FCC Test Report

Report No.:	RF180103E09-1
FCC ID:	2ACFN-QWAAC2600
Test Model:	QWA-AC2600
Series Model:	Refer to section 3.1 for more details
Received Date:	Jan. 03, 2018
Test Date:	Feb. 13 to May 31, 2018
Issued Date:	June 04, 2018
Applicant:	QNAP SYSTEMS, INC.
Address:	2F., No.22, Zhongxing Road, Xizhi District, New Taipei City, 221, Taiwan
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.
FCC Registration / Designation Number:	723255 / TW2022

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

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Release Control Record

Issue No.	Description	Date Issued
RF180103E09-1	Original release.	June 04, 2018

1 Certificate of Conformity

Product: QNAP Wireless Adapter

Brand: QNAP

Test Model: QWA-AC2600

Series Model: Refer to section 3.1 for more details

Sample Status: ENGINEERING SAMPLE

Applicant: QNAP SYSTEMS, INC.

Test Date: Feb. 13 to May 31, 2018

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:** June 04, 2018
Wendy Wu / Specialist

Approved by : _____ , **Date:** June 04, 2018
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 -10.84dB at 0.16953MHz.
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	Antenna connector is R-SMA not a standard connector.

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150kHz ~ 30MHz	1.84 dB
Radiated Emissions up to 1 GHz	30MHz ~ 1GHz	5.53 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.08 dB
	6GHz ~ 18GHz	4.98 dB
	18GHz ~ 40GHz	5.19 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	QNAP Wireless Adapter
Brand	QNAP
Test Model	QWA-AC2600
Series Model	Refer to note for more details
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	DC 3.3V from host equipment
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	DSSS, OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps
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): 11 802.11n (HT40): 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:** 969.187mW **Beamforming Mode:** 624.653mW **5.18 ~ 5.24GHz:** **Master Mode** **CDD Mode:** **5.18 ~ 5.24GHz:** 947.22mW **5.745 ~ 5.825GHz:** 994.253mW **Beamforming Mode:** **5.18 ~ 5.24GHz:** 589.379mW **5.745 ~ 5.825GHz:** 583.419mW **Client Mode** **CDD Mode:** **5.18 ~ 5.24GHz:** 246.503mW **5.745 ~ 5.825GHz:** 994.253mW **Beamforming Mode:** **5.18 ~ 5.24GHz:** 147.532mW **5.745 ~ 5.825GHz:** 583.419mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

1. The EUT has below model names, which are identical to each other in all aspects except for the following table:

Brand	Model Name	Packaging Differences	Remark
QNAP	QWA-AC2600	QNAP Brown Box	All series models hardware and software are the same.
	QW-AC2600	QNAP Brown Box, with some maketing labeling difference	
	QWA-AC2600A	QNAP Brown Box, with some maketing labeling difference	
	QWA-AC2600 R2	QNAP Brown Box, with some maketing labeling difference	
	Adapter-WirelessAC2600	packaged with Generic Brown Box (No QNAP logo)	
	SP-AC2600	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	SP-AC2600A	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	SP-AC2600 R2	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	Adapter-2QCA9984	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	
	PCI-AC2600	packaged with Generic Brown Box (No QNAP logo) for specific marketing purpose	

From the above models, model: **QWA-AC2600** was selected as representative model for the test and its data was recorded in this report.

2. Simultaneously transmission condition.

Condition	Technology	
1	WLAN 2.4GHz	WLAN 5GHz
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:

Antenna Set	Chain No.	Model No.	Antenna Net Gain (dBi)	Frequency Range (GHz)	Antenna Type	Connecter Type	*Cable Loss(dB)	excluding cable loss Antenna Gain(dBi)
1	0	98612PRSX000	1.93	2.4~2.4835	Dipole	R-SMA	1.1	3.03
			2.35	5.15~5.85			2.15	4.5
	1	98612PRSX000	1.79	2.4~2.4835	Dipole	R-SMA	1.24	3.03
			2.16	5.15~5.85			2.34	4.5
	2	98612PRSX000	1.94	2.4~2.4835	Dipole	R-SMA	1.09	3.03
			2.31	5.15~5.85			2.19	4.5
	3	98612PRSX000	1.92	2.4~2.4835	Dipole	R-SMA	1.11	3.03
			2.27	5.15~5.85			2.23	4.5

4. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	4TX	4RX
802.11g	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
5GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11a	6 ~ 54Mbps	4TX	4RX
802.11n (HT20)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11n (HT40)	MCS 0~7	4TX	4RX
	MCS 8~15	4TX	4RX
	MCS 16~23	4TX	4RX
	MCS 24~31	4TX	4RX
802.11ac (VHT20)	MCS0~8 Nss=1	4TX	4RX
	MCS0~8 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~8 Nss=4	4TX	4RX
802.11ac (VHT40)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX
802.11ac (VHT80)	MCS0~9 Nss=1	4TX	4RX
	MCS0~9 Nss=2	4TX	4RX
	MCS0~9 Nss=3	4TX	4RX
	MCS0~9 Nss=4	4TX	4RX

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. This device can support different category application which switched by access point mode and client mode by software.
6. The above EUT information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications or user's manual.

3.2 Description of Test Modes

FOR 5180 ~ 5240MHz

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

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

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

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
42	5210 MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775 MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

Radiated Emission Test (Above 1GHz):

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

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
802.11ac (VHT20)		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
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		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.

CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT20)	5180-5240 5745-5825	36 to 48 149 to 165	149	OFDM	BPSK	6.5

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.

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

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.

Master Mode / 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
802.11ac (VHT20)		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
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		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
Master Mode / Beamforming Mode (output power only)						
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
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
Client Mode / 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
802.11ac (VHT20)		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
802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
802.11ac (VHT20)		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
Client Mode / Beamforming Mode (output power only)						
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
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:

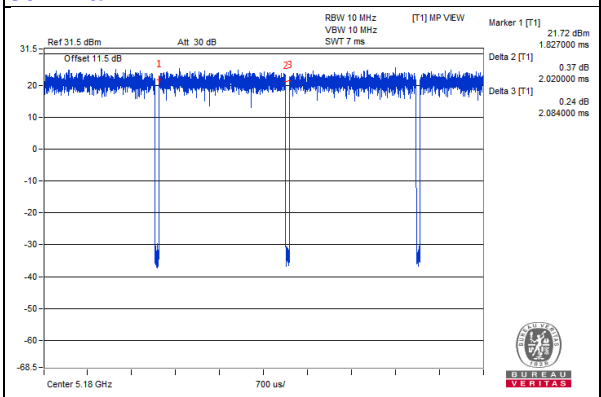
Applicable To	Environmental Conditions	Input Power (System)	Tested By
RE≥1G	23deg. C, 66%RH	120Vac, 60Hz	Frank Chuang
RE<1G	23deg. C, 66%RH	120Vac, 60Hz	Frank Chuang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

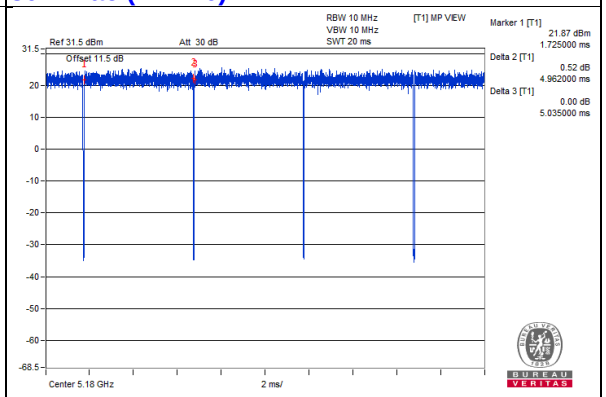
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 2.02/2.084 = 0.969, Duty factor = 10 * log(1/0.969) = 0.14
802.11ac (VHT20): Duty cycle = 4.962/5.035 = 0.986
802.11ac (VHT40): Duty cycle = 2.409/2.48 = 0.971, Duty factor = 10 * log(1/0.971) = 0.13
802.11ac (VHT80): Duty cycle = 1.134/1.2 = 0.945, Duty factor = 10 * log(1/0.945) = 0.25

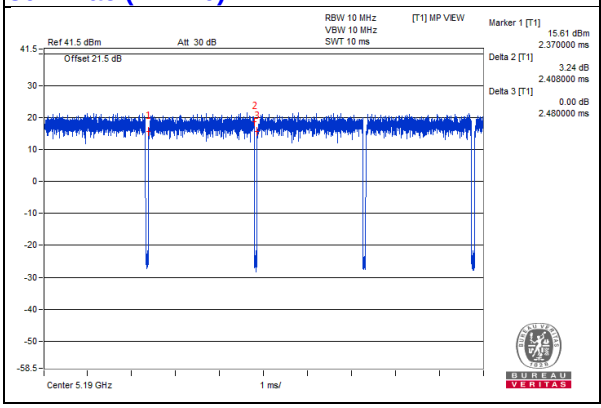
802.11a



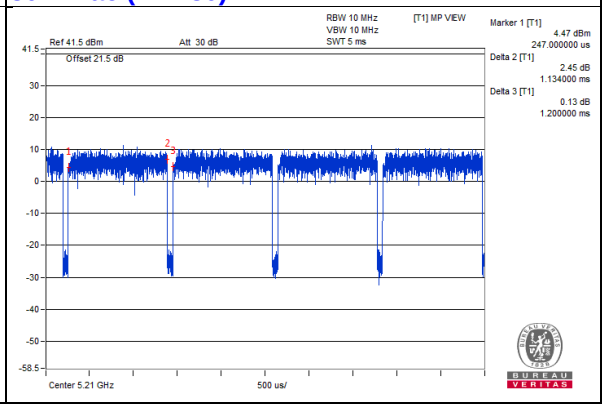
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.4 Description of Support Units

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

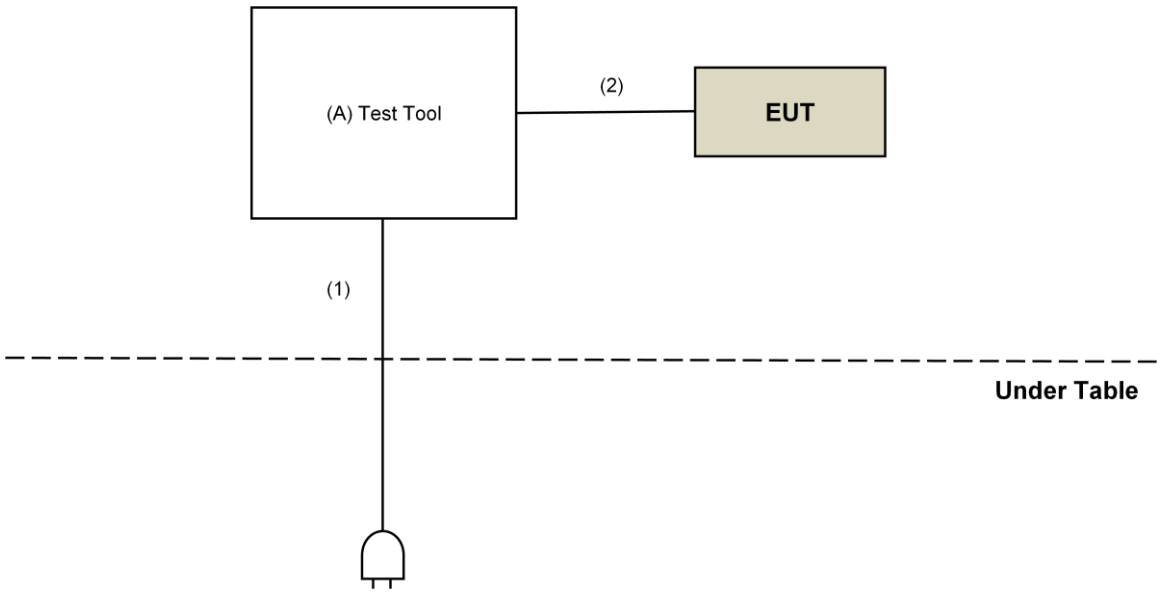
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Test Tool	NA	NA	NA	NA	Supplied by client

Note:

1. All power cords of the above support units are non-shielded (1.8m).

ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	AC Cable	1	1.7	No	0	Provided by Lab
2.	Console Cable	1	0.2	No	0	Supplied by client

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

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

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

Limits of unwanted emission out of the restricted bands

Applicable To			Limit	
789033 D02 General UNII Test Procedure New Rules v02r01			Field Strength at 3m	
			PK:74 (dBμV/m)	AV:54 (dBμV/m)
Frequency Band	Applicable To		EIRP Limit	Equivalent Field Strength at 3m
5150~5250 MHz	15.407(b)(1)		PK:-27 (dBm/MHz)	PK:68.2(dBμV/m)
5250~5350 MHz	15.407(b)(2)			
5470~5725 MHz	15.407(b)(3)			
5725~5850 MHz	☒	15.407(b)(4)(i)	PK:-27 (dBm/MHz) *1 PK:10 (dBm/MHz) *2 PK:15.6 (dBm/MHz) *3 PK:27 (dBm/MHz) *4	PK: 68.2(dBμV/m) *1 PK:105.2 (dBμV/m) *2 PK: 110.8(dBμV/m) *3 PK:122.2 (dBμV/m) *4
	☐	15.407(b)(4)(ii)	Emission limits in section 15.247(d)	

*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.

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

For below 1GHz test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Pre-Amplifier EMCI	EMC001340	980142	Feb. 09, 2018	Feb. 08, 2019
Loop Antenna(*) Electro-Metrics	EM-6879	264	Dec. 16, 2016	Dec. 15, 2018
RF Cable	NA	LOOPCAB-001 LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-05	May 05, 2018	May 04, 2019
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-3-1 966-3-2 966-3-3	Mar. 20, 2018	Mar. 19, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 03, 2017	Oct. 02, 2018
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The 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. 3.
4. The CANADA Site Registration No. is 20331-1
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: May 31, 2018

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	July 12, 2017	July 11, 2018
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-1200 EMC104-SM-SM-2000 EMC104-SM-SM-5000	160922 150317 150322	Jan. 29, 2018	Jan. 28, 2019
Spectrum Analyzer Keysight	N9030A	MY54490679	July 25, 2017	July 24, 2018
Pre-Amplifier EMCI	EMC184045SE	980386	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160924	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
Spectrum Analyzer R&S	FSv40	100964	July 1, 2017	June 30, 2018
Power meter Anritsu	ML2495A	1014008	May 11, 2017	May 10, 2018
Power sensor Anritsu	MA2411B	0917122	May 11, 2017	May 10, 2018
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 10, 2018	Jan. 09, 2019
DC Power Supply Topward	6603D	795558	NA	NA
True RMS Clamp Meter FLUKE	325	31130711WS	May 29, 2017	May 28, 2018

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2 The test was performed in 966 Chamber No. 3.
3. The CANADA Site Registration No. is 20331-1
4. Tested Date: Feb. 13 to 27, 2018

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 detects 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:

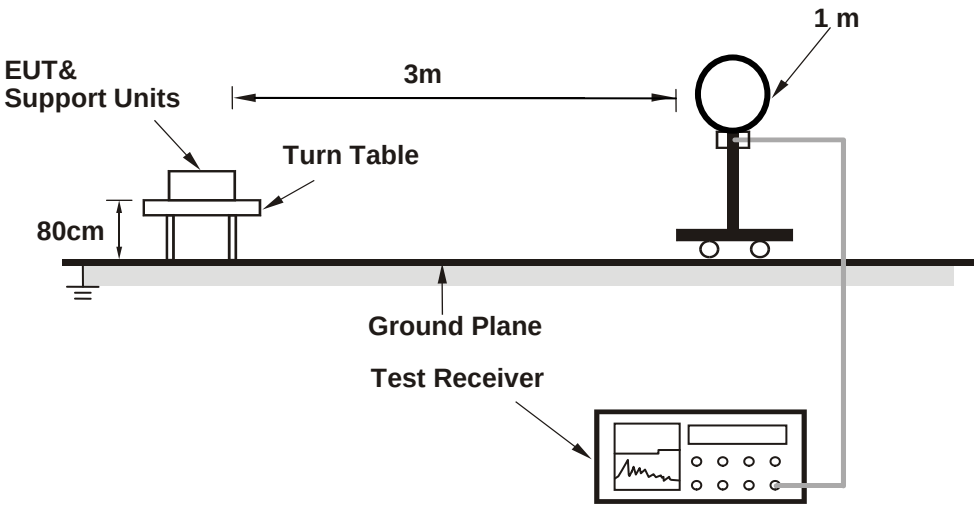
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

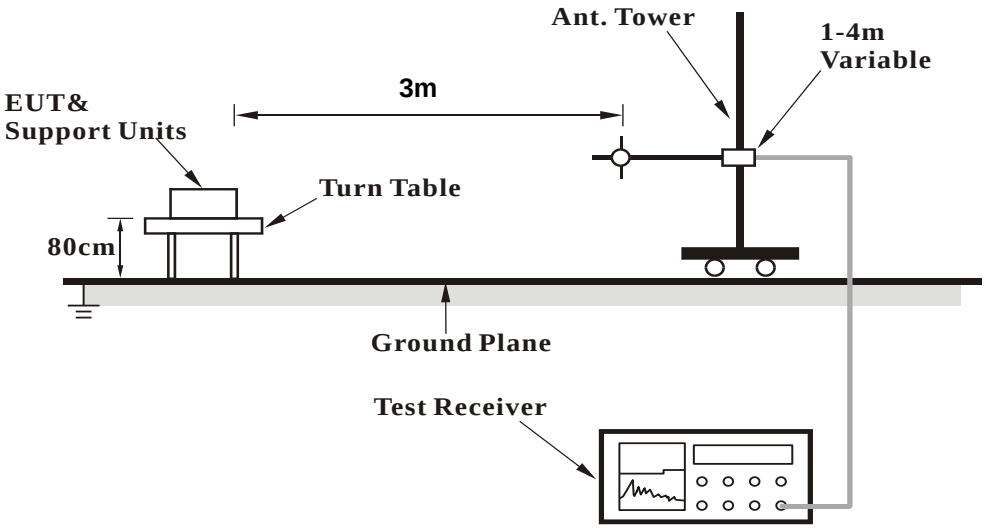
No deviation.

4.1.5 Test Setup

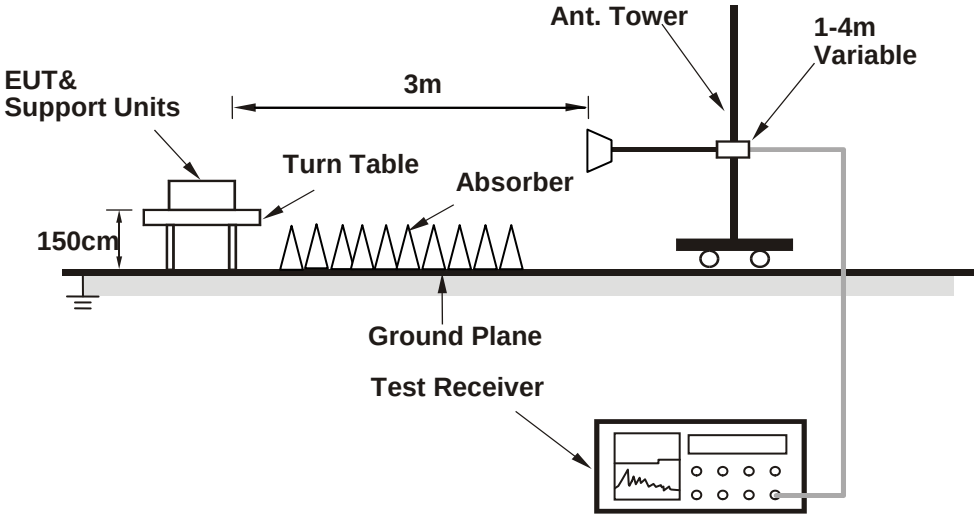
For Radiated emission below 30MHz



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

a. Placed the EUT on the testing table.
b. Controlling software (QCA Radio Conteol Toolkit_V3.0.264.0) has been activated to set the EUT on specific status.

4.1.7 Test Results

Above 1GHz Data:

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	51.8 PK	74.0	-22.2	2.47 H	251	47.8	4.0
2	5150.00	40.5 AV	54.0	-13.5	2.47 H	251	36.5	4.0
3	*5180.00	105.1 PK			2.47 H	251	101.2	3.9
4	*5180.00	95.9 AV			2.47 H	251	92.0	3.9
5	#10360.00	43.5 PK	74.0	-30.5	2.17 H	210	30.7	12.8
6	#10360.00	32.4 AV	54.0	-21.6	2.17 H	210	19.6	12.8
7	15540.00	42.1 PK	74.0	-31.9	1.34 H	66	28.8	13.3
8	15540.00	31.2 AV	54.0	-22.8	1.34 H	66	17.9	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	5150.00	62.1 PK	74.0	-11.9	2.07 V	254	58.1	4.0
2	5150.00	50.2 AV	54.0	-3.8	2.07 V	254	46.2	4.0
3	*5180.00	118.2 PK			2.07 V	254	114.3	3.9
4	*5180.00	109.1 AV			2.07 V	254	105.2	3.9
5	#10360.00	43.1 PK	74.0	-30.9	1.42 V	213	30.3	12.8
6	#10360.00	31.9 AV	54.0	-22.1	1.42 V	213	19.1	12.8
7	15540.00	42.2 PK	74.0	-31.8	2.21 V	25	28.9	13.3
8	15540.00	31.2 AV	54.0	-22.8	2.21 V	25	17.9	13.3

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	105.1 PK			2.42 H	238	101.3	3.8
2	*5200.00	95.8 AV			2.42 H	238	92.0	3.8
3	#10400.00	40.9 PK	74.0	-33.1	1.42 H	222	27.9	13.0
4	#10400.00	30.8 AV	54.0	-23.2	1.42 H	222	17.8	13.0
5	15600.00	40.0 PK	74.0	-34.0	1.45 H	28	26.3	13.7
6	15600.00	30.1 AV	54.0	-23.9	1.45 H	28	16.4	13.7
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	*5200.00	118.3 PK			2.10 V	258	114.5	3.8
2	*5200.00	108.9 AV			2.10 V	258	105.1	3.8
3	#10400.00	42.7 PK	74.0	-31.3	1.45 V	205	29.7	13.0
4	#10400.00	31.5 AV	54.0	-22.5	1.45 V	205	18.5	13.0
5	15600.00	42.3 PK	74.0	-31.7	1.43 V	2	28.6	13.7
6	15600.00	31.1 AV	54.0	-22.9	1.43 V	2	17.4	13.7

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 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	104.5 PK			2.38 H	244	100.9	3.6
2	*5240.00	95.6 AV			2.38 H	244	92.0	3.6
3	5350.00	52.3 PK	74.0	-21.7	2.38 H	244	48.7	3.6
4	5350.00	40.8 AV	54.0	-13.2	2.38 H	244	37.2	3.6
5	#10480.00	43.7 PK	74.0	-30.3	1.46 H	222	30.4	13.3
6	#10480.00	32.3 AV	54.0	-21.7	1.46 H	222	19.0	13.3
7	15720.00	42.1 PK	74.0	-31.9	2.22 H	18	29.3	12.8
8	15720.00	31.0 AV	54.0	-23.0	2.22 H	18	18.2	12.8
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	*5240.00	118.5 PK			2.02 V	258	114.9	3.6
2	*5240.00	109.5 AV			2.02 V	258	105.9	3.6
3	5350.00	53.3 PK	74.0	-20.7	2.02 V	258	49.7	3.6
4	5350.00	40.6 AV	54.0	-13.4	2.02 V	258	37.0	3.6
5	#10480.00	43.3 PK	74.0	-30.7	2.17 V	218	30.0	13.3
6	#10480.00	32.0 AV	54.0	-22.0	2.17 V	218	18.7	13.3
7	15720.00	41.9 PK	74.0	-32.1	1.40 V	77	29.1	12.8
8	15720.00	30.7 AV	54.0	-23.3	1.40 V	77	17.9	12.8

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 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	#5593.81	60.3 PK	68.2	-7.9	2.51 H	248	56.0	4.3
2	*5745.00	108.7 PK			2.51 H	248	104.3	4.4
3	*5745.00	98.5 AV			2.51 H	248	94.1	4.4
4	#5935.64	59.3 PK	68.2	-8.9	2.51 H	248	54.6	4.7
5	11490.00	44.3 PK	74.0	-29.7	2.12 H	246	31.0	13.3
6	11490.00	33.2 AV	54.0	-20.8	2.12 H	246	19.9	13.3
7	#17235.00	43.0 PK	74.0	-31.0	1.48 H	143	26.9	16.1
8	#17235.00	31.8 AV	54.0	-22.2	1.48 H	143	15.7	16.1

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	#5630.98	61.1 PK	68.2	-7.1	1.94 V	176	56.9	4.2
2	*5745.00	120.7 PK			1.94 V	176	116.3	4.4
3	*5745.00	111.2 AV			1.94 V	176	106.8	4.4
4	#5939.84	60.4 PK	68.2	-7.8	1.94 V	176	55.7	4.7
5	11490.00	43.4 PK	74.0	-30.6	2.15 V	243	30.1	13.3
6	11490.00	32.6 AV	54.0	-21.4	2.15 V	243	19.3	13.3
7	#17235.00	42.7 PK	74.0	-31.3	1.05 V	127	26.6	16.1
8	#17235.00	31.4 AV	54.0	-22.6	1.05 V	127	15.3	16.1

REMARKS:

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

CHANNEL	TX Channel 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	#5583.86	61.1 PK	68.2	-7.1	2.61 H	241	56.9	4.2
2	*5785.00	108.6 PK			2.61 H	241	104.0	4.6
3	*5785.00	98.2 AV			2.61 H	241	93.6	4.6
4	#5942.36	59.8 PK	68.2	-8.4	2.61 H	241	55.1	4.7
5	11570.00	43.8 PK	74.0	-30.2	2.13 H	240	30.3	13.5
6	11570.00	32.8 AV	54.0	-21.2	2.13 H	240	19.3	13.5
7	#17355.00	43.1 PK	74.0	-30.9	1.01 H	125	26.2	16.9
8	#17355.00	31.8 AV	54.0	-22.2	1.01 H	125	14.9	16.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5648.10	60.8 PK	68.2	-7.4	1.52 V	228	56.7	4.1
2	*5785.00	121.0 PK			1.52 V	228	116.4	4.6
3	*5785.00	111.4 AV			1.52 V	228	106.8	4.6
4	#5955.01	60.6 PK	68.2	-7.6	1.52 V	228	56.0	4.6
5	11570.00	43.2 PK	74.0	-30.8	1.56 V	155	29.7	13.5
6	11570.00	35.8 AV	54.0	-18.2	1.56 V	155	22.3	13.5
7	#17355.00	53.2 PK	74.0	-20.8	1.32 V	344	36.3	16.9
8	#17355.00	40.3 AV	54.0	-13.7	1.32 V	344	23.4	16.9

REMARKS:

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

CHANNEL	TX Channel 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	#5594.74	60.9 PK	68.2	-7.3	2.66 H	228	56.6	4.3
2	*5825.00	109.1 PK			2.66 H	228	104.4	4.7
3	*5825.00	98.9 AV			2.66 H	228	94.2	4.7
4	#5982.97	60.4 PK	68.2	-7.8	2.66 H	228	55.7	4.7
5	11650.00	43.5 PK	74.0	-30.5	2.11 H	255	30.0	13.5
6	11650.00	32.4 AV	54.0	-21.6	2.11 H	255	18.9	13.5
7	#17475.00	43.4 PK	74.0	-30.6	1.06 H	124	25.2	18.2
8	#17475.00	32.2 AV	54.0	-21.8	1.06 H	124	14.0	18.2
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	#5594.90	60.7 PK	68.2	-7.5	1.00 V	229	56.5	4.2
2	*5825.00	120.5 PK			1.18 V	229	115.8	4.7
3	*5825.00	111.2 AV			1.18 V	229	106.5	4.7
4	#5981.32	61.9 PK	68.2	-6.3	1.18 V	229	57.2	4.7
5	11650.00	43.1 PK	74.0	-30.9	1.56 V	162	29.6	13.5
6	11650.00	35.8 AV	54.0	-18.2	1.56 V	162	22.3	13.5
7	#17475.00	53.8 PK	74.0	-20.2	2.84 V	49	35.6	18.2
8	#17475.00	40.8 AV	54.0	-13.2	2.84 V	49	22.6	18.2

REMARKS:

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

802.11ac (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	53.3 PK	74.0	-20.7	2.43 H	270	49.3	4.0
2	5150.00	42.6 AV	54.0	-11.4	2.43 H	270	38.6	4.0
3	*5180.00	103.3 PK			2.43 H	270	99.4	3.9
4	*5180.00	93.8 AV			2.43 H	270	89.9	3.9
5	#10360.00	44.8 PK	74.0	-29.2	2.29 H	226	32.0	12.8
6	#10360.00	33.2 AV	54.0	-20.8	2.29 H	226	20.4	12.8
7	15540.00	41.9 PK	74.0	-32.1	1.34 H	360	28.6	13.3
8	15540.00	30.8 AV	54.0	-23.2	1.34 H	360	17.5	13.3
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.9 PK	74.0	-9.1	2.36 V	234	60.9	4.0
2	5150.00	53.7 AV	54.0	-0.3	2.36 V	234	49.7	4.0
3	*5180.00	115.6 PK			2.36 V	234	111.7	3.9
4	*5180.00	105.7 AV			2.36 V	234	101.8	3.9
5	#10360.00	43.1 PK	74.0	-30.9	2.16 V	254	30.3	12.8
6	#10360.00	32.1 AV	54.0	-21.9	2.16 V	254	19.3	12.8
7	15540.00	43.2 PK	74.0	-30.8	2.74 V	305	29.9	13.3
8	15540.00	32.1 AV	54.0	-21.9	2.74 V	305	18.8	13.3

REMARKS:

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

CHANNEL	TX Channel 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	53.5 PK	74.0	-20.5	2.39 H	279	49.5	4.0
2	5150.00	42.9 AV	54.0	-11.1	2.39 H	279	38.9	4.0
3	*5200.00	103.2 PK			2.39 H	279	99.4	3.8
4	*5200.00	93.9 AV			2.39 H	279	90.1	3.8
5	#10400.00	44.5 PK	74.0	-29.5	2.30 H	223	31.5	13.0
6	#10400.00	32.8 AV	54.0	-21.2	2.30 H	223	19.8	13.0
7	15600.00	42.1 PK	74.0	-31.9	1.36 H	353	28.4	13.7
8	15600.00	31.3 AV	54.0	-22.7	1.36 H	353	17.6	13.7
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	58.4 PK	74.0	-15.6	2.08 V	232	54.4	4.0
2	5150.00	46.5 AV	54.0	-7.5	2.08 V	232	42.5	4.0
3	*5200.00	115.2 PK			2.08 V	232	111.4	3.8
4	*5200.00	105.3 AV			2.08 V	232	101.5	3.8
5	#10400.00	41.2 PK	74.0	-32.8	1.48 V	200	28.2	13.0
6	#10400.00	31.6 AV	54.0	-22.4	1.48 V	200	18.6	13.0
7	15600.00	40.3 PK	74.0	-33.7	1.56 V	339	26.6	13.7
8	15600.00	30.2 AV	54.0	-23.8	1.56 V	339	16.5	13.7

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 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	103.7 PK			2.37 H	282	100.1	3.6
2	*5240.00	94.0 AV			2.37 H	282	90.4	3.6
3	5350.00	53.2 PK	74.0	-20.8	2.37 H	282	49.6	3.6
4	5350.00	41.5 AV	54.0	-12.5	2.37 H	282	37.9	3.6
5	#10480.00	44.6 PK	74.0	-29.4	2.35 H	149	31.3	13.3
6	#10480.00	32.7 AV	54.0	-21.3	2.35 H	149	19.4	13.3
7	15720.00	41.6 PK	74.0	-32.4	1.39 H	158	28.8	12.8
8	15720.00	30.8 AV	54.0	-23.2	1.39 H	158	18.0	12.8
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	*5240.00	115.5 PK			2.01 V	229	111.9	3.6
2	*5240.00	105.4 AV			2.01 V	229	101.8	3.6
3	5350.00	53.8 PK	74.0	-20.2	2.01 V	229	50.2	3.6
4	5350.00	42.1 AV	54.0	-11.9	2.01 V	229	38.5	3.6
5	#10480.00	41.6 PK	74.0	-32.4	1.53 V	78	28.3	13.3
6	#10480.00	31.9 AV	54.0	-22.1	1.53 V	78	18.6	13.3
7	15720.00	40.7 PK	74.0	-33.3	2.41 V	354	27.9	12.8
8	15720.00	30.6 AV	54.0	-23.4	2.41 V	354	17.8	12.8

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 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	#5631.60	60.6 PK	68.2	-7.6	2.68 H	234	56.2	4.4
2	*5745.00	109.0 PK			2.68 H	234	104.6	4.4
3	*5745.00	99.0 AV			2.68 H	234	94.6	4.4
4	#6000.83	60.0 PK	68.2	-8.2	2.68 H	234	55.2	4.8
5	11490.00	43.7 PK	74.0	-30.3	2.09 H	257	30.4	13.3
6	11490.00	32.5 AV	54.0	-21.5	2.09 H	257	19.2	13.3
7	#17235.00	43.5 PK	74.0	-30.5	1.02 H	136	27.4	16.1
8	#17235.00	32.4 AV	54.0	-21.6	1.02 H	136	16.3	16.1
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	#5607.27	60.9 PK	68.2	-7.3	1.92 V	178	56.7	4.2
2	*5745.00	121.2 PK			1.13 V	242	116.8	4.4
3	*5745.00	111.7 AV			1.13 V	242	107.3	4.4
4	#5939.81	60.0 PK	68.2	-8.2	1.92 V	178	55.3	4.7
5	11490.00	43.2 PK	74.0	-30.8	1.59 V	169	29.9	13.3
6	11490.00	36.0 AV	54.0	-18.0	1.59 V	169	22.7	13.3
7	#17235.00	53.3 PK	74.0	-20.7	2.81 V	46	37.2	16.1
8	#17235.00	40.3 AV	54.0	-13.7	2.81 V	46	24.2	16.1

REMARKS:

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

CHANNEL	TX Channel 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	#5596.43	61.3 PK	68.2	-6.9	2.69 H	242	57.0	4.3
2	*5785.00	109.2 PK			2.69 H	242	104.6	4.6
3	*5785.00	99.4 AV			2.69 H	242	94.8	4.6
4	#5924.09	60.9 PK	68.9	-8.0	2.69 H	242	56.2	4.7
5	11570.00	43.1 PK	74.0	-30.9	2.03 H	260	29.6	13.5
6	11570.00	32.0 AV	54.0	-22.0	2.03 H	260	18.5	13.5
7	#17355.00	43.4 PK	74.0	-30.6	1.01 H	139	26.5	16.9
8	#17355.00	32.3 AV	54.0	-21.7	1.01 H	139	15.4	16.9
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5602.40	60.9 PK	68.2	-7.3	1.41 V	228	56.7	4.2
2	*5785.00	121.1 PK			1.41 V	228	116.5	4.6
3	*5785.00	111.7 AV			1.41 V	228	107.1	4.6
4	#5964.53	60.2 PK	68.2	-8.0	1.41 V	228	55.5	4.7
5	11570.00	42.7 PK	74.0	-31.3	1.50 V	152	29.2	13.5
6	11570.00	33.5 AV	54.0	-20.5	1.50 V	152	20.0	13.5
7	#17355.00	52.3 PK	74.0	-21.7	1.54 V	19	35.4	16.9
8	#17355.00	36.9 AV	54.0	-17.1	1.54 V	19	20.0	16.9

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5609.28	60.1 PK	68.2	-8.1	2.64 H	253	55.7	4.4
2	*5825.00	108.9 PK			2.64 H	253	104.2	4.7
3	*5825.00	99.1 AV			2.64 H	253	94.4	4.7
4	#5985.87	59.4 PK	68.2	-8.8	2.64 H	253	54.7	4.7
5	11650.00	43.1 PK	74.0	-30.9	1.97 H	249	29.6	13.5
6	11650.00	31.9 AV	54.0	-22.1	1.97 H	249	18.4	13.5
7	#17475.00	44.0 PK	74.0	-30.0	1.03 H	149	25.8	18.2
8	#17475.00	32.8 AV	54.0	-21.2	1.03 H	149	14.6	18.2
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	#5585.70	60.5 PK	68.2	-7.7	1.48 V	229	56.4	4.1
2	*5825.00	121.2 PK			1.37 V	217	116.5	4.7
3	*5825.00	111.8 AV			1.37 V	217	107.1	4.7
4	#5966.74	60.7 PK	68.2	-7.5	1.48 V	229	56.0	4.7
5	11650.00	42.5 PK	74.0	-31.5	1.55 V	148	29.0	13.5
6	11650.00	33.2 AV	54.0	-20.8	1.55 V	148	19.7	13.5
7	#17475.00	52.6 PK	74.0	-21.4	1.57 V	10	34.4	18.2
8	#17475.00	36.9 AV	54.0	-17.1	1.57 V	10	18.7	18.2

REMARKS:

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

802.11ac (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	60.2 PK	74.0	-13.8	2.14 H	245	56.2	4.0
2	5150.00	47.5 AV	54.0	-6.5	2.14 H	245	43.5	4.0
3	*5190.00	100.1 PK			2.14 H	245	96.2	3.9
4	*5190.00	90.2 AV			2.14 H	245	86.3	3.9
5	5350.00	51.2 PK	74.0	-22.8	2.14 H	245	47.6	3.6
6	5350.00	40.2 AV	54.0	-13.8	2.14 H	245	36.6	3.6
7	#10380.00	42.6 PK	74.0	-31.4	1.52 H	136	29.7	12.9
8	#10380.00	33.4 AV	54.0	-20.6	1.52 H	136	20.5	12.9
9	15570.00	52.9 PK	74.0	-21.1	1.63 H	12	39.5	13.4
10	15570.00	37.4 AV	54.0	-16.6	1.63 H	12	24.0	13.4
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	5150.00	65.7 PK	74.0	-8.3	2.07 V	261	61.7	4.0
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**2.07 V**	**261**	**49.9**	**4.0**
3	*5190.00	114.3 PK			2.07 V	261	110.4	3.9
4	*5190.00	103.9 AV			2.07 V	261	100.0	3.9
5	5350.00	51.4 PK	74.0	-22.6	2.07 V	261	47.8	3.6
6	5350.00	40.5 AV	54.0	-13.5	2.07 V	261	36.9	3.6
7	#10380.00	41.9 PK	74.0	-32.1	1.52 V	228	29.0	12.9
8	#10380.00	32.8 AV	54.0	-21.2	1.52 V	228	19.9	12.9
9	15570.00	53.1 PK	74.0	-20.9	1.58 V	159	39.7	13.4
10	15570.00	37.4 AV	54.0	-16.6	1.58 V	159	24.0	13.4

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	60.3 PK	74.0	-13.7	2.20 H	234	56.3	4.0
2	5150.00	47.8 AV	54.0	-6.2	2.20 H	234	43.8	4.0
3	*5230.00	107.7 PK			2.20 H	234	104.1	3.6
4	*5230.00	97.1 AV			2.20 H	234	93.5	3.6
5	5350.00	53.3 PK	74.0	-20.7	2.20 H	234	49.7	3.6
6	5350.00	40.3 AV	54.0	-13.7	2.20 H	234	36.7	3.6
7	#10460.00	42.5 PK	74.0	-31.5	1.46 H	228	29.2	13.3
8	#10460.00	33.2 AV	54.0	-20.8	1.46 H	228	19.9	13.3
9	15690.00	53.3 PK	74.0	-20.7	1.54 H	157	40.3	13.0
10	15690.00	37.3 AV	54.0	-16.7	1.54 H	157	24.3	13.0
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.7 PK	74.0	-8.3	1.98 V	261	61.7	4.0
2	5150.00	53.8 AV	54.0	-0.2	1.98 V	261	49.8	4.0
3	*5230.00	119.8 PK			1.98 V	261	116.2	3.6
4	*5230.00	110.0 AV			1.98 V	261	106.4	3.6
5	5350.00	54.9 PK	74.0	-19.1	1.98 V	261	51.3	3.6
6	5350.00	43.8 AV	54.0	-10.2	1.98 V	261	40.2	3.6
7	#10460.00	42.2 PK	74.0	-31.8	1.72 V	241	28.9	13.3
8	#10460.00	30.7 AV	54.0	-23.3	1.72 V	241	17.4	13.3
9	15690.00	40.6 PK	74.0	-33.4	2.41 V	192	27.6	13.0
10	15690.00	30.1 AV	54.0	-23.9	2.41 V	192	17.1	13.0

REMARKS:

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

CHANNEL	TX Channel 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	#5601.40	61.2 PK	68.2	-7.0	2.07 H	265	56.8	4.4
2	*5755.00	105.4 PK			2.07 H	265	100.9	4.5
3	*5755.00	95.2 AV			2.07 H	265	90.7	4.5
4	#5989.59	59.8 PK	68.2	-8.4	2.07 H	265	55.1	4.7
5	11510.00	43.0 PK	74.0	-31.0	1.67 H	12	29.7	13.3
6	11510.00	31.7 AV	54.0	-22.3	1.67 H	12	18.4	13.3
7	#17265.00	41.1 PK	74.0	-32.9	1.29 H	184	24.9	16.2
8	#17265.00	30.2 AV	54.0	-23.8	1.29 H	184	14.0	16.2
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5638.22	64.9 PK	68.2	-3.3	2.04 V	176	60.8	4.1
2	*5755.00	118.3 PK			2.04 V	176	113.8	4.5
3	*5755.00	108.4 AV			2.04 V	176	103.9	4.5
4	#5936.71	60.8 PK	68.2	-7.4	2.04 V	176	56.1	4.7
5	11510.00	42.8 PK	74.0	-31.2	1.69 V	15	29.5	13.3
6	11510.00	31.4 AV	54.0	-22.6	1.69 V	15	18.1	13.3
7	#17265.00	40.9 PK	74.0	-33.1	1.31 V	198	24.7	16.2
8	#17265.00	30.1 AV	54.0	-23.9	1.31 V	198	13.9	16.2

REMARKS:

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

CHANNEL	TX Channel 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	#5647.02	61.1 PK	68.2	-7.1	2.05 H	274	56.7	4.4
2	*5795.00	105.0 PK			2.05 H	274	100.5	4.5
3	*5795.00	94.8 AV			2.05 H	274	90.3	4.5
4	#5941.83	60.6 PK	68.2	-7.6	2.05 H	274	55.9	4.7
5	11590.00	42.8 PK	74.0	-31.2	1.66 H	11	29.1	13.7
6	11590.00	31.3 AV	54.0	-22.7	1.66 H	11	17.6	13.7
7	#17385.00	41.0 PK	74.0	-33.0	1.32 H	184	23.9	17.1
8	#17385.00	30.1 AV	54.0	-23.9	1.32 H	184	13.0	17.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5592.31	60.1 PK	68.2	-8.1	1.57 V	229	55.9	4.2
2	*5795.00	117.9 PK			1.99 V	177	113.4	4.5
3	*5795.00	107.9 AV			1.99 V	177	103.4	4.5
4	#5925.84	62.6 PK	68.2	-5.6	1.57 V	229	57.9	4.7
5	11590.00	43.1 PK	74.0	-30.9	1.70 V	31	29.4	13.7
6	11590.00	31.6 AV	54.0	-22.4	1.70 V	31	17.9	13.7
7	#17385.00	40.3 PK	74.0	-33.7	1.30 V	195	23.2	17.1
8	#17385.00	29.7 AV	54.0	-24.3	1.30 V	195	12.6	17.1

REMARKS:

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

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	58.4 PK	74.0	-15.6	2.57 H	257	54.4	4.0
2	5150.00	49.8 AV	54.0	-4.2	2.57 H	257	45.8	4.0
3	*5210.00	94.8 PK			2.57 H	257	91.0	3.8
4	*5210.00	84.5 AV			2.57 H	257	80.7	3.8
5	5350.00	52.8 PK	74.0	-21.2	2.57 H	257	49.2	3.6
6	5350.00	40.3 AV	54.0	-13.7	2.57 H	257	36.7	3.6
7	#10420.00	42.6 PK	74.0	-31.4	1.68 H	142	29.5	13.1
8	#10420.00	31.1 AV	54.0	-22.9	1.68 H	142	18.0	13.1
9	15630.00	41.1 PK	74.0	-32.9	3.51 H	193	27.7	13.4
10	15630.00	30.2 AV	54.0	-23.8	3.51 H	193	16.8	13.4
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	5150.00	63.8 PK	74.0	-10.2	2.52 V	262	59.8	4.0
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**2.52 V**	**262**	**49.9**	**4.0**
3	*5210.00	106.9 PK			2.52 V	262	103.1	3.8
4	*5210.00	97.3 AV			2.52 V	262	93.5	3.8
5	5350.00	52.7 PK	74.0	-21.3	2.52 V	262	49.1	3.6
6	5350.00	40.9 AV	54.0	-13.1	2.52 V	262	37.3	3.6
7	#10420.00	42.8 PK	74.0	-31.2	1.65 V	31	29.7	13.1
8	#10420.00	31.3 AV	54.0	-22.7	1.65 V	31	18.2	13.1
9	15630.00	40.8 PK	74.0	-33.2	1.31 V	197	27.4	13.4
10	15630.00	30.2 AV	54.0	-23.8	1.31 V	197	16.8	13.4

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 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	#5643.31	61.1 PK	68.2	-7.1	2.41 H	253	56.7	4.4
2	*5775.00	104.1 PK			2.41 H	253	99.6	4.5
3	*5775.00	93.3 AV			2.41 H	253	88.8	4.5
4	#5991.14	59.6 PK	68.2	-8.6	2.41 H	253	54.9	4.7
5	11550.00	41.9 PK	74.0	-32.1	1.65 H	187	28.4	13.5
6	11550.00	31.1 AV	54.0	-22.9	1.65 H	187	17.6	13.5
7	#17325.00	40.1 PK	74.0	-33.9	1.30 H	228	23.5	16.6
8	#17325.00	30.3 AV	54.0	-23.7	1.30 H	228	13.7	16.6
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5646.31	67.7 PK	68.2	-0.5	1.30 V	227	63.6	4.1
2	*5775.00	115.8 PK			1.30 V	227	111.3	4.5
3	*5775.00	106.7 AV			1.30 V	227	102.2	4.5
4	#5928.18	65.0 PK	68.2	-3.2	1.30 V	227	60.3	4.7
5	11550.00	42.4 PK	74.0	-31.6	1.68 V	184	28.9	13.5
6	11550.00	31.4 AV	54.0	-22.6	1.68 V	184	17.9	13.5
7	#17325.00	40.1 PK	74.0	-33.9	1.36 V	201	23.5	16.6
8	#17325.00	30.0 AV	54.0	-24.0	1.36 V	201	13.4	16.6

REMARKS:

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

Below 1GHz Data:

802.11ac (VHT20)

CHANNEL	TX Channel 149	**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	37.87	31.9 QP	40.0	-8.1	1.21 H	105	40.4	-8.5
2	168.83	34.8 QP	43.5	-8.7	1.49 H	52	43.1	-8.3
3	242.34	36.7 QP	46.0	-9.3	1.59 H	211	45.8	-9.1
4	399.45	38.1 QP	46.0	-7.9	1.94 H	36	42.6	-4.5
5	606.90	36.2 QP	46.0	-9.8	1.57 H	322	35.7	0.5
6	961.01	37.8 QP	54.0	-16.2	1.59 H	233	32.0	5.8
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	**FREQ. (MHz)**	**EMISSION LEVEL (dBuV/m)**	**LIMIT (dBuV/m)**	**MARGIN (dB)**	**ANTENNA HEIGHT (m)**	**TABLE ANGLE (Degree)**	**RAW VALUE (dBuV)**	**CORRECTION FACTOR (dB/m)**
1	37.67	33.1 QP	40.0	-6.9	1.51 V	261	41.7	-8.6
2	252.53	36.2 QP	46.0	-9.8	1.89 V	203	45.1	-8.9
3	327.78	32.2 QP	46.0	-13.8	2.27 V	45	38.2	-6.0
4	405.56	39.1 QP	46.0	-6.9	2.61 V	164	43.4	-4.3
5	609.59	37.5 QP	46.0	-8.5	1.81 V	193	37.0	0.5
6	969.65	41.5 QP	54.0	-12.5	1.53 V	32	35.7	5.8

REMARKS:

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

4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Nov. 01, 2017	Oct. 31, 2018
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Nov. 15, 2017	Nov. 14, 2018
Line-Impedance Stabilization Network (for Peripheral) R&S	ENV216	100072	June 03, 2017	June 02, 2018
50 ohms Terminator	N/A	EMC-02	Sep. 22, 2017	Sep. 21, 2018
RF Cable	5D-FB	COCCAB-001	Sep. 29, 2017	Sep. 28, 2018
10 dB PAD Mini-Circuits	HAT-10+	CONATT-004	June 18, 2017	June 17, 2018
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 Conduction 1.
3 Tested Date: Feb. 14, 2018

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.

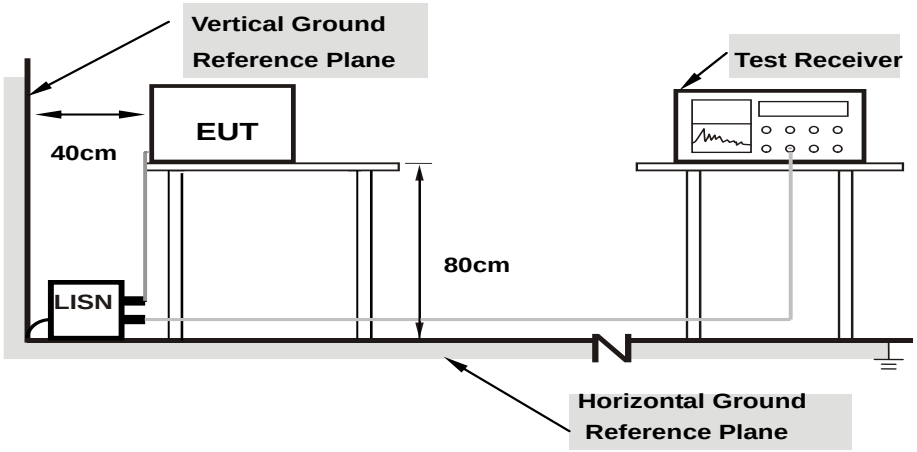
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

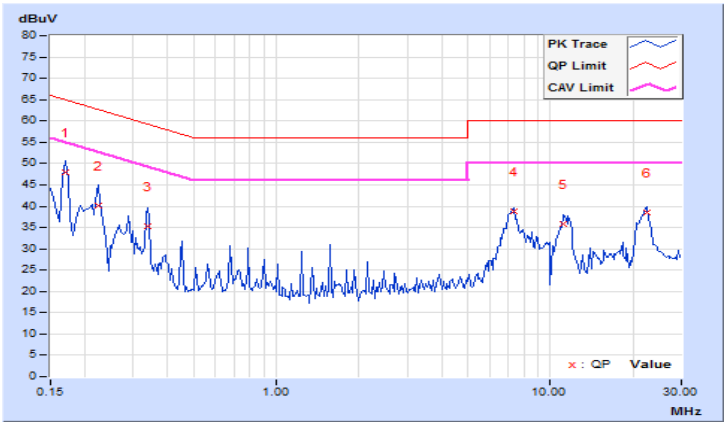
4.2.7 Test Results

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	0.16953	10.13	37.75	33.96	47.88	44.09	64.98	54.98	-17.10	-10.89
2	0.22422	10.15	30.05	23.38	40.20	33.53	62.66	52.66	-22.46	-19.13
3	0.33750	10.17	25.15	14.90	35.32	25.07	59.26	49.26	-23.94	-24.19
4	7.33203	10.52	28.27	20.79	38.79	31.31	60.00	50.00	-21.21	-18.69
5	11.16797	10.71	25.22	13.32	35.93	24.03	60.00	50.00	-24.07	-25.97
6	22.37500	11.24	27.21	14.11	38.45	25.35	60.00	50.00	-21.55	-24.65

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.

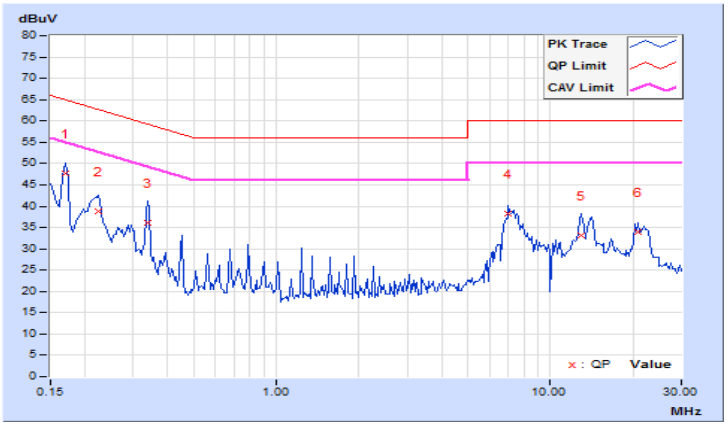


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.16953**	**10.04**	**37.57**	**34.10**	**47.61**	**44.14**	**64.98**	**54.98**	**-17.37**	**-10.84**
2	0.22422	10.04	28.81	23.47	38.85	33.51	62.66	52.66	-23.81	-19.15
3	0.33750	10.07	25.99	17.35	36.06	27.42	59.26	49.26	-23.20	-21.84
4	6.98828	10.36	27.94	25.33	38.30	35.69	60.00	50.00	-21.70	-14.31
5	12.96484	10.65	22.60	10.22	33.25	20.87	60.00	50.00	-26.75	-29.13
6	20.88281	11.02	23.05	22.78	34.07	33.80	60.00	50.00	-25.93	-16.20

REMARKS:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p ≦ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
	√	Indoor Access Point	1 Watt (30 dBm)
	√	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
Note: This device can support different category application which switched by access point mode and client mode by software.

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

Master Mode / 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	Chain 2	Chain 3				
36	5180	19.94	20.73	21.39	21.48	495.258	26.95	30.00	Pass
40	5200	20.24	21.15	21.32	21.53	513.751	27.11	30.00	Pass
48	5240	20.22	21.22	21.50	21.65	525.102	27.20	30.00	Pass
149	5745	22.30	23.84	24.86	23.96	967.009	29.85	30.00	Pass
157	5785	22.72	23.79	24.76	24.06	980.309	29.91	30.00	Pass
165	5825	22.24	23.02	24.39	23.59	871.29	29.40	30.00	Pass

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	Chain 2	Chain 3				
36	5180	19.72	20.97	21.38	21.34	492.33	26.92	30.00	Pass
40	5200	20.10	20.99	21.44	21.79	518.256	27.15	30.00	Pass
48	5240	20.13	21.02	21.26	21.64	509.054	27.07	30.00	Pass
149	5745	22.98	24.08	24.06	24.55	994.253	29.97	30.00	Pass
157	5785	22.26	23.58	23.57	23.86	867.031	29.38	30.00	Pass
165	5825	21.86	22.88	24.09	23.38	821.77	29.15	30.00	Pass

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	Chain 2	Chain 3				
38	5190	19.47	20.21	20.39	20.43	413.27	26.16	30.00	Pass
46	5230	23.05	23.64	24.32	23.87	947.22	29.76	30.00	Pass
151	5755	21.28	24.16	25.15	23.86	965.452	29.85	30.00	Pass
159	5795	21.10	23.44	24.97	23.51	888.064	29.48	30.00	Pass

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	Chain 2	Chain 3				
42	5210	10.52	13.11	13.66	13.19	75.808	18.80	30.00	Pass
155	5775	20.78	23.46	24.72	23.12	843.093	29.26	30.00	Pass

Master Mode / 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	Chain 2	Chain 3				
36	5180	19.72	20.97	21.38	21.34	492.33	26.92	27.71	Pass
40	5200	20.10	20.99	21.44	21.79	518.256	27.15	27.71	Pass
48	5240	20.13	21.02	21.26	21.64	509.054	27.07	27.71	Pass
149	5745	20.35	21.57	21.60	21.89	551.011	27.41	27.71	Pass
157	5785	20.25	21.59	21.54	21.84	545.455	27.37	27.71	Pass
165	5825	20.46	21.35	22.54	21.94	583.419	27.66	27.71	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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	Chain 2	Chain 3				
38	5190	19.47	20.21	20.39	20.43	413.27	26.16	27.71	Pass
46	5230	21.04	21.56	22.30	21.74	589.379	27.70	27.71	Pass
151	5755	18.87	21.69	22.74	21.37	549.681	27.40	27.71	Pass
159	5795	19.12	21.42	22.89	21.48	555.475	27.45	27.71	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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	Chain 2	Chain 3				
42	5210	10.52	13.11	13.66	13.19	75.808	18.80	27.71	Pass
155	5775	19.89	21.54	22.78	21.23	562.47	27.50	27.71	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 30-(8.29-6) = 27.71dBm.

Client Mode / 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	Chain 2	Chain 3				
36	5180	14.23	15.12	15.64	15.48	130.956	21.17	24.00	Pass
40	5200	14.38	15.30	15.38	15.53	131.541	21.19	24.00	Pass
48	5240	14.21	15.21	15.37	15.59	130.211	21.15	24.00	Pass
149	5745	22.30	23.84	24.86	23.96	967.009	29.85	30.00	Pass
157	5785	22.72	23.79	24.76	24.06	980.309	29.91	30.00	Pass
165	5825	22.24	23.02	24.39	23.59	871.29	29.40	30.00	Pass

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	Chain 2	Chain 3				
36	5180	13.98	15.11	15.46	15.53	128.32	21.08	24.00	Pass
40	5200	14.24	15.02	15.51	15.64	130.522	21.16	24.00	Pass
48	5240	14.10	14.90	15.45	15.66	128.495	21.09	24.00	Pass
149	5745	22.98	24.08	24.06	24.55	994.253	29.97	30.00	Pass
157	5785	22.26	23.58	23.57	23.86	867.031	29.38	30.00	Pass
165	5825	21.86	22.88	24.09	23.38	821.77	29.15	30.00	Pass

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	Chain 2	Chain 3				
38	5190	17.02	17.61	17.84	17.83	229.515	23.61	24.00	Pass
46	5230	17.16	17.64	18.67	17.98	246.503	23.92	24.00	Pass
151	5755	21.28	24.16	25.15	23.86	965.452	29.85	30.00	Pass
159	5795	21.10	23.44	24.97	23.51	888.064	29.48	30.00	Pass

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	Chain 2	Chain 3				
42	5210	10.52	13.11	13.66	13.19	75.808	18.80	24.00	Pass
155	5775	20.78	23.46	24.72	23.12	843.093	29.26	30.00	Pass

Client Mode / 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	Chain 2	Chain 3				
36	5180	13.98	15.11	15.46	15.53	128.32	21.08	21.71	Pass
40	5200	14.24	15.02	15.51	15.64	130.522	21.16	21.71	Pass
48	5240	14.10	14.90	15.45	15.66	128.495	21.09	21.71	Pass
149	5745	20.35	21.57	21.60	21.89	551.011	27.41	27.71	Pass
157	5785	20.25	21.59	21.54	21.84	545.455	27.37	27.71	Pass
165	5825	20.46	21.35	22.54	21.94	583.419	27.66	27.71	Pass

Note: 1. For UNII-1: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 24-(8.29-6) = 21.71dBm.
2. For UNII-3: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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	Chain 2	Chain 3				
38	5190	15.01	15.77	15.89	15.94	147.532	21.69	21.71	Pass
46	5230	15.04	15.54	16.23	15.57	145.759	21.64	21.71	Pass
151	5755	18.87	21.69	22.74	21.37	549.681	27.40	27.71	Pass
159	5795	19.12	21.42	22.89	21.48	555.475	27.45	27.71	Pass

Note: 1. For UNII-1: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 24-(8.29-6) = 21.71dBm.
2. For UNII-3: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 30-(8.29-6) = 27.71dBm.

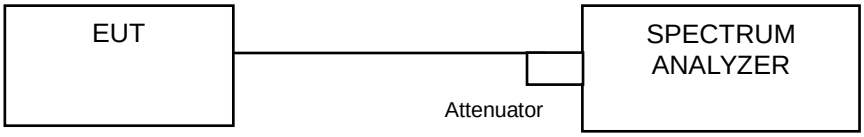
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	10.52	13.11	13.66	13.19	75.808	18.80	21.71	Pass
155	5775	19.89	21.54	22.78	21.23	562.47	27.50	27.71	Pass

Note: 1. For UNII-1: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 24-(8.29-6) = 21.71dBm.
2. For UNII-3: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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

Master Mode

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	16.44	16.44	16.56	16.44
40	5200	16.44	16.68	16.68	16.56
48	5240	16.56	16.68	16.56	16.56
149	5745	16.56	16.56	16.20	16.56
157	5785	16.56	16.68	16.32	16.56
165	5825	16.56	16.80	16.32	16.56

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	17.64	17.76	17.76	17.64
40	5200	17.64	17.76	17.76	17.76
48	5240	17.64	17.76	17.76	17.76
149	5745	17.76	17.76	17.40	17.64
157	5785	17.64	17.76	17.52	17.76
165	5825	17.64	17.76	17.64	17.76

802.11ac (VHT40)

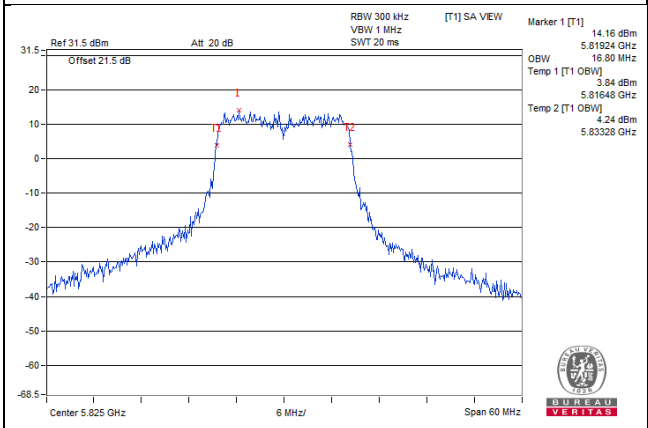
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.24	36.24	36.24	36.24
46	5230	36.24	36.24	36.24	36.24
151	5755	36.24	36.48	36.72	36.24
159	5795	36.24	36.24	36.72	36.24

802.11ac (VHT80)

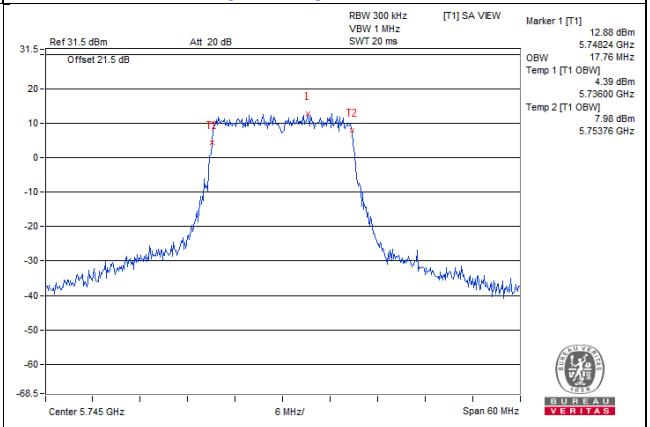
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	75.84	75.36	75.84	76.32
155	5775	76.32	76.32	76.32	75.36

Spectrum Plot of Worst Value

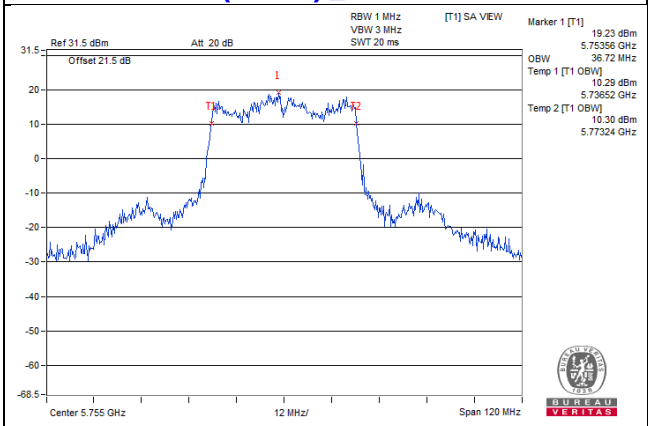
802.11a_Chain 1 / CH165



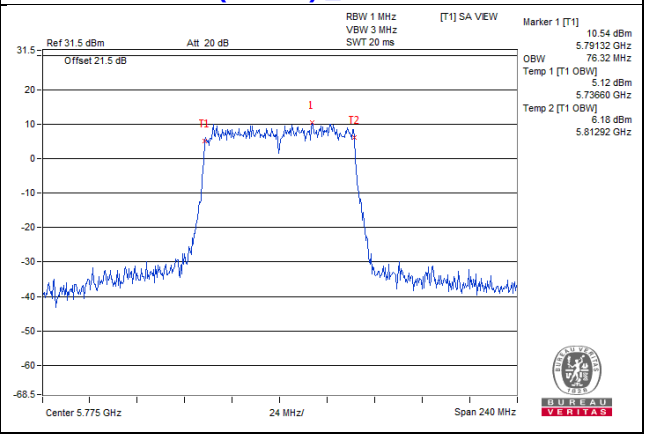
802.11ac (VHT20)_Chain 0 / CH149



802.11ac (VHT40) _Chain 2 / CH151



802.11ac (VHT80) _Chain 0 / CH155



Client Mode

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	16.44	16.68	16.56	16.56
40	5200	16.56	16.68	16.44	16.56
48	5240	16.44	16.56	16.44	16.44
149	5745	16.56	16.56	16.20	16.56
157	5785	16.56	16.68	16.32	16.56
165	5825	16.56	16.80	16.32	16.56

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	17.76	17.64	17.64	17.64
40	5200	17.64	17.64	17.76	17.64
48	5240	17.64	17.64	17.76	17.64
149	5745	17.76	17.76	17.40	17.64
157	5785	17.64	17.76	17.52	17.76
165	5825	17.64	17.76	17.64	17.76

802.11ac (VHT40)

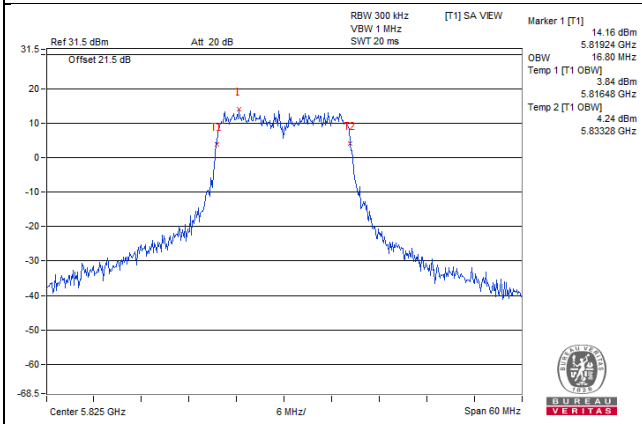
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.24	36.24	36.24	36.24
46	5230	36.24	36.24	36.00	36.24
151	5755	36.24	36.48	36.72	36.24
159	5795	36.24	36.24	36.72	36.24

802.11ac (VHT80)

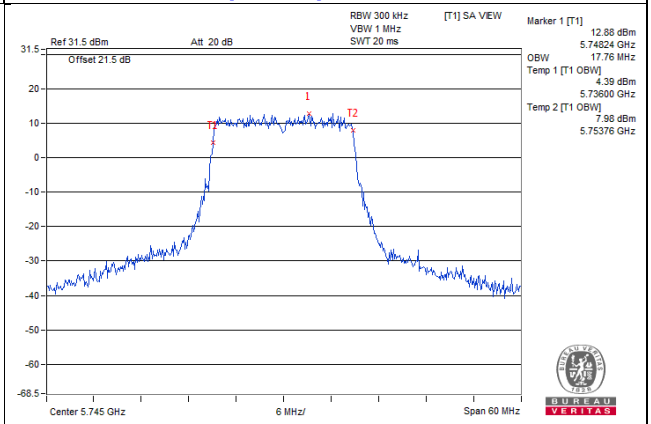
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	75.84	75.36	75.84	76.32
155	5775	76.32	76.32	76.32	75.36

Spectrum Plot of Worst Value

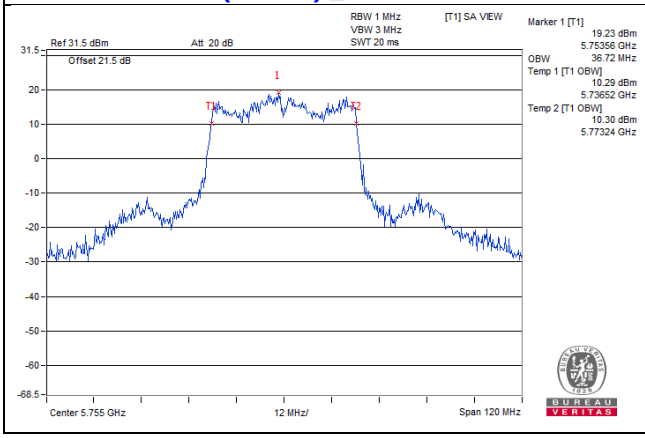
802.11a_Chain 1 / CH165



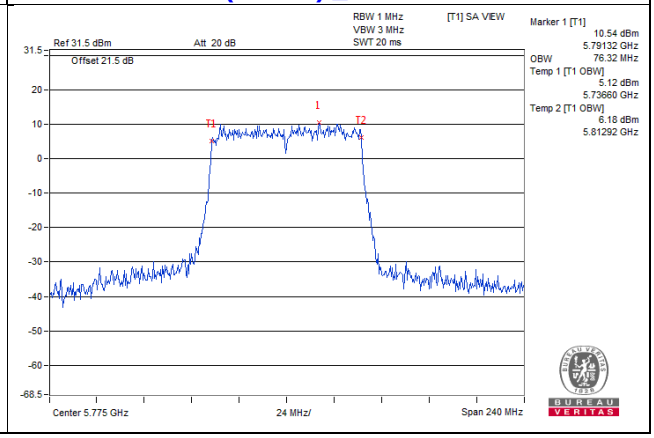
802.11ac (VHT20)_Chain 0 / CH149



802.11ac (VHT40) _Chain 2 / CH151

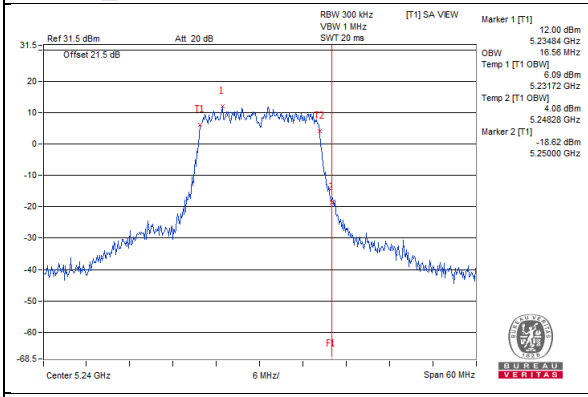


802.11ac (VHT80) _Chain 0 / CH155

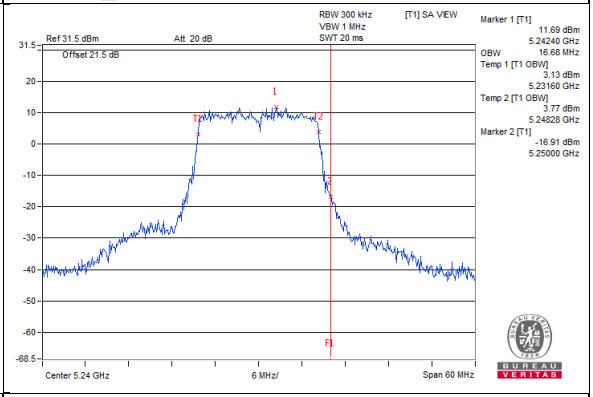


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

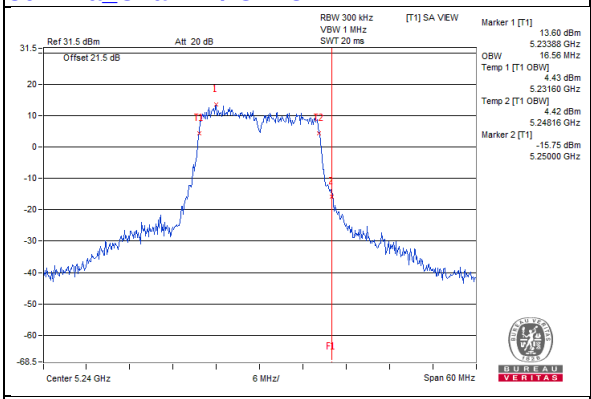
802.11a_Chain 0 / CH48



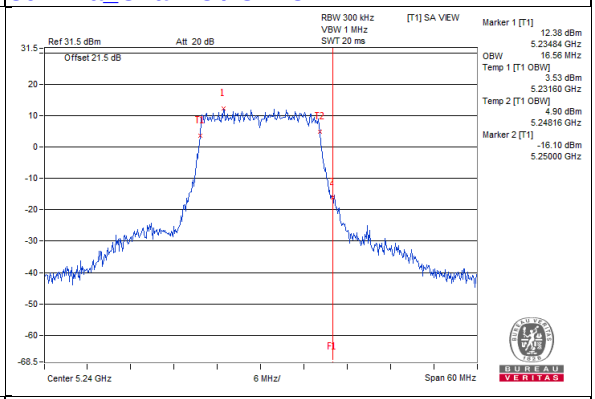
802.11a_Chain 1 / CH48



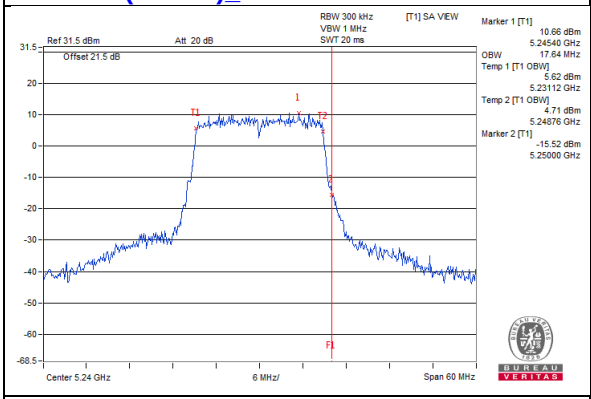
802.11a_Chain 2 / CH48



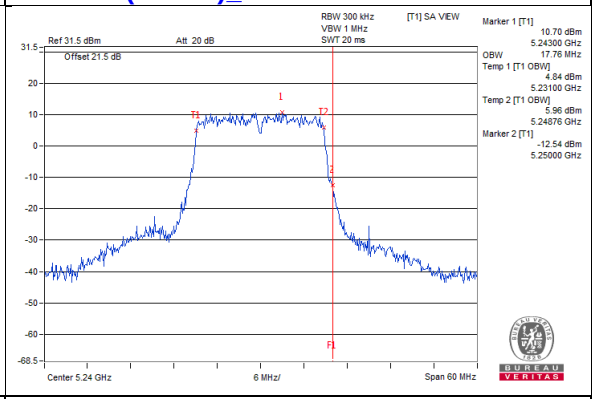
802.11a_Chain 3 / CH48



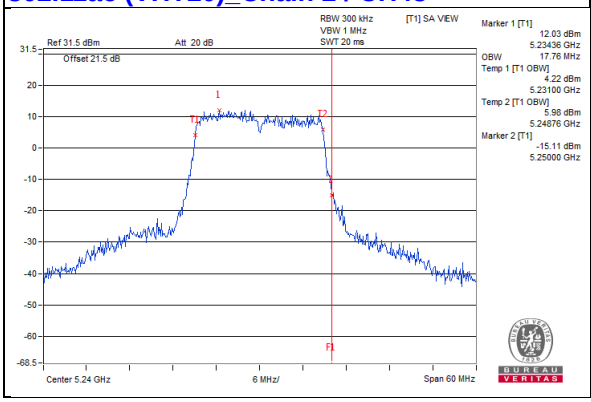
802.11ac (VHT20)_Chain 0 / CH48



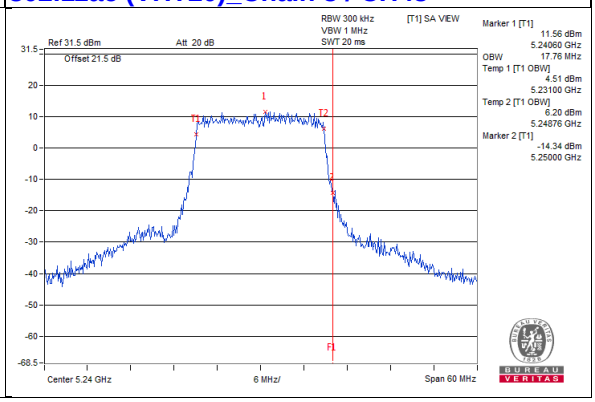
802.11ac (VHT20)_Chain 1 / CH48



802.11ac (VHT20)_Chain 2 / CH48

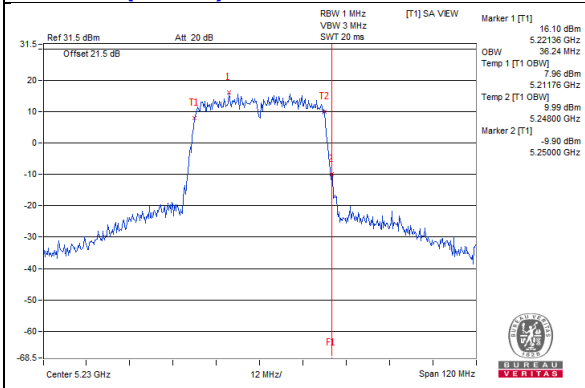


802.11ac (VHT20)_Chain 3 / CH48

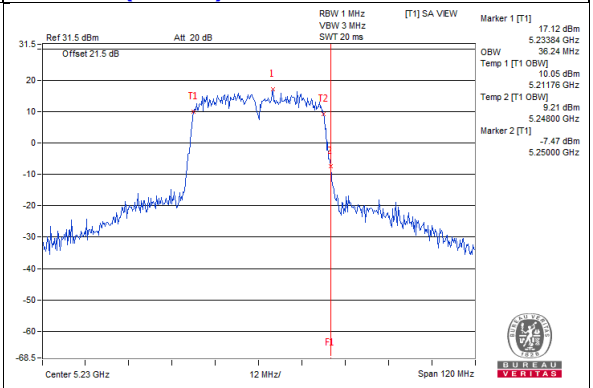


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

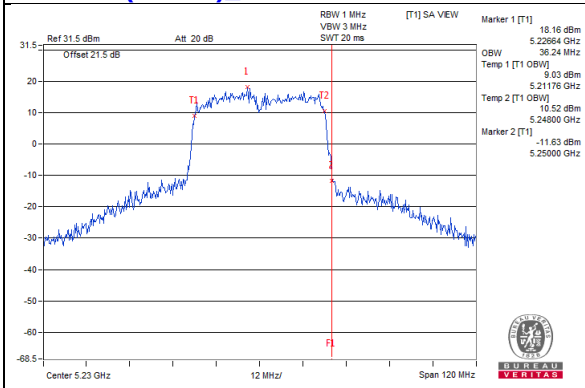
802.11ac (VHT40)_Chain 0 / CH46



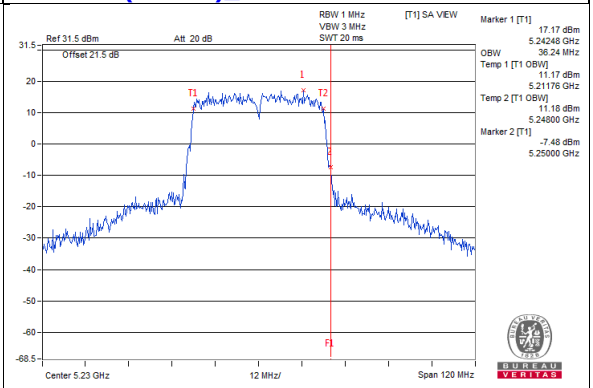
802.11ac (VHT40)_Chain 1 / CH46



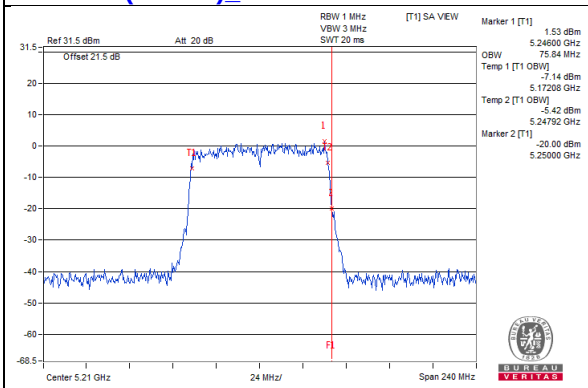
802.11ac (VHT40)_Chain 2 / CH46



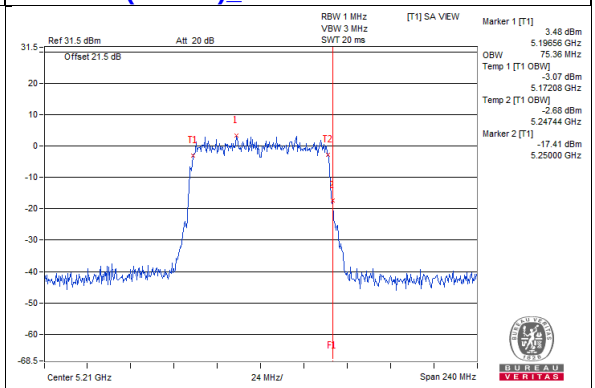
802.11ac (VHT40)_Chain 3 / CH46



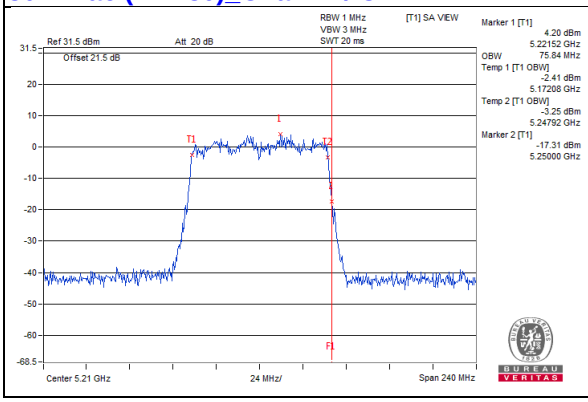
802.11ac (VHT80)_Chain 0 / CH42



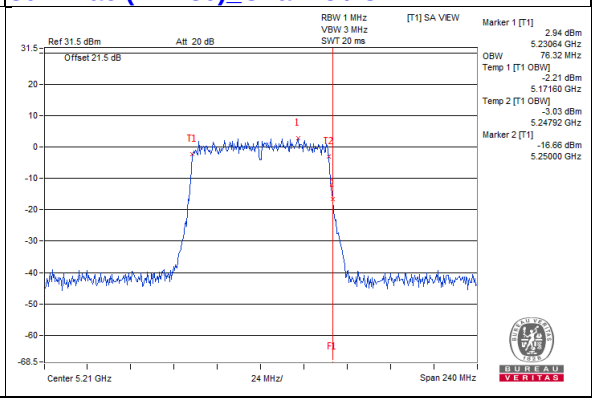
802.11ac (VHT80)_Chain 1 / CH42



802.11ac (VHT80)_Chain 2 / CH42

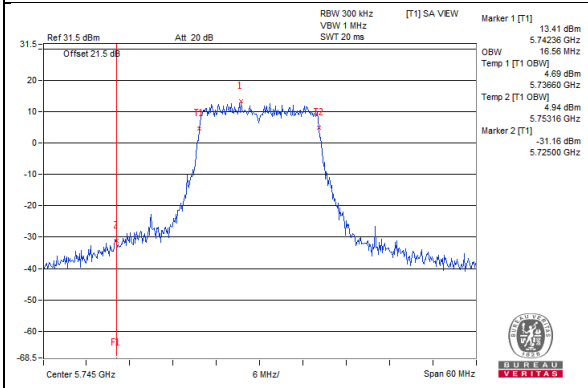


802.11ac (VHT80)_Chain 3 / CH42

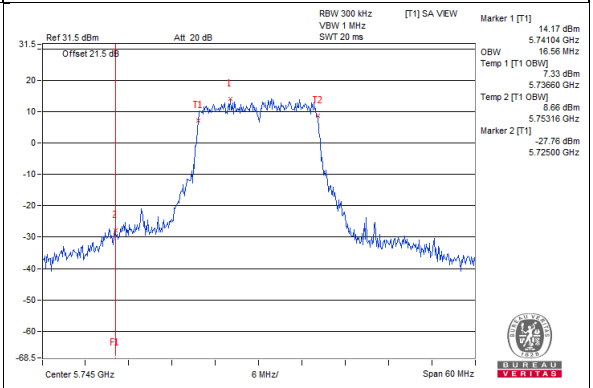


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

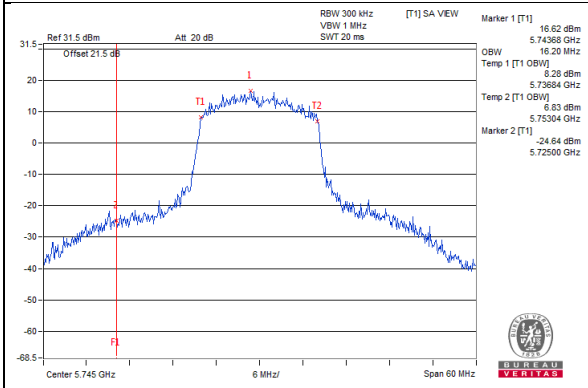
802.11a_Chain 0 / CH149



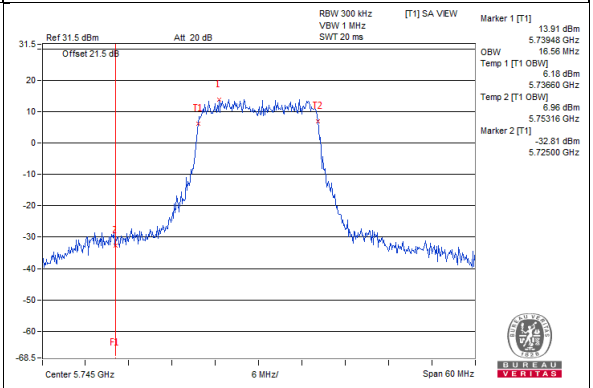
802.11a_Chain 1 / CH149



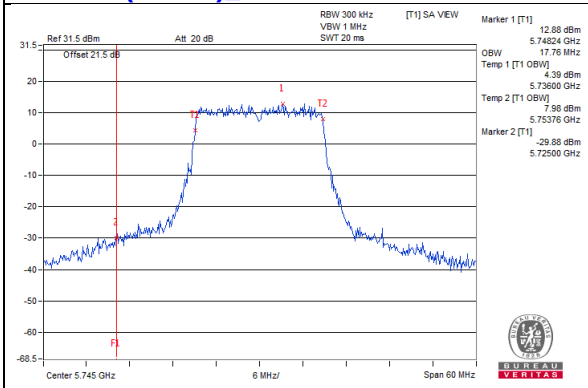
802.11a_Chain 2 / CH149



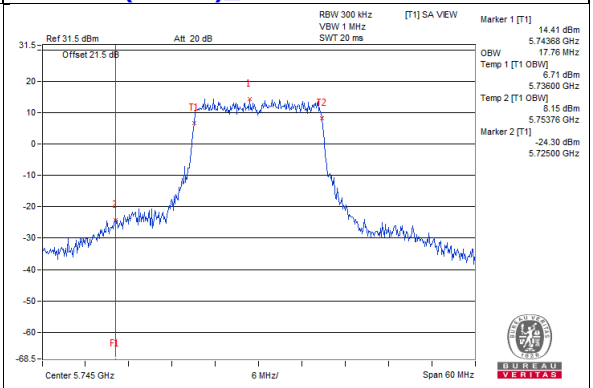
802.11a_Chain 3 / CH149



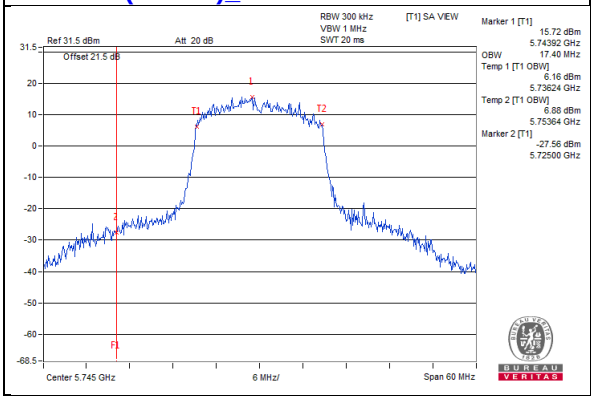
802.11ac (VHT20)_Chain 0 / CH149



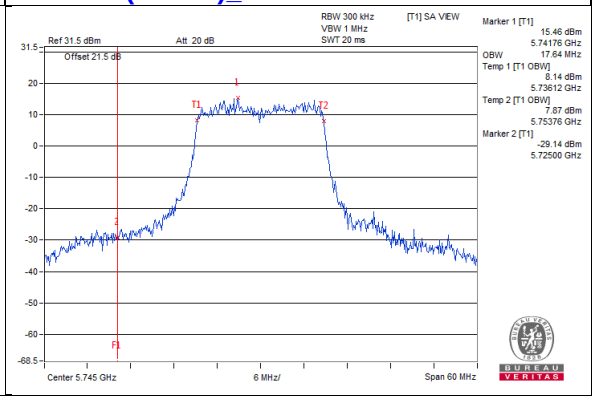
802.11ac (VHT20)_Chain 1 / CH149



802.11ac (VHT20)_Chain 2 / CH149

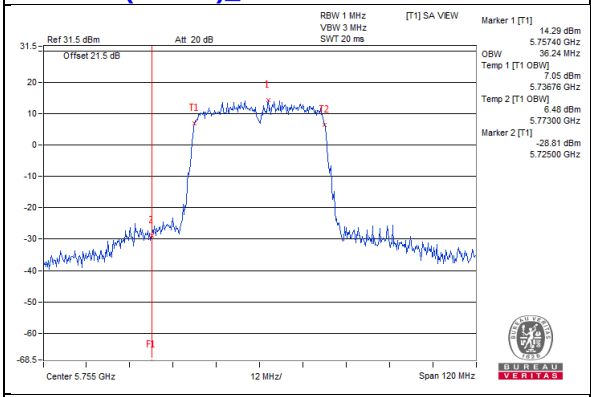


802.11ac (VHT20)_Chain 3 / CH149

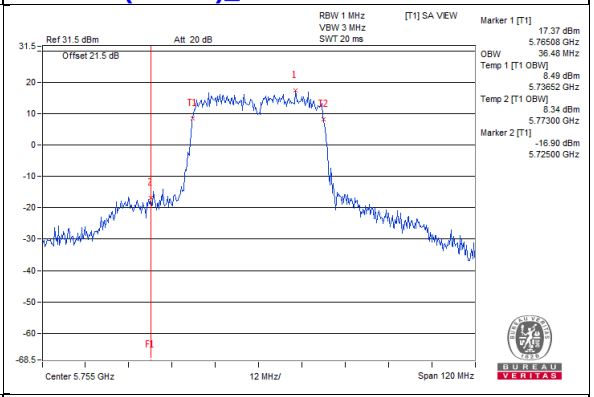


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

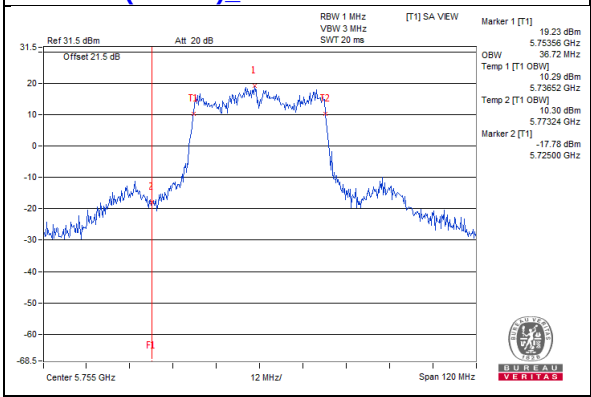
802.11ac (VHT40)_Chain 0 / CH151



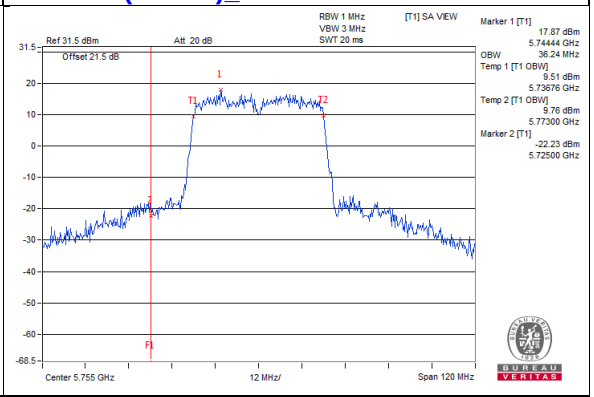
802.11ac (VHT40)_Chain 1 / CH151



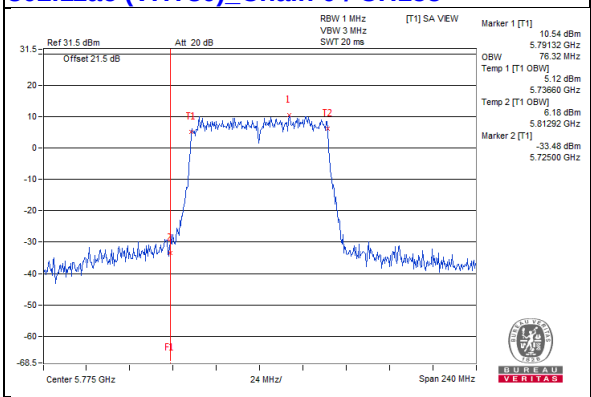
802.11ac (VHT40)_Chain 2 / CH151



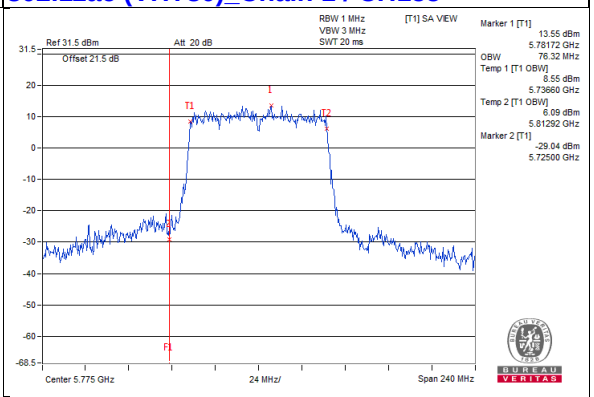
802.11ac (VHT40)_Chain 3 / CH151



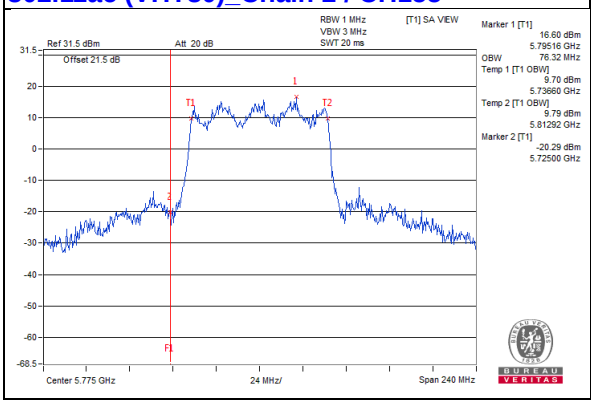
802.11ac (VHT80)_Chain 0 / CH155



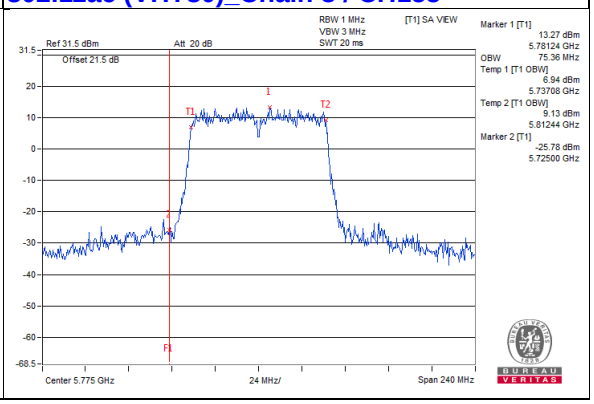
802.11ac (VHT80)_Chain 1 / CH155



802.11ac (VHT80)_Chain 2 / CH155



802.11ac (VHT80)_Chain 3 / CH155



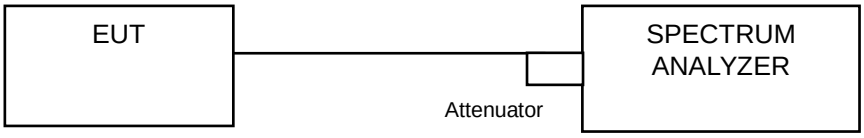
4.5 Peak Power Spectral Density Measurement

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	
	√	Client device	11dBm/ MHz
U-NII-2A	---		11dBm/ MHz
U-NII-2C	---		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

Note: This device can support different category application which switched by access point mode and client mode by software.

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

Master Mode

For U-NII-1:

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	Chain 2	Chain 3				
36	5180	6.23	6.92	7.60	7.40	0.14	13.22	14.71	Pass
40	5200	5.98	6.82	7.42	7.89	0.14	13.24	14.71	Pass
48	5240	6.10	7.20	7.78	7.70	0.14	13.40	14.71	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. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 17-(8.29-6) = 14.71dBm.

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

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	Chain 2	Chain 3			
36	5180	5.73	6.93	7.85	8.26	13.32	14.71	Pass
40	5200	5.89	7.02	7.62	8.26	13.30	14.71	Pass
48	5240	5.90	7.10	7.39	8.26	13.26	14.71	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. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 17-(8.29-6) = 14.71dBm.

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	Chain 2	Chain 3				
38	5190	1.44	3.33	3.47	3.79	0.13	9.25	14.71	Pass
46	5230	5.77	3.81	7.97	5.94	0.13	12.27	14.71	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. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 17-(8.29-6) = 14.71dBm.

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	Chain 2	Chain 3				
42	5210	-9.92	-7.44	-5.90	-23.54	0.25	-2.40	14.71	Pass

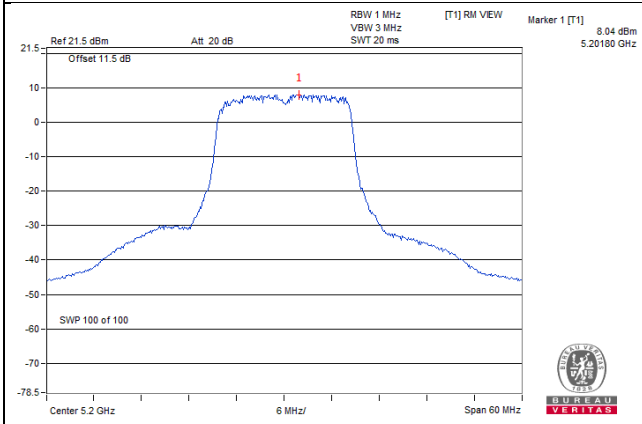
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 17-(8.29-6) = 14.71dBm.

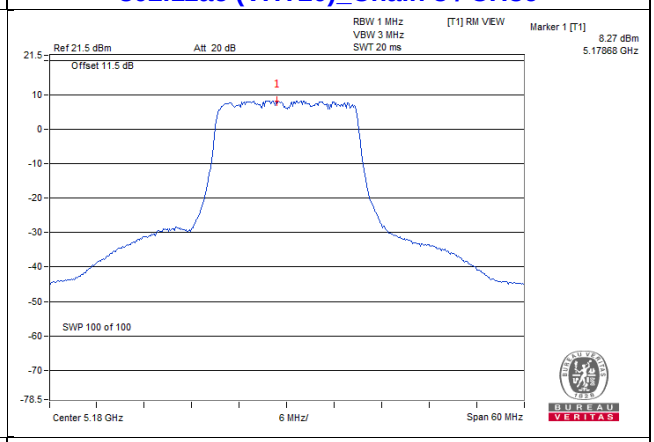
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

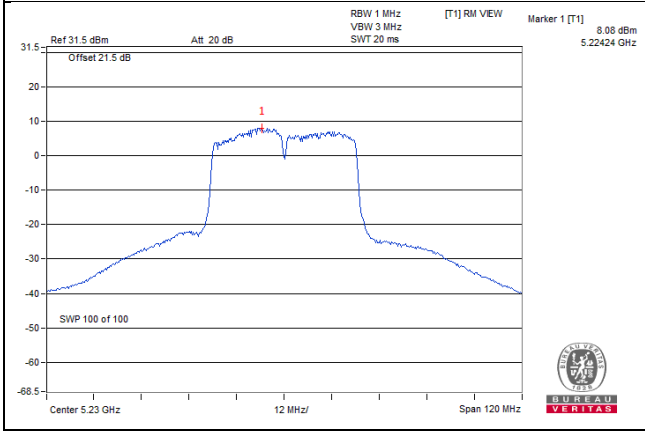
802.11a_Chain 3 / CH40



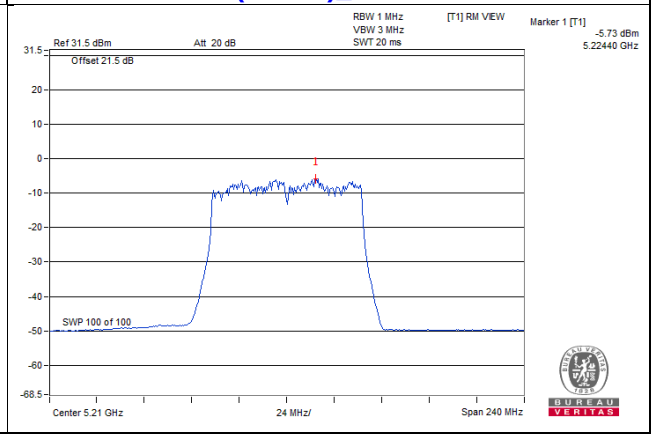
802.11ac (VHT20)_Chain 3 / CH36



802.11ac (VHT40)_Chain 2 / CH46



802.11ac (VHT80)_Chain 2 / CH42



For U-NII-3:

802.11a

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	0.02	2.24	6.02	0.14	8.40	27.71	Pass
	157	5785	0.86	3.08	6.02	0.14	9.24	27.71	Pass
	165	5825	0.70	2.92	6.02	0.14	9.08	27.71	Pass
1	149	5745	1.45	3.67	6.02	0.14	9.83	27.71	Pass
	157	5785	1.65	3.87	6.02	0.14	10.03	27.71	Pass
	165	5825	1.68	3.90	6.02	0.14	10.06	27.71	Pass
2	149	5745	3.97	6.19	6.02	0.14	12.35	27.71	Pass
	157	5785	4.32	6.54	6.02	0.14	12.70	27.71	Pass
	165	5825	3.45	5.67	6.02	0.14	11.83	27.71	Pass
3	149	5745	1.70	3.92	6.02	0.14	10.08	27.71	Pass
	157	5785	2.20	4.42	6.02	0.14	10.58	27.71	Pass
	165	5825	2.13	4.35	6.02	0.14	10.51	27.71	Pass

Note: 1. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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

802.11ac (VHT20)

TX chain	Chan.	Chan. Freq. (MHz)	PSD		10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)				
0	149	5745	-2.43	-0.21	6.02	5.81	27.71	Pass
	157	5785	-0.02	2.20	6.02	8.22	27.71	Pass
	165	5825	-0.12	2.10	6.02	8.12	27.71	Pass
1	149	5745	2.00	4.22	6.02	10.24	27.71	Pass
	157	5785	0.99	3.21	6.02	9.23	27.71	Pass
	165	5825	0.96	3.18	6.02	9.20	27.71	Pass
2	149	5745	3.90	6.12	6.02	12.14	27.71	Pass
	157	5785	3.37	5.59	6.02	11.61	27.71	Pass
	165	5825	3.58	5.80	6.02	11.82	27.71	Pass
3	149	5745	2.13	4.35	6.02	10.37	27.71	Pass
	157	5785	1.74	3.96	6.02	9.98	27.71	Pass
	165	5825	1.76	3.98	6.02	10.00	27.71	Pass

Note: 1. The Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

802.11ac (VHT40)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5745	-4.21	-1.99	6.02	0.13	4.16	27.71	Pass
	159	5785	-4.44	-2.22	6.02	0.13	3.93	27.71	Pass
1	151	5745	-1.48	0.74	6.02	0.13	6.89	27.71	Pass
	159	5785	-1.74	0.48	6.02	0.13	6.63	27.71	Pass
2	151	5745	1.21	3.43	6.02	0.13	9.58	27.71	Pass
	159	5785	1.30	3.52	6.02	0.13	9.67	27.71	Pass
3	151	5745	-1.30	0.92	6.02	0.13	7.07	27.71	Pass
	159	5785	-1.60	0.62	6.02	0.13	6.77	27.71	Pass

Note: 1. The Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

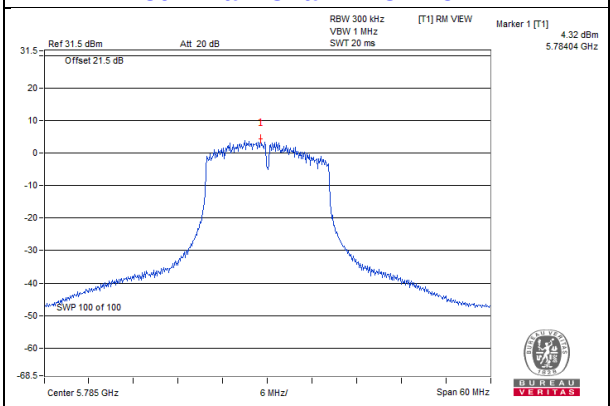
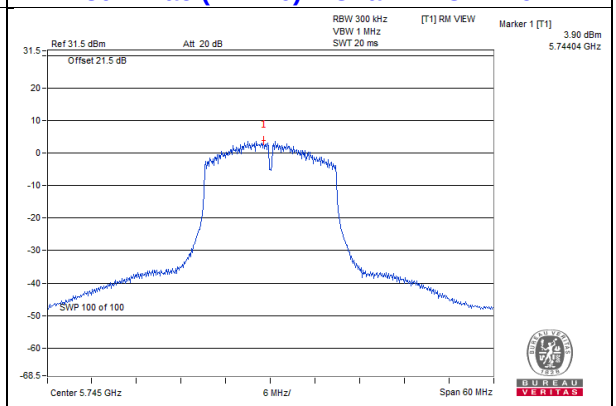
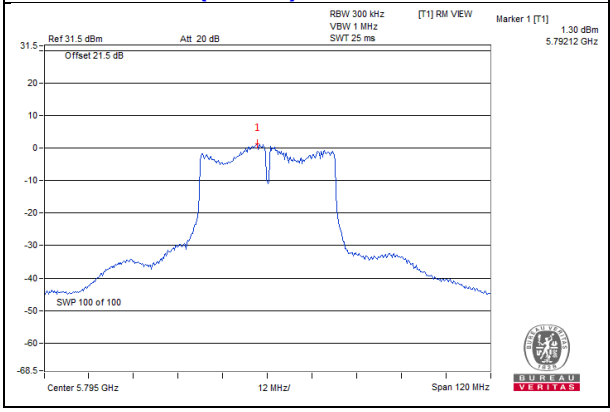
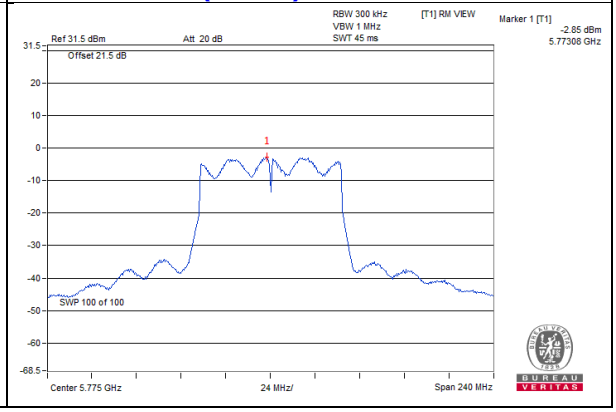
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5745	-8.04	-5.82	6.02	0.25	0.45	27.71	Pass
1	155	5745	-5.61	-3.39	6.02	0.25	2.88	27.71	Pass
2	155	5745	-2.85	-0.63	6.02	0.25	5.64	27.71	Pass
3	155	5745	-5.57	-3.35	6.02	0.25	2.92	27.71	Pass

Note: 1. The Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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

Spectrum Plot of Worst Value	
802.11a – Chain 2: CH 157	**802.11ac (VHT20) – Chain 2: CH 149**
	
802.11ac (VHT40) – Chain 2: CH 159	**802.11ac (VHT80) – Chain 2: CH 155**
	

Client Mode

For U-NII-1:

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	Chain 2	Chain 3				
36	5180	0.06	1.26	2.43	0.67	0.14	7.35	8.71	Pass
40	5200	0.72	0.99	1.24	1.61	0.14	7.31	8.71	Pass
48	5240	0.17	1.53	2.15	0.72	0.14	7.36	8.71	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. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 11-(8.29-6) = 8.71dBm.

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

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	Chain 2	Chain 3			
36	5180	-0.19	1.07	2.33	2.04	7.44	8.71	Pass
40	5200	-0.58	0.34	2.62	1.36	7.12	8.71	Pass
48	5240	0.00	0.80	2.06	2.00	7.32	8.71	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. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 11-(8.29-6) = 8.71dBm.

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	Chain 2	Chain 3				
38	5190	-0.41	0.64	1.79	0.57	0.13	6.87	8.71	Pass
46	5230	-0.11	0.60	2.35	0.34	0.13	7.05	8.71	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. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 11-(8.29-6) = 8.71dBm.

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	Chain 2	Chain 3				
42	5210	-9.92	-7.44	-5.90	-23.54	0.25	-2.40	8.71	Pass

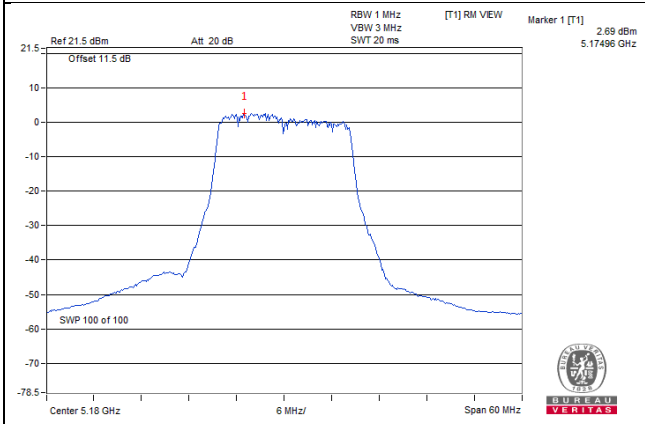
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 11-(8.29-6) = 8.71dBm.

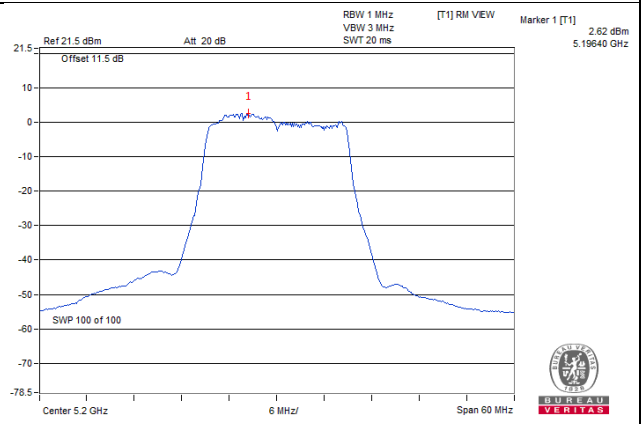
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

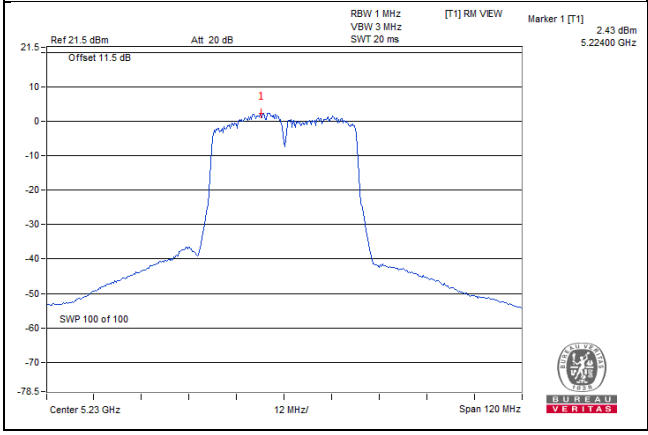
802.11a_Chain 2 / CH36



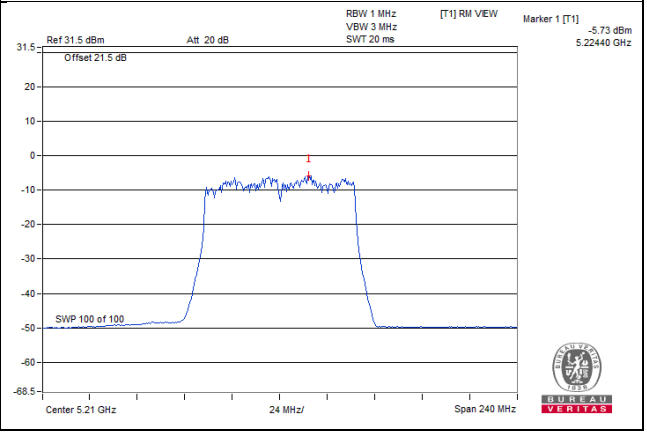
802.11ac (VHT20)_Chain 2 / CH40



802.11ac (VHT40)_Chain 2 / CH46



802.11ac (VHT80)_Chain 2 / CH42



For U-NII-3:

802.11a

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	149	5745	0.02	2.24	6.02	0.14	8.40	27.71	Pass
	157	5785	0.86	3.08	6.02	0.14	9.24	27.71	Pass
	165	5825	0.70	2.92	6.02	0.14	9.08	27.71	Pass
1	149	5745	1.45	3.67	6.02	0.14	9.83	27.71	Pass
	157	5785	1.65	3.87	6.02	0.14	10.03	27.71	Pass
	165	5825	1.68	3.90	6.02	0.14	10.06	27.71	Pass
2	149	5745	3.97	6.19	6.02	0.14	12.35	27.71	Pass
	157	5785	4.32	6.54	6.02	0.14	12.70	27.71	Pass
	165	5825	3.45	5.67	6.02	0.14	11.83	27.71	Pass
3	149	5745	1.70	3.92	6.02	0.14	10.08	27.71	Pass
	157	5785	2.20	4.42	6.02	0.14	10.58	27.71	Pass
	165	5825	2.13	4.35	6.02	0.14	10.51	27.71	Pass

Note: 1. The Directional gain = $10 \log[(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2 / 4]$ = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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

802.11ac (VHT20)

TX chain	Chan.	Chan. Freq. (MHz)	PSD		10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)				
0	149	5745	-2.43	-0.21	6.02	5.81	27.71	Pass
	157	5785	-0.02	2.20	6.02	8.22	27.71	Pass
	165	5825	-0.12	2.10	6.02	8.12	27.71	Pass
1	149	5745	2.00	4.22	6.02	10.24	27.71	Pass
	157	5785	0.99	3.21	6.02	9.23	27.71	Pass
	165	5825	0.96	3.18	6.02	9.20	27.71	Pass
2	149	5745	3.90	6.12	6.02	12.14	27.71	Pass
	157	5785	3.37	5.59	6.02	11.61	27.71	Pass
	165	5825	3.58	5.80	6.02	11.82	27.71	Pass
3	149	5745	2.13	4.35	6.02	10.37	27.71	Pass
	157	5785	1.74	3.96	6.02	9.98	27.71	Pass
	165	5825	1.76	3.98	6.02	10.00	27.71	Pass

Note: 1. The Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

802.11ac (VHT40)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	151	5745	-4.21	-1.99	6.02	0.13	4.16	27.71	Pass
	159	5785	-4.44	-2.22	6.02	0.13	3.93	27.71	Pass
1	151	5745	-1.48	0.74	6.02	0.13	6.89	27.71	Pass
	159	5785	-1.74	0.48	6.02	0.13	6.63	27.71	Pass
2	151	5745	1.21	3.43	6.02	0.13	9.58	27.71	Pass
	159	5785	1.30	3.52	6.02	0.13	9.67	27.71	Pass
3	151	5745	-1.30	0.92	6.02	0.13	7.07	27.71	Pass
	159	5785	-1.60	0.62	6.02	0.13	6.77	27.71	Pass

Note: 1. The Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

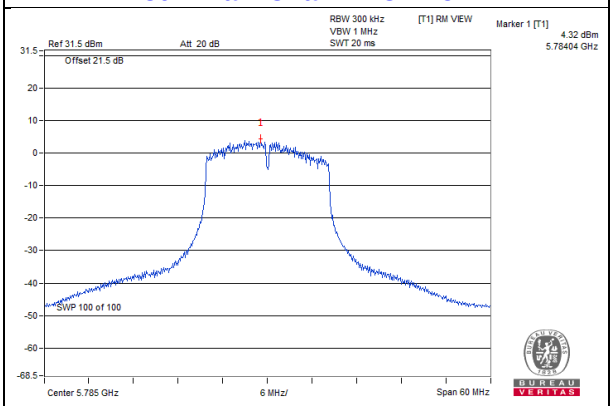
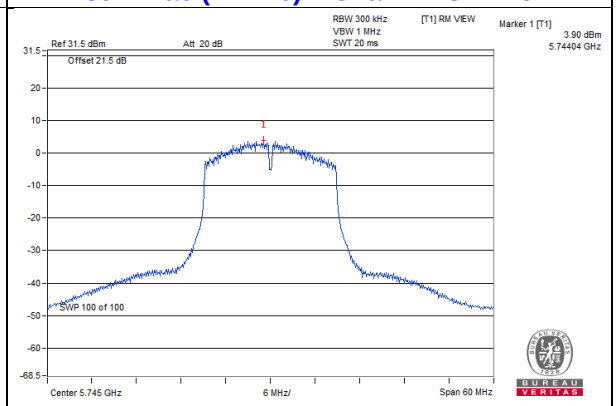
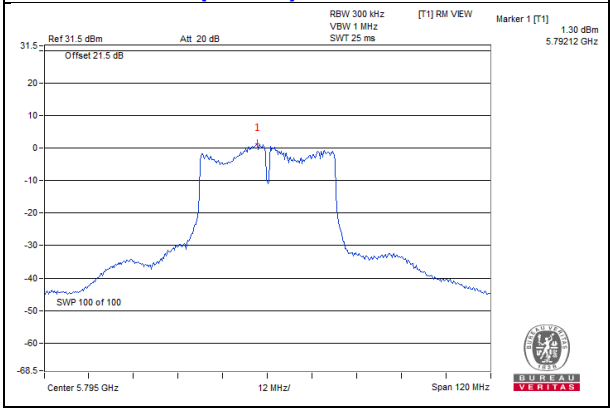
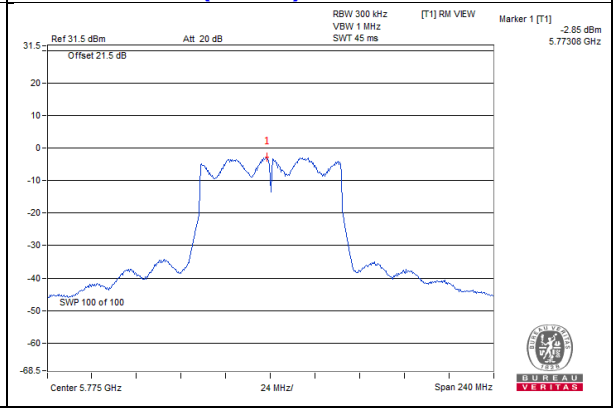
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor		10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
			(dBm/300kHz)	(dBm/500kHz)					
0	155	5745	-8.04	-5.82	6.02	0.25	0.45	27.71	Pass
1	155	5745	-5.61	-3.39	6.02	0.25	2.88	27.71	Pass
2	155	5745	-2.85	-0.63	6.02	0.25	5.64	27.71	Pass
3	155	5745	-5.57	-3.35	6.02	0.25	2.92	27.71	Pass

Note: 1. The Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 8.29dBi > 6dBi , so the power density limit shall be reduced to 30-(8.29-6) = 27.71dBm.

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

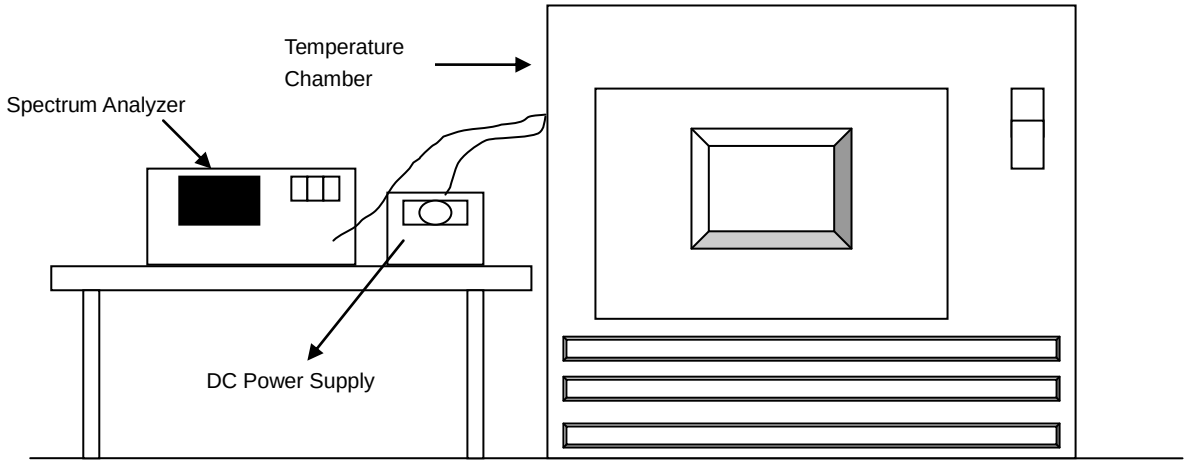
Spectrum Plot of Worst Value	
802.11a – Chain 2: CH 157	**802.11ac (VHT20) – Chain 2: CH 149**
	
802.11ac (VHT40) – Chain 2: CH 159	**802.11ac (VHT80) – Chain 2: CH 155**
	

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 DC voltage.
b. Turn the EUT on and couple its output to a spectrum analyzer.
c. Turn the EUT off and set the chamber to the highest temperature specified.
d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.
e. Repeat step 2 and 3 with the temperature chamber set to the lowest temperature.
f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.
.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
50	3.3	5180.0077	PASS	5180.0076	PASS	5180.0101	PASS	5180.0103	PASS
40	3.3	5179.9758	PASS	5179.9775	PASS	5179.9756	PASS	5179.9767	PASS
30	3.3	5180.0044	PASS	5180.0068	PASS	5180.0066	PASS	5180.0079	PASS
20	3.3	5180.0224	PASS	5180.0252	PASS	5180.0234	PASS	5180.0217	PASS
10	3.3	5180.0259	PASS	5180.0242	PASS	5180.0239	PASS	5180.0239	PASS
0	3.3	5180.0187	PASS	5180.0148	PASS	5180.016	PASS	5180.0172	PASS
-10	3.3	5179.9925	PASS	5179.9926	PASS	5179.9911	PASS	5179.9951	PASS
-20	3.3	5179.9878	PASS	5179.9854	PASS	5179.9869	PASS	5179.9856	PASS
-30	3.3	5179.9751	PASS	5179.9786	PASS	5179.9783	PASS	5179.9785	PASS

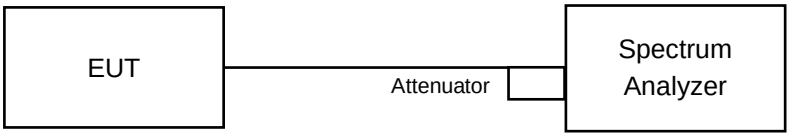
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	3.795	5180.0214	PASS	5180.0249	PASS	5180.0231	PASS	5180.0225	PASS
	3.3	5180.0224	PASS	5180.0252	PASS	5180.0234	PASS	5180.0217	PASS
	2.805	5180.0234	PASS	5180.0242	PASS	5180.024	PASS	5180.0208	PASS

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

Master Mode

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.40	16.40	15.08	16.39	0.5	Pass
157	5785	16.40	16.41	15.14	16.37	0.5	Pass
165	5825	16.39	16.40	15.13	16.37	0.5	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	17.62	17.66	13.89	17.62	0.5	Pass
157	5785	17.63	17.64	15.03	17.62	0.5	Pass
165	5825	17.59	17.58	15.00	16.98	0.5	Pass

802.11ac (VHT40)

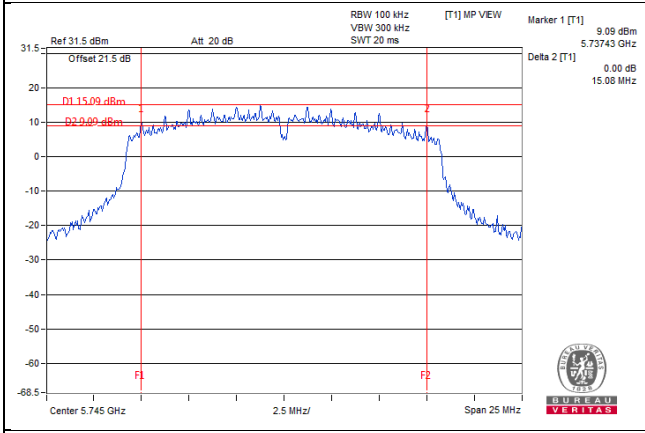
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	35.19	35.69	36.25	35.18	0.5	Pass
159	5795	35.18	35.20	36.46	35.09	0.5	Pass

802.11ac (VHT80)

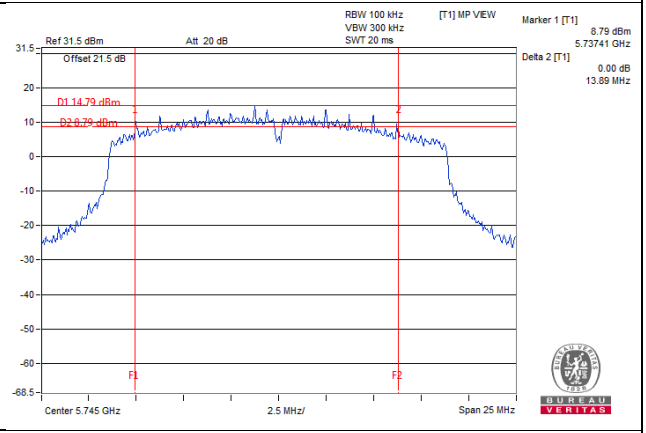
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	75.97	75.84	73.73	74.72	0.5	Pass

Spectrum Plot of Worst Value

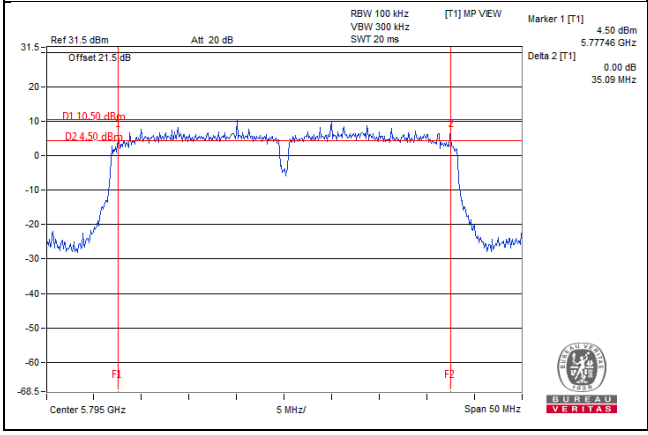
802.11a_Chain 2 / CH149



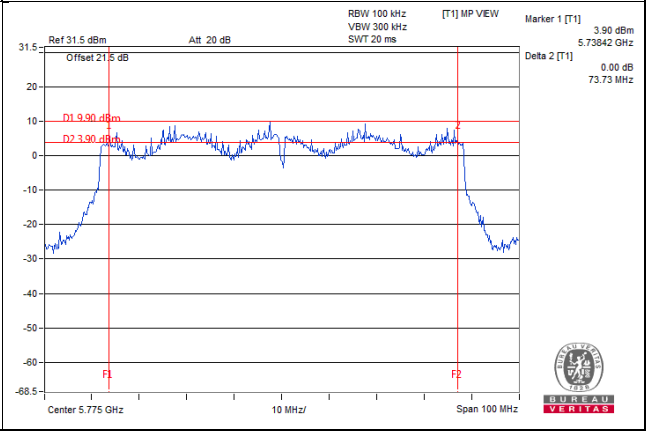
802.11ac (VHT20)_Chain 2 / CH149



802.11ac (VHT40)_Chain 3 / CH159



802.11ac (VHT80)_Chain 2 / CH155



Client Mode

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.40	16.40	15.08	16.39	0.5	Pass
157	5785	16.40	16.41	15.14	16.37	0.5	Pass
165	5825	16.39	16.40	15.13	16.37	0.5	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	17.62	17.66	13.89	17.62	0.5	Pass
157	5785	17.63	17.64	15.03	17.62	0.5	Pass
165	5825	17.59	17.58	15.00	16.98	0.5	Pass

802.11ac (VHT40)

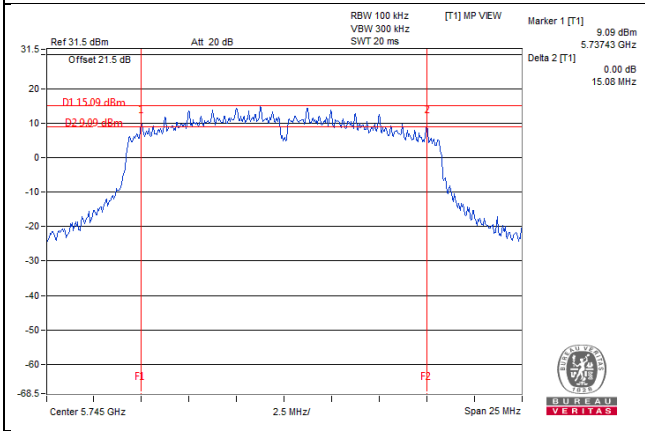
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	35.19	35.69	36.25	35.18	0.5	Pass
159	5795	35.18	35.20	36.46	35.09	0.5	Pass

802.11ac (VHT80)

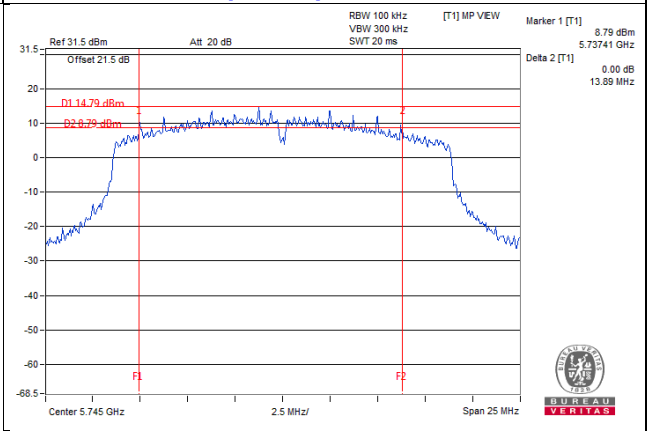
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	75.97	75.84	73.73	74.72	0.5	Pass

Spectrum Plot of Worst Value

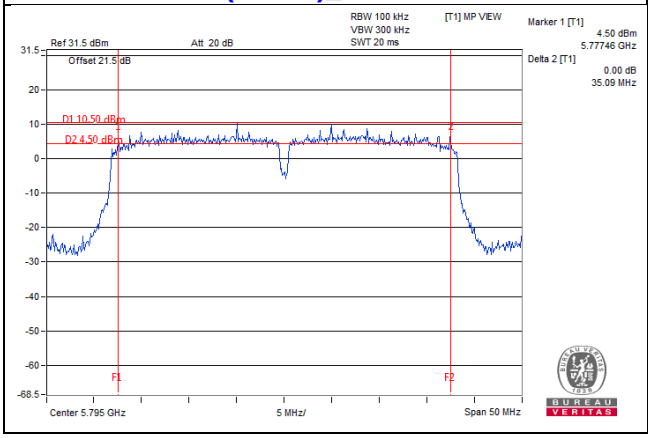
802.11a_Chain 2 / CH149



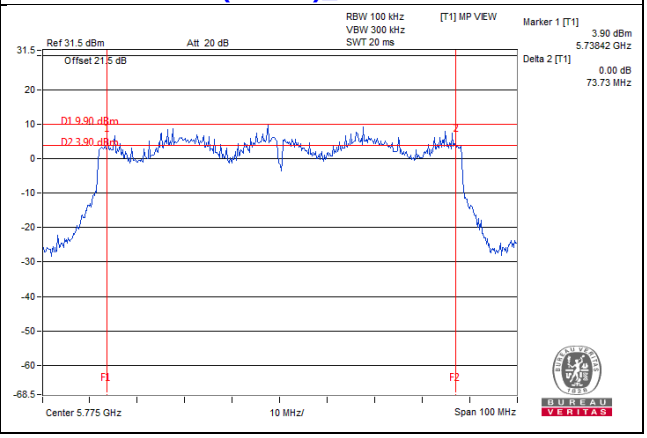
802.11ac (VHT20)_Chain 2 / CH149



802.11ac (VHT40)_Chain 3 / CH159



802.11ac (VHT80)_Chain 2 / CH155



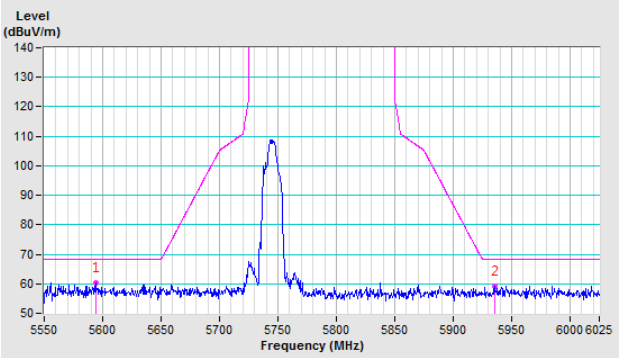
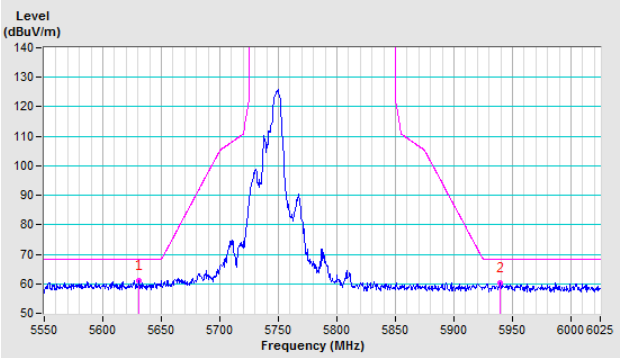
5 Pictures of Test Arrangements

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

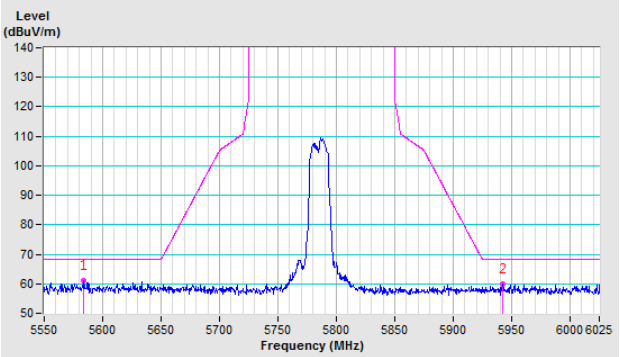
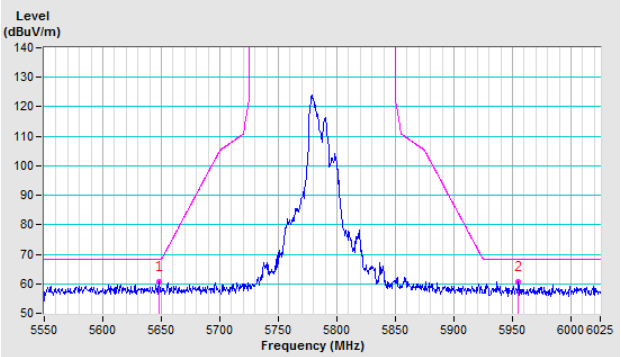
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

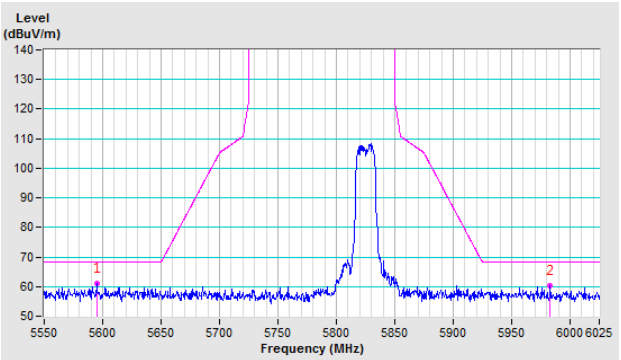
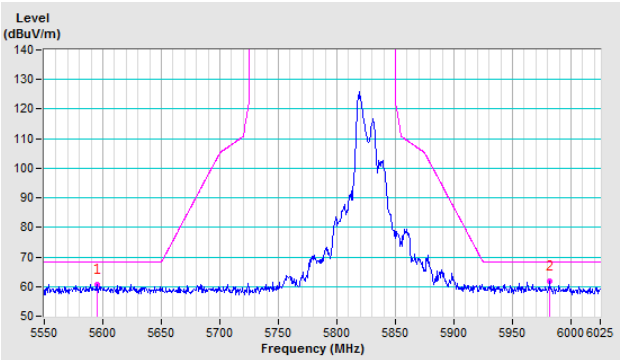
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

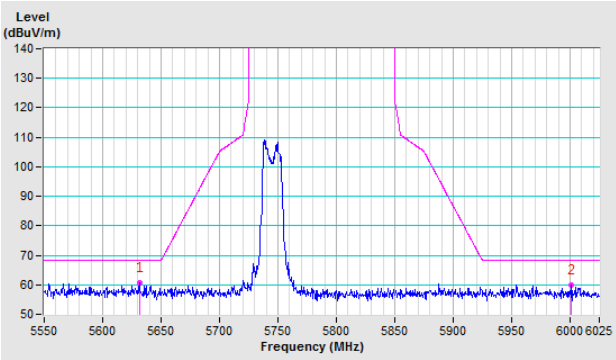
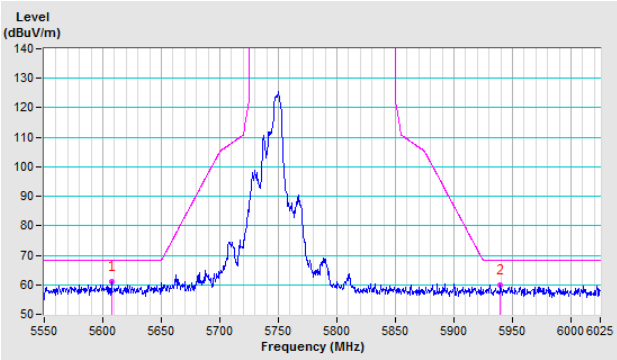
Horizontal	Vertical
	

CH 165 5825 MHz

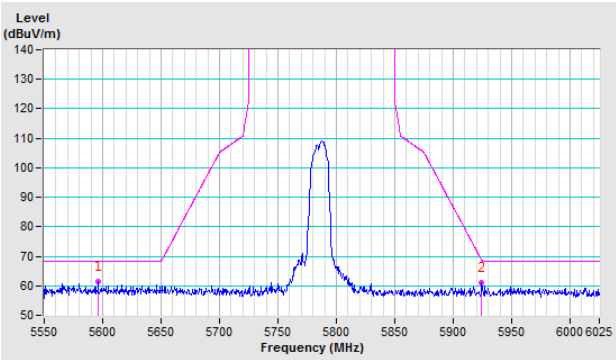
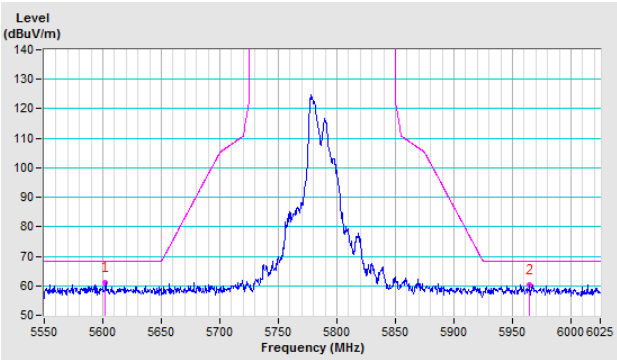
Horizontal	Vertical
	

802.11ac (VHT20)

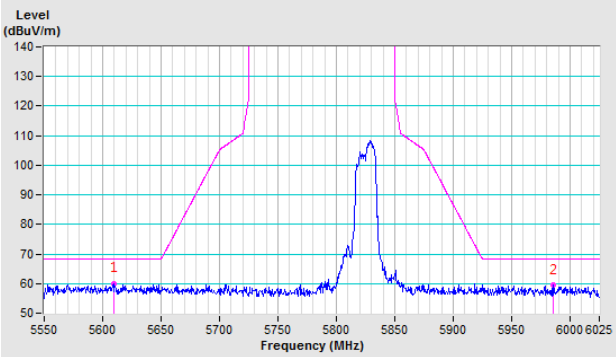
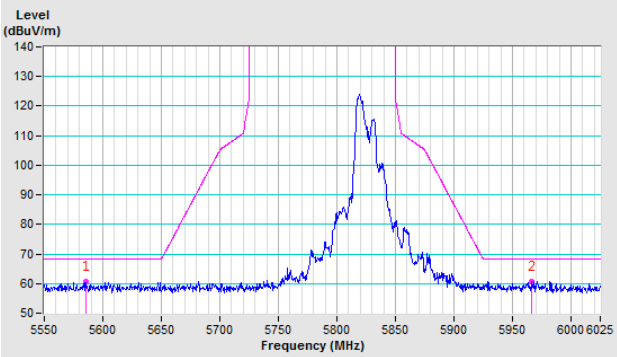
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

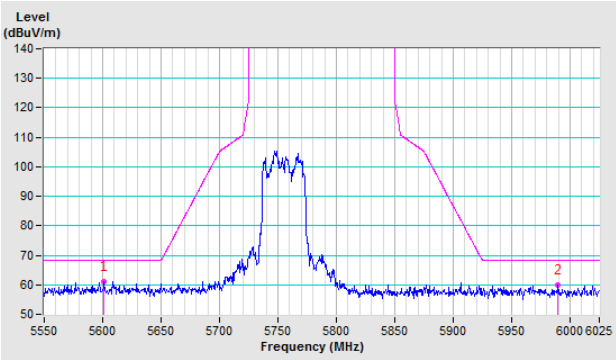
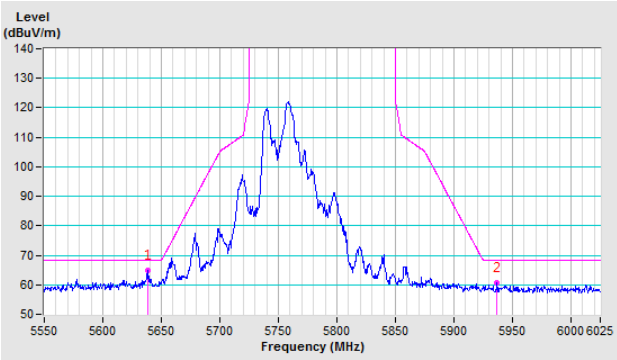
Horizontal	Vertical
	

CH 165 5825 MHz

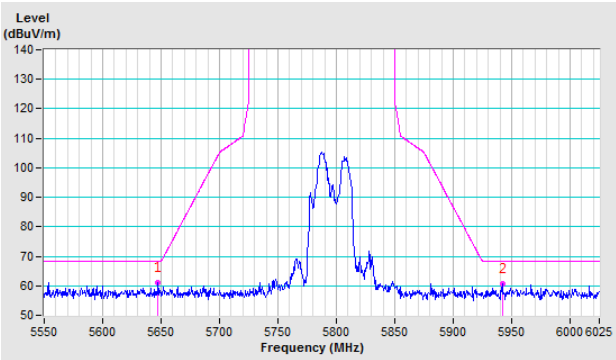
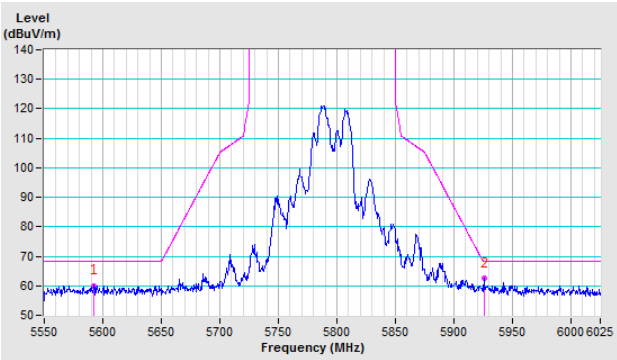
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

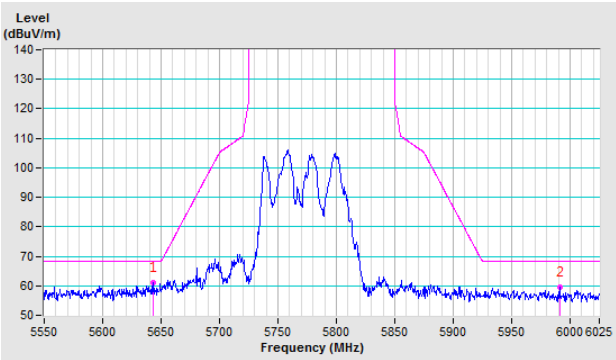
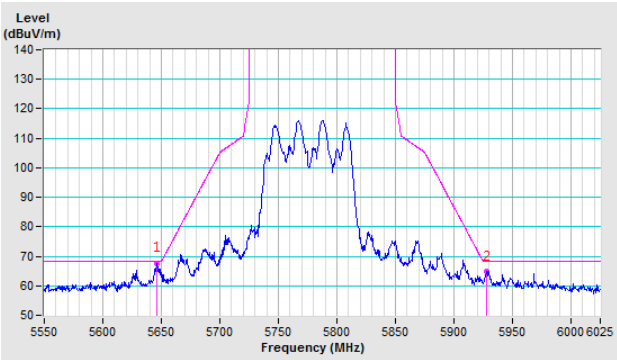
Horizontal	Vertical
	

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

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

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Hwa Ya EMC/RF/Safety Lab
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Email: service.adt@tw.bureauveritas.com
Web Site: www.bureauveritas-adt.com

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

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