

EcoFlow Inc.

TEST REPORT

SCOPE OF WORK

FCC TESTING— EF-HB-140-X

REPORT NUMBER

250717056SZN-003

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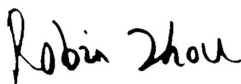


Intertek Report No.: 250717056SZN-003

EcoFlow Inc.Application
For
Certification**FCC ID: 2A2P9-PB501JK****EcoFlow RAPID Pro X Power Bank(27K, 300W)****Model: EF-HB-140-X****Brand Name: EF ECOFLOW, ECOFLOW****2.4GHz Wi-Fi Transceiver**

Report No.: 250717056SZN-003

We hereby certify that the sample of the above item is considered to comply with the requirements of FCC Part 15, Subpart C for Intentional Radiator, mention 47 CFR [10-1-24]

Prepared and Checked by:**Robin Zhou**
Senior Project Engineer**Approved by:**

Johnny Wang
Project Engineer
Date: 22 September 2025

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MEASUREMENT/TECHNICAL REPORT

This report concerns (check one) Original Grant ☒ Class II Change ☐

Equipment Type: DTS - Part 15 Digital Transmission Systems (Wi-Fi transmitter portion)

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes ☐ No ☒

If yes, defer until: _____
date

Company Name agrees to notify the Commission by: _____
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes ☐ No ☒

If no, assumed Part 15, Subpart C for intentional radiator - the new 47 CFR [10-01-24] Edition] provision.

Report prepared by:

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Table of Contents

1.0	<u>Summary of Test results</u>	4
2.0	<u>General Description</u>	5
2.1	Product Description	5
2.2	Related Submittal(s) Grants	5
2.3	Test Methodology	6
2.4	Test Facility	6
3.0	<u>System Test Configuration</u>	7
3.1	Justification	7
3.2	EUT Exercising Software	7
3.3	Special Accessories	8
3.4	Measurement Uncertainty	8
3.5	Equipment Modification	8
3.6	Support Equipment List and Description	8
4.0	<u>Measurement Results</u>	9
4.1	Maximum Conducted Output Power at Antenna Terminals	9
4.2	Minimum 6 dB RF Bandwidth	11
4.3	Maximum Power Density Reading	23
4.4	Out of Band Conducted Emissions	35
4.5	Out of Band Radiated Emissions	75
4.6	Transmitter Radiated Emissions in Restricted Bands	76
4.7	Field Strength Calculation	77
4.8	Radiated Spurious Emission	78
4.9	Conducted Emission	96
4.10	Radiated Emissions from Digital Section of Transceiver	99
4.11	Transmitter Duty Cycle Calculation and Measurements	100
5.0	<u>Equipment Photographs</u>	101
6.0	<u>Product Labelling</u>	101
7.0	<u>Technical Specifications</u>	101
8.0	<u>Instruction Manual</u>	101
9.0	<u>Confidentiality Request</u>	101
10.0	<u>Discussion of Pulse Desensitization</u>	101
11.0	<u>Test Equipment List</u>	102

1.0 Summary of Test results

Applicant: EcoFlow Inc.

Applicant Address: RM 401,Plant #1,Runheng Industrial Zone, Fuhai Street,Bao'an District, Shenzhen 518000, China

Manufacturer: EcoFlow Inc.

Manufacturer Address: RM 401,Plant #1,Runheng Industrial Zone, Fuhai Street,Bao'an District, Shenzhen 518000, China

Model: EF-HB-140-X
FCC ID: 2A2P9-PB501JK

TEST ITEM	REFERENCE	RESULTS
Max. Output power	15.247(b)(3)	Pass
6 dB Bandwidth	15.247(a)(2)	Pass
Max. Power Density	15.247(e)	Pass
Out of Band Antenna Conducted Emission	15.247(d)	Pass
Radiated Emission in Restricted Bands	15.247(d), 15.209, FCC 15.205	Pass
AC Conducted Emission	15.207	Pass
Antenna Requirement	15.203	Pass (See Notes)

Notes: The EUT uses an Integral Antenna which in accordance to Section 15.203 is considered sufficient to comply with the provisions of this section.

2.0 General Description

2.1 Product Description

The Equipment Under Test (EUT) is a EcoFlow RAPID Pro X Power Bank(27K, 300W), EF-HB-140-X with Wi-Fi function operating at 2412-2462MHz for 802.11b/g/n-HT20/ax-VHT20, 11 channels with 5MHz channel spacing and 2422-2452MHz for 802.11n-HT40, 7 channels with 5MHz channel spacing. The EUT is powered by DC 25.2 V from battery or USB-C1 DC 5V/9V/12V/15V/20V/28V powered by adapter from AC mains 120V60Hz. For more detail information pls. refer to the user manual. The EUT consists of two parts, the power bank main unit and the pogopin adapter.

Ratings:

Total Cell Capacity: 27650mAh(7*3.6V=3950mAh)
Lithium Battery Energy: 3950mAh 25.2V/99.54Wh
Rated Capacity: 15.9Ah(5V=3A)
USB-C1 Input: 5V/9V/12V/15V=3A, 20V/28V=5A, 140W Max
USB-C1 Output: 5V/9V/12V/15V=3A, 20V/28V=5A, UFCS 63W, 140W Max
USB-C2/C3 Output: 5V/9V/12V/15V=3A, 20V=3.25A, UFCS 63W, 65W Max
Total Output: 300W Max

Type of Modulation: BPSK, QPSK, 16QAM, 64QAM for OFDM; BPSK, QPSK, 16QAM, 64QAM, 256QAM, 1024QAM for OFDMA; CCK, DQPSK, DBPSK for DSSS.

Antenna Type: PCB antenna

Antenna Gain: 3.18dBi (This information is provided by applicant, and the applicant is responsible for the authenticity of the provided information.)

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

2.2 Related Submittal(s) Grants

This is an application for certification of:

DTS- Part 15 Digital Transmission Systems (2.4GHz Wi-Fi transmitter portion).

Remaining portions are subject to the following procedures:

1. Receiver portion of WiFi: exempt from technical requirement of this Part.
2. Other Digital Function: Subject to FCC Part 15B SDOC.

2.3 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10-2020 + Cor.1-2023 and KDB 558074 D01 v05r02. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

2.4 Test Facility

The Semi-anechoic chamber and shielded room used to collect the radiated data and conducted data are Shenzhen NTEK Testing Technology Co., Ltd. and located at No. 24 Xinfu East Road Xiangshan Community, Xinqiao St, Baoan District, Shenzhen, Guangdong, China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: CN1184).

3.0 System Test Configuration

3.1 Justification

For emissions testing, the equipment under test (EUT) setup to transmit continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables were manipulated to produce worst case emissions. The EUT was powered by DC 25.2 V from battery or USB-C1 DC 28V powered by adapter from AC mains 120V60Hz during the test. Only the worst data is reported in this report.

On 802.11b/g/n-HT20/n-HT40/ax-VHT20 mode, only one antenna is used, and all data rate were tested and only the worst case data is shown in the report.

For maximizing emissions, the EUT was rotated through 360°, the EUT was placed on the styrene turntable with 0.8m up to 1GHz and 1.5 m above 1GHz. The antenna height and polarization are varied during the search for maximum signal level. The antenna height is varied from 1 to 4 meters. Radiated emissions are taken at three meters unless the signal level is too low for measurement at that distance. If necessary, a pre-amplifier is used and/or the test is conducted at a closer distance.

All readings are extrapolated back to the equivalent three meter reading using inverse scaling with distance. Analyzer resolution is 100 kHz or greater for frequencies below 1000 MHz. The resolution is 1 MHz or greater for frequencies above 1000 MHz. The spurious emissions more than 20 dB below the permissible value are not reported.

The EUT and transmitting antenna was centered on the turntable.

Radiated emission measurement were performed the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

3.2 EUT Exercising Software

The EUT exercise program (provided by client) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use. The worst case configuration is used in all specified testing.

The fixed frequency software uses ESP32, version v3.6.

The parameters of test software setting:

During the test, Channel and power controlling software provided by the applicant was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the application and is going to be fixed on the firmware of the end product.

3.3 Special Accessories

N/A.

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test has been considered.

3.5 Equipment Modification

Any modifications installed previous to testing by EcoFlow Inc. will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Shenzhen NTEK Testing Technology Co., Ltd.

3.6 Support Equipment List and Description

Description	Manufacturer	Remark
Adapter	Ugreen, CD333	Input: AC 100-240V, 50/60Hz, 4.2A Max. Output: USB-C1: DC 5V/9V/12V/15V, 3A, DC 20V/28V, 5A, 140W Max. USB-C2/C3: DC 5V/9V/12V/15V, 3A, DC 20V, 5A, 100W Max. USB-C4: DC 5V/9V/12V/15V, 3A / DC 20V, 2.25A, 45W Max. USB-A: DC 5V, 3A, DC 9V, 2A, DC 12V, 1.5A, DC 10V, 2.25A, 22.5W Max.
Adapter	EF ECOFLOW, EF-DC-320	Model: EF-DC-320 Input: AC 100-120V, 50/60Hz, 4A Input: AC 200-240V, 50/60Hz, 2.5A Output: USB-C1: DC 5V/9V/12V/15V, 3A, DC 20V/28V, 5A, 140W Max. USB-C2: DC 5V/9V/12V/15V, 3A, DC 20V/28V, 5A, UFCS 63W, 140W Max. USB-C3: DC 5V/9V/12V/15V, 3A, DC 20V, 3.25A, UFCS 63W, 65W Max. USB-C4: DC 5V/9V, 3A, DC 12V, 2.5A, DC 15V, 2A, DC 20V, 1.5A, UFCS 30W, 30W Max. USB-A: DC 5V, 3A, DC 9V, 2A, DC 12V, 1.5A, UFCS 30W, 30W Max. Pogopin Output: DC 10-32V, 320W Max.

Applicant: EcoFlow Inc.

Date of Test: 30 July 2025

Worst Case Model: EF-HB-140-X

4.0 Measurement Results

4.1 Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(3):

The antenna power of the EUT was connected to the input of a broadband peak RF power meter. The power meter has a video bandwidth that is greater than DTS bandwidth and utilize a fast-responding diode detector. Power was read directly at the EUT antenna terminals with cable loss added.

For antennas with a gain less than 6 dBi, the maximum transmitter output allowed is 30 dBm.

IEEE 802.11b (Antenna Gain = 3.18dBi) (CCK, 1Mbps)		
Frequency (MHz)	Output in dBm (Average Reading)	Output in mWatt
Low Channel: 2412	-2.28	0.5916
Middle Channel: 2437	-3.41	0.4560
High Channel: 2462	-3.34	0.4634

IEEE 802.11g (Antenna Gain = 3.18dBi) (16QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Average Reading)	Output in mWatt
Low Channel: 2412	-4.31	0.3707
Middle Channel: 2437	-4.61	0.3459
High Channel: 2462	-4.09	0.3899

IEEE 802.11n-HT20 (Antenna Gain = 3.18dBi) (64QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Average Reading)	Output in mWatt
Low Channel: 2412	0.83	1.2106
Middle Channel: 2437	-4.66	0.3420
High Channel: 2462	-4.97	0.3184

IEEE 802.11n-HT40 (Antenna Gain = 3.18dBi) (64QAM, 13.5Mbps)		
Frequency (MHz)	Output in dBm (Average Reading)	Output in mWatt
Low Channel: 2422	-6.23	0.2382
Middle Channel: 2437	-5.63	0.2735
High Channel: 2452	-5.75	0.2661

IEEE 802.11ax-VHT20 (Antenna Gain = 3.18dBi) (64QAM, 6Mbps)		
Frequency (MHz)	Output in dBm (Average Reading)	Output in mWatt
Low Channel: 2412	-4.71	0.3381
Middle Channel: 2437	-4.74	0.3357
High Channel: 2462	-5.50	0.2818

Cable loss: 1.5 dB External Attenuation: 0 dB

Cable loss, external attenuation has been included in OFFSET function

EUT max. output level = 0.83dBm

EUT max. E.I.R.P = 0.83dBm + 3.18dBi = 4.01dBm =2.5177mW

For RF Exposure, the information is saved with filename: RF exposure.pdf.

Applicant: EcoFlow Inc.

Date of Test: 30 July 2025

Worst Case Model: EF-HB-140-X

4.2 Minimum 6 dB RF Bandwidth, FCC Rule 15.247(a) (2):

The antenna port of the EUT was connected to the input of a spectrum analyzer. Analyzer RES BW was set to 100 KHz according to FCC KDB 558074 D01 v05r02. For each RF output channel investigated, the spectrum analyzer center frequency was set to the channel carrier. A PEAK output reading was taken, a DISPLAY line was drawn 6 dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

Limit: The 6 dB Bandwidth is at least 500 kHz.

IEEE 802.11b (CCK, 1Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	9.060
2437	9.060
2462	9.042

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	16.335
2437	16.539
2462	16.305

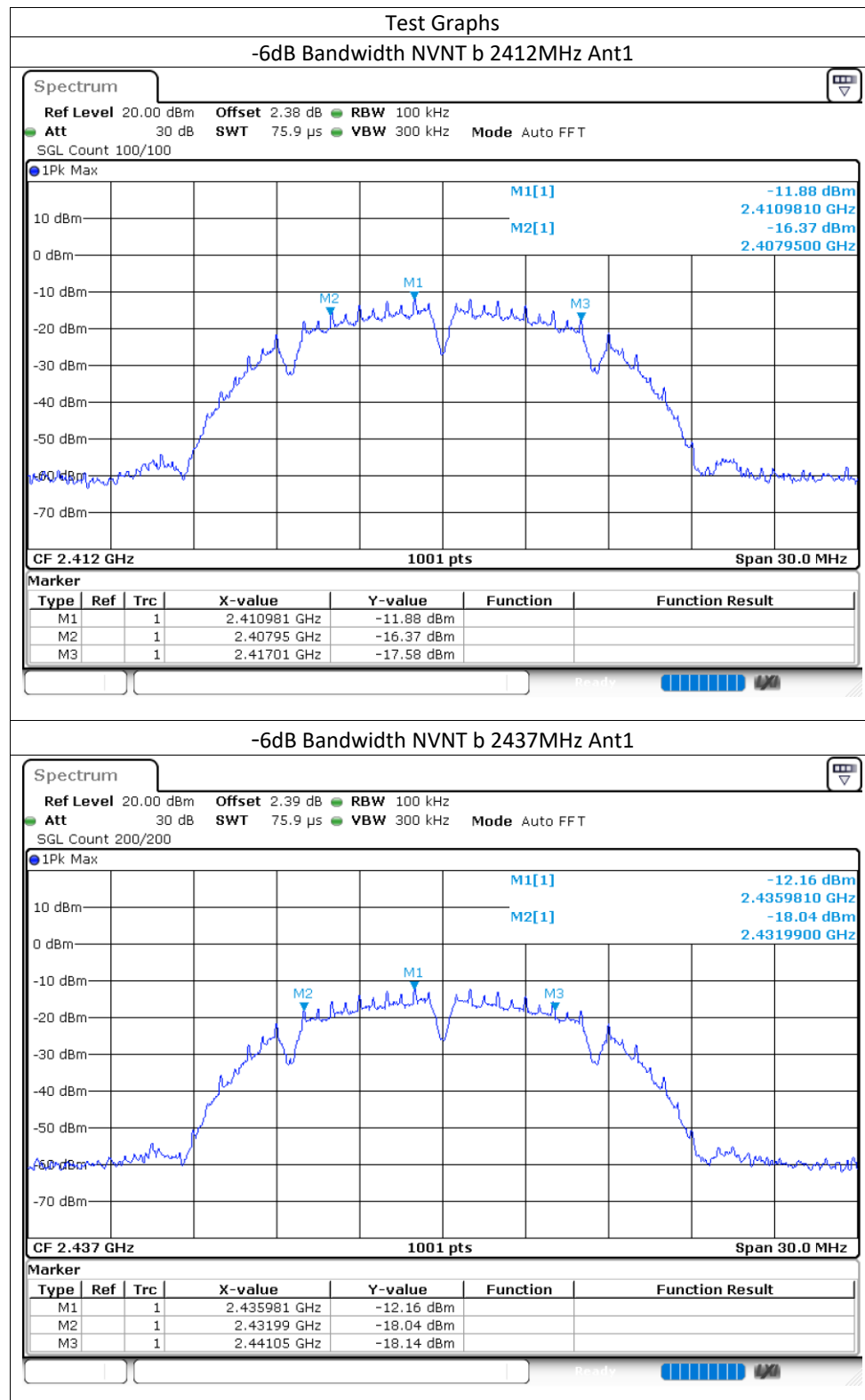
IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	17.523
2437	17.697
2462	17.538

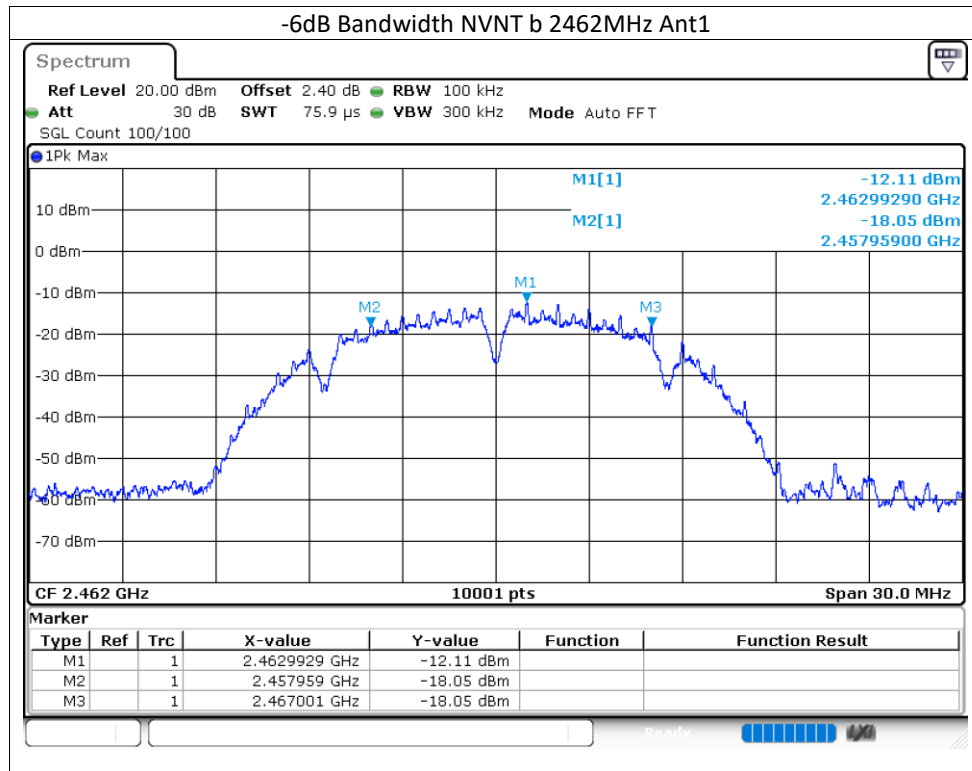
IEEE 802.11n-HT40 (64QAM, 13.5Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2422	35.058
2437	33.846
2452	35.100

IEEE 802.11ax-VHT20 (64QAM, 6Mbps)	
Frequency (MHz)	6 dB Bandwidth (MHz)
2412	18.897
2437	18.939
2462	19.059

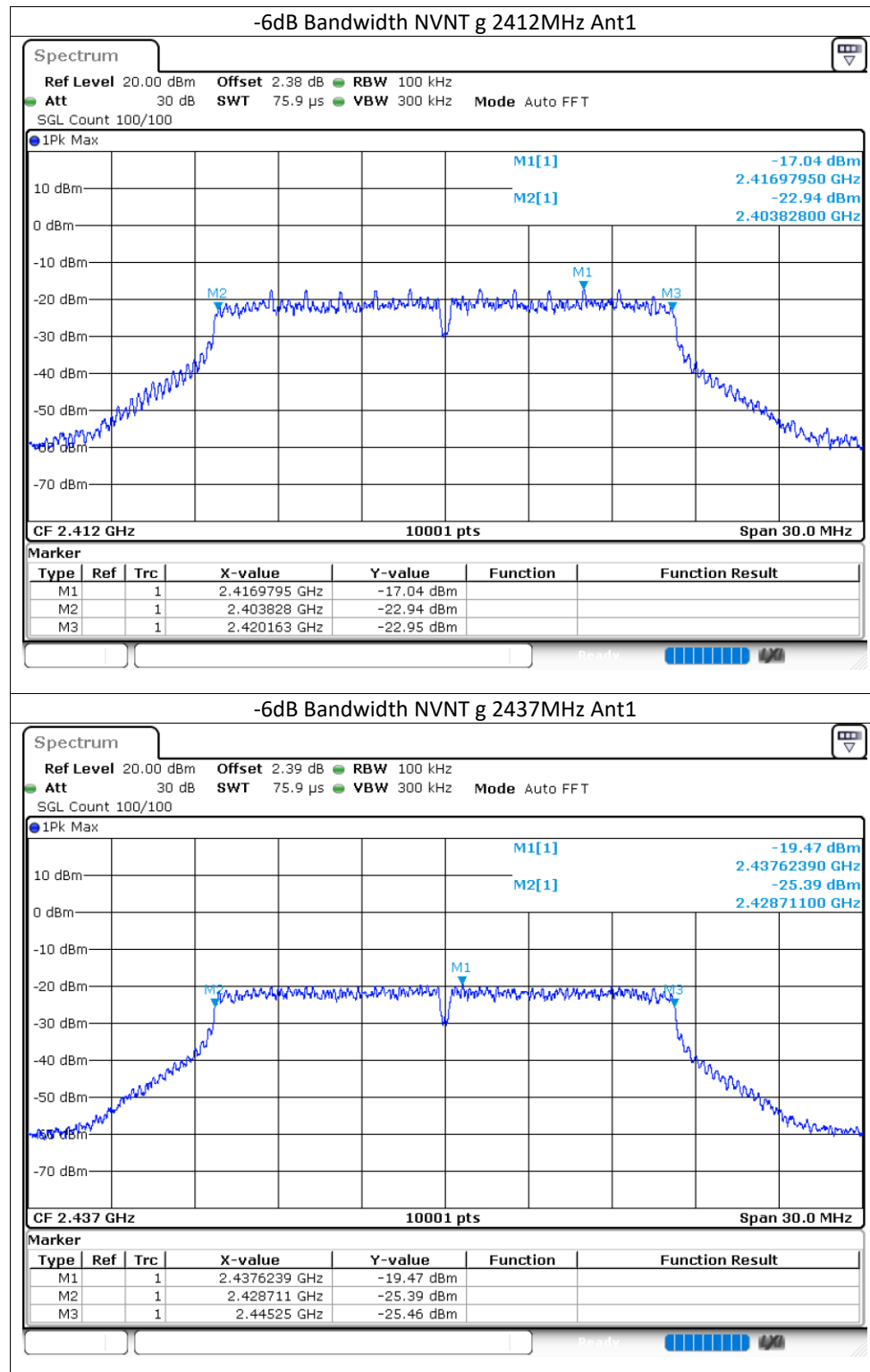
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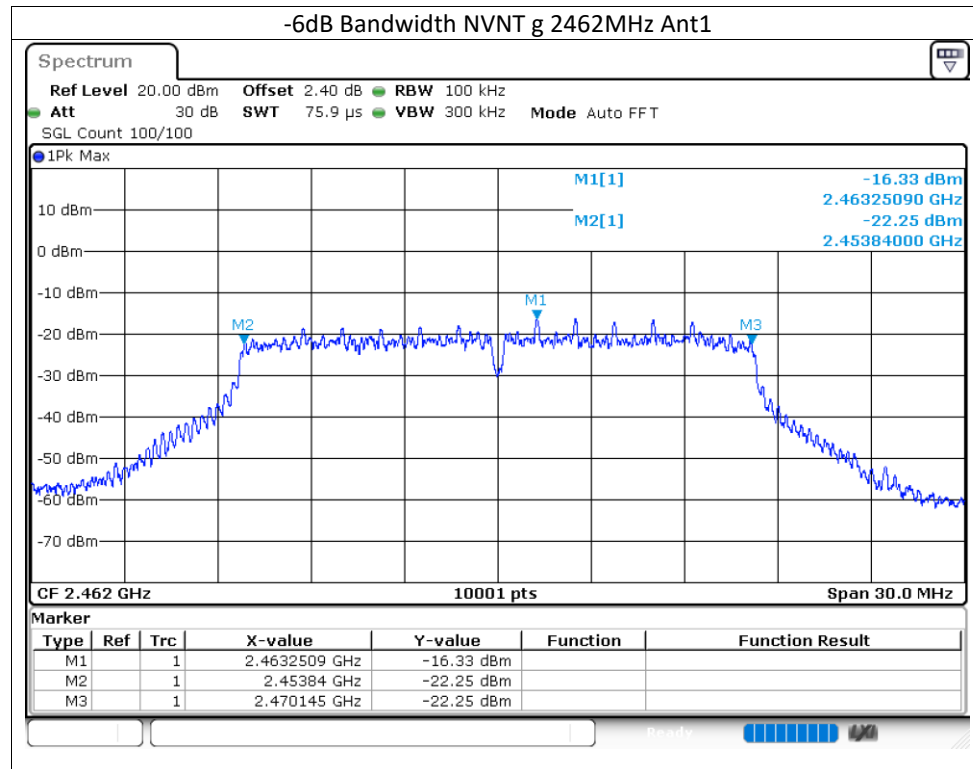
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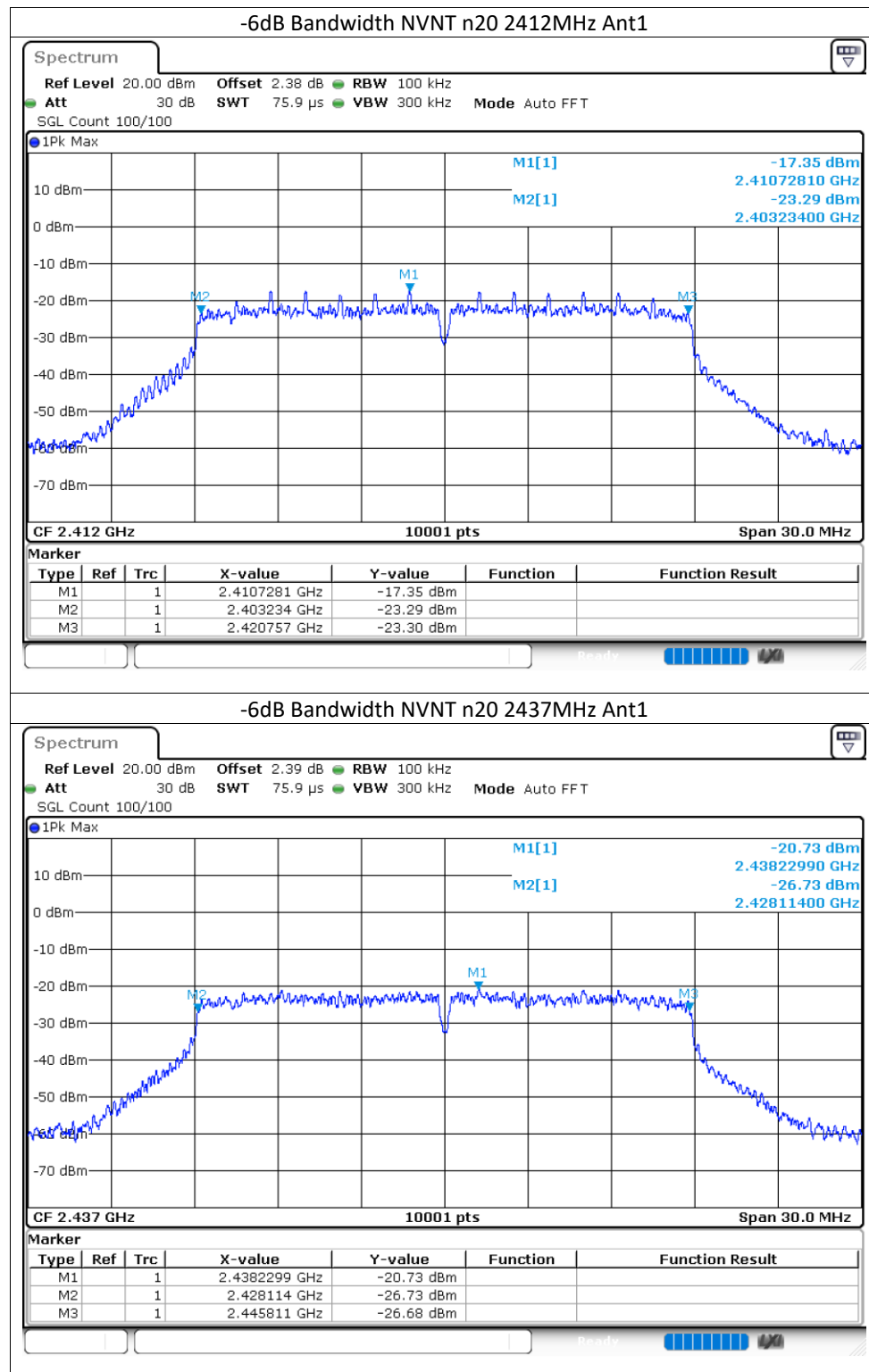


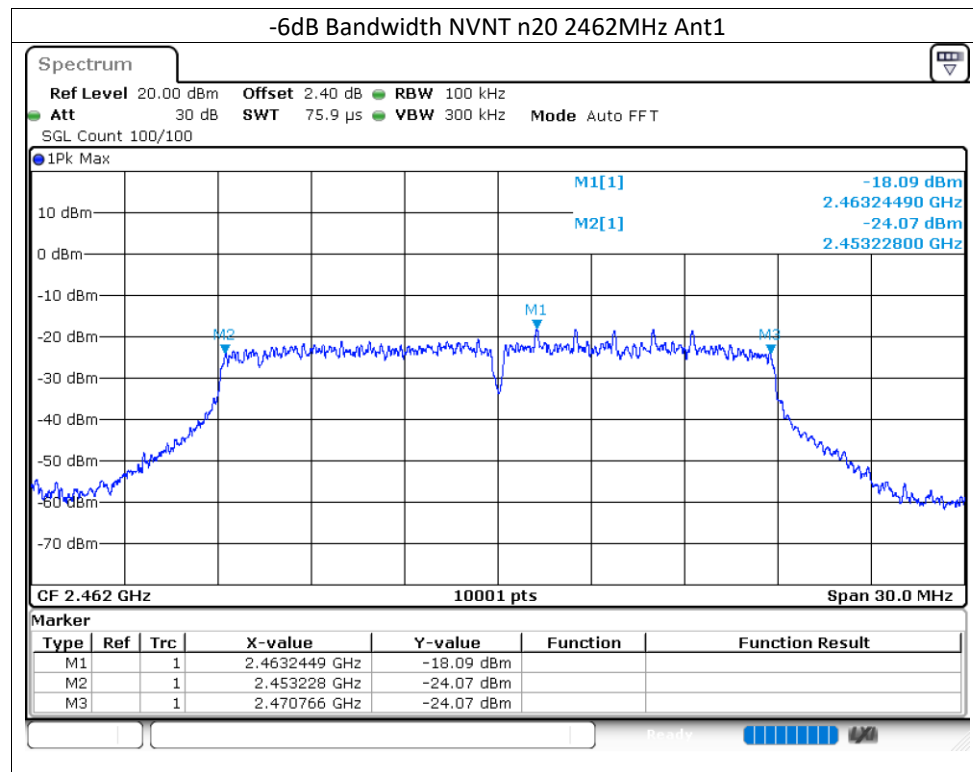
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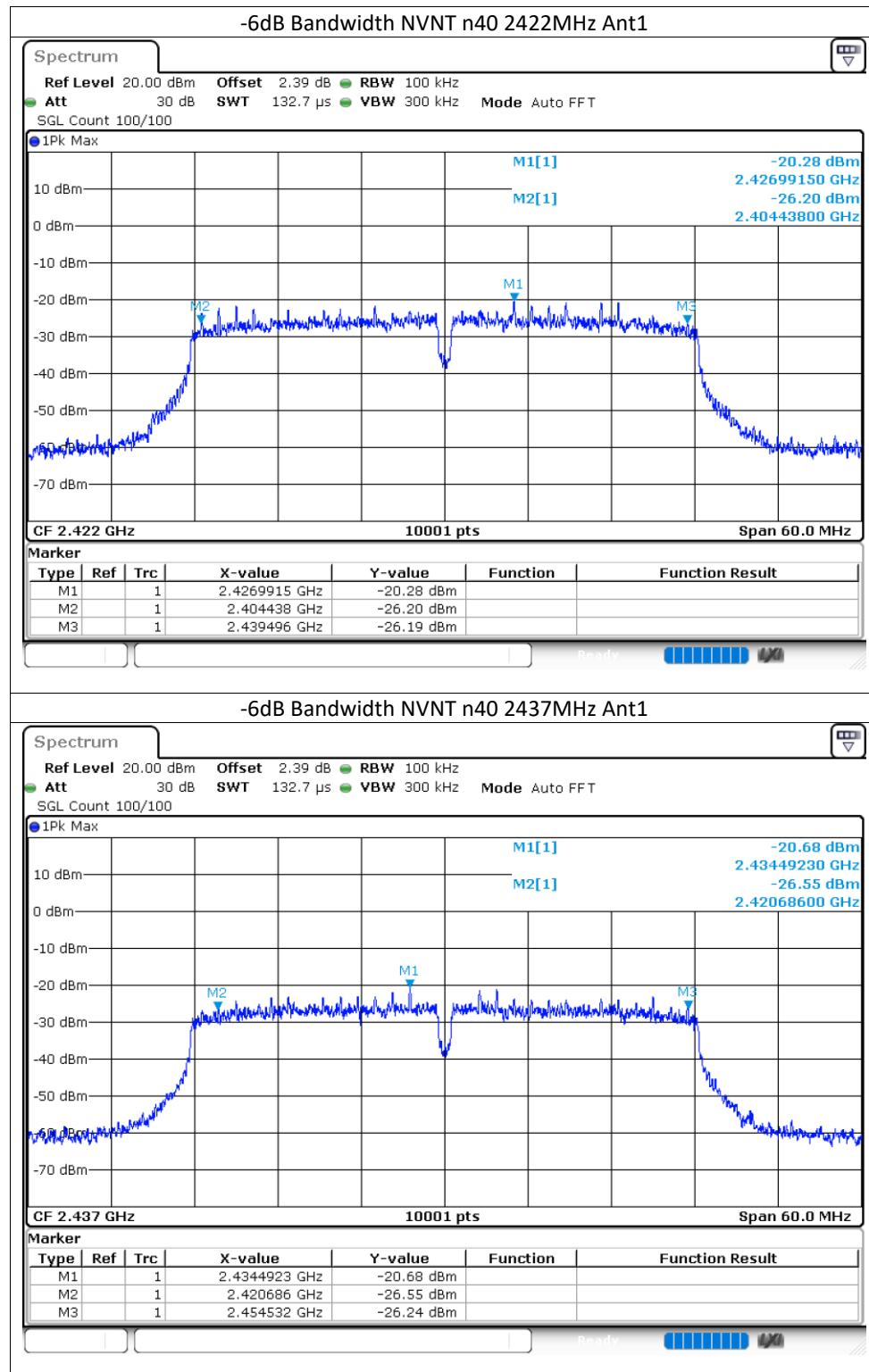


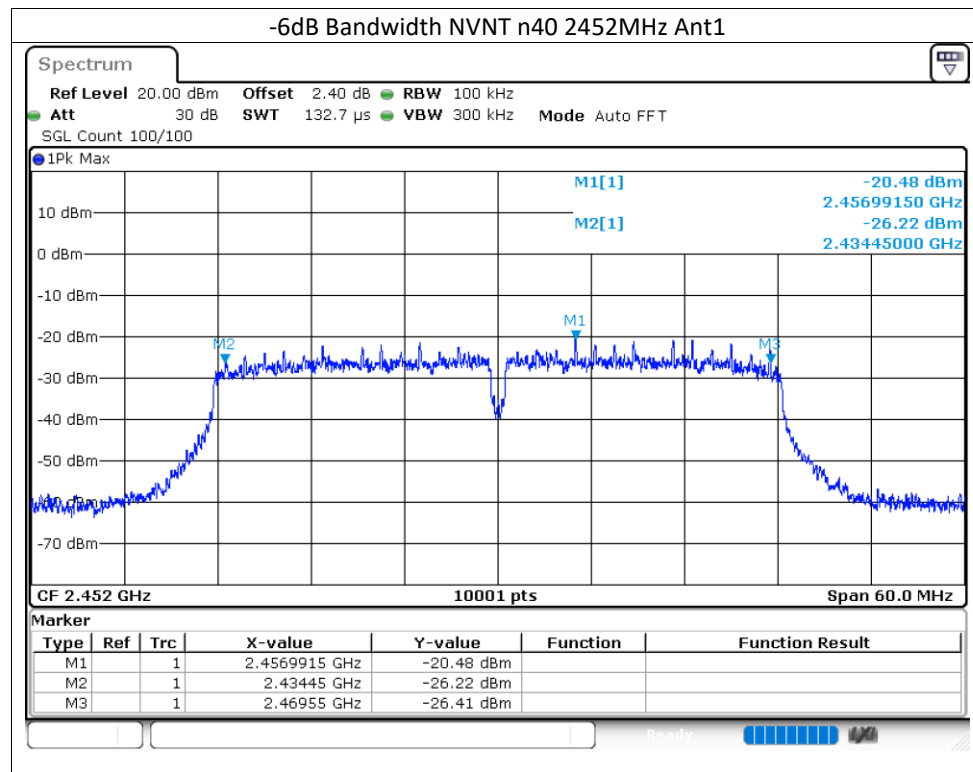
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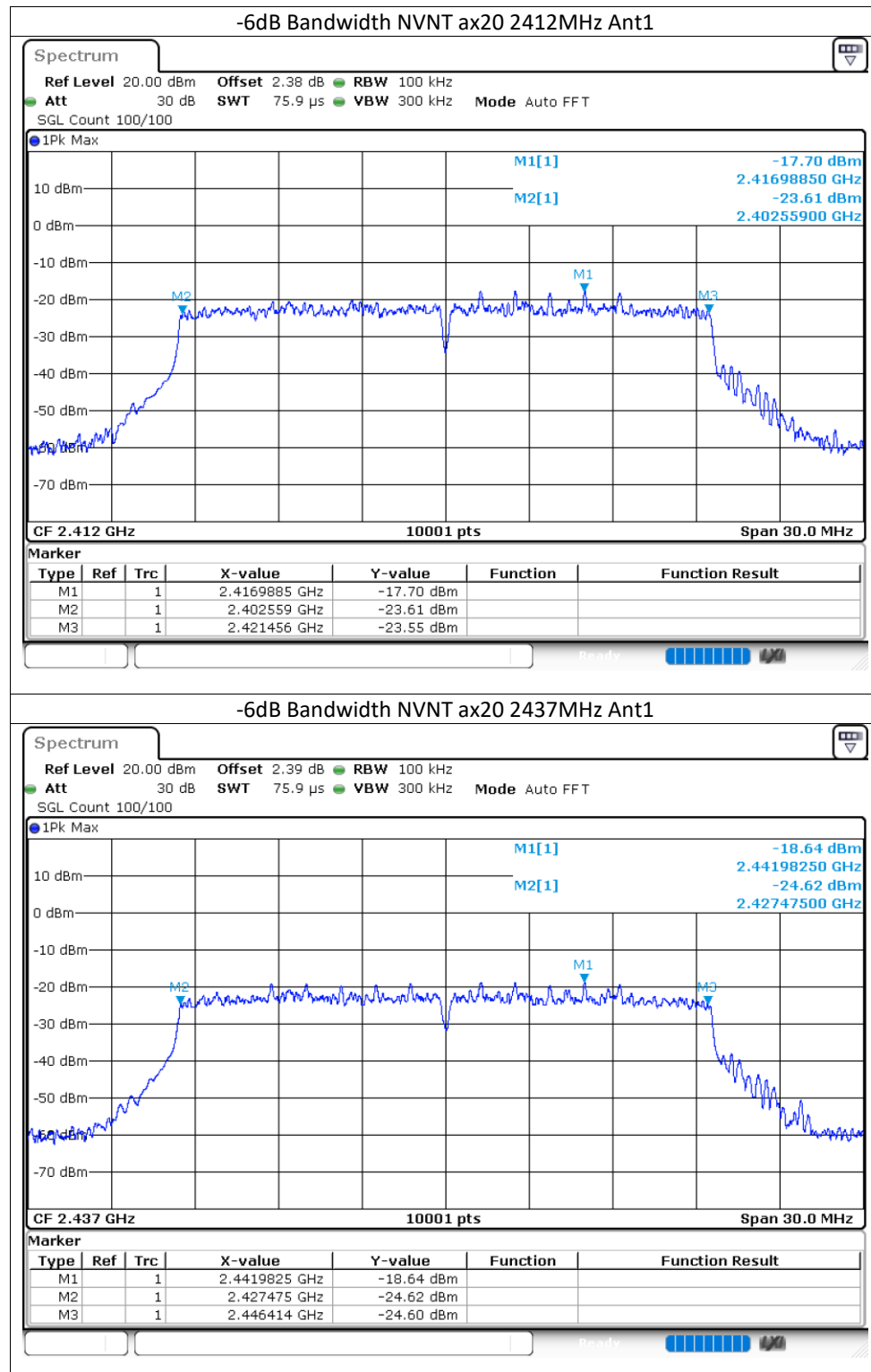


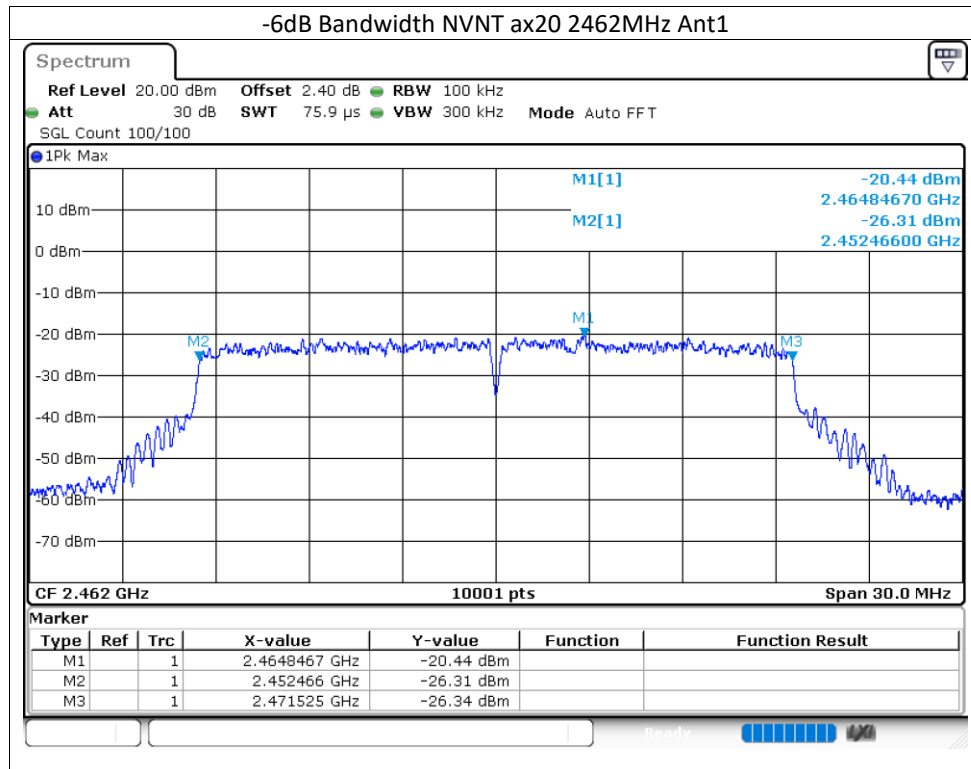
802.11n-HT40





802.11ax-VHT20





Applicant: EcoFlow Inc.
Date of Test: 30 July 2025

Worst Case Model: EF-HB-140-X

4.3 Maximum Power Density Reading, FCC Rule 15.247(e):

The Measurement Procedure AVPSD was set according to the FCC KDB 558074 D01 v05r02.

Antenna output of the EUT was coupled directly to spectrum analyzer; if an external attenuator and/or cable was used, these losses are compensated for with the analyzer OFFSET function.

Limit: The Power Density does not exceed 8dBm/3 kHz.

IEEE 802.11b (CCK, 1Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	-26.33
2437	-25.60
2462	-25.85

IEEE 802.11g (16QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	-26.38
2437	-25.95
2462	-25.98

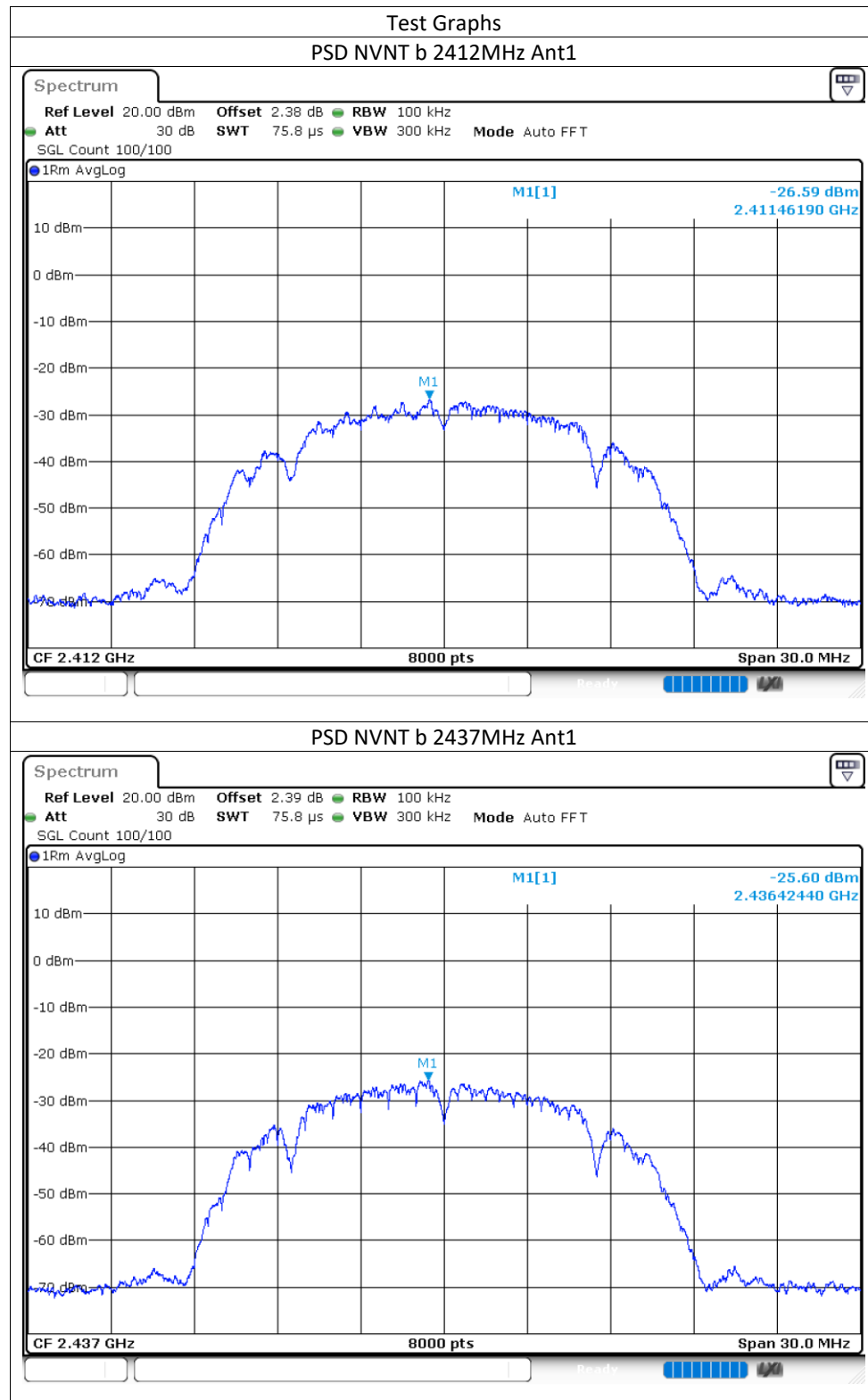
IEEE 802.11n-HT20 (64QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	-20.48
2437	-27.73
2462	-27.82

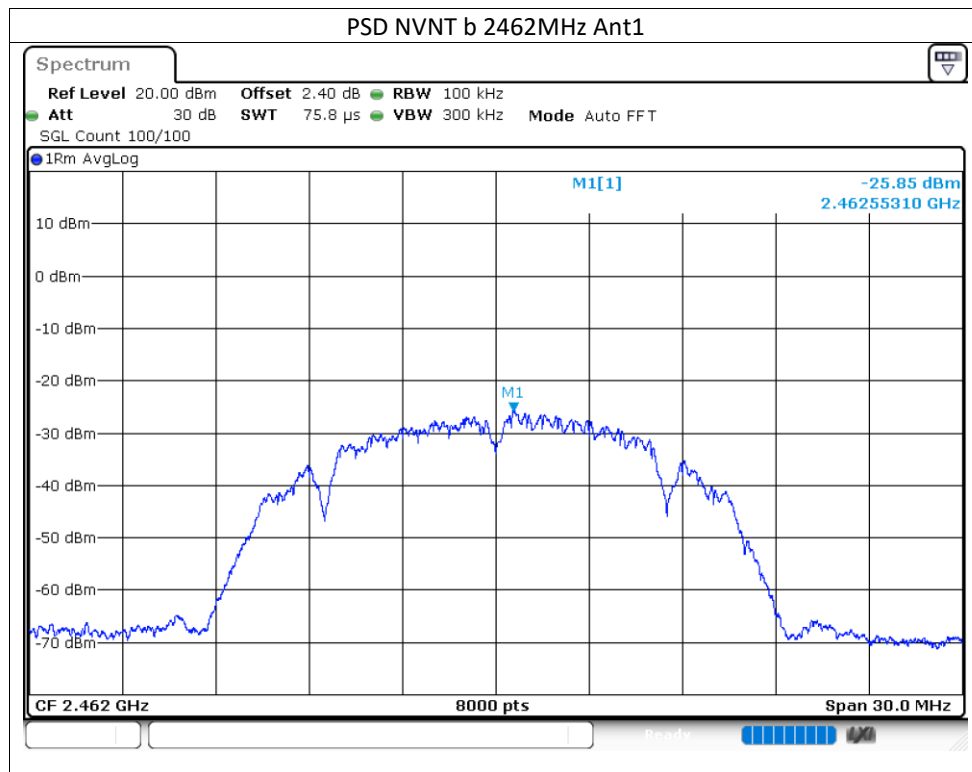
IEEE 802.11n-HT40 (64QAM, 13.5Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2422	-29.79
2437	-31.15
2452	-30.05

IEEE 802.11ax-VHT20 (64QAM, 6Mbps)	
Frequency (MHz)	Power Density with RBW 100KHz
2412	-29.01
2437	-29.07
2462	-29.67

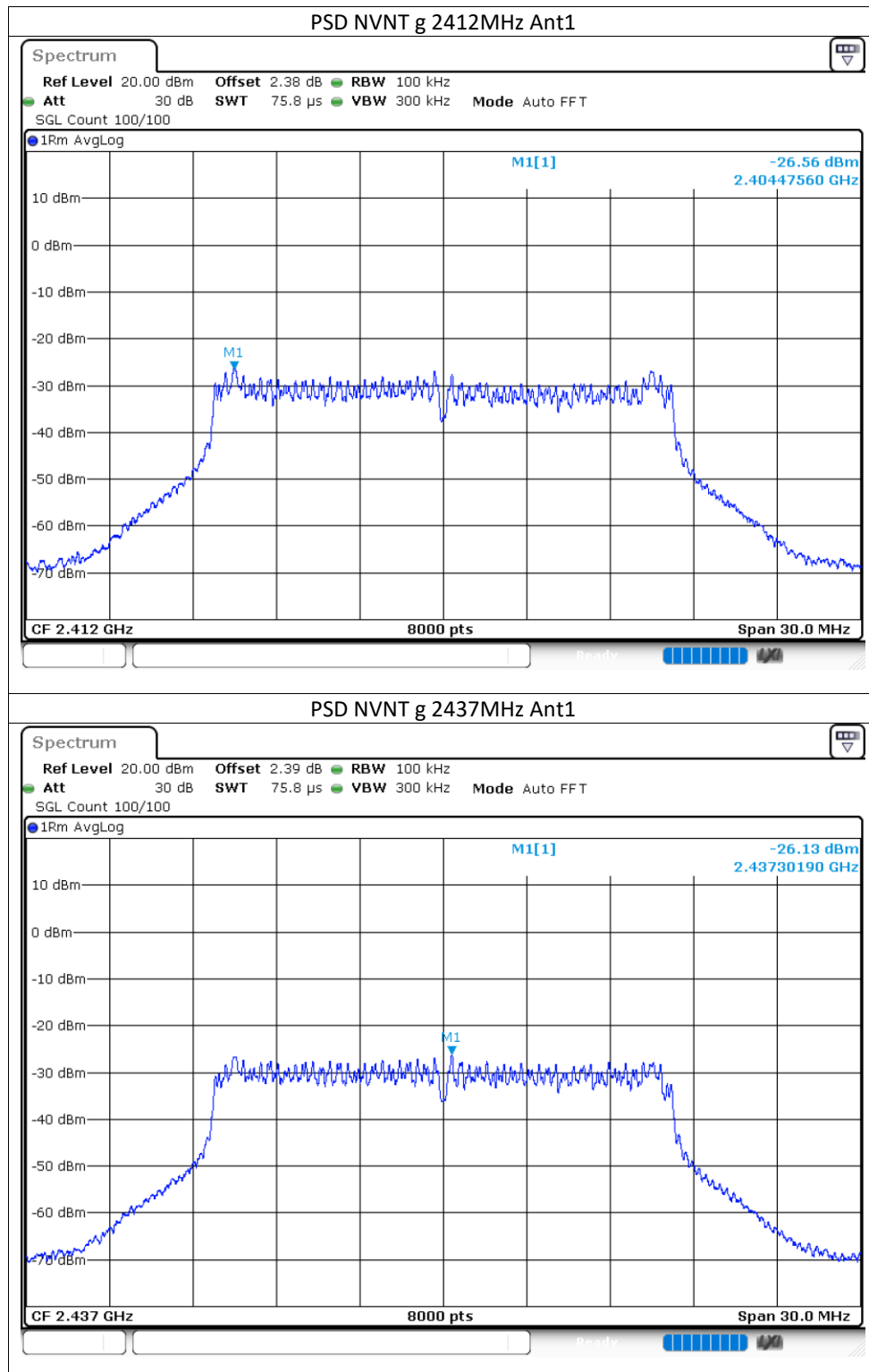
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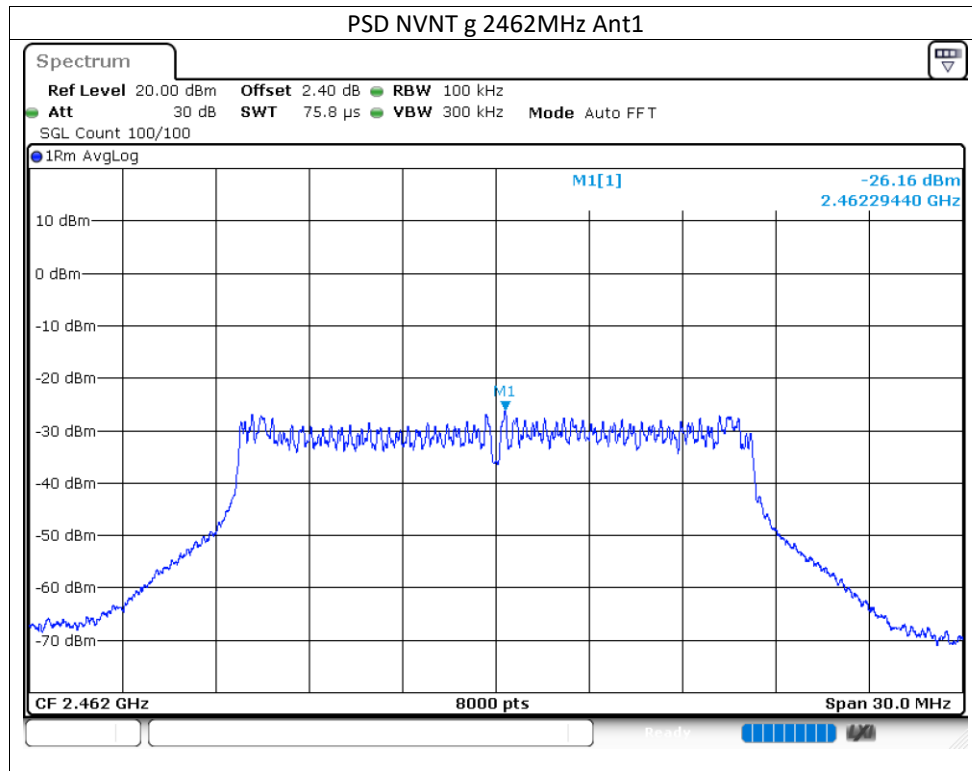
802.11b



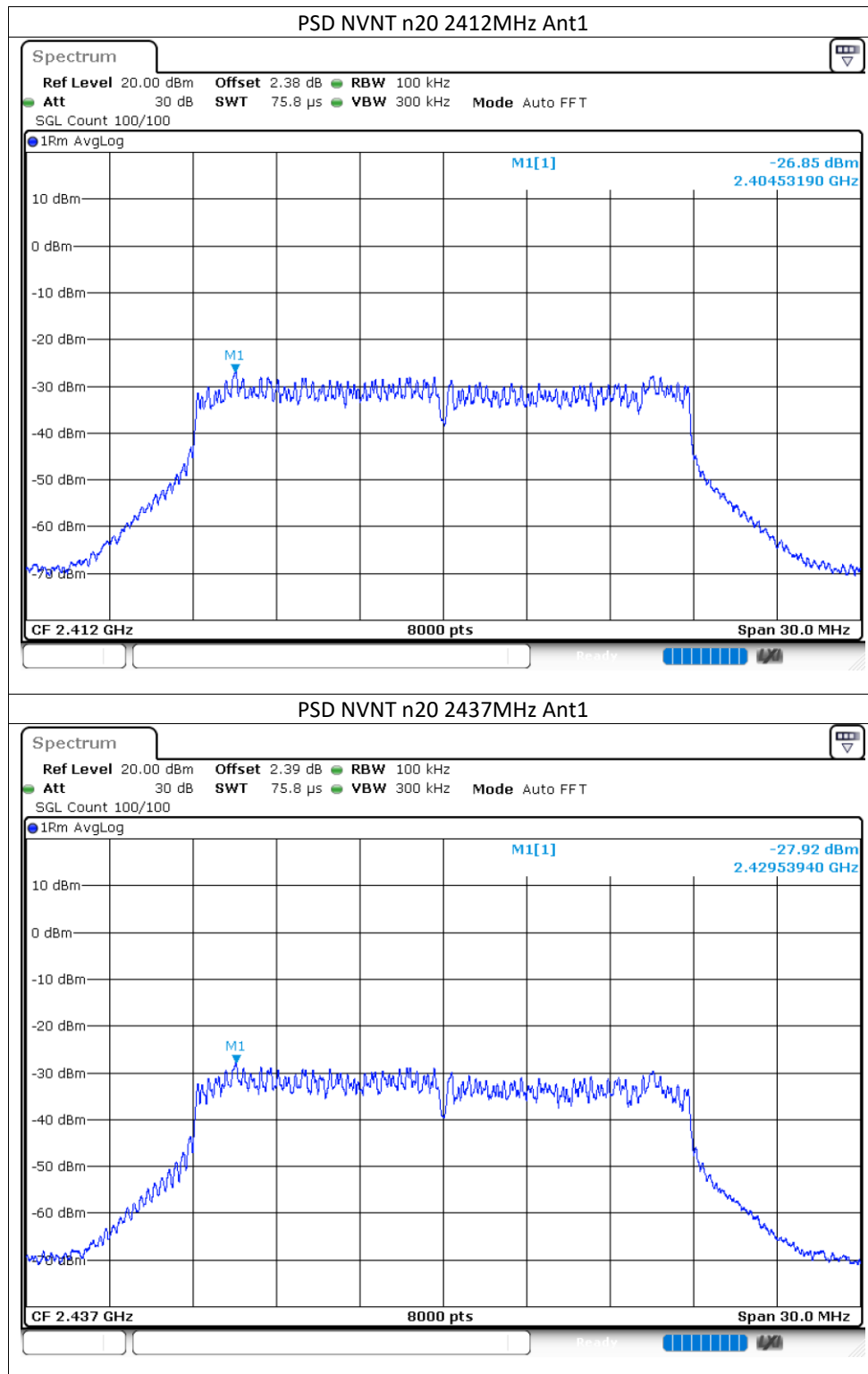


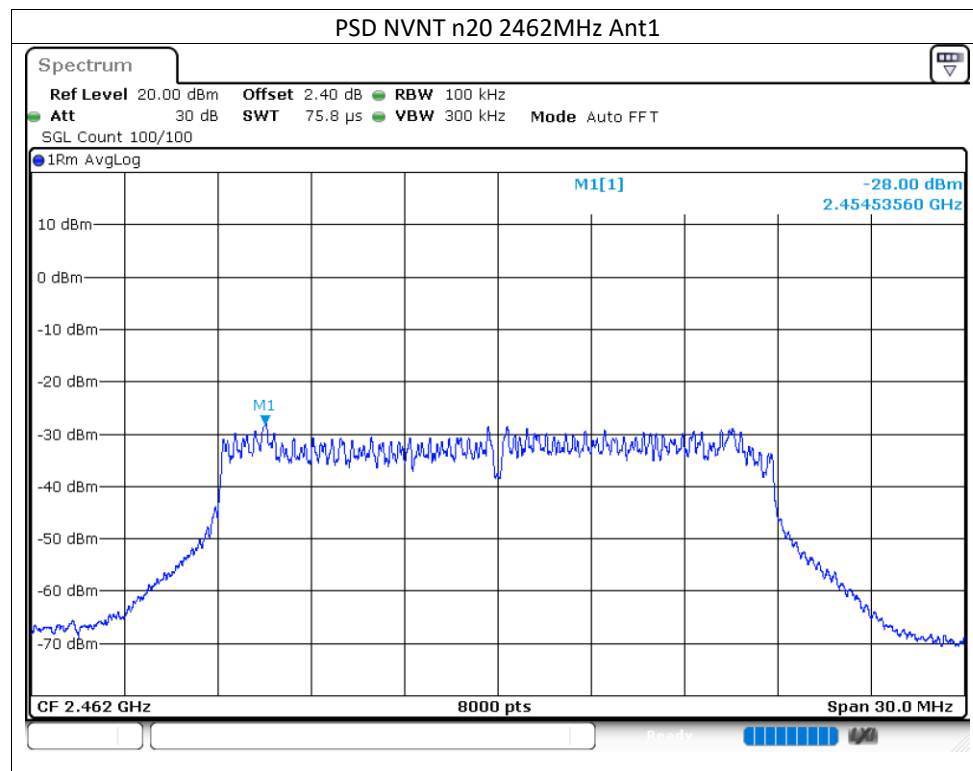
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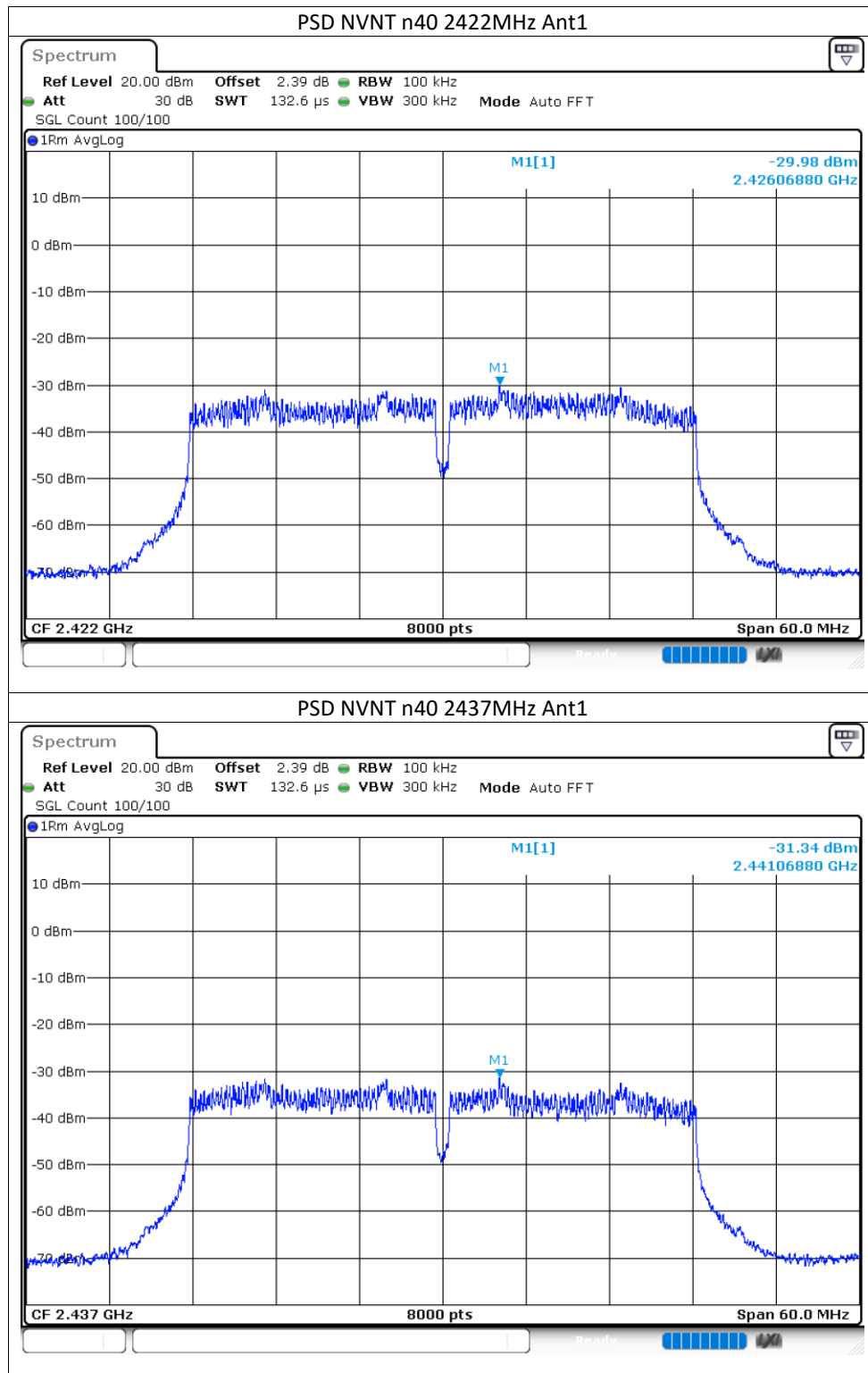


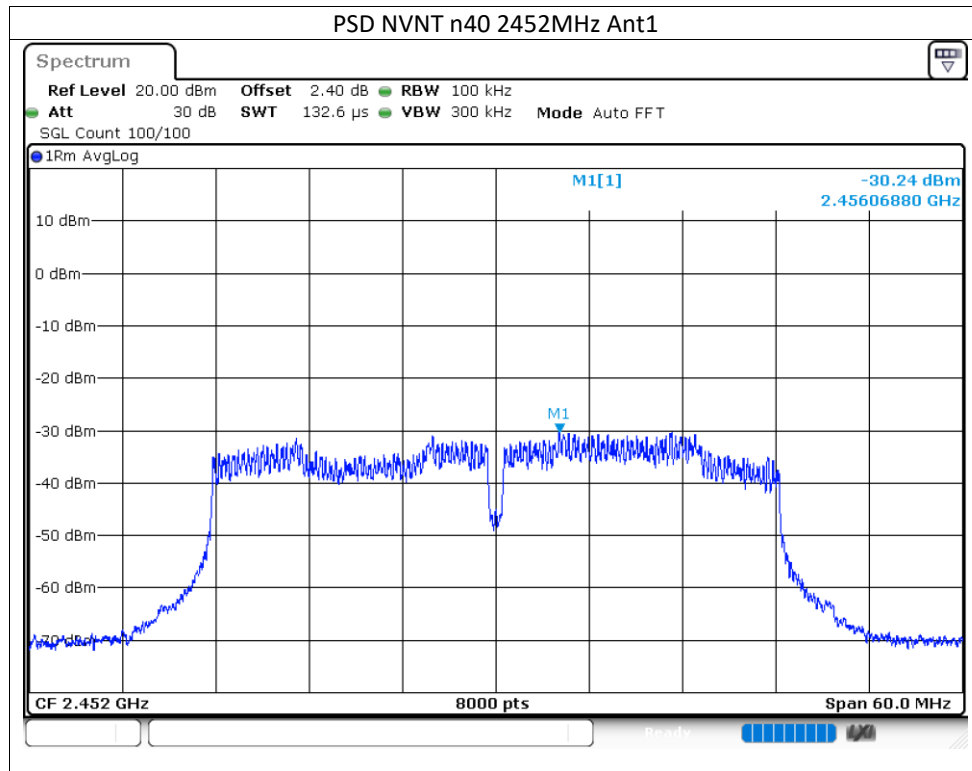
802.11n-HT20



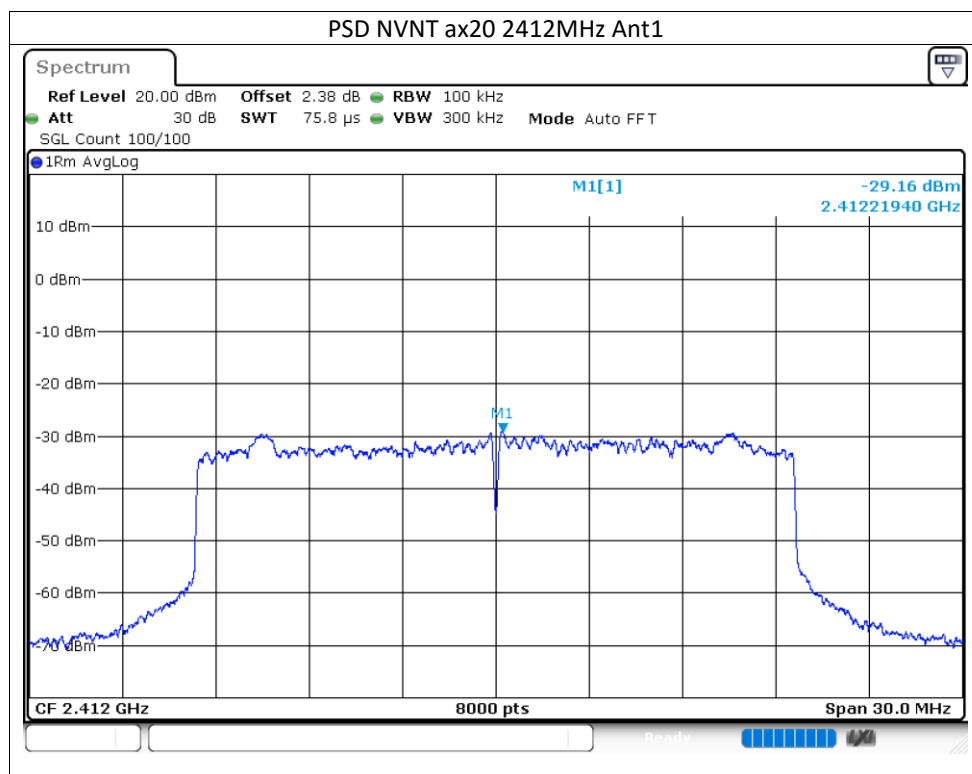


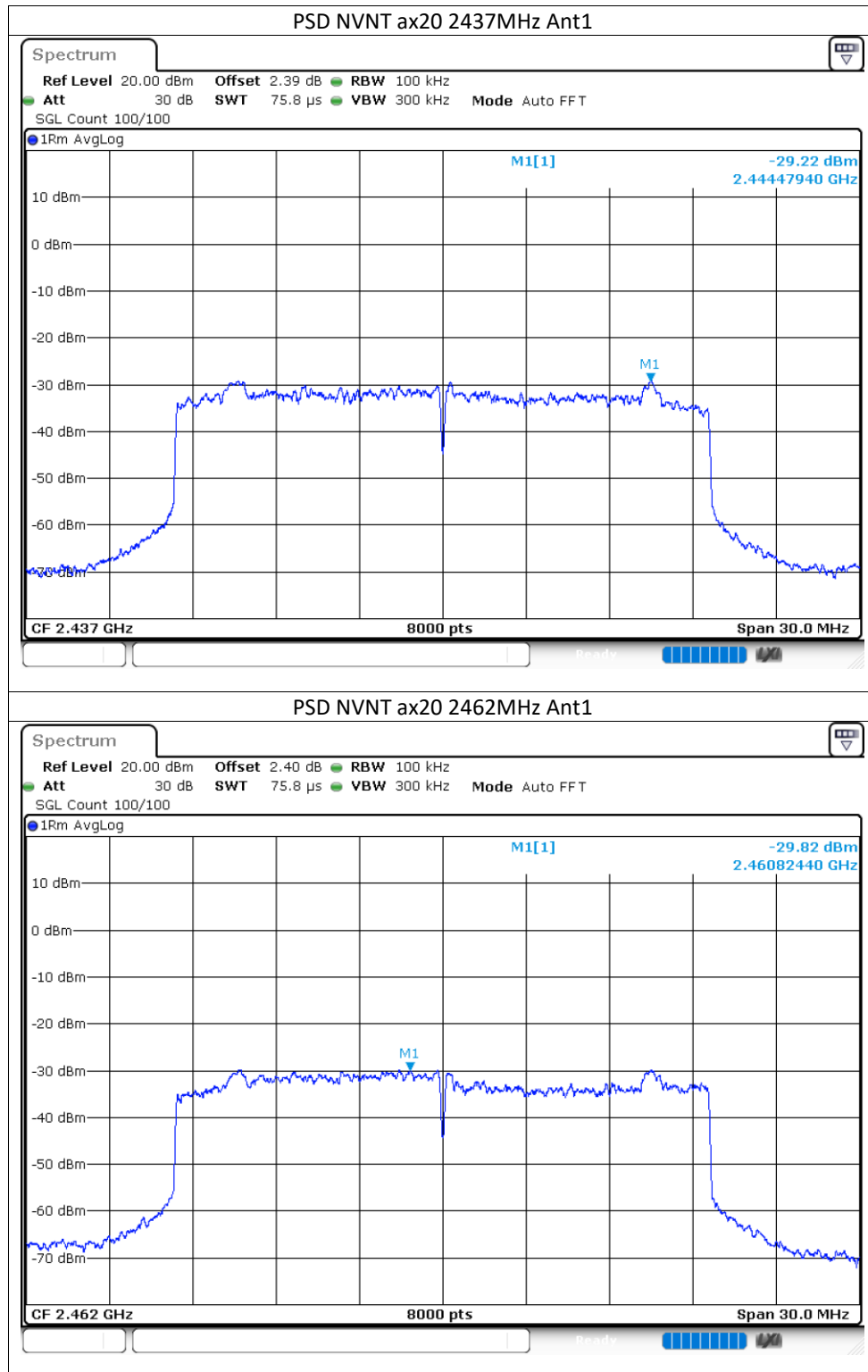
802.11n-HT40





802.11ax-VHT20





Applicant: EcoFlow Inc.

Date of Test: 30 July 2025

Worst Case Model: EF-HB-140-X

4.4 Out of Band Conducted Emissions, FCC Rule 15.247(d)

In any 100kHz 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 20dB below that in the 100kHz 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 30dB instead of 20dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a).

All other types of emissions from the EUT shall meet the general limits for radiated frequencies outside the passband.

Refer to the attached test plots for out of band conducted emissions data with rate of 1Mbps for 802.11b and 6Mbps for 802.11g and 6Mbps for 802.11n-HT20 and 13.5Mbps for 802.11n-HT40.

The test plots showed all spurious emission up to the tenth harmonic were measured and they were found to be at least 30 dB below the highest level of the desired power in the passband.

The test plots are attached as below.

