FCC TEST REPORT (15.407)

REPORT NO.:	RF141003E10-1
MODEL NO.:	EX6150
FCC ID:	PY314300283
RECEIVED:	Oct. 03, 2014
TESTED:	Oct. 09 to Dec. 09, 2014
ISSUED:	Jan. 12, 2015

APPLICANT:	NETGEAR, Inc.
ADDRESS:	350 East Plumeria Drive San Jose, CA 95134

ISSUED BY:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
LAB ADDRESS :	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (1):	No. 81-1, Lu Liao Keng, 9th Ling, Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.
TEST LOCATION (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan, R.O.C.

This report should not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
RF141003E10-1	Original release	Jan. 12, 2015

1. CERTIFICATION

PRODUCT:	AC1200 WiFi Range Extender
BRAND NAME:	NETGEAR
MODEL NO.:	EX6150
TEST SAMPLE:	ENGINEERING SAMPLE
APPLICANT:	NETGEAR, Inc.
TESTED:	Oct. 09 to Dec. 09, 2014
STANDARDS:	**FCC Part 15, Subpart E (Section 15.407)**
	ANSI C63.10-2009

The above equipment (Model: EX6150) 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:** Jan. 12, 2015
(Lori Chung, Specialist)

Approved by : _____ , **Date:** Jan. 12, 2015
(May Chen, Manager)

2. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 15, SUBPART E (SECTION 15.407)			
STANDARD SECTION	**TEST TYPE**	**RESULT**	**REMARK**
15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -14.93dB at 0.21634MHz
15.407 (b)(1/2/3/4/6)	Radiated Emissions & Band Edge Measurement	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5150.00MHz
15.407(a/1/2/3)	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(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex not a standard connector.

NOTE: 1. The EUT was operating in 2.400 ~ 2.4835GHz, 5.15~5.25GHz and 5.725~5.850GHz frequencies band. This report was recorded the RF parameters including 5.15~5.25GHz. For the 2.400 ~ 2.4835GHz and 5.725~5.850GHz 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:

This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Measurement	Value
Conducted emissions	2.86 dB
Radiated emissions (30MHz-1GHz)	5.37 dB
Radiated emissions (1GHz -6GHz)	3.65 dB
Radiated emissions (6GHz -18GHz)	3.88 dB
Radiated emissions (18GHz -40GHz)	4.11 dB

3. GENERAL INFORMATION

3.1 GENERAL DESCRIPTION OF EUT

PRODUCT	AC1200 WiFi Range Extender
MODEL NO.	EX6150
POWER SUPPLY	AC 100-240V, 0.2A, 50-60Hz
MODULATION TYPE	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
MODULATION TECHNOLOGY	DSSS,OFDM
TRANSFER RATE	802.11b: up to 11Mbps 802.11a / g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
OPERATING FREQUENCY	**For 15.407** **5GHz:** 5.18 ~ 5.24GHz
	For 15.247 **2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.745 ~ 5.825GHz
NUMBER OF CHANNEL	**For 15.407** 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
	For 15.247 **2.4GHz:** 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) **5GHz:** 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)

MAXIMUM OUTPUT POWER	**For 15.407** 802.11a: 303.086mW 802.11ac (VHT20): 299.592mW 802.11ac (VHT40): 266.722mW 802.11ac (VHT80): 58.423mW **For 15.247 (2.4GHz)** 802.11b: 212.595mW 802.11g: 616.801mW 802.11n (HT20): 471.291mW 802.11n (HT40): 122.807mW **For 15.247 (5GHz)** 802.11a: 333.071mW 802.11ac (VHT20): 329.636mW 802.11ac (VHT40): 329.259mW 802.11ac (VHT80): 270.487mW
ANTENNA TYPE	Refer to note as below
DATA CABLE	NA
I/O PORTS	Refer to user's manual
ASSOCIATED DEVICES	NA

Note:

1. 2.4GHz and 5GHz technology can transmit at same time.
2. The antennas provided to the EUT, please refer to the following table:

PCB Chain No.	Brand	Model	Antenna Gain(dBi) < including cable loss>	Frequency range (MHz ~ MHz)	Antenna Type	Connecter Type	Cable Length (mm)
Chain 0	NETGEAR	NA	3.1	2400~2500	Dipole	i-pex	50
			2.7	5150~5250			
			2.9	5250~5350			
			2.2	5470~5725			
			2.6	5725~5850			
Chain 1	NETGEAR	NA	3.1	2400~2500	Dipole	i-pex	50
			2.7	5150~5250			
			2.9	5250~5350			
			2.2	5470~5725			
			2.6	5725~5850			

3. The EUT incorporates a MIMO function.

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

Note: 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. (Final test mode refer section 3.2.1)

4. The above EUT information was declared by the manufacturer and for more detailed features description, please refer to the manufacturer's specifications or User's Manual.

3.2 DESCRIPTION OF TEST MODES

Operated in 5150 ~ 5250MHz band:

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	5210 MHz

3.2.1 TEST MODE APPLICABILITY AND TESTED CHANNEL DETAIL

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	PLC	RE < 1G	RE ≥ 1G	APCM	
-	√	√	√	√	-

Where **PLC:** Power Line Conducted Emission **RE < 1G:** Radiated Emission below 1GHz

RE ≥ 1G: Radiated Emission above 1GHz **APCM:** Antenna Port Conducted Measurement

Note:

The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Y-plane.**

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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT40)	38 to 46	46	OFDM	BPSK	13.5

RADIATED EMISSION TEST (BELOW 1 GHz):

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11ac (VHT40)	38 to 46	46	OFDM	BPSK	13.5

RADIATED EMISSION TEST (ABOVE 1 GHz):

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	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

ANTENNA PORT CONDUCTED MEASUREMENT:

☒ 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.

MODE	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
802.11a	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

TEST CONDITION:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
PLC	25deg. C, 70%RH	120Vac, 60Hz	Mike Hsieh
RE<1G	22deg. C, 69%RH	120Vac, 60Hz	Tim Ho
RE≥1G	22deg. C, 67%RH	120Vac, 60Hz	Tim Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 GENERAL DESCRIPTION OF APPLIED STANDARDS

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)

789033 D02 General UNII Test Procedures New Rules v01

662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2009

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

3.4 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.

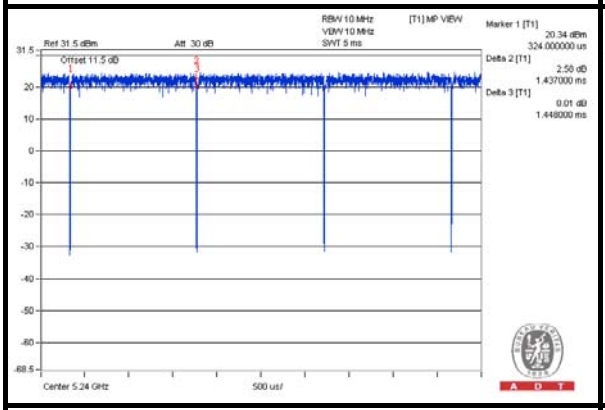
802.11a: Duty cycle = 1.437 ms/1.448 ms = 0.992

802.11ac (VHT20): Duty cycle = 1.359 ms/1.369 ms = 0.993

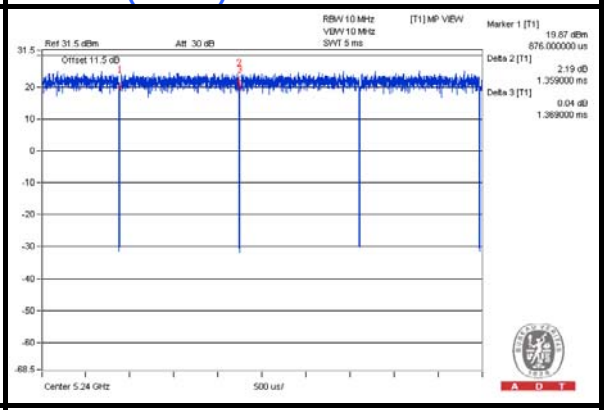
802.11ac (VHT40): Duty cycle = 0.673 ms/0.684 ms = 0.984

802.11ac (VHT80): Duty cycle = 0.33 ms/0.341 ms = 0.968, Duty factor = 10 * log(1/0.968) = 0.14

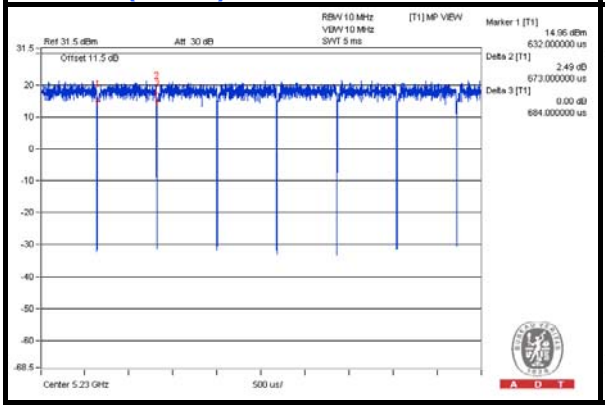
802.11a



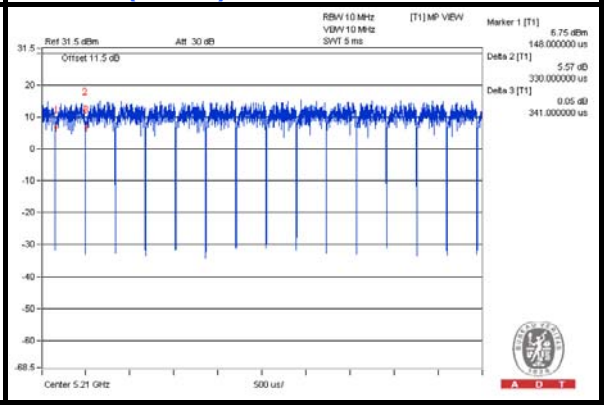
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.5 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.

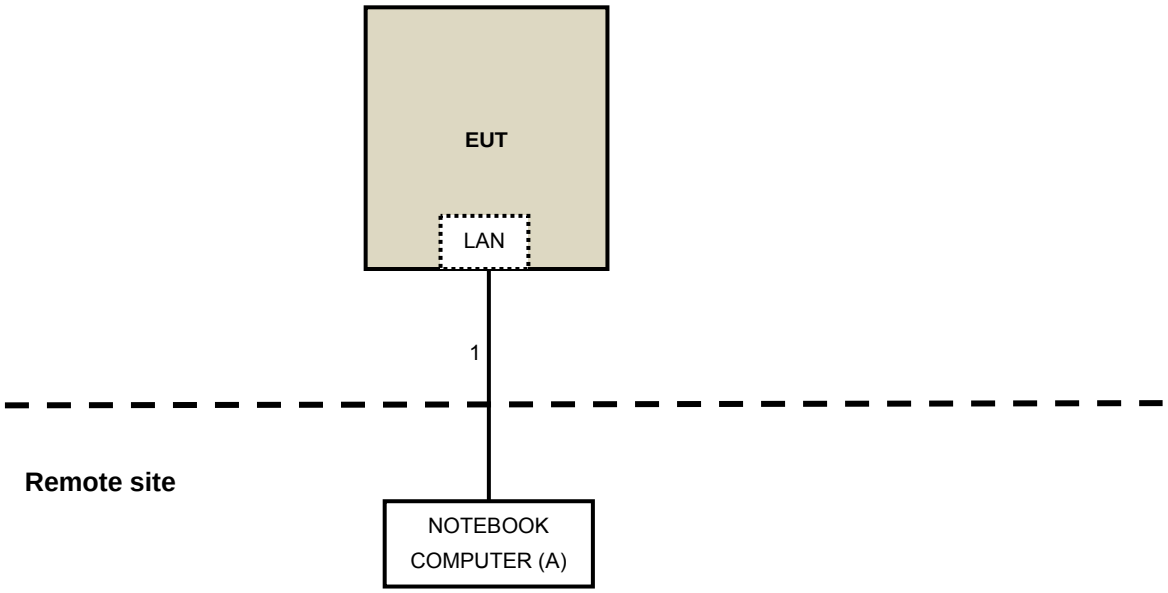
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	NOTEBOOK COMPUTER	DELL	E5430	HYV4VY1	FCC DoC	Provided by Lab

NOTE:

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

No.	Cable	Qty.	Length (m)	Shielded (Yes/ No)	Cores (Number)	Remark
1	RJ-45	1	10	No	0	Provided by Lab

3.6 CONFIGURATION OF SYSTEM UNDER TEST



4. TEST TYPES AND RESULTS

4.1 CONDUCTED EMISSION MEASUREMENT

4.1.1 LIMITS OF CONDUCTED EMISSION MEASUREMENT

FREQUENCY OF EMISSION (MHz)	CONDUCTED LIMIT (dBμV)	
	Quasi-peak	Average
0.15-0.5 0.5-5 5-30	66 to 56 56 60	56 to 46 46 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 0.50 MHz.

4.1.2 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver ROHDE & SCHWARZ	ESCS 30	100375	Apr. 29, 2014	Apr. 28, 2015
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) ROHDE & SCHWARZ	ENV216	100071	Nov. 10, 2014	Nov. 09, 2015
RF Cable (JYEBAO)	5DFB	COCCAB-001	Mar. 10, 2014	Mar. 09, 2015
50 ohms Terminator	N/A	EMC-03	Sep. 22, 2014	Sep. 21, 2015
50 ohms Terminator	N/A	EMC-02	Sep. 30, 2014	Sep. 29, 2015
Software ADT	BV ADT_Cond_V7.3.7.3	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 Shielded Room No. C.
3 The VCCI Con C Registration No. is C-3611.
4 Tested Date: Nov. 17, 2014

4.1.3 TEST PROCEDURES

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.

b. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

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

d. The frequency range from 150kHz to 30MHz was searched. Emission level under (Limit – 20dB) was not recorded.

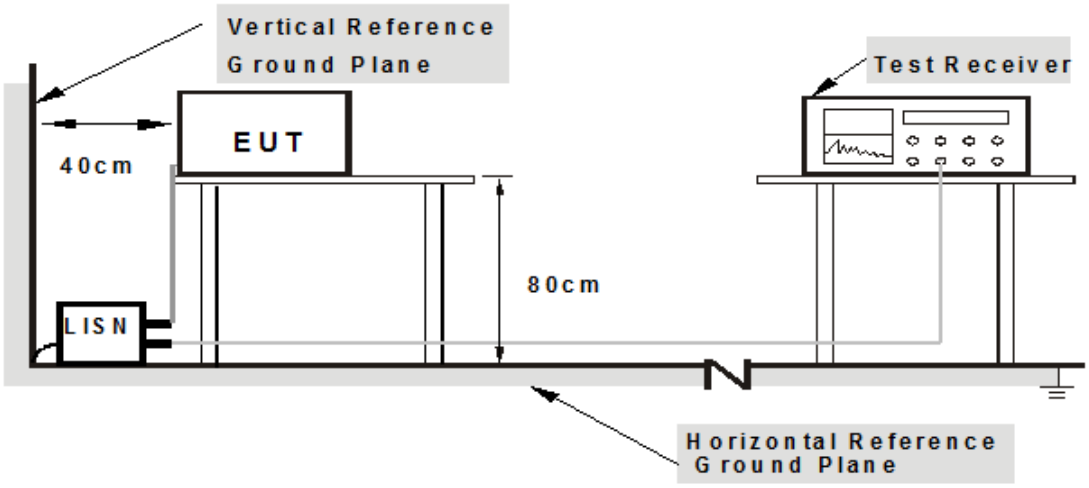
NOTE:

1. The resolution bandwidth of test receiver is 9kHz for Quasi-peak detection (QP) & Average detection (AV).

4.1.4 DEVIATION FROM TEST STANDARD

No deviation

4.1.5 TEST SETUP



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.1.6 EUT OPERATING CONDITIONS

1. Placed the EUT on testing table.
2. Prepared computer system (support unit A) to act as communication partner.
3. The communication partner ran test program “(MT76xxE_AP.exe)” to enable EUT under transmission/receiving condition continuously.

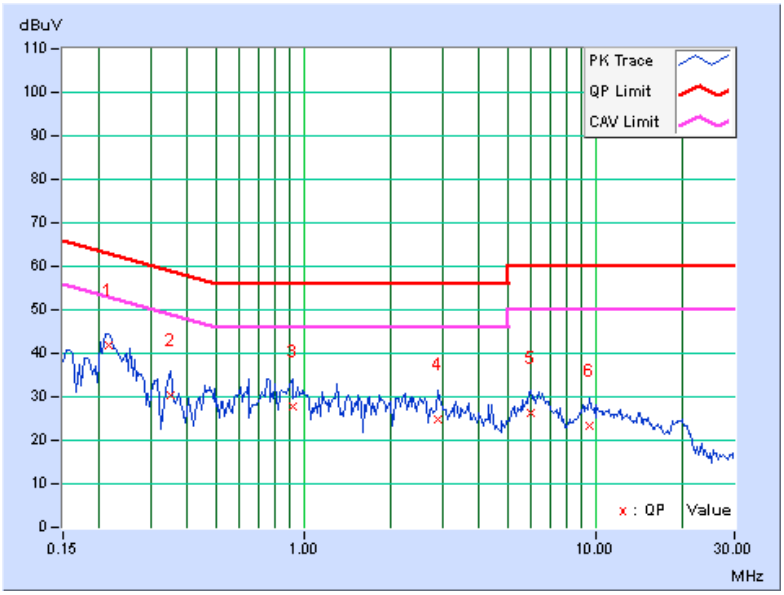
4.1.7 TEST RESULTS

PHASE	Line (L)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.21634**	**0.07**	**41.95**	**37.96**	**42.02**	**38.03**	**62.96**	**52.96**	**-20.94**	**-14.93**
2	0.34922	0.08	30.32	24.14	30.40	24.22	58.98	48.98	-28.58	-24.76
3	0.91563	0.12	27.82	18.99	27.94	19.11	56.00	46.00	-28.06	-26.89
4	2.90625	0.21	24.54	17.62	24.75	17.83	56.00	46.00	-31.25	-28.17
5	6.03906	0.32	26.04	20.70	26.36	21.02	60.00	50.00	-33.64	-28.98
6	9.54688	0.43	22.90	17.87	23.33	18.30	60.00	50.00	-36.67	-31.70

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

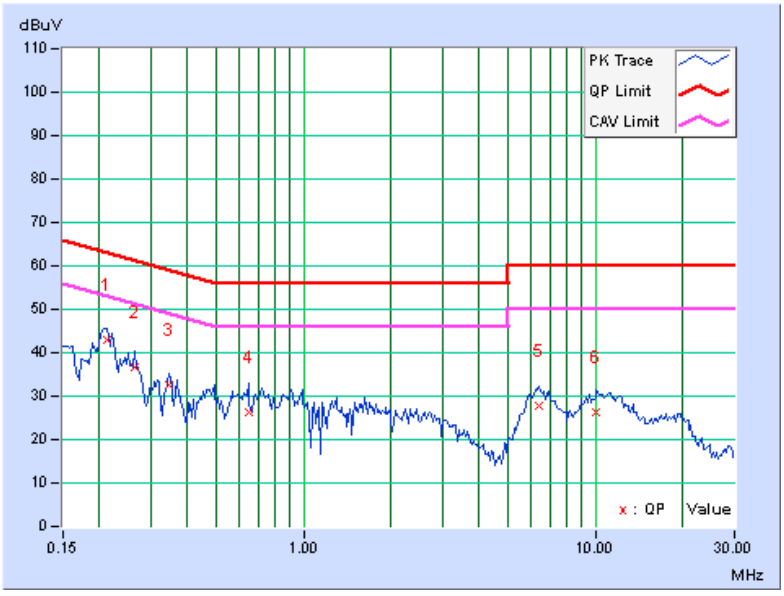


PHASE	Neutral (N)	DETECTOR FUNCTION	Quasi-Peak (QP) / Average (AV)

	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
No		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.21250	0.06	42.75	35.08	42.81	35.14	63.11	53.11	-20.30	-17.97
2	0.26328	0.07	36.65	25.46	36.72	25.53	61.33	51.33	-24.61	-25.80
3	0.34531	0.08	32.34	27.48	32.42	27.56	59.07	49.07	-26.65	-21.51
4	0.64609	0.11	26.04	15.52	26.15	15.63	56.00	46.00	-29.85	-30.37
5	6.37891	0.34	27.61	22.53	27.95	22.87	60.00	50.00	-32.05	-27.13
6	10.05859	0.46	25.86	20.18	26.32	20.64	60.00	50.00	-33.68	-29.36

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 RADIATED EMISSION AND BANDEDGE MEASUREMENT

4.2.1 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.

4.2.2 LIMITS OF UNWANTED EMISSION OUT OF THE RESTRICTED BANDS

APPLICABLE TO	LIMIT	
789033 D02 General UNII Test Procedures New Rules v01	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).

4.2.3 TEST INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
MXE EMI Receiver Agilent	N9038A	MY51210105	July 21, 2014	July 20, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-03	Nov. 13, 2013	Nov. 12, 2014
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-360	Feb. 26, 2014	Feb. 25, 2015
RF Cable	NA	CHGCAB_001	Oct. 04, 2014	Oct. 03, 2015
Horn_Antenna AISI	AIH.8018	0000320091110	Aug. 27, 2014	Aug. 26, 2015
Pre-Amplifier Agilent	8449B	3008A02578	June 24, 2014	June 23, 2015
RF Cable	NA	131205 131214 SNMY23684/4	Jan. 17, 2014	Jan. 16, 2015
Spectrum Analyzer R&S	FSV40	100964	July 05, 2014	July 04, 2015
Pre-Amplifier SPACEK LABS	SLKKa-48-6	9K16	Nov. 13, 2013	Nov. 12, 2014
Horn_Antenna SCHWARZBECK	BBHA 9170	9170-424	Aug. 26, 2014	Aug. 25, 2015
RF Cable	NA	RF104-121 RF104-204	Dec. 12, 2013	Dec. 11, 2014
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 horn antenna, preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3 The test was performed in 966 Chamber No. G.
4. The FCC Site Registration No. is 966073.
5 The VCCI Site Registration No. is G-137.
6 The CANADA Site Registration No. is IC 7450H-2.
7 Tested Date: Oct. 09 to 31, 2014

4.2.4 TEST PROCEDURES

a. The EUT was placed on the top of a rotating table 0.8 meters 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:

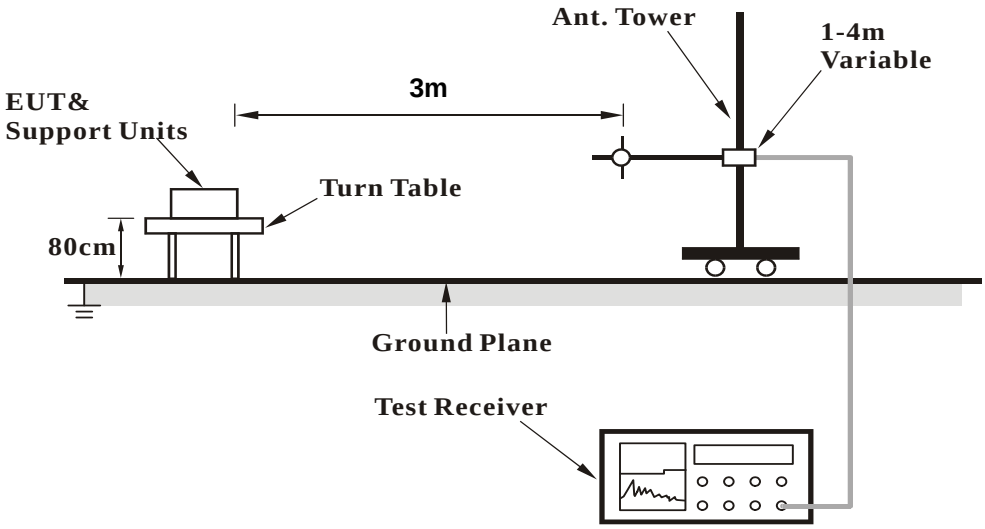
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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.

4.2.5 DEVIATION FROM TEST STANDARD

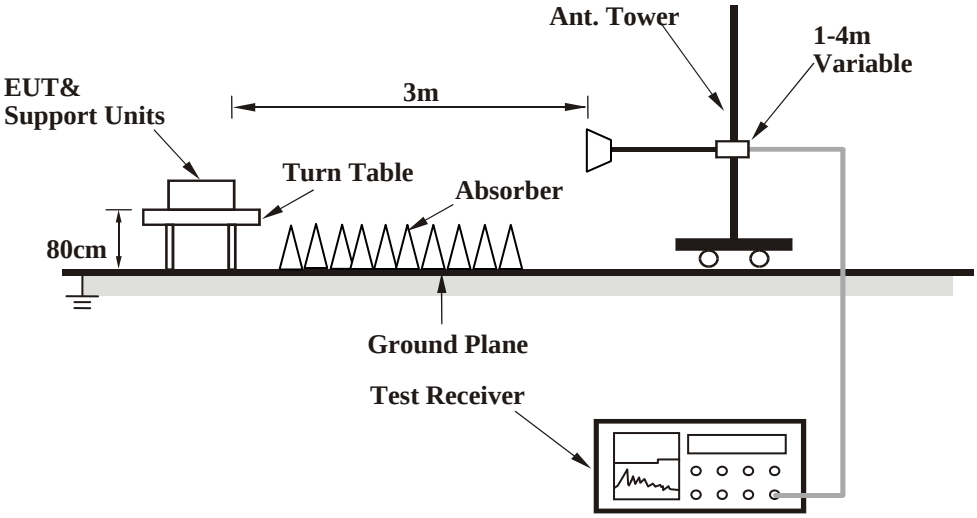
No deviation

4.2.6 TEST SETUP

<Frequency Range below 1GHz>



<Frequency Range above 1GHz>



For the actual test configuration, please refer to the related item – Photographs of the Test Configuration.

4.2.7 EUT OPERATING CONDITION

Same as 4.1.6

4.2.8 TEST RESULTS

BELOW 1GHz WORST-CASE DATA

802.11ac (VHT40)

CHANNEL	TX Channel 46	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	82.33	27.4 QP	40.0	-12.6	2.00 H	45	46.20	-18.76
2	144.95	27.8 QP	43.5	-15.8	2.00 H	259	41.08	-13.33
3	219.20	27.5 QP	46.0	-18.5	1.50 H	268	43.65	-16.14
4	374.98	26.6 QP	46.0	-19.4	1.00 H	209	36.85	-10.24
5	500.01	32.0 QP	46.0	-14.0	2.00 H	225	39.33	-7.36
6	799.99	26.6 QP	46.0	-19.4	1.00 H	146	28.05	-1.41
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	40.77	36.1 QP	40.0	-4.0	1.00 V	201	49.78	-13.73
2	70.69	33.8 QP	40.0	-6.2	1.00 V	211	49.50	-15.68
3	82.48	30.2 QP	40.0	-9.8	1.50 V	116	48.97	-18.78
4	375.03	30.7 QP	46.0	-15.3	1.00 V	169	40.95	-10.23
5	500.01	34.2 QP	46.0	-11.8	1.00 V	261	41.52	-7.36
6	924.00	31.0 QP	46.0	-15.0	2.00 V	219	30.36	0.65

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

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	5100.00	52.3 PK	74.0	-21.7	1.16 H	355	48.17	4.13
2	5100.00	47.8 AV	54.0	-6.2	1.16 H	355	43.67	4.13
3	5150.00	58.2 PK	74.0	-15.8	1.14 H	353	53.92	4.28
4	5150.00	48.4 AV	54.0	-5.6	1.14 H	353	44.12	4.28
5	*5180.00	107.6 PK			1.14 H	353	103.21	4.39
6	*5180.00	98.0 AV			1.14 H	353	93.61	4.39
7	#10360.00	54.8 PK	74.0	-19.2	1.02 H	115	44.74	10.06
8	#10360.00	41.9 AV	54.0	-12.1	1.02 H	115	31.84	10.06
9	15540.00	60.9 PK	74.0	-13.1	1.44 H	116	46.06	14.84
10	15540.00	48.5 AV	54.0	-5.5	1.44 H	116	33.66	14.84
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	69.2 PK	74.0	-4.8	1.10 V	6	64.92	4.28
2	5150.00	53.6 AV	54.0	-0.4	1.10 V	6	49.32	4.28
3	*5180.00	114.9 PK			1.10 V	6	110.51	4.39
4	*5180.00	105.5 AV			1.10 V	6	101.11	4.39
5	#10360.00	54.4 PK	74.0	-19.6	1.20 V	151	44.34	10.06
6	#10360.00	41.9 AV	54.0	-12.1	1.20 V	151	31.84	10.06
7	15540.00	60.7 PK	74.0	-13.3	1.00 V	157	45.86	14.84
8	15540.00	48.6 AV	54.0	-5.4	1.00 V	157	33.76	14.84

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	5120.00	52.2 PK	74.0	-21.8	1.15 H	343	48.02	4.18
2	5120.00	46.5 AV	54.0	-7.5	1.15 H	343	42.32	4.18
3	*5200.00	107.9 PK			1.15 H	343	103.46	4.44
4	*5200.00	97.3 AV			1.15 H	343	92.86	4.44
5	#10400.00	54.9 PK	74.0	-19.1	1.06 H	108	44.83	10.07
6	#10400.00	42.3 AV	54.0	-11.7	1.06 H	108	32.23	10.07
7	15600.00	61.6 PK	74.0	-12.4	1.44 H	126	46.54	15.06
8	15600.00	49.0 AV	54.0	-5.0	1.44 H	126	33.94	15.06
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	5120.00	62.2 PK	74.0	-11.8	1.12 V	8	58.02	4.18
2	5120.00	52.9 AV	54.0	-1.1	1.12 V	8	48.72	4.18
3	*5200.00	115.2 PK			1.12 V	8	110.76	4.44
4	*5200.00	104.8 AV			1.12 V	8	100.36	4.44
5	#10400.00	54.1 PK	74.0	-19.9	1.15 V	146	44.03	10.07
6	#10400.00	41.8 AV	54.0	-12.2	1.15 V	146	31.73	10.07
7	15600.00	60.6 PK	74.0	-13.4	1.00 V	143	45.54	15.06
8	15600.00	48.7 AV	54.0	-5.3	1.00 V	143	33.64	15.06

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

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	5120.00	52.3 PK	74.0	-21.7	1.10 H	341	48.12	4.18
2	5120.00	46.7 AV	54.0	-7.3	1.10 H	341	42.52	4.18
3	*5240.00	108.0 PK			1.10 H	341	103.59	4.41
4	*5240.00	97.5 AV			1.10 H	341	93.09	4.41
5	5361.00	52.0 PK	74.0	-22.0	1.10 H	341	47.46	4.54
6	5361.00	46.5 AV	54.0	-7.5	1.10 H	341	41.96	4.54
7	#10480.00	54.9 PK	74.0	-19.1	1.08 H	94	44.64	10.26
8	#10480.00	42.4 AV	54.0	-11.6	1.08 H	94	32.14	10.26
9	15720.00	61.6 PK	74.0	-12.4	1.46 H	120	46.93	14.67
10	15720.00	49.2 AV	54.0	-4.8	1.46 H	120	34.53	14.67
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	5120.00	62.3 PK	74.0	-11.7	1.12 V	36	58.12	4.18
2	5120.00	52.8 AV	54.0	-1.2	1.12 V	36	48.62	4.18
3	*5240.00	115.4 PK			1.12 V	2	110.99	4.41
4	*5240.00	104.9 AV			1.12 V	2	100.49	4.41
5	5361.00	62.1 PK	74.0	-11.9	1.12 V	38	57.56	4.54
6	5361.00	51.2 AV	54.0	-2.8	1.12 V	38	46.66	4.54
7	#10480.00	54.4 PK	74.0	-19.6	1.16 V	133	44.14	10.26
8	#10480.00	42.0 AV	54.0	-12.0	1.16 V	133	31.74	10.26
9	15720.00	60.7 PK	74.0	-13.3	1.03 V	137	46.03	14.67
10	15720.00	48.5 AV	54.0	-5.5	1.03 V	137	33.83	14.67

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	5100.00	53.5 PK	74.0	-20.5	1.15 H	348	46.95	6.55
2	5100.00	48.4 AV	54.0	-5.6	1.15 H	348	41.85	6.55
3	5150.00	66.5 PK	74.0	-7.5	1.12 H	352	59.70	6.80
4	5150.00	46.6 AV	54.0	-7.4	1.12 H	352	39.80	6.80
5	*5180.00	109.4 PK			1.12 H	352	102.45	6.95
6	*5180.00	99.3 AV			1.12 H	352	92.35	6.95
7	#10360.00	54.9 PK	74.0	-19.1	1.03 H	94	41.79	13.11
8	#10360.00	42.5 AV	54.0	-11.5	1.03 H	94	29.39	13.11
9	15540.00	61.6 PK	74.0	-12.4	1.43 H	110	42.91	18.69
10	15540.00	49.3 AV	54.0	-4.7	1.43 H	110	30.61	18.69
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	5100.00	63.6 PK	74.0	-10.4	1.18 V	82	59.47	4.13
2	5100.00	52.9 AV	54.0	-1.1	1.18 V	82	48.77	4.13
3	5150.00	70.6 PK	74.0	-3.4	1.18 V	83	66.32	4.28
4	5150.00	53.8 AV	54.0	-0.2	1.18 V	83	49.52	4.28
5	*5180.00	116.7 PK			1.16 V	83	112.31	4.39
6	*5180.00	106.8 AV			1.16 V	83	102.41	4.39
7	#10360.00	54.7 PK	74.0	-19.3	1.14 V	141	44.64	10.06
8	#10360.00	42.1 AV	54.0	-11.9	1.14 V	141	32.04	10.06
9	15540.00	60.8 PK	74.0	-13.2	1.02 V	149	45.96	14.84
10	15540.00	48.8 AV	54.0	-5.2	1.02 V	149	33.96	14.84

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	5120.00	52.1 PK	74.0	-21.9	1.10 H	343	47.92	4.18
2	5120.00	48.2 AV	54.0	-5.8	1.10 H	343	44.02	4.18
3	*5200.00	108.3 PK			1.12 H	357	103.86	4.44
4	*5200.00	98.5 AV			1.12 H	357	94.06	4.44
5	#10400.00	55.0 PK	74.0	-19.0	1.07 H	84	44.93	10.07
6	#10400.00	42.4 AV	54.0	-11.6	1.07 H	84	32.33	10.07
7	15600.00	61.3 PK	74.0	-12.7	1.37 H	100	46.24	15.06
8	15600.00	48.9 AV	54.0	-5.1	1.37 H	100	33.84	15.06
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	5120.00	63.3 PK	74.0	-10.7	1.06 V	83	59.12	4.18
2	5120.00	52.8 AV	54.0	-1.2	1.06 V	83	48.62	4.18
3	*5200.00	115.6 PK			1.15 V	82	111.16	4.44
4	*5200.00	106.0 AV			1.15 V	82	101.56	4.44
5	#10400.00	55.0 PK	74.0	-19.0	1.10 V	148	44.93	10.07
6	#10400.00	42.4 AV	54.0	-11.6	1.10 V	148	32.33	10.07
7	15600.00	61.3 PK	74.0	-12.7	1.05 V	152	46.24	15.06
8	15600.00	49.2 AV	54.0	-4.8	1.05 V	152	34.14	15.06

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

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	5120.00	51.2 PK	74.0	-22.8	1.07 H	342	47.02	4.18
2	5120.00	48.0 AV	54.0	-6.0	1.07 H	342	43.82	4.18
3	*5240.00	109.3 PK			1.07 H	342	104.89	4.41
4	*5240.00	99.2 AV			1.07 H	342	94.79	4.41
5	5360.00	52.1 PK	74.0	-21.9	1.18 H	228	47.56	4.54
6	5360.00	48.3 AV	54.0	-5.7	1.18 H	228	43.76	4.54
7	#10480.00	55.2 PK	74.0	-18.8	1.06 H	79	44.94	10.26
8	#10480.00	42.5 AV	54.0	-11.5	1.06 H	79	32.24	10.26
9	15720.00	61.8 PK	74.0	-12.2	1.42 H	95	47.13	14.67
10	15720.00	49.2 AV	54.0	-4.8	1.42 H	95	34.53	14.67
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	5120.00	61.4 PK	74.0	-12.6	1.06 V	83	57.22	4.18
2	5120.00	52.5 AV	54.0	-1.5	1.06 V	83	48.32	4.18
3	*5240.00	116.4 PK			1.03 V	78	111.99	4.41
4	*5240.00	106.6 AV			1.03 V	78	102.19	4.41
5	5360.00	61.8 PK	74.0	-12.2	1.25 V	80	57.26	4.54
6	5360.00	51.1 AV	54.0	-2.9	1.25 V	80	46.56	4.54
7	#10480.00	55.5 PK	74.0	-18.5	1.04 V	163	45.24	10.26
8	#10480.00	42.7 AV	54.0	-11.3	1.04 V	163	32.44	10.26
9	15720.00	61.8 PK	74.0	-12.2	1.09 V	137	47.13	14.67
10	15720.00	49.4 AV	54.0	-4.6	1.09 V	137	34.73	14.67

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	60.8 PK	74.0	-13.2	1.07 H	341	54.00	6.80
2	#5150.00	50.4 AV	54.0	-3.6	1.07 H	341	43.60	6.80
3	*5190.00	102.3 PK			1.07 H	341	95.30	7.00
4	*5190.00	92.0 AV			1.07 H	341	85.00	7.00
5	#10380.00	55.2 PK	74.0	-18.8	1.02 H	78	42.03	13.17
6	#10380.00	42.5 AV	54.0	-11.5	1.02 H	78	29.33	13.17
7	#15570.00	62.0 PK	74.0	-12.0	1.37 H	84	43.31	18.69
8	#15570.00	49.6 AV	54.0	-4.4	1.37 H	84	30.91	18.69
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	71.0 PK	74.0	-3.0	1.10 V	4	64.20	6.80
2	**#5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.10 V**	**4**	**47.10**	**6.80**
3	*5190.00	109.3 PK			1.10 V	4	102.30	7.00
4	*5190.00	99.5 AV			1.10 V	4	92.50	7.00
5	#10380.00	56.0 PK	74.0	-18.0	1.03 V	163	42.83	13.17
6	#10380.00	43.0 AV	54.0	-11.0	1.03 V	163	29.83	13.17
7	#15570.00	61.8 PK	74.0	-12.2	1.05 V	136	43.11	18.69
8	#15570.00	49.3 AV	54.0	-4.7	1.05 V	136	30.61	18.69

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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	58.3 PK	74.0	-15.7	1.06 H	333	51.50	6.80
2	5150.00	48.4 AV	54.0	-5.6	1.06 H	333	41.60	6.80
3	*5230.00	104.4 PK			1.06 H	333	97.28	7.12
4	*5230.00	94.8 AV			1.06 H	333	87.68	7.12
5	5350.00	55.4 PK	74.0	-18.6	1.06 H	333	47.91	7.49
6	5350.00	46.3 AV	54.0	-7.7	1.06 H	333	38.81	7.49
7	#10460.00	55.7 PK	74.0	-18.3	1.01 H	93	42.52	13.18
8	#10460.00	42.9 AV	54.0	-11.1	1.01 H	93	29.72	13.18
9	15690.00	62.1 PK	74.0	-11.9	1.32 H	95	43.72	18.38
10	15690.00	49.6 AV	54.0	-4.4	1.32 H	95	31.22	18.38
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	60.7 PK	74.0	-13.3	1.27 V	317	53.90	6.80
2	5150.00	53.8 AV	54.0	-0.2	1.27 V	317	47.00	6.80
3	*5230.00	111.7 PK			1.27 V	317	104.58	7.12
4	*5230.00	102.3 AV			1.27 V	317	95.18	7.12
5	5350.00	57.6 PK	74.0	-16.4	1.27 V	317	50.11	7.49
6	5350.00	44.8 AV	54.0	-9.2	1.27 V	317	37.31	7.49
7	#10460.00	56.5 PK	74.0	-17.5	1.05 V	164	43.32	13.18
8	#10460.00	43.4 AV	54.0	-10.6	1.05 V	164	30.22	13.18
9	15690.00	62.1 PK	74.0	-11.9	1.10 V	131	43.72	18.38
10	15690.00	49.4 AV	54.0	-4.6	1.10 V	131	31.02	18.38

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	65.4 PK	74.0	-8.6	1.02 H	319	58.60	6.80
2	5150.00	51.6 AV	54.0	-2.4	1.02 H	319	44.80	6.80
3	*5210.00	99.3 PK			1.02 H	319	92.24	7.06
4	*5210.00	88.1 AV			1.02 H	319	81.04	7.06
5	#10420.00	56.0 PK	74.0	-18.0	1.01 H	93	42.80	13.20
6	#10420.00	43.1 AV	54.0	-10.9	1.01 H	93	29.90	13.20
7	15630.00	62.0 PK	74.0	-12.0	1.37 H	97	43.40	18.60
8	15630.00	49.2 AV	54.0	-4.8	1.37 H	97	30.60	18.60
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	67.8 PK	74.0	-6.2	1.08 V	7	61.00	6.80
2	5150.00	53.7 AV	54.0	-0.3	1.08 V	7	46.90	6.80
3	*5210.00	106.3 PK			1.08 V	7	99.24	7.06
4	*5210.00	95.2 AV			1.08 V	7	88.14	7.06
5	#10420.00	56.4 PK	74.0	-17.6	1.06 V	173	43.20	13.20
6	#10420.00	43.5 AV	54.0	-10.5	1.06 V	173	30.30	13.20
7	15630.00	62.1 PK	74.0	-11.9	1.08 V	125	43.50	18.60
8	15630.00	49.2 AV	54.0	-4.8	1.08 V	125	30.60	18.60

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.

4.3 TRANSMIT POWER MEASUREMENT

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)

Note: Where B is the 26dB emission bandwidth in MHz.

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

Array Gain = 0 dB (i.e., no array gain) for NANT ≤ 4;

Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;

Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20-MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/NSS) dB.

4.3.2 TEST INSTRUMENTS

FOR POWER OUTPUT MEASUREMENT

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Power meter Anritsu	ML2495A	1014008	Apr. 30, 2014	Apr. 29, 2015
Power sensor Anritsu	MA2411B	0917122	Apr. 30, 2014	Apr. 29, 2015

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. Tested date : Dec. 09, 2014

4.3.3 TEST PROCEDURE

FOR POWER OUTPUT MEASUREMENT

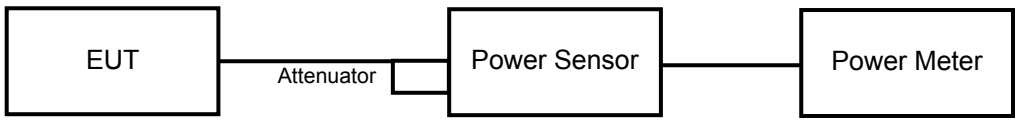
Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.4 DEVIATION FROM TEST STANDARD

No deviation

4.3.5 TEST SETUP

FOR POWER OUTPUT MEASUREMENT



4.3.6 EUT OPERATING CONDITIONS

The software provided by client to enable the EUT under transmission condition continuously at specific channel frequencies individually.

4.3.7 TEST RESULTS

POWER OUTPUT:

CHANNEL	FREQUENCY (MHz)	AVERAGE POWER (dBm)		TOTAL POWER (mW)	TOTAL POWER (dBm)	POWER LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
802.11a							
36	5180	21.81	21.75	301.329	24.79	30.00	PASS
40	5200	21.75	21.86	303.086	24.82	30.00	PASS
48	5240	21.79	21.67	297.901	24.74	30.00	PASS
802.11ac (VHT20)							
36	5180	21.72	21.76	298.562	24.75	30.00	PASS
40	5200	21.66	21.70	294.466	24.69	30.00	PASS
48	5240	21.75	21.76	299.592	24.77	30.00	PASS
802.11ac (VHT40)							
38	5190	15.22	15.59	69.49	18.42	30.00	PASS
46	5230	21.30	21.20	266.722	24.26	30.00	PASS
802.11ac (VHT80)							
42	5210	14.43	14.87	58.423	17.67	30.00	PASS

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 2015

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. Tested date : Dec. 09, 2014

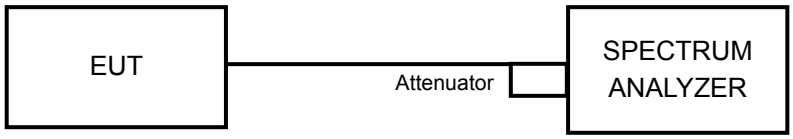
4.4.3 TEST PROCEDURES

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and for duty cycle of test signal is < 98% add 10 log (1/duty cycle)

4.4.4 DEVIATION FROM TEST STANDARD

No deviation

4.4.5 TEST SETUP



4.4.6 EUT OPERATING CONDITIONS

Same as 4.3.6

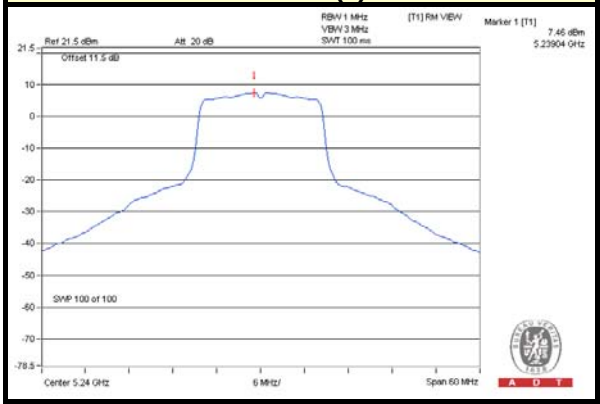
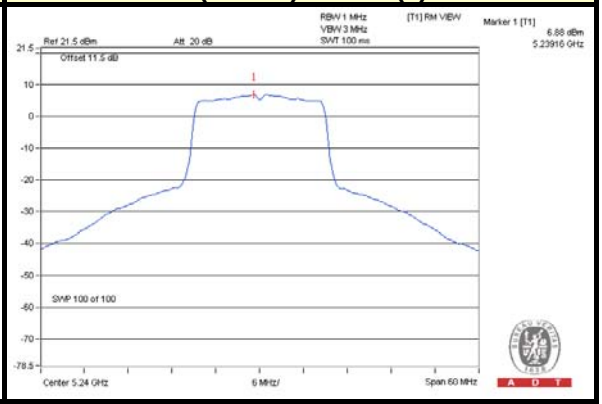
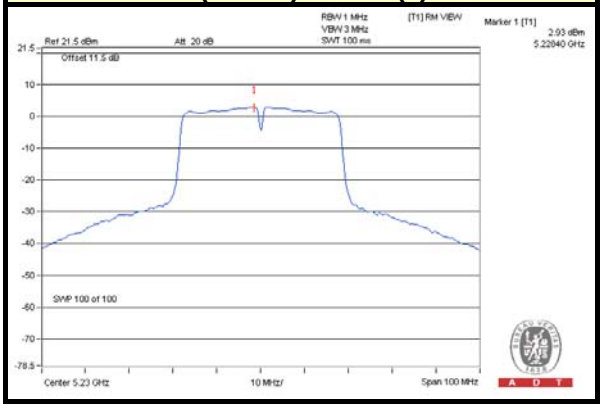
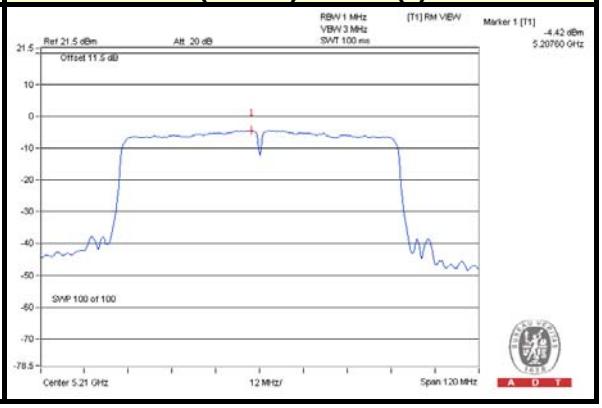
4.4.7 TEST RESULTS

802.11a						
CHAN.	CHANNEL FREQUENCY (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
36	5180	7.35	7.42	10.40	17	PASS
40	5200	7.05	6.94	10.01	17	PASS
48	5240	7.46	6.79	10.15	17	PASS
802.11ac (VHT20)						
CHAN.	CHANNEL FREQUENCY (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
36	5180	6.16	6.54	9.36	17	PASS
40	5200	6.02	5.83	8.94	17	PASS
48	5240	6.63	6.88	9.77	17	PASS
802.11ac (VHT40)						
CHAN.	CHANNEL FREQUENCY (MHz)	PSD (dBm)		TOTAL POWER DENSITY (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1			
38	5190	-1.62	-0.77	1.84	17	PASS
46	5230	2.26	2.93	5.62	17	PASS
802.11ac (VHT80)						
CHANNEL	CHANNEL FREQUENCY (MHz)	PSD W/O DUTY FACTOR (dBm)		DUTY FACTOR (dB)	TOTAL PSD WITH DUTY FACTOR (dBm)	MAX. LIMIT (dBm)	PASS / FAIL
		CHAIN 0	CHAIN 1				
42	5210	-5.49	-4.42	0.14	-1.77	17	PASS

Note : 1. Method a) 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 = 2.7dBi + 10log(2) = 5.71dBi < 6dBi , so the power density limit shall not be reduced.

3. Refer to section 3.4 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE	
802.11a / Chain(0) : CH48	**802.11ac (VHT20) / Chain(1) : CH48**
	
802.11ac (VHT40) / Chain(1) : CH46	**802.11ac (VHT80) / Chain(1) : CH42**
	

4.5 FREQUENCY STABILITY

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 INSTRUMENTS

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
SPECTRUM ANALYZER R&S	FSV 40	100964	July 05, 2014	July 04, 2015
Temperature & Humidity Chamber GIANTFORCE	GTH-150-40-SP-AR	MAA0812-008	Jan. 13, 2014	Jan. 12, 2015

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. Tested date : Dec. 12, 2014

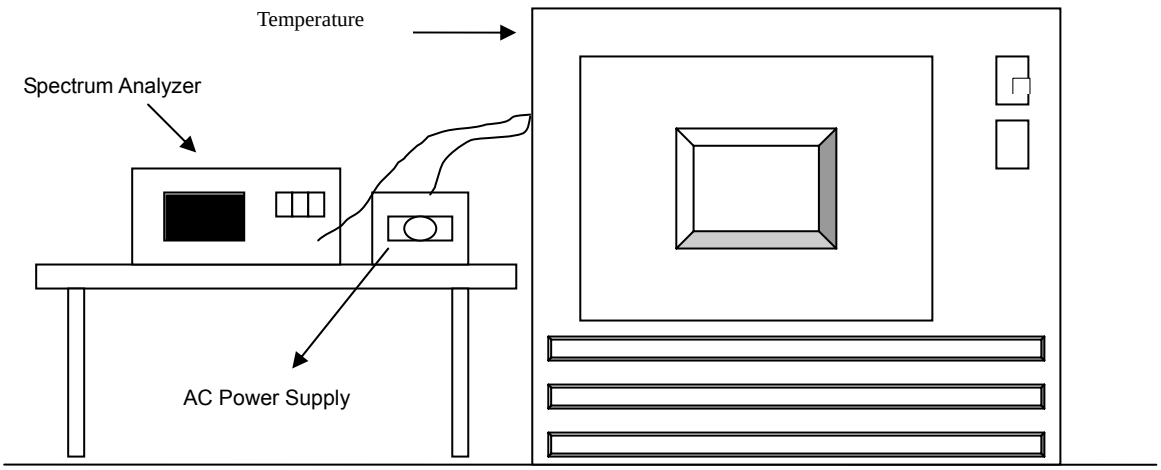
4.5.3 TEST PROCEDURE

1. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
2. Turn the EUT on and couple its output to a spectrum analyzer.
3. Turn the EUT off and set the chamber to the highest temperature specified.
4. 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.
5. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
6. 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.

4.5.4 DEVIATION FROM TEST STANDARD

No deviation

4.5.5 TEST SETUP



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: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
50	120	5239.9998	0.00000	5239.9979	-0.00004	5239.9987	-0.00002	5239.9993	-0.00001
40	120	5239.9999	0.00000	5239.997	-0.00006	5239.9991	-0.00002	5240.0019	0.00004
30	120	5239.9905	-0.00018	5239.987	-0.00025	5239.9868	-0.00025	5239.989	-0.00021
20	120	5240.0141	0.00027	5240.0165	0.00031	5240.0166	0.00032	5240.018	0.00034
10	120	5240.0217	0.00041	5240.0208	0.00040	5240.0213	0.00041	5240.0247	0.00047
0	120	5239.9759	-0.00046	5239.9785	-0.00041	5239.9765	-0.00045	5239.9749	-0.00048
-10	120	5240.0066	0.00013	5240.0016	0.00003	5240.0029	0.00006	5240.0045	0.00009
-20	120	5240.0226	0.00043	5240.0222	0.00042	5240.0236	0.00045	5240.0207	0.00040
-30	120	5240.0221	0.00042	5240.0233	0.00044	5240.0226	0.00043	5240.0197	0.00038

FREQUEMCY STABILITY VERSUS VOLTAGE									
OPERATING FREQUENCY: 5240MHz									
TEMP. (℃)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift	Measured Frequency	Frequency Drift
		(MHz)	%	(MHz)	%	(MHz)	%	(MHz)	%
20	138	5240.0145	0.00028	5240.0155	0.00030	5240.0162	0.00031	5240.017	0.00032
	120	5240.0141	0.00027	5240.0165	0.00031	5240.0166	0.00032	5240.018	0.00034
	102	5240.0141	0.00027	5240.0162	0.00031	5240.0176	0.00034	5240.018	0.00034

5. PHOTOGRAPHS OF THE TEST CONFIGURATION

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

6. 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:
Tel: 886-2-26052180
Fax: 886-2-26052943

Hsin Chu EMC/RF/Telecom Lab:
Tel: 886-3-5935343
Fax: 886-3-5935342

Hwa Ya EMC/RF/Safety Lab:
Tel: 886-3-3183232
Fax: 886-3-3270892

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.

7. APPENDIX A - MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

--- END ---