

## FCC Test Report

**Report No.:** RFBHAT-WTW-P20121068-2

**FCC ID:** R68OQ845US

**Test Model:** Open-Q 845 uSOM

**Received Date:** Jan. 22, 2021

**Test Date:** Mar. 02 ~ Mar. 11, 2021

**Issued Date:** Apr. 21, 2021

**Applicant:** Lantronix

**Address:** 7535 Irvine Center Drive, Suite 100, Irvine, CA 92618 USA

**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

**Test Location:** No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City  
33383, Taiwan

**FCC Registration /  
Designation Number:** 788550 / TW0003



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.

## 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 Standards and References .....	13
<b>4 Test Types and Results .....</b>	<b>14</b>
4.1 Radiated Emission and Bandedge Measurement .....	14
4.1.1 Limits of Radiated Emission and Bandedge Measurement .....	14
4.1.2 Test Instruments .....	15
4.1.3 Test Procedures.....	16
4.1.4 Deviation from Test Standard .....	17
4.1.5 Test Set Up .....	17
4.1.6 EUT Operating Conditions.....	18
4.1.7 Test Results .....	19
4.2 Conducted Emission Measurement.....	33
4.2.1 Limits of Conducted Emission Measurement .....	33
4.2.2 Test Instruments .....	33
4.2.3 Test Procedures.....	34
4.2.4 Deviation from Test Standard .....	34
4.2.5 Test Setup.....	34
4.2.6 EUT Operating Conditions.....	34
4.2.7 Test Results .....	35
4.3 6 dB Bandwidth Measurement.....	37
4.3.1 Limits of 6 dB Bandwidth Measurement.....	37
4.3.2 Test Setup.....	37
4.3.3 Test Instruments .....	37
4.3.4 Test Procedure .....	37
4.3.5 Deviation from Test Standard .....	37
4.3.6 EUT Operating Conditions.....	37
4.3.7 Test Results .....	38
4.4 Occupied Bandwidth Measurement.....	40
4.4.1 Test Setup.....	40
4.4.2 Test Instruments .....	40
4.4.3 Test Procedure .....	40
4.4.4 Deviation from Test Standard .....	40
4.4.5 EUT Operating Conditions.....	40
4.4.6 Test Results .....	41
4.5 Conducted Output Power Measurement .....	43
4.5.1 Limits of Conducted Output Power Measurement.....	43
4.5.2 Test Setup.....	43
4.5.3 Test Instruments .....	43
4.5.4 Test Procedures.....	43
4.5.5 Deviation from Test Standard .....	43
4.5.6 EUT Operating Conditions.....	43
4.5.7 Test Results .....	44

4.6	Power Spectral Density Measurement .....	46
4.6.1	Limits of Power Spectral Density Measurement.....	46
4.6.2	Test Setup.....	46
4.6.3	Test Instruments .....	46
4.6.4	Test Procedure .....	46
4.6.5	Deviation from Test Standard .....	47
4.6.6	EUT Operating Condition .....	47
4.6.7	Test Results .....	48
4.7	Conducted Out of Band Emission Measurement .....	51
4.7.1	Limits of Conducted Out of Band Emission Measurement.....	51
4.7.2	Test Setup.....	51
4.7.3	Test Instruments .....	51
4.7.4	Test Procedure .....	51
4.7.5	Deviation from Test Standard .....	51
4.7.6	EUT Operating Condition .....	51
4.7.7	Test Results .....	52
<b>5</b>	<b>Pictures of Test Arrangements.....</b>	<b>61</b>
	<b>Annex A- Band Edge Measurement .....</b>	<b>62</b>
	<b>Appendix – Information of the Testing Laboratories .....</b>	<b>69</b>

### Release Control Record

Issue No.	Description	Date Issued
RFBHAT-WTW-P20121068-2	Original Release	Apr. 21, 2021

## 1 Certificate of Conformity

**Product:** Open-Q 845 uSOM  
**Brand:** Lantronix  
**Test Model:** Open-Q 845 uSOM  
**Sample Status:** Engineering Sample  
**Applicant:** Lantronix  
**Test Date:** Mar. 02 ~ Mar. 11, 2021  
**Standards:** 47 CFR FCC Part 15, Subpart C (Section 15.247)  
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.

*Lena Wang*  
**Prepared by :** \_\_\_\_\_, **Date:** Apr. 21, 2021  
Lena Wang / Specialist

*Dylan Chiou*  
**Approved by :** \_\_\_\_\_, **Date:** Apr. 21, 2021  
Dylan Chiou / Senior Project Engineer

## 2 Summary of Test Results

47 CFR FCC Part 15, Subpart C (Section 15.247)			
FCC Clause	Test Item	Result	Remarks
15.207	AC Power Conducted Emission	Pass	Meet the requirement of limit. Minimum passing margin is -21.03 dB at 0.39400 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.4 dB at 2390.00 MHz.
15.247(d)	Antenna Port Emission	Pass	Meet the requirement of limit.
15.247(a)(2)	6 dB Bandwidth	Pass	Meet the requirement of limit.
---	Occupied Bandwidth Measurement	Pass	Reference only
15.247(b)	Conducted power	Pass	Meet the requirement of limit.
15.247(e)	Power Spectral Density	Pass	Meet the requirement of limit.
15.203	Antenna Requirement	Pass	Antenna connector is U.FL.

Note:

- For 2.4G band compliance with rule 15.247(d) of the band-edge items, the test plots were recorded in Annex A. Test Procedures refer to report 4.1.3.
- Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

### 2.1 Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Measurement	Frequency	Expanded Uncertainty (k=2) ( $\pm$ )
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.93 dB
	200 MHz ~ 1000 MHz	2.95 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	2.26 dB
	18 GHz ~ 40 GHz	1.94 dB

### 2.2 Modification Record

There were no modifications required for compliance.

### 3 General Information

#### 3.1 General Description of EUT

<b>Product</b>	Open-Q 845 uSOM
<b>Brand</b>	Lantronix
<b>Test Model</b>	Open-Q 845 uSOM
<b>Status of EUT</b>	Engineering Sample
<b>Power Supply Rating</b>	12 Vdc (Adapter)
<b>Modulation Type</b>	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
<b>Modulation Technology</b>	DSSS, OFDM
<b>Transfer Rate</b>	802.11b: 11.0 / 5.5 / 2.0 / 1.0 Mbps 802.11g: 54.0 / 48.0 / 36.0 / 24.0 / 18.0 / 12.0 / 9.0 / 6.0 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 400 Mbps
<b>Operating Frequency</b>	2412 ~ 2462 MHz
<b>Number of Channel</b>	11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ac (VHT20) 7 for 802.11n (HT40), 802.11ac (VHT40)
<b>Output Power</b>	CDD Mode: 453.382 mW Beamforming Mode: 322.895 mW
<b>Antenna Type</b>	Refer to Note as below
<b>Antenna Connector</b>	Refer to Note as below
<b>Accessory Device</b>	Refer to Note as below
<b>Data Cable Supplied</b>	N/A

Note:

- The EUT incorporates a MIMO function. Physically, the EUT provides two completed transmitters and two receivers.

Modulation Mode	Tx Function	CDD Mode	Beamforming Mode
802.11b	2TX	Support	Not Support
802.11g	2TX	Support	Not Support
802.11n (HT20)	2TX	Support	Support
802.11n (HT40)	2TX	Support	Support
802.11ac (VHT20)	2TX	Support	Support
802.11ac (VHT40)	2TX	Support	Support

\* The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 and 802.11ac mode for VHT20 / VHT40, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

- The following antennas were provided to the EUT.

<b>Ant. Type</b>	Flexible Dipole Antenna	
<b>Connector Type</b>	U.FL	
<b>Antenna Gain (dBi)</b>		
<b>Item</b>	<b>2.4~2.5G</b>	<b>4.9~5.8G</b>
Ant 1	3.32	6.11
Ant 2	3.32	6.11

3. The above Antenna information is declared by manufacturer and for more detailed features description, please refer to the manufacturer's specifications, the laboratory shall not be held responsible.
4. The above EUT information is declared by manufacturer and for more detailed features description, please refers to the manufacturer's specifications or user's manual.
5. BT, 2.4G and 5GHz WLAN can transmit simultaneously. The emission of the simultaneous operation has been evaluated and no non-compliance was found.



### 3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), 802.11ac (VHT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	7	2442
2	2417	8	2447
3	2422	9	2452
4	2427	10	2457
5	2432	11	2462
6	2437		

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

Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	7	2442
4	2427	8	2447
5	2432	9	2452
6	2437		

### 3.2.1 Test Mode Applicability and Tested Channel Detail

EUT Configure Mode	Applicable To				Description
	RE $\geq$ 1G	RE $<$ 1G	PLC	APCM	
-	√	√	√	√	-

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

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

**NOTE:** "-" means no effect.

**NOTE:** Radiated emission test (below 1GHz) and power line conducted emission test items chosen the worst fundamental frequency emission level.

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

- 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	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11ac (VHT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11ac (VHT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

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

- 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	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11ac (VHT40)	1 to 11	6	OFDM	BPSK	13.5

#### **Power Line Conducted Emission Test:**

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11ac (VHT40)	1 to 11	6	OFDM	BPSK	13.5

**Bandedge Measurement:**

- 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	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11ac (VHT20)	1 to 11	1, 11	OFDM	BPSK	6.5
-	802.11ac (VHT40)	3 to 9	3, 9	OFDM	BPSK	13.5

**Antenna Port Conducted Measurement:**

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11ac (VHT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11ac (VHT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5

**Test Condition:**

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Adair Peng
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Adair Peng
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Adair Peng
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Ivan Tseng

### 3.3 Duty Cycle of Test Signal

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

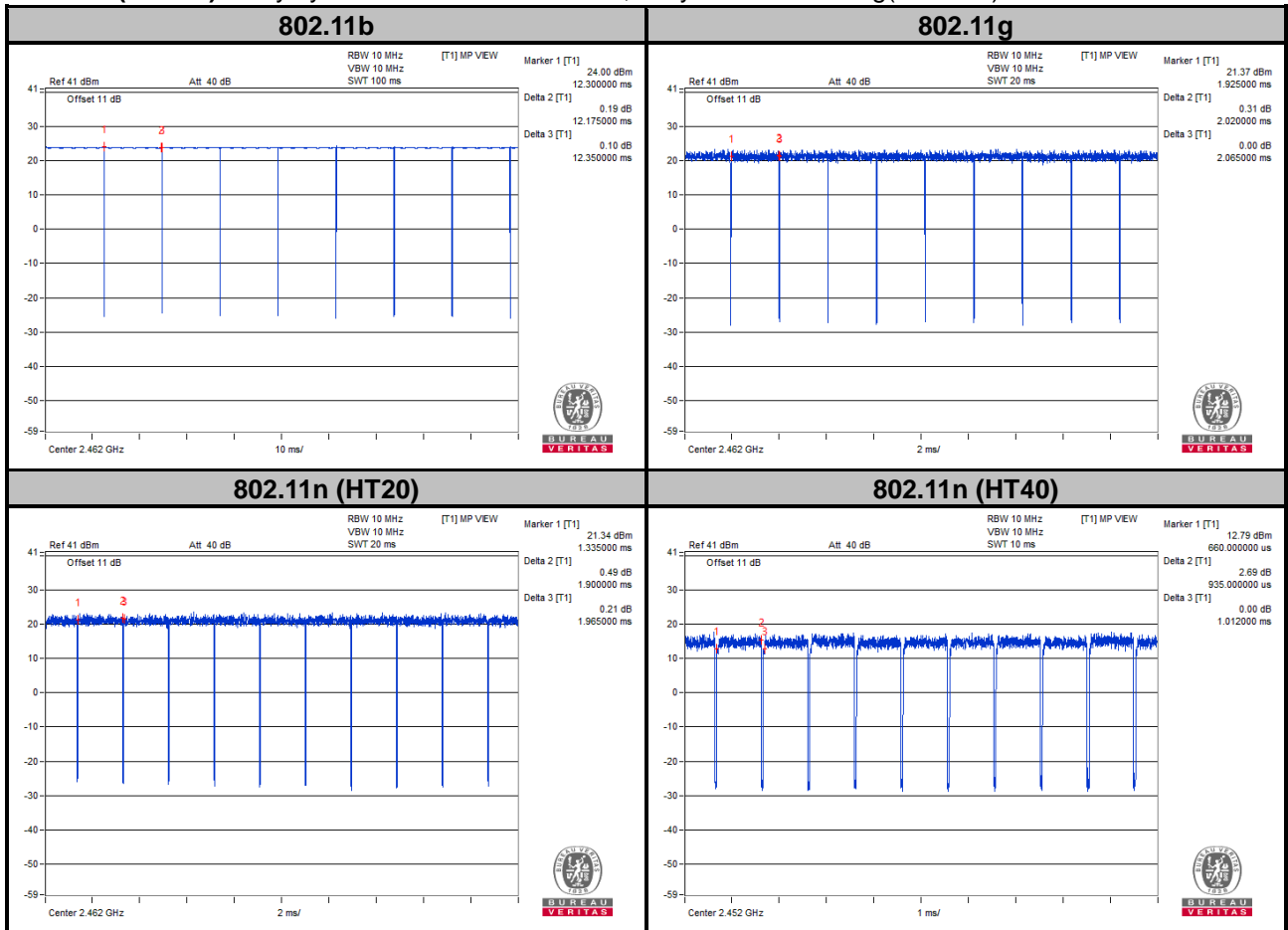
Duty cycle of test signal is  $< 98\%$ , duty factor shall be considered.

**802.11b:** Duty cycle =  $12.175/12.35 = 0.986$

**802.11g:** Duty cycle =  $2.02/2.065 = 0.978$ , Duty factor =  $10 * \log(1/0.978) = 0.10$

**802.11ac (VHT20):** Duty cycle =  $1.9/1.965 = 0.967$ , Duty factor =  $10 * \log(1/0.967) = 0.15$

**802.11ac (VHT40):** Duty cycle =  $0.935/1.012 = 0.924$ , Duty factor =  $10 * \log(1/0.924) = 0.34$



### 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.

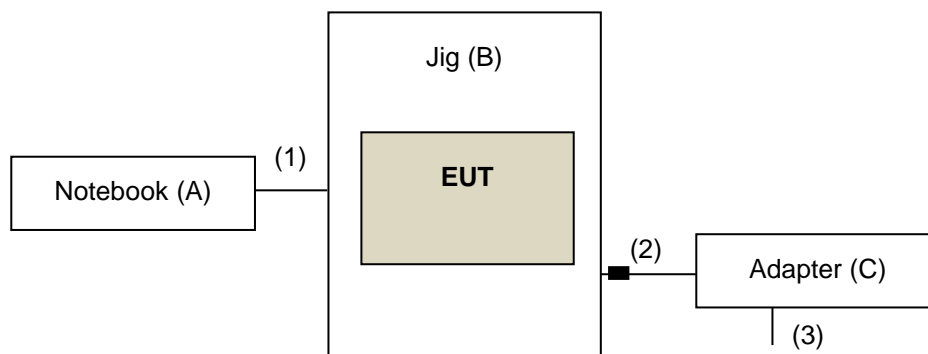
ID	Product	Brand	Model No.	Serial No.	FCC ID	Remarks
A	Notebook	Lenovo	20J4 MD A003TW	PF-11H9AK	N/A	-
B	Jig	N/A	N/A	N/A	N/A	Provided by client
C	Adapter	YINGHUIYUAN	YHY-12003000	N/A	N/A	Provided by client

Note:

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

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	Type C USB Cable	1	1	Y	0	Provided by client
2.	Adapter Cable	1	1.2	Y	1	Provided by client
3.	Power Cable	1	1.15	N	0	Provided by client

#### 3.4.1 Configuration of System under Test



### 3.5 General Description of Applied Standards 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 C (15.247)

ANSI C63.10-2013

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

#### References Test Guidance:

#### KDB 558074 D01 Meas Guidance v05r02

#### 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. Other emissions shall be at least 20 dB below the highest level of the desired power:

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

**NOTE:**

1. The lower limit shall apply at the transition frequencies.
2. Emission level (dBuV/m) = 20 log Emission level (uV/m).
3. For frequencies above 1000 MHz, 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 20 dB under any condition of modulation.

## 4.1.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Dec. 31, 2020	Dec. 30, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSP40	100040	Sep. 16, 2020	Sep. 15, 2021
BILOG Antenna SCHWARZBECK	VULB9168	9168-155	Nov. 03, 2020	Nov. 02, 2021
HORN Antenna SCHWARZBECK	BBHA 9120D	9120D-1170	Nov. 22, 2020	Nov. 21, 2021
HORN Antenna SCHWARZBECK	BBHA 9170	BBHA9170241	Nov. 22, 2020	Nov. 21, 2021
Test Receiver ROHDE & SCHWARZ	ESCI	100424	Dec. 31, 2020	Dec. 30, 2021
Preamplifier Agilent (Below 1GHz)	8447D	2944A10631	Jun. 08, 2020	Jun. 07, 2021
Preamplifier KEYSIGHT (Above 1GHz)	83017A	MY53270295	Jun. 08, 2020	Jun. 07, 2021
RF Coaxial Cable WOKEN With 5dB PAD	8D-FB	Cable-CH4-01	Aug. 16, 2020	Aug. 15, 2021
RF Coaxial Cable EMCI	EMC102-KM-KM-3000	150929	Aug. 16, 2020	Aug. 15, 2021
RF Coaxial Cable EMCI	EMC102-KM-KM-600	150928	Aug. 16, 2020	Aug. 15, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	MY 13380+295012/04	Jun. 08, 2020	Jun. 07, 2021
RF signal cable HUBER+SUHNER	SUCOFLEX 104	Cable-CH4-03 (250724)	Jun. 08, 2020	Jun. 07, 2021
Software BV ADT	ADT_Radiated_V7.6.15.9.5	NA	NA	NA
Antenna Tower inn-co GmbH	MA 4000	010303	NA	NA
Turn Table BV ADT	TT100	TT93021703	NA	NA
Turn Table Controller BV ADT	SC100	SC93021703	NA	NA
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
USB Wideband Power Sensor KEYSIGHT	U2021XA	MY55050005/MY55 190004/MY551900 07/MY55210005	Jul. 13, 2020	Jul. 12, 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 HwaYa Chamber 4.

#### 4.1.3 Test Procedures

##### **For Radiated Emission below 30 MHz**

- 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 9 kHz at frequency below 30 MHz.

##### **For Radiated Emission above 30 MHz**

- a. The EUT was placed on the top of a rotating table 0.8 meters (for 30 MHz ~ 1 GHz) / 1.5 meters (for above 1 GHz) 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 detected 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 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
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 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is  $\geq 1/T$  (Duty cycle < 98 %) or 10 Hz (Duty cycle  $\geq 98$  %) for Average detection (AV) at frequency above 1 GHz.  
(11b: RBW = 1 MHz, VBW = 10 Hz ; 11g: RBW = 1 MHz, VBW = 510 kHz ;  
11n (HT20): RBW = 1 MHz, VBW = 1 kHz ; 11n (HT40): RBW = 1 MHz, VBW = 2 kHz)
4. All modes of operation were investigated and the worst-case emissions are reported.

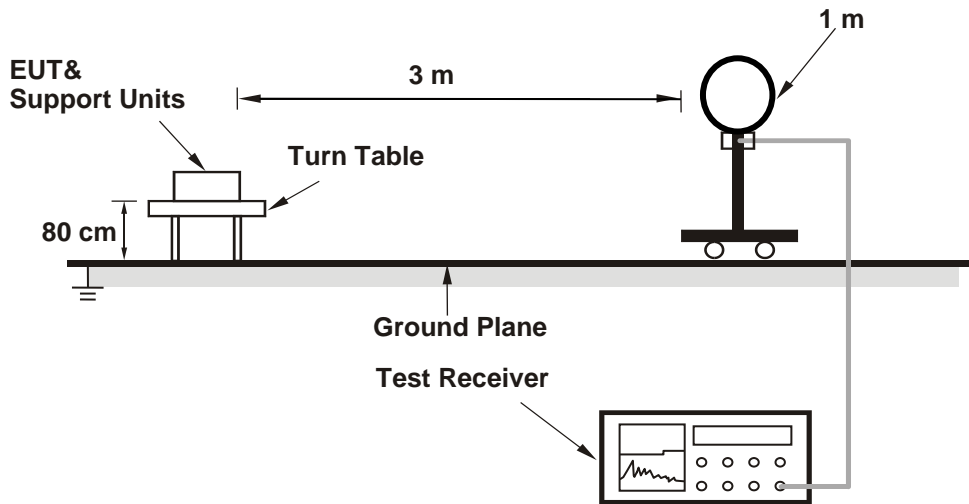


4.1.4 Deviation from Test Standard

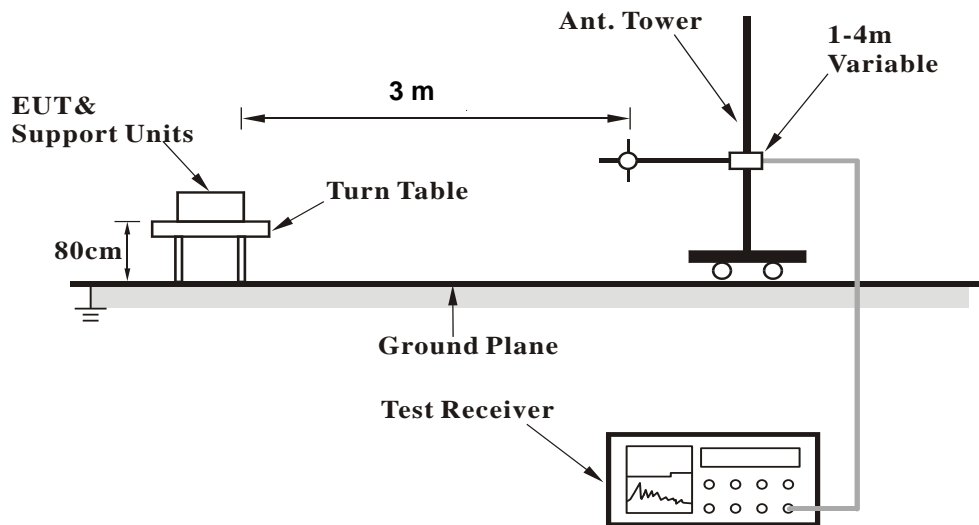
No deviation.

4.1.5 Test Set Up

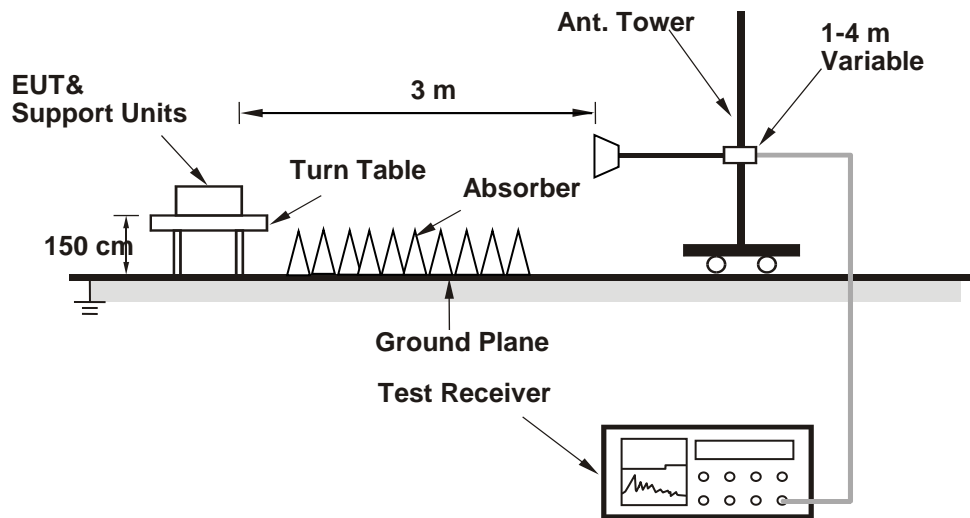
<Radiated Emission below 30 MHz>



<Radiated Emission 30 MHz to 1 GHz>



**<Radiated Emission above 1 GHz>**



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

**4.1.6 EUT Operating Conditions**

- a. Placed the EUT on a testing table.
- b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

4.1.7 Test Results

Above 1 GHz Data :  
802.11b

<b>CHANNEL</b>	TX Channel 1	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	62.2 PK	74.0	-11.8	1.31 H	350	29.6	32.6
2	2390.00	53.3 AV	54.0	-0.7	1.31 H	350	20.7	32.6
3	*2412.00	117.3 PK			1.31 H	350	84.7	32.6
4	*2412.00	114.8 AV			1.31 H	350	82.2	32.6
5	4824.00	54.0 PK	74.0	-20.0	1.26 H	349	52.7	1.3
6	4824.00	51.5 AV	54.0	-2.5	1.26 H	349	50.2	1.3
Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	61.1 PK	74.0	-12.9	3.02 V	205	28.5	32.6
2	2390.00	52.3 AV	54.0	-1.7	3.02 V	205	19.7	32.6
3	*2412.00	110.2 PK			3.02 V	205	77.6	32.6
4	*2412.00	107.6 AV			3.02 V	205	75.0	32.6
5	4824.00	49.3 PK	74.0	-24.7	1.28 V	24	48.0	1.3
6	4824.00	44.1 AV	54.0	-9.9	1.28 V	24	42.8	1.3

Remarks:

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

<b>CHANNEL</b>	TX Channel 6	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	116.0 PK			1.24 H	18	83.4	32.6
2	*2437.00	113.5 AV			1.24 H	18	80.9	32.6
3	4874.00	53.0 PK	74.0	-21.0	1.30 H	349	51.7	1.3
4	4874.00	50.3 AV	54.0	-3.7	1.30 H	349	49.0	1.3

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2437.00	108.8 PK			3.10 V	211	76.2	32.6
2	*2437.00	106.1 AV			3.10 V	211	73.5	32.6
3	4874.00	49.0 PK	74.0	-25.0	1.30 V	26	47.7	1.3
4	4874.00	43.4 AV	54.0	-10.6	1.30 V	26	42.1	1.3

**Remarks:**

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

<b>CHANNEL</b>	TX Channel 11	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	115.3 PK			1.45 H	351	82.8	32.5
2	*2462.00	112.7 AV			1.45 H	351	80.2	32.5
3	2486.00	62.4 PK	74.0	-11.6	1.45 H	351	29.8	32.6
4	2486.00	53.4 AV	54.0	-0.6	1.45 H	351	20.8	32.6
5	4924.00	51.1 PK	74.0	-22.9	1.10 H	346	49.9	1.2
6	4924.00	47.5 AV	54.0	-6.5	1.10 H	347	46.3	1.2

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	108.3 PK			2.93 V	203	75.8	32.5
2	*2462.00	105.9 AV			2.93 V	203	73.4	32.5
3	2486.00	59.6 PK	74.0	-14.4	2.93 V	203	27.0	32.6
4	2486.00	47.9 AV	54.0	-6.1	2.93 V	203	15.3	32.6
5	4924.00	48.8 PK	74.0	-25.2	1.35 V	21	47.6	1.2
6	4924.00	43.1 AV	54.0	-10.9	1.35 V	21	41.9	1.2

**Remarks:**

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

**802.11g**

<b>CHANNEL</b>	TX Channel 1	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	65.8 PK	74.0	-8.2	1.26 H	11	33.2	32.6
2	2390.00	53.4 AV	54.0	-0.6	1.26 H	11	20.8	32.6
3	*2412.00	116.8 PK			1.26 H	11	84.2	32.6
4	*2412.00	106.3 AV			1.26 H	11	73.7	32.6
5	4824.00	42.8 PK	74.0	-31.2	1.93 H	183	41.5	1.3
6	4824.00	31.1 AV	54.0	-22.9	1.93 H	183	29.8	1.3

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.3 PK	74.0	-10.7	3.17 V	243	30.7	32.6
2	2390.00	50.4 AV	54.0	-3.6	3.17 V	243	17.8	32.6
3	*2412.00	109.3 PK			3.17 V	243	76.7	32.6
4	*2412.00	100.8 AV			3.17 V	243	68.2	32.6
5	4824.00	42.3 PK	74.0	-31.7	1.85 V	230	41.0	1.3
6	4824.00	30.9 AV	54.0	-23.1	1.85 V	230	29.6	1.3

**Remarks:**

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

<b>CHANNEL</b>	TX Channel 6	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.5 PK	74.0	-6.5	1.22 H	5	34.9	32.6
2	<b>2390.00</b>	<b>53.6 AV</b>	<b>54.0</b>	<b>-0.4</b>	<b>1.22 H</b>	<b>5</b>	<b>21.0</b>	<b>32.6</b>
3	*2437.00	118.6 PK			1.22 H	5	86.0	32.6
4	*2437.00	108.7 AV			1.22 H	5	76.1	32.6
5	4874.00	43.7 PK	74.0	-30.3	2.01 H	199	42.4	1.3
6	4874.00	31.7 AV	54.0	-22.3	2.01 H	199	30.4	1.3

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	61.0 PK	74.0	-13.0	3.10 V	287	28.4	32.6
2	2390.00	48.9 AV	54.0	-5.1	3.10 V	287	16.3	32.6
3	*2437.00	112.8 PK			3.10 V	287	80.2	32.6
4	*2437.00	102.9 AV			3.10 V	287	70.3	32.6
5	4874.00	43.1 PK	74.0	-30.9	1.89 V	239	41.8	1.3
6	4874.00	31.3 AV	54.0	-22.7	1.89 V	239	30.0	1.3

**Remarks:**

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

<b>CHANNEL</b>	TX Channel 11	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	114.8 PK			1.02 H	3	82.3	32.5
2	*2462.00	104.8 AV			1.02 H	3	72.3	32.5
3	2485.00	67.8 PK	74.0	-6.2	1.02 H	3	35.2	32.6
4	2485.00	53.4 AV	54.0	-0.6	1.02 H	3	20.8	32.6
5	4924.00	43.1 PK	74.0	-30.9	1.96 H	187	41.9	1.2
6	4924.00	31.3 AV	54.0	-22.7	1.96 H	187	30.1	1.2

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	110.9 PK			3.13 V	267	78.4	32.5
2	*2462.00	100.7 AV			3.13 V	267	68.2	32.5
3	2485.00	63.8 PK	74.0	-10.2	3.13 V	267	31.2	32.6
4	2485.00	49.8 AV	54.0	-4.2	3.13 V	267	17.2	32.6
5	4924.00	42.5 PK	74.0	-31.5	1.81 V	241	41.3	1.2
6	4924.00	30.9 AV	54.0	-23.1	1.81 V	241	29.7	1.2

**Remarks:**

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



**802.11ac (VHT20)**

<b>CHANNEL</b>	TX Channel 1	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.0 PK	74.0	-7.0	1.26 H	14	34.4	32.6
2	<b>2390.00</b>	<b>53.6 AV</b>	<b>54.0</b>	<b>-0.4</b>	<b>1.26 H</b>	<b>14</b>	<b>21.0</b>	<b>32.6</b>
3	*2412.00	114.8 PK			1.26 H	14	82.2	32.6
4	*2412.00	104.6 AV			1.26 H	14	72.0	32.6
5	4824.00	43.2 PK	74.0	-30.8	2.05 H	193	41.9	1.3
6	4824.00	31.3 AV	54.0	-22.7	2.05 H	193	30.0	1.3

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.4 PK	74.0	-10.6	3.16 V	283	30.8	32.6
2	2390.00	50.6 AV	54.0	-3.4	3.16 V	283	18.0	32.6
3	*2412.00	110.1 PK			3.16 V	283	77.5	32.6
4	*2412.00	99.9 AV			3.16 V	283	67.3	32.6
5	4824.00	42.6 PK	74.0	-31.4	1.73 V	231	41.3	1.3
6	4824.00	31.0 AV	54.0	-23.0	1.73 V	231	29.7	1.3

**Remarks:**

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

<b>CHANNEL</b>	TX Channel 6	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.6 PK	74.0	-6.4	1.29 H	356	35.0	32.6
2	2390.00	52.6 AV	54.0	-1.4	1.29 H	356	20.0	32.6
3	*2437.00	119.0 PK			1.29 H	356	86.4	32.6
4	*2437.00	108.8 AV			1.29 H	356	76.2	32.6
5	4874.00	43.7 PK	74.0	-30.3	1.93 H	191	42.4	1.3
6	4874.00	31.8 AV	54.0	-22.2	1.93 H	191	30.5	1.3

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.0 PK	74.0	-11.0	3.09 V	271	30.4	32.6
2	2390.00	50.2 AV	54.0	-3.8	3.09 V	271	17.6	32.6
3	*2437.00	112.8 PK			3.09 V	271	80.2	32.6
4	*2437.00	102.4 AV			3.09 V	271	69.8	32.6
5	4874.00	43.1 PK	74.0	-30.9	1.80 V	239	41.8	1.3
6	4874.00	31.1 AV	54.0	-22.9	1.80 V	239	29.8	1.3

**Remarks:**

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

<b>CHANNEL</b>	TX Channel 11	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	114.5 PK			1.12 H	358	82.0	32.5
2	*2462.00	104.0 AV			1.12 H	358	71.5	32.5
3	2483.50	67.1 PK	74.0	-6.9	1.12 H	358	34.5	32.6
4	2483.50	53.3 AV	54.0	-0.7	1.12 H	358	20.7	32.6
5	4924.00	42.5 PK	74.0	-31.5	1.93 H	207	41.3	1.2
6	4924.00	31.0 AV	54.0	-23.0	1.93 H	207	29.8	1.2

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2462.00	109.5 PK			3.12 V	267	77.0	32.5
2	*2462.00	99.3 AV			3.12 V	267	66.8	32.5
3	2483.50	69.5 PK	74.0	-4.5	3.12 V	267	36.9	32.6
4	2483.50	53.0 AV	54.0	-1.0	3.12 V	267	20.4	32.6
5	4924.00	42.0 PK	74.0	-32.0	1.80 V	243	40.8	1.2
6	4924.00	30.7 AV	54.0	-23.3	1.80 V	243	29.5	1.2

**Remarks:**

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

802.11ac (VHT40)

<b>CHANNEL</b>	TX Channel 3	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	67.1 PK	74.0	-6.9	1.03 H	344	34.5	32.6
2	2390.00	53.3 AV	54.0	-0.7	1.03 H	344	20.7	32.6
3	*2422.00	106.4 PK			1.03 H	344	73.8	32.6
4	*2422.00	96.5 AV			1.03 H	344	63.9	32.6
5	4844.00	43.4 PK	74.0	-30.6	1.95 H	187	42.1	1.3
6	4844.00	31.5 AV	54.0	-22.5	1.95 H	187	30.2	1.3

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	60.6 PK	74.0	-13.4	3.04 V	281	28.0	32.6
2	2390.00	47.0 AV	54.0	-7.0	3.04 V	281	14.4	32.6
3	*2422.00	100.8 PK			3.04 V	281	68.2	32.6
4	*2422.00	91.2 AV			3.04 V	281	58.6	32.6
5	4844.00	43.0 PK	74.0	-31.0	1.71 V	242	41.7	1.3
6	4844.00	31.0 AV	54.0	-23.0	1.71 V	242	29.7	1.3

**Remarks:**

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

<b>CHANNEL</b>	TX Channel 6	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	69.5 PK	74.0	-4.5	1.29 H	358	36.9	32.6
2	<b>2390.00</b>	<b>53.6 AV</b>	<b>54.0</b>	<b>-0.4</b>	<b>1.29 H</b>	<b>358</b>	<b>21.0</b>	<b>32.6</b>
3	*2437.00	109.9 PK			1.29 H	358	77.3	32.6
4	*2437.00	99.9 AV			1.29 H	358	67.3	32.6
5	4874.00	43.7 PK	74.0	-30.3	1.89 H	191	42.4	1.3
6	4874.00	31.9 AV	54.0	-22.1	1.89 H	191	30.6	1.3

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	2390.00	63.7 PK	74.0	-10.3	3.08 V	232	31.1	32.6
2	2390.00	48.8 AV	54.0	-5.2	3.08 V	232	16.2	32.6
3	*2437.00	105.6 PK			3.08 V	232	73.0	32.6
4	*2437.00	95.5 AV			3.08 V	232	62.9	32.6
5	4874.00	42.9 PK	74.0	-31.1	1.83 V	240	41.6	1.3
6	4874.00	31.4 AV	54.0	-22.6	1.83 V	240	30.1	1.3

**Remarks:**

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

<b>CHANNEL</b>	TX Channel 9	<b>Detector Function</b>	Peak (PK)
<b>Frequency Range</b>	1GHz ~ 25GHz		Average (AV)

**Antenna Polarity & Test Distance : Horizontal at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	109.8 PK			1.41 H	1	77.3	32.5
2	*2452.00	99.5 AV			1.41 H	1	67.0	32.5
3	2483.50	67.1 PK	74.0	-6.9	1.41 H	1	34.5	32.6
4	2483.50	53.5 AV	54.0	-0.5	1.41 H	1	20.9	32.6
5	4904.00	43.5 PK	74.0	-30.5	1.91 H	207	42.3	1.2
6	4904.00	31.5 AV	54.0	-22.5	1.91 H	207	30.3	1.2

**Antenna Polarity & Test Distance : Vertical at 3 m**

No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	*2452.00	105.2 PK			3.11 V	250	72.7	32.5
2	*2452.00	94.9 AV			3.11 V	250	62.4	32.5
3	2483.50	61.9 PK	74.0	-12.1	3.11 V	250	29.3	32.6
4	2483.50	48.4 AV	54.0	-5.6	3.11 V	250	15.8	32.6
5	4904.00	42.8 PK	74.0	-31.2	1.76 V	233	41.6	1.2
6	4904.00	31.0 AV	54.0	-23.0	1.76 V	233	29.8	1.2

**Remarks:**

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

**9 kHz ~ 30 MHz Data:**

The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

**30 MHz ~ 1 GHz Worst-Case Data:**

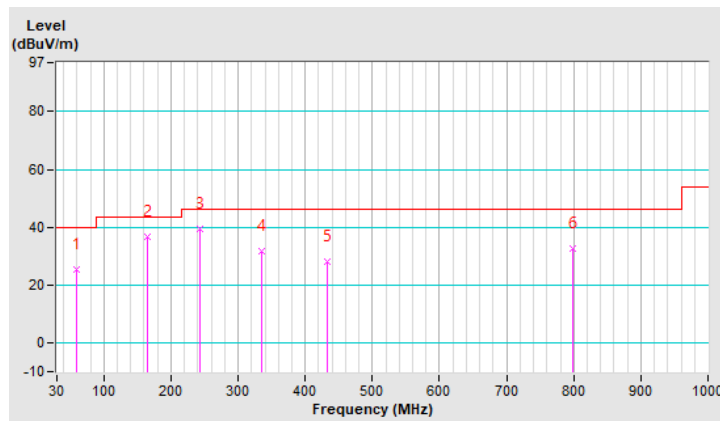
**802.11ac (VHT40)**

<b>CHANNEL</b>	TX Channel 6	<b>Detector Function</b>	Quasi-Peak (QP)
<b>Frequency Range</b>	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Horizontal at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	59.52	25.4 QP	40.0	-14.6	1.99 H	143	44.1	-18.7
2	164.96	36.8 QP	43.5	-6.7	1.99 H	49	55.1	-18.3
3	242.28	39.5 QP	46.0	-6.5	1.01 H	220	59.2	-19.7
4	335.06	31.9 QP	46.0	-14.1	1.01 H	241	48.5	-16.6
5	432.06	28.3 QP	46.0	-17.7	1.01 H	5	42.5	-14.2
6	798.97	32.6 QP	46.0	-13.4	1.01 H	146	40.2	-7.6

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit 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.

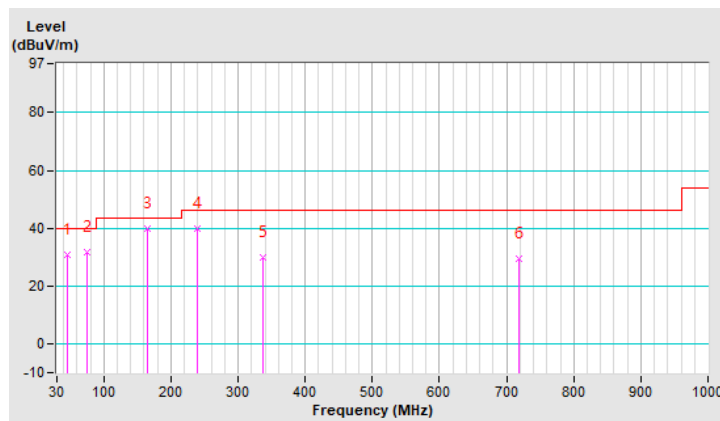


<b>CHANNEL</b>	TX Channel 6	<b>Detector Function</b>	Quasi-Peak (QP)
<b>Frequency Range</b>	30MHz ~ 1GHz		

Antenna Polarity & Test Distance : Vertical at 3 m								
No	Frequency (MHz)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV)	Correction Factor (dB/m)
1	45.46	31.0 QP	40.0	-9.0	1.49 V	213	49.2	-18.2
2	74.99	31.6 QP	40.0	-8.4	1.00 V	248	53.4	-21.8
3	164.96	40.0 QP	43.5	-3.5	1.49 V	18	58.3	-18.3
4	239.46	40.0 QP	46.0	-6.0	2.00 V	170	59.8	-19.8
5	336.46	29.7 QP	46.0	-16.3	1.49 V	295	46.3	-16.6
6	717.43	29.5 QP	46.0	-16.5	1.00 V	20	38.2	-8.7

**Remarks:**

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) – Pre-Amplifier Factor(dB)
3. Margin value = Emission Level – Limit value
4. The other emission levels were very low against the limit 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 0.50 MHz.

### 4.2.2 Test Instruments

Description & Manufacturer	Model No.	Serial No.	Date of Calibration	Due Date of Calibration
Test Receiver ROHDE & SCHWARZ	ESCI	100613	Dec. 04, 2020	Dec. 03, 2021
RF signal cable Woken	5D-FB	Cable-cond1-01	Jan. 16, 2021	Jan. 15, 2022
LISN/AMN ROHDE & SCHWARZ (EUT)	ENV216	101826	Feb. 25, 2021	Feb. 24, 2022
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100311	Aug. 28, 2020	Aug. 27, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.  
 2. The test was performed in HwaYa Shielded Room 1. (Conduction 1).  
 3. The VCCI Site Registration No. is C-12040.

#### 4.2.3 Test Procedures

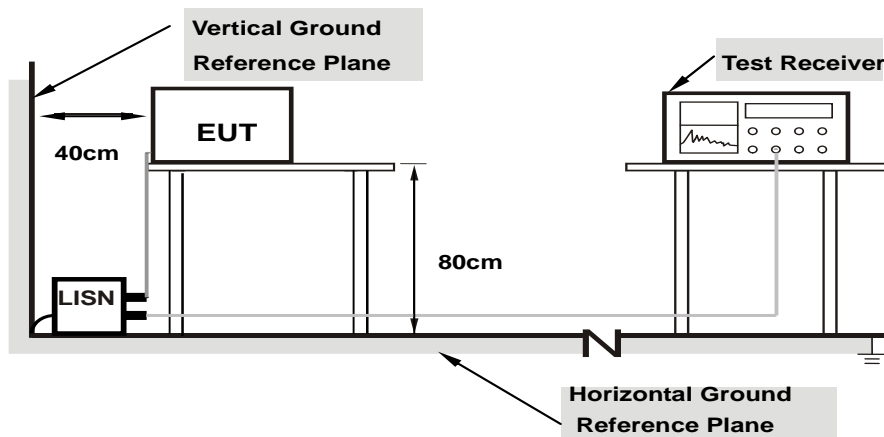
- a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

**Note:** The resolution bandwidth and video bandwidth of test receiver is 9 kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15 MHz – 30 MHz.

#### 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 Conditions

- a. Placed the EUT on a testing table.
- b. Use the software to control the EUT under transmission condition continuously at specific channel frequency.

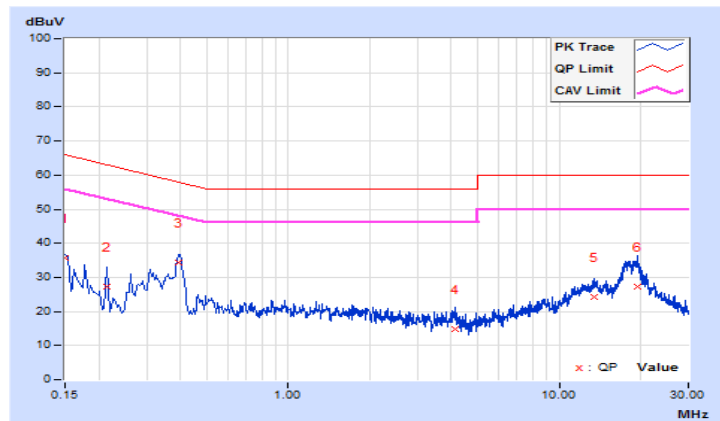
#### 4.2.7 Test Results

<b>Frequency Range</b>	150kHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9kHz
<b>Input Power</b>	120Vac, 60Hz	<b>Environmental Conditions</b>	24°C, 69%RH
<b>Tested by</b>	Edison Lee	<b>Test Date</b>	2021/3/8

Phase Of Power : Line (L)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15000	10.09	25.59	9.11	35.68	19.20	66.00	56.00	-30.32	-36.80
2	0.21400	10.12	17.15	3.33	27.27	13.45	63.05	53.05	-35.78	-39.60
3	0.39445	10.19	24.28	12.59	34.47	22.78	57.97	47.97	-23.50	-25.19
4	4.11400	10.49	4.18	0.88	14.67	11.37	56.00	46.00	-41.33	-34.63
5	13.51400	10.99	13.42	7.43	24.41	18.42	60.00	50.00	-35.59	-31.58
6	19.45000	11.29	16.12	8.64	27.41	19.93	60.00	50.00	-32.59	-30.07

**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

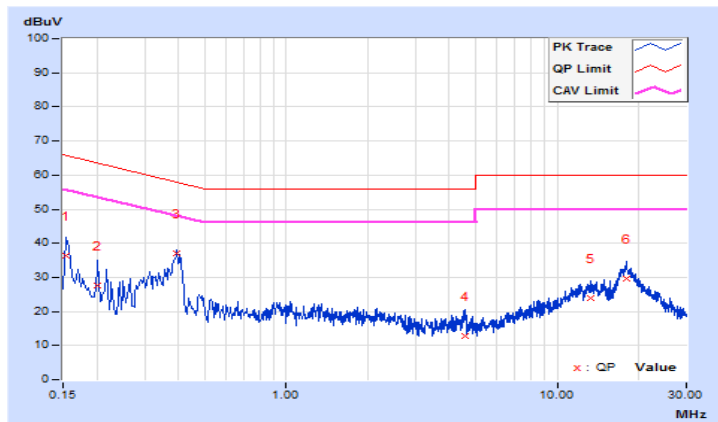


<b>Frequency Range</b>	150kHz ~ 30MHz	<b>Detector Function &amp; Resolution Bandwidth</b>	Quasi-Peak (QP) / Average (AV), 9kHz
<b>Input Power</b>	120Vac, 60Hz	<b>Environmental Conditions</b>	24°C, 69%RH
<b>Tested by</b>	Edison Lee	<b>Test Date</b>	2021/3/8

Phase Of Power : Neutral (N)										
No	Frequency (MHz)	Correction Factor (dB)	Reading Value (dBuV)		Emission Level (dBuV)		Limit (dBuV)		Margin (dB)	
			Q.P.	AV.	Q.P.	AV.	Q.P.	AV.	Q.P.	AV.
1	0.15400	10.08	26.29	10.63	36.37	20.71	65.78	55.78	-29.41	-35.07
2	0.20200	10.10	17.47	4.45	27.57	14.55	63.53	53.53	-35.96	-38.98
<b>3</b>	<b>0.39400</b>	<b>10.19</b>	<b>26.76</b>	<b>16.28</b>	<b>36.95</b>	<b>26.47</b>	<b>57.98</b>	<b>47.98</b>	<b>-21.03</b>	<b>-21.51</b>
4	4.55000	10.47	2.27	1.11	12.74	11.58	56.00	46.00	-43.26	-34.42
5	13.36200	10.82	13.13	7.09	23.95	17.91	60.00	50.00	-36.05	-32.09
6	18.01000	11.01	18.75	12.22	29.76	23.23	60.00	50.00	-30.24	-26.77

**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

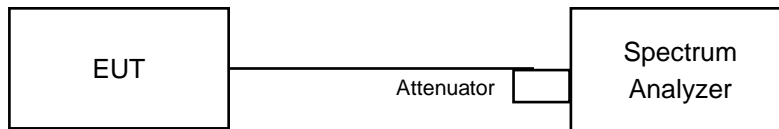


### 4.3 6 dB Bandwidth Measurement

#### 4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

#### 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

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

#### 4.3.5 Deviation from Test Standard

No deviation.

#### 4.3.6 EUT Operating Conditions

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

#### 4.3.7 Test Results

##### 802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	9.60	10.06	0.5	Pass
6	2437	9.11	9.07	0.5	Pass
11	2462	9.57	9.58	0.5	Pass

##### 802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.76	15.78	0.5	Pass
6	2437	16.12	16.10	0.5	Pass
11	2462	16.36	15.67	0.5	Pass

##### 802.11ac (VHT20)

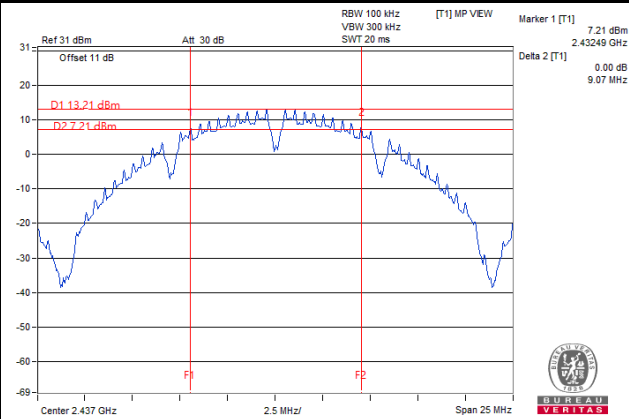
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.38	15.73	0.5	Pass
6	2437	16.59	17.52	0.5	Pass
11	2462	16.90	16.93	0.5	Pass

##### 802.11ac (VHT40)

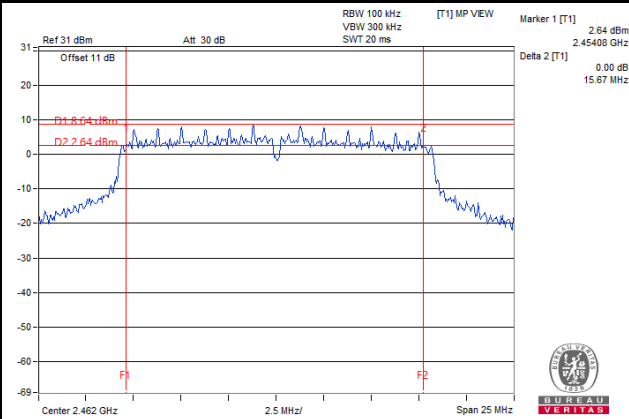
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.42	35.52	0.5	Pass
6	2437	35.25	35.33	0.5	Pass
9	2452	35.22	35.29	0.5	Pass

### Spectrum Plot of Worst Value

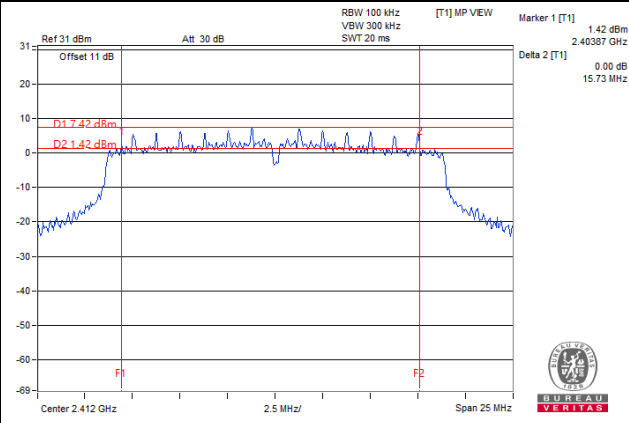
#### 802.11b



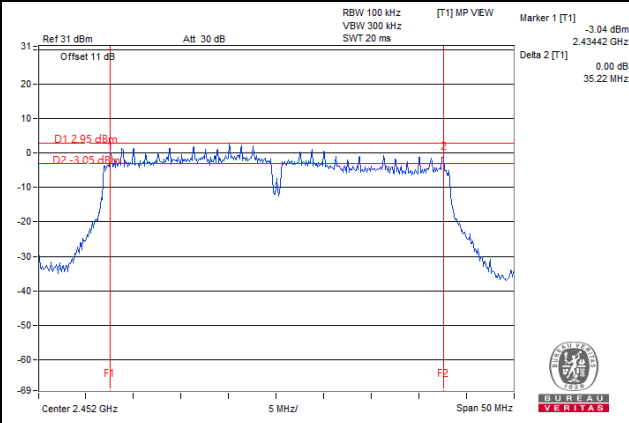
#### 802.11g



#### 802.11ac (VHT20)

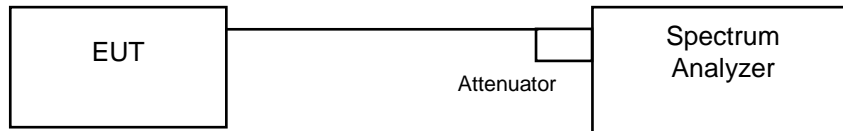


#### 802.11ac (VHT40)



## 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 sampling. 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 Deviation from Test Standard

No deviation.

### 4.4.5 EUT Operating Conditions

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



#### 4.4.6 Test Results

##### 802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	16.08	15.84	Pass
6	2437	15.00	14.88	Pass
11	2462	15.00	15.24	Pass

##### 802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	17.04	16.80	Pass
6	2437	21.48	21.24	Pass
11	2462	17.16	16.92	Pass

##### 802.11ac (VHT20)

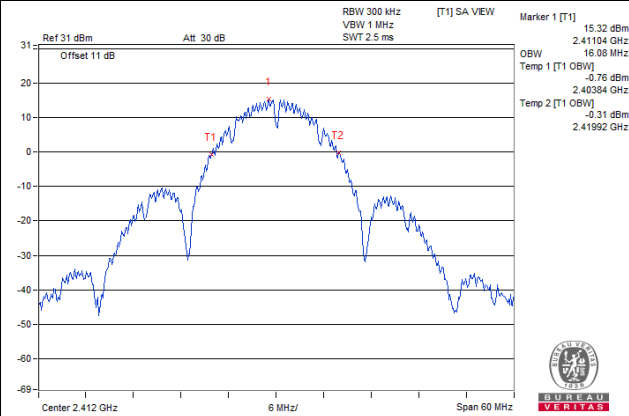
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	18.00	18.00	Pass
6	2437	21.48	21.48	Pass
11	2462	18.36	18.12	Pass

##### 802.11ac (VHT40)

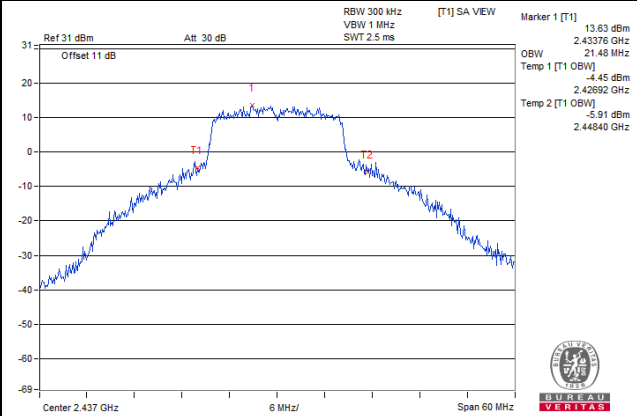
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
3	2422	36.72	36.72	Pass
6	2437	36.36	36.48	Pass
9	2452	36.60	36.48	Pass

### Spectrum Plot of Worst Value

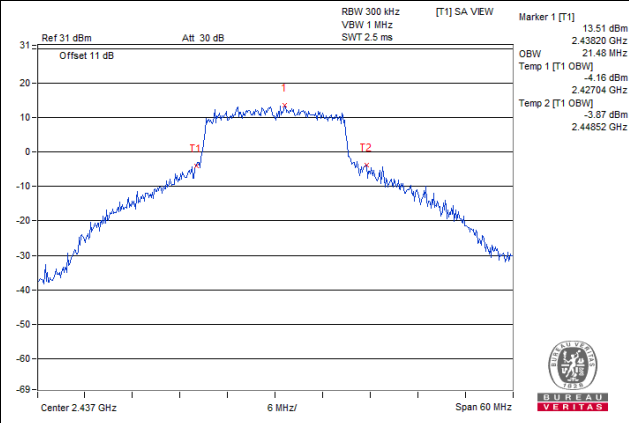
#### 802.11b



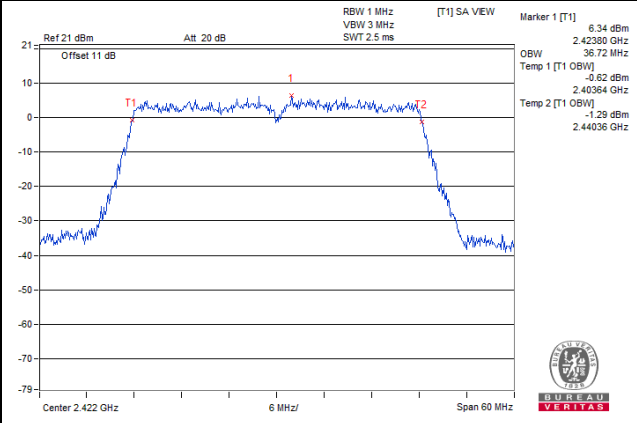
#### 802.11g



#### 802.11ac (VHT20)



#### 802.11ac (VHT40)



## 4.5 Conducted Output Power Measurement

### 4.5.1 Limits of Conducted Output Power Measurement

For systems using digital modulation in the 2400–2483.5 MHz bands: 1 Watt (30 dBm)

Per KDB 662911 D01 Multiple Transmitter Output Method of conducted output power measurement on IEEE 802.11 devices,

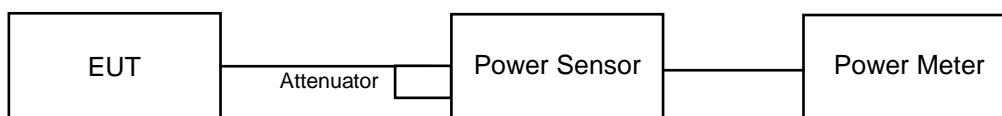
Array Gain = 0 dB (i.e., no array gain) for NANT  $\leq$  4;

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

Array Gain =  $5 \log(\text{NANT}/\text{NSS})$  dB or 3 dB, whichever is less for 20 MHz channel widths with NANT  $\geq$  5.

For power measurements on all other devices: Array Gain =  $10 \log(\text{NANT}/\text{NSS})$  dB.

### 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 Procedures

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

### 4.5.5 Deviation from Test Standard

No deviation.

### 4.5.6 EUT Operating Conditions

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

#### 4.5.7 Test Results

##### CDD Mode

##### 802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	23.83	23.26	453.382	26.56	30	Pass
6	2437	23.59	23.05	430.397	26.34	30	Pass
11	2462	23.15	22.53	385.599	25.86	30	Pass

##### 802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	18.92	18.43	147.646	21.69	30	Pass
6	2437	22.51	21.97	335.636	25.26	30	Pass
11	2462	19.27	18.57	156.473	21.94	30	Pass

##### 802.11ac (VHT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	17.86	17.24	114.061	20.57	30	Pass
6	2437	22.29	21.86	322.895	25.09	30	Pass
11	2462	19.04	18.61	152.778	21.84	30	Pass

##### 802.11ac (VHT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	12.63	11.68	33.046	15.19	30	Pass
6	2437	17.71	17.16	111.02	20.45	30	Pass
9	2452	15.82	15.31	72.157	18.58	30	Pass

## Beamforming Mode

### 802.11ac (VHT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	17.86	17.24	114.061	20.57	29.67	Pass
6	2437	22.29	21.86	322.895	25.09	29.67	Pass
11	2462	19.04	18.61	152.778	21.84	29.67	Pass

Note: Beamforming Directional gain =  $3.32\text{dBi} + 10\log(2) = 6.33\text{dBi} > 6\text{dBi}$ , so the power limit shall be reduced to  $30 - (6.33 - 6) = 29.67\text{dBm}$ .

### 802.11ac (VHT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	12.63	11.68	33.046	15.19	29.67	Pass
6	2437	17.71	17.16	111.02	20.45	29.67	Pass
9	2452	15.82	15.31	72.157	18.58	29.67	Pass

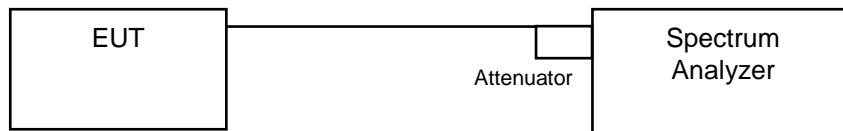
Note: Beamforming Directional gain =  $3.32\text{dBi} + 10\log(2) = 6.33\text{dBi} > 6\text{dBi}$ , so the power limit shall be reduced to  $30 - (6.33 - 6) = 29.67\text{dBm}$ .

## 4.6 Power Spectral Density Measurement

### 4.6.1 Limits of Power Spectral Density Measurement

The Maximum of Power Spectral Density Measurement is 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 4.6.2 Test Setup



### 4.6.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

### 4.6.4 Test Procedure

- a. Set analyzer center frequency to DTS channel center frequency.
- b. Set the span to 1.5 times the DTS bandwidth.
- c. Set the RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set the VBW  $\geq 3 \times \text{RBW}$ .
- e. Detector = peak.
- f. Sweep time = auto couple.
- g. Trace mode = max hold.
- h. Allow trace to fully stabilize.
- i. Use the peak marker function to determine the maximum amplitude level within the RBW.

For Average Power (Duty cycle  $\geq 98\%$ )

- a. Set instrument center frequency to DTS channel center frequency.
- b. Set span to at least 1.5 times the OBW.
- c. Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- d. Set VBW  $\geq 3 \times \text{RBW}$ .
- e. Detector = power averaging (RMS) or sample detector (when RMS not available).
- f. Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span}/\text{RBW}$ .
- g. Sweep time = auto couple.
- h. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- i. Use the peak marker function to determine the maximum amplitude level.

For Average Power (Duty cycle < 98%)

- a. Measure the duty cycle (x).
- b. Set instrument center frequency to DTS channel center frequency.
- c. Set span to at least 1.5 times the OBW.
- d. Set RBW to:  $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$ .
- e. Set VBW  $\geq 3 \times \text{RBW}$ .
- f. Detector = power averaging (RMS) or sample detector (when RMS not available).
- g. Ensure that the number of measurement points in the sweep  $\geq 2 \times \text{span}/\text{RBW}$ .
- h. Sweep time = auto couple.
- i. Do not use sweep triggering. Allow sweep to “free run”.
- j. Employ trace averaging (RMS) mode over a minimum of 100 traces.
- k. Use the peak marker function to determine the maximum amplitude level.
- l. Add  $10 \log (1/x)$ , where x is the duty cycle measured in step (a), to the measured PSD to compute the average PSD during the actual transmission time.

#### 4.6.5 Deviation from Test Standard

No deviation.

#### 4.6.6 EUT Operating Condition

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

#### 4.6.7 Test Results

##### 802.11b

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-10.24	3.01	-7.23	7.67	Pass
	6	2437	-11.86	3.01	-8.85	7.67	Pass
	11	2462	-12.66	3.01	-9.65	7.67	Pass
1	1	2412	-11.01	3.01	-8	7.67	Pass
	6	2437	-12.77	3.01	-9.76	7.67	Pass
	11	2462	-12.02	3.01	-9.01	7.67	Pass

**NOTE:**

1. Directional gain =  $3.32 \text{ dBi} + 10\log(2) = 6.33 \text{ dBi} > 6 \text{ dBi}$  , so the power density limit shall be reduced to  $8-(6.33-6) = 7.67 \text{ dBm}$ .
2. Method 2) C) of power density measurement of KDB 662911 is using for calculating total power density.

##### 802.11g

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-7.56	3.01	0.1	-4.45	7.67	Pass
	6	2437	-4.04	3.01	0.1	-0.93	7.67	Pass
	11	2462	-7.59	3.01	0.1	-4.48	7.67	Pass
1	1	2412	-8.47	3.01	0.1	-5.36	7.67	Pass
	6	2437	-5.18	3.01	0.1	-2.07	7.67	Pass
	11	2462	-8.27	3.01	0.1	-5.16	7.67	Pass

**NOTE:**

1. Directional gain =  $3.32 \text{ dBi} + 10\log(2) = 6.33 \text{ dBi} > 6 \text{ dBi}$  , so the power density limit shall be reduced to  $8-(6.33-6) = 7.67 \text{ dBm}$ .
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
3. Refer to section 3.3 for duty cycle spectrum plot.



### 802.11ac (VHT20)

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-8.67	3.01	0.15	-5.51	7.67	Pass
	6	2437	-3.65	3.01	0.15	-0.49	7.67	Pass
	11	2462	-8.11	3.01	0.15	-4.95	7.67	Pass
1	1	2412	-9.2	3.01	0.15	-6.04	7.67	Pass
	6	2437	-4.8	3.01	0.15	-1.64	7.67	Pass
	11	2462	-7.72	3.01	0.15	-4.56	7.67	Pass

**NOTE:**

1. Directional gain = 3.32 dBi + 10log(2) = 6.33 dBi > 6 dBi , so the power density limit shall be reduced to 8-(6.33-6) = 7.67 dBm.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
3. Refer to section 3.3 for duty cycle spectrum plot.

### 802.11ac (VHT40)

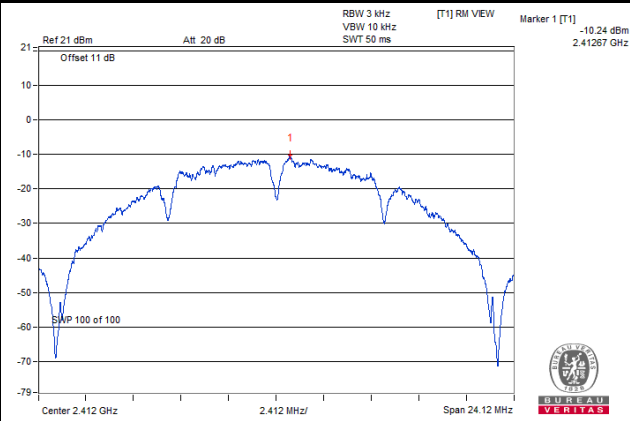
TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-29.19	3.01	0.34	-25.84	7.67	Pass
	6	2437	-21.85	3.01	0.34	-18.5	7.67	Pass
	9	2452	-24.94	3.01	0.34	-21.59	7.67	Pass
1	3	2422	-29.43	3.01	0.34	-26.08	7.67	Pass
	6	2437	-23.45	3.01	0.34	-20.1	7.67	Pass
	9	2452	-24.84	3.01	0.34	-21.49	7.67	Pass

**NOTE:**

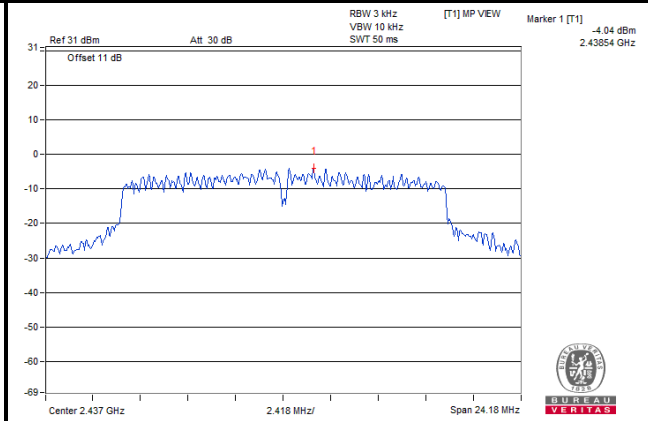
1. Directional gain = 3.32 dBi + 10log(2) = 6.33 dBi > 6 dBi , so the power density limit shall be reduced to 8-(6.33-6) = 7.67 dBm.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.
3. Refer to section 3.3 for duty cycle spectrum plot.

### Spectrum Plot of Worst Value

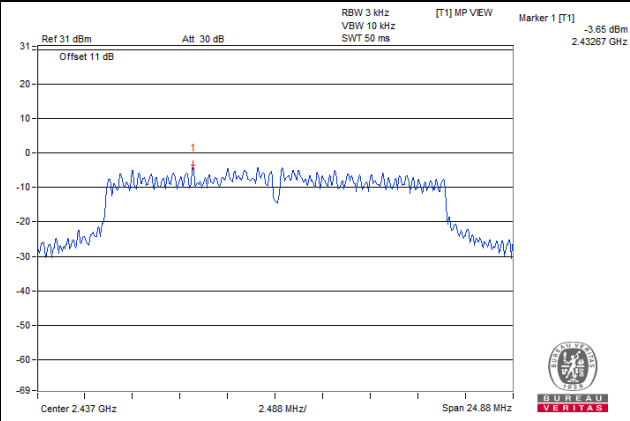
#### 802.11b



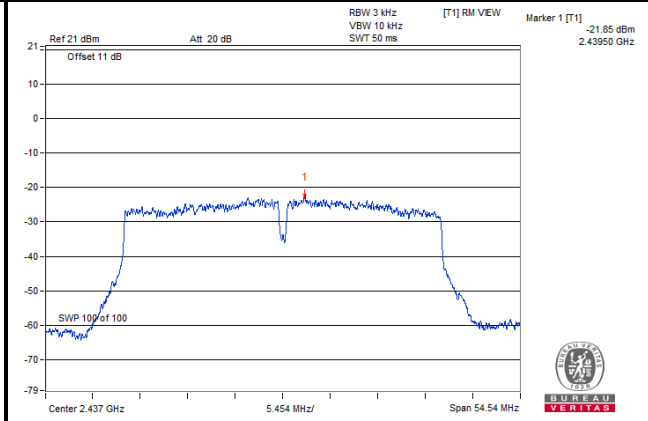
#### 802.11g



#### 802.11ac (VHT20)



#### 802.11ac (VHT40)

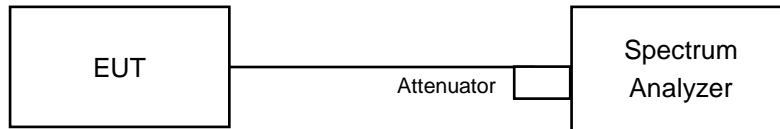


## 4.7 Conducted Out of Band Emission Measurement

### 4.7.1 Limits of Conducted Out of Band Emission Measurement

Below -30 dB of the highest emission level of operating band (in 100 kHz Resolution Bandwidth).

### 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

1. Set the RBW = 100 kHz.
2. Set the VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep time = auto couple.
5. Trace mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum power level in any 100 kHz band segment within the fundamental EBW.

#### MEASUREMENT PROCEDURE OOB

1. Set RBW = 100 kHz.
2. Set VBW  $\geq$  300 kHz.
3. Detector = peak.
4. Sweep = auto couple.
5. Trace Mode = max hold.
6. Allow trace to fully stabilize.
7. Use the peak marker function to determine the maximum amplitude level.

### 4.7.5 Deviation from Test Standard

No deviation.

### 4.7.6 EUT Operating Condition

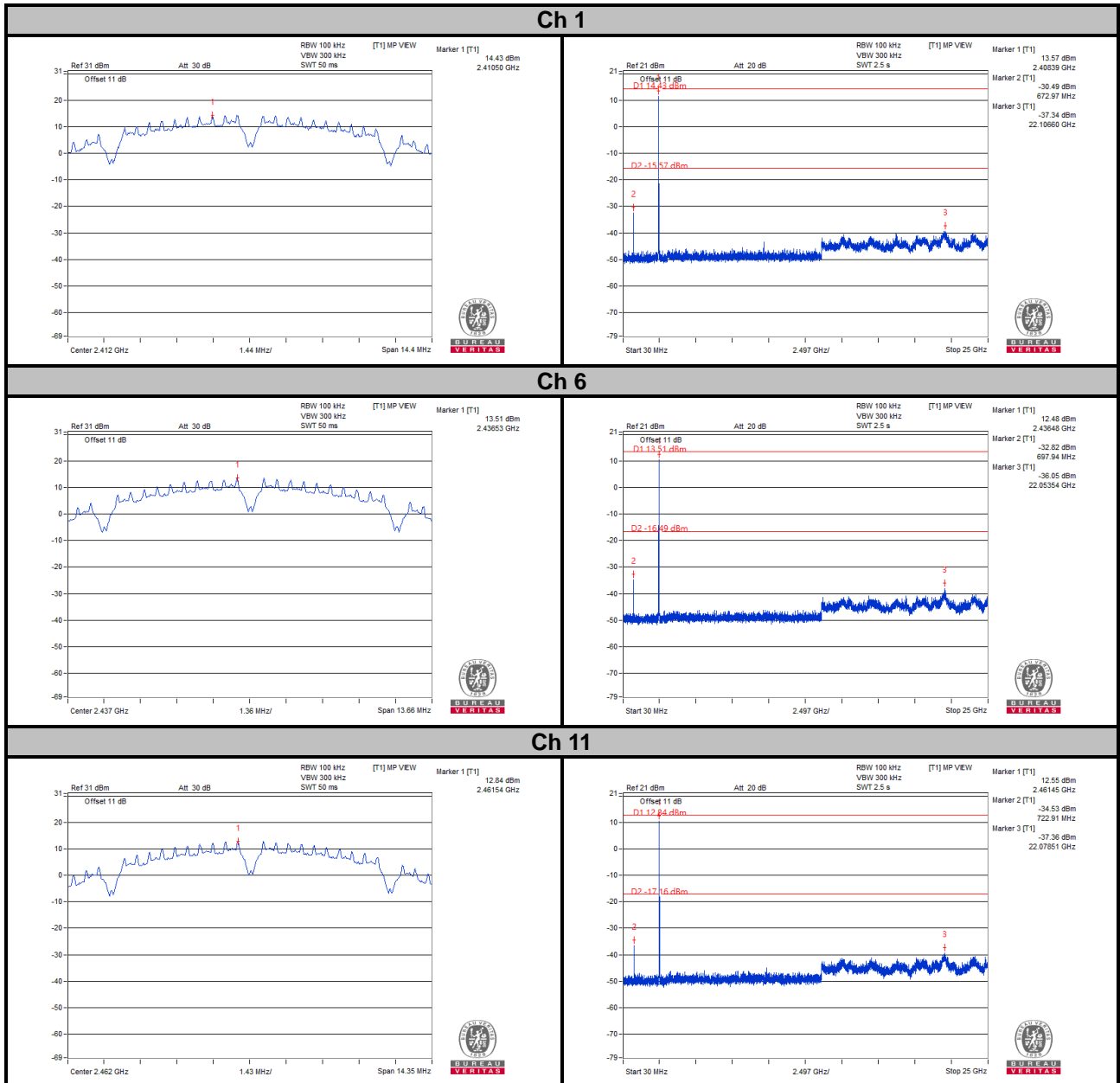
The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

### 4.7.7 Test Results

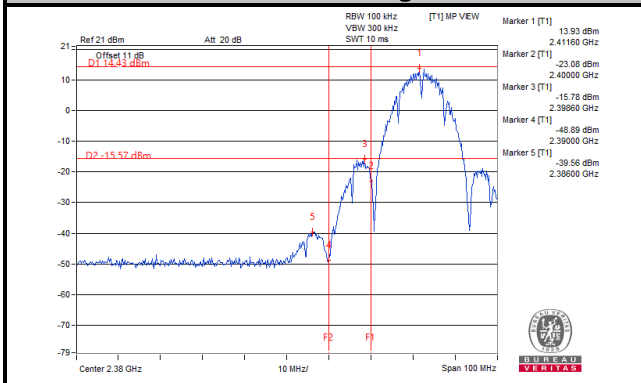
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 30 dB offset below D1. It shows compliance with the requirement.

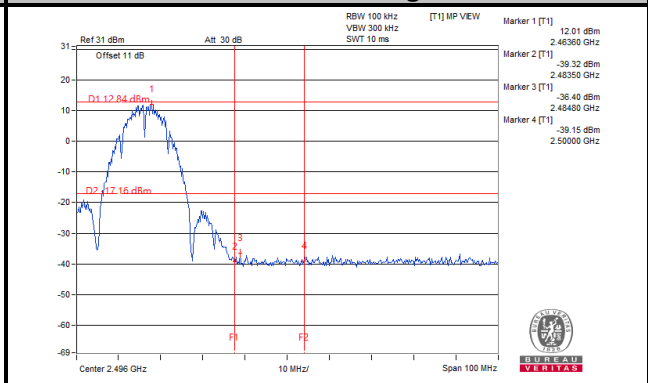
#### 802.11b CHAIN 0



### Ch 1 Band Edge

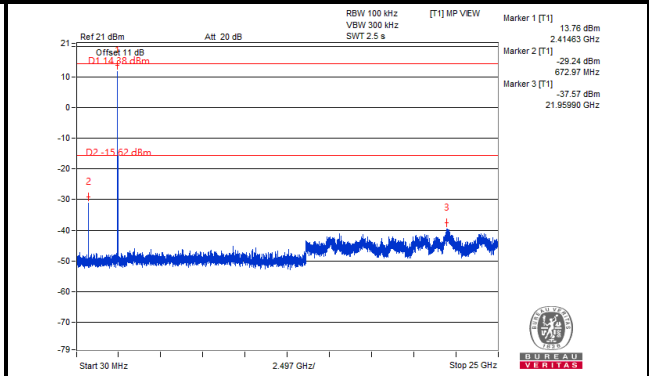
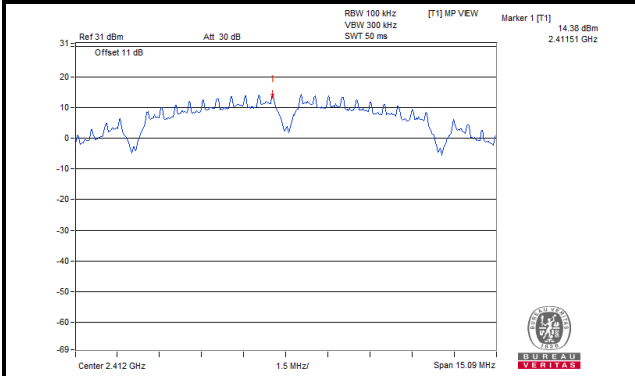


### Ch 11 Band Edge

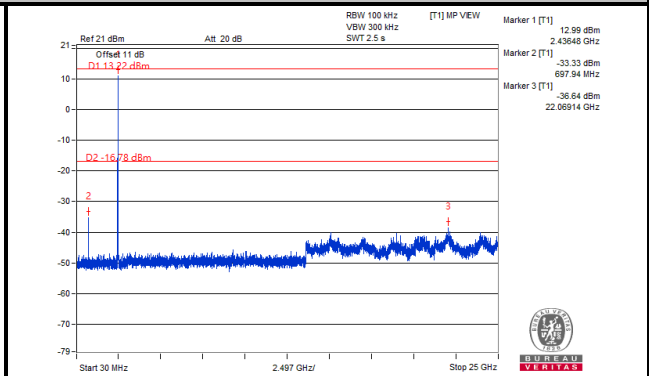
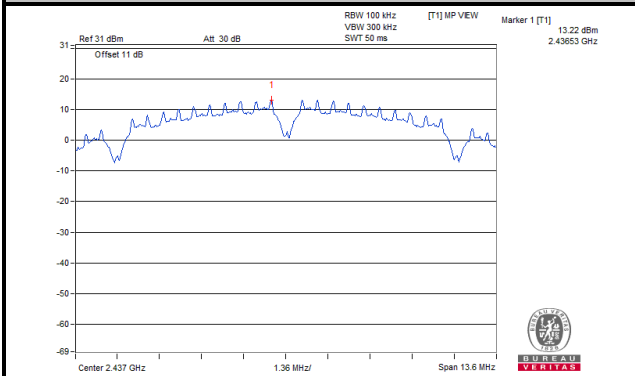


# CHAIN 1

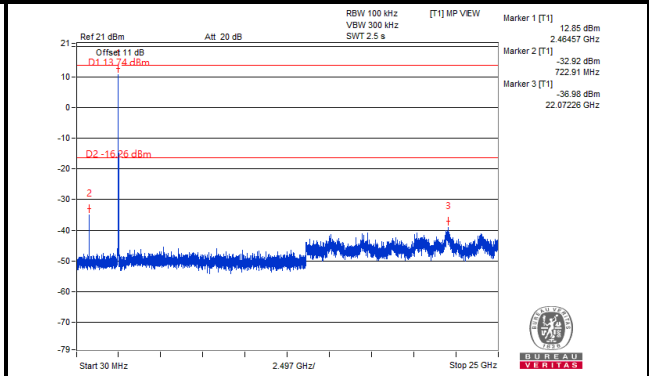
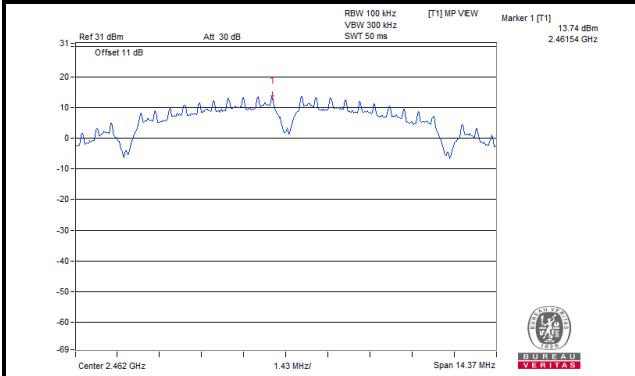
## Ch 1



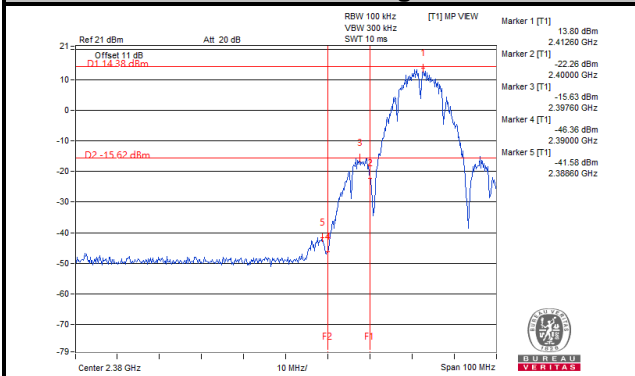
## Ch 6



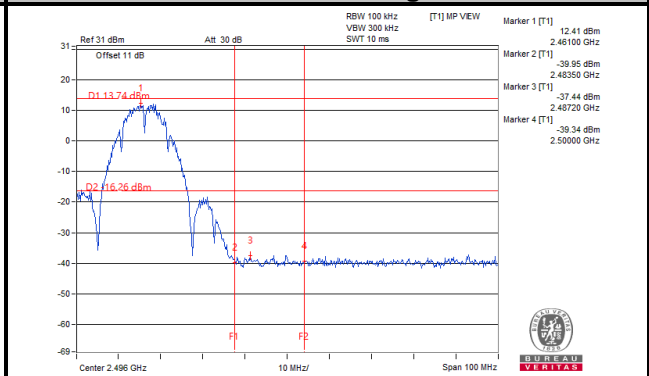
## Ch 11



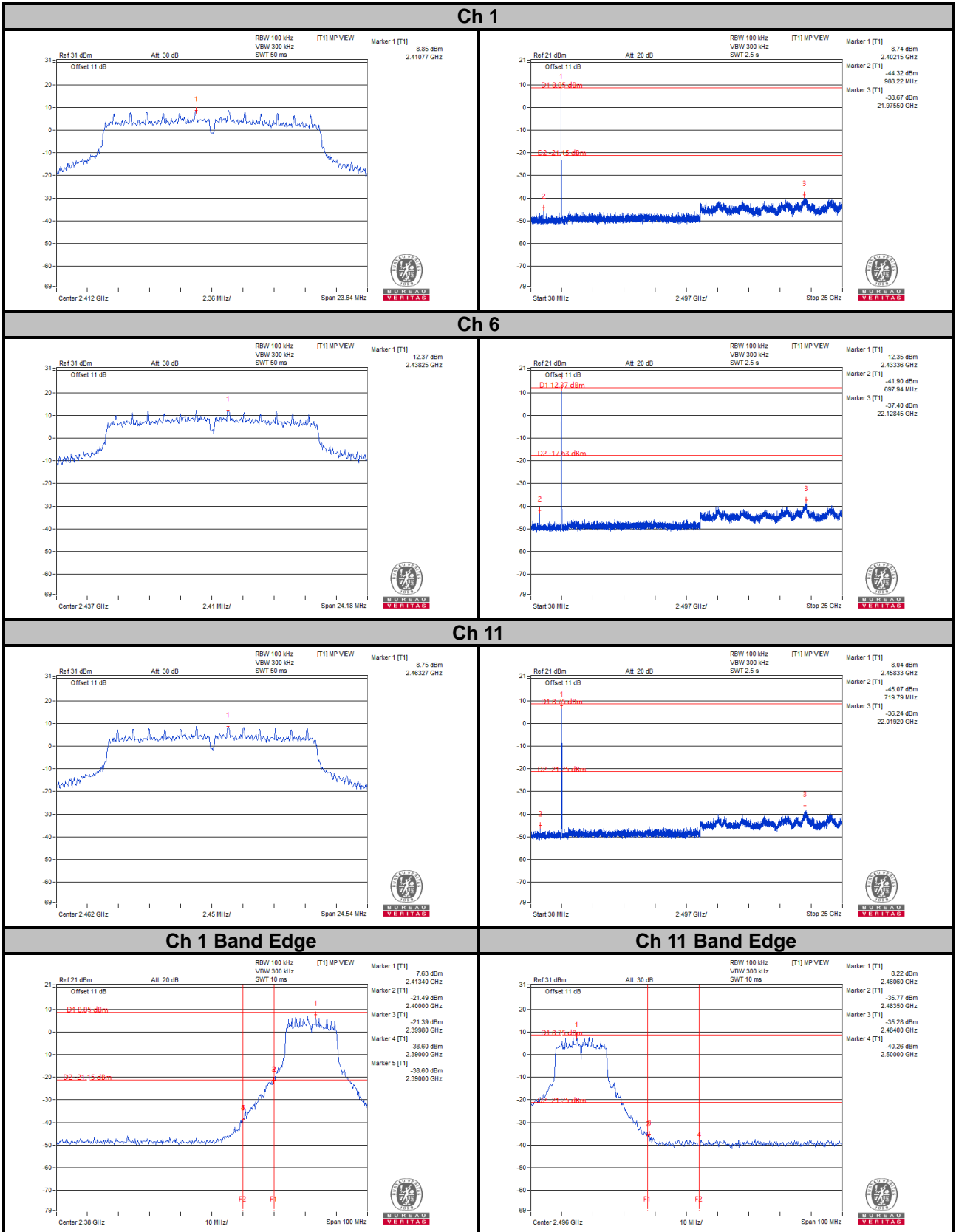
## Ch 1 Band Edge



## Ch 11 Band Edge

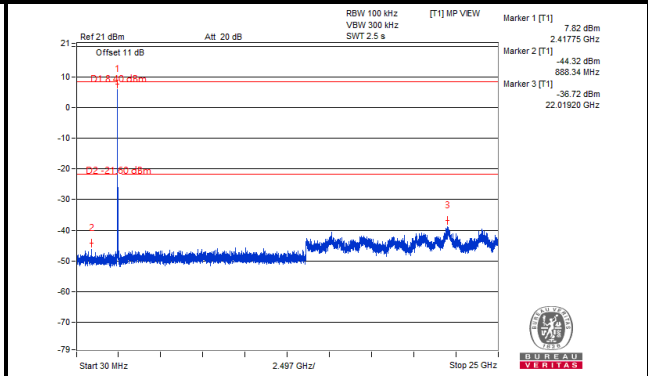
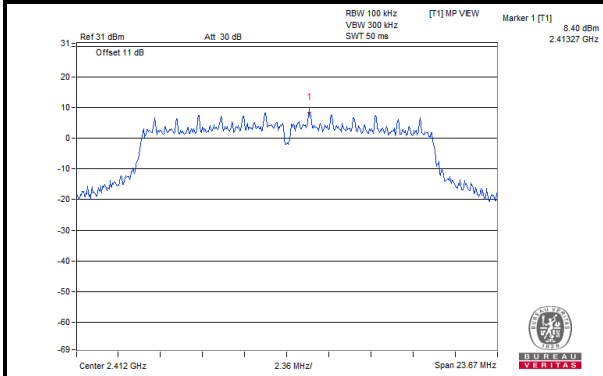


802.11g  
CHAIN 0

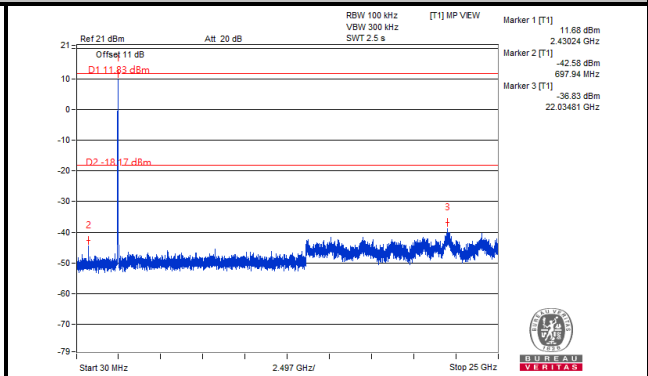
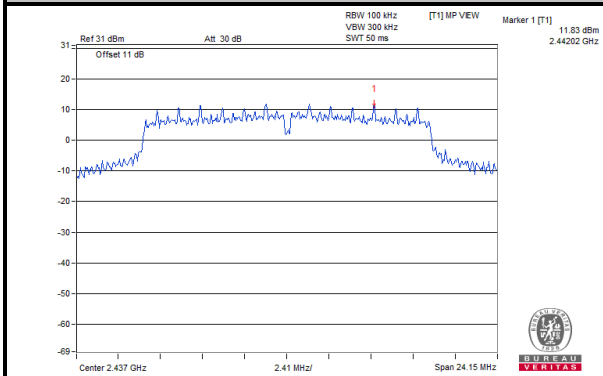


# CHAIN 1

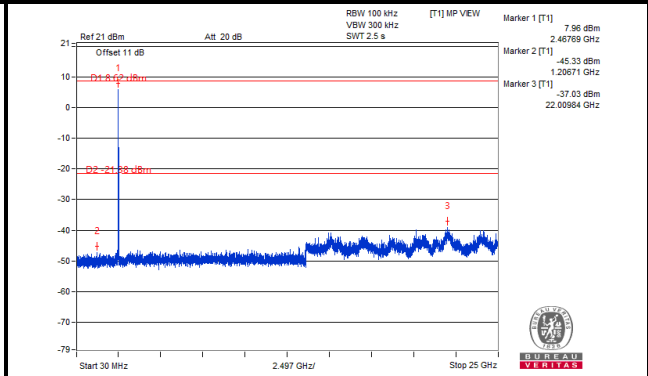
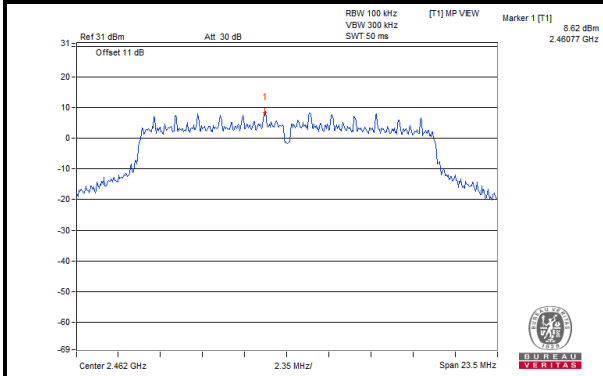
## Ch 1



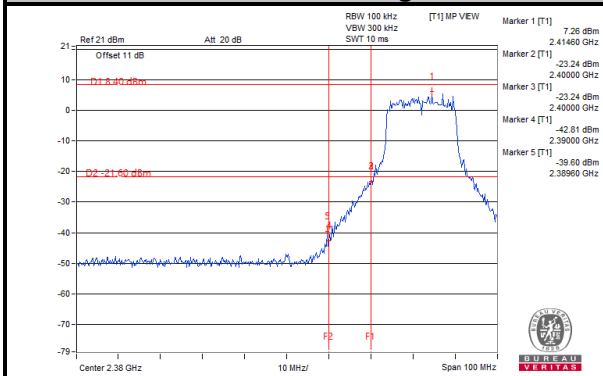
## Ch 6



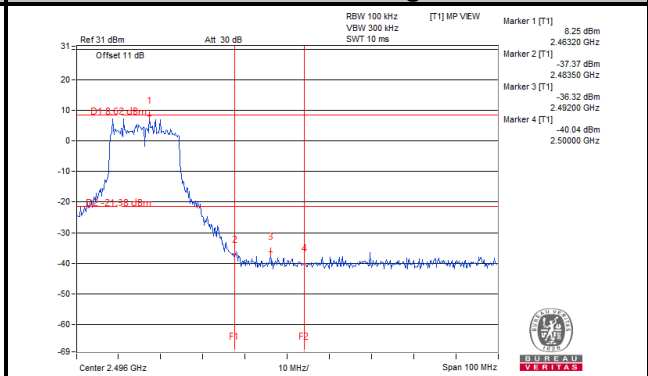
## Ch 11



## Ch 1 Band Edge

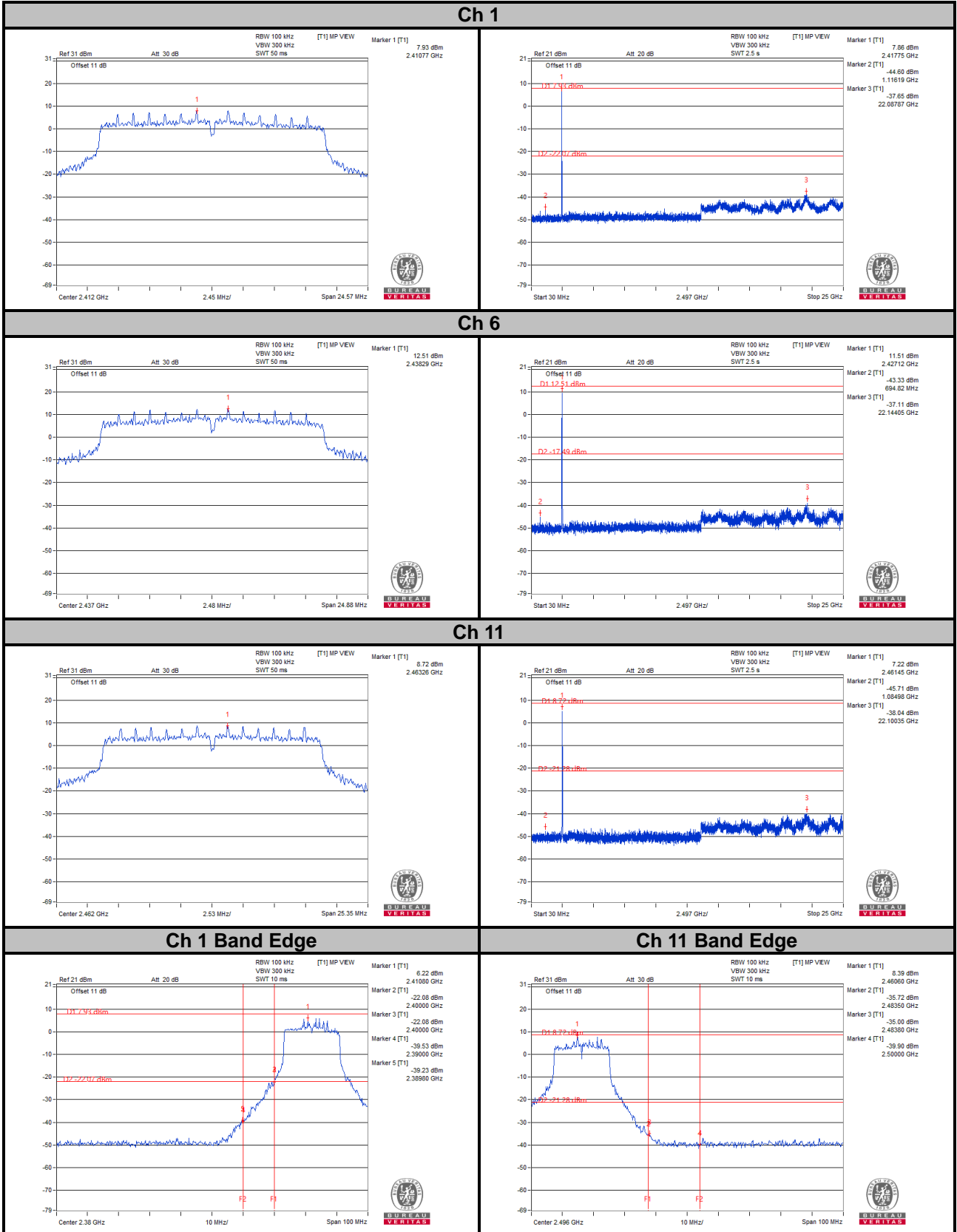


## Ch 11 Band Edge



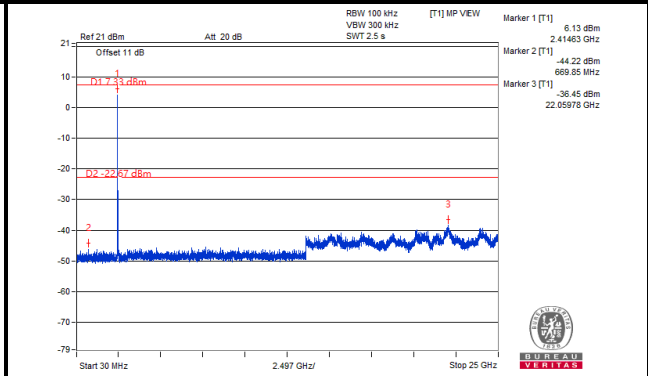
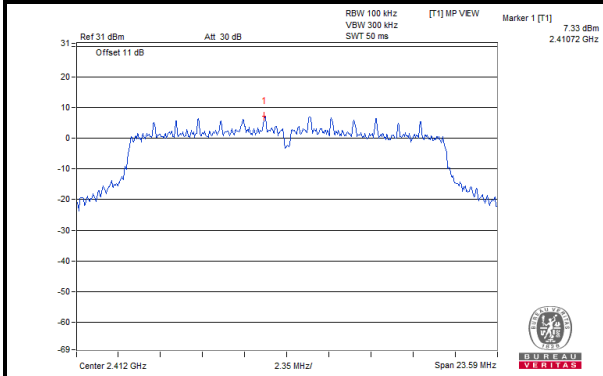


802.11ac (VHT20)  
CHAIN 0

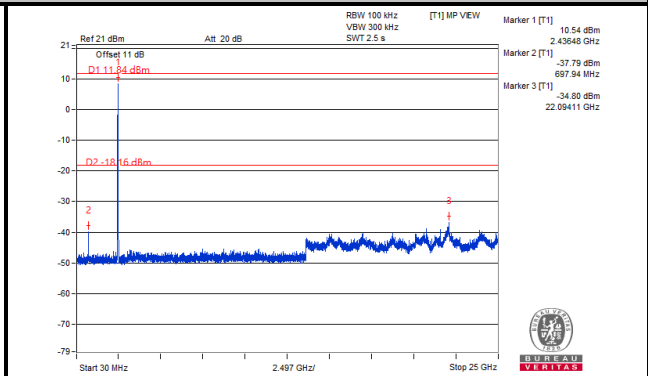
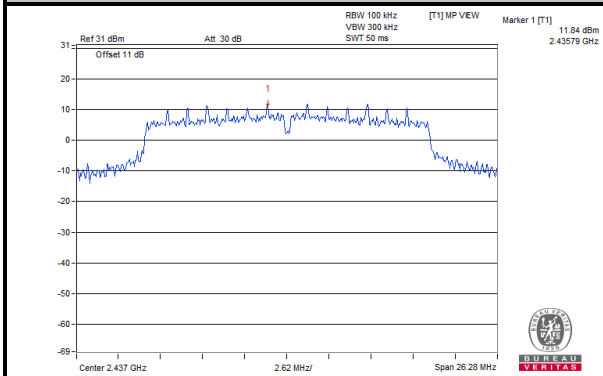


# CHAIN 1

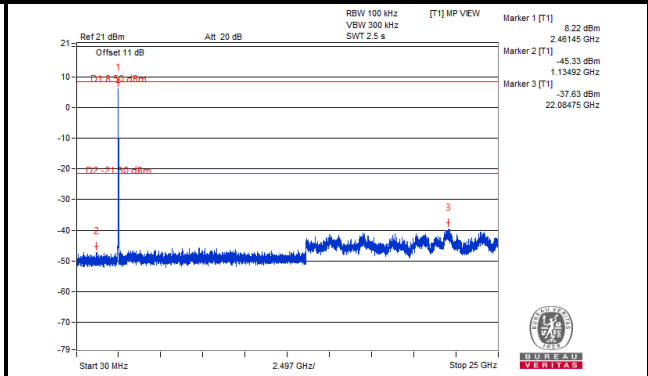
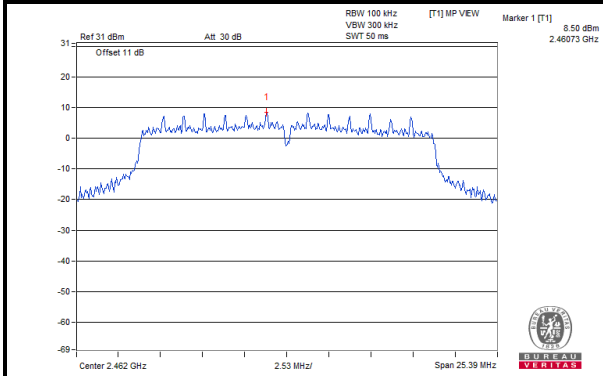
## Ch 1



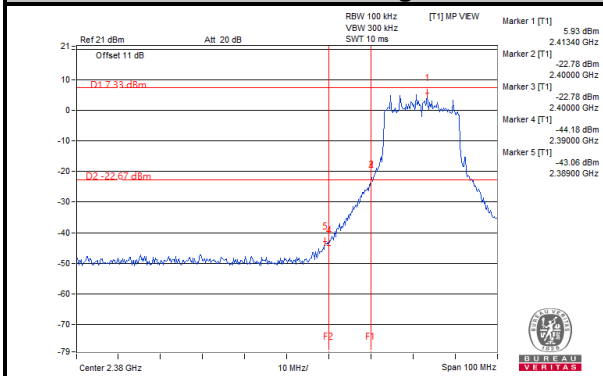
## Ch 6



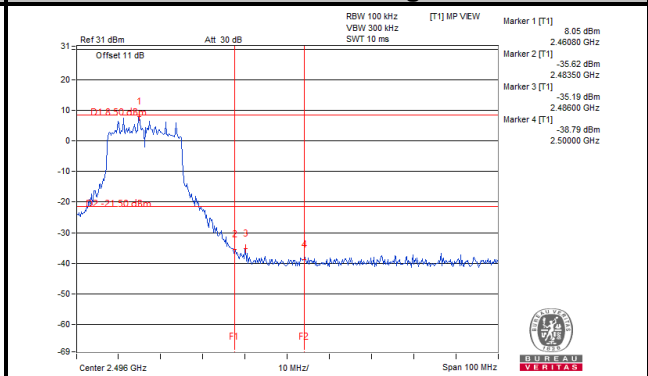
## Ch 11



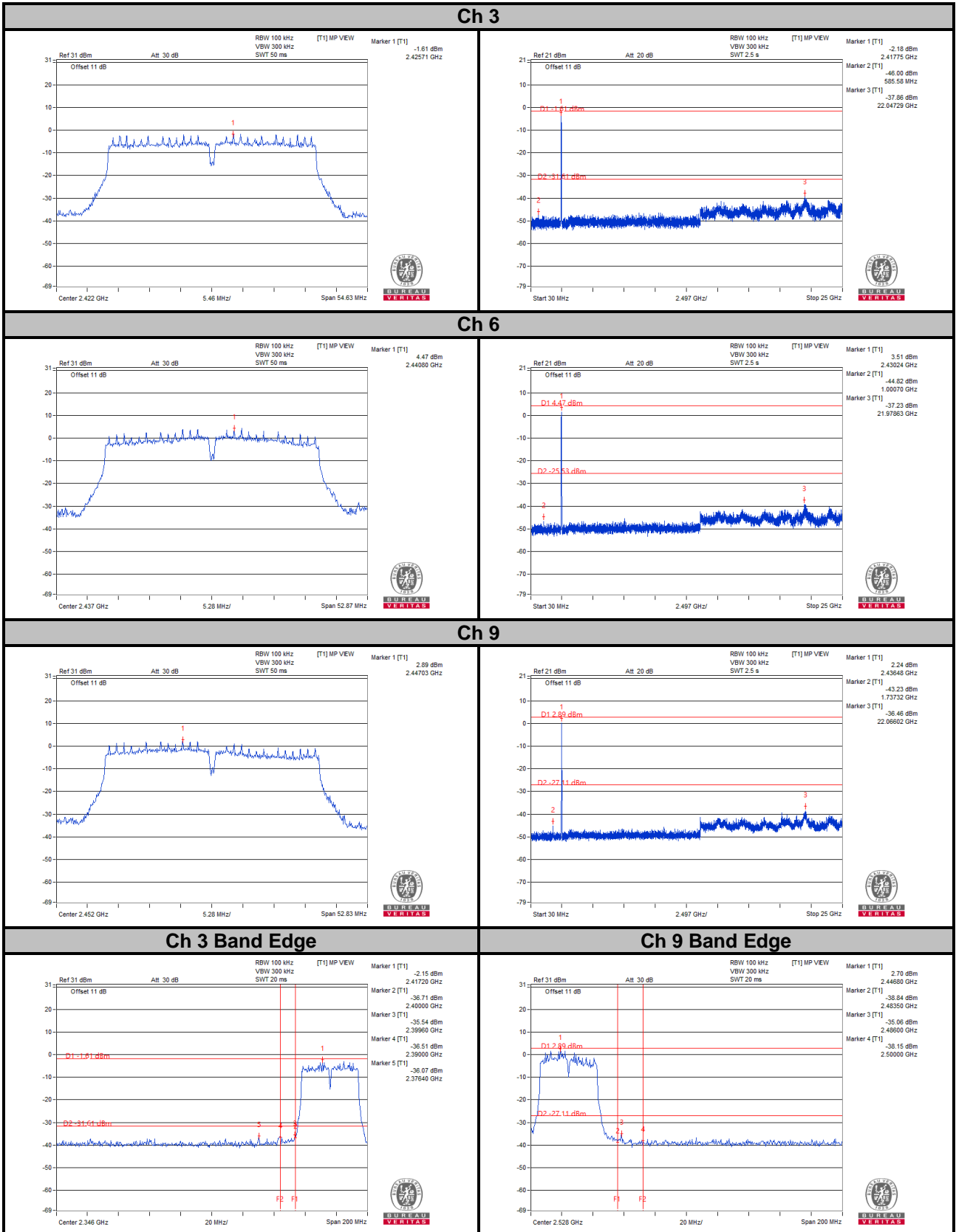
## Ch 1 Band Edge



## Ch 11 Band Edge

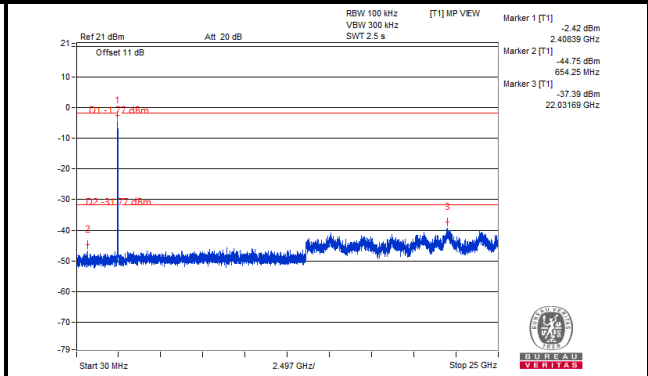
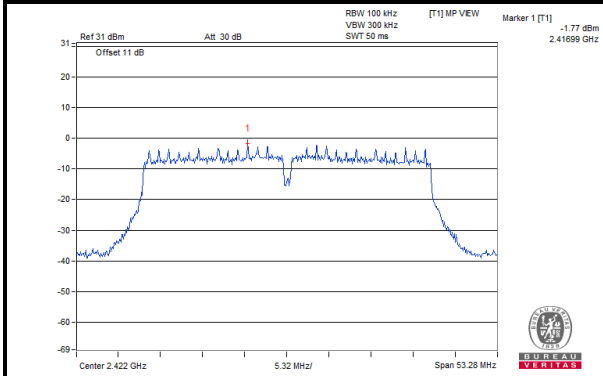


802.11ac (VHT40)  
CHAIN 0

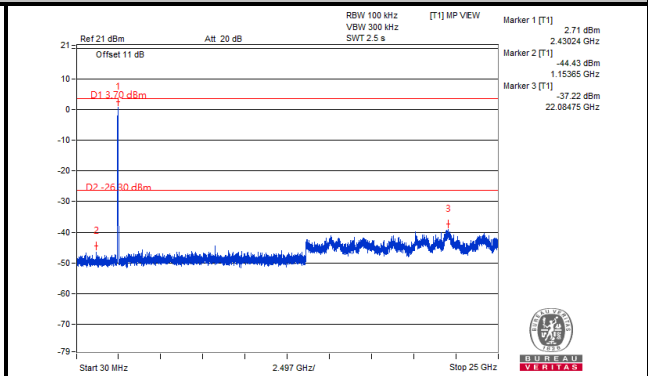
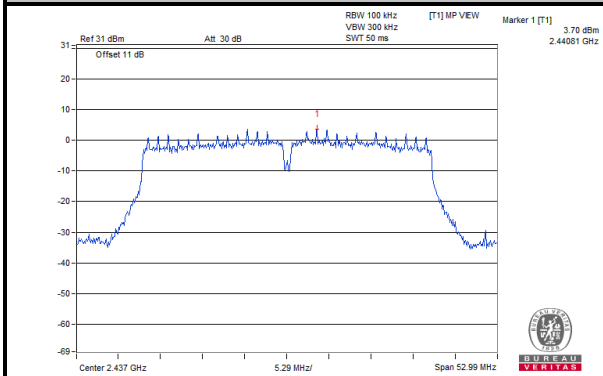


# CHAIN 1

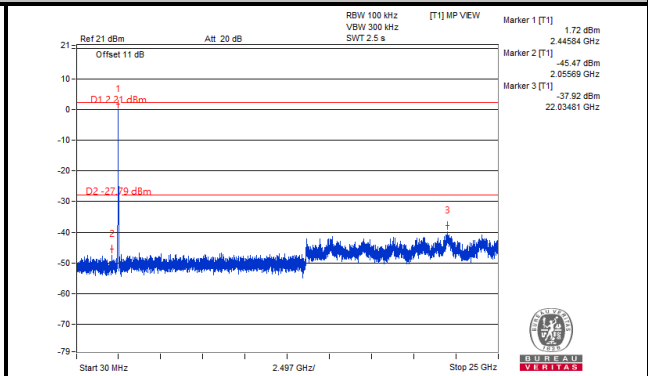
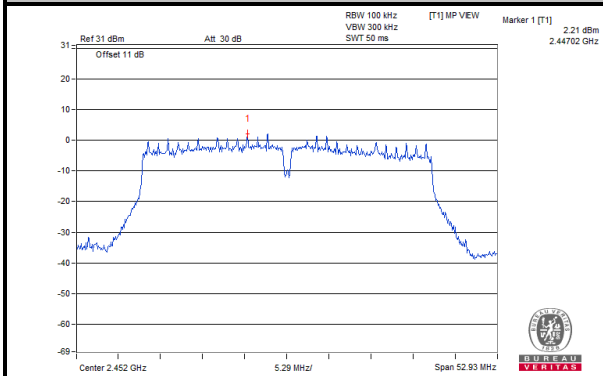
## Ch 3



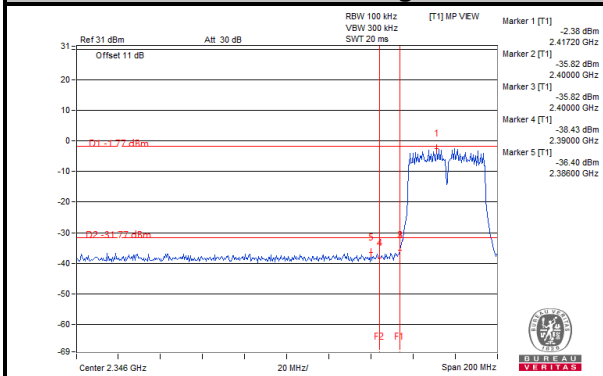
## Ch 6



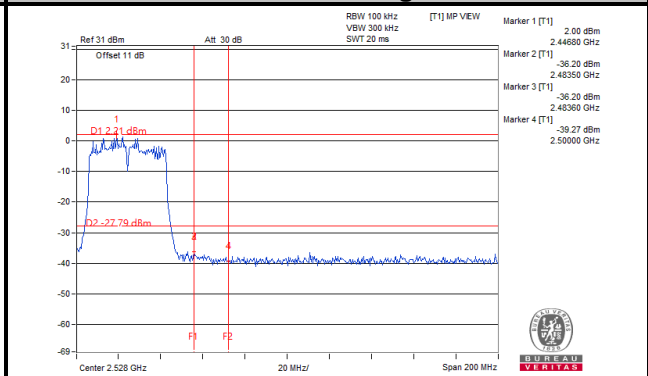
## Ch 9



## Ch 3 Band Edge



## Ch 9 Band Edge

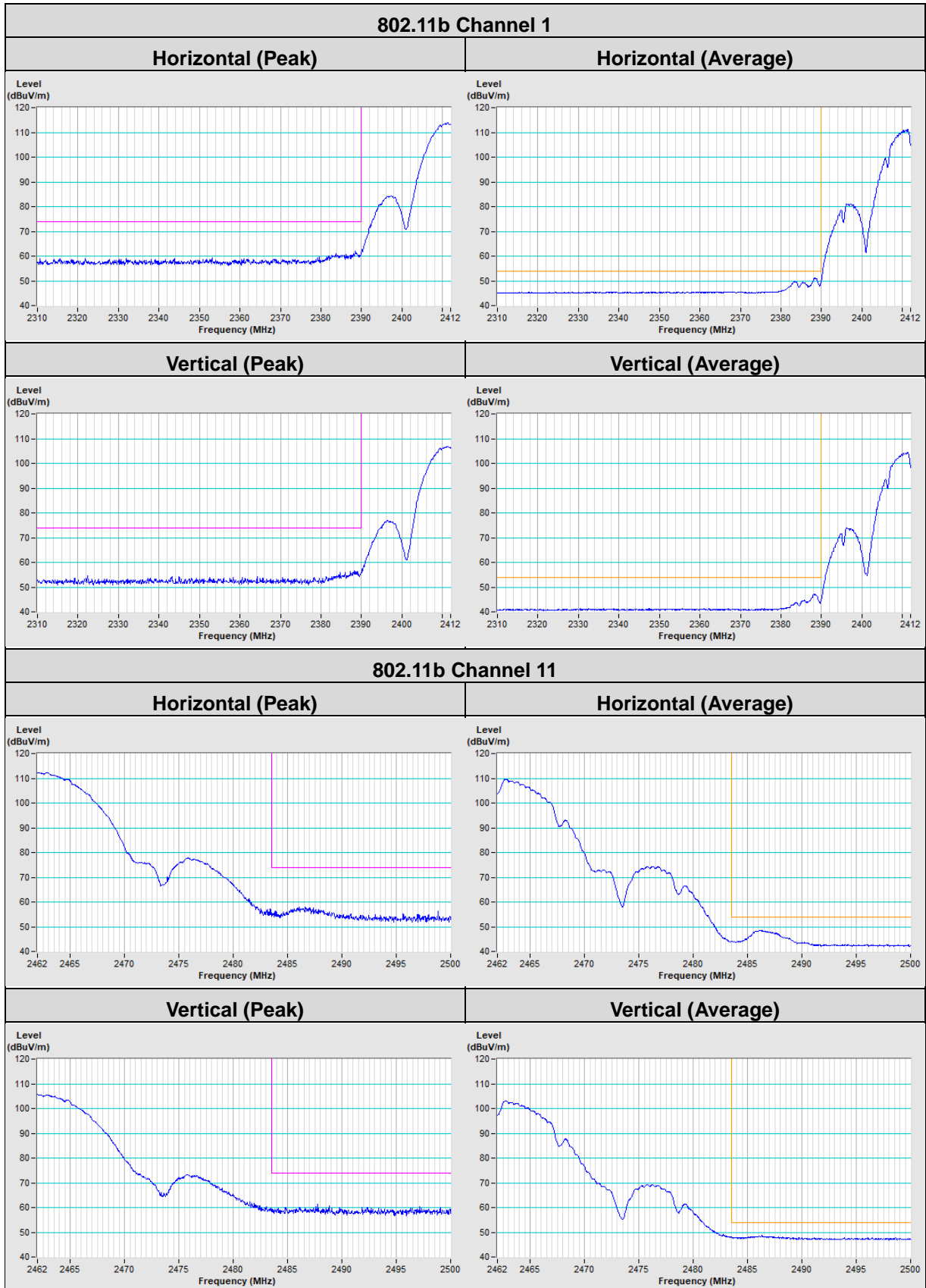


## 5 Pictures of Test Arrangements

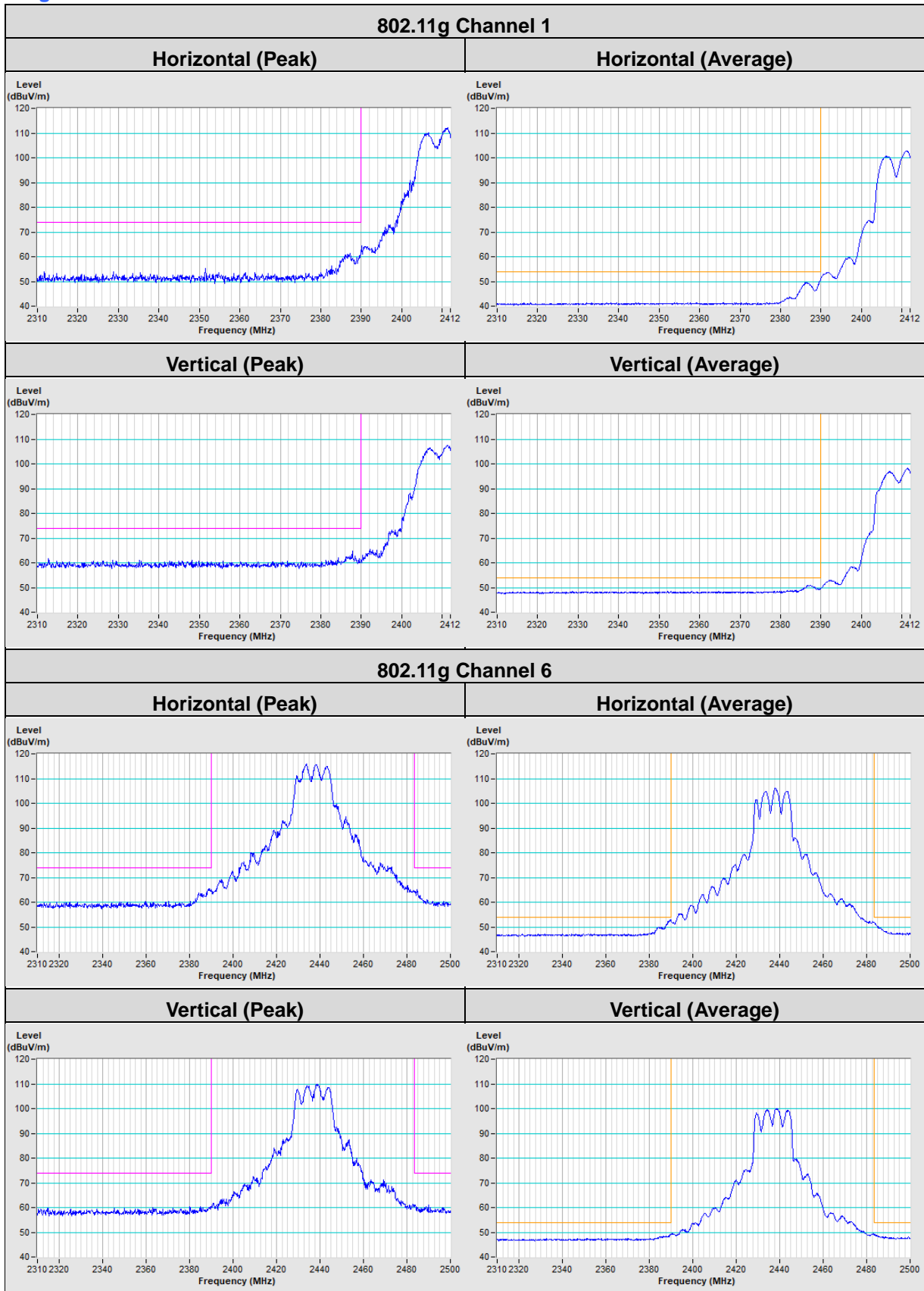
Please refer to the attached file (Test Setup Photo).

# Annex A- Band Edge Measurement

## 802.11b

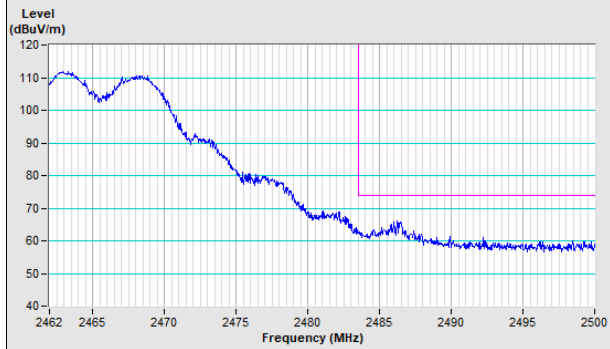


### 802.11g

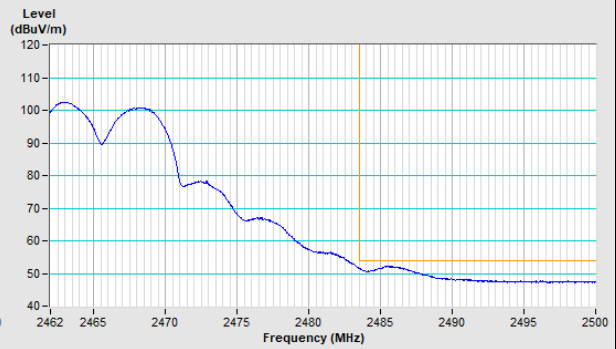


### 802.11g Channel 11

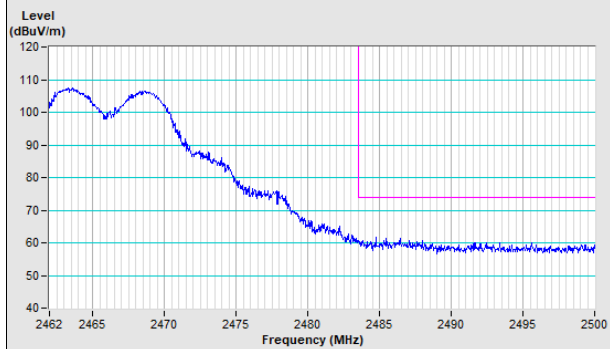
#### Horizontal (Peak)



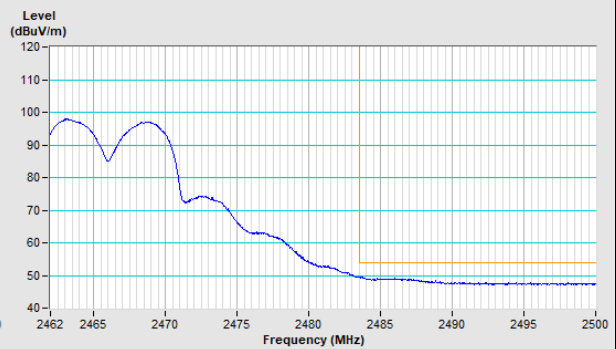
#### Horizontal (Average)



#### Vertical (Peak)

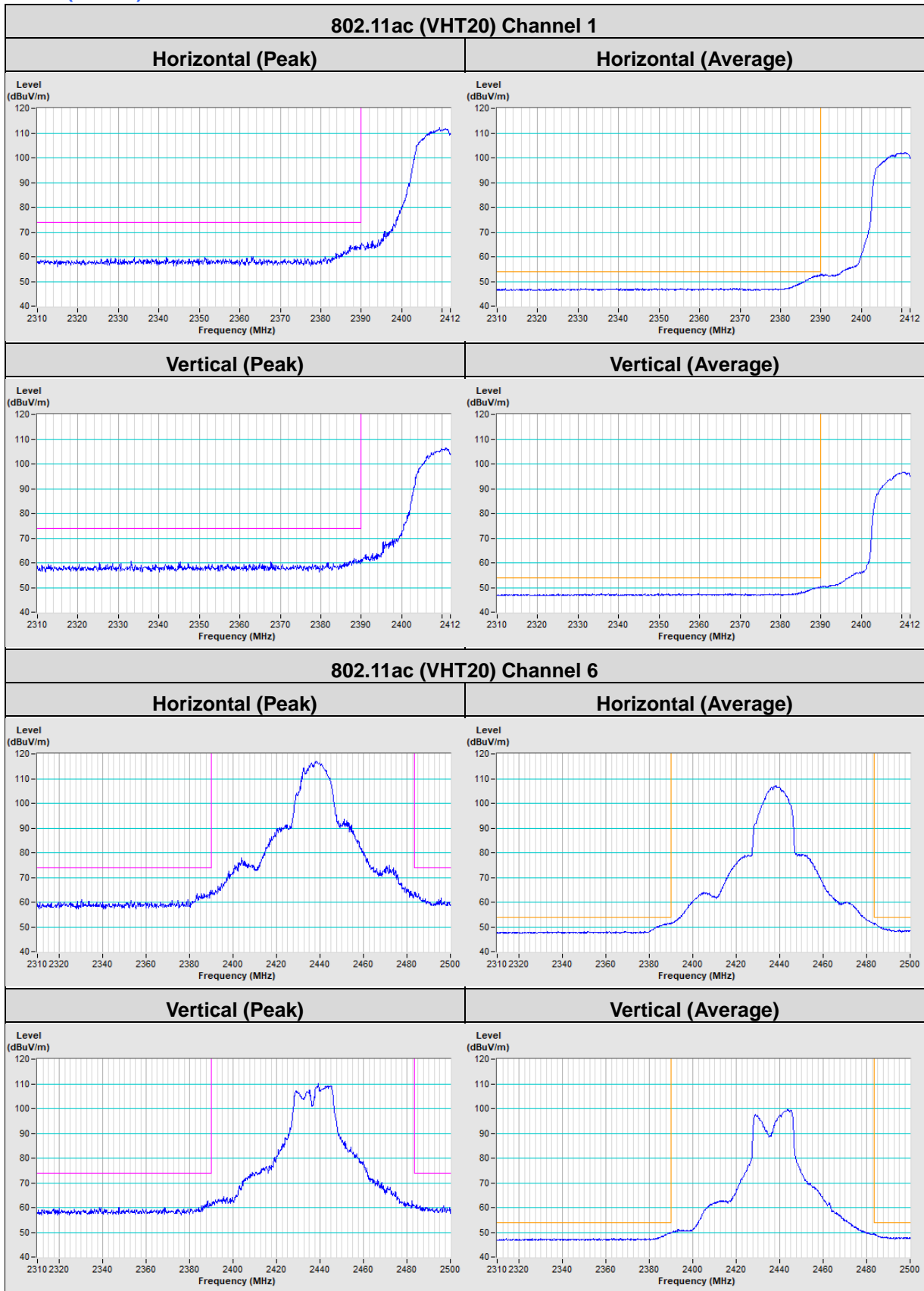


#### Vertical (Average)



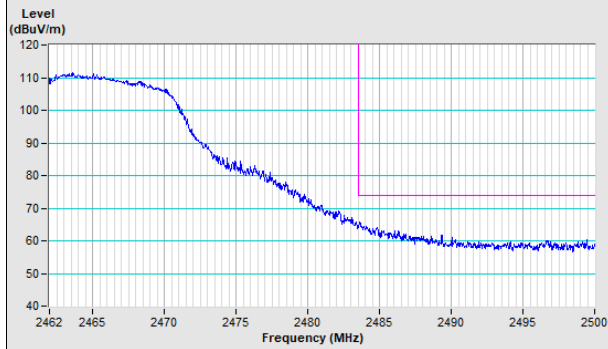


### 802.11ac (VHT20)

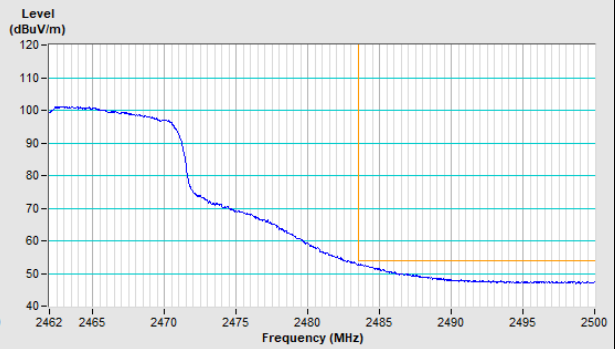


### 802.11ac (VHT20) Channel 11

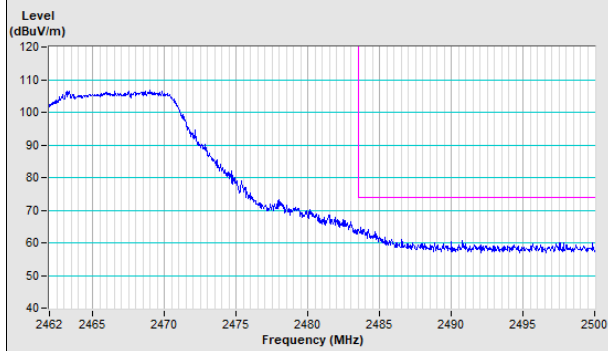
**Horizontal (Peak)**



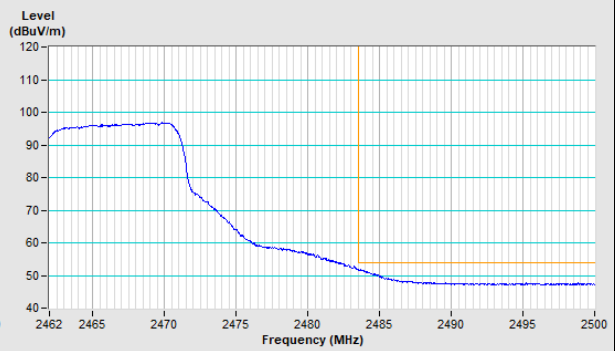
**Horizontal (Average)**



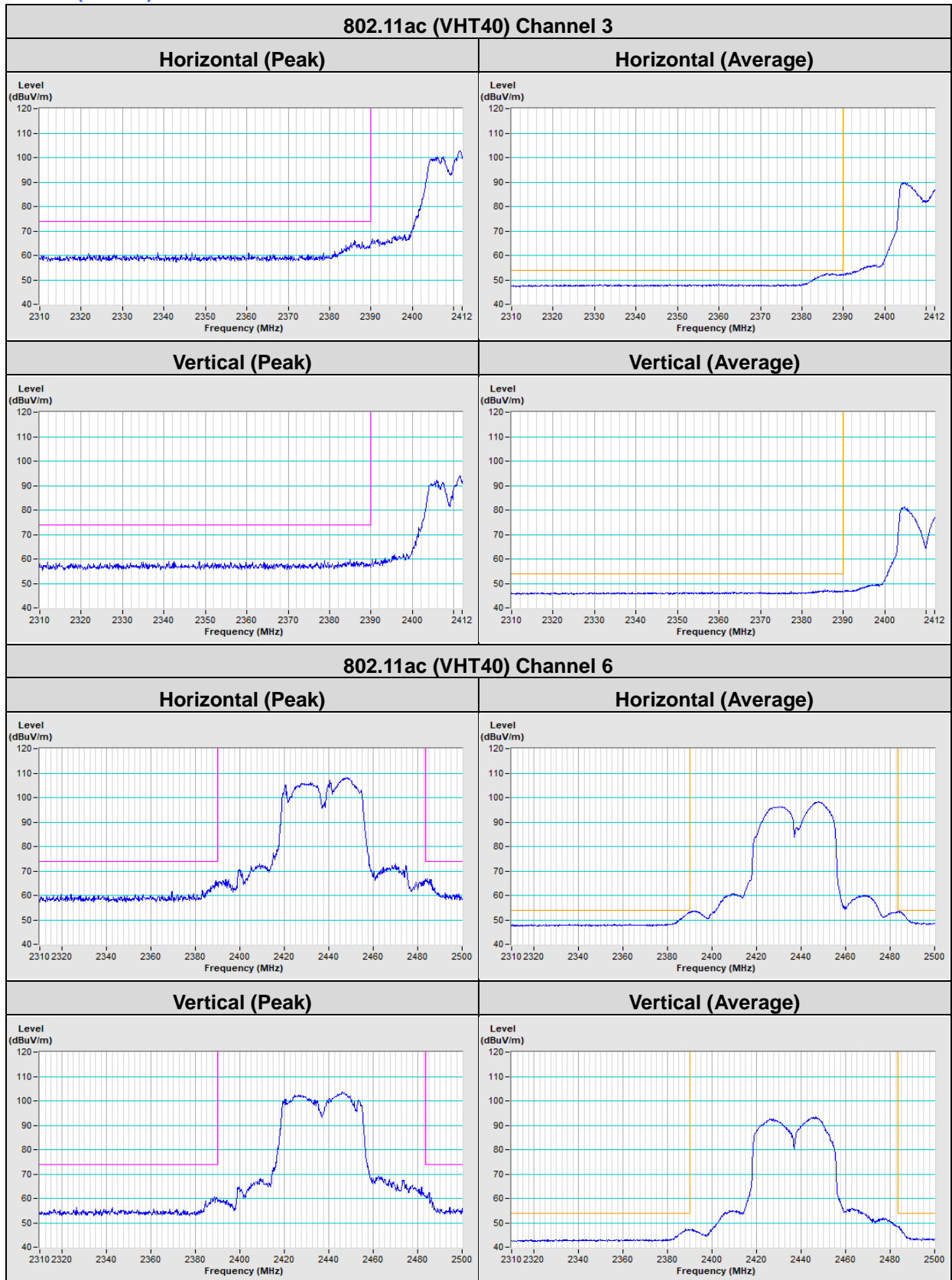
**Vertical (Peak)**



**Vertical (Average)**

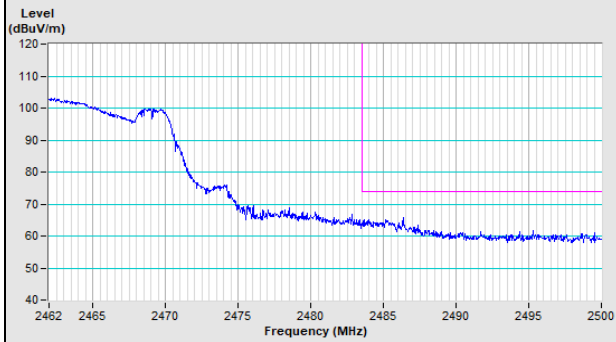


802.11ac (VHT40)

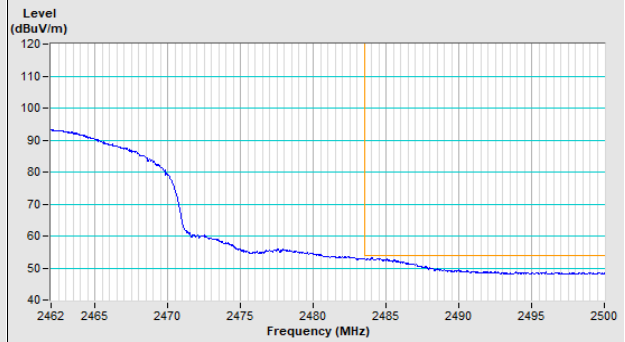


### 802.11ac (VHT40) Channel 9

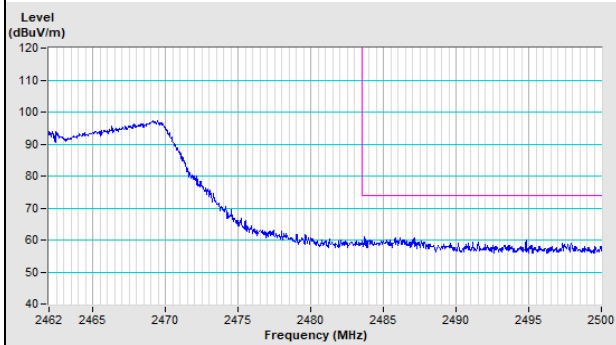
**Horizontal (Peak)**



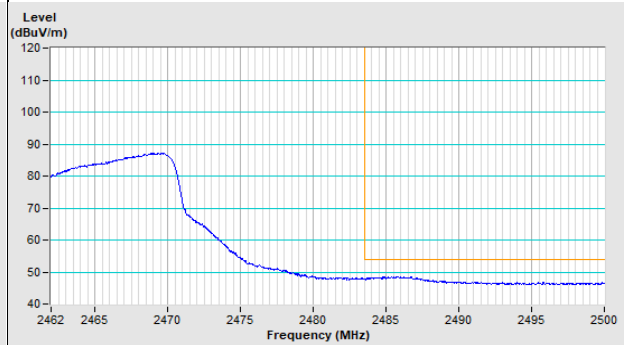
**Horizontal (Average)**



**Vertical (Peak)**



**Vertical (Average)**



## Appendix – Information of the Testing Laboratories

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

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

**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 ---