FCC Test Report

Report No.:	RF161125E01D-1
FCC ID:	PY317100373
Test Model:	EX7500
Received Date:	Nov. 25, 2016
Test Date:	Dec. 01 to 21, 2016
Issued Date:	Sep. 08, 2017
Applicant:	NETGEAR, Inc.
Address:	350 East Plumeria Drive San Jose, CA 95134
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location :	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan R.O.C.
Test Location (2):	No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RF161125E01D-1	Original release.	Sep. 08, 2017

1 Certificate of Conformity

Product:	Nighthawk X4S AC2200 Tri-Band WiFi Range Extender
Brand:	NETGEAR
Test Model:	EX7500
Sample Status:	ENGINEERING SAMPLE
Applicant:	NETGEAR, Inc.
Test Date:	Dec. 01 to 21, 2016
Standard:	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:** Sep. 08, 2017

Wendy Wu / Specialist

Approved by : _____ , **Date:** Sep. 08, 2017

May Chen / 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 -16.90dB at 1.40625MHz.
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 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	No antenna connector is used.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.83 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.34 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	3.41 dB
	6GHz ~ 18GHz	3.49 dB
	18GHz ~ 40GHz	3.30 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Nighthawk X4S AC2200 Tri-Band WiFi Range Extender
Brand	NETGEAR
Test Model	EX7500
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	AC 100-240V, 60/50Hz, 0.2A
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode and VHT20/40 mode in 2.4GHz band
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.4GHz:** **CDD Mode** 798.221mW **Beamforming Mode** 775.412mW **5GHz:** **5.18GHz ~ 5.24GHz:** **CDD Mode** 291.67mW **Beamforming Mode** 309.071mW **5.745GHz ~ 5.825GHz:** **CDD Mode** 567.608mW **Beamforming Mode** 566.416mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT has two radio transceivers, radio 1 is WLAN technologies for dual band (2.4GHz & 5GHz-UNII-3) and radio 2 is WLAN technology for single band (5GHz-UNII-1).
2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN (Radio 1) (2.4GHz)+ (5GHz-UNII-3)	WLAN (Radio 2) (5GHz-UNII-1)
Note: The emission of the simultaneous operation has been evaluated and no non-compliance was found.		

3. The antennas provided to the EUT, please refer to the following table:

WLAN (Radio 1) Antenna			
Frequency range (GHz)	Directional Antenna Gain (dBi)	Antenna Type	Connecter Type
2.4~2.4835	5.23	PIFA	NA
5.725~5.85	4.86		
WLAN (Radio 2) Antenna			
Frequency range (GHz)	Directional Antenna Gain (dBi)	Antenna Type	Connecter Type
5.15~5.25	3.35	PIFA	NA

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	2TX	2RX
802.11g	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
VHT20	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
VHT40	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	2TX	2RX
802.11n (HT20)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11n (HT40)	MCS 0~7	2TX	2RX
	MCS 8~15	2TX	2RX
802.11ac (VHT20)	MCS0~8 Nss=1	2TX	2RX
	MCS0~8 Nss=2	2TX	2RX
802.11ac (VHT40)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX
802.11ac (VHT80)	MCS0~9 Nss=1	2TX	2RX
	MCS0~9 Nss=2	2TX	2RX

Note:

1. All of modulation mode support beamforming function except 802.11a/b/g modulation mode.
2. 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)
3. The EUT support Beamforming and CDD mode, therefore both mode were investigated and the worst case scenario was identified. The worst case data were presented in test report.

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

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz

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

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

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

Channel	Frequency	Channel	Frequency
38	5190MHz	46	5230MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

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

Where **RE≥1G:** Radiated Emission above 1GHz **RE<1G:** Radiated Emission below 1GHz
PLC: Power Line Conducted Emission **APCM:** Antenna Port Conducted Measurement

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

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.

Radio 2						
CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
Beamforming Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
Radio 1						
CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
Beamforming Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	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.

Radio 2						
Beamforming Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT20)	5180-5240	36 to 48	40	OFDM	BPSK	6.5
Radio 1						
CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11a	5745-5825	149 to 165	157	OFDM	BPSK	6

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.

Radio 2						
Beamforming Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT20)	5180-5240	36 to 48	40	OFDM	BPSK	6.5
Radio 1						
CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11a	5745-5825	149 to 165	157	OFDM	BPSK	6

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.

Radio 2						
CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
Beamforming Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT20)	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11ac (VHT40)		38 to 46	38, 46	OFDM	BPSK	13.5
802.11ac (VHT80)		42	42	OFDM	BPSK	29.3
Radio 1						
CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
Beamforming Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11ac (VHT20)	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11ac (VHT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3

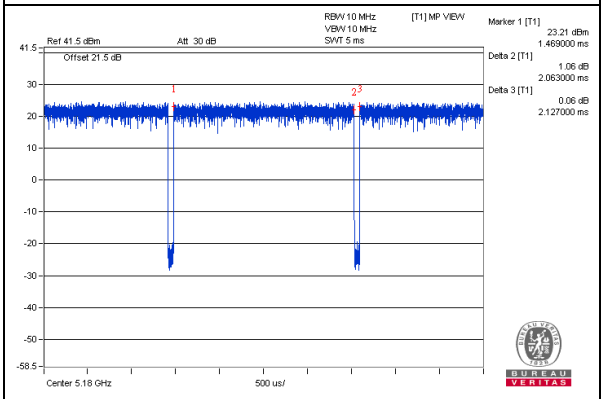
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	25deg. C, 71%RH	120Vac, 60Hz	Terry Huang
RE<1G	25deg. C, 68%RH	120Vac, 60Hz	Andy Ho
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

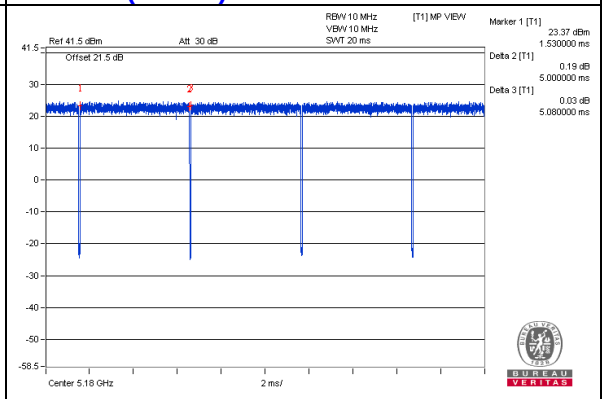
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
802.11a: Duty cycle = 2.063 ms/2.127 ms = 0.97, Duty factor = 10 * log(1/0.97) = 0.13
802.11ac (VHT20): Duty cycle = 5 ms/5.08 ms = 0.984
802.11ac (VHT40): Duty cycle = 2.434 ms/2.505 ms = 0.972, Duty factor = 10 * log(1/0.972) = 0.12
802.11ac (VHT80): Duty cycle = 1.148 ms/1.215 ms = 0.945, Duty factor = 10 * log(1/0.945) = 0.25

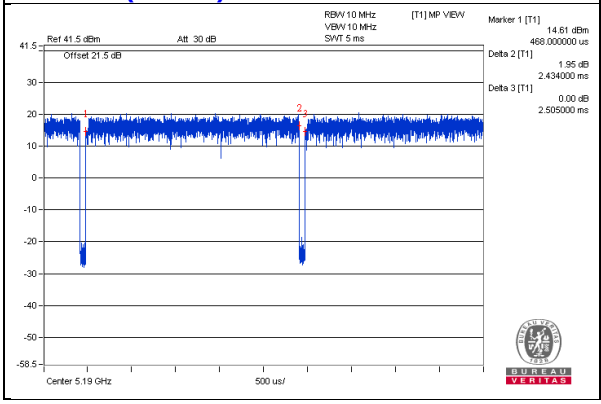
802.11a



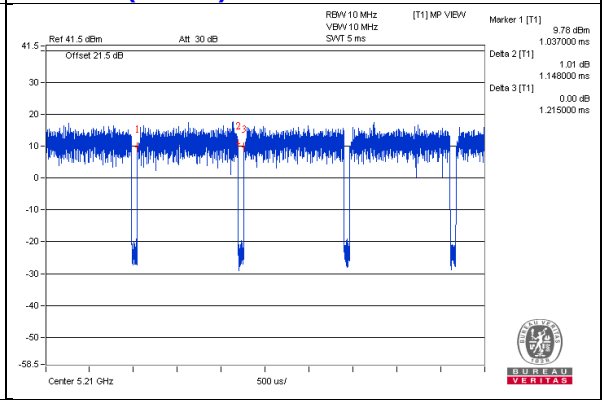
802.11ac (VHT20)



802.11ac (VHT40)



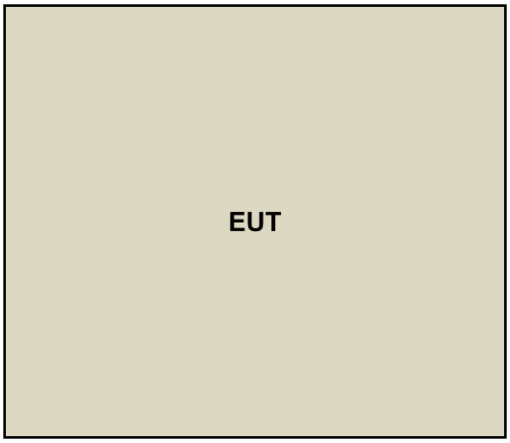
802.11ac (VHT80)



3.4 Description of Support Units

The EUT has been tested as an independent unit.

3.4.1 Configuration of System under Test



3.5 General Description of Applied Standard

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 v01r04
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.

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="2">Applicable To</td><td colspan="2">Limit</td></tr>
<tr><td colspan="2" rowspan="2">789033 D02 General UNII Test Procedure New Rules v01r04</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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 20, 2016	July 19, 2017
Pre-Amplifier(*) EMCI	EMC001340	980142	Jan. 20, 2016	Jan. 19, 2018
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 18, 2016	Jan. 17, 2017
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 10, 2016	Nov. 09, 2017
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Jan. 04, 2016	Jan. 03, 2017
RF Cable	8D	966-4-1 966-4-2 966-4-3	Apr. 02, 2016	Apr. 01, 2017
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 05, 2016	Oct. 04, 2017
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Jan. 19, 2016	Jan. 18, 2017
Pre-Amplifier Agilent	8449B	3008A01922	Sep. 18, 2016	Sep. 17, 2017
RF Cable	EMC104-SM-SM-2000 EMC104-SM-SM-5000 EMC104-SM-SM-5000	150318 150323 150324	Mar. 30, 2016	Mar. 29, 2017
Pre-Amplifier EMCI	EMC184045	980143	Jan. 15, 2016	Jan. 14, 2017
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Jan. 08, 2016	Jan. 07, 2017
RF Cable	SUCOFLEX 102	36432/2 36441/2	Jan. 16, 2016	Jan. 15, 2017
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208410	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP02	NA	NA
Spectrum Analyzer R&S	FSv40	100964	June 28, 2016	June 27, 2017
Power meter Anritsu	ML2495A	1014008	May 5, 2016	May 4, 2017
Power sensor Anritsu	MA2411B	0917122	May 5, 2016	May 4, 2017
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 15, 2016	Jan. 14, 2017
Digital Multimeter FLUKE	87III	73680266	Nov. 10, 2016	Nov. 09, 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 calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2
5 Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Dec. 20 to 21, 2016

4.1.3 Test Procedure

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:

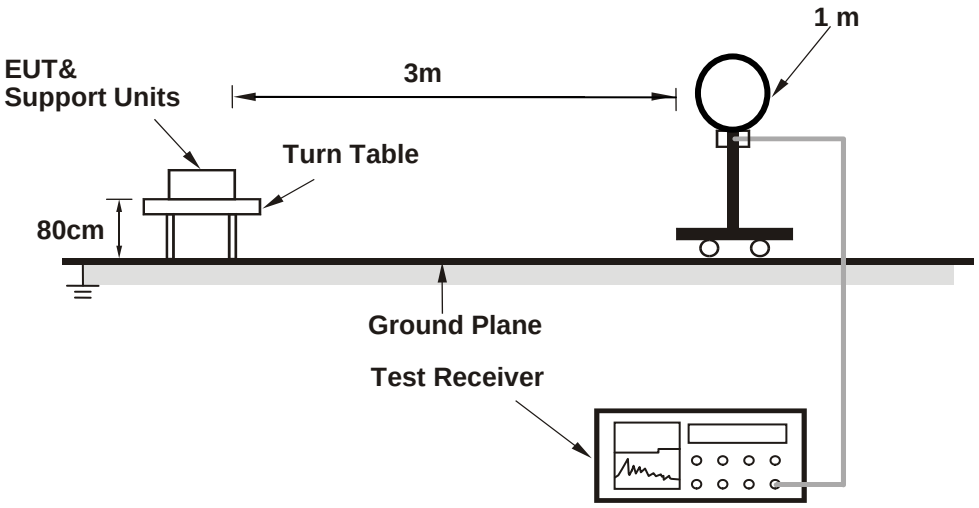
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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

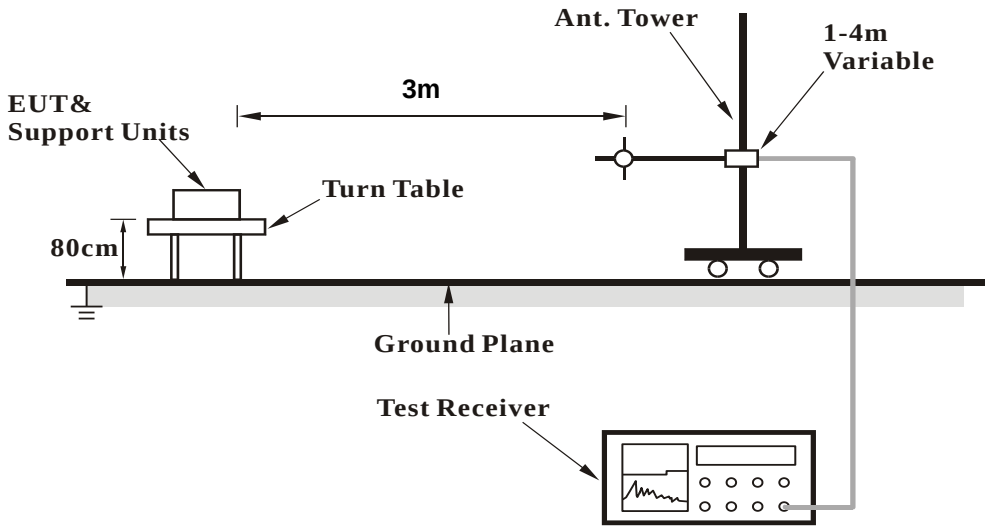
No deviation.

4.1.5 Test Setup

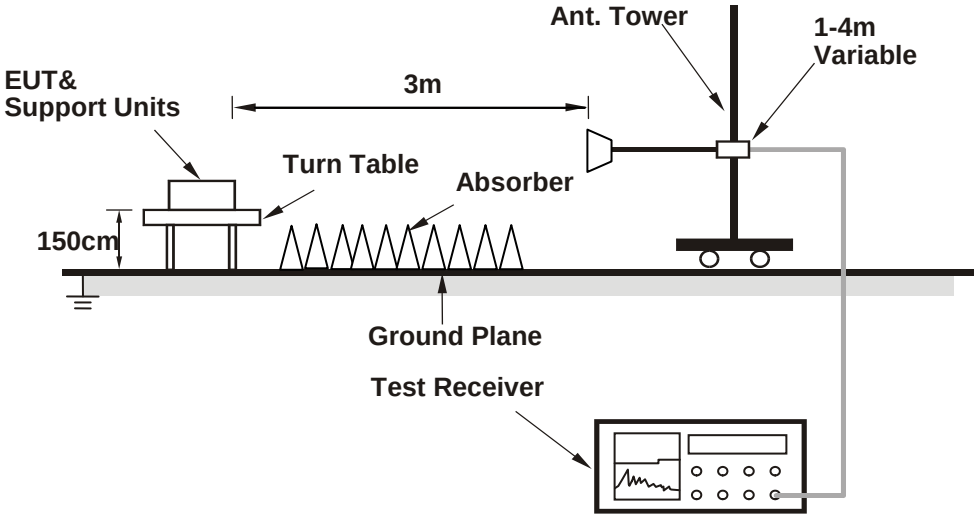
For Radiated emission below 30MHz



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 Condition

1 Turn on the power of EUT.

2 The communication partner run test program “QRCT3.0.187.0” to enable EUT under transmission/receiving condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

Radio 2

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	67.0 PK	74.0	-7.0	1.62 H	327	64.0	3.0
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.62 H**	**327**	**50.9**	**3.0**
3	*5180.00	117.0 PK			1.62 H	327	113.8	3.2
4	*5180.00	105.6 AV			1.62 H	327	102.4	3.2
5	#10360.00	56.9 PK	74.0	-17.1	1.65 H	242	43.8	13.1
6	#10360.00	45.0 AV	54.0	-9.0	1.65 H	242	31.9	13.1
7	15540.00	57.3 PK	74.0	-16.7	1.56 H	156	42.6	14.7
8	15540.00	44.7 AV	54.0	-9.3	1.56 H	156	30.0	14.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	64.4 PK	74.0	-9.6	1.88 V	76	61.4	3.0
2	5150.00	53.2 AV	54.0	-0.8	1.88 V	76	50.2	3.0
3	*5180.00	116.8 PK			1.88 V	76	113.6	3.2
4	*5180.00	105.1 AV			1.88 V	76	101.9	3.2
5	#10360.00	58.0 PK	74.0	-16.0	2.86 V	186	44.9	13.1
6	#10360.00	46.2 AV	54.0	-7.8	2.86 V	186	33.1	13.1
7	15540.00	59.7 PK	74.0	-14.3	1.70 V	259	45.0	14.7
8	15540.00	47.8 AV	54.0	-6.2	1.70 V	259	33.1	14.7

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	58.7 PK	74.0	-15.3	1.60 H	323	55.7	3.0
2	5150.00	46.0 AV	54.0	-8.0	1.60 H	323	43.0	3.0
3	*5200.00	113.0 PK			1.60 H	323	109.8	3.2
4	*5200.00	103.8 AV			1.60 H	323	100.6	3.2
5	#10400.00	56.7 PK	74.0	-17.3	1.70 H	240	43.3	13.4
6	#10400.00	45.0 AV	54.0	-9.0	1.70 H	240	31.6	13.4
7	15600.00	57.5 PK	74.0	-16.5	1.61 H	152	42.7	14.8
8	15600.00	45.1 AV	54.0	-8.9	1.61 H	152	30.3	14.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.0 PK	74.0	-12.0	1.98 V	67	59.0	3.0
2	5150.00	48.1 AV	54.0	-5.9	1.98 V	67	45.1	3.0
3	*5200.00	116.5 PK			1.98 V	67	113.3	3.2
4	*5200.00	105.9 AV			1.98 V	67	102.7	3.2
5	#10400.00	57.8 PK	74.0	-16.2	2.84 V	188	44.4	13.4
6	#10400.00	46.2 AV	54.0	-7.8	2.84 V	188	32.8	13.4
7	15600.00	59.7 PK	74.0	-14.3	1.69 V	261	44.9	14.8
8	15600.00	47.6 AV	54.0	-6.4	1.69 V	261	32.8	14.8

REMARKS:

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	112.9 PK			1.57 H	315	109.8	3.1
2	*5240.00	104.1 AV			1.57 H	315	101.0	3.1
3	5350.00	50.7 PK	74.0	-23.3	1.57 H	315	47.5	3.2
4	5350.00	38.0 AV	54.0	-16.0	1.57 H	315	34.8	3.2
5	#10480.00	57.0 PK	74.0	-17.0	1.64 H	236	44.1	12.9
6	#10480.00	45.5 AV	54.0	-8.5	1.64 H	236	32.6	12.9
7	15720.00	57.3 PK	74.0	-16.7	1.65 H	149	42.3	15.0
8	15720.00	44.9 AV	54.0	-9.1	1.65 H	149	29.9	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	*5240.00	116.4 PK			1.98 V	62	113.3	3.1
2	*5240.00	106.2 AV			1.98 V	62	103.1	3.1
3	5350.00	52.8 PK	74.0	-21.2	1.98 V	62	49.6	3.2
4	5350.00	40.0 AV	54.0	-14.0	1.98 V	62	36.8	3.2
5	#10480.00	57.7 PK	74.0	-16.3	2.86 V	193	44.8	12.9
6	#10480.00	46.4 AV	54.0	-7.6	2.86 V	193	33.5	12.9
7	15720.00	59.9 PK	74.0	-14.1	1.74 V	273	44.9	15.0
8	15720.00	48.0 AV	54.0	-6.0	1.74 V	273	33.0	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.

802.11ac (VHT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.8 PK	74.0	-8.2	1.74 H	331	62.8	3.0
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.74 H**	**331**	**50.9**	**3.0**
3	*5180.00	112.9 PK			1.74 H	331	109.7	3.2
4	*5180.00	101.5 AV			1.74 H	331	98.3	3.2
5	#10360.00	56.9 PK	74.0	-17.1	1.68 H	252	43.8	13.1
6	#10360.00	45.1 AV	54.0	-8.9	1.68 H	252	32.0	13.1
7	15540.00	56.9 PK	74.0	-17.1	1.58 H	170	42.2	14.7
8	15540.00	44.6 AV	54.0	-9.4	1.58 H	170	29.9	14.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.2 PK	74.0	-11.8	2.06 V	76	59.2	3.0
2	5150.00	48.3 AV	54.0	-5.7	2.06 V	76	45.3	3.0
3	*5180.00	111.5 PK			2.06 V	76	108.3	3.2
4	*5180.00	100.8 AV			2.06 V	76	97.6	3.2
5	#10360.00	57.4 PK	74.0	-16.6	2.83 V	181	44.3	13.1
6	#10360.00	45.8 AV	54.0	-8.2	2.83 V	181	32.7	13.1
7	15540.00	59.9 PK	74.0	-14.1	1.69 V	262	45.2	14.7
8	15540.00	47.9 AV	54.0	-6.1	1.69 V	262	33.2	14.7

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	55.0 PK	74.0	-19.0	1.68 H	347	52.0	3.0
2	5150.00	44.0 AV	54.0	-10.0	1.68 H	347	41.0	3.0
3	*5200.00	111.6 PK			1.68 H	347	108.4	3.2
4	*5200.00	102.6 AV			1.68 H	347	99.4	3.2
5	#10400.00	56.5 PK	74.0	-17.5	1.73 H	245	43.1	13.4
6	#10400.00	44.8 AV	54.0	-9.2	1.73 H	245	31.4	13.4
7	15600.00	57.1 PK	74.0	-16.9	1.59 H	176	42.3	14.8
8	15600.00	44.9 AV	54.0	-9.1	1.59 H	176	30.1	14.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	58.4 PK	74.0	-15.6	1.98 V	62	55.4	3.0
2	5150.00	46.1 AV	54.0	-7.9	1.98 V	62	43.1	3.0
3	*5200.00	115.0 PK			1.98 V	62	111.8	3.2
4	*5200.00	104.7 AV			1.98 V	62	101.5	3.2
5	#10400.00	57.2 PK	74.0	-16.8	2.84 V	185	43.8	13.4
6	#10400.00	45.8 AV	54.0	-8.2	2.84 V	185	32.4	13.4
7	15600.00	59.2 PK	74.0	-14.8	1.67 V	259	44.4	14.8
8	15600.00	47.4 AV	54.0	-6.6	1.67 V	259	32.6	14.8

REMARKS:

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

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	111.5 PK			1.70 H	331	108.4	3.1
2	*5240.00	102.0 AV			1.70 H	331	98.9	3.1
3	5350.00	48.9 PK	74.0	-25.1	1.70 H	331	45.7	3.2
4	5350.00	37.9 AV	54.0	-16.1	1.70 H	331	34.7	3.2
5	#10480.00	56.6 PK	74.0	-17.4	1.78 H	254	43.7	12.9
6	#10480.00	44.8 AV	54.0	-9.2	1.78 H	254	31.9	12.9
7	15720.00	57.3 PK	74.0	-16.7	1.60 H	163	42.3	15.0
8	15720.00	45.0 AV	54.0	-9.0	1.60 H	163	30.0	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	*5240.00	114.9 PK			1.98 V	59	111.8	3.1
2	*5240.00	104.1 AV			1.98 V	59	101.0	3.1
3	5350.00	52.4 PK	74.0	-21.6	1.98 V	59	49.2	3.2
4	5350.00	40.0 AV	54.0	-14.0	1.98 V	59	36.8	3.2
5	#10480.00	57.7 PK	74.0	-16.3	2.89 V	197	44.8	12.9
6	#10480.00	46.3 AV	54.0	-7.7	2.89 V	197	33.4	12.9
7	15720.00	58.9 PK	74.0	-15.1	1.66 V	269	43.9	15.0
8	15720.00	47.3 AV	54.0	-6.7	1.66 V	269	32.3	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.

802.11ac (VHT40)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.9 PK	74.0	-10.1	3.55 H	45	60.9	3.0
2	5150.00	51.3 AV	54.0	-2.7	3.55 H	45	48.3	3.0
3	*5190.00	106.6 PK			3.55 H	45	103.4	3.2
4	*5190.00	97.2 AV			3.55 H	45	94.0	3.2
5	#10380.00	57.0 PK	74.0	-17.0	1.63 H	262	43.8	13.2
6	#10380.00	45.0 AV	54.0	-9.0	1.63 H	262	31.8	13.2
7	15570.00	57.5 PK	74.0	-16.5	1.64 H	181	42.8	14.7
8	15570.00	44.9 AV	54.0	-9.1	1.64 H	181	30.2	14.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.3 PK	74.0	-6.7	1.98 V	60	64.3	3.0
2	5150.00	53.4 AV	54.0	-0.6	1.98 V	60	50.4	3.0
3	*5190.00	110.0 PK			1.98 V	60	106.8	3.2
4	*5190.00	99.3 AV			1.98 V	60	96.1	3.2
5	#10380.00	57.0 PK	74.0	-17.0	2.97 V	189	43.8	13.2
6	#10380.00	45.8 AV	54.0	-8.2	2.97 V	189	32.6	13.2
7	15570.00	59.8 PK	74.0	-14.2	1.61 V	286	45.1	14.7
8	15570.00	48.0 AV	54.0	-6.0	1.61 V	286	33.3	14.7

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	109.8 PK			3.58 H	37	106.7	3.1
2	*5230.00	99.2 AV			3.58 H	37	96.1	3.1
3	5350.00	48.8 PK	74.0	-25.2	3.58 H	37	45.6	3.2
4	5350.00	39.3 AV	54.0	-14.7	3.58 H	37	36.1	3.2
5	#10460.00	57.2 PK	74.0	-16.8	1.66 H	278	44.2	13.0
6	#10460.00	45.0 AV	54.0	-9.0	1.66 H	278	32.0	13.0
7	15690.00	57.6 PK	74.0	-16.4	1.67 H	190	42.5	15.1
8	15690.00	45.2 AV	54.0	-8.8	1.67 H	190	30.1	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	*5230.00	113.2 PK			1.98 V	59	110.1	3.1
2	*5230.00	102.3 AV			1.98 V	59	99.2	3.1
3	5350.00	52.2 PK	74.0	-21.8	1.98 V	59	49.0	3.2
4	5350.00	40.4 AV	54.0	-13.6	1.98 V	59	37.2	3.2
5	#10460.00	57.2 PK	74.0	-16.8	2.87 V	191	44.2	13.0
6	#10460.00	46.3 AV	54.0	-7.7	2.87 V	191	33.3	13.0
7	15690.00	59.8 PK	74.0	-14.2	1.67 V	268	44.7	15.1
8	15690.00	48.0 AV	54.0	-6.0	1.67 V	268	32.9	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.

802.11ac (VHT80)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.1 PK	74.0	-10.9	2.70 H	329	60.1	3.0
2	5150.00	51.6 AV	54.0	-2.4	2.70 H	329	48.6	3.0
3	*5210.00	101.7 PK			2.70 H	329	98.5	3.2
4	*5210.00	89.4 AV			2.70 H	329	86.2	3.2
5	#10420.00	57.4 PK	74.0	-16.6	1.58 H	250	44.2	13.2
6	#10420.00	45.3 AV	54.0	-8.7	1.58 H	250	32.1	13.2
7	15630.00	57.1 PK	74.0	-16.9	1.61 H	180	42.2	14.9
8	15630.00	44.8 AV	54.0	-9.2	1.61 H	180	29.9	14.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.5 PK	74.0	-7.5	1.98 V	61	63.5	3.0
2	5150.00	53.9 AV	54.0	-0.1	1.98 V	61	50.9	3.0
3	*5210.00	103.8 PK			1.98 V	61	100.6	3.2
4	*5210.00	92.5 AV			1.98 V	61	89.3	3.2
5	#10420.00	61.4 PK	74.0	-12.6	1.02 V	266	48.2	13.2
6	#10420.00	50.1 AV	54.0	-3.9	1.02 V	266	36.9	13.2
7	15630.00	56.4 PK	74.0	-17.6	1.13 V	184	41.5	14.9
8	15630.00	45.6 AV	54.0	-8.4	1.13 V	184	30.7	14.9

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.

Radio 1

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5609.98	57.3 PK	68.2	-10.9	3.09 H	63	54.8	2.5
2	*5745.00	112.4 PK			3.09 H	63	108.4	4.0
3	*5745.00	102.3 AV			3.09 H	63	98.3	4.0
4	#5986.23	57.0 PK	68.2	-11.2	3.09 H	63	53.8	3.2
5	11490.00	61.3 PK	74.0	-12.7	1.00 H	341	47.3	14.0
6	11490.00	50.9 AV	54.0	-3.1	1.00 H	341	36.9	14.0
7	#17235.00	64.3 PK	74.0	-9.7	1.96 H	337	44.6	19.7
8	#17235.00	50.8 AV	54.0	-3.2	1.96 H	337	31.1	19.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5566.11	58.6 PK	68.2	-9.6	1.00 V	347	56.3	2.3
2	*5745.00	115.1 PK			1.00 V	347	111.1	4.0
3	*5745.00	105.6 AV			1.00 V	347	101.6	4.0
4	#6020.33	58.5 PK	68.2	-9.7	1.00 V	347	55.2	3.3
5	11490.00	61.8 PK	74.0	-12.2	1.00 V	216	47.8	14.0
6	11490.00	51.2 AV	54.0	-2.8	1.00 V	216	37.2	14.0
7	#17235.00	54.8 PK	74.0	-19.2	1.84 V	298	35.1	19.7
8	#17235.00	45.1 AV	54.0	-8.9	1.84 V	298	25.4	19.7

REMARKS:

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5608.95	57.6 PK	68.2	-10.6	3.38 H	69	55.1	2.5
2	*5785.00	113.4 PK			3.38 H	69	109.4	4.0
3	*5785.00	103.1 AV			3.38 H	69	99.1	4.0
4	#5996.23	58.1 PK	68.2	-10.1	3.38 H	69	54.8	3.3
5	11570.00	62.5 PK	74.0	-11.5	1.00 H	336	48.7	13.8
6	11570.00	52.6 AV	54.0	-1.4	1.00 H	336	38.8	13.8
7	#17355.00	61.7 PK	74.0	-12.3	1.92 H	334	41.3	20.4
8	#17355.00	49.2 AV	54.0	-4.8	1.92 H	334	28.8	20.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5620.26	57.3 PK	68.2	-10.9	1.00 V	360	54.8	2.5
2	*5785.00	117.7 PK			1.00 V	360	113.7	4.0
3	*5785.00	108.1 AV			1.00 V	360	104.1	4.0
4	#5968.25	57.9 PK	68.2	-10.3	1.00 V	360	54.9	3.0
5	11570.00	62.2 PK	74.0	-11.8	1.00 V	220	48.4	13.8
6	11570.00	51.2 AV	54.0	-2.8	1.00 V	220	37.4	13.8
7	#17355.00	56.1 PK	74.0	-17.9	1.20 V	152	35.7	20.4
8	#17355.00	45.3 AV	54.0	-8.7	1.20 V	152	24.9	20.4

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5600.56	58.6 PK	68.2	-9.6	3.37 H	57	56.2	2.4
2	*5825.00	111.5 PK			3.02 H	44	107.5	4.0
3	*5825.00	101.5 AV			3.02 H	44	97.5	4.0
4	#5956.48	59.4 PK	68.2	-8.8	3.37 H	57	56.4	3.0
5	11650.00	63.4 PK	74.0	-10.6	3.34 H	343	49.7	13.7
6	11650.00	51.2 AV	54.0	-2.8	3.34 H	343	37.5	13.7
7	#17475.00	67.5 PK	74.0	-6.5	2.04 H	327	46.8	20.7
8	#17475.00	53.8 AV	54.0	-0.2	2.04 H	327	33.1	20.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5646.66	58.0 PK	68.2	-10.2	1.00 V	360	55.5	2.5
2	*5825.00	118.0 PK			1.00 V	360	114.0	4.0
3	*5825.00	107.7 AV			1.00 V	360	103.7	4.0
4	#6004.66	58.1 PK	68.2	-10.1	1.00 V	360	54.8	3.3
5	11650.00	61.8 PK	74.0	-12.2	1.00 V	343	48.1	13.7
6	11650.00	50.1 AV	54.0	-3.9	1.00 V	343	36.4	13.7
7	#17475.00	56.3 PK	74.0	-17.7	1.43 V	213	35.6	20.7
8	#17475.00	44.6 AV	54.0	-9.4	1.43 V	213	23.9	20.7

REMARKS:

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

802.11ac (VHT20)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5605.75	58.3 PK	68.2	-9.9	3.95 H	86	55.8	2.5
2	*5745.00	113.0 PK			3.38 H	33	109.0	4.0
3	*5745.00	102.4 AV			3.38 H	33	98.4	4.0
4	#5940.45	57.7 PK	68.2	-10.5	3.95 H	86	54.8	2.9
5	11490.00	65.8 PK	74.0	-8.2	3.37 H	349	51.8	14.0
6	11490.00	52.7 AV	54.0	-1.3	3.37 H	349	38.7	14.0
7	#17235.00	68.0 PK	74.0	-6.0	1.98 H	325	48.3	19.7
8	#17235.00	53.7 AV	54.0	-0.3	1.98 H	325	34.0	19.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5640.91	57.2 PK	68.2	-11.0	1.23 V	360	54.7	2.5
2	*5745.00	118.0 PK			1.13 V	11	114.0	4.0
3	*5745.00	106.8 AV			1.13 V	11	102.8	4.0
4	#5941.21	57.7 PK	68.2	-10.5	1.23 V	360	54.8	2.9
5	11490.00	66.7 PK	74.0	-7.3	2.74 V	320	52.7	14.0
6	11490.00	52.2 AV	54.0	-1.8	2.74 V	320	38.2	14.0
7	#17235.00	62.2 PK	74.0	-11.8	1.93 V	198	42.5	19.7
8	#17235.00	48.0 AV	54.0	-6.0	1.93 V	198	28.3	19.7

REMARKS:

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

CHANNEL	TX Channel 157	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5621.33	57.8 PK	68.2	-10.4	3.94 H	110	55.3	2.5
2	*5785.00	112.5 PK			3.39 H	61	108.5	4.0
3	*5785.00	101.6 AV			3.39 H	61	97.6	4.0
4	#5973.57	57.9 PK	68.2	-10.3	3.94 H	110	54.9	3.0
5	11570.00	64.4 PK	74.0	-9.6	3.37 H	348	50.6	13.8
6	11570.00	51.4 AV	54.0	-2.6	3.37 H	348	37.6	13.8
7	#17355.00	69.4 PK	74.0	-4.6	1.98 H	327	49.0	20.4
8	#17355.00	53.5 AV	54.0	-0.5	1.98 H	327	33.1	20.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5641.82	57.5 PK	68.2	-10.7	1.43 V	305	55.0	2.5
2	*5785.00	116.8 PK			1.10 V	345	112.8	4.0
3	*5785.00	107.6 AV			1.10 V	345	103.6	4.0
4	#6002.00	57.9 PK	68.2	-10.3	1.43 V	305	54.6	3.3
5	11570.00	61.9 PK	74.0	-12.1	1.00 V	214	48.1	13.8
6	11570.00	49.7 AV	54.0	-4.3	1.00 V	214	35.9	13.8
7	#17355.00	57.1 PK	74.0	-16.9	1.62 V	273	36.7	20.4
8	#17355.00	44.3 AV	54.0	-9.7	1.62 V	273	23.9	20.4

REMARKS:

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

CHANNEL	TX Channel 165	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5630.05	57.4 PK	68.2	-10.8	3.96 H	93	54.9	2.5
2	*5825.00	112.9 PK			3.54 H	51	108.9	4.0
3	*5825.00	102.0 AV			3.54 H	51	98.0	4.0
4	#5955.95	58.8 PK	68.2	-9.4	3.96 H	93	55.8	3.0
5	11650.00	63.8 PK	74.0	-10.2	3.34 H	343	50.1	13.7
6	11650.00	49.6 AV	54.0	-4.4	3.34 H	343	35.9	13.7
7	#17475.00	68.5 PK	74.0	-5.5	2.04 H	327	47.8	20.7
8	#17475.00	53.6 AV	54.0	-0.4	2.04 H	327	32.9	20.7
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5636.33	58.4 PK	68.2	-9.8	1.38 V	221	55.9	2.5
2	*5825.00	116.8 PK			1.00 V	360	112.8	4.0
3	*5825.00	105.7 AV			1.00 V	360	101.7	4.0
4	#5959.02	57.4 PK	68.2	-10.8	1.38 V	221	54.4	3.0
5	11650.00	62.2 PK	74.0	-11.8	1.00 V	213	48.5	13.7
6	11650.00	48.4 AV	54.0	-5.6	1.00 V	213	34.7	13.7
7	#17475.00	56.5 PK	74.0	-17.5	1.51 V	251	35.8	20.7
8	#17475.00	43.7 AV	54.0	-10.3	1.51 V	251	23.0	20.7

REMARKS:

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

802.11ac (VHT40)

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5613.48	58.7 PK	68.2	-9.5	3.94 H	229	56.2	2.5
2	*5755.00	107.7 PK			3.94 H	229	103.7	4.0
3	*5755.00	99.4 AV			3.94 H	229	95.4	4.0
4	#5947.02	57.8 PK	68.2	-10.4	3.94 H	229	54.9	2.9
5	11510.00	60.2 PK	74.0	-13.8	3.32 H	360	46.2	14.0
6	11510.00	49.7 AV	54.0	-4.3	3.32 H	360	35.7	14.0
7	#17265.00	64.5 PK	74.0	-9.5	2.71 H	358	44.6	19.9
8	#17265.00	53.7 AV	54.0	-0.3	2.71 H	358	33.8	19.9
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	#5648.47	59.8 PK	68.2	-8.4	1.82 V	34	57.3	2.5
2	*5755.00	114.3 PK			1.82 V	34	110.3	4.0
3	*5755.00	106.0 AV			1.82 V	34	102.0	4.0
4	#5971.03	59.6 PK	68.2	-8.6	1.82 V	34	56.6	3.0
5	11510.00	62.4 PK	74.0	-11.6	1.00 V	219	48.4	14.0
6	11510.00	50.0 AV	54.0	-4.0	1.00 V	219	36.0	14.0
7	#17265.00	57.1 PK	74.0	-16.9	1.62 V	279	37.2	19.9
8	#17265.00	44.3 AV	54.0	-9.7	1.62 V	279	24.4	19.9

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5615.16	57.8 PK	68.2	-10.4	2.72 H	337	55.3	2.5
2	*5795.00	107.5 PK			2.72 H	337	103.5	4.0
3	*5795.00	99.7 AV			2.72 H	337	95.7	4.0
4	#6017.01	57.5 PK	68.2	-10.7	2.72 H	337	54.2	3.3
5	11590.00	60.4 PK	74.0	-13.6	3.28 H	360	46.8	13.6
6	11590.00	49.9 AV	54.0	-4.1	3.28 H	360	36.3	13.6
7	#17385.00	64.7 PK	74.0	-9.3	2.69 H	353	44.2	20.5
8	#17385.00	53.8 AV	54.0	-0.2	2.69 H	353	33.3	20.5
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	#5639.70	59.0 PK	68.2	-9.2	1.77 V	29	56.5	2.5
2	*5795.00	114.1 PK			1.77 V	29	110.1	4.0
3	*5795.00	105.8 AV			1.77 V	29	101.8	4.0
4	#5946.30	58.3 PK	68.2	-9.9	1.77 V	29	55.4	2.9
5	11590.00	62.6 PK	74.0	-11.4	1.10 V	214	49.0	13.6
6	11590.00	50.2 AV	54.0	-3.8	1.10 V	214	36.6	13.6
7	#17385.00	57.1 PK	74.0	-16.9	1.67 V	279	36.6	20.5
8	#17385.00	44.2 AV	54.0	-9.8	1.67 V	279	23.7	20.5

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.

802.11ac (VHT80)

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK) Average (AV)
FREQUENCY RANGE	1GHz ~ 40GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5646.53	64.6 PK	68.2	-3.6	3.90 H	225	62.1	2.5
2	*5775.00	105.5 PK			3.90 H	225	101.5	4.0
3	*5775.00	98.6 AV			3.90 H	225	94.6	4.0
4	#5930.85	61.4 PK	68.2	-6.8	3.90 H	225	58.5	2.9
5	11550.00	60.7 PK	74.0	-13.3	3.23 H	360	46.8	13.9
6	11550.00	50.3 AV	54.0	-3.7	3.23 H	360	36.4	13.9
7	#17325.00	64.2 PK	74.0	-9.8	2.72 H	348	44.0	20.2
8	#17325.00	53.1 AV	54.0	-0.9	2.72 H	348	32.9	20.2
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	#5636.58	67.5 PK	68.2	-0.7	2.51 V	265	65.0	2.5
2	*5775.00	108.9 PK			1.11 V	4	104.9	4.0
3	*5775.00	100.7 AV			1.11 V	4	96.7	4.0
4	#5927.08	65.8 PK	68.2	-2.4	2.51 V	265	62.9	2.9
5	11550.00	62.7 PK	74.0	-11.3	1.09 V	203	48.8	13.9
6	11550.00	50.0 AV	54.0	-4.0	1.09 V	203	36.1	13.9
7	#17325.00	57.2 PK	74.0	-16.8	1.66 V	287	37.0	20.2
8	#17325.00	44.5 AV	54.0	-9.5	1.66 V	287	24.3	20.2

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.

Below 1GHz Data:

Radio 2

802.11ac (VHT20)

CHANNEL	TX Channel 40	**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	30.07	25.5 QP	40.0	-14.5	1.50 H	143	35.1	-9.6
2	100.83	36.1 QP	43.5	-7.4	2.00 H	103	48.6	-12.5
3	236.95	26.1 QP	46.0	-19.9	1.00 H	114	36.2	-10.1
4	341.59	25.5 QP	46.0	-20.5	1.00 H	206	32.1	-6.6
5	812.72	29.3 QP	46.0	-16.7	1.00 H	266	26.4	2.9
6	914.98	30.7 QP	46.0	-15.3	1.00 H	106	26.3	4.4
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	100.18	27.0 QP	43.5	-16.5	2.00 V	114	39.6	-12.6
2	143.20	31.3 QP	43.5	-12.2	1.00 V	206	39.5	-8.2
3	268.79	25.5 QP	46.0	-20.5	1.50 V	143	34.1	-8.6
4	660.01	33.0 QP	46.0	-13.0	1.50 V	142	32.4	0.6
5	780.00	35.4 QP	46.0	-10.6	1.50 V	206	32.8	2.6
6	840.00	36.3 QP	46.0	-9.7	1.50 V	246	33.1	3.2

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

Radio 1

802.11a

CHANNEL	TX Channel 157	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	30.07	26.1 QP	40.0	-13.9	1.00 H	144	35.7	-9.6
2	100.83	36.1 QP	43.5	-7.4	1.50 H	178	48.6	-12.5
3	236.95	27.6 QP	46.0	-18.4	1.50 H	147	37.7	-10.1
4	345.74	25.0 QP	46.0	-21.0	1.50 H	118	31.6	-6.6
5	391.28	24.6 QP	46.0	-21.4	1.50 H	251	29.9	-5.3
6	803.60	29.5 QP	46.0	-16.5	1.43 H	205	26.7	2.8
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	100.18	28.1 QP	43.5	-15.4	1.50 V	115	40.7	-12.6
2	143.20	31.2 QP	43.5	-12.3	1.50 V	113	39.4	-8.2
3	268.80	22.2 QP	46.0	-23.8	1.00 V	205	30.8	-8.6
4	660.01	33.1 QP	46.0	-12.9	1.50 V	197	32.5	0.6
5	780.00	37.7 QP	46.0	-8.3	1.50 V	38	35.1	2.6
6	840.00	35.5 QP	46.0	-10.5	1.00 V	143	32.3	3.2

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

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.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 24, 2016	Oct. 23, 2017
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 26, 2016	Oct. 25, 2017
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 13, 2016	June 12, 2017
RF Cable	5D-FB	COCCAB-001	Sep. 30, 2016	Sep. 29, 2017
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 20, 2016	June 19, 2017
Software BVADT	BVADT_Cond_ V7.3.7.4	NA	NA	NA

Note:

1. The calibration interval of the above test instruments are 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in Shielded Room No. 1.
3 Tested Date: Dec. 01, 2016

4.2.3 Test Procedure

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.

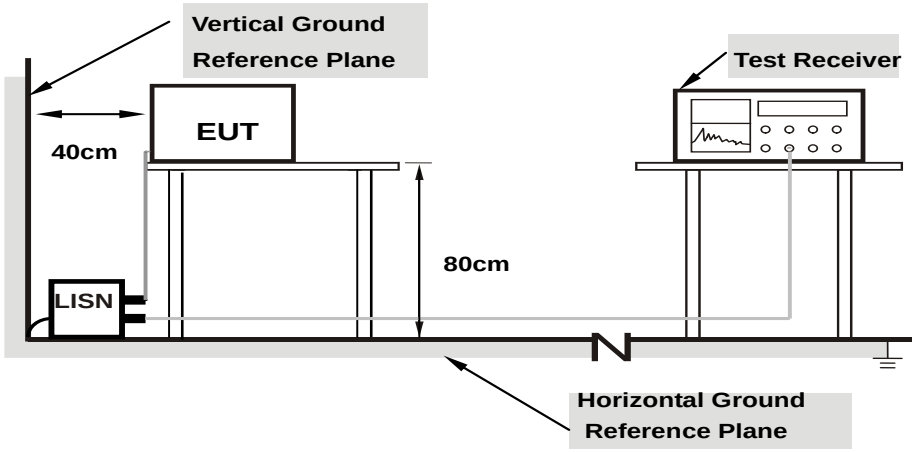
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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

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 Condition

Same as 4.1.6.

4.2.7 Test Results

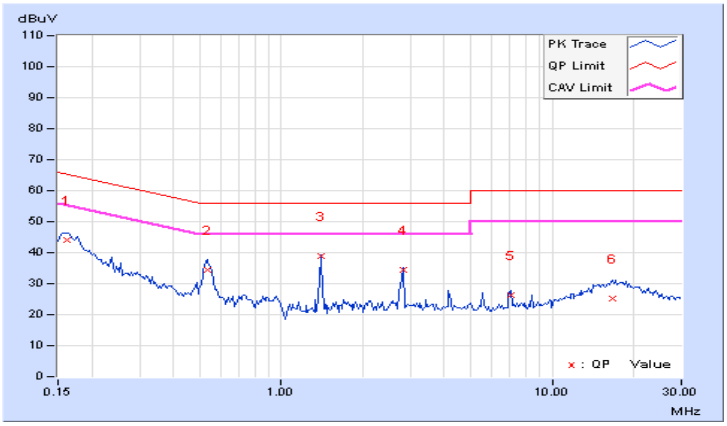
Radio 2

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	0.16172	10.20	33.93	22.41	44.13	32.61	65.38	55.38	-21.25	-22.77
2	0.53281	10.25	24.32	14.05	34.57	24.30	56.00	46.00	-21.43	-21.70
3	1.40625	10.30	28.55	17.87	38.85	28.17	56.00	46.00	-17.15	-17.83
4	2.81641	10.30	24.27	14.01	34.57	24.31	56.00	46.00	-21.43	-21.69
5	7.03906	10.52	15.86	6.62	26.38	17.14	60.00	50.00	-33.62	-32.86
6	16.68750	11.43	13.67	6.19	25.10	17.62	60.00	50.00	-34.90	-32.38

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.

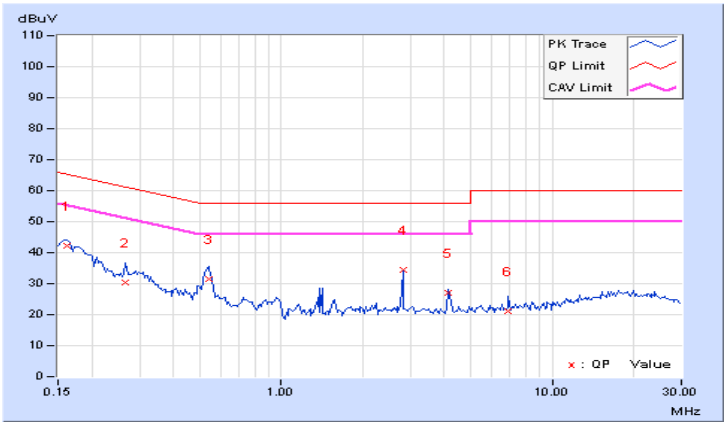


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.16172	10.19	32.20	21.38	42.39	31.57	65.38	55.38	-22.99	-23.81
2	0.26719	10.19	20.32	8.83	30.51	19.02	61.20	51.20	-30.69	-32.18
3	0.54063	10.24	21.07	16.09	31.31	26.33	56.00	46.00	-24.69	-19.67
4	2.81641	10.27	24.14	14.51	34.41	24.78	56.00	46.00	-21.59	-21.22
5	4.14453	10.23	16.77	7.83	27.00	18.06	56.00	46.00	-29.00	-27.94
6	6.90234	10.42	10.67	2.09	21.09	12.51	60.00	50.00	-38.91	-37.49

REMARKS:

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



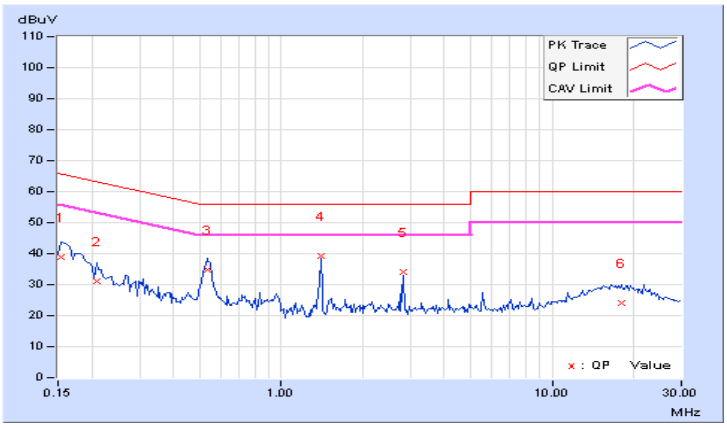
Radio 1

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	0.15391	10.20	28.83	13.93	39.03	24.13	65.79	55.79	-26.76	-31.66
2	0.20859	10.20	20.75	8.02	30.95	18.22	63.26	53.26	-32.31	-35.04
3	0.53281	10.25	24.44	14.29	34.69	24.54	56.00	46.00	-21.31	-21.46
4	**1.40625**	**10.30**	**28.80**	**18.40**	**39.10**	**28.70**	**56.00**	**46.00**	**-16.90**	**-17.30**
5	2.81641	10.30	23.88	13.53	34.18	23.83	56.00	46.00	-21.82	-22.17
6	17.98047	11.54	12.64	5.28	24.18	16.82	60.00	50.00	-35.82	-33.18

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.

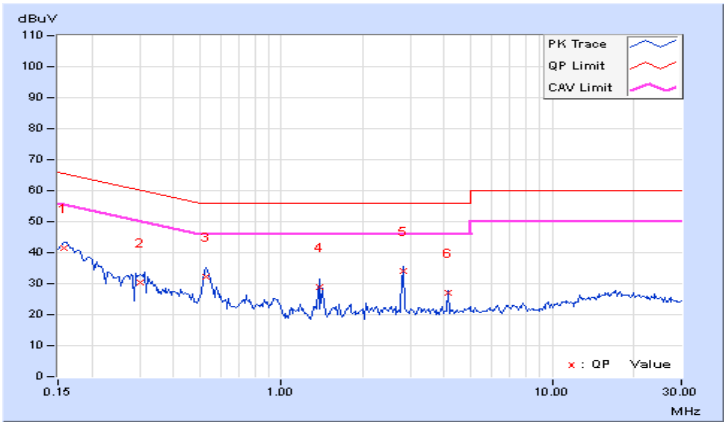


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.15781	10.19	31.40	20.36	41.59	30.55	65.58	55.58	-23.99	-25.03
2	0.30234	10.21	20.28	9.39	30.49	19.60	60.18	50.18	-29.69	-30.58
3	0.52891	10.24	22.13	17.42	32.37	27.66	56.00	46.00	-23.63	-18.34
4	1.37891	10.28	18.44	9.58	28.72	19.86	56.00	46.00	-27.28	-26.14
5	2.81641	10.27	23.92	14.21	34.19	24.48	56.00	46.00	-21.81	-21.52
6	4.14453	10.23	16.88	7.69	27.11	17.92	56.00	46.00	-28.89	-28.08

REMARKS:

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



4.3 Transmit Power Measurment

4.3.1 Limits of Transmit Power Measurement

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

*B is the 26 dB emission bandwidth in megahertz

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

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

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

4.3.2 Test Setup

4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Result

Radio 2

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	21.40	20.85	259.657	24.14	30.00	Pass
40	5200	22.18	21.02	291.67	24.65	30.00	Pass
48	5240	21.79	20.54	264.248	24.22	30.00	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	21.37	20.97	262.114	24.18	30.00	Pass
40	5200	22.29	21.45	309.071	24.90	30.00	Pass
48	5240	21.76	20.62	265.313	24.24	30.00	Pass

Note: 1. Directional gain = 3.35dBi < 6dBi, so the power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	18.32	16.76	115.344	20.62	30.00	Pass
46	5230	21.42	20.71	256.437	24.09	30.00	Pass

Note: 1. Directional gain = 3.35dBi < 6dBi, so the power limit shall not be reduced.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	16.05	15.90	79.177	18.99	30.00	Pass

Note: 1. Directional gain = 3.35dBi < 6dBi, so the power limit shall not be reduced.

Radio 1

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	24.53	24.21	547.425	27.38	30.00	Pass
157	5785	24.57	24.49	567.608	27.54	30.00	Pass
165	5825	24.40	24.24	540.884	27.33	30.00	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
149	5745	24.58	24.17	548.294	27.39	30.00	Pass
157	5785	24.42	24.25	542.767	27.35	30.00	Pass
165	5825	24.36	24.22	537.139	27.30	30.00	Pass

Note: 1. Directional gain = 4.86dBi < 6dBi, so the power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
151	5755	24.20	24.82	566.416	27.53	30.00	Pass
159	5795	24.46	24.51	561.742	27.50	30.00	Pass

Note: 1. Directional gain = 4.86dBi < 6dBi, so the power limit shall not be reduced.

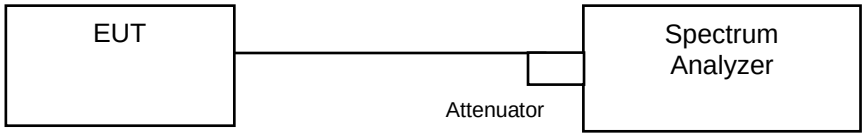
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
155	5775	23.01	22.96	397.683	26.00	30.00	Pass

Note: 1. Directional gain = 4.86dBi < 6dBi, so the power limit shall not be reduced.

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

Radio 2

CDD Mode

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.76	16.68
40	5200	22.32	16.68
48	5240	18.12	16.68

Beamforming Mode

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	18.36	17.88
40	5200	21.36	17.88
48	5240	18.96	17.76

802.11ac (VHT40)

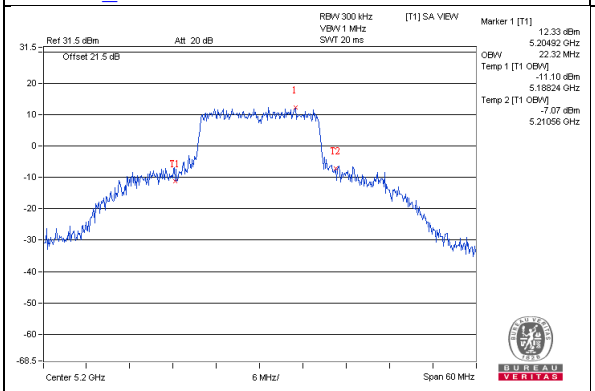
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.24	36.24
46	5230	38.64	36.48

802.11ac (VHT80)

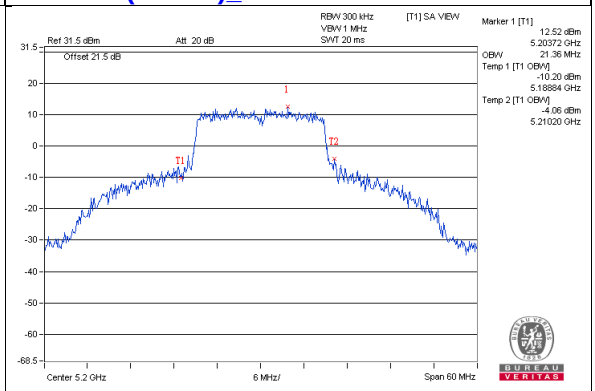
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.84	75.84

Spectrum Plot of Worst Value

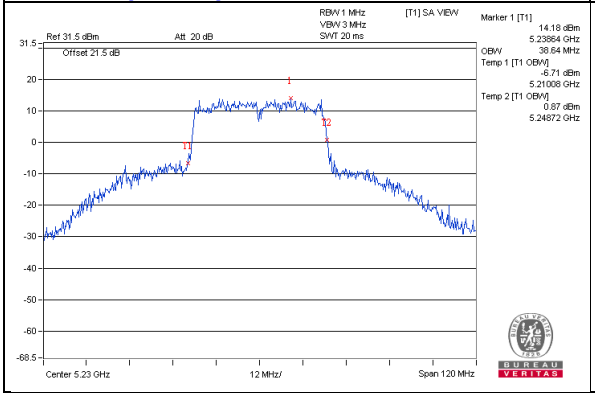
802.11a_Chain0 / CH40



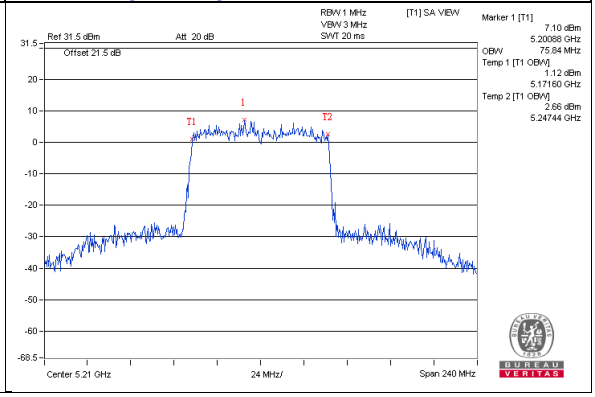
802.11ac (VHT20)_Chain0 / CH40



802.11ac (VHT40)_Chain0 / CH46



802.11ac (VHT80)_Chain0 / CH42



Radio 1

CDD Mode

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	16.68	20.40
157	5785	16.92	21.48
165	5825	17.16	19.44

Beamforming Mode

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
149	5745	17.88	21.96
157	5785	17.88	20.40
165	5825	18.12	20.76

802.11ac (VHT40)

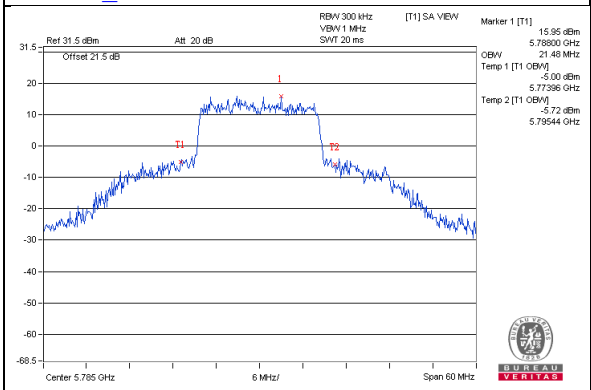
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
151	5755	36.72	37.92
159	5795	36.72	37.44

802.11ac (VHT80)

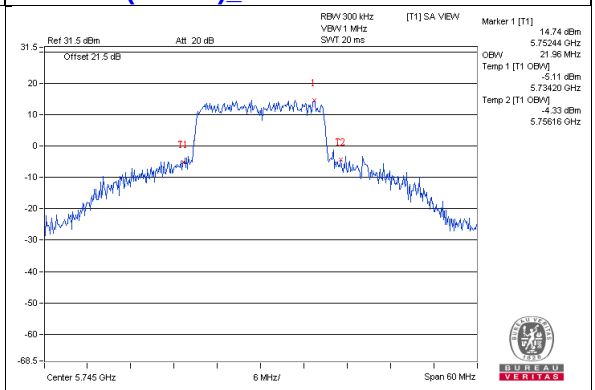
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
155	5775	76.32	76.80

Spectrum Plot of Worst Value

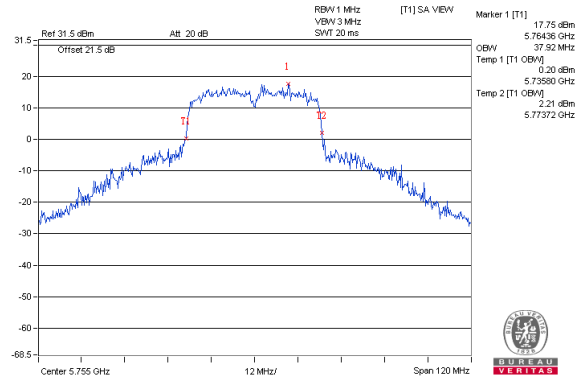
802.11a_Chain1 / CH157



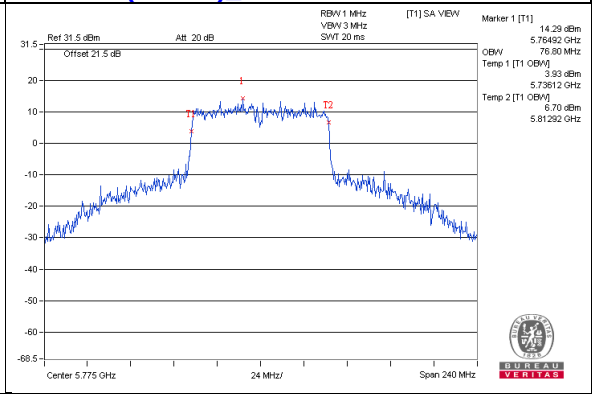
802.11ac (VHT20)_Chain1 / CH149



802.11ac (VHT40)_Chain1 / CH151

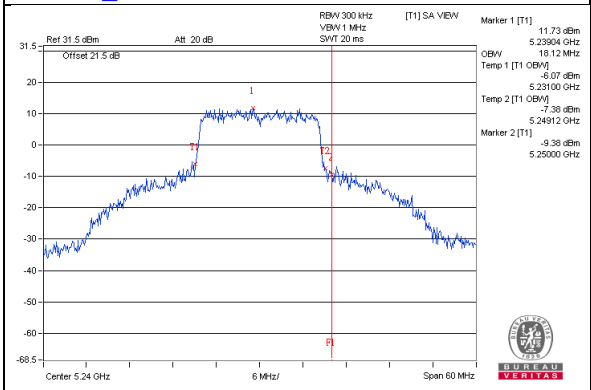


802.11ac (VHT80)_Chain1 / CH155

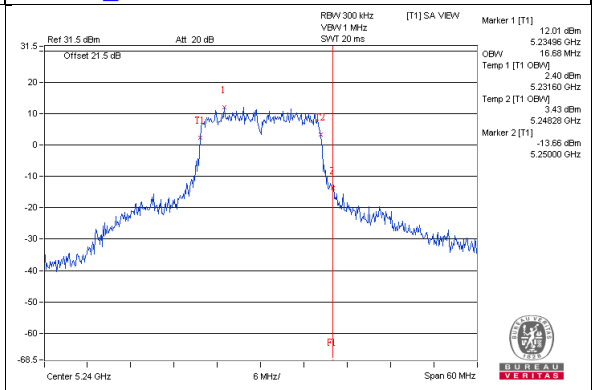


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

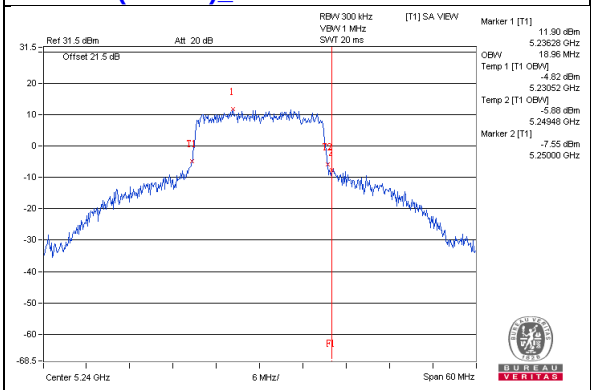
802.11a_Chain0 / CH48



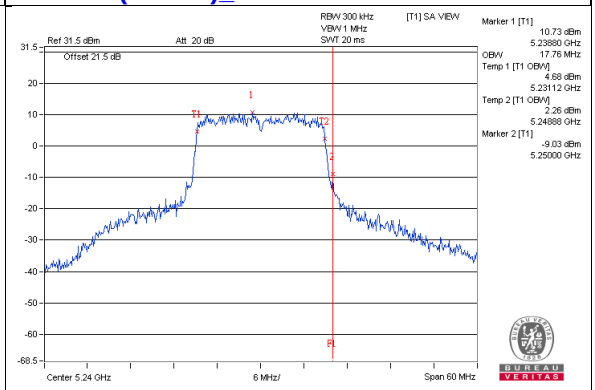
802.11a_Chain1 / CH48



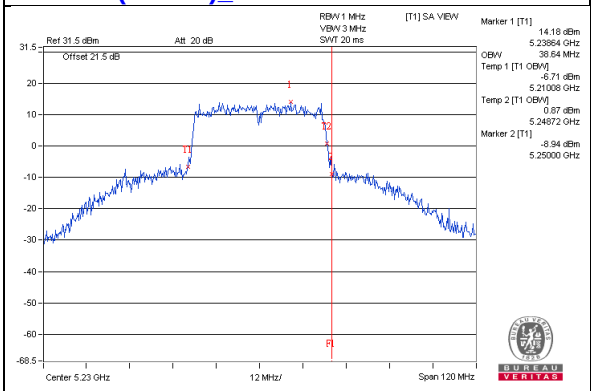
802.11ac(VHT20)_Chain0 / CH48



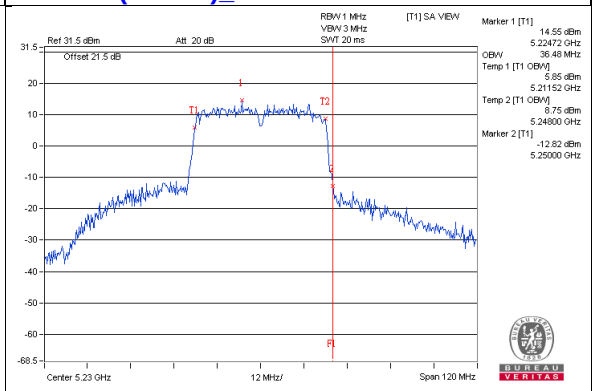
802.11ac(VHT20)_Chain1 / CH48



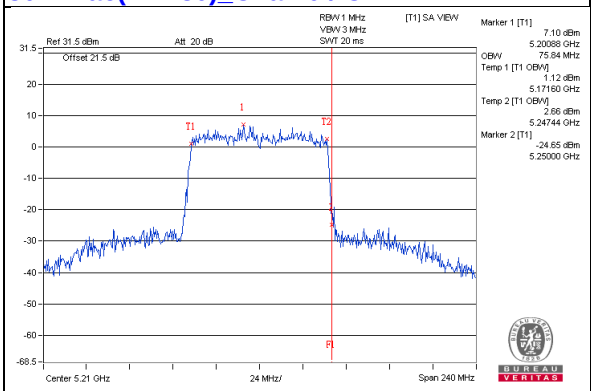
802.11ac(VHT40)_Chain0 / CH46



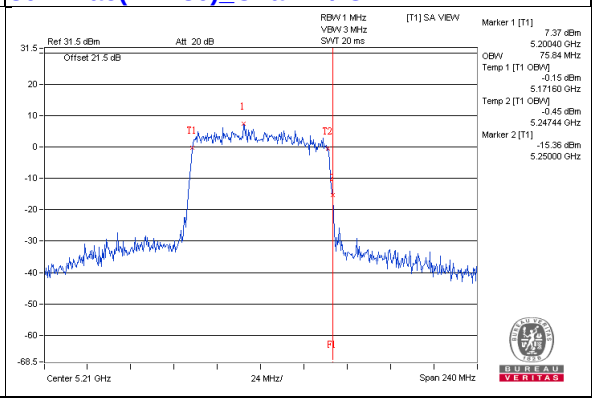
802.11ac(VHT40)_Chain1 / CH46



802.11ac(VHT80)_Chain0 / CH42

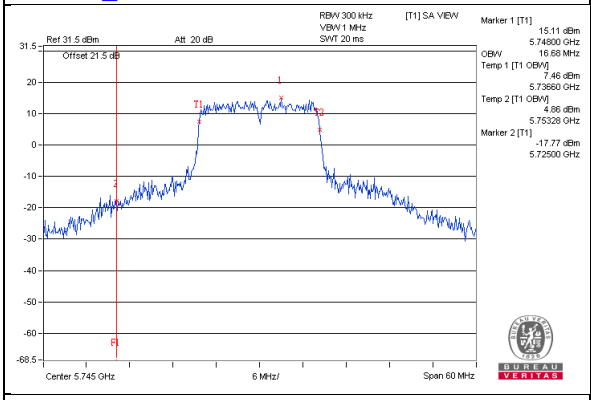


802.11ac(VHT80)_Chain1 / CH42

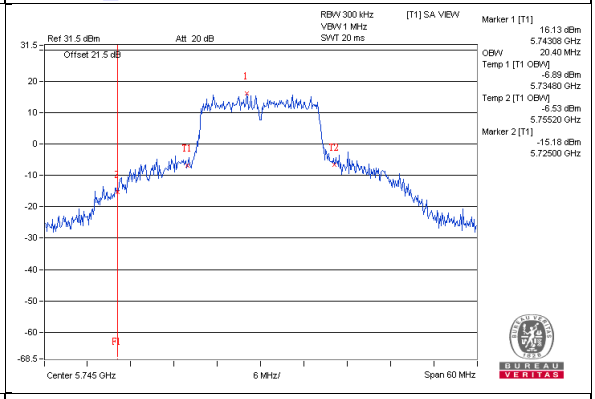


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

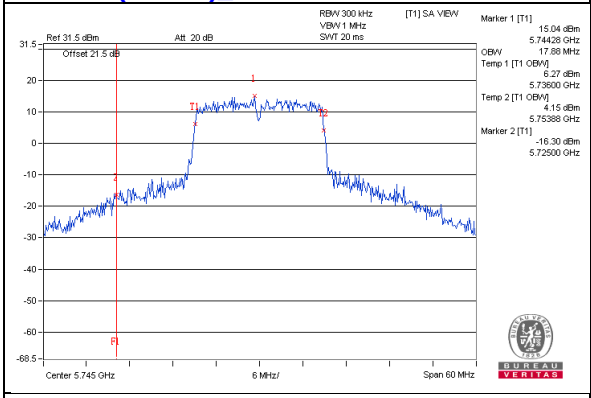
802.11a_Chain0 / CH149



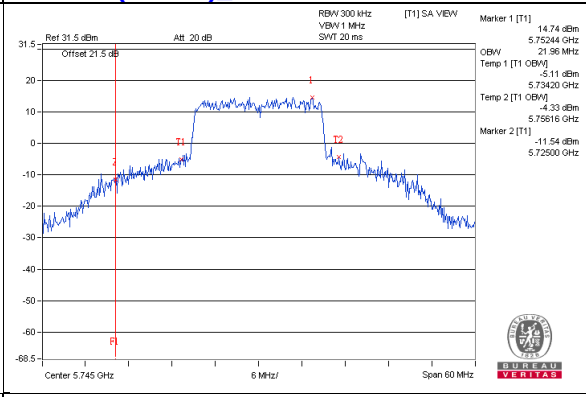
802.11a_Chain1 / CH149



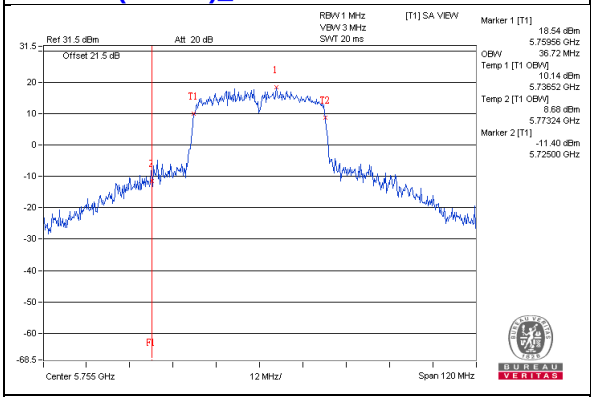
802.11ac(VHT20)_Chain0 / CH149



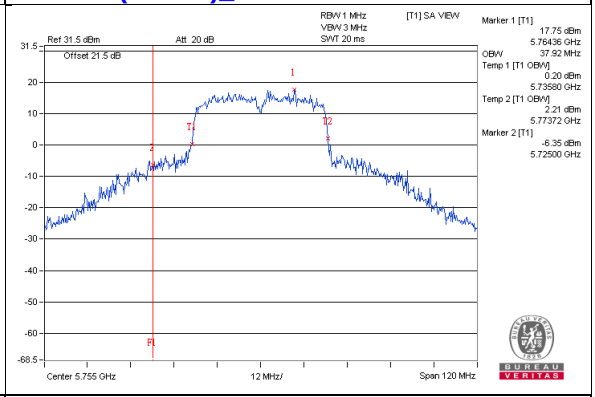
802.11ac(VHT20)_Chain1 / CH149



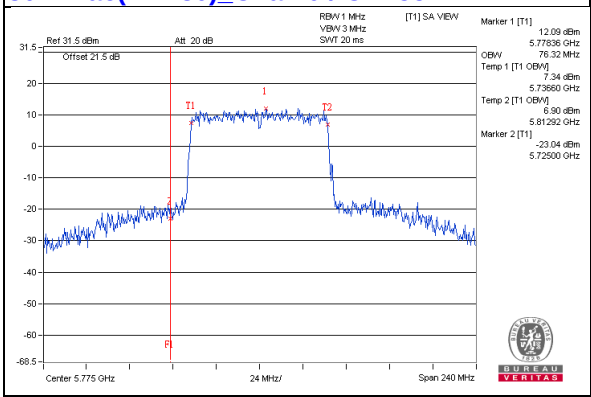
802.11ac(VHT40)_Chain0 / CH151



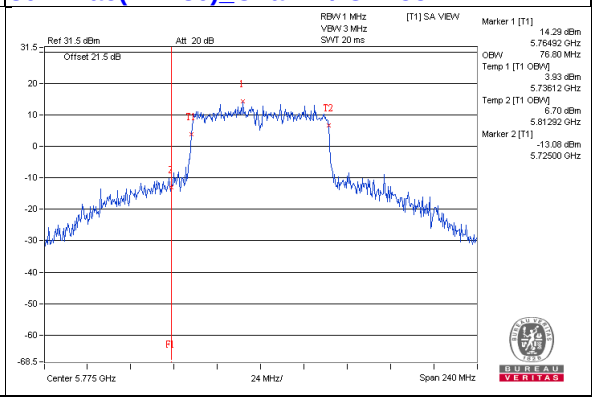
802.11ac(VHT40)_Chain1 / CH151



802.11ac(VHT80)_Chain0 / CH155



802.11ac(VHT80)_Chain1 / CH155

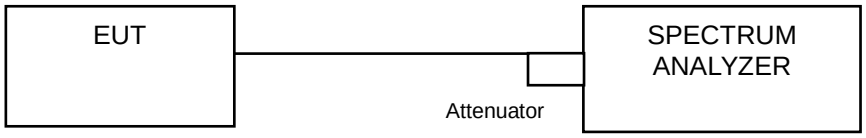


4.5 Peak Power Spectral Density Measurement

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 Procedure

802.11ac (VHT20)

For U-NII-1:

Using method SA-1

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value

For U-NII-3:

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

802.11a, 802.11ac (VHT40), 802.11ac (VHT80)

For U-NII-1:

Using method SA-2

1. Set span to encompass the entire emission bandwidth (EBW) of the signal.
2. Set RBW = 1 MHz, Set VBW ≥ 3 MHz, Detector = RMS
3. Sweep time = auto, trigger set to “free run”.
4. Trace average at least 100 traces in power averaging mode.
5. Record the max value and add 10 log (1/duty cycle)

For U-NII-3:

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1:

Radio 2

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
36	5180	7.33	6.79	0.13	10.21	17.00	Pass
40	5200	7.83	7.45	0.13	10.79	17.00	Pass
48	5240	7.10	6.58	0.13	9.99	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 3.35dBi < 6dBi, so the power density limit shall not be reduced.

3. Refer to section 3.3 for duty cycle spectrum plot.

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)		Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	7.07	6.94	10.02	17.00	Pass
40	5200	7.70	7.19	10.46	17.00	Pass
48	5240	7.40	6.43	9.95	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 3.35dBi < 6dBi, so the power density limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
38	5190	1.73	0.00	0.12	4.09	17.00	Pass
46	5230	4.05	3.83	0.12	7.08	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 3.35dBi < 6dBi, so the power density limit shall not be reduced.

3. Refer to section 3.3 for duty cycle spectrum plot.

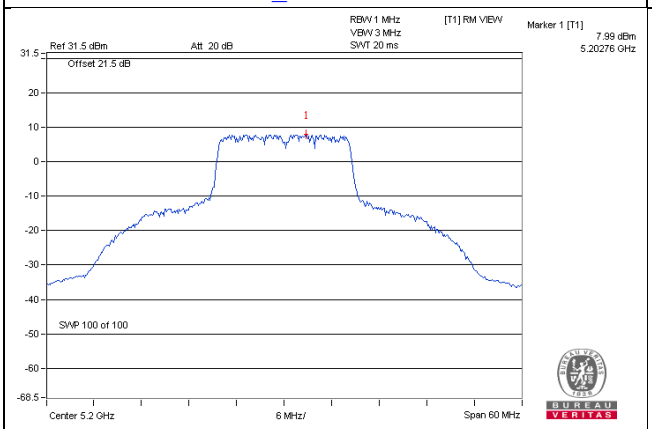
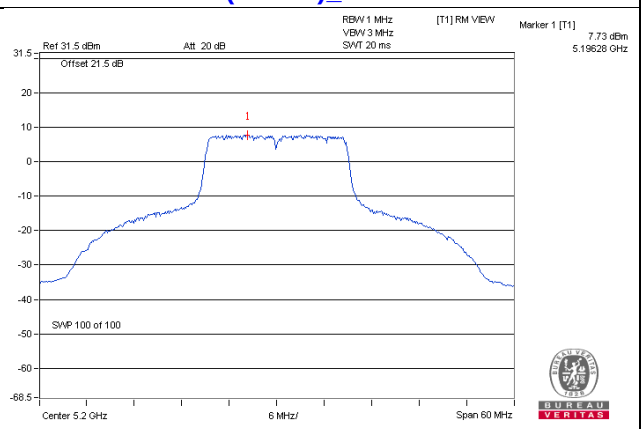
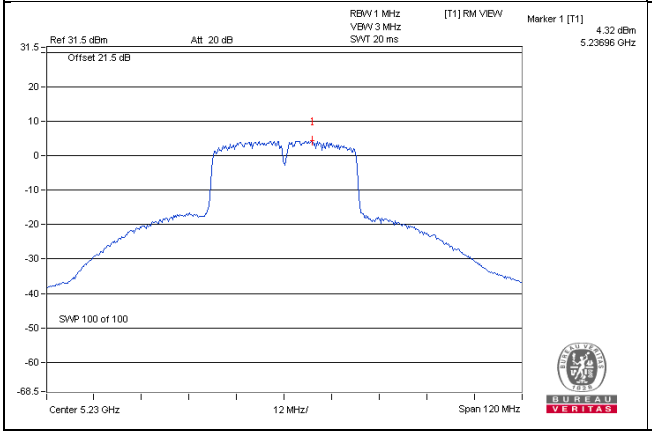
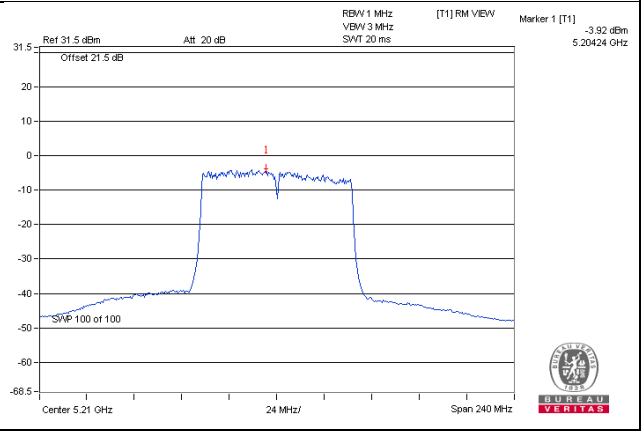
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD With Duty Factor (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-4.35	-3.92	0.25	-0.87	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. Directional gain = 3.35dBi < 6dBi, so the power density limit shall not be reduced.

3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH40	**802.11ac (VHT20)_Chain 0 / CH40**
	
802.11ac (VHT40)_Chain 0 / CH46	**802.11ac (VHT80)_Chain 1 / CH42**
	

For U-NII-3:

Radio 1

CDD Mode

802.11a

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	1.96	4.18	3.01	0.13	7.32	30.00	Pass
	157	5785	2.19	4.41	3.01	0.13	7.55	30.00	Pass
	165	5825	2.47	4.69	3.01	0.13	7.83	30.00	Pass
1	149	5745	2.54	4.76	3.01	0.13	7.90	30.00	Pass
	157	5785	2.62	4.84	3.01	0.13	7.98	30.00	Pass
	165	5825	2.14	4.36	3.01	0.13	7.50	30.00	Pass

Note: 1. Directional gain = 4.86dBi < 6dBi, so the power density limit shall not be reduced.

2. Refer to section 3.3 for duty cycle spectrum plot.

Beamforming Mode

802.11ac (VHT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=2) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	2.15	4.37	3.01	7.38	30.00	Pass
	157	5785	2.15	4.37	3.01	7.38	30.00	Pass
	165	5825	2.68	4.90	3.01	7.91	30.00	Pass
1	149	5745	2.47	4.69	3.01	7.70	30.00	Pass
	157	5785	1.97	4.19	3.01	7.20	30.00	Pass
	165	5825	2.31	4.53	3.01	7.54	30.00	Pass

Note: 1. Directional gain = 4.86dBi < 6dBi, so the power density limit shall not be reduced.

802.11ac (VHT40)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5755	-0.62	1.60	3.01	0.12	4.73	30.00	Pass
	159	5795	-1.94	0.28	3.01	0.12	3.41	30.00	Pass
1	151	5755	-0.85	1.37	3.01	0.12	4.50	30.00	Pass
	159	5795	-1.71	0.51	3.01	0.12	3.64	30.00	Pass

Note: 1. Directional gain = 4.86dBi < 6dBi, so the power density limit shall not be reduced.

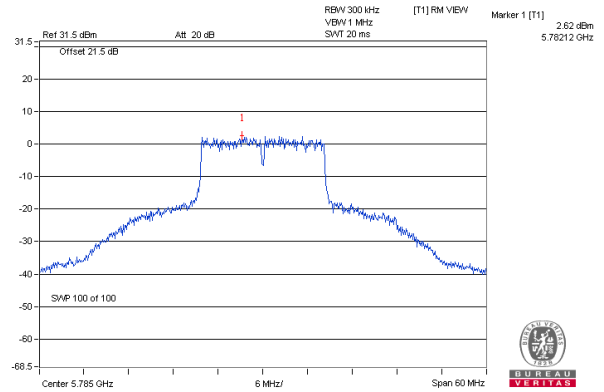
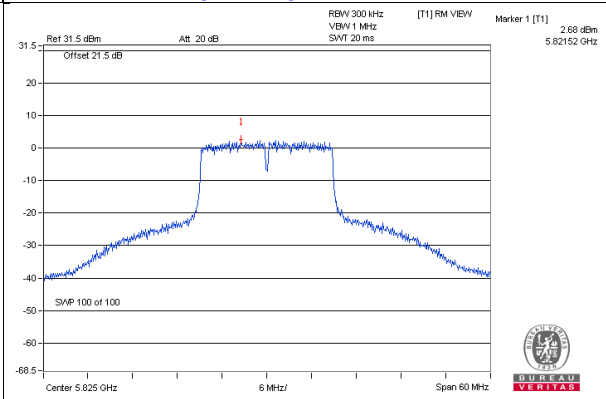
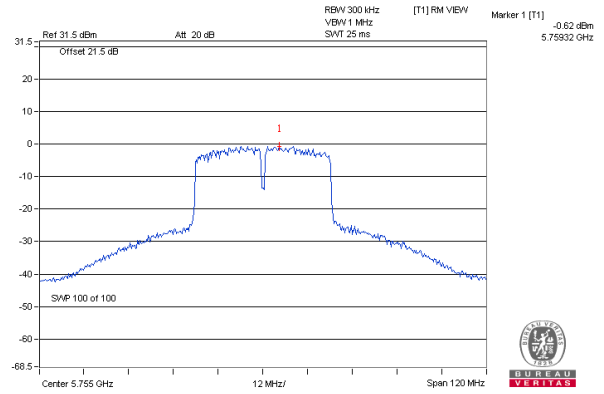
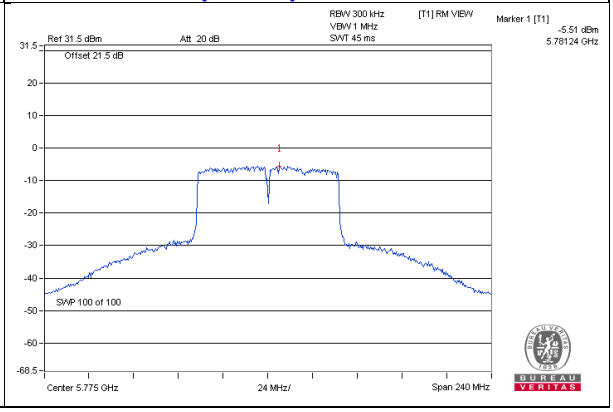
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5775	-6.09	-3.87	3.01	0.25	-0.61	30.00	Pass
1	155	5775	-5.51	-3.29	3.01	0.25	-0.03	30.00	Pass

Note: 1. Directional gain = 4.86dBi < 6dBi, so the power density limit shall not be reduced.

2. Refer to section 3.3 for duty cycle spectrum plot.

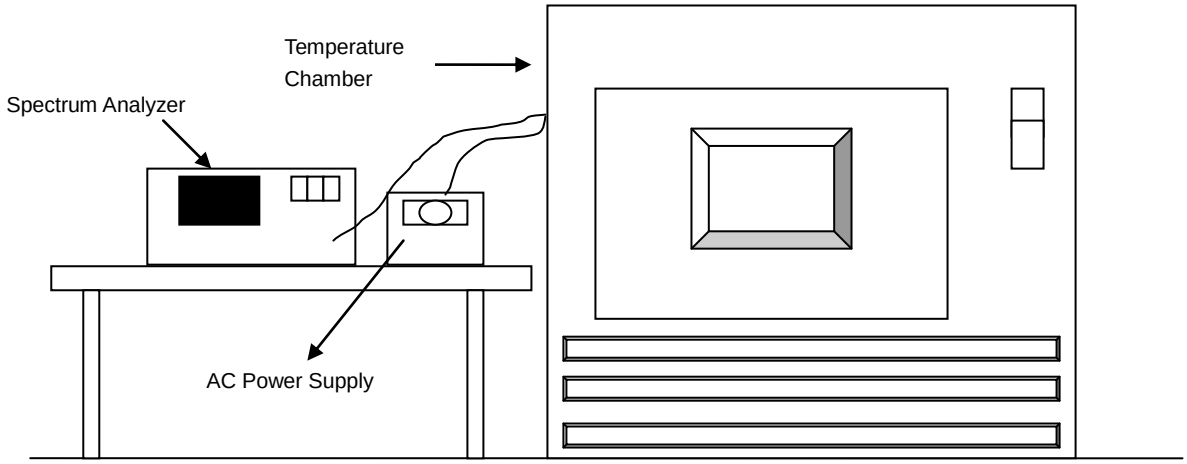
Spectrum Plot of Worst Value	
802.11a – Chain 1: CH 157	**802.11ac (VHT20) – Chain 0: CH 165**
	
802.11ac (VHT40) – Chain 0: CH 151	**802.11ac (VHT80) – Chain 1: CH 155**
	

4.6 Frequency Stability Measurement

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

Radio 2

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	120	5179.99	Pass	5179.9908	Pass	5179.9917	Pass	5179.9925	Pass
40	120	5179.9925	Pass	5179.989	Pass	5179.9884	Pass	5179.9922	Pass
30	120	5180.0133	Pass	5180.0154	Pass	5180.0121	Pass	5180.0138	Pass
20	120	5180.0053	Pass	5180.0059	Pass	5180.0067	Pass	5180.0037	Pass
10	120	5180.0136	Pass	5180.0119	Pass	5180.0129	Pass	5180.0153	Pass
0	120	5179.9915	Pass	5179.9908	Pass	5179.9889	Pass	5179.9903	Pass
-10	120	5180.0043	Pass	5180.004	Pass	5180.005	Pass	5180.0029	Pass
-20	120	5179.9868	Pass	5179.9856	Pass	5179.9849	Pass	5179.9864	Pass
-30	120	5179.9752	Pass	5179.9754	Pass	5179.9758	Pass	5179.9753	Pass

Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0049	Pass	5180.0058	Pass	5180.0065	Pass	5180.0045	Pass
	120	5180.0053	Pass	5180.0059	Pass	5180.0067	Pass	5180.0037	Pass
	102	5180.0053	Pass	5180.0064	Pass	5180.0057	Pass	5180.0027	Pass

Radio 1

Frequency Stability Versus Temp.									
Operating Frequency: 5745 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	120	5745.0031	Pass	5745.001	Pass	5745.0019	Pass	5745.0024	Pass
40	120	5744.9874	Pass	5744.9896	Pass	5744.987	Pass	5744.9875	Pass
30	120	5745.0166	Pass	5745.0204	Pass	5745.0201	Pass	5745.0171	Pass
20	120	5744.9944	Pass	5744.9937	Pass	5744.998	Pass	5744.9982	Pass
10	120	5745.0152	Pass	5745.011	Pass	5745.0097	Pass	5745.013	Pass
0	120	5744.9723	Pass	5744.9731	Pass	5744.9715	Pass	5744.9738	Pass
-10	120	5745.0274	Pass	5745.0235	Pass	5745.0258	Pass	5745.0247	Pass
-20	120	5744.9885	Pass	5744.9858	Pass	5744.9885	Pass	5744.9879	Pass
-30	120	5745.008	Pass	5745.0086	Pass	5745.01	Pass	5745.0059	Pass

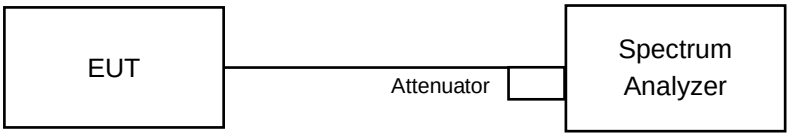
Frequency Stability Versus Voltage									
Operating Frequency: 5745 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5744.9934	Pass	5744.9932	Pass	5744.998	Pass	5744.9987	Pass
	120	5744.9944	Pass	5744.9937	Pass	5744.998	Pass	5744.9982	Pass
	102	5744.9942	Pass	5744.994	Pass	5744.9978	Pass	5744.998	Pass

4.7 6dB Bandwidth Measurment

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

Radio 1

CDD Mode

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.38	16.39	0.5	PASS
157	5785	16.38	16.40	0.5	PASS
165	5825	16.34	16.38	0.5	PASS

Beamforming Mode

802.11ac (VHT20)

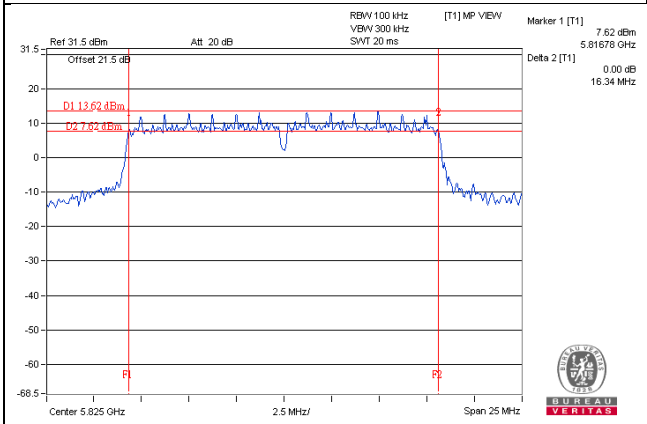
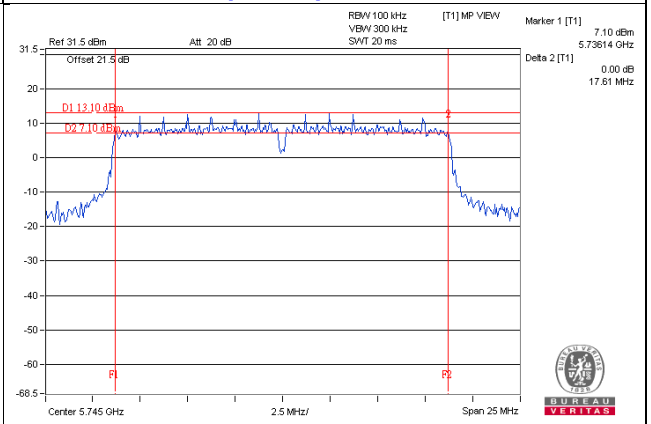
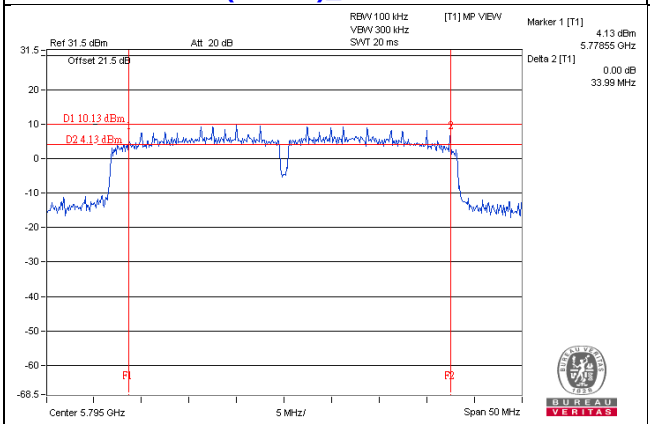
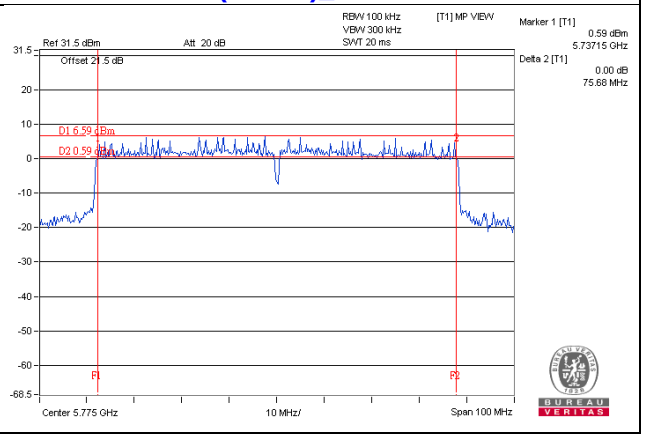
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.61	17.63	0.5	PASS
157	5785	17.62	17.64	0.5	PASS
165	5825	17.61	17.63	0.5	PASS

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.20	35.21	0.5	PASS
159	5795	35.16	33.99	0.5	PASS

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.79	75.68	0.5	PASS

Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH165	**802.11ac (VHT20)_Chain 0 / CH149**
	
802.11ac (VHT40)_Chain 1 / CH159	**802.11ac (VHT80)_Chain 1 / CH155**
	

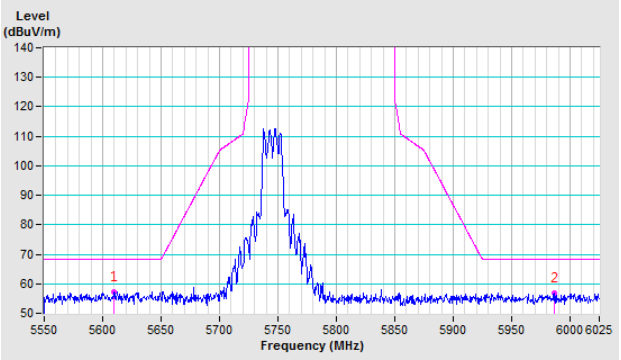
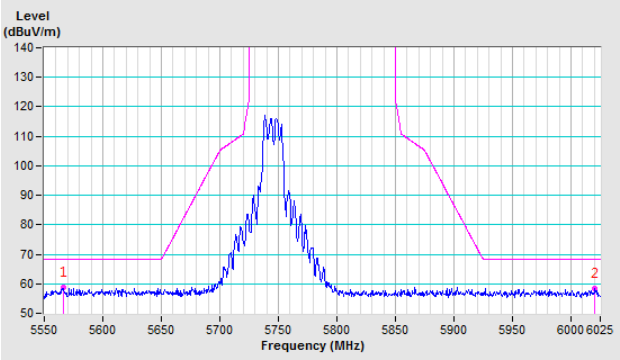
5 Pictures of Test Arrangements

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

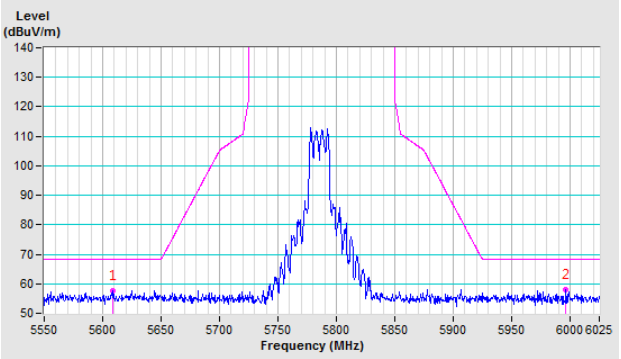
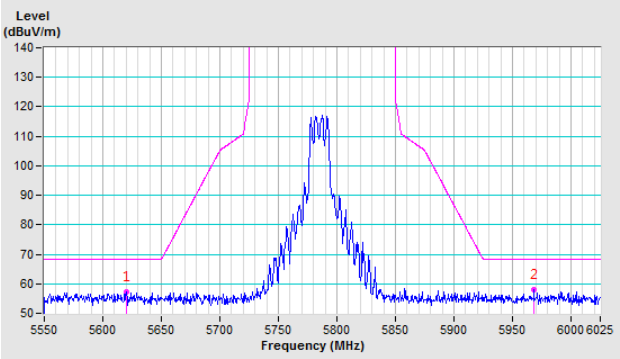
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

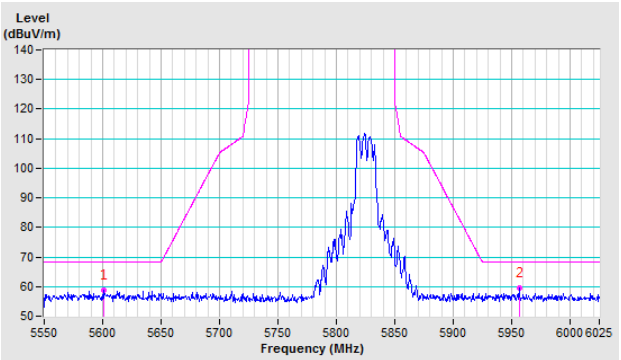
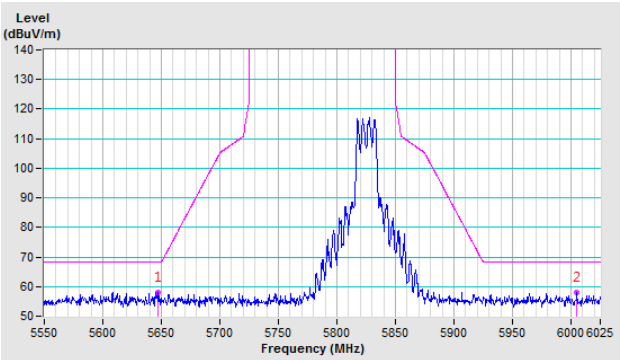
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

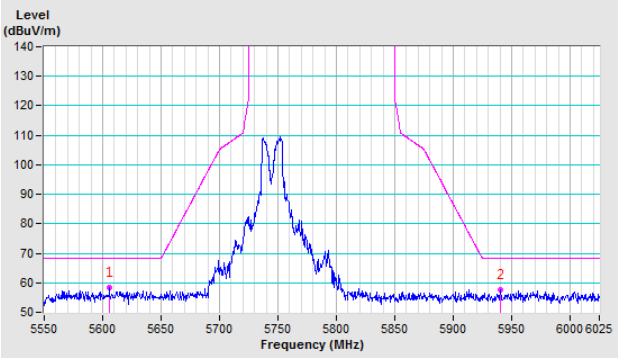
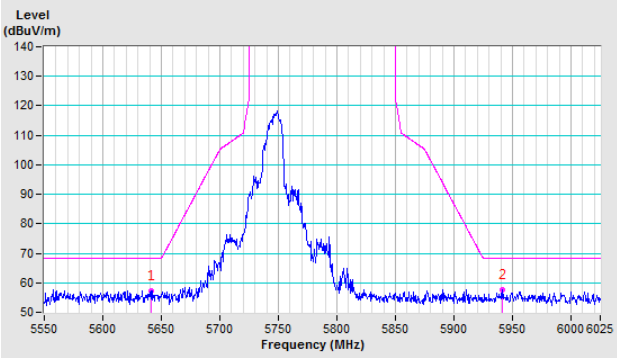
Horizontal	Vertical
	

CH 165 5825 MHz

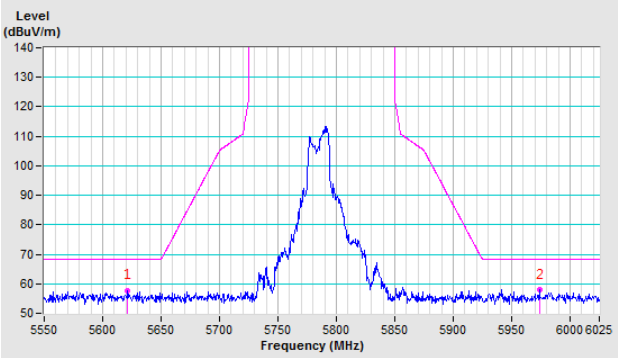
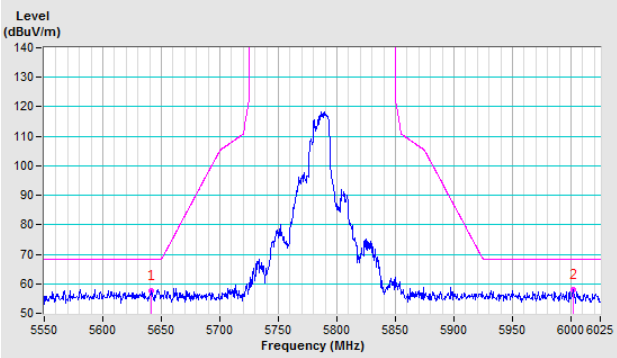
Horizontal	Vertical
	

802.11ac (VHT20)

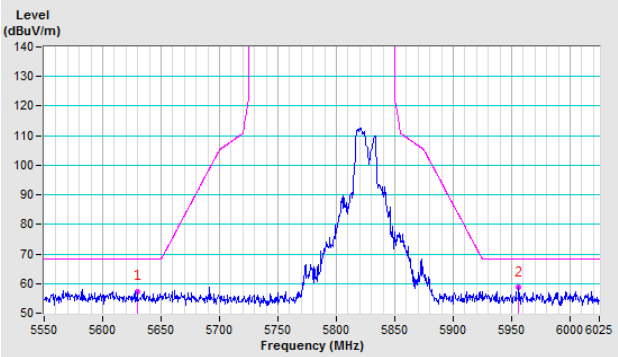
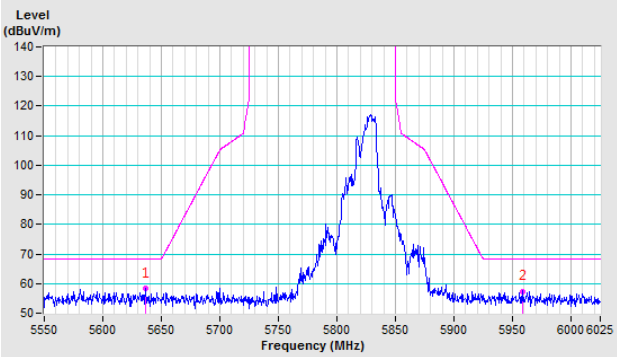
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

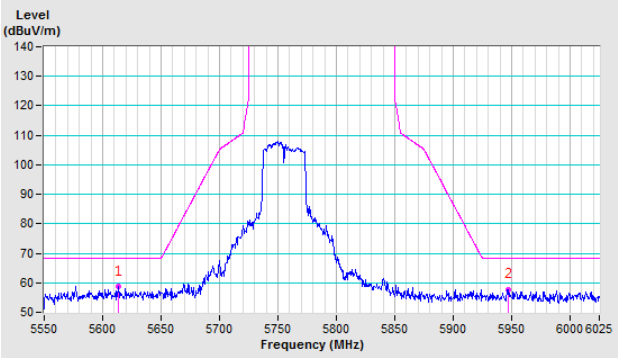
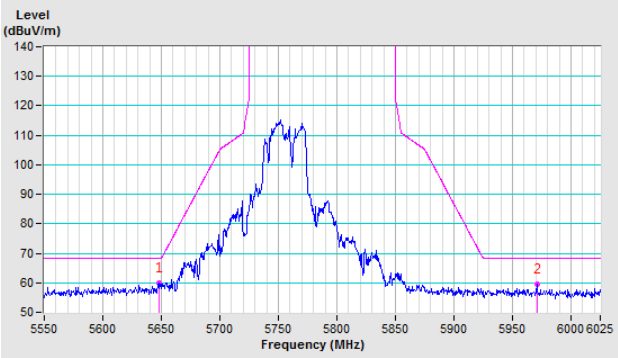
Horizontal	Vertical
	

CH 165 5825 MHz

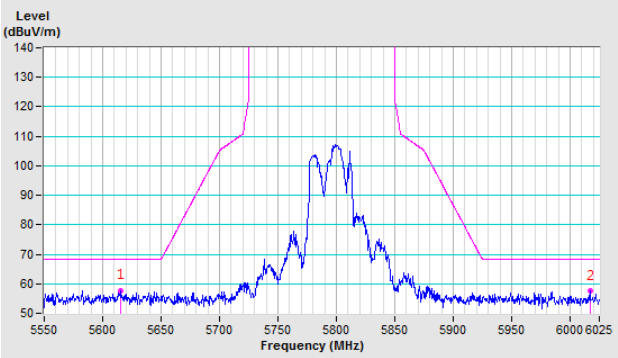
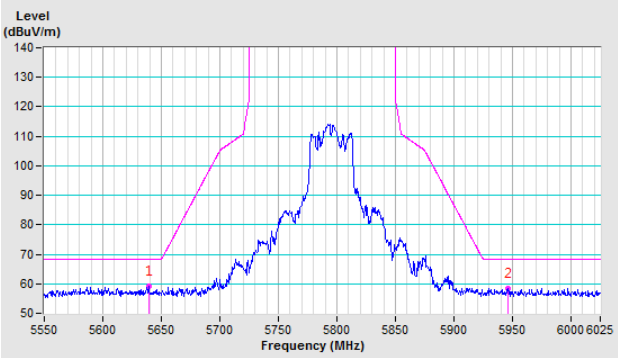
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

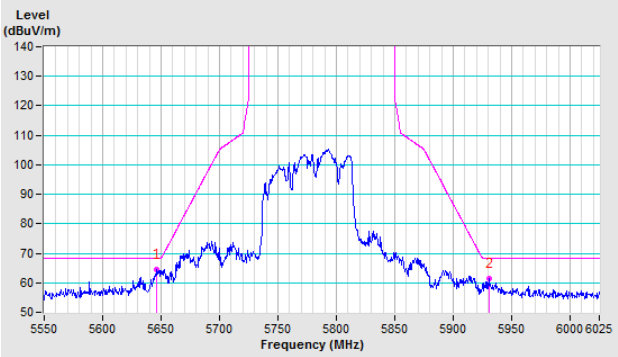
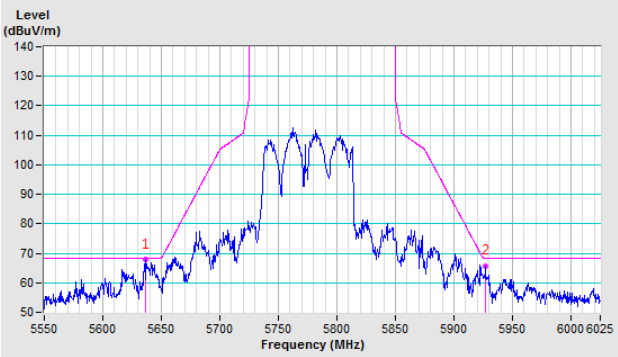
Horizontal	Vertical
	

CH 159 5795 MHz

Horizontal	Vertical
	

802.11ac (VHT80)

CH 155 5775 MHz

Horizontal	Vertical
	

Appendix – Information on the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are 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 Lab
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.

--- END ---