FCC Test Report

Report No.: RFBBEB-WTW-P21031098-1

FCC ID: 2AUAE-M350

Test Model: M350-W6

Series Model: M350-6

Received Date: 2021/9/2

Test Date: 2021/10/12 ~ 2021/11/1

Issued Date: 2022/1/14

Applicant: Proscend Communications Inc.

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory

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FCC Registration / Designation Number: 723255 / TW2022

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Release Control Record

Issue No.	Description	Date Issued
RFBBEB-WTW-P21031098-1	Original release.	2022/1/14

1 Certificate of Conformity

Product:	Industrial Dual SIM CAT6 Cellular Router, Industrial Dual SIM CAT6 Cellular Router w/WiFi
Brand:	PROSCEND
Test Model:	M350-W6
Series Model:	M350-6
Sample Status:	Engineering sample
Applicant:	Proscend Communications Inc.
Test Date:	2021/10/12 ~ 2021/11/1
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 : Vivian Huang , **Date:** 2022/1/14

Vivian Huang / Specialist

Approved by : , **Date:** 2022/1/14

Clark Lin / Technical Manager

2 Summary of Test Results

47 CFR FCC Part 15, Subpart E (Section 15.407)			
FCC Clause	Test Item	Result	Remarks
15.407(b)(6)	AC Power Conducted Emissions	Pass	Meet the requirement of limit. Minimum passing margin is -16.80dB at 0.15781MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -1.3dB at 189.42MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is R-SMA not a standard connector.

Note:
1. For U-NII-3 band compliance with rule part 15.407(b)(4)(i), the OOBE test plots were recorded in Annex A.
2. For U-NII-1 band compliance with rule 15.407(b) of the band-edge items, the test plots were recorded in Annex B. Test Procedures refer to report 4.1.3.
3. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

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	1.9 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	3.1 dB
	30MHz ~ 1GHz	5.4 dB
Radiated Emissions above 1 GHz	1GHz ~ 18GHz	5.0 dB
	18GHz ~ 40GHz	5.3 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Industrial Dual SIM CAT6 Cellular Router, Industrial Dual SIM CAT6 Cellular Router w/WiFi
Brand	PROSCEND
Test Model	M350-W6
Series Model	M350-6
Status of EUT	Engineering sample
Power Supply Rating	12 Vdc from DC Jack or 8~48 Vdc from DI/DO interface
Modulation Type	64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	OFDM
Transfer Rate	802.11a: up to 54 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 866.7 Mbps
Operating Frequency	5.18 ~ 5.24GHz, 5.745 ~ 5.825GHz
Number of Channel	802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**CDD Mode:** **5.18 ~ 5.24 GHz:** 62.168 mW **5.745 ~ 5.825 GHz:** 59.718 mW **Beamforming Mode:** **5.18 ~ 5.24 GHz:** 47.211 mW **5.745 ~ 5.825 GHz:** 57.549 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Data Cable Supplied	NA

Note:

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

Product name	Brand	Model No.	Difference
Industrial Dual SIM CAT6 Cellular Router	PROSCEND	M350-6	with CAT6 module
Industrial Dual SIM CAT6 Cellular Router w/WiFi		M350-W6	with CAT6 & Wi-Fi module

From the above models, model: **M350-W6** was selected as representative model for the test and its data was recorded in this report.

2. The EUT contains certified WWAN module which FCC ID: XMR201906EM06A
3. The EUT has below radios as following table:

Radio 1	Radio 2
WWAN(LTE) + GPS	WLAN (2.4GHz + 5GHz)

4. Simultaneously transmission condition.

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

5. The EUT was pre-tested under the following test modes :

Pre-test Mode	Description
Mode A	**Adapter mode**
Mode B	DC Power supply 8V
Mode C	DC Power supply 48V
The worst radiated emissions and conducted emissions were found in **Mode A**. Therefore only the test data of the modes were recorded in this report.	

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

Antenna No.	RF Chain No.	Model	Antenna Net Gain(dBi)	Frequency Range	Antenna Type	Antenna Connector
WIFI Ant1	Chain0	WLN98002-A	1	2.4~2.4835 GHz	Dipole	R-SMA
			1.8	5.15~5.85 GHz		
WIFI Ant2	Chain1	WLN98002-A	1	2.4~2.4835 GHz	Dipole	R-SMA
			1.8	5.15~5.85 GHz		
LTE Ant1	Chain0	AN0727-64SP6BSM	2.89	1710~1785 MHz 1850 ~1915 MHz 1920 ~2010 MHz 2300~2400 MHz 2496~2690 MHz	Dipole	SMA
			-0.46	698~748 MHz 777~787 MHz 814 ~862 MHz 880~915 MHz		
LTE Ant2	Chain1	AN0727-64SP6BSM	2.89	1710~1785 MHz 1850 ~1915 MHz 1920 ~2010 MHz 2300~2400 MHz 2496~2690 MHz	Dipole	SMA
			-0.46	698~748 MHz 777~787 MHz 814 ~862 MHz 880~915 MHz		
GPS Ant	Chain0	GPS-21951	5.2	1575~1602 MHz	Dipole	SMA

7. The EUT incorporates a MIMO function:

5GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11a	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
802.11ac (VHT20)	2TX	2RX
802.11ac (VHT40)	2TX	2RX
802.11ac (VHT80)	2TX	2RX

Note:
1. All of modulation mode support beamforming function except 802.11a 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), the manufacturer will control the power for 802.11n mode is the same as the 802.11ac or more lower than it and investigated worst case to representative mode in test report. (Final test mode refer to section 3.2.1)

8. 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.

9. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.

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 3 axis. The worst case was found when positioned on **X-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)
802.11ac (VHT20)	5180-5240 5745-5825	36 to 48 149 to 165	149	OFDM	BPSK	6.5

Power Line Conducted Emission Test:

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

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

Antenna Port Conducted Measurement:

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

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:

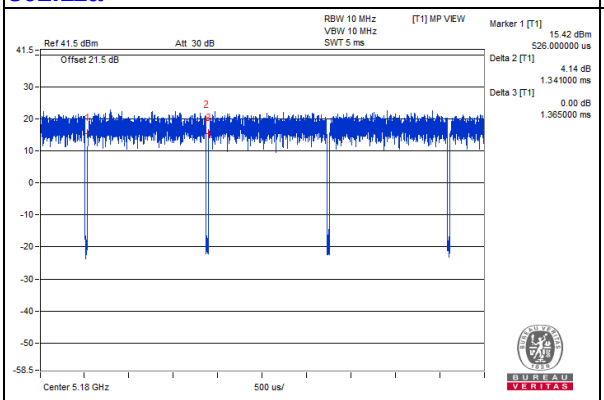
Applicable To	Environmental Conditions	Input Power (System)	Tested By
RE≥1G	25deg. C, 66%RH	120Vac, 60Hz	Tom Yang
RE<1G	25deg. C, 69%RH	120Vac, 60Hz	Sampson
PLC	25deg. C, 68%RH	120Vac, 60Hz	Sampson Chen
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jim Hung

3.3 Duty Cycle of Test Signal

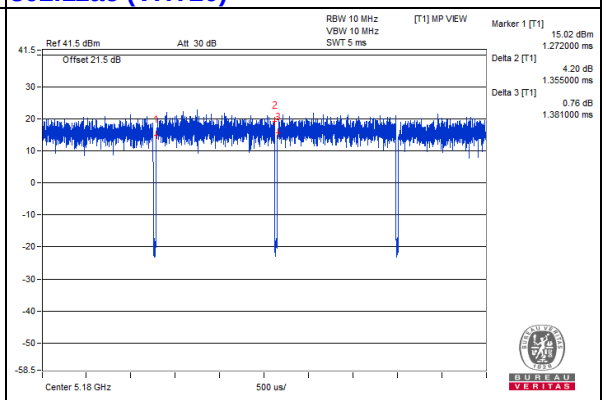
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 1.341 ms/1.365 ms = 0.982
802.11ac (VHT20): Duty cycle = 1.355 ms/1.381 ms = 0.981
802.11ac (VHT40): Duty cycle = 0.667 ms/0.68 ms = 0.981
802.11ac (VHT80): Duty cycle = 0.341 ms/0.361 ms = 0.945, Duty factor = 10 * log (1/Duty cycle) = 0.25 dB

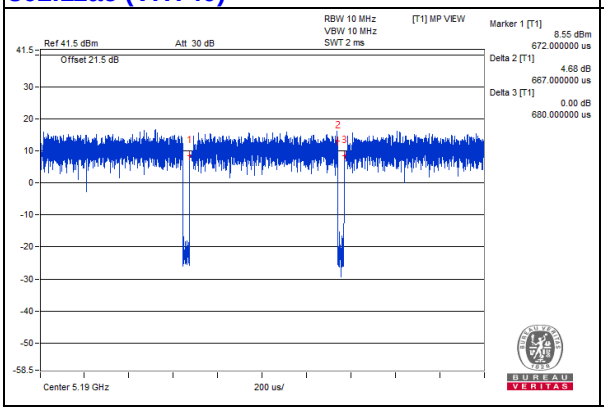
802.11a



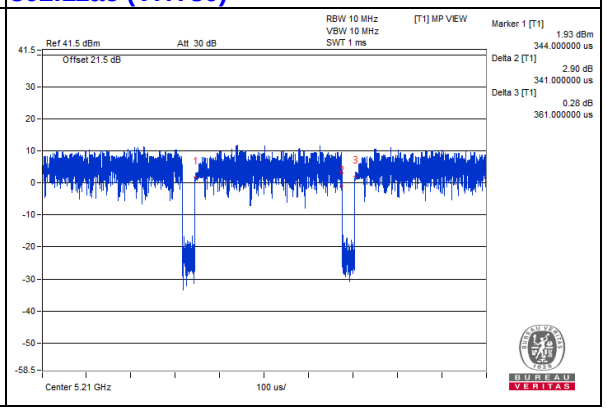
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



3.4 Description of Support Units

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

ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A.	Laptop	Lenovo	80WG	YD025N5Q	PD93165NGU	Provided by Lab
B.	Laptop	Lenovo	20U5S01X00 L14	PF-1ANPYA	NA	Provided by Lab
C.	Switch	D-Link	DGS-1005D	DR8WC92000523	NA	Provided by Lab
D.	Adapter	DEE VAN	DSA-24PFS-12 FUS	NA	NA	Supplied by applicant
E.	Load	tend	TBR-10A	NA	NA	Supplied by applicant
F.	SIM Card	R&S	CRT-Z3	NA	NA	Provided by Lab
G.	SIM Card	KeysSight	E7515-10910	NA	NA	Provided by Lab
H.	SD Card	Kingston	SDCS/16GB	NA	NA	Provided by Lab

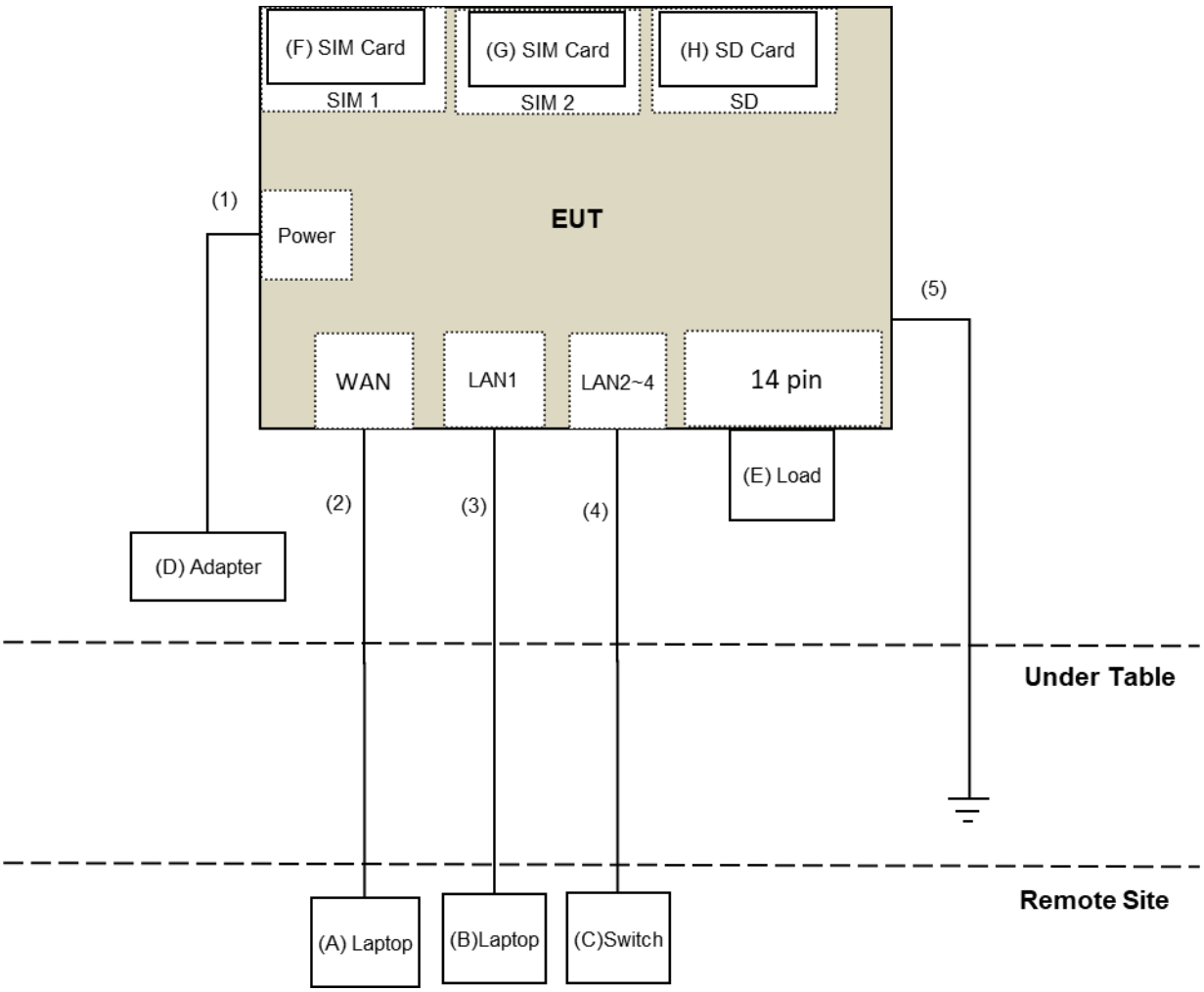
Note:

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

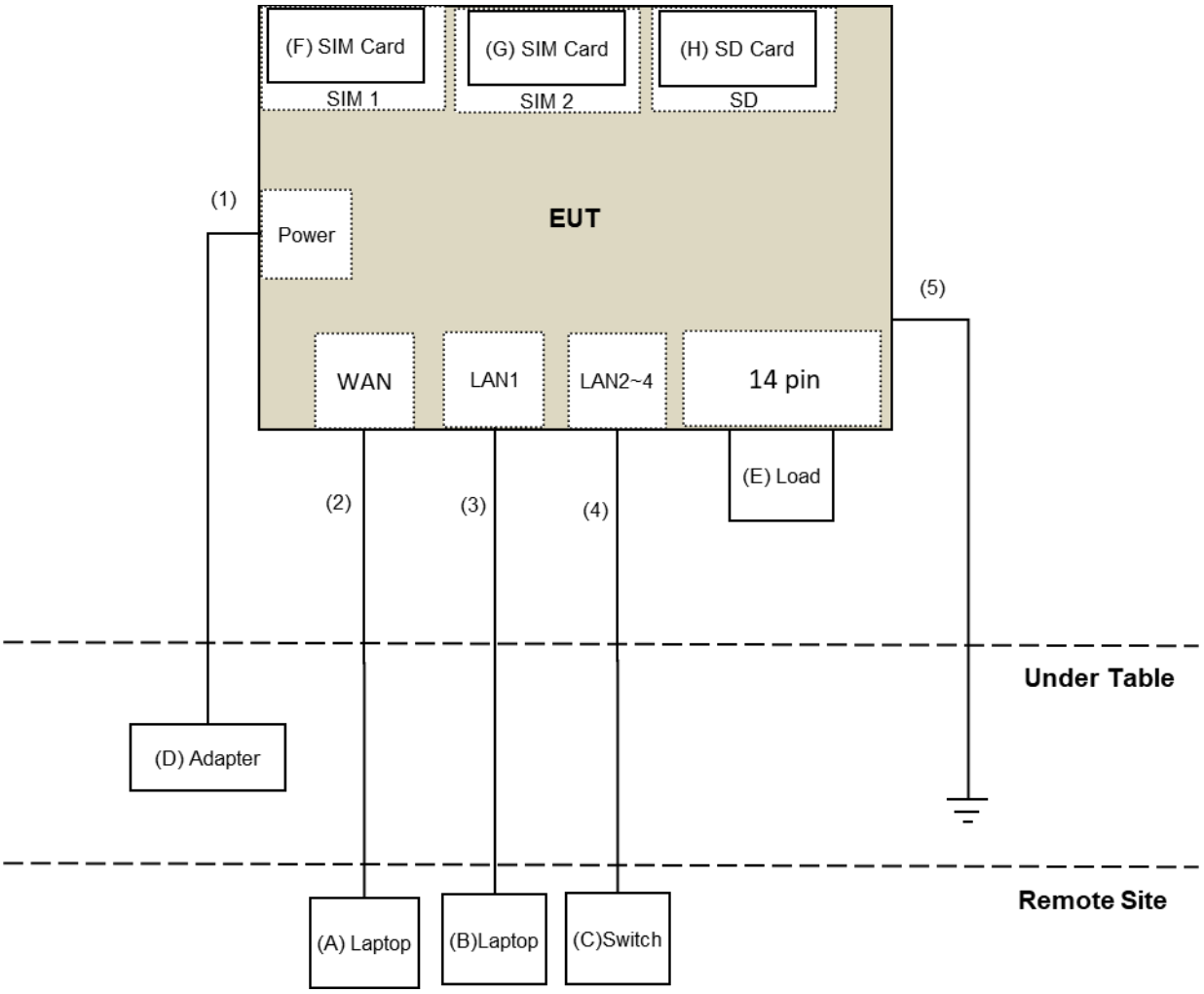
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	DC Cable	1	1.4	No	0	Supplied by applicant
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	RJ-45 Cable	1	10	No	0	Provided by Lab
4.	RJ-45 Cable	3	10	No	0	Provided by Lab
5.	Ground Cable	1	3	Yes	0	Provided by Lab

3.4.1 Configuration of System under Test

For Conducted emission:



For Radiated emission:



3.5 General Description of Applied Standard and references

The EUT is a RF Product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards and references:

Test Standard:

FCC Part 15, Subpart E (15.407)
ANSI C63.10-2013

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

References Test Guidance:

KDB 789033 D02 General UNII Test Procedure New Rules v02r01
KDB 662911 D01 Multiple Transmitter Output v02r01

All test items have been performed as a reference to the above KDB test guidance.

4 Test Types and Results

4.1 Radiated Emission and Bandedge Measurement

4.1.1 Limits of Radiated Emission and Bandedge Measurement

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

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

NOTE:

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

Limits of unwanted emission out of the restricted bands

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

*1 beyond 75 MHz or more above of the band edge.

*2 below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above.

*3 below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.

*4 from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

Note:

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

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

4.1.2 Test Instruments

For Radiated Emission & Bandedge test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Agilent	N9038A	MY50010156	2021/7/22	2022/7/21
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Pre_Amplifier EMCI	EMC001340	980142	2021/5/24	2022/5/23
LOOP ANTENNA Electro-Metrics	EM-6879	264	2021/3/5	2022/3/4
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-001	2021/1/7	2022/1/6
RF Coaxial Cable JYEBO	5D-FB	LOOPCAB-002	2021/1/7	2022/1/6
Pre_Amplifier Mini-Circuits	ZFL-1000VH2	QA0838008	2020/10/20	2021/10/19
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	2020/11/5	2021/11/4
RF Coaxial Cable COMMATE/PEWC	8D	966-3-1	2021/3/16	2022/3/15
RF Coaxial Cable COMMATE/PEWC	8D	966-3-2	2021/3/16	2022/3/15
RF Coaxial Cable COMMATE/PEWC	8D	966-3-3	2021/3/16	2022/3/15
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	2021/9/23	2022/9/22
Horn Antenna Schwarzbeck	BBHA9120-D	9120D-406	2020/11/22	2021/11/21
Pre_Amplifier EMCI	EMC12630SE	980384	2021/1/11	2022/1/10
RF Coaxial Cable EMCI	EMC104-SM-SM-1500	180504	2021/4/26	2022/4/25
RF Coaxial Cable EMCI	EMC104-SM-SM-2000	180601	2021/6/8	2022/6/7
RF Coaxial Cable EMCI	EMC104-SM-SM-6000	210201	2021/5/13	2022/5/12
Fix tool for Boresight antenna tower LIOW GUU	FBA-01	FBA_SIP01	NA	NA
Spectrum Analyzer Keysight	N9030A	MY54490679	2021/7/9	2022/7/8
Pre_Amplifier EMCI	EMC184045SE	980387	2021/1/11	2022/1/10
Horn Antenna Schwarzbeck	BBHA 9170	BBHA9170519	2020/11/22	2021/11/21
RF Cable-Frequency range: 1-40GHz EMCI	EMC102-KM-KM-1200	160924	2021/1/11	2022/1/10
RF cable (40GHz) EMCI	EMC-KM-KM-4000	200214	2021/3/10	2022/3/9

Note:

1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
2. The test was performed in 966 Chamber No. 3.
3. Tested Date: 2021/10/12 ~ 2021/10/15

For other test:

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	101516	2021/3/8	2022/3/7
Power Meter Anritsu	ML2495A	1529002	2021/6/21	2022/6/20
Pulse Power Sensor Anritsu	MA2411B	1339443	2021/5/31	2022/5/30
Attenuator WOKEN	MDCS18N-10	MDCS18N-10-01	2021/4/13	2022/4/12
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA
DC POWER SUPPLY Topward	6603D	795558	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	2021/1/14	2022/1/13
True RMS Clamp Meter Fluke	325	31130711WS	2021/6/2	2022/6/1

NOTE:
1. The test was performed in Oven room 2.
2. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
3. Tested Date: 2021/11/1

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:

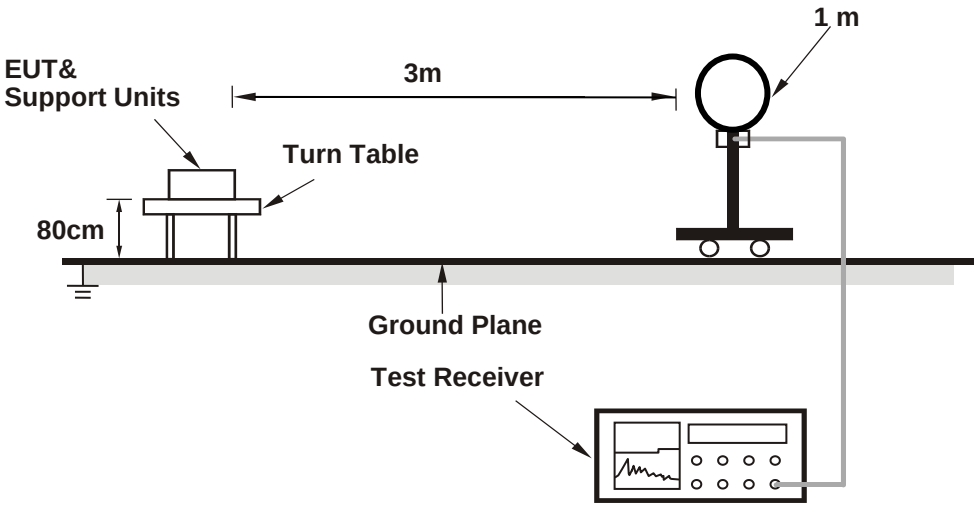
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

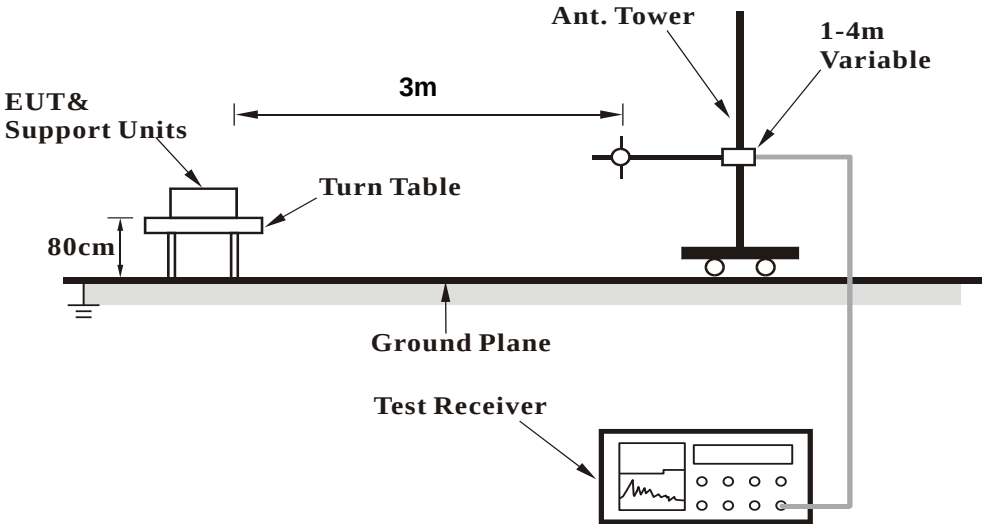
No deviation.

4.1.5 Test Setup

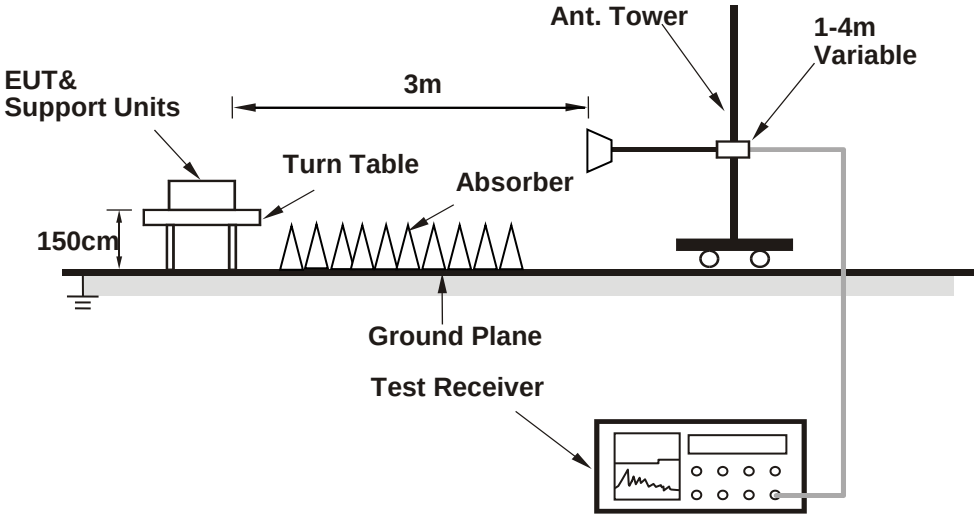
For Radiated emission below 30MHz



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 Computer which is placed on remote site.
b. Controlling software (HyperTerminal paste RF command.txt command) has been activated to set the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1GHz Data:

RF Mode	TX 802.11a	**Channel**	CH 36：5180 MHz
Frequency Range	1GHz ~ 40GHz	**Detector Function**	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	**Environmental Conditions**	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (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	50.9 PK	74.0	-23.1	1.34 H	283	46.2	4.7
2	5150.00	39.4 AV	54.0	-14.6	1.34 H	283	34.7	4.7
3	*5180.00	93.2 PK			1.34 H	283	88.6	4.6
4	*5180.00	83.8 AV			1.34 H	283	79.2	4.6
5	#10360.00	45.1 PK	68.2	-23.1	2.09 H	74	31.7	13.4
6	#10360.00	34.5 AV	54.0	-19.5	2.09 H	74	21.1	13.4
7	15540.00	47.2 PK	74.0	-26.8	1.95 H	176	32.7	14.5
8	15540.00	35.8 AV	54.0	-18.2	1.95 H	176	21.3	14.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (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	66.2 PK	74.0	-7.8	2.52 V	290	61.5	4.7
2	5150.00	44.4 AV	54.0	-9.6	2.52 V	290	39.7	4.7
3	*5180.00	102.6 PK			2.52 V	290	98.0	4.6
4	*5180.00	94.1 AV			2.52 V	290	89.5	4.6
5	#10360.00	45.4 PK	68.2	-22.8	1.82 V	123	32.0	13.4
6	#10360.00	34.7 AV	54.0	-19.3	1.82 V	123	21.3	13.4
7	15540.00	46.8 PK	74.0	-27.2	2.07 V	249	32.3	14.5
8	15540.00	35.5 AV	54.0	-18.5	2.07 V	249	21.0	14.5

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	**Channel**	CH 40：5200 MHz
Frequency Range	1GHz ~ 40GHz	**Detector Function**	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	**Environmental Conditions**	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	*5200.00	93.7 PK			1.32 H	264	89.3	4.4
2	*5200.00	83.0 AV			1.32 H	264	78.6	4.4
3	#10400.00	45.6 PK	68.2	-22.6	2.06 H	83	32.0	13.6
4	#10400.00	34.8 AV	54.0	-19.2	2.06 H	83	21.2	13.6
5	15600.00	47.2 PK	74.0	-26.8	1.93 H	180	32.7	14.5
6	15600.00	35.9 AV	54.0	-18.1	1.93 H	180	21.4	14.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	*5200.00	101.7 PK			2.53 V	291	97.3	4.4
2	*5200.00	93.8 AV			2.53 V	291	89.4	4.4
3	#10400.00	45.8 PK	68.2	-22.4	1.79 V	129	32.2	13.6
4	#10400.00	35.1 AV	54.0	-18.9	1.79 V	129	21.5	13.6
5	15600.00	46.6 PK	74.0	-27.4	2.06 V	243	32.1	14.5
6	15600.00	35.5 AV	54.0	-18.5	2.06 V	243	21.0	14.5

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	Channel	CH 48：5240 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	50.1 PK	74.0	-23.9	1.35 H	265	45.4	4.7
2	5150.00	38.9 AV	54.0	-15.1	1.35 H	265	34.2	4.7
3	*5240.00	91.9 PK			1.35 H	265	87.5	4.4
4	*5240.00	82.6 AV			1.35 H	265	78.2	4.4
5	5350.00	50.2 PK	74.0	-23.8	1.35 H	265	45.9	4.3
6	5350.00	38.6 AV	54.0	-15.4	1.35 H	265	34.3	4.3
7	#10480.00	45.4 PK	68.2	-22.8	2.04 H	80	31.7	13.7
8	#10480.00	34.9 AV	54.0	-19.1	2.04 H	80	21.2	13.7
9	15720.00	46.2 PK	74.0	-27.8	1.91 H	176	31.8	14.4
10	15720.00	35.0 AV	54.0	-19.0	1.91 H	176	20.6	14.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	50.6 PK	74.0	-23.4	2.50 V	286	45.9	4.7
2	5150.00	38.8 AV	54.0	-15.2	2.50 V	286	34.1	4.7
3	*5240.00	102.1 PK			2.50 V	286	97.7	4.4
4	*5240.00	93.9 AV			2.50 V	286	89.5	4.4
5	5350.00	51.1 PK	74.0	-22.9	2.50 V	286	46.8	4.3
6	5350.00	38.7 AV	54.0	-15.3	2.50 V	286	34.4	4.3
7	#10480.00	45.4 PK	68.2	-22.8	1.82 V	126	31.7	13.7
8	#10480.00	34.8 AV	54.0	-19.2	1.82 V	126	21.1	13.7
9	15720.00	46.2 PK	74.0	-27.8	2.04 V	258	31.8	14.4
10	15720.00	35.2 AV	54.0	-18.8	2.04 V	258	20.8	14.4

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11a	Channel	CH 149：5745 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5645.68	51.0 PK	68.2	-17.2	1.39 H	49	46.5	4.5
2	*5745.00	98.2 PK			1.39 H	49	93.2	5.0
3	*5745.00	90.1 AV			1.39 H	49	85.1	5.0
4	#5966.80	50.8 PK	68.2	-17.4	1.39 H	49	45.6	5.2
5	11490.00	48.3 PK	74.0	-25.7	2.12 H	86	33.7	14.6
6	11490.00	36.1 AV	54.0	-17.9	2.12 H	86	21.5	14.6
7	12500.00	49.2 PK	74.0	-24.8	2.08 H	204	35.4	13.8
8	12500.00	41.5 AV	54.0	-12.5	2.08 H	204	27.7	13.8
9	#17235.00	50.8 PK	68.2	-17.4	1.96 H	187	32.8	18.0
10	#17235.00	39.5 AV	54.0	-14.5	1.96 H	187	21.5	18.0
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5553.36	50.3 PK	68.2	-17.9	3.93 V	80	45.8	4.5
2	*5745.00	103.5 PK			3.93 V	80	98.5	5.0
3	*5745.00	94.9 AV			3.93 V	80	89.9	5.0
4	#6004.39	51.3 PK	68.2	-16.9	3.93 V	80	46.1	5.2
5	11490.00	48.6 PK	74.0	-25.4	1.68 V	137	34.0	14.6
6	11490.00	36.3 AV	54.0	-17.7	1.68 V	137	21.7	14.6
7	12500.00	49.9 PK	74.0	-24.1	1.51 V	173	36.1	13.8
8	12500.00	43.6 AV	54.0	-10.4	1.51 V	173	29.8	13.8
9	#17235.00	51.2 PK	68.2	-17.0	2.11 V	253	33.2	18.0
10	#17235.00	39.7 AV	54.0	-14.3	2.11 V	253	21.7	18.0

Remarks:

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

RF Mode	TX 802.11a	Channel	CH 157：5785 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5634.16	51.3 PK	68.2	-16.9	1.27 H	49	46.8	4.5
2	*5785.00	99.8 PK			1.27 H	49	94.7	5.1
3	*5785.00	90.9 AV			1.27 H	49	85.8	5.1
4	#5980.66	52.2 PK	68.2	-16.0	1.27 H	49	47.0	5.2
5	11570.00	49.1 PK	74.0	-24.9	2.06 H	87	34.5	14.6
6	11570.00	36.6 AV	54.0	-17.4	2.06 H	87	22.0	14.6
7	#17355.00	50.8 PK	68.2	-17.4	1.90 H	197	32.6	18.2
8	#17355.00	39.6 AV	54.0	-14.4	1.90 H	197	21.4	18.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5593.31	52.5 PK	68.2	-15.7	3.89 V	73	48.0	4.5
2	*5785.00	103.8 PK			3.89 V	73	98.7	5.1
3	*5785.00	95.2 AV			3.89 V	73	90.1	5.1
4	#6020.02	51.0 PK	68.2	-17.2	3.89 V	73	45.8	5.2
5	11570.00	48.2 PK	74.0	-25.8	1.70 V	123	33.6	14.6
6	11570.00	35.9 AV	54.0	-18.1	1.70 V	123	21.3	14.6
7	#17355.00	51.6 PK	68.2	-16.6	2.16 V	248	33.4	18.2
8	#17355.00	39.9 AV	54.0	-14.1	2.16 V	248	21.7	18.2

Remarks:

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

RF Mode	TX 802.11a	Channel	CH 165：5825 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5562.48	52.2 PK	68.2	-16.0	1.38 H	47	47.7	4.5
2	*5825.00	99.7 PK			1.38 H	47	94.7	5.0
3	*5825.00	90.9 AV			1.38 H	47	85.9	5.0
4	#6000.56	51.2 PK	68.2	-17.0	1.38 H	47	46.0	5.2
5	11650.00	48.6 PK	74.0	-25.4	2.16 H	95	34.2	14.4
6	11650.00	36.2 AV	54.0	-17.8	2.16 H	95	21.8	14.4
7	#17475.00	51.0 PK	68.2	-17.2	1.92 H	177	32.2	18.8
8	#17475.00	40.0 AV	54.0	-14.0	1.92 H	177	21.2	18.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5613.69	51.1 PK	68.2	-17.1	3.82 V	90	46.6	4.5
2	*5825.00	103.6 PK			3.82 V	90	98.6	5.0
3	*5825.00	95.1 AV			3.82 V	90	90.1	5.0
4	#5937.45	51.2 PK	68.2	-17.0	3.82 V	90	46.1	5.1
5	11650.00	47.8 PK	74.0	-26.2	1.65 V	123	33.4	14.4
6	11650.00	35.8 AV	54.0	-18.2	1.65 V	123	21.4	14.4
7	#17475.00	51.0 PK	68.2	-17.2	2.05 V	237	32.2	18.8
8	#17475.00	39.7 AV	54.0	-14.3	2.05 V	237	20.9	18.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 36：5180 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	51.6 PK	74.0	-22.4	1.38 H	283	46.9	4.7
2	5150.00	39.2 AV	54.0	-14.8	1.38 H	283	34.5	4.7
3	*5180.00	92.7 PK			1.38 H	283	88.1	4.6
4	*5180.00	82.9 AV			1.38 H	283	78.3	4.6
5	#10360.00	44.8 PK	68.2	-23.4	2.08 H	81	31.4	13.4
6	#10360.00	34.3 AV	54.0	-19.7	2.08 H	81	20.9	13.4
7	15540.00	47.3 PK	74.0	-26.7	1.87 H	174	32.8	14.5
8	15540.00	36.2 AV	54.0	-17.8	1.87 H	174	21.7	14.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	59.5 PK	74.0	-14.5	2.50 V	293	54.8	4.7
2	5150.00	41.8 AV	54.0	-12.2	2.50 V	293	37.1	4.7
3	*5180.00	101.4 PK			2.50 V	293	96.8	4.6
4	*5180.00	93.1 AV			2.50 V	293	88.5	4.6
5	#10360.00	45.3 PK	68.2	-22.9	1.74 V	102	31.9	13.4
6	#10360.00	34.5 AV	54.0	-19.5	1.74 V	102	21.1	13.4
7	15540.00	46.4 PK	74.0	-27.6	2.12 V	225	31.9	14.5
8	15540.00	35.3 AV	54.0	-18.7	2.12 V	225	20.8	14.5

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	**Channel**	CH 40：5200 MHz
Frequency Range	1GHz ~ 40GHz	**Detector Function**	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	**Environmental Conditions**	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	*5200.00	91.5 PK			1.35 H	282	87.1	4.4
2	*5200.00	82.6 AV			1.35 H	282	78.2	4.4
3	#10400.00	44.5 PK	68.2	-23.7	2.13 H	68	30.9	13.6
4	#10400.00	34.1 AV	54.0	-19.9	2.13 H	68	20.5	13.6
5	15600.00	47.1 PK	74.0	-26.9	1.96 H	167	32.6	14.5
6	15600.00	35.4 AV	54.0	-18.6	1.96 H	167	20.9	14.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	*5200.00	101.2 PK			2.53 V	282	96.8	4.4
2	*5200.00	93.1 AV			2.53 V	282	88.7	4.4
3	#10400.00	45.5 PK	68.2	-22.7	1.80 V	113	31.9	13.6
4	#10400.00	34.6 AV	54.0	-19.4	1.80 V	113	21.0	13.6
5	15600.00	46.1 PK	74.0	-27.9	2.10 V	239	31.6	14.5
6	15600.00	35.1 AV	54.0	-18.9	2.10 V	239	20.6	14.5

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 48：5240 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	50.2 PK	74.0	-23.8	1.38 H	282	45.5	4.7
2	5150.00	38.8 AV	54.0	-15.2	1.38 H	282	34.1	4.7
3	*5240.00	91.8 PK			1.38 H	282	87.4	4.4
4	*5240.00	83.1 AV			1.38 H	282	78.7	4.4
5	5350.00	52.4 PK	74.0	-21.6	1.38 H	282	48.1	4.3
6	5350.00	39.2 AV	54.0	-14.8	1.38 H	282	34.9	4.3
7	#10480.00	44.4 PK	68.2	-23.8	2.05 H	73	30.7	13.7
8	#10480.00	34.2 AV	54.0	-19.8	2.05 H	73	20.5	13.7
9	15720.00	47.3 PK	74.0	-26.7	1.82 H	159	32.9	14.4
10	15720.00	36.1 AV	54.0	-17.9	1.82 H	159	21.7	14.4
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	50.9 PK	74.0	-23.1	2.54 V	282	46.2	4.7
2	5150.00	38.9 AV	54.0	-15.1	2.54 V	282	34.2	4.7
3	*5240.00	101.1 PK			2.54 V	282	96.7	4.4
4	*5240.00	92.8 AV			2.54 V	282	88.4	4.4
5	5350.00	51.8 PK	74.0	-22.2	2.54 V	282	47.5	4.3
6	5350.00	38.7 AV	54.0	-15.3	2.54 V	282	34.4	4.3
7	#10480.00	45.9 PK	68.2	-22.3	1.77 V	129	32.2	13.7
8	#10480.00	34.8 AV	54.0	-19.2	1.77 V	129	21.1	13.7
9	15720.00	46.4 PK	74.0	-27.6	2.12 V	247	32.0	14.4
10	15720.00	35.4 AV	54.0	-18.6	2.12 V	247	21.0	14.4

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT20)	Channel	CH 149：5745 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5565.53	50.8 PK	68.2	-17.4	1.33 H	47	46.2	4.6
2	*5745.00	99.4 PK			1.33 H	47	94.4	5.0
3	*5745.00	90.8 AV			1.33 H	47	85.8	5.0
4	#5992.47	51.1 PK	68.2	-17.1	1.33 H	47	45.9	5.2
5	11490.00	48.2 PK	74.0	-25.8	2.08 H	77	33.6	14.6
6	11490.00	36.3 AV	54.0	-17.7	2.08 H	77	21.7	14.6
7	#17235.00	50.5 PK	68.2	-17.7	1.92 H	200	32.5	18.0
8	#17235.00	39.4 AV	54.0	-14.6	1.92 H	200	21.4	18.0
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5593.90	50.8 PK	68.2	-17.4	3.97 V	76	46.3	4.5
2	*5745.00	103.6 PK			3.97 V	76	98.6	5.0
3	*5745.00	94.9 AV			3.97 V	76	89.9	5.0
4	#5976.59	51.7 PK	68.2	-16.5	3.97 V	76	46.5	5.2
5	11490.00	48.5 PK	74.0	-25.5	1.67 V	123	33.9	14.6
6	11490.00	36.2 AV	54.0	-17.8	1.67 V	123	21.6	14.6
7	#17235.00	51.5 PK	68.2	-16.7	2.10 V	247	33.5	18.0
8	#17235.00	39.9 AV	54.0	-14.1	2.10 V	247	21.9	18.0

Remarks:

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

RF Mode	TX 802.11ac (VHT20)	Channel	CH 157：5785 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5605.95	51.4 PK	68.2	-16.8	1.47 H	48	46.9	4.5
2	*5785.00	99.4 PK			1.47 H	48	94.3	5.1
3	*5785.00	89.9 AV			1.47 H	48	84.8	5.1
4	#5962.05	52.0 PK	68.2	-16.2	1.47 H	48	46.8	5.2
5	11570.00	49.6 PK	74.0	-24.4	2.07 H	81	35.0	14.6
6	11570.00	36.9 AV	54.0	-17.1	2.07 H	81	22.3	14.6
7	#17355.00	51.3 PK	68.2	-16.9	1.89 H	193	33.1	18.2
8	#17355.00	39.9 AV	54.0	-14.1	1.89 H	193	21.7	18.2
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5601.13	50.4 PK	68.2	-17.8	3.83 V	83	45.9	4.5
2	*5785.00	103.7 PK			3.83 V	83	98.6	5.1
3	*5785.00	95.0 AV			3.83 V	83	89.9	5.1
4	#5925.57	51.3 PK	68.2	-16.9	3.83 V	83	46.2	5.1
5	11570.00	48.3 PK	74.0	-25.7	1.62 V	144	33.7	14.6
6	11570.00	35.8 AV	54.0	-18.2	1.62 V	144	21.2	14.6
7	#17355.00	51.5 PK	68.2	-16.7	2.09 V	248	33.3	18.2
8	#17355.00	39.9 AV	54.0	-14.1	2.09 V	248	21.7	18.2

Remarks:

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

RF Mode	TX 802.11ac (VHT20)	Channel	CH 165：5825 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5609.11	52.7 PK	68.2	-15.5	1.19 H	47	48.2	4.5
2	*5825.00	99.5 PK			1.19 H	47	94.5	5.0
3	*5825.00	90.7 AV			1.19 H	47	85.7	5.0
4	#5978.78	53.2 PK	68.2	-15.0	1.19 H	47	48.0	5.2
5	11650.00	50.0 PK	74.0	-24.0	2.04 H	75	35.6	14.4
6	11650.00	37.4 AV	54.0	-16.6	2.04 H	75	23.0	14.4
7	#17475.00	50.8 PK	68.2	-17.4	1.94 H	194	32.0	18.8
8	#17475.00	39.4 AV	54.0	-14.6	1.94 H	194	20.6	18.8
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5645.06	50.3 PK	68.2	-17.9	3.82 V	105	45.8	4.5
2	*5825.00	103.2 PK			3.82 V	105	98.2	5.0
3	*5825.00	94.5 AV			3.82 V	105	89.5	5.0
4	#6021.75	51.6 PK	68.2	-16.6	3.82 V	105	46.4	5.2
5	11650.00	48.4 PK	74.0	-25.6	1.73 V	142	34.0	14.4
6	11650.00	36.2 AV	54.0	-17.8	1.73 V	142	21.8	14.4
7	#17475.00	51.1 PK	68.2	-17.1	2.11 V	251	32.3	18.8
8	#17475.00	39.4 AV	54.0	-14.6	2.11 V	251	20.6	18.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT40)	Channel	CH 38：5190 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	51.5 PK	74.0	-22.5	1.27 H	279	46.8	4.7
2	5150.00	38.8 AV	54.0	-15.2	1.27 H	279	34.1	4.7
3	*5190.00	86.1 PK			1.27 H	279	81.6	4.5
4	*5190.00	75.7 AV			1.27 H	279	71.2	4.5
5	#10380.00	45.9 PK	68.2	-22.3	2.04 H	96	32.5	13.4
6	#10380.00	35.0 AV	54.0	-19.0	2.04 H	96	21.6	13.4
7	15570.00	47.1 PK	74.0	-26.9	1.99 H	188	32.5	14.6
8	15570.00	35.7 AV	54.0	-18.3	1.99 H	188	21.1	14.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	57.1 PK	74.0	-16.9	2.36 V	290	52.4	4.7
2	5150.00	42.7 AV	54.0	-11.3	2.36 V	290	38.0	4.7
3	*5190.00	96.1 PK			2.36 V	290	91.6	4.5
4	*5190.00	87.3 AV			2.36 V	290	82.8	4.5
5	#10380.00	46.3 PK	68.2	-21.9	1.80 V	132	32.9	13.4
6	#10380.00	35.2 AV	54.0	-18.8	1.80 V	132	21.8	13.4
7	15570.00	46.6 PK	74.0	-27.4	2.13 V	250	32.0	14.6
8	15570.00	35.8 AV	54.0	-18.2	2.13 V	250	21.2	14.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT40)	Channel	CH 46：5230 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (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	52.2 PK	74.0	-21.8	1.08 H	262	47.5	4.7
2	5150.00	40.3 AV	54.0	-13.7	1.08 H	262	35.6	4.7
3	*5230.00	89.2 PK			1.08 H	262	84.8	4.4
4	*5230.00	78.7 AV			1.08 H	262	74.3	4.4
5	5350.00	51.6 PK	74.0	-22.4	1.08 H	262	47.3	4.3
6	5350.00	40.0 AV	54.0	-14.0	1.08 H	262	35.7	4.3
7	#10460.00	44.3 PK	68.2	-23.9	2.07 H	76	30.7	13.6
8	#10460.00	34.0 AV	54.0	-20.0	2.07 H	76	20.4	13.6
9	15690.00	47.3 PK	74.0	-26.7	1.88 H	188	32.8	14.5
10	15690.00	36.5 AV	54.0	-17.5	1.88 H	188	22.0	14.5
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	50.7 PK	74.0	-23.3	2.38 V	264	46.0	4.7
2	5150.00	39.0 AV	54.0	-15.0	2.38 V	264	34.3	4.7
3	*5230.00	96.3 PK			2.38 V	264	91.9	4.4
4	*5230.00	87.4 AV			2.38 V	264	83.0	4.4
5	5350.00	51.6 PK	74.0	-22.4	2.38 V	264	47.3	4.3
6	5350.00	38.9 AV	54.0	-15.1	2.38 V	264	34.6	4.3
7	#10460.00	44.8 PK	68.2	-23.4	1.79 V	87	31.2	13.6
8	#10460.00	34.0 AV	54.0	-20.0	1.79 V	87	20.4	13.6
9	15690.00	46.7 PK	74.0	-27.3	2.10 V	234	32.2	14.5
10	15690.00	35.6 AV	54.0	-18.4	2.10 V	234	21.1	14.5

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT40)	Channel	CH 151：5755 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5629.50	52.9 PK	68.2	-15.3	1.13 H	52	48.4	4.5
2	*5755.00	96.4 PK			1.13 H	52	91.4	5.0
3	*5755.00	84.9 AV			1.13 H	52	79.9	5.0
4	#5934.12	52.8 PK	68.2	-15.4	1.13 H	52	47.7	5.1
5	11510.00	49.7 PK	74.0	-24.3	1.99 H	73	35.1	14.6
6	11510.00	37.3 AV	54.0	-16.7	1.99 H	73	22.7	14.6
7	#17265.00	51.1 PK	68.2	-17.1	1.95 H	191	33.2	17.9
8	#17265.00	39.5 AV	54.0	-14.5	1.95 H	191	21.6	17.9
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5593.20	51.1 PK	68.2	-17.1	3.93 V	84	46.6	4.5
2	*5755.00	98.2 PK			3.93 V	84	93.2	5.0
3	*5755.00	88.2 AV			3.93 V	84	83.2	5.0
4	#5969.00	51.5 PK	68.2	-16.7	3.93 V	84	46.3	5.2
5	11510.00	48.1 PK	74.0	-25.9	1.73 V	120	33.5	14.6
6	11510.00	35.8 AV	54.0	-18.2	1.73 V	120	21.2	14.6
7	#17265.00	51.7 PK	68.2	-16.5	2.20 V	253	33.8	17.9
8	#17265.00	40.0 AV	54.0	-14.0	2.20 V	253	22.1	17.9

Remarks:

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

RF Mode	TX 802.11ac (VHT40)	Channel	CH 159：5795 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5582.07	52.7 PK	68.2	-15.5	1.08 H	54	48.2	4.5
2	*5795.00	97.1 PK			1.08 H	54	92.0	5.1
3	*5795.00	85.9 AV			1.08 H	54	80.8	5.1
4	#6001.71	53.5 PK	68.2	-14.7	1.08 H	54	48.3	5.2
5	11590.00	49.7 PK	74.0	-24.3	2.03 H	75	35.1	14.6
6	11590.00	37.2 AV	54.0	-16.8	2.03 H	75	22.6	14.6
7	#17385.00	50.8 PK	68.2	-17.4	1.95 H	186	32.5	18.3
8	#17385.00	39.3 AV	54.0	-14.7	1.95 H	186	21.0	18.3
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5572.59	50.8 PK	68.2	-17.4	3.89 V	74	46.2	4.6
2	*5795.00	97.2 PK			3.89 V	74	92.1	5.1
3	*5795.00	87.5 AV			3.89 V	74	82.4	5.1
4	#6016.44	51.2 PK	68.2	-17.0	3.89 V	74	46.0	5.2
5	11590.00	48.9 PK	74.0	-25.1	1.70 V	130	34.3	14.6
6	11590.00	36.5 AV	54.0	-17.5	1.70 V	130	21.9	14.6
7	#17385.00	51.1 PK	68.2	-17.1	2.08 V	247	32.8	18.3
8	#17385.00	39.4 AV	54.0	-14.6	2.08 V	247	21.1	18.3

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT80)	Channel	CH 42：5210 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	5150.00	51.4 PK	74.0	-22.6	1.05 H	263	46.7	4.7
2	5150.00	41.6 AV	54.0	-12.4	1.05 H	263	36.9	4.7
3	*5210.00	84.2 PK			1.05 H	263	79.8	4.4
4	*5210.00	75.3 AV			1.05 H	263	70.9	4.4
5	5350.00	52.1 PK	74.0	-21.9	1.05 H	263	47.8	4.3
6	5350.00	41.6 AV	54.0	-12.4	1.05 H	263	37.3	4.3
7	#10420.00	44.8 PK	68.2	-23.4	2.01 H	71	31.3	13.5
8	#10420.00	34.3 AV	54.0	-19.7	2.01 H	71	20.8	13.5
9	15630.00	46.7 PK	74.0	-27.3	1.88 H	182	32.1	14.6
10	15630.00	36.1 AV	54.0	-17.9	1.88 H	182	21.5	14.6
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (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	52.5 PK	74.0	-21.5	2.52 V	262	47.8	4.7
2	5150.00	42.2 AV	54.0	-11.8	2.52 V	262	37.5	4.7
3	*5210.00	92.2 PK			2.52 V	262	87.8	4.4
4	*5210.00	84.1 AV			2.52 V	262	79.7	4.4
5	5350.00	51.7 PK	74.0	-22.3	2.52 V	262	47.4	4.3
6	5350.00	40.4 AV	54.0	-13.6	2.52 V	262	36.1	4.3
7	#10420.00	46.7 PK	68.2	-21.5	1.86 V	119	33.2	13.5
8	#10420.00	35.3 AV	54.0	-18.7	1.86 V	119	21.8	13.5
9	15630.00	47.2 PK	74.0	-26.8	2.08 V	253	32.6	14.6
10	15630.00	36.1 AV	54.0	-17.9	2.08 V	253	21.5	14.6

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

RF Mode	TX 802.11ac (VHT80)	Channel	CH 155：5775 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 66% RH
Tested By	Tom Yang		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5639.38	53.3 PK	68.2	-14.9	1.06 H	60	48.8	4.5
2	*5775.00	92.5 PK			1.06 H	60	87.4	5.1
3	*5775.00	84.2 AV			1.06 H	60	79.1	5.1
4	#5927.71	54.1 PK	68.2	-14.1	1.06 H	60	49.0	5.1
5	11550.00	50.0 PK	74.0	-24.0	2.00 H	89	35.4	14.6
6	11550.00	37.6 AV	54.0	-16.4	2.00 H	89	23.0	14.6
7	#17325.00	50.5 PK	68.2	-17.7	1.95 H	188	32.4	18.1
8	#17325.00	38.8 AV	54.0	-15.2	1.95 H	188	20.7	18.1
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	#5647.78	51.5 PK	68.2	-16.7	3.91 V	107	47.0	4.5
2	*5775.00	94.1 PK			3.91 V	107	89.0	5.1
3	*5775.00	85.9 AV			3.91 V	107	80.8	5.1
4	#5984.44	52.9 PK	68.2	-15.3	3.91 V	107	47.7	5.2
5	11550.00	49.2 PK	74.0	-24.8	1.64 V	122	34.6	14.6
6	11550.00	37.0 AV	54.0	-17.0	1.64 V	122	22.4	14.6
7	#17325.00	51.6 PK	68.2	-16.6	2.12 V	257	33.5	18.1
8	#17325.00	39.7 AV	54.0	-14.3	2.12 V	257	21.6	18.1

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit.
5. " * ": Fundamental frequency.
6. " # ": The radiated frequency is out of the restricted band.

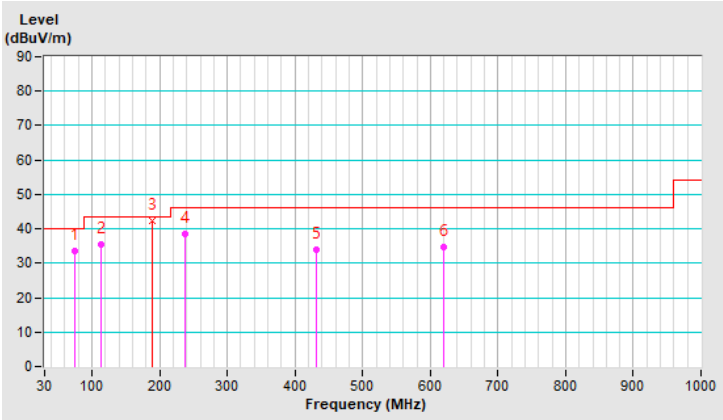
Below 1GHz Data:

RF Mode	TX 802.11ac (VHT20)	**Channel**	CH 149：5745 MHz
Frequency Range	9kHz ~ 1GHz	**Detector Function**	Quasi-Peak (QP)
Input Power	120Vac, 60Hz	**Environmental Conditions**	25 °C, 69% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	**Frequency (MHz)**	**Emission Level (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (m)**	**Table Angle (Degree)**	**Raw Value (dBuV)**	**Correction Factor (dB/m)**
1	74.97	33.4 QP	40.0	-6.6	2.00 H	229	45.0	-11.6
2	113.20	35.3 QP	43.5	-8.2	1.00 H	225	45.7	-10.4
3	**189.42**	**42.2 QP**	**43.5**	**-1.3**	**1.43 H**	**265**	**52.4**	**-10.2**
4	237.85	38.5 QP	46.0	-7.5	1.00 H	116	47.7	-9.2
5	432.05	34.0 QP	46.0	-12.0	1.00 H	354	36.6	-2.6
6	619.36	34.7 QP	46.0	-11.3	1.50 H	67	32.9	1.8

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. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.

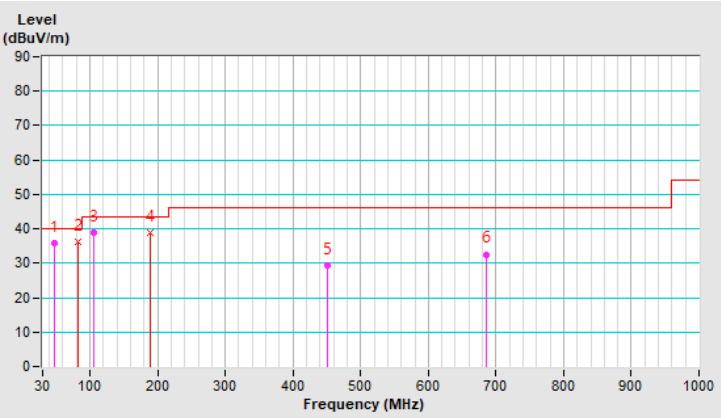


RF Mode	TX 802.11ac (VHT20)	Channel	CH 149：5745 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)
Input Power	120Vac, 60Hz	Environmental Conditions	25 °C, 69% RH
Tested By	Sampson Chen		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	46.77	35.9 QP	40.0	-4.1	1.50 V	182	44.1	-8.2
2	82.34	36.1 QP	40.0	-3.9	1.00 V	258	49.5	-13.4
3	105.22	38.8 QP	43.5	-4.7	1.50 V	265	50.2	-11.4
4	188.27	39.0 QP	43.5	-4.5	1.00 V	1	49.1	-10.1
5	450.27	29.3 QP	46.0	-16.7	1.00 V	117	31.3	-2.0
6	686.28	32.6 QP	46.0	-13.4	3.00 V	357	29.7	2.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit of frequency range 30MHz~1000MHz.
5. The emission levels were very low against the limit of frequency range 9kHz~30MHz: the amplitude of spurious emissions attenuated more than 20 dB below the permissible value to be report.



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	2021/10/13	2022/10/12
LISN R&S	ESH3-Z5	848773/004	2020/10/27	2021/10/26
LISN R & S	ESH3-Z5	835239/001	2021/3/26	2022/3/25
50 ohms Terminator	50	3	2020/10/26	2021/10/25
RF Coaxial Cable JYEBO	5D-FB	COCCAB-001	2021/9/25	2022/9/24
Fixed attenuator STI	STI02-2200-10	005	2021/8/27	2022/8/26
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: 2021/10/14

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.

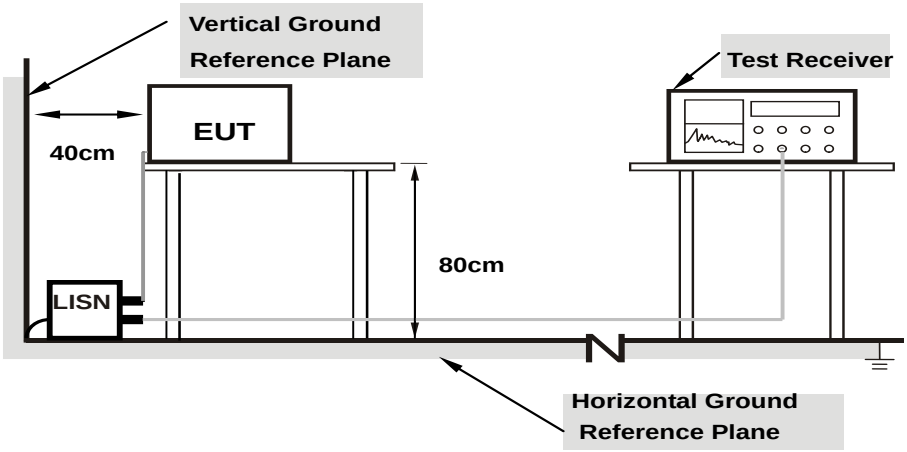
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

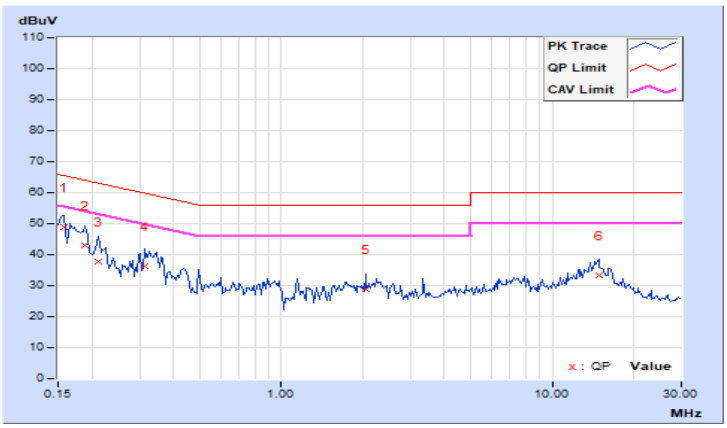
4.2.7 Test Results

RF Mode	TX 802.11ac (VHT20)	Channel	CH 149：5745 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 68% RH
Tested By	Sampson Chen		

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	**0.15781**	**10.05**	**38.73**	**23.67**	**48.78**	**33.72**	**65.58**	**55.58**	**-16.80**	**-21.86**
2	0.18906	10.07	32.87	18.26	42.94	28.33	64.08	54.08	-21.14	-25.75
3	0.21250	10.07	27.74	13.41	37.81	23.48	63.11	53.11	-25.30	-29.63
4	0.31406	10.08	26.27	18.27	36.35	28.35	59.86	49.86	-23.51	-21.51
5	2.05078	10.19	18.56	10.68	28.75	20.87	56.00	46.00	-27.25	-25.13
6	14.85547	11.24	22.14	17.10	33.38	28.34	60.00	50.00	-26.62	-21.66

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

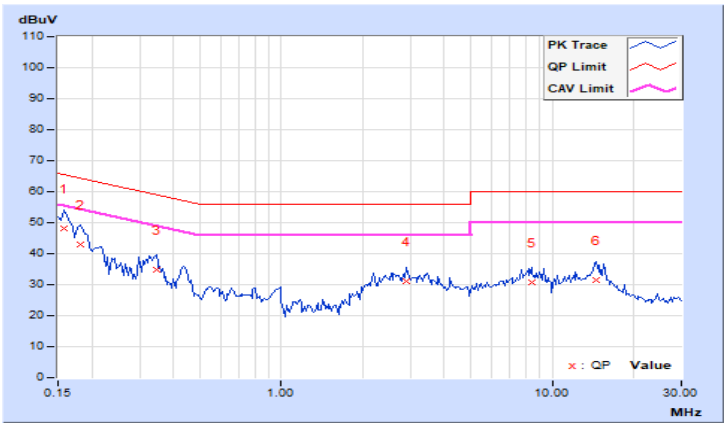


RF Mode	TX 802.11ac (VHT20)	Channel	CH 149：5745 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power (System)	120Vac, 60Hz	Environmental Conditions	25 °C, 68% RH
Tested By	Sampson Chen		

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15781	10.07	38.07	23.64	48.14	33.71	65.58	55.58	-17.44	-21.87
2	0.18125	10.08	33.03	17.57	43.11	27.65	64.43	54.43	-21.32	-26.78
3	0.34531	10.11	24.66	18.53	34.77	28.64	59.07	49.07	-24.30	-20.43
4	2.91016	10.29	20.66	14.54	30.95	24.83	56.00	46.00	-25.05	-21.17
5	8.36719	10.62	20.02	14.02	30.64	24.64	60.00	50.00	-29.36	-25.36
6	14.58984	11.02	20.37	15.69	31.39	26.71	60.00	50.00	-28.61	-23.29

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				
36	5180	14.57	14.83	59.051	17.71	30	Pass
40	5200	14.61	14.75	58.761	17.69	30	Pass
48	5240	14.87	14.98	62.168	17.94	30	Pass
149	5745	14.67	14.83	59.718	17.76	30	Pass
157	5785	14.61	14.51	57.156	17.57	30	Pass
165	5825	14.73	14.53	58.096	17.64	30	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				
36	5180	13.76	13.70	47.211	16.74	30	Pass
40	5200	13.63	13.76	46.836	16.71	30	Pass
48	5240	13.57	13.83	46.906	16.71	30	Pass
149	5745	14.62	14.56	57.549	17.60	30	Pass
157	5785	14.45	14.37	55.214	17.42	30	Pass
165	5825	14.46	13.97	52.871	17.23	30	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				
38	5190	11.48	11.73	28.954	14.62	30	Pass
46	5230	11.49	11.71	28.918	14.61	30	Pass
151	5755	11.37	11.14	26.711	14.27	30	Pass
159	5795	11.27	11.58	27.785	14.44	30	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				
42	5210	9.79	10.26	20.145	13.04	30	Pass
155	5775	10.01	10.85	22.185	13.46	30	Pass

Beamforming Mode

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	13.76	13.70	47.211	16.74	30	Pass
40	5200	13.63	13.76	46.836	16.71	30	Pass
48	5240	13.57	13.83	46.906	16.71	30	Pass
149	5745	14.62	14.56	57.549	17.60	30	Pass
157	5785	14.45	14.37	55.214	17.42	30	Pass
165	5825	14.46	13.97	52.871	17.23	30	Pass

Note: 1. For U-NII-1: The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.
2. For U-NII-3: The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	11.48	11.73	28.954	14.62	30	Pass
46	5230	11.49	11.71	28.918	14.61	30	Pass
151	5755	11.37	11.14	26.711	14.27	30	Pass
159	5795	11.27	11.58	27.785	14.44	30	Pass

Note: 1. For U-NII-1: The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.
2. For U-NII-3: The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

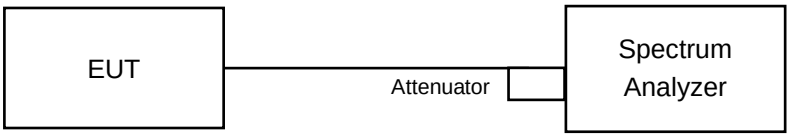
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	9.79	10.26	20.145	13.04	30	Pass
155	5775	10.01	10.85	22.185	13.46	30	Pass

Note: 1. For U-NII-1: The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.
2. For U-NII-3: The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Results

CDD Mode

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	18.6	18.24
40	5200	18.24	18.36
48	5240	18.24	18.12
149	5745	18.12	18.12
157	5785	18.24	18.12
165	5825	18.17	18

802.11ac (VHT20)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	18.61	18
40	5200	18.34	18
48	5240	18.36	17.88
149	5745	18.17	17.91
157	5785	18.44	17.83
165	5825	18.35	17.91

802.11ac (VHT40)

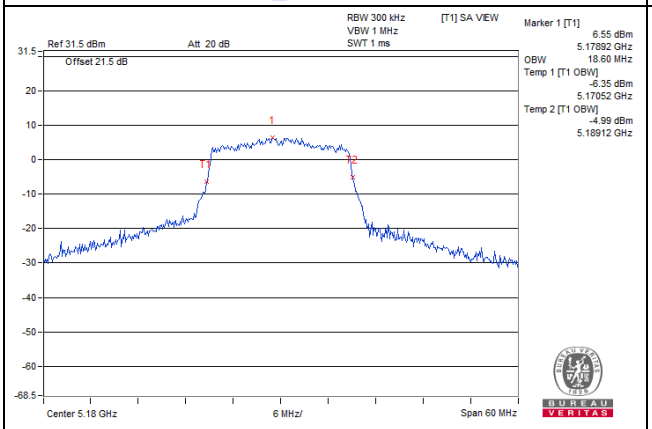
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.48	36.72
46	5230	36.72	36.72
151	5755	36.72	36.96
159	5795	36.72	36.48

802.11ac (VHT80)

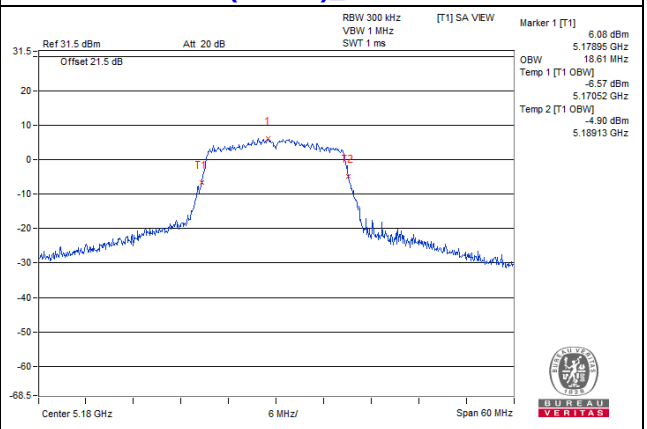
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.82	75.84
155	5775	75.82	75.84

Spectrum Plot of Max. Value

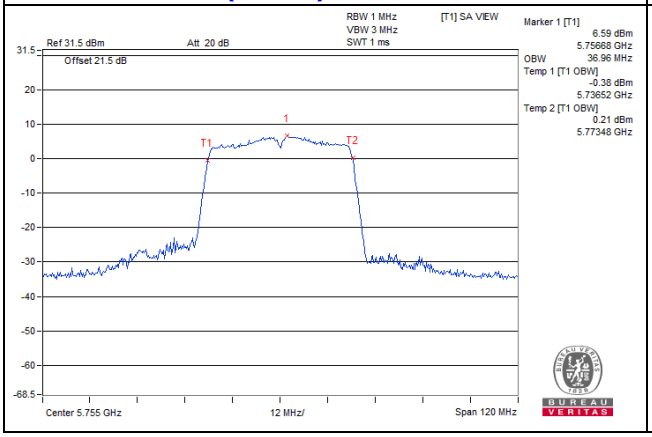
802.11a_Chain 0 / CH36



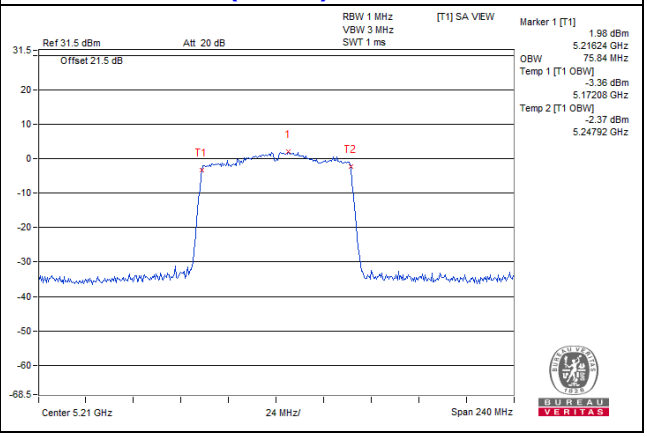
802.11ac (VHT20)_Chain 0 / CH36



802.11ac (VHT40)_Chain 1 / CH151

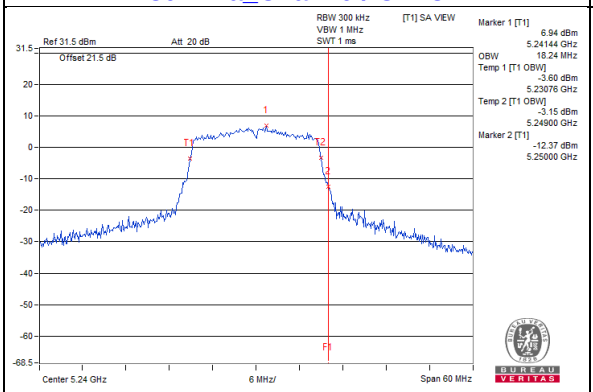


802.11ac (VHT80)_Chain 1 / CH42

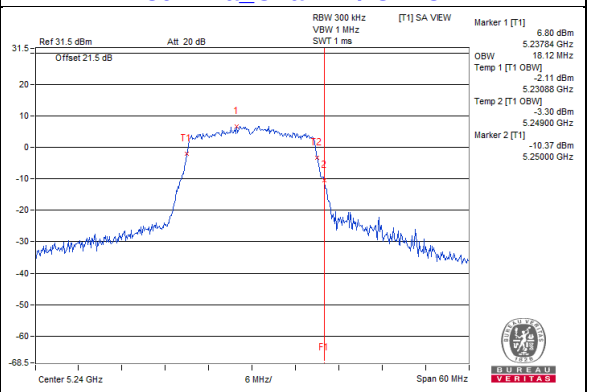


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2A band)

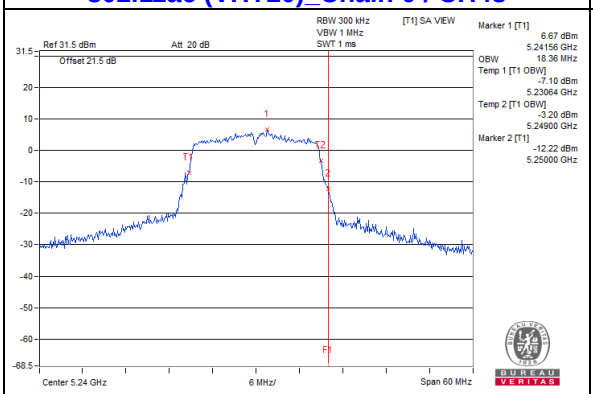
802.11a_Chain 0 / CH48



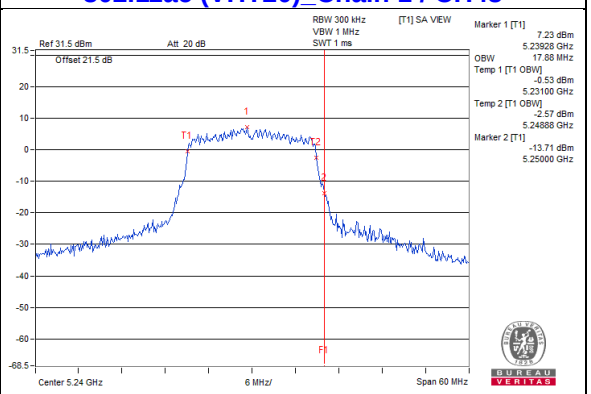
802.11a_Chain 1 / CH48



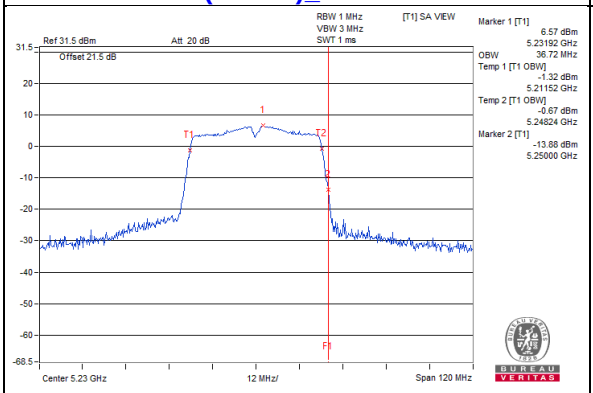
802.11ac (VHT20)_Chain 0 / CH48



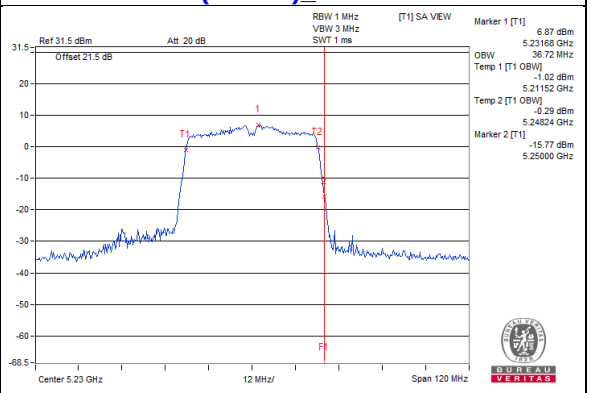
802.11ac (VHT20)_Chain 1 / CH48



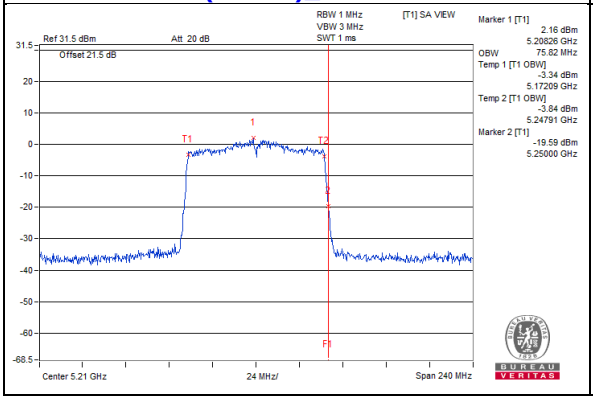
802.11ac (VHT40)_Chain 0 / CH46



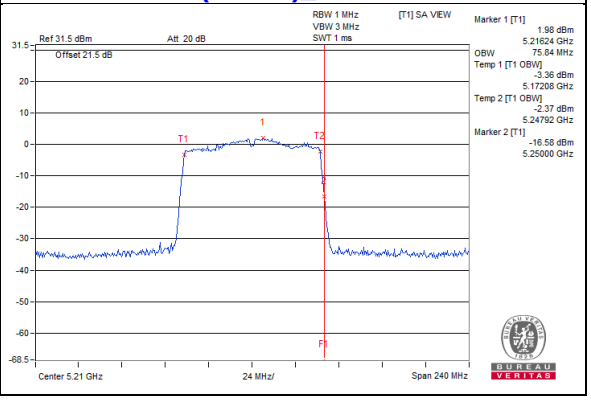
802.11ac (VHT40)_Chain 1 / CH46



802.11ac (VHT80)_Chain 0 / CH42

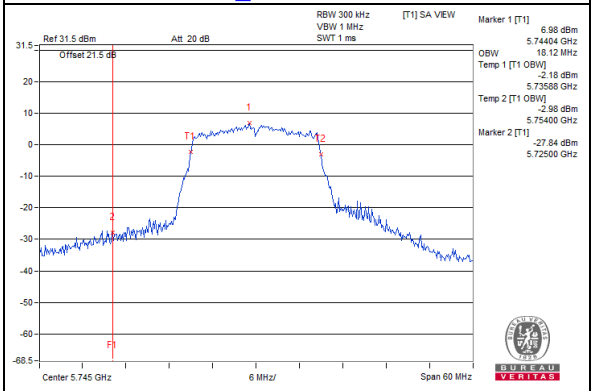


802.11ac (VHT80)_Chain 1 / CH42

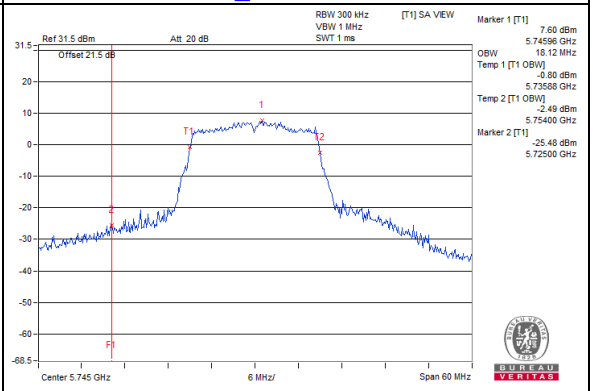


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

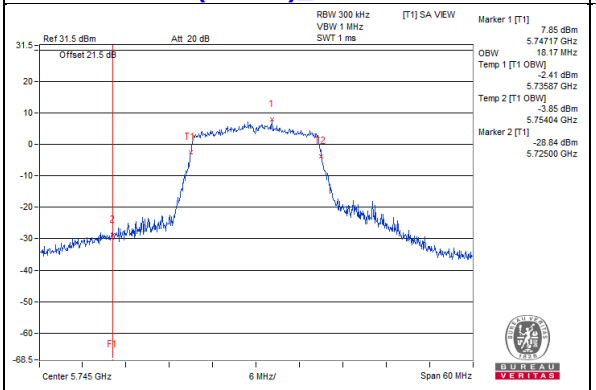
802.11a_Chain 0 / CH149



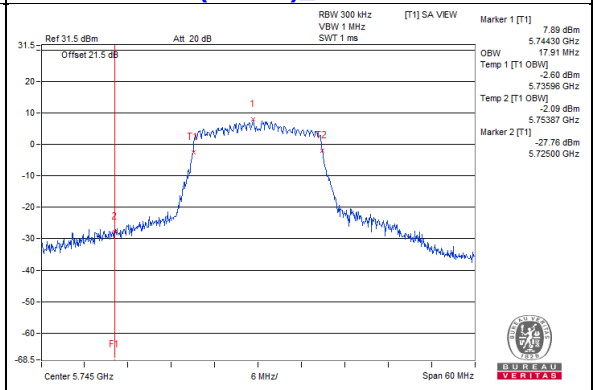
802.11a_Chain 1 / CH149



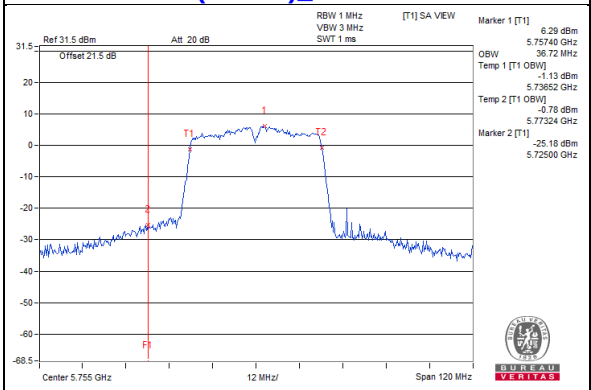
802.11ac (VHT20)_Chain 0 / CH149



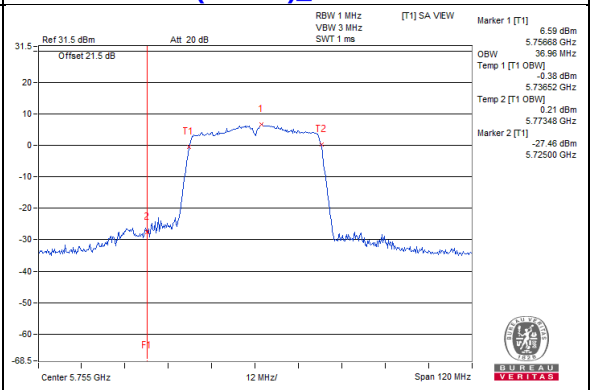
802.11ac (VHT20)_Chain 1 / CH149



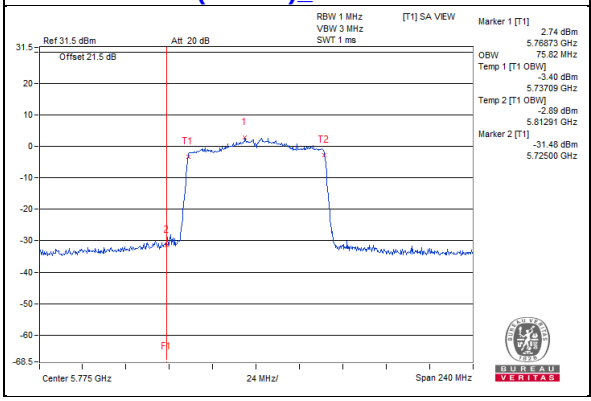
802.11ac (VHT40)_Chain 0 / CH151



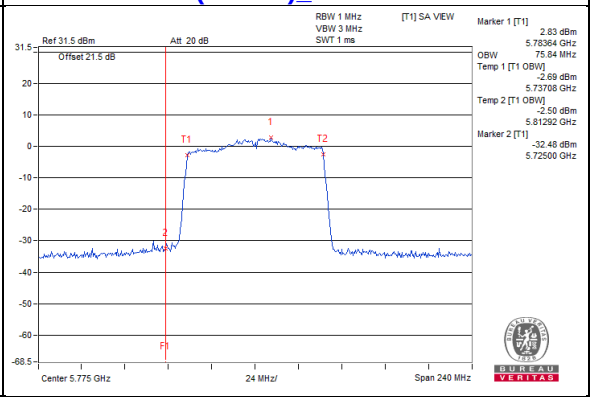
802.11ac (VHT40)_Chain 1 / CH151



802.11ac (VHT80)_Chain 0 / CH155



802.11ac (VHT80)_Chain 1 / CH155

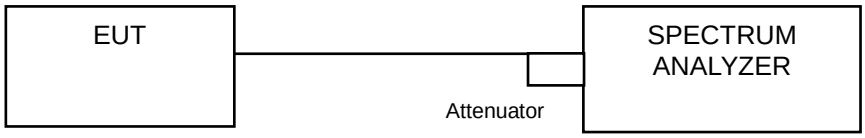


4.5 Peak Power Spectral Density Measurement

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 802.11a, 802.11ac (VHT20), 802.11ac (VHT40)
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 (increasing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value

For 802.11ac (VHT80)

For U-NII-1 band:

Using method SA-2

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

For U-NII-3 band:

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 (increasing) the measured power by a bandwidth correction factor (BWCF) where BWCF = 10log(500 kHz/300kHz)
5. Sweep time = auto, trigger set to “free run”.
6. Trace average at least 100 traces in power averaging mode.
7. Record the max value and add 10 log (1/duty cycle)

4.5.5 Deviation from Test Standard

No deviation.

4.5.6 EUT Operating Condition

Same as Item 4.3.6.

4.5.7 Test Results

For U-NII-1:

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Max. PSD Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	3.98	3.91	6.96	17.00	Pass
40	5200	4.00	4.28	7.15	17.00	Pass
48	5240	4.14	4.44	7.30	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Max. PSD Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
36	5180	2.88	3.12	6.01	17.00	Pass
40	5200	3.04	3.35	6.21	17.00	Pass
48	5240	3.42	3.62	6.53	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)		Total PSD (dBm/MHz)	Max. PSD Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1			
38	5190	-2.39	-1.93	0.86	17.00	Pass
46	5230	-1.77	-1.44	1.41	17.00	Pass

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD (dBm/MHz)	Max. PSD Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-6.92	-6.46	0.25	-3.43	17.00	Pass

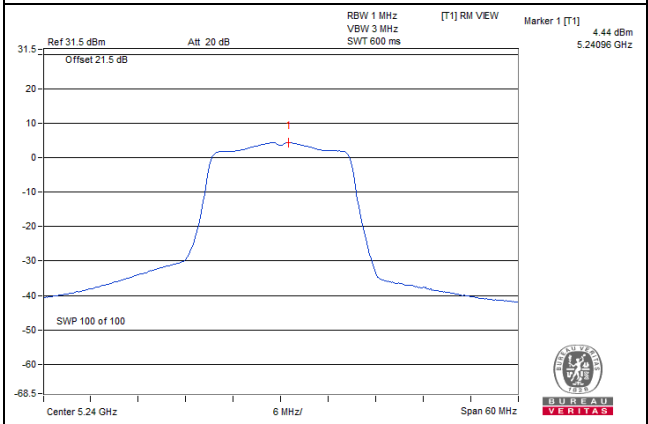
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

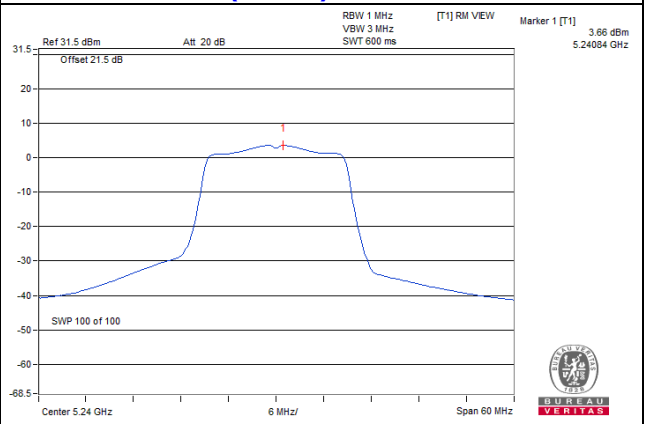
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

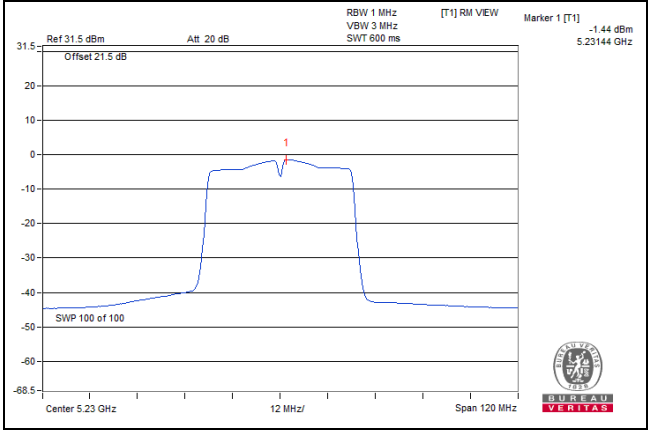
802.11a_Chain 1 / CH48



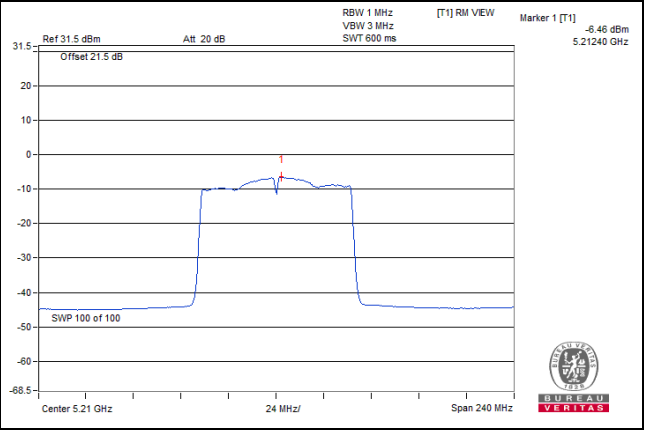
802.11ac (VHT20)_Chain 1 / CH48



802.11ac (VHT40)_Chain 1 / CH46



802.11ac (VHT80)_Chain 1 / CH42



For U-NII-3:

CDD Mode

802.11a

Chan.	Chan. Freq. (MHz)	PSD (dBm/300kHz)		Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1				
149	5745	-0.92	0.01	2.58	4.80	30.00	Pass
157	5785	-1.15	-0.11	2.41	4.63	30.00	Pass
165	5825	-1.53	-0.42	2.07	4.29	30.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/300kHz)		Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1				
149	5745	-0.83	-0.08	2.57	4.79	30.00	Pass
157	5785	-1.00	-0.15	2.46	4.68	30.00	Pass
165	5825	-1.38	0.08	2.42	4.64	30.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD (dBm/300kHz)		Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1				
151	5755	-7.26	-5.91	-3.52	-1.30	30.00	Pass
159	5795	-7.30	-5.77	-3.46	-1.24	30.00	Pass

Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.

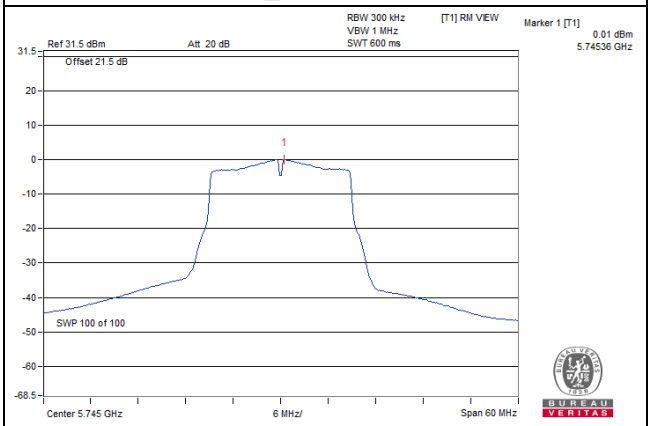
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)		Duty Factor (dB)	Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1					
155	5775	-11.78	-10.72	0.25	-7.96	-5.74	30.00	Pass

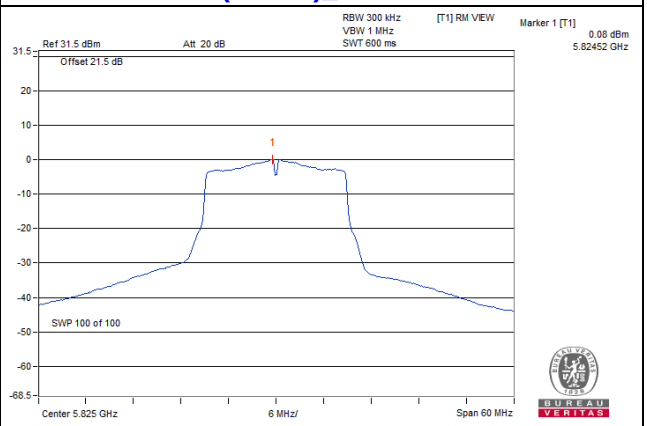
Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 1.8dBi + 10log(2) = 4.81 dBi < 6dBi, so the output power limit shall not be reduced.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

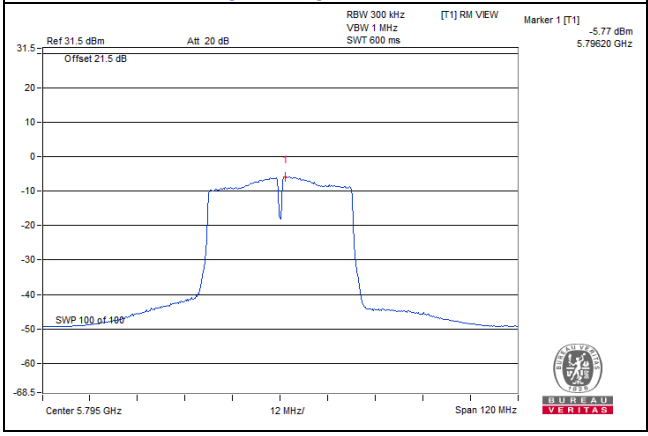
802.11a_Chain 1 / CH149



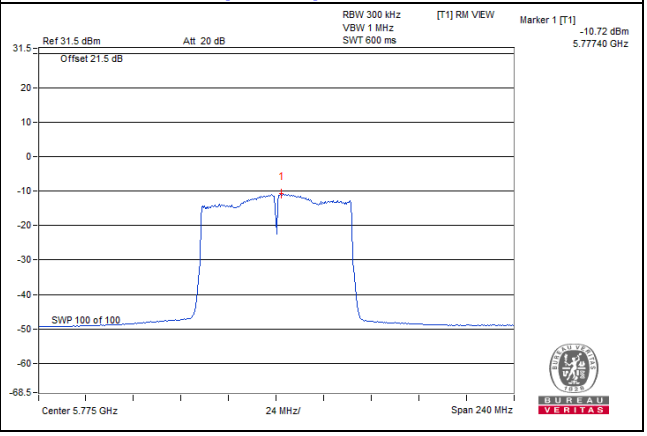
802.11ac (VHT20)_Chain 1 / CH165



802.11ac (VHT40)_Chain 1 / CH159



802.11ac (VHT80)_Chain 1 / CH155

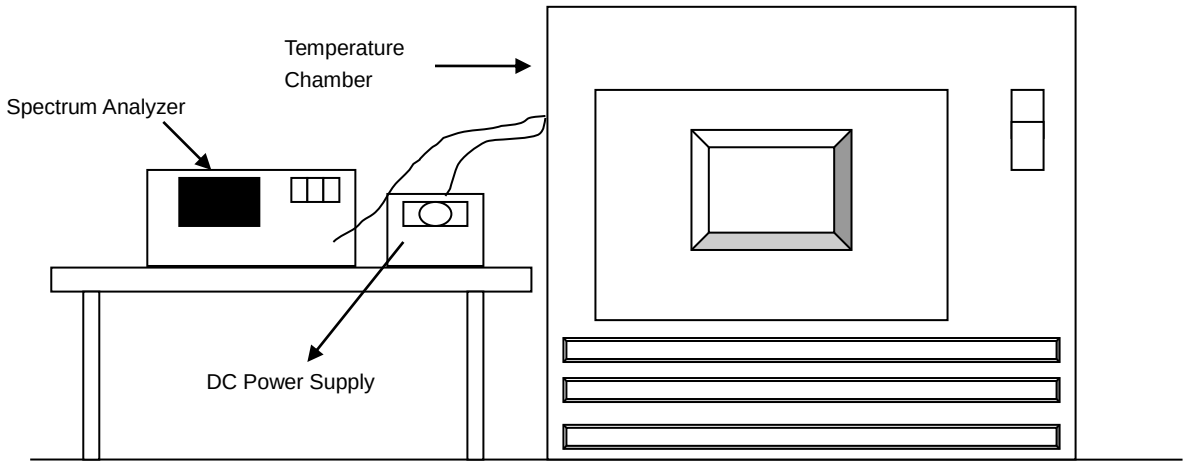


4.6 Frequency Stability Measurement

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 DC voltage.

b. Turn the EUT on and couple its output to a spectrum analyzer.

c. Turn the EUT off and set the chamber to the highest temperature specified.

d. Allow sufficient time (approximately 30 min) for the temperature of the chamber to stabilize, turn the EUT on and measure the operating frequency after 2, 5, and 10 Minutes.

e. Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed.

f. The test chamber was allowed to stabilize at +20 degree C for a minimum of 30 Minutes. The supply voltage was then adjusted on the EUT from 85% to 115% and the frequency record.

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

Frequency Stability Versus Temp.									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
70	12	5180.0039	Pass	5180.0041	Pass	5180.0047	Pass	5180.008	Pass
60	12	5180.018	Pass	5180.0184	Pass	5180.0179	Pass	5180.0166	Pass
50	12	5180.0167	Pass	5180.0159	Pass	5180.0164	Pass	5180.016	Pass
40	12	5179.9978	Pass	5179.9986	Pass	5179.998	Pass	5179.9972	Pass
30	12	5180.0163	Pass	5180.0163	Pass	5180.0152	Pass	5180.0153	Pass
20	12	5179.9921	Pass	5179.9936	Pass	5179.992	Pass	5179.9928	Pass
10	12	5180.0191	Pass	5180.0172	Pass	5180.0182	Pass	5180.0151	Pass
0	12	5179.9929	Pass	5179.9914	Pass	5179.9906	Pass	5179.9902	Pass
-10	12	5180.0137	Pass	5180.0135	Pass	5180.0129	Pass	5180.0171	Pass
-20	12	5180.0235	Pass	5180.0279	Pass	5180.0274	Pass	5180.0268	Pass

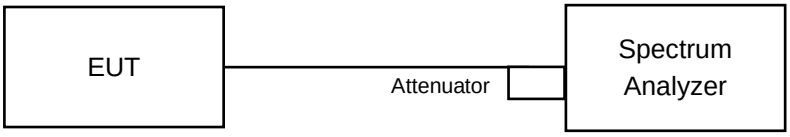
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	13.8	5179.9907	Pass	5179.9898	Pass	5179.9914	Pass	5179.9912	Pass
	12	5179.9921	Pass	5179.9936	Pass	5179.992	Pass	5179.9928	Pass
	10.2	5179.9944	Pass	5179.9918	Pass	5179.9919	Pass	5179.9909	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

CDD Mode

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.58	17.62	0.5	Pass
157	5785	17.61	17.4	0.5	Pass
165	5825	17.59	17.6	0.5	Pass

802.11ac (VHT20)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.58	17.6	0.5	Pass
157	5785	17.6	17.63	0.5	Pass
165	5825	17.57	17.63	0.5	Pass

802.11ac (VHT40)

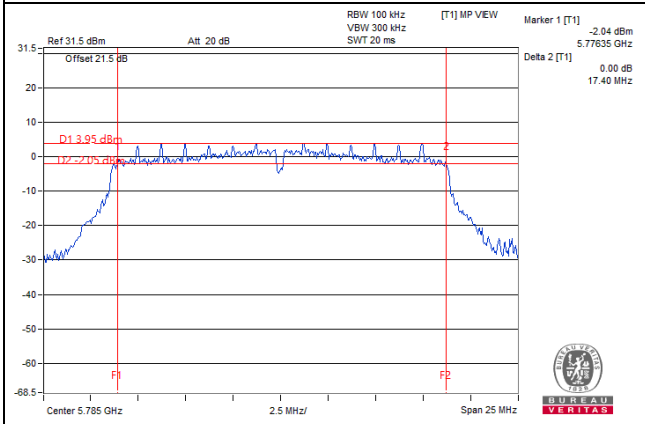
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.9	35.89	0.5	Pass
159	5795	35.66	35.54	0.5	Pass

802.11ac (VHT80)

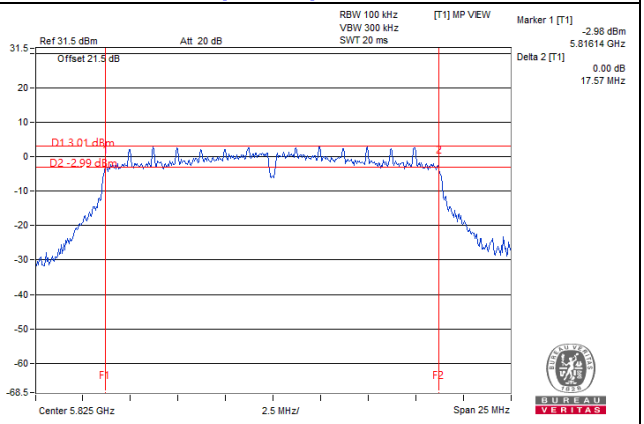
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.74	75.96	0.5	Pass

Spectrum Plot of Worst Value

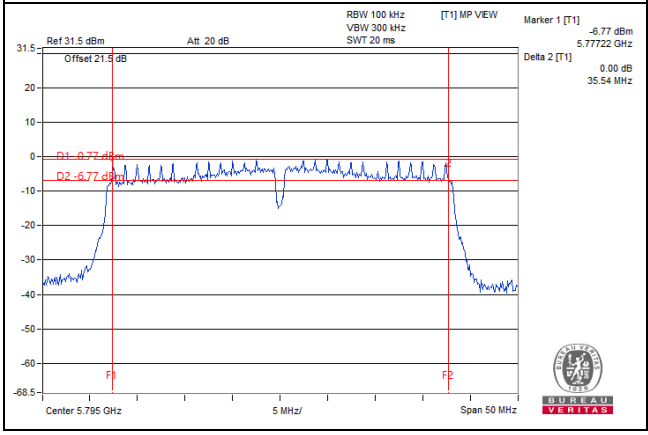
802.11a_Chain 1 / CH157



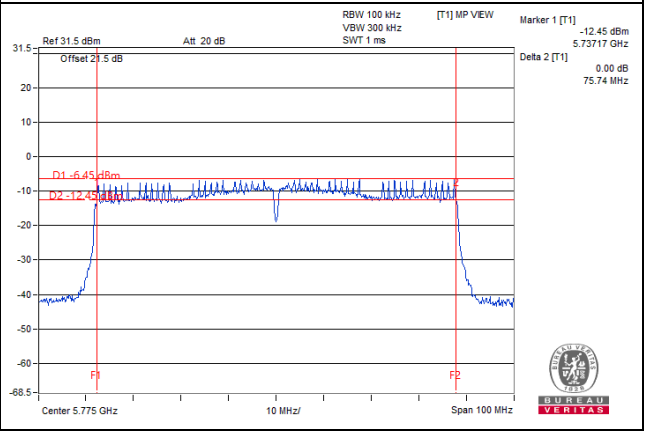
802.11ac (VHT20)_Chain 0 / CH165



802.11ac (VHT40)_Chain 1 / CH159



802.11ac (VHT80)_Chain 0 / CH155



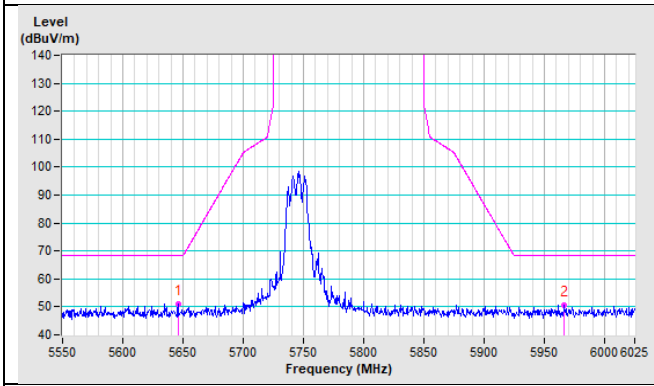
5 Pictures of Test Arrangements

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

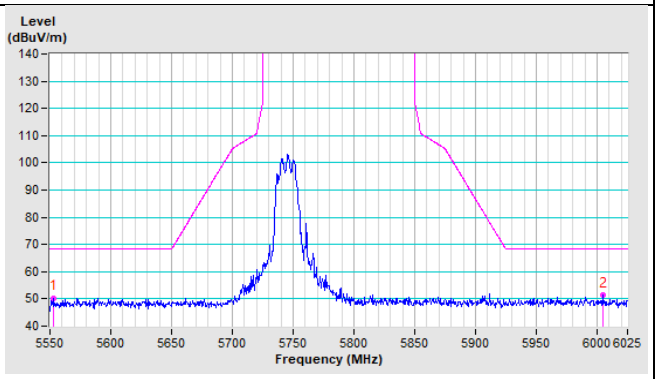
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a CH 149：5745 MHz

Horizontal

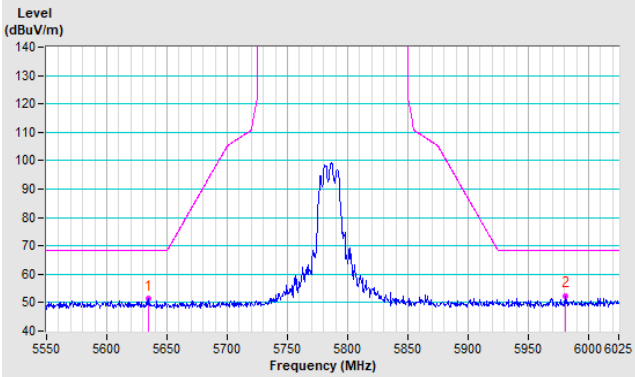


Vertical

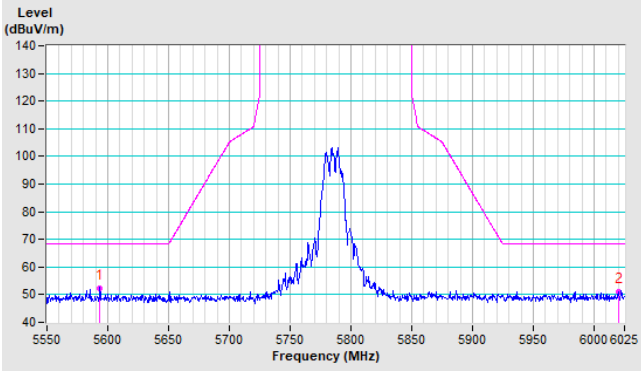


802.11a CH 157：5785 MHz

Horizontal

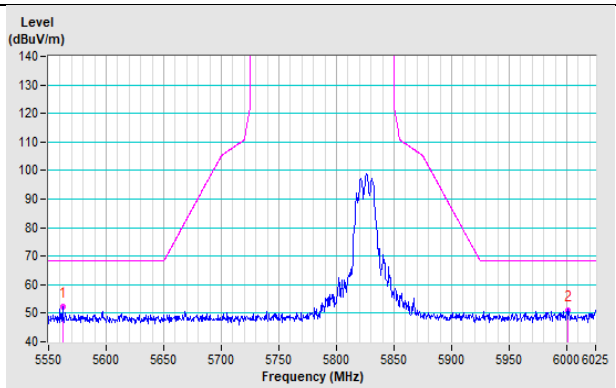


Vertical

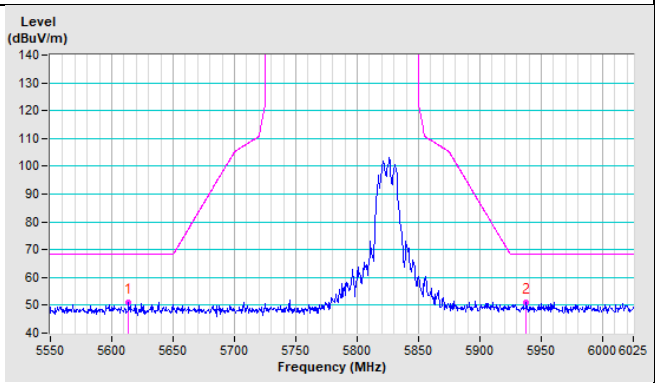


802.11a CH 165：5825 MHz

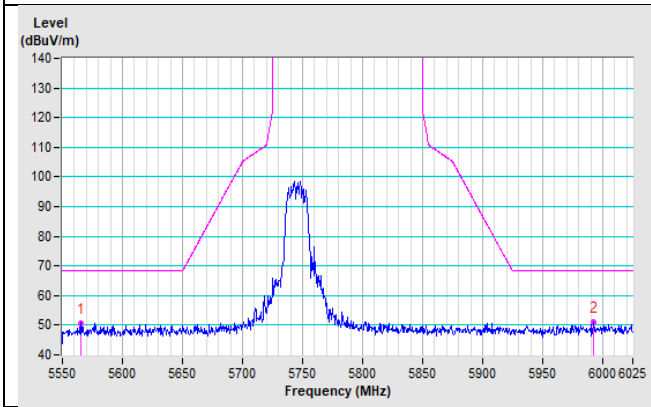
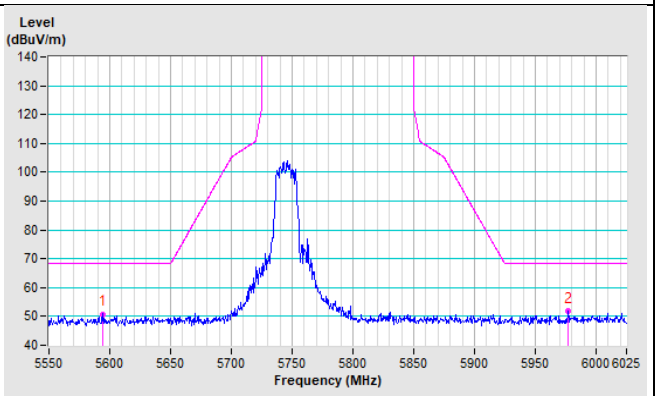
Horizontal



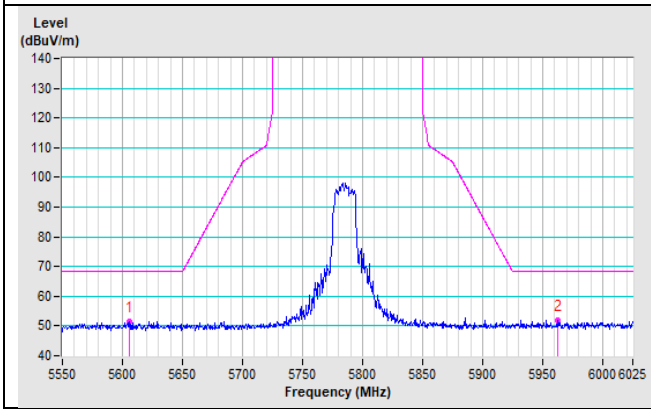
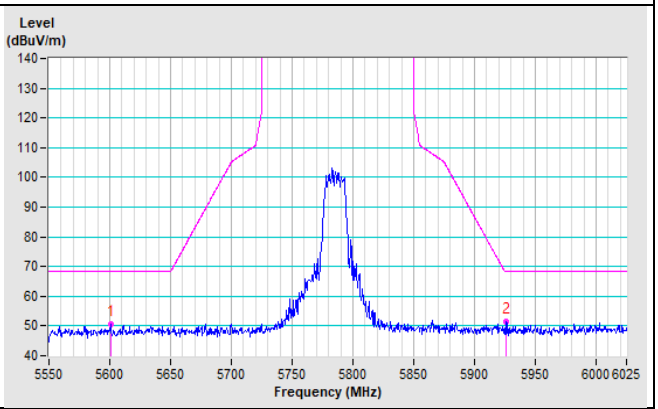
Vertical



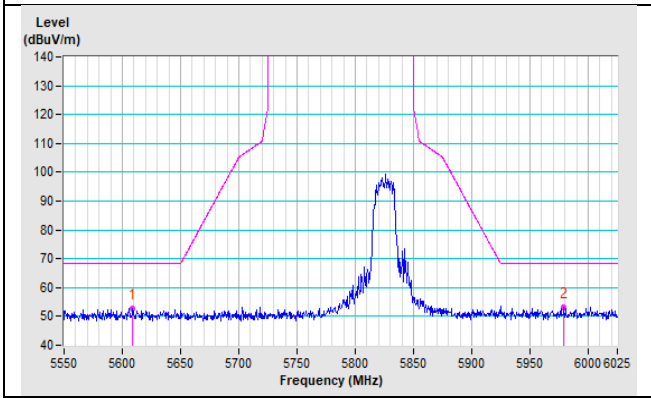
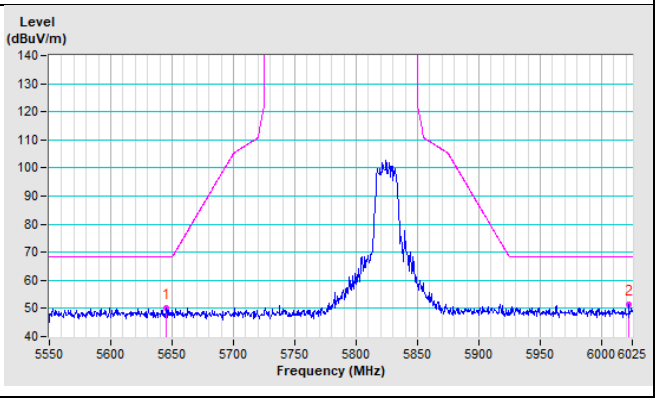
802.11ac (VHT20) CH 149：5745 MHz

Horizontal	Vertical
	

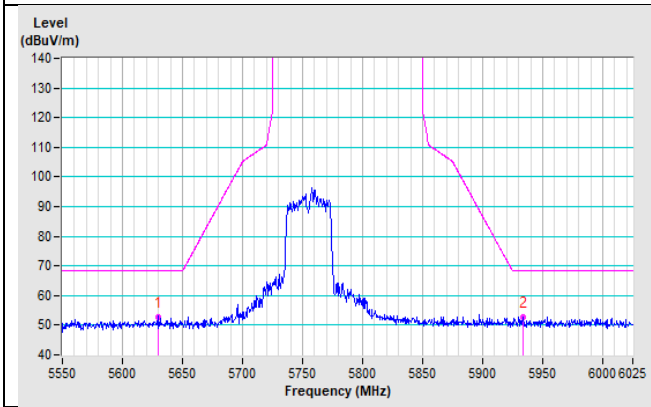
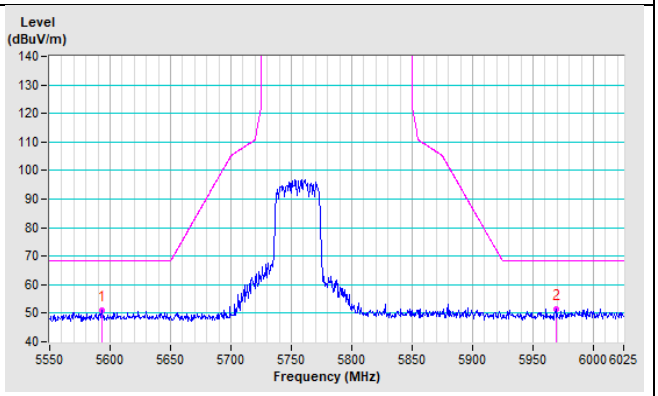
802.11ac (VHT20) CH 157：5785 MHz

Horizontal	Vertical
	

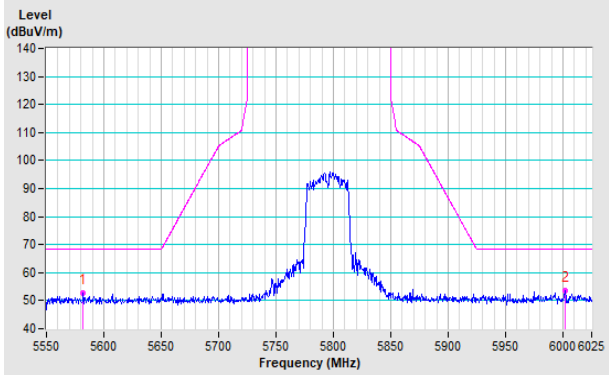
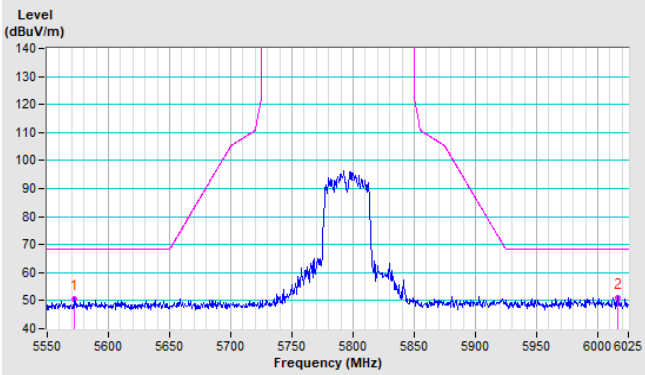
802.11ac (VHT20) CH 165：5825 MHz

Horizontal	Vertical
	

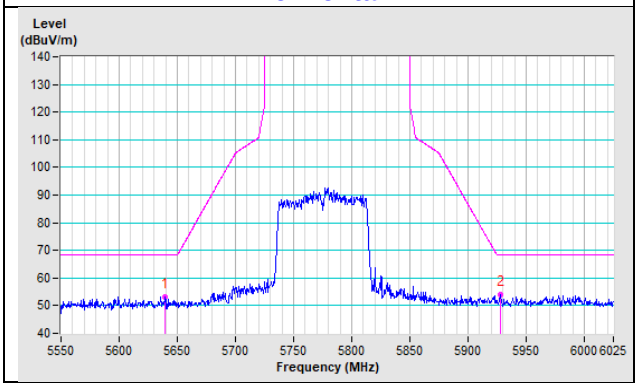
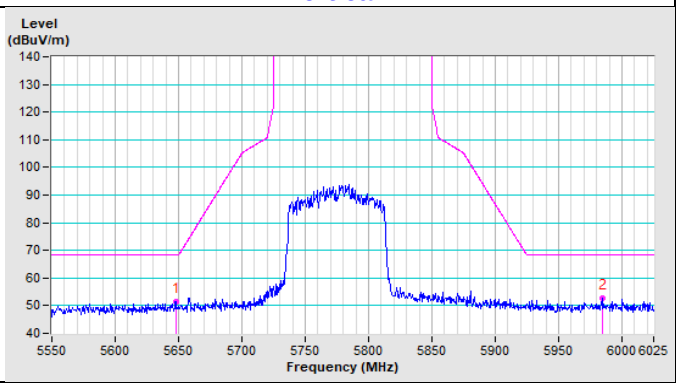
802.11ac (VHT40) CH 151：5755 MHz

Horizontal	Vertical
	

802.11ac (VHT40) CH 159：5795 MHz

Horizontal	Vertical
	

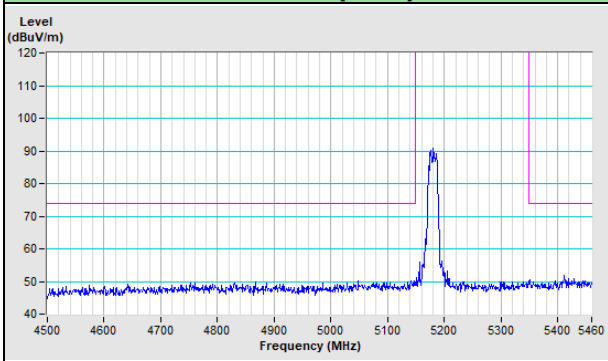
802.11ac (VHT80) CH 155：5775 MHz

Horizontal	Vertical
	

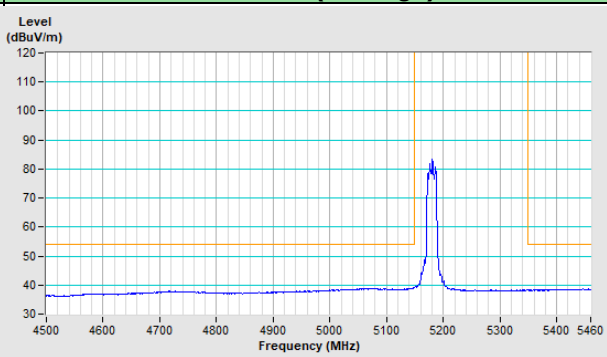
Annex B- Band-edge measurement (For U-NII-1 band)

802.11a Channel 36

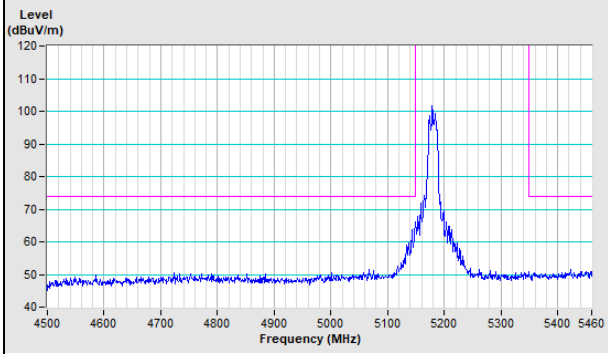
Horizontal (Peak)



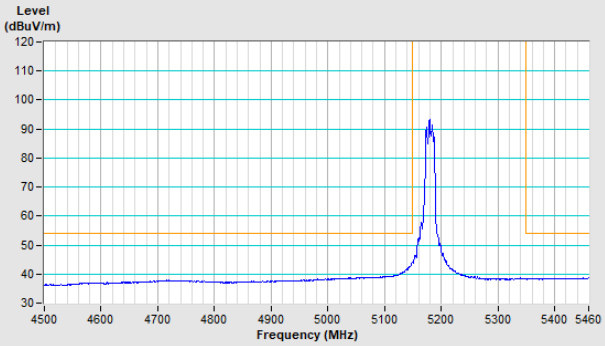
Horizontal (Average)



Vertical (Peak)

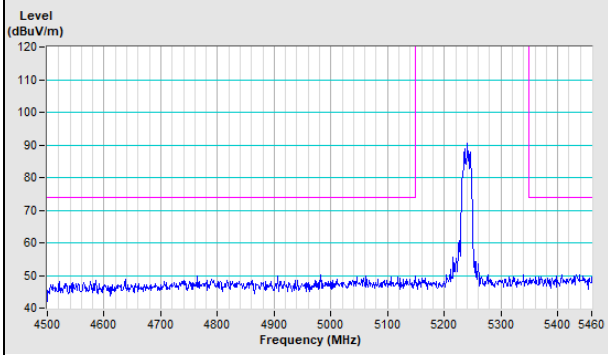


Vertical (Average)

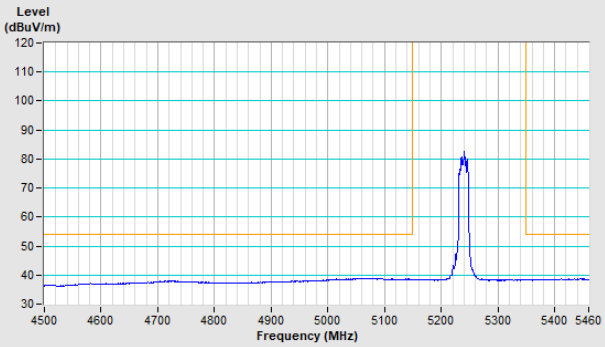


802.11a Channel 48

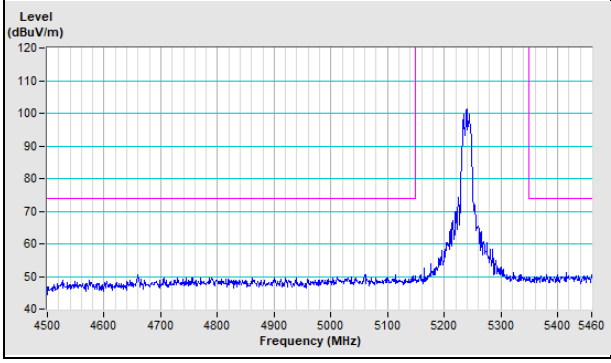
Horizontal (Peak)



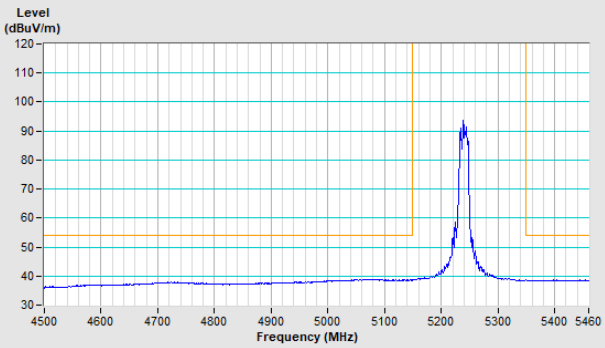
Horizontal (Average)



Vertical (Peak)

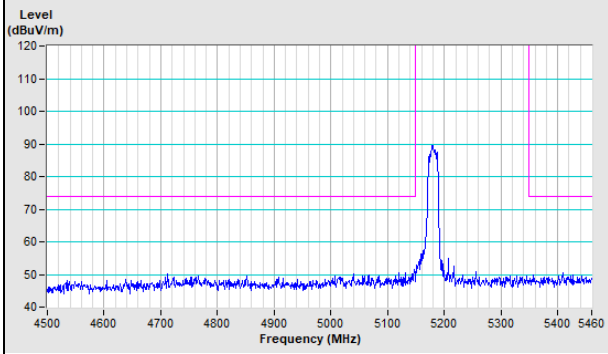


Vertical (Average)

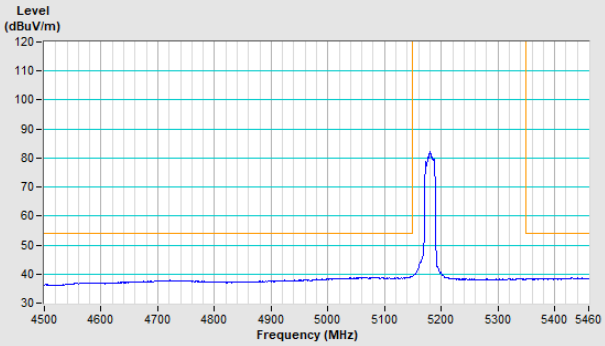


802.11ac (VHT20) Channel 36

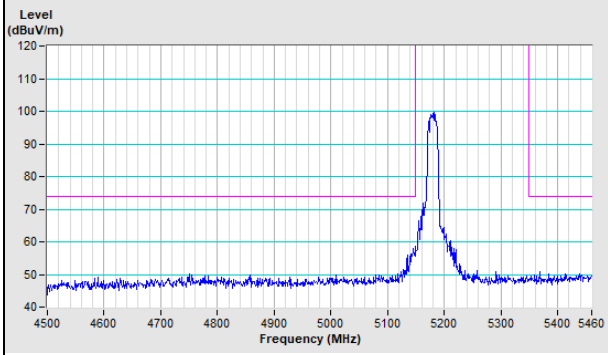
Horizontal (Peak)



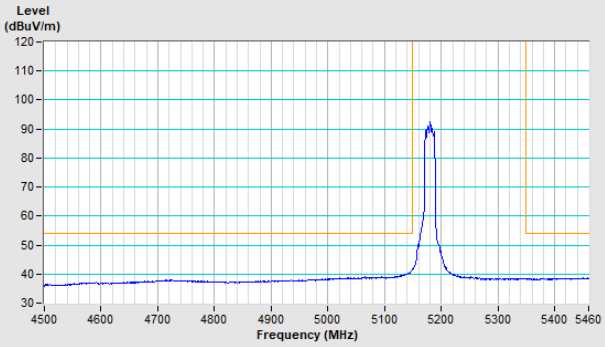
Horizontal (Average)



Vertical (Peak)

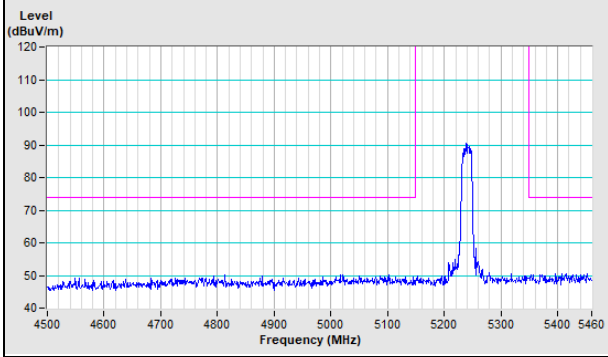


Vertical (Average)

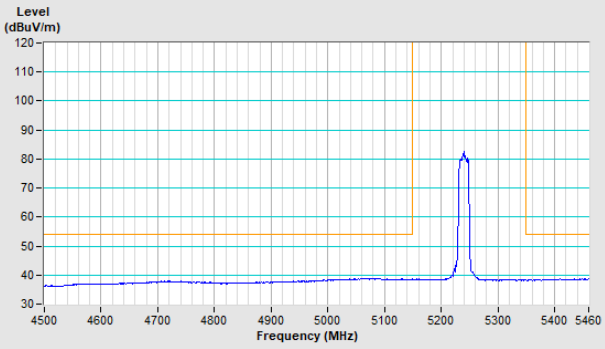


802.11ac (VHT20) Channel 48

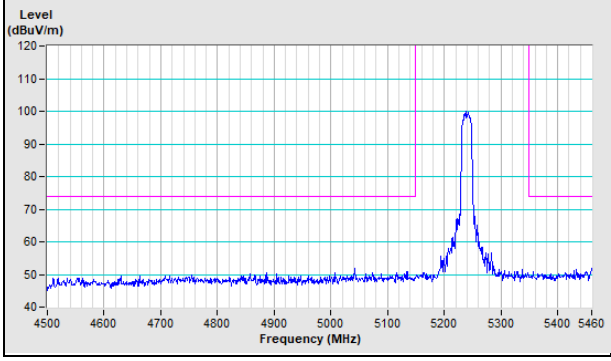
Horizontal (Peak)



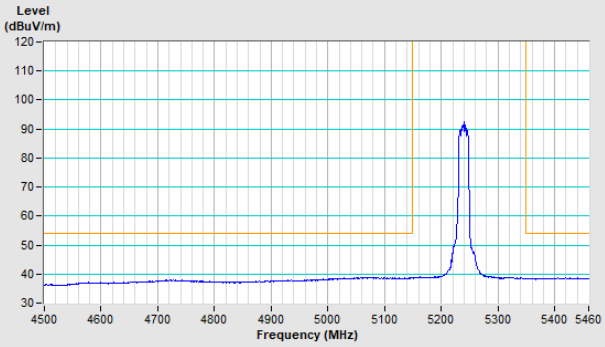
Horizontal (Average)



Vertical (Peak)

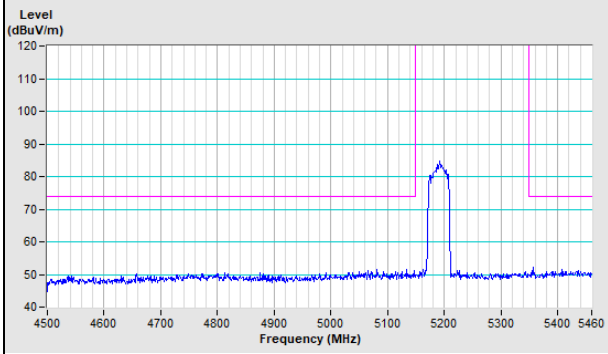


Vertical (Average)

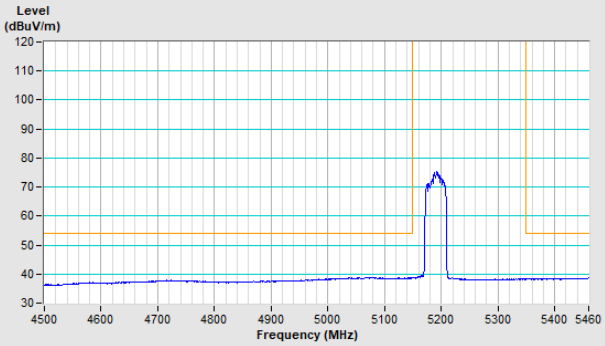


802.11ac (VHT40) Channel 38

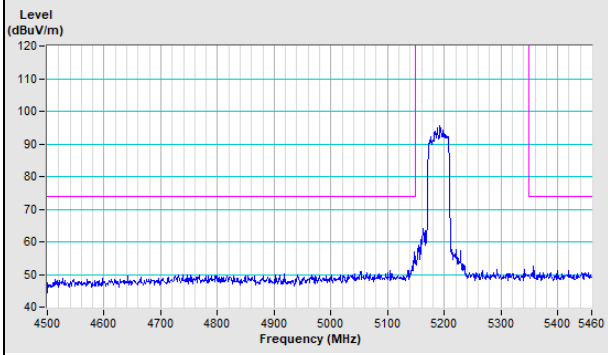
Horizontal (Peak)



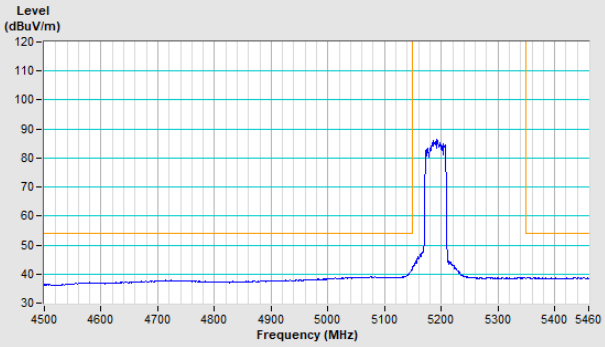
Horizontal (Average)



Vertical (Peak)

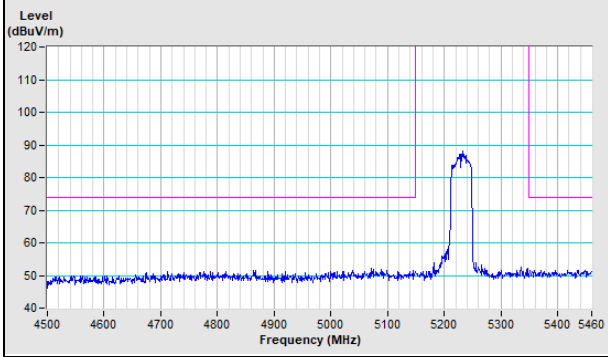


Vertical (Average)

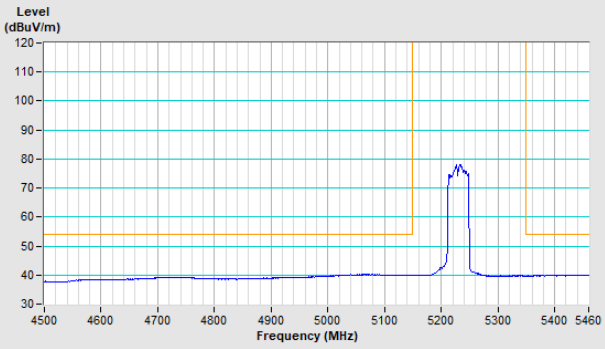


802.11ac (VHT40) Channel 46

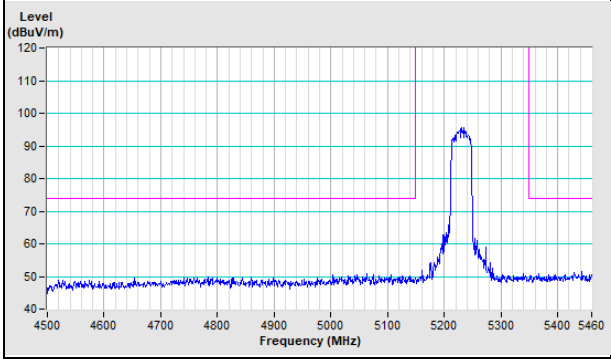
Horizontal (Peak)



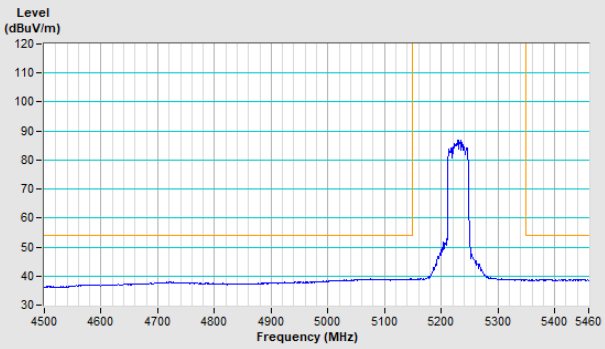
Horizontal (Average)

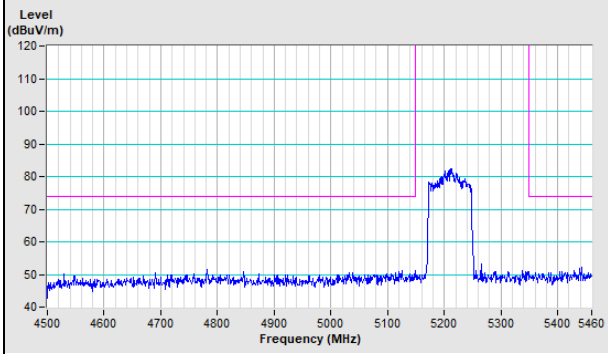
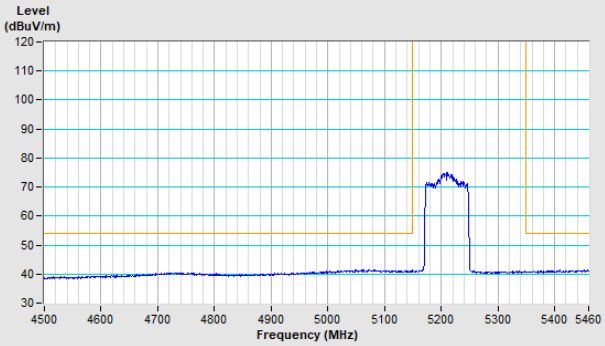
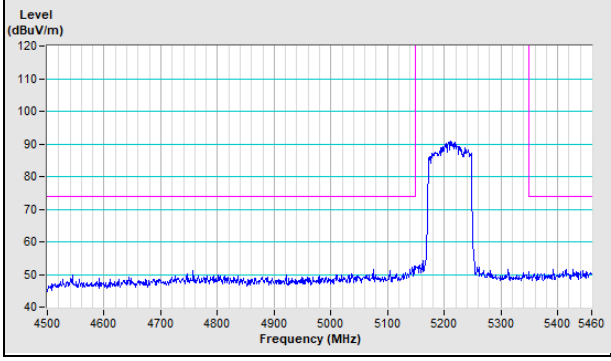
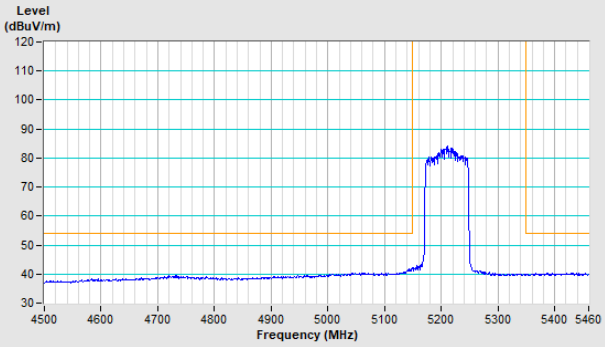


Vertical (Peak)



Vertical (Average)



802.11ac (VHT80) Channel 42	
Horizontal (Peak)	**Horizontal (Average)**
	
Vertical (Peak)	**Vertical (Average)**
	

Appendix – Information of 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.

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

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

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