
FCC Test Report

Report No.: AGC12845231102FR02

FCC ID : 2A2LL-P1

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : FJD Trion P1 LiDAR Scanner

BRAND NAME : FJ Dynamics

MODEL NAME : P1

APPLICANT : FJ Dynamics Co., Ltd

DATE OF ISSUE : Dec. 27, 2023

STANDARD(S) : FCC Part 15 Subpart E §15.407

REPORT VERSION : V1.0

Attestation of Global Compliance (Shenzhen) Co., Ltd



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Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Dec. 27, 2023	Valid	Initial Release

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1. General Information

Applicant	FJ Dynamics Co., Ltd
Address	1709, WeiXing Building 61 GaoXin South 9th Rd Nanshan District, Shenzhen China
Manufacturer	FJ Dynamics Co., Ltd
Address	1709, WeiXing Building 61 GaoXin South 9th Rd Nanshan District, Shenzhen China
Factory	FJ Dynamics Co.,Ltd
Address	4th floor building 2, Nangang Second Industrial Park, Nanshan District, Shenzhen China
Product Designation	FJD Trion P1 LiDAR Scanner
Brand Name	FJ Dynamics
Test Model	P1
Series Model(s)	N/A
Difference Description	N/A
Date of receipt of test item	Dec. 04, 2023
Date of Test	Dec. 04, 2023 to Dec. 27, 2023
Deviation from Standard	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Test Report Form No	AGCER-FCC-5G WLAN-V1

Note: The test results of this report relate only to the tested sample identified in this report.

Prepared By		
	Alan Duan (Project Engineer)	Dec. 27, 2023
Reviewed By		
	Calvin Liu (Reviewer)	Dec. 27, 2023
Approved By		
	Max Zhang (Authorized Officer)	Dec. 27, 2023

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2. Product Information

2.1 Product Technical Description

Equipment Type	☐ Outdoor access points ☐ Fixed P2P access points ☐ Indoor access points ☒ Client devices
Operation Frequency	☒ U-NII 1:5150MHz~5250MHz ☐ U-NII 2A: 5250MHz~5350MHz ☐ U-NII 2C:5470MHz~5725MHz ☒ U-NII 3: 5725MHz~5850MHz
DFS Design Type	☐ Master ☐ Slave with radar detection ☒ Slave without radar detection
TPC Function	☐ Yes ☒ No
Hardware Version	V1.4
Software Version	V1.0.5
Test Frequency Range	For 802.11a/n-HT20/ac-VHT20: 5180~5240MHz, 5745~5825MHz For 802.11n-HT40/ac-VHT40: 5190~5230MHz, 5755~5795MHz For 802.11ac-VHT80: 5210MHz, 5775MHz
RF Output Power	IEEE 802.11a(HT20):12.37dBm; IEEE 802.11n(HT20):12.58dBm; IEEE802.11n(HT40):11.95dBm; IEEE 802.11ac(VHT20):11.43dBm; IEEE802.11ac(VHT40):10.26dBm; IEEE802.11ac(VHT80):9.82dBm; IEEE802.11ax(HE20):10.22dBm; IEEE802.11ax(HE40):9.43dBm; IEEE802.11ax(HE80):8.76dBm
RF Output Power_MIMO	IEEE 802.11nHT(20):15.43dBm;IEEE802.11n(HT40):14.90dBm IEEE 802.11ac(VHT20):14.37dBm; IEEE802.11ac(VHT40):13.04dBm; IEEE802.11ac(VHT80):12.63dBm;IEEE802.11ax(HE20):13.17dBm; IEEE802.11ax(HE40):12.38dBm;IEEE802.11ax(HE80):11.74dBm
Modulation	802.11a/n:(64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11ac :(256-QAM, 64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11ax :(1024-QAM,256-QAM, 64-QAM, 16-QAM, QPSK, BPSK) OFDMA
Data Rate	802.11a:6/9/12/18/24/36/48/54Mbps; 802.11n:up to 300Mbps; 802.11ac:up to 866.6Mbps; 802.11ax:up to 1201Mbps
Number of channels	7 channels of U-NII-1 Band 8 channels of U- NII 3 Band
Antenna Designation	FPC Antenna
Antenna Gain	Refer to Chapter 2.8 of the report.
Power Supply	DC 10.8V, 3A

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2.2 Table of Carrier Frequency

For 5180~5240MHz:

4 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
36	5180 MHz	44	5220 MHz
40	5200 MHz	48	5240 MHz

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (VHT80):

Channel	Frequency	Channel	Frequency
42	5210 MHz	--	--

For 5745~5825MHz:

5 channels are provided for 802.11a, 802.11n (HT20), 802.11ac (VHT20) , 802.11ax (HE20):

Channel	Frequency	Channel	Frequency
149	5745 MHz	161	5805 MHz
153	5765 MHz	165	5825 MHz
157	5785 MHz	--	--

2 channels are provided for 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40):

Channel	Frequency	Channel	Frequency
151	5755 MHz	159	5795 MHz

1 channel is provided for 802.11ac (VHT80), 802.11ax (HE80):

Channel	Frequency	Channel	Frequency
155	5775 MHz	--	--

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2.3 IEEE 802.11n Modulation Scheme

MCS Index	N _{ss}	Modulation	R	N _{BPSC}	N _{CBPS}		N _{DBPS}		Data rate (Mbps)	
									800nsGI	
					20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

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2.4 IEEE 802.11AX Modulation Scheme

HE-MCSs for 242-tone RU, $N_{SS}=1$

HE-MCS Index	DCM	Modulation	R	N _{BPSCS}	N _{SD}	N _{CBPS}	N _{DBPS}	Data rate (Mb/s)		
								0.8μsGI	1.6μsGI	3.2μsGI
0	1	BPSK	1/2	1	117	117	58	4.3	4.0	3.6
	0		1/2		234	234	117	8.6	8.1	7.3
1	1	QPSK	1/2	2	117	234	117	8.6	8.1	7.3
	0		1/2		234	468	234	17.2	16.3	14.6
2	N/A		3/4		234	468	351	25.8	24.4	21.9
3	1	16-QAM	1/2	4	117	468	234	17.2	16.3	14.6
	0		1/2		234	936	468	34.4	32.5	29.3
4	1		3/4		117	468	351	25.8	24.4	21.9
	0		3/4		234	936	702	51.6	48.8	43.9
5	N/A	64-QAM	2/3	6	234	1404	936	68.8	65.0	58.5
6			3/4				1053	77.4	73.1	65.8
7			5/6				1170	86.0	81.3	73.1
8		256-QAM	3/4	8		1872	1404	103.2	97.5	87.8
9			5/6				1560	114.7	108.3	97.5
10		1024-QAM	3/4	10		2340	1755	129.0	121.9	109.7
11			5/6				1950	143.4	135.4	121.9

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

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HE-MCSs for 484-tone RU, $N_{SS}=1$

HE-MCS Index	DCM	Modulation	R	N _{BPSCS}	N _{SD}	N _{CBPS}	N _{DBPS}	Data rate (Mb/s)		
								0.8μsGI	1.6μsGI	3.2μsGI
0	1	BPSK	1/2	1	234	234	117	8.6	8.1	7.3
	0		1/2		468	468	234	17.2	16.3	14.6
1	1	QPSK	1/2	2	234	468	234	17.2	16.3	14.6
	0		1/2		468	936	468	34.4	32.5	29.3
2	N/A		3/4		468	936	702	51.6	48.8	43.9
3	1	16-QAM	1/2	4	234	936	468	34.4	32.5	29.3
	0		1/2		468	1872	936	68.8	65.0	58.5
4	1		3/4		234	936	702	51.6	48.8	43.9
	0		3/4		468	1872	1404	103.2	97.5	87.8
5	N/A	64-QAM	2/3	6	468	2808	1872	137.6	130.0	117.0
6			3/4				2106	154.9	146.3	131.6
7			5/6				2340	172.1	162.5	146.3
8		256-QAM	3/4	8		3744	2808	206.5	195.0	175.5
9			5/6				3120	229.4	216.7	195.0
10		1024-QAM	3/4	10		4680	3510	258.1	243.8	219.4
11			5/6				3900	286.8	270.8	243.8

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPSC	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

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2.5 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for FCC ID: 2A2LL-P1 filing to comply with the FCC Part 15 requirements.

2.6 Test Methodology

No.	Identity	Document Title
1	FCC 47 CFR Part 2	Frequency allocations and radio treaty matters; general rules and regulations
2	FCC 47 CFR Part 15	Radio Frequency Devices
3	ANSI C63.10-2013	American National Standard for Testing Unlicensed Wireless Devices
4	KDB 662911	662911 D01 Multiple Transmitter Output v02r01
5	KDB 789033	789033 D02 General U-NII Test Procedures New Rules v02r01

2.7 Special Accessories

Refer to section 4.4.

2.8 Equipment Modifications

Not available for this EUT intended for grant.

2.9 Antenna Requirement

Standard Requirement
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.
EUT Antenna: The non-detachable antenna inside the device cannot be replaced by the user at will. The gain of the antenna refer to Section 2.10 of the report

2.10 Description of Available Antennas

Antenna Type	Frequency Band (MHz)	TX Paths	Bandwidth (MHz)	Max Peak Gain (dBi)		Max Directional Gain (dBi)
				Ant 1	Ant 2	
5G WIFI FPC Antenna List (5GHz 2*2 MIMO)						
FPC Antenna	5150 ~ 5250	2	20,40,80	2.56	2.56	5.57
	5725 ~ 5850	2	20,40,80	2.56	2.56	5.57

Note 1: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11n/ac/ax mode.

Note 2: The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

If all antennas have the same gain, G_{ANT} , Directional gain = G_{ANT} + Array Gain, where Array Gain is as follows.

- For power spectral density (PSD) measurements on devices:

$$\text{Array Gain} = 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01;$$

- For power measurements on IEEE 802.11 devices:

$$\text{Array Gain} = 0 \text{ dB for } N_{ANT} \leq 4;$$

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

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

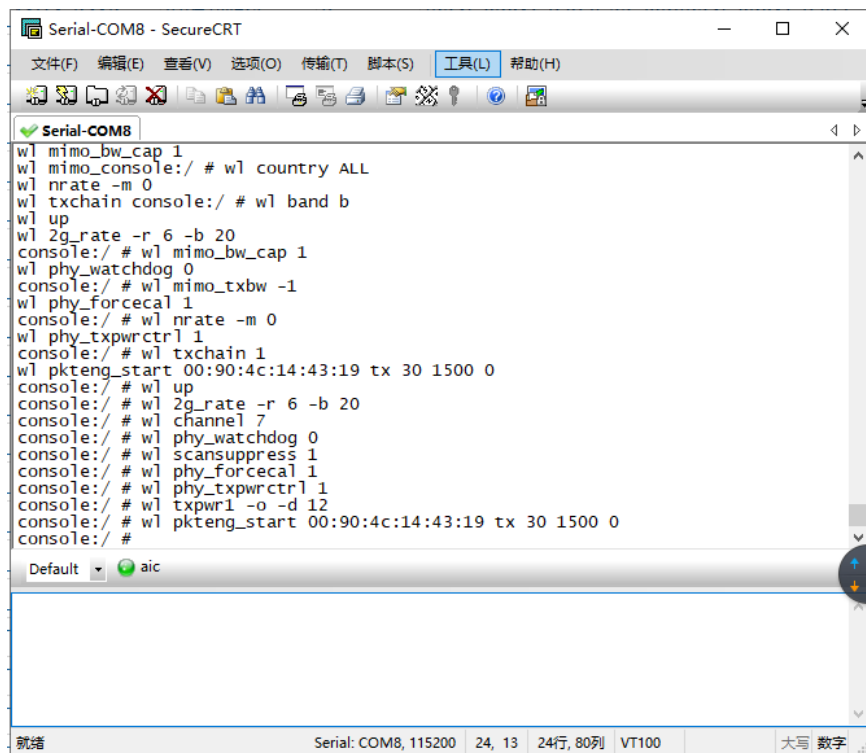
If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

2.11 Description of Test Software

For IEEE 802.11 mode:

The test utility software used during testing was “SecureCRT”, and the version was “V1.0”.

Software Setting Diagram



```

Serial-COM8 - SecureCRT
文件(F) 编辑(E) 查看(V) 选项(O) 传输(T) 脚本(S) 工具(L) 帮助(H)
Serial-COM8
w1 mimo_bw_cap 1
w1 mimo_console:/ # w1 country ALL
w1 nrate -m 0
w1 txchain console:/ # w1 band b
w1 up
w1 2g_rate -r 6 -b 20
console:/ # w1 mimo_bw_cap 1
w1 phy_watchdog 0
console:/ # w1 mimo_txbw -1
w1 phy_forcecal 1
console:/ # w1 nrate -m 0
w1 phy_txpwrctrl 1
console:/ # w1 txchain 1
w1 pkteng_start 00:90:4c:14:43:19 tx 30 1500 0
console:/ # w1 up
console:/ # w1 2g_rate -r 6 -b 20
console:/ # w1 channel 7
console:/ # w1 phy_watchdog 0
console:/ # w1 scansuppress 1
console:/ # w1 phy_forcecal 1
console:/ # w1 phy_txpwrctrl 1
console:/ # w1 txpwr1 -o -d 12
console:/ # w1 pkteng_start 00:90:4c:14:43:19 tx 30 1500 0
console:/ #
Default aic
就绪 Serial: COM8, 115200 24, 13 24行, 80列 VT100 大写 数字
  
```

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Test Mode(U-NII-1 Band)	Channel	Power Index	
		Chain 0	Chain 1
802.11a	L/M/H	12	12
802.11n(HT20)	L/M/H	12	12
802.11n(HT40)	L/M/H	12	12
802.11ac(VHT20)	L/M/H	12	12
802.11ac(VHT40)	L/M/H	12	12
802.11ac(VHT80)	L/M/H	12	12
802.11ax(HE20)	L/M/H	12	12
802.11ax(HE40)	L/M/H	12	12
802.11ax(HE80)	L/M/H	12	12
Test Mode(U-NII-3 Band)	Channel	Power Index	
		Chain 0	Chain 1
802.11a	L/M/H	12	12
802.11n(HT20)	L/M/H	12	12
802.11n(HT40)	L/M/H	12	12
802.11ac(VHT20)	L/M/H	12	12
802.11ac(VHT40)	L/M/H	12	12
802.11ac(VHT80)	L/M/H	12	12
802.11ax(HE20)	L/M/H	12	12
802.11ax(HE40)	L/M/H	12	12
802.11ax(HE80)	L/M/H	12	12

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3. Test Environment

3.1 Address of The Test Laboratory

Laboratory: Attestation of Global Compliance (Shenzhen) Co., Ltd.

Address: 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.2 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L5488

Attestation of Global Compliance (Shenzhen) Co., Ltd. has been assessed and proved to follow CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories.)

A2LA-Lab Cert. No.: 5054.02

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to follow ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

FCC-Registration No.: 975832

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files with Registration 975832.

IC-Registration No.: 24842 (CAB identifier: CN0063)

Attestation of Global Compliance (Shenzhen) Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the Certification and Engineering Bureau of Industry Canada. The acceptance letter from the IC is maintained in our files with Registration 24842.

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3.3 Environmental Conditions

	Normal Conditions
Temperature range (°C)	15 - 35
Relative humidity range	20% - 75%
Pressure range (kPa)	86 - 106
Power supply	DC 10.8V

3.4 Measurement Uncertainty

The reported uncertainty of measurement $y \pm U$, where expanded uncertainty U is based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95%.

Item	Measurement Uncertainty
Uncertainty of Conducted Emission for AC Port	$U_c = \pm 2.9 \text{ dB}$
Uncertainty of Radiated Emission below 1GHz	$U_c = \pm 3.9 \text{ dB}$
Uncertainty of Radiated Emission above 1GHz	$U_c = \pm 4.9 \text{ dB}$
Uncertainty of total RF power, conducted	$U_c = \pm 0.8 \text{ dB}$
Uncertainty of RF power density, conducted	$U_c = \pm 2.6 \text{ dB}$
Uncertainty of spurious emissions, conducted	$U_c = \pm 2 \%$
Uncertainty of Occupied Channel Bandwidth	$U_c = \pm 2.7 \%$

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3.5 List of Equipment Used

● RF Conducted Test System							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☒	AGC-ER-E036	Spectrum Analyzer	Agilent	N9020A	MY49100060	2023-06-01	2024-05-31
☒	AGC-ER-E062	Power Sensor	Agilent	U2021XA	MY54110007	2023-03-03	2024-03-02
☒	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2023-03-03	2024-03-02
☒	AGC-EM-A152	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
☒	AGC-ER-E083	Signal Generator	Agilent	E4421B	US39340815	2023-06-01	2024-05-31
☒	N/A	RF Connection Cable	N/A	1#	N/A	Each time	N/A
☒	N/A	RF Connection Cable	N/A	2#	N/A	Each time	N/A

● Radiated Spurious Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E046	EMI Test Receiver	R&S	ESCI	10096	2023-02-18	2024-02-17
☒	AGC-EM-E116	EMI Test Receiver	R&S	ESCI	100034	2023-06-03	2024-06-02
☒	AGC-EM-E061	Spectrum Analyzer	Agilent	N9010A	MY53470504	2023-06-01	2024-05-31
☒	AGC-EM-E086	Loop Antenna	ZHINAN	ZN30900C	18051	2022-03-12	2024-03-11
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2023-03-23	2024-03-22
☒	AGC-EM-E082	Horn Antenna	SCHWARZBECK	BBHA 9170	#768	2023-09-24	2025-09-23
☒	AGC-EM-E146	Pre-amplifier	ETS	3117-PA	00246148	2022-08-04	2024-08-03
☒	AGC-EM-A118	5G Filter	SongYi	BRM50716	N/A	2023-06-01	2024-05-31
☒	AGC-EM-A138	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08
☐	AGC-EM-A139	6dB Attenuator	Eeatsheep	LM-XX-6-5W	N/A	2023-06-09	2024-06-08

● AC Power Line Conducted Emission							
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Serial No.	Last Cal. Date (YY-MM-DD)	Next Cal. Date (YY-MM-DD)
☐	AGC-EM-E045	EMI Test Receiver	R&S	ESPI	101206	2023-06-03	2024-06-02
☐	AGC-EM-A130	6dB Attenuator	Eeatsheep	LM-XX-6-5W	DC-6GZ	2023-06-09	2024-06-08
☐	AGC-EM-E023	AMN	R&S	100086	ESH2-Z5	2023-06-03	2024-06-02

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● Test Software					
Used	Equipment No.	Test Equipment	Manufacturer	Model No.	Version Information
☒	AGC-EM-S003	RE Test System	FARA	EZ-EMC	V.RA-03A
☒	AGC-EM-S011	RSE Test System	Tonscend	TS ⁺ Ver2.1(JS36-RSE)	4.0.0.0
☐	AGC-EM-S001	CE Test System	R&S	ES-K1	V1.71
☒	AGC-ER-S009	BT/WIFI Test System	Tonscend	JS1120-3	2.6.77.0518

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4. System Test Configuration

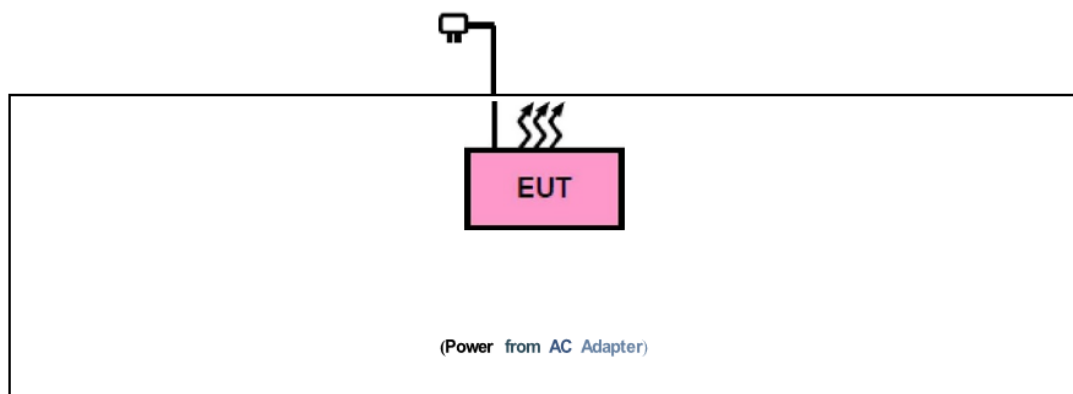
4.1 EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commission's requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT Exercise

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

4.3 Configuration of Tested System



4.4 Equipment Used in Tested System

The following peripheral devices and interface cables were connected during the measurement:

☐ Test Accessories Come From The Laboratory

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	--	--	--	--	--

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4.5 Summary of Test Results

Item	FCC Rules	Description Of Test	Result
1	§15.203	Antenna Equipment	Pass
2	§15.407(a/1/3)	RF Output Power	Pass
3	§15.407(e)	6dB Bandwidth Measurement	Pass
4	§2.1049	26dB bandwidth Measurement	Pass
5	§15.407(a/1/3)	Power Spectral Density	Pass
6	§15.407(b)(1/4)	Conducted Spurious Emission	Pass
7	§15.209,§15.407(b)(1/4)	Radiated Emission& Band Edge	Pass
8	§15.207	AC Power Line Conducted Emission	Not applicable

Note: The WIFI function cannot transmit when charging.

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5. Description of Test Modes

EUT CONFIGURE MODE	APPLICABLE TO				DESCRIPTION
	RE > 1G	RE < 1G	PLC	APCM	
A	--	--	--	--	Powered by Adapter with WIFI(5G) Link
B	☒	☒	☒	☒	Powered by Battery with WIFI(5G) Link
C	--	--	--	--	Powered by USB with WIFI(5G) Link

Where, **RE > 1G: Radiated Emission above 1GHz** **PLC: Power Line Conducted Emission**
RE < 1G: Radiated Emission below 1GHz **APCM: Antenna Port Conducted Measurement**

NOTE 1: The EUT had been pre-tested on the positioned of each 3 axis. The worst case was found when positioned on X-plane.

NOTE 2: "--" means no effect.

NOTE 3: The radiation part tests the dual-antenna MIMO as the worst combination.

Radiated Emission Test (Above 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (IF EUT with antenna diversity architecture).
- ☒ The equipment under test has multiple antennas, and only the MIMO mode is recorded as the worst.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11n (20MHz)	5180-5240	36 to 48	36, 40, 48	OFDM	6.5
B	802.11n (20MHz)	5745-5825	149 to 165	149, 157, 165	OFDM	6.5

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Radiated Emission Test (Below 1GHz):

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
- ☒ The equipment under test has multiple antennas, and only the MIMO mode is recorded as the worst.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11n(20MHz)	5180-5240	36 to 48	36	OFDM	6.5

Power Line Conducted Emission Test:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
- ☒ The equipment under test has multiple antennas, and only the MIMO mode is recorded as the worst.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11n(20MHz)	5180-5240	36 to 48	36	OFDM	6.5

Bandedge Measurement:

- ☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen available modulations, data rates and antenna ports (If EUT with antenna diversity architecture).
- ☒ The equipment under test has multiple antennas, and only the MIMO mode is recorded as the worst.
- ☒ Following channel(s) was (were) selected for the final test as listed below.

EUT Configure Mode	Mode	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11n (20MHz)	5180-5240	36 to 48	36	OFDM	6.5
B	802.11n (40MHz)		36 to 48	38	OFDM	13.5
B	802.11ac (80MHz)		42	42	OFDM	29.3
B	802.11ax (80MHz)		42	42	OFDMA	MCS0
B	802.11n (20MHz)	5745-5825	149 to 165	149	OFDM	6.5
B	802.11n (40MHz)		151 to 159	151	OFDM	13.5
B	802.11ac (80MHz)		155	155	OFDM	29.3
B	802.11ax (80mhz)		155	155	OFDMA	MCS0

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Antenna Port Conducted Measurement:

☒ Pre-Scan has been conducted to determine the worst-case mode from all possible combinations be Meen 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	Freq. Band (MHz)	Available Channel	Tested Channel	Modulation	Data Rate (Mbps)
B	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
B	802.11n (20MHz)		36 to 48	36, 40, 48	OFDM	6.5
B	802.11n (40MHz)		38 to 46	38, 46	OFDM	13.5
B	802.11ac (20MHz)		36 to 48	36, 40, 48	OFDM	6.5
B	802.11ac (40MHz)		38 to 46	38, 46	OFDM	13.5
B	802.11ac (80MHz)		42	42	OFDM	29.3
B	802.11ax (20MHz)		36 to 48	36, 40, 48	OFDMA	MCS0
B	802.11ax (40MHz)		38 to 46	38, 46	OFDMA	MCS0
B	802.11ax (80MHz)		42	42	OFDMA	MCS0
B	802.11a	5745-5825	149 to 165	149, 157, 165	OFDM	6.0
B	802.11n (20MHz)		149 to 165	149, 157, 165	OFDM	6.5
B	802.11n (40MHz)		151 to 159	151, 159	OFDM	13.5
B	802.11ac (20MHz)		149 to 165	149, 157, 165	OFDM	6.5
B	802.11ac (40MHz)		151 to 159	151, 159	OFDM	13.5
B	802.11ac (80MHz)		155	155	OFDM	29.3
B	802.11ax (20MHz)		149 to 165	149, 157, 165	OFDM	MCS0
B	802.11ax (40MHz)		151 to 159	151, 159	OFDM	MCS0
B	802.11ax (80MHz)		155	155	OFDMA	MCS0

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6. Duty Cycle Measurement

5GHz WLAN (NII) operation is possible in 20MHz, 40MHz and 80MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz, and detector = Peak. The RBW and VBW were both greater than $50/T$, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

U-NII-1					
Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11a	6	93.37	0.30	0.72	-0.60
IEEE 802.11n-HT20	MCS0	93.02	0.31	0.77	-0.63
IEEE 802.11n-HT40	MCS0	86.91	0.61	1.54	-1.22
IEEE 802.11ac-VHT20	MCS0	100	--	--	--
IEEE 802.11ac-VHT40	MCS0	100	--	--	--
IEEE 802.11ac-VHT80	MCS0	85.84	0.66	1.11	-1.33
IEEE 802.11ax-HE20	MCS0	100	--	--	--
IEEE 802.11ax-HE40	MCS0	100	--	--	--
IEEE 802.11ax-HE80	MCS0	85.74	0.67	1.11	-1.34
U-NII-3					
Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
IEEE 802.11a	6	93.37	0.30	0.72	-0.60
IEEE 802.11n-HT20	MCS0	92.83	0.32	0.77	-0.65
IEEE 802.11n-HT40	MCS0	86.77	0.62	1.54	-1.23
IEEE 802.11ac-VHT20	MCS0	100	--	--	--
IEEE 802.11ac-VHT40	MCS0	100	--	--	--
IEEE 802.11ac-VHT80	MCS0	85.74	0.67	1.11	-1.34
IEEE 802.11ax-HE20	MCS0	91.25	0.40	0.98	-0.80
IEEE 802.11ax-HE40	MCS0	84.53	0.73	1.85	-1.46
IEEE 802.11ax-HE80	MCS0	74.95	1.25	3.42	-2.50

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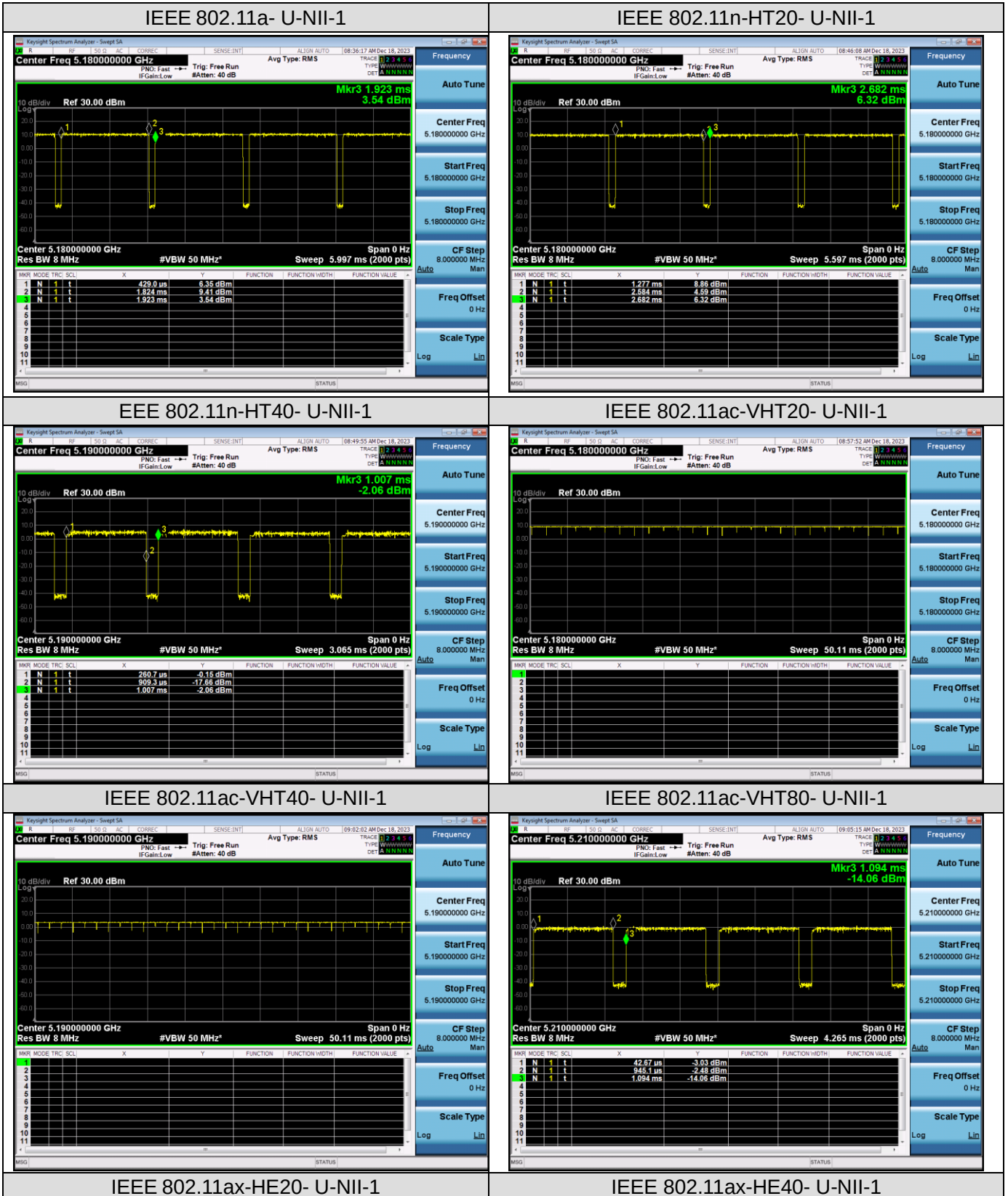
Remark:

1. Duty Cycle factor = $10 * \log (1/ \text{Duty cycle})$
2. Average factor = $20 \log_{10} \text{Duty Cycle}$
3. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value.

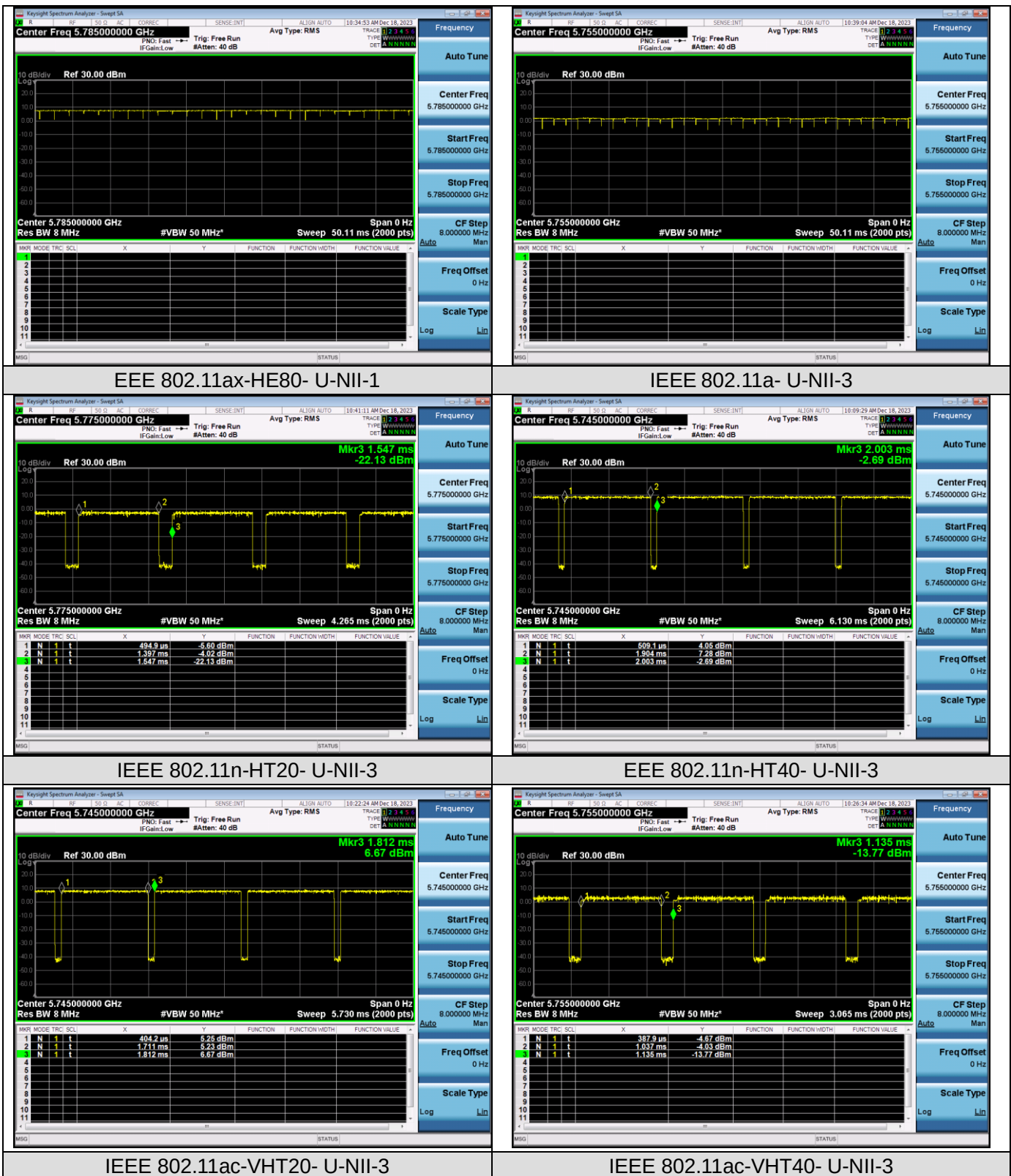
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The test plots as follows:



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7. RF Output Power Measurement

7.1 Provisions Applicable

Operation Band	EUT Category		LIMIT
U-NII-1	☐	Outdoor Access Point	1 Watt (30 dBm) (Max. e.i.r.p < 125mW(21 dBm) at any elevation angle above 30 degrees as measured from the horizon)
	☐	Fixed point-to-point Access Point	1 Watt (30 dBm)
	☐	Indoor Access Point	1 Watt (30 dBm)
	☒	Client devices	250mW (23.98 dBm)
U-NII-2A	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-2C	/		250mW (23.98 dBm) or 11 dBm+10 log B*
U-NII-3	/		1 Watt (30 dBm)

Note: Where B is the 26dB emission bandwidth in MHz.

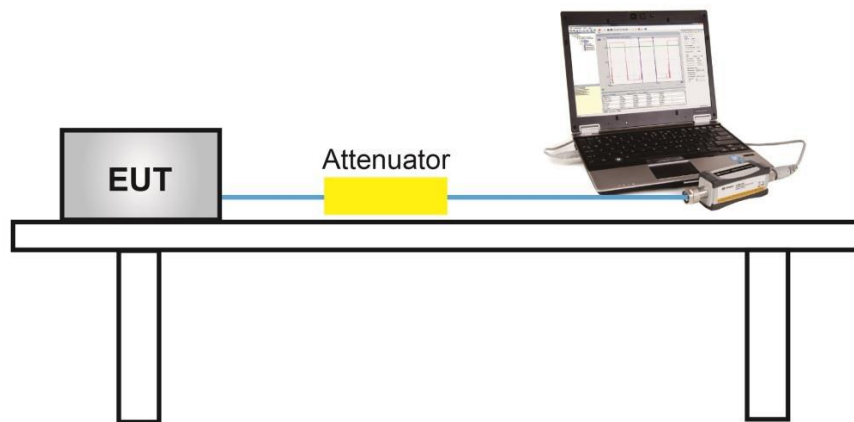
7.2 Measurement Procedure

☒ Method PM is Measurement using an RF average power meter. The procedure for this method is as follows:

1. The testing follows the ANSI C63.10 Section 12.3.3.1
2. Measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the following conditions are satisfied:
3. The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
4. At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
5. The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
6. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
7. Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
8. Adjust the measurement in dBm by adding $[10 \log (1 / D)]$, where D is the duty cycle {e.g., $[10 \log (1 / 0.25)]$, if the duty cycle is 25%}.
9. Record the test results in the report.

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7.3 Measurement Setup (Block Diagram of Configuration)



7.4 Measurement Result

Test Data of Conducted Output Power for band 5.15-5.25 GHz-ANT 1				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	12.88	23.98	Pass
	5200	12.51	23.98	Pass
	5240	12.09	23.98	Pass
802.11n20	5180	12.58	23.98	Pass
	5200	12.57	23.98	Pass
	5240	12.06	23.98	Pass
802.11n40	5190	11.83	23.98	Pass
	5230	11.41	23.98	Pass
802.11ac20	5180	11.43	23.98	Pass
	5200	11.12	23.98	Pass
	5240	10.75	23.98	Pass
802.11ac40	5190	10.26	23.98	Pass
	5230	9.78	23.98	Pass
802.11ac80	5210	9.82	23.98	Pass
802.11ax20	5180	10.22	23.98	Pass
	5200	9.91	23.98	Pass
	5240	9.39	23.98	Pass
802.11ax40	5190	9.30	23.98	Pass
	5230	8.85	23.98	Pass
802.11ax80	5210	8.69	23.98	Pass

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Test Data of Conducted Output Power for band 5.15-5.25 GHz-ANT 2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5180	12.37	23.98	Pass
	5200	12.04	23.98	Pass
	5240	11.58	23.98	Pass
802.11n20	5180	12.26	23.98	Pass
	5200	11.92	23.98	Pass
	5240	11.18	23.98	Pass
802.11n40	5190	11.95	23.98	Pass
	5230	11.48	23.98	Pass
802.11ac20	5180	11.29	23.98	Pass
	5200	11.18	23.98	Pass
	5240	10.30	23.98	Pass
802.11ac40	5190	9.79	23.98	Pass
	5230	9.31	23.98	Pass
802.11ac80	5210	9.42	23.98	Pass
802.11ax20	5180	10.10	23.98	Pass
	5200	10.00	23.98	Pass
	5240	9.56	23.98	Pass
802.11ax40	5190	9.43	23.98	Pass
	5230	8.82	23.98	Pass
802.11ax80	5210	8.76	23.98	Pass

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Test Data of Conducted Output Power for band 5.725-5.850 GHz-ANT 1				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	11.12	30	Pass
	5785	10.74	30	Pass
	5825	10.16	30	Pass
802.11n20	5745	10.51	30	Pass
	5785	10.19	30	Pass
	5825	9.58	30	Pass
802.11n40	5755	10.16	30	Pass
	5795	9.89	30	Pass
802.11ac20	5745	10.20	30	Pass
	5785	9.89	30	Pass
	5825	9.17	30	Pass
802.11ac40	5755	8.46	30	Pass
	5795	8.08	30	Pass
802.11ac80	5775	8.08	30	Pass
802.11ax20	5745	9.63	30	Pass
	5785	9.22	30	Pass
	5825	8.78	30	Pass
802.11ax40	5755	8.37	30	Pass
	5795	7.84	30	Pass
802.11ax80	5775	7.69	30	Pass

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Test Data of Conducted Output Power for band 5.725-5.850 GHz-ANT 2				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11a	5745	11.43	30	Pass
	5785	11.18	30	Pass
	5825	10.52	30	Pass
802.11n20	5745	10.70	30	Pass
	5785	10.31	30	Pass
	5825	10.19	30	Pass
802.11n40	5755	10.33	30	Pass
	5795	9.86	30	Pass
802.11ac20	5745	10.24	30	Pass
	5785	9.97	30	Pass
	5825	9.27	30	Pass
802.11ac40	5755	8.58	30	Pass
	5795	8.05	30	Pass
802.11ac80	5775	8.04	30	Pass
802.11ax20	5745	9.85	30	Pass
	5785	9.41	30	Pass
	5825	8.87	30	Pass
802.11ax40	5755	8.53	30	Pass
	5795	7.95	30	Pass
802.11ax80	5775	7.69	30	Pass

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Test Data of Conducted Output Power for band 5.15-5.25 GHz-MIMO				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	5180	15.43	23.98	Pass
	5200	15.27	23.98	Pass
	5240	14.65	23.98	Pass
802.11n40	5190	14.90	23.98	Pass
	5230	14.46	23.98	Pass
802.11ac20	5180	14.37	23.98	Pass
	5200	14.16	23.98	Pass
	5240	13.54	23.98	Pass
802.11ac40	5190	13.04	23.98	Pass
	5230	12.56	23.98	Pass
802.11ac80	5210	12.63	23.98	Pass
802.11ax20	5180	13.17	23.98	Pass
	5200	12.97	23.98	Pass
	5240	12.49	23.98	Pass
802.11ax40	5190	12.38	23.98	Pass
	5230	11.85	23.98	Pass
802.11ax80	5210	11.74	23.98	Pass

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Test Data of Conducted Output Power for band 5.725-5.85 GHz-MIMO				
Test Mode	Test Channel (MHz)	Average Power (dBm)	Limits (dBm)	Pass or Fail
802.11n20	5745	13.62	30	Pass
	5785	13.26	30	Pass
	5825	12.91	30	Pass
802.11n40	5755	13.26	30	Pass
	5795	12.89	30	Pass
802.11ac20	5745	13.23	30	Pass
	5785	12.94	30	Pass
	5825	12.23	30	Pass
802.11ac40	5755	11.53	30	Pass
	5795	11.08	30	Pass
802.11ac80	5775	11.07	30	Pass
802.11ax20	5745	12.75	30	Pass
	5785	12.33	30	Pass
	5825	11.84	30	Pass
802.11ax40	5755	11.46	30	Pass
	5795	10.91	30	Pass
802.11ax80	5775	10.70	30	Pass

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8. 6dB&26dB Bandwidth Measurement

8.1 Provisions Applicable

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

8.2 Measurement Procedure

◆ -6dB bandwidth (DTS bandwidth) Test setting:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on operation frequency individually.
3. Set RBW = 100kHz.
4. Set the VBW $\geq 3 \times$ RBW. Detector = Peak. Trace mode = max hold.
5. Measure the maximum width of the emission that is 6 dB down from the peak of the emission.

◆ 99% occupied bandwidth test setting:

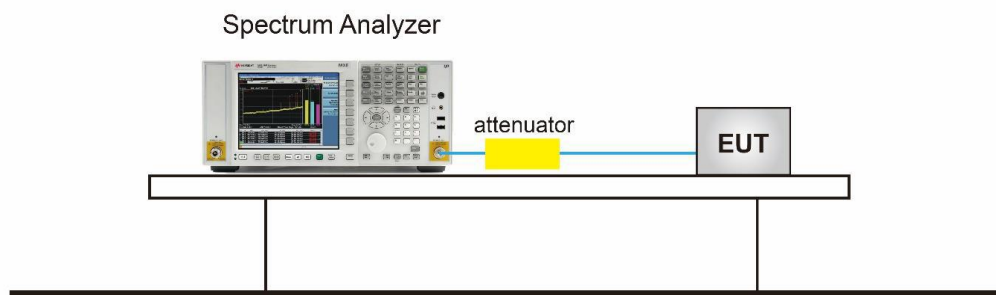
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW and video bandwidth (VBW) shall be approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

◆ -26dB Bandwidth test setting:

1. Set RBW = approximately 1% of the emission bandwidth.
2. Set the VBW > RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Measure the maximum width of the emission that is 26 dB down from the maximum of the emission.
Compare this with the RBW setting of the analyzer. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is approximately 1%.

Note: The EUT was tested according to KDB 789033 for compliance to FCC 47CFR 15.407 requirements.

8.3 Measurement Setup (Block Diagram of Configuration)



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8.4 Measurement Results

Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz-ANT 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.578	21.122	N/A	Pass
	5200	16.581	21.189	N/A	Pass
	5240	16.559	20.929	N/A	Pass
802.11n20	5180	17.756	21.193	N/A	Pass
	5200	17.726	21.353	N/A	Pass
	5240	17.722	21.319	N/A	Pass
802.11n40	5190	36.266	39.895	N/A	Pass
	5230	36.242	39.641	N/A	Pass
802.11ac20	5180	17.711	21.504	N/A	Pass
	5200	17.734	21.117	N/A	Pass
	5240	17.765	21.227	N/A	Pass
802.11ac40	5190	36.262	39.658	N/A	Pass
	5230	36.310	39.609	N/A	Pass
802.11ac80	5210	75.795	81.620	N/A	Pass
802.11ax20	5180	18.891	21.300	N/A	Pass
	5200	18.893	21.361	N/A	Pass
	5240	18.882	21.245	N/A	Pass
802.11ax40	5190	37.558	39.884	N/A	Pass
	5230	37.572	39.800	N/A	Pass
802.11ax80	5210	77.076	80.882	N/A	Pass

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Test Data of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz-ANT 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	-26dB Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5180	16.585	21.410	N/A	Pass
	5200	16.562	20.920	N/A	Pass
	5240	16.592	21.262	N/A	Pass
802.11n20	5180	17.738	21.401	N/A	Pass
	5200	17.712	21.170	N/A	Pass
	5240	17.727	21.364	N/A	Pass
802.11n40	5190	36.265	39.570	N/A	Pass
	5230	36.292	39.727	N/A	Pass
802.11ac20	5180	17.761	21.365	N/A	Pass
	5200	17.743	21.244	N/A	Pass
	5240	17.714	21.147	N/A	Pass
802.11ac40	5190	36.254	40.020	N/A	Pass
	5230	36.260	39.754	N/A	Pass
802.11ac80	5210	75.904	81.099	N/A	Pass
802.11ax20	5180	18.908	21.346	N/A	Pass
	5200	18.863	20.779	N/A	Pass
	5240	18.916	20.819	N/A	Pass
802.11ax40	5190	37.539	39.820	N/A	Pass
	5230	37.576	40.091	N/A	Pass
802.11ax80	5210	77.102	80.905	N/A	Pass

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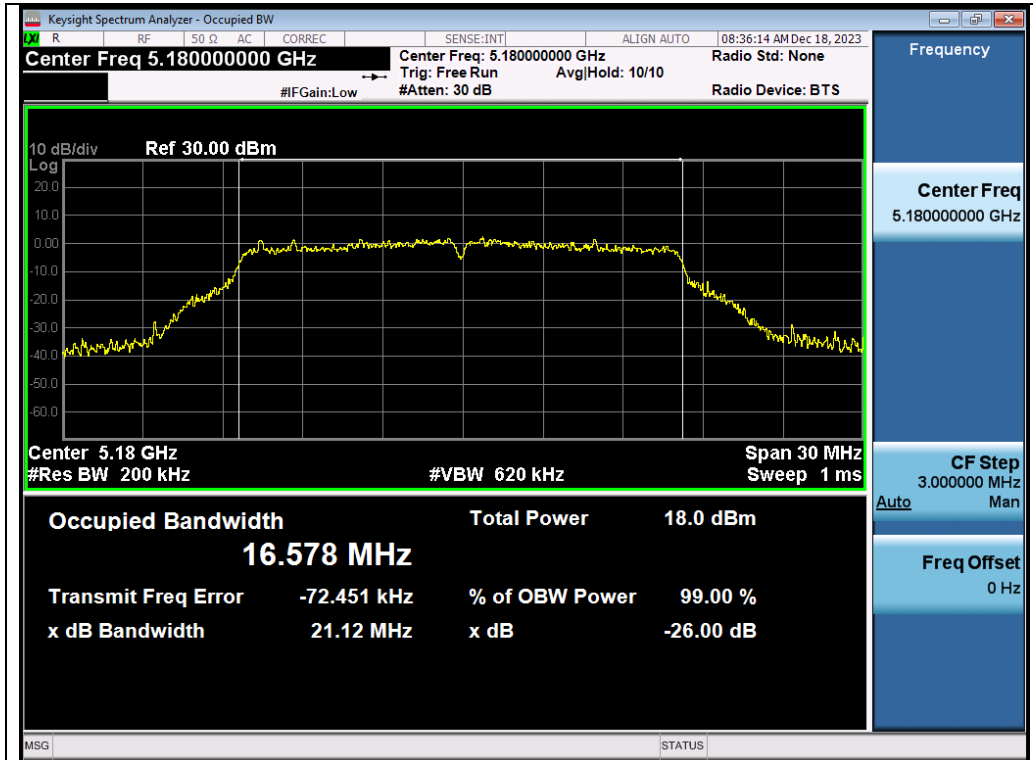
Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz-ANT 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.578	16.350	0.5	Pass
	5785	16.600	16.344	0.5	Pass
	5825	16.612	16.311	0.5	Pass
802.11n20	5745	17.708	17.258	0.5	Pass
	5785	17.755	17.519	0.5	Pass
	5825	17.732	17.528	0.5	Pass
802.11n40	5755	36.274	36.356	0.5	Pass
	5795	36.223	36.319	0.5	Pass
802.11ac20	5745	17.741	17.559	0.5	Pass
	5785	17.748	17.553	0.5	Pass
	5825	17.742	17.538	0.5	Pass
802.11ac40	5755	36.277	36.375	0.5	Pass
	5795	36.254	36.434	0.5	Pass
802.11ac80	5775	75.878	76.431	0.5	Pass
802.11ax20	5180	18.908	18.424	0.5	Pass
	5200	18.866	18.041	0.5	Pass
	5240	18.908	16.695	0.5	Pass
802.11ax40	5190	37.608	37.553	0.5	Pass
	5230	37.592	37.431	0.5	Pass
802.11ax80	5210	77.145	77.442	0.5	Pass

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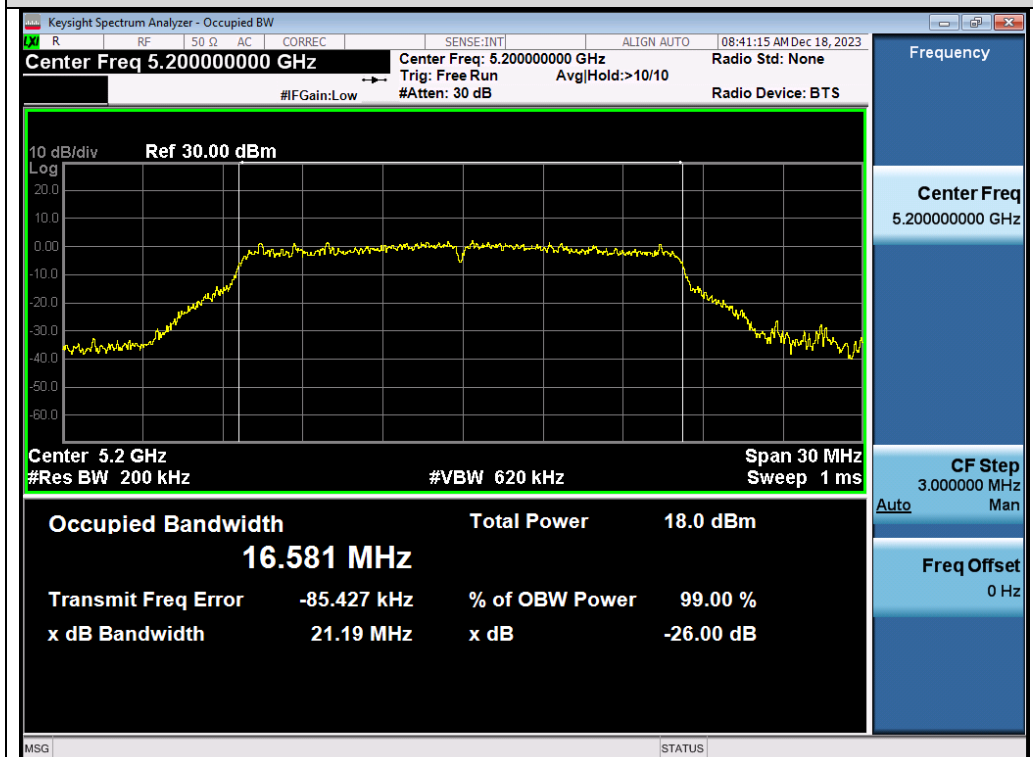
Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz-ANT 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.647	16.307	0.5	Pass
	5785	16.583	16.287	0.5	Pass
	5825	16.617	16.331	0.5	Pass
802.11n20	5745	17.734	17.566	0.5	Pass
	5785	17.776	17.570	0.5	Pass
	5825	17.786	16.949	0.5	Pass
802.11n40	5755	36.283	36.351	0.5	Pass
	5795	36.249	36.348	0.5	Pass
802.11ac20	5745	17.757	17.557	0.5	Pass
	5785	17.756	17.534	0.5	Pass
	5825	17.721	17.304	0.5	Pass
802.11ac40	5755	36.272	36.371	0.5	Pass
	5795	36.230	36.380	0.5	Pass
802.11ac80	5775	75.919	76.441	0.5	Pass
802.11ax20	5180	18.918	18.403	0.5	Pass
	5200	18.893	16.186	0.5	Pass
	5240	18.868	17.299	0.5	Pass
802.11ax40	5190	37.626	37.566	0.5	Pass
	5230	37.495	37.225	0.5	Pass
802.11ax80	5210	77.116	77.222	0.5	Pass

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Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz

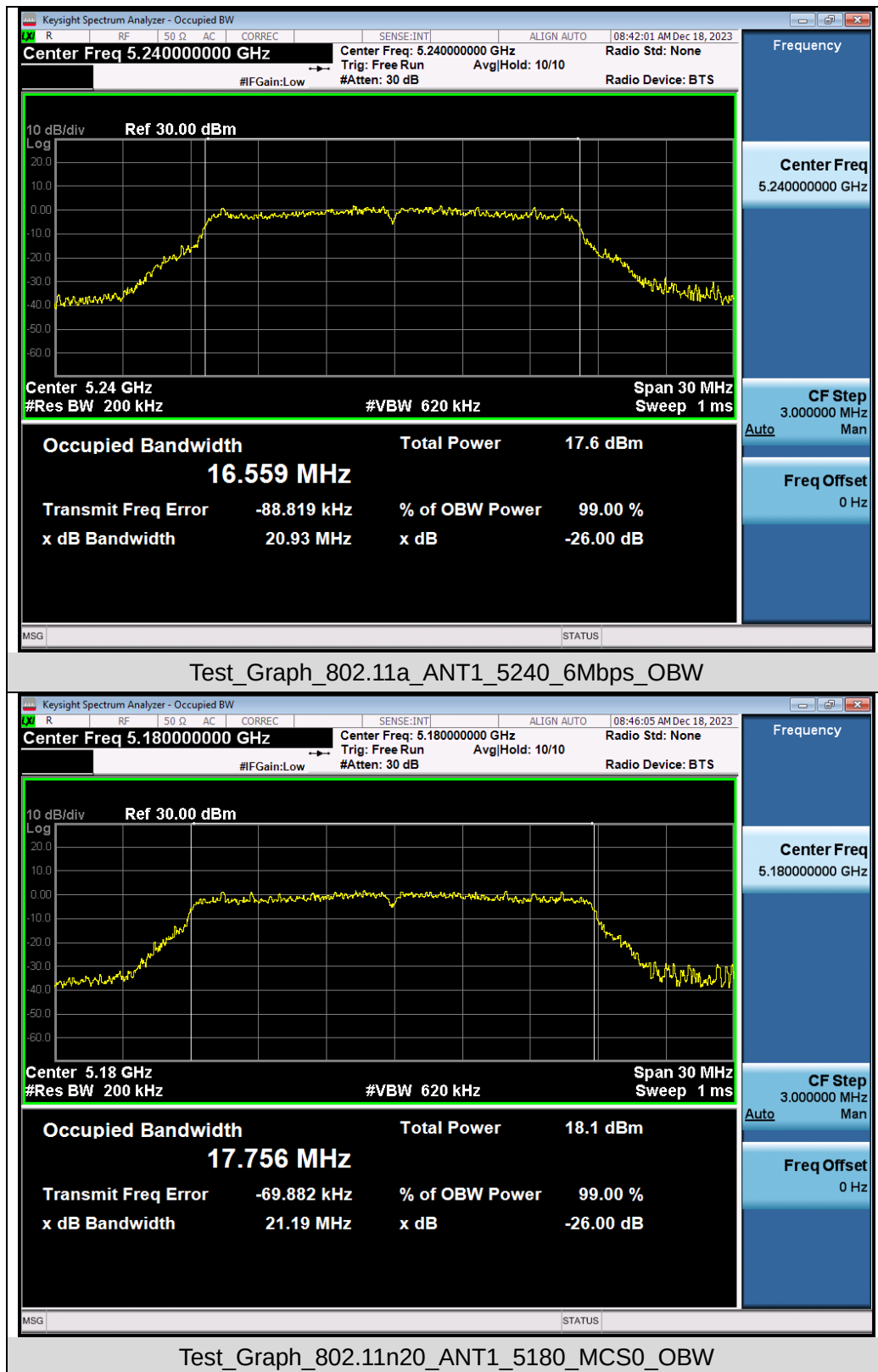


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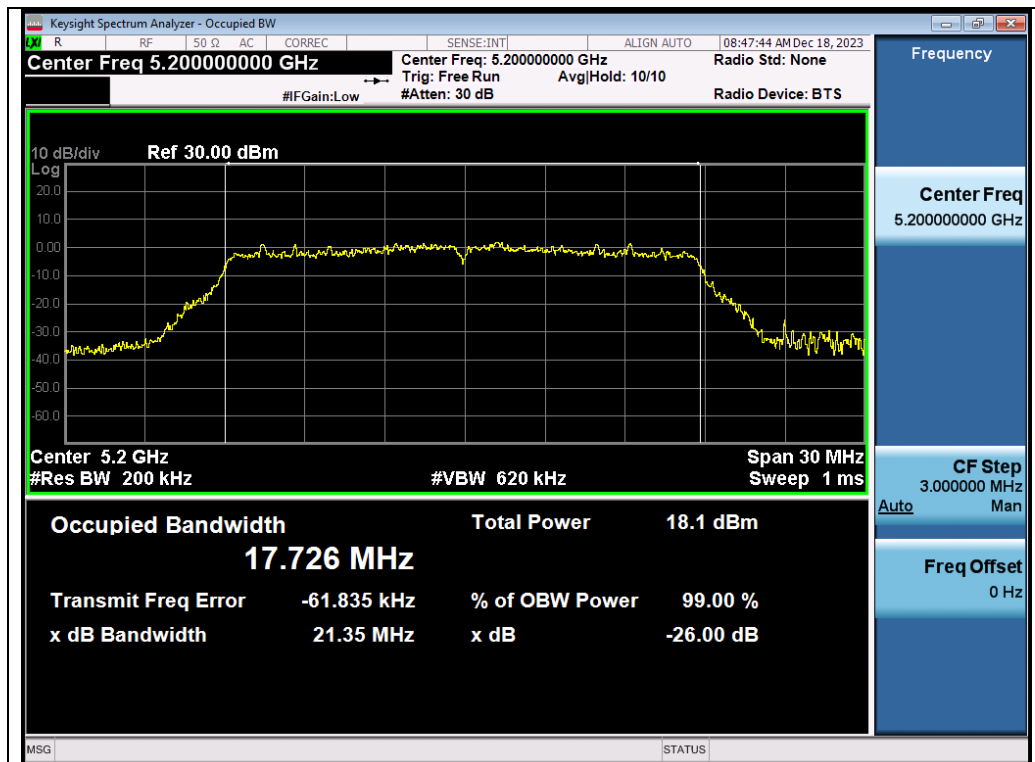


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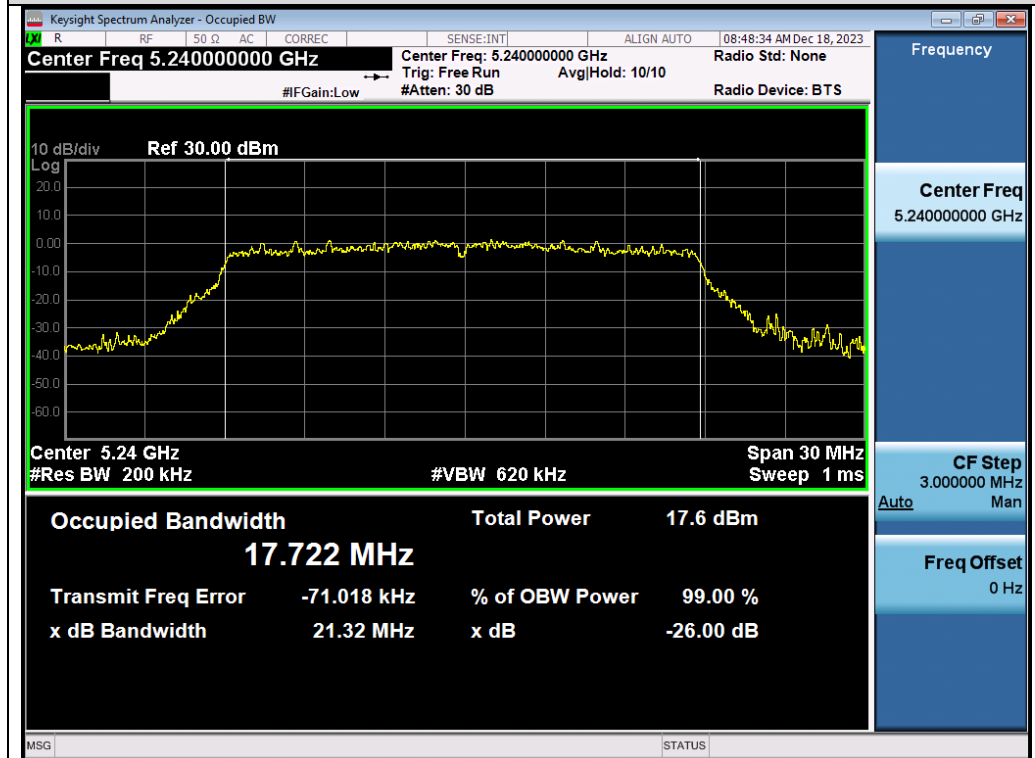
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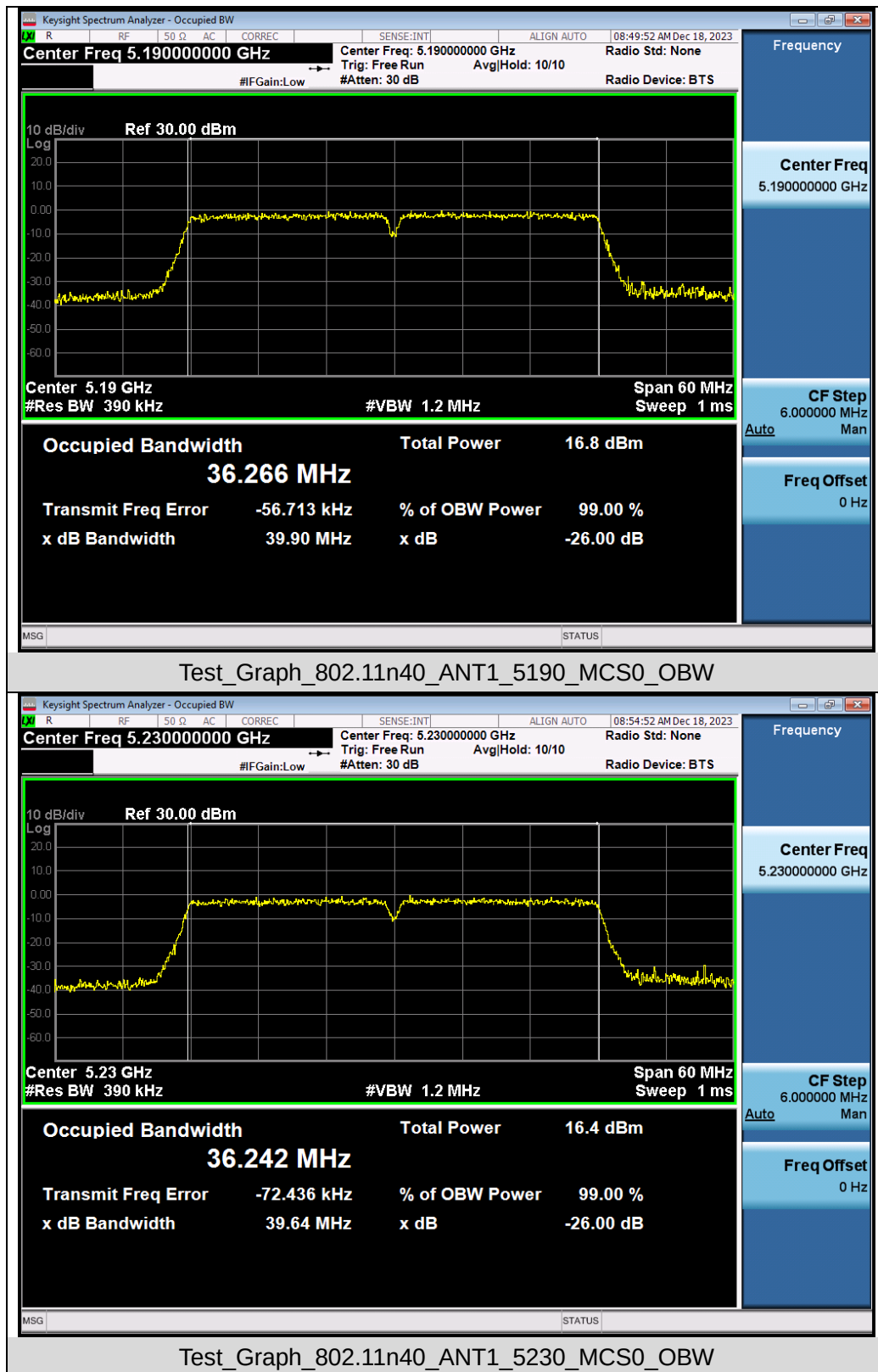
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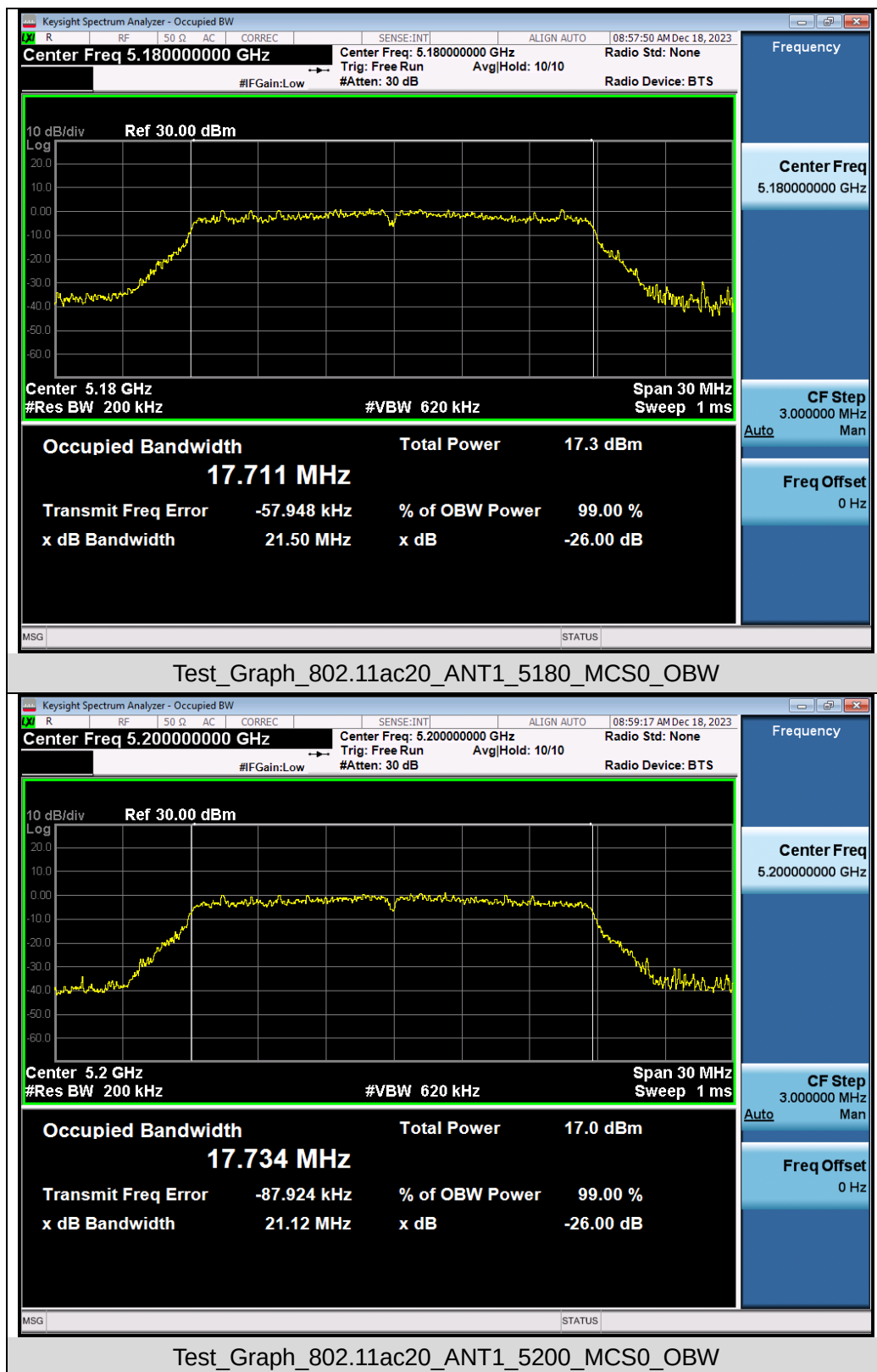
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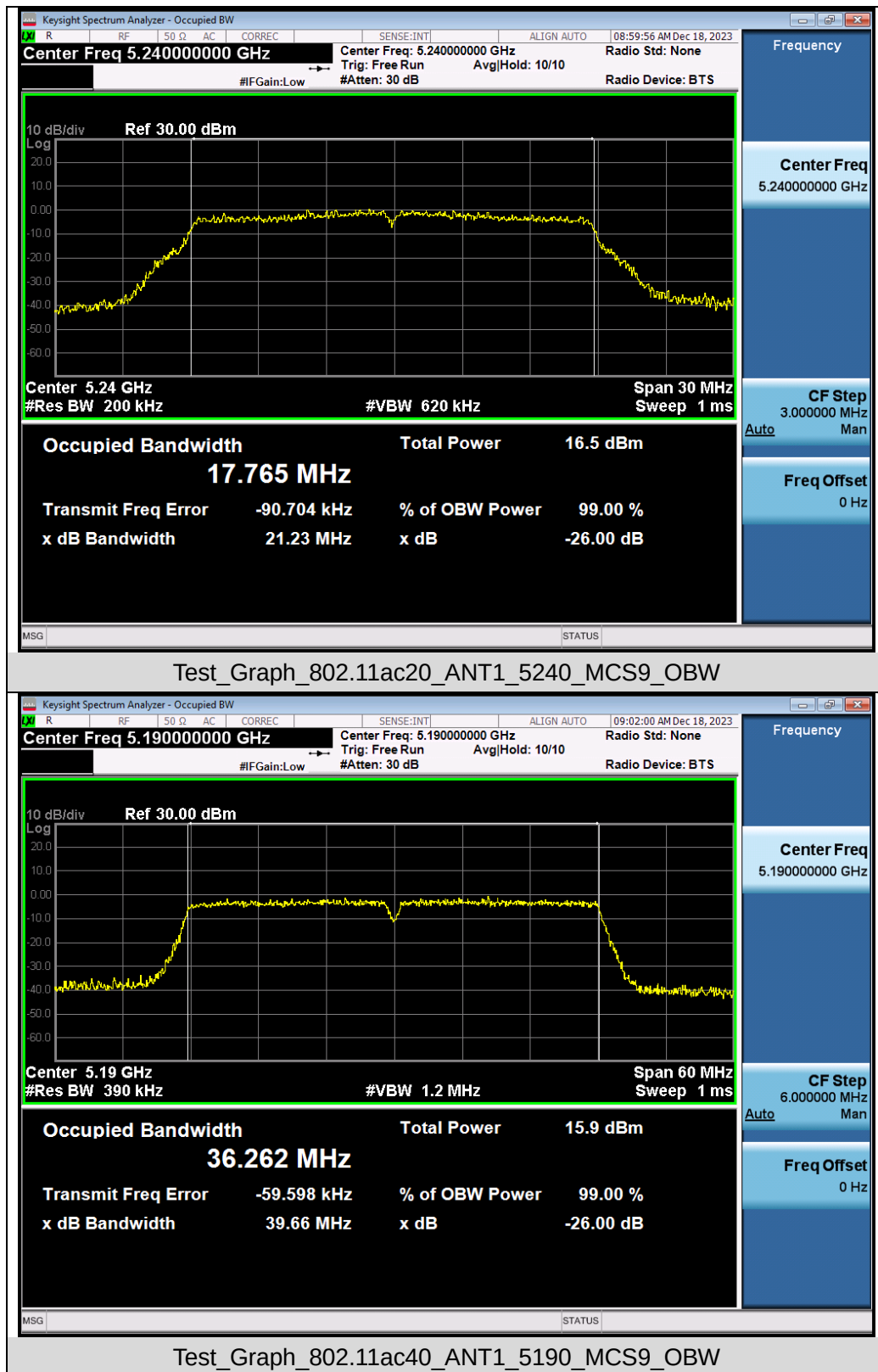
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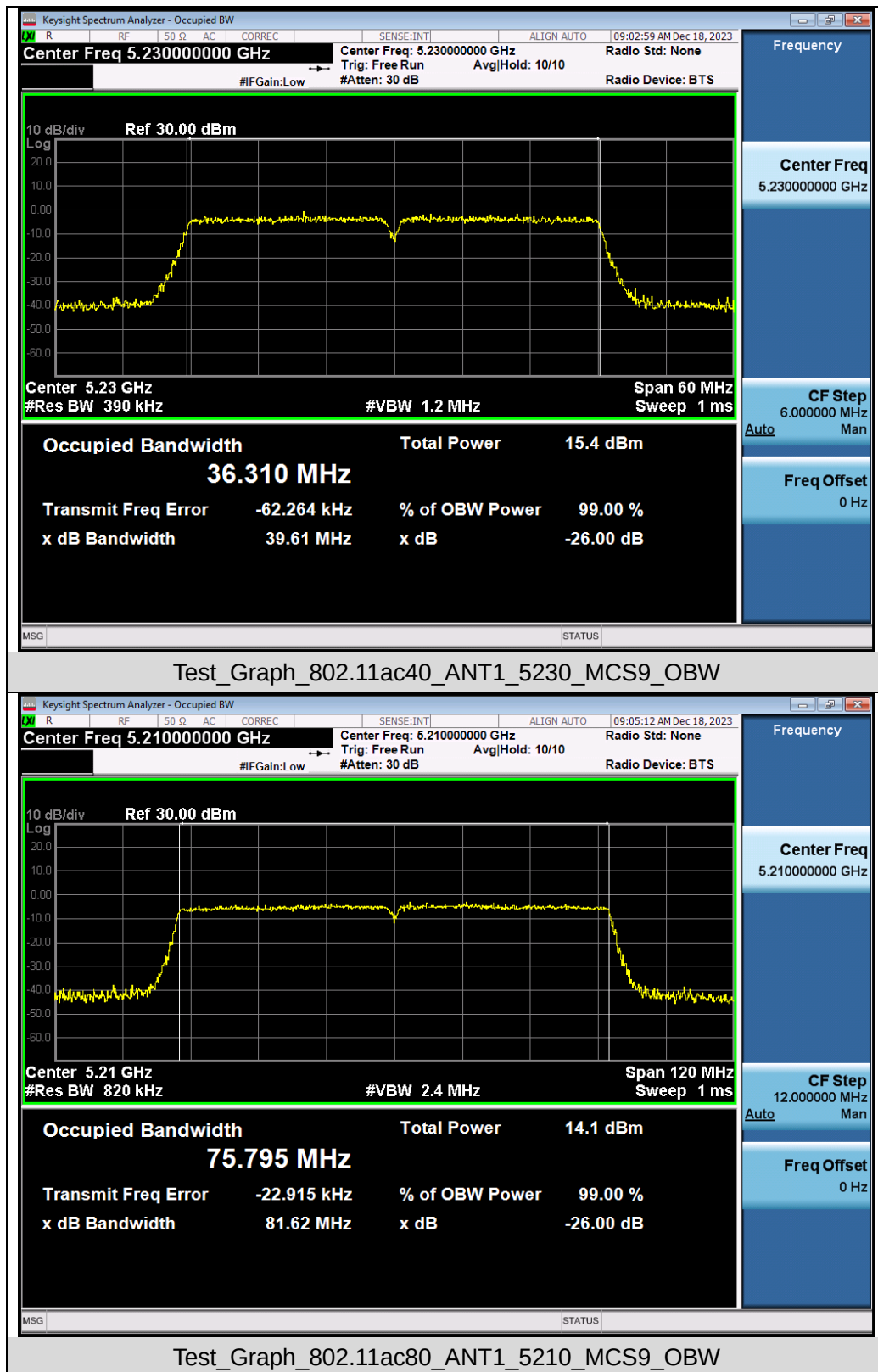
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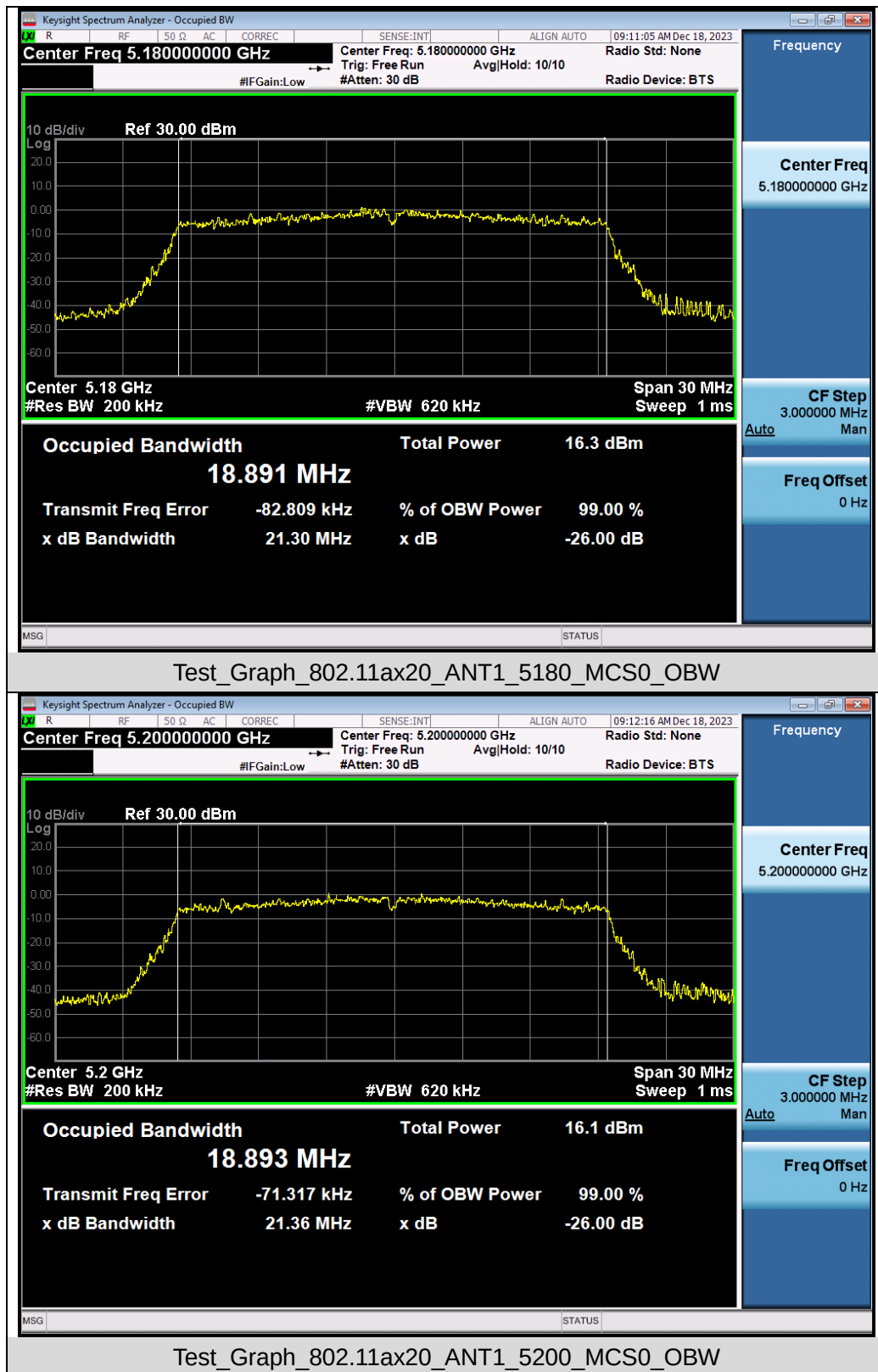
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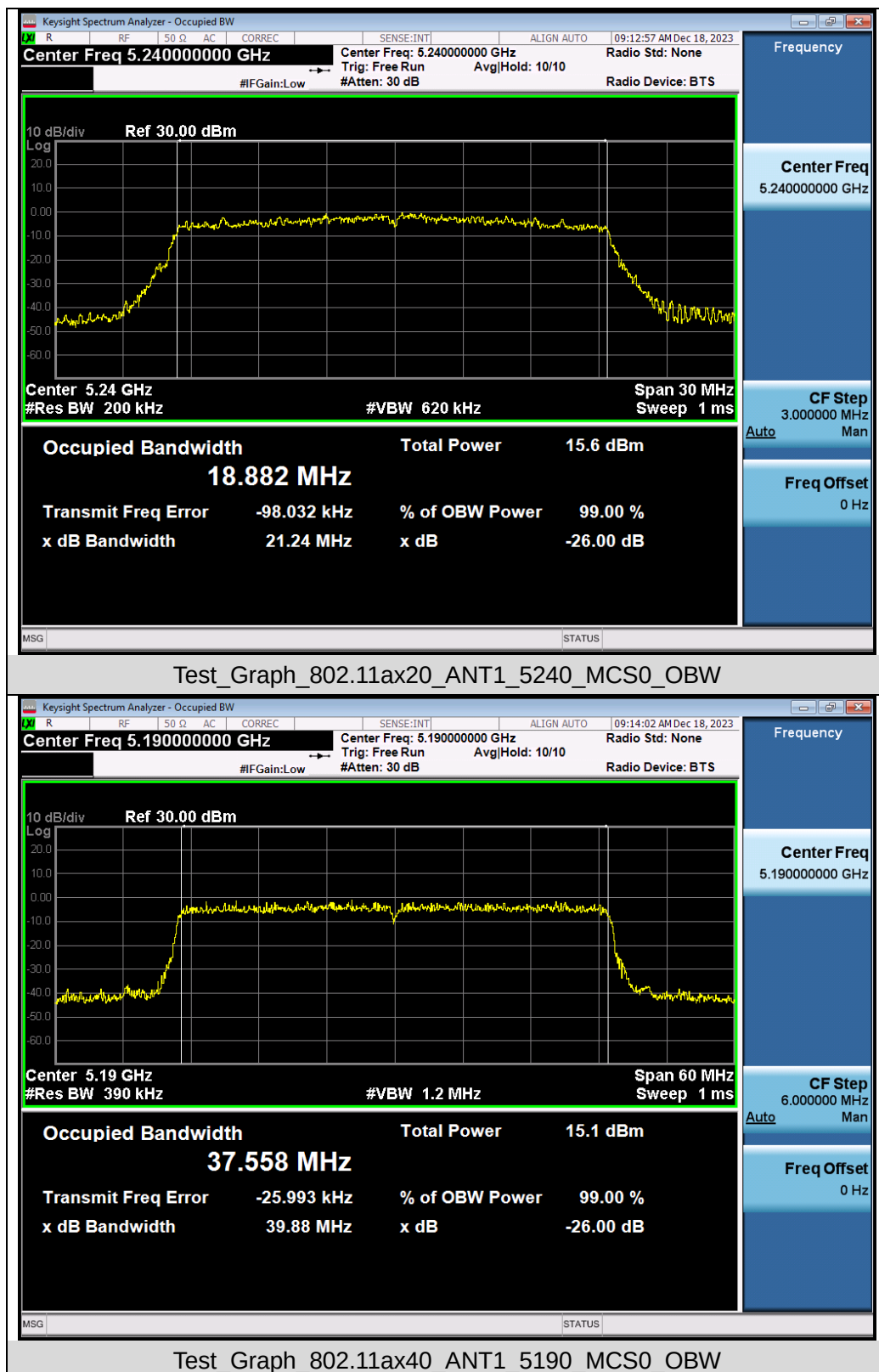
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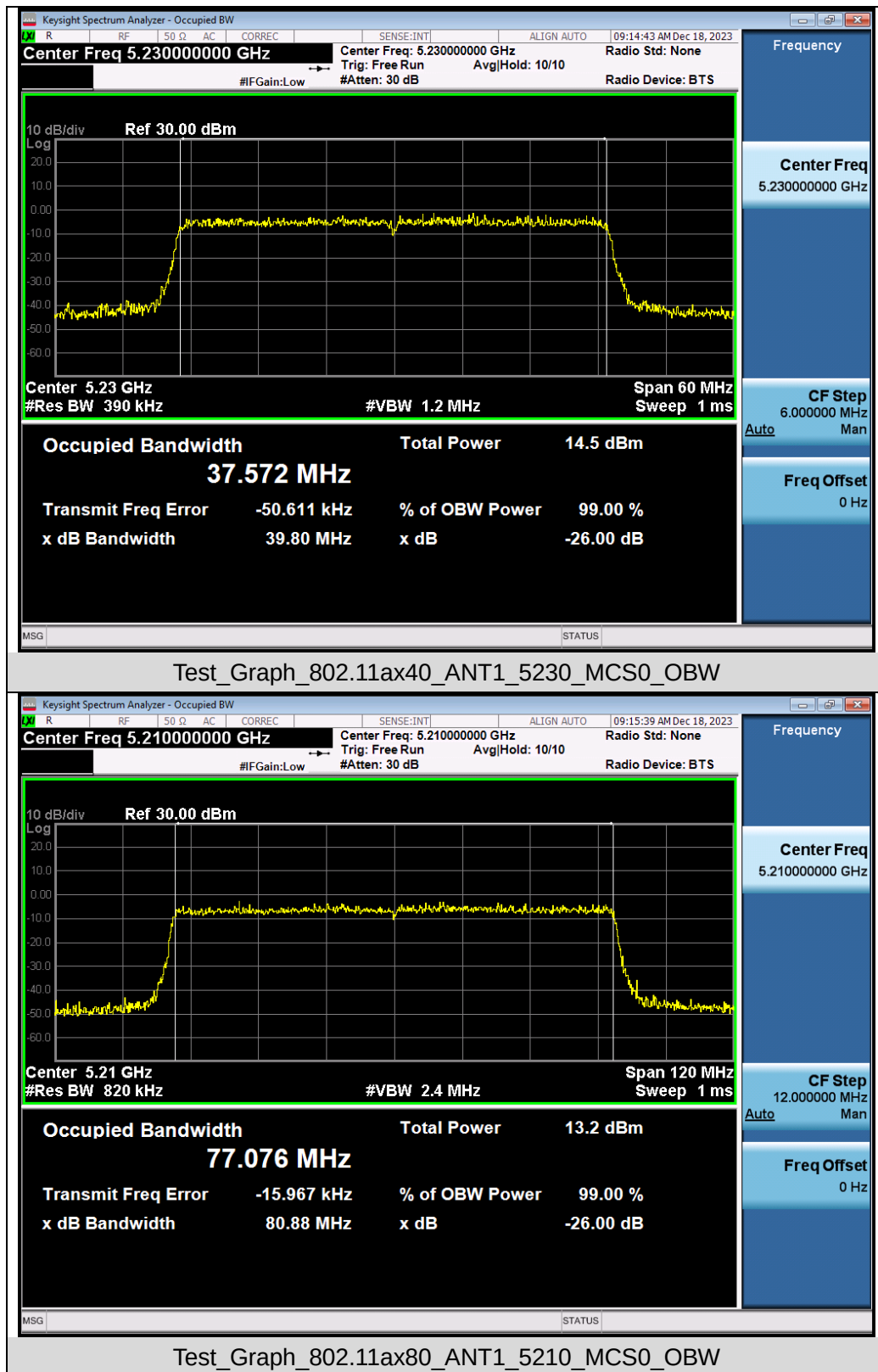
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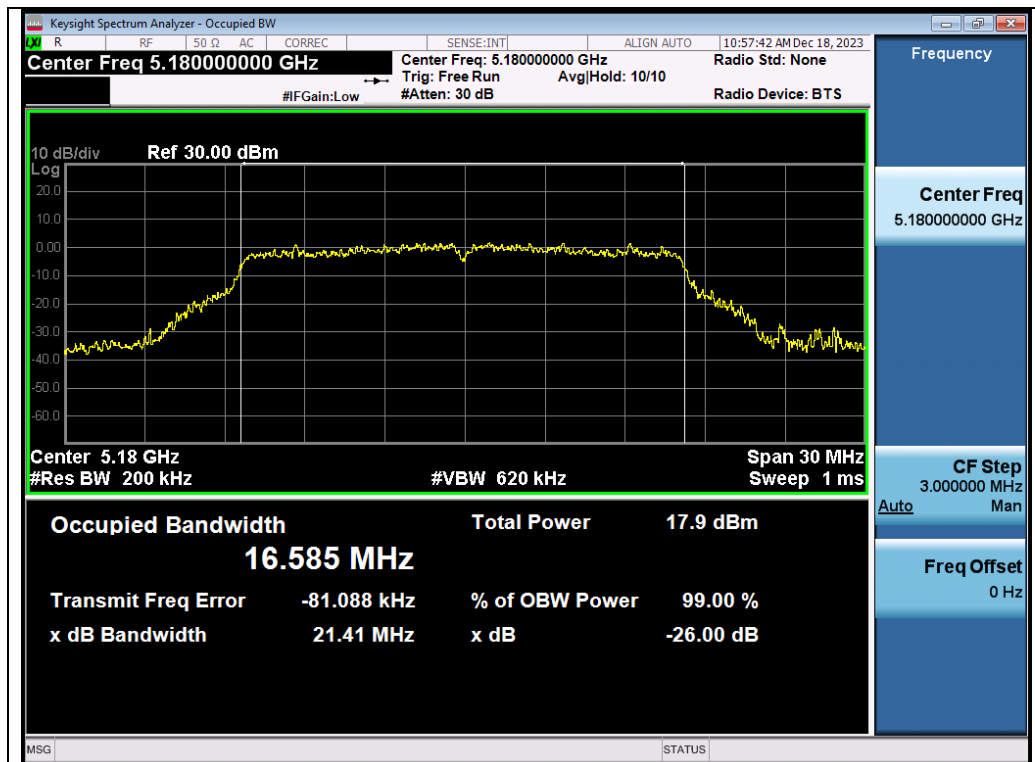
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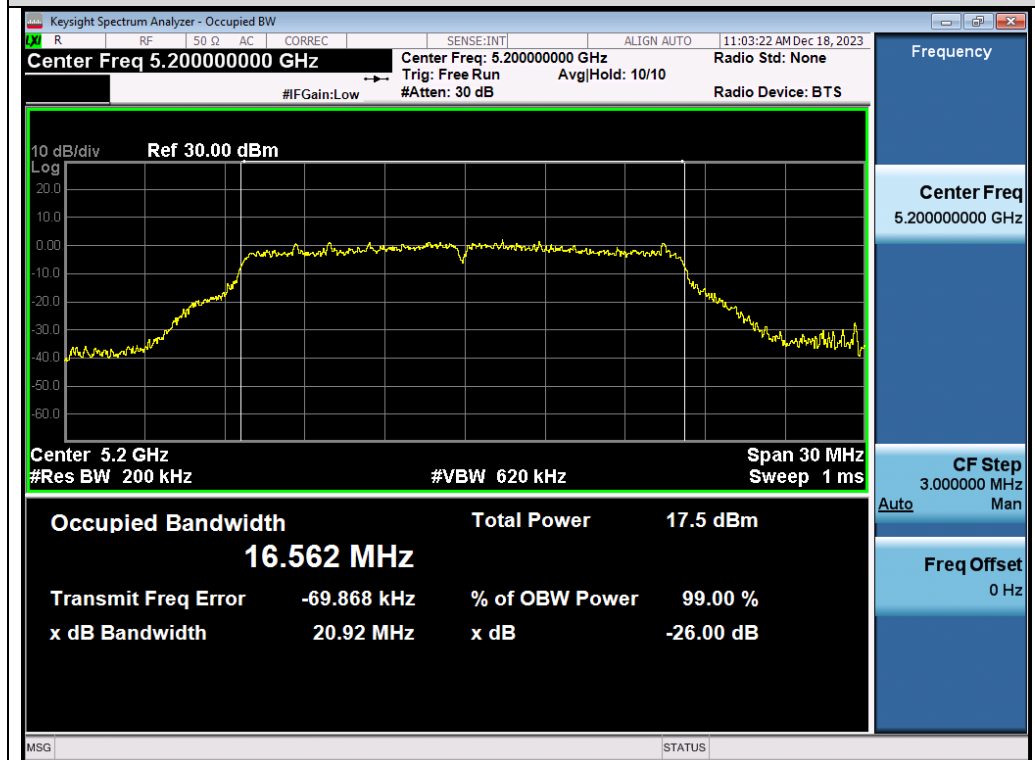
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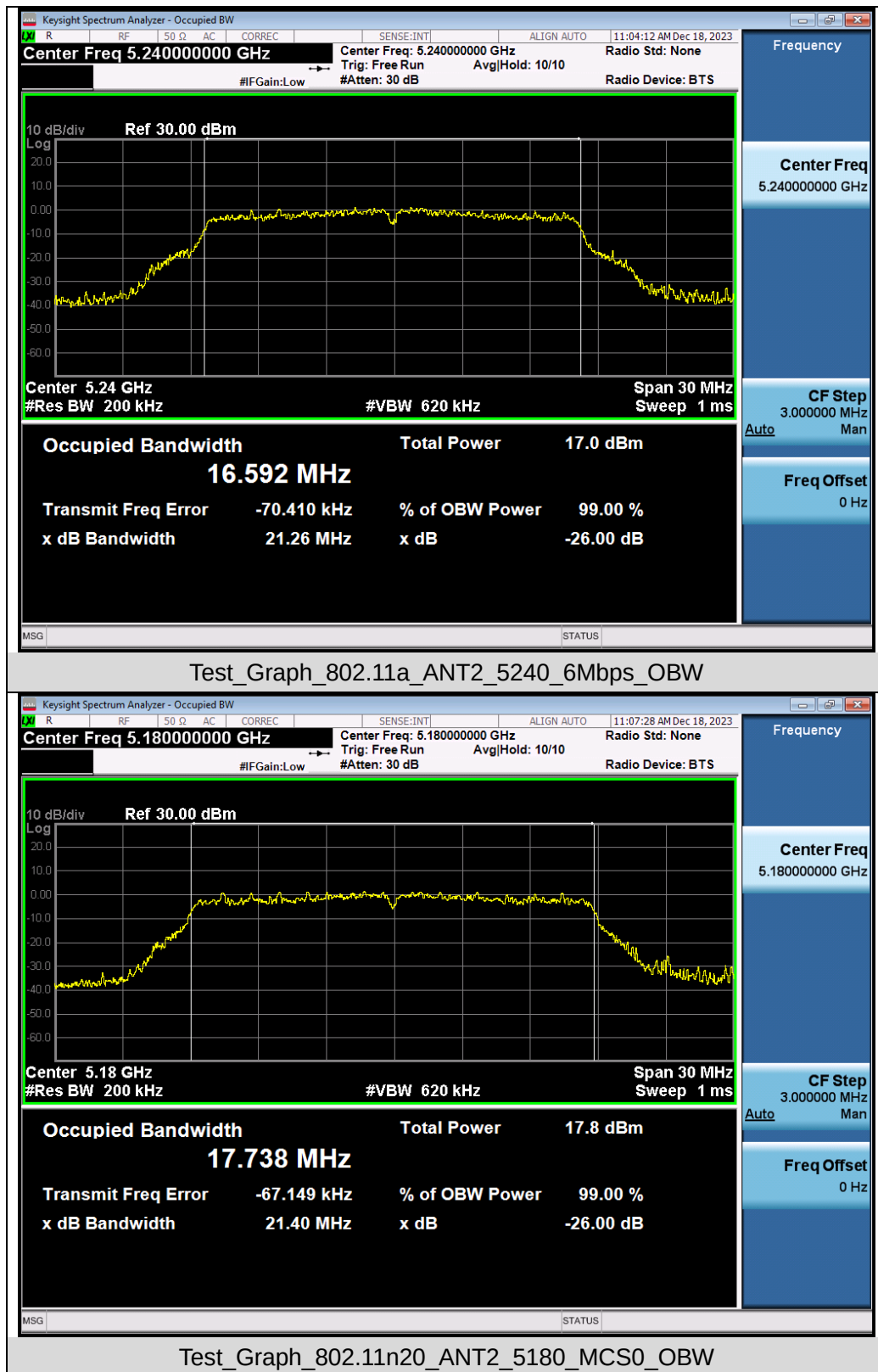


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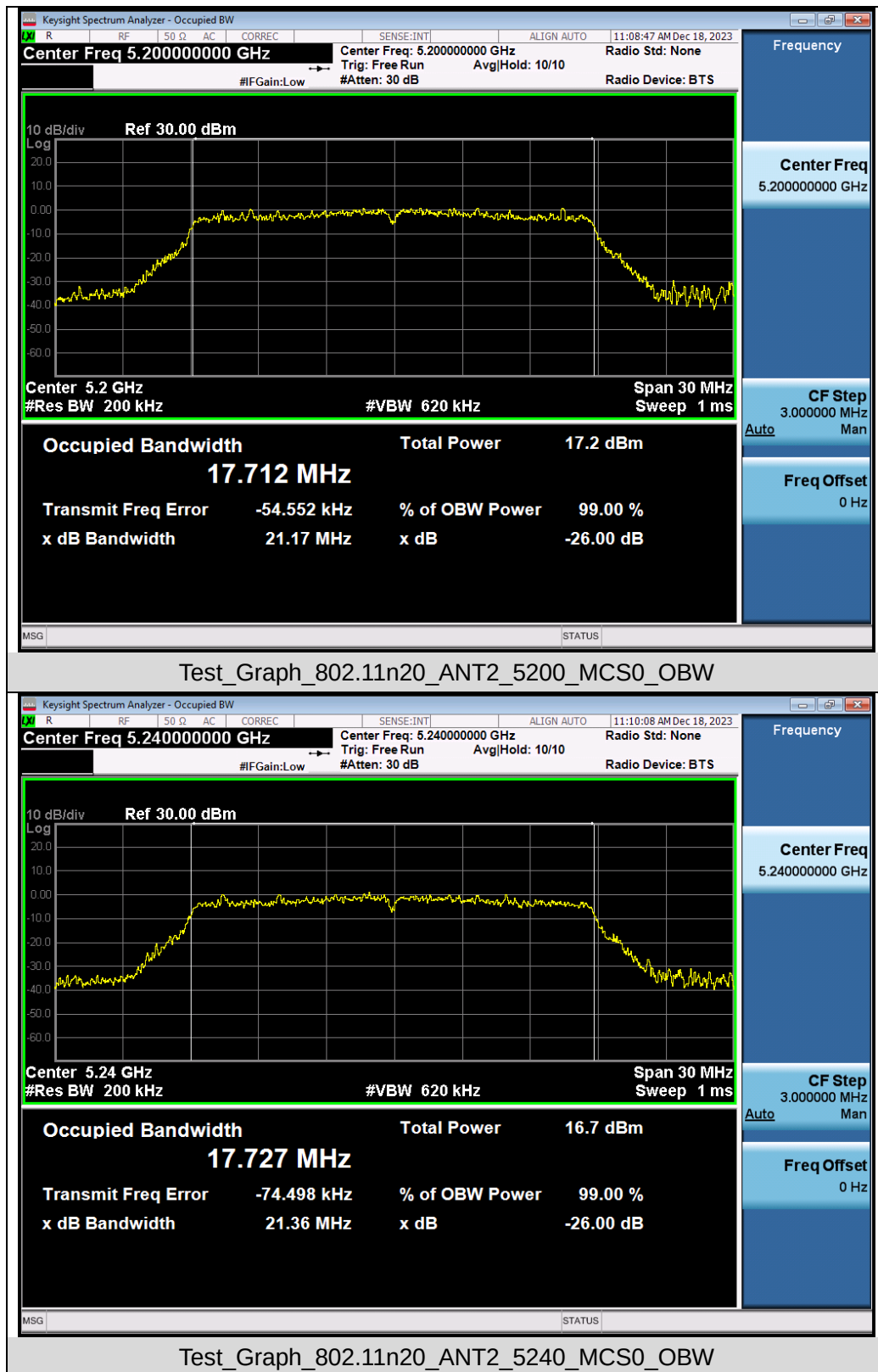


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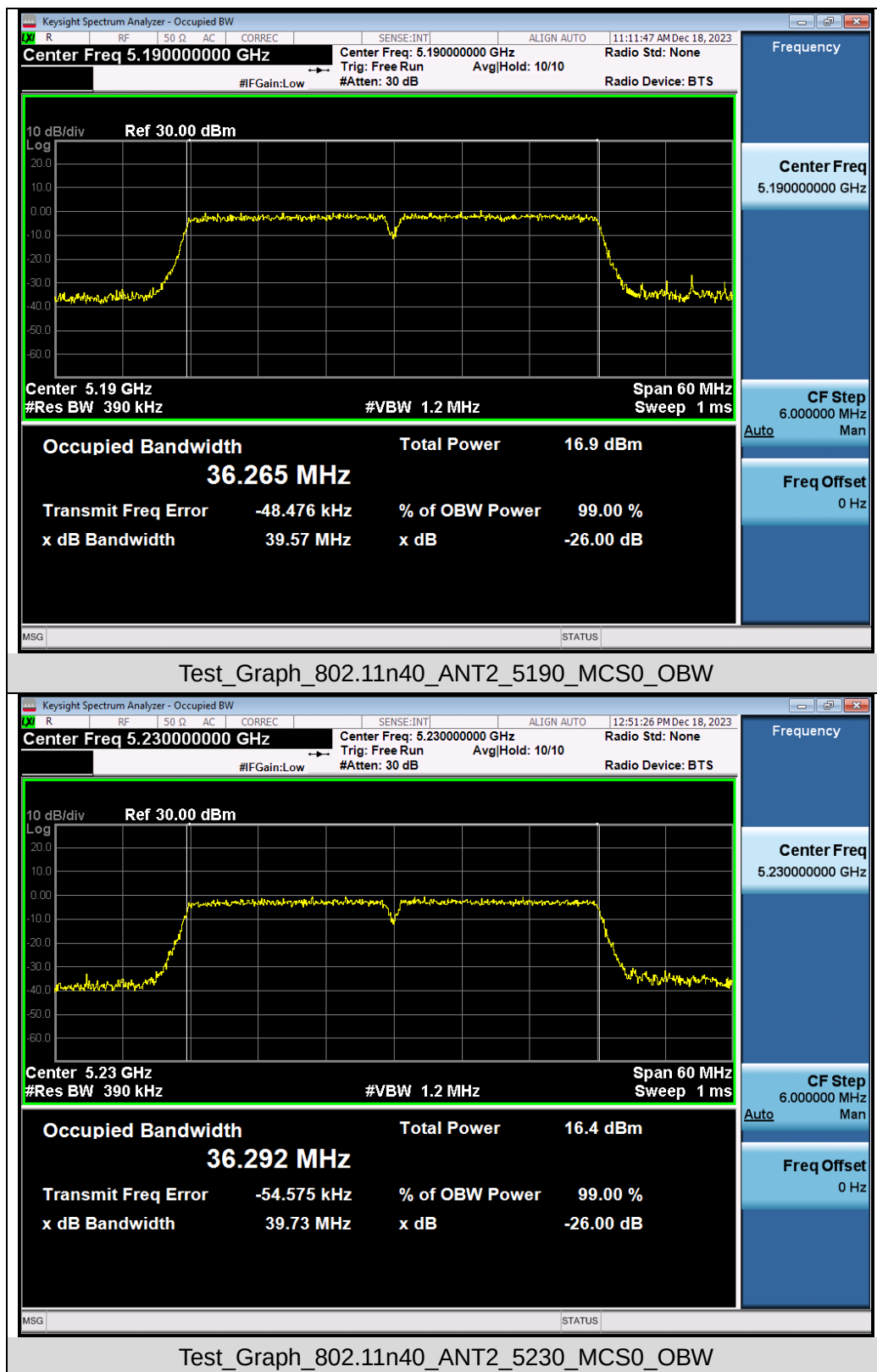
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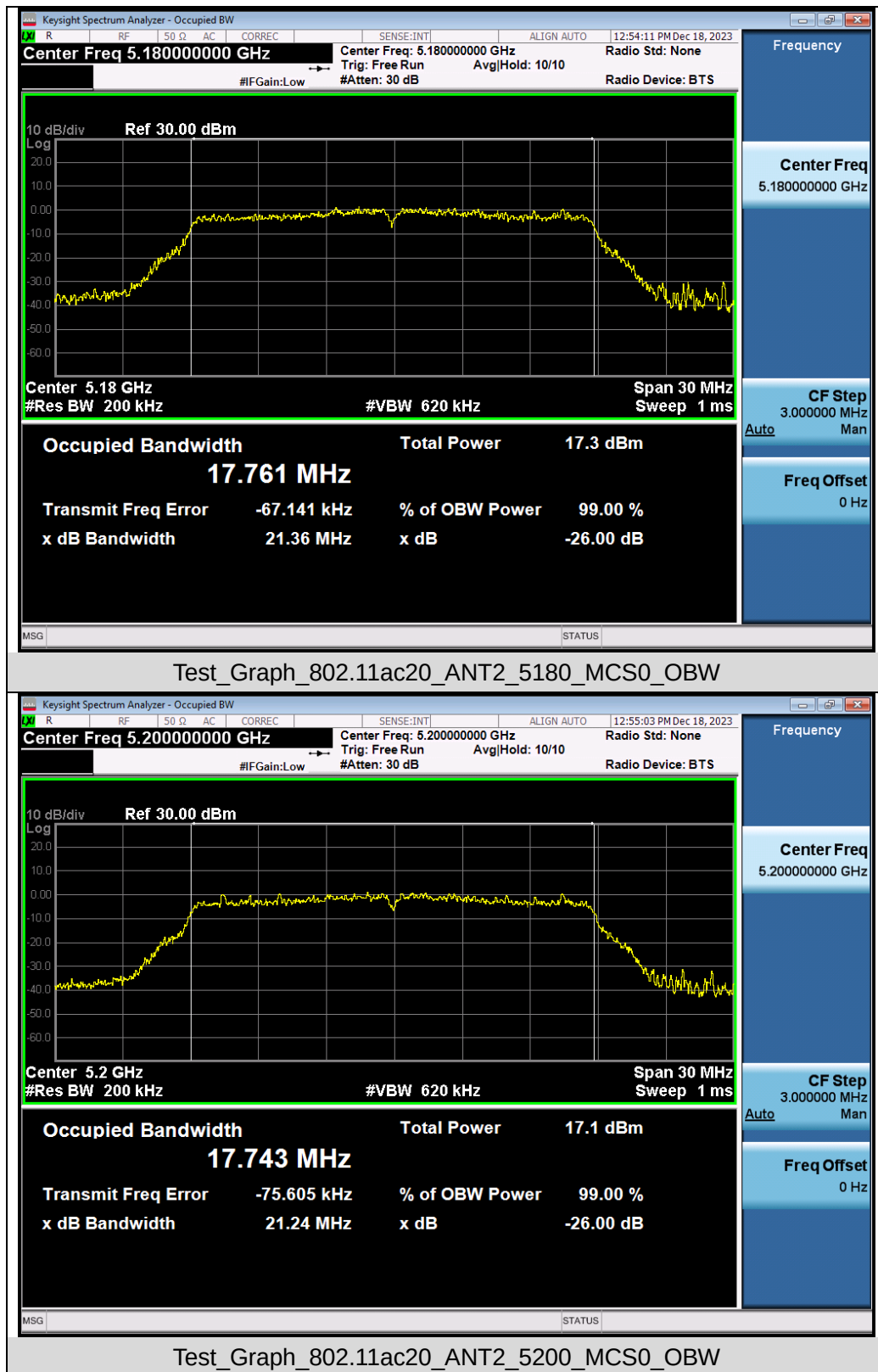


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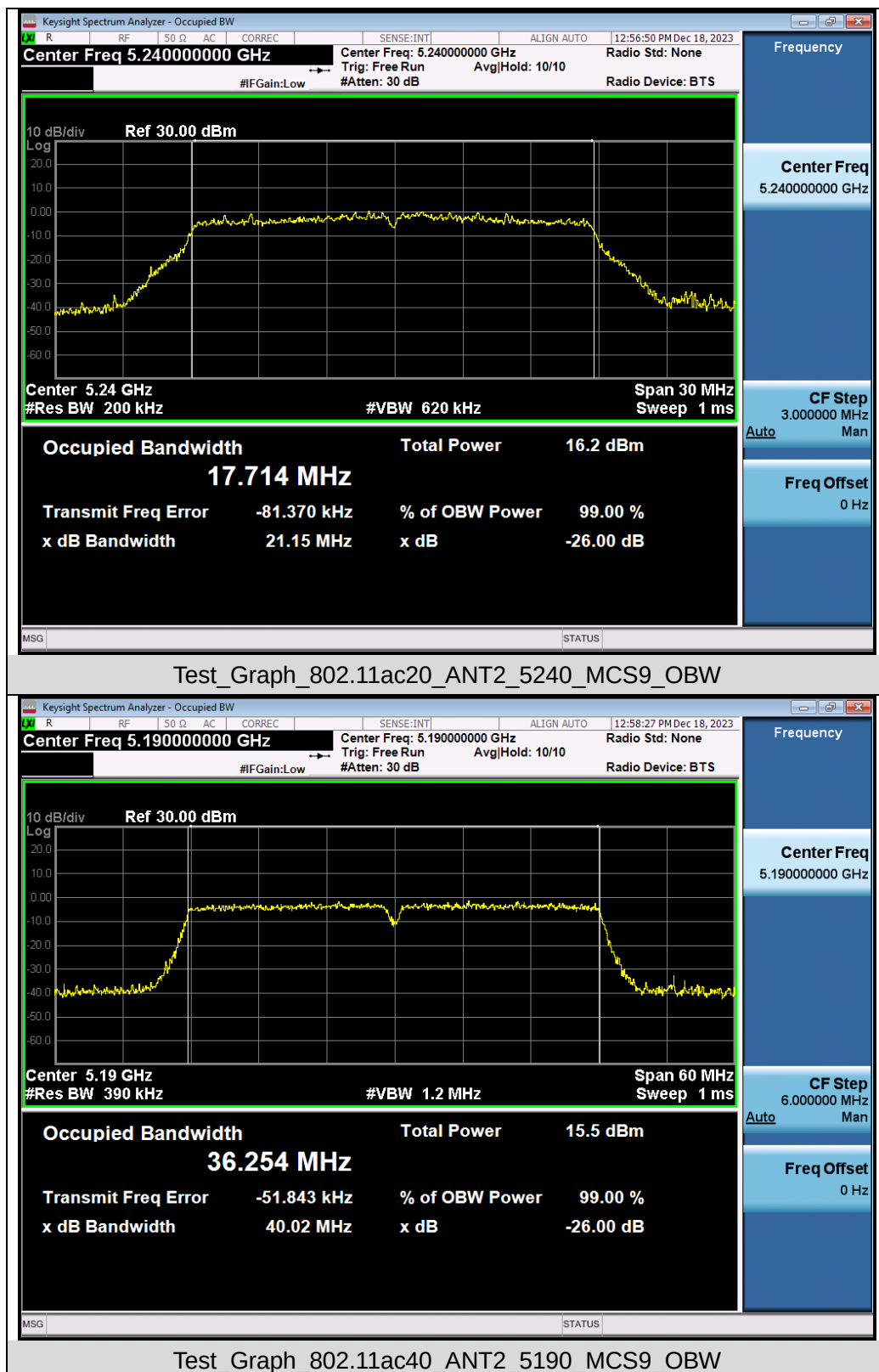


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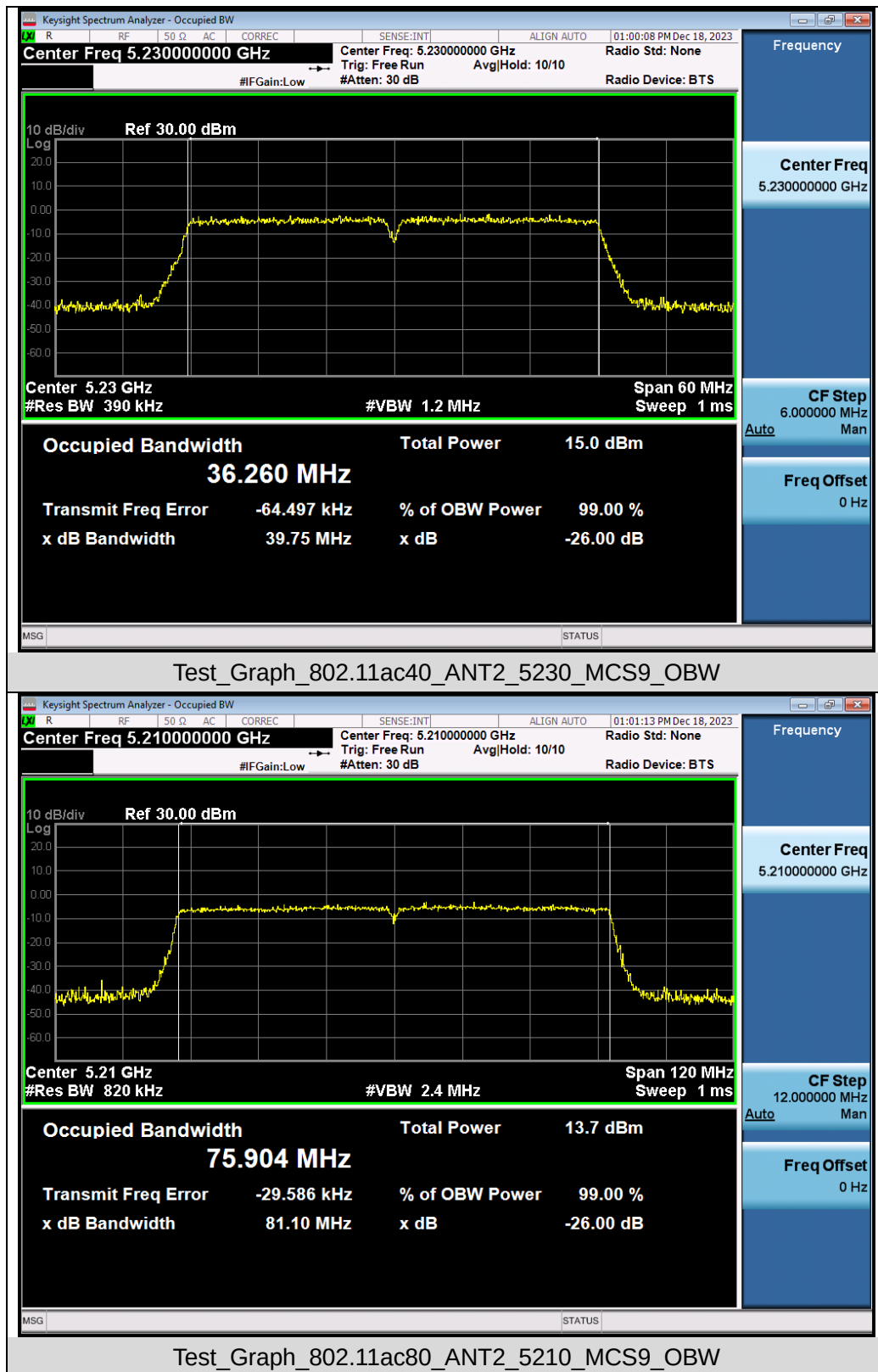
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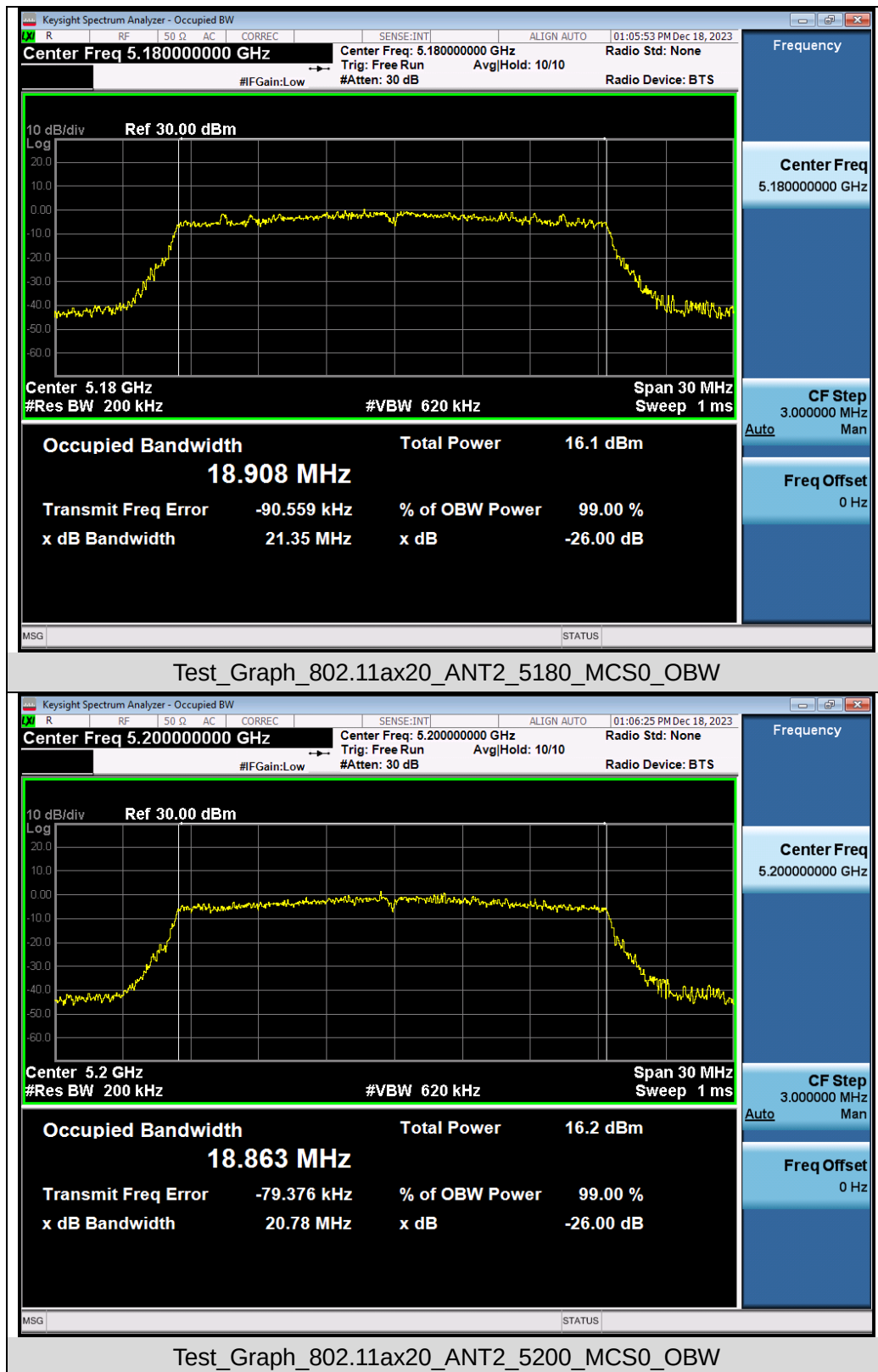
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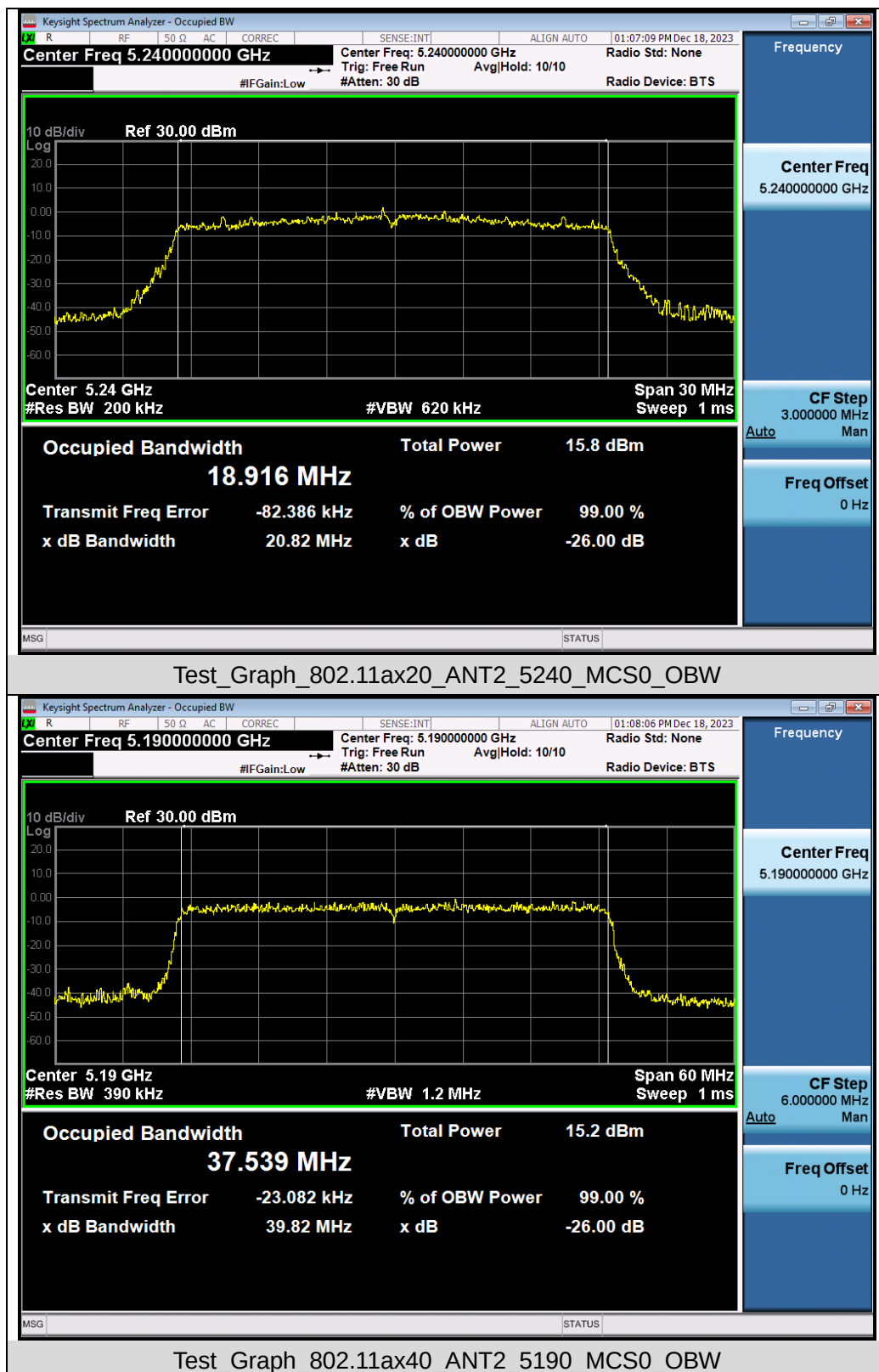


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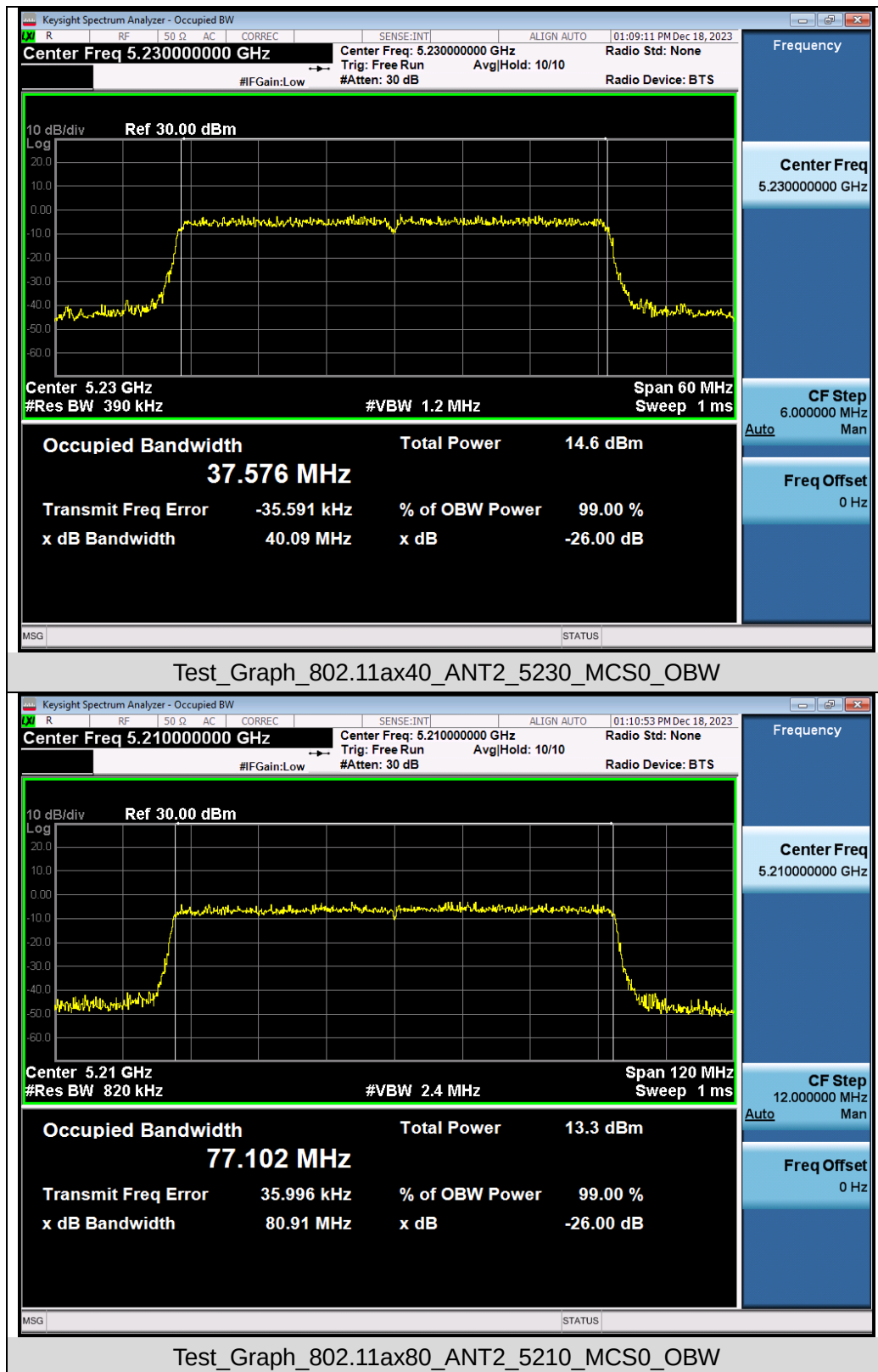


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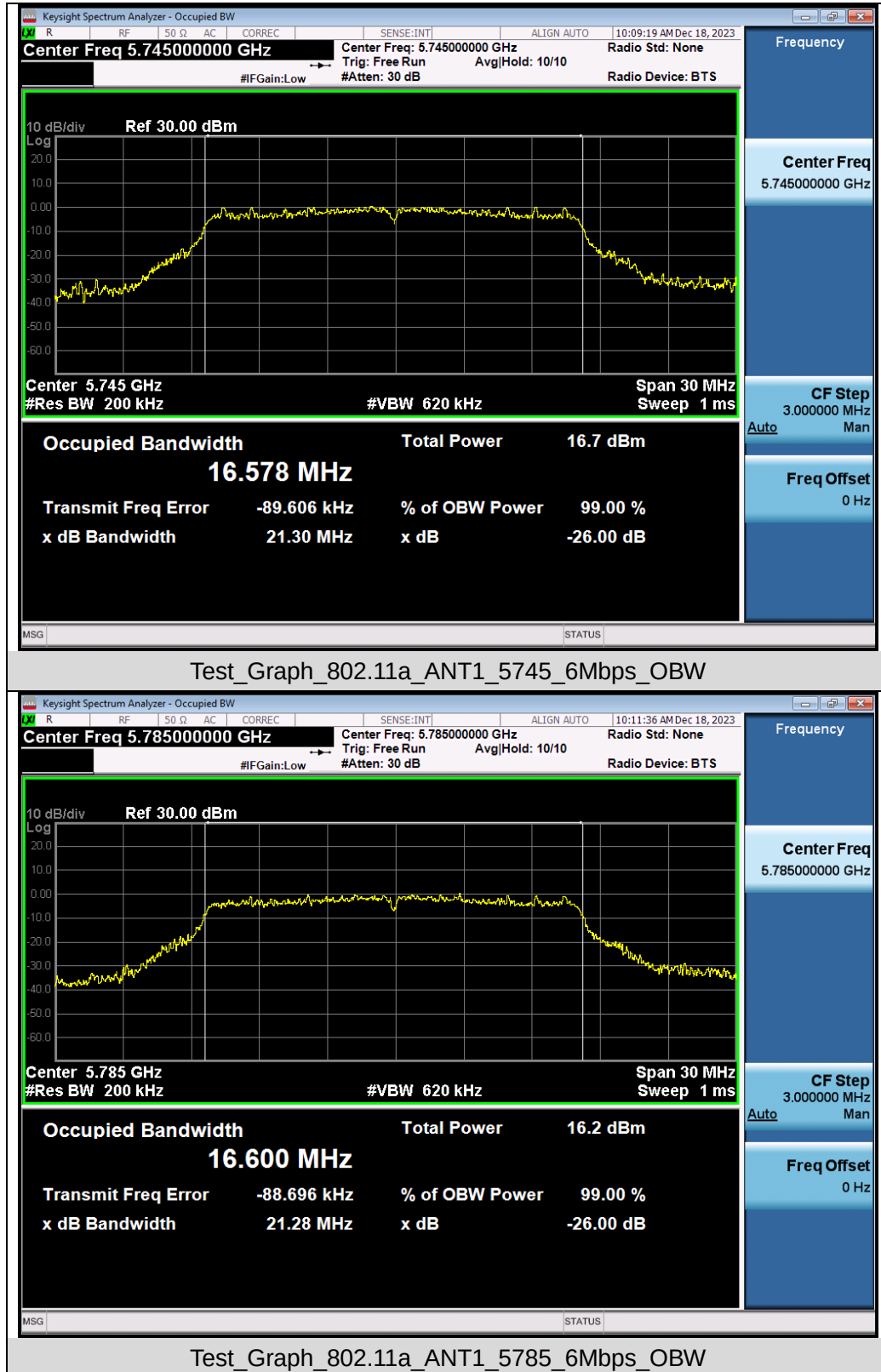


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Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.745-5.825 GHz



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