FCC Test Report

Report No.:	RFBDMW-WTW-P20121069-1
FCC ID:	M4Y-SP230
Test Model:	SP230-S5
Series Model:	SP230
Received Date:	Dec. 31, 2020
Test Date:	Jan. 18 to Feb. 05, 2021
Issued Date:	Feb. 19, 2021
Applicant:	Z-Com, Inc.
Address:	5F, No.8, HSIN ANN RD., HSINCHU SCIENCE PARK, HSINCHU, 30078 TAIWAN
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwa.
Test Location:	E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300, Taiwan.
FCC Registration / Designation Number:	723255 / TW2022

Table of Contents

Release Control Record

Issue No.	Description	Date Issued
RFBDMW-WTW-P20121069-1	Original release.	Feb. 19, 2021

1 Certificate of Conformity

Product:	802.11 ac Wave 2 Access Point
Brand:	ZCOM
Test Model:	SP230-S5
Series Model:	SP230
Sample Status:	Mass product
Applicant:	Z-Com, Inc.
Test Date:	Jan. 18 to Feb. 05, 2021
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:** Feb. 19, 2021

Vivian Hunag / Specialist

Approved by : , **Date:** Feb. 19, 2021

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 -7.64dB at 0.20859MHz.
15.407(b) (1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	PASS	Meet the requirement of limit. Minimum passing margin is -0.1dB at 5148.14MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	PASS	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	PASS	Meet the requirement of limit.
15.407(e)	6dB bandwidth	PASS	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	PASS	Meet the requirement of limit.
15.203	Antenna Requirement	PASS	Antenna connector is i-pex(MHF)not a standard connector.

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	802.11 ac Wave 2 Access Point
Brand	ZCOM
Test Model	SP230-S5
Series Model	SP230
Status of EUT	Mass product
Power Supply Rating	48 Vdc from PoE
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in 11ac mode
Modulation Technology	DSSS,OFDM
Transfer Rate	802.11b: up to 11 Mbps 802.11a/g: up to 54 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 866.7 Mbps
Operating Frequency	**2.4GHz:** 2.412 ~ 2.462GHz **5GHz:** 5.18~5.24GHz, 5.745 ~ 5.825GHz
Number of Channel	**2.4GHz:** 802.11b, 802.11g, 802.11n (HT20): 11 802.11n (HT40): 7 **5GHz:** 802.11a, 802.11n (HT20), 802.11ac (VHT20): 9 802.11n (HT40), 802.11ac (VHT40): 4 802.11ac (VHT80): 2
Output Power	**2.412 ~ 2.462 GHz:** 292.715 mW **5.18 ~ 5.24 GHz:** 274.892 mW **5.745 ~ 5.825 GHz:** 176.835 mW
Antenna Type	Refer to Note
Antenna Connector	Refer to Note
Accessory Device	NA
Cable Supplied	Ground Cable x 1

Note:

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

Model No.	Description
SP230-S5	Use 5GHz antenna of model name 98P1DUIPF000
SP230	Use 5GHz antenna of model name 1001A0016 5GHz & 2.4GHz antenna position is different compared and 5GHz antenna gain with Model: SP230-S5
Note: From the above models, the worse emission was found in Model No.: SP230-S5. Therefore only the test data of the mode was recorded in this report.	

2. The EUT has two radios as following table:

Radio 1	Radio 2
WLAN 2.4GHz	WLAN 5GHz

3. Simultaneously transmission condition.

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

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

Model: SP230-S5								
Antenna NO.	Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
2G0	Chain 0 (J26)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
2G1	Chain 1 (J24)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
5G0	Chain 0 (J23)	BDTRON	98P1DUIPF000	9.52 10.39 10.39 10.14	5.15~5.25GHz 5.25~5.35GHz 5.47~5.725GHz 5.725~5.85GHz	PCB	i-pex(MHF) i-pex(MHF)	230
5G1	Chain 1 (J25)	BDTRON	98P1DUIPF000	8.6 9.87 9.87 10.43	5.15~5.25GHz 5.25~5.35GHz 5.47~5.725GHz 5.725~5.85GHz	PCB	i-pex(MHF)	230
Model: SP230								
Antenna NO.	Chain No.	Brand	Model	Antenna Net Gain(dBi)	Frequency range	Antenna Type	Connector Type	Cable Length (mm)
2G0	Chain 0 (J26)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
2G1	Chain 1 (J24)	BDTRON	1001A0018	5.5	2.4~2.4835GHz	PCB	i-pex(MHF)	230
5G0	Chain 0 (J23)	BDTRON	1001A0016	6.5	5.15~5.85GHz	PCB	i-pex(MHF)	230
5G1	Chain 1 (J25)	BDTRON	1001A0016	6.5	5.15~5.85GHz	PCB	i-pex(MHF)	230

5. The EUT incorporates a MIMO function:

2.4GHz Band		
MODULATION MODE	**TX & RX CONFIGURATION**	
802.11b	2TX	2RX
802.11g	2TX	2RX
802.11n (HT20)	2TX	2RX
802.11n (HT40)	2TX	2RX
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: The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report.		

6. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
7. 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 Y-plane.

Radiated Emission Test (Above 1GHz):

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

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.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT40)	5180-5240 5745-5825	38 to 46 151 to 159	46	OFDM	BPSK	13.5

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.

Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
802.11ac (VHT40)	5180-5240 5745-5825	38 to 46 151 to 159	46	OFDM	BPSK	13.5

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.

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

Test Condition:

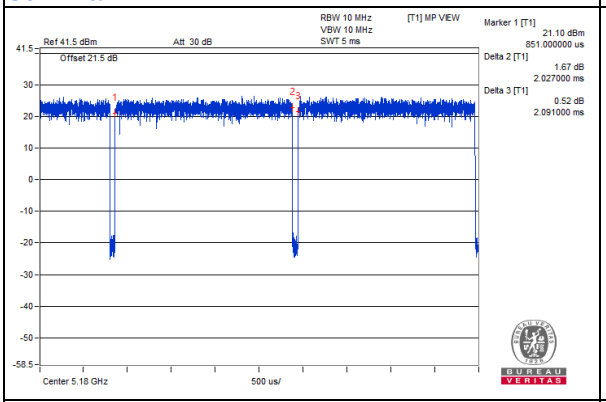
Applicable To	Environmental Conditions	Input Power (System)	Tested By
RE≥1G	25deg. C, 75%RH	120Vac, 60Hz	Tom Yang
RE<1G	25deg. C, 66%RH	120Vac, 60Hz	Sampson Chen
PLC	25deg. C, 75%RH	120Vac, 60Hz	Sampson Chen
APCM	25deg. C, 60%RH	120Vac, 60Hz	Jyunchun Lin

3.3 Duty Cycle of Test Signal

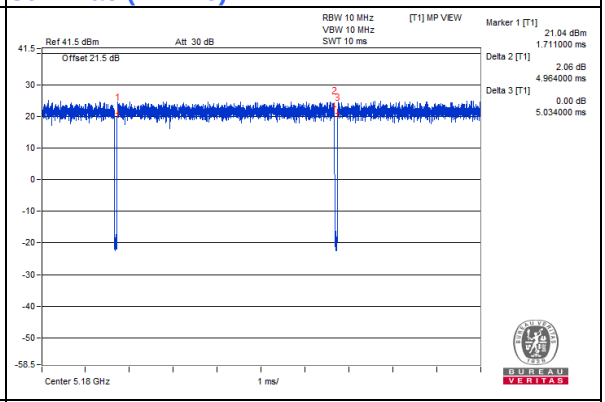
If duty cycle of test signal is ≥ 98 %, duty factor is not required.
If duty cycle of test signal is < 98%, duty factor shall be considered.

802.11a: Duty cycle = 2.027 ms/2.091 ms =0.969, Duty factor = 10 * log (1/Duty cycle) =0.14 dB
802.11ac (VHT20): Duty cycle = 4.964 ms/5.034 ms = 0.986
802.11ac (VHT40): Duty cycle = 2.412 ms/2.48 ms = 0.973, Duty factor = 10 * log (1/Duty cycle) = 0.12 dB
802.11ac (VHT80): Duty cycle = 1.136 ms/1.199 ms = 0.947, Duty factor = 10 * log (1/Duty cycle) = 0.23 dB

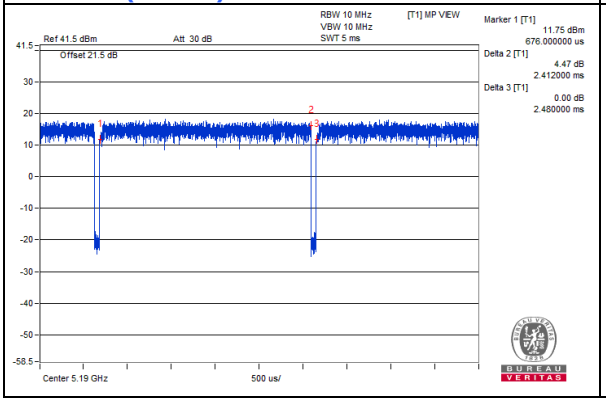
802.11a



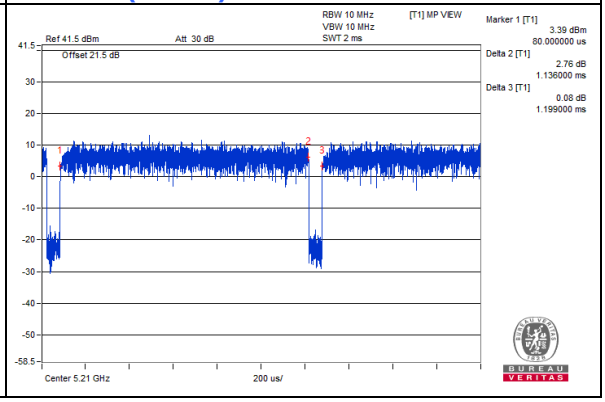
802.11ac (VHT20)



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	20U5S01X00 L14	PF-1ANPYA	NA	Provided by Lab
B.	PoE Adapter	Gigabit	PSE301G	NA	NA	Supplied by client
C.	Laptop	Lenovo	20U5S01X00 L14	PF-28LKK7	NA	Provided by Lab

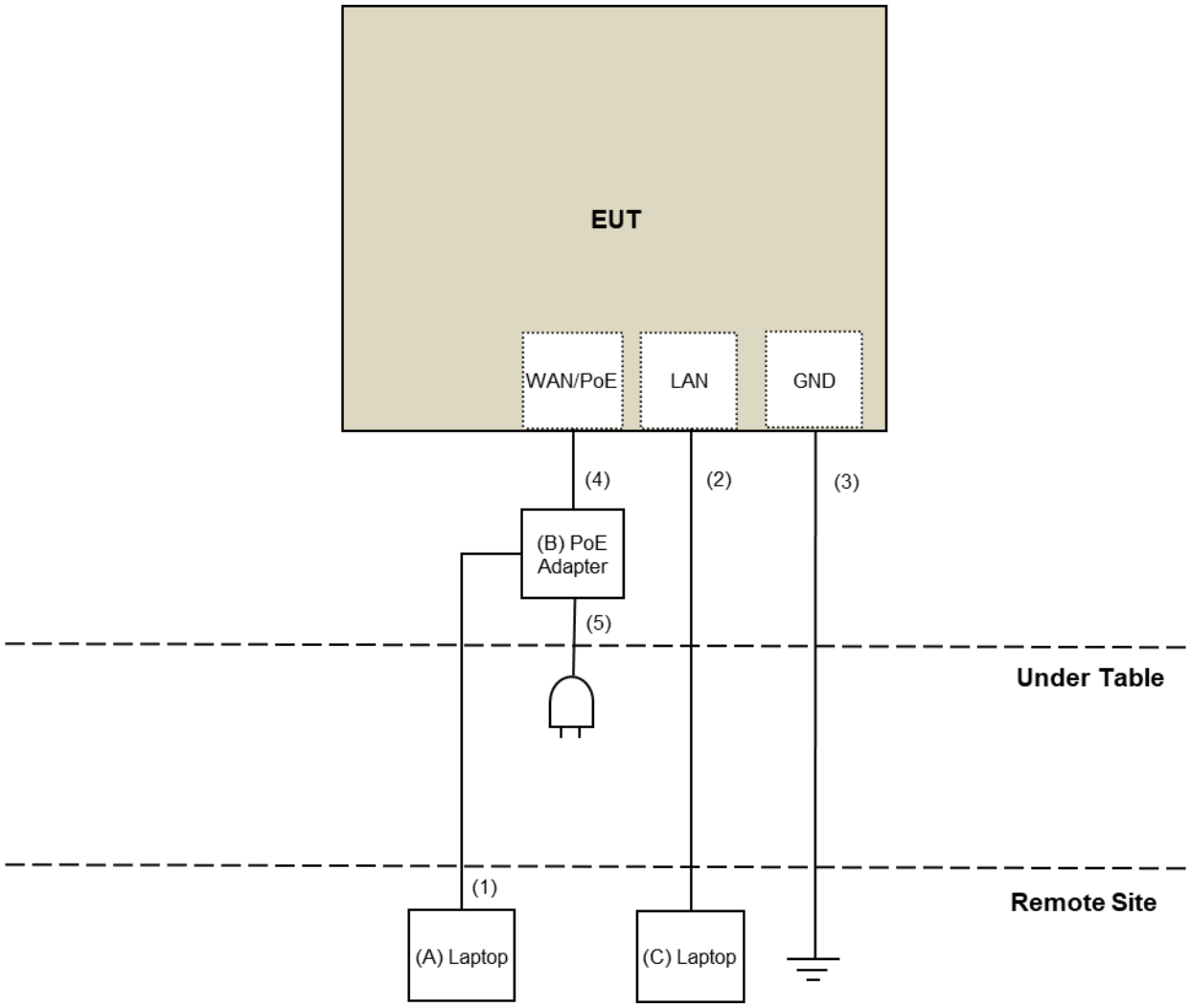
Note:

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

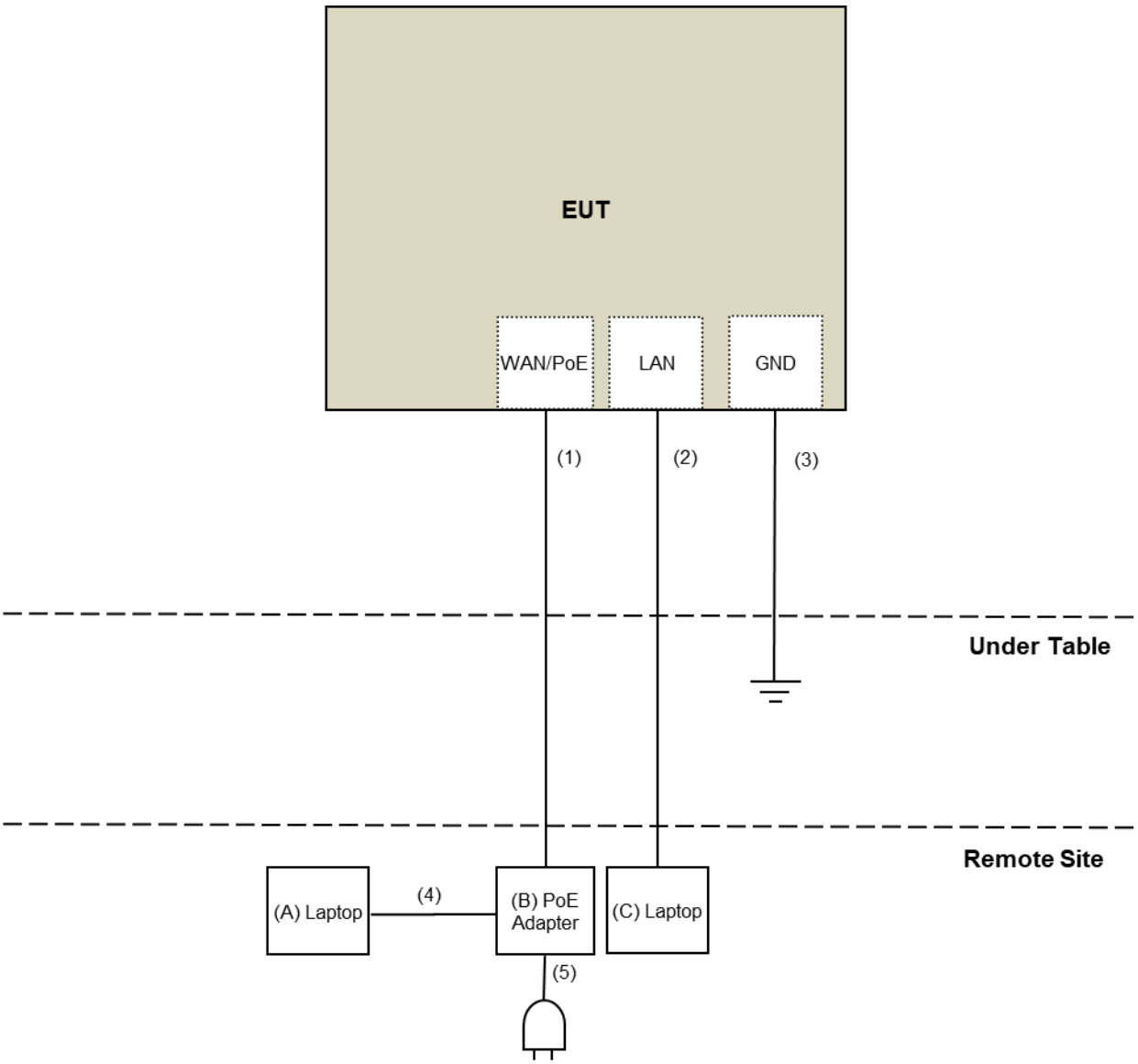
ID	Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ-45 Cable	1	10	No	0	Provided by Lab
2.	RJ-45 Cable	1	10	No	0	Provided by Lab
3.	Ground Cable	1	3	Yes	0	Supplied by client
4.	RJ-45 Cable	1	3	No	0	Provided by Lab
5.	AC Cable	1	1.8	No	0	Provided by Lab

3.4.1 Configuration of System under Test

For Conducted Emissions:



For Radiated Emissions:



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 and OOBE test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver Keysight	N9038A	MY54450088	July 06, 2020	July 05, 2021
Pre-Amplifier EMCI	EMC001340	980142	May 25, 2020	May 24, 2021
Loop Antenna Electro-Metrics	EM-6879	264	Feb. 18, 2020	Feb. 17, 2021
RF Cable	5D-FB	LOOPCAB-001	Jan. 07, 2021	Jan. 06, 2022
RF Cable	5D-FB	LOOPCAB-002	Jan. 07, 2021	Jan. 06, 2022
Pre-Amplifier Mini-Circuits	ZFL-1000VH2	QA0838008	Oct. 20, 2020	Oct. 19, 2021
Trilog Broadband Antenna SCHWARZBECK	VULB 9168	9168-361	Nov. 05, 2020	Nov. 04, 2021
RF Cable	8D	966-3-1	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-2	Mar. 17, 2020	Mar. 16, 2021
RF Cable	8D	966-3-3	Mar. 17, 2020	Mar. 16, 2021
Fixed attenuator Mini-Circuits	UNAT-5+	PAD-3m-3-01	Sep. 24, 2020	Sep. 23, 2021
Horn_Antenna SCHWARZBECK	BBHA9120-D	9120D-406	Nov. 22, 2020	Nov. 21, 2021
Pre-Amplifier EMCI	EMC12630SE	980384	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC104-SM-SM-1500	180504	Apr. 29, 2020	Apr. 28, 2021
RF Cable	EMC104-SM-SM-2000	180601	June 09, 2020	June 08, 2021
RF Cable	EMC104-SM-SM-6000	180602	June 09, 2020	June 08, 2021
Spectrum Analyzer Keysight	N9030A	MY54490679	July 13, 2020	July 12, 2021
Pre-Amplifier EMCI	EMC184045SE	980387	Jan. 11, 2021	Jan. 10, 2022
Horn_Antenna SCHWARZBECK	BBHA 9170	BBHA9170519	Nov. 22, 2020	Nov. 21, 2021
RF Cable	EMC102-KM-KM-1200	160924	Jan. 11, 2021	Jan. 10, 2022
RF Cable	EMC-KM-KM-4000	200214	Mar. 11, 2020	Mar. 10, 2021
Software	ADT_Radiated_V8.7.08	NA	NA	NA
Antenna Tower & Turn Table Max-Full	MF-7802	MF780208406	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA

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: Jan. 18 to Feb. 03, 2021

For other test

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Spectrum Analyzer R&S	FSV40	100964	May 29, 2020	May 28, 2021
Power meter Anritsu	ML2495A	1529002	July 22, 2020	July 21, 2021
Power sensor Anritsu	MA2411B	1339443	July 22, 2020	July 21, 2021
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
DC Power Supply Topward	6603D	795558	NA	NA
Temperature & Humidity Chamber Giant Force	GTH-150-40-SP-AR	MAA0812-008	Jan. 14, 2021	Jan. 13, 2022
True RMS Clamp Meter FLUKE	325	31130711WS	June 06, 2020	June 05, 2021
Software	ADT_RF Test Software V6.6.5.4	NA	NA	NA

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: Feb. 05, 2021

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:

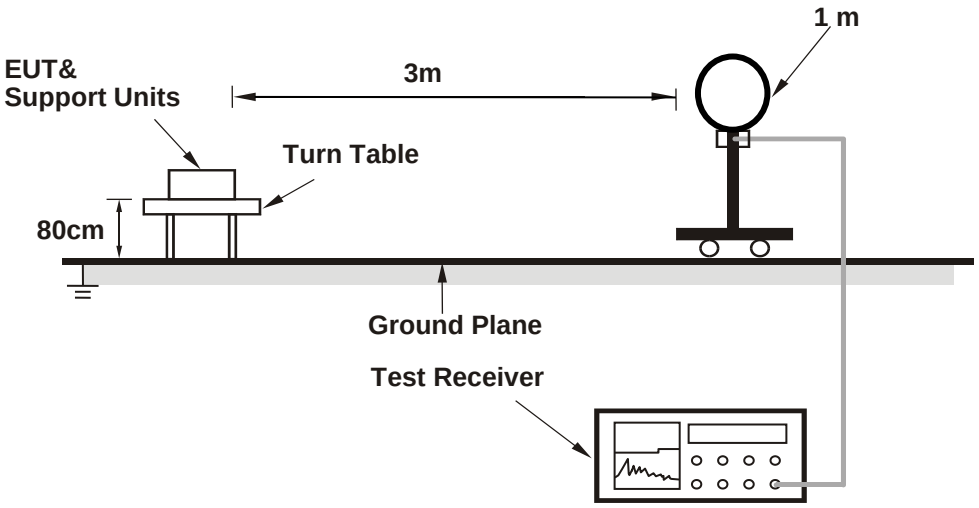
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.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

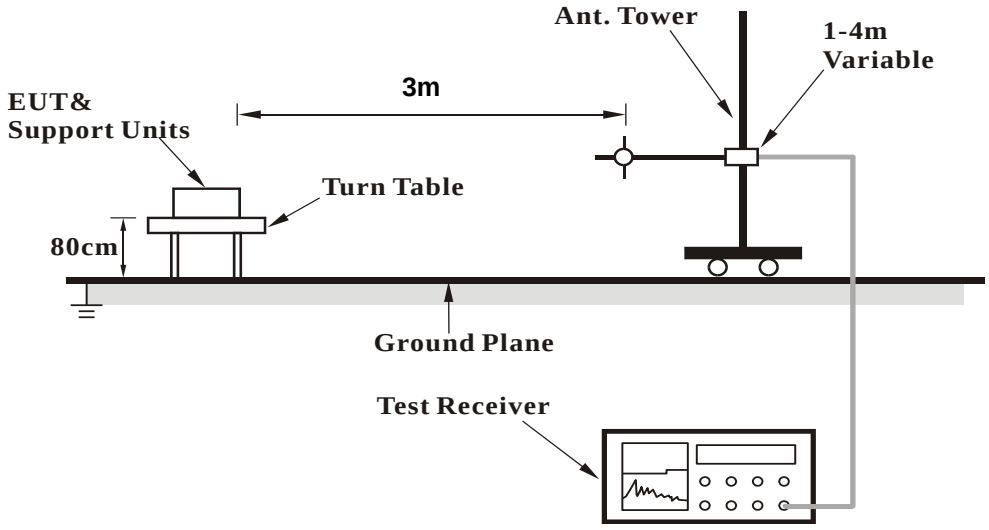
No deviation.

4.1.5 Test Setup

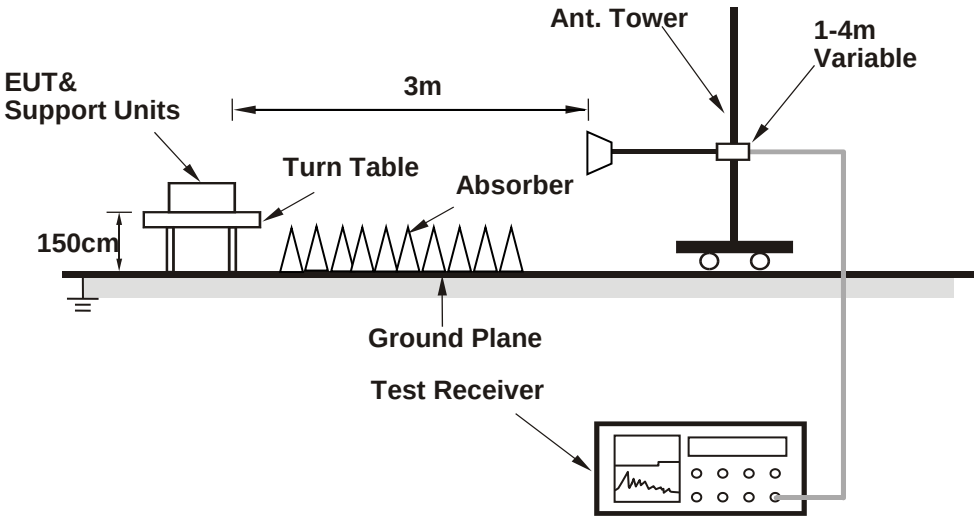
For Radiated emission below 30MHz



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 (QDART_CONN.WIN.1.0 Installer-00036.2) 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)

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	5149.61	61.5 PK	74.0	-12.5	1.87 H	22	56.2	5.3
2	5149.61	51.5 AV	54.0	-2.5	1.87 H	22	46.2	5.3
3	*5180.00	116.6 PK			1.87 H	22	111.6	5.0
4	*5180.00	108.6 AV			1.87 H	22	103.6	5.0
5	#10360.00	50.4 PK	68.2	-17.8	1.88 H	160	36.2	14.2
6	15540.00	45.5 PK	74.0	-28.5	1.77 H	153	30.6	14.9
7	15540.00	35.3 AV	54.0	-18.7	1.77 H	153	20.4	14.9
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	5148.46	67.6 PK	74.0	-6.4	1.63 V	348	62.3	5.3
2	5148.46	53.4 AV	54.0	-0.6	1.63 V	348	48.1	5.3
3	*5180.00	117.7 PK			1.63 V	348	112.7	5.0
4	*5180.00	108.6 AV			1.63 V	348	103.6	5.0
5	#10360.00	50.9 PK	68.2	-17.3	1.87 V	174	36.7	14.2
6	15540.00	45.2 PK	74.0	-28.8	1.74 V	142	30.3	14.9
7	15540.00	34.9 AV	54.0	-19.1	1.74 V	142	20.0	14.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	58.4 PK	74.0	-15.6	1.75 H	34	53.2	5.2
2	5150.00	49.4 AV	54.0	-4.6	1.75 H	34	44.2	5.2
3	*5200.00	118.6 PK			1.75 H	34	113.8	4.8
4	*5200.00	110.2 AV			1.75 H	34	105.4	4.8
5	#10400.00	51.3 PK	68.2	-16.9	1.87 H	171	37.1	14.2
6	15600.00	45.2 PK	74.0	-28.8	1.75 H	156	30.2	15.0
7	15600.00	34.7 AV	54.0	-19.3	1.75 H	156	19.7	15.0
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	5150.00	58.2 PK	74.0	-15.8	1.65 V	352	53.0	5.2
2	5150.00	48.9 AV	54.0	-5.1	1.65 V	352	43.7	5.2
3	*5200.00	118.4 PK			1.65 V	352	113.6	4.8
4	*5200.00	110.2 AV			1.65 V	352	105.4	4.8
5	#10400.00	51.4 PK	68.2	-16.8	1.89 V	183	37.2	14.2
6	15600.00	45.0 PK	74.0	-29.0	1.79 V	134	30.0	15.0
7	15600.00	34.6 AV	54.0	-19.4	1.79 V	134	19.6	15.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	5000.08	54.0 PK	74.0	-20.0	1.80 H	21	49.2	4.8
2	5000.08	48.5 AV	54.0	-5.5	1.80 H	21	43.7	4.8
3	*5240.00	118.8 PK			1.80 H	21	114.0	4.8
4	*5240.00	109.7 AV			1.80 H	21	104.9	4.8
5	#10480.00	50.7 PK	68.2	-17.5	1.87 H	185	36.6	14.1
6	15720.00	45.2 PK	74.0	-28.8	1.70 H	152	30.4	14.8
7	15720.00	35.2 AV	54.0	-18.8	1.70 H	152	20.4	14.8
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	4919.98	54.4 PK	74.0	-19.6	1.69 V	348	50.2	4.2
2	4919.98	47.8 AV	54.0	-6.2	1.69 V	348	43.6	4.2
3	*5240.00	118.2 PK			1.67 V	351	113.4	4.8
4	*5240.00	109.5 AV			1.67 V	351	104.7	4.8
5	#10480.00	50.6 PK	68.2	-17.6	1.91 V	167	36.5	14.1
6	15720.00	45.2 PK	74.0	-28.8	1.75 V	148	30.4	14.8
7	15720.00	34.6 AV	54.0	-19.4	1.75 V	148	19.8	14.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	5440.00	58.2 PK	74.0	-15.8	1.80 H	339	53.3	4.9
2	5440.00	49.9 AV	54.0	-4.1	1.80 H	339	45.0	4.9
3	#5644.05	64.1 PK	68.2	-4.1	1.62 H	357	62.7	1.4
4	*5745.00	105.9 PK			1.87 H	346	100.5	5.4
5	*5745.00	96.7 AV			1.87 H	346	91.3	5.4
6	#5991.75	55.9 PK	68.2	-12.3	1.62 H	357	54.1	1.8
7	11490.00	50.2 PK	74.0	-23.8	1.60 H	66	35.1	15.1
8	11490.00	45.4 AV	54.0	-8.6	1.60 H	66	30.3	15.1
9	#17235.00	49.1 PK	68.2	-19.1	1.43 H	331	30.5	18.6
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	5424.90	60.2 PK	74.0	-13.8	1.43 V	360	55.3	4.9
2	5424.90	53.5 AV	54.0	-0.5	1.43 V	360	48.6	4.9
3	#5585.24	52.6 PK	68.2	-15.6	1.50 V	357	47.6	5.0
4	*5745.00	103.1 PK			1.50 V	357	97.7	5.4
5	*5745.00	92.6 AV			1.50 V	357	87.2	5.4
6	#6018.52	49.4 PK	68.2	-18.8	1.50 V	357	43.6	5.8
7	11490.00	48.3 PK	74.0	-25.7	2.20 V	3	33.2	15.1
8	11490.00	38.1 AV	54.0	-15.9	2.20 V	3	23.0	15.1
9	#17235.00	49.8 PK	68.2	-18.4	1.46 V	327	31.2	18.6

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 802.11a	Channel	CH 157：5785 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)

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	5460.00	63.3 PK	74.0	-10.7	1.78 H	335	58.4	4.9
2	5460.00	53.8 AV	54.0	-0.2	1.78 H	335	48.9	4.9
3	#5468.00	64.2 PK	68.2	-4.0	1.78 H	335	59.2	5.0
4	#5616.94	57.8 PK	68.2	-10.4	1.58 H	355	56.4	1.4
5	*5785.00	117.9 PK			1.85 H	341	112.4	5.5
6	*5785.00	108.8 AV			1.85 H	341	103.3	5.5
7	#6023.74	54.8 PK	68.2	-13.4	1.58 H	355	52.9	1.9
8	11570.00	50.8 PK	74.0	-23.2	1.64 H	55	35.9	14.9
9	11570.00	45.8 AV	54.0	-8.2	1.64 H	55	30.9	14.9
10	#17355.00	49.0 PK	68.2	-19.2	1.40 H	346	30.1	18.9
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	5460.00	62.4 PK	74.0	-11.6	1.48 V	354	57.5	4.9
2	5460.00	51.3 AV	54.0	-2.7	1.48 V	354	46.4	4.9
3	#5465.00	68.0 PK	68.2	-0.2	1.48 V	354	63.0	5.0
4	#5622.31	56.1 PK	68.2	-12.1	1.52 V	350	51.1	5.0
5	*5785.00	114.9 PK			1.52 V	350	109.4	5.5
6	*5785.00	104.2 AV			1.52 V	350	98.7	5.5
7	#5945.01	51.1 PK	68.2	-17.1	1.52 V	350	45.5	5.6
8	11570.00	48.3 PK	74.0	-25.7	2.24 V	5	33.4	14.9
9	11570.00	37.8 AV	54.0	-16.2	2.24 V	5	22.9	14.9
10	#17355.00	50.3 PK	68.2	-17.9	1.51 V	316	31.4	18.9

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 802.11a	Channel	CH 165：5825 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)

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	#5508.30	63.5 PK	68.2	-4.7	1.78 H	350	58.4	5.1
2	#5585.09	59.1 PK	68.2	-9.1	1.64 H	360	57.8	1.3
3	*5825.00	118.4 PK			1.81 H	355	113.0	5.4
4	*5825.00	108.9 AV			1.81 H	355	103.5	5.4
5	#5949.26	54.6 PK	68.2	-13.6	1.64 H	360	52.8	1.8
6	11650.00	50.4 PK	74.0	-23.6	1.56 H	79	35.6	14.8
7	11650.00	45.4 AV	54.0	-8.6	1.56 H	79	30.6	14.8
8	#17475.00	49.0 PK	68.2	-19.2	1.40 H	319	29.3	19.7
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	#5505.00	67.2 PK	68.2	-1.0	1.43 V	356	62.1	5.1
2	#5632.57	56.5 PK	68.2	-11.7	1.49 V	341	51.5	5.0
3	*5825.00	114.6 PK			1.49 V	341	109.2	5.4
4	*5825.00	104.1 AV			1.49 V	341	98.7	5.4
5	#5928.34	50.7 PK	68.2	-17.5	1.49 V	341	45.1	5.6
6	11650.00	48.1 PK	74.0	-25.9	2.17 V	11	33.3	14.8
7	11650.00	37.9 AV	54.0	-16.1	2.17 V	11	23.1	14.8
8	#17475.00	49.9 PK	68.2	-18.3	1.47 V	326	30.2	19.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	61.8 PK	74.0	-12.2	1.75 H	31	56.6	5.2
2	5150.00	52.7 AV	54.0	-1.3	1.75 H	31	47.5	5.2
3	*5180.00	116.1 PK			1.75 H	31	111.1	5.0
4	*5180.00	106.8 AV			1.75 H	31	101.8	5.0
5	#10360.00	50.6 PK	68.2	-17.6	1.88 H	186	36.4	14.2
6	15540.00	45.0 PK	74.0	-29.0	1.78 H	136	30.1	14.9
7	15540.00	34.6 AV	54.0	-19.4	1.78 H	136	19.7	14.9
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	5148.14	69.2 PK	74.0	-4.8	1.82 V	350	63.9	5.3
2	**5148.14**	**53.9 AV**	**54.0**	**-0.1**	**1.82 V**	**350**	**48.6**	**5.3**
3	*5180.00	116.0 PK			1.82 V	350	111.0	5.0
4	*5180.00	106.5 AV			1.82 V	350	101.5	5.0
5	#10360.00	51.2 PK	68.2	-17.0	1.92 V	164	37.0	14.2
6	15540.00	45.4 PK	74.0	-28.6	1.76 V	156	30.5	14.9
7	15540.00	35.2 AV	54.0	-18.8	1.76 V	156	20.3	14.9

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	61.8 PK	74.0	-12.2	1.76 H	35	56.6	5.2
2	5150.00	50.7 AV	54.0	-3.3	1.76 H	35	45.5	5.2
3	*5200.00	118.1 PK			1.76 H	35	113.3	4.8
4	*5200.00	108.3 AV			1.76 H	35	103.5	4.8
5	#10400.00	50.6 PK	68.2	-17.6	1.85 H	172	36.4	14.2
6	15600.00	45.5 PK	74.0	-28.5	1.70 H	154	30.5	15.0
7	15600.00	35.3 AV	54.0	-18.7	1.70 H	154	20.3	15.0
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	5150.00	61.4 PK	74.0	-12.6	1.77 V	355	56.2	5.2
2	5150.00	50.4 AV	54.0	-3.6	1.77 V	355	45.2	5.2
3	*5200.00	117.8 PK			1.77 V	355	113.0	4.8
4	*5200.00	108.3 AV			1.77 V	355	103.5	4.8
5	#10400.00	50.5 PK	68.2	-17.7	1.82 V	182	36.3	14.2
6	15600.00	45.1 PK	74.0	-28.9	1.73 V	156	30.1	15.0
7	15600.00	34.7 AV	54.0	-19.3	1.73 V	156	19.7	15.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	4919.97	56.2 PK	74.0	-17.8	1.83 H	6	52.0	4.2
2	4919.97	50.3 AV	54.0	-3.7	1.83 H	6	46.1	4.2
3	*5240.00	116.8 PK			1.83 H	6	112.0	4.8
4	*5240.00	107.5 AV			1.83 H	6	102.7	4.8
5	#10480.00	50.7 PK	68.2	-17.5	1.86 H	181	36.6	14.1
6	15720.00	45.2 PK	74.0	-28.8	1.76 H	146	30.4	14.8
7	15720.00	34.8 AV	54.0	-19.2	1.76 H	146	20.0	14.8
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	4920.00	53.9 PK	74.0	-20.1	1.74 V	350	49.7	4.2
2	4920.00	46.9 AV	54.0	-7.1	1.74 V	350	42.7	4.2
3	*5240.00	117.0 PK			1.78 V	354	112.2	4.8
4	*5240.00	107.9 AV			1.78 V	354	103.1	4.8
5	#10480.00	50.7 PK	68.2	-17.5	1.91 V	169	36.6	14.1
6	15720.00	45.7 PK	74.0	-28.3	1.78 V	142	30.9	14.8
7	15720.00	35.1 AV	54.0	-18.9	1.78 V	142	20.3	14.8

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	5440.00	57.2 PK	74.0	-16.8	1.81 H	347	52.3	4.9
2	5440.00	50.1 AV	54.0	-3.9	1.81 H	347	45.2	4.9
3	#5555.14	56.3 PK	68.2	-11.9	1.90 H	354	51.3	5.0
4	*5745.00	106.2 PK			1.90 H	354	100.8	5.4
5	*5745.00	95.8 AV			1.90 H	354	90.4	5.4
6	#6002.07	50.5 PK	68.2	-17.7	1.90 H	354	44.7	5.8
7	11490.00	50.2 PK	74.0	-23.8	1.64 H	78	35.1	15.1
8	11490.00	45.7 AV	54.0	-8.3	1.64 H	78	30.6	15.1
9	#17235.00	49.1 PK	68.2	-19.1	1.47 H	317	30.5	18.6
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	5425.00	59.1 PK	74.0	-14.9	1.49 V	347	54.2	4.9
2	5425.00	53.6 AV	54.0	-0.4	1.49 V	347	48.7	4.9
3	#5558.94	51.7 PK	68.2	-16.5	1.53 V	357	46.7	5.0
4	*5745.00	102.9 PK			1.53 V	357	97.5	5.4
5	*5745.00	92.0 AV			1.53 V	357	86.6	5.4
6	#6002.71	49.1 PK	68.2	-19.1	1.53 V	357	43.3	5.8
7	11490.00	48.8 PK	74.0	-25.2	2.15 V	3	33.7	15.1
8	11490.00	38.3 AV	54.0	-15.7	2.15 V	3	23.2	15.1
9	#17235.00	49.7 PK	68.2	-18.5	1.47 V	321	31.1	18.6

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 (VHT20)	Channel	CH 157：5785 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)

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	5460.00	63.2 PK	74.0	-10.8	1.83 H	357	58.3	4.9
2	5460.00	53.7 AV	54.0	-0.3	1.83 H	357	48.8	4.9
3	#5462.60	65.6 PK	68.2	-2.6	1.83 H	357	60.7	4.9
4	#5558.67	57.0 PK	68.2	-11.2	1.88 H	350	52.0	5.0
5	*5785.00	118.5 PK			1.88 H	350	113.0	5.5
6	*5785.00	107.9 AV			1.88 H	350	102.4	5.5
7	#5940.27	52.0 PK	68.2	-16.2	1.88 H	350	46.4	5.6
8	11570.00	50.4 PK	74.0	-23.6	1.67 H	74	35.5	14.9
9	11570.00	46.0 AV	54.0	-8.0	1.67 H	74	31.1	14.9
10	#17355.00	48.7 PK	68.2	-19.5	1.44 H	327	29.8	18.9
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	5460.00	59.3 PK	74.0	-14.7	1.47 V	333	54.4	4.9
2	5460.00	48.5 AV	54.0	-5.5	1.47 V	333	43.6	4.9
3	#5465.00	67.5 PK	68.2	-0.7	1.47 V	333	62.5	5.0
4	#5586.22	55.9 PK	68.2	-12.3	1.58 V	350	50.9	5.0
5	*5785.00	114.9 PK			1.58 V	350	109.4	5.5
6	*5785.00	104.3 AV			1.58 V	350	98.8	5.5
7	#5943.22	51.2 PK	68.2	-17.0	1.58 V	350	45.6	5.6
8	11570.00	49.3 PK	74.0	-24.7	2.11 V	4	34.4	14.9
9	11570.00	38.5 AV	54.0	-15.5	2.11 V	4	23.6	14.9
10	#17355.00	49.4 PK	68.2	-18.8	1.47 V	306	30.5	18.9

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 (VHT20)	Channel	CH 165：5825 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)

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	#5505.00	64.8 PK	68.2	-3.4	1.84 H	349	59.7	5.1
2	#5556.48	57.5 PK	68.2	-10.7	1.92 H	360	52.5	5.0
3	*5825.00	119.5 PK			1.92 H	360	114.1	5.4
4	*5825.00	108.5 AV			1.92 H	360	103.1	5.4
5	#5983.86	52.6 PK	68.2	-15.6	1.92 H	360	46.8	5.8
6	11650.00	50.6 PK	74.0	-23.4	1.61 H	77	35.8	14.8
7	11650.00	45.8 AV	54.0	-8.2	1.61 H	77	31.0	14.8
8	#17475.00	49.4 PK	68.2	-18.8	1.47 H	318	29.7	19.7
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	#5505.00	67.4 PK	68.2	-0.8	1.53 V	341	62.3	5.1
2	#5583.82	56.3 PK	68.2	-11.9	1.47 V	336	51.3	5.0
3	*5825.00	114.5 PK			1.47 V	336	109.1	5.4
4	*5825.00	104.0 AV			1.47 V	336	98.6	5.4
5	#5961.74	50.8 PK	68.2	-17.4	1.47 V	336	45.0	5.8
6	11650.00	48.5 PK	74.0	-25.5	2.15 V	8	33.7	14.8
7	11650.00	38.0 AV	54.0	-16.0	2.15 V	8	23.2	14.8
8	#17475.00	49.5 PK	68.2	-18.7	1.41 V	307	29.8	19.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	59.5 PK	74.0	-14.5	1.77 H	6	54.3	5.2
2	5150.00	50.4 AV	54.0	-3.6	1.77 H	6	45.2	5.2
3	*5190.00	109.3 PK			1.77 H	6	104.4	4.9
4	*5190.00	101.5 AV			1.77 H	6	96.6	4.9
5	#10380.00	51.5 PK	68.2	-16.7	1.81 H	160	37.4	14.1
6	15570.00	45.4 PK	74.0	-28.6	1.78 H	151	30.4	15.0
7	15570.00	35.1 AV	54.0	-18.9	1.78 H	151	20.1	15.0
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	5149.82	68.7 PK	74.0	-5.3	1.71 V	358	63.4	5.3
2	5149.82	53.4 AV	54.0	-0.6	1.71 V	358	48.1	5.3
3	*5190.00	109.1 PK			1.71 V	358	104.2	4.9
4	*5190.00	101.0 AV			1.71 V	358	96.1	4.9
5	#10380.00	51.1 PK	68.2	-17.1	1.92 V	163	37.0	14.1
6	15570.00	45.7 PK	74.0	-28.3	1.79 V	136	30.7	15.0
7	15570.00	35.3 AV	54.0	-18.7	1.79 V	136	20.3	15.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	57.1 PK	74.0	-16.9	1.77 H	23	51.9	5.2
2	5150.00	49.9 AV	54.0	-4.1	1.77 H	23	44.7	5.2
3	*5230.00	115.2 PK			1.77 H	23	110.4	4.8
4	*5230.00	107.2 AV			1.77 H	23	102.4	4.8
5	#10460.00	51.0 PK	68.2	-17.2	1.83 H	184	36.9	14.1
6	15690.00	45.3 PK	74.0	-28.7	1.70 H	131	30.3	15.0
7	15690.00	34.9 AV	54.0	-19.1	1.70 H	131	19.9	15.0
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	5148.07	60.6 PK	74.0	-13.4	1.74 V	352	55.3	5.3
2	5148.07	49.2 AV	54.0	-4.8	1.74 V	352	43.9	5.3
3	*5230.00	115.1 PK			1.74 V	352	110.3	4.8
4	*5230.00	106.9 AV			1.74 V	352	102.1	4.8
5	#10460.00	51.2 PK	68.2	-17.0	1.90 V	173	37.1	14.1
6	15690.00	44.7 PK	74.0	-29.3	1.74 V	155	29.7	15.0
7	15690.00	34.7 AV	54.0	-19.3	1.74 V	155	19.7	15.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	5440.00	58.2 PK	74.0	-15.8	1.76 H	342	53.3	4.9
2	5440.00	48.7 AV	54.0	-5.3	1.76 H	342	43.8	4.9
3	#5557.11	55.2 PK	68.2	-13.0	1.80 H	349	50.2	5.0
4	*5755.00	105.8 PK			1.80 H	349	100.4	5.4
5	*5755.00	95.3 AV			1.80 H	349	89.9	5.4
6	#5943.49	50.5 PK	68.2	-17.7	1.80 H	349	44.9	5.6
7	11510.00	50.5 PK	74.0	-23.5	1.56 H	89	35.4	15.1
8	11510.00	45.5 AV	54.0	-8.5	1.56 H	89	30.4	15.1
9	#17265.00	49.2 PK	68.2	-19.0	1.43 H	325	30.6	18.6
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	5435.00	59.7 PK	74.0	-14.3	1.57 V	343	54.8	4.9
2	5435.00	53.2 AV	54.0	-0.8	1.57 V	343	48.3	4.9
3	#5649.49	54.4 PK	68.2	-13.8	1.45 V	355	49.4	5.0
4	*5755.00	102.5 PK			1.45 V	355	97.1	5.4
5	*5755.00	92.2 AV			1.45 V	355	86.8	5.4
6	#5942.82	49.4 PK	68.2	-18.8	1.45 V	355	43.8	5.6
7	11510.00	48.1 PK	74.0	-25.9	2.14 V	7	33.0	15.1
8	11510.00	37.9 AV	54.0	-16.1	2.14 V	7	22.8	15.1
9	#17265.00	49.3 PK	68.2	-18.9	1.36 V	311	30.7	18.6

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 159：5795 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)

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	#5475.00	64.5 PK	68.2	-3.7	1.79 H	348	59.5	5.0
2	#5630.50	56.6 PK	68.2	-11.6	1.84 H	355	51.6	5.0
3	*5795.00	115.3 PK			1.84 H	355	109.8	5.5
4	*5795.00	105.4 AV			1.84 H	355	99.9	5.5
5	#5947.41	51.3 PK	68.2	-16.9	1.84 H	355	45.7	5.6
6	11590.00	50.0 PK	74.0	-24.0	1.64 H	74	35.2	14.8
7	11590.00	45.4 AV	54.0	-8.6	1.64 H	74	30.6	14.8
8	#17385.00	49.5 PK	68.2	-18.7	1.44 H	306	30.5	19.0
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	#5475.00	67.3 PK	68.2	-0.9	1.48 V	357	62.3	5.0
2	#5613.99	56.1 PK	68.2	-12.1	1.41 V	349	51.1	5.0
3	*5795.00	110.7 PK			1.41 V	349	105.2	5.5
4	*5795.00	102.3 AV			1.41 V	349	96.8	5.5
5	#5953.11	51.0 PK	68.2	-17.2	1.41 V	349	45.3	5.7
6	11590.00	48.2 PK	74.0	-25.8	2.17 V	13	33.4	14.8
7	11590.00	37.6 AV	54.0	-16.4	2.17 V	13	22.8	14.8
8	#17385.00	49.4 PK	68.2	-18.8	1.37 V	296	30.4	19.0

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 (VHT80)	Channel	CH 42：5210 MHz
Frequency Range	1GHz ~ 40GHz	Detector Function	Peak (PK) Average (AV)

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	5000.06	54.2 PK	74.0	-19.8	1.74 H	25	49.4	4.8
2	5000.06	47.3 AV	54.0	-6.7	1.74 H	25	42.5	4.8
3	*5210.00	101.0 PK			1.74 H	25	96.2	4.8
4	*5210.00	93.0 AV			1.74 H	25	88.2	4.8
5	5353.68	56.3 PK	74.0	-17.7	1.74 H	25	51.5	4.8
6	5353.68	47.4 AV	54.0	-6.6	1.74 H	25	42.6	4.8
7	#10420.00	51.3 PK	68.2	-16.9	1.88 H	177	37.2	14.1
8	15630.00	44.9 PK	74.0	-29.1	1.71 H	156	29.9	15.0
9	15630.00	34.8 AV	54.0	-19.2	1.71 H	156	19.8	15.0
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	5146.87	65.5 PK	74.0	-8.5	1.69 V	355	60.2	5.3
2	5146.87	53.7 AV	54.0	-0.3	1.69 V	355	48.4	5.3
3	*5210.00	101.0 PK			1.69 V	355	96.2	4.8
4	*5210.00	93.0 AV			1.69 V	355	88.2	4.8
5	5353.68	53.1 PK	74.0	-20.9	1.69 V	355	48.3	4.8
6	5353.68	43.1 AV	54.0	-10.9	1.69 V	355	38.3	4.8
7	#10420.00	51.4 PK	68.2	-16.8	1.81 V	160	37.3	14.1
8	15630.00	45.0 PK	74.0	-29.0	1.77 V	139	30.0	15.0
9	15630.00	34.9 AV	54.0	-19.1	1.77 V	139	19.9	15.0

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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)

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	5455.00	57.4 PK	74.0	-16.6	1.77 H	351	52.5	4.9
2	5455.00	48.9 AV	54.0	-5.1	1.77 H	351	44.0	4.9
3	#5578.69	55.5 PK	68.2	-12.7	1.80 H	343	50.5	5.0
4	*5775.00	99.1 PK			1.80 H	343	93.6	5.5
5	*5775.00	89.1 AV			1.80 H	343	83.6	5.5
6	#5931.89	50.8 PK	68.2	-17.4	1.80 H	343	45.2	5.6
7	11550.00	50.5 PK	74.0	-23.5	1.59 H	77	35.5	15.0
8	11550.00	45.6 AV	54.0	-8.4	1.59 H	77	30.6	15.0
9	#17325.00	49.3 PK	68.2	-18.9	1.52 H	316	30.6	18.7
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	5455.00	60.1 PK	74.0	-13.9	1.45 V	352	55.2	4.9
2	5455.00	53.4 AV	54.0	-0.6	1.45 V	352	48.5	4.9
3	#5633.02	54.1 PK	68.2	-14.1	1.51 V	344	49.1	5.0
4	*5775.00	95.1 PK			1.51 V	344	89.6	5.5
5	*5775.00	84.8 AV			1.51 V	344	79.3	5.5
6	#5933.84	49.9 PK	68.2	-18.3	1.51 V	344	44.3	5.6
7	11550.00	48.9 PK	74.0	-25.1	2.09 V	18	33.9	15.0
8	11550.00	38.3 AV	54.0	-15.7	2.09 V	18	23.3	15.0
9	#17325.00	49.2 PK	68.2	-19.0	1.45 V	316	30.5	18.7

Remarks:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. 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.

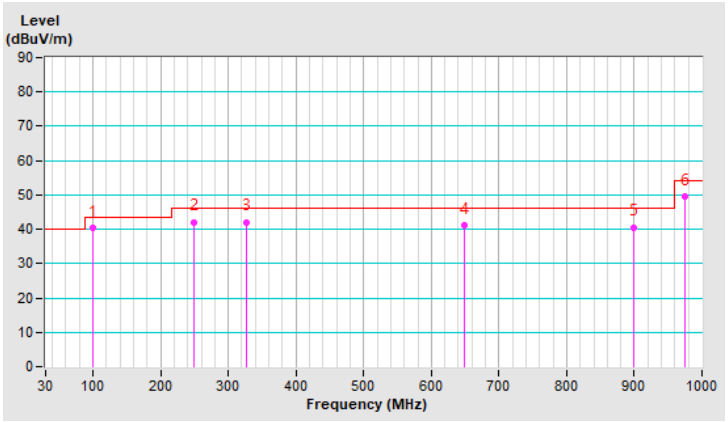
Below 1GHz Data:

RF Mode	TX 802.11ac (VHT40)	Channel	CH 46：5230 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	99.80	40.4 QP	43.5	-3.1	1.50 H	222	52.7	-12.3
2	249.40	42.1 QP	46.0	-3.9	1.50 H	90	50.7	-8.6
3	327.00	42.1 QP	46.0	-3.9	1.00 H	333	47.6	-5.5
4	649.41	41.1 QP	46.0	-4.9	1.50 H	358	38.8	2.3
5	899.40	40.6 QP	46.0	-5.4	1.00 H	301	34.0	6.6
6	975.00	49.7 QP	54.0	-4.3	2.00 H	15	41.9	7.8

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.

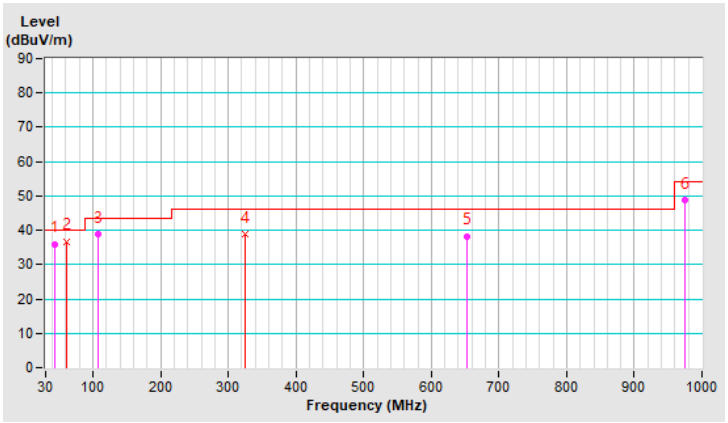


RF Mode	TX 802.11ac (VHT40)	Channel	CH 46：5230 MHz
Frequency Range	9kHz ~ 1GHz	Detector Function	Quasi-Peak (QP)

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	42.64	36.0 QP	40.0	-4.0	1.00 V	50	44.4	-8.4
2	60.64	36.8 QP	40.0	-3.2	1.00 V	191	45.6	-8.8
3	107.33	38.8 QP	43.5	-4.7	1.00 V	64	49.8	-11.0
4	325.40	38.9 QP	46.0	-7.1	1.00 V	135	44.5	-5.6
5	652.30	38.3 QP	46.0	-7.7	1.50 V	350	35.9	2.4
6	974.64	48.9 QP	54.0	-5.1	1.00 V	188	41.1	7.8

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.



4.2 Conducted Emission Measurement

4.2.1 Limits of Conducted Emission Measurement

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

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

4.2.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
Test Receiver R&S	ESCS 30	847124/029	Oct. 20, 2020	Oct. 19, 2021
Line-Impedance Stabilization Network (for EUT) R&S	ESH3-Z5	848773/004	Oct. 27, 2020	Oct. 26, 2021
Line-Impedance Stabilization Network (for Peripheral) R&S	ESH3-Z5	835239/001	Mar. 19, 2020	Mar. 18, 2021
50 ohms Terminator	50	3	Oct. 26, 2020	Oct. 25, 2021
RF Cable	5D-FB	COCCAB-001	Sep. 26, 2020	Sep. 25, 2021
Fixed attenuator EMCI	STI02-2200-10	005	Aug. 29, 2020	Aug. 28, 2021
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: Jan. 19, 2021

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.

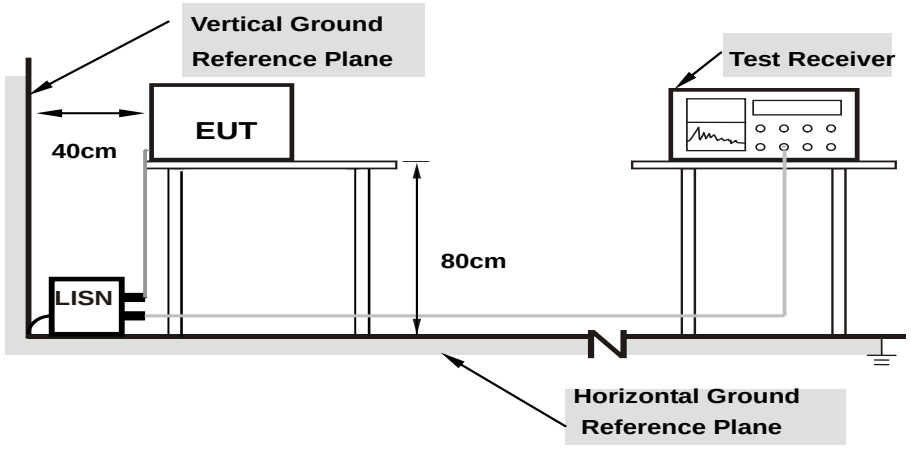
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

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.

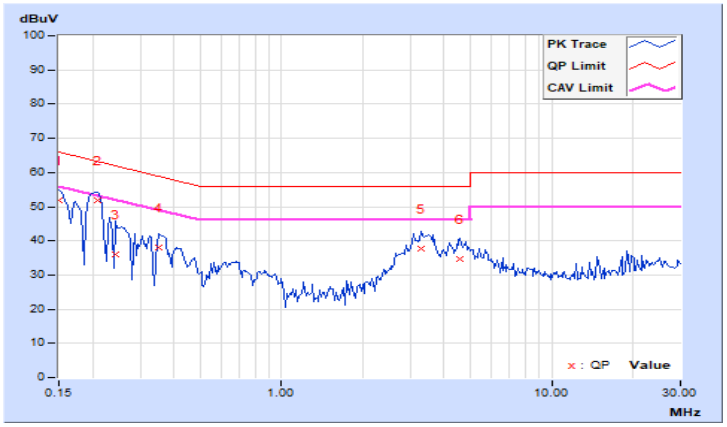
4.2.7 Test Results

RF Mode	TX 802.11ac (VHT40)	Channel	CH 46：5230 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	0.15000	9.95	42.07	31.09	52.02	41.04	66.00	56.00	-13.98	-14.96
2	**0.20859**	**9.97**	**41.91**	**35.65**	**51.88**	**45.62**	**63.26**	**53.26**	**-11.38**	**-7.64**
3	0.24375	9.97	26.15	11.41	36.12	21.38	61.97	51.97	-25.85	-30.59
4	0.35313	9.99	28.06	19.52	38.05	29.51	58.89	48.89	-20.84	-19.38
5	3.28516	10.13	27.58	17.47	37.71	27.60	56.00	46.00	-18.29	-18.40
6	4.59375	10.21	24.37	18.41	34.58	28.62	56.00	46.00	-21.42	-17.38

Remarks:

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

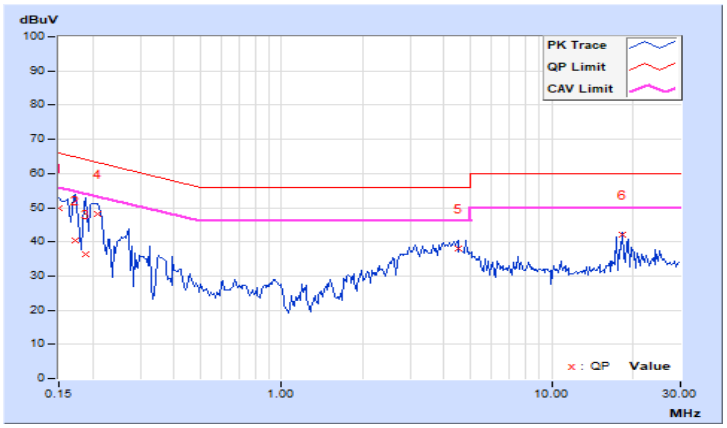


RF Mode	TX 802.11ac (VHT40)	Channel	CH 46：5230 MHz
Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz

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	0.15000	9.92	39.99	28.65	49.91	38.57	66.00	56.00	-16.09	-17.43
2	0.17344	9.93	30.49	5.52	40.42	15.45	64.79	54.79	-24.37	-39.34
3	0.18906	9.94	26.44	7.39	36.38	17.33	64.08	54.08	-27.70	-36.75
4	0.20859	9.95	38.35	30.39	48.30	40.34	63.26	53.26	-14.96	-12.92
5	4.50781	10.14	28.02	23.85	38.16	33.99	56.00	46.00	-17.84	-12.01
6	18.32031	10.78	31.34	30.86	42.12	41.64	60.00	50.00	-17.88	-8.36

Remarks:

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



4.3 Transmit Power Measurement

4.3.1 Limits of Transmit Power Measurement

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

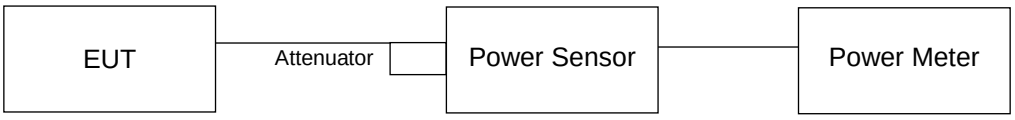
*B is the 26 dB emission bandwidth in megahertz
Note: This device can support different category application which switched by access point mode and client mode by software.

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

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

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

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

Method PM is used to perform output power measurement, trigger and gating function of wide band power meter is enabled to measure max output power of TX on burst. Duty factor is not added to measured value.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Results

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	20.23	19.36	191.737	22.83	26.48	Pass
40	5200	20.29	19.32	192.412	22.84	26.48	Pass
48	5240	20.23	19.25	189.578	22.78	26.48	Pass
149	5745	7.15	6.34	9.493	9.77	25.57	Pass
157	5785	19.30	18.62	157.892	21.98	25.57	Pass
165	5825	20.45	18.19	176.835	22.48	25.57	Pass

Note: 1. U-NII-1 Band: The maximum gain = 9.52dBi > 6dBi , so the power limit shall be reduced to 30-(9.52-6) =26.48 dBm.
2. U-NII-3 Band: The maximum gain = 10.43dBi > 6dBi , so the power limit shall be reduced to 30-(10.43-6) =25.57 dBm.

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	19.02	18.06	143.773	21.58	26.48	Pass
40	5200	20.46	19.52	200.71	23.03	26.48	Pass
48	5240	20.32	19.43	195.347	22.91	26.48	Pass
149	5745	6.95	6.10	9.028	9.56	25.57	Pass
157	5785	18.93	18.32	146.083	21.65	25.57	Pass
165	5825	19.97	17.63	157.254	21.97	25.57	Pass

Note: 1. U-NII-1 Band: The maximum gain = 9.52dBi > 6dBi , so the power limit shall be reduced to 30-(9.52-6) =26.48 dBm.
2. U-NII-3 Band: The maximum gain = 10.43dBi > 6dBi , so the power limit shall be reduced to 30-(10.43-6) =25.57 dBm.

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	15.32	14.23	60.526	17.82	26.48	Pass
46	5230	21.94	20.74	274.892	24.39	26.48	Pass
151	5755	8.68	8.64	14.69	11.67	25.57	Pass
159	5795	18.32	17.93	130.007	21.14	25.57	Pass

Note: 1. U-NII-1 Band: The maximum gain = 9.52dBi > 6dBi , so the power limit shall be reduced to 30-(9.52-6) =26.48 dBm.
2. U-NII-3 Band: The maximum gain = 10.43dBi > 6dBi , so the power limit shall be reduced to 30-(10.43-6) =25.57 dBm.

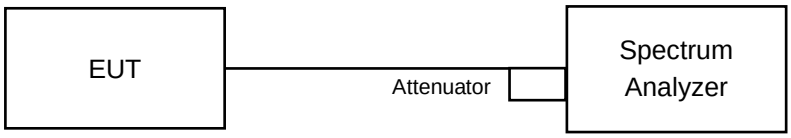
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	10.95	9.82	22.039	13.43	26.48	Pass
155	5775	4.73	4.65	5.889	7.70	25.57	Pass

Note: 1. U-NII-1 Band: The maximum gain = 9.52dBi > 6dBi , so the power limit shall be reduced to 30-(9.52-6) =26.48 dBm.
2. U-NII-3 Band: The maximum gain = 10.43dBi > 6dBi , so the power limit shall be reduced to 30-(10.43-6) =25.57 dBm.

4.4 Occupied Bandwidth Measurement

4.4.1 Test Setup



4.4.2 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.4.3 Test Procedure

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

4.4.4 Test Results

802.11a

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	16.44	16.56
40	5200	16.44	16.44
48	5240	16.44	16.44
149	5745	16.61	16.52
157	5785	16.32	16.44
165	5825	16.44	16.44

802.11ac (VHT20)

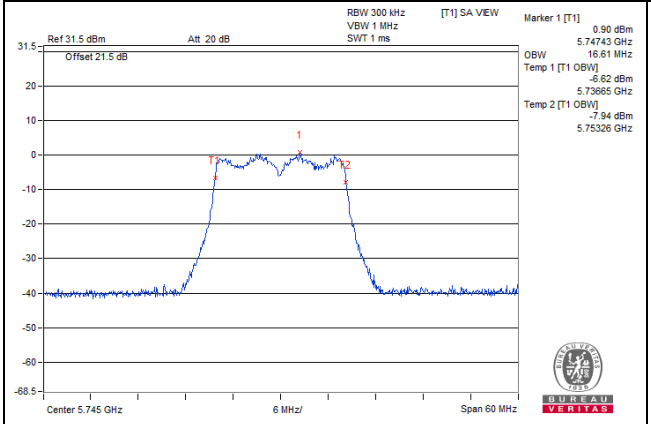
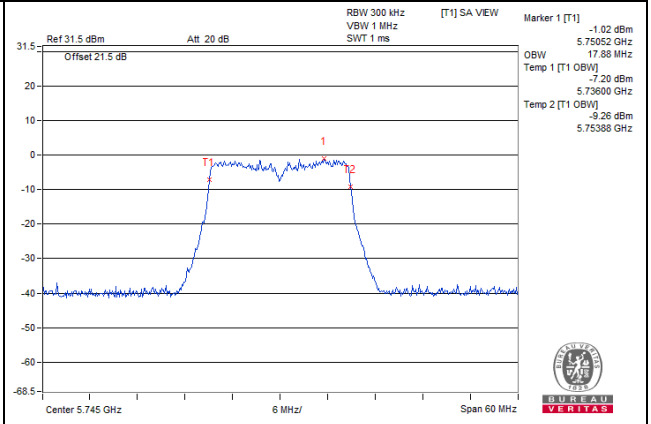
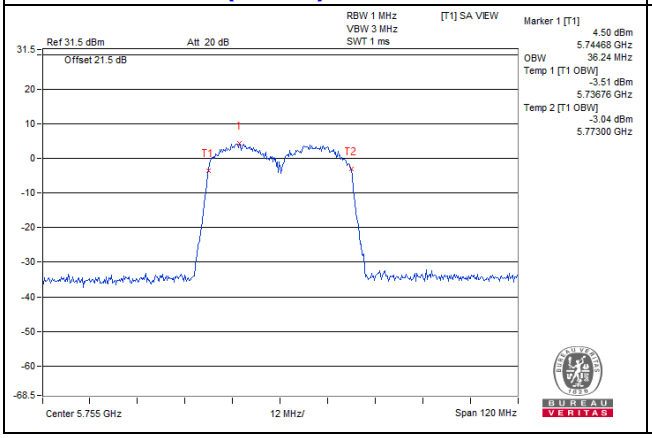
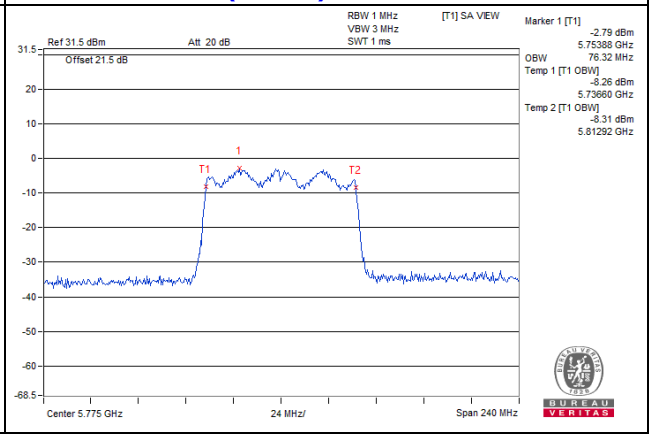
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.64	17.76
40	5200	17.64	17.64
48	5240	17.64	17.64
149	5745	17.88	17.76
157	5785	17.4	17.52
165	5825	17.76	17.76

802.11ac (VHT40)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36	36.24
46	5230	36	36.24
151	5755	36.24	36
159	5795	36	36

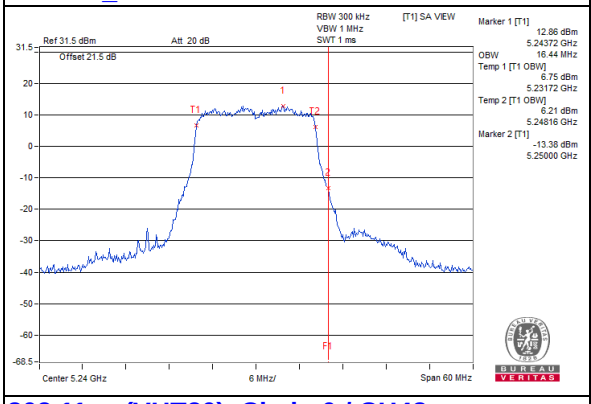
802.11ac (VHT80)

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

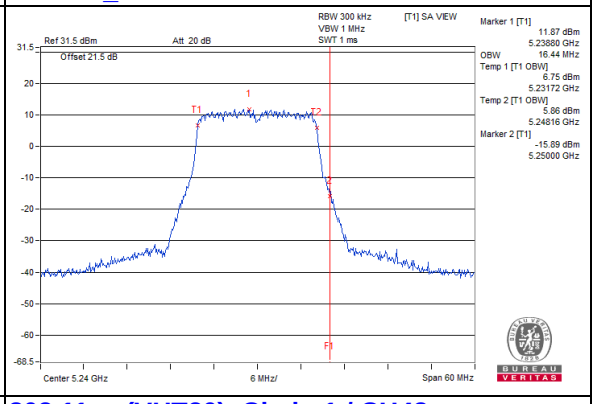
Spectrum Plot of Max. Value	
802.11a_Chain 0 / CH149	**802.11ac (VHT20)_Chain 0 / CH149**
	
802.11ac (VHT40)_Chain 0 / CH151	**802.11ac (VHT80)_Chain 0 / CH155**
	

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

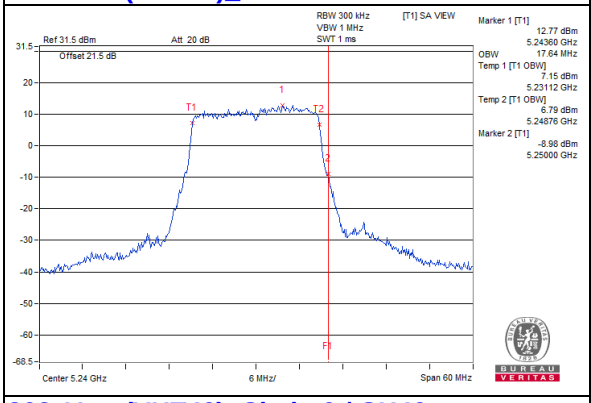
802.11a_Chain 0 / CH48



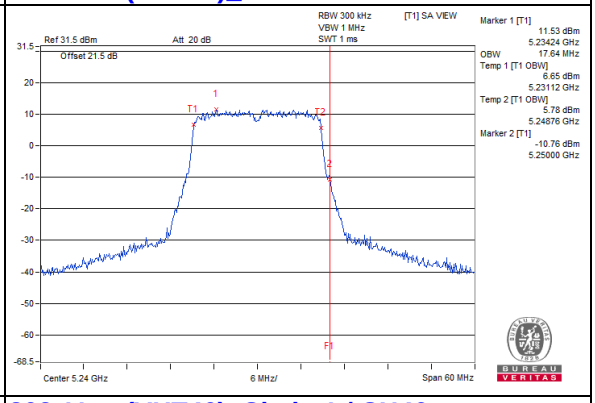
802.11a_Chain 1 / CH48



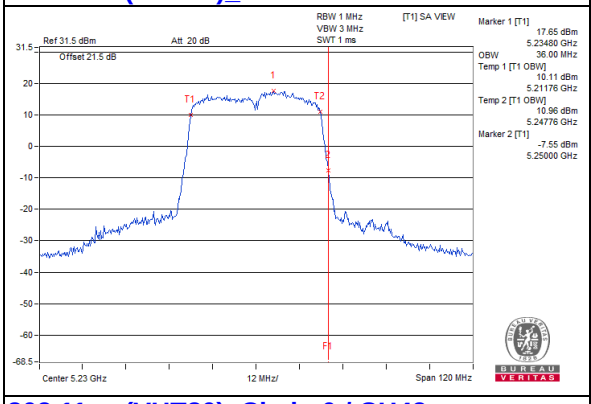
802.11ac (VHT20)_Chain 0 / CH48



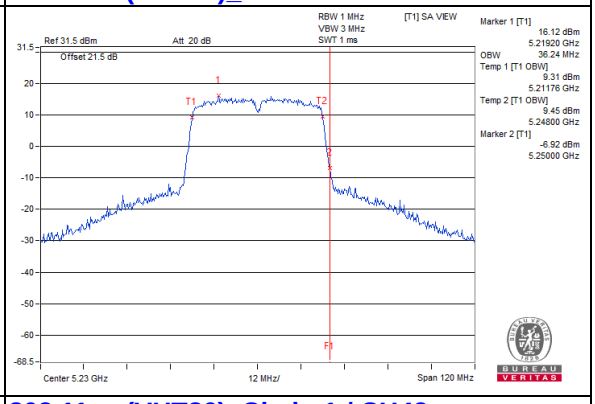
802.11ac (VHT20)_Chain 1 / CH48



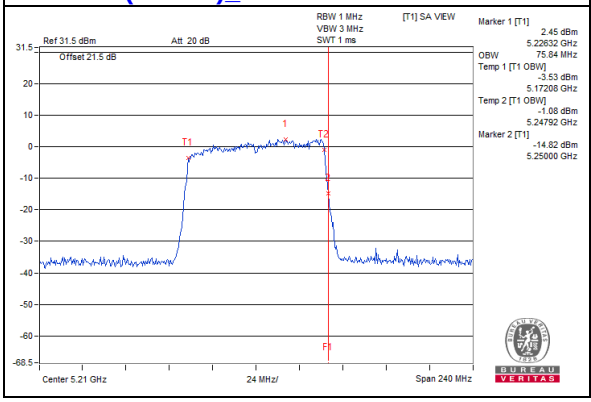
802.11ac (VHT40)_Chain 0 / CH46



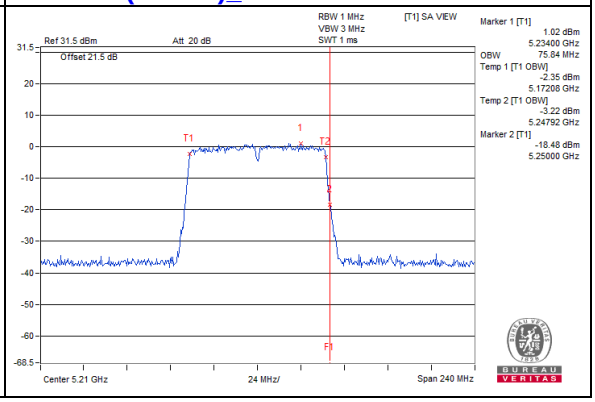
802.11ac (VHT40)_Chain 1 / CH46



802.11ac (VHT80)_Chain 0 / CH42

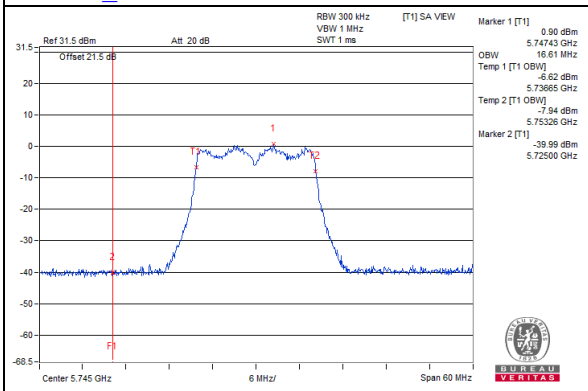


802.11ac (VHT80)_Chain 1 / CH42

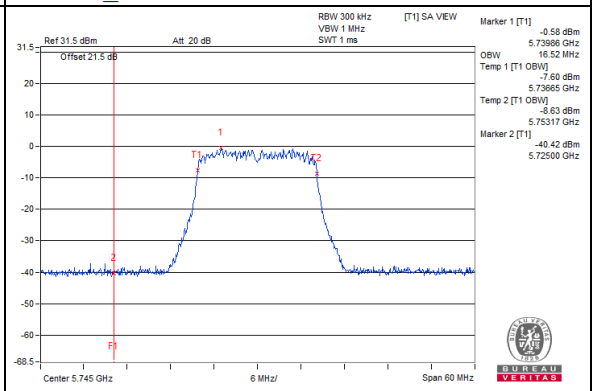


Spectrum Plot for near by DFS band
(DFS is required, if 99% OCP straddle into U-NII-2C band)

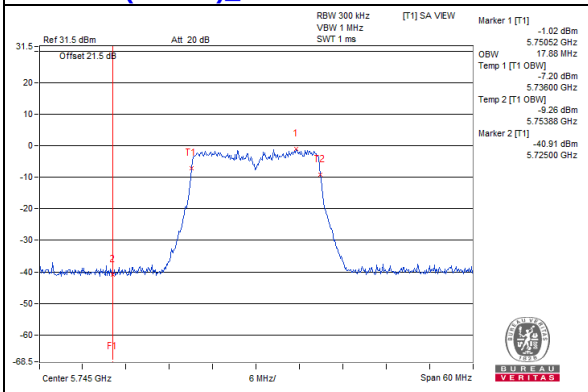
802.11a_Chain 0 / CH149



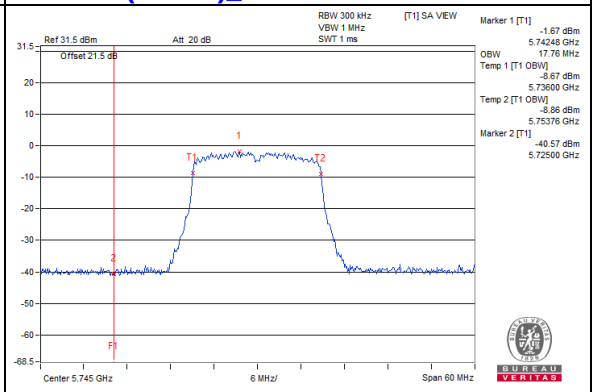
802.11a_Chain 1 / CH149



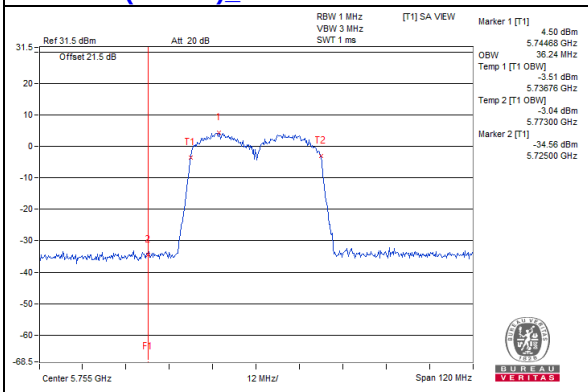
802.11ac (VHT20)_Chain 0 / CH149



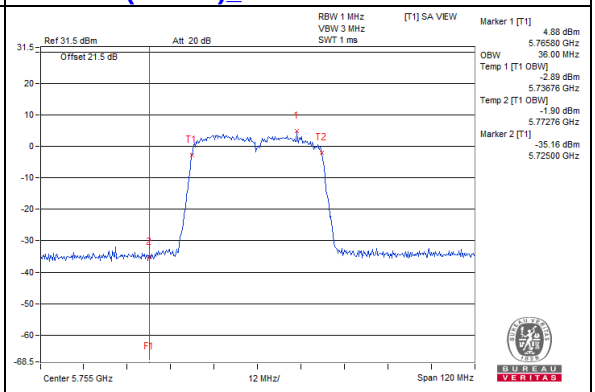
802.11ac (VHT20)_Chain 1 / CH149



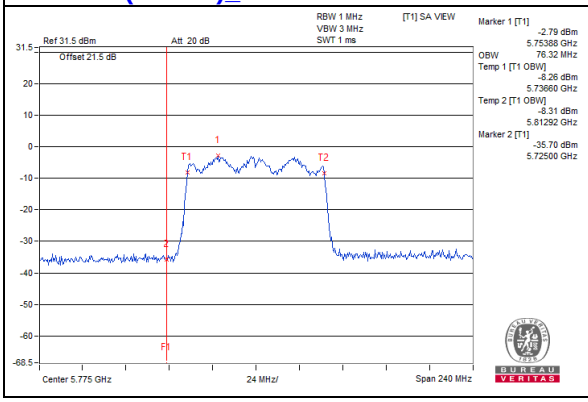
802.11ac (VHT40)_Chain 0 / CH151



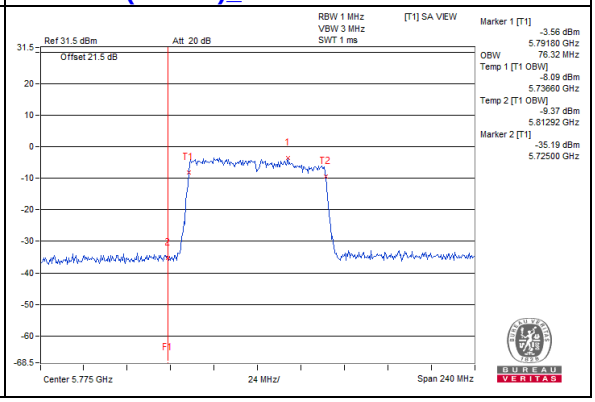
802.11ac (VHT40)_Chain 1 / CH151



802.11ac (VHT80)_Chain 0 / CH155



802.11ac (VHT80)_Chain 1 / CH155



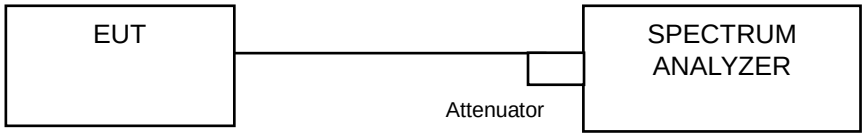
4.5 Peak Power Spectral Density Measurement

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

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

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For 802.11ac (VHT20)

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 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

For 802.11a, 802.11ac (VHT40) and 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:

802.11a

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				
36	5180	7.08	5.44	0.14	9.48	10.92	PASS
40	5200	7.21	5.42	0.14	9.55	10.92	PASS
48	5240	7.48	5.52	0.14	9.75	10.92	PASS

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 12.08dBi > 6dBi , so the power density limit shall be reduced to 17-(12.08-6) =10.92 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

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	6.13	5.17	8.69	10.92	PASS
40	5200	7.29	6.07	9.73	10.92	PASS
48	5240	7.87	6.16	10.11	10.92	PASS

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 12.08dBi > 6dBi , so the power density limit shall be reduced to 17-(12.08-6) =10.92 dBm.

802.11ac (VHT40)

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				
38	5190	-0.05	-1.65	0.12	2.35	10.92	PASS
46	5230	7.25	5.29	0.12	9.51	10.92	PASS

Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
2. The directional gain = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 12.08dBi > 6dBi , so the power density limit shall be reduced to 17-(12.08-6) =10.92 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/MHz)		Duty Factor (dB)	Total PSD (dBm/MHz)	Max. PSD Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-7.28	-9.21	0.23	-4.89	10.92	PASS

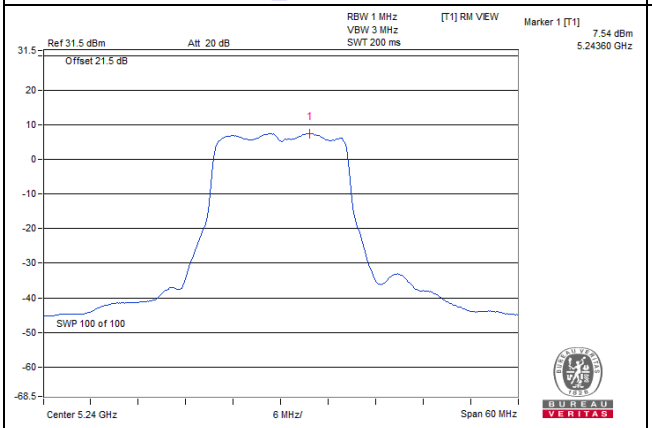
Note: 1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.

2. The directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 12.08dBi > 6dBi , so the power density limit shall be reduced to 17-(12.08-6) =10.92 dBm.

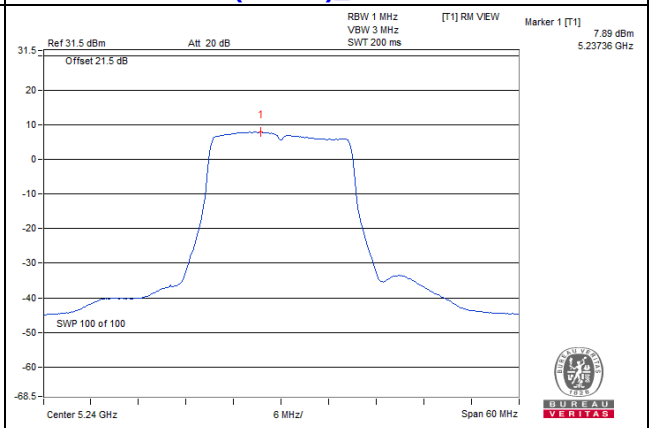
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

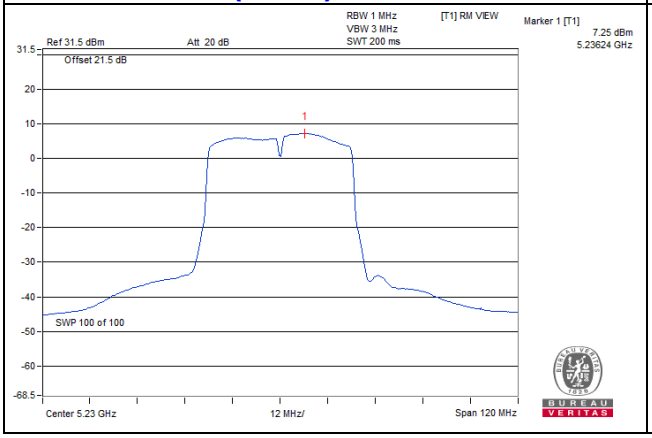
802.11a_Chain 0 / CH48



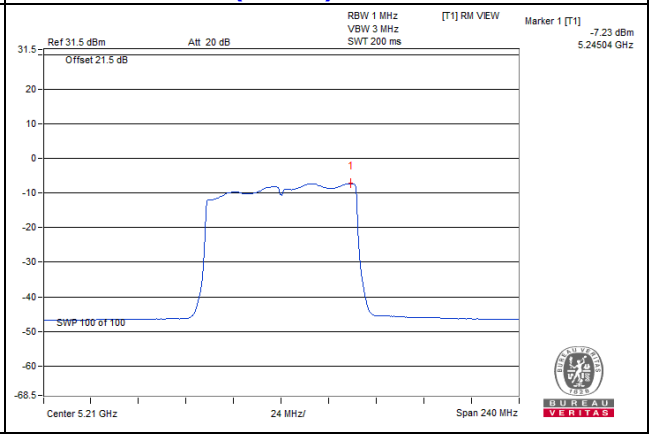
802.11ac (VHT20)_Chain 0 / CH48



802.11ac (VHT40)_Chain 0 / CH46



802.11ac (VHT80)_Chain 0 / CH42



For U-NII-3:

802.11a

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)		Duty Factor (dB)	Total PSD (mW/300kHz)	Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1						
149	5745	-12.61	-14.41	0.14	0.09393	-10.27	-8.05	22.70	PASS
157	5785	-0.81	-2.05	0.14	1.4995	1.76	3.98	22.70	PASS
165	5825	0.16	-3.21	0.14	1.5629	1.94	4.16	22.70	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 = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 13.3dBi > 6dBi , so the power density limit shall be reduced to 30-(13.3-6) =22.70 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT20)

Chan.	Chan. Freq. (MHz)	PSD (dBm/300kHz)		Total PSD (mW/300kHz)	Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1					
149	5745	-13.98	-14.80	0.07311	-11.36	-9.14	22.70	PASS
157	5785	-1.99	-2.73	1.1657	0.67	2.89	22.70	PASS
165	5825	-1.06	-3.18	1.2643	1.02	3.24	22.70	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 = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 13.3dBi > 6dBi , so the power density limit shall be reduced to 30-(13.3-6) =22.70 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (VHT40)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)		Duty Factor (dB)	Total PSD (mW/300kHz)	Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1						
151	5755	-15.13	-15.61	0.12	0.05981	-12.23	-10.01	22.70	PASS
159	5795	-5.66	-6.69	0.12	0.4996	-3.01	-0.79	22.70	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 = 10 log[$(10^{G1/20} + 10^{G2/20})^2$ / 2] = 13.3dBi > 6dBi , so the power density limit shall be reduced to 30-(13.3-6) =22.70 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

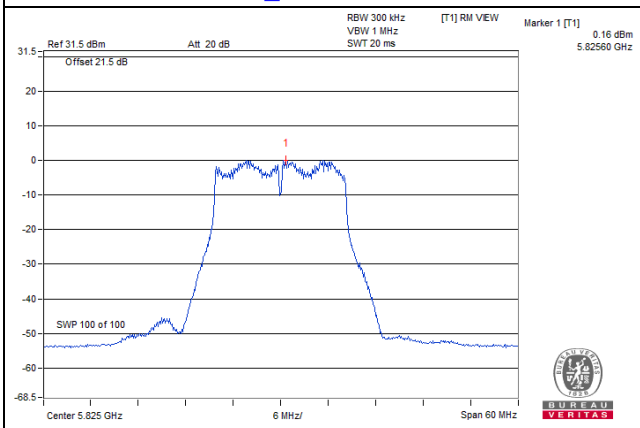
802.11ac (VHT80)

Chan.	Chan. Freq. (MHz)	PSD w/o Duty Factor (dBm/300kHz)		Duty Factor (dB)	Total PSD (mW/300kHz)	Total PSD (dBm/300kHz)	Total PSD (dBm/500kHz)	PSD Limit (dBm/500kHz)	Pass / Fail
		Chain 0	Chain 1						
155	5775	-22.45	-22.68	0.23	0.011698	-19.32	-17.10	22.70	PASS

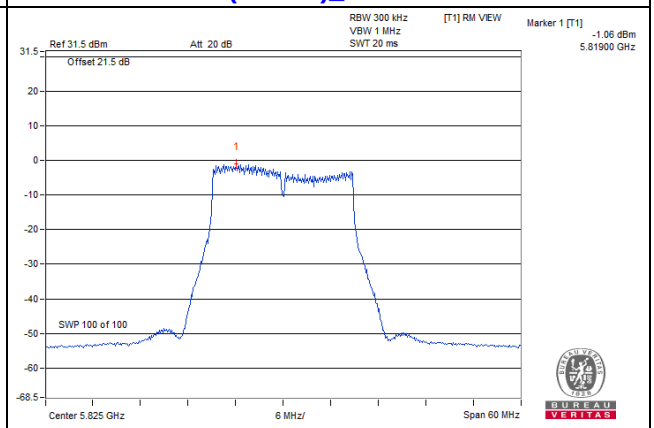
Note: 1. Method b) Measure and sum spectral maxima across the outputs of KDB 662911 is using for calculating total power density.
2. The directional gain = 10 log[($10^{G1/20}$ + $10^{G2/20}$)^2 / 2] = 13.3dBi > 6dBi , so the power density limit shall be reduced to 30-(13.3-6) =22.70 dBm.
3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

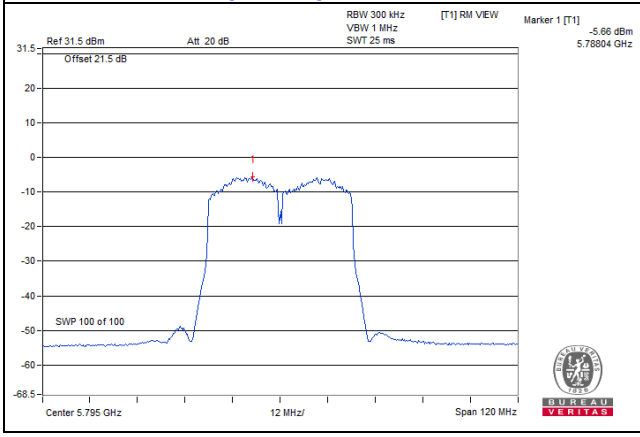
802.11a_Chain 0 / CH165



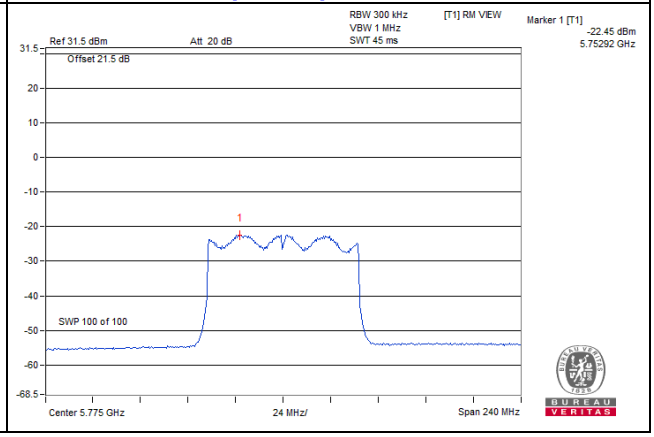
802.11ac (VHT20)_Chain 0 / CH165



802.11ac (VHT40)_Chain 0 / CH159



802.11ac (VHT80)_Chain 0 / CH155

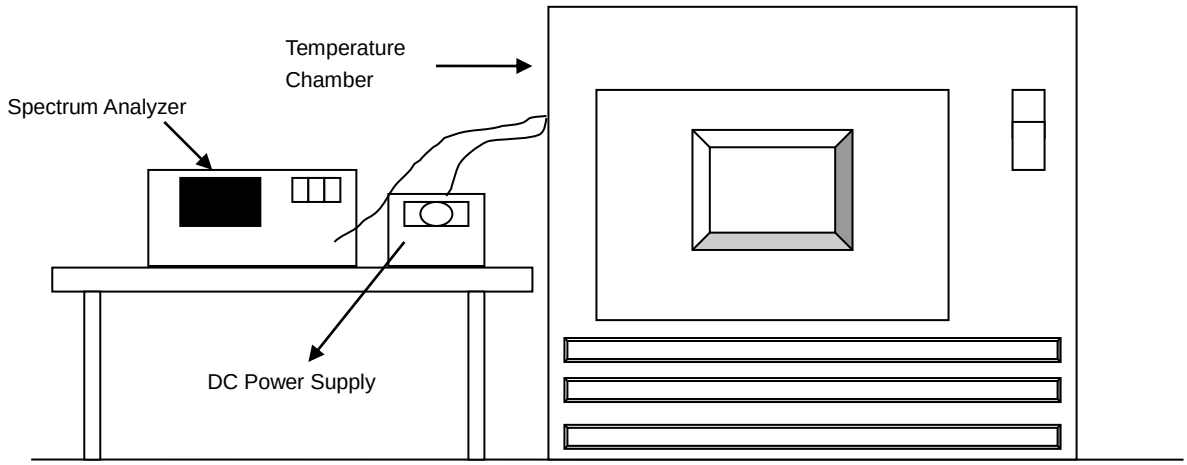


4.6 Frequency Stability Measurement

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	48	5179.975	PASS	5179.9764	PASS	5179.9754	PASS	5179.9777	PASS
60	48	5180.0177	PASS	5180.0168	PASS	5180.0197	PASS	5180.0202	PASS
50	48	5179.9926	PASS	5179.9901	PASS	5179.9927	PASS	5179.9908	PASS
40	48	5180.0121	PASS	5180.0111	PASS	5180.0099	PASS	5180.0126	PASS
30	48	5179.9967	PASS	5179.9963	PASS	5179.993	PASS	5179.994	PASS
20	48	5179.9808	PASS	5179.9795	PASS	5179.9806	PASS	5179.9803	PASS
10	48	5179.9822	PASS	5179.9828	PASS	5179.9834	PASS	5179.9859	PASS
0	48	5179.978	PASS	5179.9806	PASS	5179.9824	PASS	5179.9815	PASS
-10	48	5179.9992	PASS	5180.0002	PASS	5179.9978	PASS	5179.9963	PASS
-20	48	5179.9771	PASS	5179.9757	PASS	5179.9763	PASS	5179.9743	PASS
-30	48	5180.016	PASS	5180.0184	PASS	5180.017	PASS	5180.0197	PASS
-40	48	5179.9955	PASS	5179.995	PASS	5179.9986	PASS	5179.9994	PASS

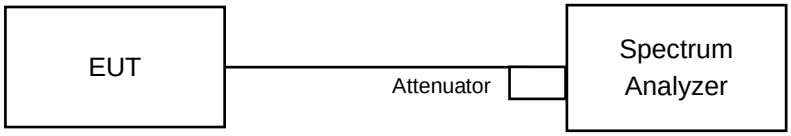
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (℃)	Power Supply (Vdc)	0 Minute		2 Minutes		5 Minutes		10 Minutes	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	55.2	5179.9807	PASS	5179.9789	PASS	5179.9803	PASS	5179.9808	PASS
	48	5179.9808	PASS	5179.9795	PASS	5179.9806	PASS	5179.9803	PASS
	40.8	5179.98	PASS	5179.9787	PASS	5179.9814	PASS	5179.9797	PASS

4.7 6dB Bandwidth Measurement

4.7.1 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is 0.5MHz.

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

4.7.7 Test Results

802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	16.4	16.36	0.5	Pass
157	5785	15.12	16.39	0.5	Pass
165	5825	15.79	16.38	0.5	Pass

802.11ac (VHT20)

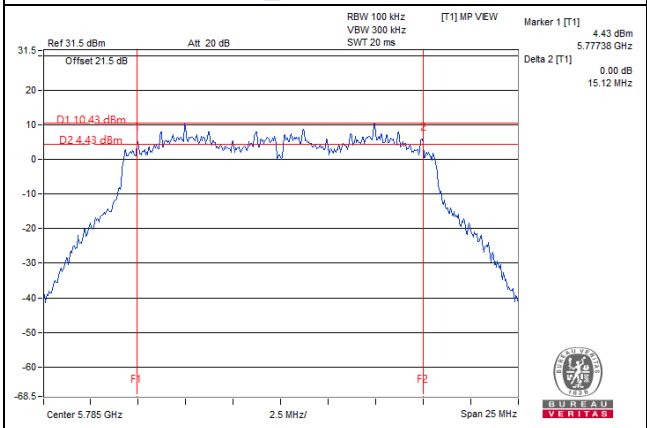
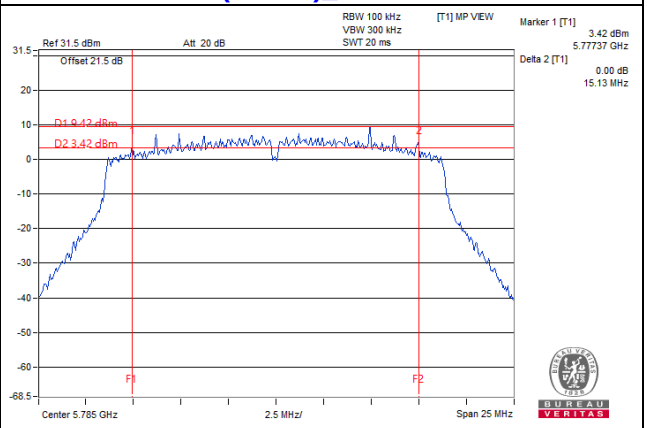
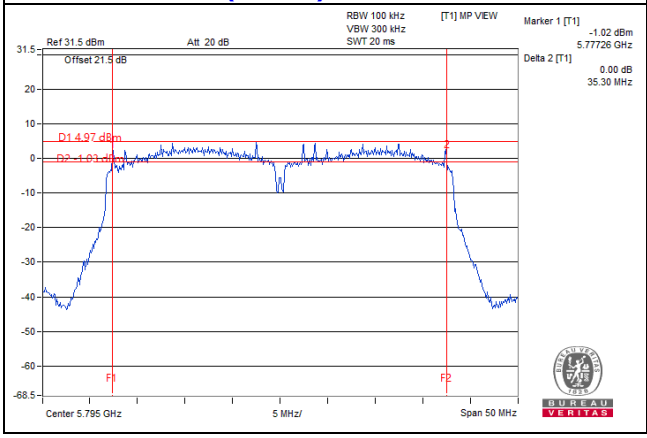
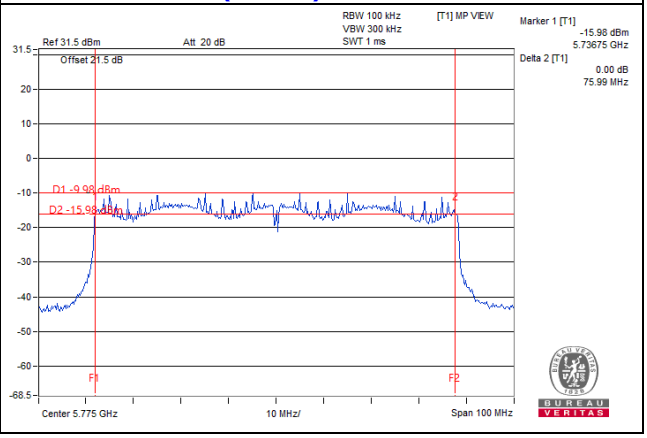
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.63	17.21	0.5	Pass
157	5785	15.13	17.23	0.5	Pass
165	5825	17.61	17.19	0.5	Pass

802.11ac (VHT40)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.31	35.82	0.5	Pass
159	5795	35.3	35.42	0.5	Pass

802.11ac (VHT80)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.99	76.04	0.5	Pass

Spectrum Plot of Worst Value	
802.11a_Chain 0 / CH157	**802.11ac (VHT20)_Chain 0 / CH157**
	
802.11ac (VHT40)_Chain 0 / CH159	**802.11ac (VHT80)_Chain 0 / CH155**
	

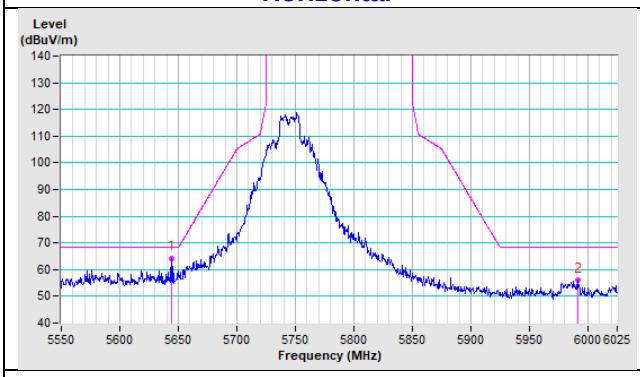
5 Pictures of Test Arrangements

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

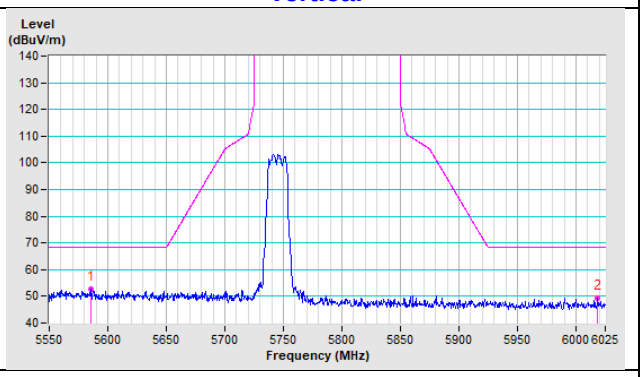
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a CH 149：5745 MHz

Horizontal

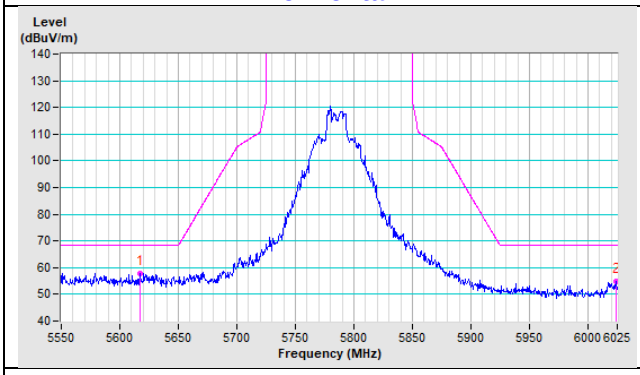


Vertical

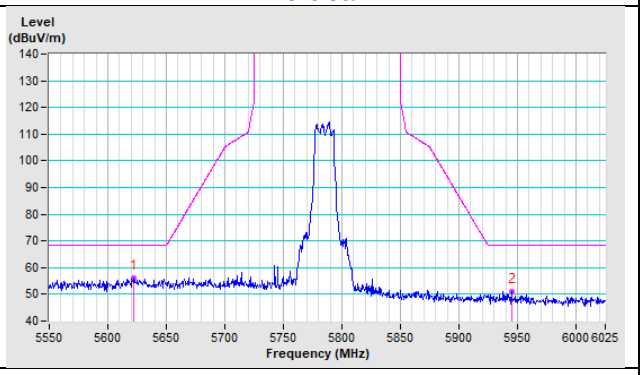


802.11a CH 157：5785 MHz

Horizontal

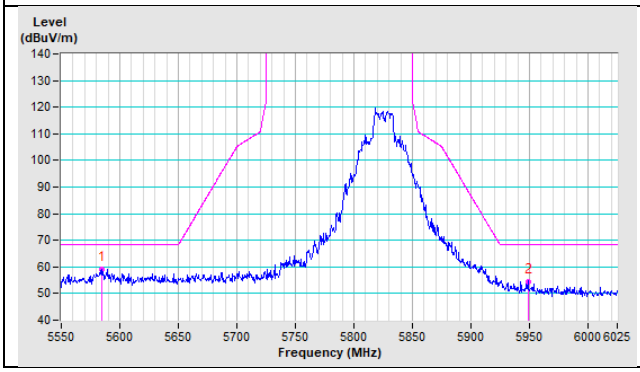


Vertical

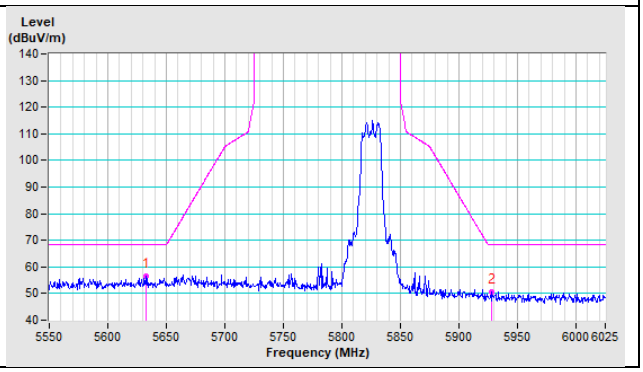


802.11a CH 165：5825 MHz

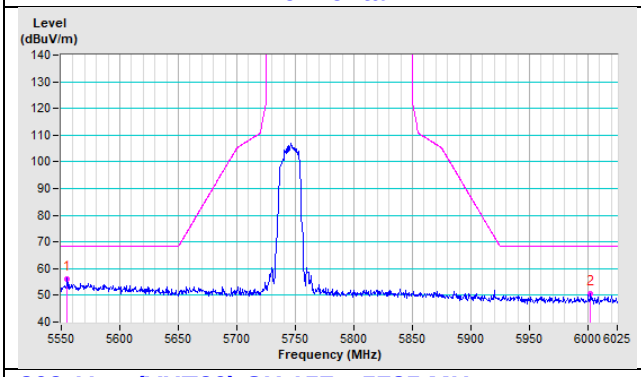
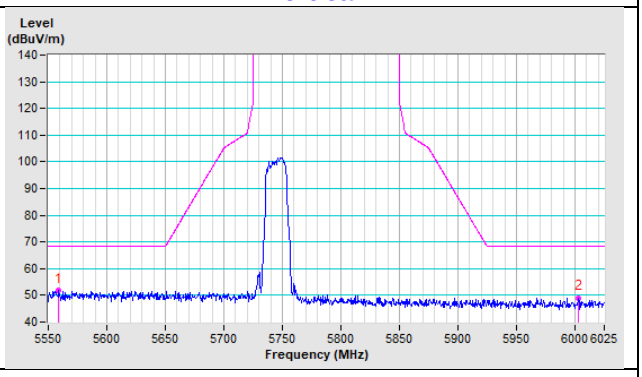
Horizontal



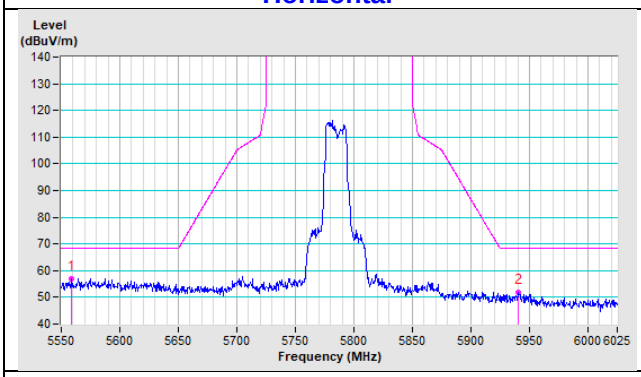
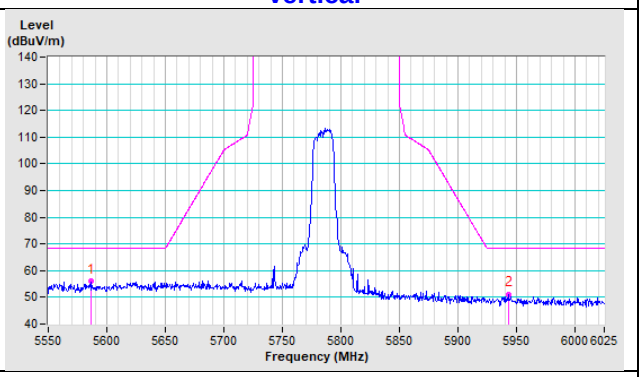
Vertical



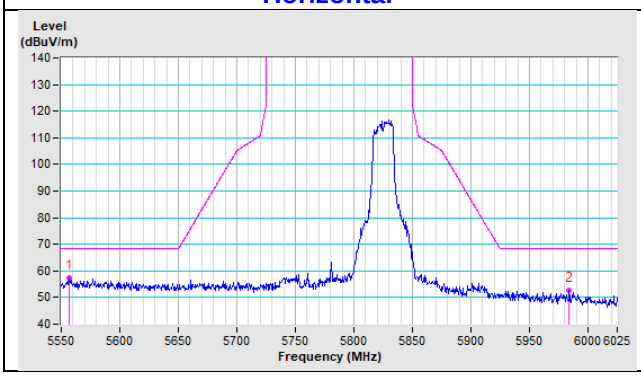
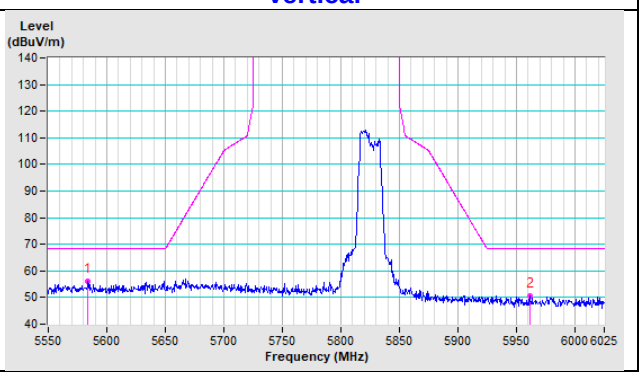
802.11ac (VHT20) CH 149：5745 MHz

Horizontal	Vertical
	

802.11ac (VHT20) CH 157：5785 MHz

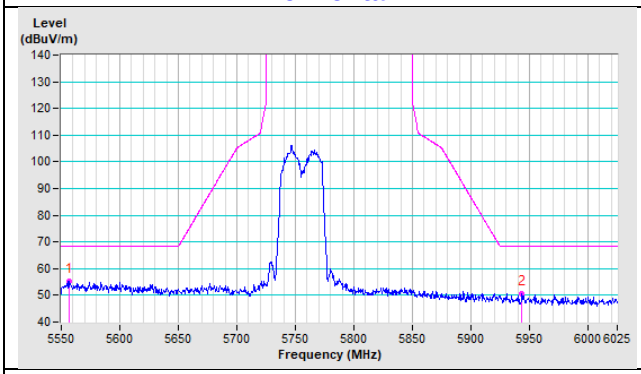
Horizontal	Vertical
	

802.11ac (VHT20) CH 165：5825 MHz

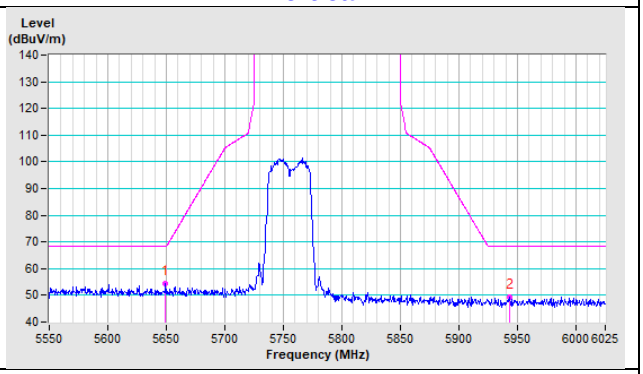
Horizontal	Vertical
	

802.11ac (VHT40) CH 151：5755 MHz

Horizontal

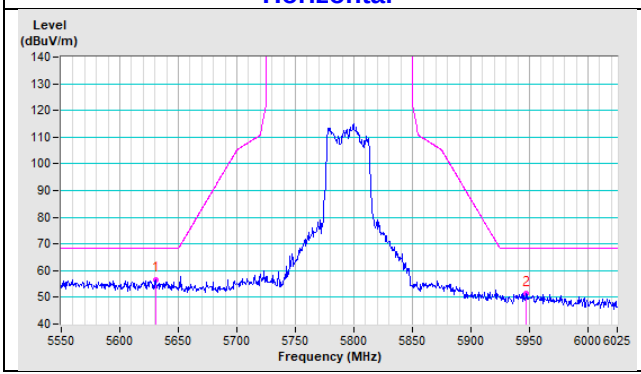


Vertical

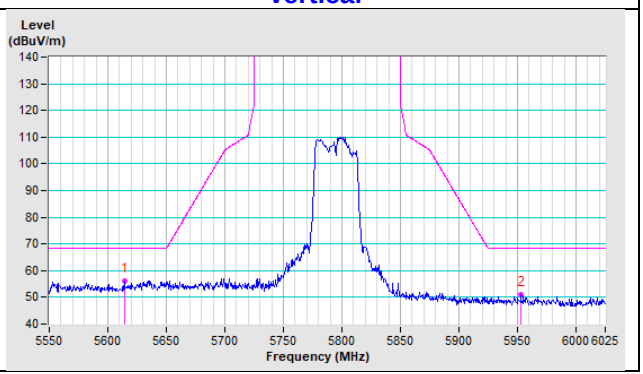


802.11ac (VHT40) CH 159：5795 MHz

Horizontal

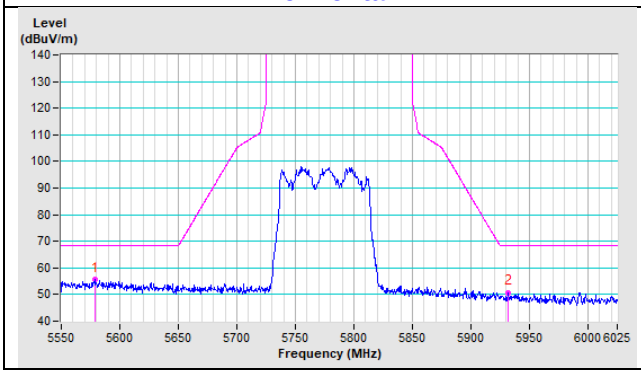


Vertical

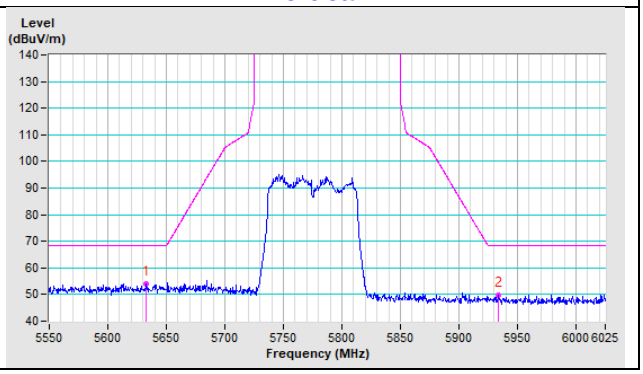


802.11ac (VHT80) CH 155：5775 MHz

Horizontal



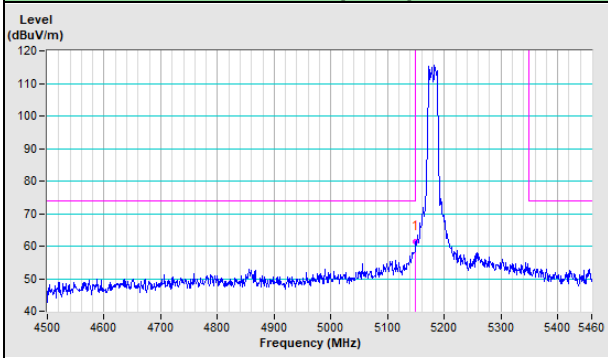
Vertical



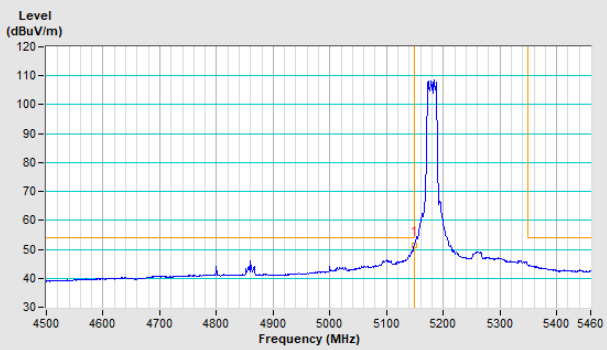
Annex B- Band-edge measurement (For U-NII-1 band)

802.11a Channel 36

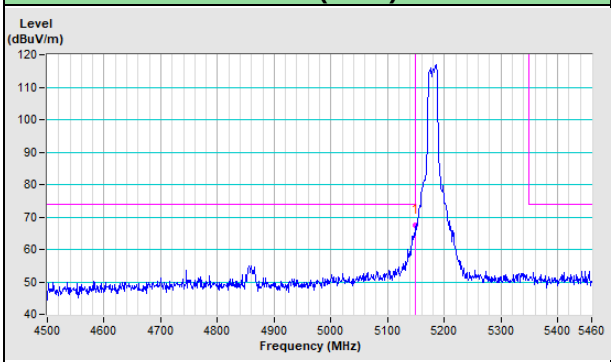
Horizontal (Peak)



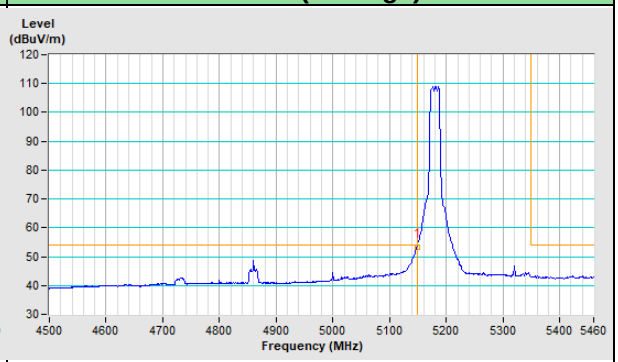
Horizontal (Average)



Vertical (Peak)

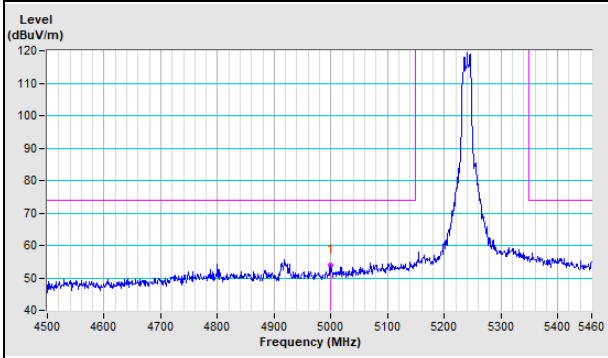


Vertical (Average)

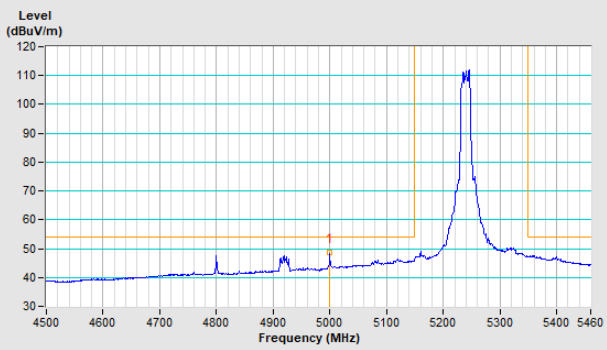


802.11a Channel 48

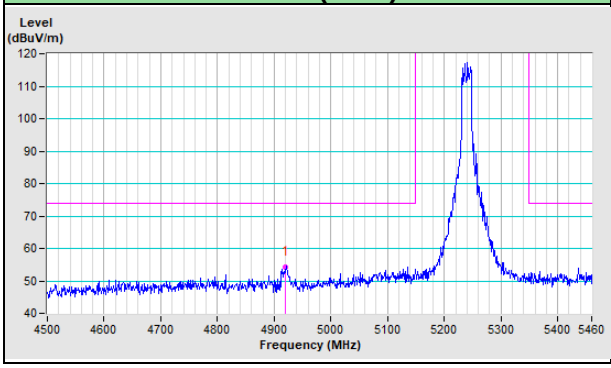
Horizontal (Peak)



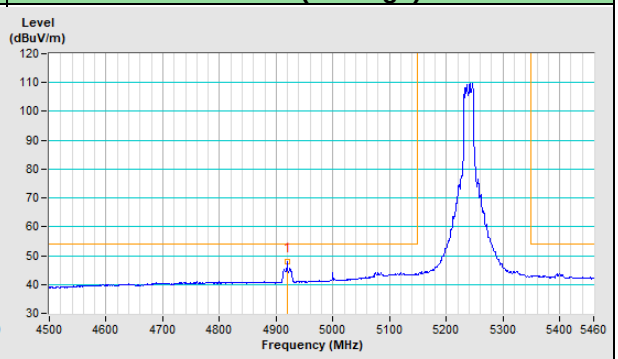
Horizontal (Average)



Vertical (Peak)

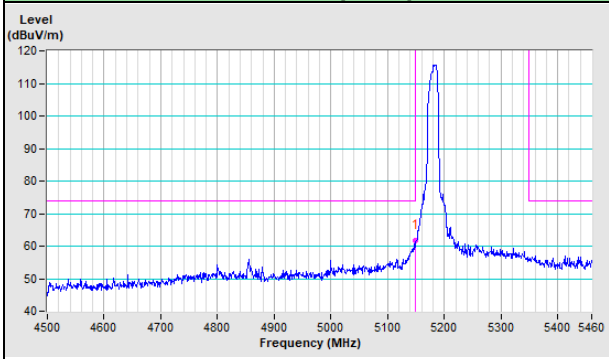


Vertical (Average)

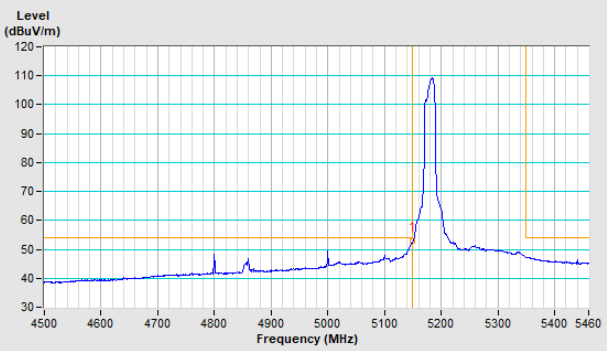


802.11ac (VHT20) Channel 36

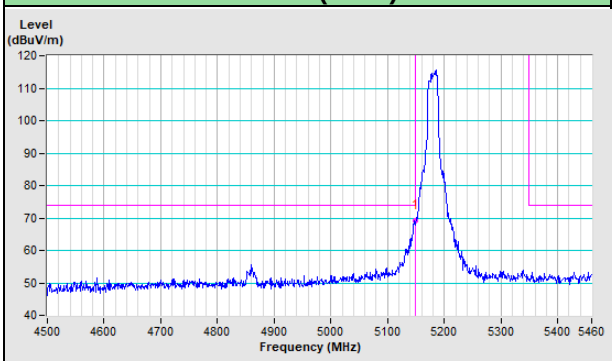
Horizontal (Peak)



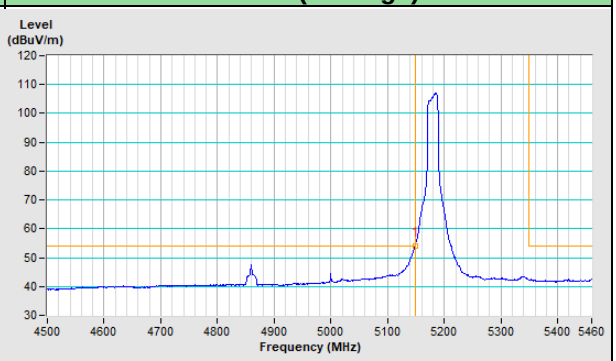
Horizontal (Average)



Vertical (Peak)

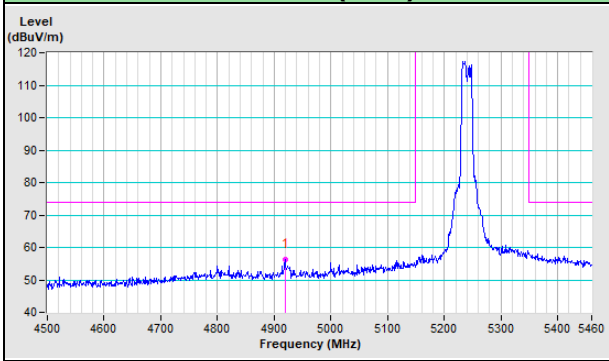


Vertical (Average)

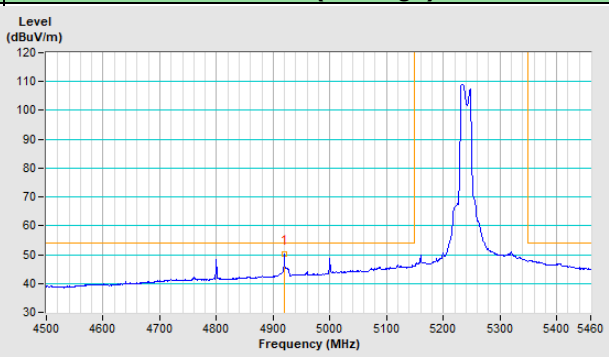


802.11ac (VHT20) Channel 48

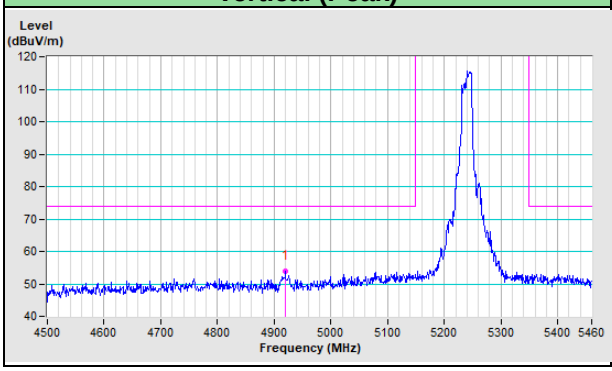
Horizontal (Peak)



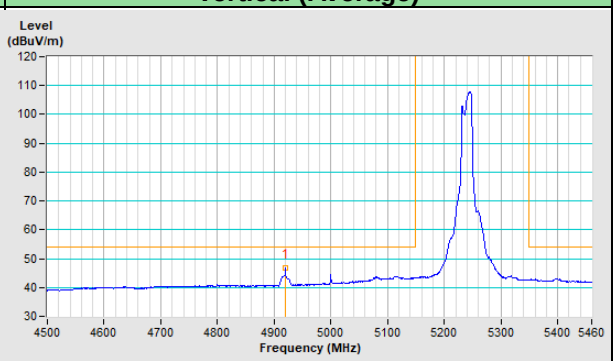
Horizontal (Average)



Vertical (Peak)

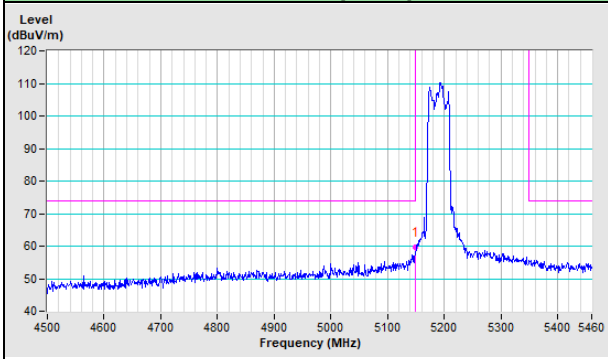


Vertical (Average)

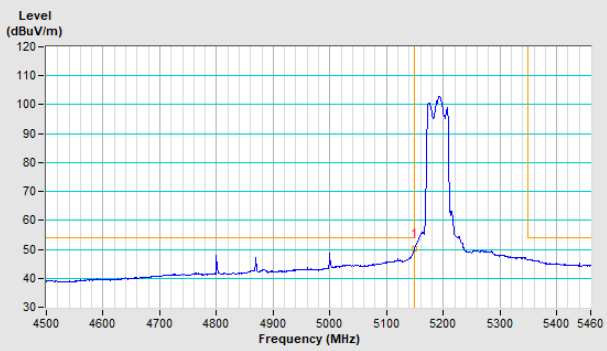


802.11ac (VHT40) Channel 38

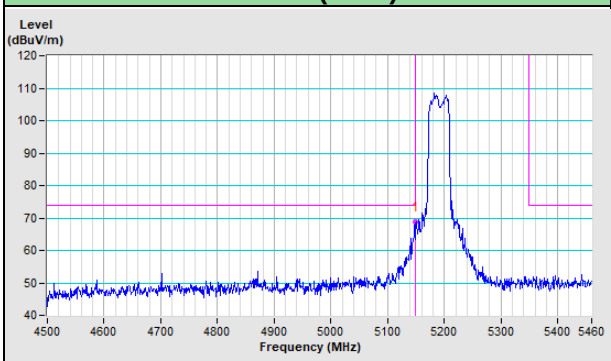
Horizontal (Peak)



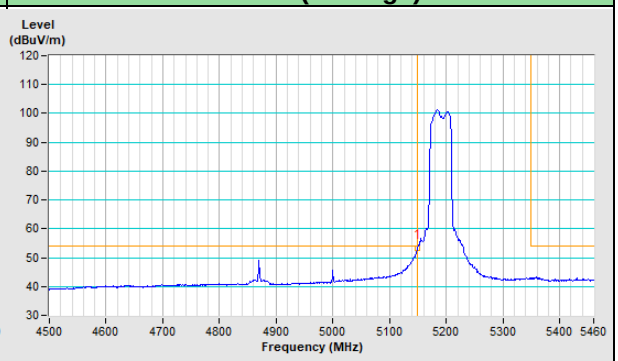
Horizontal (Average)



Vertical (Peak)

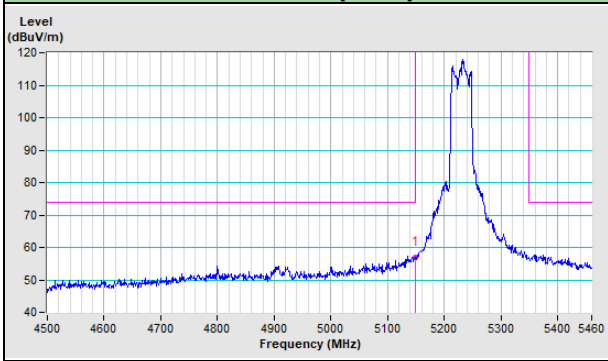


Vertical (Average)

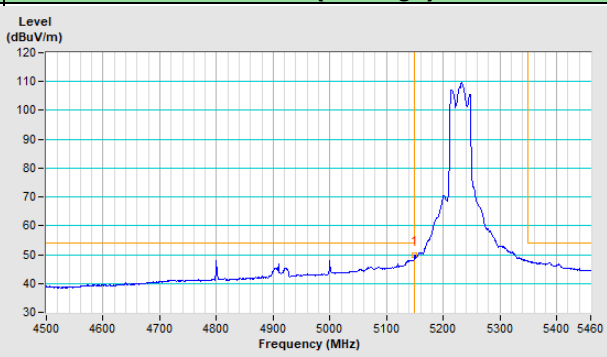


802.11ac (VHT40) Channel 46

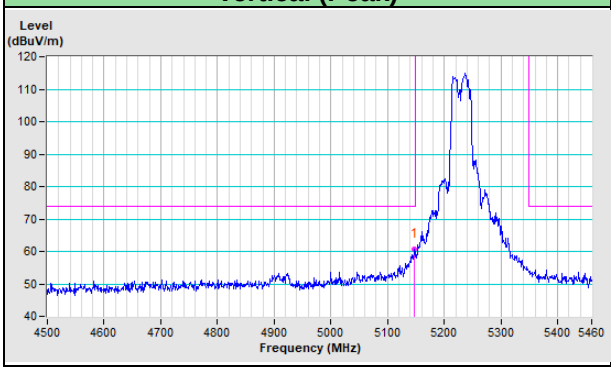
Horizontal (Peak)



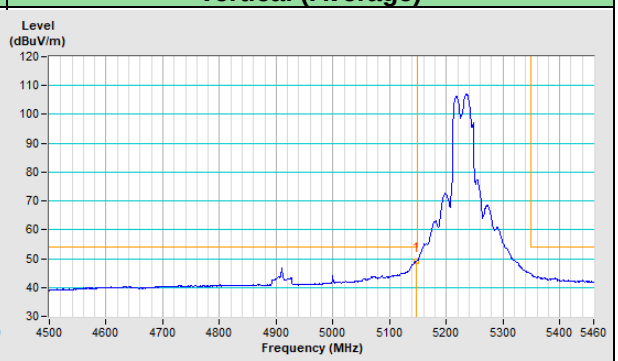
Horizontal (Average)

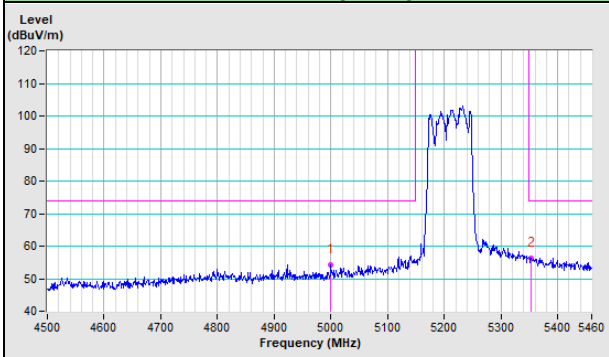
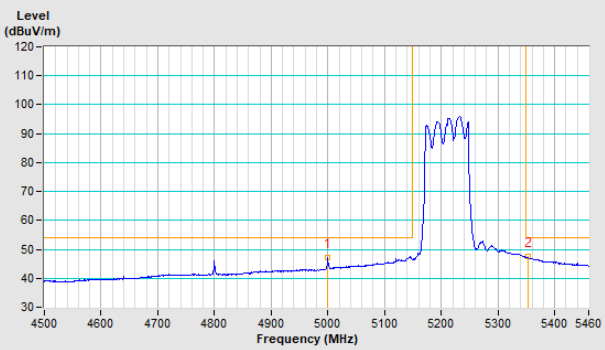
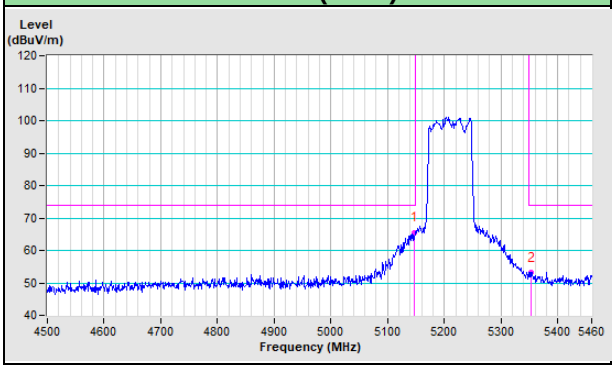
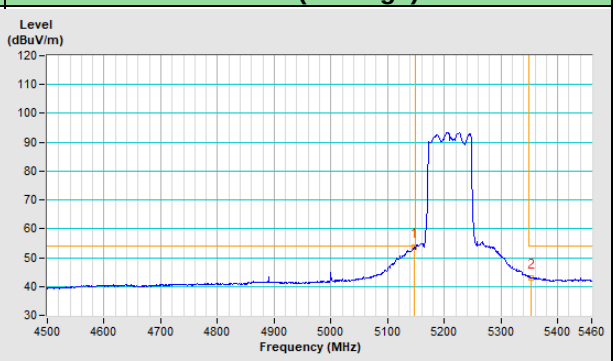


Vertical (Peak)



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.

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

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Fax: 886-2-26051924

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Tel: 886-3-6668565
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Fax: 886-3-3270892

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

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

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