FCC Test Report

Report No.:	RF180108C15E
FCC ID:	Q6G-AP225W
Test Model:	W-118
Received Date:	Jan. 08, 2018
Test Date:	Oct. 25 ~ Nov. 04, 2019
Issued Date:	Nov. 19, 2019
Applicant:	WatchGuard Technologies, Inc.
Address:	505 Fifth Avenue South, Suite 500 Seattle WA United States 98104
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Lin Kou Laboratories
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan
FCC Registration / Designation Number:	788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RF180108C15E	Original release.	Nov. 19, 2019

1 Certificate of Conformity

Product:	AP225W
Brand:	WatchGuard
Test Model:	W-118
Sample Status:	Engineering sample
Applicant:	WatchGuard Technologies, Inc.
Test Date:	Oct. 25 ~ Nov. 04, 2019
Standards:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10:2013

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

Prepared by : Pettie Chen , **Date:** Nov. 19, 2019

Pettie Chen / Senior Specialist

Approved by : Bruce Chen , **Date:** Nov. 19, 2019

Bruce Chen / Senior Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -4.71dB at 0.51000MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.2dB at 5470.00, 5725.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Meet the requirement of limit.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit.
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is IPEX not a standard connector.

Note: Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	2.94 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.04 dB
	30MHz ~ 200MHz	3.86 dB
	200MHz ~1000MHz	3.87 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AP225W
Brand	WatchGuard
Test Model	W-118
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	5260~5320MHz, 5500~5700MHz
Number of Channel	5260~5320MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5500~5700MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 11 802.11n (HT40), 802.11ac (VHT40): 5 802.11ac (VHT80): 2
Output Power	Radio 2: CDD Mode: 5260~5320MHz: 177.636mW 5500~5700MHz: 214.340mW Beamforming Mode: 5260~5320MHz: 88.824mW 5500~5700MHz: 107.178mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	NA
Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change. This report is a supplementary report to the original BV CPS report no.: RF180108C15D-3. Difference compared with the original report is adding 5260~5320MHz and 5500~5700MHz band. Therefore, the EUT was re-tested and presented in the test report.

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

Modulation Mode	TX Function	Beamforming Mode	Remark
802.11a	2TX	Not Support	Radio 2
802.11n (HT20)	2TX	Support	
802.11n (HT40)	2TX	Support	
802.11ac (VHT20)	2TX	Support	
802.11ac (VHT40)	2TX	Support	
802.11ac (VHT80)	2TX	Support	
802.11a	2RX	Not Support	Radio 3 (Scanning only)
802.11n (HT20)	2RX	Not Support	
802.11n (HT40)	2RX	Not Support	
802.11ac (VHT20)	2RX	Not Support	
802.11ac (VHT40)	2RX	Not Support	
802.11ac (VHT80)	2RX	Not Support	

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

* 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 following Adapter ande POE. (Support unit only)

Adapter	
Brand	Powertron Electronics Corp.
Model	PA1024-120IB200
Input Power	100-240Vac, 50-60Hz, 0.6A
Output Power	12Vdc / 2.0A 24W Max
Power Cord	1.5m non-shielded cable with one core 0.5m non-shielded cable without core

POE	
Brand	EnGenius
Model	EPA5006GAT
Input Power	100-240Vac, 50-60Hz, 0.8A
Output Power	54Vdc, 0.6A

4. The EUT uses following antennas.

Type	PIFA						PIFA
Connecter	IPEX						-
Radio	1		2		3		BT/Zigbee
Frequency (MHz)	2400-2500		5150-5850		2400-2500 & 5150-5850		2400-2500
Antenna	1	2	3	4	5	6	BT/Zigbee
Gain (dBi)	3.67	4.31	5.72	5.99	2.51 / 4.83	2.78 / 4.80	2.76

5. Spurious emission of the simultaneous operation mode as below and the test data please refer to report no.: RF180108C15E-1.

No	Mode
1	Radio 1 + Radio 2 + BT LE
2	Radio 1 + BT LE
3	Radio 1 + Radio 2 + Zigbee
4	Radio 1 + Zigbee

6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

5260~5320MHz:

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

Channel	Frequency	Channel	Frequency
52	5260 MHz	60	5300 MHz
56	5280 MHz	64	5320 MHz

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

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290MHz

5500~5700MHz:

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

Channel	Frequency	Channel	Frequency
100	5500 MHz	124	5620 MHz
104	5520 MHz	128	5640 MHz
108	5540 MHz	132	5660 MHz
112	5560 MHz	136	5680 MHz
116	5580 MHz	140	5700 MHz
120	5600 MHz		

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

Channel	Frequency	Channel	Frequency
102	5510 MHz	126	5630 MHz
110	5550 MHz	134	5670 MHz
118	5590 MHz		

2 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530 MHz	122	5610 MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description	
	RE≥1G	RE<1G	PLC	APCM	**Radio**	**Power**
A	√	√	√	√	Radio 2	Power from adapter
B	-	√	√	-		Power from PoE

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

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

Note:

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

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	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11n (HT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	58.5
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11n (HT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11n (HT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106, 122	106, 122	OFDM	58.5

Radiated Emission Test (Below 1GHz):

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

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A, B	802.11a	5260-5320	52 to 64	52	OFDM	6.0
		5500-5700	100 to 140		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	5260-5320	52 to 64	52	OFDM	6.0
		5500-5700	100 to 140		OFDM	6.0

Antenna Port Conducted Measurement:

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
A	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11n (HT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	58.5
A	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11n (HT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11n (HT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106, 122	106, 122	OFDM	58.5

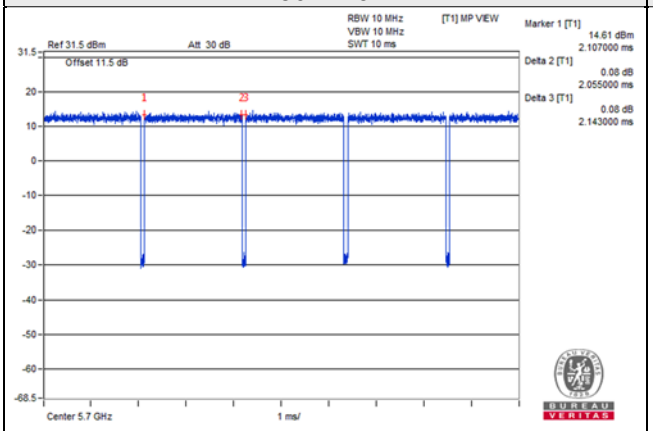
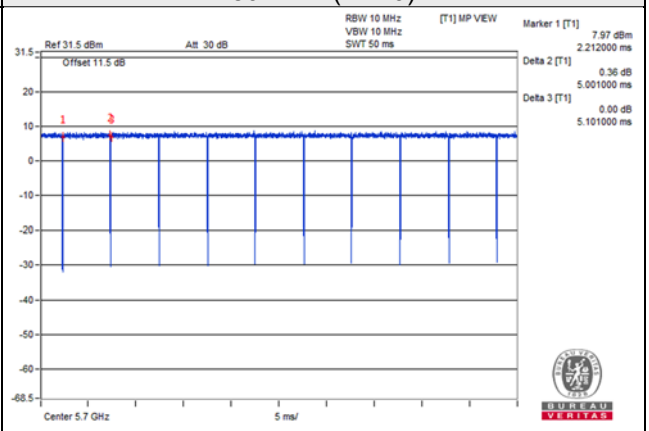
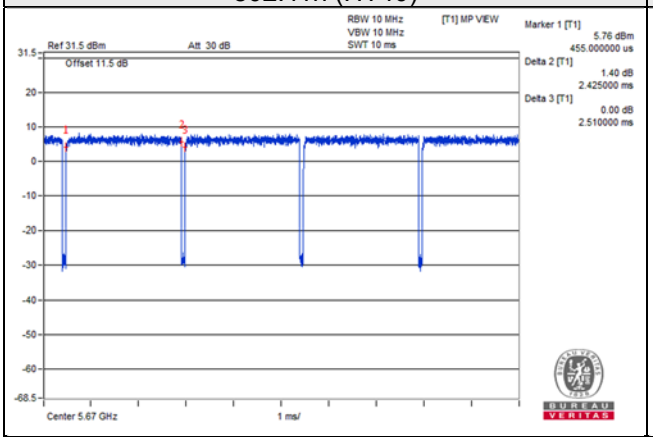
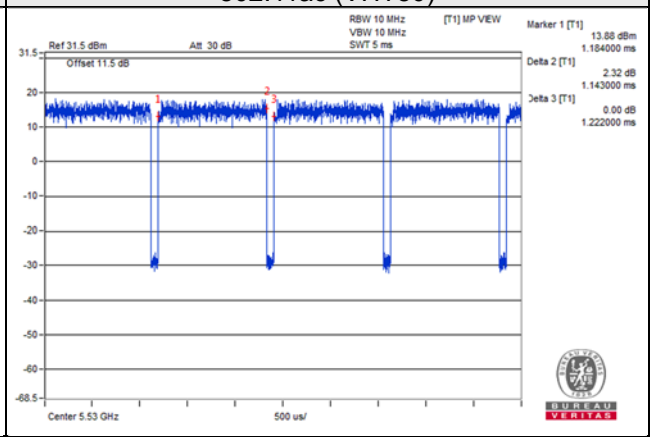
Test Condition:

Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	22 deg. C, 68% RH	120Vac, 60Hz	Adair Peng
RE<1G	23 deg. C, 67% RH	120Vac, 60Hz	Adair Peng
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Jones Chang
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Jisyong Wang

3.3 Duty Cycle of Test Signal

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

802.11a: Duty cycle = 2.055/2.143 = 0.959, Duty factor = 10 * log(1/0.959) = 0.18
802.11n (HT20): Duty cycle = 5.001/5.101 = 0.98
802.11n (HT40): Duty cycle = 2.425/2.51 = 0.966, Duty factor = 10 * log(1/0.966) = 0.15
802.11ac (VHT80): Duty cycle = 1.143/1.222 = 0.935, Duty factor = 10 * log(1/0.935) = 0.29

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	Lenovo	80Q7	PF0KUGU6	FCC DoC Approved	-
B.	Adapter	Powertron	PA1024-120IB200	NA	NA	Provided by manufacturer
C.	Load	NA	NA	NA	NA	-
D.	POE	EnGenius	EPA5006GAT	NA	NA	Provided by manufacturer

Note:

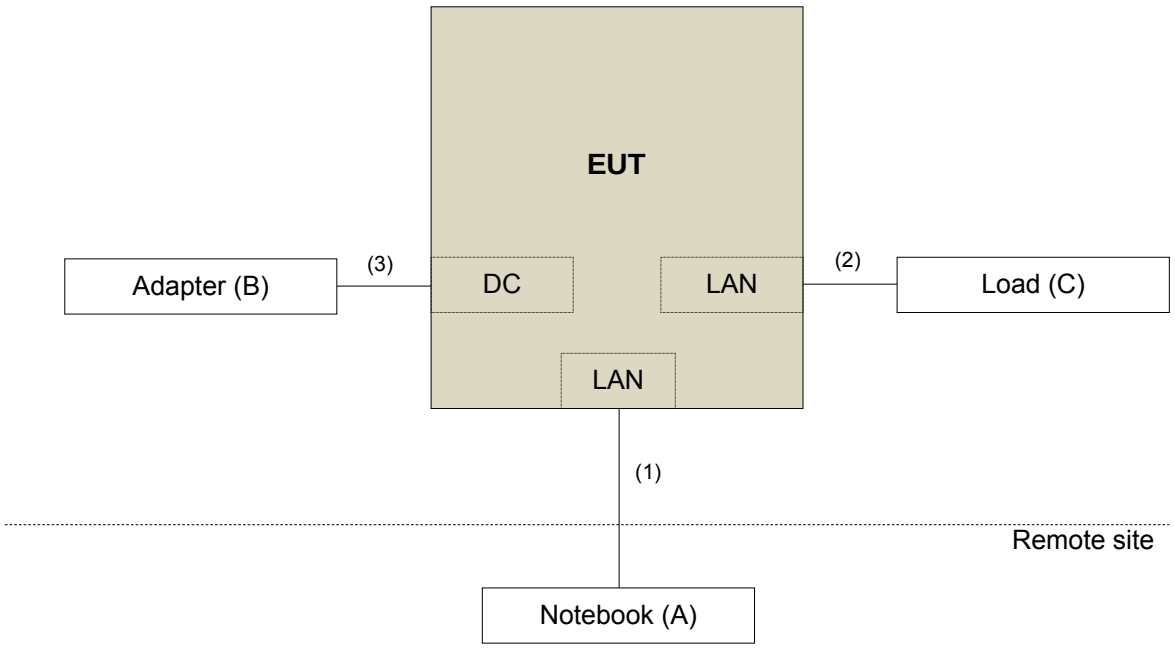
1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as a communication partner to transfer data.

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	10	N	0	-
2.	RJ45, Cat5e	4	3	N	0	-
3.	Power Cord	1	1.0	N	0	-
4.	RJ45, Cat5e	1	3	N	0	-

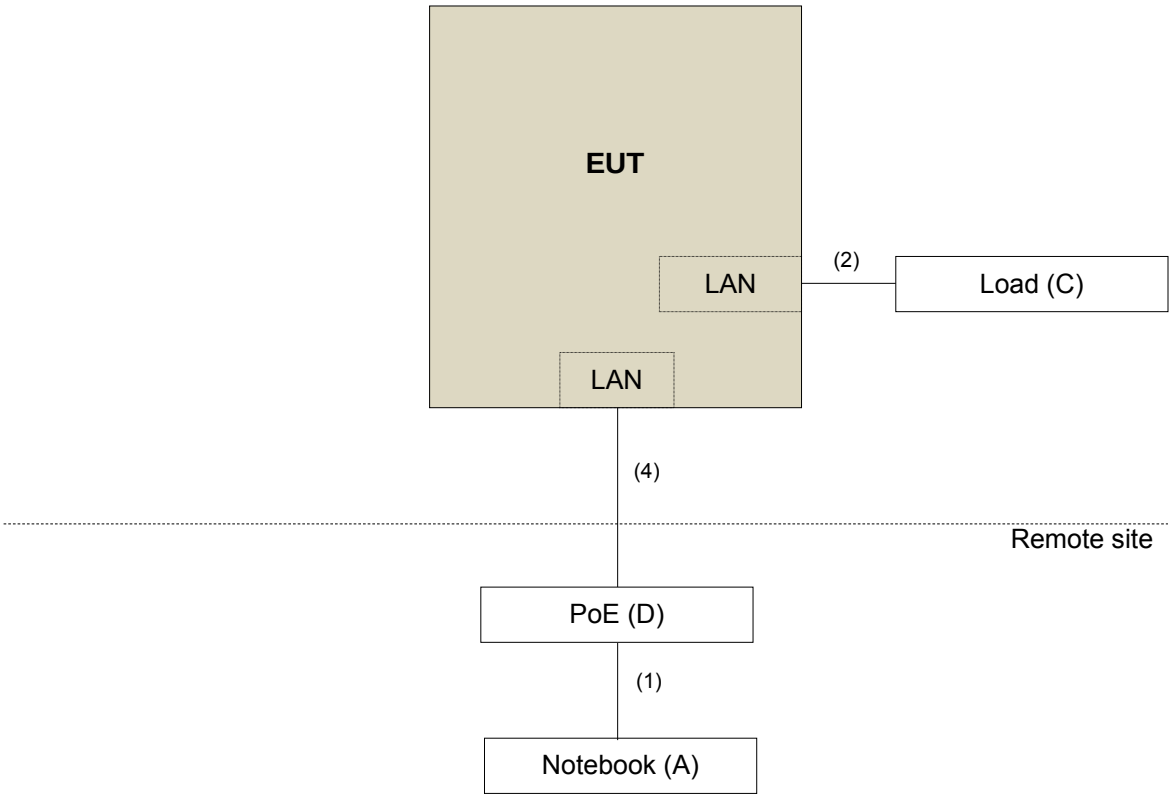
Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test

Test Mode A



Test Mode B



3.5 General Description of Applied Standards and References

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

FCC Part 15, Subpart E (15.407)
ANSI C63.10:2013

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

References Test Guidance :

KDB 789033 D02 General UNII Test Procedure New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance

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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESIB7	100187	May 30, 2019	May 29, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100039	Jun. 12, 2019	Jun. 11, 2020
BILOG Antenna SCHWARZBECK	VULB9168	9168-171	Nov. 22, 2018	Nov. 21, 2019
HORN Antenna SCHWARZBECK	9120D	209	Nov. 25, 2018	Nov. 24, 2019
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 25, 2018	Nov. 24, 2019
Loop Antenna TESEQ	HLA 6121	45745	Jul. 01, 2019	Jun. 30, 2020
Preamplifier Agilent (Below 1GHz)	8447D	2944A10738	Aug. 20, 2019	Aug. 19, 2020
Preamplifier Agilent (Above 1GHz)	8449B	3008A02465	Mar. 27, 2019	Mar. 26, 2020
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH3-01	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH3-03 (223653/4)	Aug. 20, 2019	Aug. 19, 2020
RF signal cable HUBER+SUHNER& EMCI	SUCOFLEX 104&EMC104-SM-SM-8000	Cable-CH3-03 (309224+170907)	Aug. 20, 2019	Aug. 19, 2020
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	013303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021702	NA	NA
Turn Table BV ADT	TT100	TT93021702	NA	NA
Turn Table Controller BV ADT	SC100	SC93021702	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55190004/MY55190007/MY55210005	Jul. 15, 2019	Jul. 14, 2020

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

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

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

c. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

NOTE:

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

For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for 30MHz ~ 1GHz) / 1.5 meters (for above 1GHz) above the ground at 3 meter chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

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

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and specified bandwidth with maximum hold mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detect function and specified bandwidth with maximum hold mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.

Note:

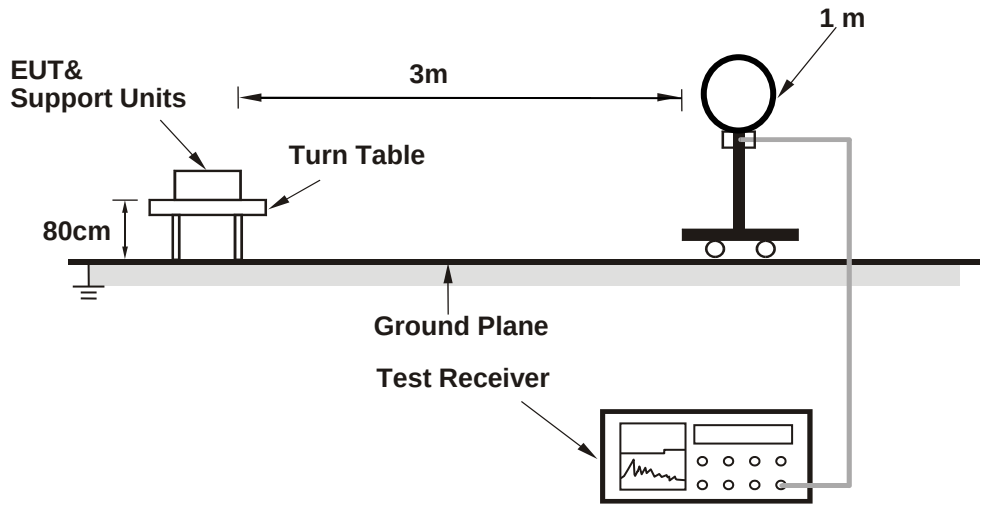
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz RBW (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

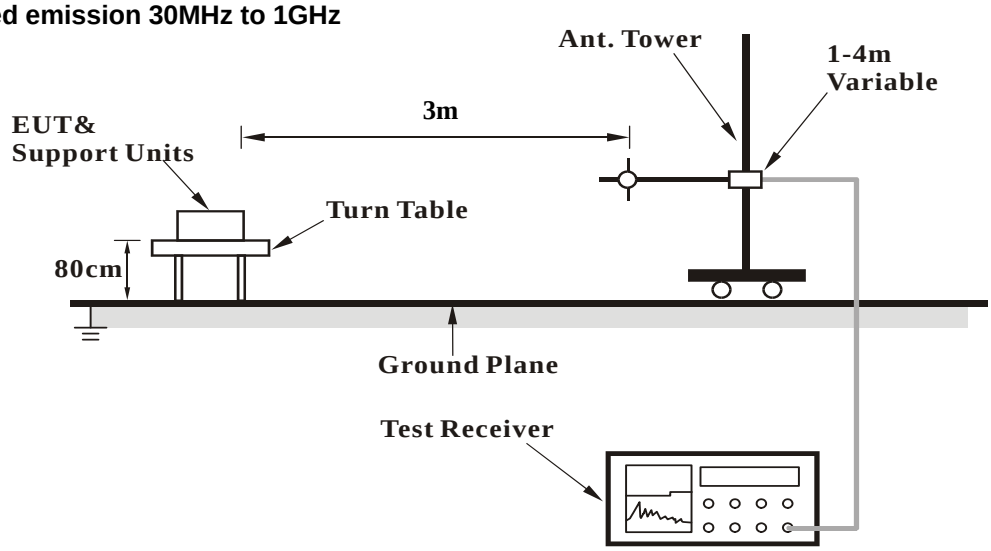
No deviation.

4.1.5 Test Set Up

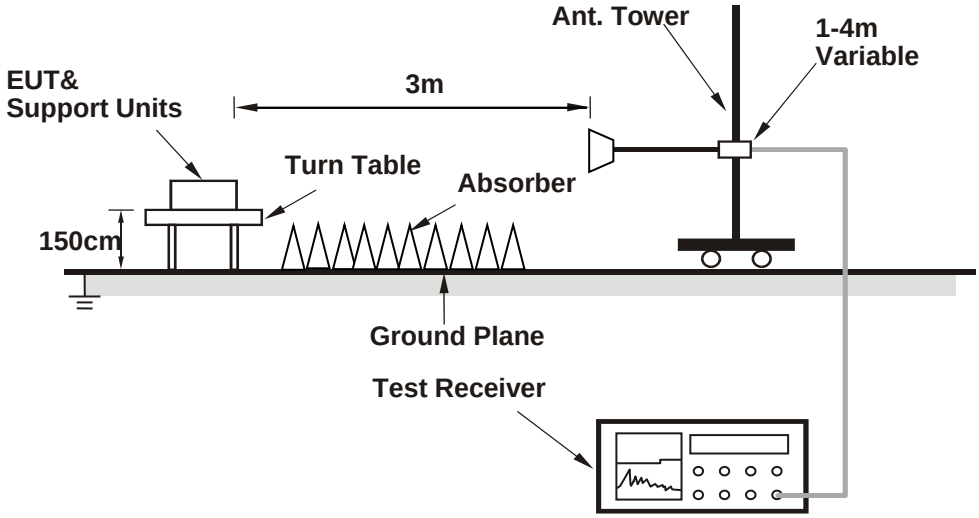
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

a. Placed the EUT on the testing table.
b. Prepared a notebook to act as a communication partner and placed it outside of testing area.
c. The communication partner connected with EUT via a RJ45 cable and ran a test program (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 52	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	54.0 PK	74.0	-20.0	1.52 H	297	50.3	3.7
2	5150.00	42.3 AV	54.0	-11.7	1.52 H	297	38.6	3.7
3	*5260.00	116.2 PK			1.48 H	303	76.8	39.4
4	*5260.00	106.2 AV			1.48 H	303	66.8	39.4
5	#10520.00	58.1 PK	68.2	-10.1	1.82 H	260	41.3	16.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.3 PK	74.0	-20.7	2.11 V	357	49.6	3.7
2	5150.00	42.5 AV	54.0	-11.5	2.11 V	357	38.8	3.7
3	*5260.00	117.6 PK			2.09 V	357	78.2	39.4
4	*5260.00	107.4 AV			2.09 V	357	68.0	39.4
5	#10520.00	57.3 PK	68.2	-10.9	2.86 V	203	40.5	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 60	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	*5300.00	116.4 PK			2.45 H	310	77.0	39.4
2	*5300.00	105.6 AV			2.45 H	310	66.2	39.4
3	5350.00	64.9 PK	74.0	-9.1	2.56 H	310	61.1	3.8
4	5350.00	48.3 AV	54.0	-5.7	2.56 H	310	44.5	3.8
5	10600.00	58.2 PK	74.0	-15.8	1.91 H	277	41.3	16.9
6	10600.00	45.0 AV	54.0	-9.0	1.91 H	277	28.1	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	*5300.00	118.0 PK			2.03 V	14	78.6	39.4
2	*5300.00	107.6 AV			2.03 V	14	68.2	39.4
3	5350.00	69.0 PK	74.0	-5.0	2.00 V	15	65.2	3.8
4	5350.00	49.3 AV	54.0	-4.7	2.00 V	15	45.5	3.8
5	10600.00	56.1 PK	74.0	-17.9	2.13 V	294	39.2	16.9
6	10600.00	43.5 AV	54.0	-10.5	2.13 V	294	26.6	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 64	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	*5320.00	113.8 PK			2.58 H	32	74.3	39.5
2	*5320.00	102.9 AV			2.58 H	32	63.4	39.5
3	5350.00	69.0 PK	74.0	-5.0	2.11 H	30	65.2	3.8
4	5350.00	50.0 AV	54.0	-4.0	2.11 H	30	46.2	3.8
5	10640.00	58.3 PK	74.0	-15.7	2.93 H	297	41.3	17.0
6	10640.00	45.0 AV	54.0	-9.0	2.93 H	297	28.0	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	*5320.00	115.2 PK			1.60 V	358	75.7	39.5
2	*5320.00	104.8 AV			1.60 V	358	65.3	39.5
3	5350.00	68.9 PK	74.0	-5.1	1.66 V	358	65.1	3.8
4	5350.00	51.4 AV	54.0	-2.6	1.66 V	358	47.6	3.8
5	10640.00	54.5 PK	74.0	-19.5	1.81 V	254	37.5	17.0
6	10640.00	41.2 AV	54.0	-12.8	1.81 V	254	24.2	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.

CHANNEL	TX Channel 100	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	5460.00	57.3 PK	74.0	-16.7	1.32 H	12	53.1	4.2
2	5460.00	42.2 AV	54.0	-11.8	1.32 H	12	38.0	4.2
3	#5470.00	66.6 PK	68.2	-1.6	1.25 H	19	62.4	4.2
4	*5500.00	114.3 PK			1.39 H	28	74.2	40.1
5	*5500.00	103.7 AV			1.39 H	28	63.6	40.1
6	11000.00	57.8 PK	74.0	-16.2	2.21 H	331	39.1	18.7
7	11000.00	45.5 AV	54.0	-8.5	2.21 H	331	26.8	18.7
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	5460.00	59.3 PK	74.0	-14.7	2.00 V	358	55.1	4.2
2	5460.00	46.0 AV	54.0	-8.0	2.00 V	358	41.8	4.2
3	**#5470.00**	**68.0 PK**	**68.2**	**-0.2**	**1.98 V**	**359**	**63.8**	**4.2**
4	*5500.00	118.0 PK			1.61 V	0	77.9	40.1
5	*5500.00	107.5 AV			1.61 V	0	67.4	40.1
6	11000.00	58.4 PK	74.0	-15.6	1.99 V	233	39.7	18.7
7	11000.00	45.6 AV	54.0	-8.4	1.99 V	233	26.9	18.7

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 116	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	*5580.00	114.0 PK			1.30 H	44	74.0	40.0
2	*5580.00	103.7 AV			1.30 H	44	63.7	40.0
3	11160.00	57.0 PK	74.0	-17.0	1.84 H	235	39.3	17.7
4	11160.00	44.2 AV	54.0	-9.8	1.84 H	235	26.5	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	*5580.00	118.2 PK			1.10 V	357	78.2	40.0
2	*5580.00	107.2 AV			1.10 V	357	67.2	40.0
3	11160.00	56.7 PK	74.0	-17.3	2.35 V	262	39.0	17.7
4	11160.00	44.2 AV	54.0	-9.8	2.35 V	262	26.5	17.7

Remarks:

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

CHANNEL	TX Channel 140	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	*5700.00	113.1 PK			1.29 H	19	73.1	40.0
2	*5700.00	102.5 AV			1.29 H	19	62.5	40.0
3	#5725.00	66.8 PK	68.2	-1.4	1.40 H	13	62.7	4.1
4	11400.00	58.4 PK	74.0	-15.6	1.79 H	229	40.7	17.7
5	11400.00	45.5 AV	54.0	-8.5	1.79 H	229	27.8	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	*5700.00	114.6 PK			1.52 V	344	74.6	40.0
2	*5700.00	104.0 AV			1.42 V	344	64.0	40.0
3	**#5725.00**	**68.0 PK**	**68.2**	**-0.2**	**1.63 V**	**330**	**63.9**	**4.1**
4	11400.00	57.2 PK	74.0	-16.8	2.58 V	298	39.5	17.7
5	11400.00	45.4 AV	54.0	-8.6	2.58 V	298	27.7	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 52	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.7 PK	74.0	-20.3	1.45 H	302	50.0	3.7
2	5150.00	42.3 AV	54.0	-11.7	1.45 H	302	38.6	3.7
3	*5260.00	116.0 PK			1.32 H	304	76.6	39.4
4	*5260.00	105.1 AV			1.32 H	304	65.7	39.4
5	#10520.00	59.2 PK	68.2	-9.0	4.00 H	273	42.4	16.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.1 PK	74.0	-18.9	1.83 V	5	51.4	3.7
2	5150.00	43.3 AV	54.0	-10.7	1.83 V	5	39.6	3.7
3	*5260.00	117.5 PK			1.93 V	16	78.1	39.4
4	*5260.00	106.8 AV			1.93 V	16	67.4	39.4
5	#10520.00	55.7 PK	68.2	-12.5	2.27 V	277	38.9	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 60	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	*5300.00	116.0 PK			1.50 H	23	76.6	39.4
2	*5300.00	104.8 AV			1.50 H	23	65.4	39.4
3	5350.00	68.1 PK	74.0	-5.9	1.60 H	20	64.3	3.8
4	5350.00	50.4 AV	54.0	-3.6	1.60 H	20	46.6	3.8
5	10600.00	57.7 PK	74.0	-16.3	2.05 H	270	40.8	16.9
6	10600.00	44.4 AV	54.0	-9.6	2.05 H	270	27.5	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	*5300.00	117.1 PK			2.11 V	40	77.7	39.4
2	*5300.00	106.2 AV			2.11 V	40	66.8	39.4
3	5350.00	66.4 PK	74.0	-7.6	1.28 V	52	62.6	3.8
4	5350.00	48.7 AV	54.0	-5.3	1.28 V	52	44.9	3.8
5	10600.00	56.5 PK	74.0	-17.5	1.79 V	289	39.6	16.9
6	10600.00	43.2 AV	54.0	-10.8	1.79 V	289	26.3	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 64	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	*5320.00	114.5 PK			1.69 H	53	75.0	39.5
2	*5320.00	103.1 AV			1.69 H	53	63.6	39.5
3	5350.00	68.4 PK	74.0	-5.6	1.71 H	42	64.6	3.8
4	5350.00	51.0 AV	54.0	-3.0	1.71 H	42	47.2	3.8
5	10640.00	56.6 PK	74.0	-17.4	1.91 H	175	39.6	17.0
6	10640.00	44.7 AV	54.0	-9.3	1.91 H	175	27.7	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	*5320.00	114.9 PK			2.38 V	322	75.4	39.5
2	*5320.00	104.0 AV			2.38 V	322	64.5	39.5
3	5350.00	69.0 PK	74.0	-5.0	2.11 V	303	65.2	3.8
4	5350.00	50.6 AV	54.0	-3.4	2.11 V	303	46.8	3.8
5	10640.00	58.3 PK	74.0	-15.7	1.98 V	277	41.3	17.0
6	10640.00	46.0 AV	54.0	-8.0	1.98 V	277	29.0	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 100	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	5460.00	57.3 PK	74.0	-16.7	2.24 H	311	53.1	4.2
2	5460.00	44.2 AV	54.0	-9.8	2.24 H	311	40.0	4.2
3	#5470.00	67.4 PK	68.2	-0.8	2.62 H	305	63.2	4.2
4	*5500.00	114.1 PK			2.00 H	329	74.0	40.1
5	*5500.00	103.0 AV			2.00 H	329	62.9	40.1
6	11000.00	58.3 PK	74.0	-15.7	1.99 H	267	39.6	18.7
7	11000.00	45.1 AV	54.0	-8.9	1.99 H	267	26.4	18.7
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	5460.00	55.3 PK	74.0	-18.7	1.62 V	343	51.1	4.2
2	5460.00	43.2 AV	54.0	-10.8	1.62 V	343	39.0	4.2
3	**#5470.00**	**68.0 PK**	**68.2**	**-0.2**	**1.32 V**	**357**	**63.8**	**4.2**
4	*5500.00	116.4 PK			1.26 V	342	76.3	40.1
5	*5500.00	104.8 AV			1.26 V	342	64.7	40.1
6	11000.00	57.5 PK	74.0	-16.5	1.77 V	269	38.8	18.7
7	11000.00	45.5 AV	54.0	-8.5	1.77 V	269	26.8	18.7

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 116	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	*5580.00	113.7 PK			2.50 H	11	73.7	40.0
2	*5580.00	102.5 AV			2.50 H	11	62.5	40.0
3	11160.00	57.6 PK	74.0	-16.4	1.91 H	267	39.9	17.7
4	11160.00	44.5 AV	54.0	-9.5	1.91 H	267	26.8	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	*5580.00	115.9 PK			1.50 V	358	75.9	40.0
2	*5580.00	105.0 AV			1.50 V	358	65.0	40.0
3	11160.00	57.7 PK	74.0	-16.3	2.09 V	256	40.0	17.7
4	11160.00	45.0 AV	54.0	-9.0	2.09 V	256	27.3	17.7

Remarks:

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

CHANNEL	TX Channel 140	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	*5700.00	113.5 PK			2.36 H	29	73.5	40.0
2	*5700.00	102.0 AV			2.36 H	29	62.0	40.0
3	#5725.00	65.9 PK	68.2	-2.3	2.31 H	30	61.8	4.1
4	11400.00	58.4 PK	74.0	-15.6	1.87 H	276	40.7	17.7
5	11400.00	45.2 AV	54.0	-8.8	1.87 H	276	27.5	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	*5700.00	114.1 PK			1.42 V	339	74.1	40.0
2	*5700.00	103.5 AV			1.42 V	339	63.5	40.0
3	**#5725.00**	**68.0 PK**	**68.2**	**-0.2**	**1.43 V**	**330**	**63.9**	**4.1**
4	11400.00	58.0 PK	74.0	-16.0	2.18 V	268	40.3	17.7
5	11400.00	45.0 AV	54.0	-9.0	2.18 V	268	27.3	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 54	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	58.1 PK	74.0	-15.9	1.50 H	29	54.4	3.7
2	5150.00	46.0 AV	54.0	-8.0	1.50 H	29	42.3	3.7
3	*5270.00	113.0 PK			1.48 H	27	73.6	39.4
4	*5270.00	103.0 AV			1.48 H	27	63.6	39.4
5	#10540.00	58.1 PK	68.2	-10.1	2.36 H	254	41.2	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	5150.00	59.2 PK	74.0	-14.8	2.10 V	355	55.5	3.7
2	5150.00	47.4 AV	54.0	-6.6	2.10 V	355	43.7	3.7
3	*5270.00	113.2 PK			2.06 V	358	73.8	39.4
4	*5270.00	103.4 AV			2.06 V	358	64.0	39.4
5	5350.00	67.1 PK	74.0	-6.9	2.22 V	353	63.3	3.8
6	5350.00	52.3 AV	54.0	-1.7	2.22 V	353	48.5	3.8
7	#10540.00	57.1 PK	68.2	-11.1	1.80 V	311	40.2	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 62	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	*5310.00	106.8 PK			2.66 H	45	67.4	39.4
2	*5310.00	96.5 AV			2.66 H	45	57.1	39.4
3	5350.00	65.3 PK	74.0	-8.7	2.70 H	30	61.5	3.8
4	5350.00	48.8 AV	54.0	-5.2	2.70 H	30	45.0	3.8
5	10620.00	56.4 PK	74.0	-17.6	1.97 H	287	39.3	17.1
6	10620.00	43.2 AV	54.0	-10.8	1.97 H	287	26.1	17.1
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	*5310.00	108.7 PK			2.01 V	359	69.3	39.4
2	*5310.00	98.3 AV			2.01 V	359	58.9	39.4
3	5350.00	66.7 PK	74.0	-7.3	2.00 V	357	62.9	3.8
4	5350.00	51.4 AV	54.0	-2.6	2.00 V	357	47.6	3.8
5	10620.00	59.1 PK	74.0	-14.9	1.69 V	255	42.0	17.1
6	10620.00	44.6 AV	54.0	-9.4	1.69 V	255	27.5	17.1

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 102	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	5460.00	59.0 PK	74.0	-15.0	2.33 H	34	54.8	4.2
2	5460.00	44.1 AV	54.0	-9.9	2.33 H	34	39.9	4.2
3	#5470.00	66.6 PK	68.2	-1.6	2.26 H	32	62.4	4.2
4	*5510.00	109.3 PK			2.20 H	31	69.2	40.1
5	*5510.00	98.9 AV			2.20 H	31	58.8	40.1
6	11020.00	58.5 PK	74.0	-15.5	2.09 H	222	40.0	18.5
7	11020.00	45.4 AV	54.0	-8.6	2.09 H	222	26.9	18.5
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	5460.00	59.9 PK	74.0	-14.1	1.71 V	357	55.7	4.2
2	5460.00	45.2 AV	54.0	-8.8	1.71 V	357	41.0	4.2
3	**#5470.00**	**68.0 PK**	**68.2**	**-0.2**	**2.00 V**	**352**	**63.8**	**4.2**
4	*5510.00	113.0 PK			1.54 V	359	72.9	40.1
5	*5510.00	103.1 AV			1.54 V	359	63.0	40.1
6	11020.00	59.4 PK	74.0	-14.6	2.55 V	260	40.9	18.5
7	11020.00	46.3 AV	54.0	-7.7	2.55 V	260	27.8	18.5

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 110	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	5460.00	60.5 PK	74.0	-13.5	2.44 H	19	56.3	4.2
2	5460.00	46.5 AV	54.0	-7.5	2.44 H	19	42.3	4.2
3	#5470.00	66.1 PK	68.2	-2.1	2.46 H	5	61.9	4.2
4	*5550.00	112.5 PK			2.44 H	10	72.5	40.0
5	*5550.00	101.7 AV			2.44 H	10	61.7	40.0
6	11100.00	57.5 PK	74.0	-16.5	1.90 H	236	39.9	17.6
7	11100.00	45.0 AV	54.0	-9.0	1.90 H	236	27.4	17.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	62.3 PK	74.0	-11.7	2.02 V	330	58.1	4.2
2	5460.00	42.1 AV	54.0	-11.9	2.02 V	330	37.9	4.2
3	#5470.00	67.5 PK	68.2	-0.7	2.21 V	350	63.3	4.2
4	*5550.00	114.6 PK			1.27 V	1	74.6	40.0
5	*5550.00	104.6 AV			1.27 V	1	64.6	40.0
6	11100.00	58.6 PK	74.0	-15.4	1.99 V	310	41.0	17.6
7	11100.00	45.2 AV	54.0	-8.8	1.99 V	310	27.6	17.6

Remarks:

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

CHANNEL	TX Channel 134	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	*5670.00	110.1 PK			2.50 H	30	70.0	40.1
2	*5670.00	100.0 AV			2.50 H	30	59.9	40.1
3	#5725.00	65.8 PK	68.2	-2.4	2.59 H	31	61.7	4.1
4	11340.00	59.3 PK	74.0	-14.7	2.07 H	249	41.4	17.9
5	11340.00	46.2 AV	54.0	-7.8	2.07 H	249	28.3	17.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5670.00	111.6 PK			1.50 V	352	71.5	40.1
2	*5670.00	101.3 AV			1.50 V	352	61.2	40.1
3	#5725.00	66.1 PK	68.2	-2.1	1.52 V	359	62.0	4.1
4	11340.00	58.1 PK	74.0	-15.9	1.99 V	284	40.2	17.9
5	11340.00	45.4 AV	54.0	-8.6	1.99 V	284	27.5	17.9

Remarks:

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

802.11ac (VHT80)

CHANNEL	TX Channel 58	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	54.4 PK	74.0	-19.6	1.52 H	17	50.7	3.7
2	5150.00	42.2 AV	54.0	-11.8	1.52 H	17	38.5	3.7
3	*5290.00	103.7 PK			1.58 H	19	64.3	39.4
4	*5290.00	93.7 AV			1.58 H	19	54.3	39.4
5	5350.00	65.2 PK	74.0	-8.8	1.40 H	22	61.4	3.8
6	5350.00	50.2 AV	54.0	-3.8	1.40 H	22	46.4	3.8
7	#10580.00	57.5 PK	68.2	-10.7	2.23 H	294	40.5	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.5 PK	74.0	-18.5	2.11 V	347	51.8	3.7
2	5150.00	43.0 AV	54.0	-11.0	2.11 V	347	39.3	3.7
3	*5290.00	103.3 PK			2.02 V	348	63.9	39.4
4	*5290.00	93.3 AV			2.02 V	348	53.9	39.4
5	5350.00	66.0 PK	74.0	-8.0	2.08 V	359	62.2	3.8
6	5350.00	52.1 AV	54.0	-1.9	2.08 V	359	48.3	3.8
7	#10580.00	58.4 PK	68.2	-9.8	1.79 V	213	41.4	17.0

Remarks:

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

CHANNEL	TX Channel 106	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	5460.00	56.9 PK	74.0	-17.1	1.64 H	22	52.7	4.2
2	5460.00	42.5 AV	54.0	-11.5	1.64 H	22	38.3	4.2
3	#5470.00	63.7 PK	68.2	-4.5	1.23 H	30	59.5	4.2
4	*5530.00	104.6 PK			1.52 H	36	64.5	40.1
5	*5530.00	94.7 AV			1.52 H	36	54.6	40.1
6	#5725.00	54.3 PK	68.2	-13.9	1.54 H	46	50.2	4.1
7	11060.00	57.5 PK	74.0	-16.5	1.97 H	313	39.5	18.0
8	11060.00	45.3 AV	54.0	-8.7	1.97 H	313	27.3	18.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	63.0 PK	74.0	-11.0	1.66 V	345	58.8	4.2
2	5460.00	46.5 AV	54.0	-7.5	1.66 V	345	42.3	4.2
3	#5470.00	67.9 PK	68.2	-0.3	1.63 V	359	63.7	4.2
4	*5530.00	109.7 PK			1.51 V	342	69.6	40.1
5	*5530.00	99.6 AV			1.51 V	342	59.5	40.1
6	#5725.00	54.8 PK	68.2	-13.4	1.60 V	350	50.7	4.1
7	11060.00	58.4 PK	74.0	-15.6	2.19 V	277	40.4	18.0
8	11060.00	45.4 AV	54.0	-8.6	2.19 V	277	27.4	18.0

Remarks:

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

CHANNEL	TX Channel 122	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	#5470.00	55.7 PK	68.2	-12.5	1.29 H	44	51.5	4.2
2	*5610.00	104.3 PK			1.56 H	39	64.2	40.1
3	*5610.00	94.4 AV			1.55 H	39	54.3	40.1
4	#5725.00	63.6 PK	68.2	-4.6	1.53 H	50	59.5	4.1
5	11220.00	57.8 PK	74.0	-16.2	2.00 H	317	39.9	17.9
6	11220.00	46.2 AV	54.0	-7.8	2.00 H	317	28.3	17.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5470.00	55.9 PK	68.2	-12.3	1.66 V	359	51.7	4.2
2	*5610.00	109.3 PK			1.49 V	349	69.2	40.1
3	*5610.00	99.2 AV			1.49 V	349	59.1	40.1
4	#5725.00	67.1 PK	68.2	-1.1	1.63 V	359	63.0	4.1
5	11220.00	58.7 PK	74.0	-15.3	2.22 V	281	40.8	17.9
6	11220.00	46.3 AV	54.0	-7.7	2.22 V	281	28.4	17.9

Remarks:

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

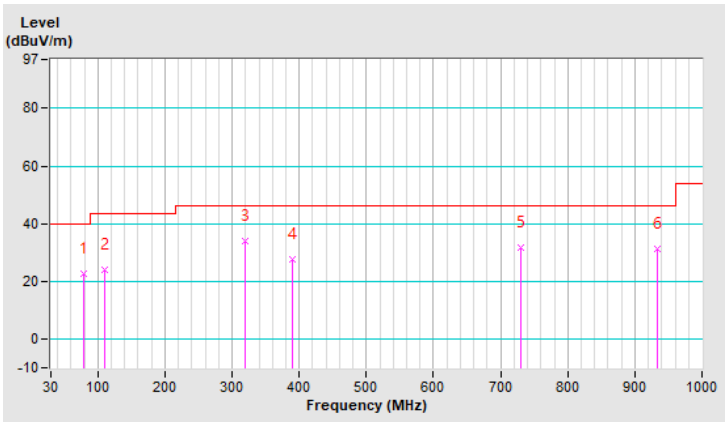
Below 1GHz Worst-Case Data: 802.11a

CHANNEL	TX Channel 52	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 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	78.51	22.6 QP	40.0	-17.4	1.00 H	79	40.4	-17.8
2	109.62	24.2 QP	43.5	-19.3	1.00 H	261	41.5	-17.3
3	319.60	34.1 QP	46.0	-11.9	1.50 H	217	46.3	-12.2
4	389.59	27.8 QP	46.0	-18.2	1.00 H	348	39.2	-11.4
5	729.84	31.9 QP	46.0	-14.1	2.00 H	16	37.1	-5.2
6	933.99	31.3 QP	46.0	-14.7	1.00 H	261	33.4	-2.1

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

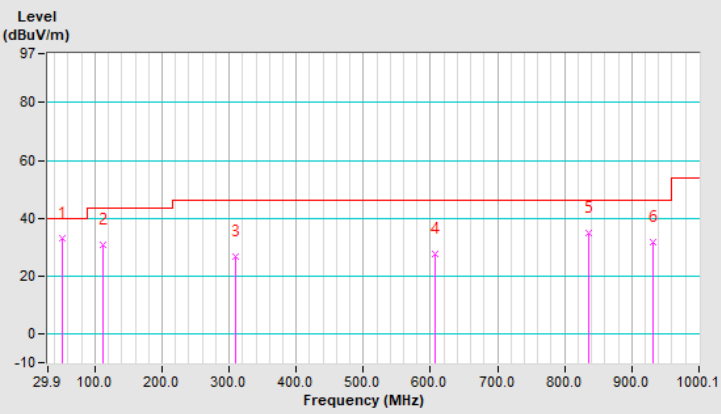


CHANNEL	TX Channel 52	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	A

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	51.29	33.1 QP	40.0	-6.9	1.50 V	18	47.2	-14.1
2	111.56	30.8 QP	43.5	-12.7	1.00 V	32	48.0	-17.2
3	309.88	26.9 QP	46.0	-19.1	1.00 V	139	39.4	-12.5
4	607.35	27.5 QP	46.0	-18.5	2.00 V	354	34.7	-7.2
5	834.84	35.0 QP	46.0	-11.0	1.00 V	6	38.5	-3.5
6	932.05	31.5 QP	46.0	-14.5	1.00 V	340	33.5	-2.0

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

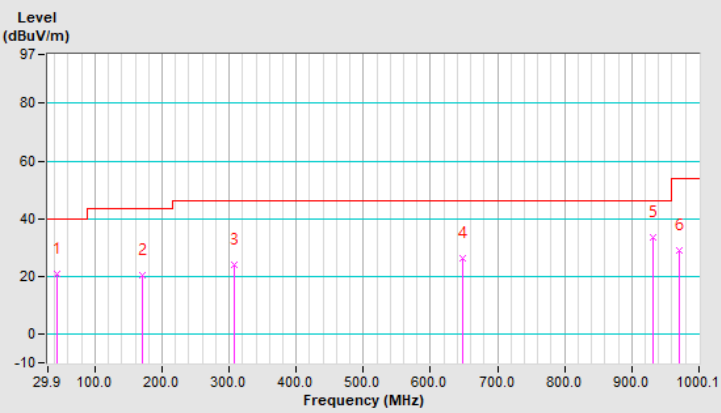


CHANNEL	TX Channel 52	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	43.51	20.9 QP	40.0	-19.1	1.00 H	69	35.4	-14.5
2	169.89	20.3 QP	43.5	-23.2	1.00 H	110	34.4	-14.1
3	307.93	24.2 QP	46.0	-21.8	1.50 H	222	36.8	-12.6
4	648.18	26.4 QP	46.0	-19.6	1.00 H	298	33.0	-6.6
5	932.05	33.7 QP	46.0	-12.3	2.00 H	310	35.7	-2.0
6	970.94	28.9 QP	54.0	-25.1	1.00 H	13	30.5	-1.6

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

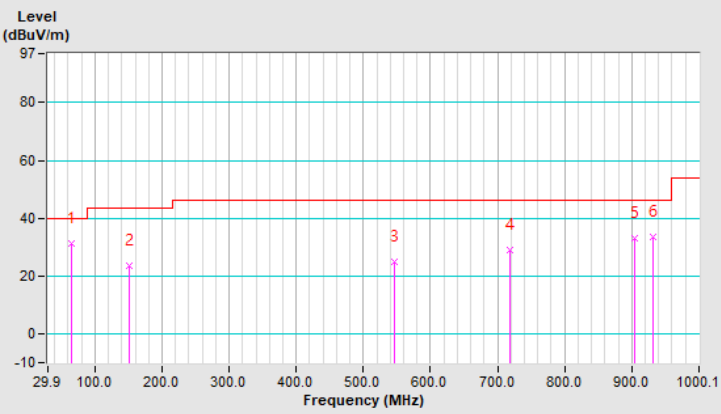


CHANNEL	TX Channel 52	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	30MHz ~ 1GHz	TEST MODE	B

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	64.90	31.4 QP	40.0	-8.6	1.00 V	5	46.5	-15.1
2	150.45	23.4 QP	43.5	-20.1	1.00 V	149	37.1	-13.7
3	547.08	25.0 QP	46.0	-21.0	1.00 V	262	33.7	-8.7
4	718.18	29.2 QP	46.0	-16.8	2.00 V	88	34.9	-5.7
5	904.83	33.1 QP	46.0	-12.9	1.00 V	354	35.6	-2.5
6	932.05	33.7 QP	46.0	-12.3	1.50 V	53	35.7	-2.0

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



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

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 (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 21, 2019	Feb. 20, 2020
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 22, 2019	Aug. 21, 2020
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

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

4.2.3 Test Procedures

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

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

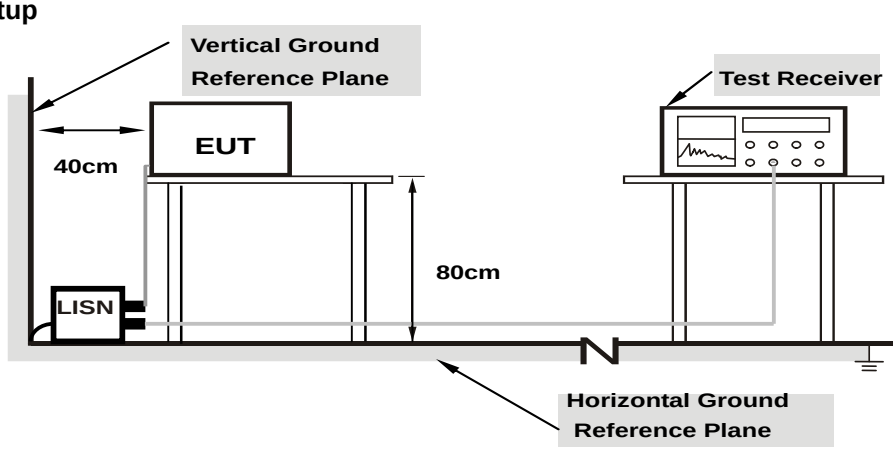
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

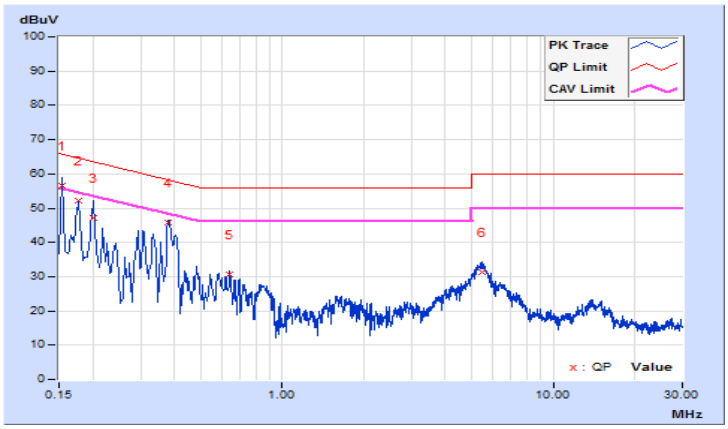
4.2.7 Test Results

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	0.15400	9.71	46.81	31.95	56.52	41.66	65.78	55.78	-9.26	-14.12
2	0.17800	9.74	42.37	28.94	52.11	38.68	64.58	54.58	-12.47	-15.90
3	0.20200	9.78	37.37	24.84	47.15	34.62	63.53	53.53	-16.38	-18.91
4	0.37800	9.89	36.04	32.04	45.93	41.93	58.32	48.32	-12.39	-6.39
5	0.64200	9.95	20.62	18.34	30.57	28.29	56.00	46.00	-25.43	-17.71
6	5.43800	10.22	21.23	13.70	31.45	23.92	60.00	50.00	-28.55	-26.08

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.

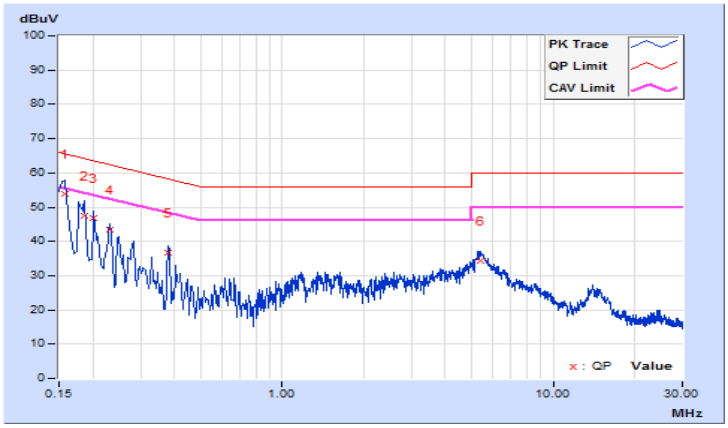


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	A		

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	0.15800	9.70	44.26	30.47	53.96	40.17	65.57	55.57	-11.61	-15.40
2	0.18600	9.77	37.86	25.09	47.63	34.86	64.21	54.21	-16.58	-19.35
3	0.20200	9.80	36.94	24.17	46.74	33.97	63.53	53.53	-16.79	-19.56
4	0.23000	9.81	33.78	18.40	43.59	28.21	62.45	52.45	-18.86	-24.24
5	0.37800	9.85	26.75	17.73	36.60	27.58	58.32	48.32	-21.72	-20.74
6	5.43000	10.16	24.28	16.20	34.44	26.36	60.00	50.00	-25.56	-23.64

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.

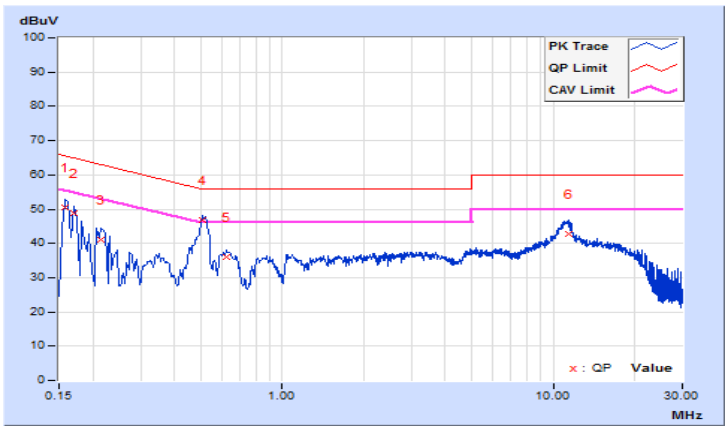


Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

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	0.15800	9.71	40.92	25.69	50.63	35.40	65.57	55.57	-14.94	-20.17
2	0.17000	9.73	39.02	22.02	48.75	31.75	64.96	54.96	-16.21	-23.21
3	0.21400	9.79	31.28	17.10	41.07	26.89	63.05	53.05	-21.98	-26.16
4	**0.51000**	**9.92**	**36.97**	**31.37**	**46.89**	**41.29**	**56.00**	**46.00**	**-9.11**	**-4.71**
5	0.62200	9.94	26.20	21.10	36.14	31.04	56.00	46.00	-19.86	-14.96
6	11.37400	10.33	32.54	27.34	42.87	37.67	60.00	50.00	-17.13	-12.33

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.

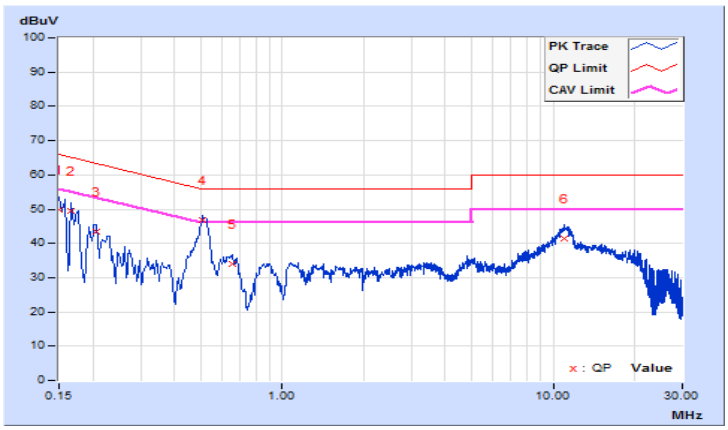


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
Test Mode	B		

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	0.15000	9.68	40.13	22.42	49.81	32.10	66.00	56.00	-16.19	-23.90
2	0.16600	9.72	39.83	23.91	49.55	33.63	65.16	55.16	-15.61	-21.53
3	0.20600	9.80	33.61	18.03	43.41	27.83	63.37	53.37	-19.96	-25.54
4	0.51000	9.88	36.81	31.19	46.69	41.07	56.00	46.00	-9.31	-4.93
5	0.65800	9.90	23.99	18.97	33.89	28.87	56.00	46.00	-22.11	-17.13
6	11.02600	10.28	31.24	25.81	41.52	36.09	60.00	50.00	-18.48	-13.91

REMARKS:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

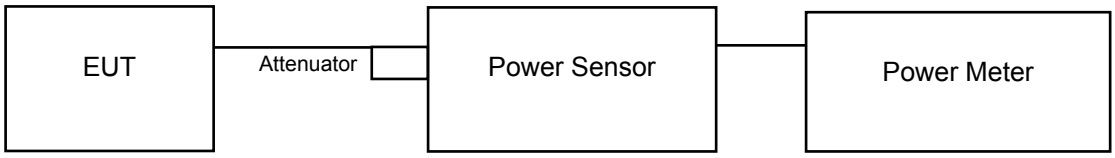
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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

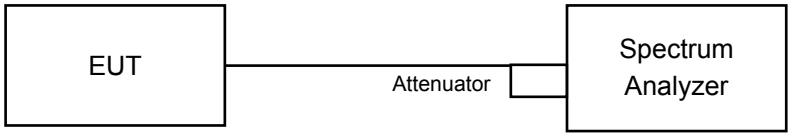
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

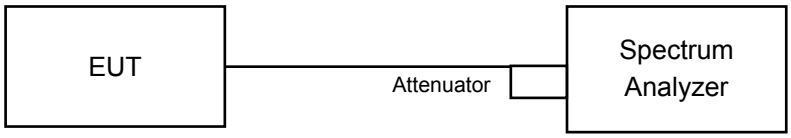
For Power Output
802.11a, 802.11n (HT20), 802.11n (HT40)



802.11ac (VHT80)



For 26dB Bandwidth



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

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

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

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

Power Output:

CDD Mode

For U-NII-2A, U-NII-2C Band

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	17.70	17.55	115.769	20.64	24.00	Pass
60	5300	17.79	17.65	118.327	20.73	24.00	Pass
64	5320	17.89	17.69	120.267	20.80	24.00	Pass
100	5500	17.65	17.69	116.959	20.68	23.85	Pass
116	5580	17.85	17.59	118.366	20.73	23.87	Pass
140	5700	17.55	17.60	114.429	20.59	23.88	Pass

Note:

For U-NII-2A, U-NII-2C Band:

Chain 0

1. 11dBm + 10log (23.41) = 24.69 > 24dBm
2. 11dBm + 10log (24.04) = 24.80 > 24dBm
3. 11dBm + 10log (24.14) = 24.82 > 24dBm
4. 11dBm + 10log (20.48) = 24.11 > 24dBm
5. 11dBm + 10log (19.56) = 23.91 < 24dBm
6. 11dBm + 10log (19.44) = 23.88 < 24dBm

Chain 1

1. 11dBm + 10log (21.48) = 24.32 > 24dBm
2. 11dBm + 10log (23.44) = 24.69 > 24dBm
3. 11dBm + 10log (23.35) = 24.68 > 24dBm
4. 11dBm + 10log (19.29) = 23.85 < 24dBm
5. 11dBm + 10log (19.37) = 23.87 < 24dBm
6. 11dBm + 10log (19.48) = 23.89 < 24dBm

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				
52	5260	17.50	17.62	114.044	20.57	24.00	Pass
60	5300	17.82	17.53	117.158	20.69	24.00	Pass
64	5320	17.91	17.63	119.745	20.78	24.00	Pass
100	5500	17.66	17.55	115.230	20.62	24.00	Pass
116	5580	17.65	17.41	113.291	20.54	24.00	Pass
140	5700	17.91	18.06	125.775	21.00	24.00	Pass

Note:
For U-NII-2A, U-NII-2C Band:
Chain 0
1. 11dBm + 10log (22.55) = 24.53 > 24dBm
2. 11dBm + 10log (22.47) = 24.51 > 24dBm
3. 11dBm + 10log (22.69) = 24.55 > 24dBm
4. 11dBm + 10log (20.45) = 24.10 > 24dBm
5. 11dBm + 10log (20.40) = 24.09 > 24dBm
6. 11dBm + 10log (20.29) = 24.07 > 24dBm

Chain 1
1. 11dBm + 10log (26.02) = 25.15 > 24dBm
2. 11dBm + 10log (28.20) = 25.50 > 24dBm
3. 11dBm + 10log (28.35) = 25.52 > 24dBm
4. 11dBm + 10log (20.46) = 24.10 > 24dBm
5. 11dBm + 10log (20.33) = 24.08 > 24dBm
6. 11dBm + 10log (20.36) = 24.08 > 24dBm

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				
54	5270	19.48	19.49	**177.636**	22.50	24.00	Pass
62	5310	14.63	14.42	56.709	17.54	24.00	Pass
102	5510	15.81	15.95	77.462	18.89	24.00	Pass
110	5550	20.38	20.22	**214.340**	23.31	24.00	Pass
134	5670	18.33	18.25	134.911	21.30	24.00	Pass

Note:
For U-NII-2A, U-NII-2C Band:
Chain 0
1. 11dBm + 10log (78.89) = 29.97 > 24dBm
2. 11dBm + 10log (40.65) = 27.09 > 24dBm
3. 11dBm + 10log (40.63) = 27.08 > 24dBm
4. 11dBm + 10log (74.58) = 29.72 > 24dBm
5. 11dBm + 10log (40.79) = 27.10 > 24dBm

Chain 1
1. 11dBm + 10log (79.06) = 29.97 > 24dBm
2. 11dBm + 10log (40.96) = 27.12 > 24dBm
3. 11dBm + 10log (40.98) = 27.12 > 24dBm
4. 11dBm + 10log (74.12) = 29.69 > 24dBm
5. 11dBm + 10log (41.25) = 27.15 > 24dBm

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				
58	5290	13.92	13.75	48.374	16.85	24.00	Pass
106	5530	15.74	15.63	74.056	18.70	24.00	Pass
122	5610	15.82	15.70	75.348	18.77	24.00	Pass

Note:
For U-NII-2A, U-NII-2C Band:
Chain 0
1. 11dBm + 10log (83.84) = 30.23 > 24dBm
2. 11dBm + 10log (83.67) = 30.22 > 24dBm
3. 11dBm + 10log (83.60) = 30.22 > 24dBm

Chain 1
1. 11dBm + 10log (83.68) = 30.22 > 24dBm
2. 11dBm + 10log (83.64) = 30.22 > 24dBm
3. 11dBm + 10log (83.84) = 30.23 > 24dBm

Beamforming Mode

For U-NII-2A, U-NII-2C Band

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	14.49	14.61	57.026	17.56	21.00	Pass
60	5300	14.81	14.52	58.583	17.68	21.00	Pass
64	5320	14.90	14.62	59.876	17.77	21.00	Pass
100	5500	14.65	14.54	57.619	17.61	21.00	Pass
116	5580	14.64	14.40	56.649	17.53	21.00	Pass
140	5700	14.90	15.05	62.892	17.99	21.00	Pass

Note: Directional Gain = 5.99 + 10log(2) = 9dBi > 6dBi, so the limit shall be reduced to 24-(9-6) = 21dBm.

* Determined Limit means compare the minimum value after 24dBm and 11 dBm+10 log(26 dB bandwidth)

For U-NII-2A, U-NII-2C Band:

Chain 0

1. 11dBm + 10log (22.55) = 24.53 > 24dBm
2. 11dBm + 10log (22.47) = 24.51 > 24dBm
3. 11dBm + 10log (22.69) = 24.55 > 24dBm
4. 11dBm + 10log (20.45) = 24.10 > 24dBm
5. 11dBm + 10log (20.40) = 24.09 > 24dBm
6. 11dBm + 10log (20.29) = 24.07 > 24dBm

Chain 1

1. 11dBm + 10log (26.02) = 25.15 > 24dBm
2. 11dBm + 10log (28.20) = 25.50 > 24dBm
3. 11dBm + 10log (28.35) = 25.52 > 24dBm
4. 11dBm + 10log (20.46) = 24.10 > 24dBm
5. 11dBm + 10log (20.33) = 24.08 > 24dBm
6. 11dBm + 10log (20.36) = 24.08 > 24dBm

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				
54	5270	16.47	16.48	**88.824**	19.49	21.00	Pass
62	5310	11.62	11.41	28.357	14.53	21.00	Pass
102	5510	12.80	12.94	38.734	15.88	21.00	Pass
110	5550	17.37	17.21	**107.178**	20.30	21.00	Pass
134	5670	15.32	15.24	67.461	18.29	21.00	Pass

Note: Directional Gain = 5.99 + 10log(2) = 9dBi > 6dBi, so the limit shall be reduced to 24-(9-6) = 21dBm.

* Determined Limit means compare the minimum value after 24dBm and 11 dBm+10 log(26 dB bandwidth)

For U-NII-2A, U-NII-2C Band:

Chain 0

1. 11dBm + 10log (78.89) = 29.97 > 24dBm
2. 11dBm + 10log (40.65) = 27.09 > 24dBm
3. 11dBm + 10log (40.63) = 27.08 > 24dBm
4. 11dBm + 10log (74.58) = 29.72 > 24dBm
5. 11dBm + 10log (40.79) = 27.10 > 24dBm

Chain 1

1. 11dBm + 10log (79.06) = 29.97 > 24dBm
2. 11dBm + 10log (40.96) = 27.12 > 24dBm
3. 11dBm + 10log (40.98) = 27.12 > 24dBm
4. 11dBm + 10log (74.12) = 29.69 > 24dBm
5. 11dBm + 10log (41.25) = 27.15 > 24dBm

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				
58	5290	10.91	10.74	24.189	13.84	21.00	Pass
106	5530	12.73	12.62	37.031	15.69	21.00	Pass
122	5610	12.81	12.69	37.677	15.76	21.00	Pass

Note: Directional Gain = 5.99 + 10log(2) = 9dBi > 6dBi, so the limit shall be reduced to 24-(9-6) = 21dBm.

* Determined Limit means compare the minimum value after 24dBm and 11 dBm+10 log(26 dB bandwidth)

For U-NII-2A, U-NII-2C Band:

Chain 0

1. 11dBm + 10log (83.84) = 30.23 > 24dBm
2. 11dBm + 10log (83.67) = 30.22 > 24dBm
3. 11dBm + 10log (83.60) = 30.22 > 24dBm

Chain 1

1. 11dBm + 10log (83.68) = 30.22 > 24dBm
2. 11dBm + 10log (83.64) = 30.22 > 24dBm
3. 11dBm + 10log (83.84) = 30.23 > 24dBm

26dB Bandwidth:

802.11a

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	23.41	21.48
60	5300	24.04	23.44
64	5320	24.14	23.35
100	5500	20.48	19.29
116	5580	19.56	19.37
140	5700	19.44	19.48

802.11n (HT20)

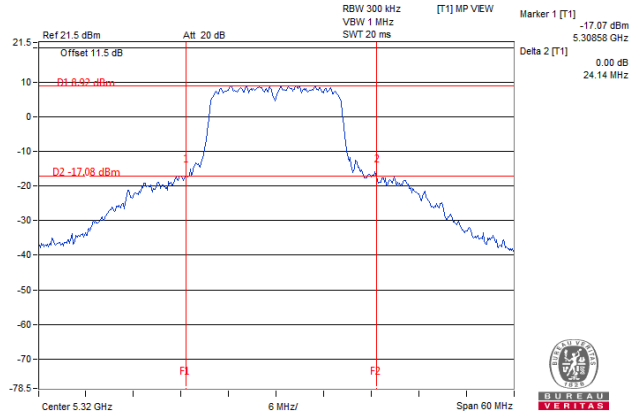
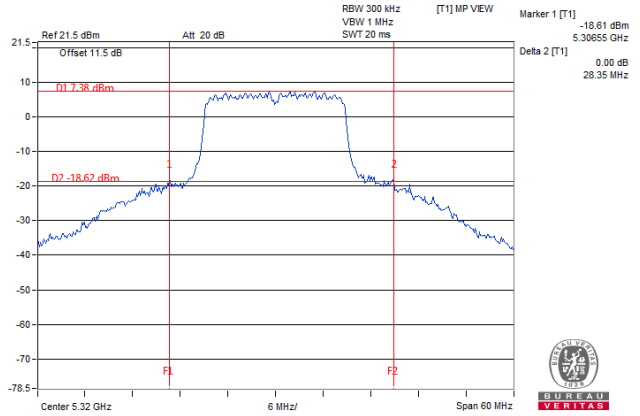
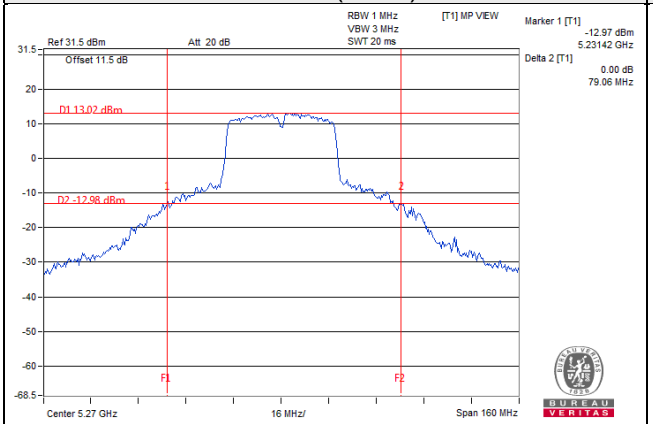
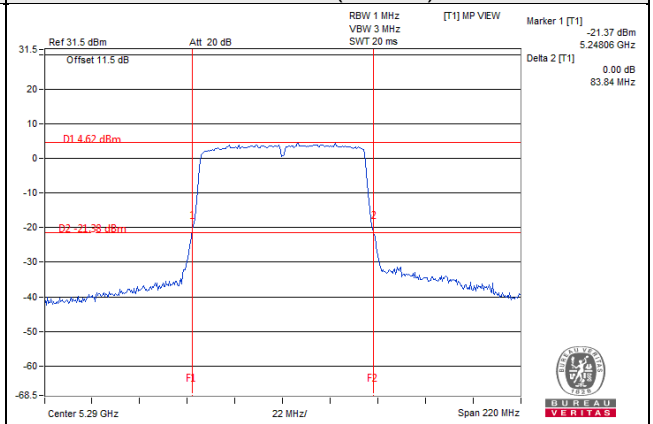
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	22.55	26.02
60	5300	22.47	28.20
64	5320	22.69	28.35
100	5500	20.45	20.46
116	5580	20.40	20.33
140	5700	20.29	20.36

802.11n (HT40)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	78.89	79.06
62	5310	40.65	40.96
102	5510	40.63	40.98
110	5550	74.58	74.12
134	5670	40.79	41.25

802.11ac (VHT80)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
58	5290	83.84	83.68
106	5530	83.67	83.64
122	5610	83.60	83.84

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

EUT Maximum Conducted Power

CDD Mode

802.11a

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	120.267	20.80
5470~5725	118.366	20.73

Note: Manufacturer provides Transmit Power Control description to meet this requirement.

802.11n (HT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	119.745	20.78
5470~5725	125.775	21.00

Note: Manufacturer provides Transmit Power Control description to meet this requirement.

802.11n (HT40)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	177.636	22.50
5470~5725	214.340	23.31

Note: Manufacturer provides Transmit Power Control description to meet this requirement.

802.11ac (VHT80)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	48.374	16.85
5470~5725	75.348	18.77

Note: Manufacturer provides Transmit Power Control description to meet this requirement.

Beamforming Mode

802.11n (HT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	59.876	17.77
5470~5725	62.892	17.99

Note: Manufacturer provides Transmit Power Control description to meet this requirement.

802.11n (HT40)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	88.824	19.49
5470~5725	107.178	20.30

Note: Manufacturer provides Transmit Power Control description to meet this requirement.

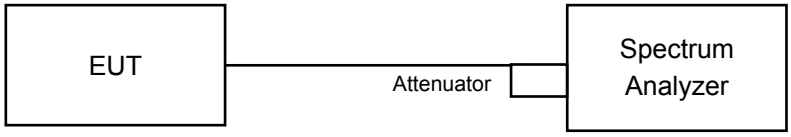
802.11ac (VHT80)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	24.189	13.84
5470~5725	37.677	15.76

Note: Manufacturer provides Transmit Power Control description to meet this requirement.

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
52	5260	16.56	16.56
60	5300	16.56	16.56
64	5320	16.68	16.56
100	5500	16.56	16.56
116	5580	16.56	16.44
140	5700	16.56	16.56

802.11n (HT20)

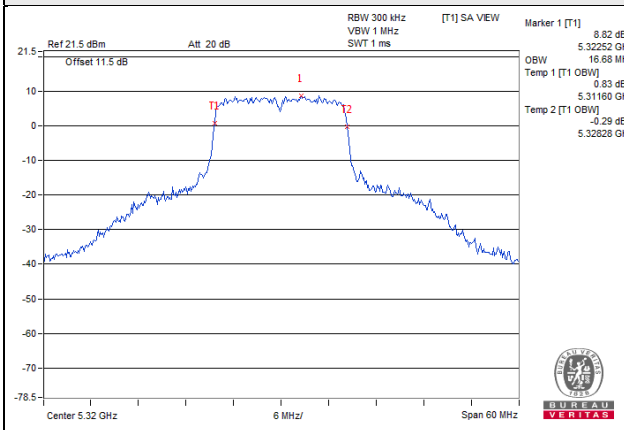
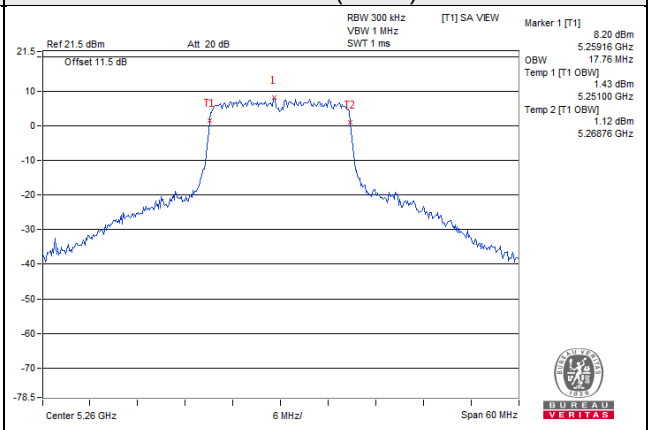
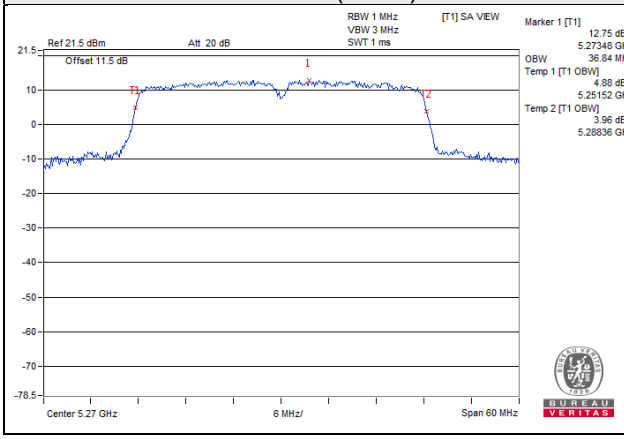
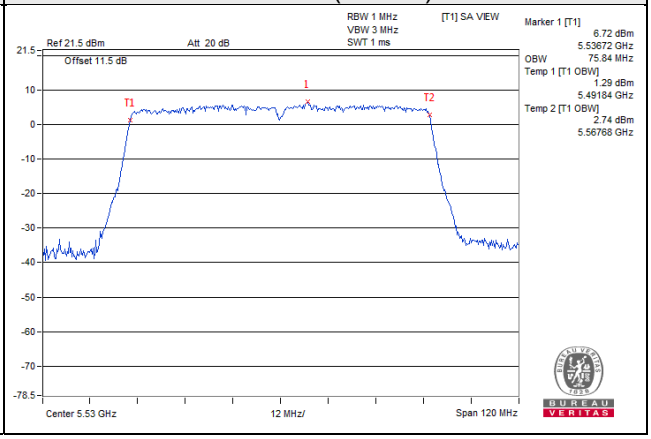
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	17.76	17.76
60	5300	17.76	17.76
64	5320	17.76	17.76
100	5500	17.64	17.76
116	5580	17.64	17.52
140	5700	17.64	17.64

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	36.84	36.84
62	5310	36.12	36.12
102	5510	36.12	36.12
110	5550	36.72	36.72
134	5670	36.12	36.12

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
58	5290	75.60	75.60
106	5530	75.84	75.84
122	5610	75.60	75.84

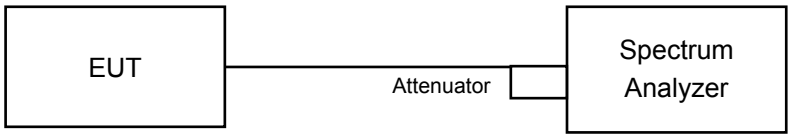
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as 4.3.6.

4.5.7 Test Results

For U-NII-2A, U-NII-2C band

802.11a

Chan.	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor	Total PSD With Duty Factor (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
52	5260	3.96	2.91	0.18	6.66	8.00	Pass
60	5300	4.39	2.93	0.18	6.91	8.00	Pass
64	5320	4.42	2.86	0.18	6.90	8.00	Pass
100	5500	4.25	3.16	0.18	6.93	8.00	Pass
116	5580	4.39	3.15	0.18	7.00	8.00	Pass
140	5700	4.09	3.70	0.18	7.09	8.00	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-2A, U-NII-2C:** Directional gain = 5.99dBi +10log (2) = 9dBi > 6dBi, so the power density limit shall be reduced to 11-(9-6) = 8dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Frequency (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
52	5260	3.66	2.91	6.31	8.00	Pass
60	5300	4.11	2.90	6.56	8.00	Pass
64	5320	4.27	2.77	6.59	8.00	Pass
100	5500	4.09	3.31	6.73	8.00	Pass
116	5580	4.23	3.40	6.85	8.00	Pass
140	5700	4.39	4.42	7.42	8.00	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-2A, U-NII-2C:** Directional gain = 5.99dBi +10log (2) = 9dBi > 6dBi, so the power density limit shall be reduced to 11-(9-6) = 8dBm.

802.11n (HT40)

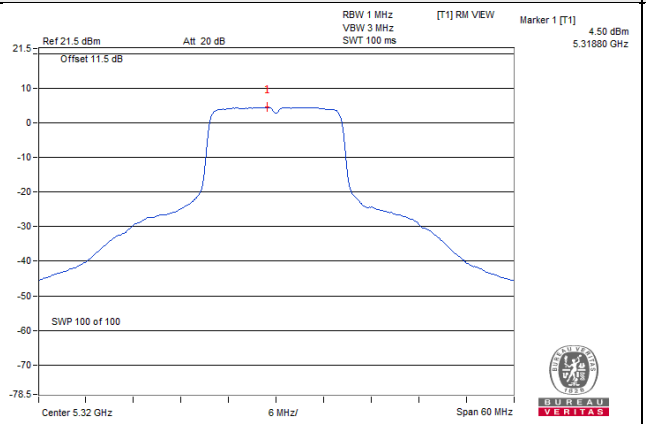
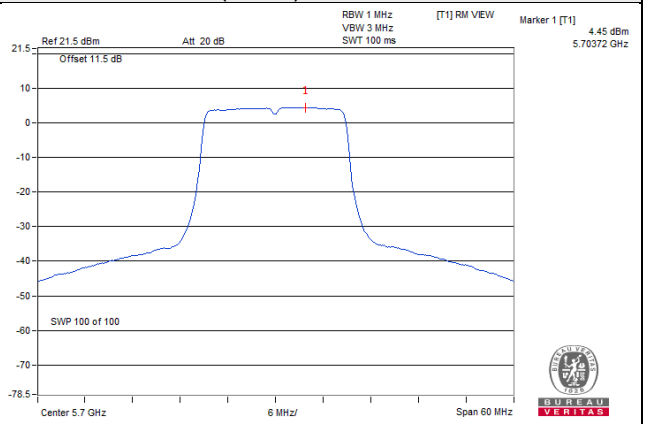
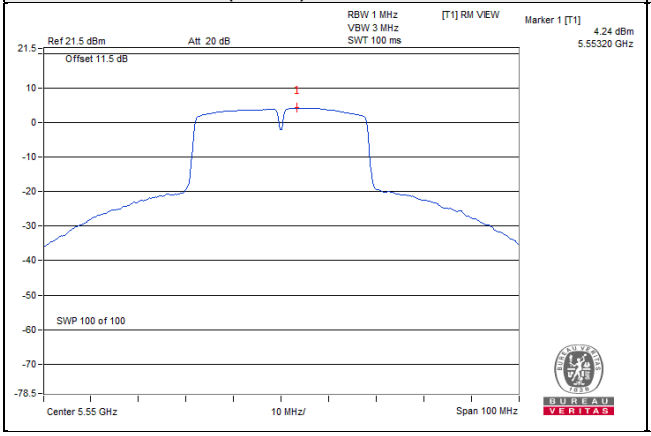
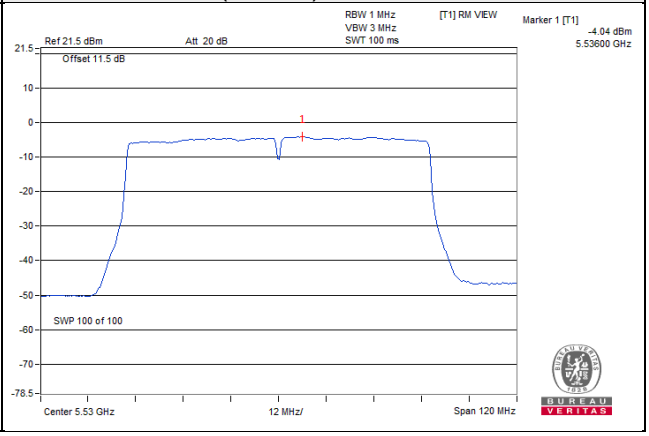
Chan.	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor	Total PSD With Duty Factor (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
54	5270	2.86	2.77	0.15	5.98	8.00	Pass
62	5310	-1.76	-2.26	0.15	1.16	8.00	Pass
102	5510	-0.31	-0.66	0.15	2.68	8.00	Pass
110	5550	4.24	3.50	0.15	7.05	8.00	Pass
134	5670	1.86	1.45	0.15	4.82	8.00	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-2A, U-NII-2C:** Directional gain = 5.99dBi +10log (2) = 9dBi > 6dBi, so the power density limit shall be reduced to 11-(9-6) = 8dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Chan.	Frequency (MHz)	PSD (dBm/MHz)		Duty Factor	Total PSD With Duty Factor (dBm/MHz)	Maximum Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
58	5290	-6.20	-6.70	0.29	-3.14	8.00	Pass
106	5530	-4.04	-4.87	0.29	-1.13	8.00	Pass
122	5610	-4.11	-4.95	0.29	-1.21	8.00	Pass

Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. **For U-NII-2A, U-NII-2C:** Directional gain = 5.99dBi +10log (2) = 9dBi > 6dBi, so the power density limit shall be reduced to 11-(9-6) = 8dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

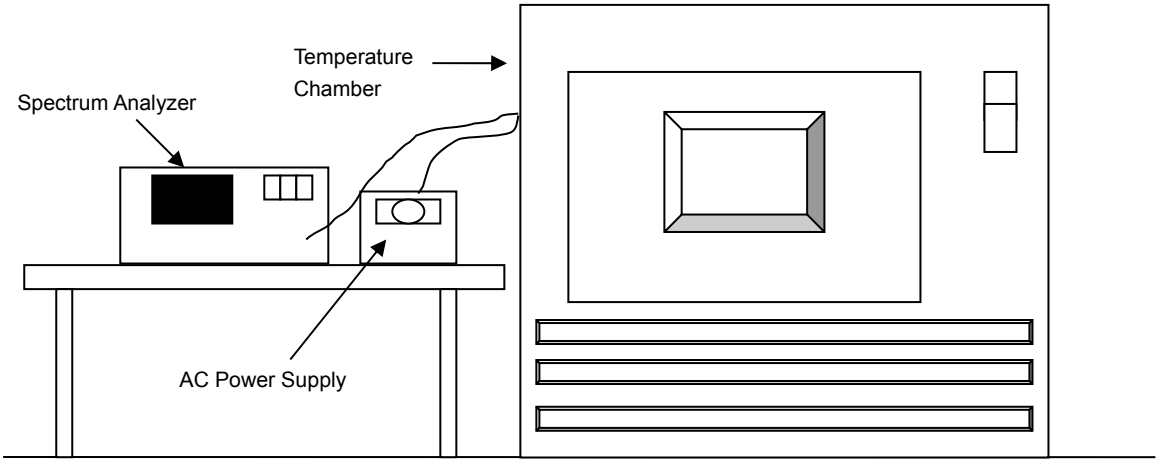
Spectrum Plot of Worst Value	
802.11a / Chain 0 / Ch 64	802.11n (HT20) / Chain 0 / Ch 140
	
802.11n (HT40) / Chain 0 / Ch 110	802.11ac (VHT80) / Chain 0 / Ch 106
	

4.6 Frequency Stability

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

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

4.6.4 Test Procedure

a. The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 minutes.
e. Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.
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: 5260MHz									
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	5259.9897	PASS	5259.9910	PASS	5259.9933	PASS	5259.9928	Pass
40	120	5259.9992	PASS	5259.9955	PASS	5259.9979	PASS	5259.9953	Pass
30	120	5259.9896	PASS	5259.9867	PASS	5259.9908	PASS	5259.9885	Pass
20	120	5259.9954	PASS	5259.9971	PASS	5259.9973	PASS	5259.9989	Pass
10	120	5259.9963	PASS	5259.9952	PASS	5259.9970	PASS	5259.9947	Pass
0	120	5260.0059	PASS	5260.0077	PASS	5260.0061	PASS	5260.0092	Pass
-10	120	5259.9886	PASS	5259.9915	PASS	5259.9905	PASS	5259.9919	Pass
-20	120	5259.9936	PASS	5259.9926	PASS	5259.9940	PASS	5259.9918	Pass

Frequency Stability Versus Voltage									
Operating Frequency: 5260MHz									
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	5259.9951	PASS	5259.9965	PASS	5259.9971	PASS	5259.9988	Pass
	120	5259.9954	PASS	5259.9971	PASS	5259.9973	PASS	5259.9989	Pass
	102	5259.9951	PASS	5259.9969	PASS	5259.9972	PASS	5259.9989	Pass

5 Pictures of Test Arrangements

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

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 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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