FCC Test Report

Report No.:	RF160415D11
FCC ID:	PY308300091
Test Model:	WNDA3100v2
Received Date:	Apr. 15, 2016
Test Date:	Jun. 8 ~ 14, 2016
Issued Date:	Jun. 15, 2016
Applicant:	NETGEAR INC.
Address:	350 East Plumeria Drive, San Jose, CA 95134, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)

Testing Laboratory
2021

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF160415D11	Original release.	Jun. 15, 2016

1 Certificate of Conformity

Product:	RangeMax Dual Band Wireless-N USB Adapter
Brand:	NETGEAR
Test Model:	WNDA3100v2
Sample Status:	Engineering sample
Applicant:	NETGEAR INC.
Test Date:	Jun. 8 ~ 14, 2016
Standard:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10: 2013

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

Prepared by : Annie Chang , **Date:** Jun. 15, 2016

Annie Chang / Senior Specialist

Approved by : Rex. Lai , **Date:** Jun. 15, 2016

Rex Lai / Assistant Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (SECTION 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -11.95dB at 0.16172MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -8.3dB at 5997.60MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used. Antenna connector is N-Type

*For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.

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	2.78 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1000MHz	4.00 dB
Radiated Emissions above 1 GHz	1GHz ~ 40GHz	3.36 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	RangeMax Dual Band Wireless-N USB Adapter
Brand	NETGEAR
Test Model	WNDA3100v2
Status of EUT	Engineering sample
Power Supply Rating	5Vdc from host equipment
Modulation Type	64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps
Operating Frequency	5745 ~ 5825MHz
Number of Channel	5 for 802.11a, 802.11n (20MHz) 802.11ac (20MHz) 2 for 802.11n (40MHz) 802.11ac (40MHz)
Output Power	38.399mW
Antenna Type	Antenna R: PCB Antenna with 1.9 dBi gain Antenna L: PCB Antenna with 2.5 dBi gain
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. This report is issued as a supplementary report to FCC ID: PY308300091. The difference compared with original report is upgrading the standard to section 15.407 under new rule (16-24) for U-NII-3 band, therefore the EUT is re-tested in this report. And the **Transmit Power Measurement** of U-NII-1 band has no effect for this addendum, the U-NII-1 band was not re-tested.

2. This report is prepared for FCC class II permissive change.

3. The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	TX FUNCTION
802.11a	1TX (support diversity parameter)
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX

4. 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

5 channels are provided for 802.11a, 802.11n (20MHz):

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

2 channels are provided for 802.11n (40MHz):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **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 **X-plane**.

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	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	13.5

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	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5745-5825	149 to 165	149	OFDM	BPSK	6.0

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	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5745-5825	149 to 165	149	OFDM	BPSK	6.0

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.

EUT Configure Mode	Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11n (40MHz)		151 to 159	151, 159	OFDM	BPSK	13.5

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	24deg. C, 72%RH	120Vac, 60Hz (System)	Ian Chang
RE<1G	24deg. C, 72%RH	120Vac, 60Hz (System)	Ian Chang
PLC	26deg. C, 78%RH	120Vac, 60Hz (System)	Ian Chang
APCM	25deg. C, 60%RH	120Vac, 60Hz (System)	Dalen Dai

3.3 Duty Cycle of Test Signal

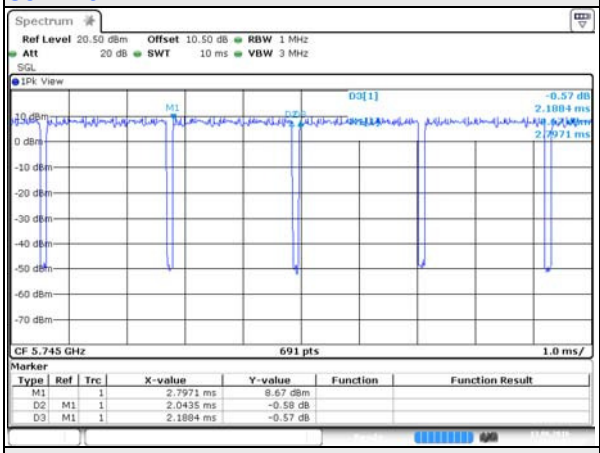
Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 2.043/2.188 = 0.934, Duty factor = 10 * log(1/0.934) = 0.30

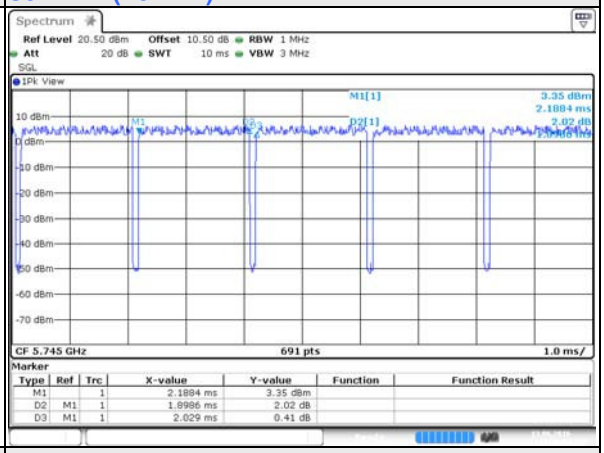
802.11n (20MHz): Duty cycle = 1.898/2.029 = 0.935, Duty factor = 10 * log(1/0.935) = 0.29

802.11n (40MHz): Duty cycle = 0.934/1.043 = 0.895, Duty factor = 10 * log(1/0.895) = 0.48

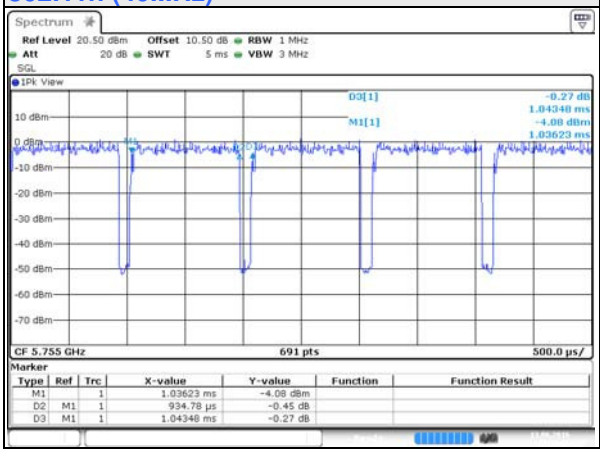
802.11a



802.11n (20MHz)



802.11n (40MHz)



3.4 Description of Support Units

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

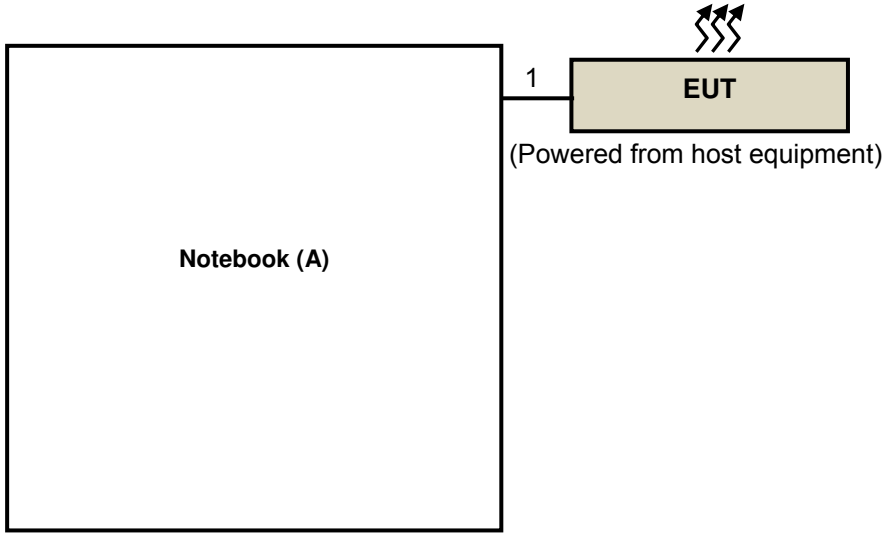
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook PC	DELL	E6530	9331GV1	FCC DoC Approved	Provided by Lab

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	USB cable	1	1.8	Y	0	Provided by Lab

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

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v01r02
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10-2013

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

NOTE: The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It 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 v01r02	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)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
15.407(b)(4)(ii)	FIELD STRENGTH at 3m / § 15.247(d),	
	PK:74 (dBμV/m)	AV:54 (dBμV/m)

*1 beyond 75 MHz or more above of the band edge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

NOTE:

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

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2944A10505	Feb. 26, 2016	Feb. 25, 2017
HP Preamplifier	8449B	3008A01886	Feb. 26, 2016	Feb. 25, 2017
HP Preamplifier	8449B	3008A01887	Feb. 26, 2016	Feb. 25, 2017
ROHDE & SCHWARZ Spectrum Analyzer	FSP 40	100036	Jun. 07, 2016	Jun. 06, 2017
ROHDE & SCHWARZ Spectrum Analyzer	FSV 40	101042	Sep. 23, 2015	Sep. 22, 2016
Agilent Test Receiver	N9038A	MY51210129	Feb. 02, 2016	Feb. 01, 2017
ROHDE & SCHWARZ Signal Generator	SMR 40	100231	Jun. 29, 2015	Jun. 28, 2016
Tektronix Oscilloscope	TDS1012	C019167	Jan. 04, 2016	Jan. 03, 2017
Anritsu Peak Power meter	ML2495A	0842014	Apr. 28, 2016	Apr. 27, 2017
Anritsu Pulse Power Sensor	MA2411B	0738404	Apr. 28, 2016	Apr. 27, 2017
ROHDE & SCHWARZ Vector Signal Generator	SMJ100A	101925	Aug. 26, 2015	Aug. 25, 2016
Schwarzbeck Antenna	VULB9168	139	Jan. 04, 2016	Jan. 03, 2017
EMCO Horn Antenna	3117	00034127	Jan. 20, 2016	Jan. 19, 2017
EMCO Horn Antenna	3115	00028257	Jan. 19, 2016	Jan. 18, 2017
ADT. Controll	ADT100	0301	NA	NA
ADT. Turn Table	TT100	0301	NA	NA
ADT. Tower	AT100	0301	NA	NA
Software	Radiated_V7.6.15.9.4	NA	NA	NA
TIMES RF cable With 10dB PAD	LMR-600	CABLE-RF-01	Mar. 18, 2016	Mar. 17, 2017
SUHNER RF cable With 10dB PAD	SF 104	CABLE-RF-01	Aug. 15, 2015	Aug. 14, 2016
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	May 25, 2016	May 24, 2017
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 14, 2015	Jul. 13, 2016
Highpass filter SUHNER	11SH10-7000/T18000-O/OP	SN 4	NA	NA
Anritsu Power Sensor	MA2411B	0738404	Apr. 28, 2016	Apr. 27, 2017
Anritsu Power Meter	ML2495A	0842014	Apr. 28, 2016	Apr. 27, 2017
Temperature & Humidity Chamber	MHU-225AU	920409	May 25, 2015	May 24, 2016
DIGITAL POWER METER IDRC	CP-240	240515	Sep. 10, 2015	Sep. 9, 2016
AC Power Source ExTech	CFW-105	E000603	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 and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chia Pau RF Chamber

4.1.3 Test Procedure

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

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

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

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

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

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

Note:

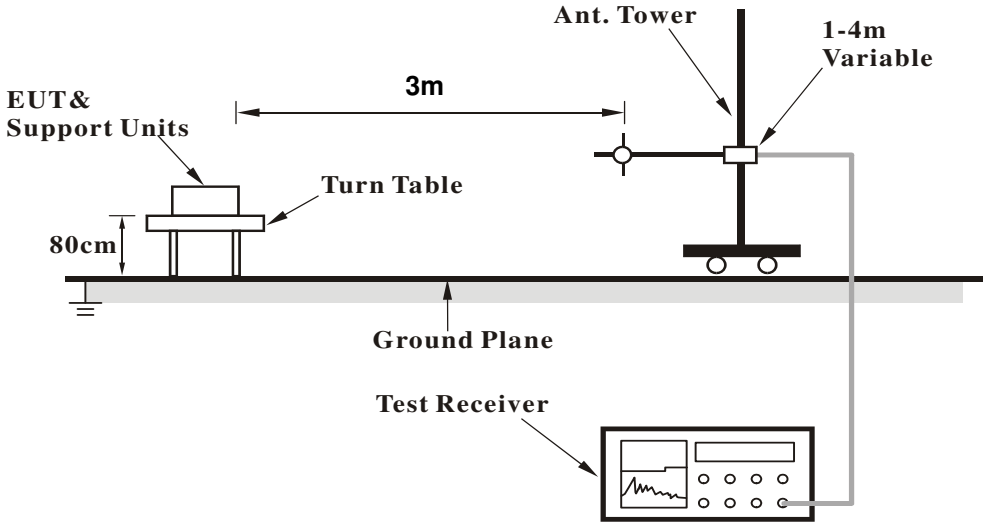
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

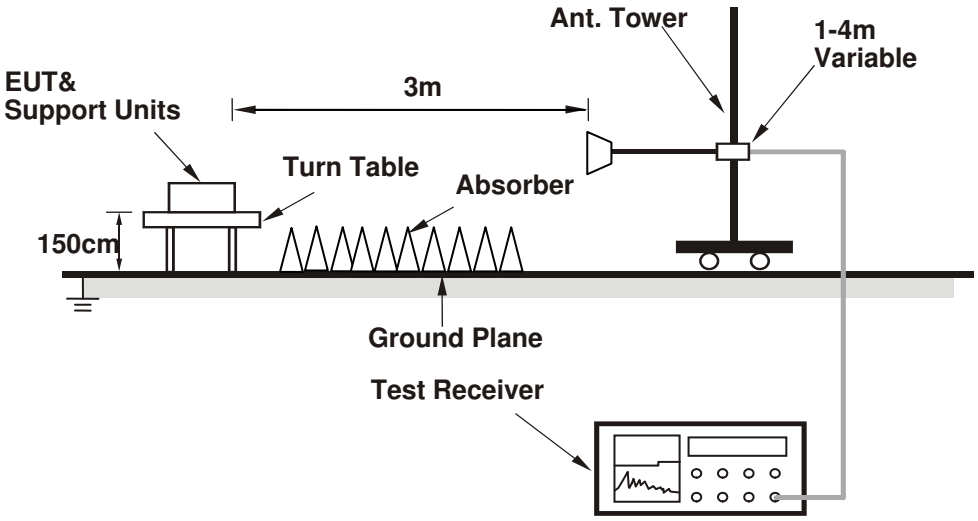
No deviation.

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

a. Turn on the power of all equipment.
b. Notebook PC ran a test program (provided by manufacture) to enable EUT under transmitting condition at specific channel continuously.

4.1.7 Test Results

ABOVE 1GHz DATA

802.11a (Chian 0)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5647.46	50.8 PK	68.2	-17.4	1.64 H	73	42.2	8.7
2	*5745.00	108.1 PK			1.64 H	73	99.7	8.4
3	*5745.00	98.9 AV			1.64 H	73	90.5	8.4
4	**#5997.60**	**59.9 PK**	**68.2**	**-8.3**	**1.64 H**	**73**	**51.1**	**8.8**
5	11490.00	57.5 PK	74.0	-16.5	2.36 H	154	38.8	18.7
6	11490.00	44.2 AV	54.0	-9.8	2.36 H	154	25.6	18.7
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	#5619.20	49.8 PK	68.2	-18.4	3.95 V	98	41.1	8.7
2	*5745.00	107.7 PK			3.95 V	98	99.3	8.4
3	*5745.00	98.9 AV			3.95 V	98	90.4	8.4
4	#5964.30	50.9 PK	68.2	-17.3	3.95 V	98	42.2	8.7
5	11490.00	56.9 PK	74.0	-17.1	1.52 V	205	38.2	18.7
6	11490.00	43.7 AV	54.0	-10.3	1.52 V	205	25.0	18.7

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5601.68	51.3 PK	68.2	-16.9	2.26 H	93	42.6	8.7
2	*5785.00	106.5 PK			2.26 H	93	98.2	8.3
3	*5785.00	97.0 AV			2.26 H	93	88.7	8.3
4	#5966.81	51.2 PK	68.2	-17.0	2.26 H	93	42.5	8.7
5	11570.00	57.5 PK	74.0	-16.5	1.64 H	194	38.7	18.8
6	11570.00	44.7 AV	54.0	-9.3	1.64 H	194	25.9	18.8
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	#5645.37	51.0 PK	68.2	-17.2	2.81 V	83	42.3	8.7
2	*5785.00	105.9 PK			2.81 V	83	97.6	8.3
3	*5785.00	95.9 AV			2.81 V	83	87.6	8.3
4	#5953.18	50.8 PK	68.2	-17.4	2.81 V	83	42.2	8.6
5	11570.00	56.9 PK	74.0	-17.1	2.15 V	88	38.1	18.8
6	11570.00	44.2 AV	54.0	-9.9	2.15 V	88	25.3	18.8

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5594.90	50.9 PK	68.2	-17.3	1.24 H	76	42.2	8.7
2	*5825.00	107.0 PK			1.24 H	76	98.6	8.3
3	*5825.00	96.5 AV			1.24 H	76	88.2	8.3
4	#5945.47	51.9 PK	68.2	-16.3	1.24 H	76	43.3	8.6
5	11650.00	57.3 PK	74.0	-16.7	1.84 H	207	38.7	18.6
6	11650.00	44.3 AV	54.0	-9.7	1.84 H	207	25.7	18.6
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	#5579.95	49.0 PK	68.2	-19.2	2.98 V	87	40.2	8.7
2	*5825.00	106.2 PK			2.98 V	87	97.9	8.3
3	*5825.00	96.0 AV			2.98 V	87	87.7	8.3
4	#5956.15	51.8 PK	68.2	-16.4	2.98 V	87	43.2	8.6
5	11650.00	57.0 PK	74.0	-17.0	1.39 V	32	38.4	18.6
6	11650.00	43.8 AV	54.0	-10.2	1.39 V	32	25.3	18.6

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.

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5636.70	51.6 PK	68.2	-16.6	1.56 H	80	42.9	8.7
2	*5745.00	103.6 PK			1.56 H	80	95.2	8.4
3	*5745.00	94.1 AV			1.56 H	80	85.7	8.4
4	#5939.93	50.7 PK	68.2	-17.5	1.56 H	80	42.1	8.6
5	11490.00	57.3 PK	74.0	-16.7	2.31 H	258	38.7	18.7
6	11490.00	44.7 AV	54.0	-9.3	2.31 H	258	26.0	18.7
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	#5613.96	49.5 PK	68.2	-18.7	3.98 V	48	40.8	8.7
2	*5745.00	99.1 PK			3.98 V	48	90.7	8.4
3	*5745.00	88.8 AV			3.98 V	48	80.4	8.4
4	#5994.65	50.4 PK	68.2	-17.8	3.98 V	48	41.7	8.8
5	11490.00	56.9 PK	74.0	-17.1	2.60 V	193	38.2	18.7
6	11490.00	44.1 AV	54.0	-9.9	2.60 V	193	25.4	18.7

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5644.38	50.4 PK	68.2	-17.8	1.52 H	78	41.8	8.7
2	*5785.00	102.7 PK			1.52 H	78	94.3	8.3
3	*5785.00	93.1 AV			1.52 H	78	84.8	8.3
4	#5941.48	50.5 PK	68.2	-17.7	1.52 H	78	41.9	8.6
5	11570.00	57.8 PK	74.0	-16.2	1.48 H	169	39.0	18.8
6	11570.00	44.7 AV	54.0	-9.3	1.48 H	169	25.9	18.8
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	#5582.26	49.5 PK	68.2	-18.7	3.42 V	96	40.8	8.7
2	*5785.00	98.0 PK			3.42 V	96	89.7	8.3
3	*5785.00	88.4 AV			3.42 V	96	80.0	8.3
4	#5979.45	50.0 PK	68.2	-18.2	3.42 V	96	41.3	8.7
5	11570.00	57.3 PK	74.0	-16.7	1.33 V	294	38.5	18.8
6	11570.00	44.1 AV	54.0	-9.9	1.33 V	294	25.3	18.8

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5581.16	49.4 PK	68.2	-18.8	1.58 H	78	40.7	8.7
2	*5825.00	103.2 PK			1.58 H	78	94.9	8.3
3	*5825.00	93.1 AV			1.58 H	78	84.7	8.3
4	#5929.73	49.8 PK	68.2	-18.4	1.58 H	78	41.3	8.5
5	11650.00	57.4 PK	74.0	-16.7	1.74 H	111	38.8	18.6
6	11650.00	44.1 AV	54.0	-9.9	1.74 H	111	25.5	18.6
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	#5593.76	49.2 PK	68.2	-19.0	3.42 V	63	40.5	8.7
2	*5825.00	98.5 PK			3.42 V	63	90.2	8.3
3	*5825.00	88.6 AV			3.42 V	63	80.3	8.3
4	#5961.67	48.8 PK	68.2	-19.4	3.42 V	63	40.2	8.7
5	11650.00	56.1 PK	74.0	-17.9	2.08 V	306	37.5	18.6
6	11650.00	43.6 AV	54.0	-10.4	2.08 V	306	25.0	18.6

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.

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5589.39	49.4 PK	68.2	-18.8	1.10 H	78	40.7	8.7
2	*5755.00	100.3 PK			1.10 H	78	91.9	8.4
3	*5755.00	91.6 AV			1.10 H	78	83.2	8.4
4	#5961.33	49.9 PK	68.2	-18.3	1.10 H	78	41.2	8.7
5	11510.00	57.7 PK	74.0	-16.3	1.64 H	200	39.1	18.6
6	11510.00	44.8 AV	54.0	-9.2	1.64 H	200	26.2	18.6
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	#5643.24	48.9 PK	68.2	-19.3	3.89 V	108	40.3	8.7
2	*5755.00	98.8 PK			3.89 V	108	90.4	8.4
3	*5755.00	90.0 AV			3.89 V	108	81.6	8.4
4	#5946.34	49.8 PK	68.2	-18.4	3.89 V	108	41.2	8.6
5	11510.00	56.8 PK	74.0	-17.2	2.25 V	16	38.2	18.6
6	11510.00	43.8 AV	54.0	-10.2	2.25 V	16	25.2	18.6

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5626.70	49.3 PK	68.2	-18.9	1.74 H	80	40.6	8.7
2	*5795.00	100.1 PK			1.74 H	80	91.8	8.3
3	*5795.00	91.3 AV			1.74 H	80	83.0	8.3
4	#5933.48	51.6 PK	68.2	-16.6	1.74 H	8	43.1	8.5
5	11590.00	57.7 PK	74.0	-16.4	2.09 H	319	38.8	18.9
6	11590.00	44.7 AV	54.0	-9.3	2.09 H	319	25.9	18.9
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	#5630.62	49.0 PK	68.2	-19.2	3.69 V	124	40.3	8.7
2	*5795.00	98.8 PK			3.69 V	124	90.5	8.3
3	*5795.00	89.8 AV			3.69 V	124	81.5	8.3
4	#5928.80	50.9 PK	68.2	-17.3	3.69 V	124	42.4	8.5
5	11590.00	56.9 PK	74.0	-17.1	2.43 V	51	38.0	18.9
6	11590.00	44.1 AV	54.0	-9.9	2.43 V	51	25.2	18.9

REMARKS:

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

BELOW 1GHz WORST-CASE DATA: 802.11a (Chian 0)

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	52.16	23.0 QP	40.0	-17.0	1.69 H	249	32.6	-9.6
2	210.86	29.7 QP	43.5	-13.8	3.15 H	311	41.6	-11.8
3	243.64	29.7 QP	46.0	-16.3	2.35 H	120	39.7	-10.0
4	300.82	27.4 QP	46.0	-18.6	1.84 H	35	35.1	-7.7
5	346.56	29.2 QP	46.0	-16.8	1.24 H	68	36.3	-7.2
6	432.60	29.0 QP	46.0	-17.0	1.19 H	169	33.9	-4.9
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	51.53	30.5 QP	40.0	-9.5	1.64 V	307	40.1	-9.6
2	120.06	29.7 QP	43.5	-13.8	1.57 V	314	41.6	-12.0
3	225.60	31.0 QP	46.0	-15.0	2.31 V	83	42.9	-11.9
4	240.00	28.9 QP	46.0	-17.2	2.54 V	29	39.1	-10.3
5	388.61	30.5 QP	46.0	-15.5	2.01 V	34	36.2	-5.8
6	432.06	27.7 QP	46.0	-18.3	1.84 V	120	32.6	-4.9

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.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESCS 30	100276	Apr. 12, 2016	Apr. 11, 2017
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101197	May 04, 2016	May 03, 2017
LISN With Adapter (for EUT)	AD10	C10Ada-002	May 04, 2016	May 03, 2017
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 25, 2015	Nov. 24, 2016
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 04, 2016	May 03, 2017
Software	Cond_V7.3.7	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 15, 2016	Feb. 14, 2017
SUHNER Terminator (For ROHDE & SCHWARZ LISN)	65BNC-5001	E1-011484	May 12, 2016	May 11, 2017
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 13, 2015	Nov. 12, 2016
LISN With Adapter (for TV EUT)	100220	N/A	Nov. 13, 2015	Nov. 12, 2016

Notes: 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. 10.
3. The VCCI Site Registration No. C-1852.

4.2.3 Test Procedure

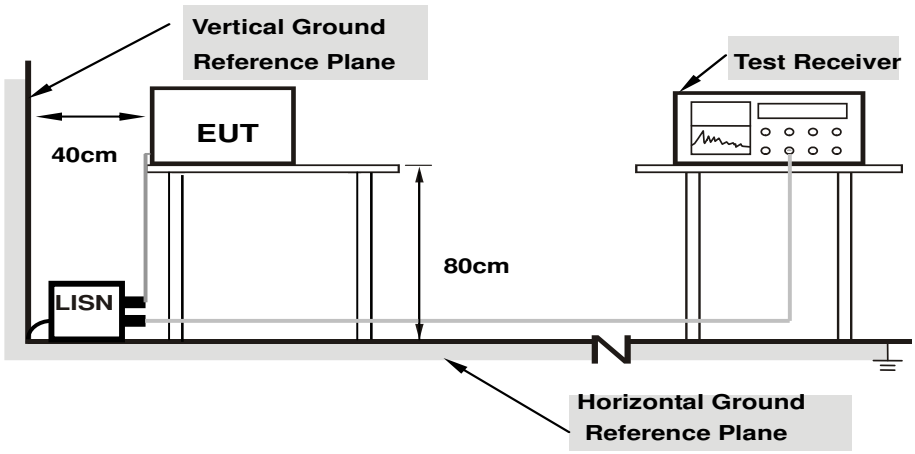
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Condition

Same as 4.1.6.

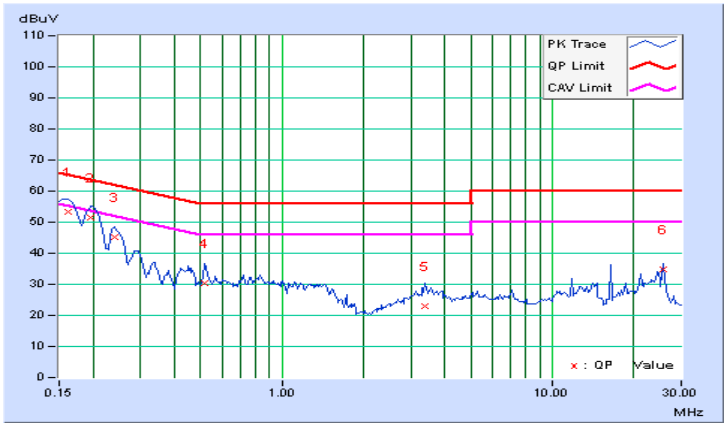
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	**0.16172**	**9.70**	**43.73**	**29.54**	**53.43**	**39.24**	**65.38**	**55.38**	**-11.95**	**-16.14**
2	0.19687	9.70	41.91	26.73	51.61	36.43	63.74	53.74	-12.13	-17.31
3	0.23984	9.70	35.54	21.75	45.24	31.45	62.10	52.10	-16.86	-20.65
4	0.51719	9.70	20.63	13.02	30.33	22.72	56.00	46.00	-25.67	-23.28
5	3.38281	9.84	13.16	5.85	23.00	15.69	56.00	46.00	-33.00	-30.31
6	25.87109	9.98	24.84	23.49	34.82	33.47	60.00	50.00	-25.18	-16.53

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

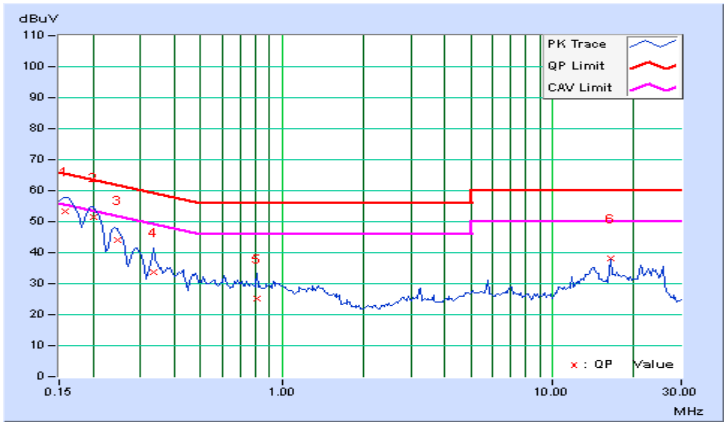


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	9.70	43.57	28.49	53.27	38.19	65.58	55.58	-12.31	-17.39
2	0.20078	9.69	41.67	25.72	51.36	35.41	63.58	53.58	-12.22	-18.17
3	0.24766	9.69	34.51	18.41	44.20	28.10	61.84	51.84	-17.64	-23.74
4	0.33359	9.69	24.05	13.41	33.74	23.10	59.36	49.36	-25.62	-26.26
5	0.81406	9.72	15.52	6.52	25.24	16.24	56.00	46.00	-30.76	-29.76
6	16.46484	9.94	28.19	27.34	38.13	37.28	60.00	50.00	-21.87	-12.72

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 Measurment

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

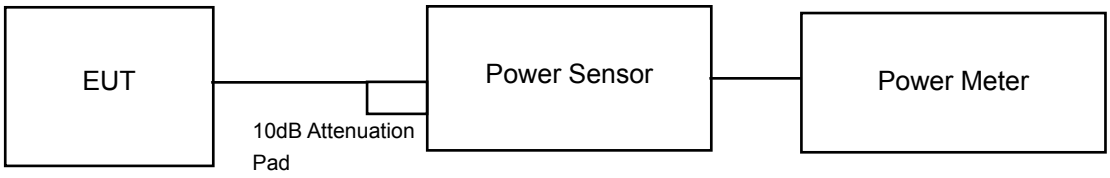
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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

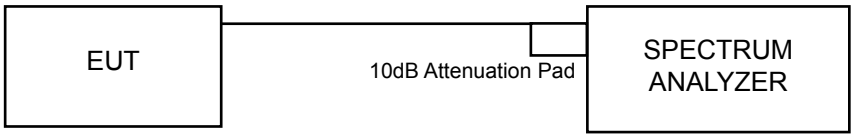
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

FOR POWER OUTPUT MEASUREMENT



FOR 26dB & OCCUPIED BANDWIDTH



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power 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.

For Occupied Bandwidth

The transmitter output was connected to the spectrum analyzer through an attenuator. The bandwidth of the fundamental frequency was measured by spectrum analyzer with resolution bandwidth in the range of 1% to 5% of the anticipated emission bandwidth, and a video bandwidth at least 3x the resolution bandwidth and set the detector to SAMPLE. The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 %of the total mean power of a given emission.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Result

Power Output:

802.11a

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Maximum Conducted Power (mW)		Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 0	Chain 1		
149	5745	15.29	14.59	33.806	28.774	30	Pass
157	5785	15.19	14.56	33.037	28.576	30	Pass
165	5825	15.20	14.57	33.113	28.642	30	Pass

802.11n (20MHz)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
149	5745	12.27	11.65	31.488	14.98	30	Pass
157	5785	12.28	11.85	32.215	15.08	30	Pass
165	5825	12.17	11.71	31.307	14.96	30	Pass

802.11n (40MHz)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
151	**5755**	**12.42**	**13.21**	**38.399**	**15.84**	**30**	**Pass**
159	5795	12.42	13.19	38.303	15.83	30	Pass

Occupied Bandwidth:

802.11a

CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
149	5745	17.30	17.00	PASS
157	5785	17.39	17.00	PASS
165	5825	17.39	17.00	PASS

802.11n (20MHz)

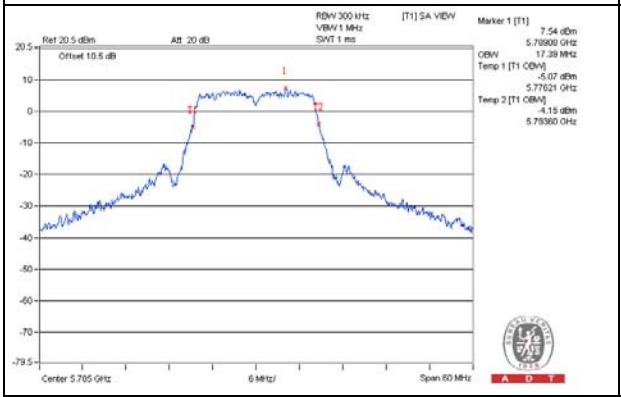
CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
149	5745	17.82	17.70	PASS
157	5785	17.90	17.70	PASS
165	5825	17.90	17.70	PASS

802.11n (40MHz)

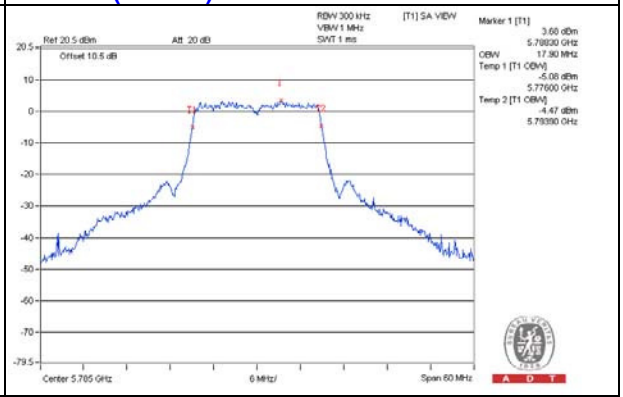
CHANNEL	CHANNEL FREQUENCY (MHz)	OCCUPIED BANDWIDTH (MHz)		PASS / FAIL
		CHAIN 0	CHAIN 1	
151	5755	36.37	36.50	PASS
159	5795	36.50	36.33	PASS

SPECTRUM PLOT OF WORST VALUE

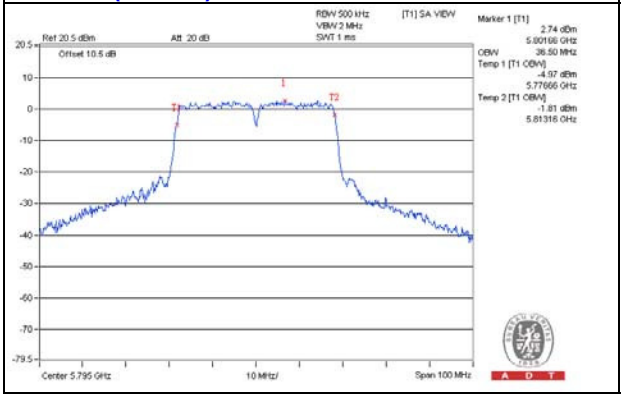
802.11a



802.11n (20MHz)



802.11n (40MHz)

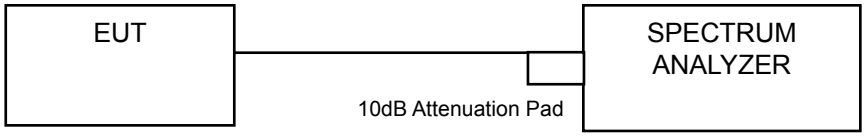


4.4 Peak Power Spectral Density Measurement

4.4.1 Limits of Peak Power Spectral Density Measurement

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

4.4.2 Test Setup



4.4.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.4 Test Procedure

For U-NII-3 band:

1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 500 kHz, Set VBW ≥ 3 RBW, 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 add 10 log (1/duty cycle)

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.3.6.

4.4.7 Test Results

For U-NII-3 Band

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	9.65	3.01	0.30	12.96	30.00	PASS
	157	5785	9.78	3.01	0.30	13.09	30.00	PASS
	165	5825	10.24	3.01	0.30	13.55	30.00	PASS
1	149	5745	9.89	3.01	0.30	13.20	30.00	PASS
	157	5785	9.95	3.01	0.30	13.26	30.00	PASS
	165	5825	9.87	3.01	0.30	13.18	30.00	PASS

NOTE:

1. Directional gain = 2.5dBi + 10log(2) = 5.51dBi < 6dBi, so the power spectral density limit is not reduced.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (20MHz)

TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	149	5745	7.89	3.01	0.29	11.19	30.00	PASS
	157	5785	7.91	3.01	0.29	11.21	30.00	PASS
	165	5825	7.94	3.01	0.29	11.24	30.00	PASS
1	149	5745	6.31	3.01	0.29	9.61	30.00	PASS
	157	5785	6.61	3.01	0.29	9.91	30.00	PASS
	165	5825	6.40	3.01	0.29	9.70	30.00	PASS

NOTE:

1. Directional gain = 2.5dBi + 10log(2) = 5.51dBi < 6dBi, so the power spectral density limit is not reduced.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (40MHz)

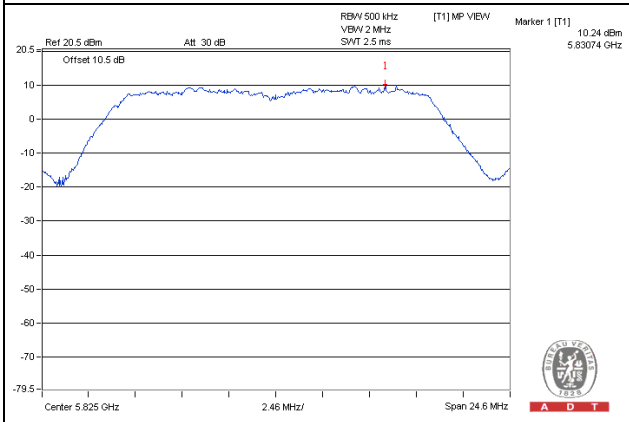
TX chain	Channel	Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=2) dB	DUTY FACTOR	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	PASS /FAIL
0	151	5755	5.73	3.01	0.48	9.22	30.00	PASS
	159	5795	4.13	3.01	0.48	7.62	30.00	PASS
1	151	5755	3.44	3.01	0.48	6.93	30.00	PASS
	159	5795	5.49	3.01	0.48	8.98	30.00	PASS

NOTE:

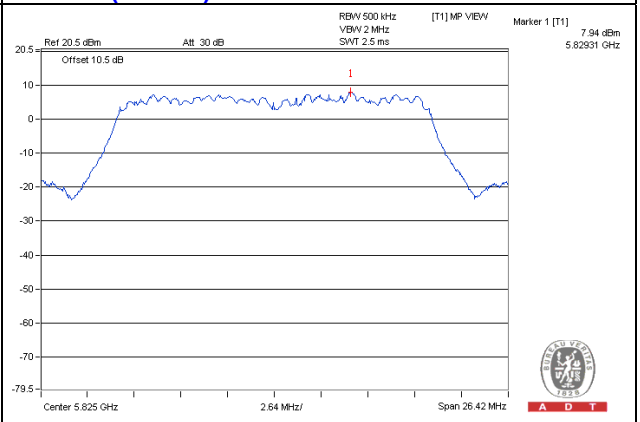
1. Directional gain = 2.5dBi + 10log(2) = 5.51dBi < 6dBi, so the power spectral density limit is not reduced.
2. Refer to section 3.3 for duty cycle spectrum plot.

SPECTRUM PLOT OF WORST VALUE

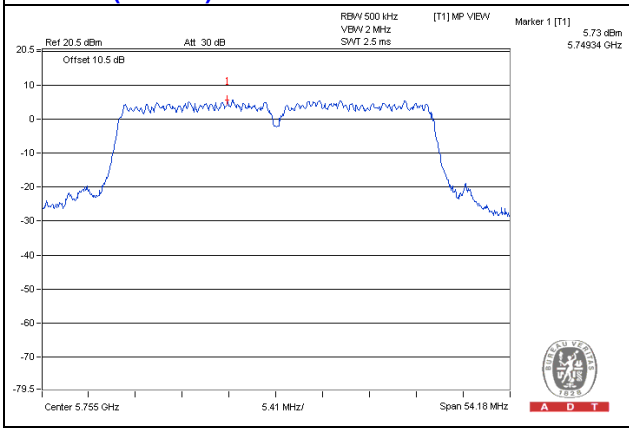
802.11a



802.11n (20MHz)



802.11n (40MHz)

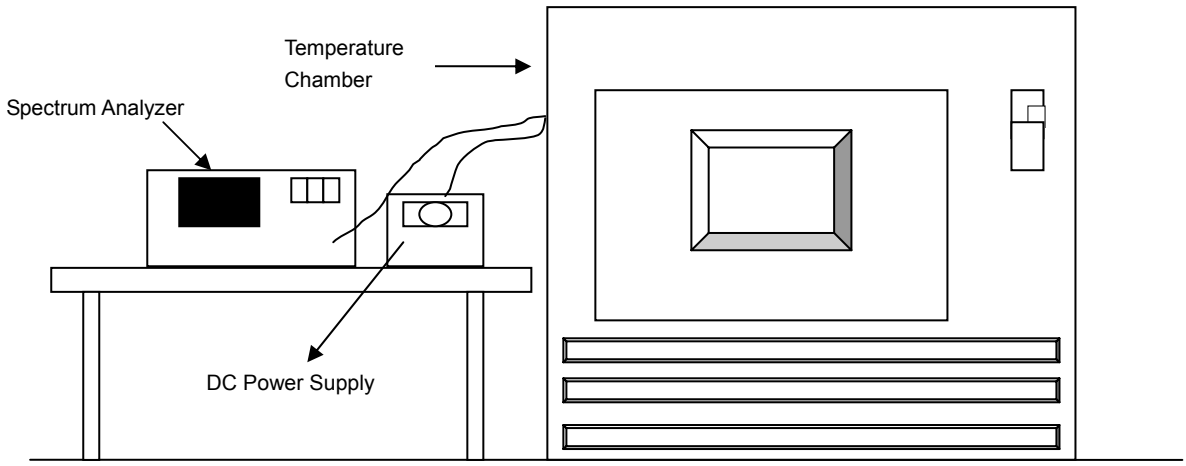


4.5 Frequency Stability Measurement

4.5.1 Limits of Frequency Stability Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal DC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

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

4.5.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5745 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	5	5745.0139	Pass	5745.0101	Pass	5745.013	Pass	5745.0138	Pass
40	5	5745.0173	Pass	5745.0179	Pass	5745.0183	Pass	5745.0186	Pass
30	5	5745.0008	Pass	5745.001	Pass	5745.0042	Pass	5745.0041	Pass
20	5	5744.9762	Pass	5744.9729	Pass	5744.9738	Pass	5744.9746	Pass
10	5	5744.9972	Pass	5744.9941	Pass	5744.9951	Pass	5744.9952	Pass
0	5	5744.9712	Pass	5744.9694	Pass	5744.97	Pass	5744.9732	Pass
-10	5	5744.9769	Pass	5744.9733	Pass	5744.9742	Pass	5744.9765	Pass
-20	5	5745.014	Pass	5745.0145	Pass	5745.0157	Pass	5745.0153	Pass
-30	5	5745.0259	Pass	5745.0239	Pass	5745.0234	Pass	5745.0225	Pass

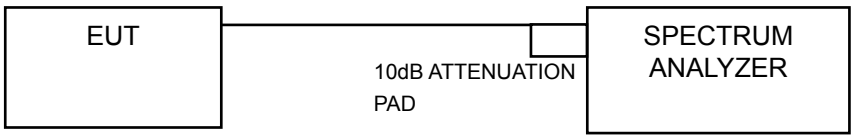
Frequency Stability Versus Voltage									
Operating Frequency: 5745 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	5.75	5744.9764	Pass	5744.9731	Pass	5744.9739	Pass	5744.9744	Pass
	5	5744.9762	Pass	5744.9729	Pass	5744.9738	Pass	5744.9746	Pass
	4.25	5744.9753	Pass	5744.9719	Pass	5744.9729	Pass	5744.9748	Pass

4.6 6dB Bandwidth Measurment

4.6.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

802.11a

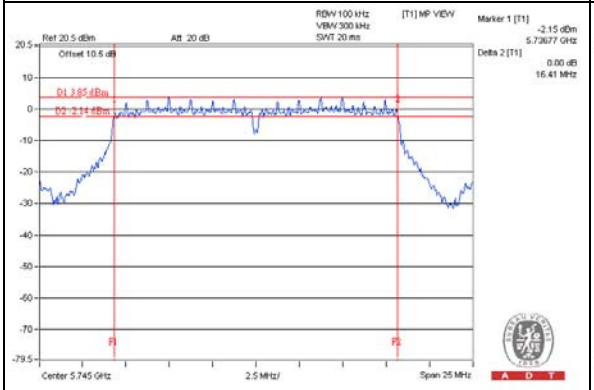
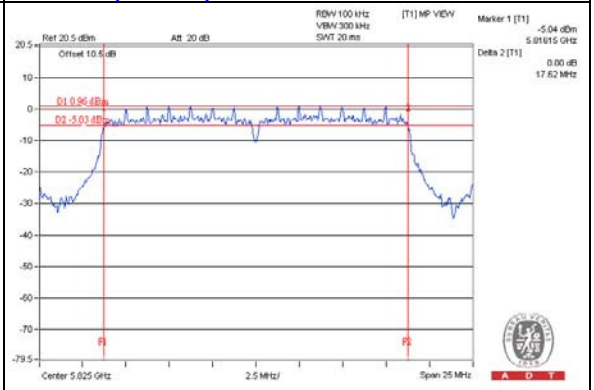
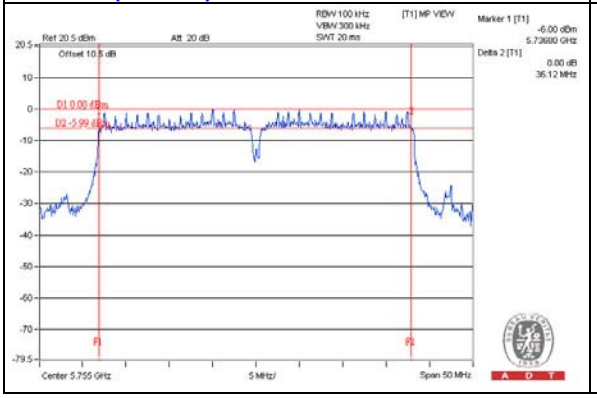
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.40	16.41	0.5	Pass
157	5785	16.39	16.40	0.5	Pass
165	5825	16.40	16.40	0.5	Pass

802.11n (20MHz)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.60	17.58	0.5	Pass
157	5785	17.61	17.61	0.5	Pass
165	5825	17.62	17.61	0.5	Pass

802.11n (40MHz)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	36.12	36.09	0.5	Pass
159	5795	36.09	36.11	0.5	Pass

Spectrum Plot of Worst Value	
802.11a	**802.11n (20MHz)**
	
802.11n (40MHz)	
	

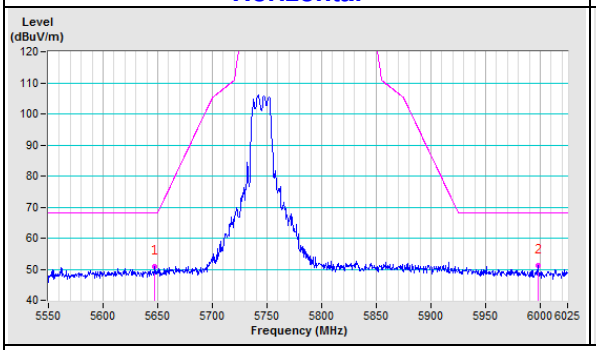
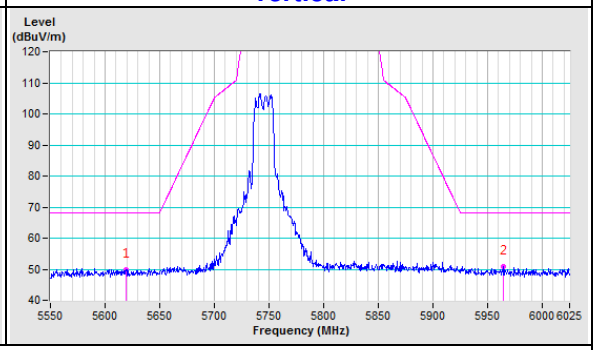
5 Pictures of Test Arrangements

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

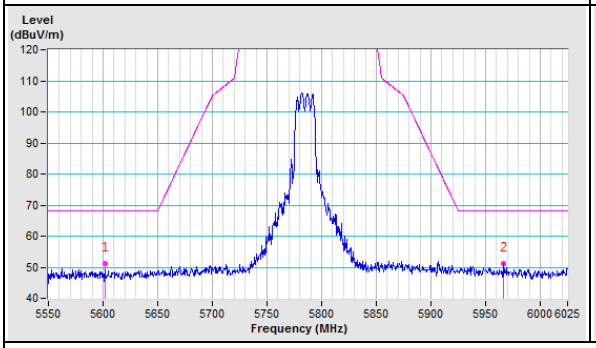
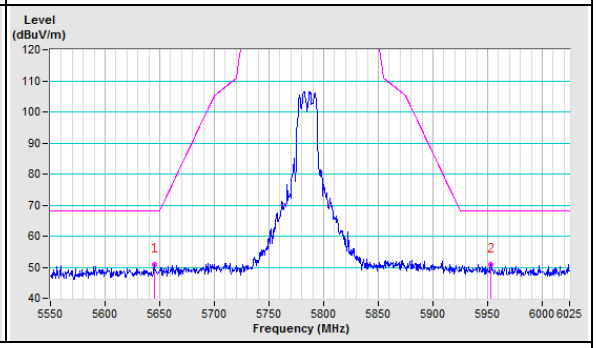
Annex A- Radiated Out of Band Emisison (OOBE) Measurement (For U-NII-3 band)

802.11a

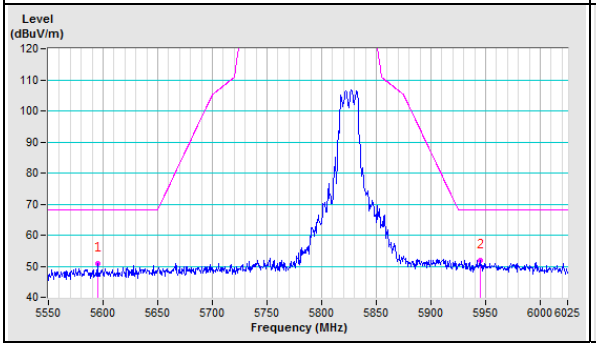
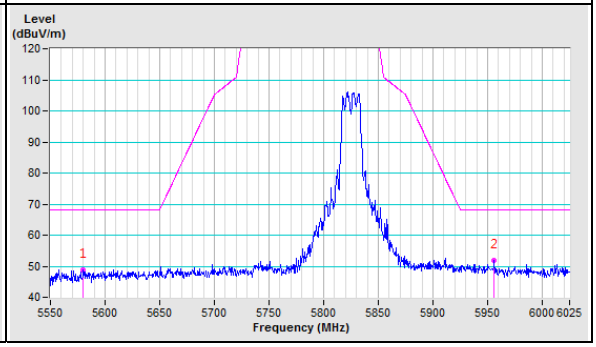
CH149

Horizontal	Vertical
	

CH157

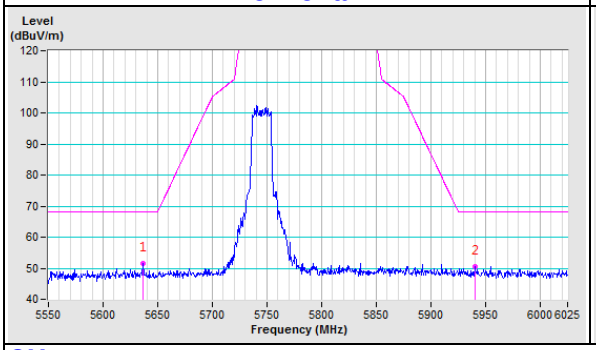
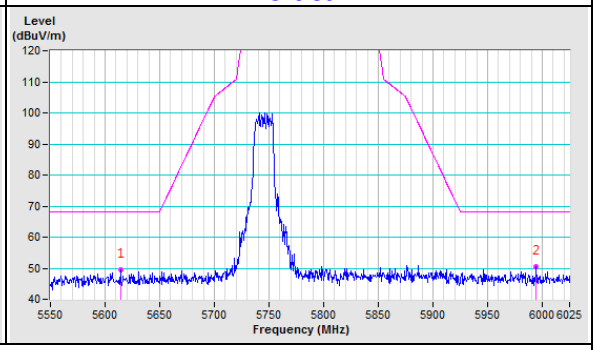
Horizontal	Vertical
	

CH165

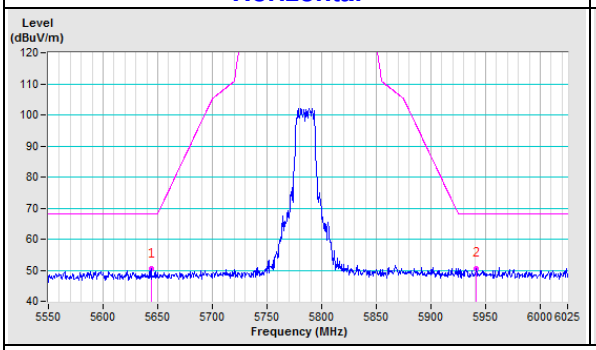
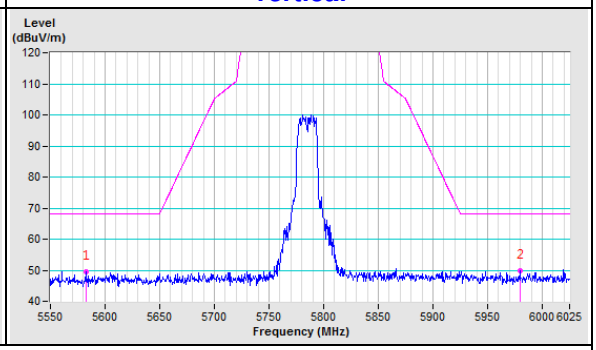
Horizontal	Vertical
	

802.11n (20MHz)

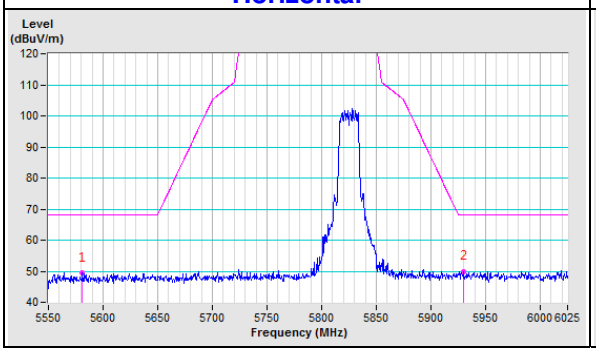
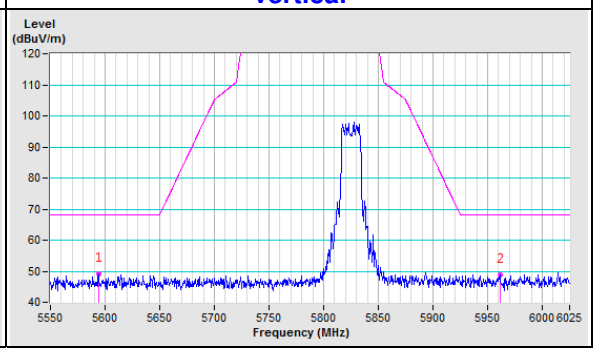
CH149

Horizontal	Vertical
	

CH157

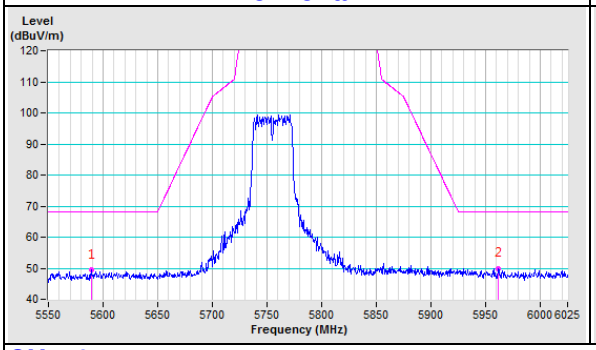
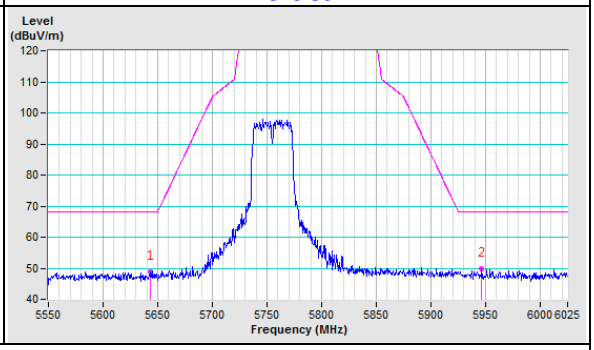
Horizontal	Vertical
	

CH165

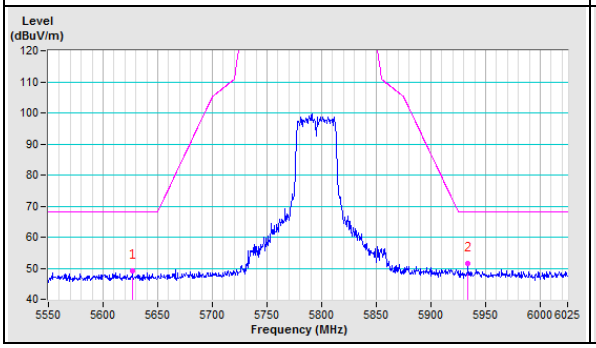
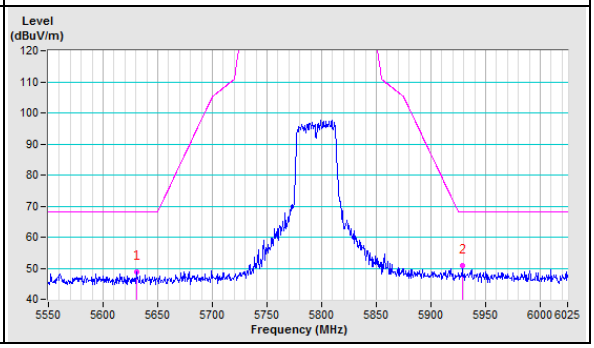
Horizontal	Vertical
	

802.11n (40MHz)

CH151

Horizontal	Vertical
	

CH159

Horizontal	Vertical
	

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/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

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.

--- END ---