

FCC Test Report (WLAN)

Report No.: RF190919D02-1

FCC ID: P27NA503S

Test Model: NA503S-4G

Series Model: NA503S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "- " , for marketing purpose)

Received Date: Sep. 19, 2019

Test Date: Oct. 3 to 21, 2019

Issued Date: Dec. 6, 2019

Applicant: Sercomm Corp.

Address: 8F, No. 3-1, YuanQu St., NanKang, Taipei 115, Taiwan, R.O.C. (NanKang Software Park)

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

**FCC Registration /
Designation Number:** 198487 / TW2021



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Table of Contents

Release Control Record	4
1 Certificate of Conformity	5
2 Summary of Test Results	6
2.1 Measurement Uncertainty	6
2.2 Modification Record	6
3 General Information	7
3.1 General Description of EUT	7
3.2 Description of Test Modes	9
3.2.1 Test Mode Applicability and Tested Channel Detail	10
3.3 Duty Cycle of Test Signal	12
3.4 Description of Support Units	13
3.4.1 Configuration of System under Test	13
3.5 General Description of Applied Standard and references	14
4 Test Types and Results	15
4.1 Radiated Emission and Bandedge Measurement	15
4.1.1 Limits of Radiated Emission and Bandedge Measurement	15
4.1.2 Test Instruments	16
4.1.3 Test Procedure	17
4.1.4 Deviation from Test Standard	17
4.1.5 Test Setup	18
4.1.6 EUT Operating Condition	19
4.1.7 Test Results	20
4.2 Conducted Emission Measurement	40
4.2.1 Limits of Conducted Emission Measurement	40
4.2.2 Test Instruments	40
4.2.3 Test Procedure	41
4.2.4 Deviation from Test Standard	41
4.2.5 Test Setup	41
4.2.6 EUT Operating Condition	41
4.2.7 Test Results	42
4.3 Transmit Power Measurement	44
4.3.1 Limits of Transmit Power Measurement	44
4.3.2 Test Setup	45
4.3.3 Test Instruments	45
4.3.4 Test Procedure	45
4.3.5 Deviation from Test Standard	45
4.3.6 EUT Operating Condition	45
4.3.7 Test Result	46
4.4 Occupied Bandwidth Measurement	47
4.4.1 Test Setup	47
4.4.2 Test Instruments	47
4.4.3 Test Procedure	47
4.4.4 Test Results	48
4.5 Peak Power Spectral Density Measurement	51
4.5.1 Limits of Peak Power Spectral Density Measurement	51
4.5.2 Test Setup	51
4.5.3 Test Instruments	51
4.5.4 Test Procedure	51
4.5.5 Deviation from Test Standard	51
4.5.6 EUT Operating Condition	51
4.5.7 Test Results	52
4.6 Frequency Stability Measurement	56

4.6.1	Limits of Frequency Stability Measurement	56
4.6.2	Test Setup.....	56
4.6.3	Test Instruments	56
4.6.4	Test Procedure	56
4.6.5	Deviation from Test Standard	56
4.6.6	EUT Operating Condition	56
4.6.7	Test Results	57
4.7	6dB Bandwidth Measurement.....	58
4.7.1	Limits of 6dB Bandwidth Measurement.....	58
4.7.2	Test Setup.....	58
4.7.3	Test Instruments	58
4.7.4	Test Procedure	58
4.7.5	Deviation from Test Standard	58
4.7.6	EUT Operating Condition	58
4.7.7	Test Results	59
5	Pictures of Test Arrangements.....	61
	Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)	62
	Appendix – Information of the Testing Laboratories	65

Release Control Record

Issue No.	Description	Date Issued
RF190919D02-1	Original release.	Dec. 6, 2019

1 Certificate of Conformity

Product: Multiple RF Home Gateway

Brand: Craftsman

Test Model: NA503S-4G

Series Model: NA503S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or "- " , for marketing purpose)

Sample Status: Engineering sample

Applicant: Sercomm Corp.

Test Date: Oct. 3 to 21, 2019

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 RF characteristics under the conditions specified in this report.

Prepared by :

Annie Chang

Date: Dec. 6, 2019

Annie Chang / Senior Specialist

Approved by :

Rex Lai

Date: Dec. 6, 2019

Rex Lai / Associate 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 -13.87dB at 0.35313MHz.
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 -2.44dB at 5150.00MHz.
15.407(a)(1/2/3)	Max Average Transmit Power	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	-	Reference only.
15.407(a)(1/2/3)	Peak Power Spectral Density	Pass	Meet the requirement of limit.
15.407(e)	6dB bandwidth	Pass	Meet the requirement of limit. (U-NII-3 Band only)
15.407(g)	Frequency Stability	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is I-PEX not a standard connector.

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

Note:

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	2.79 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.38 dB
	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.42 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	Multiple RF Home Gateway
Brand	Craftsman
Test Model	NA503S-4G
Series Model	NA503S-4Gxxxxxxx (the 1st x should be "blank" or "-"; the rest x could be 0 to 9, A to Z, "blank" or " ", for marketing purpose)
Model Difference	For marking purpose
Status of EUT	Engineering sample
Power Supply Rating	DC 12V from Adapter or DC 7.5V from battery
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: up to 54Mbps 802.11n: up to 300Mbps 802.11ac: up to 866.7Mbps
Operating Frequency	5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	5180 ~ 5240MHz 4 for 802.11a, 802.11n (20MHz), 802.11ac (20MHz) 2 for 802.11n (40MHz), 802.11ac (40MHz) 1 for 802.11ac (80MHz) 5745 ~ 5825MHz 5 for 802.11a, 802.11n (20MHz) 802.11ac (20MHz) 2 for 802.11n (40MHz) 802.11ac (40MHz) 1 for 802.11ac (80MHz)
Output Power	5180 ~ 5240MHz: 52.187mW 5745 ~ 5825MHz: 72.533mW
Antenna Type	5180 ~ 5240MHz: Ant. 3: PIFA Antenna with 2.56dBi gain Ant. 4: PIFA Antenna with 2.82dBi gain 5745 ~ 5825MHz: Ant. 3: PIFA Antenna with 3.20dBi gain Ant. 4: PIFA Antenna with 2.85dBi gain
Antenna Connector	I-PEX
Accessory Device	Adapter
Data Cable Supplied	N/A

Note:

1. The EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX FUNCTION
802.11a	1TX
802.11n (20MHz)	2TX
802.11n (40MHz)	2TX
802.11ac (20MHz)	2TX
802.11ac (40MHz)	2TX
802.11ac (80MHz)	2TX

* The modulation and bandwidth are similar for 802.11n mode for 20MHz (40MHz) and 802.11ac mode for 20MHz (40MHz), therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

2. The EUT was pre-tested with the following modes:

- ✧ Operating Mode (EUT + Battery)
- ✧ Operating + Charging Mode (EUT + Adapter)

The worst emission level was found when the EUT tested under **Operating + Charging Mode (EUT + Adapter)**, therefore, only its test data was recorded in this report.

3. The EUT uses following adapter or battery.

Item	Adapter	Battery
Brand	APD	Simplo
Model	WB-24J12FU	NA50X
AC I/P Rating	100-240V, 50-60Hz, 0.7A	-
DC O/P Rating	12V, 2A	7.5V, 2400mAh, 18Wh
Power cord	AC 2 Pin, Non-shielded DC cable (1.5m)	-

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

3.2 Description of Test Modes

5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (20MHz), 802.11ac (20MHz):

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

2 channels are provided for 802.11n (40MHz), 802.11ac (40MHz):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (80MHz):

Channel	Frequency
42	5210MHz

5745~5825MHz:

5 channels are provided for 802.11a, 802.11n (20MHz), 802.11ac (20MHz):

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

2 channels are provided for 802.11n (40MHz), 802.11ac (40MHz):

Channel	Frequency	Channel	Frequency
151	5755MHz	159	5795MHz

1 channel is provided for 802.11ac (80MHz):

Channel	Frequency
155	5775MHz

3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE<1G	PLC	APCM	
-	√	√	√	√	Operating + Charging Mode (EUT + Adapter)

Where **RE $\geq$ 1G**: Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement

NOTE: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on **X-plane**.

Radiated Emission Test (Above 1GHz):

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	6.5
	802.11ac (40MHz)		38 to 46	38, 46	OFDM	13.5
	802.11ac (80MHz)		42	42	OFDM	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	6.5
	802.11ac (40MHz)		151 to 159	151, 159	OFDM	13.5
	802.11ac (80MHz)		155	155	OFDM	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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36	OFDM	6.0
-	802.11a	5745-5825	149 to 165		OFDM	6.0

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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36	OFDM	6.0
-	802.11a	5745-5825	149 to 165		OFDM	6.0

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.

EUT Configure Mode	Mode	Frequency Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	6.5
	802.11ac (40MHz)		38 to 46	38, 46	OFDM	13.5
	802.11ac (80MHz)		42	42	OFDM	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	6.5
	802.11ac (40MHz)		151 to 159	151, 159	OFDM	13.5
	802.11ac (80MHz)		155	155	OFDM	29.3

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested By
RE$\geq$1G	25deg. C, 77%RH	120Vac, 60Hz	Ian Chang
RE<1G	25deg. C, 77%RH	120Vac, 60Hz	Ian Chang
PLC	25deg. C, 75%RH	120Vac, 60Hz	Ian Chang
APCM	25deg. C, 75%RH	120Vac, 60Hz	Saxon Lee

3.3 Duty Cycle of Test Signal

If duty cycle of test signal is $\geq 98\%$, duty factor is not required.

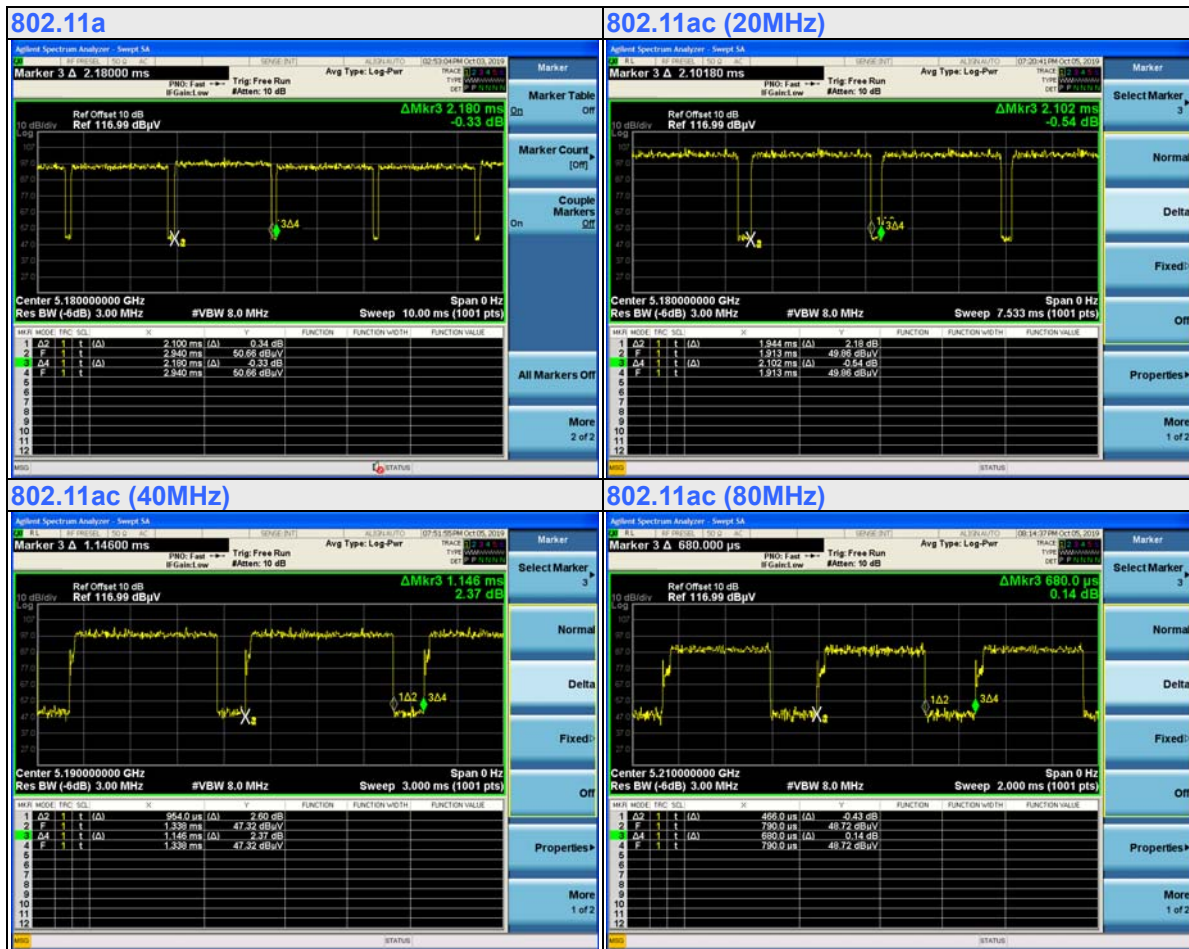
If duty cycle of test signal is $< 98\%$, duty factor shall be considered.

802.11a: Duty cycle = $2.1/2.18 = 0.963$, Duty factor = $10 * \log(1/0.963) = 0.16$

802.11ac (20MHz): Duty cycle = $1.944/2.102 = 0.925$, Duty factor = $10 * \log(1/0.925) = 0.34$

802.11ac (40MHz): Duty cycle = $0.954/1.146 = 0.832$, Duty factor = $10 * \log(1/0.832) = 0.80$

802.11ac (80MHz): Duty cycle = $0.466/0.680 = 0.685$, Duty factor = $10 * \log(1/0.685) = 1.64$



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.	Notebook PC	DELL	E6530	9331GV1	N/A	Provided by Lab

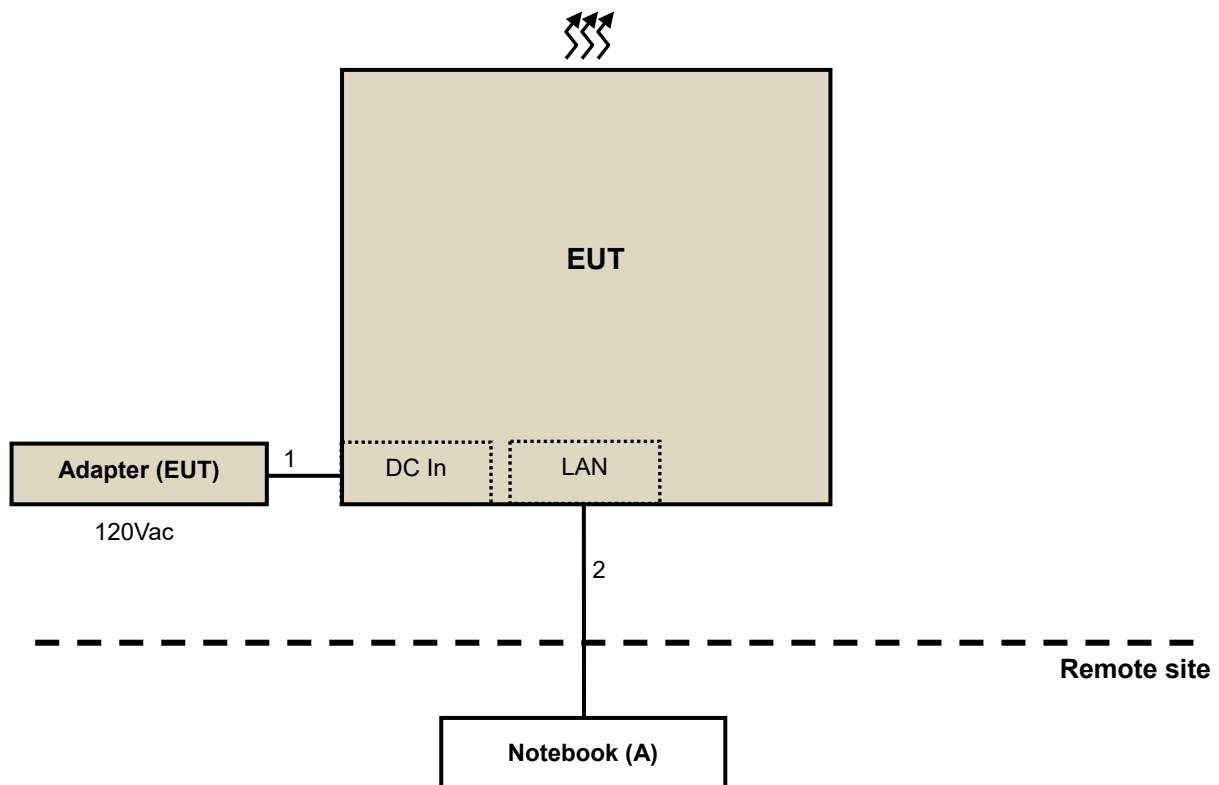
Note:

1. All power cords of the above support units are non-shielded (1.8m).
2. Item A acted as communication partners to transfer data.

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/ No)	Cores (Qty.)	Remarks
1.	DC cable	1	1.5	N	0	Supplied by client
2.	LAN cable	1	10	N	0	Provided by Lab (RJ45, Cat.5e)

Note: The core(s) is(are) originally attached to the cable(s).

3.4.1 Configuration of System under Test



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:

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

Limits of unwanted emission out of the restricted bands

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

Note:

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

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

4.1.2 Test Instruments

DESCRIPTION & MANUFACTURER	MODEL NO.	SERIAL NO.	CALIBRATED DATE	CALIBRATED UNTIL
HP Preamplifier	8447D	2432A03504	Feb. 20, 2019	Feb. 19, 2020
HP Preamplifier	8449B	3008A01201	Feb. 21, 2019	Feb. 20, 2020
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 20, 2019	Feb. 19, 2020
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 05, 2019	Mar. 04, 2020
Schwarzbeck Antenna	VULB 9168	139	Nov. 26, 2018	Nov. 25, 2019
Schwarzbeck Antenna	VHBA 9123	480	Jun. 3, 2019	Jun. 2, 2021
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 25, 2018	Nov. 24, 2019
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 25, 2018	Nov. 24, 2019
ADT. Turn Table	TT100	0306	NA	NA
ADT. Tower	AT100	0306	NA	NA
Software	Radiated_V7.6.15.9.5	NA	NA	NA
SUHNER RF cable With 4dB PAD	SF102	Cable-CH6-01	Jul. 10, 2019	Jul. 9, 2020
SUHNER RF cable With 3/4dB PAD	SF102	Cable-CH8-3.6m	Jul. 10, 2019	Jul. 9, 2020
KEYSIGHT MIMO Powermeasurement Test set	U2021XA	U2021XA-001	Jun. 11, 2019	Jun. 10, 2020
KEYSIGHT Spectrum Analyzer	N9030A	MY54490260	Jul. 30, 2019	Jul. 29, 2020
Loop Antenna EMCI	LPA600	270	Aug. 23, 2019	Aug. 22, 2021
EMCO Horn Antenna	3115	00028257	Nov. 25, 2018	Nov. 24, 2019
Highpass filter Wainwright Instruments	WHK 3.1/18G-10SS	SN 8	NA	NA
ROHDE & SCHWARZ Spectrum Analyzer	FSV40	101042	Sep. 23, 2019	Sep. 22, 2020
Anritsu Power Sensor	MA2411B	0738404	Apr. 16, 2019	Apr. 15, 2020
Anritsu Power Meter	ML2495A	0842014	Apr. 16, 2019	Apr. 15, 2020
Temperature & Humidity Chamber	MHU-225AU	920409	May 24, 2019	May 23, 2020
DIGITAL POWER METER IDRC	CP-240	240515	Sep. 18, 2019	Sep. 17, 2020
AC Power Source ExTech	CFW-105	E000603	NA	NA

- NOTE:** 1. The calibration interval of the above test instruments is 12/24 months. And the calibrations are traceable to NML/ROC and NIST/USA.
2. The horn antenna and HP preamplifier (model: 8449B) are used only for the measurement of emission frequency above 1GHz if tested.
3. The test was performed in Chamber No. 6.

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:

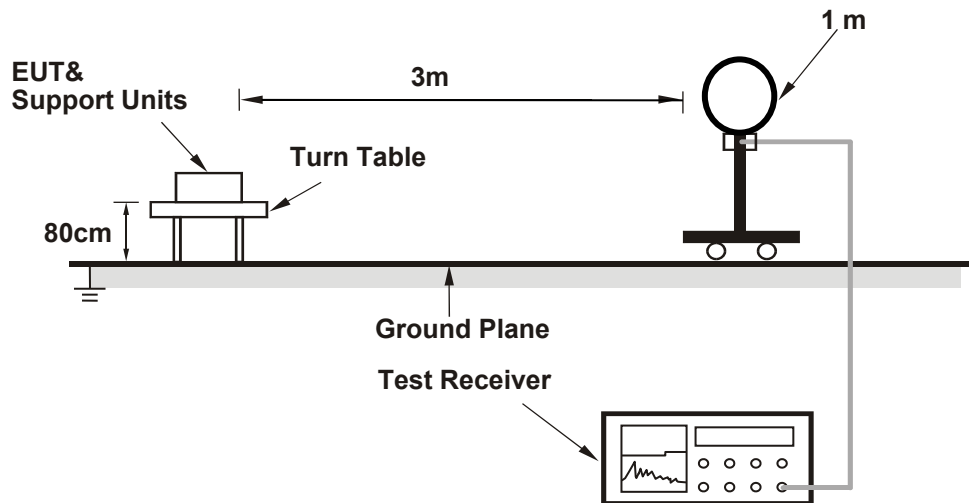
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is $\geq 1/T$ (Duty cycle < 98%) or 10Hz (Duty cycle $\geq 98\%$) 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

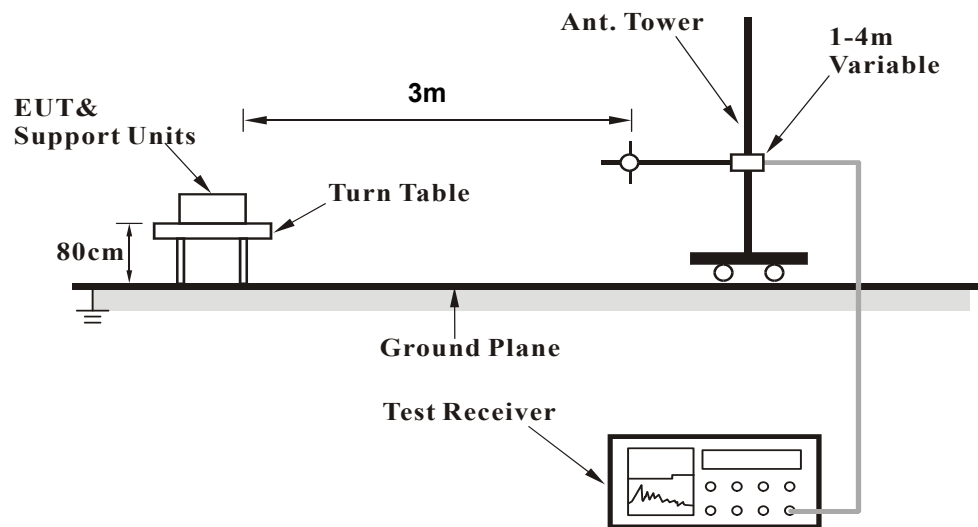
No deviation.

4.1.5 Test Setup

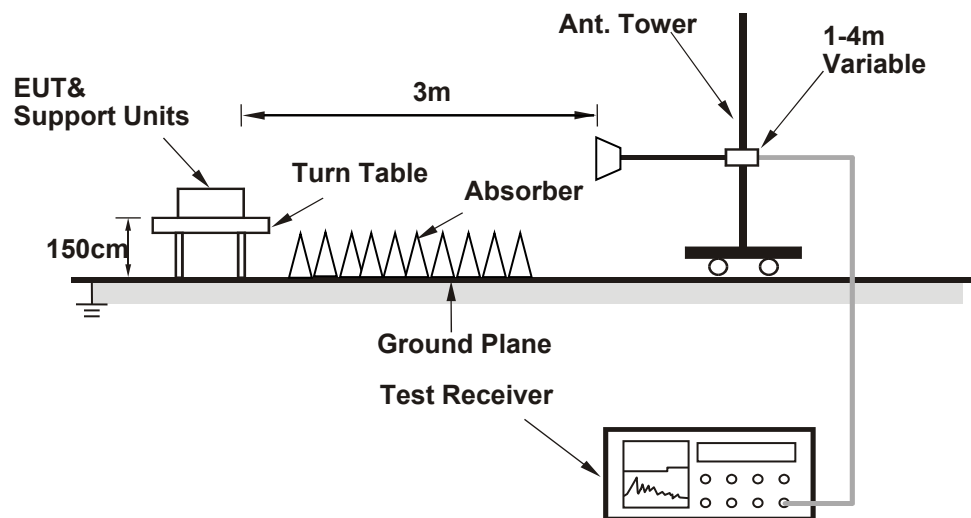
For Radiated emission below 30MHz



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

- Placed the EUT on the testing table.
- Prepared notebook to act as communication partner and placed it outside of testing area.
- The communication partner connected with EUT via a RJ45 cable and ran a test program (provided by manufacturer) to enable EUT under transmission condition continuously at specific channel frequency.
- The necessary accessories enable the system in full functions.

4.1.7 Test Results

Above 1GHz Data:

802.11a

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.28 PK	74.00	-10.72	2.77 H	27	54.19	9.09
2	5150.00	48.70 AV	54.00	-5.30	2.77 H	27	39.61	9.09
3	*5180.00	108.05 PK			2.77 H	27	98.87	9.18
4	*5180.00	98.15 AV			2.77 H	27	88.97	9.18
5	#10360.00	56.78 PK	68.20	-11.42	2.06 H	318	40.64	16.14
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	64.27 PK	74.00	-9.73	1.25 V	197	55.18	9.09
2	5150.00	49.07 AV	54.00	-4.93	1.25 V	197	39.98	9.09
3	*5180.00	110.89 PK			1.25 V	197	101.71	9.18
4	*5180.00	100.83 AV			1.25 V	197	91.65	9.18
5	#10360.00	57.05 PK	68.20	-11.15	1.67 V	239	40.91	16.14

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	107.95 PK			2.86 H	39	98.73	9.22
2	*5200.00	97.87 AV			2.86 H	39	88.65	9.22
3	#10400.00	56.87 PK	68.20	-11.33	1.93 H	325	40.58	16.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	110.16 PK			1.26 V	190	100.94	9.22
2	*5200.00	100.10 AV			1.26 V	190	90.88	9.22
3	#10400.00	57.13 PK	68.20	-11.07	1.55 V	245	40.84	16.29

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.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	107.58 PK			2.89 H	11	97.93	9.65
2	*5240.00	97.39 AV			2.89 H	11	87.74	9.65
3	5350.00	61.79 PK	74.00	-12.21	2.89 H	11	51.81	9.98
4	5350.00	47.70 AV	54.00	-6.30	2.89 H	11	37.72	9.98
5	#10480.00	57.21 PK	68.20	-10.99	1.99 H	330	40.60	16.61
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	110.85 PK			1.51 V	188	101.20	9.65
2	*5240.00	100.78 AV			1.51 V	188	91.13	9.65
3	5350.00	62.21 PK	74.00	-11.79	1.51 V	188	52.23	9.98
4	5350.00	48.24 AV	54.00	-5.76	1.51 V	188	38.26	9.98
5	#10480.00	57.57 PK	68.20	-10.63	1.84 V	231	40.96	16.61

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.

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5555.70	61.32 PK	68.20	-6.88	1.08 H	27	50.87	10.45
2	*5745.00	108.12 PK			1.08 H	27	98.41	9.71
3	*5745.00	97.94 AV			1.08 H	27	88.23	9.71
4	#6003.62	61.99 PK	68.20	-6.21	1.08 H	27	51.85	10.14
5	11490.00	58.43 PK	74.00	-15.57	1.16 H	357	40.53	17.90
6	11490.00	46.64 AV	54.00	-7.36	1.16 H	357	28.74	17.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5567.57	61.82 PK	68.20	-6.38	2.14 V	203	51.42	10.40
2	*5745.00	110.61 PK			2.14 V	203	100.90	9.71
3	*5745.00	100.37 AV			2.14 V	203	90.66	9.71
4	#6009.80	62.26 PK	68.20	-5.94	2.14 V	203	52.09	10.17
5	11490.00	58.67 PK	74.00	-15.33	1.73 V	235	40.77	17.90
6	11490.00	47.03 AV	54.00	-6.97	1.73 V	235	29.13	17.90

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5625.05	62.42 PK	68.20	-5.78	1.11 H	31	52.27	10.15
2	*5785.00	107.81 PK			1.11 H	31	98.13	9.68
3	*5785.00	97.56 AV			1.11 H	31	87.88	9.68
4	#5992.70	63.71 PK	68.20	-4.49	1.11 H	31	53.61	10.10
5	11570.00	58.26 PK	74.00	-15.74	1.19 H	359	40.21	18.05
6	11570.00	46.58 AV	54.00	-7.42	1.19 H	359	28.53	18.05
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5634.55	61.55 PK	68.20	-6.65	2.17 V	205	51.43	10.12
2	*5785.00	110.18 PK			2.17 V	205	100.50	9.68
3	*5785.00	99.82 AV			2.17 V	205	90.14	9.68
4	#5936.65	62.11 PK	68.20	-6.09	2.17 V	205	52.06	10.05
5	11570.00	58.54 PK	74.00	-15.46	1.80 V	241	40.49	18.05
6	11570.00	47.09 AV	54.00	-6.91	1.80 V	241	29.04	18.05

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5634.55	61.79 PK	68.20	-6.41	1.03 H	24	51.67	10.12
2	*5825.00	107.66 PK			1.03 H	24	97.90	9.76
3	*5825.00	97.43 AV			1.03 H	24	87.67	9.76
4	#6022.15	62.52 PK	68.20	-5.68	1.03 H	24	52.31	10.21
5	11650.00	58.22 PK	74.00	-15.78	1.21 H	2	40.00	18.22
6	11650.00	46.60 AV	54.00	-7.40	1.21 H	2	28.38	18.22
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5625.52	61.61 PK	68.20	-6.59	2.20 V	202	51.46	10.15
2	*5825.00	110.03 PK			2.20 V	202	100.27	9.76
3	*5825.00	99.74 AV			2.20 V	202	89.98	9.76
4	#5945.68	62.07 PK	68.20	-6.13	2.20 V	202	52.00	10.07
5	11650.00	58.50 PK	74.00	-15.50	1.77 V	236	40.28	18.22
6	11650.00	47.02 AV	54.00	-6.98	1.77 V	236	28.80	18.22

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.

802.11ac (20MHz)

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.37 PK	74.00	-10.63	2.69 H	36	54.28	9.09
2	5150.00	48.08 AV	54.00	-5.92	2.69 H	36	38.99	9.09
3	*5180.00	107.94 PK			2.69 H	36	98.76	9.18
4	*5180.00	97.04 AV			2.69 H	36	87.86	9.18
5	#10360.00	56.23 PK	68.20	-11.97	2.54 H	187	40.09	16.14
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	66.13 PK	74.00	-7.87	1.41 V	199	57.04	9.09
2	5150.00	49.66 AV	54.00	-4.34	1.41 V	199	40.57	9.09
3	*5180.00	110.29 PK			1.41 V	199	101.11	9.18
4	*5180.00	99.87 AV			1.41 V	199	90.69	9.18
5	#10360.00	56.80 PK	68.20	-11.40	1.67 V	234	40.66	16.14

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	107.11 PK			2.75 H	41	97.89	9.22
2	*5200.00	95.87 AV			2.75 H	41	86.65	9.22
3	#10400.00	56.12 PK	68.20	-12.08	2.69 H	336	39.83	16.29
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5200.00	109.31 PK			1.41 V	199	100.09	9.22
2	*5200.00	98.95 AV			1.41 V	199	89.73	9.22
3	#10400.00	57.16 PK	68.20	-11.04	1.63 V	239	40.87	16.29

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.

CHANNEL	TX Channel 48	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	107.11 PK			2.78 H	12	97.46	9.65
2	*5240.00	96.04 AV			2.78 H	12	86.39	9.65
3	5350.00	60.42 PK	74.00	-13.58	2.78 H	12	50.44	9.98
4	5350.00	47.57 AV	54.00	-6.43	2.78 H	12	37.59	9.98
5	#10480.00	56.27 PK	68.20	-11.93	2.47 H	46	39.66	16.61
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5240.00	110.01 PK			1.47 V	201	100.36	9.65
2	*5240.00	99.40 AV			1.47 V	201	89.75	9.65
3	5350.00	61.72 PK	74.00	-12.28	1.47 V	201	51.74	9.98
4	5350.00	48.10 AV	54.00	-5.90	1.47 V	201	38.12	9.98
5	#10480.00	57.05 PK	68.20	-11.15	1.52 V	285	40.44	16.61

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.

CHANNEL	TX Channel 149	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5583.25	61.77 PK	68.20	-6.43	1.10 H	29	51.44	10.33
2	*5745.00	108.09 PK			1.10 H	29	98.38	9.71
3	*5745.00	97.79 AV			1.10 H	29	88.08	9.71
4	#5996.50	63.16 PK	68.20	-5.04	1.10 H	29	53.04	10.12
5	11490.00	58.33 PK	74.00	-15.67	1.21 H	355	40.43	17.90
6	11490.00	46.51 AV	54.00	-7.49	1.21 H	355	28.61	17.90
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5607.95	61.31 PK	68.20	-6.89	2.21 V	240	51.08	10.23
2	*5745.00	110.56 PK			2.21 V	240	100.85	9.71
3	*5745.00	100.29 AV			2.21 V	240	90.58	9.71
4	#5965.15	62.66 PK	68.20	-5.54	2.21 V	240	52.58	10.08
5	11490.00	58.62 PK	74.00	-15.38	1.82 V	227	40.72	17.90
6	11490.00	47.01 AV	54.00	-6.99	1.82 V	227	29.11	17.90

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5626.95	62.23 PK	68.20	-5.97	1.13 H	25	52.08	10.15
2	*5785.00	108.11 PK			1.13 H	25	98.43	9.68
3	*5785.00	97.86 AV			1.13 H	25	88.18	9.68
4	#5989.37	62.17 PK	68.20	-6.03	1.13 H	25	52.06	10.11
5	11570.00	58.26 PK	74.00	-15.74	1.24 H	353	40.21	18.05
6	11570.00	46.43 AV	54.00	-7.57	1.24 H	353	28.38	18.05
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5579.45	62.16 PK	68.20	-6.04	2.17 V	228	51.81	10.35
2	*5785.00	110.21 PK			2.17 V	228	100.53	9.68
3	*5785.00	99.93 AV			2.17 V	228	90.25	9.68
4	#5994.60	62.54 PK	68.20	-5.66	2.17 V	228	52.42	10.12
5	11570.00	58.49 PK	74.00	-15.51	1.78 V	210	40.44	18.05
6	11570.00	46.92 AV	54.00	-7.08	1.78 V	210	28.87	18.05

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5642.62	61.54 PK	68.20	-6.66	1.16 H	27	51.45	10.09
2	*5825.00	108.23 PK			1.16 H	27	98.47	9.76
3	*5825.00	97.96 AV			1.16 H	27	88.20	9.76
4	#6014.55	63.00 PK	68.20	-5.20	1.16 H	27	52.82	10.18
5	11650.00	58.20 PK	74.00	-15.80	1.29 H	356	39.98	18.22
6	11650.00	46.35 AV	54.00	-7.65	1.29 H	356	28.13	18.22
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5625.05	61.59 PK	68.20	-6.61	2.23 V	234	51.44	10.15
2	*5825.00	110.42 PK			2.23 V	234	100.66	9.76
3	*5825.00	100.23 AV			2.23 V	234	90.47	9.76
4	#6002.68	62.33 PK	68.20	-5.87	2.23 V	234	52.20	10.13
5	11650.00	58.46 PK	74.00	-15.54	1.80 V	212	40.24	18.22
6	11650.00	46.81 AV	54.00	-7.19	1.80 V	212	28.59	18.22

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.

802.11ac (40MHz)

CHANNEL	TX Channel 38	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	65.32 PK	74.00	-8.68	2.77 H	26	56.23	9.09
2	5150.00	49.75 AV	54.00	-4.25	2.77 H	26	40.66	9.09
3	*5190.00	104.82 PK			2.77 H	26	95.63	9.19
4	*5190.00	94.62 AV			2.77 H	26	85.43	9.19
5	#10380.00	56.08 PK	68.20	-12.12	1.57 H	289	39.87	16.21

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	67.41 PK	74.00	-6.59	1.39 V	165	58.32	9.09
2	5150.00	51.56 AV	54.00	-2.44	1.39 V	165	42.47	9.09
3	*5190.00	107.64 PK			1.39 V	165	98.45	9.19
4	*5190.00	97.62 AV			1.39 V	165	88.43	9.19
5	#10380.00	56.90 PK	68.20	-11.30	1.94 V	268	40.69	16.21

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.

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

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	105.38 PK			2.82 H	41	95.84	9.54
2	*5230.00	95.20 AV			2.82 H	41	85.66	9.54
3	5350.00	60.34 PK	74.00	-13.66	2.82 H	41	50.36	9.98
4	5350.00	47.13 AV	54.00	-6.87	2.82 H	41	37.15	9.98
5	#10460.00	56.28 PK	68.20	-11.92	1.18 H	259	39.75	16.53
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	*5230.00	107.88 PK			1.15 V	165	98.34	9.54
2	*5230.00	97.87 AV			1.15 V	165	88.33	9.54
3	5350.00	61.51 PK	74.00	-12.49	1.15 V	165	51.53	9.98
4	5350.00	47.86 AV	54.00	-6.14	1.15 V	165	37.88	9.98
5	#10460.00	56.86 PK	68.20	-11.34	2.38 V	52	40.33	16.53

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.

CHANNEL	TX Channel 151	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5624.57	62.17 PK	68.20	-6.03	1.06 H	25	52.01	10.16
2	*5755.00	106.54 PK			1.06 H	25	96.86	9.68
3	*5755.00	96.71 AV			1.06 H	25	87.03	9.68
4	#6010.75	62.57 PK	68.20	-5.63	1.06 H	25	52.40	10.17
5	11510.00	58.16 PK	74.00	-15.84	1.28 H	349	40.24	17.92
6	11510.00	46.37 AV	54.00	-7.63	1.28 H	349	28.45	17.92
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5595.12	61.35 PK	68.20	-6.85	3.13 V	100	51.08	10.27
2	*5755.00	108.88 PK			3.13 V	100	99.20	9.68
3	*5755.00	99.04 AV			3.13 V	100	89.36	9.68
4	#6017.40	61.93 PK	68.20	-6.27	3.13 V	100	51.74	10.19
5	11510.00	58.42 PK	74.00	-15.58	1.63 V	232	40.50	17.92
6	11510.00	46.85 AV	54.00	-7.15	1.63 V	232	28.93	17.92

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.

CHANNEL	TX Channel 159	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5634.07	62.63 PK	68.20	-5.57	1.10 H	36	52.51	10.12
2	*5795.00	106.13 PK			1.10 H	36	96.44	9.69
3	*5795.00	96.20 AV			1.10 H	36	86.51	9.69
4	#5927.15	63.07 PK	68.20	-5.13	1.10 H	36	53.03	10.04
5	11590.00	58.10 PK	74.00	-15.90	1.24 H	352	40.01	18.09
6	11590.00	46.31 AV	54.00	-7.69	1.24 H	352	28.22	18.09
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5637.40	62.47 PK	68.20	-5.73	2.77 V	104	52.37	10.10
2	*5795.00	109.25 PK			2.77 V	104	99.56	9.69
3	*5795.00	99.26 AV			2.77 V	104	89.57	9.69
4	#6017.87	62.26 PK	68.20	-5.94	2.77 V	104	52.07	10.19
5	11590.00	58.62 PK	74.00	-15.38	1.54 V	227	40.53	18.09
6	11590.00	46.93 AV	54.00	-7.07	1.54 V	227	28.84	18.09

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.

802.11ac (80MHz)

CHANNEL	TX Channel 42	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	62.86 PK	74.00	-11.14	2.81 H	51	53.77	9.09
2	5150.00	47.83 AV	54.00	-6.17	2.81 H	51	38.74	9.09
3	*5210.00	98.06 PK			2.81 H	51	88.74	9.32
4	*5210.00	86.32 AV			2.81 H	51	77.00	9.32
5	5350.00	60.93 PK	74.00	-13.07	2.81 H	51	50.95	9.98
6	5350.00	47.23 AV	54.00	-6.77	2.81 H	51	37.25	9.98
7	#10420.00	56.58 PK	68.20	-11.62	1.73 H	127	40.21	16.37

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	5150.00	63.34 PK	74.00	-10.66	1.33 V	200	54.25	9.09
2	5150.00	48.15 AV	54.00	-5.85	1.33 V	200	39.06	9.09
3	*5210.00	100.66 PK			1.33 V	200	91.34	9.32
4	*5210.00	90.24 AV			1.33 V	200	80.92	9.32
5	5350.00	61.44 PK	74.00	-12.56	1.33 V	200	51.46	9.98
6	5350.00	47.71 AV	54.00	-6.29	1.33 V	200	37.73	9.98
7	#10420.00	57.21 PK	68.20	-10.99	1.94 V	256	40.84	16.37

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.

CHANNEL	TX Channel 155	DETECTOR FUNCTION	Peak (PK)
FREQUENCY RANGE	1GHz ~ 40GHz		Average (AV)

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5624.10	61.36 PK	68.20	-6.84	1.07 H	25	51.19	10.17
2	*5775.00	102.15 PK			1.07 H	25	92.45	9.70
3	*5775.00	91.69 AV			1.07 H	25	81.99	9.70
4	#5933.80	62.73 PK	68.20	-5.47	1.07 H	25	52.68	10.05
5	11550.00	58.04 PK	74.00	-15.96	1.19 H	356	40.03	18.01
6	11550.00	46.26 AV	54.00	-7.74	1.19 H	356	28.25	18.01
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5597.02	62.38 PK	68.20	-5.82	2.75 V	103	52.11	10.27
2	*5775.00	105.83 PK			2.75 V	103	96.13	9.70
3	*5775.00	95.29 AV			2.75 V	103	85.59	9.70
4	#6010.27	63.05 PK	68.20	-5.15	2.75 V	103	52.88	10.17
5	11550.00	58.50 PK	74.00	-15.50	1.57 V	229	40.49	18.01
6	11550.00	46.62 AV	54.00	-7.38	1.57 V	229	28.61	18.01

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:

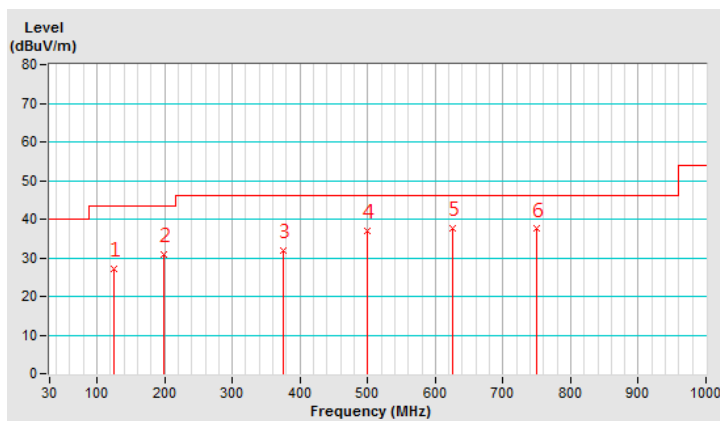
802.11a

CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	125.01	27.10 QP	43.50	-16.40	1.92 H	144	35.64	-8.54
2	198.10	30.82 QP	43.50	-12.68	1.62 H	250	39.75	-8.93
3	375.03	31.81 QP	46.00	-14.19	2.05 H	137	35.32	-3.51
4	500.01	37.08 QP	46.00	-8.92	1.46 H	232	37.75	-0.67
5	625.00	37.78 QP	46.00	-8.22	2.05 H	126	35.43	2.35
6	749.98	37.50 QP	46.00	-8.50	1.88 H	307	32.96	4.54

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.

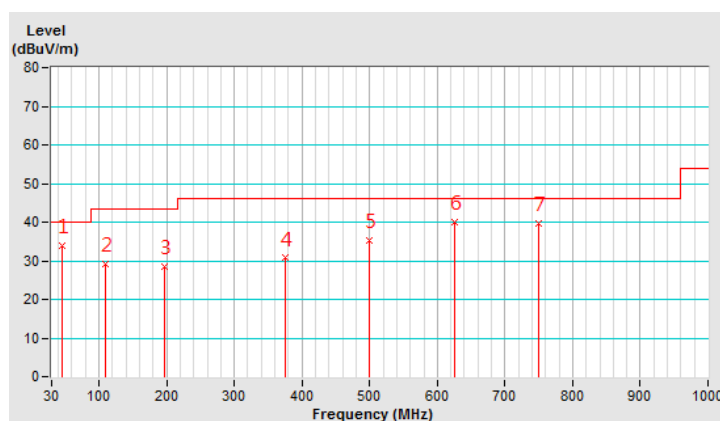


CHANNEL	TX Channel 36	DETECTOR FUNCTION	Quasi-Peak (QP)
FREQUENCY RANGE	9kHz ~ 1GHz		

ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M								
NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	46.15	34.06 QP	40.00	-5.94	1.06 V	346	41.31	-7.25
2	109.35	29.25 QP	43.50	-14.25	1.85 V	199	39.33	-10.08
3	196.11	28.44 QP	43.50	-15.06	1.34 V	282	37.41	-8.97
4	375.03	30.76 QP	46.00	-15.24	1.26 V	190	34.27	-3.51
5	500.01	35.29 QP	46.00	-10.71	2.13 V	155	35.96	-0.67
6	625.00	40.13 QP	46.00	-5.87	1.72 V	282	37.78	2.35
7	749.98	39.58 QP	46.00	-6.42	1.69 V	98	35.04	4.54

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.	Cal. Date	Cal. Due
ROHDE & SCHWARZ TEST RECEIVER	ESR3	102414	Jan. 17, 2019	Jan. 16, 2020
ROHDE & SCHWARZ Artificial Mains Network (for EUT)	ENV216	101196	Apr. 16, 2019	Apr. 15, 2020
LISN With Adapter (for EUT)	101196	NA	Apr. 16, 2019	Apr. 15, 2020
ROHDE & SCHWARZ Artificial Mains Network (for peripherals)	ESH3-Z5	100218	Nov. 30, 2018	Nov. 29, 2019
SCHWARZBECK Artificial Mains Network (For EUT)	NNLK8129	8129229	May 14, 2019	May 13, 2020
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C10.01	Feb. 13, 2019	Feb. 12, 2020
LYNICS Terminator (For ROHDE & SCHWARZ LISN)	0900510	E1-011484	May 13, 2019	May 12, 2020
ROHDE & SCHWARZ Artificial Mains Network (For TV EUT)	ESH3-Z5	100220	Nov. 21, 2018	Nov. 20, 2019
LISN With Adapter (for TV EUT)	100220	NA	Nov. 21, 2018	Nov. 20, 2019

Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.

2. The test was performed in Shielded Room No. 10.

4.2.3 Test Procedure

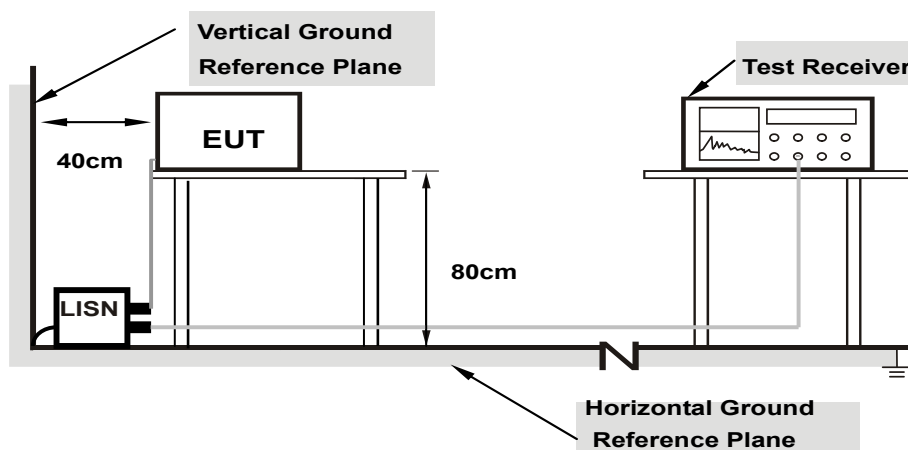
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.
- Both lines of the power mains connected to the EUT were checked for maximum conducted interference.
- The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) was not recorded.

NOTE: All modes of operation were investigated and the worst-case emissions are reported.

4.2.4 Deviation from Test Standard

No deviation.

4.2.5 Test Setup



Note: 1.Support units were connected to second LISN.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

4.2.6 EUT Operating Condition

Same as 4.1.6.

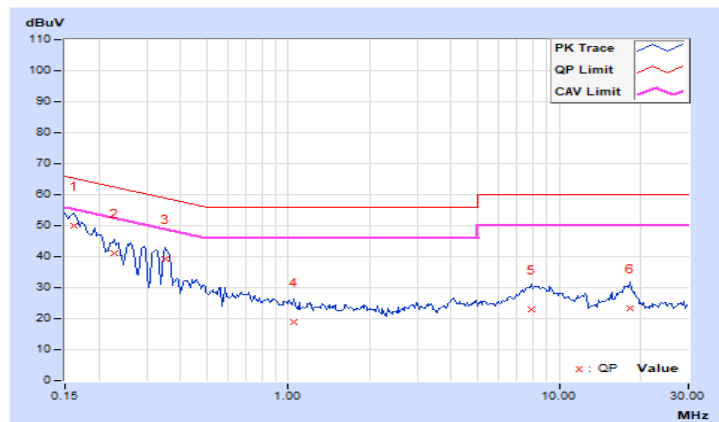
4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
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No	Freq. [MHz]	Corr. Factor	Reading Value [dB (uV)]		Emission Level [dB (uV)]		Limit [dB (uV)]		Margin (dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.68	40.15	28.63	49.83	38.31	65.38	55.38	-15.55	-17.07
2	0.22812	9.72	31.46	23.19	41.18	32.91	62.52	52.52	-21.34	-19.61
3	0.35313	9.75	29.58	25.27	39.33	35.02	58.89	48.89	-19.56	-13.87
4	1.04297	9.91	8.86	0.75	18.77	10.66	56.00	46.00	-37.23	-35.34
5	7.91797	10.23	12.75	6.07	22.98	16.30	60.00	50.00	-37.02	-33.70
6	18.28125	10.39	12.78	6.80	23.17	17.19	60.00	50.00	-36.83	-32.81

REMARKS:

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

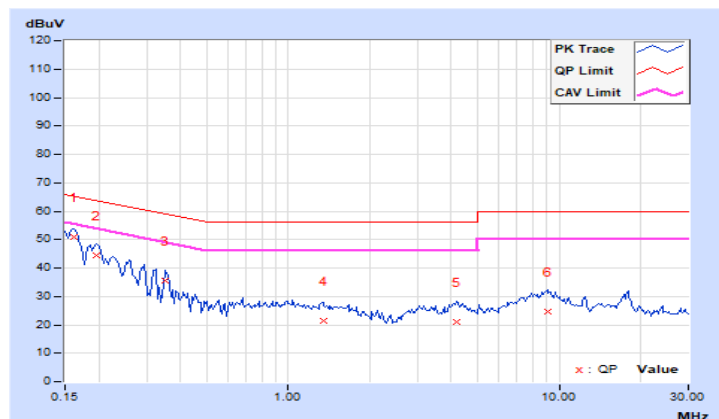


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq.	Corr.	Reading Value		Emission Level		Limit		Margin	
	[MHz]	Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
		(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.16172	9.71	41.15	29.11	50.86	38.82	65.38	55.38	-14.52	-16.56
2	0.19687	9.74	34.77	23.50	44.51	33.24	63.74	53.74	-19.23	-20.50
3	0.34922	9.80	25.65	13.88	35.45	23.68	58.98	48.98	-23.53	-25.30
4	1.35156	9.98	11.35	2.91	21.33	12.89	56.00	46.00	-34.67	-33.11
5	4.21094	10.14	10.96	3.93	21.10	14.07	56.00	46.00	-34.90	-31.93
6	9.06250	10.21	14.54	8.46	24.75	18.67	60.00	50.00	-35.25	-31.33

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 $\leq$ 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
		Fixed point-to-point Access Point	1 Watt (30 dBm)
		Indoor Access Point	1 Watt (30 dBm)
	√	Client device	250mW (24 dBm)
U-NII-2A	--		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-2C	--		250mW (24 dBm) or 11 dBm+10 log B*
U-NII-3	√		1 Watt (30 dBm)

*B is the 26 dB emission bandwidth in megahertz

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

Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;

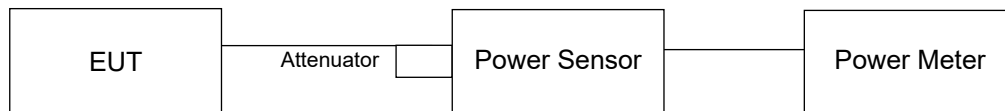
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT} ;

Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

4.3.2 Test Setup

For Power Output Measurement



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

For Average Power Measurement

For 802.11a, 802.11ac (20MHz), 802.11ac (40MHz)

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 and set the detector to AVERAGE. Duty factor is not added to measured value.

For 802.11ac (80MHz)

- 1) Set span to encompass the entire 26 dB EBW (or, alternatively, the entire 99% occupied bandwidth) of the signal.
- 2) Set sweep trigger to "free run".
- 3) Set RBW = 1 MHz.
- 4) Set VBW $\geq$ 3 MHz
- 5) Number of points in sweep $\geq$ 2 Span / RBW.
- 6) Sweep time $\leq$ (number of points in sweep) * T
- 7) Using emission bandwidth to determine the frequency span for integration the channel bandwidth.
- 8) Detector = RMS.
- 9) Trace mode = max hold.
- 10) Allow max hold to run for at least 60 seconds, or longer as needed to allow the trace to stabilize.

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Condition

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

4.3.7 Test Result

802.11a

CHAN.	FREQ. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	13.62	13.57	45.765	16.61	24	Pass
40	5200	13.81	13.80	48.032	16.82	24	Pass
48	5240	13.87	13.94	49.152	16.92	24	Pass
149	5745	14.61	14.63	57.947	17.63	30	Pass
157	5785	14.90	14.87	61.593	17.90	30	Pass
165	5825	14.94	14.95	62.45	17.96	30	Pass

802.11ac (20MHz)

CHAN.	FREQ. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
36	5180	13.76	13.58	46.571	16.68	24	Pass
40	5200	13.92	13.74	48.319	16.84	24	Pass
48	5240	13.68	13.87	47.713	16.79	24	Pass
149	5745	15.51	15.63	72.122	18.58	30	Pass
157	5785	15.43	15.52	70.559	18.49	30	Pass
165	5825	15.44	15.23	68.338	18.35	30	Pass

802.11ac (40MHz)

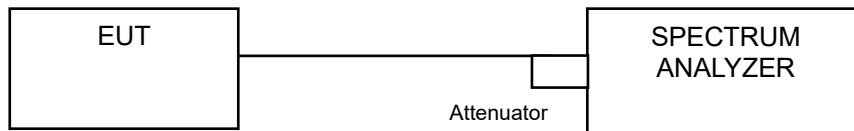
CHAN.	FREQ. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
38	5190	13.18	13.27	42.029	16.24	24	Pass
46	5230	14.11	14.22	52.187	17.18	24	Pass
151	5755	15.45	15.57	71.133	18.52	30	Pass
159	5795	15.61	15.58	72.533	18.61	30	Pass

802.11ac (80MHz)

CHAN.	FREQ. (MHz)	Maximum Conducted Power (dBm)		Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1				
42	5210	10.94	10.91	24.748	13.94	24	Pass
155	5775	14.03	14.06	50.761	17.06	30	Pass

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	16.44
40	5200	16.44	16.32
48	5240	16.44	16.44
149	5745	16.43	16.40
157	5785	16.40	16.40
165	5825	16.40	16.40

802.11ac (20MHz)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
36	5180	17.52	17.52
40	5200	17.64	17.64
48	5240	17.52	17.52
149	5745	17.65	17.70
157	5785	17.60	17.60
165	5825	17.60	17.60

802.11ac (40MHz)

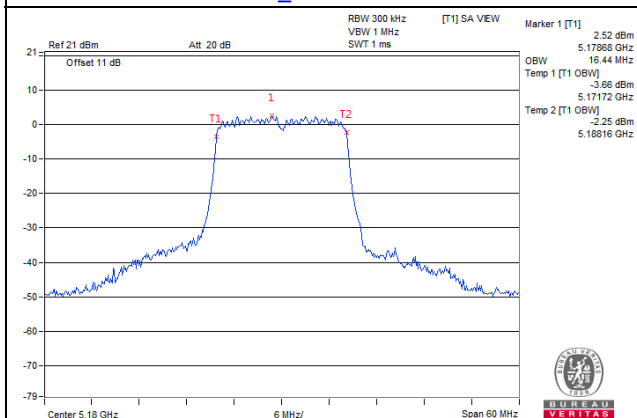
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
38	5190	36.40	36.40
46	5230	36.40	36.40
151	5755	36.24	36.34
159	5795	36.34	36.34

802.11ac (80MHz)

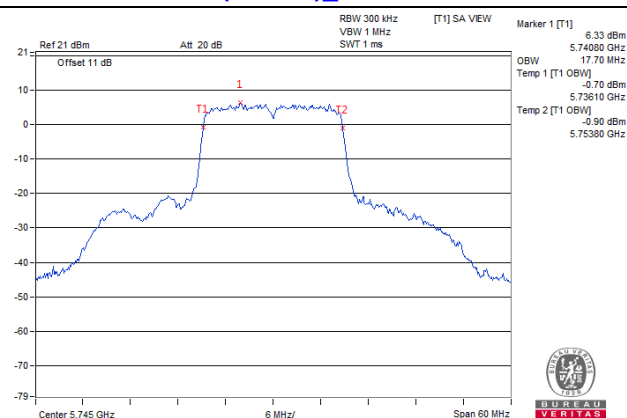
Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)	
		Chain 0	Chain 1
42	5210	75.12	75.12
155	5775	74.87	74.76

Spectrum Plot of Worst Value

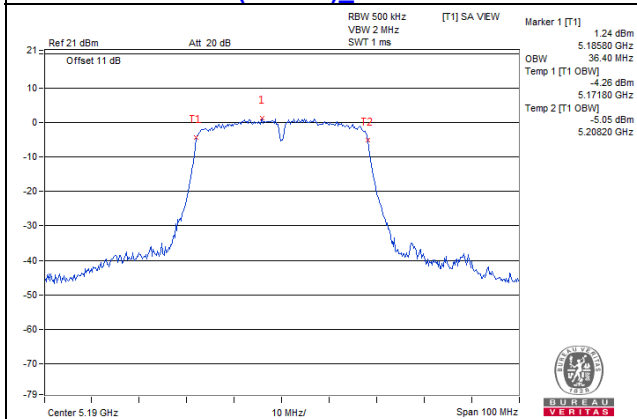
802.11a_Chain0 / CH36



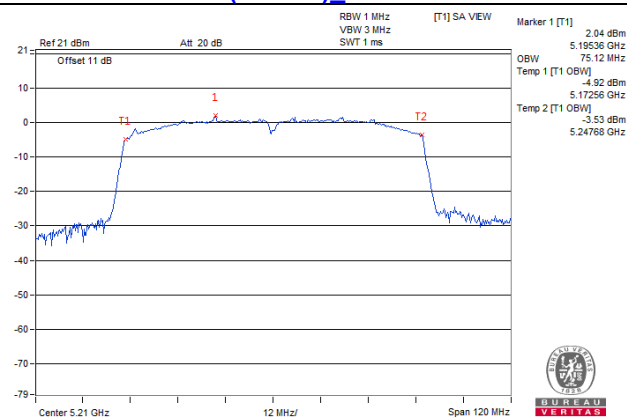
802.11ac (20MHz)_Chain1 / CH149



802.11ac (40MHz)_Chain0 / CH38

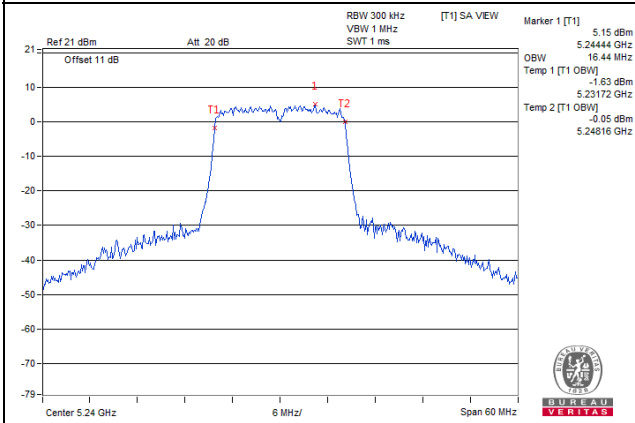


802.11ac (80MHz)_Chain0 / CH42

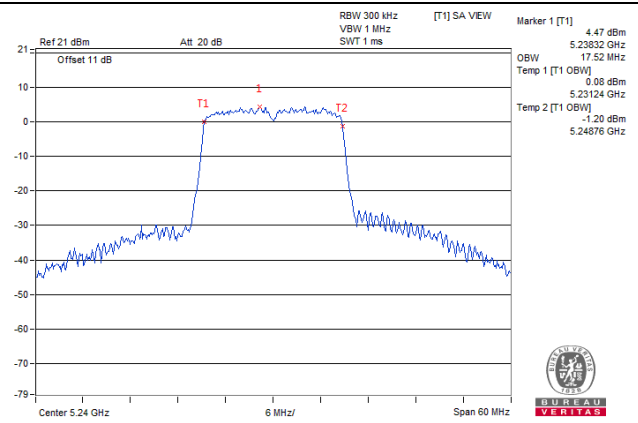


Spectrum Plot for near by DFS band (DFS is required, if 99% OCP straddle into U-NII-2A band)

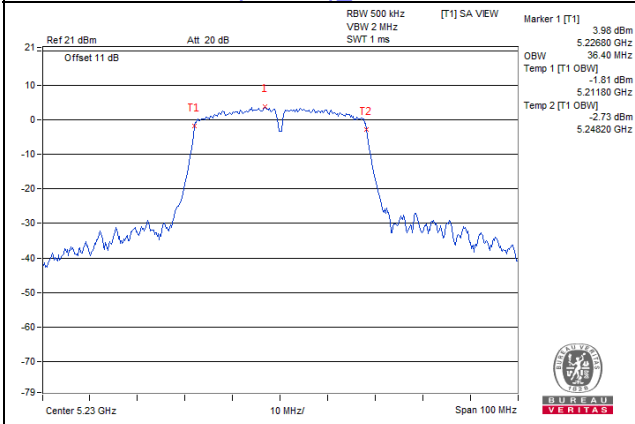
802.11a_Chain0 / CH48



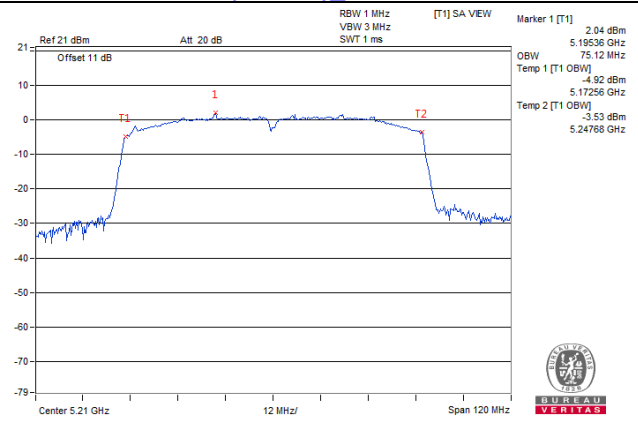
802.11ac (20MHz)_Chain0 / CH48



802.11ac (40MHz)_Chain0 / CH46



802.11ac (80MHz)_Chain0 / CH42

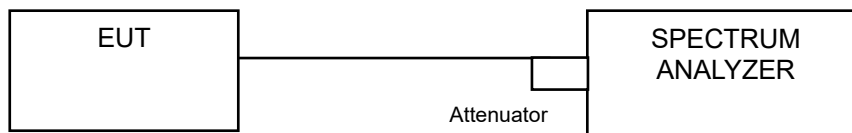


4.5 Peak Power Spectral Density Measurement

4.5.1 Limits of Peak Power Spectral Density Measurement

Operation Band	EUT Category		Limit
U-NII-1		Outdoor Access Point	17dBm/ MHz
		Fixed point-to-point Access Point	
		Indoor Access Point	
	√	Client device	11dBm/ MHz
U-NII-2A	--		11dBm/ MHz
U-NII-2C	--		11dBm/ MHz
U-NII-3	√		30dBm/ 500kHz

4.5.2 Test Setup



4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.5.4 Test Procedure

For U-NII-1 band:

Using method SA-2

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 30 kHz, Set VBW $\geq$ 1 MHz, Detector = RMS
- 3) Set Channel power measure = 1MHz
- 4) Sweep time = auto, trigger set to "free run".
- 5) Trace average at least 100 traces in power averaging mode.
- 6) 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 = 500 kHz, Set VBW $\geq$ 3 RBW, 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)

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)		Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	-2.20	-2.37	1.182	0.89	11	Pass
40	5200	-0.86	-0.69	1.6735	2.40	11	Pass
48	5240	0.29	0.28	2.1357	3.46	11	Pass

- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.70\text{dBi} < 6\text{dBi}$, so the power density limit is not reduced.
 3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (20MHz)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)		Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
36	5180	-0.90	-0.90	1.6256	2.45	11	Pass
40	5200	-0.51	-0.50	1.7805	2.85	11	Pass
48	5240	-0.28	-0.53	1.8227	2.95	11	Pass

- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.70\text{dBi} < 6\text{dBi}$, so the power density limit is not reduced.
 3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (40MHz)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)		Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
38	5190	-5.41	-5.46	0.5721	-1.63	11	Pass
46	5230	-3.03	-3.69	0.9253	0.46	11	Pass

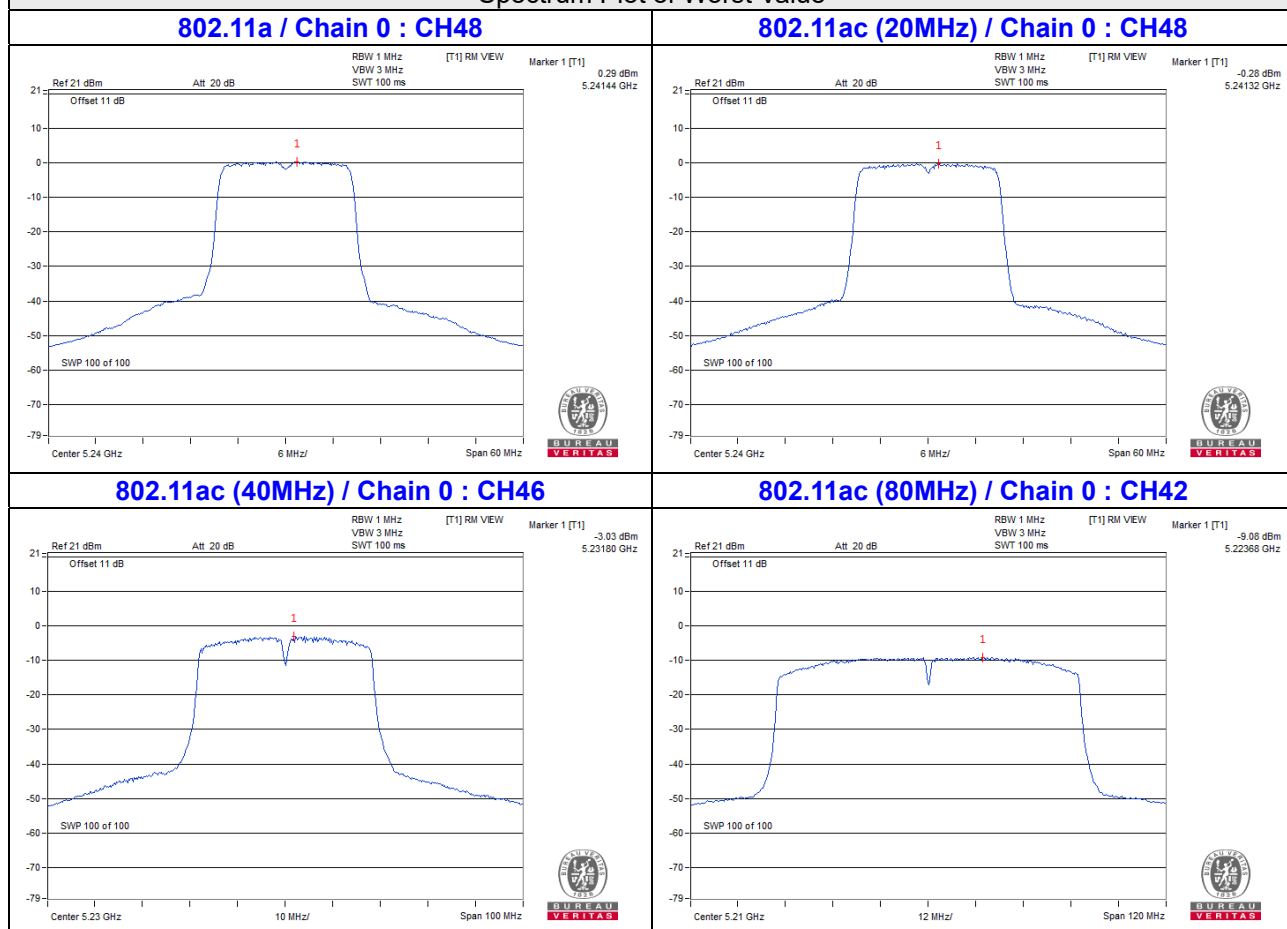
- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.70\text{dBi} < 6\text{dBi}$, so the power density limit is not reduced.
 3. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (80MHz)

Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm)		Duty Factor (dB)	Total PSD With Duty Factor (dBm)	MAX. Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
42	5210	-9.08	-9.24	0.2427	-4.51	11	Pass

- Note:**
1. Method a) of power density measurement of KDB 662911 is using for calculating total power density. Total power density is summing entire spectra across corresponding frequency bins on the various outputs by computer.
 2. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 5.70\text{dBi} < 6\text{dBi}$, so the power density limit is not reduced.
 3. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value



For U-NII-3:

802.11a

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-7.40	3.01	0.16	-4.23	29.96	Pass
	157	5785	-7.38	3.01	0.16	-4.21	29.96	Pass
	165	5825	-7.37	3.01	0.16	-4.20	29.96	Pass
1	149	5745	-7.17	3.01	0.16	-4.00	29.96	Pass
	157	5785	-7.42	3.01	0.16	-4.25	29.96	Pass
	165	5825	-7.61	3.01	0.16	-4.44	29.96	Pass

- Note:** 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.04\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(6.04-6) = 29.96\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (20MHz)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-6.96	3.01	0.34	-3.61	29.96	Pass
	157	5785	-6.98	3.01	0.34	-3.63	29.96	Pass
	165	5825	-7.44	3.01	0.34	-4.09	29.96	Pass
1	149	5745	-7.00	3.01	0.34	-3.65	29.96	Pass
	157	5785	-6.78	3.01	0.34	-3.43	29.96	Pass
	165	5825	-7.32	3.01	0.34	-3.97	29.96	Pass

- Note:** 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.04\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(6.04-6) = 29.96\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (40MHz)

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-10.40	3.01	0.80	-6.59	29.96	Pass
	159	5795	-10.31	3.01	0.80	-6.50	29.96	Pass
1	151	5755	-10.05	3.01	0.80	-6.24	29.96	Pass
	159	5795	-10.65	3.01	0.80	-6.84	29.96	Pass

- Note:** 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.04\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30-(6.04-6) = 29.96\text{dBm}$.
2. Refer to section 3.3 for duty cycle spectrum plot.

802.11ac (80MHz)

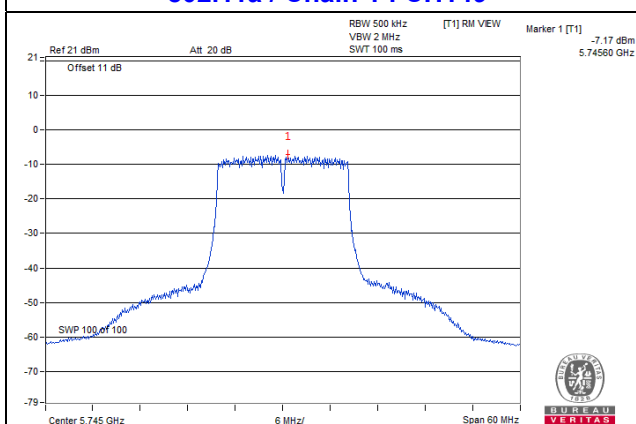
TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-16.12	3.01	1.64	-11.47	29.96	Pass
1	155	5775	-16.61	3.01	1.64	-11.96	29.96	Pass

Note: 1. Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 6.04\text{dBi} > 6\text{dBi}$, so the power density limit shall be reduced to $30 - (6.04 - 6) = 29.96\text{dBm}$.

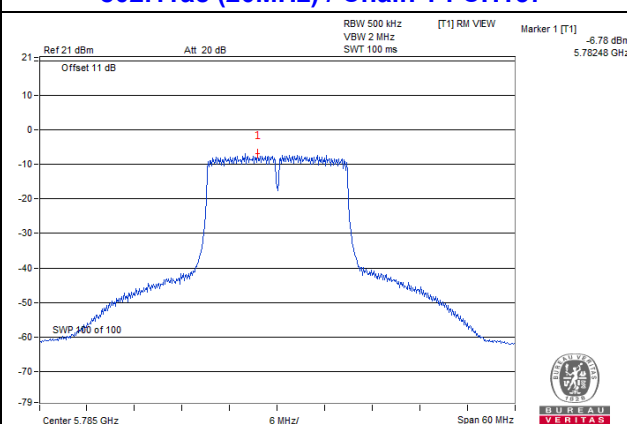
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

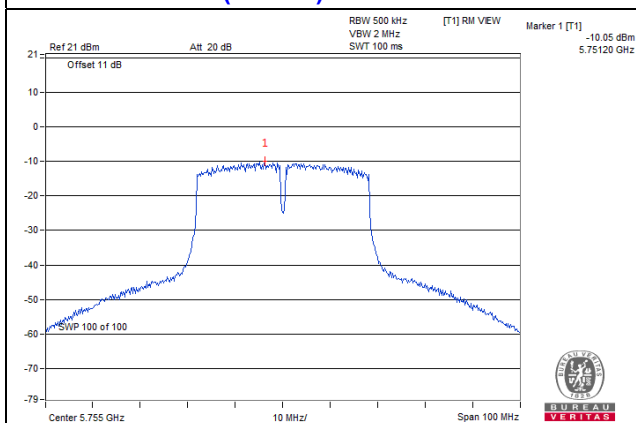
802.11a / Chain 1 : CH149



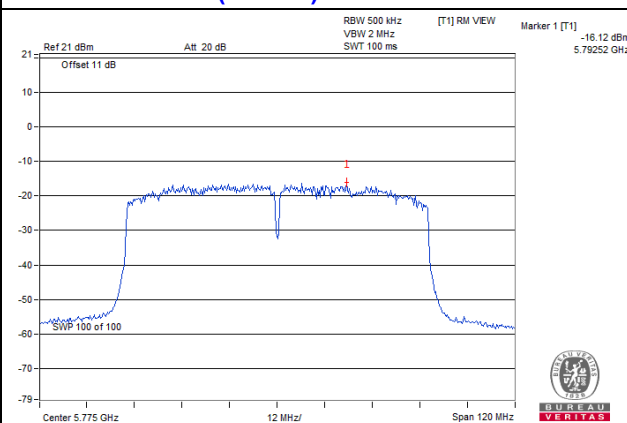
802.11ac (20MHz) / Chain 1 : CH157



802.11ac (40MHz) / Chain 1 : CH151



802.11ac (80MHz) / Chain 0 : CH155

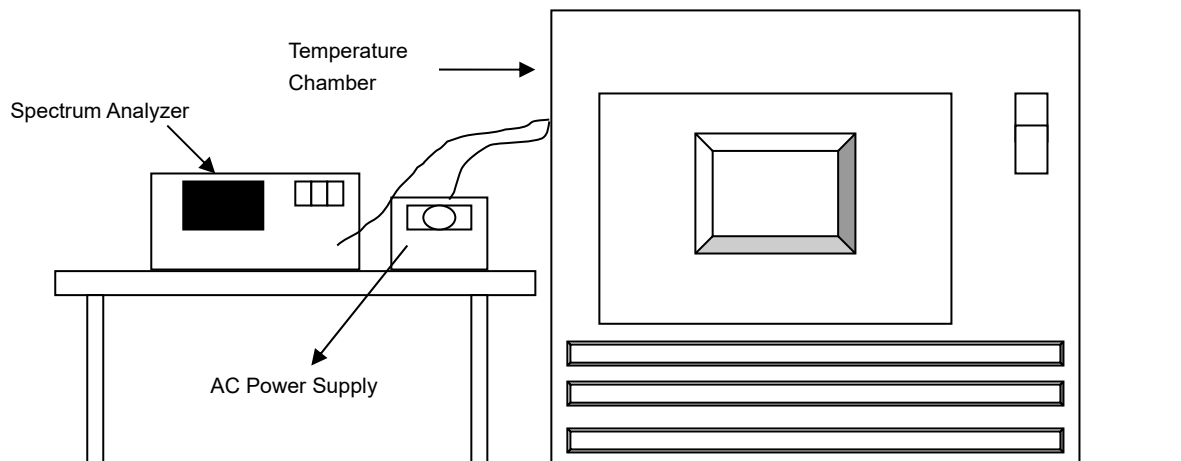


4.6 Frequency Stability Measurement

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

- The EUT was placed inside the environmental test chamber and powered by nominal AC voltage.
- Turn the EUT on and couple its output to a spectrum analyzer.
- Turn the EUT off and set the chamber to the highest temperature specified.
- 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.
- Repeat step (d) with the temperature chamber set to the next desired temperature until measurements down to the lowest specified temperature have been completed..
- 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. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
40	120	5179.9867	Pass	5179.9889	Pass	5179.9908	Pass	5179.9887	Pass
30	120	5179.9945	Pass	5179.9963	Pass	5179.9953	Pass	5179.9953	Pass
20	120	5179.9885	Pass	5179.99	Pass	5179.9886	Pass	5179.9899	Pass
10	120	5180.0235	Pass	5180.0186	Pass	5180.0203	Pass	5180.0201	Pass
0	120	5179.9918	Pass	5179.9946	Pass	5179.9926	Pass	5179.9938	Pass

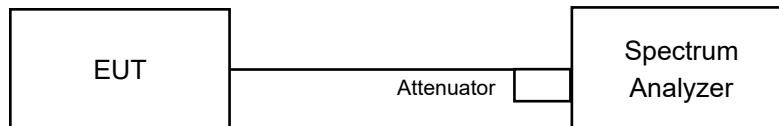
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5180.0235	Pass	5180.0182	Pass	5180.0194	Pass	5180.0206	Pass
	120	5180.0235	Pass	5180.0186	Pass	5180.0203	Pass	5180.0201	Pass
	102	5180.0233	Pass	5180.019	Pass	5180.0204	Pass	5180.021	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 4.3.3 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

- Set resolution bandwidth (RBW) = 100kHz
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW, Detector = Peak.
- Trace mode = max hold.
- Sweep = auto couple.
- 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	16.36	16.37	0.5	PASS
157	5785	16.37	16.37	0.5	PASS
165	5825	16.38	16.37	0.5	PASS

802.11ac (20MHz)

Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
149	5745	17.55	17.55	0.5	PASS
157	5785	17.35	17.35	0.5	PASS
165	5825	17.35	17.35	0.5	PASS

802.11ac (40MHz)

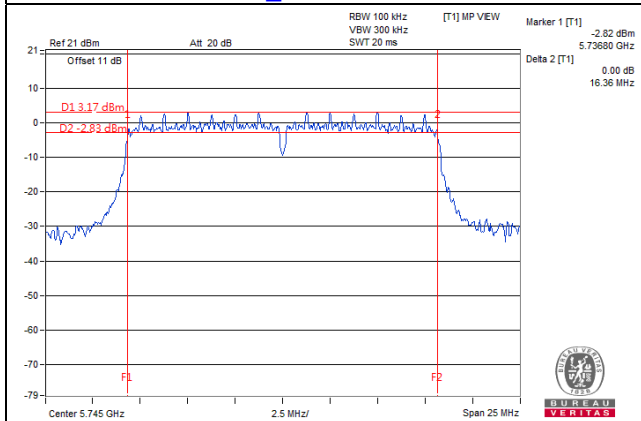
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
151	5755	35.24	35.26	0.5	PASS
159	5795	35.25	35.26	0.5	PASS

802.11ac (80MHz)

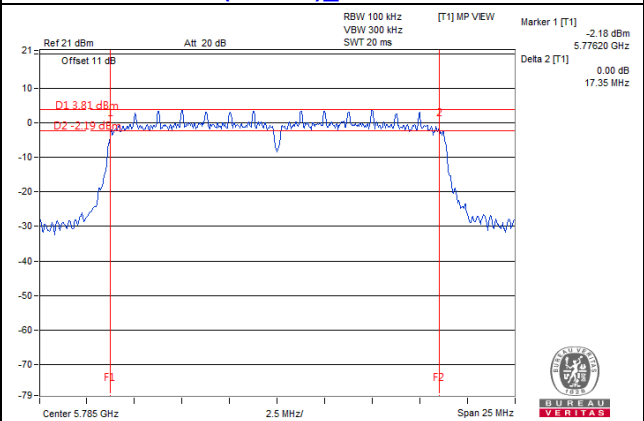
Channel	Frequency (MHz)	6dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
155	5775	75.14	75.25	0.5	PASS

Spectrum Plot of Worst Value

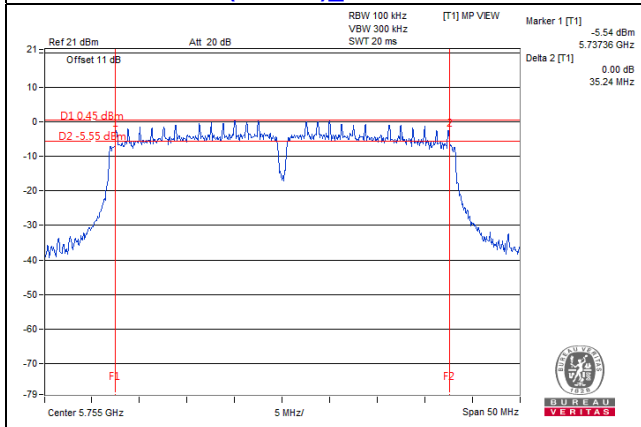
802.11a_Chain 0 / CH149



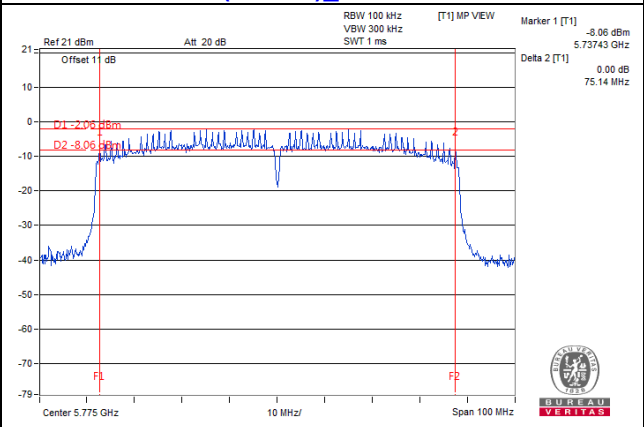
802.11ac (20MHz)_Chain 0 / CH157



802.11ac (40MHz)_Chain 0 / CH151



802.11ac (80MHz)_Chain 0 / CH155



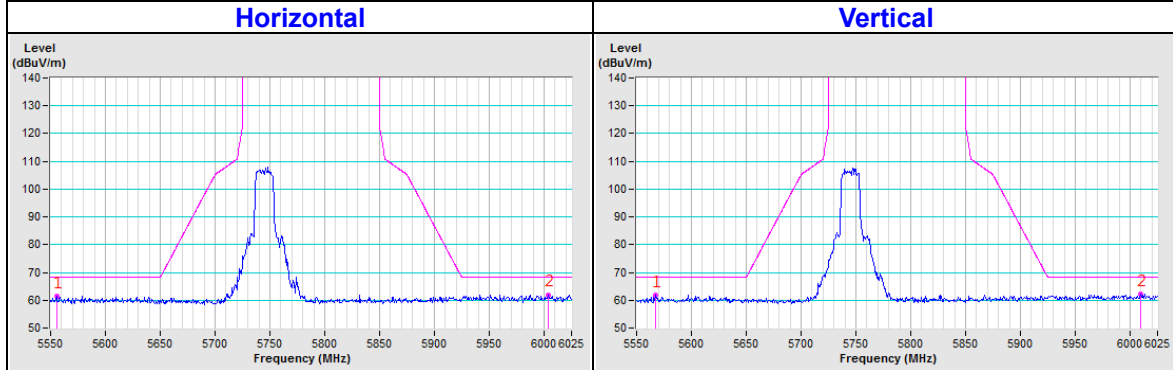
5 Pictures of Test Arrangements

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

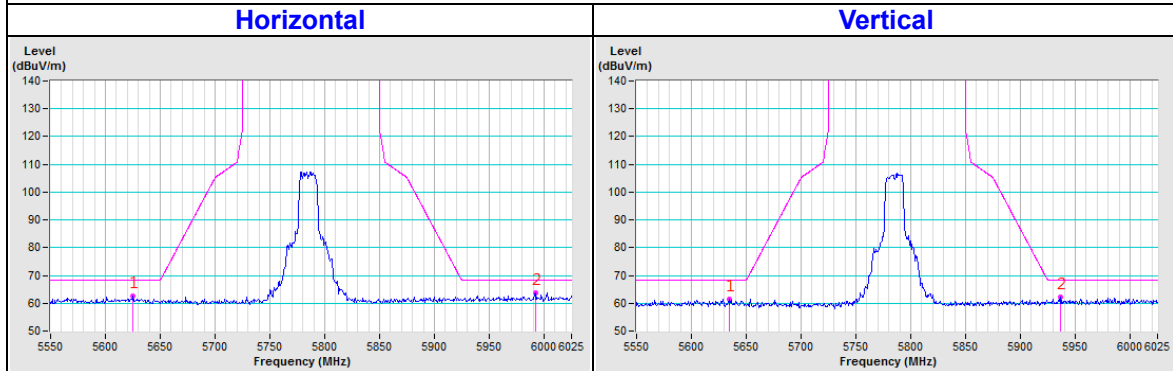
Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band)

802.11a

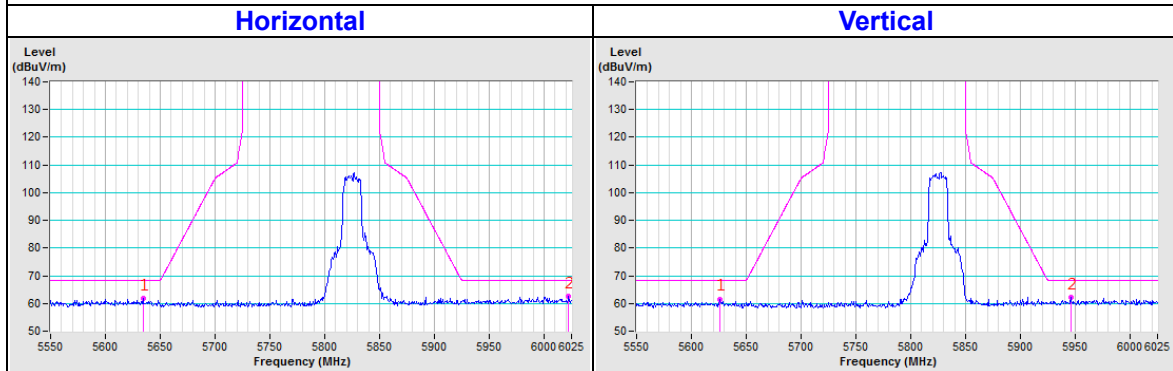
CH149



CH157



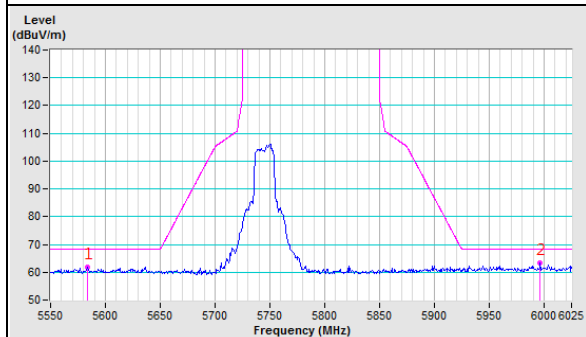
CH165



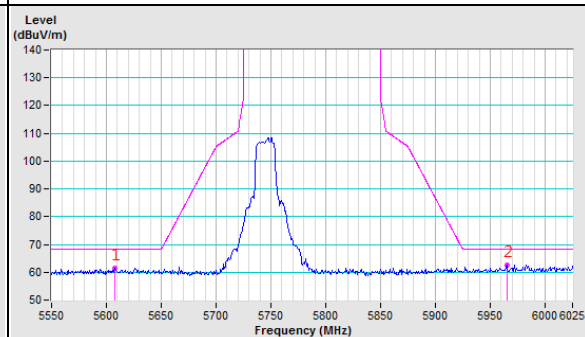
802.11ac (20MHz)

CH149

Horizontal

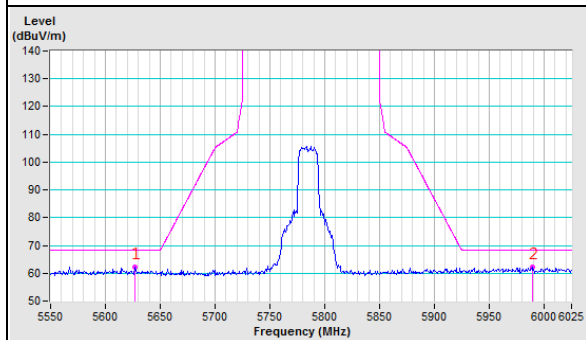


Vertical

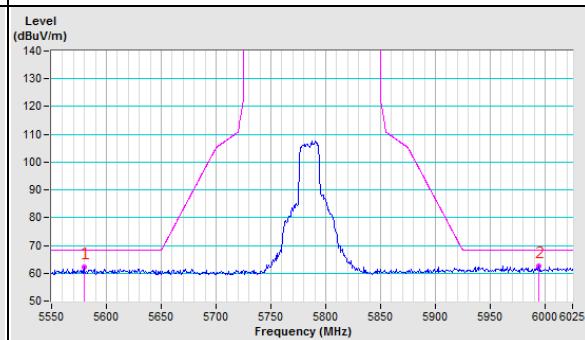


CH157

Horizontal

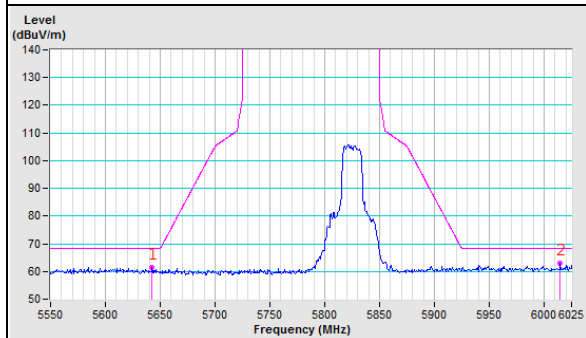


Vertical

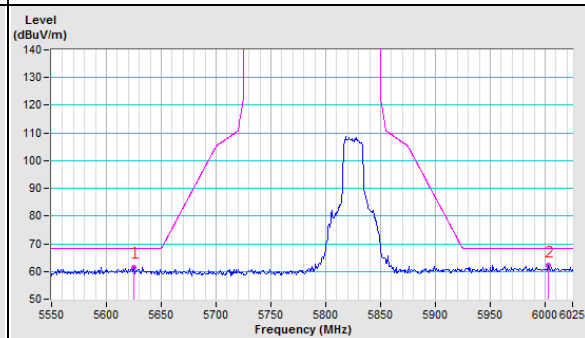


CH165

Horizontal

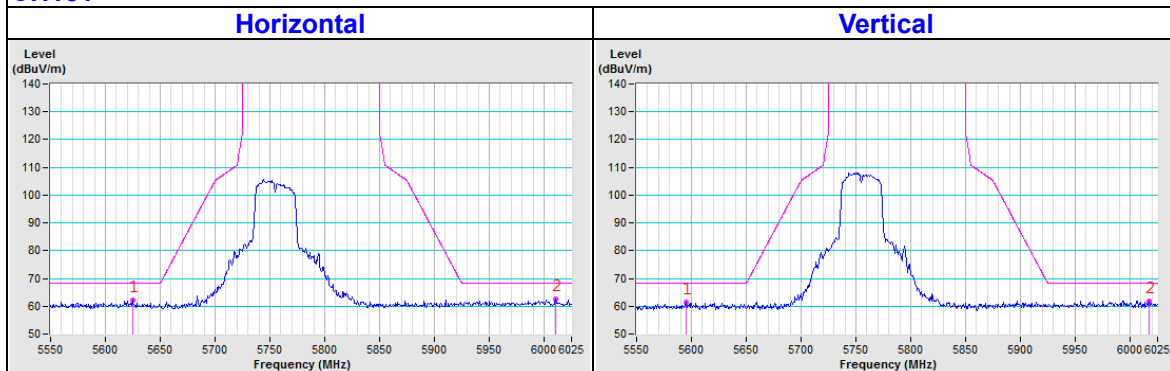


Vertical

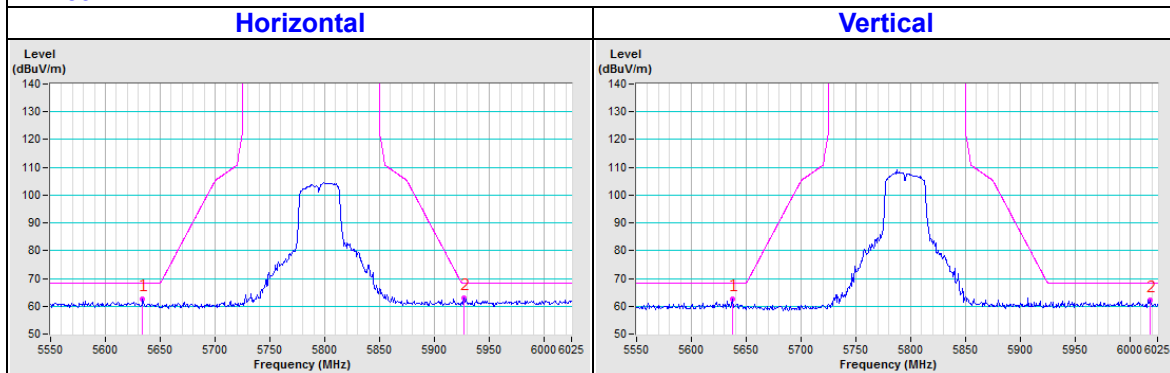


802.11ac (40MHz)

CH151

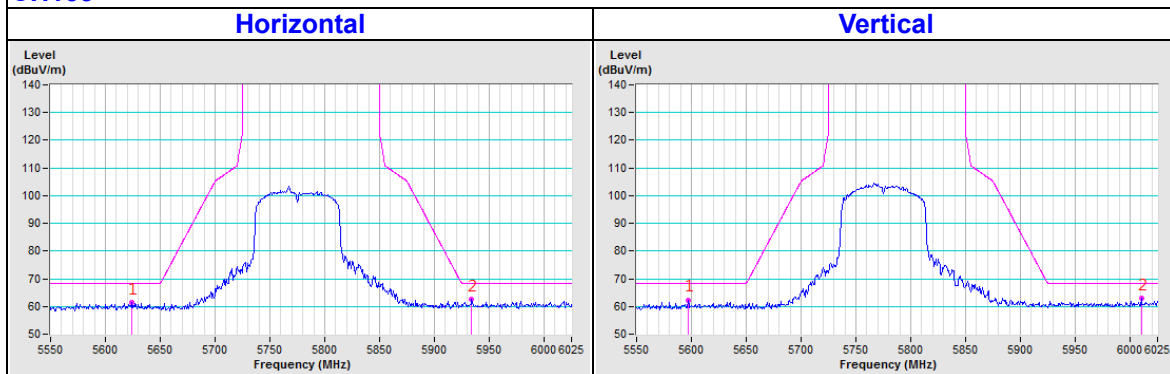


CH159



802.11ac (80MHz)

CH155



Appendix – Information of the Testing Laboratories

We, Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch, were founded in 1988 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are FCC recognized accredited test firms and accredited according to ISO/IEC 17025.

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

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