

FCC Test Report (15.407)

Report No.: RF150430E02A-1

FCC ID: PY315200309

Test Model: R8500

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Release Control Record

Issue No.	Description	Date Issued
RF150430E02A-1	Original release.	July 31, 2015

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407 Under New Rule)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	PASS	Meet the requirement of limit. Minimum passing margin is -12.98dB at 0.50547MHz.
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 15720.00MHz, 5150.00MHz & 5350.00MHz
15.407(a)(1/2 /3)	Max Average Transmit Power	PASS	Meet the requirement of limit.

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 This report is prepared for FCC Class II change. (Only Conducted Emission / radiated emissions / transmit power were presented in this 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	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.86 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Nighthawk X8 Tri Band WiFi Router
Brand	NETGEAR
Test Model	R8500
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	19Vdc from power adapter
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 802.11g/a: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps
Operating Frequency	For 15.407 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), VHT20 7 for 802.11n (HT40), VHT40
	For 15.247 (5GHz) 5 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80)
Output Power	For 15.407 CDD Mode: 802.11a: 980.686mW Beamforming Mode: 802.11ac (VHT20): 985.604mW 802.11ac (VHT40): 748.957mW 802.11ac (VHT80): 345.908mW
	For 15.247(5GHz) CDD Mode: 802.11a: 955.654mW 802.11ac (VHT20): 944.894mW 802.11ac (VHT40): 929.906mW 802.11ac (VHT80): 806.468mW Beamforming Mode: 802.11ac (VHT20): 388.161mW 802.11ac (VHT40): 388.868mW 802.11ac (VHT80): 388.815mW
	For 15.247(2.4GHz) CDD Mode: 802.11b: 858.125mW 802.11g: 929.401mW Beamforming Mode: VHT20: 848.386mW VHT40: 434.55mW

Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x 1
Data Cable Supplied	Ethernet cable (shielded, 1.5m)

Note:

- This report is prepared for FCC class II permissive change. The difference compared with the Report No.: RF150430E02-1 design is as the following information:
 - ◆ Add 2.4GHz (802.11g, 802.11n (HT20), 802.11n (HT40), VHT20 & VHT40 modulation type.
 - ◆ Change components.
 - ◆ Change internal antenna location
 - ◆ Add one new adapter (Model : 2ABS060K 1 NA)
- According to above conditions, for 5GHz (5.180~5.240GHz), only Conducted Emission / radiated emission / transmit power need to be performed. And all data was verified to meet the requirements.
- The EUT's appearance has two different colors (black and Gray), and gray was selected as representative color for the test and its data was recorded in this report.
- The EUT must be supplied with a power adapter as following table:

No	Brand Name	Model No.	P/N	Spec.
1	NETGEAR	AD2003F10	332-10631-01	Input: 100-120Vac, 50/60Hz, 1.5A Output: 19Vdc, 3.16A DC output cable: 1.8m, unshielded
2	NETGEAR	2ABS060K 1 NA	332-10788-01	Input: 100-120Vac, 50/60Hz, 1.0A Output: 19Vdc, 3.16A DC output cable: 1.8m, unshielded

From the above adapters, the worst radiated emission was found in Adapter 1. Therefore only the test data of the modes were recorded in this report.

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

Antenna No.	Ant. Gain(dBi)	Frequency range (GHz to GHz)	Antenna Type	Connector Type
Internal (1)	3.99	5.15~5.25GHz	Dipole	i-pex(MHF)
Internal (2)	3.71	5.25~5.35GHz	Dipole	i-pex(MHF)
Internal (3)	3.71	5.47~5.725GHz	Dipole	i-pex(MHF)
Internal (4)	3.98	5.725~5.85GHz	Dipole	i-pex(MHF)
External (1)	0.67	2.4~2.4835GHz	Dipole	i-pex(MHF)
	-0.84	5.15~5.25GHz	Dipole	i-pex(MHF)
	-1.38	5.25~5.35GHz	Dipole	i-pex(MHF)
	-1.6	5.47~5.725GHz	Dipole	i-pex(MHF)
	-1.79	5.725~5.85GHz	Dipole	i-pex(MHF)
External (2)	0.67	2.4~2.4835GHz	Dipole	i-pex(MHF)
	-0.84	5.15~5.25GHz	Dipole	i-pex(MHF)
	-1.38	5.25~5.35GHz	Dipole	i-pex(MHF)
	-1.6	5.47~5.725GHz	Dipole	i-pex(MHF)
	-1.79	5.725~5.85GHz	Dipole	i-pex(MHF)
External (3)	0.67	2.4~2.4835GHz	Dipole	i-pex(MHF)
	-0.84	5.15~5.25GHz	Dipole	i-pex(MHF)
	-1.38	5.25~5.35GHz	Dipole	i-pex(MHF)
	-1.6	5.47~5.725GHz	Dipole	i-pex(MHF)
	-1.79	5.725~5.85GHz	Dipole	i-pex(MHF)
External (4)	0.67	2.4~2.4835GHz	Dipole	i-pex(MHF)
	-0.84	5.15~5.25GHz	Dipole	i-pex(MHF)
	-1.38	5.25~5.35GHz	Dipole	i-pex(MHF)
	-1.6	5.47~5.725GHz	Dipole	i-pex(MHF)
	-1.79	5.725~5.85GHz	Dipole	i-pex(MHF)

6. The coexistence mode:

Technology		
WLAN(2.4GHz) - External Antenna	WLAN(5GHz <5150~5250MHz>) - External Antenna	WLAN(5GHz <5725~5850MHz>) - Internal Antenna
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

7. The EUT incorporates a MIMO function with beamforming.(Except for 802.11a/b/g)

For 2.4GHz Band

MODULATION MODE	DATA RATE (MCS)	TX & RX CONFIGURATION	
802.11b	1 ~ 11Mbps	4TX	4RX
802.11g	1 ~ 11Mbps	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

For 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)	MCS 0~8, Nss=1	4TX	4RX
	MCS 0~8, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX
802.11ac (VHT40)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX
802.11ac (VHT80)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX

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))

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

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 1
2	-	-	√	-	With adapter 2

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

- NOTE:
1. The test mode was reference to the worst case in the original test report.
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
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

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)
802.11a	5180-5240	36 to 48	40	OFDM	BPSK	6

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)
802.11a	5180-5240	36 to 48	40	OFDM	BPSK	6

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.

For Transmit Power Measurement						
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
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

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	22deg. C, 66%RH	120Vac, 60Hz	Andy Ho
RE<1G	19deg. C, 65%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 68%RH 25deg. C, 65%RH	120Vac, 60Hz	Jyunchun Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

3.3 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.

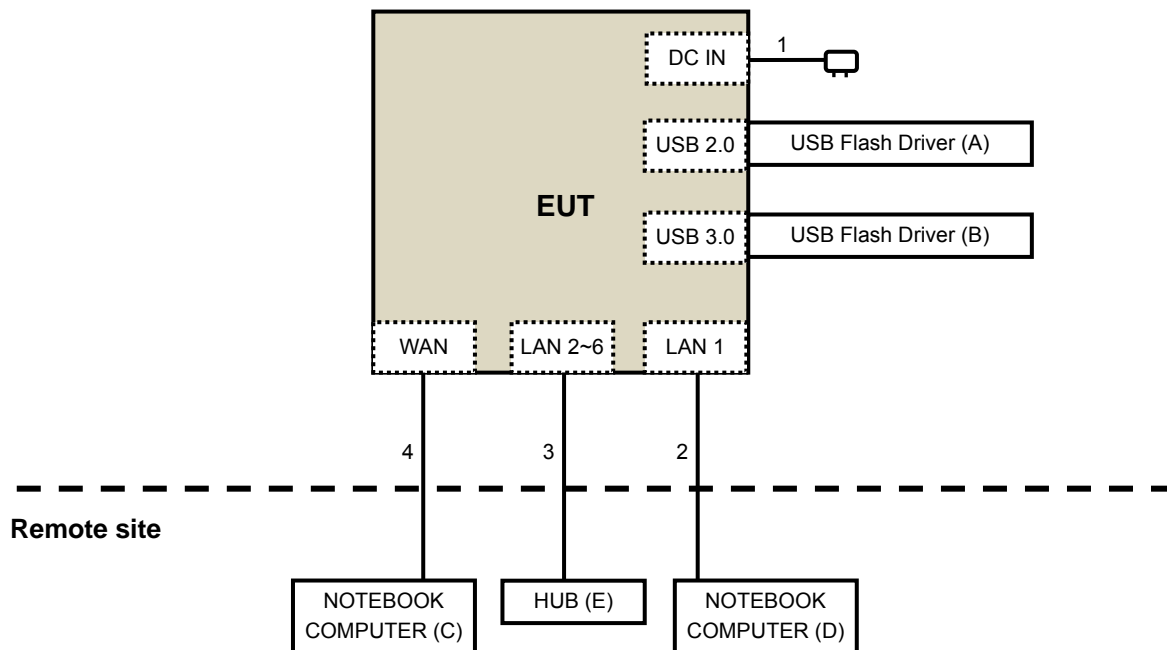
No.	Product	Brand	Model No.	Serial No.	FCC ID	Remark
A	USB Flash Driver	Transcend	JetFlash 790	NA	NA	Provided by Lab
B	USB Flash Driver	Transcend	JetFlash 790	NA	NA	Provided by Lab
C	NOTEBOOK COMPUTER	DELL	PP32LA	HSLB32S	FCC DoC	Provided by Lab
D	NOTEBOOK COMPUTER	DELL	E5430	4YV4VY1	FCC DoC	Provided by Lab
E	HUB	ZyXEL	ES-116P	S060H02000215	FCC DoC	Provided by Lab

NOTE:

- 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	DC	1	1.8	No	0	Supplied by Client
2	RJ45	1	10	No	0	Provided by Lab
3	RJ45	5	10	No	0	Provided by Lab
4	RJ45	1	10	No	0	Provided by Lab

3.3.1 Configuration of System under Test





3.4 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)
789033 D02 General UNII Test Procedure 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.

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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 v01	FIELD STRENGTH AT 3m	
	PK:74 (dBuV/m)	AV:54 (dBuV/m)
APPLICABLE TO	EIRP LIMIT	EQUIVALENT FIELD STRENGTH AT 3m
15.407(b)(1)	PK:-27 (dBm/MHz)	PK:68.2(dBuV/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(dBuV/m) ^{*1} PK:78.2 (dBuV/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:

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

4.1.2 Test Instruments

For above 1GHz

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	July 25, 2014	July 24, 2015
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Preamplifier Agilent	8449B	3008A01961	Oct. 18, 2014	Oct. 17, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	309220/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	250724/4	Aug. 09, 2014	Aug. 08, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	295012/4	Aug. 09, 2014	Aug. 08, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	019303	NA	NA
Turn Table BV ADT	TT100	TT93021704	NA	NA
Turn Table Controller BV ADT	SC100	SC93021704	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2014	Oct. 17, 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. The test was performed in HwaYa Chamber 4.
3. The FCC Site Registration No. is 460141.
4. The IC Site Registration No. is IC7450F-4.
5. Tested Date: July 03, 2015

**For below 1GHz**

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	Aug. 11, 2014	Aug. 10, 2015
Pre-Amplifier Mini-Circuits	ZFL-1000VH2 B	AMP-ZFL-04	Nov. 12, 2014	Nov. 11, 2015
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Feb. 09, 2015	Feb. 08, 2016
RF Cable	8D-FB	CHHCAB-001- 1 CHHCAB-001- 2	Oct. 05, 2014	Oct. 04, 2015
	RF-141	CHHCAB-004	Oct. 05, 2014	Oct. 04, 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: July 09, 2015

4.1.3 Test Procedure

- 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:

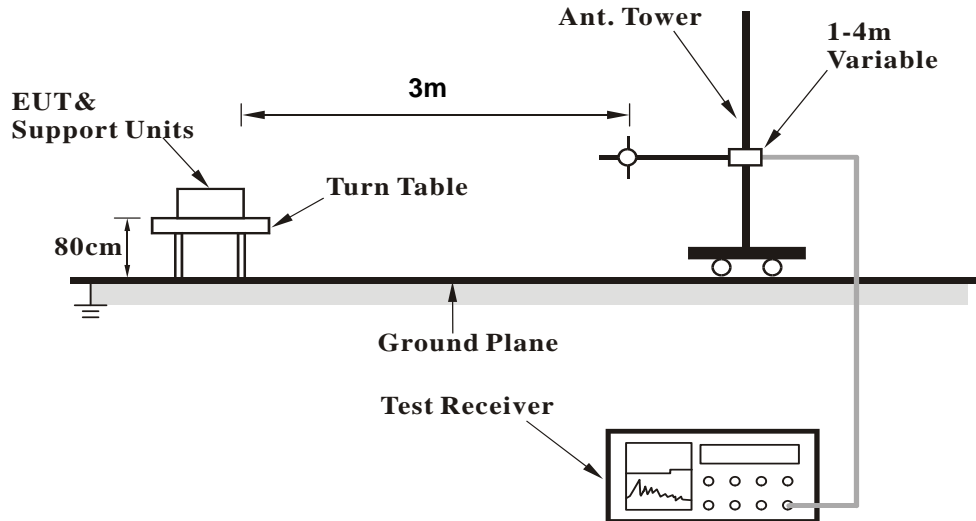
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
4. 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 ($10 \log(1/\text{duty cycle})$).
5. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is 10Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1GHz.
6. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

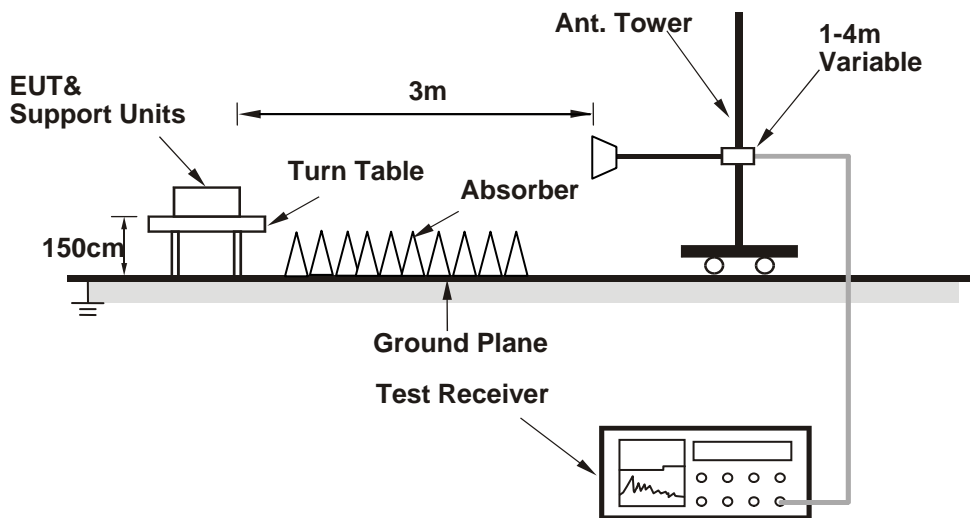
No deviation.

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 units C-D (NOTEBOOK COMPUTER) which is placed on remote site.
2. Controlling software (Mtool.exe_2_0_2_7) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data (Subcontract Item)

CDD Mode

802.11a

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	5150.00	54.5 PK	74.0	-19.5	1.42 H	284	16.13	38.37
2	5150.00	46.1 AV	54.0	-7.9	1.42 H	284	7.73	38.37
3	*5180.00	105.0 PK			1.42 H	284	66.54	38.46
4	*5180.00	94.3 AV			1.42 H	284	55.84	38.46
5	#10360.00	56.2 PK	74.0	-17.8	1.40 H	215	7.18	49.02
6	#10360.00	43.8 AV	54.0	-10.2	1.40 H	215	-5.22	49.02
7	15540.00	54.6 PK	74.0	-19.4	1.45 H	240	3.33	51.27
8	15540.00	46.5 AV	54.0	-7.5	1.45 H	240	-4.77	51.27

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	68.8 PK	74.0	-5.2	1.88 V	272	30.43	38.37
2	5150.00	53.7 AV	54.0	-0.3	1.88 V	272	15.33	38.37
3	*5180.00	120.5 PK			1.88 V	272	82.04	38.46
4	*5180.00	109.6 AV			1.88 V	272	71.14	38.46
5	#10360.00	59.8 PK	74.0	-14.2	1.51 V	236	10.78	49.02
6	#10360.00	47.4 AV	54.0	-6.6	1.51 V	236	-1.62	49.02
7	15540.00	54.3 PK	74.0	-19.7	1.36 V	237	3.03	51.27
8	15540.00	46.2 AV	54.0	-7.8	1.36 V	237	-5.07	51.27

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	5150.00	54.2 PK	74.0	-19.8	1.38 H	278	15.83	38.37
2	5150.00	45.3 AV	54.0	-8.7	1.38 H	278	6.93	38.37
3	*5200.00	109.7 PK			1.38 H	278	71.18	38.52
4	*5200.00	99.2 AV			1.38 H	278	60.68	38.52
5	5350.00	55.5 PK	74.0	-18.5	1.38 H	278	16.62	38.88
6	5350.00	44.7 AV	54.0	-9.3	1.38 H	278	5.82	38.88
7	#10400.00	56.4 PK	74.0	-17.6	1.34 H	229	7.09	49.31
8	#10400.00	43.8 AV	54.0	-10.2	1.34 H	229	-5.51	49.31
9	15600.00	54.0 PK	74.0	-20.0	1.50 H	250	2.64	51.36
10	15600.00	46.1 AV	54.0	-7.9	1.50 H	250	-5.26	51.36

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	69.0 PK	74.0	-5.0	1.74 V	325	30.63	38.37
2	5150.00	53.4 AV	54.0	-0.6	1.74 V	325	15.03	38.37
3	*5200.00	124.6 PK			1.75 V	285	86.08	38.52
4	*5200.00	114.0 AV			1.75 V	285	75.48	38.52
5	5350.00	63.4 PK	74.0	-10.6	1.74 V	188	24.52	38.88
6	5350.00	52.6 AV	54.0	-1.4	1.74 V	188	13.72	38.88
7	#10400.00	60.0 PK	74.0	-14.0	1.57 V	244	10.69	49.31
8	#10400.00	47.4 AV	54.0	-6.6	1.57 V	244	-1.91	49.31
9	15600.00	68.7 PK	74.0	-5.3	1.36 V	221	17.34	51.36
10	15600.00	53.7 AV	54.0	-0.3	1.36 V	221	2.34	51.36

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	*5240.00	110.8 PK			1.44 H	286	72.17	38.63
2	*5240.00	99.9 AV			1.44 H	286	61.27	38.63
3	5394.00	53.7 PK	74.0	-20.3	1.44 H	286	14.77	38.93
4	5394.00	42.8 AV	54.0	-11.2	1.44 H	286	3.87	38.93
5	#10480.00	56.3 PK	74.0	-17.7	1.36 H	235	7.18	49.12
6	#10480.00	43.7 AV	54.0	-10.3	1.36 H	235	-5.42	49.12
7	15720.00	53.9 PK	74.0	-20.1	1.47 H	235	2.94	50.96
8	15720.00	45.7 AV	54.0	-8.3	1.47 H	235	-5.26	50.96

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	125.7 PK			1.86 V	276	87.07	38.63
2	*5240.00	115.0 AV			1.86 V	276	76.37	38.63
3	5394.00	61.9 PK	74.0	-12.1	1.76 V	225	22.97	38.93
4	5394.00	51.1 AV	54.0	-2.9	1.76 V	225	12.17	38.93
5	#10480.00	60.3 PK	74.0	-13.7	1.55 V	233	11.18	49.12
6	#10480.00	47.6 AV	54.0	-6.4	1.55 V	233	-1.52	49.12
7	15720.00	69.4 PK	74.0	-4.6	1.48 V	219	18.44	50.96
8	15720.00	53.9 AV	54.0	-0.1	1.48 V	219	2.94	50.96

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.

Beamforming Mode
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	5150.00	56.2 PK	74.0	-17.8	1.43 H	290	17.83	38.37
2	5150.00	46.4 AV	54.0	-7.6	1.43 H	290	8.03	38.37
3	*5180.00	105.8 PK			1.43 H	290	67.34	38.46
4	*5180.00	94.4 AV			1.43 H	290	55.94	38.46
5	#10360.00	55.9 PK	74.0	-18.1	1.37 H	225	6.88	49.02
6	#10360.00	43.6 AV	54.0	-10.4	1.37 H	225	-5.42	49.02
7	15540.00	53.7 PK	74.0	-20.3	1.56 H	258	2.43	51.27
8	15540.00	45.6 AV	54.0	-8.4	1.56 H	258	-5.67	51.27

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	70.5 PK	74.0	-3.5	1.90 V	231	32.13	38.37
2	5150.00	53.9 AV	54.0	-0.1	1.90 V	231	15.53	38.37
3	*5180.00	120.6 PK			1.90 V	231	82.14	38.46
4	*5180.00	109.1 AV			1.90 V	231	70.64	38.46
5	#10360.00	60.2 PK	74.0	-13.8	1.56 V	226	11.18	49.02
6	#10360.00	47.7 AV	54.0	-6.3	1.56 V	226	-1.32	49.02
7	15540.00	54.1 PK	74.0	-19.9	1.32 V	224	2.83	51.27
8	15540.00	46.2 AV	54.0	-7.8	1.32 V	224	-5.07	51.27

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	5150.00	54.1 PK	74.0	-19.9	1.40 H	290	15.73	38.37
2	5150.00	45.9 AV	54.0	-8.1	1.40 H	290	7.53	38.37
3	*5200.00	110.3 PK			1.40 H	290	71.78	38.52
4	*5200.00	98.6 AV			1.40 H	290	60.08	38.52
5	#10400.00	57.0 PK	74.0	-17.0	1.31 H	233	7.69	49.31
6	#10400.00	44.2 AV	54.0	-9.8	1.31 H	233	-5.11	49.31
7	15600.00	54.2 PK	74.0	-19.8	1.54 H	238	2.84	51.36
8	15600.00	46.2 AV	54.0	-7.8	1.54 H	238	-5.16	51.36

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	69.0 PK	74.0	-5.0	1.79 V	232	30.63	38.37
2	5150.00	53.8 AV	54.0	-0.2	1.79 V	232	15.43	38.37
3	*5200.00	124.9 PK			1.79 V	232	86.38	38.52
4	*5200.00	113.5 AV			1.79 V	232	74.98	38.52
5	#10400.00	59.6 PK	74.0	-14.4	1.56 V	236	10.29	49.31
6	#10400.00	47.3 AV	54.0	-6.7	1.56 V	236	-2.01	49.31
7	15600.00	68.4 PK	74.0	-5.6	1.34 V	336	17.04	51.36
8	15600.00	53.2 AV	54.0	-0.8	1.34 V	336	1.84	51.36

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	*5240.00	110.2 PK			1.43 H	280	71.57	38.63
2	*5240.00	97.7 AV			1.43 H	280	59.07	38.63
3	5350.00	52.0 PK	74.0	-22.0	1.43 H	280	13.12	38.88
4	5350.00	40.8 AV	54.0	-13.2	1.43 H	280	1.92	38.88
5	#10480.00	56.9 PK	74.0	-17.1	1.39 H	245	7.78	49.12
6	#10480.00	44.2 AV	54.0	-9.8	1.39 H	245	-4.92	49.12
7	15720.00	54.1 PK	74.0	-19.9	1.51 H	256	3.14	50.96
8	15720.00	46.0 AV	54.0	-8.0	1.51 H	256	-4.96	50.96

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	125.4 PK			1.84 V	229	86.77	38.63
2	*5240.00	112.9 AV			1.84 V	229	74.27	38.63
3	5350.00	60.1 PK	74.0	-13.9	1.84 V	229	21.22	38.88
4	5350.00	48.9 AV	54.0	-5.1	1.84 V	229	10.02	38.88
5	#10480.00	63.1 PK	74.0	-10.9	1.34 V	308	13.98	49.12
6	#10480.00	49.5 AV	54.0	-4.5	1.34 V	308	0.38	49.12
7	15720.00	68.3 PK	74.0	-5.7	1.83 V	360	17.34	50.96
8	15720.00	53.9 AV	54.0	-0.1	1.83 V	360	2.94	50.96

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	51.6 PK	74.0	-22.4	1.46 H	282	13.23	38.37
2	5150.00	45.5 AV	54.0	-8.5	1.46 H	282	7.13	38.37
3	*5190.00	99.9 PK			1.46 H	282	61.42	38.48
4	*5190.00	88.2 AV			1.46 H	282	49.72	38.48
5	5350.00	49.6 PK	74.0	-24.4	1.46 H	282	10.72	38.88
6	5350.00	43.0 AV	54.0	-11.0	1.46 H	282	4.12	38.88
7	#10380.00	56.8 PK	74.0	-17.2	1.34 H	221	7.63	49.17
8	#10380.00	44.0 AV	54.0	-10.0	1.34 H	221	-5.17	49.17
9	15570.00	53.9 PK	74.0	-20.1	1.47 H	264	2.58	51.32
10	15570.00	46.0 AV	54.0	-8.0	1.47 H	264	-5.32	51.32

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	66.8 PK	74.0	-7.2	1.77 V	186	28.43	38.37
2	5150.00	53.8 AV	54.0	-0.2	1.77 V	186	15.43	38.37
3	*5190.00	114.5 PK			1.77 V	186	76.02	38.48
4	*5190.00	102.7 AV			1.77 V	186	64.22	38.48
5	5350.00	61.7 PK	74.0	-12.3	1.77 V	186	22.82	38.88
6	5350.00	50.9 AV	54.0	-3.1	1.77 V	186	12.02	38.88
7	#10380.00	59.5 PK	74.0	-14.5	1.55 V	237	10.33	49.17
8	#10380.00	47.4 AV	54.0	-6.6	1.55 V	237	-1.77	49.17
9	15570.00	54.2 PK	74.0	-19.8	1.33 V	240	2.88	51.32
10	15570.00	46.0 AV	54.0	-8.0	1.33 V	240	-5.32	51.32

REMARKS:

- Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
- Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
- The other emission levels were very low against the limit.
- Margin value = Emission Level – Limit value
- " * ": Fundamental frequency.
- " # ": 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	5081.00	52.4 PK	74.0	-21.6	1.45 H	298	14.22	38.18
2	5081.00	45.9 AV	54.0	-8.1	1.45 H	298	7.72	38.18
3	5150.00	54.5 PK	74.0	-19.5	1.45 H	298	16.13	38.37
4	5150.00	44.5 AV	54.0	-9.5	1.45 H	298	6.13	38.37
5	*5230.00	103.9 PK			1.45 H	298	65.29	38.61
6	*5230.00	92.5 AV			1.45 H	298	53.89	38.61
7	5376.00	52.7 PK	74.0	-21.3	1.45 H	298	13.79	38.91
8	5376.00	46.4 AV	54.0	-7.6	1.45 H	298	7.49	38.91
9	#10460.00	56.4 PK	74.0	-17.6	1.35 H	240	7.24	49.16
10	#10460.00	43.5 AV	54.0	-10.5	1.35 H	240	-5.66	49.16
11	15690.00	54.6 PK	74.0	-19.4	1.53 H	249	3.58	51.02
12	15690.00	46.5 AV	54.0	-7.5	1.53 H	249	-4.52	51.02

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	5081.00	64.1 PK	74.0	-9.9	1.88 V	186	25.92	38.18
2	5081.00	53.7 AV	54.0	-0.3	1.88 V	186	15.52	38.18
3	5150.00	66.2 PK	74.0	-7.8	1.82 V	229	27.83	38.37
4	5150.00	52.1 AV	54.0	-1.9	1.82 V	229	13.73	38.37
5	*5230.00	118.7 PK			1.82 V	229	80.09	38.61
6	*5230.00	107.5 AV			1.82 V	229	68.89	38.61
7	5350.00	64.5 PK	74.0	-9.5	1.91 V	223	25.62	38.88
8	5350.00	53.9 AV	54.0	-0.1	1.91 V	223	15.02	38.88
9	#10460.00	59.9 PK	74.0	-14.1	1.54 V	236	10.74	49.16
10	#10460.00	47.2 AV	54.0	-6.8	1.54 V	236	-1.96	49.16
11	15690.00	54.6 PK	74.0	-19.4	1.38 V	237	3.58	51.02
12	15690.00	46.6 AV	54.0	-7.4	1.38 V	237	-4.42	51.02

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 (VHT80)

CHANNEL	TX Channel 42	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	53.0 PK	74.0	-21.0	1.47 H	274	14.63	38.37
2	5150.00	46.2 AV	54.0	-7.8	1.47 H	274	7.83	38.37
3	*5210.00	96.9 PK			1.47 H	274	58.35	38.55
4	*5210.00	84.6 AV			1.47 H	274	46.05	38.55
5	5350.00	49.1 PK	74.0	-24.9	1.47 H	274	10.22	38.88
6	5350.00	42.0 AV	54.0	-12.0	1.47 H	274	3.12	38.88
7	#10420.00	56.1 PK	74.0	-17.9	1.39 H	234	6.84	49.26
8	#10420.00	43.5 AV	54.0	-10.5	1.39 H	234	-5.76	49.26
9	15630.00	53.9 PK	74.0	-20.1	1.50 H	258	2.65	51.25
10	15630.00	45.8 AV	54.0	-8.2	1.50 H	258	-5.45	51.25

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	67.7 PK	74.0	-6.3	1.78 V	147	29.33	38.37
2	5150.00	53.9 AV	54.0	-0.1	1.78 V	147	15.53	38.37
3	*5210.00	112.3 PK			1.78 V	147	73.75	38.55
4	*5210.00	100.0 AV			1.78 V	147	61.45	38.55
5	5350.00	61.3 PK	74.0	-12.7	1.78 V	147	22.42	38.88
6	5350.00	50.0 AV	54.0	-4.0	1.78 V	147	11.12	38.88
7	#10420.00	60.3 PK	74.0	-13.7	1.53 V	236	11.04	49.26
8	#10420.00	47.7 AV	54.0	-6.3	1.53 V	236	-1.56	49.26
9	15630.00	53.9 PK	74.0	-20.1	1.38 V	230	2.65	51.25
10	15630.00	45.8 AV	54.0	-8.2	1.38 V	230	-5.45	51.25

REMARKS:

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

below 1GHz worst-case data

CDD Mode

802.11a

CHANNEL	TX Channel 40	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	36.96	29.5 QP	40.0	-10.5	2.50 H	243	50.70	-21.21
2	247.31	40.1 QP	46.0	-5.9	1.50 H	221	61.35	-21.22
3	259.16	40.7 QP	46.0	-5.3	1.43 H	225	61.58	-20.86
4	350.49	42.2 QP	46.0	-3.8	1.00 H	360	60.32	-18.16
5	387.78	40.8 QP	46.0	-5.2	1.00 H	243	57.80	-17.04
6	500.01	36.7 QP	46.0	-9.4	1.00 H	224	50.90	-14.25

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	62.49	35.8 QP	40.0	-4.2	1.50 V	200	57.14	-21.33
2	320.70	41.7 QP	46.0	-4.3	1.00 V	116	60.26	-18.55
3	326.41	40.6 QP	46.0	-5.4	1.00 V	274	59.07	-18.45
4	394.04	41.4 QP	46.0	-4.6	1.00 V	118	58.30	-16.94
5	500.01	39.6 QP	46.0	-6.4	1.00 V	263	53.85	-14.25
6	750.03	37.2 QP	46.0	-8.8	1.00 V	149	46.43	-9.21

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	100375	May 06, 2015	May 05, 2016
Line-Impedance Stabilization Network (for EUT) SCHWARZBECK	NSLK-8127	8127-522	Sep. 15, 2014	Sep. 14, 2015
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 11, 2015	June 10, 2016
RF Cable	5D-FB	COCCAB-001	Mar. 09, 2015	Mar. 08, 2016
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 BVADT	BVADT_Cond_ V7.3.7.3	NA	NA	NA

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. C.
- 3 The VCCI Con C Registration No. is C-3611.
- 4 Tested Date: July 14 to 28, 2015

4.2.3 Test Procedures

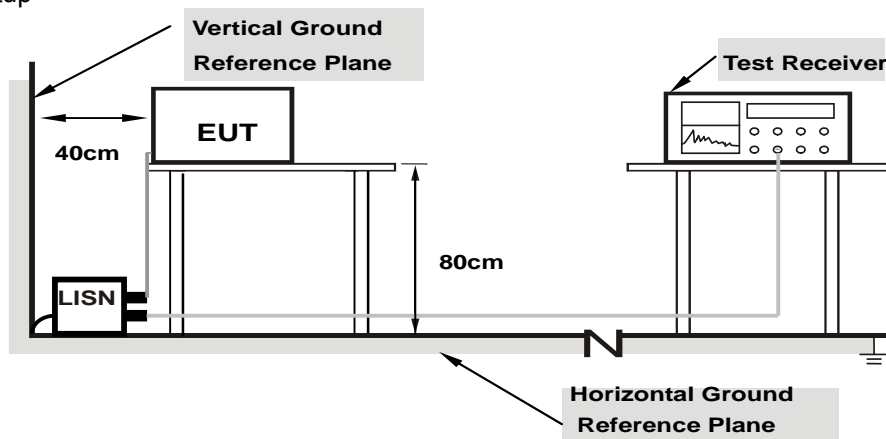
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling 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: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results (Mode 1)

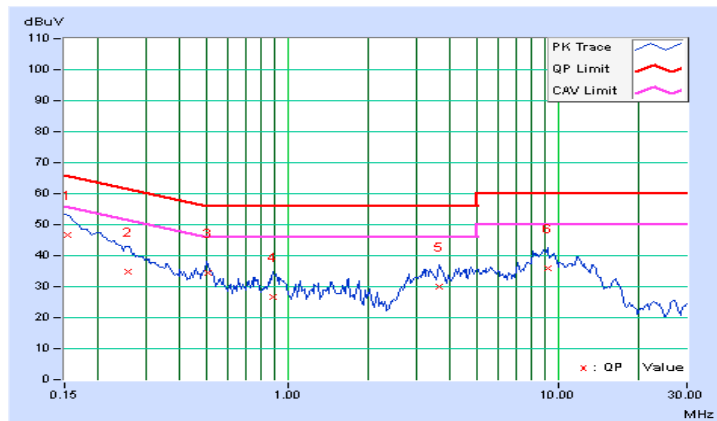
CDD Mode

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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	0.15444	0.14	46.44	38.30	46.58	38.44	65.76	55.76	-19.18	-17.32
2	0.25800	0.16	34.52	28.64	34.68	28.80	61.50	51.50	-26.82	-22.70
3	0.50797	0.18	34.28	29.84	34.46	30.02	56.00	46.00	-21.54	-15.98
4	0.88438	0.19	26.44	19.36	26.63	19.55	56.00	46.00	-29.37	-26.45
5	3.62891	0.36	29.48	21.48	29.84	21.84	56.00	46.00	-26.16	-24.16
6	9.14063	0.69	35.30	29.88	35.99	30.57	60.00	50.00	-24.01	-19.43

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

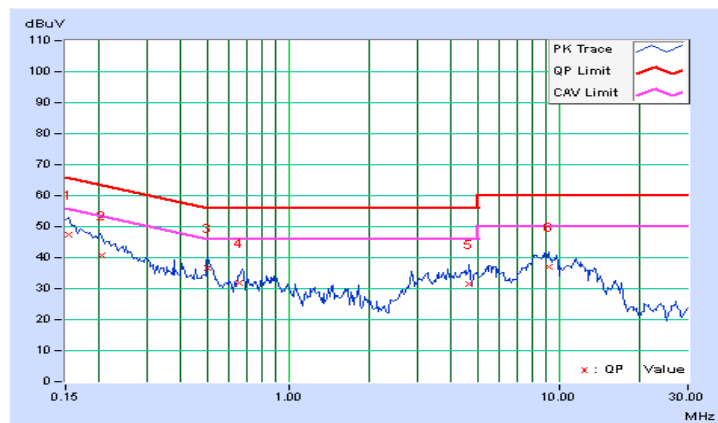


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	0.14	47.10	39.18	47.24	39.32	65.79	55.79	-18.55	-16.47
2	0.20416	0.15	40.62	33.00	40.77	33.15	63.44	53.44	-22.67	-20.29
3	0.50547	0.20	36.54	32.82	36.74	33.02	56.00	46.00	-19.26	-12.98
4	0.65984	0.21	31.56	28.08	31.77	28.29	56.00	46.00	-24.23	-17.71
5	4.65625	0.46	31.00	24.34	31.46	24.80	56.00	46.00	-24.54	-21.20
6	9.14844	0.74	36.38	31.06	37.12	31.80	60.00	50.00	-22.88	-18.20

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)

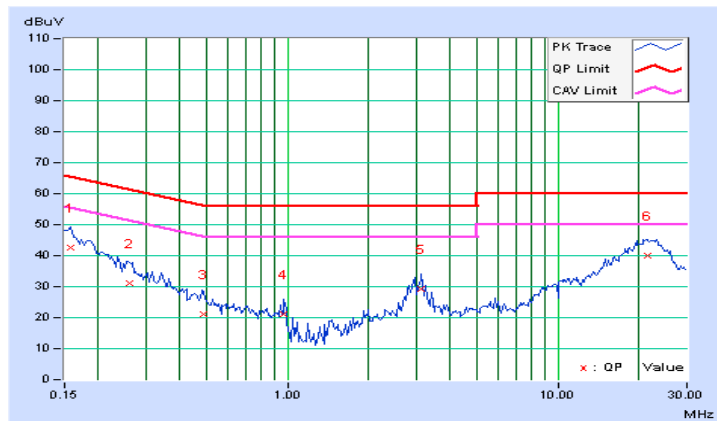
CDD Mode

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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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	0.14	42.40	29.91	42.54	30.05	65.58	55.58	-23.04	-25.53
2	0.26194	0.16	31.00	22.34	31.16	22.50	61.37	51.37	-30.21	-28.87
3	0.48691	0.17	21.02	18.54	21.19	18.71	56.22	46.22	-35.03	-27.51
4	0.97422	0.20	20.80	20.33	21.00	20.53	56.00	46.00	-35.00	-25.47
5	3.11719	0.33	29.08	22.78	29.41	23.11	56.00	46.00	-26.59	-22.89
6	21.50000	1.17	38.87	34.06	40.04	35.23	60.00	50.00	-19.96	-14.77

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

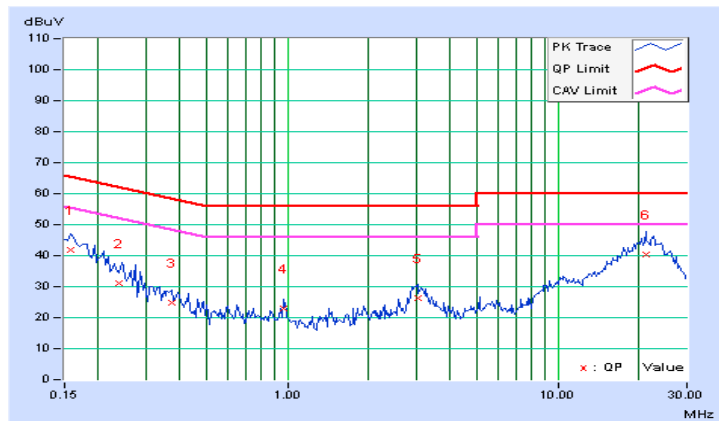


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
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Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	0.14	41.74	29.93	41.88	30.07	65.58	55.58	-23.70	-25.51
2	0.23938	0.16	31.12	22.12	31.28	22.28	62.12	52.12	-30.84	-29.84
3	0.37266	0.18	24.64	15.29	24.82	15.47	58.44	48.44	-33.62	-32.97
4	0.97422	0.24	22.56	20.74	22.80	20.98	56.00	46.00	-33.20	-25.02
5	3.02734	0.36	25.92	19.62	26.28	19.98	56.00	46.00	-29.72	-26.02
6	21.09375	1.26	39.14	34.02	40.40	35.28	60.00	50.00	-19.60	-14.72

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 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 \leq 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,

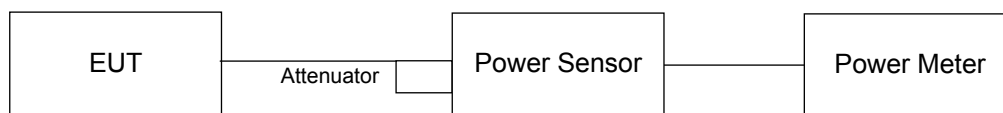
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

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	1014008	Apr. 28, 2015	Apr. 27, 2016
Power Sensor Anritsu	MA2411B	0917122	Apr. 28, 2015	Apr. 27, 2016

- NOTE:**
1. The test was performed in Oven room B.
 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: July 06, 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

CDD Mode

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
802.11a									
36	5180	23.32	23.71	22.63	22.90	827.961	29.18	30	Pass
40	5200	24.06	24.50	23.43	23.50	980.686	29.92	30	Pass
48	5240	24.13	24.29	23.24	23.28	951.032	29.78	30	Pass

Beamforming Mode

Chan.	Chan. Freq. (MHz)	Average Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
802.11ac (VHT20)									
36	5180	22.20	22.24	22.09	21.66	641.816	28.07	30	Pass
40	5200	24.25	24.24	23.47	23.65	985.604	29.94	30	Pass
48	5240	24.26	24.10	23.47	23.42	965.843	29.85	30	Pass
802.11ac (VHT40)									
38	5190	19.98	19.63	19.54	18.75	356.313	25.52	30	Pass
46	5230	23.29	22.85	22.45	22.23	748.957	28.74	30	Pass
802.11ac (VHT80)									
42	5210	19.21	19.53	19.39	19.34	345.908	25.39	30	Pass

NOTE: Directional gain = $-0.84\text{dBi} + 10\log(4) = 5.18\text{dBi} < 6\text{dBi}$, so the power limit shall not be reduced.



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

Tel: 886-2-26052180

Fax: 886-2-26051924

Hsin Chu EMC/RF Lab/Telecom Lab

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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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