



Test report No. : 4789431832-US-R0-V0
Page : 1 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1

RADIO TEST REPORT

Product : 802.11ac/b/g/n WiFi + Bluetooth M.2 Card

Model Name : WNFQ-258ACN(BT)

FCC ID : 2AVP7-K3V1

Test Regulation : FCC 47 CFR Part 15 Subpart C (Section 15.247)

Received Date : Mar. 25, 2020

Test Date : Apr. 1, 2020 ~ Apr 30, 2020

Issued Date : Jun. 17, 2020

Applicant : Bizerba SE & Co. KG
Wilhelm-Kraut-Straße 65, 72336 Balingen, Germany

Issued By : Underwriters Laboratories Taiwan Co., Ltd.
Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd.,
Zhudong Township, Hsinchu County, Taiwan



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Test report No. : 4789431832-US-R0-V0
Page : 2 of 114
Issued date : Jun. 17, 2020
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REVISION HISTORY

Original Test Report No.: 4789431832-US-R0-V0

[illegible]

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Table Of Contents

1. Attestation of Test Results	4
2. Summary of Test Results	5
3. Test Methodology and Reference Procedures.....	6
4. Facilities and Accreditation	6
5. Measurement Uncertainty	7
6. Equipment under Test	8
6.1. Description of EUT	8
6.2. Channel List	10
6.3. Test Condition	11
6.4. Description Of Available Antennas	11
6.5. Test Mode Applicability and Tested Channel Detail	12
6.6. Duty cycle	13
7. Test Equipment.....	14
8. Description of Test Setup	16
9. Test Results	17
9.1. 6dB Bandwidth	17
9.2. Conducted output power	21
9.3. Power Spectral Density	26
9.4. Conducted Out of Band Emission.....	32
9.5. Radiated Spurious Emission	57
9.6. AC Power Line Conducted Emission	85
Appendix I Radiated Band Edge Measurement	91
Appendix II Radiated Spurious Emission Measurement	107



Test report No. : 4789431832-US-R0-V0
Page : 4 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1

1. Attestation of Test Results

APPLICANT: Bizerba SE & Co. KG
Wilhelm-Kraut-Straße 65, 72336 Balingen, Germany

MANUFACTURER SparkLAN Communications, Inc.
8F., No.257, Sec. 2, Tiding Blvd., Neihu District, Taipei City
11493, Taiwan (R.O.C.)

EUT DESCRIPTION: 802.11ac/b/g/n WiFi + Bluetooth M.2 Card

MODEL: WNFQ-258ACN(BT)

SAMPLE STAGE: Identical Prototype

DATE of TESTED: Apr. 1, 2020 ~ Apr. 30, 2020

APPLICABLE STANDARDS	
STANDARD	Test Results
FCC 47 CFR PART 15 Subpart C (Section 15.247)	PASS

Underwriters Laboratories Taiwan Co., Ltd. tested the above equipment in accordance with the requirements set forth in the above standards. All indications of Pass/Fail in this report are opinions expressed by Underwriters Laboratories Taiwan Co., Ltd. based on interpretations and/or observations of test results. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Note: The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein. This document may not be altered or revised in any way unless done so by Underwriters Laboratories Taiwan Co., Ltd. and all revisions are duly noted in the revisions section. Any alteration of this document not carried out by Underwriters Laboratories Taiwan Co., Ltd. will constitute fraud and shall nullify the document. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, any agency of the Federal Government, or any agency of any government.

Prepared By:

Cindy Hsin
Project Handler

Date : Jun. 17, 2020

Approved and Authorized By:

Howard Kao
Project Engineer

Date : Jun. 17, 2020

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2. Summary of Test Results

Summary of Test Results		
FCC Clause	Test Items	Result
15.247(a)(2)	6dB Bandwidth	PASS
15.247(b)	Conducted Output Power	PASS
15.247(e)	Power Spectral Density	PASS
15.247(d)	Antenna Port Emission	PASS
15.205 / 15.209 / 15.247(d)	Radiated Emissions and Band Edge Measurement	PASS
15.207	AC Power Conducted Emission	PASS
15.203	Antenna Requirement	PASS

Note:

1. For the Radiated Band Edge test plots were recorded in Appendix I, the Radiated Emissions test plots were recorded in Appendix II.

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3. Test Methodology and Reference Procedures

The tests documented in this report were performed in accordance with 47 CFR FCC Part 2, KDB558074 D01 Meas Guidance v05r02, KDB414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013 and KDB 662911 D01 Multiple Transmitter Output v02r01.

4. Facilities and Accreditation

Test Location	Underwriters Laboratories Taiwan Co., Ltd.
Address	Building B and Building E, No. 372-7, Sec. 4, Zhongxing Rd., Zhudong Township, Hsinchu County, Taiwan
Accreditation Certificate	Underwriters Laboratories Taiwan Co., Ltd. is accredited by TAF, Laboratory Code 3398. The full scope of accreditation can be viewed at http://accreditation.taftw.org.tw/taf/public/basic/viewApplyItems.action?unitNo=3398

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5. Measurement Uncertainty

For statement of conformity, accuracy method (Section 8.2.4 and 8.2.5 of ISO Guide 98-4) was applied as decision rule for measurement in this test report.

The following uncertainties have been calculated to provide a confidence level of 95 % using a coverage factor $k=2$.

Test Item	Measurement Frequency Range	K	U(dB)
Conducted disturbance at mains terminals ports	0.15MHz ~ 30MHz	2	1.7
RF Conducted	9 kHz - 40GHz	2	1.0
Radiated disturbance below 30MHz	9 kHz - 30 MHz	2	2.2
Radiated disturbance below 1 GHz	30MHz ~ 1GHz	2	5.3
Radiated disturbance above 1GHz	1GHz ~ 40GHz	2	4.8

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6. Equipment under Test

6.1. Description of EUT

Product	802.11ac/b/g/n WiFi + Bluetooth M.2 Card
Model Name	WNFQ-258ACN(BT)
Operating Frequency	2412MHz ~ 2472MHz
Modulation	CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Transfer Rate	802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to MCS15
Number of Channel	13 for 802.11b, 802.11g, 802.11n (HT20) 9 for 802.11n (HT40)
Maximum Output Power	802.11b: 25.13 dBm 802.11g: 26.94 dBm 802.11n (HT20): 26.98 dBm 802.11n (HT40): 26.49 dBm
Normal Voltage	3.3 Vdc
S/N	1926012007465
Hardware Version	WNFQ-258ACN(BT)
Software Version	12.0.0.448

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Note:

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

Modulation Mode	Tx,Rx Function
802.11b	2TX,2RX
802.11g	2TX,2RX
802.11n (HT20)	2TX,2RX
802.11n (HT40)	2TX,2RX

2. The EUT contains following accessory devices

Product	Brand	Model	Description
N/A	N/A	N/A	N/A

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

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6.2. Channel List

13 channels are provided for 802.11b, 802.11g and 802.11n (HT20):

Channel	Frequency	Channel	Frequency
1	2412MHz	8	2447MHz
2	2417MHz	9	2452MHz
3	2422MHz	10	2457MHz
4	2427MHz	11	2462MHz
5	2432MHz	12	2467MHz
6	2437MHz	13	2472MHz
7	2442MHz	-	-

9 channels are provided for 802.11n (HT40):

Channel	Frequency	Channel	Frequency
3	2422MHz	8	2447MHz
4	2427MHz	9	2452MHz
5	2432MHz	10	2457MHz
6	2437MHz	11	2462MHz
7	2442MHz	-	-

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Doc No: 17-EM-F0876 / 5.0



6.3. Test Condition

Test Item	Test Site No.	Environmental Condition	Input Power	Test Date	Tested by
Antenna Port Conducted Measurement	SR4	23~26°C / 63~68%RH	120Vac / 60 Hz	Apr. 1, 2020 ~ Apr. 30, 2020	Patrick Kuan
Radiated Spurious Emission	966-2	22~26°C / 62~68%RH	120Vac / 60 Hz	Apr. 8, 2020 ~ Apr. 29, 2020	Patrick Kuan
AC power Line Conducted Emission	SR1	23~25°C / 63~68%RH	120Vac / 60 Hz	Apr. 22, 2020 ~ Apr. 24, 2020	Patrick Kuan

FCC Test Firm Registration Number: 498077

6.4. Description Of Available Antennas

Product	Brand	Model	Antenna Type	Remark
Antenna 0	ethertronics	1000423	PIFA	0.6dBi
Antenna 1	ethertronics	1000423	PIFA	0.6dBi
IPEX cable	N/A	N/A	N/A	Length: 130mm cable
IPEX cable	N/A	N/A	N/A	Length: 60mm cable

Note: The above antenna information was provided from customer and for more detailed features description, please refer the manufacturer's specification or user's manual.

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6.5. Test Mode Applicability and Tested Channel Detail

- 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).
- For below 1 GHz radiated emission and AC power line conducted emission have performed all modes of operation were investigated and the worst-case emissions are reported.
- For Antenna Port Conducted Measurement, this item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.
- The fundamental of the EUT was investigated in three orthogonal axes X/Y/Z, it was determined that X axis was worst-case. Therefore, all final radiated testing was performed with the EUT in X axis.
- For below 30MHz testing, investigation was done on three antenna orientations (parallel, perpendicular, and ground-parallel), parallel and perpendicular are the worst orientations, therefore testing was performed on these two orientations only.
- For AC power line conducted emissions, the pre-scan has been determined by AC power 120Vac/60Hz (worst case)

Test item	Mode	Modulation Technology	Modulation Type	Available Channel	Test Channel	Data Rate
Radiated Emissions (Above 1GHz)	802.11b	DSSS	DBPSK	1 to 13	1,6,11,12,13	1.0
	802.11g	OFDM	BPSK	1 to 13	1,6,11,12,13	6.0
	802.11n(HT20)	OFDM	BPSK	1 to 13	1,6,11,12,13	MCS0
	802.11n(HT40)	OFDM	BPSK	3 to 11	3,6,9,10,11	MCS0
Radiated Emissions (Below 1GHz)	802.11g	OFDM	BPSK	1 to 13	11	MCS0
AC Power Line Conducted Emission	802.11g	OFDM	BPSK	1 to 13	11	MCS0
Antenna Port Conducted Measurement	802.11b	DSSS	DBPSK	1 to 13	1,6,11,12,13	1.0
	802.11g	OFDM	BPSK	1 to 13	1,6,11,12,13	6.0
	802.11n(HT20)	OFDM	BPSK	1 to 13	1,6,11,12,13	MCS0
	802.11n(HT40)	OFDM	BPSK	3 to 11	3,6,9,10,11	MCS0

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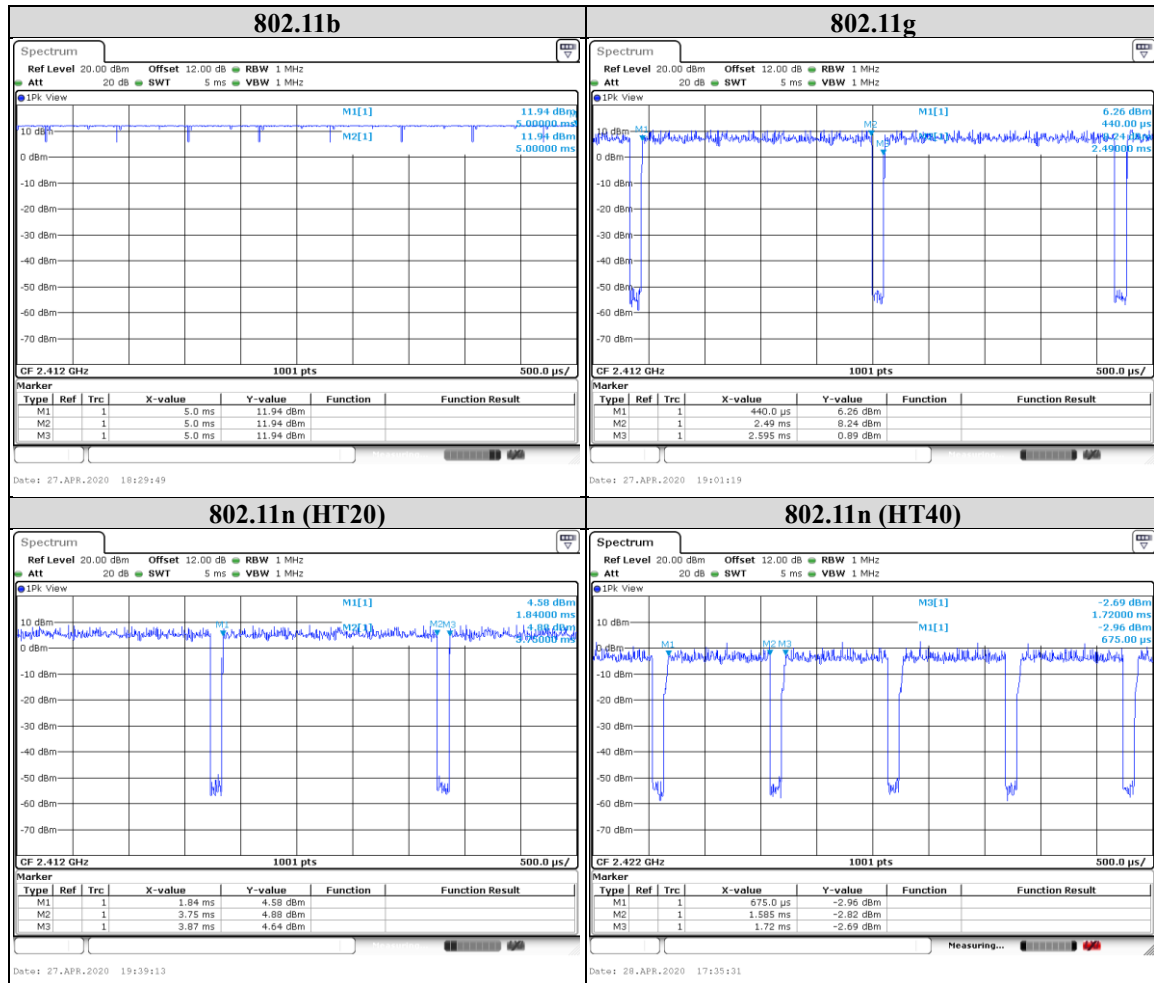
6.6. Duty cycle

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

802.11g: Duty cycle = $2.05/2.155 = 0.951$, Duty factor = $10 * \log(1/0.951) = 0.22$

802.11n (HT20): Duty cycle = $1.91/2.03 = 0.941$, Duty factor = $10 * \log(1/0.941) = 0.26$

802.11n (HT40): Duty cycle = $0.91/1.045 = 0.871$, Duty factor = $10 * \log(1/0.871) = 0.60$



Note: $T_{on} = \text{Mark2} - \text{Mark1}$, $T_{on} + T_{off} = \text{Mark3} - \text{Mark1}$.



Test report No. : 4789431832-US-R0-V0
Page : 14 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1

7. Test Equipment

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Radiated Spurious Emission					
Spectrum Analyzer	Keysight	N9010A	MY56070827	Nov. 13, 2019	1 year
EMI Test Receiver	Rohde & Schwarz	ESR7	101754	Dec. 17, 2019	1 year
Loop Antenna	ETS lindgren	6502	00213440	Dec. 19, 2019	1 year
Trilog-Broadband Antenna with 5dB Attenuator	Schwarzbeck & EMCI	VULB 9168 & N-6-05	774 & AT-N0538	Jan. 3, 2020	1 year
Horn Antenna (1-18 GHz)	Schwarzbeck	BBHA 9120 D	01690	Jan. 3, 2020	1 year
Horn Antenna(18-40 GHz)	Schwarzbeck	BBHA 9170	781	Dec. 27, 2019	1 year
Preamplifier (30-1000 MHz)	EMCI	EMC330E	980405	Feb. 4, 2020	1 year
Preamplifier (1-18 GHz)	EMCI	EMC051835B E	980406	Feb. 4, 2020	1 year
Preamplifier (18-40GHz)	EMCI	EMC184040SE E	980426	May. 8, 2019	1 year
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-4 & 170425-2	Jan. 8, 2020	1 year
Cables	Hanyitek	K1K50-UP0264-K1K50-2500	170214-1 & 170214-2	Jan. 8, 2020	1 year

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Test report No. : 4789431832-US-R0-V0
Page : 15 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1

Test Equipment List					
Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
Antenna Port Conducted Measurement					
Spectrum Analyzer	Keysight	N9010A	MY56070834	Nov. 6, 2019	1 year
FSV40 Signal Analyzer	Rohde & Schwarz	FSV40	101490	Sep. 24, 2019	1 year
Pulse Power Sensor	Anrisu	MA2411B	1531202	Dec. 23, 2019	1 year
Power Meter	Anrisu	ML2495A	1645002	Dec. 23, 2019	1 year
AC power Line Conducted Emission					
EMI Test Receiver	Rohde & Schwarz	ESR7	101753	Nov. 19, 2019	1 year
Two-Line V-Network	Rohde & Schwarz	ENV216	102136	Aug. 8, 2019	1 year
Impuls-Begrenzer Pulse Limiter	Rohde & Schwarz	ESH3-Z2	102219-Qt	Aug. 6, 2019	1 year
Cables	HARBOUR INDUSTRIES	LL142	170205-5000-1	Feb. 5, 2020	1 year

UL Software		
Description	Name	Version
Radiated measurement	E3	6.0
AC power Line Conducted Emission	EZ EMC	1.1.4.2

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8. Description of Test Setup

Support Equipment

Equipment	Brand Name	Model Name	S/N	Remark
USB Device	SP Widget	TOUCH T03	N/A	8GB
USB Device	SP Widget	TOUCH T03	N/A	8GB
USB Device	SP Widget	TOUCH T03	N/A	8GB

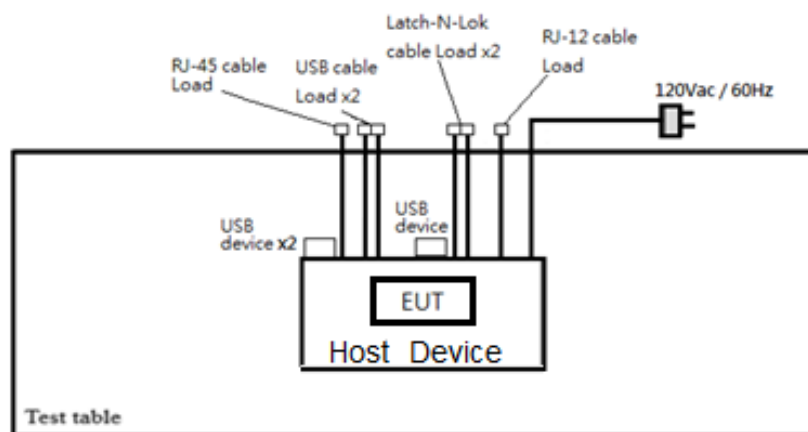
I/O Cables

Equipment	Brand Name	Model Name	S/N	Remark
RJ-45 cable	N/A	N/A	N/A	Length : 1.5m
RJ-12 cable	N/A	N/A	N/A	Length : 1m
USB cable	N/A	N/A	N/A	Type-C, Length:1.5m
USB cable	N/A	N/A	N/A	Type-C, Length:1.5m
Latch-N-Lok cable	N/A	N/A	N/A	Length : 1.5m
Latch-N-Lok cable	N/A	N/A	N/A	Length : 1.5m

Test Setup

Controlled using a bespoke application (QCARCT v3.0-00191) on a test Notebook. The application was used to enable a continuous transmission mode and to select the test channels, data rates, modulation schemes and power setting as required.

Setup Diagram for Test



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9. Test Results

9.1. 6dB Bandwidth

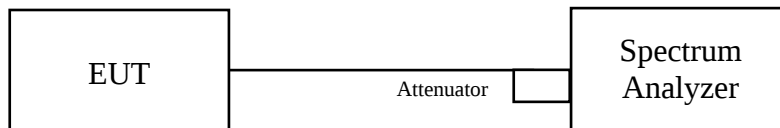
Requirements

The minimum 6 dB bandwidth shall be at least 500 kHz.

Test procedure

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

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.



Test Data

802.11b

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	8.032	8.032	0.5	Pass
6	2437	8.032	8.032	0.5	Pass
11	2462	8.032	8.032	0.5	Pass
12	2467	8.032	8.032	0.5	Pass
13	2472	8.032	8.032	0.5	Pass

802.11g

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.1449	15.1449	0.5	Pass
6	2437	15.1449	15.1449	0.5	Pass
11	2462	15.2647	15.5445	0.5	Pass
12	2467	15.1449	15.1449	0.5	Pass
13	2472	15.1049	15.3047	0.5	Pass

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Doc No: 17-EM-F0876 / 5.0



802.11n (HT20)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
1	2412	15.1049	15.1049	0.5	Pass
6	2437	15.1449	15.1449	0.5	Pass
11	2462	15.1049	15.1449	0.5	Pass
12	2467	15.1449	15.1449	0.5	Pass
13	2472	15.1049	15.1449	0.5	Pass

802.11n (HT40)

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)		Minimum Limit (MHz)	Pass / Fail
		Chain 0	Chain 1		
3	2422	35.0849	35.0849	0.5	Pass
6	2437	35.005	35.005	0.5	Pass
9	2452	35.0849	35.0849	0.5	Pass
10	2457	35.0849	35.0849	0.5	Pass
11	2462	35.0849	35.0849	0.5	Pass

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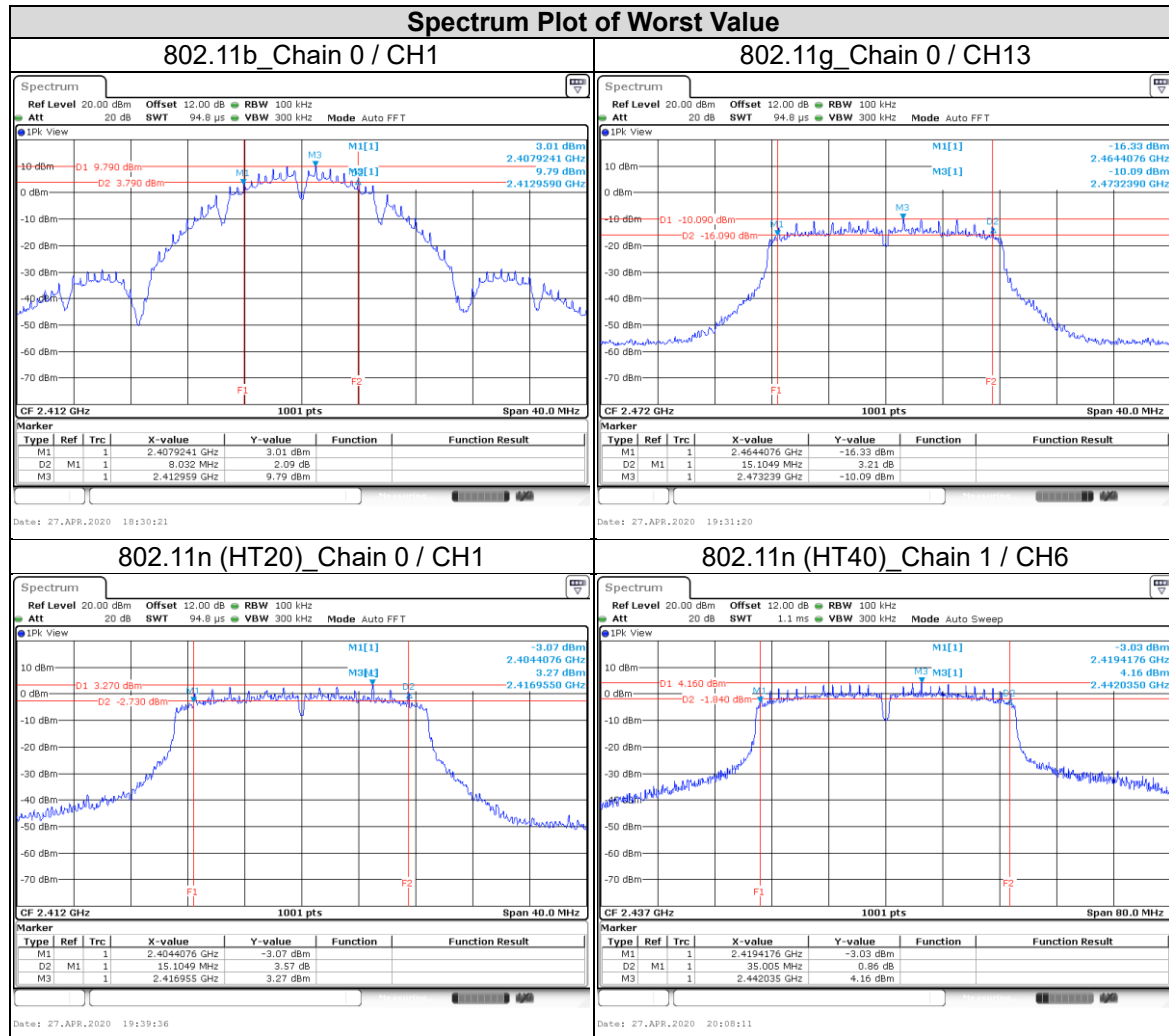
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Test report No. : 4789431832-US-R0-V0
Page : 20 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1



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9.2. Conducted output power

Requirements

For systems using digital modulation in the 2400-2483.5 MHz bands: 1 Watt.

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 $N_{ANT} \leq 4$;

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

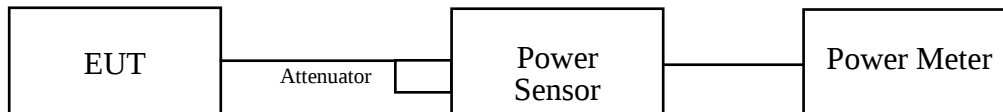
Array Gain = $5 \log(N_{ANT}/N_{SS})$ dB or 3 dB, whichever is less for 20-MHz channel widths with $N_{ANT} \geq 5$.

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

Test Procedure

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.

Test Setup



The loss between RF output port of the EUT and the input port of the Power Meter has been taken into consideration.

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Test Data

Peak Power

802.11b

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	20.89	21.22	255.178	24.07	30	Pass
6	2437	21.67	22.53	325.954	25.13	30	Pass
11	2462	20.63	21.64	261.492	24.17	30	Pass
12	2467	15.97	16.35	82.689	19.17	30	Pass
13	2472	12.34	12.79	36.151	15.58	30	Pass

802.11g

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.74	22.04	309.235	24.90	30	Pass
6	2437	23.92	23.93	493.776	26.94	30	Pass
11	2462	22.24	22.73	354.993	25.50	30	Pass
12	2467	18.72	19.34	160.374	22.05	30	Pass
13	2472	7.46	8.01	11.896	10.75	30	Pass

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Doc No: 17-EM-F0876 / 5.0



802.11n (HT20)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
1	2412	21.75	21.36	286.397	24.57	30	Pass
6	2437	24.18	23.74	498.41	26.98	30	Pass
11	2462	19.78	20.34	203.203	23.08	30	Pass
12	2467	20.69	21.76	267.188	24.27	30	Pass
13	2472	5.41	6.17	7.615	8.82	30	Pass

802.11n (HT40)

Channel	Frequency (MHz)	Peak Power (dBm)		Total Power (mW)	Total Power (dBm)	Limit (dBm)	Pass / Fail
		Chain 0	Chain 1				
3	2422	18.14	18.00	128.259	21.08	30	Pass
6	2437	23.20	23.74	445.522	26.49	30	Pass
9	2452	16.03	16.12	81.013	19.09	30	Pass
10	2457	16.46	16.63	90.285	19.56	30	Pass
11	2462	7.16	7.57	10.915	10.38	30	Pass

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Average Power (Reference Only)

802.11b

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	18.54	18.92	149.433	21.74
6	2437	19.56	20.11	192.93	22.85
11	2462	18.34	19.39	155.13	21.91
12	2467	13.13	13.76	44.327	16.47
13	2472	9.8	10.29	20.241	13.06

802.11g

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.85	16.23	80.435	19.05
6	2437	19.03	19.01	159.599	22.03
11	2462	16.73	17.05	97.797	19.90
12	2467	12.73	13.3	40.13	16.03
13	2472	1.56	2.21	3.095	4.91

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802.11n (HT20)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
1	2412	15.11	15.25	65.931	18.19
6	2437	18.56	18.27	138.922	21.43
11	2462	14.83	15.33	64.528	18.10
12	2467	12.88	13.37	41.136	16.14
13	2472	-0.62	0.01	1.869	2.72

802.11n (HT40)

Channel	Frequency (MHz)	Average Power (dBm)		Total Power (mW)	Total Power (dBm)
		Chain 0	Chain 1		
3	2422	11.54	11.61	28.744	14.59
6	2437	17.46	17.27	109.052	20.38
9	2452	9.53	9.89	18.724	12.72
10	2457	10.14	10.48	21.497	13.32
11	2462	0.44	1.11	2.398	3.80

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9.3. Power Spectral Density

Requirements

The Maximum of Power Spectral Density Measurement is 8dBm in any 3 kHz (If $G_{TX} > 6$ dBi, then $PSD = 8 - (G_{TX} - 6)$).

Note:

1. PSD = power spectral density that the same method as used to determine the conducted output power shall be used to determine the power spectral density. And power spectral density in dBm/MHz.
2. G_{TX} = the maximum transmitting antenna directional gain in dBi.
3. Directional Gain = $G_{ant} + 10 \log (N_{ant})$ dBi.

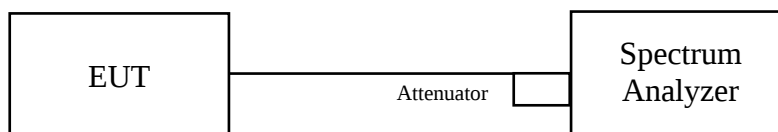
Nant: Number of Transmit Antennas

G1, G2,..., Gn: Gain of Individual Antennas (Same for Each Antenna)

Test procedure

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

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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Test Data

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	-7.63	3.01	-4.62	8	Pass
	6	2437	-6.61	3.01	-3.60	8	Pass
	11	2462	-5.78	3.01	-2.77	8	Pass
	12	2467	-10.26	3.01	-7.25	8	Pass
	13	2472	-14.28	3.01	-11.27	8	Pass
1	1	2412	-5.21	3.01	-2.20	8	Pass
	6	2437	-4.20	3.01	-1.19	8	Pass
	11	2462	-5.35	3.01	-2.34	8	Pass
	12	2467	-10.13	3.01	-7.12	8	Pass
	13	2472	-12.76	3.01	-9.75	8	Pass

NOTE: Directional gain = 3.61 dBi < 6 dBi, so the limit no need to reduced.

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802.11g

TX Chain	Channel	Freq. (MHz)	PSD (dBm/3 kHz)	10 log (N=2) dB	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)	Pass / Fail
0	1	2412	-10.62	3.01	-7.61	8	Pass
	6	2437	-7.59	3.01	-4.58	8	Pass
	11	2462	-9.82	3.01	-6.81	8	Pass
	12	2467	-12.97	3.01	-9.96	8	Pass
	13	2472	-25.69	3.01	-22.68	8	Pass
1	1	2412	-9.38	3.01	-6.37	8	Pass
	6	2437	-6.85	3.01	-3.84	8	Pass
	11	2462	-8.44	3.01	-5.43	8	Pass
	12	2467	-11.98	3.01	-8.97	8	Pass
	13	2472	-23.07	3.01	-20.06	8	Pass

NOTE: Directional gain = 3.61 dBi < 6 dBi, so the limit no need to reduced.

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802.11n (HT20)

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	-11.17	3.01	-8.16	8	Pass
	6	2437	-8.47	3.01	-5.46	8	Pass
	11	2462	-10.73	3.01	-7.72	8	Pass
	12	2467	-12.27	3.01	-9.26	8	Pass
	13	2472	-24.30	3.01	-21.29	8	Pass
1	1	2412	-9.43	3.01	-6.42	8	Pass
	6	2437	-7.21	3.01	-4.20	8	Pass
	11	2462	-9.07	3.01	-6.06	8	Pass
	12	2467	-11.68	3.01	-8.67	8	Pass
	13	2472	-23.67	3.01	-20.66	8	Pass

NOTE: Directional gain = 3.61 dBi < 6 dBi, so the limit no need to reduced.

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802.11n (HT40)

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	3	2422	-17.50	3.01	-14.49	8	Pass
	6	2437	-12.50	3.01	-9.49	8	Pass
	9	2452	-19.11	3.01	-16.10	8	Pass
	10	2457	-17.76	3.01	-14.75	8	Pass
	11	2462	-27.90	3.01	-24.89	8	Pass
1	3	2422	-16.43	3.01	-13.42	8	Pass
	6	2437	-10.06	3.01	-7.05	8	Pass
	9	2452	-17.79	3.01	-14.78	8	Pass
	10	2457	-17.03	3.01	-14.02	8	Pass
	11	2462	-26.67	3.01	-23.66	8	Pass

NOTE: Directional gain = 3.61 dBi < 6 dBi, so the limit no need to reduced.

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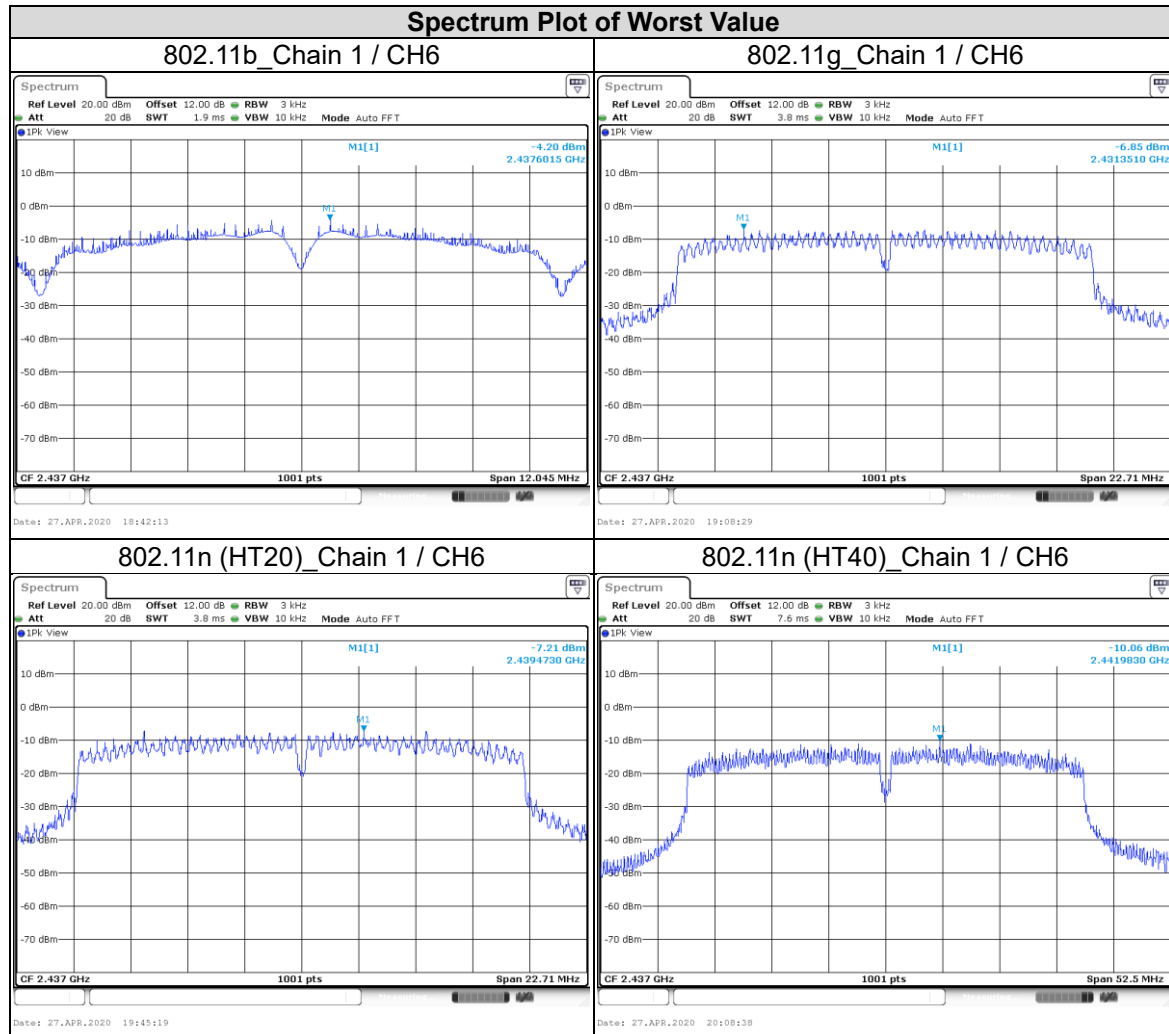
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Test report No. : 4789431832-US-R0-V0
Page : 31 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1



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9.4. Conducted Out of Band Emission

Requirements

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b) (3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209 (a) is not required.

Test procedure

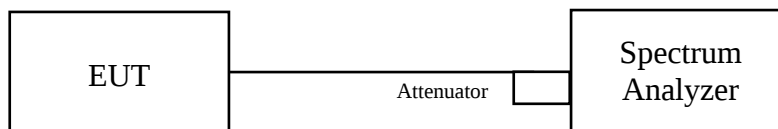
Measurement Procedure REF

1. Set the RBW = 100 kHz.
2. Set the VBW $\geq$ 300 kHz.
3. Set the span to 1.5 times the DTS bandwidth.
4. Detector = peak.
5. Sweep time = auto couple.
6. Trace mode = max hold.
7. Allow trace to fully stabilize.
8. 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 $\geq$ 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.

Test Setup



The loss between RF output port of the EUT and the input port of the Spectrum Analyzer has been taken into consideration.

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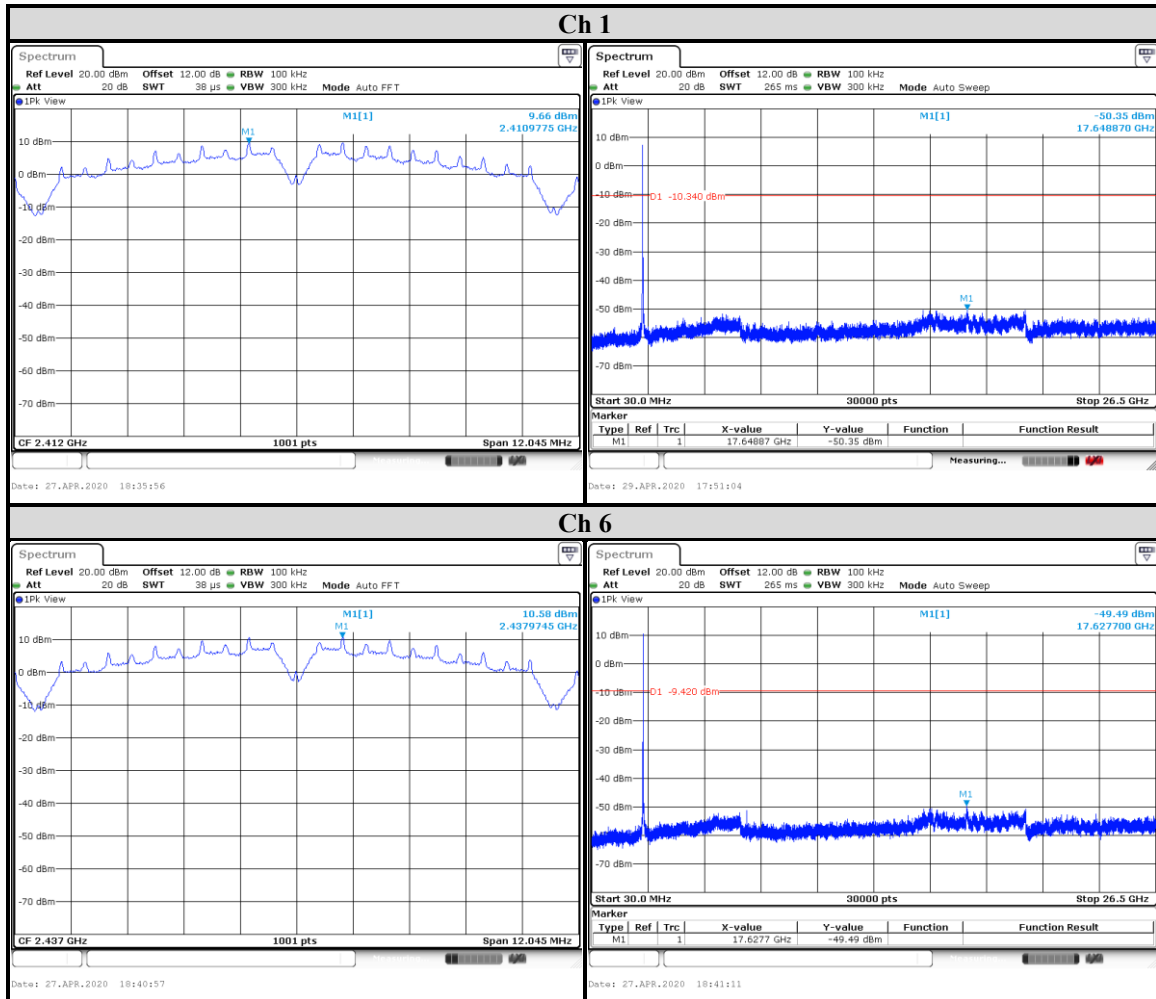


Test report No. : 4789431832-US-R0-V0
Page : 33 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1

Test Data

802.11b

CHAIN 0



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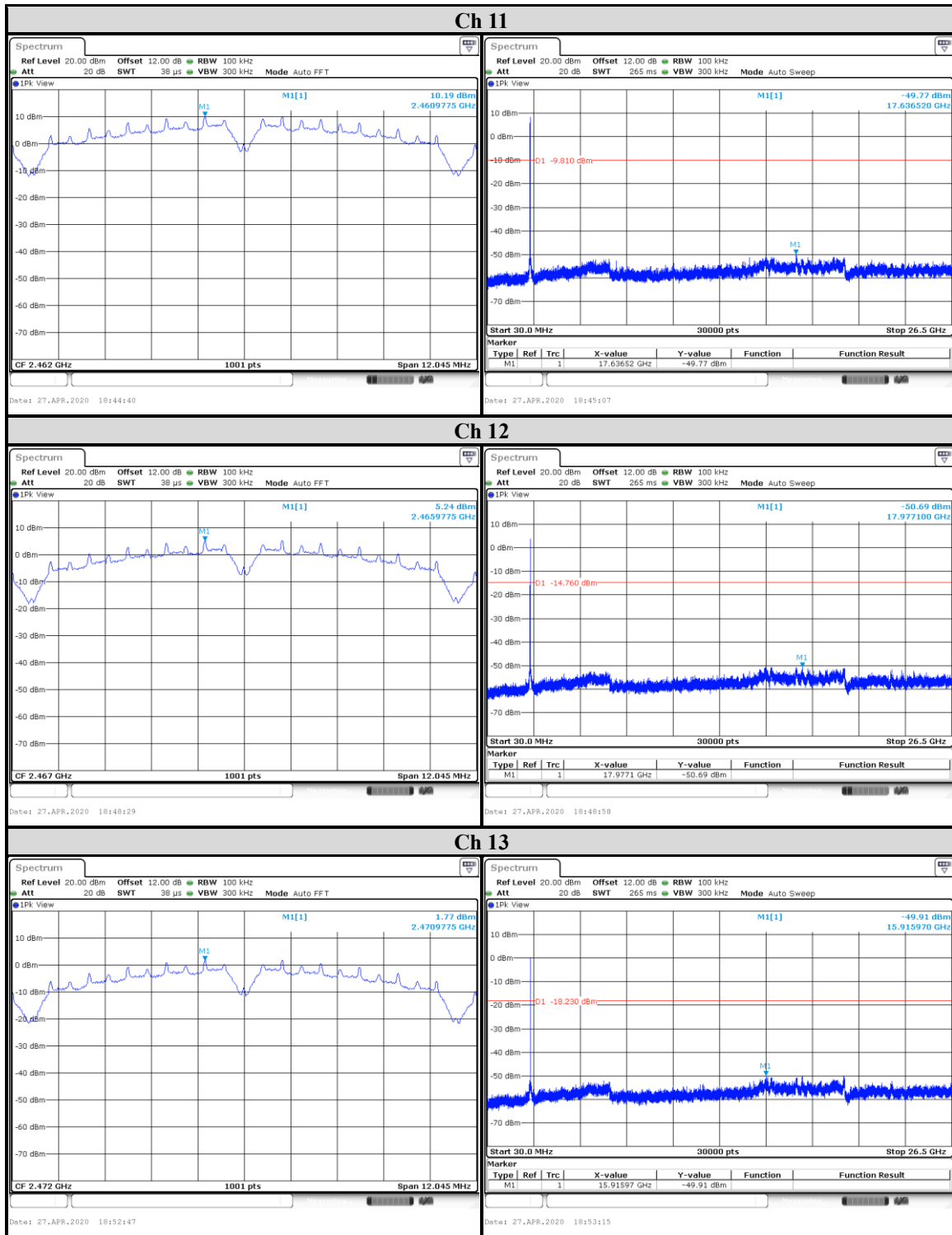
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Test report No. : 4789431832-US-R0-V0
Page : 34 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1



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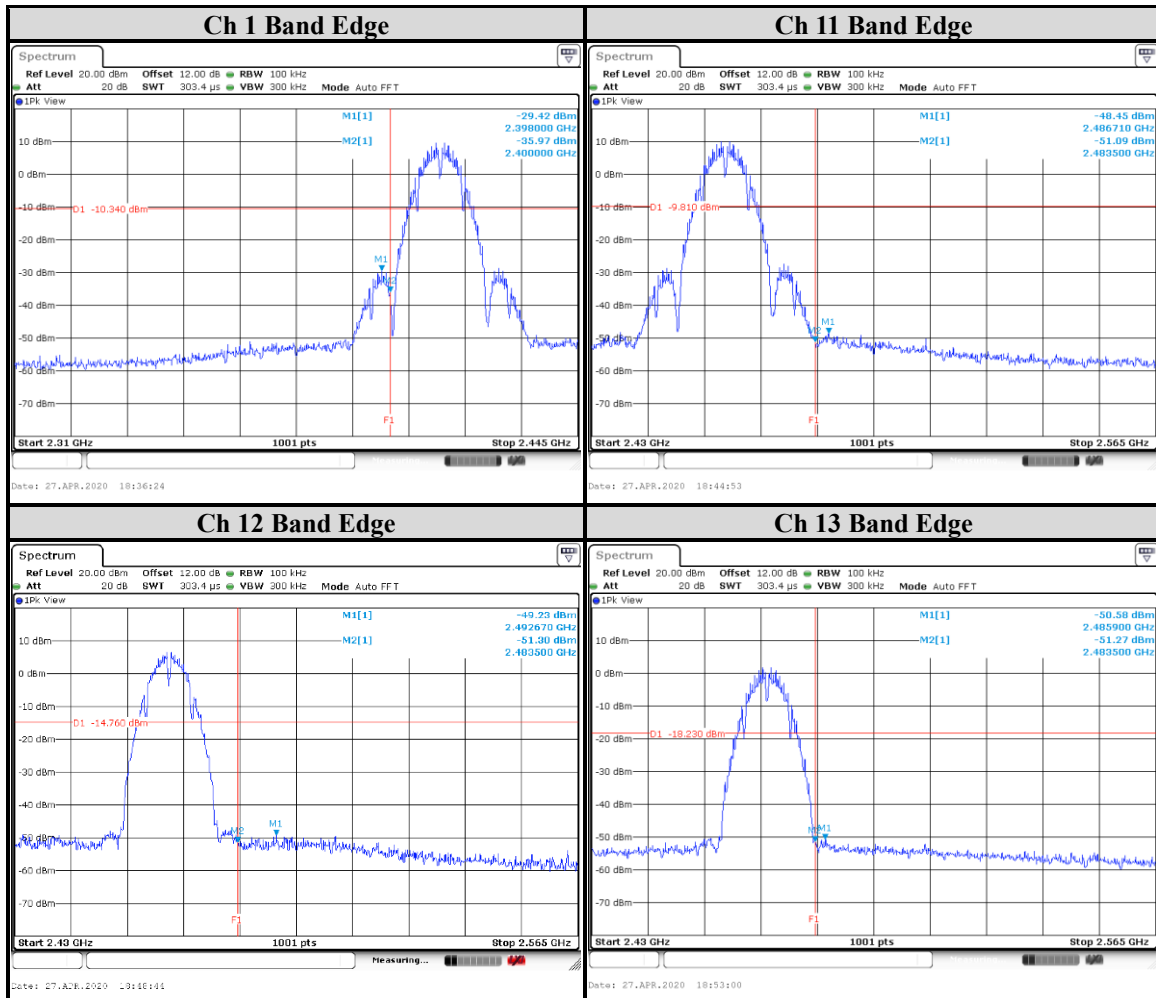
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Test report No. : 4789431832-US-R0-V0
Page : 35 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1



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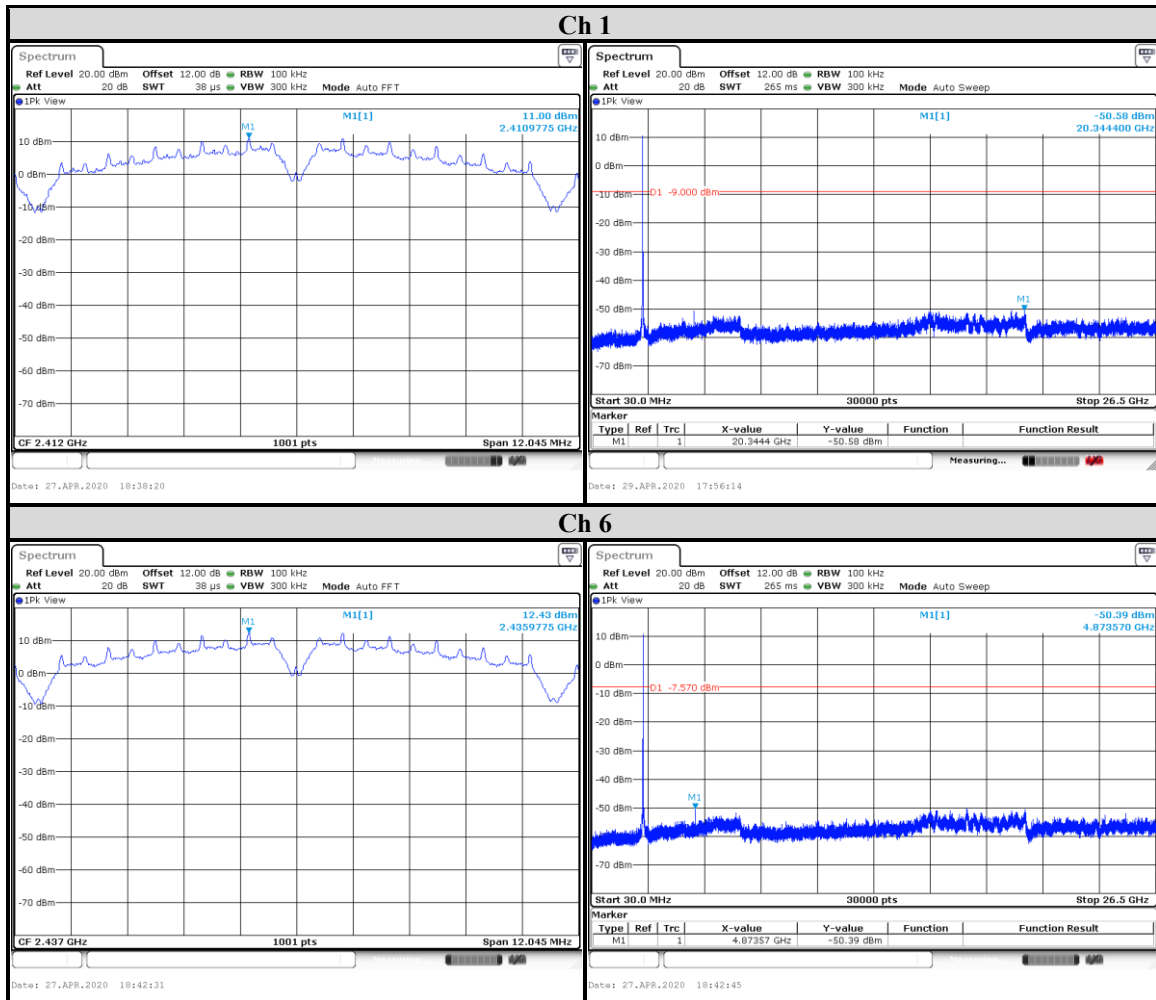
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Test report No. : 4789431832-US-R0-V0
Page : 36 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1

CHAIN 1



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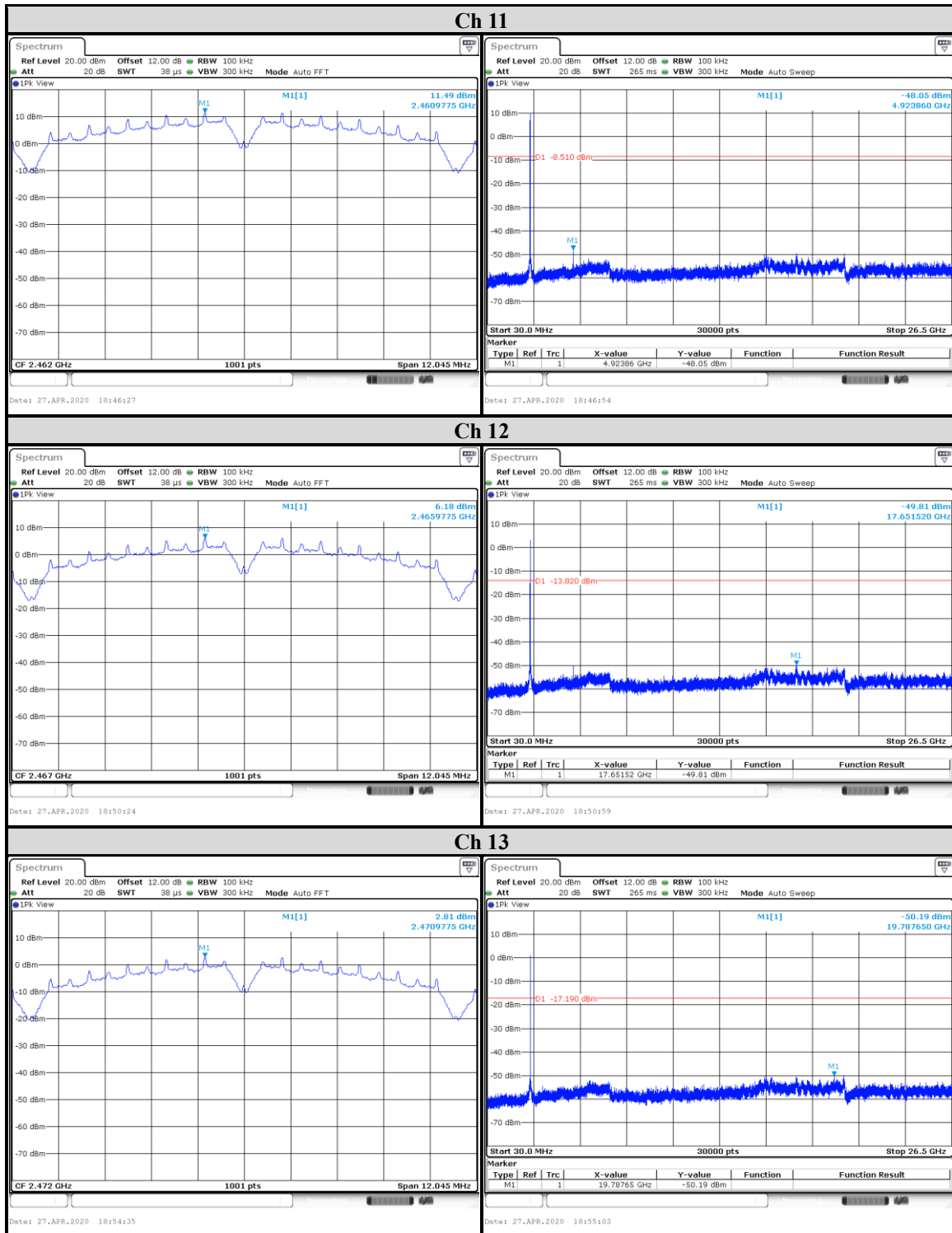
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Test report No. : 4789431832-US-R0-V0
Page : 37 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1



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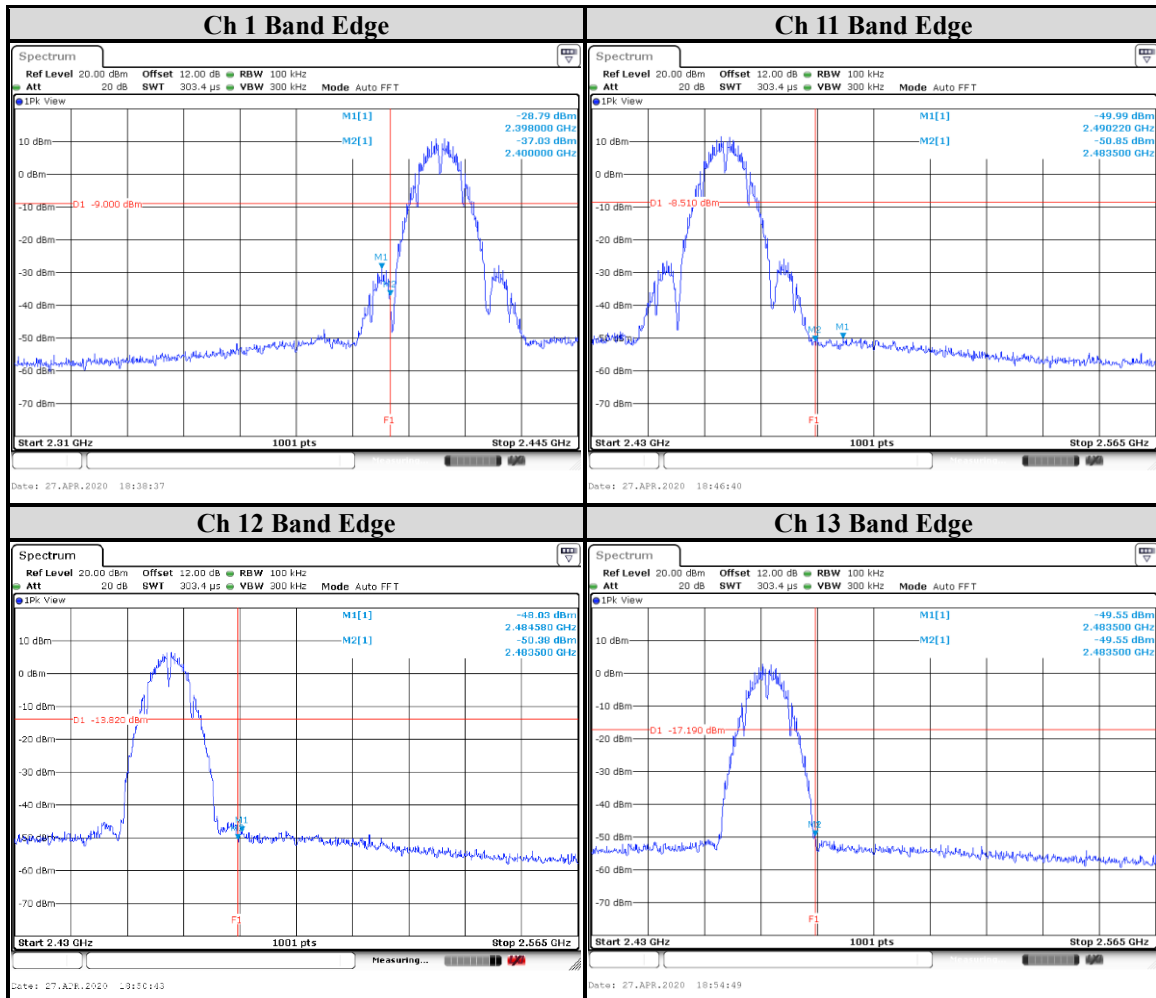
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Test report No. : 4789431832-US-R0-V0
Page : 38 of 114
Issued date : Jun. 17, 2020
FCC ID : 2AVP7-K3V1



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