FCC Test Report

Report No.:	RF150814E01-1
FCC ID:	RRK-EA-7HW03AP1
Test Model:	EA-7HW03AP1W
Series Model:	EA-7HW03AP1T
Received Date:	Aug. 14, 2015
Test Date:	Aug. 24 to Nov. 04, 2015
Issued Date:	Dec. 24, 2015
Applicant:	Alpha Networks Inc.
Address:	No.8 Li-shing 7th Rd., Science-based Industrial Park, Hsinchu, Taiwan, R.O.C.
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (1):	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
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Release Control Record

Issue No.	Description	Date Issued
RF150814E01-1	Original release.	Dec. 24, 2015

1 Certificate of Conformity

Product:	Wireless LAN Access Point
Brand:	Panasonic
Test Model:	EA-7HW03AP1W
Series Model:	EA-7HW03AP1T
Sample Status:	R&D SAMPLE
Applicant:	Alpha Networks Inc.
Test Date:	Aug. 24 to Nov. 04, 2015
Standard:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10: 2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : _____, **Date:** Dec. 24, 2015

Midoli Peng / Specialist

Approved by : _____, **Date:** Dec. 24, 2015

May Chen / Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -4.93dB at 0.29453MHz.
15.407(b) (1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.3dB at 5725.00MHz & 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is I-PEX not a standard connector.

NOTE: The EUT was operating in 2400 ~ 2483.5MHz, 5150~5250MHz and 5725~5850MHz frequencies band. This report was recorded the RF parameters including 5150~5250MHz and 5725~5850MHz. For the 2400 ~ 2483.5MHz RF parameters was recorded in another test report.

2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.37 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.72 dB
	6GHz ~ 18GHz	4.00 dB
	18GHz ~ 40GHz	4.11 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless LAN Access Point
Brand	Panasonic
Test Model	EA-7HW03AP1W
Series Model	EA-7HW03AP1T
Status of EUT	R&D SAMPLE
Power Supply Rating	DC 24V from power adapter or DC 48V from POE
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT (20/40) mode in 2.4GHz
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 800Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	**For 15.407** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
	For 15.247 2.412 ~ 2.462GHz
Number of Channel	**For 15.407** 9 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 4 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
	For 15.247 11 for 802.11b, 802.11g, 802.11n (HT20), VHT20 7 for 802.11n (HT40), VHT40
Output Power	**For 15.407(5.18 ~ 5.24GHz)** **CDD Mode** 802.11a: 390.156mW 802.11ac (VHT20): 366.747mW 802.11ac (VHT40): 392.29mW 802.11ac (VHT80): 57.137mW **Beamforming Mode** 802.11ac (VHT20): 358.26mW 802.11ac (VHT40): 384.651mW 802.11ac (VHT80): 54.684mW **For 15.407(5.745 ~ 5.825GHz)** **CDD Mode** 802.11a: 797.673mW 802.11ac (VHT20): 811.076mW 802.11ac (VHT40): 594.859mW 802.11ac (VHT80): 139.783mW **Beamforming Mode** 802.11ac (VHT20): 390.657mW 802.11ac (VHT40): 390.921mW 802.11ac (VHT80): 121.874mW
	For 15.247 802.11b: 973.865mW 802.11g: 851.922mW 802.11n(HT20): 801.309mW 802.11n(HT40): 206.802mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note

Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

1. There are 2.4GHz and 5GHz technology used for the EUT.
2. 2.4GHz & 5GHz technology can transmit at same time.
3. The EUT has two model names, which are identical to each other in all aspects except for the following table:

Brand	Product Name	Model No.	Difference
Panasonic	Wireless LAN Access Point	EA-7HW03AP1W	1. Different of color : Model: EA-7HW03AP1W (white) Model: EA-7HW03AP1T (brown) 2. For marketing requirement
		EA-7HW03AP1T	

From the above models, model: **EA-7HW03AP1W** was selected as representative model for the test and their data were recorded in this report.

4. The EUT must be supplied with POE or a power adapter as following table:

Adapter		
Brand Name	Model No.	Spec.
TAMURA	DVW2415N	Input: 100-240V, 1.0A, 50/60Hz AC intput cable: 1.3m, unshielded Output: 24V, 1.5A DC output cable: 1.25m, unshielded, with one core
POE (test only, not for sale)		
Brand Name	Model No.	Spec.
SGP	GRT-480125A	Input: 100-240V, 50/60Hz Output: 48V

5. The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Brand	Model	Antenna Type	Antenna Gain (dBi)		Connector type
				2.4GHz	5GHz	
Chain (0)	Hong Lin INDUSTRIAL CO.,LTD	290-20211	PIFA	3	4	I-PEX
Chain (1)		290-20211		3	4	
Chain (2)		290-20212		3	4	
Chain (3)		290-20212		3	4	

6. The EUT was pre-tested under following test modes :

Pre-test Mode	Power
Mode A	Adapter mode
Mode B	**POE mode**

From the above modes, the worst radiated emission was found in **Mode B**. Therefore only the test data of the modes were recorded in this report.

7. The EUT incorporates a MIMO function with beamforming.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	4TX	4RX
802.11g	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
VHT20	MCS0~8 Nss=1	4TX	4RX
	MCS0~8 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~8 Nss=4	4TX	4RX
VHT40	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS0~8 Nss=1	4TX	4RX
	MCS0~8 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~8 Nss=4	4TX	4RX
802.11ac (VHT40)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX
802.11ac (VHT80)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX

Note: 1. The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report.
2. All of modulation mode support beamforming function except 2.4GHz & 802.11a/n modulation mode.

8. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency	Channel	Frequency
149	5745MHz	161	5805MHz
153	5765MHz	165	5825MHz
157	5785MHz		

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE≥1G	RE<1G	PLC	APCM	
1	-	-	√	-	With adapter
2	√	√	√	√	With POE

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

NOTE: 1. The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **X-plane (below 1GHz) &Y-plane (above 1GHz)**
2. "-"means no effect.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Radiated Emission Test (Below 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 48	157	OFDM	BPSK	6.5
	5745-5825	149 to 165				

Power Line Conducted Emission Test:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 48	157	OFDM	BPSK	6.5
	5745-5825	149 to 165				

Antenna Port Conducted Measurement:

☒ This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).
☒ Following channel(s) was (were) selected for the final test as listed below.

CDD Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
802.11ac (VHT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3
Beamforming Mode						
MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

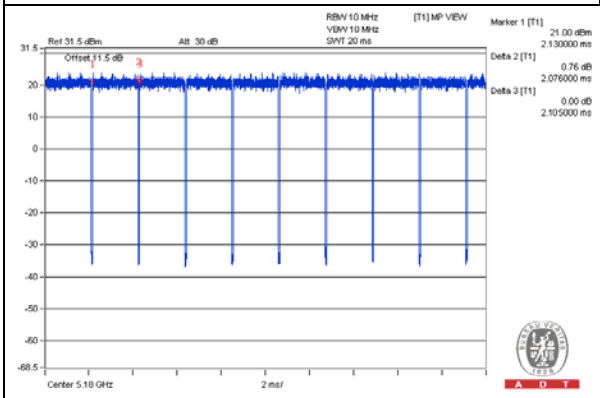
Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	24deg. C, 67%RH	120Vac, 60Hz	Robert Cheng
RE<1G	24deg. C, 69%RH	120Vac, 60Hz	Weiwei Lo
PLC	26deg. C, 76%RH	120Vac, 60Hz	Jyunchun Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

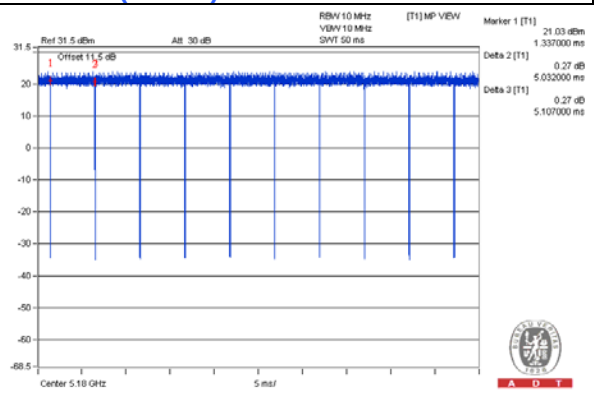
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
802.11a: Duty cycle = 2.076 ms/2.105 ms = 0.986
802.11ac (VHT20): Duty cycle = 5.032 ms/5.107 ms = 0.985
802.11ac (VHT40): Duty cycle = 2.42 ms/2.512 ms = 0.963, Duty factor = 10 * log(1/0.963) = 0.16
802.11ac (VHT80): Duty cycle = 1.142 ms/1.214 ms = 0.941, Duty factor = 10 * log(1/0.941) = 0.27

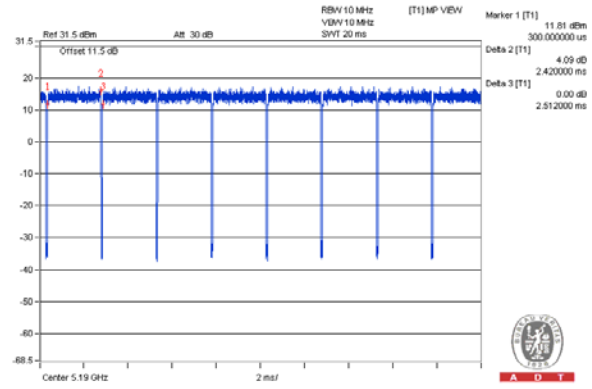
802.11a



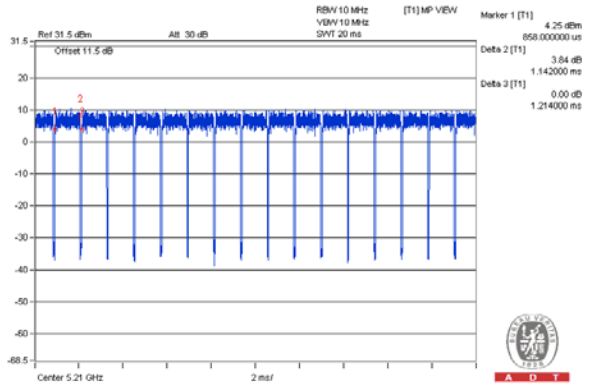
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.4 Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	NOTEBOOK COMPUTER	DELL	E6440	F9LYQ32	FCC DoC	Provided by Lab
B.	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab
C.	POE	SGP	GRT-480125A	NA	NA	Supplied by Client
D.	USB 3.0 DONGLE	Transcend	NA	NA	NA	Provided by Lab
E.	USB 3.0 DONGLE	Transcend	NA	NA	NA	Provided by Lab

Note:

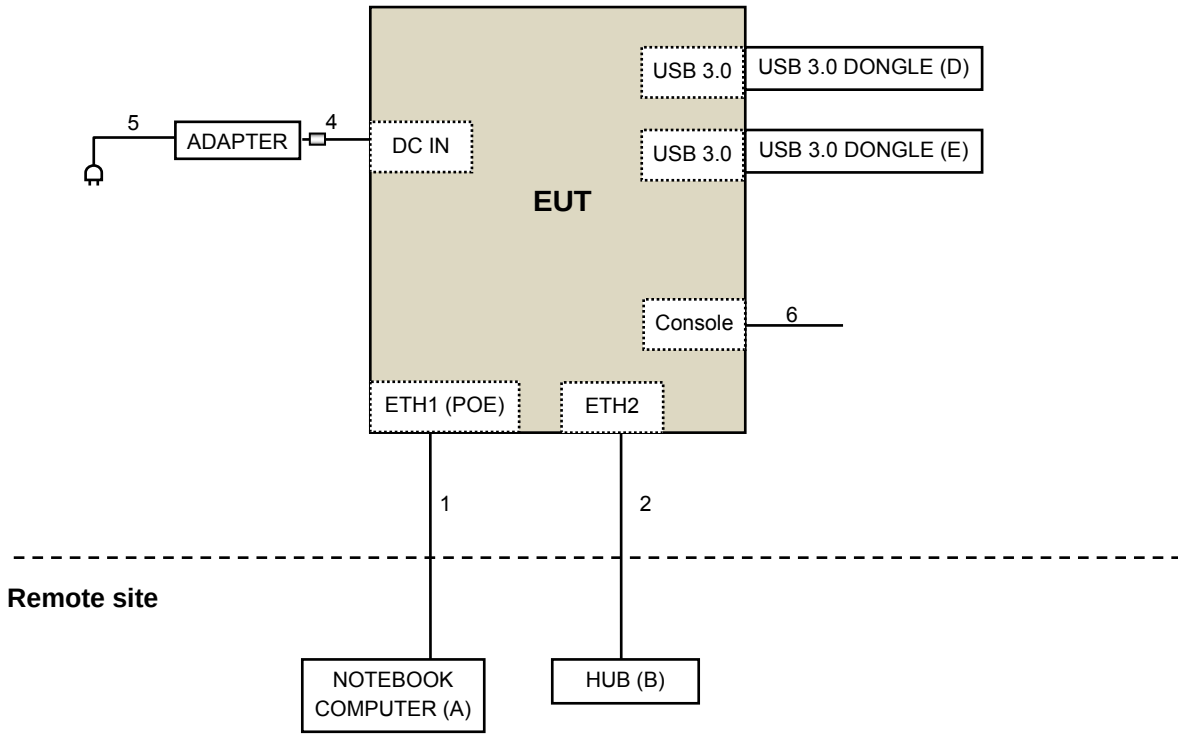
1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45	1	10	No	0	Provided by Lab
2.	RJ45	1	10	No	0	Provided by Lab
3.	RJ45	1	1	No	0	Provided by Lab
4.	DC	1	1.25	No	1	Supplied by client
5.	AC	1	1.3	No	0	Supplied by client
6.	RJ45 to Console	1	1.5	No	0	Provided by Lab

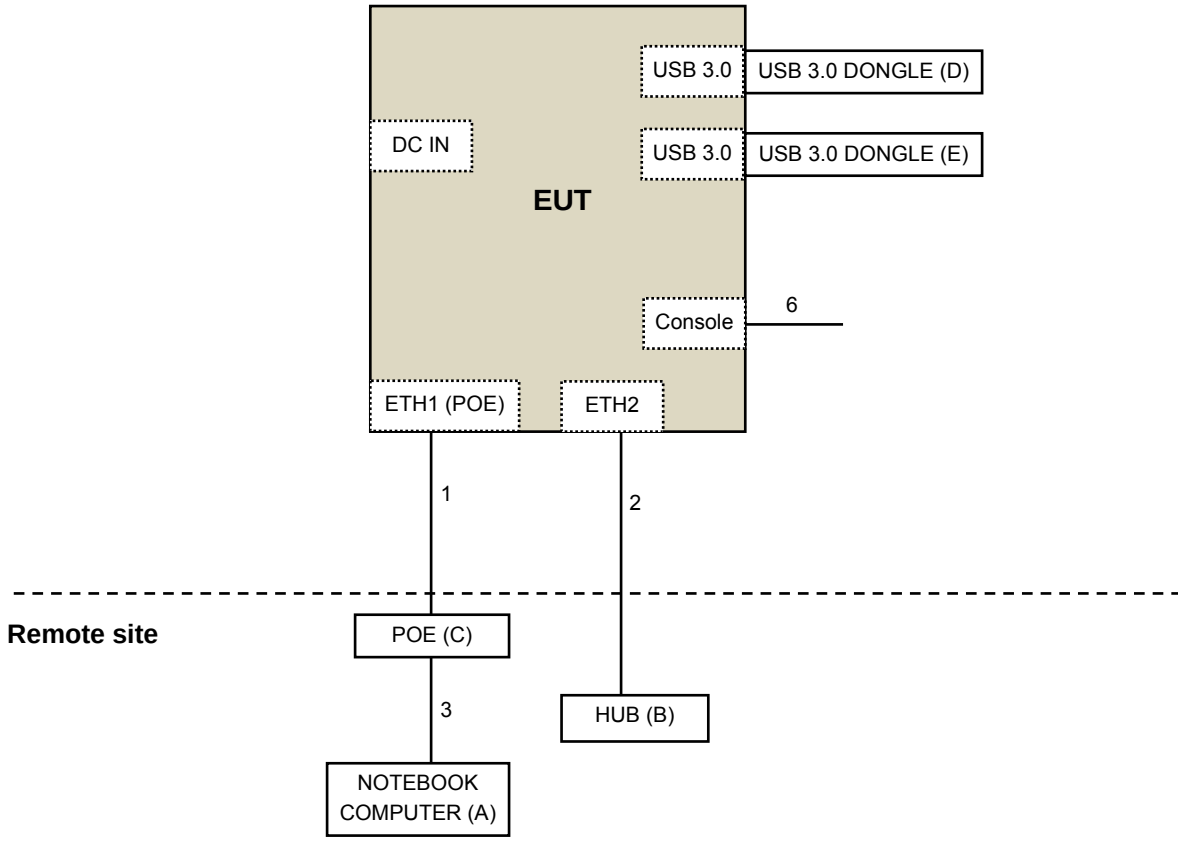
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

Adapter Mode:



POE Mode:


USB 3.0
USB 3.0 DONGLE (D)
DC IN
USB 3.0
USB 3.0 DONGLE (E)
EUT
Console
6
ETH1 (POE)
ETH2
1
2
Remote site
POE (C)
3
HUB (B)
NOTEBOOK
COMPUTER (A)

3.5 General Description of Applied Standard

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v01r01
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

All test items have been performed and recorded as per the above standards.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/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

NOTE:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	**LIMIT**	
789033 D02 General UNII Test Procedure New Rules v01r01	FIELD STRENGTH AT 3m	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)
APPLICABLE TO	**EIRP LIMIT**	**EQUIVALENT FIELD STRENGTH AT 3m**
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
15.407(b)(2)		
15.407(b)(3)		
15.407(b)(4)	PK:-27 (dBm/MHz) *1 PK:-17 (dBm/MHz) *2	PK: 68.2(dBμV/m) *1 PK:78.2 (dBμV/m) *2

NOTE: *1 beyond 10MHz of the band edge *2 within 10 MHz of band edge

The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

For below 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210105	July 24, 2015	July 23, 2016
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-03	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 06, 2015	Feb. 05, 2016
RF Cable	8D-FB	CHGCAB-001-1 CHGCAB-001-2	Oct. 04, 2014	Oct. 03, 2015
	RF-141	CHGCAB-004	Oct. 04, 2014	Oct. 03, 2015
Software	ADT_Radiated_V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. G.
3. The FCC Site Registration No. is 966073.
4. The VCCI Site Registration No. is G-137.
5. The CANADA Site Registration No. is IC 7450H-2.
6. Tested Date: Sep. 01, 2015

For above 1GHz:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY51210202	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna AISI	AIH.8018	0000220091110	Feb. 06, 2015	Feb. 05, 2016
Pre-Amplifier Agilent	8449B	3008A01923	Oct. 28, 2014	Oct. 27, 2015
RF Cable	NA	131206 131213 131215 SNMY23685/4	Jan. 16, 2015	Jan. 15, 2016
Spectrum Analyzer R&S	FSV40	100964	Jun. 26, 2015	Jun. 25, 2016
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Dec. 12, 2014	Dec. 11, 2015
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Feb. 05, 2015	Feb. 04, 2016
RF Cable	NA	329751/4 RF104-204	Dec. 11, 2014	Dec. 10, 2015
Software	ADT_Radiated _V8.7.07	NA	NA	NA
Antenna Tower & Turn Table CT	NA	NA	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. H.
3. The FCC Site Registration No. is 797305.
4. The CANADA Site Registration No. is IC 7450H-3.
5. Tested Date: Aug. 26, 2015

4.1.3 Test Procedure

a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

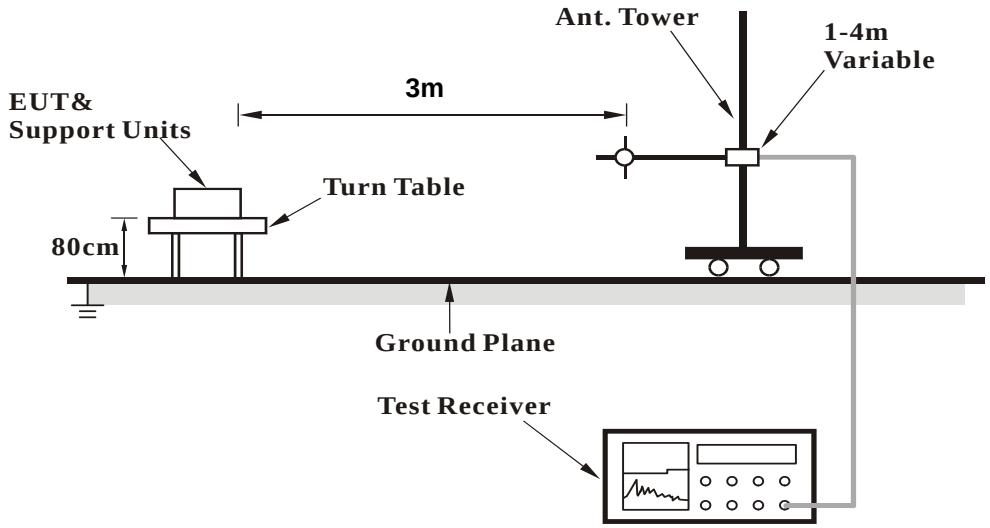
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 3MHz for RMS Average (Duty cycle < 98%) for Average detection (AV) at frequency above 1GHz, then the measurement results was added to a correction factor (10 log(1/duty cycle)).
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
5. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

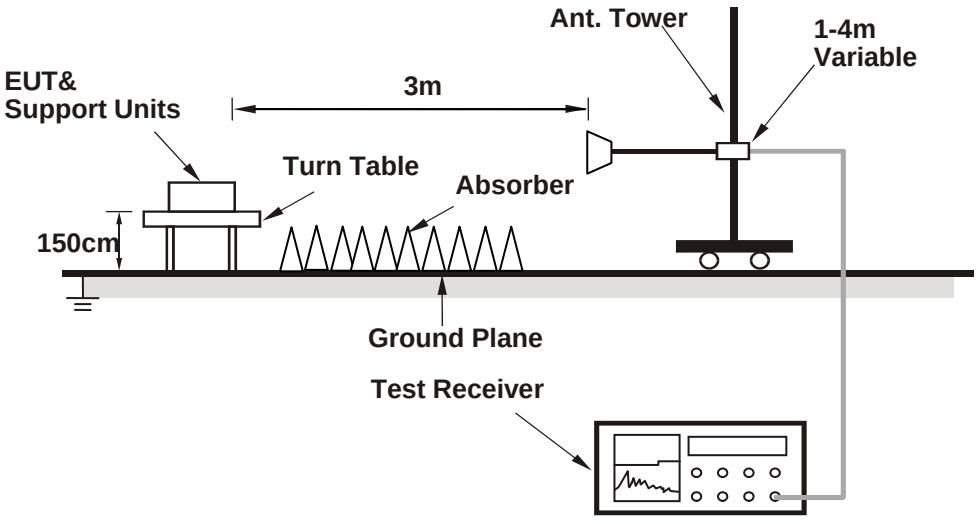
No deviation.

4.1.5 Test Setup

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.1.6 EUT Operating Condition

1. Connect the EUT with the support unit A (Notebook Computer) which is placed on remote site.
2. Controlling software (QCART.EXE V3.0.93.0) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.6 PK	74.0	-5.4	1.88 H	4	62.13	6.47
2	5150.00	53.2 AV	54.0	-0.8	1.88 H	4	46.73	6.47
3	*5180.00	116.1 PK			1.56 H	360	109.45	6.65
4	*5180.00	105.9 AV			1.56 H	360	99.25	6.65
5	#10360.00	54.6 PK	74.0	-19.4	1.45 H	107	40.39	14.21
6	#10360.00	43.2 AV	54.0	-10.8	1.45 H	107	28.99	14.21
7	15540.00	63.0 PK	74.0	-11.0	1.31 H	229	44.24	18.76
8	15540.00	49.9 AV	54.0	-4.1	1.31 H	229	31.14	18.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.6 PK	74.0	-10.4	1.50 V	349	57.13	6.47
2	5150.00	48.7 AV	54.0	-5.3	1.50 V	349	42.23	6.47
3	*5180.00	114.2 PK			1.50 V	342	107.55	6.65
4	*5180.00	103.8 AV			1.50 V	342	97.15	6.65
5	#10360.00	54.3 PK	74.0	-19.7	2.04 V	131	40.09	14.21
6	#10360.00	43.2 AV	54.0	-10.8	2.04 V	131	28.99	14.21
7	15540.00	65.9 PK	74.0	-8.1	2.05 V	126	47.14	18.76
8	15540.00	50.1 AV	54.0	-3.9	2.05 V	126	31.34	18.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	115.8 PK			1.62 H	360	109.03	6.77
2	*5200.00	105.4 AV			1.62 H	360	98.63	6.77
3	#10400.00	54.8 PK	74.0	-19.2	1.39 H	110	40.58	14.22
4	#10400.00	43.2 AV	54.0	-10.8	1.39 H	110	28.98	14.22
5	15600.00	64.2 PK	74.0	-9.8	1.26 H	226	45.86	18.34
6	15600.00	50.3 AV	54.0	-3.7	1.26 H	226	31.96	18.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	114.0 PK			1.47 V	339	107.23	6.77
2	*5200.00	103.8 AV			1.47 V	339	97.03	6.77
3	#10400.00	53.8 PK	74.0	-20.2	2.10 V	144	39.58	14.22
4	#10400.00	43.2 AV	54.0	-10.8	2.10 V	144	28.98	14.22
5	15600.00	65.2 PK	74.0	-8.8	2.00 V	111	46.86	18.34
6	15600.00	49.9 AV	54.0	-4.1	2.00 V	111	31.56	18.34

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	116.1 PK			1.57 H	360	109.28	6.82
2	*5240.00	106.0 AV			1.57 H	360	99.18	6.82
3	5350.00	58.2 PK	74.0	-15.8	1.57 H	360	51.16	7.04
4	5350.00	43.1 AV	54.0	-10.9	1.57 H	360	36.06	7.04
5	#10480.00	54.0 PK	74.0	-20.0	1.36 H	117	40.01	13.99
6	#10480.00	43.1 AV	54.0	-10.9	1.36 H	117	29.11	13.99
7	15720.00	62.9 PK	74.0	-11.1	1.40 H	236	43.87	19.03
8	15720.00	49.3 AV	54.0	-4.7	1.40 H	236	30.27	19.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	114.2 PK			1.52 V	343	107.38	6.82
2	*5240.00	104.1 AV			1.52 V	343	97.28	6.82
3	5350.00	58.1 PK	74.0	-15.9	1.52 V	343	51.06	7.04
4	5350.00	42.8 AV	54.0	-11.2	1.52 V	343	35.76	7.04
5	#10480.00	54.2 PK	74.0	-19.8	2.06 V	142	40.21	13.99
6	#10480.00	43.2 AV	54.0	-10.8	2.06 V	142	29.21	13.99
7	15720.00	65.5 PK	74.0	-8.5	2.01 V	103	46.47	19.03
8	15720.00	50.4 AV	54.0	-3.6	2.01 V	103	31.37	19.03

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	69.5 PK	74.0	-4.5	1.19 H	92	62.12	7.38
2	#5715.00	53.1 AV	54.0	-0.9	1.19 H	92	45.72	7.38
3	**#5725.00**	**77.9 PK**	**78.2**	**-0.3**	**1.00 H**	**324**	**70.52**	**7.38**
4	*5745.00	113.5 PK			1.24 H	271	106.12	7.38
5	*5745.00	104.4 AV			1.24 H	271	97.02	7.38
6	11490.00	54.7 PK	74.0	-19.3	1.36 H	96	40.18	14.52
7	11490.00	43.4 AV	54.0	-10.6	1.36 H	96	28.88	14.52
8	#17235.00	63.6 PK	74.0	-10.4	1.40 H	226	39.84	23.76
9	#17235.00	49.9 AV	54.0	-4.1	1.40 H	226	26.14	23.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	67.1 PK	74.0	-6.9	1.50 V	338	59.72	7.38
2	#5715.00	49.8 AV	54.0	-4.2	1.50 V	338	42.42	7.38
3	#5725.00	73.7 PK	78.2	-4.5	1.52 V	341	66.32	7.38
4	*5745.00	111.1 PK			1.55 V	350	103.72	7.38
5	*5745.00	102.1 AV			1.55 V	350	94.72	7.38
6	11490.00	54.0 PK	74.0	-20.0	2.00 V	120	39.48	14.52
7	11490.00	42.9 AV	54.0	-11.1	2.00 V	120	28.38	14.52
8	#17235.00	65.3 PK	74.0	-8.7	2.04 V	111	41.54	23.76
9	#17235.00	50.1 AV	54.0	-3.9	2.04 V	111	26.34	23.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	58.1 PK	74.0	-15.9	1.44 H	345	50.72	7.38
2	#5715.00	47.6 AV	54.0	-6.4	1.44 H	345	40.22	7.38
3	#5725.00	63.9 PK	78.2	-14.3	1.44 H	345	56.52	7.38
4	*5785.00	118.4 PK			1.18 H	352	111.02	7.38
5	*5785.00	107.1 AV			1.18 H	352	99.72	7.38
6	#5850.00	57.4 PK	78.2	-20.8	1.28 H	78	50.15	7.25
7	#5860.00	54.4 PK	74.0	-19.6	1.28 H	78	47.18	7.22
8	#5860.00	43.0 AV	54.0	-11.0	1.28 H	78	35.78	7.22
9	11570.00	54.5 PK	74.0	-19.5	1.40 H	117	39.93	14.57
10	11570.00	42.8 AV	54.0	-11.2	1.40 H	117	28.23	14.57
11	#17355.00	64.3 PK	74.0	-9.7	1.22 H	155	40.24	24.06
12	#17355.00	50.1 AV	54.0	-3.9	1.22 H	155	26.04	24.06
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	55.2 PK	74.0	-18.8	1.46 V	344	47.82	7.38
2	#5715.00	44.3 AV	54.0	-9.7	1.46 V	344	36.92	7.38
3	#5725.00	59.8 PK	78.2	-18.4	1.47 V	351	52.42	7.38
4	*5785.00	115.6 PK			1.53 V	336	108.22	7.38
5	*5785.00	104.7 AV			1.53 V	336	97.32	7.38
6	#5850.00	54.3 PK	78.2	-23.9	1.54 V	347	47.05	7.25
7	#5860.00	51.4 PK	74.0	-22.6	1.47 V	351	44.18	7.22
8	#5860.00	39.9 AV	54.0	-14.1	1.47 V	351	32.68	7.22
9	11570.00	54.1 PK	74.0	-19.9	1.98 V	129	39.53	14.57
10	11570.00	43.2 AV	54.0	-10.8	1.98 V	129	28.63	14.57
11	#17355.00	65.3 PK	74.0	-8.7	2.00 V	111	41.24	24.06
12	#17355.00	50.2 AV	54.0	-3.8	2.00 V	111	26.14	24.06

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	114.8 PK			1.10 H	274	107.49	7.31
2	*5825.00	106.3 AV			1.10 H	274	98.99	7.31
3	#5850.00	76.2 PK	78.2	-2.0	1.18 H	358	68.95	7.25
4	#5860.00	67.3 PK	68.2	-0.9	1.20 H	265	60.08	7.22
5	11650.00	54.6 PK	74.0	-19.4	1.46 H	103	39.93	14.67
6	11650.00	43.2 AV	54.0	-10.8	1.46 H	103	28.53	14.67
7	#17475.00	63.7 PK	74.0	-10.3	1.22 H	207	39.68	24.02
8	#17475.00	50.3 AV	54.0	-3.7	1.22 H	207	26.28	24.02
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	112.1 PK			1.58 V	335	104.79	7.31
2	*5825.00	103.9 AV			1.58 V	335	96.59	7.31
3	#5850.00	73.2 PK	78.2	-5.0	1.52 V	349	65.95	7.25
4	#5860.00	64.8 PK	68.2	-3.4	1.51 V	328	57.58	7.22
5	11650.00	53.6 PK	74.0	-20.4	2.02 V	127	38.93	14.67
6	11650.00	42.6 AV	54.0	-11.4	2.02 V	127	27.93	14.67
7	#17475.00	64.8 PK	74.0	-9.2	2.01 V	99	40.78	24.02
8	#17475.00	49.8 AV	54.0	-4.2	2.01 V	99	25.78	24.02

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT20)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.3 PK	74.0	-8.7	1.06 H	360	58.83	6.47
2	**5150.00**	**53.7 AV**	**54.0**	**-0.3**	**1.06 H**	**360**	**47.23**	**6.47**
3	*5180.00	116.2 PK			1.19 H	23	109.55	6.65
4	*5180.00	107.1 AV			1.19 H	23	100.45	6.65
5	#10360.00	54.1 PK	74.0	-19.9	1.51 H	113	39.89	14.21
6	#10360.00	42.8 AV	54.0	-11.2	1.51 H	113	28.59	14.21
7	15540.00	63.6 PK	74.0	-10.4	1.32 H	230	44.84	18.76
8	15540.00	50.0 AV	54.0	-4.0	1.32 H	230	31.24	18.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.1 PK	74.0	-10.9	1.52 V	345	56.63	6.47
2	5150.00	48.2 AV	54.0	-5.8	1.52 V	345	41.73	6.47
3	*5180.00	114.5 PK			1.54 V	337	107.85	6.65
4	*5180.00	104.1 AV			1.54 V	337	97.45	6.65
5	#10360.00	53.1 PK	74.0	-20.9	1.95 V	121	38.89	14.21
6	#10360.00	42.2 AV	54.0	-11.8	1.95 V	121	27.99	14.21
7	15540.00	65.6 PK	74.0	-8.4	2.05 V	99	46.84	18.76
8	15540.00	50.2 AV	54.0	-3.8	2.05 V	99	31.44	18.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	116.0 PK			1.19 H	11	109.23	6.77
2	*5200.00	106.9 AV			1.19 H	11	100.13	6.77
3	#10400.00	53.5 PK	74.0	-20.5	1.49 H	123	39.28	14.22
4	#10400.00	42.5 AV	54.0	-11.5	1.49 H	123	28.28	14.22
5	15600.00	63.9 PK	74.0	-10.1	1.21 H	238	45.56	18.34
6	15600.00	49.9 AV	54.0	-4.1	1.21 H	238	31.56	18.34
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	114.4 PK			1.52 V	330	107.63	6.77
2	*5200.00	104.2 AV			1.52 V	330	97.43	6.77
3	#10400.00	53.4 PK	74.0	-20.6	2.00 V	116	39.18	14.22
4	#10400.00	42.5 AV	54.0	-11.5	2.00 V	116	28.28	14.22
5	15600.00	64.9 PK	74.0	-9.1	2.00 V	115	46.56	18.34
6	15600.00	50.0 AV	54.0	-4.0	2.00 V	115	31.66	18.34

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	115.8 PK			1.20 H	11	108.98	6.82
2	*5240.00	106.8 AV			1.20 H	11	99.98	6.82
3	5350.00	57.6 PK	74.0	-16.4	1.20 H	11	50.56	7.04
4	5350.00	47.5 AV	54.0	-6.5	1.20 H	11	40.46	7.04
5	#10480.00	54.6 PK	74.0	-19.4	1.46 H	75	40.61	13.99
6	#10480.00	43.2 AV	54.0	-10.8	1.46 H	75	29.21	13.99
7	15720.00	63.2 PK	74.0	-10.8	1.32 H	253	44.17	19.03
8	15720.00	49.8 AV	54.0	-4.2	1.32 H	253	30.77	19.03
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	113.6 PK			1.54 V	329	106.78	6.82
2	*5240.00	103.3 AV			1.54 V	329	96.48	6.82
3	5350.00	47.6 PK	74.0	-26.4	1.54 V	329	40.56	7.04
4	5350.00	46.8 AV	54.0	-7.2	1.54 V	329	39.76	7.04
5	#10480.00	54.7 PK	74.0	-19.3	2.02 V	147	40.71	13.99
6	#10480.00	43.4 AV	54.0	-10.6	2.02 V	147	29.41	13.99
7	15720.00	65.9 PK	74.0	-8.1	1.94 V	107	46.87	19.03
8	15720.00	50.6 AV	54.0	-3.4	1.94 V	107	31.57	19.03

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	65.7 PK	74.0	-8.3	1.48 H	360	58.32	7.38
2	#5715.00	53.2 AV	54.0	-0.8	1.48 H	360	45.82	7.38
3	**#5725.00**	**77.9 PK**	**78.2**	**-0.3**	**1.07 H**	**325**	**70.52**	**7.38**
4	*5745.00	113.0 PK			1.18 H	274	105.62	7.38
5	*5745.00	104.5 AV			1.18 H	274	97.12	7.38
6	11490.00	54.3 PK	74.0	-19.7	1.48 H	102	39.78	14.52
7	11490.00	42.8 AV	54.0	-11.2	1.48 H	102	28.28	14.52
8	#17235.00	63.9 PK	74.0	-10.1	1.33 H	242	40.14	23.76
9	#17235.00	50.5 AV	54.0	-3.5	1.33 H	242	26.74	23.76
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	63.2 PK	74.0	-10.8	1.51 V	326	55.82	7.38
2	#5715.00	48.3 AV	54.0	-5.7	1.51 V	326	40.92	7.38
3	#5725.00	74.8 PK	78.2	-3.4	1.47 V	340	67.42	7.38
4	*5745.00	109.7 PK			1.54 V	347	102.32	7.38
5	*5745.00	101.1 AV			1.54 V	347	93.72	7.38
6	11490.00	53.8 PK	74.0	-20.2	2.00 V	145	39.28	14.52
7	11490.00	42.5 AV	54.0	-11.5	2.00 V	145	27.98	14.52
8	#17235.00	65.1 PK	74.0	-8.9	1.98 V	115	41.34	23.76
9	#17235.00	50.2 AV	54.0	-3.8	1.98 V	115	26.44	23.76

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	120.5 PK			1.52 H	344	113.12	7.38
2	*5785.00	109.3 AV			1.52 H	344	101.92	7.38
3	11570.00	54.2 PK	74.0	-19.8	1.46 H	98	39.63	14.57
4	11570.00	43.0 AV	54.0	-11.0	1.46 H	98	28.43	14.57
5	#17355.00	63.1 PK	74.0	-10.9	1.37 H	238	39.04	24.06
6	#17355.00	50.4 AV	54.0	-3.6	1.37 H	238	26.34	24.06
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	117.4 PK			1.50 V	337	110.02	7.38
2	*5785.00	106.1 AV			1.50 V	337	98.72	7.38
3	11570.00	54.4 PK	74.0	-19.6	1.97 V	106	39.83	14.57
4	11570.00	43.6 AV	54.0	-10.4	1.97 V	106	29.03	14.57
5	#17355.00	65.5 PK	74.0	-8.5	2.04 V	109	41.44	24.06
6	#17355.00	50.1 AV	54.0	-3.9	2.04 V	109	26.04	24.06

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	113.8 PK			1.00 H	354	106.49	7.31
2	*5825.00	105.4 AV			1.00 H	354	98.09	7.31
3	#5850.00	72.2 PK	78.2	-6.0	1.03 H	335	64.95	7.25
4	#5860.00	67.8 PK	68.2	-0.4	1.21 H	273	60.58	7.22
5	11650.00	53.9 PK	74.0	-20.1	1.37 H	121	39.23	14.67
6	11650.00	43.0 AV	54.0	-11.0	1.37 H	121	28.33	14.67
7	#17475.00	62.5 PK	74.0	-11.5	1.34 H	253	38.48	24.02
8	#17475.00	49.9 AV	54.0	-4.1	1.34 H	253	25.88	24.02
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	110.2 PK			1.52 V	320	102.89	7.31
2	*5825.00	101.9 AV			1.52 V	320	94.59	7.31
3	#5850.00	67.5 PK	78.2	-10.7	1.49 V	355	60.25	7.25
4	#5860.00	63.5 PK	68.2	-4.7	1.48 V	333	56.28	7.22
5	11650.00	53.2 PK	74.0	-20.8	2.05 V	140	38.53	14.67
6	11650.00	42.2 AV	54.0	-11.8	2.05 V	140	27.53	14.67
7	#17475.00	64.7 PK	74.0	-9.3	2.04 V	104	40.68	24.02
8	#17475.00	49.8 AV	54.0	-4.2	2.04 V	104	25.78	24.02

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT40)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.6 PK	74.0	-9.4	1.31 H	4	58.13	6.47
2	5150.00	53.6 AV	54.0	-0.4	1.31 H	4	47.13	6.47
3	*5190.00	110.2 PK			1.30 H	77	103.50	6.70
4	*5190.00	102.1 AV			1.30 H	77	95.40	6.70
5	#10380.00	54.7 PK	74.0	-19.3	1.42 H	99	40.49	14.21
6	#10380.00	43.2 AV	54.0	-10.8	1.42 H	99	28.99	14.21
7	15570.00	62.7 PK	74.0	-11.3	1.38 H	224	44.15	18.55
8	15570.00	50.0 AV	54.0	-4.0	1.38 H	224	31.45	18.55
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.5 PK	74.0	-10.5	1.47 V	335	57.03	6.47
2	5150.00	49.1 AV	54.0	-4.9	1.47 V	335	42.63	6.47
3	*5190.00	108.0 PK			1.46 V	344	101.30	6.70
4	*5190.00	98.9 AV			1.46 V	344	92.20	6.70
5	#10380.00	54.3 PK	74.0	-19.7	2.07 V	123	40.09	14.21
6	#10380.00	43.4 AV	54.0	-10.6	2.07 V	123	29.19	14.21
7	15570.00	65.0 PK	74.0	-9.0	1.99 V	117	46.45	18.55
8	15570.00	50.1 AV	54.0	-3.9	1.99 V	117	31.55	18.55

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 46	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.5 PK	74.0	-10.5	1.67 H	3	57.03	6.47
2	5150.00	53.6 AV	54.0	-0.4	1.67 H	3	47.13	6.47
3	*5230.00	115.2 PK			1.33 H	79	108.39	6.81
4	*5230.00	106.9 AV			1.33 H	79	100.09	6.81
5	5350.00	59.8 PK	74.0	-14.2	1.33 H	79	52.76	7.04
6	5350.00	49.4 AV	54.0	-4.6	1.33 H	79	42.36	7.04
7	#10460.00	53.5 PK	74.0	-20.5	1.45 H	123	39.45	14.05
8	#10460.00	42.4 AV	54.0	-11.6	1.45 H	123	28.35	14.05
9	15690.00	62.5 PK	74.0	-11.5	1.36 H	244	43.63	18.87
10	15690.00	50.0 AV	54.0	-4.0	1.36 H	244	31.13	18.87
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.9 PK	74.0	-11.1	1.50 V	314	56.43	6.47
2	5150.00	48.1 AV	54.0	-5.9	1.50 V	314	41.63	6.47
3	*5230.00	112.7 PK			1.37 V	356	105.89	6.81
4	*5230.00	103.8 AV			1.37 V	356	96.99	6.81
5	5350.00	58.1 PK	74.0	-15.9	1.37 V	356	51.06	7.04
6	5350.00	48.2 AV	54.0	-5.8	1.37 V	356	41.16	7.04
7	#10460.00	53.8 PK	74.0	-20.2	2.00 V	117	39.75	14.05
8	#10460.00	42.7 AV	54.0	-11.3	2.00 V	117	28.65	14.05
9	15690.00	65.9 PK	74.0	-8.1	1.96 V	106	47.03	18.87
10	15690.00	50.5 AV	54.0	-3.5	1.96 V	106	31.63	18.87

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	67.2 PK	68.2	-1.0	1.41 H	349	59.82	7.38
2	#5725.00	71.5 PK	78.2	-6.7	1.56 H	360	64.12	7.38
3	*5755.00	108.2 PK			1.29 H	335	100.82	7.38
4	*5755.00	99.3 AV			1.29 H	335	91.92	7.38
5	11510.00	55.1 PK	74.0	-18.9	1.44 H	91	40.60	14.50
6	11510.00	43.7 AV	54.0	-10.3	1.44 H	91	29.20	14.50
7	#17265.00	62.4 PK	74.0	-11.6	1.28 H	227	38.88	23.52
8	#17265.00	50.2 AV	54.0	-3.8	1.28 H	227	26.68	23.52
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	64.3 PK	68.2	-3.9	1.50 V	338	56.92	7.38
2	#5725.00	68.2 PK	78.2	-10.0	1.45 V	327	60.82	7.38
3	*5755.00	105.7 PK			1.43 V	328	98.32	7.38
4	*5755.00	96.4 AV			1.43 V	328	89.02	7.38
5	11510.00	54.4 PK	74.0	-19.6	2.00 V	134	39.90	14.50
6	11510.00	43.1 AV	54.0	-10.9	2.00 V	134	28.60	14.50
7	#17265.00	65.3 PK	74.0	-8.7	2.05 V	100	41.78	23.52
8	#17265.00	50.2 AV	54.0	-3.8	2.05 V	100	26.68	23.52

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	111.5 PK			1.36 H	332	104.12	7.38
2	*5795.00	102.8 AV			1.36 H	332	95.42	7.38
3	#5850.00	71.3 PK	78.2	-6.9	1.37 H	338	64.05	7.25
4	#5860.00	67.8 PK	68.2	-0.4	1.43 H	81	60.58	7.22
5	11590.00	54.9 PK	74.0	-19.1	1.41 H	109	40.29	14.61
6	11590.00	43.4 AV	54.0	-10.6	1.41 H	109	28.79	14.61
7	#17385.00	62.9 PK	74.0	-11.1	1.40 H	249	38.41	24.49
8	#17385.00	50.1 AV	54.0	-3.9	1.40 H	249	25.61	24.49
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	108.7 PK			1.49 V	350	101.32	7.38
2	*5795.00	99.6 AV			1.49 V	350	92.22	7.38
3	#5850.00	66.9 PK	78.2	-11.3	1.46 V	323	59.65	7.25
4	#5860.00	64.2 PK	68.2	-4.0	1.38 V	342	56.98	7.22
5	11590.00	54.2 PK	74.0	-19.8	1.96 V	129	39.59	14.61
6	11590.00	43.0 AV	54.0	-11.0	1.96 V	129	28.39	14.61
7	#17385.00	65.1 PK	74.0	-8.9	1.97 V	124	40.61	24.49
8	#17385.00	50.2 AV	54.0	-3.8	1.97 V	124	25.71	24.49

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

802.11ac (VHT80)

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.6 PK	74.0	-11.4	1.32 H	0	56.13	6.47
2	5150.00	53.4 AV	54.0	-0.6	1.32 H	0	46.93	6.47
3	*5210.00	102.0 PK			1.18 H	77	95.22	6.78
4	*5210.00	94.4 AV			1.18 H	77	87.62	6.78
5	5350.00	58.2 PK	74.0	-15.8	1.18 H	77	51.16	7.04
6	5350.00	49.3 AV	54.0	-4.7	1.18 H	77	42.26	7.04
7	#10420.00	53.8 PK	74.0	-20.2	1.42 H	116	39.65	14.15
8	#10420.00	42.9 AV	54.0	-11.1	1.42 H	116	28.75	14.15
9	15630.00	63.1 PK	74.0	-10.9	1.34 H	232	44.58	18.52
10	15630.00	50.2 AV	54.0	-3.8	1.34 H	232	31.68	18.52
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.6 PK	74.0	-10.4	1.54 V	322	57.13	6.47
2	5150.00	48.6 AV	54.0	-5.4	1.54 V	322	42.13	6.47
3	*5210.00	99.6 PK			1.51 V	338	92.82	6.78
4	*5210.00	91.8 AV			1.51 V	338	85.02	6.78
5	5350.00	60.1 PK	74.0	-13.9	1.51 V	338	53.06	7.04
6	5350.00	46.2 AV	54.0	-7.8	1.51 V	338	39.16	7.04
7	#10420.00	54.1 PK	74.0	-19.9	2.08 V	139	39.95	14.15
8	#10420.00	43.0 AV	54.0	-11.0	2.08 V	139	28.85	14.15
9	15630.00	65.5 PK	74.0	-8.5	1.95 V	124	46.98	18.52
10	15630.00	50.3 AV	54.0	-3.7	1.95 V	124	31.78	18.52

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	67.4 PK	68.2	-0.8	1.26 H	280	60.02	7.38
2	#5725.00	63.7 PK	78.2	-14.5	1.30 H	348	56.32	7.38
3	*5775.00	104.1 PK			1.38 H	355	96.72	7.38
4	*5775.00	95.9 AV			1.38 H	355	88.52	7.38
5	#5850.00	65.7 PK	78.2	-12.5	1.41 H	345	58.45	7.25
6	#5860.00	63.5 PK	68.2	-4.7	1.32 H	360	56.28	7.22
7	11550.00	54.1 PK	74.0	-19.9	1.49 H	109	39.55	14.55
8	11550.00	42.9 AV	54.0	-11.1	1.49 H	109	28.35	14.55
9	#17325.00	62.7 PK	74.0	-11.3	1.30 H	224	39.08	23.62
10	#17325.00	50.1 AV	54.0	-3.9	1.30 H	224	26.48	23.62
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5715.00	64.2 PK	68.2	-4.0	1.53 V	317	56.82	7.38
2	#5725.00	59.7 PK	78.2	-18.5	1.51 V	337	52.32	7.38
3	*5775.00	101.1 PK			1.43 V	339	93.72	7.38
4	*5775.00	93.4 AV			1.43 V	339	86.02	7.38
5	#5850.00	61.4 PK	78.2	-16.8	1.52 V	314	54.15	7.25
6	#5860.00	58.4 PK	68.2	-9.8	1.42 V	327	51.18	7.22
7	11550.00	54.5 PK	74.0	-19.5	2.03 V	123	39.95	14.55
8	11550.00	43.4 AV	54.0	-10.6	2.03 V	123	28.85	14.55
9	#17325.00	65.4 PK	74.0	-8.6	2.01 V	100	41.78	23.62
10	#17325.00	50.1 AV	54.0	-3.9	2.01 V	100	26.48	23.62

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz Data

802.11ac (VHT20)

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	Below 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	102.94	31.7 QP	43.5	-11.8	2.00 H	68	48.73	-17.07
2	149.02	30.8 QP	43.5	-12.7	2.00 H	38	43.70	-12.93
3	271.97	36.2 QP	46.0	-9.8	1.00 H	55	49.18	-13.01
4	600.02	31.7 QP	46.0	-14.3	1.50 H	360	36.03	-4.30
5	625.00	34.9 QP	46.0	-11.2	1.50 H	360	38.59	-3.74
6	749.98	30.7 QP	46.0	-15.3	1.50 H	360	31.89	-1.21
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	149.31	29.6 QP	43.5	-13.9	1.00 V	269	42.54	-12.93
2	251.40	32.4 QP	46.0	-13.6	1.50 V	312	46.37	-13.97
3	599.97	29.3 QP	46.0	-16.7	1.50 V	359	33.58	-4.30
4	625.00	34.8 QP	46.0	-11.2	1.00 V	195	38.54	-3.74
5	749.98	30.9 QP	46.0	-15.1	1.50 V	38	32.10	-1.21
6	875.02	32.4 QP	46.0	-13.6	1.00 V	0	32.19	0.24

REMARKS:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	100287	Apr. 17, 2015	Apr. 16, 2016
Line-Impedance Stabilization Network (for EUT) R&S	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable	5D-FB	COACAB-001	May 25, 2015	May 24, 2016
50 ohms Terminator	50	3	Oct. 17, 2014	Oct. 16, 2015
50 ohms Terminator	N/A	EMC-04	Oct. 21, 2014	Oct. 20, 2015
Software BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 11, 2015	June 10, 2016

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. A.
3. The VCCI Con A Registration No. is C-817.
4. Tested Date: Aug. 24, 2015

4.2.3 Test Procedure

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

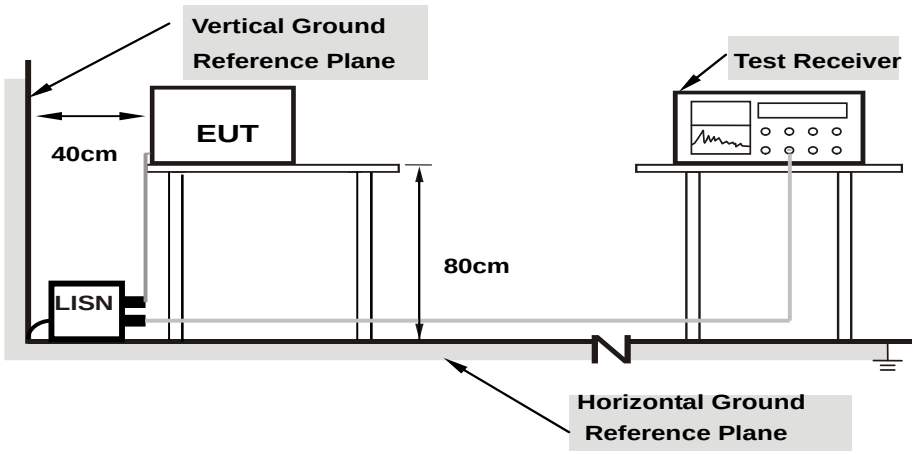
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80 cm from EUT and at least 80 from other units and other metal planes

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Condition

Same as 4.1.6.

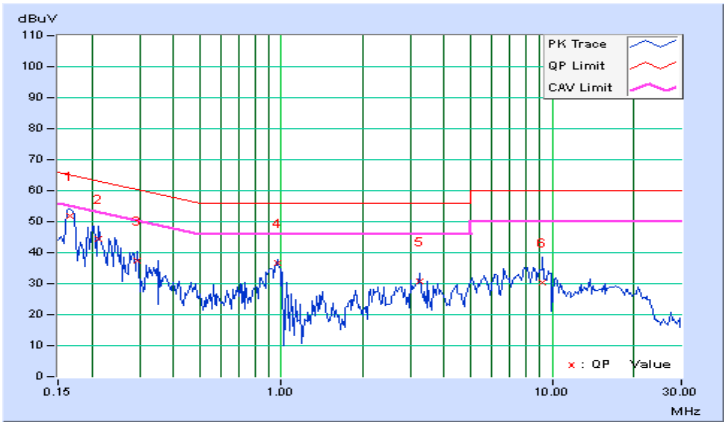
4.2.7 Test Results (Mode 1)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16562	0.10	51.66	40.21	51.76	40.31	65.18	55.18	-13.42	-14.87
2	0.21250	0.10	44.52	29.65	44.62	29.75	63.11	53.11	-18.48	-23.35
3	0.29453	0.13	37.42	25.05	37.55	25.18	60.40	50.40	-22.85	-25.22
4	0.96641	0.23	36.35	35.83	36.58	36.06	56.00	46.00	-19.42	-9.94
5	3.23438	0.32	30.51	23.96	30.83	24.28	56.00	46.00	-25.17	-21.72
6	9.25391	0.52	29.90	22.13	30.42	22.65	60.00	50.00	-29.58	-27.35

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

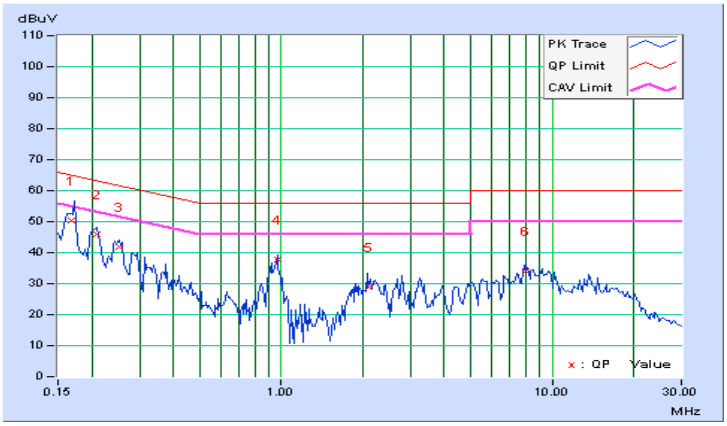


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16819	0.09	50.25	39.23	50.34	39.32	65.05	55.05	-14.71	-15.73
2	0.20859	0.10	45.93	33.80	46.03	33.90	63.26	53.26	-17.23	-19.36
3	0.25156	0.11	41.65	28.12	41.76	28.23	61.71	51.71	-19.94	-23.47
4	0.96641	0.21	37.64	37.56	37.85	37.77	56.00	46.00	-18.15	-8.23
5	2.10006	0.26	28.58	26.77	28.84	27.03	56.00	46.00	-27.16	-18.97
6	7.97656	0.44	33.56	29.57	34.00	30.01	60.00	50.00	-26.00	-19.99

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



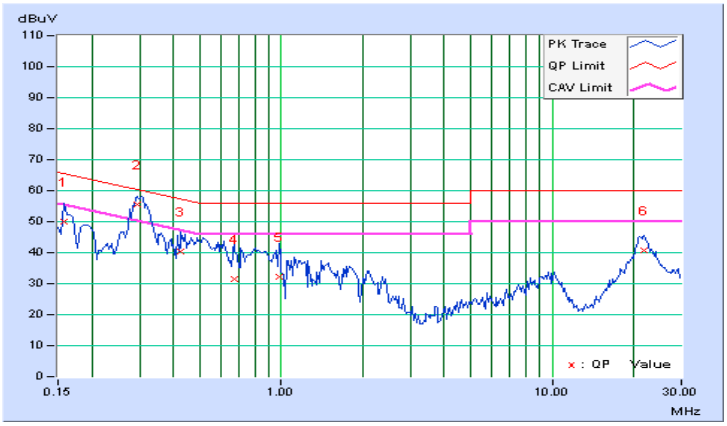
4.2.8 Test Results (Mode 2)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.10	49.85	38.81	49.95	38.91	65.58	55.58	-15.63	-16.67
2	**0.29453**	**0.13**	**55.34**	**43.34**	**55.47**	**43.47**	**60.40**	**50.40**	**-4.93**	**-6.93**
3	0.42734	0.16	40.34	30.12	40.50	30.28	57.30	47.30	-16.80	-17.02
4	0.66953	0.19	31.38	20.77	31.57	20.96	56.00	46.00	-24.43	-25.04
5	0.97813	0.23	31.97	21.34	32.20	21.57	56.00	46.00	-23.80	-24.43
6	21.96094	0.80	40.03	34.78	40.83	35.58	60.00	50.00	-19.17	-14.42

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value

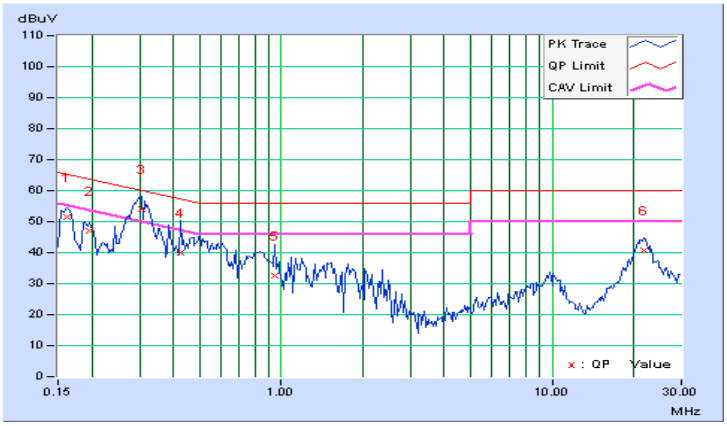


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	0.09	51.46	40.31	51.55	40.40	65.38	55.38	-13.83	-14.98
2	0.19687	0.10	47.05	36.57	47.15	36.67	63.74	53.74	-16.59	-17.07
3	0.30625	0.13	53.83	38.68	53.96	38.81	60.07	50.07	-6.12	-11.27
4	0.42344	0.15	39.80	28.66	39.95	28.81	57.38	47.38	-17.43	-18.57
5	0.94688	0.20	32.41	22.22	32.61	22.42	56.00	46.00	-23.39	-23.58
6	21.80469	0.79	39.77	34.54	40.56	35.33	60.00	50.00	-19.44	-14.67

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level – Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value



4.3 Transmit Power Measurment

4.3.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
	√	Indoor Access Point	1 Watt (30 dBm)
		Mobile and Portable client device	250mW (24 dBm)
U-NII-2A	---		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C	---		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

4.3.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	0824006	May 25, 2015	May 24, 2016
Power sensor Anritsu	MA2411B	0738172	May 25, 2015	May 24, 2016

Note:

NOTE: 1. The test was performed in Oven room 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Nov. 04, 2015

4.3.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.3.7 Test Result

POWER OUTPUT

CDD Mode

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	19.32	19.37	19.77	20.91	390.156	25.91	30	Pass
40	5200	19.11	19.39	19.81	20.86	385.984	25.87	30	Pass
48	5240	19.07	19.53	19.77	20.68	382.259	25.82	30	Pass
149	5745	19.69	20.50	20.11	21.87	461.693	26.64	30	Pass
157	5785	21.59	23.61	23.57	22.93	797.673	29.02	30	Pass
165	5825	21.35	22.57	22.61	22.83	691.432	28.40	30	Pass

802.11ac (VHT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	18.93	19.05	19.45	20.57	360.646	25.57	30	Pass
40	5200	18.95	19.21	19.51	20.52	363.943	25.61	30	Pass
48	5240	19.21	19.31	19.39	20.46	366.747	25.64	30	Pass
149	5745	19.67	20.33	19.79	21.73	444.794	26.48	30	Pass
157	5785	21.96	23.95	23.44	22.67	811.076	29.09	30	Pass
165	5825	21.68	22.57	23.52	22.64	736.507	28.67	30	Pass

802.11ac (VHT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
38	5190	15.21	15.07	15.45	16.71	147.282	21.68	30	Pass
46	5230	19.16	19.48	19.98	20.85	392.29	25.94	30	Pass
151	5755	16.63	17.17	16.84	18.71	220.753	23.44	30	Pass
159	5795	20.33	21.79	21.91	22.57	594.859	27.74	30	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
42	5210	10.56	10.61	11.78	12.83	57.137	17.57	30	Pass
155	5775	14.32	14.89	15.07	16.97	139.783	21.45	30	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
36	5180	18.42	18.61	18.49	18.73	287.39	24.58	25.98	Pass
40	5200	19.32	19.42	19.52	19.81	358.26	25.54	25.98	Pass
48	5240	19.27	19.32	19.54	19.77	354.827	25.50	25.98	Pass
149	5745	19.72	19.83	19.92	20.11	390.657	25.92	25.98	Pass
157	5785	19.76	19.77	19.81	20.02	385.647	25.86	25.98	Pass
165	5825	19.64	19.71	19.78	19.96	379.729	25.79	25.98	Pass

Note: Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power limit shall be reduced to 30-(10.02-6) = 25.98dBm.

802.11ac (VHT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
38	5190	14.96	14.84	15.21	16.52	139.876	21.46	25.98	Pass
46	5230	19.65	19.77	19.83	20.06	384.651	25.85	25.98	Pass
151	5755	16.75	17.06	16.67	18.54	216.033	23.35	25.98	Pass
159	5795	19.72	19.82	19.91	20.14	390.921	25.92	25.98	Pass

Note: Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power limit shall be reduced to 30-(10.02-6) = 25.98dBm.

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		CHAIN 0	CHAIN 1	CHAIN 2	CHAIN 3				
42	5210	11.54	11.47	11.13	11.28	54.684	17.38	25.98	Pass
155	5775	14.45	14.89	14.77	15.21	121.874	20.86	25.98	Pass

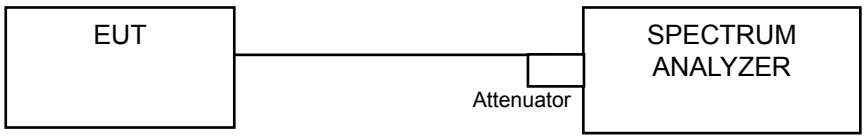
Note: Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power limit shall be reduced to 30-(10.02-6) = 25.98dBm.

4.4 Peak Power Spectral Density Measurement

4.4.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		LIMIT
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
	√	Indoor Access Point	
		Mobile and Portable client device	11dBm/ MHz
U-NII-2A	---		11dBm/ MHz
U-NII-2C	---		11dBm/ MHz
U-NII-3	√-		30dBm/ 500kHz

4.4.2 Test Setup



4.4.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 22, 2015	Jan. 21, 2016

Note:

NOTE: 1. The test was performed in Oven room 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Nov. 04, 2015

4.4.4 Test Procedure

For U-NII-1 band:

802.11a, 802 & 11ac (VH20)

Using method SA-1

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 30 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3) Set Channel power measure = 1MHz
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value

802.11ac (VH40) & 802.11ac (VHT80)

Using method SA-2

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 30 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3) Set Channel power measure = 1MHz
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

802.11a, 802 & 11ac (VH20)

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5) Sweep time = auto, trigger set to “free run”.
6) Trace average at least 100 traces in power averaging mode.
7) Record the max value

802.11ac (VH40) & 802.11ac (VHT80)

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS
3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5) Sweep time = auto, trigger set to “free run”.
6) Trace average at least 100 traces in power averaging mode.
7) Record the max value and add 10 log (1/duty cycle)

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.3.6.

4.4.7 Test Results

For U-NII-1 Band

802.11a

Chan.	Chan. Freq. (MHz)	PSD (dBm)				Total Power Density (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
36	5180	4.80	4.89	5.05	5.52	11.09	12.98	Pass
40	5200	4.85	5.21	5.18	5.51	11.21	12.98	Pass
48	5240	4.83	5.31	4.87	5.16	11.07	12.98	Pass

Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 17-(10.02-6) = 12.98dBm.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm)				Total Power Density (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
36	5180	4.41	4.83	4.60	4.97	10.73	12.98	Pass
40	5200	4.38	5.26	4.61	5.04	10.86	12.98	Pass
48	5240	4.20	4.91	4.64	4.88	10.69	12.98	Pass

Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 17-(10.02-6) = 12.98dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor(dBm)				Duty Factor	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	-1.54	-1.38	-1.72	-0.88	0.16	4.82	12.98	Pass
46	5230	2.86	3.16	3.26	3.28	0.16	9.33	12.98	Pass

Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 17-(10.02-6) = 12.98dBm.

3. Refer to section 3.3 for duty cycle spectrum plot.

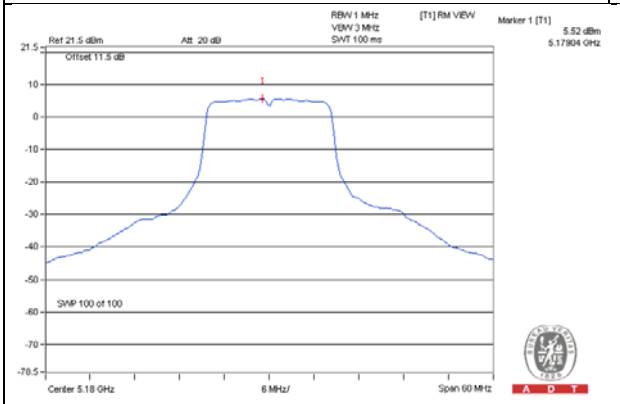
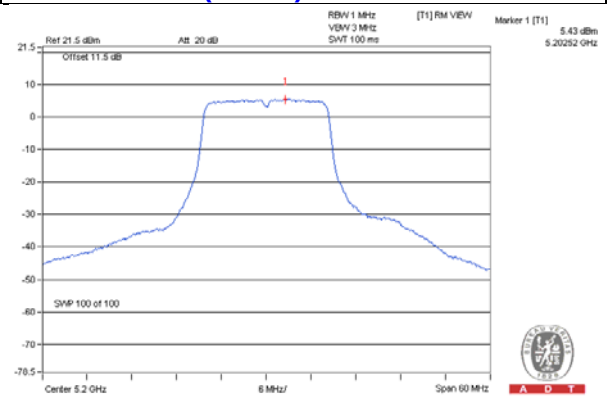
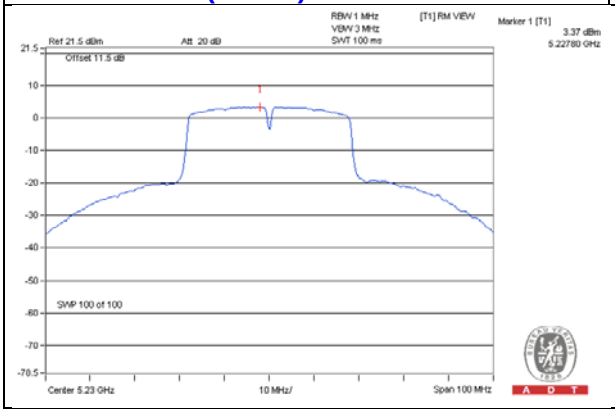
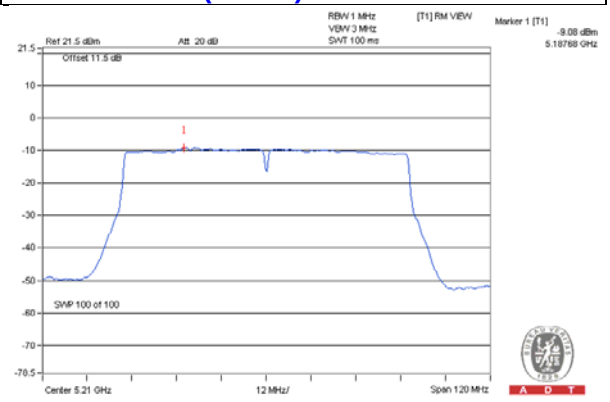
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor(dBm)				Duty Factor	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	-10.15	-9.82	-9.50	-9.08	0.27	-3.33	12.98	Pass

Note: 1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 17-(10.02-6) = 12.98dBm.

3. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE	
802.11a – Chain 3: CH 36	802.11ac (VHT20) – Chain 1: CH 40
	
802.11ac (VHT40) – Chain 3: CH 46	802.11ac (VHT80) – Chain 3: CH 42
	

For U-NII-3 Band

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-1.75	0.47	6.02	6.49	25.98	Pass
	157	5785	0.74	2.96	6.02	8.98	25.98	Pass
	165	5825	0.40	2.62	6.02	8.64	25.98	Pass
1	149	5745	-0.88	1.34	6.02	7.36	25.98	Pass
	157	5785	2.93	5.15	6.02	11.17	25.98	Pass
	165	5825	1.39	3.61	6.02	9.63	25.98	Pass
2	149	5745	-1.84	0.38	6.02	6.40	25.98	Pass
	157	5785	1.97	4.19	6.02	10.21	25.98	Pass
	165	5825	1.00	3.22	6.02	9.24	25.98	Pass
3	149	5745	-0.65	1.57	6.02	7.59	25.98	Pass
	157	5785	0.47	2.69	6.02	8.71	25.98	Pass
	165	5825	0.45	2.67	6.02	8.69	25.98	Pass

Note: 1. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 30-(10.02-6) = 25.98dBm.

802.11ac (VHT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-2.03	0.19	6.02	6.21	25.98	Pass
	157	5785	0.16	2.38	6.02	8.40	25.98	Pass
	165	5825	-0.13	2.09	6.02	8.11	25.98	Pass
1	149	5745	-1.33	0.89	6.02	6.91	25.98	Pass
	157	5785	2.35	4.57	6.02	10.59	25.98	Pass
	165	5825	0.98	3.20	6.02	9.22	25.98	Pass
2	149	5745	-2.24	-0.02	6.02	6.00	25.98	Pass
	157	5785	1.30	3.52	6.02	9.54	25.98	Pass
	165	5825	0.47	2.69	6.02	8.71	25.98	Pass
3	149	5745	-0.88	1.34	6.02	7.36	25.98	Pass
	157	5785	0.18	2.40	6.02	8.42	25.98	Pass
	165	5825	0.08	2.30	6.02	8.32	25.98	Pass

Note: 1. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 30-(10.02-6) = 25.98dBm.

802.11ac (VHT40)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-7.43	-5.21	6.02	0.16	0.97	25.98	Pass
	159	5795	-2.83	-0.61	6.02	0.16	5.57	25.98	Pass
1	151	5755	-6.71	-4.49	6.02	0.16	1.69	25.98	Pass
	159	5795	-1.79	0.43	6.02	0.16	6.61	25.98	Pass
2	151	5755	-7.62	-5.40	6.02	0.16	0.78	25.98	Pass
	159	5795	-2.50	-0.28	6.02	0.16	5.90	25.98	Pass
3	151	5755	-6.49	-4.27	6.02	0.16	1.91	25.98	Pass
	159	5795	-2.84	-0.62	6.02	0.16	5.56	25.98	Pass

Note: 1. Directional gain = 4dBi + 10log(4) = 10.02dBi > 6dBi , so the power density limit shall be reduced to 30-(10.02-6) = 25.98dBm.

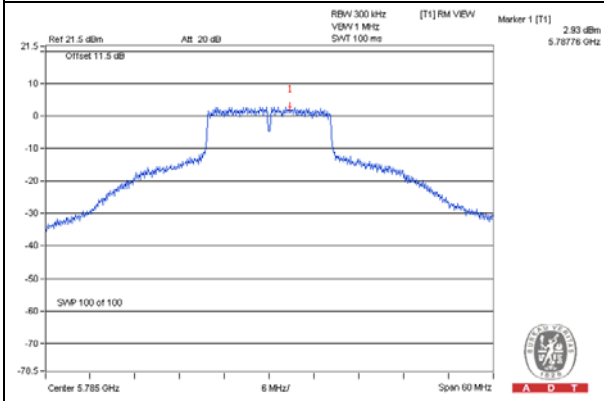
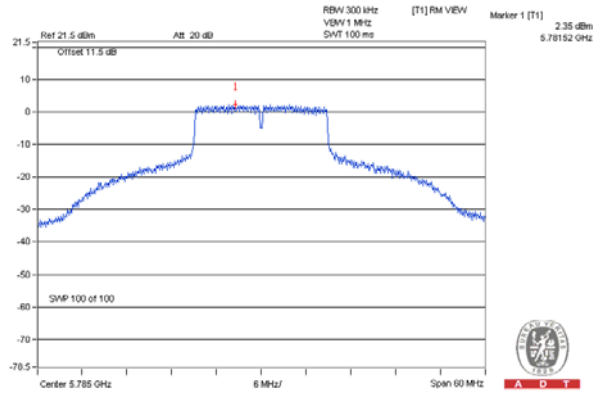
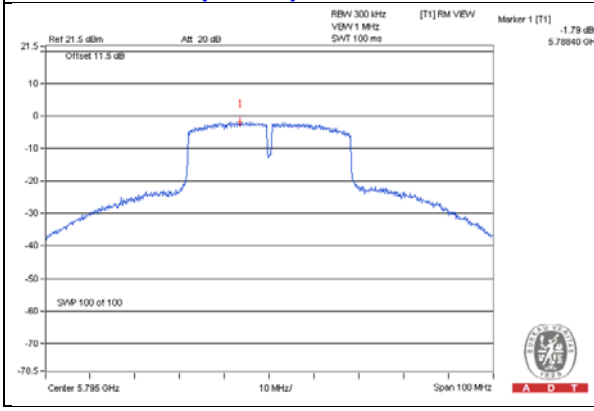
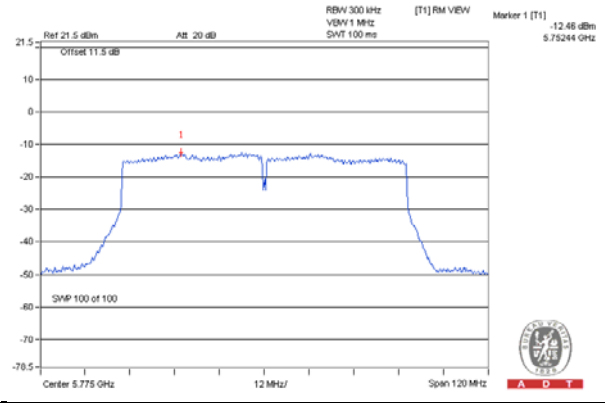
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-13.87	-11.65	6.02	0.27	-5.36	25.98	Pass
1	155	5775	-12.95	-10.73	6.02	0.27	-4.44	25.98	Pass
2	155	5775	-13.90	-11.68	6.02	0.27	-5.39	25.98	Pass
3	155	5775	-12.46	-10.24	6.02	0.27	-3.95	25.98	Pass

Note: 1. Directional gain = 5.97dBi + 10log(2) = 8.98dBi > 6dBi , so the power density limit shall be reduced to 30-(8.98-6) = 27.02dBm.

2. Refer to section 3.3 for duty cycle spectrum plot.

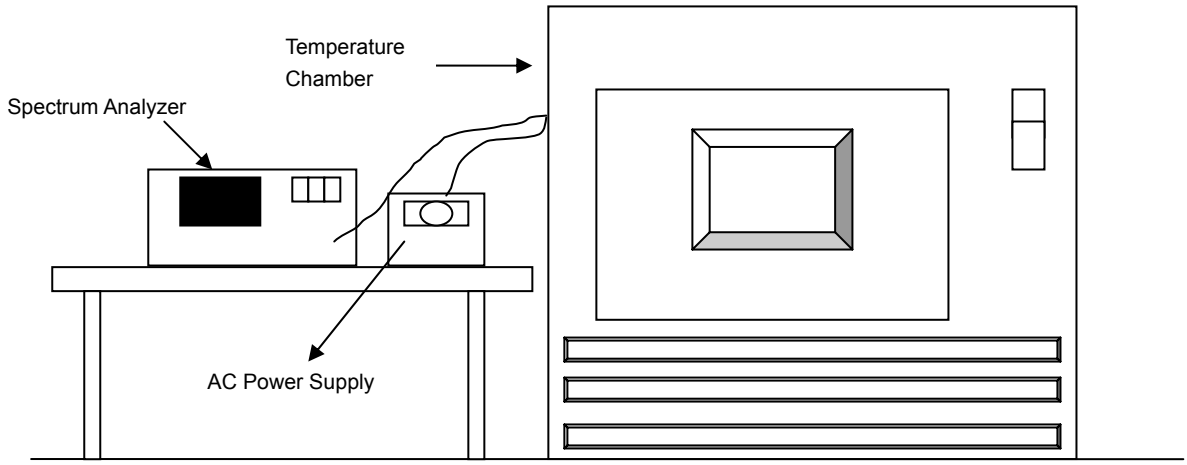
SPECTRUM PLOT OF WORST VALUE	
802.11a – Chain 1: CH 157	802.11ac (VHT20) – Chain 1: CH 157
	
802.11ac (VHT40) – Chain 1: CH 159	802.11ac (VHT80) – Chain 3: CH 155
	

4.5 Frequency Stability Measurement

4.5.1 Limits of Frequency Stability Measurement

The frequency of the carrier signal shall be maintained within band of operation

4.5.2 Test Setup



4.5.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Temperature & Humidity Chamber TERCHY	MHU-225AU	911033	Dec. 08, 2014	Dec. 07, 2015

Note:

NOTE: 1. The test was performed in Oven room 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Nov. 04, 2015

4.5.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. 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.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Set the EUT transmit at un-modulation mode to test frequency stability.

4.5.7 Test Results

FREQUEMCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5180MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5179.9856	-0.00028	5179.9879	-0.00023	5179.9856	-0.00028	5179.9872	-0.00025
40	120	5180.0171	0.00033	5180.0188	0.00036	5180.0195	0.00038	5180.0207	0.00040
30	120	5180.0022	0.00004	5180.0065	0.00013	5180.0031	0.00006	5180.0066	0.00013
20	120	5179.9911	-0.00017	5179.9879	-0.00023	5179.9913	-0.00017	5179.9922	-0.00015
10	120	5180.006	0.00012	5180.0053	0.00010	5180.0045	0.00009	5180.0033	0.00006
0	120	5180.0187	0.00036	5180.0223	0.00043	5180.0192	0.00037	5180.0204	0.00039
-10	120	5180.004	0.00008	5180.0049	0.00009	5180.0034	0.00007	5180.005	0.00010
-20	120	5179.9807	-0.00037	5179.9788	-0.00041	5179.9815	-0.00036	5179.9793	-0.00040
-30	120	5180.0223	0.00043	5180.0234	0.00045	5180.0224	0.00043	5180.0223	0.00043

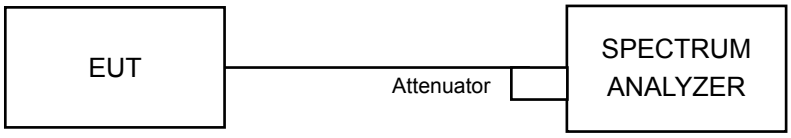
FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5180MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5179.9906	-0.00018	5179.9871	-0.00025	5179.9916	-0.00016	5179.9924	-0.00015
	120	5179.9911	-0.00017	5179.9879	-0.00023	5179.9913	-0.00017	5179.9922	-0.00015
	102	5179.9915	-0.00016	5179.9873	-0.00025	5179.9906	-0.00018	5179.9919	-0.00016

4.6 6dB Bandwidth Measurment

4.6.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.6.2 Test Setup



4.6.3 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSP40	100036	Jan. 22, 2015	Jan. 21, 2016

Note:

NOTE: 1. The test was performed in Oven room 1.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: Nov. 04, 2015

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

a. Set resolution bandwidth (RBW) = 100kHz
b. Set the video bandwidth (VBW) ≥ 3 x RBW, Detector = Peak.
c. Trace mode = max hold.
d. Sweep = auto couple.
e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

4.6.5 Deviation from Test Standard
No deviation.

4.6.6 EUT Operating Condition

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

4.6.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.31	16.31	16.37	16.38	0.5	Pass
157	5785	15.22	15.92	15.14	16.29	0.5	Pass
165	5825	15.24	16.07	16.01	15.75	0.5	Pass

802.11ac (VHT20)

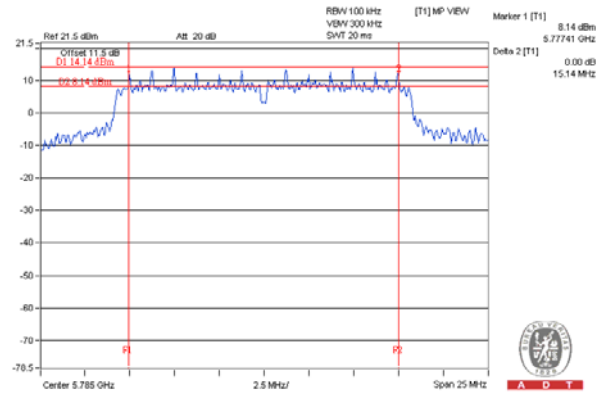
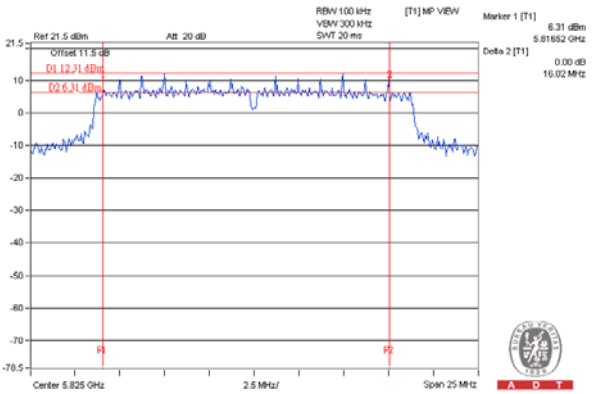
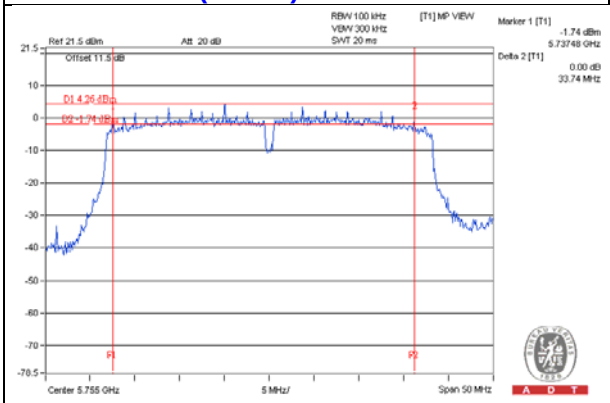
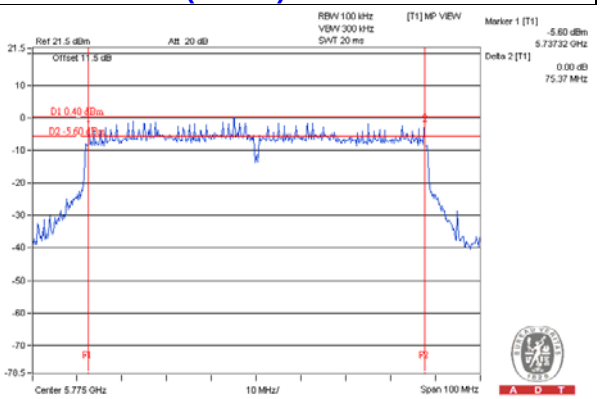
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	17.27	16.34	17.58	16.58	0.5	Pass
157	5785	17.18	17.51	17.56	16.89	0.5	Pass
165	5825	16.02	16.56	16.94	17.31	0.5	Pass

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	35.17	33.86	33.74	33.82	0.5	Pass
159	5795	35.10	35.10	34.01	34.76	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	75.43	75.40	75.40	75.37	0.5	Pass

SPECTRUM PLOT OF WORST VALUE	
802.11a – Chain 2: CH 157	802.11ac (VHT20) – Chain 0: CH 165
	
802.11ac (VHT40) – Chain 2: CH 151	802.11ac (VHT80) – Chain 3: CH 155
	

5 Pictures of Test Arrangements

Please refer to the attached file (Test Setup Photo).

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

Linko EMC/RF Lab
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Hsin Chu EMC/RF Lab/Telecom Lab
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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

The address and road map of all our labs can be found in our web site also.

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