FCC Test Report

Report No.:	RF170505C01-2
FCC ID:	TVE-141703
Test Model:	FortiAP 222E
Series Model:	FortiAP 222Exxxxxx, FAP-222Exxxxxx, FORTIAP-222Exxxxxx (where “x” can be used as “A-Z” or “0-9” or “-“ or blank for software changes or marketing purposes only)
Received Date:	May 05, 2017
Test Date:	May 19 ~ Jul. 24, 2017
Issued Date:	Jul. 25, 2017
Applicant:	Fortinet Inc.
Address:	899 Kifer Road Sunnyvale, CA 94086 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.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)

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Release Control Record

Issue No.	Description	Date Issued
RF170505C01-2	Original release.	Jul. 25, 2017

1 Certificate of Conformity

Product:	Secured Wireless Access Point
Brand:	Fortinet Inc.
Test Model:	FortiAP 222E
Series Model:	FortiAP 222Exxxxxx, FAP-222Exxxxxx, FORTIAP-222Exxxxxx (where “x” can be used as “A-Z” or “0-9” or “-“ or blank for software changes or marketing purposes only)
Sample Status:	Engineering sample
Applicant:	Fortinet Inc.
Test Date:	May 19 ~ Jul. 24, 2017
Standards:	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:** Jul. 25, 2017

Pettie Chen / Senior Specialist

Approved by : _____ , **Date:** Jul. 25, 2017

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 -5.01dB at 0.47060MHz.
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 -1.1dB at 5650.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit.
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is N-Type. (The device is professionally installed)

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	2.94 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	Secured Wireless Access Point
Brand	Fortinet Inc.
Test Model	FortiAP 222E
Series model	FortiAP 222Exxxxxx, FAP-222Exxxxxx, FORTIAP-222Exxxxxx (where “x” can be used as “A-Z” or “0-9” or “-“ or blank for software changes or marketing purposes only)
Model Difference	Refer to Note
Power Supply Rating	54Vdc (POE)
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 867Mbps
Operating Frequency	5180~5240MHz, 5745~5825MHz
Number of Channel	5180~5240MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5745~5825MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 5 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1
Output Power	CDD Mode: 5180~5240MHz: 233.056mW 5745~5825MHz: 373.670mW Beamforming Mode: 5180~5240MHz: 113.240mW 5745~5825MHz: 186.848mW
Antenna Type	Dipole antenna with 7dBi gain
Antenna Connector	N-Type (The device is professionally installed)
Accessory Device	PoE, wall mount
Cable Supplied	1.8m non-shielded Grounding Cable without core

Note:

1. All models are listed as below. Model FortiAP 222E is the representative for final test.

Brand	Model	Difference
Fortinet Inc.	FortiAP 222Exxxxxx	where “x” can be used as “A-Z” or “0-9” or “-“ or blank for software changes or marketing purposes only
	FAP-222Exxxxxx	
	FORTIAP-222Exxxxxx	

2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitter and 2 receivers.

Band	Modulation Mode	CDD Mode	Beamforming Mode	TX Function
5GHz	802.11a	Support	Not Support	2TX
	802.11n (HT20)	Support	Support	2TX
	802.11n (HT40)	Support	Support	2TX
	802.11ac (VHT20)	Support	Support	2TX
	802.11ac (VHT40)	Support	Support	2TX
	802.11ac (VHT80)	Support	Support	2TX

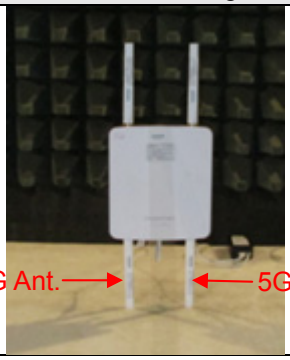
* The modulation and bandwidth are similar for 802.11n mode for HT20/HT40 and 802.11ac mode for VHT20/VHT40. After pre-testing, 802.11ac (VHT20/VHT40) power is lower than 802.11n (HT20/HT40), therefore 802.11n (HT20/HT40) is the worst case to representative mode in test report. (Final test mode refer section 3.2.1)

3. The EUT consumes power from the following PoE.

PoE	
Brand	SENAO
Model	EPA5006GPR
Input Power	100-240Vac~0.8A, 50-60Hz
Output Power	54Vdc / 0.6A
Power Cord	0.5m non-shielded power cord without core

4. The WLAN & BT LE can transmit simultaneously.

5. The EUT will install at outdoor area, the highest antenna gain from the horizon above 30 degrees as below, for more detail information please refer to antenna specification and user manual

Antenna	Antenna gain	Antenna install degree
Dipole	-4.032dBi	
Due to device will restricted installation position as above photo, thus consider to above 30 degrees from the horizon the highest antenna gain are chosen from antenna specification exhibits from 120~240 degrees for U-NII-1 band		

6. 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

5180~5240MHz:

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

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≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

Where RE≥1G: Radiated Emission above 1GHz & Bandedge Measurement RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission APCM: Antenna Port Conducted Measurement

Note:

1. The 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	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5
	802.11ac (VHT80)		42	42	OFDM	58.5
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	6.5
	802.11n (HT40)		151 to 159	151, 159	OFDM	13.5
	802.11ac (VHT80)		155	155	OFDM	58.5

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	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	157	OFDM	6.0
		5745-5825	149 to 165		OFDM	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	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	157	OFDM	6.0
		5745-5825	149 to 165		OFDM	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	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5
	802.11ac (VHT80)		42	42	OFDM	58.5
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	6.5
	802.11n (HT40)		151 to 159	151, 159	OFDM	13.5
	802.11ac (VHT80)		155	155	OFDM	58.5

Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	23deg. C, 66%RH	120Vac, 60Hz	Willy Cheng
RE<1G	25deg. C, 66%RH	120Vac, 60Hz	Jones Chang
PLC	25deg. C, 67%RH	120Vac, 60Hz	Jones Chang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

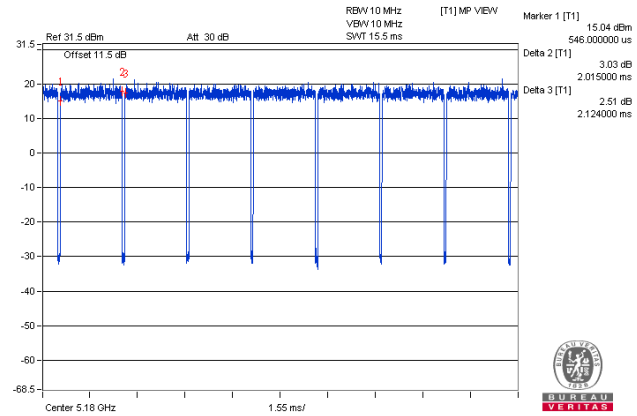
3.3 Duty Cycle of Test Signal

For U-NII-1 Band

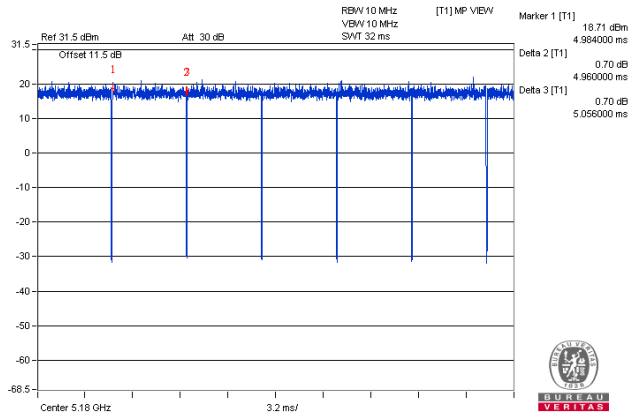
Duty cycle of test signal is > 98%, duty factor is not required
Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 2.015/2.124 = 0.949, Duty factor = 10 * log(1/0.949) = 0.23
802.11n (HT20): Duty cycle = 4.96/5.056 = 0.981
802.11n (HT40): Duty cycle = 2.389/2.505 = 0.954, Duty factor = 10 * log(1/0.954) = 0.21
802.11ac (VHT80): Duty cycle = 1.124/1.223 = 0.919, Duty factor = 10 * log(1/0.919) = 0.37

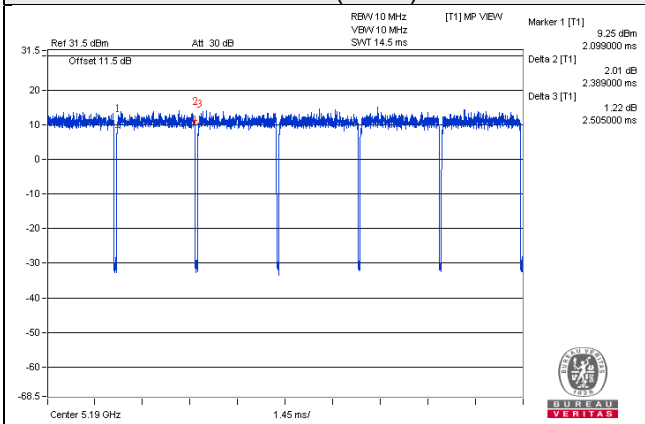
802.11a



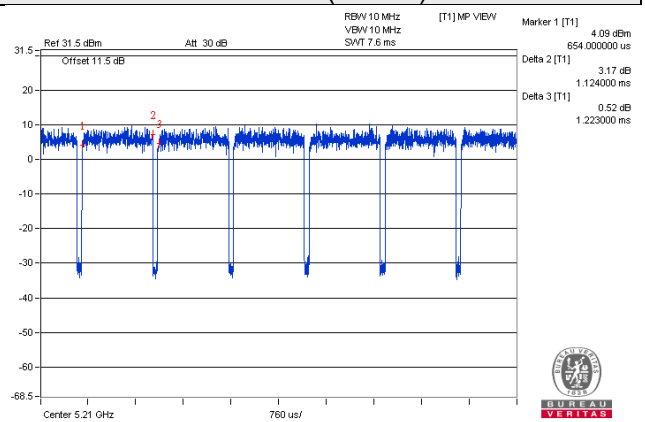
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

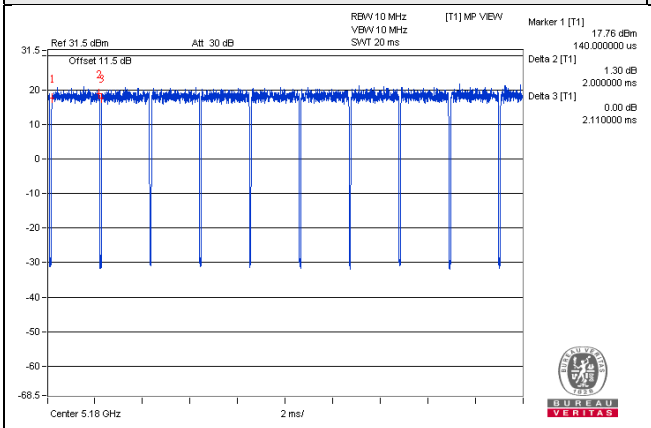


For U-NII-3 Band

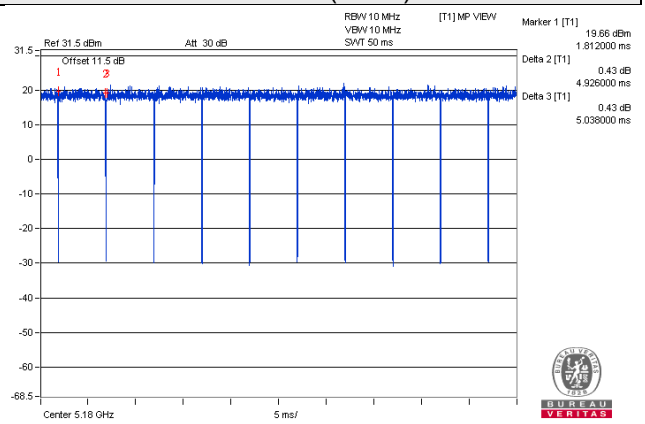
Duty cycle of test signal is > 98%, duty factor is not required
Duty cycle of test signal is < 98 %, duty factor is required

802.11a: Duty cycle = 2.0/2.11 = 0.948, Duty factor = 10 * log(1/0.948) = 0.23
802.11n (HT20): Duty cycle = 4.926/5.038 = 0.978, Duty factor = 10 * log(1/0.978) = 0.10
802.11n (HT40): Duty cycle = 2.397/2.495 = 0.961, Duty factor = 10 * log(1/0.961) = 0.17
802.11ac (VHT80): Duty cycle = 1.117/1.215 = 0.919, Duty factor = 10 * log(1/0.919) = 0.37

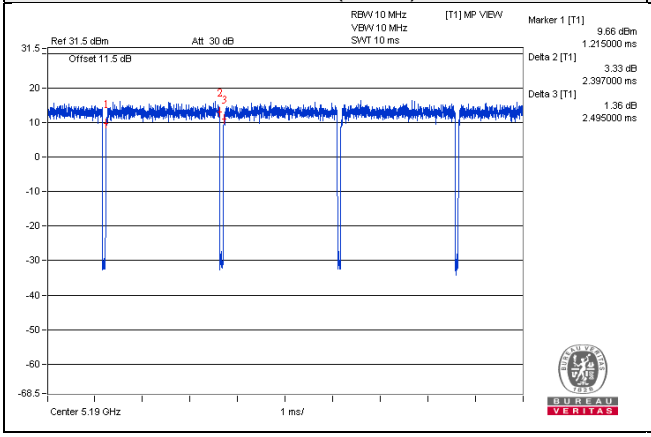
802.11a



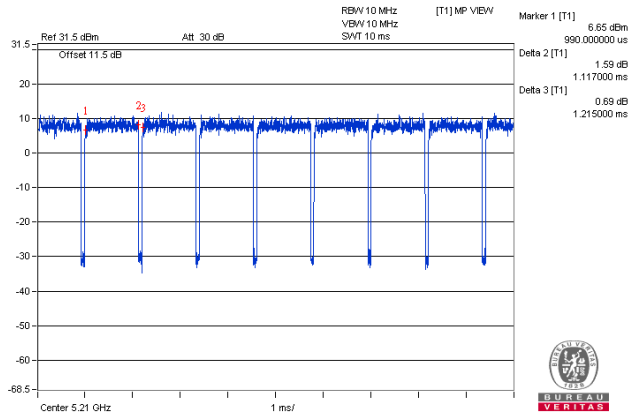
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



3.4 Description of Support Units

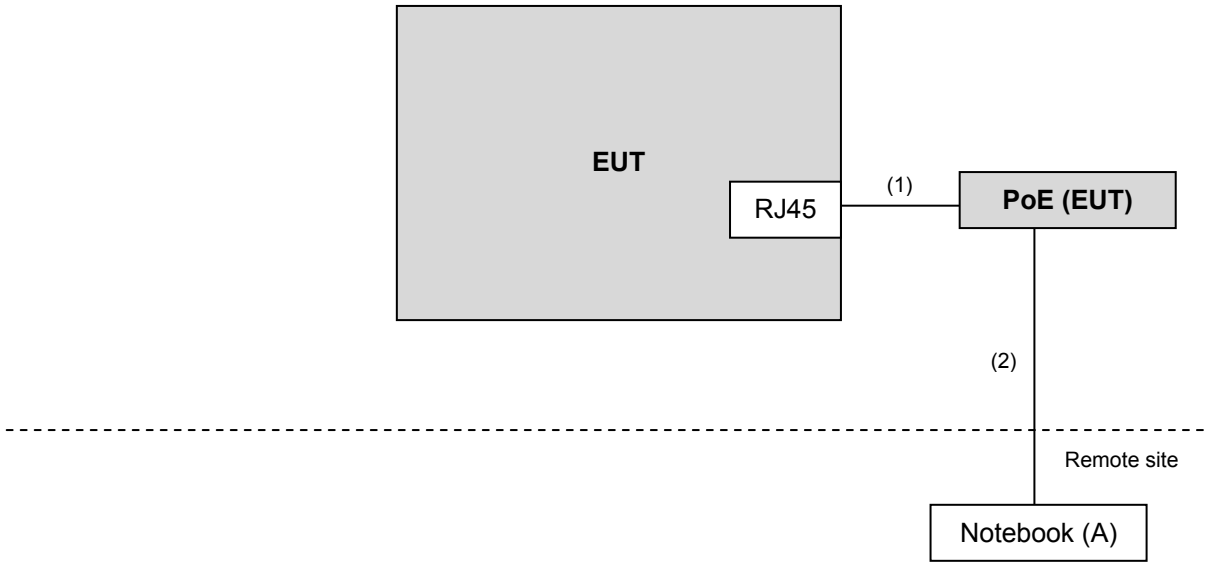
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

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	1.0	N	0	-
2.	RJ45 cable	1	10	N	0	-

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standards

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

FCC Part 15, Subpart E (15.407)
KDB 789033 D02 General UNII Test Procedure New Rules v01r04
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 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

<table>
<tr><td colspan="3">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="3" rowspan="2">789033 D02 General UNII Test Procedure New Rules v01r04</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK: 74 (dBµV/m)</td><td>AV: 54 (dBµV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK: -27 (dBm/MHz)</td><td rowspan="3">PK: 68.2(dBµV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☒</td><td>15.407(b)(4)(i)</td><td>PK: -27 (dBm/MHz) *1
PK: 10 (dBm/MHz) *2
PK: 15.6 (dBm/MHz) *3
PK: 27 (dBm/MHz) *4</td><td>PK: 68.2(dBµV/m) *1
PK: 105.2 (dBµV/m) *2
PK: 110.8(dBµV/m) *3
PK: 122.2 (dBµV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*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.</td></tr>
</table>

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.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 02, 2017	May 01, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Nov. 16, 2016	Nov. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	9120D	209	Dec. 27, 2016	Dec. 26, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8447D	2944A10738	Aug. 22, 2016	Aug. 21, 2017
Preamplifier Agilent	8449B	3008A01922	Sep. 18, 2016	Sep. 17, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (214378)	Aug. 22, 2016	Aug. 21, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 106	Cable-CH3-03 (309224+12738)	Aug. 22, 2016	Aug. 21, 2017
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 BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 11, 2016	Aug. 10, 2017
Power Sensor	MA2411B	0738171	Aug. 11, 2016	Aug. 10, 2017
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 17, 2016	Oct. 16, 2017

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is IC 7450F-3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. 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. Both X and Y axes of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case 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.

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 9kHz at frequency below 30MHz.

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 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 ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

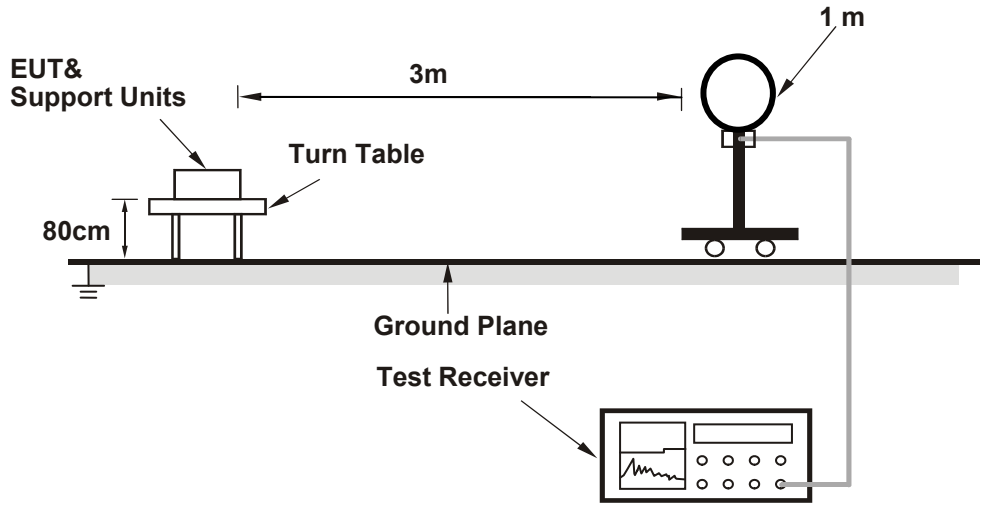
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

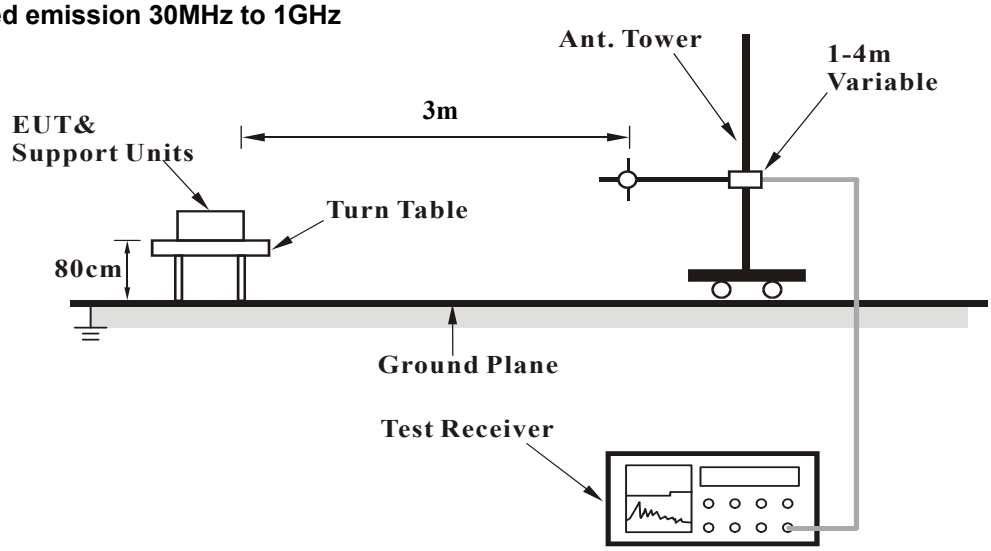
No deviation.

4.1.5 Test Set Up

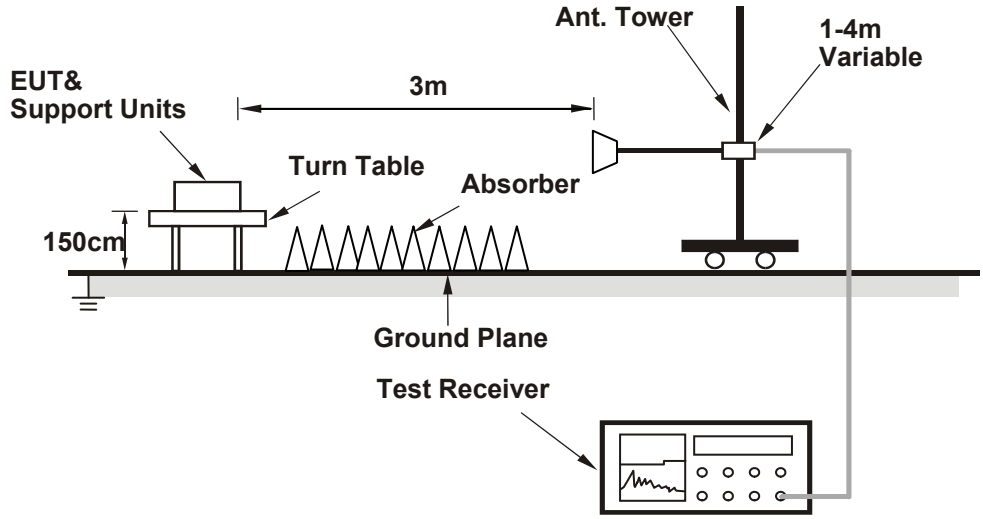
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission 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 a 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 (QCARCT.exe) to enable EUT under transmission condition continuously at specific channel frequency.
d. 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) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.3 PK	74.0	-18.7	1.70 H	279	54.5	0.8
2	5150.00	44.3 AV	54.0	-9.7	1.70 H	279	43.5	0.8
3	*5180.00	100.3 PK			1.66 H	216	61.6	38.7
4	*5180.00	90.4 AV			1.66 H	216	51.7	38.7
5	#10360.00	57.1 PK	74.0	-16.9	2.03 H	345	44.4	12.7
6	#10360.00	44.2 AV	54.0	-9.8	2.03 H	345	31.5	12.7
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	5150.00	66.0 PK	74.0	-8.0	1.38 V	338	65.2	0.8
2	5150.00	52.4 AV	54.0	-1.6	1.38 V	338	51.6	0.8
3	*5180.00	116.1 PK			1.86 V	354	77.4	38.7
4	*5180.00	106.0 AV			1.86 V	354	67.3	38.7
5	#10360.00	58.2 PK	74.0	-15.8	1.86 V	33	45.5	12.7
6	#10360.00	45.0 AV	54.0	-9.0	1.86 V	33	32.3	12.7

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.9 PK	74.0	-18.1	1.70 H	133	55.1	0.8
2	5150.00	44.1 AV	54.0	-9.9	1.70 H	133	43.3	0.8
3	*5200.00	104.5 PK			1.60 H	217	65.8	38.7
4	*5200.00	94.5 AV			1.60 H	217	55.8	38.7
5	#10400.00	57.9 PK	74.0	-16.1	1.99 H	301	45.2	12.7
6	#10400.00	45.3 AV	54.0	-8.7	1.99 H	301	32.6	12.7
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	5150.00	64.1 PK	74.0	-9.9	1.86 V	313	63.3	0.8
2	5150.00	51.4 AV	54.0	-2.6	1.86 V	313	50.6	0.8
3	*5200.00	120.9 PK			1.55 V	331	82.2	38.7
4	*5200.00	110.7 AV			1.55 V	331	72.0	38.7
5	#10400.00	59.0 PK	74.0	-15.0	1.49 V	331	46.3	12.7
6	#10400.00	47.0 AV	54.0	-7.0	1.49 V	331	34.3	12.7

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 48	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	*5240.00	104.8 PK			1.62 H	218	66.0	38.8
2	*5240.00	94.5 AV			1.62 H	218	55.7	38.8
3	5420.00	57.4 PK	74.0	-16.6	1.83 H	339	56.1	1.3
4	5420.00	45.8 AV	54.0	-8.2	1.83 H	339	44.5	1.3
5	#10480.00	58.7 PK	74.0	-15.3	1.99 H	30	45.2	13.5
6	#10480.00	45.6 AV	54.0	-8.4	1.99 H	30	32.1	13.5
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	122.0 PK			1.78 V	329	83.2	38.8
2	*5240.00	111.4 AV			1.78 V	329	72.6	38.8
3	5420.00	57.9 PK	74.0	-16.1	1.59 V	344	56.6	1.3
4	5420.00	47.9 AV	54.0	-6.1	1.59 V	344	46.6	1.3
5	#10480.00	61.2 PK	74.0	-12.8	1.79 V	341	47.7	13.5
6	#10480.00	47.9 AV	54.0	-6.1	1.79 V	341	34.4	13.5

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 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	#5634.40	56.1 PK	68.2	-12.1	1.71 H	228	54.4	1.7
2	*5745.00	102.8 PK			1.71 H	228	62.9	39.9
3	*5745.00	92.3 AV			1.71 H	228	52.4	39.9
4	#5994.40	57.2 PK	68.2	-11.0	1.17 H	228	54.4	2.8
5	11490.00	58.3 PK	74.0	-15.7	1.89 H	223	43.8	14.5
6	11490.00	44.9 AV	54.0	-9.1	1.89 H	223	30.4	14.5
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	#5632.80	56.1 PK	68.2	-12.1	1.50 V	354	54.4	1.7
2	*5745.00	119.8 PK			1.50 V	354	79.9	39.9
3	*5745.00	109.2 AV			1.50 V	354	69.3	39.9
4	#5955.20	56.6 PK	68.2	-11.6	1.50 V	354	54.0	2.6
5	11490.00	58.7 PK	74.0	-15.3	1.50 V	149	44.2	14.5
6	11490.00	45.0 AV	54.0	-9.0	1.50 V	149	30.5	14.5

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	#5637.60	55.7 PK	68.2	-12.5	1.97 H	215	54.0	1.7
2	*5785.00	103.0 PK			1.97 H	215	62.9	40.1
3	*5785.00	92.5 AV			1.97 H	215	52.4	40.1
4	#5970.40	57.2 PK	68.2	-11.0	1.97 H	215	54.5	2.7
5	11570.00	59.4 PK	74.0	-14.6	1.72 H	289	45.1	14.3
6	11570.00	45.6 AV	54.0	-8.4	1.72 H	289	31.3	14.3
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	#5608.00	57.0 PK	68.2	-11.2	1.49 V	354	55.3	1.7
2	*5785.00	120.2 PK			1.49 V	354	80.1	40.1
3	*5785.00	109.6 AV			1.49 V	354	69.5	40.1
4	#5958.40	56.4 PK	68.2	-11.8	1.49 V	354	53.8	2.6
5	11570.00	59.1 PK	74.0	-14.9	1.62 V	329	44.8	14.3
6	11570.00	45.3 AV	54.0	-8.7	1.62 V	329	31.0	14.3

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 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	#5628.80	55.7 PK	68.2	-12.5	1.32 H	110	54.0	1.7
2	*5825.00	104.9 PK			1.32 H	110	64.7	40.2
3	*5825.00	95.0 AV			1.32 H	110	54.8	40.2
4	#5992.00	56.8 PK	68.2	-11.4	1.32 H	110	54.0	2.8
5	11650.00	58.0 PK	74.0	-16.0	2.21 H	198	43.6	14.4
6	11650.00	44.6 AV	54.0	-9.4	2.21 H	198	30.2	14.4
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	#5645.60	55.7 PK	68.2	-12.5	1.63 V	331	54.0	1.7
2	*5825.00	120.4 PK			1.63 V	331	80.2	40.2
3	*5825.00	109.8 AV			1.63 V	331	69.6	40.2
4	#5980.80	56.5 PK	68.2	-11.7	1.63 V	331	53.7	2.8
5	11650.00	58.0 PK	74.0	-16.0	1.23 V	338	43.6	14.4
6	11650.00	44.7 AV	54.0	-9.3	1.23 V	338	30.3	14.4

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.7 PK	74.0	-20.3	1.82 H	222	52.9	0.8
2	5150.00	42.4 AV	54.0	-11.6	1.82 H	222	41.6	0.8
3	*5180.00	99.0 PK			1.82 H	213	60.3	38.7
4	*5180.00	88.6 AV			1.82 H	213	49.9	38.7
5	#10360.00	56.7 PK	74.0	-17.3	1.56 H	10	44.0	12.7
6	#10360.00	43.8 AV	54.0	-10.2	1.56 H	10	31.1	12.7
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	5150.00	65.6 PK	74.0	-8.4	1.85 V	18	64.8	0.8
2	5150.00	52.3 AV	54.0	-1.7	1.85 V	18	51.5	0.8
3	*5180.00	116.5 PK			1.56 V	2	77.8	38.7
4	*5180.00	105.3 AV			1.56 V	2	66.6	38.7
5	#10360.00	58.3 PK	74.0	-15.7	1.93 V	313	45.6	12.7
6	#10360.00	45.2 AV	54.0	-8.8	1.93 V	313	32.5	12.7

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	52.3 PK	74.0	-21.7	1.66 H	201	51.5	0.8
2	5150.00	41.6 AV	54.0	-12.4	1.66 H	201	40.8	0.8
3	*5200.00	104.8 PK			1.71 H	213	66.1	38.7
4	*5200.00	94.6 AV			1.71 H	213	55.9	38.7
5	#10400.00	57.3 PK	74.0	-16.7	1.49 H	29	44.6	12.7
6	#10400.00	44.8 AV	54.0	-9.2	1.49 H	29	32.1	12.7
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	5150.00	66.8 PK	74.0	-7.2	1.77 V	19	66.0	0.8
2	5150.00	52.5 AV	54.0	-1.5	1.77 V	19	51.7	0.8
3	*5200.00	121.8 PK			1.77 V	338	83.1	38.7
4	*5200.00	110.5 AV			1.77 V	338	71.8	38.7
5	#10400.00	60.0 PK	74.0	-14.0	1.49 V	23	47.3	12.7
6	#10400.00	47.7 AV	54.0	-6.3	1.49 V	23	35.0	12.7

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 48	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	*5240.00	103.1 PK			1.71 H	219	64.3	38.8
2	*5240.00	92.9 AV			1.71 H	219	54.1	38.8
3	5420.00	56.9 PK	74.0	-17.1	1.99 H	300	55.6	1.3
4	5420.00	44.7 AV	54.0	-9.3	1.99 H	300	43.4	1.3
5	#10480.00	59.2 PK	74.0	-14.8	1.33 H	22	45.7	13.5
6	#10480.00	45.9 AV	54.0	-8.1	1.33 H	22	32.4	13.5
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	122.3 PK			1.70 V	345	83.5	38.8
2	*5240.00	112.0 AV			1.70 V	345	73.2	38.8
3	5420.00	57.6 PK	74.0	-16.4	1.53 V	320	56.3	1.3
4	5420.00	47.1 AV	54.0	-6.9	1.53 V	320	45.8	1.3
5	#10480.00	60.1 PK	74.0	-13.9	1.87 V	0	46.6	13.5
6	#10480.00	48.0 AV	54.0	-6.0	1.87 V	0	34.5	13.5

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 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	#5626.40	55.5 PK	68.2	-12.7	1.45 H	123	53.8	1.7
2	*5745.00	104.7 PK			1.45 H	123	64.8	39.9
3	*5745.00	93.3 AV			1.45 H	123	53.4	39.9
4	#5977.60	56.3 PK	68.2	-11.9	1.45 H	123	53.5	2.8
5	11490.00	59.1 PK	74.0	-14.9	1.36 H	229	44.6	14.5
6	11490.00	45.4 AV	54.0	-8.6	1.36 H	229	30.9	14.5
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	#5629.60	55.9 PK	68.2	-12.3	1.45 V	352	54.2	1.7
2	*5745.00	119.6 PK			1.45 V	352	79.7	39.9
3	*5745.00	109.0 AV			1.45 V	352	69.1	39.9
4	#5975.20	56.5 PK	68.2	-11.7	1.45 V	352	53.7	2.8
5	11490.00	60.5 PK	74.0	-13.5	1.63 V	354	46.0	14.5
6	11490.00	46.5 AV	54.0	-7.5	1.63 V	354	32.0	14.5

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	#5638.40	56.2 PK	68.2	-12.0	1.59 H	122	54.5	1.7
2	*5785.00	106.0 PK			1.59 H	122	65.9	40.1
3	*5785.00	94.6 AV			1.59 H	122	54.5	40.1
4	#5988.00	56.2 PK	68.2	-12.0	1.59 H	122	53.4	2.8
5	11570.00	58.2 PK	74.0	-15.8	1.49 H	107	43.9	14.3
6	11570.00	44.9 AV	54.0	-9.1	1.49 H	107	30.6	14.3
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	#5616.80	56.8 PK	68.2	-11.4	1.45 V	351	55.1	1.7
2	*5785.00	119.6 PK			1.45 V	351	79.5	40.1
3	*5785.00	109.5 AV			1.45 V	351	69.4	40.1
4	#5993.60	56.8 PK	68.2	-11.4	1.45 V	351	54.0	2.8
5	11570.00	58.8 PK	74.0	-15.2	1.41 V	331	44.5	14.3
6	11570.00	45.2 AV	54.0	-8.8	1.41 V	331	30.9	14.3

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 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	#5626.40	55.8 PK	68.2	-12.4	1.50 H	112	54.1	1.7
2	*5825.00	105.0 PK			1.50 H	112	64.8	40.2
3	*5825.00	94.6 AV			1.50 H	112	54.4	40.2
4	#5979.20	56.4 PK	68.2	-11.8	1.50 H	112	53.6	2.8
5	11650.00	57.9 PK	74.0	-16.1	1.82 H	148	43.5	14.4
6	11650.00	44.8 AV	54.0	-9.2	1.82 H	148	30.4	14.4
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	#5610.40	56.4 PK	68.2	-11.8	1.47 V	349	54.7	1.7
2	*5825.00	120.3 PK			1.47 V	349	80.1	40.2
3	*5825.00	109.8 AV			1.47 V	349	69.6	40.2
4	#5994.40	56.5 PK	68.2	-11.7	1.47 V	349	53.7	2.8
5	11650.00	58.0 PK	74.0	-16.0	1.44 V	334	43.6	14.4
6	11650.00	44.7 AV	54.0	-9.3	1.44 V	334	30.3	14.4

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	52.3 PK	74.0	-21.7	1.65 H	160	51.5	0.8
2	5150.00	41.3 AV	54.0	-12.7	1.65 H	160	40.5	0.8
3	*5190.00	92.4 PK			1.70 H	165	53.7	38.7
4	*5190.00	82.9 AV			1.70 H	165	44.2	38.7
5	#10380.00	55.2 PK	74.0	-18.8	1.54 H	234	42.4	12.8
6	#10380.00	41.9 AV	54.0	-12.1	1.54 H	234	29.1	12.8
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	5150.00	68.4 PK	74.0	-5.6	1.54 V	5	67.6	0.8
2	5150.00	52.6 AV	54.0	-1.4	1.54 V	5	51.8	0.8
3	*5190.00	108.4 PK			1.55 V	19	69.7	38.7
4	*5190.00	99.4 AV			1.55 V	19	60.7	38.7
5	#10380.00	56.4 PK	74.0	-17.6	1.95 V	288	43.6	12.8
6	#10380.00	43.4 AV	54.0	-10.6	1.95 V	288	30.6	12.8

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.
6. " # ": The radiated frequency is out of the restricted band.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	56.0 PK	74.0	-18.0	2.12 H	186	55.2	0.8
2	5150.00	42.8 AV	54.0	-11.2	2.12 H	186	42.0	0.8
3	*5230.00	99.0 PK			2.20 H	288	60.2	38.8
4	*5230.00	89.0 AV			2.20 H	288	50.2	38.8
5	5350.00	56.9 PK	74.0	-17.1	3.31 H	298	55.8	1.1
6	5350.00	43.6 AV	54.0	-10.4	3.31 H	298	42.5	1.1
7	#10460.00	58.5 PK	74.0	-15.5	1.99 H	228	45.2	13.3
8	#10460.00	45.4 AV	54.0	-8.6	1.99 H	228	32.1	13.3
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	65.7 PK	74.0	-8.3	1.61 V	7	64.9	0.8
2	5150.00	52.7 AV	54.0	-1.3	1.61 V	7	51.9	0.8
3	*5230.00	118.2 PK			1.72 V	332	79.4	38.8
4	*5230.00	108.6 AV			1.72 V	332	69.8	38.8
5	5350.00	60.5 PK	74.0	-13.5	1.74 V	7	59.4	1.1
6	5350.00	47.8 AV	54.0	-6.2	1.74 V	7	46.7	1.1
7	#10460.00	58.8 PK	74.0	-15.2	2.21 V	156	45.5	13.3
8	#10460.00	45.5 AV	54.0	-8.5	2.21 V	156	32.2	13.3

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 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	#5641.60	55.4 PK	68.2	-12.8	1.80 H	224	53.7	1.7
2	#5650.00	56.3 PK	68.2	-11.9	1.77 H	228	54.6	1.7
3	*5755.00	101.2 PK			1.80 H	224	61.3	39.9
4	*5755.00	90.6 AV			1.80 H	224	50.7	39.9
5	#5967.20	56.2 PK	68.2	-12.0	1.80 H	224	53.5	2.7
6	11510.00	58.4 PK	74.0	-15.6	1.31 H	211	43.9	14.5
7	11510.00	45.0 AV	54.0	-9.0	1.31 H	211	30.5	14.5
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	#5648.80	62.6 PK	68.2	-5.6	1.50 V	351	60.9	1.7
2	#5650.00	65.0 PK	68.2	-3.2	1.60 V	6	63.3	1.7
3	*5755.00	117.0 PK			1.50 V	351	77.1	39.9
4	*5755.00	106.8 AV			1.50 V	351	66.9	39.9
5	#5938.40	57.2 PK	68.2	-11.0	1.50 V	351	54.6	2.6
6	11510.00	58.1 PK	74.0	-15.9	1.53 V	339	43.6	14.5
7	11510.00	45.3 AV	54.0	-8.7	1.53 V	339	30.8	14.5

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	#5640.80	55.0 PK	68.2	-13.2	1.68 H	131	53.3	1.7
2	*5795.00	101.3 PK			1.68 H	131	61.2	40.1
3	*5795.00	90.9 AV			1.68 H	131	50.8	40.1
4	#5940.00	55.5 PK	68.2	-12.7	1.68 H	131	52.9	2.6
5	11590.00	58.5 PK	74.0	-15.5	1.63 H	261	44.2	14.3
6	11590.00	45.2 AV	54.0	-8.8	1.63 H	261	30.9	14.3
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	#5628.00	56.2 PK	68.2	-12.0	1.46 V	352	54.5	1.7
2	*5795.00	117.3 PK			1.46 V	352	77.2	40.1
3	*5795.00	107.2 AV			1.46 V	352	67.1	40.1
4	#5938.40	57.0 PK	68.2	-11.2	1.46 V	352	54.4	2.6
5	11590.00	58.8 PK	74.0	-15.2	1.62 V	339	44.5	14.3
6	11590.00	44.9 AV	54.0	-9.1	1.62 V	339	30.6	14.3

Remarks:

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

802.11ac (VHT80)

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.9 PK	74.0	-20.1	1.80 H	220	53.1	0.8
2	5150.00	42.5 AV	54.0	-11.5	1.80 H	220	41.7	0.8
3	*5210.00	87.8 PK			1.83 H	165	49.1	38.7
4	*5210.00	78.6 AV			1.83 H	165	39.9	38.7
5	5350.00	53.2 PK	74.0	-20.8	1.77 H	202	52.1	1.1
6	5350.00	41.6 AV	54.0	-12.4	1.77 H	202	40.5	1.1
7	#10420.00	55.4 PK	74.0	-18.6	1.77 H	101	42.5	12.9
8	#10420.00	42.5 AV	54.0	-11.5	1.77 H	101	29.6	12.9
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	5150.00	66.1 PK	74.0	-7.9	1.53 V	5	65.3	0.8
2	5150.00	52.2 AV	54.0	-1.8	1.53 V	5	51.4	0.8
3	*5210.00	104.0 PK			1.59 V	10	65.3	38.7
4	*5210.00	94.4 AV			1.59 V	10	55.7	38.7
5	5350.00	56.7 PK	74.0	-17.3	1.60 V	33	55.6	1.1
6	5350.00	44.7 AV	54.0	-9.3	1.60 V	33	43.6	1.1
7	#10420.00	55.8 PK	74.0	-18.2	1.90 V	168	42.9	12.9
8	#10420.00	43.1 AV	54.0	-10.9	1.90 V	168	30.2	12.9

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.

CHANNEL	TX Channel 155	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	#5615.20	56.0 PK	68.2	-12.2	1.76 H	260	54.3	1.7
2	#5650.00	59.2 PK	68.2	-9.0	1.68 H	292	57.5	1.7
3	*5775.00	94.9 PK			1.76 H	260	54.9	40.0
4	*5775.00	84.8 AV			1.76 H	260	44.8	40.0
5	#5925.00	56.1 PK	68.2	-12.1	1.66 H	359	53.5	2.6
6	#5930.40	56.0 PK	68.2	-12.2	1.76 H	260	53.4	2.6
7	11550.00	57.0 PK	74.0	-17.0	1.77 H	205	42.5	14.5
8	11550.00	43.9 AV	54.0	-10.1	1.77 H	205	29.4	14.5
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	#5649.60	63.8 PK	68.2	-4.4	1.47 V	349	62.1	1.7
2	**#5650.00**	**67.1 PK**	**68.2**	**-1.1**	**1.49 V**	**19**	**65.4**	**1.7**
3	*5775.00	109.5 PK			1.47 V	349	69.5	40.0
4	*5775.00	99.7 AV			1.47 V	349	59.7	40.0
5	#5925.00	59.0 PK	68.2	-9.2	1.59 V	329	56.4	2.6
6	#5928.00	59.5 PK	68.2	-8.7	1.47 V	349	56.9	2.6
7	11550.00	58.6 PK	74.0	-15.4	1.90 V	251	44.1	14.5
8	11550.00	45.7 AV	54.0	-8.3	1.90 V	251	31.2	14.5

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

CHANNEL	TX Channel 157	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	29.90	26.5 QP	40.0	-13.5	2.00 H	319	42.9	-16.4
2	57.12	27.5 QP	40.0	-12.5	2.00 H	12	42.1	-14.6
3	103.78	35.2 QP	43.5	-8.3	2.00 H	105	53.2	-18.0
4	142.67	32.4 QP	43.5	-11.1	1.00 H	96	46.5	-14.1
5	169.89	31.3 QP	43.5	-12.2	1.51 H	118	45.2	-13.9
6	214.61	34.0 QP	43.5	-9.5	2.00 H	213	49.8	-15.8
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	30.26	36.4 QP	40.0	-3.6	1.00 V	31	52.8	-16.4
2	62.95	36.7 QP	40.0	-3.3	1.00 V	10	52.0	-15.3
3	88.23	34.1 QP	43.5	-9.4	1.49 V	210	53.9	-19.8
4	103.78	35.7 QP	43.5	-7.8	1.00 V	283	53.7	-18.0
5	156.28	27.7 QP	43.5	-15.8	1.00 V	116	41.4	-13.7
6	214.61	31.7 QP	43.5	-11.8	1.49 V	182	47.5	-15.8

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

Frequency (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15 - 0.5	66 - 56	56 - 46
0.50 - 5.0	56	46
5.0 - 30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies.
2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 21, 2016	Nov. 20, 2017
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Dec. 22, 2016	Dec. 21, 2017
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 10, 2017	Mar. 09, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Jul. 28, 2016	Jul. 27, 2017
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

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

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

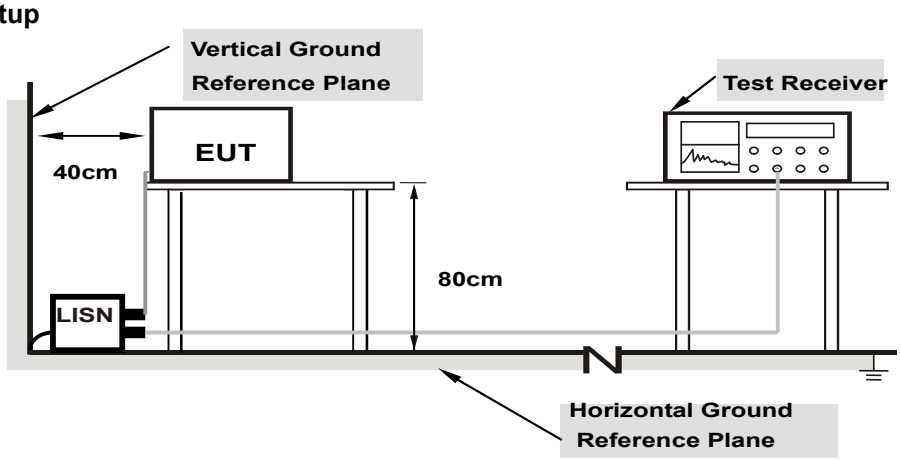
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

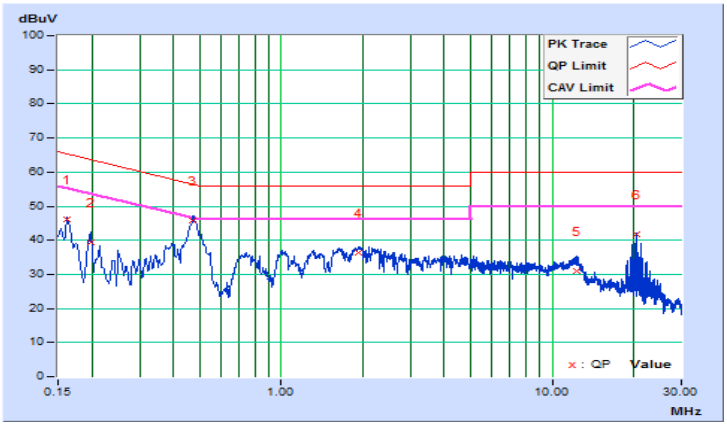
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16200	10.41	35.66	24.13	46.07	34.54	65.36	55.36	-19.29	-20.82
2	0.19780	10.43	28.90	17.88	39.33	28.31	63.70	53.70	-24.37	-25.39
3	**0.47060**	**10.50**	**35.26**	**30.99**	**45.76**	**41.49**	**56.50**	**46.50**	**-10.74**	**-5.01**
4	1.91800	10.52	25.72	21.33	36.24	31.85	56.00	46.00	-19.76	-14.15
5	12.33800	11.02	19.91	14.74	30.93	25.76	60.00	50.00	-29.07	-24.24
6	20.55000	11.45	30.24	29.73	41.69	41.18	60.00	50.00	-18.31	-8.82

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.

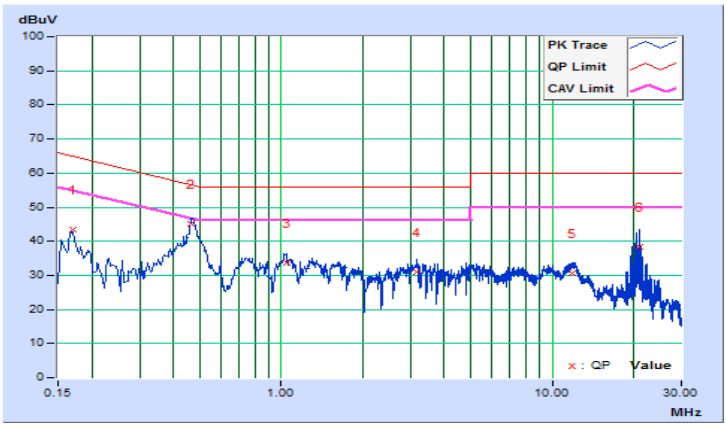


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16932	10.17	33.24	21.60	43.41	31.77	64.99	54.99	-21.58	-23.22
2	0.46567	10.23	34.73	29.35	44.96	39.58	56.59	46.59	-11.63	-7.01
3	1.04200	10.24	23.46	20.10	33.70	30.34	56.00	46.00	-22.30	-15.66
4	3.16600	10.37	20.74	15.25	31.11	25.62	56.00	46.00	-24.89	-20.38
5	11.83415	10.71	19.99	14.64	30.70	25.35	60.00	50.00	-29.30	-24.65
6	21.05000	11.08	27.34	21.80	38.42	32.88	60.00	50.00	-21.58	-17.12

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 ≦ 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

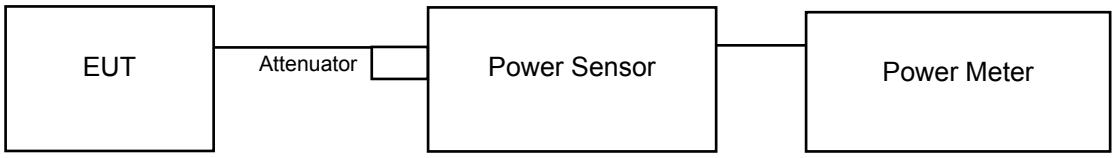
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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 $N_{ANT} \geq 5$.

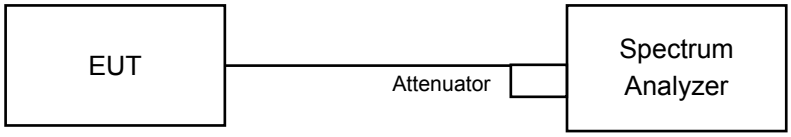
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

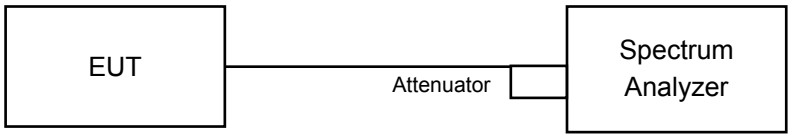
For Power Output
802.11a, 802.11n (HT20), 802.11n (HT40)



802.11ac (VHT80)



For 26dB and 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

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)
a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
b. Set sweep trigger to “free run”.
c. Set RBW = 1 MHz
d. Set VBW ≥ 3 MHz
e. Number of points in sweep ≥ 2 Span / RBW
f. Sweep time ≤ (number of points in sweep) * T
g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
h. Detector = RMS
i. Trace mode = max hold
j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
k. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

For 26dB Bandwidth
a. Set RBW = approximately 1% of the emission bandwidth.
b. Set the VBW > RBW.
c. Detector = Peak.
d. Trace mode = max hold.
e. 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%.

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 Sampling. 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 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:

CDD Mode

For U-NII-1 Band (Outdoor Access Point Mode)

802.11a

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1						
36	5180	14.23	15.39	61.079	17.86	-4.032	13.83	21.00	Pass
40	5200	20.13	21.14	**233.056**	23.67	-4.032	19.64	21.00	Pass
48	5240	20.01	20.82	221.012	23.44	-4.032	19.41	21.00	Pass

Note:
Gain = -4.032dBi(above 30 degrees from the horizon),
EIRP = conducted power +(-4.032dBi) + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1						
36	5180	14.25	15.45	61.682	17.90	-4.032	13.87	21.00	Pass
40	5200	20.14	20.91	226.586	23.55	-4.032	19.52	21.00	Pass
48	5240	19.70	20.81	213.829	23.30	-4.032	19.27	21.00	Pass

Note:
Gain = -4.032dBi(above 30 degrees from the horizon),
EIRP = conducted power +(-4.032dBi) + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1						
38	5190	11.04	12.54	30.653	14.86	-4.032	10.83	21.00	Pass
46	5230	18.32	19.63	159.753	22.03	-4.032	18.00	21.00	Pass

Note:
Gain = -4.032dBi(above 30 degrees from the horizon),
EIRP = conducted power +(-4.032dBi) + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

802.11ac (VHT80)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1						
42	5210	9.63	11.25	22.518	13.53	-4.032	9.50	21.00	Pass

Note:
Gain = -4.032dBi(above 30 degrees from the horizon),
EIRP = conducted power +(-4.032dBi) + array gain = (0 dB (i.e., no array gain) for $N_{ANT} \leq 4$).

For U-NII-3 Band

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	19.37	20.23	191.936	22.83	29.00	Pass
157	5785	21.32	22.33	306.521	24.86	29.00	Pass
165	5825	21.35	22.98	335.067	25.25	29.00	Pass

Note: U-NII-3 Band: Gain = 7dBi > 6dBi, so the power limit shall be reduced to 30-(7-6) = 29.00dBm.

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	18.66	20.11	176.016	22.46	29.00	Pass
157	5785	21.33	22.40	309.611	24.91	29.00	Pass
165	5825	22.78	21.27	323.639	25.10	29.00	Pass

Note: U-NII-3 Band: Gain = 7dBi > 6dBi, so the power limit shall be reduced to 30-(7-6) = 29.00dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	19.59	21.48	231.596	23.65	29.00	Pass
159	5795	21.97	23.35	**373.670**	25.72	29.00	Pass

Note: U-NII-3 Band: Gain = 7dBi > 6dBi, so the power limit shall be reduced to 30-(7-6) = 29.00dBm.

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	16.96	18.47	119.966	20.79	29.00	Pass

Note: U-NII-3 Band: Gain = 7dBi > 6dBi, so the power limit shall be reduced to 30-(7-6) = 29.00dBm.

Beamforming Mode

For U-NII-1 Band (Outdoor Access Point Mode)

802.11n (HT20)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1						
36	5180	11.24	12.44	30.832	14.89	-1.022	13.87	21.00	Pass
40	5200	17.13	17.90	**113.240**	20.54	-1.022	19.52	21.00	Pass
48	5240	16.69	17.80	106.905	20.29	-1.022	19.27	21.00	Pass

Note:
Gain = -4.032dBi + beamforming gain (3.01dBi)=-1.022,
EIRP = conducted power +(-4.032dBi) + beamforming gain (3.01dBi) = (0 dB (i.e., no array gain) for NANT ≤ 4).

802.11n (HT40)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1						
38	5190	8.03	9.53	15.311	11.85	-1.022	10.83	21.00	Pass
46	5230	15.31	16.62	79.799	19.02	-1.022	18.00	21.00	Pass

Note:
Gain = -4.032dBi + beamforming gain (3.01dBi)=-1.022,
EIRP = conducted power +(-4.032dBi) + beamforming gain (3.01dBi) = (0 dB (i.e., no array gain) for NANT ≤ 4).

802.11ac (VHT80)

Chan.	Freq. (MHz)	Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Gain (dBi)	EIRP (dBm)	EIRP limit (dBm)	Pass / Fail
		Chain 0	Chain 1						
42	5210	6.62	8.24	11.272	10.52	-1.022	9.50	21.00	Pass

Note:
Gain = -4.032dBi + beamforming gain (3.01dBi)=-1.022,
EIRP = conducted power +(-4.032dBi) + beamforming gain (3.01dBi) = (0 dB (i.e., no array gain) for NANT ≤ 4).

For U-NII-3 Band

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	15.65	17.10	88.105	19.45	25.99	Pass
157	5785	18.32	19.39	154.882	21.90	25.99	Pass
165	5825	19.77	18.26	161.808	22.09	25.99	Pass

Note: U-NII-3 Band: Directional gain = 7dBi +10log (2) = 10.01dBi > 6dBi, so the power limit shall be reduced to 30-(10.01-6) = 25.99dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	16.58	18.47	115.806	20.64	25.99	Pass
159	5795	18.96	20.34	**186.848**	22.71	25.99	Pass

Note: U-NII-3 Band: Directional gain = 7dBi +10log (2) = 10.01dBi > 6dBi, so the power limit shall be reduced to 30-(10.01-6) = 25.99dBm.

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	13.95	15.46	59.987	17.78	25.99	Pass

Note: U-NII-3 Band: Directional gain = 7dBi +10log (2) = 10.01dBi > 6dBi, so the power limit shall be reduced to 30-(10.01-6) = 25.99dBm.

26dB Bandwidth:

802.11a

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	19.66	19.52
40	5200	31.30	36.38
48	5240	36.30	40.60

802.11n (HT20)

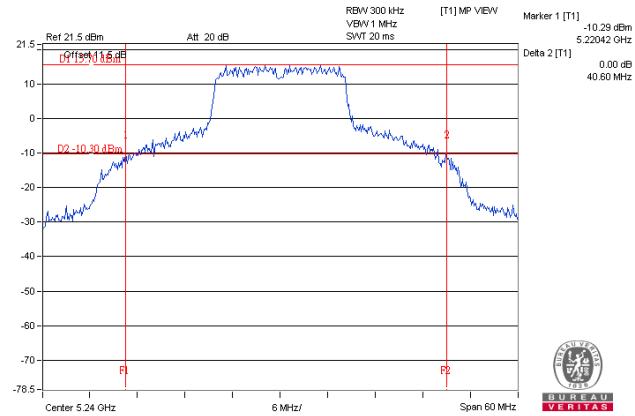
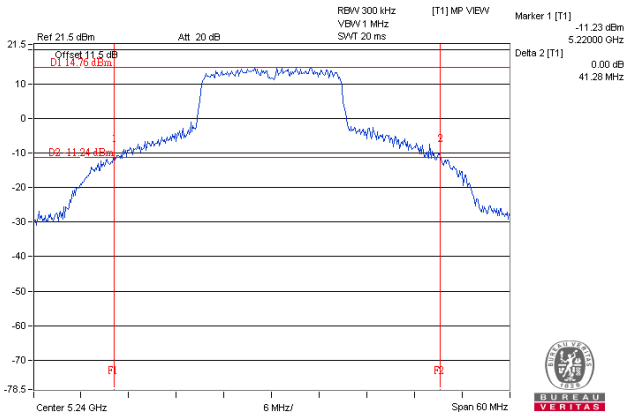
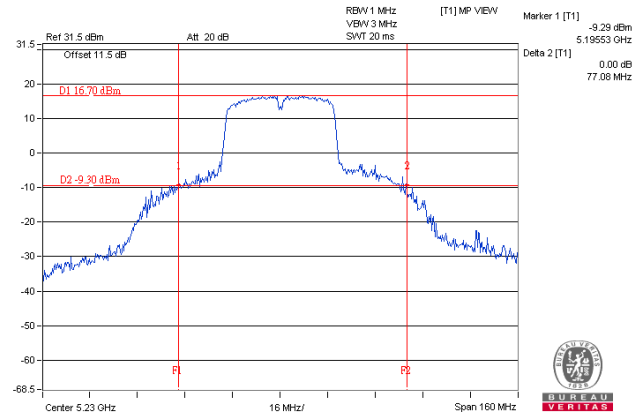
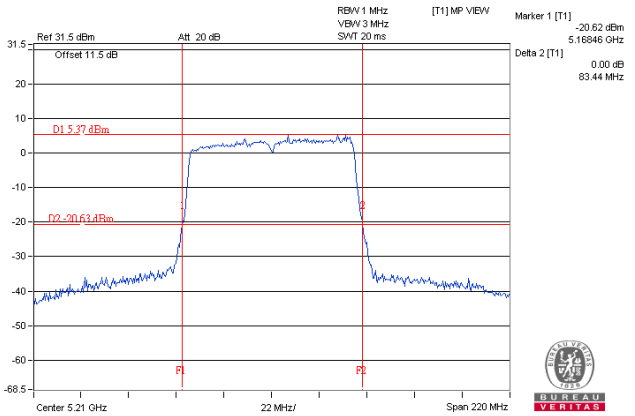
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	20.60	20.37
40	5200	32.98	39.41
48	5240	37.87	41.28

802.11n (HT40)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	40.98	41.00
46	5230	60.99	77.08

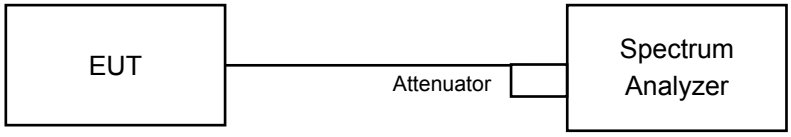
802.11ac (VHT80)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	83.43	83.44

Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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 sampling. 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.

4.4.4 Test Result

802.11a

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.44	16.44
40	5200	16.80	17.52
48	5240	17.40	17.50
149	5745	17.04	25.91
157	5785	17.04	24.60
165	5825	17.28	25.20

802.11n (HT20)

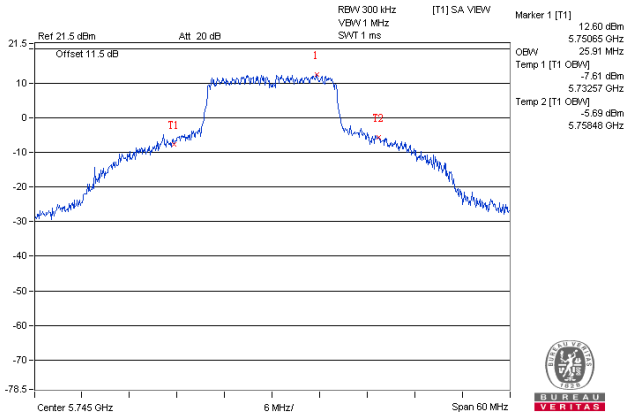
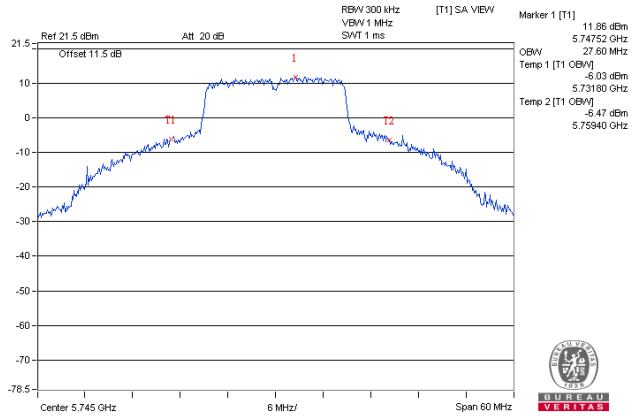
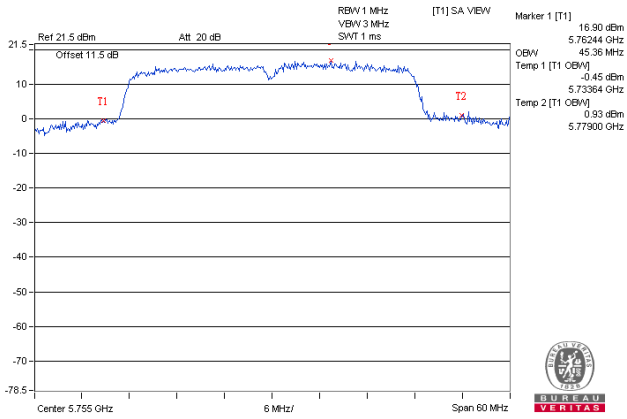
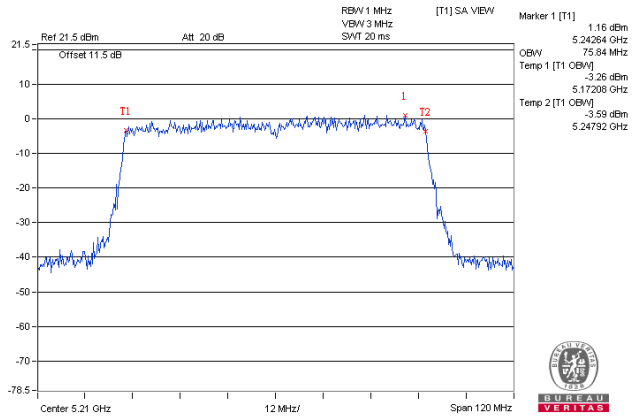
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.76
40	5200	18.00	18.72
48	5240	18.60	18.70
149	5745	18.00	27.60
157	5785	18.00	25.80
165	5825	18.24	26.16

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.24	36.36
46	5230	36.36	36.72
151	5755	36.84	45.36
159	5795	36.84	41.04

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.84	75.84
155	5775	75.84	75.84

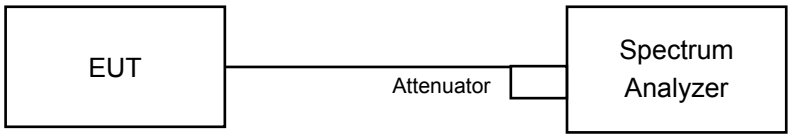
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.5 Peak Power Spectral Density Measurement

4.5.1 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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1band:
Duty cycle of test signal is ≥ 98%
Using method SA-1
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1MHz, Set VBW ≥ 3 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

For U-NII-3 band:
Duty cycle of test signal is ≥ 98%
Using method SA-1
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS.
3) Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.
4) Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured 1) power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz / 300 kHz).
5) Sweep time = auto, trigger set to “free run”.
6) Trace average at least 100 traces in power averaging mode.
7) Record the max value.

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as 4.3.6.

4.5.7 Test Results

For U-NII-1 Band (Outdoor Access Point Mode) band

802.11a

Chan.	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor	Total PSD With Duty Factor (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	0.62	2.49	0.23	4.89	12.99	Pass
40	5200	6.49	8.38	0.23	10.77	12.99	Pass
48	5240	7.56	9.22	0.23	11.71	12.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1:** Directional gain = 7dBi +10log (2) = 10.01dBi > 6dBi, so the power density limit shall be reduced to 17-(10.01-6) = 12.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Frequency (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	0.21	2.02	4.22	12.99	Pass
40	5200	6.06	7.91	10.09	12.99	Pass
48	5240	6.91	8.84	10.99	12.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1:** Directional gain = 7dBi +10log (2) = 10.01dBi > 6dBi, so the power density limit shall be reduced to 17-(10.01-6) = 12.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

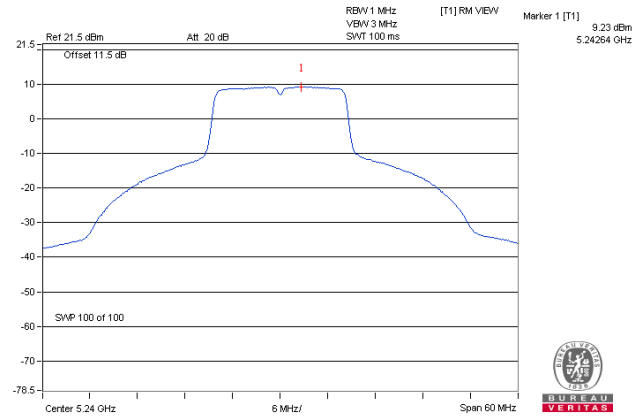
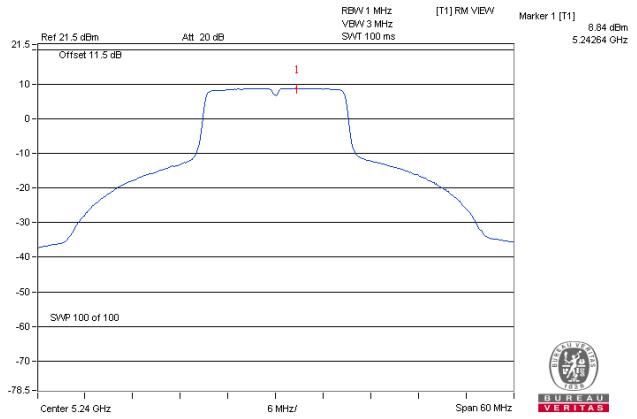
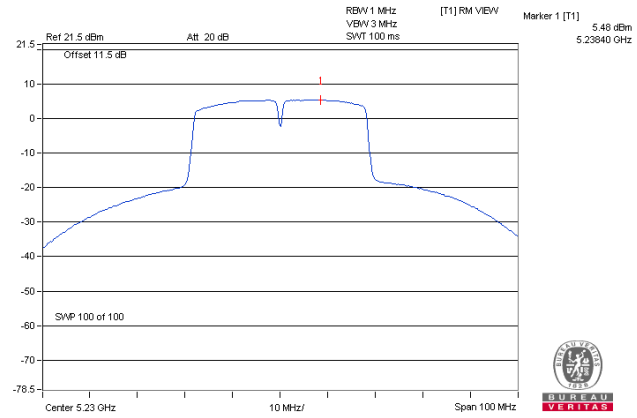
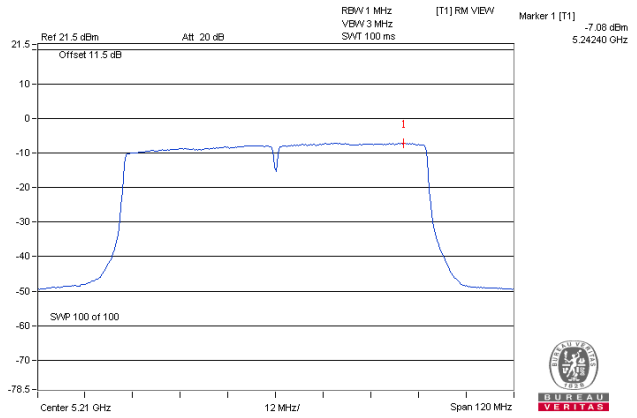
Chan.	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor	Total PSD With Duty Factor (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-5.27	-3.42	0.21	-1.03	12.99	Pass
46	5230	3.43	5.45	0.21	7.77	12.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1:** Directional gain = 7dBi +10log (2) = 10.01dBi > 6dBi, so the power density limit shall be reduced to 17-(10.01-6) = 12.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Chan.	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor	Total PSD With Duty Factor (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-9.47	-7.08	0.37	-4.74	12.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-1:** Directional gain = 7dBi +10log (2) = 10.01dBi > 6dBi, so the power density limit shall be reduced to 17-(10.01-6) = 12.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11a / Chain 1 / Ch 48	802.11n (HT20) / Chain 1 / Ch 48
	
802.11n (HT40) / Chain 1 / Ch 46	802.11ac (VHT80) / Chain 1 / Ch 42
	

For U-NII-3 band:

802.11a

Ch.	Freq. (MHz)	PSD (dBm/300kHz)		PSD (dBm/500kHz)		Duty factor	Total PSD (dBm /500 kHz)	Limit (dBm /500 kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 0	Chain 1				
149	5745	-0.44	-0.60	1.78	1.62	0.23	4.94	25.99	Pass
157	5785	0.69	0.62	2.91	2.84	0.23	6.12	25.99	Pass
165	5825	0.90	1.19	3.12	3.41	0.23	6.51	25.99	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. For U-NII-3: Directional gain =7dBi + 10log(2)=10.01dBi > 6dBi, so the power density limit shall be reduced to 30-(10.01-6) = 25.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Ch.	Freq. (MHz)	PSD (dBm/300kHz)		PSD (dBm/500kHz)		Duty factor	Total PSD (dBm /500 kHz)	Limit (dBm /500 kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 0	Chain 1				
149	5745	-1.31	-0.68	0.91	1.54	0.10	4.34	25.99	Pass
157	5785	-0.24	0.52	1.98	2.74	0.10	5.48	25.99	Pass
165	5825	0.18	1.02	2.40	3.24	0.10	5.95	25.99	Pass

Note:

1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. For U-NII-3: Directional gain =7dBi + 10log(2)=10.01dBi > 6dBi, so the power density limit shall be reduced to 30-(10.01-6) = 25.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

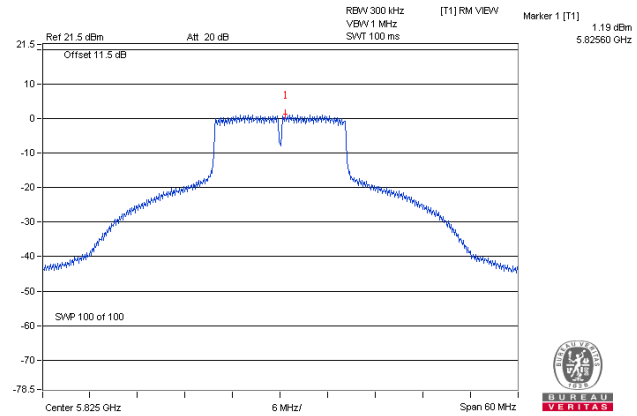
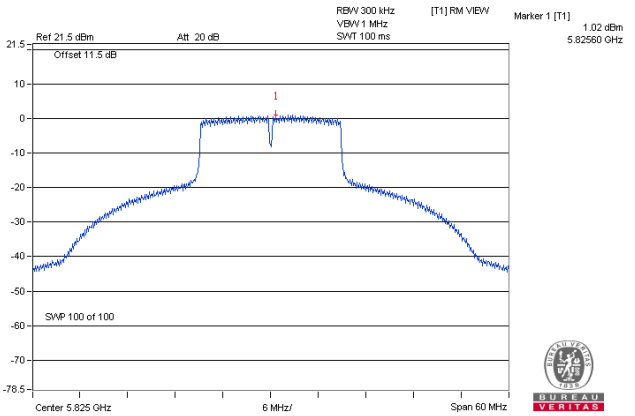
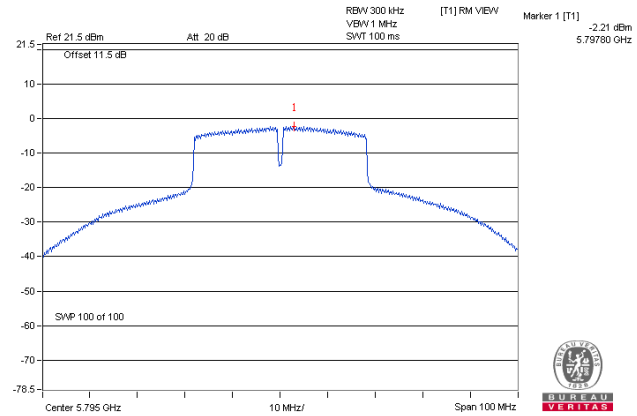
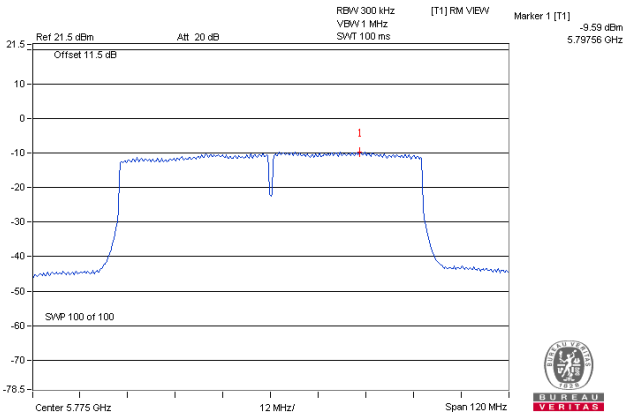
Ch.	Freq. (MHz)	PSD (dBm/300kHz)		PSD (dBm/500kHz)		Duty factor	Total PSD (dBm /500 kHz)	Limit (dBm /500 kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 0	Chain 1				
151	5755	-3.87	-2.87	-1.65	-0.65	0.17	2.06	25.99	Pass
159	5795	-2.78	-2.21	-0.56	0.01	0.17	2.92	25.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. For U-NII-3: Directional gain =7dBi + 10log(2)=10.01dBi > 6dBi, so the power density limit shall be reduced to 30-(10.01-6) = 25.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Ch.	Freq. (MHz)	PSD (dBm/300kHz)		PSD (dBm/500kHz)		Duty factor	Total PSD (dBm /500 kHz)	Limit (dBm /500 kHz)	Pass / Fail
		Chain 0	Chain 1	Chain 0	Chain 1				
155	5775	-10.84	-9.59	-8.62	-7.37	0.37	-4.57	25.99	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. For U-NII-3: Directional gain =7dBi + 10log(2)=10.01dBi > 6dBi, so the power density limit shall be reduced to 30-(10.01-6) = 25.99dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

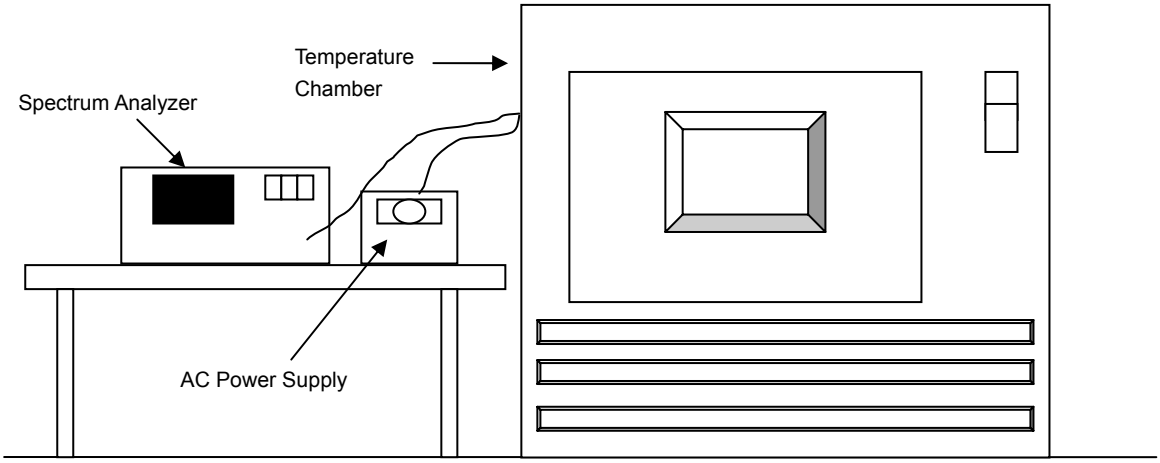
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.6 Frequency Stability

4.6.1 Limits of Frequency Stability Measurement

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

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

a. The EUT was placed inside the environmental test chamber and powered by nominal AC 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.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (℃)	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	5179.9984	-0.00003	5179.9991	-0.00002	5180.0019	0.00004	5179.9990	-0.00002
40	120	5180.0131	0.00025	5180.0140	0.00027	5180.0159	0.00031	5180.0134	0.00026
30	120	5179.9965	-0.00007	5179.9975	-0.00005	5179.9945	-0.00011	5179.9951	-0.00009
20	120	5179.9878	-0.00024	5179.9879	-0.00023	5179.9916	-0.00016	5179.9876	-0.00024
10	120	5179.9869	-0.00025	5179.9882	-0.00023	5179.9918	-0.00016	5179.9898	-0.00020
0	120	5180.0156	0.00030	5180.0169	0.00033	5180.0186	0.00036	5180.0184	0.00036
-10	120	5179.9953	-0.00009	5180.0004	0.00001	5179.9967	-0.00006	5179.9957	-0.00008
-20	120	5179.9912	-0.00017	5179.9874	-0.00024	5179.9888	-0.00022	5179.9873	-0.00025
-30	120	5179.9834	-0.00032	5179.9834	-0.00032	5179.9853	-0.00028	5179.9840	-0.00031

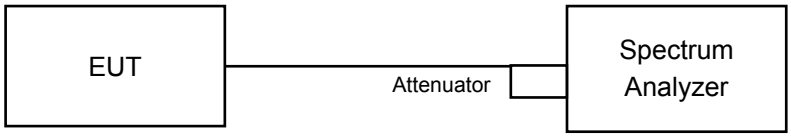
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5179.9879	-0.00023	5179.9875	-0.00024	5179.9911	-0.00017	5179.9871	-0.00025
	120	5179.9878	-0.00024	5179.9879	-0.00023	5179.9916	-0.00016	5179.9876	-0.00024
	102	5179.9868	-0.00025	5179.9869	-0.00025	5179.9906	-0.00018	5179.9882	-0.00023

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

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

4.7.5 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
		Chain 0	Chain 1		
149	5745	16.39	16.36	0.5	Pass
157	5785	16.41	16.37	0.5	Pass
165	5825	16.40	16.38	0.5	Pass

802.11n (HT20)

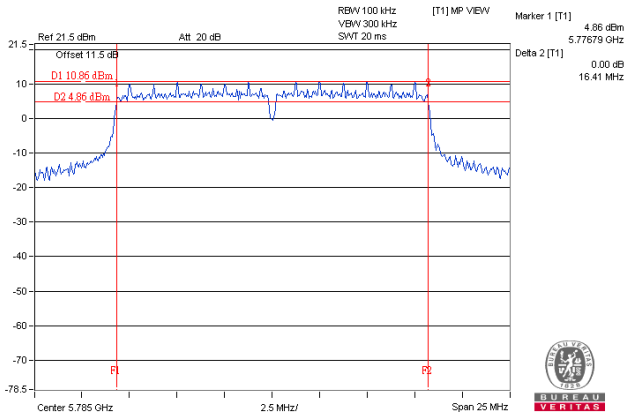
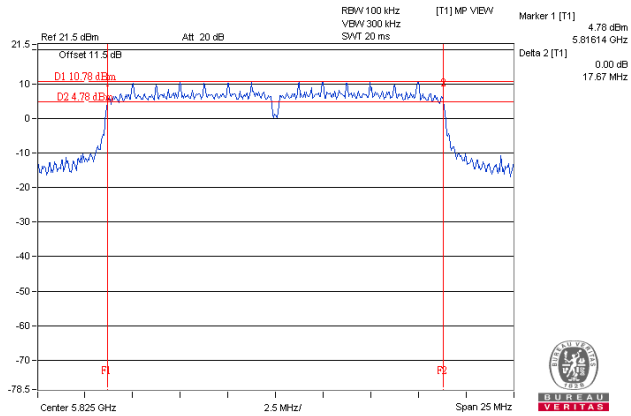
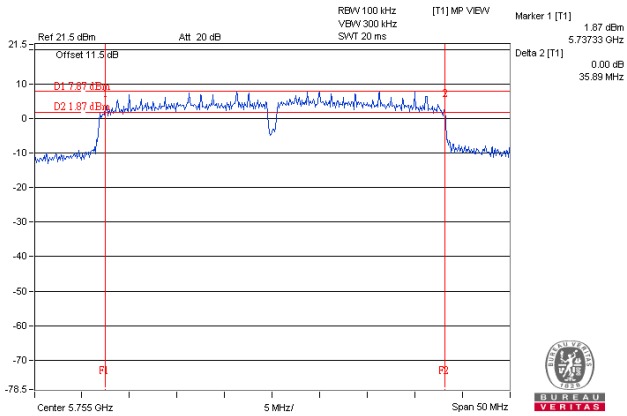
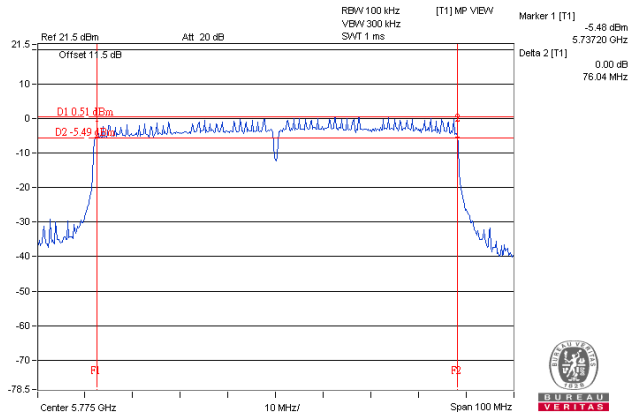
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.63	17.61	0.5	Pass
157	5785	17.63	17.18	0.5	Pass
165	5825	17.67	17.57	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.59	35.89	0.5	Pass
159	5795	35.18	35.22	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	76.04	75.97	0.5	Pass

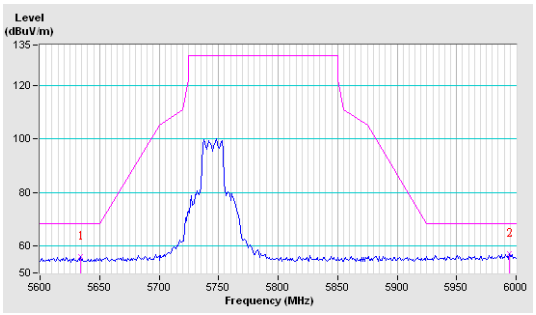
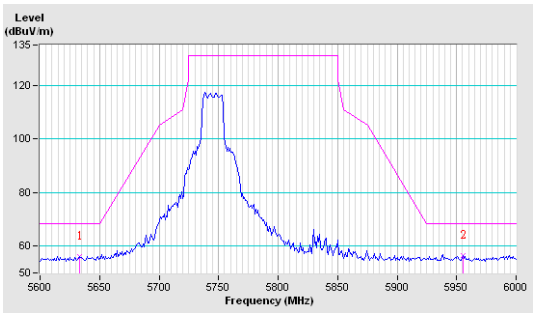
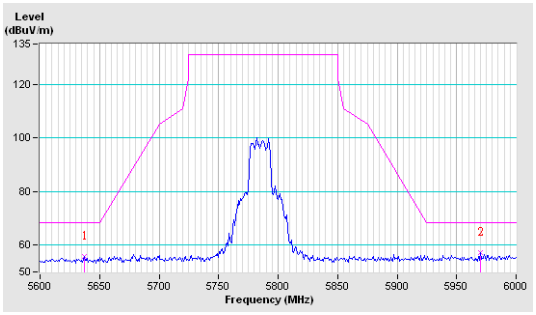
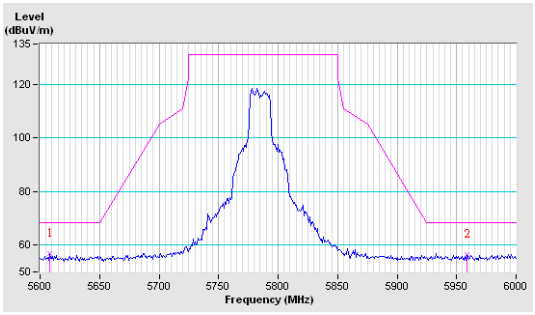
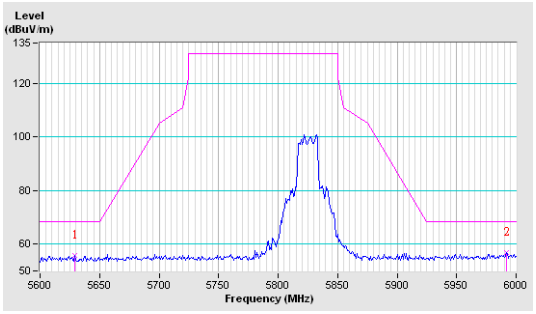
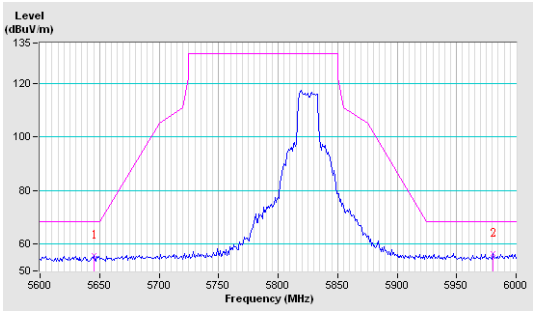
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

5 Pictures of Test Arrangements

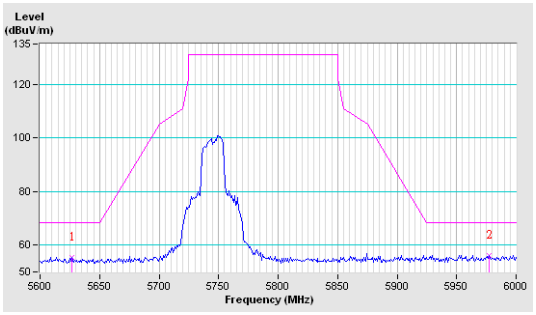
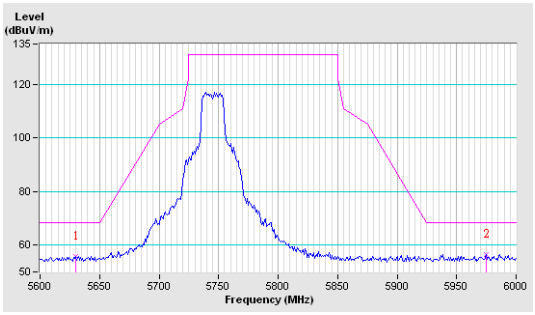
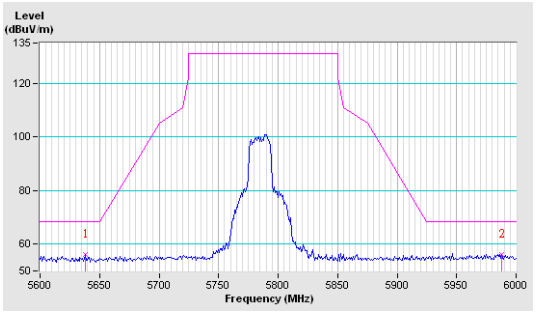
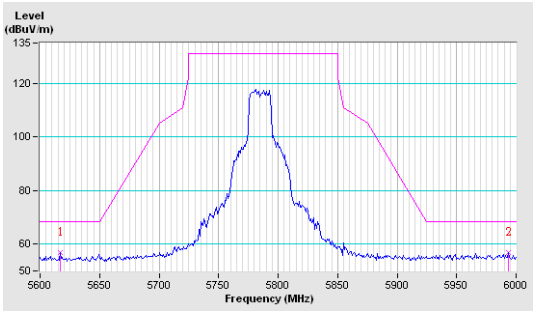
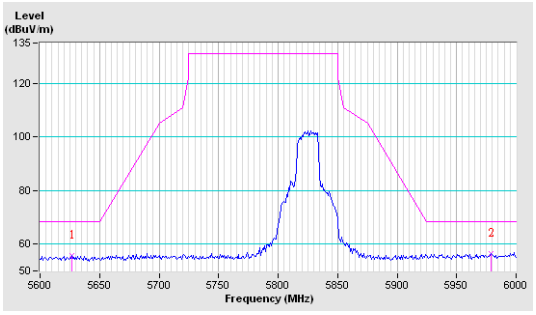
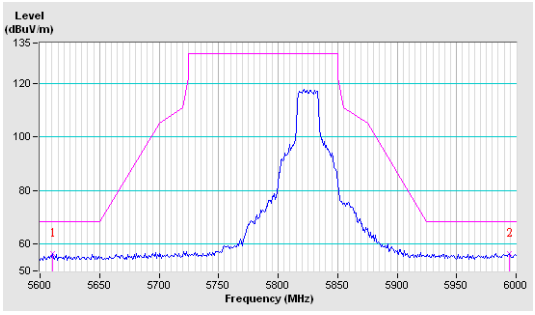
Please refer to the attached file (Test Setup Photo).

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

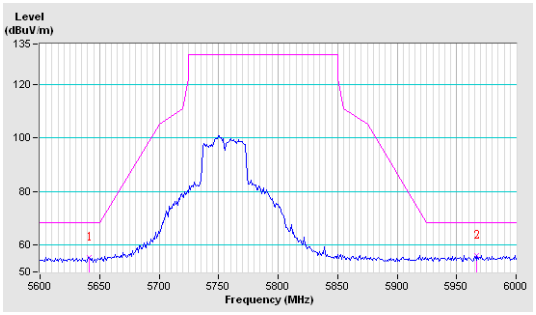
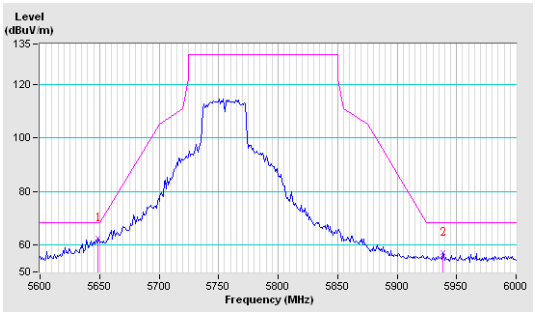
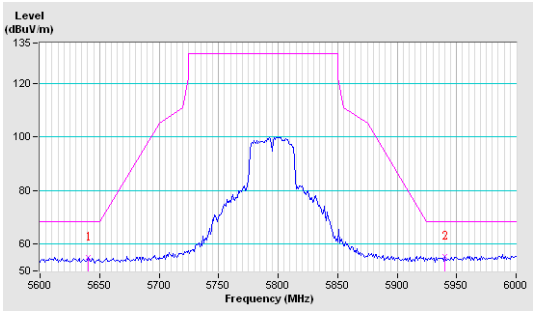
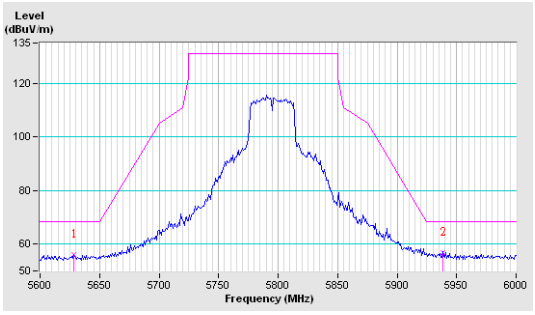
802.11a

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

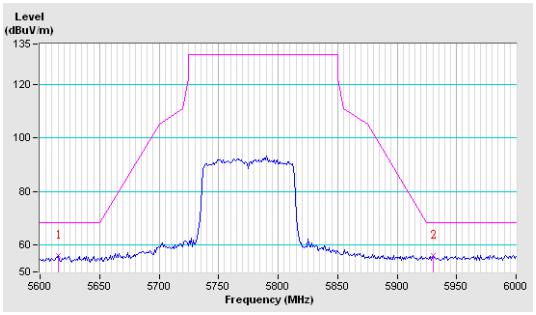
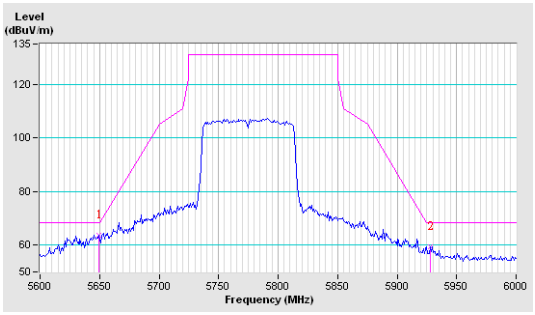
802.11n (HT20)

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

802.11n (HT40)

CH151	
Horizontal	Vertical
	
CH159	
Horizontal	Vertical
	

802.11ac (VHT80)

CH155	
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 FCC recognized accredited test firms and 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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