FCC Test Report

Report No.: RF200511E13-1

FCC ID: 2AHBN-AP12

Test Model: AP12

Received Date: May 11, 2020

Test Date: Jul. 07 ~ Aug. 04, 2020

Issued Date: Aug. 04, 2020

Applicant: Juniper Networks, Inc.

Address: 1133 Innovation Way Sunnyvale, CA 94089 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 (1): No.19, Hwa Ya 2nd Rd., Wen Hwa Vil., Kwei Shan Dist., Taoyuan City 33383, Taiwan

Test Location (2): B2F., No.215, Sec. 3, Beixin Rd., Xindian Dist., New Taipei City 231, Taiwan

FCC Registration / Designation Number: 788550 / TW0003
427177 / TW0011

Testing Laboratory
2021

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

Release Control Record **4**

1 Certificate of Conformity **5**

2 Summary of Test Results **6**

2.1 Measurement Uncertainty 6
2.2 Modification Record 6

3 General Information **7**

3.1 General Description of EUT 7
3.2 Description of Test Modes 10
3.2.1 Test Mode Applicability and Tested Channel Detail 11
3.3 Duty Cycle of Test Signal 13
3.4 Description of Support Units 15
3.4.1 Configuration of System under Test 15
3.5 General Description of Applied Standards and References 15

4 Test Types and Results **16**

4.1 Radiated Emission and Bandedge Measurement 16
4.1.1 Limits of Radiated Emission and Bandedge Measurement 16
4.1.2 Test Instruments 17
4.1.3 Test Procedures 18
4.1.4 Deviation from Test Standard 19
4.1.5 Test Set Up 19
4.1.6 EUT Operating Conditions 20
4.1.7 Test Results 21
4.2 Conducted Emission Measurement 49
4.2.1 Limits of Conducted Emission Measurement 49
4.2.2 Test Instruments 49
4.2.3 Test Procedures 50
4.2.4 Deviation from Test Standard 50
4.2.5 Test Setup 50
4.2.6 EUT Operating Conditions 50
4.2.7 Test Results 51
4.3 6 dB Bandwidth Measurement 55
4.3.1 Limits of 6 dB Bandwidth Measurement 55
4.3.2 Test Setup 55
4.3.3 Test Instruments 55
4.3.4 Test Procedure 55
4.3.5 Deviation from Test Standard 55
4.3.6 EUT Operating Conditions 55
4.3.7 Test Results 56
4.4 Occupied Bandwidth Measurement 60
4.4.1 Test Setup 60
4.4.2 Test Instruments 60
4.4.3 Test Procedure 60
4.4.4 Deviation from Test Standard 60
4.4.5 EUT Operating Conditions 60
4.4.6 Test Results 61
4.5 Conducted Output Power Measurement 65
4.5.1 Limits of Conducted Output Power Measurement 65
4.5.2 Test Setup 65
4.5.3 Test Instruments 65
4.5.4 Test Procedures 65
4.5.5 Deviation from Test Standard 65
4.5.6 EUT Operating Conditions 65
4.5.7 Test Results 66

4.6 Power Spectral Density Measurement 69
4.6.1 Limits of Power Spectral Density Measurement 69
4.6.2 Test Setup 69
4.6.3 Test Instruments 69
4.6.4 Test Procedure 69
4.6.5 Deviation from Test Standard 70
4.6.6 EUT Operating Condition 70
4.6.7 Test Results 71
4.7 Conducted Out of Band Emission Measurement 76
4.7.1 Limits of Conducted Out of Band Emission Measurement 76
4.7.2 Test Setup 76
4.7.3 Test Instruments 76
4.7.4 Test Procedure 76
4.7.5 Deviation from Test Standard 76
4.7.6 EUT Operating Condition 76
4.7.7 Test Results 77

5 Pictures of Test Arrangements 101

Annex A- Band Edge Measurement 102

Appendix – Information of the Testing Laboratories 126

Release Control Record

Issue No.	Description	Date Issued
RF200511E13-1	Original Release	Aug. 04, 2020

1 Certificate of Conformity

Product: 802.11ax Wallplate AP

Brand: Mist

Test Model: AP12

Sample Status: Engineering Sample

Applicant: Juniper Networks, Inc.

Test Date: Jul. 07 ~ Aug. 04, 2020

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.

Prepared by : Lena Wang , **Date:** Aug. 04, 2020

Lena Wang / Specialist

Approved by : , **Date:** Aug. 04, 2020

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 -12.68 dB at 0.58200 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -0.08 dB at 2483.5 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 i-pex(MHF).

Note:

1. 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.
2. Determining compliance based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty.

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
Conducted Emissions at mains ports	150 kHz ~ 30 MHz	2.79 dB
Radiated Emissions up to 1 GHz	9 kHz ~ 30 MHz	3.04 dB
	30 MHz ~ 200 MHz	2.0153 dB
	200 MHz ~ 1000 MHz	2.0224 dB
Radiated Emissions above 1 GHz	1 GHz ~ 18 GHz	1.0121 dB
	18 GHz ~ 40 GHz	1.1508 dB

2.2 Modification Record

There were no modifications required for compliance.

3 General Information

3.1 General Description of EUT

Product	802.11ax Wallplate AP
Brand	Mist
Test Model	AP12
Status of EUT	Engineering Sample
Power Supply Rating	55.0 Vdc
Modulation Type	CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM for OFDMA
Modulation Technology	DSSS, OFDM
Transfer Rate	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 300.0 Mbps 802.11ax: up to 573.5 Mbps
Operating Frequency	2412 ~ 2462 MHz
Number of Channel	11 for 802.11b, 802.11g, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20) 7 for 802.11n (HT40), 802.11ac (VHT40), 11ax (HE40)
Output Power	CDD Mode: 2TX: 465.307 mW (Mode A) 1TX: 399.945 mW (Mode B) Beamforming Mode: 2TX: 190.343 mW (Mode A)
Antenna Type	Refer to Note as below
Antenna Connector	Refer to Note as below
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

1. There are three radios for the EUT.

Radio	Function	TX/RX Function
Radio 1(WL0)	WLAN 2.4G	TX/RX
Radio 2(WL1) Scanning	WLAN 2.4G & 5G	TX/RX
Radio 3(WL2)	WLAN 5G	TX/RX
Radio 4	BT5.0	TX/RX

2. The EUT incorporates a MIMO function. Physically, the EUT provides 2 completed transmitters and 2 receivers.

Modulation Mode	TX Function	Beamforming
Radio 1		
802.11b	2TX	Not Support
802.11g	2TX	Not Support
802.11n (HT20)	2TX	Support
802.11n (HT40)	2TX	Support
802.11ac (VHT20)	2TX	Support
802.11ac (VHT40)	2TX	Support
802.11ax (HE20)	2TX	Support
802.11ax (HE40)	2TX	Support
Radio 2		
802.11b	1TX	Not Support
802.11g	1TX	Not Support
802.11n (HT20)	1TX	Not Support
802.11n (HT40)	1TX	Not Support
802.11ac (VHT20)	1TX	Not Support
802.11ac (VHT40)	1TX	Not Support
802.11ax (HE20)	1TX	Not Support
802.11ax (HE40)	1TX	Not Support
802.11a	1TX	Not Support
802.11n (HT20)	1TX	Not Support
802.11n (HT40)	1TX	Not Support
802.11ac (VHT20)	1TX	Not Support
802.11ac (VHT40)	1TX	Not Support
802.11ac (VHT80)	1TX	Not Support
802.11ax (HE20)	1TX	Not Support
802.11ax (HE40)	1TX	Not Support
802.11ax (HE80)	1TX	Not Support
Radio 3		
802.11a	2TX	Not Support
802.11n (HT20)	2TX	Support
802.11n (HT40)	2TX	Support
802.11ac (VHT20)	2TX	Support
802.11ac (VHT40)	2TX	Support
802.11ax (HE20)	2TX	Support
802.11ax (HE40)	2TX	Support
802.11ax (HE80)	1TX	Support
Radio 4		
BT5.0	1TX	Not Support

*The modulation and bandwidth are similar for 802.11n mode for HT20 / HT40 ,802.11ac mode for VHT20 / VHT40 / VHT80 and 802.11ax HE20 / HE40 / HE80, therefore investigated worst case to representative mode in test report. (Final test mode refer section 3.2.1)

*The worst case of Radio 1 is beamforming on mode for the final tests.

*The worst configuration is as below.

Mode	Chain
Radio 1 / 2TX	Chain 0 + 1
Radio 2 / 1TX	Chain 0
Radio 3 / 2TX	Chain 0 + 1
Radio 4 / 1TX	Chain 0

*After estimating, 2TX is the worst case for the final tests.

3. The EUT contains following accessory devices. (Support unit only)

Product	Brand	Model	Description
POE	Microsemi	PD-9001GR/AC	I/P: 100-240 Vac, 50/60 Hz, 0.67 A O/P: 55 Vdc, 0.6 A

4. The following antennas were provided to the EUT.

Antenna Type	PIFA	
Antenna Connector	IPEX	
Gain (dBi)	Frequency	
	2.4~2.4835GHz	5.15~5.85GHz
Int. WIFI Ant. 1	2.7	5.5
Int. WIFI Ant. 2	2.9	5.7
Scanning Radio Ant.	2.1	5

*Int. WIFI Ant. 1~2 (2.4G) were for Radio 1 and Int. WIFI Ant. 1~2 (5G) were for Radio 3.
*Scanning Radio Ant. was for Radio 2

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

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

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), 802.11ax (HE20):

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≥1G	RE<1G	PLC	APCM	
A	√	√	√	√	Radio 1(WL0)
B	√	√	√	√	Radio 2(WL1) Scanning

Where **RE≥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.

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)
A, B	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
	802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
	802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

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)
A	802.11ax (HE20)	1 to 11	6	OFDMA	BPSK	MCS0
B	802.11g	1 to 11	6	OFDM	BPSK	6.0

Power Line Conducted Emission Test:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
A	802.11ax (HE20)	1 to 11	6	OFDMA	BPSK	MCS0
B	802.11g	1 to 11	6	OFDM	BPSK	6.0

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)
A, B	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
	802.11ax (HE20)	1 to 11	1, 11	OFDMA	BPSK	MCS0
	802.11ax (HE40)	3 to 9	3, 9	OFDMA	BPSK	MCS0

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)
A, B	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
	802.11ax (HE20)	1 to 11	1, 6, 11	OFDMA	BPSK	MCS0
	802.11ax (HE40)	3 to 9	3, 6, 9	OFDMA	BPSK	MCS0

Test Condition:

Applicable To	Environmental Conditions	Input Power	Tested by
RE≥1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee, Charles Hsiao
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Jisyong Wang
APCM	25 deg. C, 65 % RH	120 Vac, 60 Hz	Gavin Wu

3.3 Duty Cycle of Test Signal

Duty cycle of test signal is ≥ 98 %, duty factor is not required.

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

Mode A

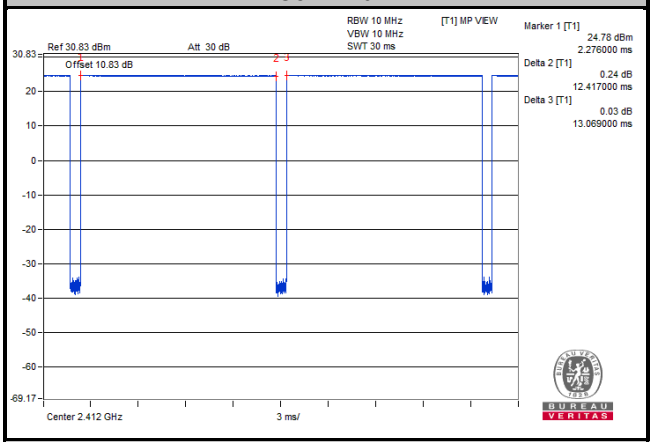
802.11b: Duty cycle = 12.417/13.069 = 0.95, Duty factor = 10 * log(1/0.95) = 0.22

802.11g: Duty cycle = 2.063/2.19 = 0.942, Duty factor = 10 * log(1/0.942) = 0.26

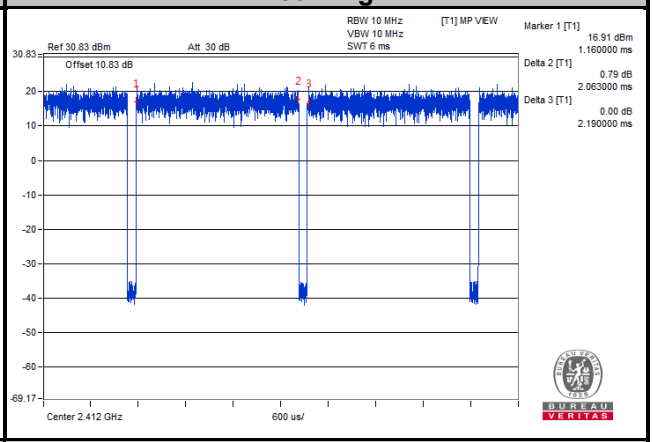
802.11ax (HE20): Duty cycle = 1.486/1.52 = 0.978, Duty factor = 10 * log(1/0.978) = 0.10

802.11ax (HE40): Duty cycle = 0.771/0.803 = 0.96, Duty factor = 10 * log(1/0.96) = 0.18

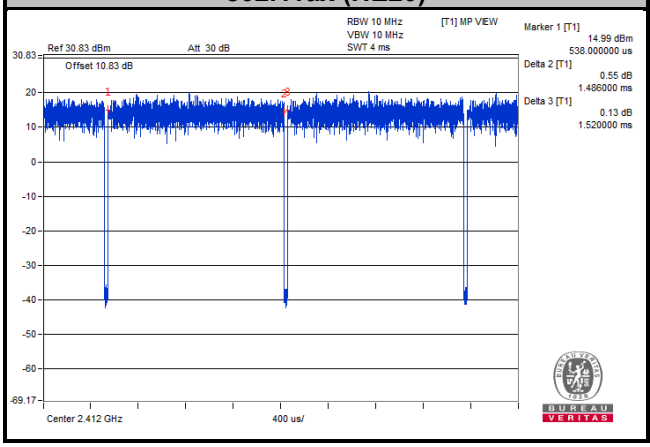
802.11b



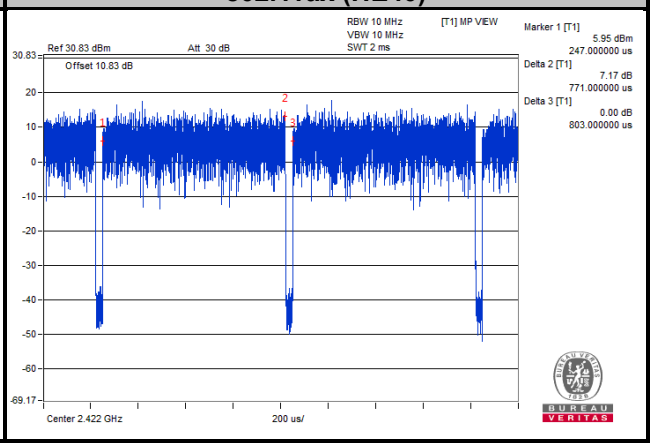
802.11g



802.11ax (HE20)



802.11ax (HE40)



Mode B

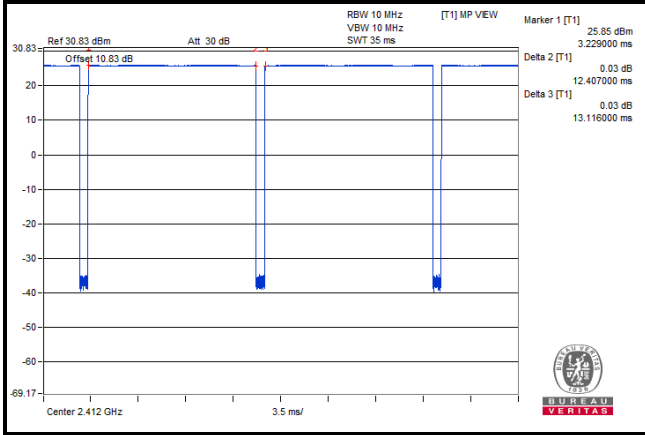
802.11b: Duty cycle = 12.407/13.116 = 0.946, Duty factor = 10 * log(1/0.946) = 0.24

802.11g: Duty cycle = 2.06/2.173 = 0.948, Duty factor = 10 * log(1/0.948) = 0.23

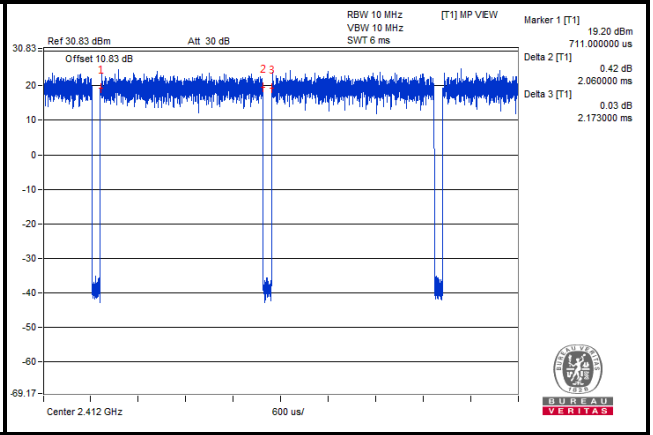
802.11ax (HE20): Duty cycle = 1.916/1.949 = 0.983, Duty factor = 10 * log(1/0.983) = 0.07

802.11ax (HE40): Duty cycle = 0.942/0.974 = 0.967, Duty factor = 10 * log(1/0.967) = 0.15

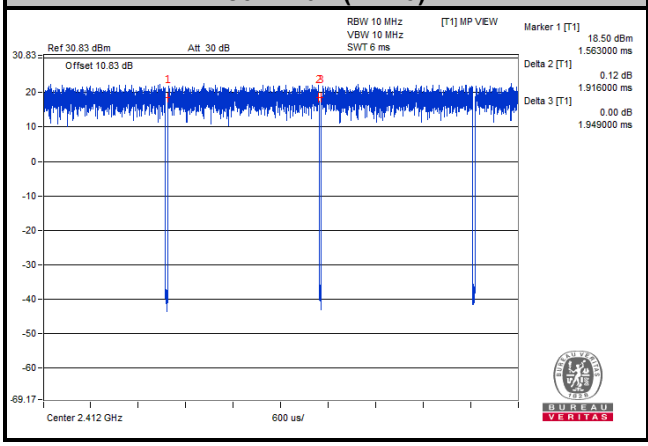
802.11b



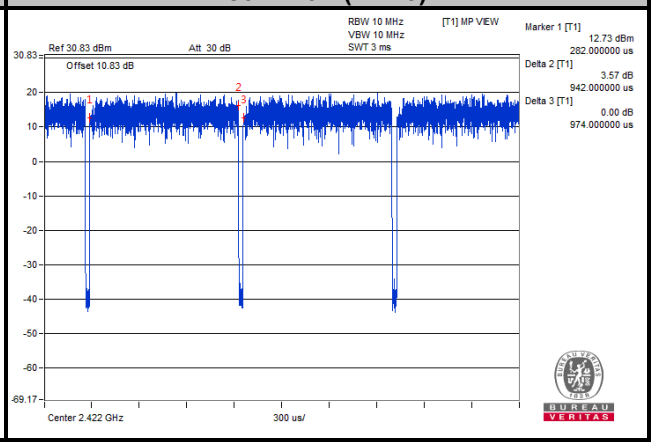
802.11g



802.11ax (HE20)



802.11ax (HE40)



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.

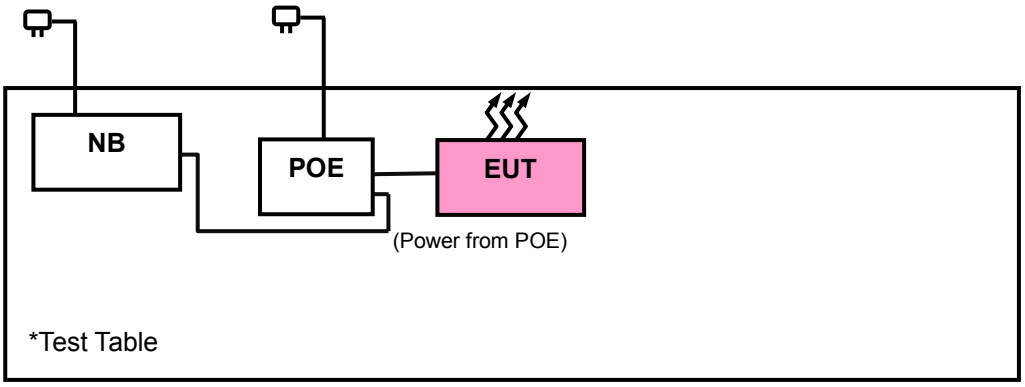
No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Notebook	DELL	E6420	D3T96R1	FCC DoC Approved

ID	Cable Descriptions	Qty.	Length (m)	Shielding (Yes/No)	Cores (Qty.)	Remarks
1.	RJ45 Cable	1	1	N	0	Cat5e
2.	RJ45 Cable	1	1	N	0	Cat5e

Note:

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

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 Agilent Technologies	N9038A	MY52260177	Aug. 26, 2019	Aug. 25, 2020
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 16, 2020	Apr. 15, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 12, 2019	Nov. 11, 2020
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 24, 2019	Nov. 23, 2020
HORN Antenna SCHWARZBECK	BBHA 9170	9170-480	Nov. 24, 2019	Nov. 23, 2020
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 14, 2020	Apr. 13, 2021
Loop Antenna	HLA 6121	45745	Jul. 06, 2020	Jul. 05, 2021
Preamplifier Agilent	310N	187226	Jun. 17, 2020	Jun. 16, 2021
Preamplifier Agilent	83017A	MY39501357	Jun. 17, 2020	Jun. 16, 2021
Power Meter Anritsu	ML2495A	1012010	Sep. 04, 2019	Sep. 03, 2020
Power Sensor Anritsu	MA2411B	1315050	Sep. 04, 2019	Sep. 03, 2020
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 17, 2020	Jun. 16, 2021
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 17, 2020	Jun. 17, 2021
Software BV ADT	E3 8.130425b	NA	NA	NA
Antenna Tower MF	NA	NA	NA	NA
Turn Table MF	NA	NA	NA	NA
Antenna Tower &Turn Table Controller MF	MF-7802	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 HsinTien Chamber 1.

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:

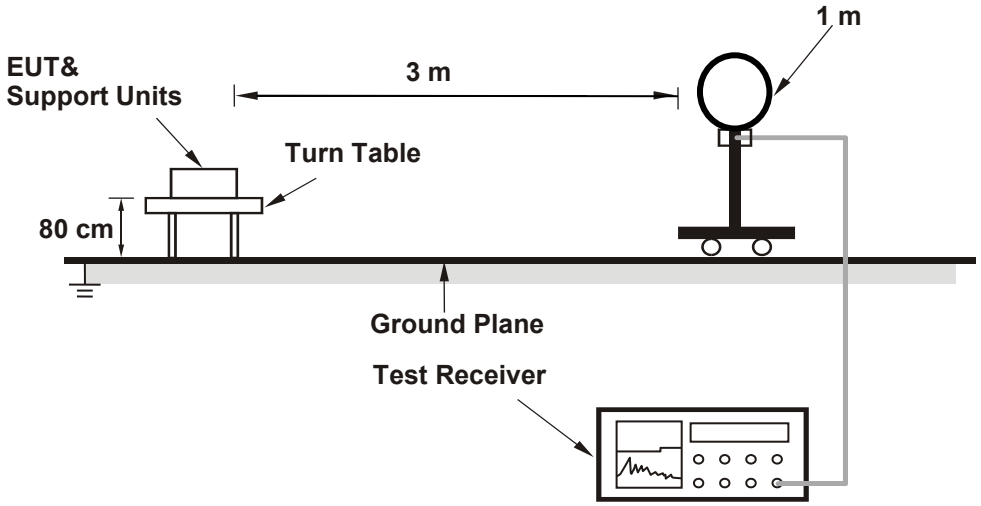
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is ≥ 1/T (Duty cycle < 98 %) or 10 Hz (Duty cycle ≥ 98 %) for Average detection (AV) at frequency above 1 GHz. (11b: RBW = 1 MHz, VBW =100 Hz ; 11g: RBW = 1 MHz, VBW = 510 Hz ;
   11ax (HE20): RBW = 1 MHz, VBW = 1 kHz for Mode A, 10 Hz for Mode B ; 11ax (HE40): 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

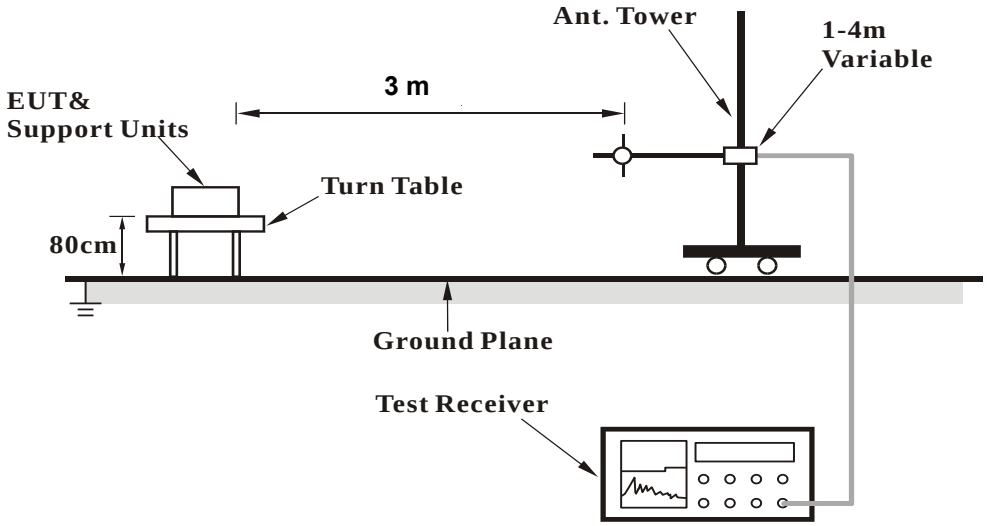
No deviation.

4.1.5 Test Set Up

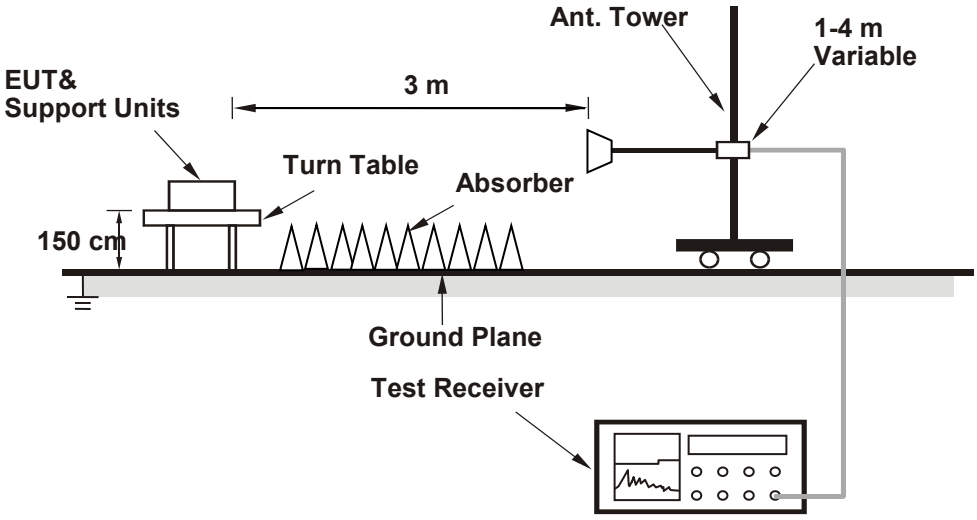
<Radiated Emission below 30 MHz>



<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：

Mode A

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	47.03	42.53	4.5	54	-6.97	100	249	Average
2390	55.7	51.2	4.5	74	-18.3	100	249	Peak
2412	104.54	99.99	4.55			100	249	Average
2412	107.25	102.7	4.55			100	249	Peak
4824	40.54	30.25	10.29	54	-13.46	104	165	Average
4824	47.88	37.59	10.29	74	-26.12	104	165	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.53	49.03	4.5	54	-0.47	221	314	Average
2390	61.64	57.14	4.5	74	-12.36	221	314	Peak
2412	109.76	105.21	4.55			221	314	Average
2412	111.94	107.39	4.55			221	314	Peak
4824	40.54	30.25	10.29	54	-13.46	146	165	Average
4824	48.18	37.89	10.29	74	-25.82	146	165	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	44.41	39.91	4.5	54	-9.59	111	249	Average
2390	53.63	49.13	4.5	74	-20.37	111	249	Peak
2437	106.48	101.89	4.59			111	249	Average
2437	109.22	104.63	4.59			111	249	Peak
2483.5	44.56	39.9	4.66	54	-9.44	111	249	Average
2483.5	54.91	50.25	4.66	74	-19.09	111	249	Peak
4874	53.9	43.69	10.21	54	-0.1	189	4	Average
4874	55.82	45.61	10.21	74	-18.18	189	4	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.52	49.02	4.5	54	-0.48	221	228	Average
2390	60.09	55.59	4.5	74	-13.91	221	228	Peak
2437	113.64	109.05	4.59			221	229	Average
2437	116.26	111.67	4.59			221	229	Peak
2483.5	52.23	47.57	4.66	54	-1.77	221	229	Average
2483.5	60.03	55.37	4.66	74	-13.97	221	229	Peak
4874	51.85	41.64	10.21	54	-2.15	103	263	Average
4874	53.62	43.41	10.21	74	-20.38	103	263	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	103.69	99.07	4.62			188	221	Average
2462	106.85	102.23	4.62			188	221	Peak
2483.5	43.11	38.45	4.66	54	-10.89	188	221	Average
2483.5	53.65	48.99	4.66	74	-20.35	188	221	Peak
4924	43.5	33.25	10.25	54	-10.5	155	241	Average
4924	48.47	38.22	10.25	74	-25.53	155	241	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	110.94	106.32	4.62			221	228	Average
2462	113.59	108.97	4.62			221	228	Peak
2483.5	53.11	48.45	4.66	54	-0.89	234	228	Average
2483.5	61.7	57.04	4.66	74	-12.3	234	228	Peak
4924	42.4	32.15	10.25	54	-11.6	102	22	Average
4924	48.41	38.16	10.25	74	-25.59	102	22	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	47.04	42.54	4.5	54	-6.96	100	249	Average
2390	63.26	58.76	4.5	74	-10.74	100	249	Peak
2412	98.59	94.04	4.55			100	249	Average
2412	105.39	100.84	4.55			100	249	Peak
4824	41.46	31.17	10.29	54	-12.54	158	107	Average
4824	47.69	37.4	10.29	74	-26.31	158	107	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.7	49.2	4.5	54	-0.3	208	225	Average
2390	69.8	65.3	4.5	74	-4.2	208	225	Peak
2412	102.25	97.7	4.55			225	224	Average
2412	109.76	105.21	4.55			225	224	Peak
4824	41.84	31.55	10.29	54	-12.16	185	36	Average
4824	48.07	37.78	10.29	74	-25.93	185	36	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	46.49	41.99	4.5	54	-7.51	111	249	Average
2390	61.07	56.57	4.5	74	-12.93	111	249	Peak
2437	102.14	97.55	4.59			111	249	Average
2437	109.79	105.2	4.59			111	249	Peak
2483.5	46.95	42.29	4.66	54	-7.05	111	249	Average
2483.5	62.04	57.38	4.66	74	-11.96	111	249	Peak
4874	41.89	31.68	10.21	54	-12.11	139	46	Average
4874	48.17	37.96	10.21	74	-25.83	139	46	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.41	48.91	4.5	54	-0.59	221	227	Average
2390	66.56	62.06	4.5	74	-7.44	221	227	Peak
2437	107.9	103.31	4.59			221	229	Average
2437	114.22	109.63	4.59			221	229	Peak
2483.5	52.31	47.65	4.66	54	-1.69	221	229	Average
2483.5	67.71	63.05	4.66	74	-6.29	221	229	Peak
4874	41.24	31.03	10.21	54	-12.76	126	87	Average
4874	47.41	37.2	10.21	74	-26.59	126	87	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	99.46	94.84	4.62			188	221	Average
2462	106.25	101.63	4.62			188	221	Peak
2483.5	45.75	41.09	4.66	54	-8.25	188	221	Average
2483.5	65.77	61.11	4.66	74	-8.23	188	221	Peak
4924	41.62	31.37	10.25	54	-12.38	160	235	Average
4924	47.88	37.63	10.25	74	-26.12	160	235	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	103.37	98.75	4.62			221	228	Average
2462	110.35	105.73	4.62			221	228	Peak
2483.5	52.68	48.02	4.66	54	-1.32	234	228	Average
2483.5	70.44	65.78	4.66	74	-3.56	234	228	Peak
4924	41.37	31.12	10.25	54	-12.63	139	14	Average
4924	47.63	37.38	10.25	74	-26.37	139	14	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11ax (HE20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	44.36	39.86	4.5	54	-9.64	100	249	Average
2390	66.73	62.23	4.5	74	-7.27	100	249	Peak
2412	99.54	94.99	4.55			100	249	Average
2412	106.32	101.77	4.55			100	249	Peak
4824	40.54	30.25	10.29	54	-13.46	105	165	Average
4824	47.86	37.57	10.29	74	-26.14	105	165	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.79	49.29	4.5	54	-0.21	204	224	Average
2390	72.36	67.86	4.5	74	-1.64	204	224	Peak
2412	103.36	98.81	4.55			225	224	Average
2412	110.64	106.09	4.55			225	224	Peak
4824	40.54	30.25	10.29	54	-13.46	142	165	Average
4824	48.6	38.31	10.29	74	-25.4	142	165	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	47.77	43.27	4.5	54	-6.23	111	249	Average
2390	62.19	57.69	4.5	74	-11.81	111	249	Peak
2437	103.69	99.1	4.59			111	249	Average
2437	110.31	105.72	4.59			111	249	Peak
2483.5	46.68	42.02	4.66	54	-7.32	111	249	Average
2483.5	60.84	56.18	4.66	74	-13.16	111	249	Peak
4874	42.11	31.9	10.21	54	-11.89	134	176	Average
4874	48.3	38.09	10.21	74	-25.7	134	176	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.81	49.31	4.5	54	-0.19	221	227	Average
2390	67.24	62.74	4.5	74	-6.76	221	227	Peak
2437	108.48	103.89	4.59			221	229	Average
2437	115.65	111.06	4.59			221	229	Peak
2483.5	53.2	48.54	4.66	54	-0.8	221	227	Average
2483.5	67.08	62.42	4.66	74	-6.92	221	227	Peak
4874	42.06	31.85	10.21	54	-11.94	150	148	Average
4874	48.4	38.19	10.21	74	-25.6	150	148	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	99.52	94.9	4.62			188	221	Average
2462	106.37	101.75	4.62			188	221	Peak
2483.5	45.01	40.35	4.66	54	-8.99	188	221	Average
2483.5	66.98	62.32	4.66	74	-7.02	188	221	Peak
4924	42.49	32.24	10.25	54	-11.51	184	131	Average
4924	48.63	38.38	10.25	74	-25.37	184	131	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	103.41	98.79	4.62			221	228	Average
2462	110.31	105.69	4.62			221	228	Peak
2483.5	53.05	48.39	4.66	54	-0.95	234	228	Average
2483.5	71.21	66.55	4.66	74	-2.79	234	228	Peak
4924	41.49	31.24	10.25	54	-12.51	107	134	Average
4924	47.78	37.53	10.25	74	-26.22	107	134	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11ax (HE40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	46.34	41.84	4.5	54	-7.66	100	249	Average
2390	59.72	55.22	4.5	74	-14.28	100	249	Peak
2422	95.52	90.96	4.56			100	249	Average
2422	102.53	97.97	4.56			100	249	Peak
2483.5	42.6	37.94	4.66	54	-11.4	100	249	Average
2483.5	53.5	48.84	4.66	74	-20.5	100	249	Peak
4844	41.47	31.24	10.23	54	-12.53	156	1070	Average
4844	47.72	37.49	10.23	74	-26.28	156	1070	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.57	49.07	4.5	54	-0.43	204	227	Average
2390	65.35	60.85	4.5	74	-8.65	204	227	Peak
2422	99.62	95.06	4.56			225	224	Average
2422	106.82	102.26	4.56			225	224	Peak
2483.5	44.03	39.37	4.66	54	-9.97	225	224	Average
2483.5	54.56	49.9	4.66	74	-19.44	225	224	Peak
4844	40.97	30.74	10.23	54	-13.03	131	49	Average
4844	47.12	36.89	10.23	74	-26.88	131	49	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2422 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	48.15	43.65	4.5	54	-5.85	111	249	Average
2390	62.57	58.07	4.5	74	-11.43	111	249	Peak
2437	97.57	92.98	4.59			111	249	Average
2437	104.42	99.83	4.59			111	249	Peak
2483.5	47.11	42.45	4.66	54	-6.89	111	249	Average
2483.5	65.65	60.99	4.66	74	-8.35	111	249	Peak
4874	42.67	32.46	10.21	54	-11.33	148	206	Average
4874	49.07	38.86	10.21	74	-24.93	148	206	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.71	49.21	4.5	54	-0.29	221	226	Average
2390	67.93	63.43	4.5	74	-6.07	221	226	Peak
2437	102.37	97.78	4.59			221	226	Average
2437	109.26	104.67	4.59			221	226	Peak
2483.5	53.84	49.18	4.66	54	-0.16	221	226	Average
2483.5	69.28	64.62	4.66	74	-4.72	221	226	Peak
4874	41.36	31.15	10.21	54	-12.64	135	190	Average
4874	47.82	37.61	10.21	74	-26.18	135	190	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	42.82	38.32	4.5	54	-11.18	188	221	Average
2390	54.6	50.1	4.5	74	-19.4	188	221	Peak
2452	96.74	92.14	4.6			188	221	Average
2452	103.46	98.86	4.6			188	221	Peak
2483.5	47.28	42.62	4.66	54	-6.72	188	221	Average
2483.5	63.86	59.2	4.66	74	-10.14	188	221	Peak
4904	41.62	31.48	10.14	54	-12.38	117	236	Average
4904	47.97	37.83	10.14	74	-26.03	117	236	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	45.45	40.95	4.5	54	-8.55	221	228	Average
2390	56.27	51.77	4.5	74	-17.73	221	228	Peak
2452	100.46	95.86	4.6			221	228	Average
2452	107.08	102.48	4.6			221	228	Peak
2483.5	53.71	49.05	4.66	54	-0.29	234	228	Average
2483.5	66.39	61.73	4.66	74	-7.61	234	228	Peak
4904	41.47	31.33	10.14	54	-12.53	183	241	Average
4904	47.71	37.57	10.14	74	-26.29	183	241	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2452 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

Mode B

802.11b

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	50.38	45.88	4.5	54	-3.62	102	19	Average
2390	57.18	52.68	4.5	74	-16.82	102	19	Peak
2412	107.33	102.78	4.55			102	19	Average
2412	109.96	105.41	4.55			102	19	Peak
4824	41.95	31.66	10.29	54	-12.05	111	11	Average
4824	47.84	37.55	10.29	74	-26.16	111	11	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.2	48.7	4.5	54	-0.8	203	229	Average
2390	59.81	55.31	4.5	74	-14.19	203	229	Peak
2412	109.46	104.91	4.55			203	229	Average
2412	111.67	107.12	4.55			203	229	Peak
4824	41.79	31.5	10.29	54	-12.21	112	24	Average
4824	47.74	37.45	10.29	74	-26.26	112	24	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	48.99	44.49	4.5	54	-5.01	102	19	Average
2390	55.75	51.25	4.5	74	-18.25	102	19	Peak
2437	110.07	105.48	4.59			102	19	Average
2437	112.23	107.64	4.59			102	19	Peak
2483.5	52.56	47.9	4.66	54	-1.44	102	19	Average
2483.5	59.56	54.9	4.66	74	-14.44	102	19	Peak
4874	41.37	31.16	10.21	54	-12.63	164	2	Average
4874	46.89	36.68	10.21	74	-27.11	164	2	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	51.55	47.05	4.5	54	-2.45	178	229	Average
2390	59.14	54.64	4.5	74	-14.86	178	229	Peak
2437	111.64	107.05	4.59			178	229	Average
2437	113.5	108.91	4.59			178	229	Peak
2483.5	53.9	49.24	4.66	54	-0.1	178	229	Average
2483.5	60.89	56.23	4.66	74	-13.11	178	229	Peak
4874	41.68	31.47	10.21	54	-12.32	148	217	Average
4874	47.22	37.01	10.21	74	-26.78	148	217	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	105.65	101.03	4.62			110	56	Average
2462	107.9	103.28	4.62			110	56	Peak
2483.5	44.89	40.23	4.66	54	-9.11	110	56	Average
2483.5	53.05	48.39	4.66	74	-20.95	110	56	Peak
2500	50.68	46.01	4.67	54	-3.32	110	56	Average
2500	56.53	51.86	4.67	74	-17.47	110	56	Peak
4924	41.8	31.55	10.25	54	-12.2	148	5	Average
4924	48.08	37.83	10.25	74	-25.92	148	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	108.75	104.13	4.62			171	229	Average
2462	111.12	106.5	4.62			171	229	Peak
2483.5	46.1	41.44	4.66	54	-7.9	171	229	Average
2483.5	55.53	50.87	4.66	74	-18.47	171	229	Peak
2499.54	53.49	48.82	4.67	54	-0.51	171	229	Average
2499.54	58.96	54.29	4.67	74	-15.04	171	229	Peak
4924	41.49	31.24	10.25	54	-12.51	105	263	Average
4924	47.62	37.37	10.25	74	-26.38	105	263	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	50.47	45.97	4.5	54	-3.53	102	19	Average
2390	66.37	61.87	4.5	74	-7.63	102	19	Peak
2412	100.7	96.15	4.55			102	19	Average
2412	107.58	103.03	4.55			102	19	Peak
4824	41.88	31.59	10.29	54	-12.12	125	5	Average
4824	47.42	37.13	10.29	74	-26.58	125	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.65	49.15	4.5	54	-0.35	203	229	Average
2390	70.81	66.31	4.5	74	-3.19	203	229	Peak
2412	101.58	97.03	4.55			203	229	Average
2412	108.1	103.55	4.55			203	229	Peak
4824	41.92	31.63	10.29	54	-12.08	126	222	Average
4824	47.72	37.43	10.29	74	-26.28	126	222	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	48.42	43.92	4.5	54	-5.58	102	19	Average
2390	61.58	57.08	4.5	74	-12.42	102	19	Peak
2437	104.59	100	4.59			102	19	Average
2437	111.88	107.29	4.59			102	19	Peak
2483.5	52.75	48.09	4.66	54	-1.25	102	19	Average
2483.5	66.3	61.64	4.66	74	-7.7	102	19	Peak
4874	41.65	31.44	10.21	54	-12.35	181	208	Average
4874	46.18	35.97	10.21	74	-27.82	181	208	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	50.56	46.06	4.5	54	-3.44	178	229	Average
2390	64.29	59.79	4.5	74	-9.71	178	229	Peak
2437	106.21	101.62	4.59			178	229	Average
2437	113.92	109.33	4.59			178	229	Peak
2483.5	53.92	49.26	4.66	54	-0.08	178	229	Average
2483.5	67.77	63.11	4.66	74	-6.23	178	229	Peak
4874	41.94	31.73	10.21	54	-12.06	146	250	Average
4874	46.5	36.29	10.21	74	-27.5	146	250	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	98.51	93.89	4.62			110	20	Average
2462	105.92	101.3	4.62			110	20	Peak
2483.5	53.19	48.53	4.66	54	-0.81	110	20	Average
2483.5	71.44	66.78	4.66	74	-2.56	110	20	Peak
4924	41.8	31.55	10.25	54	-12.2	180	5	Average
4924	46.91	36.66	10.25	74	-27.09	180	5	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	101.28	96.66	4.62			171	229	Average
2462	108.93	104.31	4.62			171	229	Peak
2483.5	53.71	49.05	4.66	54	-0.29	171	229	Average
2483.5	72.07	67.41	4.66	74	-1.93	171	229	Peak
4924	41.71	31.46	10.25	54	-12.29	135	5	Average
4924	46.89	36.64	10.25	74	-27.11	135	5	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11ax (HE20)

EUT Test Condition		Measurement Detail	
Channel	Channel 1	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	49.86	45.36	4.5	54	-4.14	102	19	Average
2390	64.37	59.87	4.5	74	-9.63	102	19	Peak
2412	99.51	94.96	4.55			102	19	Average
2412	107.7	103.15	4.55			102	19	Peak
4824	42.13	31.84	10.29	54	-11.87	135	55	Average
4824	48.01	37.72	10.29	74	-25.99	135	55	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	53.51	49.01	4.5	54	-0.49	203	229	Average
2390	68.23	63.73	4.5	74	-5.77	203	229	Peak
2412	101.24	96.69	4.55			203	229	Average
2412	109.15	104.6	4.55			203	229	Peak
4824	42.55	32.26	10.29	54	-11.45	114	24	Average
4824	48.03	37.74	10.29	74	-25.97	114	24	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2412 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	48.53	44.03	4.5	54	-5.47	102	19	Average
2390	61.53	57.03	4.5	74	-12.47	102	19	Peak
2437	102.9	98.31	4.59			102	19	Average
2437	113.35	108.76	4.59			102	19	Peak
2483.5	52	47.34	4.66	54	-2	102	19	Average
2483.5	64.41	59.75	4.66	74	-9.59	102	19	Peak
4874	41.64	31.43	10.21	54	-12.36	136	285	Average
4874	48.48	38.27	10.21	74	-25.52	136	285	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	50.15	45.65	4.5	54	-3.85	178	229	Average
2390	62.91	58.41	4.5	74	-11.09	178	229	Peak
2437	104.94	67.89	37.05			178	229	Average
2437	114.6	77.55	37.05			178	229	Peak
2483.5	53.45	48.79	4.66	54	-0.55	178	229	Average
2483.5	67.98	63.32	4.66	74	-6.02	178	229	Peak
4874	42.26	32.05	10.21	54	-11.74	128	255	Average
4874	47.31	37.1	10.21	74	-26.69	128	255	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 11	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	100.34	95.72	4.62			110	20	Average
2462	107.05	102.43	4.62			110	20	Peak
2483.5	46.48	41.82	4.66	54	-7.52	110	20	Average
2483.5	66.44	61.78	4.66	74	-7.56	110	20	Peak
4924	41.8	31.55	10.25	54	-12.2	185	324	Average
4924	47.59	37.34	10.25	74	-26.41	185	324	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2462	104.54	99.92	4.62			171	229	Average
2462	111.86	107.24	4.62			171	229	Peak
2483.5	53.38	48.72	4.66	54	-0.62	171	229	Average
2483.5	70.85	66.19	4.66	74	-3.15	171	229	Peak
4924	41.51	31.26	10.25	54	-12.49	175	55	Average
4924	47.91	37.66	10.25	74	-26.09	175	55	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2462 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

802.11ax (HE40)

EUT Test Condition		Measurement Detail	
Channel	Channel 3	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	49.2	44.7	4.5	54	-4.8	102	19	Average
2390	63.11	58.61	4.5	74	-10.89	102	19	Peak
2422	100.25	95.69	4.56			102	19	Average
2422	109.02	104.46	4.56			102	19	Peak
2483.5	46.89	42.23	4.66	54	-7.11	102	19	Average
2483.5	58.76	54.1	4.66	74	-15.24	102	19	Peak
4844	42.26	32.03	10.23	54	-11.74	134	266	Average
4844	46.6	36.37	10.23	74	-27.4	134	266	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	52.88	48.38	4.5	54	-1.12	212	229	Average
2390	67.35	62.85	4.5	74	-6.65	212	229	Peak
2422	100.63	96.07	4.56			212	229	Average
2422	110.2	105.64	4.56			212	229	Peak
2483.5	47.82	43.16	4.66	54	-6.18	212	229	Average
2483.5	60.46	55.8	4.66	74	-13.54	212	229	Peak
4844	42.23	32	10.23	54	-11.77	185	155	Average
4844	47.31	37.08	10.23	74	-26.69	185	155	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2422 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	49.18	44.68	4.5	54	-4.82	102	19	Average
2390	59.22	54.72	4.5	74	-14.78	102	19	Peak
2437	95.07	90.48	4.59			102	19	Average
2437	104.79	100.2	4.59			102	19	Peak
2483.5	52.52	47.86	4.66	54	-1.48	102	19	Average
2483.5	65.69	61.03	4.66	74	-8.31	102	19	Peak
4874	41.83	31.62	10.21	54	-12.17	105	2	Average
4874	47.41	37.2	10.21	74	-26.59	105	2	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	48.77	44.27	4.5	54	-5.23	178	229	Average
2390	60.87	56.37	4.5	74	-13.13	178	229	Peak
2437	97.3	92.71	4.59			178	229	Average
2437	106.84	102.25	4.59			178	229	Peak
2483.5	53.39	48.73	4.66	54	-0.61	178	229	Average
2483.5	66.95	62.29	4.66	74	-7.05	178	229	Peak
4874	42.06	31.85	10.21	54	-11.94	159	22	Average
4874	47.47	37.26	10.21	74	-26.53	159	22	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2437 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

EUT Test Condition		Measurement Detail	
Channel	Channel 9	**Frequency Range**	1 GHz ~ 25 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Average (AV)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Charles Hsiao

Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	45.94	41.44	4.5	54	-8.06	110	20	Average
2390	56.04	51.54	4.5	74	-17.96	110	20	Peak
2452	95.58	90.98	4.6			110	20	Average
2452	102.94	98.34	4.6			110	20	Peak
2483.5	46.64	41.98	4.66	54	-7.36	110	20	Average
2483.5	63.23	58.57	4.66	74	-10.77	110	20	Peak
4904	41.56	31.42	10.14	54	-12.44	116	204	Average
4904	47.7	37.56	10.14	74	-26.3	116	204	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	**Emission Level (dBuV/m)**	**Read Level (dBuV)**	**Factor (dB/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Antenna Height (cm)**	**Table Angle (Degree)**	**Remark**
2390	47.82	43.32	4.5	54	-6.18	170	249	Average
2390	56.07	51.57	4.5	74	-17.93	170	249	Peak
2452	100.58	95.98	4.6			170	249	Average
2452	107.42	102.82	4.6			170	249	Peak
2483.5	53.9	49.24	4.66	54	-0.1	170	249	Average
2483.5	68.47	63.81	4.66	74	-5.53	170	249	Peak
4904	41.83	31.69	10.14	54	-12.17	137	275	Average
4904	46.88	36.74	10.14	74	-27.12	137	275	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value
2. 2452 MHz: Fundamental frequency.
3. The emission levels of other frequencies were very low against the limit.

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.

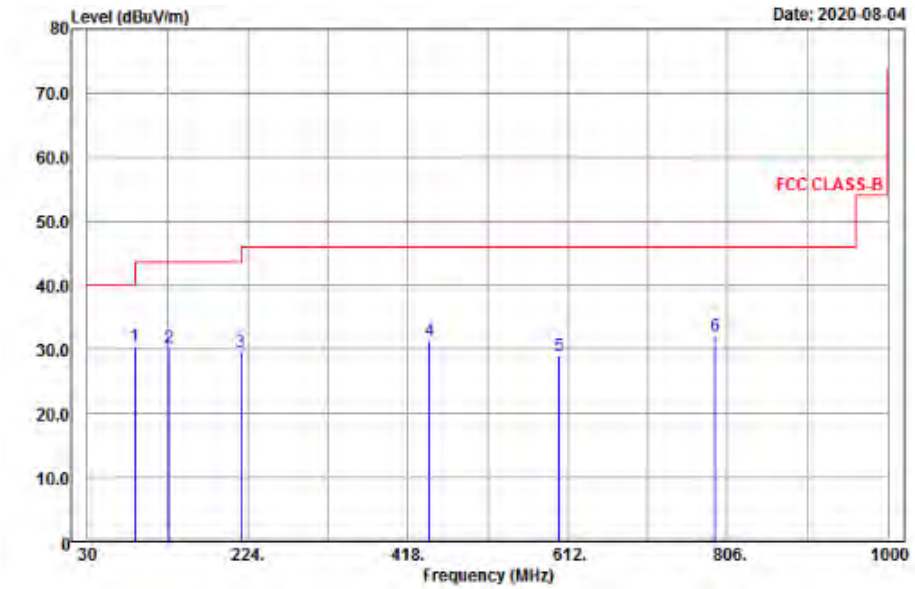
30 MHz ~ 1 GHz Worst-Case Data:

Mode A

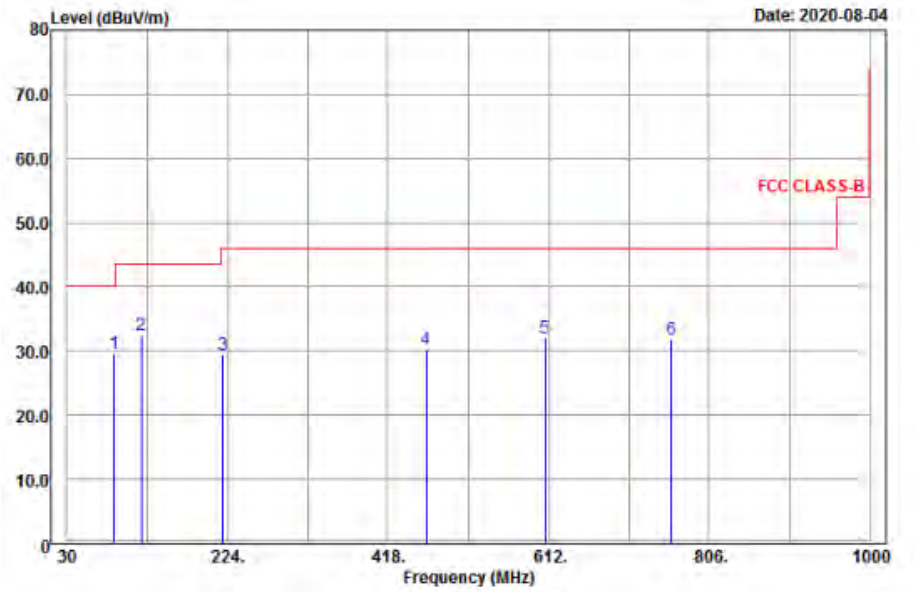
802.11ax (HE20)

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
88.05	30.54	50.1	43.5	-12.96	-19.56	125	188	Peak
128.82	30.28	50.67	43.5	-13.22	-20.39	173	68	Peak
216.3	29.74	47.69	46	-16.26	-17.95	120	55	Peak
444.9	31.37	44.72	46	-14.63	-13.35	188	206	Peak
601.7	28.94	39.48	46	-17.06	-10.54	113	68	Peak
790.7	32.01	39.85	46	-13.99	-7.84	172	11	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
86.7	29.71	49.8	40	-10.29	-20.09	132	58	Peak
120.18	32.54	51.98	43.5	-10.96	-19.44	176	315	Peak
218.73	29.53	47.41	46	-16.47	-17.88	102	44	Peak
463.8	30.25	43.32	46	-15.75	-13.07	136	78	Peak
607.3	32.07	42.56	46	-13.93	-10.49	185	261	Peak
759.9	31.78	40.05	46	-14.22	-8.27	104	284	Peak

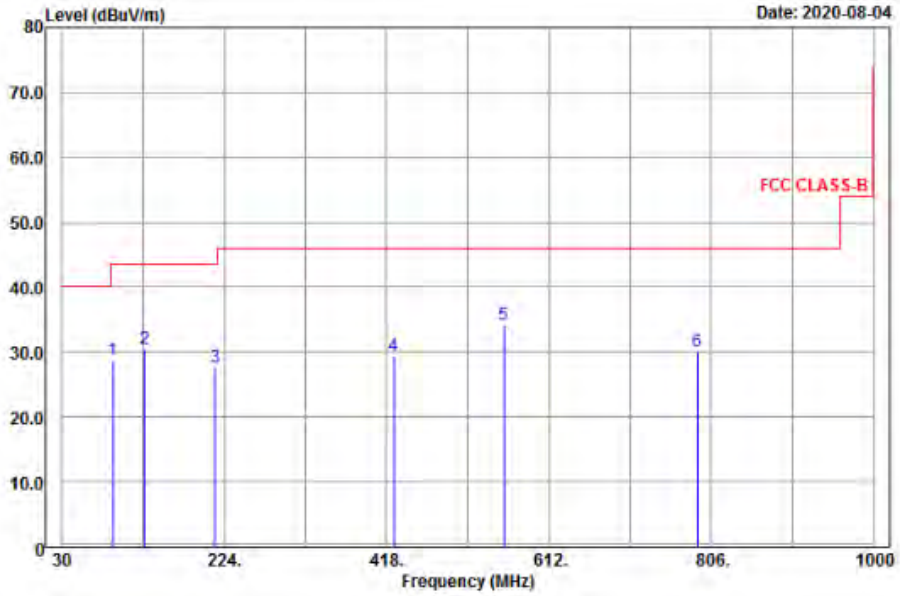
Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value.
2. The emission levels of other frequencies were very low against the limit.

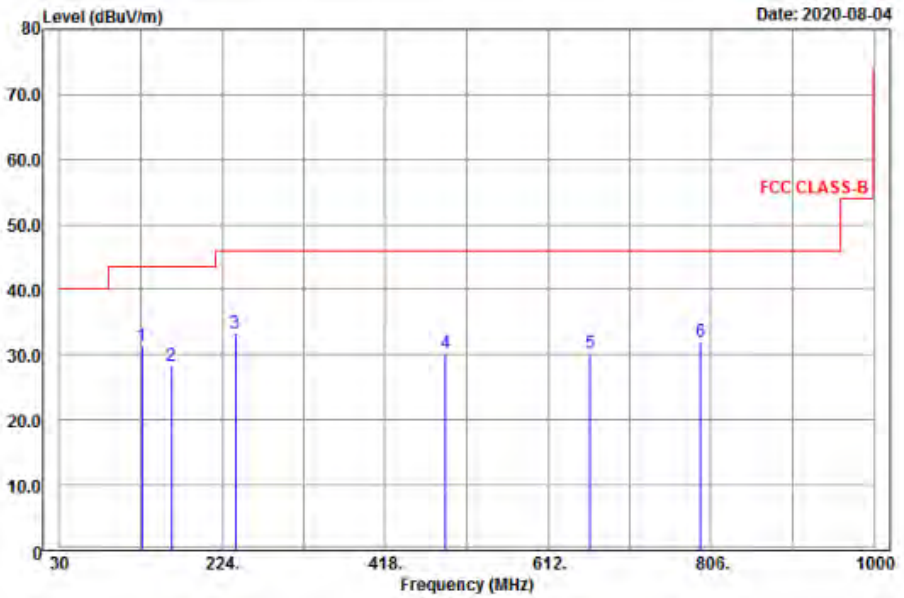
Mode B
802.11g

EUT Test Condition		Measurement Detail	
Channel	Channel 6	**Frequency Range**	30 MHz ~ 1 GHz
Input Power	120 Vac, 60 Hz	**Detector Function**	Peak (PK) Quasi-peak (QP)
Environmental Conditions	25 deg. C, 65 % RH	**Tested By**	Karl Lee

Horizontal



Vertical



Antenna Polarity & Test Distance: Horizontal at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
91.56	28.7	47.5	43.5	-14.8	-18.8	138	115	Peak
129.36	30.41	50.76	43.5	-13.09	-20.35	159	344	Peak
213.6	27.76	45.81	43.5	-15.74	-18.05	117	254	Peak
426.7	29.48	43.02	46	-16.52	-13.54	151	82	Peak
558.3	34.12	45.55	46	-11.88	-11.43	131	112	Peak
789.3	30.08	37.94	46	-15.92	-7.86	172	341	Peak
Antenna Polarity & Test Distance: Vertical at 3 m								
Frequency (MHz)	Emission Level (dBuV/m)	Read Level (dBuV)	Factor (dB/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (cm)	Table Angle (Degree)	Remark
128.01	31.41	51.69	43.5	-12.09	-20.28	162	312	Peak
163.38	28.27	48.77	43.5	-15.23	-20.5	153	74	Peak
239.25	33.3	50.35	46	-12.7	-17.05	115	146	Peak
490.4	30.35	42.84	46	-15.65	-12.49	156	19	Peak
662.6	30.36	40.19	46	-15.64	-9.83	177	14	Peak
793.5	32.02	39.8	46	-13.98	-7.78	168	21	Peak

Remarks:

1. Emission Level = Read Level + Factor
   Margin value = Emission level – Limit value.
2. The emission levels of other frequencies were very low against the limit.

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	ESR3	102412	Feb. 17, 2020	Feb. 16, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 05, 2019	Sep. 04, 2020
LISN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 20, 2020	Jan. 19, 2021
LISN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 13, 2019	Aug. 12, 2020
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 2 (Conduction 2).
3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

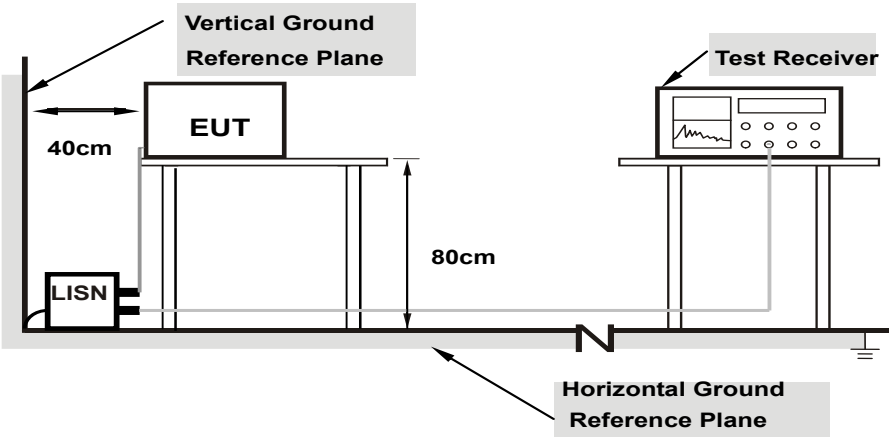
a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling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

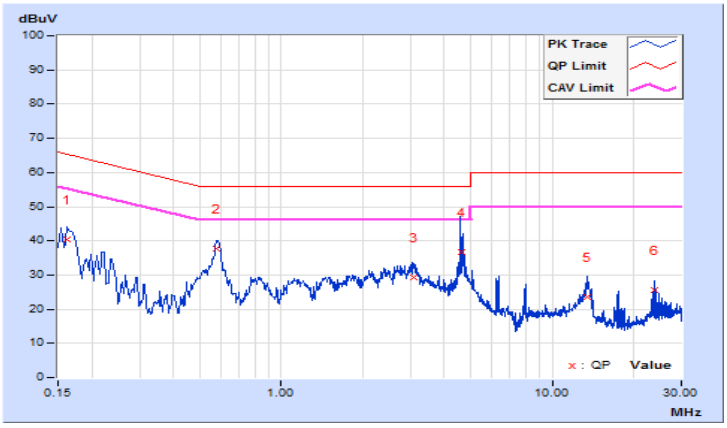
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 69%RH
Tested by	Tim Chen	Test Date	2020/8/3
Test Mode	Mode A		

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	0.16190	9.63	30.73	19.18	40.36	28.81	65.37	55.37	-25.01	-26.56
2	0.57342	9.66	28.03	21.12	37.69	30.78	56.00	46.00	-18.31	-15.22
3	3.07800	9.76	19.46	12.74	29.22	22.50	56.00	46.00	-26.78	-23.50
4	4.62600	9.80	26.93	16.09	36.73	25.89	56.00	46.00	-19.27	-20.11
5	13.55800	9.89	13.58	7.95	23.47	17.84	60.00	50.00	-36.53	-32.16
6	23.93400	9.91	15.53	12.14	25.44	22.05	60.00	50.00	-34.56	-27.95

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

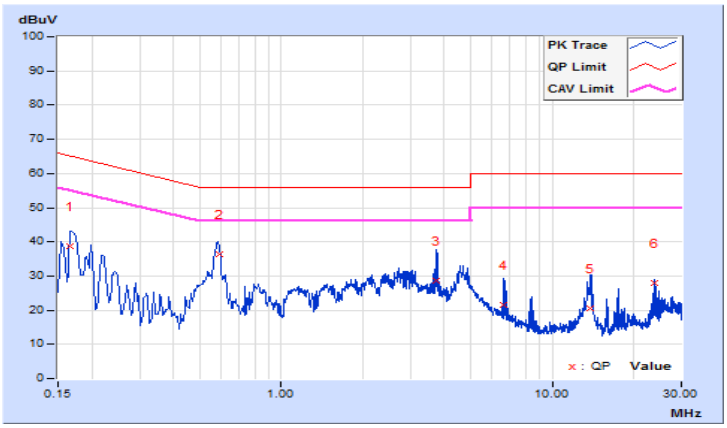


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 69%RH
Tested by	Tim Chen	Test Date	2020/8/3
Test Mode	Mode A		

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	0.16535	9.65	29.09	17.99	38.74	27.64	65.19	55.19	-26.45	-27.55
2	0.59400	9.68	26.78	19.72	36.46	29.40	56.00	46.00	-19.54	-16.60
3	3.72200	9.81	18.80	12.97	28.61	22.78	56.00	46.00	-27.39	-23.22
4	6.65400	9.86	11.75	7.68	21.61	17.54	60.00	50.00	-38.39	-32.46
5	13.86200	9.96	10.72	5.42	20.68	15.38	60.00	50.00	-39.32	-34.62
6	23.93000	10.05	17.88	17.00	27.93	27.05	60.00	50.00	-32.07	-22.95

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

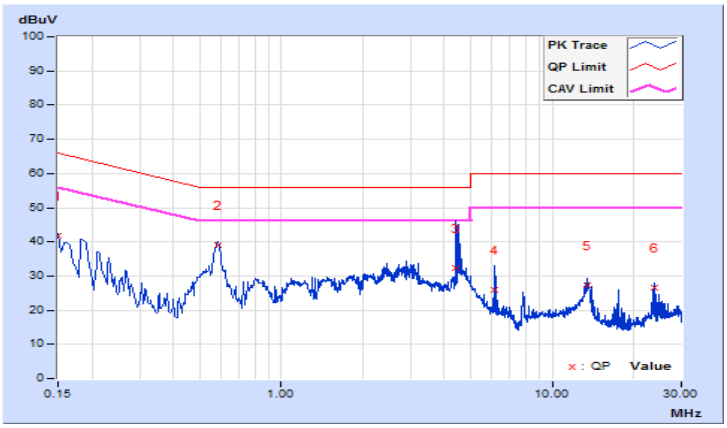


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 70%RH
Tested by	Tim Chen	Test Date	2020/8/3
Test Mode	Mode B		

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	0.15008	9.63	32.28	22.27	41.91	31.90	66.00	56.00	-24.09	-24.10
2	**0.58200**	**9.66**	**29.53**	**23.66**	**39.19**	**33.32**	**56.00**	**46.00**	**-16.81**	**-12.68**
3	4.42200	9.80	22.60	11.89	32.40	21.69	56.00	46.00	-23.60	-24.31
4	6.09400	9.82	16.12	2.65	25.94	12.47	60.00	50.00	-34.06	-37.53
5	13.45800	9.89	17.48	13.60	27.37	23.49	60.00	50.00	-32.63	-26.51
6	23.92600	9.91	16.70	15.98	26.61	25.89	60.00	50.00	-33.39	-24.11

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

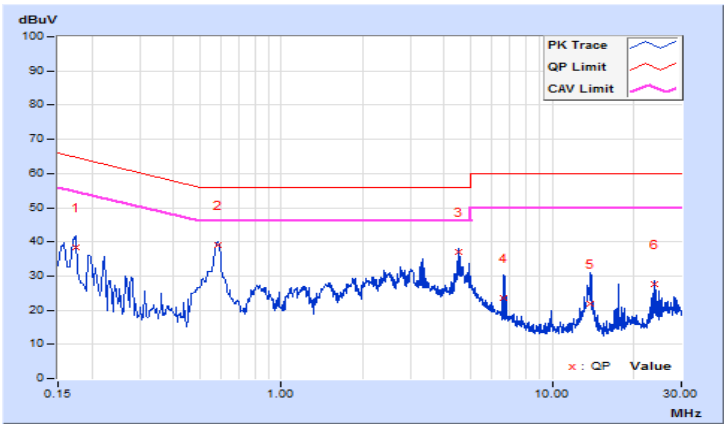


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23℃, 70%RH
Tested by	Tim Chen	Test Date	2020/8/3
Test Mode	Mode B		

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	0.17400	9.65	28.69	17.17	38.34	26.82	64.77	54.77	-26.43	-27.95
2	0.58563	9.68	29.25	23.50	38.93	33.18	56.00	46.00	-17.07	-12.82
3	4.49800	9.83	27.24	15.17	37.07	25.00	56.00	46.00	-18.93	-21.00
4	6.59400	9.86	13.69	1.47	23.55	11.33	60.00	50.00	-36.45	-38.67
5	13.90600	9.96	12.01	4.79	21.97	14.75	60.00	50.00	-38.03	-35.25
6	23.92600	10.05	17.54	16.55	27.59	26.60	60.00	50.00	-32.41	-23.40

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

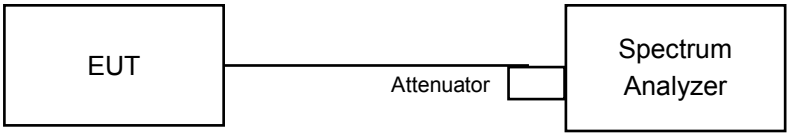


4.3 6 dB Bandwidth Measurement

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

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

4.3.5 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

Mode A

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	7.11	6.60	0.5	Pass
6	2437	7.07	7.09	0.5	Pass
11	2462	7.11	7.10	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	16.45	16.46	0.5	Pass
6	2437	16.42	16.42	0.5	Pass
11	2462	16.40	16.41	0.5	Pass

802.11ax (HE20)

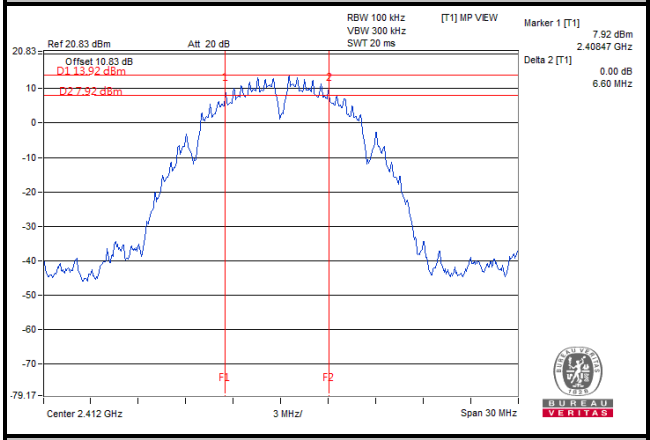
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	19.06	19.05	0.5	Pass
6	2437	19.07	17.70	0.5	Pass
11	2462	19.08	19.06	0.5	Pass

802.11ax (HE40)

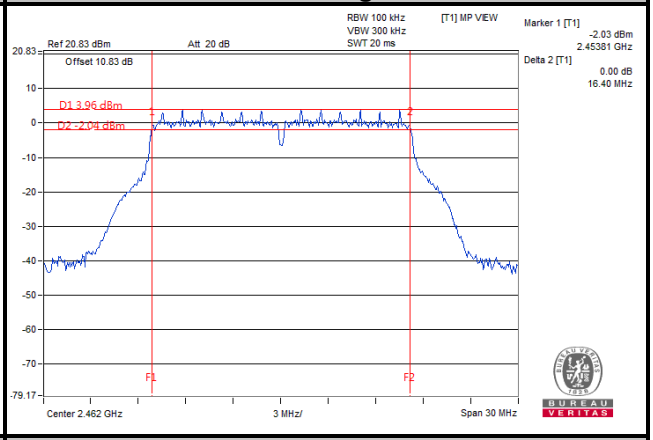
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	37.75	37.50	0.5	Pass
6	2437	37.74	36.86	0.5	Pass
9	2452	37.78	37.57	0.5	Pass

Spectrum Plot of Worst Value

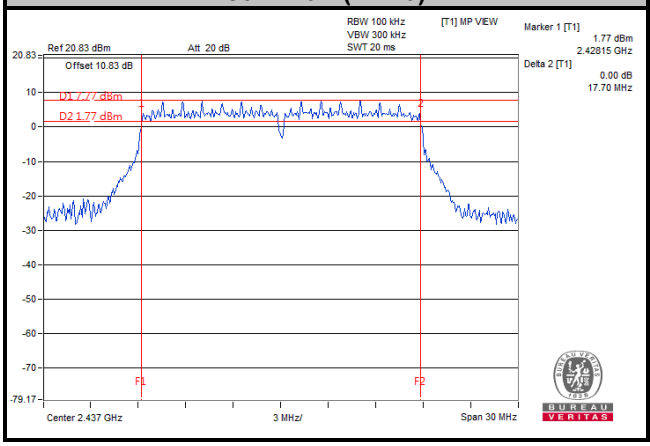
802.11b



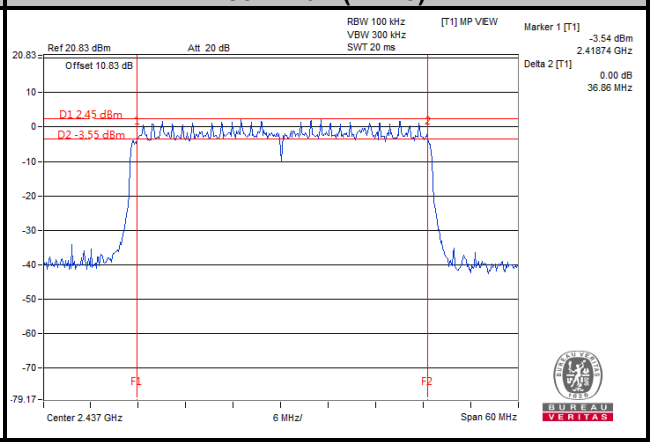
802.11g



802.11ax (HE20)



802.11ax (HE40)



Mode B

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	7.09	0.5	Pass
6	2437	9.11	0.5	Pass
11	2462	7.11	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	16.44	0.5	Pass
6	2437	16.40	0.5	Pass
11	2462	16.40	0.5	Pass

802.11ax (HE20)

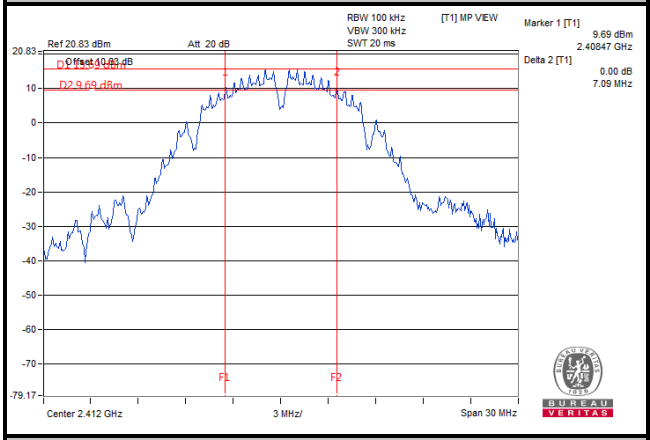
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
1	2412	17.69	0.5	Pass
6	2437	18.95	0.5	Pass
11	2462	17.68	0.5	Pass

802.11ax (HE40)

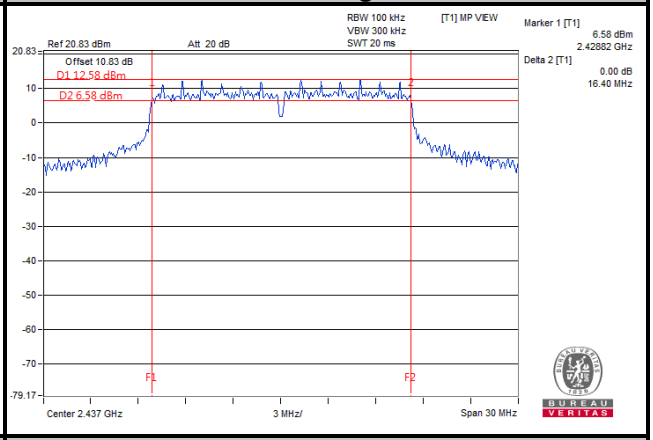
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Minimum Limit (MHz)	Pass / Fail
3	2422	36.43	0.5	Pass
6	2437	37.74	0.5	Pass
9	2452	36.45	0.5	Pass

Spectrum Plot of Worst Value

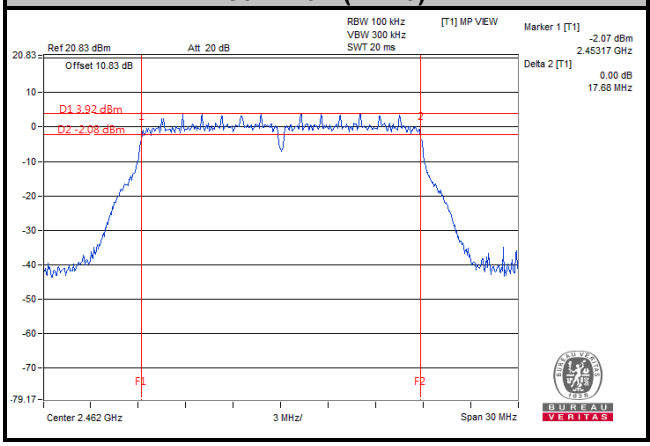
802.11b



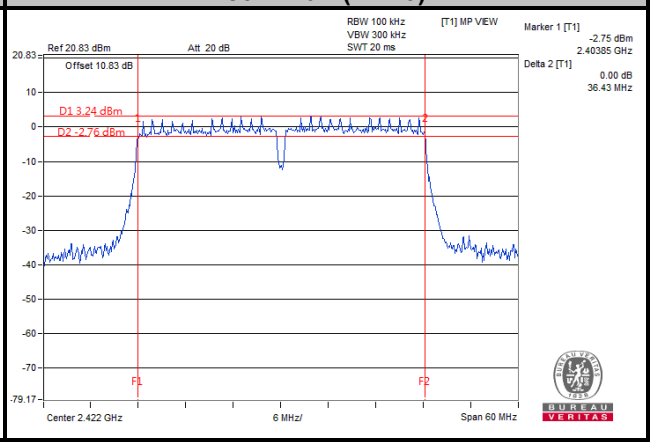
802.11g



802.11ax (HE20)

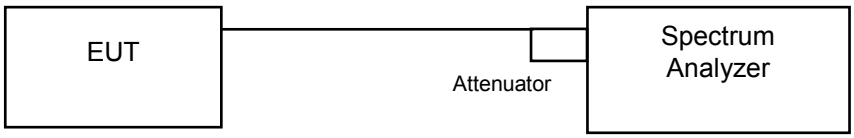


802.11ax (HE40)



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

Mode A

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	10.56	10.56	Pass
6	2437	13.08	12.24	Pass
11	2462	10.68	10.32	Pass

802.11g

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

802.11ax (HE20)

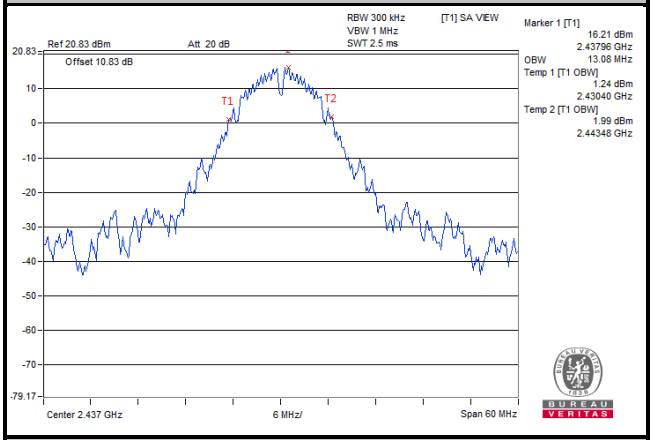
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	19.08	19.20	Pass
6	2437	19.20	18.12	Pass
11	2462	19.08	19.20	Pass

802.11ax (HE40)

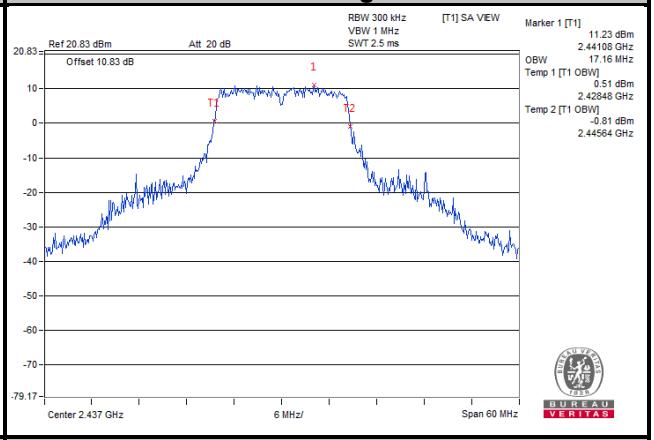
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
3	2422	37.92	37.92	Pass
6	2437	37.92	37.92	Pass
9	2452	37.68	37.68	Pass

Spectrum Plot of Worst Value

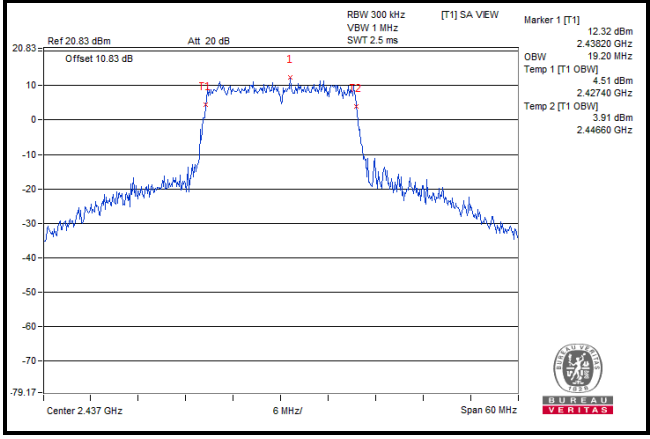
802.11b



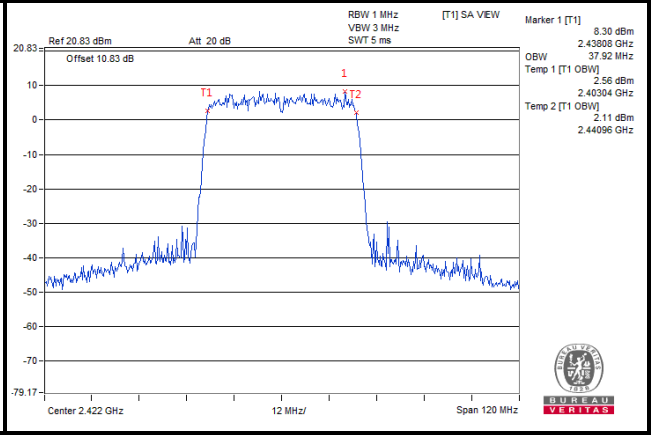
802.11g



802.11ax (HE20)



802.11ax (HE40)



Mode B

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	11.64	Pass
6	2437	15.12	Pass
11	2462	10.68	Pass

802.11g

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	16.92	Pass
6	2437	20.52	Pass
11	2462	17.04	Pass

802.11ax (HE20)

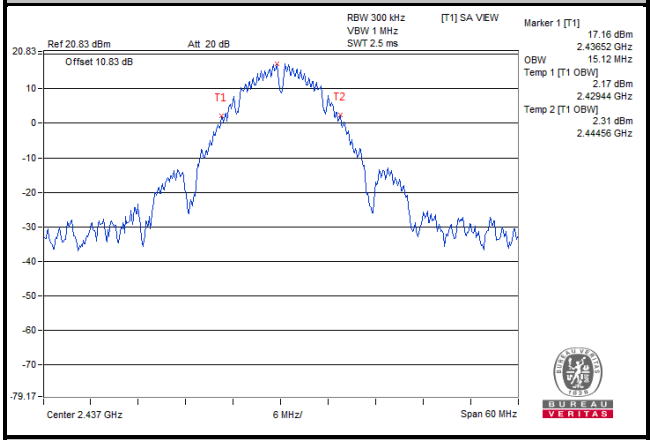
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
1	2412	18.00	Pass
6	2437	19.56	Pass
11	2462	18.12	Pass

802.11ax (HE40)

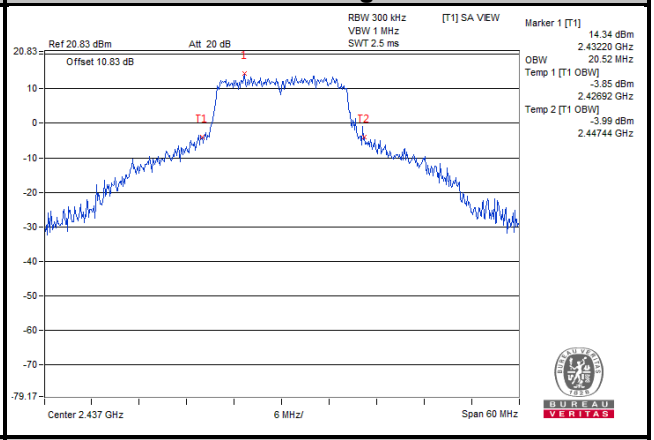
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)	Pass / Fail
3	2422	36.48	Pass
6	2437	37.92	Pass
9	2452	36.72	Pass

Spectrum Plot of Worst Value

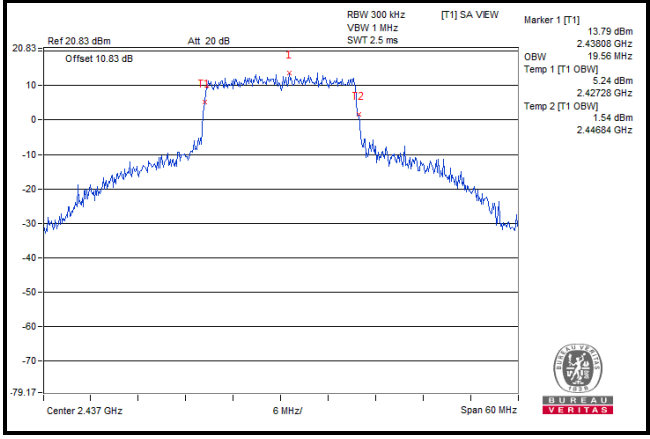
802.11b



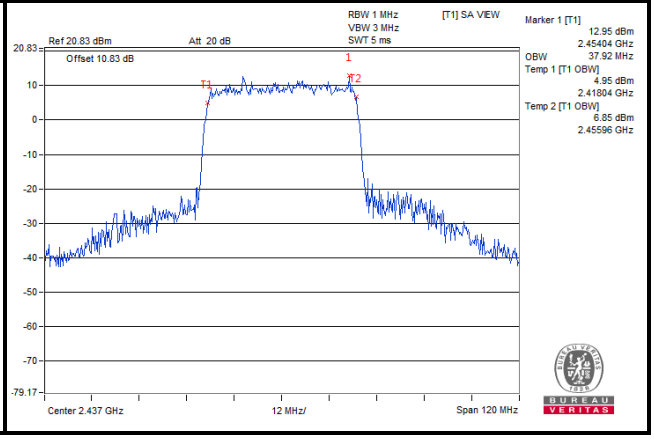
802.11g



802.11ax (HE20)



802.11ax (HE40)



4.5 Conducted Output Power Measurement

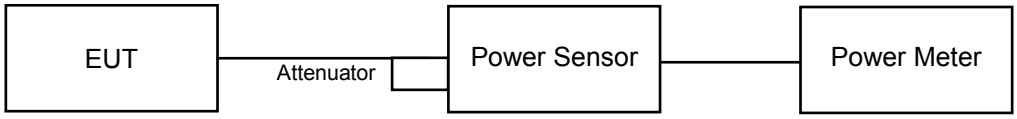
4.5.1 Limits of Conducted Output Power Measurement

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 ≤ 4;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any NANT;
Array Gain = 5 log(NANT/NSS) dB or 3 dB, whichever is less for 20 MHz channel widths with NANT ≥ 5.

For power measurements on all other devices: Array Gain = 10 log(NANT/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

Mode A

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.23	20.95	257.191	24.10	30	Pass
6	2437	23.80	23.53	465.307	26.68	30	Pass
11	2462	20.08	19.66	194.329	22.89	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	15.22	15.01	64.962	18.13	30	Pass
6	2437	20.08	19.81	197.579	22.96	30	Pass
11	2462	15.52	15.29	69.452	18.42	30	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	13.93	13.85	48.983	16.90	30	Pass
6	2437	19.81	19.76	190.343	22.80	30	Pass
11	2462	13.79	13.75	47.647	16.78	30	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	13.92	13.90	49.207	16.92	30	Pass
6	2437	15.99	15.87	78.356	18.94	30	Pass
9	2452	13.86	13.76	48.09	16.82	30	Pass

Mode B

802.11b

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	239.332	23.79	30	Pass
6	2437	399.945	26.02	30	Pass
11	2462	136.458	21.35	30	Pass

802.11g

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	79.616	19.01	30	Pass
6	2437	252.348	24.02	30	Pass
11	2462	66.069	18.20	30	Pass

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
1	2412	68.707	18.37	30	Pass
6	2437	193.642	22.87	30	Pass
11	2462	44.361	16.47	30	Pass

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (mW)	Average Power (dBm)	Limit (dBm)	Pass / Fail
3	2422	65.013	18.13	30	Pass
6	2437	66.222	18.21	30	Pass
9	2452	38.815	15.89	30	Pass

Beamforming Mode

Mode A

802.11ax (HE20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	13.93	13.85	48.983	16.90	30	Pass
6	2437	19.81	19.76	190.343	22.80	30	Pass
11	2462	13.79	13.75	47.647	16.78	30	Pass

NOTE: Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ = 5.81dBi < 6 dBi, so the limit no need to be reduced.

802.11ax (HE40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	13.92	13.90	49.207	16.92	30	Pass
6	2437	15.99	15.87	78.356	18.94	30	Pass
9	2452	13.86	13.76	48.09	16.82	30	Pass

NOTE: Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ = 5.81dBi < 6 dBi, so the limit no need to be reduced.

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 kHz ≤ RBW ≤ 100 kHz.
d. Set the VBW ≥ 3 × 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 < 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 kHz ≤ RBW ≤ 100 kHz.
e. Set VBW ≥3 x RBW.
f. Detector = power averaging (RMS) or sample detector (when RMS not available).
g. Ensure that the number of measurement points in the sweep ≥ 2 x span/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

Mode A

802.11b

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	-8.32	3.01	0.22	-5.09	8	Pass
	6	2437	-5.68	3.01	0.22	-2.45	8	Pass
	11	2462	-10.13	3.01	0.22	-6.9	8	Pass
1	1	2412	-8.53	3.01	0.22	-5.3	8	Pass
	6	2437	-4.75	3.01	0.22	-1.52	8	Pass
	11	2462	-10.26	3.01	0.22	-7.03	8	Pass

NOTE:

1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N_{ANT}]$ = 5.81dBi < 6 dBi, so the limit no need to be reduced.
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	-16.52	3.01	0.26	-13.25	8	Pass
	6	2437	-11.1	3.01	0.26	-7.83	8	Pass
	11	2462	-16.31	3.01	0.26	-13.04	8	Pass
1	1	2412	-15.86	3.01	0.26	-12.59	8	Pass
	6	2437	-10.64	3.01	0.26	-7.37	8	Pass
	11	2462	-15.21	3.01	0.26	-11.94	8	Pass

NOTE:

1. Directional gain = 10log[(10G1/20 + 10G2/20 + …. + 10GN/20)2 / NANT] = 5.81dBi < 6 dBi, so the limit no need to be reduced.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

802.11ax (HE20)

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	-19.29	3.01	0.10	-16.18	8	Pass
	6	2437	-12.02	3.01	0.10	-8.91	8	Pass
	11	2462	-18.08	3.01	0.10	-14.97	8	Pass
1	1	2412	-17.59	3.01	0.10	-14.48	8	Pass
	6	2437	-12.12	3.01	0.10	-9.01	8	Pass
	11	2462	-16.27	3.01	0.10	-13.16	8	Pass

NOTE:

1. Directional gain = 10log[(10G1/20 + 10G2/20 + …. + 10GN/20)2 / NANT] = 5.81dBi < 6 dBi, so the limit no need to be reduced.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

802.11ax (HE40)

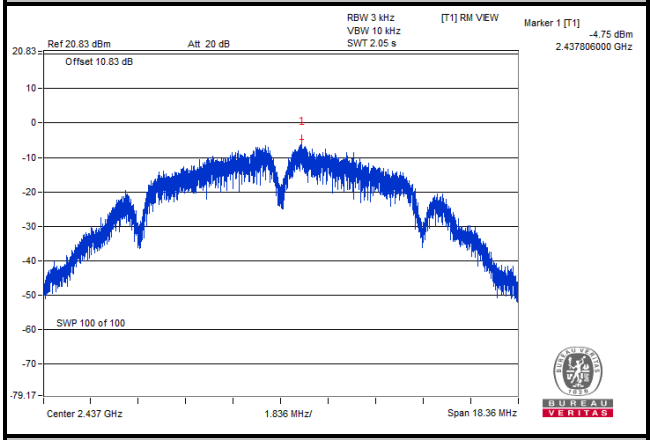
TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Duty Factor (dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-22.01	3.01	0.18	-18.82	8	Pass
	6	2437	-19.5	3.01	0.18	-16.31	8	Pass
	9	2452	-21.11	3.01	0.18	-17.92	8	Pass
1	3	2422	-21.61	3.01	0.18	-18.42	8	Pass
	6	2437	-19.3	3.01	0.18	-16.11	8	Pass
	9	2452	-20.9	3.01	0.18	-17.71	8	Pass

NOTE:

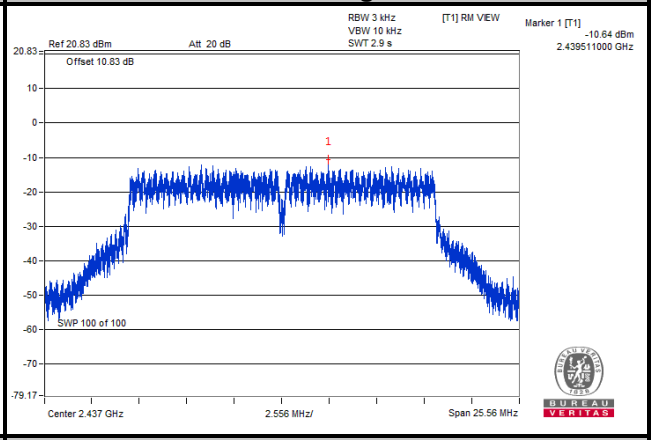
1. Directional gain = 10log[(10G1/20 + 10G2/20 + …. + 10GN/20)2 / NANT] = 5.81dBi < 6 dBi, so the limit no need to be reduced.
2. Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

Spectrum Plot of Worst Value

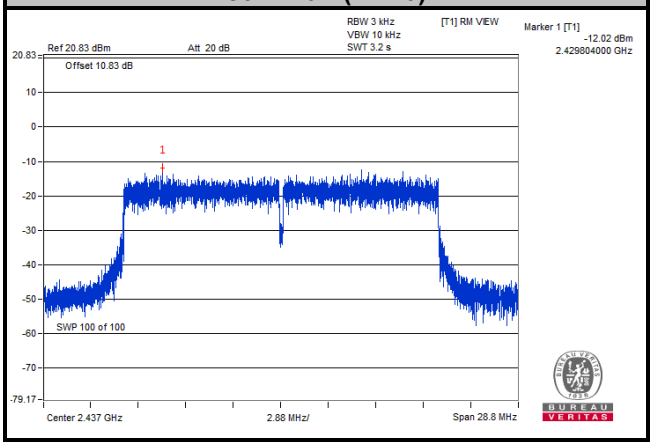
802.11b



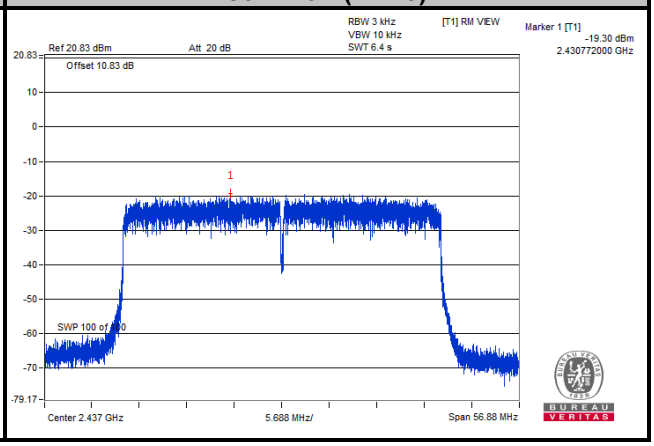
802.11g



802.11ax (HE20)



802.11ax (HE40)



Mode B

802.11b

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-7.74	8	Pass
6	2437	-5.19	8	Pass
11	2462	-9.55	8	Pass

802.11g

Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-13.02	8	Pass
6	2437	-8.53	8	Pass
11	2462	-14.16	8	Pass

802.11ax (HE20)

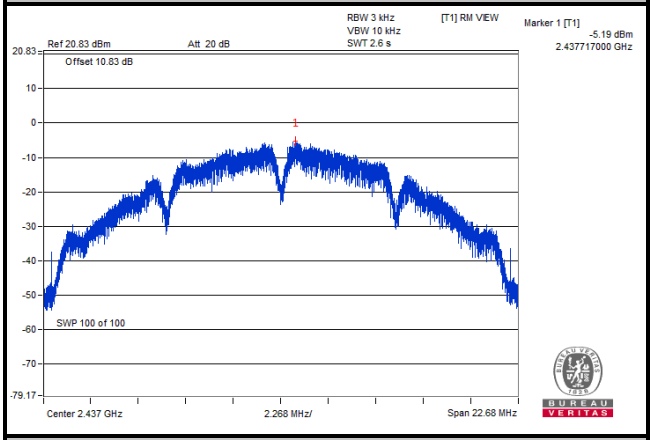
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
1	2412	-14.07	8	Pass
6	2437	-10.42	8	Pass
11	2462	-16.94	8	Pass

802.11ax (HE40)

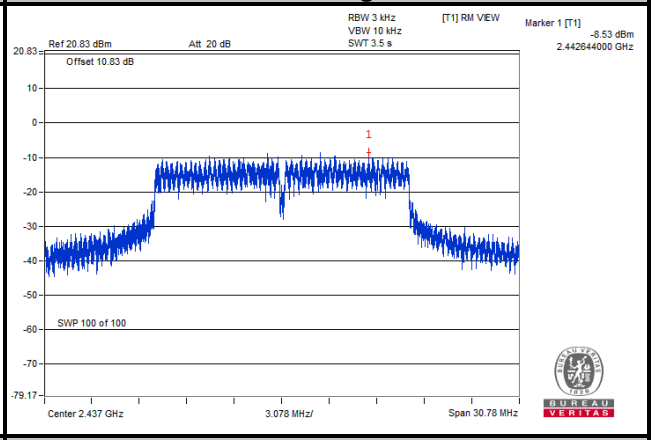
Channel	Frequency (MHz)	PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
3	2422	-16.69	8	Pass
6	2437	-17.96	8	Pass
9	2452	-19.35	8	Pass

Spectrum Plot of Worst Value

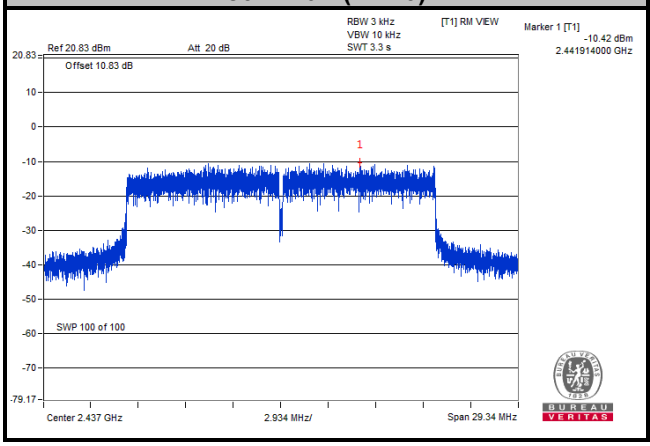
802.11b



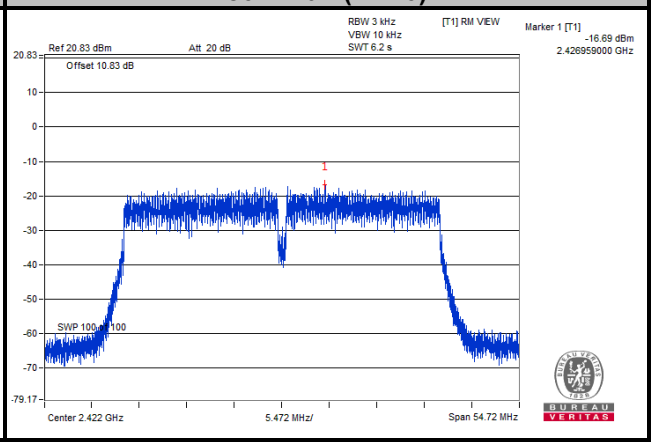
802.11g



802.11ax (HE20)



802.11ax (HE40)

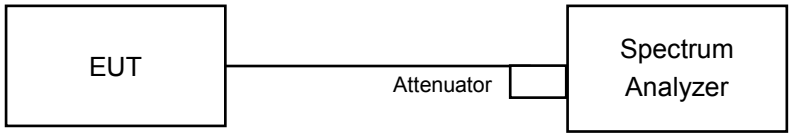


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

Below -20 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 ≥ 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 OOBE

1. Set RBW = 100 kHz.
2. Set VBW ≥ 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.

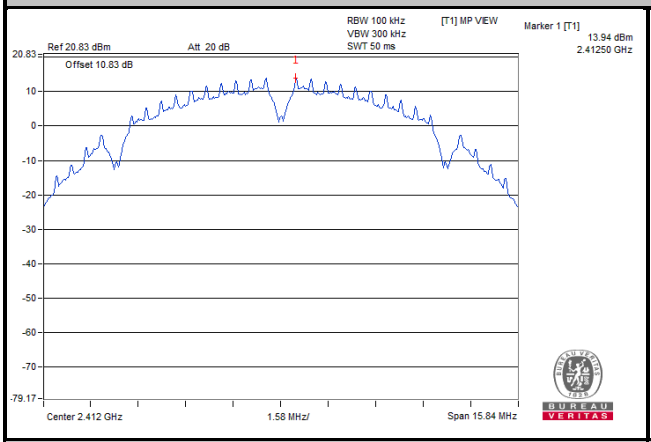
The spectrum plots are attached on the following images. D1 line indicates the highest level, and D2 line indicates the 30 dB offset below D1. It shows compliance with the requirement.

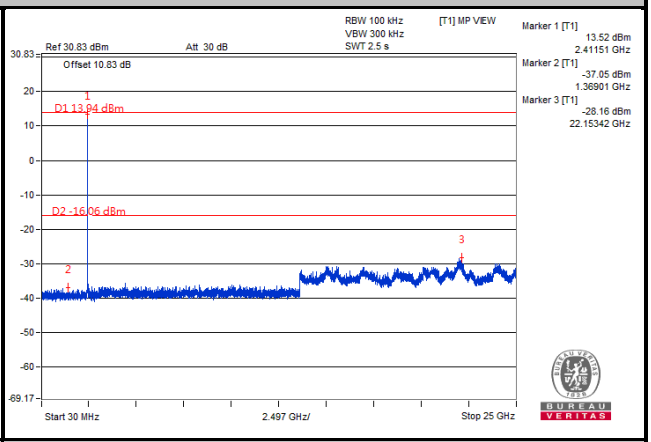
Mode A

802.11b

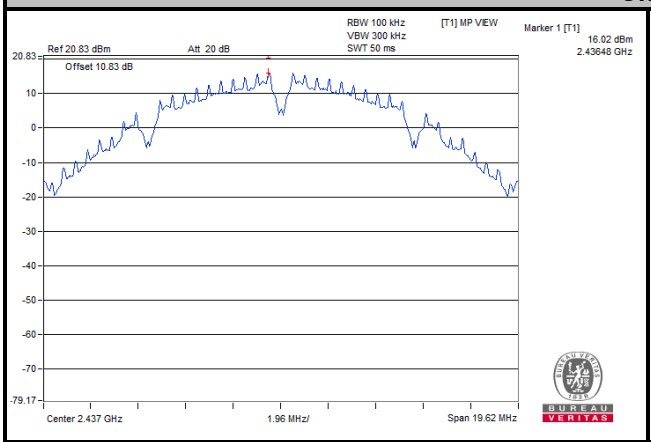
CHAIN 0

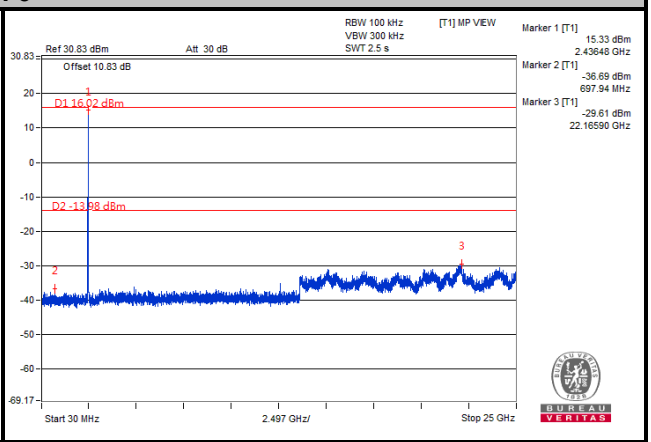
Ch 1



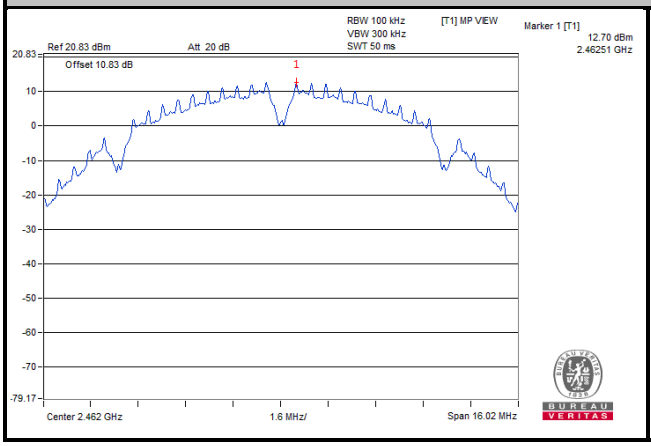


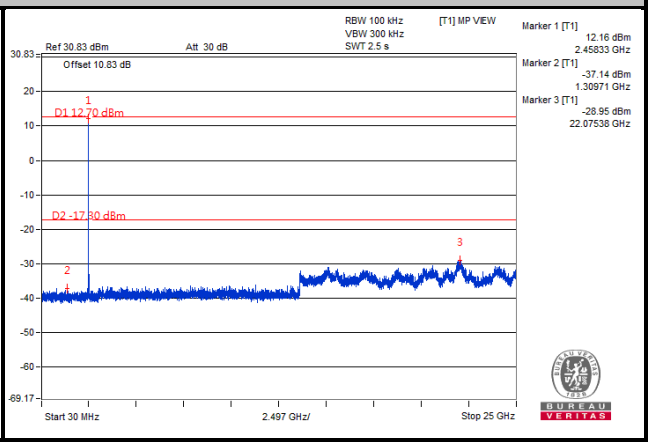
Ch 6

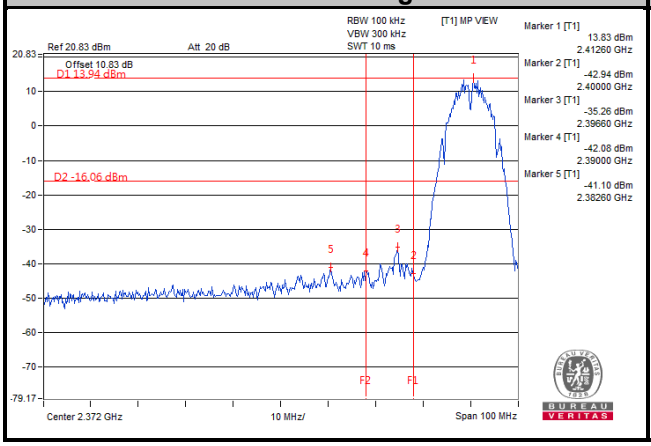
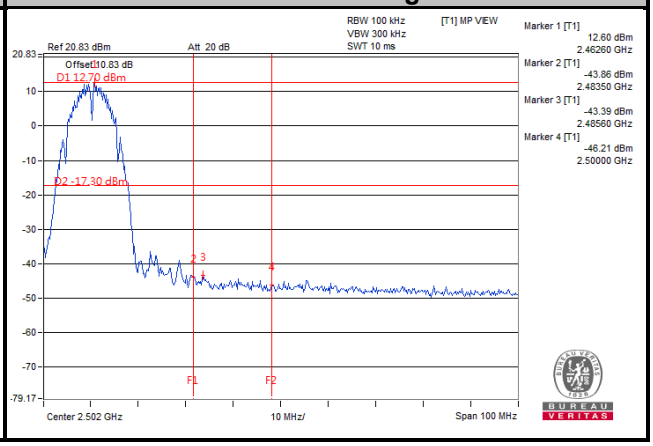




Ch 11

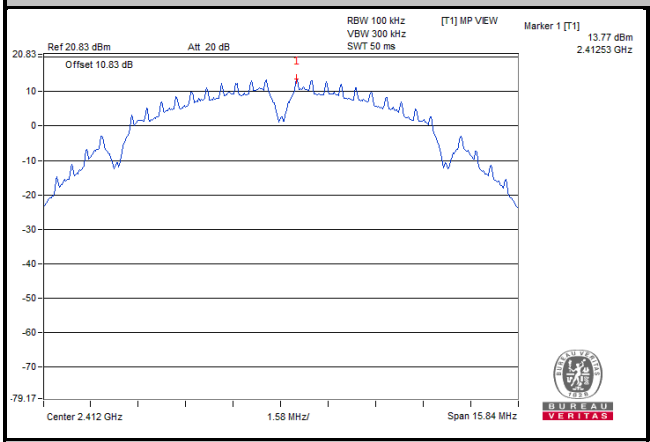


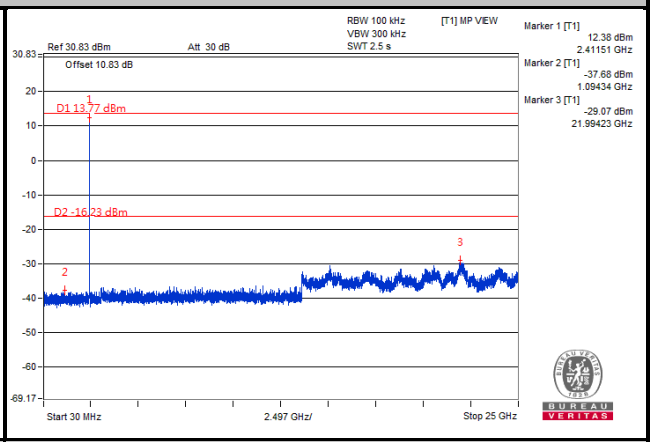


Ch 1 Band Edge	Ch 11 Band Edge
	

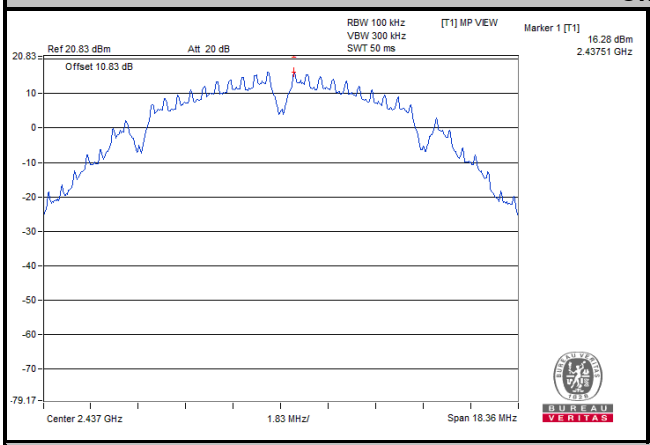
CHAIN 1

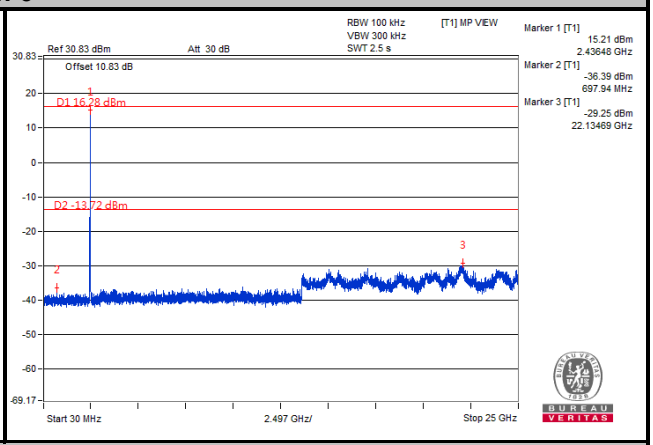
Ch 1



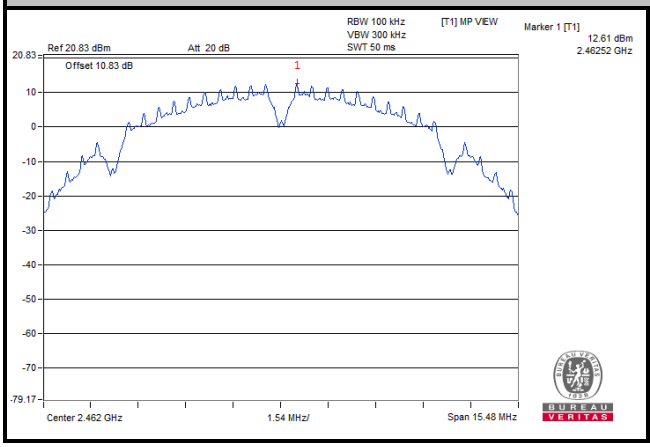


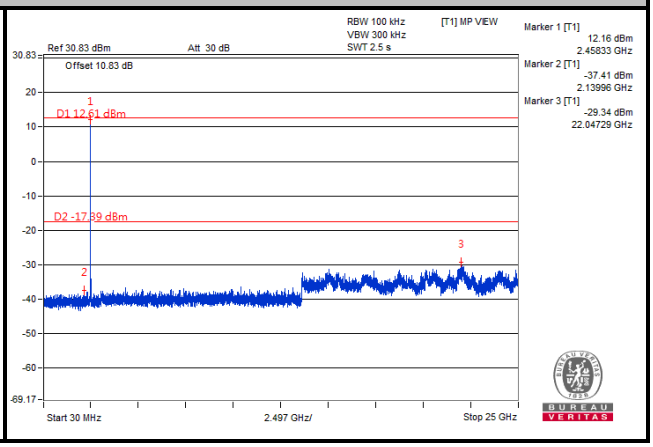
Ch 6

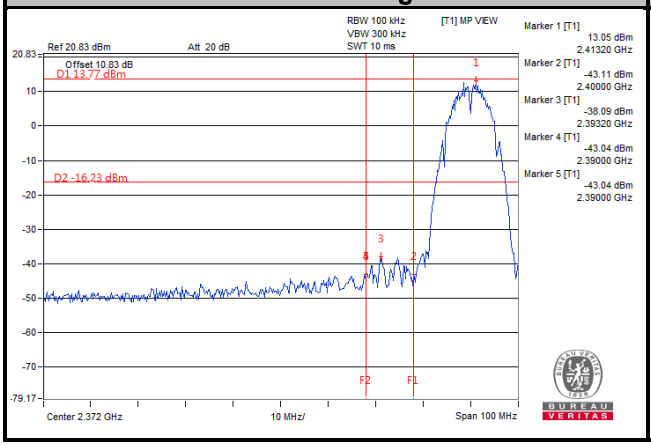
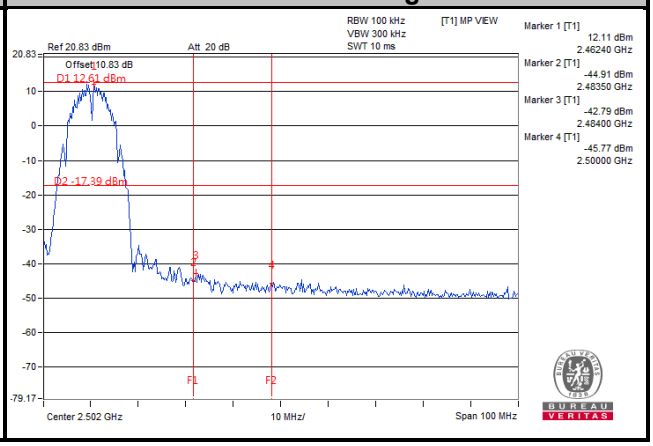




Ch 11



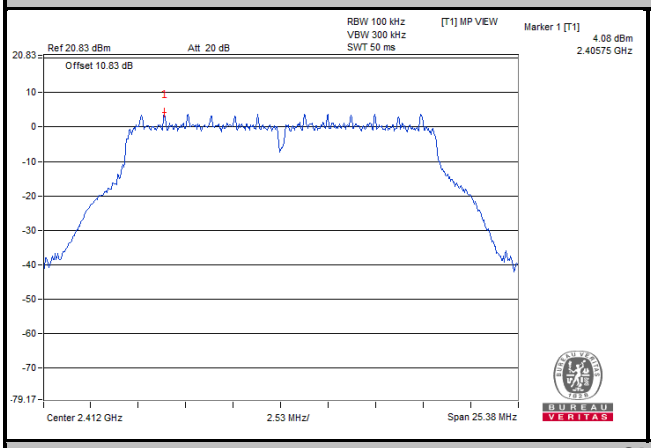


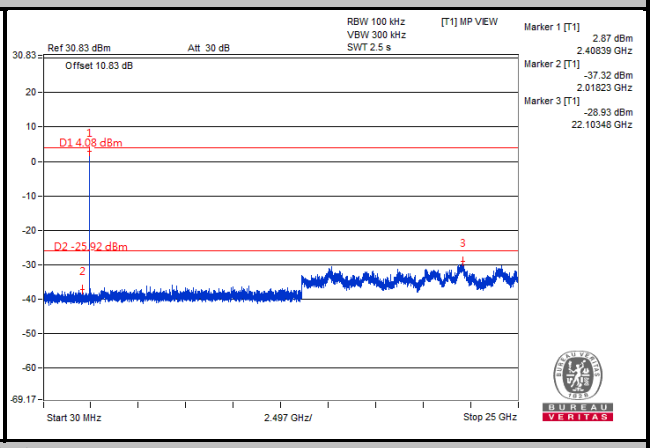
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11g

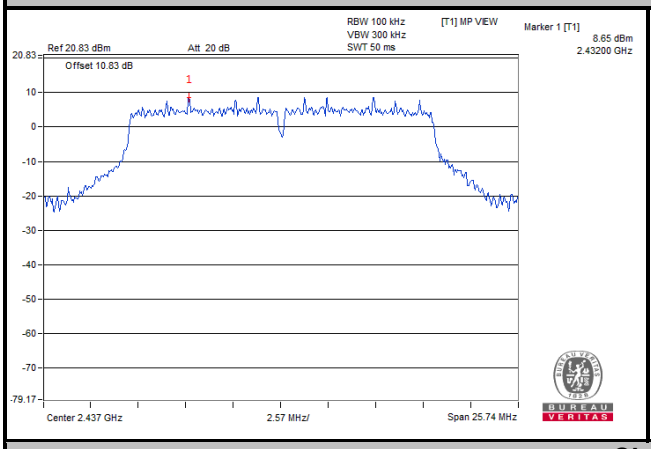
CHAIN 0

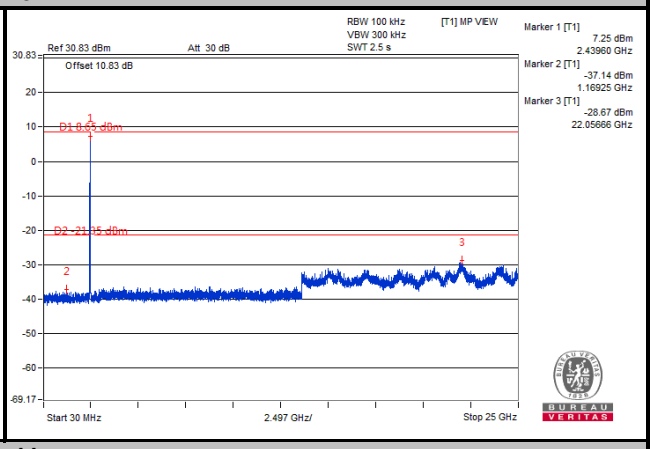
Ch 1



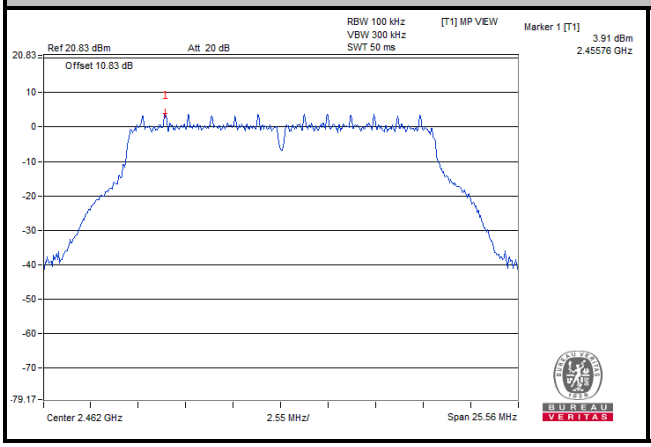


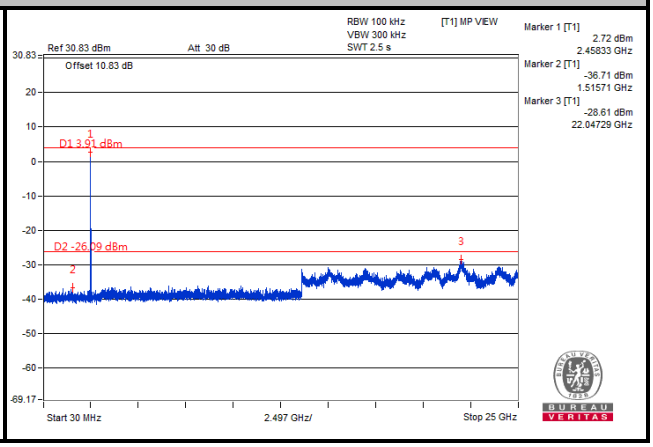
Ch 6



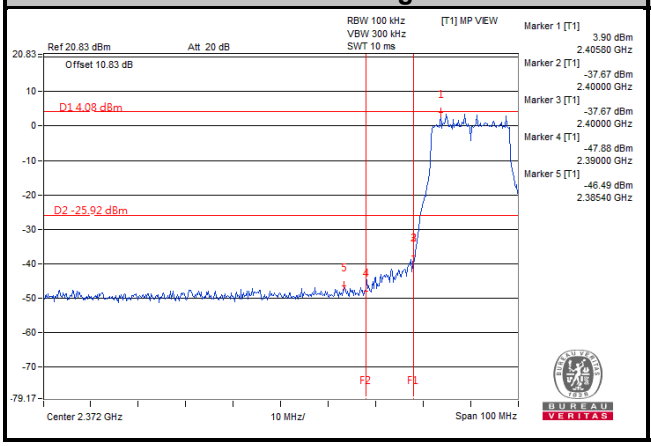


Ch 11

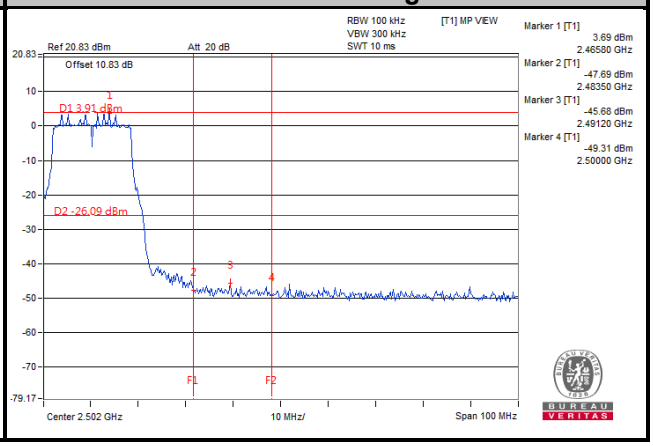




Ch 1 Band Edge

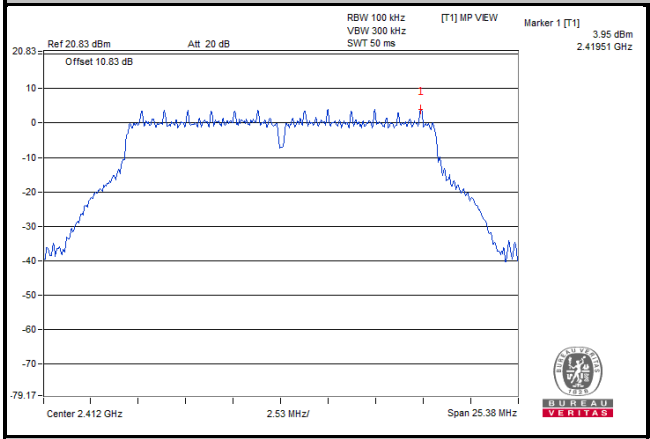


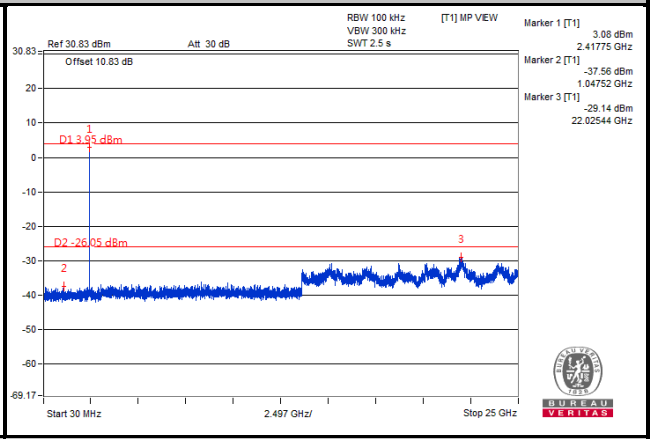
Ch 11 Band Edge



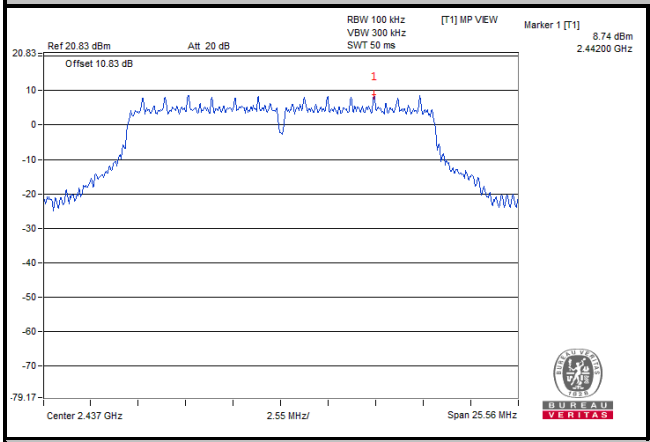
CHAIN 1

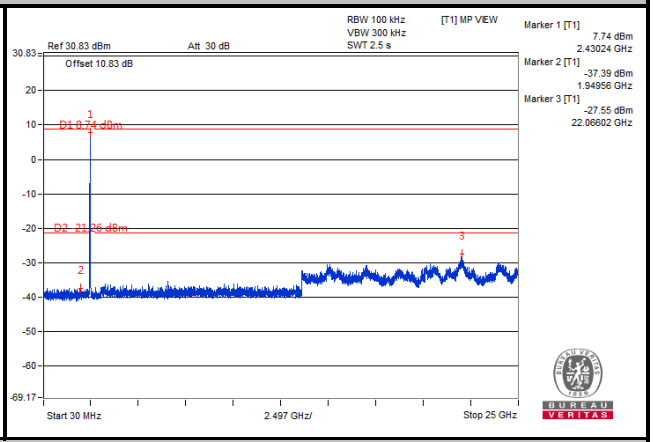
Ch 1



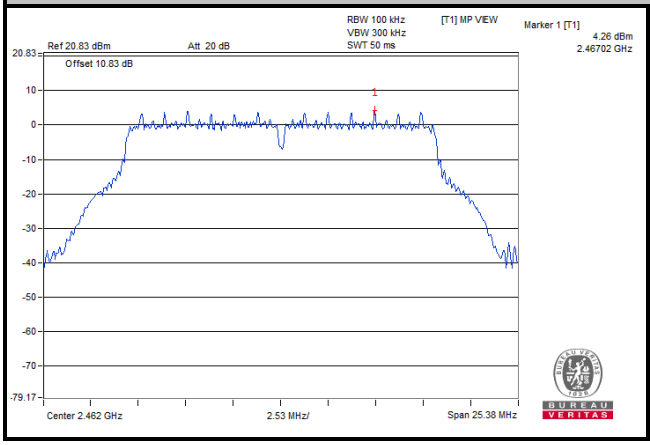


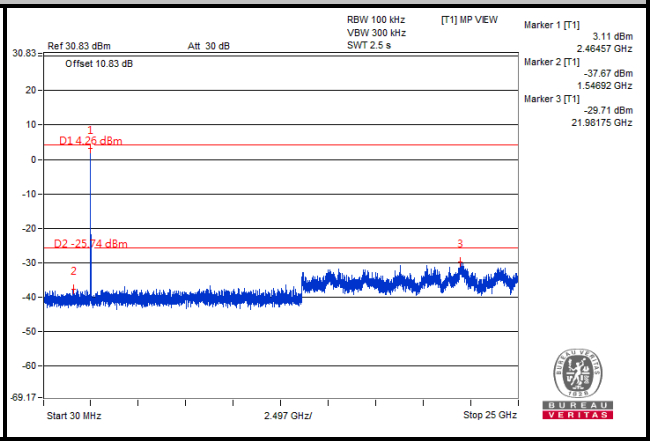
Ch 6

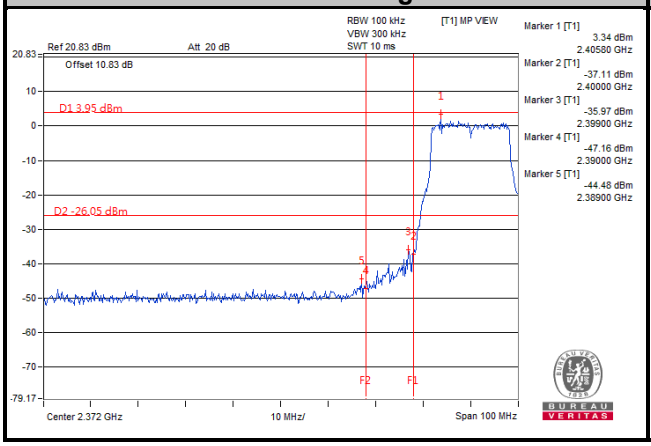
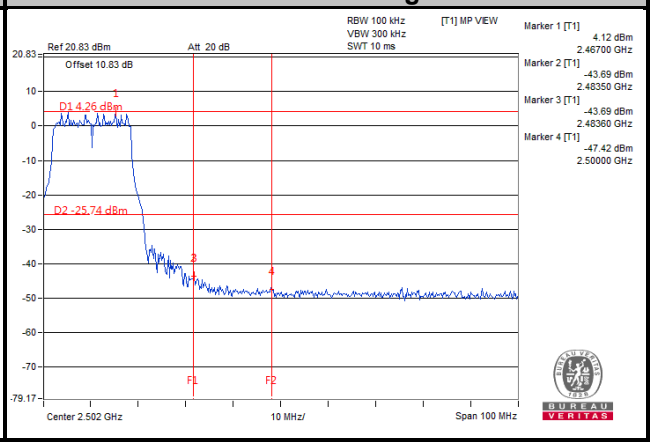




Ch 11



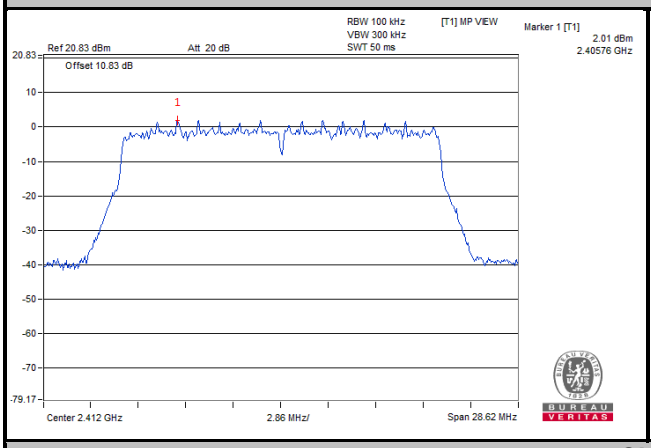


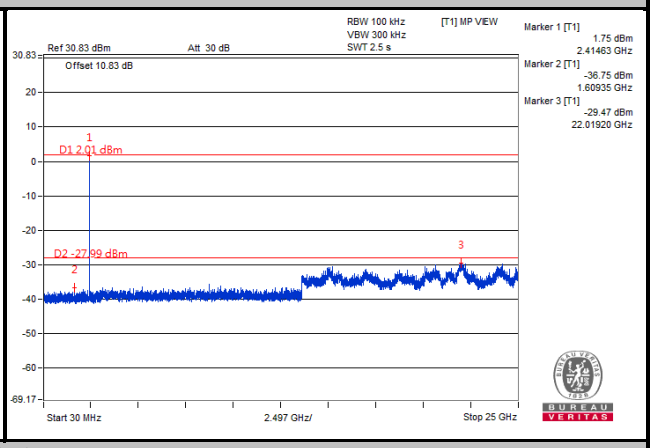
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11ax (HE20)

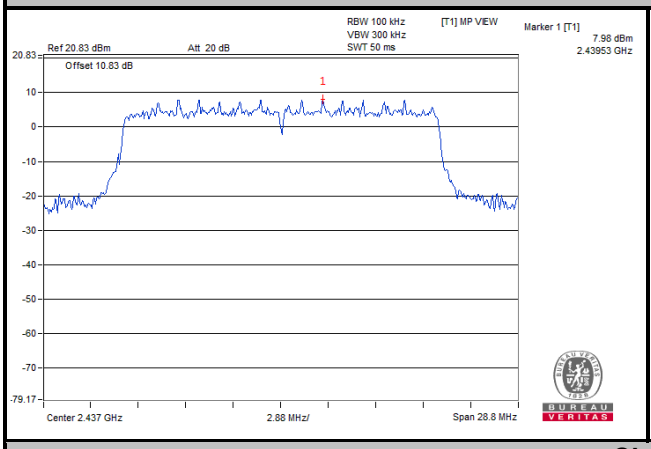
CHAIN 0

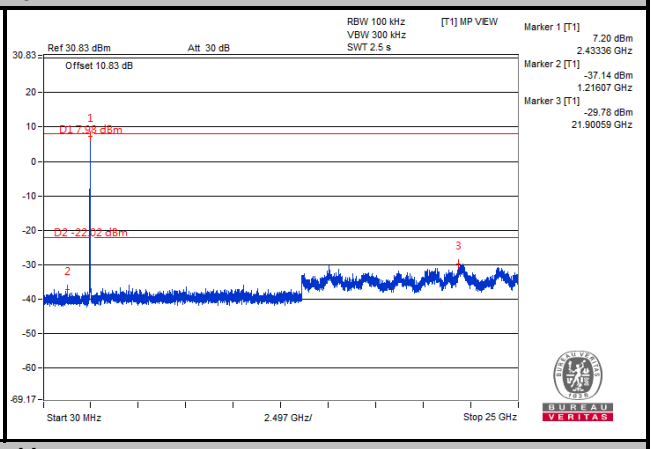
Ch 1



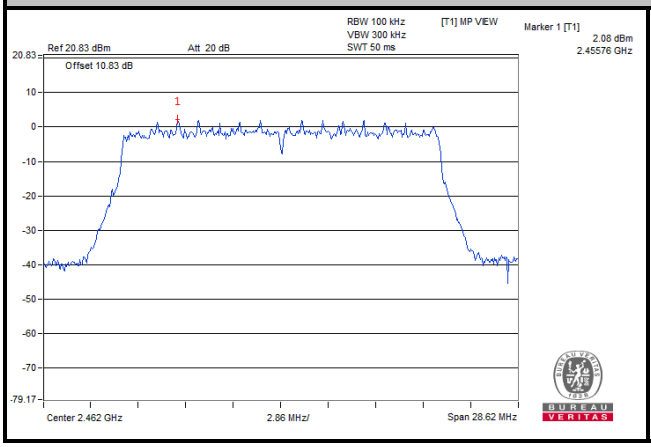


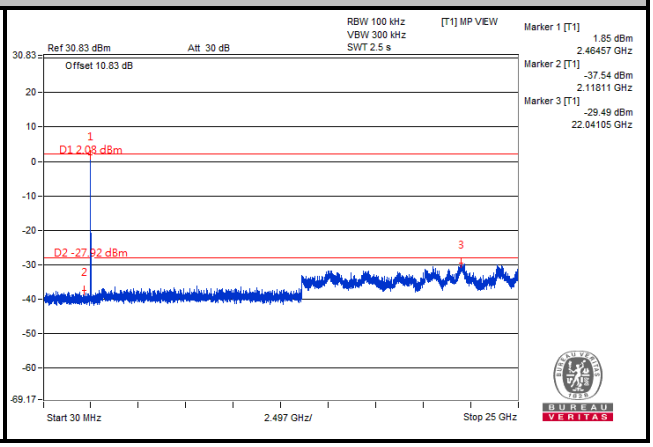
Ch 6

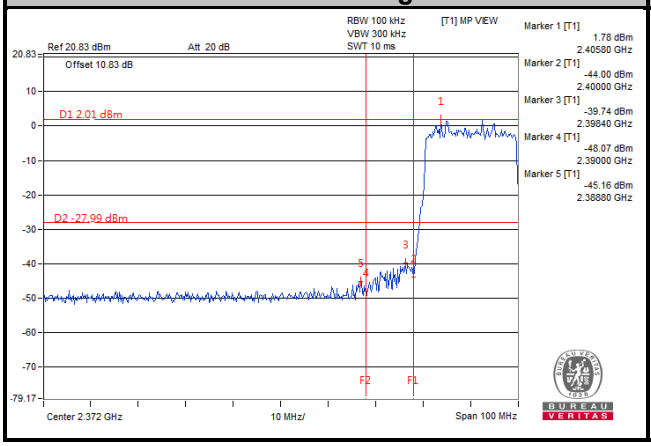
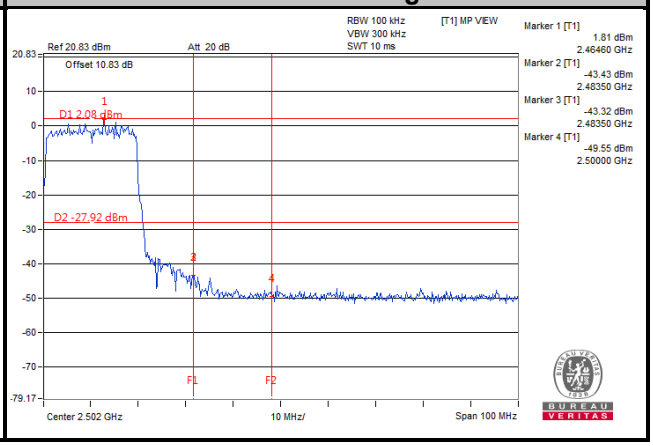




Ch 11

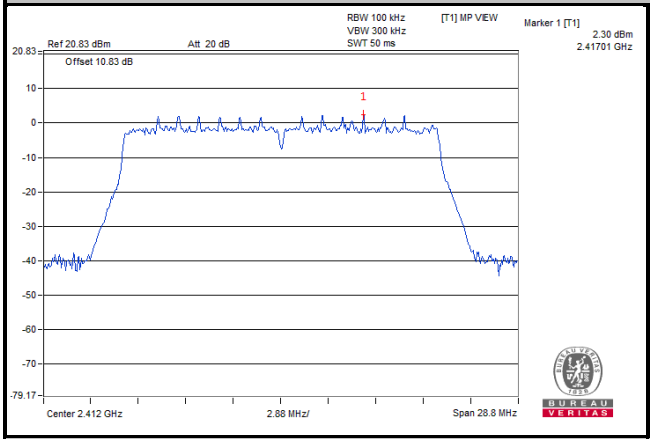


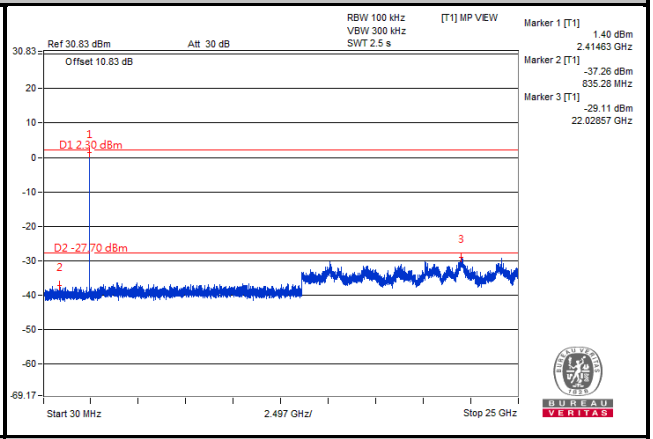


Ch 1 Band Edge	Ch 11 Band Edge
	

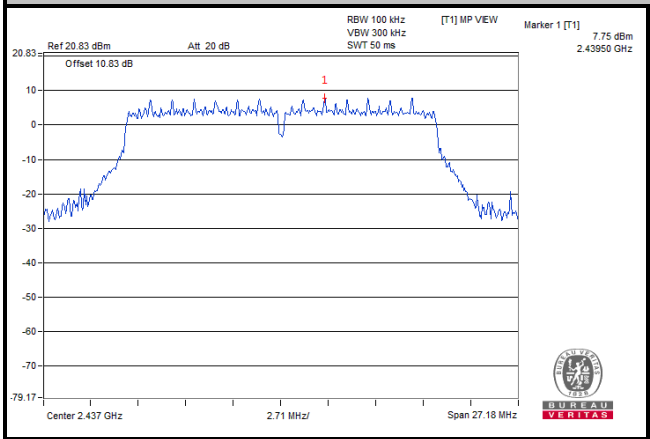
CHAIN 1

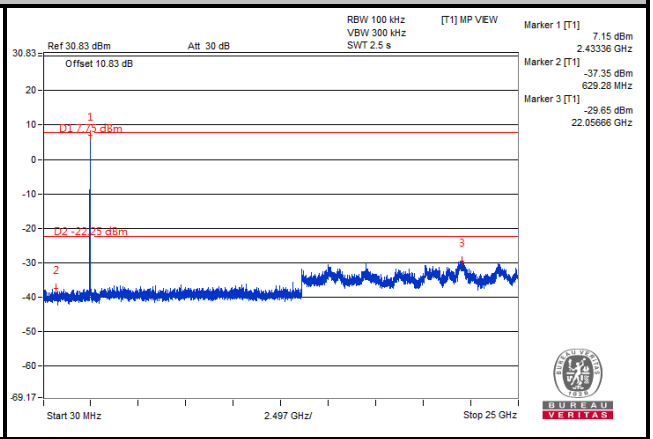
Ch 1



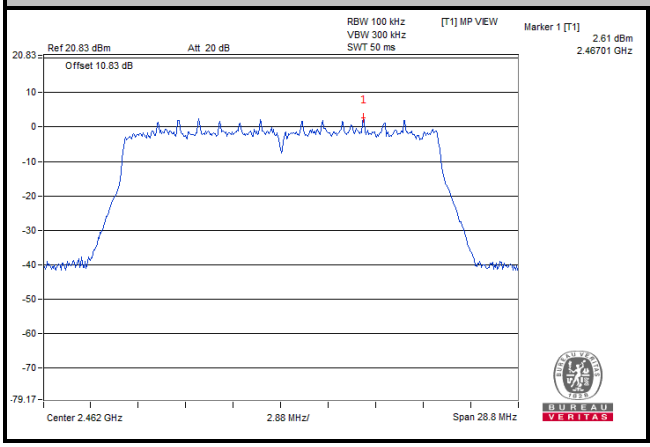


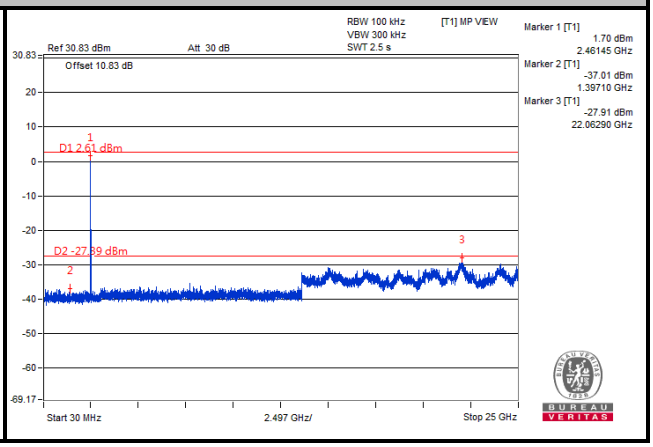
Ch 6

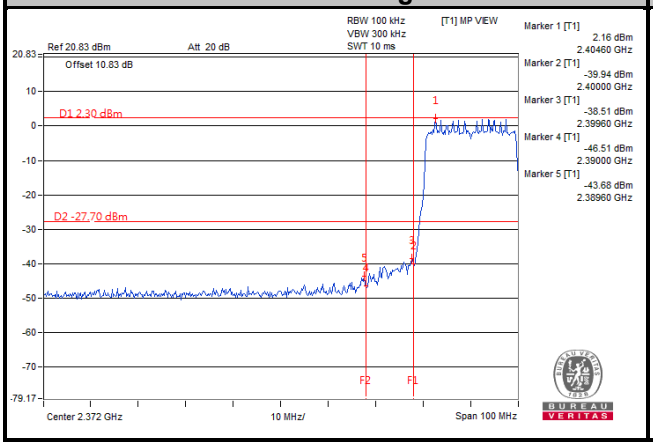
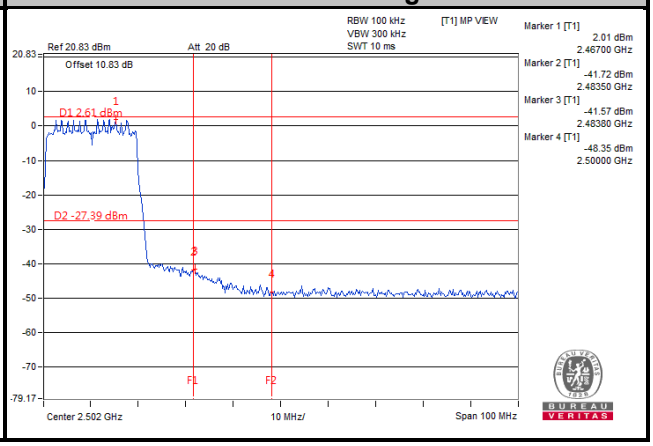




Ch 11



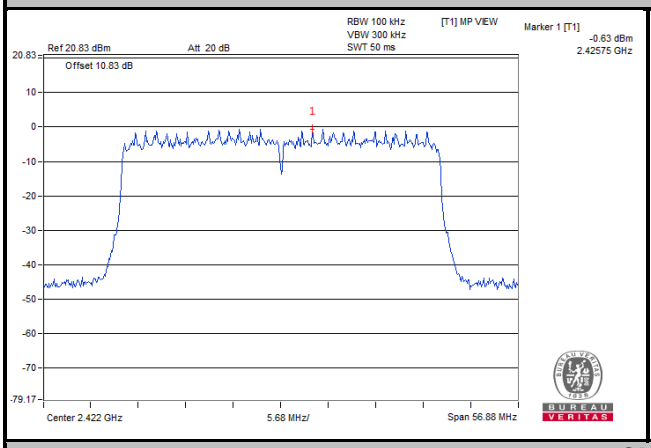


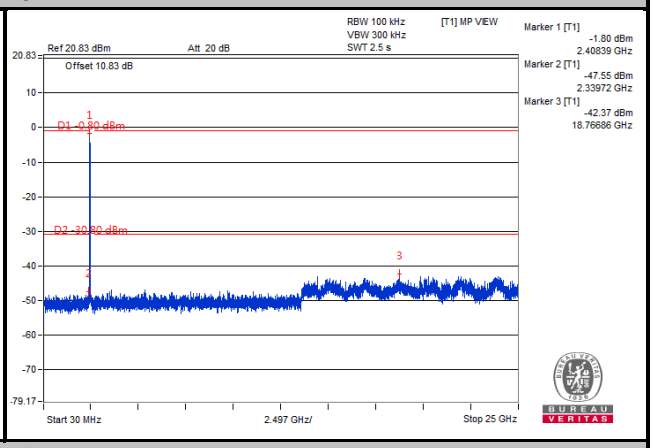
Ch 1 Band Edge	Ch 11 Band Edge
	

802.11ax (HE40)

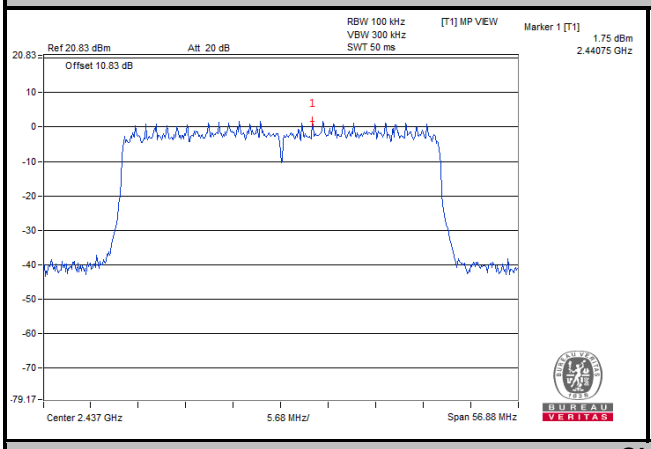
CHAIN 0

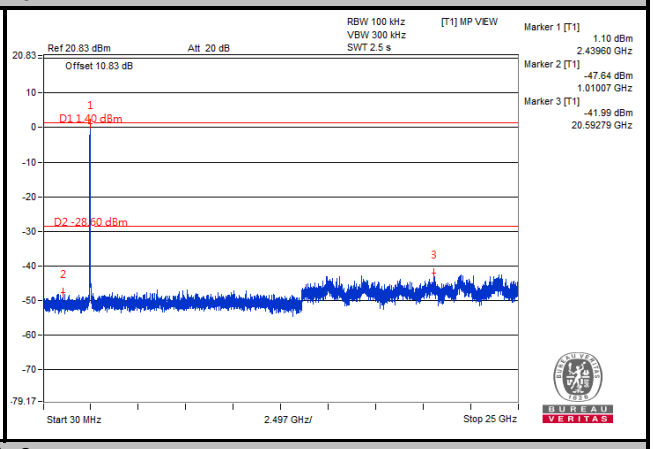
Ch 3



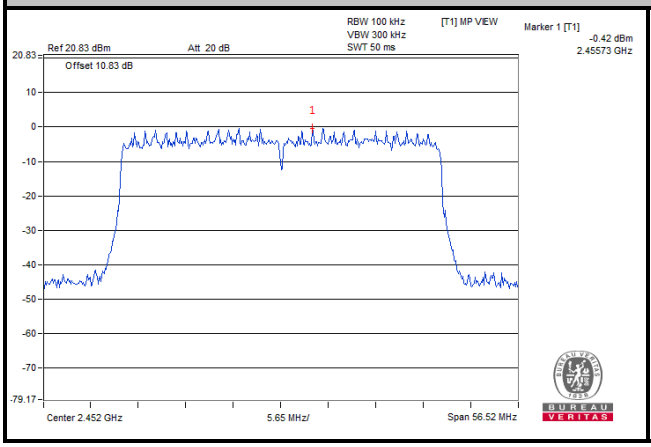


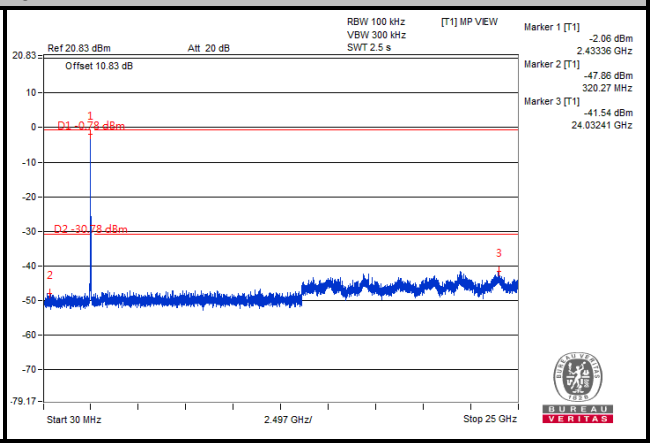
Ch 6

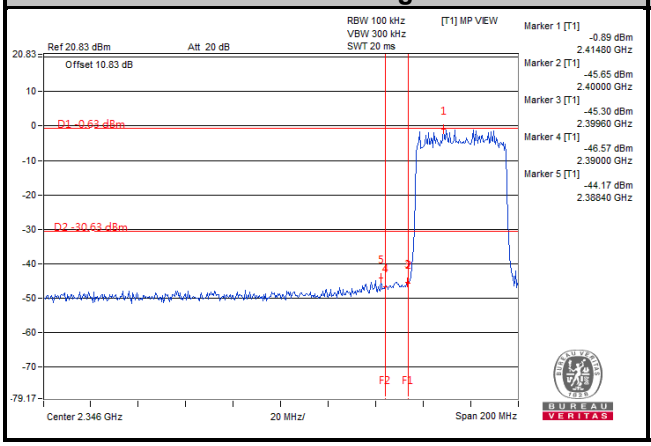
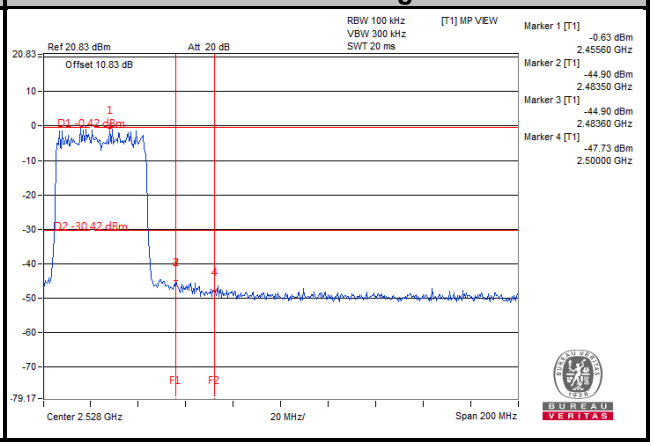




Ch 9

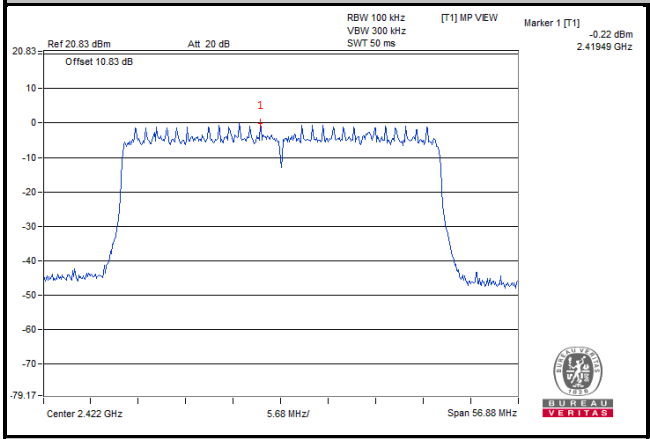


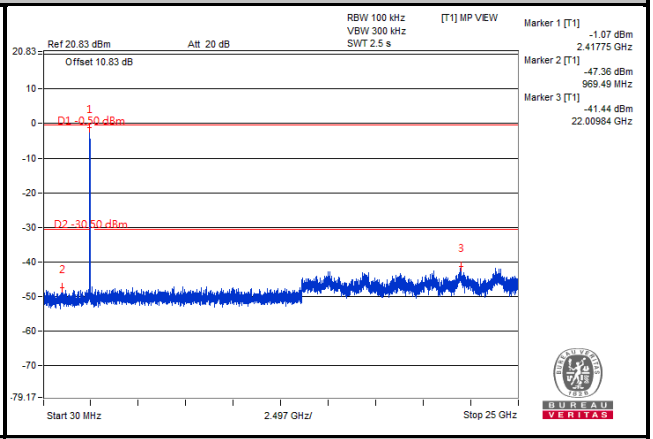


Ch 3 Band Edge	Ch 9 Band Edge
	

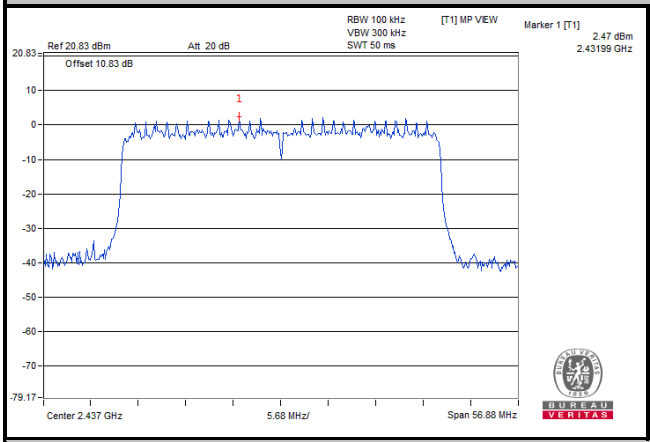
CHAIN 1

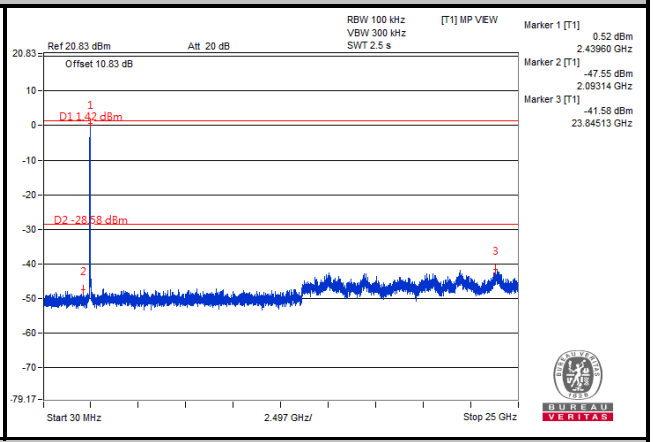
Ch 3



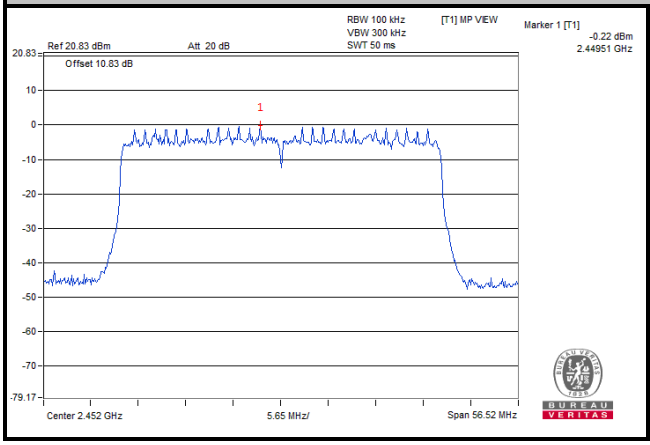


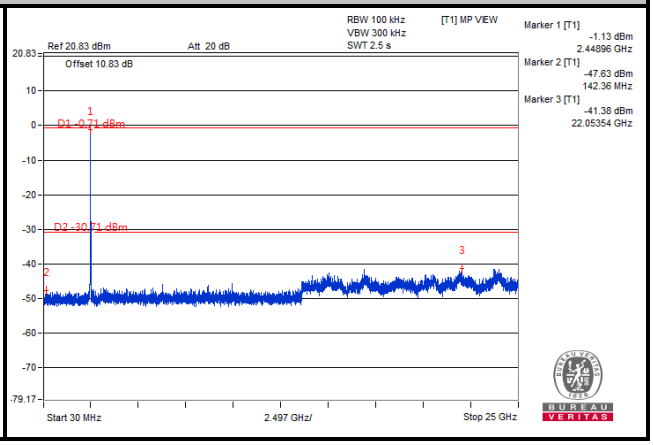
Ch 6

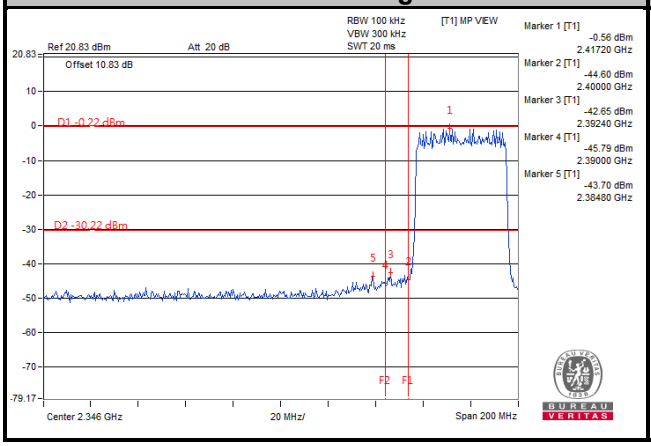
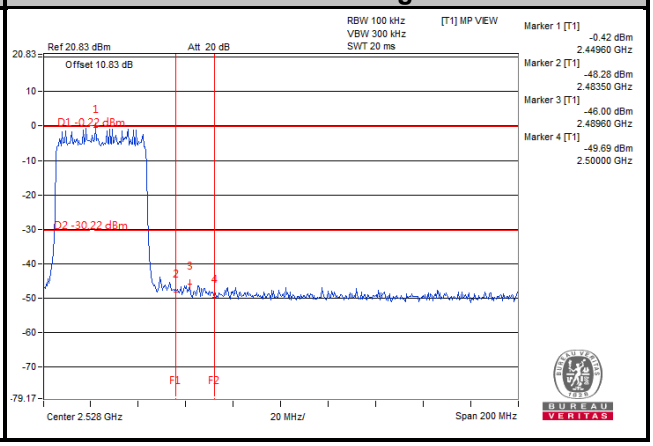




Ch 9



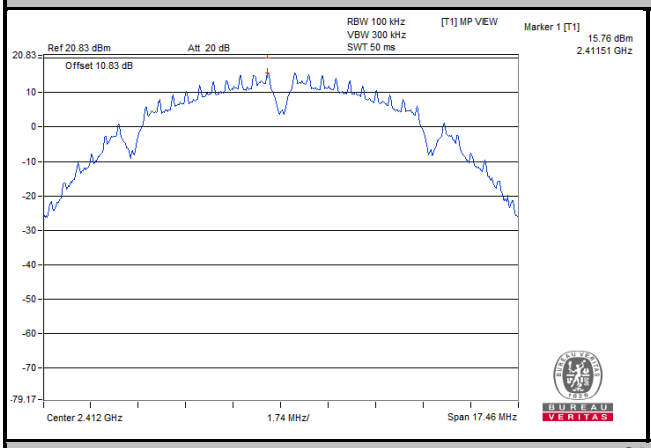


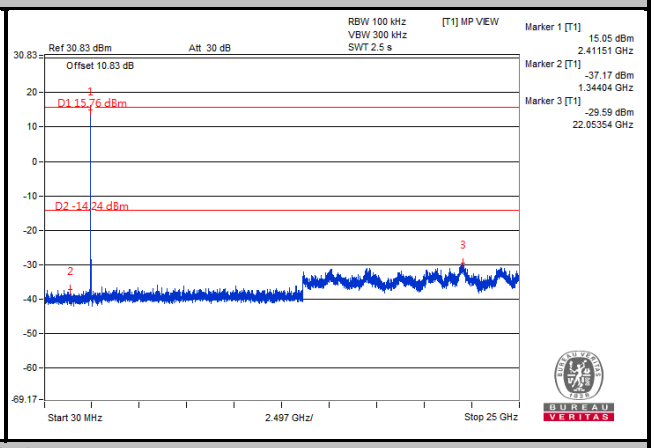
Ch 3 Band Edge	Ch 9 Band Edge
	

Mode B

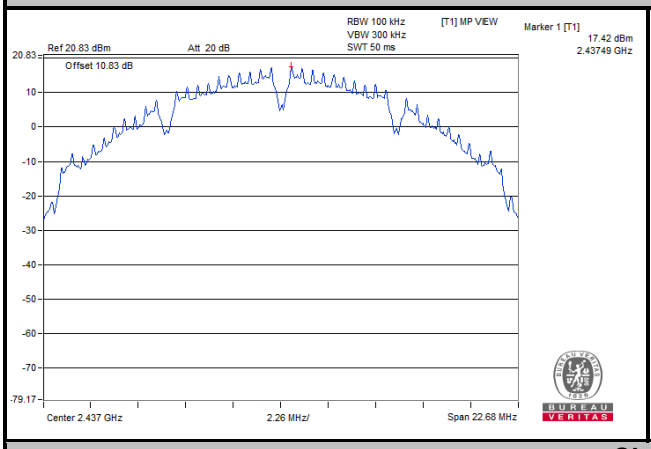
802.11b

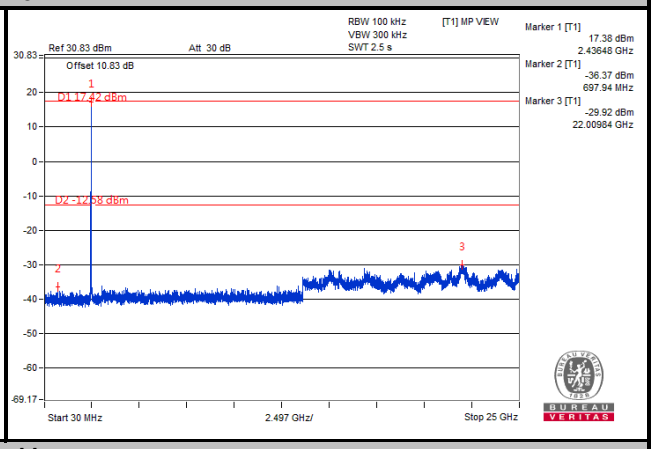
Ch 1



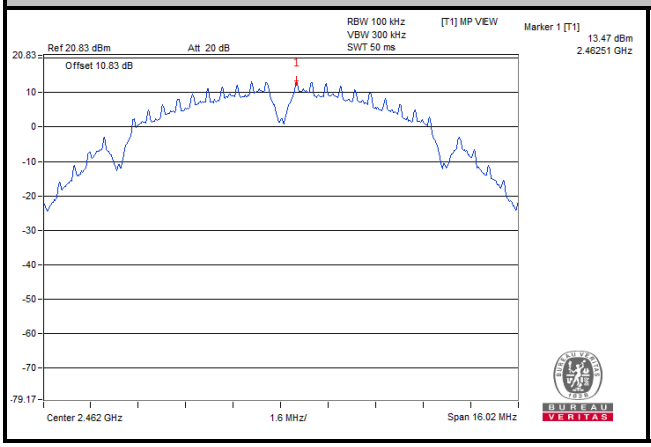


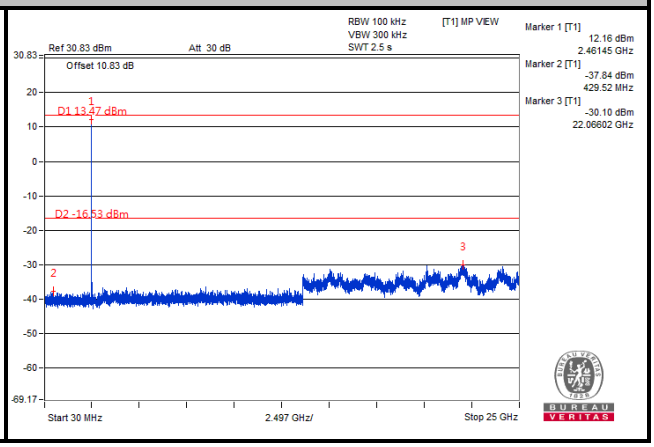
Ch 6

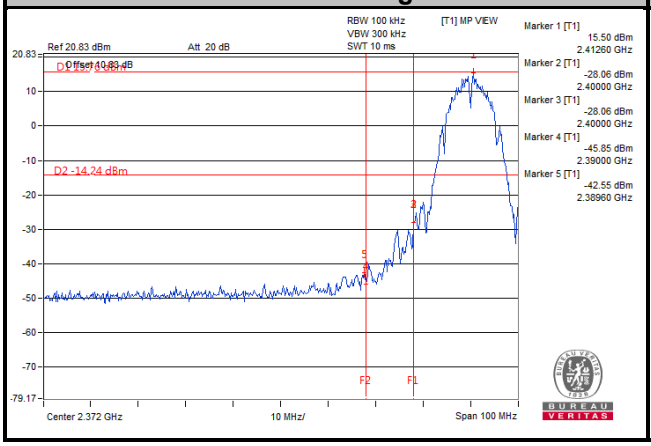
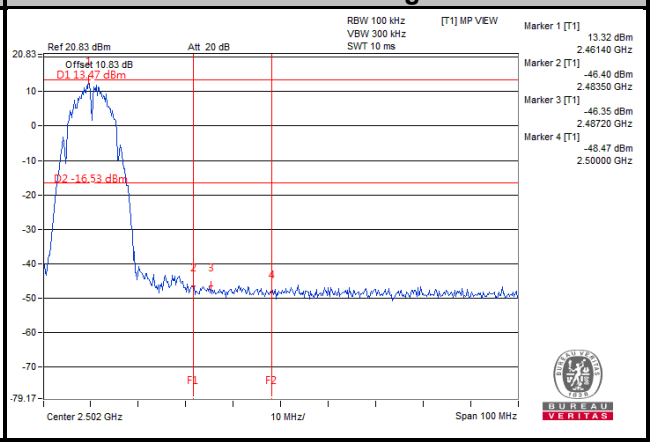




Ch 11

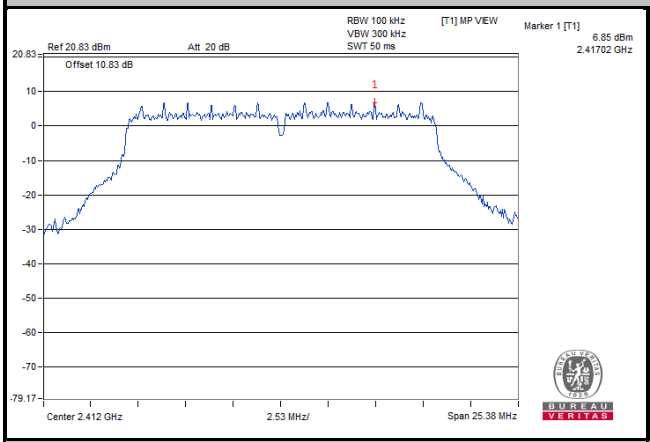


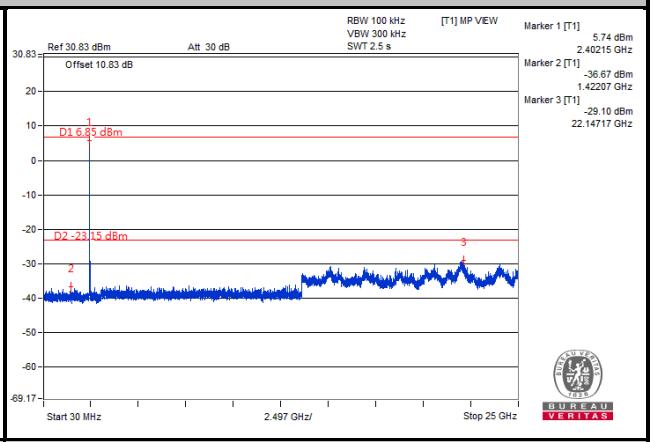


Ch 1 Band Edge	Ch 11 Band Edge
	

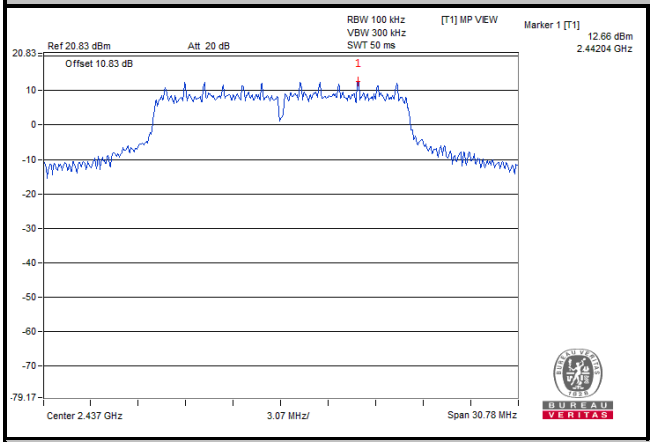
802.11g

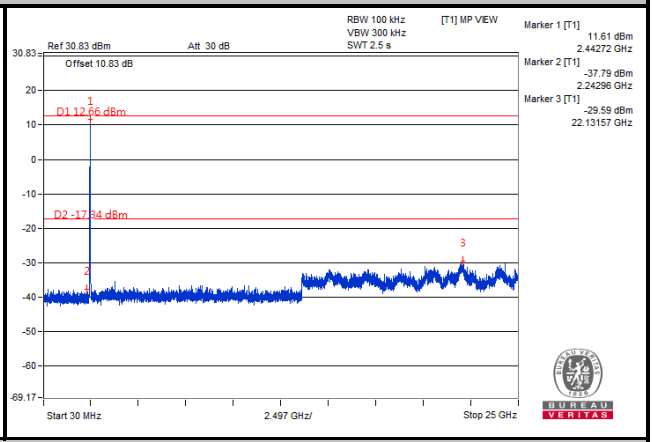
Ch 1



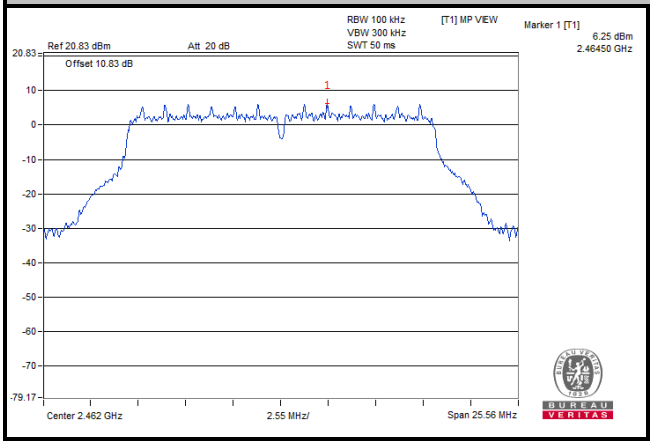


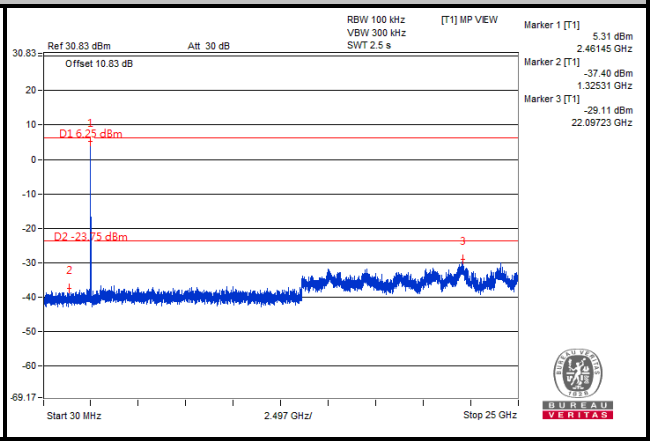
Ch 6

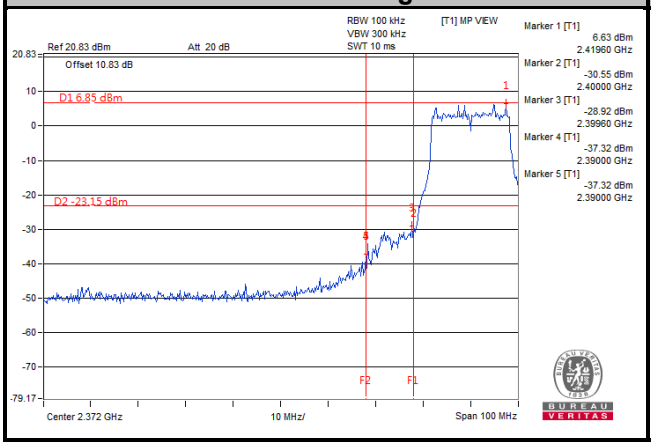
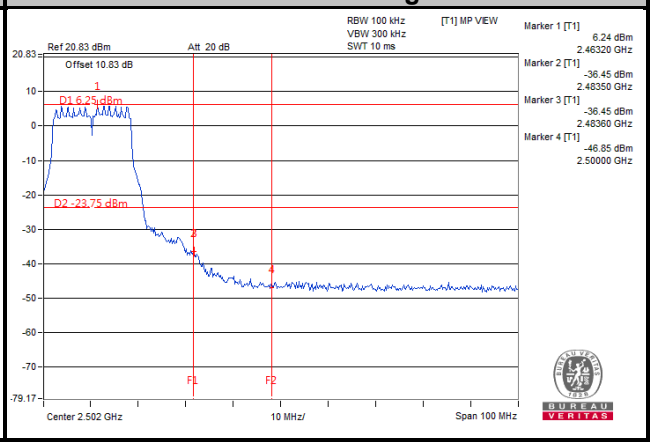




Ch 11

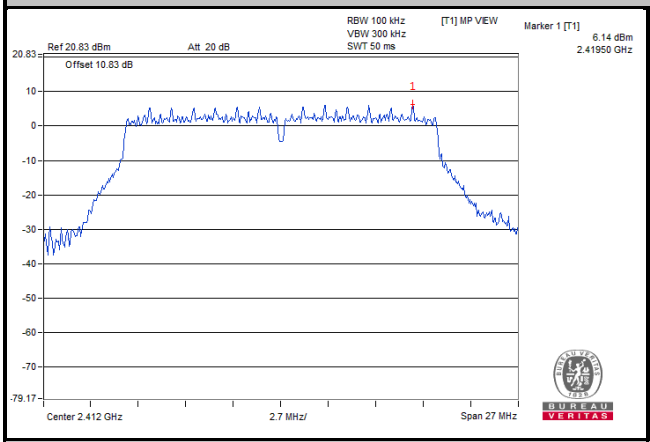


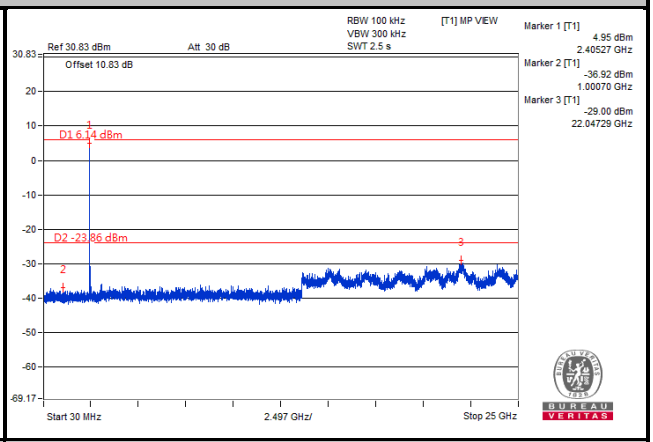


Ch 1 Band Edge	Ch 11 Band Edge
	

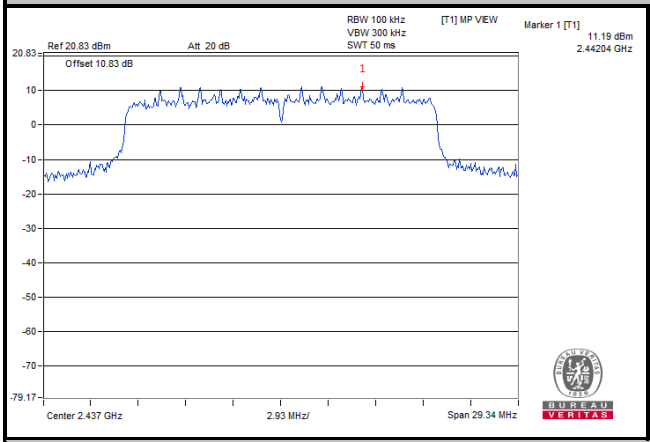
802.11ax (HE20)

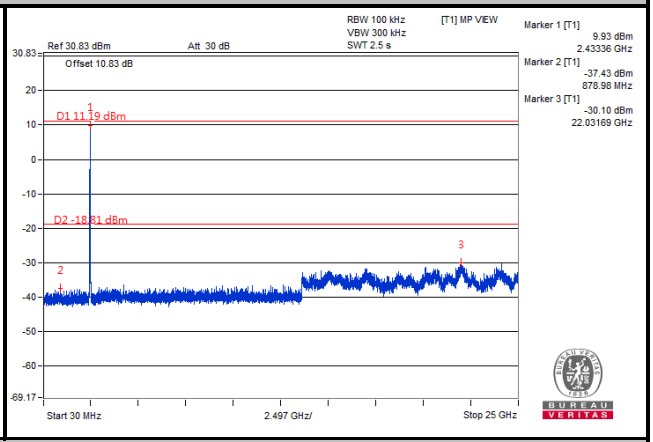
Ch 1



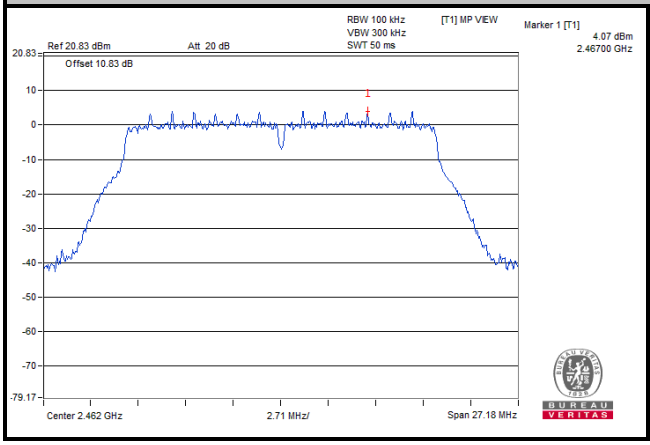


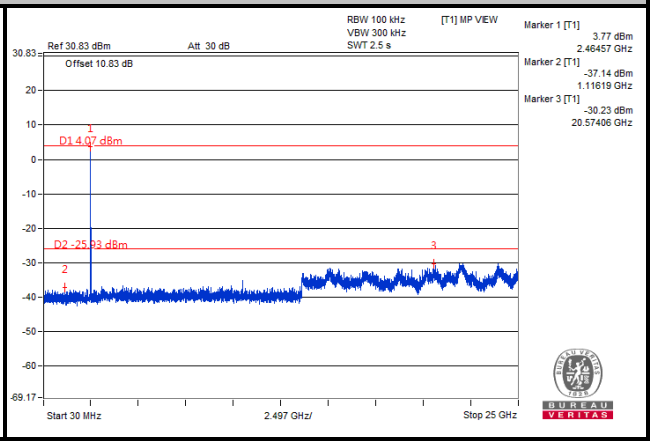
Ch 6

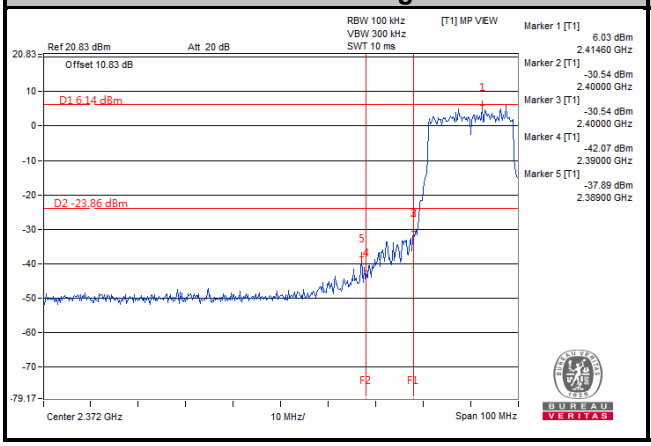
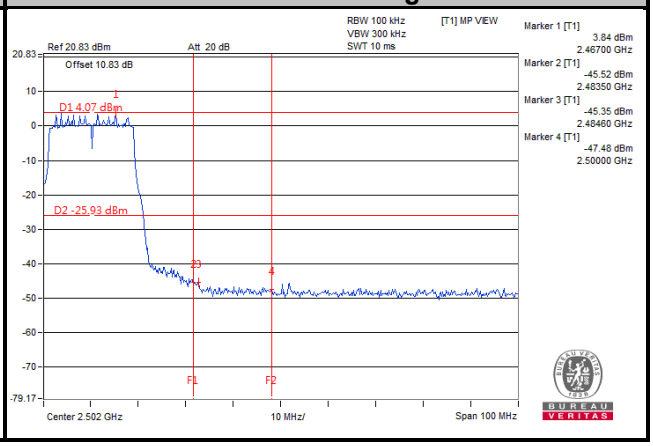




Ch 11

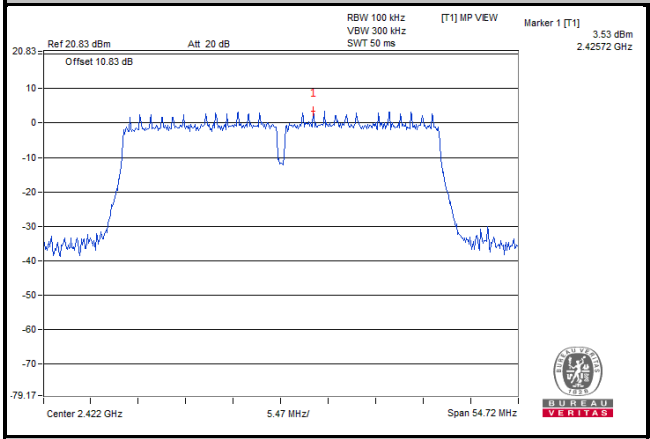


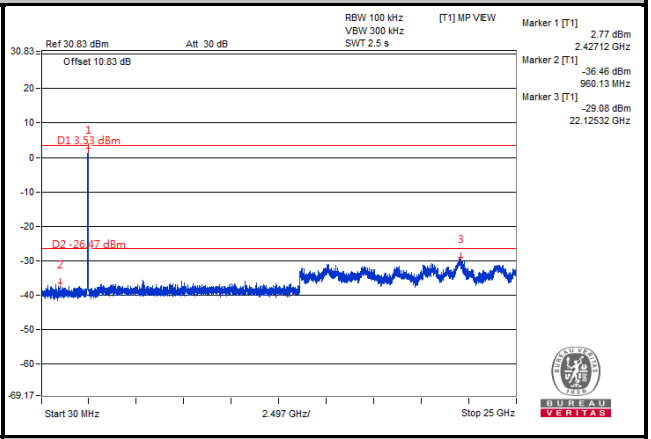


Ch 1 Band Edge	Ch 11 Band Edge
	

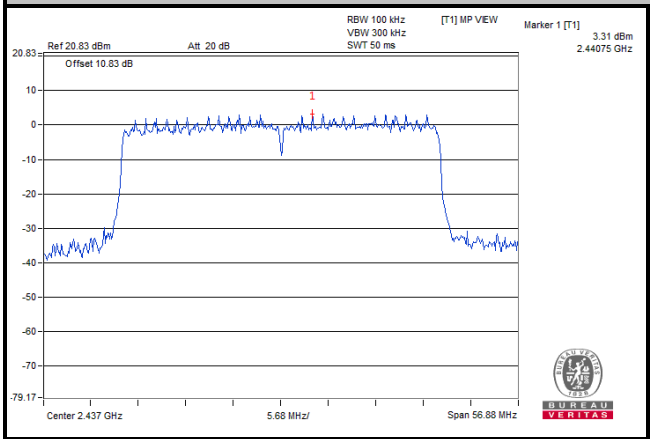
802.11ax (HE40)

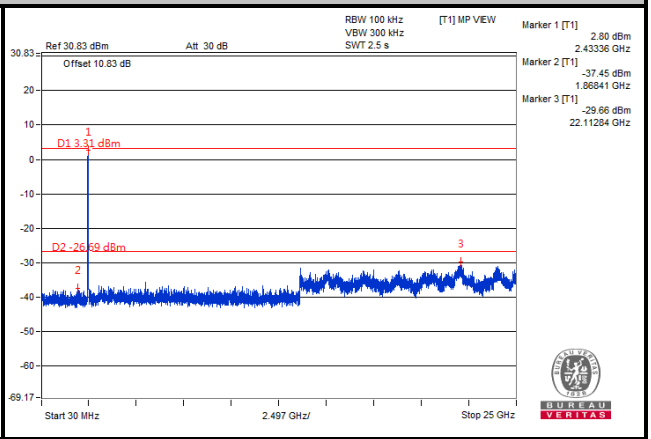
Ch 3



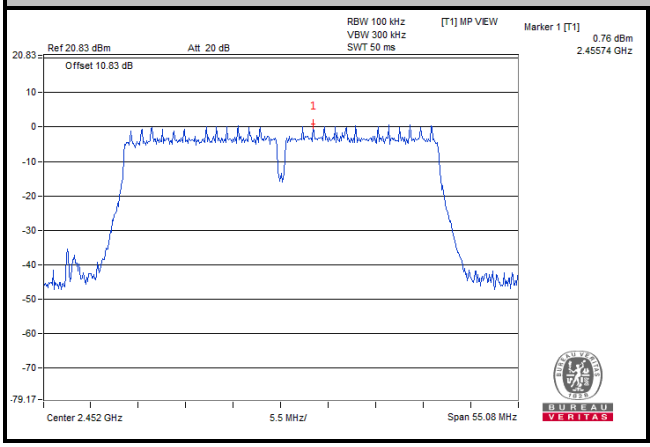


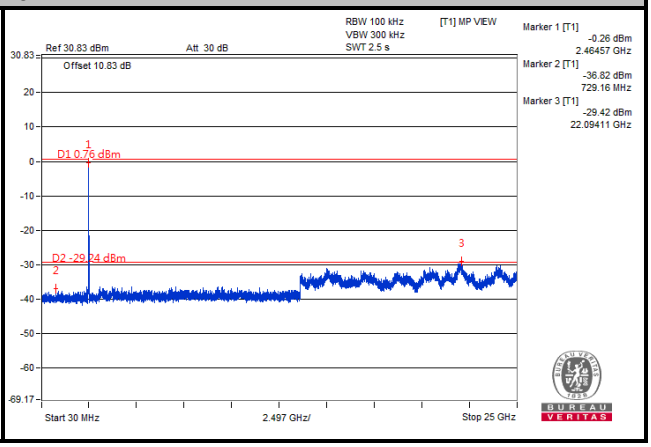
Ch 6

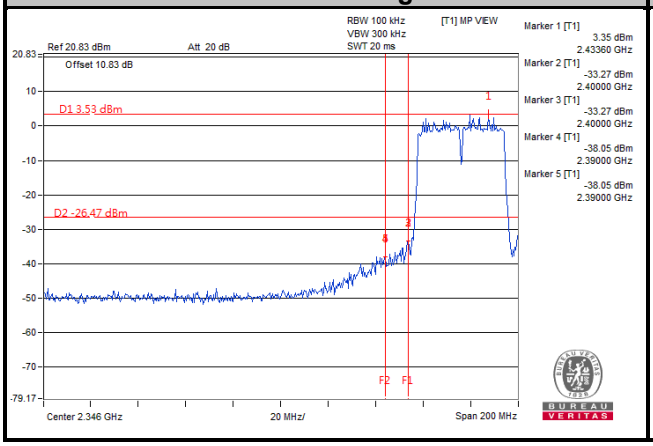
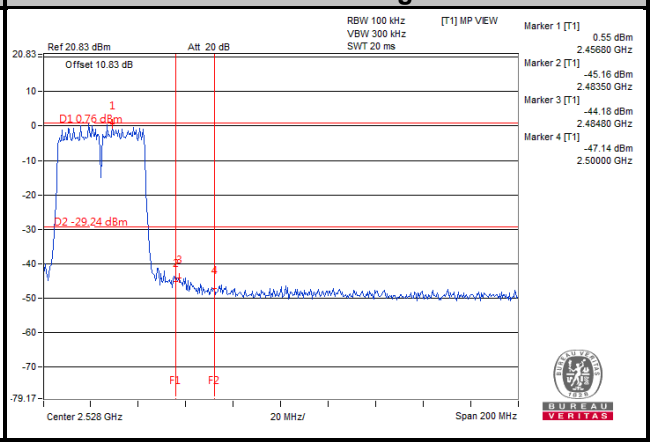




Ch 9





Ch 3 Band Edge	Ch 9 Band Edge
	

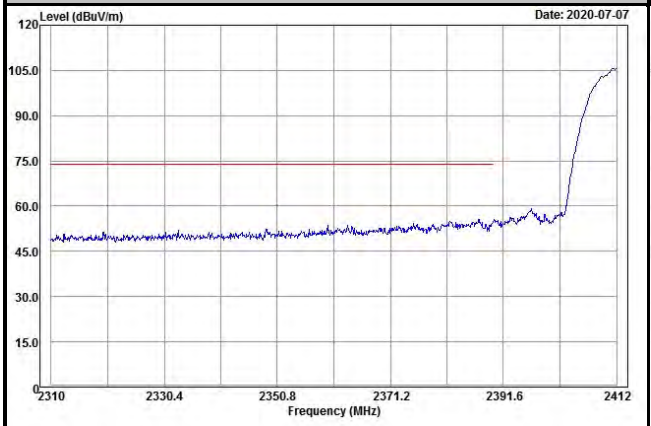
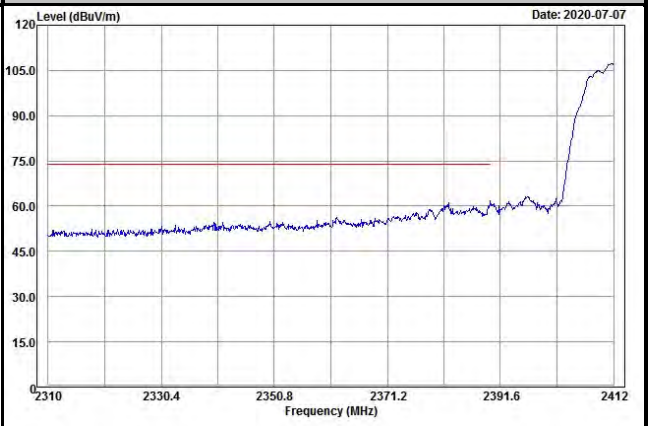
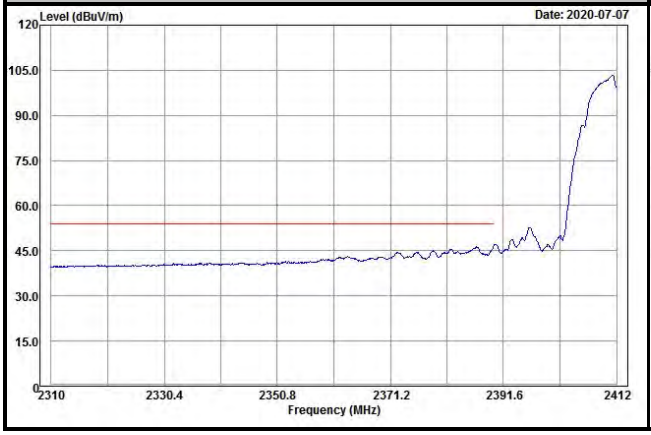
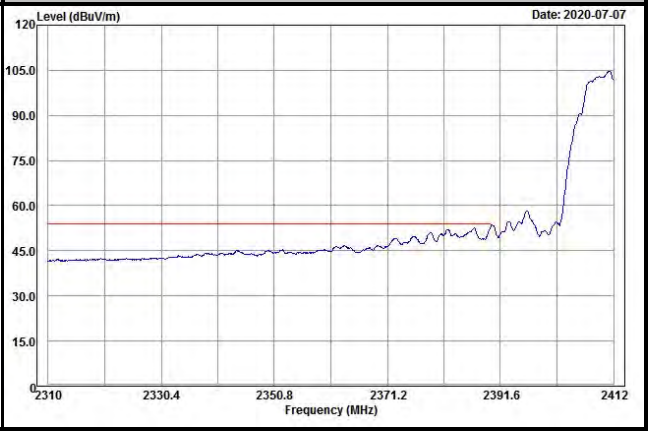
5 Pictures of Test Arrangements

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

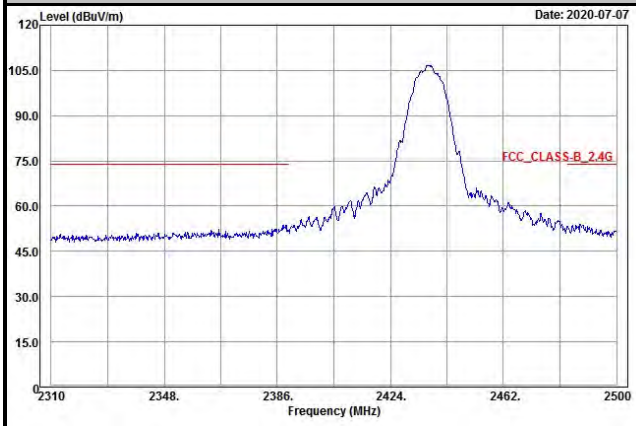
Annex A- Band Edge Measurement

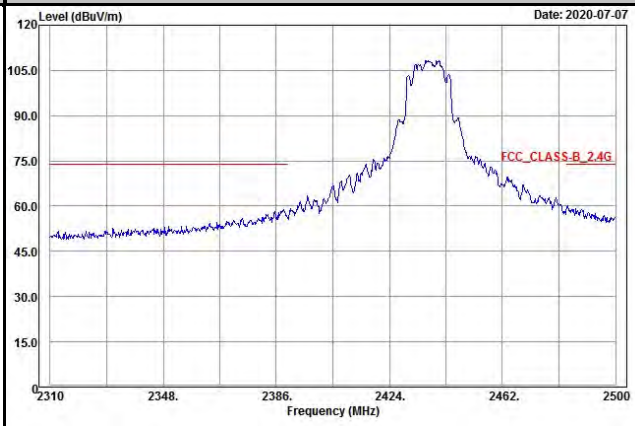
Mode A

802.11b

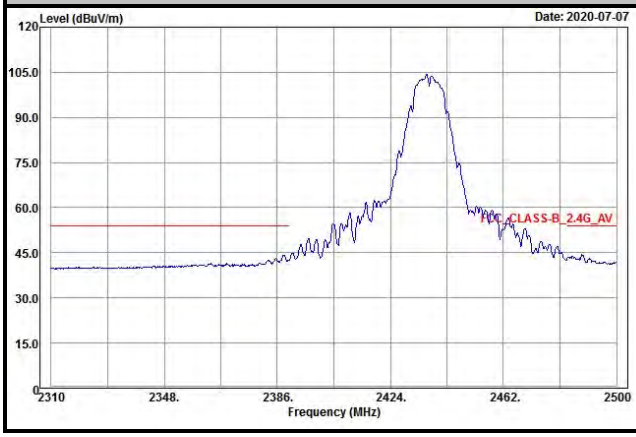
Ch 1	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

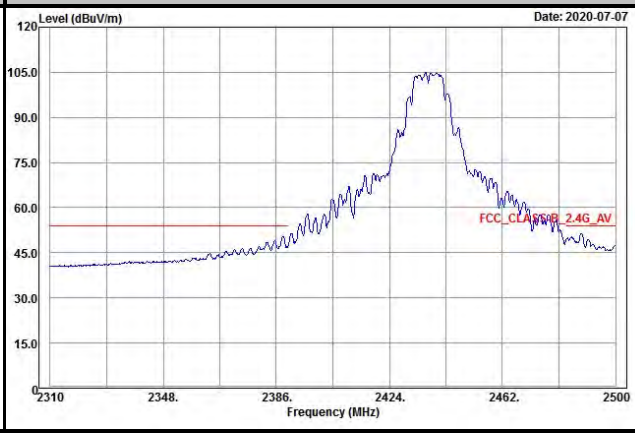
Ch 6	
Peak	
Horizontal	Vertical

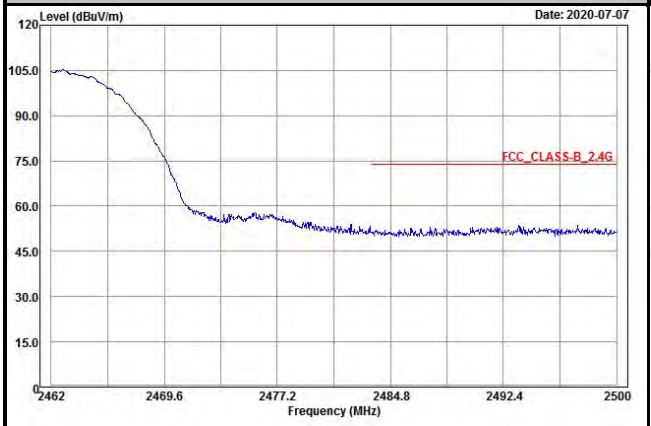
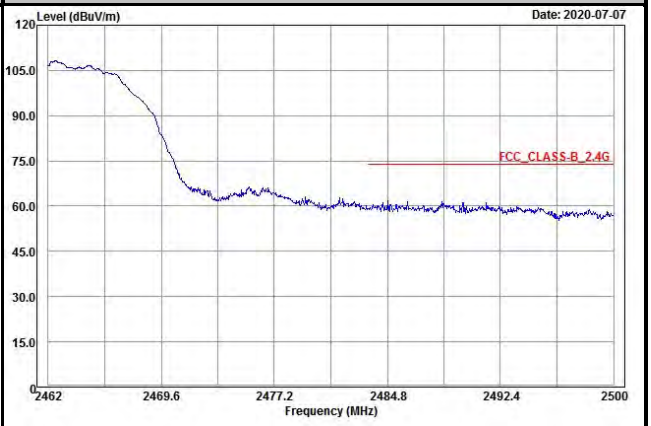
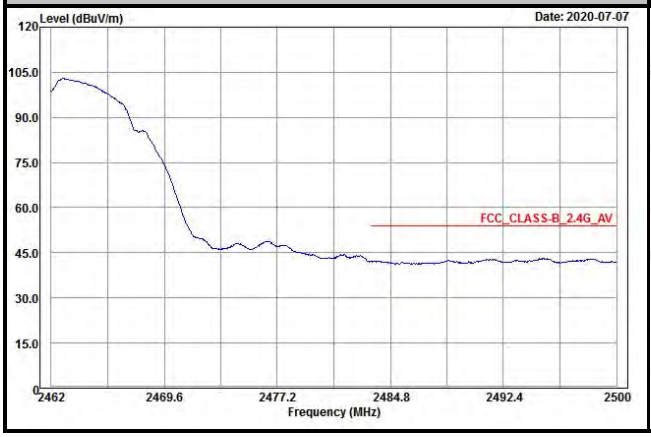
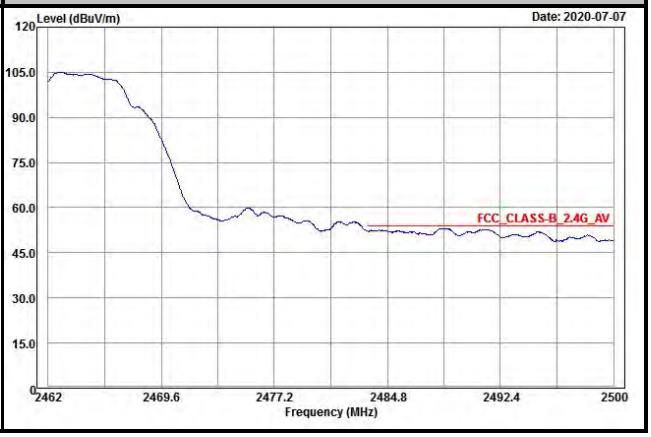




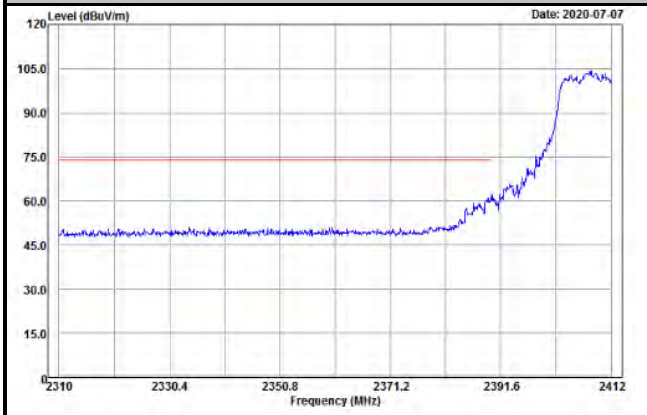
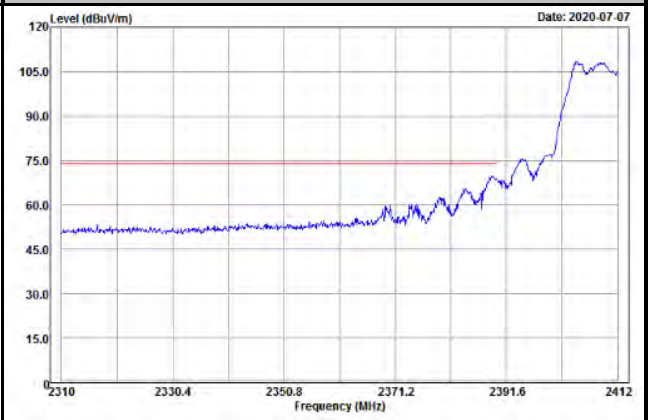
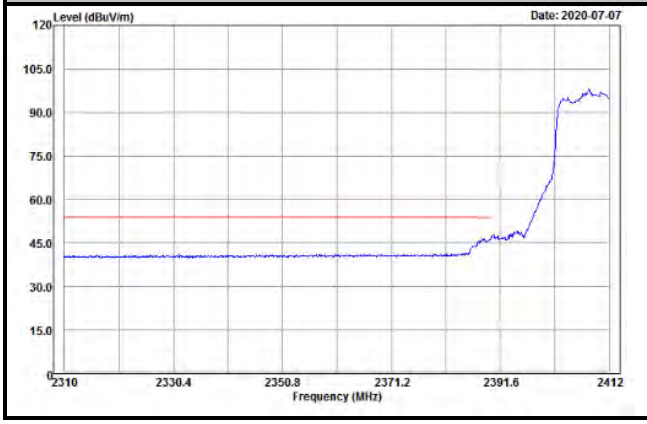
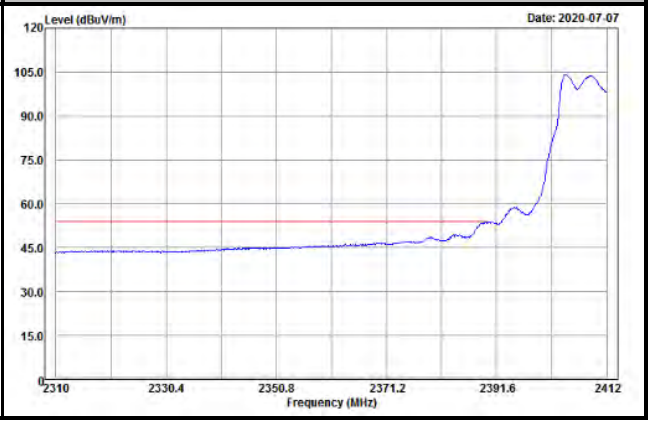
Average	
Horizontal	Vertical



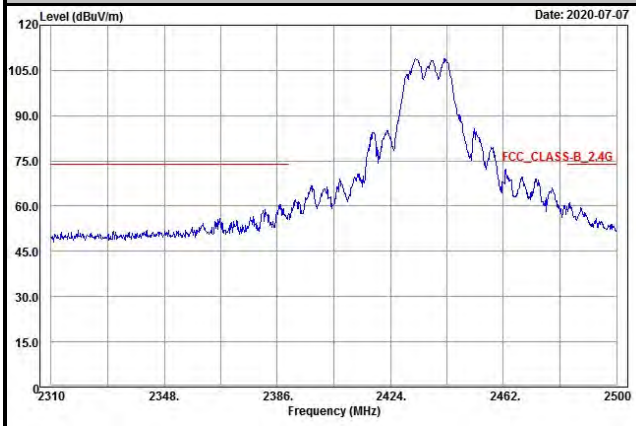


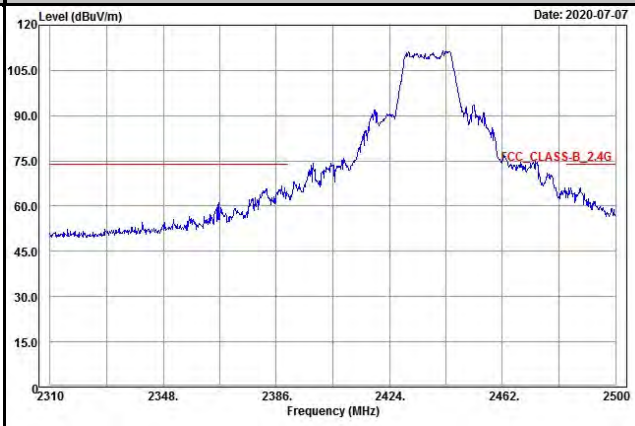
Ch 11	
Peak	
Horizontal	**Vertical**
	
Average	
Horizontal	**Vertical**
	

802.11g

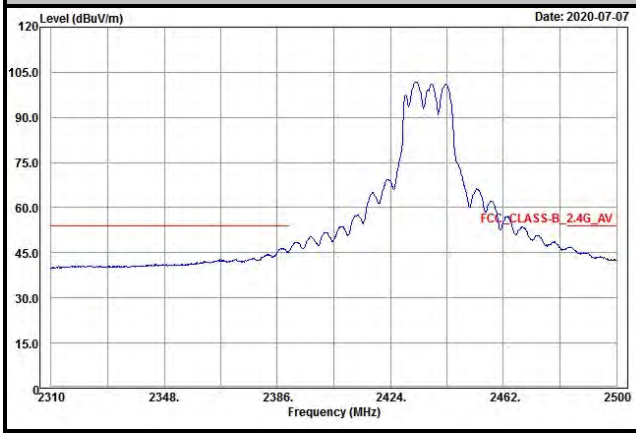
Ch 1	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

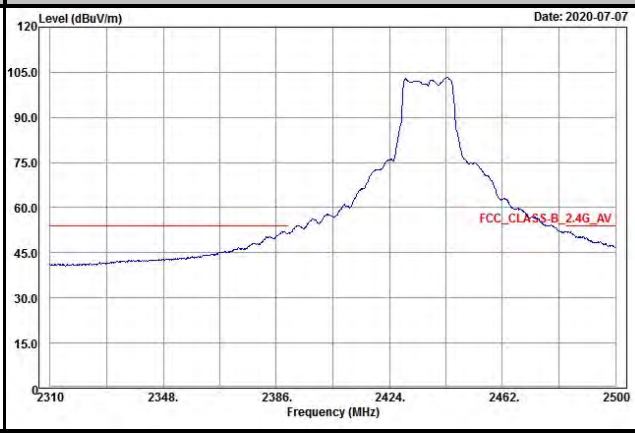
Ch 6	
Peak	
Horizontal	Vertical

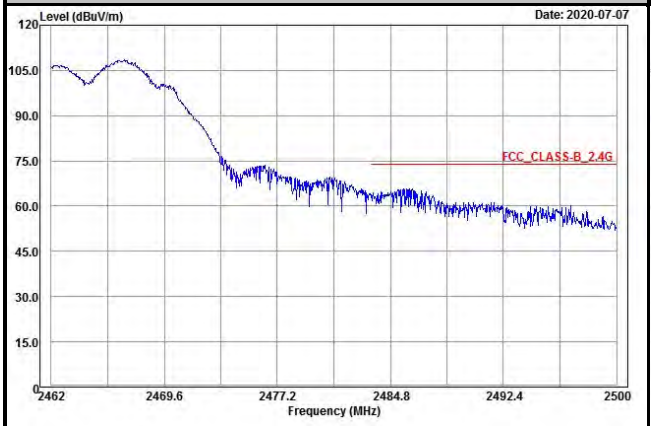
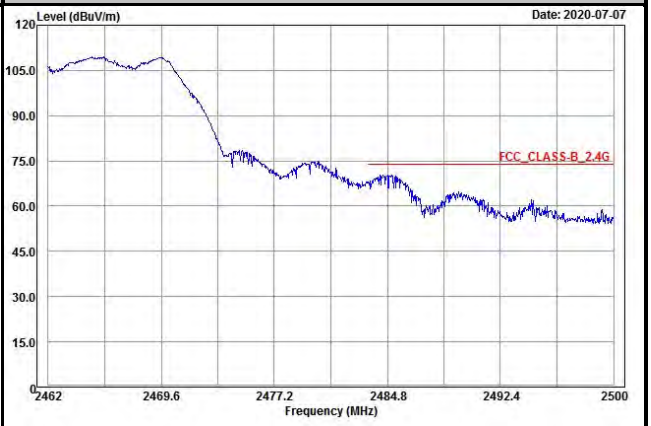
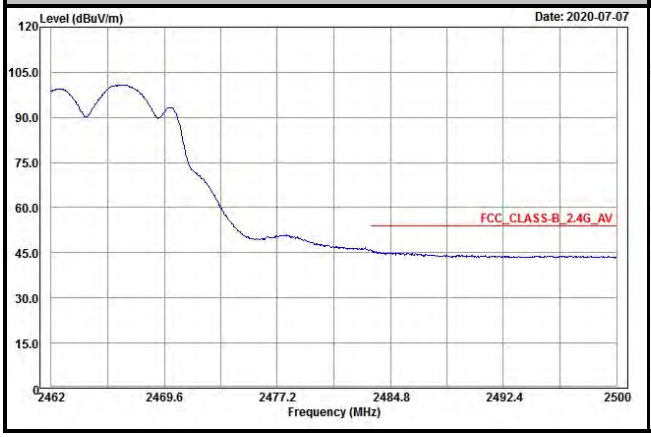




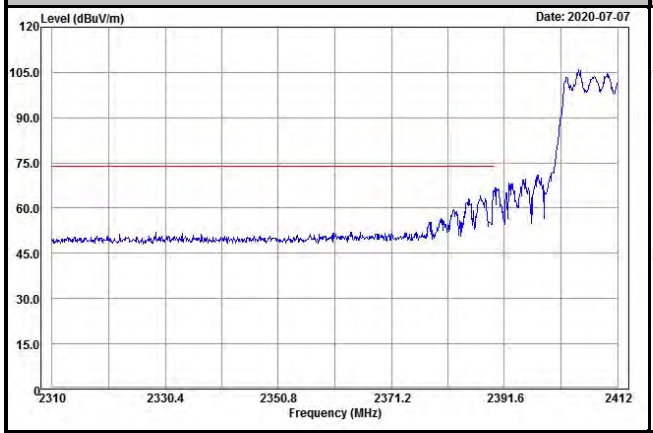
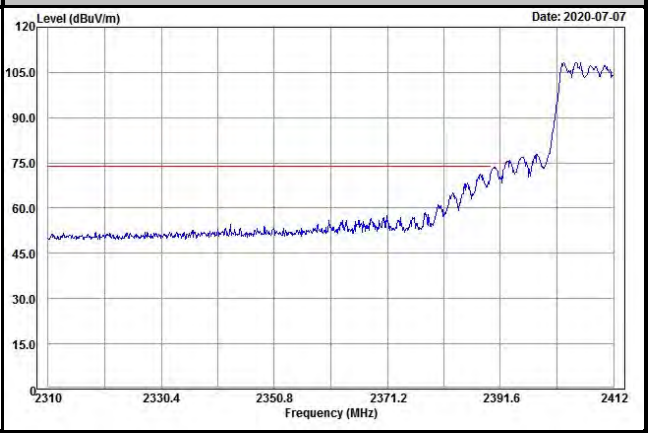
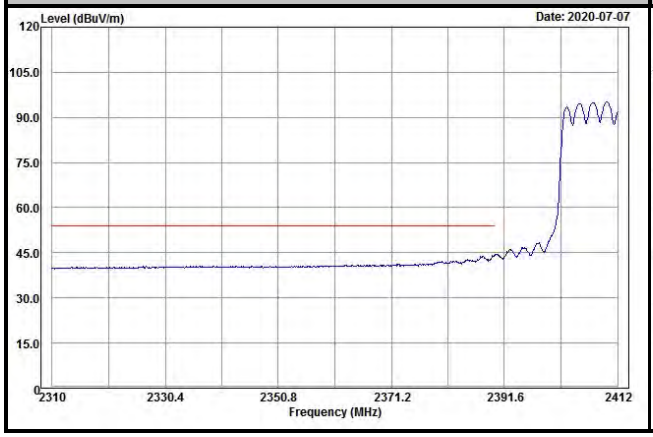
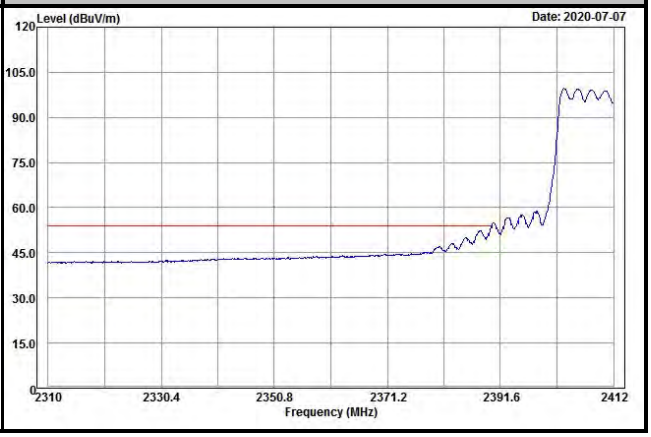
Average	
Horizontal	Vertical



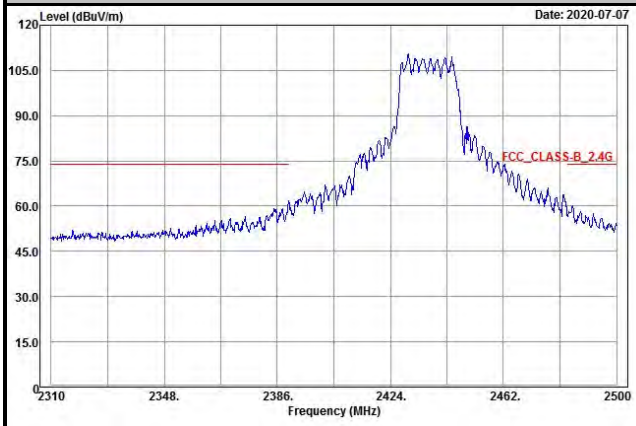


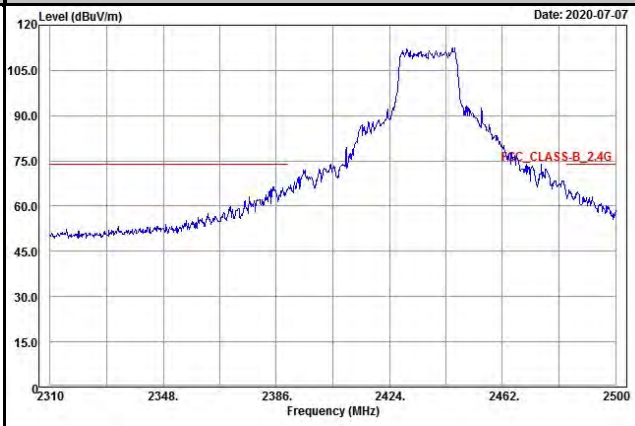
Ch 11	
Peak	
Horizontal	**Vertical**
	
Average	
Horizontal	**Vertical**
	

802.11ax (HE20)

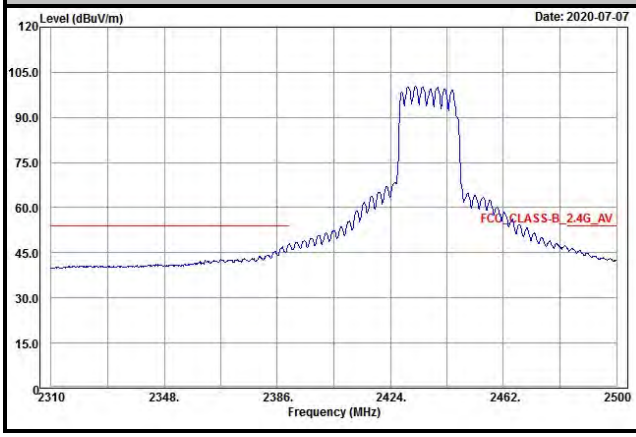
Ch 1	
Peak	
Horizontal	Vertical
	
Average	
Horizontal	Vertical
	

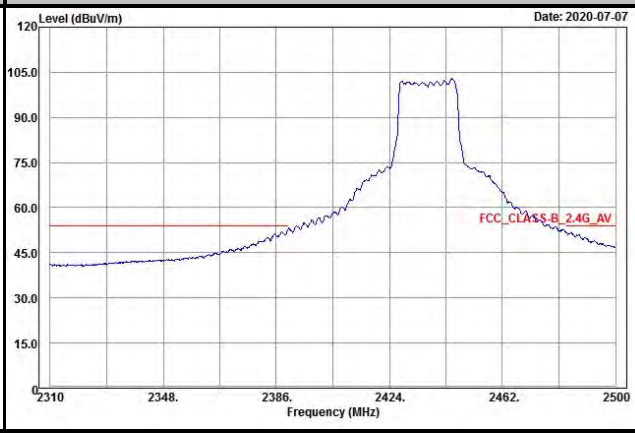
Ch 6	
Peak	
Horizontal	Vertical

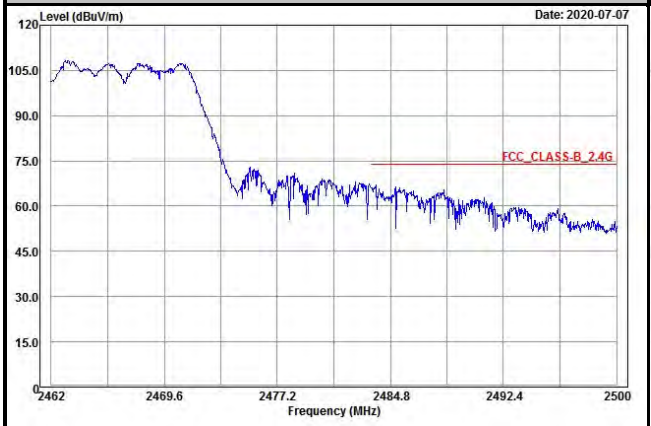
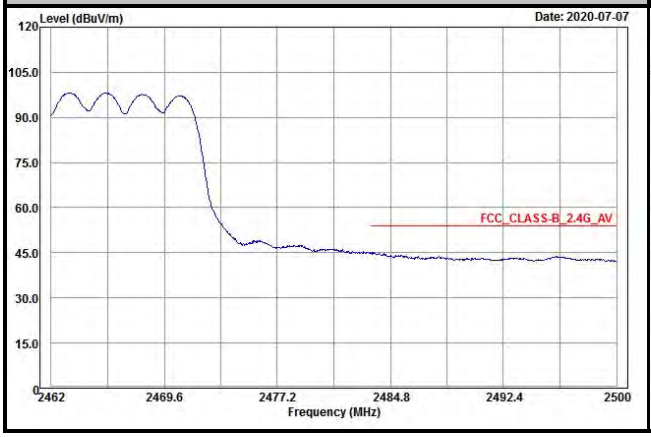




Average	
Horizontal	Vertical

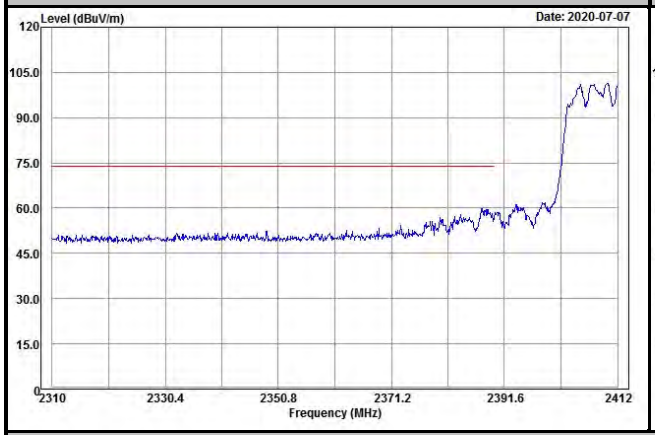


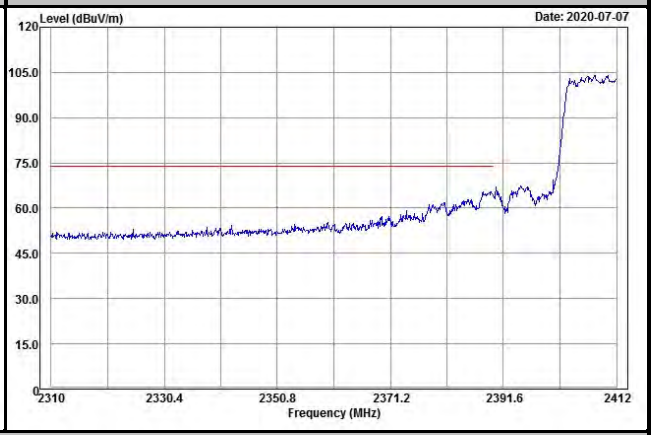


Ch 11	
Peak	
Horizontal	**Vertical**
	
Average	
Horizontal	**Vertical**
	

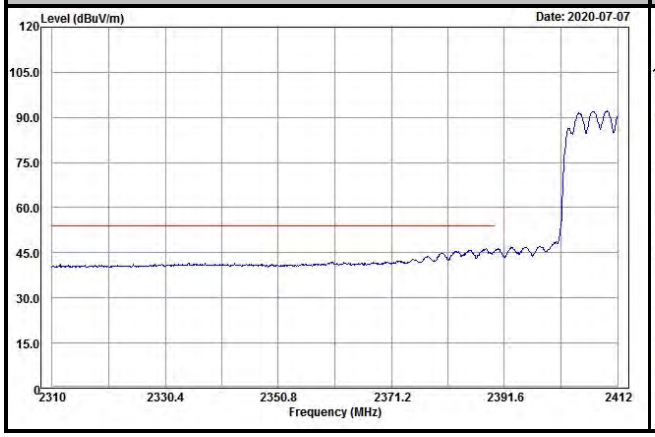
802.11ax (HE40)

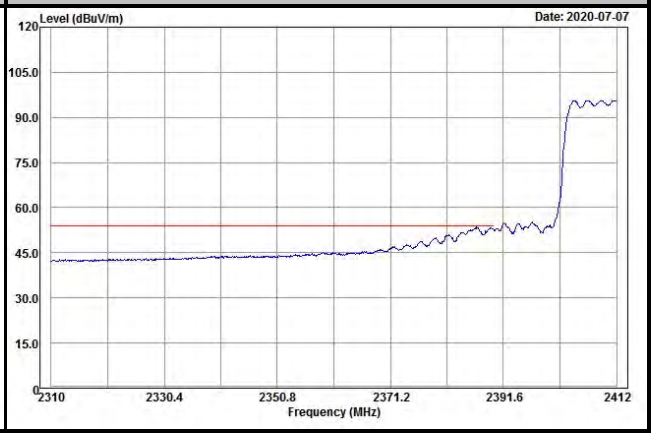
Ch 3	
Peak	
Horizontal	Vertical

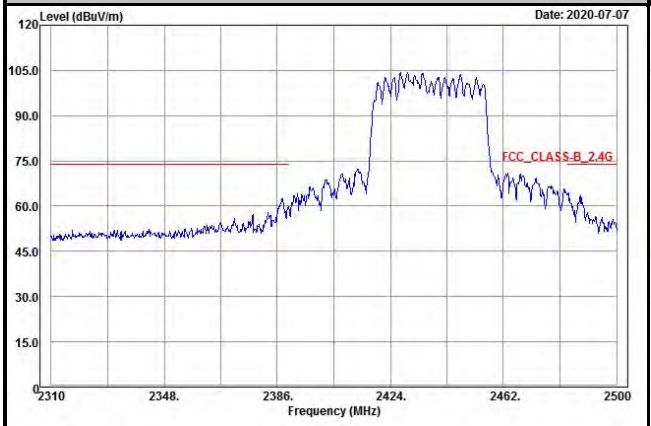
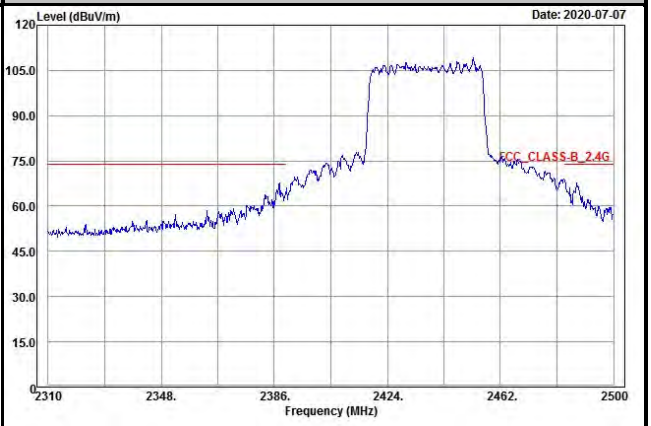
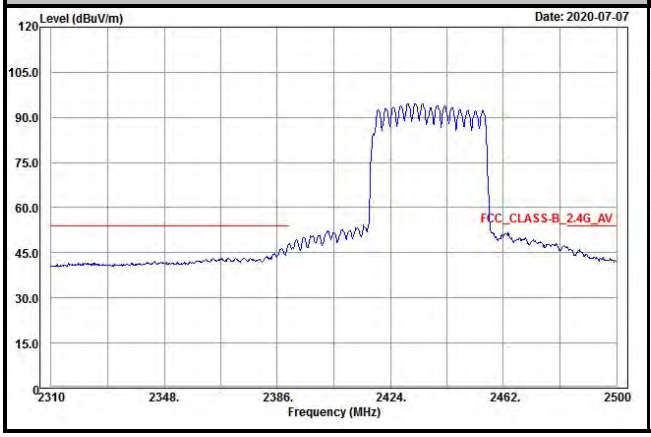
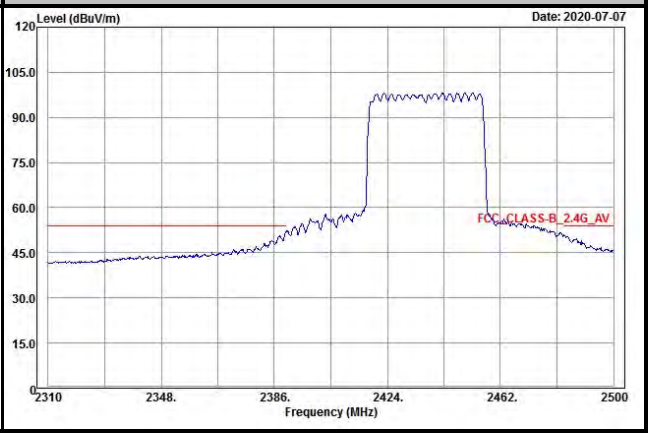


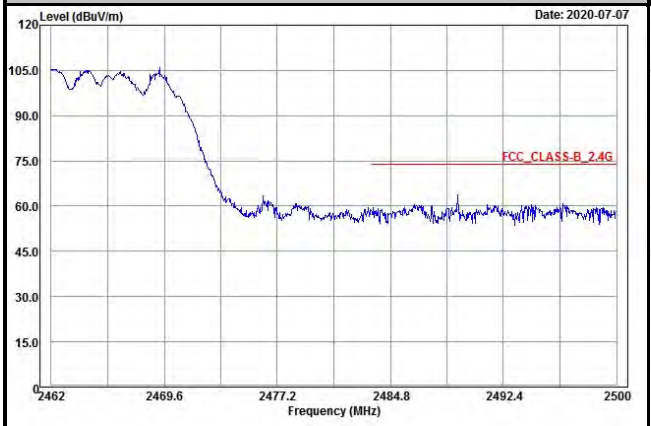
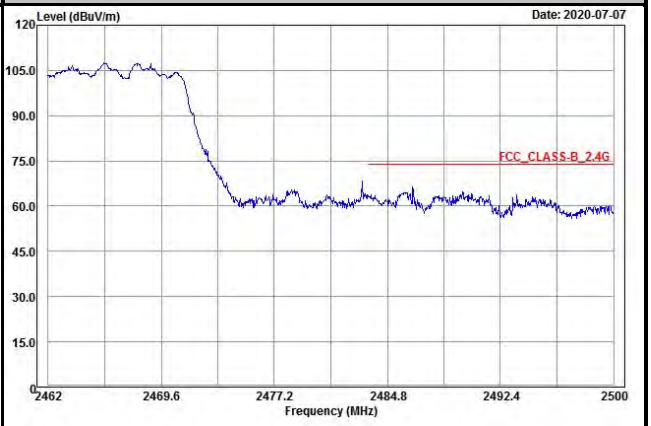
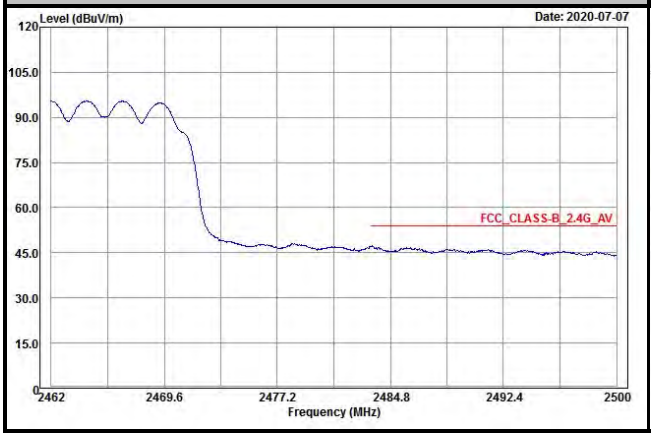
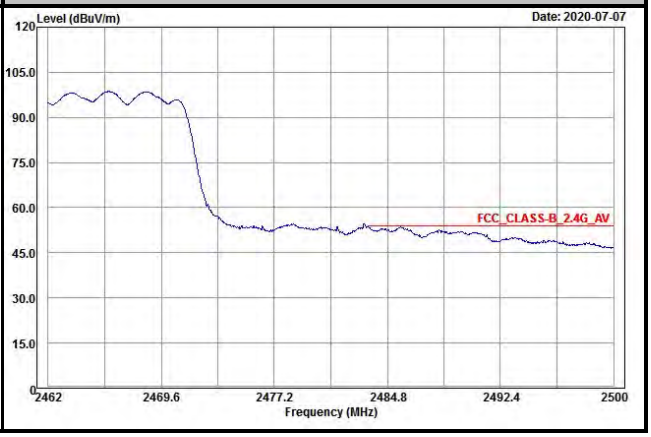


Average	
Horizontal	Vertical





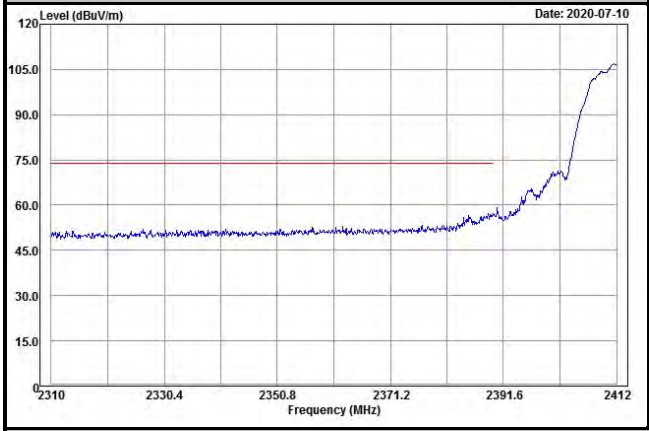
Ch 6	
Peak	
Horizontal	**Vertical**
	
Average	
Horizontal	**Vertical**
	

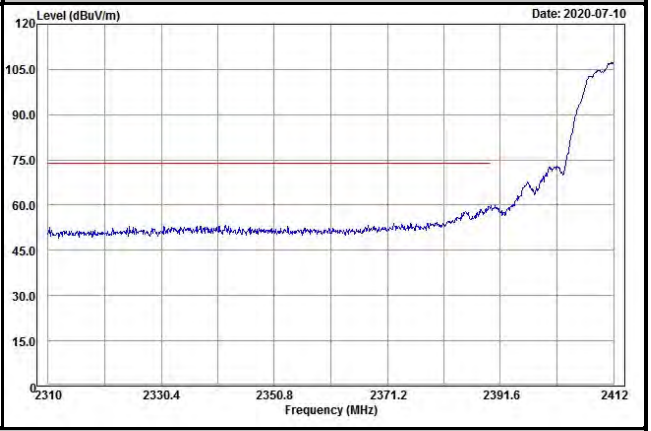
Ch 9	
Peak	
Horizontal	**Vertical**
	
Average	
Horizontal	**Vertical**
	

Mode B

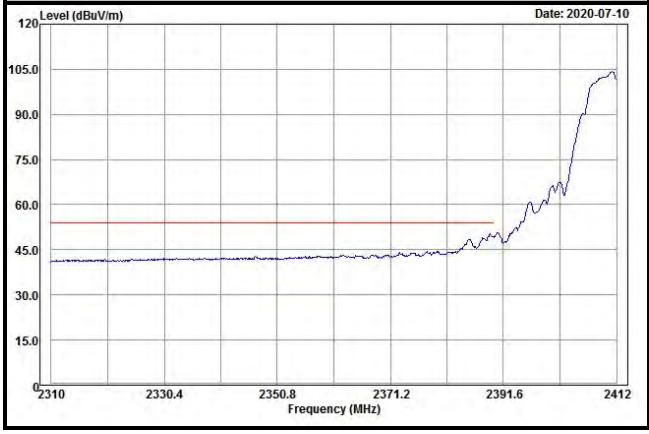
802.11b

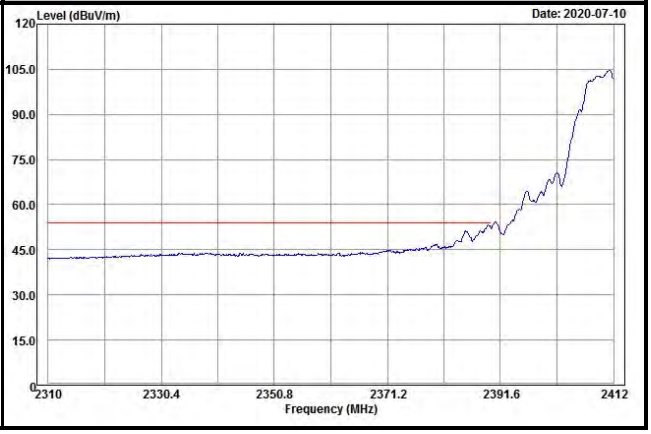
Ch 1	
Peak	
Horizontal	Vertical



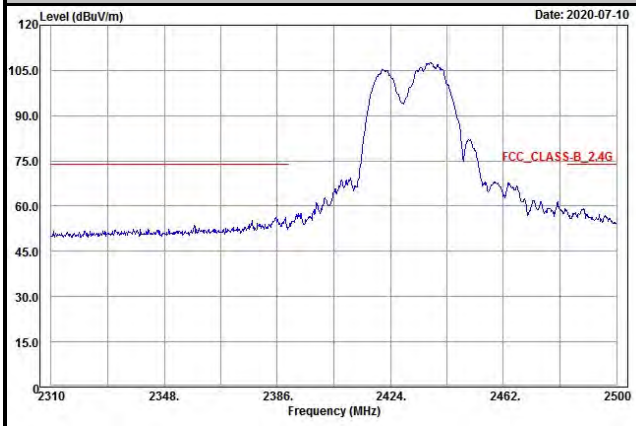


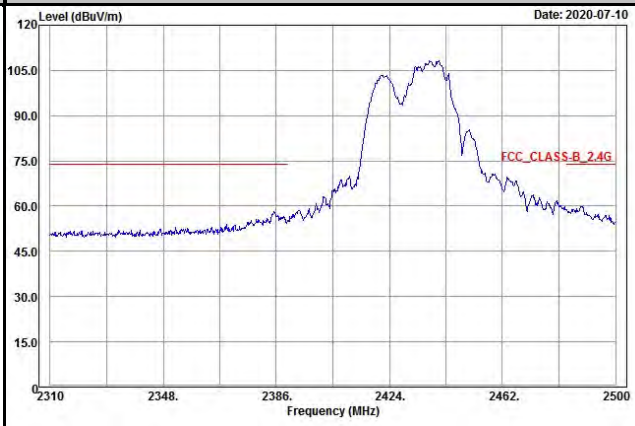
Average	
Horizontal	Vertical



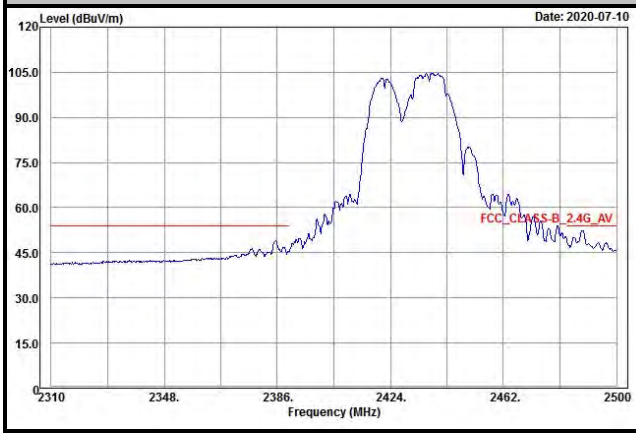


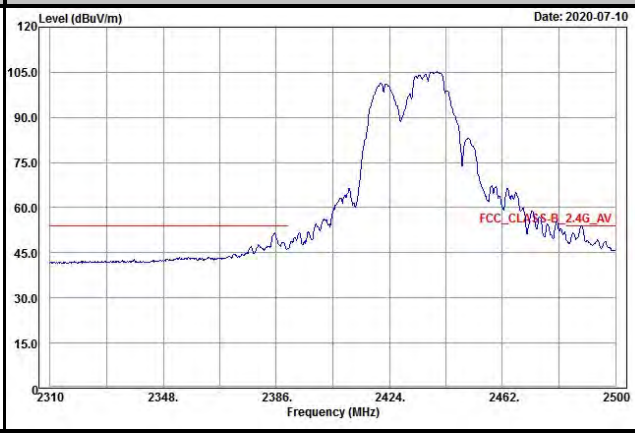
Ch 6	
Peak	
Horizontal	Vertical



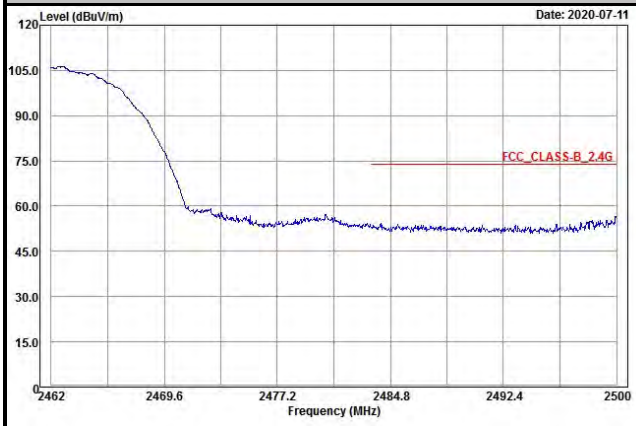


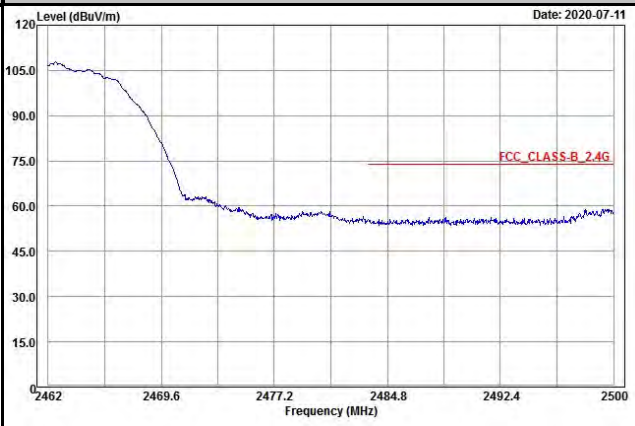
Average	
Horizontal	Vertical



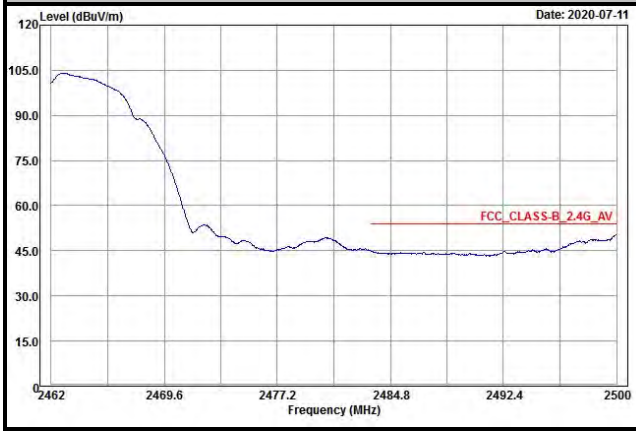


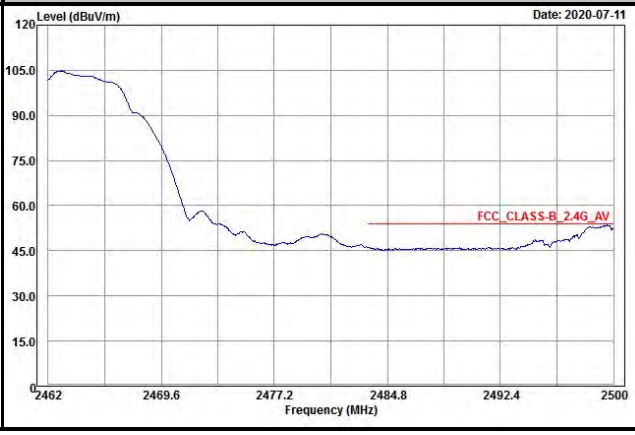
Ch 11	
Peak	
Horizontal	Vertical





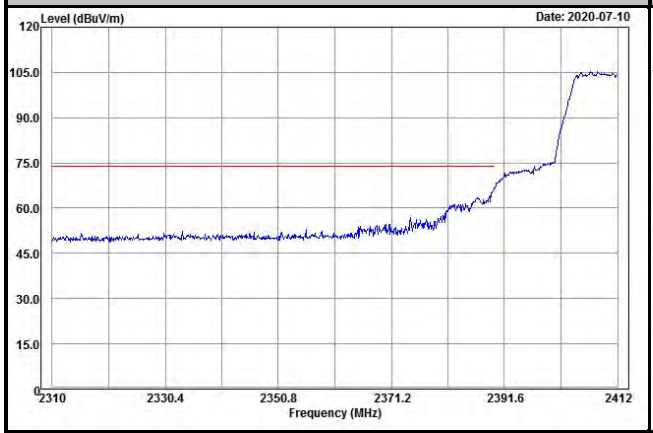
Average	
Horizontal	Vertical

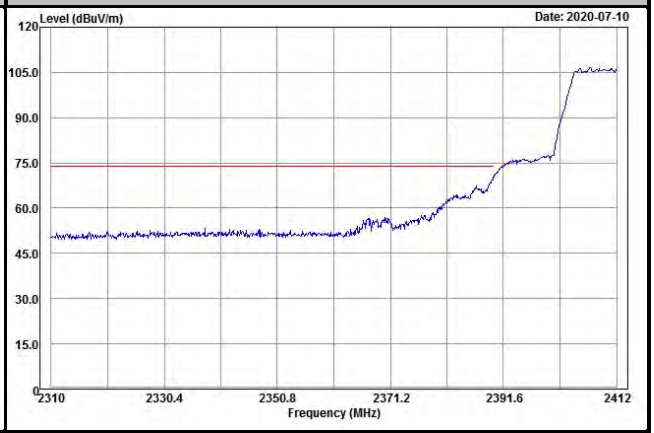




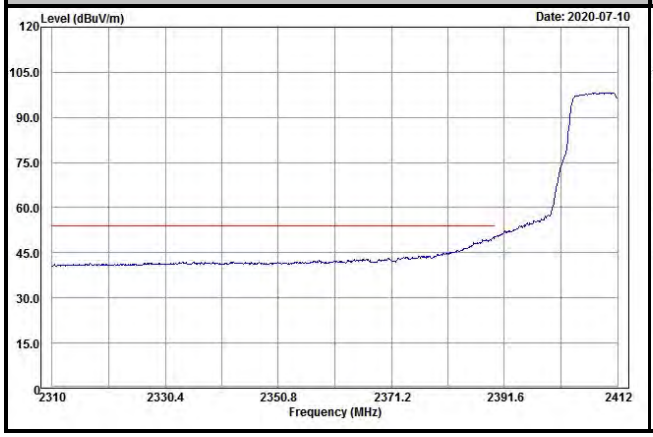
802.11g

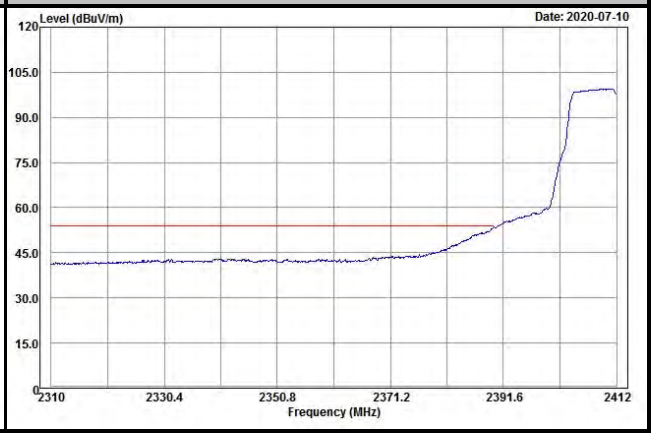
Ch 1	
Peak	
Horizontal	Vertical



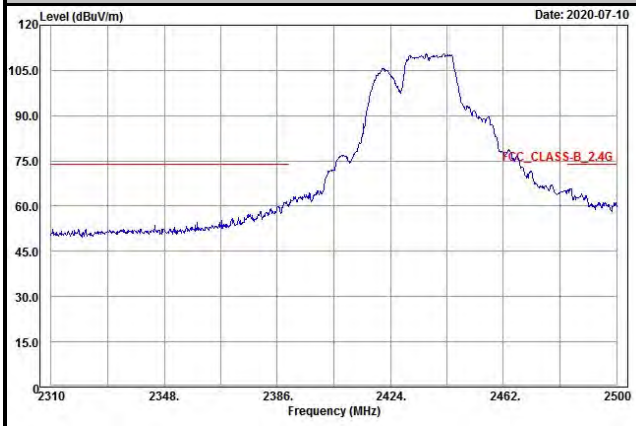


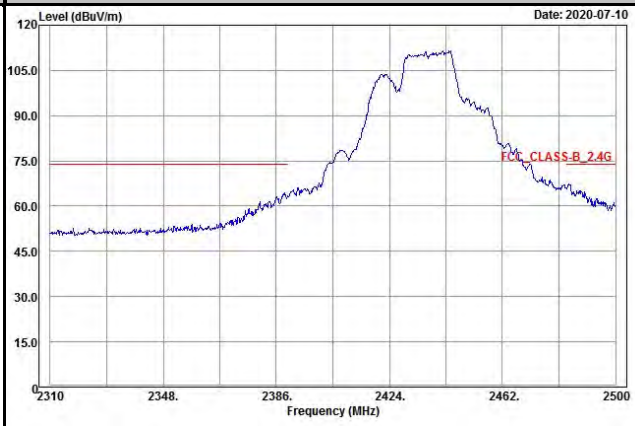
Average	
Horizontal	Vertical



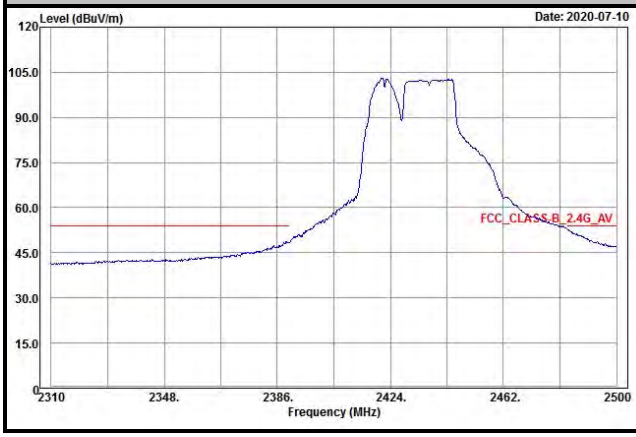


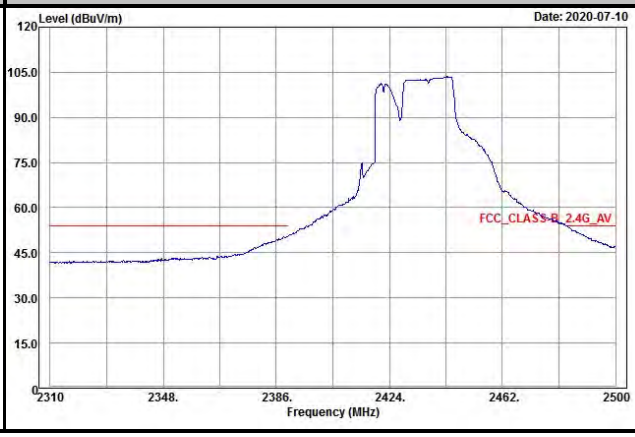
Ch 6	
Peak	
Horizontal	Vertical

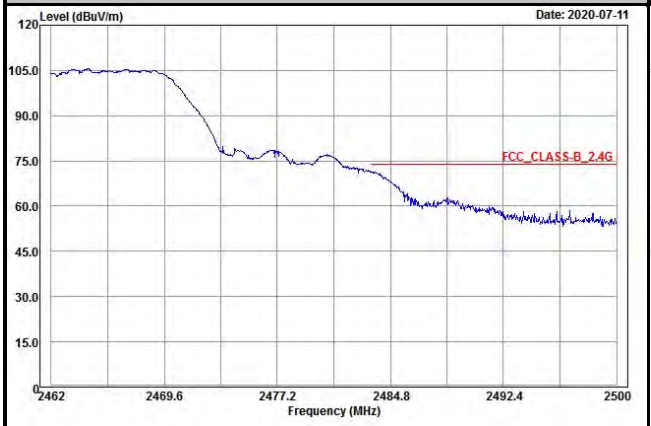
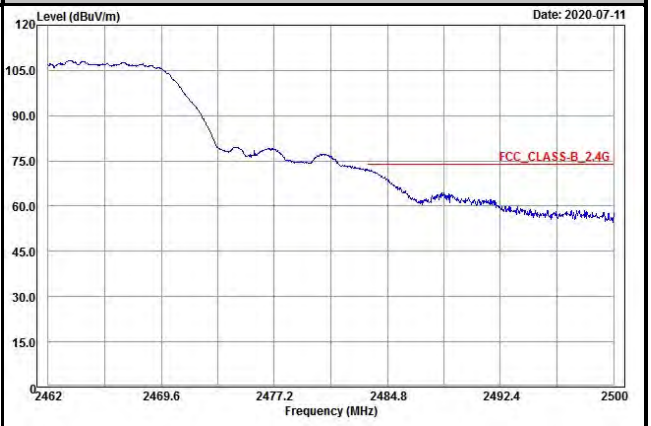
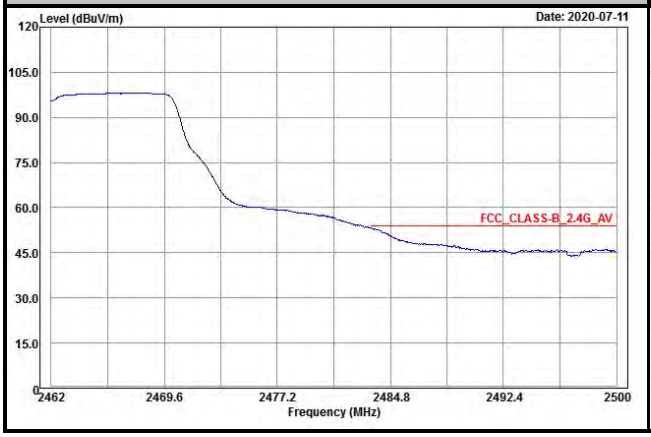




Average	
Horizontal	Vertical

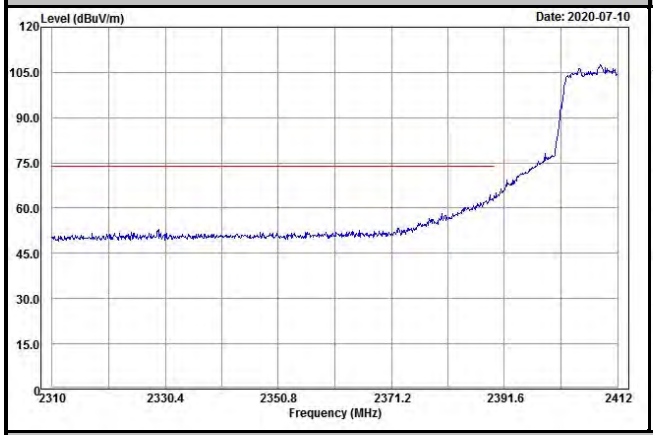


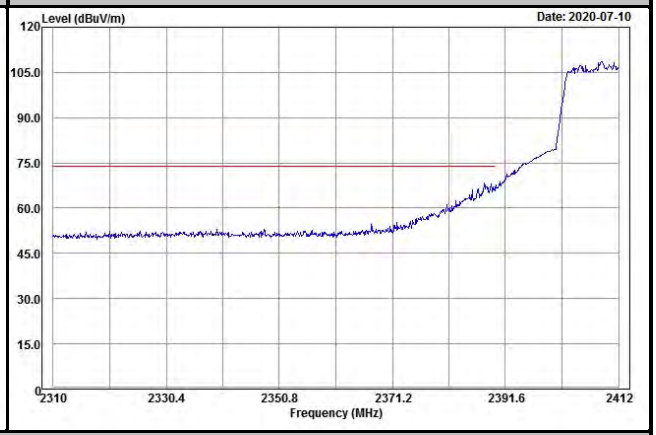


Ch 11	
Peak	
Horizontal	**Vertical**
	
Average	
Horizontal	**Vertical**
	

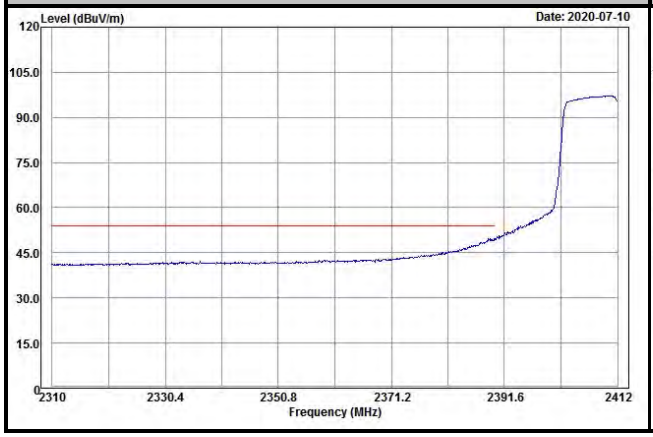
802.11ax (HE20)

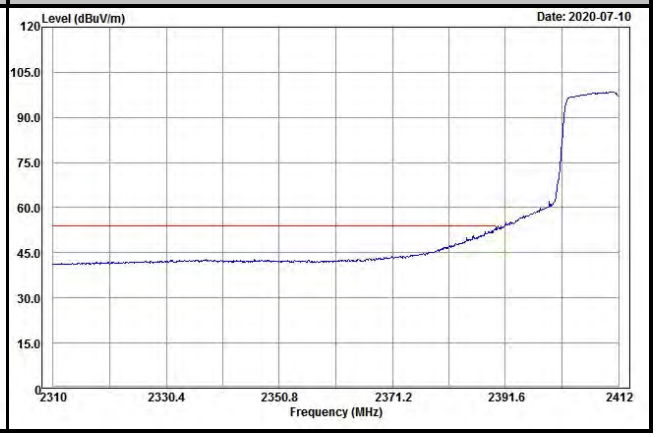
Ch 1	
Peak	
Horizontal	Vertical



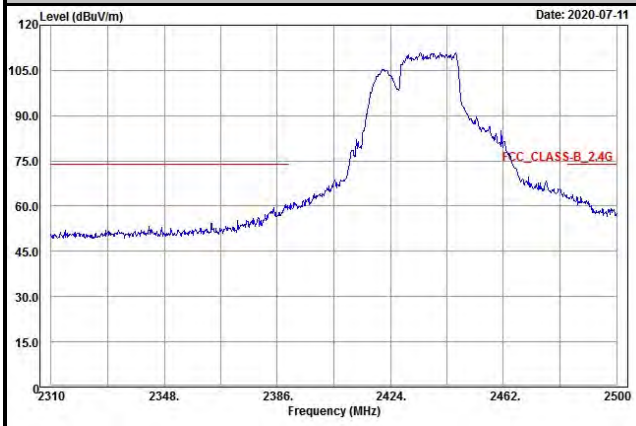


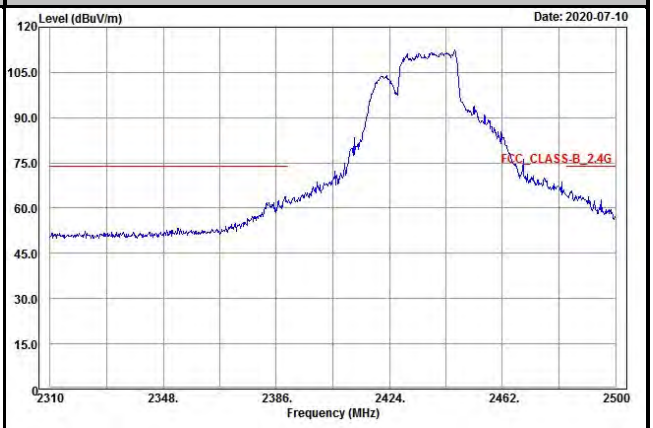
Average	
Horizontal	Vertical



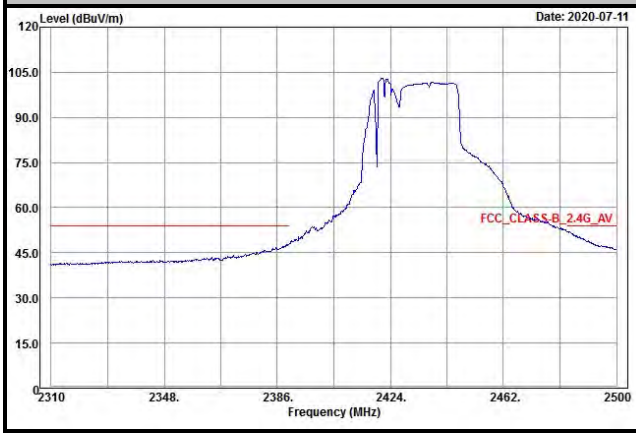


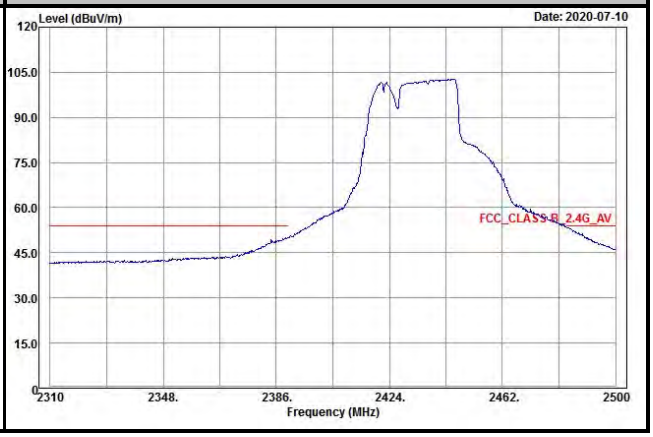
Ch 6	
Peak	
Horizontal	Vertical

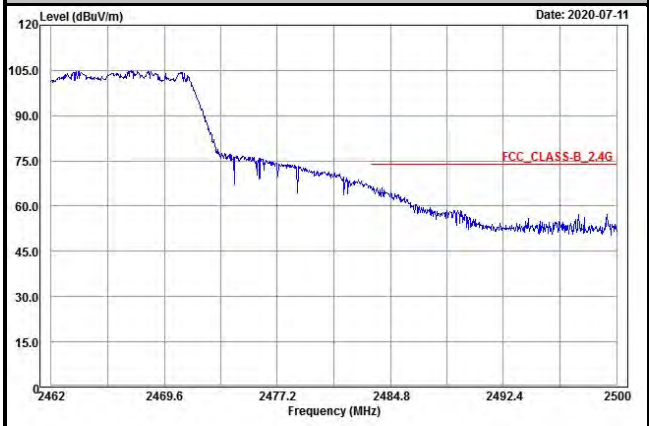
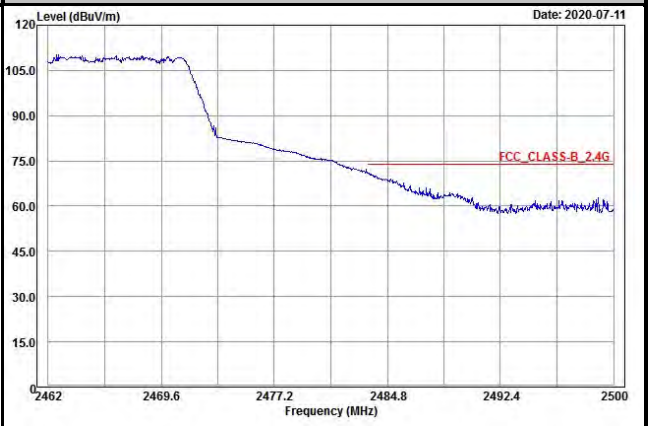
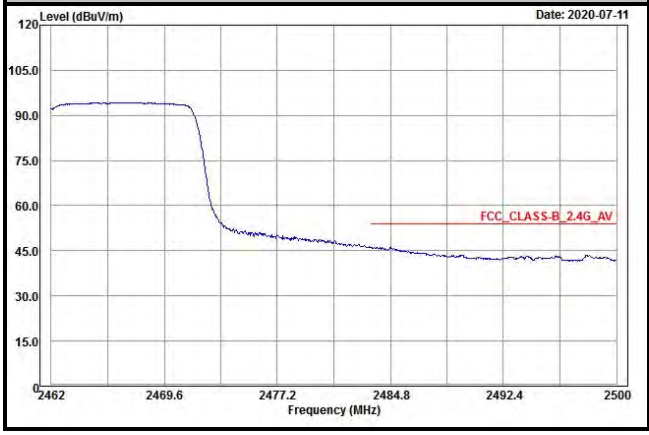




Average	
Horizontal	Vertical

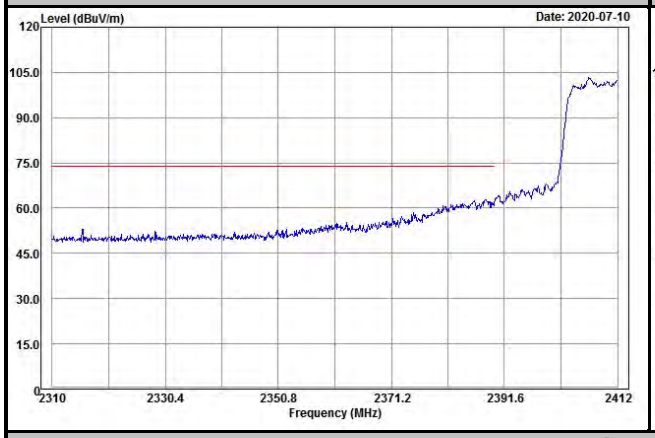


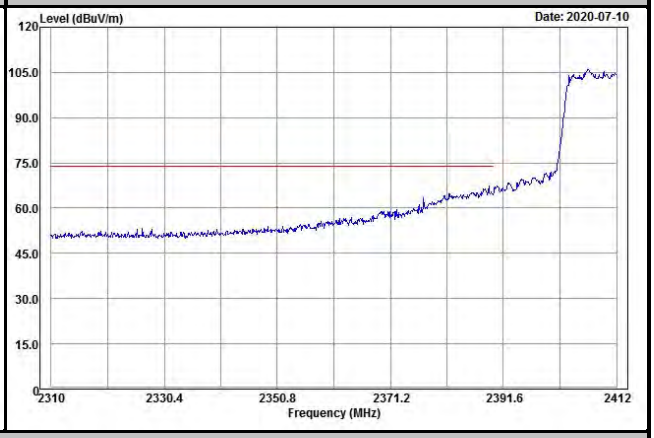


Ch 11	
Peak	
Horizontal	**Vertical**
	
Average	
Horizontal	**Vertical**
	

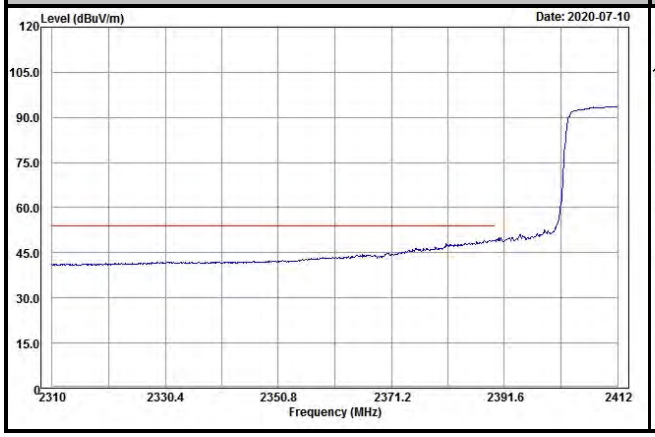
802.11ax (HE40)

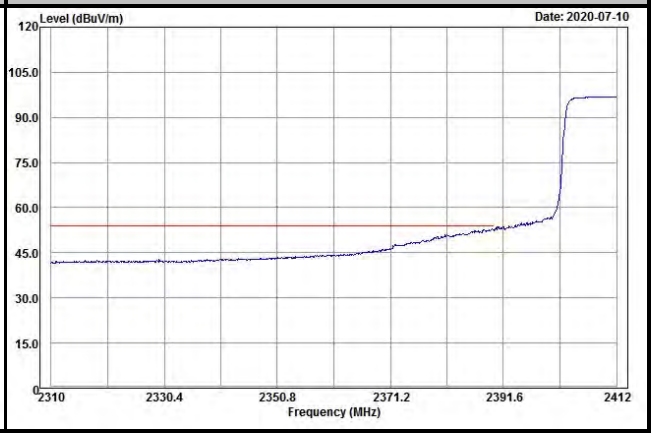
Ch 3	
Peak	
Horizontal	Vertical



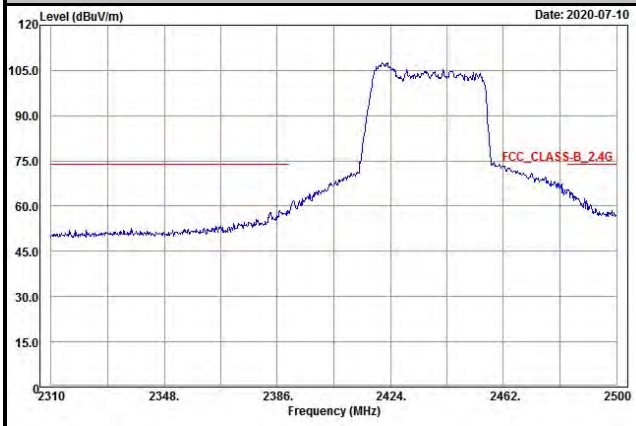


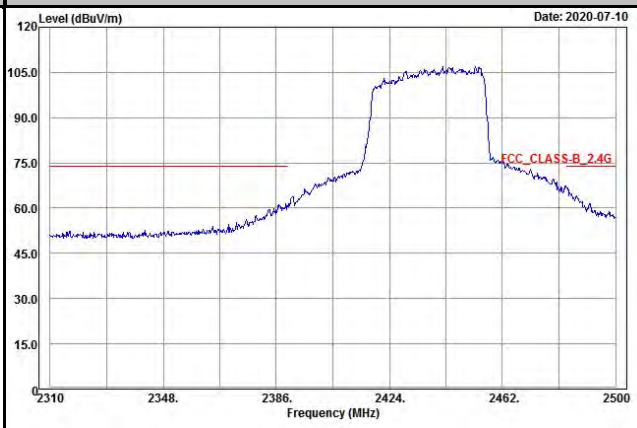
Average	
Horizontal	Vertical



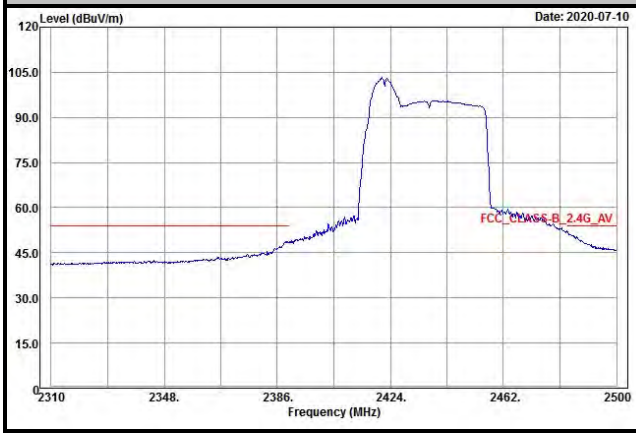


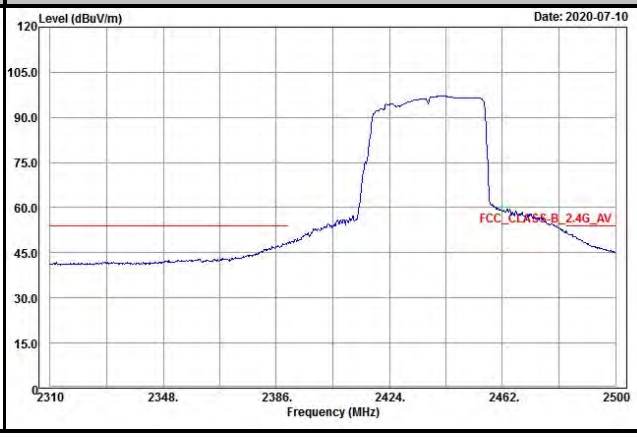
Ch 6	
Peak	
Horizontal	Vertical



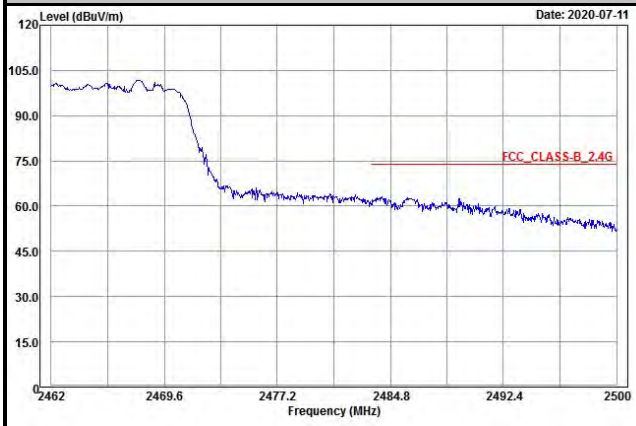


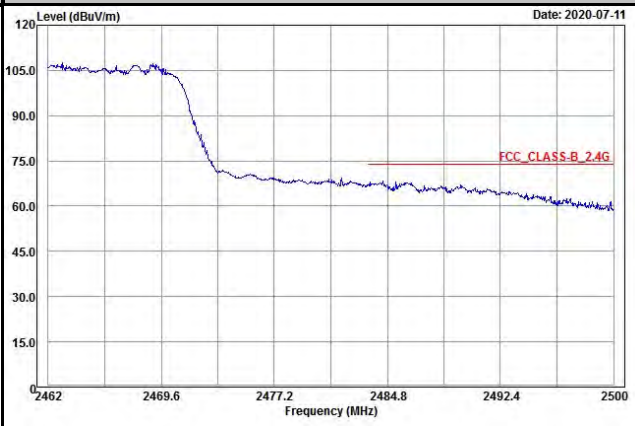
Average	
Horizontal	Vertical



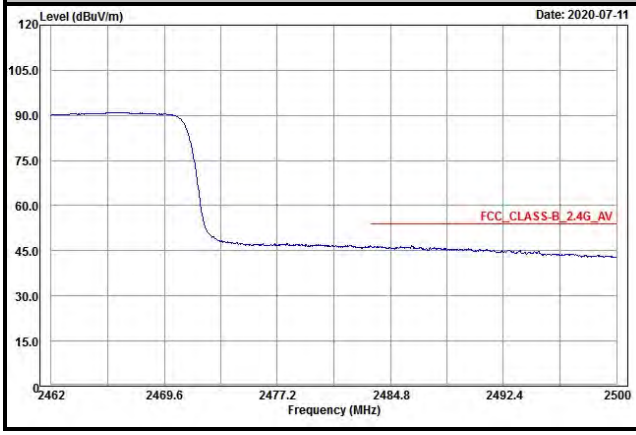


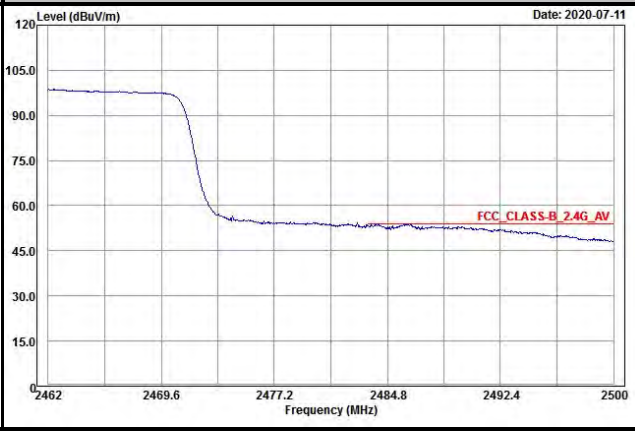
Ch 9	
Peak	
Horizontal	Vertical





Average	
Horizontal	Vertical





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
Web Site: www.bureauveritas-adt.com

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

--- END ---