FCC Test Report

Report No.:	RF160809C28A
FCC ID:	PY316200339
Test Model:	R9000
Series Model:	R8900
Received Date:	Aug. 09, 2016
Test Date:	Sep. 22 ~ Oct. 12, 2016
Issued Date:	Oct. 26, 2016
Applicant:	NETGEAR, INC.
Address:	350 E. Plumeria Drive, San Jose CA 95134, 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.)

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The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Issue No.	Description	Date Issued
RF160809C28A	Original release.	Oct. 26, 2016

1 Certificate of Conformity

Product:	AD7200 Smart WiFi Router
Brand:	NETGEAR
Test Model:	R9000
Series Model:	R8900
Sample Status:	Engineering sample
Applicant:	NETGEAR, INC.
Test Date:	Sep. 22 ~ Oct. 12, 2016
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 EMC characteristics under the conditions specified in this report.

Prepared by : _____ , **Date:** Oct. 26, 2016

Polly Chien / Specialist

Approved by : _____ , **Date:** Oct. 26, 2016

Ken Liu / Senior Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.91dB at 0.50996MHz.
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 -0.1dB at 5350.00MHz.
15.407(a) (1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
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.

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	2.44 dB
Radiated Emissions up to 1 GHz	30MHz ~ 200MHz	3.59 dB
	200MHz ~1000MHz	3.60 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	2.29 dB
	18GHz ~ 40GHz	2.29 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	AD7200 Smart WiFi Router
Brand	NETGEAR
Test Model	R9000
Series Model	R8900
Model Difference	Refer to Note for more details
Status of EUT	Engineering sample
Power Supply Rating	19Vdc (adapter)
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	OFDM
Transfer Rate	802.11a: 54.0/ 48.0/ 36.0/ 24.0/ 18.0/ 12.0/ 9.0/ 6.0Mbps 802.11n: up to 800.0Mbps 802.11ac: up to 1733.0Mbps
Operating Frequency	5260 ~ 5320MHz, 5500 ~ 5700MHz
Number of Channel	5260 ~ 5320MHz: 4 for 802.11a, 802.11n (HT20) , 802.11ac (VHT20) 2 for 802.11n (HT40), 802.11ac (VHT40) 1 for 802.11ac (VHT80) 5500 ~ 5700MHz: 11 for 802.11a, 802.11n (HT20), 802.11ac (VHT20) 5 for 802.11n (HT40), 802.11ac (VHT40) 2 for 802.11ac (VHT80)
Output Power	CDD Mode: 5260 ~ 5320MHz: 242.254mW 5500 ~ 5700MHz: 249.471mW Beamforming Mode: 5260 ~ 5320MHz: 242.254mW 5500 ~ 5700MHz: 249.471mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter
Data Cable Supplied	NA

Note:

1. This report is prepared for FCC class II permissive change.
2. This report is issued as a supplementary report of BV ADT report no.: RF160809C28-1. The differences compared with the original report are adding 5.26GHz to 5.32GHz and 5.50GHz to 5.70GHz to the EUT by software, adding one model and removing 802.11ac (VHT80+VHT80) channel. Therefore, all tests had been tested.
3. The following models are provided to this EUT. The model of the R9000 was chosen for final test. (New model is marked in boldface.)

Brand	Model	Difference
NETGEAR	R9000	2.4GHz up to 256QAM
	R8900	**2.4GHz up to 64QAM**

4. The EUT incorporates a MIMO function. Physically, the EUT provides 4 completed transmitters and 4 receivers.

Band	Modulation Mode	Beamforming Mode	TX Function	Available Channel
5GHz	802.11a	Not Support	4TX	52 ~ 64, 100 ~140
	802.11n (HT20)	Support	4TX	52 ~ 64, 100 ~140
	802.11n (HT40)	Support	4TX	54 ~ 62, 110 ~134
	802.11ac (VHT80)	Support	4TX	58, 106 ~ 122

* For 802.11a, the EUT doesn't support Beamforming mode.
* The modulation and bandwidth are similar for 802.11n mode for 20MHz / 40MHz and 802.11ac mode for V20MHz / V40MHz, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)
* For 5GHz band 802.11n and 802.11ac, after pre-tested two modes (with beamforming mode and CDD mode) found CDD mode was the worst, therefore chosen for final test and presented in the test report.

5. The EUT uses following antennas.

Ant. Type	Connecter Type	Antenna Gain (dBi)				
Dipole	I-PEX	5180MHz	5190MHz	5200MHz	5210MHz	5230MHz
		1.70	1.62	1.63	1.66	1.52
		5240MHz	5260MHz	5270MHz	5290MHz	5300MHz
		1.45	1.21	1.21	1.18	1.18
		5310MHz	5320MHz	5500MHz	5510MHz	5530MHz
		1.27	1.27	1.21	1.21	1.20
		5550MHz	5580MHz	5610MHz	5670MHz	5700MHz
		1.11	0.88	0.95	1.37	1.25
		Directional Gain (dBi)				
		5180MHz	5190MHz	5200MHz	5210MHz	5230MHz
		5.868	5.918	5.763	5.826	5.472
		5240MHz	5260MHz	5270MHz	5290MHz	5300MHz
		5.487	5.55	5.488	5.414	5.37
		5310MHz	5320MHz	5500MHz	5510MHz	5530MHz
		5.352	5.346	5.318	5.12	5.234
		5550MHz	5580MHz	5610MHz	5670MHz	5700MHz
		5.627	5.239	5.239	4.975	5.772

6. WLAN 2.4GHz, WLAN 5GHz, WLAN 60GHz 802.11ad and BT LE technologies can transmit at same time.
7. Spurious emission of the simultaneous operation (WLAN 2.4GHz, WLAN 5GHz, WLAN 60GHz 802.11ad and BT LE) has been evaluated and no non-compliance was found.

8. The EUT consumes power from the following adapters.

Adapter 1	
Brand	NETGEAR
Model	AD2003F10
Part No.	332-10631-01
Input Power	100-120Vac, 50/60Hz, 1.5A
Output Power	19Vdc, 3.16A
Power Line	1.8m cable without core attached on adapter

Adapter 2	
Brand	NETGEAR
Model	2ABS060K 1 NA
Part No.	332-10788-01
Input Power	100-120Vac, 50/60Hz, 1.7A
Output Power	19Vdc, 3.16A
Power Line	1.8m cable without core attached on adapter

*After pre-tested two adapters, found adapter 2 was the worst and chosen for final test

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	5290 MHz

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	5530MHz	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	
-	√	√	√	√	-

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

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

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

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

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

EUT CONFIGURE MODE	MODE	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6.0
-	802.11ac (VHT20)		52 to 64	52, 60, 64	OFDM	BPSK	7.2
-	802.11ac (VHT40)		54 to 62	54, 62	OFDM	BPSK	15.0
-	802.11ac (VHT80)		58	58	OFDM	BPSK	130.0
-	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	BPSK	6.0
-	802.11ac (VHT20)		100 to 140	100, 116, 140	OFDM	BPSK	7.2
-	802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	BPSK	15.0
-	802.11ac (VHT80)		106 to 122	106, 122	OFDM	BPSK	130.0

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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5260-5320	52 to 64	100	OFDM	BPSK	6.0
		5500-5700	100 to 140		OFDM	BPSK	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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5260-5320	52 to 64	100	OFDM	BPSK	6.0
		5500-5700	100 to 140		OFDM	BPSK	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	FREQ. BAND (MHz)	AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TECHNOLOGY	MODULATION TYPE	DATA RATE (Mbps)
-	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	BPSK	6.0
-	802.11ac (VHT20)		52 to 64	52, 60, 64	OFDM	BPSK	7.2
-	802.11ac (VHT40)		54 to 62	54, 62	OFDM	BPSK	15.0
-	802.11ac (VHT80)		58	58	OFDM	BPSK	130.0
-	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	BPSK	6.0
-	802.11ac (VHT20)		100 to 140	100, 116, 140	OFDM	BPSK	7.2
-	802.11ac (VHT40)		102 to 134	102, 110, 134	OFDM	BPSK	15.0
-	802.11ac (VHT80)		106 to 122	106, 122	OFDM	BPSK	130.0

Test Condition:

APPLICABLE TO	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
RE≥1G	25deg. C, 66%RH	120Vac, 60Hz	Matthew Yang, Chris Lin
RE<1G	26deg. C, 54%RH	120Vac, 60Hz	Chris Lin
PLC	25deg. C, 65%RH	120Vac, 60Hz	Chris Lin
APCM	25deg. C, 60%RH	120Vac, 60Hz	Frank Liu

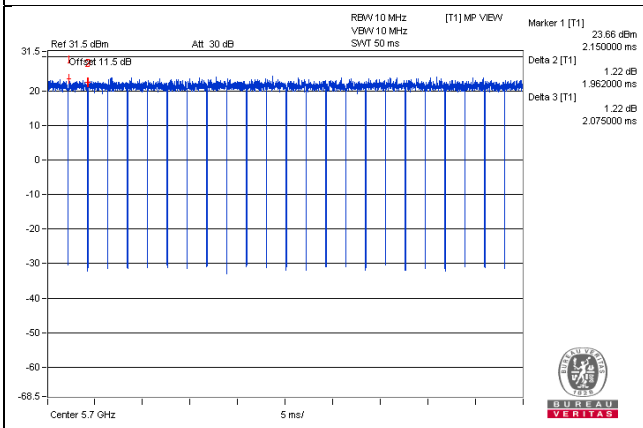
3.3 Duty Cycle of Test Signal

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

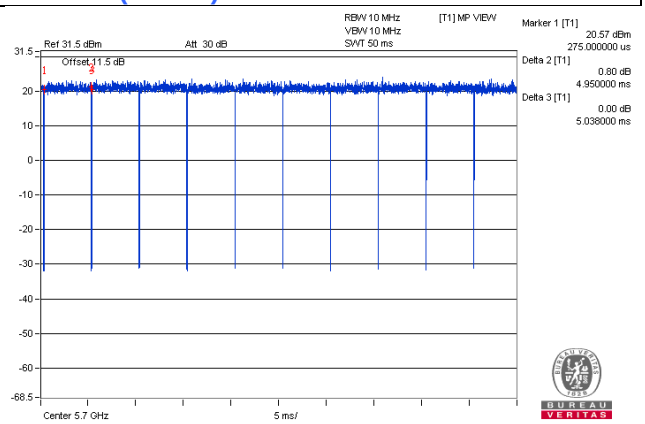
CDD Mode

802.11a: Duty cycle = 1.962/2.075 = 0.946, Duty factor = 10 * log(1/0.946) = 0.24
802.11ac (VHT20): Duty cycle = 4.950/5.038 = 0.983
802.11ac (VHT40): Duty cycle = 2.363/2.488 = 0.950, Duty factor = 10 * log(1/0.950) = 0.22
802.11ac (VHT80): Duty cycle = 1.074/1.249 = 0.860, Duty factor = 10 * log(1/0.860) = 0.66

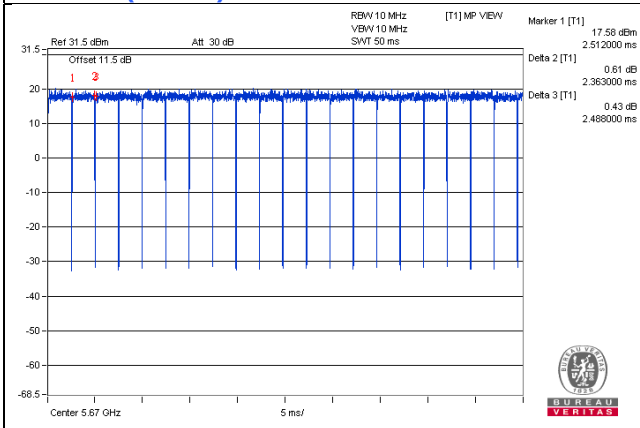
802.11a



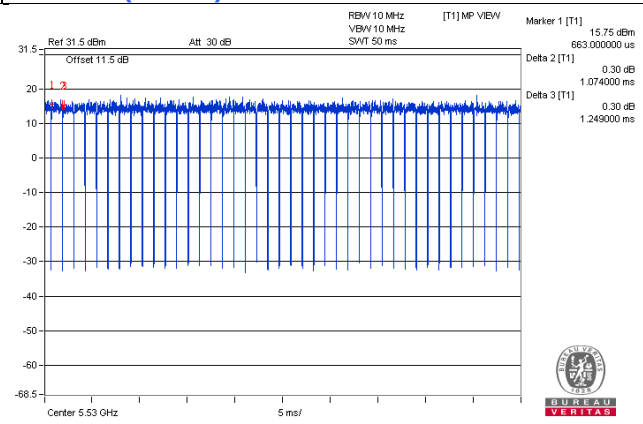
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



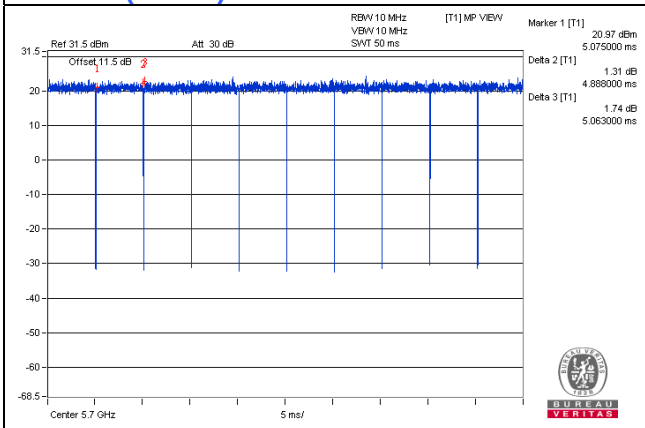
Beamforming Mode

802.11ac (VHT20): Duty cycle = 4.888/5.063 = 0.965, Duty factor = 10 * log(1/0.965) = 0.15

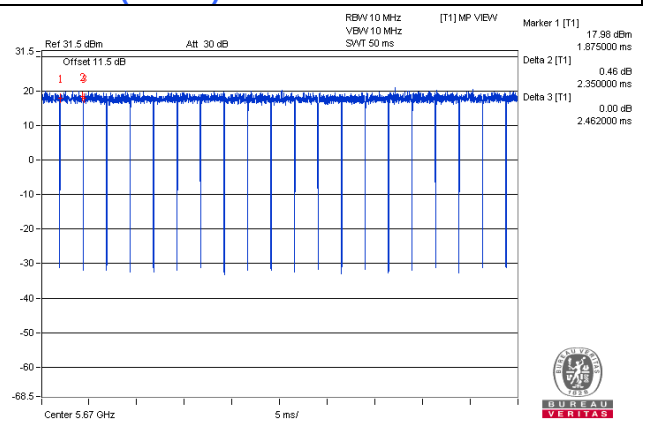
802.11ac (VHT40): Duty cycle = 2.435/2.462 = 0.955, Duty factor = 10 * log(1/0.955) = 0.20

802.11ac (VHT80): Duty cycle = 1.087/1.224 = 0.888, Duty factor = 10 * log(1/0.888) = 0.52

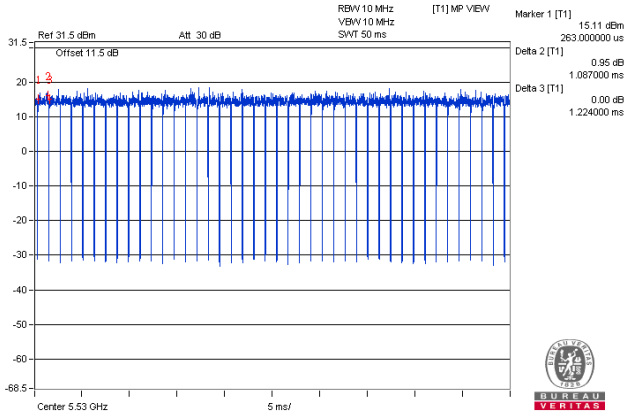
802.11ac (VHT20)



802.11ac (VHT40)



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.

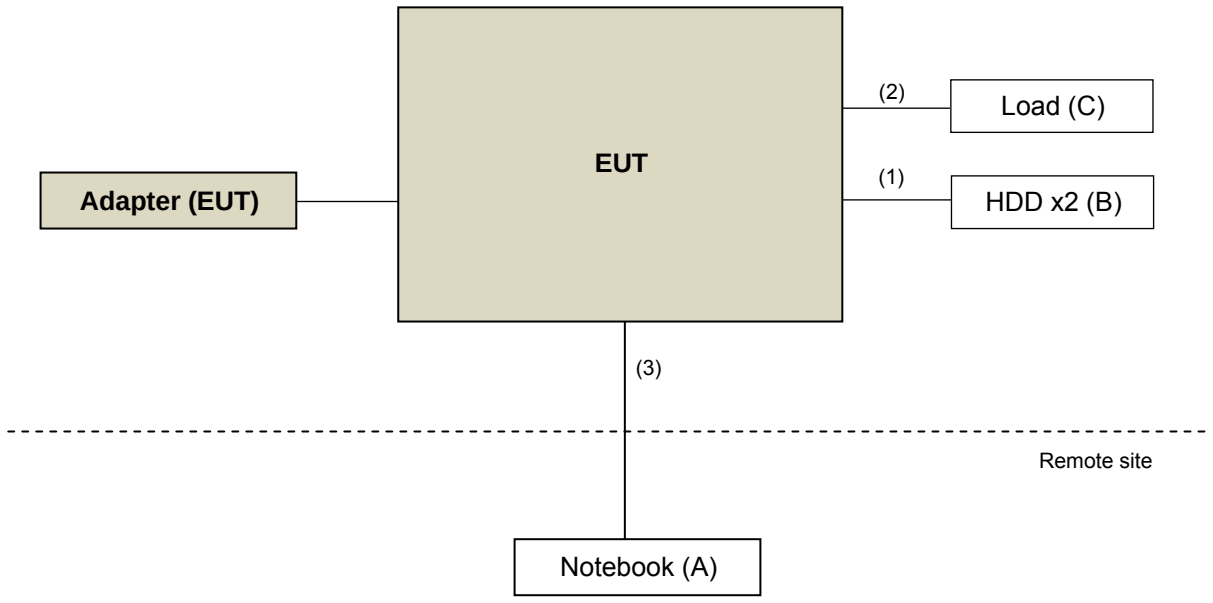
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	6RP2YM1	FCC DoC Approved	-
B.	HDD	TOSHIBA	DTB305	X4RBCC3RT3ZB	NA	-
	HDD	TOSHIBA	DTB305	X4R2C64VT3ZB	NA	-
C.	Load	NA	NA	NA	NA	-

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.	USB cable	2	0.5	Y	0	-
2.	RJ45 cable	6	1.8	N	0	Cat5e
3.	RJ45 cable	1	3	N	0	Cat5e

3.4.1 Configuration of System under Test



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 v01r03

KDB 662911 D01 Multiple Transmitter Output v02r01

ANSI C63.10-2013

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

NOTE: The EUT has been verified to comply with the requirements of FCC Part 15, Subpart B, Class B (DoC). The test report has been issued separately.

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. Other emissions shall be at least 20dB below the highest level of the desired power:

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 v01r03</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	Apr. 18, 2016	Apr. 17, 2017
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 16, 2016	Aug. 15, 2017
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Jan. 07, 2016	Jan. 06, 2017
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Jan. 08, 2016	Jan. 07, 2017
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Jan. 18, 2016	Jan. 17, 2017
Loop Antenna	EM-6879	269	Aug. 11, 2016	Aug. 10, 2017
Preamplifier Agilent	8449B	3008A01960	Aug. 09, 2016	Aug. 08, 2017
Preamplifier Agilent	8447D	2944A10631	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Aug. 09, 2016	Aug. 08, 2017
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03(250724)	Aug. 09, 2016	Aug. 08, 2017
Software BV ADT	ADT_Radiated_ V7.6.15.9.4	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Antenna Tower Controller BV ADT	AT100	AT93021703	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
High Speed Peak Power Meter	ML2495A	0824012	Aug. 11, 2016	Aug. 10, 2017
Power Sensor	MA2411B	0738171	Aug. 11, 2016	Aug. 10, 2017
26GHz ~ 40GHz Amplifier	EM26400	815221	Oct. 18, 2015	Oct. 17, 2016
			Oct. 17, 2016	Oct. 16, 2017

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 4.
3. The horn antenna and preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 460141.
5. The IC Site Registration No. is IC7450F-4.

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

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

c. Both X and Y axes of the antenna are set to make the measurement.

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

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

Note:

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

For Radiated emission above 30MHz

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

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

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

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

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

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

Note:

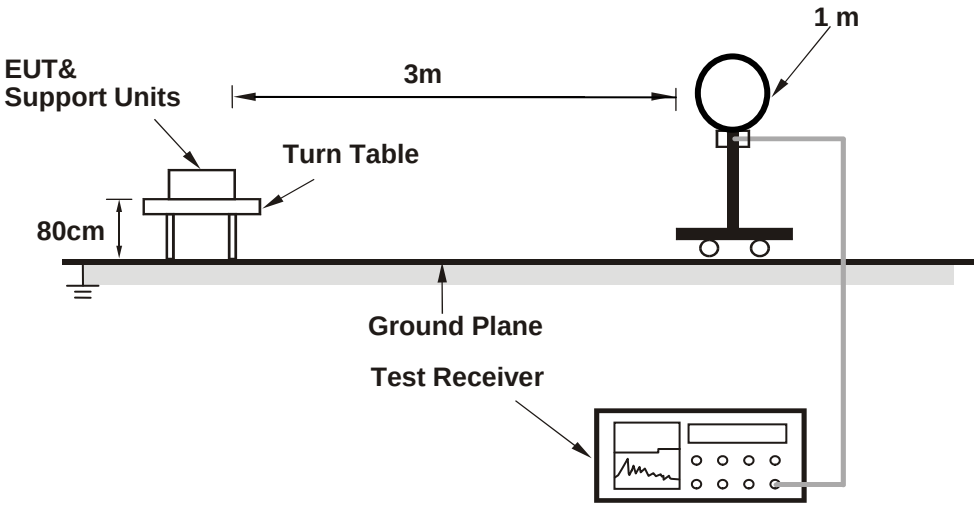
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

4.1.4 Deviation from Test Standard

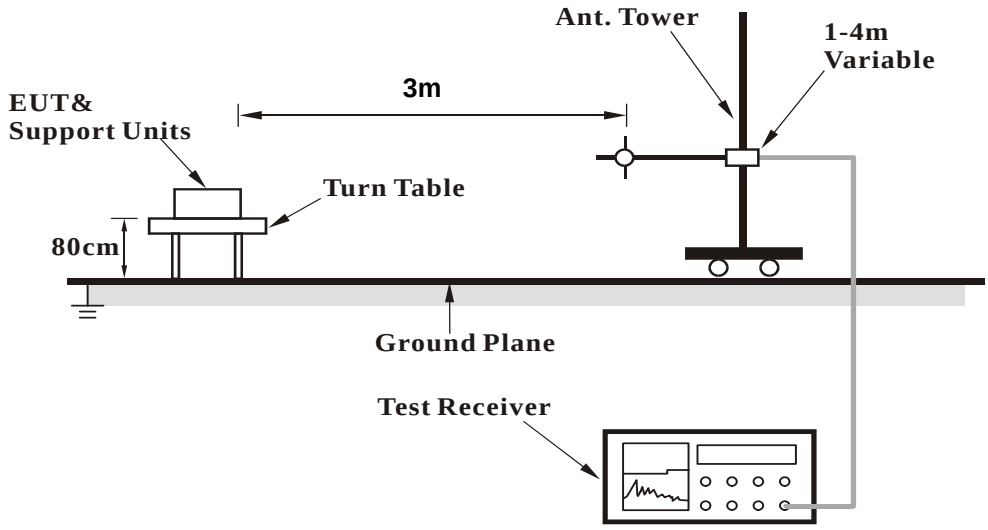
No deviation.

4.1.5 Test Setup

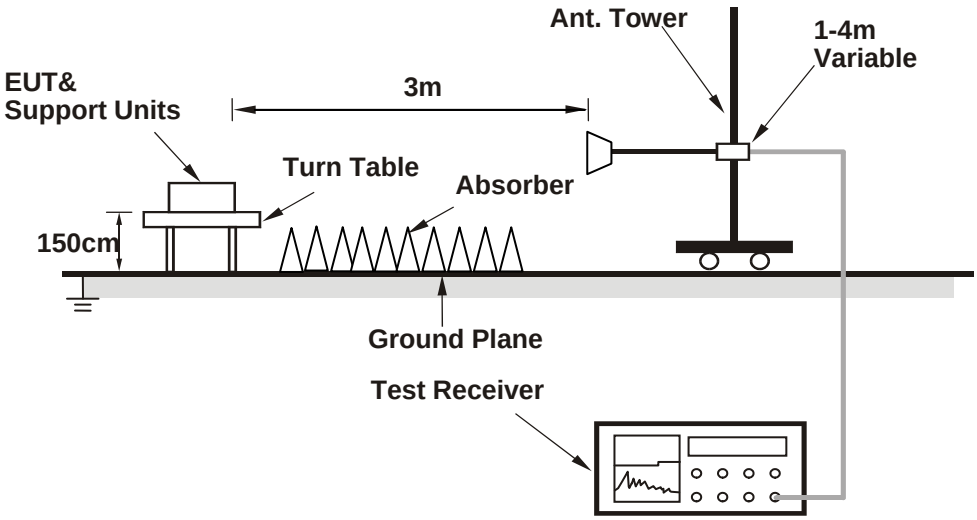
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1GHz Worst-Case 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	58.6 PK	74.0	-15.4	1.66 H	123	52.60	6.00
2	5150.00	45.9 AV	54.0	-8.1	1.66 H	123	39.90	6.00
3	*5260.00	106.1 PK			1.66 H	123	65.90	40.20
4	*5260.00	96.1 AV			1.66 H	123	55.90	40.20
5	#10520.00	59.9 PK	74.0	-14.1	1.47 H	54	41.60	18.30
6	#10520.00	47.1 AV	54.0	-6.9	1.47 H	54	28.80	18.30
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	57.5 PK	74.0	-16.5	1.34 V	152	51.50	6.00
2	5150.00	46.5 AV	54.0	-7.5	1.34 V	152	40.50	6.00
3	*5260.00	122.1 PK			1.34 V	152	81.90	40.20
4	*5260.00	111.5 AV			1.34 V	152	71.30	40.20
5	#10520.00	61.8 PK	74.0	-12.2	1.36 V	97	43.50	18.30
6	#10520.00	49.9 AV	54.0	-4.1	1.36 V	97	31.60	18.30

Remark:

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	102.8 PK			1.01 H	71	62.60	40.20
2	*5300.00	92.9 AV			1.01 H	71	52.70	40.20
3	10600.00	60.0 PK	74.0	-14.0	1.15 H	204	41.30	18.70
4	10600.00	48.6 AV	54.0	-5.4	1.15 H	204	29.90	18.70
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	121.1 PK			1.40 V	149	80.90	40.20
2	*5300.00	110.2 AV			1.40 V	149	70.00	40.20
3	10600.00	61.3 PK	74.0	-12.7	1.36 V	97	42.60	18.70
4	10600.00	49.7 AV	54.0	-4.3	1.36 V	97	31.00	18.70

Remark:

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.

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	102.8 PK			1.32 H	6	62.60	40.20
2	*5320.00	92.9 AV			1.32 H	6	52.70	40.20
3	5350.00	59.8 PK	74.0	-14.2	1.32 H	6	53.60	6.20
4	5350.00	47.4 AV	54.0	-6.6	1.32 H	6	41.20	6.20
5	10640.00	60.0 PK	74.0	-14.0	1.10 H	74	41.00	19.00
6	10640.00	47.7 AV	54.0	-6.3	1.10 H	74	28.70	19.00
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	119.5 PK			1.87 V	224	79.30	40.20
2	*5320.00	108.9 AV			1.87 V	224	68.70	40.20
3	5350.00	62.4 PK	74.0	-11.6	1.87 V	224	56.20	6.20
4	5350.00	49.4 AV	54.0	-4.6	1.87 V	224	43.20	6.20
5	10640.00	61.6 PK	74.0	-12.4	1.44 V	52	42.60	19.00
6	10640.00	49.6 AV	54.0	-4.4	1.44 V	52	30.60	19.00

Remark:

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.

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	61.0 PK	74.0	-13.0	2.51 H	236	54.70	6.30
2	5460.00	46.1 AV	54.0	-7.9	2.51 H	236	39.80	6.30
3	#5470.00	60.3 PK	74.0	-13.7	2.51 H	236	54.00	6.30
4	#5470.00	45.0 AV	54.0	-9.0	2.51 H	236	38.70	6.30
5	*5500.00	105.2 PK			2.51 H	236	64.80	40.40
6	*5500.00	95.0 AV			2.51 H	236	54.60	40.40
7	11000.00	60.1 PK	74.0	-13.9	1.36 H	98	40.60	19.50
8	11000.00	48.2 AV	54.0	-5.8	1.36 H	98	28.70	19.50
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	62.1 PK	74.0	-11.9	1.99 V	167	55.80	6.30
2	5460.00	48.2 AV	54.0	-5.8	1.99 V	167	41.90	6.30
3	#5470.00	57.9 PK	74.0	-16.1	1.99 V	167	51.60	6.30
4	#5470.00	47.1 AV	54.0	-6.9	1.99 V	167	40.80	6.30
5	*5500.00	120.6 PK			1.99 V	167	80.20	40.40
6	*5500.00	110.9 AV			1.99 V	167	70.50	40.40
7	11000.00	62.4 PK	74.0	-11.6	1.33 V	225	42.90	19.50
8	11000.00	50.2 AV	54.0	-3.8	1.33 V	225	30.70	19.50

Remark:

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	106.2 PK			2.52 H	238	65.70	40.50
2	*5580.00	95.6 AV			2.52 H	238	55.10	40.50
3	11160.00	61.5 PK	74.0	-12.5	1.15 H	64	41.50	20.00
4	11160.00	49.9 AV	54.0	-4.1	1.15 H	64	29.90	20.00
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	121.2 PK			1.96 V	168	80.70	40.50
2	*5580.00	110.9 AV			1.96 V	168	70.40	40.50
3	11160.00	62.9 PK	74.0	-11.1	1.33 V	228	42.90	20.00
4	11160.00	50.6 AV	54.0	-3.4	1.33 V	228	30.60	20.00

Remark:

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	104.0 PK			1.00 H	213	63.10	40.90
2	*5700.00	93.8 AV			1.00 H	213	52.90	40.90
3	#5725.00	59.6 PK	74.0	-14.4	1.36 H	87	52.90	6.70
4	#5725.00	46.6 AV	54.0	-7.4	1.36 H	87	39.90	6.70
5	11400.00	62.1 PK	74.0	-11.9	1.32 H	64	41.50	20.60
6	11400.00	50.5 AV	54.0	-3.5	1.32 H	64	29.90	20.60
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	119.8 PK			1.67 V	166	78.90	40.90
2	*5700.00	110.1 AV			1.67 V	166	69.20	40.90
3	#5725.00	64.3 PK	74.0	-9.7	1.67 V	166	57.60	6.70
4	#5725.00	48.6 AV	54.0	-5.4	1.67 V	166	41.90	6.70
5	11400.00	63.5 PK	74.0	-10.5	1.63 V	52	42.90	20.60
6	11400.00	51.8 AV	54.0	-2.2	1.63 V	52	31.20	20.60

Remark:

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 (VHT20)

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	58.9 PK	74.0	-15.1	1.00 H	164	52.90	6.00
2	5150.00	44.7 AV	54.0	-9.3	1.00 H	164	38.70	6.00
3	*5260.00	103.5 PK			1.00 H	164	63.30	40.20
4	*5260.00	93.7 AV			1.00 H	164	53.50	40.20
5	#10520.00	59.9 PK	74.0	-14.1	1.55 H	226	41.60	18.30
6	#10520.00	48.2 AV	54.0	-5.8	1.55 H	226	29.90	18.30
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	58.0 PK	74.0	-16.0	1.45 V	206	52.00	6.00
2	5150.00	46.6 AV	54.0	-7.4	1.45 V	206	40.60	6.00
3	*5260.00	121.8 PK			1.45 V	206	81.60	40.20
4	*5260.00	111.6 AV			1.45 V	206	71.40	40.20
5	#10520.00	60.9 PK	74.0	-13.1	1.32 V	64	42.60	18.30
6	#10520.00	48.4 AV	54.0	-5.6	1.32 V	64	30.10	18.30

Remark:

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	103.6 PK			1.02 H	70	63.40	40.20
2	*5300.00	92.7 AV			1.02 H	70	52.50	40.20
3	10600.00	59.9 PK	74.0	-14.1	1.30 H	88	41.20	18.70
4	10600.00	47.5 AV	54.0	-6.5	1.30 H	88	28.80	18.70
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	121.2 PK			1.48 V	210	81.00	40.20
2	*5300.00	110.8 AV			1.48 V	210	70.60	40.20
3	10600.00	61.3 PK	74.0	-12.7	1.26 V	97	42.60	18.70
4	10600.00	49.4 AV	54.0	-4.6	1.26 V	97	30.70	18.70

Remark:

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.

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	103.1 PK			1.00 H	166	62.90	40.20
2	*5320.00	92.5 AV			1.00 H	166	52.30	40.20
3	5350.00	61.8 PK	74.0	-12.2	1.00 H	166	55.60	6.20
4	5350.00	46.3 AV	54.0	-7.7	1.00 H	166	40.10	6.20
5	10640.00	60.5 PK	74.0	-13.5	1.05 H	64	41.50	19.00
6	10640.00	47.8 AV	54.0	-6.2	1.05 H	64	28.80	19.00
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	122.2 PK			1.40 V	205	82.00	40.20
2	*5320.00	110.8 AV			1.40 V	205	70.60	40.20
3	5350.00	60.0 PK	74.0	-14.0	1.40 V	205	53.80	6.20
4	5350.00	48.7 AV	54.0	-5.3	1.40 V	205	42.50	6.20
5	10640.00	61.6 PK	74.0	-12.4	1.32 V	64	42.60	19.00
6	10640.00	49.5 AV	54.0	-4.5	1.32 V	64	30.50	19.00

Remark:

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.

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	59.2 PK	74.0	-14.8	2.45 H	237	52.90	6.30
2	5460.00	45.0 AV	54.0	-9.0	2.45 H	237	38.70	6.30
3	#5470.00	59.6 PK	74.0	-14.4	2.45 H	237	53.30	6.30
4	#5470.00	46.2 AV	54.0	-7.8	2.45 H	237	39.90	6.30
5	*5500.00	104.6 PK			2.45 H	237	64.20	40.40
6	*5500.00	94.6 AV			2.45 H	237	54.20	40.40
7	11000.00	59.8 PK	74.0	-14.2	1.17 H	41	40.30	19.50
8	11000.00	48.2 AV	54.0	-5.8	1.17 H	41	28.70	19.50
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	61.3 PK	74.0	-12.7	1.75 V	15	55.00	6.30
2	5460.00	46.8 AV	54.0	-7.2	1.75 V	15	40.50	6.30
3	#5470.00	64.2 PK	74.0	-9.8	1.75 V	15	57.90	6.30
4	#5470.00	47.8 AV	54.0	-6.2	1.75 V	15	41.50	6.30
5	*5500.00	120.5 PK			1.75 V	15	80.10	40.40
6	*5500.00	109.7 AV			1.75 V	15	69.30	40.40
7	11000.00	62.1 PK	74.0	-11.9	1.05 V	47	42.60	19.50
8	11000.00	50.4 AV	54.0	-3.6	1.05 V	47	30.90	19.50

Remark:

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	104.6 PK			2.53 H	243	64.10	40.50
2	*5580.00	93.5 AV			2.53 H	243	53.00	40.50
3	11160.00	60.3 PK	74.0	-13.7	1.47 H	85	40.30	20.00
4	11160.00	48.7 AV	54.0	-5.3	1.47 H	85	28.70	20.00
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	119.0 PK			1.90 V	213	78.50	40.50
2	*5580.00	108.0 AV			1.90 V	213	67.50	40.50
3	11160.00	62.6 PK	74.0	-11.4	1.63 V	54	42.60	20.00
4	11160.00	50.7 AV	54.0	-3.3	1.63 V	54	30.70	20.00

Remark:

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	104.4 PK			1.00 H	217	63.50	40.90
2	*5700.00	93.6 AV			1.00 H	217	52.70	40.90
3	#5725.00	59.9 PK	74.0	-14.1	1.00 H	217	53.20	6.70
4	#5725.00	46.6 AV	54.0	-7.4	1.00 H	217	39.90	6.70
5	11400.00	61.2 PK	74.0	-12.8	1.32 H	64	40.60	20.60
6	11400.00	50.5 AV	54.0	-3.5	1.32 H	64	29.90	20.60
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	119.8 PK			1.63 V	215	78.90	40.90
2	*5700.00	108.9 AV			1.63 V	215	68.00	40.90
3	#5725.00	61.4 PK	74.0	-12.6	1.63 V	215	54.70	6.70
4	#5725.00	48.7 AV	54.0	-5.3	1.63 V	215	42.00	6.70
5	11400.00	63.2 PK	74.0	-10.8	1.33 V	225	42.60	20.60
6	11400.00	51.2 AV	54.0	-2.8	1.33 V	225	30.60	20.60

Remark:

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 (VHT40)

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	57.7 PK	74.0	-16.3	1.46 H	153	51.70	6.00
2	5150.00	44.7 AV	54.0	-9.3	1.46 H	153	38.70	6.00
3	*5270.00	103.1 PK			1.46 H	153	62.90	40.20
4	*5270.00	92.5 AV			1.46 H	153	52.30	40.20
5	#10540.00	59.6 PK	74.0	-14.4	1.16 H	77	41.20	18.40
6	#10540.00	47.4 AV	54.0	-6.6	1.16 H	77	29.00	18.40
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	57.7 PK	74.0	-16.3	1.45 V	210	51.70	6.00
2	5150.00	45.6 AV	54.0	-8.4	1.45 V	210	39.60	6.00
3	*5270.00	118.8 PK			1.45 V	210	78.60	40.20
4	*5270.00	109.5 AV			1.45 V	210	69.30	40.20
5	#10540.00	60.1 PK	74.0	-13.9	1.00 V	134	41.70	18.40
6	#10540.00	47.6 AV	54.0	-6.4	1.00 V	134	29.20	18.40

Remark:

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	101.3 PK			1.44 H	154	61.10	40.20
2	*5310.00	91.9 AV			1.44 H	154	51.70	40.20
3	5350.00	58.1 PK	74.0	-15.9	1.44 H	154	51.90	6.20
4	5350.00	45.6 AV	54.0	-8.4	1.44 H	154	39.40	6.20
5	10620.00	59.9 PK	74.0	-14.1	1.14 H	86	41.10	18.80
6	10620.00	46.8 AV	54.0	-7.2	1.14 H	86	28.00	18.80
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	117.9 PK			1.27 V	203	77.70	40.20
2	*5310.00	108.9 AV			1.27 V	203	68.70	40.20
3	5350.00	66.5 PK	74.0	-7.5	1.27 V	203	60.30	6.20
4	**5350.00**	**53.9 AV**	**54.0**	**-0.1**	**1.27 V**	**203**	**47.70**	**6.20**
5	10620.00	60.6 PK	74.0	-13.4	1.00 V	156	41.80	18.80
6	10620.00	48.1 AV	54.0	-5.9	1.00 V	156	29.30	18.80

Remark:

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.

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	58.3 PK	74.0	-15.7	2.09 H	300	52.00	6.30
2	5460.00	44.8 AV	54.0	-9.2	2.09 H	300	38.50	6.30
3	#5470.00	54.7 PK	74.0	-19.3	2.09 H	300	48.40	6.30
4	#5470.00	44.4 AV	54.0	-9.6	2.09 H	300	38.10	6.30
5	*5510.00	101.0 PK			2.09 H	300	60.60	40.40
6	*5510.00	91.5 AV			2.09 H	300	51.10	40.40
7	11020.00	61.1 PK	74.0	-12.9	1.36 H	59	41.60	19.50
8	11020.00	48.4 AV	54.0	-5.6	1.36 H	59	28.90	19.50
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	63.6 PK	74.0	-10.4	1.83 V	231	57.30	6.30
2	5460.00	51.2 AV	54.0	-2.8	1.83 V	231	44.90	6.30
3	#5470.00	59.7 PK	74.0	-14.3	1.83 V	231	53.40	6.30
4	#5470.00	47.7 AV	54.0	-6.3	1.83 V	231	41.40	6.30
5	*5510.00	118.3 PK			1.83 V	231	77.90	40.40
6	*5510.00	108.3 AV			1.83 V	231	67.90	40.40
7	11020.00	61.5 PK	74.0	-12.5	1.21 V	110	42.00	19.50
8	11020.00	48.6 AV	54.0	-5.4	1.21 V	110	29.10	19.50

Remark:

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	*5550.00	100.8 PK			1.97 H	303	60.30	40.50
2	*5550.00	90.9 AV			1.97 H	303	50.40	40.50
3	11100.00	61.2 PK	74.0	-12.8	1.35 H	74	41.20	20.00
4	11100.00	49.1 AV	54.0	-4.9	1.35 H	74	29.10	20.00
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	*5550.00	117.7 PK			1.89 V	229	77.20	40.50
2	*5550.00	107.6 AV			1.89 V	229	67.10	40.50
3	11100.00	62.3 PK	74.0	-11.7	1.20 V	115	42.30	20.00
4	11100.00	49.4 AV	54.0	-4.6	1.20 V	115	29.40	20.00

Remark:

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	99.6 PK			2.09 H	240	58.90	40.70
2	*5670.00	90.2 AV			2.09 H	240	49.50	40.70
3	#5725.00	58.1 PK	74.0	-15.9	2.09 H	240	51.40	6.70
4	#5725.00	45.2 AV	54.0	-8.8	2.09 H	240	38.50	6.70
5	11340.00	62.3 PK	74.0	-11.7	1.39 H	47	41.80	20.50
6	11340.00	49.7 AV	54.0	-4.3	1.39 H	47	29.20	20.50
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	117.4 PK			1.79 V	264	76.70	40.70
2	*5670.00	107.2 AV			1.79 V	264	66.50	40.70
3	#5725.00	60.0 PK	74.0	-14.0	1.79 V	264	53.30	6.70
4	#5725.00	47.3 AV	54.0	-6.7	1.79 V	264	40.60	6.70
5	11340.00	62.9 PK	74.0	-11.1	1.25 V	202	42.40	20.50
6	11340.00	50.3 AV	54.0	-3.7	1.25 V	202	29.80	20.50

Remark:

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.

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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	58.1 PK	74.0	-15.9	1.00 H	122	52.10	6.00
2	5150.00	44.7 AV	54.0	-9.3	1.00 H	122	38.70	6.00
3	*5290.00	93.3 PK			1.00 H	122	53.10	40.20
4	*5290.00	83.1 AV			1.00 H	122	42.90	40.20
5	5350.00	58.1 PK	74.0	-15.9	1.00 H	122	51.90	6.20
6	5350.00	45.2 AV	54.0	-8.8	1.00 H	122	39.00	6.20
7	#10580.00	59.6 PK	74.0	-14.4	1.20 H	89	41.00	18.60
8	#10580.00	47.5 AV	54.0	-6.5	1.20 H	89	28.90	18.60
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	58.2 PK	74.0	-15.8	1.42 V	203	52.20	6.00
2	5150.00	45.2 AV	54.0	-8.8	1.42 V	203	39.20	6.00
3	*5290.00	110.8 PK			1.42 V	203	70.60	40.20
4	*5290.00	100.6 AV			1.42 V	203	60.40	40.20
5	5350.00	70.4 PK	74.0	-3.6	1.42 V	203	64.20	6.20
6	5350.00	53.7 AV	54.0	-0.3	1.42 V	203	47.50	6.20
7	#10580.00	61.0 PK	74.0	-13.0	1.00 V	142	42.40	18.60
8	#10580.00	47.7 AV	54.0	-6.3	1.00 V	142	29.10	18.60

Remark:

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	55.8 PK	74.0	-18.2	1.97 H	318	49.50	6.30
2	5460.00	44.8 AV	54.0	-9.2	1.97 H	318	38.50	6.30
3	#5470.00	56.2 PK	74.0	-17.8	1.97 H	318	49.90	6.30
4	#5470.00	44.5 AV	54.0	-9.5	1.97 H	318	38.20	6.30
5	*5530.00	98.8 PK			1.97 H	318	58.40	40.40
6	*5530.00	89.0 AV			1.97 H	318	48.60	40.40
7	#5725.00	59.7 PK	74.0	-14.3	1.97 H	318	53.00	6.70
8	#5725.00	46.9 AV	54.0	-7.1	1.97 H	318	40.20	6.70
9	11060.00	60.3 PK	74.0	-13.7	1.36 H	60	40.50	19.80
10	11060.00	48.0 AV	54.0	-6.0	1.36 H	60	28.20	19.80
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	66.2 PK	74.0	-7.8	1.98 V	208	59.90	6.30
2	5460.00	50.8 AV	54.0	-3.2	1.98 V	208	44.50	6.30
3	#5470.00	68.8 PK	74.0	-5.2	1.95 V	208	62.50	6.30
4	#5470.00	53.8 AV	54.0	-0.2	1.95 V	208	47.50	6.30
5	*5530.00	113.3 PK			1.98 V	208	72.90	40.40
6	*5530.00	103.6 AV			1.98 V	208	63.20	40.40
7	#5725.00	58.6 PK	74.0	-15.4	1.98 V	208	51.90	6.70
8	#5725.00	48.2 AV	54.0	-5.8	1.98 V	208	41.50	6.70
9	11060.00	61.6 PK	74.0	-12.4	1.23 V	211	41.80	19.80
10	11060.00	49.3 AV	54.0	-4.7	1.23 V	211	29.50	19.80

Remark:

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	58.1 PK	74.0	-15.9	2.60 H	159	51.80	6.30
2	#5470.00	45.3 AV	54.0	-8.7	2.60 H	159	39.00	6.30
3	*5610.00	98.8 PK			2.60 H	159	58.30	40.50
4	*5610.00	88.8 AV			2.60 H	159	48.30	40.50
5	11220.00	61.4 PK	74.0	-12.6	1.55 H	224	41.30	20.10
6	11220.00	48.5 AV	54.0	-5.5	1.55 H	224	28.40	20.10
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	59.7 PK	74.0	-14.3	1.96 V	168	53.40	6.30
2	#5470.00	45.8 AV	54.0	-8.2	1.96 V	168	39.50	6.30
3	*5610.00	113.5 PK			1.96 V	168	73.00	40.50
4	*5610.00	104.1 AV			1.96 V	168	63.60	40.50
5	11220.00	63.7 PK	74.0	-10.3	1.08 V	97	43.60	20.10
6	11220.00	50.2 AV	54.0	-3.8	1.08 V	97	30.10	20.10

Remark:

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 100	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	99.75	34.2 QP	43.5	-9.3	1.50 H	51	52.80	-18.60
2	233.64	36.8 QP	46.0	-9.2	1.24 H	209	52.30	-15.50
3	390.81	40.8 QP	46.0	-5.2	1.00 H	90	51.40	-10.60
4	499.48	39.7 QP	46.0	-6.3	2.00 H	325	48.20	-8.50
5	625.60	38.2 QP	46.0	-7.8	1.24 H	247	43.80	-5.60
6	835.17	37.3 QP	46.0	-8.7	1.00 H	315	39.10	-1.80
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	53.18	34.3 QP	40.0	-5.7	1.50 V	353	48.20	-13.90
2	313.20	36.2 QP	46.0	-9.8	1.24 V	285	48.20	-12.00
3	392.75	38.7 QP	46.0	-7.3	1.24 V	172	49.20	-10.50
4	577.09	36.7 QP	46.0	-9.3	1.00 V	7	43.70	-7.00
5	815.76	37.8 QP	46.0	-8.2	1.24 V	11	39.70	-1.90
6	924.42	34.2 QP	46.0	-11.8	1.24 V	117	34.30	-0.10

Remark:

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.	Date Of Calibration	Due Date Of Calibration
Test Receiver ROHDE & SCHWARZ	ESCS30	100289	Dec. 23, 2015	Dec. 22, 2016
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Dec. 26, 2015	Dec. 25, 2016
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 11, 2016	Jan. 10, 2017
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Jul. 26, 2016	Jul. 25, 2017
Software ADT	BV ADT_Cond_ V7.3.7.3	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 2.
3. The VCCI Site Registration No. is C-2047.

4.2.3 Test Procedures

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

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

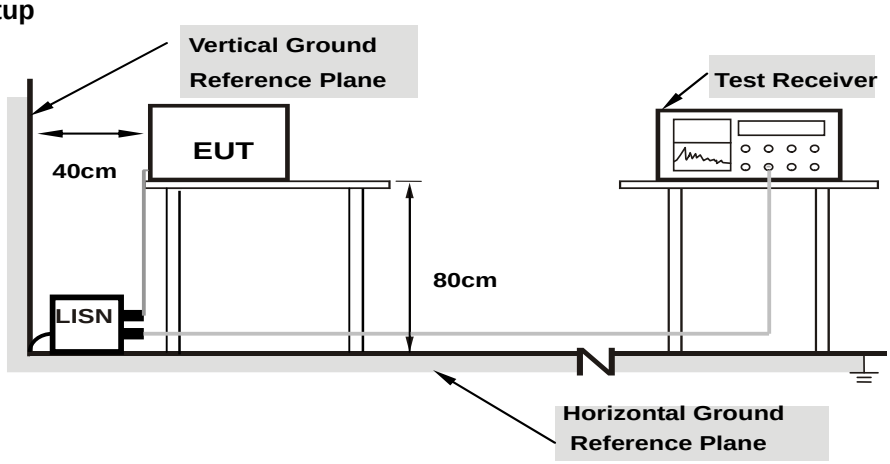
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

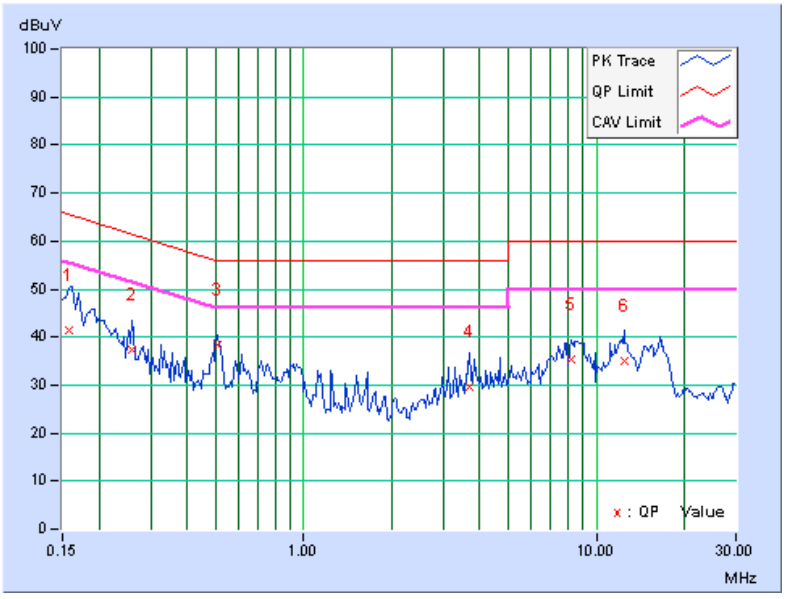
4.2.7 Test Results

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

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	0.15852	10.19	31.14	15.08	41.33	25.27	65.54	55.54	-24.21	-30.27
2	0.25957	10.22	27.24	15.63	37.46	25.85	61.45	51.45	-23.99	-25.60
3	**0.50996**	**10.25**	**28.21**	**22.84**	**38.46**	**33.09**	**56.00**	**46.00**	**-17.54**	**-12.91**
4	3.66526	10.40	19.39	11.98	29.79	22.38	56.00	46.00	-26.21	-23.62
5	8.20887	10.49	24.96	19.57	35.45	30.06	60.00	50.00	-24.55	-19.94
6	12.43795	10.55	24.33	19.11	34.88	29.66	60.00	50.00	-25.12	-20.34

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.

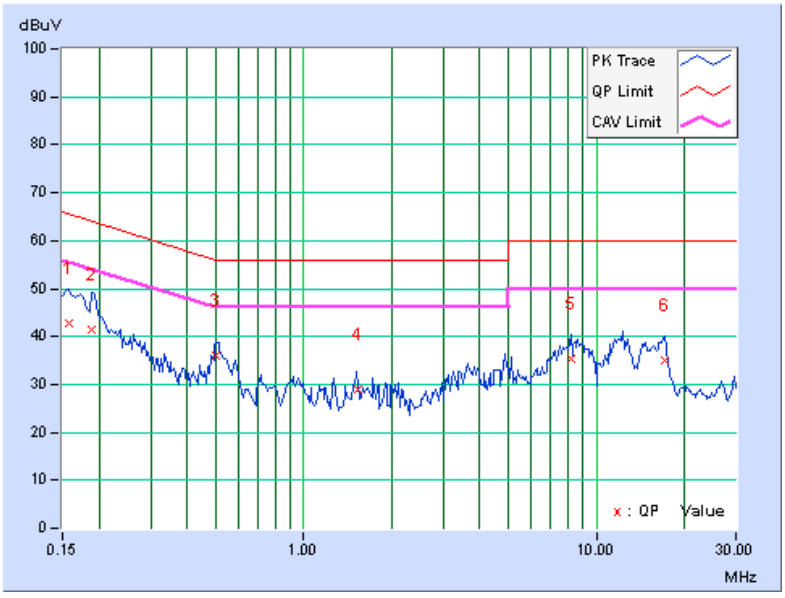


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.15852	10.19	32.42	15.08	42.61	25.27	65.54	55.54	-22.93	-30.27
2	0.18954	10.20	31.31	17.65	41.51	27.85	64.06	54.06	-22.55	-26.21
3	0.50250	10.30	25.64	19.15	35.94	29.45	56.00	46.00	-20.06	-16.55
4	1.52456	10.35	18.76	11.07	29.11	21.42	56.00	46.00	-26.89	-24.58
5	8.17630	10.59	24.63	17.33	35.22	27.92	60.00	50.00	-24.78	-22.08
6	17.10225	10.79	24.24	18.67	35.03	29.46	60.00	50.00	-24.97	-20.54

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

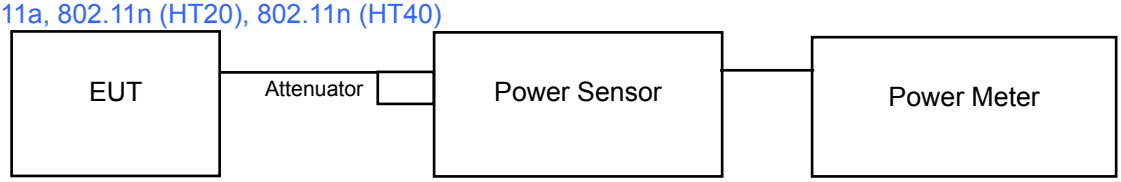
Operation Band	EUT Category		LIMIT
U-NII-1	---	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	---	Fixed point-to-point Access Point	1 Watt (30 dBm)
	√	Indoor Access Point	1 Watt (30 dBm)
	---	Mobile and Portable 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

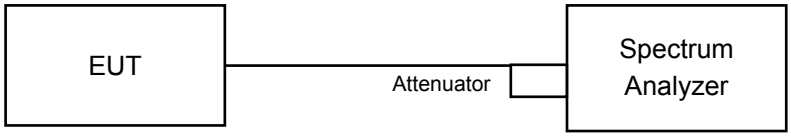
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less for 20-MHz 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

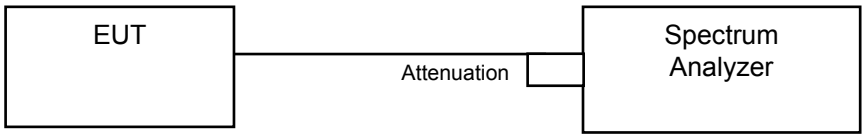
For Power Output Measurement
802.11a, 802.11n (HT20), 802.11n (HT40)



802.11ac (VHT80)



For 26dB and Occupied 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, 802.11ac (VHT20), 802.11ac (VHT40)

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)

1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
2) Set sweep trigger to “free run”.
3) Set RBW = 1 MHz.
4) Set VBW ≥ 3 MHz
5) Number of points in sweep ≥ 2 Span / RBW.
6) Sweep time ≤ (number of points in sweep) * T
7) Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
8) Detector = RMS.
9) Trace mode = max hold.
10) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

For 26dB Occupied Bandwidth

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

Power Output:

CDD Mode

802.11a

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
52	5260	16.72	17.48	17.11	17.07	205.302	23.12	23.89	Pass
60	5300	16.95	17.54	17.18	16.78	206.182	23.14	23.88	Pass
64	5320	16.70	17.42	17.28	17.05	206.137	23.14	23.94	Pass
100	5500	16.40	17.36	17.58	17.02	205.732	23.13	23.85	Pass
116	5580	16.71	16.87	17.64	17.12	205.121	23.12	23.89	Pass
140	5700	16.66	17.13	17.65	16.93	205.514	23.13	23.89	Pass

Note:

Chain 0

1. 11dBm + 10log(19.56) = 23.91 dBm < 24dBm.
2. 11dBm + 10log(19.43) = 23.88 dBm < 24dBm.
3. 11dBm + 10log(19.72) = 23.95 dBm < 24dBm.
4. 11dBm + 10log(19.54) = 23.91 dBm < 24dBm.
5. 11dBm + 10log(19.49) = 23.90 dBm < 24dBm.
6. 11dBm + 10log(19.46) = 23.89 dBm < 24dBm.

Chain 1

1. 11dBm + 10log(19.45) = 23.89 dBm < 24dBm.
2. 11dBm + 10log(19.47) = 23.89 dBm < 24dBm.
3. 11dBm + 10log(19.68) = 23.94 dBm < 24dBm.
4. 11dBm + 10log(19.79) = 23.96 dBm < 24dBm.
5. 11dBm + 10log(19.44) = 23.89 dBm < 24dBm.
6. 11dBm + 10log(19.98) = 24.01 dBm > 24dBm.

Chain 2

1. 11dBm + 10log(19.56) = 23.91 dBm < 24dBm.
2. 11dBm + 10log(19.30) = 23.86 dBm < 24dBm.
3. 11dBm + 10log(19.93) = 23.99 dBm < 24dBm.
4. 11dBm + 10log(19.29) = 23.85 dBm < 24dBm.
5. 11dBm + 10log(20.08) = 24.03 dBm > 24dBm.
6. 11dBm + 10log(19.74) = 23.95 dBm < 24dBm.

Chain 3

1. 11dBm + 10log(19.83) = 23.97 dBm < 24dBm.
2. 11dBm + 10log(19.43) = 23.88 dBm < 24dBm.
3. 11dBm + 10log(19.58) = 23.92 dBm < 24dBm.
4. 11dBm + 10log(19.66) = 23.94 dBm < 24dBm.
5. 11dBm + 10log(19.83) = 23.97 dBm < 24dBm.
6. 11dBm + 10log(19.87) = 23.98 dBm < 24dBm.

802.11ac (VHT20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
52	5260	16.63	17.67	17.24	16.79	205.224	23.12	24.00	Pass
60	5300	16.85	17.85	17.55	17.01	216.490	23.35	24.00	Pass
64	5320	16.62	17.77	17.77	16.87	214.243	23.31	24.00	Pass
100	5500	16.56	17.60	17.93	17.04	215.503	23.33	24.00	Pass
116	5580	17.01	17.03	17.78	17.35	215.004	23.32	24.00	Pass
140	5700	16.79	16.95	18.36	16.92	215.051	23.33	24.00	Pass

Note:

Chain 0

1. 11dBm + 10log(20.61) = 24.14 dBm > 24dBm.
2. 11dBm + 10log(20.63) = 24.14 dBm > 24dBm.
3. 11dBm + 10log(20.67) = 24.15 dBm > 24dBm.
4. 11dBm + 10log(20.52) = 24.12 dBm > 24dBm.
5. 11dBm + 10log(20.34) = 24.08 dBm > 24dBm.
6. 11dBm + 10log(20.74) = 24.17 dBm > 24dBm.

Chain 1

1. 11dBm + 10log(20.82) = 24.18 dBm > 24dBm.
2. 11dBm + 10log(20.44) = 24.10 dBm > 24dBm.
3. 11dBm + 10log(20.43) = 24.10 dBm > 24dBm.
4. 11dBm + 10log(20.61) = 24.14 dBm > 24dBm.
5. 11dBm + 10log(20.52) = 24.12 dBm > 24dBm.
6. 11dBm + 10log(20.64) = 24.15 dBm > 24dBm.

Chain 2

1. 11dBm + 10log(20.63) = 24.14 dBm > 24dBm.
2. 11dBm + 10log(20.72) = 24.16 dBm > 24dBm.
3. 11dBm + 10log(20.70) = 24.16 dBm > 24dBm.
4. 11dBm + 10log(20.55) = 24.13 dBm > 24dBm.
5. 11dBm + 10log(20.59) = 24.14 dBm > 24dBm.
6. 11dBm + 10log(20.68) = 24.16 dBm > 24dBm.

Chain 3

1. 11dBm + 10log(20.56) = 24.13 dBm > 24dBm.
2. 11dBm + 10log(20.58) = 24.13 dBm > 24dBm.
3. 11dBm + 10log(20.54) = 24.13 dBm > 24dBm.
4. 11dBm + 10log(20.57) = 24.13 dBm > 24dBm.
5. 11dBm + 10log(20.64) = 24.15 dBm > 24dBm.
6. 11dBm + 10log(20.81) = 24.18 dBm > 24dBm.

802.11ac (VHT40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
54	5270	16.97	18.93	17.79	17.34	**242.254**	23.84	24.00	Pass
62	5310	17.23	18.42	17.91	17.36	238.599	23.78	24.00	Pass
102	5510	17.48	18.20	18.46	17.58	**249.471**	23.97	24.00	Pass
110	5550	17.55	17.44	18.21	17.65	236.780	23.74	24.00	Pass
134	5670	17.03	16.91	18.93	17.38	232.422	23.66	24.00	Pass

Note:
Chain 0
1. 11dBm + 10log(41.04) = 27.13 dBm > 24dBm.
2. 11dBm + 10log(41.12) = 27.14 dBm > 24dBm.
3. 11dBm + 10log(41.02) = 27.13 dBm > 24dBm.
4. 11dBm + 10log(41.13) = 27.14 dBm > 24dBm.
5. 11dBm + 10log(41.16) = 27.14 dBm > 24dBm.

Chain 1
1. 11dBm + 10log(40.93) = 27.12 dBm > 24dBm.
2. 11dBm + 10log(41.17) = 27.15 dBm > 24dBm.
3. 11dBm + 10log(41.20) = 27.15 dBm > 24dBm.
4. 11dBm + 10log(41.03) = 27.13 dBm > 24dBm.
5. 11dBm + 10log(40.94) = 27.12 dBm > 24dBm.

Chain 2
1. 11dBm + 10log(40.73) = 27.10 dBm > 24dBm.
2. 11dBm + 10log(40.98) = 27.13 dBm > 24dBm.
3. 11dBm + 10log(41.42) = 27.17 dBm > 24dBm.
4. 11dBm + 10log(41.15) = 27.14 dBm > 24dBm.
5. 11dBm + 10log(41.09) = 27.14 dBm > 24dBm.

Chain 3
1. 11dBm + 10log(40.78) = 27.10 dBm > 24dBm.
2. 11dBm + 10log(40.87) = 27.11 dBm > 24dBm.
3. 11dBm + 10log(40.76) = 27.10 dBm > 24dBm.
4. 11dBm + 10log(41.14) = 27.14 dBm > 24dBm.
5. 11dBm + 10log(41.30) = 27.16 dBm > 24dBm.

802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
58	5290	13.89	15.87	13.98	13.77	111.954	20.49	24.00	Pass
106	5530	17.48	17.87	18.28	17.71	243.529	23.87	24.00	Pass
122	5610	17.44	17.85	18.16	17.83	242.555	23.85	24.00	Pass

Note:
Chain 0
1. 11dBm + 10log(80.79) = 30.07 dBm > 24dBm.
2. 11dBm + 10log(81.08) = 30.09 dBm > 24dBm.
3. 11dBm + 10log(81.05) = 30.09 dBm > 24dBm.

Chain 1
1. 11dBm + 10log(81.07) = 30.09 dBm > 24dBm.
2. 11dBm + 10log(81.09) = 30.09 dBm > 24dBm.
3. 11dBm + 10log(80.99) = 30.08 dBm > 24dBm.

Chain 2
1. 11dBm + 10log(80.94) = 30.08 dBm > 24dBm.
2. 11dBm + 10log(80.94) = 30.08 dBm > 24dBm.
3. 11dBm + 10log(81.12) = 30.09 dBm > 24dBm.

Chain 3
1. 11dBm + 10log(80.77) = 30.07 dBm > 24dBm.
2. 11dBm + 10log(81.10) = 30.09 dBm > 24dBm.
3. 11dBm + 10log(81.14) = 30.09 dBm > 24dBm.

Beamforming Mode

802.11ac (VHT20)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
52	5260	16.63	17.67	17.24	16.79	205.224	23.12	24.00	Pass
60	5300	16.85	17.85	17.55	17.01	216.490	23.35	24.00	Pass
64	5320	16.62	17.77	17.77	16.87	214.243	23.31	24.00	Pass
100	5500	16.56	17.60	17.93	17.04	215.503	23.33	24.00	Pass
116	5580	17.01	17.03	17.78	17.35	215.004	23.32	24.00	Pass
140	5700	16.79	16.95	18.36	16.92	215.051	23.33	24.00	Pass

Note:

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

Chain 0

1. 11dBm + 10log(20.61) = 24.14 dBm > 24dBm.
2. 11dBm + 10log(20.63) = 24.14 dBm > 24dBm.
3. 11dBm + 10log(20.67) = 24.15 dBm > 24dBm.
4. 11dBm + 10log(20.52) = 24.12 dBm > 24dBm.
5. 11dBm + 10log(20.34) = 24.08 dBm > 24dBm.
6. 11dBm + 10log(20.74) = 24.17 dBm > 24dBm.

Chain 1

1. 11dBm + 10log(20.82) = 24.18 dBm > 24dBm.
2. 11dBm + 10log(20.44) = 24.10 dBm > 24dBm.
3. 11dBm + 10log(20.43) = 24.10 dBm > 24dBm.
4. 11dBm + 10log(20.61) = 24.14 dBm > 24dBm.
5. 11dBm + 10log(20.52) = 24.12 dBm > 24dBm.
6. 11dBm + 10log(20.64) = 24.15 dBm > 24dBm.

Chain 2

1. 11dBm + 10log(20.63) = 24.14 dBm > 24dBm.
2. 11dBm + 10log(20.72) = 24.16 dBm > 24dBm.
3. 11dBm + 10log(20.70) = 24.16 dBm > 24dBm.
4. 11dBm + 10log(20.55) = 24.13 dBm > 24dBm.
5. 11dBm + 10log(20.59) = 24.14 dBm > 24dBm.
6. 11dBm + 10log(20.68) = 24.16 dBm > 24dBm.

Chain 3

1. 11dBm + 10log(20.56) = 24.13 dBm > 24dBm.
2. 11dBm + 10log(20.58) = 24.13 dBm > 24dBm.
3. 11dBm + 10log(20.54) = 24.13 dBm > 24dBm.
4. 11dBm + 10log(20.57) = 24.13 dBm > 24dBm.
5. 11dBm + 10log(20.64) = 24.15 dBm > 24dBm.
6. 11dBm + 10log(20.81) = 24.18 dBm > 24dBm.

*U-NII-2A:

5260MHz: Directional gain = 5.55dBi < 6dBi, so the power limit no need to reduced.

5300MHz: Directional gain = 5.37dBi < 6dBi, so the power limit no need to reduced.

5320MHz: Directional gain = 5.346dBi < 6dBi, so the power limit no need to reduced.

*U-NII-2C:

5500MHz: Directional gain = 5.318dBi < 6dBi, so the power limit no need to reduced.

5580MHz: Directional gain = 5.239dBi < 6dBi, so the power limit no need to reduced.

5700MHz: Directional gain = 5.772dBi < 6dBi, so the power limit no need to reduced.

802.11ac (VHT40)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
54	5270	16.97	18.93	17.79	17.34	**242.254**	23.84	24.00	Pass
62	5310	17.23	18.42	17.91	17.36	238.599	23.78	24.00	Pass
102	5510	17.48	18.20	18.46	17.58	**249.471**	23.97	24.00	Pass
110	5550	17.55	17.44	18.21	17.65	236.780	23.74	24.00	Pass
134	5670	17.03	16.91	18.93	17.38	232.422	23.66	24.00	Pass

Note:
For U-NII-2A, U-NII-2C Band:
Chain 0
1. 11dBm + 10log(41.04) = 27.13 dBm > 24dBm.
2. 11dBm + 10log(41.12) = 27.14 dBm > 24dBm.
3. 11dBm + 10log(41.02) = 27.13 dBm > 24dBm.
4. 11dBm + 10log(41.13) = 27.14 dBm > 24dBm.
5. 11dBm + 10log(41.16) = 27.14 dBm > 24dBm.
Chain 1
1. 11dBm + 10log(40.93) = 27.12 dBm > 24dBm.
2. 11dBm + 10log(41.17) = 27.15 dBm > 24dBm.
3. 11dBm + 10log(41.20) = 27.15 dBm > 24dBm.
4. 11dBm + 10log(41.03) = 27.13 dBm > 24dBm.
5. 11dBm + 10log(40.94) = 27.12 dBm > 24dBm.
Chain 2
1. 11dBm + 10log(40.73) = 27.10 dBm > 24dBm.
2. 11dBm + 10log(40.98) = 27.13 dBm > 24dBm.
3. 11dBm + 10log(41.42) = 27.17 dBm > 24dBm.
4. 11dBm + 10log(41.15) = 27.14 dBm > 24dBm.
5. 11dBm + 10log(41.09) = 27.14 dBm > 24dBm.
Chain 3
1. 11dBm + 10log(40.78) = 27.10 dBm > 24dBm.
2. 11dBm + 10log(40.87) = 27.11 dBm > 24dBm.
3. 11dBm + 10log(40.76) = 27.10 dBm > 24dBm.
4. 11dBm + 10log(41.14) = 27.14 dBm > 24dBm.
5. 11dBm + 10log(41.30) = 27.16 dBm > 24dBm.

*U-NII-2A:

5270MHz: Directional gain = 5.488dBi < 6dBi, so the power limit no need to reduced.

5310MHz: Directional gain = 5.352dBi < 6dBi, so the power limit no need to reduced.

*U-NII-2C:

5510MHz: Directional gain = 5.12dBi < 6dBi, so the power limit no need to reduced.

5550MHz: Directional gain = 5.627dBi < 6dBi, so the power limit no need to reduced.

5670MHz: Directional gain = 4.975dBi < 6dBi, so the power limit no need to reduced.

802.11ac (VHT80)

Channel	Frequency (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
58	5290	13.89	15.87	13.98	13.77	111.954	20.49	24.00	Pass
106	5530	17.48	17.87	18.28	17.71	243.529	23.87	24.00	Pass
122	5610	17.44	17.85	18.16	17.83	242.555	23.85	24.00	Pass

Note:
For U-NII-2A, U-NII-2C Band:
Chain 0
1. 11dBm + 10log(80.79) = 30.07 dBm > 24dBm.
2. 11dBm + 10log(81.08) = 30.09 dBm > 24dBm.
3. 11dBm + 10log(81.05) = 30.09 dBm > 24dBm.
Chain 1
1. 11dBm + 10log(81.07) = 30.09 dBm > 24dBm.
2. 11dBm + 10log(81.09) = 30.09 dBm > 24dBm.
3. 11dBm + 10log(80.99) = 30.08 dBm > 24dBm.
Chain 2
1. 11dBm + 10log(80.94) = 30.08 dBm > 24dBm.
2. 11dBm + 10log(80.94) = 30.08 dBm > 24dBm.
3. 11dBm + 10log(81.12) = 30.09 dBm > 24dBm.
Chain 3
1. 11dBm + 10log(80.77) = 30.07 dBm > 24dBm.
2. 11dBm + 10log(81.10) = 30.09 dBm > 24dBm.
3. 11dBm + 10log(81.14) = 30.09 dBm > 24dBm.

*U-NII-2A:

5290MHz: Directional gain = 5.414dBi < 6dBi, so the power limit no need to reduced.
*U-NII-2C:

5530MHz: Directional gain = 5.234dBi < 6dBi, so the power limit no need to reduced.

5610MHz: Directional gain = 5.239dBi < 6dBi, so the power limit no need to reduced.

26dB Bandwidth:

CDD Mode

802.11a

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
52	5260	19.56	19.45	19.56	19.83
60	5300	19.43	19.47	19.30	19.43
64	5320	19.72	19.68	19.93	19.58
100	5500	19.54	19.79	19.29	19.66
116	5580	19.49	19.44	20.08	19.83
140	5700	19.46	19.98	19.74	19.87

802.11ac (VHT20)

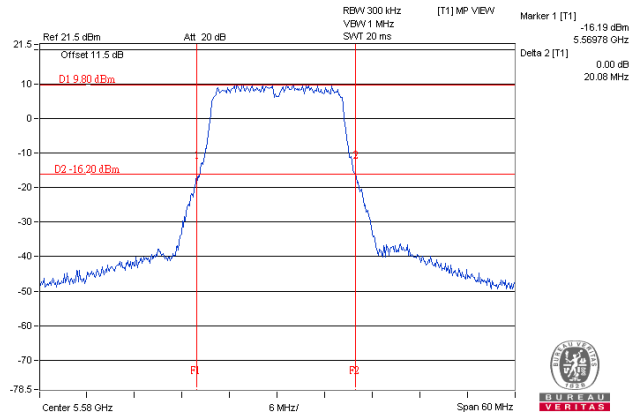
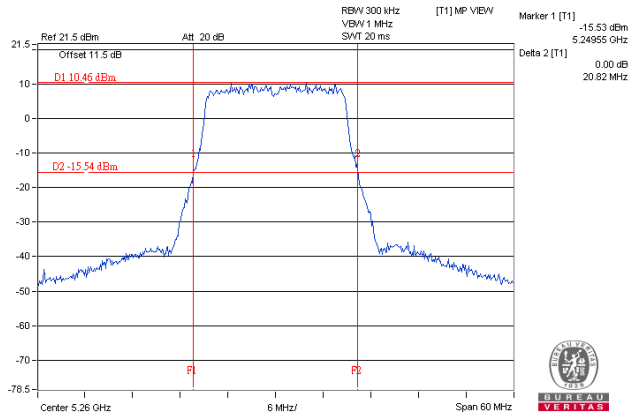
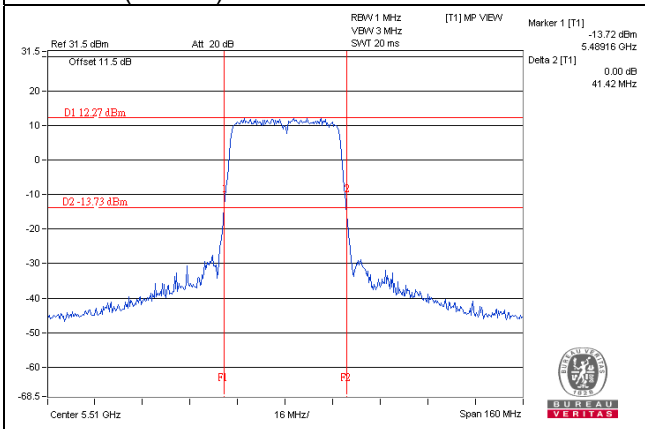
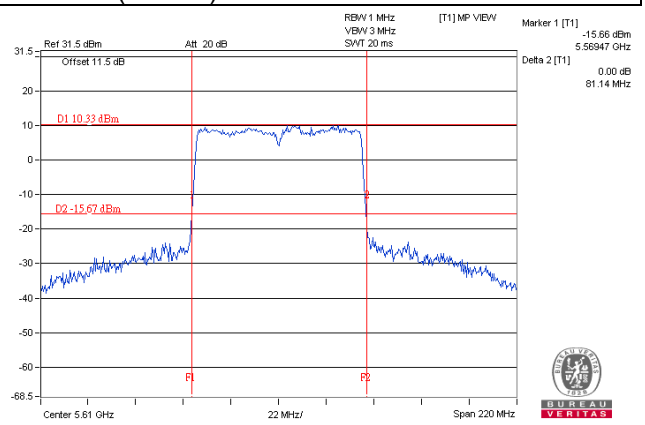
Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
52	5260	20.61	20.82	20.63	20.56
60	5300	20.63	20.44	20.72	20.58
64	5320	20.67	20.43	20.70	20.54
100	5500	20.52	20.61	20.55	20.57
116	5580	20.34	20.52	20.59	20.64
140	5700	20.74	20.64	20.68	20.81

802.11ac (VHT40)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
54	5270	41.04	40.93	40.73	40.78
62	5310	41.12	41.17	40.98	40.87
102	5510	41.02	41.20	41.42	40.76
110	5550	41.13	41.03	41.15	41.14
134	5670	41.16	40.94	41.09	41.30

802.11ac (VHT80)

Channel	Frequency (MHz)	26dBc Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
58	5290	80.79	81.07	80.94	80.77
106	5530	81.08	81.09	80.94	81.10
122	5610	81.05	80.99	81.12	81.14

Spectrum Plot of Worst Value	
802.11a	802.11ac (VHT20)
	
802.11ac (VHT40)	802.11ac (VHT80)
	

EUT MAXIMUM CONDUCTED POWER

CDD Mode

802.11a

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	206.182	23.14
5470~5725	205.732	23.13

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

802.11ac (VHT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	216.490	23.35
5470~5725	215.503	23.33

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

802.11ac (VHT40)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	242.254	23.84
5470~5725	250.775	23.99

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	111.954	20.49
5470~5725	243.529	23.87

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

Beamforming Mode

802.11ac (VHT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	216.490	23.35
5470~5725	215.503	23.33

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

802.11ac (VHT40)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	242.254	23.84
5470~5725	250.775	23.99

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

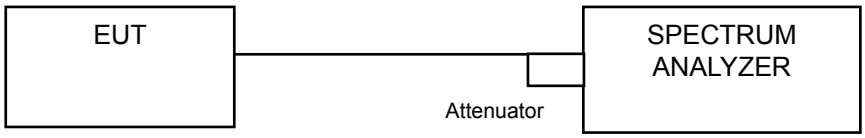
802.11ac (VHT80)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	111.954	20.49
5470~5725	243.529	23.87

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 SAMPLE. 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 Results

CDD Mode

802.11a

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
52	5260	16.44	16.56	16.44	16.44
60	5300	16.44	16.56	16.44	16.44
64	5320	16.44	16.56	16.44	16.44
100	5500	16.44	16.56	16.56	16.44
116	5580	16.56	16.44	16.56	16.56
140	5700	16.44	16.56	16.56	16.44

802.11ac (VHT20)

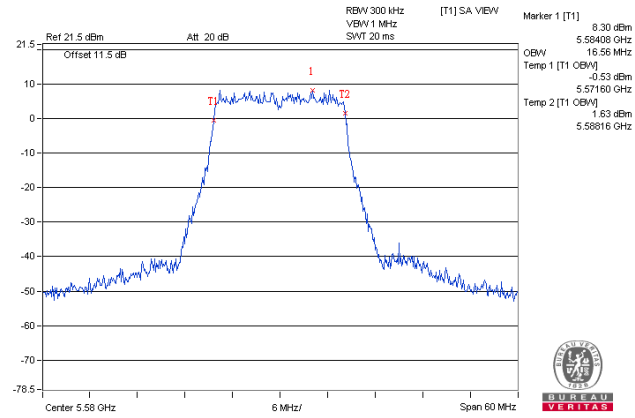
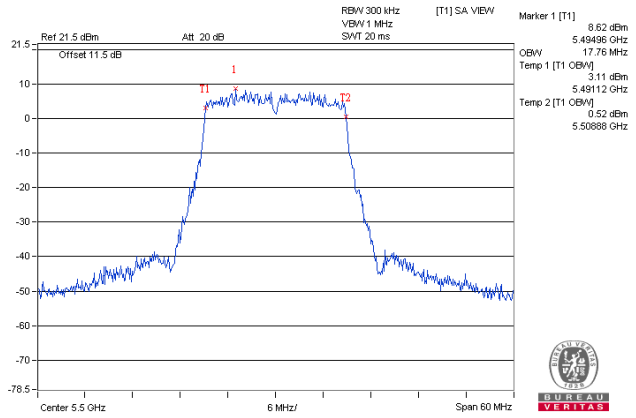
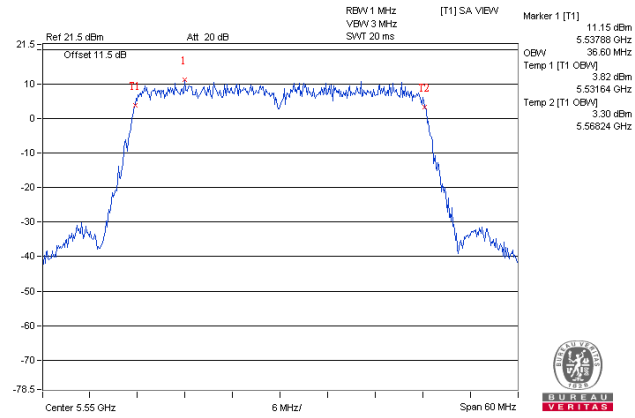
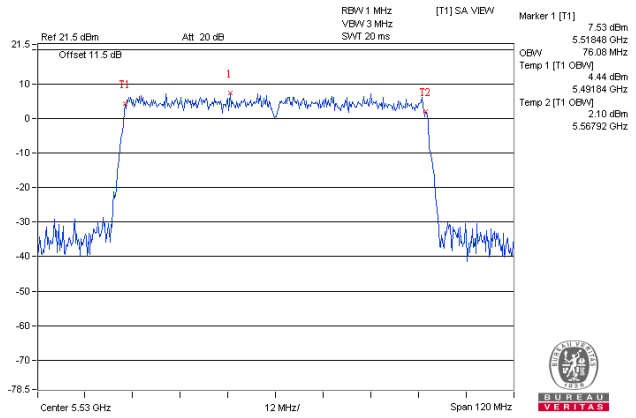
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
52	5260	17.64	17.64	17.64	17.64
60	5300	17.64	17.64	17.76	17.76
64	5320	17.64	17.76	17.64	17.64
100	5500	17.76	17.64	17.64	17.64
116	5580	17.64	17.76	17.76	17.76
140	5700	17.64	17.64	17.64	17.64

802.11ac (VHT40)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
54	5270	36.48	36.36	36.48	36.48
62	5310	36.48	36.36	36.48	36.48
102	5510	36.48	36.48	36.48	36.48
110	5550	36.60	36.48	36.60	36.48
134	5670	36.48	36.48	36.48	36.48

802.11ac (VHT80)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
58	5290	75.84	75.84	75.84	76.08
106	5530	76.08	76.08	76.08	75.84
122	5610	76.08	76.08	76.08	76.08

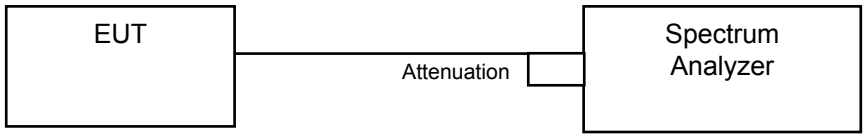
Spectrum Plot of Worst Value	
802.11a	802.11ac (VHT20)
	
802.11ac (VHT40)	802.11ac (VHT80)
	

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

Using method SA-1

Duty cycle >98%

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

Using method SA-2

Duty cycle <98%

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 and add 10 log (1/duty cycle)

For U-NII-3 band:

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

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

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

d. Scale the observed power level to an equivalent value in 500 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/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 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, U-NII-2A, U-NII-2C Band:
CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)				Duty Factor (dB)	Total PSD With Duty Factor (dBm)	Max. Limit (dBm)	Pass/ Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
52	5260	4.56	4.79	4.34	4.82	0.24	10.89	11.00	Pass
60	5300	4.31	4.46	4.51	4.50	0.24	10.71	11.00	Pass
64	5320	4.26	4.49	4.58	4.53	0.24	10.73	11.00	Pass
100	5500	4.15	4.28	4.24	4.11	0.24	10.46	11.00	Pass
116	5580	3.87	4.13	3.92	3.87	0.24	10.21	11.00	Pass
140	5700	4.22	4.23	4.20	4.24	0.24	10.48	11.00	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. U-NII-2A:
   5260MHz: Directional gain = 5.55dBi < 6dBi, so the power density limit no need to reduced.
   5300MHz: Directional gain = 5.37dBi < 6dBi, so the power density limit no need to reduced.
   5320MHz: Directional gain = 5.346dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C:
   5500MHz: Directional gain = 5.318dBi < 6dBi, so the power density limit no need to reduced.
   5580MHz: Directional gain = 5.239dBi < 6dBi, so the power density limit no need to reduced.
   5700MHz: Directional gain = 5.772dBi < 6dBi, so the power density limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total PSD (dBm)	Max. Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
52	5260	4.21	4.05	4.34	4.26	10.24	11.00	Pass
60	5300	3.87	3.92	4.02	3.93	9.96	11.00	Pass
64	5320	3.84	3.90	3.96	3.88	9.92	11.00	Pass
100	5500	3.60	3.69	3.71	3.62	9.68	11.00	Pass
116	5580	3.27	3.39	3.39	3.37	9.38	11.00	Pass
140	5700	3.69	3.73	3.80	3.80	9.78	11.00	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. U-NII-2A:
   5260MHz: Directional gain = 5.55dBi < 6dBi, so the power density limit no need to reduced.
   5300MHz: Directional gain = 5.37dBi < 6dBi, so the power density limit no need to reduced.
   5320MHz: Directional gain = 5.346dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C:
   5500MHz: Directional gain = 5.318dBi < 6dBi, so the power density limit no need to reduced.
   5580MHz: Directional gain = 5.239dBi < 6dBi, so the power density limit no need to reduced.
   5700MHz: Directional gain = 5.772dBi < 6dBi, so the power density limit no need to reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)				Duty Factor (dB)	Total PSD With Duty Factor (dBm)	Max. Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
54	5270	1.03	1.09	1.07	2.24	0.22	7.63	11.00	Pass
62	5310	0.61	0.82	0.93	1.76	0.22	7.30	11.00	Pass
102	5510	0.57	0.63	0.45	1.84	0.22	7.15	11.00	Pass
110	5550	0.19	0.23	0.21	1.37	0.22	6.77	11.00	Pass
134	5670	0.69	0.80	0.66	1.68	0.22	7.22	11.00	Pass

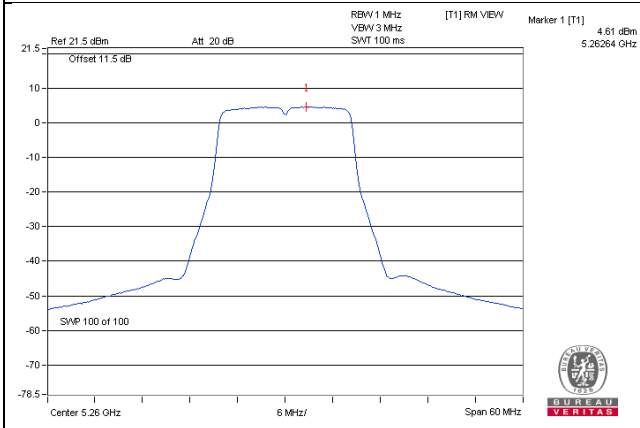
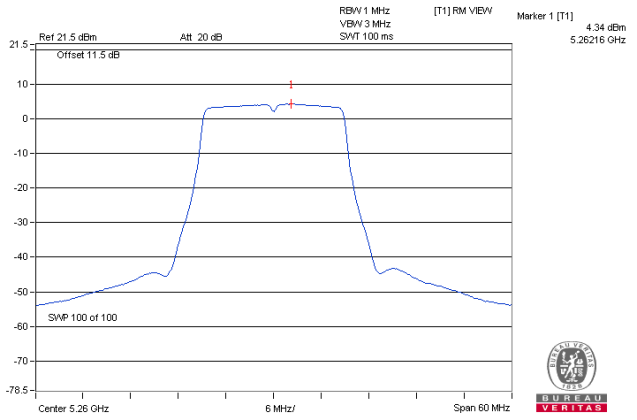
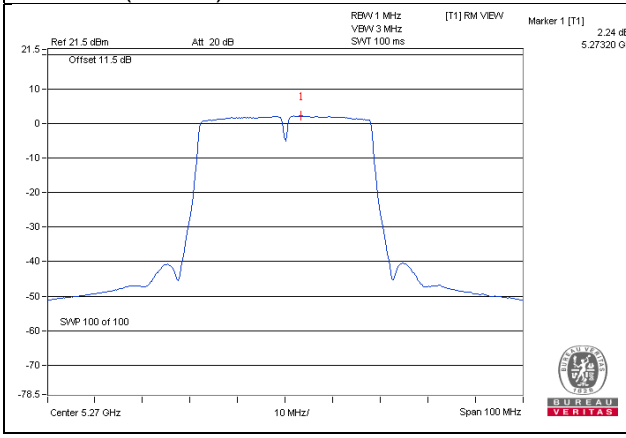
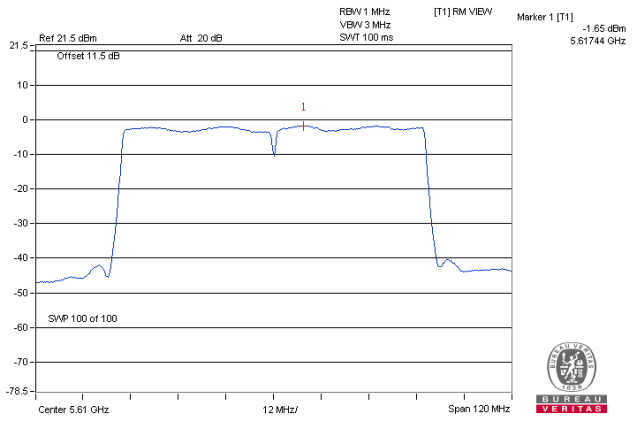
Note:
1. Method 1 of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. U-NII-2A:
   5270MHz: Directional gain = 5.488dBi < 6dBi, so the power density limit no need to reduced.
   5310MHz: Directional gain = 5.352dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C:
   5510MHz: Directional gain = 5.12dBi < 6dBi, so the power density limit no need to reduced.
   5550MHz: Directional gain = 5.627dBi < 6dBi, so the power density limit no need to reduced.
   5670MHz: Directional gain = 4.975dBi < 6dBi, so the power density limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)				Duty Factor (dB)	Total PSD With Duty Factor (dBm)	Max. Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
58	5290	-6.27	-6.12	-6.35	-6.24	0.66	0.43	11.00	Pass
106	5530	-2.66	-2.71	-2.77	-2.65	0.66	3.98	11.00	Pass
122	5610	-1.86	-1.83	-1.58	-1.65	0.66	4.95	11.00	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. U-NII-2A:
   5290MHz: Directional gain = 5.414dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C:
   5530MHz: Directional gain = 5.234dBi < 6dBi, so the power density limit no need to reduced.
   5610MHz: Directional gain = 5.239dBi < 6dBi, so the power density limit no need to reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

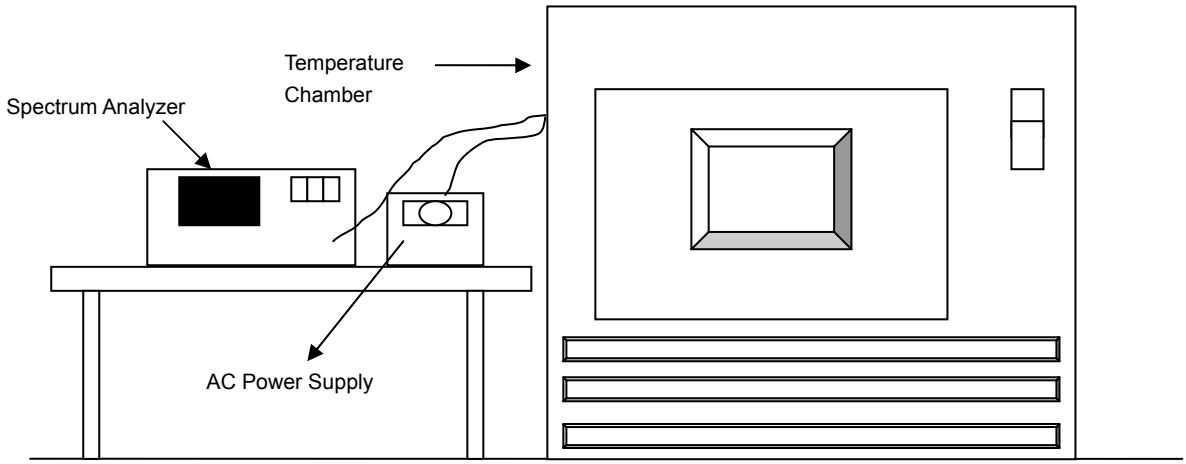
Spectrum Plot of Worst Value	
802.11a / Chain 3 / Ch 52	802.11ac (VHT20) / Chain 2 / Ch 52
	
802.11ac (VHT40) / Chain 3 / Ch 54	802.11ac (VHT80) / Chain 3 / Ch 122
	

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: 5260MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
50	120	5260.0160	0.00030	5260.0137	0.00026	5260.0163	0.00031	5260.0149	0.00028
40	120	5260.0013	0.00002	5260.0019	0.00004	5260.0018	0.00003	5260.0014	0.00003
30	120	5259.9875	-0.00024	5259.9870	-0.00025	5259.9889	-0.00021	5259.9881	-0.00023
20	120	5260.0092	0.00017	5260.0106	0.00020	5260.0115	0.00022	5260.0111	0.00021
10	120	5259.9873	-0.00024	5259.9872	-0.00024	5259.9858	-0.00027	5259.9879	-0.00023
0	120	5260.0211	0.00040	5260.0251	0.00048	5260.0224	0.00043	5260.0235	0.00045
-10	120	5259.9788	-0.00040	5259.9764	-0.00045	5259.9808	-0.00037	5259.9766	-0.00044
-20	120	5260.0241	0.00046	5260.0212	0.00040	5260.0228	0.00043	5260.0202	0.00038
-30	120	5259.9827	-0.00033	5259.9836	-0.00031	5259.9793	-0.00039	5259.9798	-0.00038

Frequency Stability Versus Voltage.									
Operating Frequency: 5260MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)	Measured Frequency (MHz)	Frequency Drift (%)
20	138	5260.0101	0.00019	5260.0098	0.00019	5260.0118	0.00022	5260.0106	0.00020
	120	5260.0092	0.00017	5260.0106	0.00020	5260.0115	0.00022	5260.0111	0.00021
	102	5260.0099	0.00019	5260.0114	0.00022	5260.0113	0.00021	5260.0121	0.00023

5 Pictures of Test Arrangements

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

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 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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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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