



REPORT No.: SZ24060210W08

TEST REPORT

APPLICANT : Sonim Technologies, Inc.

PRODUCT NAME : Mobile Hotspot

MODEL NAME : H500V

BRAND NAME : Sonim

FCC ID : WYPH500V

STANDARD(S) : 47 CFR Part 2
47 CFR Part 30, Subpart C

RECEIPT DATE : 2024-06-26

TEST DATE : 2024-06-27 to 2024-07-08

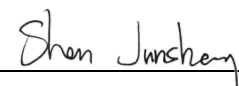
ISSUE DATE : 2024-09-20



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DIRECTORY

1. Technical Information	3
1.1. Applicant and Manufacturer Information	3
1.2. Equipment Under Test (EUT) Description	3
1.3. Maximum EIRP and Emission Designator	5
1.4. Test Standards and Results	6
1.5. Environmental Conditions	7
1.6. Minimum Measurement Distance for Final Radiated Measurements	7
1.7. Calculations of Measurement Result	7
1.8. Radiated Test Items	8
2. 47 CFR Part 2, Part 30 Requirements	10
2.1. Equivalent Isotropic Radiated Power	10
2.2. Occupied Bandwidth	15
2.3 Frequency Stability	103
2.4 Radiated Spurious Emissions	105
2.5 Band Edge Emissions	146
Annex A Antenna Gain	163
Annex B Test Uncertainty	165
Annex C Testing Laboratory Information	166
Annex D Test Equipment Utilized	167

Change History		
Version	Date	Reason for change
1.0	2024-09-20	First edition



1. Technical Information

Note: Provide by applicant.

1.1. Applicant and Manufacturer Information

Applicant:	Sonim Technologies, Inc.
Applicant Address:	4445 Eastgate Mall, Suite 200, San Diego, CA 92121, USA
Manufacturer:	Sonim Technologies, Inc.
Manufacturer Address:	4445 Eastgate Mall, Suite 200, San Diego, CA 92121, USA

1.2. Equipment Under Test (EUT) Description

Product Name:	Mobile Hotspot	
EUT Serial No:	5#	
Hardware Version:	V2.0	
Software Version:	H50.0-03-5.4.0-15.32.00	
Operation Band:	n260, n261	
Subcarrier Spacing (SCS):	120 kHz	
Modulation Type:	DFT-s-OFDM	BPSK, QPSK, 16QAM, 64QAM
	CP-OFDM	QPSK, 16QAM, 64QAM
Frequency Range:	n260	Tx: 37 GHz – 40 GHz
		Rx: 37 GHz – 40 GHz
	n261	Tx: 27.50 GHz - 28.35 GHz
		Rx: 27.50 GHz - 28.35 GHz
Channel Bandwidth:	n260	50 MHz, 100 MHz
	n261	50 MHz, 100 MHz
Antenna Type:	Patch Antenna	
Accessory Information:	AC Adapter	
	Brand Name:	N/A
	Model No.:	1-CHUSQ302-097
	Serial No.:	N/A
	Rated Input:	100~240V~50/60Hz; 0.5A
	Rated Output:	5.0V=3.0A; 9.0V=2.0A; 12.0V=1.5A;
	Manufacturer 1:	HUIZHOU PUAN ELECTRONICS CO.,LTD
	Battery	
	Brand Name:	sonim
	Model No.:	BAT-06000-01S
	Serial No.:	N/A



REPORT No.: SZ24060210W08

	Capacity:	6000mAh
	Rated Voltage:	3.85V
	Charge Limit:	4.40V
	Manufacturer:	Guangdong Fenghua New Energy Co.,Ltd.

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.



1.3. Maximum EIRP and Emission Designator

Band	Maximum EIRP (dBm)	Maximum EIRP (W)
n260	33.51	2.244
n261	31.15	1.303

n260	Emission Designator (99%OBW)				
BW(MHz)	Modulation	Pi/2 BPSK	QPSK	16QAM	64QAM
50	DFT-s-OFDM	46M0G7D	46M0G7D	46M0W7D	46M0W7D
	CP-OFDM	/	46M0G7D	46M1W7D	45M9W7D
100	DFT-s-OFDM	95M2G7D	93M4G7D	93M4W7D	92M3W7D
	CP-OFDM	/	96M7G7D	94M8W7D	94M9W7D

n261	Emission Designator (99%OBW)				
BW(MHz)	Modulation	Pi/2 BPSK	QPSK	16QAM	64QAM
50	DFT-s-OFDM	46M5G7D	46M1G7D	46M0W7D	46M1W7D
	CP-OFDM	/	46M0G7D	45M9W7D	46M1W7D
100	DFT-s-OFDM	91M6G7D	91M8G7D	91M8W7D	91M4W7D
	CP-OFDM	/	94M6G7D	94M5W7D	94M5W7D

1.4. Test Standards and Results

The objective of the report is to perform testing according to Part 2, Part 30 for the EUT FCC ID Certification:

No	Identity	Document Title
1	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
2	47 CFR Part 30	Upper Microwave Flexible Use Service
3	ANSI C63.26-2015	American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services
4	KDB 842590 D01	Upper Microwave Flexible Use Service v01r02
5	KDB 971168 D01	Power Meas License Digital Systems v03r01

Test detailed items/section required by FCC rules and results are as below:

Section	Description	Test Engineer	Result	Method Determination /Remark
2.1046 30.202	EIRP Measurement	Liu Yuanxin	PASS	No deviation
2.1049	Occupied Bandwidth	Liu Yuanxin	PASS	No deviation
2.1055	Frequency Stability	Liu Yuanxin	PASS	No deviation
2.1053 30.203	Radiated Spurious Emissions	Gao Jianrou	PASS	No deviation
2.1053 30.203	Band Edge Emissions	Gao Jianrou	PASS	No deviation

Note 1: The tests were performed according to the method of measurements prescribed in ANSI C63.26-2015 and KDB 842590 D01.

Note 2: All modes of operation and modulation modes were assessed. The test results shown in the following sections represent the worst-case emissions.

Note 3: Beam ID was selected according to the maximum EIRP in the EIRP simulation.

Note 4: The DFT-s-OFDM and CP-OFDM transmission schemes were evaluated for each test type, and only the worst-case data were included.

Note 5: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.

Note 6: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

1.5. Environmental Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (°C):	15 - 35
Relative Humidity (%):	30 - 60
Atmospheric Pressure (kPa):	86 - 106

1.6. Minimum Measurement Distance for Final Radiated Measurements

All measurements of the fundamental emission, out of band, harmonics and spurious emissions shall be made in the far field of the measurement antenna. The far-field boundary for mmWave antennas is greater than or equal to $2D^2/\lambda$ (with D being the largest dimension of the antenna, and λ the wavelength of the emission). When the selected far-field measurement distance is different than the distance at which the applicable limit is specified, a linear inverse distance attenuation factor (20 dB/decade of distance change for field strength) shall be applied.

For fundamental and out-of-band emissions the largest far-field distance of either the EUT antenna or measurement antenna shall be used. For spurious emissions the far-field distance is based only on the measurement antenna.

Frequency Range (GHz)	Wavelength (m)	Far Field Distance (m)	Measurement Distance (m)
18-40	0.0075	2.46	3
40-60	0.0050	0.588	1.5
60-90	0.0033	0.335	1.5
90-140	0.0021	0.685	1.5
140-200	0.0015	0.174	1.5

1.7. Calculations of Measurement Result

According to KDB 842590 D01 Upper Microwave Flexible Use Service.

EIRP Calculation:

EIRP (dBm) = Spectrum Analyzer Level(dBm) - Antenna Gain (dBi) + Converter Loss(dB) + Space Loss(dB) + Cable Loss(dB)

Radiated Spurious Emissions Calculation:

RSE EIRP (dBm) = Spectrum Analyzer Level(dBm) - Pre-amplifier Gain(dB) - Antenna Gain (dBi) + Converter Loss(dB) + Space Loss(dB) + Cable Loss(dB)

Note: For below 40GHz, since the test does not require the use of a mixer, so the test results do not require the calculation of Converter Loss.

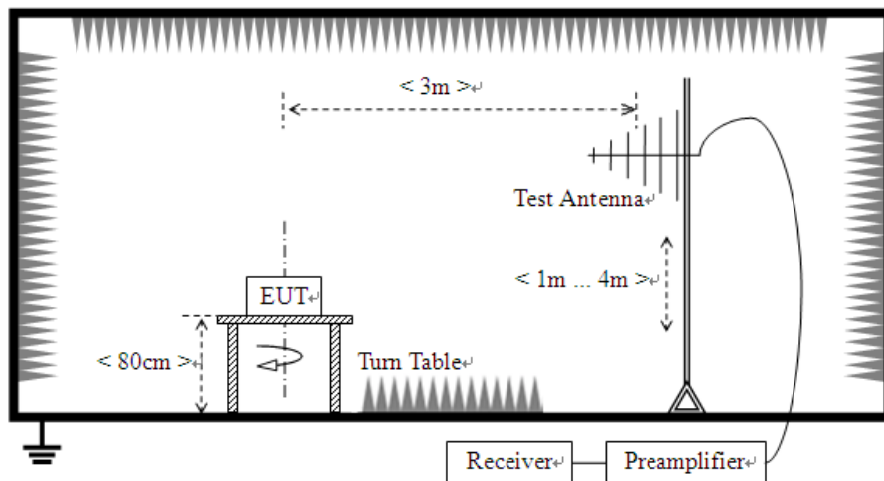
Radiated Spurious Emissions Calculation:

RSE EIRP (dBm) = Spectrum Analyzer Level(dBm) - Antenna Gain (dBi) + Converter Loss(dB) + Space Loss(dB) + Cable Loss(dB)

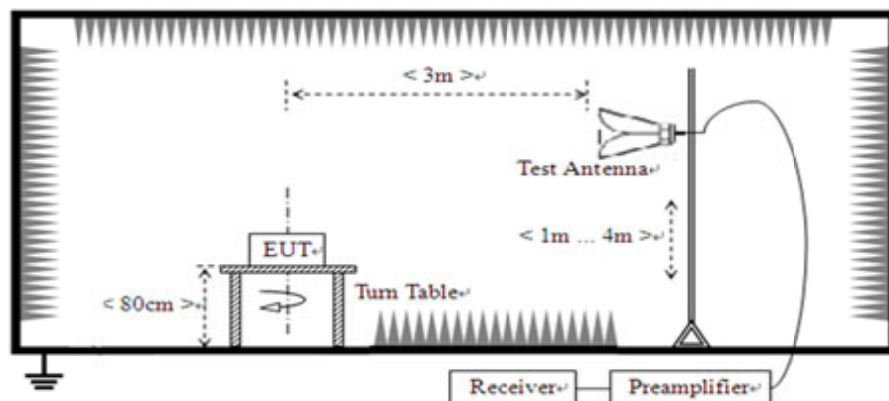
Note: The test results in the screenshot already includes this offset.

1.8. Radiated Test Items

The EUT is located in a 3m Full-Anechoic Chamber, the cable loss, air loss and so on of the site as factors are pre-calibrated using the "Substitution" method, and calculated to correct the reading. In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (1GHz to 40GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is varied from 1m to 4m above the ground and the Turn Table is actuated to turn from 0° to 360° to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of Notch Filters and High Pass Filter.



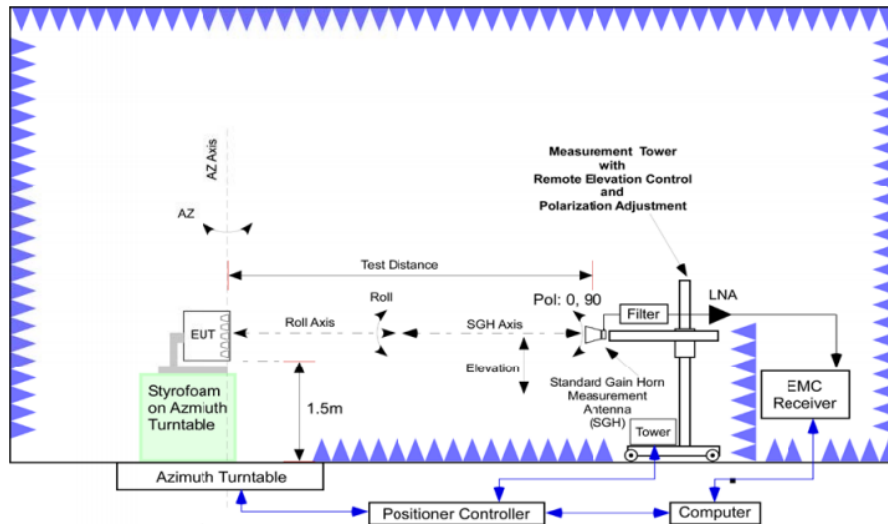
(For the test frequency from 30MHz to 1GHz)



(For the test frequency from 1GHz to 40GHz)

Test Antenna is 1.5m away from the EUT. Test Antenna height is varied from 1m to 2.5m above the

ground and the Turn Table is actuated to turn from 0° to 360° to determine the maximum value of the radiated power. The emission levels at both horizontal and vertical polarizations should be tested. The Filters consists of reject filter. The LNA can be used to increase the dynamic range for the measurement receiver.



(For the test frequency from 40GHz to 220GHz)

Note: When doing measurements above 1GHz, the EUT has been within the 3dB cone width of the horn antenna.

2. 47 CFR Part 2, Part 30 Requirements

2.1. Equivalent Isotropic Radiated Power

2.1.1. Requirement

According to FCC section 2.1046(a), for mobile stations, the average power of the sum of all antenna is limited to a maximum EIRP of +43 dBm.

2.1.2. Test procedure

ANSI C63.26-2015 - Section 5.2.4.4.1

KDB 842590 D01 v01r02 Section 4.2

2.1.3. Test Settings

1. Set the EUT power to the maximum
2. Enter the channel power function of the spectrometer
3. Set the center frequency to be tested
4. Detector = RMS
5. Trace mode = Trace average
6. Span = 2*OBW
7. Sweep time = Auto
8. Number of sweep point $\geq 2 \times \text{span} / \text{RBW}$
9. RBW = 1~5%BW
10. VBW $\geq 3 \times \text{RBW}$
11. Integ BW = BW

Note 1: The average EIRP reported calculated is according to KDB 842590:

$$\text{EIRP (dBm)} = \text{Spectrum Analyzer Level (dBm)} - \text{Antenna Gain (dBi)} + \text{Space Loss (dB)} + \text{Path Loss (dB)}$$

The test results in the screenshot already includes this offset.

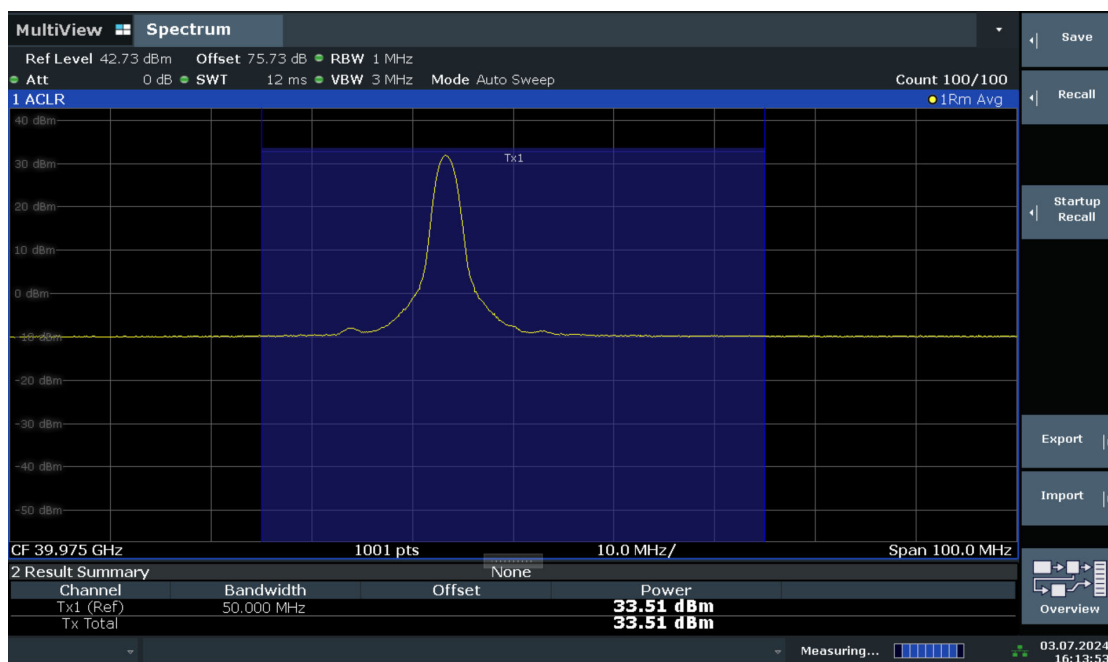
Note 2: The measurement (resolution) bandwidth of the signal analyzer (or measurement device) is less than the bandwidth of the transmitted signal then power integration method may be used to integrate power over the occupied bandwidth of the transmitted signal (in case of power measurement) or over the reference bandwidth (in case of power spectral density measurement).



n260, Module 0, SCS=120kHz, Beam ID: 14+142 PUSCH DFT-s-OFDM						
Bandwidth	RB allocation	Frequency (MHz)	Power (dBm)			
			Pi/2 BPSK	QPSK	16QAM	64QAM
50MHz	10@11	37025.04	/	28.24	/	/
		38499.96	28.34	28.28	26.20	24.00
		39975	/	31.40	/	/
	1@11	37025.04	/	30.85	/	/
		38499.96	30.99	31.10	28.80	27.03
		39975	/	33.51	/	/
100MHz	20@22	37050	/	27.80	/	/
		38499.96	28.24	28.16	26.14	24.03
		39949.92	/	30.85	/	/
	1@22	37050	/	21.04	/	/
		38499.96	22.48	21.39	20.41	17.71
		39949.92	/	24.48	/	/

Worst Case:

n260, Module 0, 50MHz, RB: 1@11, HIGH CH, PUSCH DFT-s-OFDM QPSK

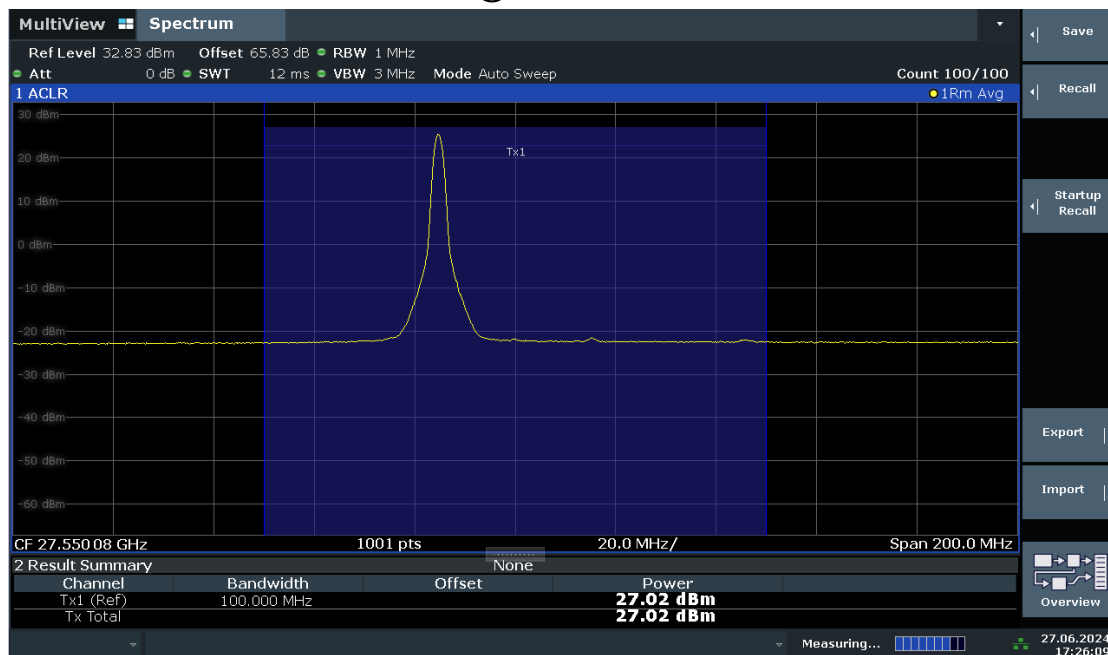




n261, Module 0, SCS=120kHz, Beam ID: 146 PUSCH DFT-s-OFDM						
Bandwidth	RB allocation	Frequency (MHz)	Power (dBm)			
			Pi/2 BPSK	QPSK	16QAM	64QAM
50MHz	10@11	27525	/	26.13	/	/
		27924.96	23.68	25.28	23.24	22.15
		28324.92	/	23.57	/	/
	1@11	27525	/	25.66	/	/
		27924.96	23.66	25.40	23.43	22.32
		28324.92	/	23.70	/	/
100MHz	20@22	27550.08	/	26.71	/	/
		27924.96	25.77	25.88	23.97	22.03
		28299.96	/	25.88	/	/
	1@22	27550.08	/	27.02	/	/
		27924.96	26.62	26.54	24.46	22.72
		28299.96	/	25.83	/	/

Worst Case:

n261, Module 0, 100MHz, RB: 1@22, LOW CH, PUSCH DFT-s-OFDM QPSK

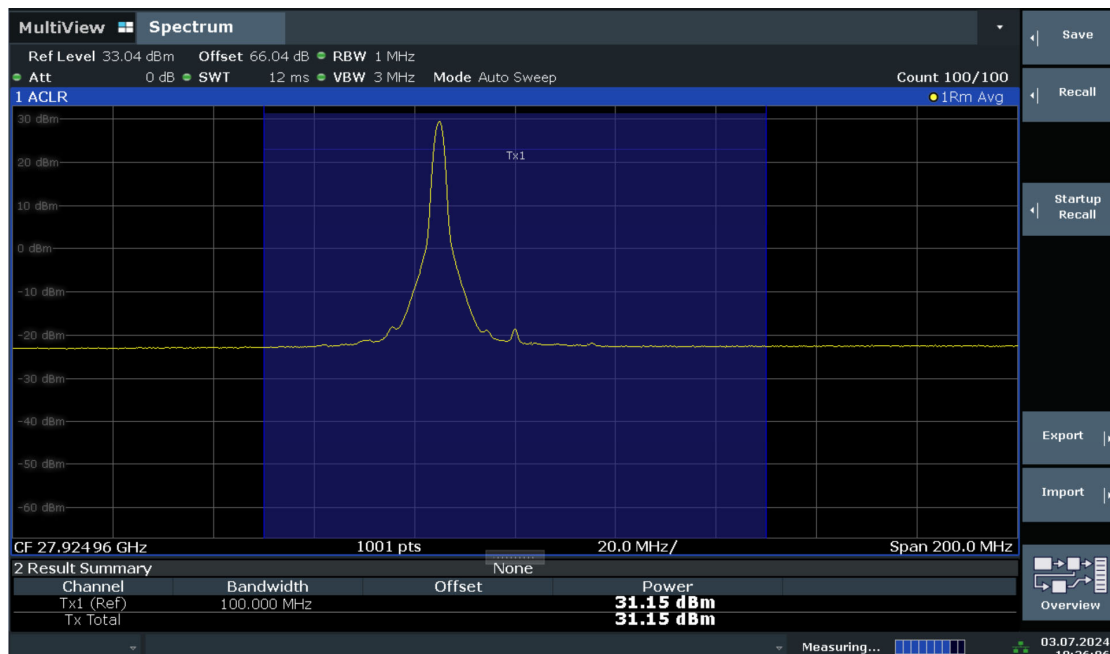




n261, Module 0, SCS=120kHz, Beam ID: 18+146 PUSCH DFT-s-OFDM						
Bandwidth	RB allocation	Frequency (MHz)	Power (dBm)			
			Pi/2 BPSK	QPSK	16QAM	64QAM
50MHz	10@11	27525	/	27.99	/	/
		27924.96	27.51	27.74	25.76	23.82
		28324.92	/	26.04	/	/
	1@11	27525	/	23.42	/	/
		27924.96	20.70	21.79	19.91	17.30
		28324.92	/	20.76	/	/
100MHz	20@22	27550.08	/	28.42	/	/
		27924.96	28.83	28.84	26.86	24.82
		28299.96	/	27.44	/	/
	1@22	27550.08	/	31.14	/	/
		27924.96	31.15	31.01	29.09	27.23
		28299.96	/	27.30	/	/

Worst Case:

n261, Module 0, 100MHz, RB: 1@22, MID CH, PUSCH DFT-s-OFDM BPSK





2.2. Occupied Bandwidth

2.2.1. Requirement

According to FCC section 2.1049, the occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission. Occupied bandwidth is also known as the 99% emission bandwidth.

2.2.2. Test procedure

ANSI C63.26-2015 - Section 5.4.3

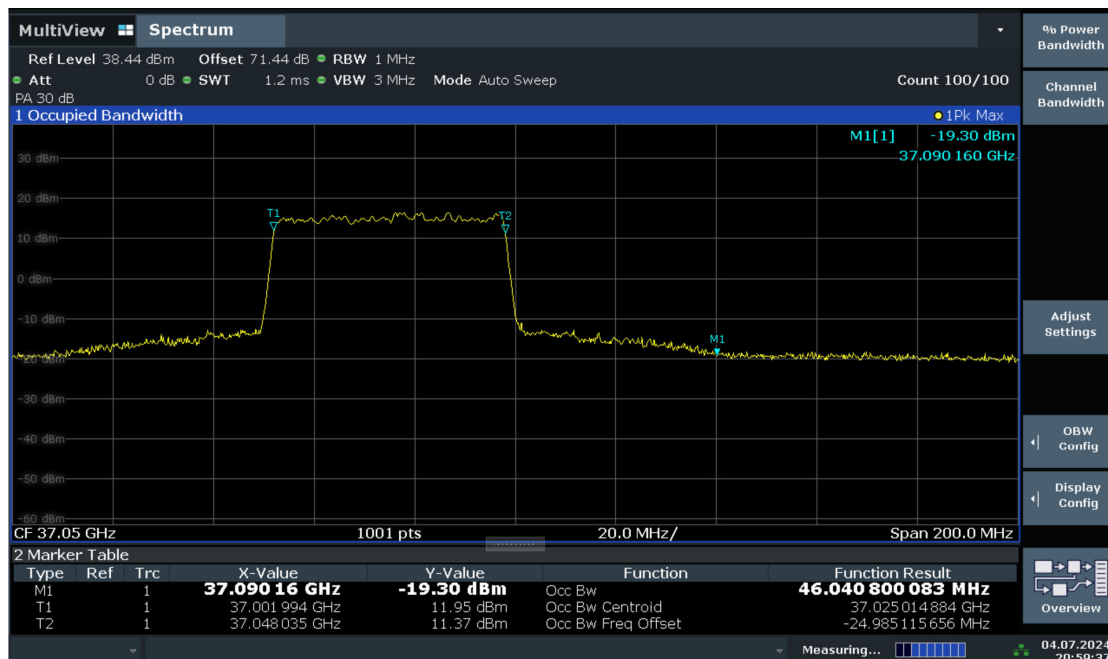
2.2.3. Test Settings

1. Enter the Occupied Bandwidth function of the spectrometer
2. Set the center frequency to be tested
3. Detector = Peak
4. Trace mode = Max hold
5. Span = $2 \times \text{OBW}$
6. Sweep time = Auto
7. RBW = $1 \sim 5\% \text{OBW}$
8. VBW $\geq 3 \times \text{RBW}$
9. Report the value of 99% bandwidth



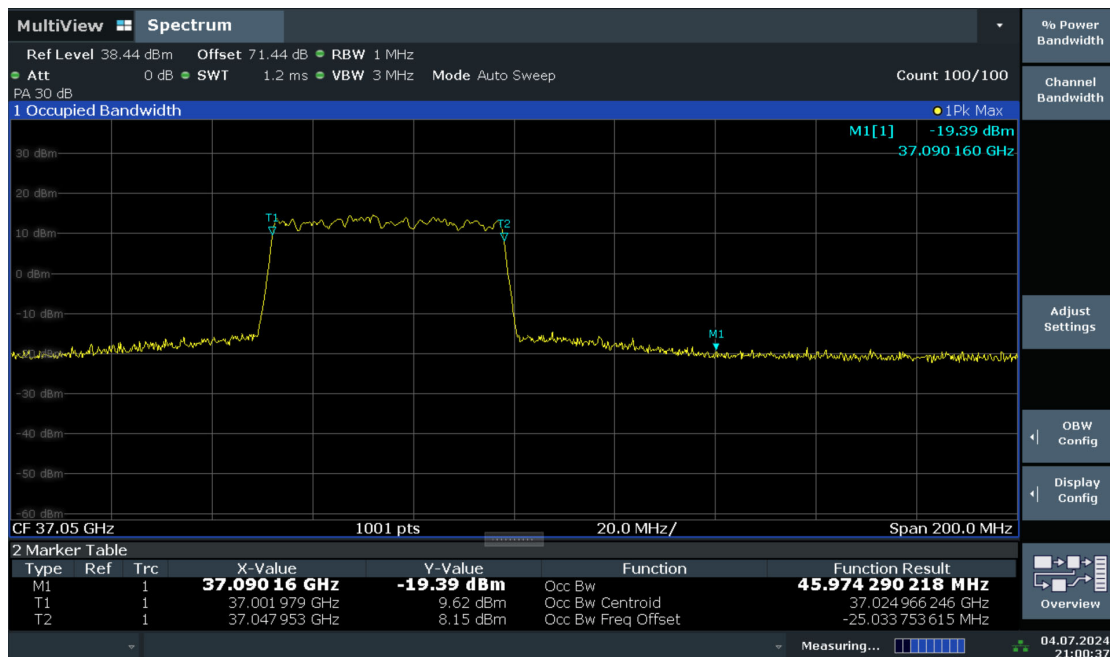
2.2.4. Test Result

n260, Module 0, SCS=120kHz, Beam ID: 14							
BW (MHz)	RB allocation	Modulation	Frequency (MHz)	99% BW(MHz)			
				Pi/2 BPSK	QPSK	16QAM	64QAM
50	Full RB	DFT-s-OFDM	37025.04	45.95	46.04	45.97	46.03
			38499.96	45.98	45.98	45.96	45.93
			39975	46.03	45.71	45.91	45.83
	Full RB	CP-OFDM	37025.04	/	45.93	45.97	45.87
			38499.96	/	45.96	45.96	45.88
			39975	/	45.93	45.92	45.84
100	Full RB	DFT-s-OFDM	37050	91.60	91.45	91.40	91.76
			38499.96	91.85	91.57	91.93	91.95
			39949.92	95.17	93.35	93.35	92.27
	Full RB	CP-OFDM	37050	/	94.62	94.50	94.43
			38499.96	/	94.36	94.78	94.90
			39949.92	/	96.65	94.58	94.47

**n260, Module 0, 50MHz, LOW CH, PUSCH DFT BPSK (99% BW)****n260, Module 0, 50MHz, LOW CH, PUSCH DFT QPSK (99% BW)**



n260, Module 0, 50MHz, LOW CH, PUSCH DFT 16QAM (99% BW)



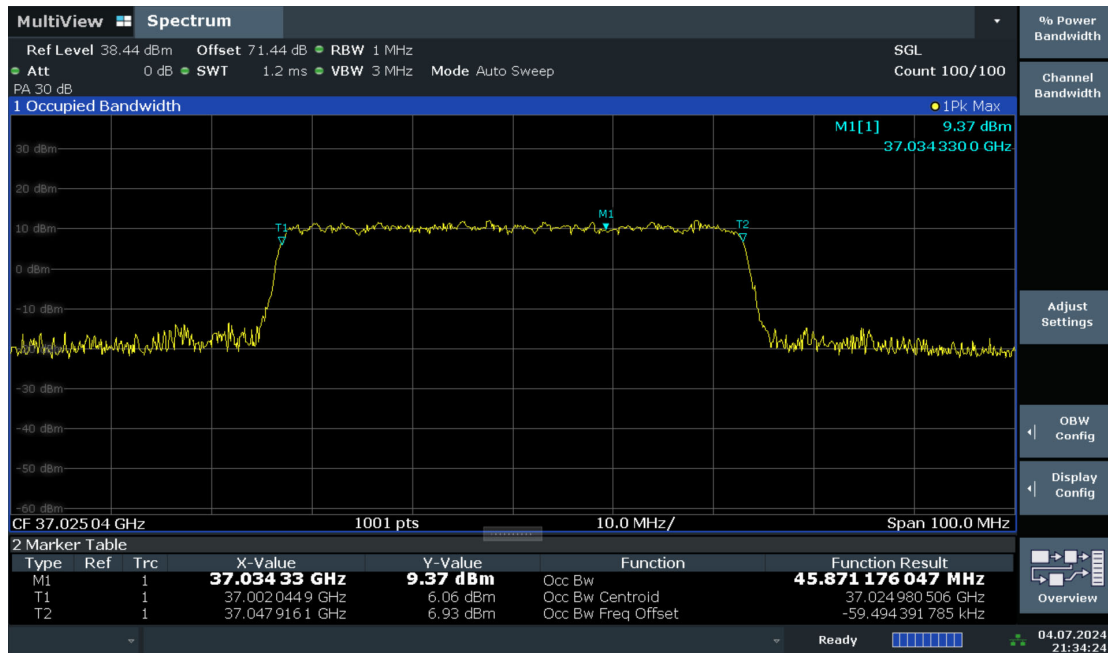
n260, Module 0, 50MHz, LOW CH, PUSCH DFT 64QAM (99% BW)



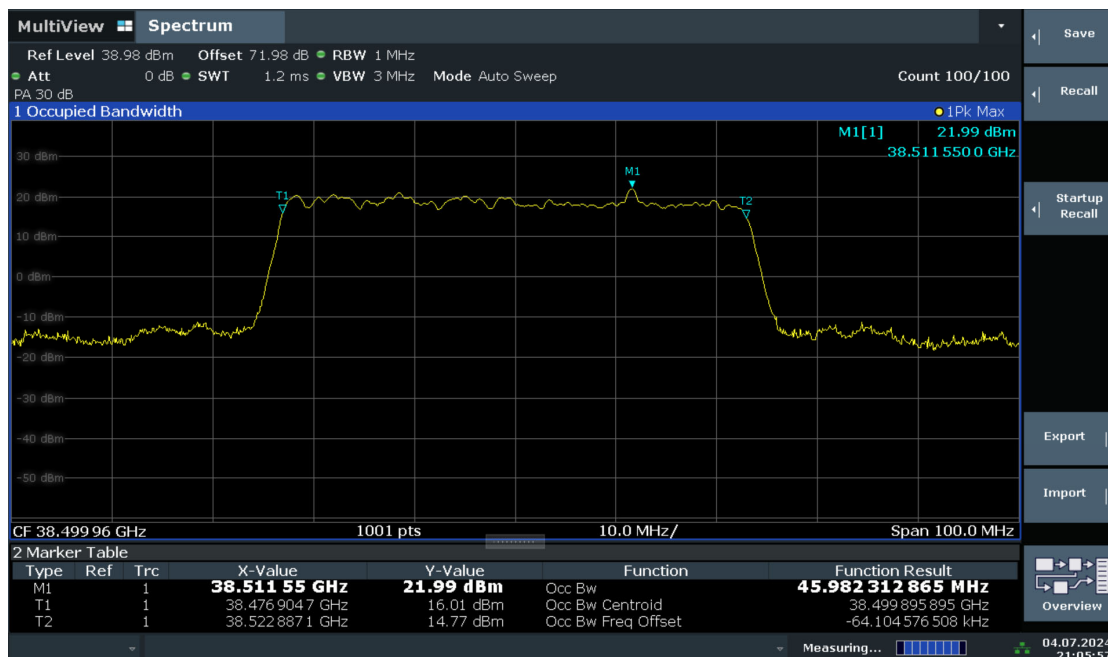
**n260, Module 0, 50MHz, LOW CH, CP-OFDM QPSK (99% BW)****n260, Module 0, 50MHz, LOW CH, CP-OFDM 16QAM (99% BW)**



n260, Module 0, 50MHz, LOW CH, CP-OFDM 64QAM (99% BW)



n260, Module 0, 50MHz, MID CH, PUSCH DFT BPSK (99% BW)

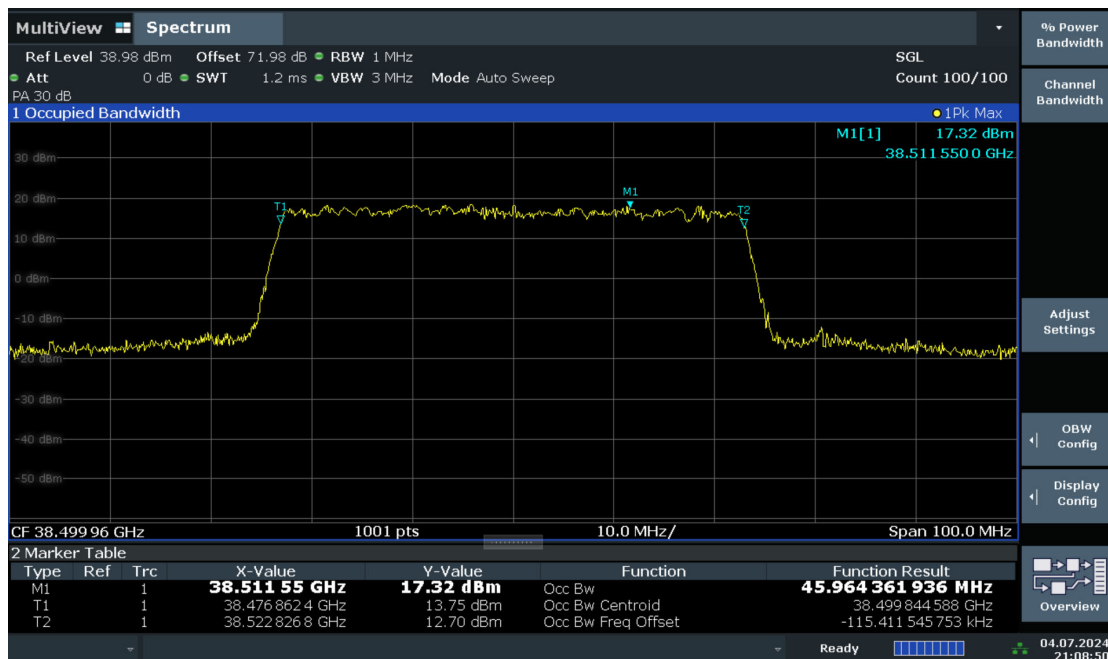




n260, Module 0, 50MHz, MID CH, PUSCH DFT QPSK (99% BW)



n260, Module 0, 50MHz, MID CH, PUSCH DFT 16QAM (99% BW)



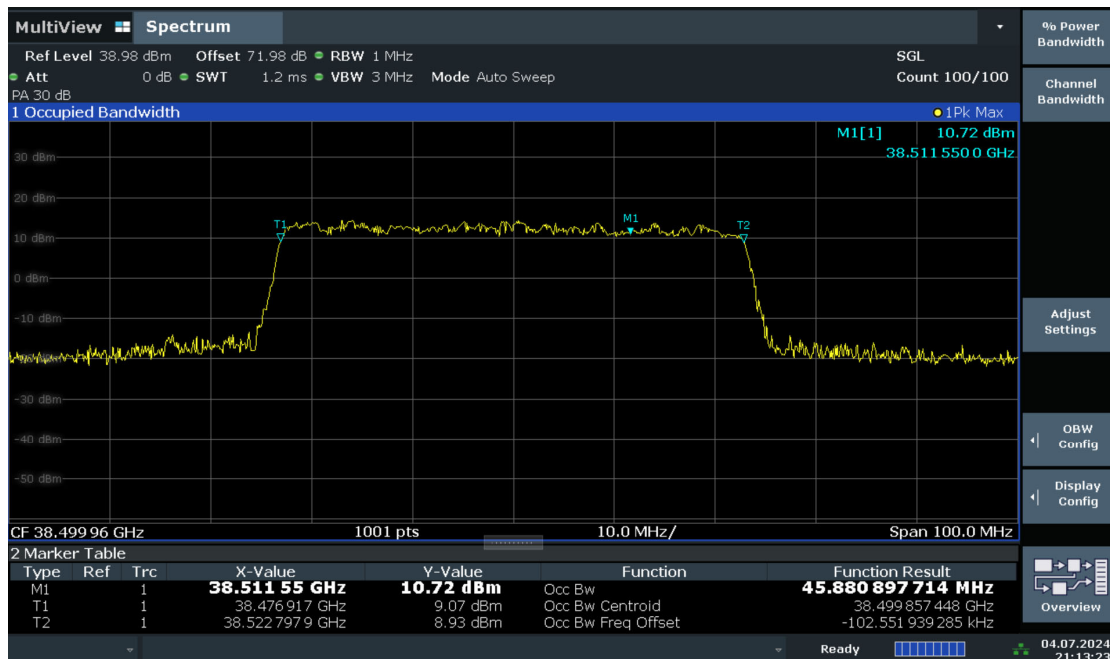
**n260, Module 0, 50MHz, MID CH, PUSCH DFT 64QAM (99% BW)****n260, Module 0, 50MHz, MID CH, CP-OFDM QPSK (99% BW)**

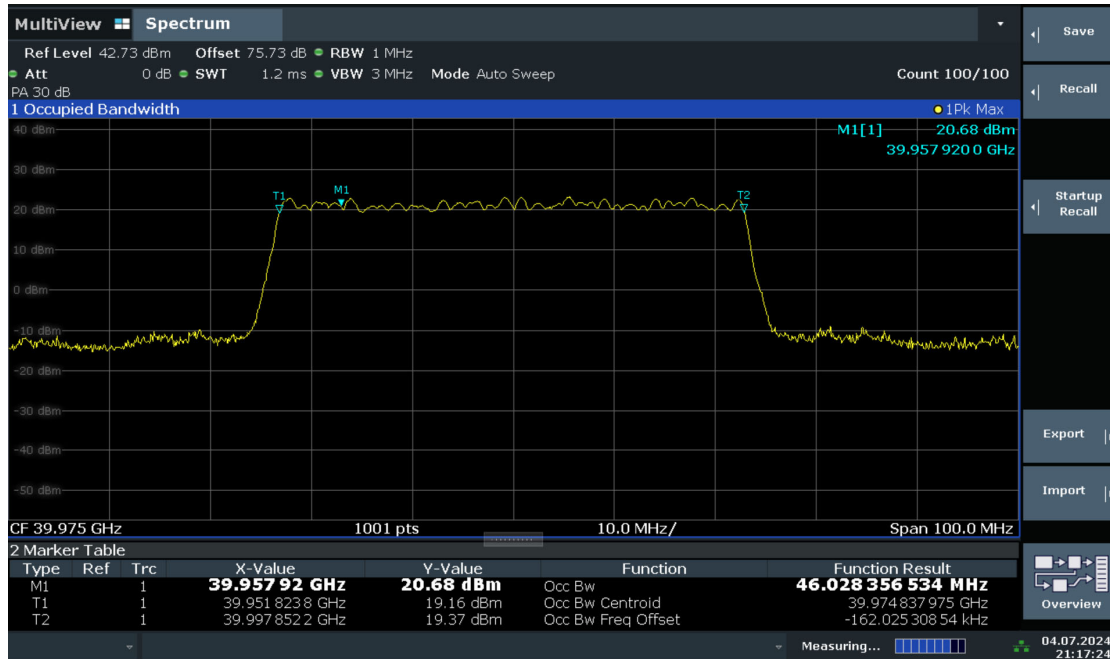


n260, Module 0, 50MHz, MID CH, CP-OFDM 16QAM (99% BW)



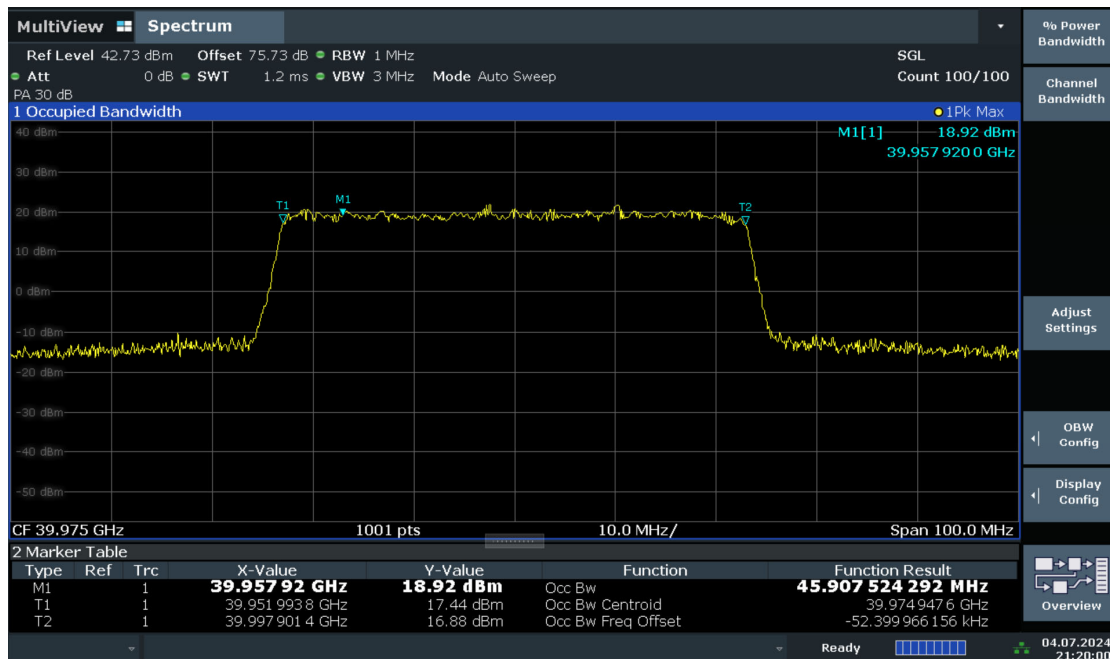
n260, Module 0, 50MHz, MID CH, CP-OFDM 64QAM (99% BW)



**n260, Module 0, 50MHz, HIGH CH, PUSCH DFT BPSK (99% BW)****n260, Module 0, 50MHz, HIGH CH, PUSCH DFT QPSK (99% BW)**



n260, Module 0, 50MHz, HIGH CH, PUSCH DFT 16QAM (99% BW)



n260, Module 0, 50MHz, HIGH CH, PUSCH DFT 64QAM (99% BW)

