FCC Test Report

Report No.:	RF181129C36-1
FCC ID:	A8J-EWS385AP
Test Model:	EWS385AP
Series Model:	EAP2250, ECW125 (refer to item 3.1 for more details)
Received Date:	Nov. 29, 2018
Test Date:	Dec. 19 ~ Dec. 28, 2018
Issued Date:	Jan. 07, 2019
Applicant:	EnGenius Technologies
Address:	1580 Scenic Avenue, Costa Mesa, CA92626
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RF181129C36-1	Original release	Jan. 07, 2019

1 Certificate of Conformity

Product:	AC2200 Tri Band Indoor Ceiling Mount Access Point
Brand:	EnGenius
Test Model:	EWS385AP
Series Model:	EAP2250, ECW125 (refer to item 3.1 for more details)
Sample Status:	Engineering sample
Applicant:	EnGenius Technologies
Test Date:	Dec. 19 ~ Dec. 28, 2018
Standards:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10:2013

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

Prepared by : Celine Chou , **Date:** Jan. 07, 2019

Celine Chou / Senior Specialist

Approved by : Bruce Chen , **Date:** Jan. 07, 2019

Bruce Chen / 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 -8.64dB at 0.47813MHz.
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 -1.2dB at 5650.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is 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.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AC2200 Tri Band Indoor Ceiling Mount Access Point
Brand	EnGenius
Test Model	EWS385AP
Series Model	EAP2250, ECW125
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	CDD Mode: 5180 ~ 5240MHz: 177.701mW 5745 ~ 5825MHz: 213.569mW Beamforming Mode: 5180 ~ 5240MHz: 88.857mW 5745 ~ 5825MHz: 106.791mW
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.

Brand	Model	Description
EnGenius	EWS385AP	For marketing definition
	EAP2250	
	ECW125	

* The model of the EWS385AP was chosen for final test.

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

Band	Modulation Mode	Beamforming Mode	TX Function	Remark
5GHz Band 1	802.11a	Not Support	2TX	Radio 3 (Ant. 4, 5)
	802.11n (HT20)	Support	2TX	
	802.11n (HT40)	Support	2TX	
	802.11ac (VHT20)	Support	2TX	
	802.11ac (VHT40)	Support	2TX	
	802.11ac (VHT80)	Support	2TX	
5GHz Band 4	802.11a	Not Support	2TX	Radio 2 (Ant. 3, 6)
	802.11n (HT20)	Support	2TX	
	802.11n (HT40)	Support	2TX	
	802.11ac (VHT20)	Support	2TX	
	802.11ac (VHT40)	Support	2TX	
	802.11ac (VHT80)	Support	2TX	

* The modulation and bandwidth are similar for 802.11n mode for 20MHz/40MHz and 802.11ac mode for 20MHz/40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)
* For 802.11n and 802.11ac, CDD mode and Beamforming mode are presented in power output test item. For other test items, CDD mode is the worst case for final tests after pretesting.

3. The EUT consumes power from the following adapter & POE.

Adapter (support unit only)	
Brand	DEE VAN ENTERPRIE CO., LTD
Model	DSA-12PFT-12 FUS 120100
Input Power	100-240Vac, 50/60Hz, 0.5A
Output Power	12Vdc, 1A
Power Line	1.45m DC cable without core attached on adapter

POE (support unit only)	
Brand	EnGenius
Model	EPA5006GP
Input Power	100-240Vac, 50-60Hz, 0.8A
Output Power	54Vdc, 0.6A
Power Line	0.5m AC cable without core

4. The following antennas were provided to the EUT.

Ant. No.	1	2	3	4	5	6
Ant. Type	PIFA	PIFA	PIFA	PIFA	PIFA	PIFA
Ant. Connector	IPEX	IPEX	IPEX	IPEX	IPEX	IPEX
Frequency (MHz)	2400-2500		5150-5875			
Peak Gain (dBi)	4.62	4.44	5.97	5.94	5.88	5.99
Remark	Radio 1 (WLAN 2.4G)		Radio 2 (WLAN 5G Band 4)	Radio 3 (WLAN 5G Band 1)		Radio 2 (WLAN 5G Band 4)

5. 2.4GHz (Radio 1) & 5GHz (Radio 2) & 5GHz (Radio 3) technology can transmit at same time.
6. Spurious emission of the simultaneous operation (2.4GHz (Radio 1) & 5GHz (Radio 2) & 5GHz (Radio 3)) has been evaluated and no non-compliance was found.

3.2 Description of Test Modes

For 5180 ~ 5240MHz:

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

For 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Powered by adapter
B	-	√	√	-	Powered by 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: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)	Remark
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0	Radio 3
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5	Radio 3
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5	Radio 3
	802.11ac (VHT80)		42	42	OFDM	29.3	Radio 3
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	Radio 2
	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	6.5	Radio 2
	802.11n (HT40)		151 to 159	151, 159	OFDM	13.5	Radio 2
	802.11ac (VHT80)		155	155	OFDM	29.3	Radio 2

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
A, B	802.11a	5180-5240	36 to 48	48	OFDM	6.0	Radio 3
A, B	802.11a	5745-5825	149 to 165	165	OFDM	6.0	Radio 2

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
A, B	802.11a	5180-5240	36 to 48	48	OFDM	6.0	Radio 3
A, B	802.11a	5745-5825	149 to 165	165	OFDM	6.0	Radio 2

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
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0	Radio 3
	802.11n (HT20)		36 to 48	36, 40, 48	OFDM	6.5	Radio 3
	802.11n (HT40)		38 to 46	38, 46	OFDM	13.5	Radio 3
	802.11ac (VHT80)		42	42	OFDM	29.3	Radio 3
A	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0	Radio 2
	802.11n (HT20)		149 to 165	149, 157, 165	OFDM	6.5	Radio 2
	802.11n (HT40)		151 to 159	151, 159	OFDM	13.5	Radio 2
	802.11ac (VHT80)		155	155	OFDM	29.3	Radio 2

Test Condition:

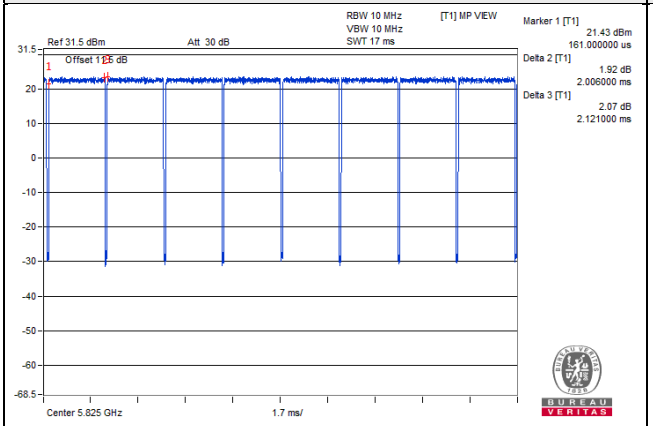
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 67% RH 24 deg. C, 66% RH	120Vac, 60Hz	Willy Cheng
RE<1G	24 deg. C, 69% RH	120Vac, 60Hz 54Vdc	Willy Cheng
PLC	22 deg. C, 66% RH	120Vac, 60Hz 54Vdc	Adair Peng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Chris Lin

3.3 Duty Cycle of Test Signal

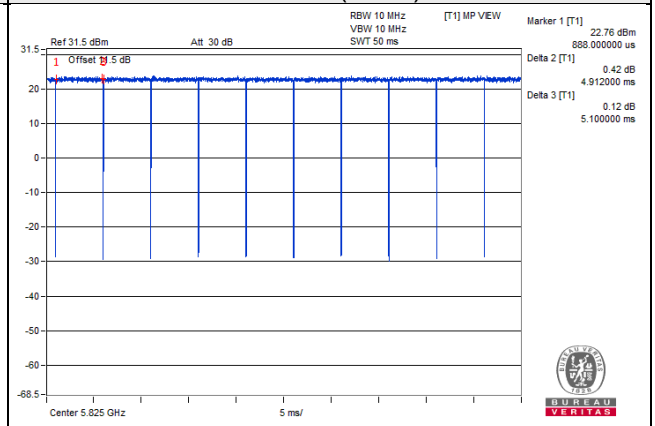
Duty cycle of test signal is < 98%, duty factor is required.

802.11a: Duty cycle = 2.006/2.121 = 0.946, Duty factor = 10 * log (1/0.946) = 0.24
802.11n (HT20): Duty cycle = 4.912/5.100 = 0.963, Duty factor = 10 * log (1/0.963) = 0.16
802.11n (HT40): Duty cycle = 2.391/2.497 = 0.958, Duty factor = 10 * log (1/0.958) = 0.19
802.11ac (VHT80): Duty cycle = 1.127/1.213 = 0.929, Duty factor = 10 * log (1/0.929) = 0.32

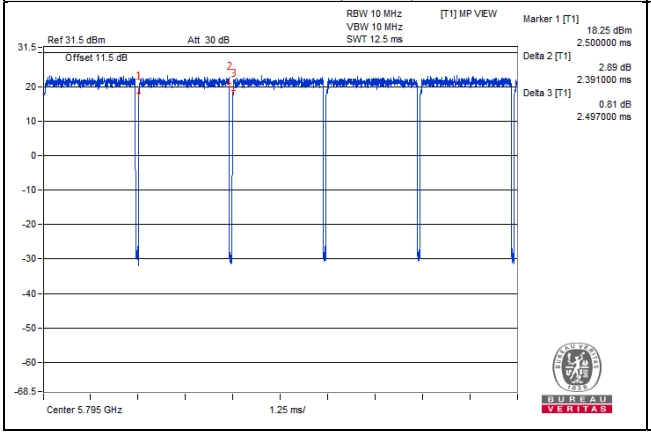
802.11a



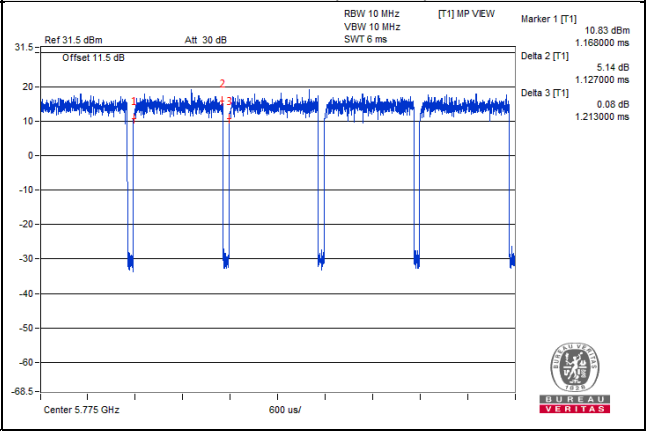
802.11n (HT20)



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	DEE VAN ENTERPRIE CO., LTD	DSA-12PFT-12 FUS 120100	NA	NA	Provided by manufacturer
D.	POE	EnGenius	EPA5006GP	NA	NA	Provided by manufacturer

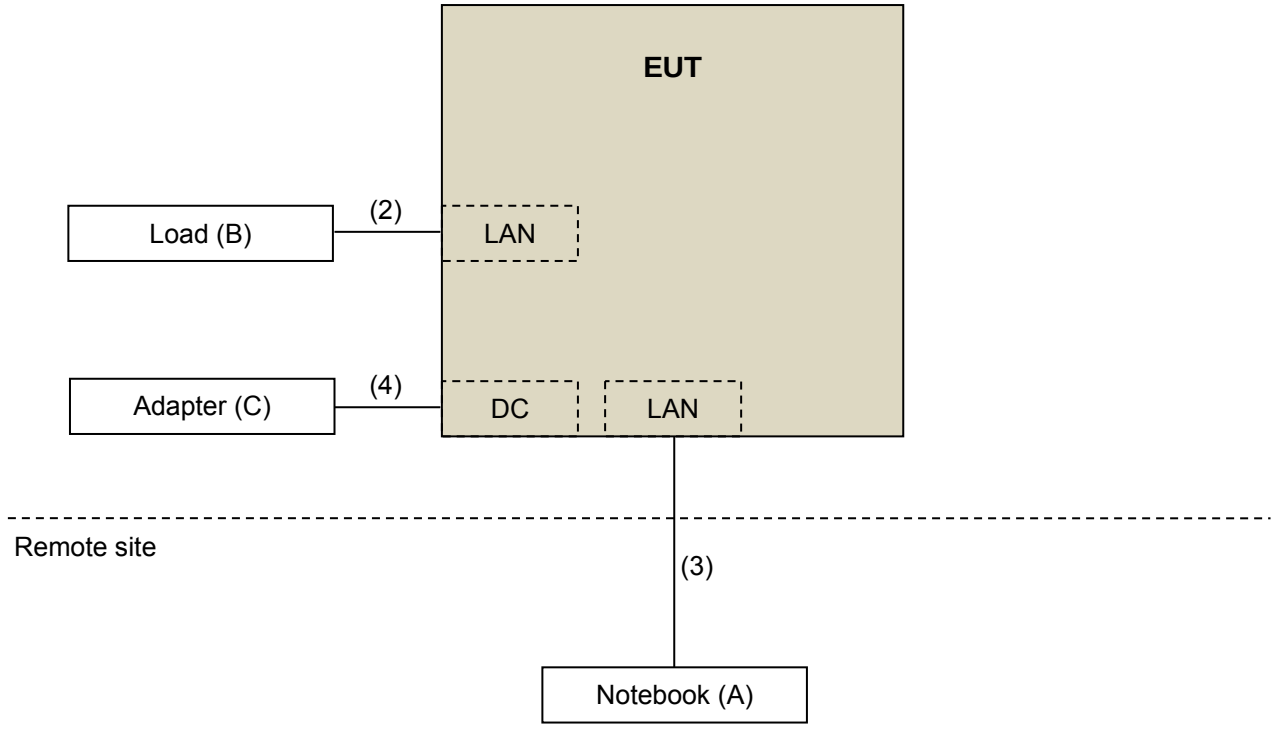
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

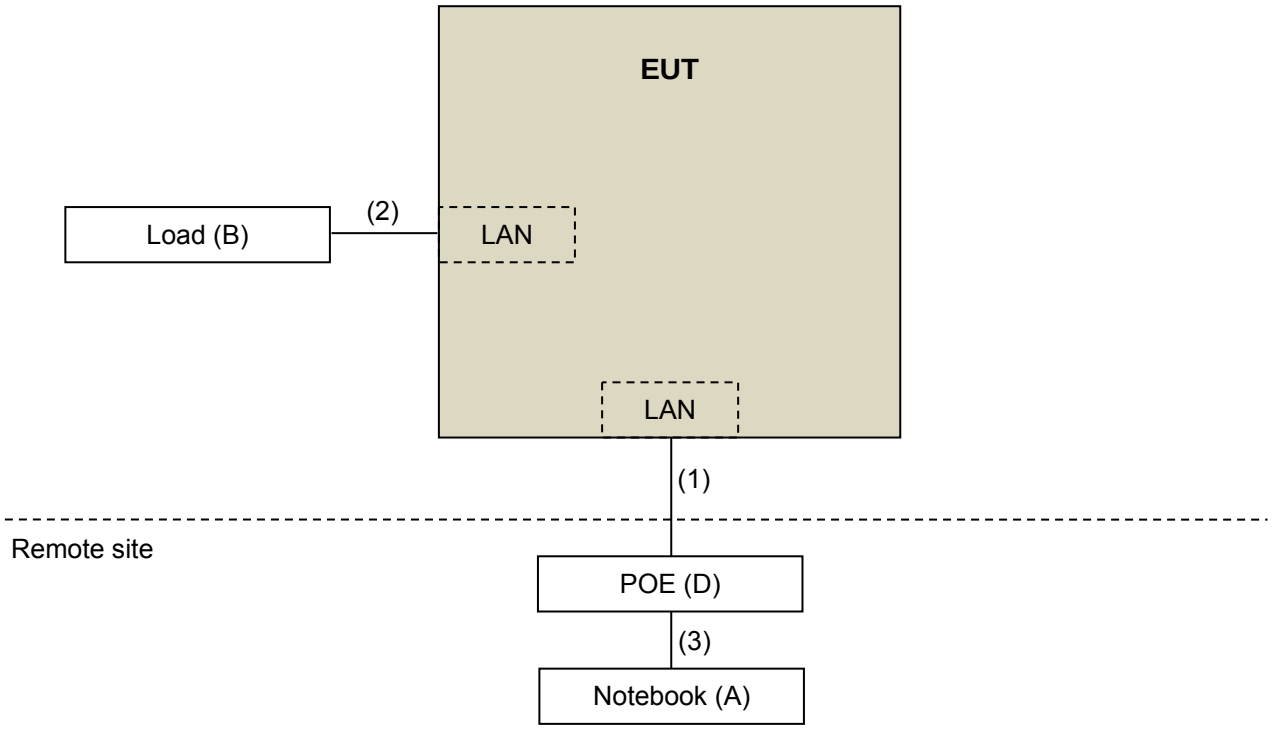
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	1.5	N	0	-
2.	RJ45, Cat5e	1	1.5	N	0	-
3.	RJ45, Cat5e	1	5	N	0	-
4.	DC	1	1.45	-	0	Provided by manufacturer

3.4.1 Configuration of System under Test

Test Mode A



Test Mode B



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 29, 2018	May 28, 2019
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	Jun. 14, 2018	Jun. 13, 2019
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2018	Aug. 20, 2019
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Apr. 03, 2018	Apr. 02, 2019
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-S M-8000	Cable-CH3-03 (309224+170907)	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
Pre-amplifier (18GHz-40GHz) EMC	EMC184045B	980175	Nov. 14, 2018	Nov. 13, 2019
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY5519 0004/MY55190007/MY 55210005	Jul. 17, 2018	Jul. 16, 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.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
5. The IC Site Registration No. is 7450F-3.

4.1.3 Test Procedures

For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

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

c. 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.

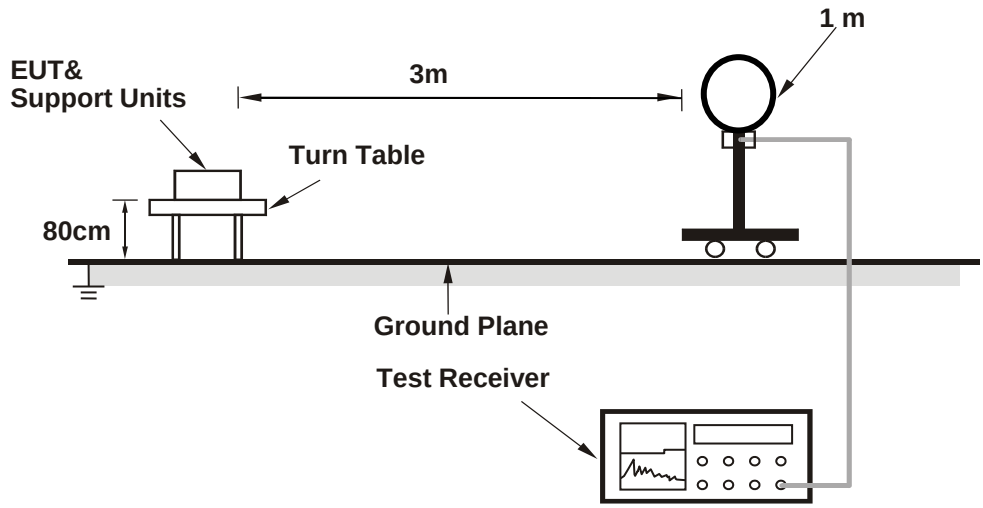
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

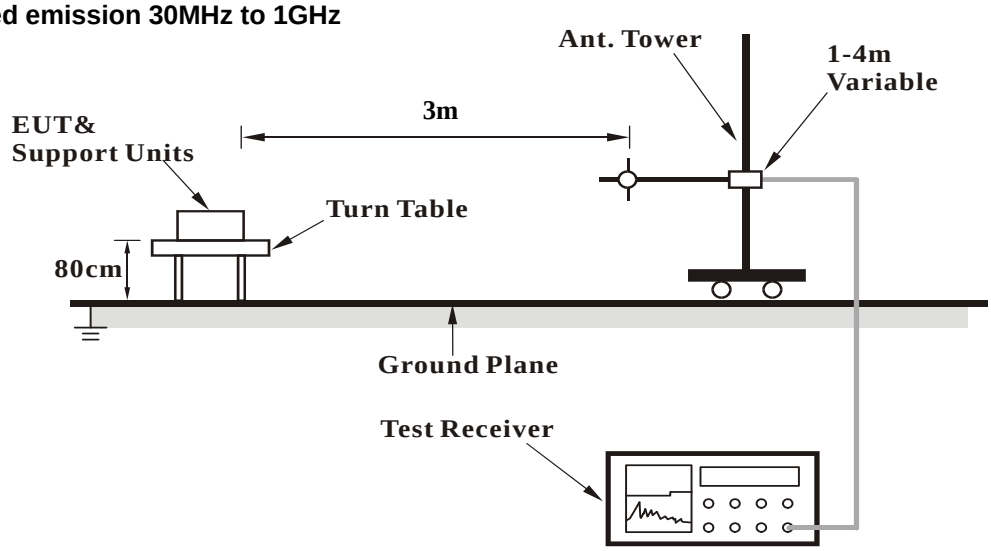
No deviation.

4.1.5 Test Setup

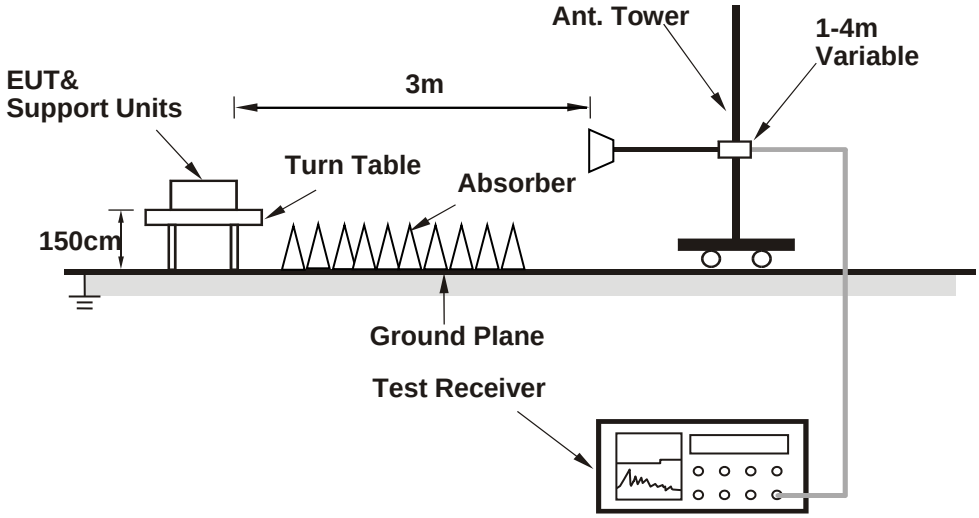
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
d. The communication partner sent data to EUT by command "PING".

4.1.7 Test Results

Above 1GHz data:

802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	61.4 PK	74.0	-12.6	2.53 H	305	57.9	3.5
2	5150.00	45.5 AV	54.0	-8.5	2.53 H	305	42.0	3.5
3	*5180.00	106.3 PK			3.07 H	301	67.1	39.2
4	*5180.00	95.4 AV			3.07 H	301	56.2	39.2
5	#10360.00	58.3 PK	68.2	-9.9	2.96 H	258	42.9	15.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	71.5 PK	74.0	-2.5	2.95 V	98	68.0	3.5
2	5150.00	52.3 AV	54.0	-1.7	2.95 V	98	48.8	3.5
3	*5180.00	115.8 PK			2.92 V	102	76.6	39.2
4	*5180.00	105.2 AV			2.92 V	102	66.0	39.2
5	#10360.00	57.7 PK	68.2	-10.5	1.88 V	261	42.3	15.4

Remarks:

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

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	*5200.00	112.0 PK			3.86 H	263	72.7	39.3
2	*5200.00	101.3 AV			3.86 H	263	62.0	39.3
3	#10400.00	58.2 PK	68.2	-10.0	2.22 H	185	42.6	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	117.7 PK			2.67 V	106	78.4	39.3
2	*5200.00	106.9 AV			2.67 V	106	67.6	39.3
3	#10400.00	58.3 PK	68.2	-9.9	2.70 V	356	42.7	15.6

Remarks:

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

CHANNEL	TX Channel 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	110.9 PK			3.86 H	218	71.8	39.1
2	*5240.00	99.8 AV			3.86 H	218	60.7	39.1
3	5350.00	47.0 PK	74.0	-27.0	3.52 H	199	43.3	3.7
4	5350.00	43.1 AV	54.0	-10.9	3.52 H	199	39.4	3.7
5	#10480.00	58.8 PK	68.2	-9.4	1.59 H	262	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	*5240.00	118.2 PK			3.01 V	225	79.1	39.1
2	*5240.00	107.5 AV			3.01 V	225	68.4	39.1
3	5350.00	57.1 PK	74.0	-16.9	3.25 V	198	53.4	3.7
4	5350.00	43.5 AV	54.0	-10.5	3.25 V	198	39.8	3.7
5	#10480.00	59.0 PK	68.2	-9.2	2.59 V	165	42.8	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 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	#5612.18	55.2 PK	68.2	-13.0	3.32 H	234	51.0	4.2
2	*5745.00	110.5 PK			3.32 H	234	70.7	39.8
3	*5745.00	99.8 AV			3.32 H	234	60.0	39.8
4	#5963.46	58.5 PK	68.2	-9.7	3.32 H	234	53.7	4.8
5	11490.00	60.4 PK	74.0	-13.6	3.85 H	250	43.6	16.8
6	11490.00	46.7 AV	54.0	-7.3	3.85 H	250	29.9	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	#5605.77	56.6 PK	68.2	-11.6	2.52 V	36	52.4	4.2
2	*5745.00	118.4 PK			2.52 V	36	78.6	39.8
3	*5745.00	107.7 AV			2.52 V	36	67.9	39.8
4	#5939.10	58.6 PK	68.2	-9.6	2.52 V	36	53.8	4.8
5	11490.00	66.5 PK	74.0	-7.5	3.29 V	182	49.7	16.8
6	11490.00	52.4 AV	54.0	-1.6	3.29 V	182	35.6	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 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	#5606.41	54.5 PK	68.2	-13.7	3.89 H	234	50.3	4.2
2	*5785.00	111.2 PK			3.89 H	234	71.1	40.1
3	*5785.00	100.2 AV			3.89 H	234	60.1	40.1
4	#5964.74	56.8 PK	68.2	-11.4	3.89 H	234	52.0	4.8
5	11570.00	59.0 PK	74.0	-15.0	2.13 H	297	42.0	17.0
6	11570.00	45.6 AV	54.0	-8.4	2.13 H	297	28.6	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	#5603.21	55.3 PK	68.2	-12.9	2.76 V	36	51.1	4.2
2	*5785.00	118.5 PK			2.76 V	36	78.4	40.1
3	*5785.00	107.6 AV			2.76 V	36	67.5	40.1
4	#5978.21	57.1 PK	68.2	-11.1	2.76 V	36	52.1	5.0
5	11570.00	62.8 PK	74.0	-11.2	2.32 V	182	45.8	17.0
6	11570.00	49.7 AV	54.0	-4.3	2.32 V	182	32.7	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 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	#5609.62	54.6 PK	68.2	-13.6	3.86 H	235	50.4	4.2
2	*5825.00	111.8 PK			3.86 H	235	71.5	40.3
3	*5825.00	101.0 AV			3.86 H	235	60.7	40.3
4	#5982.69	57.7 PK	68.2	-10.5	3.86 H	235	52.7	5.0
5	11650.00	60.1 PK	74.0	-13.9	2.12 H	256	43.5	16.6
6	11650.00	45.9 AV	54.0	-8.1	2.12 H	256	29.3	16.6
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	#5647.44	55.8 PK	68.2	-12.4	3.05 V	38	51.5	4.3
2	*5825.00	118.4 PK			3.05 V	38	78.1	40.3
3	*5825.00	107.2 AV			3.05 V	38	66.9	40.3
4	#5978.21	57.5 PK	68.2	-10.7	3.05 V	38	52.5	5.0
5	11650.00	59.6 PK	74.0	-14.4	1.13 V	305	43.0	16.6
6	11650.00	49.1 AV	54.0	-4.9	1.13 V	305	32.5	16.6

Remarks:

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

802.11n (HT20)

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	60.5 PK	74.0	-13.5	3.21 H	268	57.0	3.5
2	5150.00	46.1 AV	54.0	-7.9	3.21 H	268	42.6	3.5
3	*5180.00	106.4 PK			3.20 H	304	67.2	39.2
4	*5180.00	95.1 AV			3.20 H	304	55.9	39.2
5	#10360.00	58.6 PK	68.2	-9.6	2.02 H	128	43.2	15.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.8 PK	74.0	-5.2	3.08 V	212	65.3	3.5
2	5150.00	52.2 AV	54.0	-1.8	3.08 V	212	48.7	3.5
3	*5180.00	115.7 PK			2.90 V	222	76.5	39.2
4	*5180.00	104.7 AV			2.90 V	222	65.5	39.2
5	#10360.00	57.7 PK	68.2	-10.5	2.64 V	128	42.3	15.4

Remarks:

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

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	*5200.00	112.4 PK			3.83 H	263	73.1	39.3
2	*5200.00	101.0 AV			3.83 H	263	61.7	39.3
3	#10400.00	58.1 PK	68.2	-10.1	1.93 H	222	42.5	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	117.4 PK			2.57 V	129	78.1	39.3
2	*5200.00	106.5 AV			2.57 V	129	67.2	39.3
3	#10400.00	57.7 PK	68.2	-10.5	2.35 V	321	42.1	15.6

Remarks:

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

CHANNEL	TX Channel 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	111.9 PK			3.79 H	265	72.8	39.1
2	*5240.00	100.8 AV			3.79 H	265	61.7	39.1
3	5350.00	57.5 PK	74.0	-16.5	3.65 H	288	53.8	3.7
4	5350.00	43.6 AV	54.0	-10.4	3.65 H	288	39.9	3.7
5	#10480.00	59.6 PK	68.2	-8.6	1.93 H	231	43.4	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	*5240.00	118.0 PK			2.62 V	311	78.9	39.1
2	*5240.00	107.2 AV			2.62 V	311	68.1	39.1
3	5350.00	56.9 PK	74.0	-17.1	2.77 V	293	53.2	3.7
4	5350.00	43.6 AV	54.0	-10.4	2.77 V	293	39.9	3.7
5	#10480.00	58.9 PK	68.2	-9.3	2.22 V	309	42.7	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 149	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5629.49	54.4 PK	68.2	-13.8	3.32 H	232	50.2	4.2
2	*5745.00	111.1 PK			3.32 H	232	71.3	39.8
3	*5745.00	100.1 AV			3.32 H	232	60.3	39.8
4	#5957.69	57.5 PK	68.2	-10.7	3.32 H	232	52.7	4.8
5	11490.00	59.5 PK	74.0	-14.5	3.85 H	250	42.7	16.8
6	11490.00	46.4 AV	54.0	-7.6	3.85 H	250	29.6	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	#5614.10	55.7 PK	68.2	-12.5	2.51 V	35	51.5	4.2
2	*5745.00	118.8 PK			2.51 V	35	79.0	39.8
3	*5745.00	107.9 AV			2.51 V	35	68.1	39.8
4	#5969.87	58.2 PK	68.2	-10.0	2.51 V	35	53.3	4.9
5	11490.00	64.4 PK	74.0	-9.6	2.01 V	184	47.6	16.8
6	11490.00	50.8 AV	54.0	-3.2	2.01 V	184	34.0	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 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	#5621.79	53.7 PK	68.2	-14.5	2.70 H	219	49.5	4.2
2	*5785.00	109.3 PK			2.70 H	219	69.2	40.1
3	*5785.00	98.0 AV			2.70 H	219	57.9	40.1
4	#5951.92	56.4 PK	68.2	-11.8	2.70 H	219	51.6	4.8
5	11570.00	59.9 PK	74.0	-14.1	2.15 H	261	42.9	17.0
6	11570.00	45.6 AV	54.0	-8.4	2.15 H	261	28.6	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	#5600.64	55.6 PK	68.2	-12.6	2.61 V	37	51.4	4.2
2	*5785.00	118.6 PK			2.61 V	37	78.5	40.1
3	*5785.00	107.7 AV			2.61 V	37	67.6	40.1
4	#5973.72	57.8 PK	68.2	-10.4	2.61 V	37	52.8	5.0
5	11570.00	63.2 PK	74.0	-10.8	2.14 V	183	46.2	17.0
6	11570.00	49.3 AV	54.0	-4.7	2.14 V	183	32.3	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 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	#5603.85	54.8 PK	68.2	-13.4	2.92 H	220	50.6	4.2
2	*5825.00	110.1 PK			2.92 H	220	69.8	40.3
3	*5825.00	98.8 AV			2.92 H	220	58.5	40.3
4	#5978.21	57.3 PK	68.2	-10.9	2.92 H	220	52.3	5.0
5	11650.00	58.8 PK	74.0	-15.2	2.83 H	256	42.2	16.6
6	11650.00	45.5 AV	54.0	-8.5	2.83 H	256	28.9	16.6
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	#5646.15	55.2 PK	68.2	-13.0	3.29 V	39	50.9	4.3
2	*5825.00	119.1 PK			3.29 V	39	78.8	40.3
3	*5825.00	108.0 AV			3.29 V	39	67.7	40.3
4	#5982.69	57.8 PK	68.2	-10.4	3.29 V	39	52.8	5.0
5	11650.00	59.6 PK	74.0	-14.4	1.13 V	303	43.0	16.6
6	11650.00	49.1 AV	54.0	-4.9	1.13 V	303	32.5	16.6

Remarks:

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

802.11n (HT40)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.0 PK	74.0	-12.0	3.02 H	165	58.5	3.5
2	5150.00	45.3 AV	54.0	-8.7	3.02 H	165	41.8	3.5
3	*5190.00	103.4 PK			3.30 H	231	64.1	39.3
4	*5190.00	92.8 AV			3.30 H	231	53.5	39.3
5	#10380.00	57.7 PK	68.2	-10.5	1.76 H	231	42.2	15.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.1 PK	74.0	-4.9	2.42 V	105	65.6	3.5
2	5150.00	52.5 AV	54.0	-1.5	2.42 V	105	49.0	3.5
3	*5190.00	111.1 PK			2.82 V	107	71.8	39.3
4	*5190.00	100.8 AV			2.82 V	107	61.5	39.3
5	#10380.00	58.5 PK	68.2	-9.7	2.51 V	69	43.0	15.5

Remarks:

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

CHANNEL	TX Channel 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	59.6 PK	74.0	-14.4	3.62 H	222	56.1	3.5
2	5150.00	45.2 AV	54.0	-8.8	3.62 H	222	41.7	3.5
3	*5230.00	107.0 PK			3.77 H	214	67.9	39.1
4	*5230.00	97.0 AV			3.77 H	214	57.9	39.1
5	5350.00	57.0 PK	74.0	-17.0	3.67 H	249	53.3	3.7
6	5350.00	43.2 AV	54.0	-10.8	3.67 H	249	39.5	3.7
7	#10460.00	58.0 PK	68.2	-10.2	1.87 H	209	42.0	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	67.7 PK	74.0	-6.3	2.91 V	257	64.2	3.5
2	5150.00	51.5 AV	54.0	-2.5	2.91 V	257	48.0	3.5
3	*5230.00	115.4 PK			2.77 V	225	76.3	39.1
4	*5230.00	104.7 AV			2.77 V	225	65.6	39.1
5	5350.00	58.6 PK	74.0	-15.4	2.87 V	237	54.9	3.7
6	5350.00	44.2 AV	54.0	-9.8	2.87 V	237	40.5	3.7
7	#10460.00	58.5 PK	68.2	-9.7	2.49 V	312	42.5	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 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	#5649.36	55.9 PK	68.2	-12.3	3.23 H	238	51.6	4.3
2	#5650.00	57.8 PK	68.2	-10.4	3.19 H	208	53.5	4.3
3	*5755.00	108.1 PK			3.23 H	238	68.3	39.8
4	*5755.00	97.7 AV			3.23 H	238	57.9	39.8
5	#5983.97	58.8 PK	68.2	-9.4	3.23 H	238	53.8	5.0
6	11510.00	58.1 PK	74.0	-15.9	2.69 H	218	41.2	16.9
7	11510.00	45.1 AV	54.0	-8.9	2.69 H	218	28.2	16.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5630.77	62.0 PK	68.2	-6.2	2.77 V	36	57.8	4.2
2	**#5650.00**	**67.0 PK**	**68.2**	**-1.2**	**2.72 V**	**40**	**62.7**	**4.3**
3	*5755.00	115.4 PK			2.77 V	36	75.6	39.8
4	*5755.00	105.0 AV			2.77 V	36	65.2	39.8
5	#5989.10	57.3 PK	68.2	-10.9	2.77 V	36	52.3	5.0
6	11510.00	61.7 PK	74.0	-12.3	2.13 V	182	44.8	16.9
7	11510.00	48.4 AV	54.0	-5.6	2.13 V	182	31.5	16.9

Remarks:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5620.51	54.3 PK	68.2	-13.9	3.88 H	234	50.1	4.2
2	*5795.00	109.4 PK			3.88 H	234	69.3	40.1
3	*5795.00	98.9 AV			3.88 H	234	58.8	40.1
4	#5972.44	57.2 PK	68.2	-11.0	3.88 H	234	52.2	5.0
5	11590.00	59.3 PK	74.0	-14.7	2.18 H	269	42.3	17.0
6	11590.00	45.8 AV	54.0	-8.2	2.18 H	269	28.8	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	#5648.72	59.4 PK	68.2	-8.8	2.77 V	36	55.1	4.3
2	*5795.00	116.7 PK			2.77 V	36	76.6	40.1
3	*5795.00	106.1 AV			2.77 V	36	66.0	40.1
4	#5929.49	58.6 PK	68.2	-9.6	2.77 V	36	53.7	4.9
5	11590.00	59.1 PK	74.0	-14.9	1.00 V	303	42.1	17.0
6	11590.00	48.2 AV	54.0	-5.8	1.00 V	303	31.2	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

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	59.3 PK	74.0	-14.7	3.15 H	269	55.8	3.5
2	5150.00	45.2 AV	54.0	-8.8	3.15 H	269	41.7	3.5
3	*5210.00	98.4 PK			3.23 H	232	59.2	39.2
4	*5210.00	88.4 AV			3.23 H	232	49.2	39.2
5	5350.00	56.6 PK	74.0	-17.4	3.46 H	222	52.9	3.7
6	5350.00	42.9 AV	54.0	-11.1	3.46 H	222	39.2	3.7
7	#10420.00	57.7 PK	68.2	-10.5	1.59 H	264	42.0	15.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.3 PK	74.0	-6.7	2.31 V	108	63.8	3.5
2	5150.00	52.2 AV	54.0	-1.8	2.31 V	108	48.7	3.5
3	*5210.00	105.8 PK			2.30 V	109	66.6	39.2
4	*5210.00	95.9 AV			2.30 V	109	56.7	39.2
5	5350.00	56.9 PK	74.0	-17.1	2.08 V	114	53.2	3.7
6	5350.00	43.3 AV	54.0	-10.7	2.08 V	114	39.6	3.7
7	#10420.00	57.3 PK	68.2	-10.9	1.89 V	155	41.6	15.7

Remarks:

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

CHANNEL	TX Channel 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	#5645.51	55.6 PK	68.2	-12.6	3.96 H	229	51.3	4.3
2	#5650.00	58.2 PK	68.2	-10.0	3.54 H	218	53.9	4.3
3	*5775.00	101.8 PK			3.96 H	229	61.8	40.0
4	*5775.00	91.7 AV			3.96 H	229	51.7	40.0
5	#5925.00	58.4 PK	68.2	-9.8	3.62 H	259	53.5	4.9
6	#5955.13	57.2 PK	68.2	-11.0	3.96 H	229	52.4	4.8
7	11550.00	58.5 PK	74.0	-15.5	2.23 H	156	41.5	17.0
8	11550.00	45.7 AV	54.0	-8.3	2.23 H	156	28.7	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	#5648.72	62.0 PK	68.2	-6.2	2.69 V	36	57.7	4.3
2	#5650.00	66.9 PK	68.2	-1.3	2.70 V	39	62.6	4.3
3	*5775.00	109.1 PK			2.69 V	36	69.1	40.0
4	*5775.00	98.9 AV			2.69 V	36	58.9	40.0
5	#5925.00	61.5 PK	68.2	-6.7	2.90 V	54	56.6	4.9
6	#5926.28	58.1 PK	68.2	-10.1	2.69 V	36	53.2	4.9
7	11550.00	59.4 PK	74.0	-14.6	1.04 V	311	42.4	17.0
8	11550.00	45.8 AV	54.0	-8.2	1.04 V	311	28.8	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

Below 1GHz Worst-Case Data:

802.11a

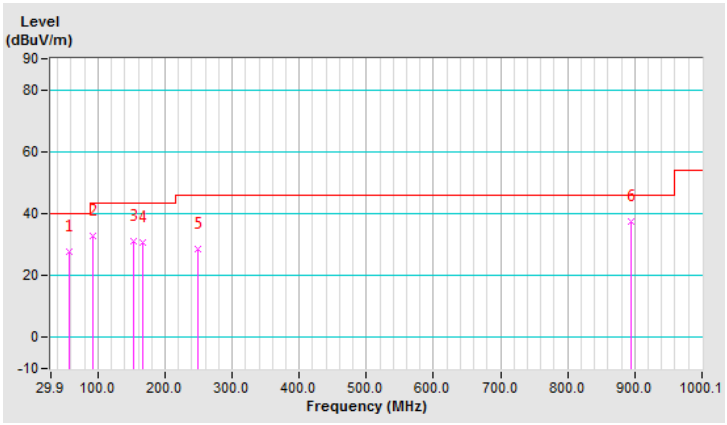
Radio 3

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	27.6 QP	40.0	-12.4	1.99 H	57	37.7	-10.1
2	92.12	32.7 QP	43.5	-10.8	1.99 H	251	47.1	-14.4
3	152.39	31.0 QP	43.5	-12.5	1.49 H	93	40.2	-9.2
4	166.00	30.6 QP	43.5	-12.9	1.49 H	98	39.7	-9.1
5	249.60	28.6 QP	46.0	-17.4	1.00 H	70	37.7	-9.1
6	895.11	37.3 QP	46.0	-8.7	1.99 H	26	33.1	4.2

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 of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

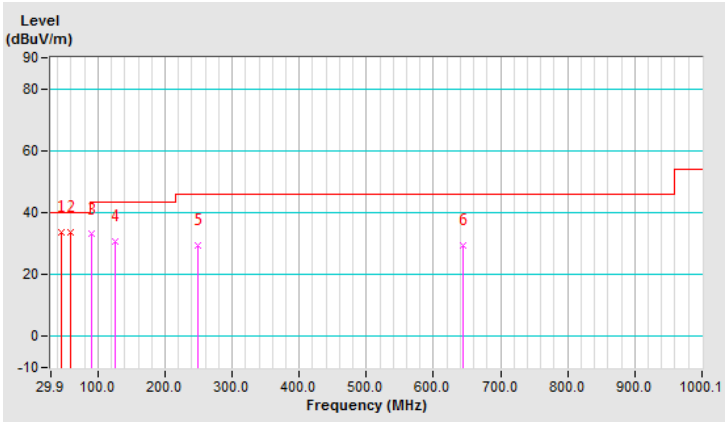


CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

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	45.06	33.7 QP	40.0	-6.3	1.00 V	280	43.5	-9.8
2	59.38	33.6 QP	40.0	-6.4	1.00 V	29	43.7	-10.1
3	90.17	33.0 QP	43.5	-10.5	1.49 V	133	47.6	-14.6
4	125.17	30.5 QP	43.5	-13.0	1.00 V	6	41.5	-11.0
5	249.60	29.2 QP	46.0	-16.8	1.00 V	248	38.3	-9.1
6	644.30	29.6 QP	46.0	-16.4	2.00 V	6	30.2	-0.6

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 of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

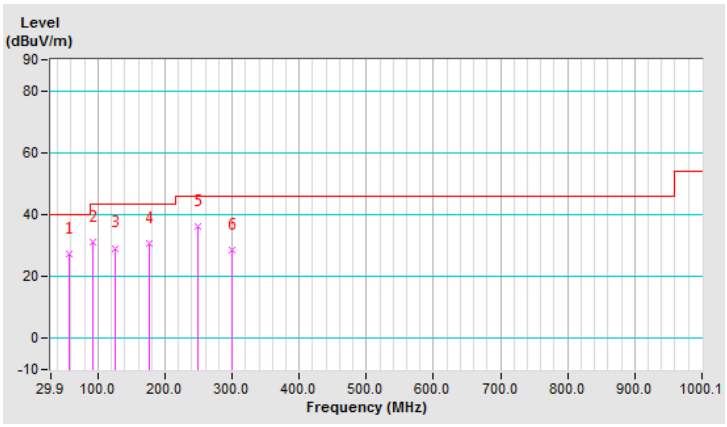


CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	27.1 QP	40.0	-12.9	2.00 H	216	37.2	-10.1
2	92.12	31.0 QP	43.5	-12.5	2.00 H	255	45.4	-14.4
3	125.17	29.2 QP	43.5	-14.3	1.49 H	64	40.2	-11.0
4	175.72	30.8 QP	43.5	-12.7	2.00 H	246	40.7	-9.9
5	249.60	36.3 QP	46.0	-9.7	1.00 H	86	45.4	-9.1
6	300.16	28.7 QP	46.0	-17.3	1.00 H	228	36.1	-7.4

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. The other emission levels were very low against the limit of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

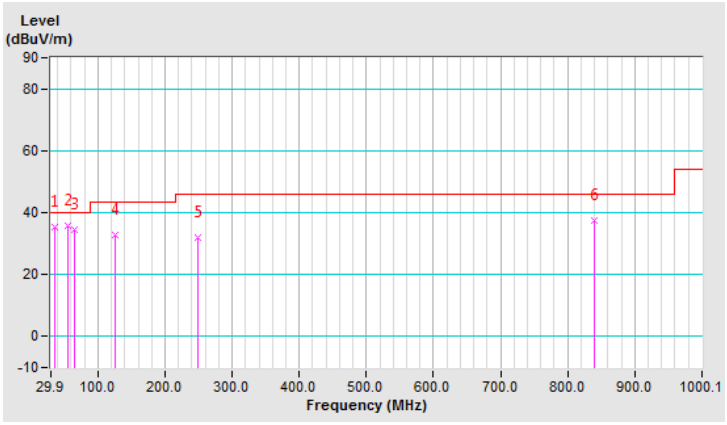


CHANNEL	TX Channel 48	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

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	35.73	35.2 QP	40.0	-4.8	1.01 V	198	46.3	-11.1
2	55.18	35.9 QP	40.0	-4.1	1.51 V	34	45.7	-9.8
3	64.90	34.4 QP	40.0	-5.6	1.01 V	342	45.3	-10.9
4	125.17	32.9 QP	43.5	-10.6	1.01 V	23	43.9	-11.0
5	249.60	31.9 QP	46.0	-14.1	1.51 V	164	41.0	-9.1
6	840.67	37.6 QP	46.0	-8.4	2.00 V	291	34.9	2.7

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 of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report



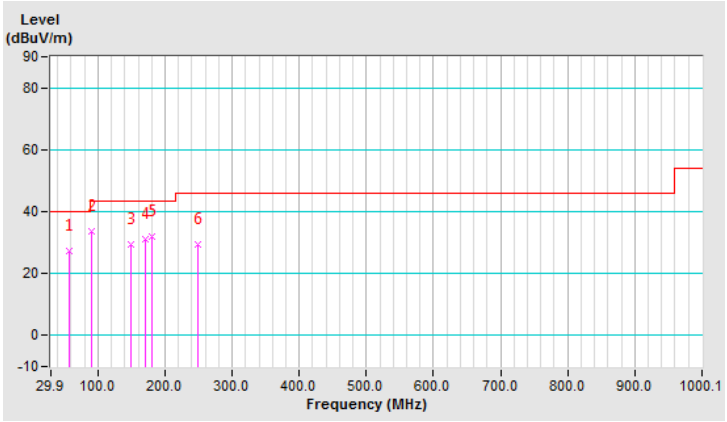
Radio 2

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	27.4 QP	40.0	-12.6	2.00 H	82	37.5	-10.1
2	90.17	33.5 QP	43.5	-10.0	2.00 H	89	48.1	-14.6
3	148.50	29.4 QP	43.5	-14.1	2.00 H	89	38.6	-9.2
4	169.89	31.3 QP	43.5	-12.2	2.00 H	84	40.7	-9.4
5	179.61	31.9 QP	43.5	-11.6	2.00 H	86	42.1	-10.2
6	249.60	29.2 QP	46.0	-16.8	1.01 H	64	38.3	-9.1

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 of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

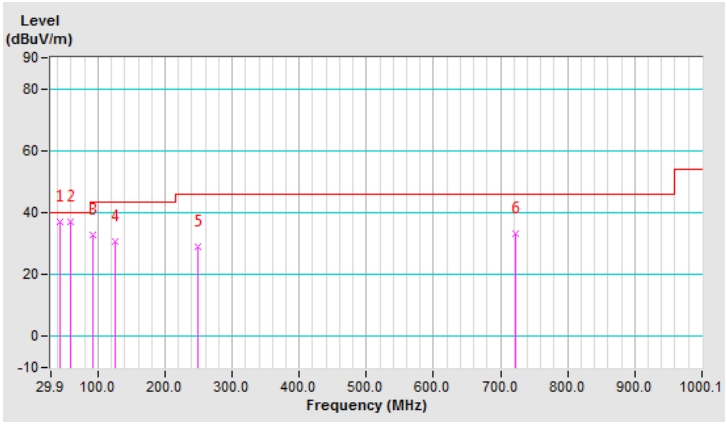


CHANNEL	TX Channel 165	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	A		

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	43.51	37.0 QP	40.0	-3.0	1.00 V	213	47.0	-10.0
2	59.06	37.0 QP	40.0	-3.0	1.00 V	12	47.1	-10.1
3	92.12	32.7 QP	43.5	-10.8	1.50 V	132	47.1	-14.4
4	125.17	30.6 QP	43.5	-12.9	1.00 V	36	41.6	-11.0
5	249.60	28.9 QP	46.0	-17.1	1.00 V	249	38.0	-9.1
6	722.07	33.3 QP	46.0	-12.7	1.00 V	294	32.3	1.0

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 of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

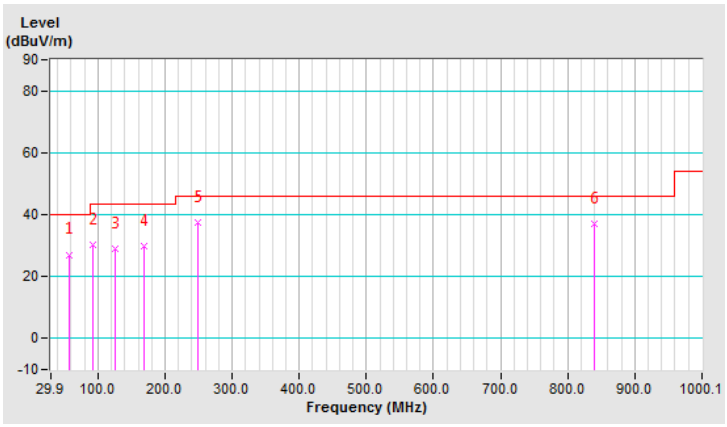


CHANNEL	TX Channel 165	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	57.12	27.1 QP	40.0	-12.9	1.99 H	87	37.2	-10.1
2	92.12	30.1 QP	43.5	-13.4	1.99 H	263	44.5	-14.4
3	125.17	28.8 QP	43.5	-14.7	1.49 H	45	39.8	-11.0
4	167.94	29.9 QP	43.5	-13.6	1.99 H	216	39.2	-9.3
5	249.60	37.5 QP	46.0	-8.5	1.00 H	80	46.6	-9.1
6	840.67	36.9 QP	46.0	-9.1	1.49 H	2	34.2	2.7

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 of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report

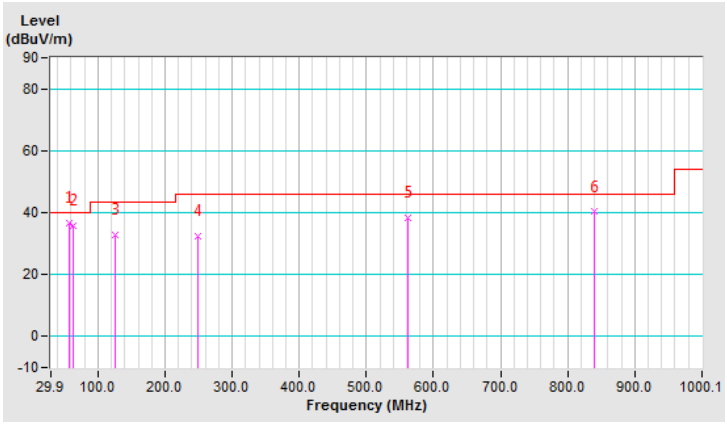


CHANNEL	TX Channel 165	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		
TEST MODE	B		

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	57.12	36.5 QP	40.0	-3.5	1.99 V	15	46.6	-10.1
2	62.95	35.9 QP	40.0	-4.1	1.00 V	21	46.2	-10.3
3	125.17	32.6 QP	43.5	-10.9	1.00 V	21	43.6	-11.0
4	249.60	32.2 QP	46.0	-13.8	1.99 V	175	41.3	-9.1
5	562.64	38.1 QP	46.0	-7.9	1.00 V	221	40.5	-2.4
6	840.67	40.2 QP	46.0	-5.8	1.49 V	335	37.5	2.7

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 of frequency range 30MHz ~ 1000MHz
4. Margin value = Emission Level – Limit value
5. The emission levels were very low against the limit of frequency range 9kHz ~ 30MHz: the amplitude of spurious emissions attenuated more than 20 dB 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

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. 26, 2018	Feb. 25, 2019
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-2040.

4.2.3 Test Procedures

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

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

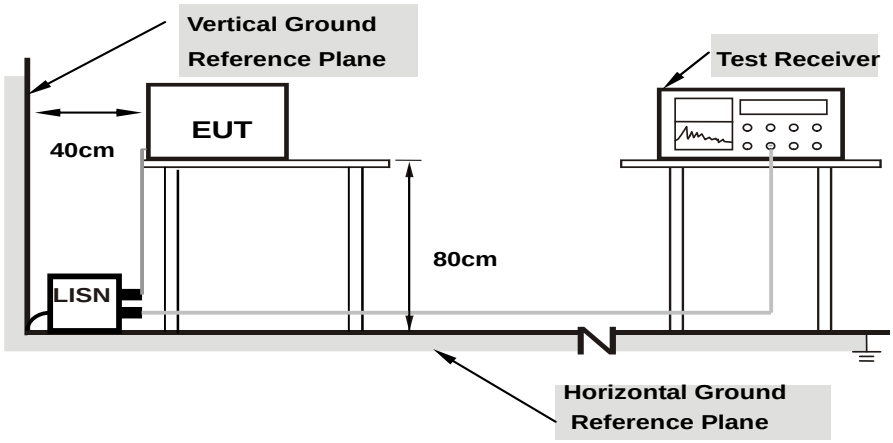
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

Worst-case data:

802.11a

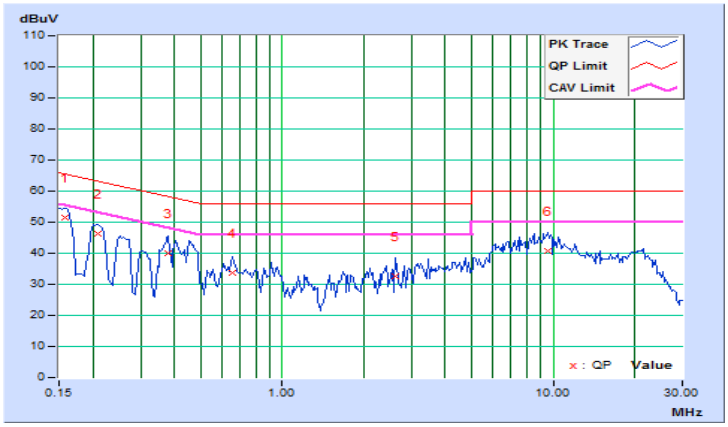
Radio 3

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.73	41.73	29.63	51.46	39.36	65.58	55.58	-14.12	-16.22
2	0.20859	9.72	36.45	26.17	46.17	35.89	63.26	53.26	-17.09	-17.37
3	0.38047	9.75	30.43	18.41	40.18	28.16	58.27	48.27	-18.09	-20.11
4	0.65391	9.72	24.01	16.56	33.73	26.28	56.00	46.00	-22.27	-19.72
5	2.62891	9.76	22.70	13.84	32.46	23.60	56.00	46.00	-23.54	-22.40
6	9.51563	9.87	30.96	23.66	40.83	33.53	60.00	50.00	-19.17	-16.47

Remarks:

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

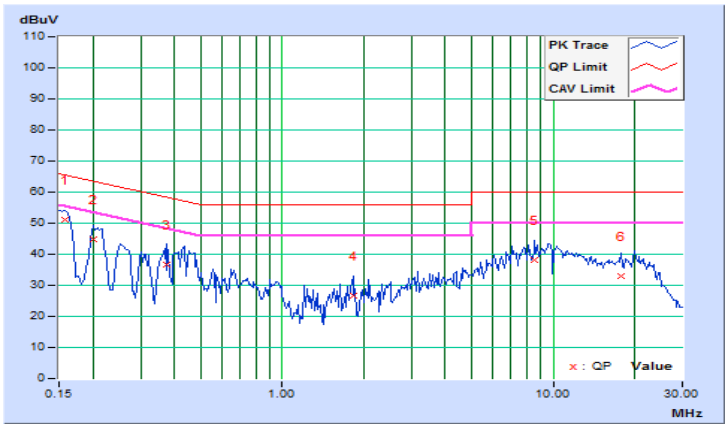


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.72	41.41	29.03	51.13	38.75	65.58	55.58	-14.45	-16.83
2	0.20078	9.73	35.26	20.96	44.99	30.69	63.58	53.58	-18.59	-22.89
3	0.37656	9.75	27.07	15.61	36.82	25.36	58.35	48.35	-21.53	-22.99
4	1.83203	9.73	16.89	9.28	26.62	19.01	56.00	46.00	-29.38	-26.99
5	8.56250	9.89	28.27	21.11	38.16	31.00	60.00	50.00	-21.84	-19.00
6	17.85156	10.05	22.97	16.30	33.02	26.35	60.00	50.00	-26.98	-23.65

Remarks:

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

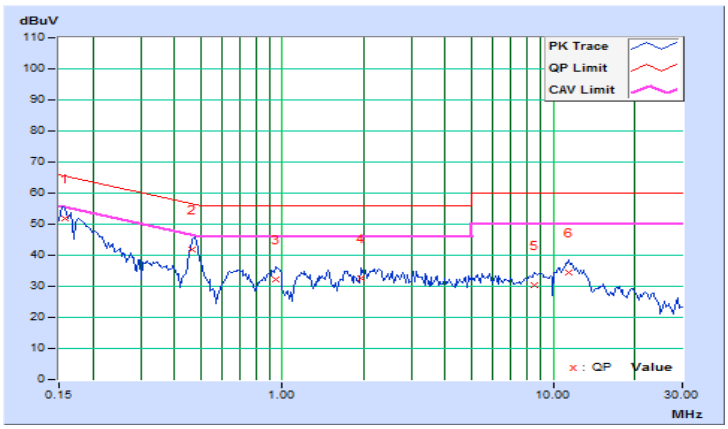


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.67	42.29	26.53	51.96	36.20	65.58	55.58	-13.62	-19.38
2	0.46641	9.66	32.24	28.24	41.90	37.90	56.58	46.58	-14.68	-8.68
3	0.94688	9.65	22.71	19.75	32.36	29.40	56.00	46.00	-23.64	-16.60
4	1.94922	9.68	22.81	19.11	32.49	28.79	56.00	46.00	-23.51	-17.21
5	8.57031	9.82	20.68	15.93	30.50	25.75	60.00	50.00	-29.50	-24.25
6	11.49219	9.86	24.55	19.89	34.41	29.75	60.00	50.00	-25.59	-20.25

Remarks:

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

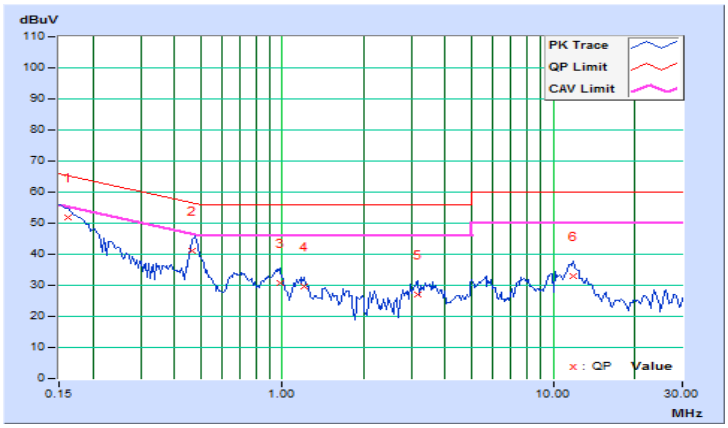


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.68	42.00	24.96	51.68	34.64	65.38	55.38	-13.70	-20.74
2	0.46641	9.67	31.53	27.47	41.20	37.14	56.58	46.58	-15.38	-9.44
3	0.97813	9.65	20.98	17.85	30.63	27.50	56.00	46.00	-25.37	-18.50
4	1.21094	9.66	19.94	16.84	29.60	26.50	56.00	46.00	-26.40	-19.50
5	3.17969	9.71	17.40	11.29	27.11	21.00	56.00	46.00	-28.89	-25.00
6	11.81250	9.89	23.12	18.43	33.01	28.32	60.00	50.00	-26.99	-21.68

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.



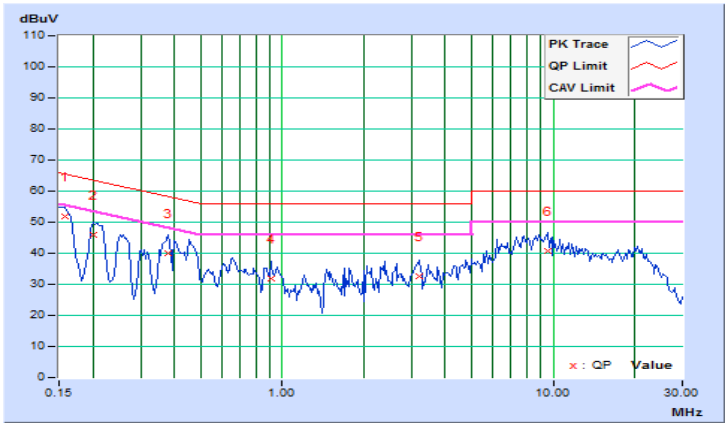
Radio 2

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

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.73	42.19	29.89	51.92	39.62	65.58	55.58	-13.66	-15.96
2	0.20078	9.72	36.28	23.09	46.00	32.81	63.58	53.58	-17.58	-20.77
3	0.38047	9.75	30.27	18.27	40.02	28.02	58.27	48.27	-18.25	-20.25
4	0.90781	9.69	22.12	14.46	31.81	24.15	56.00	46.00	-24.19	-21.85
5	3.18750	9.77	22.67	14.19	32.44	23.96	56.00	46.00	-23.56	-22.04
6	9.58984	9.87	30.71	23.93	40.58	33.80	60.00	50.00	-19.42	-16.20

Remarks:

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

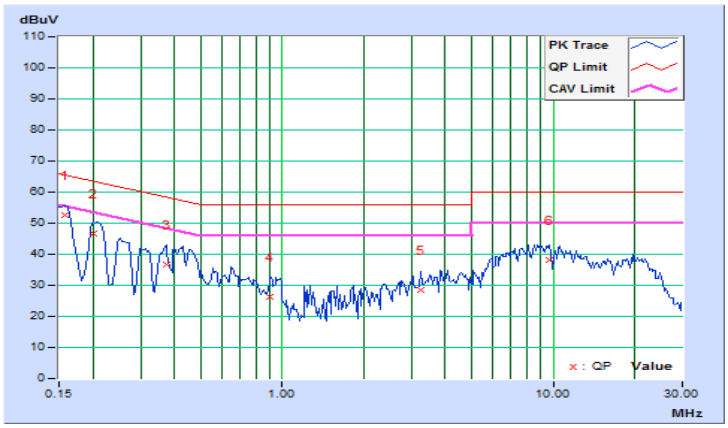


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.72	42.77	29.91	52.49	39.63	65.58	55.58	-13.09	-15.95
2	0.20078	9.73	36.79	22.32	46.52	32.05	63.58	53.58	-17.06	-21.53
3	0.37266	9.75	27.08	17.48	36.83	27.23	58.44	48.44	-21.61	-21.21
4	0.90391	9.72	16.41	8.02	26.13	17.74	56.00	46.00	-29.87	-28.26
5	3.26172	9.78	18.69	10.28	28.47	20.06	56.00	46.00	-27.53	-25.94
6	9.70703	9.91	28.29	21.19	38.20	31.10	60.00	50.00	-21.80	-18.90

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.

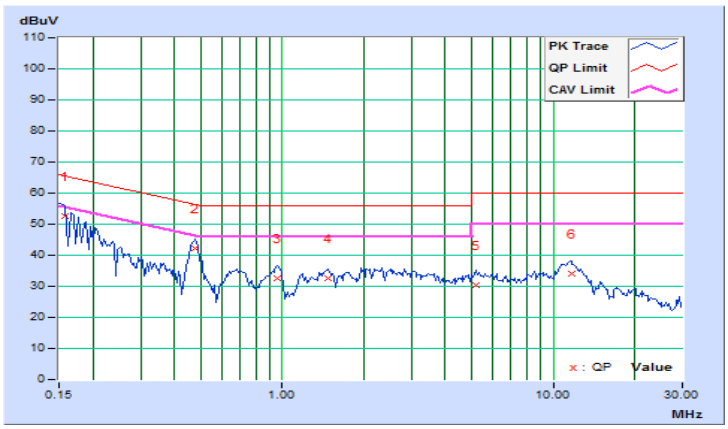


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	9.67	42.90	27.01	52.57	36.68	65.58	55.58	-13.01	-18.90
2	**0.47813**	**9.66**	**32.64**	**28.07**	**42.30**	**37.73**	**56.37**	**46.37**	**-14.07**	**-8.64**
3	0.96250	9.65	22.79	19.89	32.44	29.54	56.00	46.00	-23.56	-16.46
4	1.47656	9.66	22.98	20.11	32.64	29.77	56.00	46.00	-23.36	-16.23
5	5.18359	9.75	20.56	15.49	30.31	25.24	60.00	50.00	-29.69	-24.76
6	11.67188	9.86	24.26	19.50	34.12	29.36	60.00	50.00	-25.88	-20.64

Remarks:

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

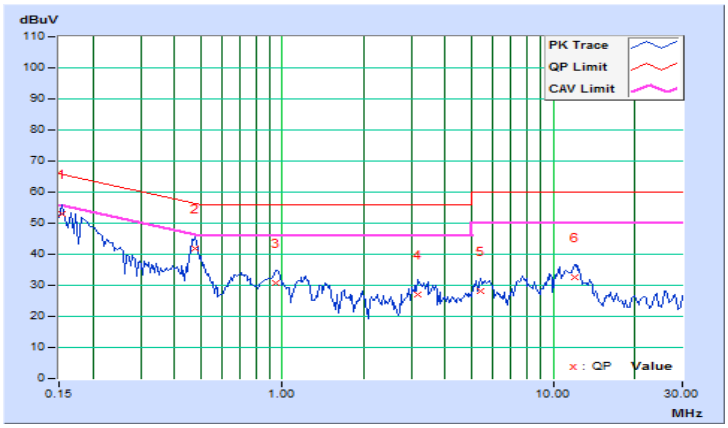


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15391	9.68	43.18	27.49	52.86	37.17	65.79	55.79	-12.93	-18.62
2	0.47813	9.67	32.35	27.83	42.02	37.50	56.37	46.37	-14.35	-8.87
3	0.94297	9.65	20.99	18.20	30.64	27.85	56.00	46.00	-25.36	-18.15
4	3.16797	9.71	17.23	11.06	26.94	20.77	56.00	46.00	-29.06	-25.23
5	5.40234	9.76	18.43	12.58	28.19	22.34	60.00	50.00	-31.81	-27.66
6	12.02734	9.89	22.66	18.02	32.55	27.91	60.00	50.00	-27.45	-22.09

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)

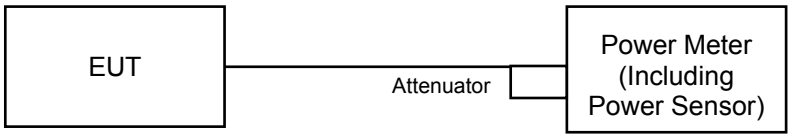
*B is the 26 dB emission bandwidth in megahertz

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



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement
Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst and set the detector to average. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

Power Output:

CDD Mode

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	17.61	17.89	119.195	20.76	30.00	Pass
40	5200	18.66	19.62	165.073	22.18	30.00	Pass
48	5240	19.33	19.62	177.326	22.49	30.00	Pass
149	5745	19.81	20.31	203.118	23.08	30.00	Pass
157	5785	19.88	20.06	198.666	22.98	30.00	Pass
165	5825	19.65	19.55	182.414	22.61	30.00	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	17.42	17.49	111.313	20.47	30.00	Pass
40	5200	19.09	19.85	**177.701**	22.50	30.00	Pass
48	5240	19.11	19.51	170.801	22.32	30.00	Pass
149	5745	19.82	20.33	203.835	23.09	30.00	Pass
157	5785	19.75	19.88	191.681	22.83	30.00	Pass
165	5825	19.51	19.48	178.047	22.51	30.00	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	15.48	15.55	71.210	18.53	30.00	Pass
46	5230	19.12	19.77	176.500	22.47	30.00	Pass
151	5755	19.71	20.29	200.446	23.02	30.00	Pass
159	5795	20.31	20.26	**213.569**	23.30	30.00	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	14.76	14.84	60.402	17.81	30.00	Pass
155	5775	16.89	16.81	96.838	19.86	30.00	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	14.41	14.48	55.660	17.46	27.05	Pass
40	5200	16.08	16.84	**88.857**	19.49	27.05	Pass
48	5240	16.10	16.50	85.406	19.31	27.05	Pass
149	5745	16.81	17.32	101.924	20.08	27.00	Pass
157	5785	16.74	16.87	95.847	19.82	27.00	Pass
165	5825	16.50	16.47	89.029	19.50	27.00	Pass

Note:

1. For U-NII-1 Band: Directional gain = 5.94dBi + 10log(2) = 8.95dBi > 6dBi, so the power limit shall be reduced to 30-(8.95-6) = 27.05dBm.
2. For U-NII-3 Band: Directional gain = 5.99dBi + 10log(2) = 9.00dBi > 6dBi, so the power limit shall be reduced to 30-(9.00-6) = 27.00dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	12.47	12.54	35.607	15.52	27.05	Pass
46	5230	16.11	16.76	88.256	19.46	27.05	Pass
151	5755	16.70	17.28	100.230	20.01	27.00	Pass
159	5795	17.30	17.25	**106.791**	20.29	27.00	Pass

Note:

1. For U-NII-1 Band: Directional gain = 5.94dBi + 10log(2) = 8.95dBi > 6dBi, so the power limit shall be reduced to 30-(8.95-6) = 27.05dBm.
2. For U-NII-3 Band: Directional gain = 5.99dBi + 10log(2) = 9.00dBi > 6dBi, so the power limit shall be reduced to 30-(9.00-6) = 27.00dBm.

802.11ac (VHT80)

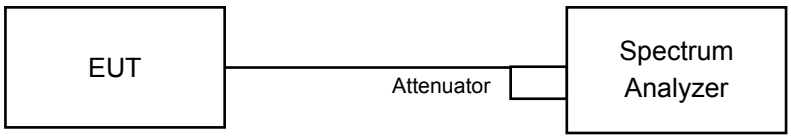
Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	11.75	11.83	30.203	14.80	27.05	Pass
155	5775	13.88	13.80	48.422	16.85	27.00	Pass

Note:

1. For U-NII-1 Band: Directional gain = 5.94dBi + 10log(2) = 8.95dBi > 6dBi, so the power limit shall be reduced to 30-(8.95-6) = 27.05dBm.
2. For U-NII-3 Band: Directional gain = 5.99dBi + 10log(2) = 9.00dBi > 6dBi, so the power limit shall be reduced to 30-(9.00-6) = 27.00dBm.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Result

802.11a

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.56	16.56
40	5200	16.80	18.84
48	5240	17.16	20.40
149	5745	19.48	17.40
157	5785	20.52	17.52
165	5825	20.04	17.28

802.11n (HT20)

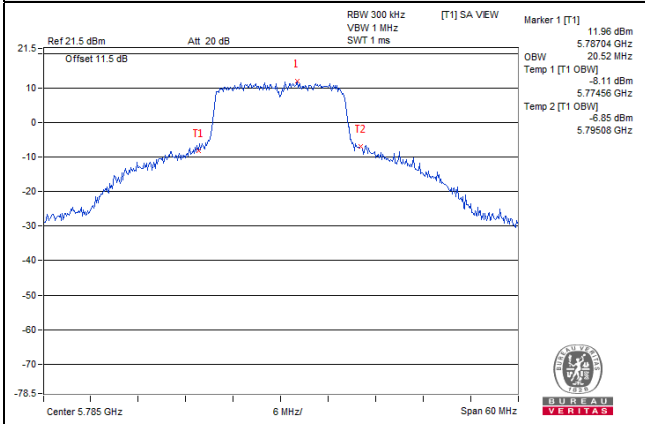
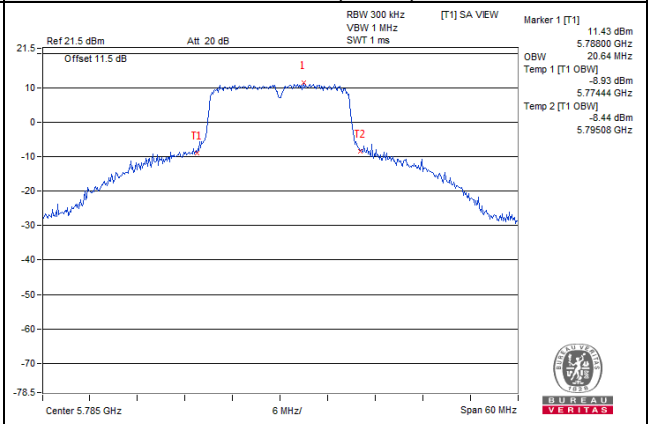
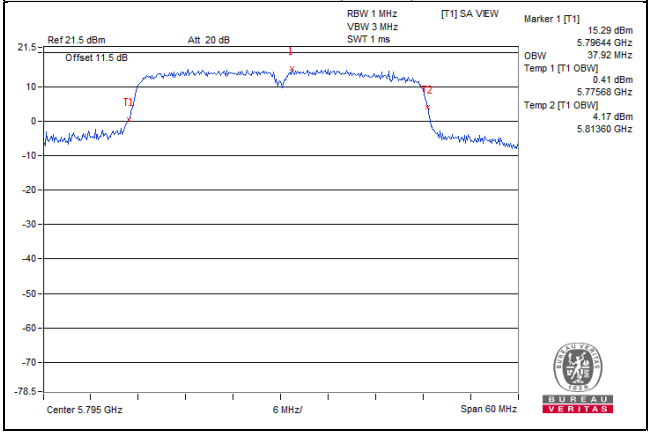
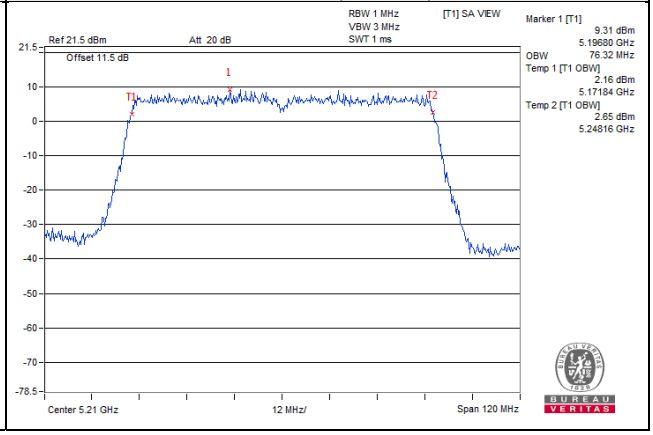
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.64
40	5200	17.88	19.56
48	5240	18.12	18.00
149	5745	19.68	18.36
157	5785	20.64	18.36
165	5825	20.16	18.12

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.36	36.12
46	5230	36.60	37.56
151	5755	36.96	36.84
159	5795	37.92	36.84

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	76.32	75.84
155	5775	75.84	75.84

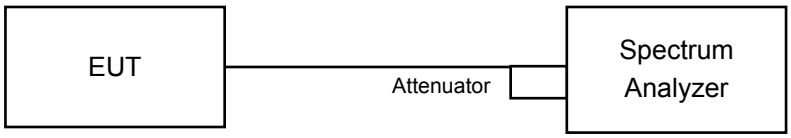
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

For U-NII-1 band:

Using method SA-2

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

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

c. Set Channel power measure = 1MHz

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

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

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

For U-NII-3 band:

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

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

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

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

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

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as 4.3.6.

4.5.7 Test Results

For U-NII-1 band:

802.11a

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	4.06	4.97	0.24	7.79	14.05	Pass
40	5200	6.31	7.02	0.24	9.93	14.05	Pass
48	5240	6.51	7.16	0.24	10.10	14.05	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.94dBi + 10log(2) = 8.95dBi > 6dBi, so the power density limit shall be reduced to 17-(8.95-6) = 14.05dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

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	2.86	4.28	0.16	6.80	14.05	Pass
40	5200	6.20	6.47	0.16	9.51	14.05	Pass
48	5240	6.54	6.41	0.16	9.65	14.05	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.94dBi + 10log(2) = 8.95dBi > 6dBi, so the power density limit shall be reduced to 17-(8.95-6) = 14.05dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

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	-0.95	-0.43	0.19	2.52	14.05	Pass
46	5230	3.71	3.98	0.19	7.05	14.05	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.94dBi + 10log(2) = 8.95dBi > 6dBi, so the power density limit shall be reduced to 17-(8.95-6) = 14.05dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

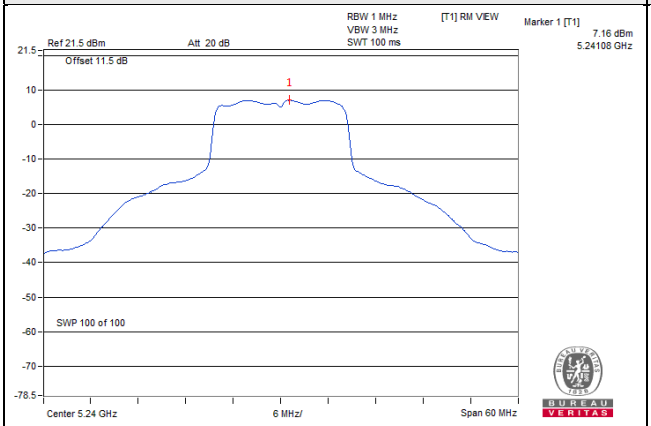
802.11ac (VHT80)

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	-5.28	-4.43	0.32	-1.50	14.05	Pass

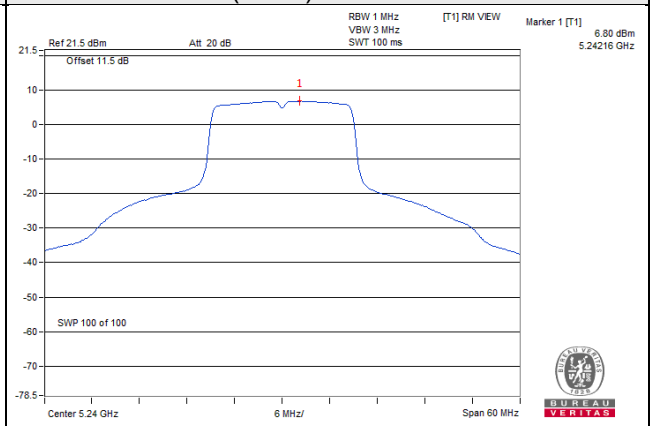
Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.94dBi + 10log(2) = 8.95dBi > 6dBi, so the power density limit shall be reduced to 17-(8.95-6) = 14.05dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

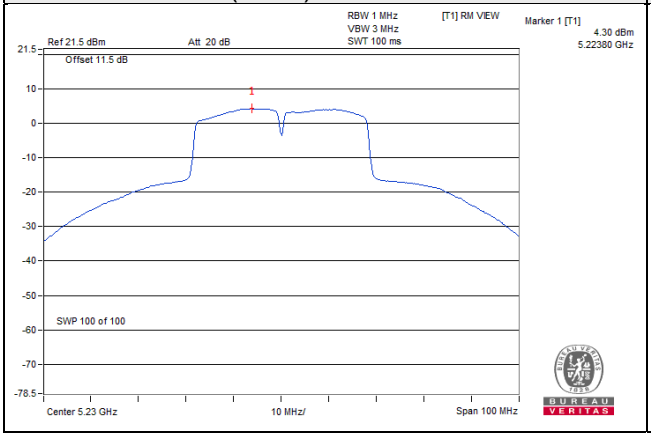
802.11a / Chain 1 / CH 48



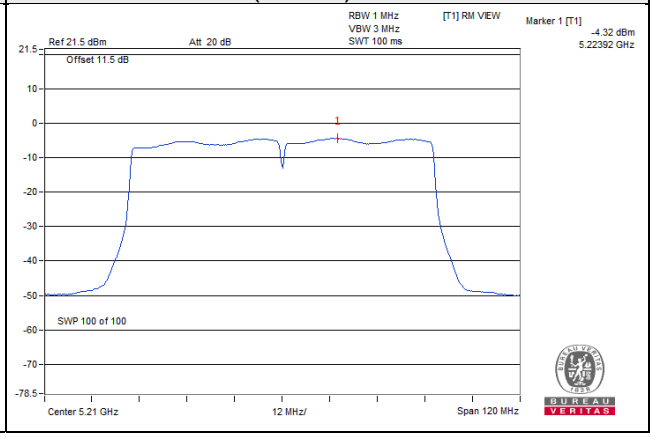
802.11n (HT20) / Chain 0 / CH 48



802.11n (HT40) / Chain 1 / CH 46



802.11ac (VHT80) / Chain 1 / 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	-0.73	1.49	3.01	0.24	4.74	27.00	Pass
	157	5785	-0.90	1.32	3.01	0.24	4.57	27.00	Pass
	165	5825	-1.43	0.79	3.01	0.24	4.04	27.00	Pass
1	149	5745	-1.40	0.82	3.01	0.24	4.07	27.00	Pass
	157	5785	-1.70	0.52	3.01	0.24	3.77	27.00	Pass
	165	5825	-1.89	0.33	3.01	0.24	3.58	27.00	Pass

Note:
1. Directional gain = 5.99dBi + 10log(2) = 9.00dBi > 6dBi, so the power density limit shall be reduced to 30-(9.00-6) = 27.00dBm.
2. 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	-0.83	1.39	3.01	0.16	4.56	27.00	Pass
	157	5785	-1.16	1.06	3.01	0.16	4.23	27.00	Pass
	165	5825	-1.74	0.48	3.01	0.16	3.65	27.00	Pass
1	149	5745	-1.82	0.40	3.01	0.16	3.57	27.00	Pass
	157	5785	-2.00	0.22	3.01	0.16	3.39	27.00	Pass
	165	5825	-2.32	-0.10	3.01	0.16	3.07	27.00	Pass

Note:
1. Directional gain = 5.99dBi + 10log(2) = 9.00dBi > 6dBi, so the power density limit shall be reduced to 30-(9.00-6) = 27.00dBm.
2. 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	-4.10	-1.88	3.01	0.19	1.32	27.00	Pass
	159	5795	-3.87	-1.65	3.01	0.19	1.55	27.00	Pass
1	151	5755	-4.87	-2.65	3.01	0.19	0.55	27.00	Pass
	159	5795	-4.55	-2.33	3.01	0.19	0.87	27.00	Pass

Note:
1. Directional gain = 5.99dBi + 10log(2) = 9.00dBi > 6dBi, so the power density limit shall be reduced to 30-(9.00-6) = 27.00dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

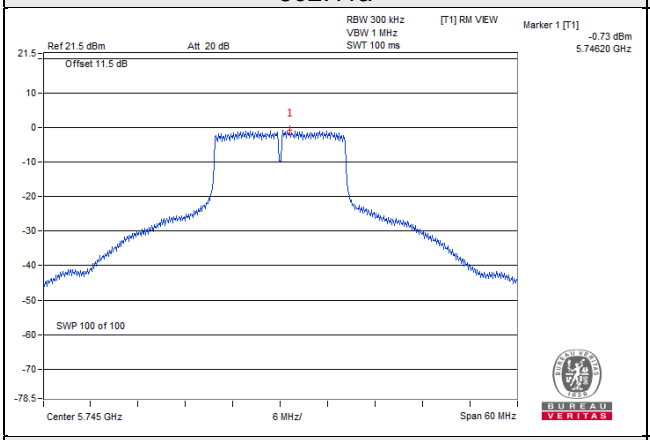
802.11ac (VHT80)

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	-10.93	-8.71	3.01	0.32	-5.38	27.00	Pass
1	155	5775	-11.72	-9.50	3.01	0.32	-6.17	27.00	Pass

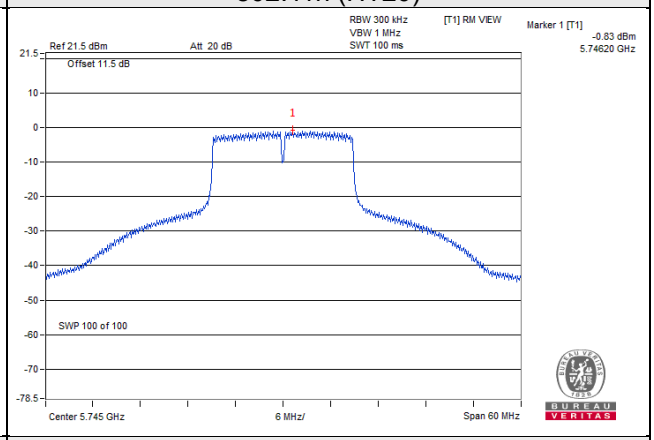
Note:
1. Directional gain = 5.99dBi + 10log(2) = 9.00dBi > 6dBi, so the power density limit shall be reduced to 30-(9.00-6) = 27.00dBm.
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

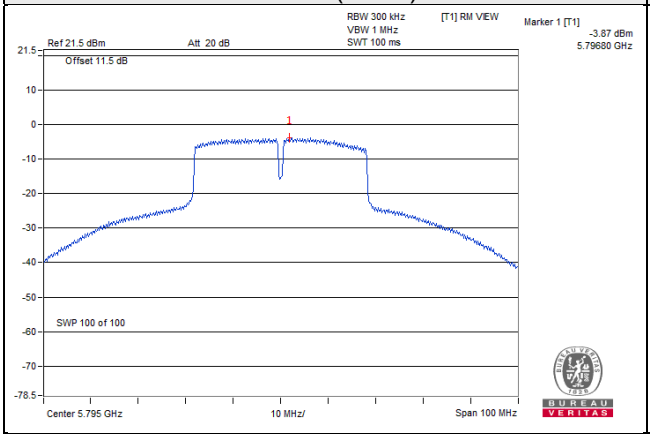
802.11a



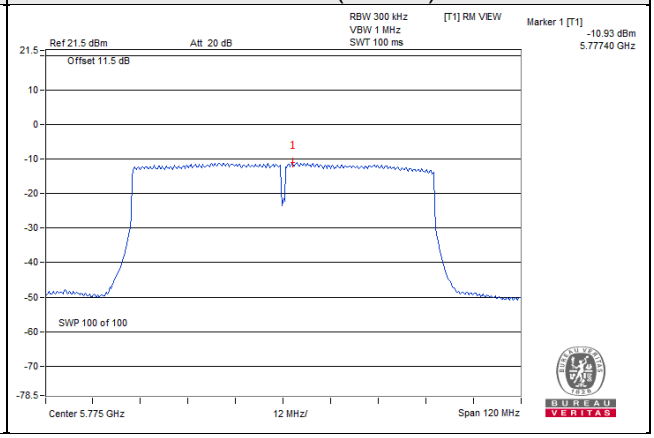
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)

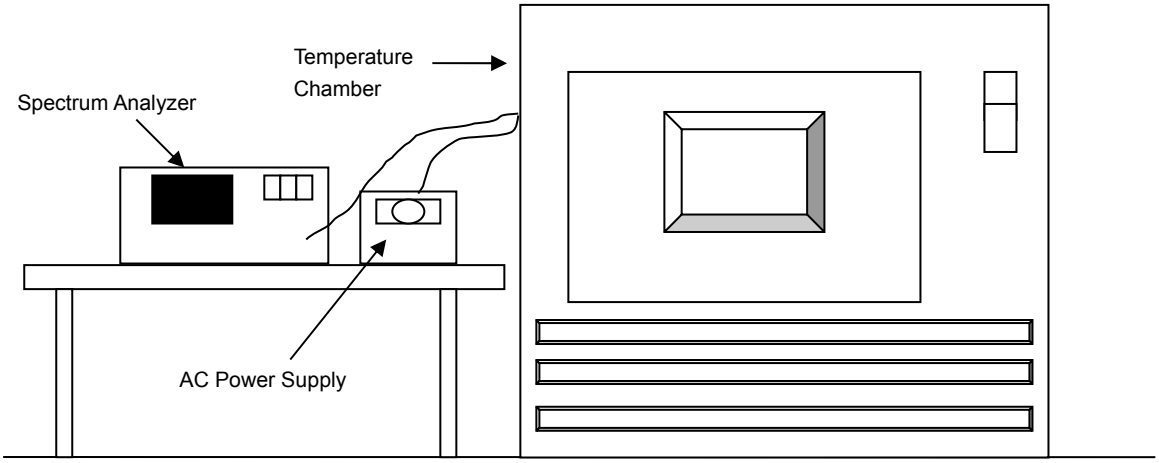


4.6 Frequency Stability

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. 11, 2018	Jun. 10, 2019
WIT Standard Temperature And Humidity Chamber	TH-4S-C	W981030	Jun. 04, 2018	Jun. 03, 2019
Digital Multimeter Fluke	87-III	70360742	Jun. 29, 2018	Jun. 28, 2019
AC Power Supply Extech	CFW-105	E000603	NA	NA

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

4.6.4 Test Procedure

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

b. Turn the EUT on and couple its output to a spectrum analyzer.

c. Turn the EUT off and set the chamber to the highest temperature specified.

d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.

e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
50	120	5180.0045	Pass	5180.0051	Pass	5180.0056	Pass	5180.0065	Pass
40	120	5179.9989	Pass	5179.9974	Pass	5179.9946	Pass	5179.9983	Pass
30	120	5179.9972	Pass	5179.9984	Pass	5179.9964	Pass	5179.9982	Pass
20	120	5179.9956	Pass	5179.9933	Pass	5179.9912	Pass	5179.9957	Pass
10	120	5179.9736	Pass	5179.972	Pass	5179.9766	Pass	5179.9722	Pass
0	120	5179.9835	Pass	5179.9847	Pass	5179.9812	Pass	5179.9808	Pass
-10	120	5180.0154	Pass	5180.0118	Pass	5180.0108	Pass	5180.0135	Pass
-20	120	5180.0097	Pass	5180.0111	Pass	5180.0117	Pass	5180.0131	Pass
-30	120	5180.0178	Pass	5180.0169	Pass	5180.0193	Pass	5180.0165	Pass

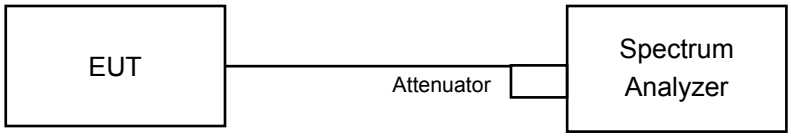
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5179.9951	Pass	5179.9926	Pass	5179.992	Pass	5179.9953	Pass
	120	5179.9956	Pass	5179.9933	Pass	5179.9912	Pass	5179.9957	Pass
	102	5179.9965	Pass	5179.9932	Pass	5179.992	Pass	5179.9958	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

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.35	16.38	0.5	Pass
157	5785	16.38	16.39	0.5	Pass
165	5825	16.40	16.40	0.5	Pass

802.11n (HT20)

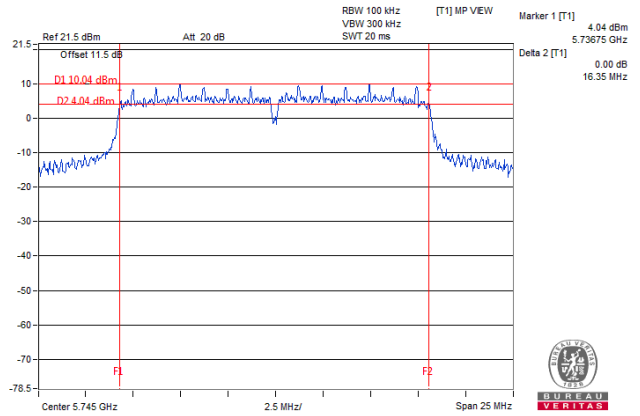
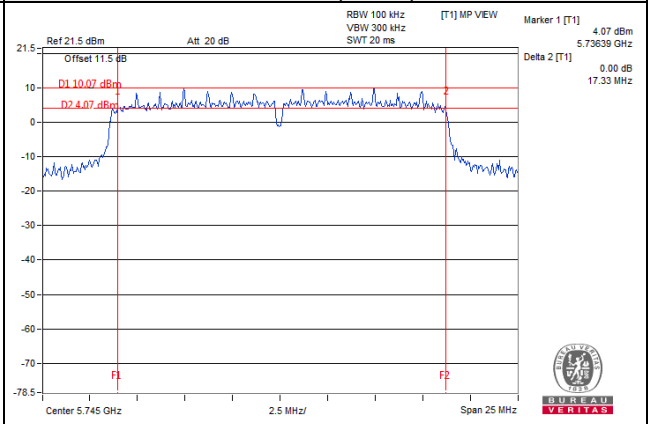
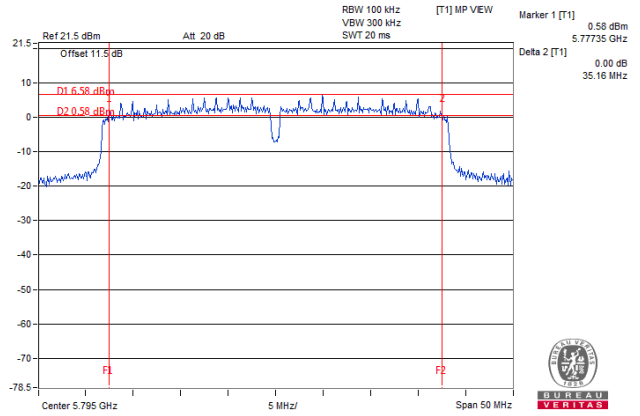
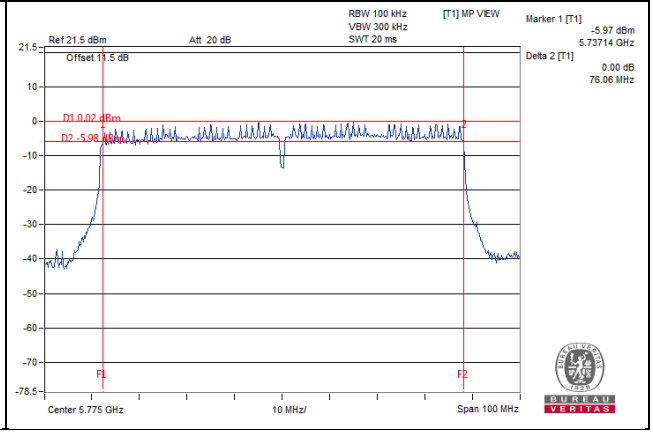
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.33	17.62	0.5	Pass
157	5785	17.60	17.60	0.5	Pass
165	5825	17.61	17.63	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.21	35.40	0.5	Pass
159	5795	35.31	35.16	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	76.26	76.06	0.5	Pass

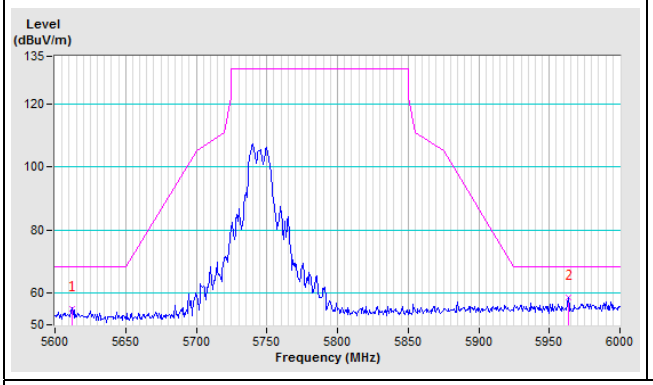
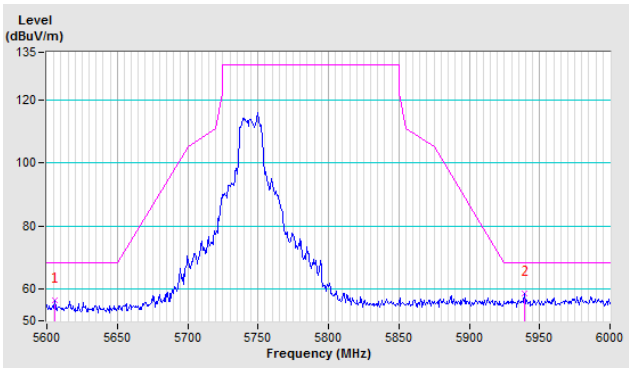
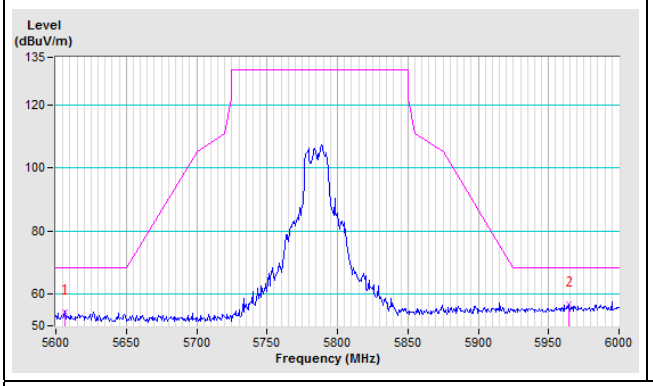
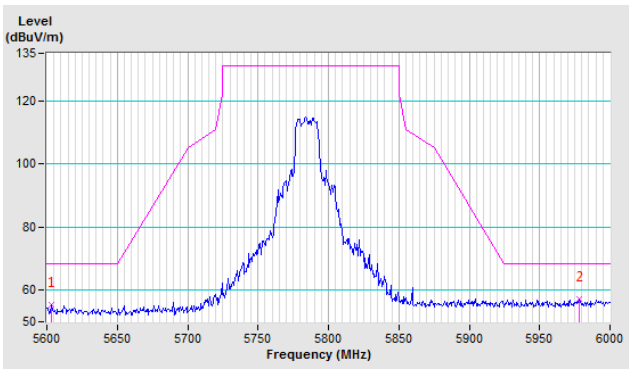
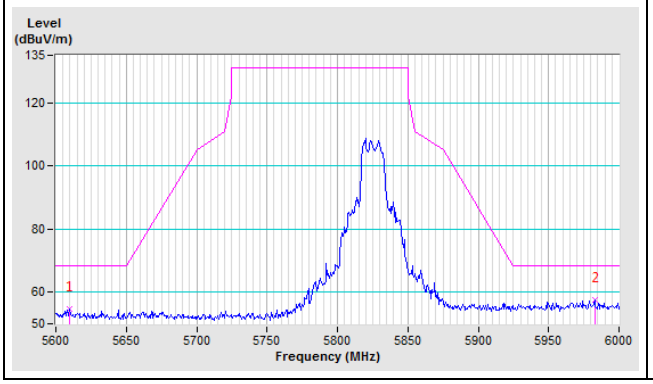
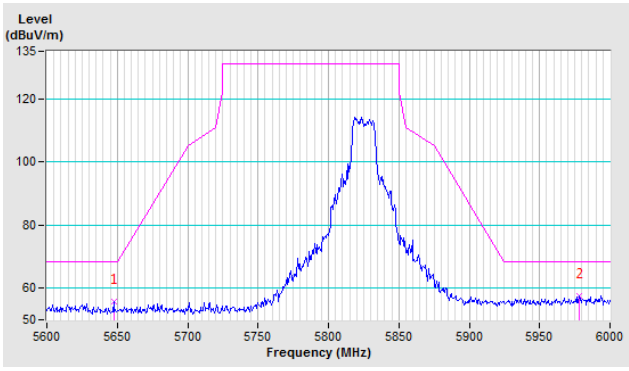
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

5 Pictures of Test Arrangements

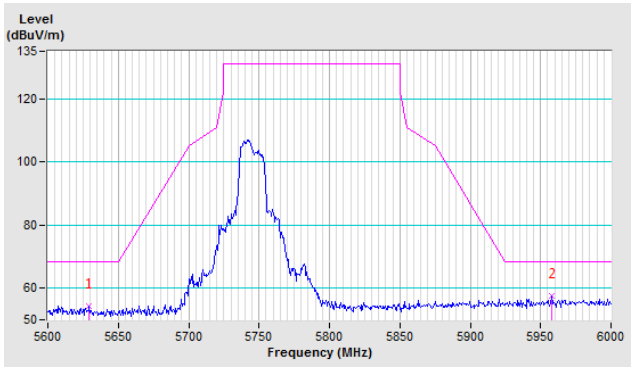
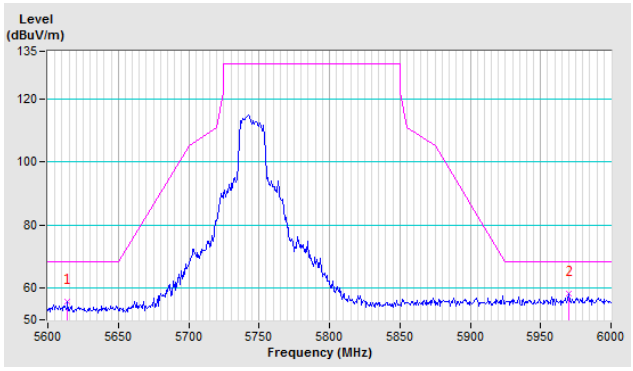
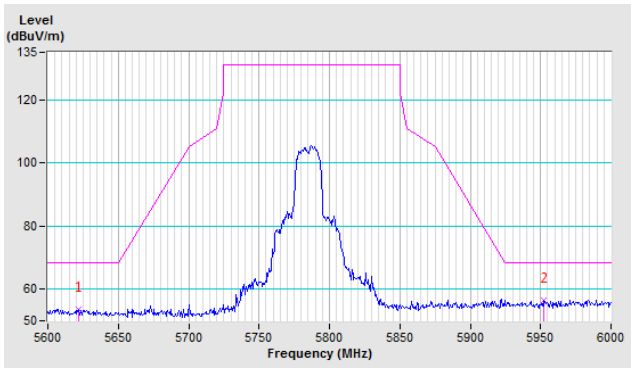
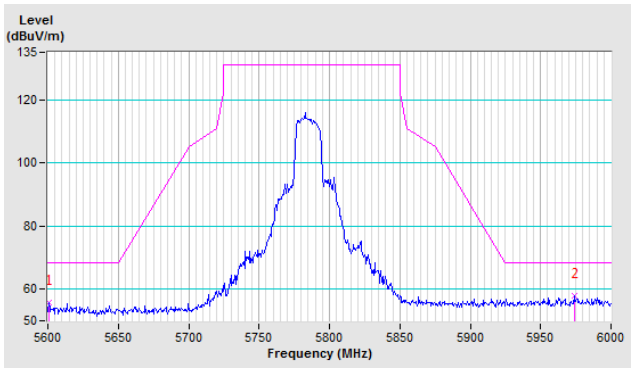
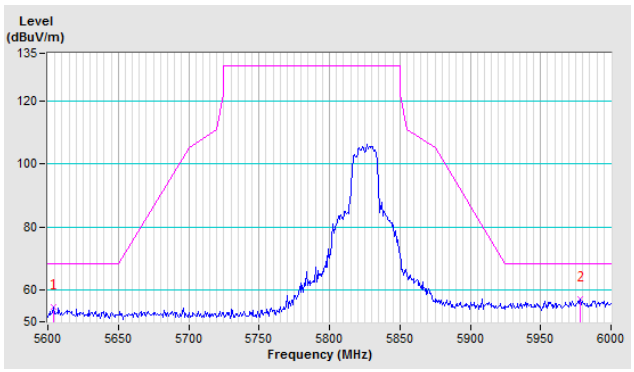
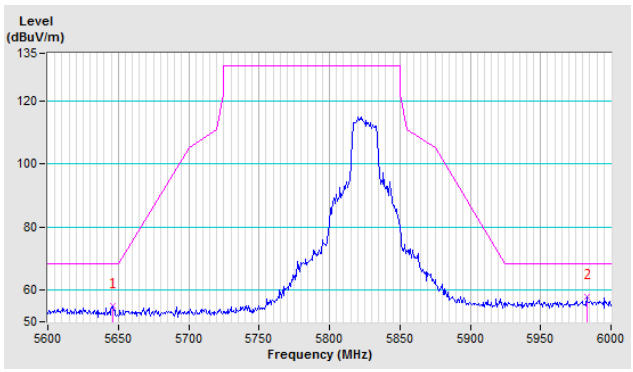
Please refer to the attached file (Test Setup Photo).

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

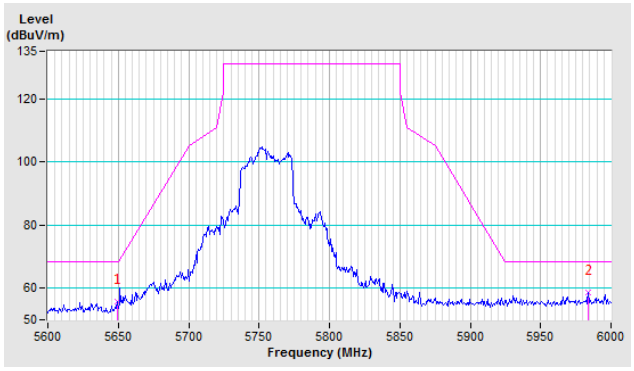
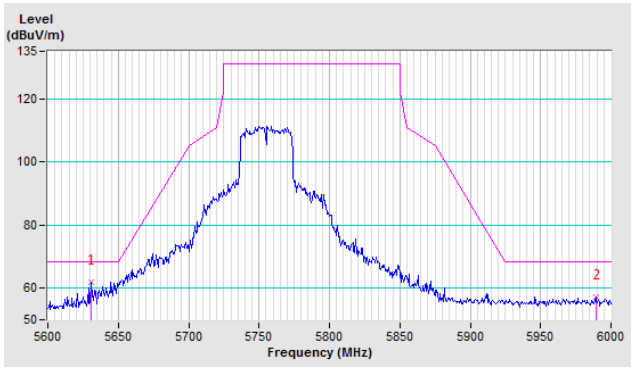
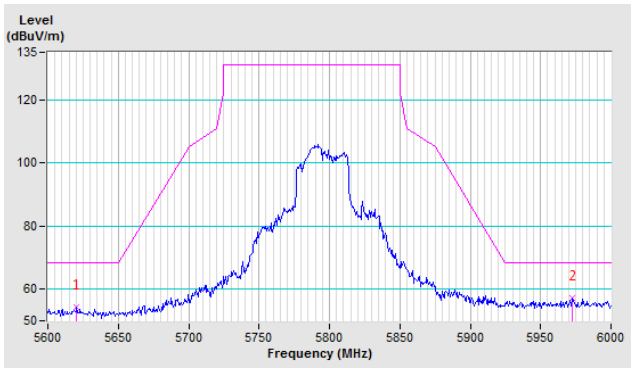
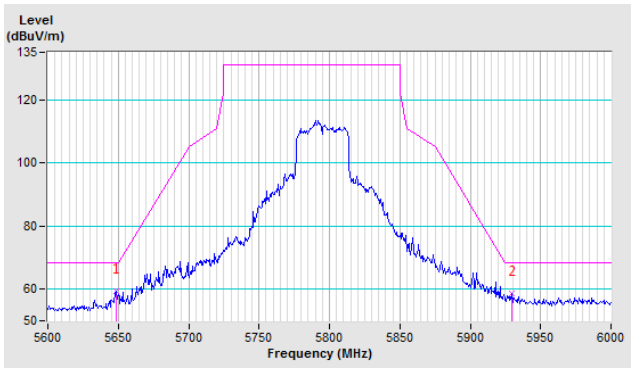
802.11a

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

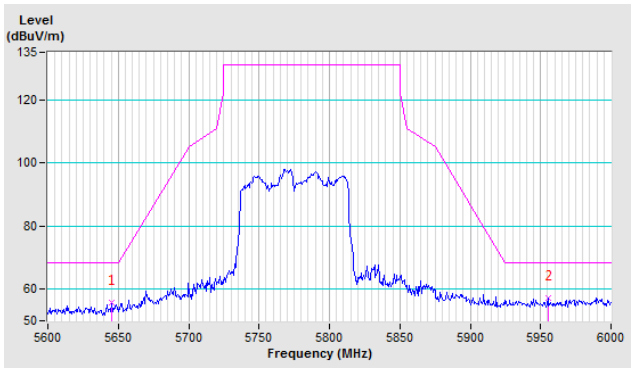
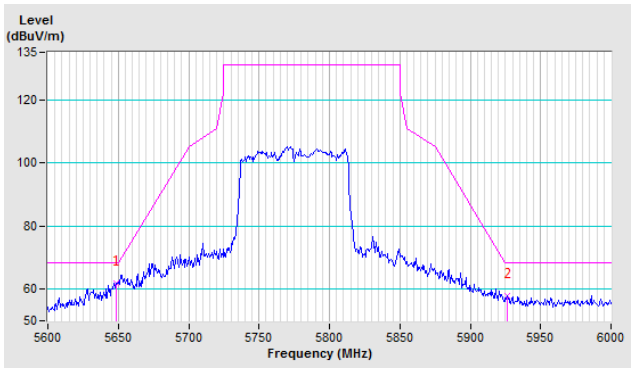
802.11n (HT20)

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

802.11n (HT40)

CH151	
Horizontal	Vertical
	
CH159	
Horizontal	Vertical
	

802.11ac (VHT80)

CH155	
Horizontal	Vertical
	

Appendix – Information 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:

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

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