FCC Test Report

Report No.:	RF180316C33-1
FCC ID:	2AKCZ-0CF
Test Model:	APL44-0CF
Received Date:	Mar. 16, 2018
Test Date:	Mar. 19 ~ Mar. 29, 2018
Issued Date:	Apr. 19, 2018
Applicant:	SonicWall Inc.
Address:	1033 McCarthy Blvd., Milpitas, CA 95035, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF180316C33-1	Original release	Apr. 19, 2018

1 Certificate of Conformity

Product:	Wireless Access Point
Brand:	SONICWALL
Test Model:	APL44-0CF
Sample Status:	Engineering sample
Applicant:	SonicWall Inc.
Test Date:	Mar. 19 ~ Mar. 29, 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:** Apr. 19, 2018

Celine Chou / Specialist

Approved by : Bruce Chen , **Date:** Apr. 19, 2018

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 -12.63dB at 0.20201MHz.
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 -1.3dB at 5925.00MHz, 5150.00MHz and 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 I-PEX not a standard connector.

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

2.1 Measurement Uncertainty

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

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

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless Access Point
Brand	SONICWALL
Test Model	APL44-0CF
Sample Status	Engineering sample
Power Supply Rating	12Vdc from Adapter 52Vdc 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: 469.456mW 5745 ~ 5825MHz: 475.872mW Beamforming Mode: 5180 ~ 5240MHz: 232.592mW 5745 ~ 5825MHz: 233.262mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Cable Supplied	1.75m non-shielded RJ45 cable without core

Note:

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

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

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

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

2. The EUT consumes power from the following Adapter and PoE. (support unit only)

Adapter	
Brand	Powertron Electronics Corp.
Model	PA1015-120DUB150
Input	100-240Vac~50-60Hz 0.4A
Output	12Vdc/ 1.5A 18W Max.
Power Line	1.5m cable without core attached on adapter

PoE	
Brand	DELL
Model	ADPE01-0B1
Input	100-240Vac~50-60Hz 0.6A
Output	52Vdc/ 0.58A

3. The following antennas were provided to the EUT.

Ant. No.	1	2	3	4	5 (BLE)	6 (Scan)
Ant. Type	PIFA	PIFA	PIFA	PIFA	PCB	PCB
Ant. Connector	IPEX	IPEX	IPEX	IPEX	IPEX	IPEX
Frequency (MHz)	2400-2500		5150-5850		2400-2500	2400-2500
Peak Gain (dBi)	4.58	3.63	5.56	4.58	5.80	3.89

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:
1. The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **Z-plane**.
2. "-" means no effect.

Radiated Emission Test (Above 1GHz):

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

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

Radiated Emission Test (Below 1GHz):

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A, B	802.11a	5180-5240	36 to 48	157	OFDM	6.0
	802.11a	5745-5825	149 to 165		OFDM	6.0

Power Line Conducted Emission Test:

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A, B	802.11a	5180-5240	36 to 48	157	OFDM	6.0
	802.11a	5745-5825	149 to 165		OFDM	6.0

Peak Power Spectral Density, Bandwidth and Frequency Stability Measurement:

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

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

Transmit Power Measurement:

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

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

Test Condition:

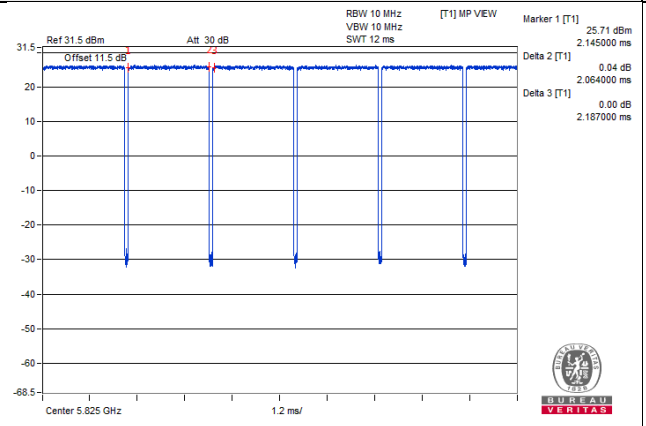
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	24 deg. C, 66% RH 23 deg. C, 69% RH	120Vac, 60Hz	Adair Peng Will Cheng
RE<1G	23 deg. C, 66% RH	120Vac, 60Hz 52Vdc	Will Cheng
PLC	25 deg. C, 75% RH	120Vac, 60Hz 52Vdc	Adair Peng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Chris Lin

3.3 Duty Cycle of Test Signal

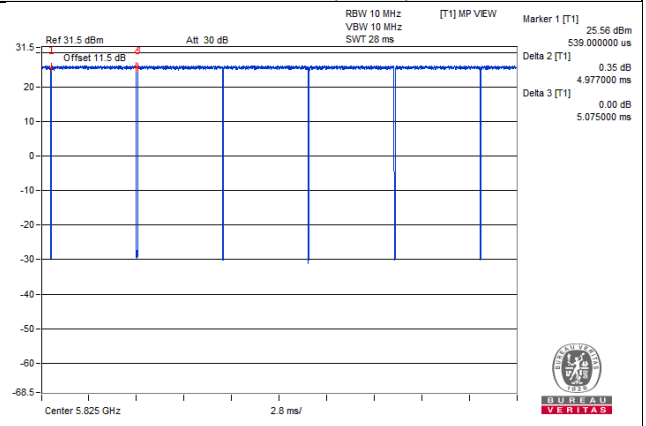
802.11n (HT20): Duty cycle of test signal is > 98%, duty factor is not required.
802.11a, 802.11n (HT40), 802.11ac (VHT80): Duty cycle of test signal is < 98%, duty factor is required.

802.11a: Duty cycle = 2.064/2.187 = 0.944, Duty factor = 10 * log (1/0.944) = 0.25
802.11n (HT20): Duty cycle = 4.977/5.075 = 0.981
802.11n (HT40): Duty cycle = 2.415/2.508 = 0.963, Duty factor = 10 * log (1/0.963) = 0.16
802.11ac (VHT80): Duty cycle = 1.140/1.234 = 0.924, Duty factor = 10 * log (1/0.924) = 0.34

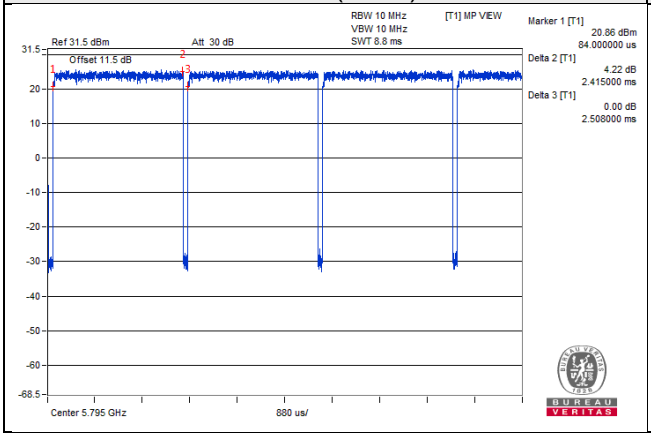
802.11a



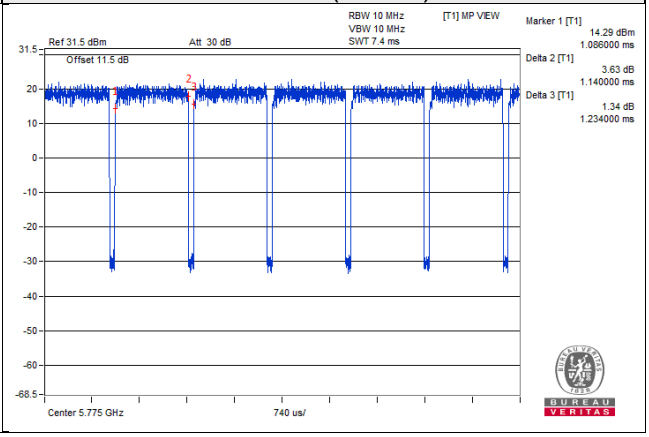
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



3.4 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	6RP2YM1	FCC DoC Approved	-
B.	USB Flash	HP	v250W	01	FCC DoC Approved	-
C.	Adapter	Powertron Electronics Corp.	PA1015-120DUB150	NA	NA	Provided by client
D.	PoE	DELL	ADPE01-0B1	NA	NA	Provided by client

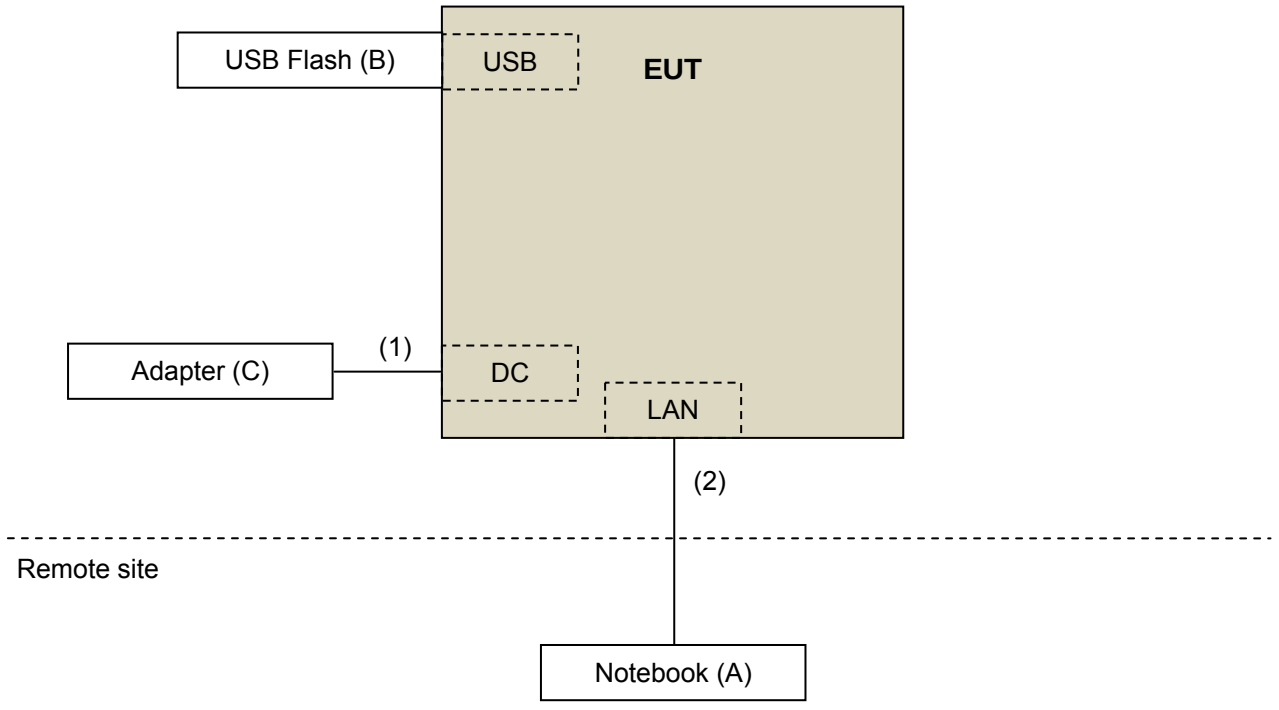
Note:

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

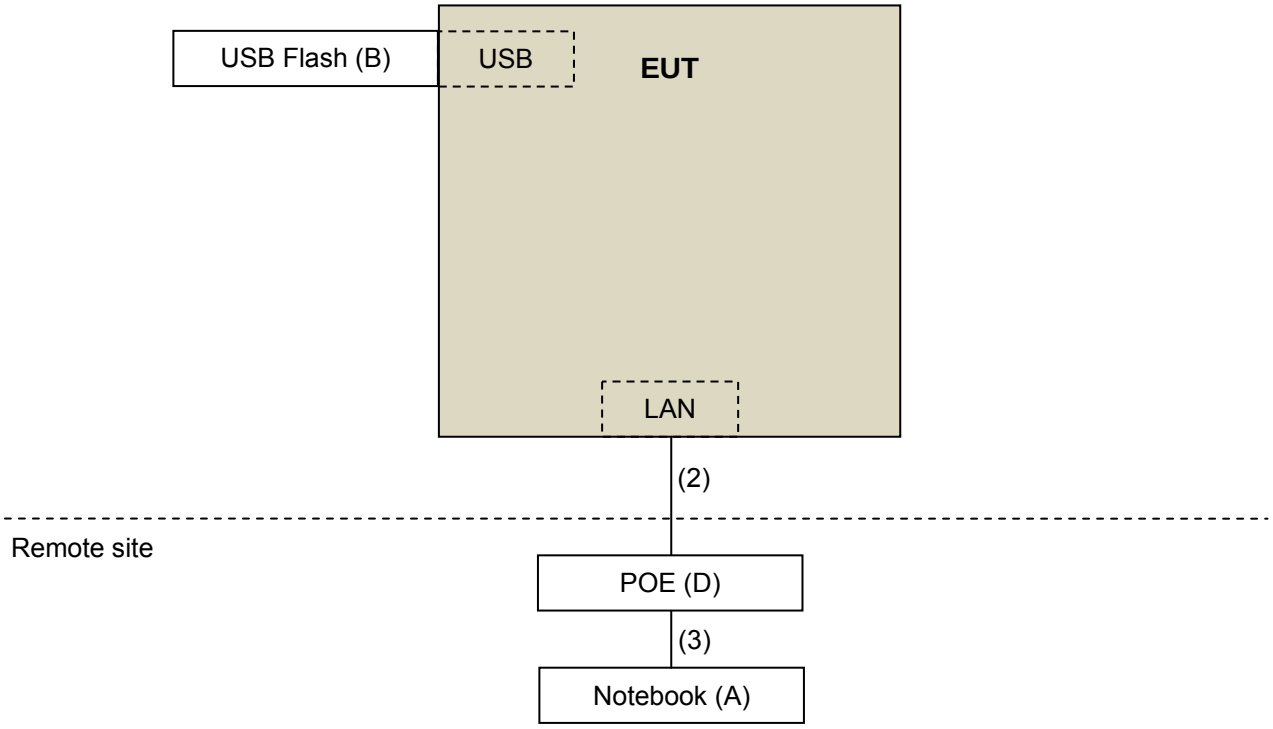
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.5	N	0	Attached on adapter
2.	RJ45, Cat5e	1	3	N	0	-
3.	RJ45, Cat5e	1	1.8	N	0	-

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 02, 2017	May 01, 2018
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100041	Dec. 12, 2017	Dec. 11, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	9120D	209	Dec. 13, 2017	Dec. 12, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 21, 2017	Aug. 20, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A01976	Aug. 21, 2017	Aug. 20, 2018
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 21, 2017	Aug. 20, 2018
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM-8000	Cable-CH3-03 (309224+170907)	Sep.11, 2017	Sep. 10, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
26GHz ~ 40GHz Amplifier Agilent	8449B	3008A1960	Aug. 08, 2017	Aug. 07, 2018
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018

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

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

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

c. 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.

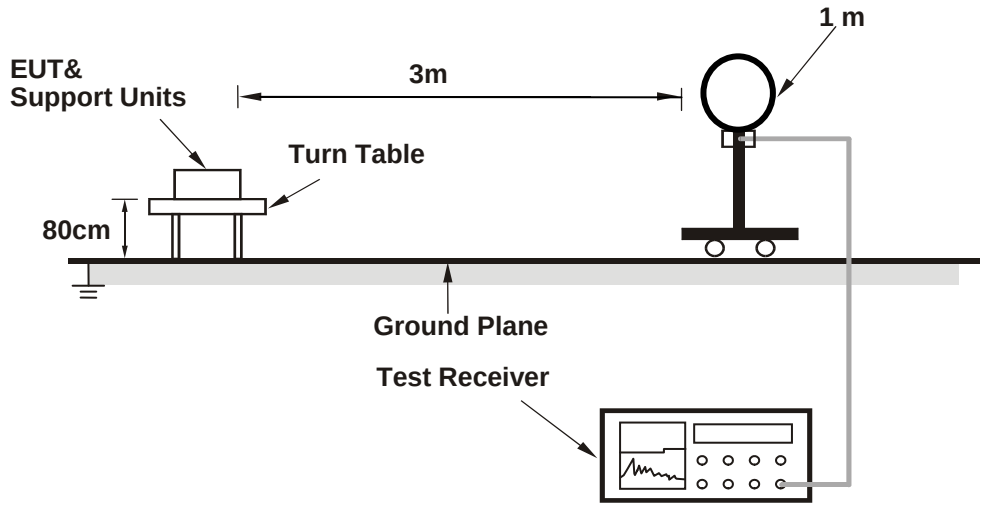
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

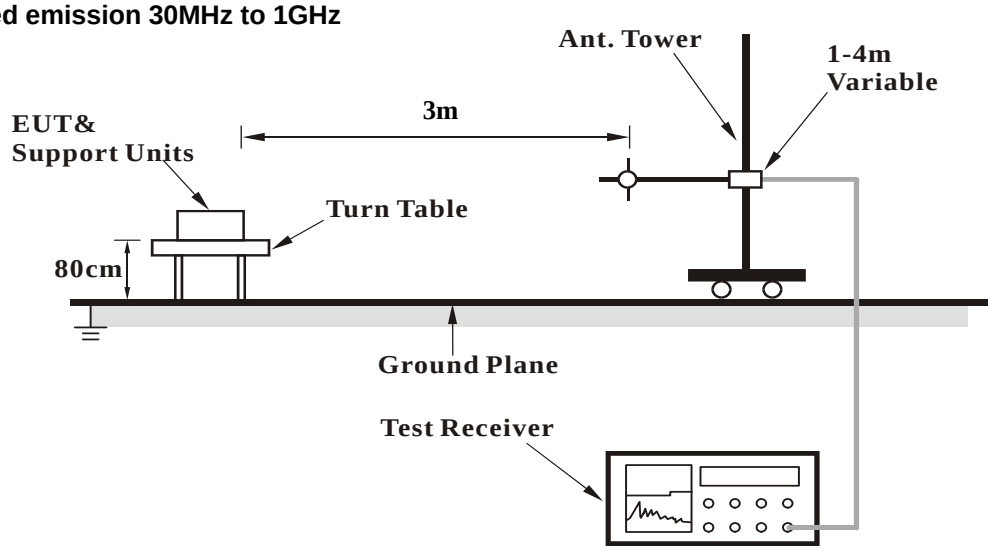
No deviation.

4.1.5 Test Setup

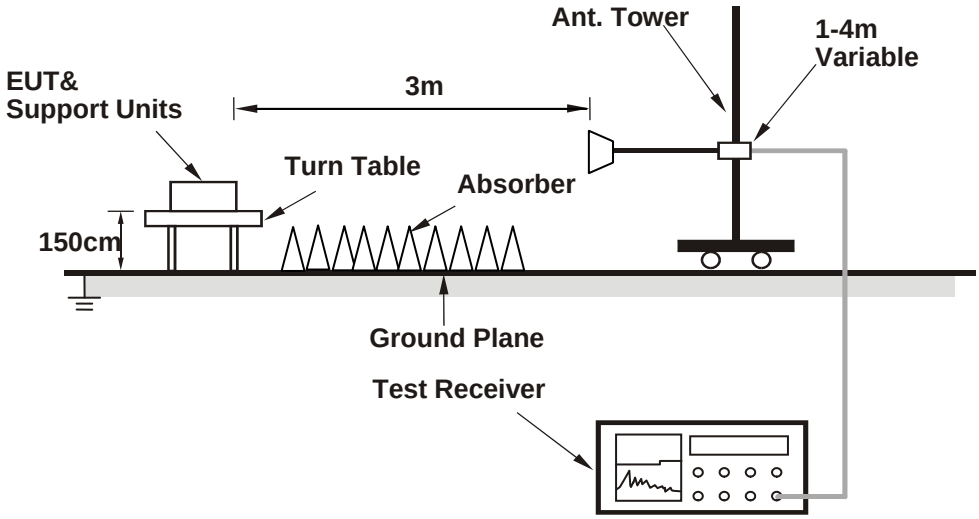
For Radiated emission below 30MHz



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	71.4 PK	74.0	-2.6	1.86 H	283	67.7	3.7
2	5150.00	52.6 AV	54.0	-1.4	1.86 H	283	48.9	3.7
3	*5180.00	118.8 PK			1.84 H	283	79.2	39.6
4	*5180.00	108.1 AV			1.84 H	283	68.5	39.6
5	#10360.00	58.5 PK	74.0	-15.5	2.23 H	151	42.9	15.6
6	#10360.00	45.0 AV	54.0	-9.0	2.23 H	151	29.4	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.0 PK	74.0	-5.0	1.64 V	330	65.3	3.7
2	5150.00	49.5 AV	54.0	-4.5	1.64 V	330	45.8	3.7
3	*5180.00	116.8 PK			1.46 V	359	77.2	39.6
4	*5180.00	106.0 AV			1.46 V	359	66.4	39.6
5	#10360.00	57.6 PK	74.0	-16.4	1.80 V	266	42.0	15.6
6	#10360.00	44.7 AV	54.0	-9.3	1.80 V	266	29.1	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 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	122.1 PK			2.54 H	301	82.5	39.6
2	*5200.00	111.4 AV			2.54 H	301	71.8	39.6
3	#10400.00	58.1 PK	74.0	-15.9	1.93 H	166	42.5	15.6
4	#10400.00	44.9 AV	54.0	-9.1	1.93 H	166	29.3	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	119.7 PK			1.42 V	351	80.1	39.6
2	*5200.00	109.0 AV			1.42 V	351	69.4	39.6
3	#10400.00	57.7 PK	74.0	-16.3	1.93 V	278	42.1	15.6
4	#10400.00	44.3 AV	54.0	-9.7	1.93 V	278	28.7	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	121.2 PK			2.59 H	295	81.8	39.4
2	*5240.00	110.9 AV			2.59 H	295	71.5	39.4
3	5350.00	57.7 PK	74.0	-16.3	2.31 H	289	53.9	3.8
4	5350.00	44.7 AV	54.0	-9.3	2.31 H	289	40.9	3.8
5	#10480.00	57.7 PK	74.0	-16.3	2.19 H	193	41.1	16.6
6	#10480.00	44.4 AV	54.0	-9.6	2.19 H	193	27.8	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	*5240.00	119.9 PK			1.40 V	353	80.5	39.4
2	*5240.00	109.6 AV			1.40 V	353	70.2	39.4
3	5350.00	56.3 PK	74.0	-17.7	1.51 V	344	52.5	3.8
4	5350.00	42.8 AV	54.0	-11.2	1.51 V	344	39.0	3.8
5	#10480.00	57.6 PK	74.0	-16.4	2.13 V	261	41.0	16.6
6	#10480.00	44.1 AV	54.0	-9.9	2.13 V	261	27.5	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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5642.40	56.1 PK	68.2	-12.1	2.51 H	302	51.8	4.3
2	*5745.00	122.2 PK			2.51 H	302	82.1	40.1
3	*5745.00	111.3 AV			2.51 H	302	71.2	40.1
4	#5934.40	58.0 PK	68.2	-10.2	2.51 H	302	53.0	5.0
5	11490.00	62.0 PK	74.0	-12.0	1.78 H	201	44.2	17.8
6	11490.00	47.2 AV	54.0	-6.8	1.78 H	201	29.4	17.8
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	#5612.80	55.6 PK	68.2	-12.6	3.74 V	328	51.4	4.2
2	*5745.00	119.4 PK			3.74 V	328	79.3	40.1
3	*5745.00	108.9 AV			3.74 V	328	68.8	40.1
4	#5955.20	57.2 PK	68.2	-11.0	3.74 V	328	52.2	5.0
5	11490.00	61.0 PK	74.0	-13.0	2.18 V	188	43.2	17.8
6	11490.00	47.5 AV	54.0	-6.5	2.18 V	188	29.7	17.8

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	#5613.60	55.9 PK	68.2	-12.3	2.43 H	295	51.7	4.2
2	*5785.00	122.2 PK			2.43 H	295	81.9	40.3
3	*5785.00	111.2 AV			2.43 H	295	70.9	40.3
4	#5971.20	57.8 PK	68.2	-10.4	2.43 H	295	52.8	5.0
5	11570.00	62.8 PK	74.0	-11.2	1.71 H	354	44.7	18.1
6	11570.00	48.6 AV	54.0	-5.4	1.71 H	354	30.5	18.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5617.60	56.2 PK	68.2	-12.0	3.87 V	320	52.0	4.2
2	*5785.00	119.5 PK			3.87 V	320	79.2	40.3
3	*5785.00	108.9 AV			3.87 V	320	68.6	40.3
4	#5947.20	57.4 PK	68.2	-10.8	3.87 V	320	52.4	5.0
5	11570.00	60.9 PK	74.0	-13.1	1.69 V	186	42.8	18.1
6	11570.00	47.3 AV	54.0	-6.7	1.69 V	186	29.2	18.1

Remarks:

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

CHANNEL	TX Channel 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	#5609.60	55.8 PK	68.2	-12.4	2.39 H	292	51.6	4.2
2	*5825.00	122.5 PK			2.39 H	292	82.0	40.5
3	*5825.00	111.2 AV			2.39 H	292	70.7	40.5
4	#5927.20	59.3 PK	68.2	-8.9	2.39 H	292	54.4	4.9
5	11650.00	61.6 PK	74.0	-12.4	2.67 H	9	43.9	17.7
6	11650.00	48.4 AV	54.0	-5.6	2.67 H	9	30.7	17.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5634.40	56.1 PK	68.2	-12.1	2.38 V	334	51.9	4.2
2	*5825.00	120.9 PK			2.38 V	334	80.4	40.5
3	*5825.00	109.8 AV			2.38 V	334	69.3	40.5
4	#5959.20	57.9 PK	68.2	-10.3	2.38 V	334	52.9	5.0
5	11650.00	59.5 PK	74.0	-14.5	2.12 V	188	41.8	17.7
6	11650.00	46.6 AV	54.0	-7.4	2.12 V	188	28.9	17.7

Remarks:

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

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	70.3 PK	74.0	-3.7	1.78 H	40	66.6	3.7
2	5150.00	52.4 AV	54.0	-1.6	1.78 H	40	48.7	3.7
3	*5180.00	119.4 PK			1.73 H	287	79.8	39.6
4	*5180.00	108.2 AV			1.73 H	287	68.6	39.6
5	#10360.00	58.2 PK	74.0	-15.8	2.11 H	187	42.6	15.6
6	#10360.00	44.7 AV	54.0	-9.3	2.11 H	187	29.1	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.6 PK	74.0	-5.4	1.54 V	356	64.9	3.7
2	5150.00	50.6 AV	54.0	-3.4	1.54 V	356	46.9	3.7
3	*5180.00	117.4 PK			1.41 V	340	77.8	39.6
4	*5180.00	106.3 AV			1.41 V	340	66.7	39.6
5	#10360.00	57.6 PK	74.0	-16.4	1.83 V	241	42.0	15.6
6	#10360.00	44.1 AV	54.0	-9.9	1.83 V	241	28.5	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 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	122.2 PK			1.77 H	282	82.6	39.6
2	*5200.00	111.2 AV			1.77 H	282	71.6	39.6
3	#10400.00	58.2 PK	74.0	-15.8	2.22 H	213	42.6	15.6
4	#10400.00	44.5 AV	54.0	-9.5	2.22 H	213	28.9	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	119.9 PK			1.55 V	337	80.3	39.6
2	*5200.00	108.8 AV			1.55 V	337	69.2	39.6
3	#10400.00	57.8 PK	74.0	-16.2	1.95 V	234	42.2	15.6
4	#10400.00	44.1 AV	54.0	-9.9	1.95 V	234	28.5	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	121.9 PK			1.78 H	285	82.5	39.4
2	*5240.00	111.0 AV			1.78 H	285	71.6	39.4
3	5350.00	56.5 PK	74.0	-17.5	1.91 H	277	52.7	3.8
4	5350.00	44.1 AV	54.0	-9.9	1.91 H	277	40.3	3.8
5	#10480.00	57.4 PK	74.0	-16.6	1.87 H	179	40.8	16.6
6	#10480.00	44.3 AV	54.0	-9.7	1.87 H	179	27.7	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	*5240.00	119.8 PK			1.54 V	342	80.4	39.4
2	*5240.00	108.8 AV			1.54 V	342	69.4	39.4
3	5350.00	55.8 PK	74.0	-18.2	1.61 V	354	52.0	3.8
4	5350.00	42.6 AV	54.0	-11.4	1.61 V	354	38.8	3.8
5	#10480.00	57.6 PK	74.0	-16.4	1.79 V	197	41.0	16.6
6	#10480.00	44.1 AV	54.0	-9.9	1.79 V	197	27.5	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.

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	#5643.20	56.9 PK	68.2	-11.3	2.49 H	298	52.6	4.3
2	*5745.00	122.0 PK			2.49 H	298	81.9	40.1
3	*5745.00	110.8 AV			2.49 H	298	70.7	40.1
4	#5968.00	57.9 PK	68.2	-10.3	2.49 H	298	52.9	5.0
5	11490.00	60.4 PK	74.0	-13.6	1.77 H	212	42.6	17.8
6	11490.00	47.3 AV	54.0	-6.7	1.77 H	212	29.5	17.8
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	#5626.40	57.1 PK	68.2	-11.1	1.41 V	12	52.9	4.2
2	*5745.00	120.5 PK			1.41 V	12	80.4	40.1
3	*5745.00	109.4 AV			1.41 V	12	69.3	40.1
4	#5937.60	57.1 PK	68.2	-11.1	1.41 V	12	52.2	4.9
5	11490.00	60.2 PK	74.0	-13.8	1.72 V	293	42.4	17.8
6	11490.00	47.3 AV	54.0	-6.7	1.72 V	293	29.5	17.8

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	#5612.80	56.0 PK	68.2	-12.2	2.48 H	285	51.8	4.2
2	*5785.00	121.9 PK			2.48 H	285	81.6	40.3
3	*5785.00	110.9 AV			2.48 H	285	70.6	40.3
4	#5966.40	57.8 PK	68.2	-10.4	2.48 H	285	52.8	5.0
5	11570.00	60.4 PK	74.0	-13.6	2.37 H	189	42.3	18.1
6	11570.00	47.9 AV	54.0	-6.1	2.37 H	189	29.8	18.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5624.00	56.0 PK	68.2	-12.2	1.29 V	5	51.8	4.2
2	*5785.00	120.7 PK			1.29 V	5	80.4	40.3
3	*5785.00	109.4 AV			1.29 V	5	69.1	40.3
4	#5962.40	57.8 PK	68.2	-10.4	1.29 V	5	52.8	5.0
5	11570.00	60.0 PK	74.0	-14.0	1.99 V	256	41.9	18.1
6	11570.00	47.2 AV	54.0	-6.8	1.99 V	256	29.1	18.1

Remarks:

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

CHANNEL	TX Channel 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	#5644.80	55.8 PK	68.2	-12.4	1.95 H	291	51.5	4.3
2	*5825.00	122.1 PK			1.95 H	291	81.6	40.5
3	*5825.00	111.2 AV			1.95 H	291	70.7	40.5
4	#5930.40	60.3 PK	68.2	-7.9	1.95 H	291	55.3	5.0
5	11650.00	60.3 PK	74.0	-13.7	1.77 H	213	42.6	17.7
6	11650.00	47.5 AV	54.0	-6.5	1.77 H	213	29.8	17.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5624.80	54.4 PK	68.2	-13.8	1.31 V	10	50.2	4.2
2	*5825.00	120.7 PK			1.31 V	10	80.2	40.5
3	*5825.00	109.2 AV			1.31 V	10	68.7	40.5
4	#5927.20	56.7 PK	68.2	-11.5	1.31 V	10	51.8	4.9
5	11650.00	59.8 PK	74.0	-14.2	1.93 V	303	42.1	17.7
6	11650.00	47.2 AV	54.0	-6.8	1.93 V	303	29.5	17.7

Remarks:

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

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	70.7 PK	74.0	-3.3	1.68 H	286	67.0	3.7
2	5150.00	52.4 AV	54.0	-1.6	1.68 H	286	48.7	3.7
3	*5190.00	114.1 PK			1.85 H	278	74.5	39.6
4	*5190.00	103.9 AV			1.85 H	278	64.3	39.6
5	#10380.00	58.4 PK	74.0	-15.6	2.22 H	203	42.8	15.6
6	#10380.00	44.3 AV	54.0	-9.7	2.22 H	203	28.7	15.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	68.0 PK	74.0	-6.0	1.45 V	335	64.3	3.7
2	5150.00	50.4 AV	54.0	-3.6	1.45 V	335	46.7	3.7
3	*5190.00	112.0 PK			1.51 V	334	72.4	39.6
4	*5190.00	101.8 AV			1.51 V	334	62.2	39.6
5	#10380.00	57.9 PK	74.0	-16.1	2.21 V	189	42.3	15.6
6	#10380.00	43.8 AV	54.0	-10.2	2.21 V	189	28.2	15.6

Remarks:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	69.2 PK	74.0	-4.8	1.76 H	288	65.5	3.7
2	5150.00	52.3 AV	54.0	-1.7	1.76 H	288	48.6	3.7
3	*5230.00	117.0 PK			1.82 H	283	77.6	39.4
4	*5230.00	106.9 AV			1.82 H	283	67.5	39.4
5	#10460.00	57.7 PK	74.0	-16.3	2.20 H	199	41.5	16.2
6	#10460.00	44.4 AV	54.0	-9.6	2.20 H	199	28.2	16.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.7 PK	74.0	-6.3	1.44 V	332	64.0	3.7
2	5150.00	51.2 AV	54.0	-2.8	1.44 V	332	47.5	3.7
3	*5230.00	116.4 PK			1.48 V	358	77.0	39.4
4	*5230.00	105.7 AV			1.48 V	358	66.3	39.4
5	#10460.00	57.3 PK	74.0	-16.7	1.91 V	263	41.1	16.2
6	#10460.00	44.1 AV	54.0	-9.9	1.91 V	263	27.9	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 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	#5649.60	64.4 PK	68.2	-3.8	2.21 H	296	60.1	4.3
2	#5650.00	66.5 PK	68.2	-1.7	2.46 H	318	62.2	4.3
3	*5755.00	118.7 PK			2.21 H	296	78.6	40.1
4	*5755.00	108.4 AV			2.21 H	296	68.3	40.1
5	#5930.40	58.3 PK	68.2	-9.9	2.21 H	296	53.3	5.0
6	11510.00	60.6 PK	74.0	-13.4	2.22 H	199	42.8	17.8
7	11510.00	47.3 AV	54.0	-6.7	2.22 H	199	29.5	17.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5648.00	63.3 PK	68.2	-4.9	1.28 V	4	59.0	4.3
2	#5650.00	66.3 PK	68.2	-1.9	1.46 V	5	62.0	4.3
3	*5755.00	117.3 PK			1.28 V	4	77.2	40.1
4	*5755.00	106.9 AV			1.28 V	4	66.8	40.1
5	#5932.80	58.9 PK	68.2	-9.3	1.28 V	4	53.9	5.0
6	11510.00	60.1 PK	74.0	-13.9	2.21 V	197	42.3	17.8
7	11510.00	46.9 AV	54.0	-7.1	2.21 V	197	29.1	17.8

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 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	#5636.80	58.6 PK	68.2	-9.6	2.29 H	290	54.4	4.2
2	*5795.00	119.3 PK			2.29 H	290	79.0	40.3
3	*5795.00	108.7 AV			2.29 H	290	68.4	40.3
4	**#5925.00**	**66.9 PK**	**68.2**	**-1.3**	**2.35 H**	**310**	**62.0**	**4.9**
5	#5936.00	62.8 PK	68.2	-5.4	2.29 H	290	57.9	4.9
6	11590.00	60.7 PK	74.0	-13.3	1.89 H	188	42.7	18.0
7	11590.00	47.6 AV	54.0	-6.4	1.89 H	188	29.6	18.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5632.80	55.9 PK	68.2	-12.3	1.59 V	17	51.7	4.2
2	*5795.00	116.7 PK			1.59 V	17	76.4	40.3
3	*5795.00	106.3 AV			1.59 V	17	66.0	40.3
4	#5925.00	64.9 PK	68.2	-3.3	1.66 V	359	60.0	4.9
5	#5934.40	63.0 PK	68.2	-5.2	1.59 V	17	58.0	5.0
6	11590.00	60.2 PK	74.0	-13.8	1.87 V	254	42.2	18.0
7	11590.00	47.2 AV	54.0	-6.8	1.87 V	254	29.2	18.0

Remarks:

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

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	68.2 PK	74.0	-5.8	1.99 H	288	64.5	3.7
2	**5150.00**	**52.7 AV**	**54.0**	**-1.3**	**1.99 H**	**288**	**49.0**	**3.7**
3	*5210.00	110.3 PK			2.70 H	298	70.8	39.5
4	*5210.00	99.7 AV			2.70 H	298	60.2	39.5
5	5350.00	59.2 PK	74.0	-14.8	2.25 H	286	55.4	3.8
6	5350.00	45.6 AV	54.0	-8.4	2.25 H	286	41.8	3.8
7	#10420.00	57.8 PK	74.0	-16.2	1.87 H	193	42.0	15.8
8	#10420.00	44.5 AV	54.0	-9.5	1.87 H	193	28.7	15.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.0 PK	74.0	-9.0	1.58 V	337	61.3	3.7
2	5150.00	51.5 AV	54.0	-2.5	1.58 V	337	47.8	3.7
3	*5210.00	108.5 PK			1.47 V	359	69.0	39.5
4	*5210.00	98.5 AV			1.47 V	359	59.0	39.5
5	5350.00	58.0 PK	74.0	-16.0	1.27 V	354	54.2	3.8
6	5350.00	45.1 AV	54.0	-8.9	1.27 V	354	41.3	3.8
7	#10420.00	57.4 PK	74.0	-16.6	1.88 V	209	41.6	15.8
8	#10420.00	44.1 AV	54.0	-9.9	1.88 V	209	28.3	15.8

Remarks:

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

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	#5645.60	65.4 PK	68.2	-2.8	2.52 H	304	61.1	4.3
2	**#5650.00**	**66.9 PK**	**68.2**	**-1.3**	**1.85 H**	**280**	**62.6**	**4.3**
3	*5775.00	111.8 PK			2.52 H	304	71.6	40.2
4	*5775.00	101.3 AV			2.52 H	304	61.1	40.2
5	#5925.00	65.7 PK	68.2	-2.5	3.34 H	287	60.8	4.9
6	#5926.40	63.5 PK	68.2	-4.7	2.52 H	304	58.6	4.9
7	11550.00	60.3 PK	74.0	-13.7	2.08 H	156	42.3	18.0
8	11550.00	47.3 AV	54.0	-6.7	2.08 H	156	29.3	18.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5648.80	62.8 PK	68.2	-5.4	1.40 V	13	58.5	4.3
2	#5650.00	64.0 PK	68.2	-4.2	1.68 V	344	59.7	4.3
3	*5775.00	109.3 PK			1.40 V	13	69.1	40.2
4	*5775.00	99.0 AV			1.40 V	13	58.8	40.2
5	#5925.00	56.9 PK	68.2	-11.3	1.57 V	358	52.0	4.9
6	#5954.40	60.7 PK	68.2	-7.5	1.40 V	13	55.7	5.0
7	11550.00	59.5 PK	74.0	-14.5	1.87 V	226	41.5	18.0
8	11550.00	46.8 AV	54.0	-7.2	1.87 V	226	28.8	18.0

Remarks:

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

Below 1GHz Worst-Case Data: 802.11a

CHANNEL	TX Channel 157	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	26.7 QP	40.0	-13.3	2.00 H	97	41.1	-14.4
2	131.00	26.9 QP	43.5	-16.6	2.00 H	273	42.2	-15.3
3	278.77	31.8 QP	46.0	-14.2	1.00 H	235	45.0	-13.2
4	416.81	34.2 QP	46.0	-11.8	1.00 H	15	45.1	-10.9
5	471.25	38.3 QP	46.0	-7.7	2.00 H	125	48.1	-9.8
6	624.85	38.9 QP	46.0	-7.1	1.00 H	152	45.7	-6.8
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	37.67	30.1 QP	40.0	-9.9	1.00 V	182	45.4	-15.3
2	55.18	31.9 QP	40.0	-8.1	1.00 V	5	46.2	-14.3
3	99.89	29.9 QP	43.5	-13.6	1.00 V	108	48.4	-18.5
4	278.77	29.6 QP	46.0	-16.4	1.99 V	269	42.8	-13.2
5	416.81	38.4 QP	46.0	-7.6	1.49 V	15	49.3	-10.9
6	624.85	36.9 QP	46.0	-9.1	1.00 V	235	43.7	-6.8

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

CHANNEL	TX Channel 157	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	26.2 QP	40.0	-13.8	1.99 H	254	40.6	-14.4
2	152.39	27.7 QP	43.5	-15.8	1.00 H	77	41.5	-13.8
3	189.33	28.5 QP	43.5	-15.0	1.99 H	272	44.7	-16.2
4	276.82	29.4 QP	46.0	-16.6	1.00 H	253	42.7	-13.3
5	467.36	37.0 QP	46.0	-9.0	1.99 H	318	46.9	-9.9
6	624.85	37.1 QP	46.0	-8.9	1.00 H	151	43.9	-6.8
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	36.37	31.4 QP	40.0	-8.6	1.00 V	184	46.9	-15.5
2	105.73	34.7 QP	43.5	-8.8	1.00 V	103	52.5	-17.8
3	276.82	29.4 QP	46.0	-16.6	2.00 V	309	42.7	-13.3
4	374.04	33.1 QP	46.0	-12.9	1.50 V	109	44.7	-11.6
5	412.92	37.3 QP	46.0	-8.7	1.50 V	268	48.3	-11.0
6	624.85	36.2 QP	46.0	-9.8	1.00 V	234	43.0	-6.8

Remarks:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

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

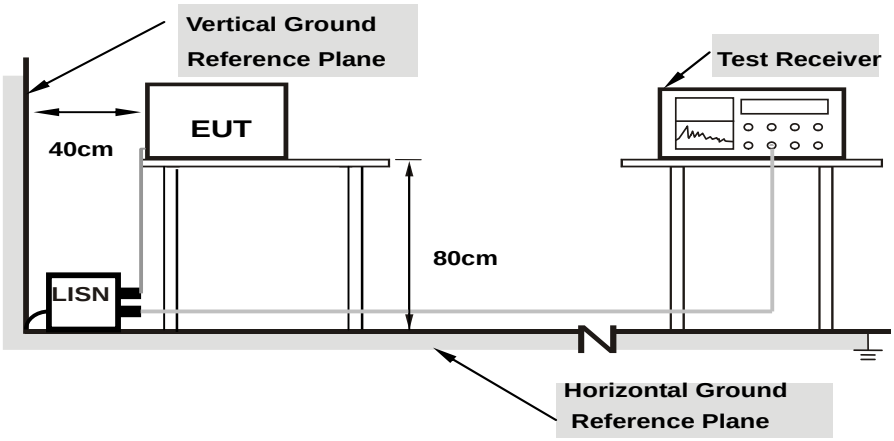
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

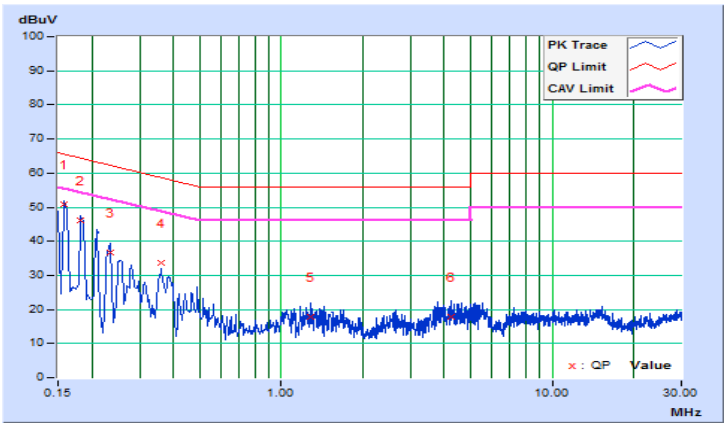
Worst-case data: 802.11a

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	0.15811	10.16	40.84	24.65	51.00	34.81	65.56	55.56	-14.56	-20.75
2	0.18228	10.16	35.98	20.68	46.14	30.84	64.38	54.38	-18.24	-23.54
3	0.23400	10.16	26.61	10.85	36.77	21.01	62.31	52.31	-25.54	-31.30
4	0.36200	10.20	23.55	18.45	33.75	28.65	58.68	48.68	-24.93	-20.03
5	1.28200	10.19	7.70	3.85	17.89	14.04	56.00	46.00	-38.11	-31.96
6	4.25400	10.36	7.35	2.31	17.71	12.67	56.00	46.00	-38.29	-33.33

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.

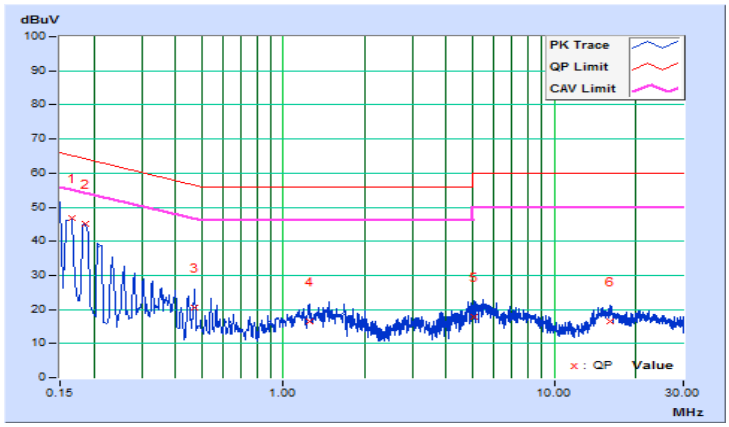


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

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	0.16535	10.15	36.56	21.70	46.71	31.85	65.19	55.19	-18.48	-23.34
2	0.18519	10.16	34.95	19.54	45.11	29.70	64.25	54.25	-19.14	-24.55
3	0.47000	10.20	10.35	1.17	20.55	11.37	56.51	46.51	-35.96	-35.14
4	1.25800	10.21	6.32	2.58	16.53	12.79	56.00	46.00	-39.47	-33.21
5	5.03400	10.38	7.61	1.87	17.99	12.25	60.00	50.00	-42.01	-37.75
6	16.01000	10.84	5.55	1.38	16.39	12.22	60.00	50.00	-43.61	-37.78

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.

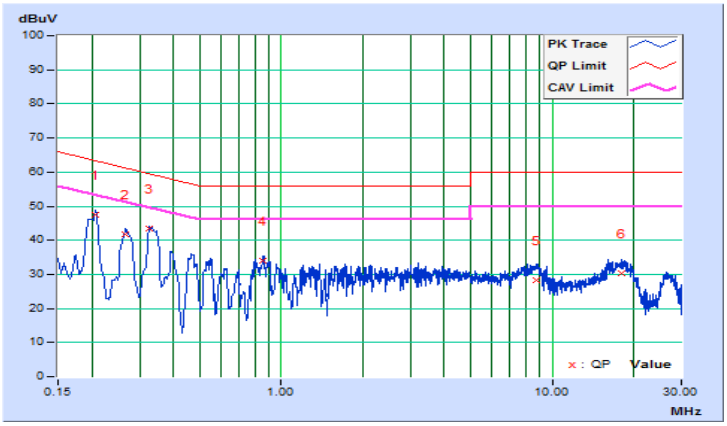


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

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	0.20600	10.10	37.31	30.09	47.41	40.19	63.37	53.37	-15.96	-13.18
2	0.26639	10.11	31.62	24.60	41.73	34.71	61.23	51.23	-19.50	-16.52
3	0.32630	10.11	33.18	23.81	43.29	33.92	59.54	49.54	-16.25	-15.62
4	0.85400	10.14	23.88	11.39	34.02	21.53	56.00	46.00	-21.98	-24.47
5	8.74600	10.55	17.86	11.19	28.41	21.74	60.00	50.00	-31.59	-28.26
6	18.15000	11.10	19.31	13.85	30.41	24.95	60.00	50.00	-29.59	-25.05

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.

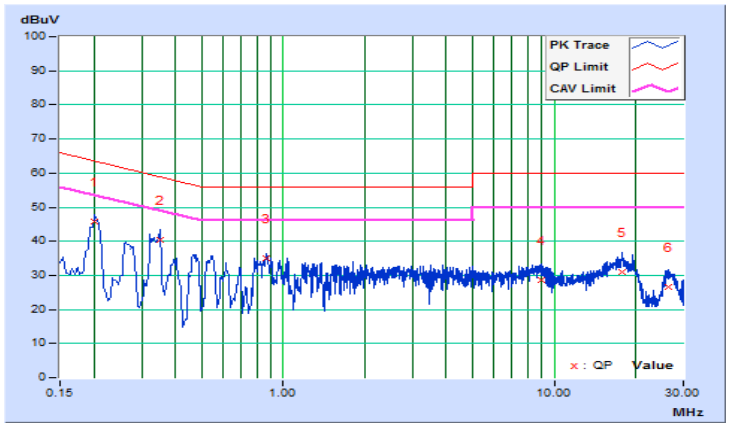


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

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	**0.20201**	**10.10**	**35.69**	**30.80**	**45.79**	**40.90**	**63.53**	**53.53**	**-17.74**	**-12.63**
2	0.35000	10.11	30.23	17.78	40.34	27.89	58.96	48.96	-18.62	-21.07
3	0.87000	10.13	24.85	12.26	34.98	22.39	56.00	46.00	-21.02	-23.61
4	8.98200	10.48	18.10	11.00	28.58	21.48	60.00	50.00	-31.42	-28.52
5	17.83800	10.85	20.10	13.64	30.95	24.49	60.00	50.00	-29.05	-25.51
6	26.47400	11.03	15.70	10.10	26.73	21.13	60.00	50.00	-33.27	-28.87

Remarks:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

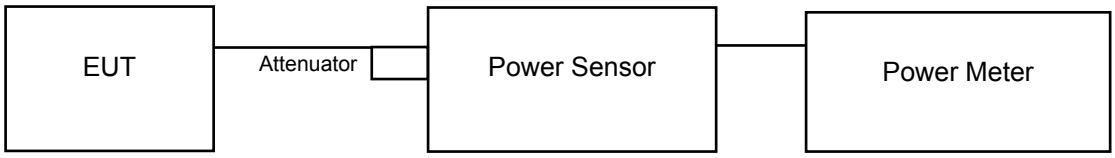
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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

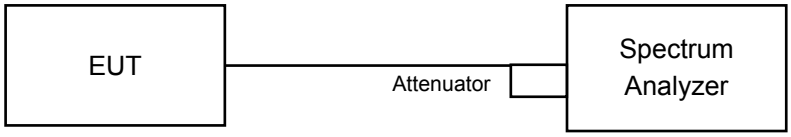
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

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



802.11ac (VHT80)



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

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

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

For 802.11ac (VHT80)

a. Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.

b. Set sweep trigger to “free run”.

c. Set RBW = 1 MHz.

d. Set VBW ≥ 3 MHz.

e. Number of points in sweep ≥ 2 Span / RBW.

f. Sweep time ≤ (number of points in sweep) * T

g. Using emission bandwidth to determine the frequency span for integration the channel bandwidth.

h. Detector = RMS.

i. Trace mode = max hold.

j. Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

k. Compute power by integrating the spectrum across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal using the instrument’s band power measurement function with band limits set equal to the EBW (or occupied bandwidth) band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at 1 MHz intervals extending across the EBW (or, alternatively, the entire 99% occupied bandwidth) of the spectrum.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

Power Output:

CDD Mode

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	20.98	20.77	244.713	23.89	30.00	Pass
40	5200	23.78	23.63	**469.456**	26.72	30.00	Pass
48	5240	23.12	23.01	405.102	26.08	30.00	Pass
149	5745	23.92	23.47	468.935	26.71	30.00	Pass
157	5785	23.88	23.47	466.674	26.69	30.00	Pass
165	5825	23.96	23.56	**475.872**	26.77	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	20.79	20.85	241.569	23.83	30.00	Pass
40	5200	23.74	23.59	465.152	26.68	30.00	Pass
48	5240	23.02	23.01	400.433	26.03	30.00	Pass
149	5745	23.84	23.41	461.383	26.64	30.00	Pass
157	5785	23.13	23.19	414.038	26.17	30.00	Pass
165	5825	23.84	23.51	466.491	26.69	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	19.93	19.79	193.681	22.87	30.00	Pass
46	5230	23.54	23.28	438.758	26.42	30.00	Pass
151	5755	23.28	23.13	418.403	26.22	30.00	Pass
159	5795	23.69	23.20	442.814	26.46	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	19.37	19.31	171.807	22.35	30.00	Pass
155	5775	20.07	19.42	189.123	22.77	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	17.78	17.84	120.793	20.82	27.43	Pass
40	5200	20.73	20.58	**232.592**	23.67	27.43	Pass
48	5240	20.01	20.00	200.231	23.02	27.43	Pass
149	5745	20.83	20.40	230.708	23.63	27.43	Pass
157	5785	20.12	20.18	207.034	23.16	27.43	Pass
165	5825	20.83	20.50	**233.262**	23.68	27.43	Pass

Note: Beamforming gain = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power limit shall be reduced to 30-(8.57-6) = 27.43dBm.

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	16.92	16.78	96.847	19.86	27.43	Pass
46	5230	20.53	20.27	219.394	23.41	27.43	Pass
151	5755	20.27	20.12	209.216	23.21	27.43	Pass
159	5795	20.68	20.19	221.422	23.45	27.43	Pass

Note: Beamforming gain = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power limit shall be reduced to 30-(8.57-6) = 27.43dBm.

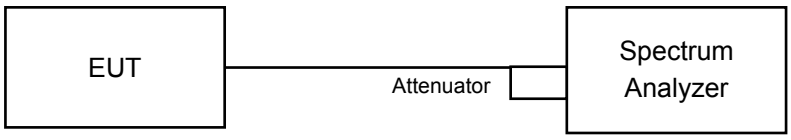
802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	16.36	16.30	85.909	19.34	27.43	Pass
155	5775	17.06	16.41	94.568	19.76	27.43	Pass

Note: Beamforming gain = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power limit shall be reduced to 30-(8.57-6) = 27.43dBm.

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	25.80	25.08
48	5240	17.57	16.68
149	5745	28.08	23.30
157	5785	27.96	24.24
165	5825	32.76	30.00

802.11n (HT20)

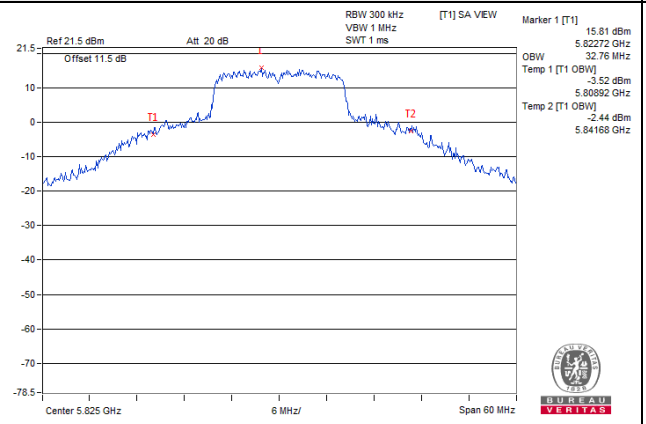
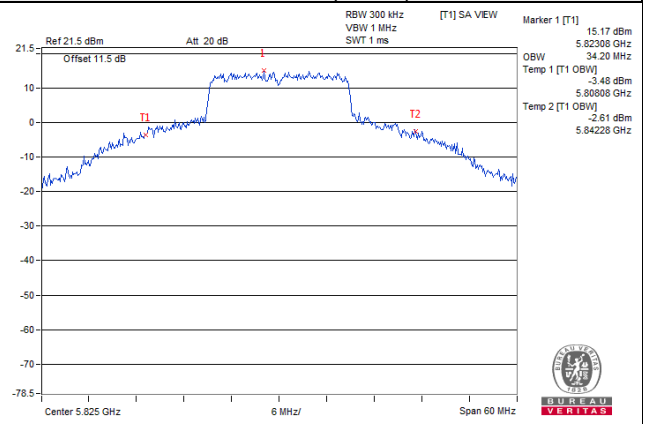
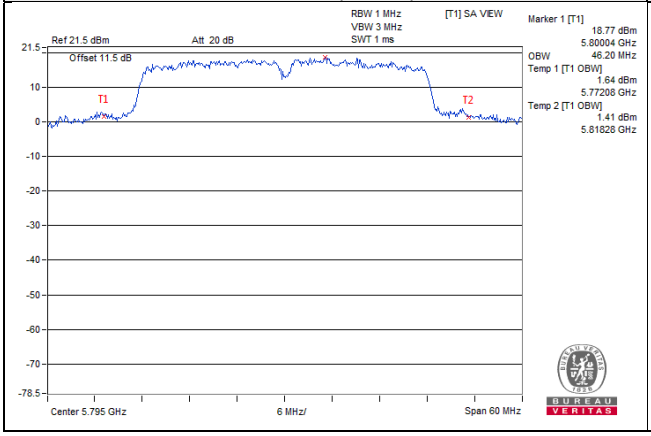
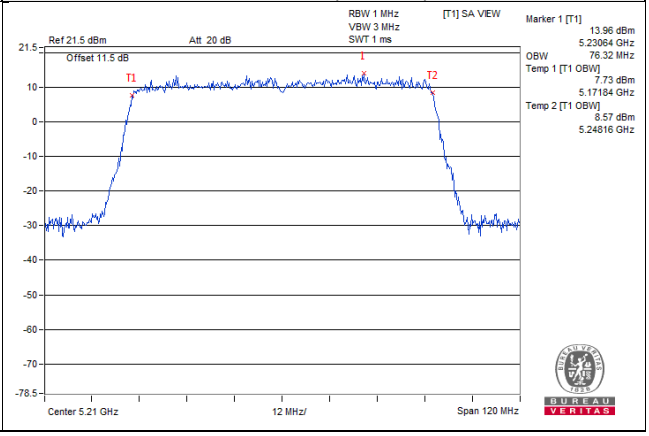
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.64
40	5200	27.00	19.20
48	5240	18.35	17.88
149	5745	28.80	22.87
157	5785	28.56	24.60
165	5825	34.20	30.72

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.24	36.12
46	5230	37.80	36.60
151	5755	40.80	36.96
159	5795	46.20	40.56

802.11ac (VHT80)

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

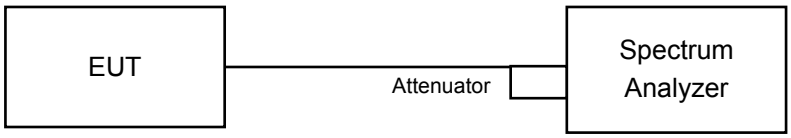
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

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:

Duty cycle of test signal is > 98%

Using method SA-1

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

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

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

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

e. Record the max value

Duty cycle of test signal is < 98%

Using method SA-2

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

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

c. Set Channel power measure = 1MHz

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

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

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

For U-NII-3 band:

Duty cycle of test signal is > 98%

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

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

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

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

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

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

g. Record the max value

Duty cycle of test signal is < 98%

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

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

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

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

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

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1 band:

802.11a

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	7.36	7.31	0.25	10.60	14.43	Pass
40	5200	10.71	10.66	0.25	13.95	14.43	Pass
48	5240	9.45	9.26	0.25	12.62	14.43	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 = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 17-(8.57-6) = 14.43dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	7.08	6.94	10.02	14.43	Pass
40	5200	10.42	10.24	13.34	14.43	Pass
48	5240	9.23	9.12	12.19	14.43	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 = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 17-(8.57-6) = 14.43dBm.

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	3.33	3.23	0.16	6.45	14.43	Pass
46	5230	7.28	6.37	0.16	10.02	14.43	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 = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 17-(8.57-6) = 14.43dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

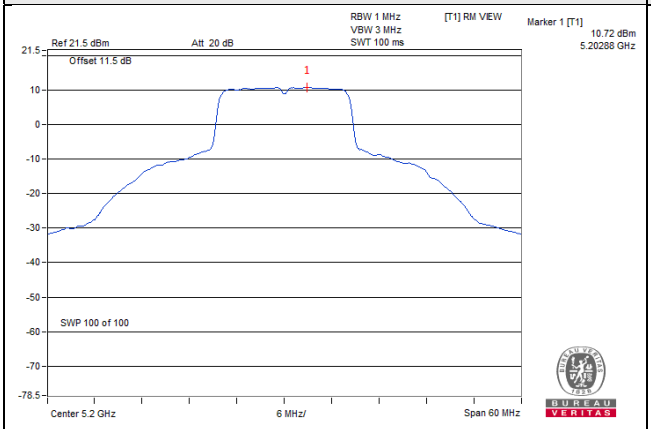
802.11ac (VHT80)

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	-0.53	-0.98	0.34	2.61	14.43	Pass

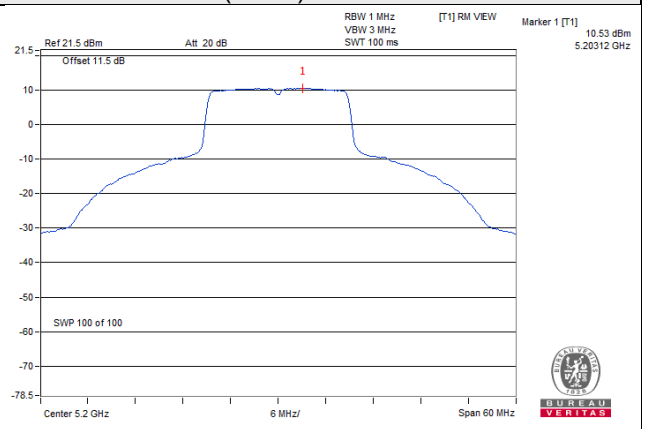
Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 17-(8.57-6) = 14.43dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

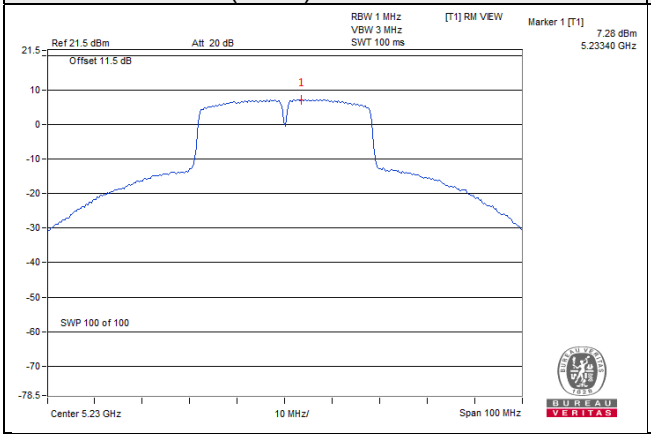
802.11a / Chain 0 / CH 40



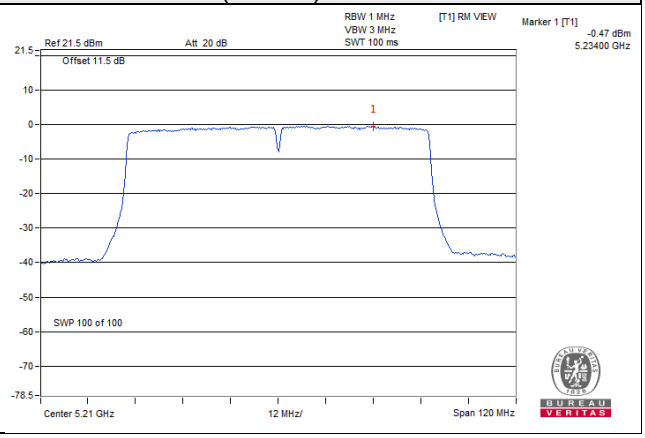
802.11n (HT20) / Chain 0 / CH 40



802.11n (HT40) / Chain 0 / CH 46



802.11ac (VHT80) / Chain 0 / CH 42



For U-NII-3 band:

802.11a

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	2.70	4.92	3.01	0.25	8.18	27.43	Pass
	157	5785	2.27	4.49	3.01	0.25	7.75	27.43	Pass
	165	5825	2.70	4.92	3.01	0.25	8.18	27.43	Pass
1	149	5745	2.61	4.83	3.01	0.25	8.09	27.43	Pass
	157	5785	2.39	4.61	3.01	0.25	7.87	27.43	Pass
	165	5825	2.77	4.99	3.01	0.25	8.25	27.43	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 = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 30-(8.57-6) = 27.43dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

TX chain	Chan.	Freq. (MHz)	PSD (dBm/300 kHz)	PSD (dBm/500 kHz)	10 log (N=2) dB	Total PSD (dBm/500 kHz)	Limit (dBm/500 kHz)	Pass / Fail
0	149	5745	2.56	4.78	3.01	7.79	27.43	Pass
	157	5785	1.96	4.18	3.01	7.19	27.43	Pass
	165	5825	2.33	4.55	3.01	7.56	27.43	Pass
1	149	5745	2.30	4.52	3.01	7.53	27.43	Pass
	157	5785	2.12	4.34	3.01	7.35	27.43	Pass
	165	5825	2.17	4.39	3.01	7.40	27.43	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 = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 30-(8.57-6) = 27.43dBm.

802.11n (HT40)

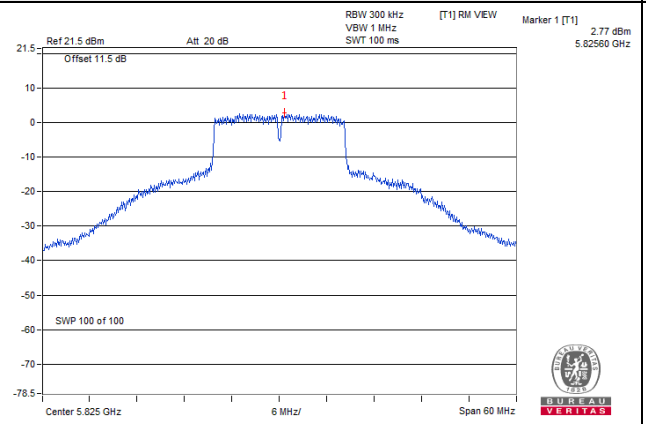
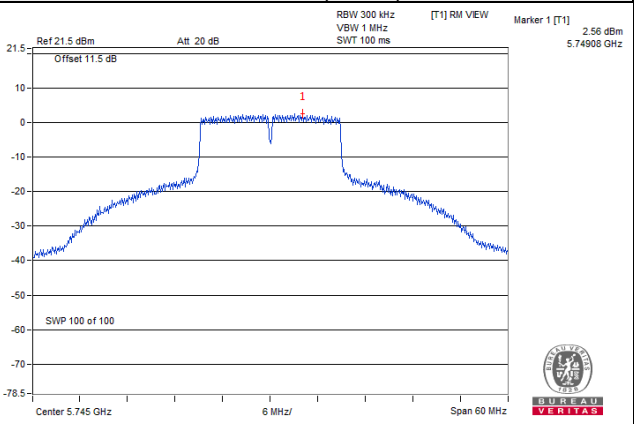
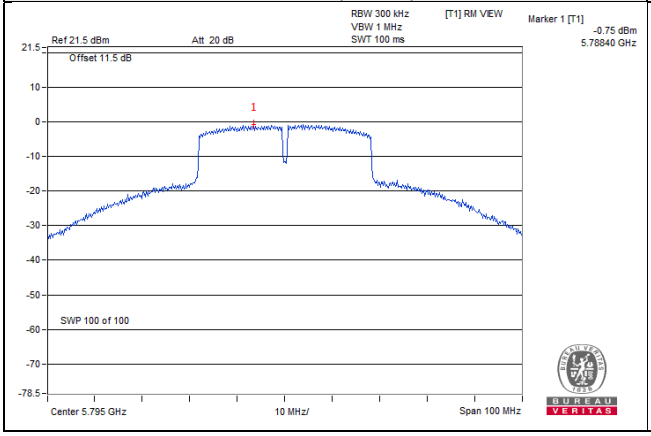
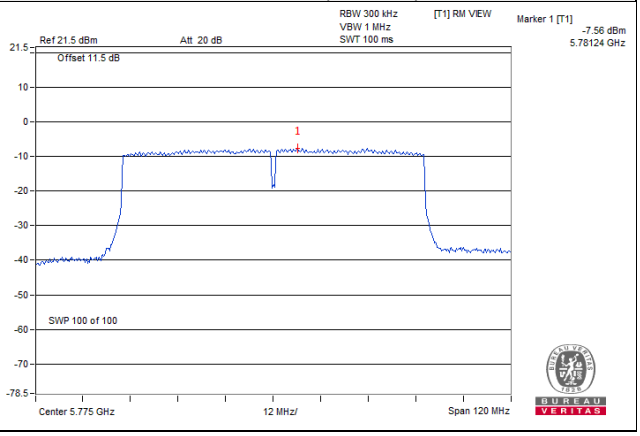
TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-1.03	1.19	3.01	0.16	4.36	27.43	Pass
	159	5795	-0.75	1.47	3.01	0.16	4.64	27.43	Pass
1	151	5755	-1.59	0.63	3.01	0.16	3.80	27.43	Pass
	159	5795	-1.00	1.22	3.01	0.16	4.39	27.43	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 = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 30-(8.57-6) = 27.43dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/ 500kHz)	Pass / Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-7.56	-5.34	3.01	0.34	-1.99	27.43	Pass
1	155	5775	-7.97	-5.75	3.01	0.34	-2.40	27.43	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 = 5.56dBi + 10log(2) = 8.57dBi > 6dBi, so the power density limit shall be reduced to 30-(8.57-6) = 27.43dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

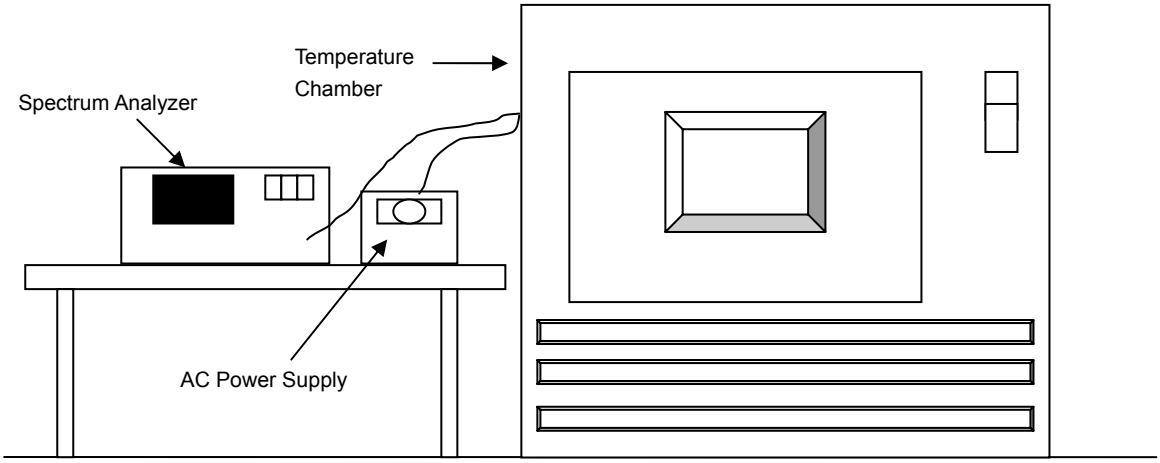
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.6 Frequency Stability

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

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

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

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

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

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

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
50	120	5179.9905	Pass	5179.9857	Pass	5179.9905	Pass	5179.9877	Pass
40	120	5179.9933	Pass	5179.9917	Pass	5179.9932	Pass	5179.9933	Pass
30	120	5179.9845	Pass	5179.9847	Pass	5179.9846	Pass	5179.9845	Pass
20	120	5179.9803	Pass	5179.9786	Pass	5179.9786	Pass	5179.9808	Pass
10	120	5179.9802	Pass	5179.9791	Pass	5179.9757	Pass	5179.9784	Pass
0	120	5179.994	Pass	5179.9928	Pass	5179.995	Pass	5179.9919	Pass
-10	120	5179.9786	Pass	5179.9816	Pass	5179.9805	Pass	5179.9822	Pass
-20	120	5179.9885	Pass	5179.9856	Pass	5179.9876	Pass	5179.9887	Pass
-30	120	5180.0007	Pass	5180.0031	Pass	5179.9993	Pass	5180.0037	Pass

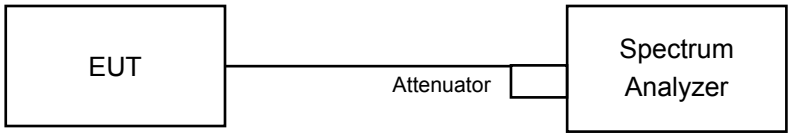
Frequency Stability Versus Voltage									
Operating Frequency: 5180MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5179.9801	Pass	5179.9778	Pass	5179.9796	Pass	5179.9811	Pass
	120	5179.9803	Pass	5179.9786	Pass	5179.9786	Pass	5179.9808	Pass
	102	5179.9794	Pass	5179.979	Pass	5179.978	Pass	5179.9809	Pass

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

Measurement Procedure REF

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.35	16.36	0.5	Pass
157	5785	16.37	16.37	0.5	Pass
165	5825	16.35	16.36	0.5	Pass

802.11n (HT20)

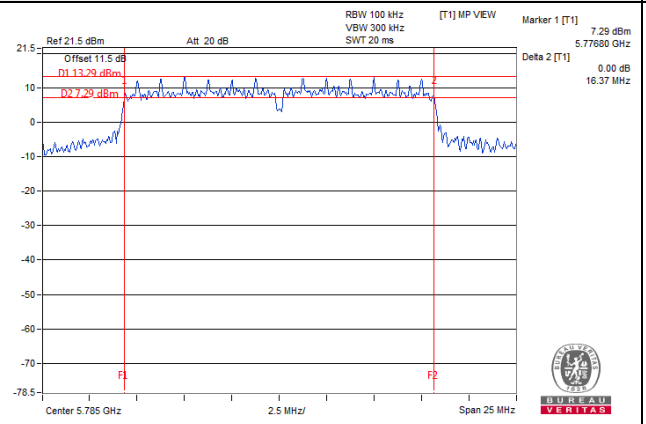
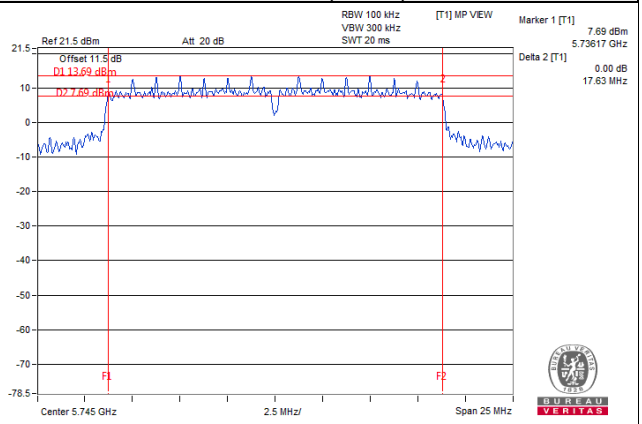
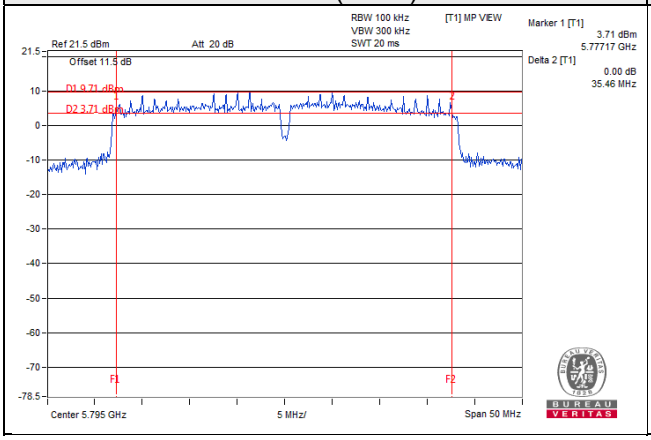
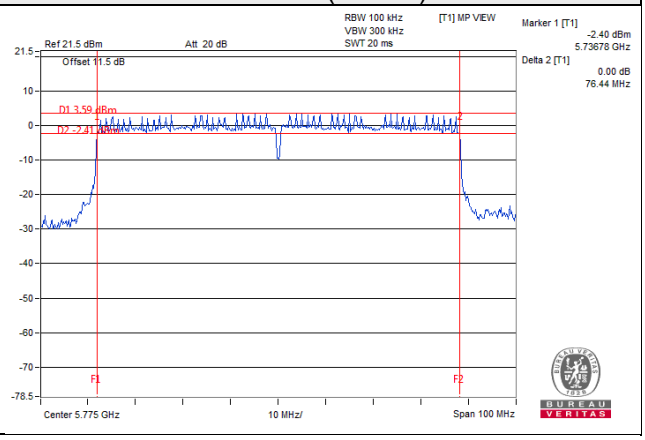
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.63	17.60	0.5	Pass
157	5785	17.62	17.58	0.5	Pass
165	5825	17.62	17.57	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.24	35.31	0.5	Pass
159	5795	35.27	35.46	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	76.44	75.65	0.5	Pass

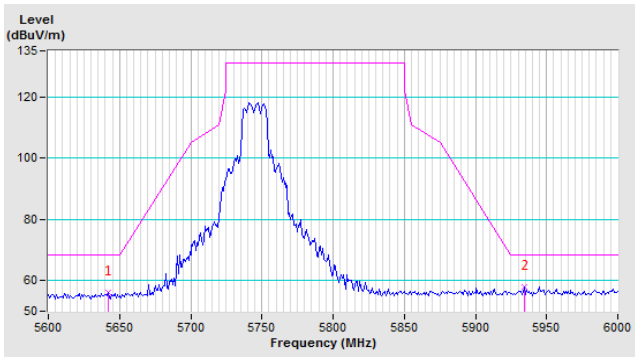
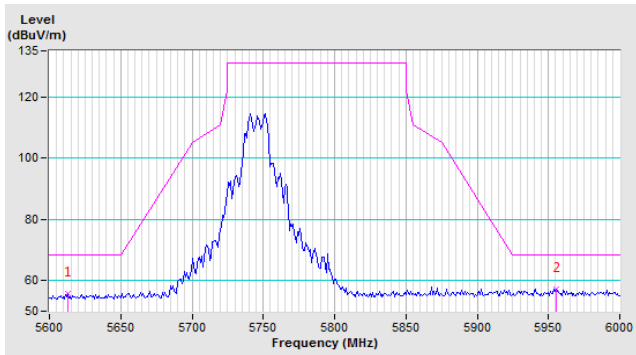
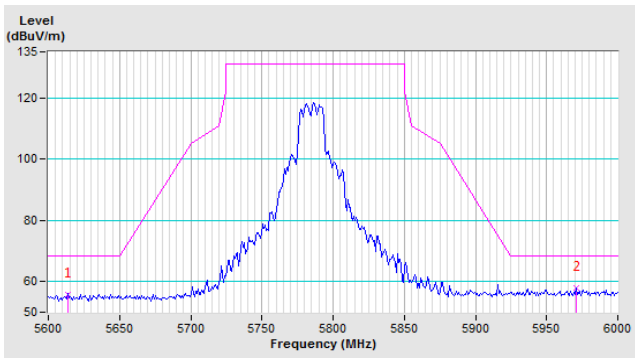
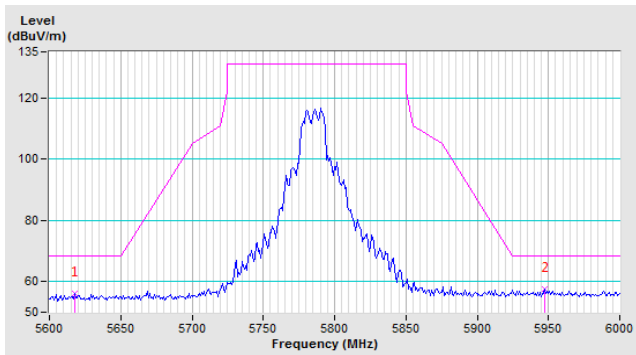
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

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
	
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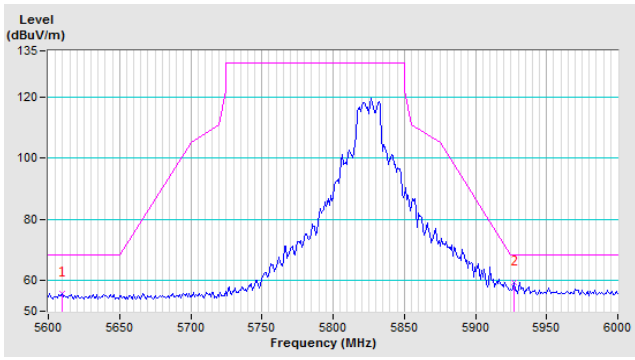
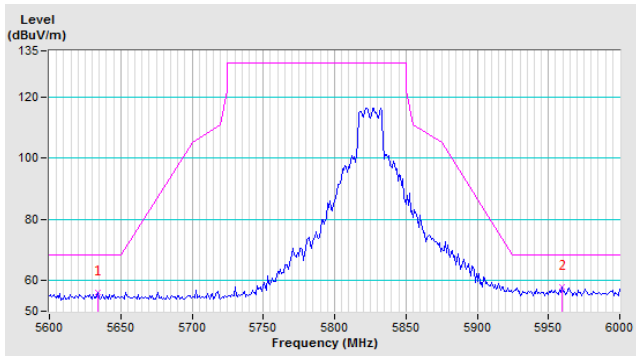
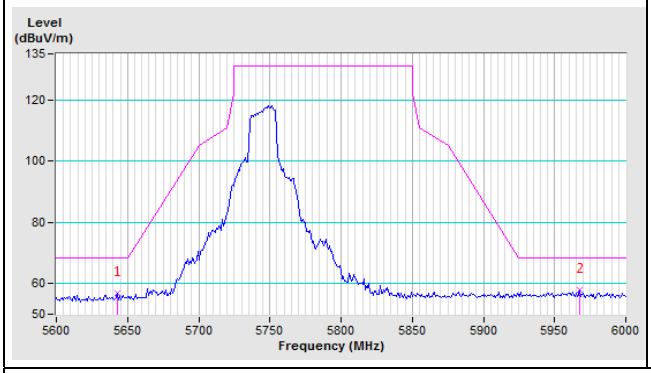
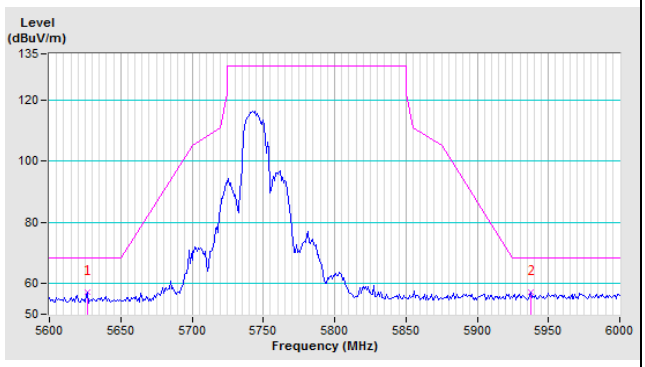
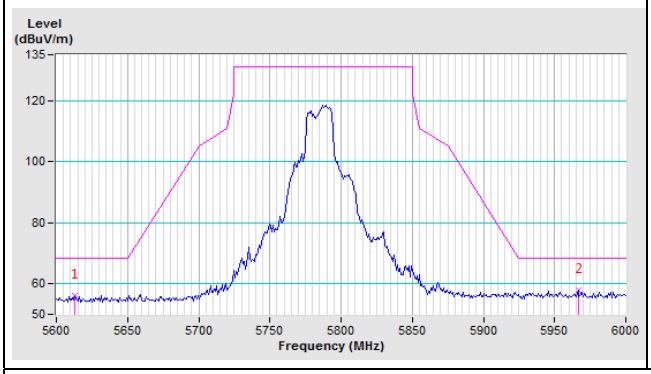
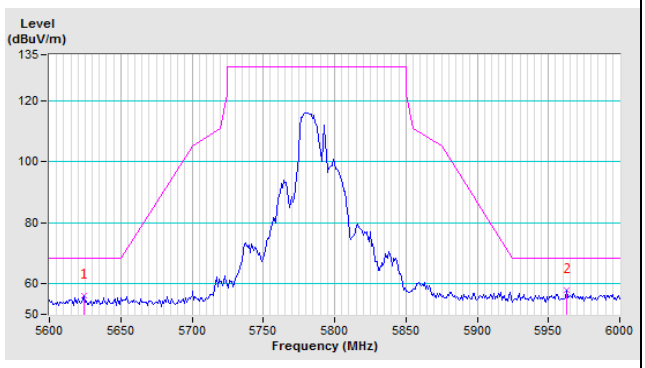
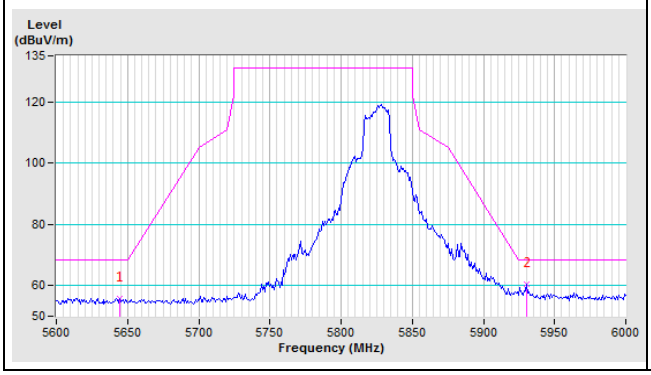
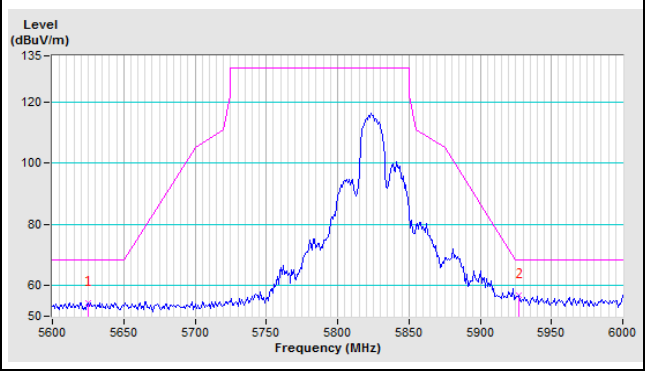
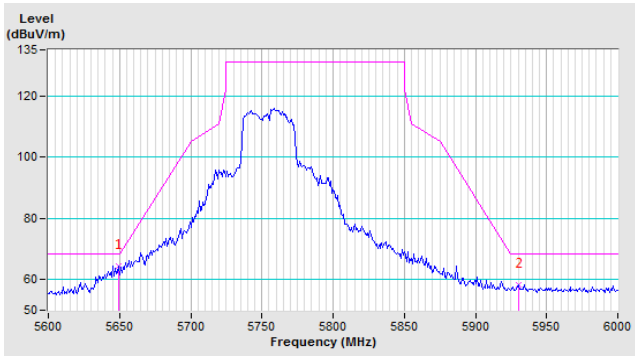
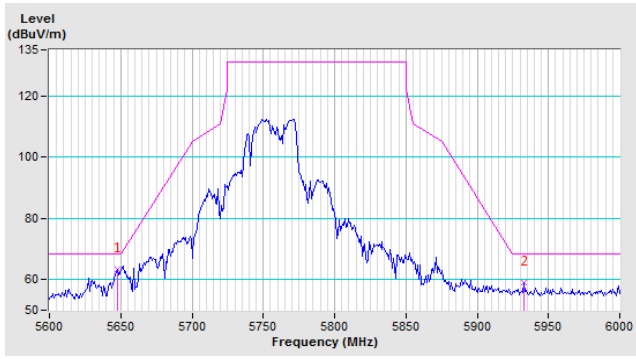
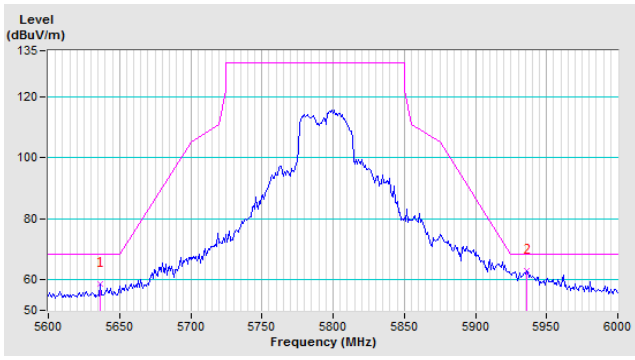
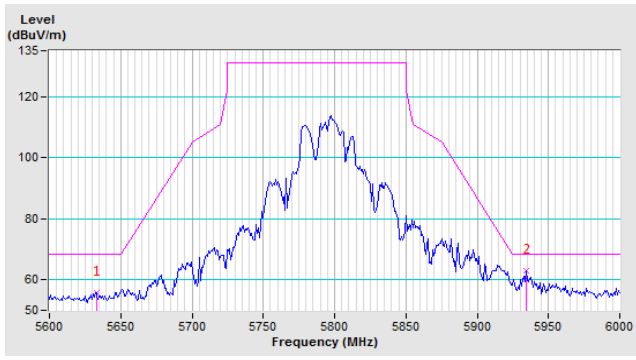
Horizontal	Vertical
	

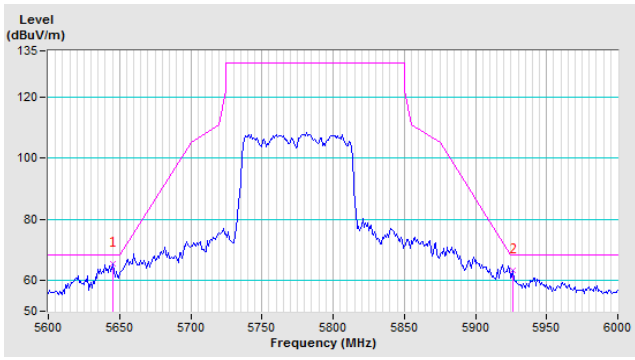
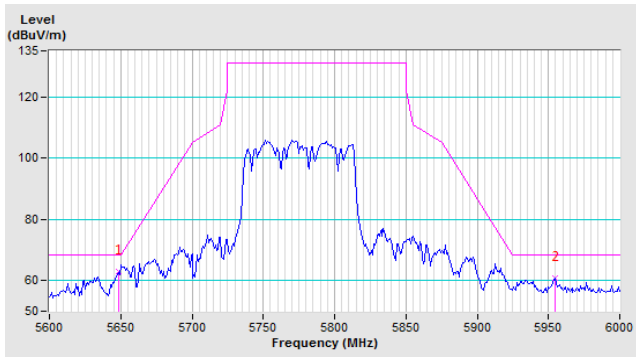
802.11n (HT20)

CH149	
Horizontal	Vertical
	
CH157	
Horizontal	Vertical
	
CH165	
Horizontal	Vertical
	

802.11n (HT40)

CH151	
Horizontal	Vertical
	
CH159	
Horizontal	Vertical
	

802.11ac (VHT80)

CH155	
Horizontal	Vertical
	

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

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

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

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

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

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

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

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