FCC Test Report

Report No.:	RF180822E04-1
FCC ID:	XCNUBC1322
Test Model:	UBC1322
Received Date:	Sep. 03, 2018
Test Date:	Sep. 06 to 20, 2018
Issued Date:	Oct. 03, 2018
Applicant:	Ubee Interactive Corp.
Address:	10F-1, No. 5, Taiyuan 1st St. Jhubei Ci, Hsinchu County 302, Taiwan , R.O.C.
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

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Release Control Record

Issue No.	Description	Date Issued
RF180822E04-1	Original release.	Oct. 03, 2018

1 Certificate of Conformity

Product:	Wireless eMTA
Brand:	Ubee
Test Model:	UBC1322
Applicant:	Ubee Interactive Corp.
Test Date:	Sep. 06 to 20, 2018
Standard:	47 CFR FCC Part 15, Subpart E (Section 15.407) ANSI C63.10: 2013

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

Prepared by : _____ , **Date:** Oct. 03, 2018

Claire Kuan / Specialist

Approved by : _____ , **Date:** Oct. 03, 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 -21.61dB at 0.16562MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5150.00MHz, 5644.87MHz, 5650.77MHz, 11570.00MHz, 17235.00MHz, 17475.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is 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	5.33 dB
Radiated Emissions above 1 GHz	1GHz ~ 6GHz	5.10 dB
	6GHz ~ 18GHz	4.85 dB
	18GHz ~ 40GHz	5.24 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Wireless eMTA
Brand	Ubee
Test Model	UBC1322
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 and VHT (20/40) mode in 2.4GHz 1024QAM for OFDM VHT (20/40/80) in 5GHz
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11Mbps 802.11a/g: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733.3Mbps OFDM VHT (20/40/80) 1024QAM: up to 2166 Mbps
Operating Frequency	**2.4GHz:** 2.412GHz ~ 2.462GHz **5GHz:** 5.18GHz ~ 5.24GHz, 5.745GHz ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20), VHT20: 11 802.11n (HT40), VHT40: 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20), VHT20: 9 802.11n (HT40), 802.11ac (VHT40), VHT40: 4 802.11ac (VHT80), VHT80: 2
Output Power	**2.412 ~ 2.462GHz:** **CDD Mode:** 837.761 mW **Beamforming Mode:** 592.09mW **5.18 ~ 5.24GHz** **CDD Mode:** 454.978 mW **Beamforming Mode** 357.97mW **5.745 ~ 5.825GHz** **CDD Mode:** 995.226mW **Beamforming Mode:** 360.409mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	Adapter × 1
Data Cable Supplied	RJ45 Cable × 1 (Unshielded, 1.8m)

Note:

1. The EUT has below Ubee P/N, which are identical to each other in all aspects except for the followings:

Model Name	Ubee P/N	Difference
UBC1322	UBC1322AA	With MoCA, CPU 3390
	UBC1322BA	Without MoCA, CPU 3390

Note:
1. There are two versions for Model UBC1322, same PCBA, one is with MoCA, and the other is no MoCA.
2. From the above Ubee P/N, Ubee P/N: UBC1322AA was selected as representative Ubee P/N for the test and its data was recorded in this report.

2. Simultaneously transmission condition.

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

3. The EUT must be supplied from power adapter as the following table:

Brand	Model No.	Spec.
LEI	MU30AY120250-A1	Input: 100-240Vac, 800mA, 50/60Hz Output: 12Vdc, 2.5A DC output cable (Unshielded, 1.5m)

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

Antenna No.	Transmitter Circuit	Ant. Net Gain (dBi)	Freq. range (GHz)	Ant. Type	Connecter Type	Cable Length (mm)
1	Chain 2	3.48	2.4~2.4835	Dipole	i-pex(MHF)	85
	Chain 1	4.08	5.15~5.85			
2	Chain 1	3.49	2.4~2.4835	Dipole	i-pex(MHF)	73
	Chain 2	4.49	5.15~5.85			
3	Chain 0	4.49	5.15~5.85	Dipole	i-pex(MHF)	42
4	Chain 0	3.49	2.4~2.4835	Dipole	i-pex(MHF)	81
	Chain 3	4.47	5.15~5.85			

5. The EUT incorporates a MIMO function

2.4GHz Band			
MODULATION MODE	**DATA RATE (MCS)**	**TX & RX CONFIGURATION**	
802.11b	1 ~ 11Mbps	3TX	3RX
802.11g	6 ~ 54Mbps	3TX	3RX
802.11n (HT20)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
802.11n (HT40)	MCS 0~7	3TX	3RX
	MCS 8~15	3TX	3RX
	MCS 16~23	3TX	3RX
VHT20 (Support 256QAM)	MCS 0~8, Nss=1	3TX	3RX
	MCS 0~8, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX
VHT40 (Support 256QAM)	MCS 0~9, Nss=1	3TX	3RX
	MCS 0~9, Nss=2	3TX	3RX
	MCS 0~9, Nss=3	3TX	3RX

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)	MCS 0~8, Nss=1	4TX	4RX
	MCS 0~8, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~8, Nss=4	4TX	4RX
802.11ac (VHT40)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX
802.11ac (VHT80)	MCS 0~9, Nss=1	4TX	4RX
	MCS 0~9, Nss=2	4TX	4RX
	MCS 0~9, Nss=3	4TX	4RX
	MCS 0~9, Nss=4	4TX	4RX
VHT20 (Support 1024QAM)	MCS 0~11, Nss=1	4TX	4RX
	MCS 0~11, Nss=2	4TX	4RX
	MCS 0~11, Nss=3	4TX	4RX
	MCS 0~11, Nss=4	4TX	4RX
VHT40 (Support 1024QAM)	MCS 0~11, Nss=1	4TX	4RX
	MCS 0~11, Nss=2	4TX	4RX
	MCS 0~11, Nss=3	4TX	4RX
	MCS 0~11, Nss=4	4TX	4RX
VHT80 (Support 1024QAM)	MCS 0~11, Nss=1	4TX	4RX
	MCS 0~11, Nss=2	4TX	4RX
	MCS 0~11, Nss=3	4TX	4RX
	MCS 0~11, 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	5210 MHz

FOR 5745 ~ 5825MHz:

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

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

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

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80):

Channel	Frequency
155	5775 MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

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

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

Note: The EUT had been pre-tested on the positioned of each 2 axis. The worst case was found when positioned on **Y-plane**.

Radiated Emission Test (Above 1GHz):

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

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

Radiated Emission Test (Below 1GHz):

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

CDD Mode						
Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11a	5180-5240, 5745-5825	36 to 48, 149 to 165	149	OFDM	BPSK	6

Power Line Conducted Emission Test:

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

CDD Mode						
Mode	**FREQ. Band (MHz)**	**Available Channel**	**Tested Channel**	**Modulation Technology**	**Modulation Type**	**Data Rate (Mbps)**
802.11a	5180-5240, 5745-5825	36 to 48, 149 to 165	149	OFDM	BPSK	6

Antenna Port Conducted Measurement:

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

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

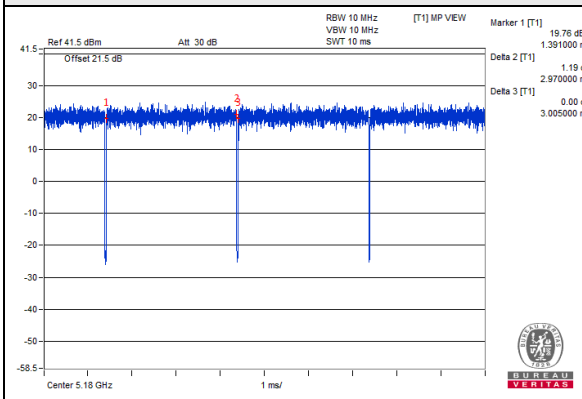
Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	23deg. C, 66%RH	120Vac, 60Hz	Andy Ho
RE<1G	23deg. C, 68%RH	120Vac, 60Hz	Frank Chuang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Frank Chuang
APCM	25deg. C, 60%RH	120Vac, 60Hz	Anderson Chen

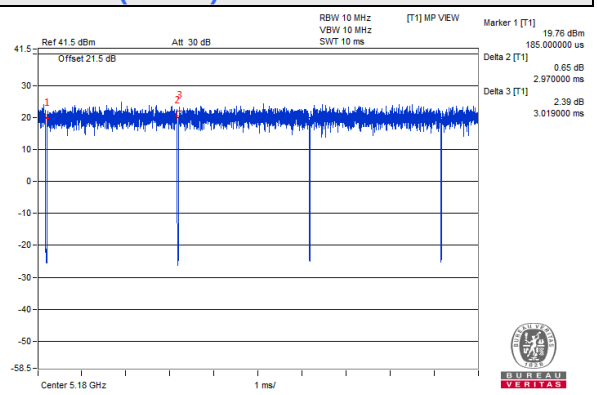
3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.
802.11a: Duty cycle = 2.97/3.005 = 0.988
802.11ac (VHT20): Duty cycle = 2.97/3.019 = 0.984
802.11ac (VHT40): Duty cycle = 2.969/3.002 = 0.989
802.11ac (VHT80): Duty cycle = 2.961/2.994 = 0.989

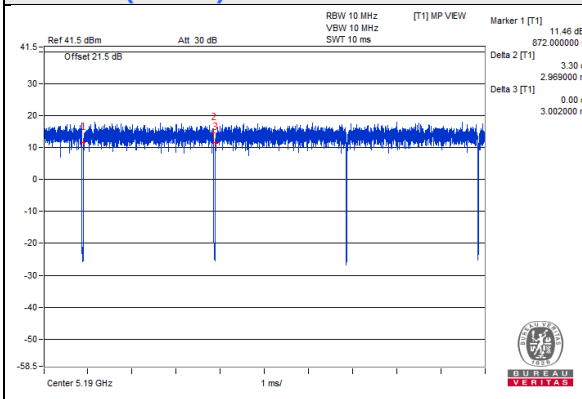
802.11a



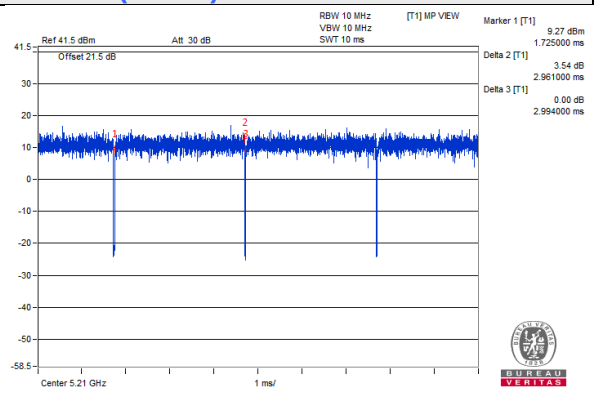
802.11ac (VHT20)



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.

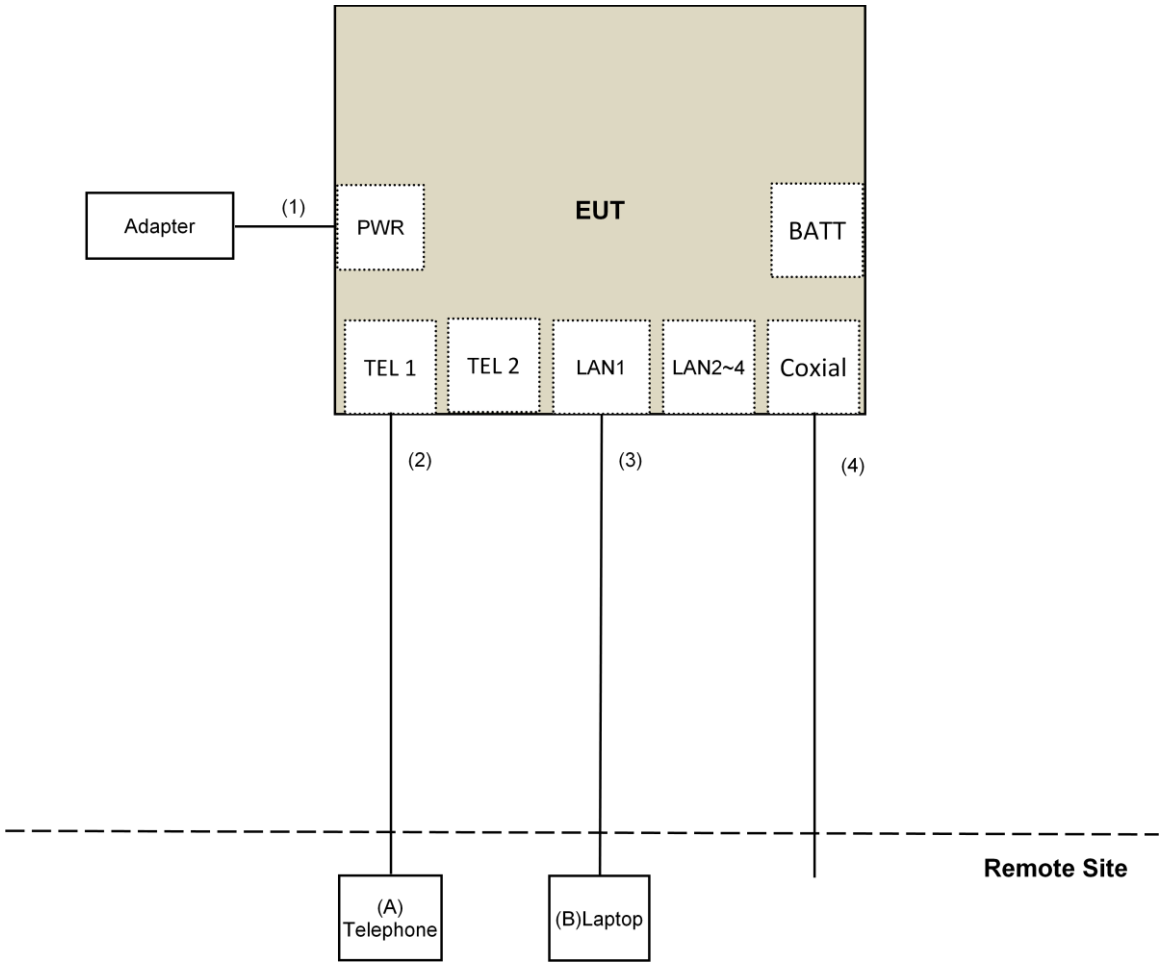
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Telephone	WONDER	WD-303	7C17KA04011	NA	Provided by Lab
B.	Laptop	DELL	E6420	B92T3R1	FCC DoC	Provided by Lab

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.	DC Cable	1	1.5	No	0	Supplied by client
2.	RJ-11 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	10	No	0	Provided by Lab
4.	Coaxial Cable	1	10	Yes	0	Provided by Lab

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="5">*1 beyond 75 MHz or more above of the band edge.
*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.
*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.
*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.</td></tr>
</table>

Note:

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

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 05, 2018	July 04, 2019
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	Jan. 15, 2018	Jan. 14, 2019
RF Cable	NA	LOOPCAB-002	Jan. 15, 2018	Jan. 14, 2019
Pre-Amplifier Mini-Circuits	ZFL-1000VH2B	AMP-ZFL-01	Nov. 09, 2017	Nov. 08, 2018
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-406	Nov. 29, 2017	Nov. 28, 2018
RF Cable	8D	966-4-1	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-2	Mar. 21, 2018	Mar. 20, 2019
RF Cable	8D	966-4-3	Mar. 21, 2018	Mar. 20, 2019
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-4-01	Oct. 03, 2017	Oct. 02, 2018
Horn_Antenna SCHWARZBECK	BBHA 9120D	9120D-783	Dec. 12, 2017	Dec. 11, 2018
Pre-Amplifier Mini-Circuits	ZVA-183-S+	AMP-ZVA-03	May 10, 2018	May 09, 2019
RF Cable	EMC104-SM-SM-1200	160923	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-2000	150318	Jan. 29, 2018	Jan. 28, 2019
RF Cable	EMC104-SM-SM-5000	150321	Jan. 29, 2018	Jan. 28, 2019
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 29, 2018	Jan. 28, 2019
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170608	Dec. 14, 2017	Dec. 13, 2018
RF Cable	EMC102-KM-KM-1200	160925	Jan. 29, 2018	Jan. 28, 2019
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Boresight Antenna Tower & Turn Table Max-Full	MF-7802BS	MF780208530	NA	NA
Spectrum Analyzer Agilent	E4446A	MY48250254	Nov. 21, 2017	Nov. 20, 2018
Power meter Anritsu	ML2495A	1014008	May 09, 2018	May 08, 2019
Power sensor Anritsu	MA2411B	0917122	May 09, 2018	May 08, 2019
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 22, 2018	May 21, 2019

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. *The calibration interval of the above test instruments is 24 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. The test was performed in 966 Chamber No. 4.
4. The CANADA Site Registration No. is 20331-2
5. Loop antenna was used for all emissions below 30 MHz.
6. Tested Date: Sep. 06 to 20, 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:

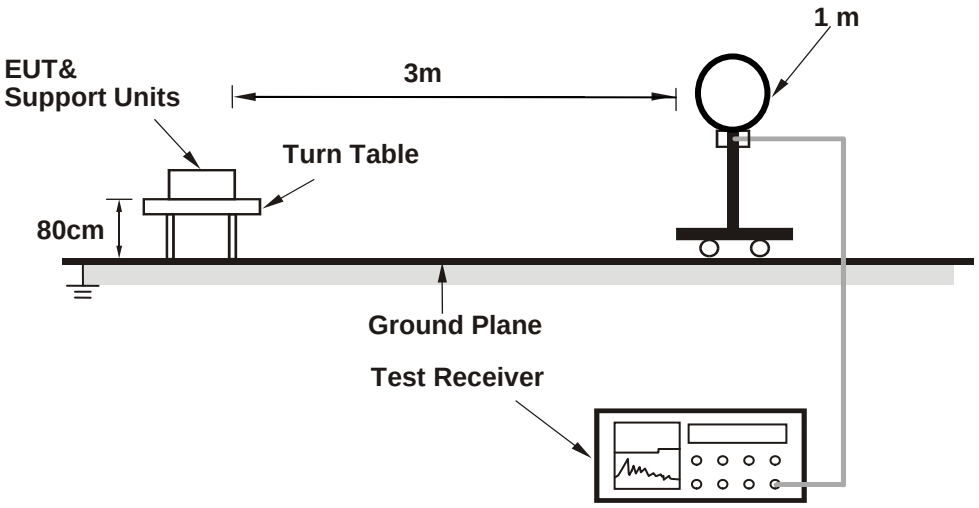
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

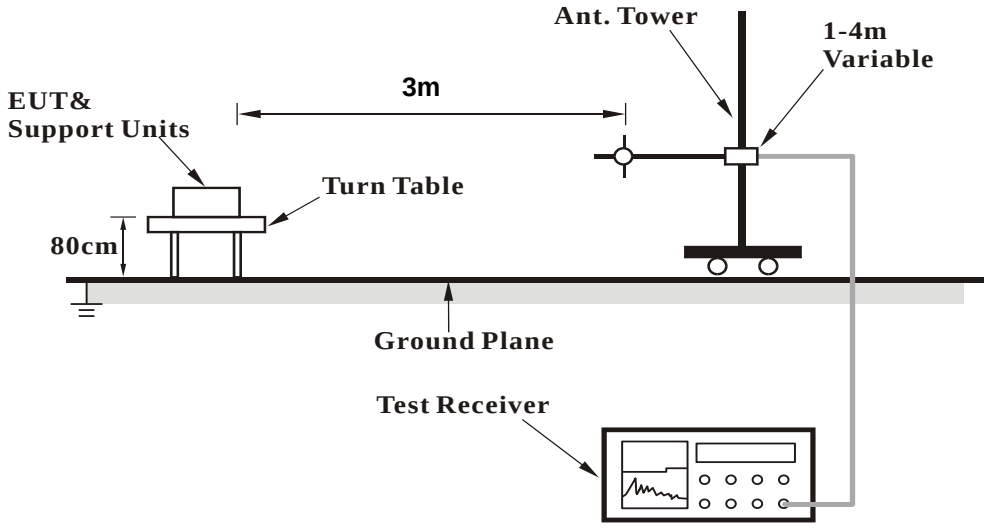
No deviation.

4.1.5 Test Setup

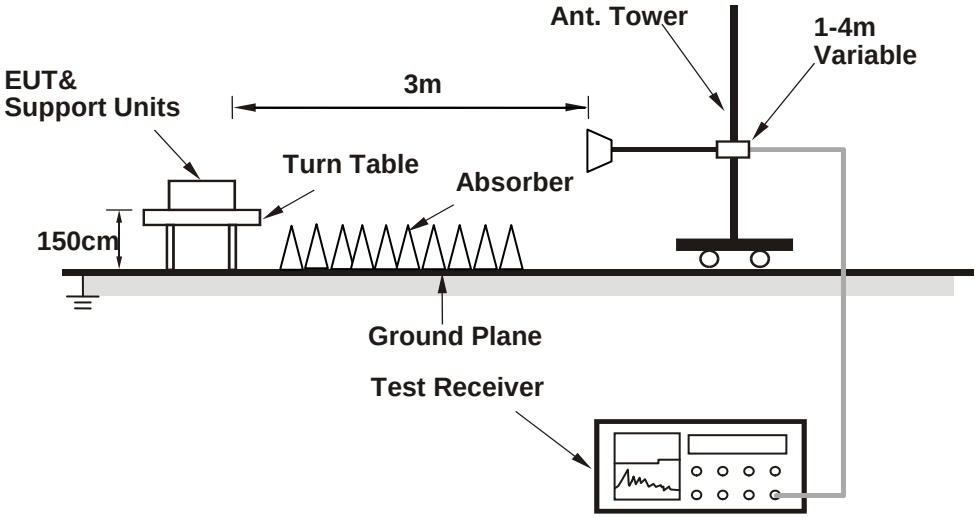
For Radiated emission below 30MHz



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 (MTOOL [V3.0.0.6]) 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	72.3 PK	74.0	-1.7	1.24 H	334	69.3	3.0
2	**5150.00**	**53.9 AV**	**54.0**	**-0.1**	**1.24 H**	**334**	**50.9**	**3.0**
3	*5180.00	119.4 PK			1.24 H	334	116.6	2.8
4	*5180.00	108.0 AV			1.24 H	334	105.2	2.8
5	#5471.00	55.2 PK	68.2	-13.0	1.24 H	334	52.3	2.9
6	#10360.00	61.0 PK	68.2	-7.2	1.51 H	91	48.6	12.4
7	15540.00	64.4 PK	74.0	-9.6	1.47 H	93	51.6	12.8
8	15540.00	51.3 AV	54.0	-2.7	1.47 H	93	38.5	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	70.5 PK	74.0	-3.5	3.73 V	137	67.5	3.0
2	5150.00	52.9 AV	54.0	-1.1	3.73 V	137	49.9	3.0
3	*5180.00	115.3 PK			3.73 V	137	112.5	2.8
4	*5180.00	105.4 AV			3.73 V	137	102.6	2.8
5	#5471.00	51.8 PK	68.2	-16.4	3.73 V	137	48.9	2.9
6	#10360.00	53.9 PK	68.2	-14.3	1.49 V	71	41.5	12.4
7	15540.00	60.6 PK	74.0	-13.4	1.46 V	112	47.8	12.8
8	15540.00	48.2 AV	54.0	-5.8	1.46 V	112	35.4	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 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	67.3 PK	74.0	-6.7	1.35 H	334	64.3	3.0
2	5150.00	53.7 AV	54.0	-0.3	1.35 H	334	50.7	3.0
3	*5200.00	123.4 PK			1.35 H	334	120.7	2.7
4	*5200.00	113.5 AV			1.35 H	334	110.8	2.7
5	5350.00	51.9 PK	74.0	-22.1	1.35 H	334	49.3	2.6
6	5350.00	43.6 AV	54.0	-10.4	1.35 H	334	41.0	2.6
7	5358.90	63.3 PK	74.0	-10.7	1.35 H	334	60.6	2.7
8	5358.90	53.1 AV	54.0	-0.9	1.35 H	334	50.4	2.7
9	#10400.00	61.9 PK	68.2	-6.3	1.50 H	81	49.4	12.5
10	15600.00	65.3 PK	74.0	-8.7	1.50 H	107	52.5	12.8
11	15600.00	52.2 AV	54.0	-1.8	1.50 H	107	39.4	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	65.8 PK	74.0	-8.2	3.74 V	137	62.8	3.0
2	5150.00	52.5 AV	54.0	-1.5	3.74 V	137	49.5	3.0
3	*5200.00	122.7 PK			3.74 V	137	120.0	2.7
4	*5200.00	112.8 AV			3.74 V	137	110.1	2.7
5	5350.00	51.4 PK	74.0	-22.6	3.74 V	137	48.8	2.6
6	5350.00	42.3 AV	54.0	-11.7	3.74 V	137	39.7	2.6
7	5358.90	64.2 PK	74.0	-9.8	3.74 V	137	61.5	2.7
8	5358.90	50.8 AV	54.0	-3.2	3.74 V	137	48.1	2.7
9	#10400.00	54.8 PK	68.2	-13.4	1.50 V	71	42.3	12.5
10	15600.00	61.5 PK	74.0	-12.5	1.50 V	107	48.7	12.8
11	15600.00	49.1 AV	54.0	-4.9	1.50 V	107	36.3	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 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	*5240.00	122.8 PK			1.47 H	334	120.3	2.5
2	*5240.00	112.6 AV			1.47 H	334	110.1	2.5
3	5350.00	54.1 PK	74.0	-19.9	1.47 H	334	51.5	2.6
4	5350.00	44.7 AV	54.0	-9.3	1.47 H	334	42.1	2.6
5	5398.80	60.2 PK	74.0	-13.8	1.47 H	334	57.4	2.8
6	5398.80	50.9 AV	54.0	-3.1	1.47 H	334	48.1	2.8
7	#10480.00	61.5 PK	68.2	-6.7	1.50 H	95	48.5	13.0
8	15720.00	64.9 PK	74.0	-9.1	1.50 H	111	52.5	12.4
9	15720.00	51.8 AV	54.0	-2.2	1.50 H	111	39.4	12.4
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	*5240.00	120.5 PK			3.72 V	138	118.0	2.5
2	*5240.00	110.3 AV			3.72 V	138	107.8	2.5
3	5350.00	51.7 PK	74.0	-22.3	3.72 V	138	49.1	2.6
4	5350.00	42.3 AV	54.0	-11.7	3.72 V	138	39.7	2.6
5	5398.80	57.6 PK	74.0	-16.4	3.72 V	138	54.8	2.8
6	5398.80	48.5 AV	54.0	-5.5	3.72 V	138	45.7	2.8
7	#10480.00	54.4 PK	68.2	-13.8	1.44 V	66	41.4	13.0
8	15720.00	61.1 PK	74.0	-12.9	1.56 V	111	48.7	12.4
9	15720.00	48.7 AV	54.0	-5.3	1.56 V	111	36.3	12.4

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 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	**#5650.30**	**68.3 PK**	**68.4**	**-0.1**	**1.47 H**	**334**	**65.1**	**3.2**
2	*5745.00	122.9 PK			1.47 H	334	119.6	3.3
3	*5745.00	112.9 AV			1.47 H	334	109.6	3.3
4	#5985.92	58.6 PK	68.2	-9.6	1.47 H	334	54.9	3.7
5	11490.00	64.8 PK	74.0	-9.2	1.50 H	93	51.4	13.4
6	11490.00	52.8 AV	54.0	-1.2	1.50 H	93	39.4	13.4
7	**#17235.00**	**68.1 PK**	**68.2**	**-0.1**	**1.26 H**	**24**	**51.4**	**16.7**
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	#5581.17	59.6 PK	68.2	-8.6	2.07 V	76	56.4	3.2
2	*5745.00	117.3 PK			2.07 V	76	114.0	3.3
3	*5745.00	108.1 AV			2.07 V	76	104.8	3.3
4	#5988.61	58.7 PK	68.2	-9.5	2.07 V	76	55.0	3.7
5	11490.00	60.5 PK	74.0	-13.5	1.50 V	76	47.1	13.4
6	11490.00	49.5 AV	54.0	-4.5	1.50 V	76	36.1	13.4
7	#17235.00	66.6 PK	68.2	-1.6	1.54 V	119	49.9	16.7

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5551.69	66.2 PK	68.2	-2.0	1.48 H	355	63.2	3.0
2	*5785.00	122.6 PK			1.48 H	355	119.3	3.3
3	*5785.00	112.5 AV			1.48 H	355	109.2	3.3
4	#5926.33	61.9 PK	68.2	-6.3	1.48 H	355	58.3	3.6
5	11570.00	64.8 PK	74.0	-9.2	1.50 H	88	51.4	13.4
6	**11570.00**	**53.9 AV**	**54.0**	**-0.1**	**1.50 H**	**88**	**40.5**	**13.4**
7	#17355.00	68.0 PK	68.2	-0.2	1.50 H	21	50.7	17.3
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	#5617.50	60.1 PK	68.2	-8.1	2.05 V	77	56.8	3.3
2	*5785.00	117.0 PK			2.05 V	77	113.7	3.3
3	*5785.00	107.8 AV			2.05 V	77	104.5	3.3
4	#5937.89	59.3 PK	68.2	-8.9	2.05 V	77	55.7	3.6
5	11570.00	61.7 PK	74.0	-12.3	1.46 V	67	48.3	13.4
6	11570.00	50.6 AV	54.0	-3.4	1.46 V	67	37.2	13.4
7	#17355.00	67.2 PK	68.2	-1.0	1.59 V	126	49.9	17.3

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 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	#5590.13	63.0 PK	68.2	-5.2	1.47 H	337	59.8	3.2
2	*5825.00	121.2 PK			1.47 H	337	117.7	3.5
3	*5825.00	111.4 AV			1.47 H	337	107.9	3.5
4	#5922.98	69.5 PK	69.7	-0.2	1.47 H	337	65.9	3.6
5	11650.00	64.1 PK	74.0	-9.9	1.50 H	88	50.8	13.3
6	11650.00	52.8 AV	54.0	-1.2	1.50 H	88	39.5	13.3
7	**#17475.00**	**68.1 PK**	**68.2**	**-0.1**	**1.19 H**	**24**	**49.9**	**18.2**
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5585.26	60.1 PK	68.2	-8.1	2.03 V	75	56.9	3.2
2	*5825.00	115.5 PK			2.03 V	75	112.0	3.5
3	*5825.00	105.8 AV			2.03 V	75	102.3	3.5
4	#5979.72	59.5 PK	68.2	-8.7	2.03 V	75	55.9	3.6
5	11650.00	60.8 PK	74.0	-13.2	1.47 V	67	47.5	13.3
6	11650.00	49.7 AV	54.0	-4.3	1.47 V	67	36.4	13.3
7	#17475.00	67.0 PK	68.2	-1.2	1.57 V	104	48.8	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	68.9 PK	74.0	-5.1	1.61 H	176	65.9	3.0
2	5150.00	53.7 AV	54.0	-0.3	1.61 H	176	50.7	3.0
3	*5180.00	117.1 PK			1.61 H	176	114.3	2.8
4	*5180.00	107.4 AV			1.61 H	176	104.6	2.8
5	#10360.00	60.7 PK	68.2	-7.5	1.52 H	92	48.3	12.4
6	15540.00	64.4 PK	74.0	-9.6	1.50 H	109	51.6	12.8
7	15540.00	51.4 AV	54.0	-2.6	1.50 H	109	38.6	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	66.7 PK	74.0	-7.3	3.74 V	128	63.7	3.0
2	5150.00	51.4 AV	54.0	-2.6	3.74 V	128	48.4	3.0
3	*5180.00	114.6 PK			3.74 V	128	111.8	2.8
4	*5180.00	104.8 AV			3.74 V	128	102.0	2.8
5	#10360.00	53.4 PK	68.2	-14.8	1.48 V	78	41.0	12.4
6	15540.00	60.4 PK	74.0	-13.6	1.45 V	113	47.6	12.8
7	15540.00	48.2 AV	54.0	-5.8	1.45 V	113	35.4	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 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	66.0 PK	74.0	-8.0	1.70 H	176	63.0	3.0
2	5150.00	53.7 AV	54.0	-0.3	1.70 H	176	50.7	3.0
3	*5200.00	121.5 PK			1.70 H	176	118.8	2.7
4	*5200.00	111.1 AV			1.70 H	176	108.4	2.7
5	5350.00	51.3 PK	74.0	-22.7	1.70 H	176	48.7	2.6
6	5350.00	42.7 AV	54.0	-11.3	1.70 H	176	40.1	2.6
7	5365.80	60.9 PK	74.0	-13.1	1.70 H	176	58.2	2.7
8	5365.80	50.9 AV	54.0	-3.1	1.70 H	176	48.2	2.7
9	#10400.00	61.6 PK	68.2	-6.6	1.55 H	67	49.1	12.5
10	15600.00	65.6 PK	74.0	-8.4	1.48 H	114	52.8	12.8
11	15600.00	52.2 AV	54.0	-1.8	1.48 H	114	39.4	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	64.7 PK	74.0	-9.3	3.70 V	141	61.7	3.0
2	5150.00	52.3 AV	54.0	-1.7	3.70 V	141	49.3	3.0
3	*5200.00	118.6 PK			3.70 V	141	115.9	2.7
4	*5200.00	108.4 AV			3.70 V	141	105.7	2.7
5	5350.00	49.8 PK	74.0	-24.2	3.70 V	141	47.2	2.6
6	5350.00	41.2 AV	54.0	-12.8	3.70 V	141	38.6	2.6
7	5365.80	58.5 PK	74.0	-15.5	3.70 V	141	55.8	2.7
8	5365.80	49.3 AV	54.0	-4.7	3.70 V	141	46.6	2.7
9	#10400.00	53.9 PK	68.2	-14.3	1.42 V	69	41.4	12.5
10	15600.00	61.7 PK	74.0	-12.3	1.52 V	108	48.9	12.8
11	15600.00	49.0 AV	54.0	-5.0	1.52 V	108	36.2	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 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	117.4 PK			1.92 H	176	114.9	2.5
2	*5240.00	107.6 AV			1.92 H	176	105.1	2.5
3	5350.00	52.1 PK	74.0	-21.9	1.92 H	176	49.5	2.6
4	5350.00	42.2 AV	54.0	-11.8	1.92 H	176	39.6	2.6
5	5396.00	57.4 PK	74.0	-16.6	1.92 H	156	54.6	2.8
6	5396.00	47.8 AV	54.0	-6.2	1.92 H	156	45.0	2.8
7	#10480.00	61.0 PK	68.2	-7.2	1.56 H	83	48.0	13.0
8	15720.00	63.9 PK	74.0	-10.1	1.49 H	95	51.5	12.4
9	15720.00	51.1 AV	54.0	-2.9	1.49 H	95	38.7	12.4
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	*5240.00	115.3 PK			3.74 V	126	112.8	2.5
2	*5240.00	105.1 AV			3.74 V	126	102.6	2.5
3	5350.00	51.3 PK	74.0	-22.7	3.74 V	126	48.7	2.6
4	5350.00	41.6 AV	54.0	-12.4	3.74 V	126	39.0	2.6
5	5396.00	55.1 PK	74.0	-18.9	3.74 V	126	52.3	2.8
6	5396.00	45.6 AV	54.0	-8.4	3.74 V	126	42.8	2.8
7	#10480.00	54.2 PK	68.2	-14.0	1.46 V	87	41.2	13.0
8	15720.00	60.8 PK	74.0	-13.2	1.54 V	115	48.4	12.4
9	15720.00	48.3 AV	54.0	-5.7	1.54 V	115	35.9	12.4

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 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	**#5650.77**	**68.7 PK**	**68.8**	**-0.1**	**1.25 H**	**348**	**65.5**	**3.2**
2	*5745.00	121.5 PK			1.25 H	348	118.2	3.3
3	*5745.00	111.6 AV			1.25 H	348	108.3	3.3
4	#5976.89	62.7 PK	68.2	-5.5	1.25 H	348	59.1	3.6
5	11490.00	65.3 PK	74.0	-8.7	1.50 H	88	51.9	13.4
6	11490.00	52.2 AV	54.0	-1.8	1.50 H	88	38.8	13.4
7	#17235.00	66.7 PK	68.2	-1.5	1.50 H	24	50.0	16.7
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	#5577.60	60.0 PK	68.2	-8.2	3.67 V	60	56.8	3.2
2	*5745.00	117.7 PK			3.67 V	60	114.4	3.3
3	*5745.00	107.8 AV			3.67 V	60	104.5	3.3
4	#5991.10	58.3 PK	68.2	-9.9	3.67 V	60	54.6	3.7
5	11490.00	60.0 PK	74.0	-14.0	1.50 V	87	46.6	13.4
6	11490.00	48.7 AV	54.0	-5.3	1.50 V	87	35.3	13.4
7	#17235.00	65.3 PK	68.2	-2.9	1.50 V	132	48.6	16.7

REMARKS:

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

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5621.13	63.3 PK	68.2	-4.9	1.27 H	351	60.0	3.3
2	*5785.00	122.6 PK			1.27 H	351	119.3	3.3
3	*5785.00	112.6 AV			1.27 H	351	109.3	3.3
4	#5941.38	62.6 PK	68.2	-5.6	1.27 H	351	59.1	3.5
5	11570.00	63.5 PK	74.0	-10.5	1.41 H	88	50.1	13.4
6	11570.00	52.6 AV	54.0	-1.4	1.41 H	88	39.2	13.4
7	#17355.00	67.8 PK	68.2	-0.4	1.50 H	24	50.5	17.3
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	#5620.59	64.6 PK	68.2	-3.6	3.64 V	62	61.3	3.3
2	*5785.00	117.9 PK			3.64 V	62	114.6	3.3
3	*5785.00	108.2 AV			3.64 V	62	104.9	3.3
4	#5937.74	62.4 PK	68.2	-5.8	3.64 V	62	58.8	3.6
5	11570.00	60.8 PK	74.0	-13.2	1.49 V	88	47.4	13.4
6	11570.00	49.4 AV	54.0	-4.6	1.49 V	88	36.0	13.4
7	#17355.00	66.6 PK	68.2	-1.6	1.57 V	126	49.3	17.3

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 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	#5590.14	63.3 PK	68.2	-4.9	1.26 H	349	60.1	3.2
2	*5825.00	122.0 PK			1.26 H	349	118.5	3.5
3	*5825.00	112.1 AV			1.26 H	349	108.6	3.5
4	#5927.51	63.7 PK	68.2	-4.5	1.26 H	349	60.1	3.6
5	11650.00	65.7 PK	74.0	-8.3	1.03 H	111	52.4	13.3
6	11650.00	52.5 AV	54.0	-1.5	1.03 H	111	39.2	13.3
7	#17475.00	68.0 PK	68.2	-0.2	1.25 H	24	49.8	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	#5575.08	62.1 PK	68.2	-6.1	2.02 V	75	58.9	3.2
2	*5825.00	127.0 PK			2.02 V	75	123.5	3.5
3	*5825.00	117.5 AV			2.02 V	75	114.0	3.5
4	#5981.70	59.8 PK	68.2	-8.4	2.02 V	75	56.1	3.7
5	11650.00	60.5 PK	74.0	-13.5	1.48 V	80	47.2	13.3
6	11650.00	49.2 AV	54.0	-4.8	1.48 V	80	35.9	13.3
7	#17475.00	66.8 PK	68.2	-1.4	1.48 V	135	48.6	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 (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	68.2 PK	74.0	-5.8	1.45 H	329	65.2	3.0
2	5150.00	53.8 AV	54.0	-0.2	1.45 H	329	50.8	3.0
3	*5190.00	110.8 PK			1.45 H	329	108.0	2.8
4	*5190.00	101.4 AV			1.45 H	329	98.6	2.8
5	5350.00	60.1 PK	74.0	-13.9	1.45 H	329	57.5	2.6
6	5350.00	51.3 AV	54.0	-2.7	1.45 H	329	48.7	2.6
7	#10380.00	59.3 PK	68.2	-8.9	1.56 H	95	46.9	12.4
8	15570.00	62.7 PK	74.0	-11.3	1.52 H	95	49.9	12.8
9	15570.00	49.6 AV	54.0	-4.4	1.52 H	95	36.8	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	67.0 PK	74.0	-7.0	3.70 V	136	64.0	3.0
2	5150.00	52.3 AV	54.0	-1.7	3.70 V	136	49.3	3.0
3	*5190.00	108.3 PK			3.70 V	136	105.5	2.8
4	*5190.00	98.8 AV			3.70 V	136	96.0	2.8
5	5350.00	58.3 PK	74.0	-15.7	3.70 V	136	55.7	2.6
6	5350.00	49.8 AV	54.0	-4.2	3.70 V	136	47.2	2.6
7	#10380.00	51.2 PK	68.2	-17.0	1.47 V	57	38.8	12.4
8	15570.00	58.9 PK	74.0	-15.1	1.54 V	119	46.1	12.8
9	15570.00	46.5 AV	54.0	-7.5	1.54 V	119	33.7	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 46	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	62.7 PK	74.0	-11.3	1.44 H	332	59.7	3.0
2	5150.00	49.6 AV	54.0	-4.4	1.44 H	332	46.6	3.0
3	*5230.00	115.6 PK			1.44 H	332	113.1	2.5
4	*5230.00	105.4 AV			1.44 H	332	102.9	2.5
5	5350.00	55.2 PK	74.0	-18.8	1.44 H	332	52.6	2.6
6	5350.00	43.5 AV	54.0	-10.5	1.44 H	332	40.9	2.6
7	5384.00	63.5 PK	74.0	-10.5	1.44 H	332	60.8	2.7
8	5384.00	53.7 AV	54.0	-0.3	1.44 H	332	51.0	2.7
9	#10460.00	61.3 PK	68.2	-6.9	1.55 H	67	48.4	12.9
10	15690.00	64.2 PK	74.0	-9.8	1.46 H	110	51.8	12.4
11	15690.00	51.0 AV	54.0	-3.0	1.46 H	110	38.6	12.4
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	60.0 PK	74.0	-14.0	3.71 V	152	57.0	3.0
2	5150.00	47.2 AV	54.0	-6.8	3.71 V	152	44.2	3.0
3	*5230.00	112.5 PK			3.71 V	152	110.0	2.5
4	*5230.00	102.7 AV			3.71 V	152	100.2	2.5
5	5350.00	51.8 PK	74.0	-22.2	3.71 V	152	49.2	2.6
6	5350.00	41.3 AV	54.0	-12.7	3.71 V	152	38.7	2.6
7	5384.00	62.7 PK	74.0	-11.3	3.71 V	152	60.0	2.7
8	5384.00	51.8 AV	54.0	-2.2	3.71 V	152	49.1	2.7
9	#10460.00	53.8 PK	68.2	-14.4	1.46 V	84	40.9	12.9
10	15690.00	59.8 PK	74.0	-14.2	1.48 V	112	47.4	12.4
11	15690.00	47.9 AV	54.0	-6.1	1.48 V	112	35.5	12.4

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 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	#5645.64	67.9 PK	68.2	-0.3	1.38 H	353	64.7	3.2
2	*5755.00	120.5 PK			1.38 H	353	117.2	3.3
3	*5755.00	110.4 AV			1.38 H	353	107.1	3.3
4	#5926.64	60.5 PK	68.2	-7.7	1.38 H	353	56.9	3.6
5	11510.00	62.1 PK	74.0	-11.9	1.44 H	89	48.7	13.4
6	11510.00	48.7 AV	54.0	-5.3	1.44 H	89	35.3	13.4
7	#17265.00	62.0 PK	68.2	-6.2	1.28 H	35	45.2	16.8
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	#5612.72	61.5 PK	68.2	-6.7	3.66 V	61	58.2	3.3
2	*5755.00	115.4 PK			3.66 V	61	112.1	3.3
3	*5755.00	105.5 AV			3.66 V	61	102.2	3.3
4	#5955.44	58.2 PK	68.2	-10.0	3.66 V	61	54.7	3.5
5	11510.00	56.3 PK	74.0	-17.7	1.48 V	65	42.9	13.4
6	11510.00	45.2 AV	54.0	-8.8	1.48 V	65	31.8	13.4
7	#17265.00	61.7 PK	68.2	-6.5	1.50 V	114	44.9	16.8

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 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	#5648.15	67.9 PK	68.2	-0.3	1.46 H	354	64.7	3.2
2	*5795.00	119.5 PK			1.46 H	354	116.2	3.3
3	*5795.00	109.8 AV			1.46 H	354	106.5	3.3
4	#5932.93	67.7 PK	68.2	-0.5	1.46 H	354	64.1	3.6
5	11590.00	61.3 PK	74.0	-12.7	1.45 H	93	47.9	13.4
6	11590.00	48.2 AV	54.0	-5.8	1.45 H	93	34.8	13.4
7	#17385.00	62.1 PK	68.2	-6.1	1.31 H	28	44.6	17.5
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5638.34	64.9 PK	68.2	-3.3	3.62 V	64	61.7	3.2
2	*5795.00	115.0 PK			3.62 V	64	111.7	3.3
3	*5795.00	105.2 AV			3.62 V	64	101.9	3.3
4	#5939.52	66.1 PK	68.2	-2.1	3.62 V	64	62.5	3.6
5	11590.00	56.0 PK	74.0	-18.0	1.46 V	87	42.6	13.4
6	11590.00	44.7 AV	54.0	-9.3	1.46 V	87	31.3	13.4
7	#17385.00	61.3 PK	68.2	-6.9	1.60 V	117	43.8	17.5

REMARKS:

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

802.11ac (VHT80)

CHANNEL	TX Channel 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	67.7 PK	74.0	-6.3	1.43 H	336	64.7	3.0
2	5150.00	53.8 AV	54.0	-0.2	1.43 H	336	50.8	3.0
3	*5210.00	107.5 PK			1.43 H	336	104.8	2.7
4	*5210.00	98.0 AV			1.43 H	336	95.3	2.7
5	5350.00	59.5 PK	74.0	-14.5	1.43 H	336	56.9	2.6
6	5350.00	48.6 AV	54.0	-5.4	1.43 H	336	46.0	2.6
7	#10420.00	59.2 PK	68.2	-9.0	1.45 H	77	46.6	12.6
8	15630.00	62.3 PK	74.0	-11.7	1.53 H	121	49.6	12.7
9	15630.00	49.2 AV	54.0	-4.8	1.53 H	121	36.5	12.7
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	66.1 PK	74.0	-7.9	3.72 V	136	63.1	3.0
2	5150.00	52.6 AV	54.0	-1.4	3.72 V	136	49.6	3.0
3	*5210.00	105.2 PK			3.72 V	136	102.5	2.7
4	*5210.00	95.8 AV			3.72 V	136	93.1	2.7
5	5350.00	57.2 PK	74.0	-16.8	3.72 V	136	54.6	2.6
6	5350.00	46.3 AV	54.0	-7.7	3.72 V	136	43.7	2.6
7	#10420.00	51.5 PK	68.2	-16.7	1.47 V	62	38.9	12.6
8	15630.00	58.9 PK	74.0	-15.1	1.50 V	94	46.2	12.7
9	15630.00	46.6 AV	54.0	-7.4	1.50 V	94	33.9	12.7

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 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	**#5644.87**	**68.1 PK**	**68.2**	**-0.1**	**1.47 H**	**359**	**64.9**	**3.2**
2	*5775.00	115.3 PK			1.47 H	359	111.9	3.4
3	*5775.00	105.1 AV			1.47 H	359	101.7	3.4
4	#5930.83	62.4 PK	68.2	-5.8	1.47 H	359	58.8	3.6
5	11550.00	60.6 PK	74.0	-13.4	1.45 H	88	47.3	13.3
6	11550.00	47.3 AV	54.0	-6.7	1.45 H	88	34.0	13.3
7	#17325.00	61.1 PK	68.2	-7.1	1.24 H	25	44.0	17.1
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5642.01	65.5 PK	68.2	-2.7	3.63 V	63	62.3	3.2
2	*5775.00	110.0 PK			3.63 V	63	106.6	3.4
3	*5775.00	100.1 AV			3.63 V	63	96.7	3.4
4	#5925.69	60.6 PK	68.2	-7.6	3.63 V	63	57.0	3.6
5	11550.00	56.0 PK	74.0	-18.0	1.51 V	70	42.7	13.3
6	11550.00	44.5 AV	54.0	-9.5	1.51 V	70	31.2	13.3
7	#17325.00	61.1 PK	68.2	-7.1	1.50 V	129	44.0	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.

Below 1GHz Data:

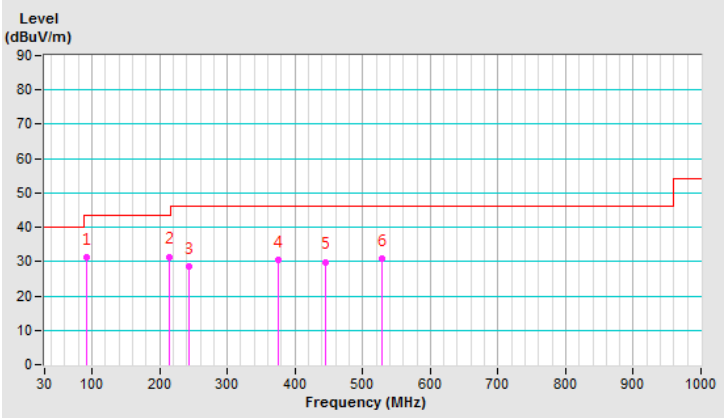
802.11a

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	92.35	31.2 QP	43.5	-12.3	2.00 H	87	44.7	-13.5
2	214.78	31.5 QP	43.5	-12.0	1.50 H	104	42.3	-10.8
3	243.45	28.5 QP	46.0	-17.5	1.50 H	71	37.6	-9.1
4	375.03	30.4 QP	46.0	-15.6	1.00 H	51	35.4	-5.0
5	445.26	29.9 QP	46.0	-16.1	2.00 H	320	32.9	-3.0
6	529.55	30.8 QP	46.0	-15.2	2.00 H	228	32.4	-1.6

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

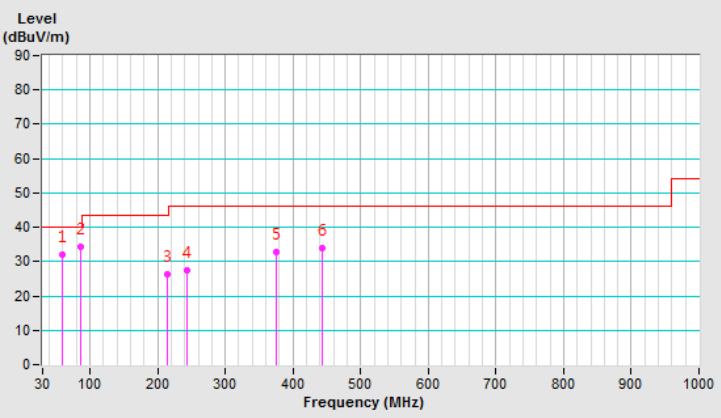


CHANNEL	TX Channel 149	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

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	58.15	31.9 QP	40.0	-8.1	1.00 V	129	40.2	-8.3
2	87.21	34.2 QP	40.0	-5.8	1.00 V	360	47.9	-13.7
3	214.78	26.3 QP	43.5	-17.2	1.00 V	346	37.1	-10.8
4	243.42	27.5 QP	46.0	-18.5	1.00 V	360	36.6	-9.1
5	375.00	32.9 QP	46.0	-13.1	1.50 V	345	37.9	-5.0
6	442.47	33.9 QP	46.0	-12.1	1.00 V	84	37.0	-3.1

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



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 04, 2018	June 03, 2019
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 EMCI	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: Sep. 07, 2018

4.2.3 Test Procedure

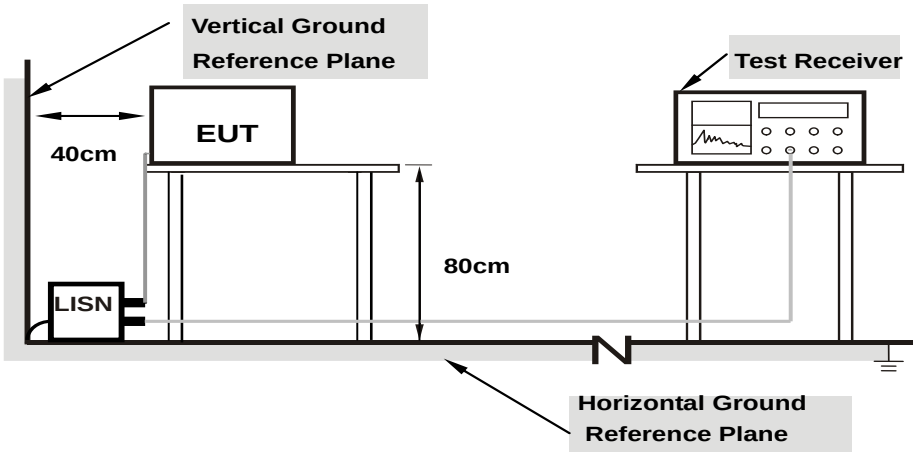
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling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

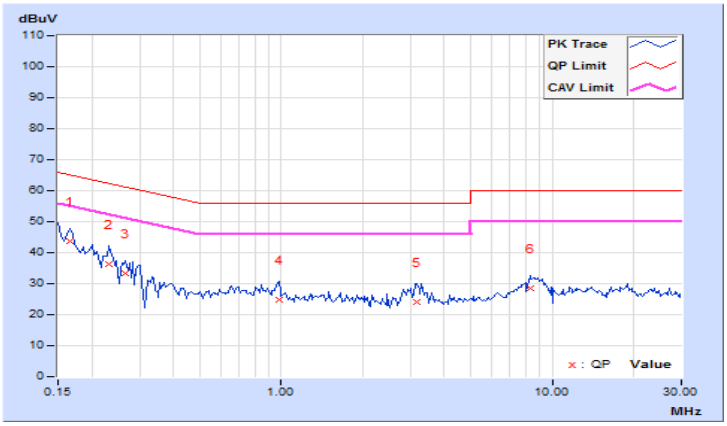
4.2.7 Test Results

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	**0.16562**	**10.05**	**33.52**	**18.00**	**43.57**	**28.05**	**65.18**	**55.18**	**-21.61**	**-27.13**
2	0.23203	10.08	26.11	15.56	36.19	25.64	62.38	52.38	-26.19	-26.74
3	0.26719	10.09	23.28	13.62	33.37	23.71	61.20	51.20	-27.83	-27.49
4	0.97813	10.17	14.63	4.61	24.80	14.78	56.00	46.00	-31.20	-31.22
5	3.16406	10.29	13.93	4.58	24.22	14.87	56.00	46.00	-31.78	-31.13
6	8.28125	10.60	17.92	13.18	28.52	23.78	60.00	50.00	-31.48	-26.22

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

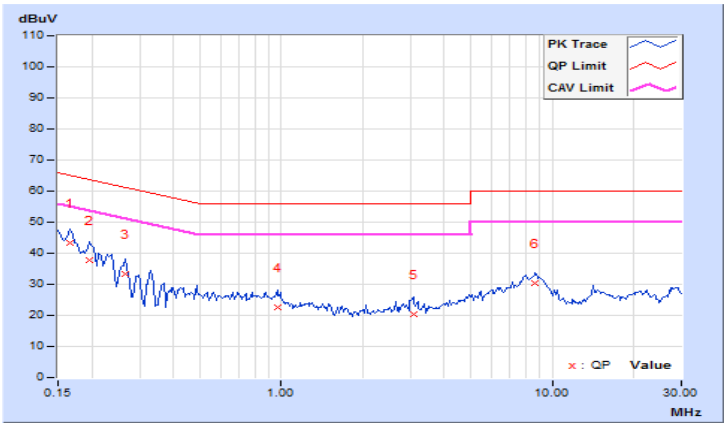


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)

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	0.16562	9.96	33.34	20.04	43.30	30.00	65.18	55.18	-21.88	-25.18
2	0.19687	9.97	27.98	16.81	37.95	26.78	63.74	53.74	-25.79	-26.96
3	0.26719	9.99	23.44	14.51	33.43	24.50	61.20	51.20	-27.77	-26.70
4	0.96641	10.04	12.71	6.08	22.75	16.12	56.00	46.00	-33.25	-29.88
5	3.07031	10.15	10.19	1.05	20.34	11.20	56.00	46.00	-35.66	-34.80
6	8.65625	10.46	19.83	14.88	30.29	25.34	60.00	50.00	-29.71	-24.66

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 Results

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	19.12	19.70	19.62	19.25	350.745	25.45	30.00	Pass
40	5200	19.06	19.75	19.52	19.21	347.848	25.41	30.00	Pass
48	5240	19.01	19.72	19.63	19.51	354.536	25.50	30.00	Pass
149	5745	23.58	23.84	23.68	24.65	995.226	29.98	30.00	Pass
157	5785	23.32	23.75	23.25	24.51	945.757	29.76	30.00	Pass
165	5825	23.25	23.81	23.43	24.58	959.156	29.82	30.00	Pass

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	19.02	19.72	19.11	19.52	344.561	25.37	30.00	Pass
40	5200	19.03	19.81	19.35	19.47	350.313	25.44	30.00	Pass
48	5240	18.87	19.78	19.45	19.43	347.955	25.42	30.00	Pass
149	5745	23.15	23.74	23.54	24.55	954.176	29.80	30.00	Pass
157	5785	23.25	23.77	23.51	24.48	954.512	29.80	30.00	Pass
165	5825	23.17	23.64	23.41	24.43	935.309	29.71	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	15.85	16.62	16.28	16.33	169.795	22.30	30.00	Pass
46	5230	19.87	20.98	20.75	20.56	454.978	26.58	30.00	Pass
151	5755	23.45	23.74	23.35	24.20	937.2	29.72	30.00	Pass
159	5795	23.65	23.75	23.36	24.48	966.189	29.85	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	15.35	16.02	15.94	15.91	152.529	21.83	30.00	Pass
155	5775	21.75	22.44	21.96	22.54	661.521	28.21	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	19.02	19.72	19.11	19.52	344.561	25.37	25.6	Pass
40	5200	19.03	19.81	19.35	19.47	350.313	25.44	25.6	Pass
48	5240	18.87	19.78	19.45	19.43	347.955	25.42	25.6	Pass
149	5745	19.22	19.86	19.55	19.52	360.081	25.56	25.6	Pass
157	5785	19.23	19.79	19.51	19.48	357.08	25.53	25.6	Pass
165	5825	19.14	19.68	19.56	19.51	354.628	25.50	25.6	Pass

Note: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power limit shall be reduced to 30-(10.4-6) = 25.6dBm.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	15.85	16.62	16.28	16.33	169.795	22.30	25.6	Pass
46	5230	19.35	19.76	19.54	19.41	357.97	25.54	25.6	Pass
151	5755	19.31	19.87	19.52	19.47	360.409	25.57	25.6	Pass
159	5795	19.32	19.85	19.42	19.53	359.353	25.56	25.6	Pass

Note: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power limit shall be reduced to 30-(10.4-6) = 25.6dBm.

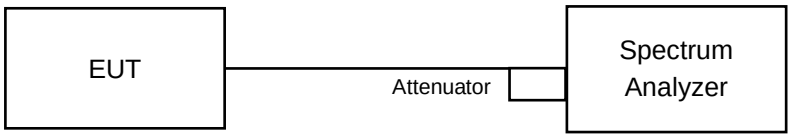
802.11ac (VHT80)

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	15.35	16.02	15.94	15.91	152.529	21.83	25.6	Pass
155	5775	19.12	19.62	19.36	19.54	349.528	25.43	25.6	Pass

Note: Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power limit shall be reduced to 30-(10.4-6) = 25.6dBm.

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	17.16	16.92	16.92	16.92
40	5200	17.16	16.92	17.04	16.92
48	5240	17.04	16.92	16.92	16.92
149	5745	25.92	18.36	18.84	27.84
157	5785	26.76	18.36	19.20	28.44
165	5825	28.32	18.96	19.56	29.40

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	18.12	18.00	18.12	18.24
40	5200	18.12	18.00	18.12	18.12
48	5240	18.24	18.00	18.00	18.12
149	5745	24.60	19.08	19.32	29.64
157	5785	25.80	19.80	19.08	29.52
165	5825	27.96	19.68	19.56	29.64

802.11ac (VHT40)

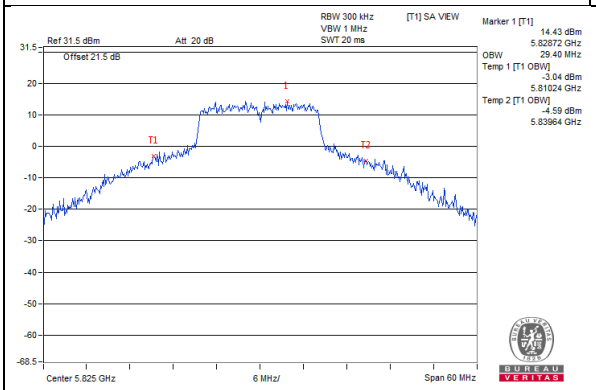
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.72	36.72	36.72	36.72
46	5230	36.96	36.72	36.96	36.72
151	5755	50.88	37.20	37.68	52.32
159	5795	58.08	38.16	38.16	58.80

802.11ac (VHT80)

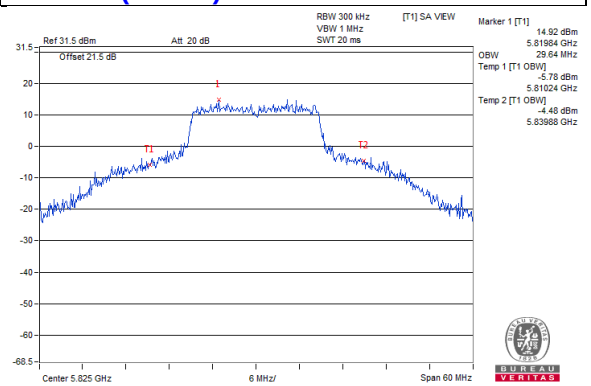
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	74.88	75.36	75.36	74.88
155	5775	77.28	76.32	76.32	78.24

Spectrum Plot of Worst Value

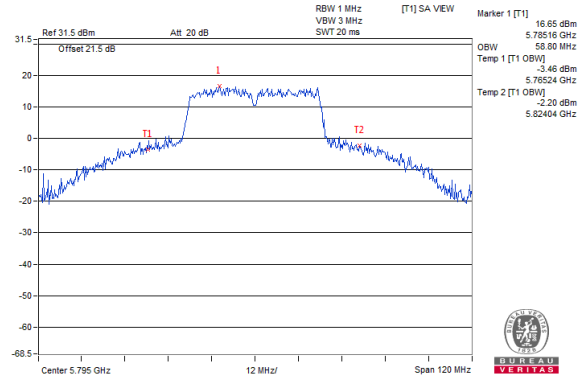
802.11a / Chain 3 : CH165



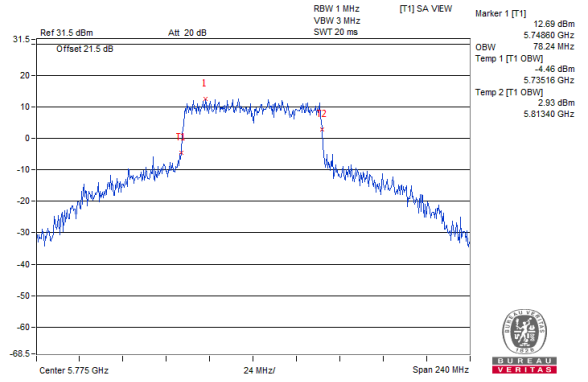
802.11ac (VHT20) / Chain 3 : CH165



802.11ac (VHT40) / Chain 3 : CH159

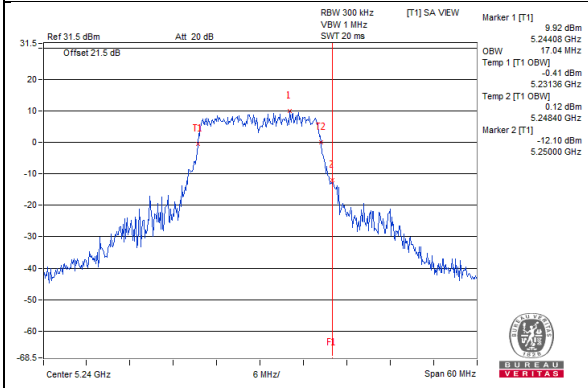


802.11ac (VHT80) / Chain 3 : CH155

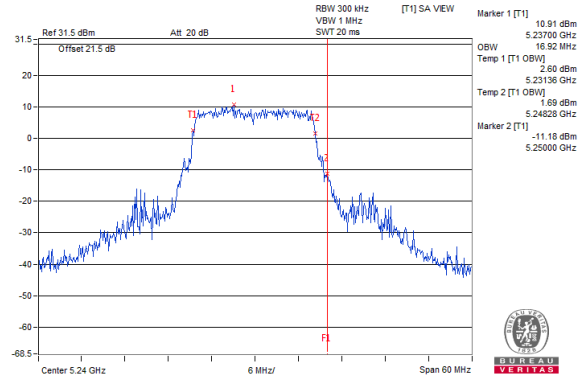


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

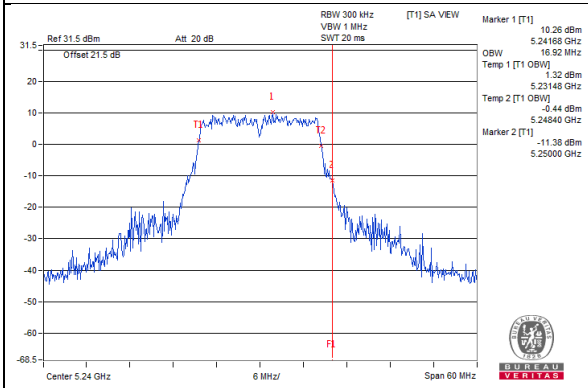
802.11a / Chain 0 : CH48



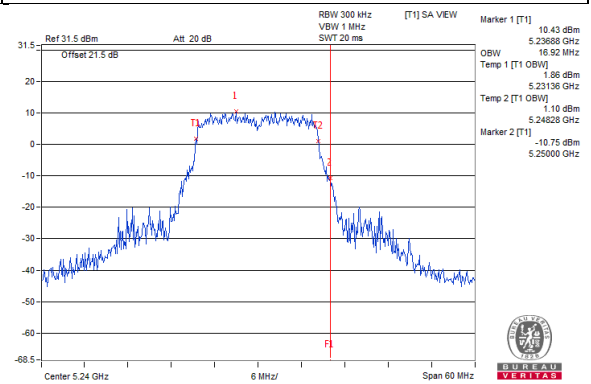
802.11a / Chain 1 : CH48



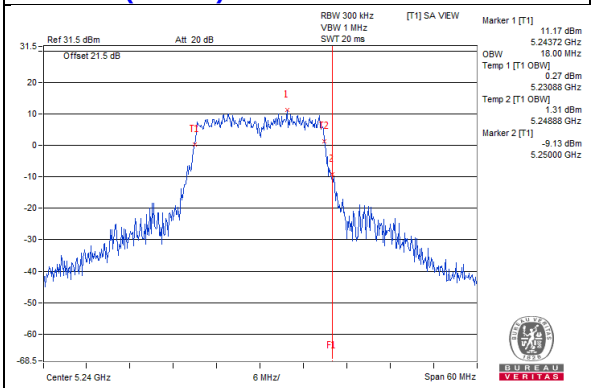
802.11a / Chain 2 : CH48



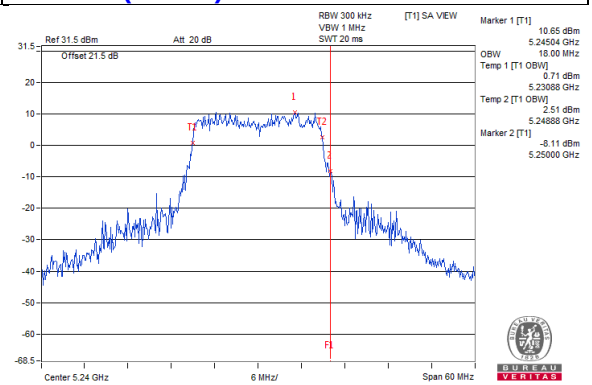
802.11a / Chain 3 : CH48



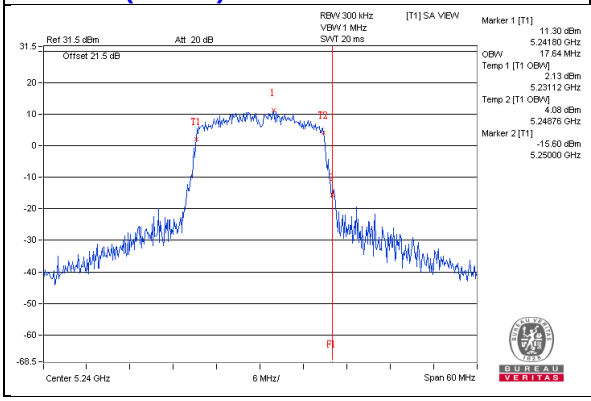
802.11ac (VHT20) / Chain 0 : CH48



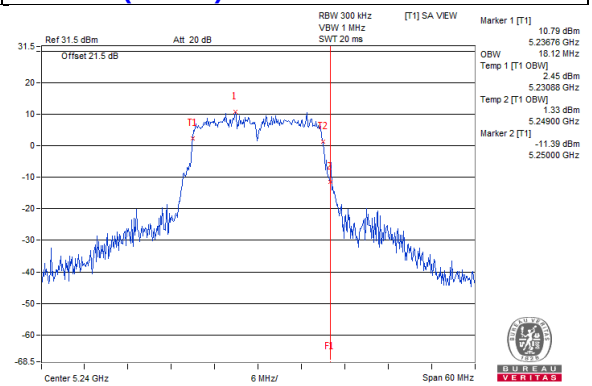
802.11ac (VHT20) / Chain 1 : CH48



802.11ac (VHT20) / Chain 2 : CH48

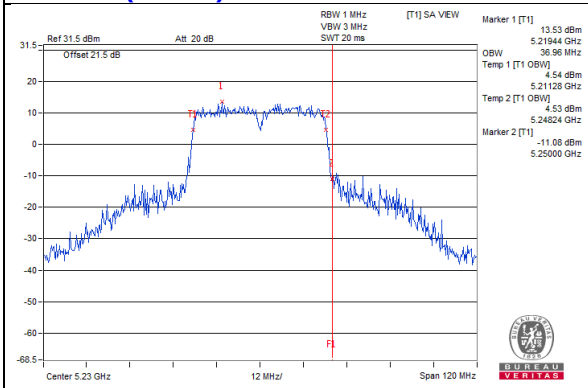


802.11ac (VHT20) / Chain 3 : CH48

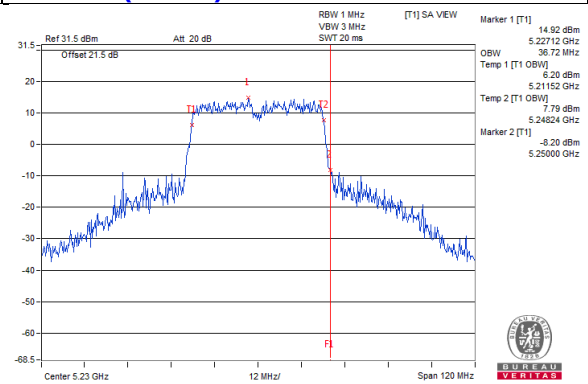


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

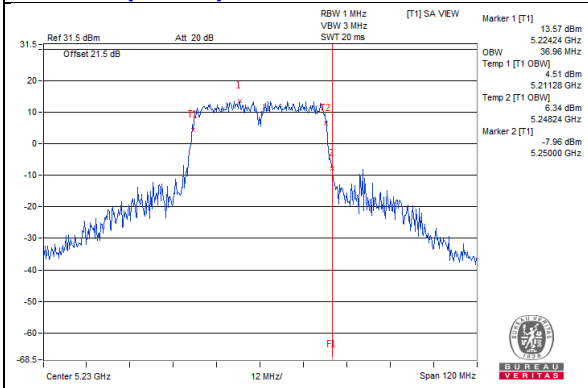
802.11ac (VHT40) / Chain 0 : CH46



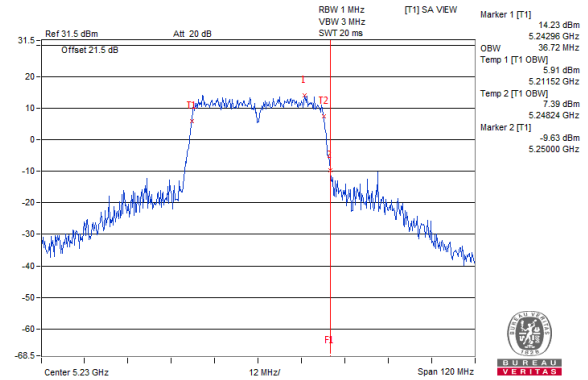
802.11ac (VHT40) / Chain 1 : CH46



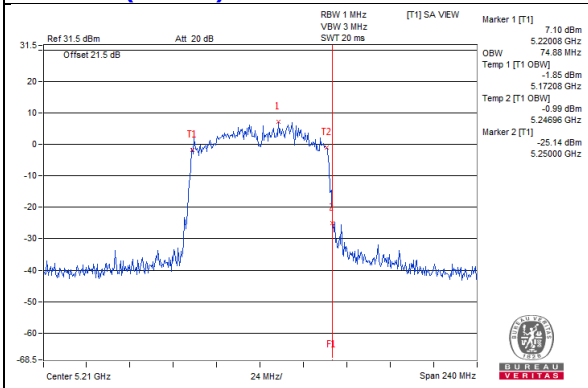
802.11ac (VHT40) / Chain 2 : CH46



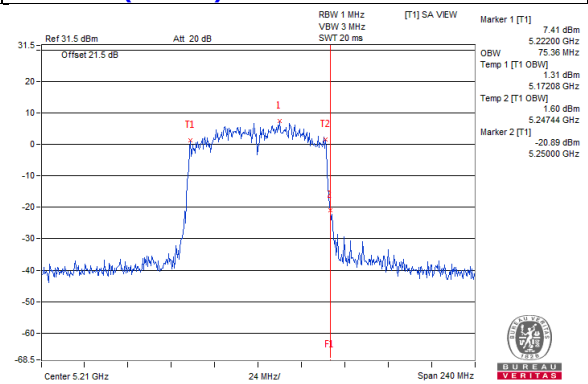
802.11ac (VHT40) / Chain 3 : CH46



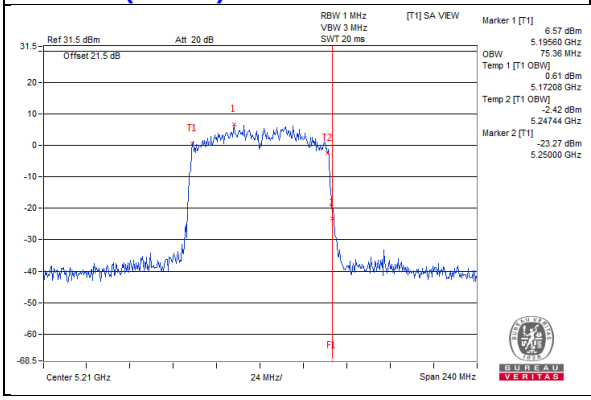
802.11ac (VHT80) / Chain 0 : CH42



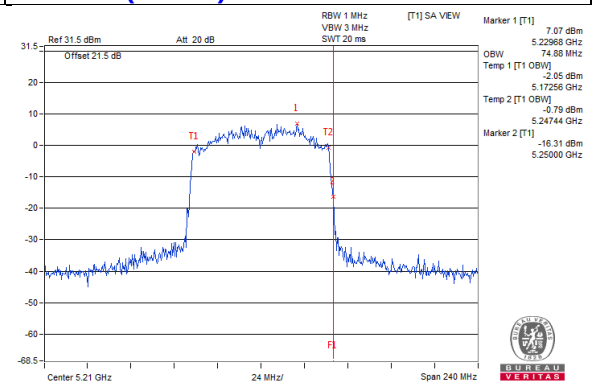
802.11ac (VHT80) / Chain 1 : CH42



802.11ac (VHT80) / Chain 2 : CH42

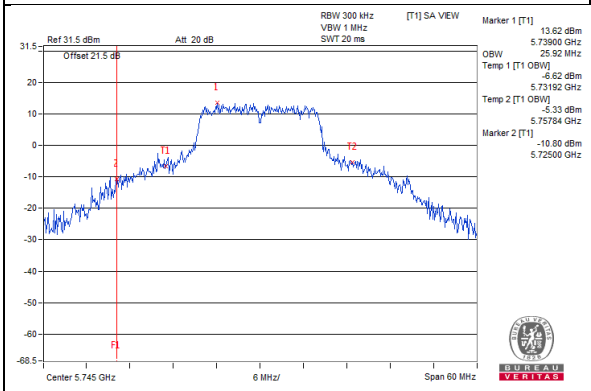


802.11ac (VHT80) / Chain 3 : CH42

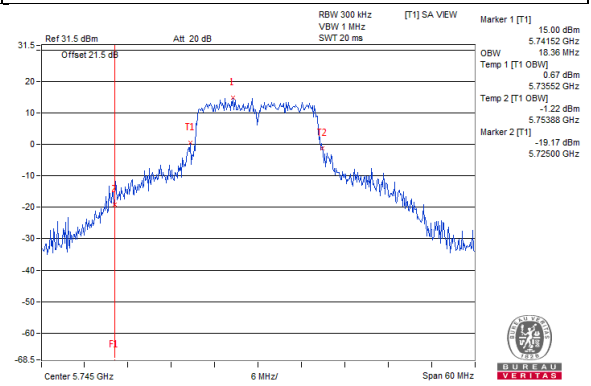


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

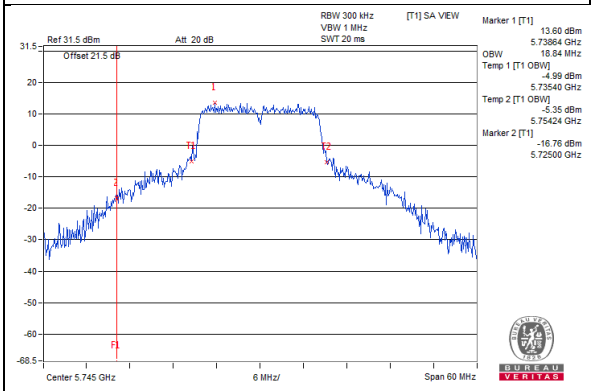
802.11a / Chain 0 : CH149



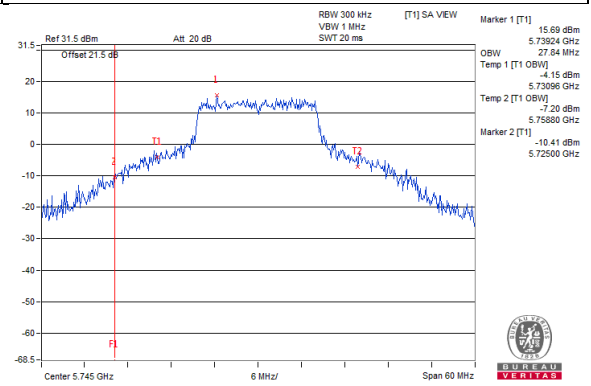
802.11a / Chain 1 : CH149



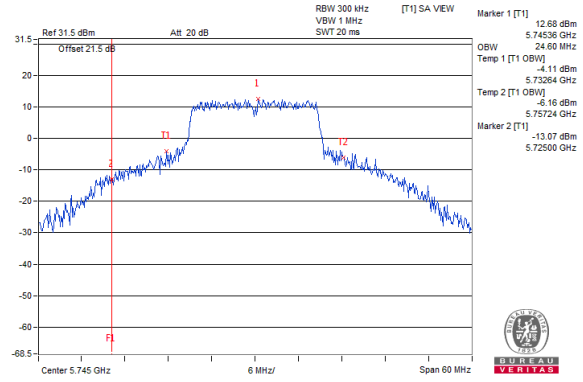
802.11a / Chain 2 : CH149



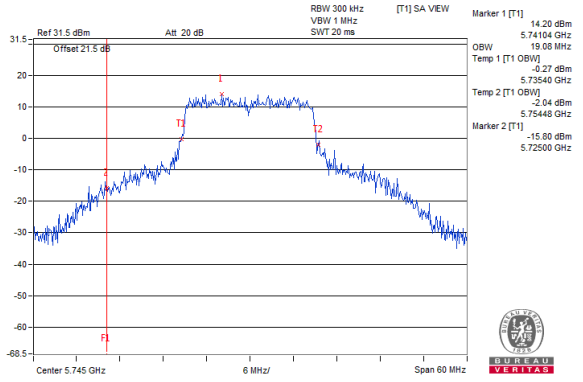
802.11a / Chain 3 : CH149



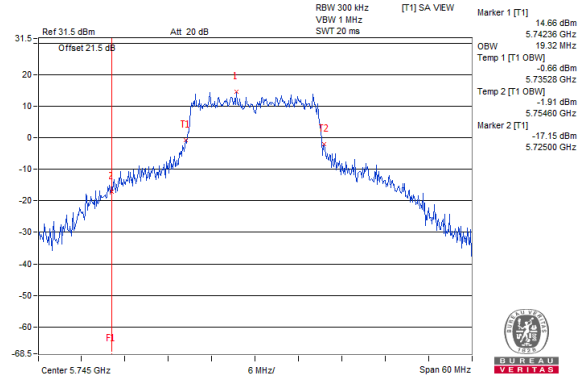
802.11ac (VHT20) / Chain 0 : CH149



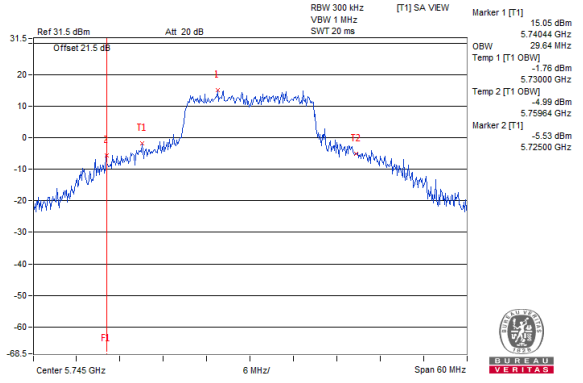
802.11ac (VHT20) / Chain 1 : CH149



802.11ac (VHT20) / Chain 2 : CH149

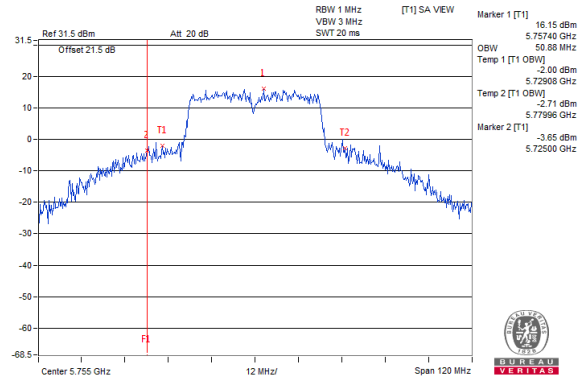


802.11ac (VHT20) / Chain 3 : CH149

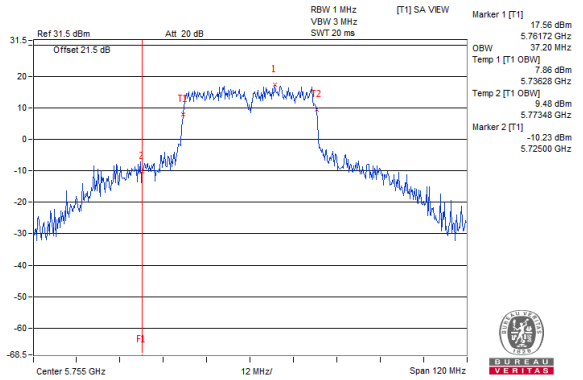


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

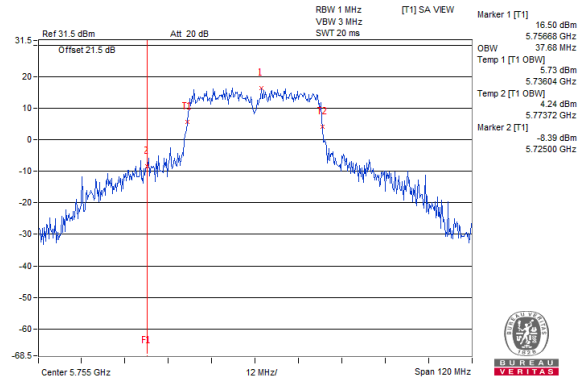
802.11ac (VHT40) / Chain 0 : CH151



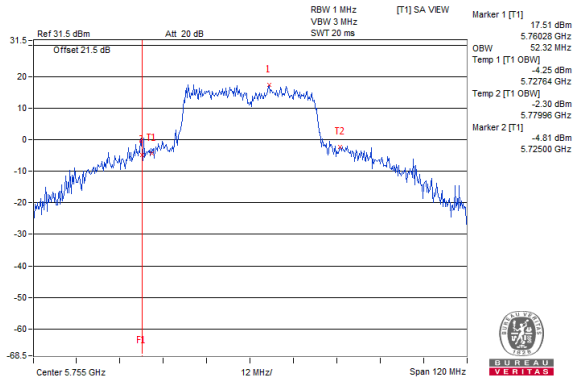
802.11ac (VHT40) / Chain 1 : CH151



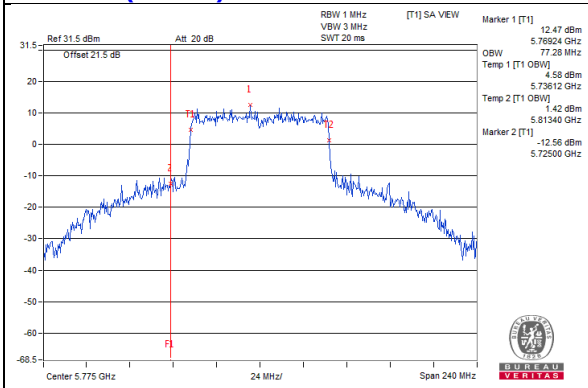
802.11ac (VHT40) / Chain 2 : CH151



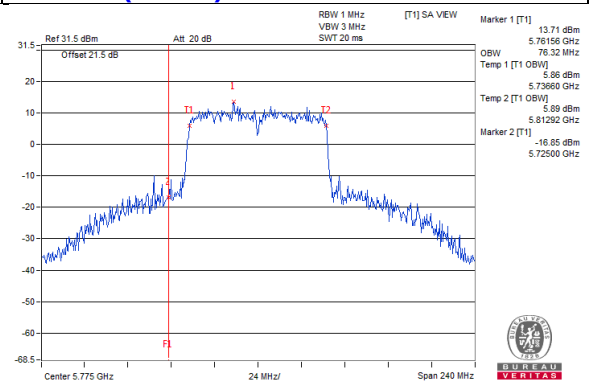
802.11ac (VHT40) / Chain 3 : CH151



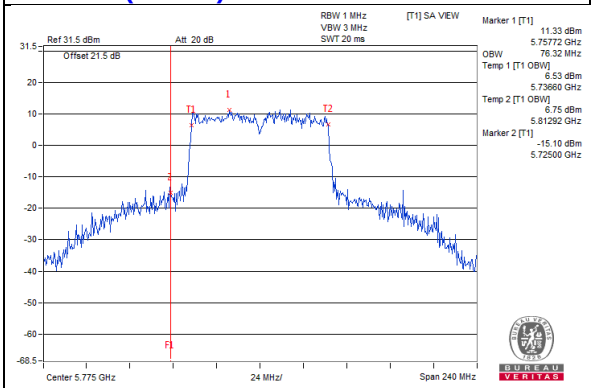
802.11ac (VHT80) / Chain 0 : CH155



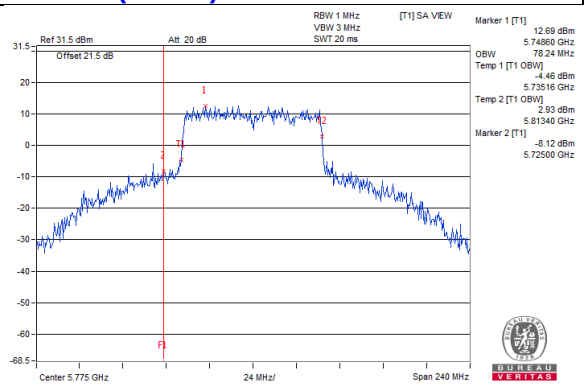
802.11ac (VHT80) / Chain 1 : CH155



802.11ac (VHT80) / Chain 2 : CH155



802.11ac (VHT80) / Chain 3 : CH155

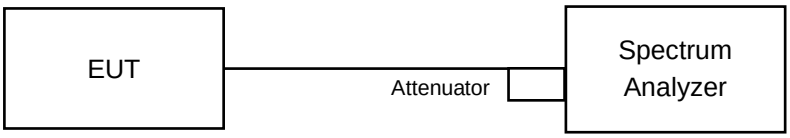


4.5 Peak Power Spectral Density Measurement

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

For U-NII-1 band:

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(500kHz/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

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:

CDD Mode

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	5.79	6.63	6.20	5.88	12.16	12.6	Pass
40	5200	6.10	6.29	6.26	5.71	12.12	12.6	Pass
48	5240	5.85	6.66	6.13	6.06	12.21	12.6	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 17-(10.4-6) = 12.6dBm.

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	5.90	6.63	6.09	5.96	12.18	12.6	Pass
40	5200	6.01	6.65	6.50	5.44	12.20	12.6	Pass
48	5240	5.96	6.42	6.44	5.85	12.20	12.6	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 17-(10.4-6) = 12.6dBm.

802.11ac (VHT40)

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			
38	5190	-1.10	-0.24	-1.03	-0.57	5.30	12.6	Pass
46	5230	3.06	4.46	3.82	4.02	9.89	12.6	Pass

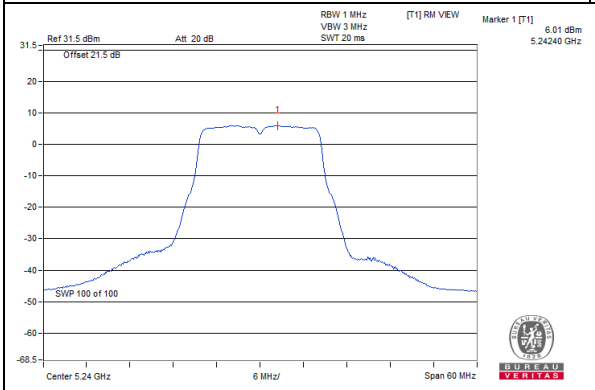
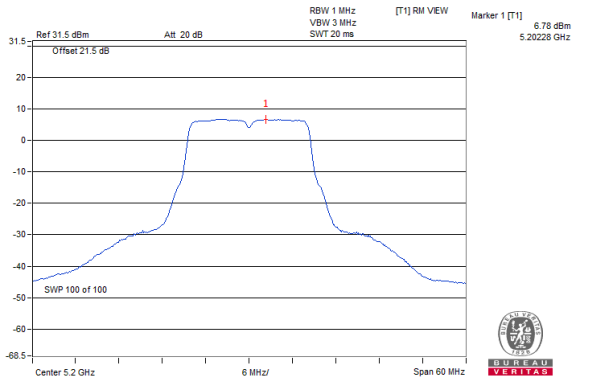
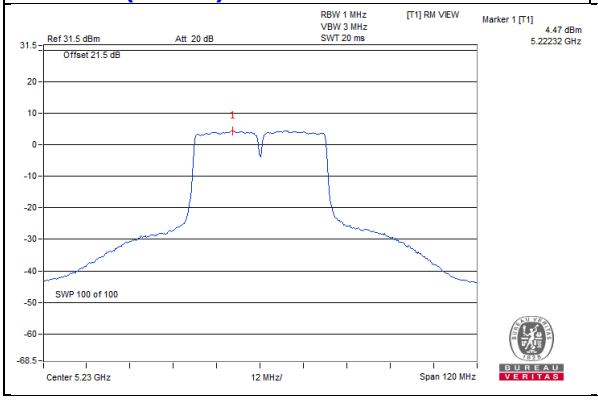
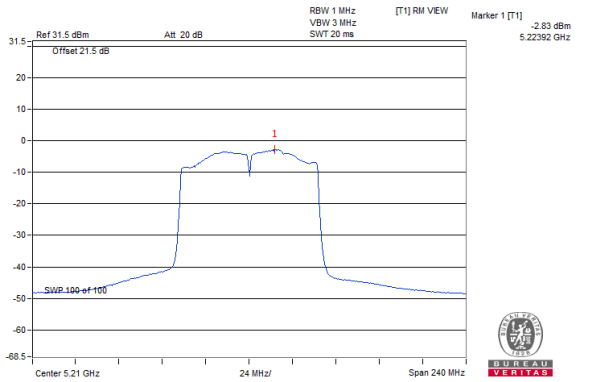
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 17-(10.4-6) = 12.6dBm.

802.11ac (VHT80)

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			
42	5210	-3.48	-2.96	-3.01	-2.92	2.93	12.6	Pass

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

2. Directional gain = 10 log[($10^{G0/20}$ + $10^{G1/20}$ + $10^{G2/20}$ + $10^{G3/20}$)^2 / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 17-(10.4-6) = 12.6dBm.

Spectrum Plot of Worst Value	
802.11a / Chain 1 : CH48	802.11ac (VHT20) / Chain 1 : CH40
	
802.11ac (VHT40) / Chain 1: CH46	802.11ac (VHT80) / Chain 3 : CH42
	

For U-NII-3:

802.11a

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	1.52	3.74	6.02	9.76	25.6	Pass
	157	5785	1.16	3.38	6.02	9.40	25.6	Pass
	165	5825	0.87	3.09	6.02	9.11	25.6	Pass
1	149	5745	2.07	4.29	6.02	10.31	25.6	Pass
	157	5785	1.83	4.05	6.02	10.07	25.6	Pass
	165	5825	1.82	4.04	6.02	10.06	25.6	Pass
2	149	5745	1.85	4.07	6.02	10.09	25.6	Pass
	157	5785	1.56	3.78	6.02	9.80	25.6	Pass
	165	5825	1.48	3.70	6.02	9.72	25.6	Pass
3	149	5745	3.04	5.26	6.02	11.28	25.6	Pass
	157	5785	2.80	5.02	6.02	11.04	25.6	Pass
	165	5825	2.58	4.80	6.02	10.82	25.6	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 30-(10.4-6) = 25.6dBm.

802.11ac (VHT20)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	0.93	3.15	6.02	9.17	25.6	Pass
	157	5785	0.82	3.04	6.02	9.06	25.6	Pass
	165	5825	0.31	2.53	6.02	8.55	25.6	Pass
1	149	5745	1.60	3.82	6.02	9.84	25.6	Pass
	157	5785	1.35	3.57	6.02	9.59	25.6	Pass
	165	5825	1.20	3.42	6.02	9.44	25.6	Pass
2	149	5745	1.39	3.61	6.02	9.63	25.6	Pass
	157	5785	1.41	3.63	6.02	9.65	25.6	Pass
	165	5825	1.38	3.60	6.02	9.62	25.6	Pass
3	149	5745	2.47	4.69	6.02	10.71	25.6	Pass
	157	5785	2.49	4.71	6.02	10.73	25.6	Pass
	165	5825	2.16	4.38	6.02	10.40	25.6	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 30-(10.4-6) = 25.6dBm.

802.11ac (VHT40)

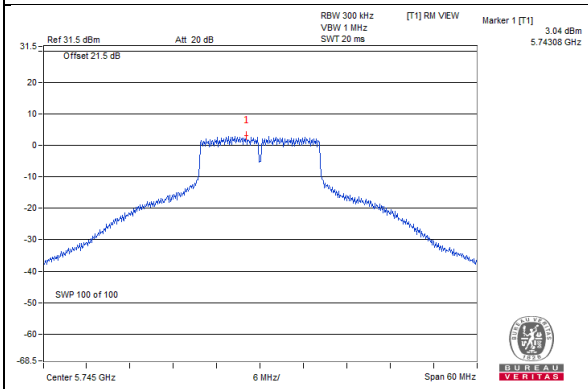
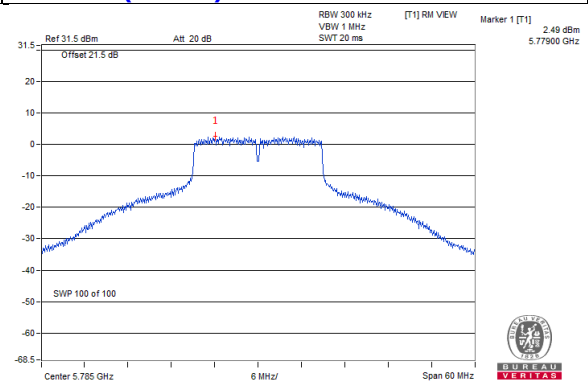
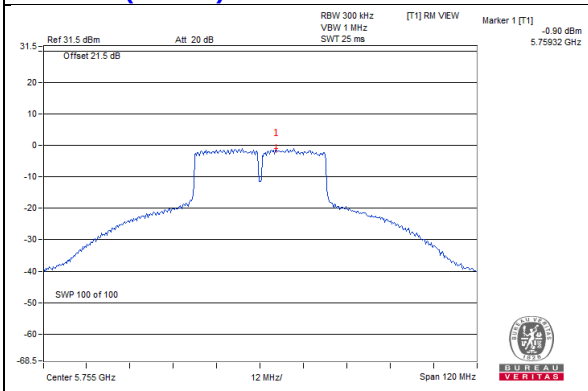
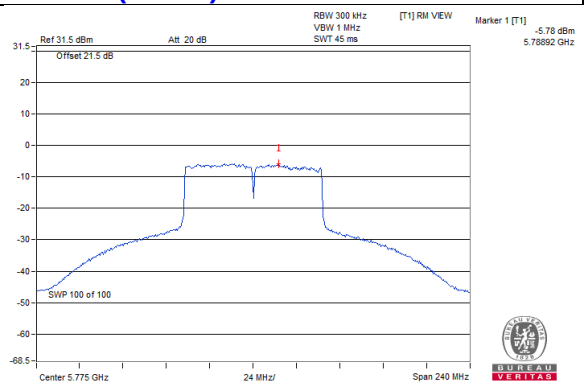
TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-2.04	0.18	6.02	6.20	25.6	Pass
	159	5795	-1.95	0.27	6.02	6.29	25.6	Pass
1	151	5755	-1.81	0.41	6.02	6.43	25.6	Pass
	159	5795	-1.83	0.39	6.02	6.41	25.6	Pass
2	151	5755	-1.75	0.47	6.02	6.49	25.6	Pass
	159	5795	-1.69	0.53	6.02	6.55	25.6	Pass
3	151	5755	-0.90	1.32	6.02	7.34	25.6	Pass
	159	5795	-0.93	1.29	6.02	7.31	25.6	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 30-(10.4-6) = 25.6dBm.

802.11ac (VHT80)

TX chain	Channel	Freq. (MHz)	PSD (dBm/300kHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-6.95	-4.73	6.02	1.29	25.6	Pass
1	155	5775	-6.49	-4.27	6.02	1.75	25.6	Pass
2	155	5775	-6.49	-4.27	6.02	1.75	25.6	Pass
3	155	5775	-5.78	-3.56	6.02	2.46	25.6	Pass

Note: 1. Directional gain = 10 log[$(10^{G0/20} + 10^{G1/20} + 10^{G2/20} + 10^{G3/20})^2$ / 4] = 10.4dBi > 6dBi , so the power density limit shall be reduced to 30-(10.4-6) = 25.6dBm.

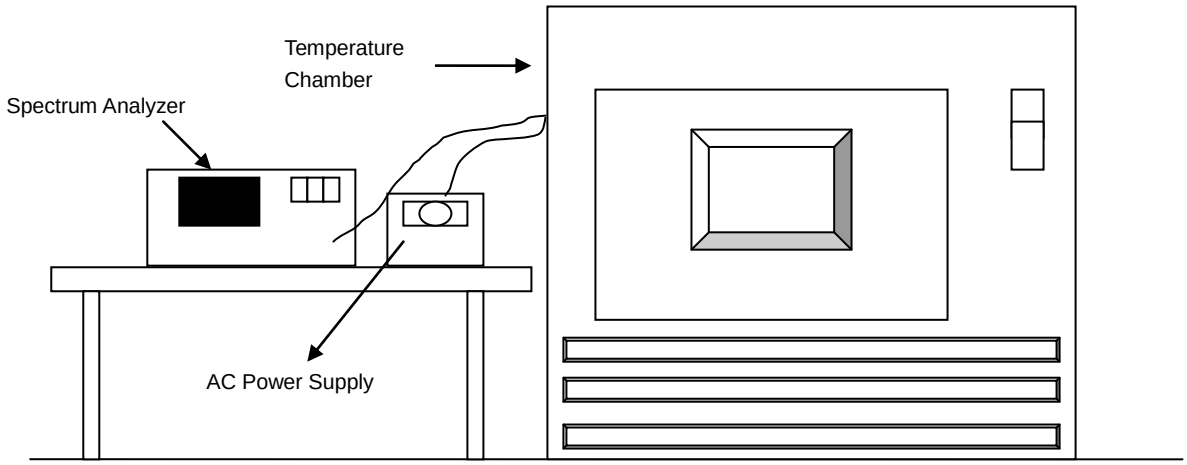
Spectrum Plot of Worst Value	
802.11a / Chain 3 : CH149	802.11ac (VHT20) / Chain 3 : CH157
	
802.11ac (VHT40) / Chain 3: CH151	802.11ac (VHT80) / Chain 3 : CH155
	

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	5180.004	PASS	5180.0008	PASS	5180.0016	PASS	5180.0033	PASS
40	120	5179.975	PASS	5179.9741	PASS	5179.9769	PASS	5179.9734	PASS
30	120	5179.9904	PASS	5179.9904	PASS	5179.9914	PASS	5179.9914	PASS
20	120	5179.9919	PASS	5179.9942	PASS	5179.9907	PASS	5179.9936	PASS
10	120	5179.9862	PASS	5179.986	PASS	5179.9858	PASS	5179.9872	PASS
0	120	5179.9967	PASS	5179.9956	PASS	5179.9956	PASS	5179.9946	PASS
-10	120	5180.0066	PASS	5180.0053	PASS	5180.0072	PASS	5180.0083	PASS
-20	120	5180.0108	PASS	5180.0126	PASS	5180.0138	PASS	5180.013	PASS
-30	120	5179.9864	PASS	5179.9827	PASS	5179.9823	PASS	5179.985	PASS

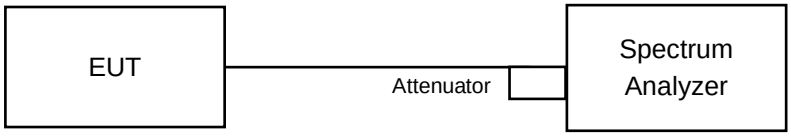
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vac)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5179.9914	PASS	5179.9939	PASS	5179.9908	PASS	5179.9937	PASS
	120	5179.9919	PASS	5179.9942	PASS	5179.9907	PASS	5179.9936	PASS
	102	5179.9914	PASS	5179.9939	PASS	5179.9911	PASS	5179.9943	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	16.41	16.40	16.41	16.39	0.5	Pass
157	5785	16.44	16.41	16.42	16.42	0.5	Pass
165	5825	16.43	16.38	16.43	16.42	0.5	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	17.69	17.66	17.68	17.68	0.5	Pass
157	5785	17.68	17.66	17.64	17.65	0.5	Pass
165	5825	17.66	17.64	17.65	17.66	0.5	Pass

802.11ac (VHT40)

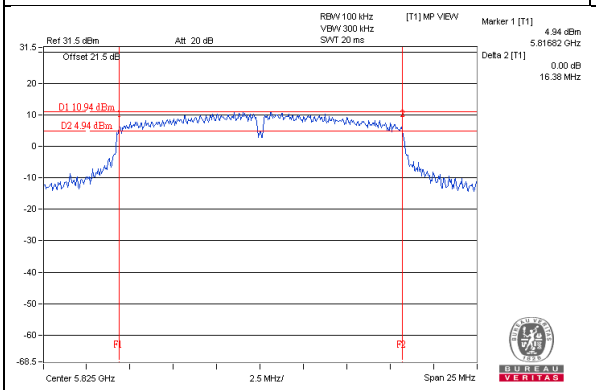
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	36.42	36.43	35.88	36.41	0.5	Pass
159	5795	36.45	36.29	36.46	36.45	0.5	Pass

802.11ac (VHT80)

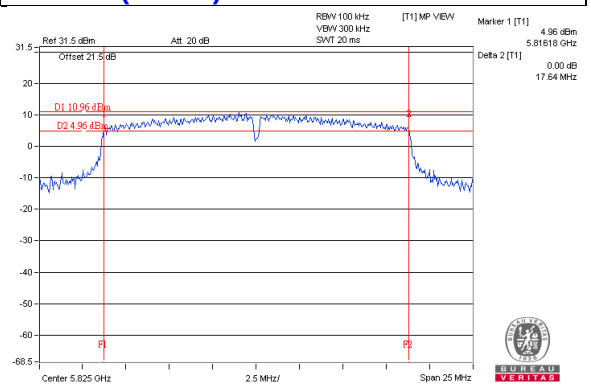
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	76.56	76.57	76.59	76.59	0.5	Pass

Spectrum Plot of Worst Value

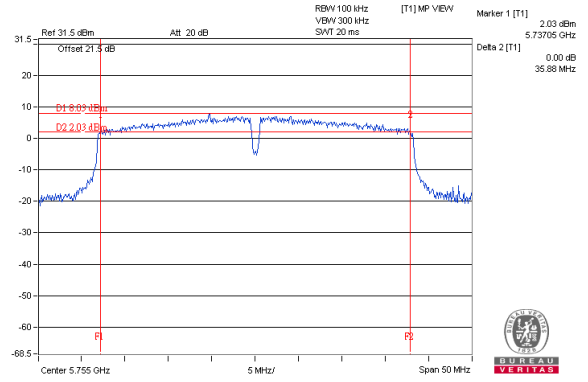
802.11a / Chain 1 : CH165



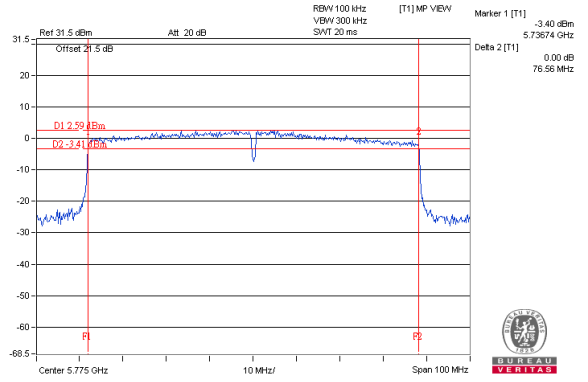
802.11ac (VHT20) / Chain 1 : CH165



802.11ac (VHT40) / Chain 2: CH151



802.11ac (VHT80) / Chain 0 : CH155



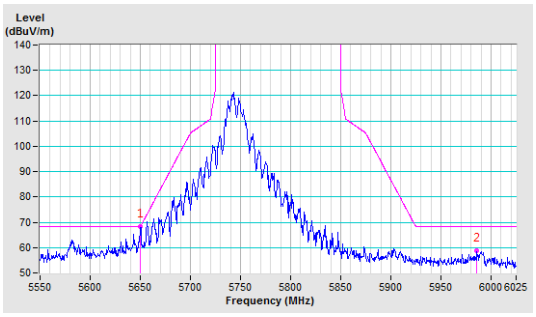
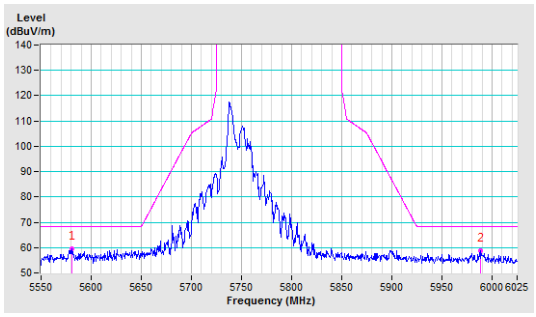
5 Pictures of Test Arrangements

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

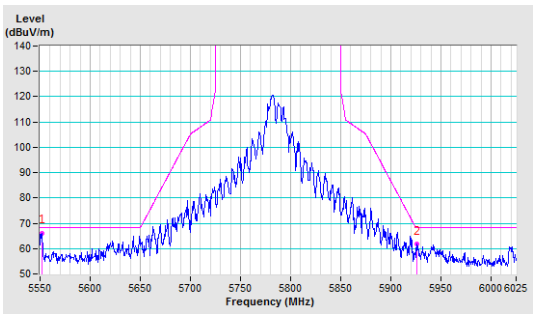
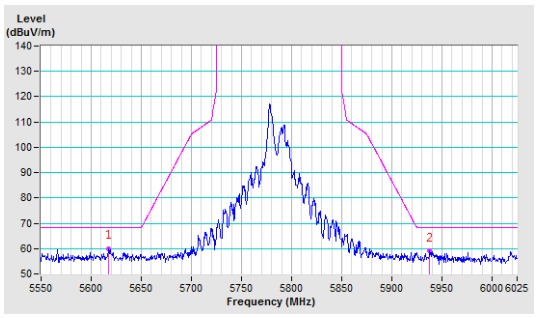
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

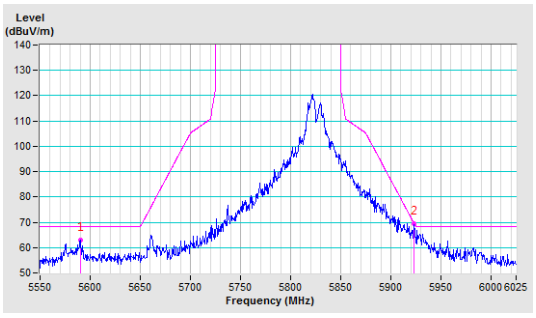
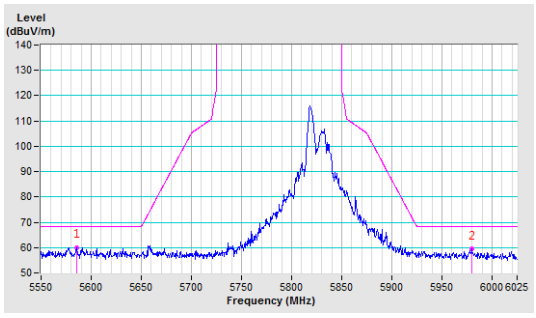
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

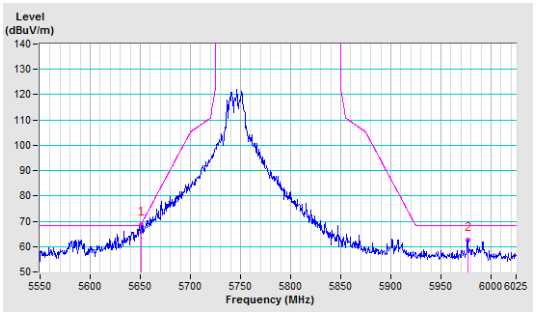
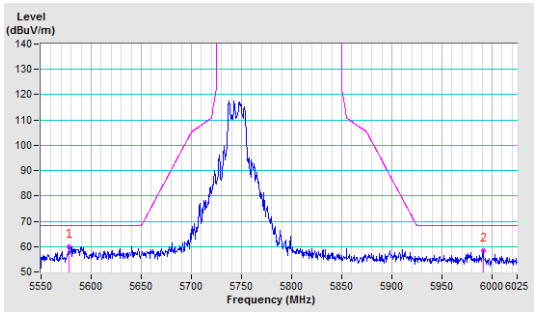
Horizontal	Vertical
	

CH 165 5825 MHz

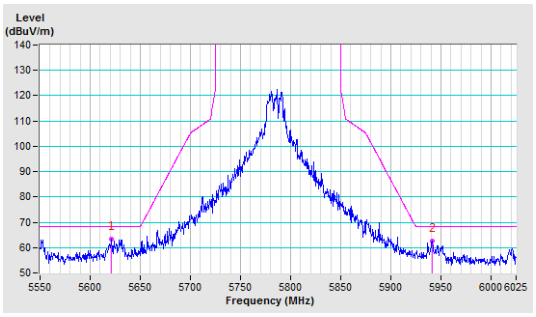
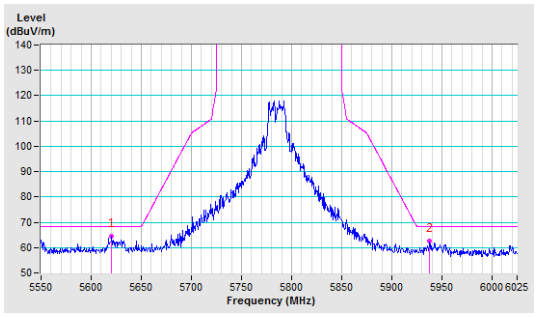
Horizontal	Vertical
	

802.11ac (VHT20)

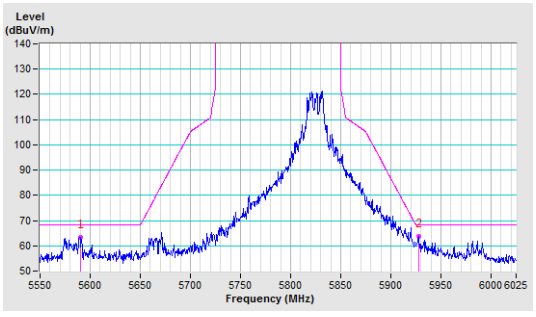
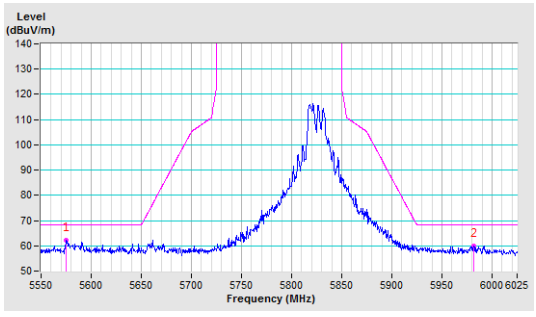
CH 149 5745 MHz

Horizontal	Vertical
	

CH 157 5785 MHz

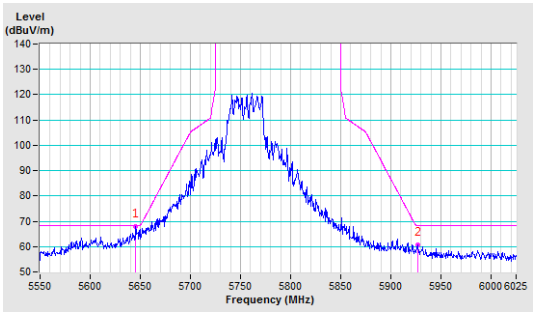
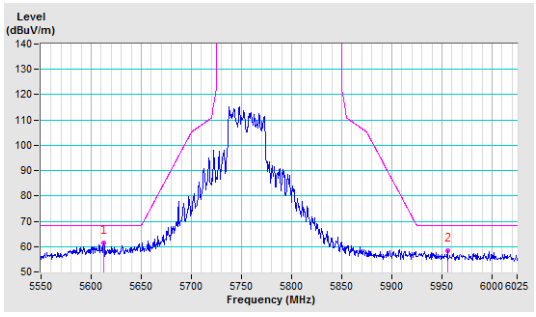
Horizontal	Vertical
	

CH 165 5825 MHz

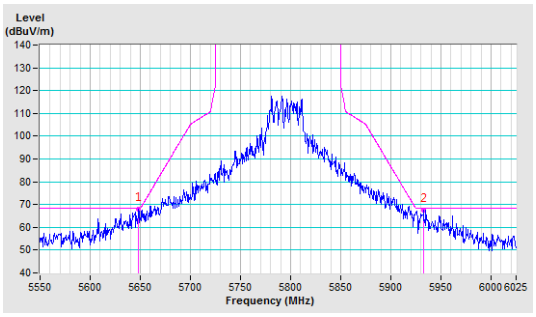
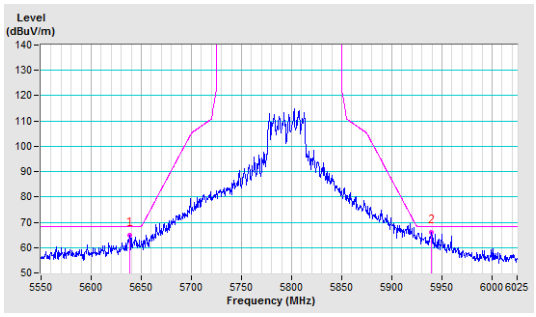
Horizontal	Vertical
	

802.11ac (VHT40)

CH 151 5755 MHz

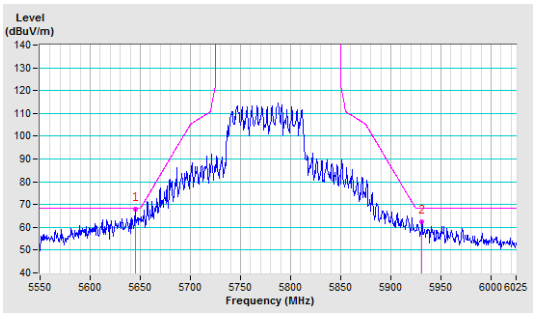
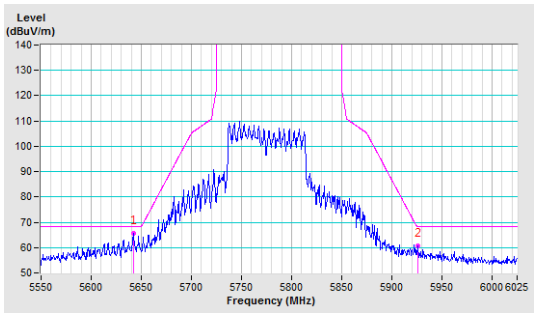
Horizontal	Vertical
	

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
Fax: 886-2-26051924

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

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

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

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

--- END ---