FCC Test Report

Report No.:	RF170801C12-1
FCC ID:	KA2WL6620APSA1
Test Model:	DWL-6620APS
Received Date:	Aug. 01, 2017
Test Date:	Aug. 24 ~ Sep. 11, 2017
Issued Date:	Sep. 12, 2017
Applicant:	D-Link Corporation
Address:	17595 Mt. Herrmann, Fountain Valley, California, United States, 92708
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.)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF170801C12-1	Original release.	Sep. 12, 2017

1 Certificate of Conformity

Product:	Unified AC Concurrent Dual-band PoE Access Point
Brand:	D-Link Corporation
Test Model:	DWL-6620APS
Sample Status:	Identical Prototype
Applicant:	D-Link Corporation
Test Date:	Aug. 24 ~ Sep. 11, 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 RF characteristics under the conditions specified in this report.

Prepared by : Celine Chou , **Date:** Sep. 12, 2017

Celine Chou / Specialist

Approved by : Ken Liu , **Date:** Sep. 12, 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 -3.99dB at 0.35703MHz.
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 -0.3dB at 55.69MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is I-pex not a standard connector.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Unified AC Concurrent Dual-band PoE Access Point
Brand	D-Link Corporation
Test Model	DWL-6620APS
Sample Status	Identical Prototype
Power Supply Rating	12Vdc from adapter 53Vdc from 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: 605.902mW 5745~5825MHz: 772.808mW Beamforming Mode: 5180~5240MHz: 302.972mW 5745~5825MHz: 386.430mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter
Cable Supplied	NA

Note:

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

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

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

* For 802.11n and 802.11ac, CDD mode and Beamforming mode are presented in power output test item. For other test items, CDD mode is the worst case for final tests after pretesting.

2. The EUT uses following antennas.

Type	Connector	Gain (dBi)	
		2.4GHz	5GHz
Smart Antenna	I-pex	4.90	6.10

3. The EUT consumes power from the following adapters and POE. (POE for support unit only)

Adapter 1	
Brand	D-Link
Model	AMS115-1202000FU
Input Power	100-240Vac, 50-60Hz, 0.8A
Output Power	12Vdc, 2A
Power Line	1.2m power cable without core attached on adapter

Adapter 2	
Brand	D-Link
Model	WA-24Q12R
Input Power	100-240Vac, 50-60Hz, 0.7A
Output Power	12Vdc, 2A
Power Line	1.2m power cable without core attached on adapter

POE	
Brand	D-Link
Model	PGS-1210-10P
Input Power	100-240Vac
Output Power	53Vdc

4. 2.4GHz & 5GHz technology can transmit at same time.

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	
A	√	√	√	√	Power from adapter 1
B	-	√	√	-	Power from adapter 2
C	-	√	√	-	Power from POE

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 **X-plane**.
2. "-" means no effect.

Radiated Emission Test (Above 1GHz):

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A	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	29.3
A	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	29.3

Radiated Emission Test (Below 1GHz):

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A, B, C	802.11a	5180-5240	36 to 48	48	OFDM	6.0
	802.11a	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)
A, B, C	802.11a	5180-5240	36 to 48	48	OFDM	6.0
	802.11a	5745-5825	149 to 165		OFDM	6.0

Transmit Power 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)
CDD Mode						
A	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	29.3
A	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	29.3
Beamforming Mode						
A	802.11n (HT20)	5180-5240	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	29.3
A	802.11n (HT20)	5745-5825	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	29.3

Peak Power Spectral Density, Bandwidth and Frequency Stability 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)
A	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	29.3
A	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	29.3

Test Condition:

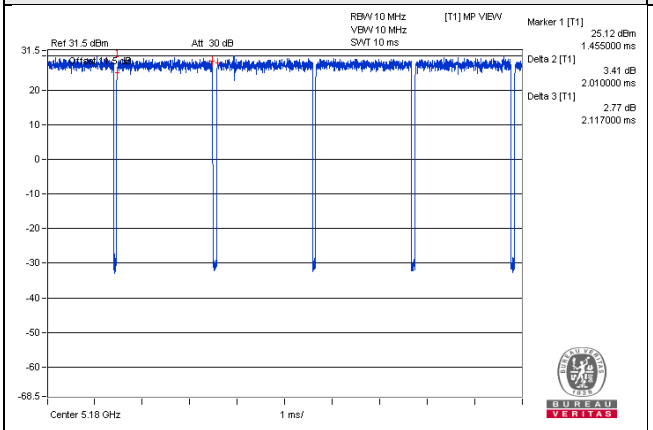
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 66% RH	120Vac, 60Hz	James Yang
RE<1G	25 deg. C, 65% RH	120Vac, 60Hz 53Vdc	James Yang
PLC	23 deg. C, 64% RH	120Vac, 60Hz 53Vdc	Willy Cheng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Leo Tsai Frank Liu

3.3 Duty Cycle of Test Signal

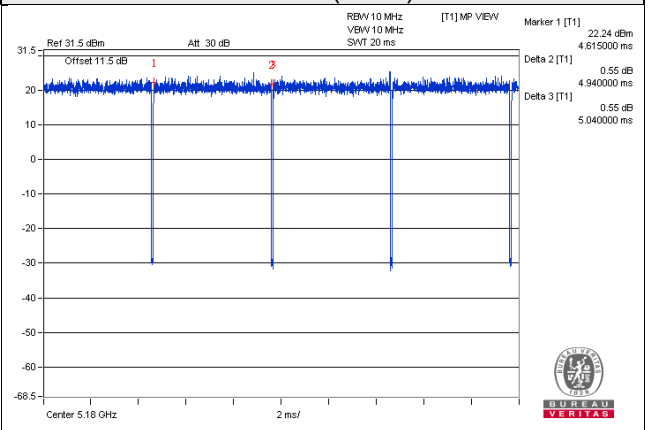
802.11n (HT20): Duty cycle of test signal is > 98%, duty factor is not required.
802.11a, 802.11n (HT40), 802.11ac (VHT80): Duty cycle of test signal is < 98%, duty factor is required.

802.11a: Duty cycle = 2.010/2.117 = 0.949, Duty factor = 10 * log(1/0.949) = 0.23
802.11n (HT20): Duty cycle = 4.494/5.040 = 0.980
802.11n (HT40): Duty cycle = 2.385/2.505 = 0.952, Duty factor = 10 * log(1/0.952) = 0.21
802.11ac (VHT80): Duty cycle = 1.117/1.222 = 0.914, Duty factor = 10 * log(1/0.914) = 0.39

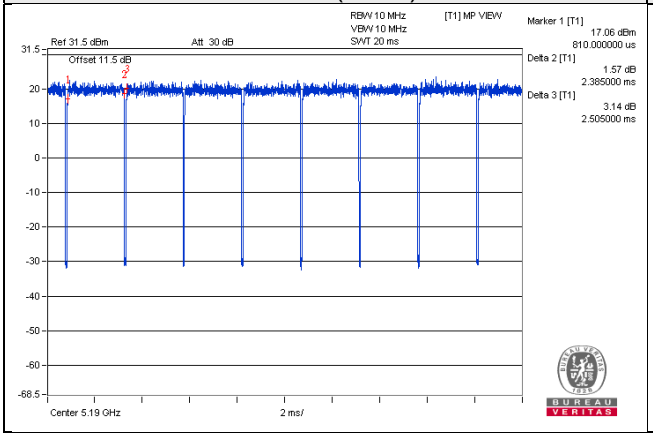
802.11a



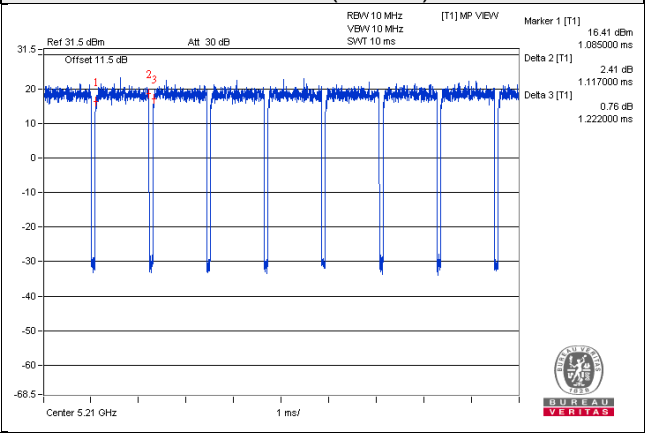
802.11n (HT20)



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	6RP2YM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	POE	D-Link	PGS-1210-10P	NA	NA	Provided by manufacturer

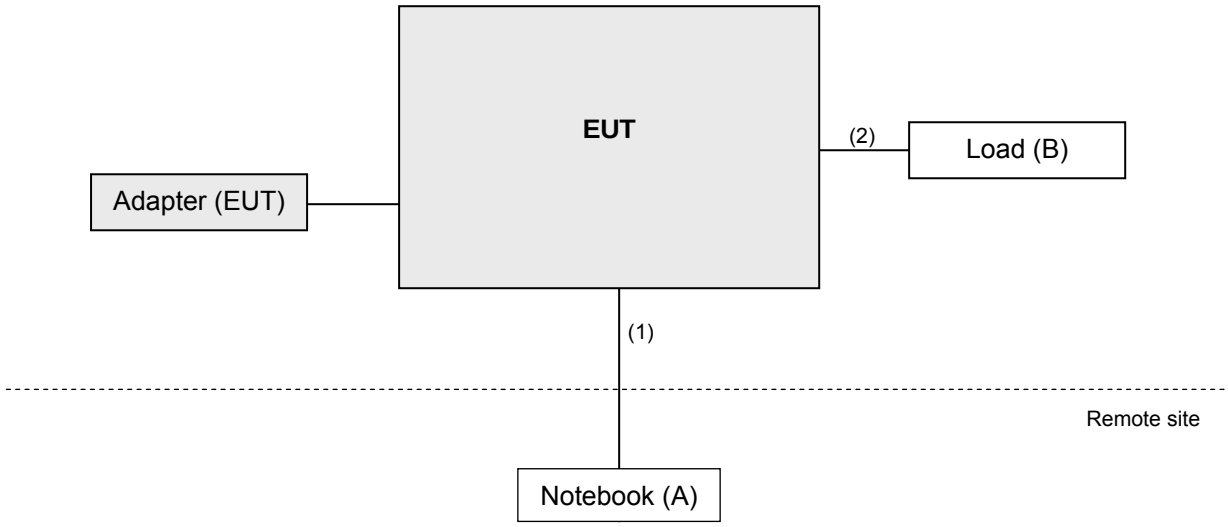
Note:

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.

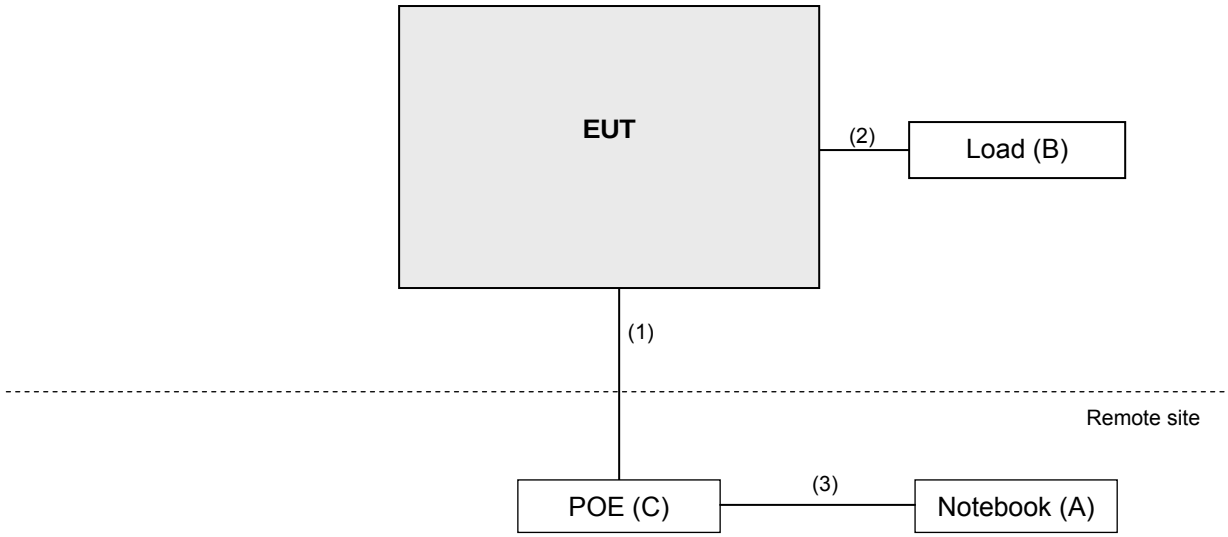
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	3	N	0	-
2.	RJ45, Cat5e	2	1.8	N	0	-
3.	RJ45, Cat5e	1	1.8	N	0	-

3.4.1 Configuration of System under Test

Adapter Mode



POE Mode



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 v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10:2013

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

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 v02r01</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 KEYSIGHT	N9038A	MY55420137	Mar. 27, 2017	Mar. 26, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100269	May. 11, 2017	May. 10, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 28, 2016	Dec. 27, 2017
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 27, 2016	Dec. 26, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 14, 2016	Dec. 13, 2017
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent	8449B	3008A01638	Feb. 22, 2017	Feb. 21, 2018
Preamplifier Agilent	8447D	2944A10638	Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-02 (248780+MY13377)	Aug. 08, 2017	Aug. 07, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 01, 2017	Jul. 31, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 17, 2016	Oct. 16, 2017
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 07, 2017	Jun. 06, 2018

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 9.
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-9.

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:

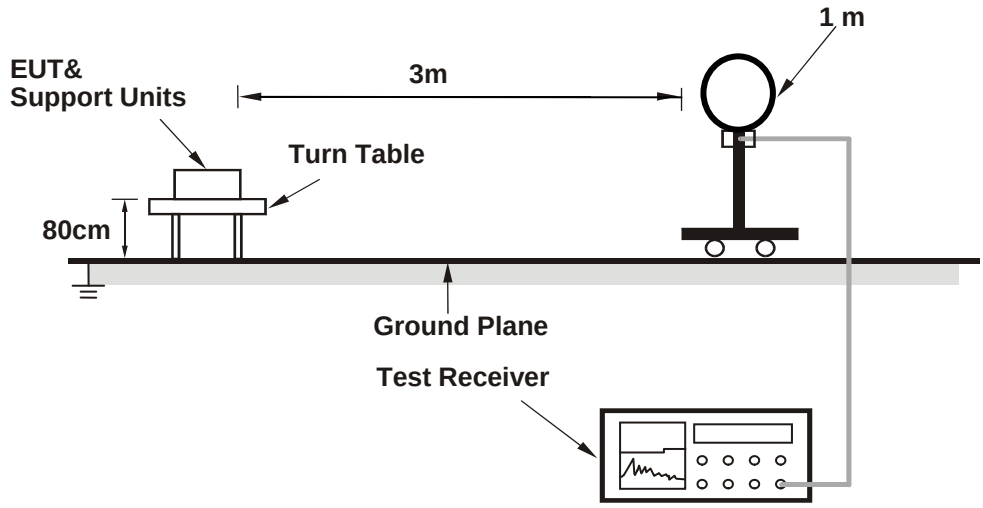
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

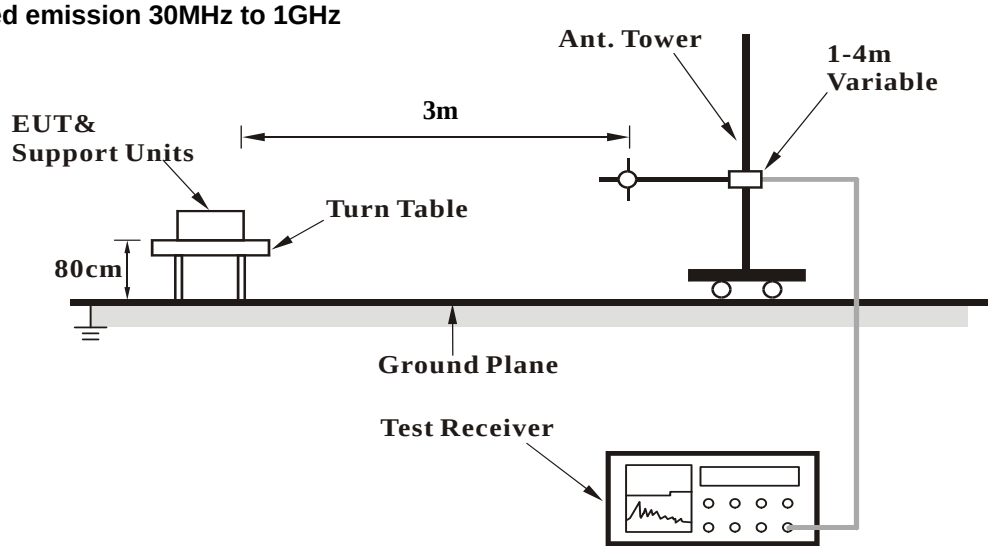
No deviation.

4.1.5 Test Setup

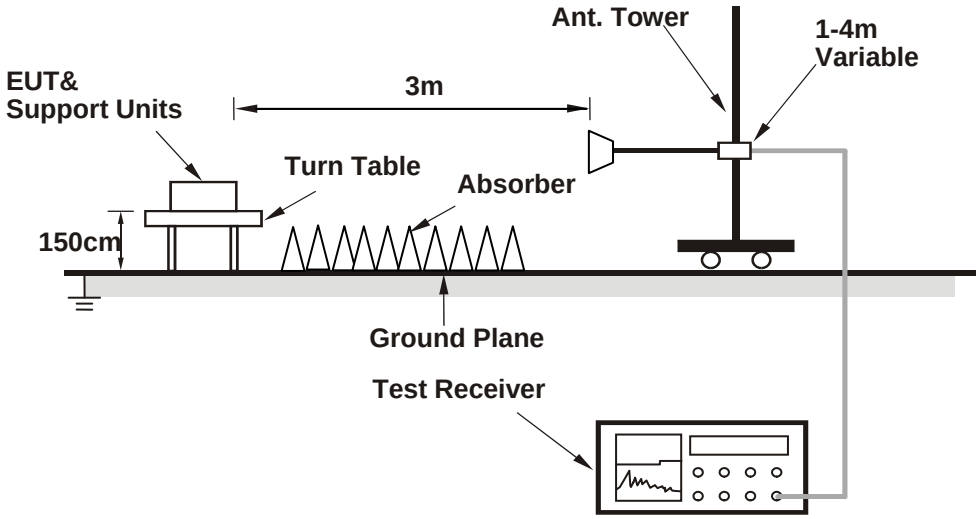
For Radiated emission below 30MHz



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 (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".

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	58.1 PK	74.0	-15.9	1.81 H	307	54.2	3.9
2	5150.00	45.5 AV	54.0	-8.5	1.81 H	307	41.6	3.9
3	*5180.00	106.0 PK			1.72 H	322	65.3	40.7
4	*5180.00	95.6 AV			1.72 H	322	54.9	40.7
5	#10360.00	58.8 PK	74.0	-15.2	1.28 H	204	43.3	15.5
6	#10360.00	46.1 AV	54.0	-7.9	1.28 H	204	30.6	15.5
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	5150.00	66.8 PK	74.0	-7.2	3.29 V	314	62.9	3.9
2	5150.00	53.2 AV	54.0	-0.8	3.29 V	314	49.3	3.9
3	*5180.00	119.1 PK			2.87 V	319	78.4	40.7
4	*5180.00	108.0 AV			2.87 V	319	67.3	40.7
5	#10360.00	60.3 PK	74.0	-13.7	1.98 V	332	44.8	15.5
6	#10360.00	46.0 AV	54.0	-8.0	1.98 V	332	30.5	15.5

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 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	57.3 PK	74.0	-16.7	3.42 H	283	53.4	3.9
2	5150.00	43.8 AV	54.0	-10.2	3.42 H	283	39.9	3.9
3	*5200.00	114.1 PK			3.50 H	285	73.3	40.8
4	*5200.00	103.9 AV			3.50 H	285	63.1	40.8
5	#10400.00	58.1 PK	74.0	-15.9	1.92 H	168	42.6	15.5
6	#10400.00	45.0 AV	54.0	-9.0	1.92 H	168	29.5	15.5
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	5150.00	66.2 PK	74.0	-7.8	3.16 V	316	62.3	3.9
2	5150.00	51.4 AV	54.0	-2.6	3.16 V	316	47.5	3.9
3	*5200.00	122.6 PK			2.93 V	313	81.8	40.8
4	*5200.00	112.7 AV			2.93 V	313	71.9	40.8
5	#10400.00	58.9 PK	74.0	-15.1	1.48 V	352	43.4	15.5
6	#10400.00	46.2 AV	54.0	-7.8	1.48 V	352	30.7	15.5

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 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	114.1 PK			3.31 H	287	73.3	40.8
2	*5240.00	103.6 AV			3.31 H	287	62.8	40.8
3	5350.00	56.8 PK	74.0	-17.2	3.05 H	267	52.4	4.4
4	5350.00	44.2 AV	54.0	-9.8	3.05 H	267	39.8	4.4
5	#10480.00	57.2 PK	74.0	-16.8	3.45 H	67	42.1	15.1
6	#10480.00	44.4 AV	54.0	-9.6	3.45 H	67	29.3	15.1
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	122.9 PK			2.90 V	328	82.1	40.8
2	*5240.00	113.1 AV			2.90 V	328	72.3	40.8
3	5350.00	57.9 PK	74.0	-16.1	2.92 V	333	53.5	4.4
4	5350.00	45.1 AV	54.0	-8.9	2.92 V	333	40.7	4.4
5	#10480.00	57.6 PK	74.0	-16.4	2.10 V	125	42.5	15.1
6	#10480.00	45.0 AV	54.0	-9.0	2.10 V	125	29.9	15.1

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	#5629.60	59.3 PK	68.2	-8.9	3.03 H	283	54.6	4.7
2	*5745.00	110.8 PK			3.03 H	283	69.3	41.5
3	*5745.00	100.7 AV			3.03 H	283	59.2	41.5
4	#5947.20	59.4 PK	68.2	-8.8	3.03 H	283	54.6	4.8
5	11490.00	59.2 PK	74.0	-14.8	1.06 H	352	43.2	16.0
6	11490.00	46.5 AV	54.0	-7.5	1.06 H	352	30.5	16.0
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	#5641.60	59.6 PK	68.2	-8.6	3.26 V	203	54.9	4.7
2	*5745.00	123.5 PK			3.26 V	203	82.0	41.5
3	*5745.00	112.5 AV			3.26 V	203	71.0	41.5
4	#5957.60	59.8 PK	68.2	-8.4	3.26 V	203	55.0	4.8
5	11490.00	64.0 PK	74.0	-10.0	2.85 V	204	48.0	16.0
6	11490.00	50.7 AV	54.0	-3.3	2.85 V	204	34.7	16.0

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	#5624.80	59.9 PK	68.2	-8.3	3.45 H	284	55.1	4.8
2	*5785.00	110.0 PK			3.45 H	284	68.5	41.5
3	*5785.00	99.8 AV			3.45 H	284	58.3	41.5
4	#5973.60	59.5 PK	68.2	-8.7	3.45 H	284	54.7	4.8
5	11570.00	59.6 PK	74.0	-14.4	1.68 H	135	43.9	15.7
6	11570.00	46.4 AV	54.0	-7.6	1.68 H	135	30.7	15.7
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	#5623.20	59.8 PK	68.2	-8.4	3.12 V	202	55.0	4.8
2	*5785.00	121.4 PK			3.12 V	202	79.9	41.5
3	*5785.00	111.0 AV			3.12 V	202	69.5	41.5
4	#5970.40	59.4 PK	68.2	-8.8	3.12 V	202	54.6	4.8
5	11570.00	62.8 PK	74.0	-11.2	3.00 V	208	47.1	15.7
6	11570.00	50.0 AV	54.0	-4.0	3.00 V	208	34.3	15.7

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 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	#5624.00	59.1 PK	68.2	-9.1	3.50 H	284	54.3	4.8
2	*5825.00	110.8 PK			3.50 H	284	69.2	41.6
3	*5825.00	100.5 AV			3.50 H	284	58.9	41.6
4	#5958.40	59.3 PK	68.2	-8.9	3.50 H	284	54.5	4.8
5	11650.00	58.6 PK	74.0	-15.4	1.76 H	84	43.0	15.6
6	11650.00	45.5 AV	54.0	-8.5	1.76 H	84	29.9	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5604.80	60.2 PK	68.2	-8.0	3.03 V	206	55.4	4.8
2	*5825.00	121.4 PK			3.03 V	206	79.8	41.6
3	*5825.00	111.2 AV			3.03 V	206	69.6	41.6
4	#5950.40	59.9 PK	68.2	-8.3	3.03 V	206	55.1	4.8
5	11650.00	62.0 PK	74.0	-12.0	2.84 V	207	46.4	15.6
6	11650.00	48.9 AV	54.0	-5.1	2.84 V	207	33.3	15.6

Remarks:

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

802.11n (HT20)

CHANNEL	TX Channel 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	58.7 PK	74.0	-15.3	2.72 H	284	54.8	3.9
2	5150.00	45.3 AV	54.0	-8.7	2.72 H	284	41.4	3.9
3	*5180.00	110.1 PK			2.76 H	289	69.4	40.7
4	*5180.00	99.7 AV			2.76 H	289	59.0	40.7
5	#10360.00	57.7 PK	74.0	-16.3	1.32 H	240	42.2	15.5
6	#10360.00	44.7 AV	54.0	-9.3	1.32 H	240	29.2	15.5
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	5150.00	67.0 PK	74.0	-7.0	2.80 V	340	63.1	3.9
2	5150.00	53.1 AV	54.0	-0.9	2.80 V	340	49.2	3.9
3	*5180.00	119.3 PK			2.82 V	324	78.6	40.7
4	*5180.00	108.1 AV			2.82 V	324	67.4	40.7
5	#10360.00	59.1 PK	74.0	-14.9	1.62 V	107	43.6	15.5
6	#10360.00	45.8 AV	54.0	-8.2	1.62 V	107	30.3	15.5

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 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	57.8 PK	74.0	-16.2	2.75 H	293	53.9	3.9
2	5150.00	44.3 AV	54.0	-9.7	2.75 H	293	40.4	3.9
3	*5200.00	114.4 PK			2.76 H	286	73.6	40.8
4	*5200.00	103.3 AV			2.76 H	286	62.5	40.8
5	#10400.00	58.1 PK	74.0	-15.9	1.68 H	117	42.6	15.5
6	#10400.00	44.8 AV	54.0	-9.2	1.68 H	117	29.3	15.5
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	5150.00	66.3 PK	74.0	-7.7	2.50 V	337	62.4	3.9
2	5150.00	50.3 AV	54.0	-3.7	2.50 V	337	46.4	3.9
3	*5200.00	123.5 PK			2.68 V	324	82.7	40.8
4	*5200.00	112.5 AV			2.68 V	324	71.7	40.8
5	#10400.00	59.7 PK	74.0	-14.3	1.10 V	305	44.2	15.5
6	#10400.00	46.1 AV	54.0	-7.9	1.10 V	305	30.6	15.5

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 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	112.8 PK			2.10 H	311	72.0	40.8
2	*5240.00	102.0 AV			2.10 H	311	61.2	40.8
3	5350.00	57.4 PK	74.0	-16.6	2.04 H	316	53.0	4.4
4	5350.00	44.5 AV	54.0	-9.5	2.04 H	316	40.1	4.4
5	#10480.00	58.1 PK	74.0	-15.9	1.68 H	74	43.0	15.1
6	#10480.00	44.5 AV	54.0	-9.5	1.68 H	74	29.4	15.1
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	124.3 PK			2.51 V	322	83.5	40.8
2	*5240.00	113.0 AV			2.51 V	322	72.2	40.8
3	5350.00	57.7 PK	74.0	-16.3	2.61 V	320	53.3	4.4
4	5350.00	45.2 AV	54.0	-8.8	2.61 V	320	40.8	4.4
5	#10480.00	58.9 PK	74.0	-15.1	2.18 V	26	43.8	15.1
6	#10480.00	46.1 AV	54.0	-7.9	2.18 V	26	31.0	15.1

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	#5609.60	60.4 PK	68.2	-7.8	3.04 H	282	55.6	4.8
2	*5745.00	111.5 PK			3.04 H	282	70.0	41.5
3	*5745.00	101.0 AV			3.04 H	282	59.5	41.5
4	#5989.60	59.5 PK	68.2	-8.7	3.04 H	282	54.7	4.8
5	11490.00	60.5 PK	74.0	-13.5	1.52 H	327	44.5	16.0
6	11490.00	46.7 AV	54.0	-7.3	1.52 H	327	30.7	16.0
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	#5624.00	60.0 PK	68.2	-8.2	3.31 V	204	55.2	4.8
2	*5745.00	122.5 PK			3.31 V	204	81.0	41.5
3	*5745.00	111.8 AV			3.31 V	204	70.3	41.5
4	#5949.60	59.0 PK	68.2	-9.2	3.31 V	204	54.1	4.9
5	11490.00	62.7 PK	74.0	-11.3	2.94 V	198	46.7	16.0
6	11490.00	48.6 AV	54.0	-5.4	2.94 V	198	32.6	16.0

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	#5645.60	58.7 PK	68.2	-9.5	3.20 H	279	54.0	4.7
2	*5785.00	111.0 PK			3.20 H	279	69.5	41.5
3	*5785.00	100.2 AV			3.20 H	279	58.7	41.5
4	#5944.80	59.4 PK	68.2	-8.8	3.20 H	279	54.6	4.8
5	11570.00	60.2 PK	74.0	-13.8	2.43 H	218	44.5	15.7
6	11570.00	46.1 AV	54.0	-7.9	2.43 H	218	30.4	15.7
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	#5610.40	60.0 PK	68.2	-8.2	3.19 V	205	55.2	4.8
2	*5785.00	121.5 PK			3.19 V	205	80.0	41.5
3	*5785.00	110.8 AV			3.19 V	205	69.3	41.5
4	#5958.40	59.6 PK	68.2	-8.6	3.19 V	205	54.8	4.8
5	11570.00	61.5 PK	74.0	-12.5	2.83 V	200	45.8	15.7
6	11570.00	48.3 AV	54.0	-5.7	2.83 V	200	32.6	15.7

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 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	#5616.00	60.0 PK	68.2	-8.2	3.00 H	294	55.2	4.8
2	*5825.00	109.9 PK			3.00 H	294	68.3	41.6
3	*5825.00	99.8 AV			3.00 H	294	58.2	41.6
4	#5976.80	59.1 PK	68.2	-9.1	3.00 H	294	54.3	4.8
5	11650.00	59.5 PK	74.0	-14.5	2.64 H	121	43.9	15.6
6	11650.00	45.7 AV	54.0	-8.3	2.64 H	121	30.1	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5628.80	59.4 PK	68.2	-8.8	3.13 V	206	54.7	4.7
2	*5825.00	121.9 PK			3.13 V	206	80.3	41.6
3	*5825.00	111.2 AV			3.13 V	206	69.6	41.6
4	#5946.40	59.7 PK	68.2	-8.5	3.13 V	206	54.9	4.8
5	11650.00	60.6 PK	74.0	-13.4	2.83 V	200	45.0	15.6
6	11650.00	47.4 AV	54.0	-6.6	2.83 V	200	31.8	15.6

Remarks:

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

802.11n (HT40)

CHANNEL	TX Channel 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	58.1 PK	74.0	-15.9	2.56 H	280	54.2	3.9
2	5150.00	45.7 AV	54.0	-8.3	2.56 H	280	41.8	3.9
3	*5190.00	104.2 PK			3.51 H	286	63.4	40.8
4	*5190.00	94.9 AV			3.51 H	286	54.1	40.8
5	#10380.00	59.1 PK	74.0	-14.9	1.43 H	266	43.5	15.6
6	#10380.00	44.9 AV	54.0	-9.1	1.43 H	266	29.3	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.1 PK	74.0	-6.9	2.39 V	318	63.2	3.9
2	5150.00	53.4 AV	54.0	-0.6	2.39 V	318	49.5	3.9
3	*5190.00	113.9 PK			2.41 V	322	73.1	40.8
4	*5190.00	104.5 AV			2.41 V	322	63.7	40.8
5	#10380.00	59.4 PK	74.0	-14.6	1.86 V	150	43.8	15.6
6	#10380.00	46.0 AV	54.0	-8.0	1.86 V	150	30.4	15.6

Remarks:

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

CHANNEL	TX Channel 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	57.7 PK	74.0	-16.3	3.00 H	294	53.8	3.9
2	5150.00	44.7 AV	54.0	-9.3	3.00 H	294	40.8	3.9
3	*5230.00	111.1 PK			3.06 H	288	70.3	40.8
4	*5230.00	101.5 AV			3.06 H	288	60.7	40.8
5	#10460.00	56.8 PK	74.0	-17.2	1.60 H	172	41.6	15.2
6	#10460.00	44.2 AV	54.0	-9.8	1.60 H	172	29.0	15.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.8 PK	74.0	-5.2	3.48 V	319	64.9	3.9
2	5150.00	53.3 AV	54.0	-0.7	3.48 V	319	49.4	3.9
3	*5230.00	119.1 PK			3.42 V	222	78.3	40.8
4	*5230.00	109.7 AV			3.42 V	222	68.9	40.8
5	#10460.00	57.2 PK	74.0	-16.8	1.57 V	165	42.0	15.2
6	#10460.00	44.1 AV	54.0	-9.9	1.57 V	165	28.9	15.2

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	#5628.80	59.2 PK	68.2	-9.0	3.01 H	275	54.5	4.7
2	*5755.00	107.1 PK			3.01 H	275	65.6	41.5
3	*5755.00	97.7 AV			3.01 H	275	56.2	41.5
4	#5968.80	59.4 PK	68.2	-8.8	3.01 H	275	54.6	4.8
5	11510.00	59.9 PK	74.0	-14.1	1.87 H	162	44.0	15.9
6	11510.00	46.3 AV	54.0	-7.7	1.87 H	162	30.4	15.9
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	#5647.20	62.9 PK	68.2	-5.3	3.38 V	202	58.2	4.7
2	*5755.00	118.0 PK			3.38 V	202	76.5	41.5
3	*5755.00	108.5 AV			3.38 V	202	67.0	41.5
4	#5974.40	59.1 PK	68.2	-9.1	3.38 V	202	54.3	4.8
5	11510.00	59.1 PK	74.0	-14.9	2.91 V	267	43.2	15.9
6	11510.00	46.7 AV	54.0	-7.3	2.91 V	267	30.8	15.9

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 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	#5610.40	59.3 PK	68.2	-8.9	2.97 H	282	54.5	4.8
2	*5795.00	108.2 PK			2.97 H	282	66.7	41.5
3	*5795.00	98.6 AV			2.97 H	282	57.1	41.5
4	#5951.20	58.7 PK	68.2	-9.5	2.97 H	282	53.9	4.8
5	11590.00	58.8 PK	74.0	-15.2	2.16 H	314	43.3	15.5
6	11590.00	45.8 AV	54.0	-8.2	2.16 H	314	30.3	15.5
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	60.1 PK	68.2	-8.1	3.02 V	206	55.4	4.7
2	*5795.00	117.8 PK			3.02 V	206	76.3	41.5
3	*5795.00	108.4 AV			3.02 V	206	66.9	41.5
4	#5930.40	60.7 PK	68.2	-7.5	3.02 V	206	55.9	4.8
5	11590.00	60.4 PK	74.0	-13.6	2.95 V	200	44.9	15.5
6	11590.00	48.1 AV	54.0	-5.9	2.95 V	200	32.6	15.5

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.

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	59.9 PK	74.0	-14.1	3.40 H	281	56.0	3.9
2	5150.00	45.8 AV	54.0	-8.2	3.40 H	281	41.9	3.9
3	*5210.00	101.6 PK			3.66 H	285	60.8	40.8
4	*5210.00	91.8 AV			3.66 H	285	51.0	40.8
5	5350.00	57.0 PK	74.0	-17.0	3.28 H	273	52.6	4.4
6	5350.00	44.2 AV	54.0	-9.8	3.28 H	273	39.8	4.4
7	#10420.00	58.3 PK	74.0	-15.7	1.84 H	256	43.0	15.3
8	#10420.00	44.9 AV	54.0	-9.1	1.84 H	256	29.6	15.3
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	66.5 PK	74.0	-7.5	3.55 V	20	62.6	3.9
2	5150.00	53.2 AV	54.0	-0.8	3.55 V	20	49.3	3.9
3	*5210.00	108.7 PK			3.46 V	217	67.9	40.8
4	*5210.00	99.1 AV			3.46 V	217	58.3	40.8
5	5350.00	59.5 PK	74.0	-14.5	3.45 V	23	55.1	4.4
6	5350.00	46.8 AV	54.0	-7.2	3.45 V	23	42.4	4.4
7	#10420.00	57.7 PK	74.0	-16.3	2.36 V	188	42.4	15.3
8	#10420.00	44.7 AV	54.0	-9.3	2.36 V	188	29.4	15.3

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 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	#5602.40	59.4 PK	68.2	-8.8	2.97 H	283	54.6	4.8
2	#5650.00	58.9 PK	68.2	-9.3	2.95 H	288	54.2	4.7
3	*5775.00	100.6 PK			2.97 H	283	59.1	41.5
4	*5775.00	90.3 AV			2.97 H	283	48.8	41.5
5	#5972.80	59.6 PK	68.2	-8.6	2.97 H	283	54.8	4.8
6	11550.00	59.6 PK	74.0	-14.4	1.73 H	105	43.8	15.8
7	11550.00	46.6 AV	54.0	-7.4	1.73 H	105	30.8	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	#5648.80	64.7 PK	68.2	-3.5	3.23 V	204	60.0	4.7
2	#5650.00	67.5 PK	68.2	-0.7	3.22 V	205	62.8	4.7
3	*5775.00	111.3 PK			3.23 V	204	69.8	41.5
4	*5775.00	101.4 AV			3.23 V	204	59.9	41.5
5	#5930.40	60.1 PK	68.2	-8.1	3.23 V	204	55.3	4.8
6	11550.00	59.2 PK	74.0	-14.8	2.98 V	332	43.4	15.8
7	11550.00	46.3 AV	54.0	-7.7	2.98 V	332	30.5	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
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

Below 1GHz Worst-Case Data: 802.11a

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	92.08	31.7 QP	43.5	-11.8	1.99 H	265	50.7	-19.0
2	224.00	30.1 QP	46.0	-15.9	1.49 H	111	46.1	-16.0
3	311.30	40.1 QP	46.0	-5.9	1.00 H	277	52.2	-12.1
4	359.80	44.2 QP	46.0	-1.8	1.00 H	178	55.8	-11.6
5	538.28	39.7 QP	46.0	-6.3	1.49 H	166	48.7	-9.0
6	575.14	40.3 QP	46.0	-5.7	1.49 H	167	48.5	-8.2
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	31.81	30.2 QP	40.0	-9.8	1.00 V	213	45.6	-15.4
2	59.44	34.3 QP	40.0	-5.7	1.00 V	25	48.3	-14.0
3	142.52	29.7 QP	43.5	-13.8	1.00 V	97	43.5	-13.8
4	359.80	43.2 QP	46.0	-2.8	1.49 V	287	54.8	-11.6
5	437.40	35.8 QP	46.0	-10.2	1.00 V	124	46.0	-10.2
6	582.90	35.1 QP	46.0	-10.9	1.00 V	265	43.1	-8.0

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	59.10	30.4 QP	40.0	-9.6	2.00 H	108	44.4	-14.0
2	92.08	33.5 QP	43.5	-10.0	2.00 H	261	52.5	-19.0
3	144.46	31.7 QP	43.5	-11.8	2.00 H	109	45.4	-13.7
4	222.06	34.3 QP	46.0	-11.7	1.00 H	298	50.3	-16.0
5	359.80	44.3 QP	46.0	-1.7	1.00 H	66	55.9	-11.6
6	573.20	41.3 QP	46.0	-4.7	1.51 H	184	49.6	-8.3
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	31.24	33.1 QP	40.0	-6.9	1.00 V	226	48.6	-15.5
2	59.52	33.9 QP	40.0	-6.1	1.48 V	39	48.0	-14.1
3	94.02	32.4 QP	43.5	-11.1	1.49 V	230	51.2	-18.8
4	169.68	29.4 QP	43.5	-14.1	1.00 V	297	43.3	-13.9
5	367.56	42.9 QP	46.0	-3.1	1.49 V	87	54.3	-11.4
6	575.14	37.5 QP	46.0	-8.5	1.49 V	103	45.7	-8.2

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	C		

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	95.96	37.6 QP	43.5	-5.9	1.49 H	118	56.1	-18.5
2	167.74	36.0 QP	43.5	-7.5	1.49 H	275	49.7	-13.7
3	249.22	37.4 QP	46.0	-8.6	1.00 H	133	51.7	-14.3
4	361.74	43.7 QP	46.0	-2.3	1.00 H	259	55.2	-11.5
5	528.58	40.4 QP	46.0	-5.6	1.49 H	28	49.4	-9.0
6	569.32	41.5 QP	46.0	-4.5	1.49 H	183	50.0	-8.5
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	32.66	32.4 QP	40.0	-7.6	1.00 V	193	47.7	-15.3
2	**55.69**	**39.7 QP**	**40.0**	**-0.3**	**1.00 V**	**93**	**53.5**	**-13.8**
3	97.90	37.0 QP	43.5	-6.5	1.00 V	309	55.4	-18.4
4	167.74	33.5 QP	43.5	-10.0	1.00 V	273	47.2	-13.7
5	365.62	41.8 QP	46.0	-4.2	1.49 V	99	53.3	-11.5
6	594.54	33.7 QP	46.0	-12.3	1.00 V	157	41.3	-7.6

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission Level – Limit value

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	ESCS 30	100288	Aug.17, 2017	Aug. 16, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 09, 2017	Sep. 08, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 17, 2017	Jan. 16, 2018
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 02, 2017	Aug. 01, 2018
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 2.
3. The VCCI Site Registration No. is C-2047.

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.

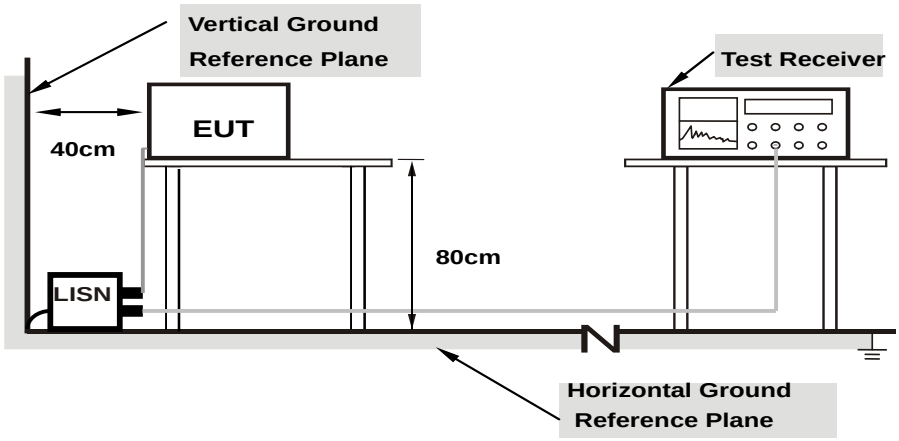
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

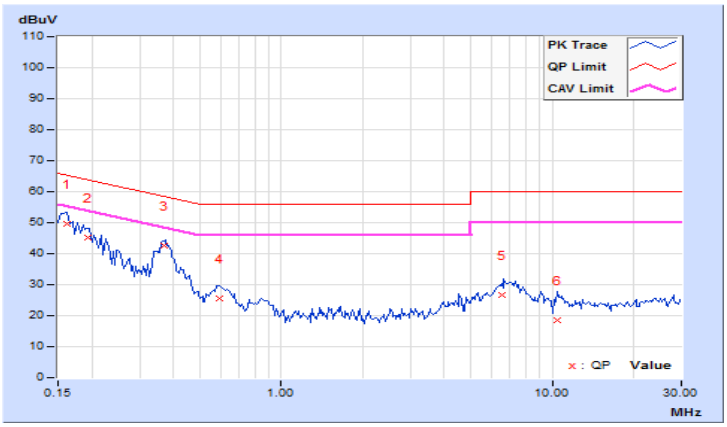
Worst-case data: 802.11a

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

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	0.16172	10.40	39.32	26.18	49.72	36.58	65.38	55.38	-15.66	-18.80
2	0.19297	10.42	34.66	21.73	45.08	32.15	63.91	53.91	-18.83	-21.76
3	0.36875	10.41	32.22	24.48	42.63	34.89	58.53	48.53	-15.90	-13.64
4	0.59531	10.44	15.01	7.37	25.45	17.81	56.00	46.00	-30.55	-28.19
5	6.52734	10.65	15.88	9.61	26.53	20.26	60.00	50.00	-33.47	-29.74
6	10.44922	10.71	7.93	4.84	18.64	15.55	60.00	50.00	-41.36	-34.45

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.

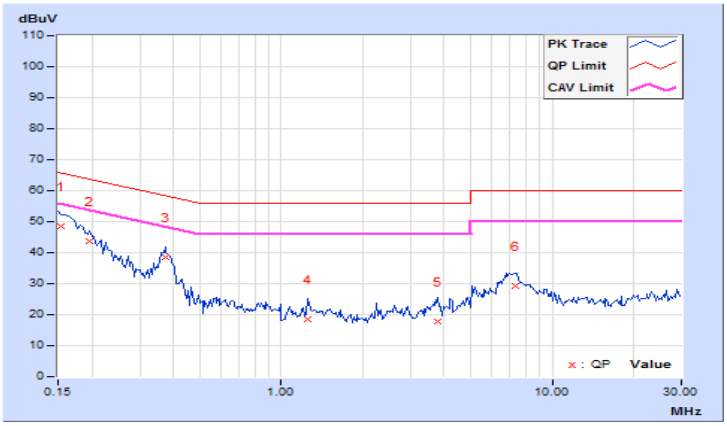


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.43	37.98	21.97	48.41	32.40	65.79	55.79	-17.38	-23.39
2	0.19687	10.36	33.27	20.06	43.63	30.42	63.74	53.74	-20.11	-23.32
3	0.37266	10.37	28.18	20.07	38.55	30.44	58.44	48.44	-19.89	-18.00
4	1.25781	10.50	8.20	3.68	18.70	14.18	56.00	46.00	-37.30	-31.82
5	3.77734	10.59	7.04	0.61	17.63	11.20	56.00	46.00	-38.37	-34.80
6	7.30469	10.63	18.70	12.99	29.33	23.62	60.00	50.00	-30.67	-26.38

Remarks:

1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.



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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.40	36.00	27.72	46.40	38.12	65.58	55.58	-19.18	-17.46
2	**0.35703**	**10.41**	**35.94**	**34.40**	**46.35**	**44.81**	**58.80**	**48.80**	**-12.45**	**-3.99**
3	0.41953	10.41	23.04	19.82	33.45	30.23	57.46	47.46	-24.01	-17.23
4	0.59141	10.43	13.41	8.59	23.84	19.02	56.00	46.00	-32.16	-26.98
5	4.60547	10.61	16.01	8.80	26.62	19.41	56.00	46.00	-29.38	-26.59
6	19.73047	10.89	13.72	7.89	24.61	18.78	60.00	50.00	-35.39	-31.22

Remarks:

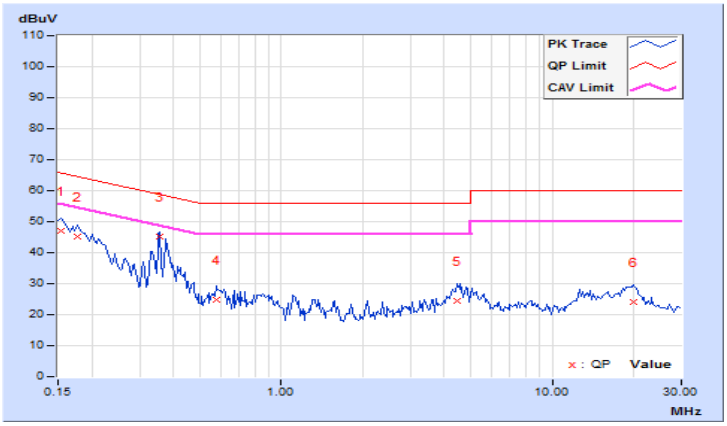
1. Q.P. and AV. are abbreviations of quasi-peak and average individually.
2. The emission levels of other frequencies were very low against the limit.
3. Margin value = Emission level - Limit value
4. Correction factor = Insertion loss + Cable loss
5. Emission Level = Correction Factor + Reading Value.

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	10.43	36.63	27.60	47.06	38.03	65.79	55.79	-18.73	-17.76
2	0.17734	10.39	34.85	26.29	45.24	36.68	64.61	54.61	-19.37	-17.93
3	0.35703	10.37	34.87	33.09	45.24	43.46	58.80	48.80	-13.56	-5.34
4	0.57578	10.41	14.30	10.34	24.71	20.75	56.00	46.00	-31.29	-25.25
5	4.48828	10.61	13.98	5.93	24.59	16.54	56.00	46.00	-31.41	-29.46
6	20.07031	10.99	12.93	6.62	23.92	17.61	60.00	50.00	-36.08	-32.39

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.

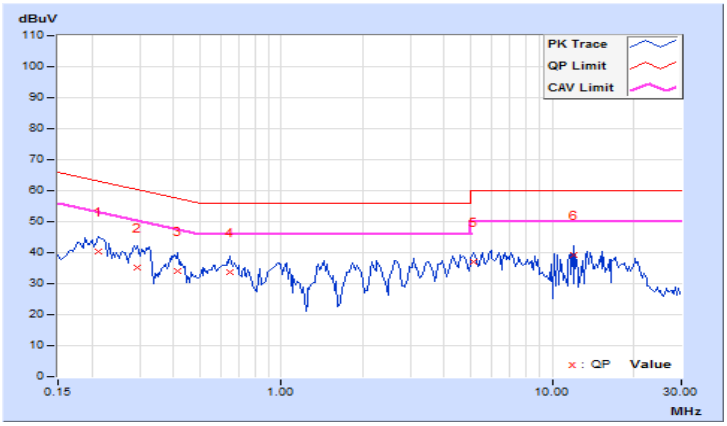


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.21250	10.42	29.83	16.90	40.25	27.32	63.11	53.11	-22.86	-25.79
2	0.29453	10.42	24.93	15.67	35.35	26.09	60.40	50.40	-25.05	-24.31
3	0.41563	10.41	23.65	15.89	34.06	26.30	57.54	47.54	-23.48	-21.24
4	0.65000	10.44	23.30	17.79	33.74	28.23	56.00	46.00	-22.26	-17.77
5	5.14453	10.62	26.34	21.05	36.96	31.67	60.00	50.00	-23.04	-18.33
6	11.96094	10.74	28.62	28.40	39.36	39.14	60.00	50.00	-20.64	-10.86

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.

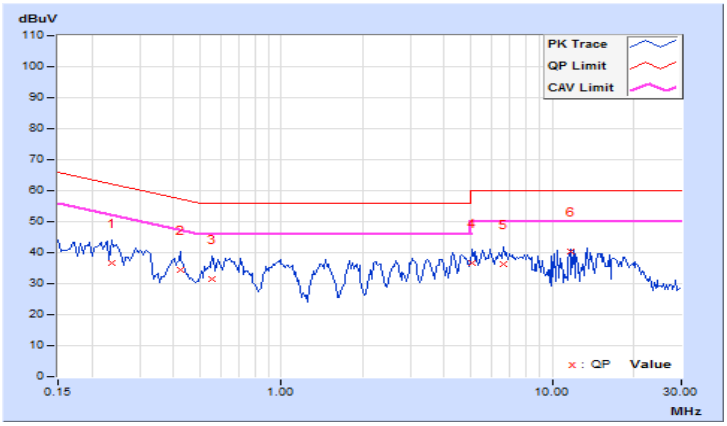


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	C		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.23594	10.36	26.20	17.65	36.56	28.01	62.24	52.24	-25.68	-24.23
2	0.42344	10.38	23.95	18.73	34.33	29.11	57.38	47.38	-23.05	-18.27
3	0.55234	10.41	20.94	15.21	31.35	25.62	56.00	46.00	-24.65	-20.38
4	5.06641	10.61	26.15	20.79	36.76	31.40	60.00	50.00	-23.24	-18.60
5	6.61328	10.63	25.70	19.47	36.33	30.10	60.00	50.00	-23.67	-19.90
6	11.70703	10.71	29.79	28.92	40.50	39.63	60.00	50.00	-19.50	-10.37

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

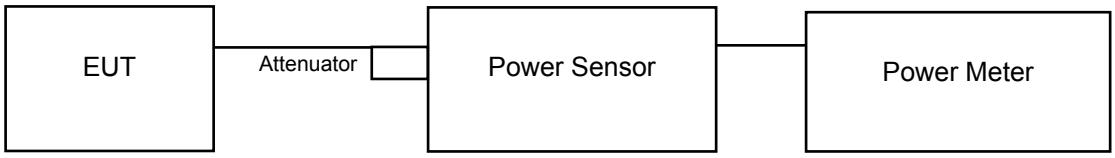
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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 $N_{ANT} \geq 5$.

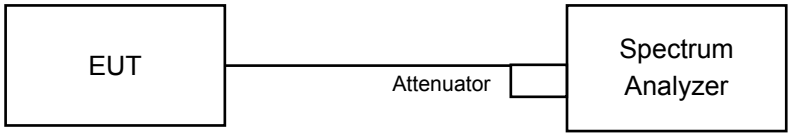
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

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



802.11ac (VHT80)



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.

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

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	19.83	20.06	197.552	22.96	29.90	Pass
40	5200	22.53	22.61	361.451	25.58	29.90	Pass
48	5240	22.47	22.78	366.275	25.64	29.90	Pass
149	5745	25.86	25.39	731.417	28.64	29.90	Pass
157	5785	26.08	25.54	763.605	28.83	29.90	Pass
165	5825	25.88	25.67	756.236	28.79	29.90	Pass

Note: Gain = 6.10dBi > 6dBi, so the power limit shall be reduced to 30-(6.10-6) = 29.90dBm.

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				
36	5180	20.02	20.18	204.694	23.11	29.90	Pass
40	5200	22.86	22.69	378.977	25.79	29.90	Pass
48	5240	22.59	22.67	366.479	25.64	29.90	Pass
149	5745	26.00	25.17	726.959	28.62	29.90	Pass
157	5785	25.68	25.44	719.773	28.57	29.90	Pass
165	5825	25.93	25.81	**772.808**	28.88	29.90	Pass

Note: Gain = 6.10dBi > 6dBi, so the power limit shall be reduced to 30-(6.10-6) = 29.90dBm.

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				
38	5190	17.56	17.49	113.121	20.54	29.90	Pass
46	5230	24.63	24.99	**605.902**	27.82	29.90	Pass
151	5755	25.00	25.07	637.594	28.05	29.90	Pass
159	5795	26.00	25.73	772.218	28.88	29.90	Pass

Note: Gain = 6.10dBi > 6dBi, so the power limit shall be reduced to 30-(6.10-6) = 29.90dBm.

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				
42	5210	17.02	17.01	100.584	20.03	29.90	Pass
155	5775	19.15	19.26	166.557	22.22	29.90	Pass

Note: Gain = 6.10dBi > 6dBi, so the power limit shall be reduced to 30-(6.10-6) = 29.90dBm.

Beamforming Mode

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				
36	5180	17.01	17.17	102.353	20.10	26.89	Pass
40	5200	19.85	19.68	189.502	22.78	26.89	Pass
48	5240	19.58	19.66	183.252	22.63	26.89	Pass
149	5745	22.99	22.16	363.504	25.61	26.89	Pass
157	5785	22.67	22.43	359.912	25.56	26.89	Pass
165	5825	22.92	22.80	**386.430**	25.87	26.89	Pass

Note: Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power limit shall be reduced to 30-(9.11-6) = 26.89dBm.

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				
38	5190	14.55	14.48	56.564	17.53	26.89	Pass
46	5230	21.62	21.98	**302.972**	24.81	26.89	Pass
151	5755	21.99	22.06	318.819	25.04	26.89	Pass
159	5795	22.99	22.72	386.135	25.87	26.89	Pass

Note: Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power limit shall be reduced to 30-(9.11-6) = 26.89dBm.

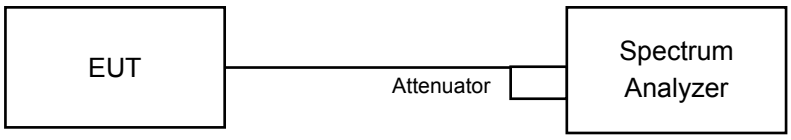
802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	14.01	14.00	50.296	17.02	26.89	Pass
155	5775	16.14	16.25	83.285	19.21	26.89	Pass

Note: Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power limit shall be reduced to 30-(9.11-6) = 26.89dBm.

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	16.44	16.56
48	5240	16.44	16.56
149	5745	30.26	29.48
157	5785	26.16	27.00
165	5825	29.40	28.32

802.11n (HT20)

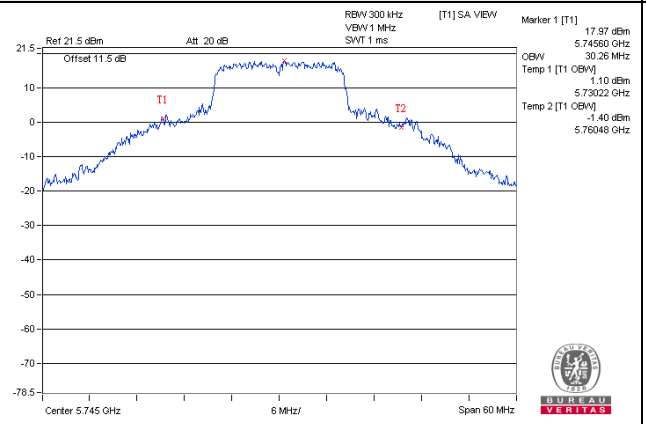
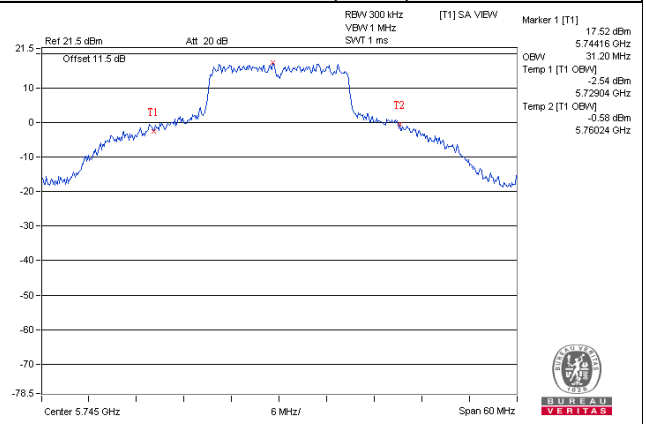
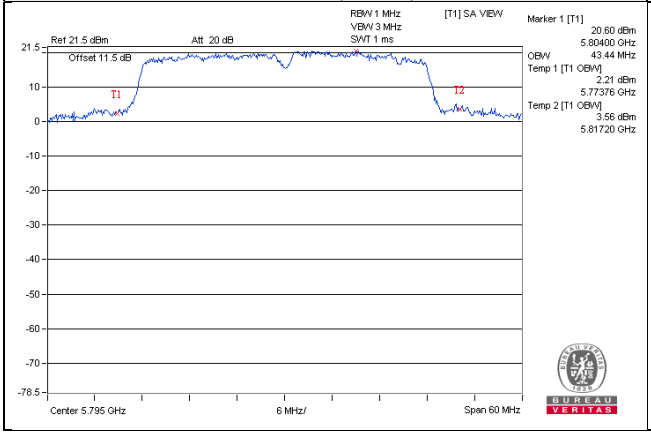
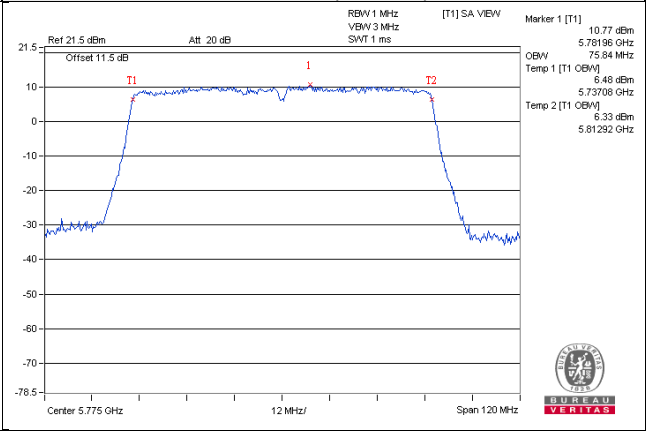
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.64
40	5200	17.64	17.64
48	5240	17.64	17.64
149	5745	30.36	31.20
157	5785	26.16	27.36
165	5825	30.72	28.68

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.24	36.12
46	5230	36.60	36.72
151	5755	37.92	42.24
159	5795	43.44	42.84

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.84	75.84
155	5775	75.84	75.60

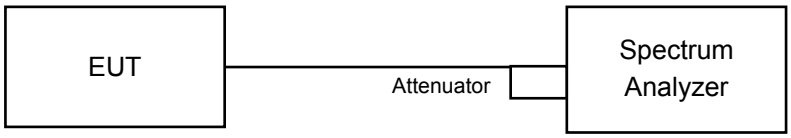
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

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-1 band:

Duty cycle of test signal is > 98%

Using method SA-1

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.

b. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS

c. Sweep time = auto, trigger set to “free run”.

d. Trace average at least 100 traces in power averaging mode.

e. Record the max value

Duty cycle of test signal is < 98%

Using method SA-2

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.

b. Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS

c. Set Channel power measure = 1MHz

d. Sweep time = auto, trigger set to “free run”.

e. Trace average at least 100 traces in power averaging mode.

f. Record the max value and add 10 log (1/duty cycle)

For U-NII-3 band:

Duty cycle of test signal is > 98%

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.

b. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS

c. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.

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

e. Sweep time = auto, trigger set to “free run”.

f. Trace average at least 100 traces in power averaging mode.

g. Record the max value

Duty cycle of test signal is < 98%

a. Set span to encompass the entire emission bandwidth (EBW) of the signal.

b. Set RBW = 300 kHz, Set VBW ≥ 1 MHz, Detector = RMS

c. Use the peak marker function to determine the maximum power level in any 300 kHz band segment within the fundamental EBW.

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

e. Sweep time = auto, trigger set to “free run”.

f. Trace average at least 100 traces in power averaging mode.

g. Record the max value and add 10 log (1/duty cycle)

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:

802.11a

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	7.69	7.47	0.23	10.82	13.89	Pass
40	5200	10.46	10.70	0.23	13.82	13.89	Pass
48	5240	10.81	10.32	0.23	13.81	13.89	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. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 17-(9.11-6) = 13.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	7.47	7.34	10.42	13.89	Pass
40	5200	10.67	10.66	13.68	13.89	Pass
48	5240	10.86	10.13	13.52	13.89	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. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 17-(9.11-6) = 13.89dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	2.13	2.08	0.21	5.33	13.89	Pass
46	5230	9.55	9.19	0.21	12.60	13.89	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. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 17-(9.11-6) = 13.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

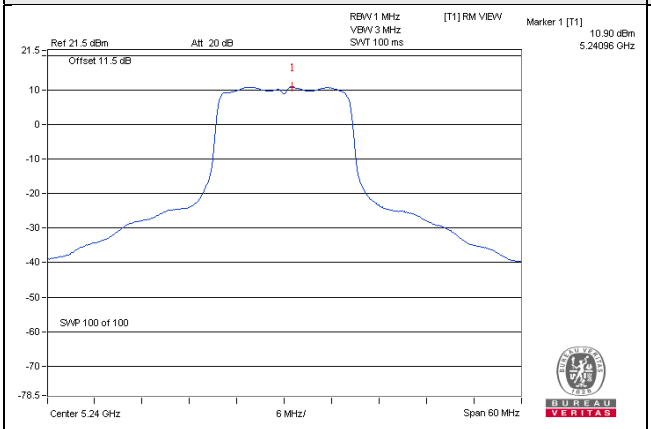
802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-2.12	-2.12	0.39	1.28	13.89	Pass

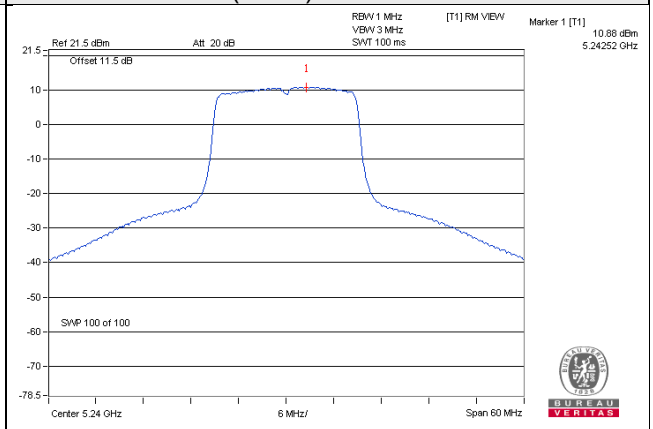
Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 17-(9.11-6) = 13.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

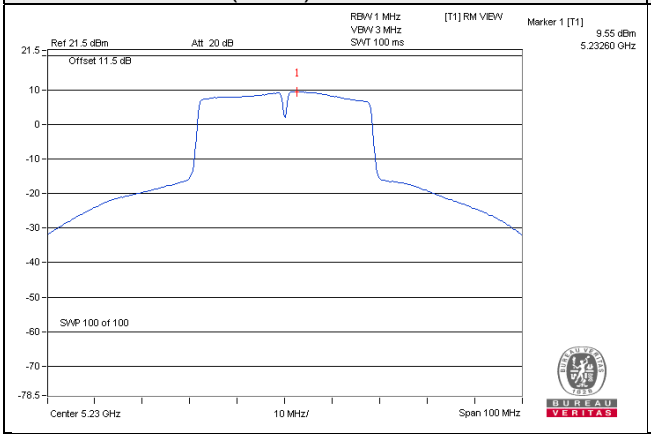
802.11a / Chain 0 / CH 48



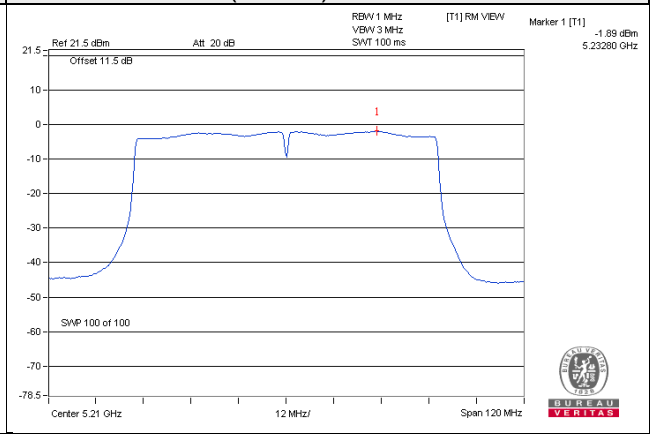
802.11n (HT20) / Chain 0 / CH 48



802.11n (HT40) / Chain 0 / CH 46



802.11ac (VHT80) / Chain 0 / CH 42



For U-NII-3 band:

802.11a

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	5.10	7.32	3.01	0.23	10.56	26.89	Pass
	157	5785	4.67	6.89	3.01	0.23	10.13	26.89	Pass
	165	5825	5.16	7.38	3.01	0.23	10.62	26.89	Pass
1	149	5745	4.47	6.69	3.01	0.23	9.93	26.89	Pass
	157	5785	4.18	6.40	3.01	0.23	9.64	26.89	Pass
	165	5825	4.65	6.87	3.01	0.23	10.11	26.89	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. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 30-(9.11-6) = 26.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD		10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)				
0	149	5745	4.74	6.96	3.01	9.97	26.89	Pass
	157	5785	4.39	6.61	3.01	9.62	26.89	Pass
	165	5825	4.86	7.08	3.01	10.09	26.89	Pass
1	149	5745	4.36	6.58	3.01	9.59	26.89	Pass
	157	5785	3.90	6.12	3.01	9.13	26.89	Pass
	165	5825	4.47	6.69	3.01	9.70	26.89	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. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 30-(9.11-6) = 26.89dBm.

802.11n (HT40)

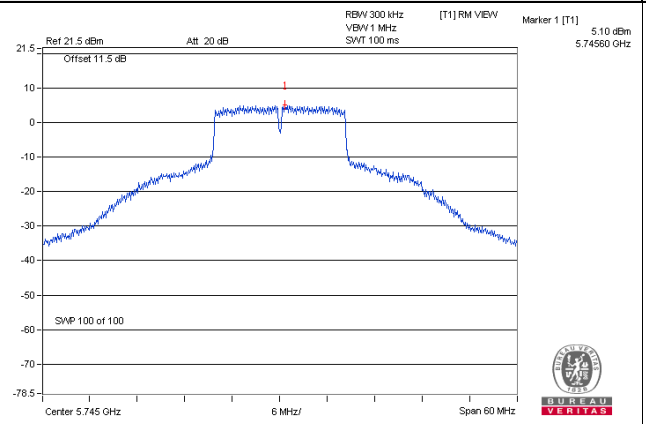
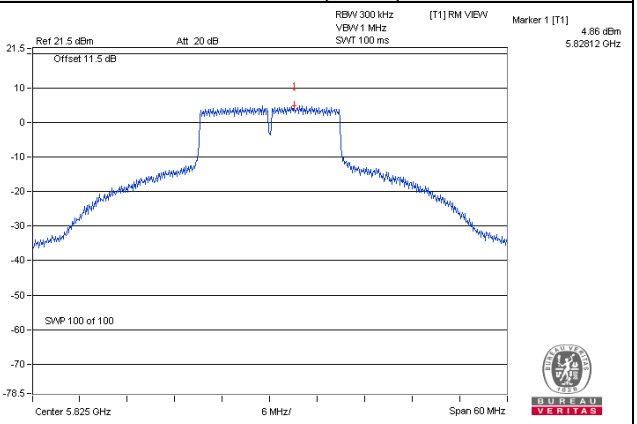
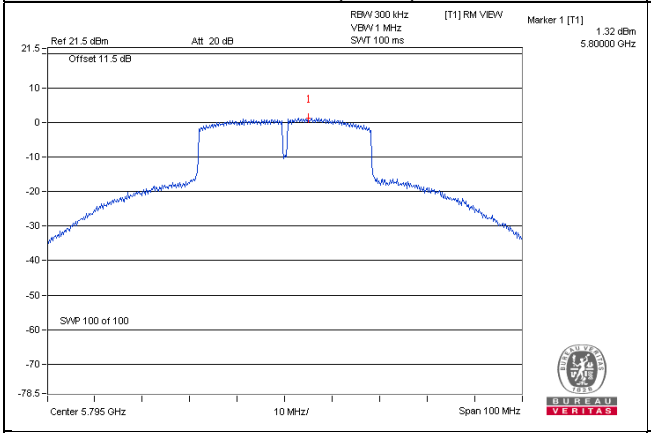
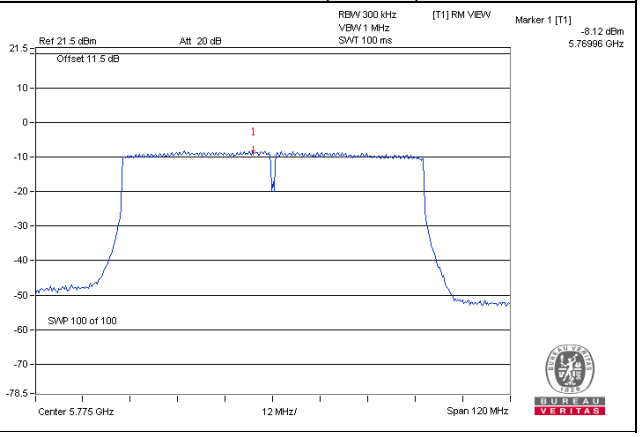
TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	0.64	2.86	3.01	0.21	6.08	26.89	Pass
	159	5795	1.32	3.54	3.01	0.21	6.76	26.89	Pass
1	151	5755	0.68	2.90	3.01	0.21	6.12	26.89	Pass
	159	5795	1.05	3.27	3.01	0.21	6.49	26.89	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. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 30-(9.11-6) = 26.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-8.55	-6.33	3.01	0.39	-2.93	26.89	Pass
1	155	5775	-8.12	-5.90	3.01	0.39	-2.50	26.89	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. Directional gain = 6.10dBi + 10log(2) = 9.11dBi > 6dBi, so the power density limit shall be reduced to 30-(9.11-6) = 26.89dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

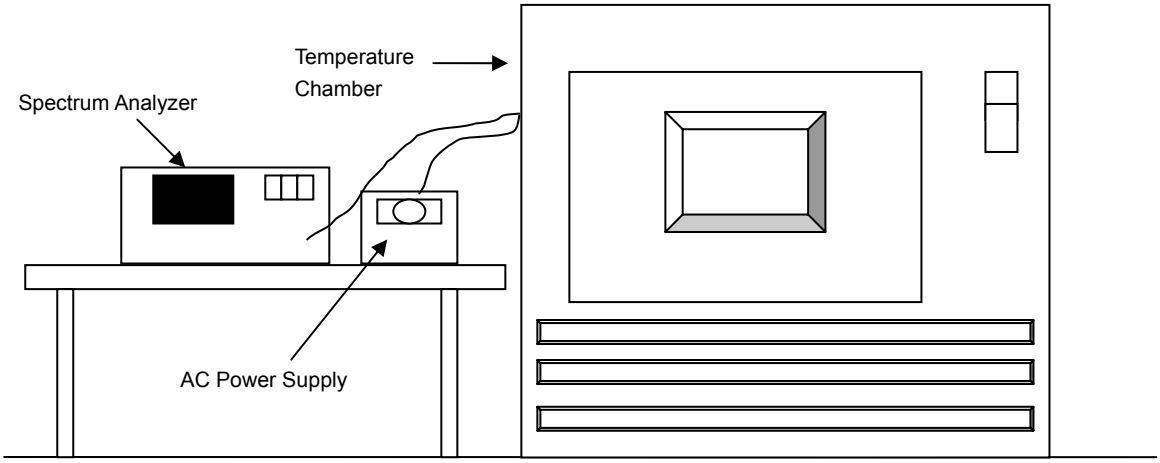
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

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	5180.0081	0.00016	5180.0098	0.00019	5180.0091	0.00018	5180.0066	0.00013
40	120	5179.9799	-0.00039	5179.9805	-0.00038	5179.9802	-0.00038	5179.9761	-0.00046
30	120	5180.0025	0.00005	5180.0024	0.00005	5179.9989	-0.00002	5180.001	0.00002
20	120	5180.0042	0.00008	5180.0037	0.00007	5180.0023	0.00004	5180.0017	0.00003
10	120	5179.9821	-0.00035	5179.979	-0.00041	5179.9801	-0.00038	5179.9793	-0.00040
0	120	5179.9758	-0.00047	5179.9767	-0.00045	5179.9778	-0.00043	5179.9789	-0.00041
-10	120	5180.0024	0.00005	5180.0037	0.00007	5180.0034	0.00007	5180.0051	0.00010
-20	120	5179.9725	-0.00053	5179.9745	-0.00049	5179.9742	-0.00050	5179.9756	-0.00047
-30	120	5179.9882	-0.00023	5179.9875	-0.00024	5179.9916	-0.00016	5179.9876	-0.00024

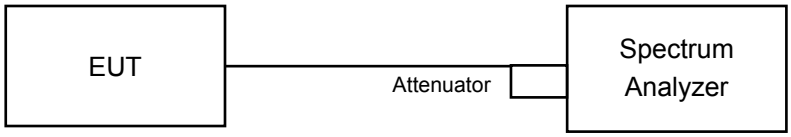
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5180.0043	0.00008	5180.0034	0.00007	5180.0023	0.00004	5180.0025	0.00005
	120	5180.0042	0.00008	5180.0037	0.00007	5180.0023	0.00004	5180.0017	0.00003
	102	5180.0042	0.00008	5180.0035	0.00007	5180.0027	0.00005	5180.0017	0.00003

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 = average.
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	16.34	16.36	0.5	Pass
157	5785	16.37	16.38	0.5	Pass
165	5825	16.37	16.38	0.5	Pass

802.11n (HT20)

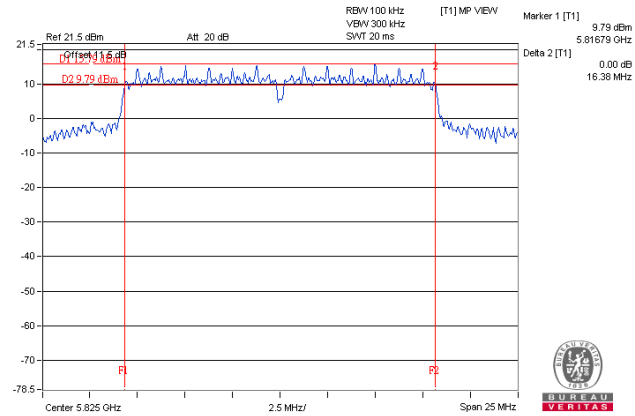
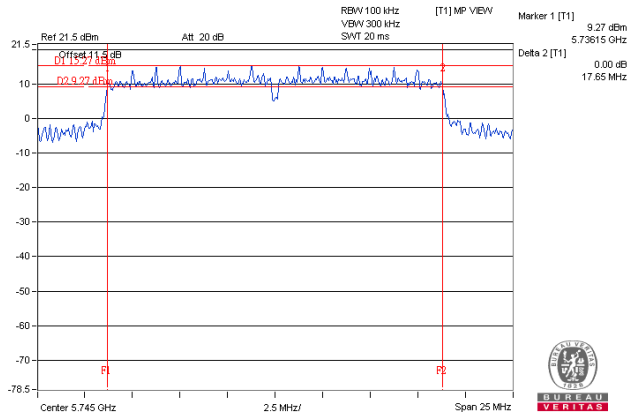
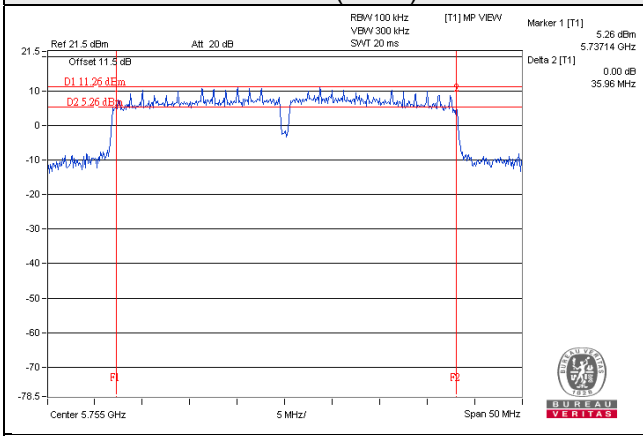
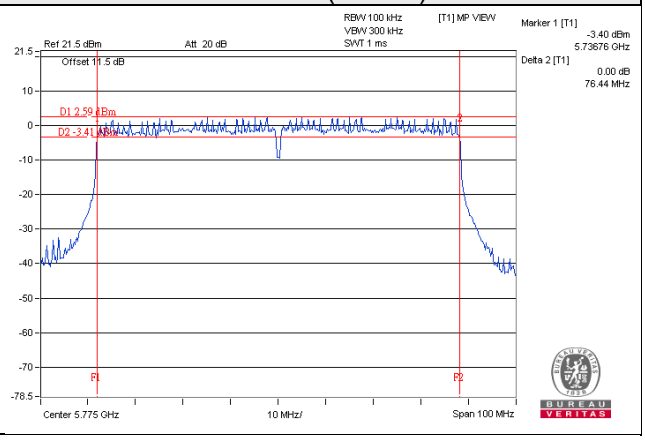
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.65	17.65	0.5	Pass
157	5785	17.62	17.62	0.5	Pass
165	5825	17.63	17.60	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.96	35.48	0.5	Pass
159	5795	35.33	35.24	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	76.44	76.28	0.5	Pass

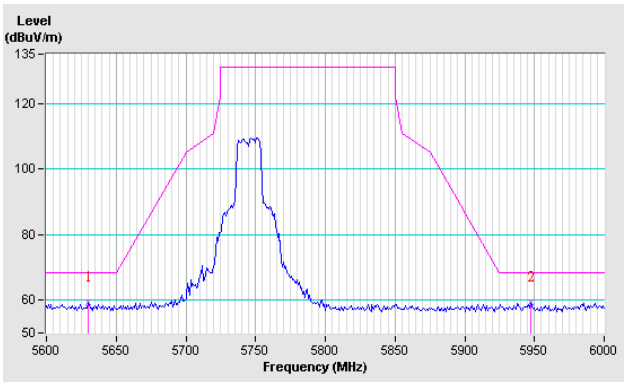
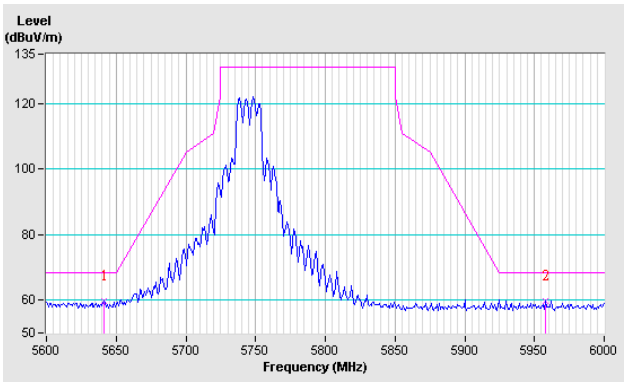
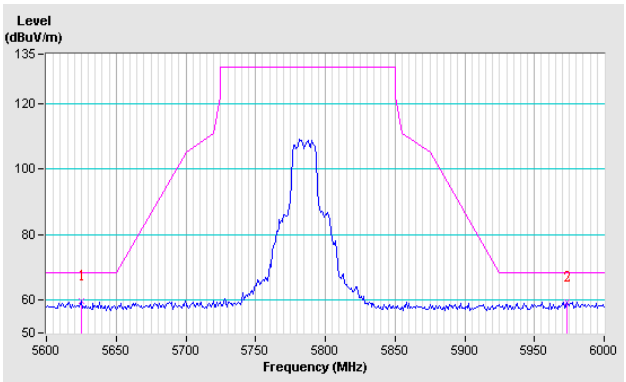
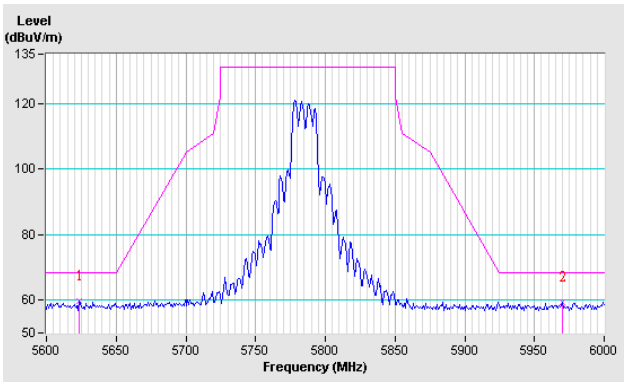
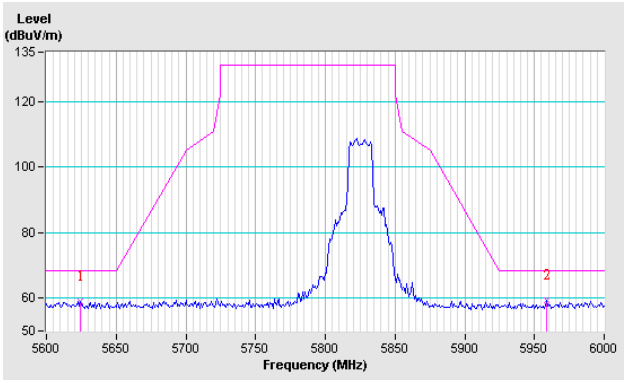
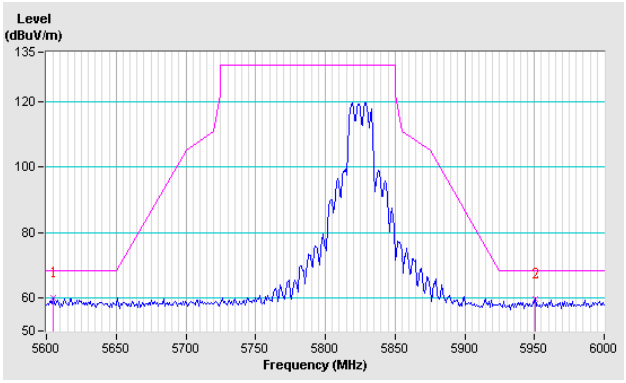
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

5 Pictures of Test Arrangements

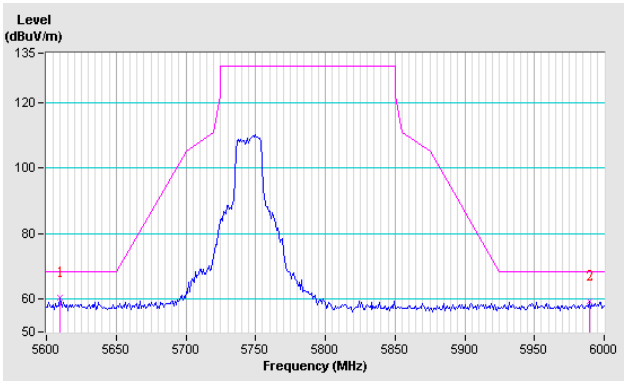
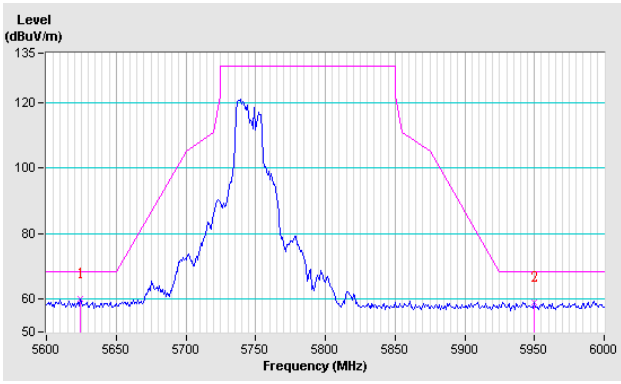
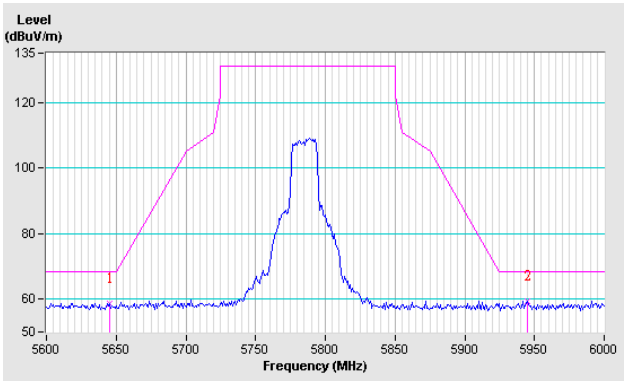
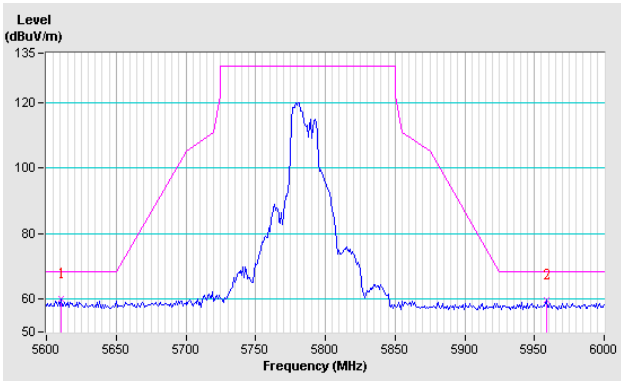
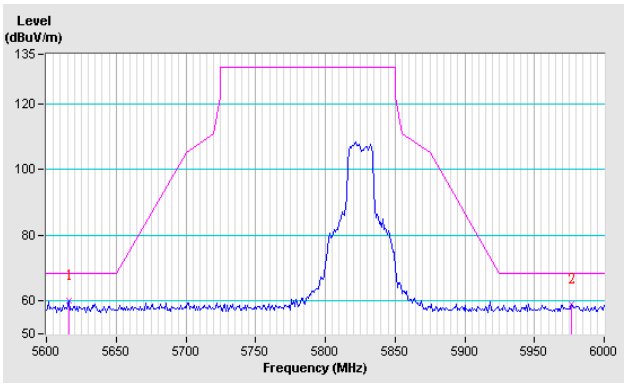
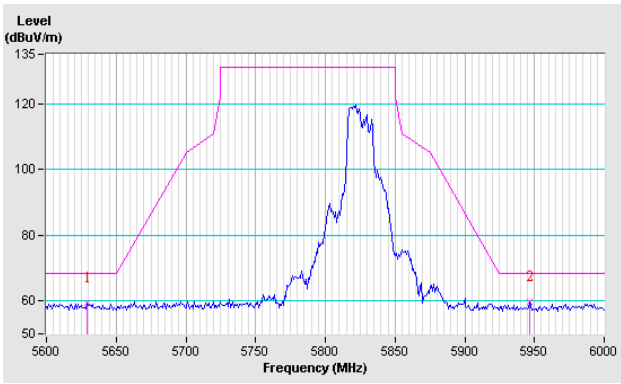
Please refer to the attached file (Test Setup Photo).

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

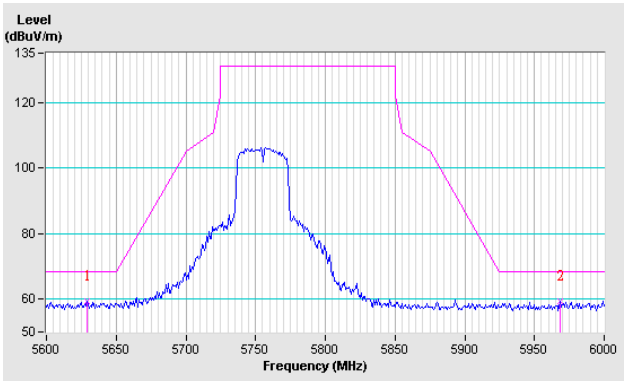
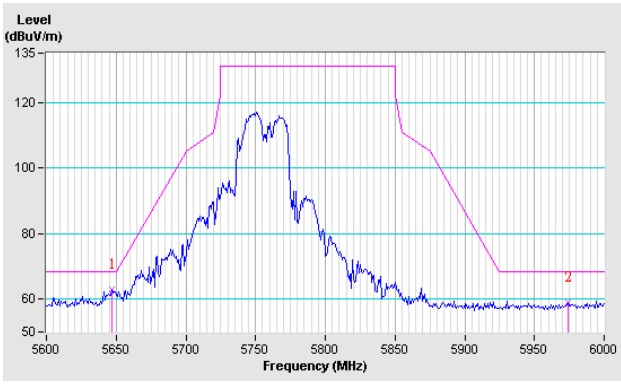
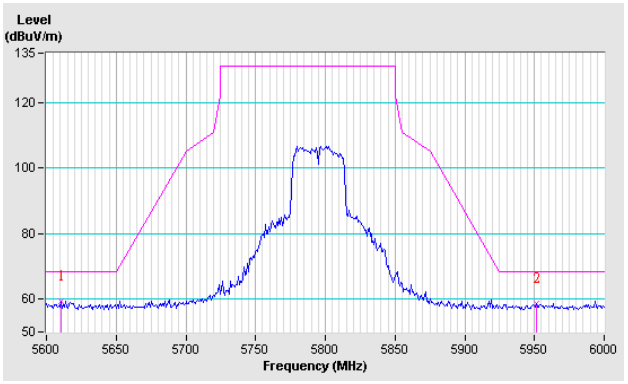
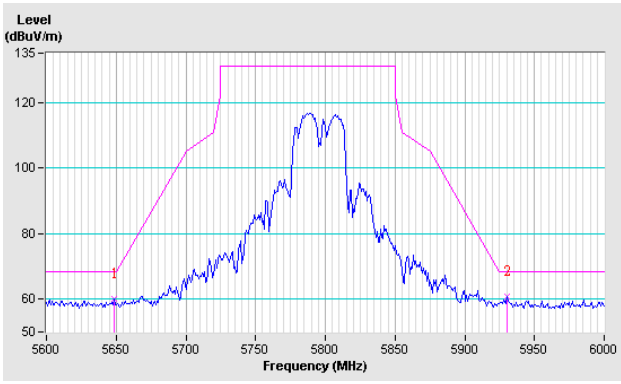
802.11a

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

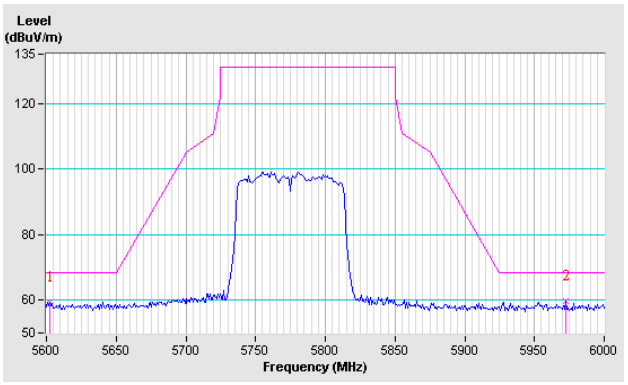
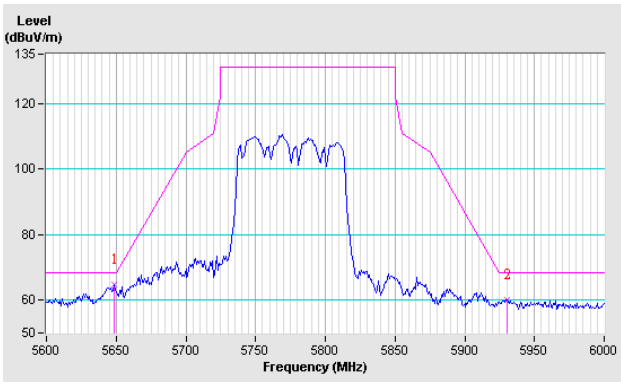
802.11n (HT20)

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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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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