

FCC Test Report

Report No.: RF150122C14-1

FCC ID: TE7RE210

Test Model: RE210

Received Date: Jan. 26, 2015

Test Date: Apr. 09 ~ Apr. 24, 2015

Issued Date: May 07, 2015

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A D T

Release Control Record

Issue No.	Description	Date Issued
RF150122C14-1	Original release.	May 07, 2015

1 Certificate of Conformity

Product: AC750 Wi-Fi Range Extender

Brand: TP-LINK

Test Model: RE210

Sample Status: Prototype


Applicant: TP-LINK TECHNOLOGIES CO., LTD.

Test Date: Apr. 09 ~ Apr. 24, 2015

Standard: 47 CFR FCC Part 15, Subpart E (Section 15.407)
ANSI C63.10:2013

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

Prepared by :  , **Date:** May 07, 2015
Polly Chien / Specialist

Approved by :  , **Date:** May 07, 2015
Ken Liu / Senior 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 -12.57dB at 0.16096MHz.
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 875.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-PEX not a standard connector.

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	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~ 1000MHz	3.87 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	AC750 Wi-Fi Range Extender
Brand	TP-LINK
Test Model	RE210
Status of EUT	Prototype
Power Supply Rating	100-240Vac, 0.3A, 50/60Hz
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 300.0Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	5180 ~ 5240MHz & 5745 ~ 5825MHz
Number of Channel	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	5180 ~ 5240MHz: 81.283mW 5745 ~ 5825MHz: 80.353mW
Antenna Type	Omi-directional antenna with 2dBi gain
Antenna Connector	i-PEX
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT provides 1 completed transmitter and 1 receiver.

Modulation Mode	TX Function
802.11a	1TX
802.11n (HT20)	1TX
802.11n (HT40)	1TX
802.11ac (VHT20)	1TX
802.11ac (VHT40)	1TX
802.11ac (VHT80)	1TX

*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)

2. 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 (40MHz):

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	APCM	
-	√	√	√	√	-

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

NOTE:

1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-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	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Radiated Emission Test (Below 1GHz):

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5320 5745-5825	36 to 64 149 to 165	36	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	5180-5320 5745-5825	36 to 64 149 to 165	36	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.

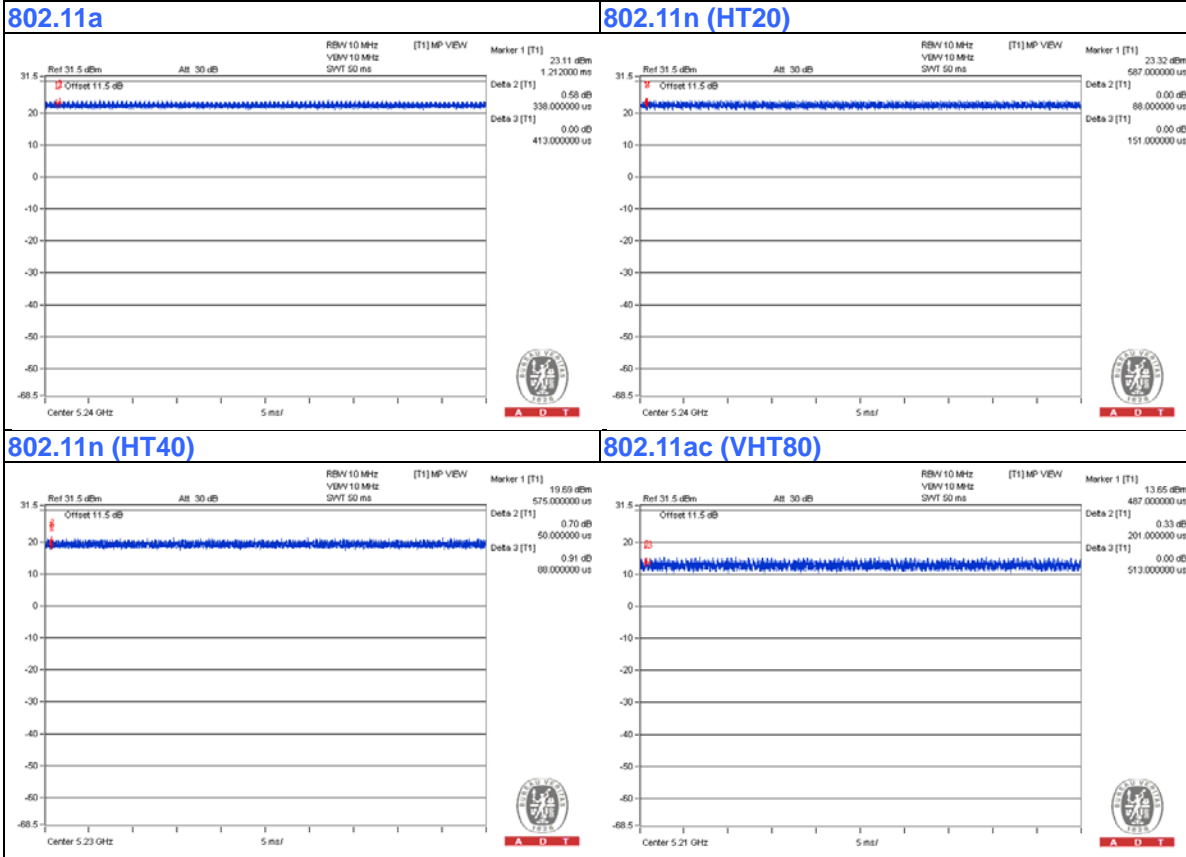
EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.0
-	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11n (HT40)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.0
-	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE \geq 1G	17deg. C, 71%RH	120Vac, 60Hz	Jones Chang
RE $<$ 1G	19deg. C, 61%RH	120Vac, 60Hz	Jones Chang
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Leo Tsai

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is > 98 %, duty factor is not required.



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.

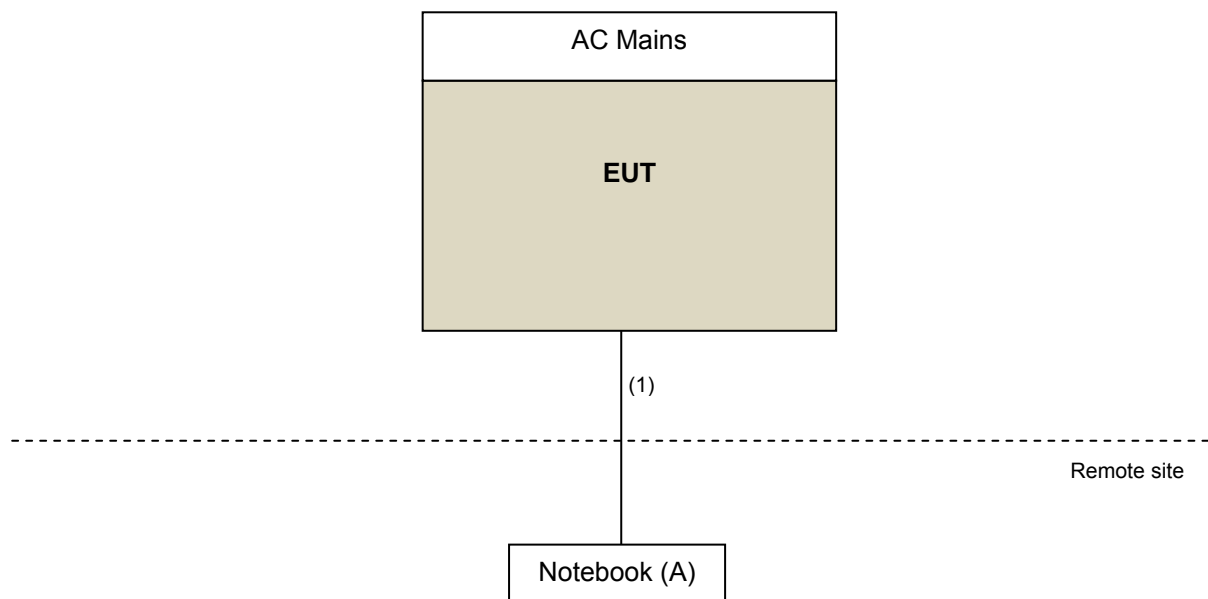
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-

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 cable	1	3	N	0	-

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)

789033 D02 General UNII Test Procedure New Rules v01

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 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

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Oct. 06, 2014	Oct. 05, 2015
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Aug. 29, 2014	Aug. 28, 2015
BILOG Antenna SCHWARZBECK	VULB9168	9168-160	Feb. 05, 2015	Feb. 04, 2016
HORN Antenna SCHWARZBECK	9120D	209	Feb. 09, 2015	Feb. 08, 2016
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Feb. 09, 2015	Feb. 08, 2016
Loop Antenna	HFH2-Z2	100070	Mar. 06, 2014	Mar. 05, 2016
Preamplifier Agilent	8447D	2944A10738	Oct. 18, 2014	Oct. 17, 2015
Preamplifier Agilent	8449B	3008A01964	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 104	214378/4	Aug. 22, 2014	Aug. 21, 2015
RF signal cable HUBER+SUHNNER	SUCOFLEX 106	12738/6 +309224/4	Aug. 22, 2014	Aug. 21, 2015
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller inn-co GmbH	CO2000	017303	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. 26, 2014	Jul. 25, 2015
Power Sensor	MA2411B	0738171	Jul. 26, 2014	Jul. 25, 2015
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2014	Oct. 17, 2015
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 09, 2014	Jun. 08, 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 calibration interval of the loop antenna is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
 3. The test was performed in HwaYa Chamber 3.
 4. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
 5. The FCC Site Registration No. is 988962.
 6. The IC Site Registration No. is IC 7450F-3.

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:

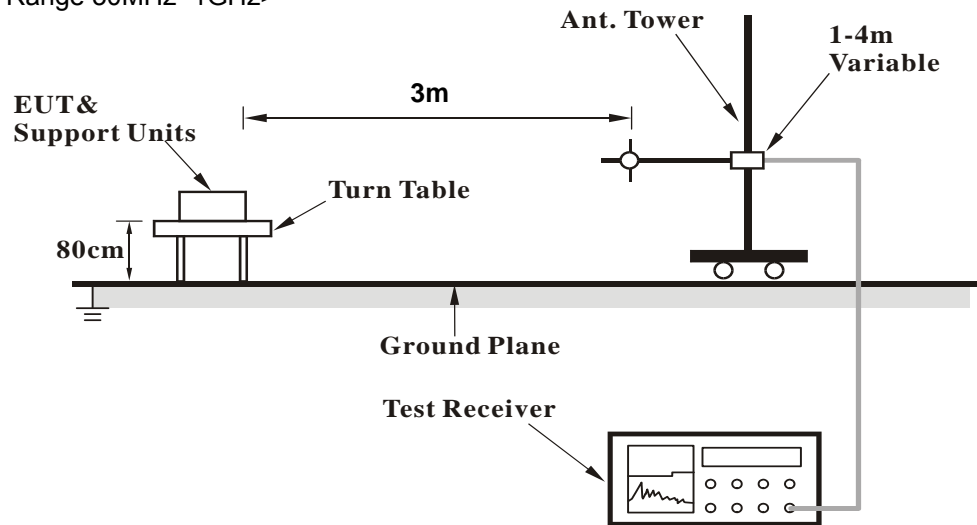
1. For emission measurements above 1 GHz, the EUT shall be placed at a height of 1.5 m above the ground at 3 meter chamber room for test
2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
3. The resolution 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

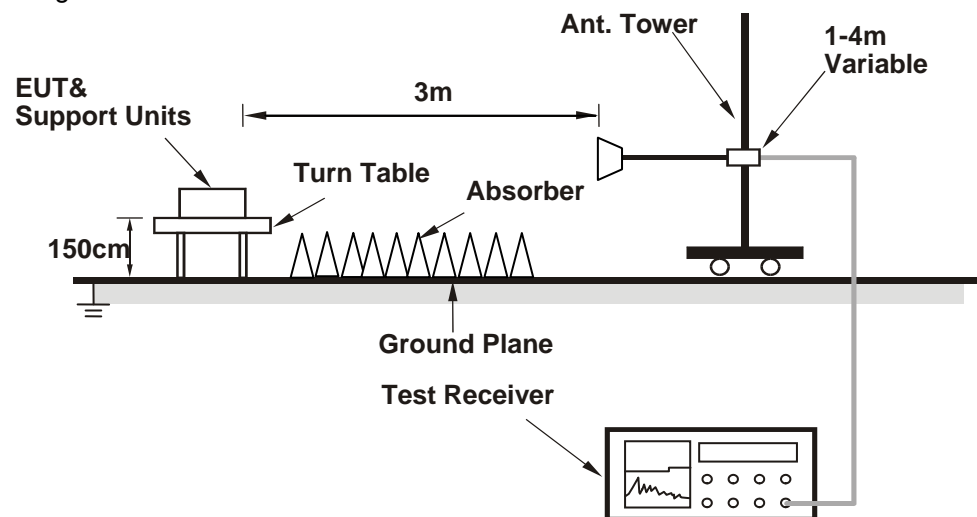
No deviation.

4.1.5 Test Setup

<Frequency Range 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

- a. Placed the EUT on the testing table.
- b. Prepared notebook to act as a communication partner and placed it outside of testing area.
- c. 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.
- d. The communication partner sent data to EUT by command "PING".
- e. The necessary accessories enable the system in full functions.

4.1.7 Test Results
ABOVE 1GHz DATA :
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	59.6 PK	74.0	-14.4	1.27 H	321	53.60	6.00
2	5150.00	48.5 AV	54.0	-5.5	1.27 H	321	42.50	6.00
3	*5180.00	101.7 PK			1.25 H	326	62.20	39.50
4	*5180.00	92.3 AV			1.25 H	326	52.80	39.50
5	#10360.00	60.9 PK	74.0	-13.1	1.30 H	298	42.50	18.40
6	#10360.00	47.8 AV	54.0	-6.2	1.30 H	298	29.40	18.40

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	67.0 PK	74.0	-7.0	1.24 V	328	61.00	6.00
2	5150.00	51.3 AV	54.0	-2.7	1.24 V	328	45.30	6.00
3	*5180.00	111.9 PK			1.18 V	328	72.40	39.50
4	*5180.00	102.3 AV			1.18 V	328	62.80	39.50
5	#10360.00	60.8 PK	74.0	-13.2	1.14 V	55	42.40	18.40
6	#10360.00	47.6 AV	54.0	-6.4	1.14 V	55	29.20	18.40

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	*5200.00	102.0 PK			1.32 H	330	62.40	39.60
2	*5200.00	93.2 AV			1.32 H	330	53.60	39.60
3	#10400.00	61.2 PK	74.0	-12.8	1.42 H	255	42.70	18.50
4	#10400.00	48.0 AV	54.0	-6.0	1.42 H	255	29.50	18.50

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	112.9 PK			1.10 V	333	73.30	39.60
2	*5200.00	103.4 AV			1.10 V	333	63.80	39.60
3	#10400.00	60.6 PK	74.0	-13.4	1.16 V	75	42.10	18.50
4	#10400.00	47.6 AV	54.0	-6.4	1.16 V	75	29.10	18.50

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	102.2 PK			1.26 H	324	62.60	39.60
2	*5240.00	92.5 AV			1.26 H	324	52.90	39.60
3	5350.00	57.6 PK	74.0	-16.4	1.26 H	330	51.50	6.10
4	5350.00	46.5 AV	54.0	-7.5	1.26 H	330	40.40	6.10
5	#10480.00	61.8 PK	74.0	-12.2	1.30 H	319	42.80	19.00
6	#10480.00	48.7 AV	54.0	-5.3	1.30 H	319	29.70	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	*5240.00	112.4 PK			1.16 V	327	72.80	39.60
2	*5240.00	102.9 AV			1.16 V	327	63.30	39.60
3	5350.00	59.0 PK	74.0	-15.0	1.21 V	303	52.90	6.10
4	5350.00	47.6 AV	54.0	-6.4	1.21 V	303	41.50	6.10
5	#10480.00	61.0 PK	74.0	-13.0	1.20 V	19	42.00	19.00
6	#10480.00	48.0 AV	54.0	-6.0	1.20 V	19	29.00	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) – 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 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	59.4 PK	74.0	-14.6	1.16 H	326	53.40	6.00
2	5150.00	48.2 AV	54.0	-5.8	1.16 H	326	42.20	6.00
3	*5180.00	101.8 PK			1.16 H	326	62.30	39.50
4	*5180.00	92.4 AV			1.16 H	326	52.90	39.50
5	#10360.00	60.8 PK	74.0	-13.2	1.36 H	317	42.40	18.40
6	#10360.00	47.9 AV	54.0	-6.1	1.36 H	317	29.50	18.40

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	68.9 PK	74.0	-5.1	1.25 V	327	62.90	6.00
2	5150.00	51.9 AV	54.0	-2.1	1.25 V	327	45.90	6.00
3	*5180.00	111.4 PK			1.25 V	327	71.90	39.50
4	*5180.00	101.8 AV			1.25 V	327	62.30	39.50
5	#10360.00	59.8 PK	74.0	-14.2	1.06 V	17	41.40	18.40
6	#10360.00	46.9 AV	54.0	-7.1	1.06 V	17	28.50	18.40

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	*5200.00	103.0 PK			1.20 H	330	63.40	39.60
2	*5200.00	93.5 AV			1.20 H	330	53.90	39.60
3	#10400.00	61.1 PK	74.0	-12.9	1.40 H	326	42.60	18.50
4	#10400.00	48.0 AV	54.0	-6.0	1.40 H	326	29.50	18.50

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	111.9 PK			1.23 V	326	72.30	39.60
2	*5200.00	102.4 AV			1.23 V	326	62.80	39.60
3	#10400.00	60.4 PK	74.0	-13.6	1.10 V	26	41.90	18.50
4	#10400.00	47.2 AV	54.0	-6.8	1.10 V	26	28.70	18.50

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	102.5 PK			1.37 H	324	62.90	39.60
2	*5240.00	93.1 AV			1.37 H	324	53.50	39.60
3	5350.00	57.0 PK	74.0	-17.0	1.37 H	324	50.90	6.10
4	5350.00	45.9 AV	54.0	-8.1	1.37 H	324	39.80	6.10
5	#10480.00	61.7 PK	74.0	-12.3	1.27 H	323	42.70	19.00
6	#10480.00	48.6 AV	54.0	-5.4	1.27 H	323	29.60	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	*5240.00	112.3 PK			1.23 V	322	72.70	39.60
2	*5240.00	102.9 AV			1.23 V	322	63.30	39.60
3	5350.00	59.1 PK	74.0	-14.9	1.23 V	322	53.00	6.10
4	5350.00	47.5 AV	54.0	-6.5	1.23 V	322	41.40	6.10
5	#10480.00	61.0 PK	74.0	-13.0	1.13 V	22	42.00	19.00
6	#10480.00	47.9 AV	54.0	-6.1	1.13 V	22	28.90	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)
– 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 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	59.5 PK	74.0	-14.5	1.20 H	333	53.50	6.00
2	5150.00	48.3 AV	54.0	-5.7	1.20 H	333	42.30	6.00
3	*5190.00	95.3 PK			1.16 H	298	55.80	39.50
4	*5190.00	86.2 AV			1.16 H	298	46.70	39.50
5	#10380.00	60.5 PK	74.0	-13.5	1.30 H	289	42.00	18.50
6	#10380.00	47.5 AV	54.0	-6.5	1.30 H	289	29.00	18.50

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	1.07 V	298	63.00	6.00
2	5150.00	53.5 AV	54.0	-0.5	1.07 V	298	47.50	6.00
3	*5190.00	106.8 PK			1.13 V	297	67.30	39.50
4	*5190.00	97.7 AV			1.13 V	297	58.20	39.50
5	#10380.00	60.8 PK	74.0	-13.2	1.15 V	44	42.30	18.50
6	#10380.00	47.6 AV	54.0	-6.4	1.15 V	44	29.10	18.50

REMARKS:

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



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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	98.7 PK			1.00 H	300	59.10	39.60
2	*5230.00	89.6 AV			1.00 H	300	50.00	39.60
3	5350.00	57.7 PK	74.0	-16.3	1.00 H	301	51.60	6.10
4	5350.00	46.9 AV	54.0	-7.1	1.00 H	301	40.80	6.10
5	#10460.00	60.7 PK	74.0	-13.3	1.21 H	299	41.80	18.90
6	#10460.00	47.7 AV	54.0	-6.3	1.21 H	299	28.80	18.90

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	*5230.00	109.8 PK			1.64 V	14	70.20	39.60
2	*5230.00	100.3 AV			1.64 V	14	60.70	39.60
3	5350.00	58.2 PK	74.0	-15.8	1.35 V	307	52.10	6.10
4	5350.00	47.0 AV	54.0	-7.0	1.35 V	307	40.90	6.10
5	#10460.00	61.7 PK	74.0	-12.3	1.45 V	320	42.80	18.90
6	#10460.00	48.4 AV	54.0	-5.6	1.45 V	320	29.50	18.90

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	57.7 PK	74.0	-16.3	1.10 H	299	51.70	6.00
2	5150.00	46.5 AV	54.0	-7.5	1.10 H	299	40.50	6.00
3	*5210.00	92.6 PK			1.01 H	299	53.00	39.60
4	*5210.00	82.2 AV			1.01 H	299	42.60	39.60
5	#10420.00	60.0 PK	74.0	-14.0	1.30 H	340	41.40	18.60
6	#10420.00	46.8 AV	54.0	-7.2	1.30 H	340	28.20	18.60

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.0 PK	74.0	-6.0	1.08 V	298	62.00	6.00
2	5150.00	53.6 AV	54.0	-0.4	1.08 V	298	47.60	6.00
3	*5210.00	102.1 PK			1.19 V	296	62.50	39.60
4	*5210.00	92.1 AV			1.19 V	296	52.50	39.60
5	#10420.00	60.4 PK	74.0	-13.6	1.29 V	306	41.80	18.60
6	#10420.00	47.1 AV	54.0	-6.9	1.29 V	306	28.50	18.60

REMARKS:

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

802.11a

CHANNEL	TX Channel 149	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	#5714.00	61.6 PK	74.0	-12.4	1.20 H	41	54.80	6.80
2	#5714.00	50.3 AV	54.0	-3.7	1.20 H	41	43.50	6.80
3	#5722.00	73.1 PK	78.2	-5.1	1.22 H	40	66.30	6.80
4	#5725.00	72.1 PK	78.2	-6.1	1.22 H	40	65.30	6.80
5	*5745.00	101.7 PK			1.27 H	40	61.30	40.40
6	*5745.00	92.3 AV			1.27 H	40	51.90	40.40
7	11490.00	60.5 PK	74.0	-13.5	1.30 H	223	42.10	18.40
8	11490.00	47.4 AV	54.0	-6.6	1.30 H	223	29.00	18.40

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	#5714.00	69.3 PK	74.0	-4.7	1.79 V	19	62.50	6.80
2	#5714.00	52.1 AV	54.0	-1.9	1.79 V	19	45.30	6.80
3	#5722.00	77.8 PK	78.2	-0.4	1.78 V	19	71.00	6.80
4	#5725.00	67.3 PK	78.2	-10.9	1.78 V	20	60.50	6.80
5	*5745.00	110.1 PK			1.62 V	15	69.70	40.40
6	*5745.00	100.8 AV			1.62 V	15	60.40	40.40
7	11490.00	60.9 PK	74.0	-13.1	1.20 V	310	42.50	18.40
8	11490.00	47.7 AV	54.0	-6.3	1.20 V	310	29.30	18.40

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)
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	*5785.00	102.9 PK			1.32 H	40	62.40	40.50
2	*5785.00	93.7 AV			1.32 H	40	53.20	40.50
3	11570.00	60.8 PK	74.0	-13.2	1.21 H	250	42.40	18.40
4	11570.00	47.8 AV	54.0	-6.2	1.21 H	250	29.40	18.40

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	111.9 PK			1.82 V	19	71.40	40.50
2	*5785.00	102.4 AV			1.82 V	19	61.90	40.50
3	11570.00	61.5 PK	74.0	-12.5	1.51 V	350	43.10	18.40
4	11570.00	48.3 AV	54.0	-5.7	1.51 V	350	29.90	18.40

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)
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	*5825.00	103.4 PK			1.25 H	40	62.90	40.50
2	*5825.00	93.9 AV			1.25 H	40	53.40	40.50
3	#5850.00	64.8 PK	78.2	-13.4	1.36 H	54	57.90	6.90
4	#5853.00	65.7 PK	78.2	-12.5	1.36 H	54	58.70	7.00
5	#5861.00	60.0 PK	74.0	-14.0	1.29 H	44	53.00	7.00
6	#5861.00	48.3 AV	54.0	-5.7	1.29 H	44	41.30	7.00
7	11650.00	61.4 PK	74.0	-12.6	1.40 H	350	42.50	18.90
8	11650.00	48.2 AV	54.0	-5.8	1.40 H	350	29.30	18.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	111.4 PK			1.66 V	20	70.90	40.50
2	*5825.00	102.2 AV			1.66 V	20	61.70	40.50
3	#5850.00	73.5 PK	78.2	-4.7	1.67 V	19	66.60	6.90
4	#5853.00	74.0 PK	78.2	-4.2	1.67 V	19	67.00	7.00
5	#5861.00	68.0 PK	74.0	-6.0	1.86 V	19	61.00	7.00
6	#5861.00	51.0 AV	54.0	-3.0	1.86 V	19	44.00	7.00
7	11650.00	62.0 PK	74.0	-12.0	1.56 V	334	43.10	18.90
8	11650.00	48.9 AV	54.0	-5.1	1.56 V	334	30.00	18.90

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)
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	#5714.00	60.1 PK	74.0	-13.9	1.43 H	43	53.30	6.80
2	#5714.00	49.3 AV	54.0	-4.7	1.43 H	43	42.50	6.80
3	#5722.00	67.9 PK	78.2	-10.3	1.39 H	40	61.10	6.80
4	#5725.00	67.1 PK	78.2	-11.1	1.39 H	40	60.30	6.80
5	*5745.00	99.9 PK			1.39 H	38	59.50	40.40
6	*5745.00	90.5 AV			1.39 H	38	50.10	40.40
7	11490.00	60.3 PK	74.0	-13.7	1.30 H	298	41.90	18.40
8	11490.00	47.2 AV	54.0	-6.8	1.30 H	298	28.80	18.40

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	#5714.00	68.9 PK	74.0	-5.1	1.74 V	21	62.10	6.80
2	#5714.00	52.1 AV	54.0	-1.9	1.74 V	21	45.30	6.80
3	#5722.00	77.7 PK	78.2	-0.5	1.93 V	21	70.90	6.80
4	#5725.00	64.3 PK	78.2	-13.9	1.93 V	21	57.50	6.80
5	*5745.00	109.0 PK			1.84 V	22	68.60	40.40
6	*5745.00	99.5 AV			1.84 V	22	59.10	40.40
7	11490.00	60.9 PK	74.0	-13.1	1.20 V	313	42.50	18.40
8	11490.00	47.5 AV	54.0	-6.5	1.20 V	313	29.10	18.40

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)
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	*5785.00	102.6 PK			1.33 H	40	62.10	40.50
2	*5785.00	92.8 AV			1.33 H	40	52.30	40.50
3	11570.00	60.4 PK	74.0	-13.6	1.10 H	253	42.00	18.40
4	11570.00	47.6 AV	54.0	-6.4	1.10 H	253	29.20	18.40

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	111.6 PK			1.82 V	16	71.10	40.50
2	*5785.00	101.8 AV			1.82 V	16	61.30	40.50
3	11570.00	61.4 PK	74.0	-12.6	1.21 V	303	43.00	18.40
4	11570.00	48.6 AV	54.0	-5.4	1.21 V	303	30.20	18.40

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)
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	*5825.00	102.5 PK			1.38 H	43	62.00	40.50
2	*5825.00	92.5 AV			1.38 H	43	52.00	40.50
3	#5850.00	64.5 PK	78.2	-13.7	1.37 H	36	57.60	6.90
4	#5853.00	66.3 PK	78.2	-11.9	1.37 H	36	59.30	7.00
5	#5861.00	61.3 PK	74.0	-12.7	1.40 H	40	54.30	7.00
6	#5861.00	50.5 AV	54.0	-3.5	1.40 H	40	43.50	7.00
7	11650.00	60.8 PK	74.0	-13.2	1.29 H	300	41.90	18.90
8	11650.00	48.0 AV	54.0	-6.0	1.29 H	300	29.10	18.90

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5825.00	111.7 PK			1.89 V	20	71.20	40.50
2	*5825.00	102.0 AV			1.89 V	20	61.50	40.50
3	#5850.00	75.4 PK	78.2	-2.8	1.88 V	19	68.50	6.90
4	#5853.00	76.4 PK	78.2	-1.8	1.88 V	19	69.40	7.00
5	#5861.00	68.4 PK	74.0	-5.6	1.88 V	19	61.40	7.00
6	#5861.00	51.6 AV	54.0	-2.4	1.88 V	19	44.60	7.00
7	11650.00	61.5 PK	74.0	-12.5	1.52 V	323	42.60	18.90
8	11650.00	48.4 AV	54.0	-5.6	1.52 V	323	29.50	18.90

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)
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	#5714.00	62.4 PK	74.0	-11.6	1.39 H	37	55.60	6.80
2	#5714.00	50.8 AV	54.0	-3.2	1.39 H	37	44.00	6.80
3	#5722.00	67.1 PK	78.2	-11.1	1.41 H	40	60.30	6.80
4	#5725.00	66.3 PK	78.2	-11.9	1.41 H	40	59.50	6.80
5	*5755.00	97.3 PK			1.39 H	37	56.80	40.50
6	*5755.00	87.6 AV			1.39 H	37	47.10	40.50
7	11510.00	60.0 PK	74.0	-14.0	1.30 H	266	41.70	18.30
8	11510.00	46.9 AV	54.0	-7.1	1.30 H	266	28.60	18.30

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	#5714.00	70.2 PK	74.0	-3.8	1.92 V	22	63.40	6.80
2	#5714.00	52.9 AV	54.0	-1.1	1.92 V	22	46.10	6.80
3	#5722.00	77.7 PK	78.2	-0.5	1.93 V	22	70.90	6.80
4	#5725.00	67.0 PK	78.2	-11.2	1.93 V	22	60.20	6.80
5	*5755.00	106.0 PK			1.60 V	22	65.50	40.50
6	*5755.00	96.6 AV			1.60 V	22	56.10	40.50
7	11510.00	60.4 PK	74.0	-13.6	1.49 V	359	42.10	18.30
8	11510.00	47.2 AV	54.0	-6.8	1.49 V	359	28.90	18.30

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)
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	*5795.00	98.7 PK			1.54 H	36	58.20	40.50
2	*5795.00	89.0 AV			1.54 H	36	48.50	40.50
3	#5850.00	60.9 PK	78.2	-17.3	1.49 H	44	54.00	6.90
4	#5853.00	62.1 PK	78.2	-16.1	1.49 H	44	55.10	7.00
5	#5861.00	59.0 PK	74.0	-15.0	1.50 H	40	52.00	7.00
6	#5861.00	48.1 AV	54.0	-5.9	1.50 H	40	41.10	7.00
7	11590.00	60.1 PK	74.0	-13.9	1.26 H	51	41.60	18.50
8	11590.00	46.8 AV	54.0	-7.2	1.26 H	51	28.30	18.50

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5795.00	107.8 PK			1.84 V	24	67.30	40.50
2	*5795.00	98.1 AV			1.84 V	24	57.60	40.50
3	#5850.00	65.9 PK	78.2	-12.3	1.94 V	22	59.00	6.90
4	#5853.00	66.9 PK	78.2	-11.3	1.94 V	22	59.90	7.00
5	#5861.00	65.0 PK	74.0	-9.0	1.94 V	18	58.00	7.00
6	#5861.00	49.9 AV	54.0	-4.1	1.94 V	18	42.90	7.00
7	11590.00	60.4 PK	74.0	-13.6	1.66 V	351	41.90	18.50
8	11590.00	47.1 AV	54.0	-6.9	1.66 V	351	28.60	18.50

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 155	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	#5714.00	50.4 PK	74.0	-23.6	1.39 H	40	43.60	6.80
2	#5714.00	49.0 AV	54.0	-5.0	1.39 H	40	42.20	6.80
3	#5722.00	65.1 PK	78.2	-13.1	1.37 H	41	58.30	6.80
4	#5725.00	65.6 PK	78.2	-12.6	1.37 H	41	58.80	6.80
5	*5775.00	91.2 PK			1.38 H	39	50.70	40.50
6	*5775.00	82.1 AV			1.38 H	39	41.60	40.50
7	#5850.00	56.9 PK	78.2	-21.3	1.40 H	50	50.00	6.90
8	#5853.00	59.3 PK	78.2	-18.9	1.40 H	50	52.30	7.00
9	#5861.00	58.5 PK	74.0	-15.5	1.44 H	54	51.50	7.00
10	#5861.00	47.3 AV	54.0	-6.7	1.44 H	54	40.30	7.00
11	11550.00	59.6 PK	74.0	-14.4	1.38 H	50	41.20	18.40
12	11550.00	46.4 AV	54.0	-7.6	1.38 H	50	28.00	18.40

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	#5714.00	57.4 PK	74.0	-16.6	1.72 V	18	50.60	6.80
2	#5714.00	53.5 AV	54.0	-0.5	1.72 V	18	46.70	6.80
3	#5722.00	74.1 PK	78.2	-4.1	1.91 V	22	67.30	6.80
4	#5725.00	73.7 PK	78.2	-4.5	1.91 V	22	66.90	6.80
5	*5775.00	101.1 PK			1.76 V	22	60.60	40.50
6	*5775.00	91.2 AV			1.76 V	22	50.70	40.50
7	#5850.00	67.2 PK	78.2	-11.0	1.57 V	19	60.30	6.90
8	#5853.00	67.0 PK	78.2	-11.2	1.57 V	19	60.00	7.00
9	#5861.00	66.1 PK	74.0	-7.9	1.57 V	19	59.10	7.00
10	#5861.00	50.0 AV	54.0	-4.0	1.57 V	19	43.00	7.00
11	11550.00	59.9 PK	74.0	-14.1	1.60 V	340	41.50	18.40
12	11550.00	46.7 AV	54.0	-7.3	1.60 V	340	28.30	18.40

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:

802.11a

CHANNEL	TX Channel 36	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	249.60	38.1 QP	46.0	-7.9	1.00 H	88	52.50	-14.40
2	374.00	37.9 QP	46.0	-8.1	1.00 H	226	48.90	-11.00
3	500.40	39.4 QP	46.0	-6.6	1.49 H	136	47.80	-8.40
4	624.90	45.3 QP	46.0	-0.7	1.49 H	7	50.90	-5.60
5	751.20	43.2 QP	46.0	-2.8	1.00 H	209	46.40	-3.20
6	875.00	45.4 QP	46.0	-0.6	1.48 H	133	46.50	-1.10

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	249.60	38.6 QP	46.0	-7.4	1.49 V	154	53.00	-14.40
2	374.00	40.0 QP	46.0	-6.0	1.00 V	18	51.00	-11.00
3	500.40	40.1 QP	46.0	-5.9	1.00 V	96	48.50	-8.40
4	624.90	42.2 QP	46.0	-3.8	1.00 V	135	47.80	-5.60
5	751.20	41.0 QP	46.0	-5.0	1.49 V	128	44.20	-3.20
6	875.00	45.9 QP	46.0	-0.1	1.48 V	150	47.00	-1.10

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

Tested date: Apr. 09, 2015

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100612	Sep. 30, 2014	Sep. 29, 2015
RF signal cable Woken	5D-FB	Cable-HYC01-01	Dec. 26, 2014	Dec. 25, 2015
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	847265/023	Oct. 21, 2014	Oct. 20, 2015
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 21, 2014	Jul. 20, 2015
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

NOTE: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in HwaYa Shielded Room 1.

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

4.2.3 Test Procedure

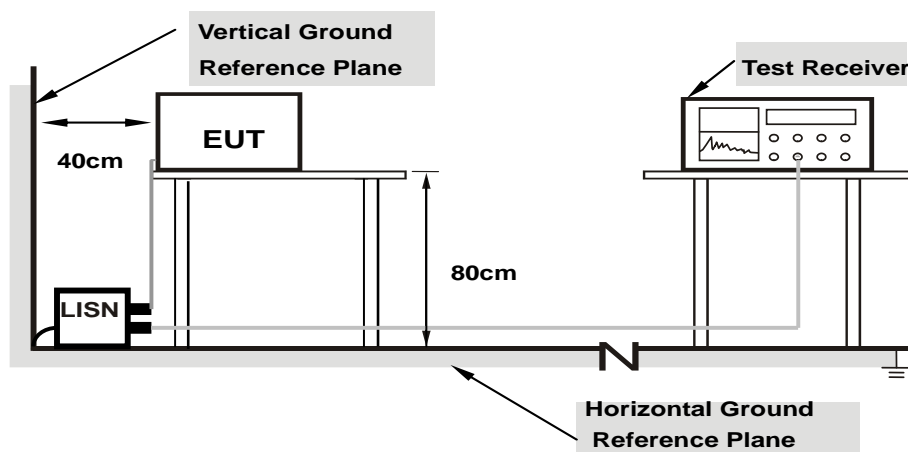
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

Same as 4.1.6.

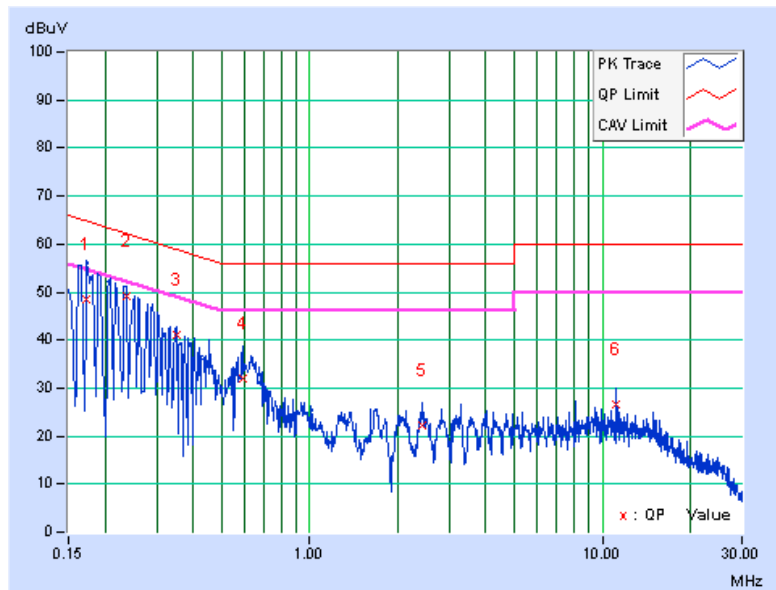
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor (dB)	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.17346	0.11	48.30	28.29	48.41	28.40	64.79	54.79	-16.38	-26.39
2	0.23586	0.12	49.08	36.13	49.20	36.25	62.24	52.24	-13.04	-15.99
3	0.34926	0.11	40.92	26.80	41.03	26.91	58.98	48.98	-17.95	-22.07
4	0.58792	0.09	31.78	25.22	31.87	25.31	56.00	46.00	-24.13	-20.69
5	2.41780	0.16	22.22	15.85	22.38	16.01	56.00	46.00	-33.62	-29.99
6	11.18402	0.55	25.98	16.95	26.53	17.50	60.00	50.00	-33.47	-32.50

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.

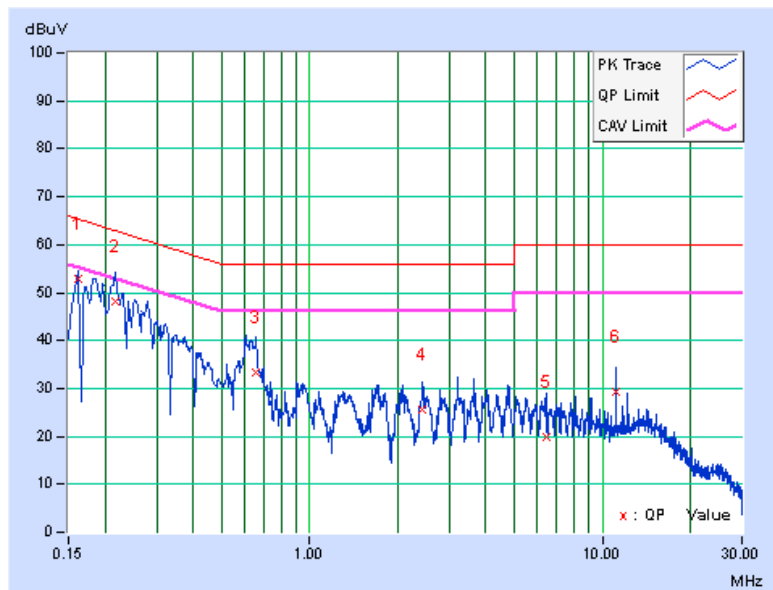


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr. Factor (dB)	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
			1	0.16096	0.12	52.72	39.16	52.84	39.28	65.41
2	0.21647	0.13	48.15	31.96	48.28	32.09	62.95	52.95	-14.67	-20.86
3	0.65830	0.15	33.10	24.84	33.25	24.99	56.00	46.00	-22.75	-21.01
4	2.42562	0.25	25.45	17.94	25.70	18.19	56.00	46.00	-30.30	-27.81
5	6.40991	0.33	19.42	13.71	19.75	14.04	60.00	50.00	-40.25	-35.96
6	11.17620	0.38	29.03	24.33	29.41	24.71	60.00	50.00	-30.59	-25.29

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.



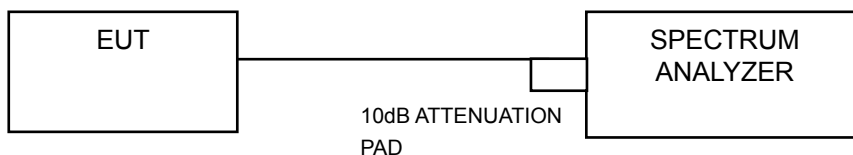
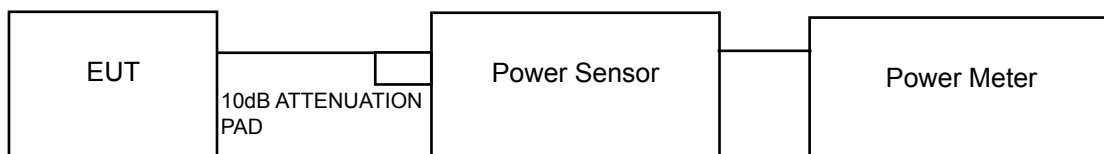
4.3 Transmit Power Measurement

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

4.3.2 Test Setup



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

789033 D02 General UNII Test Procedures New Rules v01 E/3/b

For 802.11a, 802.11n (HT20), 802.11n (HT40)

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 802.11ac (VHT80)

789033 D02 General UNII Test Procedure New Rules v01

- 1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- 2) Set sweep trigger to "free run".
- 3) Set RBW = 1 MHz.
- 4) Set VBW \geq 3 MHz
- 5) Number of points in sweep \geq 2 Span / RBW.
- 6) Sweep time \leq (number of points in sweep) * T
- 7) Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
- 8) Detector = RMS.
- 9) Trace mode = max hold.
- 10) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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 (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass/Fail
36	5180	81.283	19.10	30	Pass
40	5200	81.096	19.09	30	Pass
48	5240	76.736	18.85	30	Pass
149	5745	58.614	17.68	30	Pass
157	5785	80.353	19.05	30	Pass
165	5825	78.163	18.93	30	Pass

802.11n (HT20)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass/Fail
36	5180	79.616	19.01	30	Pass
40	5200	81.283	19.10	30	Pass
48	5240	74.473	18.72	30	Pass
149	5745	45.814	16.61	30	Pass
157	5785	78.705	18.96	30	Pass
165	5825	78.343	18.94	30	Pass

802.11n (HT40)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass/Fail
38	5190	52.966	17.24	30	Pass
46	5230	79.433	19.00	30	Pass
151	5755	45.290	16.56	30	Pass
159	5795	70.632	18.49	30	Pass

802.11ac (VHT80)

Channel	Channel Frequency (MHz)	Maximum Conducted Power (mW)	Maximum Conducted Power (dBm)	Power Limit (dBm)	Pass/Fail
42	5210	35.563	15.51	30	Pass
155	5775	28.642	14.57	30	Pass

26dB BANDWIDTH:**802.11a**

Channel	Channel Frequency (MHz)	26dBc Bandwidth (MHz)	Pass / Fail
36	5180	27.61	PASS
40	5200	26.56	PASS
48	5240	25.35	PASS

802.11n (HT20)

Channel	Channel Frequency (MHz)	26dBc Bandwidth (MHz)	Pass / Fail
36	5180	29.02	PASS
40	5200	32.72	PASS
48	5240	29.03	PASS

802.11n (HT40)

Channel	Channel Frequency (MHz)	26dBc Bandwidth (MHz)	Pass / Fail
38	5190	43.86	PASS
46	5230	66.01	PASS

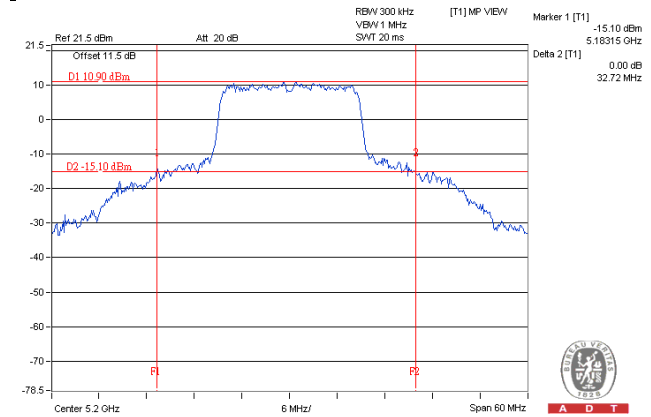
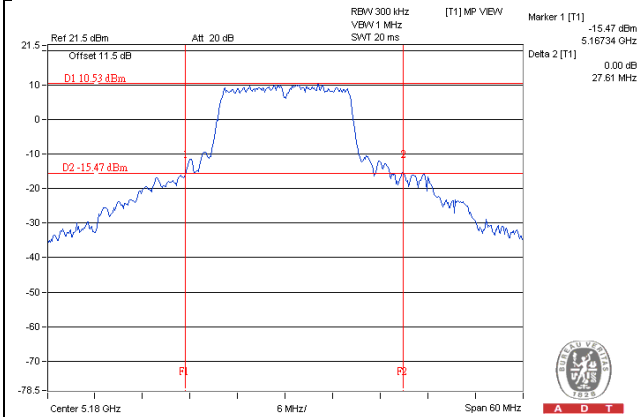
802.11ac (VHT80)

Channel	Channel Frequency (MHz)	26dBc Bandwidth (MHz)	Pass / Fail
42	5210	81.94	PASS

SPECTRUM PLOT OF WORST VALUE

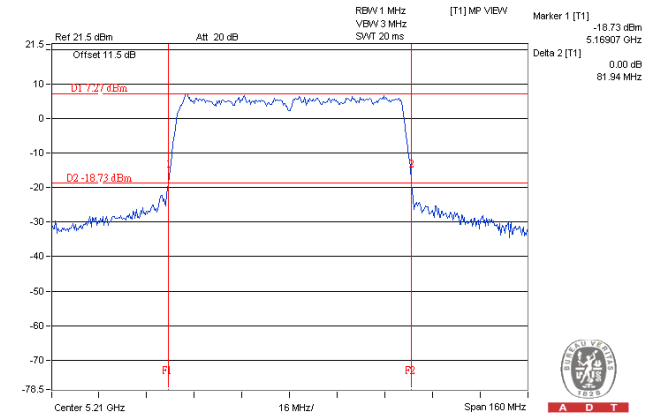
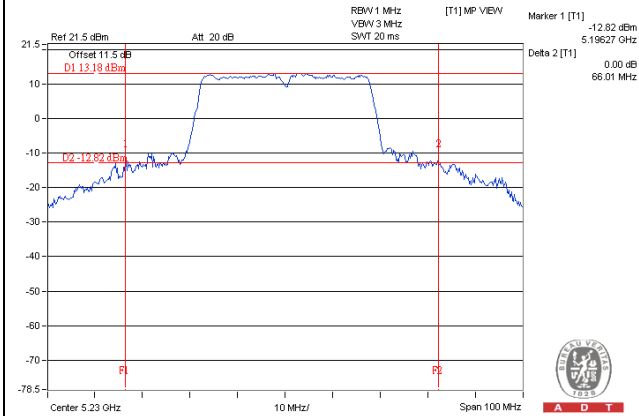
802.11a

802.11n (HT20)



802.11n (HT40)

802.11ac (VHT80)



OCCUPIED BANDWIDTH:
802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
36	5180	16.80
40	5200	16.80
48	5240	16.80
149	5745	17.04
157	5785	20.04
165	5825	19.32

802.11n (HT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
36	5180	17.76
40	5200	17.88
48	5240	17.64
149	5745	17.64
157	5785	21.60
165	5825	19.32

802.11n (HT40)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
38	5190	36.48
46	5230	36.60
151	5755	36.60
159	5795	37.08

802.11ac (VHT80)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)
42	5210	75.84
155	5775	75.84

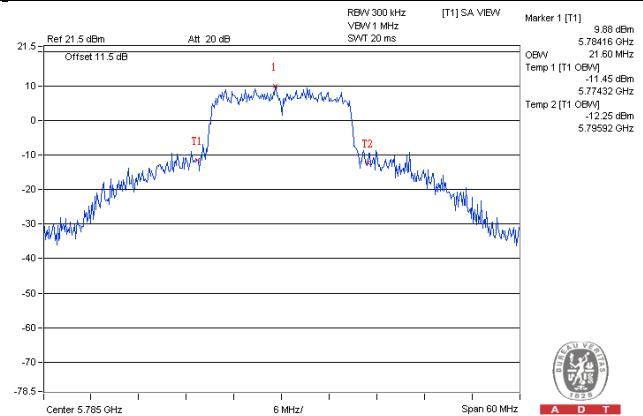
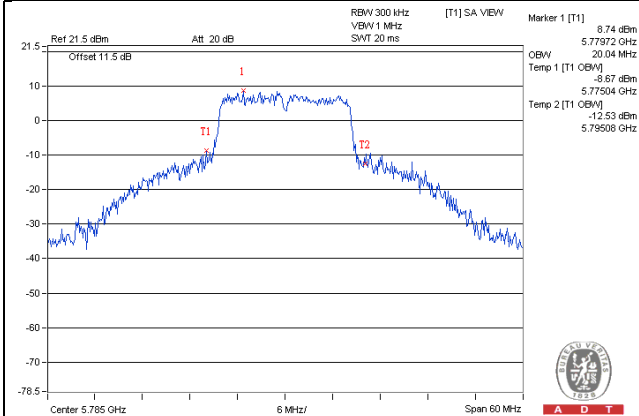


A D T

SPECTRUM PLOT OF WORST VALUE

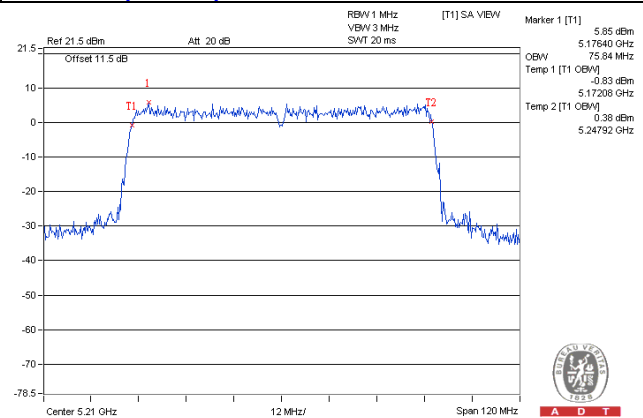
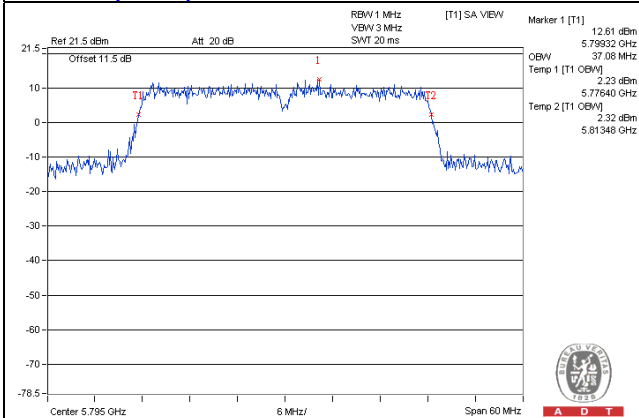
802.11a

802.11n (HT20)



802.11n (HT40)

802.11ac (VHT80)

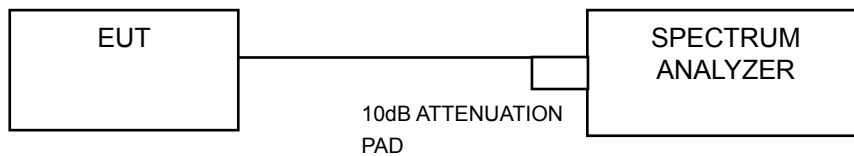


4.4 Peak Power Spectral Density Measurement

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

789033 D02 General UNII Test Procedures New Rules v01 E/2/b

For U-NII-1 band:

Using method SA-1

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

789033 D02 General UNII Test Procedures New Rules v01 F/5

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)
- 6) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500kHz/300kHz)

4.4.5 Deviation from Test Standard

No deviation.

4.4.6 EUT Operating Condition

Same as Item 4.3.6.

4.4.7 Test Results

For U-NII-1 Band

802.11a

Channel	Frequency (MHz)	PSD (dBm)	Maximum Limit (dBm)	Pass/Fail
36	5180	3.98	17.00	Pass
40	5200	4.40	17.00	Pass
48	5240	4.12	17.00	Pass

802.11n (HT20)

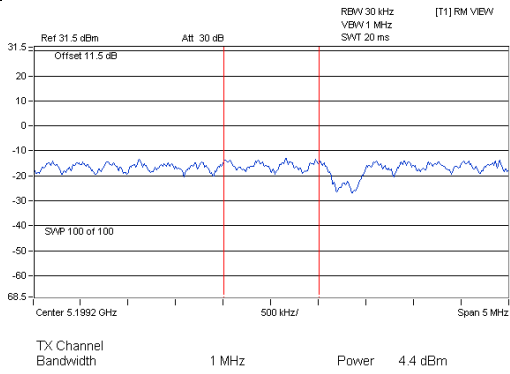
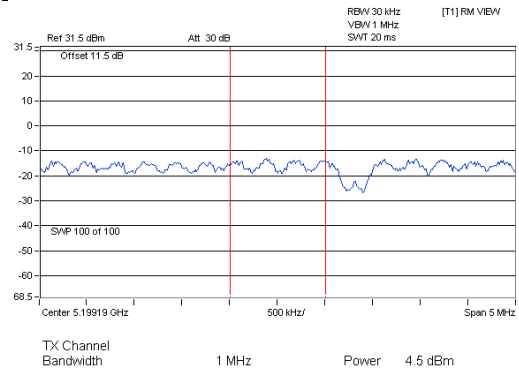
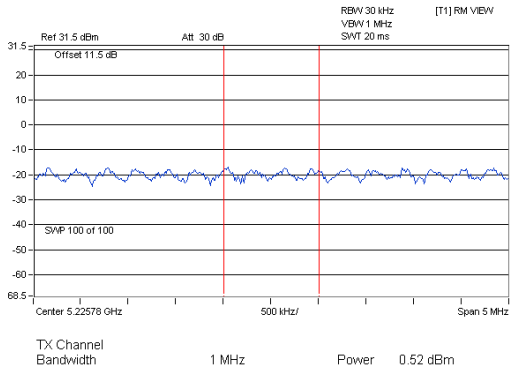
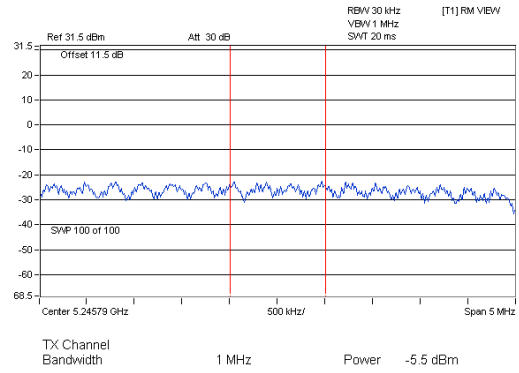
Channel	Frequency (MHz)	PSD (dBm)	Maximum Limit (dBm)	Pass/Fail
36	5180	3.73	17.00	Pass
40	5200	4.50	17.00	Pass
48	5240	4.02	17.00	Pass

802.11n (HT40)

Channel	Frequency (MHz)	PSD (dBm)	Maximum Limit (dBm)	Pass/Fail
38	5190	-1.25	17.00	Pass
46	5230	0.52	17.00	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	PSD (dBm)	Maximum Limit (dBm)	Pass/Fail
42	5210	-5.50	17.00	Pass

SPECTRUM PLOT OF WORST VALUE**802.11a****802.11n (HT20)****A D T****A D T****802.11n (HT40)****802.11ac (VHT80)****A D T****A D T**

For U-NII-3 Band

802.11a

Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
149	5745	-3.71	-1.49	30	Pass
157	5785	-2.57	-0.35	30	Pass
165	5825	-2.34	-0.12	30	Pass

802.11n (HT20)

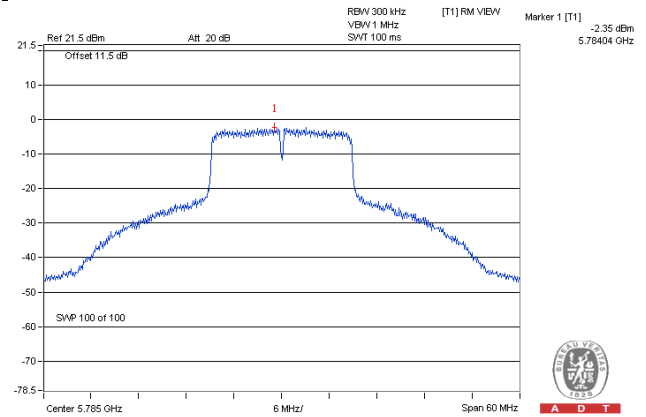
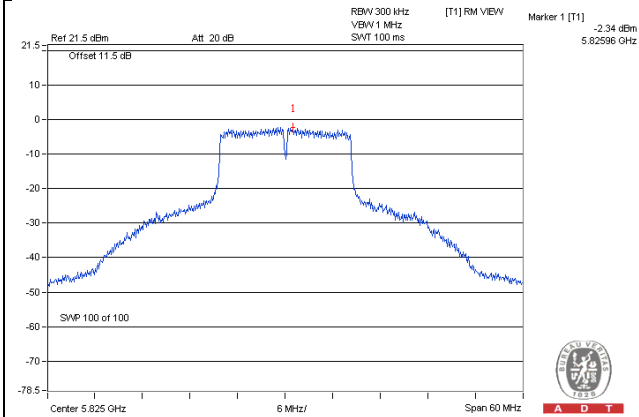
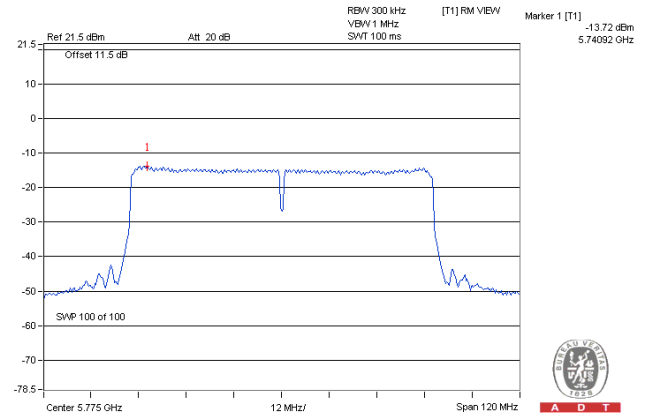
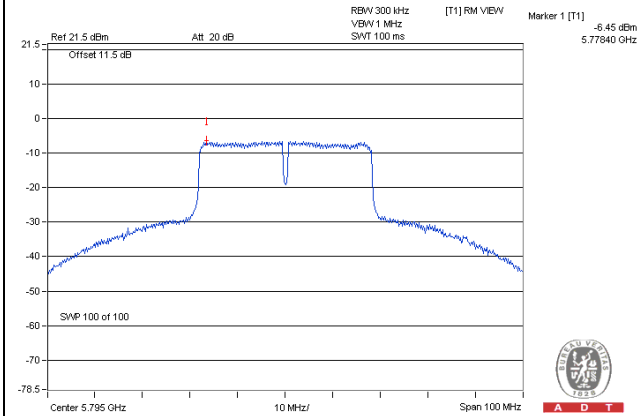
Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
149	5745	-4.80	-2.58	30	Pass
157	5785	-2.35	-0.13	30	Pass
165	5825	-2.65	-0.43	30	Pass

802.11n (HT40)

Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
151	5755	-8.43	-6.21	30	Pass
159	5795	-6.45	-4.23	30	Pass

802.11ac (VHT80)

Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
155	5775	-13.72	-11.50	30	Pass

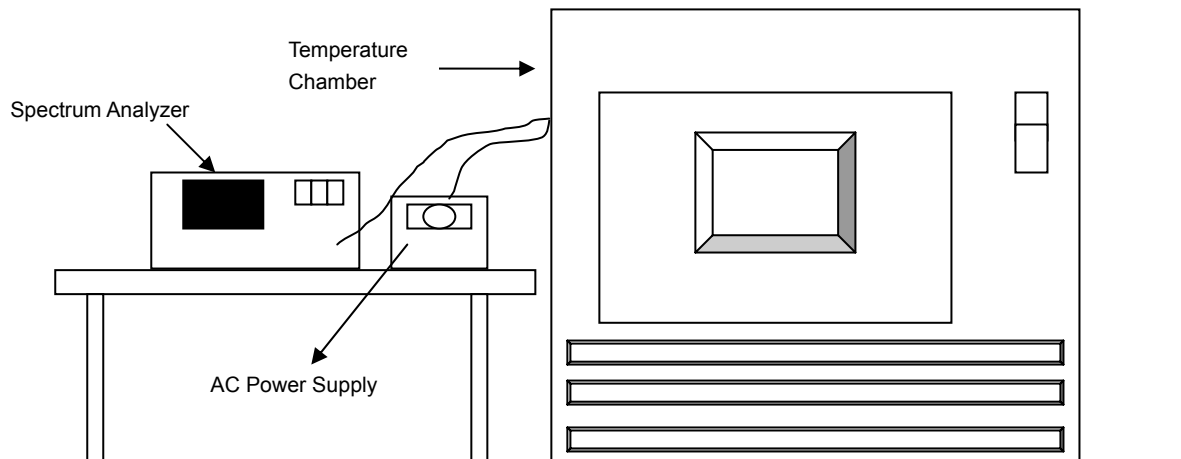
SPECTRUM PLOT OF WORST VALUE**802.11a****802.11n (HT20)****802.11n (HT40)****802.11ac (VHT80)**

4.5 Frequency Stability

4.5.1 Limits of Frequency Stability Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
- 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: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5240.0072	0.00014	5240.0076	0.00015	5240.0100	0.00019	5240.0071	0.00014
40	120	5239.9991	-0.00002	5239.9964	-0.00007	5239.9970	-0.00006	5239.9972	-0.00005
30	120	5239.9956	-0.00008	5239.9975	-0.00005	5239.9957	-0.00008	5239.9968	-0.00006
20	120	5239.9967	-0.00006	5239.9960	-0.00008	5239.9956	-0.00008	5239.9978	-0.00004
10	120	5239.9765	-0.00045	5239.9802	-0.00038	5239.9753	-0.00047	5239.9765	-0.00045
0	120	5239.9974	-0.00005	5239.9987	-0.00002	5239.9940	-0.00011	5239.9959	-0.00008
-10	120	5240.0103	0.00020	5240.0136	0.00026	5240.0088	0.00017	5240.0099	0.00019
-20	120	5240.0244	0.00047	5240.0211	0.00040	5240.0248	0.00047	5240.0256	0.00049
-30	120	5240.0024	0.00005	5240.0005	0.00001	5240.0014	0.00003	5240.0021	0.00004

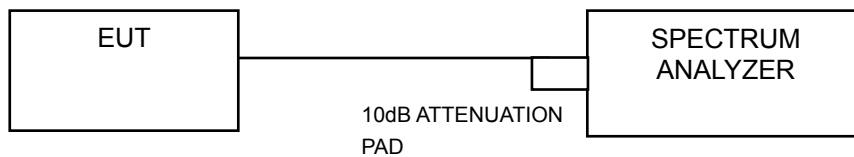
FREQUENCY STABILITY VERSUS TEMP.									
OPERATING FREQUENCY: 5240MHz									
TEMP. (°C)	POWER SUPPLY (Vac)	0 MINUTE		2 MINUTE		5 MINUTE		10 MINUTE	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5239.9969	-0.00006	5239.9950	-0.00010	5239.9959	-0.00008	5239.9970	-0.00006
	120	5239.9967	-0.00006	5239.9960	-0.00008	5239.9956	-0.00008	5239.9978	-0.00004
	102	5239.9960	-0.00008	5239.9965	-0.00007	5239.9947	-0.00010	5239.9988	-0.00002

4.6 20dBc Bandwidth Measurement

4.6.1 Limits of Peak Transmit Power Measurement

Must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates.

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

789033 D02 General UNII Test Procedures New Rules v01 (II)(C)

Emission bandwidth

- 1) Set RBW = approximately 1% of the emission bandwidth.
- 2) Set the VBW > RBW.
- 3) Detector = Peak.
- 4) Trace mode = max hold.
- 5) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.6.5 Test Result

802.11a

Channel	Channel Frequency (MHz)	20dBc Bandwidth (MHz)	Pass / Fail
36	5180	18.75	PASS
40	5200	19.93	PASS
48	5240	18.93	PASS
149	5745	20.13	PASS
157	5785	24.85	PASS
165	5825	23.24	PASS

802.11n (HT20)

Channel	Channel Frequency (MHz)	20dBc Bandwidth (MHz)	Pass / Fail
36	5180	19.32	PASS
40	5200	19.36	PASS
48	5240	19.35	PASS
149	5745	19.33	PASS
157	5785	30.17	PASS
165	5825	29.20	PASS

802.11n (HT40)

Channel	Channel Frequency (MHz)	26dBc Bandwidth (MHz)	Pass / Fail
38	5190	38.64	PASS
46	5230	38.89	PASS
151	5755	38.98	PASS
159	5795	46.41	PASS

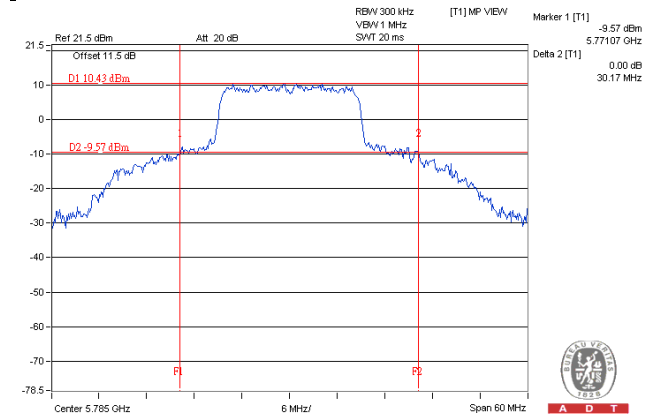
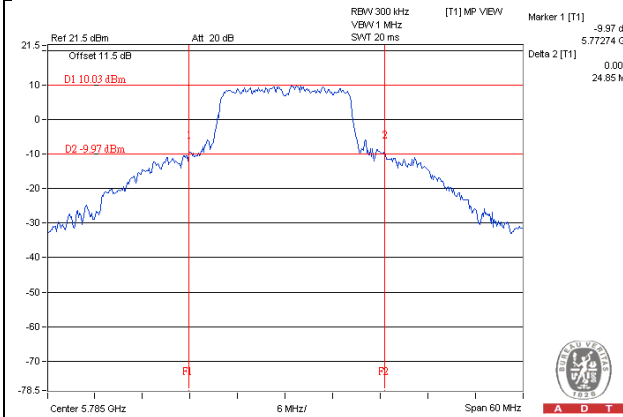
802.11ac (VHT80)

Channel	Channel Frequency (MHz)	26dBc Bandwidth (MHz)	Pass / Fail
42	5210	78.40	PASS
155	5775	79.04	PASS

SPECTRUM PLOT OF WORST VALUE

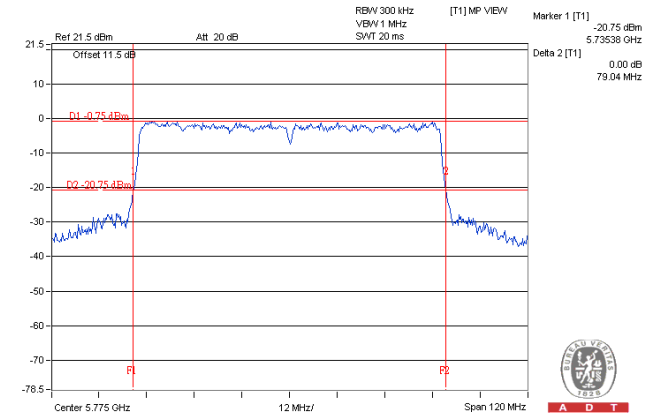
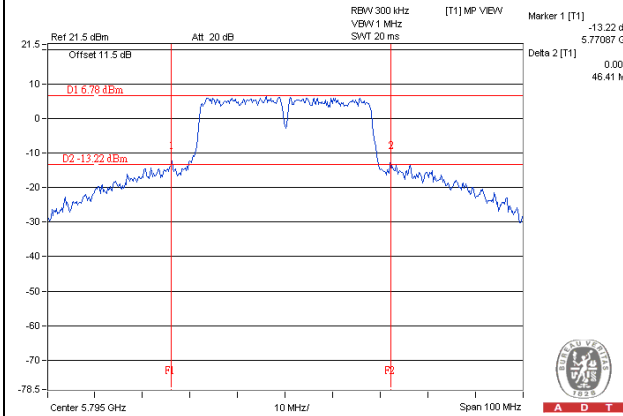
802.11a

802.11n (HT20)



802.11n (HT40)

802.11ac (VHT80)

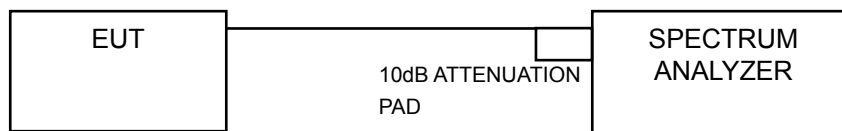


4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

789033 D02 General UNII Test Procedures New Rules v01 (C)

- a. Set resolution bandwidth (RBW) = 100kHz
- b. Set the video bandwidth (VBW) $\geq 3 \times$ 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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	16.59	0.5	PASS
157	5785	16.55	0.5	PASS
165	5825	16.54	0.5	PASS

802.11n (HT20)

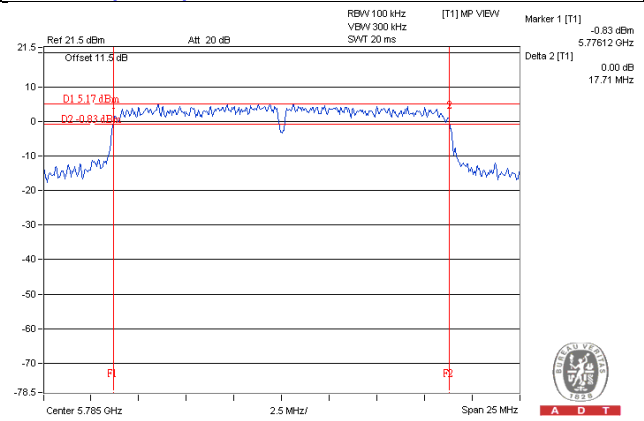
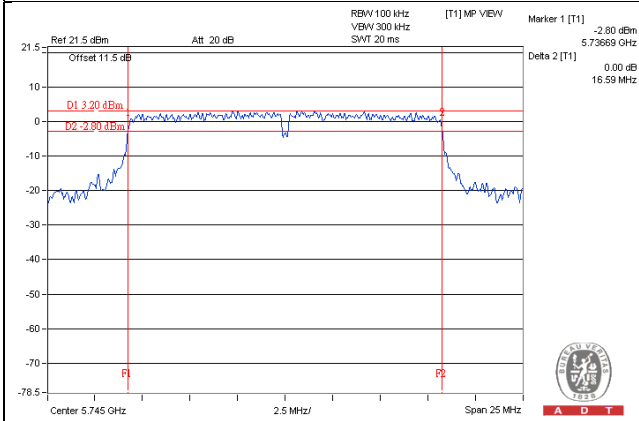
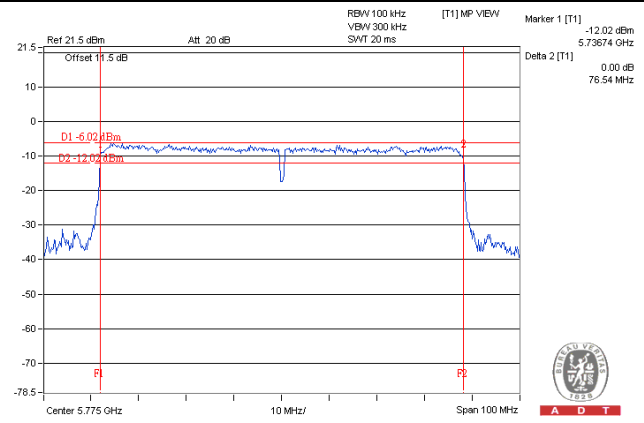
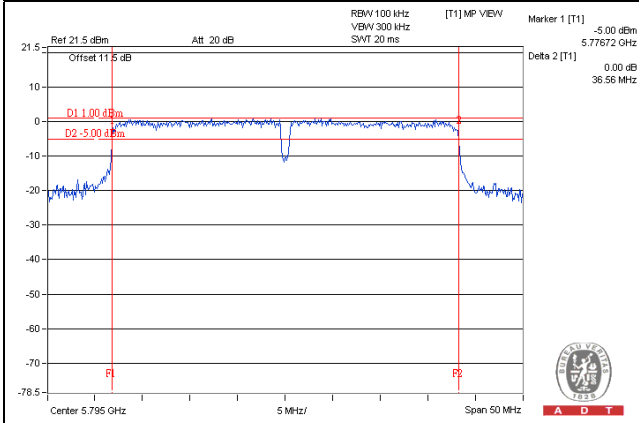
Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
149	5745	17.67	0.5	PASS
157	5785	17.71	0.5	PASS
165	5825	17.67	0.5	PASS

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
151	5755	36.55	0.5	PASS
159	5795	36.56	0.5	PASS

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
155	5775	76.54	0.5	PASS

SPECTRUM PLOT OF WORST VALUE**802.11a****802.11n (HT20)****802.11n (HT40)****802.11ac (VHT80)**



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.

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

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