FCC Test Report

Report No.:	RF190624C08-1
FCC ID:	TVE-37176T0464
Test Model:	FAP-231E
Series Model:	FortiAP 231Exxxxxx, FAP-231E xxxxxx, FORTIAP-231E xxxxxx (where “x” can be used as “A-Z”, or “-0-9”, or “-“, or blank for software changes or marketing purposes only) (refer to item 3.1 for more details)
Received Date:	Jun. 24, 2019
Test Date:	Jul. 05 ~ Aug. 03, 2019
Issued Date:	Aug. 08, 2019
Applicant:	Fortinet Inc.
Address:	899 Kifer Road Sunnyvale, CA 94086 USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
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

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification.
The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF190624C08-1	Original release.	Aug. 08, 2019

1 Certificate of Conformity

Product:	Wireless Access Point
Brand:	Fortinet
Test Model:	FAP-231E
Series Model:	FortiAP 231Exxxxxx, FAP-231E xxxxxx, FORTIAP-231E xxxxxx (where “x” can be used as “A-Z”, or “-0-9”, or “-“, or blank for software changes or marketing purposes only) (refer to item 3.1 for more details)
Sample Status:	Engineering sample
Applicant:	Fortinet Inc.
Test Date:	Jul. 05 ~ Aug. 03, 2019
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 : _____ , **Date:** Aug. 08, 2019
Polly Chien / Specialist

Approved by : _____ , **Date:** Aug. 08, 2019
Bruce Chen / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -5.34dB at 0.48235MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.1dB at 5150.00 MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit.
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is IPEX 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.
Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	9 kHz ~ 30 MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless Access Point
Brand	Fortinet
Test Model	FAP-231E
Series Model	FortiAP 231Exxxxxx, FAP-231E xxxxxx, FORTIAP-231E xxxxxx (where “x” can be used as “A-Z”, or “-0-9”, or “-“, or blank for software changes or marketing purposes only)
Model Difference	Refer to note
Sample Status	Engineering sample
Power Supply rating	12Vdc from Adapter 54Vdc 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	Radio 1: CDD Mode: 5745~5825MHz: 503.742mW Beamforming Mode: 5745~5825MHz: 251.888mW Radio 2: CDD Mode: 5180~5240MHz: 410.712mW 5745~5825MHz: 455.226mW Beamforming Mode: 5180~5240MHz: 205.370mW 5745~5825MHz: 227.629mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Cable Supplied	NA

Note:

1. The following models are provided to this EUT. The model FAP-231E was chosen for final test.

Brand	Model	Description
Fortinet	FAP-231E	where “x” can be used as “A-Z”, or “-0-9”, or “-“, or blank for software changes or marketing purposes only
	FortiAP 231Exxxxxx	
	FAP-231E xxxxxx	
	FORTIAP-231E xxxxxx	

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

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

* The modulation and bandwidth are similar for 802.11n mode for 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.

3. Operation mode and channels.

Mode	Radio 1	Radio 2	Radio 3
1	2.4GHz Band (Service) Ch 1 to 13	5.0GHz full Band (Service) Ch 36 to 165	2.4GHz/5.0GHz Dual Band Scanning (RX only)
2	5.0GHz High Band (Service) Ch 100 to 165	5.0GHz Low Band (Service) Ch 36 to 64	2.4GHz Band (Service) Ch 1 to 13 (TX)
3	5.0GHz High Band (Service) Ch 100 to 165	5.0GHz Low Band (Service) Ch 36 to 64	2.4GHz/5.0GHz Dual Band Scanning (RX only)

4. The EUT consumes power from the following adapter and POE. (support units only)

Adapter	
Brand	Asian Power Devices Inc.
Model	WA-30J12R
Input Power	100-240Vac, 50/60Hz, 0.9A MAX
Output Power	12Vdc, 2.5A
Power Line	1.46m cable without core attached on adapter

POE	
Brand	EnGenius
Model	EPA5006GR
Input Power	100-240Vac, 50-60Hz, 0.8A
Output Power	54Vdc, 0.6A

5. The EUT uses following antennas.

Type	PIFA				Connector		IPEX		
Radio	2		1		1		3		BLE
Antenna No.	1	2	3	4	5	6	7	8	
Frequency (MHz)	5150~5850				2400~2500		2400~2500/ 5150~5850		2400~2500
Gain (dBi)	5.5	5.4	5.4	5.5	4.7	4.3	4.5/5.6	5.1/5.6	5.1

* The maximum antenna gains of Radio 1, 2, 3 are chosen for final test.

6. Radio 1 & Radio 2 & Radio 3 technologies 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	5180MHz	44	5220MHz
40	5200MHz	48	5240MHz

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

Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

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		
A1	-	√	√	-	Radio 1	Power from adapter
A2	√	√	√	√		Power from PoE
B1	-	√	√	-	Radio 2	Power from adapter
B2	√	√	√	√		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 Y-plane.
2. "-"means no effect.
3. Radiated emission (below 1GHz) and power line conducted emission test items chosen the worst maximum power.

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)	Remark
B2	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0	Radio 2 for band 1
	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	
B2	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	Radio 2 for band 4
	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	
A2	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	Radio 1 for band 4
	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)	Remark
A1, A2	802.11n (HT40)	5745-5825	149 to 165	159	OFDM	13.5	Radio 1 for band 4
B1, B2	802.11n (HT40)	5745-5825	149 to 165	159	OFDM	13.5	Radio 2 for band 4

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)	Remark
A1, A2	802.11n (HT40)	5745-5825	149 to 165	159	OFDM	13.5	Radio 1 for band 4
B1, B2	802.11n (HT40)	5745-5825	149 to 165	159	OFDM	13.5	Radio 2 for band 4

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)	Remark
B2	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0	Radio 2 for band 1
	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	
B2	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	Radio 2 for band 4
	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	
A2	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	Radio 1 for band 4
	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, 68% RH	120Vac, 60Hz	Willy Cheng
RE<1G	24 deg. C, 69% RH	120Vac, 60Hz 54Vdc	Willy Cheng
PLC	23 deg. C, 66% RH	120Vac, 60Hz 54Vdc	Willy Cheng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Chris Lin

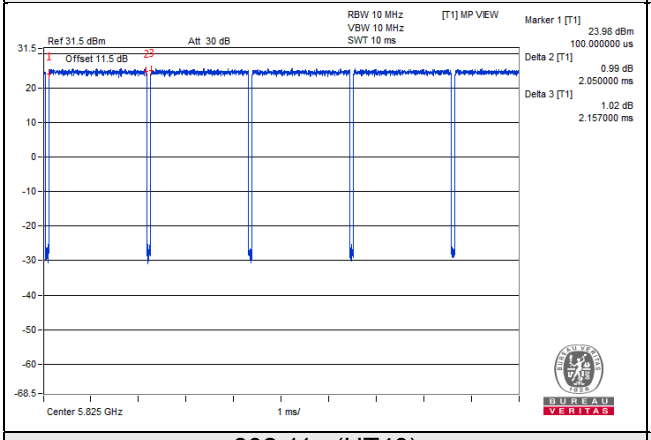
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98%, duty factor is not required.
Duty cycle of test signal is < 98%, duty factor shall be considered.

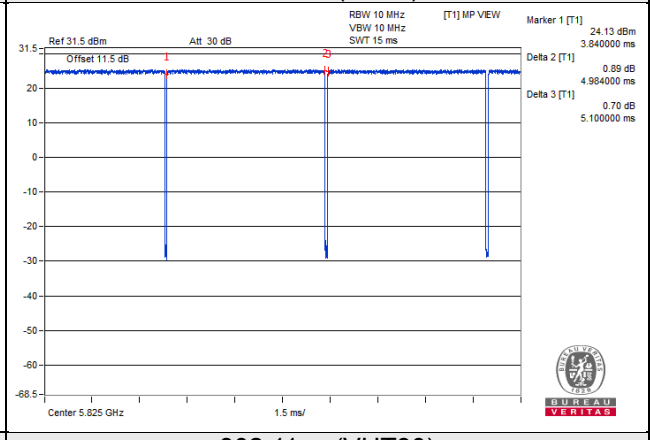
Radio 1

802.11a: Duty cycle = 2.050/2.157 = 0.950, Duty factor = 10 * log(1/0.950) = 0.22
802.11n (HT20): Duty cycle = 4.984/5.100 = 0.977, Duty factor = 10 * log(1/0.977) = 0.10
802.11n (HT40): Duty cycle = 2.422/2.527 = 0.958, Duty factor = 10 * log(1/0.958) = 0.18
802.11ac (VHT80): Duty cycle = 1.132/1.236 = 0.916, Duty factor = 10 * log(1/0.916) = 0.38

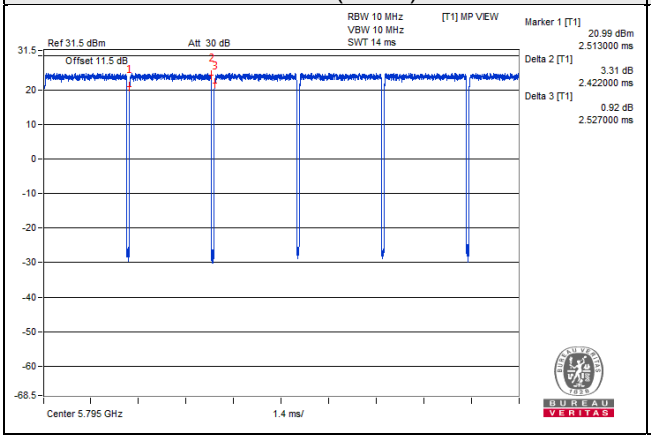
802.11a



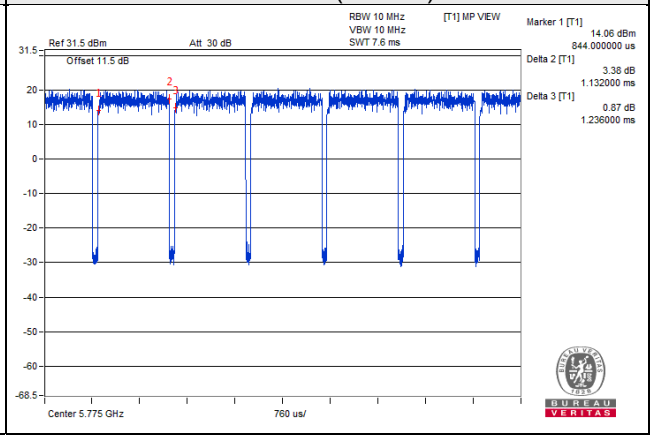
802.11n (HT20)



802.11n (HT40)



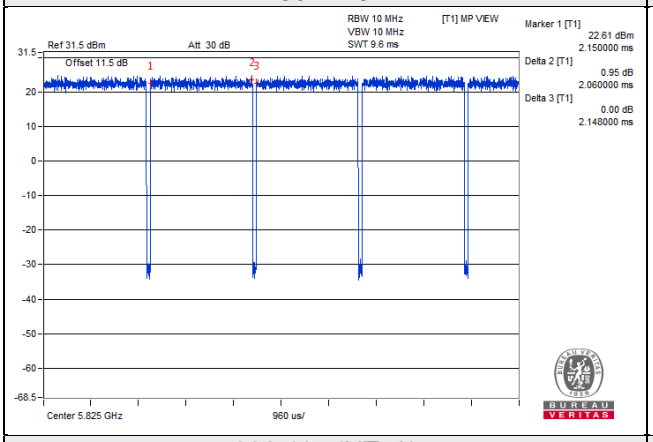
802.11ac (VHT80)



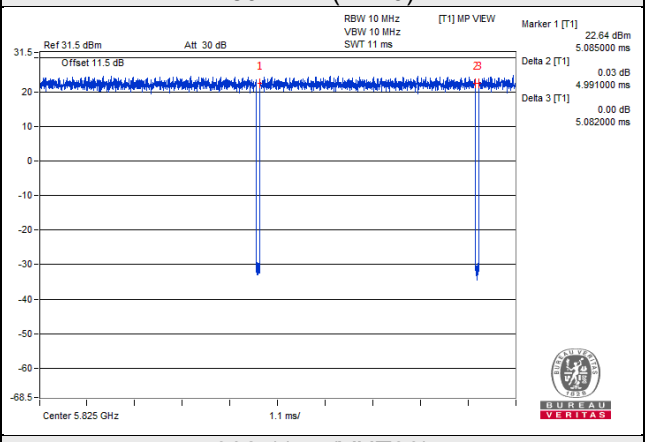
Radio 2

802.11a: Duty cycle = 2.060/2.148 = 0.959, Duty factor = 10 * log(1/0.959) = 0.18
802.11n (HT20): Duty cycle = 4.991/5.082 = 0.982
802.11n (HT40): Duty cycle = 2.430/2.527 = 0.962, Duty factor = 10 * log(1/0.962) = 0.17
802.11ac (VHT80): Duty cycle = 1.136/1.239 = 0.917, Duty factor = 10 * log(1/0.917) = 0.38

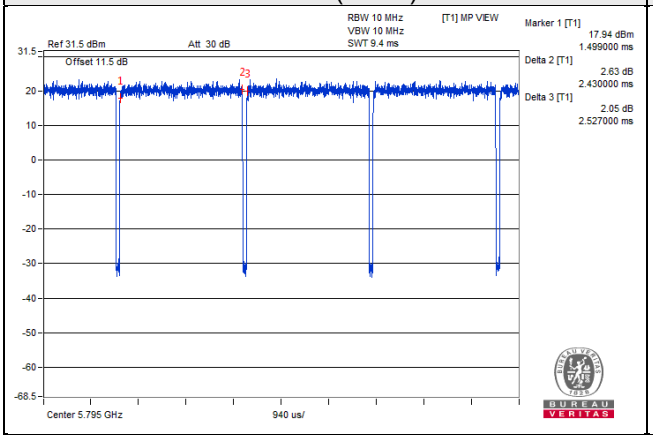
802.11a



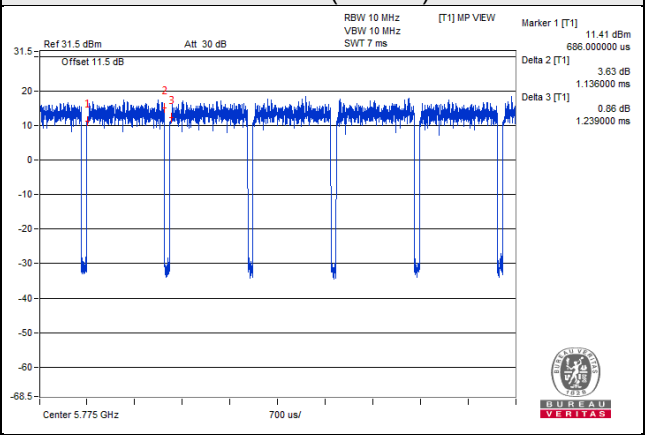
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



3.4 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	Adapter	Asian Power Devices Inc.	WA-30J12R	N/A	N/A	Provided by client
D.	POE	EnGenius	EPA5006GR	N/A	N/A	Provided by client

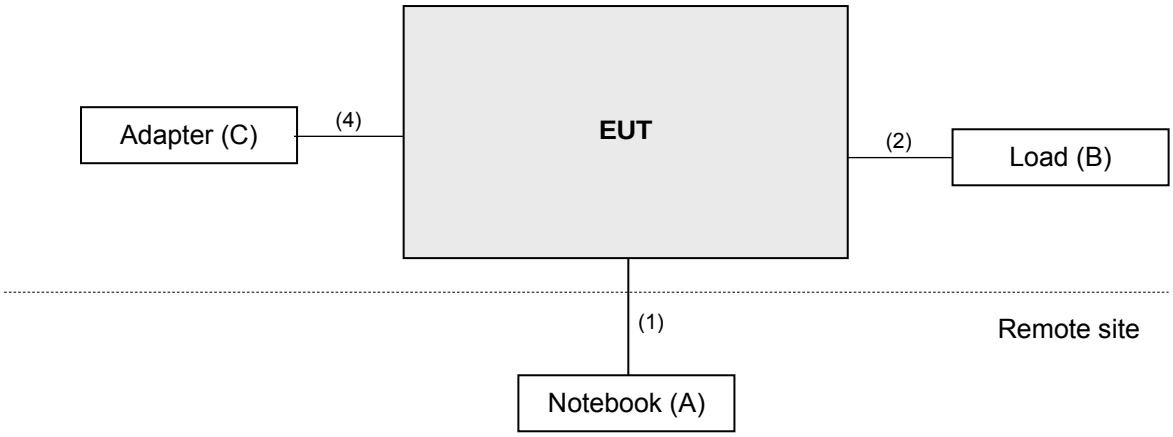
Note:

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.

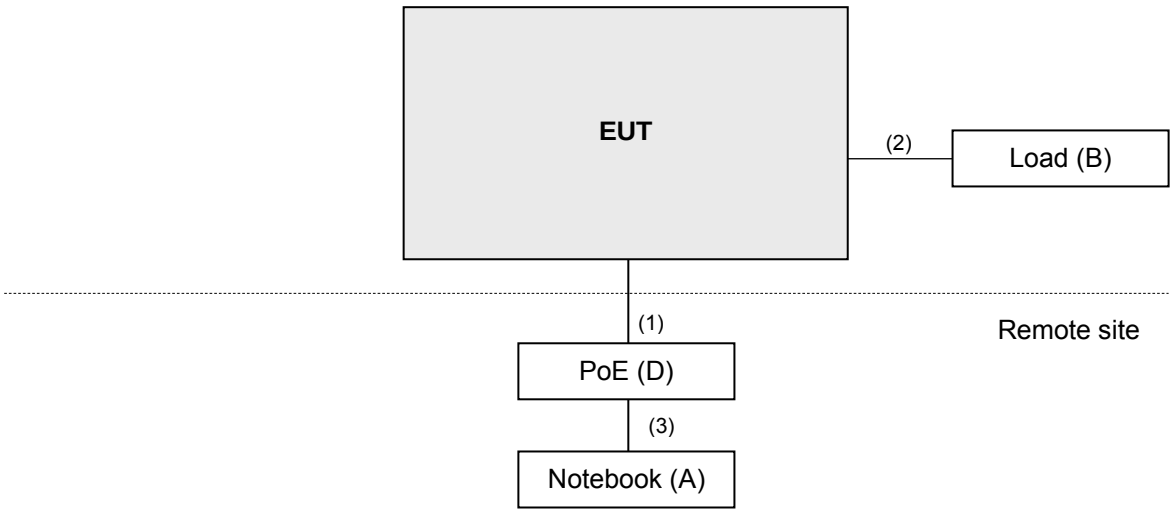
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	5	N	0	-
2.	RJ45, Cat5e	2	1.5	N	0	-
3.	RJ45, Cat5e	1	1.5	N	0	-
4.	Power cable	1	1.46	-	0	Provided by client

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 ROHDE & SCHWARZ	ESIB7	100187	May 30, 2019	May 29, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
HORN Antenna SCHWARZBECK	9120D	209	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 27, 2019	Mar. 26, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM- 8000	Cable-CH3-03 (309224+170907)	Aug. 21, 2018	Aug. 20, 2019
RF signal cable WOKEN	8D-FB	Cable-CH3-01	Aug. 21, 2018	Aug. 20, 2019
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 17, 2018	Jul. 16, 2019
			Jul. 15, 2019	Jul. 14, 2020
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Nov. 14, 2018	Nov. 13, 2019

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 3.

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. Parallel, perpendicular, and ground-parallel orientations 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.

   For Radio 1 (11a: RBW = 1 MHz, VBW =1 kHz ; 11n (HT20): RBW = 1 MHz, VBW = 300 Hz ; 11n (HT40): RBW = 1 MHz, VBW = 1 kHz ; 11ac (VHT80): RBW = 1 MHz, VBW = 1 kHz)

   For Radio 2 (11a: RBW = 1 MHz, VBW =1 kHz ; 11n (HT20): RBW = 1 MHz, VBW = 10 Hz ; 11n (HT40): RBW = 1 MHz, VBW = 1 kHz ; 11ac (VHT80): RBW = 1 MHz, VBW = 1 kHz)

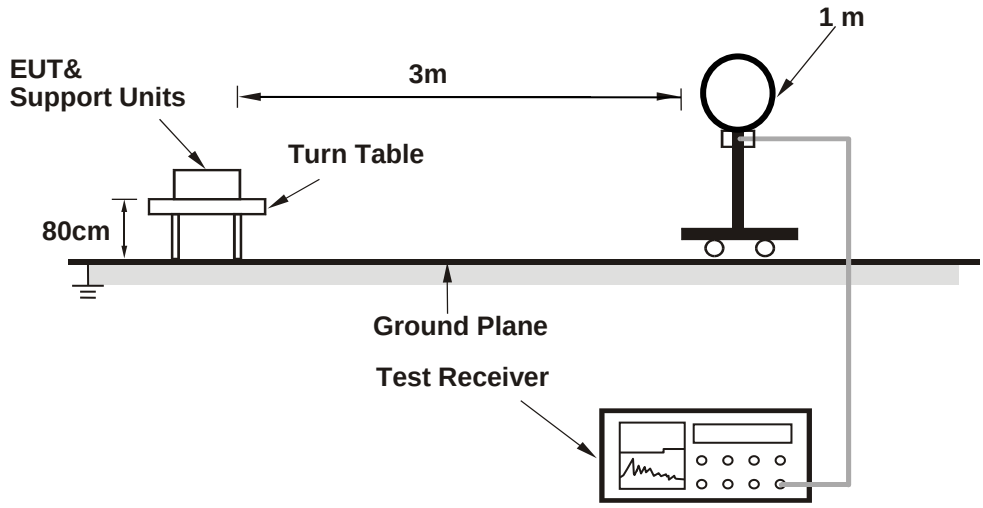
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

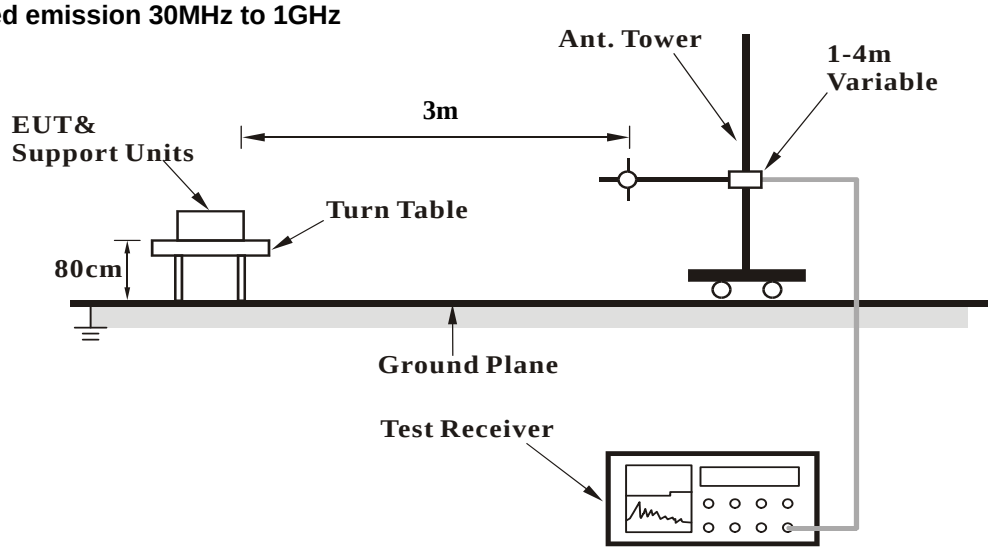
No deviation.

4.1.5 Test Setup

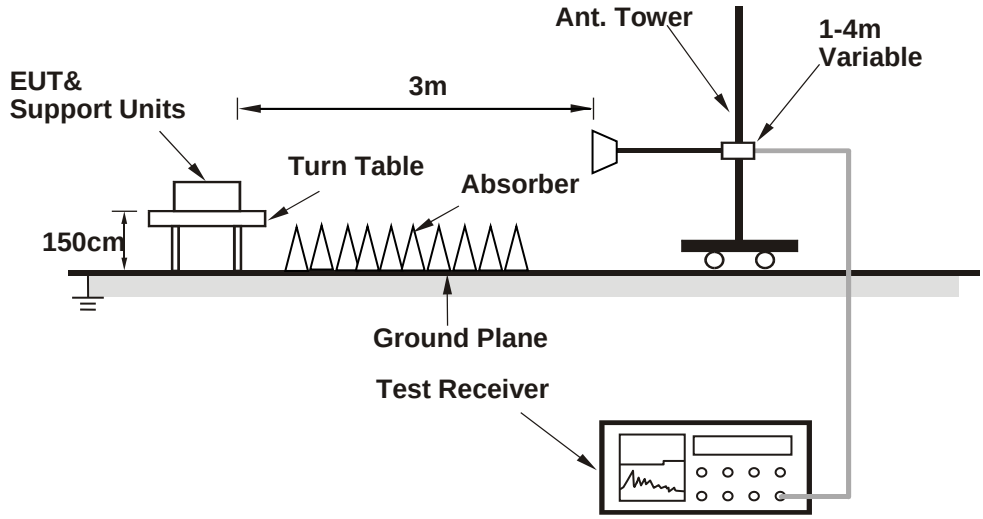
For Radiated emission below 30MHz



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

Mode A2: Radio 1

Above 1GHz worst-Case data:

802.11a

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	#5635.90	59.4 PK	68.2	-8.8	1.92 H	304	54.9	4.5
2	#5650.00	62.8 PK	68.2	-5.4	1.82 H	321	58.3	4.5
3	*5745.00	117.8 PK			1.92 H	304	77.7	40.1
4	*5745.00	106.8 AV			1.92 H	304	66.7	40.1
5	#5985.90	58.0 PK	68.2	-10.2	1.92 H	304	52.6	5.4
6	11490.00	57.9 PK	74.0	-16.1	1.61 H	188	39.9	18.0
7	11490.00	44.3 AV	54.0	-9.7	1.61 H	188	26.3	18.0
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	#5648.34	64.6 PK	68.2	-3.6	1.52 V	192	60.1	4.5
2	#5650.00	66.6 PK	68.2	-1.6	1.71 V	166	62.1	4.5
3	*5745.00	118.3 PK			1.52 V	192	78.2	40.1
4	*5745.00	107.4 AV			1.52 V	192	67.3	40.1
5	#5940.74	59.3 PK	68.2	-8.9	1.52 V	192	54.0	5.3
6	11490.00	58.9 PK	74.0	-15.1	1.88 V	165	40.9	18.0
7	11490.00	44.5 AV	54.0	-9.5	1.88 V	165	26.5	18.0

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	#5602.56	57.4 PK	68.2	-10.8	1.95 H	307	52.8	4.6
2	*5785.00	118.5 PK			1.95 H	307	78.2	40.3
3	*5785.00	107.6 AV			1.95 H	307	67.3	40.3
4	#5962.82	58.7 PK	68.2	-9.5	1.95 H	307	53.4	5.3
5	11570.00	58.5 PK	74.0	-15.5	1.98 H	135	40.8	17.7
6	11570.00	45.3 AV	54.0	-8.7	1.98 H	135	27.6	17.7
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	#5605.13	56.1 PK	68.2	-12.1	1.55 V	174	51.5	4.6
2	*5785.00	119.6 PK			1.55 V	174	79.3	40.3
3	*5785.00	108.9 AV			1.55 V	174	68.6	40.3
4	#5980.13	58.6 PK	68.2	-9.6	1.55 V	174	53.2	5.4
5	11570.00	58.2 PK	74.0	-15.8	1.89 V	170	40.5	17.7
6	11570.00	44.7 AV	54.0	-9.3	1.89 V	170	27.0	17.7

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	#5625.00	56.4 PK	68.2	-11.8	2.79 H	300	51.9	4.5
2	*5825.00	119.6 PK			2.79 H	300	79.2	40.4
3	*5825.00	108.3 AV			2.79 H	300	67.9	40.4
4	#5937.18	58.8 PK	68.2	-9.4	2.79 H	300	53.5	5.3
5	11650.00	59.2 PK	74.0	-14.8	1.82 H	175	41.7	17.5
6	11650.00	45.5 AV	54.0	-8.5	1.82 H	175	28.0	17.5
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	#5606.41	56.1 PK	68.2	-12.1	1.81 V	177	51.5	4.6
2	*5825.00	120.9 PK			1.81 V	177	80.5	40.4
3	*5825.00	109.8 AV			1.81 V	177	69.4	40.4
4	#5930.77	59.1 PK	68.2	-9.1	1.81 V	177	53.8	5.3
5	11650.00	59.6 PK	74.0	-14.4	1.90 V	182	42.1	17.5
6	11650.00	46.1 AV	54.0	-7.9	1.90 V	182	28.6	17.5

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.

802.11n (HT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5642.95	60.6 PK	68.2	-7.6	1.84 H	295	56.1	4.5
2	*5745.00	118.3 PK			1.84 H	295	78.2	40.1
3	*5745.00	106.8 AV			1.84 H	295	66.7	40.1
4	#5982.69	57.5 PK	68.2	-10.7	1.84 H	295	52.1	5.4
5	11490.00	58.9 PK	74.0	-15.1	1.55 H	183	40.9	18.0
6	11490.00	44.2 AV	54.0	-9.8	1.55 H	183	26.2	18.0
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	#5635.90	62.4 PK	68.2	-5.8	1.48 V	193	57.9	4.5
2	*5745.00	118.8 PK			1.48 V	193	78.7	40.1
3	*5745.00	107.8 AV			1.48 V	193	67.7	40.1
4	#5968.59	58.3 PK	68.2	-9.9	1.48 V	193	53.0	5.3
5	11490.00	59.3 PK	74.0	-14.7	1.90 V	172	41.3	18.0
6	11490.00	44.7 AV	54.0	-9.3	1.90 V	172	26.7	18.0

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	#5610.90	56.5 PK	68.2	-11.7	1.80 H	309	51.9	4.6
2	*5785.00	118.5 PK			1.80 H	310	78.2	40.3
3	*5785.00	107.2 AV			1.80 H	310	66.9	40.3
4	#5934.62	58.5 PK	68.2	-9.7	1.80 H	309	53.2	5.3
5	11570.00	58.6 PK	74.0	-15.4	1.82 H	133	40.9	17.7
6	11570.00	44.6 AV	54.0	-9.4	1.82 H	133	26.9	17.7
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	#5620.51	57.0 PK	68.2	-11.2	1.61 V	192	52.4	4.6
2	*5785.00	120.1 PK			1.61 V	192	79.8	40.3
3	*5785.00	109.1 AV			1.61 V	192	68.8	40.3
4	#5974.36	58.6 PK	68.2	-9.6	1.61 V	192	53.2	5.4
5	11570.00	59.0 PK	74.0	-15.0	1.91 V	161	41.3	17.7
6	11570.00	44.9 AV	54.0	-9.1	1.91 V	161	27.2	17.7

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	#5616.03	57.1 PK	68.2	-11.1	2.77 H	300	52.5	4.6
2	*5825.00	119.5 PK			2.77 H	300	79.1	40.4
3	*5825.00	108.0 AV			2.77 H	300	67.6	40.4
4	#5958.97	59.0 PK	68.2	-9.2	2.77 H	300	53.7	5.3
5	11650.00	59.4 PK	74.0	-14.6	1.72 H	169	41.9	17.5
6	11650.00	45.5 AV	54.0	-8.5	1.72 H	169	28.0	17.5
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	#5605.13	57.0 PK	68.2	-11.2	1.61 V	193	52.4	4.6
2	*5825.00	120.8 PK			1.61 V	193	80.4	40.4
3	*5825.00	109.9 AV			1.61 V	193	69.5	40.4
4	#5972.44	59.0 PK	68.2	-9.2	1.61 V	193	53.6	5.4
5	11650.00	60.0 PK	74.0	-14.0	1.84 V	167	42.5	17.5
6	11650.00	46.0 AV	54.0	-8.0	1.84 V	167	28.5	17.5

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.

802.11n (HT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5634.62	61.1 PK	68.2	-7.1	2.91 H	279	56.6	4.5
2	#5650.00	62.4 PK	68.2	-5.8	3.15 H	304	57.9	4.5
3	*5755.00	111.8 PK			2.91 H	279	71.7	40.1
4	*5755.00	101.3 AV			2.91 H	279	61.2	40.1
5	#5952.56	58.9 PK	68.2	-9.3	2.91 H	279	53.6	5.3
6	11510.00	59.8 PK	74.0	-14.2	1.82 H	165	41.7	18.1
7	11510.00	44.1 AV	54.0	-9.9	1.82 H	165	26.0	18.1
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	#5649.36	64.9 PK	68.2	-3.3	1.21 V	189	60.4	4.5
2	#5650.00	66.5 PK	68.2	-1.7	1.70 V	166	62.0	4.5
3	*5755.00	113.8 PK			1.21 V	189	73.7	40.1
4	*5755.00	103.5 AV			1.21 V	189	63.4	40.1
5	#5995.51	57.9 PK	68.2	-10.3	1.21 V	189	52.5	5.4
6	11510.00	60.2 PK	74.0	-13.8	1.84 V	170	42.1	18.1
7	11510.00	44.5 AV	54.0	-9.5	1.84 V	170	26.4	18.1

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 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	#5632.05	61.4 PK	68.2	-6.8	2.92 H	294	56.9	4.5
2	*5795.00	116.4 PK			2.92 H	294	76.0	40.4
3	*5795.00	105.9 AV			2.92 H	294	65.5	40.4
4	#5931.41	64.6 PK	68.2	-3.6	2.92 H	294	59.3	5.3
5	11590.00	58.9 PK	74.0	-15.1	1.90 H	121	41.3	17.6
6	11590.00	45.1 AV	54.0	-8.9	1.90 H	121	27.5	17.6
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	#5625.00	56.7 PK	68.2	-11.5	1.61 V	191	52.2	4.5
2	*5795.00	115.5 PK			1.61 V	191	75.1	40.4
3	*5795.00	105.2 AV			1.61 V	191	64.8	40.4
4	#5987.82	58.9 PK	68.2	-9.3	1.61 V	191	53.5	5.4
5	11590.00	59.4 PK	74.0	-14.6	1.83 V	170	41.8	17.6
6	11590.00	45.6 AV	54.0	-8.4	1.83 V	170	28.0	17.6

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.

802.11ac (VHT80)

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	#5639.10	60.3 PK	68.2	-7.9	2.86 H	292	55.8	4.5
2	#5650.00	62.9 PK	68.2	-5.3	2.37 H	315	58.4	4.5
3	*5775.00	109.2 PK			2.86 H	292	68.9	40.3
4	*5775.00	98.7 AV			2.86 H	292	58.4	40.3
5	#5925.00	59.7 PK	68.2	-8.5	2.34 H	317	54.4	5.3
6	#5925.64	59.1 PK	68.2	-9.1	2.86 H	292	53.8	5.3
7	11550.00	58.1 PK	74.0	-15.9	1.72 H	180	40.2	17.9
8	11550.00	44.1 AV	54.0	-9.9	1.72 H	180	26.2	17.9
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	#5632.05	62.5 PK	68.2	-5.7	1.61 V	189	58.0	4.5
2	#5650.00	66.5 PK	68.2	-1.7	1.62 V	178	62.0	4.5
3	*5775.00	111.0 PK			1.61 V	189	70.7	40.3
4	*5775.00	100.3 AV			1.61 V	189	60.0	40.3
5	#5925.00	61.1 PK	68.2	-7.1	1.61 V	169	55.8	5.3
6	#5953.21	59.6 PK	68.2	-8.6	1.61 V	189	54.3	5.3
7	11550.00	58.6 PK	74.0	-15.4	1.90 V	170	40.7	17.9
8	11550.00	44.6 AV	54.0	-9.4	1.90 V	170	26.7	17.9

Remarks:

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

Below 1GHz Worst-Case

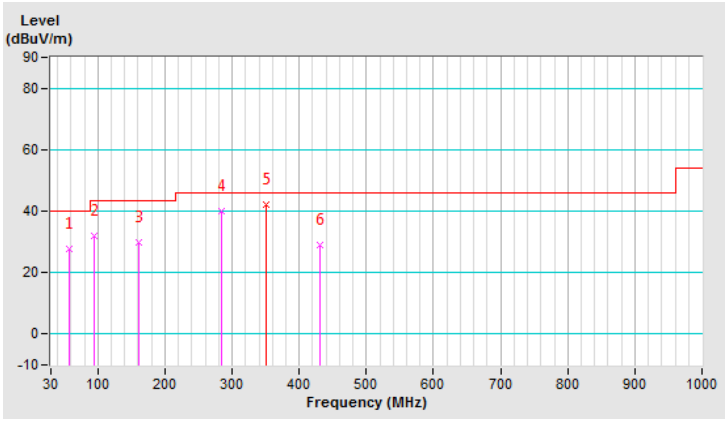
802.11n (HT40)

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A1

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	57.21	27.8 QP	40.0	-12.2	1.99 H	4	37.9	-10.1
2	94.15	31.9 QP	43.5	-11.6	1.99 H	220	46.2	-14.3
3	160.24	30.0 QP	43.5	-13.5	1.50 H	211	39.0	-9.0
4	284.65	40.0 QP	46.0	-6.0	1.00 H	12	47.7	-7.7
5	350.57	42.0 QP	46.0	-4.0	1.00 H	187	48.6	-6.6
6	430.44	29.1 QP	46.0	-16.9	1.99 H	159	33.7	-4.6

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

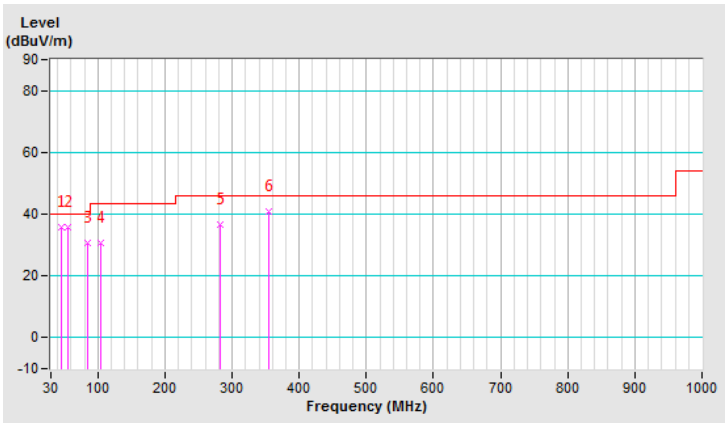


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A1

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	45.55	35.8 QP	40.0	-4.2	1.00 V	22	45.6	-9.8
2	55.27	35.7 QP	40.0	-4.3	1.00 V	254	45.5	-9.8
3	84.43	30.6 QP	40.0	-9.4	1.00 V	57	45.1	-14.5
4	103.87	30.6 QP	43.5	-12.9	1.00 V	64	43.7	-13.1
5	282.71	36.5 QP	46.0	-9.5	1.49 V	156	44.3	-7.8
6	354.63	40.9 QP	46.0	-5.1	1.00 V	145	47.5	-6.6

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

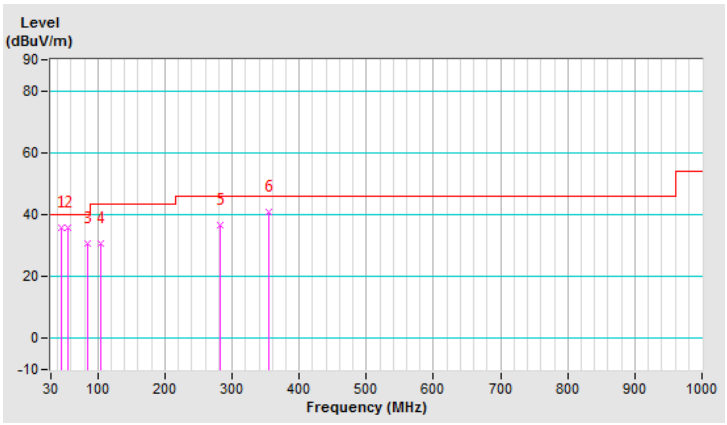


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A2

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	57.21	28.6 QP	40.0	-11.4	1.99 H	164	38.7	-10.1
2	92.20	30.7 QP	43.5	-12.8	1.99 H	0	45.1	-14.4
3	160.24	30.5 QP	43.5	-13.0	1.49 H	207	39.5	-9.0
4	284.65	39.4 QP	46.0	-6.6	1.00 H	168	47.1	-7.7
5	348.80	41.4 QP	46.0	-4.6	1.00 H	191	48.1	-6.7
6	405.17	29.3 QP	46.0	-16.7	1.99 H	113	34.9	-5.6

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

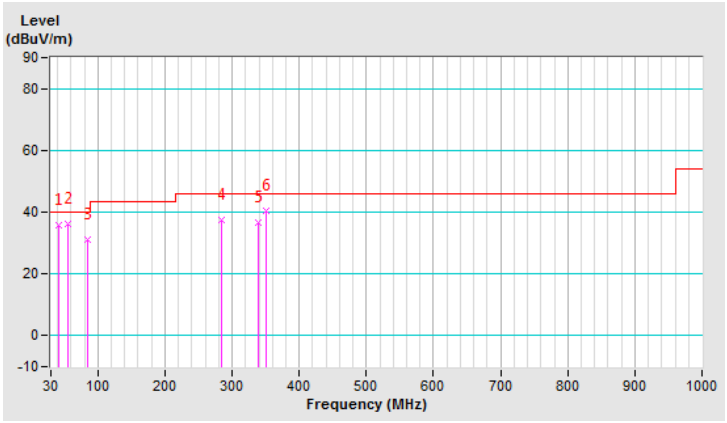


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	A2

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	41.66	35.6 QP	40.0	-4.4	1.01 V	133	45.7	-10.1
2	55.27	36.3 QP	40.0	-3.7	1.01 V	247	46.1	-9.8
3	84.43	30.9 QP	40.0	-9.1	1.01 V	74	45.4	-14.5
4	284.65	37.3 QP	46.0	-8.7	2.00 V	154	45.0	-7.7
5	339.08	36.4 QP	46.0	-9.6	1.01 V	157	43.2	-6.8
6	350.74	40.6 QP	46.0	-5.4	1.01 V	116	47.2	-6.6

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.



Mode B2: Radio 2

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	70.6 PK	74.0	-3.4	2.77 H	329	66.2	4.4
2	5150.00	52.3 AV	54.0	-1.7	2.77 H	329	47.9	4.4
3	*5180.00	115.1 PK			2.31 H	338	75.6	39.5
4	*5180.00	104.4 AV			2.31 H	338	64.9	39.5
5	#10360.00	57.4 PK	68.2	-10.8	2.66 H	339	41.4	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	5150.00	62.1 PK	74.0	-11.9	1.00 V	333	57.7	4.4
2	5150.00	46.0 AV	54.0	-8.0	1.00 V	333	41.6	4.4
3	*5180.00	108.7 PK			1.40 V	299	69.2	39.5
4	*5180.00	97.8 AV			1.40 V	299	58.3	39.5
5	#10360.00	57.3 PK	68.2	-10.9	1.72 V	196	41.3	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 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	69.7 PK	74.0	-4.3	1.88 H	328	65.3	4.4
2	5150.00	52.6 AV	54.0	-1.4	1.88 H	328	48.2	4.4
3	*5200.00	117.5 PK			2.62 H	347	78.0	39.5
4	*5200.00	106.7 AV			2.62 H	347	67.2	39.5
5	#10400.00	57.5 PK	68.2	-10.7	2.58 H	332	41.3	16.2
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	62.1 PK	74.0	-11.9	1.08 V	338	57.7	4.4
2	5150.00	45.6 AV	54.0	-8.4	1.08 V	338	41.2	4.4
3	*5200.00	112.6 PK			1.16 V	301	73.1	39.5
4	*5200.00	102.0 AV			1.16 V	301	62.5	39.5
5	#10400.00	57.8 PK	68.2	-10.4	1.92 V	145	41.6	16.2

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 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	117.1 PK			2.60 H	342	77.8	39.3
2	*5240.00	106.4 AV			2.60 H	342	67.1	39.3
3	5350.00	56.7 PK	74.0	-17.3	1.92 H	285	52.4	4.3
4	5350.00	42.9 AV	54.0	-11.1	1.92 H	285	38.6	4.3
5	#10480.00	58.5 PK	68.2	-9.7	2.48 H	330	41.5	17.0
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	*5240.00	112.1 PK			1.17 V	299	72.8	39.3
2	*5240.00	101.6 AV			1.17 V	299	62.3	39.3
3	5350.00	55.5 PK	74.0	-18.5	1.21 V	304	51.2	4.3
4	5350.00	43.8 AV	54.0	-10.2	1.21 V	304	39.5	4.3
5	#10480.00	58.8 PK	68.2	-9.4	1.84 V	173	41.8	17.0

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 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	#5610.26	57.5 PK	68.2	-10.7	2.78 H	343	52.9	4.6
2	*5745.00	118.7 PK			2.78 H	343	78.6	40.1
3	*5745.00	108.0 AV			2.78 H	343	67.9	40.1
4	#5969.23	59.0 PK	68.2	-9.2	2.78 H	343	53.7	5.3
5	11490.00	58.3 PK	74.0	-15.7	1.77 H	214	40.3	18.0
6	11490.00	45.3 AV	54.0	-8.7	1.77 H	214	27.3	18.0
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	#5618.59	56.7 PK	68.2	-11.5	1.33 V	279	52.1	4.6
2	*5745.00	114.7 PK			1.33 V	279	74.6	40.1
3	*5745.00	103.7 AV			1.33 V	279	63.6	40.1
4	#5987.82	59.1 PK	68.2	-9.1	1.33 V	279	53.7	5.4
5	11490.00	58.1 PK	74.0	-15.9	1.75 V	166	40.1	18.0
6	11490.00	44.0 AV	54.0	-10.0	1.75 V	166	26.0	18.0

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	#5617.95	56.6 PK	68.2	-11.6	2.88 H	342	52.0	4.6
2	*5785.00	119.3 PK			2.88 H	342	79.0	40.3
3	*5785.00	108.2 AV			2.88 H	342	67.9	40.3
4	#5971.15	57.9 PK	68.2	-10.3	2.88 H	342	52.6	5.3
5	11490.00	58.2 PK	74.0	-15.8	2.95 H	138	40.2	18.0
6	11490.00	45.9 AV	54.0	-8.1	2.95 H	138	27.9	18.0
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	#5647.44	55.9 PK	68.2	-12.3	1.38 V	278	51.4	4.5
2	*5785.00	115.2 PK			1.38 V	278	74.9	40.3
3	*5785.00	104.5 AV			1.38 V	278	64.2	40.3
4	#5971.15	58.1 PK	68.2	-10.1	1.38 V	278	52.8	5.3
5	11490.00	58.9 PK	74.0	-15.1	1.68 V	175	40.9	18.0
6	11490.00	45.2 AV	54.0	-8.8	1.68 V	175	27.2	18.0

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 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	#5632.05	56.9 PK	68.2	-11.3	3.11 H	343	52.4	4.5
2	*5825.00	119.9 PK			3.11 H	343	79.5	40.4
3	*5825.00	108.9 AV			3.11 H	343	68.5	40.4
4	#5967.31	58.7 PK	68.2	-9.5	3.11 H	343	53.4	5.3
5	11650.00	60.8 PK	74.0	-13.2	2.86 H	211	43.3	17.5
6	11650.00	47.5 AV	54.0	-6.5	2.86 H	211	30.0	17.5
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	#5613.46	56.8 PK	68.2	-11.4	1.22 V	281	52.2	4.6
2	*5825.00	115.0 PK			1.22 V	281	74.6	40.4
3	*5825.00	104.1 AV			1.22 V	281	63.7	40.4
4	#5958.33	58.3 PK	68.2	-9.9	1.22 V	281	53.0	5.3
5	11650.00	59.2 PK	74.0	-14.8	1.70 V	176	41.7	17.5
6	11650.00	46.0 AV	54.0	-8.0	1.70 V	176	28.5	17.5

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.

802.11n (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	69.1 PK	74.0	-4.9	2.49 H	291	64.7	4.4
2	5150.00	52.2 AV	54.0	-1.8	2.49 H	291	47.8	4.4
3	*5180.00	114.9 PK			2.27 H	338	75.4	39.5
4	*5180.00	103.7 AV			2.27 H	338	64.2	39.5
5	#10360.00	57.2 PK	68.2	-11.0	2.58 H	332	41.2	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	5150.00	65.2 PK	74.0	-8.8	1.21 V	300	60.8	4.4
2	5150.00	48.0 AV	54.0	-6.0	1.21 V	300	43.6	4.4
3	*5180.00	108.4 PK			1.41 V	303	68.9	39.5
4	*5180.00	98.0 AV			1.41 V	303	58.5	39.5
5	#10360.00	57.5 PK	68.2	-10.7	2.69 V	183	41.5	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 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	72.2 PK	74.0	-1.8	2.83 H	294	67.8	4.4
2	**5150.00**	**52.9 AV**	**54.0**	**-1.1**	**2.83 H**	**294**	**48.5**	**4.4**
3	*5200.00	118.0 PK			2.32 H	339	78.5	39.5
4	*5200.00	106.8 AV			2.32 H	339	67.3	39.5
5	#10400.00	58.8 PK	68.2	-9.4	2.45 H	259	42.6	16.2
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	65.8 PK	74.0	-8.2	1.20 V	300	61.4	4.4
2	5150.00	48.5 AV	54.0	-5.5	1.20 V	300	44.1	4.4
3	*5200.00	112.2 PK			1.39 V	301	72.7	39.5
4	*5200.00	101.0 AV			1.39 V	301	61.5	39.5
5	#10400.00	57.8 PK	68.2	-10.4	1.84 V	193	41.6	16.2

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 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	116.9 PK			1.88 H	332	77.6	39.3
2	*5240.00	106.1 AV			1.88 H	332	66.8	39.3
3	5350.00	46.1 PK	74.0	-27.9	1.96 H	299	41.8	4.3
4	5350.00	43.3 AV	54.0	-10.7	1.96 H	299	39.0	4.3
5	#10480.00	58.5 PK	68.2	-9.7	2.46 H	289	41.5	17.0
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	*5240.00	111.5 PK			1.18 V	300	72.2	39.3
2	*5240.00	100.7 AV			1.18 V	300	61.4	39.3
3	5350.00	55.6 PK	74.0	-18.4	1.06 V	325	51.3	4.3
4	5350.00	43.5 AV	54.0	-10.5	1.06 V	325	39.2	4.3
5	#10480.00	58.4 PK	68.2	-9.8	2.63 V	219	41.4	17.0

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 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	#5612.82	55.8 PK	68.2	-12.4	2.80 H	344	51.2	4.6
2	*5745.00	119.1 PK			2.80 H	344	79.0	40.1
3	*5745.00	107.7 AV			2.80 H	344	67.6	40.1
4	#5926.28	58.1 PK	68.2	-10.1	2.80 H	344	52.8	5.3
5	11490.00	58.5 PK	74.0	-15.5	1.81 H	220	40.5	18.0
6	11490.00	44.9 AV	54.0	-9.1	1.81 H	220	26.9	18.0
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	#5608.33	56.6 PK	68.2	-11.6	1.46 V	280	52.0	4.6
2	*5745.00	114.3 PK			1.46 V	280	74.2	40.1
3	*5745.00	103.4 AV			1.46 V	280	63.3	40.1
4	#5999.36	58.1 PK	68.2	-10.1	1.46 V	280	52.7	5.4
5	11490.00	58.1 PK	74.0	-15.9	1.90 V	185	40.1	18.0
6	11490.00	44.2 AV	54.0	-9.8	1.90 V	185	26.2	18.0

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	#5610.26	56.3 PK	68.2	-11.9	2.90 H	343	51.7	4.6
2	*5785.00	119.4 PK			2.90 H	343	79.1	40.3
3	*5785.00	108.2 AV			2.90 H	343	67.9	40.3
4	#5943.59	58.7 PK	68.2	-9.5	2.90 H	343	53.4	5.3
5	11570.00	58.3 PK	74.0	-15.7	1.71 H	210	40.6	17.7
6	11570.00	44.7 AV	54.0	-9.3	1.71 H	210	27.0	17.7
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	#5601.28	56.2 PK	68.2	-12.0	1.40 V	282	51.6	4.6
2	*5785.00	114.4 PK			1.40 V	282	74.1	40.3
3	*5785.00	103.5 AV			1.40 V	282	63.2	40.3
4	#5985.26	57.6 PK	68.2	-10.6	1.40 V	282	52.2	5.4
5	11570.00	57.8 PK	74.0	-16.2	1.87 V	191	40.1	17.7
6	11570.00	44.2 AV	54.0	-9.8	1.87 V	191	26.5	17.7

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	#5618.59	56.9 PK	68.2	-11.3	2.98 H	343	52.3	4.6
2	*5825.00	119.9 PK			2.98 H	343	79.5	40.4
3	*5825.00	108.6 AV			2.98 H	343	68.2	40.4
4	#5958.33	58.3 PK	68.2	-9.9	2.98 H	343	53.0	5.3
5	11650.00	60.7 PK	74.0	-13.3	2.57 H	203	43.2	17.5
6	11650.00	47.8 AV	54.0	-6.2	2.57 H	203	30.3	17.5
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	#5603.21	56.3 PK	68.2	-11.9	1.55 V	274	51.7	4.6
2	*5825.00	115.2 PK			1.55 V	274	74.8	40.4
3	*5825.00	104.3 AV			1.55 V	274	63.9	40.4
4	#5943.59	59.0 PK	68.2	-9.2	1.55 V	274	53.7	5.3
5	11650.00	60.1 PK	74.0	-13.9	1.77 V	179	42.6	17.5
6	11650.00	46.8 AV	54.0	-7.2	1.77 V	179	29.3	17.5

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.

802.11n (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	69.6 PK	74.0	-4.4	1.99 H	324	65.2	4.4
2	5150.00	52.3 AV	54.0	-1.7	1.99 H	324	47.9	4.4
3	*5190.00	109.1 PK			2.09 H	333	69.6	39.5
4	*5190.00	98.7 AV			2.09 H	333	59.2	39.5
5	#10380.00	57.8 PK	68.2	-10.4	2.23 H	254	41.6	16.2
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	59.6 PK	74.0	-14.4	1.06 V	332	55.2	4.4
2	5150.00	45.7 AV	54.0	-8.3	1.06 V	332	41.3	4.4
3	*5190.00	103.7 PK			1.39 V	301	64.2	39.5
4	*5190.00	93.2 AV			1.39 V	301	53.7	39.5
5	#10380.00	57.7 PK	68.2	-10.5	1.92 V	163	41.5	16.2

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 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	67.1 PK	74.0	-6.9	2.37 H	338	62.7	4.4
2	5150.00	52.5 AV	54.0	-1.5	2.37 H	338	48.1	4.4
3	*5230.00	113.4 PK			2.18 H	334	74.1	39.3
4	*5230.00	103.3 AV			2.18 H	334	64.0	39.3
5	5350.00	57.3 PK	74.0	-16.7	1.96 H	314	53.0	4.3
6	5350.00	44.1 AV	54.0	-9.9	1.96 H	314	39.8	4.3
7	#10460.00	58.3 PK	68.2	-9.9	2.22 H	217	41.5	16.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	60.2 PK	74.0	-13.8	1.09 V	345	55.8	4.4
2	5150.00	45.6 AV	54.0	-8.4	1.09 V	345	41.2	4.4
3	*5230.00	107.7 PK			1.17 V	299	68.4	39.3
4	*5230.00	97.6 AV			1.17 V	299	58.3	39.3
5	5350.00	56.3 PK	74.0	-17.7	1.27 V	321	52.0	4.3
6	5350.00	43.2 AV	54.0	-10.8	1.27 V	321	38.9	4.3
7	#10460.00	58.4 PK	68.2	-9.8	1.98 V	207	41.6	16.8

Remarks:

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

CHANNEL	TX Channel 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	#5637.82	62.4 PK	68.2	-5.8	2.91 H	345	57.9	4.5
2	#5650.00	66.5 PK	68.2	-1.7	2.87 H	5	62.0	4.5
3	*5755.00	115.4 PK			2.91 H	345	75.3	40.1
4	*5755.00	105.2 AV			2.91 H	345	65.1	40.1
5	#5933.97	59.2 PK	68.2	-9.0	2.91 H	345	53.9	5.3
6	11510.00	58.4 PK	74.0	-15.6	2.09 H	231	40.3	18.1
7	11510.00	45.2 AV	54.0	-8.8	2.09 H	231	27.1	18.1
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	#5646.15	58.6 PK	68.2	-9.6	1.23 V	279	54.1	4.5
2	#5650.00	62.6 PK	68.2	-5.6	1.33 V	281	58.1	4.5
3	*5755.00	111.4 PK			1.23 V	279	71.3	40.1
4	*5755.00	101.1 AV			1.23 V	279	61.0	40.1
5	#5982.05	58.3 PK	68.2	-9.9	1.23 V	279	52.9	5.4
6	11510.00	58.0 PK	74.0	-16.0	1.87 V	169	39.9	18.1
7	11510.00	44.9 AV	54.0	-9.1	1.87 V	169	26.8	18.1

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 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	#5641.67	62.2 PK	68.2	-6.0	2.86 H	344	57.7	4.5
2	*5795.00	117.4 PK			2.86 H	344	77.0	40.4
3	*5795.00	106.8 AV			2.86 H	344	66.4	40.4
4	#5931.41	61.2 PK	68.2	-7.0	2.86 H	344	55.9	5.3
5	11590.00	59.3 PK	74.0	-14.7	2.00 H	221	41.7	17.6
6	11590.00	46.3 AV	54.0	-7.7	2.00 H	221	28.7	17.6
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	#5648.08	57.6 PK	68.2	-10.6	1.35 V	277	53.1	4.5
2	*5795.00	113.3 PK			1.35 V	277	72.9	40.4
3	*5795.00	102.9 AV			1.35 V	277	62.5	40.4
4	#5939.74	59.6 PK	68.2	-8.6	1.35 V	277	54.3	5.3
5	11590.00	58.7 PK	74.0	-15.3	1.89 V	185	41.1	17.6
6	11590.00	45.8 AV	54.0	-8.2	1.89 V	185	28.2	17.6

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.

802.11ac (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	66.4 PK	74.0	-7.6	2.21 H	331	62.0	4.4
2	5150.00	52.3 AV	54.0	-1.7	2.21 H	331	47.9	4.4
3	*5210.00	104.9 PK			2.09 H	332	65.5	39.4
4	*5210.00	94.6 AV			2.09 H	332	55.2	39.4
5	5350.00	56.7 PK	74.0	-17.3	2.27 H	302	52.4	4.3
6	5350.00	43.6 AV	54.0	-10.4	2.27 H	302	39.3	4.3
7	#10420.00	58.0 PK	68.2	-10.2	2.39 H	264	41.5	16.5
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	59.0 PK	74.0	-15.0	1.63 V	302	54.6	4.4
2	5150.00	46.1 AV	54.0	-7.9	1.63 V	302	41.7	4.4
3	*5210.00	99.3 PK			1.13 V	296	59.9	39.4
4	*5210.00	88.9 AV			1.13 V	296	49.5	39.4
5	5350.00	56.5 PK	74.0	-17.5	1.82 V	323	52.2	4.3
6	5350.00	43.3 AV	54.0	-10.7	1.82 V	323	39.0	4.3
7	#10420.00	58.1 PK	68.2	-10.1	1.68 V	199	41.6	16.5

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 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	#5639.10	65.1 PK	68.2	-3.1	2.63 H	2	60.6	4.5
2	#5650.00	66.5 PK	68.2	-1.7	2.62 H	1	62.0	4.5
3	*5775.00	109.5 PK			2.63 H	2	69.2	40.3
4	*5775.00	98.9 AV			2.63 H	2	58.6	40.3
5	#5925.00	62.3 PK	68.2	-5.9	2.63 H	345	57.0	5.3
6	#5928.85	61.0 PK	68.2	-7.2	2.63 H	2	55.7	5.3
7	11550.00	59.5 PK	74.0	-14.5	1.97 H	230	41.6	17.9
8	11550.00	45.8 AV	54.0	-8.2	1.97 H	230	27.9	17.9
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	#5643.59	61.3 PK	68.2	-6.9	1.16 V	280	56.8	4.5
2	#5650.00	63.0 PK	68.2	-5.2	1.27 V	271	58.5	4.5
3	*5775.00	105.2 PK			1.16 V	280	64.9	40.3
4	*5775.00	94.6 AV			1.16 V	280	54.3	40.3
5	#5925.00	61.0 PK	68.2	-7.2	1.21 V	285	55.7	5.3
6	#5925.64	58.6 PK	68.2	-9.6	1.16 V	280	53.3	5.3
7	11550.00	58.4 PK	74.0	-15.6	1.81 V	180	40.5	17.9
8	11550.00	45.4 AV	54.0	-8.6	1.81 V	180	27.5	17.9

Remarks:

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

Below 1GHz Worst-Case

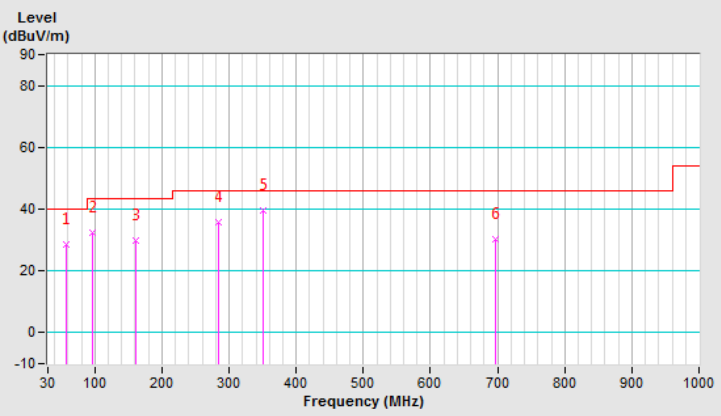
802.11n (HT40)

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B1

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	57.21	28.7 QP	40.0	-11.3	2.00 H	220	38.8	-10.1
2	96.09	32.5 QP	43.5	-11.0	2.00 H	213	46.5	-14.0
3	160.24	30.0 QP	43.5	-13.5	2.00 H	210	39.0	-9.0
4	284.65	35.6 QP	46.0	-10.4	1.00 H	162	43.3	-7.7
5	350.74	39.6 QP	46.0	-6.4	1.00 H	195	46.2	-6.6
6	696.75	30.2 QP	46.0	-15.8	2.00 H	2	30.0	0.2

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

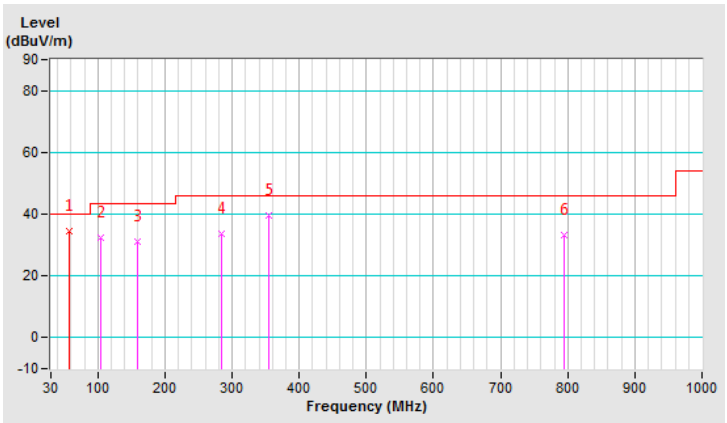


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B1

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.30	34.6 QP	40.0	-5.4	1.00 V	18	44.7	-10.1
2	103.87	32.4 QP	43.5	-11.1	1.00 V	79	45.5	-13.1
3	158.30	31.1 QP	43.5	-12.4	1.00 V	299	40.2	-9.1
4	284.65	33.5 QP	46.0	-12.5	1.49 V	152	41.2	-7.7
5	354.63	39.6 QP	46.0	-6.4	1.00 V	145	46.2	-6.6
6	793.95	33.3 QP	46.0	-12.7	1.00 V	159	31.0	2.3

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

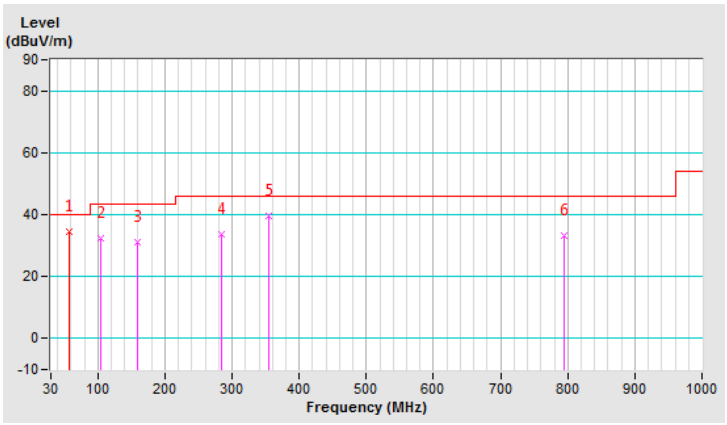


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B2

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	41.66	25.3 QP	40.0	-14.7	1.99 H	48	35.4	-10.1
2	57.21	28.1 QP	40.0	-11.9	1.99 H	143	38.2	-10.1
3	94.15	30.9 QP	43.5	-12.6	1.99 H	226	45.2	-14.3
4	160.24	29.2 QP	43.5	-14.3	1.99 H	223	38.2	-9.0
5	282.71	38.8 QP	46.0	-7.2	1.00 H	20	46.6	-7.8
6	352.69	41.7 QP	46.0	-4.3	1.00 H	194	48.3	-6.6

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.

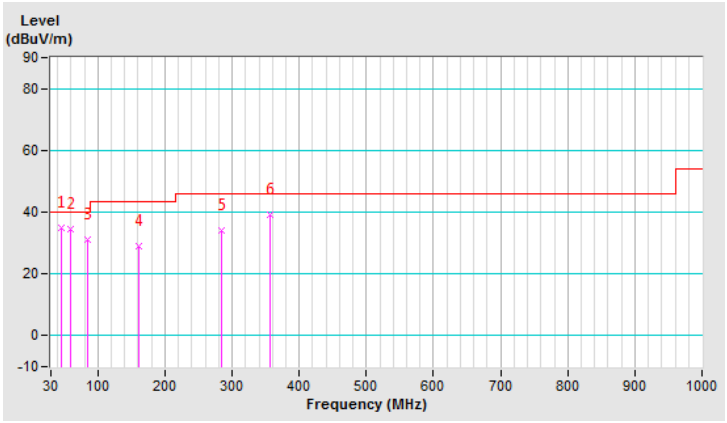


CHANNEL	TX Channel 159	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz	TEST MODE	B2

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	45.55	34.9 QP	40.0	-5.1	1.50 V	5	44.7	-9.8
2	59.16	34.5 QP	40.0	-5.5	1.01 V	52	44.6	-10.1
3	84.43	31.1 QP	40.0	-8.9	1.01 V	58	45.6	-14.5
4	160.24	29.0 QP	43.5	-14.5	1.01 V	58	38.0	-9.0
5	284.65	34.0 QP	46.0	-12.0	1.50 V	130	41.7	-7.7
6	356.57	39.1 QP	46.0	-6.9	1.01 V	144	45.6	-6.5

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. Margin value = Emission Level – Limit value
4. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20dB below the permissible value to be report.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Tested date: Aug. 03, 2019

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 10, 2018	Dec. 09, 2019
RF signal cable Woken	5D-FB	Cable-cond1-01	Sep. 05, 2018	Sep. 04, 2019
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 21, 2019	Feb. 20, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 19, 2018	Aug. 18, 2019
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-12040.

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.

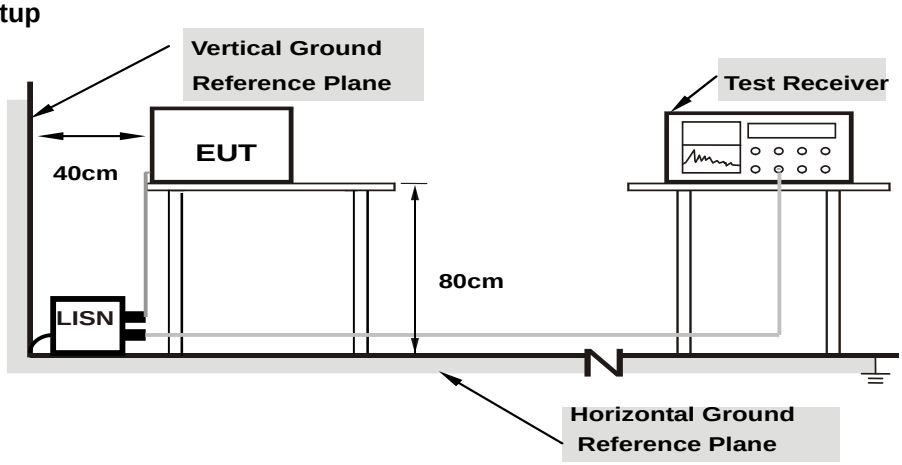
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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:

Radio 1

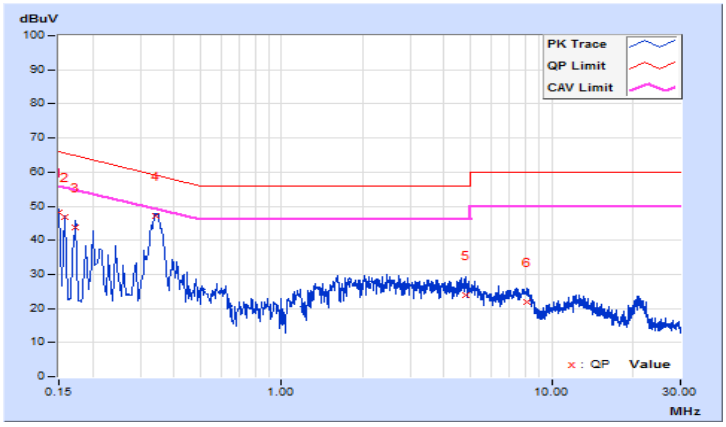
802.11n (HT40)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	A1

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	0.15000	9.84	38.18	23.44	48.02	33.28	66.00	56.00	-17.98	-22.72
2	0.15782	9.84	36.83	21.47	46.67	31.31	65.58	55.58	-18.91	-24.27
3	0.17346	9.84	33.98	20.04	43.82	29.88	64.79	54.79	-20.97	-24.91
4	0.34469	9.87	37.22	30.27	47.09	40.14	59.09	49.09	-12.00	-8.95
5	4.80681	10.04	13.85	7.76	23.89	17.80	56.00	46.00	-32.11	-28.20
6	8.07567	10.12	11.75	6.56	21.87	16.68	60.00	50.00	-38.13	-33.32

REMARKS:

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

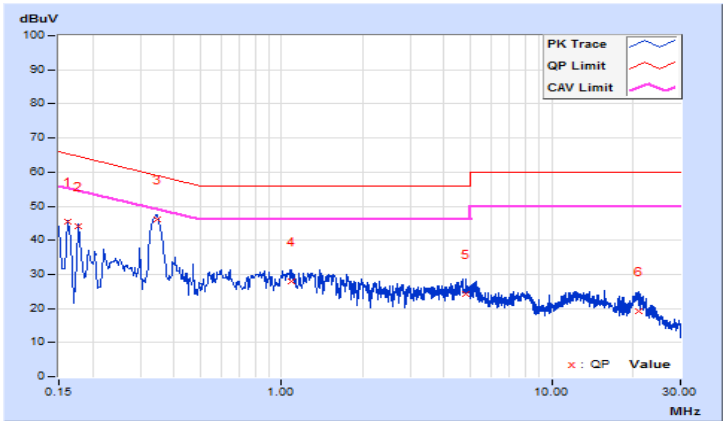


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	A1

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	0.16181	9.82	35.74	19.05	45.56	28.87	65.37	55.37	-19.81	-26.50
2	0.17744	9.83	34.40	21.84	44.23	31.67	64.60	54.60	-20.37	-22.93
3	0.34560	9.86	36.42	29.57	46.28	39.43	59.07	49.07	-12.79	-9.64
4	1.09231	9.88	18.14	13.43	28.02	23.31	56.00	46.00	-27.98	-22.69
5	4.83418	10.02	14.11	8.12	24.13	18.14	56.00	46.00	-31.87	-27.86
6	21.07632	10.32	8.96	3.16	19.28	13.48	60.00	50.00	-40.72	-36.52

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.

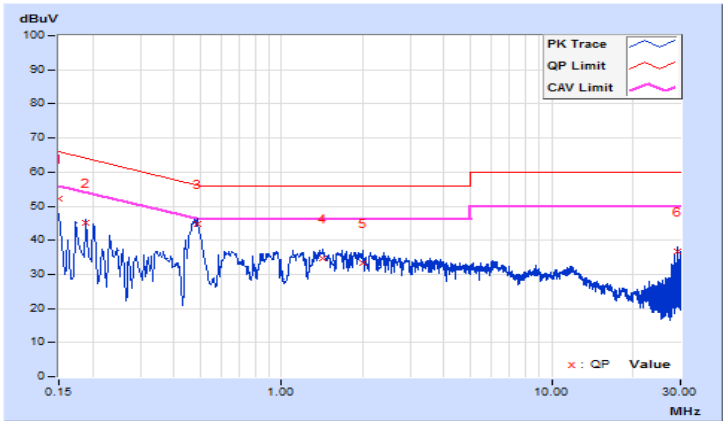


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	A2

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	0.15000	9.69	42.62	28.99	52.31	38.68	66.00	56.00	-13.69	-17.32
2	0.18903	9.68	35.60	22.52	45.28	32.20	64.08	54.08	-18.80	-21.88
3	0.48626	9.68	35.24	30.36	44.92	40.04	56.23	46.23	-11.31	-6.19
4	1.42857	9.68	24.93	20.94	34.61	30.62	56.00	46.00	-21.39	-15.38
5	2.00725	9.70	23.63	18.59	33.33	28.29	56.00	46.00	-22.67	-17.71
6	29.32642	9.95	26.61	25.15	36.56	35.10	60.00	50.00	-23.44	-14.90

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.

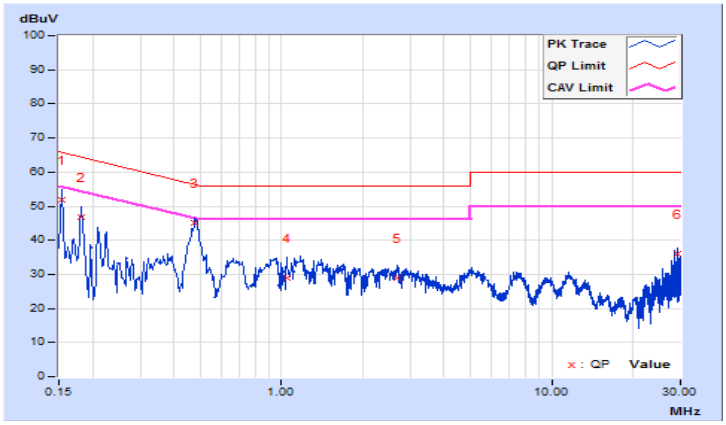


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	A2

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	9.66	42.16	28.16	51.82	37.82	65.79	55.79	-13.97	-17.97
2	0.18122	9.66	37.19	22.94	46.85	32.60	64.43	54.43	-17.58	-21.83
3	0.47915	9.65	35.59	30.75	45.24	40.40	56.35	46.35	-11.11	-5.95
4	1.04148	9.64	19.38	12.89	29.02	22.53	56.00	46.00	-26.98	-23.47
5	2.69541	9.69	19.35	13.92	29.04	23.61	56.00	46.00	-26.96	-22.39
6	29.33424	10.04	26.09	22.02	36.13	32.06	60.00	50.00	-23.87	-17.94

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.



Radio 2

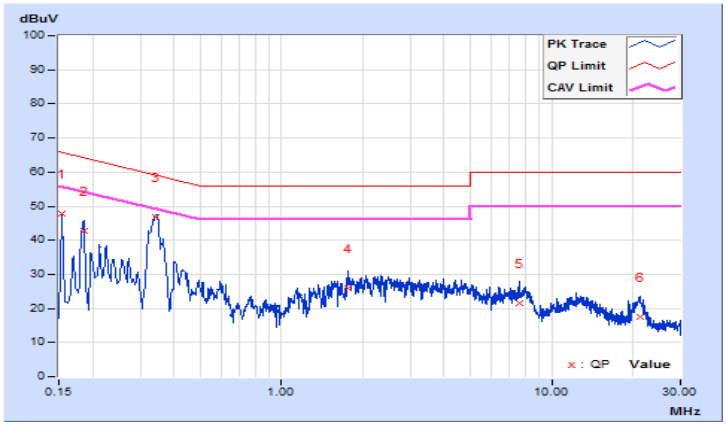
802.11n (HT40)

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	B1

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	0.15391	9.84	37.86	23.18	47.70	33.02	65.79	55.79	-18.09	-22.77
2	0.18508	9.85	32.87	18.45	42.72	28.30	64.25	54.25	-21.53	-25.95
3	0.34108	9.87	37.04	30.40	46.91	40.27	59.18	49.18	-12.27	-8.91
4	1.77265	9.94	15.94	10.81	25.88	20.75	56.00	46.00	-30.12	-25.25
5	7.56336	10.10	11.41	6.20	21.51	16.30	60.00	50.00	-38.49	-33.70
6	21.22881	10.25	7.33	0.61	17.58	10.86	60.00	50.00	-42.42	-39.14

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.

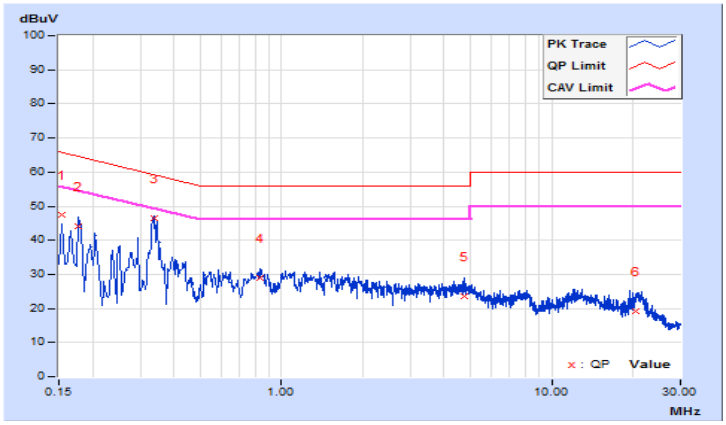


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	B1

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	9.82	37.81	24.20	47.63	34.02	65.79	55.79	-18.16	-21.77
2	0.17744	9.83	34.32	21.83	44.15	31.66	64.60	54.60	-20.45	-22.94
3	0.33768	9.86	36.48	29.75	46.34	39.61	59.26	49.26	-12.92	-9.65
4	0.83816	9.88	18.99	14.43	28.87	24.31	56.00	46.00	-27.13	-21.69
5	4.73252	10.02	13.67	7.63	23.69	17.65	56.00	46.00	-32.31	-28.35
6	20.42726	10.31	8.88	2.93	19.19	13.24	60.00	50.00	-40.81	-36.76

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.

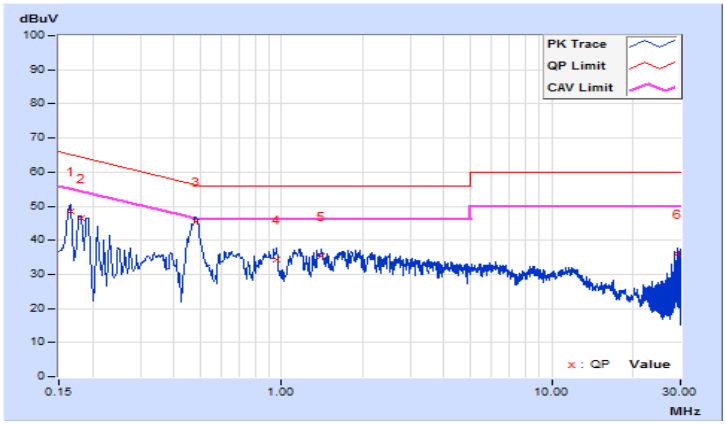


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	B2

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	0.16564	9.69	38.89	25.19	48.58	34.88	65.18	55.18	-16.60	-20.30
2	0.18122	9.68	36.65	23.44	46.33	33.12	64.43	54.43	-18.10	-21.31
3	**0.48235**	**9.68**	**35.83**	**31.28**	**45.51**	**40.96**	**56.30**	**46.30**	**-10.79**	**-5.34**
4	0.95561	9.67	24.83	21.01	34.50	30.68	56.00	46.00	-21.50	-15.32
5	1.40511	9.68	25.78	21.48	35.46	31.16	56.00	46.00	-20.54	-14.84
6	29.33033	9.95	26.23	23.76	36.18	33.71	60.00	50.00	-23.82	-16.29

REMARKS:

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

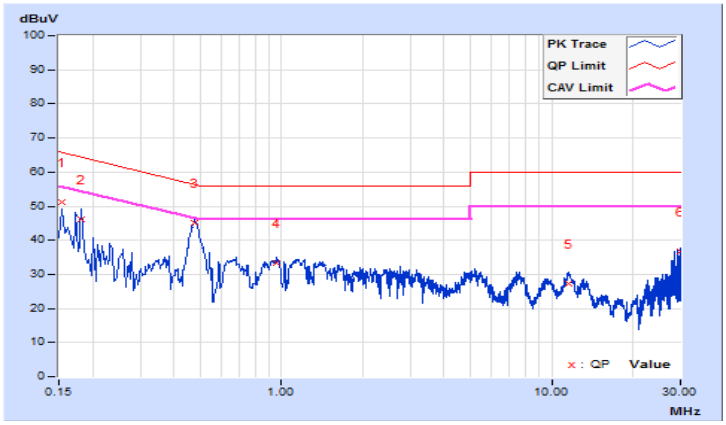


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Channel	TX Channel 159	Test Mode	B2

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	9.66	41.63	27.74	51.29	37.40	65.79	55.79	-14.50	-18.39
2	0.18122	9.66	36.58	22.49	46.24	32.15	64.43	54.43	-18.19	-22.28
3	0.47537	9.65	35.52	30.04	45.17	39.69	56.42	46.42	-11.25	-6.73
4	0.95546	9.64	23.58	19.86	33.22	29.50	56.00	46.00	-22.78	-16.50
5	11.58284	9.88	17.23	12.10	27.11	21.98	60.00	50.00	-32.89	-28.02
6	29.82299	10.04	26.74	24.75	36.78	34.79	60.00	50.00	-23.22	-15.21

REMARKS:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

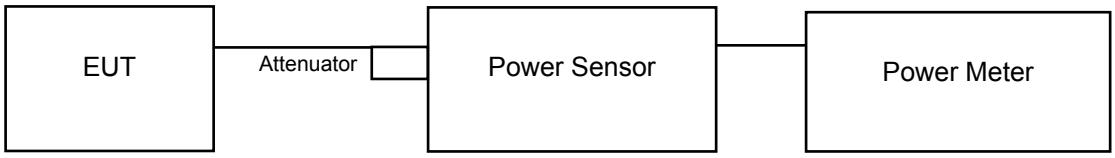
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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

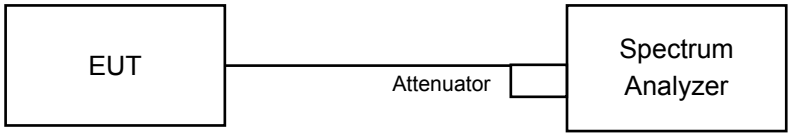
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

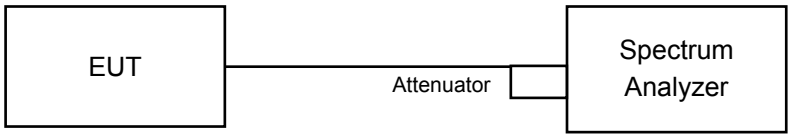
For Power Output
802.11a, 802.11n (HT20), 802.11n (HT40)



802.11ac (VHT80)



For Bandwidth



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

For 802.11a, 802.11n (HT20), 802.11n (HT40)
Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst and set the detector to AVERAGE. Duty factor is not added to measured value.

For 802.11ac (VHT80)
1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
2) Set sweep trigger to “free run”.
3) Set RBW = 1 MHz.
4) Set VBW ≥ 3 MHz.
5) Number of points in sweep ≥ 2 Span / RBW.
6) Sweep time ≤ (number of points in sweep) * T
7) Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
8) Detector = RMS.
9) Trace mode = max hold.
10) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.
11) Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

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

4.3.5 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:

Mode A2: Radio 1

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				
149	5745	22.91	23.41	414.714	26.18	30	Pass
157	5785	23.11	23.83	446.190	26.50	30	Pass
165	5825	23.06	23.88	446.645	26.50	30	Pass

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	23.42	23.40	438.562	26.42	30	Pass
157	5785	23.29	23.75	450.441	26.54	30	Pass
165	5825	23.22	23.89	454.800	26.58	30	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	21.46	21.28	274.235	24.38	30	Pass
159	5795	23.68	24.32	**503.742**	27.02	30	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	20.80	20.71	237.987	23.77	30	Pass

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				
149	5745	20.41	20.39	219.297	23.41	27.49	Pass
157	5785	20.28	20.74	225.237	23.53	27.49	Pass
165	5825	20.21	20.88	227.416	23.57	27.49	Pass

Note: Max. Beamforming Gain = 5.50dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	18.45	18.27	137.127	21.37	27.49	Pass
159	5795	20.67	21.31	**251.888**	24.01	27.49	Pass

Note: Max. Beamforming Gain = 5.50dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	17.79	17.70	119.001	20.76	27.49	Pass

Note: Max. Beamforming Gain = 5.50dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.

Mode B2: Radio 2

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	19.07	18.53	152.009	21.82	30	Pass
40	5200	22.83	23.02	392.314	25.94	30	Pass
48	5240	22.95	22.35	369.033	25.67	30	Pass
149	5745	23.45	22.22	388.034	25.89	30	Pass
157	5785	22.43	22.15	339.044	25.30	30	Pass
165	5825	23.75	21.97	394.535	25.96	30	Pass

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	18.97	18.51	149.844	21.76	30	Pass
40	5200	22.91	22.30	365.258	25.63	30	Pass
48	5240	23.10	23.15	**410.712**	26.14	30	Pass
149	5745	22.35	22.09	333.599	25.23	30	Pass
157	5785	23.76	22.06	398.378	26.00	30	Pass
165	5825	22.22	22.11	329.28	25.18	30	Pass

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	16.83	16.25	90.365	19.56	30	Pass
46	5230	21.03	20.45	237.682	23.76	30	Pass
151	5755	22.28	21.93	324.999	25.12	30	Pass
159	5795	24.22	22.81	**455.226**	26.58	30	Pass

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	15.69	15.13	69.652	18.43	30	Pass
155	5775	19.15	18.81	158.257	21.99	30	Pass

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	15.96	15.50	74.927	18.75	27.49	Pass
40	5200	19.90	19.29	182.642	22.62	27.49	Pass
48	5240	20.09	20.14	**205.370**	23.13	27.49	Pass
149	5745	19.34	19.08	166.811	22.22	27.49	Pass
157	5785	20.75	19.05	199.203	22.99	27.49	Pass
165	5825	19.21	19.10	164.651	22.17	27.49	Pass

Note: Max. Beamforming Gain = 5.50dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.

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	13.82	13.24	45.185	16.55	27.49	Pass
46	5230	18.02	17.44	118.850	20.75	27.49	Pass
151	5755	19.27	18.92	162.511	22.11	27.49	Pass
159	5795	21.21	19.80	**227.629**	23.57	27.49	Pass

Note: Max. Beamforming Gain = 5.50dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.

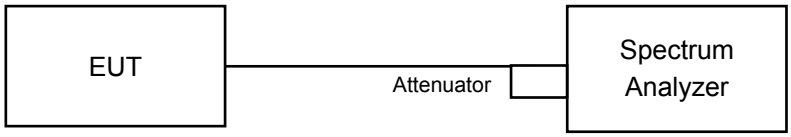
802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	12.68	12.12	34.828	15.42	27.49	Pass
155	5775	16.14	15.80	79.134	18.98	27.49	Pass

Note: Max. Beamforming Gain = 5.50dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.

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

Mode A2: Radio 1

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	28.09	18.52
157	5785	25.20	18.48
165	5825	24.60	19.92

802.11n (HT20)

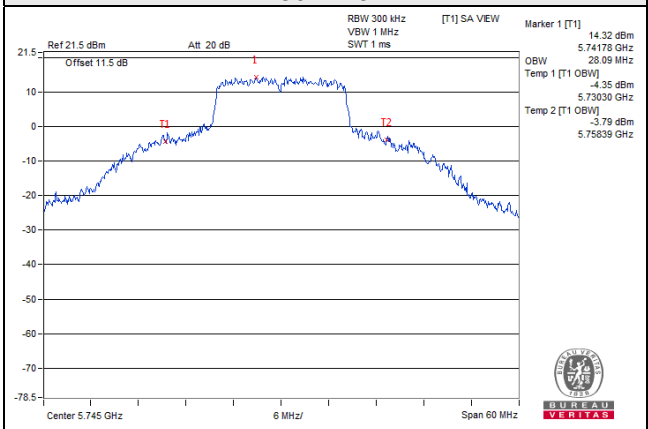
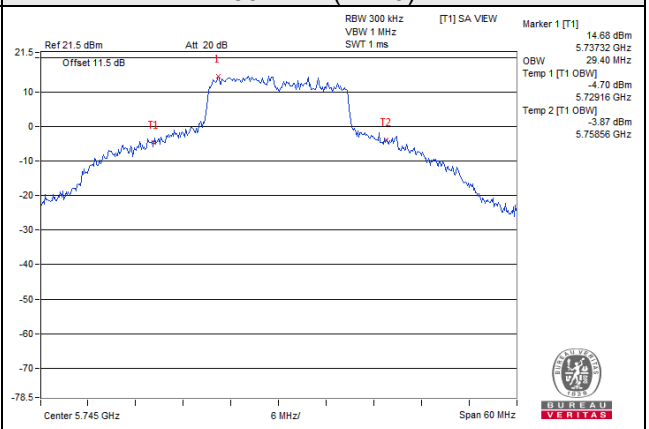
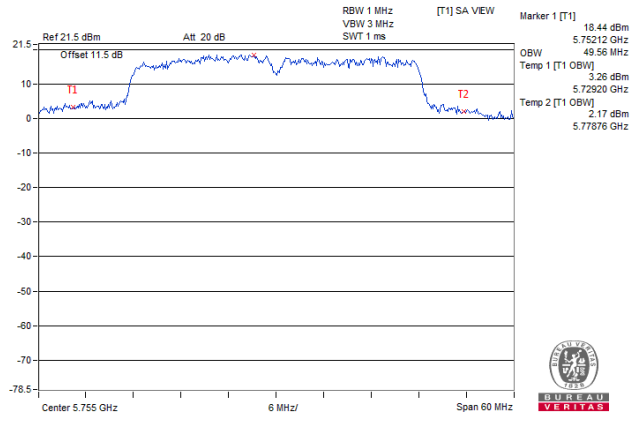
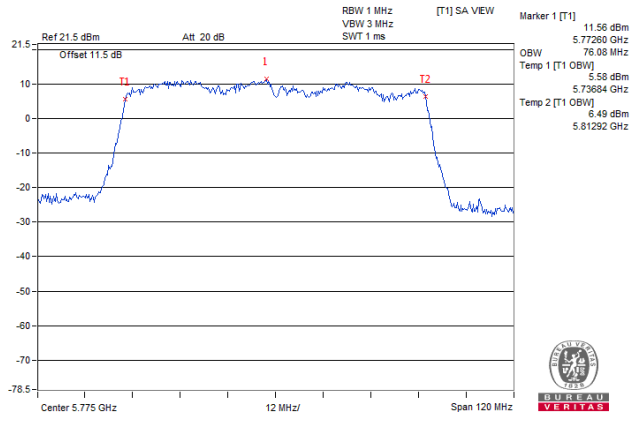
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	29.40	19.32
157	5785	26.40	18.24
165	5825	25.32	18.36

802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
151	5755	49.56	37.68
159	5795	47.52	37.80

802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
155	5775	76.08	75.84

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

Mode B2: Radio 2

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.56	16.56
40	5200	17.16	16.92
48	5240	16.92	17.04
149	5745	19.32	19.92
157	5785	20.64	20.40
165	5825	21.96	19.92

802.11n (HT20)

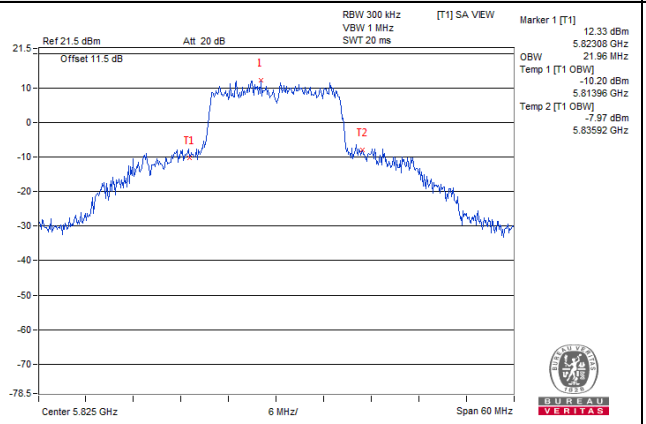
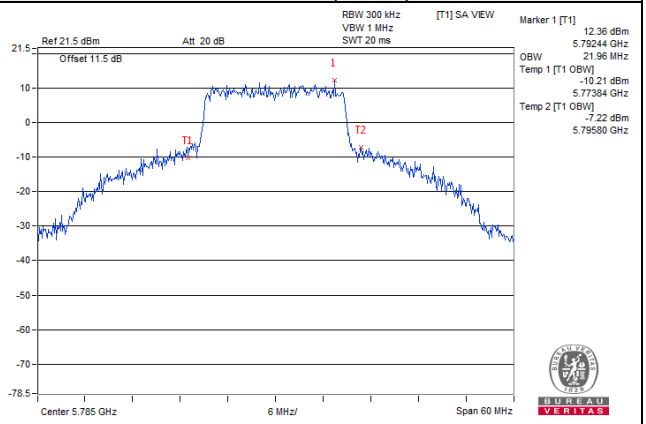
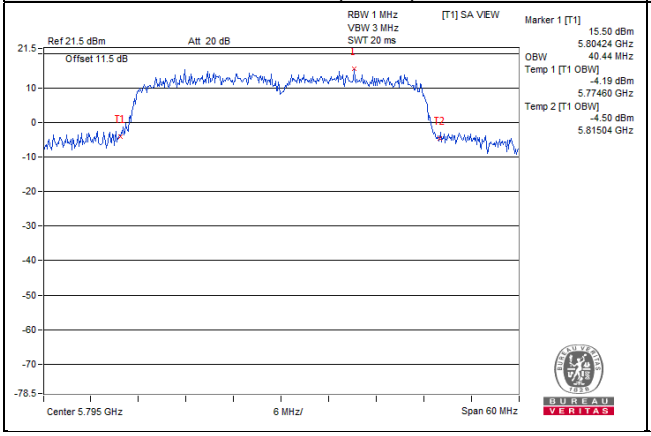
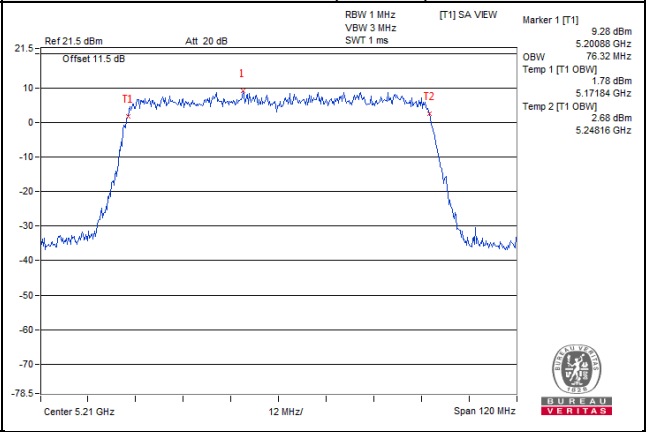
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.76	17.76
40	5200	18.12	18.12
48	5240	18.24	18.24
149	5745	20.28	21.12
157	5785	21.96	21.00
165	5825	21.84	20.76

802.11n (HT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.24	36.24
46	5230	36.24	36.24
151	5755	36.96	37.08
159	5795	39.48	40.44

802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	76.08	76.32
155	5775	75.60	75.84

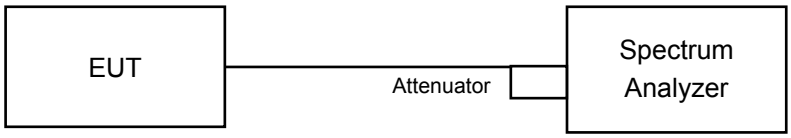
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1 band:
Duty cycle of test signal is ≥ 98%
Using method SA-1
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS.
3) Set Channel power measure = 1MHz.
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value.

Duty cycle of test signal is < 98%
Using method SA-2
1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
2) Set RBW = 1MHz, Set VBW ≥ 3 MHz, Detector = RMS.
3) Set Channel power measure = 1MHz.
4) Sweep time = auto, trigger set to “free run”.
5) Trace average at least 100 traces in power averaging mode.
6) Record the max value and add 10 log (1/duty cycle).

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

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

Mode A2: Radio 1

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	1.55	3.77	3.01	0.22	7.00	27.49	Pass
	157	5785	1.52	3.74	3.01	0.22	6.97	27.49	Pass
	165	5825	1.25	3.47	3.01	0.22	6.70	27.49	Pass
1	149	5745	2.22	4.44	3.01	0.22	7.67	27.49	Pass
	157	5785	2.06	4.28	3.01	0.22	7.51	27.49	Pass
	165	5825	2.54	4.76	3.01	0.22	7.99	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

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	2.16	4.38	3.01	0.10	7.49	27.49	Pass
	157	5785	2.14	4.36	3.01	0.10	7.47	27.49	Pass
	165	5825	2.09	4.31	3.01	0.10	7.42	27.49	Pass
1	149	5745	1.60	3.82	3.01	0.10	6.93	27.49	Pass
	157	5785	2.15	4.37	3.01	0.10	7.48	27.49	Pass
	165	5825	2.60	4.82	3.01	0.10	7.93	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

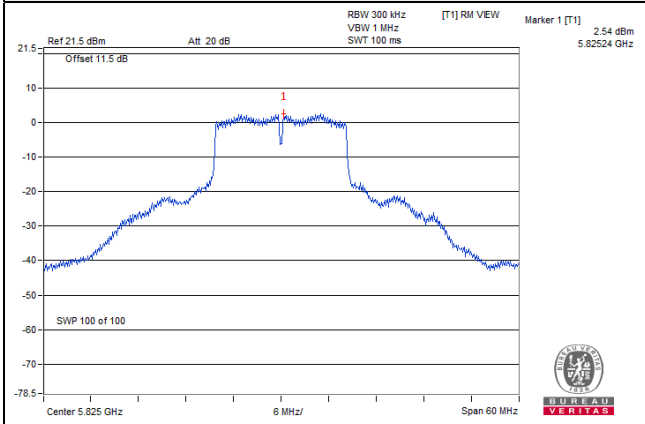
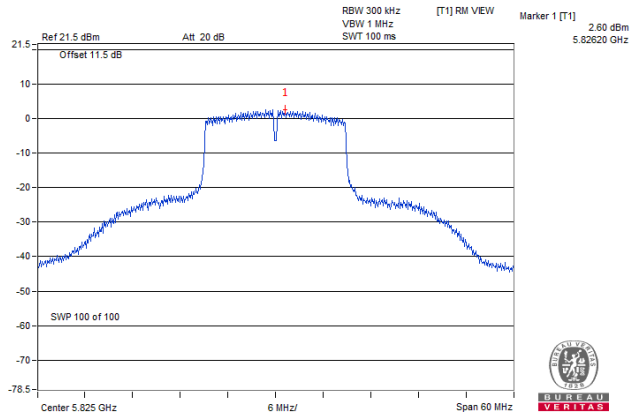
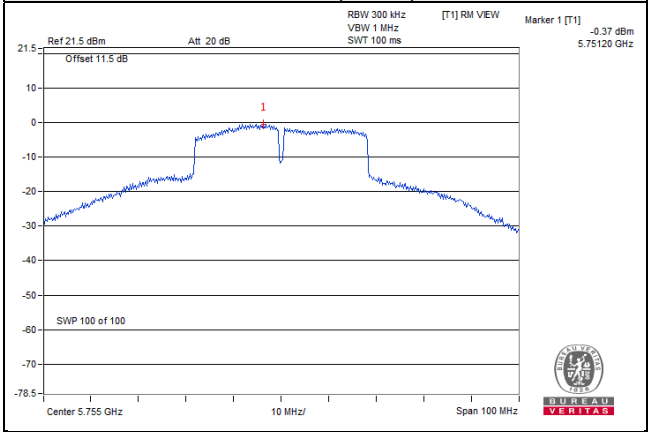
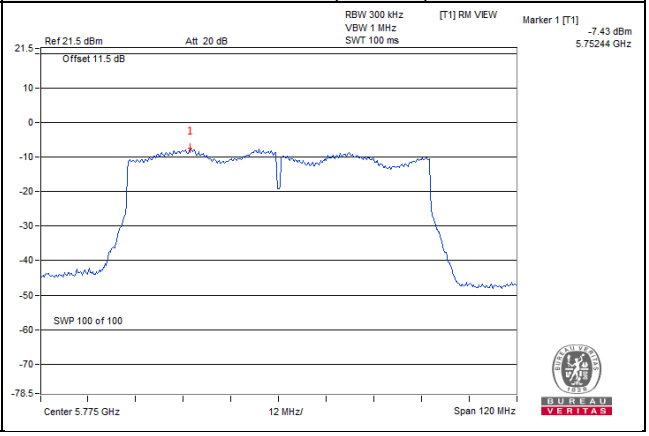
TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-0.37	1.85	3.01	0.18	5.04	27.49	Pass
	159	5795	-0.49	1.73	3.01	0.18	4.92	27.49	Pass
1	151	5755	-0.66	1.56	3.01	0.18	4.75	27.49	Pass
	159	5795	-0.56	1.66	3.01	0.18	4.85	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.
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	-7.43	-5.21	3.01	0.38	-1.82	27.49	Pass
1	155	5775	-8.59	-6.37	3.01	0.38	-2.98	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.
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)
	

Mode B2: Radio 2

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	3.76	3.92	0.18	7.03	14.49	Pass
40	5200	7.82	7.96	0.18	11.08	14.49	Pass
48	5240	8.15	8.36	0.18	11.45	14.49	Pass

Note:

1. Method E) 2) a) 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. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 17-(8.51-6) = 14.49dBm.
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	3.51	3.67	6.60	14.49	Pass
40	5200	7.44	7.70	10.58	14.49	Pass
48	5240	7.73	7.92	10.84	14.49	Pass

Note:

1. Method E) 2) a) 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. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 17-(8.51-6) = 14.49dBm.

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	-1.70	-1.05	0.17	1.82	14.49	Pass
46	5230	3.04	3.35	0.17	6.38	14.49	Pass

Note:

1. Method E) 2) a) 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. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 17-(8.51-6) = 14.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

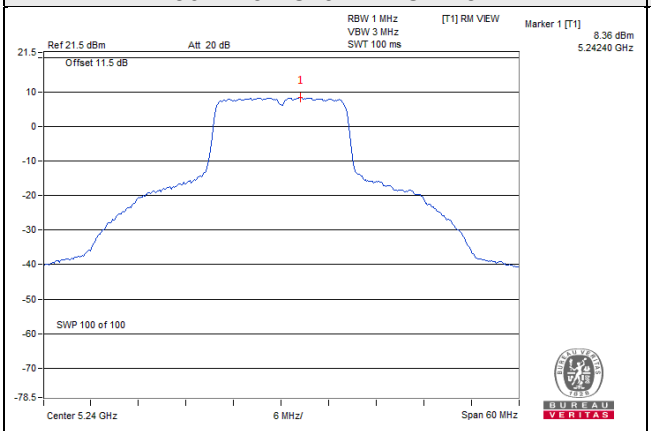
802.11ac (VHT80)

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	-6.05	-5.70	0.38	-2.48	14.49	Pass

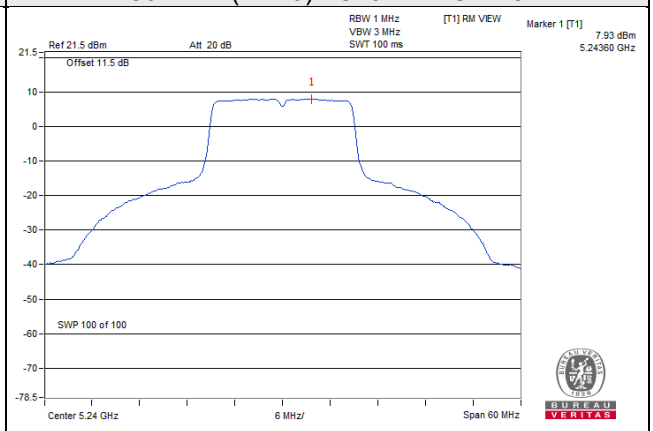
Note:
1. Method E) 2) a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 17-(8.51-6) = 14.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

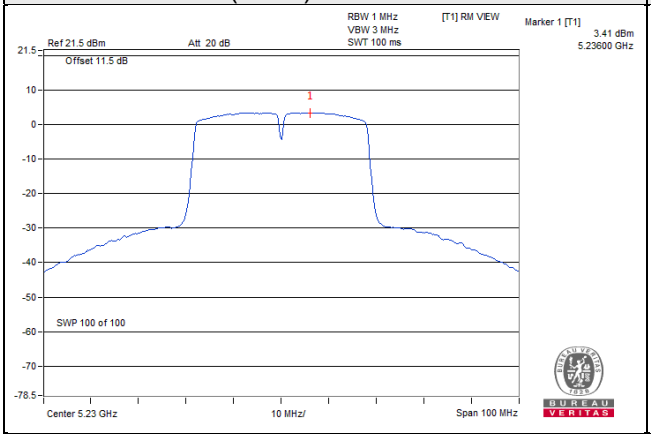
802.11a / Chain 1 / CH 48



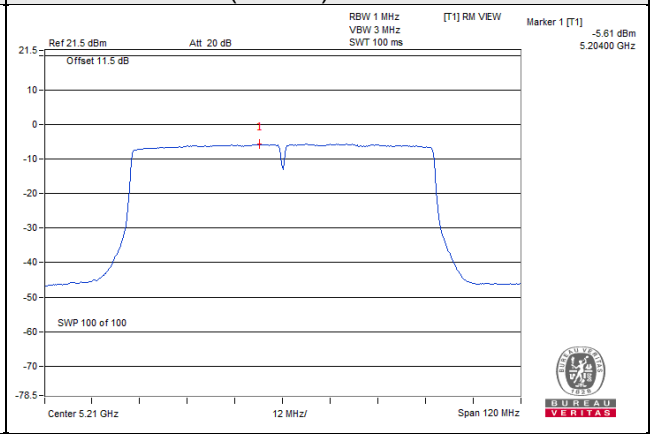
802.11n (HT20) / Chain 1 / CH 48



802.11n (HT40) / Chain 1 / CH 46



802.11ac (VHT80) / Chain 1 / CH 42



For U-NII-3 band:

802.11a

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	-0.19	2.03	3.01	0.18	0.70	27.49	Pass
	157	5785	-0.32	1.90	3.01	0.18	0.55	27.49	Pass
	165	5825	-0.60	1.62	3.01	0.18	0.20	27.49	Pass
1	149	5745	-0.53	1.69	3.01	0.18	1.35	27.49	Pass
	157	5785	-0.76	1.46	3.01	0.18	1.23	27.49	Pass
	165	5825	-0.98	1.24	3.01	0.18	0.70	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.
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	-0.65	1.57	3.01	4.58	27.49	Pass
	157	5785	-0.65	1.57	3.01	4.58	27.49	Pass
	165	5825	-1.10	1.12	3.01	4.13	27.49	Pass
1	149	5745	-0.77	1.45	3.01	4.46	27.49	Pass
	157	5785	-0.74	1.48	3.01	4.49	27.49	Pass
	165	5825	-1.04	1.18	3.01	4.19	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.

802.11n (HT40)

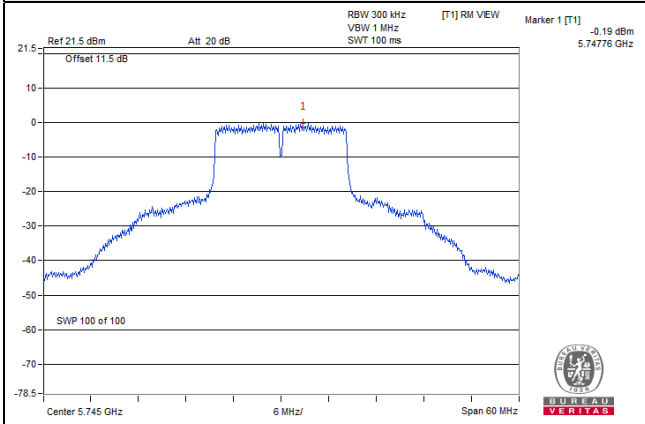
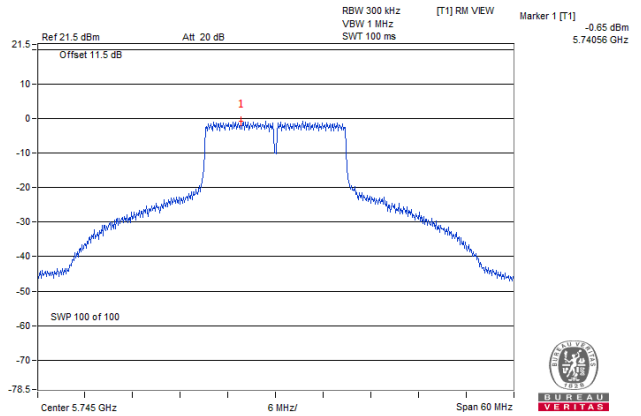
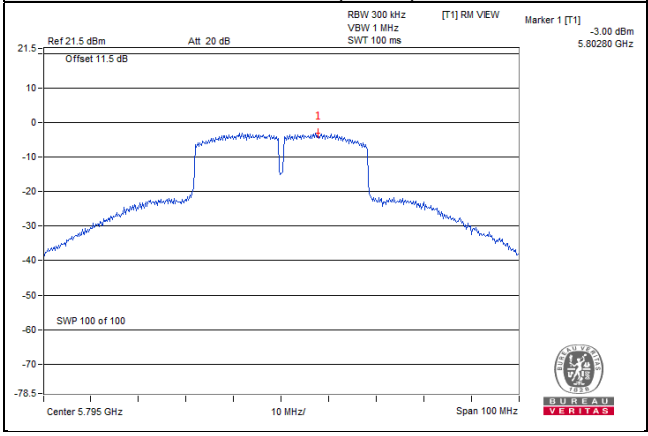
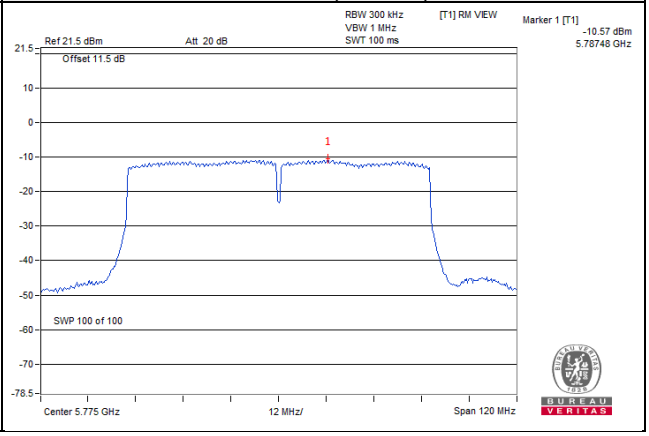
TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-3.96	-1.74	3.01	0.17	1.44	27.49	Pass
	159	5795	-3.00	-0.78	3.01	0.17	2.40	27.49	Pass
1	151	5755	-4.21	-1.99	3.01	0.17	1.19	27.49	Pass
	159	5795	-3.33	-1.11	3.01	0.17	2.07	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.
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	-10.57	-8.35	3.01	0.38	-4.96	27.49	Pass
1	155	5775	-11.07	-8.85	3.01	0.38	-5.46	27.49	Pass

Note:
1. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
2. Max. Directional Gain = 5.5dBi + 10log(2) = 8.51dBi > 6dBi, so the limit shall be reduced to 30-(8.51-6) = 27.49dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

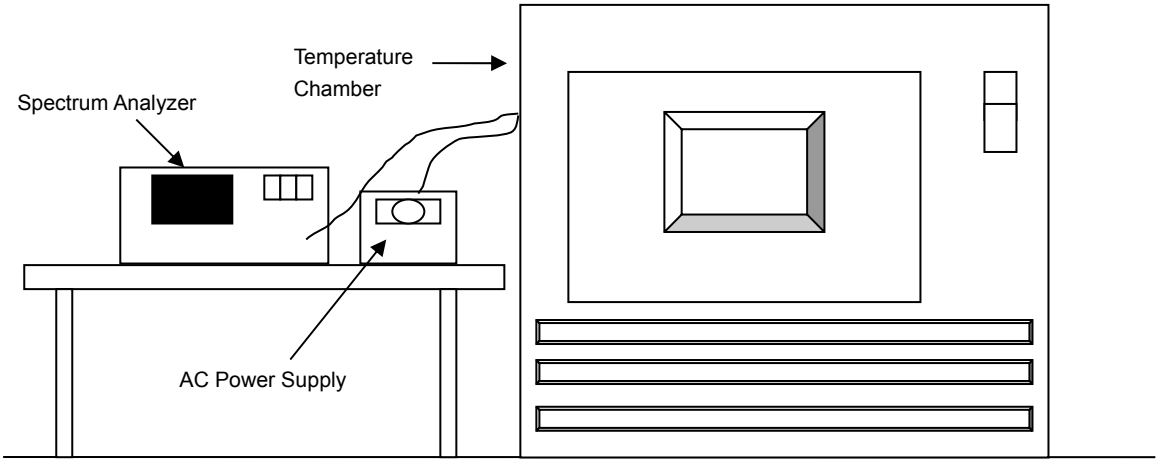
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

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

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2019	Jun. 11, 2020
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 03, 2019	Jun. 02, 2020
Digital Multimeter Fluke	87-III	70360742	Jun. 27, 2019	Jun. 26, 2020
AC Power Supply Extech	CFW-105	E000603	NA	NA

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 c and d with every 10 degrees reduction until the lowest temperature achieved.
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

Mode A2: Radio 1

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
40	120	5744.9912	PASS	5744.9904	PASS	5744.9909	PASS	5744.9936	PASS
30	120	5744.9763	PASS	5744.9732	PASS	5744.9759	PASS	5744.9759	PASS
20	120	5745.0108	PASS	5745.0121	PASS	5745.0115	PASS	5745.0102	PASS
10	120	5744.9892	PASS	5744.9885	PASS	5744.9935	PASS	5744.9895	PASS
0	120	5744.9833	PASS	5744.9869	PASS	5744.9831	PASS	5744.9833	PASS

Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5745.0114	PASS	5745.0129	PASS	5745.0106	PASS	5745.011	PASS
	120	5745.0108	PASS	5745.0121	PASS	5745.0115	PASS	5745.0102	PASS
	102	5745.011	PASS	5745.0117	PASS	5745.0114	PASS	5745.0111	PASS

Mode B2: Radio 2

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
40	120	5179.9998	PASS	5180.0006	PASS	5179.9996	PASS	5179.9965	PASS
30	120	5179.9887	PASS	5179.9875	PASS	5179.9909	PASS	5179.9911	PASS
20	120	5180.0195	PASS	5180.0214	PASS	5180.022	PASS	5180.0179	PASS
10	120	5179.9896	PASS	5179.9887	PASS	5179.9896	PASS	5179.9896	PASS
0	120	5179.9961	PASS	5179.9945	PASS	5179.9932	PASS	5179.9928	PASS

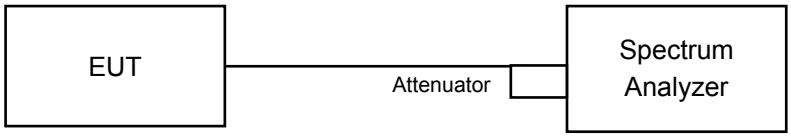
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0203	PASS	5180.0207	PASS	5180.0212	PASS	5180.0186	PASS
	120	5180.0195	PASS	5180.0214	PASS	5180.022	PASS	5180.0179	PASS
	102	5180.0205	PASS	5180.0205	PASS	5180.0225	PASS	5180.0169	PASS

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

Measurement Procedure REF

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

Mode A2: Radio 1

802.11a

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.34	16.37	0.5	Pass
157	5785	16.36	16.37	0.5	Pass
165	5825	16.35	15.16	0.5	Pass

802.11n (HT20)

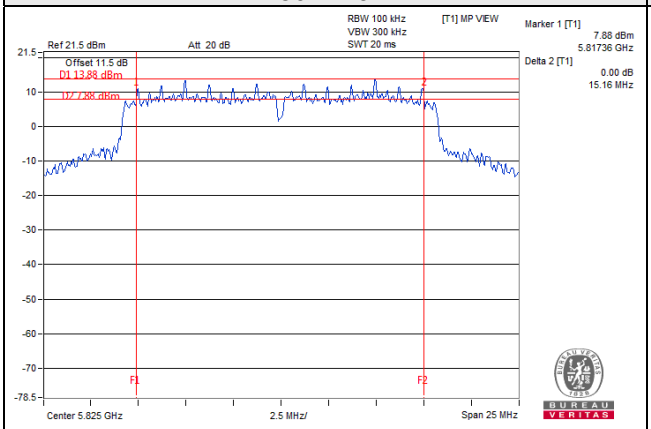
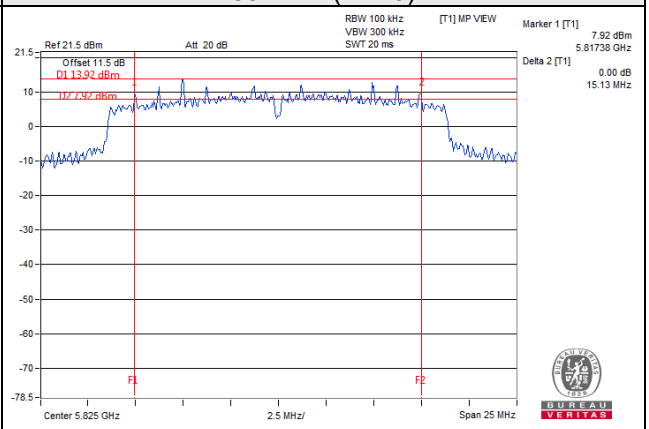
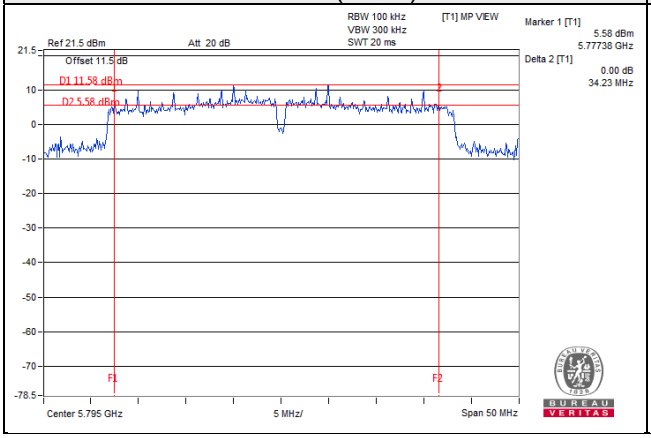
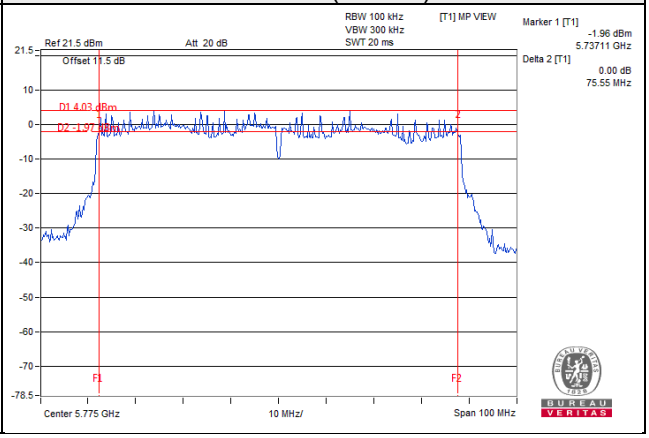
Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.44	17.64	0.5	Pass
157	5785	16.00	17.61	0.5	Pass
165	5825	15.13	15.18	0.5	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.14	35.21	0.5	Pass
159	5795	34.23	35.19	0.5	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.55	75.64	0.5	Pass

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

Mode B2: Radio 2

802.11a

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.40	16.37	0.5	Pass
157	5785	16.40	16.38	0.5	Pass
165	5825	16.39	16.37	0.5	Pass

802.11n (HT20)

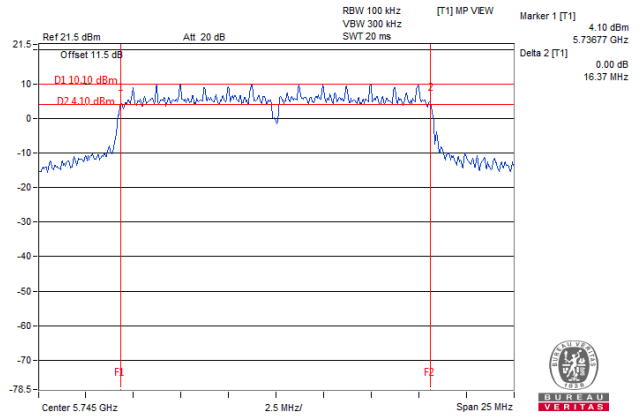
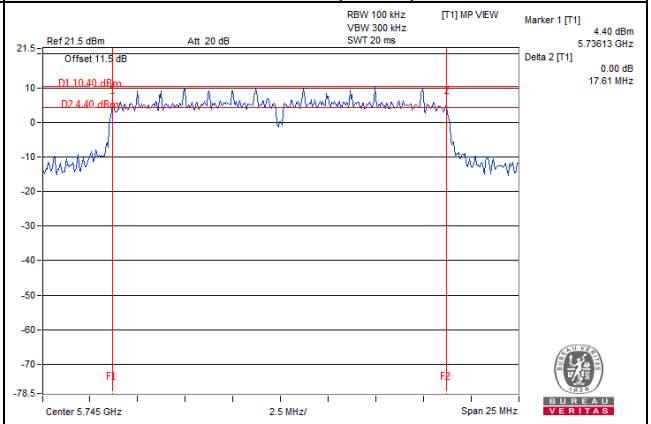
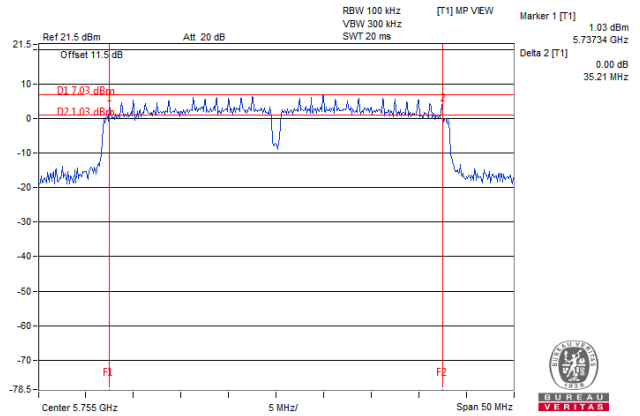
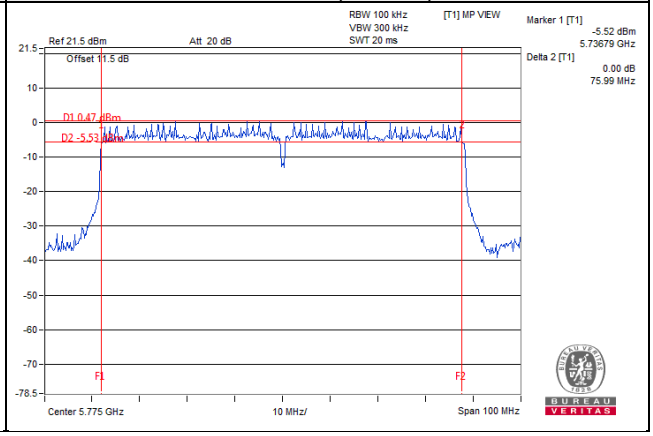
Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.65	17.61	0.5	Pass
157	5785	17.64	17.62	0.5	Pass
165	5825	17.63	17.61	0.5	Pass

802.11n (HT40)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.23	35.21	0.5	Pass
159	5795	35.24	35.35	0.5	Pass

802.11ac (VHT80)

Chan.	Freq. (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.99	76.09	0.5	Pass

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

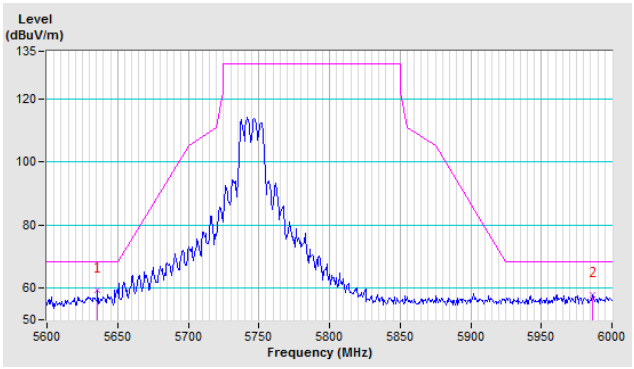
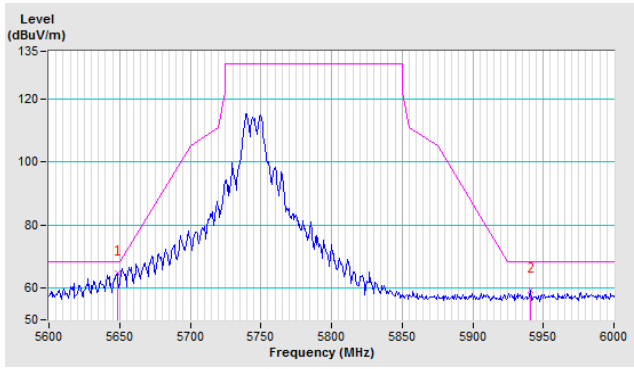
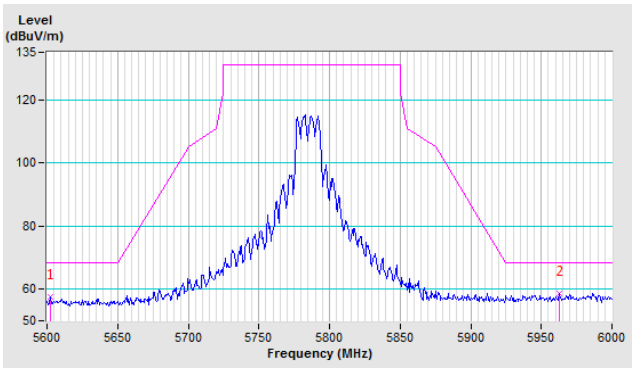
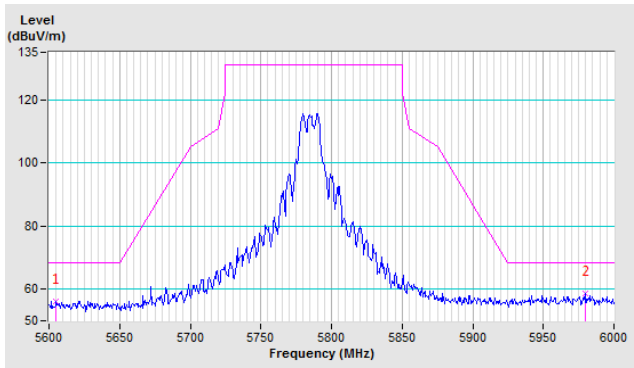
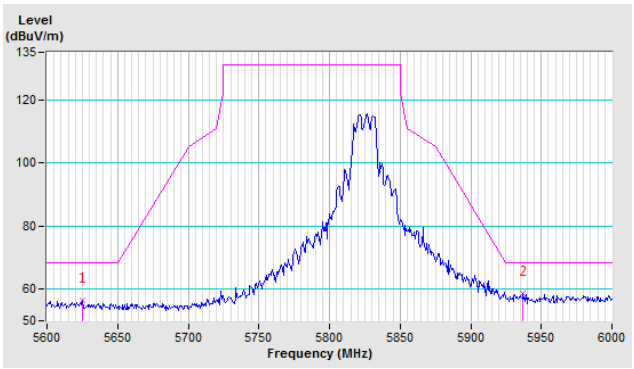
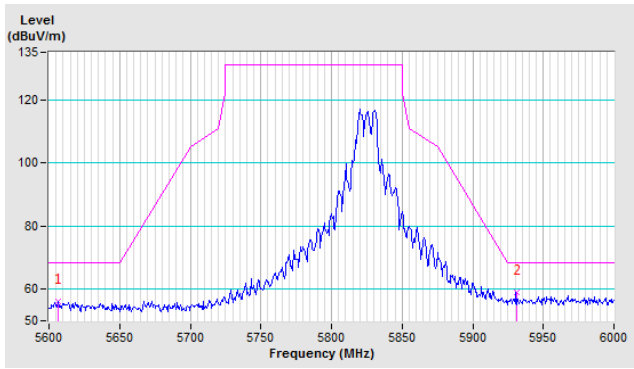
5 Pictures of Test Arrangements

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

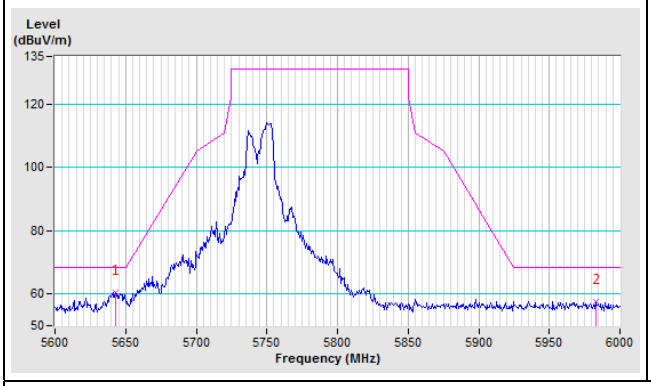
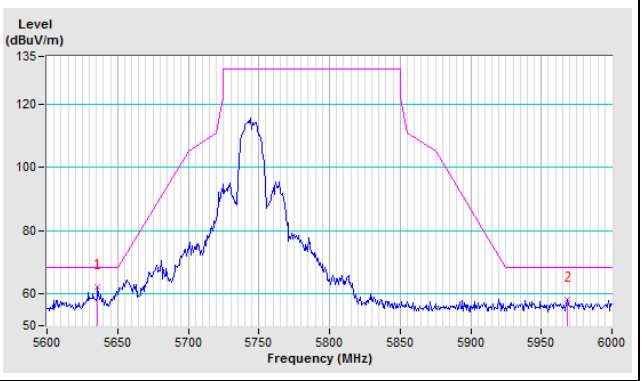
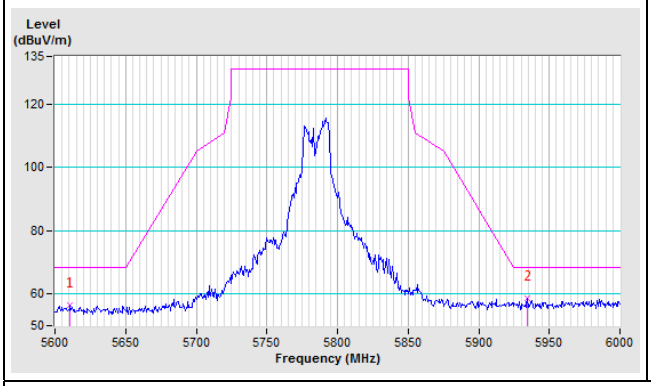
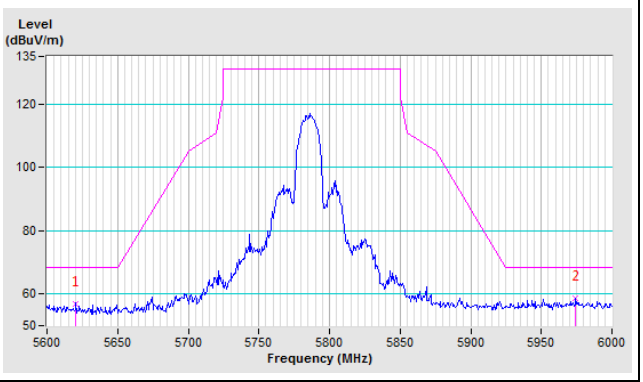
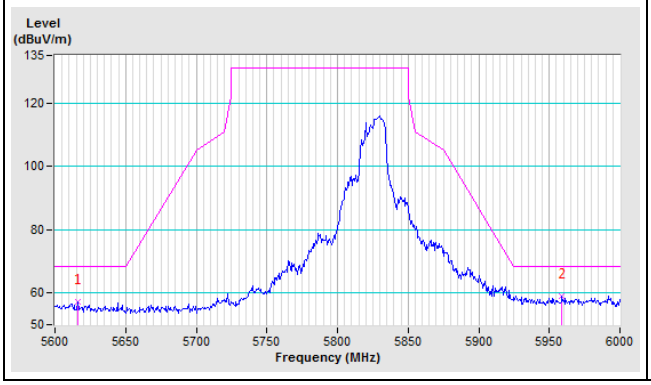
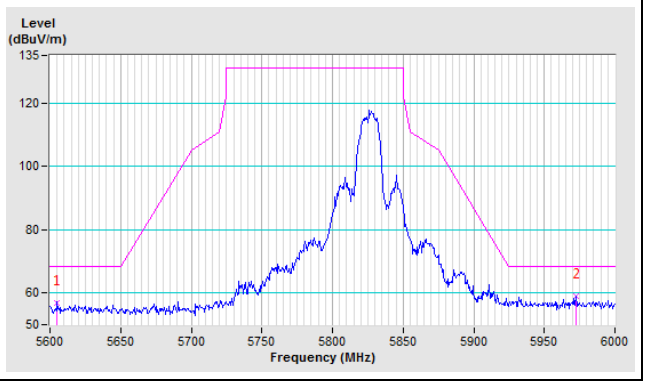
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

Mode A2: Radio 1

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)

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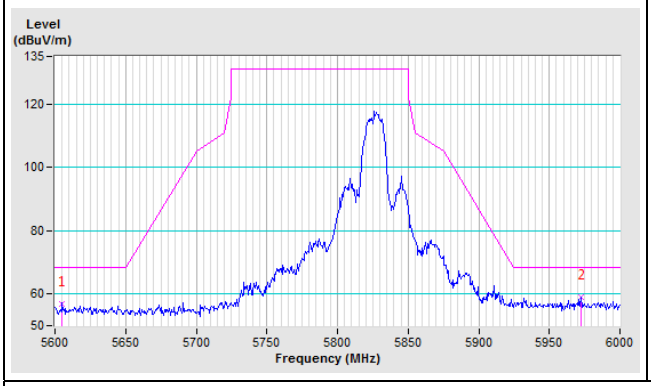
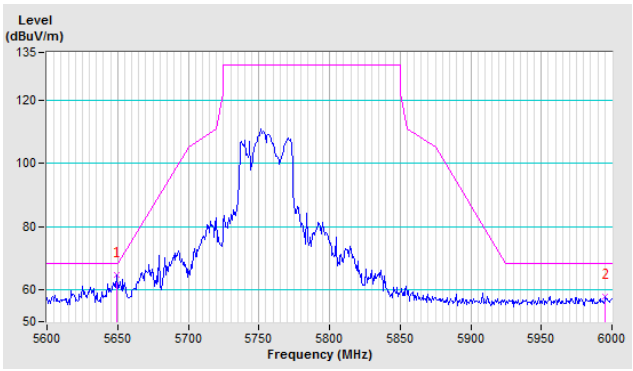
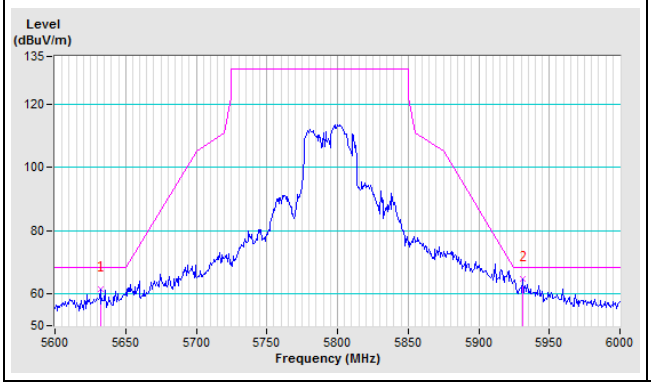
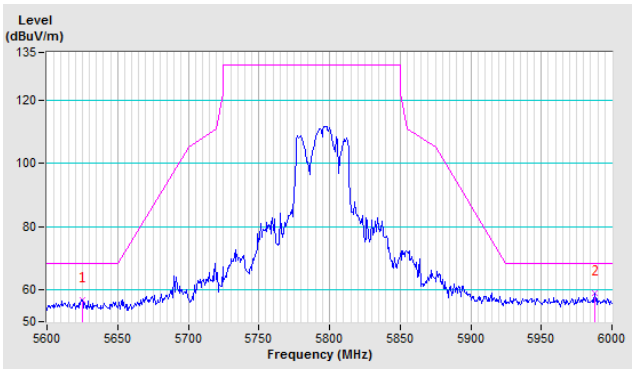
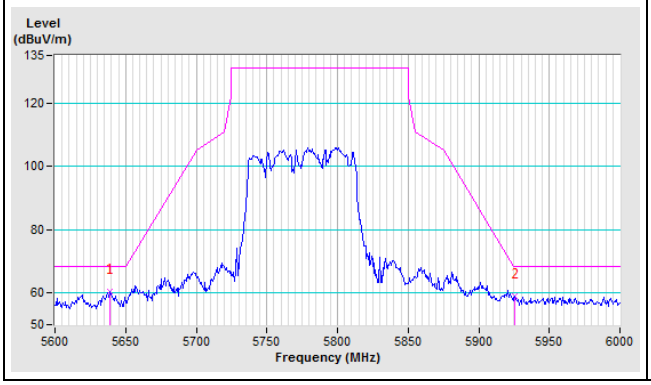
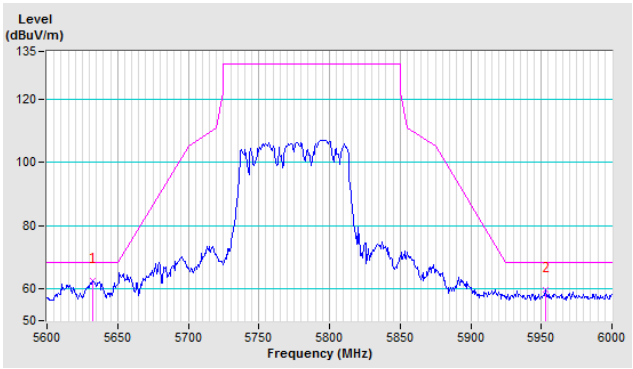
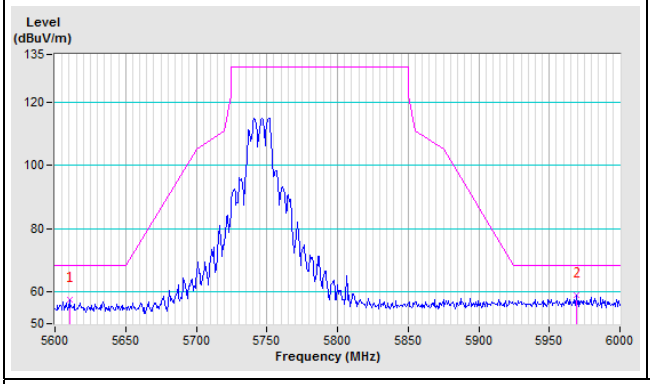
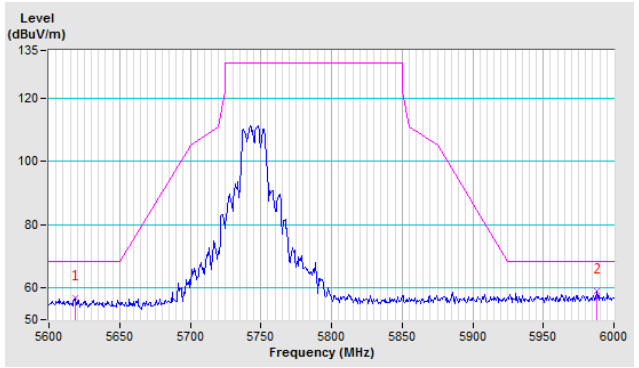
Horizontal	Vertical
	
CH159	
Horizontal	Vertical
	

802.11ac (VHT80)

CH155	
Horizontal	Vertical
	

Mode B2: Radio 2

802.11a

CH149	
Horizontal	Vertical
	
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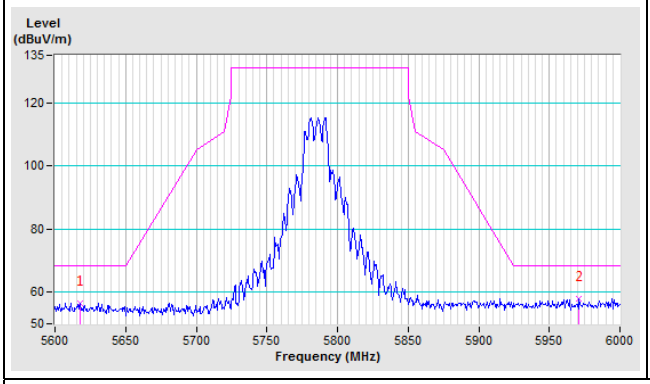
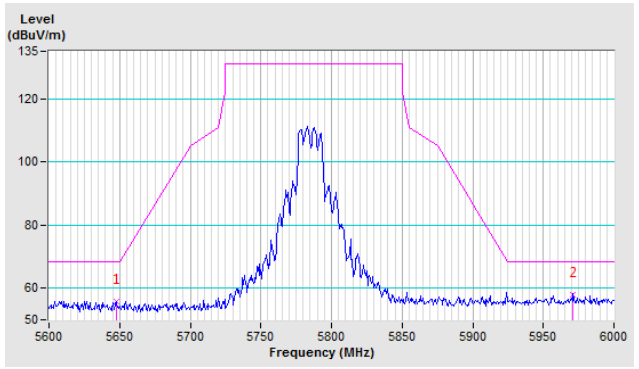
Horizontal	Vertical
	
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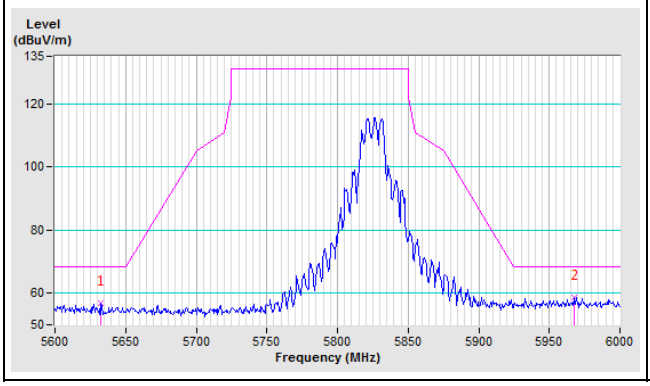
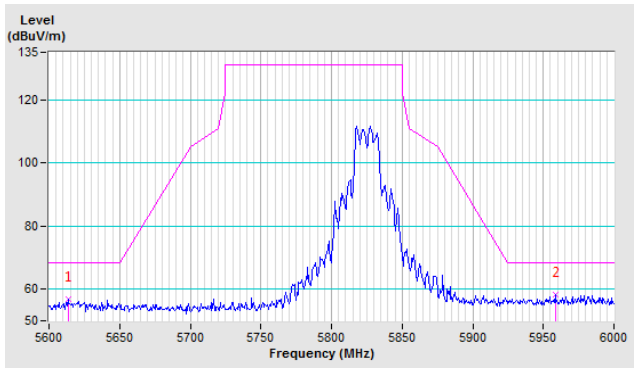
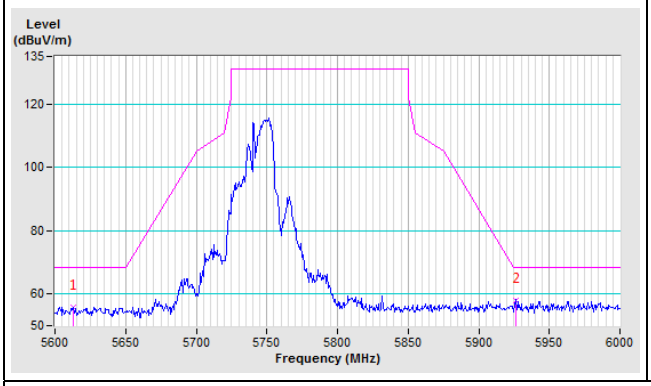
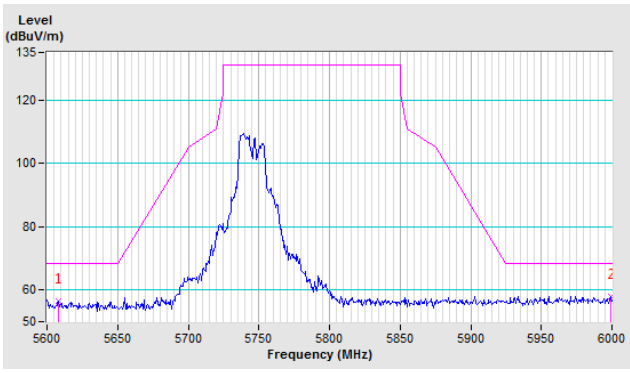
	

802.11n (HT20)

CH149	
Horizontal	Vertical
	
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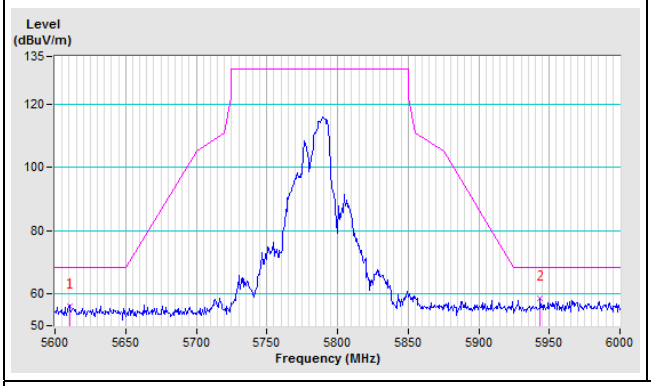	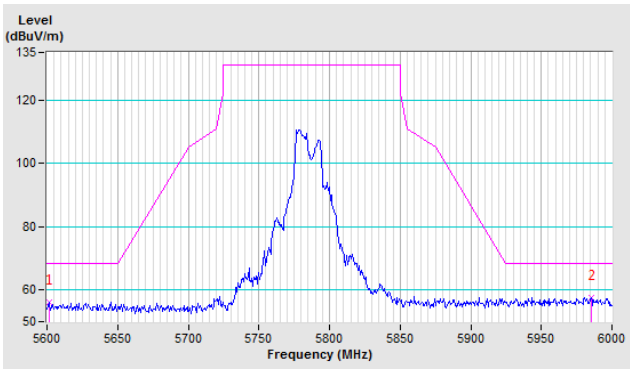
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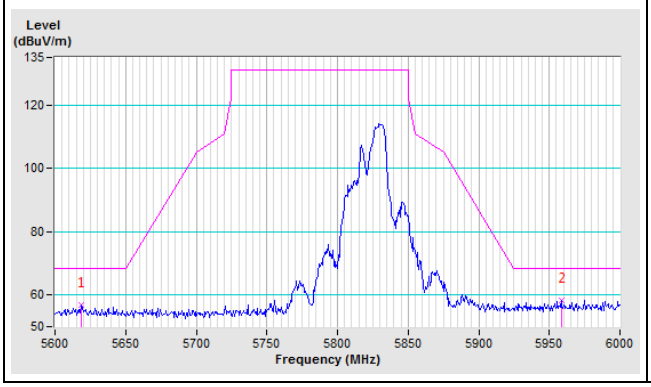
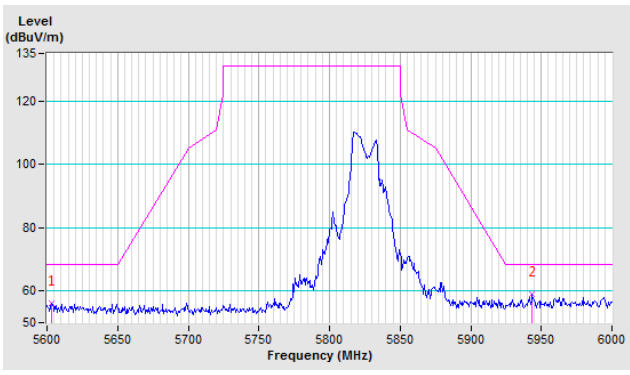
Horizontal	Vertical
	

802.11n (HT40)

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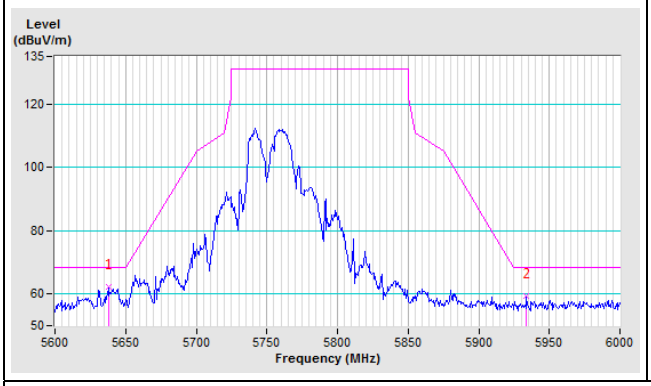
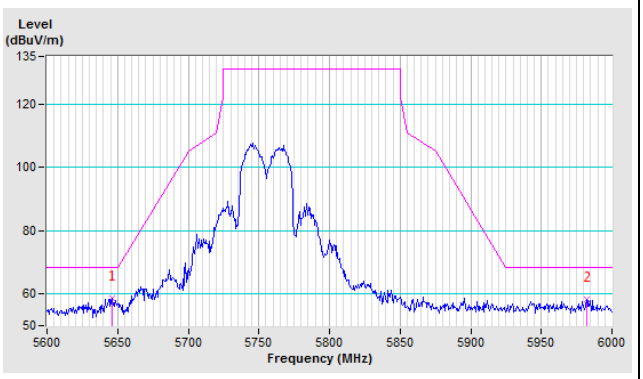
Horizontal	Vertical
	
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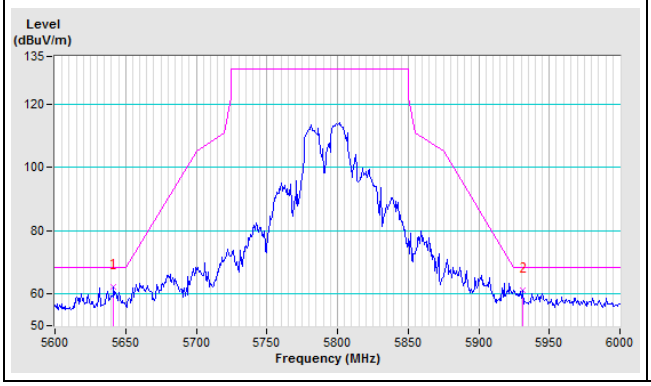
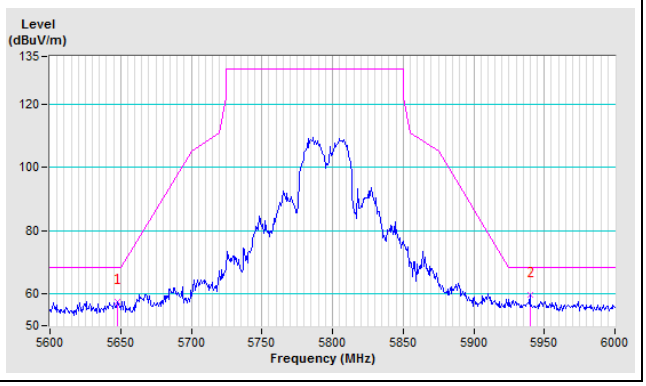
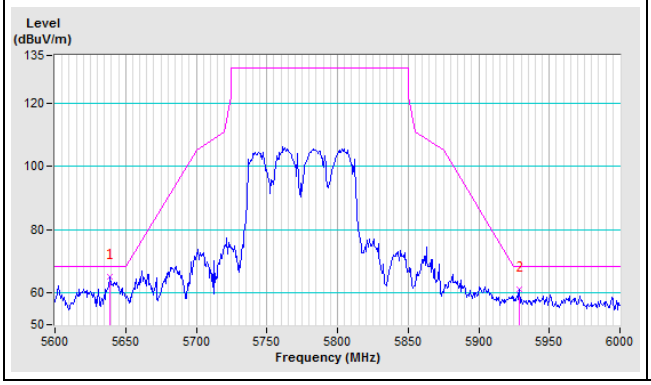
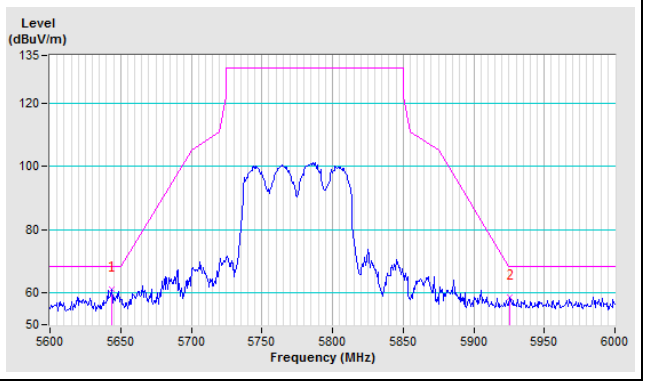
Horizontal	Vertical
	

802.11ac (VHT80)

CH155	
Horizontal	Vertical
	

Appendix – Information of 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.

If you have any comments, please feel free to contact us at the following:

Lin Kou EMC/RF Lab
Tel: 886-2-26052180
Fax: 886-2-26051924

Hsin Chu EMC/RF/Telecom Lab
Tel: 886-3-6668565
Fax: 886-3-6668323

Hwa Ya EMC/RF/Safety Lab
Tel: 886-3-3183232
Fax: 886-3-3270892

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

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

--- END ---