FCC Test Report

Report No.:	RF180330C21A
FCC ID:	YOR-MR2200AC
Test Model:	MR2200ac
Received Date:	Mar. 30, 2018
Test Date:	May 25 ~ Jun. 14, 2018
Issued Date:	Jun. 29, 2018
Applicant:	Synology Incorporated
Address:	3F-3, No. 106, Chang An W. Rd., Taipe Taiwan 103
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lab Address:	No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan (R.O.C.)
Test Location:	No. 19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, TAIWAN (R.O.C.)
FCC Registration / Designation Number:	788550 / TW0003

Testing Laboratory
2021

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Release Control Record

Issue No.	Description	Date Issued
RF180330C21A	Original release	Jun. 29, 2018

1 Certificate of Conformity

Product:	802.11ac Wireless Router
Brand:	Synology
Test Model:	MR2200ac
Sample Status:	Engineering sample
Applicant:	Synology Incorporated
Test Date:	May 25 ~ Jun. 14, 2018
Standards:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10:2013

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

Prepared by : Celine Chou , **Date:** Jun. 29, 2018

Celine Chou / Specialist

Approved by : Bruce Chen , **Date:** Jun. 29, 2018

Bruce Chen / Project Engineer

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -12.78dB at 0.15391MHz.
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 -0.7dB at 10520.00MHz and 11400.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(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	2.94 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	802.11ac Wireless Router
Brand	Synology
Test Model	MR2200ac
Sample Status	Engineering sample
Power Supply Rating	12Vdc (Adapter)
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: 54/48/36/24/18/12/9/6Mbps 802.11n: up to 300Mbps 802.11ac: up to 867Mbps
Operating Frequency	5260 ~ 5320MHz, 5500 ~ 5700MHz
Number of Channel	5260 ~ 5320MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 4 802.11n (HT40), 802.11ac (VHT40): 2 802.11ac (VHT80): 1 5500 ~ 5700MHz: 802.11a, 802.11n (HT20), 802.11ac (VHT20): 11 802.11n (HT40), 802.11ac (VHT40): 5 802.11ac (VHT80): 2
Output Power	CDD Mode: 5260 ~ 5320MHz: 227.458mW 5500 ~ 5700MHz: 236.600mW Beamforming Mode: 5260 ~ 5320MHz: 113.737mW 5500 ~ 5700MHz: 118.309mW
Antenna Type	Refer to note
Antenna Connector	Refer to note
Accessory Device	Adapter
Cable Supplied	1m non-shielded LAN cable without core

Note:

1. This report is prepared for FCC class II permissive change. The difference compared with the original report (BV CPS report no.: RF180330C21-1) is adding 5.26GHz to 5.32GHz and 5.50GHz to 5.70GHz by software.
2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	Beamforming Mode	TX Function
802.11a	Not Support	2TX
802.11n (HT20)	Support	2TX
802.11n (HT40)	Support	2TX
802.11ac (VHT20)	Support	2TX
802.11ac (VHT40)	Support	2TX
802.11ac (VHT80)	Support	2TX

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

3. The following chips are used for the EUT.

Chip	Antenna	Function	Band
IPQ4019	Ant. 1, Ant. 2	WLAN 2.4G	2.4G
	Ant. 3, Ant. 4	WLAN 5G	U-NII-1/ U-NII-2A
QCA9886	Ant. 5, Ant. 6	WLAN 5G	UNII-2C/UNII-3

4. The EUT consumes power from the following adapter.

Adapter	
Brand	Asian Power Devices Inc.
Model	WB-24J12FU
Input	100-240Vac, 50-60Hz, 0.7A Max.
Output	12Vdc, 2A
Power Line	1.5m cable without core attached on adapter

5. The following antennas were provided to the EUT.

No.	Brand	Model	Type	Connector	Gain (dBi)								
					2400			2450			2500		
1	lynwave	ALX17P-051XXE-01	PIFA	I-PEX	3.70			3.49			3.61		
2	lynwave	ALX17P-051XXE-00	PIFA	I-PEX	3.15			3.78			3.53		
No.	Brand	Model	Type	Connector	Gain (dBi)								
					5150	5250	5350	5450	5550	5650	5725	5775	5825
3	lynwave	ALX17M-091XX2-00	Embedded	I-PEX	2.22	1.75	2.15	-	-	-	-	-	-
4	lynwave	ALX17M-091XX2-01	Embedded	I-PEX	2.73	1.97	2.60	-	-	-	-	-	-
5	lynwave	ALX17P-091XXB-01	PIFA	I-PEX	-	-	-	3.08	3.87	3.49	3.75	3.44	3.27
6	lynwave	ALX17P-091XXB-00	PIFA	I-PEX	-	-	-	2.90	3.72	3.68	3.32	3.50	3.51

3.2 Description of Test Modes

For 5260 ~ 5320MHz:

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

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

2 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
54	5270 MHz	62	5310 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
58	5290MHz

For 5500 ~ 5700MHz:

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

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

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

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

2 channels are provided for 802.11ac (VHT80):

Channel	Frequency	Channel	Frequency
106	5530 MHz	122	5610 MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable to				Description
	RE≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	-

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

Radiated Emission Test (Above 1GHz):

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

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11n (HT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
-	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11n (HT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11n (HT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	29.3

Radiated Emission Test (Below 1GHz):

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

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

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

Power Line Conducted Emission Test:

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

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

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

Peak Power Spectral Density, Bandwidth and Frequency Stability Measurement:

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11n (HT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
-	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11n (HT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11n (HT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	29.3

Transmit Power Measurement:

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

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
CDD Mode						
-	802.11a	5260-5320	52 to 64	52, 60, 64	OFDM	6.0
	802.11n (HT20)		52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
-	802.11a	5500-5700	100 to 140	100, 116, 140	OFDM	6.0
	802.11n (HT20)		100 to 140	100, 116, 140	OFDM	6.5
	802.11n (HT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	29.3
Beamforming Mode						
-	802.11n (HT20)	5260-5320	52 to 64	52, 60, 64	OFDM	6.5
	802.11n (HT40)		54 to 62	54, 62	OFDM	13.5
	802.11ac (VHT80)		58	58	OFDM	29.3
-	802.11n (HT20)	5500-5700	100 to 140	100, 116, 140	OFDM	6.5
	802.11n (HT40)		102 to 134	102, 110, 134	OFDM	13.5
	802.11ac (VHT80)		106 to 122	106, 122	OFDM	29.3

Test Condition:

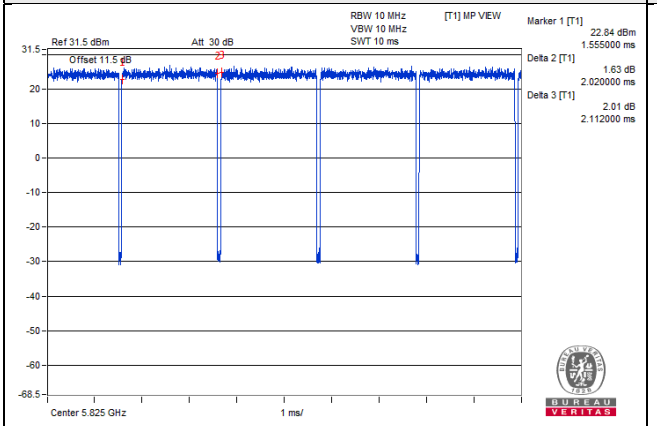
Applicable to	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 66% RH	120Vac, 60Hz	Greg Lin
RE<1G	25 deg. C, 70% RH	120Vac, 60Hz	Adair Peng
PLC	25 deg. C, 75% RH	120Vac, 60Hz	Adair Peng
APCM	25 deg. C, 60% RH	120Vac, 60Hz	Ted Chang

3.3 Duty Cycle of Test Signal

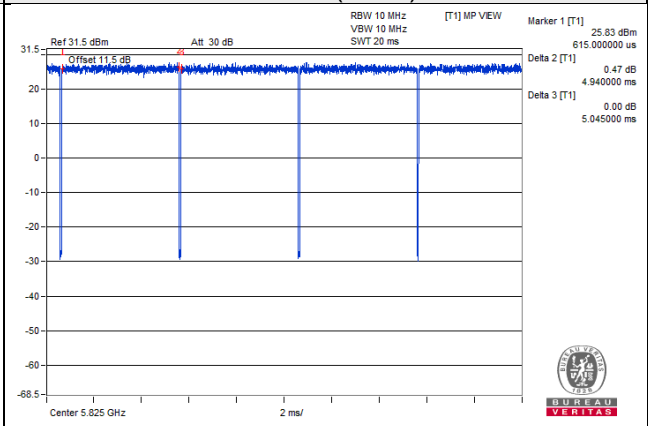
Duty cycle of test signal is < 98%, duty factor is required.

802.11a: Duty cycle = 2.020/2.112 = 0.956, Duty factor = 10 * log (1/0.956) = 0.19
802.11n (HT20): Duty cycle = 4.940/5.045 = 0.979, Duty factor = 10 * log (1/0.979) = 0.09
802.11n (HT40): Duty cycle = 2.395/2.485 = 0.964, Duty factor = 10 * log (1/0.964) = 0.16
802.11ac (VHT80): Duty cycle = 1.132/1.200 = 0.943, Duty factor = 10 * log (1/0.943) = 0.25

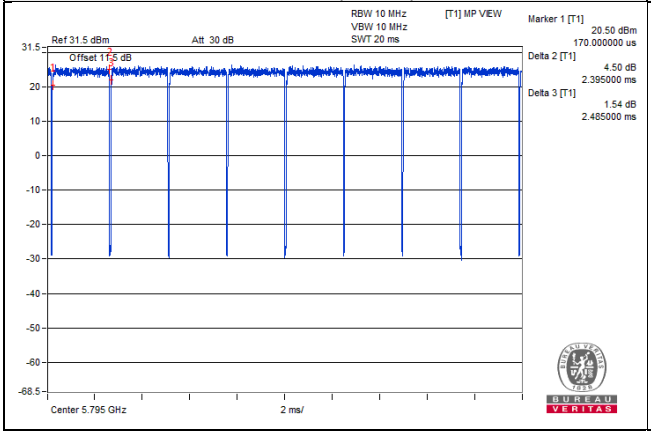
802.11a



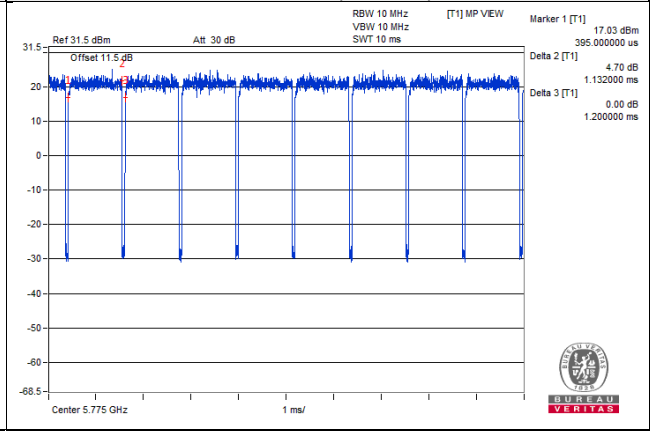
802.11n (HT20)



802.11n (HT40)



802.11ac (VHT80)



3.4 Description of Support Units

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

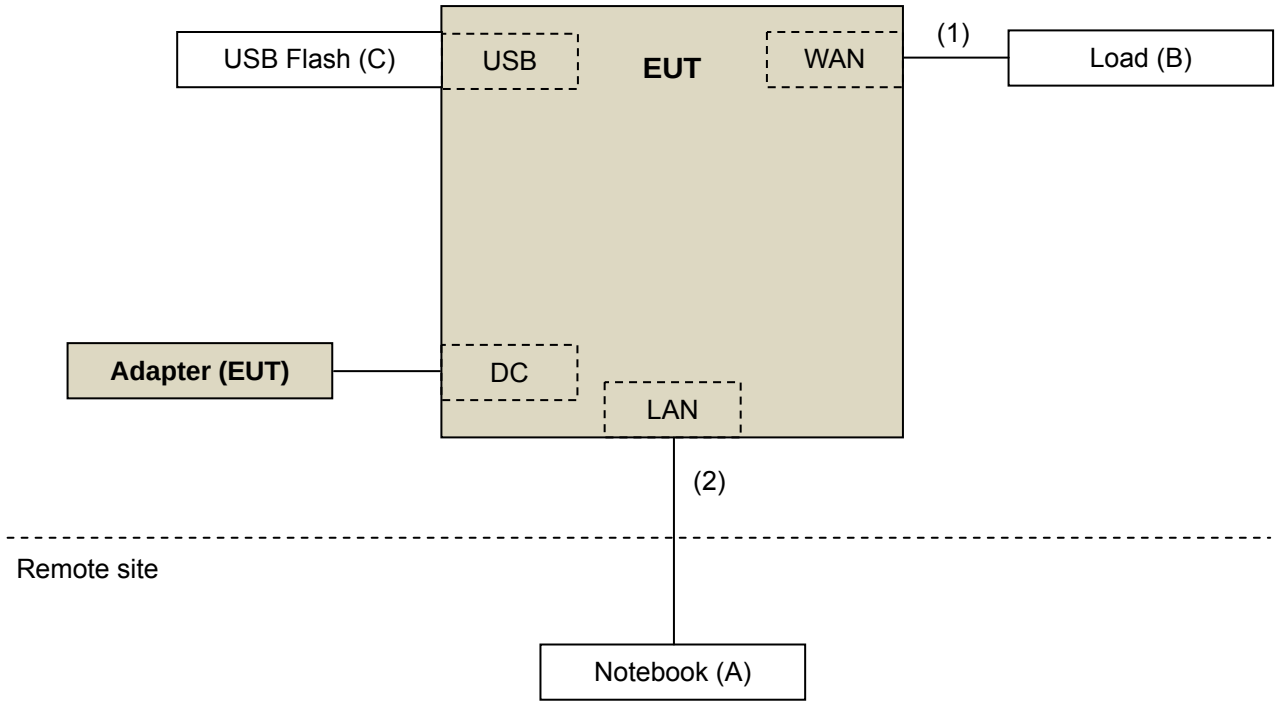
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Notebook	DELL	E5410	1HC2XM1	FCC DoC Approved	-
B.	Load	NA	NA	NA	NA	-
C.	USB Flash	HP	v250W	01	FCC DoC Approved	-

Note:

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

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45, Cat5e	1	1.5	N	0	-
2.	RJ45, Cat5e	1	6	N	0	-

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 v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01
ANSI C63.10:2013

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

Radiated emissions which fall in the restricted bands must comply with the radiated emission limits specified as below table.

Frequencies (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

Note:

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000MHz, the field strength limits are based on average detector, however, the peak field strength of any emission shall not exceed the maximum permitted average limits, specified above by more than 20dB under any condition of modulation.

Limits of unwanted emission out of the restricted bands

<table>
<tr><td colspan="3">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="3" rowspan="2">789033 D02 General UNII Test Procedure New Rules v02r01</td><td colspan="2">Field Strength at 3m</td></tr>
<tr><td>PK: 74 (dBμV/m)</td><td>AV: 54 (dBμV/m)</td></tr>
<tr><td>Frequency Band</td><td colspan="2">Applicable To</td><td>EIRP Limit</td><td>Equivalent Field Strength at 3m</td></tr>
<tr><td>5150~5250 MHz</td><td colspan="2">15.407(b)(1)</td><td rowspan="3">PK: -27 (dBm/MHz)</td><td rowspan="3">PK: 68.2(dBμV/m)</td></tr>
<tr><td>5250~5350 MHz</td><td colspan="2">15.407(b)(2)</td></tr>
<tr><td>5470~5725 MHz</td><td colspan="2">15.407(b)(3)</td></tr>
<tr><td rowspan="2">5725~5850 MHz</td><td>☐</td><td>15.407(b)(4)(i)</td><td>PK: -27 (dBm/MHz) *1
PK: 10 (dBm/MHz) *2
PK: 15.6 (dBm/MHz) *3
PK: 27 (dBm/MHz) *4</td><td>PK: 68.2(dBμV/m) *1
PK: 105.2 (dBμV/m) *2
PK: 110.8(dBμV/m) *3
PK: 122.2 (dBμV/m) *4</td></tr>
<tr><td>☐</td><td>15.407(b)(4)(ii)</td><td colspan="2">Emission limits in section 15.247(d)</td></tr>
<tr><td colspan="5">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

Note: The following formula is used to convert the equipment isotropic radiated power (eirp) to field strength:

$$E = \frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts).

4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver KEYSIGHT	N9038A	MY55420137	Apr. 11, 2018	Apr. 10, 2019
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Aug. 18, 2017	Aug. 17, 2018
BILOG Antenna SCHWARZBECK	VULB9168	9168-148	Dec. 11, 2017	Dec. 10, 2018
HORN Antenna SCHWARZBECK	BBHA 9120 D	9120D-1169	Dec. 12, 2017	Dec. 11, 2018
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Dec. 01, 2017	Nov. 30, 2018
Loop Antenna EMCI	EM-6879	269	Aug. 11, 2017	Aug. 10, 2018
Preamplifier Agilent (Below 1GHz)	8447D	2944A10638	Aug. 08, 2017	Aug. 07, 2018
Preamplifier Agilent (Above 1GHz)	8449B	3008A01638	Feb. 22, 2018	Feb. 21, 2019
RF signal cable HUBER+SUHNER&EMCI	SUCOFLEX 104 & EMC104-SM-SM8000	CABLE-CH9-02 (248780+171006)	Jan. 15, 2018	Jan. 14, 2019
RF signal cable HUBER+SUHNER	SUCOFLEX 104	CABLE-CH9-(250795/4)	Aug. 08, 2017	Aug. 07, 2018
RF signal cable Woken	8D-FB	Cable-CH9-01	Aug. 01, 2017	Jul. 31, 2018
Software BV ADT	ADT_Radiated_ V7.6.15.9.5	NA	NA	NA
Antenna Tower EMCO	2070/2080	512.835.4684	NA	NA
Turn Table EMCO	2087-2.03	NA	NA	NA
Antenna Tower &Turn BV ADT	AT100	AT93021705	NA	NA
Turn Table BV ADT	TT100	TT93021705	NA	NA
Turn Table Controller BV ADT	SC100	SC93021705	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
26GHz ~ 40GHz Amplifier Agilent	8449B	3008A1960	Aug. 08, 2017	Aug. 07, 2018
High Speed Peak Power Meter	ML2495A	0824012	Aug. 18, 2017	Aug. 17, 2018
Power Sensor	MA2411B	0738171	Aug. 18, 2017	Aug. 17, 2018
Temperature & Humidity Chamber TERCHY	HRM-120RF	931022	Nov. 20, 2017	Nov. 19, 2018

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Chamber 9.
3. The FCC Designation Number is TW0003. The number will be varied with the Lab location and scope as attached.
4. The IC Site Registration No. is IC 7450F-9.

4.1.3 Test Procedures

For Radiated emission below 30MHz

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

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

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

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

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

Note:

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

For Radiated emission above 30MHz

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

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

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

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

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

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

Note:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98%) or 10Hz (Duty cycle ≥ 98%) for Average detection (AV) at frequency above 1GHz.

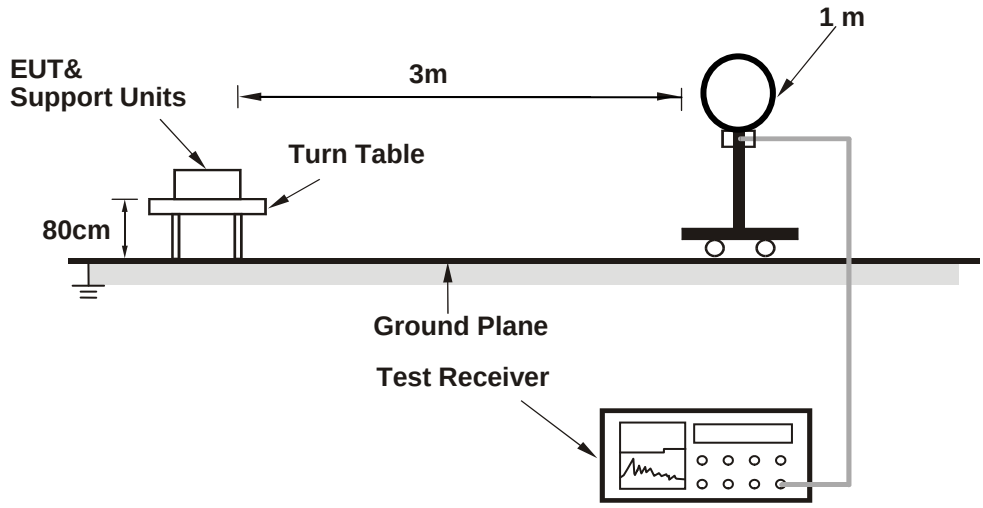
4. All modes of operation were investigated and the worst-case emissions are reported.

4.1.4 Deviation from Test Standard

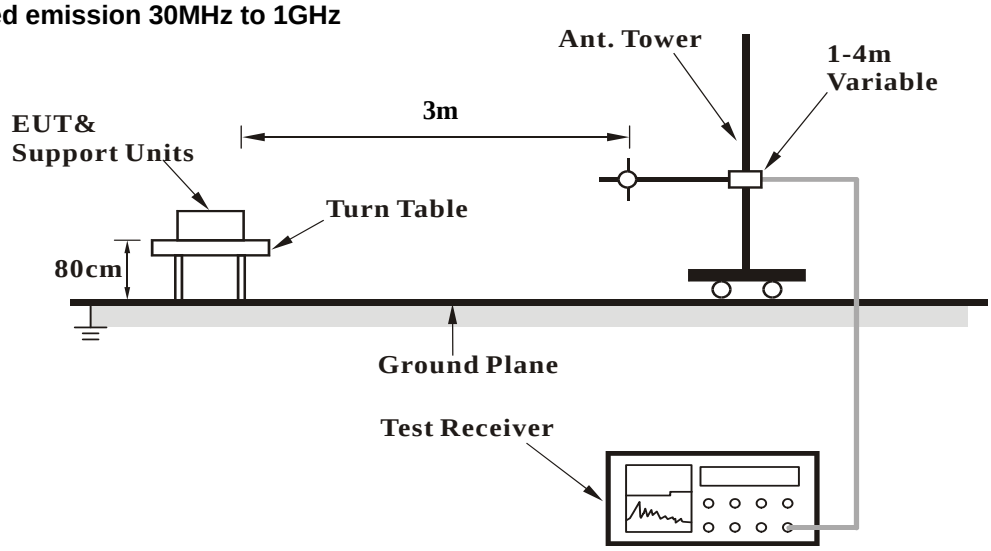
No deviation.

4.1.5 Test Setup

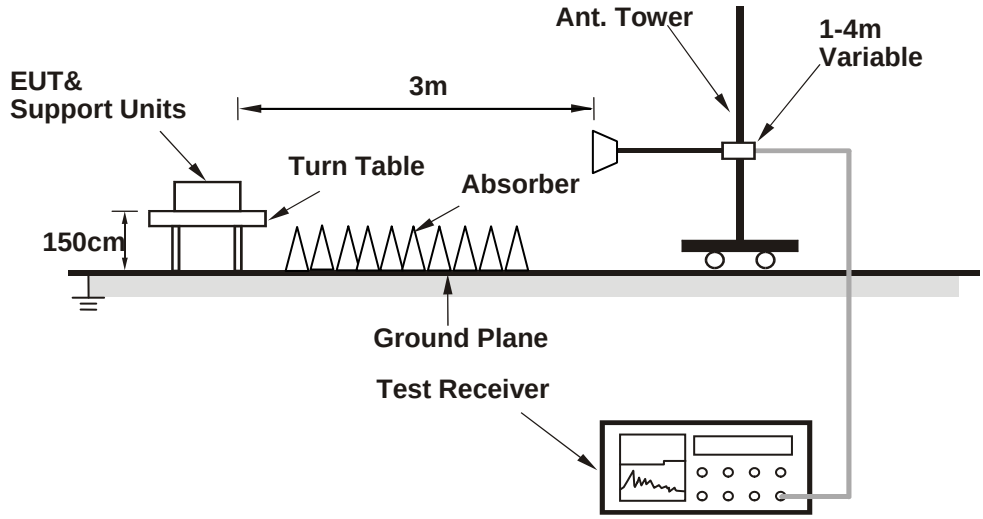
For Radiated emission below 30MHz



For Radiated emission 30MHz to 1GHz



For Radiated emission above 1GHz



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

4.1.6 EUT Operating Conditions

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

4.1.7 Test Results

Above 1GHz data:

802.11a

CHANNEL	TX Channel 52	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.7 PK	74.0	-20.3	1.51 H	342	51.8	1.9
2	5150.00	40.5 AV	54.0	-13.5	1.51 H	342	38.6	1.9
3	*5260.00	115.5 PK			1.57 H	355	77.1	38.4
4	*5260.00	105.2 AV			1.57 H	355	66.8	38.4
5	#10520.00	67.0 PK	74.0	-7.0	1.02 H	139	51.8	15.2
6	#10520.00	52.1 AV	54.0	-1.9	1.02 H	139	36.9	15.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	54.1 PK	74.0	-19.9	1.96 V	254	52.2	1.9
2	5150.00	40.6 AV	54.0	-13.4	1.96 V	254	38.7	1.9
3	*5260.00	116.2 PK			1.89 V	270	77.8	38.4
4	*5260.00	106.0 AV			1.89 V	270	67.6	38.4
5	#10520.00	67.6 PK	74.0	-6.4	1.23 V	200	52.4	15.2
6	**#10520.00**	**53.3 AV**	**54.0**	**-0.7**	**1.23 V**	**200**	**38.1**	**15.2**

Remarks:

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

CHANNEL	TX Channel 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	114.3 PK			1.63 H	348	75.8	38.5
2	*5300.00	104.1 AV			1.63 H	348	65.6	38.5
3	10600.00	66.9 PK	74.0	-7.1	1.02 H	148	51.8	15.1
4	10600.00	52.2 AV	54.0	-1.8	1.02 H	148	37.1	15.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	115.1 PK			1.78 V	278	76.6	38.5
2	*5300.00	104.9 AV			1.78 V	278	66.4	38.5
3	10600.00	67.3 PK	74.0	-6.7	1.08 V	202	52.2	15.1
4	10600.00	53.1 AV	54.0	-0.9	1.08 V	202	38.0	15.1

Remarks:

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

CHANNEL	TX Channel 64	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5320.00	114.5 PK			1.60 H	351	75.9	38.6
2	*5320.00	104.4 AV			1.60 H	351	65.8	38.6
3	5350.00	61.4 PK	74.0	-12.6	1.76 H	338	59.6	1.8
4	5350.00	45.2 AV	54.0	-8.8	1.76 H	338	43.4	1.8
5	10640.00	65.3 PK	74.0	-8.7	1.00 H	144	50.1	15.2
6	10640.00	50.5 AV	54.0	-3.5	1.00 H	144	35.3	15.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5320.00	115.1 PK			1.69 V	273	76.5	38.6
2	*5320.00	105.0 AV			1.69 V	273	66.4	38.6
3	5350.00	62.3 PK	74.0	-11.7	1.76 V	274	60.5	1.8
4	5350.00	46.1 AV	54.0	-7.9	1.76 V	274	44.3	1.8
5	10640.00	67.4 PK	74.0	-6.6	1.10 V	203	52.2	15.2
6	10640.00	52.8 AV	54.0	-1.2	1.10 V	203	37.6	15.2

Remarks:

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

CHANNEL	TX Channel 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	50.5 PK	74.0	-23.5	2.07 H	188	48.3	2.2
2	5460.00	45.3 AV	54.0	-8.7	2.07 H	188	43.1	2.2
3	#5470.00	63.3 PK	74.0	-10.7	2.07 H	188	61.1	2.2
4	#5470.00	50.1 AV	54.0	-3.9	2.07 H	188	47.9	2.2
5	*5500.00	116.1 PK			1.56 H	195	76.9	39.2
6	*5500.00	105.4 AV			1.56 H	195	66.2	39.2
7	11000.00	64.4 PK	74.0	-9.6	1.43 H	246	47.4	17.0
8	11000.00	51.2 AV	54.0	-2.8	1.43 H	246	34.2	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	53.4 PK	74.0	-20.6	1.87 V	150	51.2	2.2
2	5460.00	47.8 AV	54.0	-6.2	1.87 V	150	45.6	2.2
3	#5470.00	66.6 PK	74.0	-7.4	1.84 V	150	64.4	2.2
4	#5470.00	52.8 AV	54.0	-1.2	1.84 V	150	50.6	2.2
5	*5500.00	118.0 PK			1.86 V	187	78.8	39.2
6	*5500.00	107.4 AV			1.86 V	187	68.2	39.2
7	11000.00	65.6 PK	74.0	-8.4	2.15 V	199	48.6	17.0
8	11000.00	52.4 AV	54.0	-1.6	2.15 V	199	35.4	17.0

Remarks:

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

CHANNEL	TX Channel 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	115.3 PK			1.49 H	195	75.9	39.4
2	*5580.00	104.5 AV			1.49 H	195	65.1	39.4
3	11160.00	65.5 PK	74.0	-8.5	1.64 H	242	49.5	16.0
4	11160.00	51.7 AV	54.0	-2.3	1.64 H	242	35.7	16.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5580.00	117.9 PK			2.20 V	145	78.5	39.4
2	*5580.00	107.6 AV			2.20 V	145	68.2	39.4
3	11160.00	66.5 PK	74.0	-7.5	1.86 V	289	50.5	16.0
4	11160.00	52.8 AV	54.0	-1.2	1.86 V	289	36.8	16.0

Remarks:

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

CHANNEL	TX Channel 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	114.8 PK			2.37 H	190	75.3	39.5
2	*5700.00	104.8 AV			2.37 H	190	65.3	39.5
3	#5725.00	59.2 PK	74.0	-14.8	1.52 H	171	56.4	2.8
4	#5725.00	46.8 AV	54.0	-7.2	1.52 H	171	44.0	2.8
5	11400.00	64.7 PK	74.0	-9.3	3.33 H	240	48.9	15.8
6	11400.00	51.0 AV	54.0	-3.0	3.33 H	240	35.2	15.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	114.9 PK			1.65 V	182	75.4	39.5
2	*5700.00	105.3 AV			1.65 V	182	65.8	39.5
3	#5725.00	61.8 PK	74.0	-12.2	1.67 V	180	59.0	2.8
4	#5725.00	48.0 AV	54.0	-6.0	1.67 V	180	45.2	2.8
5	11400.00	66.7 PK	74.0	-7.3	1.50 V	118	50.9	15.8
6	11400.00	52.8 AV	54.0	-1.2	1.50 V	118	37.0	15.8

Remarks:

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

802.11n (HT20)

CHANNEL	TX Channel 52	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.3 PK	74.0	-20.7	2.17 H	328	51.4	1.9
2	5150.00	39.4 AV	54.0	-14.6	2.17 H	328	37.5	1.9
3	*5260.00	117.3 PK			2.04 H	347	78.9	38.4
4	*5260.00	107.2 AV			2.04 H	347	68.8	38.4
5	#10520.00	66.1 PK	74.0	-7.9	2.38 H	199	50.9	15.2
6	#10520.00	52.0 AV	54.0	-2.0	2.38 H	199	36.8	15.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	53.3 PK	74.0	-20.7	1.94 V	287	51.4	1.9
2	5150.00	40.7 AV	54.0	-13.3	1.94 V	287	38.8	1.9
3	*5260.00	118.0 PK			1.87 V	274	79.6	38.4
4	*5260.00	107.6 AV			1.87 V	274	69.2	38.4
5	#10520.00	67.1 PK	74.0	-6.9	2.04 V	230	51.9	15.2
6	#10520.00	53.1 AV	54.0	-0.9	2.04 V	230	37.9	15.2

Remarks:

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

CHANNEL	TX Channel 60	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	116.0 PK			1.96 H	337	77.5	38.5
2	*5300.00	105.9 AV			1.96 H	337	67.4	38.5
3	10600.00	66.9 PK	74.0	-7.1	2.49 H	203	51.8	15.1
4	10600.00	52.3 AV	54.0	-1.7	2.49 H	203	37.2	15.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5300.00	116.8 PK			1.84 V	275	78.3	38.5
2	*5300.00	106.4 AV			1.84 V	275	67.9	38.5
3	10600.00	67.3 PK	74.0	-6.7	2.19 V	181	52.2	15.1
4	10600.00	53.2 AV	54.0	-0.8	2.19 V	181	38.1	15.1

Remarks:

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

CHANNEL	TX Channel 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	116.0 PK			1.98 H	343	77.4	38.6
2	*5320.00	106.0 AV			1.98 H	343	67.4	38.6
3	5350.00	66.6 PK	74.0	-7.4	2.07 H	329	64.8	1.8
4	5350.00	49.1 AV	54.0	-4.9	2.07 H	329	47.3	1.8
5	10640.00	65.5 PK	74.0	-8.5	2.32 H	201	50.3	15.2
6	10640.00	51.6 AV	54.0	-2.4	2.32 H	201	36.4	15.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5320.00	116.8 PK			1.81 V	277	78.2	38.6
2	*5320.00	106.5 AV			1.81 V	277	67.9	38.6
3	5350.00	67.1 PK	74.0	-6.9	1.91 V	294	65.3	1.8
4	5350.00	50.7 AV	54.0	-3.3	1.91 V	294	48.9	1.8
5	10640.00	67.0 PK	74.0	-7.0	1.76 V	171	51.8	15.2
6	10640.00	52.9 AV	54.0	-1.1	1.76 V	171	37.7	15.2

Remarks:

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

CHANNEL	TX Channel 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	58.9 PK	74.0	-15.1	1.76 H	162	56.7	2.2
2	5460.00	45.0 AV	54.0	-9.0	1.76 H	162	42.8	2.2
3	#5470.00	63.4 PK	74.0	-10.6	1.96 H	177	61.2	2.2
4	#5470.00	49.1 AV	54.0	-4.9	1.96 H	177	46.9	2.2
5	*5500.00	112.6 PK			1.66 H	198	73.4	39.2
6	*5500.00	102.4 AV			1.66 H	198	63.2	39.2
7	11000.00	67.8 PK	74.0	-6.2	1.13 H	289	50.8	17.0
8	11000.00	51.6 AV	54.0	-2.4	1.13 H	289	34.6	17.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	60.5 PK	74.0	-13.5	2.10 V	181	58.3	2.2
2	5460.00	46.9 AV	54.0	-7.1	2.10 V	181	44.7	2.2
3	#5470.00	64.8 PK	74.0	-9.2	1.79 V	188	62.6	2.2
4	#5470.00	51.0 AV	54.0	-3.0	1.79 V	188	48.8	2.2
5	*5500.00	116.3 PK			2.61 V	136	77.1	39.2
6	*5500.00	105.2 AV			2.61 V	136	66.0	39.2
7	11000.00	68.5 PK	74.0	-5.5	3.66 V	27	51.5	17.0
8	11000.00	52.8 AV	54.0	-1.2	3.66 V	27	35.8	17.0

Remarks:

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

CHANNEL	TX Channel 116	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5580.00	114.0 PK			1.53 H	201	74.6	39.4
2	*5580.00	103.9 AV			1.53 H	201	64.5	39.4
3	11160.00	56.4 PK	74.0	-17.6	1.22 H	301	40.4	16.0
4	11160.00	51.6 AV	54.0	-2.4	1.22 H	301	35.6	16.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5580.00	117.5 PK			2.21 V	147	78.1	39.4
2	*5580.00	106.8 AV			2.21 V	147	67.4	39.4
3	11160.00	67.2 PK	74.0	-6.8	2.19 V	60	51.2	16.0
4	11160.00	52.9 AV	54.0	-1.1	2.19 V	60	36.9	16.0

Remarks:

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

CHANNEL	TX Channel 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	114.4 PK			1.55 H	206	74.9	39.5
2	*5700.00	104.1 AV			1.55 H	206	64.6	39.5
3	#5725.00	59.5 PK	74.0	-14.5	1.73 H	187	56.7	2.8
4	#5725.00	46.4 AV	54.0	-7.6	1.73 H	187	43.6	2.8
5	11400.00	68.9 PK	74.0	-5.1	1.06 H	288	53.1	15.8
6	**11400.00**	**53.3 AV**	**54.0**	**-0.7**	**1.06 H**	**288**	**37.5**	**15.8**
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5700.00	117.6 PK			2.26 V	141	78.1	39.5
2	*5700.00	107.1 AV			2.26 V	141	67.6	39.5
3	#5725.00	61.1 PK	74.0	-12.9	2.42 V	139	58.3	2.8
4	#5725.00	47.9 AV	54.0	-6.1	2.42 V	139	45.1	2.8
5	11400.00	68.0 PK	74.0	-6.0	2.09 V	64	52.2	15.8
6	11400.00	53.0 AV	54.0	-1.0	2.09 V	64	37.2	15.8

Remarks:

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

802.11n (HT40)

CHANNEL	TX Channel 54	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	54.7 PK	74.0	-19.3	2.12 H	332	52.8	1.9
2	5150.00	41.7 AV	54.0	-12.3	2.12 H	332	39.8	1.9
3	*5270.00	115.6 PK			2.00 H	345	77.1	38.5
4	*5270.00	105.4 AV			2.00 H	345	66.9	38.5
5	#10540.00	63.4 PK	74.0	-10.6	2.28 H	196	48.2	15.2
6	#10540.00	49.6 AV	54.0	-4.4	2.28 H	196	34.4	15.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.2 PK	74.0	-18.8	2.20 V	277	53.3	1.9
2	5150.00	42.7 AV	54.0	-11.3	2.20 V	277	40.8	1.9
3	*5270.00	115.9 PK			1.86 V	275	77.4	38.5
4	*5270.00	105.7 AV			1.86 V	275	67.2	38.5
5	#10540.00	65.4 PK	74.0	-8.6	1.91 V	233	50.2	15.2
6	#10540.00	52.7 AV	54.0	-1.3	1.91 V	233	37.5	15.2

Remarks:

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

CHANNEL	TX Channel 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	111.7 PK			1.82 H	345	73.2	38.5
2	*5310.00	101.6 AV			1.82 H	345	63.1	38.5
3	5350.00	63.8 PK	74.0	-10.2	1.78 H	354	62.0	1.8
4	5350.00	52.6 AV	54.0	-1.4	1.78 H	354	50.8	1.8
5	10620.00	65.8 PK	74.0	-8.2	2.34 H	198	50.6	15.2
6	10620.00	51.6 AV	54.0	-2.4	2.34 H	198	36.4	15.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5310.00	111.1 PK			1.80 V	273	72.6	38.5
2	*5310.00	101.2 AV			1.80 V	273	62.7	38.5
3	5350.00	66.0 PK	74.0	-8.0	1.88 V	273	64.2	1.8
4	5350.00	52.9 AV	54.0	-1.1	1.88 V	273	51.1	1.8
5	10620.00	66.0 PK	74.0	-8.0	2.17 V	183	50.8	15.2
6	10620.00	51.8 AV	54.0	-2.2	2.17 V	183	36.6	15.2

Remarks:

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

CHANNEL	TX Channel 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	62.0 PK	74.0	-12.0	1.80 H	158	59.8	2.2
2	5460.00	47.9 AV	54.0	-6.1	1.80 H	158	45.7	2.2
3	#5470.00	63.7 PK	74.0	-10.3	2.09 H	186	61.5	2.2
4	#5470.00	50.0 AV	54.0	-4.0	2.09 H	186	47.8	2.2
5	*5510.00	109.1 PK			1.50 H	198	69.8	39.3
6	*5510.00	99.0 AV			1.50 H	198	59.7	39.3
7	11020.00	60.3 PK	74.0	-13.7	1.07 H	291	43.4	16.9
8	11020.00	47.6 AV	54.0	-6.4	1.07 H	291	30.7	16.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	58.6 PK	74.0	-15.4	1.65 V	186	56.4	2.2
2	5460.00	46.9 AV	54.0	-7.1	1.65 V	186	44.7	2.2
3	#5470.00	65.5 PK	74.0	-8.5	1.90 V	156	63.3	2.2
4	#5470.00	52.9 AV	54.0	-1.1	1.90 V	156	50.7	2.2
5	*5510.00	111.4 PK			1.90 V	183	72.1	39.3
6	*5510.00	100.9 AV			1.90 V	183	61.6	39.3
7	11020.00	62.4 PK	74.0	-11.6	3.82 V	28	45.5	16.9
8	11020.00	50.8 AV	54.0	-3.2	3.82 V	28	33.9	16.9

Remarks:

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

CHANNEL	TX Channel 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	108.6 PK			1.54 H	203	69.3	39.3
2	*5550.00	98.4 AV			1.54 H	203	59.1	39.3
3	11100.00	62.0 PK	74.0	-12.0	1.12 H	293	45.7	16.3
4	11100.00	50.1 AV	54.0	-3.9	1.12 H	293	33.8	16.3
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	111.7 PK			1.66 V	187	72.4	39.3
2	*5550.00	101.5 AV			1.66 V	187	62.2	39.3
3	11100.00	65.9 PK	74.0	-8.1	3.76 V	28	49.6	16.3
4	11100.00	52.8 AV	54.0	-1.2	3.76 V	28	36.5	16.3

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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	111.9 PK			1.47 H	191	72.4	39.5
2	*5670.00	101.7 AV			1.47 H	191	62.2	39.5
3	#5725.00	55.5 PK	74.0	-18.5	1.54 H	209	52.7	2.8
4	#5725.00	43.6 AV	54.0	-10.4	1.54 H	209	40.8	2.8
5	11340.00	65.3 PK	74.0	-8.7	1.03 H	286	49.1	16.2
6	11340.00	53.1 AV	54.0	-0.9	1.03 H	286	36.9	16.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5670.00	115.2 PK			2.12 V	142	75.7	39.5
2	*5670.00	105.1 AV			2.12 V	142	65.6	39.5
3	#5725.00	58.1 PK	74.0	-15.9	2.37 V	138	55.3	2.8
4	#5725.00	46.3 AV	54.0	-7.7	2.37 V	138	43.5	2.8
5	11340.00	64.8 PK	74.0	-9.2	2.09 V	62	48.6	16.2
6	11340.00	52.7 AV	54.0	-1.3	2.09 V	62	36.5	16.2

Remarks:

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

802.11ac (VHT80)

CHANNEL	TX Channel 58	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	54.7 PK	74.0	-19.3	1.61 H	346	52.8	1.9
2	5150.00	43.1 AV	54.0	-10.9	1.61 H	346	41.2	1.9
3	*5290.00	108.8 PK			1.73 H	349	70.3	38.5
4	*5290.00	98.7 AV			1.73 H	349	60.2	38.5
5	5350.00	63.9 PK	74.0	-10.1	1.78 H	354	62.1	1.8
6	5350.00	52.4 AV	54.0	-1.6	1.78 H	354	50.6	1.8
7	#10580.00	56.8 PK	74.0	-17.2	2.32 H	205	41.8	15.0
8	#10580.00	44.5 AV	54.0	-9.5	2.32 H	205	29.5	15.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	54.7 PK	74.0	-19.3	1.75 V	269	52.8	1.9
2	5150.00	42.5 AV	54.0	-11.5	1.75 V	269	40.6	1.9
3	*5290.00	109.0 PK			1.89 V	274	70.5	38.5
4	*5290.00	99.0 AV			1.89 V	274	60.5	38.5
5	5350.00	64.2 PK	74.0	-9.8	1.81 V	277	62.4	1.8
6	5350.00	52.7 AV	54.0	-1.3	1.81 V	277	50.9	1.8
7	#10580.00	61.3 PK	74.0	-12.7	2.37 V	198	46.3	15.0
8	#10580.00	48.1 AV	54.0	-5.9	2.37 V	198	33.1	15.0

Remarks:

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

CHANNEL	TX Channel 106	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	60.7 PK	74.0	-13.3	1.84 H	216	58.5	2.2
2	5460.00	47.3 AV	54.0	-6.7	1.84 H	216	45.1	2.2
3	#5470.00	61.4 PK	74.0	-12.6	2.07 H	187	59.2	2.2
4	#5470.00	49.4 AV	54.0	-4.6	2.07 H	187	47.2	2.2
5	*5530.00	104.2 PK			1.68 H	196	64.9	39.3
6	*5530.00	94.6 AV			1.68 H	196	55.3	39.3
7	#5725.00	52.2 PK	74.0	-21.8	1.99 H	229	49.4	2.8
8	#5725.00	39.6 AV	54.0	-14.4	1.99 H	229	36.8	2.8
9	11060.00	58.8 PK	74.0	-15.2	1.02 H	297	42.3	16.5
10	11060.00	46.2 AV	54.0	-7.8	1.02 H	297	29.7	16.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	67.3 PK	74.0	-6.7	1.86 V	144	65.1	2.2
2	5460.00	52.7 AV	54.0	-1.3	1.86 V	144	50.5	2.2
3	#5470.00	64.6 PK	74.0	-9.4	1.72 V	156	62.4	2.2
4	#5470.00	50.6 AV	54.0	-3.4	1.72 V	156	48.4	2.2
5	*5530.00	107.7 PK			2.24 V	145	68.4	39.3
6	*5530.00	97.8 AV			2.24 V	145	58.5	39.3
7	#5725.00	55.3 PK	74.0	-18.7	1.80 V	166	52.5	2.8
8	#5725.00	42.4 AV	54.0	-11.6	1.80 V	166	39.6	2.8
9	11060.00	57.8 PK	74.0	-16.2	3.31 V	68	41.3	16.5
10	11060.00	46.2 AV	54.0	-7.8	3.31 V	68	29.7	16.5

Remarks:

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

CHANNEL	TX Channel 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	5460.00	60.8 PK	74.0	-13.2	1.88 H	223	58.6	2.2
2	5460.00	47.5 AV	54.0	-6.5	1.88 H	223	45.3	2.2
3	#5470.00	61.3 PK	74.0	-12.7	2.04 H	189	59.1	2.2
4	#5470.00	49.5 AV	54.0	-4.5	2.04 H	189	47.3	2.2
5	*5610.00	104.9 PK			1.72 H	204	65.5	39.4
6	*5610.00	94.8 AV			1.72 H	204	55.4	39.4
7	#5725.00	52.3 PK	74.0	-21.7	2.01 H	230	49.5	2.8
8	#5725.00	39.5 AV	54.0	-14.5	2.01 H	230	36.7	2.8
9	11220.00	58.2 PK	74.0	-15.8	1.07 H	302	42.4	15.8
10	11220.00	45.6 AV	54.0	-8.4	1.07 H	302	29.8	15.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5460.00	67.4 PK	74.0	-6.6	1.89 V	137	65.2	2.2
2	5460.00	52.7 AV	54.0	-1.3	1.89 V	137	50.5	2.2
3	#5470.00	64.9 PK	74.0	-9.1	1.77 V	158	62.7	2.2
4	#5470.00	51.0 AV	54.0	-3.0	1.77 V	158	48.8	2.2
5	*5610.00	108.1 PK			2.28 V	151	68.7	39.4
6	*5610.00	98.1 AV			2.28 V	151	58.7	39.4
7	#5725.00	55.2 PK	74.0	-18.8	1.83 V	164	52.4	2.8
8	#5725.00	42.6 AV	54.0	-11.4	1.83 V	164	39.8	2.8
9	11220.00	57.2 PK	74.0	-16.8	3.28 V	76	41.4	15.8
10	11220.00	45.7 AV	54.0	-8.3	3.28 V	76	29.9	15.8

Remarks:

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

Below 1GHz Worst-Case Data: 802.11a

CHANNEL	TX Channel 52	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	57.12	28.2 QP	40.0	-11.8	1.99 H	77	42.6	-14.4
2	125.17	35.4 QP	43.5	-8.1	1.49 H	241	51.3	-15.9
3	177.67	29.9 QP	43.5	-13.6	1.49 H	91	44.6	-14.7
4	323.49	32.8 QP	46.0	-13.2	1.00 H	244	45.0	-12.2
5	432.37	36.0 QP	46.0	-10.0	1.99 H	207	46.3	-10.3
6	490.70	33.0 QP	46.0	-13.0	1.99 H	210	42.5	-9.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	62.95	34.4 QP	40.0	-5.6	1.01 V	26	49.3	-14.9
2	125.17	29.6 QP	43.5	-13.9	1.01 V	258	45.5	-15.9
3	208.77	29.5 QP	43.5	-14.0	1.01 V	205	46.2	-16.7
4	410.98	35.7 QP	46.0	-10.3	1.50 V	16	46.7	-11.0
5	492.64	31.3 QP	46.0	-14.7	1.01 V	144	40.9	-9.6
6	673.46	29.0 QP	46.0	-17.0	1.01 V	347	35.3	-6.3

Remarks:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Due
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Nov. 23, 2017	Nov. 22, 2018
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond1-01	Sep. 05, 2017	Sep. 04, 2018
LISN ROHDE & SCHWARZ (EUT)	ESH3-Z5	835239/001	Mar. 06, 2018	Mar. 05, 2019
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 15, 2017	Aug. 14, 2018
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in HwaYa Shielded Room 1.
3. The VCCI Site Registration No. is C-2040.

4.2.3 Test Procedures

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

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

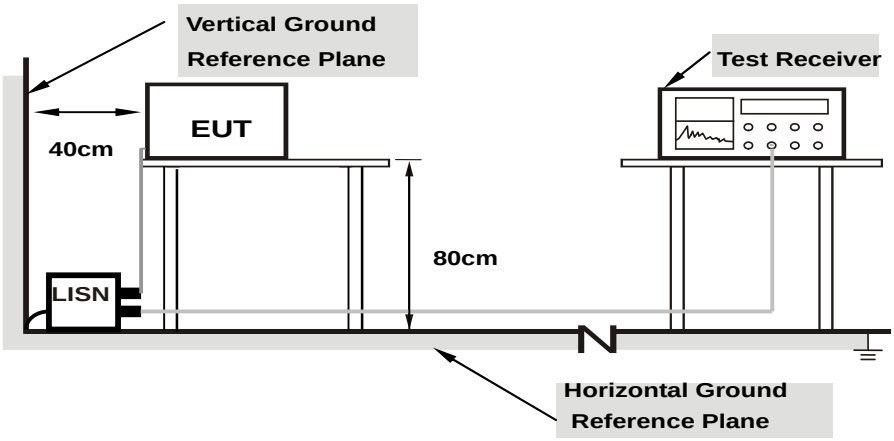
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



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

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

4.2.6 EUT Operating Conditions

Same as 4.1.6.

4.2.7 Test Results

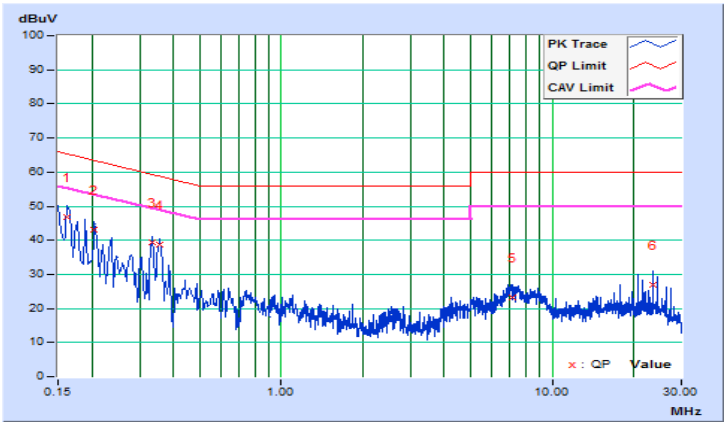
Worst-case data: 802.11a

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

No	Freq.	Corr. Factor	Reading Value		Emission Level		Limit		Margin	
			[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16181	10.16	36.66	23.48	46.82	33.64	65.37	55.37	-18.55	-21.73
2	0.20474	10.16	32.96	23.27	43.12	33.43	63.42	53.42	-20.30	-19.99
3	0.33396	10.19	29.26	25.14	39.45	35.33	59.35	49.35	-19.90	-14.02
4	0.35723	10.19	28.39	24.20	38.58	34.39	58.79	48.79	-20.21	-14.40
5	7.18018	10.51	12.68	5.07	23.19	15.58	60.00	50.00	-36.81	-34.42
6	23.54353	11.32	15.69	9.76	27.01	21.08	60.00	50.00	-32.99	-28.92

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.

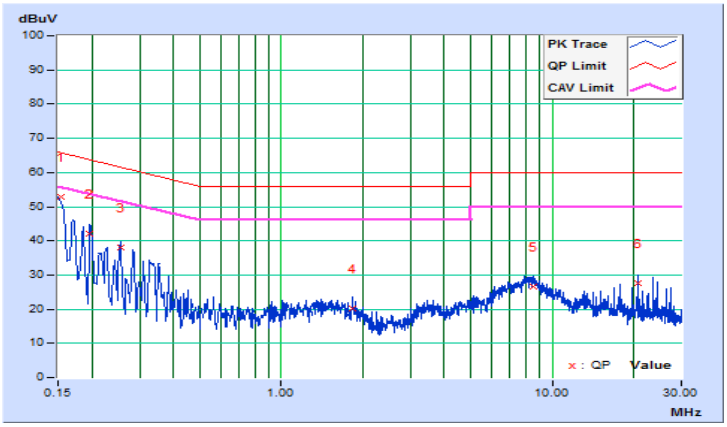


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	**0.15391**	**10.15**	**42.86**	**30.69**	**53.01**	**40.84**	**65.79**	**55.79**	**-12.78**	**-14.95**
2	0.19692	10.16	32.09	16.75	42.25	26.91	63.74	53.74	-21.49	-26.83
3	0.25557	10.17	27.98	17.70	38.15	27.87	61.57	51.57	-23.42	-23.70
4	1.83912	10.22	9.98	5.82	20.20	16.04	56.00	46.00	-35.80	-29.96
5	8.57214	10.52	15.99	8.71	26.51	19.23	60.00	50.00	-33.49	-30.77
6	20.71269	11.03	16.69	14.58	27.72	25.61	60.00	50.00	-32.28	-24.39

Remarks:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

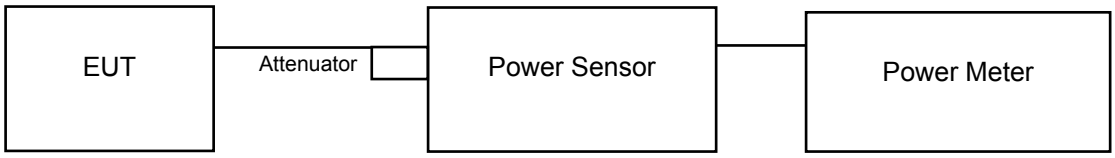
Per KDB 662911 Method of conducted output power measurement on IEEE 802.11 devices,

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

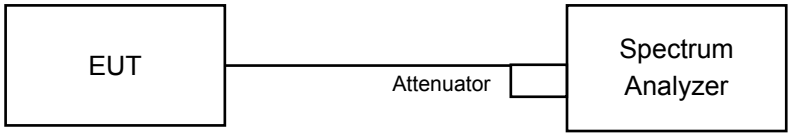
For power measurements on all other devices: Array Gain = 10 log(N_{ANT}/N_{SS}) dB.

4.3.2 Test Setup

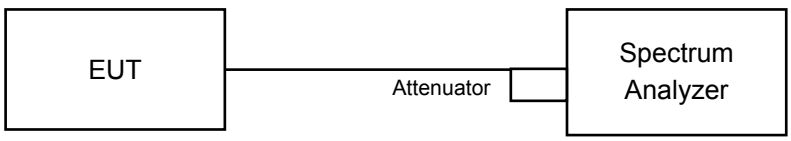
For Power Output
802.11a, 802.11n (HT20), 802.11n (HT40)



802.11ac (VHT80)



For 26dB Bandwidth



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

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

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

For 802.11ac (VHT80)

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

b. Set sweep trigger to “free run”.

c. Set RBW = 1 MHz.

d. Set VBW ≥ 3 MHz.

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

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

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

h. Detector = RMS.

i. Trace mode = max hold.

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

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

For 26dB Bandwidth

a. Set RBW = approximately 1% of the emission bandwidth.

b. Set the VBW > RBW.

c. Detector = Peak.

d. Trace mode = max hold.

e. Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Result

Power Output:

CDD Mode

802.11a

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	20.62	19.82	211.285	23.25	23.93	Pass
60	5300	20.75	19.73	212.822	23.28	23.87	Pass
64	5320	20.18	19.32	189.739	22.78	23.85	Pass
100	5500	18.85	18.47	147.043	21.67	23.99	Pass
116	5580	18.82	18.11	140.922	21.49	23.96	Pass
140	5700	19.27	17.31	138.355	21.41	23.97	Pass

Note:

Chain 0

1. 11dBm + 10log (19.64) = 23.93 < 24dBm
2. 11dBm + 10log (19.79) = 23.96 < 24dBm
3. 11dBm + 10log (19.92) = 23.99 < 24dBm
4. 11dBm + 10log (20.20) = 24.05 > 24dBm
5. 11dBm + 10log (20.06) = 24.02 > 24dBm
6. 11dBm + 10log (20.44) = 24.10 > 24dBm

Chain 1

1. 11dBm + 10log (19.66) = 23.93 < 24dBm
2. 11dBm + 10log (19.40) = 23.87 < 24dBm
3. 11dBm + 10log (19.30) = 23.85 < 24dBm
4. 11dBm + 10log (19.91) = 23.99 < 24dBm
5. 11dBm + 10log (19.80) = 23.96 < 24dBm
6. 11dBm + 10log (19.84) = 23.97 < 24dBm

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	20.72	19.93	216.433	23.35	24.00	Pass
60	5300	20.71	19.64	209.806	23.22	24.00	Pass
64	5320	21.00	20.03	226.586	23.55	24.00	Pass
100	5500	19.58	19.38	177.478	22.49	24.00	Pass
116	5580	19.96	19.29	184.001	22.65	24.00	Pass
140	5700	20.64	19.75	210.284	23.23	24.00	Pass

Note:
Chain 0
1. 11dBm + 10log (20.44) = 24.10 > 24dBm
2. 11dBm + 10log (20.76) = 24.17 > 24dBm
3. 11dBm + 10log (20.81) = 24.18 > 24dBm
4. 11dBm + 10log (20.70) = 24.15 > 24dBm
5. 11dBm + 10log (20.47) = 24.11 > 24dBm
6. 11dBm + 10log (20.47) = 24.11 > 24dBm

Chain 1
1. 11dBm + 10log (20.67) = 24.15 > 24dBm
2. 11dBm + 10log (20.46) = 24.10 > 24dBm
3. 11dBm + 10log (20.68) = 24.15 > 24dBm
4. 11dBm + 10log (20.68) = 24.15 > 24dBm
5. 11dBm + 10log (20.64) = 24.14 > 24dBm
6. 11dBm + 10log (20.57) = 24.13 > 24dBm

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
54	5270	21.03	20.03	**227.458**	23.57	24.00	Pass
62	5310	19.37	18.42	155.999	21.93	24.00	Pass
102	5510	19.05	18.89	157.799	21.98	24.00	Pass
110	5550	19.96	19.29	184.001	22.65	24.00	Pass
134	5670	21.17	20.24	**236.600**	23.74	24.00	Pass

Note:
Chain 0
1. 11dBm + 10log (40.71) = 27.09 > 24dBm
2. 11dBm + 10log (40.82) = 27.10 > 24dBm
3. 11dBm + 10log (40.98) = 27.12 > 24dBm
4. 11dBm + 10log (40.91) = 27.11 > 24dBm
5. 11dBm + 10log (40.92) = 27.11 > 24dBm

Chain 1
1. 11dBm + 10log (40.36) = 27.05 > 24dBm
2. 11dBm + 10log (40.37) = 27.06 > 24dBm
3. 11dBm + 10log (40.96) = 27.12 > 24dBm
4. 11dBm + 10log (40.96) = 27.12 > 24dBm
5. 11dBm + 10log (41.07) = 27.13 > 24dBm

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
58	5290	19.39	18.38	155.761	21.92	24.00	Pass
106	5530	17.60	17.28	111.000	20.45	24.00	Pass
122	5610	17.54	17.19	109.114	20.38	24.00	Pass

Note:
Chain 0
1. 11dBm + 10log (84.28) = 30.25 > 24dBm
2. 11dBm + 10log (84.34) = 30.26 > 24dBm
3. 11dBm + 10log (84.05) = 30.24 > 24dBm

Chain 1
1. 11dBm + 10log (83.44) = 30.21 > 24dBm
2. 11dBm + 10log (84.14) = 30.25 > 24dBm
3. 11dBm + 10log (84.07) = 30.24 > 24dBm

Beamforming Mode

802.11n (HT20)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
52	5260	17.71	16.92	108.224	20.34	24.00	Pass
60	5300	17.70	16.63	104.910	20.21	24.00	Pass
64	5320	17.99	17.02	113.301	20.54	24.00	Pass
100	5500	16.57	16.37	88.745	19.48	23.12	Pass
116	5580	16.95	16.28	92.007	19.64	23.12	Pass
140	5700	17.63	16.74	105.149	20.22	23.12	Pass

Note:

1. U-NII-2A band: Directional gain = 2.73dBi + 10log(2) = 5.74dBi < 6dBi, so the power limit no need to reduced.
2. U-NII-2C band: Directional gain = 3.87dBi + 10log(2) = 6.88dBi > 6dBi, so the power limit shall be reduced to 24-(6.88-6) = 23.12dBm.

Chain 0

1. 11dBm + 10log (20.44) = 24.10 > 24dBm
2. 11dBm + 10log (20.76) = 24.17 > 24dBm
3. 11dBm + 10log (20.81) = 24.18 > 24dBm
4. 11dBm + 10log (20.70) = 24.15 > 24dBm
5. 11dBm + 10log (20.47) = 24.11 > 24dBm
6. 11dBm + 10log (20.47) = 24.11 > 24dBm

Chain 1

1. 11dBm + 10log (20.67) = 24.15 > 24dBm
2. 11dBm + 10log (20.46) = 24.10 > 24dBm
3. 11dBm + 10log (20.68) = 24.15 > 24dBm
4. 11dBm + 10log (20.68) = 24.15 > 24dBm
5. 11dBm + 10log (20.64) = 24.14 > 24dBm
6. 11dBm + 10log (20.57) = 24.13 > 24dBm

802.11n (HT40)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
54	5270	18.02	17.02	**113.737**	20.56	24.00	Pass
62	5310	16.36	15.41	78.005	18.92	24.00	Pass
102	5510	16.04	15.88	78.905	18.97	23.12	Pass
110	5550	16.95	16.28	92.007	19.64	23.12	Pass
134	5670	18.16	17.23	**118.309**	20.73	23.12	Pass

Note:
1. U-NII-2A band: Directional gain = 2.73dBi + 10log(2) = 5.74dBi < 6dBi, so the power limit no need to reduced.
2. U-NII-2C band: Directional gain = 3.87dBi + 10log(2) = 6.88dBi > 6dBi, so the power limit shall be reduced to 24-(6.88-6) = 23.12dBm.

Chain 0

1. 11dBm + 10log (40.71) = 27.09 > 24dBm
2. 11dBm + 10log (40.82) = 27.10 > 24dBm
3. 11dBm + 10log (40.98) = 27.12 > 24dBm
4. 11dBm + 10log (40.91) = 27.11 > 24dBm
5. 11dBm + 10log (40.92) = 27.11 > 24dBm

Chain 1

1. 11dBm + 10log (40.36) = 27.05 > 24dBm
2. 11dBm + 10log (40.37) = 27.06 > 24dBm
3. 11dBm + 10log (40.96) = 27.12 > 24dBm
4. 11dBm + 10log (40.96) = 27.12 > 24dBm
5. 11dBm + 10log (41.07) = 27.13 > 24dBm

802.11ac (VHT80)

Chan.	Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
58	5290	16.38	15.37	77.886	18.91	24.00	Pass
106	5530	14.59	14.27	55.504	17.44	23.12	Pass
122	5610	14.53	14.18	54.561	17.37	23.12	Pass

Note:
1. U-NII-2A band: Directional gain = 2.73dBi + 10log(2) = 5.74dBi < 6dBi, so the power limit no need to reduced.
2. U-NII-2C band: Directional gain = 3.87dBi + 10log(2) = 6.88dBi > 6dBi, so the power limit shall be reduced to 24-(6.88-6) = 23.12dBm.

Chain 0

1. 11dBm + 10log (84.28) = 30.25 > 24dBm
2. 11dBm + 10log (84.34) = 30.26 > 24dBm
3. 11dBm + 10log (84.05) = 30.24 > 24dBm

Chain 1

1. 11dBm + 10log (83.44) = 30.21 > 24dBm
2. 11dBm + 10log (84.14) = 30.25 > 24dBm
3. 11dBm + 10log (84.07) = 30.24 > 24dBm

26dB Bandwidth:

802.11a

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	19.64	19.66
60	5300	19.79	19.40
64	5320	19.92	19.30
100	5500	20.20	19.91
116	5580	20.06	19.80
140	5700	20.44	19.84

802.11n (HT20)

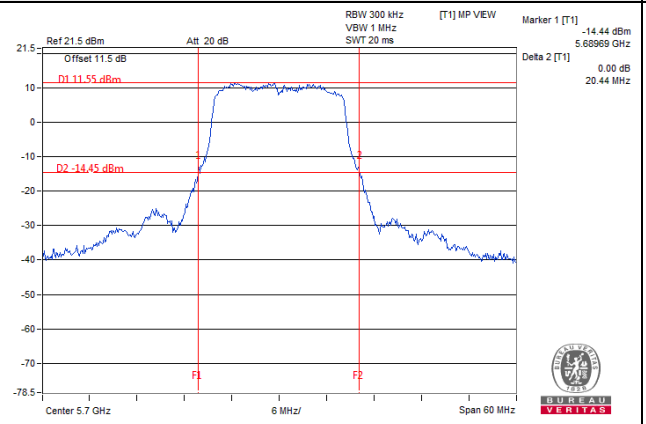
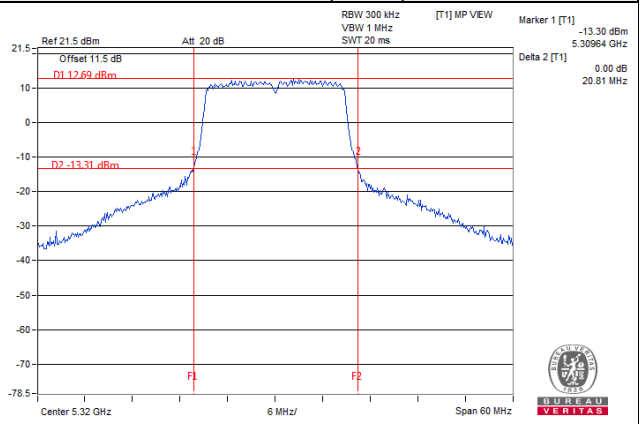
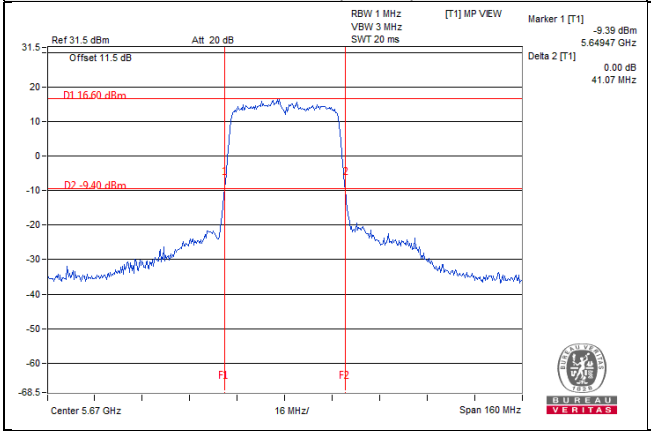
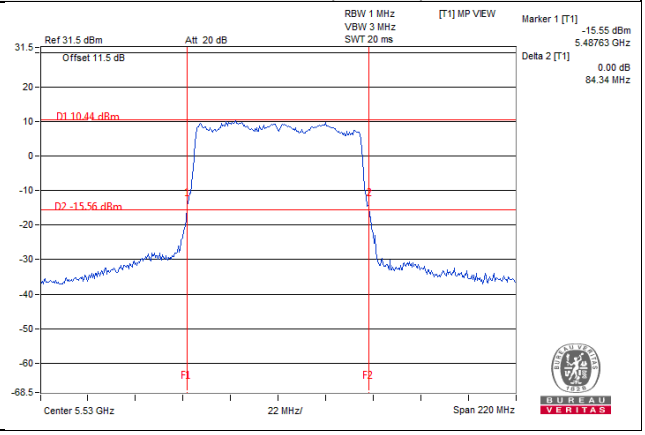
Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	20.44	20.67
60	5300	20.76	20.46
64	5320	20.81	20.68
100	5500	20.70	20.68
116	5580	20.47	20.64
140	5700	20.47	20.57

802.11n (HT40)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	40.71	40.36
62	5310	40.82	40.37
102	5510	40.98	40.96
110	5550	40.91	40.96
134	5670	40.92	41.07

802.11ac (VHT80)

Chan.	Freq. (MHz)	26dBc Bandwidth (MHz)	
		Chain 0	Chain 1
58	5290	84.28	83.44
106	5530	84.34	84.14
122	5610	84.05	84.07

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

EUT Maximum Conducted Power

CDD Mode

802.11a

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	212.822	23.28
5470~5725	147.043	21.67

802.11n (HT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	226.586	23.55
5470~5725	210.284	23.23

802.11n (HT40)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	227.458	23.57
5470~5725	236.600	23.74

802.11ac (VHT80)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	155.761	21.92
5470~5725	111.000	20.45

Beamforming Mode

802.11n (HT20)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	113.301	20.54
5470~5725	105.149	20.22

802.11n (HT40)

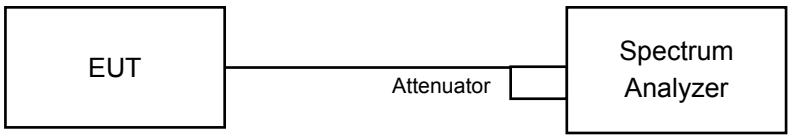
Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	113.737	20.56
5470~5725	118.309	20.73

802.11ac (VHT80)

Frequency Band (MHz)	Max. Power	
	Output Power (mW)	Output Power (dBm)
5250~5350	77.886	18.91
5470~5725	55.504	17.44

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Result

802.11a

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	16.44	16.44
60	5300	16.44	16.44
64	5320	16.44	16.44
100	5500	16.52	16.44
116	5580	16.44	16.44
140	5700	16.44	16.44

802.11n (HT20)

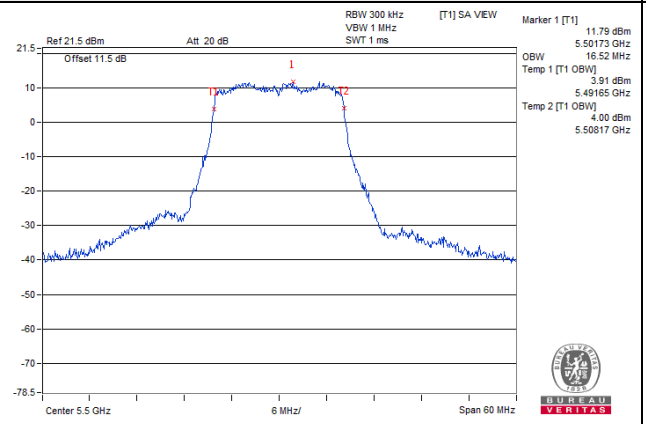
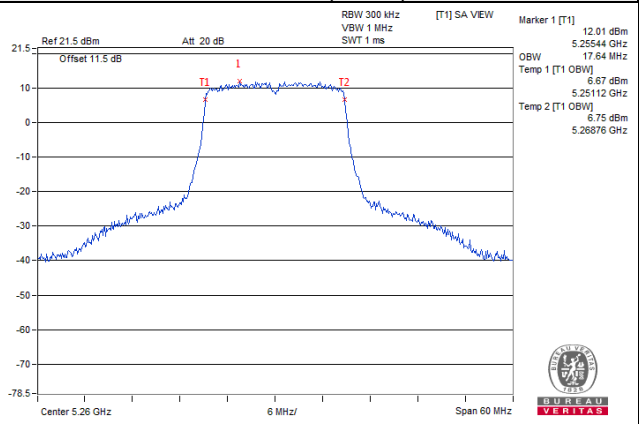
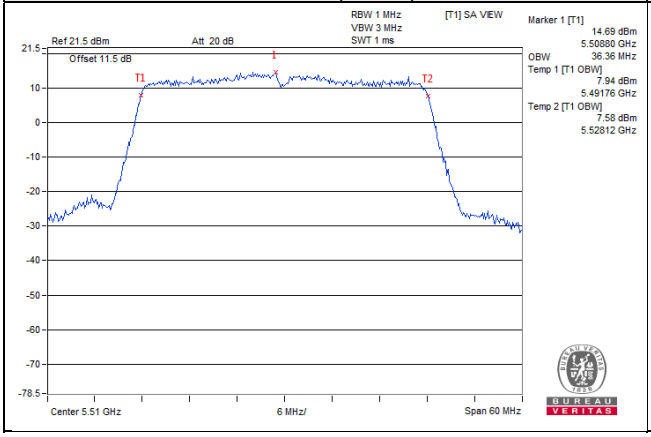
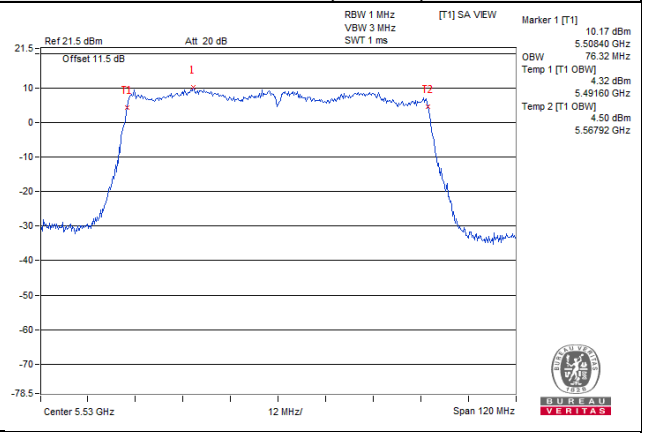
Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
52	5260	17.64	17.64
60	5300	17.64	17.64
64	5320	17.64	17.64
100	5500	17.64	17.64
116	5580	17.64	17.64
140	5700	17.52	17.64

802.11n (HT40)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
54	5270	36.24	36.00
62	5310	36.24	36.24
102	5510	36.36	36.12
110	5550	36.36	36.24
134	5670	36.36	36.36

802.11ac (VHT80)

Chan.	Freq. (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
58	5290	75.84	75.84
106	5530	76.32	76.08
122	5610	75.84	75.84

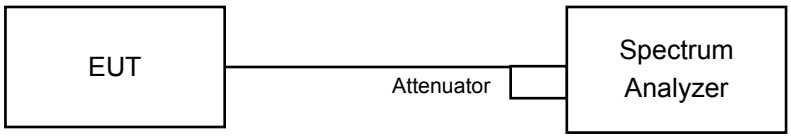
Spectrum Plot of Worst Value	
802.11a	802.11n (HT20)
	
802.11n (HT40)	802.11ac (VHT80)
	

4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedures

Using method SA-2

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

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

c. Set Channel power measure = 1MHz

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

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

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Conditions

Same as 4.3.6.

4.5.7 Test Results

802.11a

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
52	5260	7.81	7.68	0.19	10.95	11.00	Pass
60	5300	7.81	7.71	0.19	10.96	11.00	Pass
64	5320	7.50	7.04	0.19	10.48	11.00	Pass
100	5500	7.14	6.54	0.19	10.05	10.12	Pass
116	5580	6.92	6.16	0.19	9.76	10.12	Pass
140	5700	6.67	6.18	0.19	9.64	10.12	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 band: Directional gain = 2.73dBi + 10log(2) = 5.74dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C band: Directional gain = 3.87dBi + 10log(2) = 6.88dBi > 6dBi, so the power density limit shall be reduced to 11-(6.88-6) = 10.12dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT20)

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
52	5260	7.84	6.97	0.09	10.53	11.00	Pass
60	5300	7.43	7.43	0.09	10.53	11.00	Pass
64	5320	7.85	7.40	0.09	10.73	11.00	Pass
100	5500	7.00	6.09	0.09	9.67	10.12	Pass
116	5580	7.34	6.09	0.09	9.86	10.12	Pass
140	5700	6.98	6.37	0.09	9.79	10.12	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 band: Directional gain = 2.73dBi + 10log(2) = 5.74dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C band: Directional gain = 3.87dBi + 10log(2) = 6.88dBi > 6dBi, so the power density limit shall be reduced to 11-(6.88-6) = 10.12dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11n (HT40)

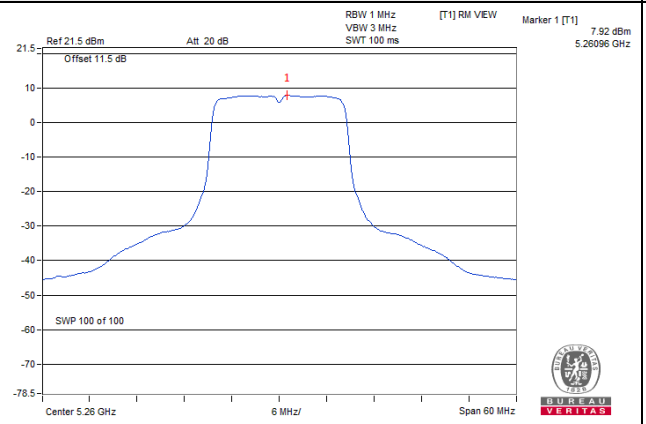
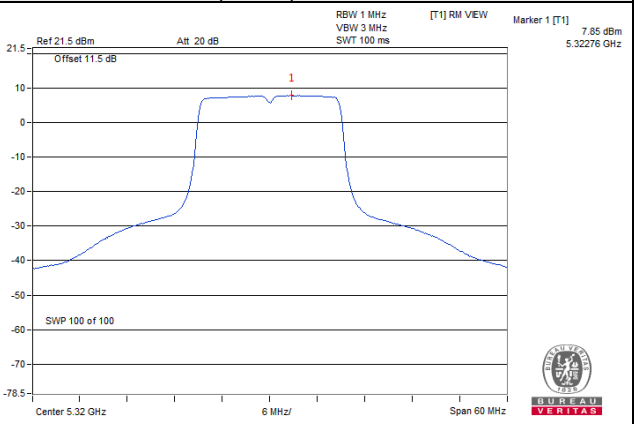
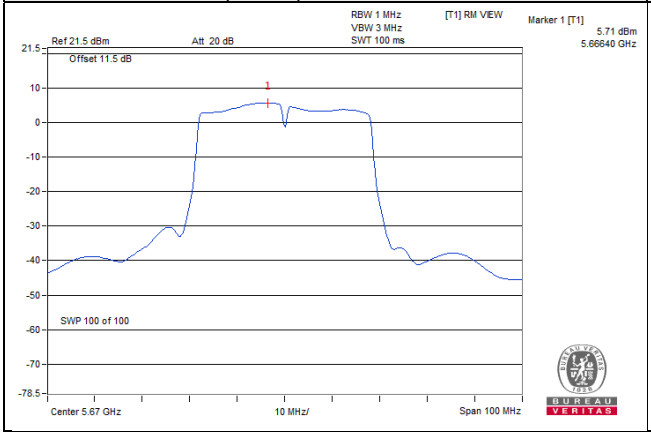
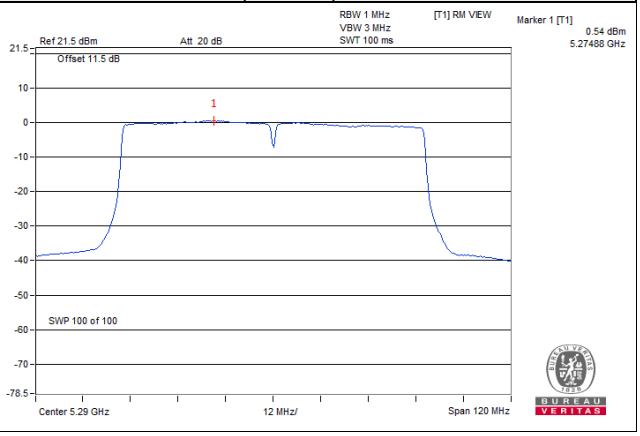
Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
54	5270	5.19	5.07	0.16	8.30	11.00	Pass
62	5310	3.37	3.39	0.16	6.55	11.00	Pass
102	5510	4.46	3.40	0.16	7.13	10.12	Pass
110	5550	4.95	3.93	0.16	7.64	10.12	Pass
134	5670	5.69	5.01	0.16	8.53	10.12	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 band: Directional gain = 2.73dBi + 10log(2) = 5.74dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C band: Directional gain = 3.87dBi + 10log(2) = 6.88dBi > 6dBi, so the power density limit shall be reduced to 11-(6.88-6) = 10.12dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Chan.	Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD with Duty Factor (dBm/MHz)	Max. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
58	5290	0.47	0.21	0.25	3.61	11.00	Pass
106	5530	-0.73	-1.71	0.25	2.07	10.12	Pass
122	5610	-0.01	-1.51	0.25	2.57	10.12	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 band: Directional gain = 2.73dBi + 10log(2) = 5.74dBi < 6dBi, so the power density limit no need to reduced.
   U-NII-2C band: Directional gain = 3.87dBi + 10log(2) = 6.88dBi > 6dBi, so the power density limit shall be reduced to 11-(6.88-6) = 10.12dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

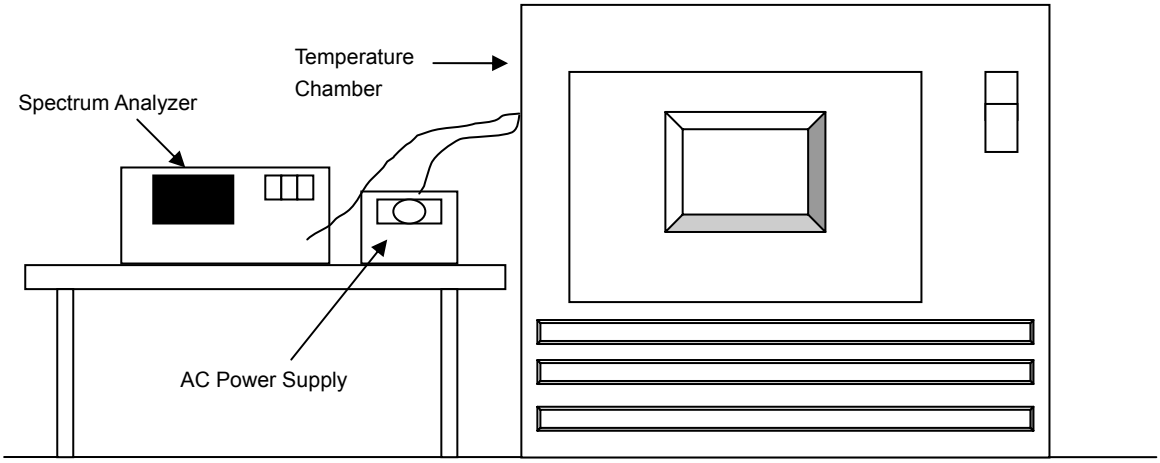
Spectrum Plot of Worst Value	
802.11a / Chain 0 / CH 52	802.11n (HT20) / Chain 0 / CH 64
	
802.11n (HT40) / Chain 0 / CH 134	802.11ac (VHT80) / Chain 0 / 58
	

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)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
50	120	5260.0246	Pass	5260.0223	Pass	5260.0224	Pass	5260.0248	Pass
40	120	5260.0172	Pass	5260.0155	Pass	5260.0137	Pass	5260.0187	Pass
30	120	5260.0004	Pass	5260.0028	Pass	5260.0016	Pass	5260.0038	Pass
20	120	5260.0111	Pass	5260.0094	Pass	5260.0081	Pass	5260.0119	Pass
10	120	5259.9987	Pass	5259.9995	Pass	5259.9985	Pass	5260.0006	Pass
0	120	5260.0147	Pass	5260.0141	Pass	5260.0162	Pass	5260.0138	Pass
-10	120	5260.0039	Pass	5260.0067	Pass	5260.0065	Pass	5260.0045	Pass
-20	120	5259.9945	Pass	5259.9904	Pass	5259.9948	Pass	5259.9919	Pass
-30	120	5260.0173	Pass	5260.0152	Pass	5260.0175	Pass	5260.0155	Pass

Frequency Stability Versus Voltage									
Operating Frequency: 5260MHz									
Temp. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result	Measured Frequency (MHz)	Result
20	138	5260.0116	Pass	5260.0101	Pass	5260.0073	Pass	5260.0114	Pass
	120	5260.0111	Pass	5260.0094	Pass	5260.0081	Pass	5260.0119	Pass
	102	5260.0121	Pass	5260.0088	Pass	5260.0079	Pass	5260.0112	Pass

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 FCC recognized accredited test firms and accredited and approved according to ISO/IEC 17025.

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

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

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

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

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

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

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