FCC Test Report

Report No.:	RF180227E06-1
FCC ID:	KA2IR2680A1
Test Model:	DIR-2680
Received Date:	Feb. 27, 2018
Test Date:	Mar. 17 to 26, 2018
Issued Date:	Apr. 26, 2018
Applicant:	D-Link Corporation
Address:	17595 Mt. Herrmann, Fountain Valley, California United States
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

Testing Laboratory
2022

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Release Control Record

Issue No.	Description	Date Issued
RF180227E06-1	Original release.	Apr. 26, 2018

1 Certificate of Conformity

Product:	D-Fend AC2600 Wi-Fi Router
Brand:	D-Link Corporation
Test Model:	DIR-2680
Sample Status:	ENGINEERING SAMPLE
Applicant:	D-Link Corporation
Test Date:	Mar. 17 to 26, 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 : Wendy Wu , **Date:** Apr. 26, 2018

Wendy Wu / Specialist

Approved by : , **Date:** Apr. 26, 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 -17.40dB at 0.47422MHz.
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 -1.1dB at 5150.00MHz, 5648.88MHz.
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 i-pex (MHF) 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	D-Fend AC2600 Wi-Fi Router
Brand	D-Link Corporation
Test Model	DIR-2680
Status of EUT	ENGINEERING SAMPLE
Power Supply Rating	12Vdc from power adapter
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 802.11g: 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:** **1TX Mode:** 663.743mW **CDD Mode:** 993.019mW **Beamforming Mode:** 401.721mW **5GHz:** **CDD Mode:** **5.18 ~ 5.24GHz:** 650.182mW **5.745 ~ 5.825GHz:** 988.682mW **Beamforming Mode:** **5.18 ~ 5.24GHz:** 323.859mW **5.745 ~ 5.825GHz:** 328.561mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter x1
Data Cable Supplied	NA

Note:

1. The EUT may have black and white colors for marketing requirement.
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 EUT must be supplied from power adapter as following table:

No.	Brand	Model No.	Spec.	Color	Plug
1	APD	WA-36A12FU	Input: 100-240Vac, 0.9A, 50-60Hz Output: 12Vdc, 3A DC output cable (Unshielded, 1.2m)	Black & White	-
2	APD	WA-36A12R	Input: 100-240Vac, 0.9A, 50-60Hz Output: 12Vdc, 3A DC output cable (Unshielded, 1.2m)	Black & White	Replaceable
From above adapter, Adapter 1 was selected for final test.					

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

Ant No.	PCB No.	Brand	Model	Antenna Gain (dBi)	Frequency rang (MHz)	Antenna type	Connector type
1	AJ5 (2.4GHz_5GHz_1)	Whayu	C641-510203-A	3.6	2400~2500	Dipole	i-pex(MHF)
				4.9	5150~5825		
2	AJ6 (2.4GHz_5GHz_2)	Whayu	C641-510204-A	3.8	2400~2500	Dipole	i-pex(MHF)
				4.6	5150~5825		
3	AJ7 (2.4GHz_5GHz_3)	Whayu	C641-510205-A	3.9	2400~2500	Dipole	i-pex(MHF)
				4.9	5150~5825		
4	AJ8 (2.4GHz_5GHz_4)	Whayu	C641-510206-A	3.9	2400~2500	Dipole	i-pex(MHF)
				4.8	5150~5825		
For 802.11b mode will fix transmission on Ant 4.							

5. The EUT incorporates a MIMO function.

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	1TX Fixed Ant 4	1RX
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 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.
3. 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)

6. The above EUT information is declared by manufacturer and for more detailed features description, please refers 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	5210MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

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
802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (HT40)		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
802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)		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	165	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	165	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.

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
802.11n (HT20)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
802.11n (HT40)		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
802.11n (HT20)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
802.11n (HT40)		151 to 159	151, 159	OFDM	BPSK	13.5
802.11ac (VHT80)		155	155	OFDM	BPSK	29.3
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

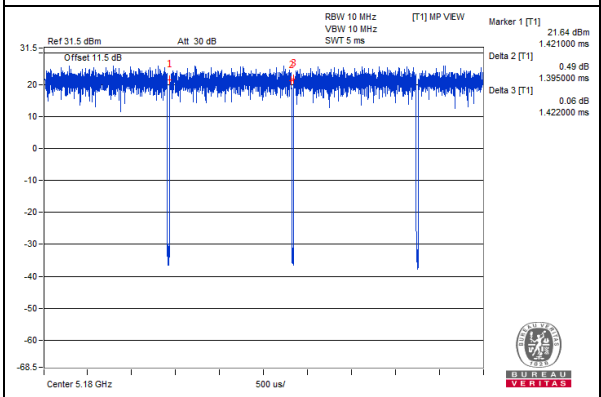
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	23deg. C, 69%RH	120Vac, 60Hz	Steven Chiang
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Steven Chiang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Andy Ho
APCM	25deg. C, 60%RH	120Vac, 60Hz	Robert Cheng

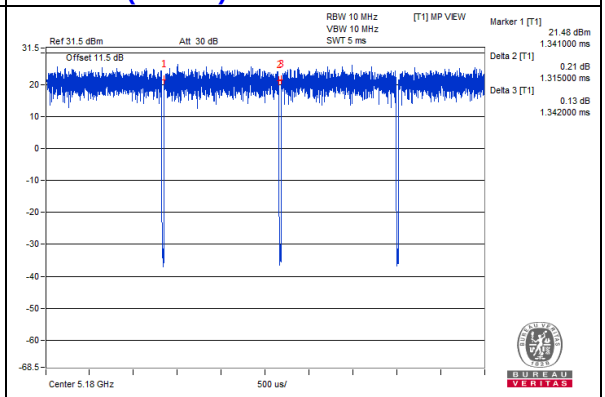
3.3 Duty Cycle of Test Signal

If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.
802.11a: Duty cycle = 1.395 ms/1.422 ms = 0.981
802.11ac (VHT20): Duty cycle = 1.315 ms/1.342 ms = 0.98
802.11ac (VHT40): Duty cycle = 0.656 ms/0.681 ms = 0.963, Duty factor = 10 * log(1/0.963) = 0.16
802.11ac (VHT80): Duty cycle = 0.324 ms/0.349 ms = 0.928, Duty factor = 10 * log(1/0.928) = 0.32

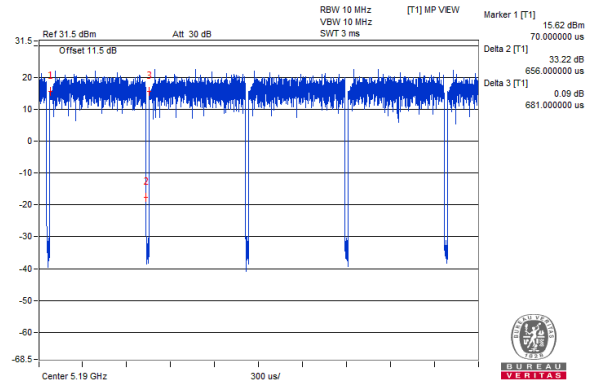
802.11a



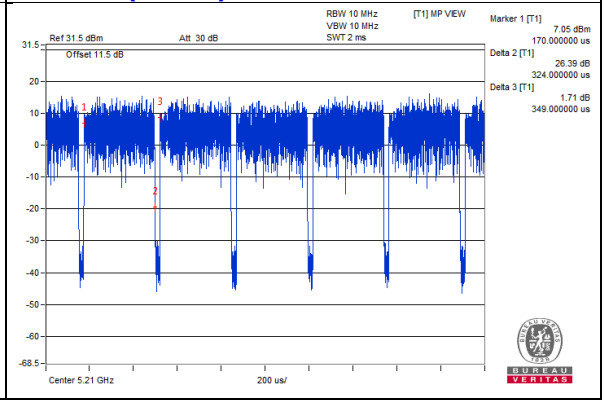
802.11ac (VHT20)



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.

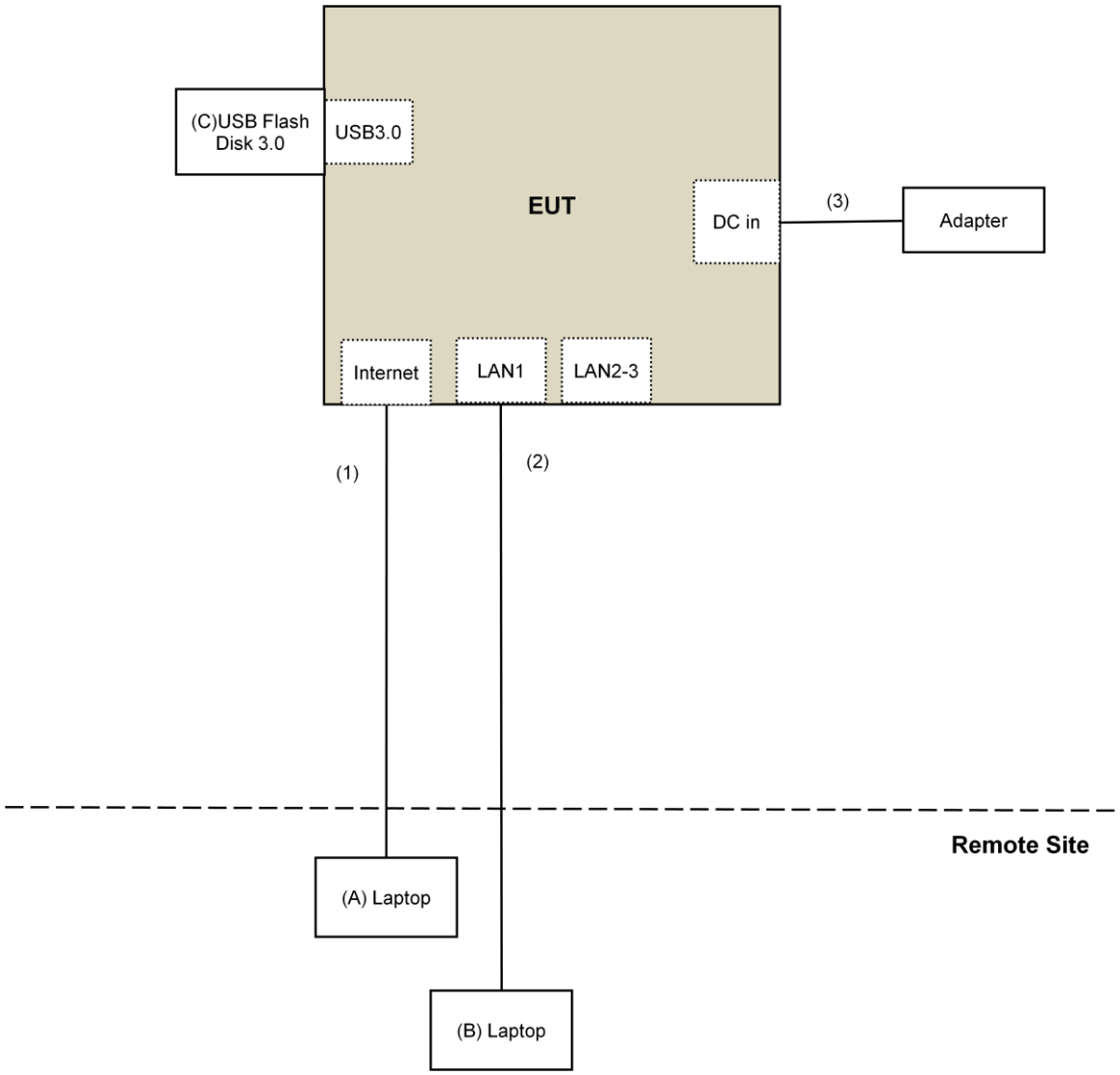
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab
B.	Laptop	DELL	E6420	482T3R1	FCC DoC	Provided by Lab
C.	USB Flash Disk 3.0	Transcend	16GB	NA	NA	Provided by Lab

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.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	DC Cable	1	1.2	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

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

Note:

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

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver 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 06, 2017	May 05, 2018
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	Apr. 01, 2017	Mar. 31, 2018
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Oct. 03, 2017	Oct. 02, 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
AC Power Source Extech Electronics	6205	1440452	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 10, 2018	Jan. 09, 2019
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 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: Mar. 22 to 26, 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. Parallel, perpendicular, and ground-parallel orientations of the antenna are set to make the measurement.

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

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

NOTE:

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

For Radiated emission above 30MHz

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

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

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

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

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

f. The test-receiver system was set to peak and average 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:

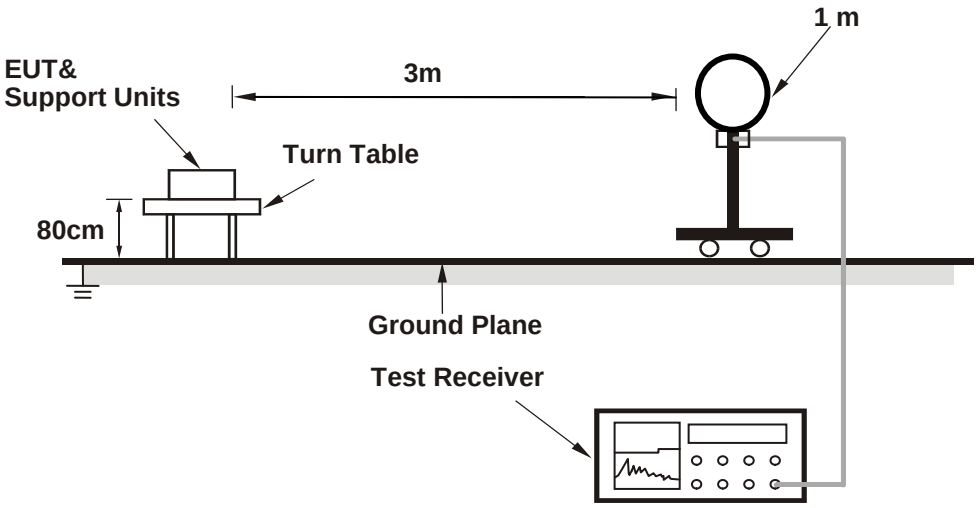
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

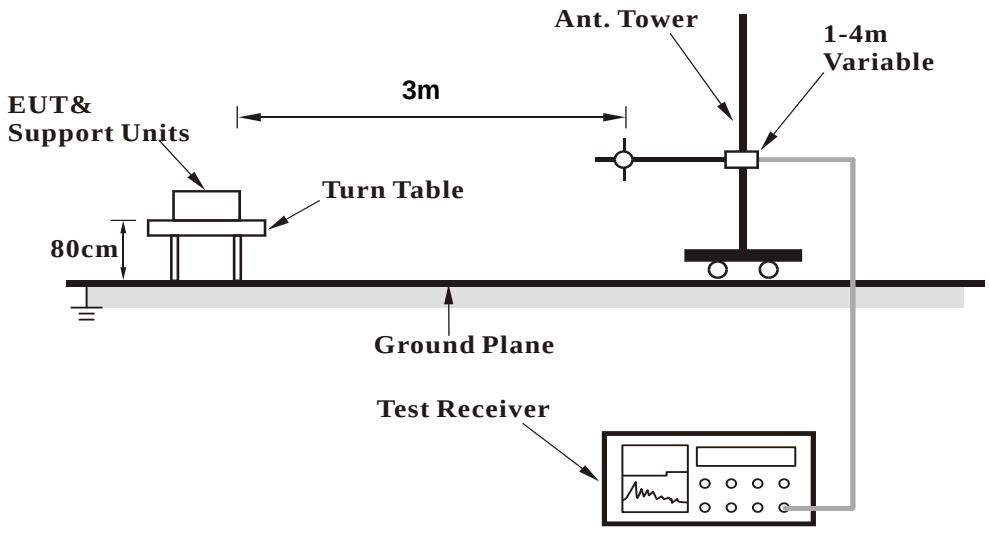
No deviation.

4.1.5 Test Setup

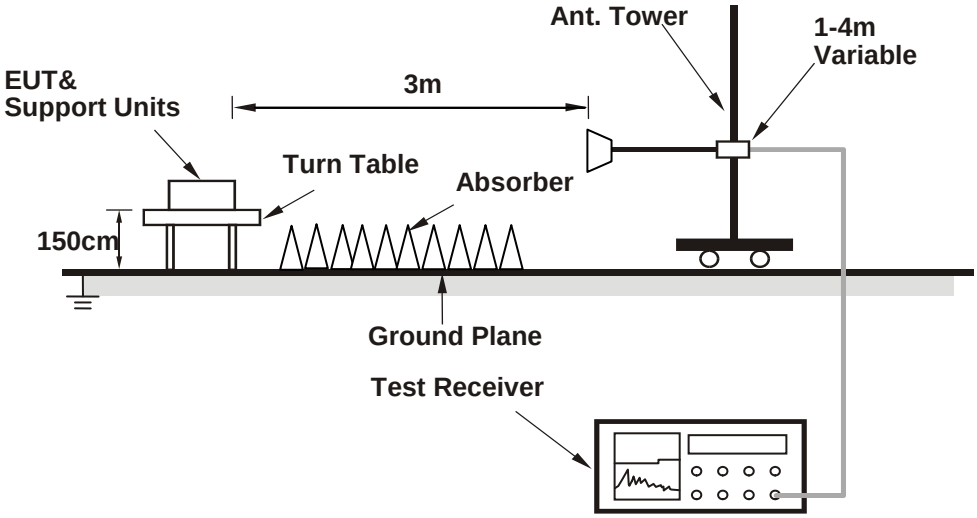
For Radiated emission below 30MHz



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. Connected the EUT with the Laptop which is placed on remote site.
b. Controlling software (DUT_setup.540.54.exe) 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	63.4 PK	74.0	-10.6	1.67 H	125	59.4	4.0
2	5150.00	43.0 AV	54.0	-11.0	1.67 H	125	39.0	4.0
3	*5180.00	115.3 PK			1.67 H	125	111.4	3.9
4	*5180.00	104.3 AV			1.67 H	125	100.4	3.9
5	#10360.00	51.0 PK	74.0	-23.0	1.52 H	319	38.2	12.8
6	#10360.00	39.7 AV	54.0	-14.3	1.52 H	319	26.9	12.8
7	15540.00	50.7 PK	74.0	-23.3	2.07 H	77	37.4	13.3
8	15540.00	38.8 AV	54.0	-15.2	2.07 H	77	25.5	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**	**72.9 PK**	**74.0**	**-1.1**	**2.07 V**	**81**	**68.9**	**4.0**
2	5150.00	49.8 AV	54.0	-4.2	2.07 V	81	45.8	4.0
3	*5180.00	119.0 PK			2.07 V	81	115.1	3.9
4	*5180.00	108.4 AV			2.07 V	81	104.5	3.9
5	#10360.00	51.3 PK	74.0	-22.7	1.00 V	318	38.5	12.8
6	#10360.00	39.9 AV	54.0	-14.1	1.00 V	318	27.1	12.8
7	15540.00	52.5 PK	74.0	-21.5	2.07 V	143	39.2	13.3
8	15540.00	40.2 AV	54.0	-13.8	2.07 V	143	26.9	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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	62.1 PK	74.0	-11.9	1.62 H	131	58.1	4.0
2	5150.00	46.5 AV	54.0	-7.5	1.62 H	131	42.5	4.0
3	*5200.00	117.8 PK			1.62 H	131	114.0	3.8
4	*5200.00	106.9 AV			1.62 H	131	103.1	3.8
5	5350.00	54.5 PK	74.0	-19.5	1.62 H	131	50.9	3.6
6	5350.00	40.8 AV	54.0	-13.2	1.62 H	131	37.2	3.6
7	#10400.00	51.7 PK	74.0	-22.3	1.51 H	324	38.7	13.0
8	#10400.00	40.1 AV	54.0	-13.9	1.51 H	324	27.1	13.0
9	15600.00	50.7 PK	74.0	-23.3	2.01 H	87	37.0	13.7
10	15600.00	38.6 AV	54.0	-15.4	2.01 H	87	24.9	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	69.0 PK	74.0	-5.0	1.95 V	80	65.0	4.0
2	5150.00	52.5 AV	54.0	-1.5	1.95 V	80	48.5	4.0
3	*5200.00	121.8 PK			1.95 V	80	118.0	3.8
4	*5200.00	111.9 AV			1.95 V	80	108.1	3.8
5	5350.00	55.2 PK	74.0	-18.8	1.95 V	80	51.6	3.6
6	5350.00	41.6 AV	54.0	-12.4	1.95 V	80	38.0	3.6
7	#10400.00	53.9 PK	74.0	-20.1	1.04 V	310	40.9	13.0
8	#10400.00	42.0 AV	54.0	-12.0	1.04 V	310	29.0	13.0
9	15600.00	55.1 PK	74.0	-18.9	2.11 V	133	41.4	13.7
10	15600.00	41.6 AV	54.0	-12.4	2.11 V	133	27.9	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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	56.9 PK	74.0	-17.1	1.74 H	140	52.9	4.0
2	5150.00	44.7 AV	54.0	-9.3	1.74 H	140	40.7	4.0
3	*5240.00	117.4 PK			1.74 H	140	113.8	3.6
4	*5240.00	106.7 AV			1.74 H	140	103.1	3.6
5	5350.00	53.5 PK	74.0	-20.5	1.74 H	140	49.9	3.6
6	5350.00	41.9 AV	54.0	-12.1	1.74 H	140	38.3	3.6
7	#10480.00	54.0 PK	74.0	-20.0	1.11 H	312	40.7	13.3
8	#10480.00	42.0 AV	54.0	-12.0	1.11 H	312	28.7	13.3
9	15720.00	52.4 PK	74.0	-21.6	2.15 H	132	39.6	12.8
10	15720.00	39.9 AV	54.0	-14.1	2.15 H	132	27.1	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	5150.00	56.9 PK	74.0	-17.1	2.00 V	82	52.9	4.0
2	5150.00	44.9 AV	54.0	-9.1	2.00 V	82	40.9	4.0
3	*5240.00	121.1 PK			2.00 V	82	117.5	3.6
4	*5240.00	111.9 AV			2.00 V	82	108.3	3.6
5	5350.00	53.8 PK	74.0	-20.2	2.00 V	82	50.2	3.6
6	5350.00	42.3 AV	54.0	-11.7	2.00 V	82	38.7	3.6
7	#10480.00	54.3 PK	74.0	-19.7	1.10 V	316	41.0	13.3
8	#10480.00	42.2 AV	54.0	-11.8	1.10 V	316	28.9	13.3
9	15720.00	55.6 PK	74.0	-18.4	2.12 V	118	42.8	12.8
10	15720.00	41.9 AV	54.0	-12.1	2.12 V	118	29.1	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	#5608.54	58.0 PK	68.2	-10.2	1.79 H	71	53.7	4.3
2	*5745.00	117.6 PK			1.79 H	71	113.2	4.4
3	*5745.00	107.8 AV			1.79 H	71	103.4	4.4
4	#5976.24	57.3 PK	68.2	-10.9	1.79 H	71	52.7	4.6
5	11490.00	58.8 PK	74.0	-15.2	2.51 H	340	45.5	13.3
6	11490.00	44.6 AV	54.0	-9.4	2.51 H	340	31.3	13.3
7	#17235.00	52.6 PK	74.0	-21.4	2.27 H	105	36.5	16.1
8	#17235.00	39.4 AV	54.0	-14.6	2.27 H	105	23.3	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	#5636.35	59.6 PK	68.2	-8.6	1.99 V	295	55.5	4.1
2	*5745.00	122.3 PK			1.99 V	295	117.9	4.4
3	*5745.00	112.7 AV			1.99 V	295	108.3	4.4
4	#5938.84	59.0 PK	68.2	-9.2	1.99 V	295	54.1	4.9
5	11490.00	57.5 PK	74.0	-16.5	1.11 V	223	44.2	13.3
6	11490.00	44.8 AV	54.0	-9.2	1.11 V	223	31.5	13.3
7	#17235.00	58.7 PK	74.0	-15.3	1.93 V	111	42.6	16.1
8	#17235.00	44.6 AV	54.0	-9.4	1.93 V	111	28.5	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	#5645.96	58.2 PK	68.2	-10.0	1.83 H	85	53.9	4.3
2	*5785.00	117.1 PK			1.83 H	85	112.5	4.6
3	*5785.00	107.2 AV			1.83 H	85	102.6	4.6
4	#6009.04	57.2 PK	68.2	-11.0	1.83 H	85	52.5	4.7
5	11570.00	58.7 PK	74.0	-15.3	2.48 H	326	45.2	13.5
6	11570.00	44.8 AV	54.0	-9.2	2.48 H	326	31.3	13.5
7	#17355.00	52.5 PK	74.0	-21.5	3.48 H	340	35.6	16.9
8	#17355.00	39.5 AV	54.0	-14.5	3.48 H	340	22.6	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	#5639.77	59.3 PK	68.2	-8.9	2.69 V	121	55.2	4.1
2	*5785.00	123.4 PK			2.69 V	121	118.8	4.6
3	*5785.00	113.6 AV			2.69 V	121	109.0	4.6
4	#5989.01	58.0 PK	68.2	-10.2	2.69 V	121	53.2	4.8
5	11570.00	57.6 PK	74.0	-16.4	1.01 V	238	44.1	13.5
6	11570.00	44.5 AV	54.0	-9.5	1.01 V	238	31.0	13.5
7	#17355.00	58.6 PK	74.0	-15.4	1.95 V	102	41.7	16.9
8	#17355.00	44.6 AV	54.0	-9.4	1.95 V	102	27.7	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	#5623.23	57.9 PK	68.2	-10.3	1.86 H	97	53.5	4.4
2	*5825.00	117.3 PK			1.86 H	97	112.6	4.7
3	*5825.00	107.6 AV			1.86 H	97	102.9	4.7
4	#5976.42	58.2 PK	68.2	-10.0	1.89 H	97	53.6	4.6
5	11650.00	58.0 PK	74.0	-16.0	2.48 H	327	44.5	13.5
6	11650.00	44.4 AV	54.0	-9.6	2.48 H	327	30.9	13.5
7	#17475.00	52.1 PK	74.0	-21.9	3.49 H	336	33.9	18.2
8	#17475.00	39.3 AV	54.0	-14.7	3.49 H	336	21.1	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	#5642.85	59.1 PK	68.2	-9.1	2.66 V	124	55.0	4.1
2	*5825.00	122.3 PK			2.66 V	124	117.6	4.7
3	*5825.00	112.2 AV			2.66 V	124	107.5	4.7
4	#5925.21	58.4 PK	68.2	-9.8	2.66 V	124	53.5	4.9
5	11650.00	57.5 PK	74.0	-16.5	1.06 V	225	44.0	13.5
6	11650.00	44.7 AV	54.0	-9.3	1.06 V	225	31.2	13.5
7	#17475.00	58.8 PK	74.0	-15.2	1.95 V	102	40.6	18.2
8	#17475.00	44.8 AV	54.0	-9.2	1.95 V	102	26.6	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	71.2 PK	74.0	-2.8	1.71 H	130	67.2	4.0
2	5150.00	51.0 AV	54.0	-3.0	1.71 H	130	47.0	4.0
3	*5180.00	113.5 PK			1.71 H	130	109.6	3.9
4	*5180.00	103.4 AV			1.71 H	130	99.5	3.9
5	#10360.00	50.2 PK	74.0	-23.8	1.58 H	321	37.4	12.8
6	#10360.00	39.1 AV	54.0	-14.9	1.58 H	321	26.3	12.8
7	15540.00	52.7 PK	74.0	-21.3	2.04 H	147	39.4	13.3
8	15540.00	40.3 AV	54.0	-13.7	2.04 H	147	27.0	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**	**72.9 PK**	**74.0**	**-1.1**	**2.15 V**	**86**	**68.9**	**4.0**
2	5150.00	51.4 AV	54.0	-2.6	2.15 V	86	47.4	4.0
3	*5180.00	117.4 PK			2.15 V	86	113.5	3.9
4	*5180.00	107.7 AV			2.15 V	86	103.8	3.9
5	#10360.00	50.9 PK	74.0	-23.1	2.14 V	331	38.1	12.8
6	#10360.00	39.5 AV	54.0	-14.5	2.14 V	331	26.7	12.8
7	15540.00	52.5 PK	74.0	-21.5	2.09 V	157	39.2	13.3
8	15540.00	40.2 AV	54.0	-13.8	2.09 V	157	26.9	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)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

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	71.2 PK	74.0	-2.8	1.74 H	135	67.2	4.0
2	5150.00	51.2 AV	54.0	-2.8	1.74 H	135	47.2	4.0
3	*5200.00	117.2 PK			1.74 H	135	113.4	3.8
4	*5200.00	107.8 AV			1.74 H	135	104.0	3.8
5	5350.00	53.2 PK	74.0	-20.8	1.74 H	135	49.6	3.6
6	5350.00	41.0 AV	54.0	-13.0	1.74 H	135	37.4	3.6
7	#10400.00	50.0 PK	74.0	-24.0	1.64 H	313	37.0	13.0
8	#10400.00	38.9 AV	54.0	-15.1	1.64 H	313	25.9	13.0
9	15600.00	53.1 PK	74.0	-20.9	2.06 H	147	39.4	13.7
10	15600.00	40.7 AV	54.0	-13.3	2.06 H	147	27.0	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**	**72.9 PK**	**74.0**	**-1.1**	**2.04 V**	**82**	**68.9**	**4.0**
2	5150.00	52.7 AV	54.0	-1.3	2.04 V	82	48.7	4.0
3	*5200.00	121.5 PK			2.04 V	82	117.7	3.8
4	*5200.00	111.6 AV			2.04 V	82	107.8	3.8
5	5350.00	53.8 PK	74.0	-20.2	2.04 V	82	50.2	3.6
6	5350.00	41.3 AV	54.0	-12.7	2.04 V	82	37.7	3.6
7	#10400.00	53.9 PK	74.0	-20.1	1.00 V	317	40.9	13.0
8	#10400.00	41.9 AV	54.0	-12.1	1.00 V	317	28.9	13.0
9	15600.00	55.1 PK	74.0	-18.9	2.14 V	129	41.4	13.7
10	15600.00	41.3 AV	54.0	-12.7	2.14 V	129	27.6	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	116.6 PK			1.79 H	136	113.0	3.6
2	*5240.00	107.4 AV			1.79 H	136	103.8	3.6
3	5350.00	53.8 PK	74.0	-20.2	1.79 H	136	50.2	3.6
4	5350.00	41.5 AV	54.0	-12.5	1.79 H	136	37.9	3.6
5	#10480.00	49.7 PK	74.0	-24.3	1.65 H	323	36.4	13.3
6	#10480.00	38.6 AV	54.0	-15.4	1.65 H	323	25.3	13.3
7	15720.00	53.4 PK	74.0	-20.6	1.35 H	228	40.6	12.8
8	15720.00	40.9 AV	54.0	-13.1	1.35 H	228	28.1	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	121.0 PK			2.10 V	84	117.4	3.6
2	*5240.00	111.4 AV			2.10 V	84	107.8	3.6
3	5350.00	54.5 PK	74.0	-19.5	2.10 V	84	50.9	3.6
4	5350.00	41.7 AV	54.0	-12.3	2.10 V	84	38.1	3.6
5	#10480.00	53.9 PK	74.0	-20.1	1.98 V	332	40.6	13.3
6	#10480.00	42.0 AV	54.0	-12.0	1.98 V	332	28.7	13.3
7	15720.00	55.2 PK	74.0	-18.8	2.20 V	117	42.4	12.8
8	15720.00	41.3 AV	54.0	-12.7	2.20 V	117	28.5	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	#5648.48	58.5 PK	68.2	-9.7	2.06 H	93	54.2	4.3
2	*5745.00	116.9 PK			2.06 H	93	112.5	4.4
3	*5745.00	107.2 AV			2.06 H	93	102.8	4.4
4	#5930.71	58.0 PK	68.2	-10.2	2.06 H	93	53.4	4.6
5	11490.00	55.4 PK	74.0	-18.6	2.20 H	111	42.1	13.3
6	11490.00	41.1 AV	54.0	-12.9	2.20 H	111	27.8	13.3
7	#17235.00	54.1 PK	74.0	-19.9	2.20 H	81	38.0	16.1
8	#17235.00	41.1 AV	54.0	-12.9	2.20 H	81	25.0	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	#5604.52	57.3 PK	68.2	-10.9	1.36 V	288	53.1	4.2
2	*5745.00	122.8 PK			1.36 V	288	118.4	4.4
3	*5745.00	112.4 AV			1.36 V	288	108.0	4.4
4	#6010.88	58.1 PK	68.2	-10.1	1.36 V	288	53.3	4.8
5	11490.00	55.0 PK	74.0	-19.0	2.24 V	109	41.7	13.3
6	11490.00	40.9 AV	54.0	-13.1	2.24 V	109	27.6	13.3
7	#17235.00	54.0 PK	74.0	-20.0	2.14 V	87	37.9	16.1
8	#17235.00	41.3 AV	54.0	-12.7	2.14 V	87	25.2	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	#5638.73	57.1 PK	68.2	-11.1	2.01 H	96	52.8	4.3
2	*5785.00	116.8 PK			2.01 H	96	112.2	4.6
3	*5785.00	107.1 AV			2.01 H	96	102.5	4.6
4	#5989.14	57.8 PK	68.2	-10.4	2.01 H	96	53.1	4.7
5	11570.00	55.3 PK	74.0	-18.7	2.26 H	88	41.8	13.5
6	11570.00	41.2 AV	54.0	-12.8	2.26 H	88	27.7	13.5
7	#17355.00	53.8 PK	74.0	-20.2	1.13 H	234	36.9	16.9
8	#17355.00	41.2 AV	54.0	-12.8	1.13 H	234	24.3	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	#5638.27	58.9 PK	68.2	-9.3	1.35 V	286	54.8	4.1
2	*5785.00	121.9 PK			1.35 V	286	117.3	4.6
3	*5785.00	112.0 AV			1.35 V	286	107.4	4.6
4	#5971.81	57.7 PK	68.2	-10.5	1.35 V	286	52.9	4.8
5	11570.00	54.8 PK	74.0	-19.2	2.21 V	96	41.3	13.5
6	11570.00	40.8 AV	54.0	-13.2	2.21 V	96	27.3	13.5
7	#17355.00	54.1 PK	74.0	-19.9	1.17 V	226	37.2	16.9
8	#17355.00	41.3 AV	54.0	-12.7	1.17 V	226	24.4	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	#5641.94	57.9 PK	68.2	-10.3	1.98 H	86	53.6	4.3
2	*5825.00	117.5 PK			1.98 H	86	112.8	4.7
3	*5825.00	107.6 AV			1.98 H	86	102.9	4.7
4	#5952.40	57.6 PK	68.2	-10.6	1.98 H	86	53.0	4.6
5	11650.00	54.7 PK	74.0	-19.3	1.15 H	357	41.2	13.5
6	11650.00	40.7 AV	54.0	-13.3	1.15 H	357	27.2	13.5
7	#17475.00	54.7 PK	74.0	-19.3	2.17 H	232	36.5	18.2
8	#17475.00	41.6 AV	54.0	-12.4	2.17 H	232	23.4	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	#5625.50	57.5 PK	68.2	-10.7	1.33 V	285	53.3	4.2
2	*5825.00	121.5 PK			1.32 V	285	116.8	4.7
3	*5825.00	111.9 AV			1.32 V	285	107.2	4.7
4	#5947.57	57.5 PK	68.2	-10.7	1.33 V	285	52.7	4.8
5	11650.00	54.6 PK	74.0	-19.4	1.16 V	80	41.1	13.5
6	11650.00	40.6 AV	54.0	-13.4	1.16 V	80	27.1	13.5
7	#17475.00	54.4 PK	74.0	-19.6	2.17 V	234	36.2	18.2
8	#17475.00	41.5 AV	54.0	-12.5	2.17 V	234	23.3	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	70.0 PK	74.0	-4.0	1.81 H	200	66.0	4.0
2	5150.00	52.3 AV	54.0	-1.7	1.81 H	200	48.3	4.0
3	*5190.00	108.7 PK			1.81 H	200	104.8	3.9
4	*5190.00	98.9 AV			1.81 H	200	95.0	3.9
5	5350.00	53.0 PK	74.0	-21.0	1.81 H	200	49.4	3.6
6	5350.00	41.0 AV	54.0	-13.0	1.81 H	200	37.4	3.6
7	#10380.00	49.4 PK	74.0	-24.6	2.13 H	218	36.5	12.9
8	#10380.00	36.5 AV	54.0	-17.5	2.13 H	218	23.6	12.9
9	15570.00	49.7 PK	74.0	-24.3	1.24 H	353	36.3	13.4
10	15570.00	37.4 AV	54.0	-16.6	1.24 H	353	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	71.4 PK	74.0	-2.6	1.80 V	201	67.4	4.0
2	5150.00	52.6 AV	54.0	-1.4	1.80 V	201	48.6	4.0
3	*5190.00	111.9 PK			1.80 V	201	108.0	3.9
4	*5190.00	102.1 AV			1.80 V	201	98.2	3.9
5	5350.00	53.3 PK	74.0	-20.7	1.80 V	201	49.7	3.6
6	5350.00	41.2 AV	54.0	-12.8	1.80 V	201	37.6	3.6
7	#10380.00	49.8 PK	74.0	-24.2	2.12 V	218	36.9	12.9
8	#10380.00	36.6 AV	54.0	-17.4	2.12 V	218	23.7	12.9
9	15570.00	49.9 PK	74.0	-24.1	1.21 V	338	36.5	13.4
10	15570.00	37.8 AV	54.0	-16.2	1.21 V	338	24.4	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	*5230.00	113.6 PK			1.85 H	145	110.0	3.6
2	*5230.00	103.5 AV			1.85 H	145	99.9	3.6
3	5350.00	56.7 PK	74.0	-17.3	1.85 H	145	53.1	3.6
4	5350.00	42.6 AV	54.0	-11.4	1.85 H	145	39.0	3.6
5	#10460.00	52.2 PK	74.0	-21.8	1.62 H	321	38.9	13.3
6	#10460.00	38.8 AV	54.0	-15.2	1.62 H	321	25.5	13.3
7	15690.00	52.2 PK	74.0	-21.8	1.33 H	239	39.2	13.0
8	15690.00	40.3 AV	54.0	-13.7	1.33 H	239	27.3	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	*5230.00	117.5 PK			1.89 V	193	113.9	3.6
2	*5230.00	107.6 AV			1.89 V	193	104.0	3.6
3	5350.00	57.8 PK	74.0	-16.2	1.89 V	193	54.2	3.6
4	5350.00	43.3 AV	54.0	-10.7	1.89 V	193	39.7	3.6
5	#10460.00	51.8 PK	74.0	-22.2	2.15 V	98	38.5	13.3
6	#10460.00	38.7 AV	54.0	-15.3	2.15 V	98	25.4	13.3
7	15690.00	52.0 PK	74.0	-22.0	1.25 V	209	39.0	13.0
8	15690.00	39.8 AV	54.0	-14.2	1.25 V	209	26.8	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	#5646.52	63.3 PK	68.2	-4.9	1.76 H	120	59.0	4.3
2	*5755.00	114.8 PK			1.76 H	120	110.3	4.5
3	*5755.00	105.3 AV			1.76 H	120	100.8	4.5
4	#5997.71	57.3 PK	68.2	-10.9	1.76 H	120	52.6	4.7
5	11510.00	55.2 PK	74.0	-18.8	2.21 H	48	41.9	13.3
6	11510.00	40.9 AV	54.0	-13.1	2.21 H	48	27.6	13.3
7	#17265.00	54.0 PK	74.0	-20.0	1.78 H	227	37.8	16.2
8	#17265.00	41.3 AV	54.0	-12.7	1.78 H	227	25.1	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	#5649.31	64.2 PK	68.2	-4.0	1.17 V	287	60.0	4.2
2	*5755.00	118.1 PK			1.17 V	287	113.6	4.5
3	*5755.00	108.5 AV			1.17 V	287	104.0	4.5
4	#5987.77	58.2 PK	68.2	-10.0	1.17 V	287	53.4	4.8
5	11510.00	55.4 PK	74.0	-18.6	2.17 V	109	42.1	13.3
6	11510.00	41.1 AV	54.0	-12.9	2.17 V	109	27.8	13.3
7	#17265.00	54.3 PK	74.0	-19.7	1.21 V	221	38.1	16.2
8	#17265.00	41.7 AV	54.0	-12.3	1.21 V	221	25.5	16.2

REMARKS:

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

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	#5590.27	57.4 PK	68.2	-10.8	1.81 H	103	53.1	4.3
2	*5795.00	115.2 PK			1.81 H	103	110.7	4.5
3	*5795.00	105.4 AV			1.81 H	103	100.9	4.5
4	#5926.81	58.2 PK	68.2	-10.0	1.81 H	103	53.6	4.6
5	11590.00	55.5 PK	74.0	-18.5	1.17 H	347	41.8	13.7
6	11590.00	41.3 AV	54.0	-12.7	1.17 H	347	27.6	13.7
7	#17385.00	53.5 PK	74.0	-20.5	2.14 H	212	36.4	17.1
8	#17385.00	41.0 AV	54.0	-13.0	2.14 H	212	23.9	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	#5640.78	57.6 PK	68.2	-10.6	2.44 V	283	53.5	4.1
2	*5795.00	118.9 PK			2.44 V	283	114.4	4.5
3	*5795.00	108.5 AV			2.44 V	283	104.0	4.5
4	#5924.47	58.2 PK	68.6	-10.4	2.44 V	283	53.3	4.9
5	11590.00	55.1 PK	74.0	-18.9	2.14 V	99	41.4	13.7
6	11590.00	41.0 AV	54.0	-13.0	2.14 V	99	27.3	13.7
7	#17385.00	54.2 PK	74.0	-19.8	1.15 V	221	37.1	17.1
8	#17385.00	41.7 AV	54.0	-12.3	1.15 V	221	24.6	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	63.2 PK	74.0	-10.8	1.86 H	161	59.2	4.0
2	5150.00	52.1 AV	54.0	-1.9	1.86 H	161	48.1	4.0
3	*5210.00	103.9 PK			1.86 H	161	100.1	3.8
4	*5210.00	95.7 AV			1.86 H	161	91.9	3.8
5	5350.00	54.2 PK	74.0	-19.8	1.86 H	161	50.6	3.6
6	5350.00	42.9 AV	54.0	-11.1	1.86 H	161	39.3	3.6
7	#10420.00	49.9 PK	74.0	-24.1	1.60 H	322	36.8	13.1
8	#10420.00	36.8 AV	54.0	-17.2	1.60 H	322	23.7	13.1
9	15630.00	50.3 PK	74.0	-23.7	1.30 H	242	36.9	13.4
10	15630.00	37.9 AV	54.0	-16.1	1.30 H	242	24.5	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	64.8 PK	74.0	-9.2	2.46 V	288	60.8	4.0
2	5150.00	52.8 AV	54.0	-1.2	2.46 V	288	48.8	4.0
3	*5210.00	107.4 PK			2.46 V	288	103.6	3.8
4	*5210.00	98.8 AV			2.46 V	288	95.0	3.8
5	5350.00	54.5 PK	74.0	-19.5	2.46 V	288	50.9	3.6
6	5350.00	43.1 AV	54.0	-10.9	2.46 V	288	39.5	3.6
7	#10420.00	50.0 PK	74.0	-24.0	2.15 V	209	36.9	13.1
8	#10420.00	37.0 AV	54.0	-17.0	2.15 V	209	23.9	13.1
9	15630.00	50.3 PK	74.0	-23.7	1.24 V	329	36.9	13.4
10	15630.00	38.2 AV	54.0	-15.8	1.24 V	329	24.8	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	#5631.36	66.2 PK	68.2	-2.0	1.78 H	146	61.9	4.3
2	*5775.00	110.5 PK			1.78 H	146	106.0	4.5
3	*5775.00	99.9 AV			1.78 H	146	95.4	4.5
4	#5930.11	61.0 PK	68.2	-7.2	1.78 H	146	56.4	4.6
5	11550.00	49.8 PK	74.0	-24.2	1.63 H	308	36.3	13.5
6	11550.00	36.6 AV	54.0	-17.4	1.63 H	308	23.1	13.5
7	#17325.00	50.6 PK	74.0	-23.4	1.35 H	232	34.0	16.6
8	#17325.00	38.1 AV	54.0	-15.9	1.35 H	232	21.5	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	**#5648.88**	**67.1 PK**	**68.2**	**-1.1**	**2.48 V**	**277**	**62.9**	**4.2**
2	*5775.00	111.2 PK			2.48 V	277	106.7	4.5
3	*5775.00	103.2 AV			2.48 V	277	98.7	4.5
4	#5929.86	61.7 PK	68.2	-6.5	2.48 V	277	56.8	4.9
5	11550.00	51.5 PK	74.0	-22.5	2.09 V	104	38.0	13.5
6	11550.00	38.3 AV	54.0	-15.7	2.09 V	104	24.8	13.5
7	#17325.00	51.7 PK	74.0	-22.3	1.28 V	217	35.1	16.6
8	#17325.00	39.3 AV	54.0	-14.7	1.28 V	217	22.7	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 165	**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	158.91	33.2 QP	43.5	-10.3	1.50 H	97	41.2	-8.0
2	296.70	37.7 QP	46.0	-8.3	1.00 H	293	45.1	-7.4
3	395.62	37.6 QP	46.0	-8.4	1.00 H	327	42.7	-5.1
4	593.45	34.8 QP	46.0	-11.2	1.50 H	176	35.5	-0.7
5	692.39	40.5 QP	46.0	-5.5	1.00 H	226	39.7	0.8
6	890.22	36.8 QP	46.0	-9.2	1.00 H	274	33.4	3.4
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	159.88	33.1 QP	43.5	-10.4	1.50 V	34	41.2	-8.1
2	296.75	31.3 QP	46.0	-14.7	2.00 V	360	38.7	-7.4
3	395.64	38.2 QP	46.0	-7.8	1.50 V	255	43.3	-5.1
4	593.47	33.2 QP	46.0	-12.8	1.50 V	0	33.9	-0.7
5	692.34	35.6 QP	46.0	-10.4	1.00 V	56	34.8	0.8
6	890.17	35.2 QP	46.0	-10.8	1.00 V	355	31.8	3.4

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

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
Fixed attenuator EMEC	STI02-2200-10	003	Mar. 16, 2018	Mar. 15, 2019
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: Mar. 17, 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.

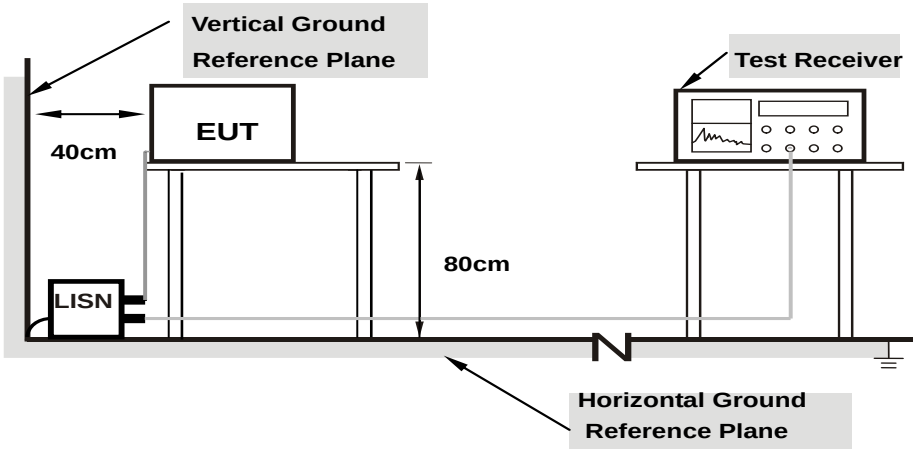
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

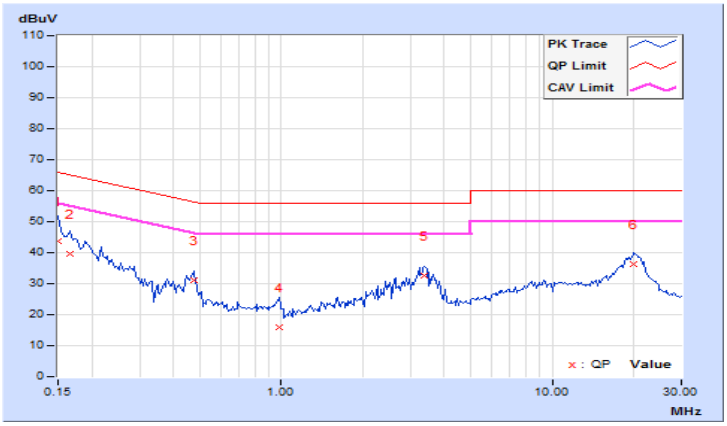
4.2.7 Test Results

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	0.15000	10.14	33.40	18.34	43.54	28.48	66.00	56.00	-22.46	-27.52
2	0.16562	10.14	29.37	13.32	39.51	23.46	65.18	55.18	-25.67	-31.72
3	**0.47422**	**10.21**	**20.91**	**18.83**	**31.12**	**29.04**	**56.44**	**46.44**	**-25.32**	**-17.40**
4	0.97813	10.25	5.61	-1.76	15.86	8.49	56.00	46.00	-40.14	-37.51
5	3.37500	10.40	22.17	10.00	32.57	20.40	56.00	46.00	-23.43	-25.60
6	20.02734	11.51	24.81	19.17	36.32	30.68	60.00	50.00	-23.68	-19.32

REMARKS:

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

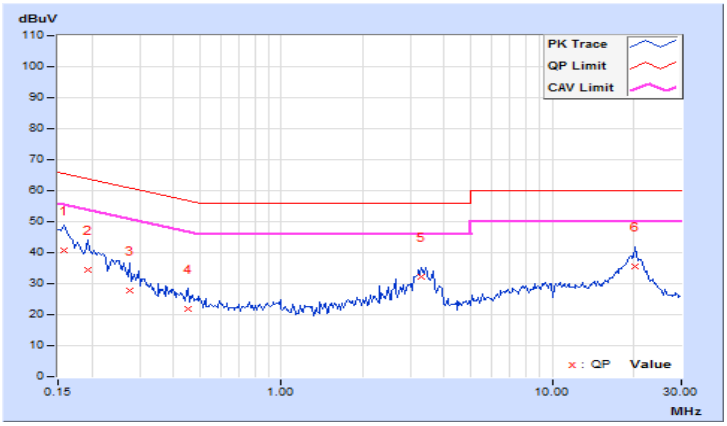


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

No	Freq.	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
	[MHz]	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.05	30.78	14.04	40.83	24.09	65.58	55.58	-24.75	-31.49
2	0.19297	10.05	24.32	9.91	34.37	19.96	63.91	53.91	-29.54	-33.95
3	0.27500	10.07	17.88	6.20	27.95	16.27	60.97	50.97	-33.02	-34.70
4	0.45469	10.10	11.83	3.52	21.93	13.62	56.79	46.79	-34.86	-33.17
5	3.30469	10.25	21.85	10.60	32.10	20.85	56.00	46.00	-23.90	-25.15
6	20.32813	11.29	24.44	18.67	35.73	29.96	60.00	50.00	-24.27	-20.04

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

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

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	18.76	19.34	18.79	19.51	326.077	25.13	30.00	Pass
40	5200	18.62	18.78	18.79	19.23	307.723	24.88	30.00	Pass
48	5240	19.34	18.91	18.74	19.13	320.368	25.06	30.00	Pass
149	5745	23.31	23.84	23.56	24.01	935.146	29.71	30.00	Pass
157	5785	23.41	23.77	23.54	23.98	933.491	29.70	30.00	Pass
165	5825	23.35	23.94	23.61	23.87	937.41	29.72	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	18.63	19.13	18.64	19.56	318.271	25.03	30.00	Pass
40	5200	18.87	19.21	18.66	19.54	323.859	25.10	30.00	Pass
48	5240	18.94	19.08	18.74	19.49	322.99	25.09	30.00	Pass
149	5745	23.39	23.62	23.45	23.86	912.946	29.60	30.00	Pass
157	5785	23.41	23.67	23.41	23.84	913.472	29.61	30.00	Pass
165	5825	23.74	23.91	23.91	24.15	988.682	29.95	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	18.99	19.16	18.69	18.92	313.608	24.96	30.00	Pass
46	5230	22.08	22.25	21.89	22.21	650.182	28.13	30.00	Pass
151	5755	23.69	23.89	23.90	24.01	976.029	29.89	30.00	Pass
159	5795	23.74	23.91	23.84	23.93	971.904	29.88	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	15.55	16.04	15.59	16.42	156.148	21.94	30.00	Pass
155	5775	21.08	21.27	21.20	21.70	541.938	27.34	30.00	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	18.63	19.13	18.64	19.56	318.271	25.03	25.18	Pass
40	5200	18.87	19.21	18.66	19.54	323.859	25.10	25.18	Pass
48	5240	18.94	19.08	18.74	19.49	322.99	25.09	25.18	Pass
149	5745	18.89	19.21	18.84	19.56	327.739	25.16	25.18	Pass
157	5785	19.01	19.02	18.94	19.46	326.066	25.13	25.18	Pass
165	5825	18.94	18.98	18.75	19.48	321.116	25.07	25.18	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.82dBi > 6dBi , so the power limit shall be reduced to 30-(10.82-6) = 25.18dBm.

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	18.99	19.16	18.69	18.92	313.608	24.96	25.18	Pass
46	5230	18.92	19.14	18.74	18.86	311.748	24.94	25.18	Pass
151	5755	19.13	19.26	19.02	19.15	328.202	25.16	25.18	Pass
159	5795	19.17	19.23	19.30	18.87	328.561	25.17	25.18	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.82dBi > 6dBi , so the power limit shall be reduced to 30-(10.82-6) = 25.18dBm.

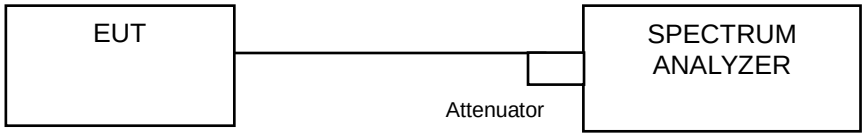
802.11ac (VHT80)

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	15.55	16.04	15.59	16.42	156.148	21.94	25.18	Pass
155	5775	18.89	19.12	18.82	19.12	316.97	25.01	25.18	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.82dBi > 6dBi , so the power limit shall be reduced to 30-(10.82-6) = 25.18dBm.

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

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	16.80	16.92	16.68	16.92
40	5200	16.80	16.80	16.68	16.92
48	5240	16.80	16.68	16.56	16.68
149	5745	16.80	16.92	16.92	16.92
157	5785	16.80	16.92	16.92	16.92
165	5825	16.80	16.80	16.92	16.92

802.11ac (VHT20)

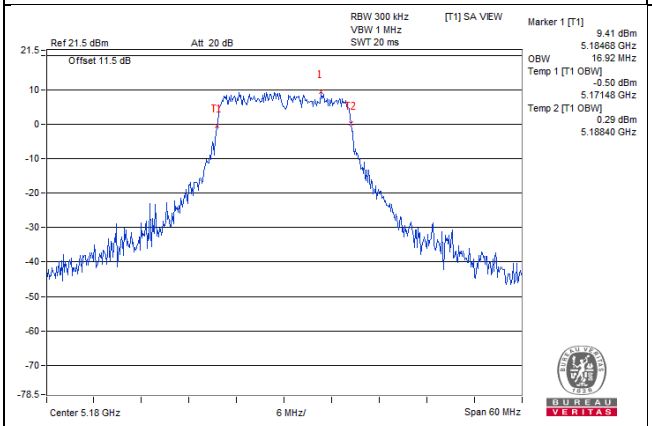
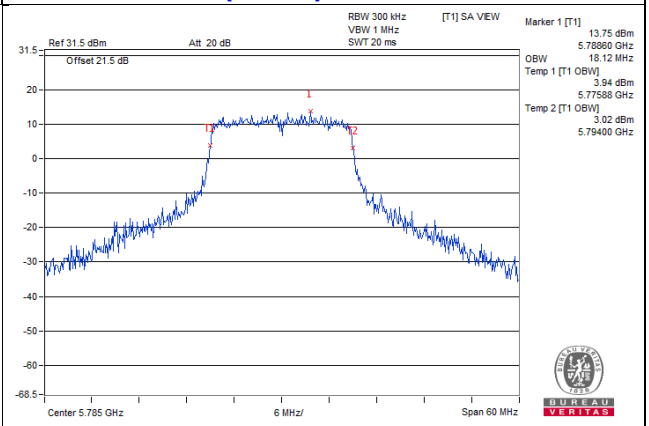
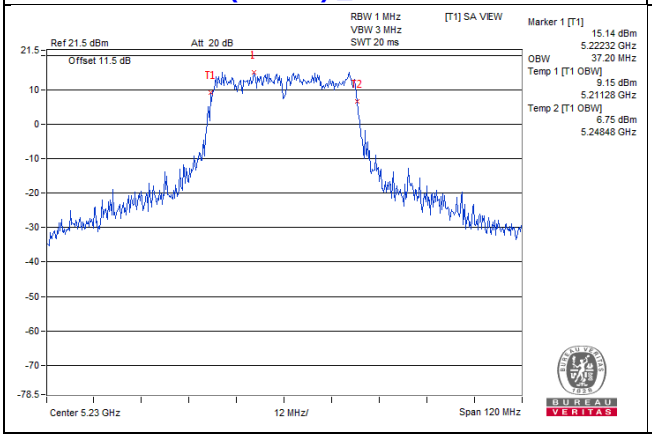
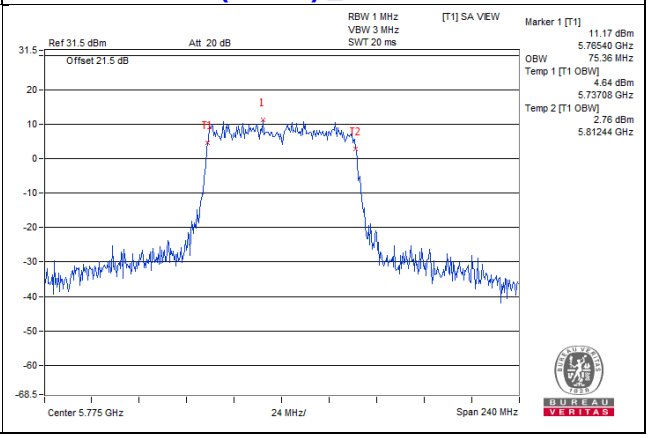
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	18.00	17.88	17.76	17.88
40	5200	17.76	18.00	17.76	17.88
48	5240	18.00	17.88	17.76	17.88
149	5745	17.88	18.00	17.88	18.12
157	5785	18.00	18.12	18.12	18.12
165	5825	18.00	17.88	18.12	17.88

802.11ac (VHT40)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.96	36.96	36.72	36.72
46	5230	36.96	36.96	37.20	36.96
151	5755	36.96	36.96	36.72	36.48
159	5795	36.72	36.96	36.96	36.72

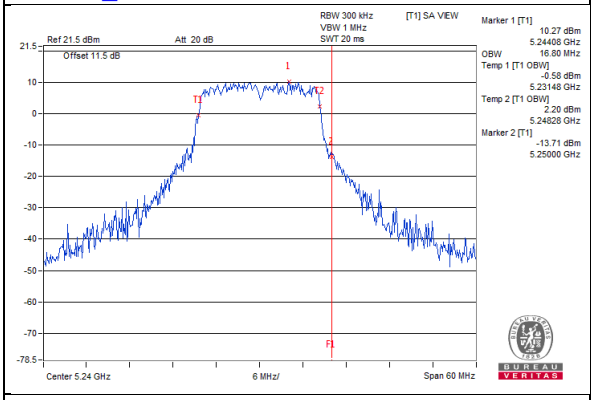
802.11ac (VHT80)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	74.88	75.36	75.36	75.36
155	5775	75.36	75.36	75.36	74.88

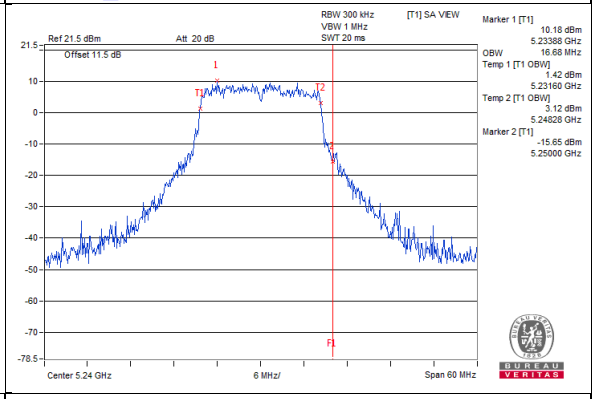
Spectrum Plot of Worst Value	
802.11a_Chain 1 / CH36	**802.11ac (VHT20)_Chain 1 / CH157**
	
802.11ac (VHT40) _Chain 2 / CH46	**802.11ac (VHT80) _Chain 0 / CH155**
	

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

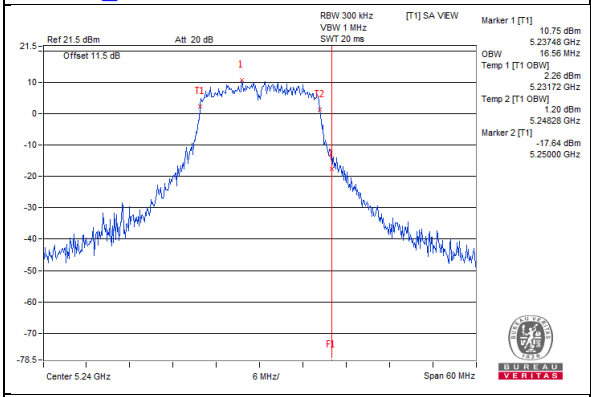
802.11a_Chain 0 / CH48



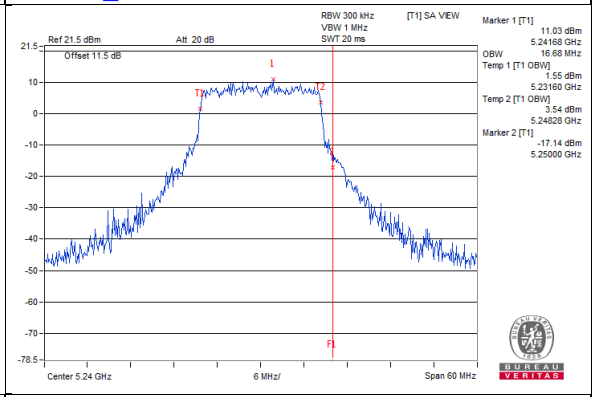
802.11a_Chain 1 / CH48



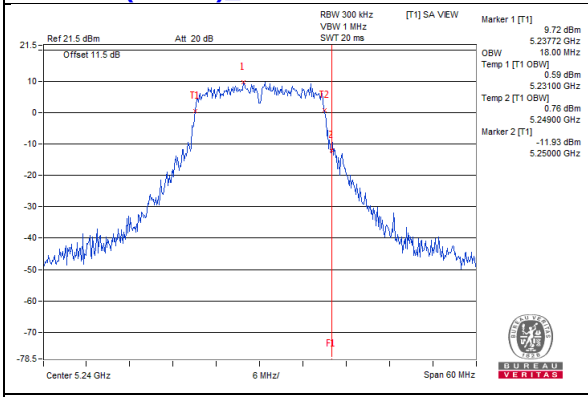
802.11a_Chain 2 / CH48



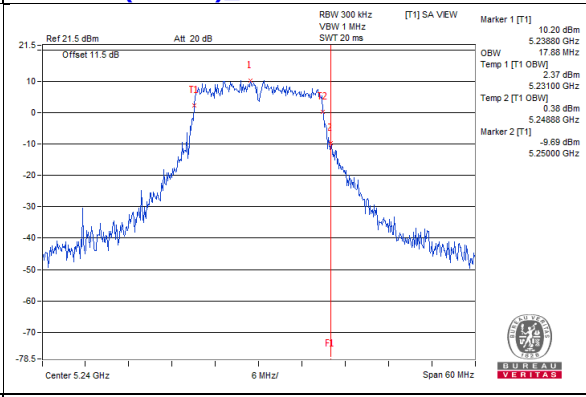
802.11a_Chain 3 / CH48



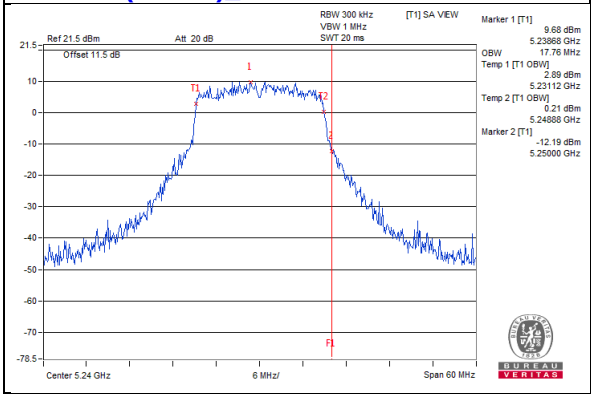
802.11ac (VHT20)_Chain 0 / CH48



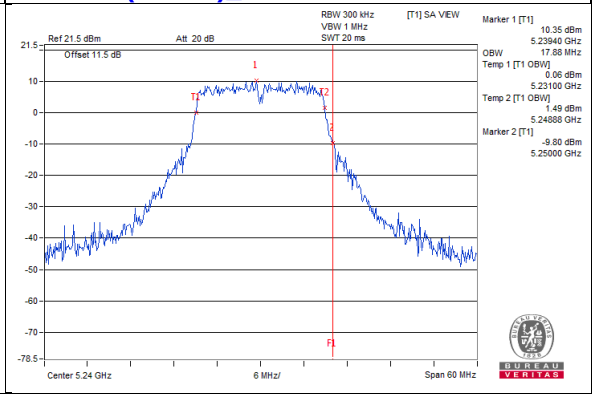
802.11ac (VHT20)_Chain 1 / CH48



802.11ac (VHT20)_Chain 2 / CH48

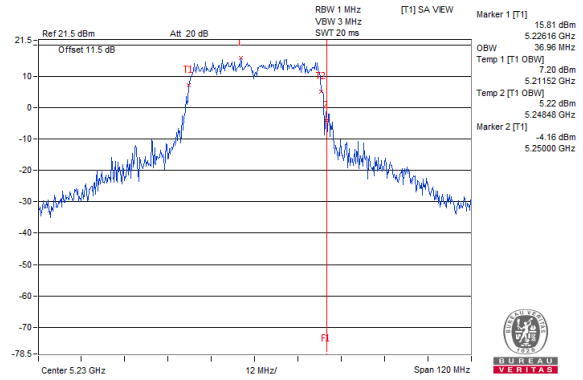


802.11ac (VHT20)_Chain 3 / CH48

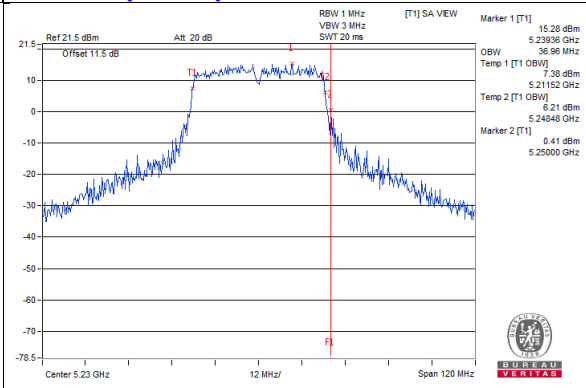


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

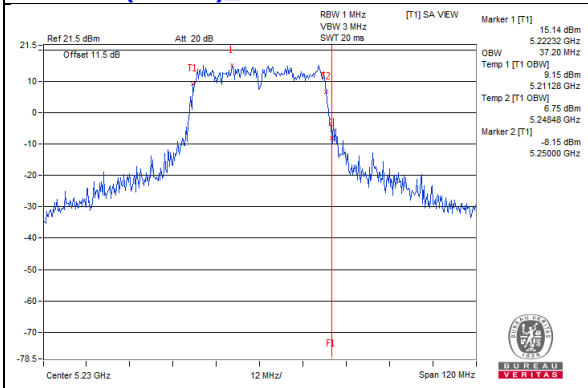
802.11ac (VHT40)_Chain 0 / CH46



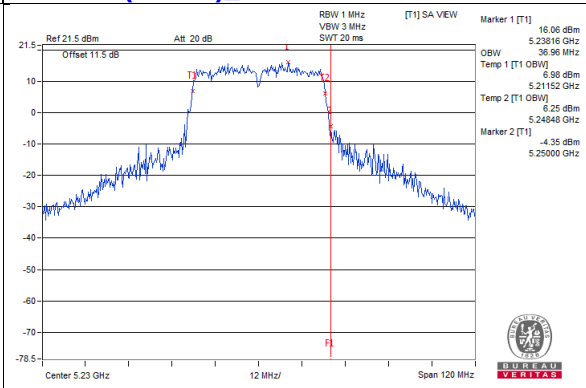
802.11ac (VHT40)_Chain 1 / CH46



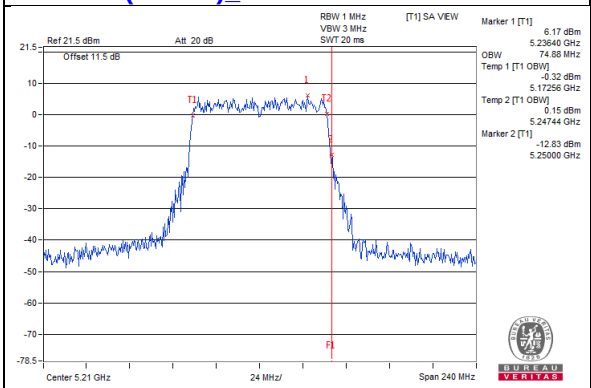
802.11ac (VHT40)_Chain 2 / CH46



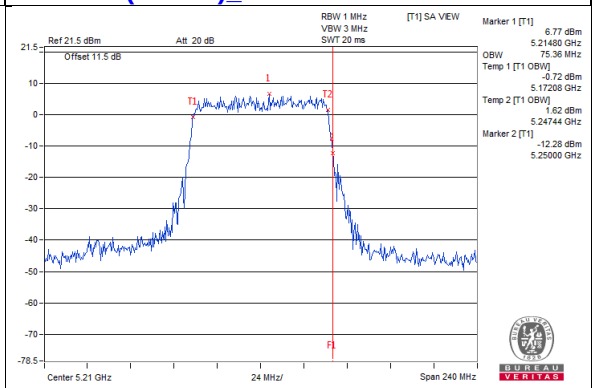
802.11ac (VHT40)_Chain 3 / CH46



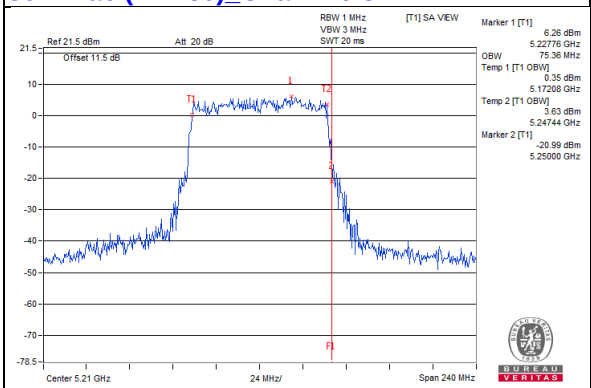
802.11ac (VHT80)_Chain 0 / CH42



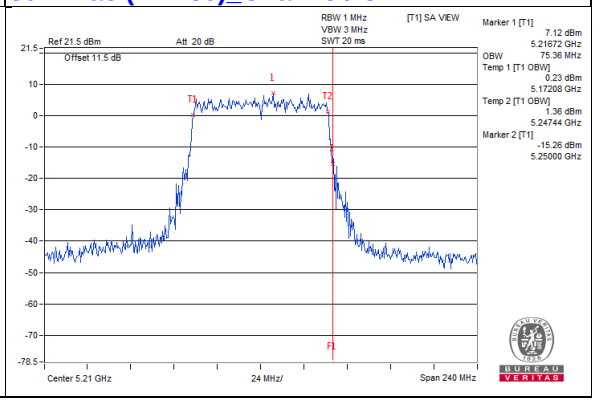
802.11ac (VHT80)_Chain 1 / CH42



802.11ac (VHT80)_Chain 2 / CH42

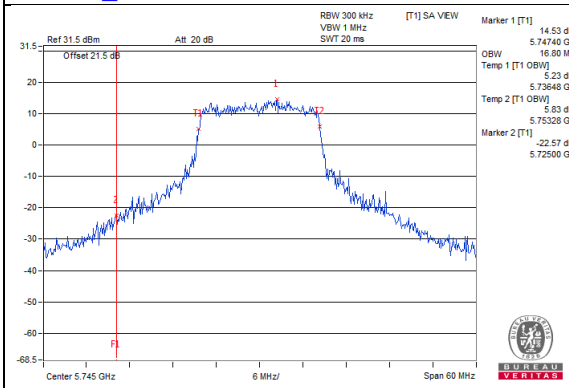


802.11ac (VHT80)_Chain 3 / CH42

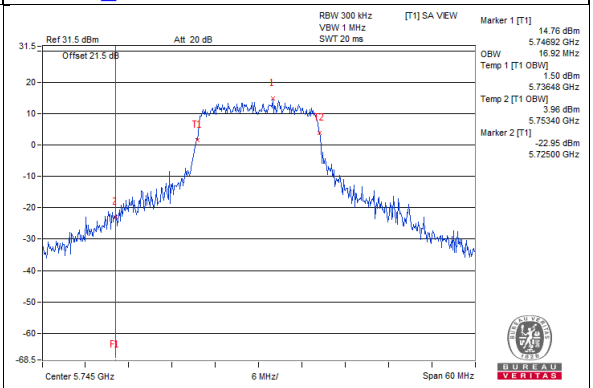


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

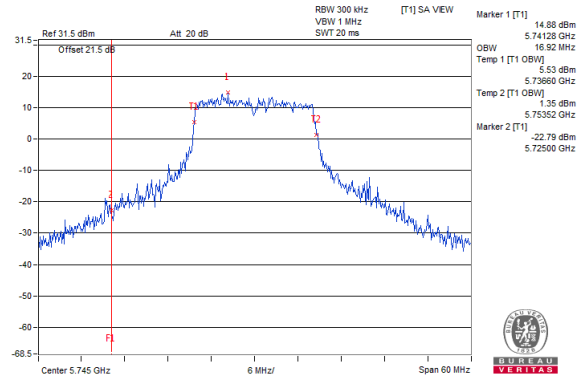
802.11a_Chain 0 / CH149



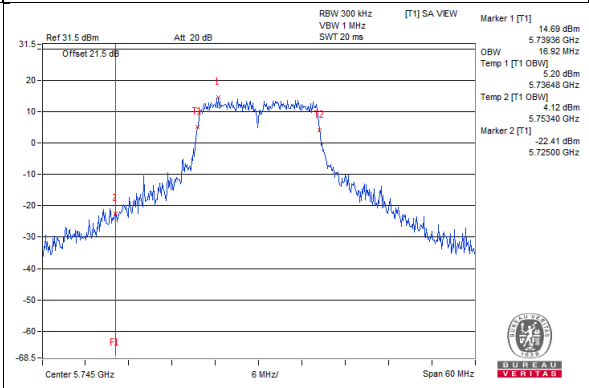
802.11a_Chain 1 / CH149



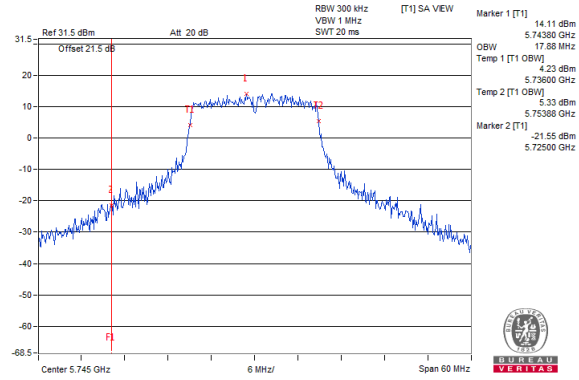
802.11a_Chain 2 / CH149



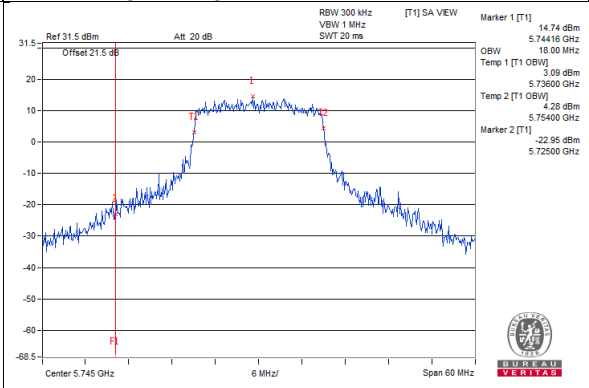
802.11a_Chain 3 / CH149



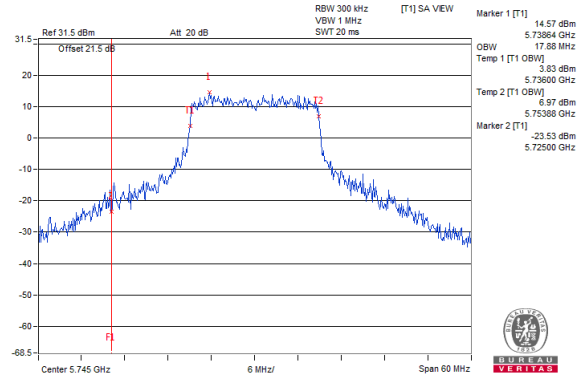
802.11ac (VHT20)_Chain 0 / CH149



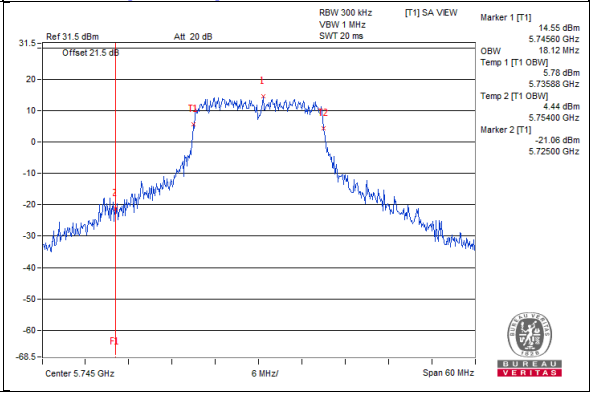
802.11ac (VHT20)_Chain 1 / CH149



802.11ac (VHT20)_Chain 2 / CH149

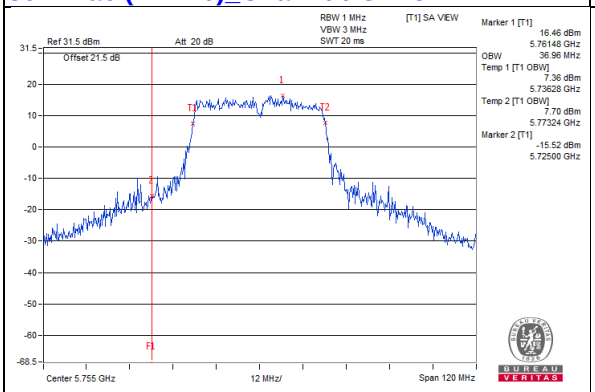


802.11ac (VHT20)_Chain 3 / CH149

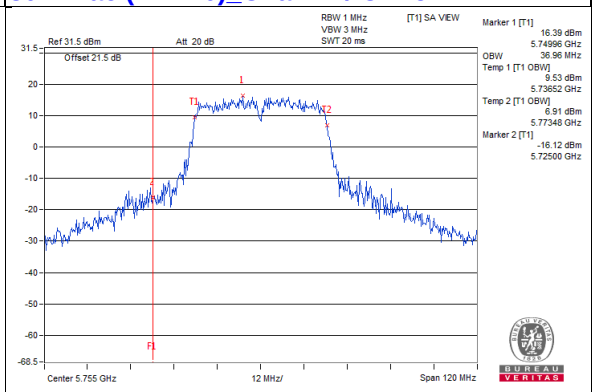


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

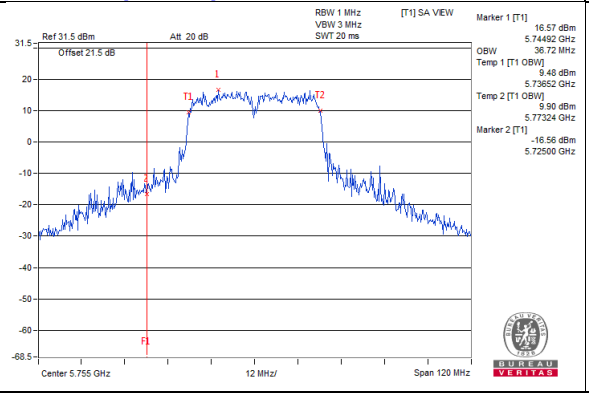
802.11ac (VHT40)_Chain 0 / CH151



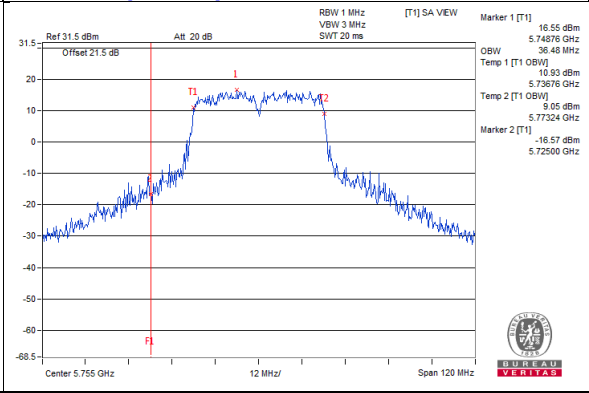
802.11ac (VHT40)_Chain 1 / CH151



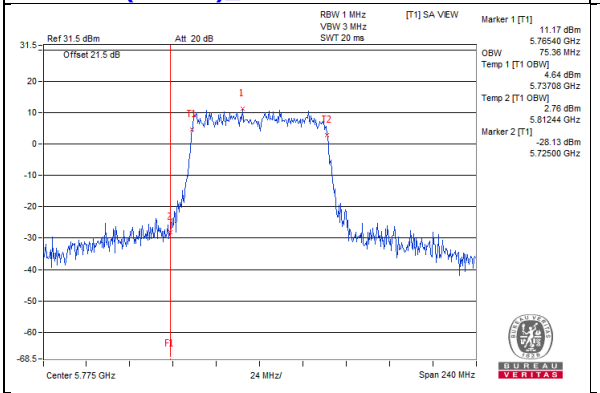
802.11ac (VHT40)_Chain 2 / CH151



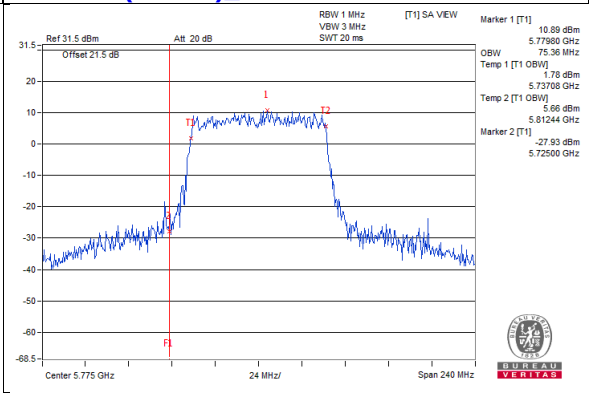
802.11ac (VHT40)_Chain 3 / CH151



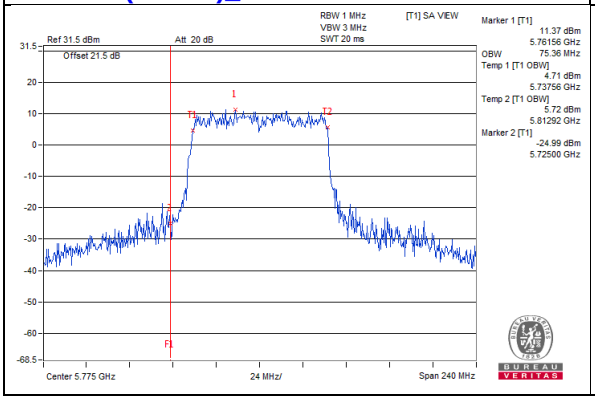
802.11ac (VHT80)_Chain 0 / CH155



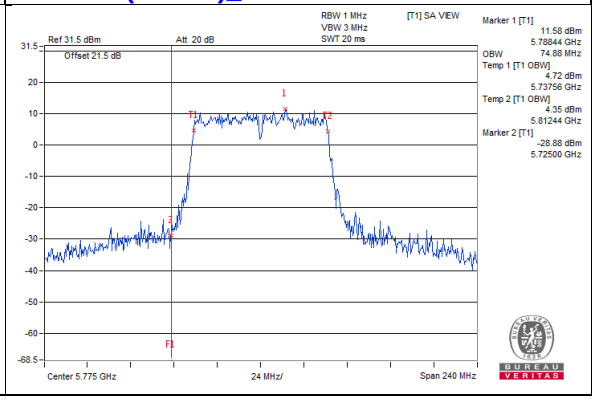
802.11ac (VHT80)_Chain 1 / CH155



802.11ac (VHT80)_Chain 2 / CH155



802.11ac (VHT80)_Chain 3 / CH155

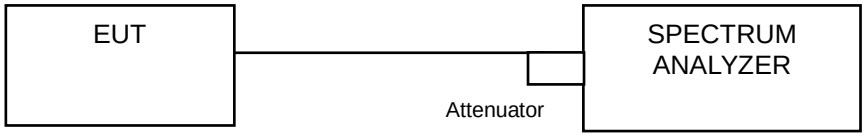


4.5 Peak Power Spectral Density Measurement

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

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

802.11a, 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

802.11ac (VHT40), 802.11ac (VHT80)

For U-NII-1:

Using method SA-2

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

For U-NII-3:

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

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1:

802.11a

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	5.71	6.27	5.44	6.86	12.13	12.18	Pass
40	5200	5.70	6.15	5.80	6.59	12.09	12.18	Pass
48	5240	5.93	6.23	5.96	6.07	12.07	12.18	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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.

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	5.69	6.05	6.14	6.42	12.10	12.18	Pass
40	5200	5.74	6.26	6.13	6.07	12.07	12.18	Pass
48	5240	5.68	6.34	6.19	6.11	12.11	12.18	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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.

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	2.42	2.76	2.70	2.54	0.16	8.79	12.18	Pass
46	5230	5.98	5.38	6.00	5.74	0.16	11.97	12.18	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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

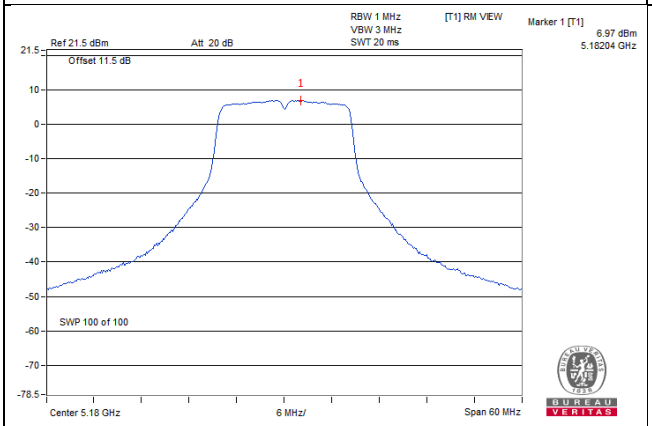
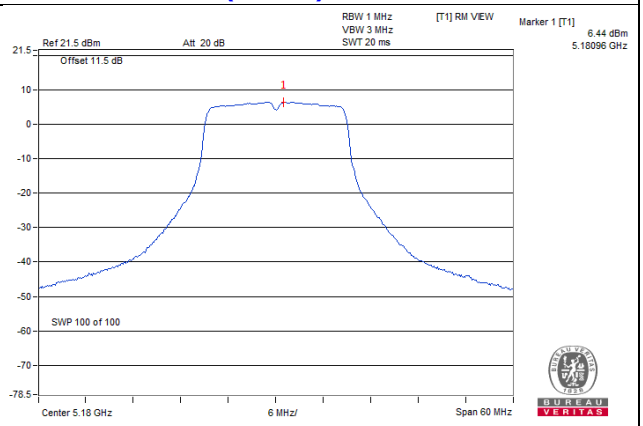
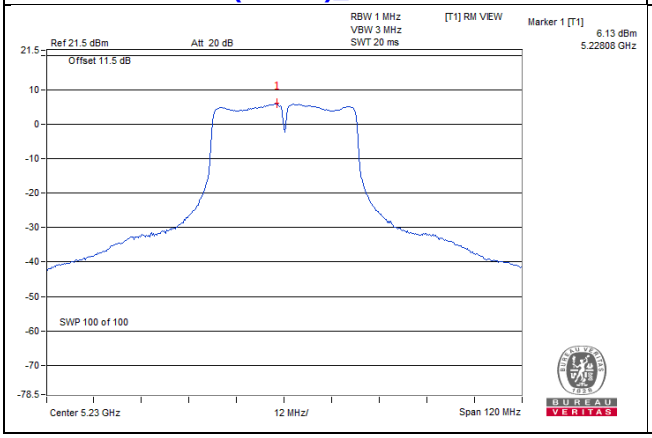
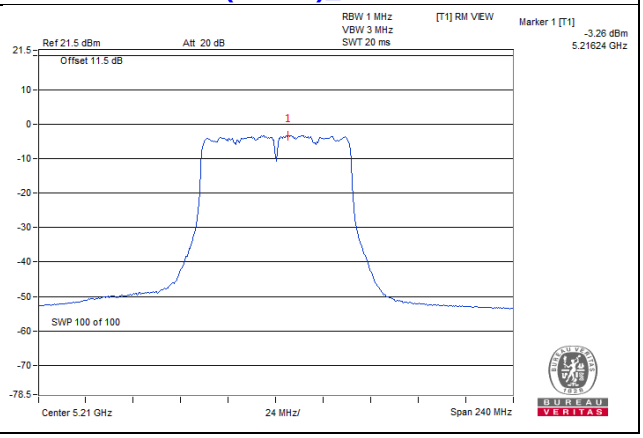
802.11ac (VHT80)

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	-3.80	-3.67	-3.49	-3.48	0.32	2.74	12.18	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] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 17-(10.82-6) = 12.18dBm.

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

Spectrum Plot of Worst Value	
802.11a_Chain 3 / CH36	**802.11ac (VHT20)_Chain 3 / CH36**
	
802.11ac (VHT40)_Chain 2 / CH46	**802.11ac (VHT80)_Chain 3 / CH42**
	

For U-NII-3:

802.11a

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	2.49	4.71	6.02	10.73	25.18	Pass
	157	5785	2.32	4.54	6.02	10.56	25.18	Pass
	165	5825	2.53	4.75	6.02	10.77	25.18	Pass
1	149	5745	2.46	4.68	6.02	10.70	25.18	Pass
	157	5785	1.99	4.21	6.02	10.23	25.18	Pass
	165	5825	1.83	4.05	6.02	10.07	25.18	Pass
2	149	5745	1.48	3.70	6.02	9.72	25.18	Pass
	157	5785	1.77	3.99	6.02	10.01	25.18	Pass
	165	5825	1.51	3.73	6.02	9.75	25.18	Pass
3	149	5745	2.33	4.55	6.02	10.57	25.18	Pass
	157	5785	2.29	4.51	6.02	10.53	25.18	Pass
	165	5825	2.15	4.37	6.02	10.39	25.18	Pass

Note: 1. The Directional gain = 10 log[(10$^{G0/20}$ + 10$^{G1/20}$ + 10$^{G2/20}$ + 10$^{G3/20}$)^2 / 4] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 30-(10.82-6) = 25.18dBm.

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	2.46	4.68	6.02	10.70	25.18	Pass
	157	5785	2.03	4.25	6.02	10.27	25.18	Pass
	165	5825	2.18	4.40	6.02	10.42	25.18	Pass
1	149	5745	1.71	3.93	6.02	9.95	25.18	Pass
	157	5785	1.40	3.62	6.02	9.64	25.18	Pass
	165	5825	1.45	3.67	6.02	9.69	25.18	Pass
2	149	5745	1.87	4.09	6.02	10.11	25.18	Pass
	157	5785	1.63	3.85	6.02	9.87	25.18	Pass
	165	5825	1.46	3.68	6.02	9.70	25.18	Pass
3	149	5745	1.99	4.21	6.02	10.23	25.18	Pass
	157	5785	1.90	4.12	6.02	10.14	25.18	Pass
	165	5825	1.95	4.17	6.02	10.19	25.18	Pass

Note: 1. The Directional gain = 10 log[(10$^{G0/20}$ + 10$^{G1/20}$ + 10$^{G2/20}$ + 10$^{G3/20}$)^2 / 4] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 30-(10.82-6) = 25.18dBm.

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	-1.17	1.05	6.02	0.16	7.23	25.18	Pass
	159	5785	-1.14	1.08	6.02	0.16	7.26	25.18	Pass
1	151	5745	-2.15	0.07	6.02	0.16	6.25	25.18	Pass
	159	5785	-2.56	-0.34	6.02	0.16	5.84	25.18	Pass
2	151	5745	-1.29	0.93	6.02	0.16	7.11	25.18	Pass
	159	5785	-1.54	0.68	6.02	0.16	6.86	25.18	Pass
3	151	5745	-1.21	1.01	6.02	0.16	7.19	25.18	Pass
	159	5785	-1.48	0.74	6.02	0.16	6.92	25.18	Pass

Note: 1. The Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ + $10^{G3/20}$)^2 / 4] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 30-(10.82-6) = 25.18dBm.

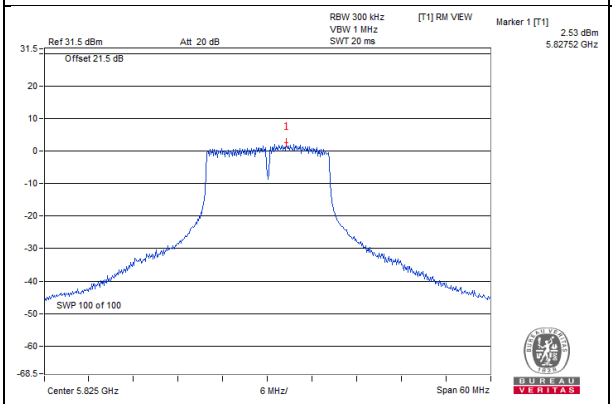
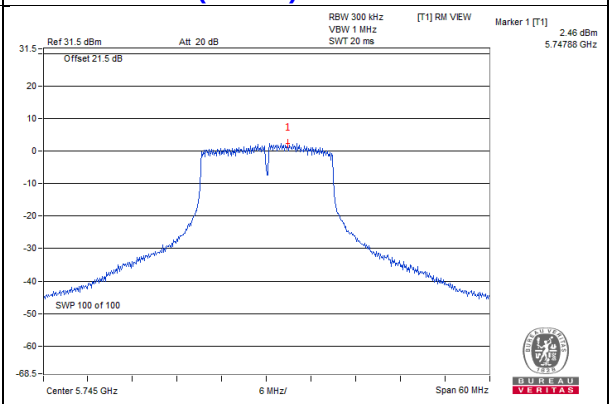
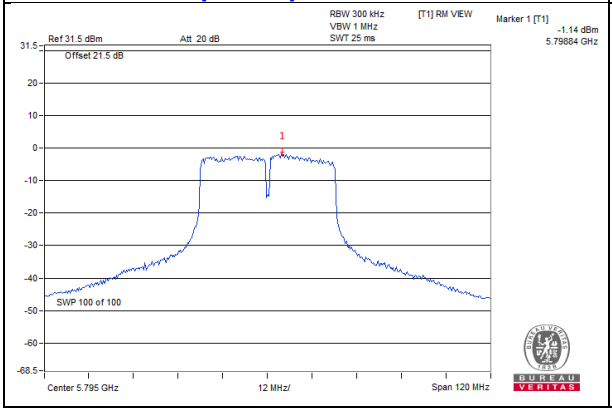
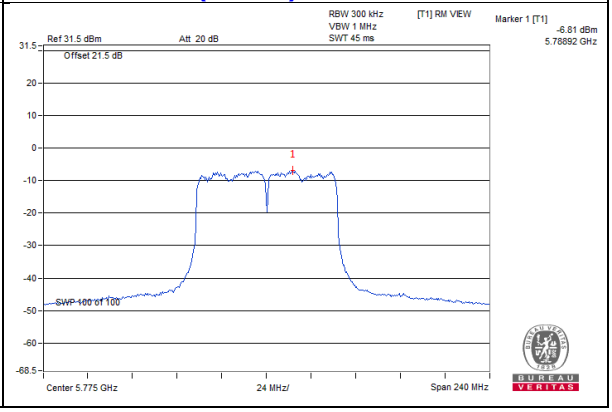
2. Refer to section 3.3 for duty cycle spectrum plot.

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	-7.36	-5.14	6.02	0.32	1.20	25.18	Pass
1	155	5745	-7.61	-5.39	6.02	0.32	0.95	25.18	Pass
2	155	5745	-7.17	-4.95	6.02	0.32	1.39	25.18	Pass
3	155	5745	-6.81	-4.59	6.02	0.32	1.75	25.18	Pass

Note: 1. The Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ + $10^{G3/20}$)^2 / 4] = 10.82dBi > 6dBi , so the power density limit shall be reduced to 30-(10.82-6) = 25.18dBm.

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

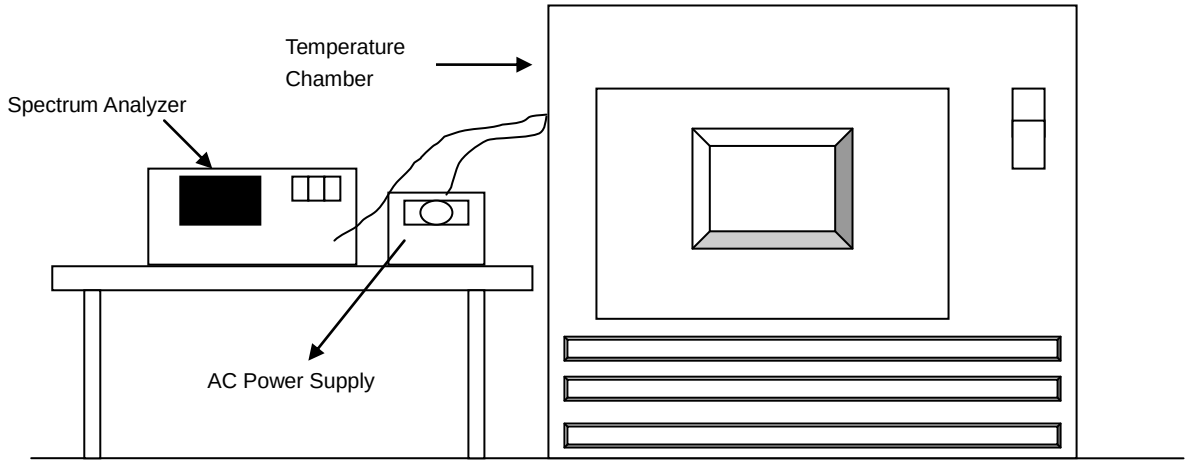
Spectrum Plot of Worst Value	
802.11a – Chain 0: CH 165	**802.11ac (VHT20) – Chain 0: CH 149**
	
802.11ac (VHT40) – Chain 0: CH 159	**802.11ac (VHT80) – Chain 3: CH 155**
	

4.6 Frequency Stability Measurement

4.6.1 Limits of Frequency Stability Measurement

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

4.6.2 Test Setup



4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.6.4 Test Procedure

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	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	120	5180.0247	PASS	5180.0242	PASS	5180.0242	PASS	5180.027	PASS
40	120	5179.9998	PASS	5179.9993	PASS	5179.9991	PASS	5179.9992	PASS
30	120	5180.0043	PASS	5180.0003	PASS	5180.0029	PASS	5180.0041	PASS
20	120	5179.9889	PASS	5179.9853	PASS	5179.99	PASS	5179.9861	PASS
10	120	5179.9883	PASS	5179.9877	PASS	5179.9857	PASS	5179.9858	PASS
0	120	5180.0058	PASS	5180.0016	PASS	5180.0041	PASS	5180.0058	PASS
-10	120	5180.0138	PASS	5180.0154	PASS	5180.0135	PASS	5180.0166	PASS
-20	120	5179.9792	PASS	5179.9794	PASS	5179.9814	PASS	5179.9804	PASS
-30	120	5180.0207	PASS	5180.0205	PASS	5180.0222	PASS	5180.0222	PASS

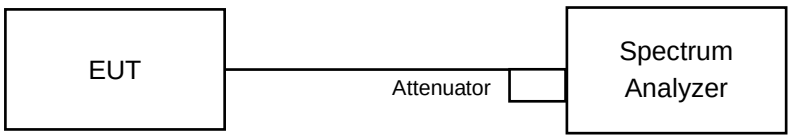
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5179.989	PASS	5179.9858	PASS	5179.9907	PASS	5179.986	PASS
	120	5179.9889	PASS	5179.9853	PASS	5179.99	PASS	5179.9861	PASS
	102	5179.9884	PASS	5179.9848	PASS	5179.9909	PASS	5179.9859	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

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	15.82	16.34	16.39	16.38	0.5	Pass
157	5785	16.09	16.32	16.39	16.38	0.5	Pass
165	5825	16.07	16.36	16.39	16.38	0.5	Pass

802.11ac (VHT20)

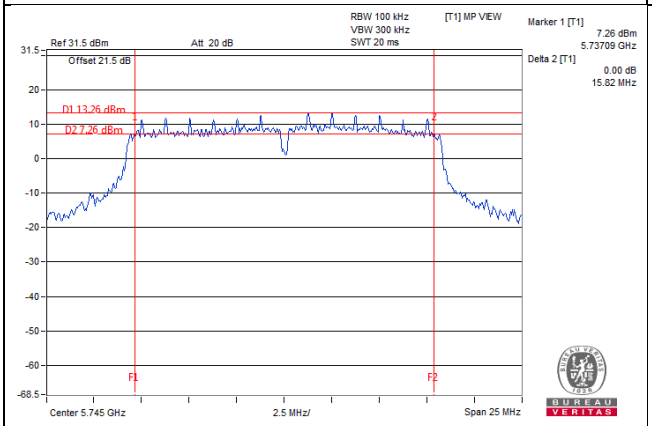
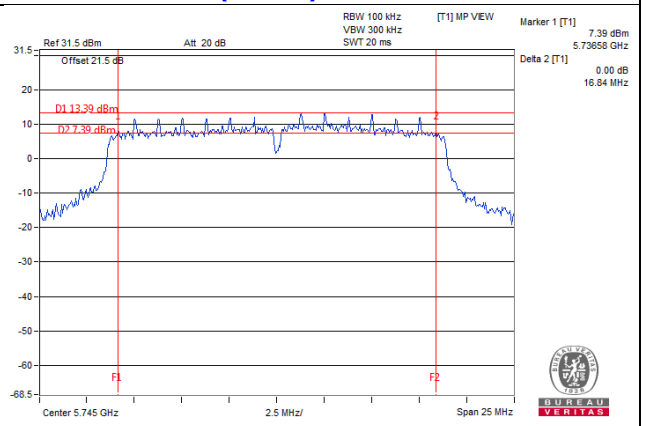
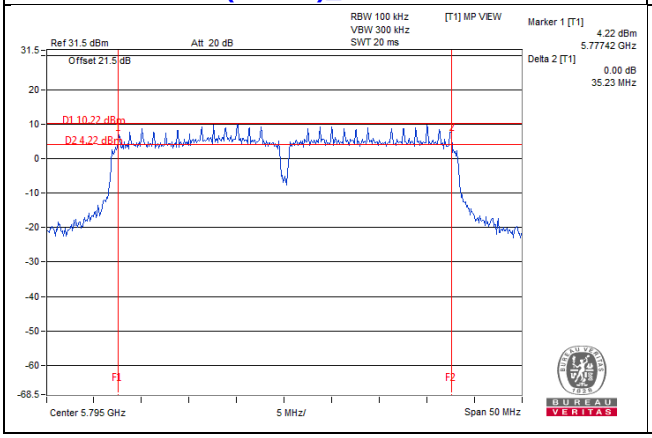
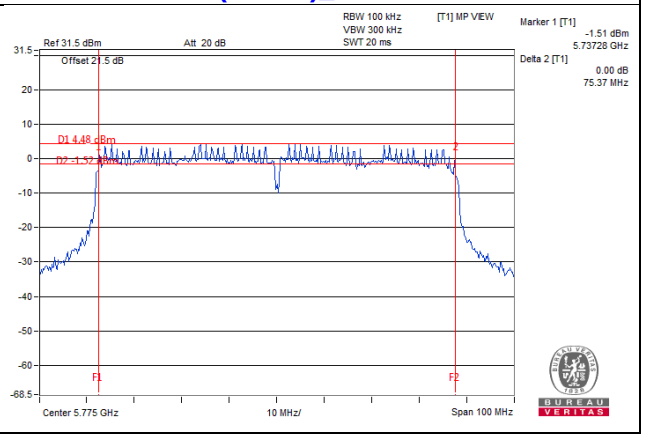
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.84	16.84	17.64	17.63	0.5	Pass
157	5785	16.97	16.89	17.61	17.60	0.5	Pass
165	5825	16.87	16.99	17.62	17.62	0.5	Pass

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	35.46	35.32	35.31	35.28	0.5	Pass
159	5795	35.51	35.35	35.25	35.23	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	75.37	75.58	75.47	75.46	0.5	Pass

Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH149	**802.11ac (VHT20)_Chain 0 / CH149**
	
802.11ac (VHT40)_Chain 3 / CH159	**802.11ac (VHT80)_Chain 0 / CH155**
	

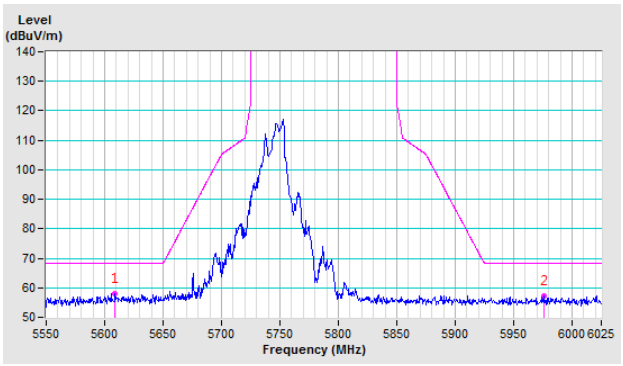
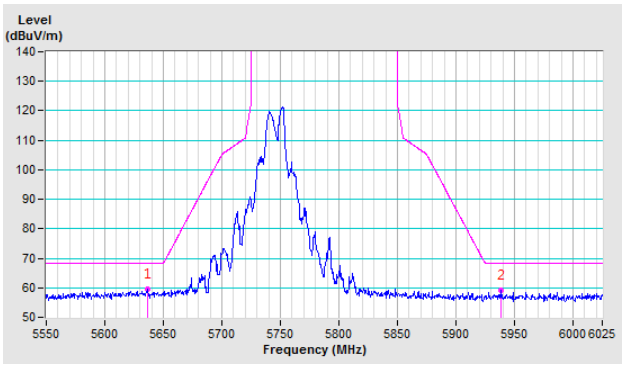
5 Pictures of Test Arrangements

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

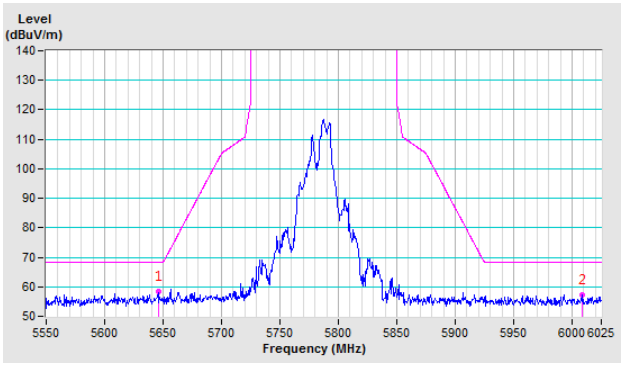
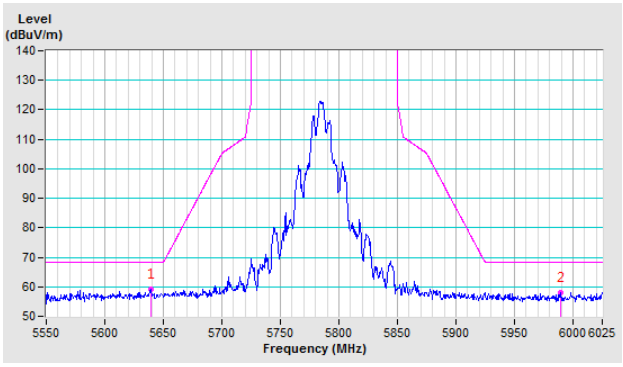
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

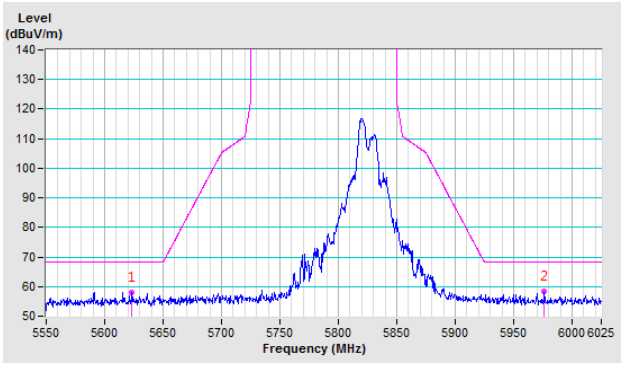
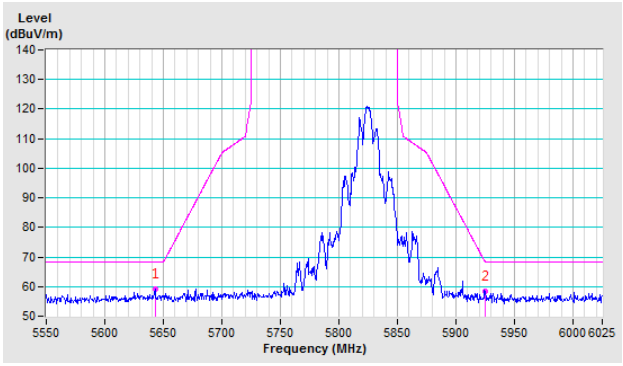
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

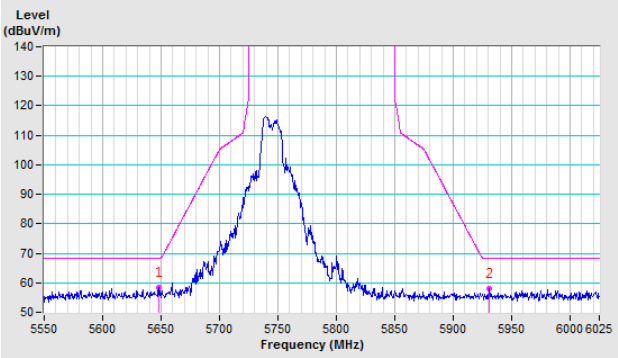
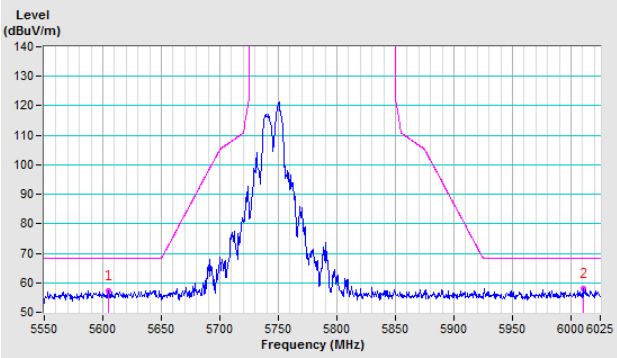
Horizontal	Vertical
	

CH 165 5825 MHz

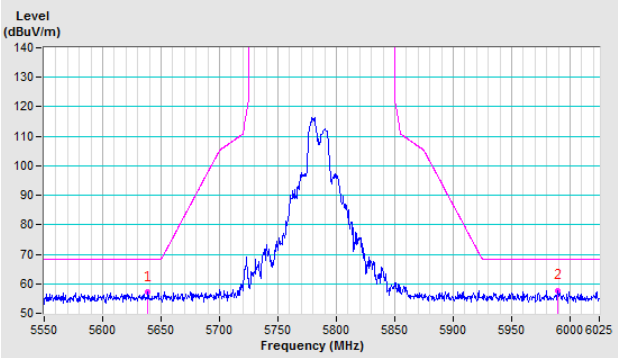
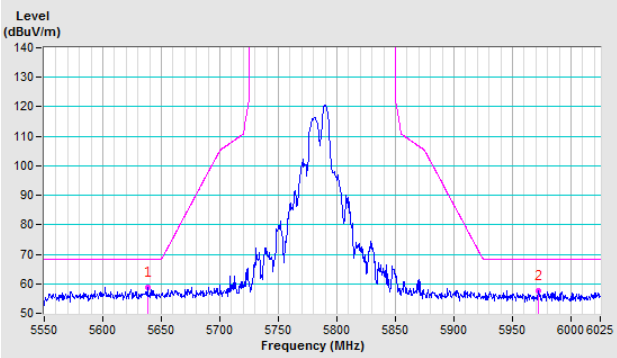
Horizontal	Vertical
	

802.11ac (VHT20)

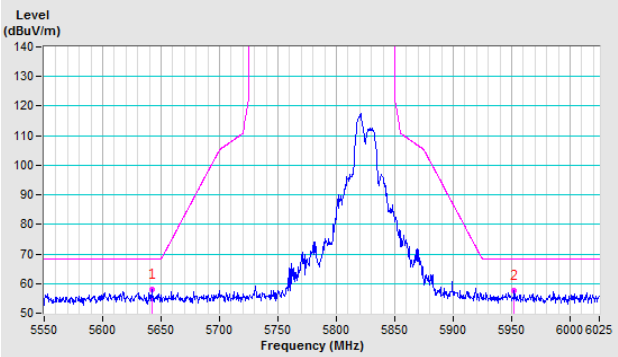
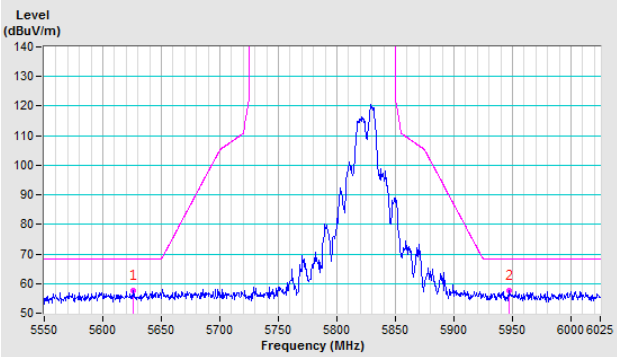
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

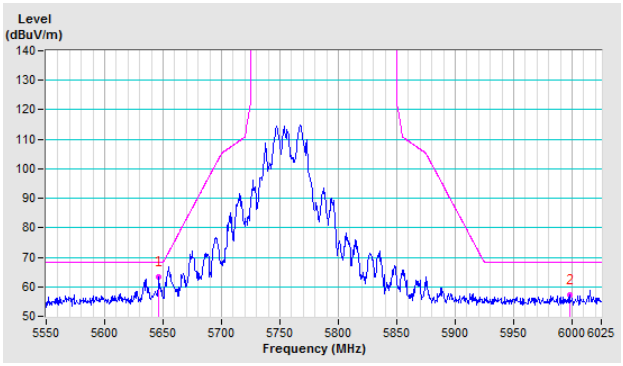
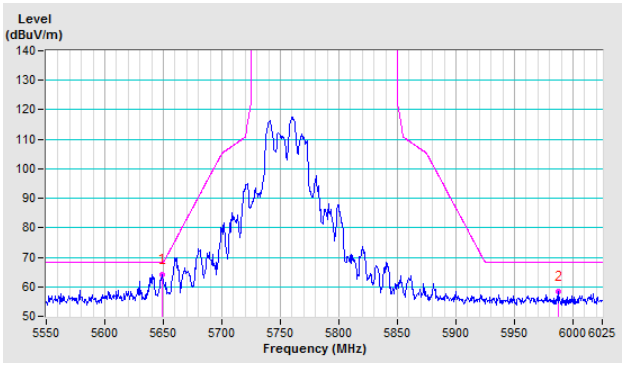
Horizontal	Vertical
	

CH 165 5825 MHz

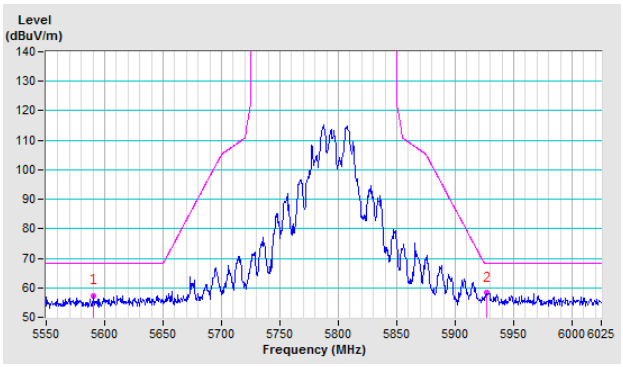
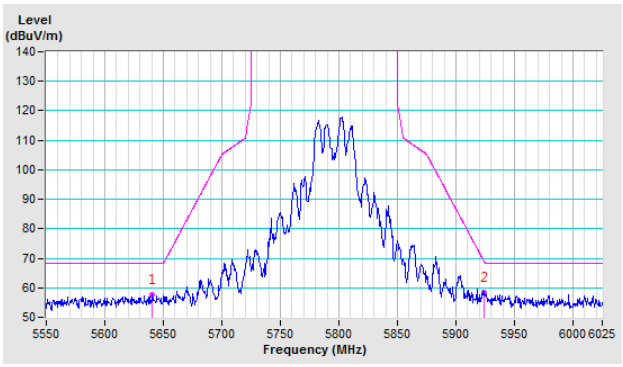
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

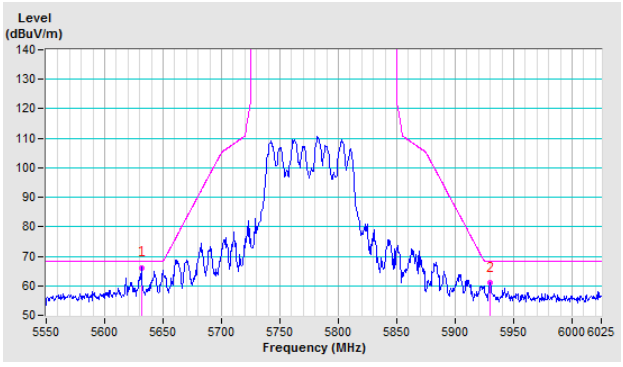
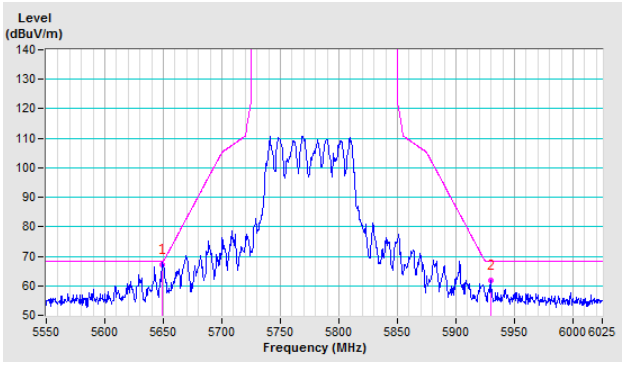
Horizontal	Vertical
	

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:

Linkou EMC/RF Lab
Tel: 886-2-26052180
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Hsin Chu EMC/RF/Telecom 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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