
FCC Test Report

Report No.: AGC16253240402FR04

FCC ID : 2AOVU-SN6BKUB
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Set Top Box
BRAND NAME : N/A
MODEL NAME : SEI700B2MW, SN6BKXX(X=A-Z)
APPLICANT : Shenzhen SEI Robotics Co., Ltd
DATE OF ISSUE : May 14, 2024
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	/	May 14, 2024	Valid	Initial Release

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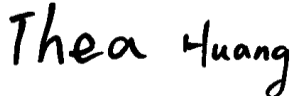
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1. General Information

Applicant	Shenzhen SEI Robotics Co., Ltd
Address	4th Floor, Productivity Building D, #5 Hi-Tech Middle 2nd Road, Shenzhen Hi-Tech Industrial Park, Nanshan District, Shenzhen, China
Manufacturer	Shenzhen SEI Robotics Co., Ltd
Address	4th Floor, Productivity Building D, #5 Hi-Tech Middle 2nd Road, Shenzhen Hi-Tech Industrial Park, Nanshan District, Shenzhen, China
Factory	Shenzhen SEI Robotics Co., Ltd
Address	4th Floor, Productivity Building D, #5 Hi-Tech Middle 2nd Road, Shenzhen Hi-Tech Industrial Park, Nanshan District, Shenzhen, China
Product Designation	Set Top Box
Brand Name	N/A
Test Model	SEI700B2MW
Series Model(s)	SN6BKXX(X=A-Z)
Difference Description	All the same except for the model name and appearance color.
Date of receipt of test item	Apr. 16, 2024
Date of Test	Apr. 16, 2024~ May 14, 2024
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		
	Thea Huang (Project Engineer)	May 14, 2024
Reviewed By		
	Calvin Liu (Reviewer)	May 14, 2024
Approved By		
	Max Zhang Authorized Officer	May 14, 2024

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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 2C:5470MHz~5725MHz	☐ U-NII 2A: 5250MHz~5350MHz ☒ U-NII 3: 5725MHz~5850MHz
DFS Design Type	☐ Master ☐ Slave with radar detection ☒ Slave without radar detection	
TPC Function	☐ Yes ☒ No	
Hardware Version	SMB.316.02	
Software Version	Android R (v11.7.6673)	
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):13.64dBm; IEEE 802.11n(HT20):13.58dBm; IEEE802.11n(HT40):12.25dBm; IEEE 802.11ac(VHT20):14.99dBm; IEEE802.11ac(VHT40):13.10dBm; IEEE802.11ac(VHT80):12.25dBm;	
RF Output Power_MIMO	IEEE 802.11nHT(20):14.92 dBm;IEEE802.11n(HT40):14.31dBm IEEE 802.11ac(VHT20):16.33dBm; IEEE802.11ac(VHT40):14.99dBm; IEEE802.11ac(VHT80):13.76dBm;	
Modulation	802.11a/n:(64-QAM, 16-QAM, QPSK, BPSK) OFDM 802.11ac :(256-QAM, 64-QAM, 16-QAM, QPSK, BPSK) OFDM	
Data Rate	802.11a:6/9/12/18/24/36/48/54Mbps; 802.11n:up to 300Mbps; 802.11ac:up to 866.6Mbps;	
Number of channels	7 channels of U-NII-1 Band 8 channels of U- NII 3 Band	
Antenna Designation	PCB onboard antenna	
Antenna Gain	Refer to Chapter 2.10 of the report.	
Power Supply	DC 12V by battery	

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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):

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):

Channel	Frequency	Channel	Frequency
38	5190 MHz	46	5230 MHz

1 channel is provided for 802.11ac (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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2.5 Related Submittal(S) / Grant (S)

This submittal(s) (test report) is intended for **FCC ID: 2AOVU-SN6BKUB** 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

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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 PCB Antenna List (5GHz 2*2 MIMO)						
PCB Antenna	5150 ~ 5250	2	20,40,80	-3.123	-7.824	-0.113
	5725 ~ 5850	2	20,40,80	-4.272	-2.085	0.925

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:

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

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

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

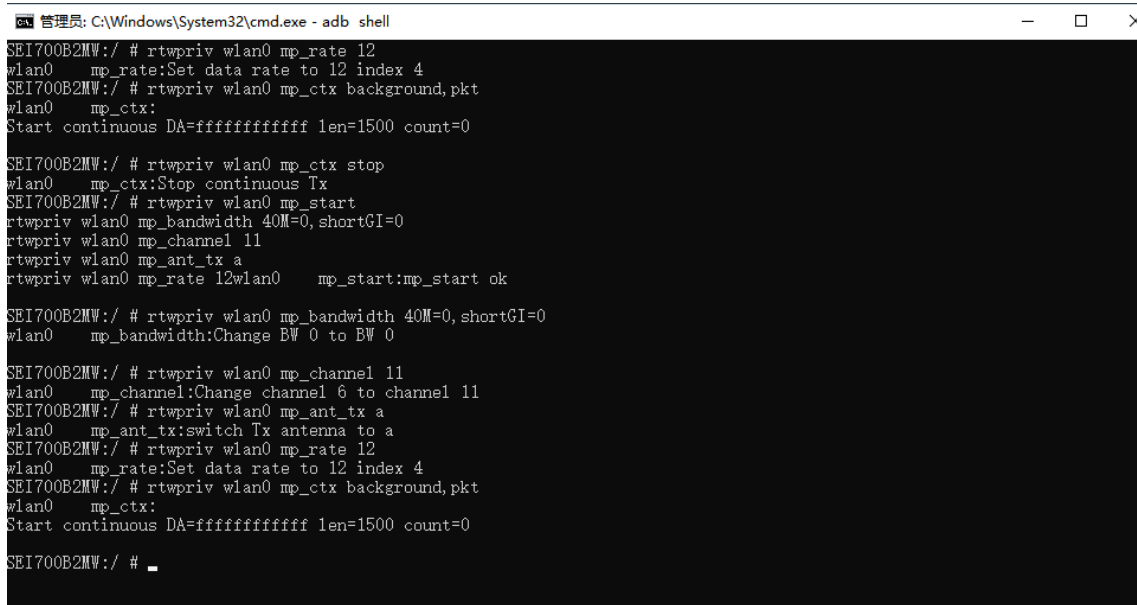
If antenna gains are not equal, Directional gain may be calculated by using the formulas applicable to equal gain antennas with G_{ANT} set equal to the gain of the antenna having the highest gain.

2.11 Description of Test Software

For IEEE 802.11 mode:

The test utility software used during testing was “cmd”

Software Setting Diagram



```

管理员: C:\Windows\System32\cmd.exe - adb shell
SEI700B2MW:/ # rtwpriv wlan0 mp_rate 12
wlan0 mp_rate:Set data rate to 12 index 4
SEI700B2MW:/ # rtwpriv wlan0 mp_ctx background,pkt
wlan0 mp_ctx:
Start continuous DA=ffffffff len=1500 count=0

SEI700B2MW:/ # rtwpriv wlan0 mp_ctx stop
wlan0 mp_ctx:Stop continuous Tx
SEI700B2MW:/ # rtwpriv wlan0 mp_start
rtwpriv wlan0 mp_bandwidth 40M=0,shortGI=0
rtwpriv wlan0 mp_channel 11
rtwpriv wlan0 mp_ant_tx a
rtwpriv wlan0 mp_rate 12wlan0 mp_start:mp_start ok

SEI700B2MW:/ # rtwpriv wlan0 mp_bandwidth 40M=0,shortGI=0
wlan0 mp_bandwidth:Change BW 0 to BW 0

SEI700B2MW:/ # rtwpriv wlan0 mp_channel 11
wlan0 mp_channel:Change channel 6 to channel 11
SEI700B2MW:/ # rtwpriv wlan0 mp_ant_tx a
wlan0 mp_ant_tx:switch Tx antenna to a
SEI700B2MW:/ # rtwpriv wlan0 mp_rate 12
wlan0 mp_rate:Set data rate to 12 index 4
SEI700B2MW:/ # rtwpriv wlan0 mp_ctx background,pkt
wlan0 mp_ctx:
Start continuous DA=ffffffff len=1500 count=0

SEI700B2MW:/ # .
  
```

Test Mode	Channel	Power Index	
		Chain 0	Chain 1
802.11a	L/M/H	default	default
802.11n(HT20)	L/M/H	default	default
802.11n(HT40)	L/M/H	default	default
802.11ac(VHT20)	L/M/H	default	default
802.11ac(VHT40)	L/M/H	default	default
802.11ac(VHT80)	L/M/H	default	default

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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 12V

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	2024-02-01	2025-01-31
☒	AGC-ER-E063	Power Sensor	Agilent	U2021XA	MY54110009	2024-02-01	2025-01-31
☒	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	2024-02-01	2025-01-31
☒	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	2024-03-05	2026-03-04
☒	AGC-EM-E001	Wideband Antenna	SCHWARZBECK	VULB9168	D69250	2023-05-11	2025-05-10
☒	AGC-EM-E029	Broadband Ridged Horn Antenna	ETS	3117	00034609	2024-03-31	2025-03-30
☒	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-A119	2.4G Filter	SongYi	N/A	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-S001	CE Test System	R&S	ES-K1	V1.71
☒	AGC-EM-S003	RE Test System	FARA	EZ-EMC	VRA-03A
☒	AGC-ER-S012	BT/WIFI Test System	Tonscend	JS1120-2	2.6
☒	AGC-EM-S011	RSE Test System	Tonscend	TS+-Ver2.1(JS36-RSE)	4.0.0.0

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4. System Test Configuration

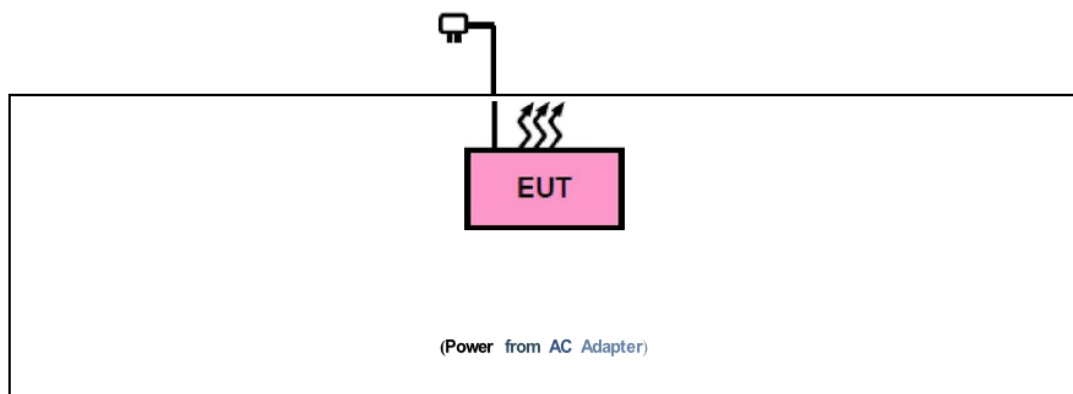
4.1 EUT Configuration

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					--
2					--

☒ Test Accessories Come From The Manufacturer

No.	Equipment	Model No.	Manufacturer	Specification Information	Cable
1	Adapter	F12L46-120100SPAU	CHENZHOUE FRECOM ELECTRONICS CO., LTD.	Input: AC100~240V.50/60Hz Output:DC12V/1.0A	--
2	USB Cable	--	--	--	--

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4.5 Summary of Test Results

Item	FCC Rules	Description Of Test	Result
1	RSS-Gen §6.8	Antenna Equipment	Pass
2	RSS-247 §6.2.1.1&6.2.4.1	RF Output Power	Pass
3	RSS-247 §6.2.4.1	6 dB Bandwidth	Pass
4	RSS-Gen §6.7	99% Occupied Bandwidth	Pass
5	RSS-247 §6.2.1.1&6.2.4.1	Power Spectral Density	Pass
6	RSS-247 §6.2.1.2&6.2.4.2	Conducted Band Edge and Out-of-Band Emissions	Pass
7	RSS-Gen §8.9 RSS-247 §6.2.1.2&6.2.4.2	Radiated Spurious Emission	Pass
8	RSS-Gen §8.8	AC Power Line Conducted Emission	Pass

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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 device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.
- ☒ 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)
A	802.11n (20MHz)	5180-5240	38 to 46	36, 40, 48	OFDM	MCS0
A	802.11n (20MHz)	5745-5825	149 to 165	149, 157, 165	OFDM	MCS0

● 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 device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.
- ☒ 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)
A	802.11ac(20MHz)	5745-5825	149 to 165	165	OFDM	MCS0

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● **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 device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.
- ☒ 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)
A	802.11ac(20MHz)	5745-5825	149 to 165	165	OFDM	MCS0

● **Band edge 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 device under test has multiple antennas. The mode that supports MIMO technology records the worst data, and the mode that does not support MIMO technology records antenna 1 as the worst data.
- ☒ 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)
A	802.11a	5180-5240	36 to 48	36, 40, 48	OFDM	6.0
A	802.11n (40MHz)		38 to 46	38, 46	OFDM	MCS9
A	802.11ac (80MHz)		42	42	OFDM	MCS9

● **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	802.11a	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

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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:

Operating mode	Data rates (Mbps)	Duty Cycle (%)	Duty Cycle Factor (dB)	1/ T Minimum VBW (kHz)	Average Factor (dB)
Band U-NII1:5150MHz-5250MHz					
802.11a	6	93.23	0.3	0.48	-0.61
802.11n_HT20	MCS0	91.26	0.4	0.52	-0.79
802.11n_HT40	MCS0	85.67	0.67	1.06	-1.34
802.11ac_VHT20	MCS0	90.2	0.45	0.52	-0.9
802.11ac_VHT40	MCS0	84.55	0.73	1.05	-1.46
802.11ac_VHT80	MCS0	73.84	1.32	2.17	-2.63
Band U-NII 3: 5725MHz-5850MHz					
802.11a	6	90.33	0.44	0.48	-0.88
802.11n_HT20	MCS0	95.29	0.21	0.52	-0.42
802.11n_HT40	MCS0	82.88	0.82	1.06	-1.63
802.11ac_VHT20	MCS0	90.62	0.43	0.52	-0.86
802.11ac_VHT40	MCS0	48.66	3.13	8.88	-6.26
802.11ac_VHT80	MCS0	23.72	6.25	13.64	-12.5

Remark:

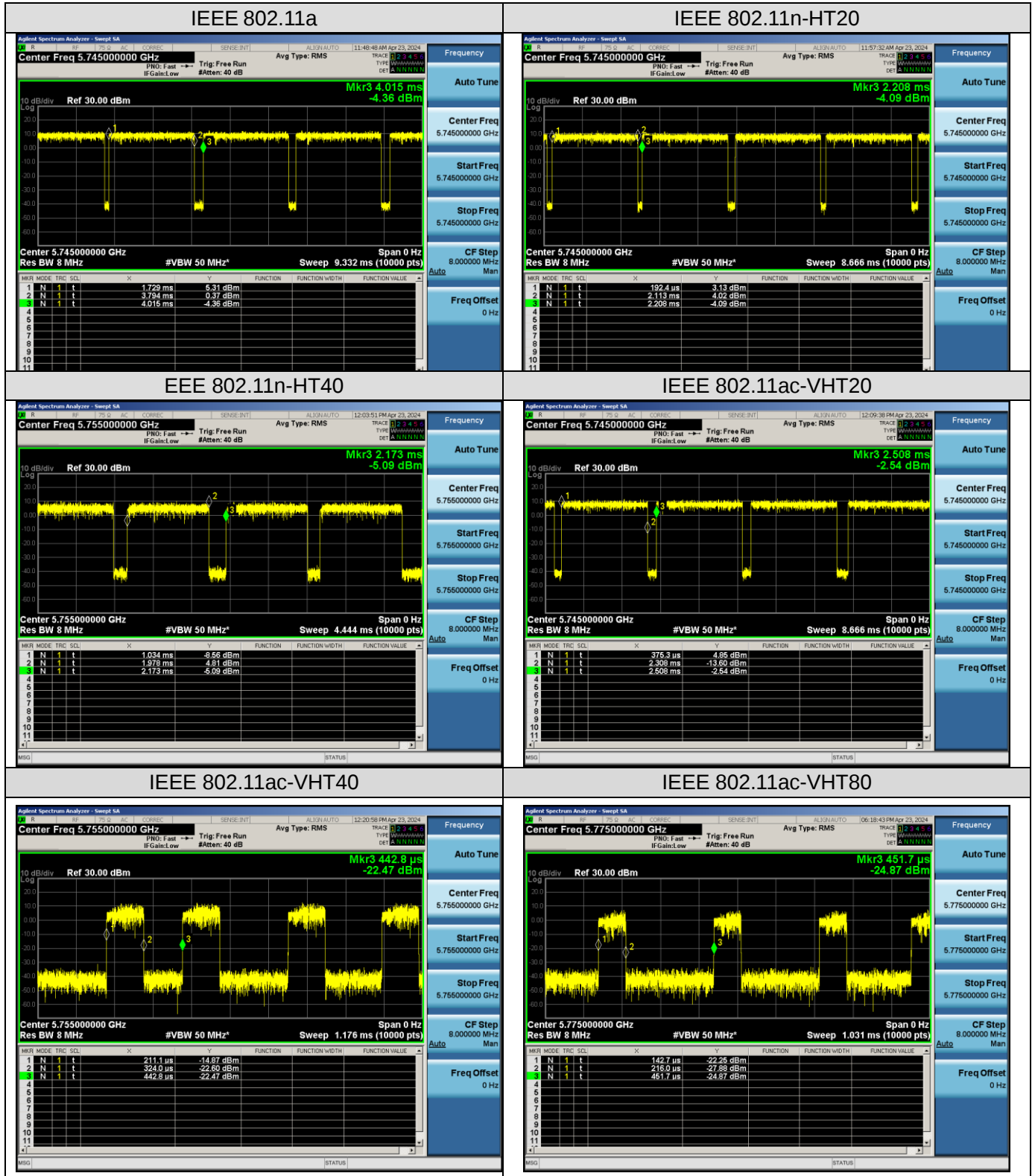
1. Duty Cycle factor = $10 * \log (1/ \text{Duty cycle})$, Average factor = $20 \log_{10} \text{Duty Cycle}$
2. The duty cycle of each frequency band mode reflects the determination requirements of the low channel measurement value.
3. Involving the test items of duty cycle compensation coefficient, the final results have been added and calculated by the software and presented.

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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.

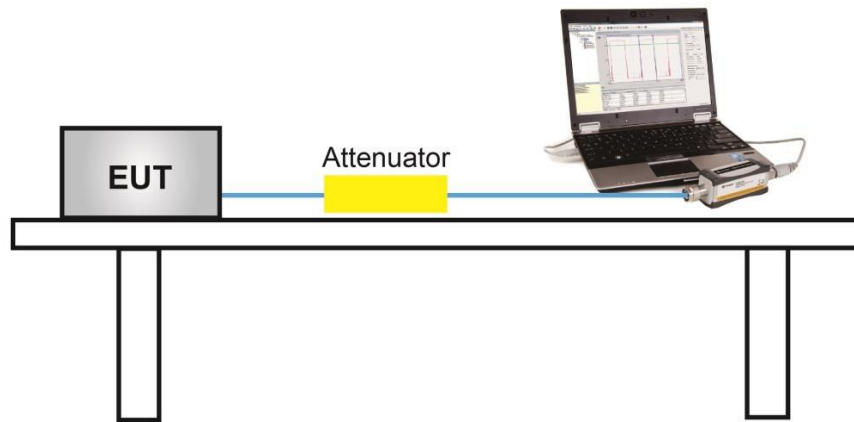
7.2 Measurement Procedure

☒ 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	6.85	23.98	Pass
	5200	6.50	23.98	Pass
	5240	7.15	23.98	Pass
802.11n20	5180	5.91	23.98	Pass
	5200	6.33	23.98	Pass
	5240	7.00	23.98	Pass
802.11n40	5190	6.03	23.98	Pass
	5230	6.51	23.98	Pass
802.11ac20	5180	6.11	23.98	Pass
	5200	6.31	23.98	Pass
	5240	6.67	23.98	Pass
802.11ac40	5190	5.88	23.98	Pass
	5230	6.48	23.98	Pass
802.11ac80	5210	7.26	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	10.45	23.98	Pass
	5200	10.46	23.98	Pass
	5240	11.43	23.98	Pass
802.11n20	5180	9.87	23.98	Pass
	5200	10.65	23.98	Pass
	5240	11.30	23.98	Pass
802.11n40	5190	10.36	23.98	Pass
	5230	11.21	23.98	Pass
802.11ac20	5180	10.22	23.98	Pass
	5200	10.31	23.98	Pass
	5240	11.20	23.98	Pass
802.11ac40	5190	9.97	23.98	Pass
	5230	10.89	23.98	Pass
802.11ac80	5210	11.12	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	12.11	30	Pass
	5785	12.81	30	Pass
	5825	13.64	30	Pass
802.11n20	5745	11.22	30	Pass
	5785	12.61	30	Pass
	5825	13.58	30	Pass
802.11n40	5755	11.94	30	Pass
	5795	12.25	30	Pass
802.11ac20	5745	11.36	30	Pass
	5785	12.99	30	Pass
	5825	14.99	30	Pass
802.11ac40	5755	11.35	30	Pass
	5795	13.10	30	Pass
802.11ac80	5775	8.44	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	10.26	30	Pass
	5785	9.06	30	Pass
	5825	9.00	30	Pass
802.11n20	5745	10.41	30	Pass
	5785	8.93	30	Pass
	5825	9.15	30	Pass
802.11n40	5755	10.54	30	Pass
	5795	8.47	30	Pass
802.11ac20	5745	10.92	30	Pass
	5785	9.16	30	Pass
	5825	10.56	30	Pass
802.11ac40	5755	11.22	30	Pass
	5795	10.47	30	Pass
802.11ac80	5775	12.25	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	11.34	23.98	Pass
	5200	12.02	23.98	Pass
	5240	12.67	23.98	Pass
802.11n40	5190	11.72	23.98	Pass
	5230	12.48	23.98	Pass
802.11ac20	5180	11.64	23.98	Pass
	5200	11.77	23.98	Pass
	5240	12.51	23.98	Pass
802.11ac40	5190	11.40	23.98	Pass
	5230	12.23	23.98	Pass
802.11ac80	5210	12.62	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	13.84	30	Pass
	5785	14.16	30	Pass
	5825	14.92	30	Pass
802.11n40	5755	14.31	30	Pass
	5795	13.77	30	Pass
802.11ac20	5745	14.16	30	Pass
	5785	14.49	30	Pass
	5825	16.33	30	Pass
802.11ac40	5755	14.30	30	Pass
	5795	14.99	30	Pass
802.11ac80	5775	13.76	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:

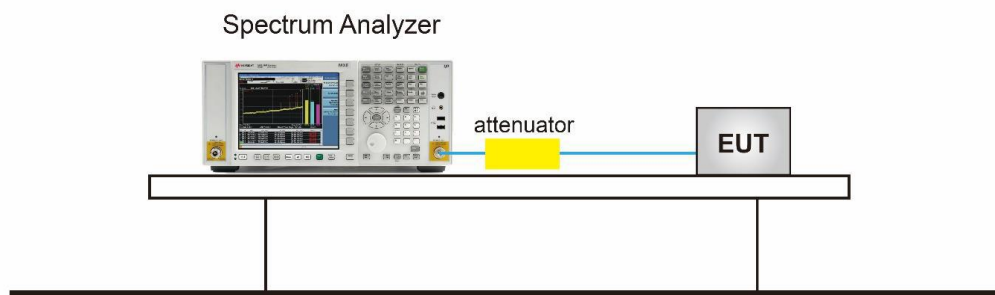
1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set Span = approximately 1.5 to 5 times the OBW, centered on a nominal channel
The nominal IF filter bandwidth (3 dB RBW) shall 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	16.327	18.266	N/A	Pass
	5200	16.340	18.384	N/A	Pass
	5240	16.333	18.360	N/A	Pass
802.11n20	5180	17.526	19.227	N/A	Pass
	5200	17.522	19.195	N/A	Pass
	5240	17.506	19.258	N/A	Pass
802.11n40	5190	36.040	40.502	N/A	Pass
	5230	36.060	40.534	N/A	Pass
802.11ac20	5180	17.520	19.284	N/A	Pass
	5200	17.514	19.184	N/A	Pass
	5240	17.497	19.208	N/A	Pass
802.11ac40	5190	36.025	40.437	N/A	Pass
	5230	35.979	40.190	N/A	Pass
802.11ac80	5210	74.736	80.121	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	16.331	18.307	N/A	Pass
	5200	16.325	18.390	N/A	Pass
	5240	16.326	18.325	N/A	Pass
802.11n20	5180	17.522	19.313	N/A	Pass
	5200	17.509	19.292	N/A	Pass
	5240	17.511	19.328	N/A	Pass
802.11n40	5190	36.037	40.626	N/A	Pass
	5230	36.003	40.445	N/A	Pass
802.11ac20	5180	17.501	19.276	N/A	Pass
	5200	17.513	19.277	N/A	Pass
	5240	17.518	19.364	N/A	Pass
802.11ac40	5190	36.031	41.425	N/A	Pass
	5230	36.028	40.799	N/A	Pass
802.11ac80	5210	74.731	80.304	N/A	Pass

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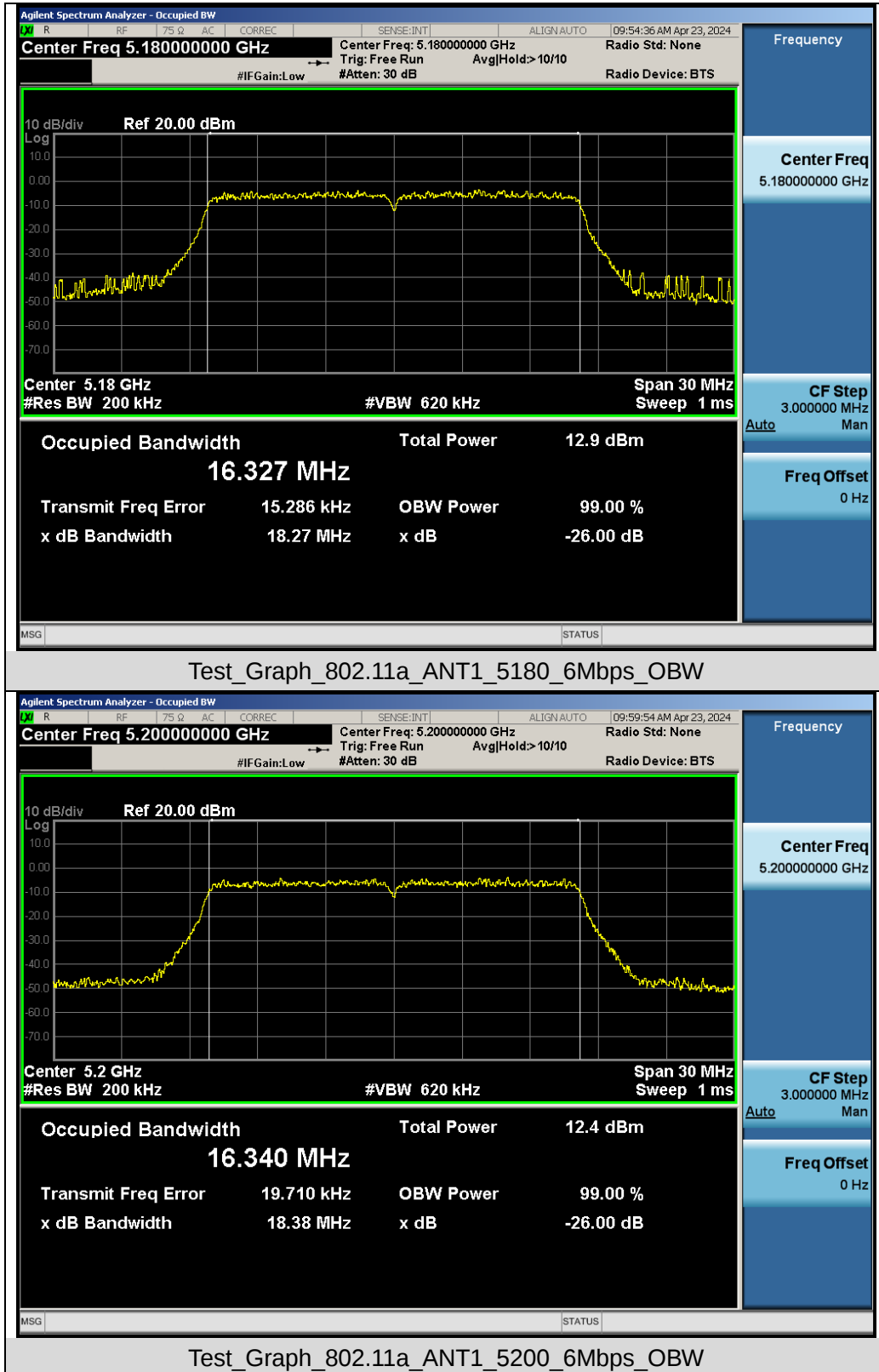
Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz-ANT 1					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.421	16.348	0.5	Pass
	5785	16.386	16.349	0.5	Pass
	5825	16.420	16.352	0.5	Pass
802.11n20	5745	17.552	17.577	0.5	Pass
	5785	17.578	17.561	0.5	Pass
	5825	17.594	17.559	0.5	Pass
802.11n40	5755	36.118	34.093	0.5	Pass
	5795	36.146	35.132	0.5	Pass
802.11ac20	5745	17.557	17.563	0.5	Pass
	5785	17.569	17.557	0.5	Pass
	5825	17.580	17.637	0.5	Pass
802.11ac40	5755	36.210	36.122	0.5	Pass
	5795	36.223	36.028	0.5	Pass
802.11ac80	5775	75.683	75.462	0.5	Pass

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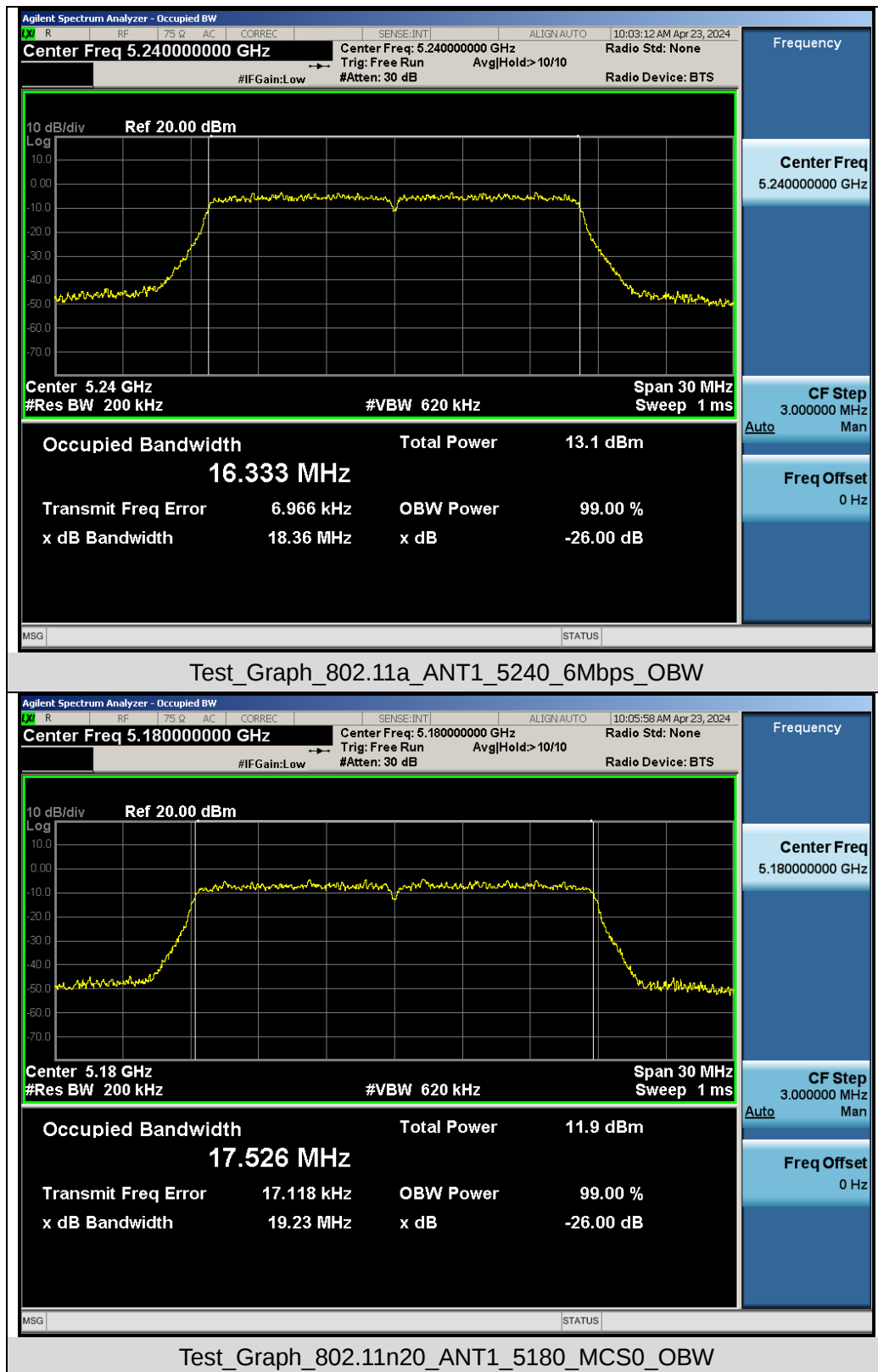
Test Data of Occupied Bandwidth and DTS Bandwidth for band 5.725-5.85 GHz-ANT 2					
Test Mode	Test Channel (MHz)	99% Occupied Bandwidth (MHz)	DTS Bandwidth (MHz)	Limits (MHz)	Pass or Fail
802.11a	5745	16.341	16.326	0.5	Pass
	5785	16.328	16.332	0.5	Pass
	5825	16.332	16.352	0.5	Pass
802.11n20	5745	17.524	17.557	0.5	Pass
	5785	17.521	17.563	0.5	Pass
	5825	17.523	17.311	0.5	Pass
802.11n40	5755	36.012	35.327	0.5	Pass
	5795	36.014	35.116	0.5	Pass
802.11ac20	5745	17.526	17.554	0.5	Pass
	5785	17.523	17.554	0.5	Pass
	5825	17.571	17.620	0.5	Pass
802.11ac40	5755	36.001	35.688	0.5	Pass
	5795	36.109	35.689	0.5	Pass
802.11ac80	5775	75.457	75.158	0.5	Pass

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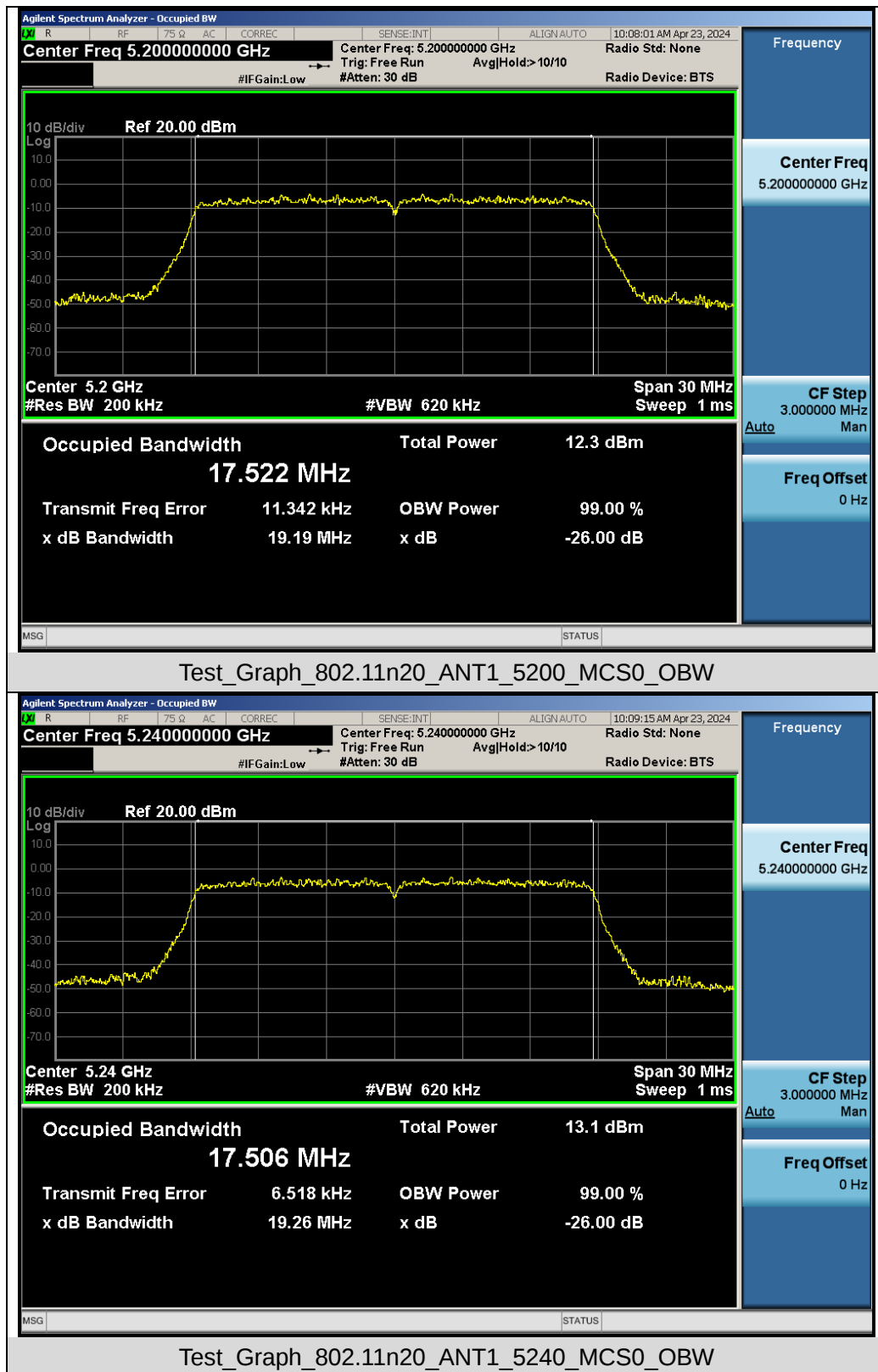
Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.15-5.25 GHz



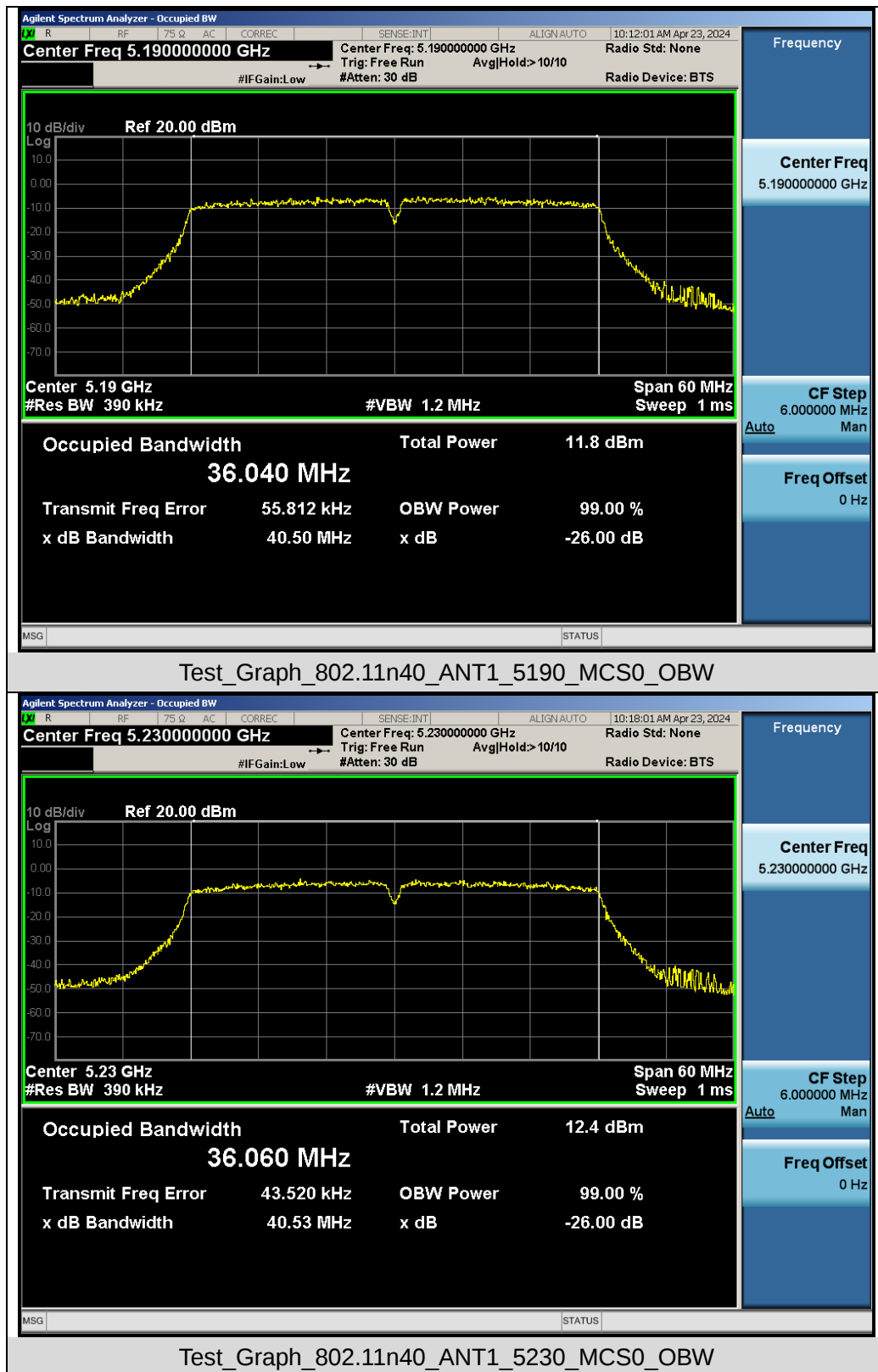
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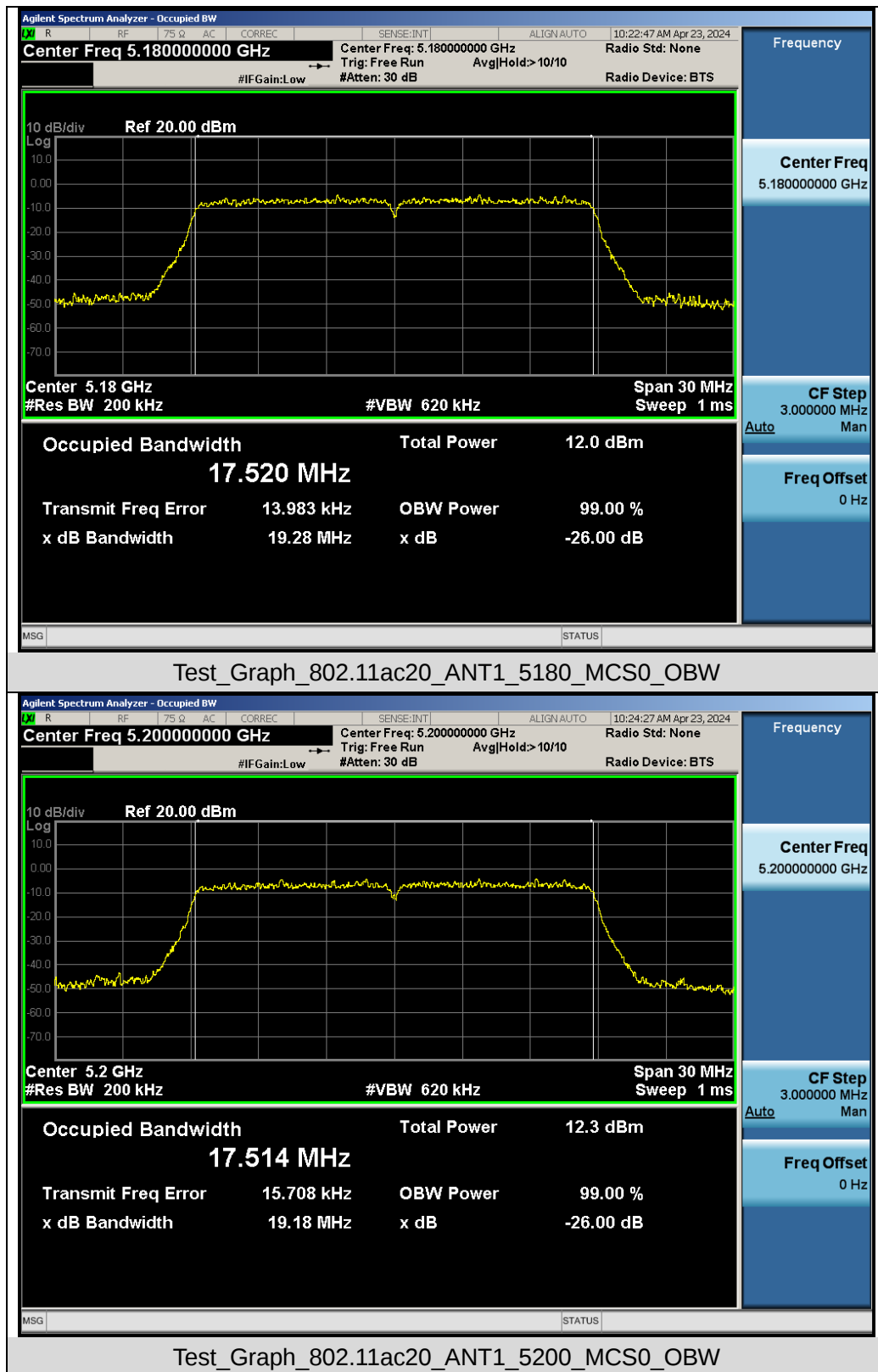
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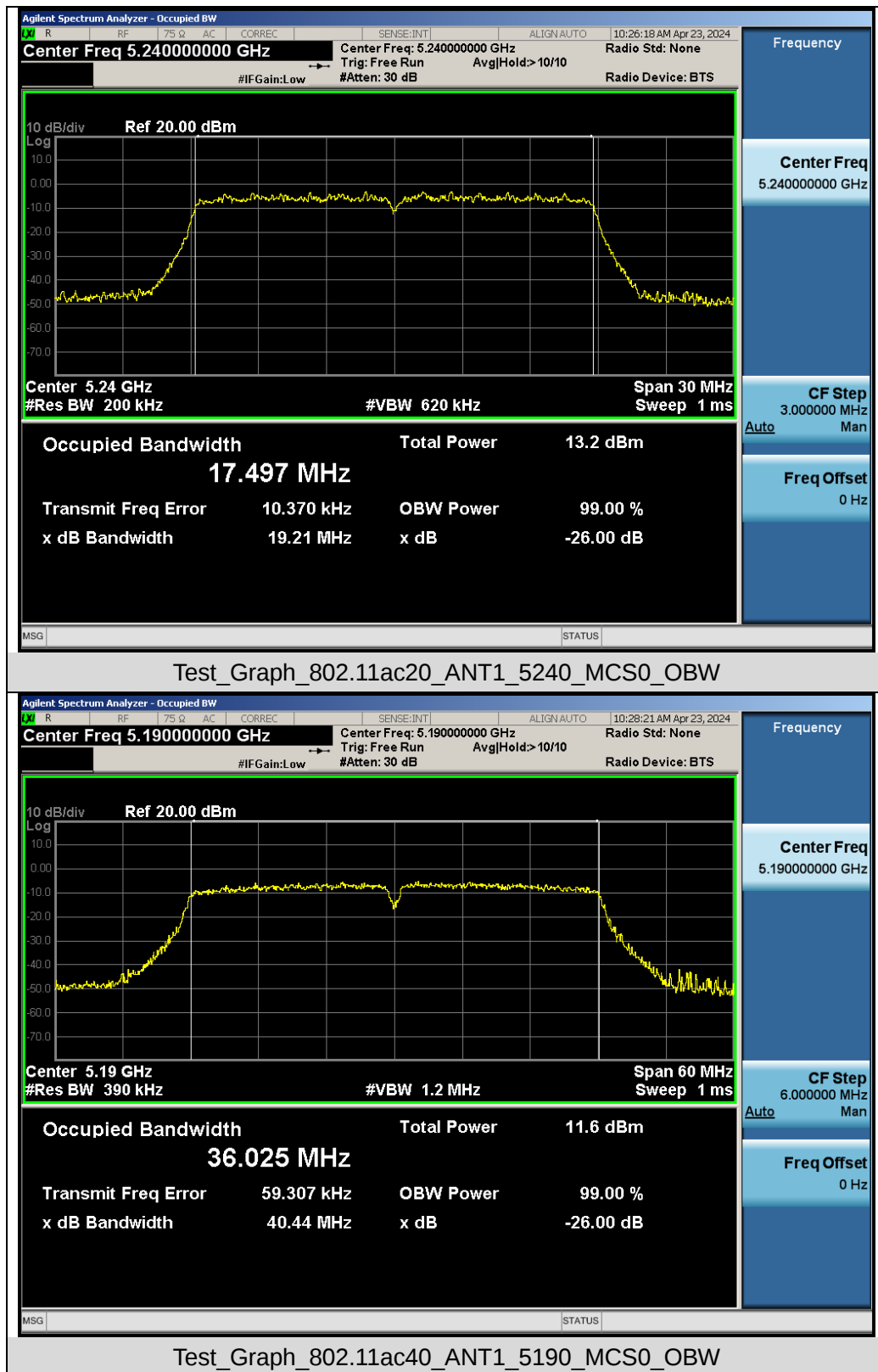
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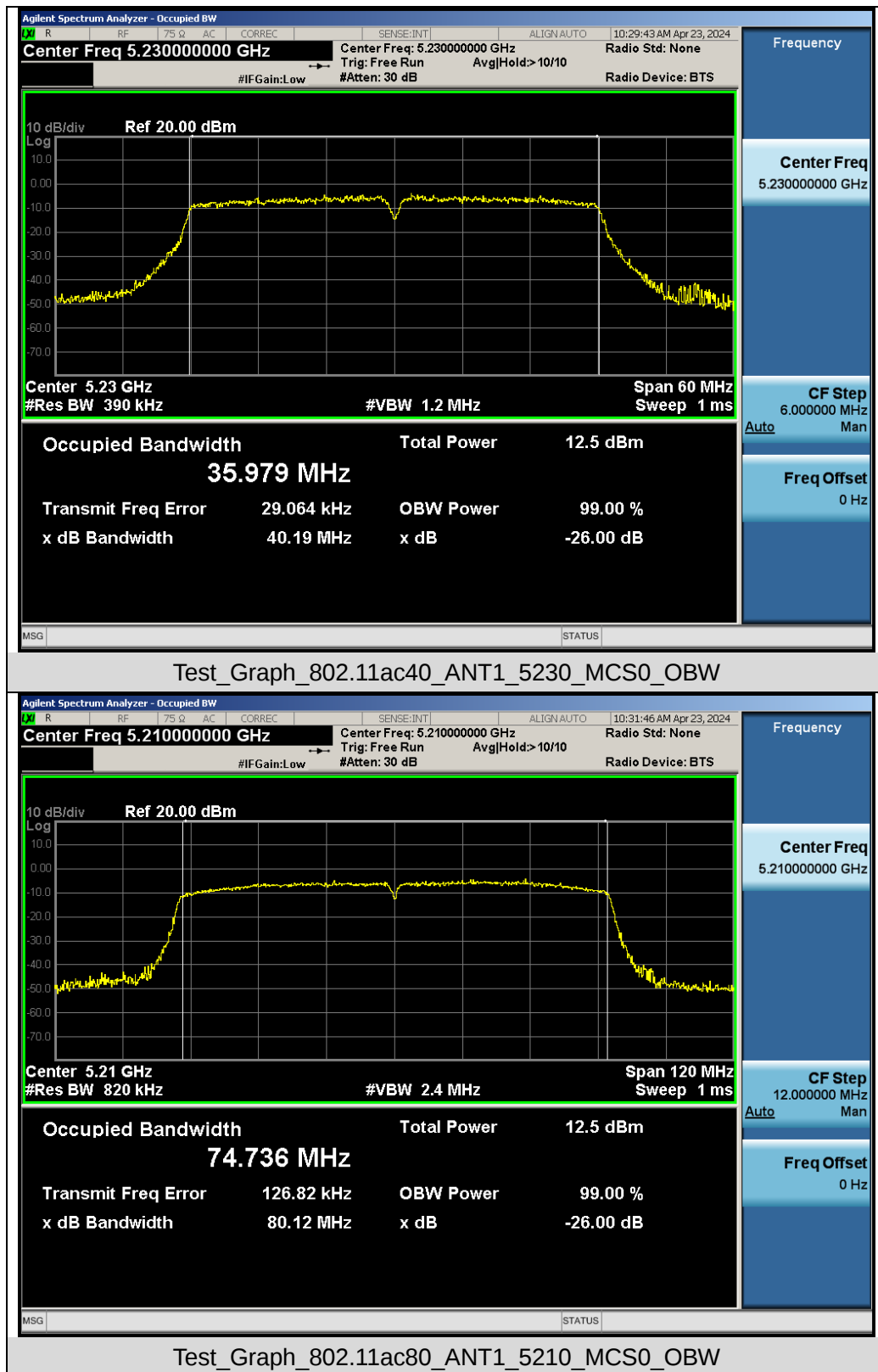
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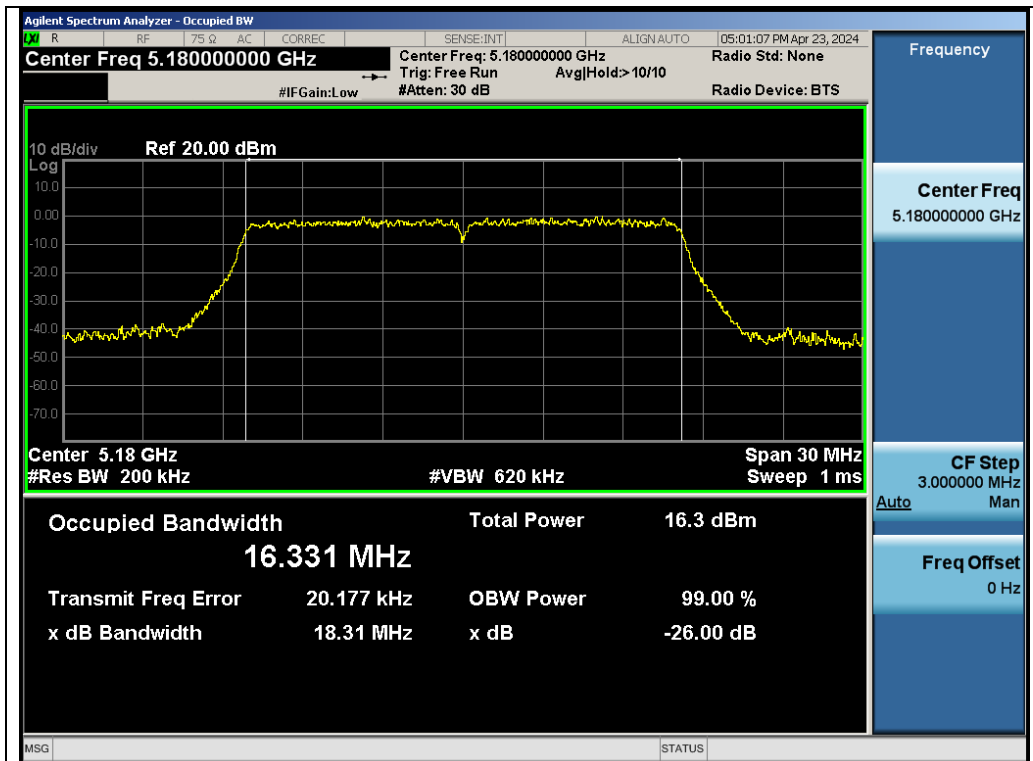


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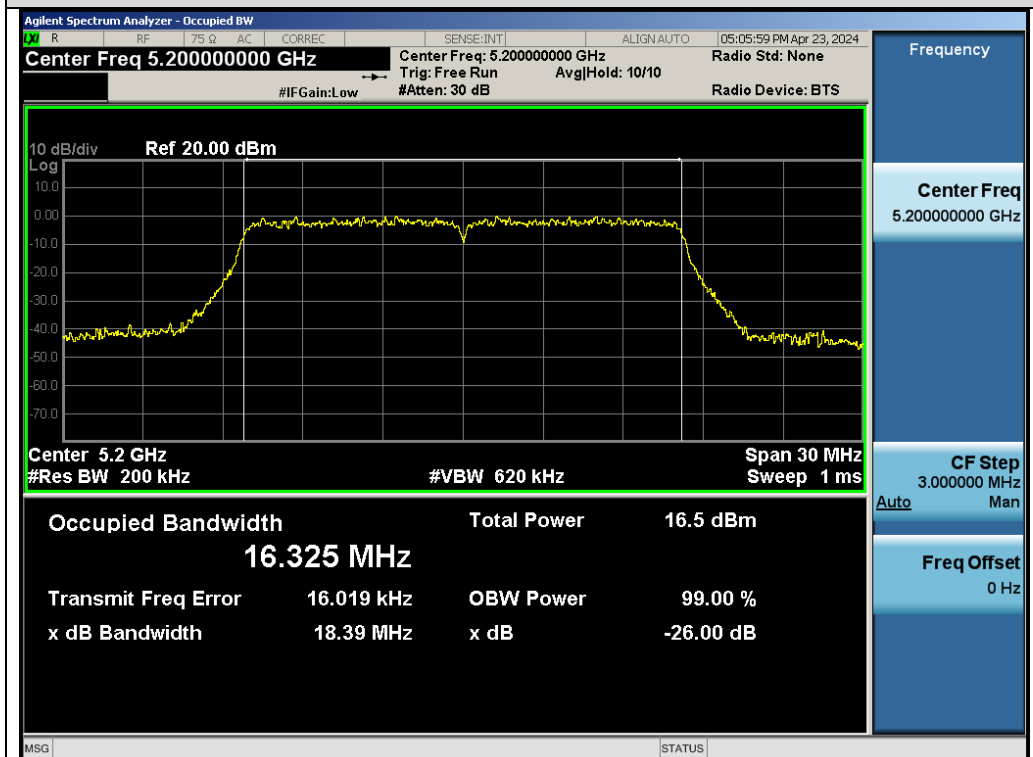


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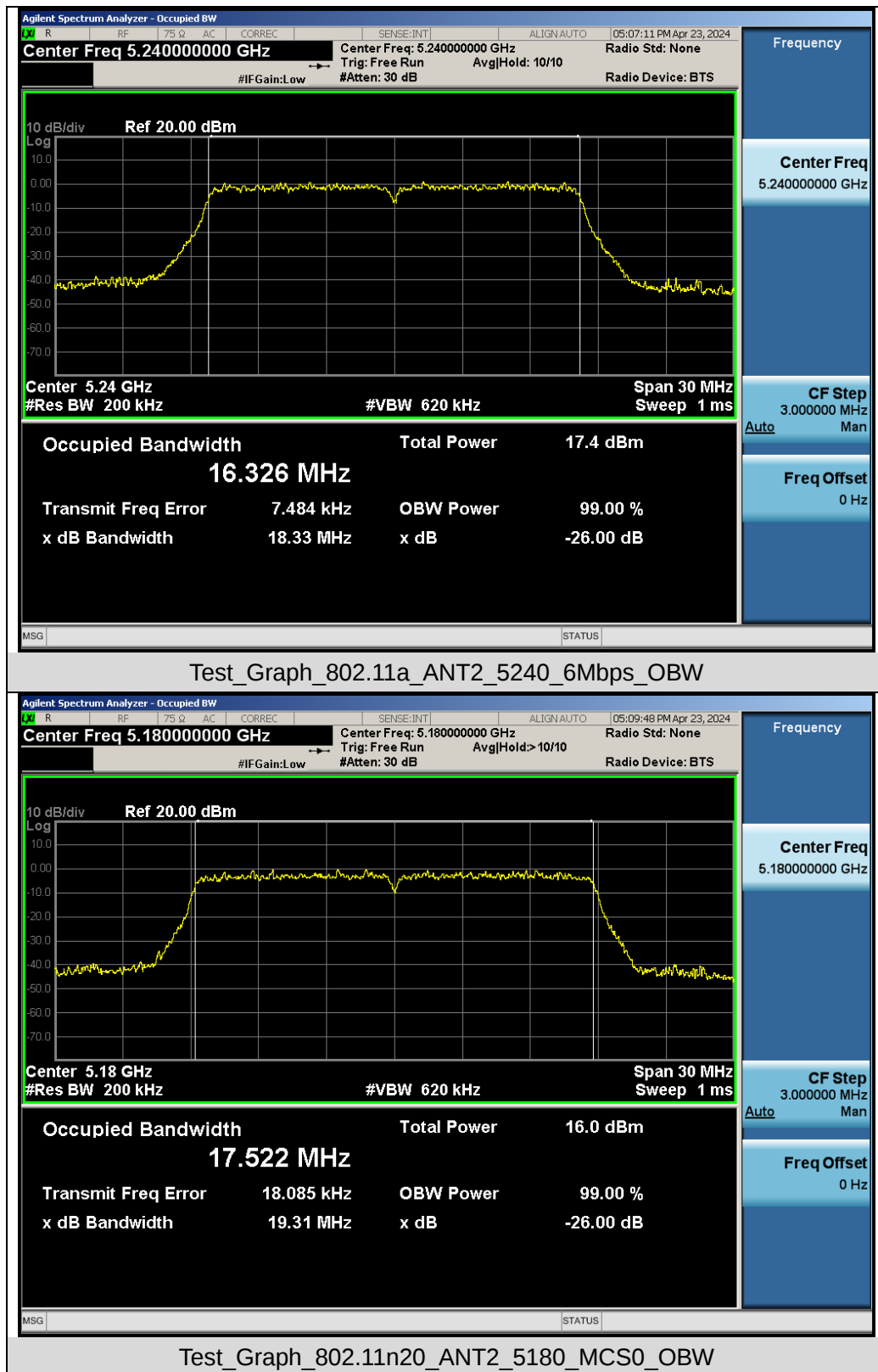


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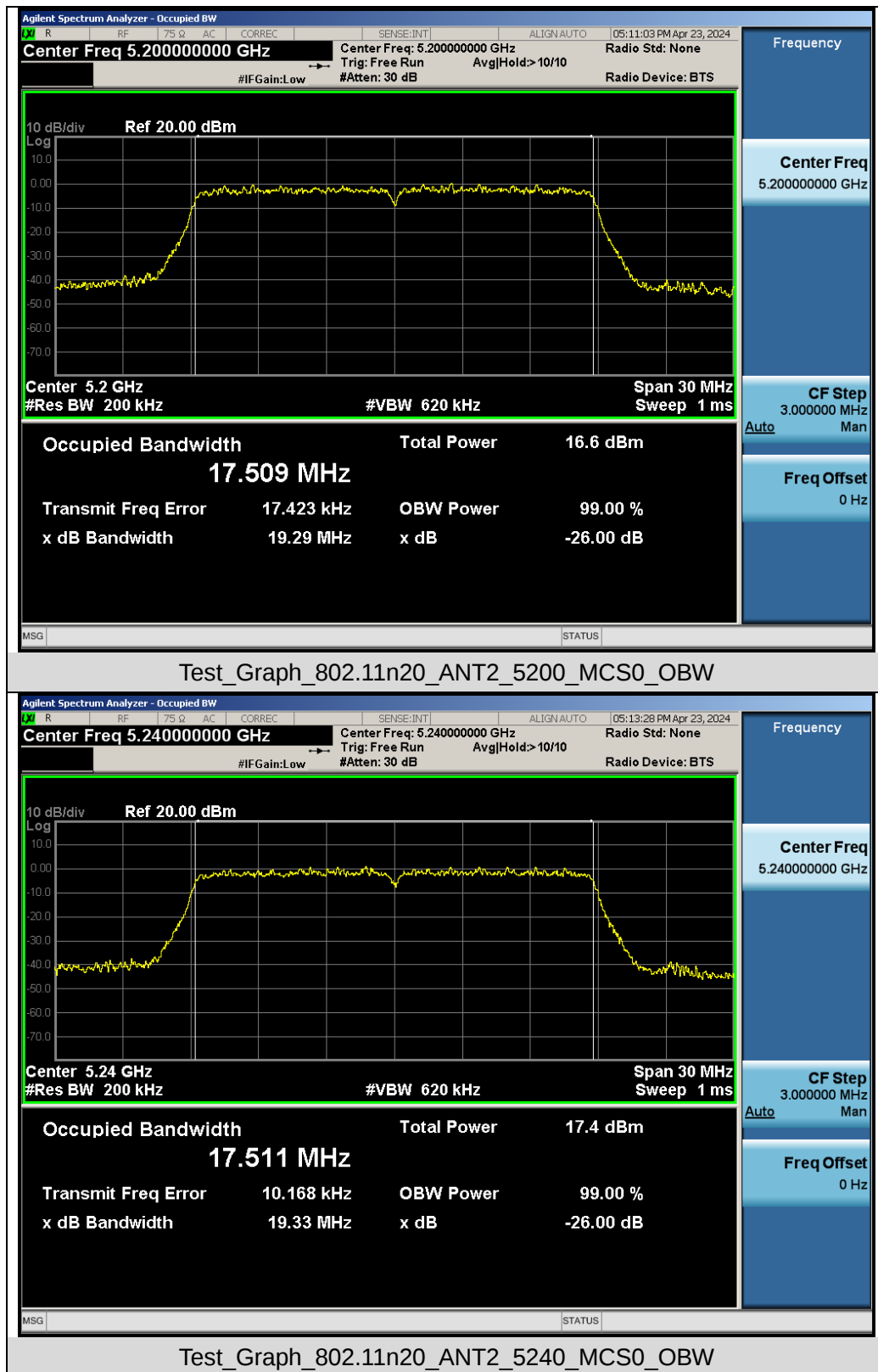
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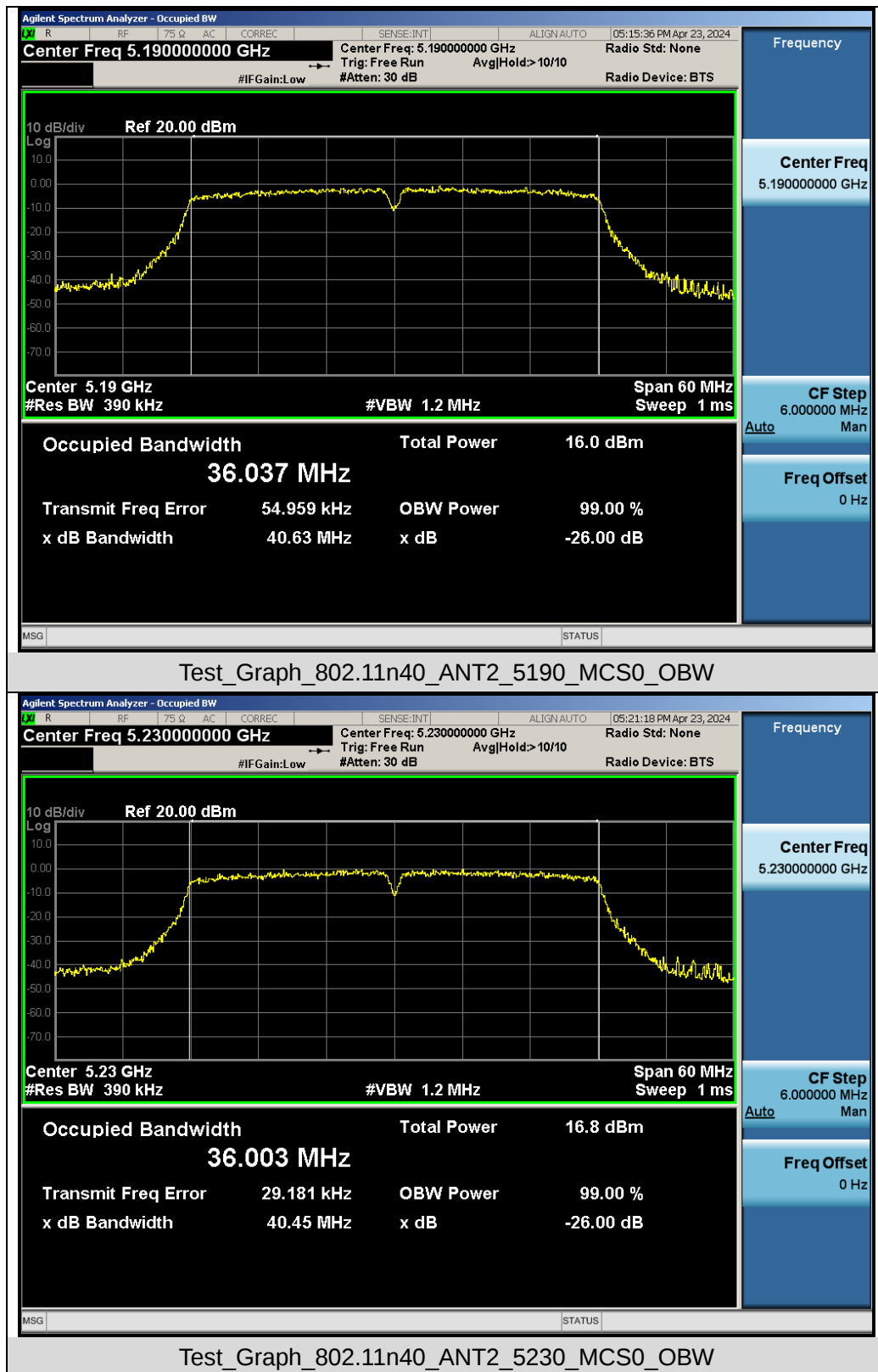


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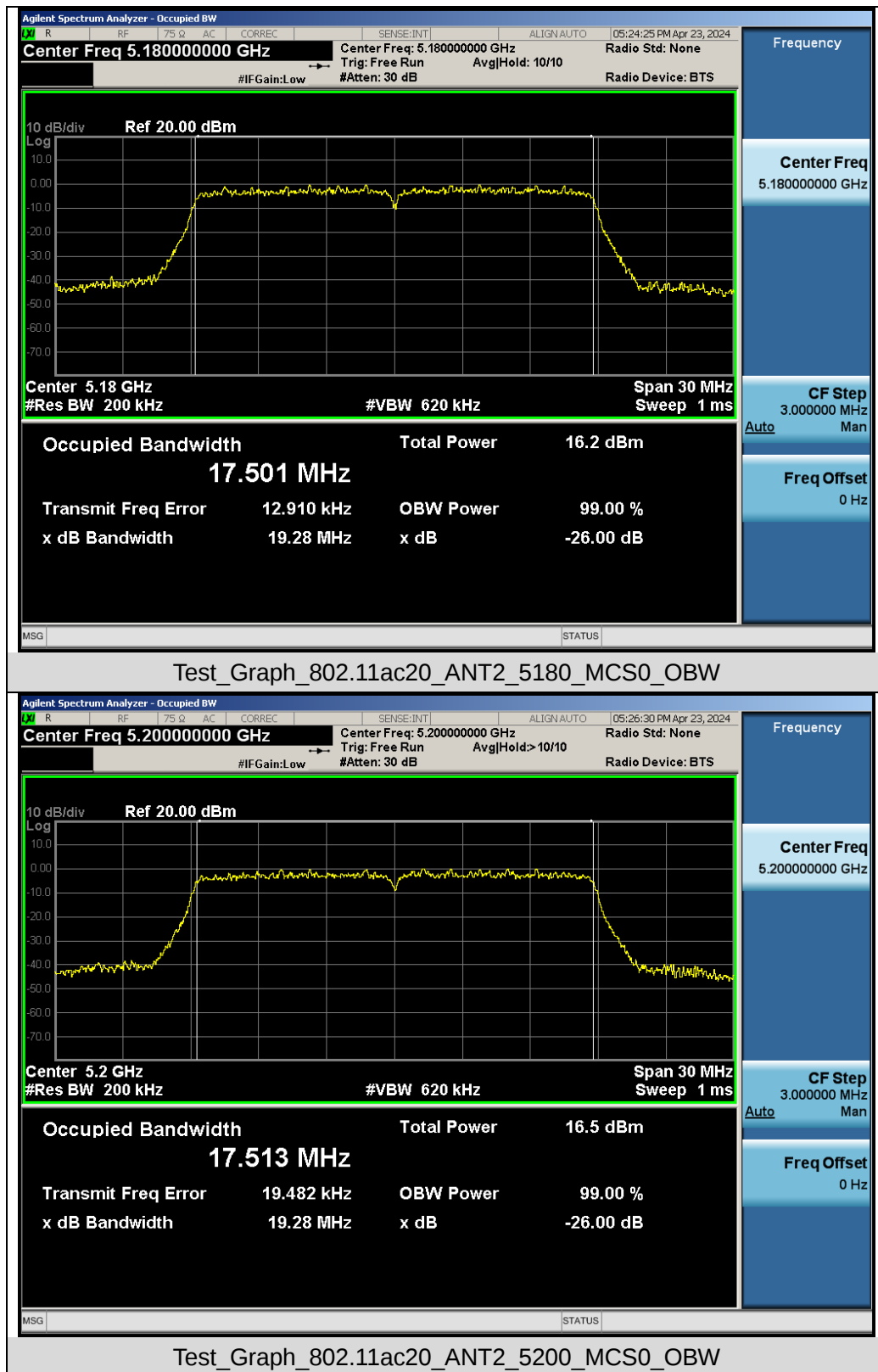


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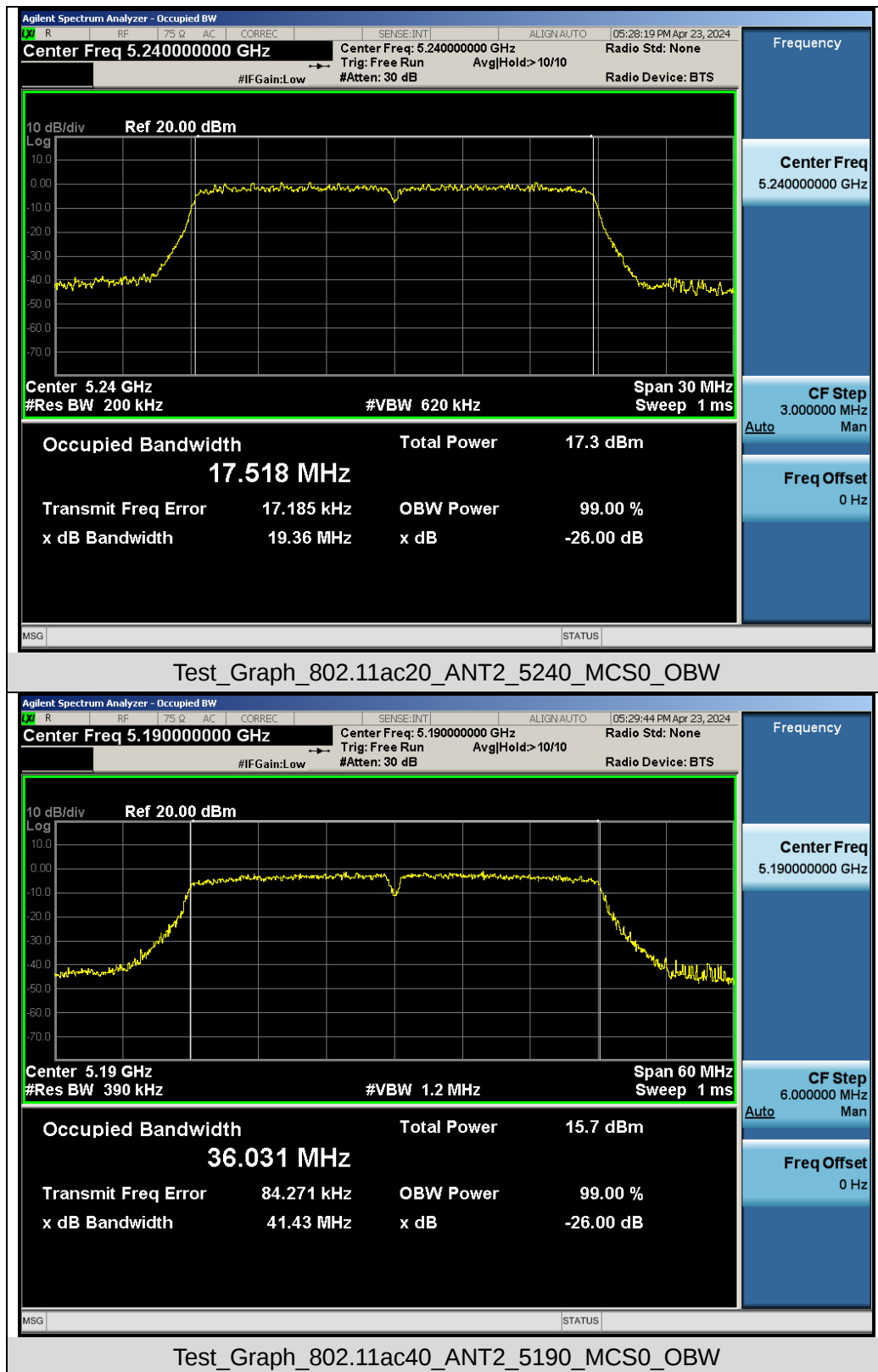


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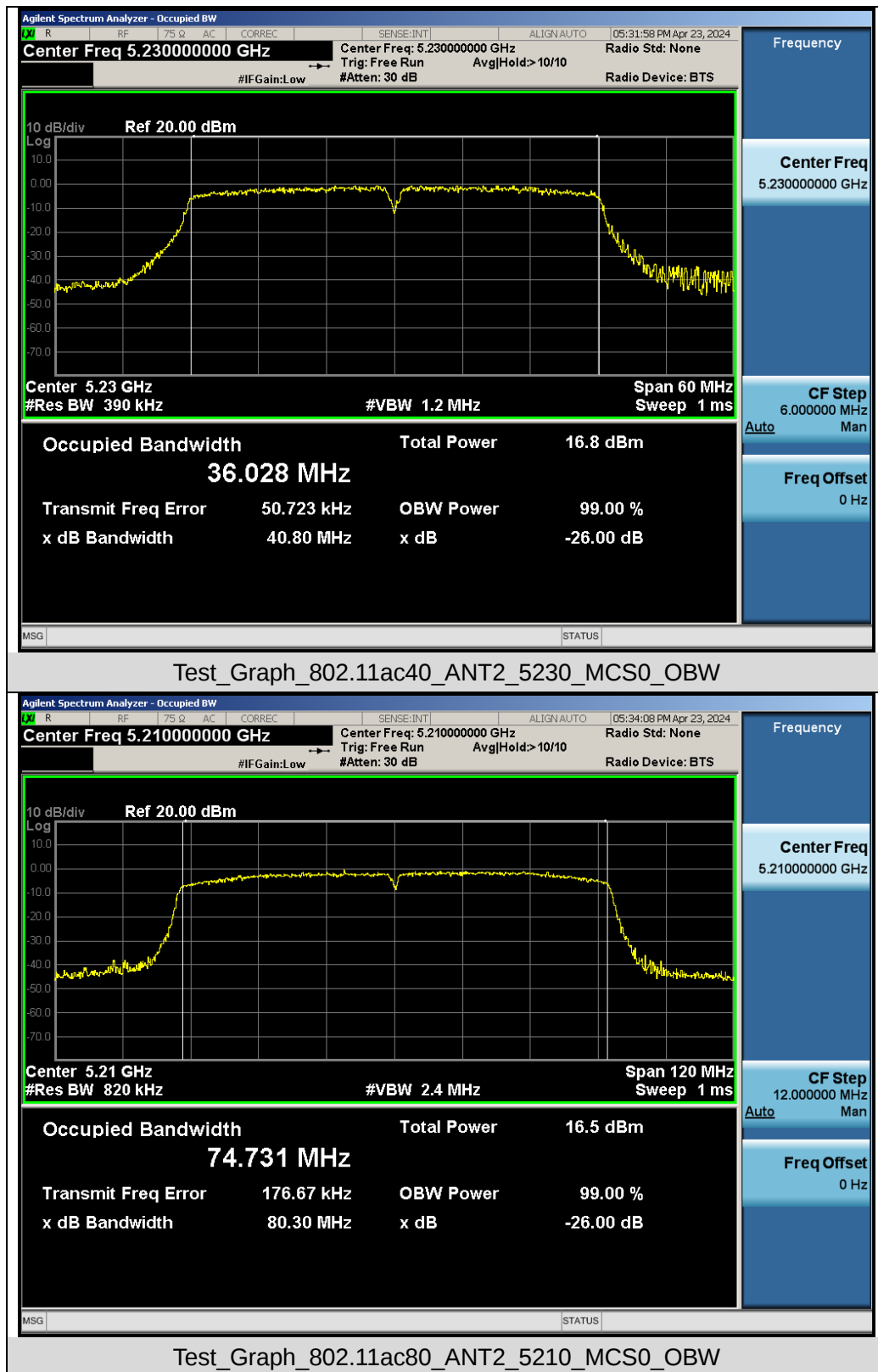


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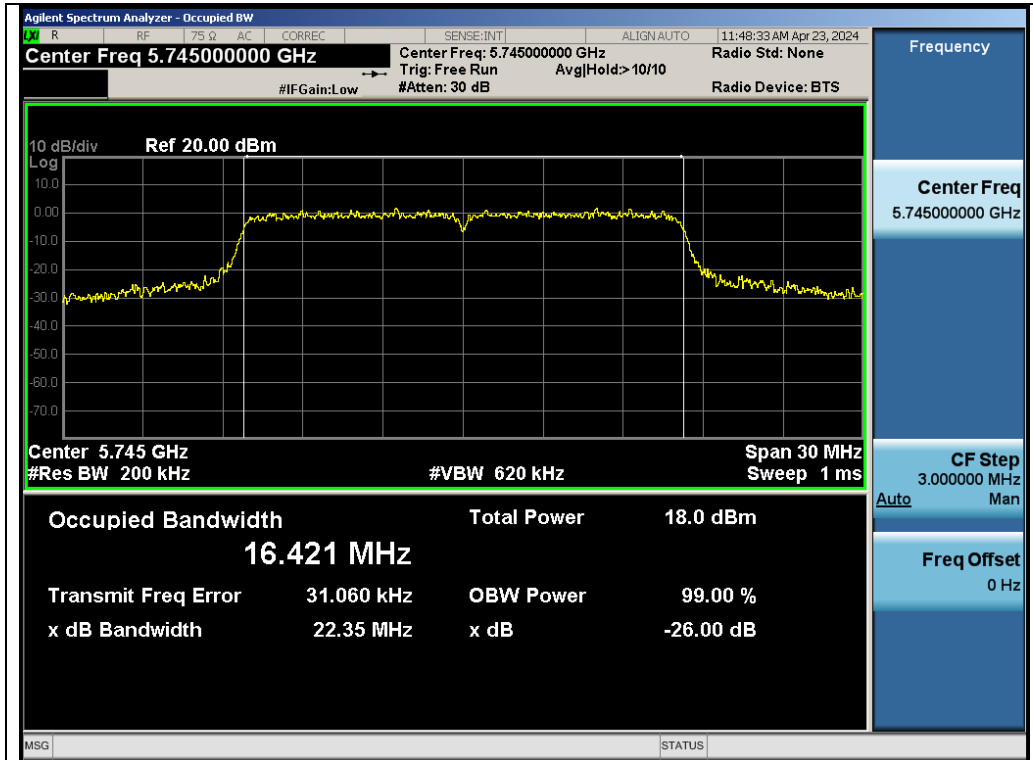
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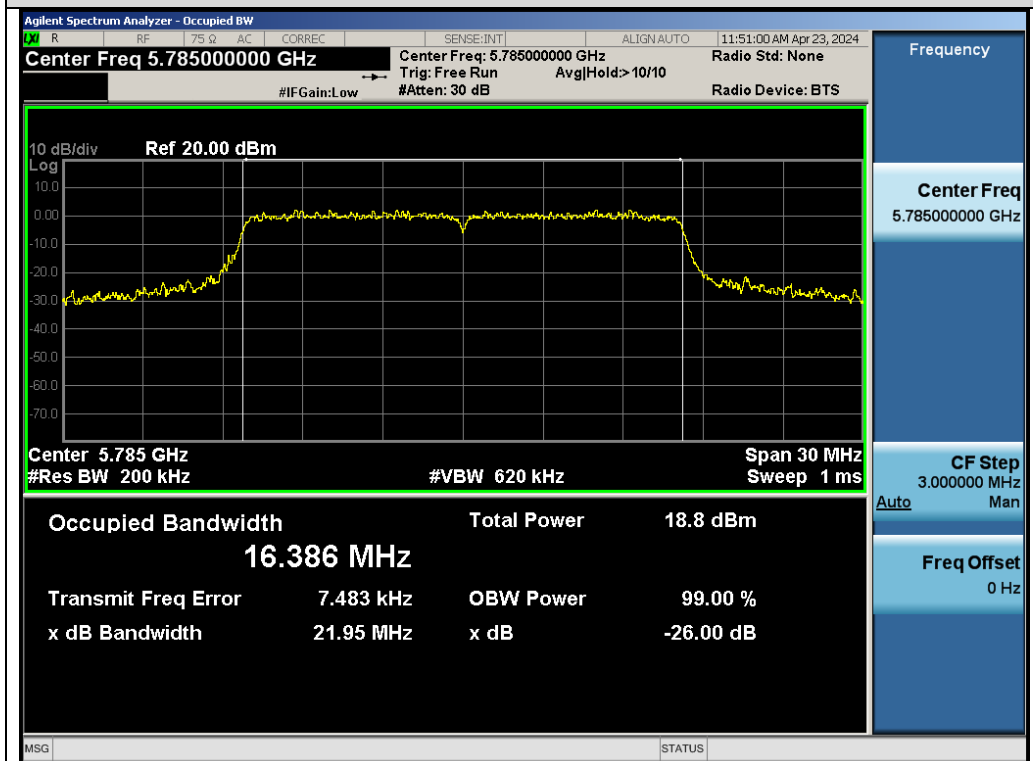


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Test Graphs of Occupied Bandwidth and -26dB Bandwidth for band 5.745-5.825 GHz

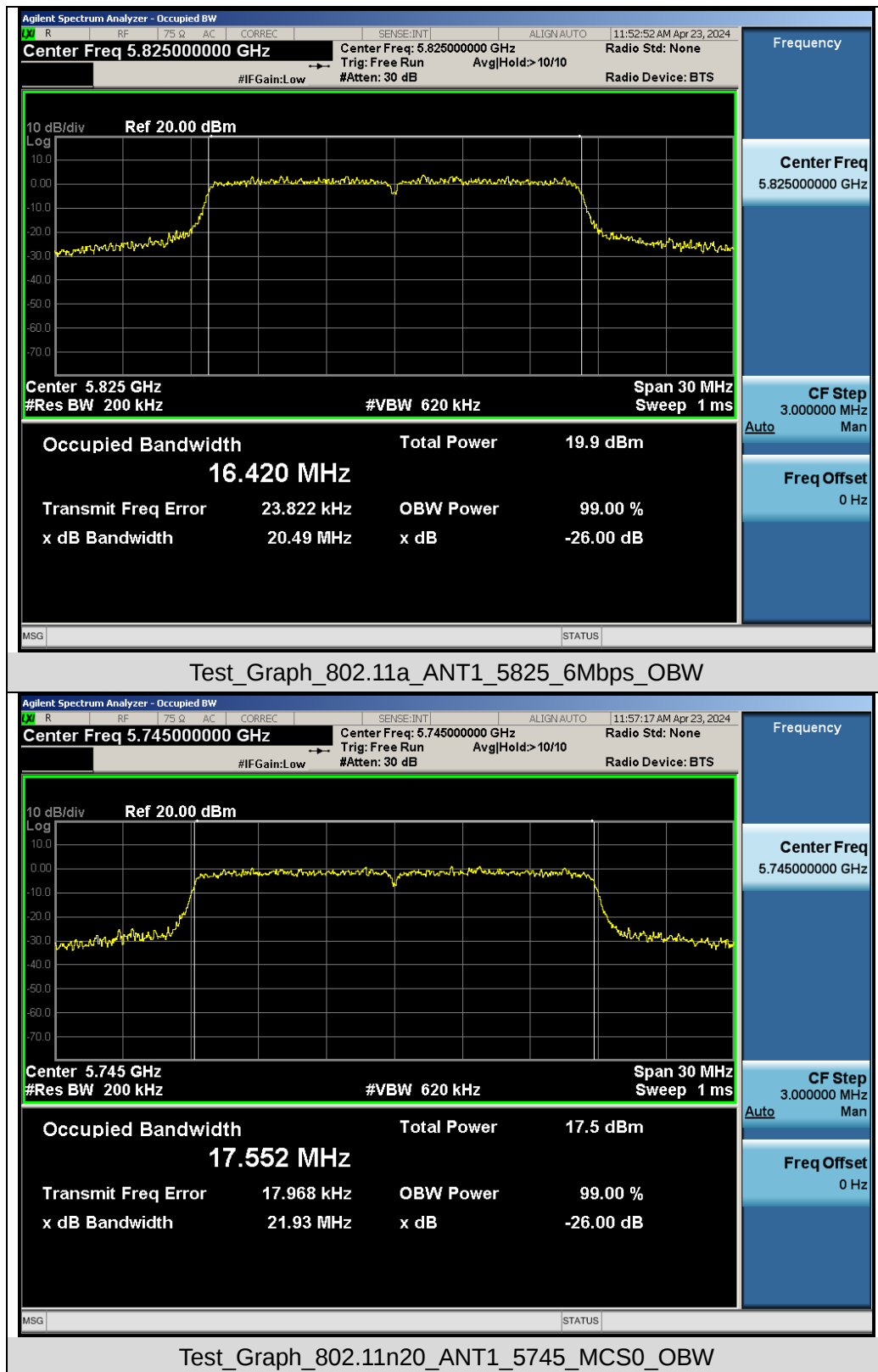


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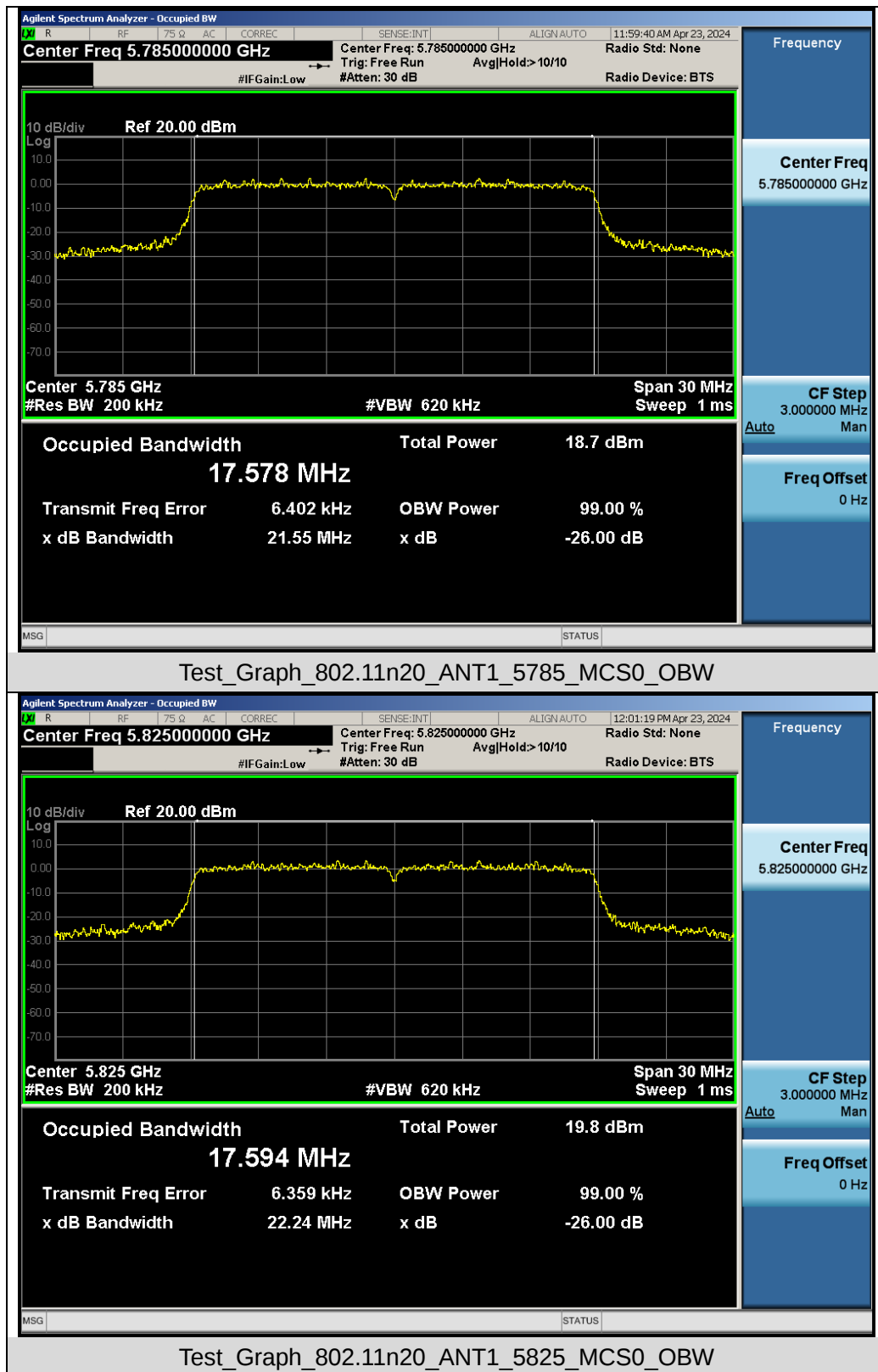


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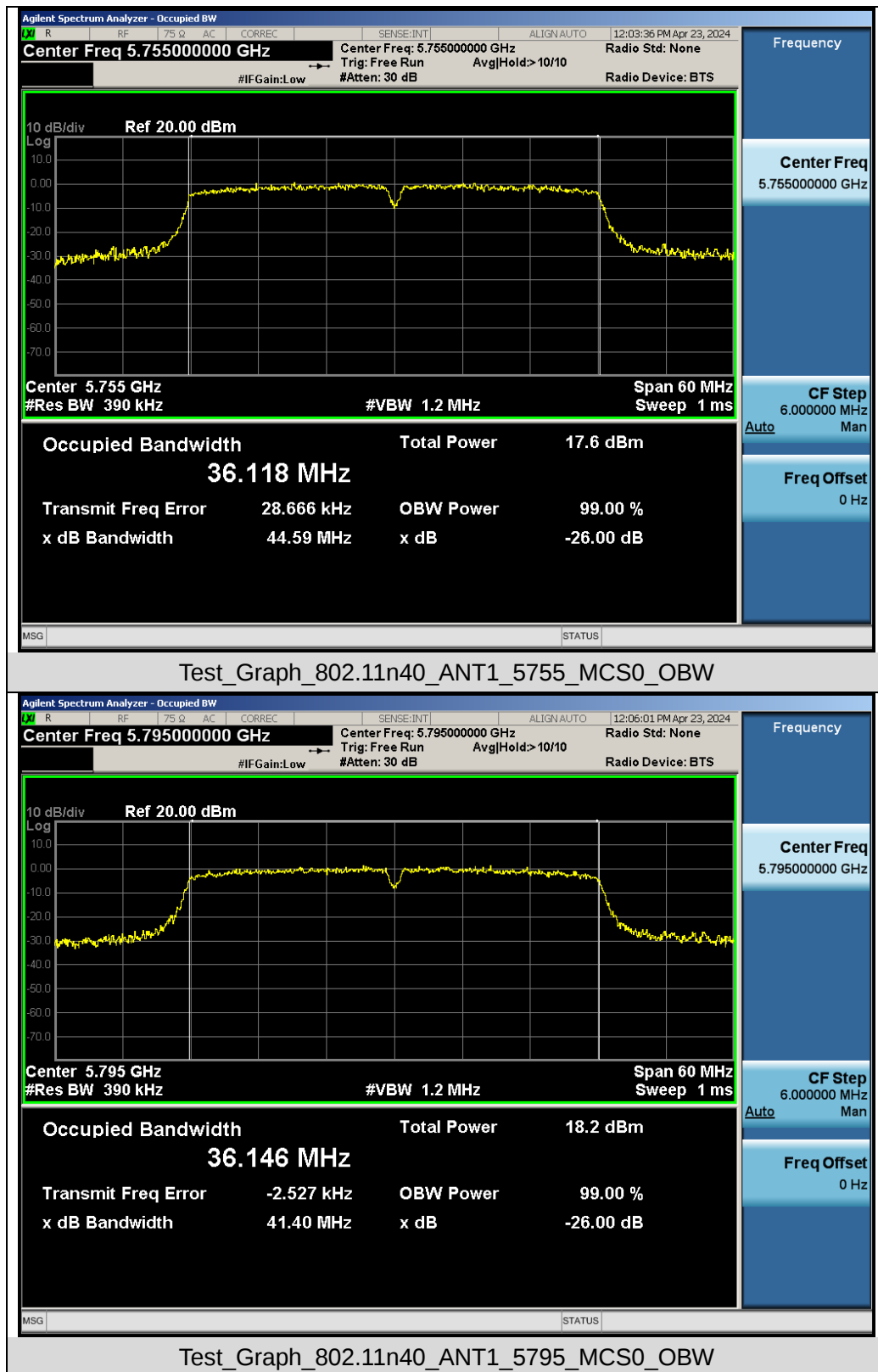
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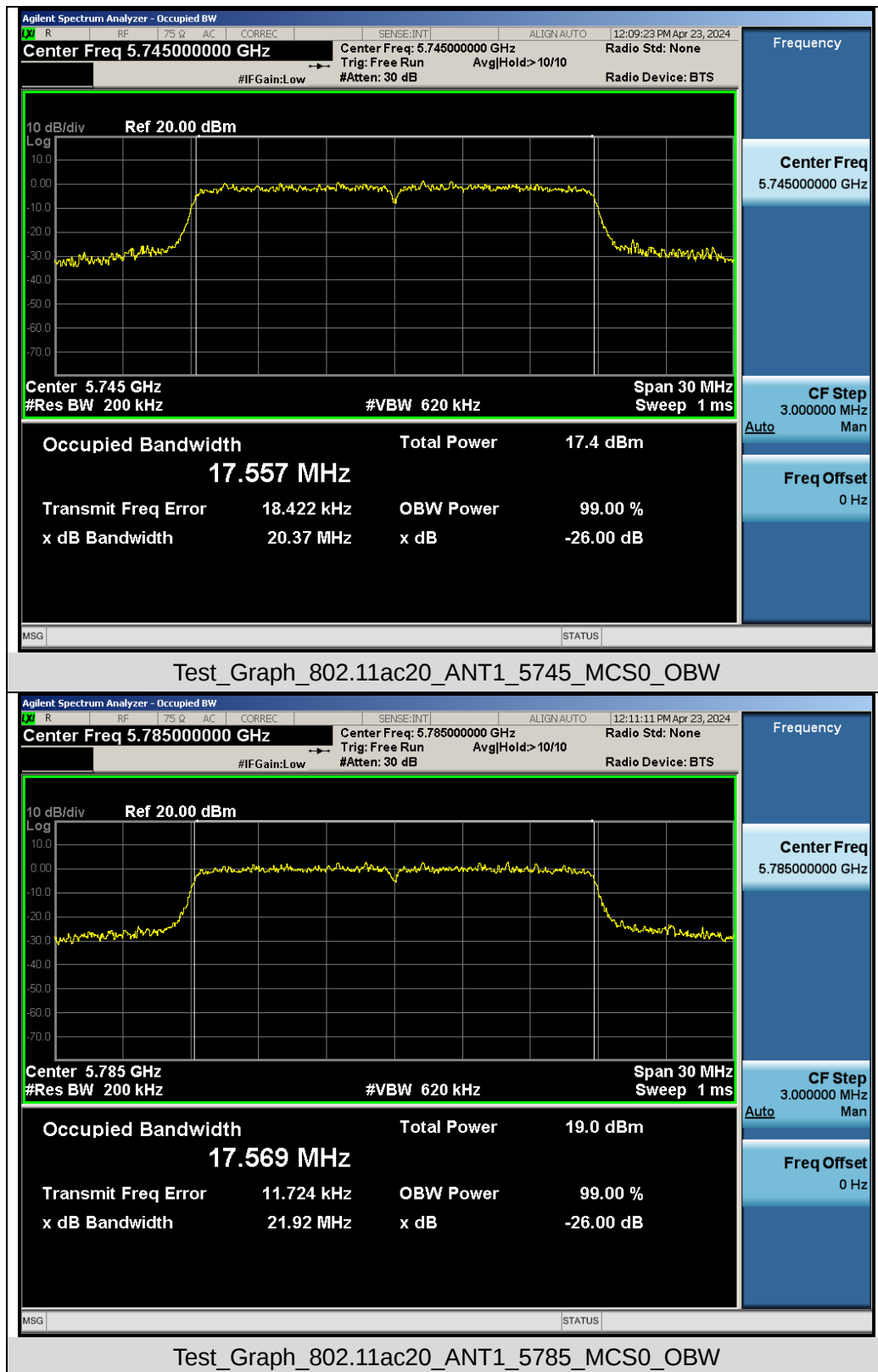


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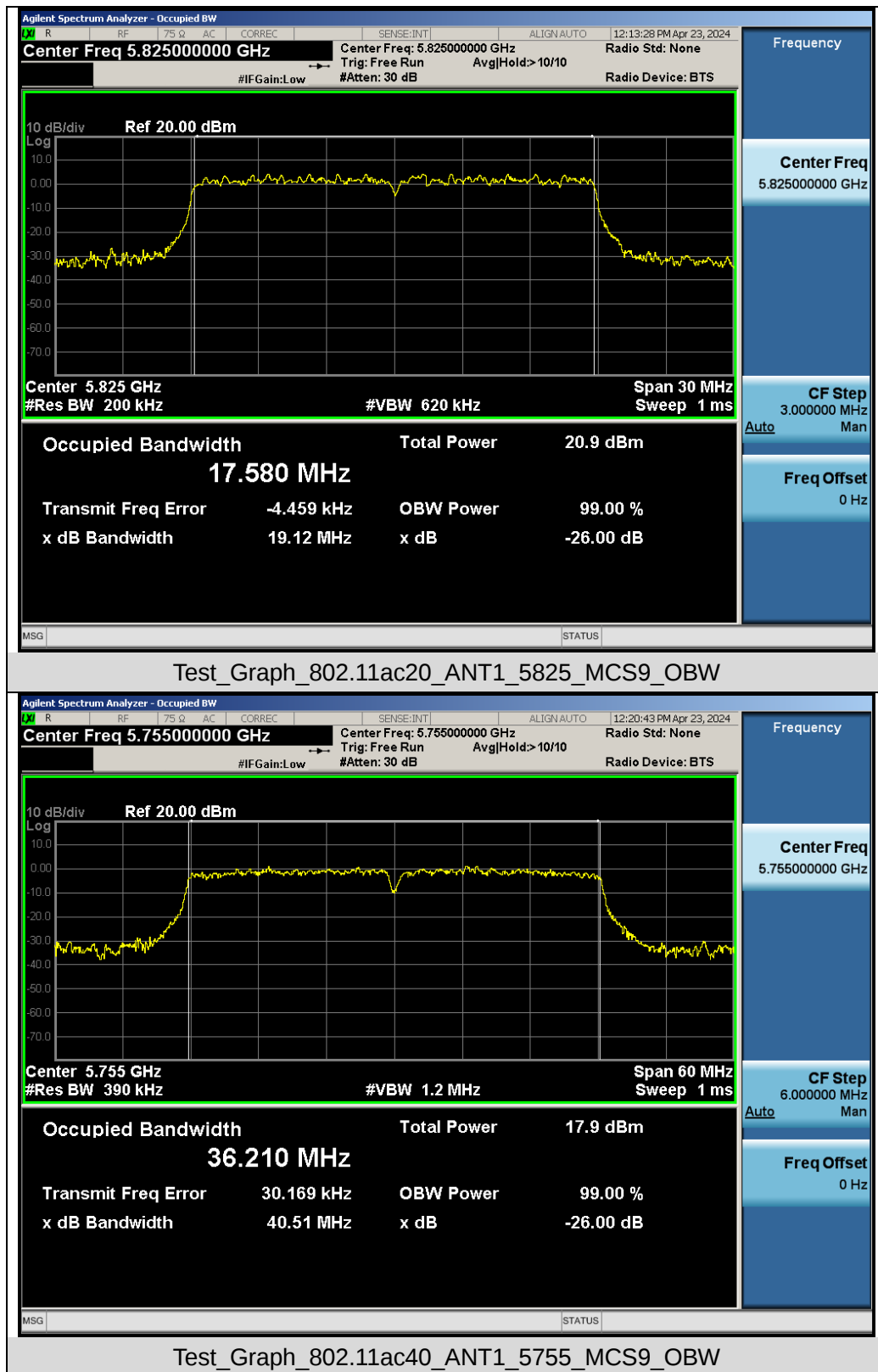


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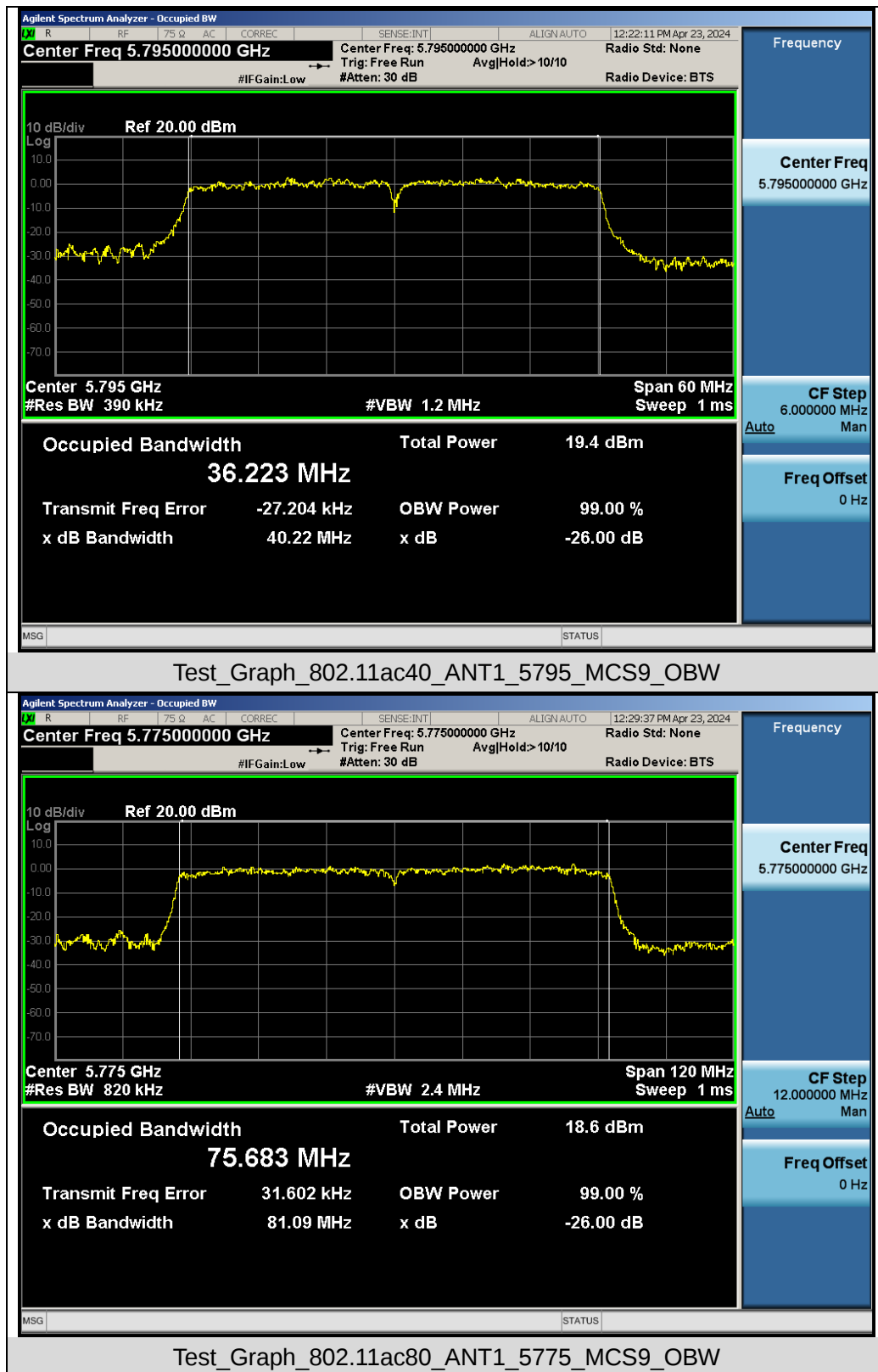
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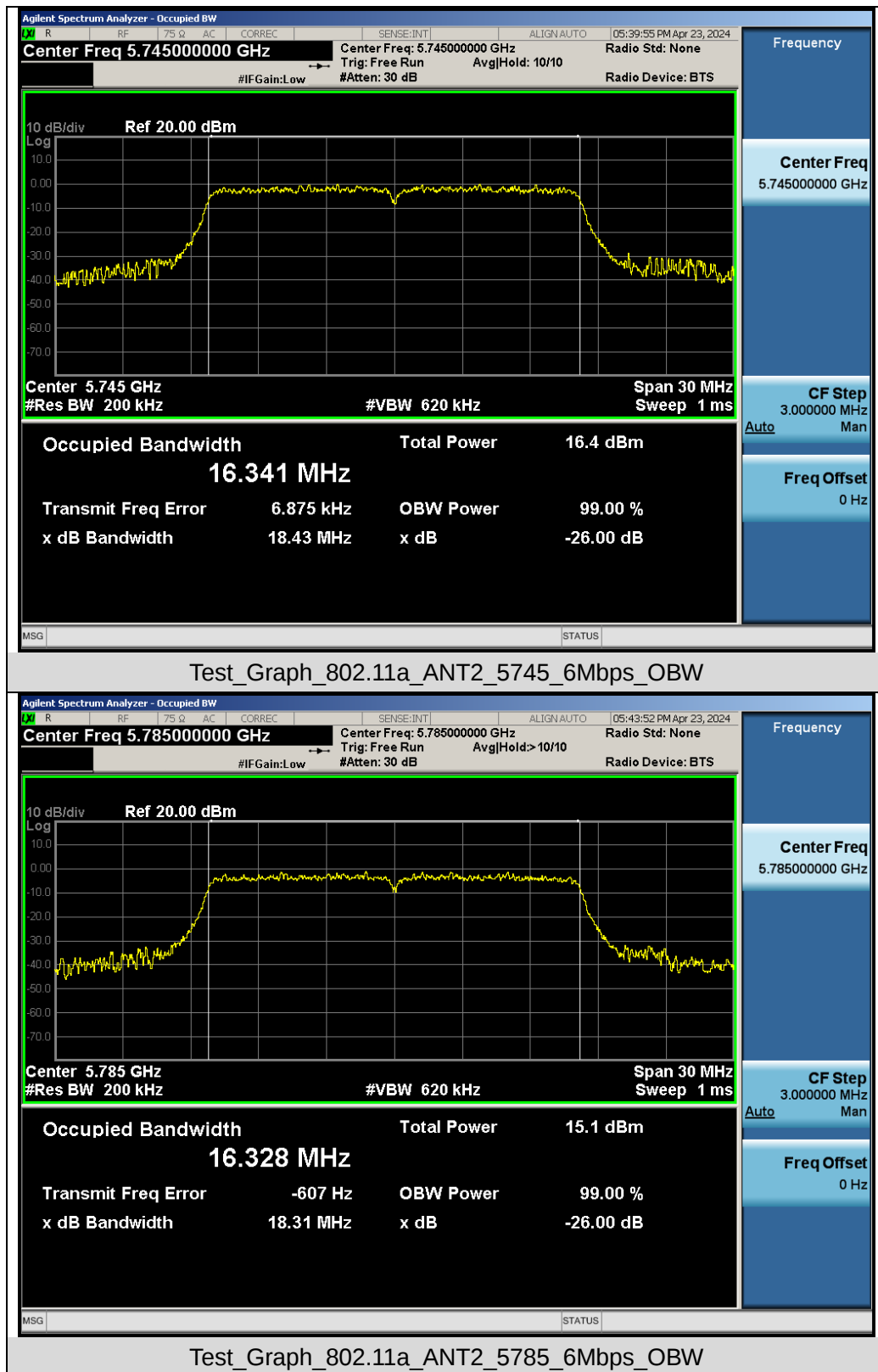
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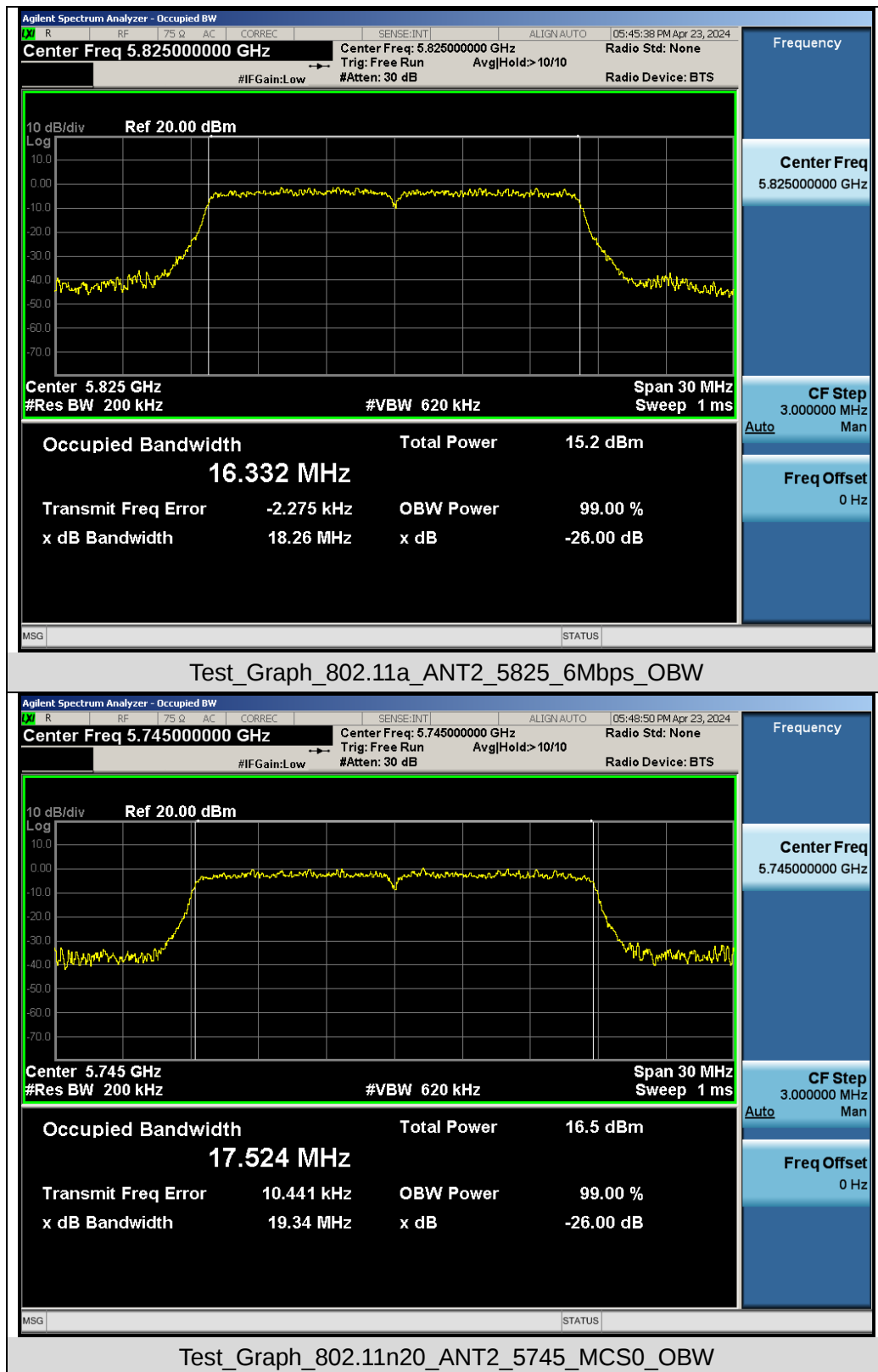
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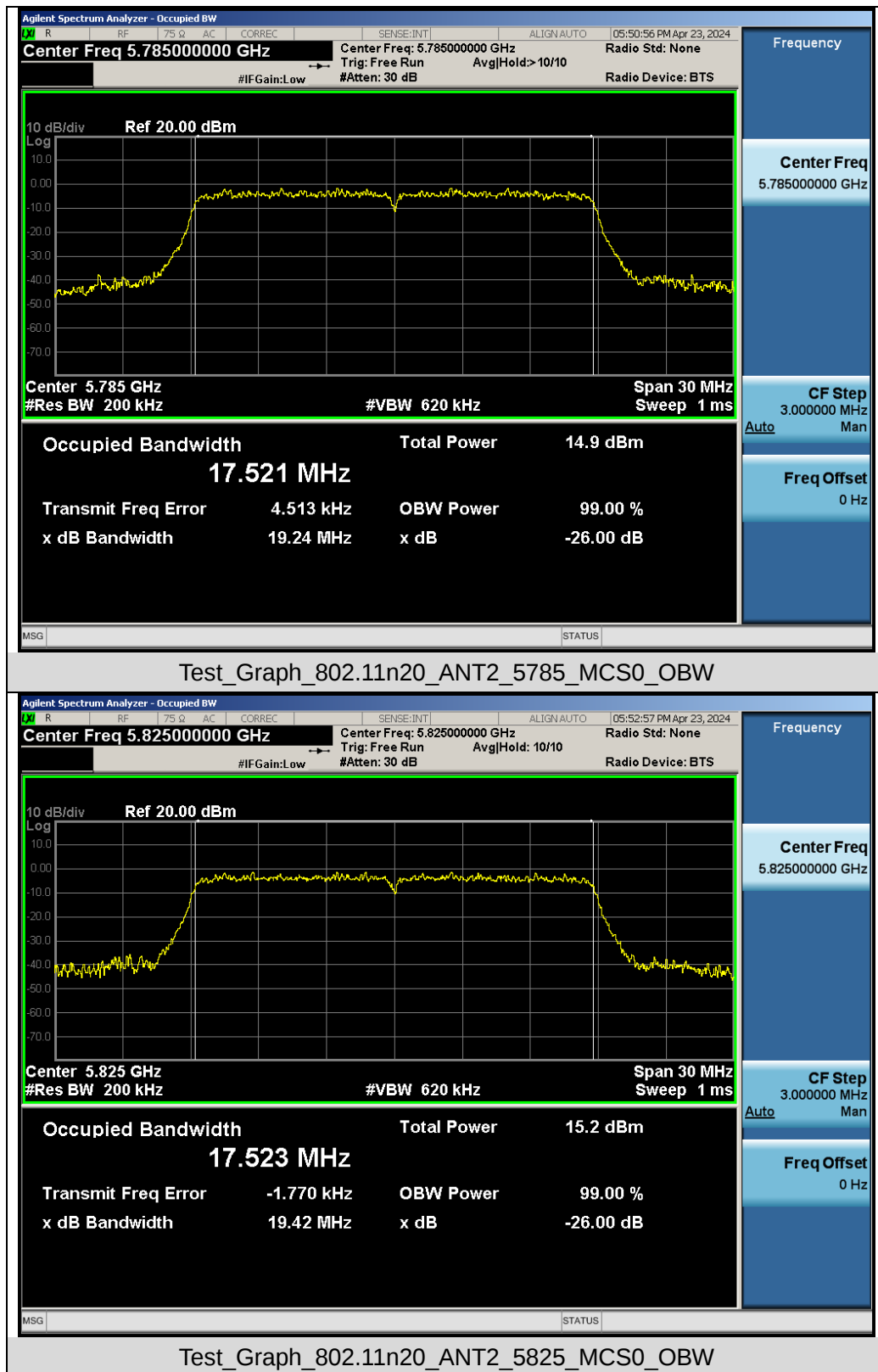
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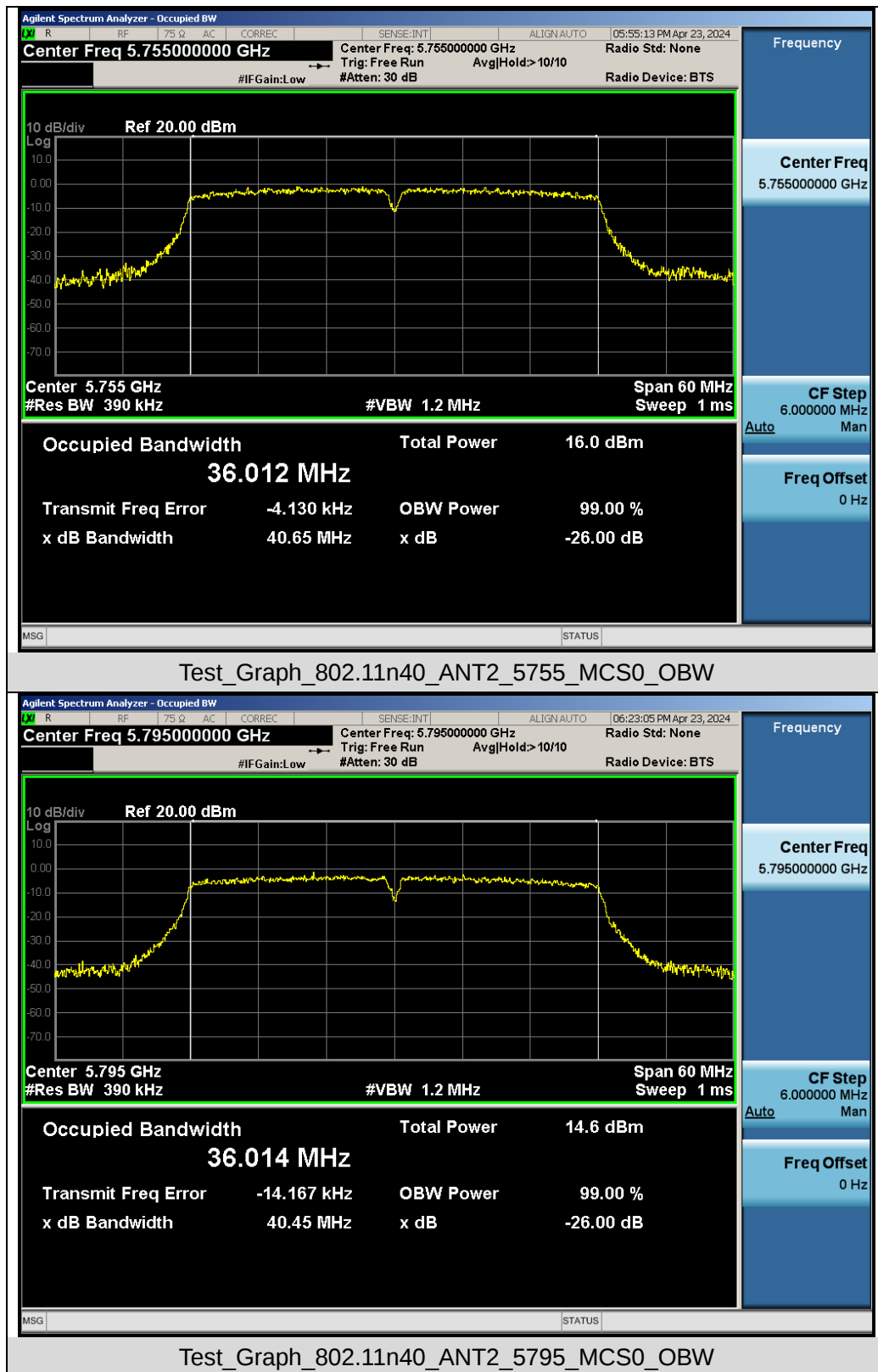
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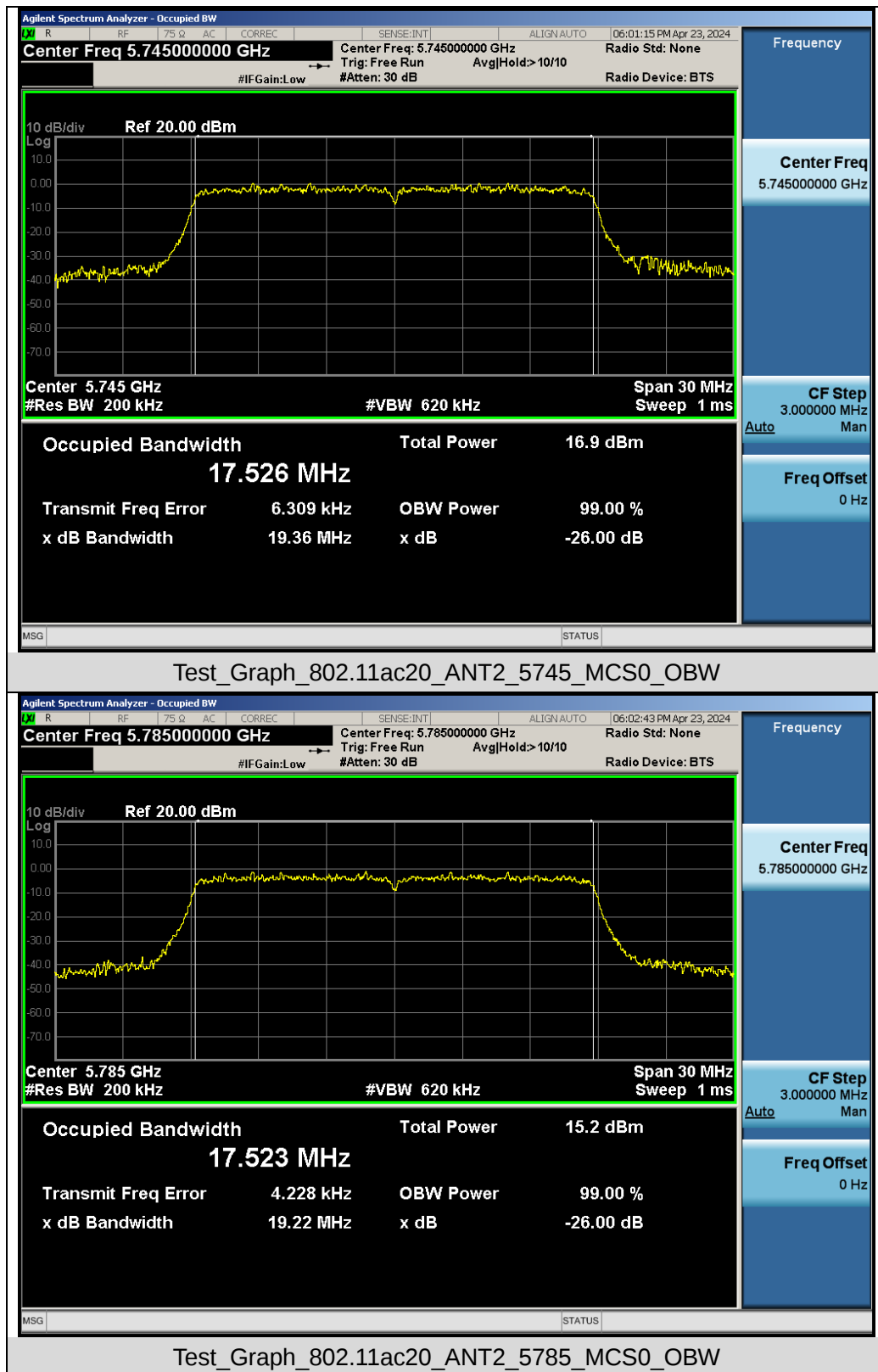
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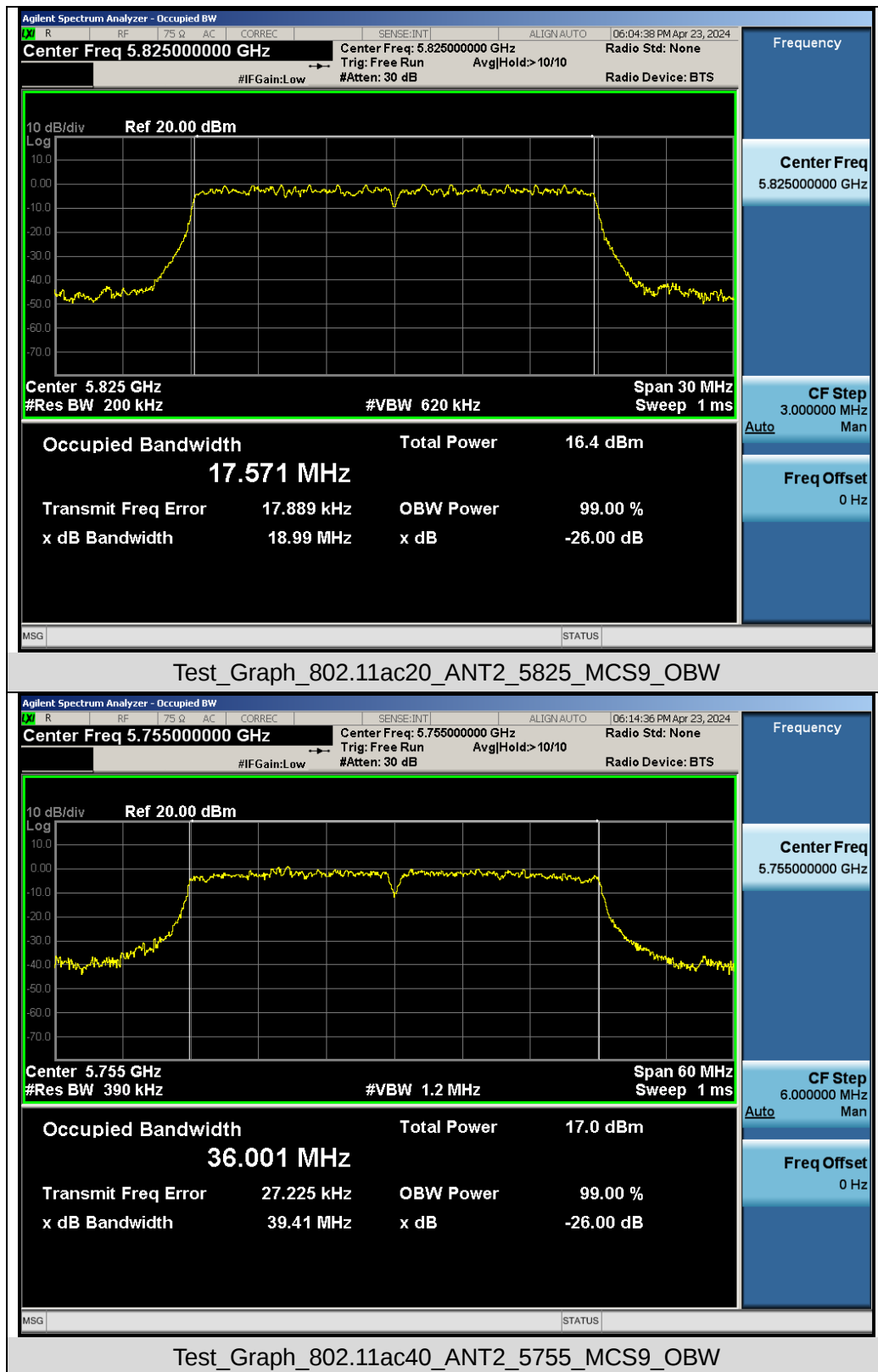
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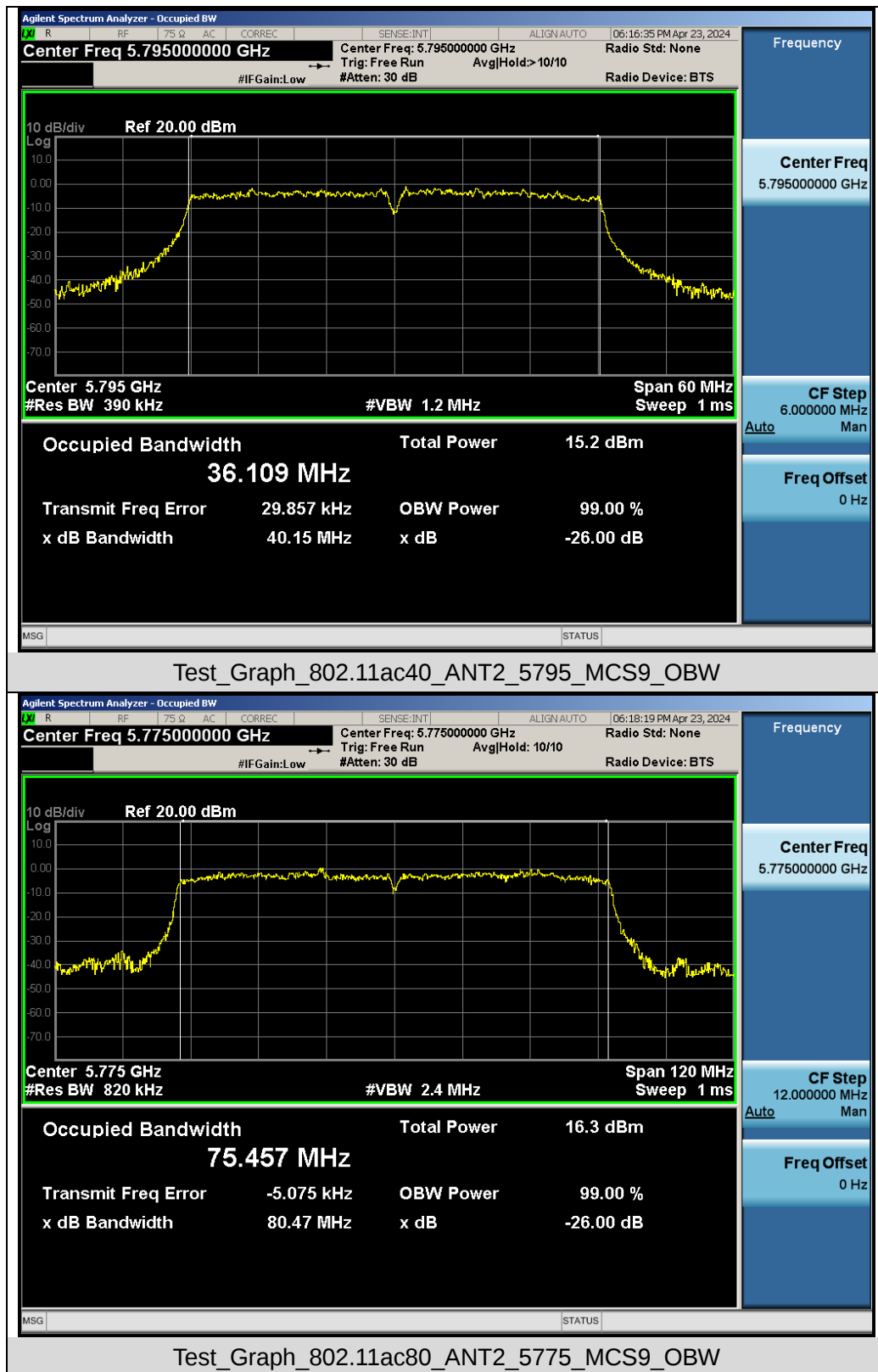
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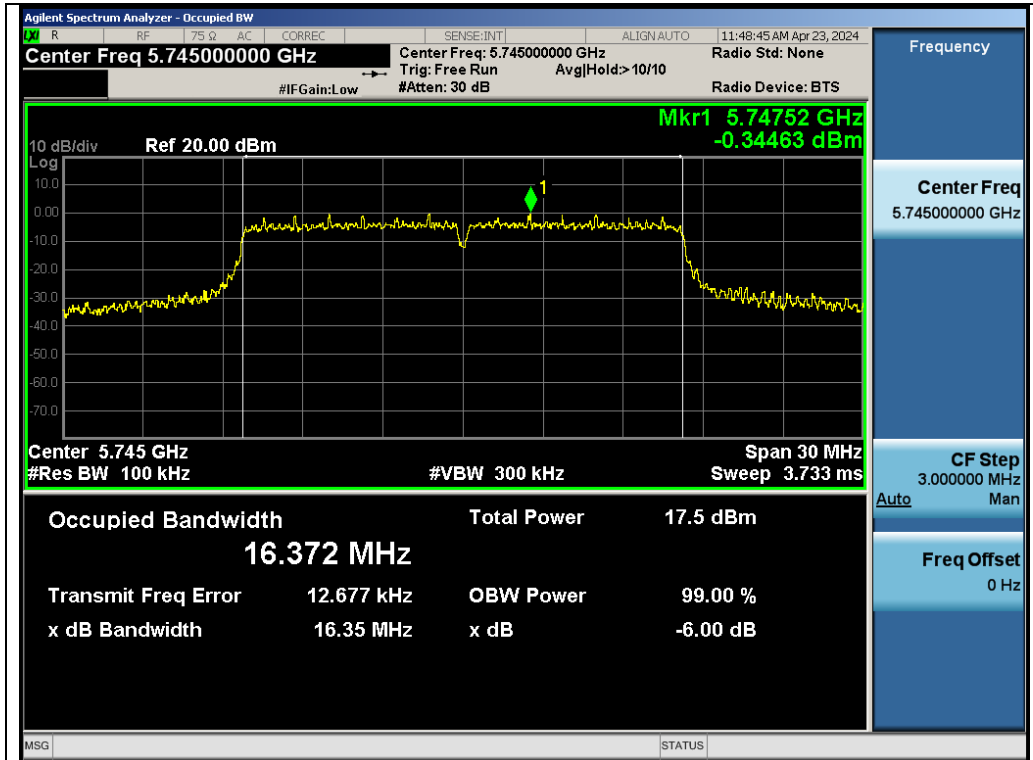


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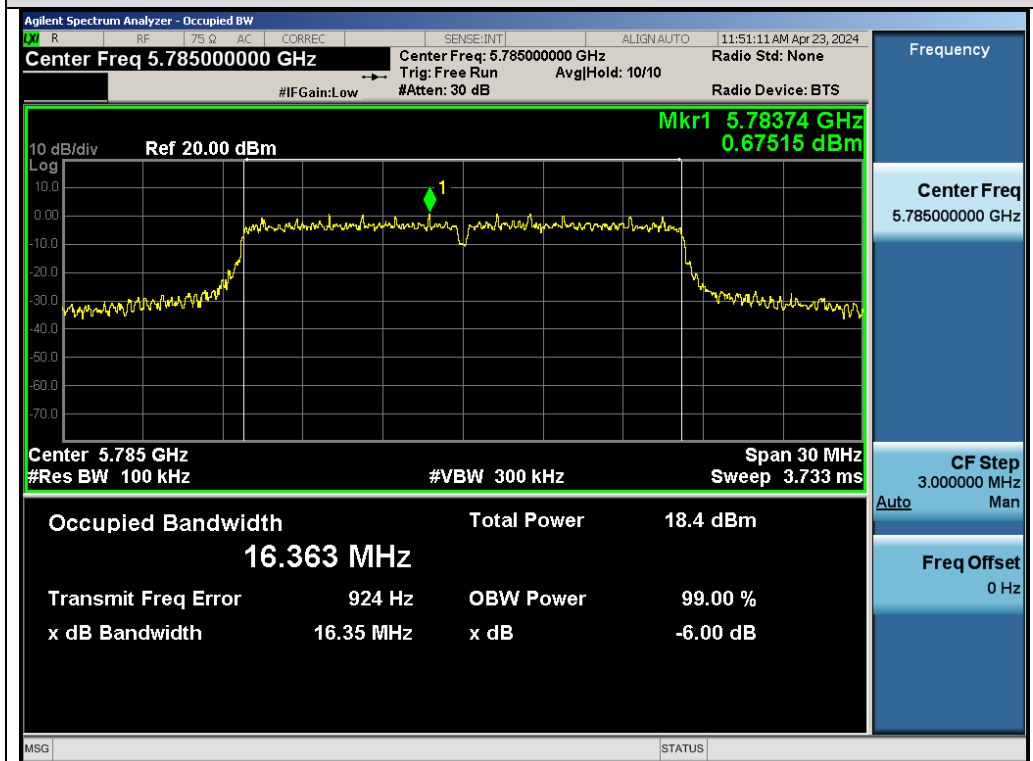


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Test Graphs of DTS Bandwidth for band 5.725-5.85 GHz

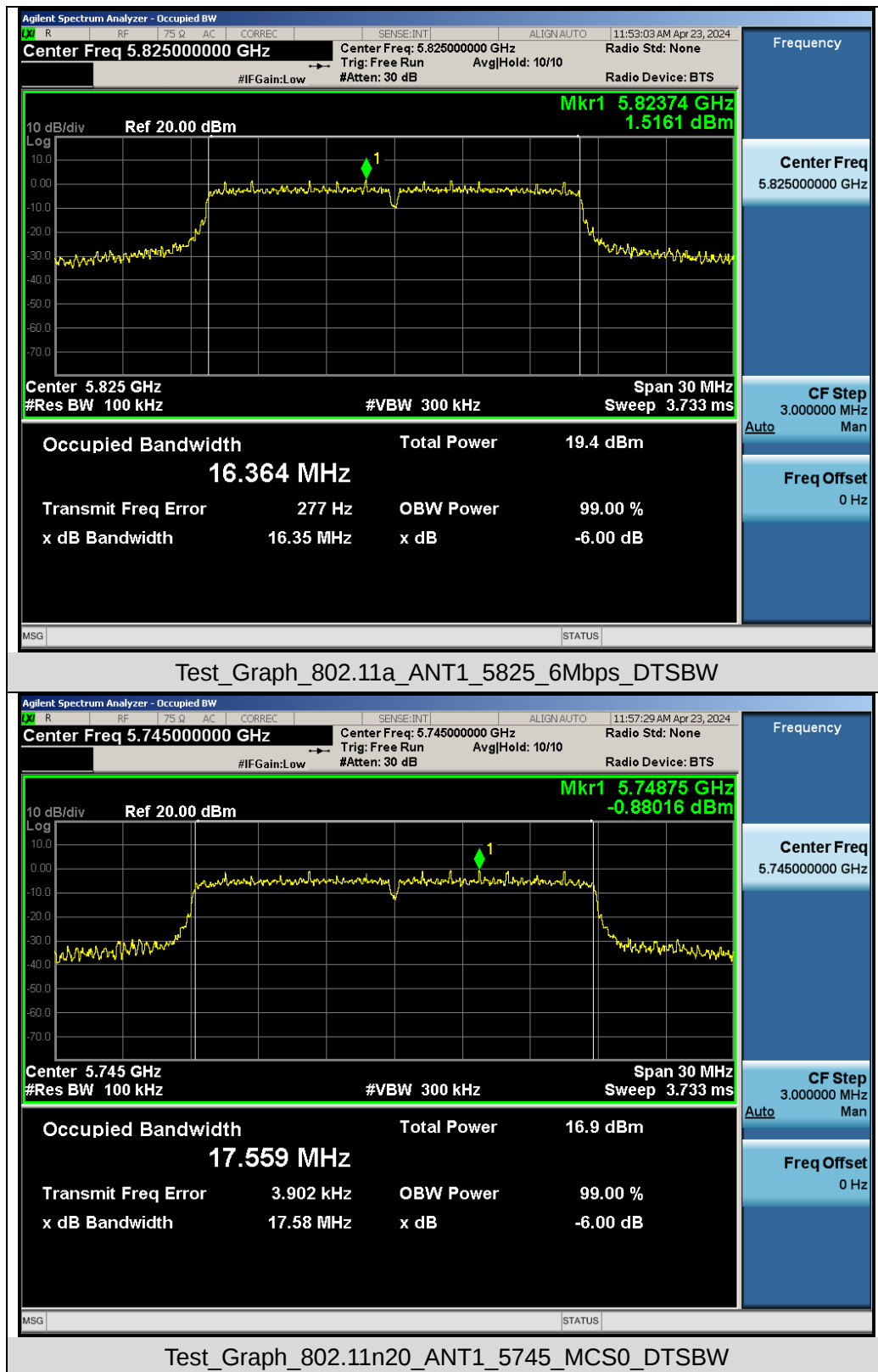


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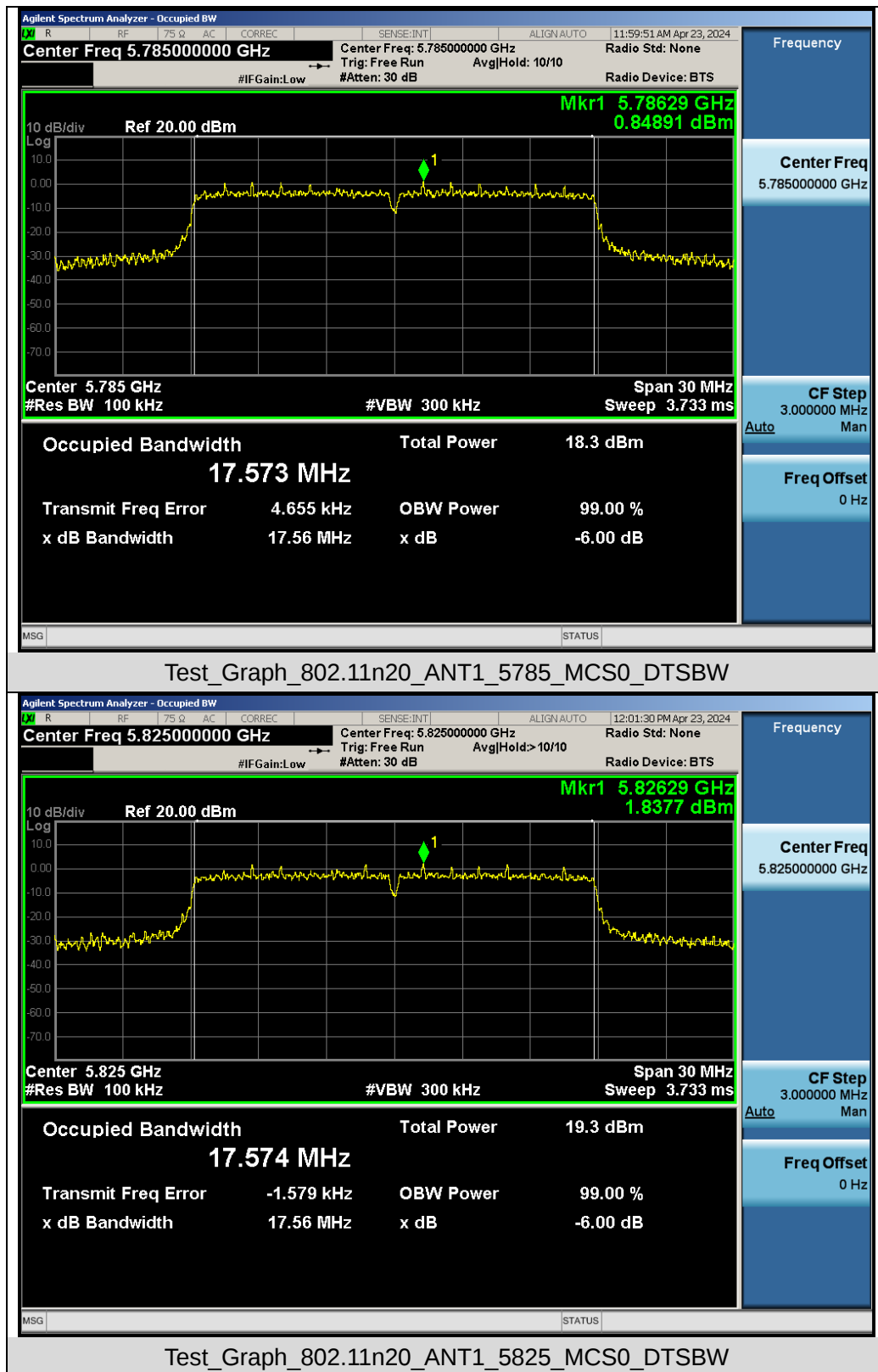


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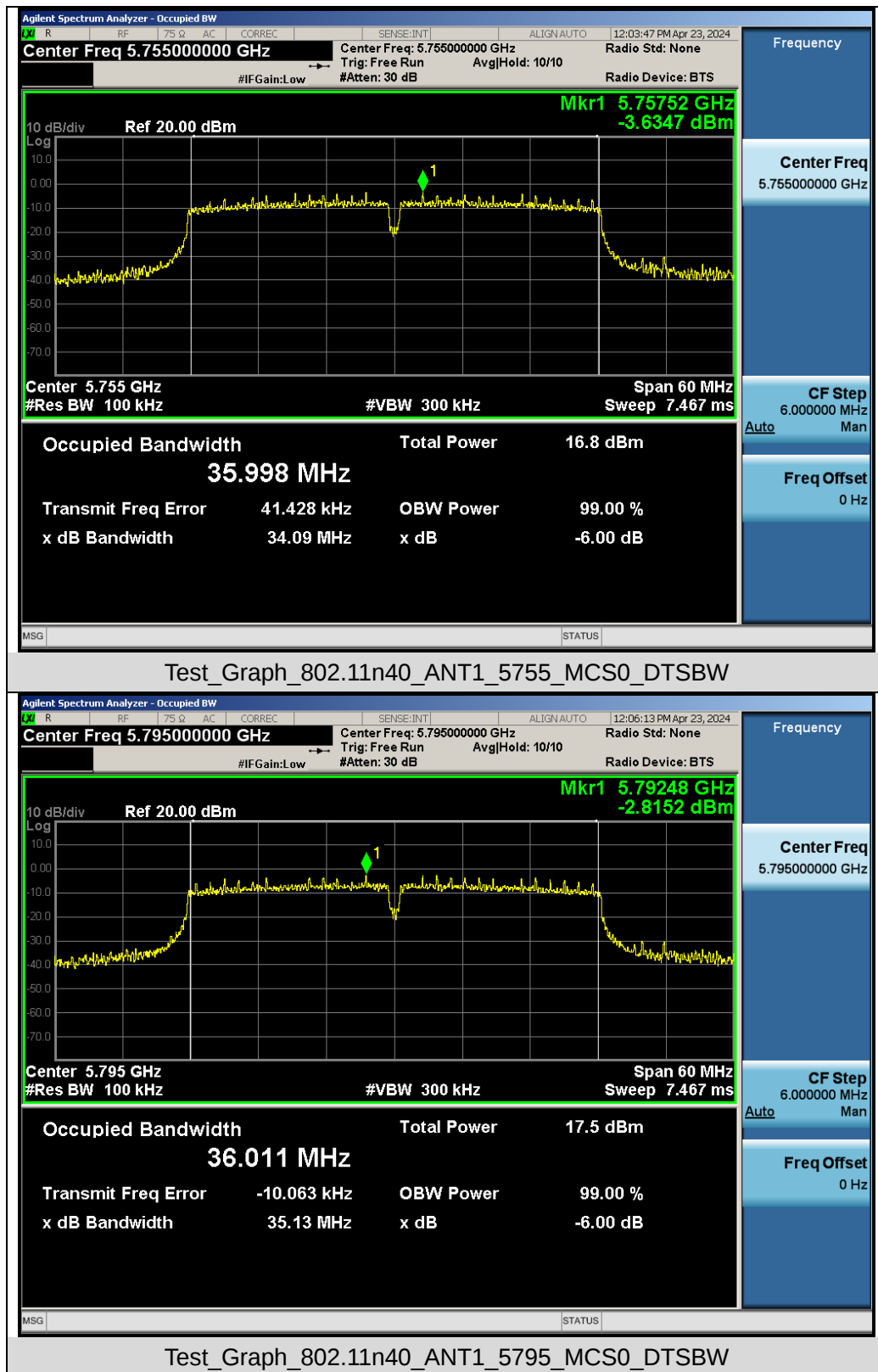
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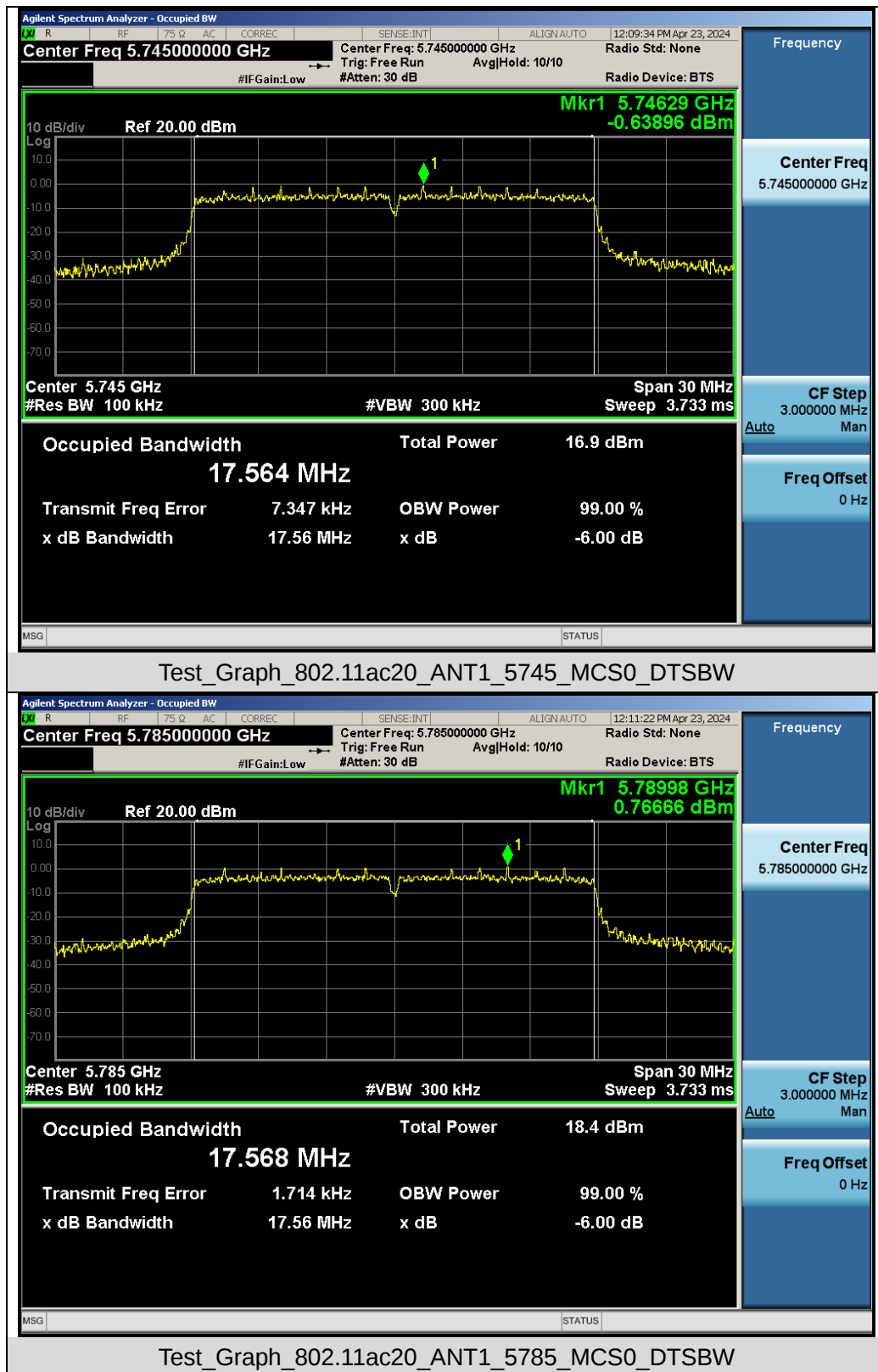
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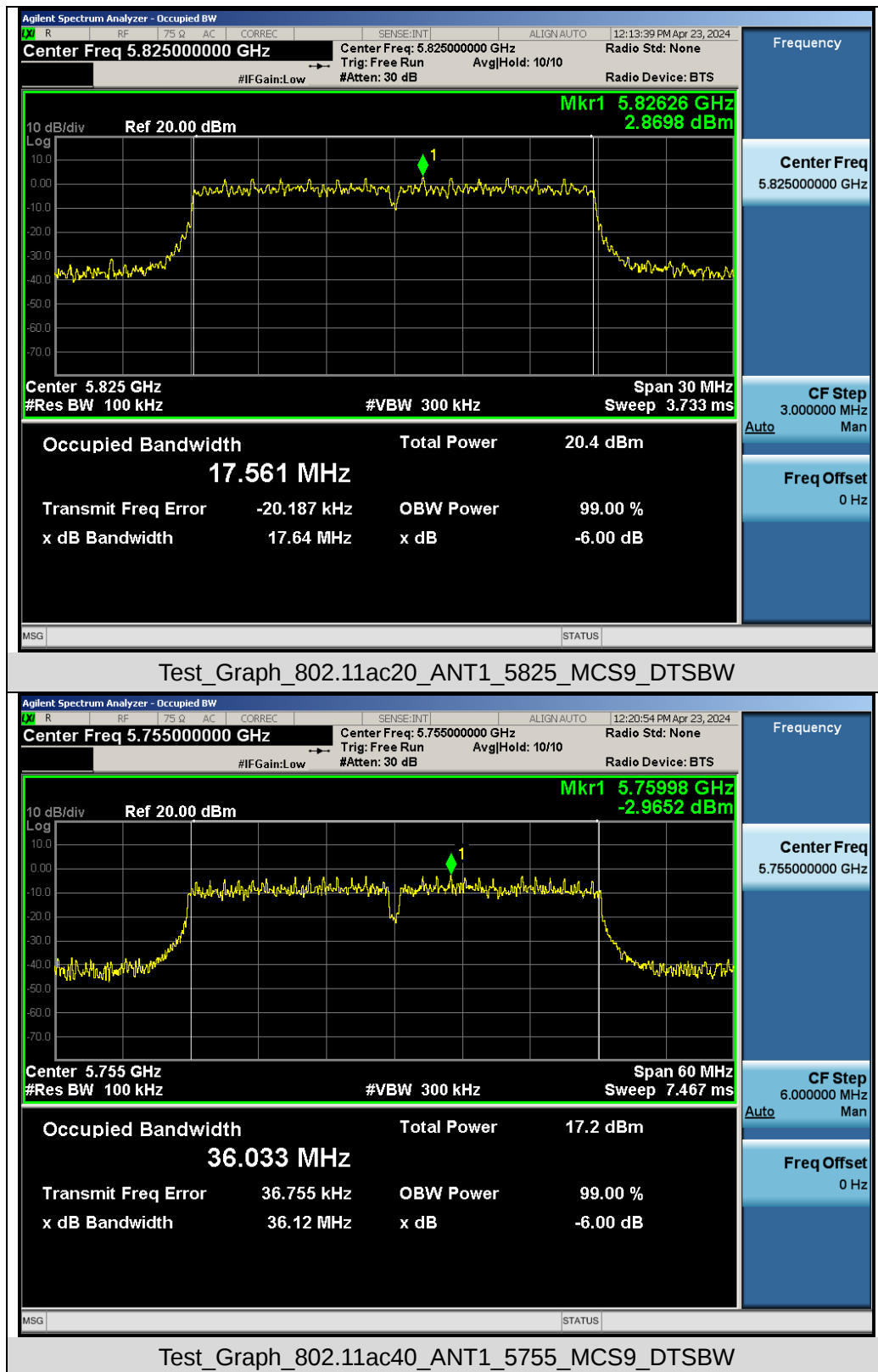
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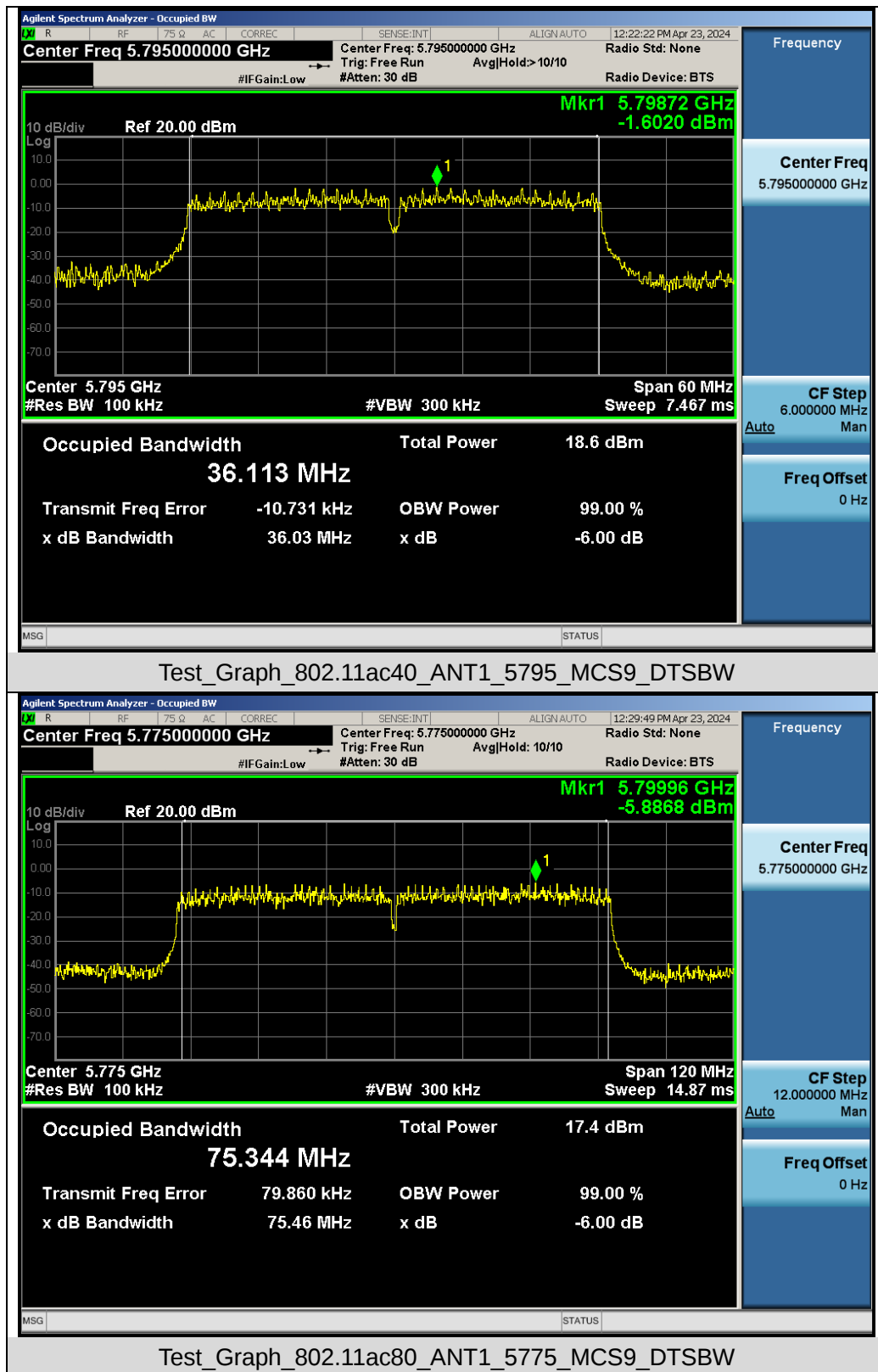


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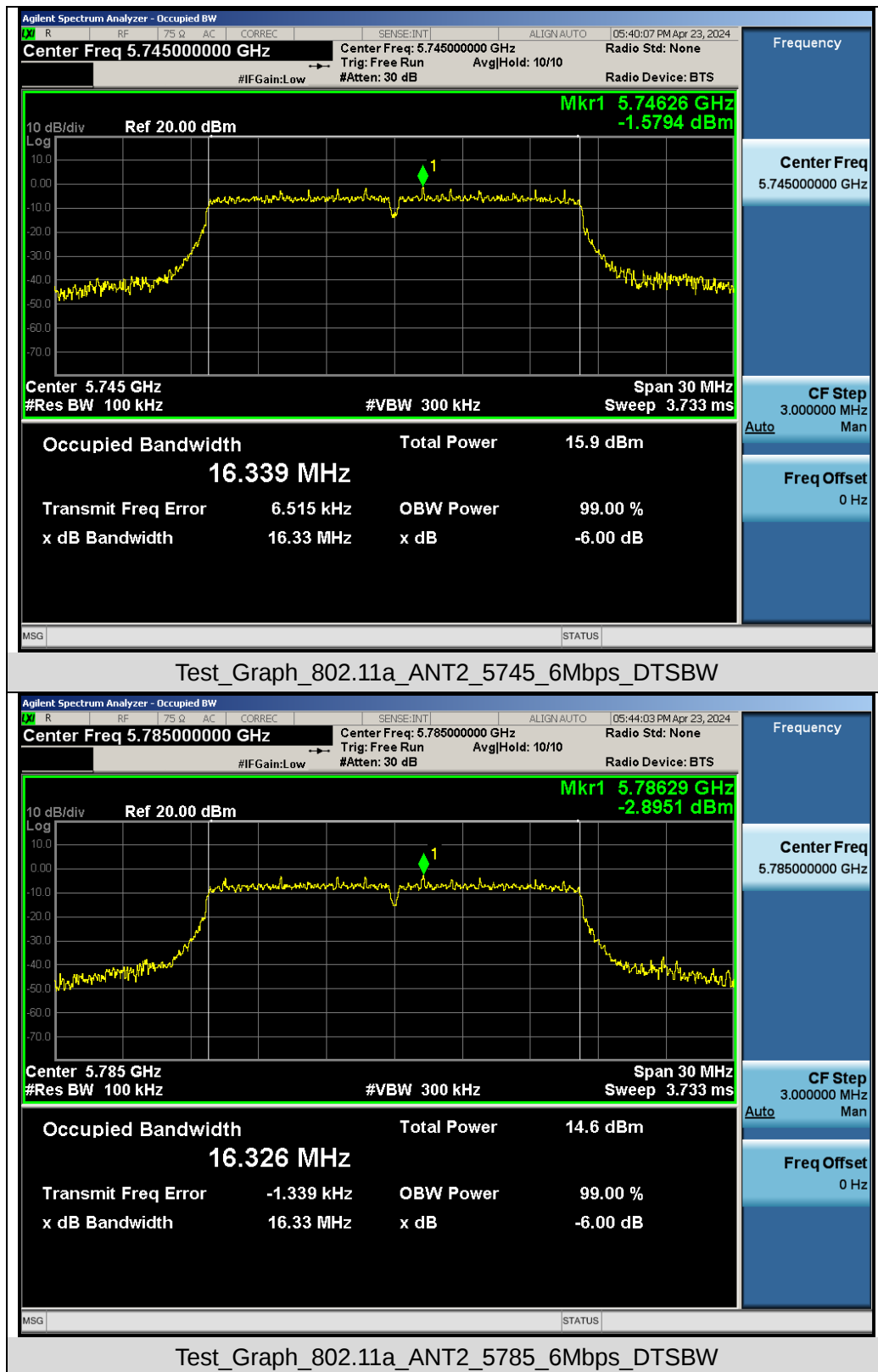
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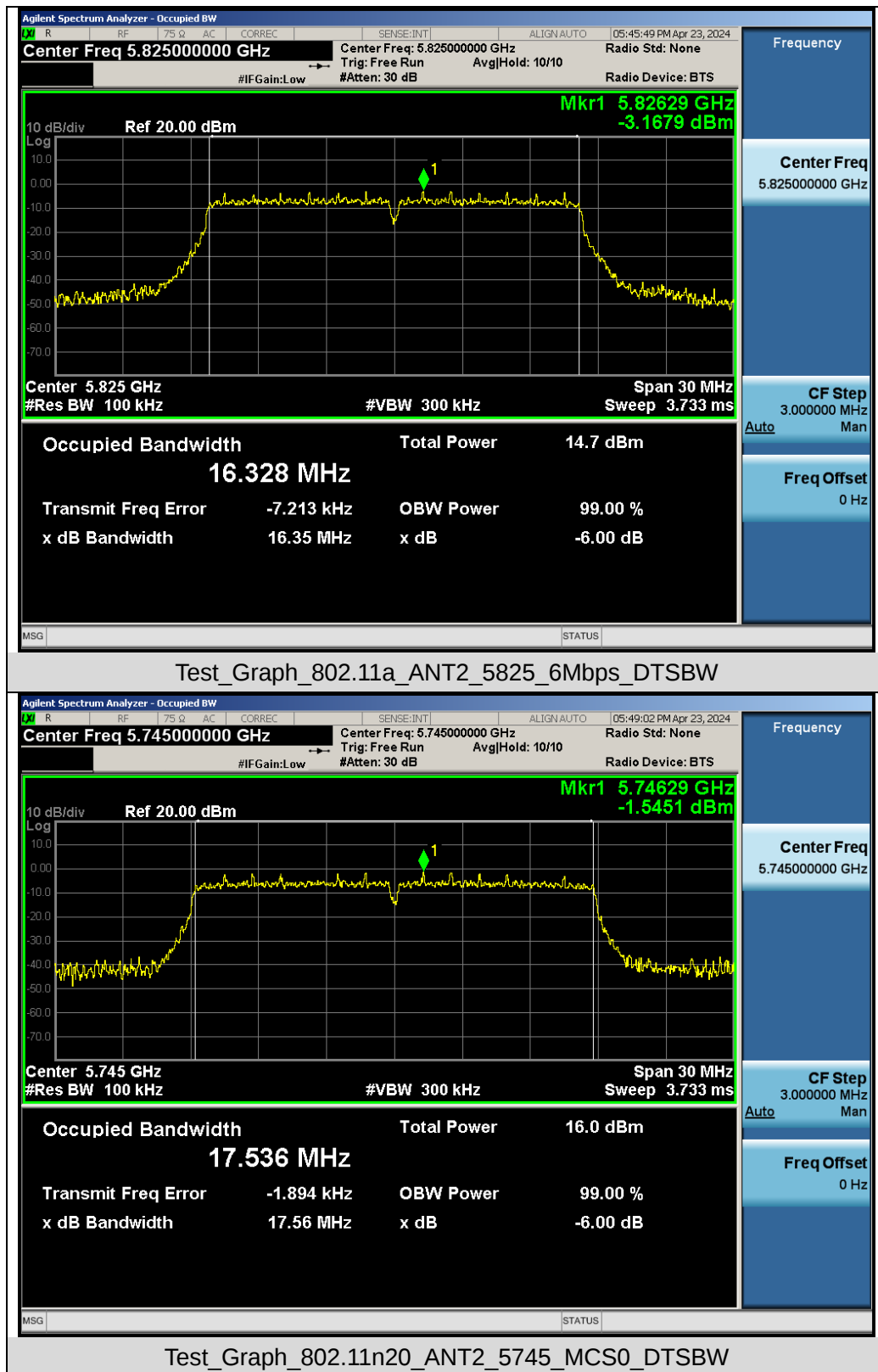


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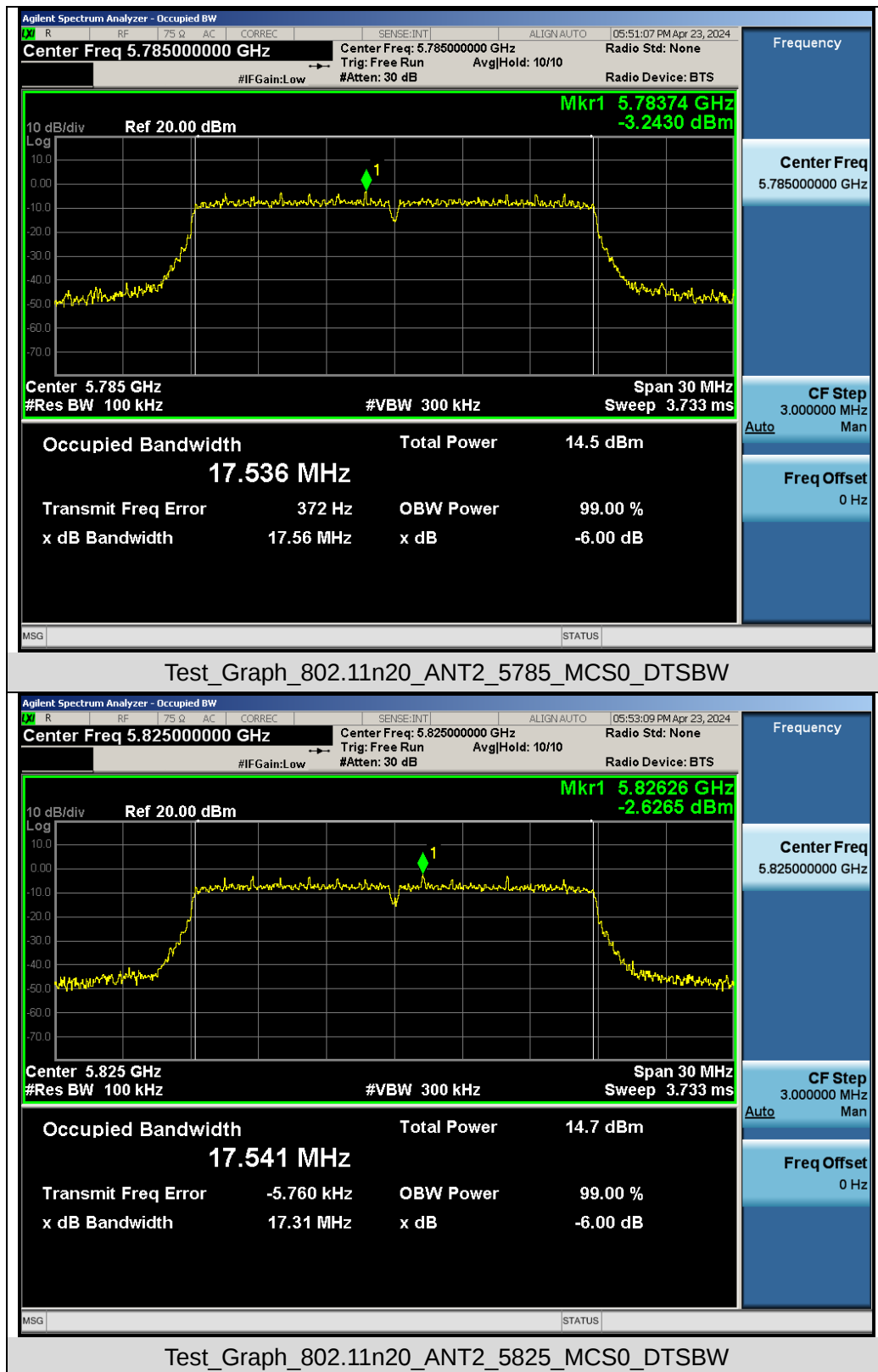


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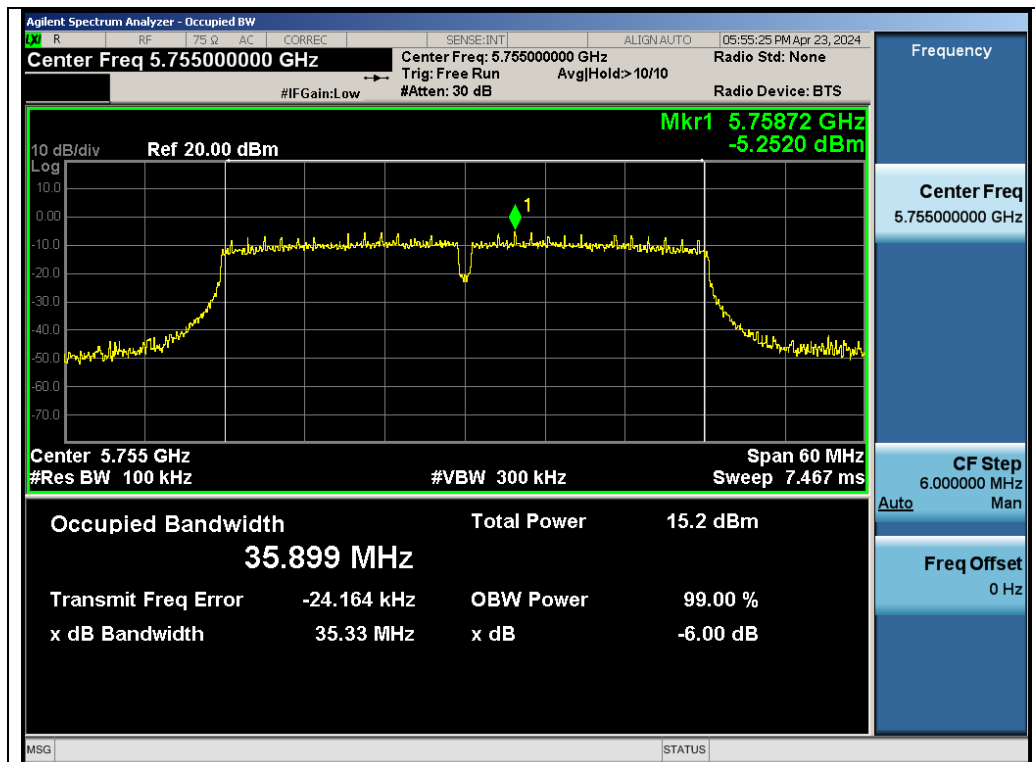


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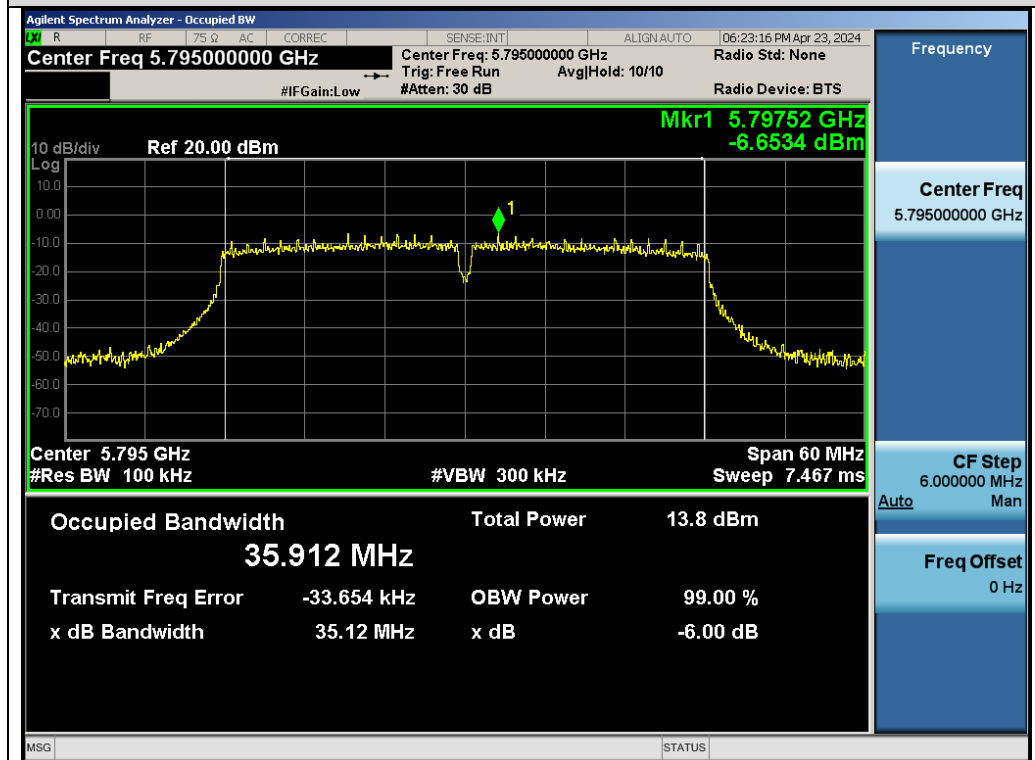
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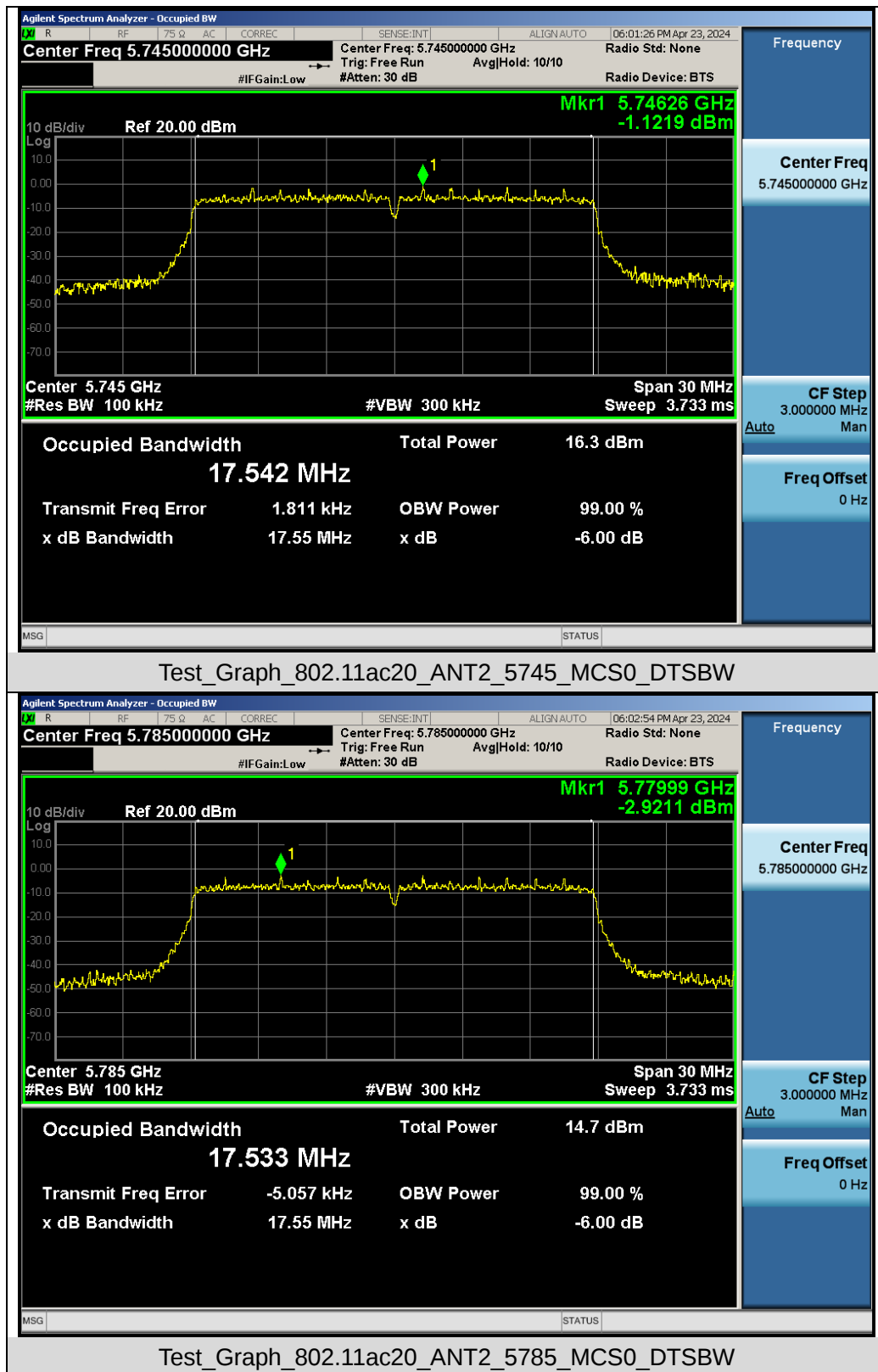
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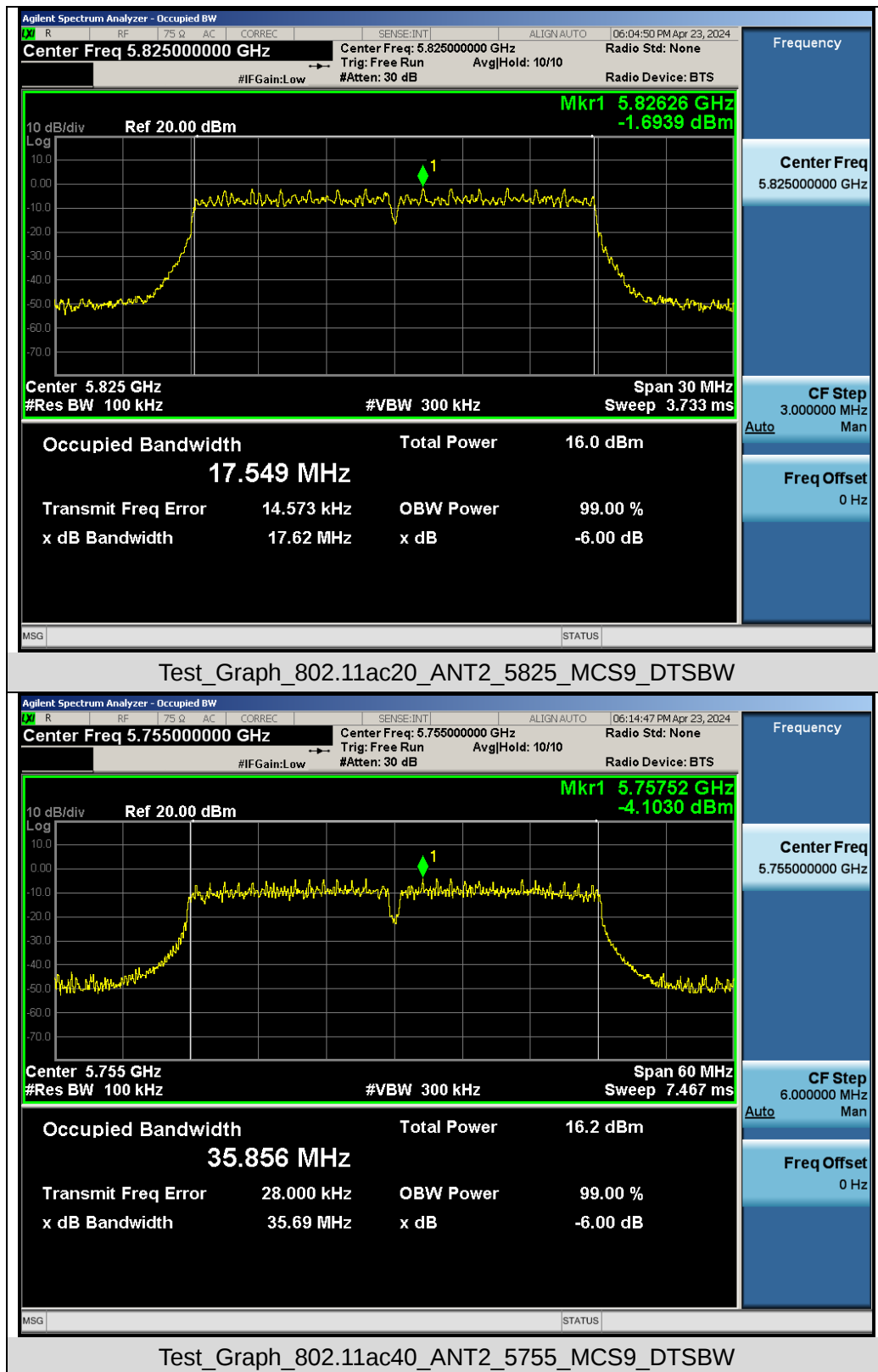
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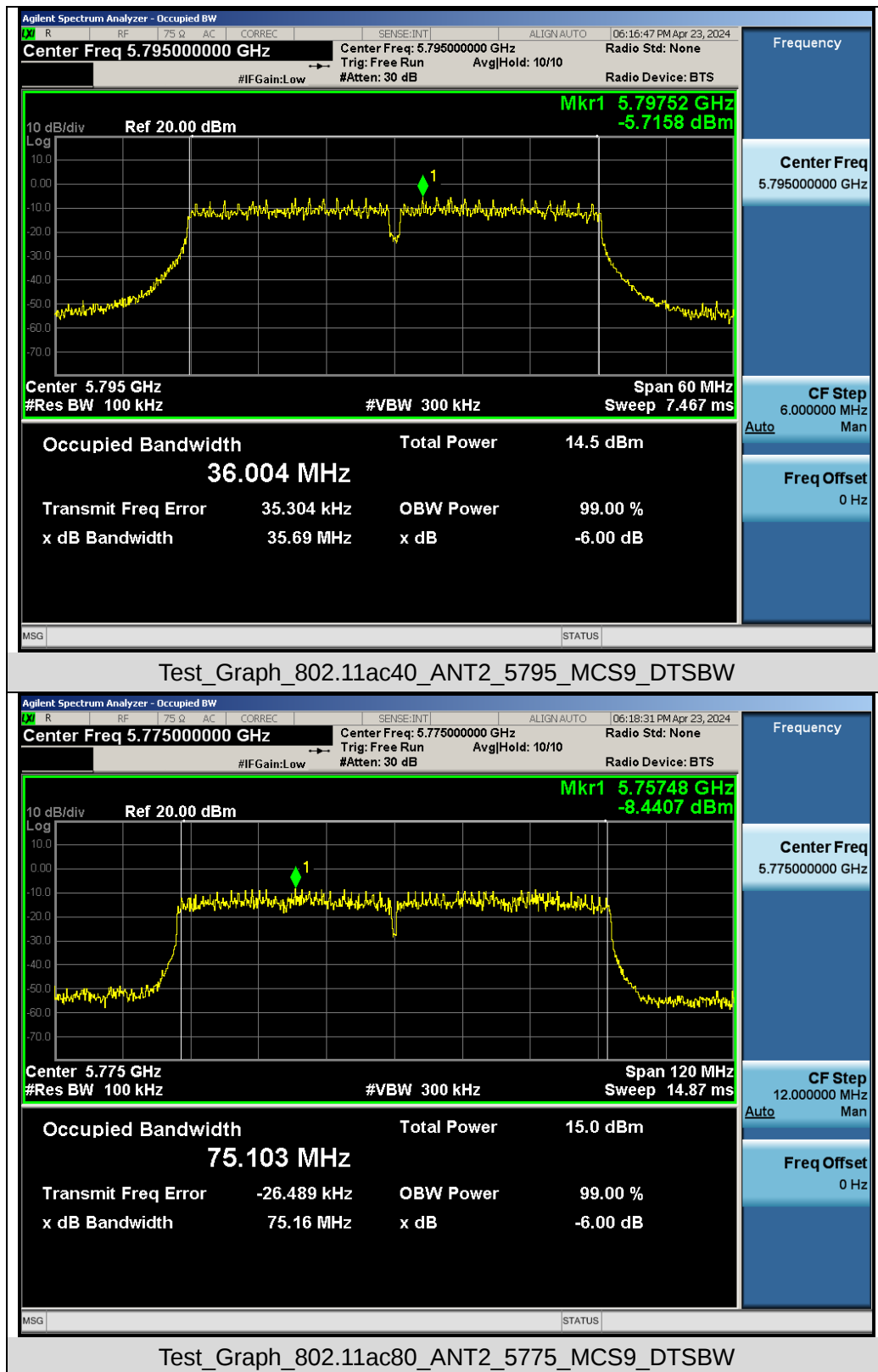
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9. Power Spectral Density Measurement

9.1 Provisions Applicable

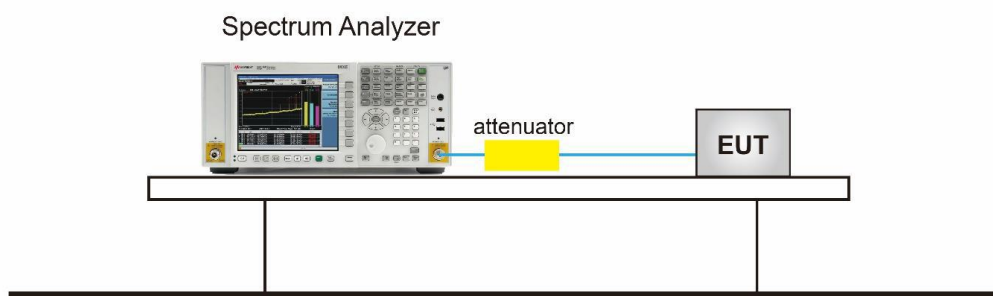
Operation Band	EUT Category		LIMIT
U-NII-1	☐	Outdoor Access Point	17dBm/ MHz
	☐	Fixed point-to-point Access Point	17dBm/ MHz
	☐	Indoor Access Point	17dBm/ MHz
	☒	Client devices	11dBm/ MHz
U-NII-2A	/		11dBm/ MHz
U-NII-2C	/		11dBm/ MHz
U-NII-3	/		30 dBm/500kHz

9.2 Measurement Procedure

☒ For Average power spectral density test:

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator.
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz.
4. If measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100KHz
5. Set VBW $\geq$ [3 $\times$ RBW].
6. Sweep Time=Auto couple.
7. Detector function=RMS (i.e., power averaging).
8. Trace average at least 100 traces in power averaging (rms) mode.
9. When the measurement bandwidth of Maximum PSD is specified in 100 kHz, add a constant factor $10 \times \log(500\text{kHz}/100\text{kHz}) = 6.99$ dB to the measured result.
10. Determine according to the duty cycle of the equipment: when it is less than 98%, follow the steps below.
11. Add [10 log (1/D)], where D is the duty cycle, to the measured power to compute the average power during the actual transmission times (because the measurement represents an average over both the ON and OFF times of the transmission). For example, add [10 log (1/0.25)] = 6 dB if the duty cycle is 25%.
12. Record the test results in the report.

9.3 Measurement Setup (Block Diagram of Configuration)



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9.4 Measurement Result

Test Data of Conducted Output Power Density for band 5.15-5.25 GHz-ANT 1				
Test Mode	Test Channel (MHz)	Average Power Density (dBm/MHz)	Limits (dBm/MHz)	Pass or Fail
802.11a	5180	3.624	11	Pass
	5200	3.600	11	Pass
	5240	4.969	11	Pass
802.11n20	5180	2.485	11	Pass
	5200	3.167	11	Pass
	5240	4.016	11	Pass
802.11n40	5190	0.192	11	Pass
	5230	0.962	11	Pass
802.11ac20	5180	3.443	11	Pass
	5200	3.200	11	Pass
	5240	3.965	11	Pass
802.11ac40	5190	1.104	11	Pass
	5230	0.891	11	Pass
802.11ac80	5210	-0.028	11	Pass

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