

FCC Test Report

Report No.: RFBEHG-WTW-P2105066-2

FCC ID: 2AA5WKMP8S1AA

Test Model: NAR01 (Mobile Router)

Received Date: May 24, 2021

Test Date: Jul. 14 ~ Aug. 05, 2021

Issued Date: Sep. 30, 2021

Applicant: NEC Platforms, Ltd.

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FCC Registration / 788550 / TW0003

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Release Control Record

Issue No.	Description	Date Issued
RFBEHG-WTW-P2105066-2	Original Release	Sep. 30, 2021

1 Certificate of Conformity

Product: NAR01 Mobile Router

Brand: NEC

Test Model: NAR01 (Mobile Router)

Sample Status: Engineering Sample

Applicant: NEC Platforms, Ltd.

Test Date: Jul. 14 ~ Aug. 05, 2021

Standards: 47 CFR FCC Part 15, Subpart C (Section 15.247)
ANSI C63.10:2013

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's RF characteristics under the conditions specified in this report.

Prepared by : Lena Wang , Date: Sep. 30, 2021
Lena Wang / Specialist

Approved by : Dylan Chiou , Date: Sep. 30, 2021
Dylan Chiou / Senior 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 -8.73 dB at 0.52536 MHz.
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	Pass	Meet the requirement of limit. Minimum passing margin is -1.18 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	No antenna connector is used.

Note:

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

2.1 Measurement Uncertainty

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

Measurement	Frequency	Expanded Uncertainty (k=2) (±)
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	NAR01 Mobile Router
Brand	NEC
Test Model	NAR01 (Mobile Router)
Status of EUT	Engineering Sample
Power Supply Rating	5.0 Vdc (adapter) 3.8 Vdc (Battery)
Modulation Type	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDMA
Modulation Technology	DSSS, OFDM, OFDMA
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), 802.11ax (HE20) 7 for 802.11n (HT40), 802.11ax (HE40)
Output Power	44.979 mW
Antenna Type	Refer to Note as below
Antenna Connector	N/A
Accessory Device	N/A
Data Cable Supplied	N/A

Note:

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

Modulation Mode	Tx Function
802.11b	2TX
802.11g	2TX
802.11n (HT20)	2TX
802.11n (HT40)	2TX
802.11ax (HE20)	2TX
802.11ax (HE40)	2TX

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

2. The EUT contains following accessory devices.

Product	Brand	Model	Description
Battery	NEC	GXE-005945	3.8 Vdc, Rated 4000mAh, 16Wh

3. The EUT uses following antennas.

Antenna Type		Inverted L (Omni-directional)	
Band		BT	WLAN2.4G
Gain	Ant. 1 (TX/RX)	0.1	0.1
	Ant. 2 (TX/RX)	-	0.3

4. 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.
5. 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.
6. WLAN 2.4G & WWAN technology can transmit at same time.
7. Spurious emission of the simultaneous operation (WLAN2.4G & WWAN) has been evaluated and no non-compliance was found.

3.2 Description of Test Modes

11 channels are provided for 802.11b, 802.11g and 802.11n (HT20), 802.11ax (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), 802.11ax (HE40):

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	
-	√	√	√	√	-

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 **X-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)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
-	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)
-	802.11n (HT40)	3 to 9	9	OFDM	BPSK	13.5

Power Line Conducted Emission Test:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11n (HT40)	3 to 9	9	OFDM	BPSK	13.5

Bandedge Measurement:

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

EUT Configure Mode	Mode	Available Channel	Tested Channel	Modulation Technology	Modulation Type	Data Rate (Mbps)
-	802.11b	1 to 11	1, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 9	OFDM	BPSK	13.5
-	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)
-	802.11b	1 to 11	1, 6, 11	DSSS	DBPSK	1.0
-	802.11g	1 to 11	1, 6, 11	OFDM	BPSK	6.0
-	802.11n (HT20)	1 to 11	1, 6, 11	OFDM	BPSK	6.5
-	802.11n (HT40)	3 to 9	3, 6, 9	OFDM	BPSK	13.5
-	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 $\geq$ 1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
RE<1G	25 deg. C, 65 % RH	120 Vac, 60 Hz	Karl Lee
PLC	25 deg. C, 65 % RH	120 Vac, 60 Hz	Cookie Ku
APCM	25 deg. C, 65 % RH	3.8 Vdc	Ivan Tseng

3.3 Duty Cycle of Test Signal

802.11b: Duty cycle = $8.375/8.5 = 0.985$, Duty cycle of test signal is $\geq 98\%$, duty factor is not required.

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

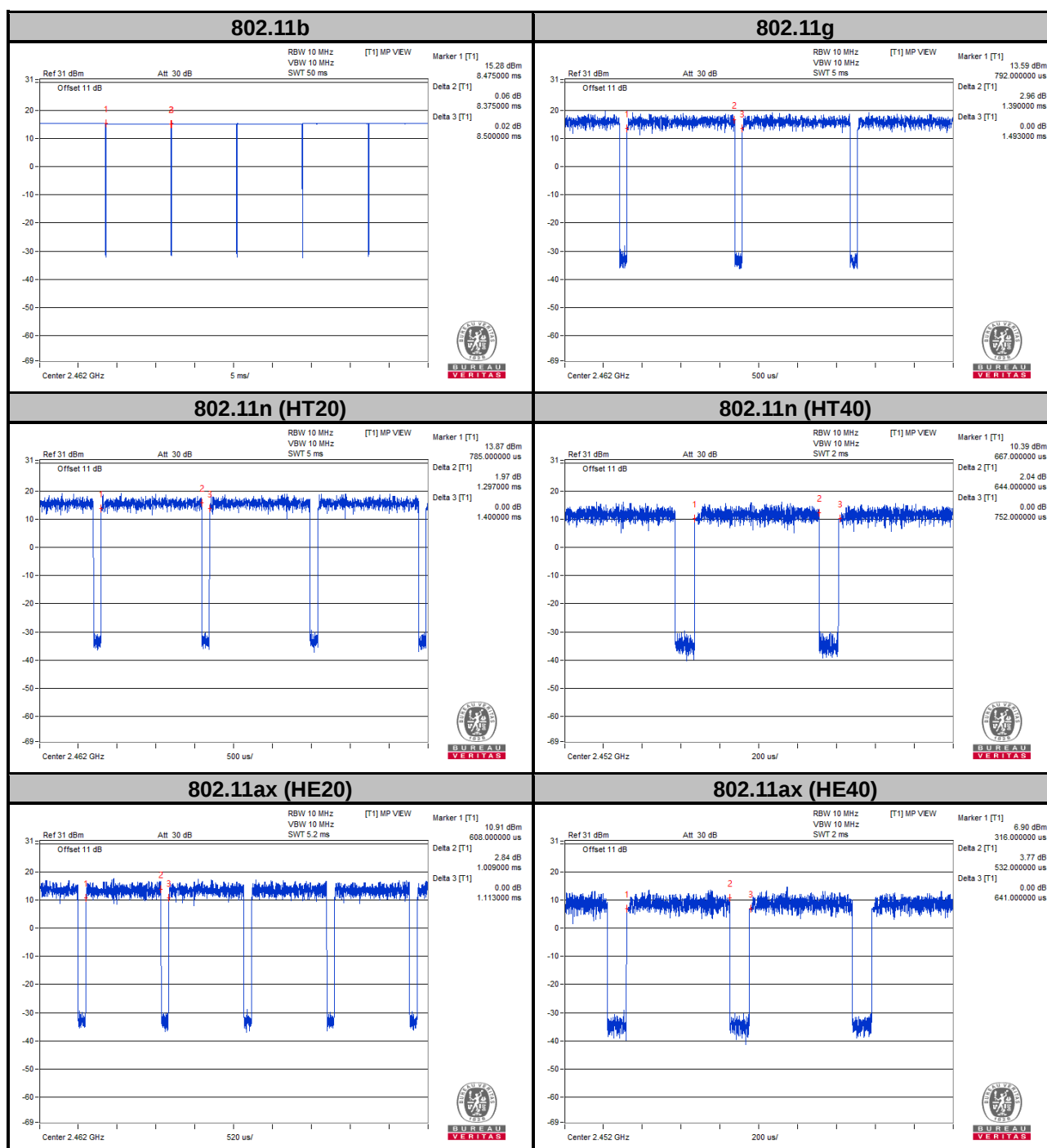
802.11g: Duty cycle = $1.39/1.493 = 0.931$, Duty factor = $10 * \log(1/0.931) = 0.31$

802.11n (HT20): Duty cycle = $1.297/1.4 = 0.926$, Duty factor = $10 * \log(1/0.926) = 0.33$

802.11n (HT40): Duty cycle = $0.644/0.752 = 0.856$, Duty factor = $10 * \log(1/0.856) = 0.67$

802.11ax (HE20): Duty cycle = $1.009/1.113 = 0.907$, Duty factor = $10 * \log(1/0.907) = 0.43$

802.11ax (HE40): Duty cycle = $0.532/0.641 = 0.83$, Duty factor = $10 * \log(1/0.83) = 0.81$



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.

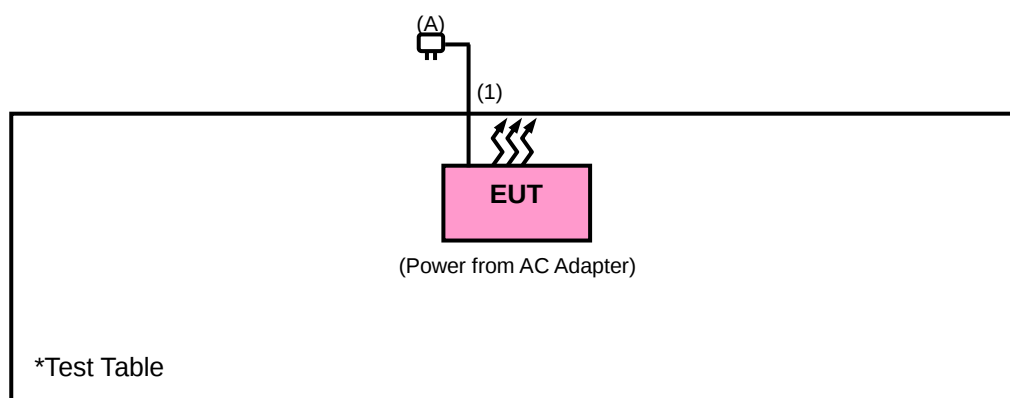
No.	Product	Brand	Model No.	Serial No.	FCC ID
A	Adapter	N/A	TC U250	N/A	N/A

No.	Signal Cable Description of The Above Support Units
1.	Type C Cable: 1M, Provided by client

Note:

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

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. 24, 2020	Aug. 23, 2021
Spectrum Analyzer ROHDE & SCHWARZ	FSU43	101261	Apr. 12, 2021	Apr. 11, 2022
HORN Antenna ETS-Lindgren	3117	00143293	Nov. 22, 2020	Nov. 21, 2021
BILOG Antenna SCHWARZBECK	VULB 9168	9168-616	Nov. 09, 2020	Nov. 08, 2021
Fixed Attenuator Mini-Circuits	MDCS18N-10	MDCS18N-10-01	Apr. 13, 2021	Apr. 12, 2022
Loop Antenna	EM-6879	269	Sep. 17, 2020	Sep. 16, 2021
Preamplifier Agilent	310N	187226	Jun. 17, 2021	Jun. 16, 2022
Preamplifier Agilent	83017A	MY39501357	Jun. 17, 2021	Jun. 16, 2022
Preamplifier EMCI	EMC 184045	980116	Oct. 07, 2020	Oct. 06, 2021
Power Meter Anritsu	ML2495A	1012010	Sep. 01, 2020	Aug. 31, 2021
Power Sensor Anritsu	MA2411B	1315050	Sep. 01, 2020	Aug. 31, 2021
RF signal cable ETS-LINDGREN	5D-FB	Cable-CH1-01(RFC-SMS-100-SMS-120+RFC-SMS-100-SMS-400)	Jun. 17, 2021	Jun. 16, 2022
RF signal cable ETS-LINDGREN	8D-FB	Cable-CH1-02(RFC-SMS-100-SMS-24)	Jun. 17, 2021	Jun. 16, 2022
Boresight Antenna Fixture	FBA-01	FBA-SIP01	NA	NA
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:

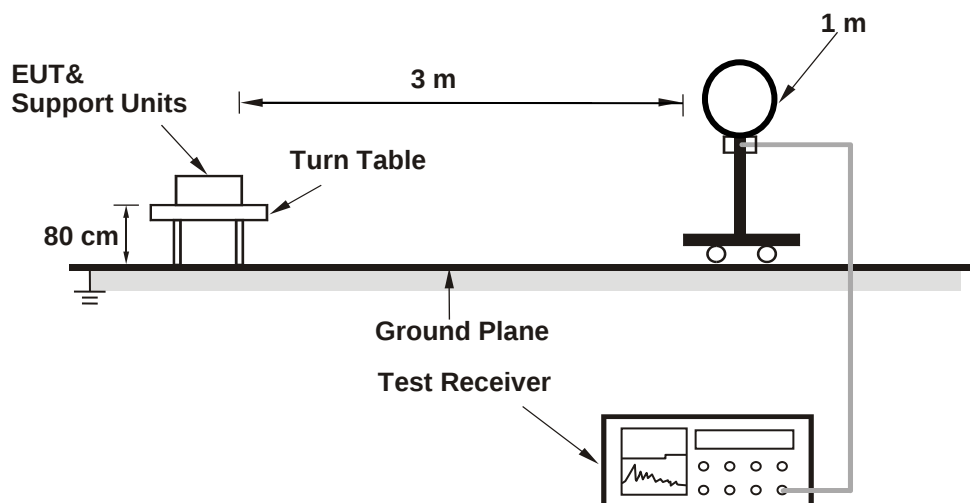
1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) or Peak detection (PK) at frequency below 1 GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1 GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is $\geq 1/T$ (Duty cycle $< 98\%$) or 10 Hz (Duty cycle $\geq 98\%$) for Average detection (AV) at frequency above 1 GHz.
(11b: RBW = 1 MHz, VBW = 10 Hz ; 11g: RBW = 1 MHz, VBW = 1 kHz ;
11n (HT20): RBW = 1 MHz, VBW = 1 kHz ; 11n (HT40): RBW = 1 MHz, VBW = 2 kHz ; 11ax (HE20):
RBW = 1 MHz, VBW = 1 kHz ; 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

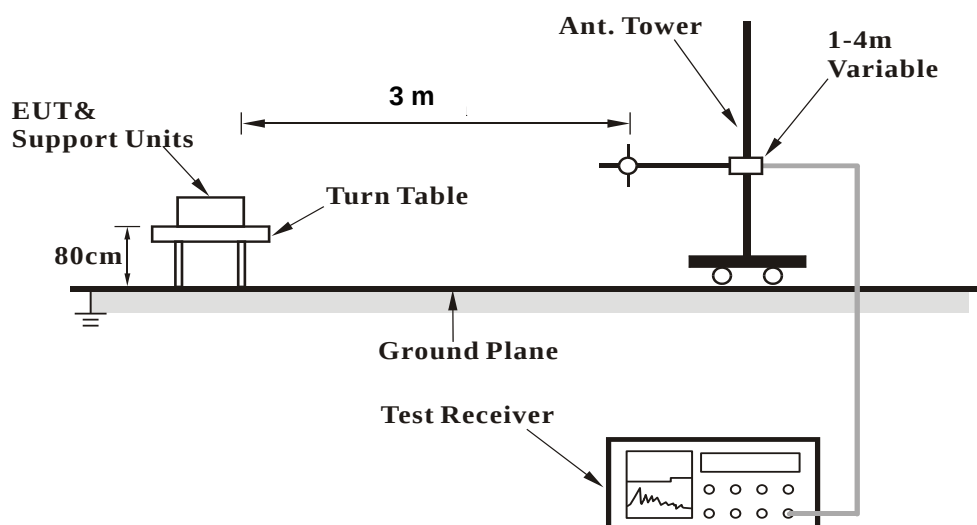
No deviation.

4.1.5 Test Set Up

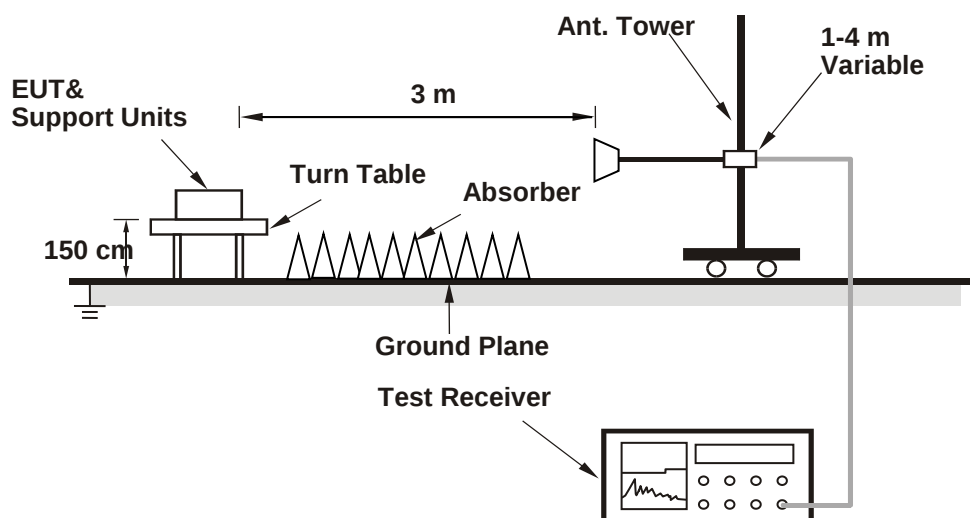
<Radiated Emission below 30 MHz>



<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

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

4.1.7 Test Results

Above 1 GHz Data : 802.11b

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	42.63	38.13	4.5	54	-11.37	168	40	Average
2390	52.47	47.97	4.5	74	-21.53	168	40	Peak
2412	100.44	95.89	4.55			176	40	Average
2412	102.62	98.07	4.55			176	40	Peak
4824	41.69	31.4	10.29	54	-12.31	148	119	Average
4824	49	38.71	10.29	74	-25	148	119	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	41.4	36.9	4.5	54	-12.6	332	271	Average
2390	51.92	47.42	4.5	74	-22.08	332	271	Peak
2412	96	91.45	4.55			350	274	Average
2412	98.15	93.6	4.55			350	274	Peak
4824	41.57	31.28	10.29	54	-12.43	146	150	Average
4824	49.51	39.22	10.29	74	-24.49	146	150	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- 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	41.3	36.8	4.5	54	-12.7	132	159	Average
2390	51.39	46.89	4.5	74	-22.61	132	159	Peak
2437	99.39	94.8	4.59			132	159	Average
2437	101.37	96.78	4.59			132	159	Peak
2483.5	41.83	37.17	4.66	54	-12.17	132	159	Average
2483.5	52.79	48.13	4.66	74	-21.21	132	159	Peak
4874	41.65	31.44	10.21	54	-12.35	187	201	Average
4874	48.18	37.97	10.21	74	-25.82	187	201	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	41.31	36.81	4.5	54	-12.69	314	274	Average
2390	51.37	46.87	4.5	74	-22.63	314	274	Peak
2437	95.44	90.85	4.59			314	274	Average
2437	97.47	92.88	4.59			314	274	Peak
2483.5	41.82	37.16	4.66	54	-12.18	314	274	Average
2483.5	52.16	47.5	4.66	74	-21.84	314	274	Peak
4874	41.66	31.45	10.21	54	-12.34	148	55	Average
4874	48.4	38.19	10.21	74	-25.6	148	55	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	100.21	95.59	4.62			208	157	Average
2462	102.51	97.89	4.62			208	157	Peak
2483.5	41.92	37.26	4.66	54	-12.08	196	161	Average
2483.5	52.07	47.41	4.66	74	-21.93	196	161	Peak
4924	41.63	31.38	10.25	54	-12.37	185	205	Average
4924	48.98	38.73	10.25	74	-25.02	185	205	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	96.36	91.74	4.62			268	262	Average
2462	98.65	94.03	4.62			268	262	Peak
2483.5	42.41	37.75	4.66	54	-11.59	268	253	Average
2483.5	52.5	47.84	4.66	74	-21.5	268	253	Peak
4924	41.65	31.4	10.25	54	-12.35	149	347	Average
4924	47.92	37.67	10.25	74	-26.08	149	347	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.
- 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	51	46.5	4.5	54	-3	167	47	Average
2390	63.6	59.1	4.5	74	-10.4	167	47	Peak
2412	97.71	93.16	4.55			176	40	Average
2412	104.49	99.94	4.55			176	40	Peak
4824	41.75	31.46	10.29	54	-12.25	172	189	Average
4824	48.75	38.46	10.29	74	-25.25	172	189	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	45.54	41.04	4.5	54	-8.46	334	259	Average
2390	59.23	54.73	4.5	74	-14.77	334	259	Peak
2412	93.37	88.82	4.55			350	274	Average
2412	99.84	95.29	4.55			350	274	Peak
4824	41.66	31.37	10.29	54	-12.34	134	309	Average
4824	49.33	39.04	10.29	74	-24.67	134	309	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- 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	41.39	36.89	4.5	54	-12.61	132	159	Average
2390	51.84	47.34	4.5	74	-22.16	132	159	Peak
2437	95.03	90.44	4.59			132	159	Average
2437	103.81	99.22	4.59			132	159	Peak
2483.5	41.94	37.28	4.66	54	-12.06	132	159	Average
2483.5	53.09	48.43	4.66	74	-20.91	132	159	Peak
4874	41.85	31.64	10.21	54	-12.15	155	16	Average
4874	48.62	38.41	10.21	74	-25.38	155	16	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	41.54	37.04	4.5	54	-12.46	314	274	Average
2390	51.96	47.46	4.5	74	-22.04	314	274	Peak
2437	92.83	88.24	4.59			314	274	Average
2437	100.01	95.42	4.59			314	274	Peak
2483.5	41.93	37.27	4.66	54	-12.07	314	274	Average
2483.5	51.59	46.93	4.66	74	-22.41	314	274	Peak
4874	41.67	31.46	10.21	54	-12.33	134	209	Average
4874	48.45	38.24	10.21	74	-25.55	134	209	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	97.58	92.96	4.62			208	157	Average
2462	104.26	99.64	4.62			208	157	Peak
2483.5	47.4	42.74	4.66	54	-6.6	213	124	Average
2483.5	63.49	58.83	4.66	74	-10.51	213	124	Peak
4924	41.63	31.38	10.25	54	-12.37	178	199	Average
4924	47.84	37.59	10.25	74	-26.16	178	199	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	93.64	89.02	4.62			268	262	Average
2462	100.4	95.78	4.62			268	262	Peak
2483.5	45.24	40.58	4.66	54	-8.76	275	260	Average
2483.5	58.51	53.85	4.66	74	-15.49	275	260	Peak
4924	41.66	31.41	10.25	54	-12.34	164	177	Average
4924	49.22	38.97	10.25	74	-24.78	164	177	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.

802.11n (HT20)

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	52.32	47.82	4.5	54	-1.68	164	52	Average
2390	67.44	62.94	4.5	74	-6.56	164	52	Peak
2412	97.36	92.81	4.55			176	40	Average
2412	104.38	99.83	4.55			176	40	Peak
4824	41.77	31.48	10.29	54	-12.23	134	198	Average
4824	48.83	38.54	10.29	74	-25.17	134	198	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	46.88	42.38	4.5	54	-7.12	342	279	Average
2390	62.78	58.28	4.5	74	-11.22	342	279	Peak
2412	93.19	88.64	4.55			350	274	Average
2412	100.51	95.96	4.55			350	274	Peak
4824	41.71	31.42	10.29	54	-12.29	148	177	Average
4824	49.78	39.49	10.29	74	-24.22	148	177	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- 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	41.36	36.86	4.5	54	-12.64	132	159	Average
2390	52.01	47.51	4.5	74	-21.99	132	159	Peak
2437	96.3	91.71	4.59			132	159	Average
2437	103.53	98.94	4.59			132	159	Peak
2483.5	41.91	37.25	4.66	54	-12.09	132	159	Average
2483.5	53.71	49.05	4.66	74	-20.29	132	159	Peak
4874	41.48	31.27	10.21	54	-12.52	134	229	Average
4874	47.78	37.57	10.21	74	-26.22	134	229	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	41.37	36.87	4.5	54	-12.63	314	274	Average
2390	51.61	47.11	4.5	74	-22.39	314	274	Peak
2437	92.65	88.06	4.59			314	274	Average
2437	99.63	95.04	4.59			314	274	Peak
2483.5	41.79	37.13	4.66	54	-12.21	314	274	Average
2483.5	52.02	47.36	4.66	74	-21.98	314	274	Peak
4874	41.69	31.48	10.21	54	-12.31	164	206	Average
4874	49.83	39.62	10.21	74	-24.17	164	206	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	97.41	92.79	4.62			208	157	Average
2462	104.13	99.51	4.62			208	157	Peak
2483.5	49.02	44.36	4.66	54	-4.98	214	150	Average
2483.5	63.96	59.3	4.66	74	-10.04	214	150	Peak
4924	41.68	31.43	10.25	54	-12.32	157	122	Average
4924	49.17	38.92	10.25	74	-24.83	157	122	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	93.33	88.71	4.62			268	262	Average
2462	100.32	95.7	4.62			268	262	Peak
2483.5	46.59	41.93	4.66	54	-7.41	274	243	Average
2483.5	61.51	56.85	4.66	74	-12.49	274	243	Peak
4924	41.7	31.45	10.25	54	-12.3	187	195	Average
4924	48.45	38.2	10.25	74	-25.55	187	195	Peak

Remarks:

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

802.11n (HT40)

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	52.75	48.25	4.5	54	-1.25	145	16	Average
2390	72.26	67.76	4.5	74	-1.74	145	16	Peak
2422	93.92	89.36	4.56			150	11	Average
2422	100.81	96.25	4.56			150	11	Peak
2483.5	42.4	37.74	4.66	54	-11.6	150	11	Average
2483.5	53.93	49.27	4.66	74	-20.07	150	11	Peak
4844	41.81	31.58	10.23	54	-12.19	164	33	Average
4844	48.47	38.24	10.23	74	-25.53	164	33	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	46.41	41.91	4.5	54	-7.59	331	254	Average
2390	65.83	61.33	4.5	74	-8.17	331	254	Peak
2422	89.29	84.73	4.56			350	274	Average
2422	95.95	91.39	4.56			350	274	Peak
2483.5	42.81	38.15	4.66	54	-11.19	350	274	Average
2483.5	53.38	48.72	4.66	74	-20.62	350	274	Peak
4844	41.88	31.65	10.23	54	-12.12	145	229	Average
4844	48.86	38.63	10.23	74	-25.14	145	229	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2422 MHz: Fundamental frequency.
- 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	44.08	39.58	4.5	54	-9.92	132	165	Average
2390	57.17	52.67	4.5	74	-16.83	132	165	Peak
2437	94.79	90.2	4.59			145	170	Average
2437	101.8	97.21	4.59			145	170	Peak
2483.5	52.14	47.48	4.66	54	-1.86	171	206	Average
2483.5	65.36	60.7	4.66	74	-8.64	171	206	Peak
4874	41.64	31.43	10.21	54	-12.36	177	14	Average
4874	48.34	38.13	10.21	74	-25.66	177	14	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	44.17	39.67	4.5	54	-9.83	325	259	Average
2390	57.28	52.78	4.5	74	-16.72	325	259	Peak
2437	89.8	85.21	4.59			314	274	Average
2437	96.69	92.1	4.59			314	274	Peak
2483.5	48.4	43.74	4.66	54	-5.6	306	274	Average
2483.5	60.75	56.09	4.66	74	-13.25	306	274	Peak
4874	41.59	31.38	10.21	54	-12.41	155	169	Average
4874	48.09	37.88	10.21	74	-25.91	155	169	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	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	42.01	37.51	4.5	54	-11.99	208	194	Average
2390	55.75	51.25	4.5	74	-18.25	208	194	Peak
2452	93.49	88.89	4.6			208	178	Average
2452	100.01	95.41	4.6			208	178	Peak
2483.5	52.82	48.16	4.66	54	-1.18	220	164	Average
2483.5	69.43	64.77	4.66	74	-4.57	220	164	Peak
4904	41.48	31.34	10.14	54	-12.52	158	88	Average
4904	48.76	38.62	10.14	74	-25.24	158	88	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	41.87	37.37	4.5	54	-12.13	268	262	Average
2390	51.54	47.04	4.5	74	-22.46	268	262	Peak
2452	89.32	84.72	4.6			268	262	Average
2452	95.52	90.92	4.6			268	262	Peak
2483.5	50.1	45.44	4.66	54	-3.9	263	229	Average
2483.5	67.43	62.77	4.66	74	-6.57	263	229	Peak
4904	41.4	31.26	10.14	54	-12.6	125	55	Average
4904	49.02	38.88	10.14	74	-24.98	125	55	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.

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	45.41	40.91	4.5	54	-8.59	162	52	Average
2390	57.5	53	4.5	74	-16.5	162	52	Peak
2412	93.93	89.38	4.55			176	40	Average
2412	103.36	98.81	4.55			176	40	Peak
4824	41.74	31.45	10.29	54	-12.26	159	268	Average
4824	48.56	38.27	10.29	74	-25.44	159	268	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	42.47	37.97	4.5	54	-11.53	346	272	Average
2390	53.49	48.99	4.5	74	-20.51	346	272	Peak
2412	89.65	85.1	4.55			350	274	Average
2412	98.89	94.34	4.55			350	274	Peak
4824	41.63	31.34	10.29	54	-12.37	154	188	Average
4824	47.99	37.7	10.29	74	-26.01	154	188	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2412 MHz: Fundamental frequency.
- 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	41.28	36.78	4.5	54	-12.72	132	159	Average
2390	51.44	46.94	4.5	74	-22.56	132	159	Peak
2437	92.87	88.28	4.59			132	159	Average
2437	102.73	98.14	4.59			132	159	Peak
2483.5	41.86	37.2	4.66	54	-12.14	132	159	Average
2483.5	52.28	47.62	4.66	74	-21.72	132	159	Peak
4874	41.75	31.54	10.21	54	-12.25	101	349	Average
4874	48.68	38.47	10.21	74	-25.32	101	349	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	41.38	36.88	4.5	54	-12.62	314	274	Average
2390	52.2	47.7	4.5	74	-21.8	314	274	Peak
2437	89.11	84.52	4.59			314	274	Average
2437	99.37	94.78	4.59			314	274	Peak
2483.5	41.9	37.24	4.66	54	-12.1	314	274	Average
2483.5	52.07	47.41	4.66	74	-21.93	314	274	Peak
4874	41.77	31.56	10.21	54	-12.23	187	208	Average
4874	48.07	37.86	10.21	74	-25.93	187	208	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	93.52	88.9	4.62			208	157	Average
2462	103.09	98.47	4.62			208	157	Peak
2483.5	43.97	39.31	4.66	54	-10.03	224	153	Average
2483.5	57.43	52.77	4.66	74	-16.57	224	153	Peak
4924	41.85	31.6	10.25	54	-12.15	164	163	Average
4924	48.69	38.44	10.25	74	-25.31	164	163	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	89.74	85.12	4.62			268	262	Average
2462	100.18	95.56	4.62			268	262	Peak
2483.5	42.69	38.03	4.66	54	-11.31	260	272	Average
2483.5	54.02	49.36	4.66	74	-19.98	260	272	Peak
4924	41.73	31.48	10.25	54	-12.27	158	88	Average
4924	48.34	38.09	10.25	74	-25.66	158	88	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2462 MHz: Fundamental frequency.
- 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	45.35	40.85	4.5	54	-8.65	149	21	Average
2390	57.28	52.78	4.5	74	-16.72	149	21	Peak
2422	92.32	87.76	4.56			150	11	Average
2422	102.48	97.92	4.56			150	11	Peak
2483.5	42.18	37.52	4.66	54	-11.82	150	11	Average
2483.5	52.44	47.78	4.66	74	-21.56	150	11	Peak
4844	41.67	31.44	10.23	54	-12.33	106	344	Average
4844	48.28	38.05	10.23	74	-25.72	106	344	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	42.47	37.97	4.5	54	-11.53	328	273	Average
2390	54.8	50.3	4.5	74	-19.2	328	273	Peak
2422	87.8	83.24	4.56			350	274	Average
2422	97.79	93.23	4.56			350	274	Peak
2483.5	41.97	37.31	4.66	54	-12.03	350	274	Average
2483.5	51.73	47.07	4.66	74	-22.27	350	274	Peak
4844	41.65	31.42	10.23	54	-12.35	187	179	Average
4844	48.23	38	10.23	74	-25.77	187	179	Peak

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value
- 2422 MHz: Fundamental frequency.
- 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	41.82	37.32	4.5	54	-12.18	145	170	Average
2390	51.37	46.87	4.5	74	-22.63	145	170	Peak
2437	92.57	87.98	4.59			145	170	Average
2437	101.86	97.27	4.59			145	170	Peak
2483.5	43.76	39.1	4.66	54	-10.24	145	170	Average
2483.5	54.65	49.99	4.66	74	-19.35	145	170	Peak
4874	41.62	31.41	10.21	54	-12.38	187	164	Average
4874	48.26	38.05	10.21	74	-25.74	187	164	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	41.75	37.25	4.5	54	-12.25	314	274	Average
2390	51.51	47.01	4.5	74	-22.49	314	274	Peak
2437	87.52	82.93	4.59			314	274	Average
2437	96.89	92.3	4.59			314	274	Peak
2483.5	41.24	36.58	4.66	54	-12.76	314	274	Average
2483.5	52.01	47.35	4.66	74	-21.99	314	274	Peak
4874	41.53	31.32	10.21	54	-12.47	187	208	Average
4874	47.93	37.72	10.21	74	-26.07	187	208	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	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	41.42	36.92	4.5	54	-12.58	208	178	Average
2390	52.27	47.77	4.5	74	-21.73	208	178	Peak
2452	92.41	87.81	4.6			208	178	Average
2452	102.47	97.87	4.6			208	178	Peak
2483.5	46.65	41.99	4.66	54	-7.35	216	178	Average
2483.5	61.33	56.67	4.66	74	-12.67	216	178	Peak
4904	41.73	31.59	10.14	54	-12.27	102	321	Average
4904	48.63	38.49	10.14	74	-25.37	102	321	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	41.32	36.82	4.5	54	-12.68	268	262	Average
2390	51.72	47.22	4.5	74	-22.28	268	262	Peak
2452	88.5	83.9	4.6			268	262	Average
2452	96.9	92.3	4.6			268	262	Peak
2483.5	45.99	41.33	4.66	54	-8.01	256	234	Average
2483.5	58.62	53.96	4.66	74	-15.38	256	234	Peak
4904	41.61	31.47	10.14	54	-12.39	185	155	Average
4904	48.16	38.02	10.14	74	-25.84	185	155	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:

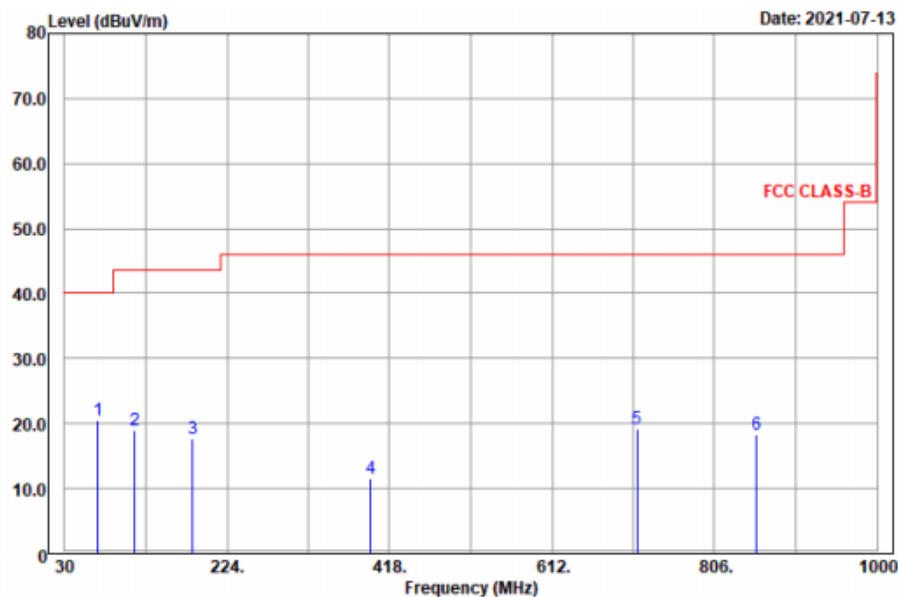
The amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required to be report.

30 MHz ~ 1 GHz Worst-Case Data:

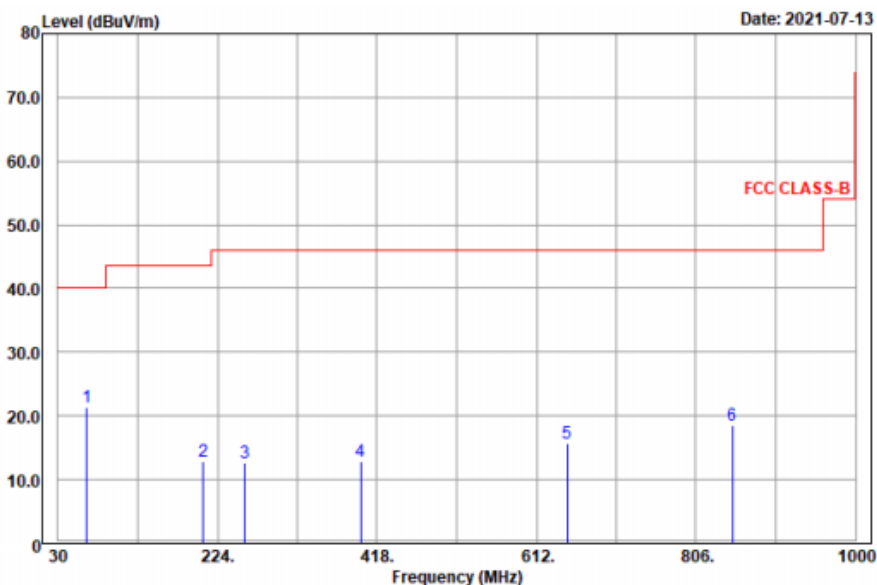
802.11n (HT40)

EUT Test Condition		Measurement Detail	
Channel	Channel 9	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
70.23	20.44	39.99	-19.55	40	-19.56	296	104	QP
113.7	18.92	36.95	-18.03	43.5	-24.58	132	326	QP
183.09	17.55	36.89	-19.34	43.5	-25.95	170	125	QP
395.9	11.51	25.53	-14.02	46	-34.49	258	153	QP
713.7	19.11	28.08	-8.97	46	-26.89	163	251	QP
855.8	18.37	25.04	-6.67	46	-27.63	128	226	QP
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
65.37	21.26	38.77	-17.51	40	-18.74	284	152	QP
206.58	12.84	31.01	-18.17	43.5	-30.66	178	46	QP
257.61	12.58	29.28	-16.7	46	-33.42	192	242	QP
398	12.95	26.95	-14	46	-33.05	256	227	QP
649.3	15.74	25.84	-10.1	46	-30.26	150	253	QP
850.2	18.6	25.4	-6.8	46	-27.4	154	19	QP

Remarks:

- Emission Level = Read Level + Factor
Margin value = Emission level – Limit value.
- 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	102783	Dec. 21, 2020	Dec. 20, 2021
RF signal cable (with 10dB PAD) Woken	5D-FB	Cable-cond2-01	Sep. 04, 2020	Sep. 03, 2021
LISN/AMN ROHDE & SCHWARZ (EUT)	ESH2-Z5	100100	Jan. 28, 2021	Jan. 27, 2022
LISN/AMN ROHDE & SCHWARZ (Peripheral)	ESH3-Z5	100312	Aug. 18, 2020	Aug. 17, 2021
Software ADT	BV ADT_Cond_ V7.3.7.4	NA	NA	NA

- Note: 1. The calibration interval of the above test instruments is 12 months and the calibrations are traceable to NML/ROC and NIST/USA.
 2. The test was performed in HwaYa Shielded Room 2 (Conduction 2).
 3. The VCCI Site Registration No. is C-12047.

4.2.3 Test Procedures

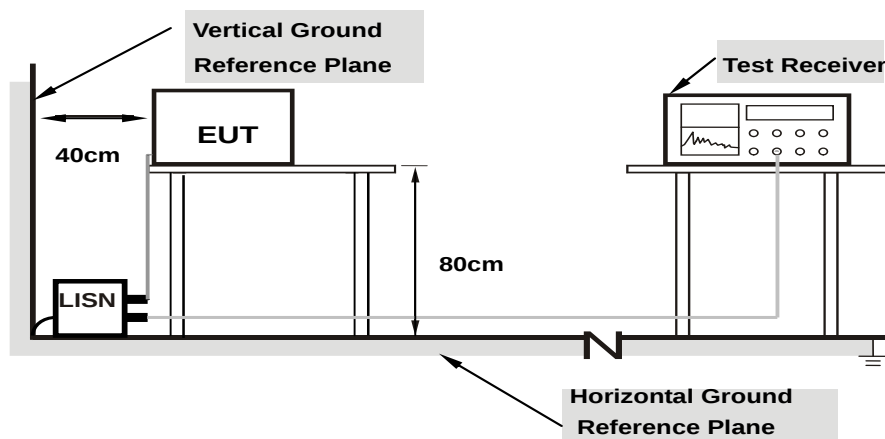
- The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/50 uH of coupling impedance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

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

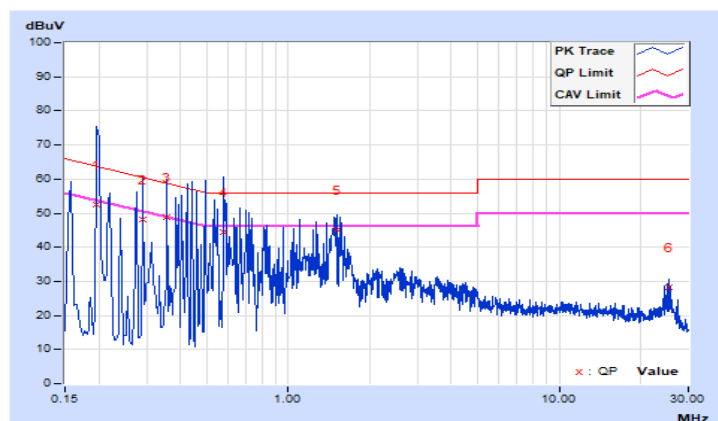
4.2.7 Test Results

Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23 °C, 66% RH
Tested by	Cookie Ku	Test Date	2021/8/5

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	0.19692	10.12	42.51	15.68	52.63	25.80	63.74	53.74	-11.11	-27.94
2	0.29076	10.15	37.83	9.56	47.98	19.71	60.50	50.50	-12.52	-30.79
3	0.35723	10.17	38.70	5.81	48.87	15.98	58.79	48.79	-9.92	-32.81
4	0.58010	10.20	34.34	5.58	44.54	15.78	56.00	46.00	-11.46	-30.22
5	1.51459	10.28	34.99	14.87	45.27	25.15	56.00	46.00	-10.73	-20.85
6	25.52590	10.56	17.72	1.17	28.28	11.73	60.00	50.00	-31.72	-38.27

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

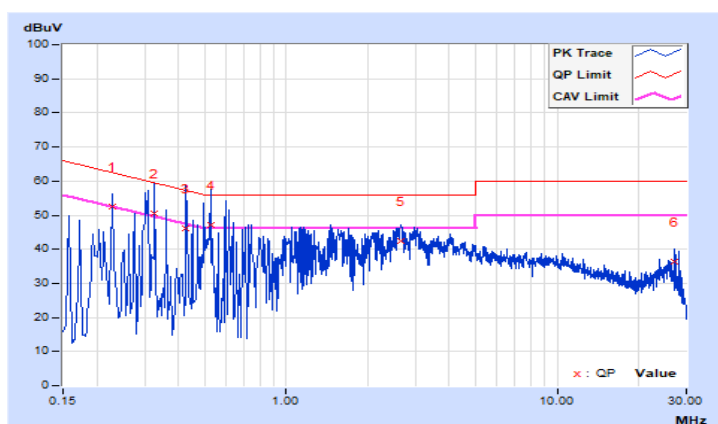


Frequency Range	150kHz ~ 30MHz	Detector Function & Resolution Bandwidth	Quasi-Peak (QP) / Average (AV), 9kHz
Input Power	120Vac, 60Hz	Environmental Conditions	23 °C, 66% RH
Tested by	Cookie Ku	Test Date	2021/8/5

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	0.22820	10.13	42.25	8.70	52.38	18.83	62.51	52.51	-10.13	-33.68
2	0.32595	10.17	40.19	10.05	50.36	20.22	59.55	49.55	-9.19	-29.33
3	0.42761	10.20	35.82	7.35	46.02	17.55	57.30	47.30	-11.28	-29.75
4	0.52536	10.22	37.05	14.64	47.27	24.86	56.00	46.00	-8.73	-21.14
5	2.65240	10.36	31.94	15.80	42.30	26.16	56.00	46.00	-13.70	-19.84
6	27.25803	10.75	25.50	4.79	36.25	15.54	60.00	50.00	-23.75	-34.46

Remarks:

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

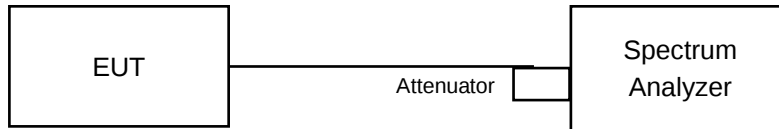


4.3 6 dB Bandwidth Measurement

4.3.1 Limits of 6 dB Bandwidth Measurement

The minimum of 6 dB Bandwidth Measurement is 0.5 MHz.

4.3.2 Test Setup



4.3.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.3.4 Test Procedure

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

4.3.5 Deviation from Test Standard

No deviation.

4.3.6 EUT Operating Conditions

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

4.3.7 Test Results

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	10.11	10.12	0.5	Pass
6	2437	10.12	10.12	0.5	Pass
11	2462	10.12	10.12	0.5	Pass

802.11g

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

802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	17.15	17.13	0.5	Pass
6	2437	17.15	17.33	0.5	Pass
11	2462	17.37	17.38	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.56	35.53	0.5	Pass
6	2437	35.71	35.68	0.5	Pass
9	2452	35.59	35.61	0.5	Pass

802.11ax (HE20)

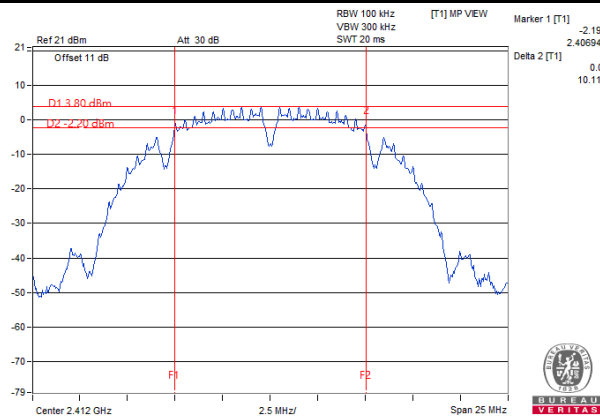
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	18.48	18.50	0.5	Pass
6	2437	18.56	18.56	0.5	Pass
11	2462	18.52	18.48	0.5	Pass

802.11ax (HE40)

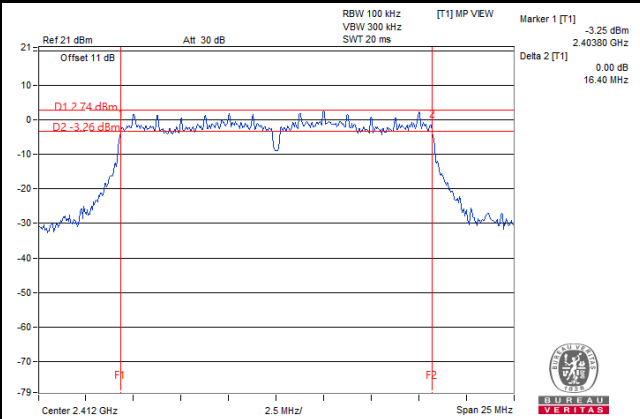
Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	36.61	37.08	0.5	Pass
6	2437	37.10	36.98	0.5	Pass
9	2452	37.19	37.06	0.5	Pass

Spectrum Plot of Worst Value

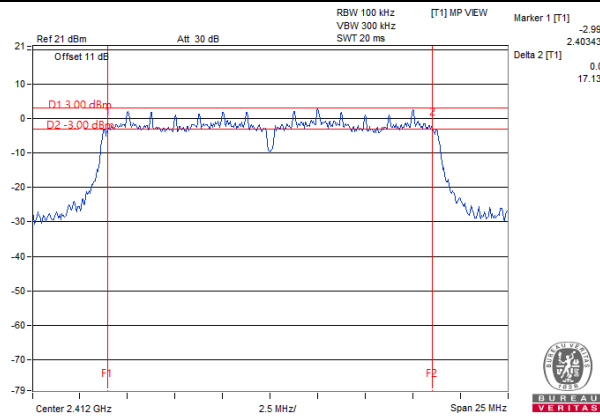
802.11b



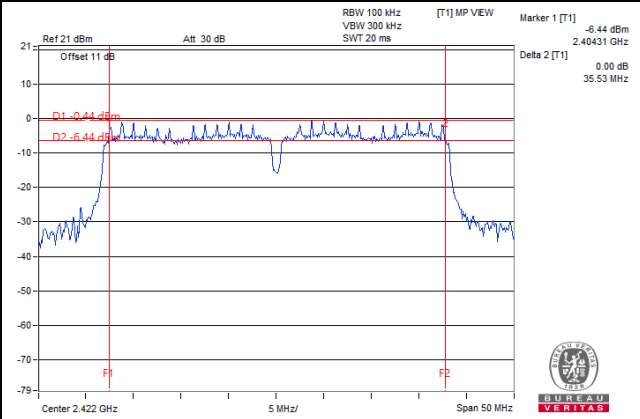
802.11g



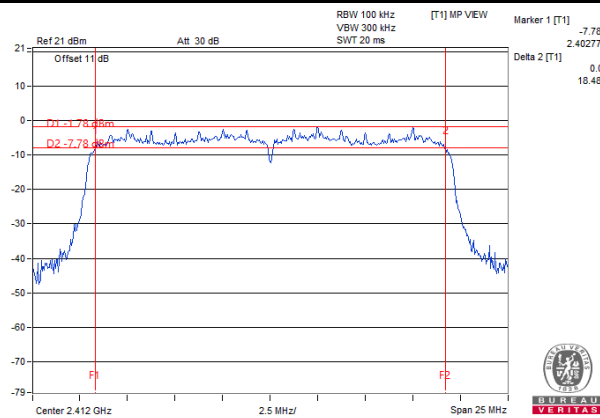
802.11n (HT20)



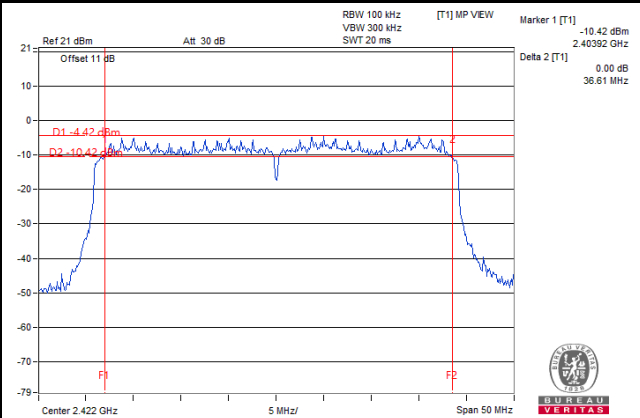
802.11n (HT40)



802.11ax (HE20)

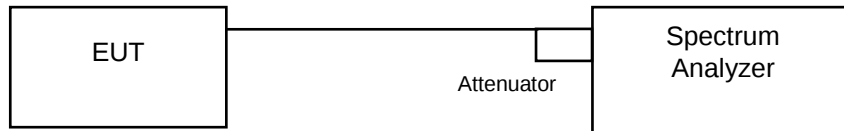


802.11ax (HE40)



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

802.11b

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	13.38	13.38	Pass
6	2437	13.38	13.38	Pass
11	2462	13.68	13.44	Pass

802.11g

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

802.11n (HT20)

Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	17.88	17.88	Pass
6	2437	17.76	17.88	Pass
11	2462	17.88	17.88	Pass

802.11n (HT40)

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

802.11ax (HE20)

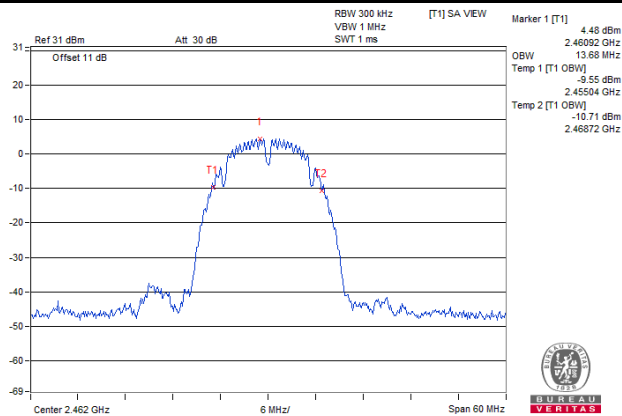
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
1	2412	18.84	18.78	Pass
6	2437	18.84	18.84	Pass
11	2462	18.84	18.84	Pass

802.11ax (HE40)

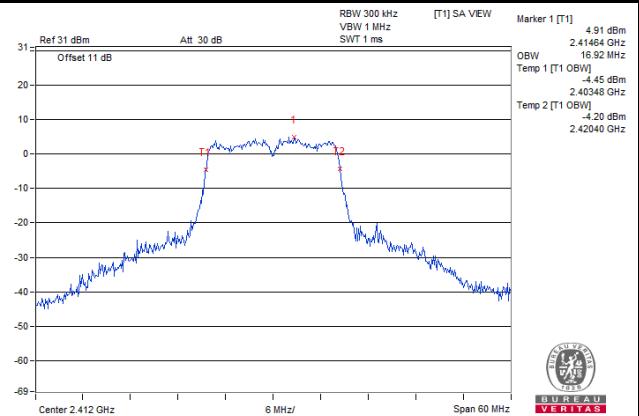
Channel	Frequency (MHz)	Occupied Bandwidth (MHz)		Pass / Fail
		Chain 0	Chain 1	
3	2422	37.68	37.92	Pass
6	2437	37.80	37.80	Pass
9	2452	37.68	37.80	Pass

Spectrum Plot of Worst Value

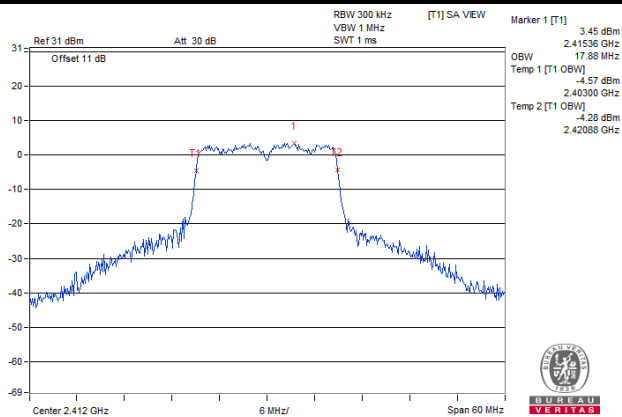
802.11b



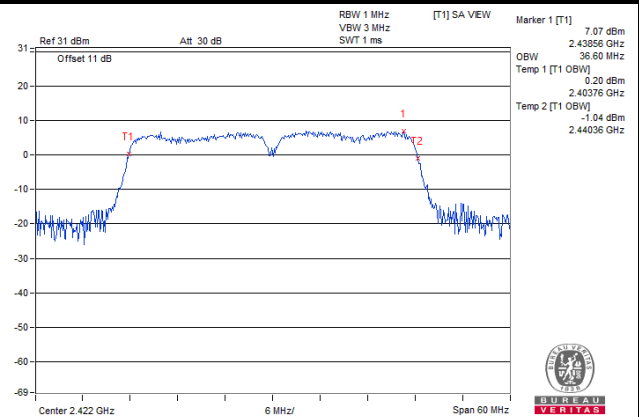
802.11g



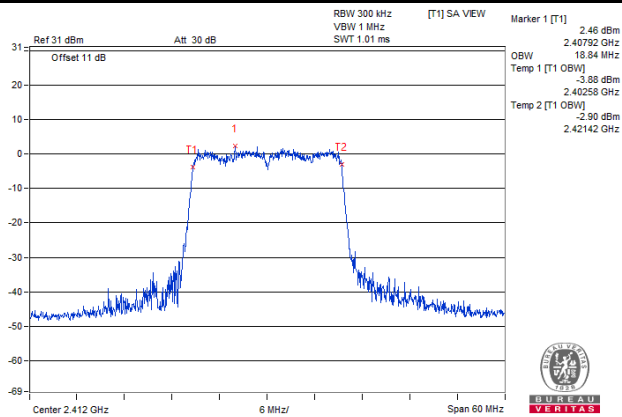
802.11n (HT20)



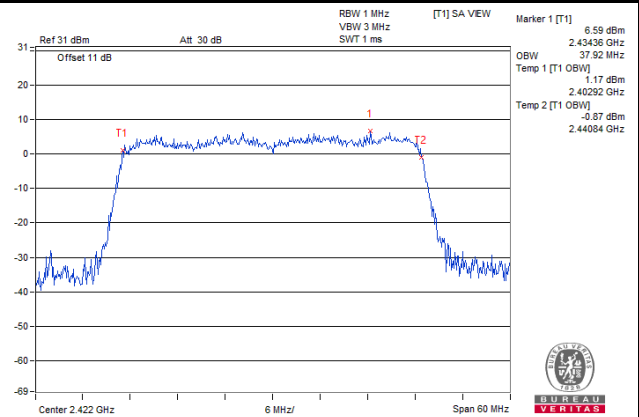
802.11n (HT40)



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,

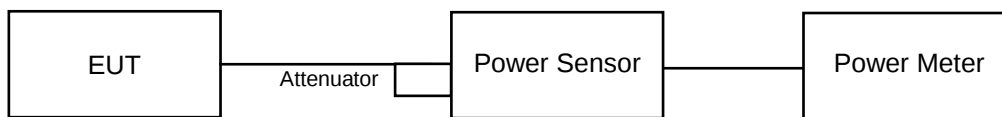
Array Gain = 0 dB (i.e., no array gain) for $NANT \leq 4$;

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 $NANT \geq 5$.

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

A peak power sensor was used on the output port of the EUT. A power meter was used to read the response of the peak power sensor. Record the power level.

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

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	13.26	13.74	44.843	16.52	30	Pass
6	2437	13.31	13.72	44.979	16.53	30	Pass
11	2462	13.29	13.71	44.827	16.52	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	12.54	12.97	37.763	15.77	30	Pass
6	2437	12.48	12.92	37.29	15.72	30	Pass
11	2462	12.56	12.98	37.891	15.79	30	Pass

802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	12.53	12.95	37.63	15.76	30	Pass
6	2437	12.47	12.89	37.114	15.70	30	Pass
11	2462	12.58	12.96	37.883	15.78	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	12.51	12.98	37.685	15.76	30	Pass
6	2437	12.46	12.94	37.299	15.72	30	Pass
9	2452	12.24	12.61	34.988	15.44	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	9.22	9.67	17.624	12.46	30	Pass
6	2437	9.28	9.73	17.87	12.52	30	Pass
11	2462	9.32	9.70	17.883	12.52	30	Pass

802.11ax (HE40)

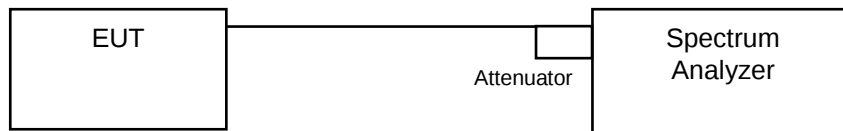
Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	9.36	9.74	18.049	12.56	30	Pass
6	2437	9.22	9.64	17.561	12.45	30	Pass
9	2452	9.45	9.87	18.516	12.68	30	Pass

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

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

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

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

For Average Power (Duty cycle < 98%)

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

4.6.5 Deviation from Test Standard

No deviation.

4.6.6 EUT Operating Condition

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

4.6.7 Test Results

802.11b

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-21	3.01	-17.99	8	Pass
	6	2437	-21.8	3.01	-18.79	8	Pass
	11	2462	-21.42	3.01	-18.41	8	Pass
1	1	2412	-21	3.01	-17.99	8	Pass
	6	2437	-20.75	3.01	-17.74	8	Pass
	11	2462	-20.79	3.01	-17.78	8	Pass

NOTE:

1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 3.21 \text{ dBi} < 6 \text{ dBi}$, 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	-23.03	3.01	0.31	-19.71	8	Pass
	6	2437	-23.53	3.01	0.31	-20.21	8	Pass
	11	2462	-23.75	3.01	0.31	-20.43	8	Pass
1	1	2412	-23.08	3.01	0.31	-19.76	8	Pass
	6	2437	-23.12	3.01	0.31	-19.8	8	Pass
	11	2462	-23.37	3.01	0.31	-20.05	8	Pass

NOTE:

1. Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 3.21 \text{ dBi} < 6 \text{ dBi}$, 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.

802.11n (HT20)

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	-24.37	3.01	0.33	-21.03	8	Pass
	6	2437	-24.52	3.01	0.33	-21.18	8	Pass
	11	2462	-23.99	3.01	0.33	-20.65	8	Pass
1	1	2412	-23.43	3.01	0.33	-20.09	8	Pass
	6	2437	-23.77	3.01	0.33	-20.43	8	Pass
	11	2462	-23.54	3.01	0.33	-20.2	8	Pass

NOTE:

- Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 3.21 \text{ dBi} < 6 \text{ dBi}$, so the limit no need to be reduced.
- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

802.11n (HT40)

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	-27.4	3.01	0.67	-23.72	8	Pass
	6	2437	-27.46	3.01	0.67	-23.78	8	Pass
	9	2452	-27.59	3.01	0.67	-23.91	8	Pass
1	3	2422	-27.31	3.01	0.67	-23.63	8	Pass
	6	2437	-27.13	3.01	0.67	-23.45	8	Pass
	9	2452	-27.92	3.01	0.67	-24.24	8	Pass

NOTE:

- Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 3.21 \text{ dBi} < 6 \text{ dBi}$, so the limit no need to be reduced.
- 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	-28.83	3.01	0.43	-25.39	8	Pass
	6	2437	-29.09	3.01	0.43	-25.65	8	Pass
	11	2462	-27.86	3.01	0.43	-24.42	8	Pass
1	1	2412	-27.92	3.01	0.43	-24.48	8	Pass
	6	2437	-28	3.01	0.43	-24.56	8	Pass
	11	2462	-27.9	3.01	0.43	-24.46	8	Pass

NOTE:

- Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 3.21 \text{ dBi} < 6 \text{ dBi}$, so the limit no need to be reduced.
- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

802.11ax (HE40)

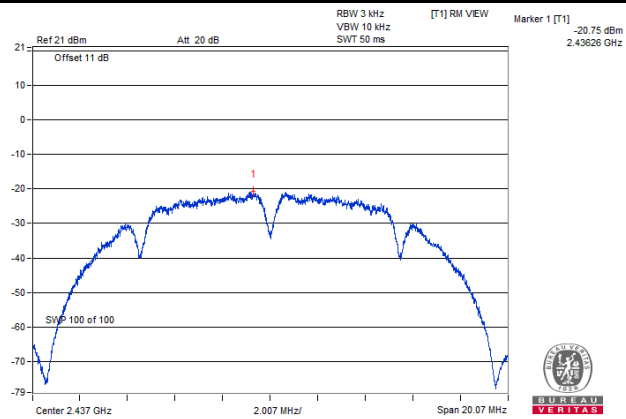
TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Duty Factor (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	3	2422	-30.97	3.01	0.81	-27.15	8	Pass
	6	2437	-31.04	3.01	0.81	-27.22	8	Pass
	9	2452	-31.82	3.01	0.81	-28	8	Pass
1	3	2422	-30.96	3.01	0.81	-27.14	8	Pass
	6	2437	-30.35	3.01	0.81	-26.53	8	Pass
	9	2452	-30.55	3.01	0.81	-26.73	8	Pass

NOTE:

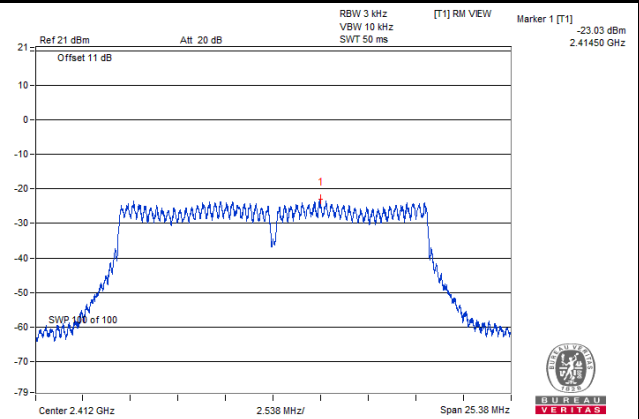
- Directional gain = $10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N_{ANT}] = 3.21 \text{ dBi} < 6 \text{ dBi}$, so the limit no need to be reduced.
- Method E) 2) c) of power density measurement of KDB 662911 is using for calculating total power density.

Spectrum Plot of Worst Value

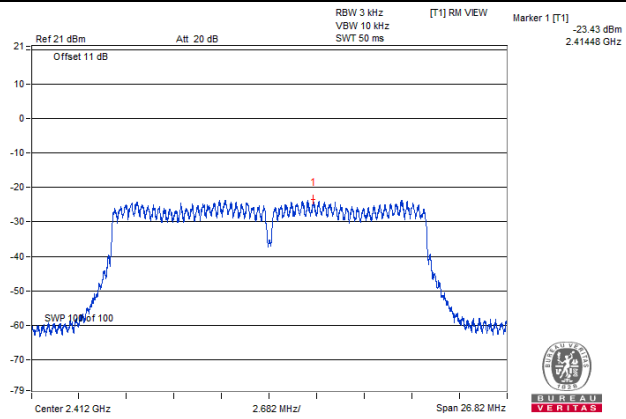
802.11b



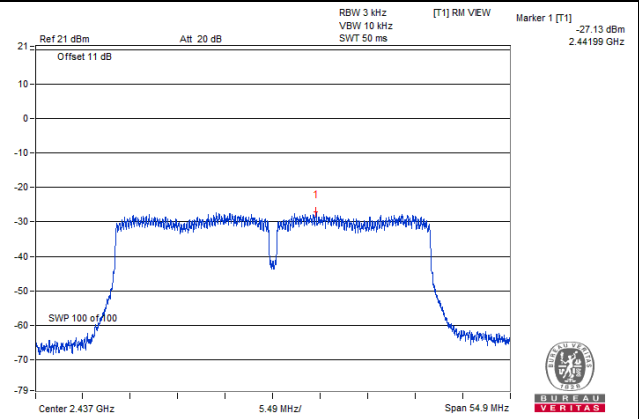
802.11g



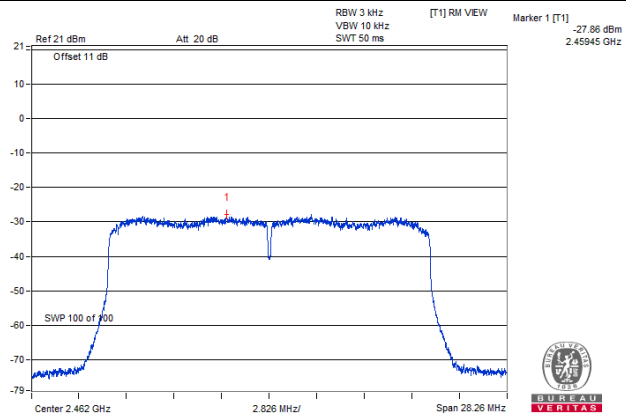
802.11n (HT20)



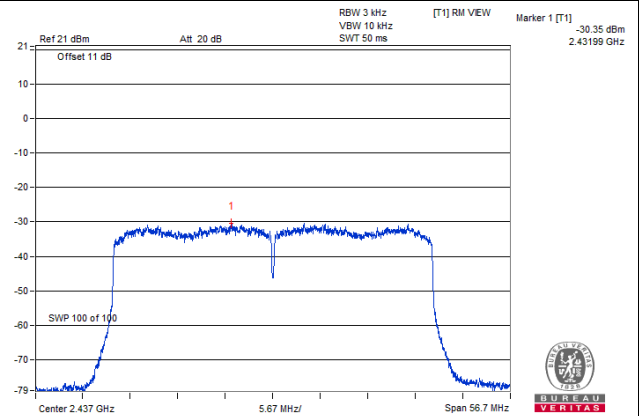
802.11n (HT40)



802.11ax (HE20)



802.11ax (HE40)

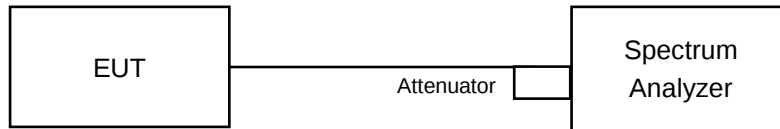


4.7 Conducted Out of Band Emission Measurement

4.7.1 Limits of Conducted Out of Band Emission Measurement

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

4.7.2 Test Setup



4.7.3 Test Instruments

Refer to section 4.1.2 to get information of above instrument.

4.7.4 Test Procedure

MEASUREMENT PROCEDURE REF

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

MEASUREMENT PROCEDURE OOB

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

4.7.5 Deviation from Test Standard

No deviation.

4.7.6 EUT Operating Condition

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

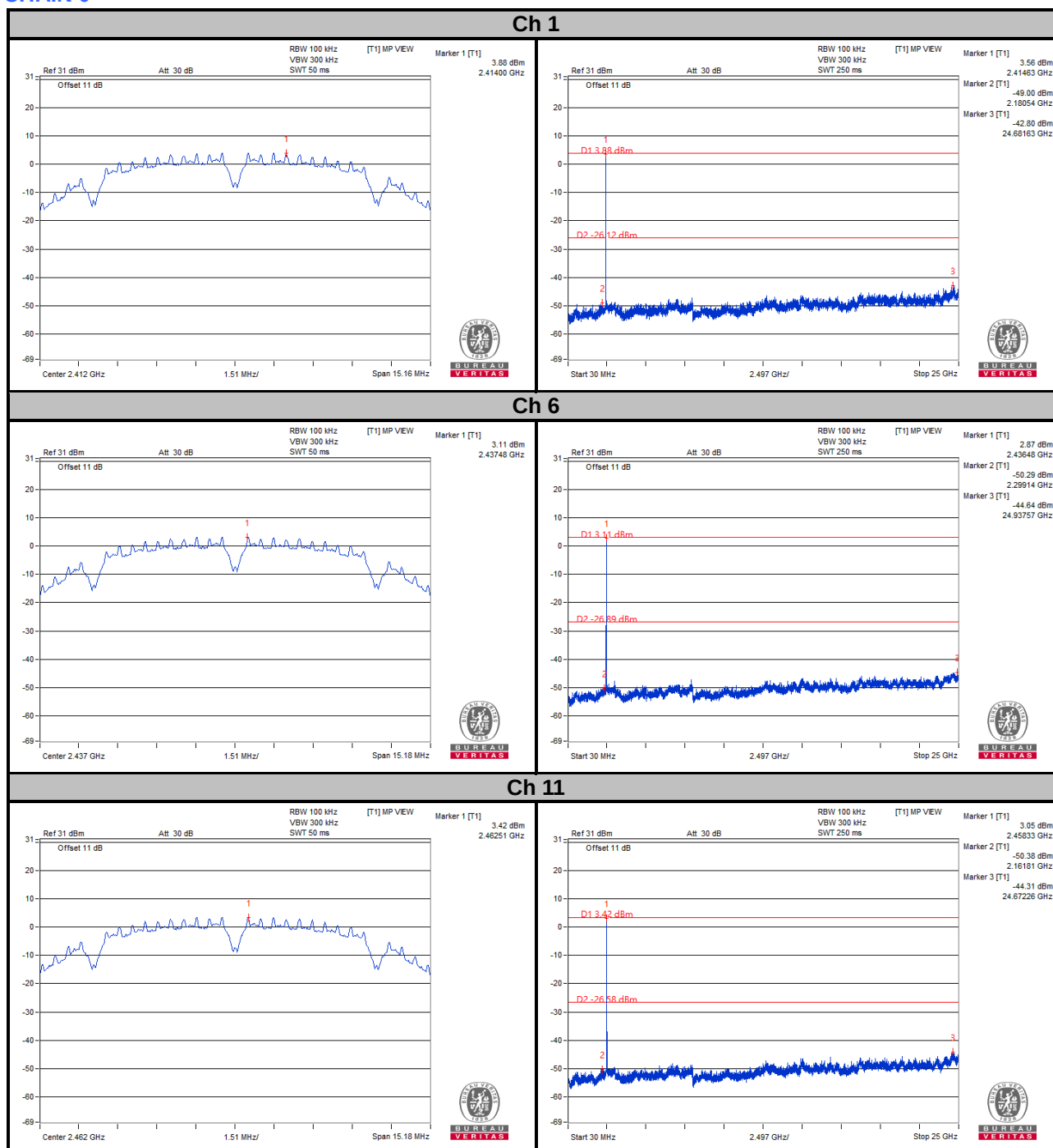
4.7.7 Test Results

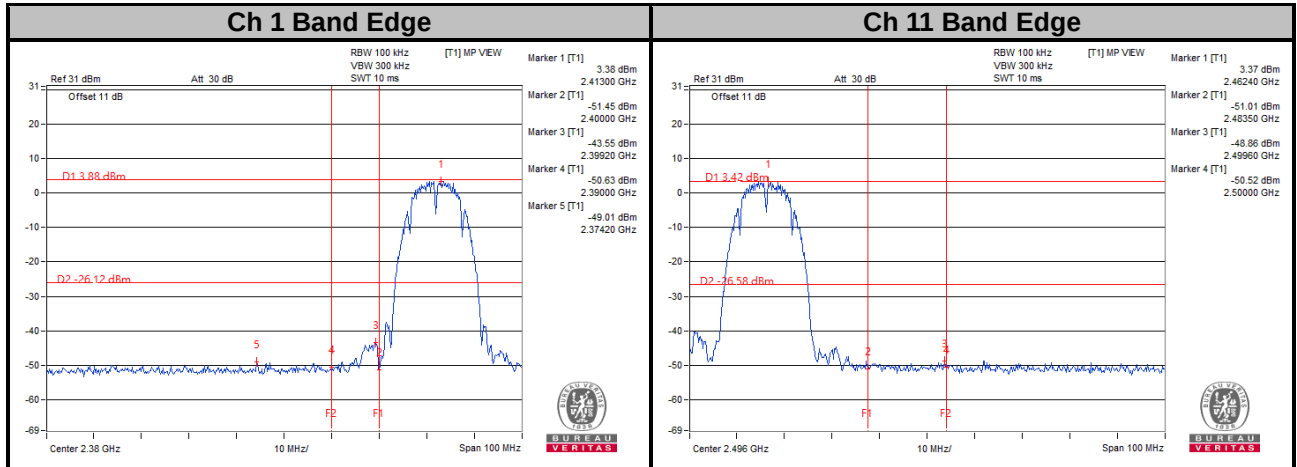
The conducted emission test is performed on each TX port of operating mode without summing or adding 10log (N) since the limit is relative emission limit.

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

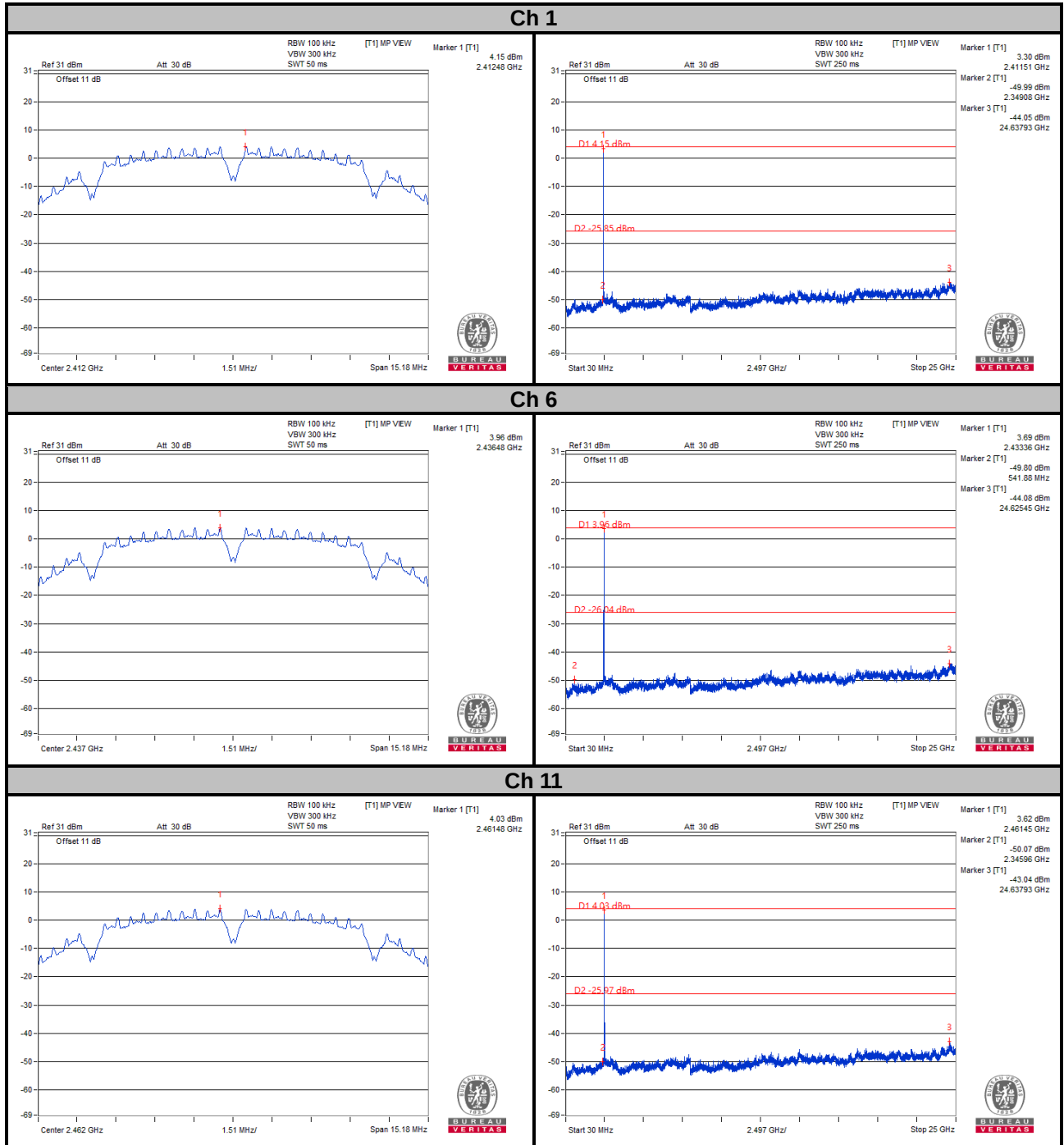
802.11b

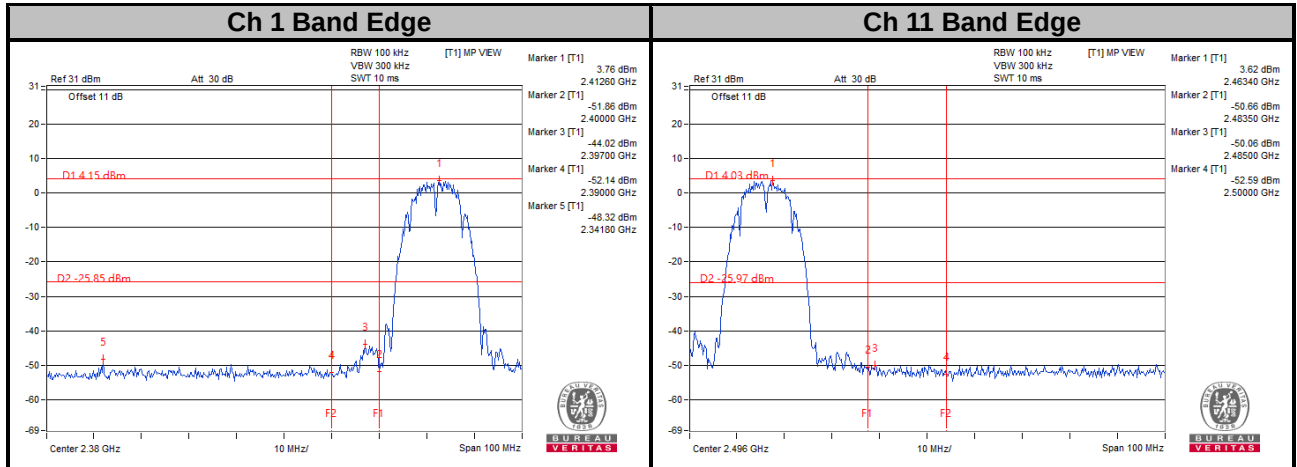
CHAIN 0



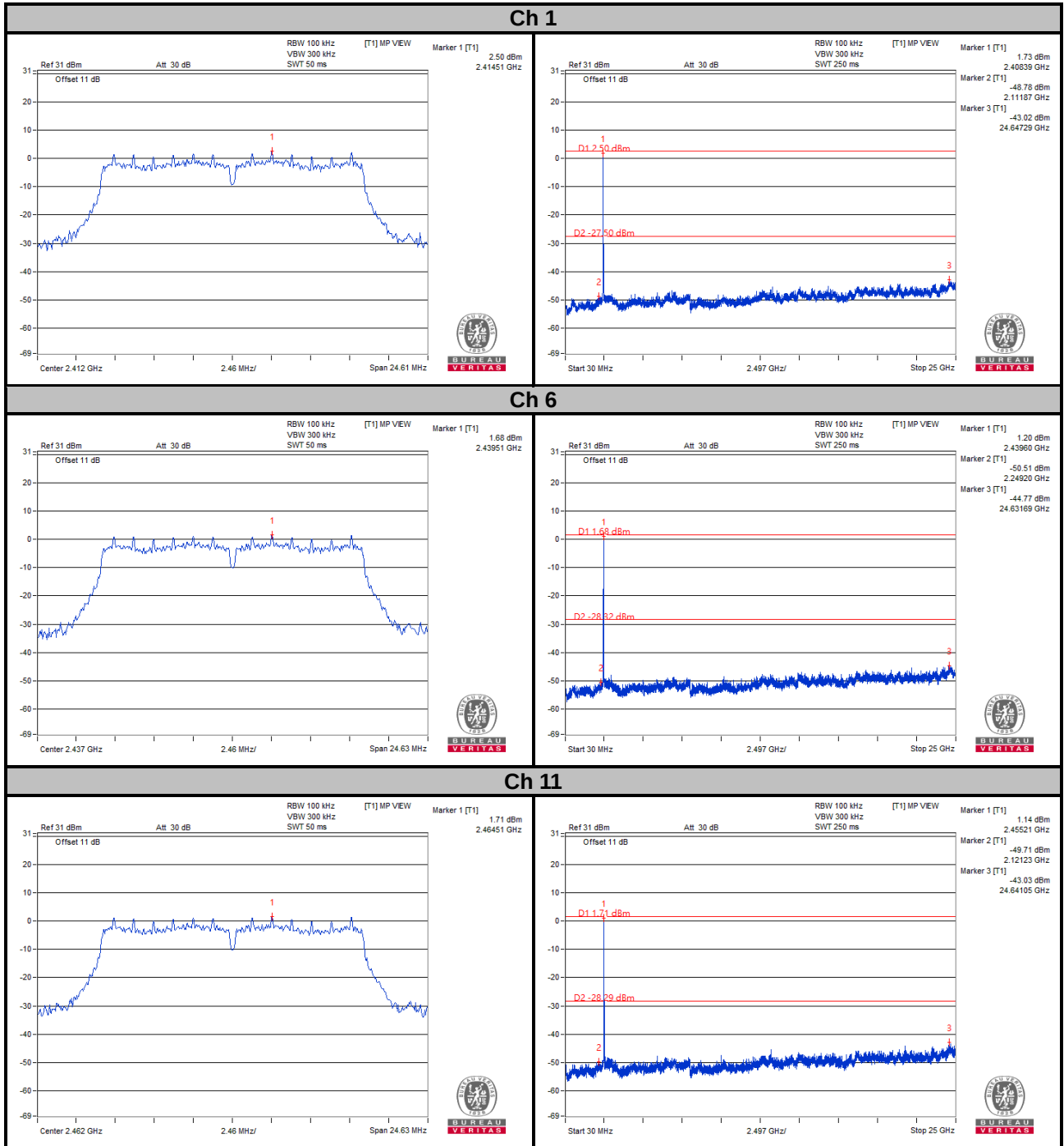


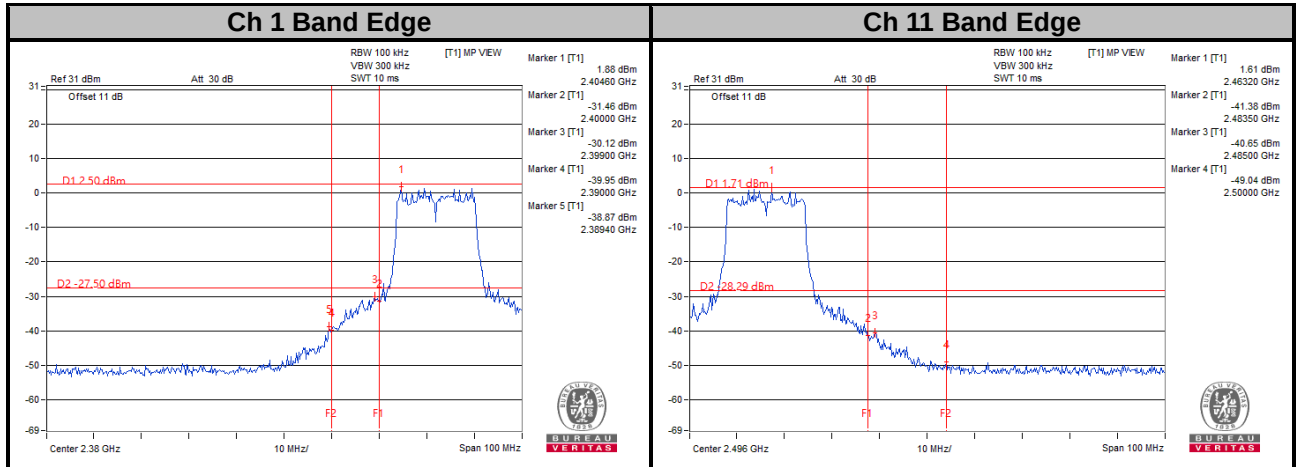
CHAIN 1



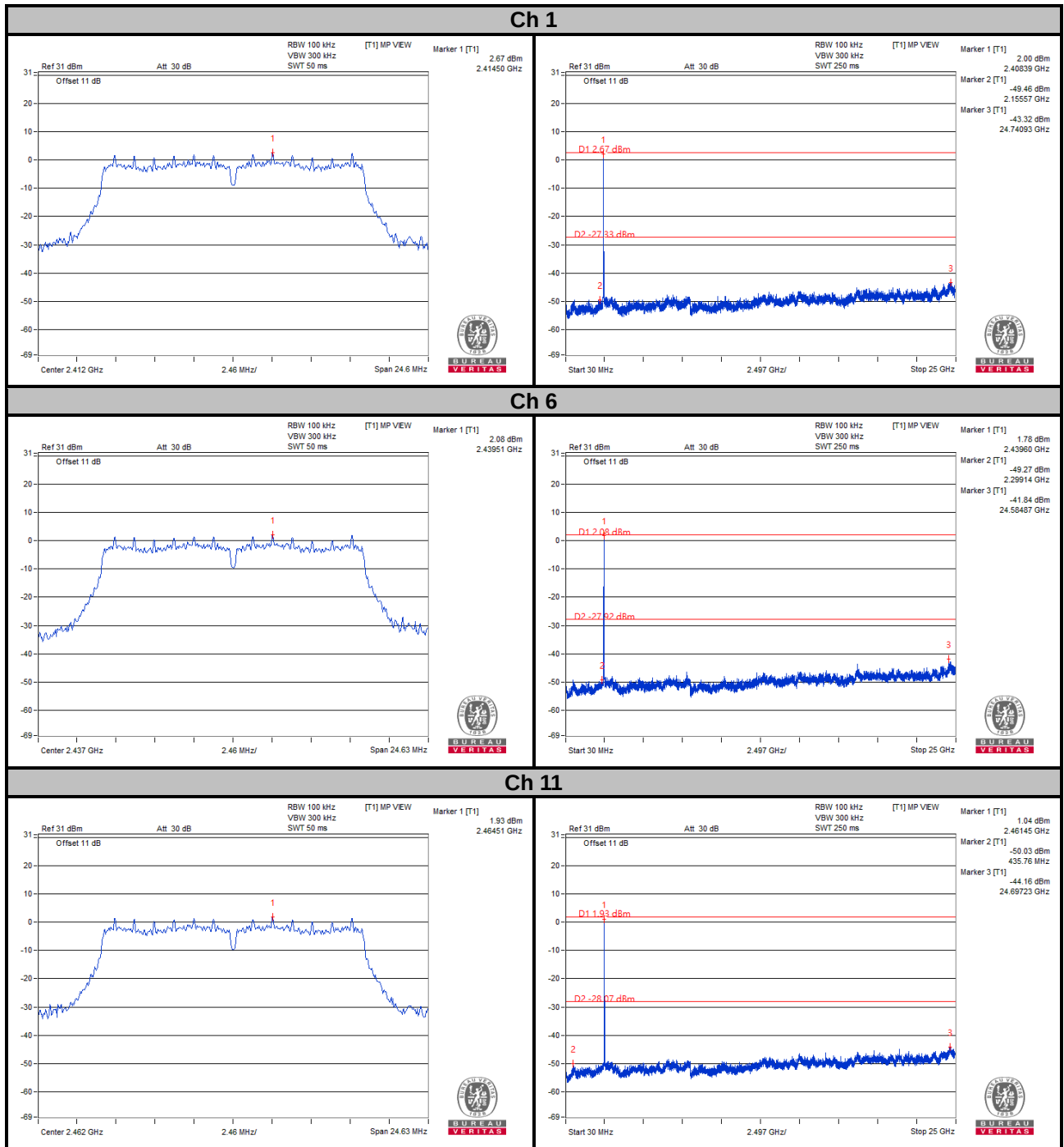


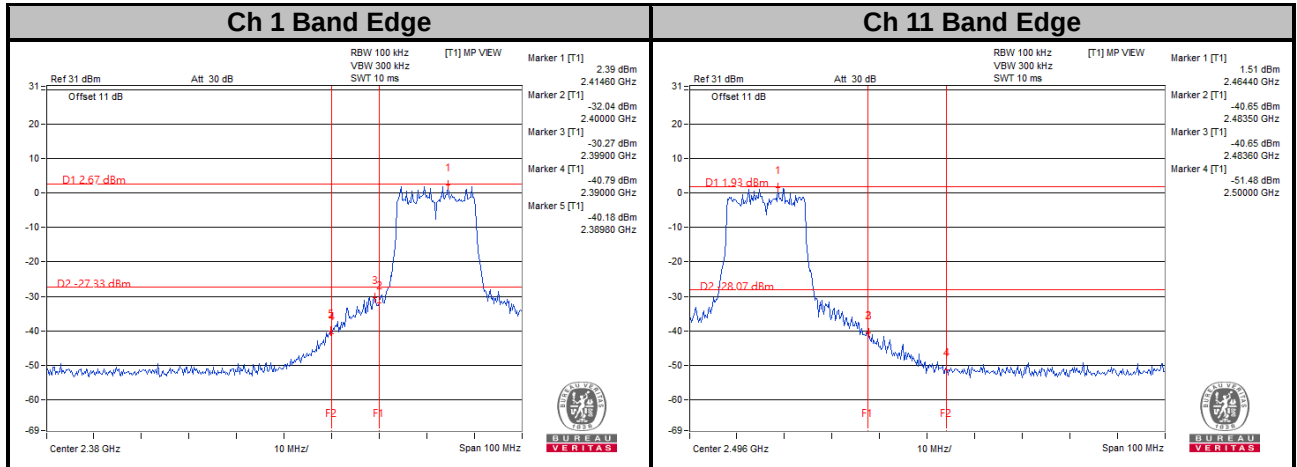
802.11g
CHAIN 0





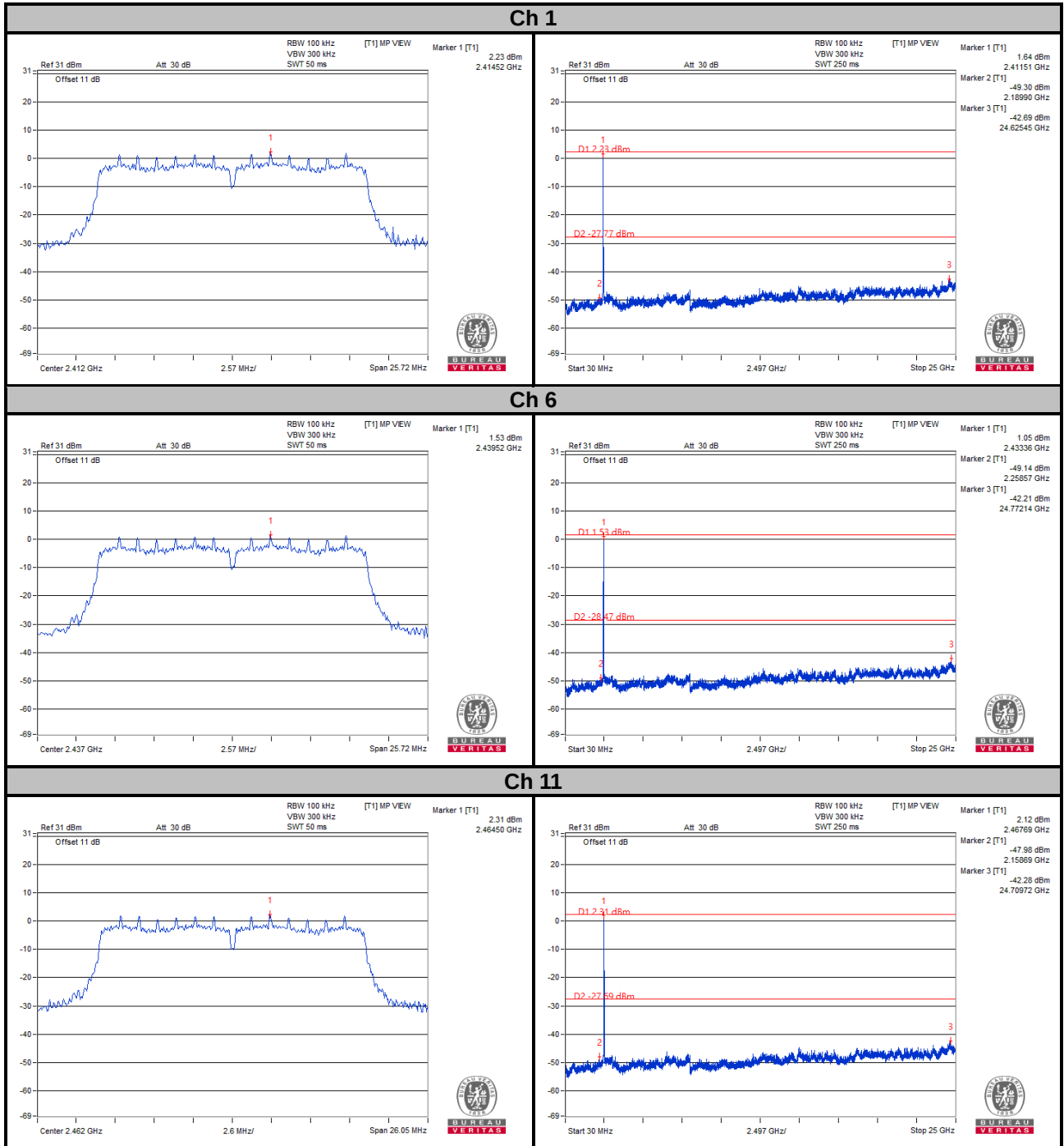
CHAIN 1

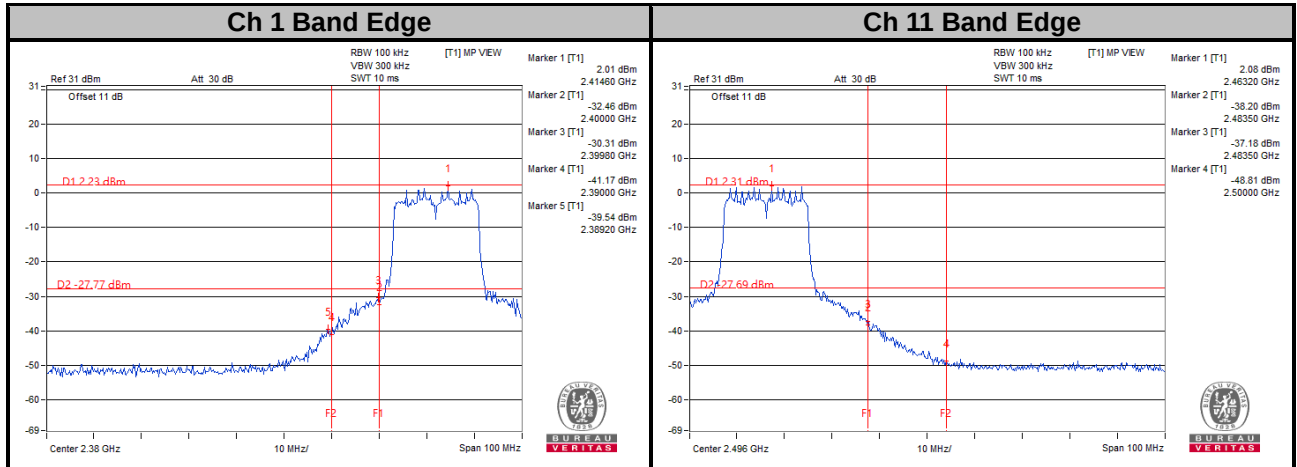




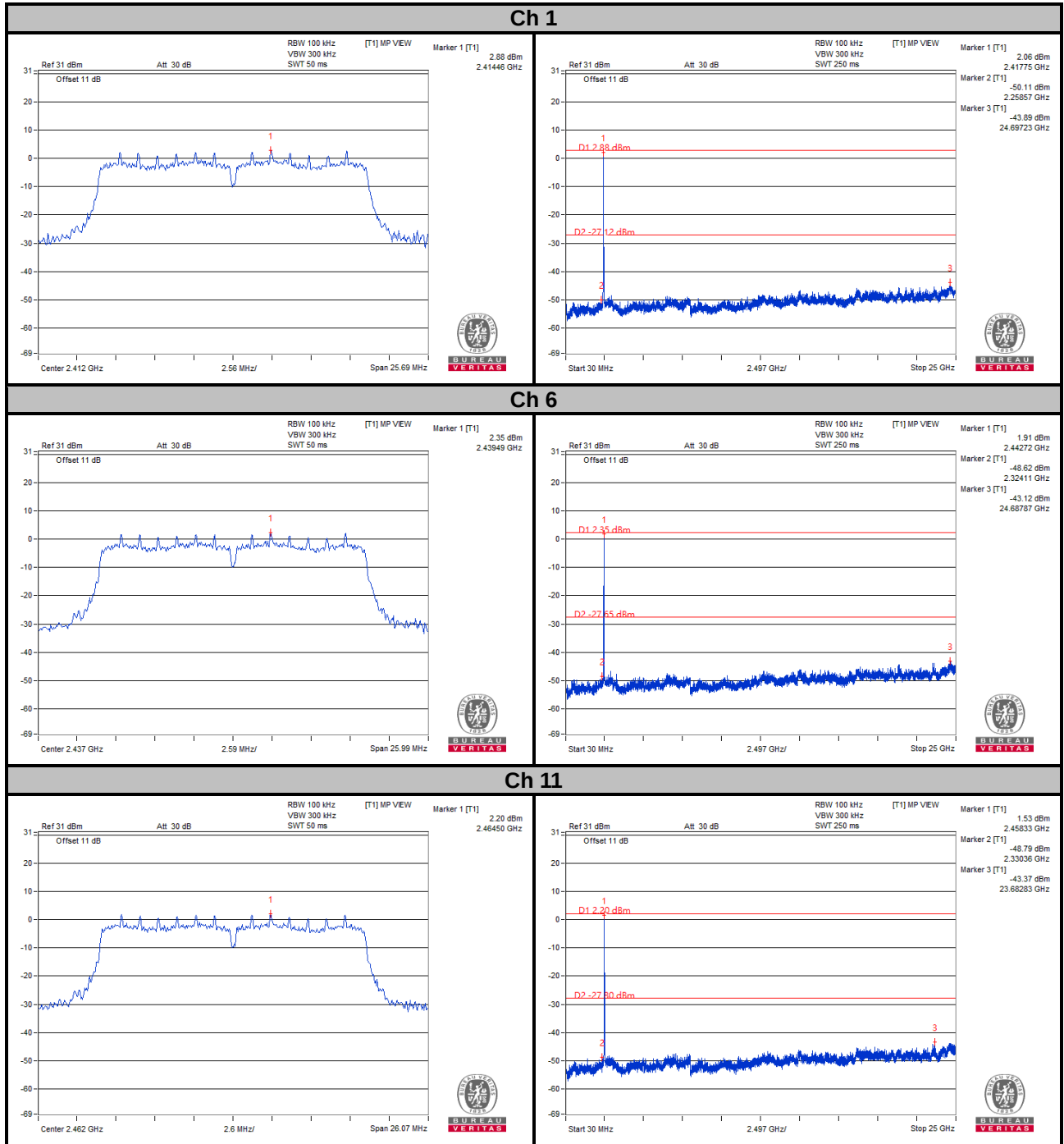
802.11n (HT20)

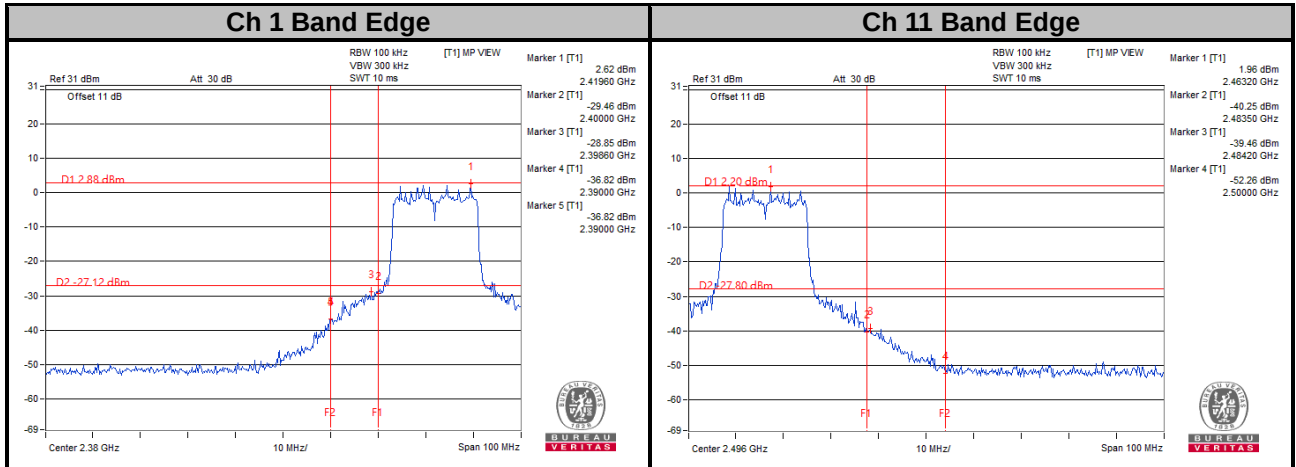
CHAIN 0



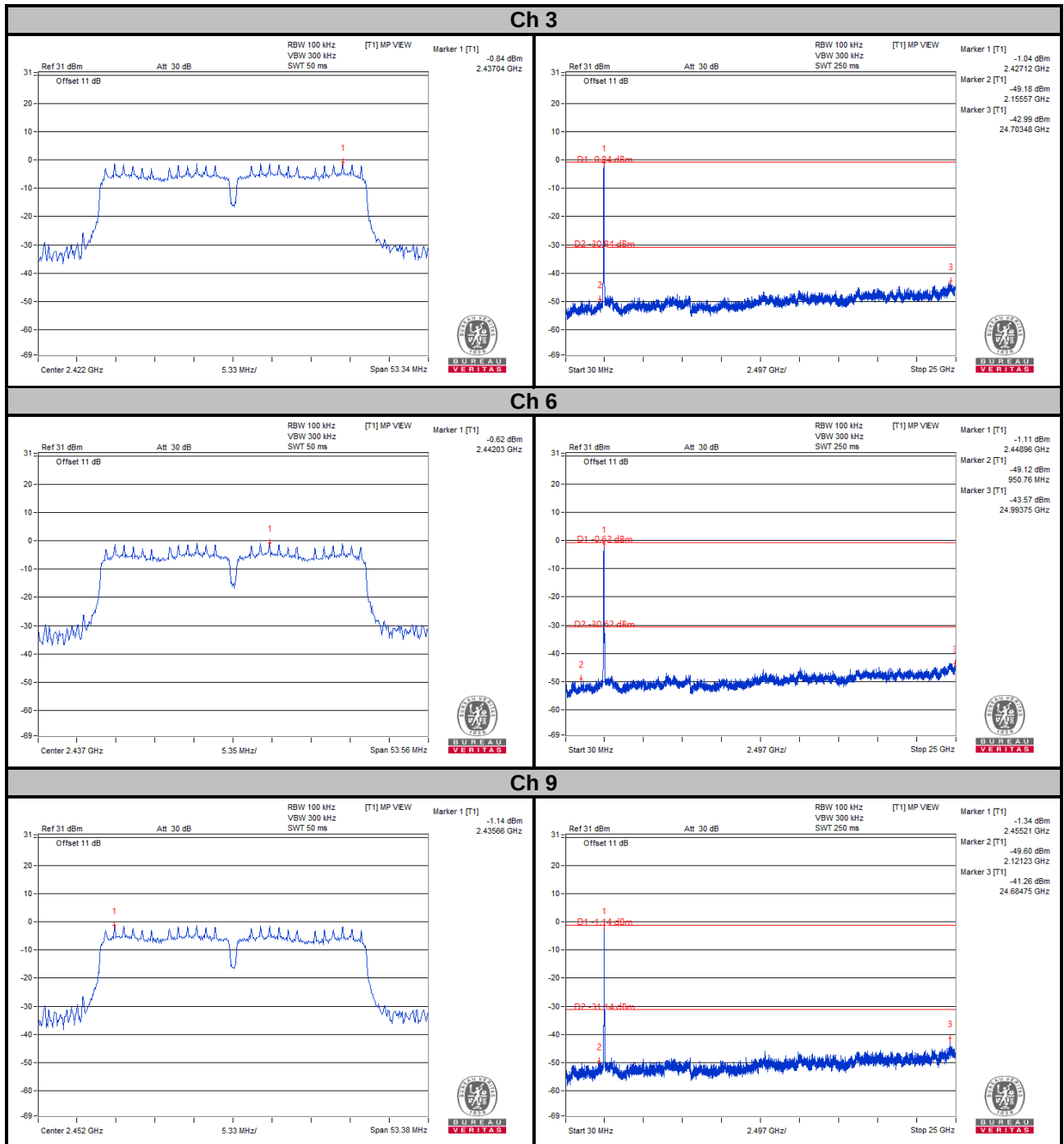


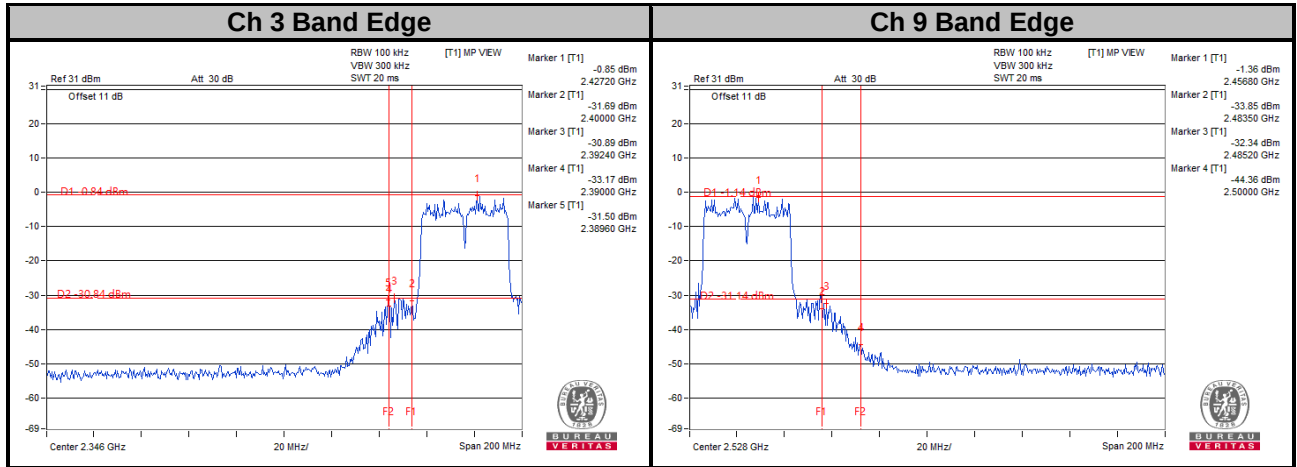
CHAIN 1





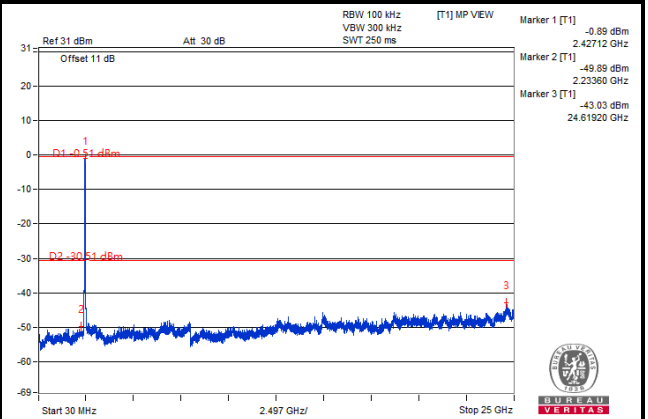
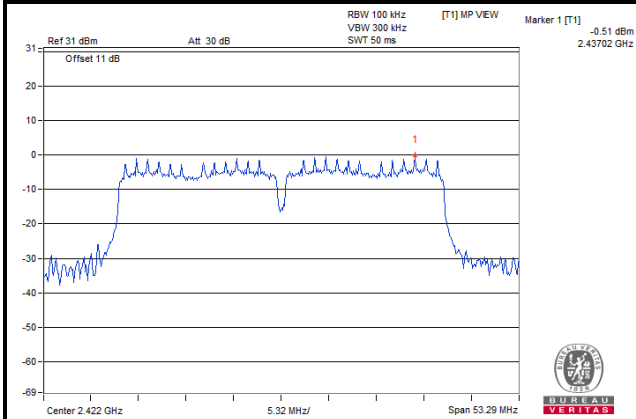
802.11n (HT40) CHAIN 0



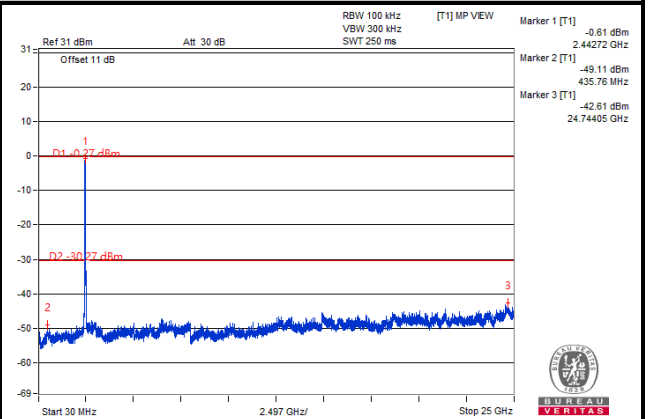
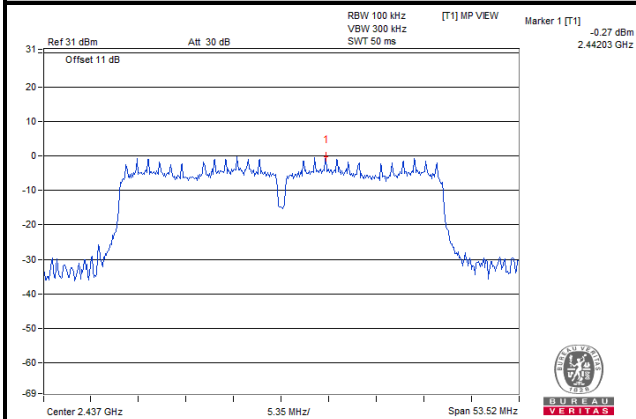


CHAIN 1

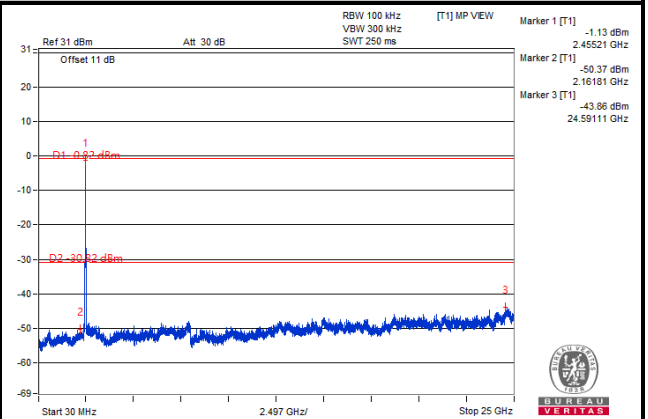
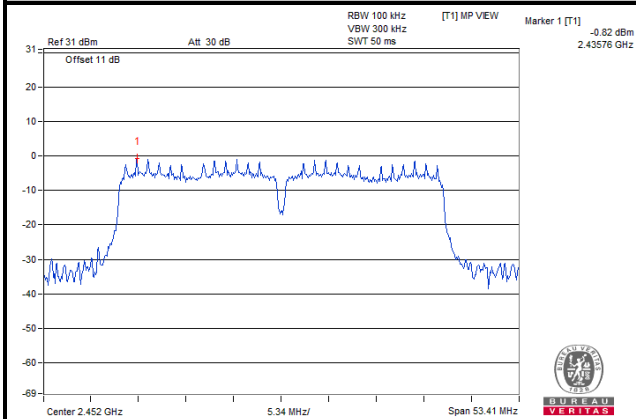
Ch 3

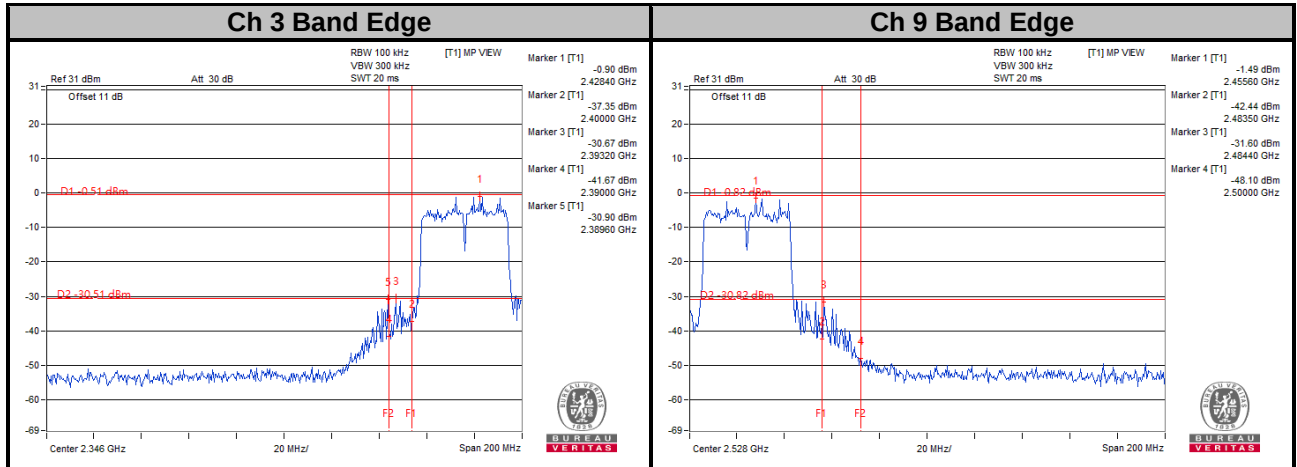


Ch 6



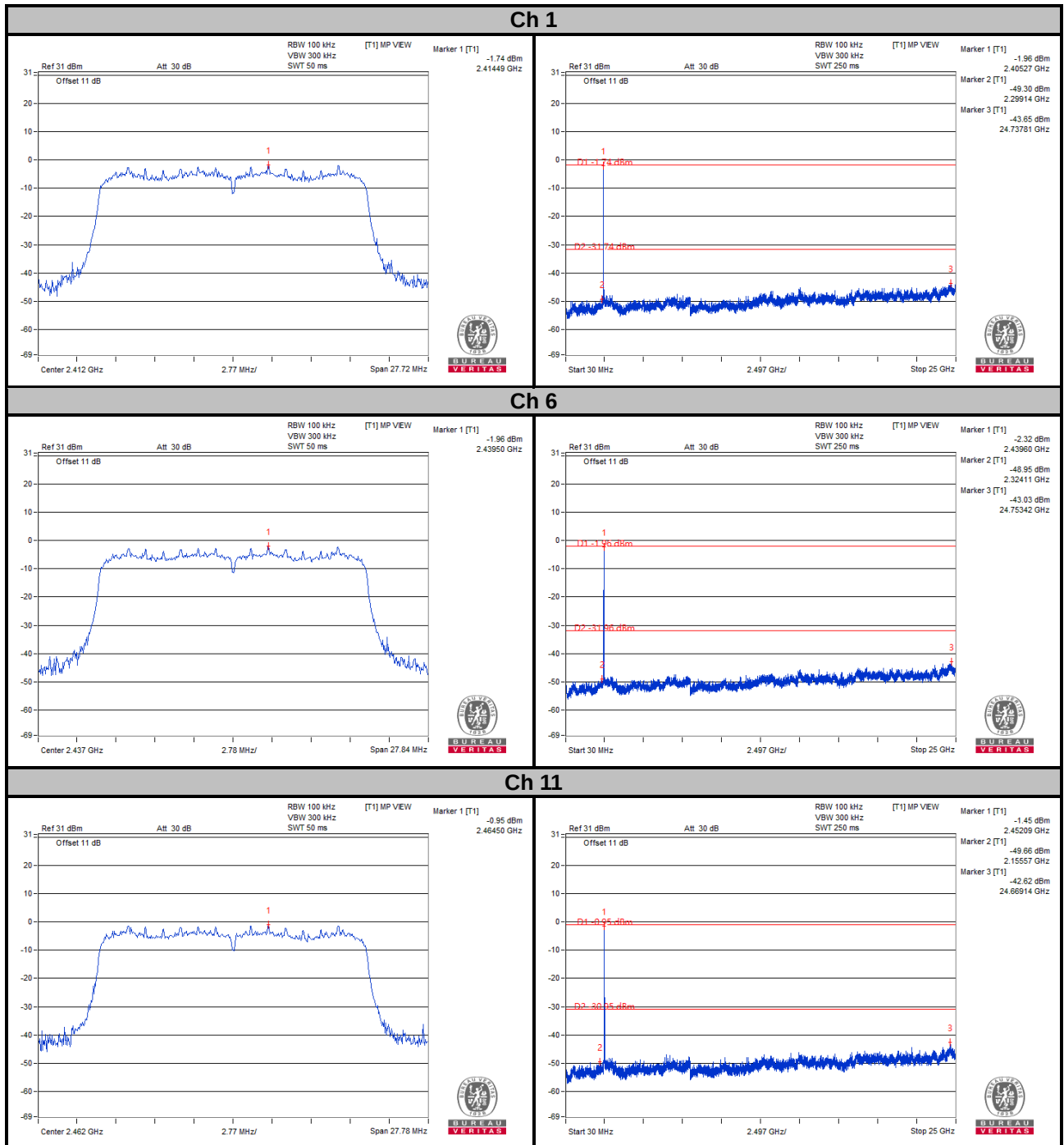
Ch 9

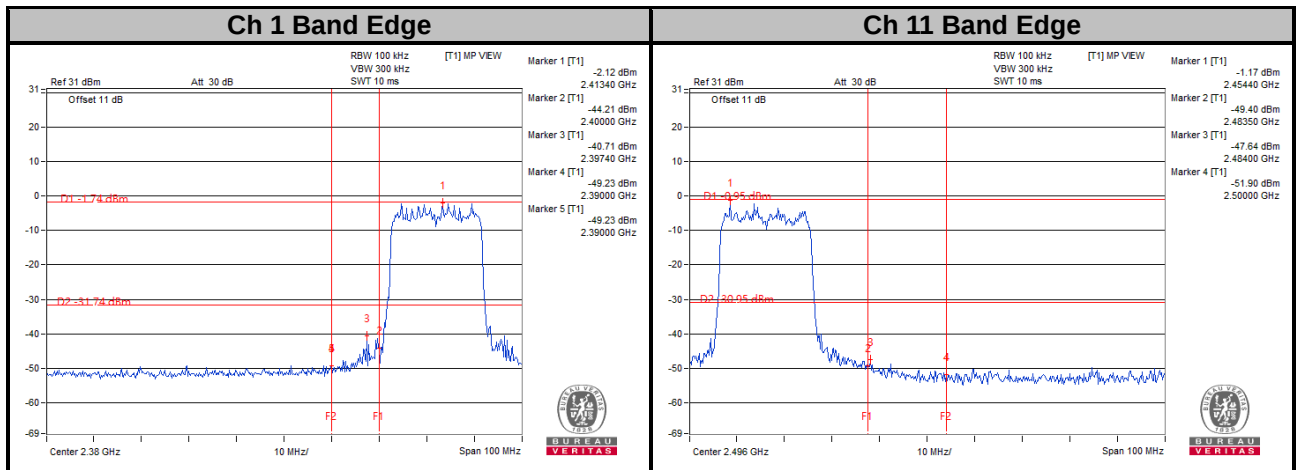




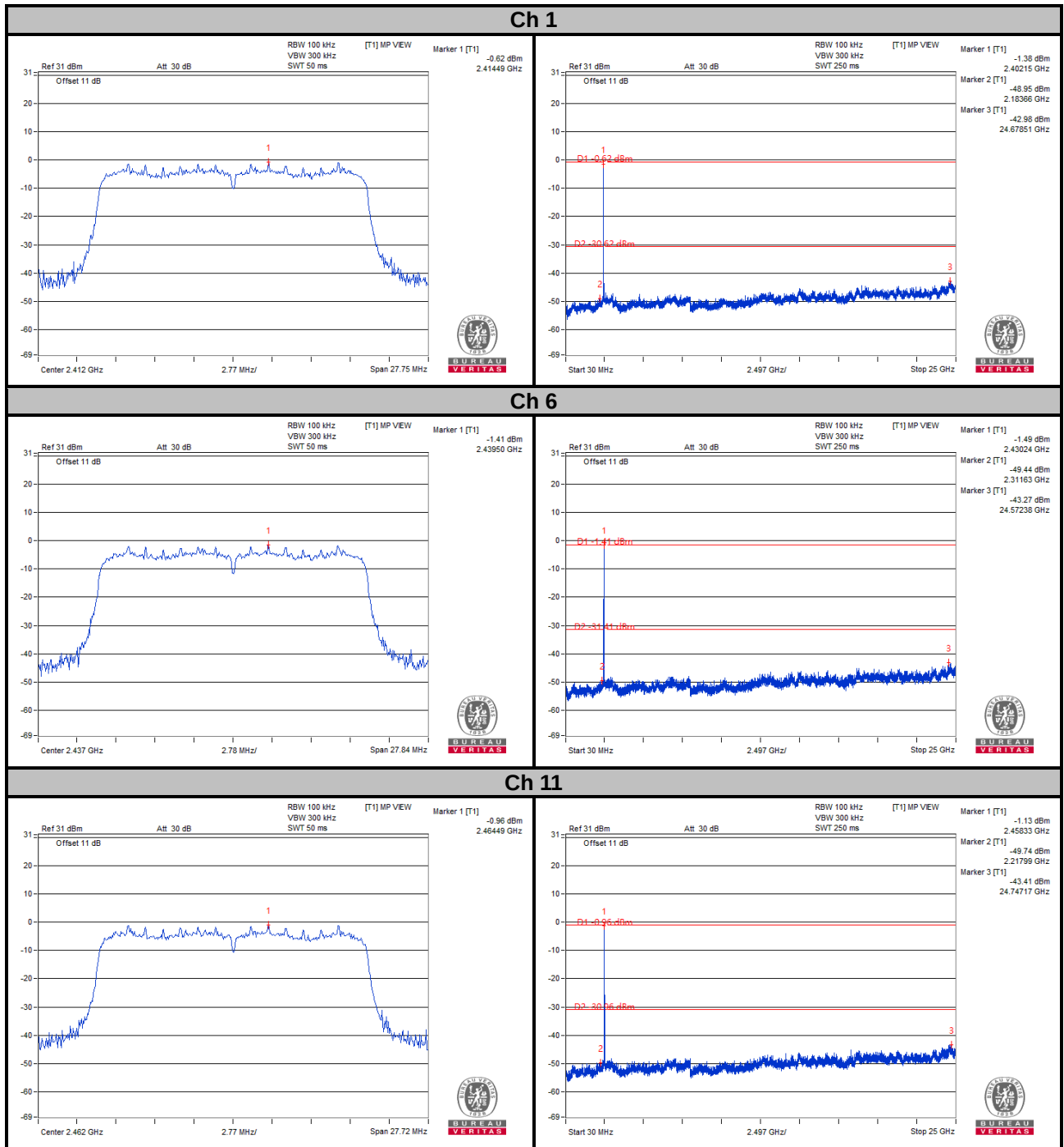
802.11ax (HE20)

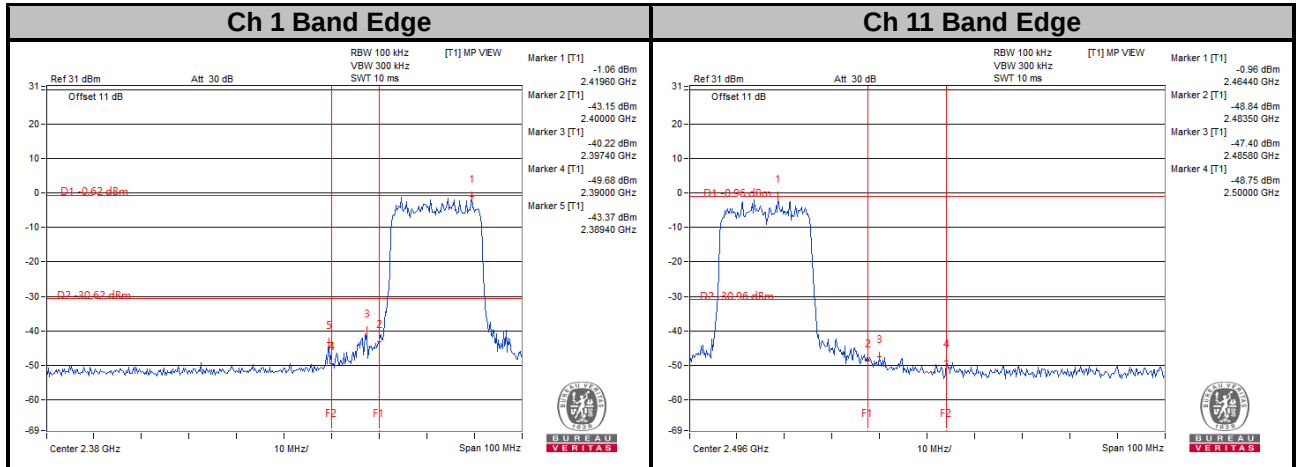
CHAIN 0





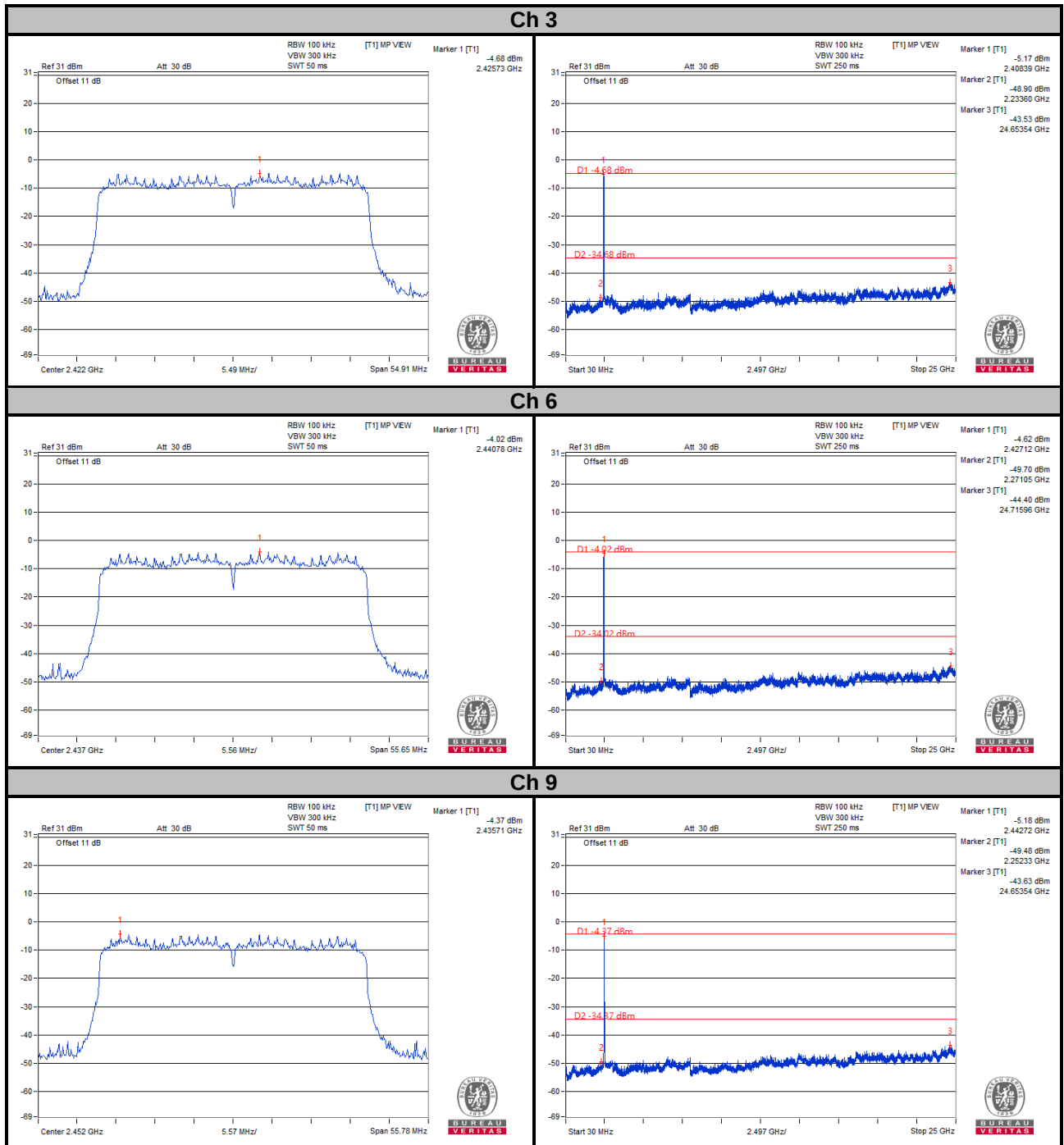
CHAIN 1

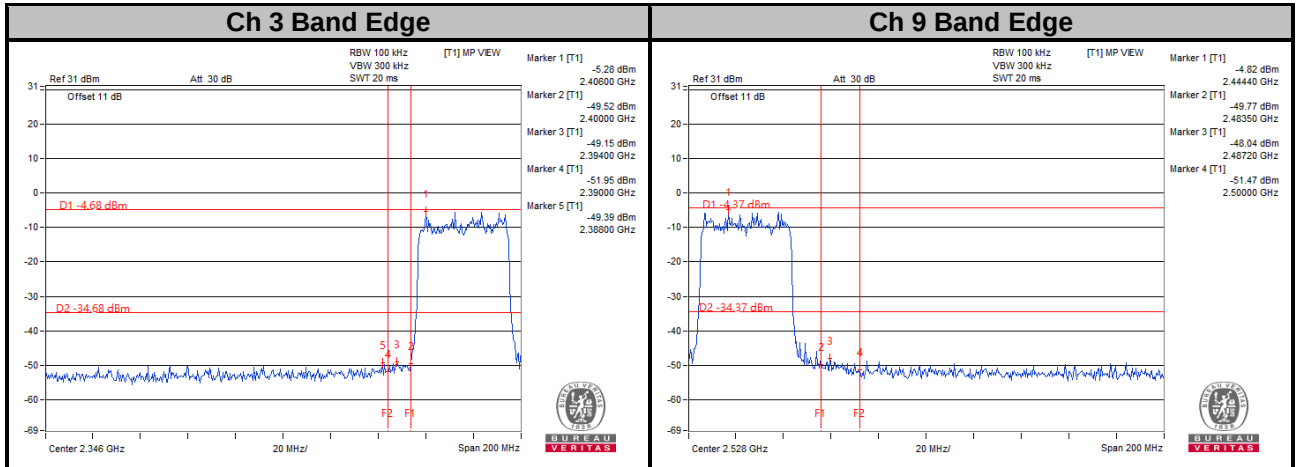




802.11ax (HE40)

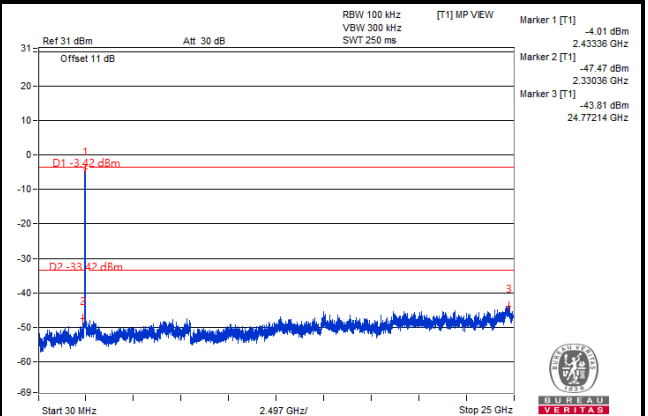
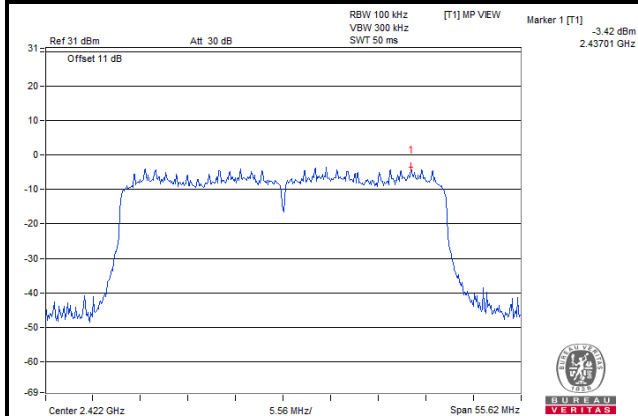
CHAIN 0



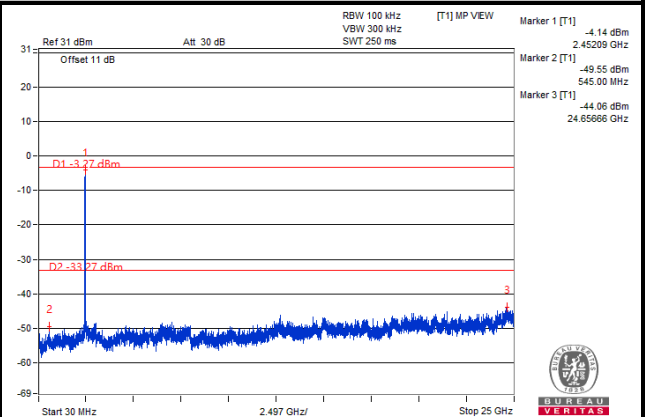
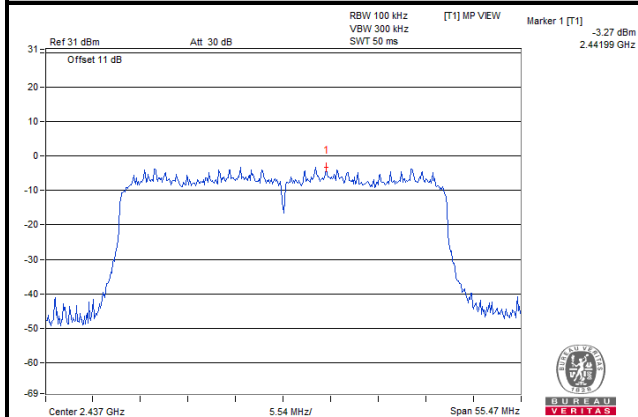


CHAIN 1

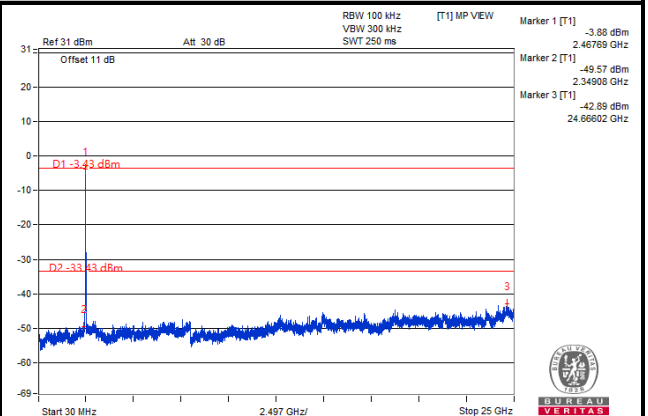
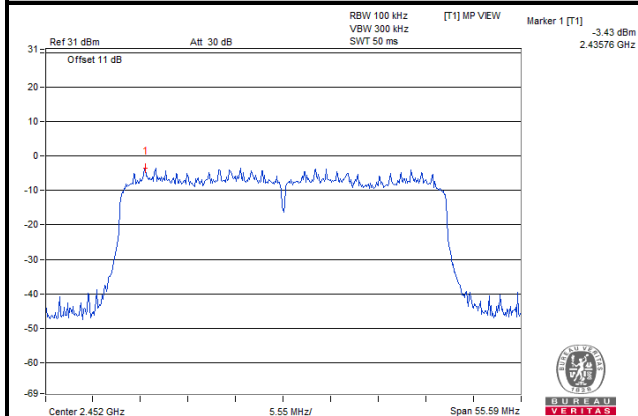
Ch 3

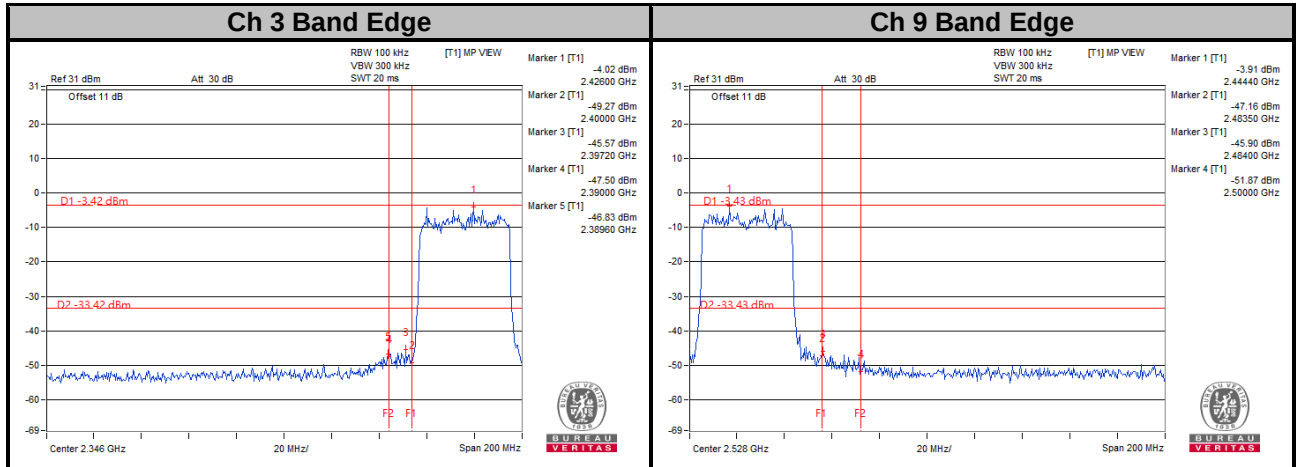


Ch 6



Ch 9



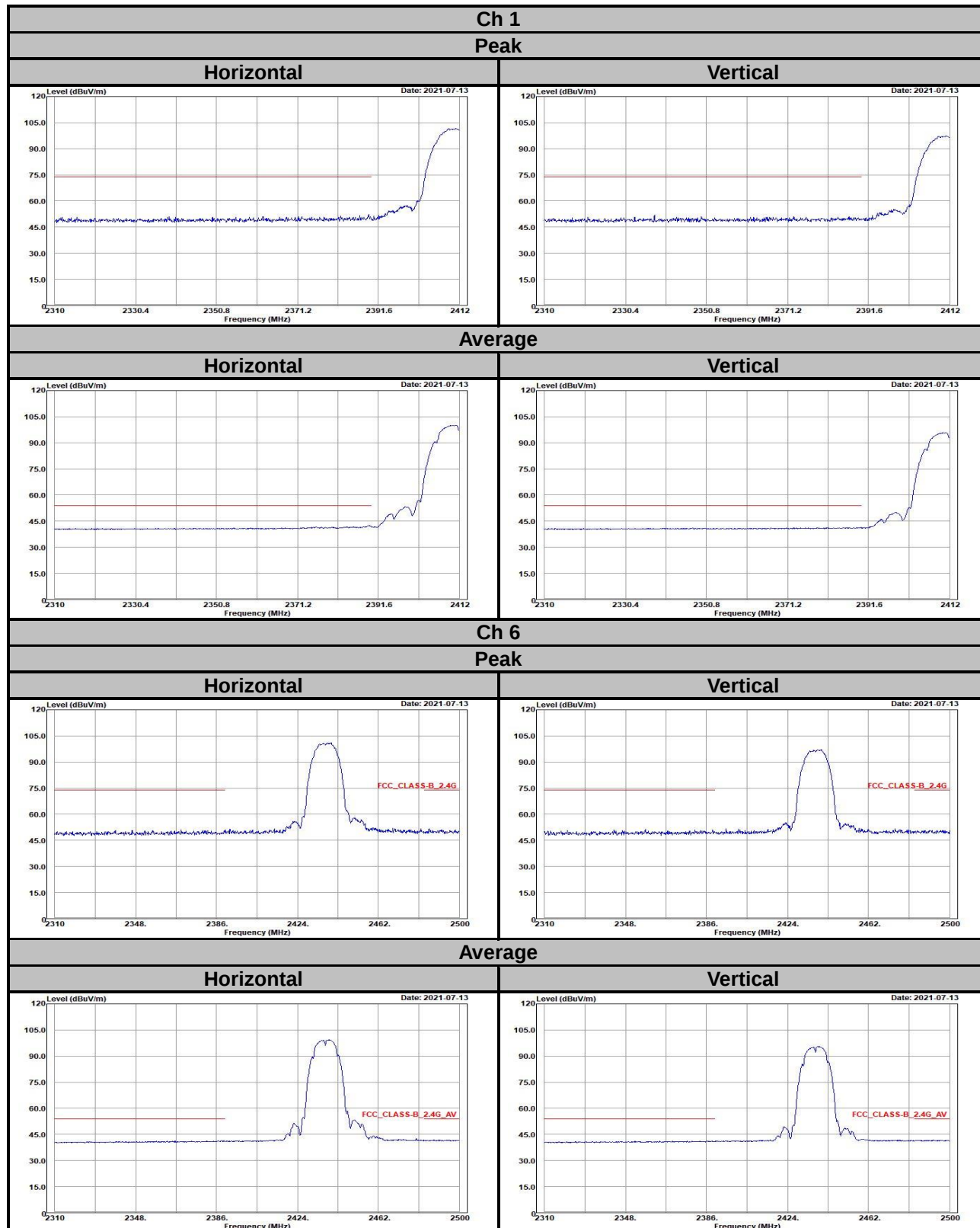


5 Pictures of Test Arrangements

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

Annex A- Band Edge Measurement

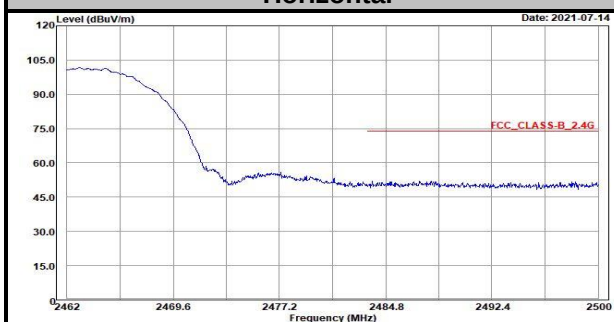
802.11b



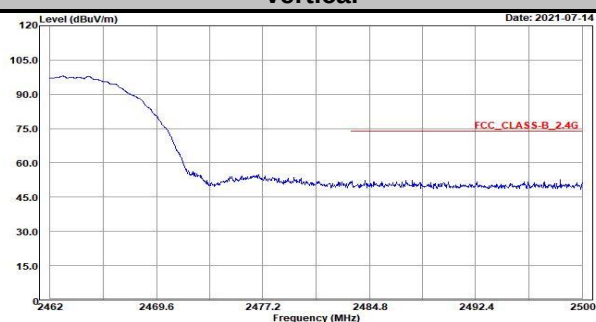
Ch 11

Peak

Horizontal



Vertical

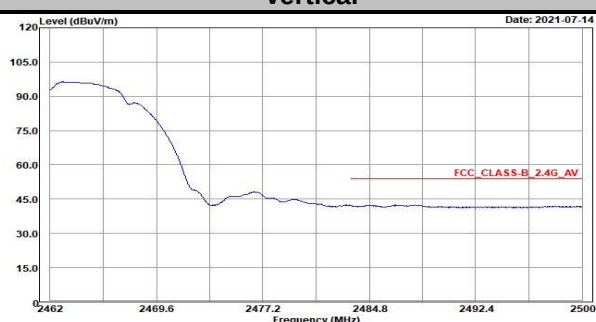


Average

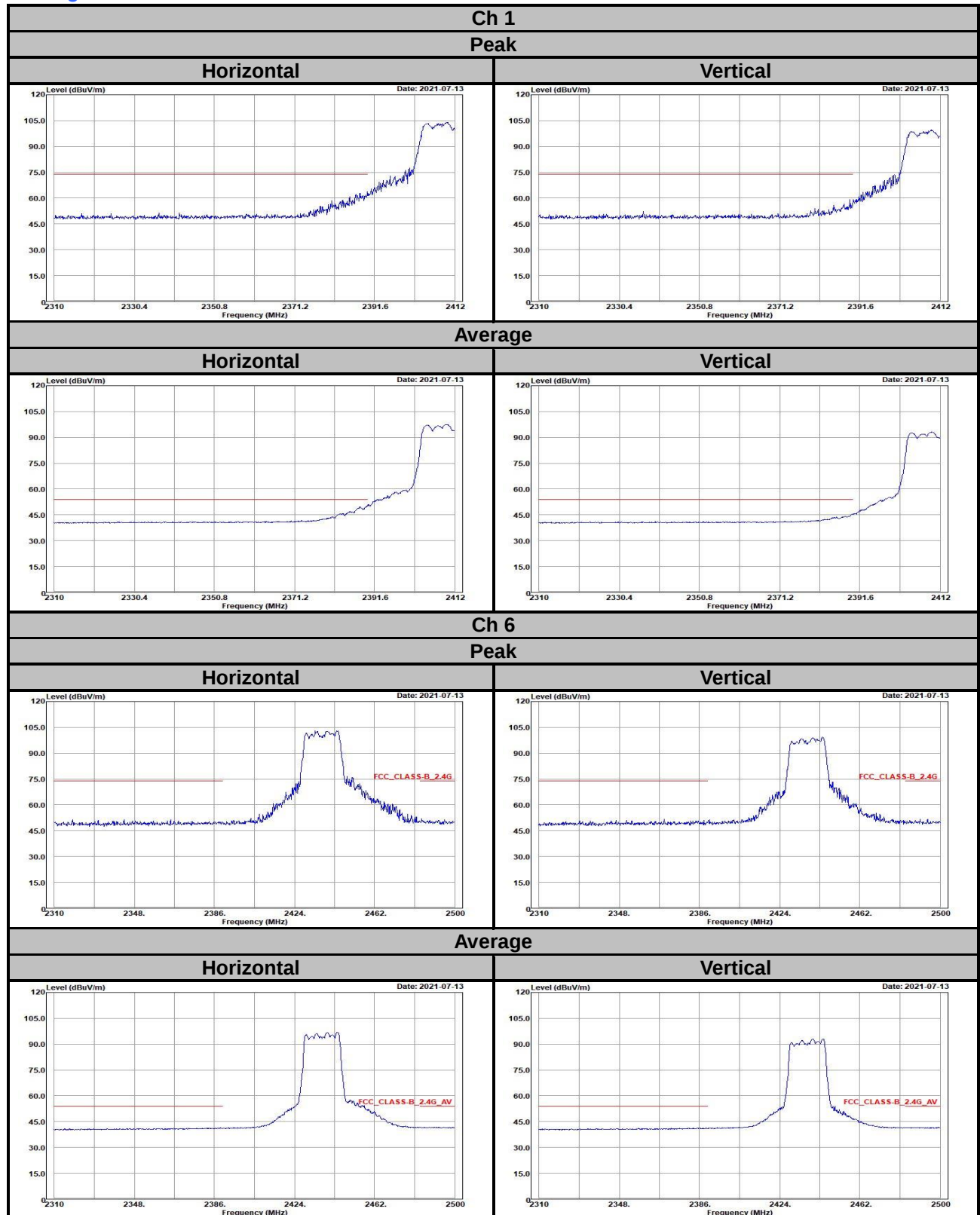
Horizontal



Vertical



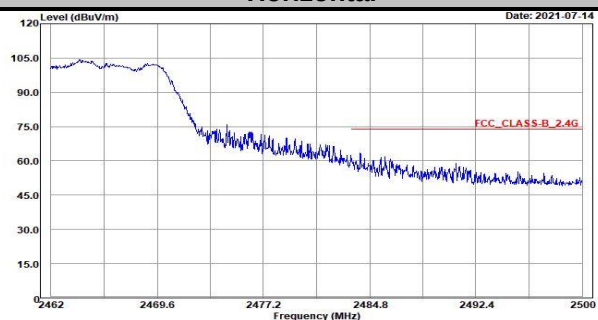
802.11g



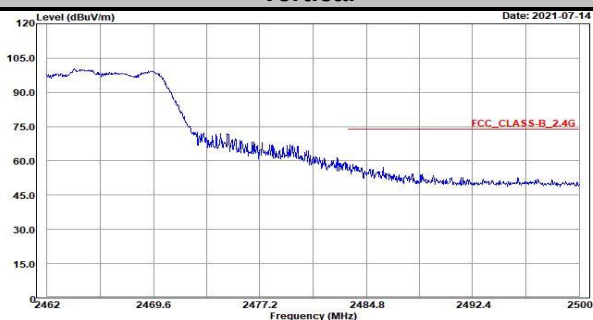
Ch 11

Peak

Horizontal



Vertical



Average

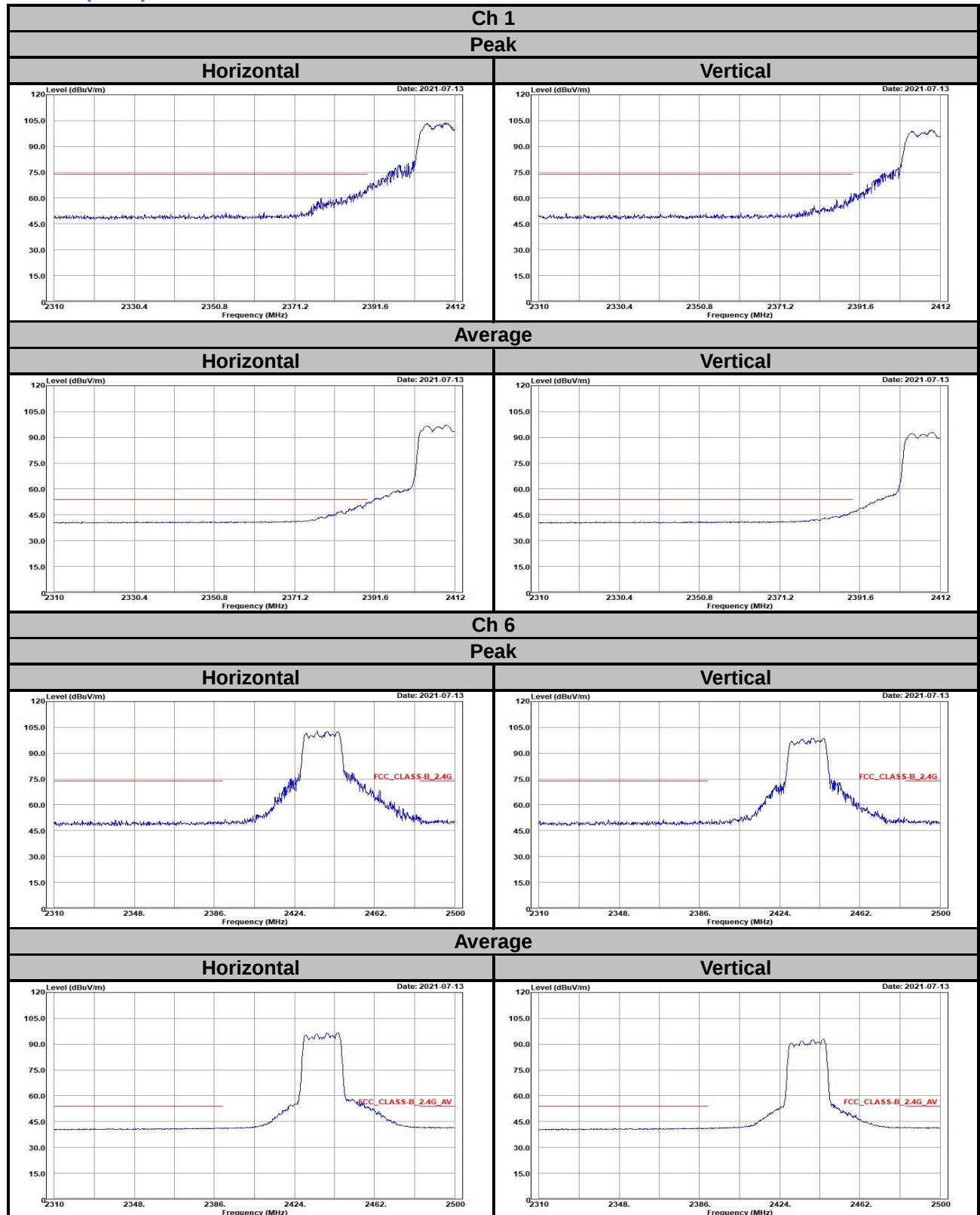
Horizontal



Vertical



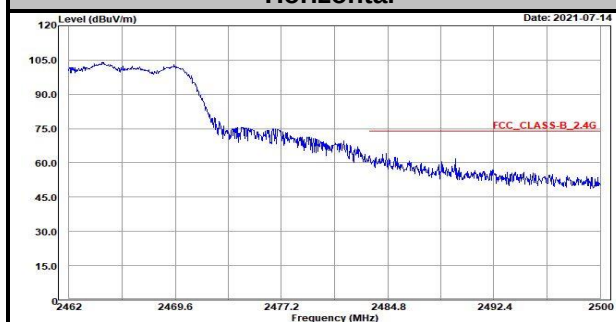
802.11n (HT20)



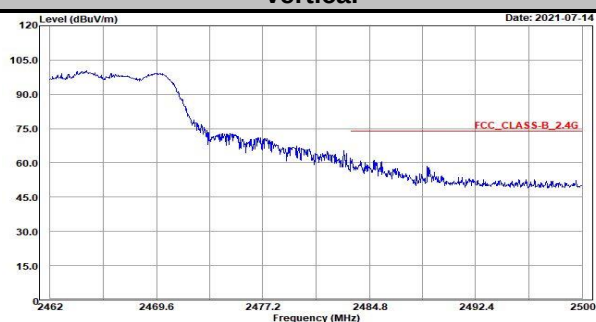
Ch 11

Peak

Horizontal



Vertical

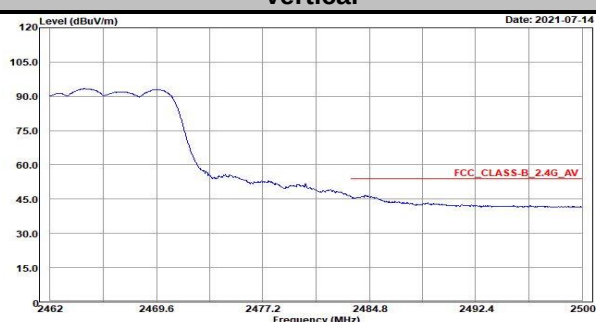


Average

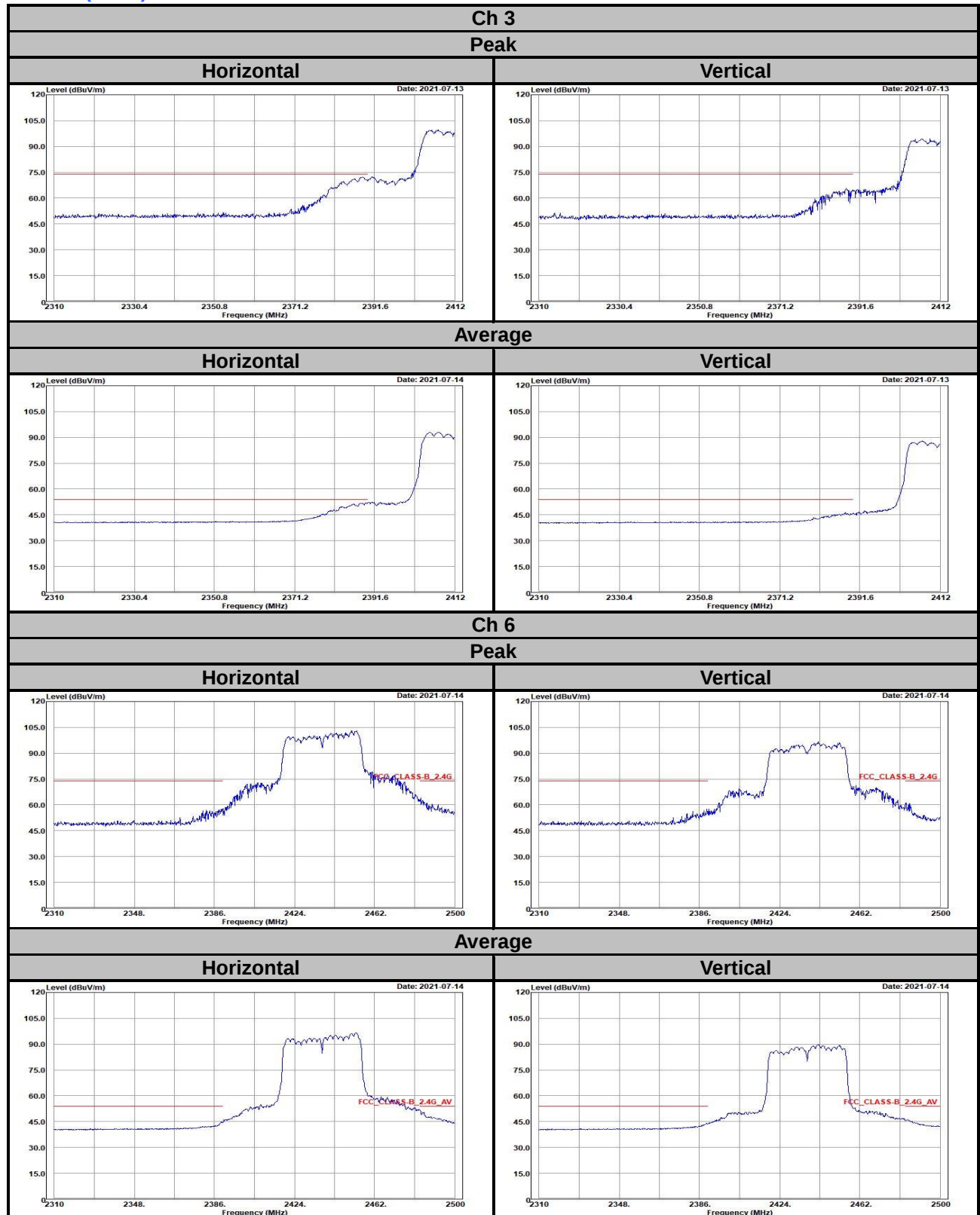
Horizontal



Vertical



802.11n (HT40)



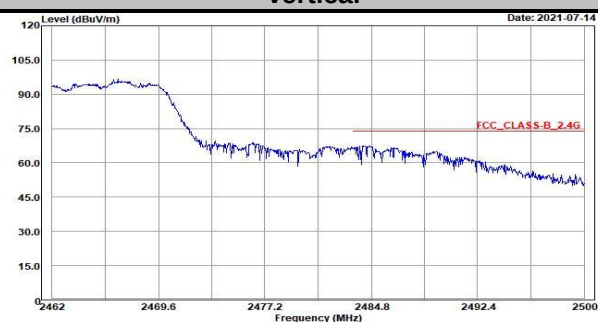
Ch 9

Peak

Horizontal



Vertical

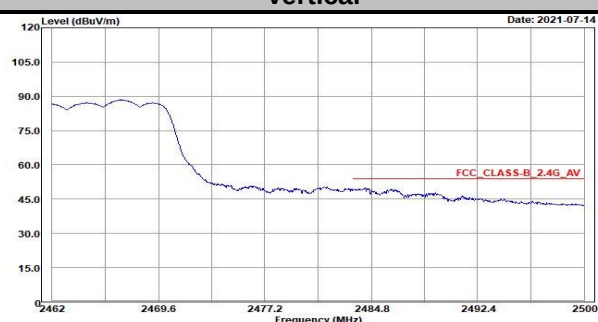


Average

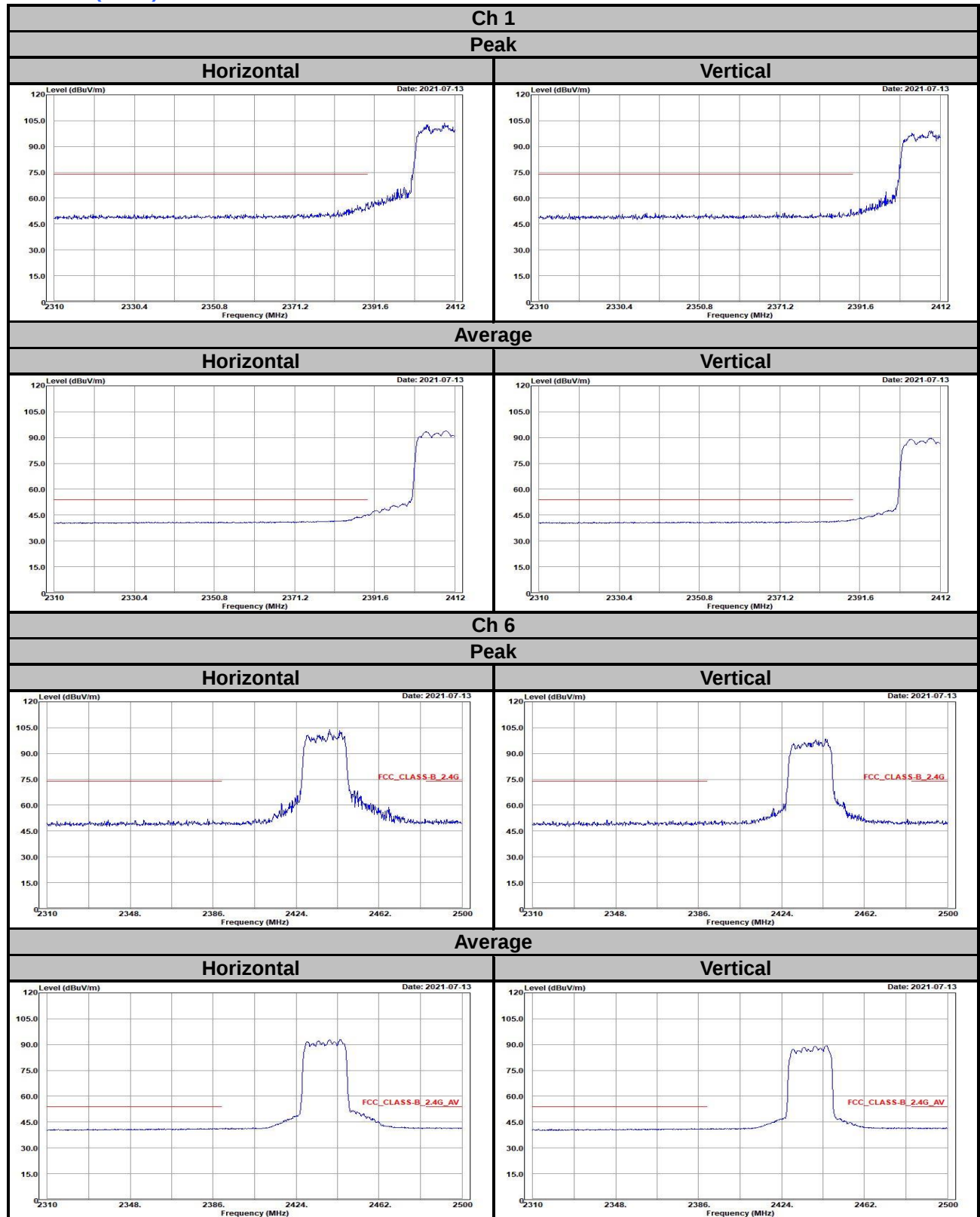
Horizontal



Vertical



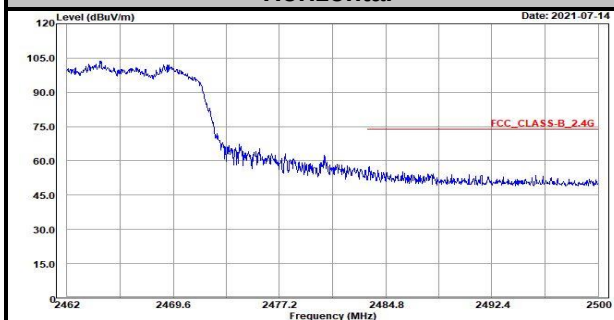
802.11ax (HE20)



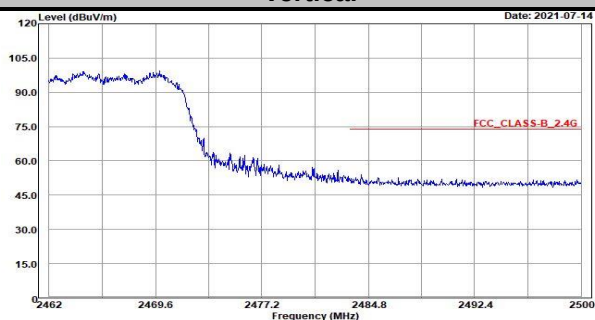
Ch 11

Peak

Horizontal

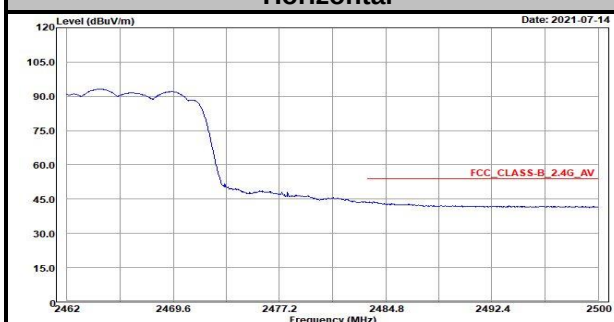


Vertical

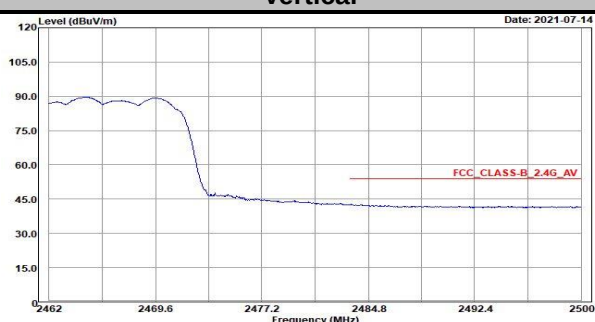


Average

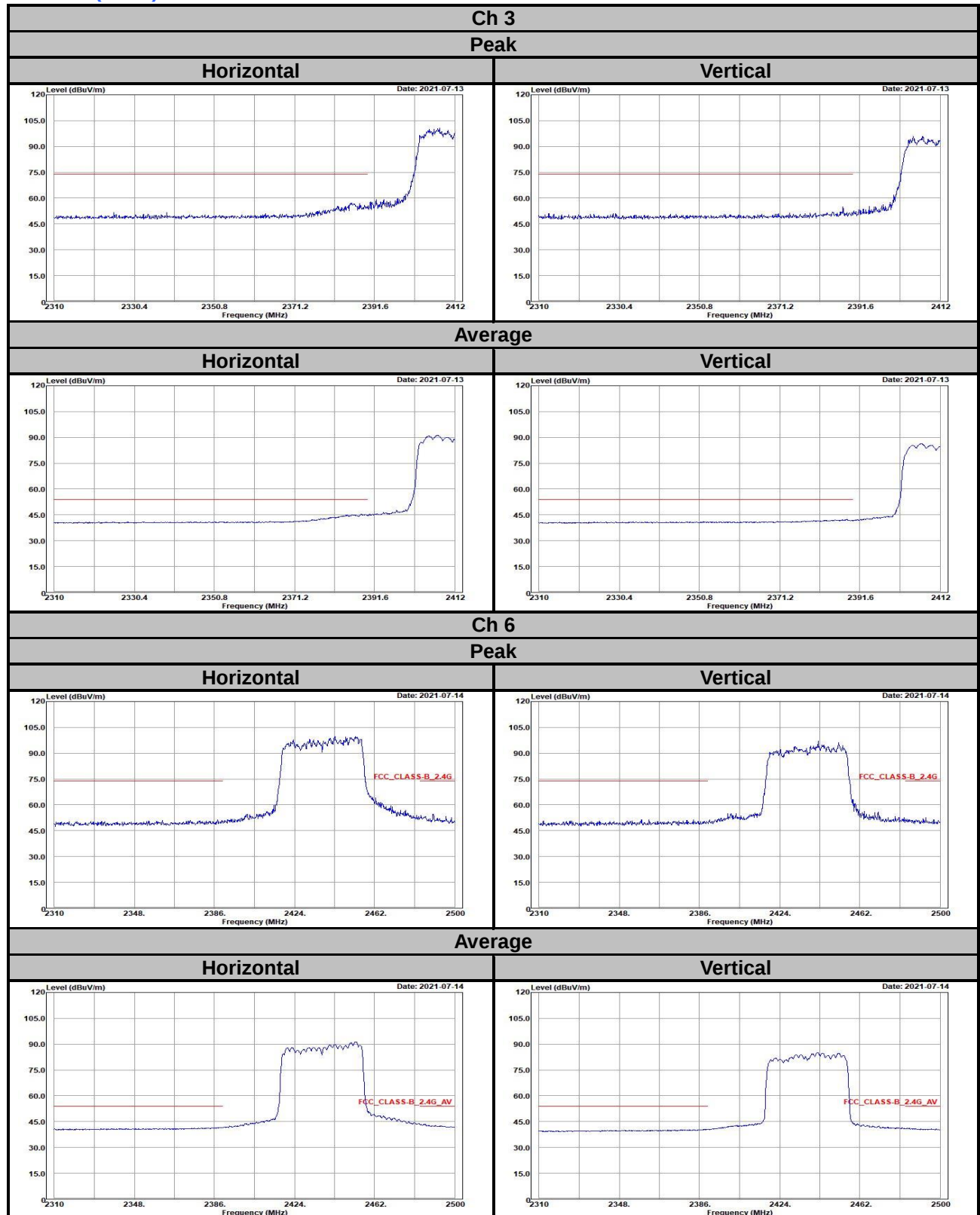
Horizontal



Vertical



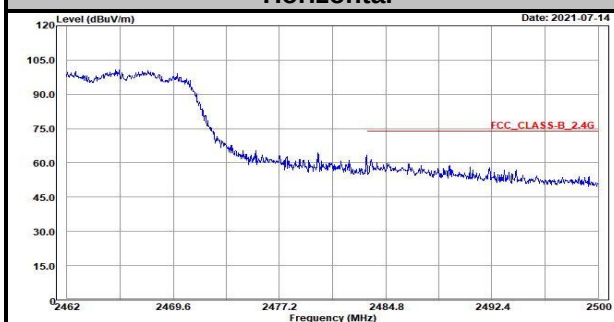
802.11ax (HE40)



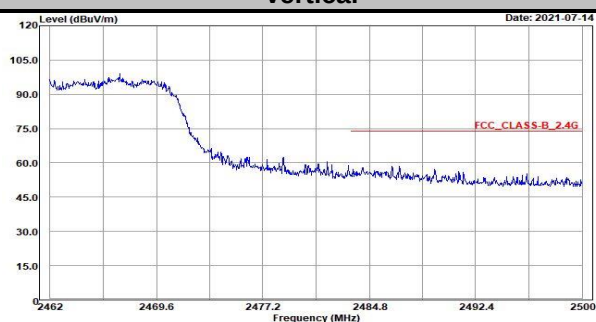
Ch 9

Peak

Horizontal

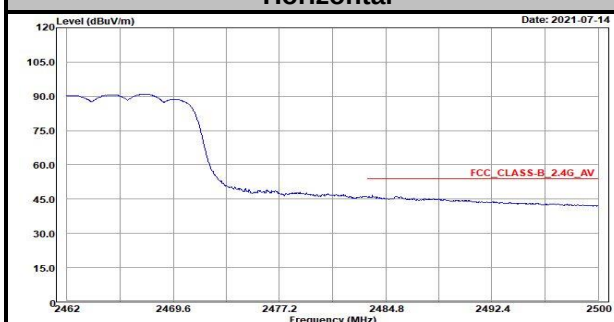


Vertical

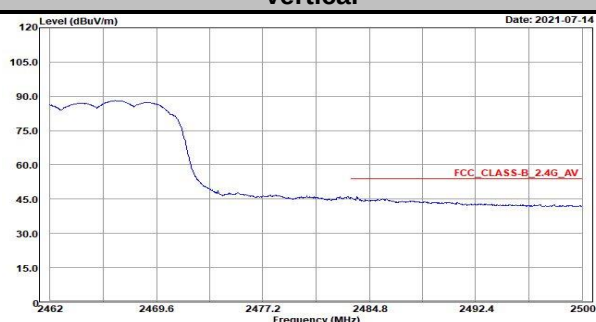


Average

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:

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Email: service.adt@tw.bureauveritas.com

Web Site: www.bureauveritas-adt.com

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

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