

FCC Test Report (Co-Located)

Report No.: RF160205C08-2

FCC ID: PY315200317

Test Model: EX7300

Received Date: Feb. 04, 2016

Test Date: Apr. 07, 2016

Issued Date: Apr. 07, 2016

Applicant: NETGEAR, INC.

Address: 350 East Plumeria Drive San Jose, CA 95134

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch

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Test Location: No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)



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Release Control Record

Issue No.	Description	Date Issued
RF160205C08-2	Original release.	Apr. 07, 2016

1 Certificate of Conformity

Product: Nighthawk X4 AC2200 WiFi Range Extender

Brand: NETGEAR

Test Model: EX7300

Sample Status: Engineering sample

Applicant: NETGEAR, INC.

Test Date: Apr. 07, 2016

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)

47 CFR FCC Part 15, Subpart E (Section 15.407)

ANSI C63.10:2013

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

Prepared by :



Date:

Apr. 07, 2016

Suntee Liu / Specialist

Approved by :



Date:

Apr. 07, 2016

Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247) 47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.207 15.407(b)(6)	AC Power Conducted Emission	PASS	Meet the requirement of limit. Minimum passing margin is -13.19dB at 0.53400MHz.
15.205 / 15.209 / 15.247(d) 15.407(b) (1/2/3/4/6)	Radiated Emission	PASS	Meet the requirement of limit. Minimum passing margin is -0.3dB at 15600.00MHz.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expended Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 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 X4 AC2200 WiFi Range Extender
Brand	NETGEAR
Test Model	EX7300
Status of EUT	Engineering sample
Power Supply Rating	100-240Vac, 0.3A, 50/60Hz
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: 11/5.5/2/1Mbps 802.11a/g: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733Mbps
Operating Frequency	2.4GHz: 2412 ~ 2462MHz 5.0GHz: 5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	2412 ~ 2462MHz: 11 for 802.11b, 802.11g, 802.11n (HT20) 7 for 802.11n (HT40) 5180 ~ 5240MHz: 4 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5745 ~ 5825MHz: 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	2412~2462MHz: 562.644mW CDD Mode: 5180 ~ 5240MHz: 636.257mW 5745 ~ 5825MHz: 751.864mW Beamforming Mode: 5180 ~ 5240MHz: 508.828mW 5745 ~ 5825MHz: 429.555mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

Band	Modulation Mode	Beamforming Mode	TX Function
2.4GHz	802.11b	Not Support	3TX
	802.11g	Not Support	3TX
	802.11n (HT20)	Not Support	3TX
	802.11n (HT40)	Not Support	3TX
5GHz	802.11a	Not Support	4TX
	802.11n (HT20)	Support	4TX
	802.11n (HT40)	Support	4TX
	802.11ac (VHT20)	Support	4TX
	802.11ac (VHT40)	Support	4TX
	802.11ac (VHT80)	Support	4TX

* 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)

* For 5GHz band 802.11n and 802.11ac, CDD mode is the worst case for final radiated emission and power line conducted emission tests after pretesting CDD mode and beamforming mode.

2. The EUT uses following antennas.

Antenna Type	Chain 0/1/2: PIFA, Chain 3: PCB								Antenna Connector	NA							
Antenna Gain (dBi)																	
Chain	Frequency (MHz)																
	2412	2422	2437	2452	2462	5180	5200	5240	5190	5230	5210	5745	5785	5825	5755	5795	5775
0	2.5	2.5	3	3.5	4	1.7	2.2	2.5	1.9	2.2	2.2	3.7	4	4	3.9	4	4
1	1.5	1.7	2.1	2.3	2.4	3.6	3.6	3.8	3.6	3.7	3.7	4	4.2	4.1	4.1	4.2	4.2
2	3.1	3.3	3.6	4	4	2.6	2.7	3.1	2.6	3	3	2.5	2.9	3.1	2.5	3	2.9
3	-	-	-	-	-	2.3	2.4	2.5	2.3	2.5	2.4	3.2	3	3.2	3.2	3.1	3

3.2 Description of Test Modes

FOR 2.4GHz

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency	Channel	Frequency
1	2412MHz	7	2442MHz
2	2417MHz	8	2447MHz
3	2422MHz	9	2452MHz
4	2427MHz	10	2457MHz
5	2432MHz	11	2462MHz
6	2437MHz		

7 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	7	2442MHz
4	2427MHz	8	2447MHz
5	2432MHz	9	2452MHz
6	2437MHz		

FOR 5180 ~ 5240MHz

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to			Description
	RE $\geq$ 1G	RE<1G	PLC	
A, B	√	√	√	Refer to each test item

Where RE $\geq$ 1G: Radiated Emission above 1GHz & Bandedge Measurement
RE<1G: Radiated Emission below 1GHz
PLC: Power Line Conducted Emission

Note: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane for 2.4GHz and Z-plane for 5GHz.

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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology
A	802.11n (HT20)	2412-2462	1 to 11	6	OFDM
	802.11a	5180-5240	36 to 48	40	OFDM
B	802.11n (HT20)	2412-2462	1 to 11	6	OFDM
	802.11a	5745-5825	149 to 165	157	OFDM

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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology
A	802.11n (HT20)	2412-2462	1 to 11	6	OFDM
	802.11a	5180-5240	36 to 48	40	OFDM
B	802.11n (HT20)	2412-2462	1 to 11	6	OFDM
	802.11a	5745-5825	149 to 165	157	OFDM

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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology
A	802.11n (HT20)	2412-2462	1 to 11	6	OFDM
	802.11a	5180-5240	36 to 48	40	OFDM
B	802.11n (HT20)	2412-2462	1 to 11	6	OFDM
	802.11a	5745-5825	149 to 165	157	OFDM

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE $\geq$ 1G	23 deg. C, 63% RH	120Vac, 60Hz	Alan Wu
RE<1G	23 deg. C, 63% RH	120Vac, 60Hz	Alan Wu
PLC	23 deg. C, 63% RH	120Vac, 60Hz	Alan Wu

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.

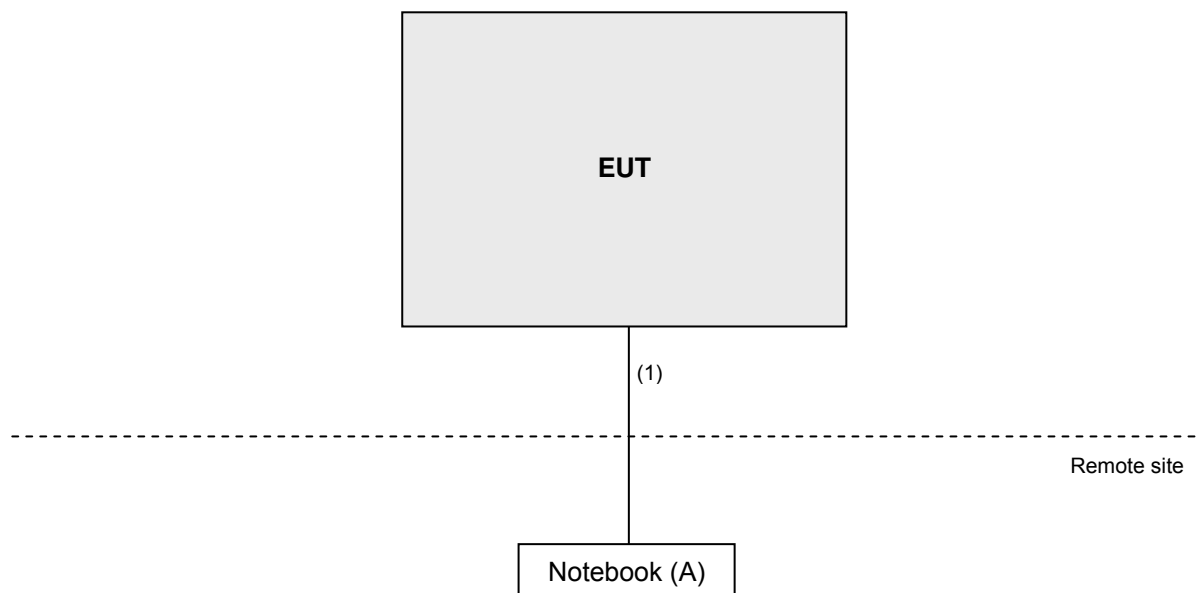
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	BPQ7MQ1	FCC DoC Approved	-

Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45	1	5	N	0	-

3.3.1 Configuration of System under Test



3.4 General Description of Applied Standards

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

FCC Part 15, Subpart C (15.247)

FCC Part 15, Subpart E (15.407)

ANSI C63.10-2013

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. Other emissions shall be at least 20dB below the highest level of the desired power:

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 Procedures New Rules v01r01	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:

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

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 12, 2015	Oct. 11, 2016
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Jul. 08, 2015	Jul. 07, 2016
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Jan. 08, 2016	Jan. 07, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Preamplifier Agilent	8449B	3008A01960	Aug. 09, 2015	Aug. 08, 2016
Preamplifier Agilent	8447D	2944A10631	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-02(295012+309220)	Aug. 09, 2015	Aug. 08, 2016
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	Aug. 09, 2015	Aug. 08, 2016
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 BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100.	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824011	Jul. 09, 2015	Jul. 08, 2016
Power Sensor	MA2411B	0738171	Jul. 09, 2015	Jul. 08, 2016

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 horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 460141.
5. The IC Site Registration No. is IC7450F-4.

4.1.3 Test Procedures

- a. The EUT was placed on the top of a rotating table 0.8 meters (for below 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.
- b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
- c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
- d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
- e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.
- f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

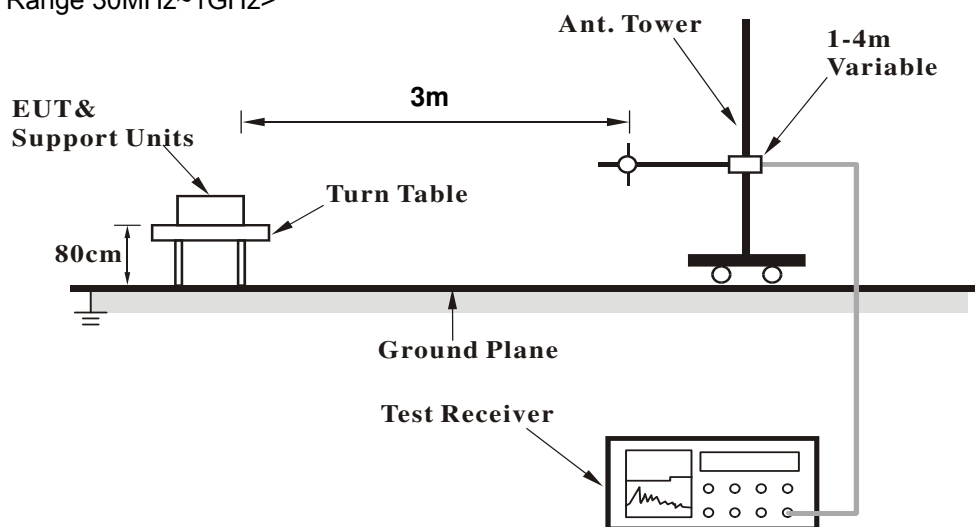
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

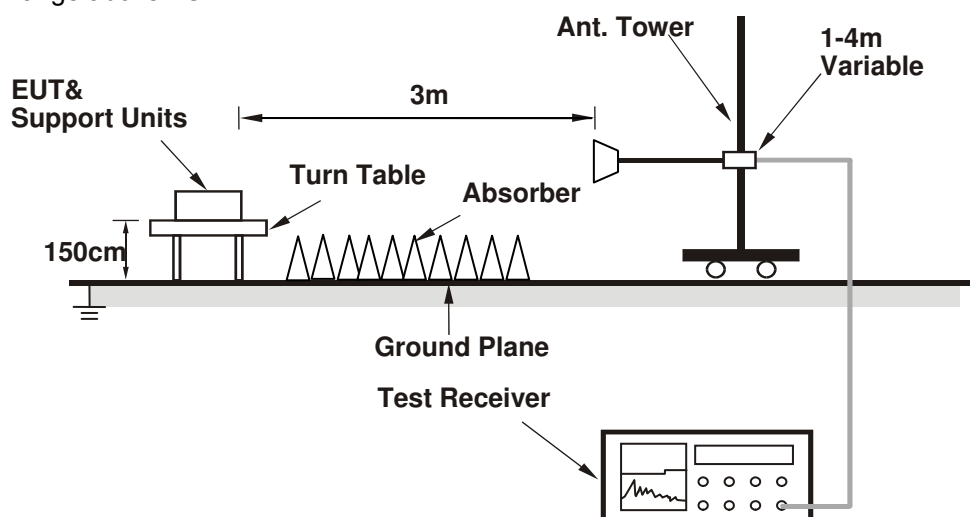
No deviation.

4.1.5 Test Setup

<Frequency Range 30MHz~1GHz>



<Frequency Range above 1GHz>



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

4.1.6 EUT Operating Conditions

- Placed the EUT on the testing table.
- Prepared a notebook to act as a communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The communication partner sent data to EUT by command "PING".
- The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz Data

CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	A

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	*2437.00	118.2 PK			1.67 H	142	86.00	32.20
2	*2437.00	108.8 AV			1.67 H	142	76.60	32.20
3	4874.00	60.0 PK	74.0	-14.0	1.00 H	146	53.40	6.60
4	4874.00	46.0 AV	54.0	-8.0	1.00 H	146	39.40	6.60
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	*2437.00	116.2 PK			1.66 V	68	84.00	32.20
2	*2437.00	106.7 AV			1.66 V	68	74.50	32.20
3	4874.00	58.7 PK	74.0	-15.3	1.00 V	236	52.10	6.60
4	4874.00	45.1 AV	54.0	-8.9	1.00 V	236	38.50	6.60

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 40	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	A

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	119.8 PK			1.56 H	194	80.20	39.60
2	*5200.00	109.4 AV			1.56 H	194	69.80	39.60
3	#10400.00	61.1 PK	74.0	-12.9	1.00 H	82	43.10	18.00
4	#10400.00	48.6 AV	54.0	-5.4	1.00 H	82	30.60	18.00
5	15600.00	65.6 PK	74.0	-8.4	1.25 H	3	46.90	18.70
6	15600.00	53.7 AV	54.0	-0.3	1.25 H	3	35.00	18.70
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	118.3 PK			1.02 V	151	78.70	39.60
2	*5200.00	107.7 AV			1.02 V	151	68.10	39.60
3	#10400.00	61.3 PK	74.0	-12.7	1.00 V	174	43.30	18.00
4	#10400.00	48.2 AV	54.0	-5.8	1.00 V	174	30.20	18.00
5	15600.00	65.0 PK	74.0	-9.0	1.14 V	51	46.30	18.70
6	15600.00	53.6 AV	54.0	-0.4	1.14 V	51	34.90	18.70

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)
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	802.11n (HT20) CH 6 + 802.11a CH 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	B

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	*2437.00	118.6 PK			1.63 H	226	86.40	32.20
2	*2437.00	108.4 AV			1.63 H	226	76.20	32.20
3	4874.00	59.7 PK	74.0	-14.3	1.00 H	140	53.10	6.60
4	4874.00	46.3 AV	54.0	-7.7	1.00 H	140	39.70	6.60
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	*2437.00	115.8 PK			1.62 V	84	83.60	32.20
2	*2437.00	106.3 AV			1.62 V	84	74.10	32.20
3	4874.00	58.5 PK	74.0	-15.5	1.00 V	196	51.90	6.60
4	4874.00	45.3 AV	54.0	-8.7	1.00 V	196	38.70	6.60

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.

CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 25GHz	TEST MODE	B

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	121.0 PK			1.66 H	179	80.50	40.50
2	*5785.00	111.6 AV			1.66 H	179	71.10	40.50
3	11570.00	61.5 PK	74.0	-12.5	1.71 H	53	42.50	19.00
4	11570.00	48.3 AV	54.0	-5.7	1.71 H	53	29.30	19.00
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5785.00	116.3 PK			3.40 V	327	75.80	40.50
2	*5785.00	105.9 AV			3.40 V	327	65.40	40.50
3	11570.00	59.4 PK	74.0	-14.6	1.77 V	49	40.40	19.00
4	11570.00	47.0 AV	54.0	-7.0	1.77 V	49	28.00	19.00

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz data

CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 40	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	37.66	31.4 QP	40.0	-8.6	1.99 H	13	46.10	-14.70
2	124.98	39.5 QP	43.5	-4.0	1.99 H	163	55.30	-15.80
3	249.17	42.4 QP	46.0	-3.6	1.00 H	292	57.00	-14.60
4	301.56	35.9 QP	46.0	-10.1	1.00 H	166	48.60	-12.70
5	375.29	32.9 QP	46.0	-13.1	1.00 H	261	44.40	-11.50
6	625.60	34.7 QP	46.0	-11.3	1.24 H	186	41.30	-6.60
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	57.07	32.1 QP	40.0	-7.9	1.00 V	7	46.30	-14.20
2	124.98	31.7 QP	43.5	-11.8	1.00 V	320	47.50	-15.80
3	198.71	32.7 QP	43.5	-10.8	1.00 V	223	49.30	-16.60
4	249.17	40.2 QP	46.0	-5.8	1.50 V	221	54.80	-14.60
5	375.29	33.0 QP	46.0	-13.0	1.24 V	248	44.50	-11.50
6	625.60	33.3 QP	46.0	-12.7	1.00 V	261	39.90	-6.60

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)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 157	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	37.66	33.5 QP	40.0	-6.5	2.00 H	13	48.20	-14.70
2	124.98	38.7 QP	43.5	-4.8	2.00 H	167	54.50	-15.80
3	198.71	32.0 QP	43.5	-11.5	1.00 H	291	48.60	-16.60
4	249.17	42.2 QP	46.0	-3.8	1.00 H	291	56.80	-14.60
5	299.62	34.6 QP	46.0	-11.4	1.24 H	183	47.40	-12.80
6	625.60	34.0 QP	46.0	-12.0	1.24 H	192	40.60	-6.60
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	53.18	31.7 QP	40.0	-8.3	1.00 V	19	45.50	-13.80
2	124.98	32.1 QP	43.5	-11.4	1.00 V	341	47.90	-15.80
3	198.71	31.0 QP	43.5	-12.5	1.00 V	203	47.60	-16.60
4	249.17	40.1 QP	46.0	-5.9	1.50 V	225	54.70	-14.60
5	416.04	32.4 QP	46.0	-13.6	1.00 V	171	43.30	-10.90
6	625.60	32.3 QP	46.0	-13.7	1.00 V	256	38.90	-6.60

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)
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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 16, 2015	Nov. 15, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Feb. 26, 2016	Feb. 25, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 24, 2015	Jul. 23, 2016
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 HwaYa Shielded Room 1.

3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

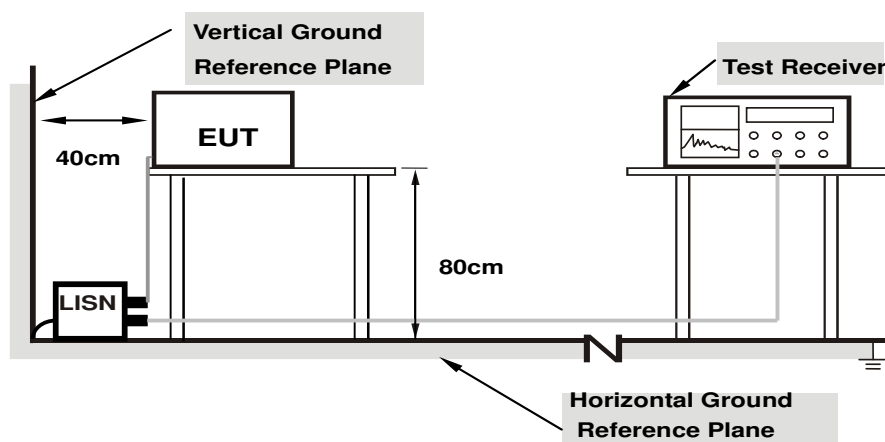
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were 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.

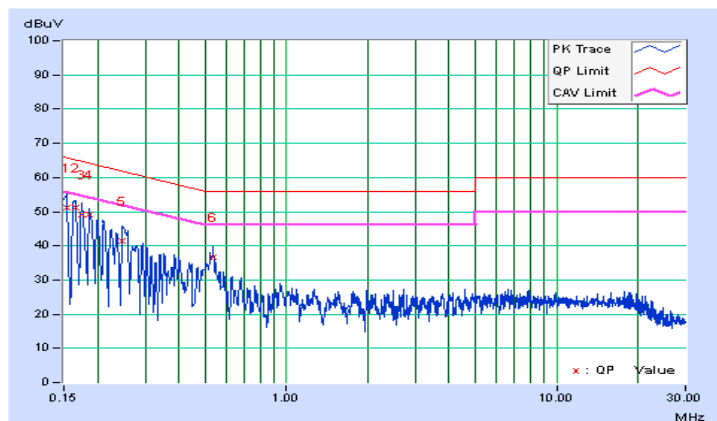
4.2.7 Test Results

CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 40	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	A		

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	0.15400	10.02	41.26	25.66	51.28	35.68	65.78	55.78	-14.50	-20.10
2	0.16535	10.05	41.24	27.61	51.29	37.66	65.19	55.19	-13.90	-17.53
3	0.17400	10.07	39.12	23.22	49.19	33.29	64.77	54.77	-15.58	-21.48
4	0.18600	10.09	39.15	25.33	49.24	35.42	64.21	54.21	-14.97	-18.79
5	0.24614	10.12	31.39	17.24	41.51	27.36	61.89	51.89	-20.37	-24.52
6	0.53404	10.17	26.41	18.39	36.58	28.56	56.00	46.00	-19.42	-17.44

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

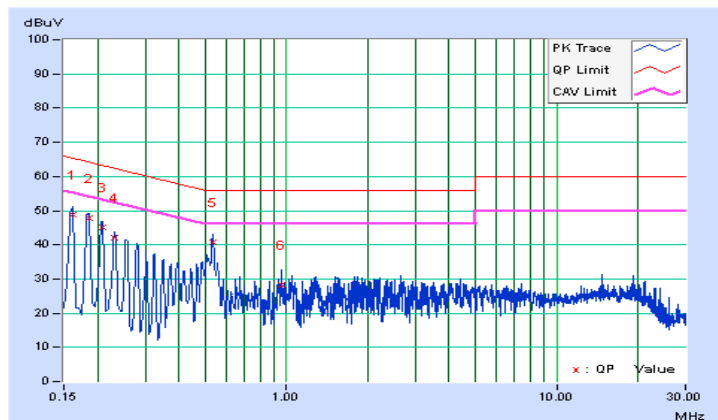


CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 40	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	A		

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	0.16190	10.01	38.68	24.40	48.69	34.41	65.37	55.37	-16.67	-20.95
2	0.18519	10.03	37.89	25.69	47.92	35.72	64.25	54.25	-16.33	-18.53
3	0.20740	10.04	35.07	22.43	45.11	32.47	63.31	53.31	-18.19	-20.83
4	0.23000	10.06	31.86	18.80	41.92	28.86	62.45	52.45	-20.53	-23.59
5	0.53400	10.17	30.62	22.64	40.79	32.81	56.00	46.00	-15.21	-13.19
6	0.95400	10.22	17.97	9.27	28.19	19.49	56.00	46.00	-27.81	-26.51

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

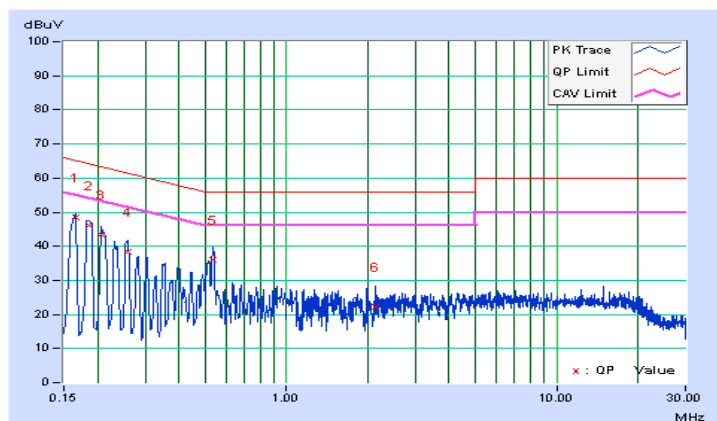


CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 157	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	B		

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	0.16579	10.05	38.28	25.04	48.33	35.09	65.17	55.17	-16.84	-20.08
2	0.18600	10.09	36.07	23.01	46.16	33.10	64.21	54.21	-18.05	-21.11
3	0.20600	10.12	33.34	19.36	43.46	29.48	63.37	53.37	-19.90	-23.88
4	0.25742	10.12	28.29	14.77	38.41	24.89	61.51	51.51	-23.10	-26.62
5	0.53404	10.17	25.94	17.82	36.11	27.99	56.00	46.00	-19.89	-18.01
6	2.12600	10.28	11.97	4.34	22.25	14.62	56.00	46.00	-33.75	-31.38

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

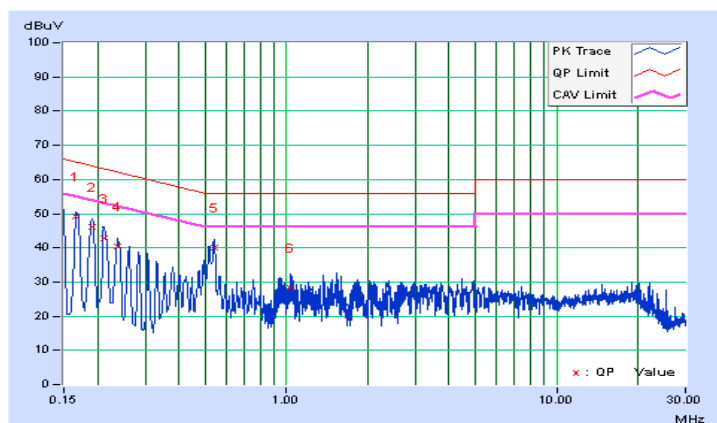


CHANNEL	802.11n (HT20) CH 6 + 802.11a CH 157	Detector Function	Quasi-Peak (QP) / Average (AV)
TEST MODE	B		

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	0.16600	10.02	39.08	26.66	49.10	36.68	65.16	55.16	-16.06	-18.48
2	0.19000	10.03	36.19	22.63	46.22	32.66	64.04	54.04	-17.81	-21.37
3	0.21015	10.05	32.78	20.08	42.83	30.13	63.20	53.20	-20.37	-23.07
4	0.23800	10.06	30.45	18.35	40.51	28.41	62.17	52.17	-21.65	-23.75
5	0.53828	10.17	29.90	22.20	40.07	32.37	56.00	46.00	-15.93	-13.63
6	1.03400	10.23	18.11	9.45	28.34	19.68	56.00	46.00	-27.66	-26.32

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



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:

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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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