

## FCC Test Report

**Report No.:** RF190717D15A

**FCC ID:** 2AATB-WAP-7530

**Test Model:** WAP-7530

**Received Date:** Jan. 20, 2020

**Test Date:** Feb. 24 to Apr. 16, 2020

**Issued Date:** Apr. 27, 2020

**Applicant:** Tatung Technology Inc.

**Address:** 10F, No.288, Sec 6, Civic Blvd, Xinyi Dist, Taipei City 11087, Taiwan

**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



This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by TAF or any government agencies.

## Table of Contents

<b>Release Control Record</b> .....	<b>4</b>
<b>1 Certificate of Conformity</b> .....	<b>5</b>
<b>2 Summary of Test Results</b> .....	<b>6</b>
2.1 Measurement Uncertainty.....	6
2.2 Modification Record.....	6
<b>3 General Information</b> .....	<b>7</b>
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
<b>4 Test Types and Results</b> .....	<b>15</b>
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.....	58
4.5.1 Limits of Peak Power Spectral Density Measurement.....	58
4.5.2 Test Setup.....	58
4.5.3 Test Instruments.....	58
4.5.4 Test Procedure.....	59
4.5.5 Deviation from Test Standard.....	59
4.5.6 EUT Operating Condition.....	59
4.5.7 Test Results.....	60
4.6 Frequency Stability Measurement.....	65

4.6.1	Limits of Frequency Stability Measurement .....	65
4.6.2	Test Setup.....	65
4.6.3	Test Instruments .....	65
4.6.4	Test Procedure .....	65
4.6.5	Deviation from Test Standard .....	65
4.6.6	EUT Operating Condition .....	65
4.6.7	Test Results .....	66
4.7	6dB Bandwidth Measurement.....	67
4.7.1	Limits of 6dB Bandwidth Measurement.....	67
4.7.2	Test Setup.....	67
4.7.3	Test Instruments .....	67
4.7.4	Test Procedure .....	67
4.7.5	Deviation from Test Standard .....	67
4.7.6	EUT Operating Condition .....	67
4.7.7	Test Results .....	68
<b>5</b>	<b>Pictures of Test Arrangements.....</b>	<b>70</b>
	<b>Annex A- Radiated Out of Band Emission (OOBE) Measurement (For U-NII-3 band).....</b>	<b>71</b>
	<b>Annex B- Bandedge Measurement (For U-NII-1 band).....</b>	<b>74</b>
	<b>Appendix – Information of the Testing Laboratories .....</b>	<b>78</b>

### Release Control Record

Issue No.	Description	Date Issued
RF190717D15A	Original release.	Apr. 27, 2020

## 1 Certificate of Conformity

**Product:** Dual Band Wireless Router

**Brand:** TTI, WizeLink

**Test Model:** WAP-7530

**Sample Status:** Engineering sample

**Applicant:** Tatung Technology Inc.

**Test Date:** Feb. 24 to Apr. 16, 2020

**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:** Apr. 27, 2020  
Annie Chang / Senior Specialist

**Approved by :** Rex Lai, **Date:** Apr. 27, 2020  
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 -12.90dB at 0.15000MHz.
15.407(b)(1/2/3/4(i/ii)/6)	Radiated Emissions & Band Edge Measurement*	Pass	Meet the requirement of limit. Minimum passing margin is -1.05dB at 11490.00MHz.
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.

### Note:

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

### 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) ( $\pm$ )
Conducted Emissions at mains ports	150kHz ~ 30MHz	3.00 dB
Radiated Emissions up to 1 GHz	9kHz ~ 30MHz	2.61 dB
	30MHz ~ 1GHz	5.43 dB
Radiated Emissions above 1 GHz	Above 1GHz	5.14 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

Product	Dual Band Wireless Router
Brand	TTI, WizeLink
Test Model	WAP-7530
Status of EUT	Engineering sample
Power Supply Rating	DC 12V from Adapter
Modulation Type	256QAM, 64QAM, 16QAM, QPSK, BPSK
Modulation Technology	OFDM
Transfer Rate	802.11a: up to 54Mbps 802.11n: up to 600Mbps 802.11ac: up to 1733Mbps
Operating Frequency	5180 ~ 5240MHz, 5745 ~ 5825MHz
Number of Channel	<b>5180 ~ 5240MHz</b> 4 for 802.11a, 802.11n (20MHz), 802.11ac (20MHz) 2 for 802.11n (40MHz), 802.11ac (40MHz) 1 for 802.11ac (80MHz) <b>5745 ~ 5825MHz</b> 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	<b>5180 ~ 5240MHz:</b> 159.893mW <b>5745 ~ 5825MHz:</b> 252.336mW
Antenna Type	PCB antenna with 4.42dBi gain
Antenna Connector	I-PEX
Accessory Device	Adapter
Data Cable Supplied	Non-shielde LAN cable (3m)

Note:

1. The EUT provides 4 completed transmitters and 4 receivers.

Modulation Mode	TX FUNCTION
802.11b	4TX
802.11g	4TX
802.11a	4TX
802.11n (20MHz)	4TX
802.11n (40MHz)	4TX
802.11ac (20MHz)	4TX
802.11ac (40MHz)	4TX
802.11ac (80MHz)	4TX

\* 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. 2.4GHz & 5GHz technologies can transmit at same time.

3. The emission of the simultaneous operation has been evaluated and no non-compliance was found.

4. The EUT consumes power from the following adapters.

AC Adapter	1	2
Brand	Sunny	AtechOEM
Model	SYS1616-2412-W2	ADS0248T-W120200
Input Power	100-240Vac, 1.0A MAX, 50-60Hz	100-240Vac, 50-60Hz, 0.6A
Output Power	12Vdc / 2A	12Vdc / 2A
Power Line	AC 2 Pin, Non-shielded DC cable (1.5m)	AC 2 Pin, Non-shielded DC cable (1.5m)

After pre-tested above Adapters, the **Adapter 1** was the worst case, therefore, only its test data was recorded in this report.

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



### 3.2 Description of Test Modes

#### FOR 5180 ~ 5240MHz

4 channels are provided for 802.11a, 802.11n (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

#### FOR 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≥1G	RE<1G	PLC	APCM	
-	√	√	√	√	Powered by adapter

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

#### **Radiated Emission Test (Above 1GHz):**

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

EUT Configure Mode	Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
-	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11ac (40MHz)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (80MHz)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
-	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11ac (40MHz)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (80MHz)		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.

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

**Power Line Conducted Emission Test:**

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

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

**Antenna Port Conducted Measurement:**

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

EUT Configure Mode	Mode	FREQ. Band (MHz)	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	BPSK	6
-	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	BPSK	6.5
-	802.11ac (40MHz)		38 to 46	38, 46	OFDM	BPSK	13.5
-	802.11ac (80MHz)		42	42	OFDM	BPSK	29.3
-	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	BPSK	6
-	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	BPSK	6.5
-	802.11ac (40MHz)		151 to 159	151, 159	OFDM	BPSK	13.5
-	802.11ac (80MHz)		155	155	OFDM	BPSK	29.3

**Test Condition:**

Applicable To	Environmental Conditions	Input Power	Tested By
RE≥1G	19deg. C, 79%RH	120Vac, 60Hz	Ian Chang
RE<1G	19deg. C, 79%RH	120Vac, 60Hz	Ian Chang
PLC	21deg. C, 83%RH	120Vac, 60Hz	Dalen Dai
APCM	25deg. C, 76%RH	120Vac, 60Hz	Dalen Dai

### 3.3 Duty Cycle of Test Signal

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

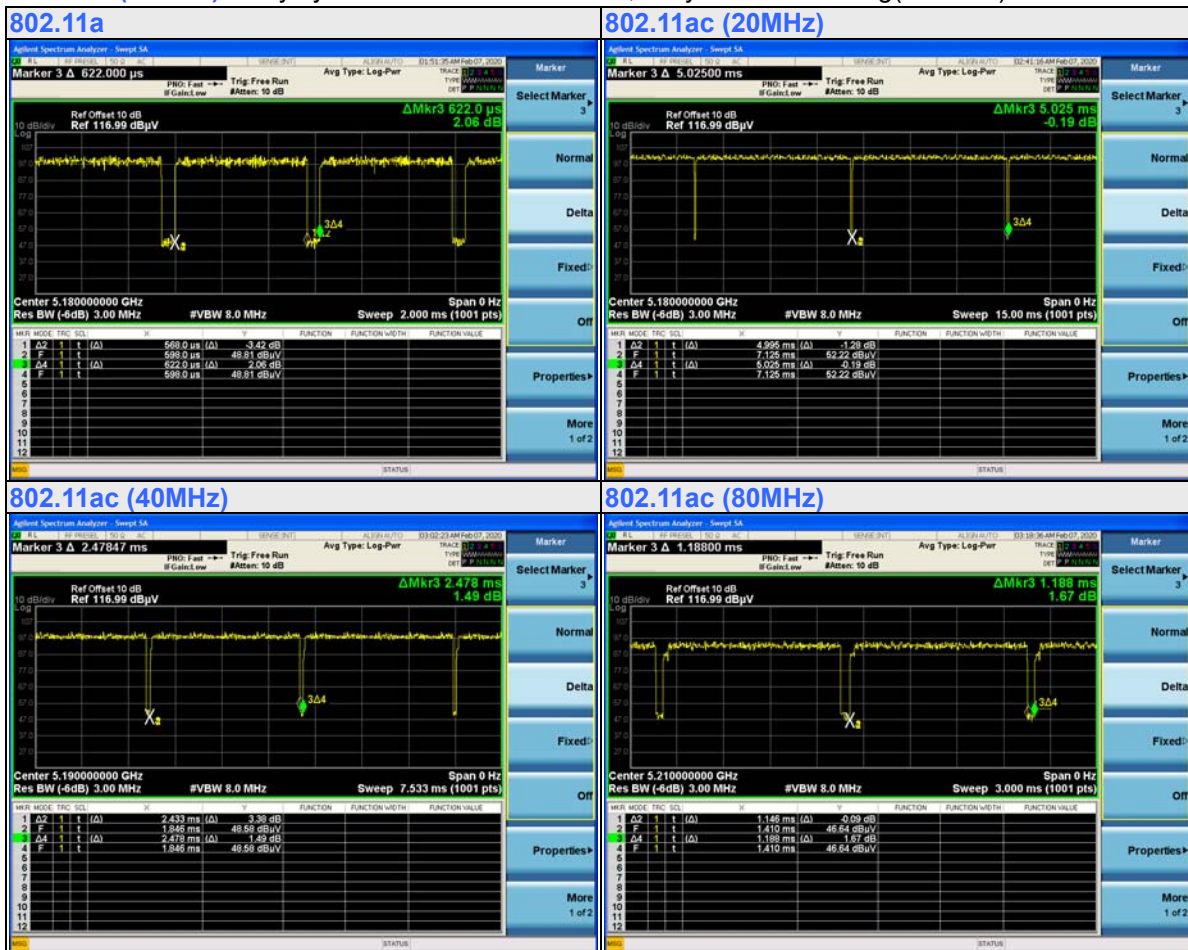
If duty cycle of test signal is  $< 98\%$ , duty factor shall be considered.

**802.11a:** Duty cycle =  $0.568/0.622 = 0.913$ , Duty factor =  $10 * \log(1/0.913) = 0.39$

**802.11ac (20MHz):** Duty cycle =  $4.995/5.025 = 0.994$

**802.11ac (40MHz):** Duty cycle =  $0.433/2.478 = 0.982$

**802.11ac (80MHz):** Duty cycle =  $1.146/1.188 = 0.965$ , Duty factor =  $10 * \log(1/0.965) = 0.16$



### 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	SONY	SVS151A12P	275548477000760	FCC DoC Approved	Provided by Lab
B.	Load	N/A	N/A	N/A	N/A	Provided by Lab

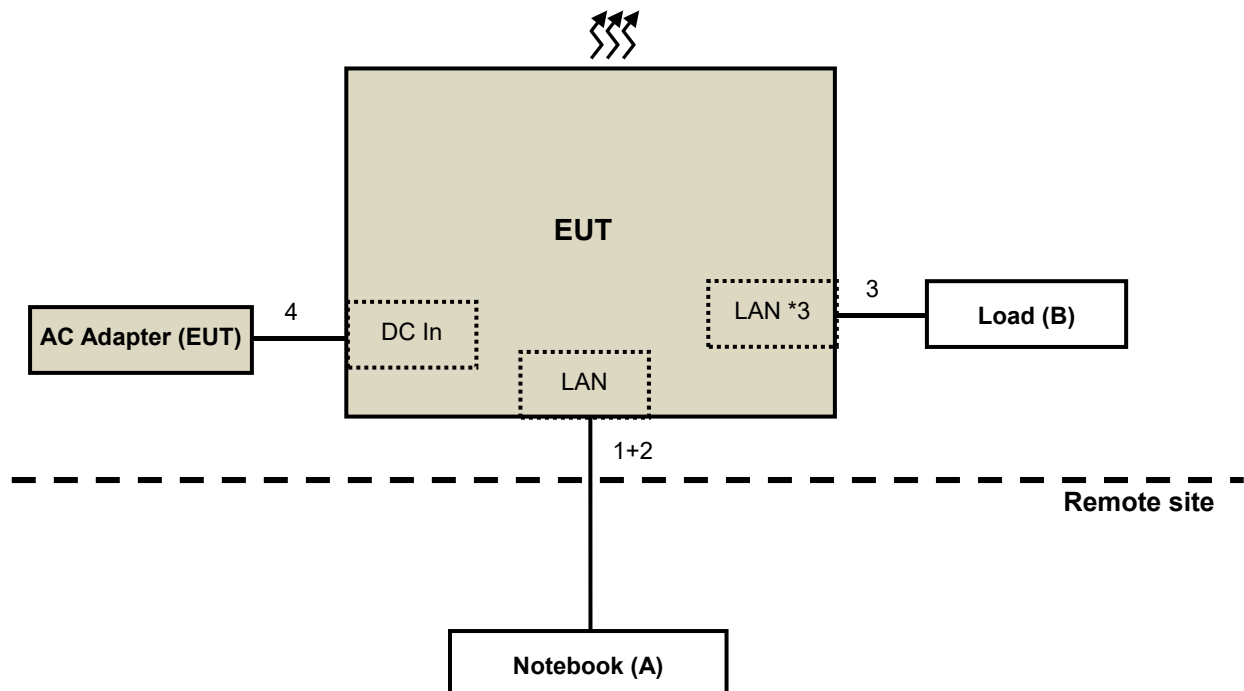
Note:

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.	LAN cable	1	10	N	0	Provided by Lab (RJ45, Cat.5e)
2.	LAN cable	1	3	N	0	Supplied by client (RJ45, Cat.5e)
3.	LAN cable	3	1.5	N	0	Provided by Lab (RJ45, Cat.5e)
4.	DC cable	1	1.5	N	0	Supplied by client

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	<input checked="" type="checkbox"/> 15.407(b)(4)(i)	PK:-27 (dBm/MHz) <sup>*1</sup> PK:10 (dBm/MHz) <sup>*2</sup> PK:15.6 (dBm/MHz) <sup>*3</sup> PK:27 (dBm/MHz) <sup>*4</sup>	PK: 68.2(dBµV/m) <sup>*1</sup> PK:105.2 (dBµV/m) <sup>*2</sup> PK: 110.8(dBµV/m) <sup>*3</sup> PK:122.2 (dBµV/m) <sup>*4</sup>
	<input type="checkbox"/> 15.407(b)(4)(ii)	Emission limits in section 15.247(d)	
<sup>*1</sup> beyond 75 MHz or more above of the band edge. <sup>*3</sup> below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above.		<sup>*2</sup> below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above. <sup>*4</sup> 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. 19, 2020	Feb. 18, 2021
HP Preamplifier	8449B	3008A01201	Feb. 20, 2020	Feb. 19, 2021
MITEQ Preamplifier	AMF-6F-260400-33-8P	892164	Feb. 19, 2020	Feb. 18, 2021
Agilent TEST RECEIVER	N9038A	MY51210129	Mar. 18, 2020	Mar. 17, 2021
Schwarzbeck Antenna	VULB 9168	139	Nov. 7, 2019	Nov. 6, 2020
Schwarzbeck Antenna	VHBA 9123	480	Jun. 3, 2019	Jun. 2, 2021
Schwarzbeck Horn Antenna	BBHA-9170	212	Nov. 24, 2019	Nov. 23, 2020
Schwarzbeck Horn Antenna	BBHA 9120-D1	D130	Nov. 24, 2019	Nov. 23, 2020
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. 24, 2019	Nov. 23, 2020
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

- 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. Tested Date: Apr. 6 to 24, 2020



#### 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:**

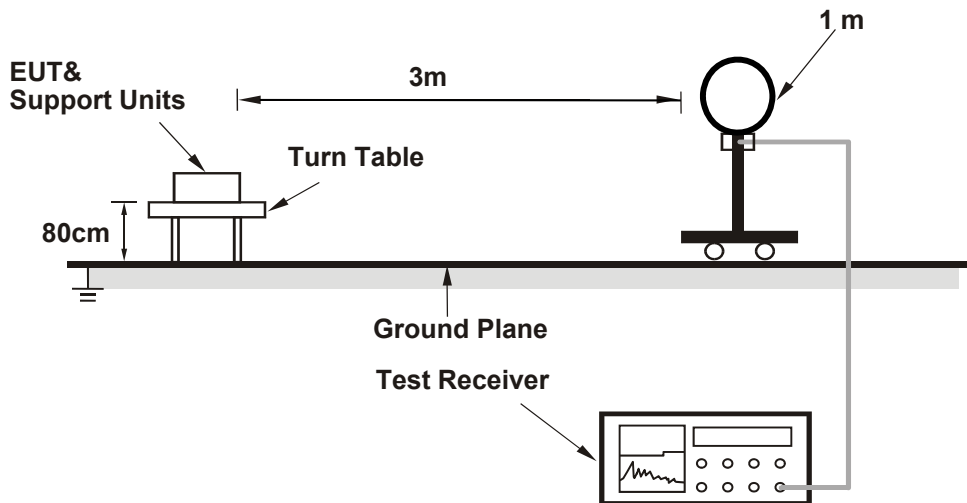
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection (QP) at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.
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.  
(802.11a: RBW = 1MHz, VBW = 1.8kHz; 802.11n (20MHz): RBW = 1MHz, VBW = 10Hz;  
802.11ac (40MHz): RBW = 1MHz, VBW = 10Hz; 802.11ac (80MHz): RBW = 1MHz, VBW = 910Hz)
4. All modes of operation were investigated and the worst-case emissions are reported.

#### 4.1.4 Deviation from Test Standard

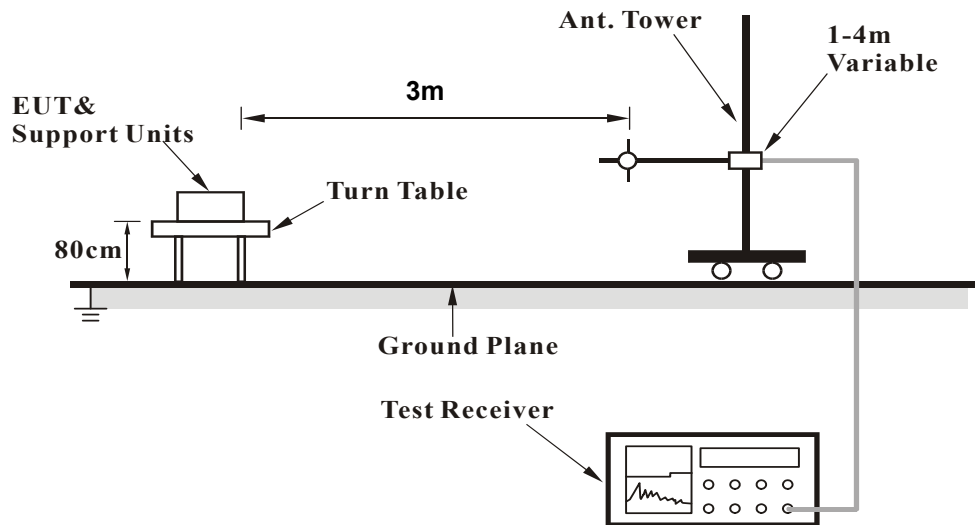
No deviation.

#### 4.1.5 Test Setup

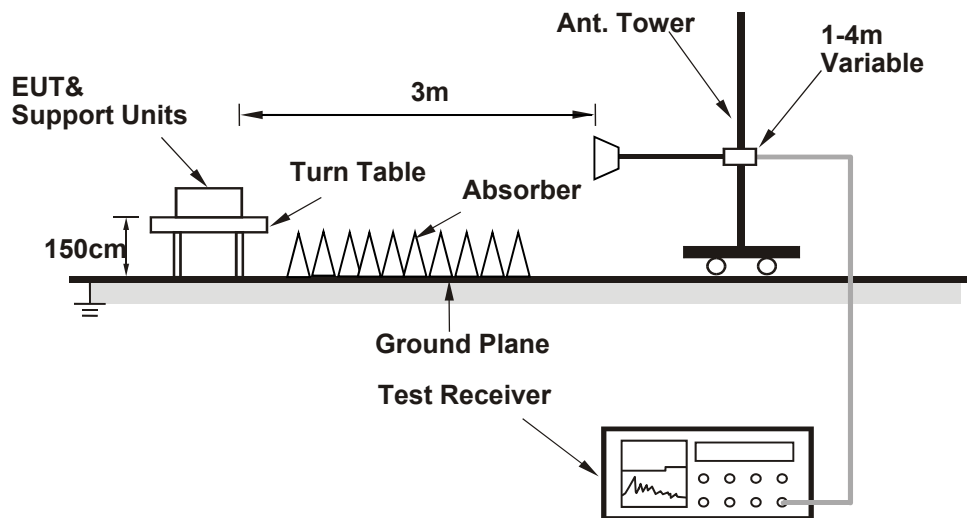
##### For Radiated emission below 30MHz



##### 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 Notebook Computer which is placed on remote site.
- b. Set the EUT under transmission condition continuously at specific channel frequency continuously.

4.1.7 Test Results

Above 1GHz Data:

802.11a

<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	62.19 PK	74.00	-11.81	2.76 H	237	52.65	9.54
2	5150.00	49.94 AV	54.00	-4.06	2.76 H	237	40.40	9.54
3	*5180.00	111.82 PK			2.76 H	237	102.22	9.60
4	*5180.00	102.62 AV			2.76 H	237	93.02	9.60
5	#10360.00	62.60 PK	68.20	-5.60	1.17 H	315	46.53	16.07

**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	63.66 PK	74.00	-10.34	1.38 V	289	54.12	9.54
2	5150.00	51.10 AV	54.00	-2.90	1.38 V	289	41.56	9.54
3	*5180.00	115.45 PK			1.38 V	289	105.85	9.60
4	*5180.00	105.89 AV			1.38 V	289	96.29	9.60
5	#10360.00	65.06 PK	68.20	-3.14	1.23 V	277	48.99	16.07

**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.

<b>CHANNEL</b>	TX Channel 40	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	111.21 PK			2.79 H	241	101.58	9.63
2	*5200.00	101.76 AV			2.79 H	241	92.13	9.63
3	#10400.00	62.31 PK	68.20	-5.89	1.20 H	318	46.23	16.08

**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	114.12 PK			2.44 V	287	104.49	9.63
2	*5200.00	104.46 AV			2.44 V	287	94.83	9.63
3	#10400.00	64.64 PK	68.20	-3.56	1.36 V	278	48.56	16.08

**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.

<b>CHANNEL</b>	TX Channel 48	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	111.35 PK			2.79 H	234	101.52	9.83
2	*5240.00	102.17 AV			2.79 H	234	92.34	9.83
3	5350.00	62.14 PK	74.00	-11.86	2.79 H	234	51.89	10.25
4	5350.00	49.38 AV	54.00	-4.62	2.79 H	234	39.13	10.25
5	#10480.00	62.27 PK	68.20	-5.93	1.25 H	330	46.05	16.22

**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	*5240.00	114.64 PK			2.42 V	273	104.81	9.83
2	*5240.00	105.31 AV			2.42 V	273	95.48	9.83
3	5350.00	62.46 PK	74.00	-11.54	2.42 V	273	52.21	10.25
4	5350.00	49.71 AV	54.00	-4.29	2.42 V	273	39.46	10.25
5	#10480.00	64.63 PK	68.20	-3.57	1.26 V	282	48.41	16.22

**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.

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5639.30	61.46 PK	68.20	-6.74	1.88 H	269	51.53	9.93
2	*5745.00	112.18 PK			1.88 H	269	102.61	9.57
3	*5745.00	102.40 AV			1.88 H	269	92.83	9.57
4	#6007.90	62.85 PK	68.20	-5.35	1.88 H	269	52.91	9.94
5	11490.00	65.90 PK	74.00	-8.10	1.00 H	323	48.19	17.71
6	<b>11490.00</b>	<b>52.95 AV</b>	<b>54.00</b>	<b>-1.05</b>	<b>1.00 H</b>	<b>323</b>	<b>35.24</b>	<b>17.71</b>

**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	#5637.87	62.14 PK	68.20	-6.06	2.24 V	269	52.21	9.93
2	*5745.00	114.91 PK			2.24 V	269	105.34	9.57
3	*5745.00	104.84 AV			2.24 V	269	95.27	9.57
4	#5926.20	63.29 PK	68.20	-4.91	2.24 V	269	53.52	9.77
5	11490.00	63.79 PK	74.00	-10.21	1.34 V	165	46.08	17.71
6	11490.00	50.09 AV	54.00	-3.91	1.34 V	165	32.38	17.71

**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.

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5566.15	61.22 PK	68.20	-6.98	1.86 H	271	50.99	10.23
2	*5785.00	111.95 PK			1.86 H	271	102.40	9.55
3	*5785.00	102.28 AV			1.86 H	271	92.73	9.55
4	#6001.25	62.29 PK	68.20	-5.91	1.86 H	271	52.38	9.91
5	11570.00	65.67 PK	74.00	-8.33	1.05 H	318	47.85	17.82
6	11570.00	52.74 AV	54.00	-1.26	1.05 H	318	34.92	17.82

**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	#5589.90	61.36 PK	68.20	-6.84	2.17 V	268	51.23	10.13
2	*5785.00	114.76 PK			2.17 V	268	105.21	9.55
3	*5785.00	104.91 AV			2.17 V	268	95.36	9.55
4	#5944.73	62.97 PK	68.20	-5.23	2.17 V	268	53.16	9.81
5	11570.00	63.52 PK	74.00	-10.48	1.41 V	163	45.70	17.82
6	11570.00	49.80 AV	54.00	-4.20	1.41 V	163	31.98	17.82

**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.



<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5606.52	62.08 PK	68.20	-6.12	1.84 H	266	52.03	10.05
2	*5825.00	111.88 PK			1.84 H	266	102.28	9.60
3	*5825.00	102.10 AV			1.84 H	266	92.50	9.60
4	#5940.45	63.23 PK	68.20	-4.97	1.84 H	266	53.44	9.79
5	11650.00	65.38 PK	74.00	-8.62	1.03 H	327	47.43	17.95
6	11650.00	52.61 AV	54.00	-1.39	1.03 H	327	34.66	17.95

**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	#5634.07	61.84 PK	68.20	-6.36	2.12 V	269	51.90	9.94
2	*5825.00	114.48 PK			2.12 V	269	104.88	9.60
3	*5825.00	104.66 AV			2.12 V	269	95.06	9.60
4	#5953.75	62.72 PK	68.20	-5.48	2.12 V	269	52.90	9.82
5	11650.00	63.47 PK	74.00	-10.53	1.37 V	166	45.52	17.95
6	11650.00	49.69 AV	54.00	-4.31	1.37 V	166	31.74	17.95

**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)

<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	60.50 PK	74.00	-13.50	2.79 H	240	50.96	9.54
2	5150.00	48.53 AV	54.00	-5.47	2.79 H	240	38.99	9.54
3	*5180.00	108.36 PK			2.79 H	240	98.76	9.60
4	*5180.00	98.19 AV			2.79 H	240	88.59	9.60
5	#10360.00	61.28 PK	68.20	-6.92	1.32 H	336	45.21	16.07

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	61.00 PK	74.00	-13.00	2.42 V	313	51.46	9.54
2	5150.00	49.15 AV	54.00	-4.85	2.42 V	313	39.61	9.54
3	*5180.00	111.44 PK			2.42 V	313	101.84	9.60
4	*5180.00	101.17 AV			2.42 V	313	91.57	9.60
5	#10360.00	64.71 PK	68.20	-3.49	1.46 V	171	48.64	16.07

**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.

<b>CHANNEL</b>	TX Channel 40	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	107.86 PK			2.81 H	250	98.23	9.63
2	*5200.00	98.04 AV			2.81 H	250	88.41	9.63
3	#10400.00	61.27 PK	68.20	-6.93	1.27 H	329	45.19	16.08

**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	110.92 PK			2.38 V	311	101.29	9.63
2	*5200.00	100.72 AV			2.38 V	311	91.09	9.63
3	#10400.00	64.24 PK	68.20	-3.96	1.52 V	180	48.16	16.08

**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.

<b>CHANNEL</b>	TX Channel 48	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	108.57 PK			2.77 H	237	98.74	9.83
2	*5240.00	98.46 AV			2.77 H	237	88.63	9.83
3	5350.00	62.34 PK	74.00	-11.66	2.77 H	237	52.09	10.25
4	5350.00	47.51 AV	54.00	-6.49	2.77 H	237	37.26	10.25
5	#10480.00	61.11 PK	68.20	-7.09	1.28 H	329	44.89	16.22

**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	*5240.00	111.72 PK			2.49 V	313	101.89	9.83
2	*5240.00	101.41 AV			2.49 V	313	91.58	9.83
3	5350.00	62.21 PK	74.00	-11.79	2.49 V	313	51.96	10.25
4	5350.00	48.33 AV	54.00	-5.67	2.49 V	313	38.08	10.25
5	#10480.00	63.91 PK	68.20	-4.29	1.00 V	167	47.69	16.22

**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.

<b>CHANNEL</b>	TX Channel 149	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5586.10	61.83 PK	68.20	-6.37	1.19 H	254	51.70	10.13
2	*5745.00	109.69 PK			1.19 H	254	100.12	9.57
3	*5745.00	99.81 AV			1.19 H	254	90.24	9.57
4	#5982.25	63.30 PK	68.20	-4.90	1.19 H	254	53.42	9.88
5	11490.00	64.53 PK	74.00	-9.47	1.06 H	294	46.82	17.71
6	11490.00	51.09 AV	54.00	-2.91	1.06 H	294	33.38	17.71

**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	#5576.12	62.26 PK	68.20	-5.94	1.31 V	313	52.07	10.19
2	*5745.00	114.93 PK			1.31 V	313	105.36	9.57
3	*5745.00	104.52 AV			1.31 V	313	94.95	9.57
4	#5930.48	63.25 PK	68.20	-4.95	1.31 V	313	53.48	9.77
5	11490.00	63.53 PK	74.00	-10.47	1.17 V	208	45.82	17.71
6	11490.00	50.16 AV	54.00	-3.84	1.17 V	208	32.45	17.71

**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.

<b>CHANNEL</b>	TX Channel 157	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5558.07	60.83 PK	68.20	-7.37	1.16 H	255	50.56	10.27
2	*5785.00	109.34 PK			1.16 H	255	99.79	9.55
3	*5785.00	99.67 AV			1.16 H	255	90.12	9.55
4	#6006.95	61.90 PK	68.20	-6.30	1.16 H	255	51.96	9.94
5	11570.00	64.29 PK	74.00	-9.71	1.08 H	297	46.47	17.82
6	11570.00	50.84 AV	54.00	-3.16	1.08 H	297	33.02	17.82

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5575.18	61.80 PK	68.20	-6.40	1.36 V	316	51.61	10.19
2	*5785.00	114.59 PK			1.36 V	316	105.04	9.55
3	*5785.00	104.88 AV			1.36 V	316	95.33	9.55
4	#6011.23	61.91 PK	68.20	-6.29	1.36 V	316	51.95	9.96
5	11570.00	63.35 PK	74.00	-10.65	1.21 V	204	45.53	17.82
6	11570.00	50.04 AV	54.00	-3.96	1.21 V	204	32.22	17.82

**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.

<b>CHANNEL</b>	TX Channel 165	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5597.02	60.95 PK	68.20	-7.25	1.18 H	257	50.87	10.08
2	*5825.00	109.28 PK			1.18 H	257	99.68	9.60
3	*5825.00	99.53 AV			1.18 H	257	89.93	9.60
4	#5973.70	61.94 PK	68.20	-6.26	1.18 H	257	52.08	9.86
5	11650.00	64.15 PK	74.00	-9.85	1.09 H	292	46.20	17.95
6	11650.00	50.70 AV	54.00	-3.30	1.09 H	292	32.75	17.95

**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	#5619.35	61.67 PK	68.20	-6.53	1.38 V	311	51.67	10.00
2	*5825.00	114.37 PK			1.38 V	311	104.77	9.60
3	*5825.00	104.78 AV			1.38 V	311	95.18	9.60
4	#5988.90	63.50 PK	68.20	-4.70	1.38 V	311	53.61	9.89
5	11650.00	63.29 PK	74.00	-10.71	1.19 V	205	45.34	17.95
6	11650.00	49.95 AV	54.00	-4.05	1.19 V	205	32.00	17.95

**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)

<b>CHANNEL</b>	TX Channel 38	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	61.88 PK	74.00	-12.12	2.72 H	334	52.34	9.54
2	5150.00	50.73 AV	54.00	-3.27	2.72 H	334	41.19	9.54
3	*5190.00	105.98 PK			2.72 H	334	96.37	9.61
4	*5190.00	95.29 AV			2.72 H	334	85.68	9.61
5	#10380.00	60.66 PK	68.20	-7.54	1.69 H	269	44.59	16.07

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	64.86 PK	74.00	-9.14	2.52 V	315	55.32	9.54
2	5150.00	51.78 AV	54.00	-2.22	2.52 V	315	42.24	9.54
3	*5190.00	109.18 PK			2.52 V	315	99.57	9.61
4	*5190.00	98.21 AV			2.52 V	315	88.60	9.61
5	#10380.00	63.71 PK	68.20	-4.49	1.64 V	235	47.64	16.07

**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.



<b>CHANNEL</b>	TX Channel 46	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	106.63 PK			2.68 H	339	96.85	9.78
2	*5230.00	95.01 AV			2.68 H	339	85.23	9.78
3	5350.00	62.21 PK	74.00	-11.79	2.68 H	339	51.96	10.25
4	5350.00	47.53 AV	54.00	-6.47	2.68 H	339	37.28	10.25
5	#10460.00	59.50 PK	68.20	-8.70	1.42 H	36	43.32	16.18

**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	108.93 PK			2.50 V	311	99.15	9.78
2	*5230.00	97.01 AV			2.50 V	311	87.23	9.78
3	5350.00	62.76 PK	74.00	-11.24	2.50 V	311	52.51	10.25
4	5350.00	48.54 AV	54.00	-5.46	2.50 V	311	38.29	10.25
5	#10460.00	63.64 PK	68.20	-4.56	1.88 V	254	47.46	16.18

**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.

<b>CHANNEL</b>	TX Channel 151	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5623.15	61.68 PK	68.20	-6.52	1.14 H	259	51.69	9.99
2	*5755.00	107.17 PK			1.14 H	259	97.62	9.55
3	*5755.00	96.73 AV			1.14 H	259	87.18	9.55
4	#5980.35	61.75 PK	68.20	-6.45	1.14 H	259	51.88	9.87
5	11510.00	63.06 PK	74.00	-10.94	1.05 H	296	45.34	17.72
6	11510.00	49.30 AV	54.00	-4.70	1.05 H	296	31.58	17.72

**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	#5627.43	61.68 PK	68.20	-6.52	1.63 V	313	51.72	9.96
2	*5755.00	112.08 PK			1.63 V	313	102.53	9.55
3	*5755.00	101.69 AV			1.63 V	313	92.14	9.55
4	#5966.10	62.46 PK	68.20	-5.74	1.63 V	313	52.61	9.85
5	11510.00	62.16 PK	74.00	-11.84	1.28 V	174	44.44	17.72
6	11510.00	48.51 AV	54.00	-5.49	1.28 V	174	30.79	17.72

**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.

<b>CHANNEL</b>	TX Channel 159	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5622.20	61.53 PK	68.20	-6.67	1.19 H	257	51.54	9.99
2	*5795.00	107.08 PK			1.19 H	257	97.52	9.56
3	*5795.00	96.62 AV			1.19 H	257	87.06	9.56
4	#6019.30	62.12 PK	68.20	-6.08	1.19 H	257	52.14	9.98
5	11590.00	62.87 PK	74.00	-11.13	1.06 H	298	45.02	17.85
6	11590.00	49.18 AV	54.00	-4.82	1.06 H	298	31.33	17.85

**ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M**

NO.	FREQ. (MHz)	EMISSION LEVEL (dBuV/m)	LIMIT (dBuV/m)	MARGIN (dB)	ANTENNA HEIGHT (m)	TABLE ANGLE (Degree)	RAW VALUE (dBuV)	CORRECTION FACTOR (dB/m)
1	#5639.30	63.17 PK	68.20	-5.03	1.65 V	317	53.24	9.93
2	*5795.00	111.79 PK			1.65 V	317	102.23	9.56
3	*5795.00	101.48 AV			1.65 V	317	91.92	9.56
4	#5989.37	64.11 PK	68.20	-4.09	1.65 V	317	54.22	9.89
5	11590.00	62.03 PK	74.00	-11.97	1.29 V	168	44.18	17.85
6	11590.00	48.39 AV	54.00	-5.61	1.29 V	168	30.54	17.85

**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)

<b>CHANNEL</b>	TX Channel 42	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	62.88 PK	74.00	-11.12	2.68 H	329	53.34	9.54
2	5150.00	48.50 AV	54.00	-5.50	2.68 H	329	38.96	9.54
3	*5210.00	102.30 PK			2.68 H	329	92.63	9.67
4	*5210.00	93.25 AV			2.68 H	329	83.58	9.67
5	5350.00	62.12 PK	74.00	-11.88	2.68 H	329	51.87	10.25
6	5350.00	48.14 AV	54.00	-5.86	2.68 H	329	37.89	10.25
7	#10420.00	58.69 PK	68.20	-9.51	1.87 H	54	42.58	16.11

**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	66.24 PK	74.00	-7.76	2.82 V	356	56.70	9.54
2	5150.00	50.77 AV	54.00	-3.23	2.82 V	356	41.23	9.54
3	*5210.00	105.33 PK			2.82 V	356	95.66	9.67
4	*5210.00	95.90 AV			2.82 V	356	86.23	9.67
5	5350.00	62.55 PK	74.00	-11.45	2.82 V	356	52.30	10.25
6	5350.00	48.62 AV	54.00	-5.38	2.82 V	356	38.37	10.25
7	#10420.00	62.33 PK	68.20	-5.87	1.69 V	314	46.22	16.11

**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.

<b>CHANNEL</b>	TX Channel 155	<b>DETECTOR FUNCTION</b>	Peak (PK)
<b>FREQUENCY RANGE</b>	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	#5578.02	61.44 PK	68.20	-6.76	1.16 H	255	51.26	10.18
2	*5775.00	104.56 PK			1.16 H	255	94.99	9.57
3	*5775.00	94.10 AV			1.16 H	255	84.53	9.57
4	#5932.85	62.60 PK	68.20	-5.60	1.16 H	255	52.82	9.78
5	11550.00	61.98 PK	74.00	-12.02	1.07 H	302	44.19	17.79
6	11550.00	48.52 AV	54.00	-5.48	1.07 H	302	30.73	17.79

**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	#5580.87	62.43 PK	68.20	-5.77	1.61 V	312	52.26	10.17
2	*5775.00	109.14 PK			1.61 V	312	99.57	9.57
3	*5775.00	99.67 AV			1.61 V	312	90.10	9.57
4	#5947.57	63.56 PK	68.20	-4.64	1.61 V	312	53.74	9.82
5	11550.00	61.35 PK	74.00	-12.65	1.22 V	171	43.56	17.79
6	11550.00	47.83 AV	54.00	-6.17	1.22 V	171	30.04	17.79

**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:**

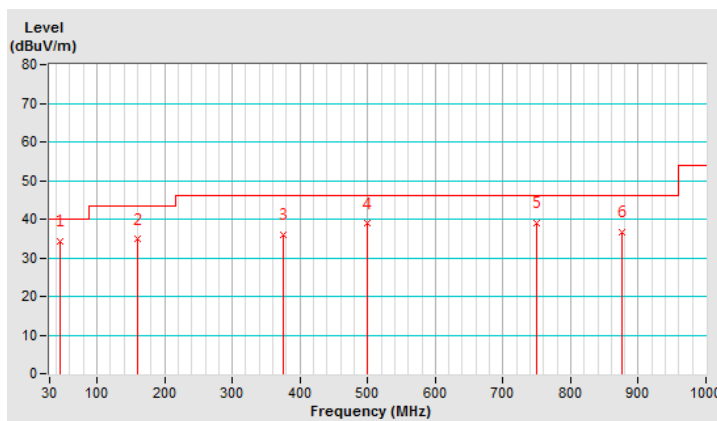
**802.11a**

<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	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	44.55	34.20 QP	40.00	-5.80	1.72 H	98	41.44	-7.24
2	160.61	34.83 QP	43.50	-8.67	1.16 H	231	41.36	-6.53
3	374.98	36.10 QP	46.00	-9.90	1.53 H	240	39.34	-3.24
4	500.01	38.87 QP	46.00	-7.13	1.94 H	124	39.33	-0.46
5	750.03	38.90 QP	46.00	-7.10	2.11 H	215	34.11	4.79
6	875.02	36.69 QP	46.00	-9.31	2.29 H	147	29.95	6.74

**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.



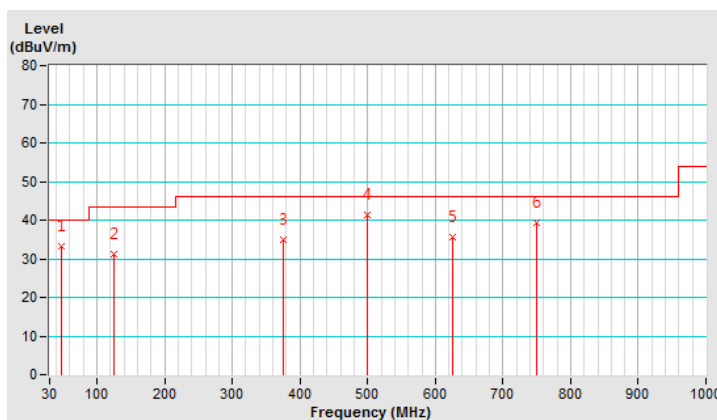
<b>CHANNEL</b>	TX Channel 36	<b>DETECTOR FUNCTION</b>	Quasi-Peak (QP)
<b>FREQUENCY RANGE</b>	9kHz ~ 1GHz		

**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	46.49	33.15 QP	40.00	-6.85	1.35 V	58	40.32	-7.17
2	125.01	31.25 QP	43.50	-12.25	1.07 V	289	39.93	-8.68
3	375.03	35.04 QP	46.00	-10.96	1.64 V	325	38.41	-3.37
4	500.01	41.47 QP	46.00	-4.53	2.03 V	140	42.07	-0.60
5	625.00	35.59 QP	46.00	-10.41	1.88 V	325	33.10	2.49
6	749.98	39.44 QP	46.00	-6.56	2.27 V	37	34.89	4.55

**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	ESCS30	100276	Apr. 8, 2019	Apr. 7, 2020
SCHWARZBECK Artificial Mains Network (for EUT)	NSLK 8128	8128-244	Nov. 11, 2019	Nov. 10, 2020
LISN With Adapter (for EUT)	AD10	C05Ada-001	Nov. 11, 2019	Nov. 10, 2020
ROHDE & SCHWARZ Artificial Mains Network (for peripheral)	ESH3-Z5	100220	Nov. 18, 2019	Nov. 17, 2020
Software	Cond_V7.3.7.4	NA	NA	NA
RF cable (JYEBAO) With 10dB PAD	5D-FB	Cable-C05.01	Jan. 30, 2020	Jan. 29, 2021
LYNICS Terminator (For R&S LISN)	0900510	E1-01-305	Feb. 17, 2020	Feb. 16, 2021

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. 5.

3. Tested Date: Feb. 24, 2020



#### 4.2.3 Test Procedure

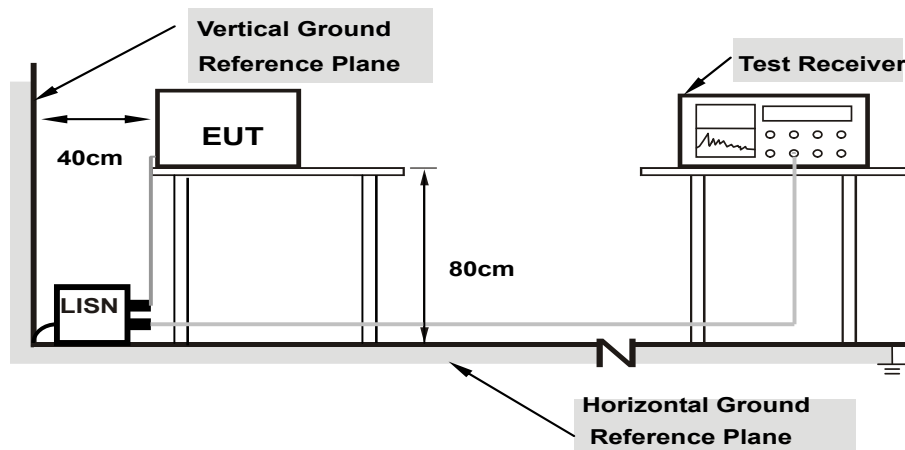
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance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

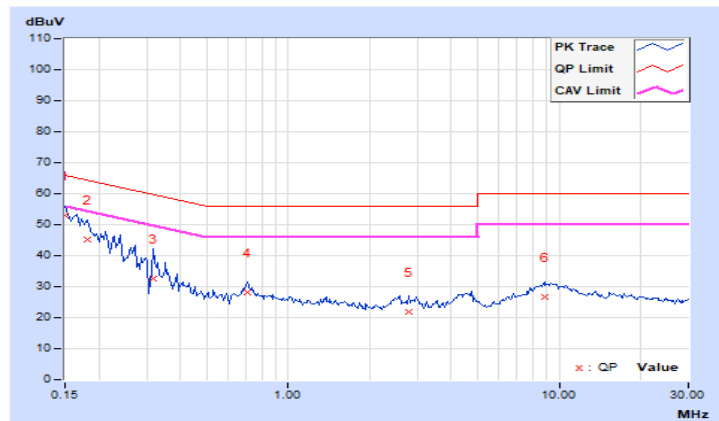
#### 4.2.7 Test Results

Phase	Line (L)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	----------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor (dB)	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
<b>1</b>	<b>0.15000</b>	<b>9.90</b>	<b>43.20</b>	<b>29.18</b>	<b>53.10</b>	<b>39.08</b>	<b>66.00</b>	<b>56.00</b>	<b>-12.90</b>	<b>-16.92</b>
2	0.18125	9.90	35.44	20.25	45.34	30.15	64.43	54.43	-19.09	-24.28
3	0.31797	9.91	22.50	12.31	32.41	22.22	59.76	49.76	-27.35	-27.54
4	0.70469	9.94	18.20	12.33	28.14	22.27	56.00	46.00	-27.86	-23.73
5	2.79297	10.08	11.63	4.99	21.71	15.07	56.00	46.00	-34.29	-30.93
6	8.86719	10.44	16.25	8.97	26.69	19.41	60.00	50.00	-33.31	-30.59

#### 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.

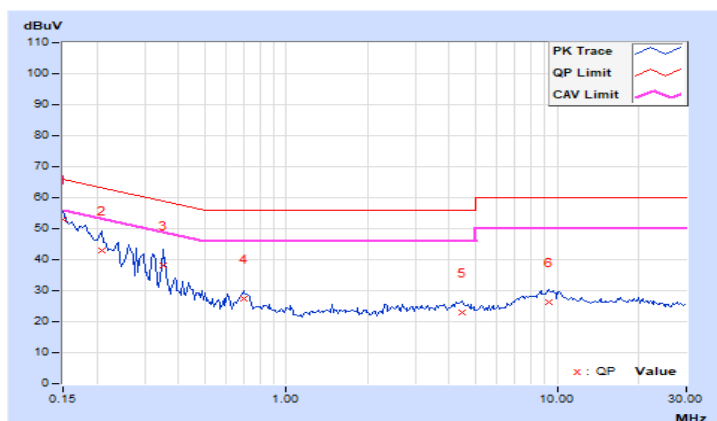


Phase	Neutral (N)	Detector Function	Quasi-Peak (QP) / Average (AV)
-------	-------------	-------------------	--------------------------------

No	Freq. [MHz]	Corr.	Reading Value		Emission Level		Limit		Margin	
		Factor	[dB (uV)]		[dB (uV)]		[dB (uV)]		(dB)	
	(dB)	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	
1	0.15000	9.92	42.95	29.44	52.87	39.36	66.00	56.00	-13.13	-16.64
2	0.20859	9.92	32.96	21.91	42.88	31.83	63.26	53.26	-20.38	-21.43
3	0.34922	9.93	28.08	21.70	38.01	31.63	58.98	48.98	-20.97	-17.35
4	0.69688	9.96	17.60	10.58	27.56	20.54	56.00	46.00	-28.44	-25.46
5	4.48828	10.20	12.64	5.50	22.84	15.70	56.00	46.00	-33.16	-30.30
6	9.34375	10.48	15.68	8.71	26.16	19.19	60.00	50.00	-33.84	-30.81

**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.



### 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,

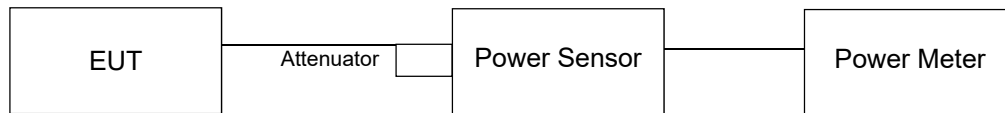
Array Gain = 0 dB (i.e., no array gain) for  $N_{ANT} \leq 4$ ;

Array Gain = 0 dB (i.e., no array gain) for channel widths  $\geq 40$  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

##### 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

Power Output:

802.11a

CHAN.	CHAN. FREQ. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	14.03	14.04	14.07	14.27	102.901	20.12	30	Pass
40	5200	14.20	14.13	14.15	14.32	105.227	20.22	30	Pass
48	5240	13.89	14.00	14.04	14.18	101.143	20.05	30	Pass
149	5745	15.36	15.19	15.80	15.67	142.310	21.53	30	Pass
157	5785	15.37	15.20	15.83	15.65	142.558	21.54	30	Pass
165	5825	15.33	15.21	15.78	15.64	141.796	21.52	30	Pass

802.11ac (20MHz)

CHAN.	CHAN. FREQ. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
36	5180	13.91	13.99	14.00	14.36	102.074	20.09	30	Pass
40	5200	13.93	13.94	14.02	14.30	101.641	20.07	30	Pass
48	5240	13.94	13.92	13.97	14.38	101.796	20.08	30	Pass
149	5745	17.12	17.21	16.94	16.84	201.862	23.05	30	Pass
157	5785	17.14	17.19	17.02	16.88	203.224	23.08	30	Pass
165	5825	17.18	17.28	16.96	16.94	204.786	23.11	30	Pass

802.11ac (40MHz)

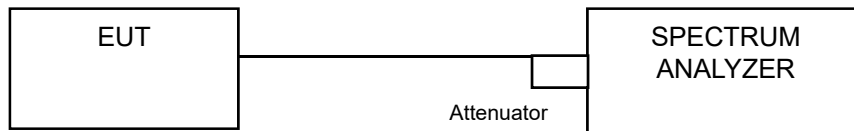
CHAN.	CHAN. FREQ. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
38	5190	15.94	15.86	15.95	16.30	159.825	22.04	30	Pass
46	5230	15.98	15.85	15.91	16.27	159.445	22.03	30	Pass
151	5755	17.75	18.12	18.03	17.78	247.941	23.94	30	Pass
159	5795	17.82	18.20	18.09	17.81	251.415	24.00	30	Pass

802.11ac (80MHz)

CHAN.	CHAN. FREQ. (MHz)	Maximum Conducted Power (dBm)				Total Power (mW)	Total Power (dBm)	Power Limit (dBm)	Pass/Fail
		Chain 0	Chain 1	Chain 2	Chain 3				
42	5210	15.82	15.90	15.87	16.45	<b>159.893</b>	22.04	30	Pass
155	5775	17.82	18.02	18.16	17.99	<b>252.336</b>	24.02	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	Chain 2	Chain 3
36	5180	16.80	16.92	16.80	16.80
40	5200	16.80	16.92	16.80	16.80
48	5240	16.80	16.80	16.80	16.80
149	5745	16.95	16.90	16.90	16.90
157	5785	16.90	16.90	16.90	16.90
165	5825	16.90	16.90	16.90	16.90

##### 802.11ac (20MHz)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
36	5180	18.24	18.24	18.24	18.24
40	5200	18.24	18.24	18.24	18.24
48	5240	18.24	18.24	18.24	18.24
149	5745	18.17	18.10	18.20	18.30
157	5785	18.30	18.30	18.20	18.20
165	5825	18.30	18.20	18.20	18.10

##### 802.11ac (40MHz)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
38	5190	36.60	36.40	36.60	36.60
46	5230	36.60	36.60	36.60	36.60
151	5755	36.67	36.67	36.67	36.67
159	5795	36.67	36.67	36.67	36.50

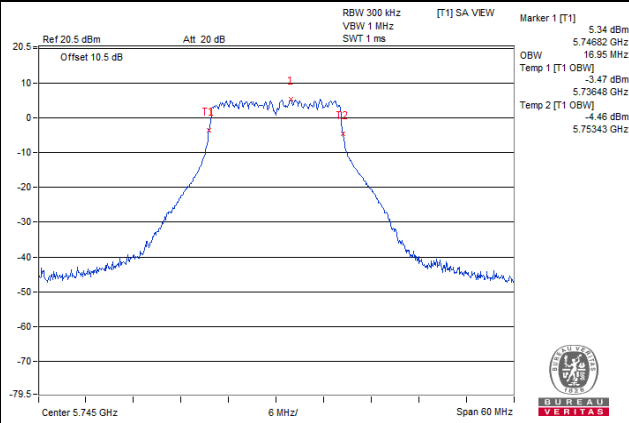
##### 802.11ac (80MHz)

Channel	Channel Frequency (MHz)	Occupied Bandwidth (MHz)			
		Chain 0	Chain 1	Chain 2	Chain 3
42	5210	75.36	75.36	75.36	75.36
155	5775	75.48	75.32	75.32	75.32

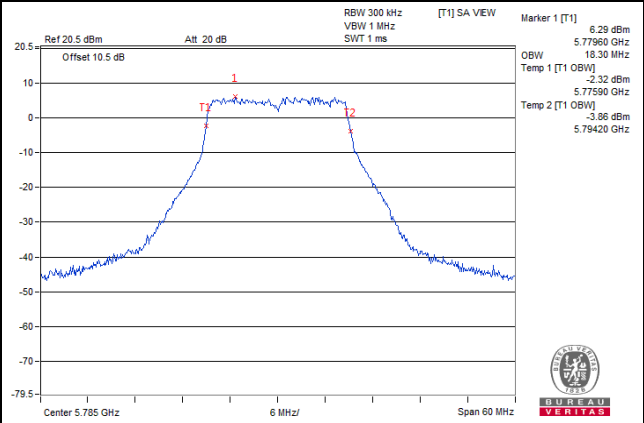


### Spectrum Plot of Worst Value

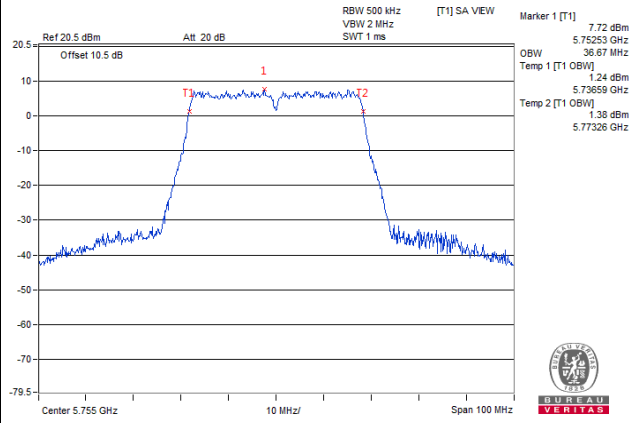
**802.11a\_Chain0 / CH149**



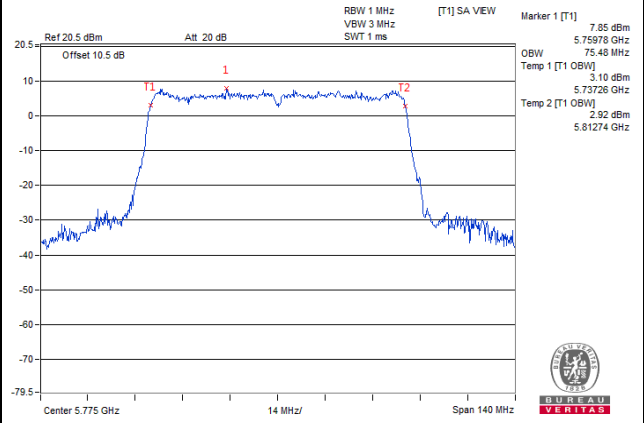
**802.11ac (20MHz)\_Chain0 / CH157**



**802.11ac (40MHz)\_Chain0 / CH151**

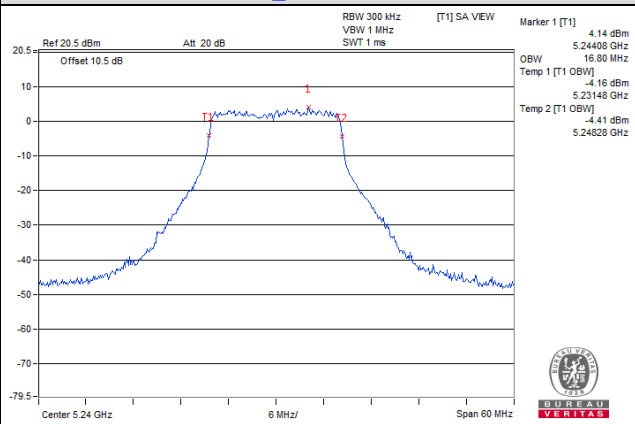


**802.11ac (80MHz)\_Chain0 / CH155**

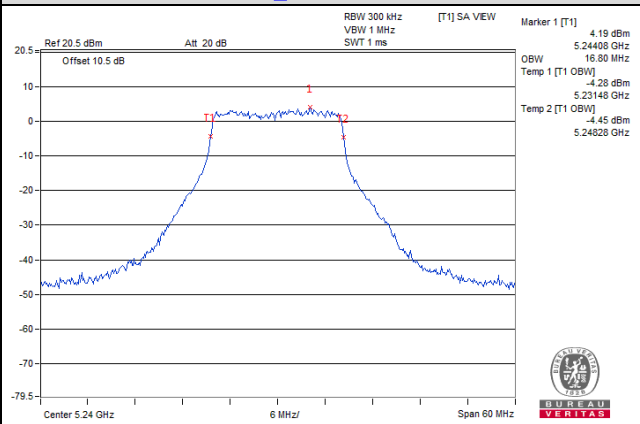


### Spectrum Plot for near by DFS band

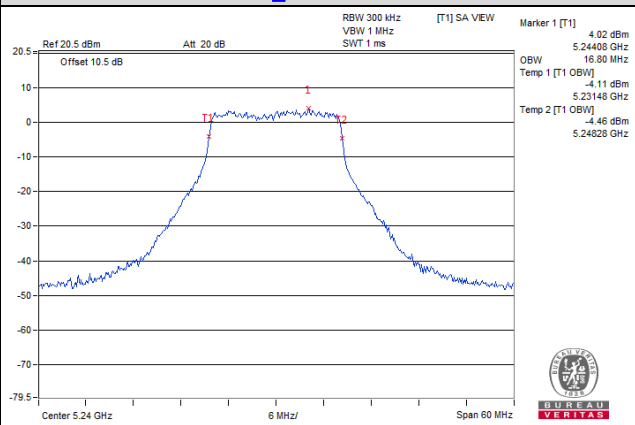
#### 802.11a\_Chain0 / CH48



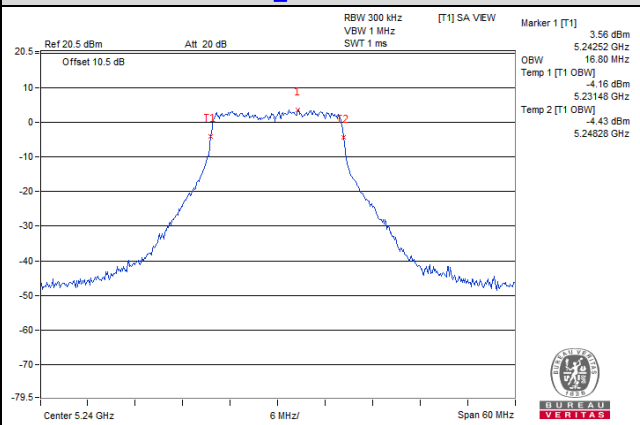
#### 802.11a\_Chain1 / CH48



#### 802.11a\_Chain2 / CH48

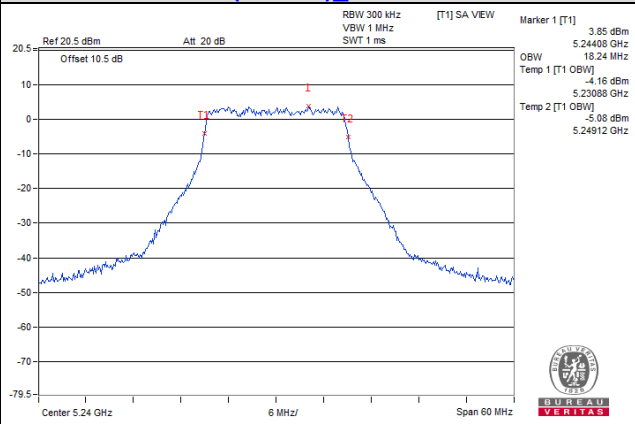


#### 802.11a\_Chain3 / CH48

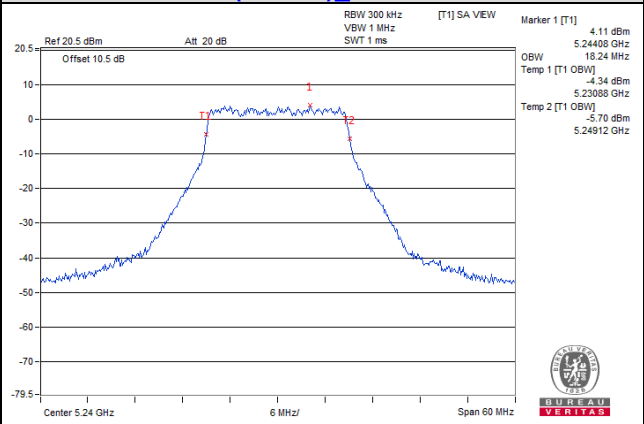


### Spectrum Plot for near by DFS band

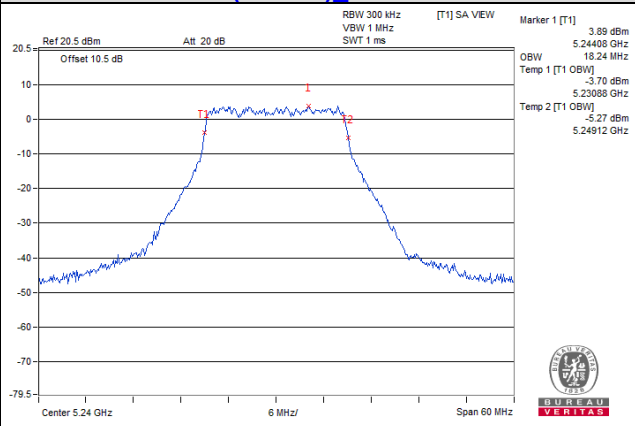
#### 802.11ac (20MHz)\_Chain0 / CH48



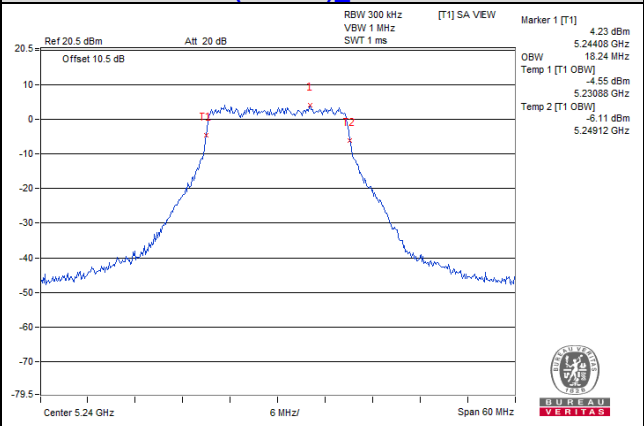
#### 802.11ac (20MHz)\_Chain1 / CH48



#### 802.11ac (20MHz)\_Chain2 / CH48

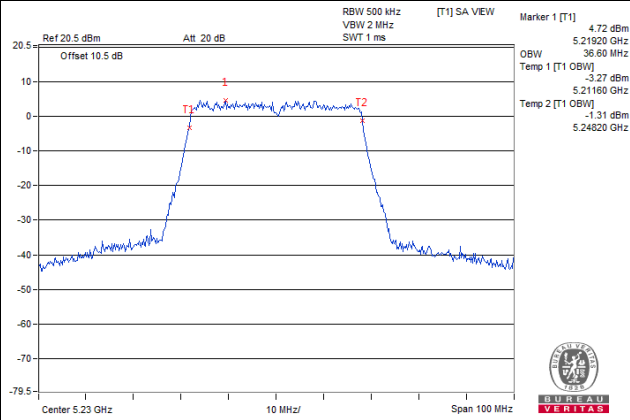


#### 802.11ac (20MHz)\_Chain3 / CH48

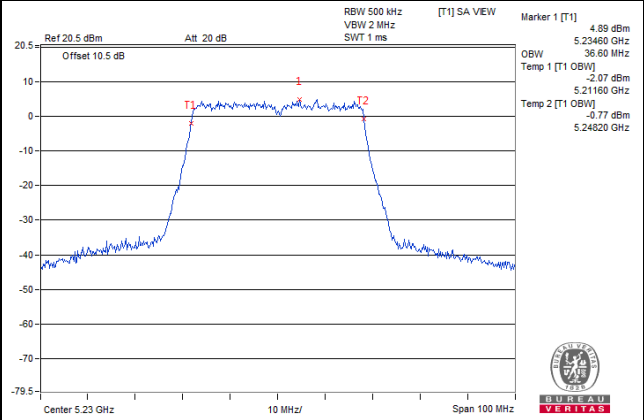


### Spectrum Plot for near by DFS band

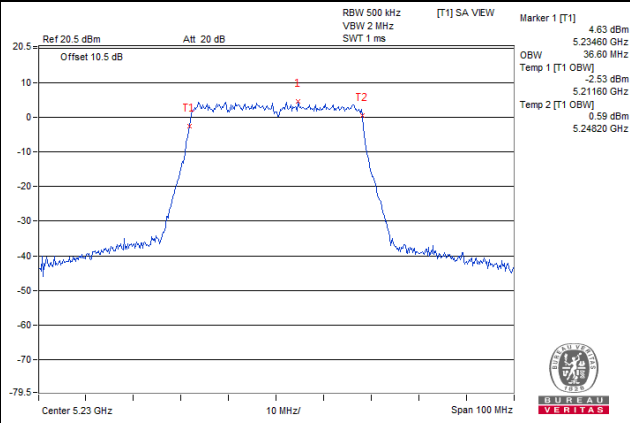
#### 802.11ac (40MHz)\_Chain0 / CH46



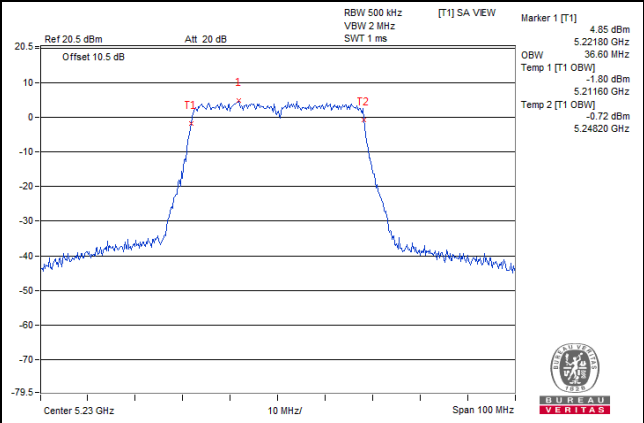
#### 802.11ac (40MHz)\_Chain1 / CH46



#### 802.11ac (40MHz)\_Chain2 / CH46

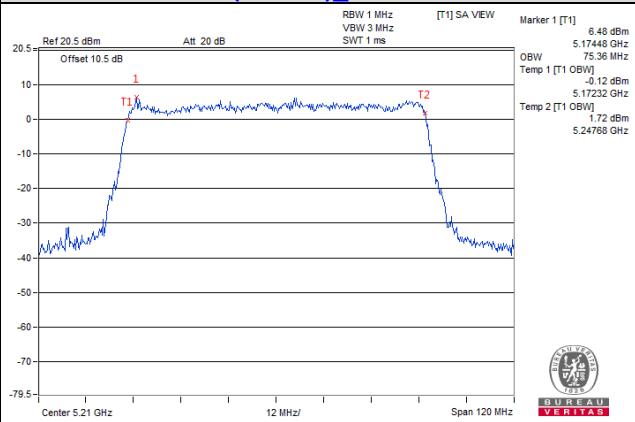


#### 802.11ac (40MHz)\_Chain3 / CH46

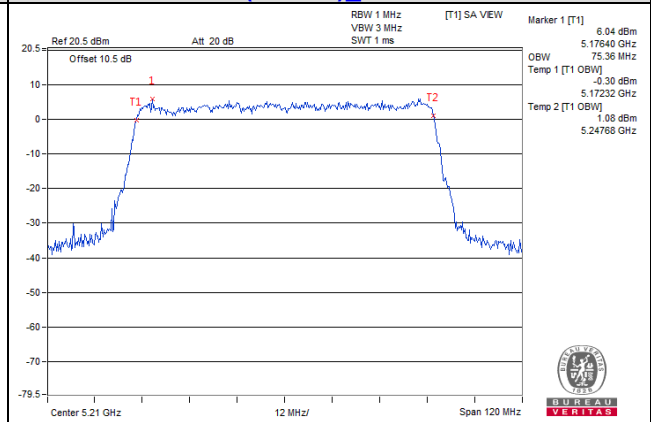


### Spectrum Plot for near by DFS band

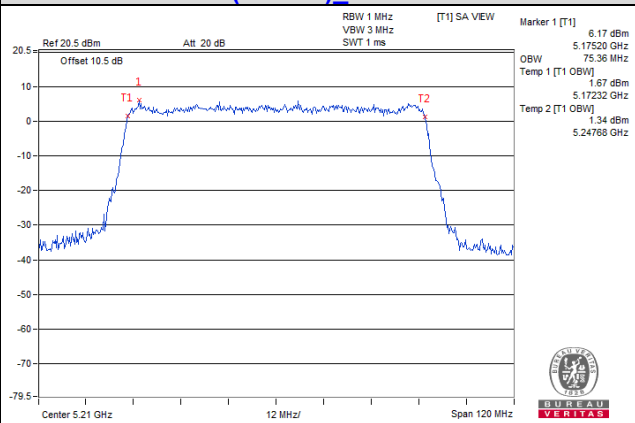
#### 802.11ac (80MHz)\_Chain0 / CH42



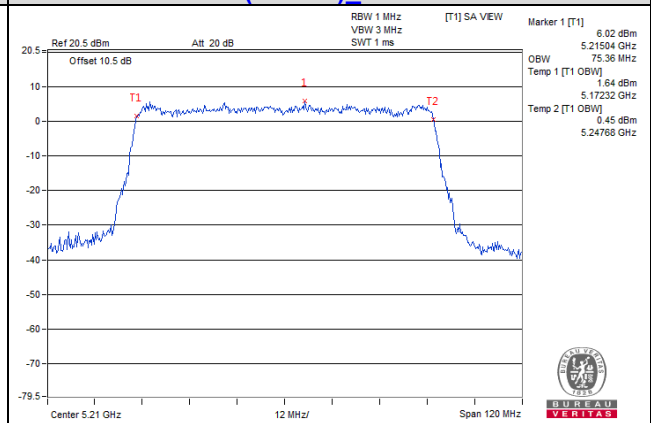
#### 802.11ac (80MHz)\_Chain1/ CH42



#### 802.11ac (80MHz)\_Chain2 / CH42

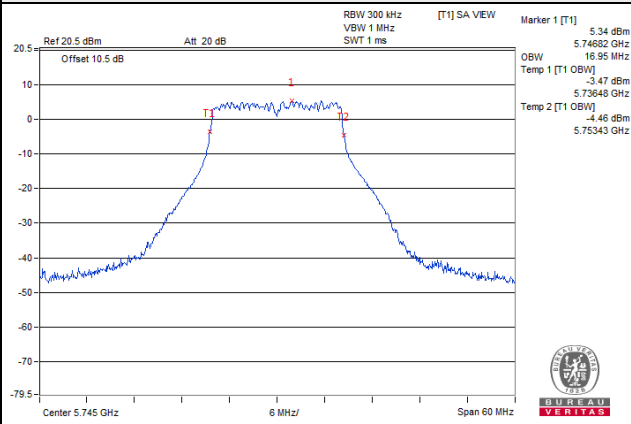


#### 802.11ac (80MHz)\_Chain3/ CH42

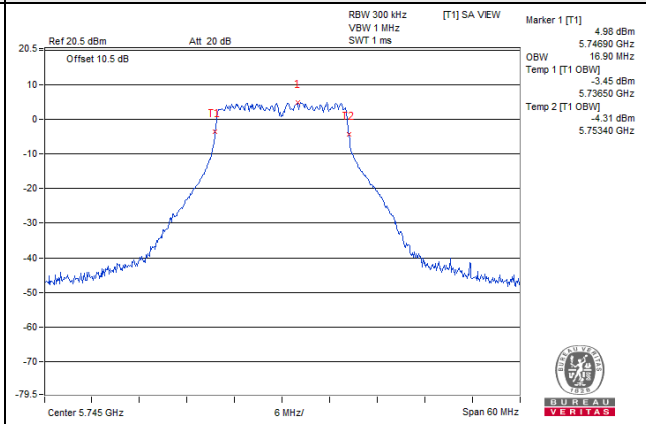


### Spectrum Plot for near By DFS Band

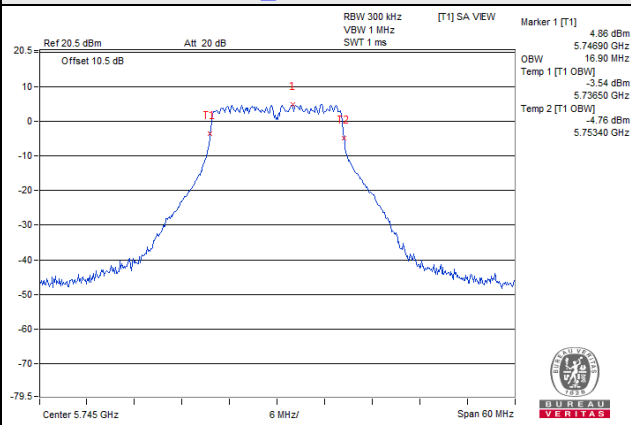
#### 802.11a\_Chain0 / CH 149



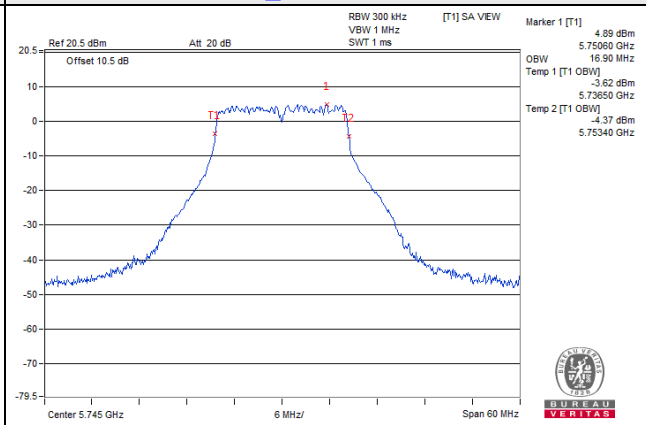
#### 802.11a\_Chain1 / CH 149



#### 802.11a\_Chain2 / CH 149

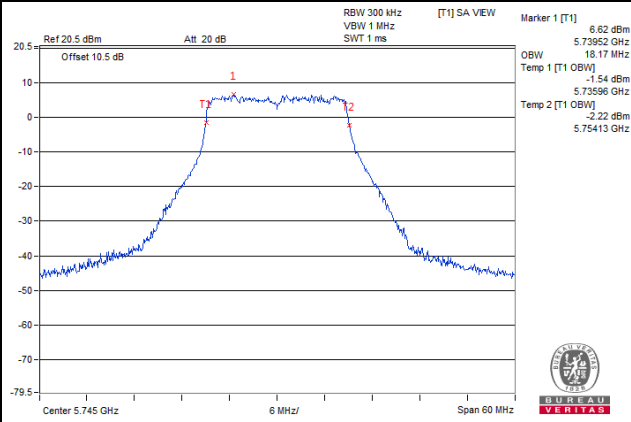


#### 802.11a\_Chain3 / CH 149

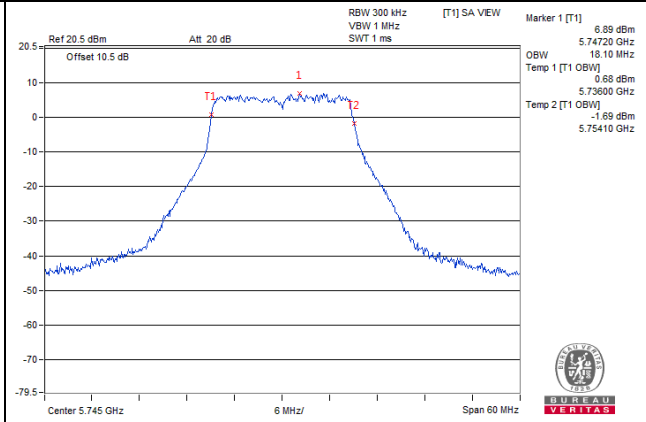


### Spectrum Plot for near by DFS band

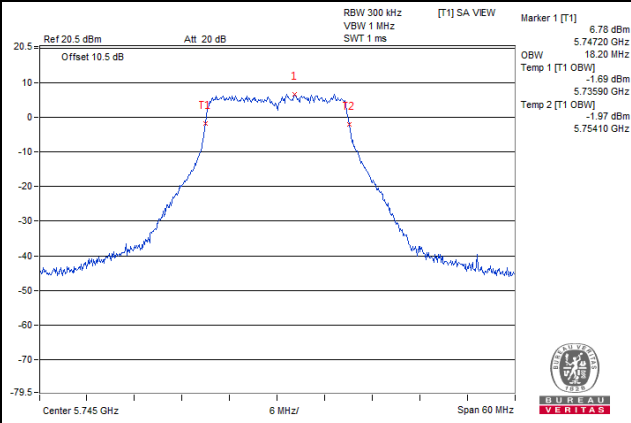
#### 802.11ac (20MHz)\_Chain0 / CH 149



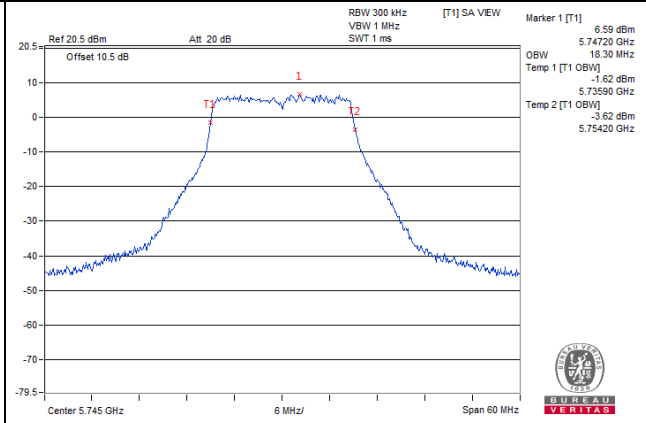
#### 802.11ac (20MHz)\_Chain1 / CH 149



#### 802.11ac (20MHz)\_Chain2 / CH 149

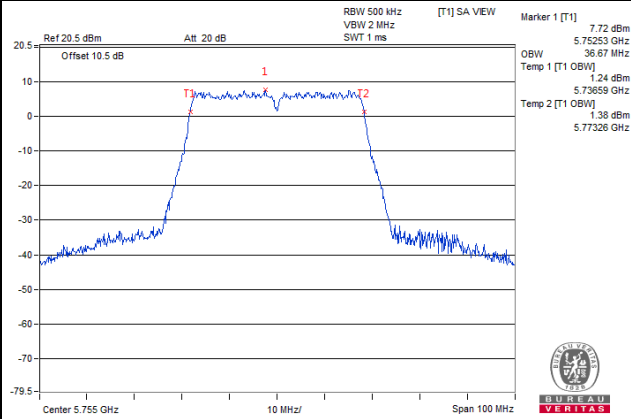


#### 802.11ac (20MHz)\_Chain3 / CH 149

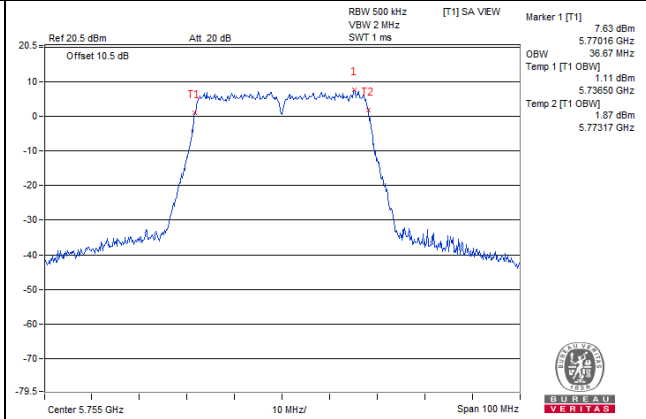


### Spectrum Plot for near by DFS band

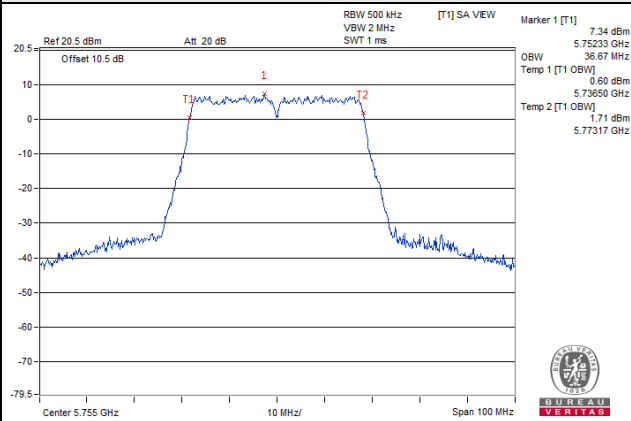
**802.11ac (40MHz)\_Chain0 / CH 151**



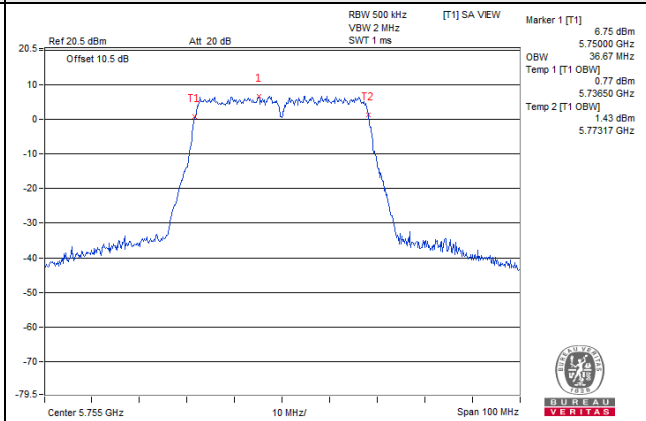
**802.11ac (40MHz)\_Chain1 / CH 151**



**802.11ac (40MHz)\_Chain2 / CH 151**



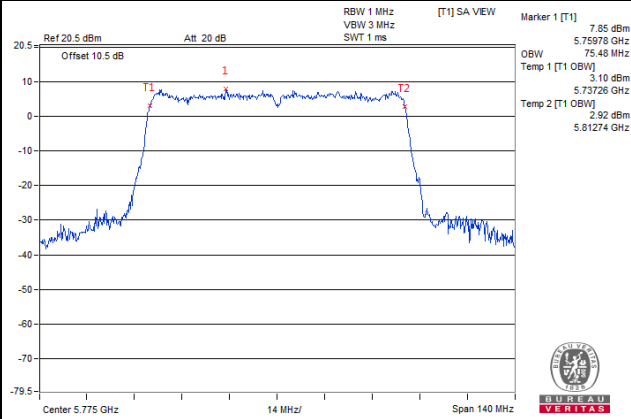
**802.11ac (40MHz)\_Chain3 / CH 151**



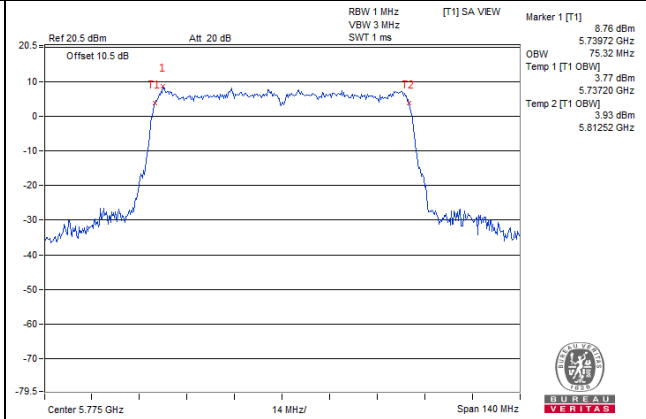


### Spectrum Plot for near by DFS band

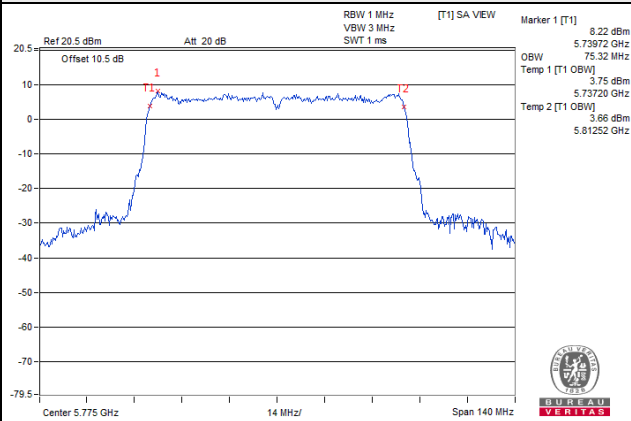
**802.11ac (80MHz)\_Chain0 / CH 155**



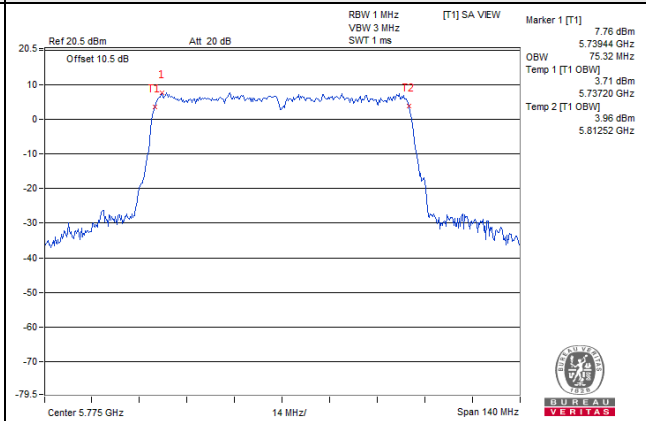
**802.11ac (80MHz)\_Chain1 / CH 155**



**802.11ac (80MHz)\_Chain2 / CH 155**



**802.11ac (80MHz)\_Chain3 / CH 155**

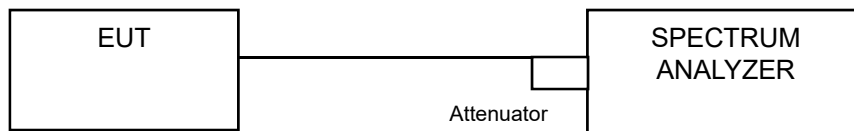


## 4.5 Peak Power Spectral Density Measurement

### 4.5.1 Limits of Peak Power Spectral Density Measurement

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

### 4.5.2 Test Setup



### 4.5.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

#### 4.5.4 Test Procedure

##### **For U-NII-1 band:**

Using method SA-1

- 1) Set span to encompass the entire emission bandwidth (EBW) of the signal.
- 2) Set RBW = 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

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  $10 \log (1/\text{duty cycle})$

##### **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  $10 \log (1/\text{duty cycle})$

#### 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	Chain 2	Chain 3				
36	5180	-0.15	-0.08	-0.06	-0.12	0.39	6.31	6.56	Pass
40	5200	-0.29	-0.24	-0.20	-0.25	0.39	6.17	6.56	Pass
48	5240	-0.43	-0.48	-0.49	-0.47	0.39	5.94	6.56	Pass

- Note:**
- 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.
  - Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $17-(10.44-6) = 6.56\text{dBm}$ .
  - Refer to section 3.3 for duty cycle spectrum plot.

##### 802.11ac (20MHz)

Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
36	5180	0.10	-0.35	-0.11	-0.23	5.88	6.56	Pass
40	5200	-0.39	-0.32	-0.31	-0.17	5.72	6.56	Pass
48	5240	-0.11	-0.06	-0.10	-0.12	5.92	6.56	Pass

- Note:**
- 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.
  - Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $17-(10.44-6) = 6.56\text{dBm}$ .

##### 802.11ac (40MHz)

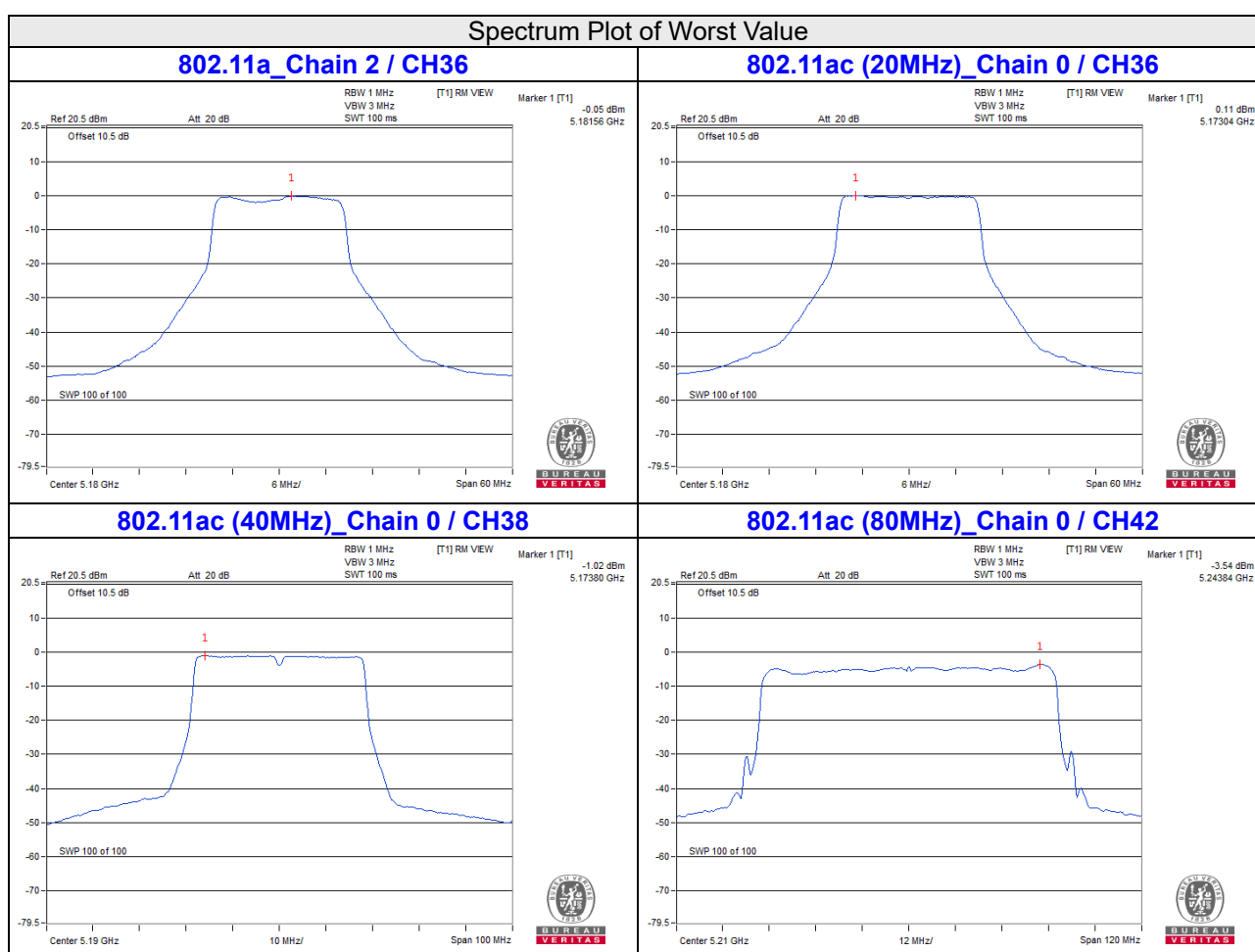
Chan.	Chan. Freq. (MHz)	PSD (dBm/MHz)				Total Power Density (dBm/MHz)	MAX. Limit (dBm/MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3			
38	5190	-1.03	-1.37	-1.35	-1.73	4.66	6.56	Pass
46	5230	-1.90	-1.90	-1.99	-1.77	4.13	6.56	Pass

- Note:**
- 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.
  - Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $17-(10.44-6) = 6.56\text{dBm}$ .

### 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	Chain 2	Chain 3				
42	5210	-3.55	-3.57	-3.69	-4.47	0.16	2.38	6.56	Pass

- Note:**
- 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.
  - Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$ , so the power density limit shall be reduced to  $17 - (10.44 - 6) = 6.56\text{dBm}$ .
  - Refer to section 3.3 for duty cycle spectrum plot.



**For U-NII-3:**

**802.11a**

TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-7.64	6.02	0.39	-1.23	25.56	Pass
	157	5785	-8.01	6.02	0.39	-1.60	25.56	Pass
	165	5825	-7.98	6.02	0.39	-1.57	25.56	Pass
1	149	5745	-7.77	6.02	0.39	-1.36	25.56	Pass
	157	5785	-8.09	6.02	0.39	-1.68	25.56	Pass
	165	5825	-8.19	6.02	0.39	-1.78	25.56	Pass
2	149	5745	-7.87	6.02	0.39	-1.46	25.56	Pass
	157	5785	-8.08	6.02	0.39	-1.67	25.56	Pass
	165	5825	-8.32	6.02	0.39	-1.91	25.56	Pass
3	149	5745	-7.84	6.02	0.39	-1.43	25.56	Pass
	157	5785	-8.12	6.02	0.39	-1.71	25.56	Pass
	165	5825	-8.23	6.02	0.39	-1.82	25.56	Pass

Note: 1. Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $30-(10.44-6) = 25.56\text{dBm}$ .

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

**802.11ac (20MHz)**

TX chain	Chan.	Chan. Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	149	5745	-5.54	6.02	0.48	25.56	Pass
	157	5785	-5.94	6.02	0.08	25.56	Pass
	165	5825	-6.07	6.02	-0.05	25.56	Pass
1	149	5745	-5.43	6.02	0.59	25.56	Pass
	157	5785	-5.91	6.02	0.11	25.56	Pass
	165	5825	-6.05	6.02	-0.03	25.56	Pass
2	149	5745	-5.51	6.02	0.51	25.56	Pass
	157	5785	-5.51	6.02	0.51	25.56	Pass
	165	5825	-6.07	6.02	-0.05	25.56	Pass
3	149	5745	-5.49	6.02	0.53	25.56	Pass
	157	5785	-5.61	6.02	0.41	25.56	Pass
	165	5825	-6.00	6.02	0.02	25.56	Pass

Note: Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $30-(10.44-6) = 25.56\text{dBm}$ .

### 802.11ac (40MHz)

TX chain	Chan.	Chan. Freq. (MHz)	PSD (dBm/500kHz)	10 log (N=4) dB	Total PSD (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	151	5755	-8.23	6.02	-2.21	25.56	Pass
	159	5795	-8.78	6.02	-2.76	25.56	Pass
1	151	5755	-8.31	6.02	-2.29	25.56	Pass
	159	5795	-8.70	6.02	-2.68	25.56	Pass
2	151	5755	-8.37	6.02	-2.35	25.56	Pass
	159	5795	-8.72	6.02	-2.70	25.56	Pass
3	151	5755	-8.57	6.02	-2.55	25.56	Pass
	159	5795	-8.78	6.02	-2.76	25.56	Pass

Note: Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $30-(10.44-6) = 25.56\text{dBm}$ .

### 802.11ac (80MHz)

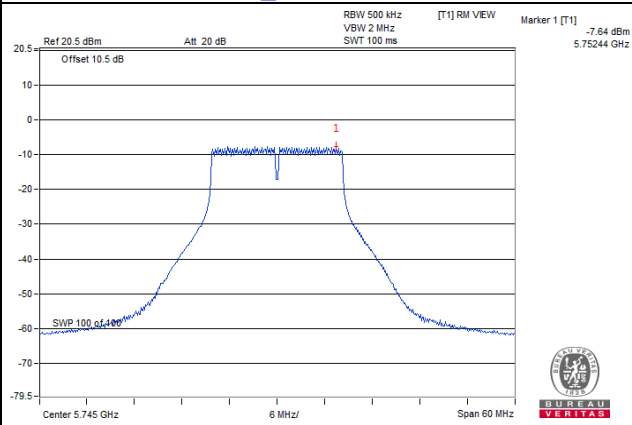
TX chain	Chan.	Chan. Freq. (MHz)	PSD W/O Duty Factor (dBm/500kHz)	10 log (N=4) dB	Duty Factor (dB)	Total PSD With Duty Factor (dBm/500kHz)	Limit (dBm/500kHz)	Pass /Fail
0	155	5775	-11.23	6.02	0.16	-5.05	25.56	Pass
1	155	5775	-10.89	6.02	0.16	-4.71	25.56	Pass
2	155	5775	-10.91	6.02	0.16	-4.73	25.56	Pass
3	155	5775	-10.98	6.02	0.16	-4.80	25.56	Pass

Note: 1. Directional gain =  $4.42\text{dBi} + 10\log(4) = 10.44\text{dBi} > 6\text{dBi}$  , so the power density limit shall be reduced to  $30-(10.44-6) = 25.56\text{dBm}$ .

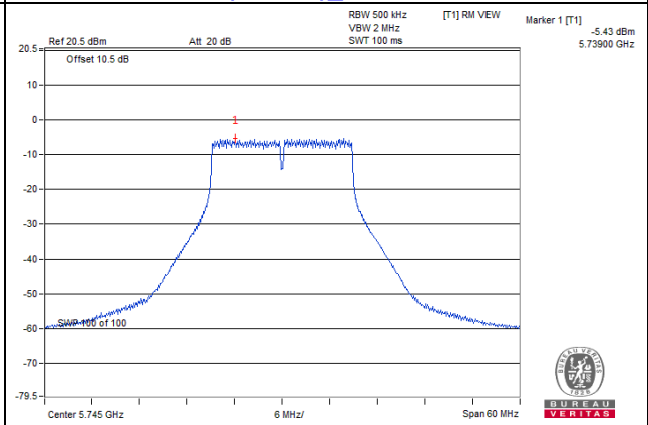
2. Refer to section 3.3 for duty cycle spectrum plot.

Spectrum Plot of Worst Value

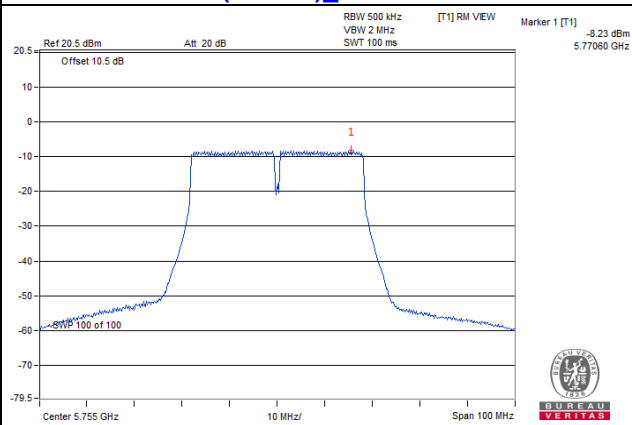
**802.11a\_Chain 0 / CH149**



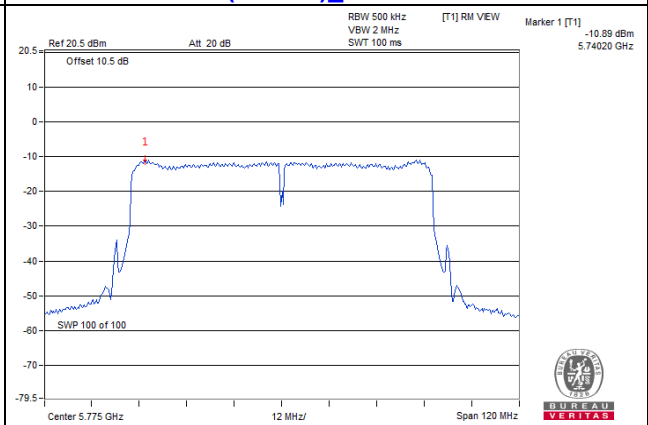
**802.11ac (20MHz)\_Chain 1 / CH149**



**802.11ac (40MHz)\_Chain 0 / CH151**



**802.11ac (80MHz)\_Chain 1 / CH155**



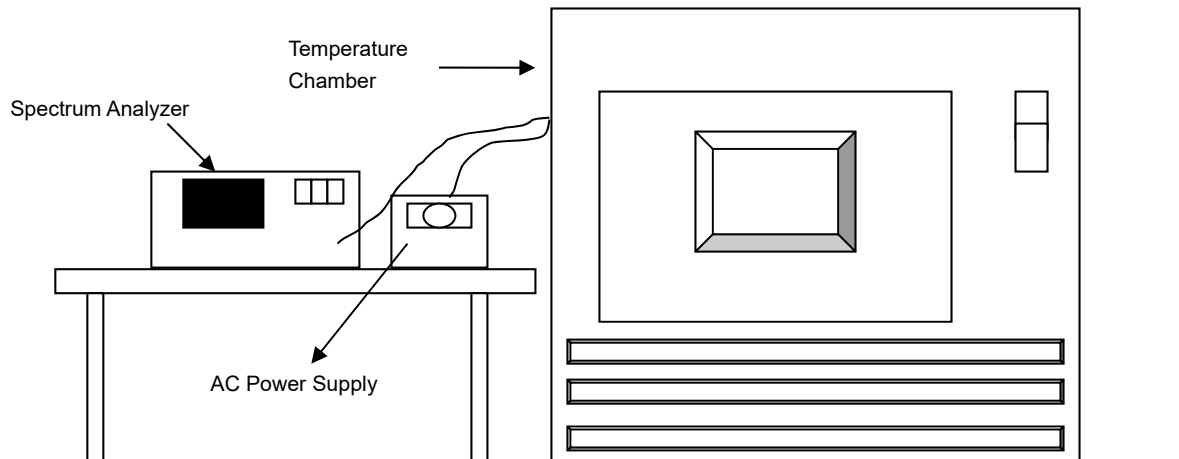


## 4.6 Frequency Stability Measurement

### 4.6.1 Limits of Frequency Stability Measurement

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

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

- 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
50	120	5179.9963	Pass	5179.9944	Pass	5179.9992	Pass	5179.9959	Pass
40	120	5180.0173	Pass	5180.0127	Pass	5180.014	Pass	5180.0164	Pass
30	120	5179.9773	Pass	5179.9771	Pass	5179.974	Pass	5179.975	Pass
20	120	5179.9888	Pass	5179.9855	Pass	5179.9883	Pass	5179.9877	Pass
10	120	5179.984	Pass	5179.9837	Pass	5179.9851	Pass	5179.9832	Pass
0	120	5179.9778	Pass	5179.9748	Pass	5179.9772	Pass	5179.9741	Pass
-10	120	5180.01	Pass	5180.0076	Pass	5180.0058	Pass	5180.0087	Pass
-20	120	5179.9768	Pass	5179.9759	Pass	5179.9757	Pass	5179.9722	Pass
-30	120	5179.9815	Pass	5179.9838	Pass	5179.9793	Pass	5179.9839	Pass

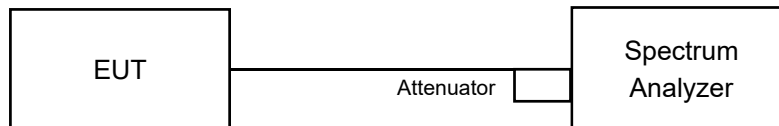
Frequency Stability Versus Voltage									
Operating Frequency: 5180 MHz									
TEMP. (°C)	Power Supply (Vac)	0 Minute		2 Minute		5 Minute		10 Minute	
		Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail	Measured Frequency (MHz)	Pass/Fail
20	138	5179.9885	Pass	5179.9857	Pass	5179.9888	Pass	5179.9883	Pass
	120	5179.9888	Pass	5179.9855	Pass	5179.9883	Pass	5179.9877	Pass
	102	5179.9898	Pass	5179.9863	Pass	5179.9878	Pass	5179.9874	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)  $\geq 3 \times$  RBW, Detector = Peak.
- c. Trace mode = max hold.
- d. Sweep = auto couple.
- e. Measure the maximum width of the emission that is constrained by the frequencies associated with the two amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission

### 4.7.5 Deviation from Test Standard

No deviation.

### 4.7.6 EUT Operating Condition

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

#### 4.7.7 Test Results

##### 802.11a

Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
149	5745	16.42	16.43	16.43	16.43	0.5	PASS
157	5785	16.44	16.43	16.43	16.43	0.5	PASS
165	5825	16.43	16.43	16.43	16.43	0.5	PASS

##### 802.11ac (20MHz)

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

##### 802.11ac (40MHz)

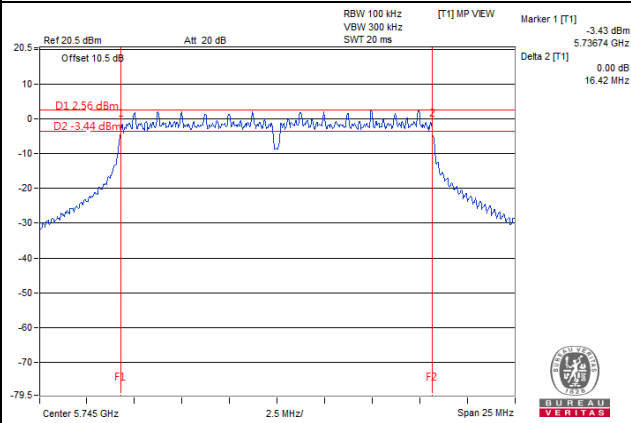
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
151	5755	36.40	36.47	36.46	36.45	0.5	PASS
159	5795	36.46	36.46	36.47	36.46	0.5	PASS

##### 802.11ac (80MHz)

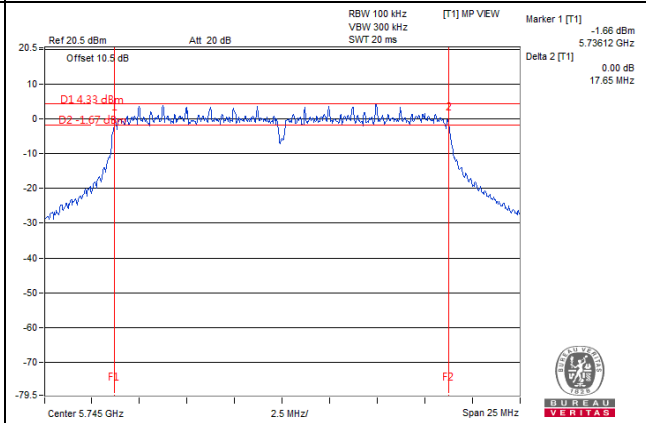
Channel	Frequency (MHz)	6dB Bandwidth (MHz)				Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1	Chain 2	Chain 3		
155	5775	75.39	75.45	75.45	75.46	0.5	PASS

Spectrum Plot of Worst Value

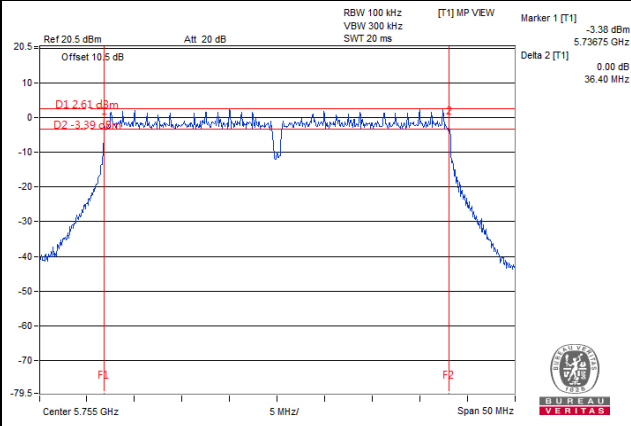
802.11a\_Chain 0 / CH149



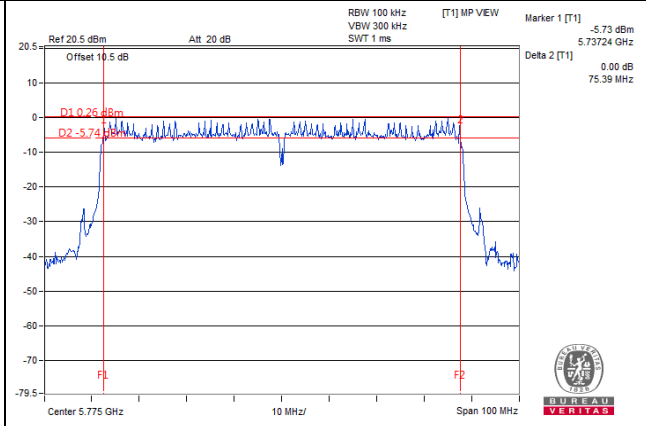
802.11ac (20MHz)\_Chain 0 / CH149



802.11ac (40MHz)\_Chain 0 / CH151



802.11ac (80MHz)\_Chain 0 / CH155

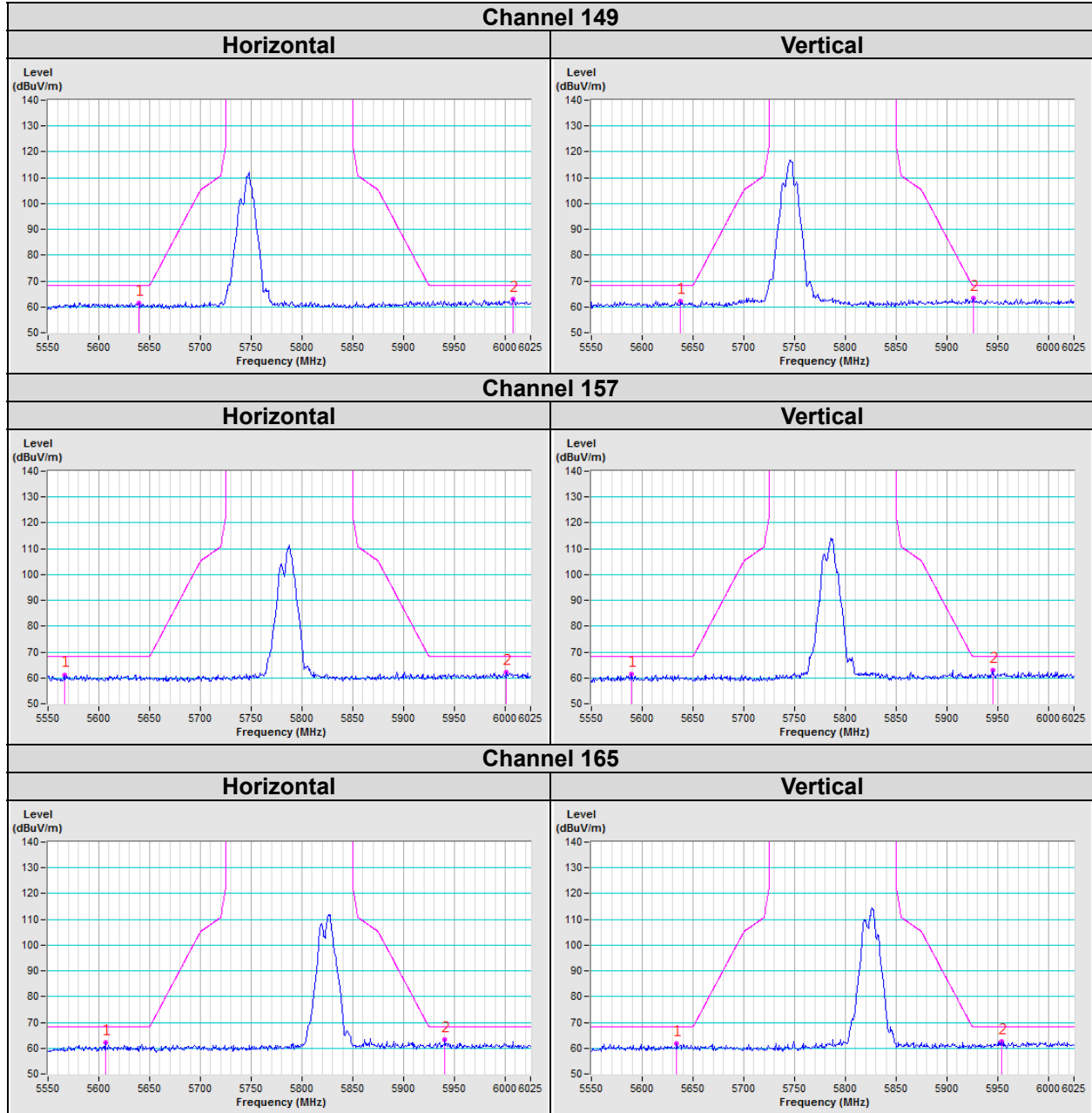


## 5 Pictures of Test Arrangements

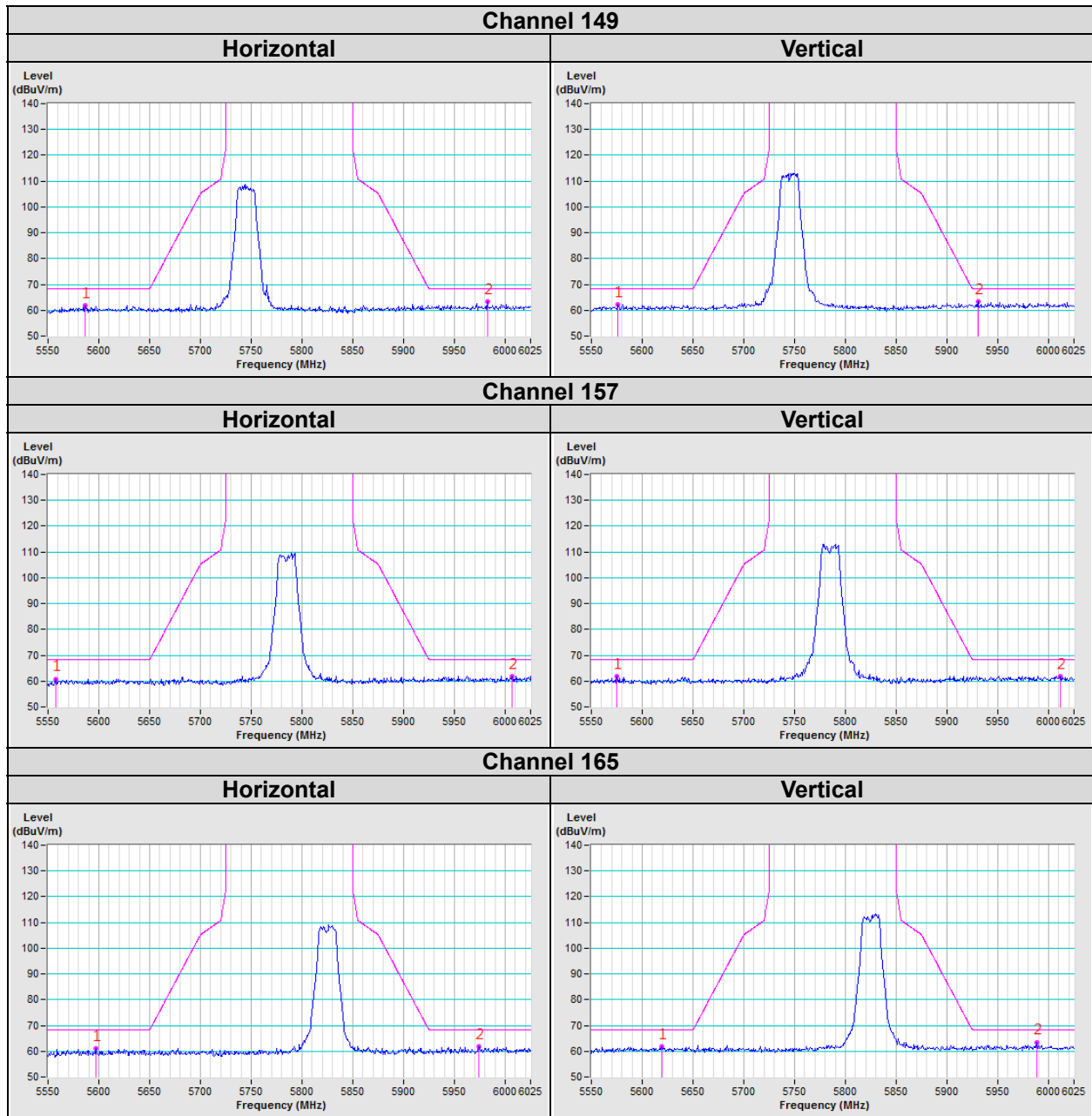
Please refer to the attached file (Test Setup Photo).

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

### 802.11a

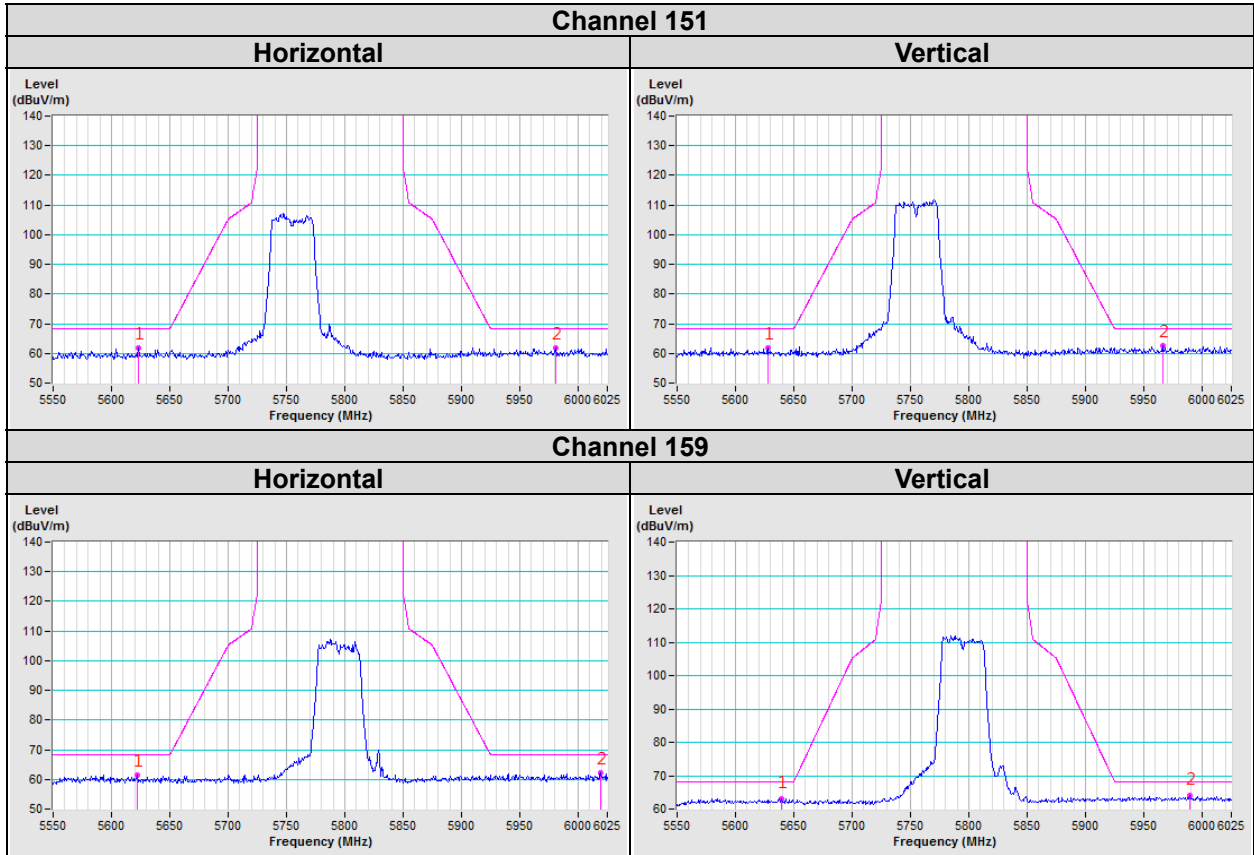


### 802.11ac (20MHz)

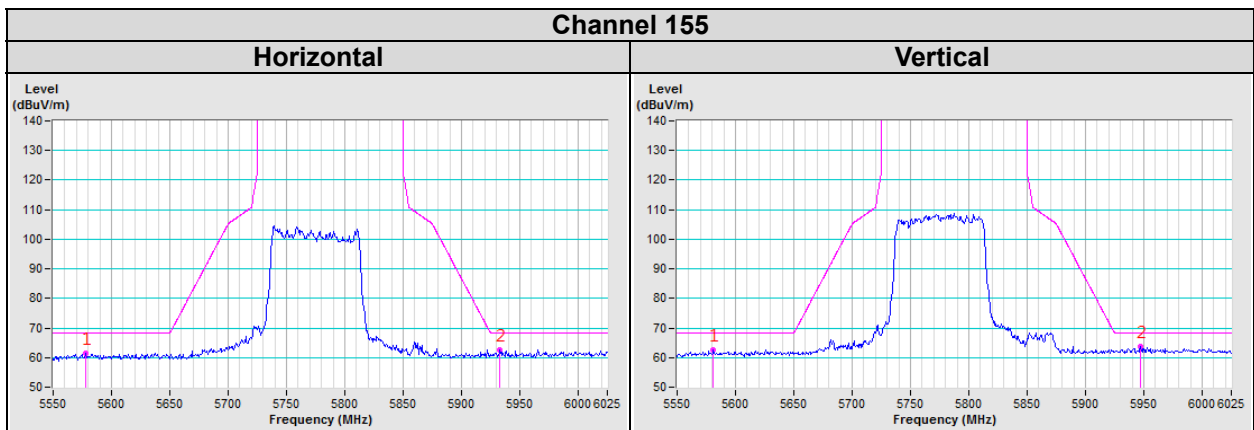




### 802.11ac (40MHz)

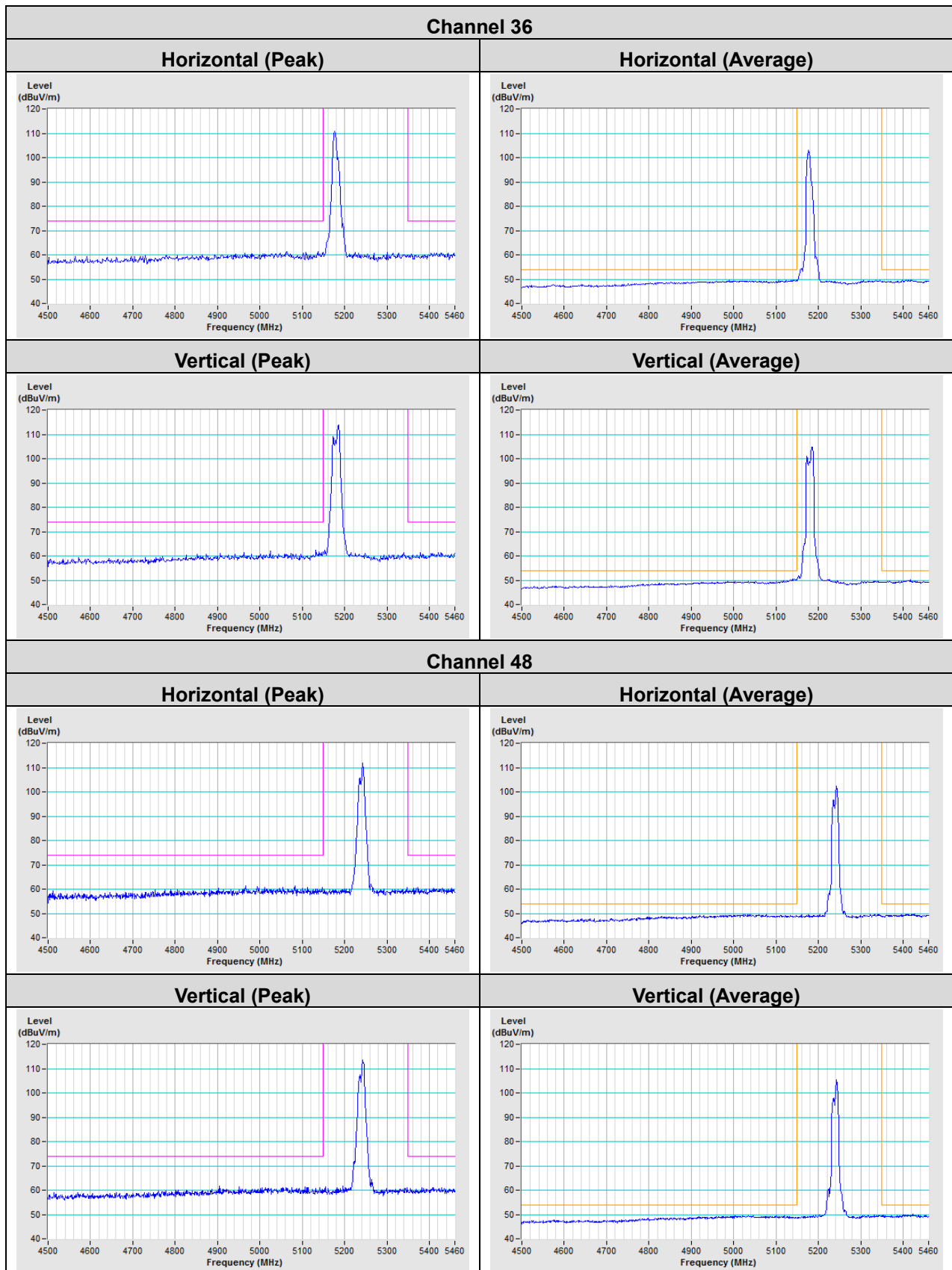


### 802.11ac (80MHz)

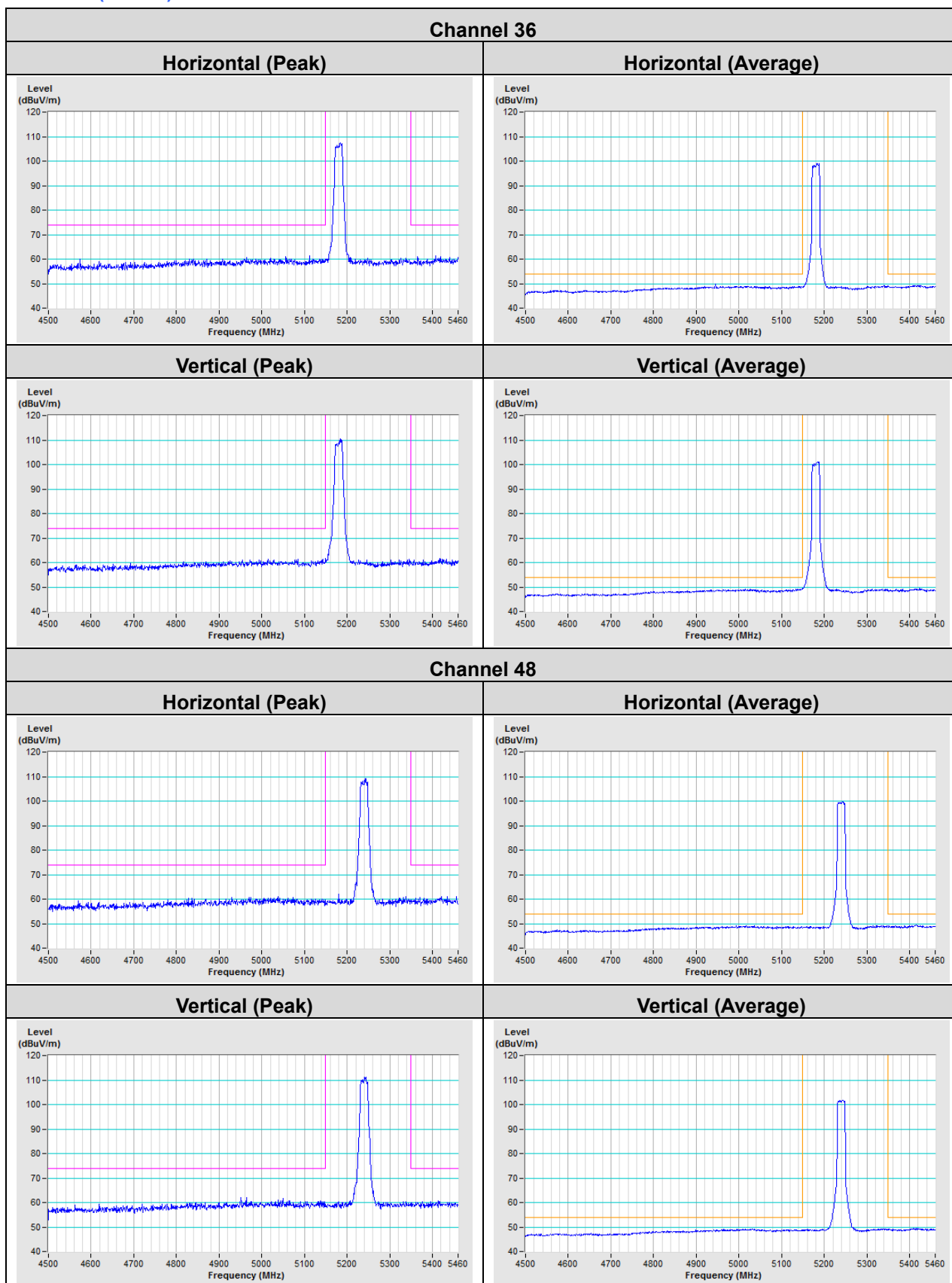


## Annex B- Bandedge Measurement (For U-NII-1 band)

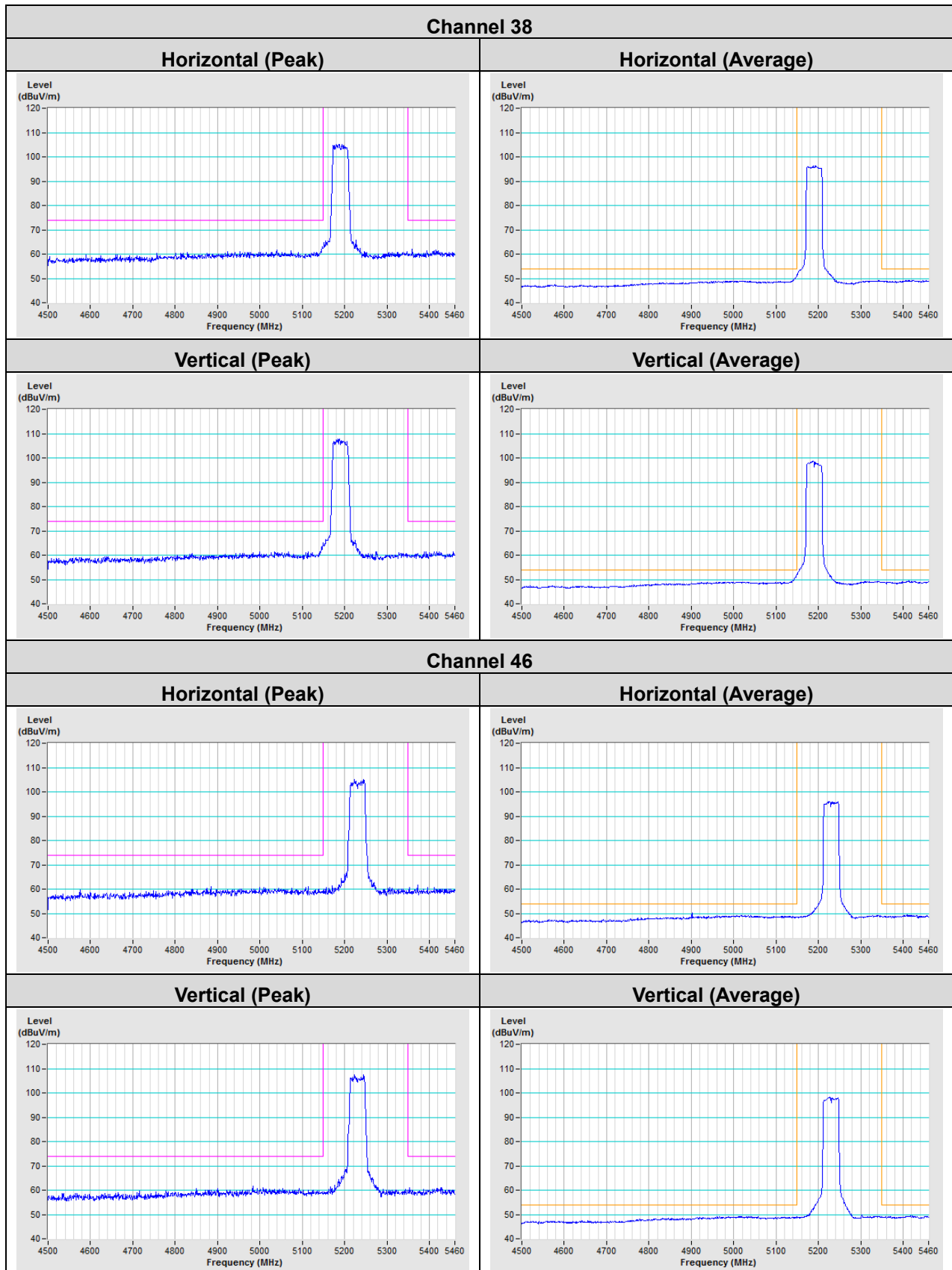
802.11a



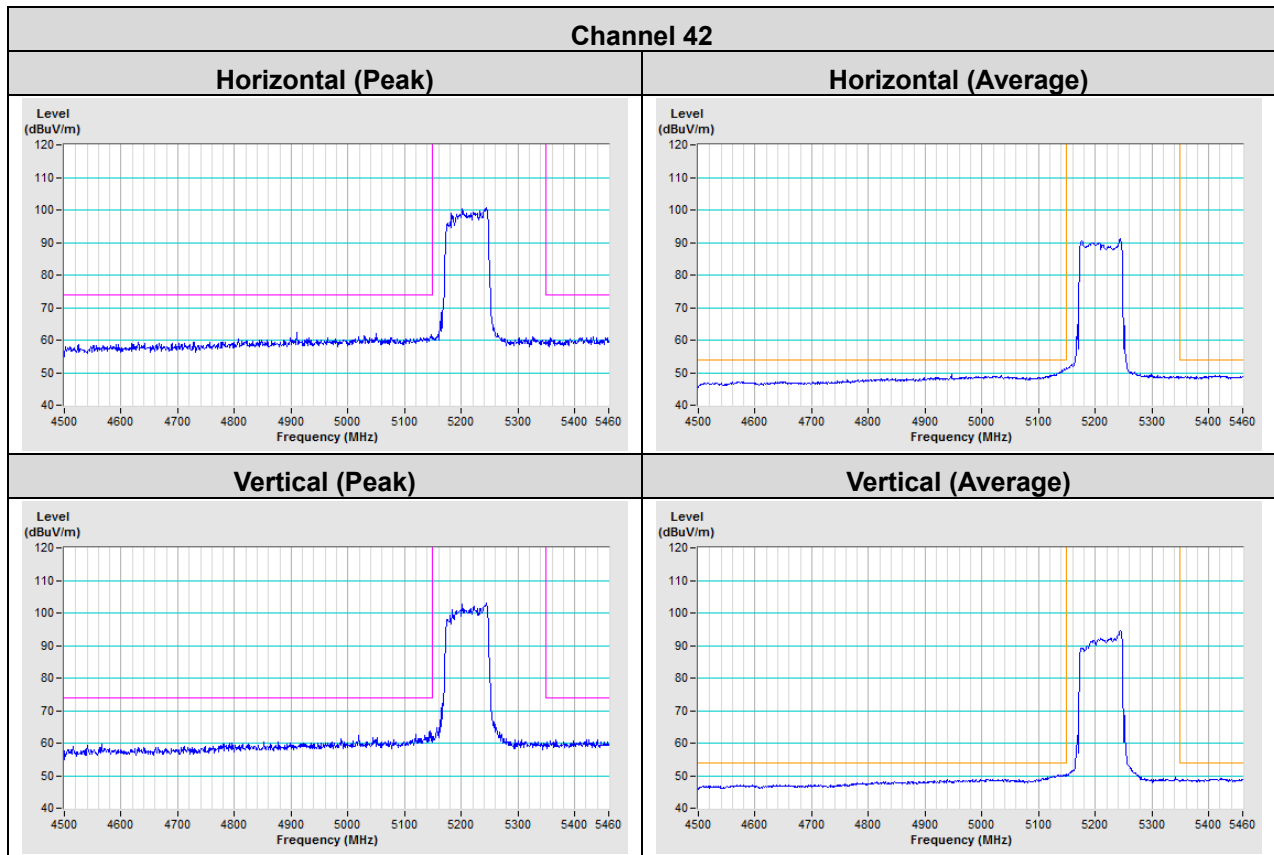
802.11ac (VHT20)



802.11ac (VHT40)



802.11ac (VHT80)



## 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:

**Lin Kou EMC/RF Lab**

Tel: 886-2-26052180

Fax: 886-2-26051924

**Hsin Chu EMC/RF/Telecom Lab**

Tel: 886-3-6668565

Fax: 886-3-6668323

**Hwa Ya EMC/RF/Safety Lab**

Tel: 886-3-3183232

Fax: 886-3-3270892

**Email:** [service.adt@tw.bureauveritas.com](mailto:service.adt@tw.bureauveritas.com)

**Web Site:** [www.bureauveritas-adt.com](http://www.bureauveritas-adt.com)

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

--- END ---