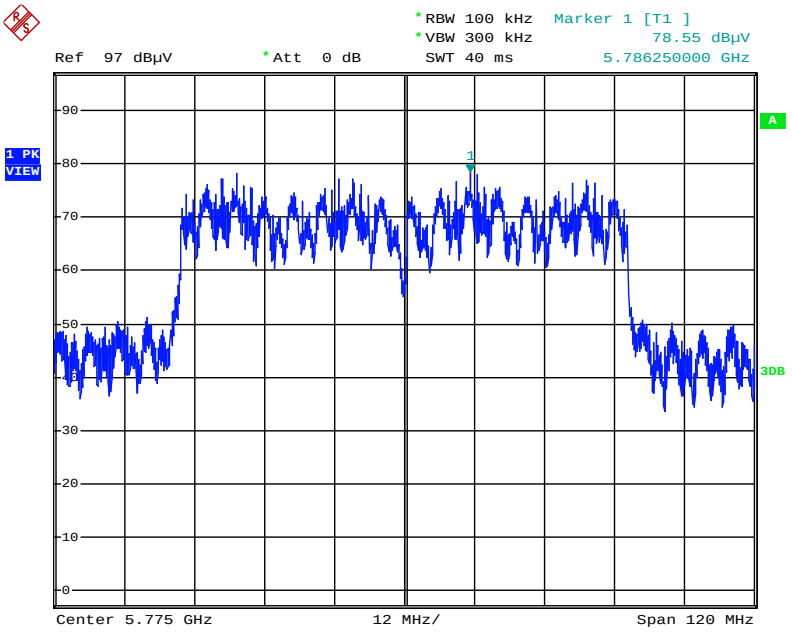
Plot on Configuration IEEE 802.11ac MCS0/Nss1 VHT20 / CH 11 / 2500MHz~26500MHz (down 30dBc)



Date: 28.OCT.2015 03:38:49

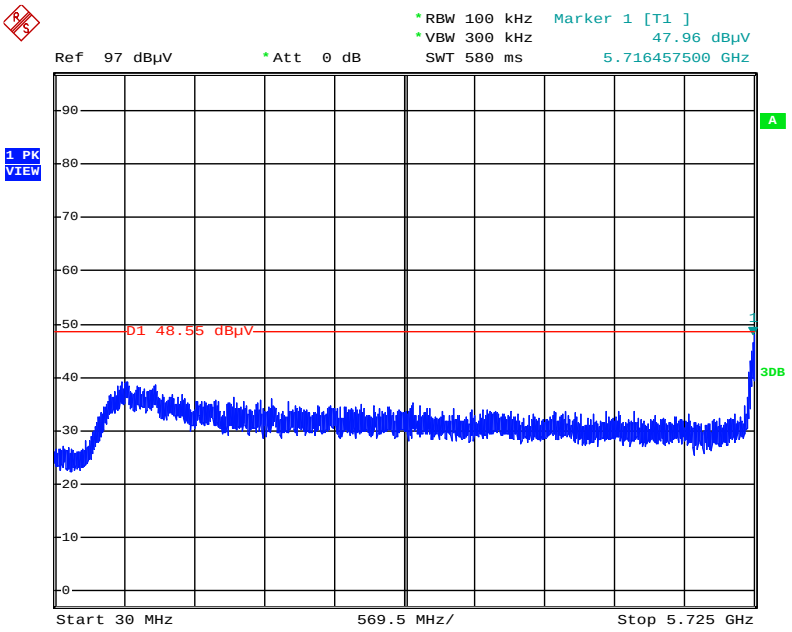
For 5G Band

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



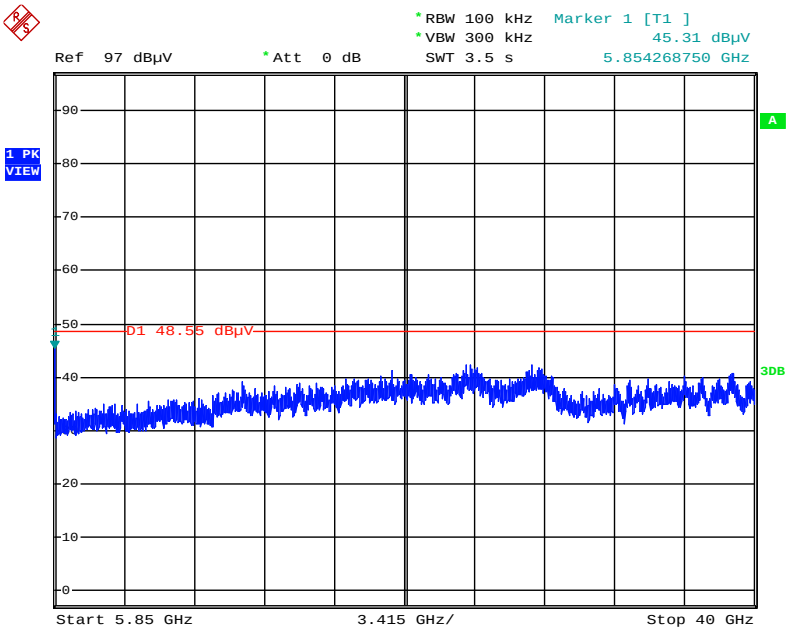
Date: 23.OCT.2015 00:51:02

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



Date: 23.OCT.2015 00:51:36

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



Date: 23.OCT.2015 00:52:12

4.7. Antenna Requirements

4.7.1. Limit

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

4.7.2. Antenna Connector Construction

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

5. LIST OF MEASURING EQUIPMENTS

For adding Adapter 4 ~ 6 and Second Red, Black Heat sink test record

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)
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 06, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	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 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. 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)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)

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

*Calibration Interval of instruments listed above is two year.

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

For EUT Rev 5.01 test record

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
BILOG ANTENNA	Schaffner	CBL6112D	22021	20MHz ~ 2GHz	May 06, 2015	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 28, 2014	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Feb. 24, 2015	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 12, 2015	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 06, 2014	Radiation (03CH01-CB)
EMI Receiver	Agilent	N9038A	MY52260123	9kHz ~ 8.4GHz	Jan. 21, 2015	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-1	N/A	30 MHz ~ 1 GHz	Nov. 15, 2014	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 12, 2015*	Radiation (03CH01-CB)

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

*Calibration Interval of instruments listed above is two year.

For adding 3TX/3RX function test record

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Remark
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Oct. 22, 2015	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2014	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)
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)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 12, 2014	Conducted (TH01-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Sep. 21, 2015	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-7	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz – 26.5 GHz	Nov. 15, 2014	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 03, 2014	Conducted (TH01-CB)

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

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%