TEST REPORT

Dt&C

Dt&C Co., Ltd.

42, Yurim-ro, 154Beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea, 17042
Tel : 031-321-2664, Fax : 031-321-1664

1. Report No : DRTFCC2304-0058

2. Customer

- Name (FCC) : Point Mobile Co., LTD. / Name (IC) : POINTMOBILE CO.,LTD
- Address (FCC) : B-9F, Kabul Great Valley 32 Digital-ro 9-gil, Geumcheon-gu Seoul South Korea 153-709
  Address (IC) : B-9F Kabul Great Valley, 32, Digital-ro 9-gil, Geumcheon-gu Seoul Korea (Republic Of)

3. Use of Report : FCC & IC Certification

4. Product Name / Model Name : Mobile Computer / PM560
   FCC ID : V2X-PM560
   IC : 10664A-PM560

5. FCC Regulation(s): Part 15.407
   IC Standard(s): RSS-247 Issue 2, RSS-Gen Issue 5
   Test Method used: ANSI C63.10-2013, KDB789033 D02v02r01, KDB662911 D01v02r01

6. Date of Test : 2023.03.21 ~ 2023.04.12

7. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing

8. Testing Environment : See appended test report.

9. Test Result : Refer to the attached test result.

The results shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test report is not related to KOLAS accreditation.

Affirmation	Tested by Name : SeungMin Gil (Signature)	Technical Manager Name : JaeJin Lee (Signature)

2023 . 04 . 14 .

Dt&C Co., Ltd.

If this report is required to confirmation of authenticity, please contact to report@dtnc.net

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Test Report Version

Test Report No.	Date	Description	Revised by	Reviewed by
DRTFCC2304-0058	Apr. 14, 2023	Initial issue	SeungMin Gil	JaeJin Lee

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1. General Information

1.1. Description of EUT

Equipment Class	Unlicensed National Information Infrastructure TX(NII)
Product Name	Mobile Computer
Model Name	PM560
Add Model Name	-
Firmware Version Identification Number	56.00xx
EUT Serial Number	Conducted : 2223710235, Radiated: 2303310292
Power Supply	DC 3.63 V
Modulation Technique	OFDM
Antenna Specification	Antenna Type: LDS Antenna Antenna Gain: Refer to the clause 3 in test report

Band	Mode	Tx. frequency(MHz)	Max. conducted power(dBm)	Antenna gain(dBi)	Max. e.i.r.p (dBm)
U-NII 1	802.11a	5 180 ~ 5 240	**12.81**	4.60	17.41
	802.11n(HT20)	5 180 ~ 5 240	12.85	4.60	17.45
	802.11ac(VHT20)	5 180 ~ 5 240	12.82	4.60	17.42
	802.11n(HT40)	5 190 ~ 5 230	14.38	4.60	18.98
	802.11ac(VHT40)	5 190 ~ 5 230	14.37	4.60	18.97
	802.11ac(VHT80)	5 210	11.70	4.60	16.30
U-NII 2A	802.11a	5 260 ~ 5 320	**15.41**	4.94	20.35
	802.11n(HT20)	5 260 ~ 5 320	14.10	4.94	19.04
	802.11ac(VHT20)	5 260 ~ 5 320	14.04	4.94	18.98
	802.11n(HT40)	5 270 ~ 5 310	14.35	4.94	19.29
	802.11ac(VHT40)	5 270 ~ 5 310	14.30	4.94	19.24
	802.11ac(VHT80)	5 290	11.13	4.94	16.07
U-NII 2C	802.11a	5 500 ~ 5 720	**15.80**	5.03	20.83
	802.11n(HT20)	5 500 ~ 5 720	14.86	5.03	19.89
	802.11ac(VHT20)	5 500 ~ 5 720	14.81	5.03	19.84
	802.11n(HT40)	5 510 ~ 5 710	14.38	5.03	19.41
	802.11ac(VHT40)	5 510 ~ 5 710	14.33	5.03	19.36
	802.11ac(VHT80)	5 530 ~ 5 690	13.61	5.03	18.64
U-NII 3	802.11a	5 745 ~ 5 825	**15.11**	5.13	20.24
	802.11n(HT20)	5 745 ~ 5 825	14.29	5.13	19.42
	802.11ac(VHT20)	5 745 ~ 5 825	14.42	5.13	19.55
	802.11n(HT40)	5 755 ~ 5 795	14.34	5.13	19.47
	802.11ac(VHT40)	5 755 ~ 5 795	14.32	5.13	19.45
	802.11ac(VHT80)	5 775	13.69	5.13	18.82

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1.2. Declaration by the applicant / manufacturer

N/A

1.3. Testing Laboratory

Dt&C Co., Ltd.		
The 3 m test site and conducted measurement facility used to collect the radiated data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 17042. The test site complies with the requirements of Part 2.948 according to ANSI C63.4-2014. **- FCC & IC MRA Designation No. : KR0034** **- ISED#: 5740A**		
www.dtnc.net		
Telephone	:	+ 82-31-321-2664
FAX	:	+ 82-31-321-1664

1.4. Testing Environment

Ambient Condition	
▪ Temperature	+21 ℃ ~ +24 ℃
▪ Relative Humidity	+36 % ~ +41 %

1.5. Measurement Uncertainty

The measurement uncertainties shown below were calculated in accordance with requirements of ANSI C63.4-2014 and ANSI C63.10-2013. All measurement uncertainty values are shown with a coverage factor of *k* = 2 to indicate a 95 % level of confidence.

Parameter	Measurement uncertainty
Antenna-port conducted emission	1.0 dB (The confidence level is about 95 %, k = 2)
AC power-line conducted emission	3.4 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz Below)	4.8 dB (The confidence level is about 95 %, k = 2)
Radiated emission (1 GHz ~ 18 GHz)	5.0 dB (The confidence level is about 95 %, k = 2)
Radiated emission (18 GHz Above)	5.2 dB (The confidence level is about 95 %, k = 2)

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1.6. Test Equipment List

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
Spectrum Analyzer	Agilent Technologies	N9020A	22/06/24	23/06/24	MY46471622
Spectrum Analyzer	Agilent Technologies	N9020A	22/12/16	23/12/16	MY48010133
Spectrum Analyzer	Agilent Technologies	N9020A	22/12/16	23/12/16	MY48011700
Spectrum Analyzer	Agilent Technologies	N9020A	22/06/24	23/06/24	US47360812
Spectrum Analyzer	KEYSIGHT	N9030B	22/12/16	23/12/16	MY55480168
DC Power Supply	Agilent Technologies	66332A	22/06/24	23/06/24	US37473627
Multimeter	FLUKE	17B+	22/12/16	23/12/16	36390701WS
Signal Generator	Rohde Schwarz	SMBV100A	22/12/16	23/12/16	255571
Signal Generator	ANRITSU	MG3695C	22/12/16	23/12/16	173501
Thermohygrometer	BODYCOM	BJ5478	22/12/16	23/12/16	120612-1
Thermohygrometer	BODYCOM	BJ5478	22/12/16	23/12/16	120612-2
Thermohygrometer	BODYCOM	BJ5478	22/06/24	23/06/24	N/A
Loop Antenna	ETS-Lindgren	6502	22/12/16	24/12/16	00226186
Hybrid Antenna	Schwarzbeck	VULB 9160	22/12/16	23/12/16	3362
Horn Antenna	ETS-Lindgren	3117	22/06/24	23/06/24	00143278
Horn Antenna	A.H.Systems Inc.	SAS-574	22/06/24	23/06/24	155
PreAmplifier	tsj	MLA-0118-B01-40	22/12/16	23/12/16	1852267
PreAmplifier	tsj	MLA-1840-J02-45	22/06/24	23/06/24	16966-10728
PreAmplifier	H.P	8447D	22/12/16	23/12/16	2944A07774
High Pass Filter	Wainwright Instruments	WHKX12-935-1000-15000-40SS	22/06/24	23/06/24	8
High Pass Filter	Wainwright Instruments	WHKX10-2838-3300-18000-60SS	22/06/24	23/06/24	1
High Pass Filter	Wainwright Instruments	WHNX8.0/26.5-6SS	22/06/24	23/06/24	3
Attenuator	Hefei Shunze	SS5T2.92-10-40	22/06/24	23/06/24	16012202
Attenuator	Aeroflex/Weinschel	56-3	22/06/24	23/06/24	Y2370
Attenuator	SMAJK	SMAJK-2-3	22/06/24	23/06/24	3
Attenuator	SMAJK	SMAJK-2-3	22/06/24	23/06/24	2
Attenuator	Aeroflex/Weinschel	86-10-11	22/06/24	23/06/24	408
Power Meter & Wide Bandwidth Sensor	Anritsu	ML2496A MA2411B	22/12/16	23/12/16	1338004 1911481
EMI Test Receiver	ROHDE&SCHWARZ	ESCI7	23/01/31	24/01/31	100910
PULSE LIMITER	Rohde Schwarz	ESH3-Z2	22/08/22	23/08/22	101333
LISN	SCHWARZBECK	NSLK 8128 RC	22/10/26	23/10/26	8128 RC-387
Thermo Hygro Meter	TESTO	608-H1	23/01/13	24/01/13	45084791
Cable	Dt&C	Cable	23/01/04	24/01/04	G-2
Cable	HUBER+SUHNER	SUCOFLEX 100	23/01/04	24/01/04	G-3
Cable	Dt&C	Cable	23/01/04	24/01/04	G-4
Cable	OMT	YSS21S	23/01/04	24/01/04	G-5
Cable	Junkosha	MWX241	23/01/03	24/01/03	mmW-1
Cable	Junkosha	MWX241	23/01/03	24/01/03	mmW-4
Cable	HUBER+SUHNER	SUCOFLEX100	23/01/04	24/01/04	M-01
Cable	HUBER+SUHNER	SUCOFLEX100	23/01/04	24/01/04	M-02
Cable	JUNKOSHA	MWX241/B	23/01/04	24/01/04	M-03
Cable	JUNKOSHA	J12J101757-00	23/01/04	24/01/04	M-07
Cable	HUBER+SUHNER	SUCOFLEX106	23/01/04	24/01/04	M-09
Cable	RADIALL	TESTPRO 3	23/01/04	24/01/04	RFC-44
Cable	RADIALL	TESTPRO 3	23/01/04	24/01/04	RFC-03
Cable	Dt&C	Cable	23/01/04	24/01/04	RFC-69
Test Software	tsj	Radiated Emission Measurement	NA	NA	Version 2.00.0147
Test Software	tsj	Noise Terminal Measurement	NA	NA	Version 2.00.0185

Note1: The measurement antennas were calibrated in accordance to the requirements of ANSI C63.5-2017.
Note2: The cable is not a regular calibration item, so it has been calibrated by Dt&C itself.

2. Test Methodology

The measurement procedures described in the ANSI C63.10-2013 and the guidance provided in KDB789033 D02v02r01 were used in measurement of the EUT.

The EUT was tested per the guidance of KDB789033 D02v02r01. And ANSI C63.10-2013 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

2.1. EUT Configuration

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

2.2. EUT Exercise

The EUT was operated in the test mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.407 under the FCC Rules Part 15 Subpart E.

2.3. General Test Procedures

Conducted Emissions

The power-line conducted emission test procedure is not described on the KDB789033 D02v02r01.

So this test was fulfilled with the requirements in Section 6.2 of ANSI C63.10-2013.

The EUT is placed on the wooden table, which is 0.8 m above ground plane and the conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

Basically the radiated tests were performed with KDB789033 D02v02r01. But some requirements and procedures like test site requirements, EUT setup and maximizing procedure were fulfilled with the requirements in Section 5 and 6 of the ANSI C63.10-2013 as stated on KDB789033 D02v02r01.

The EUT is placed on a non-conductive table, which is 0.8 m above ground plane. For emission measurements above 1 GHz, the table height is 1.5 m. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 1 m or 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of the EUT were rotated through three orthogonal axis.

2.4. Instrument Calibration

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment, which is traceable to recognized national standards.

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2.5. Description of Test Modes

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting.

Transmitting Configuration of EUT

Mode	SISO		MIMO (CDD)	MIMO (SDM)
	Ant 1	Ant 2	Ant 1 & 2	Ant 1 & 2
	Data rate			
802.11a	6 ~ 54 Mbps	6 ~ 54 Mbps	6 ~ 54 Mbps	-
802.11n(HT20)	MCS 0 ~ 7	MCS 0 ~ 7	MCS 0 ~ 7	MCS 8 ~ 15
802.11ac(VHT20)	MCS 0 ~ 8(1SS)	MCS 0 ~ 8(1SS)	MCS 0 ~ 8(1SS)	MCS 0 ~ 8(2SS)
802.11n(HT40)	MCS 0 ~ 7	MCS 0 ~ 7	MCS 0 ~ 7	MCS 8 ~ 15
802.11ac(VHT40)	MCS 0 ~ 9(1SS)	MCS 0 ~ 9(1SS)	MCS 0 ~ 9(1SS)	MCS 0 ~ 9(2SS)
802.11ac(VHT80)	MCS 0 ~ 9(1SS)	MCS 0 ~ 9(1SS)	MCS 0 ~ 9(1SS)	MCS 0 ~ 9(2SS)

Note1: SDM = Spatial Diversity Multiplexing, CDD = Cycle Delay Diversity, SS = Spatial Streams

EUT Operation test setup

- Test Software: PM560_Script_Tool

- Power setting: Refer to the table below.

Tested frequency and power setting

Band	Channel	Frequency (MHz)	802.11a
			Power Setting
U-NII 1	36	5 180	10
	40	5 200	10
	48	5 240	10
U-NII 2A	52	5 260	13
	60	5 300	13
	64	5 320	11
U-NII 2C	100	5 500	11
	116	5 580	13
	144	5 720	13
U-NII 3	149	5 745	12
	157	5 785	13
	165	5 825	12

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Band	Channel	Frequency (MHz)	802.11n(HT20), 802.11ac(VHT20)
			Power Setting
U-NII 1	36	5 180	10
	40	5 200	10
	48	5 240	10
U-NII 2A	52	5 260	12
	60	5 300	12
	64	5 320	11
U-NII 2C	100	5 500	11
	116	5 580	12
	144	5 720	12
U-NII 3	149	5 745	12
	157	5 785	12
	165	5 825	12

Band	Channel	Frequency (MHz)	802.11n(HT40), 802.11ac(VHT40)
			Power Setting
U-NII 1	38	5 190	8
	46	5 230	12
U-NII 2A	54	5 270	12
	62	5 310	8
U-NII 2C	102	5 510	7
	110	5 550	12
	142	5 710	12
U-NII 3	151	5 755	12
	159	5 795	12

Band	Channel	Frequency (MHz)	802.11ac(VHT80)
			Power Setting
U-NII 1	42	5 210	9
U-NII 2A	58	5 290	9
U-NII 2C	106	5 530	9
	138	5 690	11
U-NII 3	155	5 775	11

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Tested Mode

Test Mode		ANT configuration	Worst data rate
TM 1	802.11a	CDD Multiple transmitting	6Mbps
TM 2	802.11n(HT20)	CDD Multiple transmitting	MCS0
TM 3	802.11n(HT40)	CDD Multiple transmitting	MCS0
TM 4	802.11ac(VHT80)	CDD Multiple transmitting	MCS0

Note 1: The worst case data rate is determined as above test mode according to the power measurements.

3. Antenna Requirements

▣ **According to Part 15.203**

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 shall be considered sufficient to comply with the provisions of this section."

The antenna is attached on the device by means of unique coupling method (Spring Tension).
Therefore this E.U.T complies with the requirement of Part 15.203

Directional antenna gain:

Bands	SISO		MIMO (CDD) Note 1.	MIMO (SDM) Note 2
	ANT 1 [dBi]	ANT 2 [dBi]	Directional Gain[dBi]	Directional Gain[dBi]
U-NII 1	1.52	1.67	***4.60***	1.59
U-NII 2A	1.76	2.10	***4.94***	1.93
U-NII 2C	1.80	2.24	***5.03***	2.02
U-NII 3	2.18	2.05	***5.13***	2.12

Note 1. Directional gain(correlated signal with unequal antenna gain and equal transmit power)

$10 \log [(10^{G1/20} + 10^{G2/20} + \ldots + 10^{GN/20})^2 / N^{ANT}]$ dBi

Note 2. Directional gain(completely uncorrelated signal with unequal antenna gain and equal transmit power)

$10 \log [(10^{G1/10} + 10^{G2/10} + \ldots + 10^{GN/10}) / N^{ANT}]$ dBi

4. Summary of Test Result

FCC Part Section(s)	RSS Section(s)	Test Description	Limit	Test Condition	Status Note 1
15.407(a)	RSS-247[6.2]	Emission Bandwidth (26 dB Bandwidth)	N/A	Conducted	C
15.407(e)	RSS-247[6.2]	Minimum Emission Bandwidth (6 dB Bandwidth)	> 500 kHz in 5 725 ~ 5 850 MHz		C
15.407(a)	RSS-247[6.2]	Maximum Conducted Output Power	Part 15.407(a) (Refer to section 5.3)		C
15.407(a)	RSS-247[6.2]	Peak Power Spectral Density	Part 15.407(a) (Refer to section 5.4)		C
-	RSS-Gen[6.7]	Occupied Bandwidth (99 %)	N/A		C
15.407(h)	RSS-247[6.3]	Dynamic Frequency Selection	Part 15.407(h) (Refer to the DFS test report)		C Note 4
15.205 15.209 15.407(b)	RSS-Gen[8.9] RSS-Gen[8.10] RSS-247[6.2]	Unwanted Emissions	Part 15.209, 15.407(b) (Refer to section 5.5)	Radiated	C Note 3
15.207	RSS-Gen[8.8]	AC Conducted Emissions	Part 15.207 (Refer to section 5.6)	AC Line Conducted	C
15.203	-	Antenna Requirements	Part 15.203 (Refer to section 3)	-	C

Note 1: **C** = Comply **NC** = Not Comply **NT** = Not Tested **NA** = Not Applicable
Note 2: For radiated emission tests below 30 MHz were performed on semi-anechoic chamber which is correlated with OATS.
Note 3: This test item was performed in three orthogonal EUT positions and the worst case data was reported.
Note 4: Refer to the DFS test report.

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5. TEST RESULT

5.1 Emission Bandwidth (26 dB Bandwidth) & Occupied BW (99 %)

▣ Test Requirements

- Emission Bandwidth (26 dB Bandwidth)

The bandwidth at 26 dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.
The 26 dB bandwidth is used to determine the conducted output power limit.

- Occupied BW (99 %)

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 % emission bandwidth, as calculated or measured

▣ Test Configuration

Refer to the APPENDIX I.

▣ Test Procedure

- Emission Bandwidth (26 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02v02r01**.

1. Set resolution bandwidth (RBW) = approximately **1 %** of the EBW.
2. Set the video bandwidth **(VBW) > RBW**.
3. Detector = **Peak**.
4. Trace mode = **max hold**.

Measure the maximum width of the emission that is 26 dB down from the peak 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 %.

- Occupied BW (99 %): RSS-Gen[6.7]

1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
2. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
3. The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3x RBW.

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▣ **Test Results: Comply**

Test Mode	Band	Channel	Frequency(MHz)	26 dB BW(MHz)		99 % BW(MHz)	
				ANT 1	ANT 2	ANT 1	ANT 2
TM 1	U-NII 1	36	5 180	25.99	23.21	16.72	16.57
		40	5 200	20.88	20.68	16.65	16.57
		48	5 240	20.94	21.48	16.63	16.52
	U-NII 2A	52	5 260	24.26	24.69	16.88	16.70
		60	5 300	21.93	24.14	16.79	16.74
		64	5 320	22.87	20.74	16.71	16.50
	U-NII 2C	100	5 500	21.07	21.01	16.62	16.52
		116	5 580	21.16	21.04	16.67	16.57
		144	5 720	20.72	20.90	16.64	16.54
TM 2	U-NII 1	36	5 180	21.19	21.20	17.81	17.74
		40	5 200	21.34	21.05	17.78	17.70
		48	5 240	21.26	20.88	17.77	17.71
	U-NII 2A	52	5 260	24.47	22.75	17.90	17.79
		60	5 300	22.17	23.95	17.88	17.78
		64	5 320	21.78	22.59	17.86	17.75
	U-NII 2C	100	5 500	21.60	21.18	17.80	17.70
		116	5 580	21.47	21.33	17.84	17.72
		144	5 720	21.49	21.35	17.76	17.73
TM 3	U-NII 1	38	5 190	39.61	38.98	36.20	36.21
		46	5 230	45.92	39.13	36.37	36.25
	U-NII 2A	54	5 270	39.43	39.19	36.24	36.22
		62	5 310	39.25	38.80	36.21	36.18
	U-NII 2C	102	5 510	39.70	39.23	36.19	36.23
		110	5 550	39.57	39.43	36.33	36.21
		142	5 710	44.20	39.17	36.31	36.23
TM 4	U-NII 1	42	5 210	80.92	80.18	75.59	75.52
	U-NII 2A	58	5 290	81.34	80.12	75.50	75.48
	U-NII 2C	106	5 530	81.24	80.74	75.47	75.45
		138	5 690	81.17	81.05	75.59	75.55

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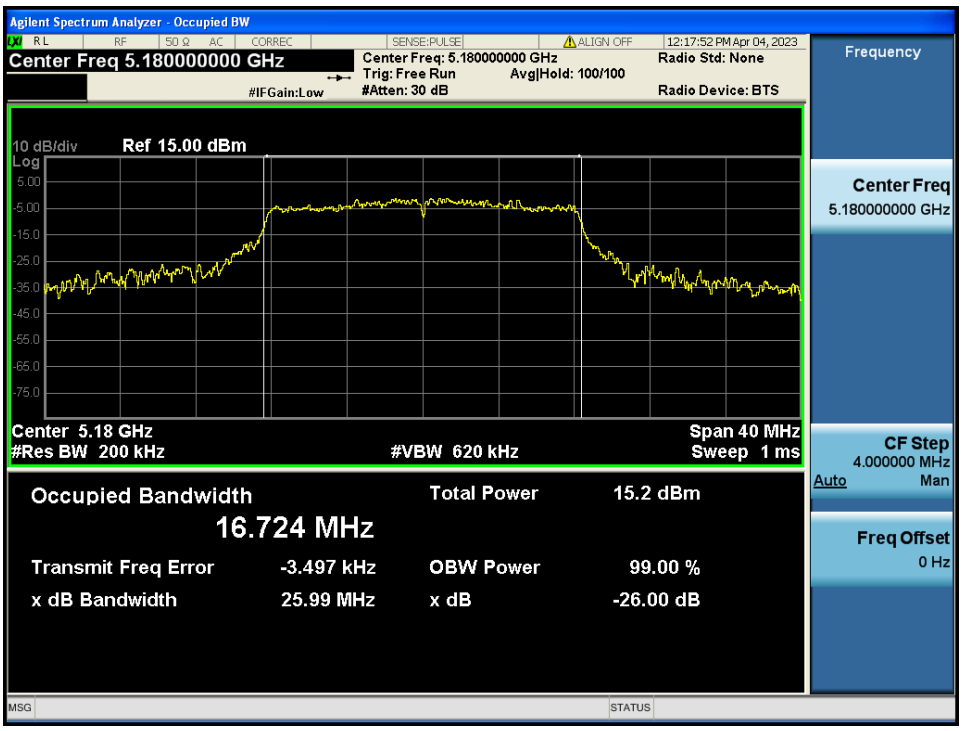
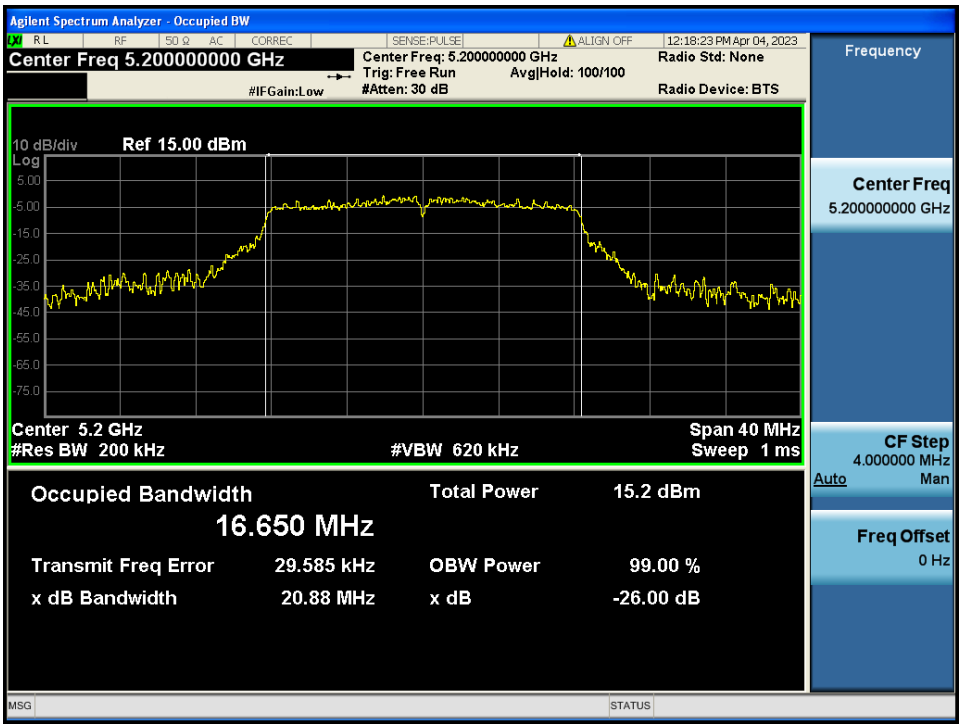
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.36



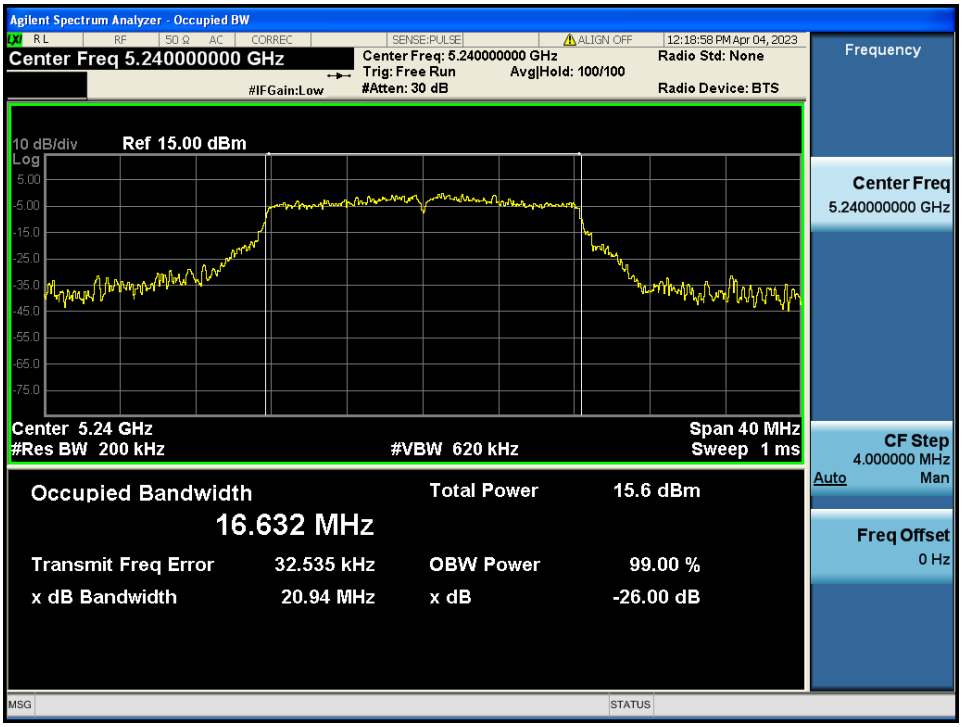
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.40



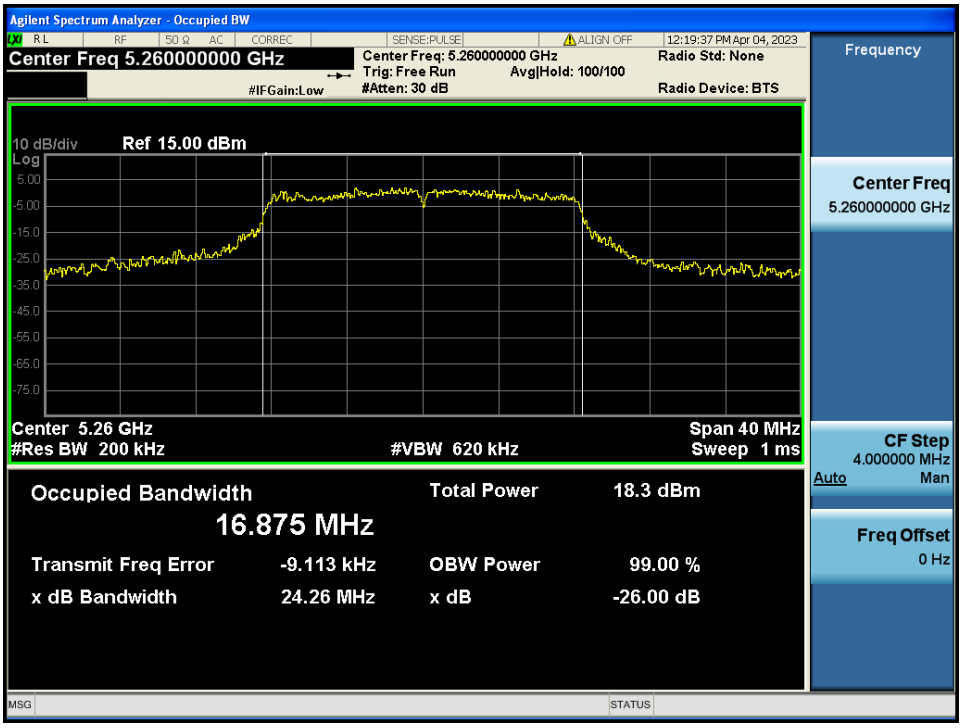
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.48



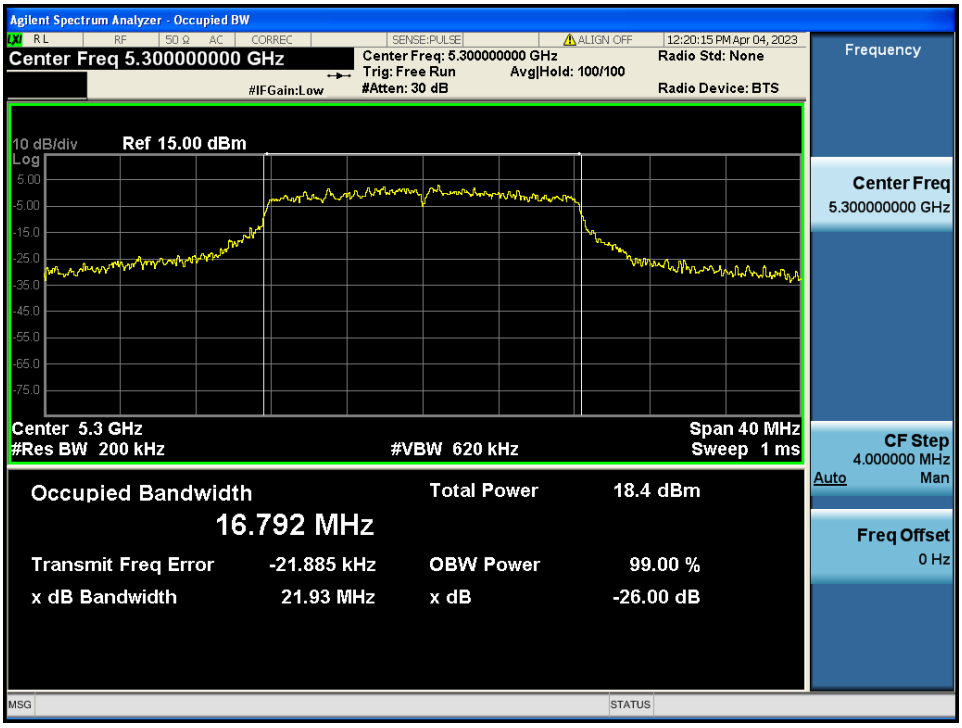
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.52



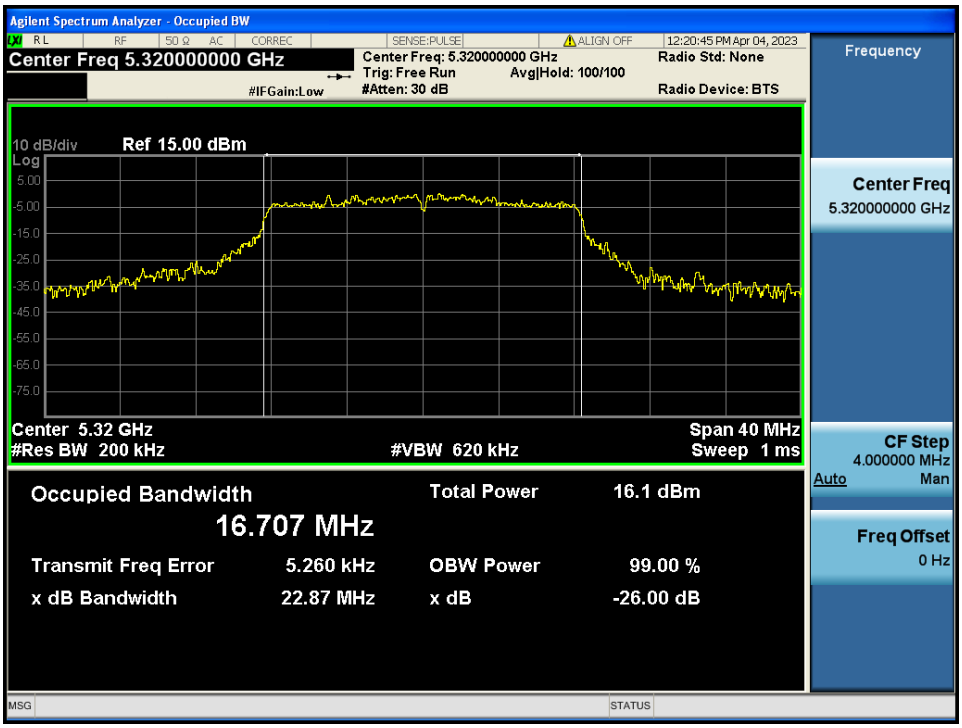
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.60



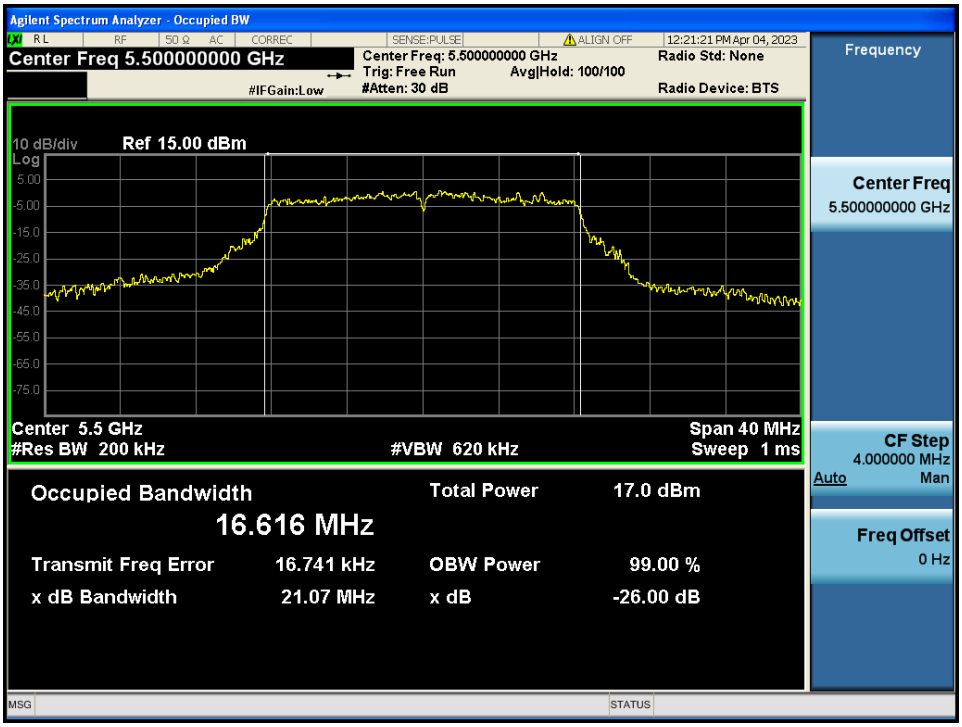
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.64



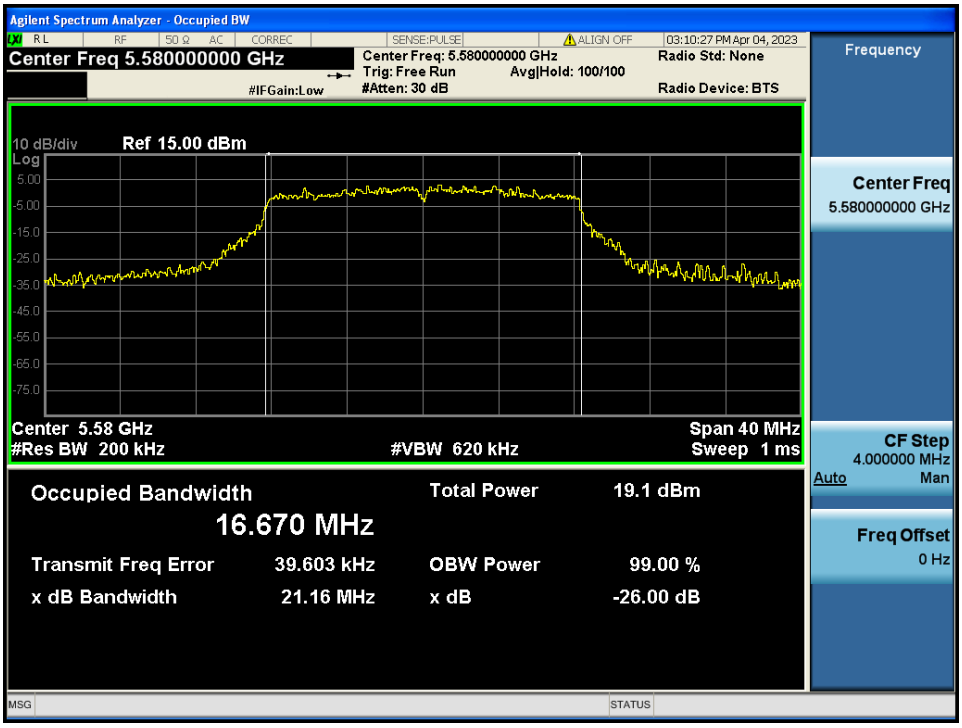
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.100



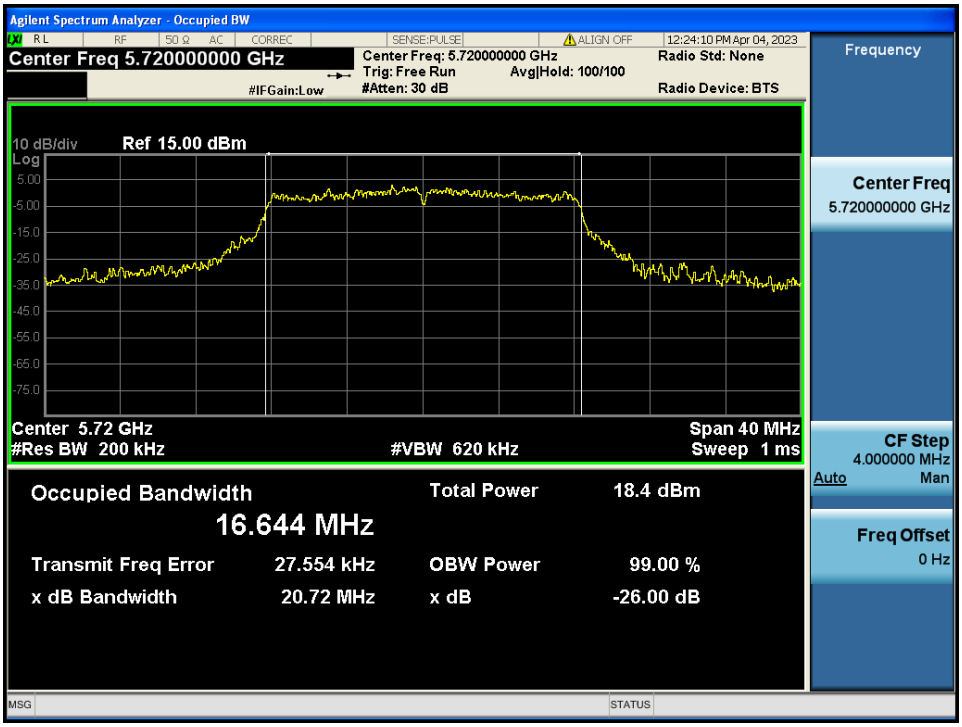
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.116



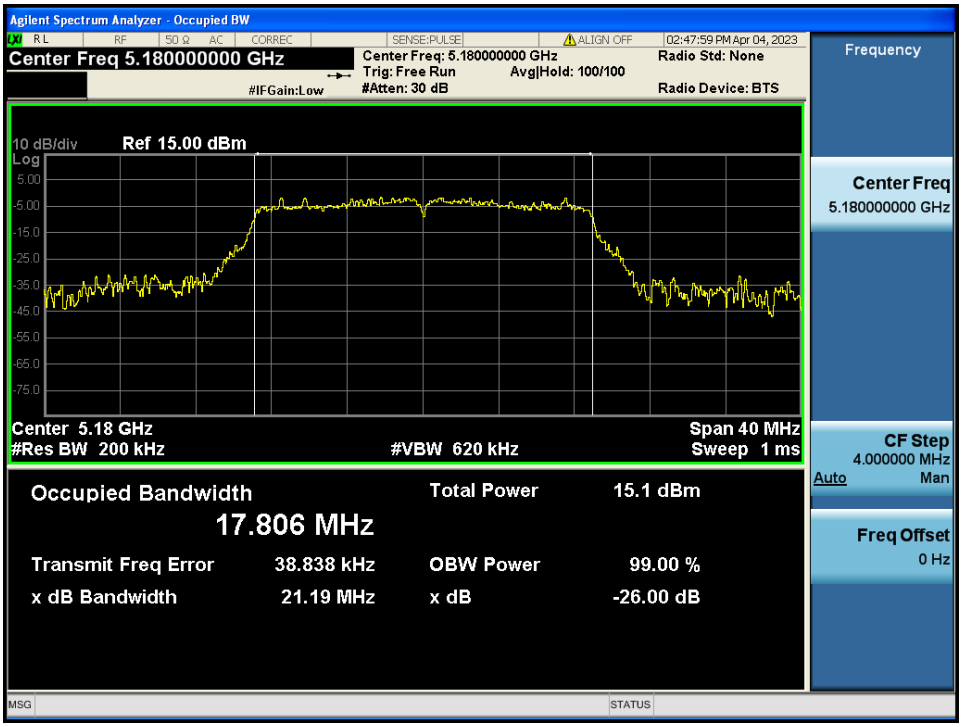
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 1 & Ch.144



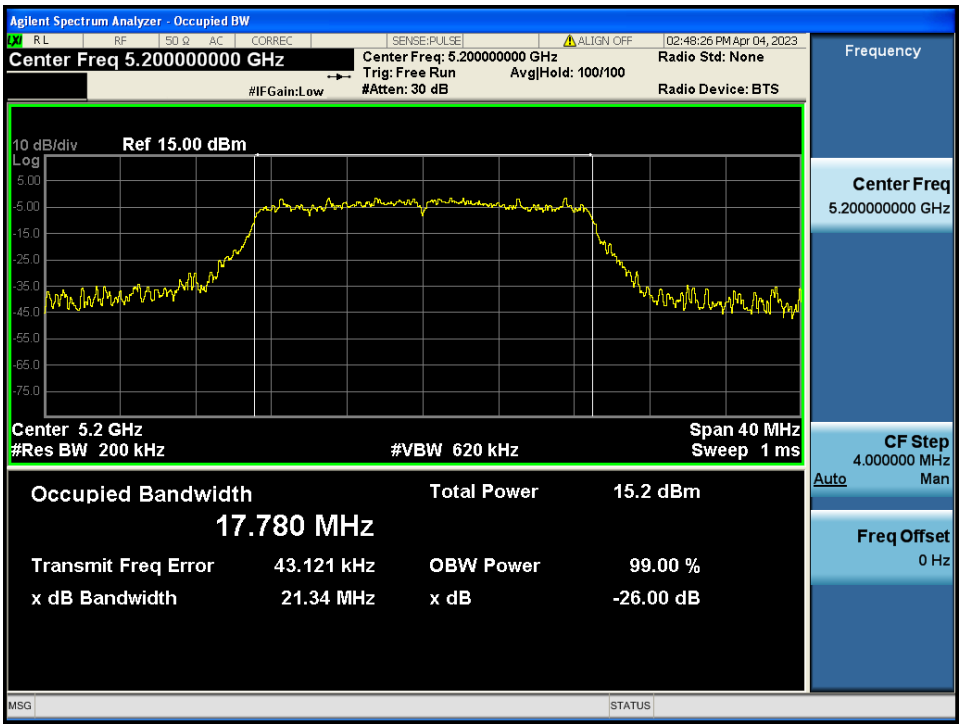
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.36



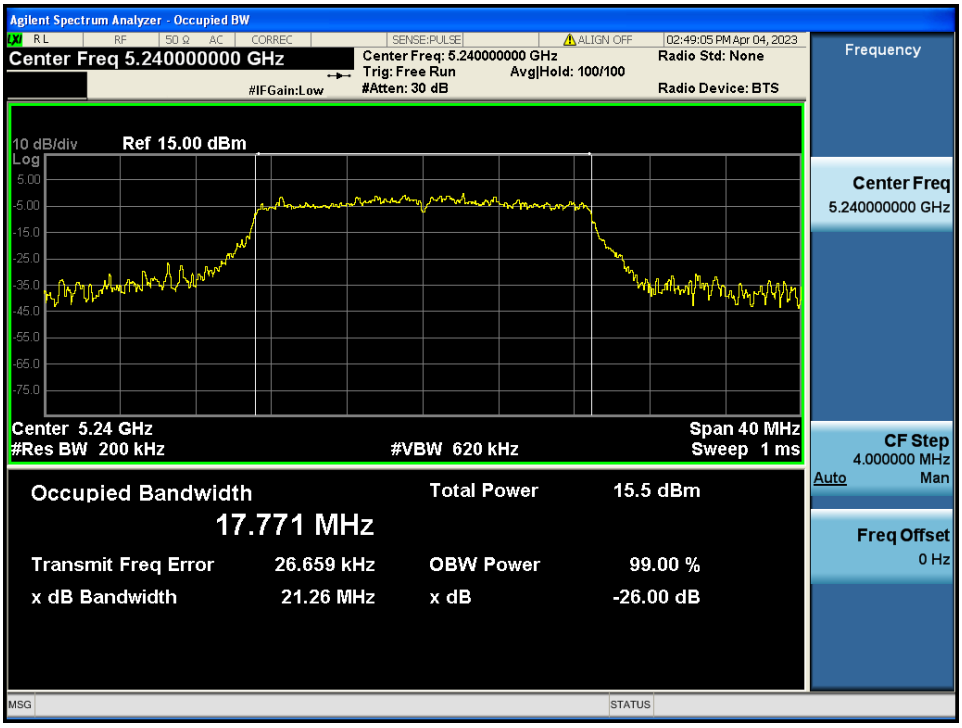
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.40



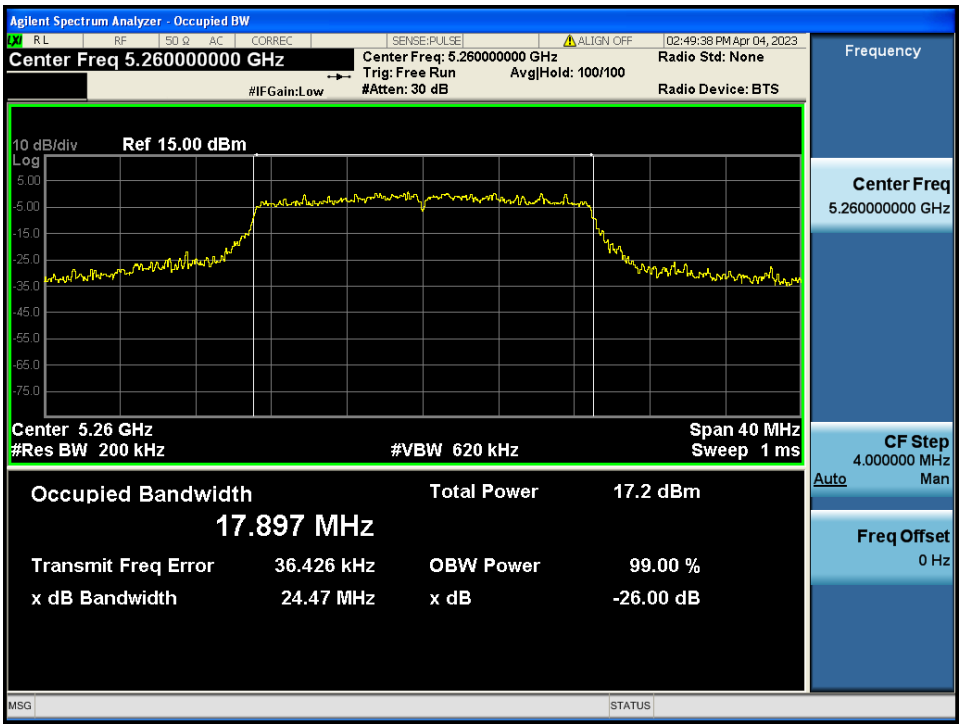
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.48



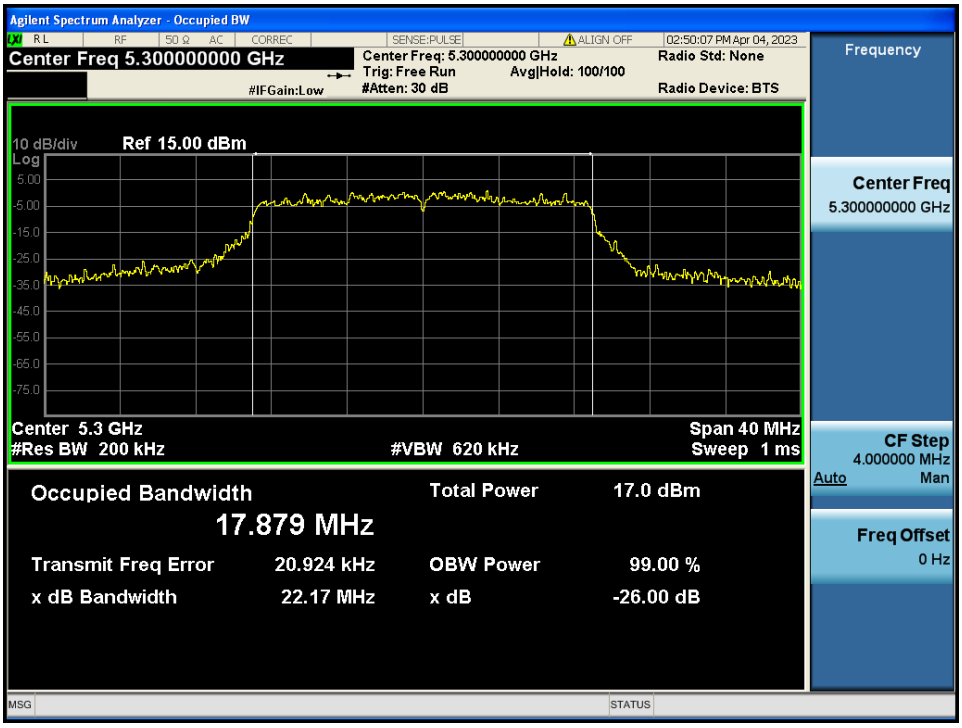
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.52



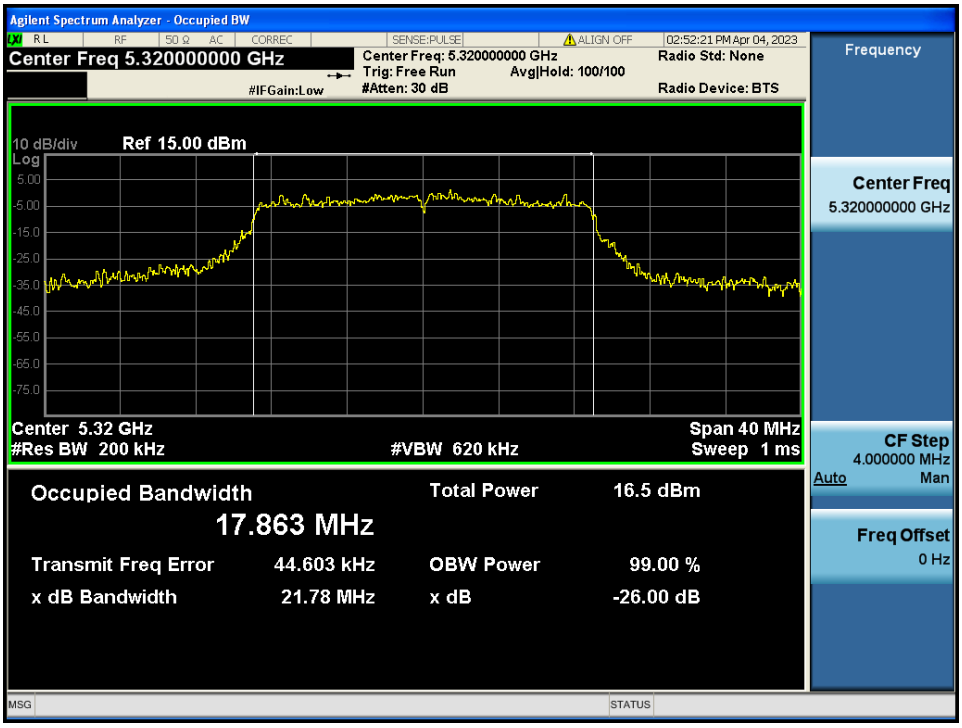
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.60



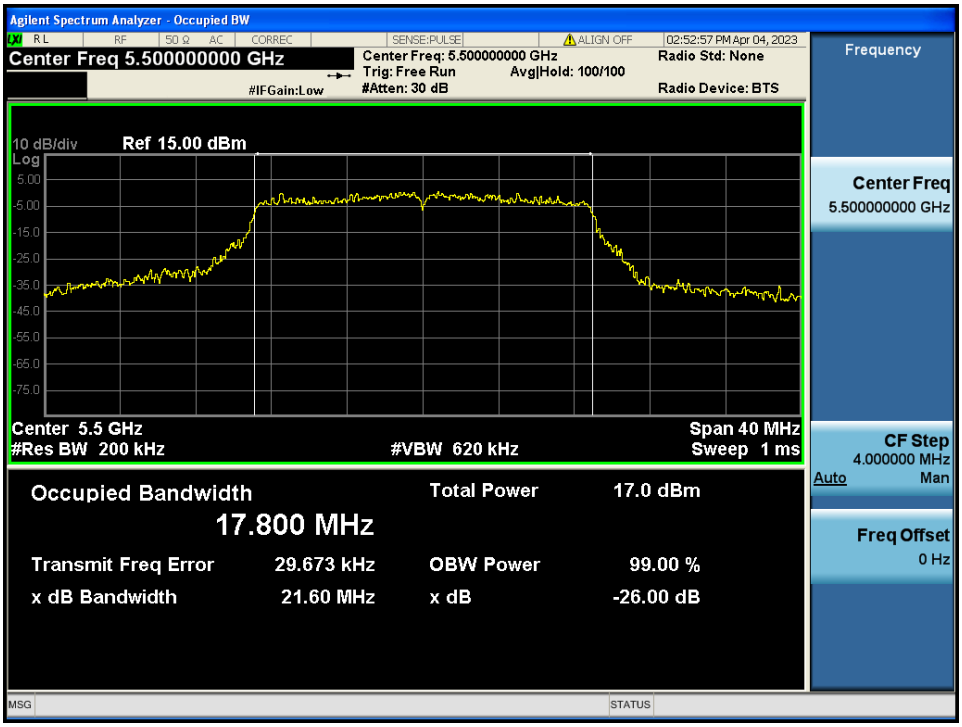
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.64



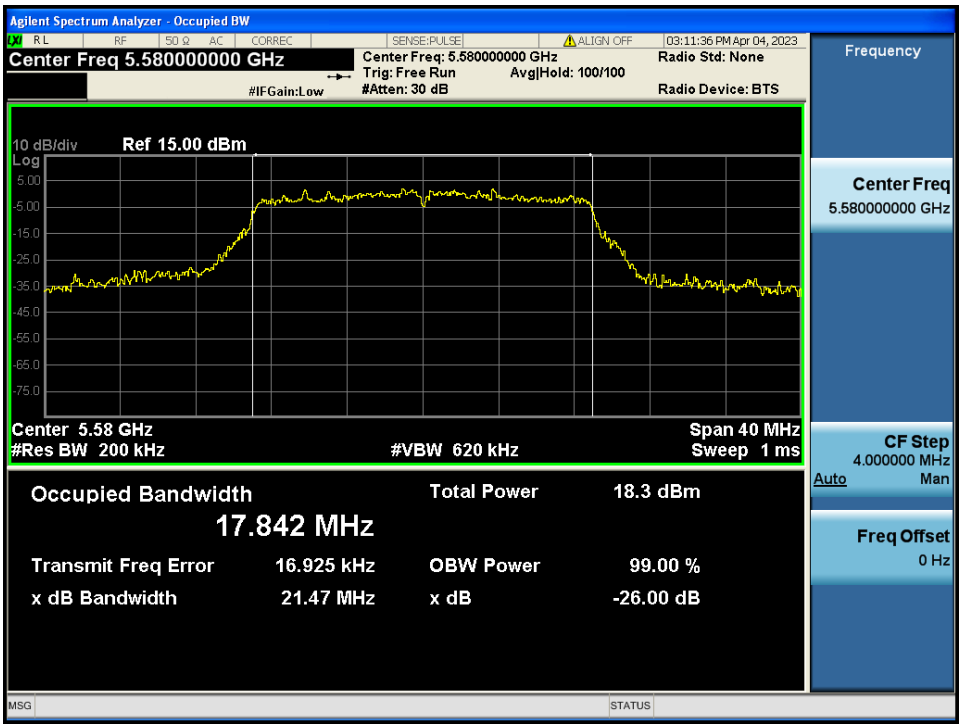
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.100



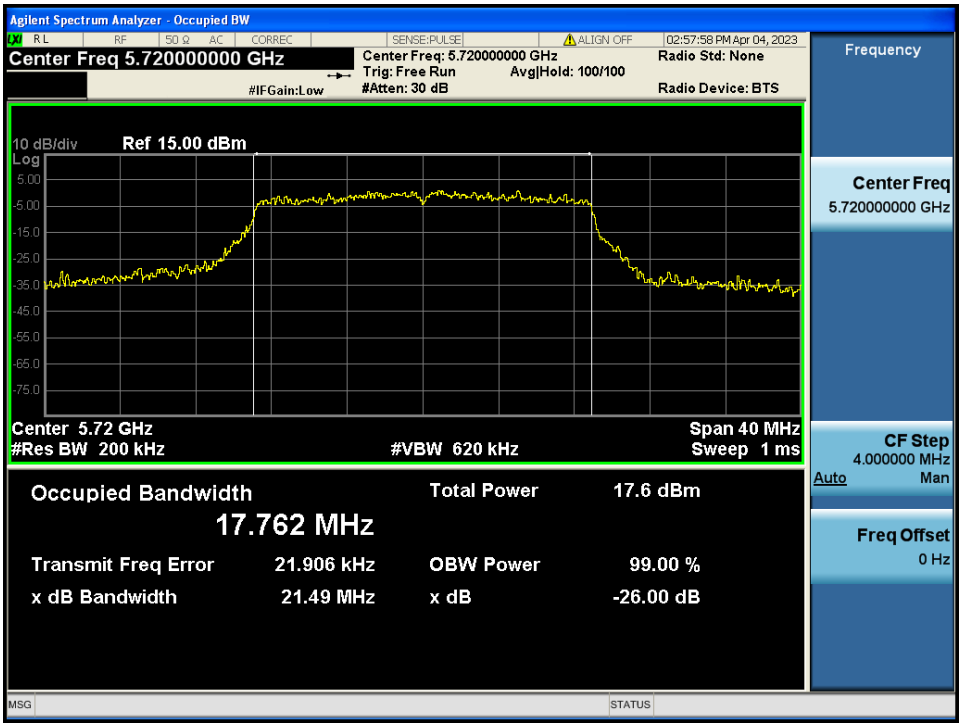
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.116



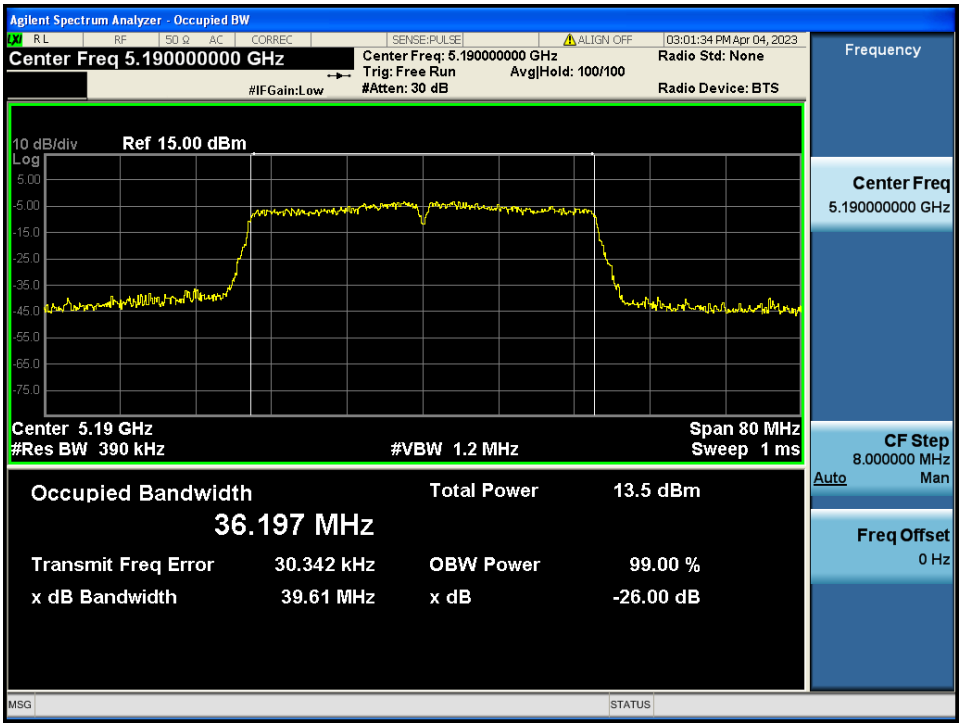
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 1 & Ch.144



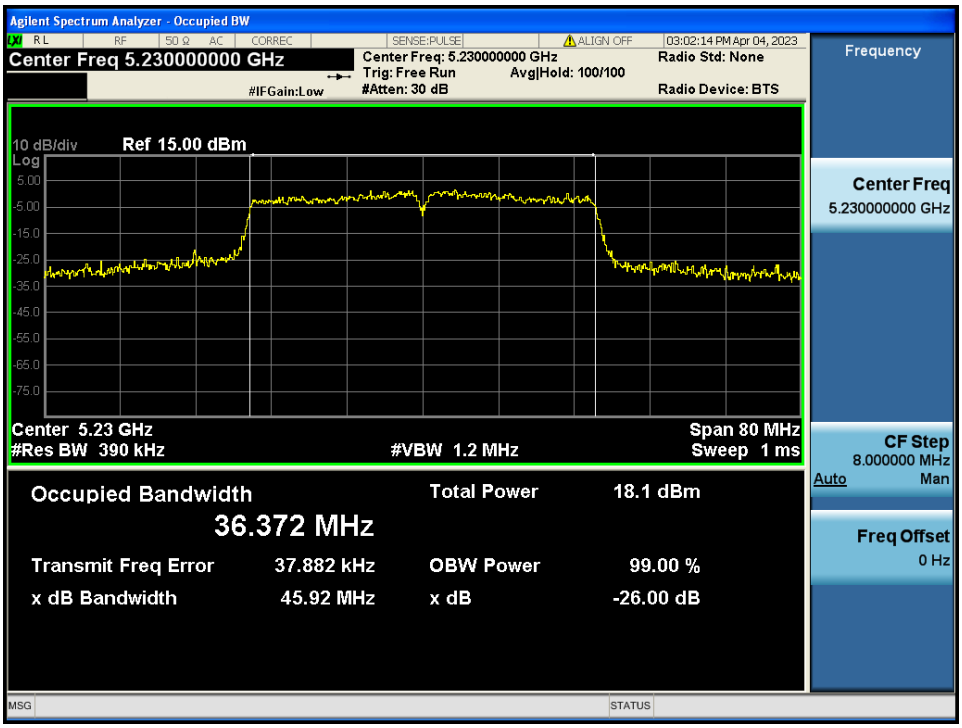
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 1 & Ch.38



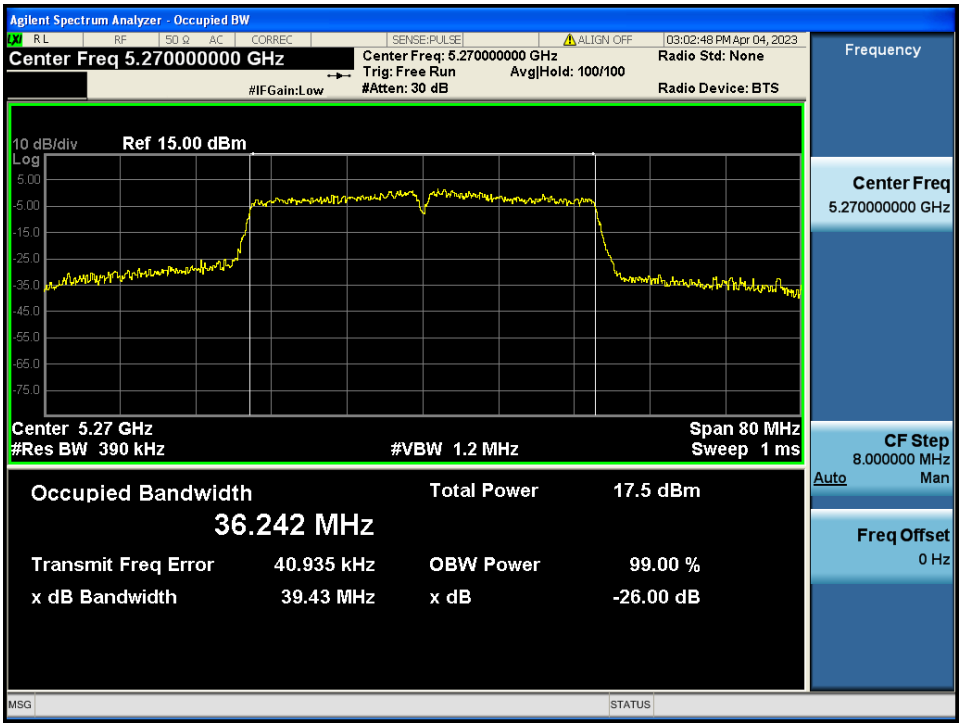
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 1 & Ch.46



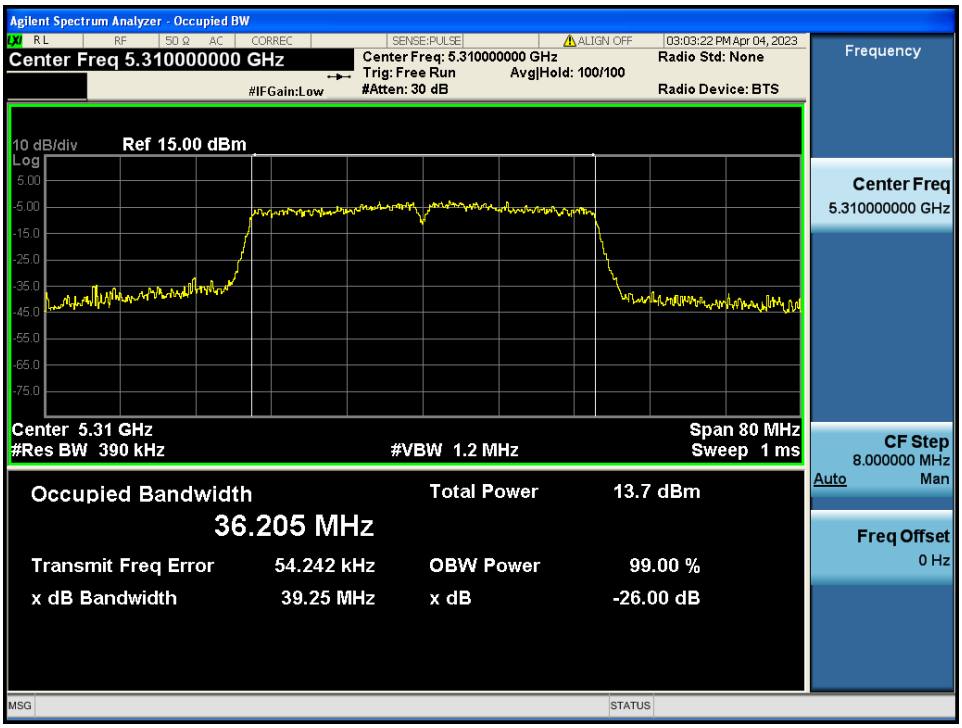
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 1 & Ch.54



26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 1 & Ch.62



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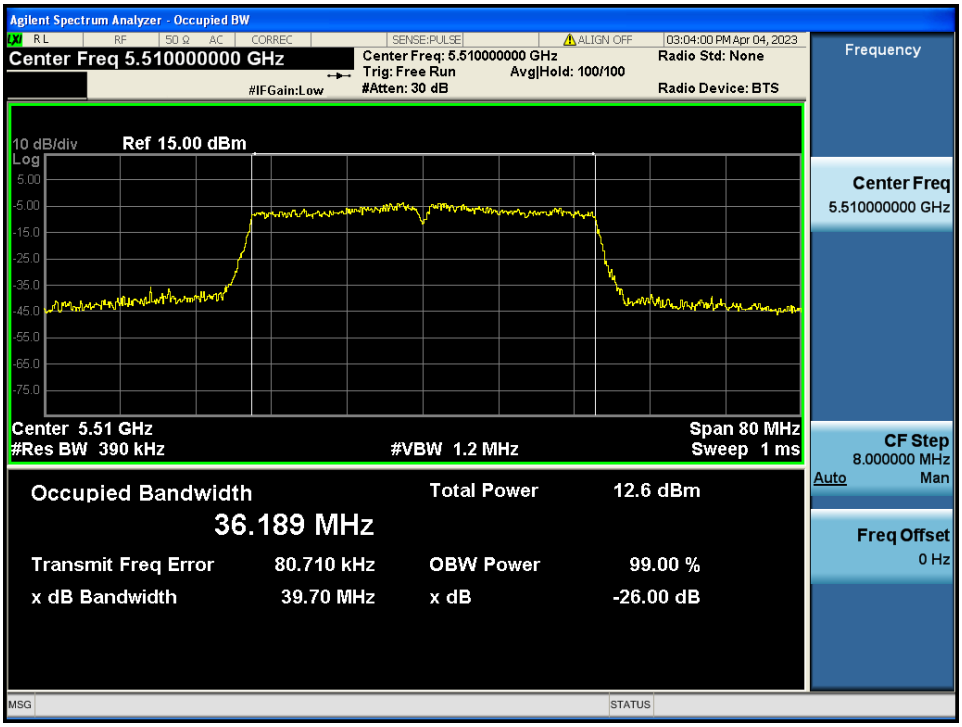
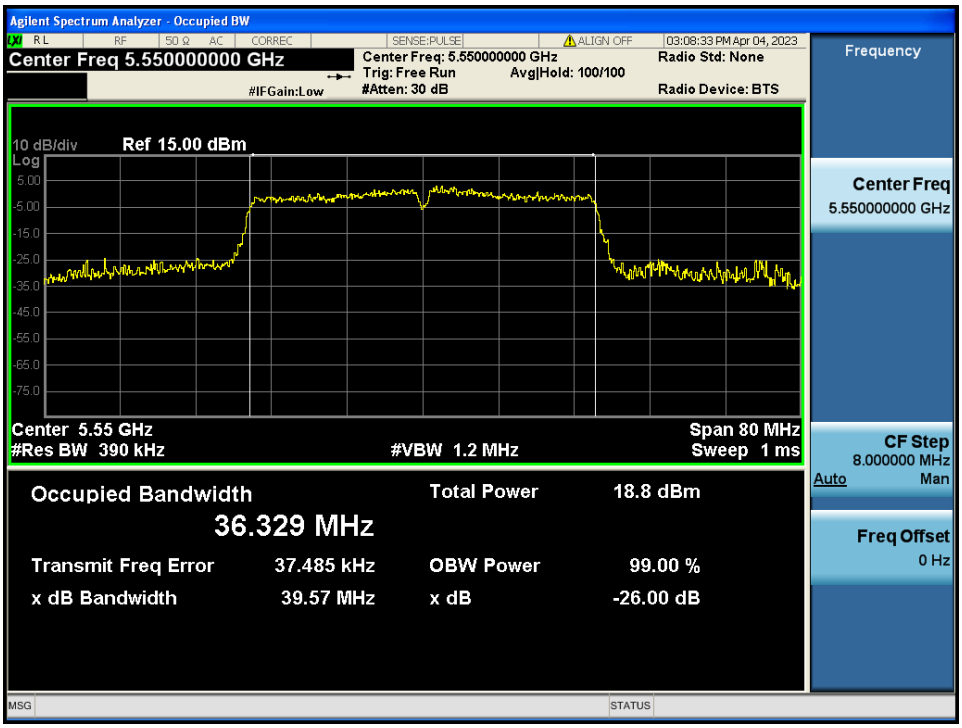
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 1 & Ch.102



26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 1 & Ch.110



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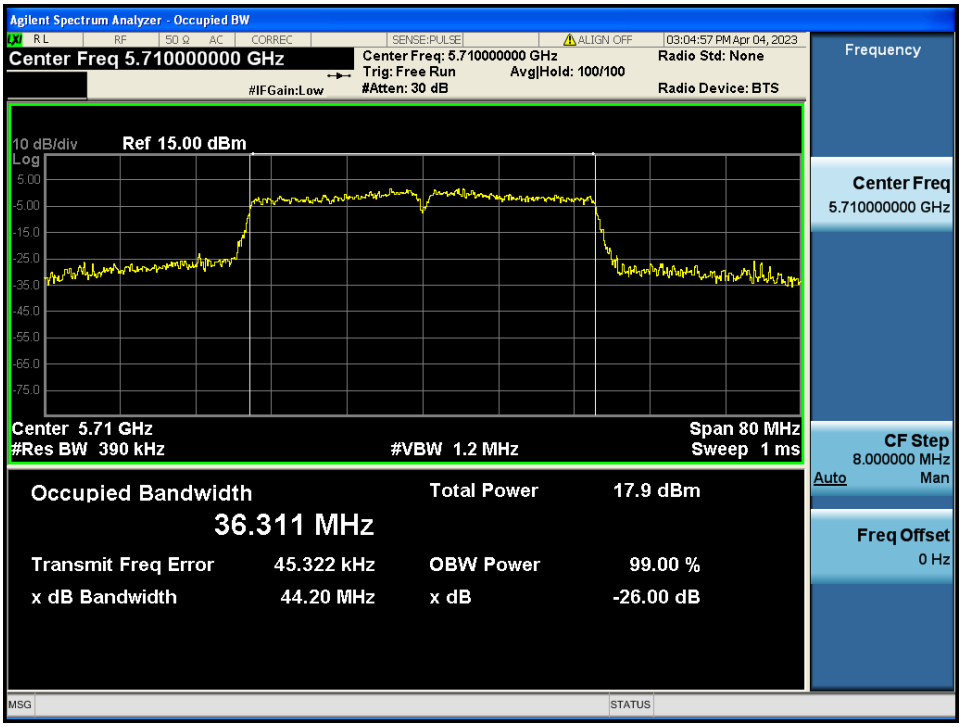
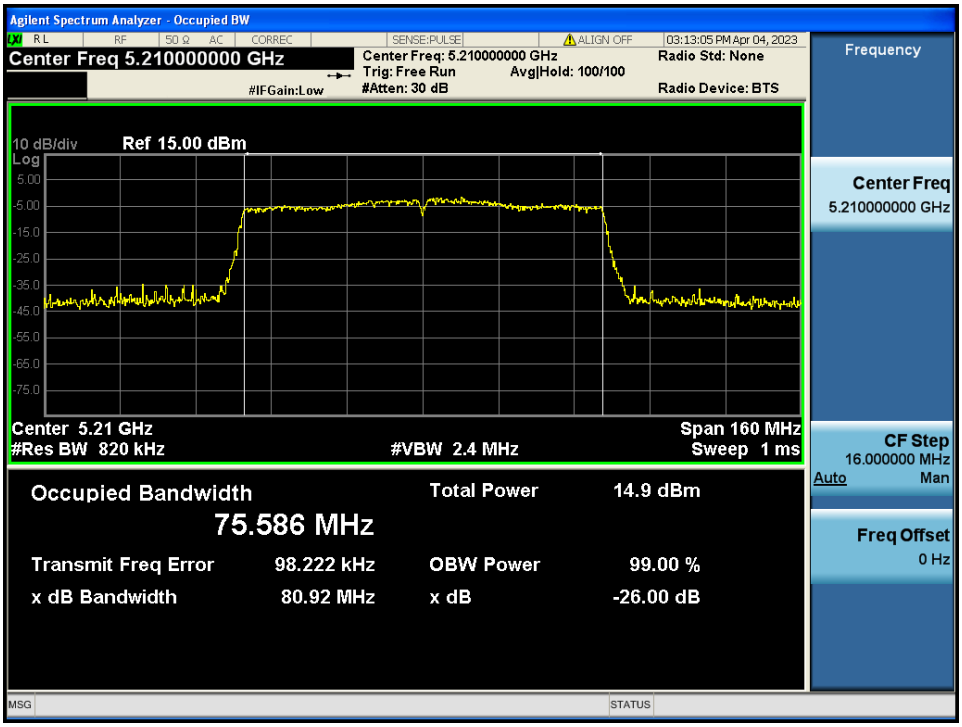
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 1 & Ch.142



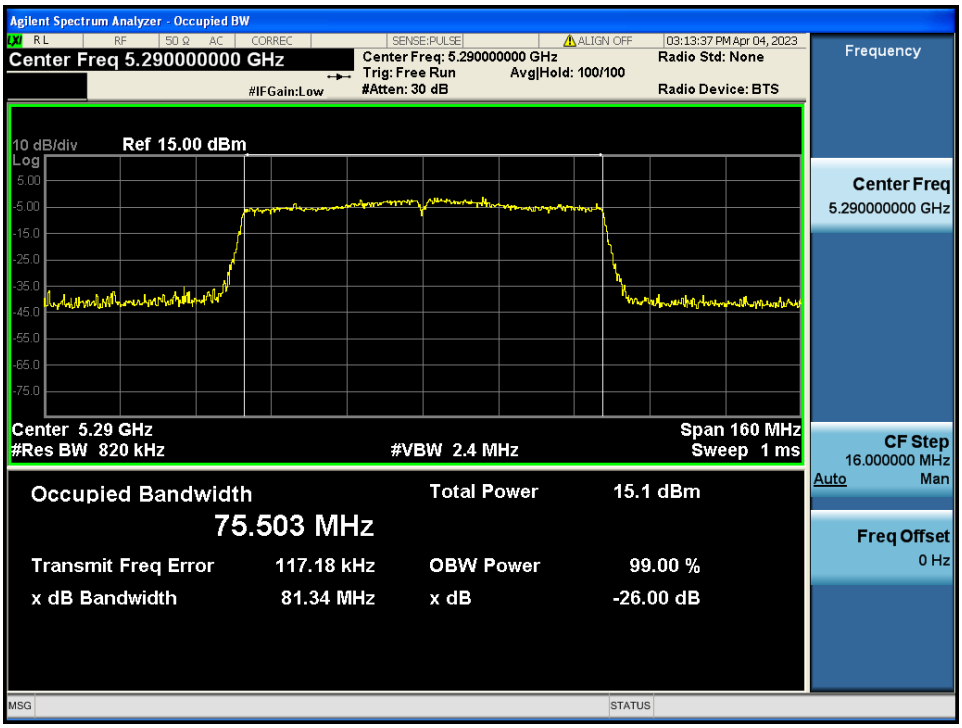
26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 1 & Ch.42



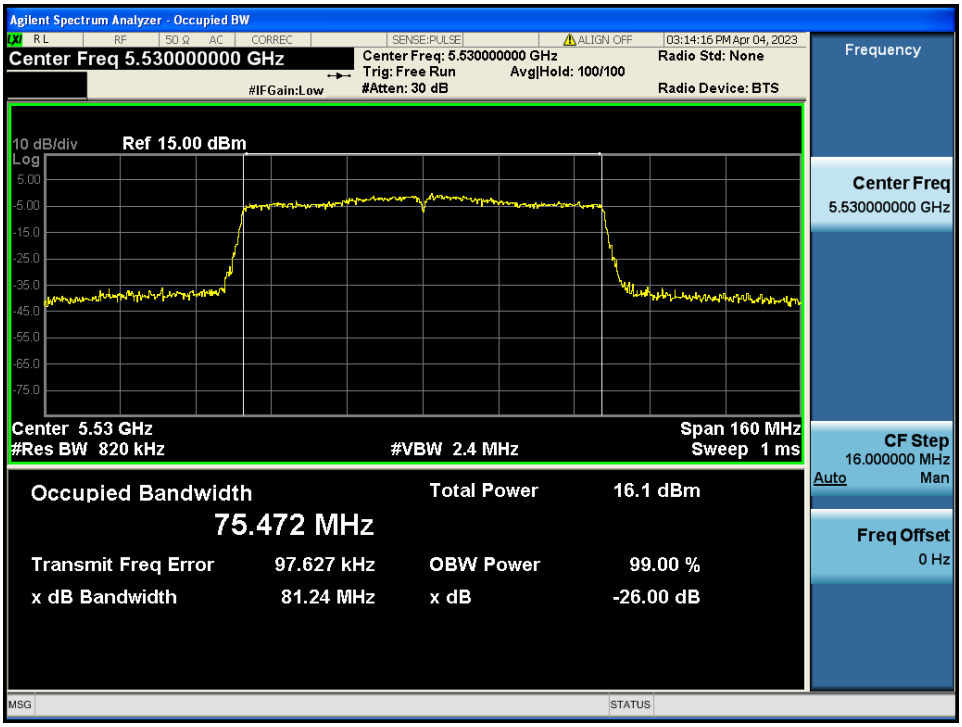
26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 1 & Ch.58



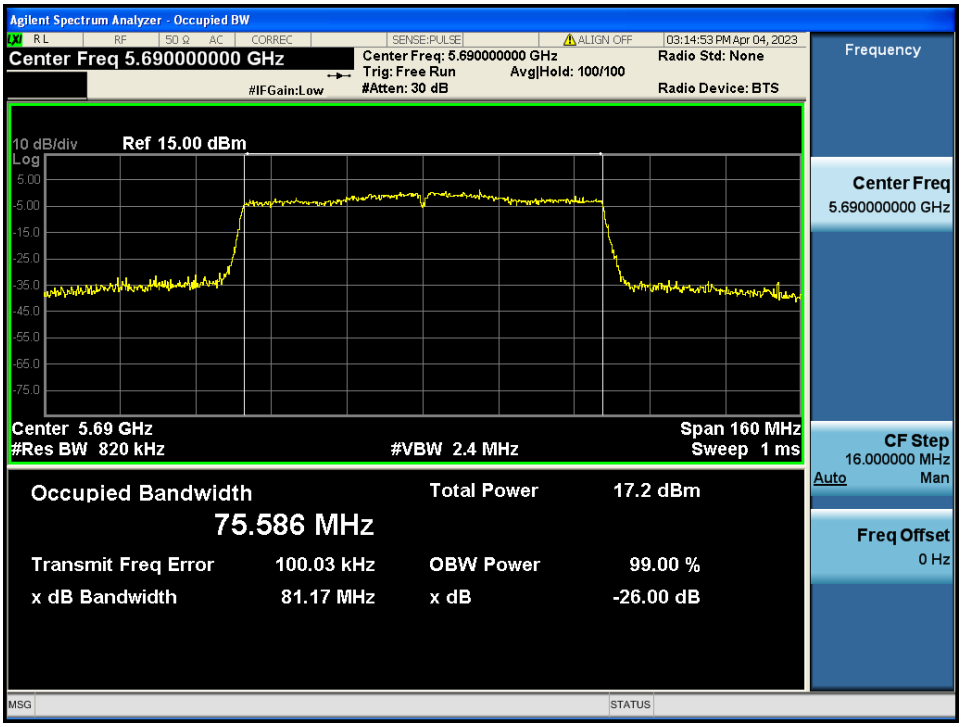
26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 1 & Ch.106



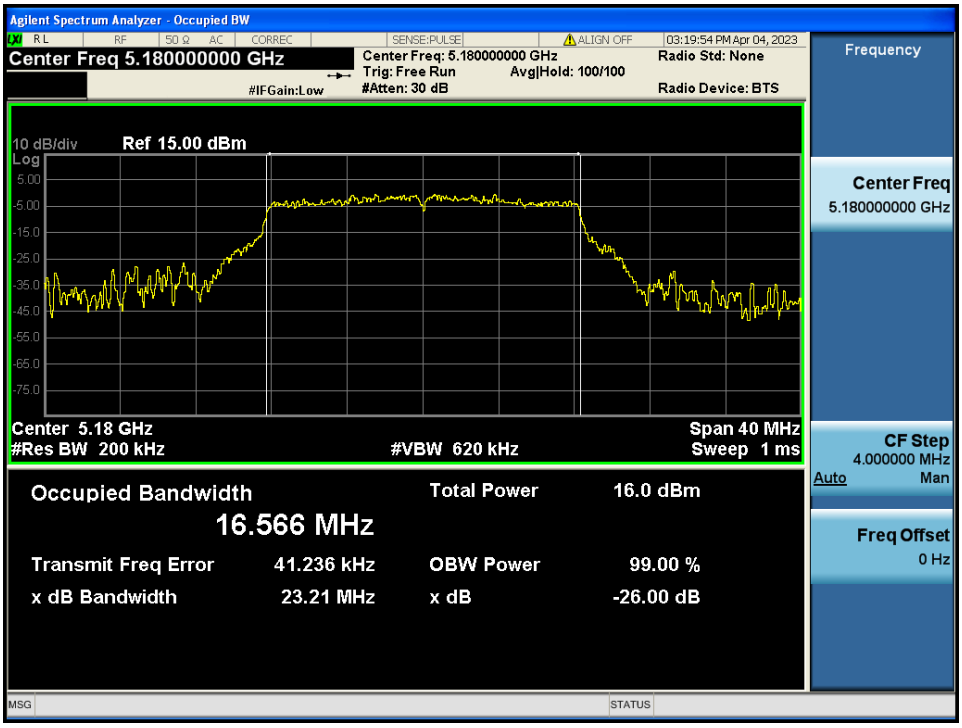
26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 1 & Ch.138



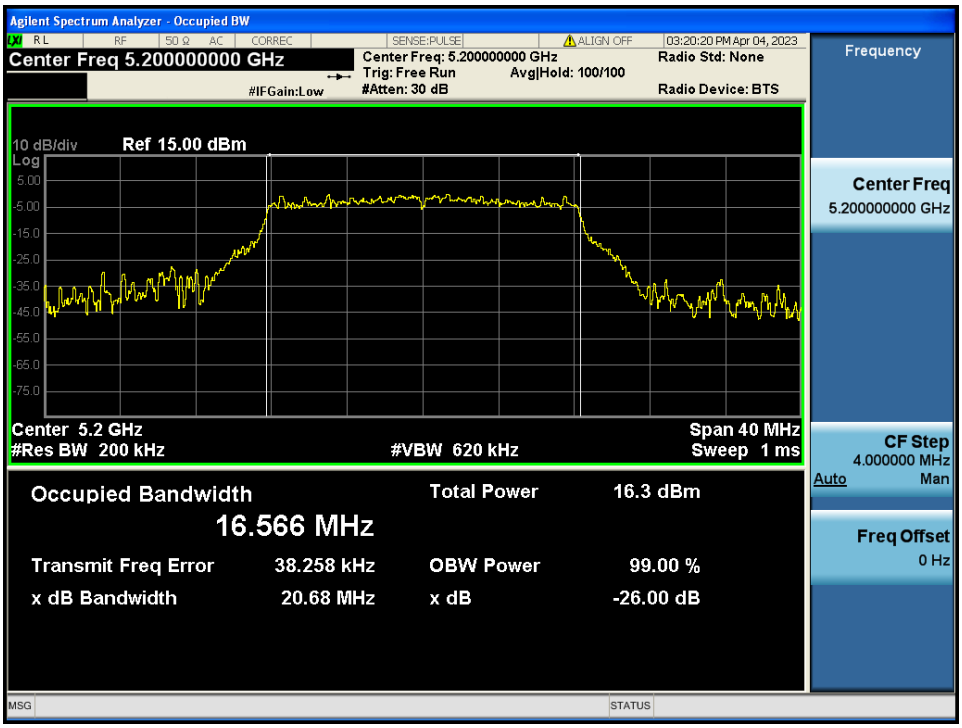
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.36



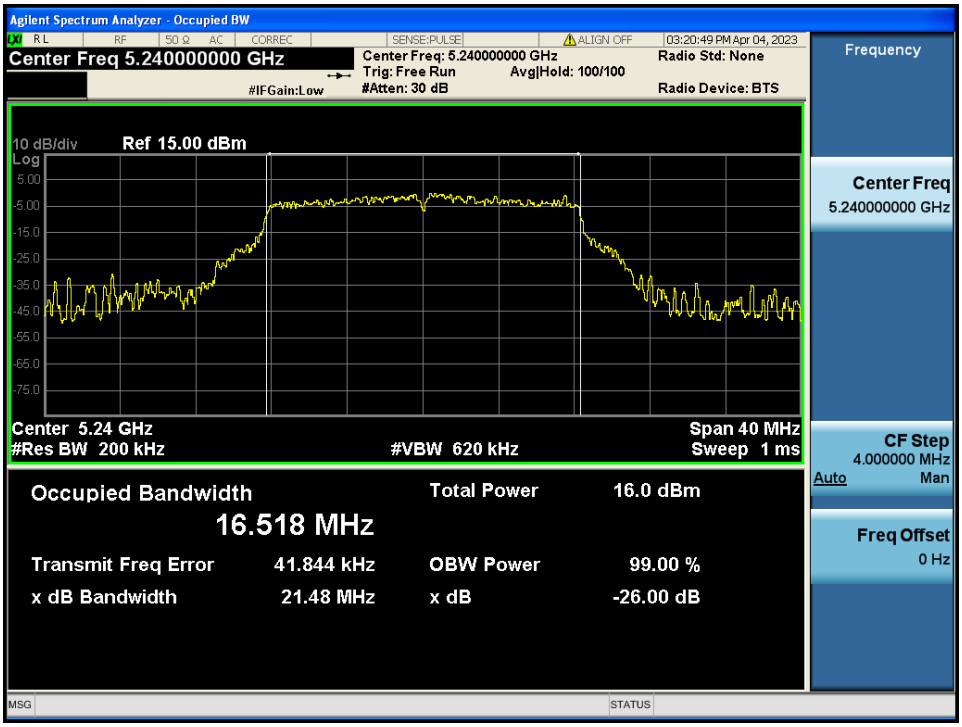
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.40



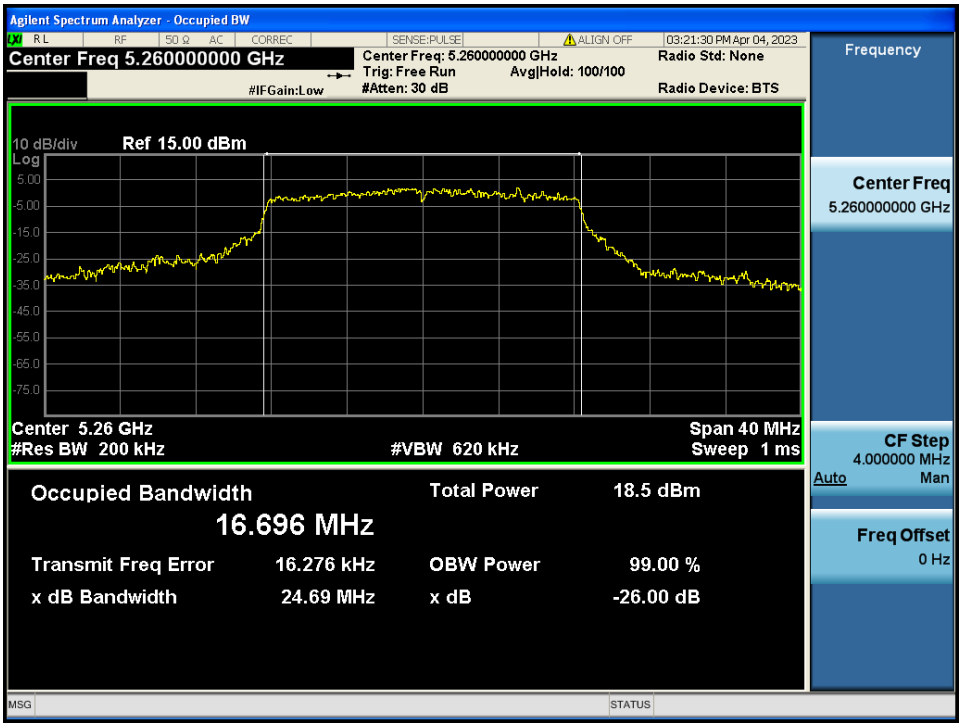
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.48



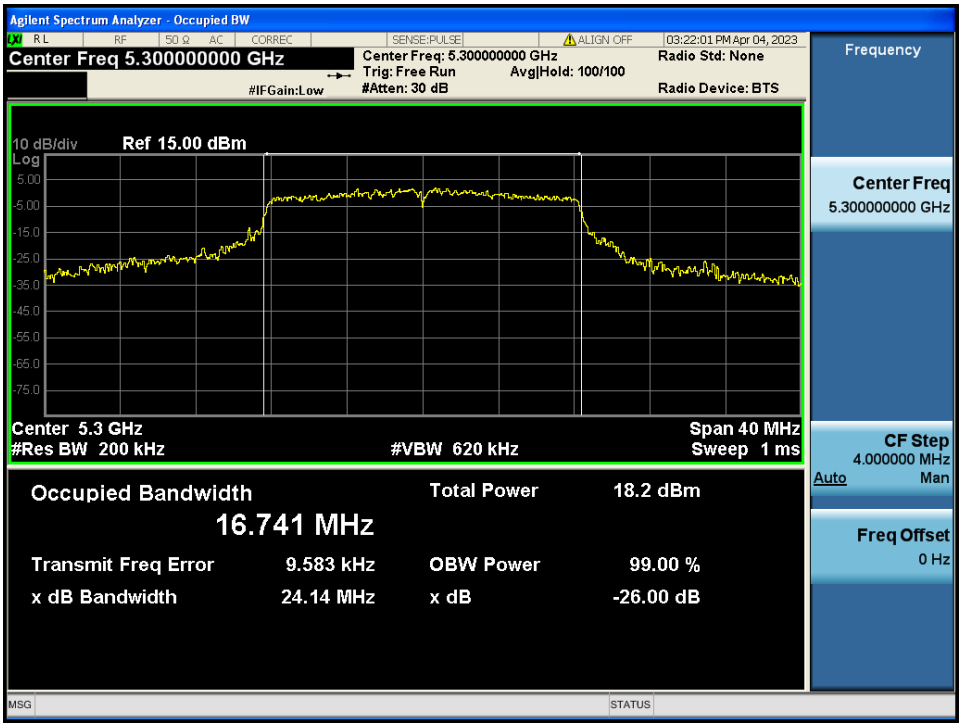
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.52



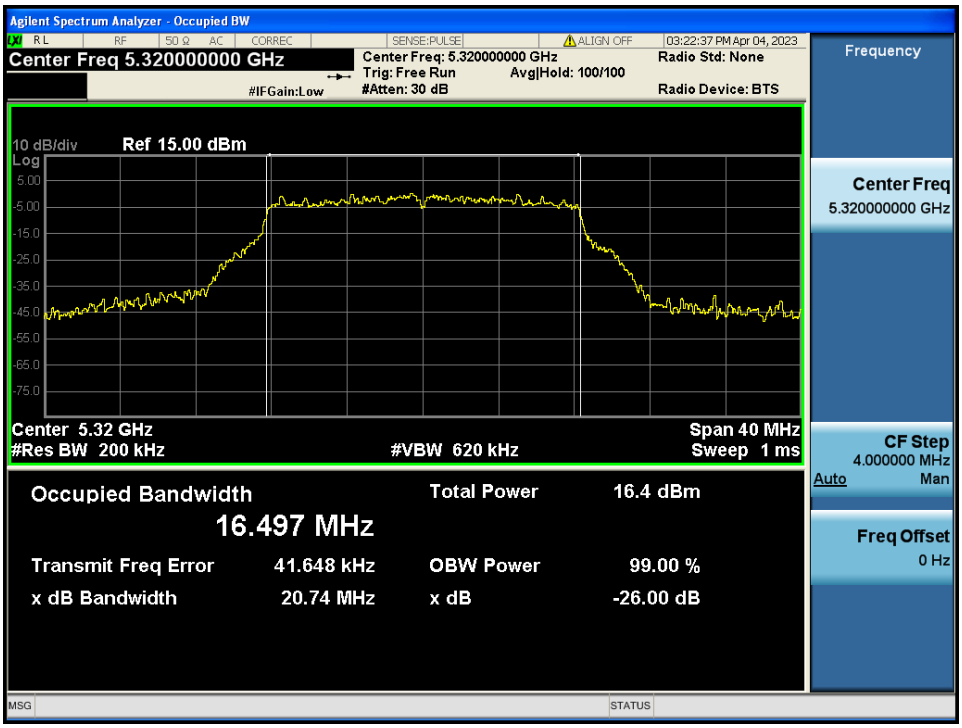
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.60



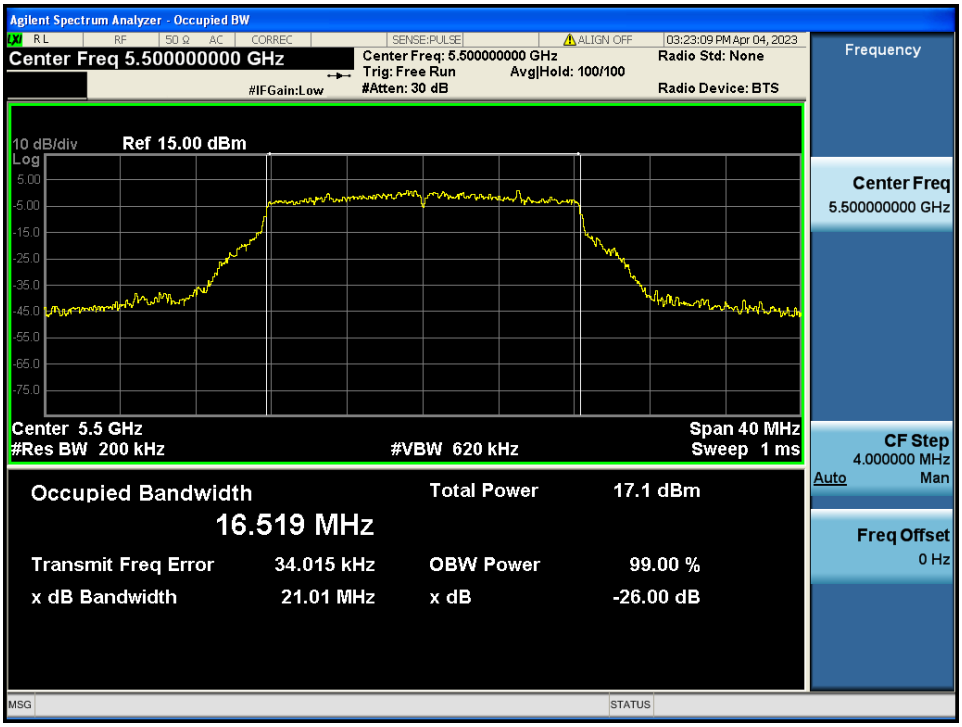
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.64



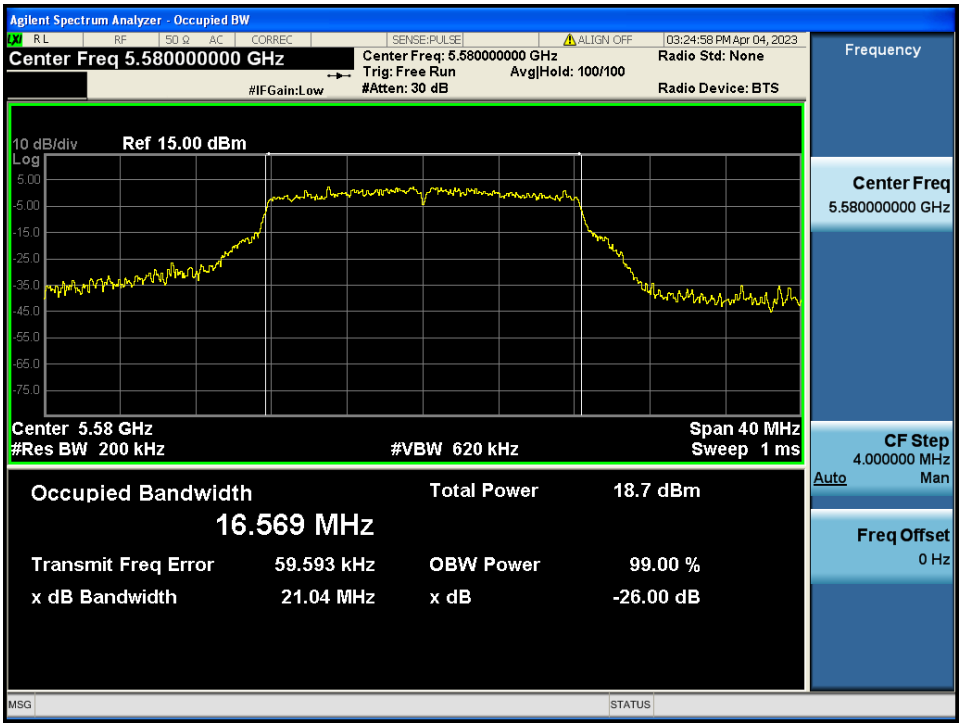
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.100



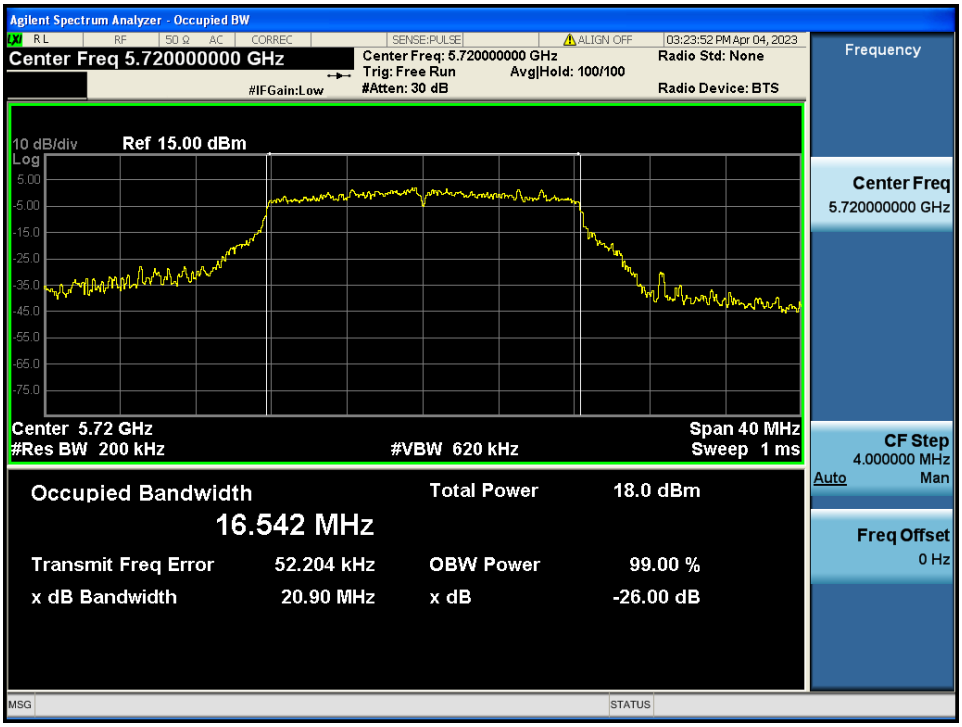
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.116



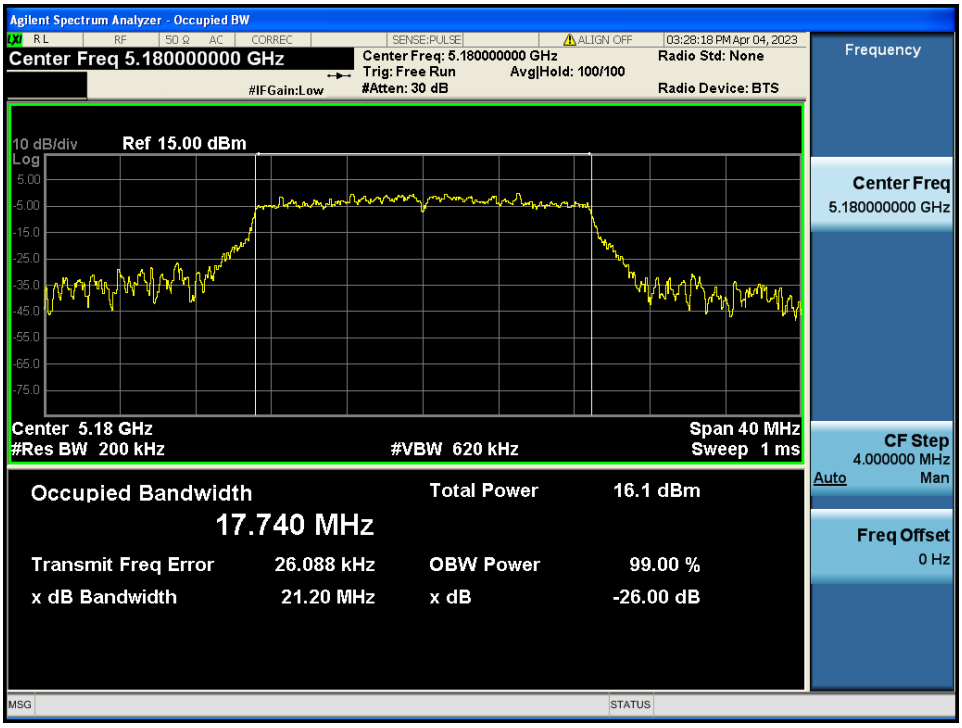
26 dB Bandwidth & Occupied BW

Test Mode: TM 1 & ANT 2 & Ch.144



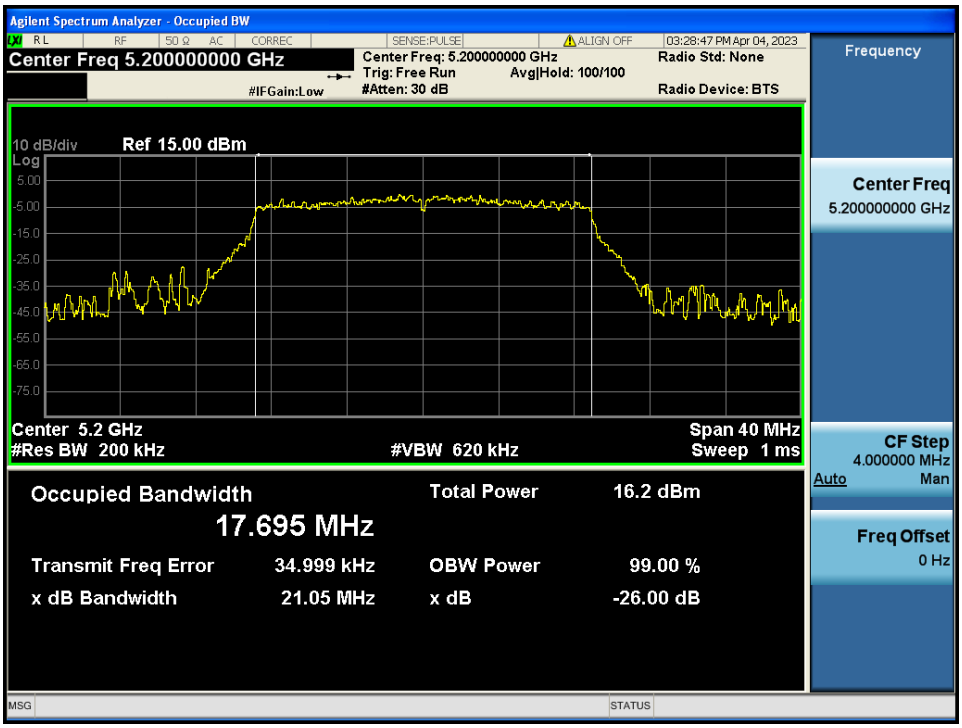
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.36



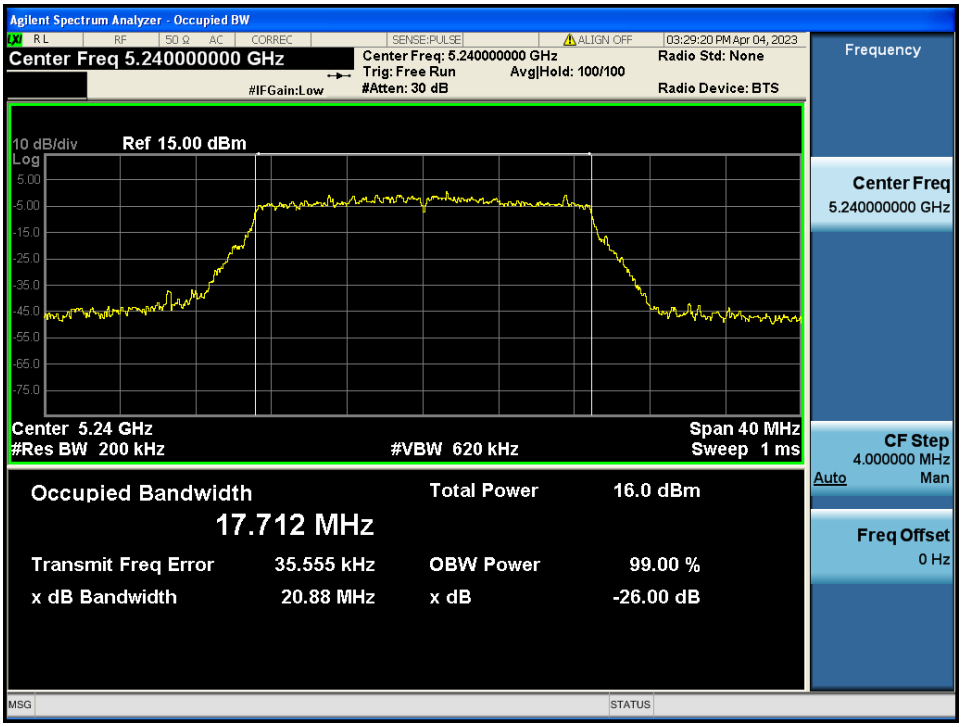
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.40



26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.48

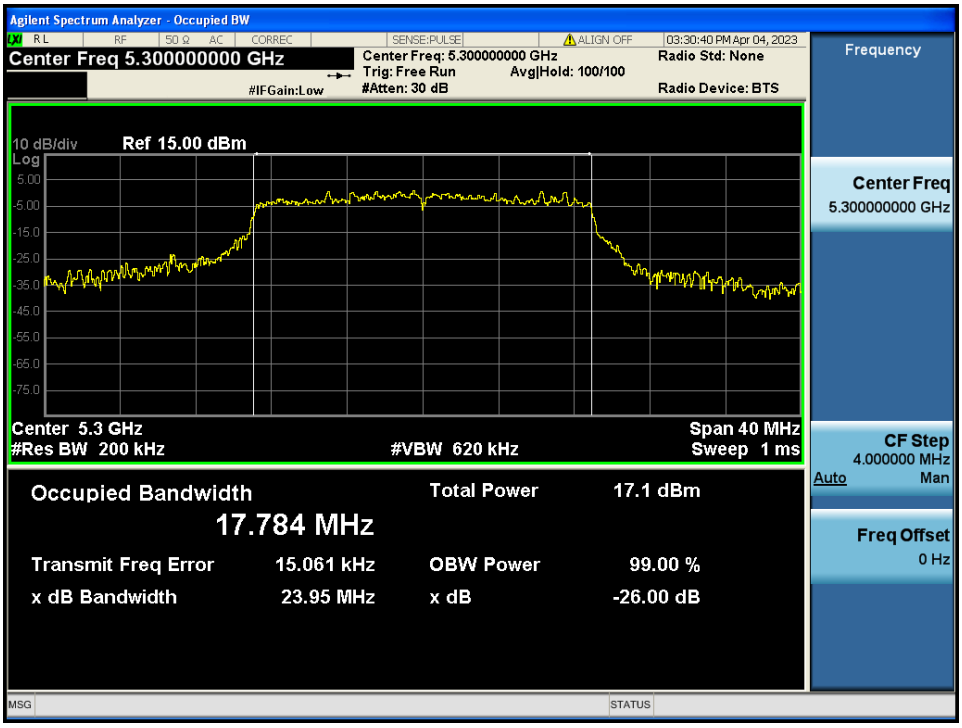


26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.52

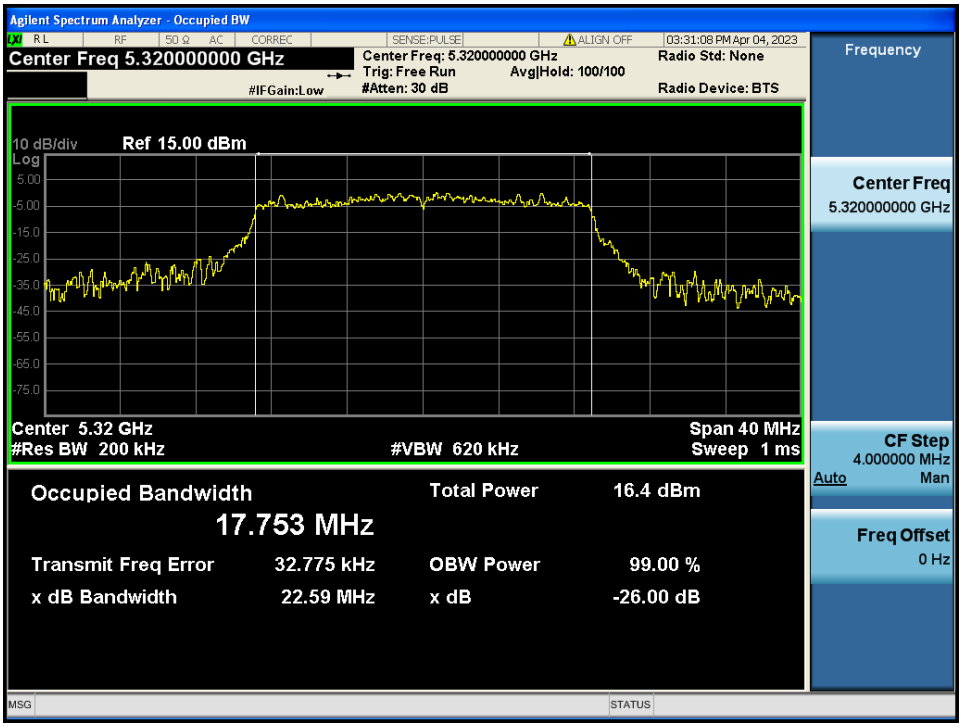
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.60



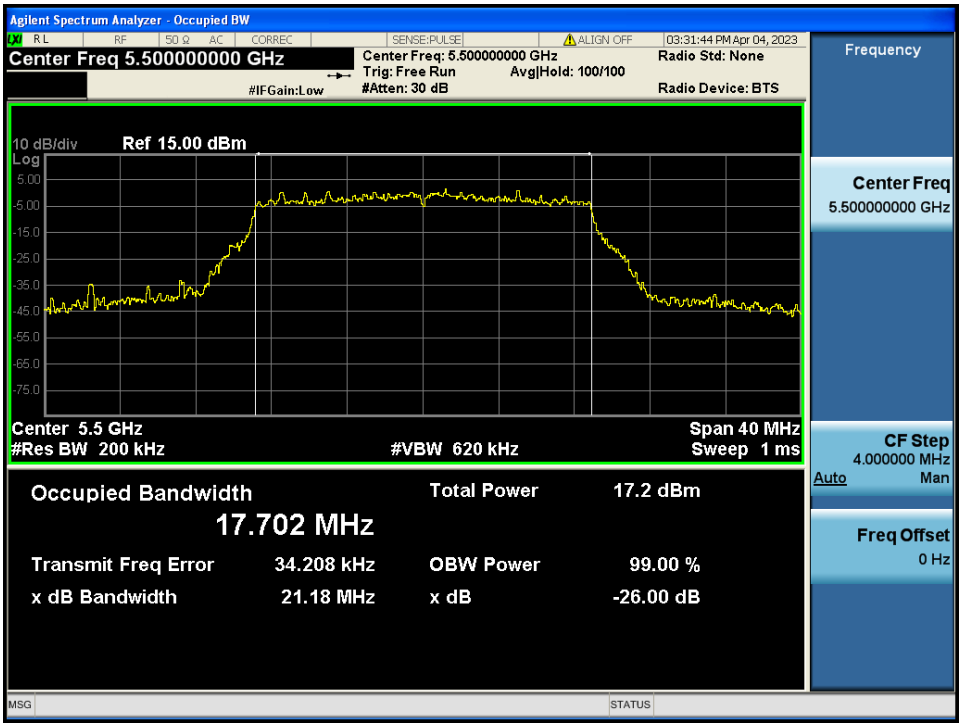
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.64



26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.100



26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.116

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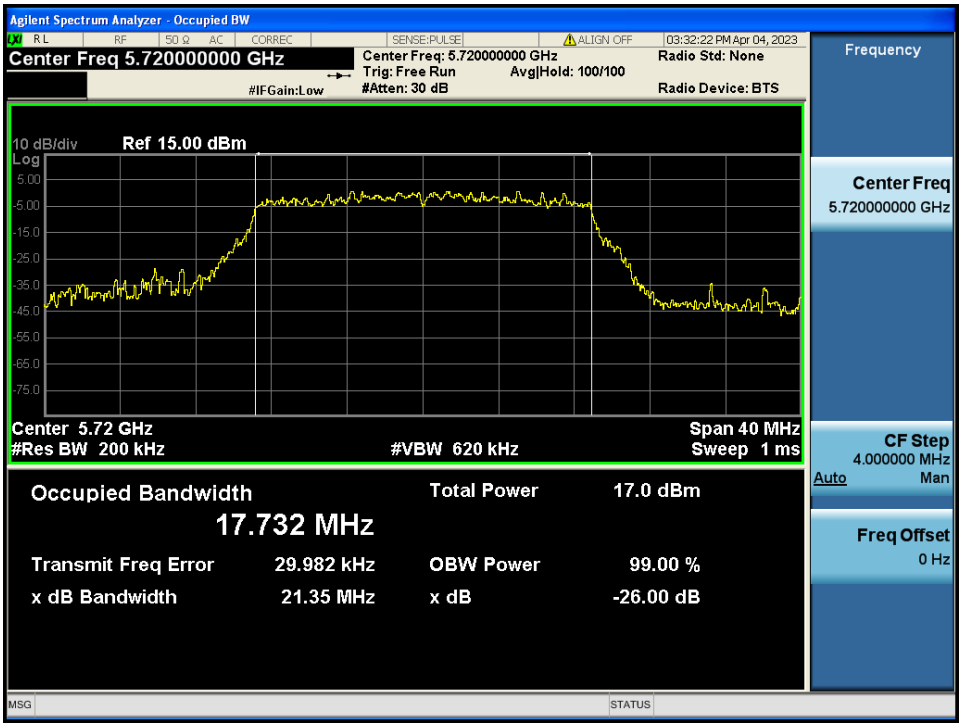
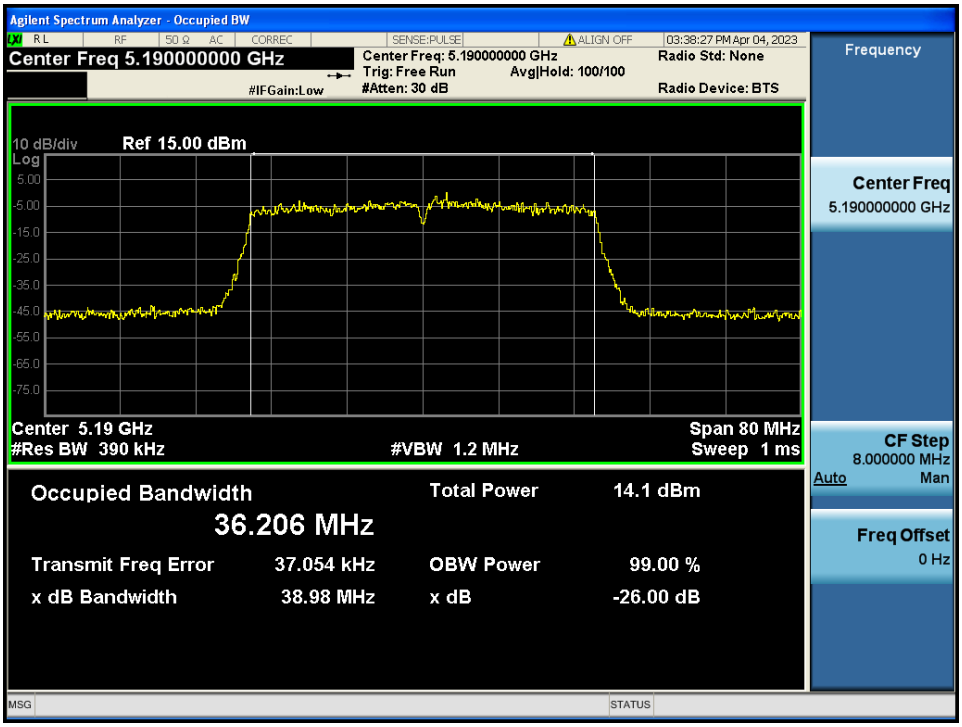
26 dB Bandwidth & Occupied BW

Test Mode: TM 2 & ANT 2 & Ch.144



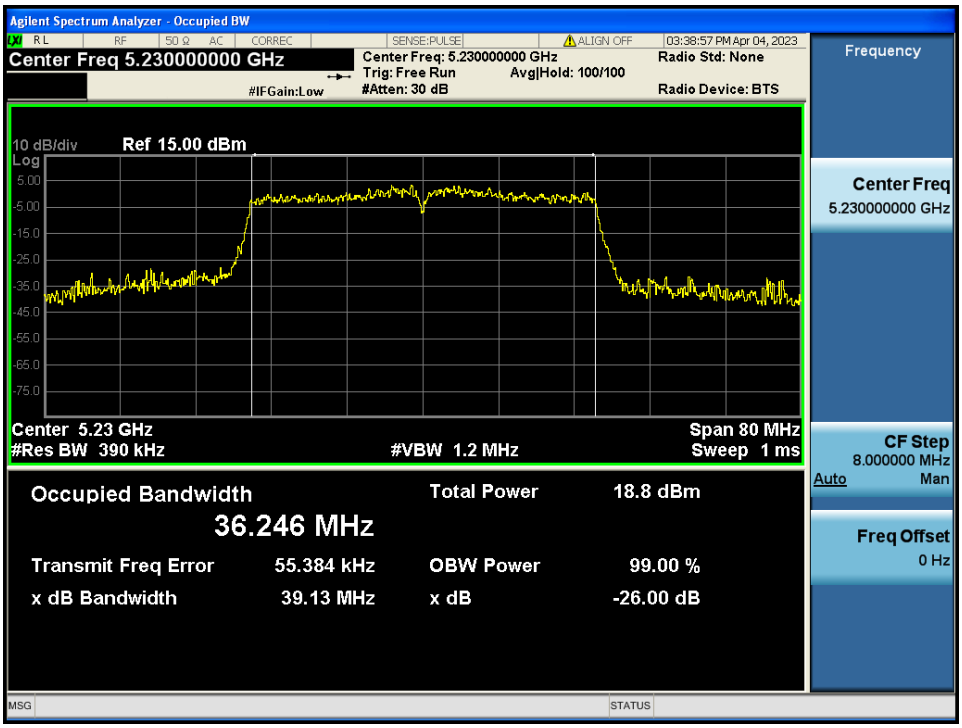
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 2 & Ch.38



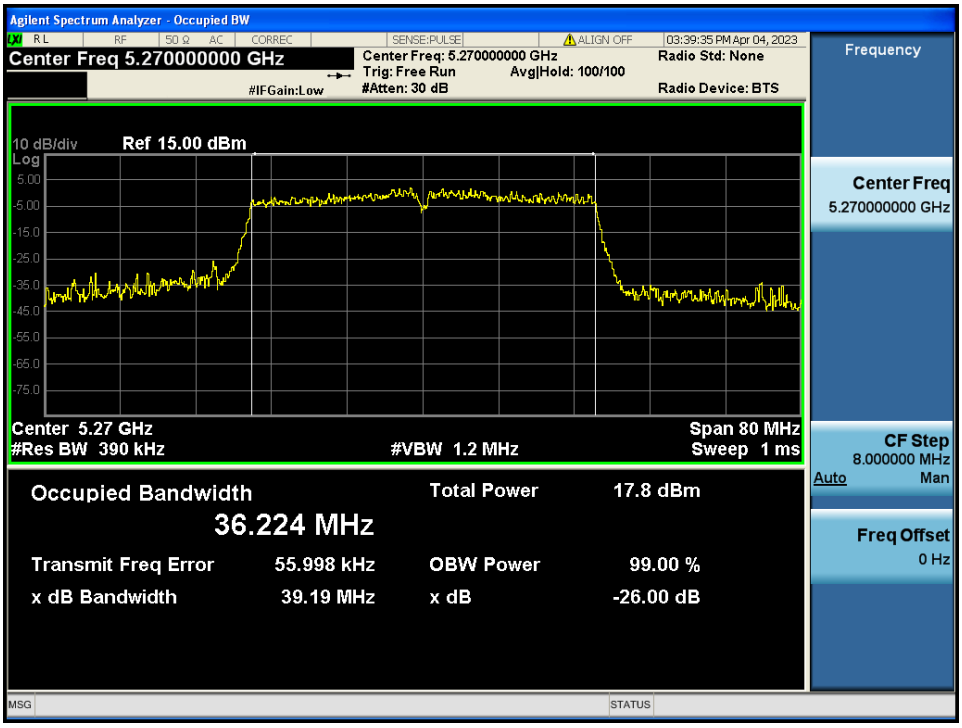
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 2 & Ch.46



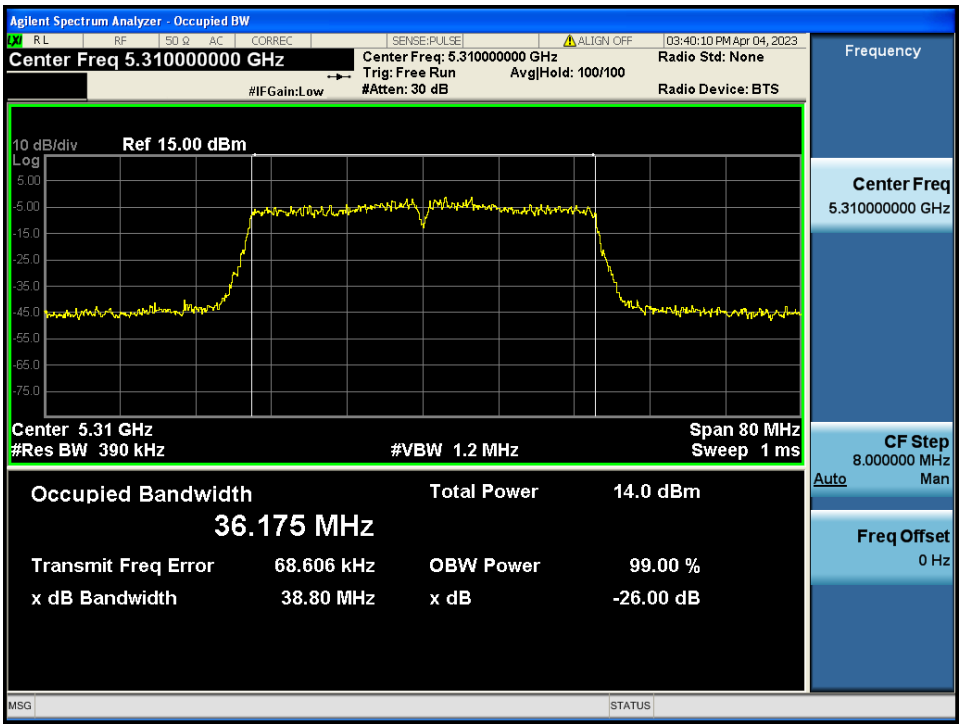
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 2 & Ch.54



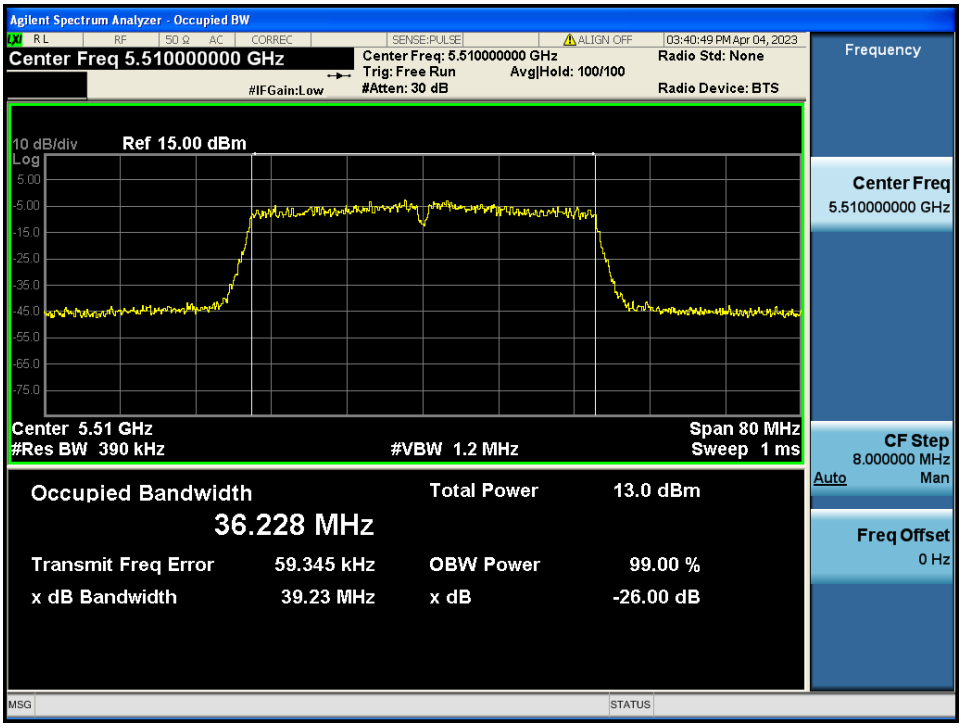
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 2 & Ch.62



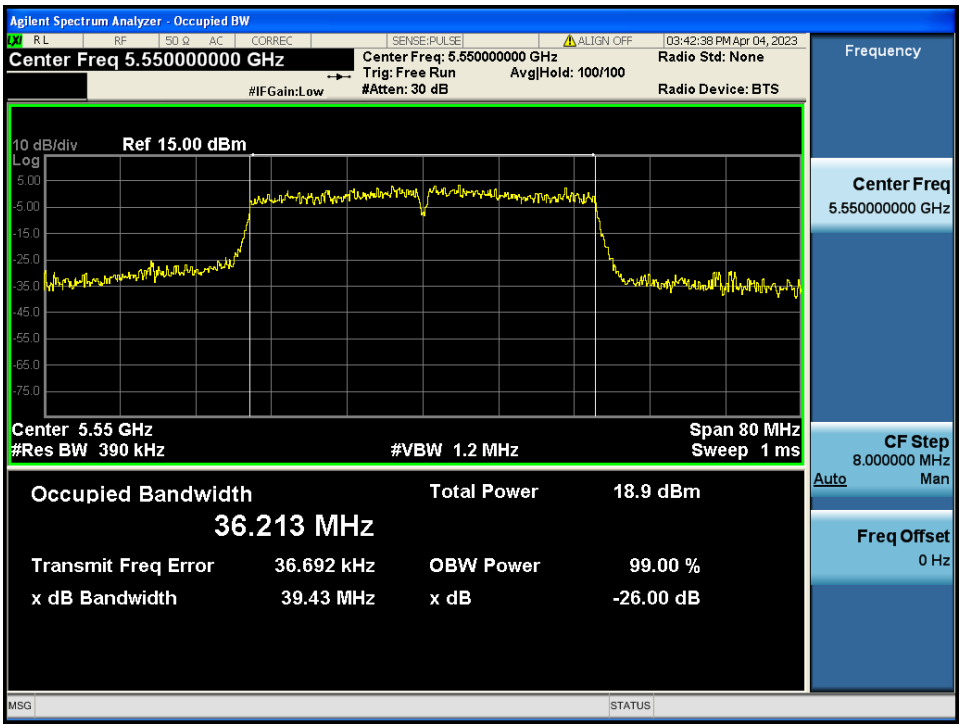
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 2 & Ch.102



26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 2 & Ch.110



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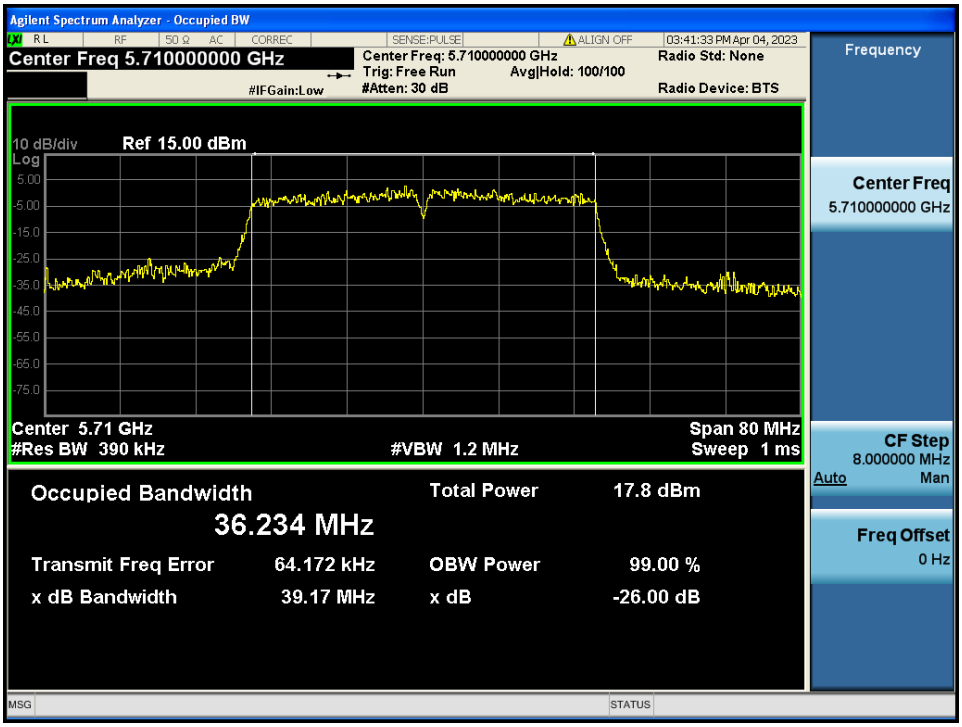
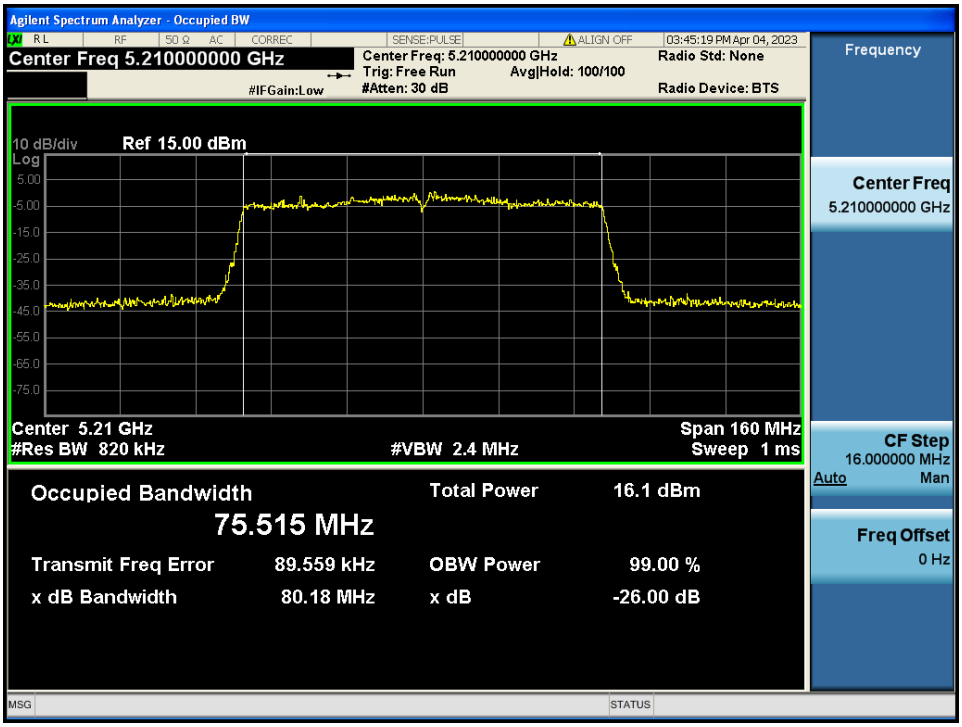
26 dB Bandwidth & Occupied BW

Test Mode: TM 3 & ANT 2 & Ch.142



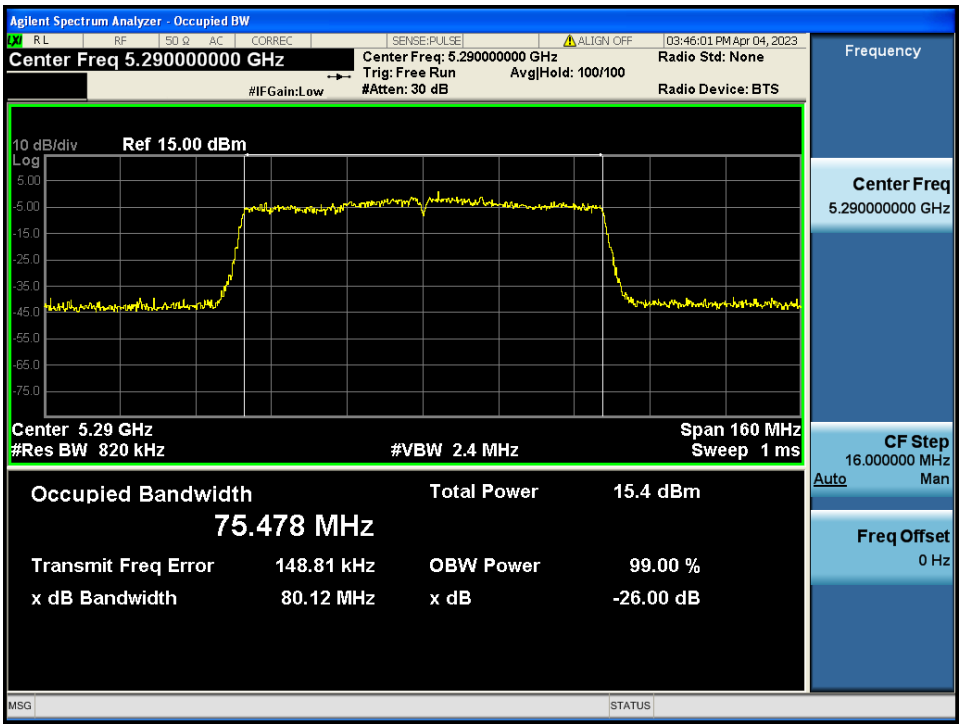
26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 2 & Ch.42



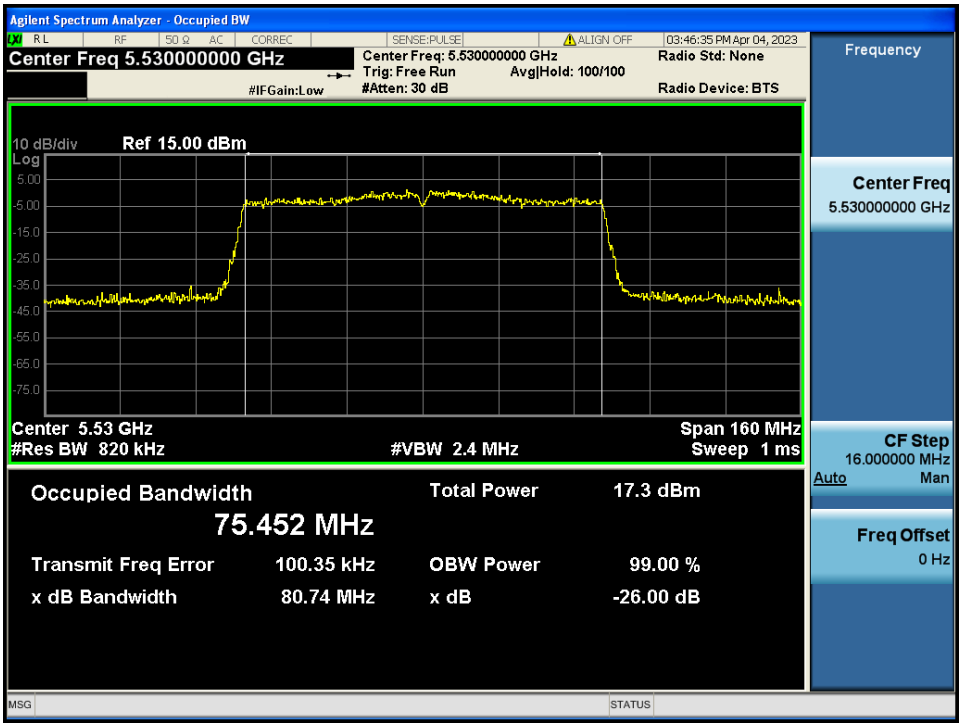
26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 2 & Ch.58



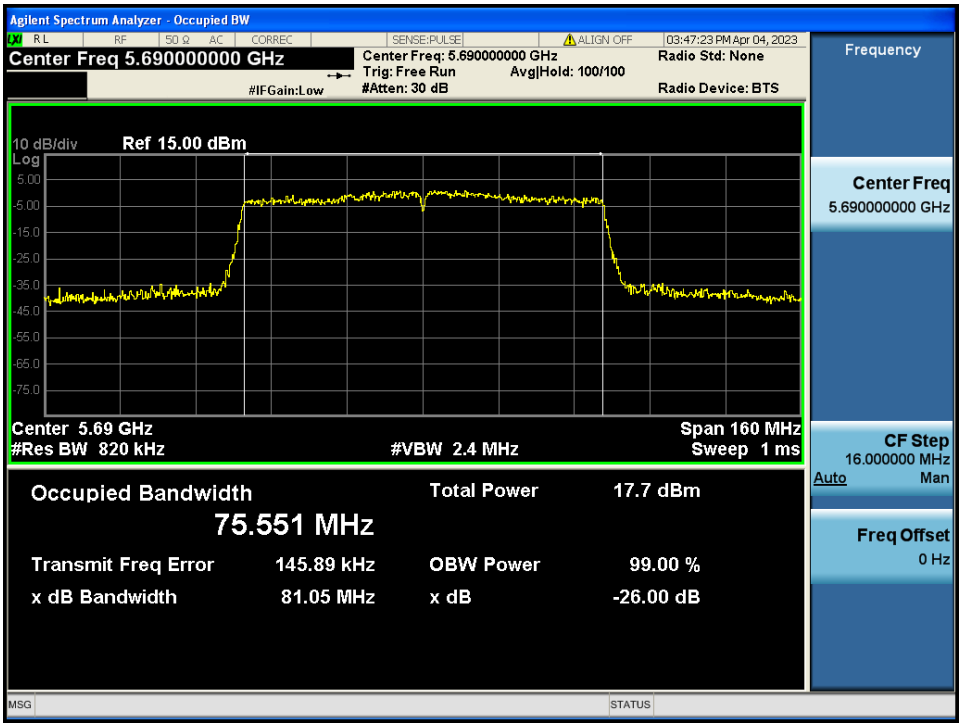
26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 2 & Ch.106



26 dB Bandwidth & Occupied BW

Test Mode: TM 4 & ANT 2 & Ch.138



5.2 Minimum Emission Bandwidth (6 dB Bandwidth) & Occupied BW (99 %)

▣ Test Requirements

- Emission Bandwidth (6 dB Bandwidth)

Within the 5.725-5.85 GHz band, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

- Occupied BW (99 %)

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99 % emission bandwidth, as calculated or measured.

▣ Test Configuration

Refer to the APPENDIX I.

▣ Test Procedure

- Emission Bandwidth (6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB789033 D02v02r01**.

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth **≥ 3 x RBW**.
3. Detector = **Peak**.
4. Trace mode = **max hold**.

   Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

- Occupied BW (99 %) : RSS-Gen[6.7]

1. The transmitter shall be operated at its maximum carrier power measured under normal test conditions.
2. The span of the analyzer shall be set to capture all products of the modulation process, including the emission skirts.
3. The resolution bandwidth (RBW) shall be in the range of 1 % to 5 % of the occupied bandwidth (OBW) and video bandwidth (VBW) shall be approximately 3 x RBW.

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▣ **Test Results: Comply**

Test Mode	Band	Channel	Frequency(MHz)	6 dB BW(MHz)		99 % BW(MHz)	
				ANT 1	ANT 2	ANT 1	ANT 2
TM 1	U-NII 3	149	5 745	16.37	16.32	16.87	16.53
		157	5 785	16.30	16.34	16.80	16.58
		165	5 825	16.08	16.36	16.67	16.55
TM 2	U-NII 3	149	5 745	17.32	17.56	17.89	17.73
		157	5 785	17.35	16.98	17.81	17.72
		165	5 825	17.34	17.62	17.87	17.72
TM 3	U-NII 3	151	5 755	36.09	35.86	36.35	36.26
		159	5 795	35.26	35.73	36.34	36.06
TM 4	U-NII 3	155	5 775	75.47	75.39	75.61	75.60

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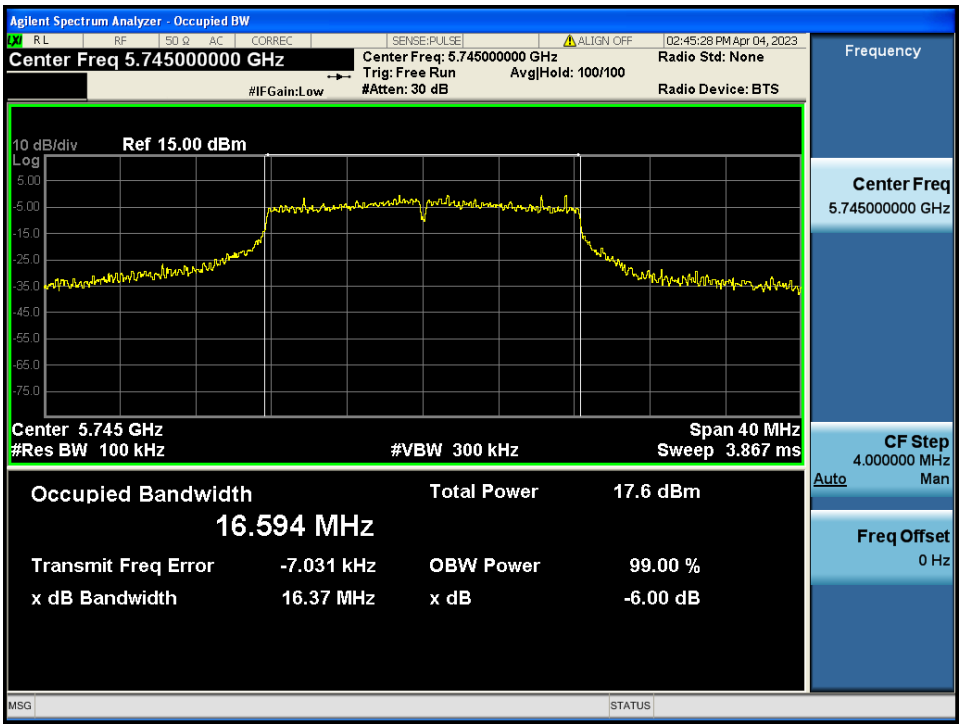
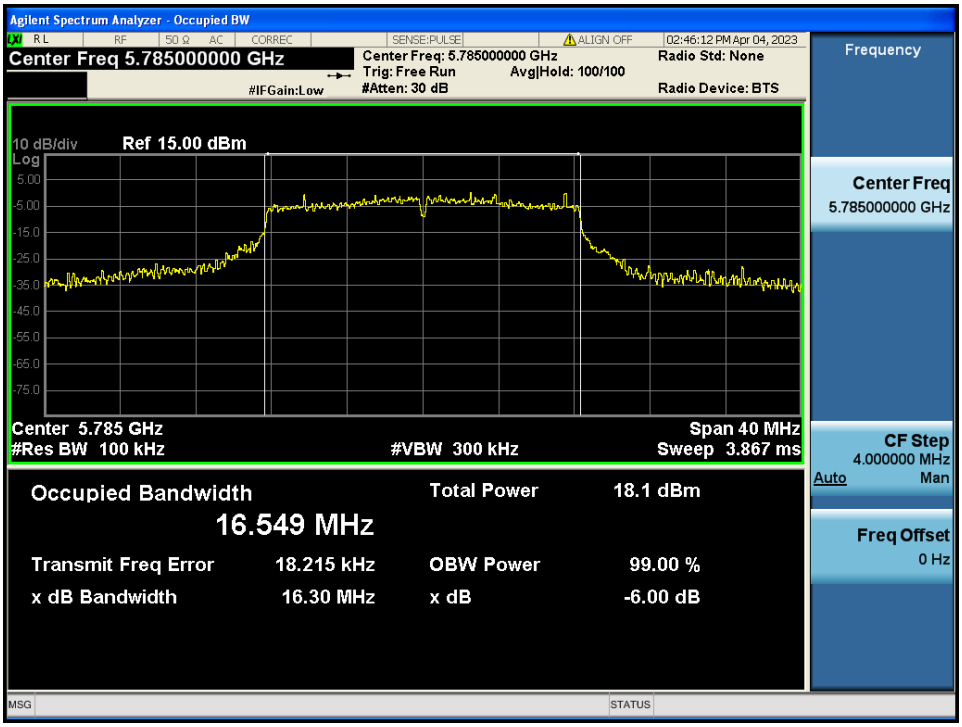
6 dB Bandwidth

Test Mode: TM 1 & ANT 1 & Ch.149



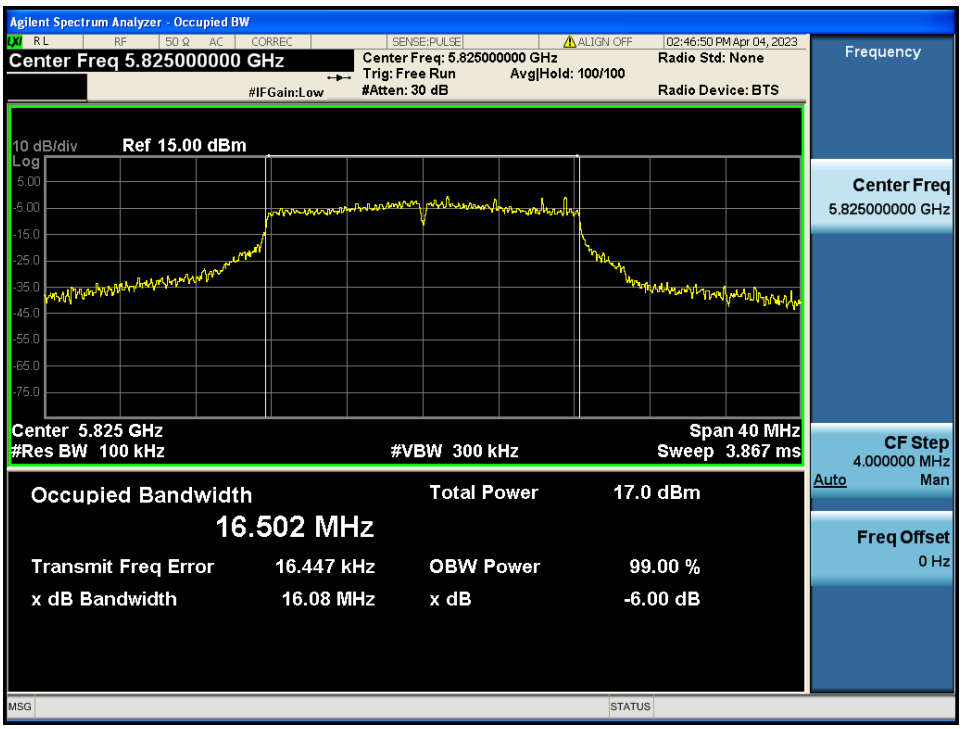
6 dB Bandwidth

Test Mode: TM 1 & ANT 1 & Ch.157



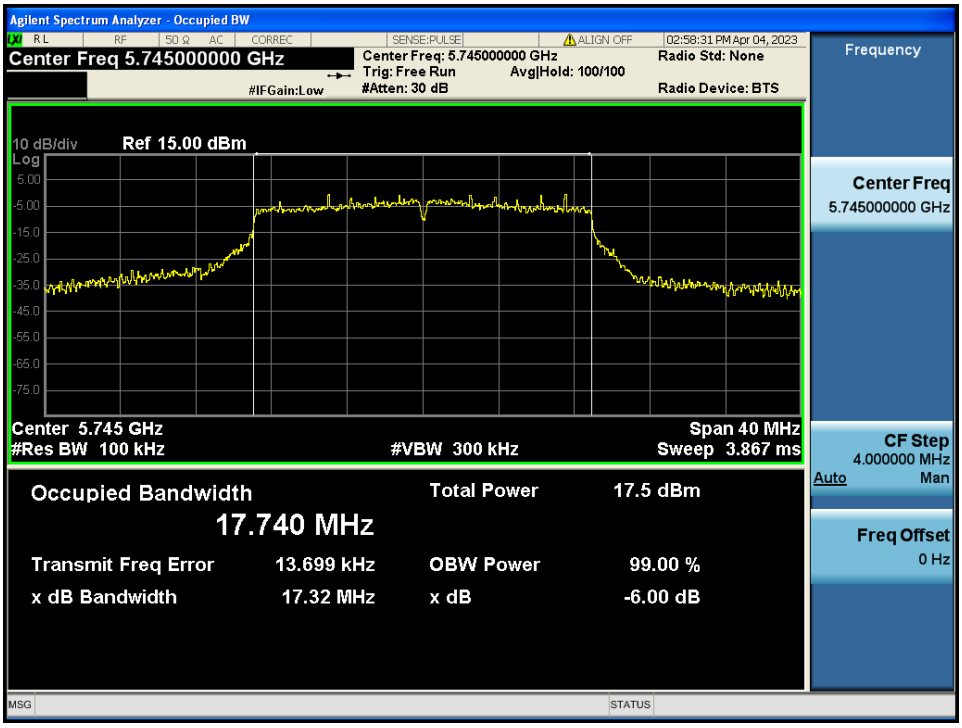
6 dB Bandwidth

Test Mode: TM 1 & ANT 1 & Ch.165



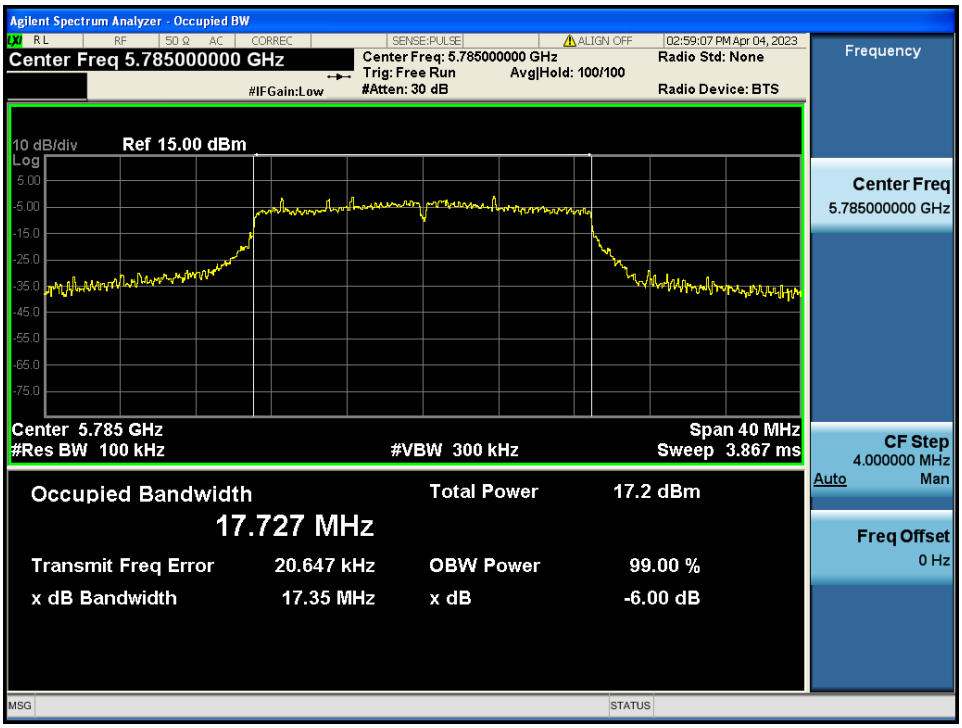
6 dB Bandwidth

Test Mode: TM 2 & ANT 1 & Ch.149



6 dB Bandwidth

Test Mode: TM 2 & ANT 1 & Ch.157



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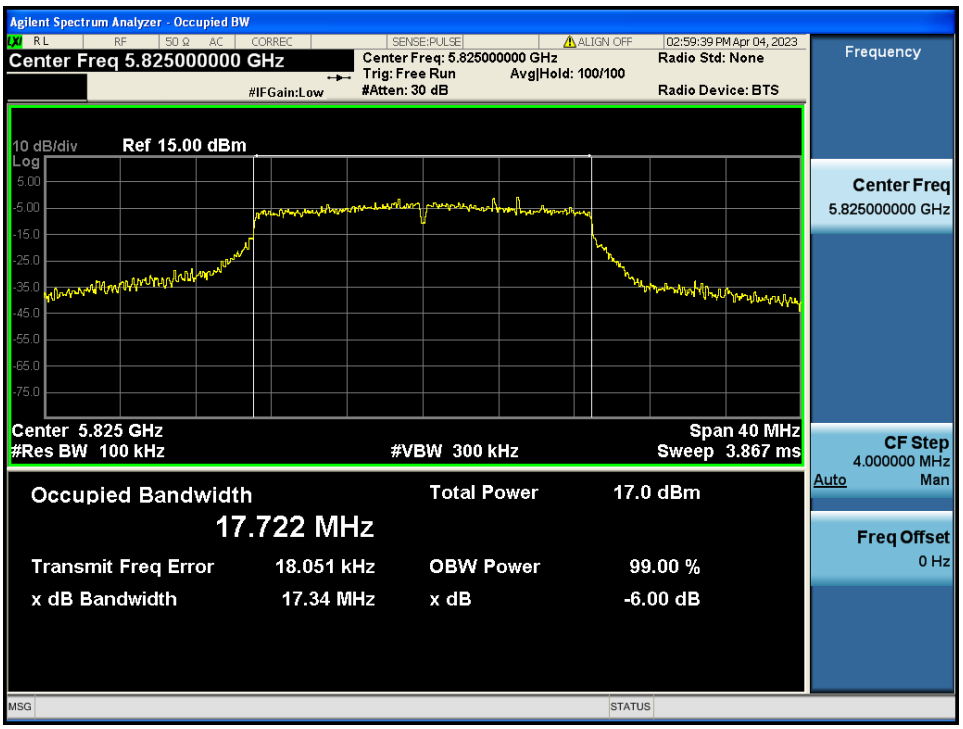
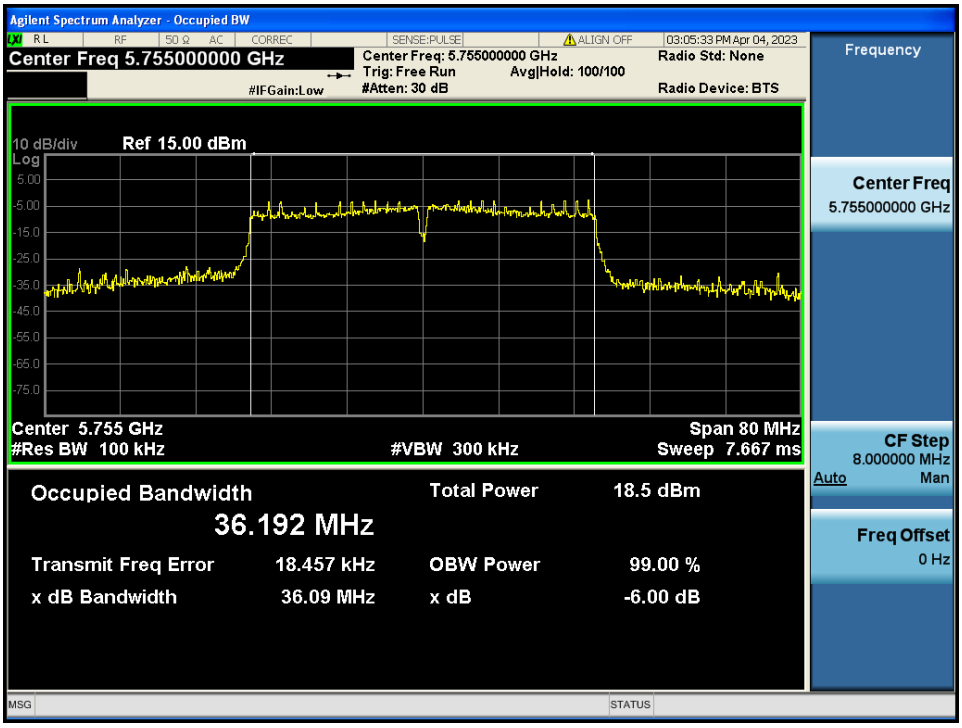
6 dB Bandwidth

Test Mode: TM 2 & ANT 1 & Ch.165



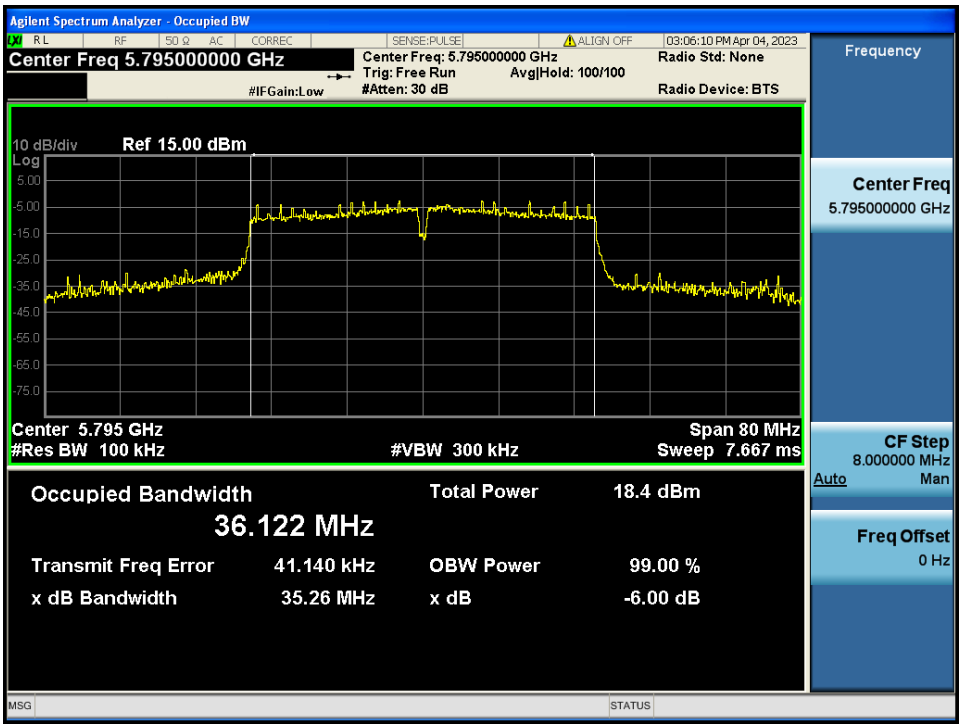
6 dB Bandwidth

Test Mode: TM 3 & ANT 1 & Ch.151



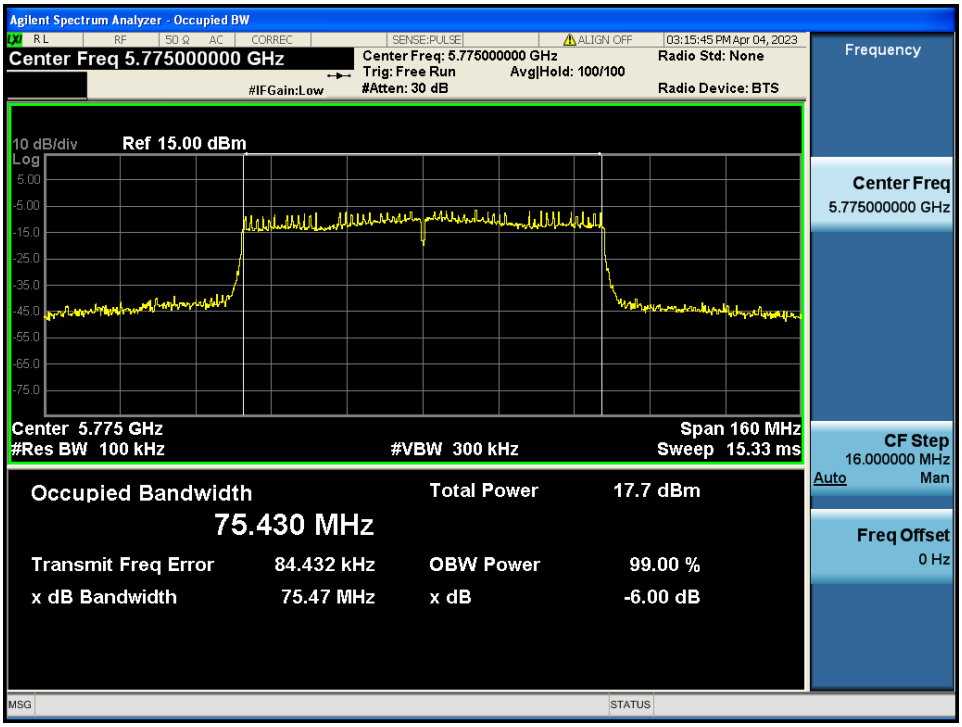
6 dB Bandwidth

Test Mode: TM 3 & ANT 1 & Ch.159



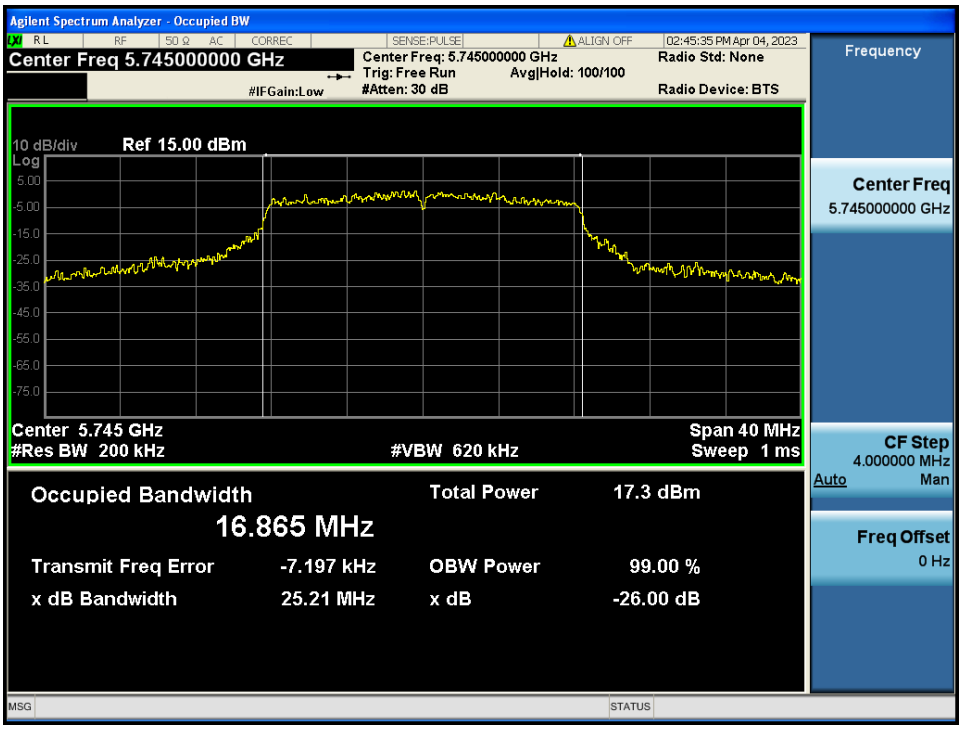
6 dB Bandwidth

Test Mode: TM 4 & ANT 1 & Ch.155



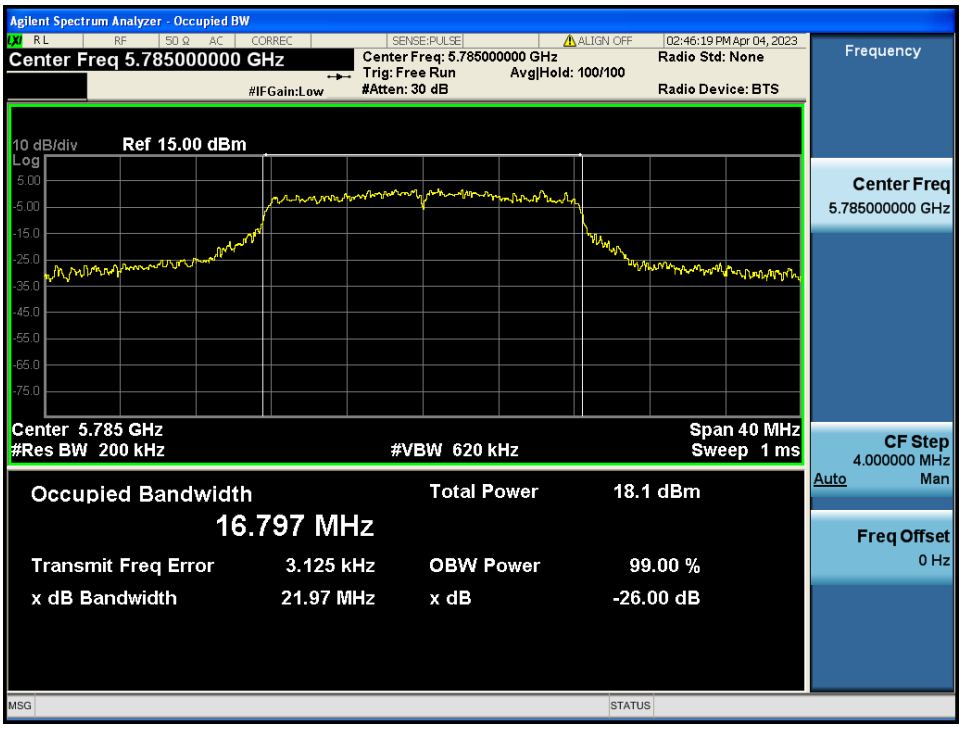
Occupied Bandwidth

Test Mode: TM 1 & ANT 1 & Ch.149



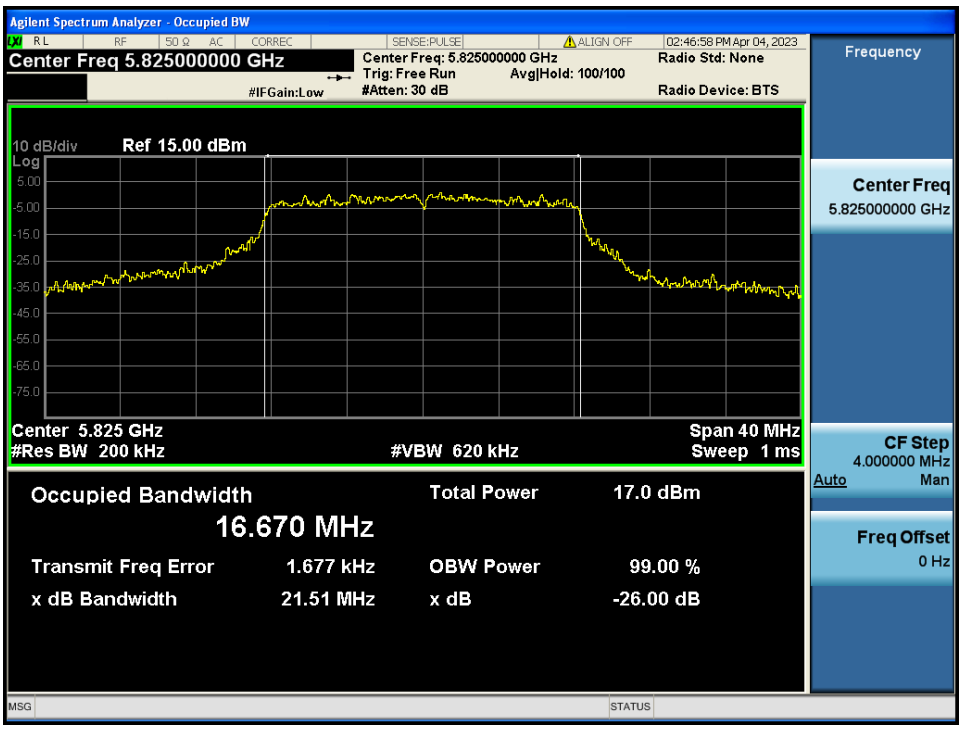
Occupied Bandwidth

Test Mode: TM 1 & ANT 1 & Ch.157



Occupied Bandwidth

Test Mode: TM 1 & ANT 1 & Ch.165

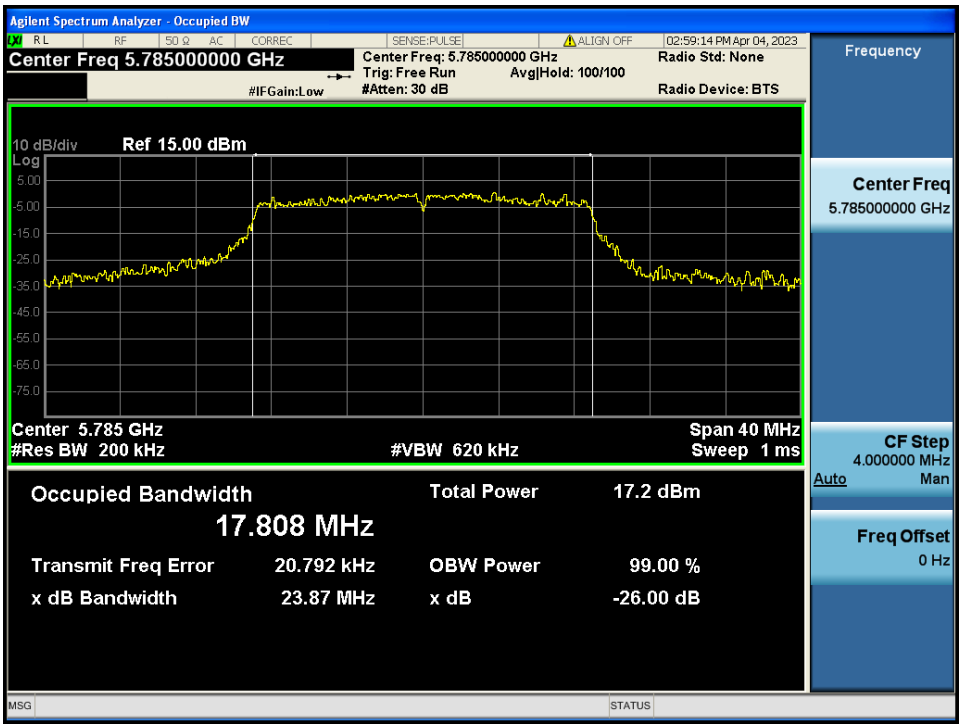


Occupied Bandwidth

Test Mode: TM 2 & ANT 1 & Ch.149

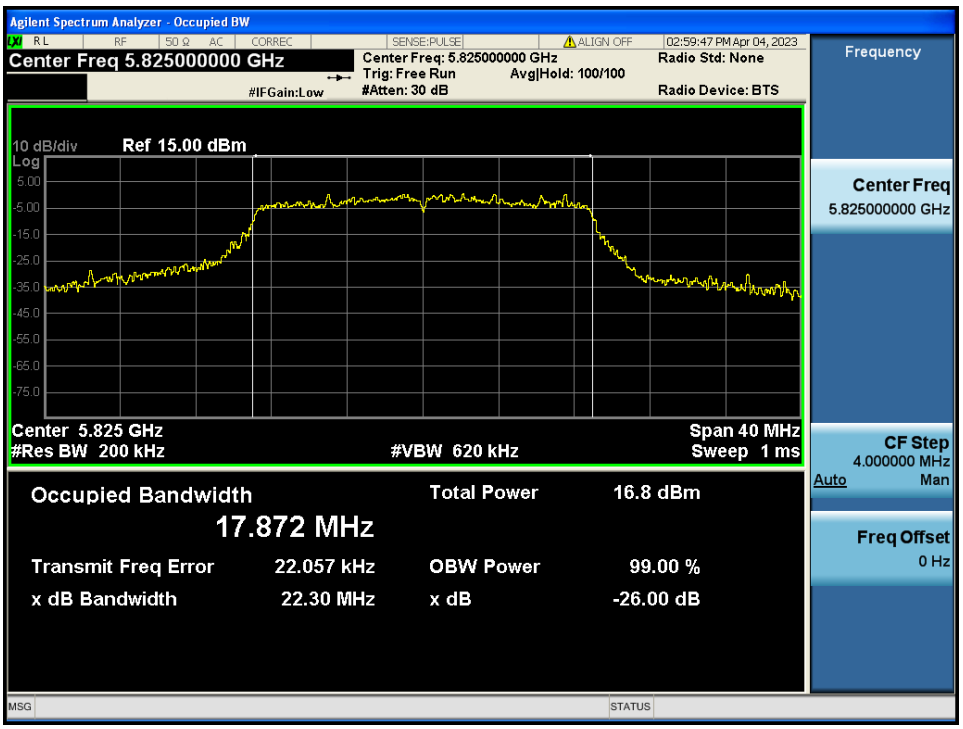
Occupied Bandwidth

Test Mode: TM 2 & ANT 1 & Ch.157



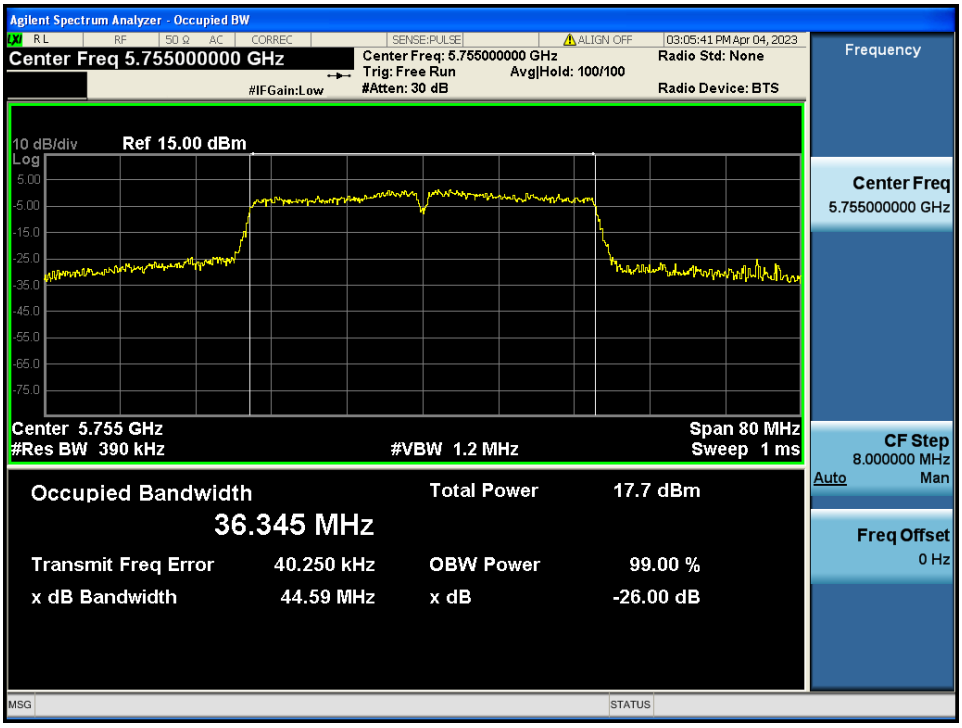
Occupied Bandwidth

Test Mode: TM 2 & ANT 1 & Ch.165



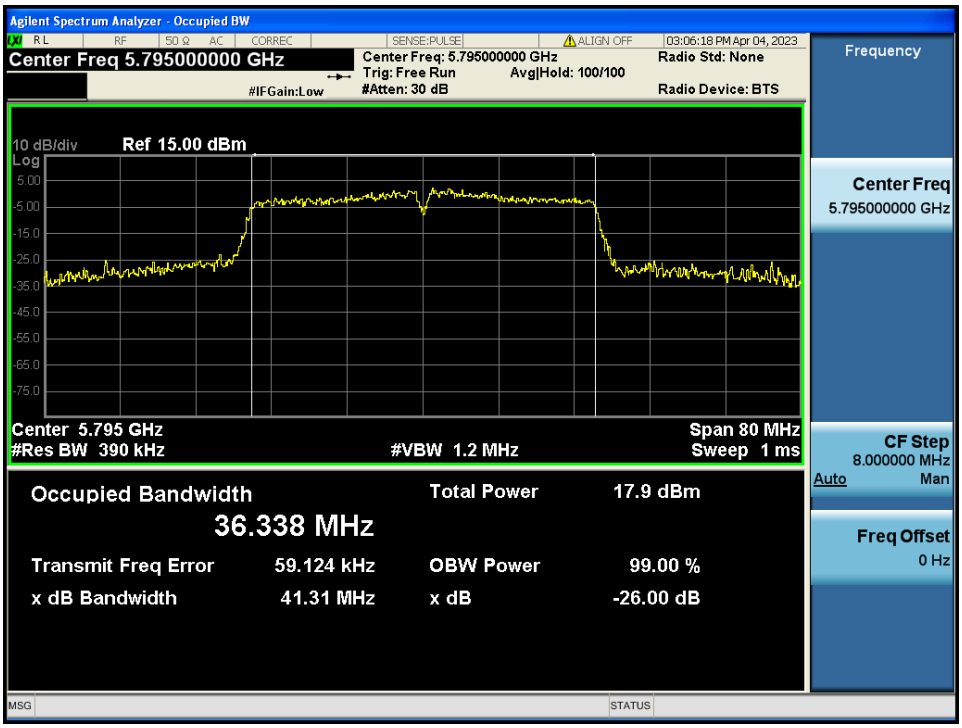
Occupied Bandwidth

Test Mode: TM 3 & ANT 1 & Ch.151



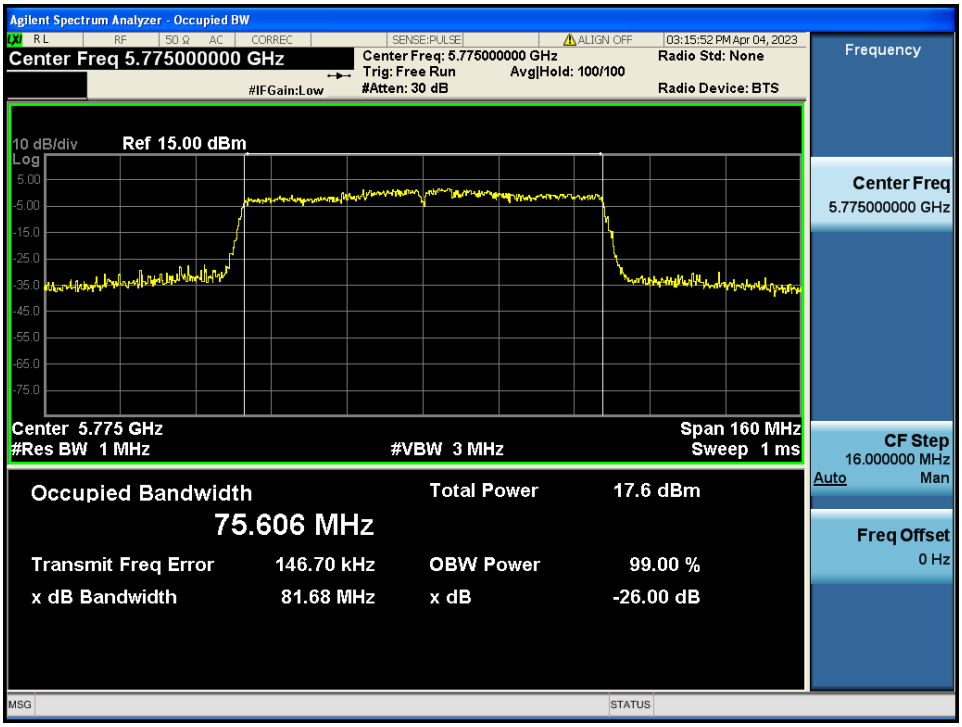
Occupied Bandwidth

Test Mode: TM 3 & ANT 1 & Ch.159



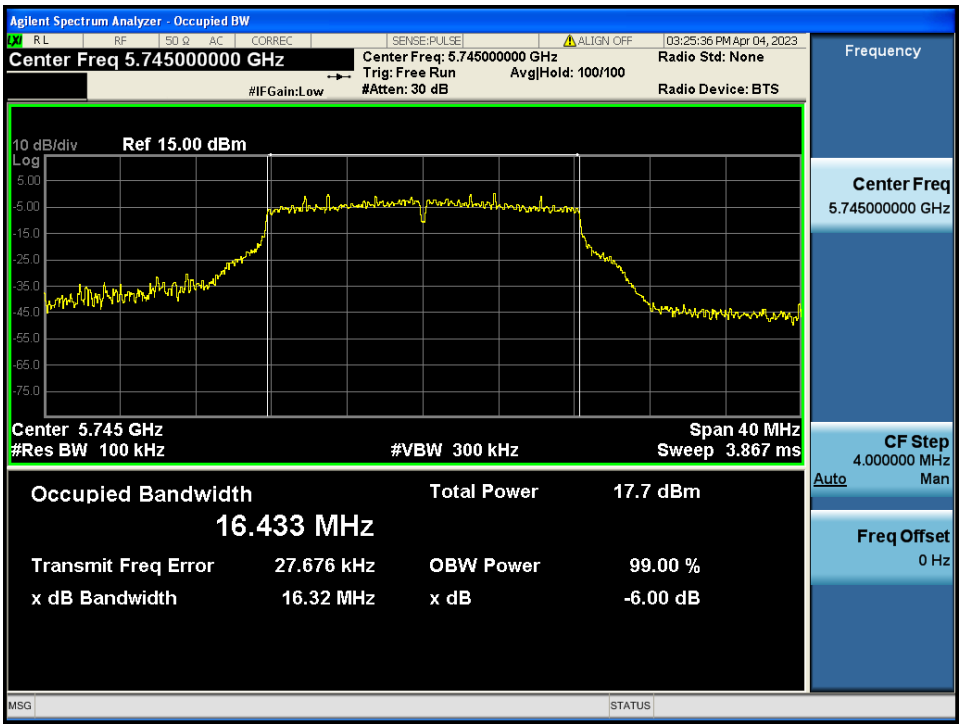
Occupied Bandwidth

Test Mode: TM 4 & ANT 1 & Ch.155



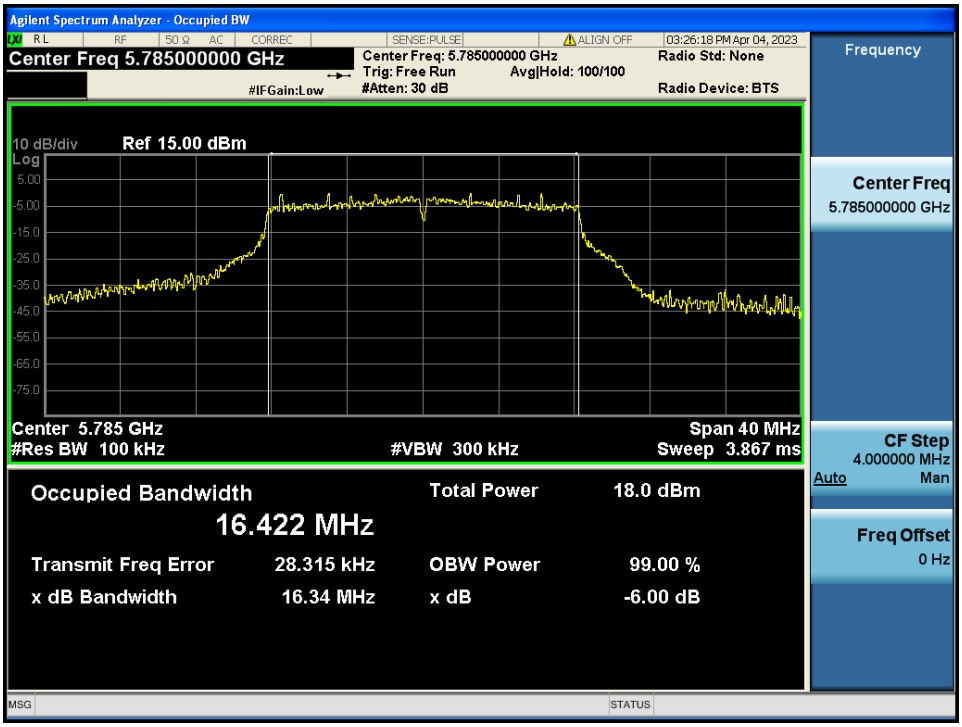
6 dB Bandwidth

Test Mode: TM 1 & ANT 2 & Ch.149



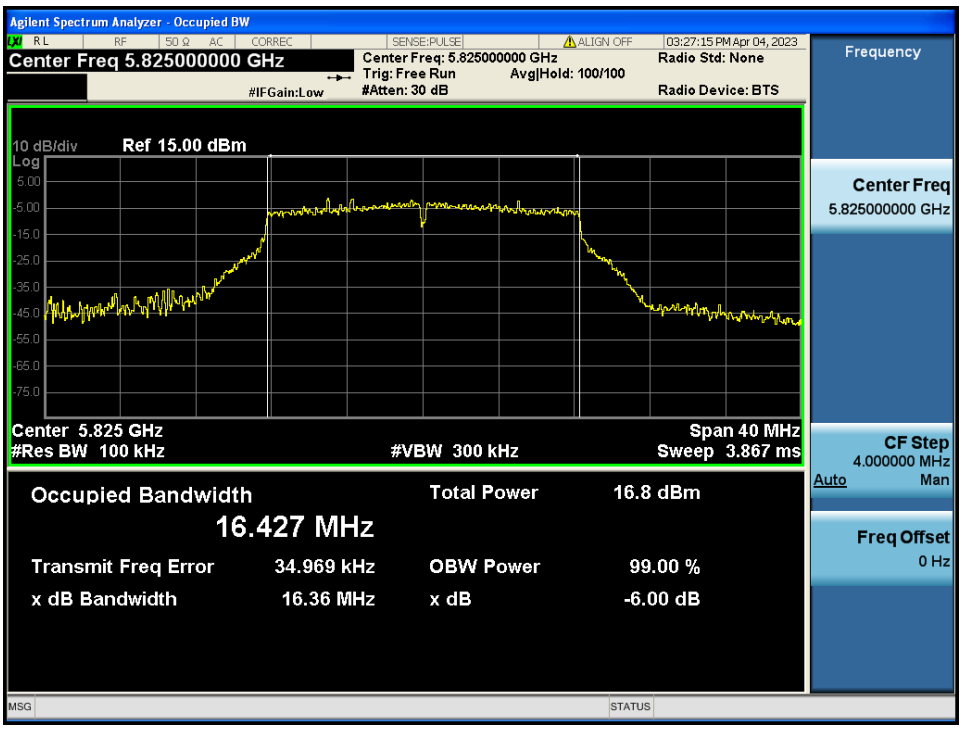
6 dB Bandwidth

Test Mode: TM 1 & ANT 2 & Ch.157



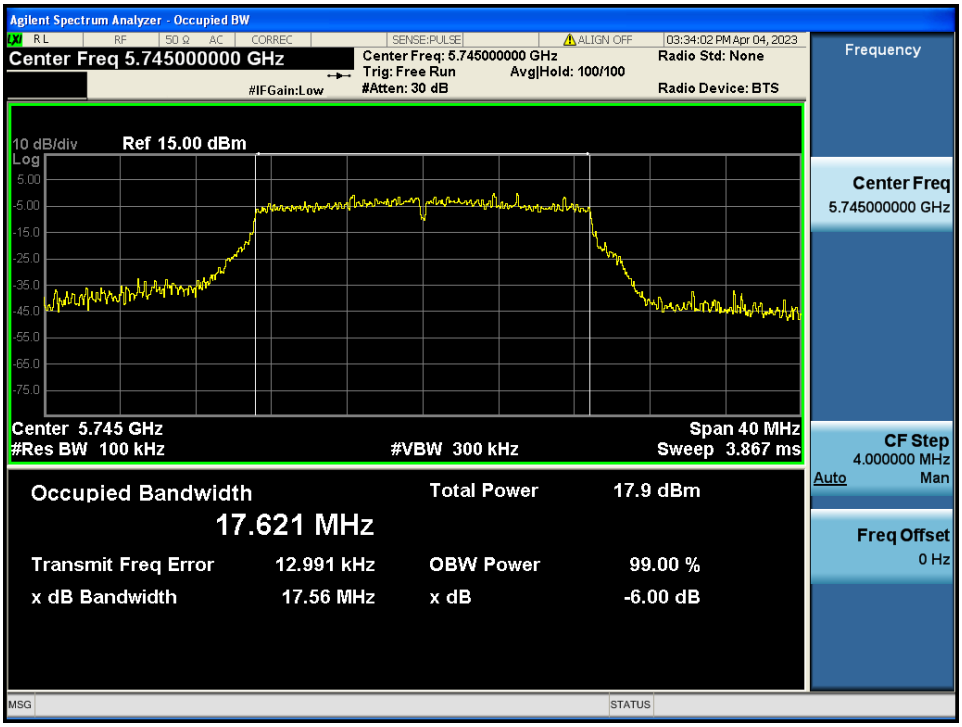
6 dB Bandwidth

Test Mode: TM 1 & ANT 2 & Ch.165



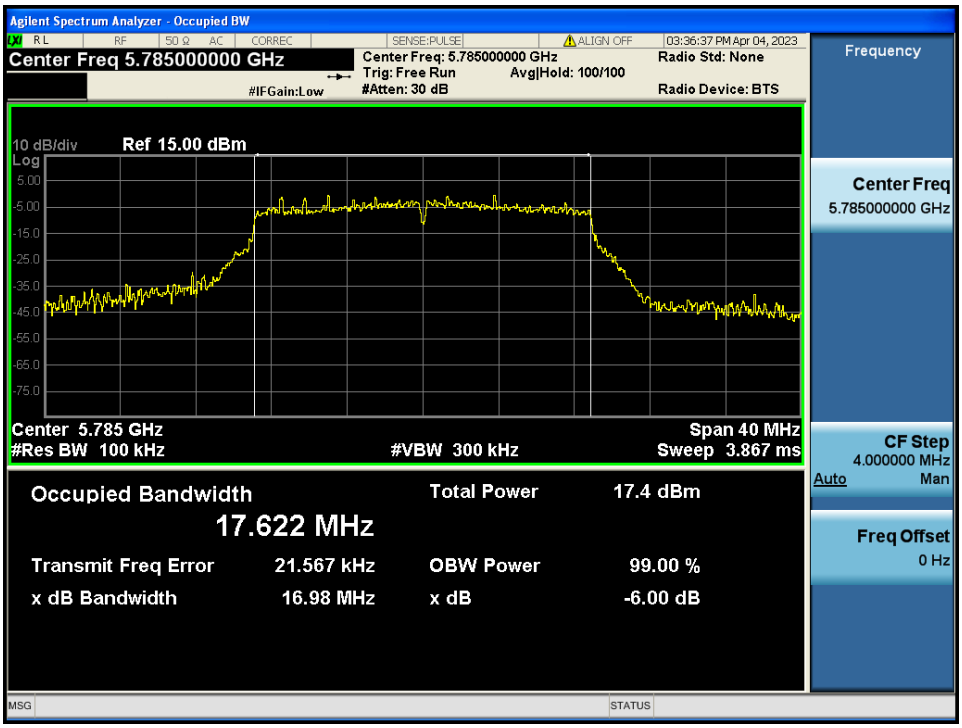
6 dB Bandwidth

Test Mode: TM 2 & ANT 2 & Ch.149



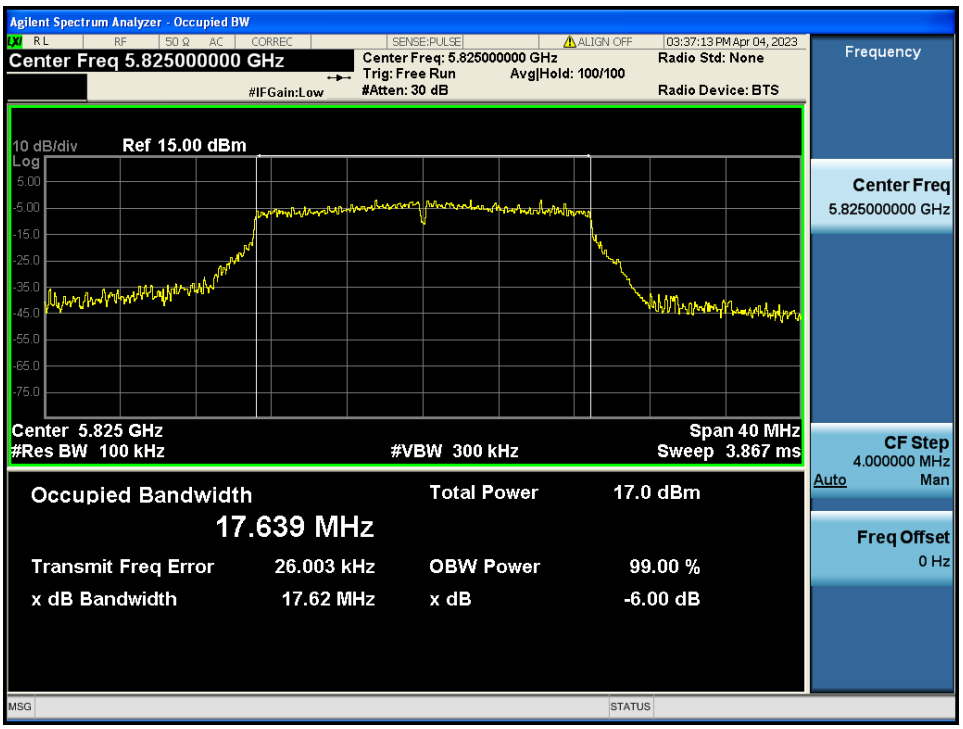
6 dB Bandwidth

Test Mode: TM 2 & ANT 2 & Ch.157



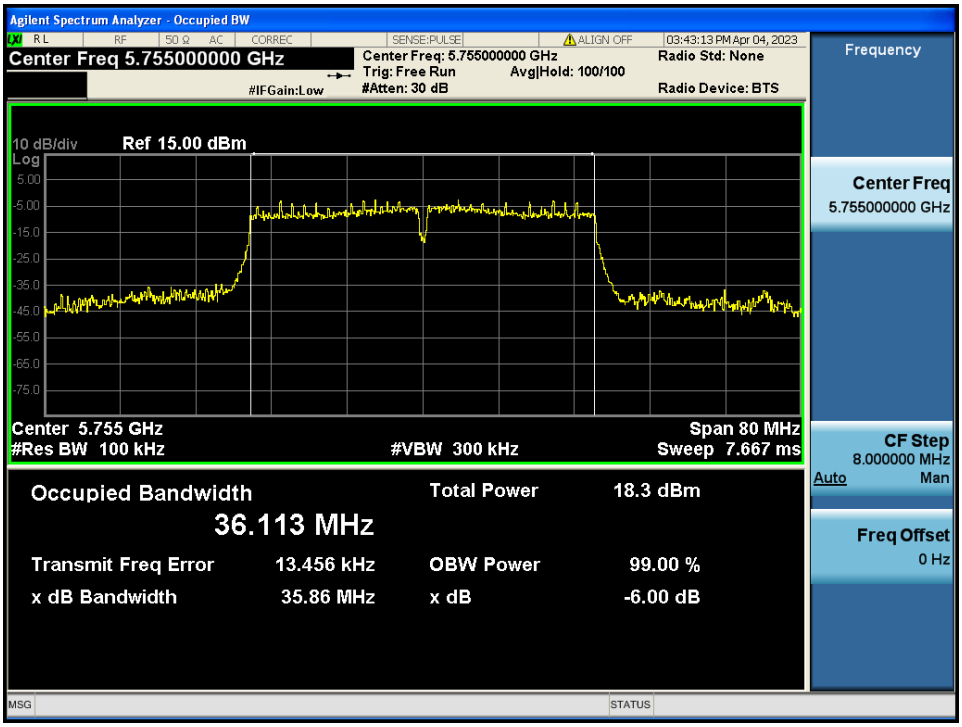
6 dB Bandwidth

Test Mode: TM 2 & ANT 2 & Ch.165



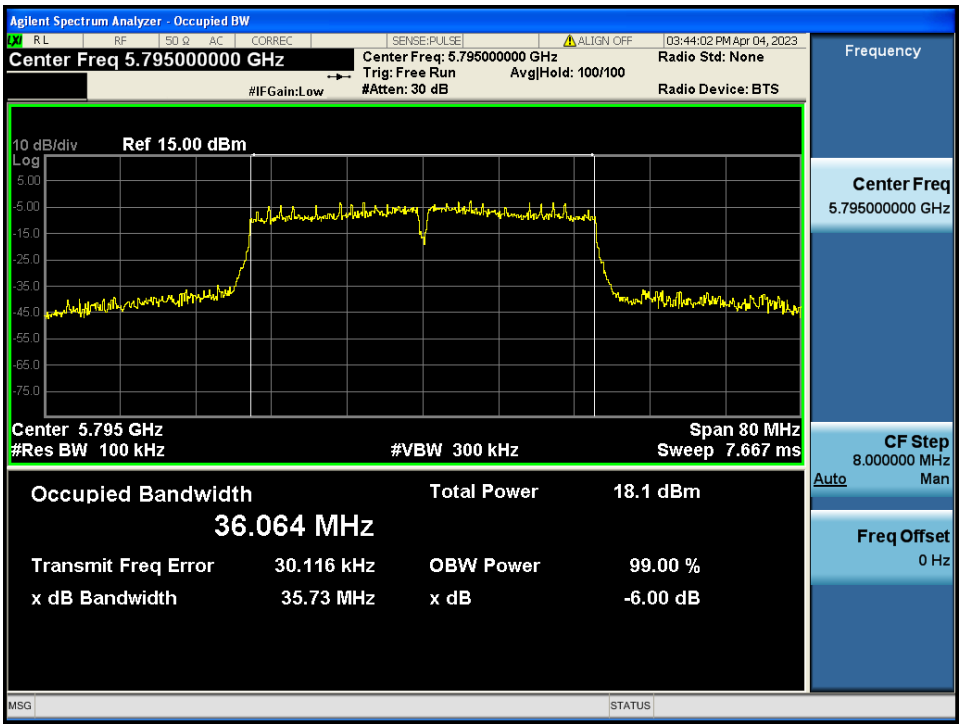
6 dB Bandwidth

Test Mode: TM 3 & ANT 2 & Ch.151



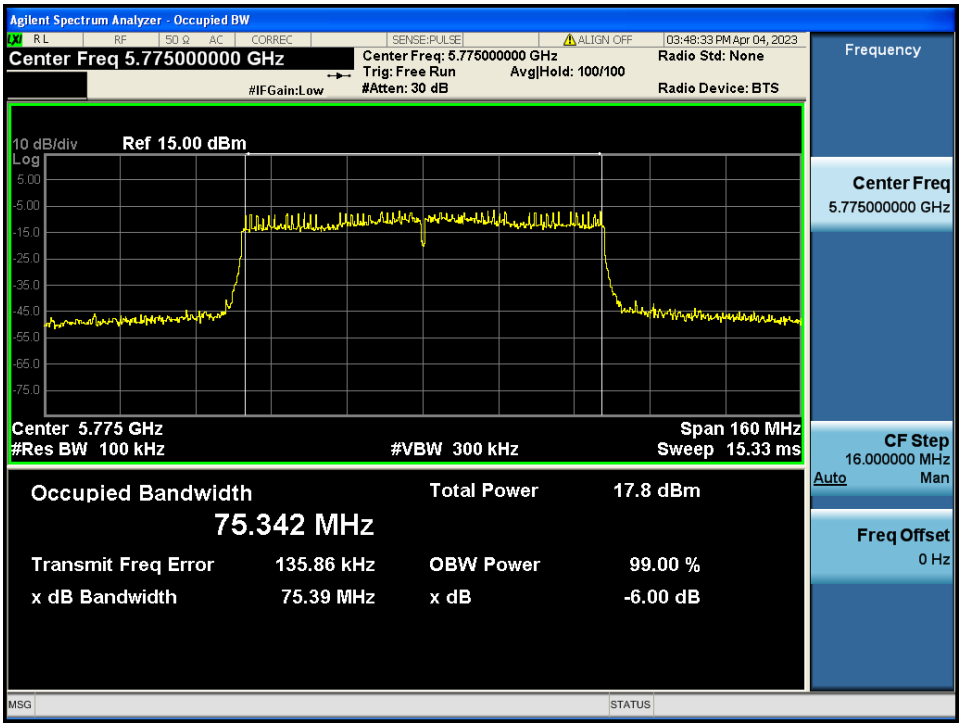
6 dB Bandwidth

Test Mode: TM 3 & ANT 2 & Ch.159



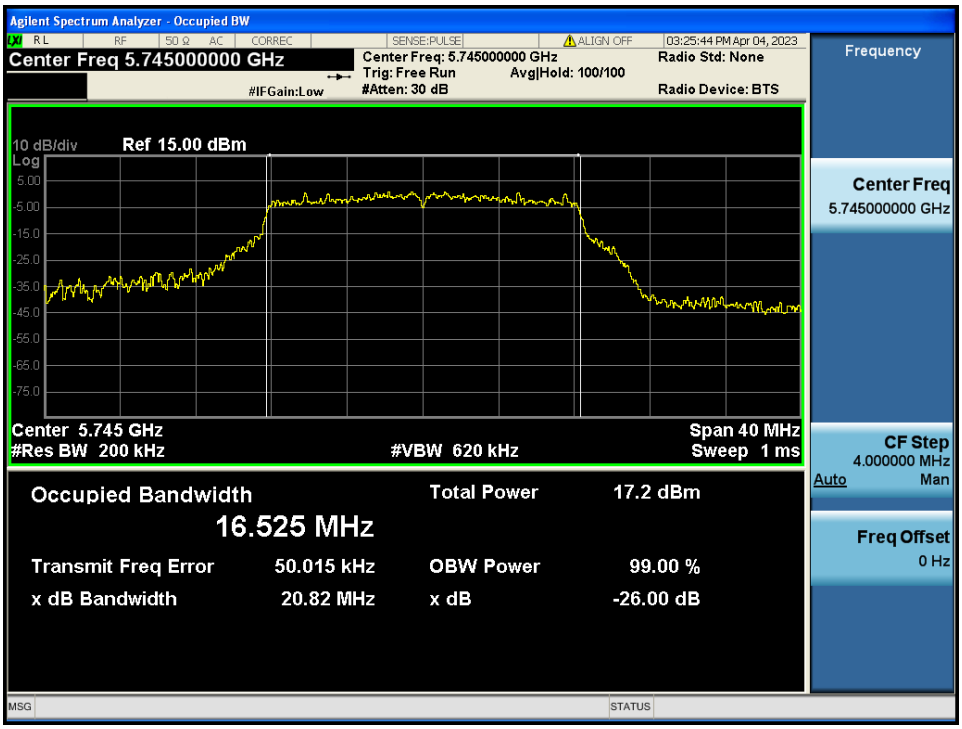
6 dB Bandwidth

Test Mode: TM 4 & ANT 2 & Ch.155



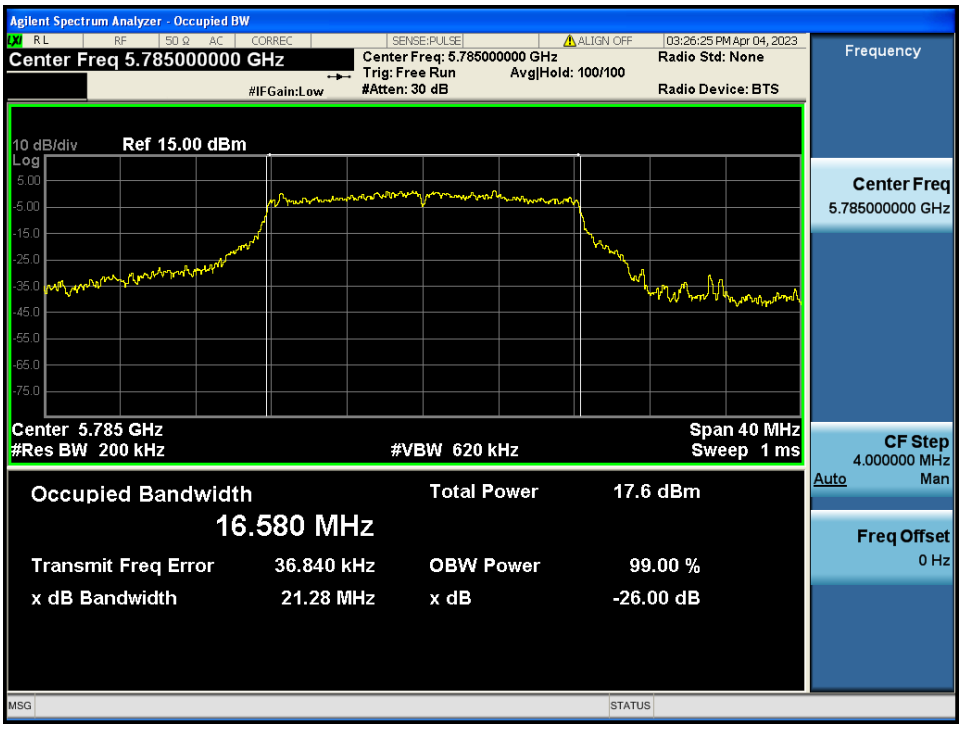
Occupied Bandwidth

Test Mode: TM 1 & ANT 2 & Ch.149



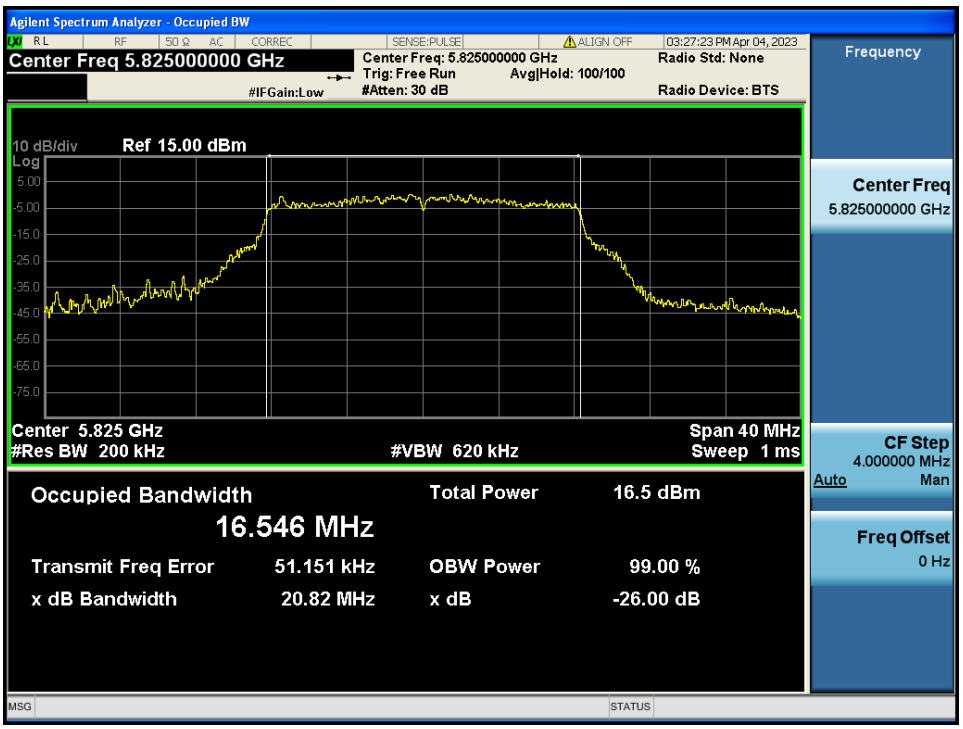
Occupied Bandwidth

Test Mode: TM 1 & ANT 2 & Ch.157



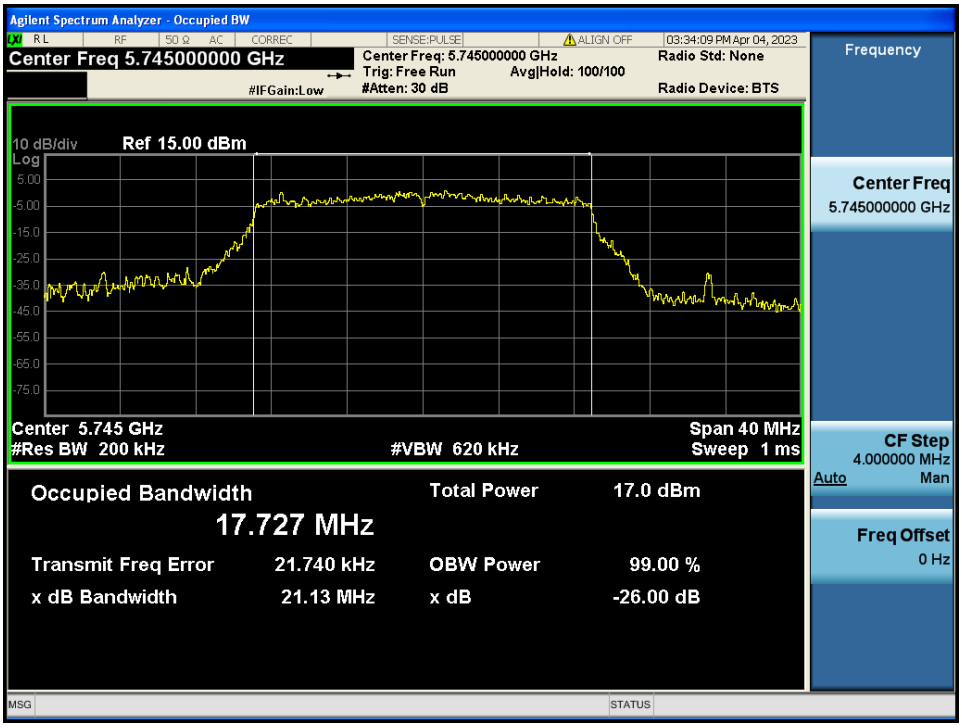
Occupied Bandwidth

Test Mode: TM 1 & ANT 2 & Ch.165



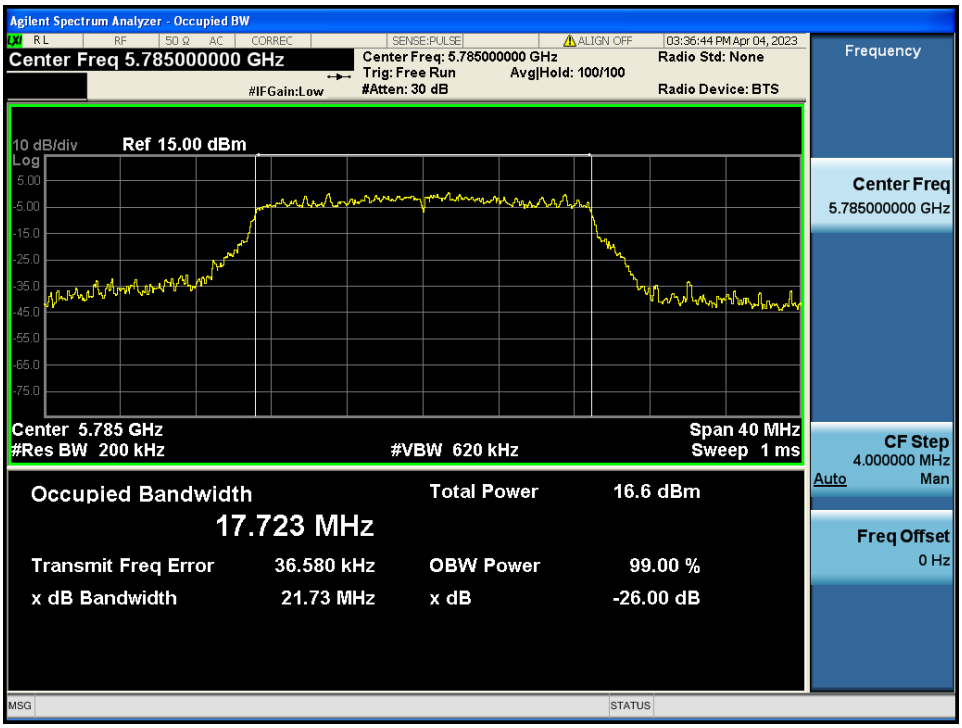
Occupied Bandwidth

Test Mode: TM 2 & ANT 2 & Ch.149



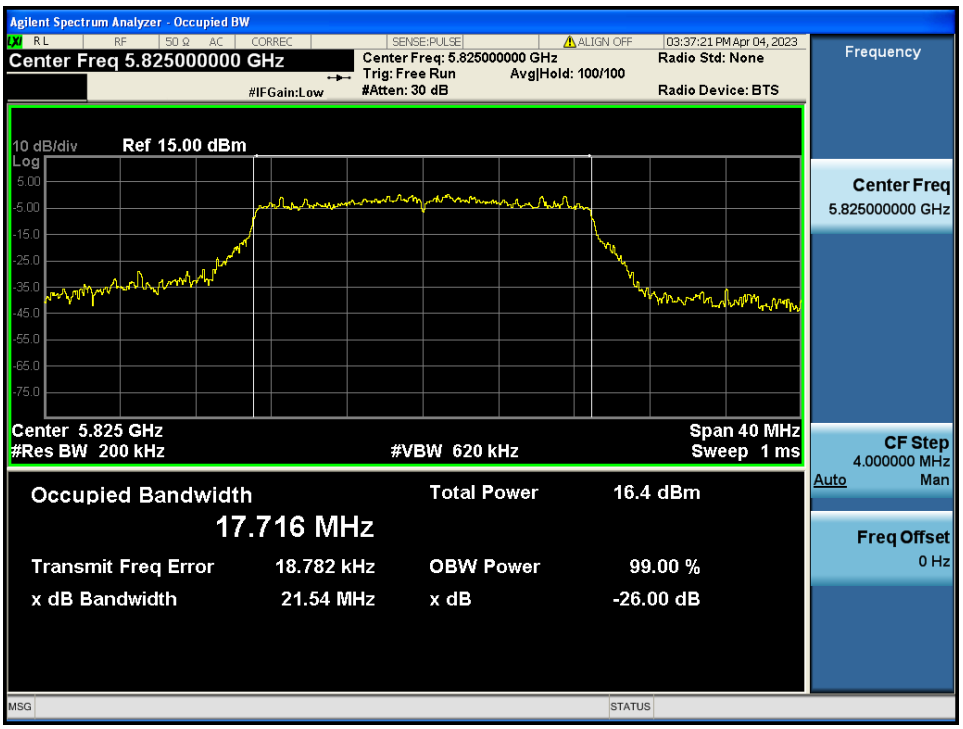
Occupied Bandwidth

Test Mode: TM 2 & ANT 2 & Ch.157



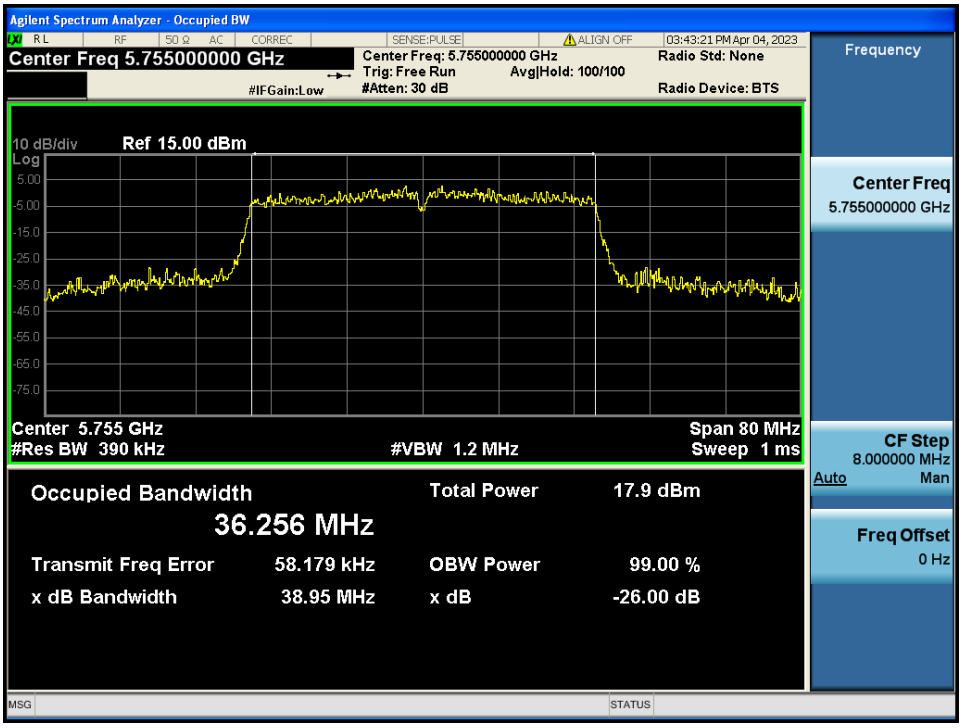
Occupied Bandwidth

Test Mode: TM 2 & ANT 2 & Ch.165



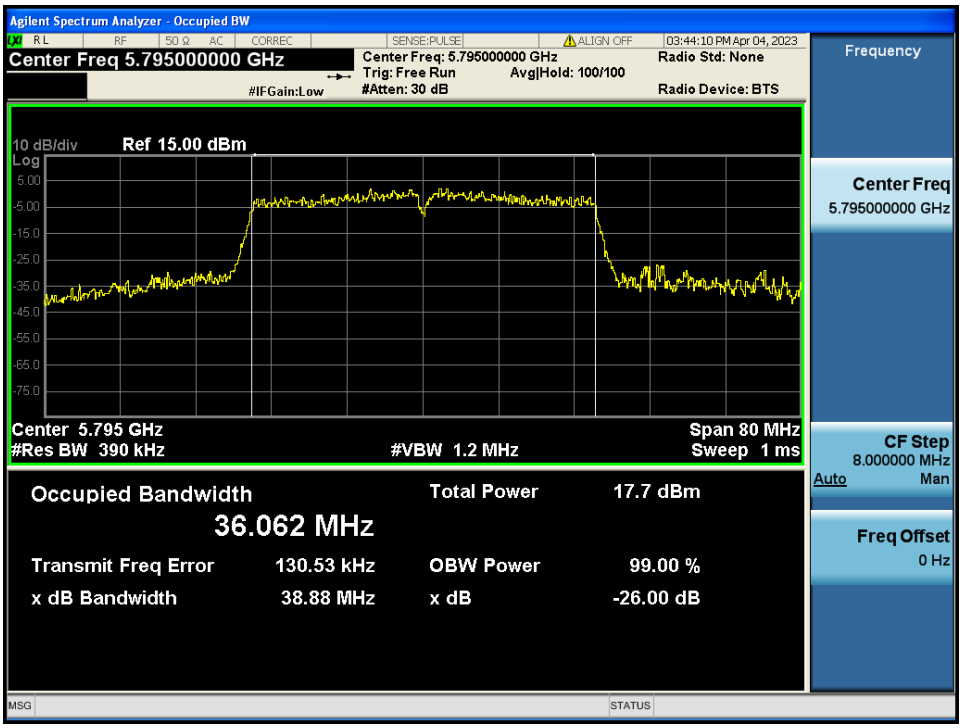
Occupied Bandwidth

Test Mode: TM 3 & ANT 2 & Ch.151



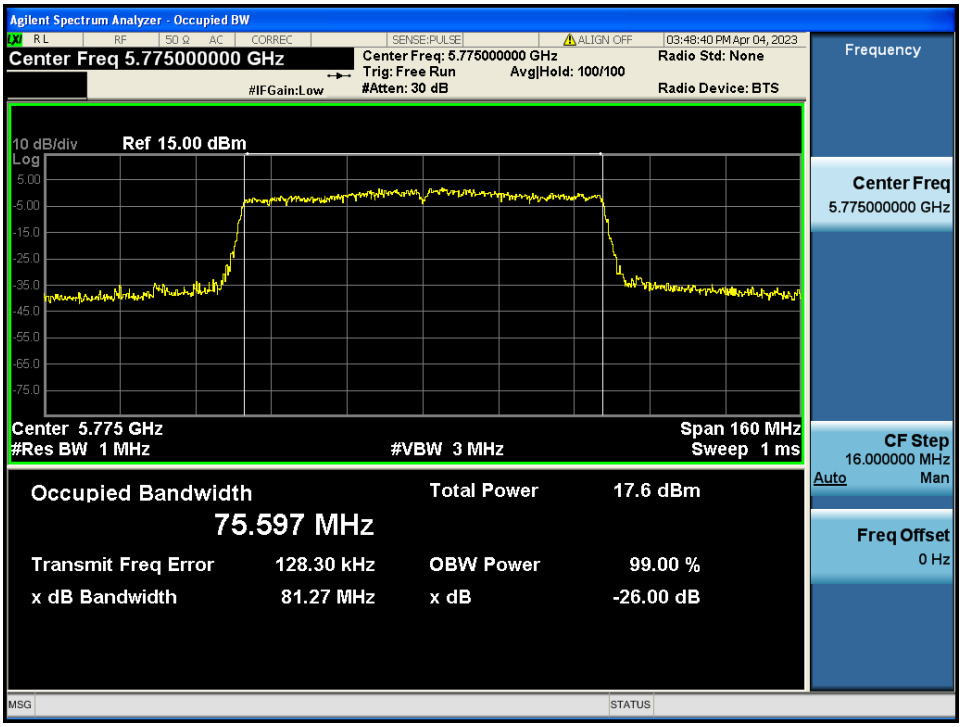
Occupied Bandwidth

Test Mode: TM 3 & ANT 2 & Ch.159



Occupied Bandwidth

Test Mode: TM 4 & ANT 2 & Ch.155



5.3 Maximum Conducted Output Power

▣ Test Requirements

Part. 15.407(a)

(1) For the band 5.15 GHz - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 GHz - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm).
(ii) For an indoor access point operating in the band 5.15 GHz - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.
(iii) For fixed point-to-point access points operating in the band 5.15 GHz - 5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power or maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power and maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
(iv) For mobile and portable client devices in the 5.15 GHz - 5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(2) **For the 5.25 GHz - 5.35 GHz and 5.47 GHz - 5.725 GHz bands, the maximum conducted output power over the frequency bands of operation shall not exceed the lesser of 250 mW or 11 dBm + 10 log B, where B is the 26 dB emission bandwidth in megahertz.** If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(3) **For the band 5.725 GHz - 5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W**. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.

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(1) For band 5 150 MHz – 5 250 MHz

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.
For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99 % emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

(2) For band 5 250 MHz – 5 350 MHz

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.
Devices, other than devices installed in vehicles, shall comply with the following:
a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;
b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99 % emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

(3) For band 5 470 MHz – 5 600 MHz and 5 650 MHz – 5 725 MHz

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99 % emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than
500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

(4) For band 5 725 MHz – 5 850 MHz

The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

▣ Test Configuration

Method PM-G

▣ Test Procedure

Method PM-G of KDB789033 D02v02r01

Measurements may be performed using a wideband gated RF power meter provided that the gate parameters are adjusted such that the power is measured only when the EUT is transmitting at its maximum power control level. Since the measurement is made only during the ON time of the transmitter, no duty cycle correction factor is required.

▣ **Test Results: Comply**

- Output Power: Single & CDD

Mode	Band	Channel	Frequency (MHz)	Conducted Output Power(dBm)			Antenna Gain(dBi)	e.i.r.p[Note1] (dBm)
				ANT 1	ANT 2	ANT1+ANT2 (CDD)		
802.11a	U-NII 1	36	5 180	9.11	10.04	12.61	4.60	17.21
		40	5 200	9.15	10.01	12.61	4.60	17.21
		48	5 240	9.38	10.18	12.81	4.60	17.41
	U-NII 2A	52	5 260	12.07	12.36	15.23	4.94	20.17
		60	5 300	12.15	12.63	15.41	4.94	20.35
		64	5 320	10.35	10.69	13.53	4.94	18.47
	U-NII 2C	100	5 500	11.09	11.06	14.09	5.03	19.12
		116	5 580	13.02	12.54	15.80	5.03	20.83
		144	5 720	12.58	11.84	15.24	5.03	20.27
	U-NII 3	149	5 745	11.44	11.41	14.44	5.13	19.57
		157	5 785	12.19	12.01	15.11	5.13	20.24
		165	5 825	10.97	10.81	13.90	5.13	19.03
802.11n (HT20)	U-NII 1	36	5 180	8.92	10.03	12.52	4.60	17.12
		40	5 200	8.99	10.05	12.56	4.60	17.16
		48	5 240	9.42	10.22	12.85	4.60	17.45
	U-NII 2A	52	5 260	10.71	11.43	14.10	4.94	19.04
		60	5 300	10.89	11.24	14.08	4.94	19.02
		64	5 320	10.23	10.33	13.29	4.94	18.23
	U-NII 2C	100	5 500	11.06	11.05	14.07	5.03	19.10
		116	5 580	12.13	11.56	14.86	5.03	19.89
		144	5 720	11.47	10.76	14.14	5.03	19.17
	U-NII 3	149	5 745	11.20	11.35	14.29	5.13	19.42
		157	5 785	11.03	11.28	14.17	5.13	19.30
		165	5 825	10.95	10.78	13.88	5.13	19.01
802.11ac (VHT20)	U-NII 1	36	5 180	9.03	9.98	12.54	4.60	17.14
		40	5 200	9.18	10.15	12.70	4.60	17.30
		48	5 240	9.40	10.18	12.82	4.60	17.42
	U-NII 2A	52	5 260	10.74	11.14	13.95	4.94	18.89
		60	5 300	10.83	11.23	14.04	4.94	18.98
		64	5 320	10.11	10.21	13.17	4.94	18.11
	U-NII 2C	100	5 500	10.95	10.89	13.93	5.03	18.96
		116	5 580	12.07	11.52	14.81	5.03	19.84
		144	5 720	11.37	11.01	14.20	5.03	19.23
	U-NII 3	149	5 745	11.35	11.46	14.42	5.13	19.55
		157	5 785	11.12	10.98	14.06	5.13	19.19
		165	5 825	10.94	10.74	13.85	5.13	18.98

Note 1: e.i.r.p= Conducted Output Power + Antenna Gain

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Mode	Band	Channel	Frequency (MHz)	Conducted Output Power(dBm)			Antenna Gain(dBi)	e.i.r.p[Note1] (dBm)
				ANT 1	ANT 2	ANT1+ANT2 (CDD)		
802.11n (HT40)	U-NII 1	38	5 190	7.38	7.50	10.45	4.60	15.05
		46	5 230	10.97	11.73	14.38	4.60	18.98
	U-NII 2A	54	5 270	10.89	11.75	14.35	4.94	19.29
		62	5 310	7.56	7.36	10.47	4.94	15.41
	U-NII 2C	102	5 510	6.36	6.18	9.28	5.03	14.31
		110	5 550	10.93	11.71	14.35	5.03	19.38
		142	5 710	10.92	11.77	14.38	5.03	19.41
	U-NII 3	151	5 755	10.86	11.72	14.32	5.13	19.45
		159	5 795	10.88	11.74	14.34	5.13	19.47
802.11ac (VHT40)	U-NII 1	38	5 190	7.25	7.43	10.35	4.60	14.95
		46	5 230	10.92	11.75	14.37	4.60	18.97
	U-NII 2A	54	5 270	10.87	11.68	14.30	4.94	19.24
		62	5 310	7.43	7.33	10.39	4.94	15.33
	U-NII 2C	102	5 510	6.32	6.12	9.23	5.03	14.26
		110	5 550	10.87	11.72	14.33	5.03	19.36
		142	5 710	10.90	11.68	14.32	5.03	19.35
	U-NII 3	151	5 755	10.92	11.66	14.32	5.13	19.45
		159	5 795	10.92	11.66	14.32	5.13	19.45
802.11ac (VHT80)	U-NII 1	42	5 210	8.43	8.93	11.70	4.60	16.30
	U-NII 2A	58	5 290	8.13	8.11	11.13	4.94	16.07
	U-NII 2C	106	5 530	8.64	9.21	11.94	5.03	16.97
		138	5 690	10.42	10.77	13.61	5.03	18.64
	U-NII 3	155	5 775	10.41	10.93	13.69	5.13	18.82

Note 1: e.i.r.p= Conducted Output Power + Antenna Gain

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- Summed Output Power: SDM

Mode	Band	Channel	Frequency (MHz)	Conducted Output Power(dBm)			Antenna Gain(dBi)	e.i.r.p[Note1] (dBm)
				ANT 1	ANT 2	ANT1+ANT2 (CDD)		
802.11n (HT20)	U-NII 1	36	5 180	8.88	10.00	12.49	1.59	14.08
		40	5 200	8.95	10.01	12.52	1.59	14.11
		48	5 240	9.39	10.18	12.81	1.59	14.40
	U-NII 2A	52	5 260	10.69	11.40	14.07	1.93	16.00
		60	5 300	10.85	11.21	14.04	1.93	15.97
		64	5 320	10.20	10.30	13.26	1.93	15.19
	U-NII 2C	100	5 500	11.01	11.00	14.02	2.02	16.04
		116	5 580	12.09	11.52	14.82	2.02	16.84
		144	5 720	11.42	10.71	14.09	2.02	16.11
	U-NII 3	149	5 745	11.16	11.31	14.25	2.12	16.37
		157	5 785	11.00	11.23	14.13	2.12	16.25
		165	5 825	10.91	10.75	13.84	2.12	15.96
802.11ac (VHT20)	U-NII 1	36	5 180	8.99	9.93	12.50	1.59	14.09
		40	5 200	9.15	10.12	12.67	1.59	14.26
		48	5 240	9.36	10.14	12.78	1.59	14.37
	U-NII 2A	52	5 260	10.71	11.10	13.92	1.93	15.85
		60	5 300	10.79	11.19	14.00	1.93	15.93
		64	5 320	10.11	10.21	13.17	1.93	15.10
	U-NII 2C	100	5 500	10.91	10.89	13.91	2.02	15.93
		116	5 580	12.03	11.49	14.78	2.02	16.80
		144	5 720	11.34	10.98	14.17	2.02	16.19
	U-NII 3	149	5 745	11.32	11.41	14.38	2.12	16.50
		157	5 785	11.09	10.93	14.02	2.12	16.14
		165	5 825	10.90	10.70	13.81	2.12	15.93

Note 1: e.i.r.p= Conducted Output Power + Antenna Gain

Mode	Band	Channel	Frequency (MHz)	Conducted Output Power(dBm)			Antenna Gain(dBi)	e.i.r.p[Note1] (dBm)
				ANT 1	ANT 2	ANT1+ANT2 (CDD)		
802.11n (HT40)	U-NII 1	38	5 190	7.32	7.46	10.40	1.59	11.99
		46	5 230	10.92	11.70	14.34	1.59	15.93
	U-NII 2A	54	5 270	10.84	11.71	14.31	1.93	16.24
		62	5 310	7.51	7.33	10.43	1.93	12.36
	U-NII 2C	102	5 510	6.32	6.15	9.25	2.02	11.27
		110	5 550	10.90	11.68	14.32	2.02	16.34
		142	5 710	10.86	11.72	14.32	2.02	16.34
	U-NII 3	151	5 755	10.83	11.69	14.29	2.12	16.41
		159	5 795	10.81	11.70	14.29	2.12	16.41
802.11ac (VHT40)	U-NII 1	38	5 190	7.25	7.39	10.33	1.59	11.92
		46	5 230	10.87	11.71	14.32	1.59	15.91
	U-NII 2A	54	5 270	10.83	11.63	14.26	1.93	16.19
		62	5 310	7.46	7.26	10.37	1.93	12.30
	U-NII 2C	102	5 510	6.27	6.11	9.20	2.02	11.22
		110	5 550	10.84	11.69	14.30	2.02	16.32
		142	5 710	10.85	11.65	14.28	2.02	16.30
	U-NII 3	151	5 755	10.87	11.63	14.28	2.12	16.40
		159	5 795	10.88	11.62	14.28	2.12	16.40
802.11ac (VHT80)	U-NII 1	42	5 210	8.40	8.90	11.67	1.59	13.26
	U-NII 2A	58	5 290	8.09	8.08	11.10	1.93	13.03
	U-NII 2C	106	5 530	8.60	9.18	11.91	2.02	13.93
		138	5 690	10.38	10.73	13.57	2.02	15.59
	U-NII 3	155	5 775	10.37	10.89	13.65	2.12	15.77

Note 1: e.i.r.p= Conducted Output Power + Antenna Gain

5.4 Maximum Power Spectral Density

▣ Test requirements

Part. 15.407(a)

(1) For the band 5.15 GHz - 5.25 GHz.

(i) For an outdoor access point operating in the band 5.15 GHz - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. **note1**

(ii) For an indoor access point operating in the band 5.15 GHz - 5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 MHz band. note1

(iii) For fixed point-to-point access points operating in the band 5.15 GHz - 5.25 GHz, transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi.

(iv) For mobile and portable client devices in the 5.15 GHz - 5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 MHz band. note1

(2) For the 5.25 GHz - 5.35 GHz and 5.47 GHz - 5.725 GHz bands, the peak power spectral density shall not exceed 11 dBm in any 1 MHz band. note1

(3) For the band 5.725 GHz - 5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500 kHz band.note1,note2

Note1: If transmitting antennas of directional gain greater than 6 dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note2: Fixed point - to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information.

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(1) For band 5 150 MHz – 5 250 MHz

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement transmitter power control (TPC) in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.
For other devices, the maximum e.i.r.p. shall not exceed 200 mW or 10 + 10 log10B, dBm, whichever power is less. B is the 99 % emission bandwidth in megahertz. The e.i.r.p. spectral density shall not exceed 10 dBm in any 1.0 MHz band.

(2) For band 5 250 MHz – 5 350 MHz

For OEM devices installed in vehicles, the maximum e.i.r.p. shall not exceed 30 mW or 1.76 + 10 log10B, dBm, whichever is less. Devices shall implement TPC in order to have the capability to operate at least 3 dB below the maximum permitted e.i.r.p. of 30 mW.
Devices, other than devices installed in vehicles, shall comply with the following:
a) The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band;
b) The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99 % emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than 500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

(3) For band 5 470 MHz – 5 600 MHz and 5 650 MHz – 5 725 MHz

The maximum conducted output power shall not exceed 250 mW or 11 + 10 log10B, dBm, whichever is less. The power spectral density shall not exceed 11 dBm in any 1.0 MHz band.
The maximum e.i.r.p. shall not exceed 1.0 W or 17 + 10 log10B, dBm, whichever is less. B is the 99 % emission bandwidth in megahertz. Note that devices with a maximum e.i.r.p. greater than
500 mW shall implement TPC in order to have the capability to operate at least 6 dB below the maximum permitted e.i.r.p. of 1 W.

(4) For band 5 725 MHz – 5 850 MHz

The maximum conducted output power shall not exceed 1 W. The output power spectral density shall not exceed 30 dBm in any 500 kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, both the maximum conducted output power and the output power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

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▣ Test Configuration

Refer to the APPENDIX I.

▣ Test Procedure

Maximum Power Spectral Density is measured using Measurement Procedure **of KDB789033 D02v02r01**

1) Create an average power spectrum for the EUT operating mode being tested by following the instructions in section II.E.2. for measuring maximum conducted output power using a spectrum analyzer or EMI receiver: select the appropriate test method (SA - 1, SA - 2, SA - 3, or alternatives to each) and apply it up to, but not including, the step labeled, "Compute power…". (This procedure is required even if the maximum conducted output power measurement was performed using a power meter, method PM.)

2) Use the peak search function on the instrument to find the peak of the spectrum and record its value.

3) Make the following adjustments to the peak value of the spectrum, if applicable:
   a) If Method SA - 2 or SA - 2 Alternative was used, add 10 log(1 / x), where x is the duty cycle, to the peak of the spectrum.
   b) If Method SA - 3 Alternative was used and the linear mode was used in step II.E.2.g (viii), add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.

4) The result is the Maximum PSD over 1 MHz reference bandwidth.

5) For devices operating in the bands 5.15 GHz - 5.25 GHz, 5.25 GHz - 5.35 GHz, and 5.47 GHz - 5.725 GHz, the above procedures make use of 1 MHz RBW to satisfy directly the 1 MHz reference bandwidth specified in §15.407(a). For devices operating in the band 5.725 GHz - 5.85 GHz, the rules specify a measurement bandwidth of 500 kHz. Many spectrum analyzers do not have 500 kHz RBW, thus a narrower RBW may need to be used. The rules permit the use of a RBWs less than 1 MHz, or 500 kHz, "provided that the measured power is integrated over the full reference bandwidth" to show the total power over the specified measurement bandwidth (i.e., 1 MHz, or 500 kHz). If measurements are performed using a reduced resolution bandwidth (< 1 MHz, or < 500 kHz) and integrated over 1 MHz, or 500 kHz bandwidth, the following adjustments to the procedures apply:
   a) Set RBW ≥ 1 / T, where T is defined in section II.B.1.a). (Refer to Appendix II)
   b) Set VBW ≥ 3 RBW.
   c) If measurement bandwidth of Maximum PSD is specified in 500 kHz, add 10 log(500 kHz / RBW) to the measured result, whereas RBW (< 500 kHz) is the reduced resolution bandwidth of the spectrum analyzer set during measurement.
   d) If measurement bandwidth of Maximum PSD is specified in 1 MHz, add 10 log(1 MHz / RBW) to the measured result, whereas RBW (< 1 MHz) is the reduced resolution bandwidth of spectrum analyzer set during measurement.
   e) Care must be taken to ensure that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

Note: As a practical matter, it is recommended to use reduced RBW of 100 kHz for the sections 5.c) and 5.d) above, since RBW = 100 kHz is available on nearly all spectrum analyzers.

▣ **Test Results: Comply**

Test Mode	Band	Channel	Frequency (MHz)	Reading (dBm)		TF Note 1 (dB)	Power Spectral Density(dBm)	Antenna Gain(dBi)	e.i.r.p Spectral Density (dBm)
				ANT 1	ANT 2		ANT1+ANT2 (CDD)		
TM 1	U-NII 1	36	5 180	-0.79	0.19	0.30	3.04	4.60	7.64
		40	5 200	-1.10	-0.02	0.30	2.78	4.60	7.38
		48	5 240	-0.20	0.22	0.30	3.33	4.60	7.93
	U-NII 2A	52	5 260	2.20	2.42	0.30	5.62	4.94	10.56
		60	5 300	2.11	2.59	0.30	5.67	4.94	10.61
		64	5 320	0.29	0.27	0.30	3.59	4.94	8.53
	U-NII 2C	100	5 500	0.78	1.23	0.30	4.32	5.03	9.35
		116	5 580	2.97	3.14	0.30	6.37	5.03	11.40
		144	5 720	2.37	2.10	0.30	5.55	5.03	10.58
TM 2	U-NII 1	36	5 180	-0.97	-0.25	0.31	2.73	4.60	7.33
		40	5 200	-1.20	-0.14	0.31	2.68	4.60	7.28
		48	5 240	-0.79	-0.18	0.31	2.85	4.60	7.45
	U-NII 2A	52	5 260	0.47	1.03	0.31	4.08	4.94	9.02
		60	5 300	0.78	0.85	0.31	4.14	4.94	9.08
		64	5 320	0.01	0.01	0.31	3.33	4.94	8.27
	U-NII 2C	100	5 500	0.99	0.77	0.31	4.20	5.03	9.23
		116	5 580	1.90	1.65	0.31	5.10	5.03	10.13
		144	5 720	1.03	0.61	0.31	4.15	5.03	9.18
TM 3	U-NII 1	38	5 190	-6.11	-5.82	0.61	-2.34	4.60	2.26
		46	5 230	-1.55	-1.37	0.61	2.16	4.60	6.76
	U-NII 2A	54	5 270	-2.21	-2.12	0.61	1.46	4.94	6.40
		62	5 310	-6.03	-6.21	0.61	-2.50	4.94	2.44
	U-NII 2C	102	5 510	-6.86	-7.13	0.61	-3.37	5.03	1.66
		110	5 550	-0.70	-1.14	0.61	2.71	5.03	7.74
		142	5 710	-1.16	-1.55	0.61	2.27	5.03	7.30
TM 4	U-NII 1	42	5 210	-8.97	-7.61	1.14	-4.09	4.60	0.51
	U-NII 2A	58	5 290	-8.90	-8.30	1.14	-4.44	4.94	0.50
	U-NII 2C	106	5 530	-8.15	-6.83	1.14	-3.29	5.03	1.74
		138	5 690	-6.47	-6.40	1.14	-2.28	5.03	2.75

Note 1: Power Spectral Density = Reading(Measurement Data) + TF
Note 2: e.i.r.p Spectral Density= Power spectral density + EUT Antenna Gain
Note 3: "U-NII 1, 2A, 2C [TF] = DCCF"
"U-NII 3 [TF] = 10*LOG(500 kHz/100 kHz) + DCCF"
Where, TF = Total Factor, DCCF = Duty Cycle Correction Factor
For DCCF(Duty Cycle Correction Factor) please refer to appendix II.

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Test Mode	Band	Channel	Frequency (MHz)	Reading (dBm/100kHz)		TF Note 1 (dB)	Power Spectral Density (dBm/500kHz)	Antenna Gain(dBi)	e.i.r.p Spectral Density (dBm/500kHz)
				ANT 1	ANT 2		ANT1+ANT2 (CDD)		
TM 1	U-NII 3	149	5 745	-7.28	-7.62	7.29	2.85	5.13	7.98
		157	5 785	-6.61	-7.41	7.29	3.31	5.13	8.44
		165	5 825	-8.06	-8.24	7.29	2.15	5.13	7.28
TM 2	U-NII 3	149	5 745	-7.95	-7.97	7.30	2.35	5.13	7.48
		157	5 785	-8.19	-8.05	7.30	2.19	5.13	7.32
		165	5 825	-8.53	-8.98	7.30	1.56	5.13	6.69
TM 3	U-NII 3	151	5 755	-11.16	-11.03	7.60	-0.48	5.13	4.65
		159	5 795	-10.68	-11.72	7.60	-0.56	5.13	4.57
TM 4	U-NII 3	155	5 775	-15.89	-15.62	8.13	-4.61	5.13	0.52

Note 1: Power Spectral Density = Reading(Measurement Data) + TF
Note 2: e.i.r.p Spectral Density= Power spectral density + EUT Antenna Gain
Note 3: "U-NII 1, 2A, 2C [TF] = DCCF"
"U-NII 3 [TF] = 10*LOG(500 kHz/100 kHz) + DCCF"
Where, TF = Total Factor, DCCF = Duty Cycle Correction Factor
For DCCF(Duty Cycle Correction Factor) please refer to appendix II.

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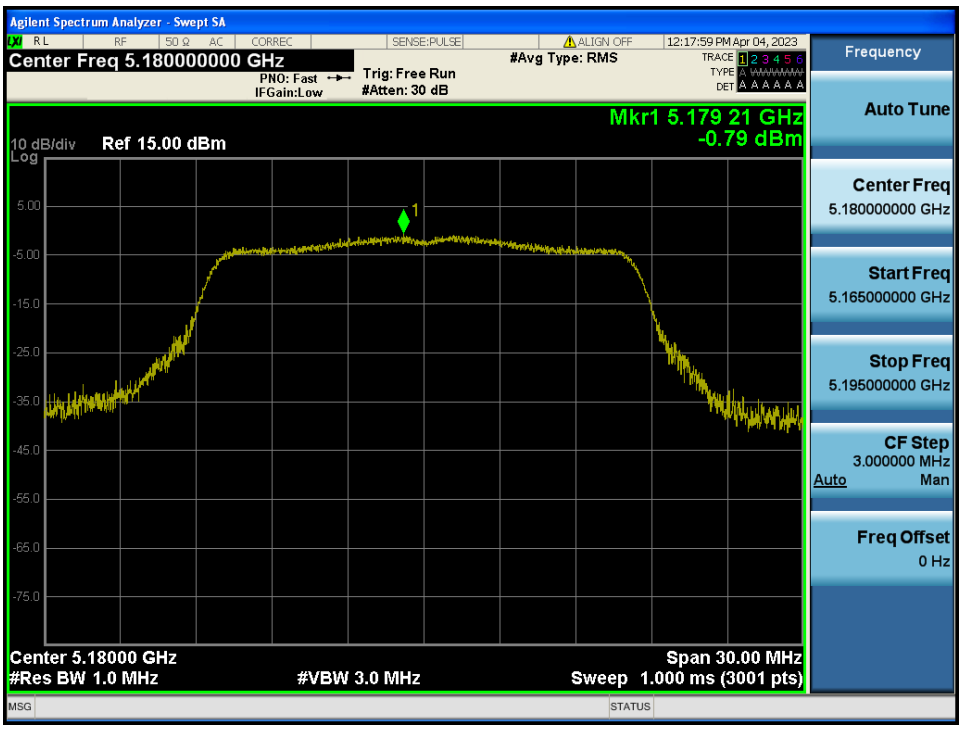
Maximum Power Spectral Density

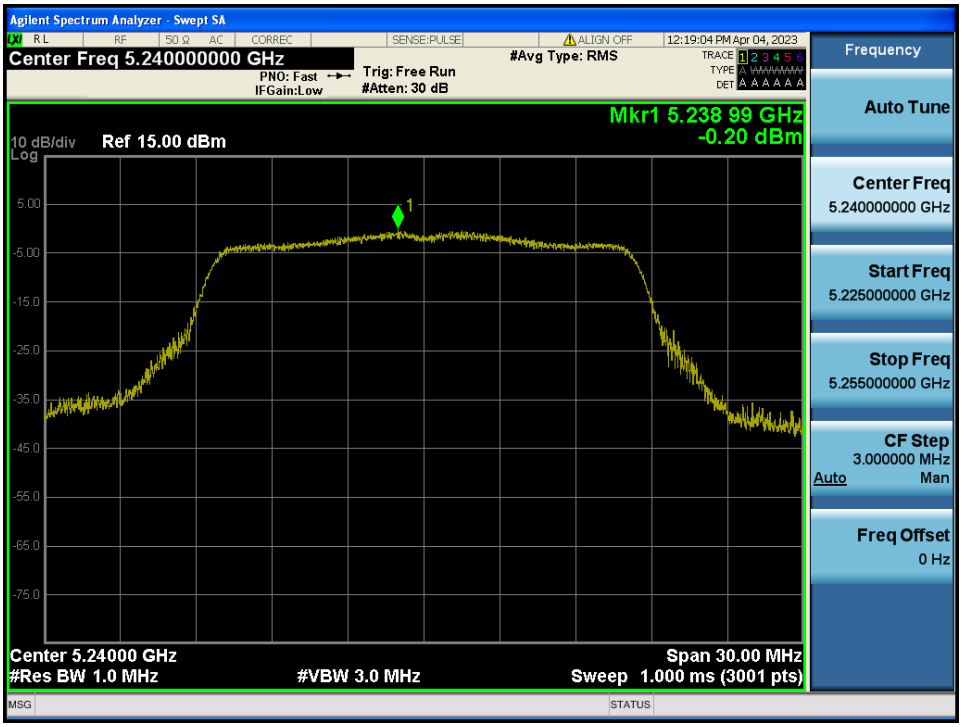
Test Mode: TM 1 & ANT 1 & Ch.36



Maximum Power Spectral Density

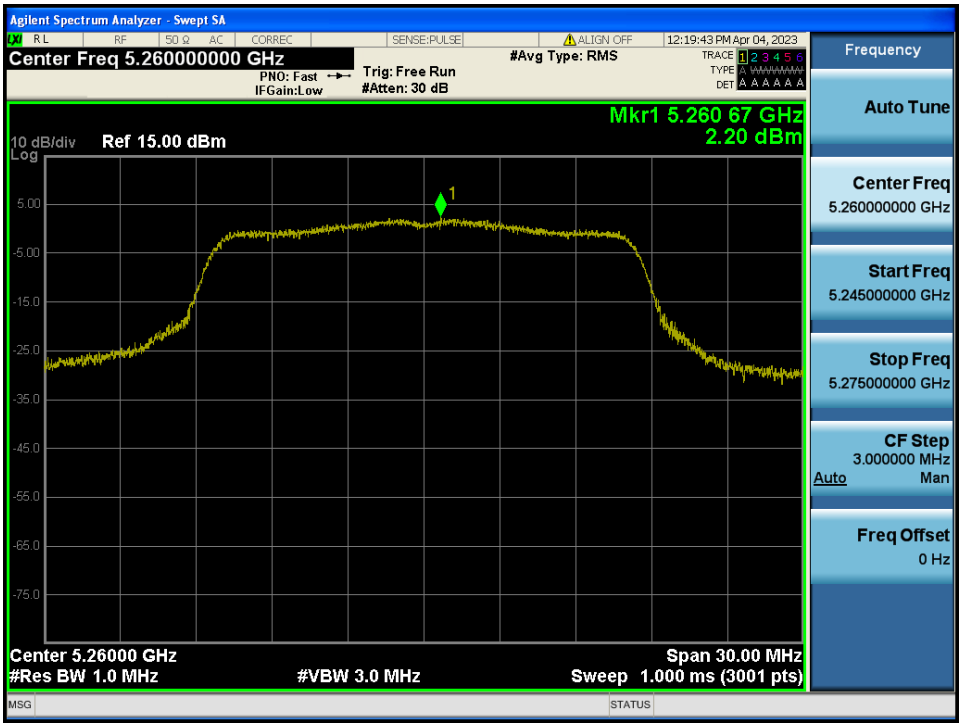
Test Mode: TM 1 & ANT 1 & Ch.40

Maximum Power Spectral Density Test Mode: TM 1 & ANT 1 & Ch.48



Maximum Power Spectral Density

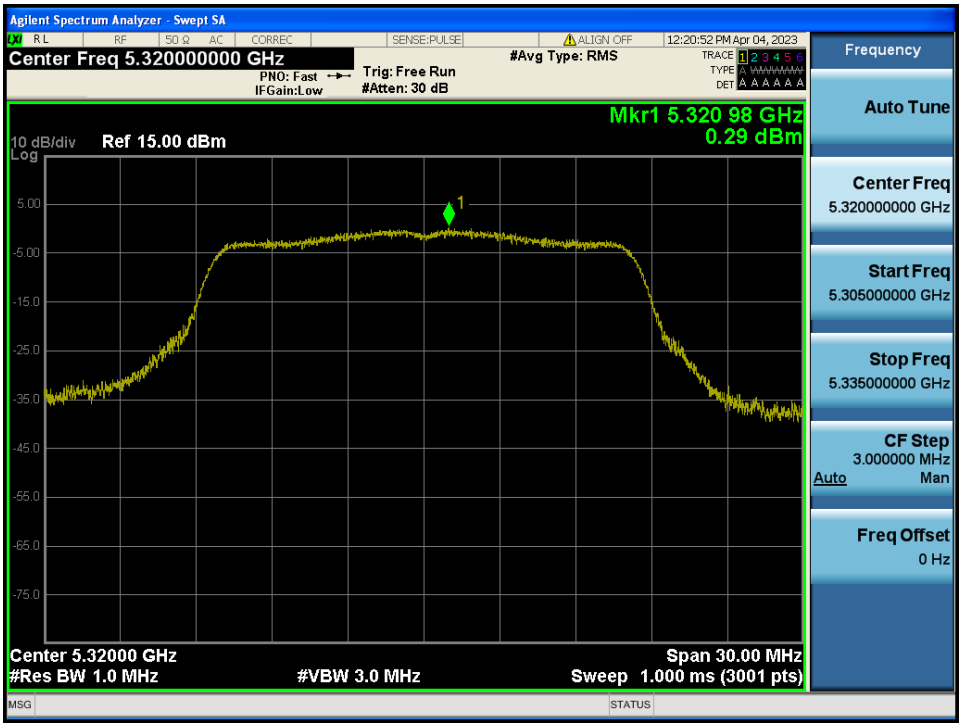
Test Mode: TM 1 & ANT 1 & Ch.52



Maximum Power Spectral Density

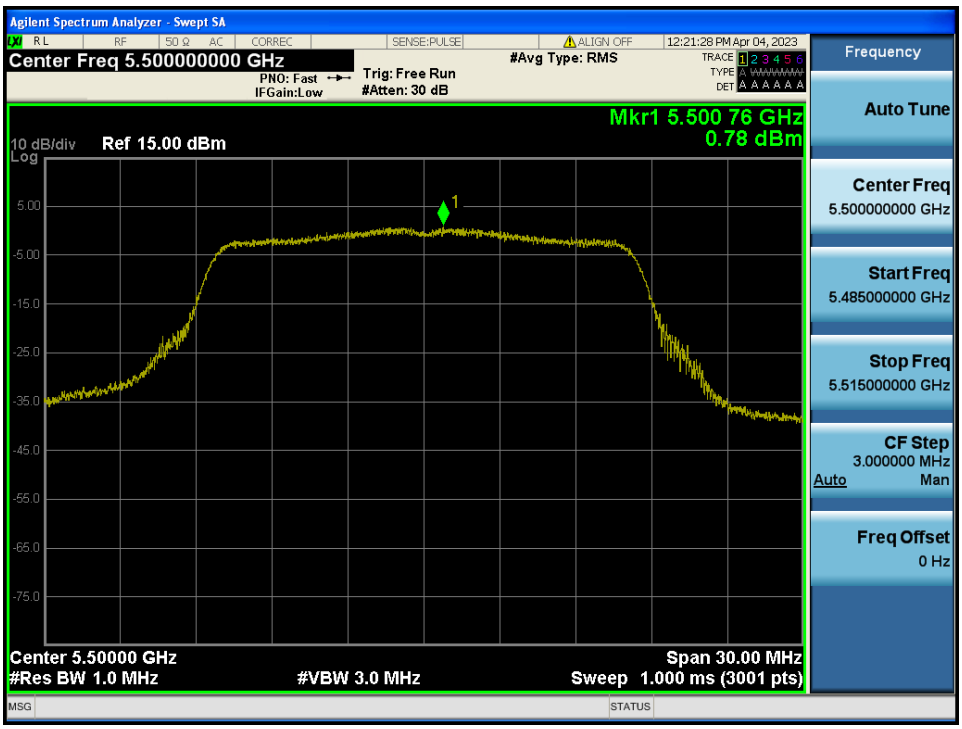
Test Mode: TM 1 & ANT 1 & Ch.60

Maximum Power Spectral Density Test Mode: TM 1 & ANT 1 & Ch.64



Maximum Power Spectral Density

Test Mode: TM 1 & ANT 1 & Ch.100



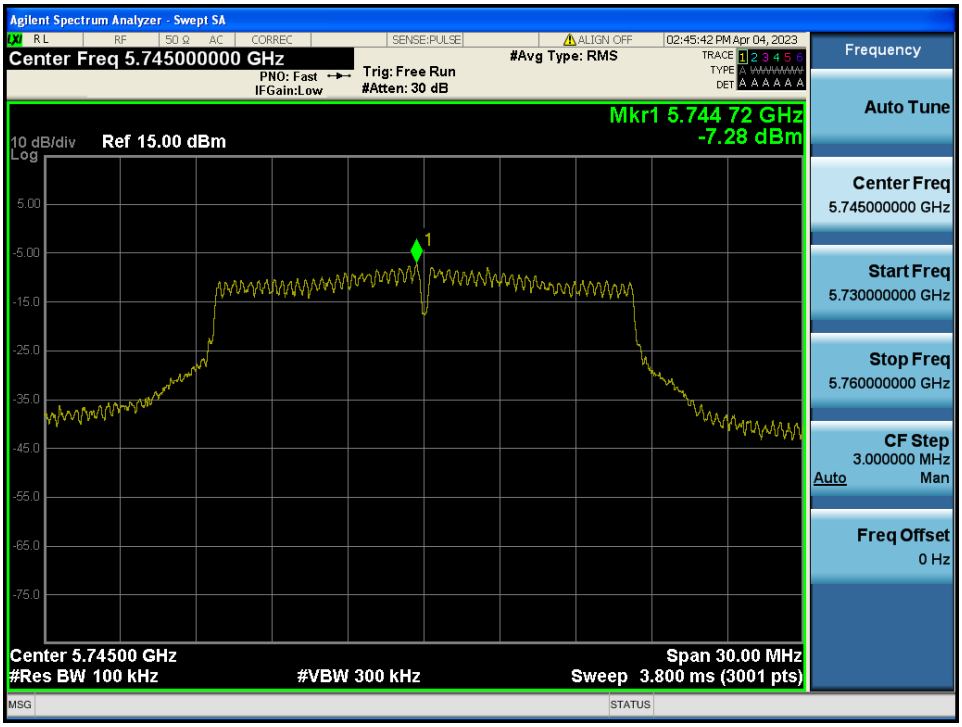
Maximum Power Spectral Density

Test Mode: TM 1 & ANT 1 & Ch.116

Maximum Power Spectral Density Test Mode: TM 1 & ANT 1 & Ch.144

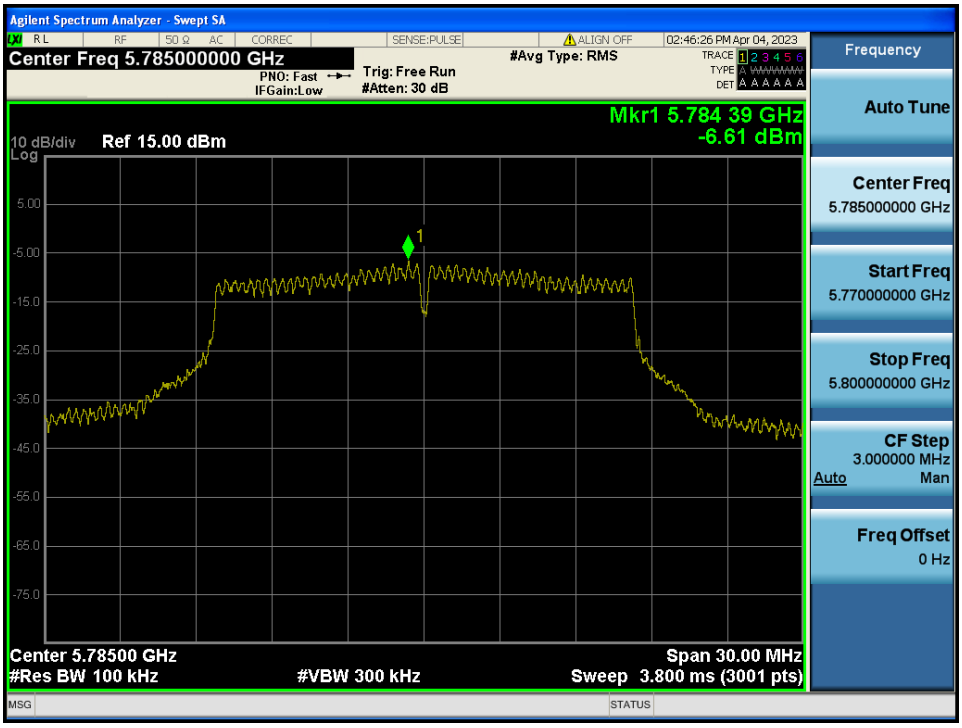
Maximum Power Spectral Density

Test Mode: TM 1 & ANT 1 & Ch.149

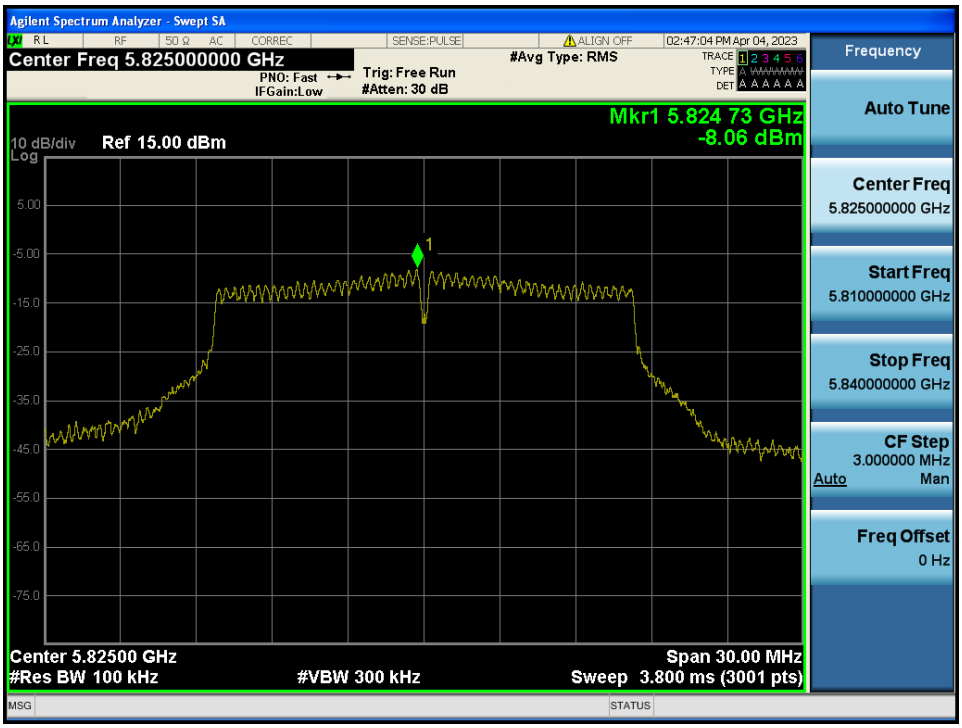


Maximum Power Spectral Density

Test Mode: TM 1 & ANT 1 & Ch.157

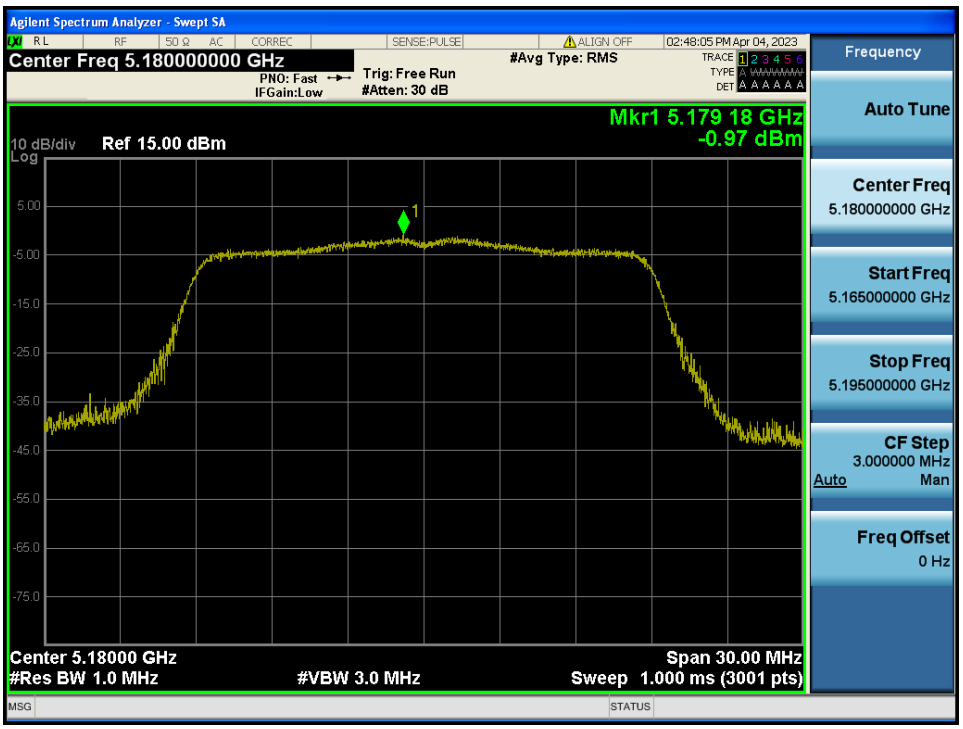


Maximum Power Spectral Density Test Mode: TM 1 & ANT 1 & Ch.165



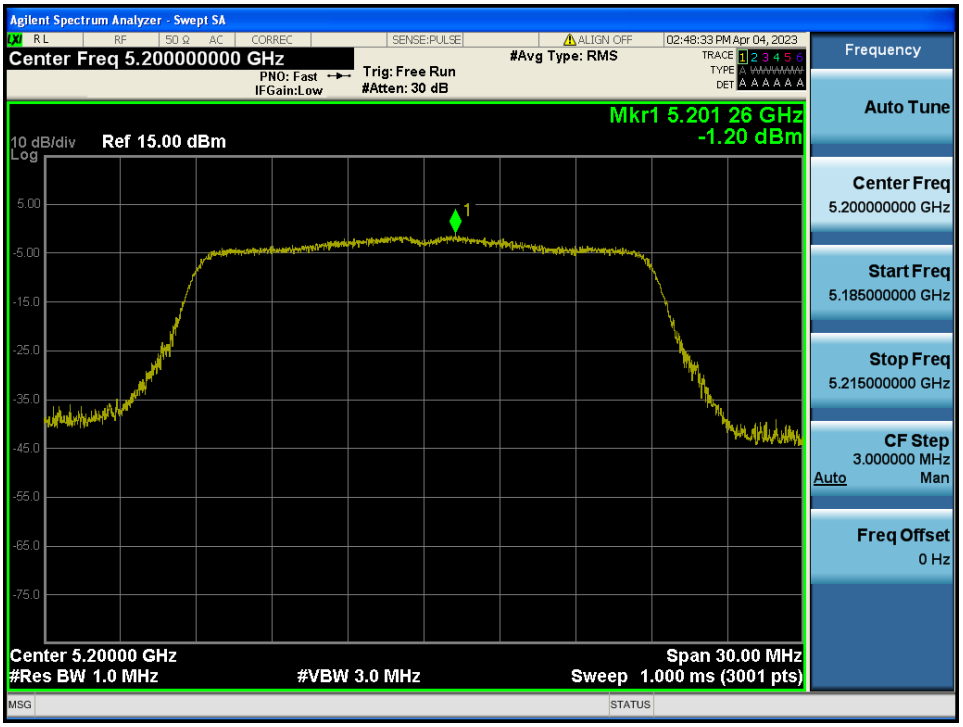
Maximum Power Spectral Density

Test Mode: TM 2 & ANT 1 & Ch.36



Maximum Power Spectral Density

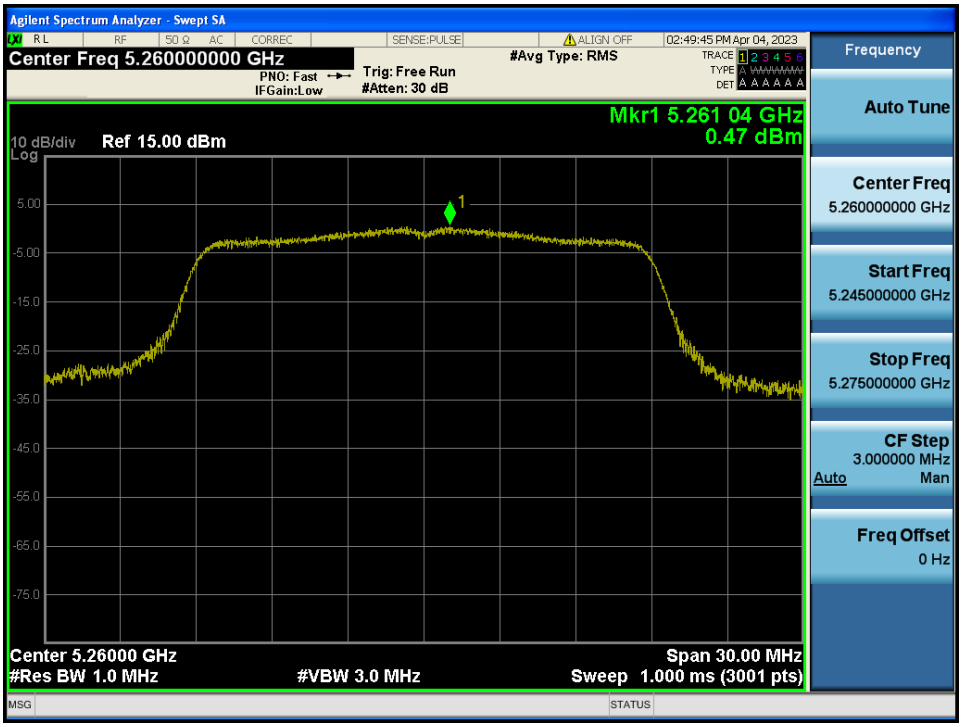
Test Mode: TM 2 & ANT 1 & Ch.40



Maximum Power Spectral Density Test Mode: TM 2 & ANT 1 & Ch.48

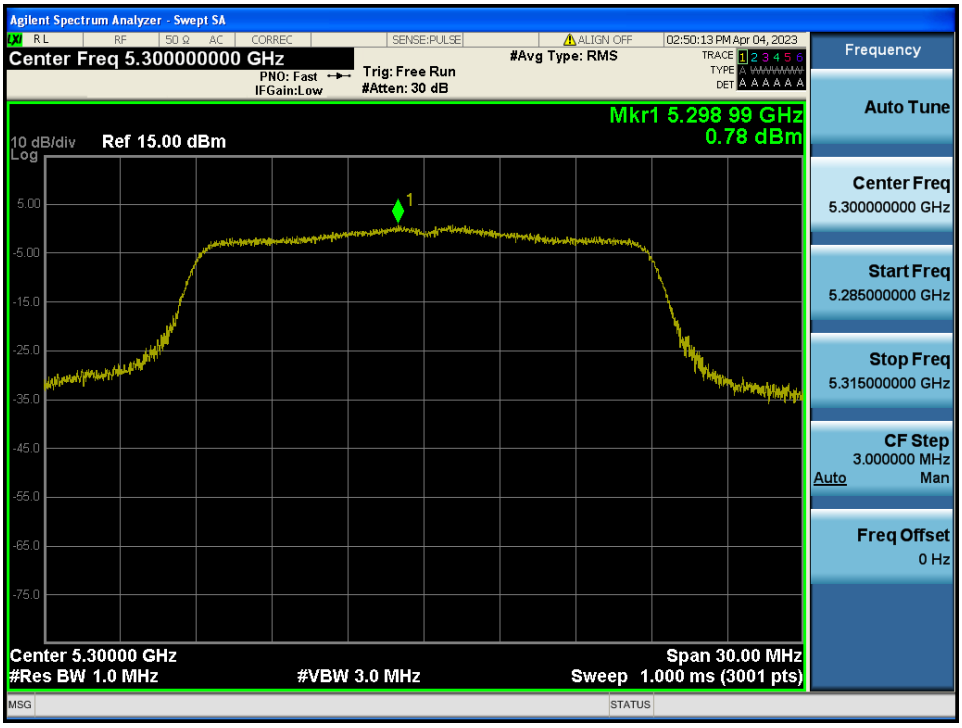
Maximum Power Spectral Density

Test Mode: TM 2 & ANT 1 & Ch.52

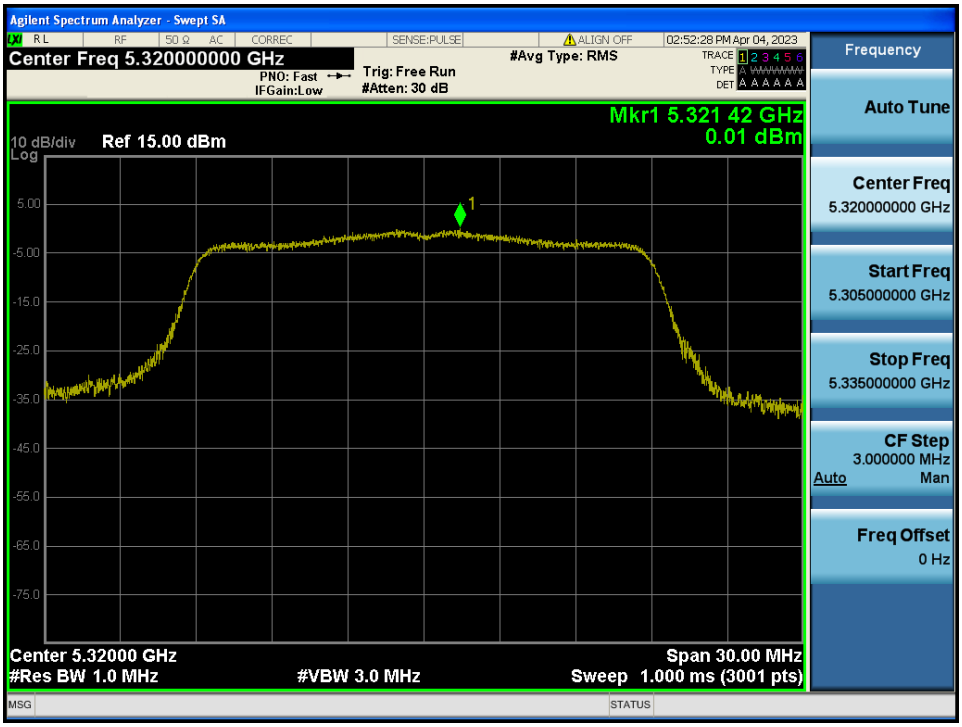


Maximum Power Spectral Density

Test Mode: TM 2 & ANT 1 & Ch.60

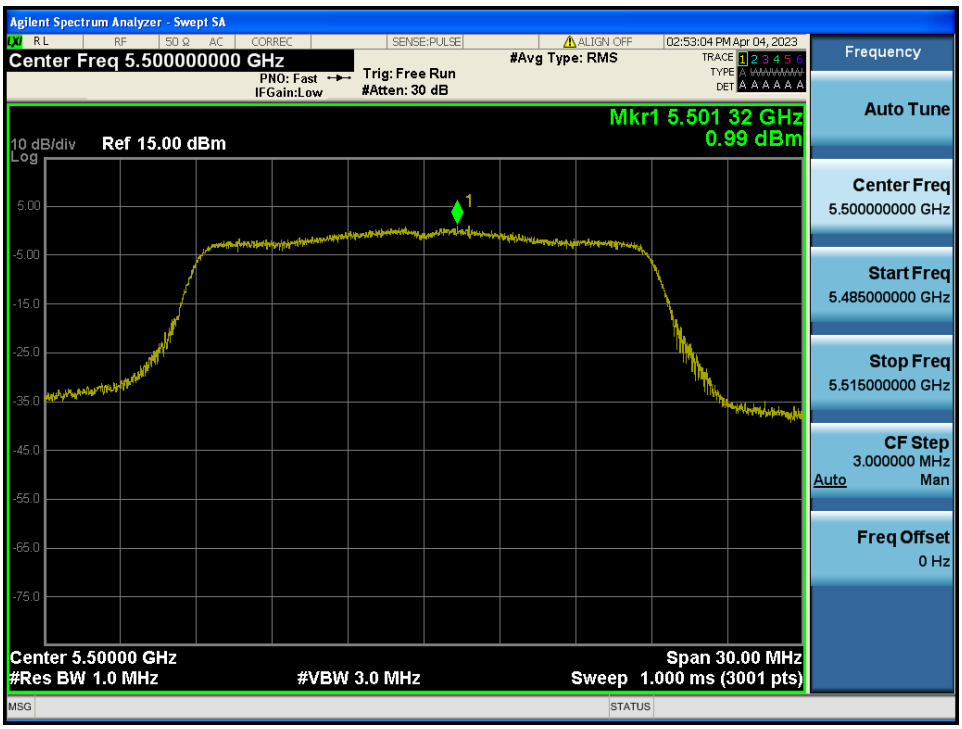


Maximum Power Spectral Density Test Mode: TM 2 & ANT 1 & Ch.64



Maximum Power Spectral Density

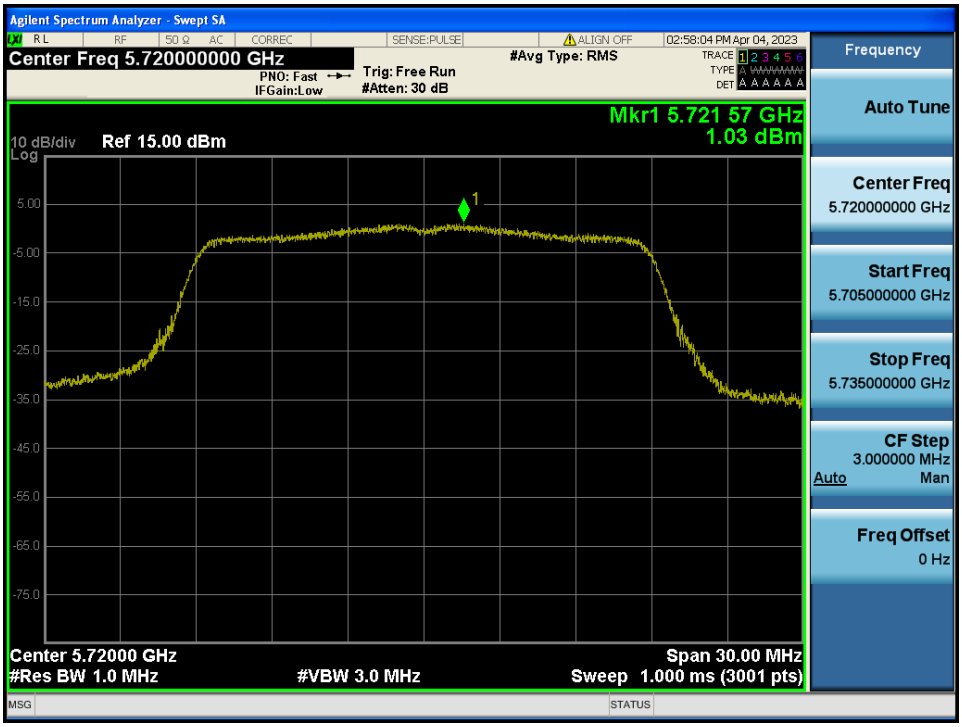
Test Mode: TM 2 & ANT 1 & Ch.100



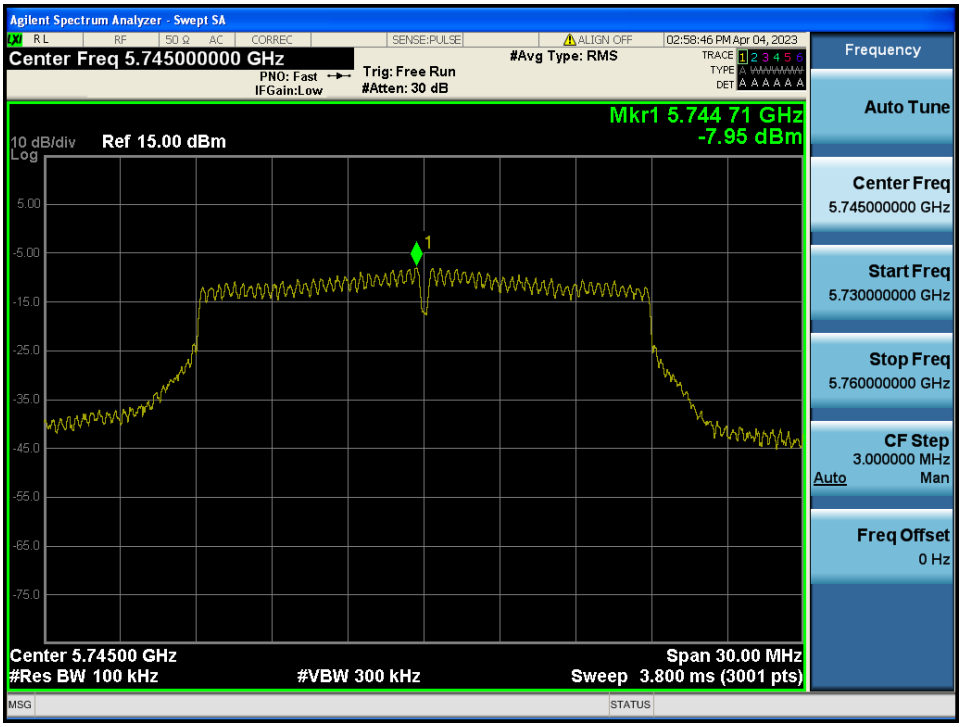
Maximum Power Spectral Density

Test Mode: TM 2 & ANT 1 & Ch.116

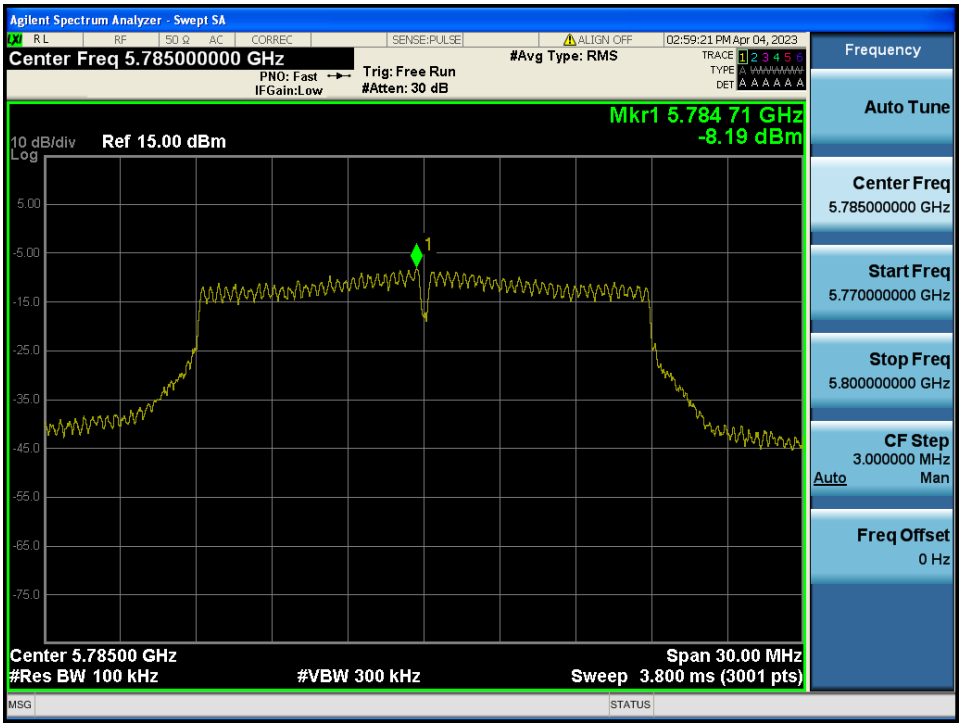
Maximum Power Spectral Density Test Mode: TM 2 & ANT 1 & Ch.144



Maximum Power Spectral Density Test Mode: TM 2 & ANT 1 & Ch.149



Maximum Power Spectral Density Test Mode: TM 2 & ANT 1 & Ch.157



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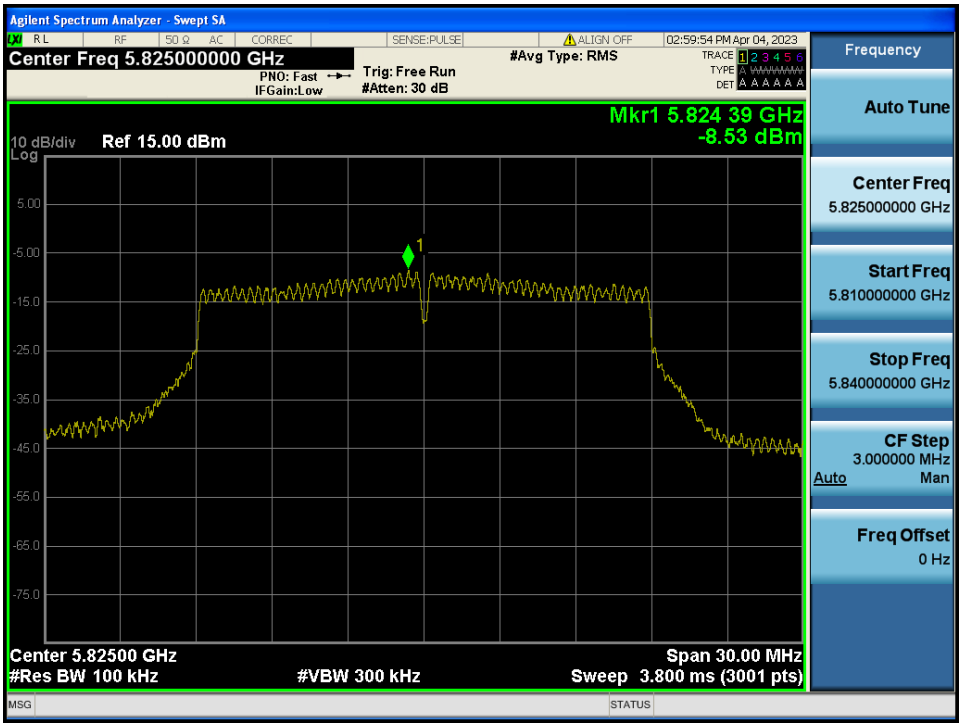

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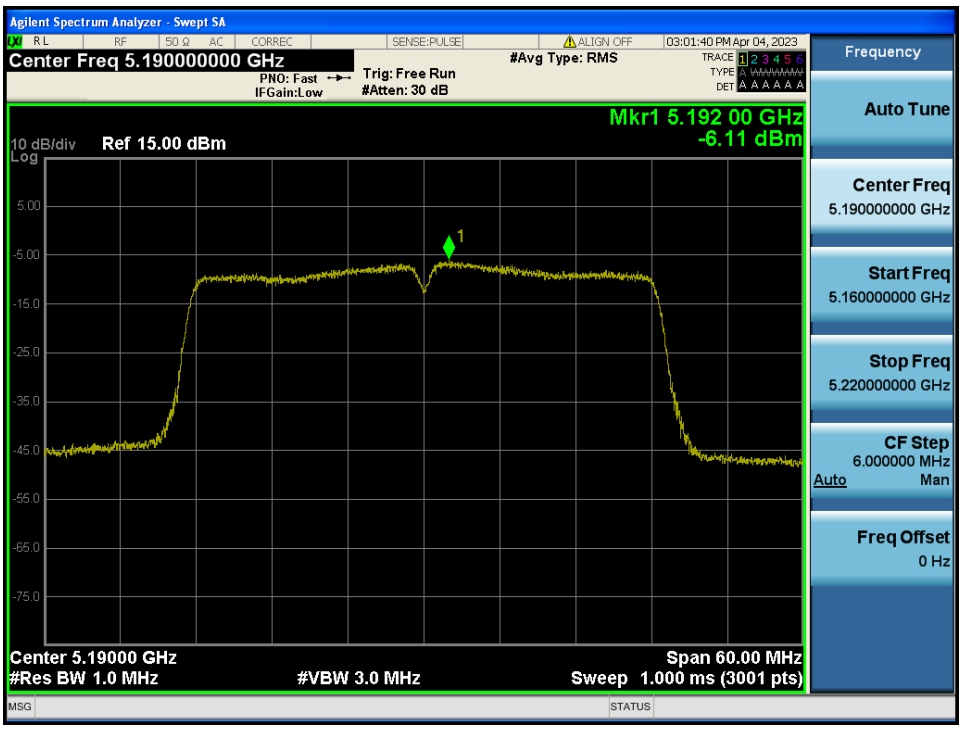
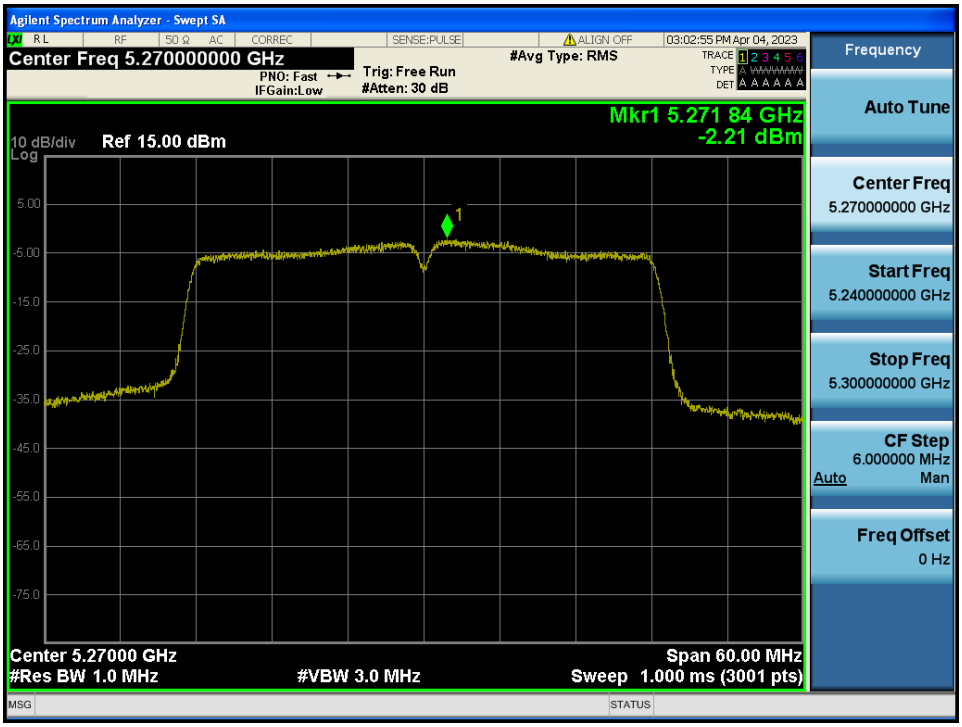


Maximum Power Spectral Density Test Mode: TM 3 & ANT 1 & Ch.46

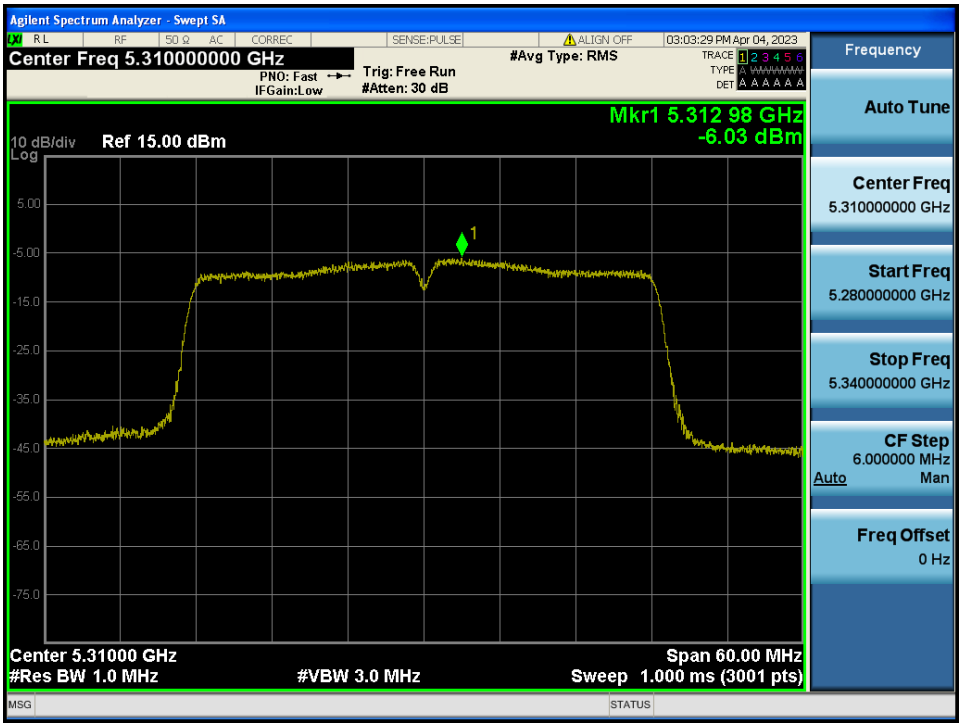
Maximum Power Spectral Density

Test Mode: TM 3 & ANT 1 & Ch.54



Maximum Power Spectral Density

Test Mode: TM 3 & ANT 1 & Ch.62



Maximum Power Spectral Density

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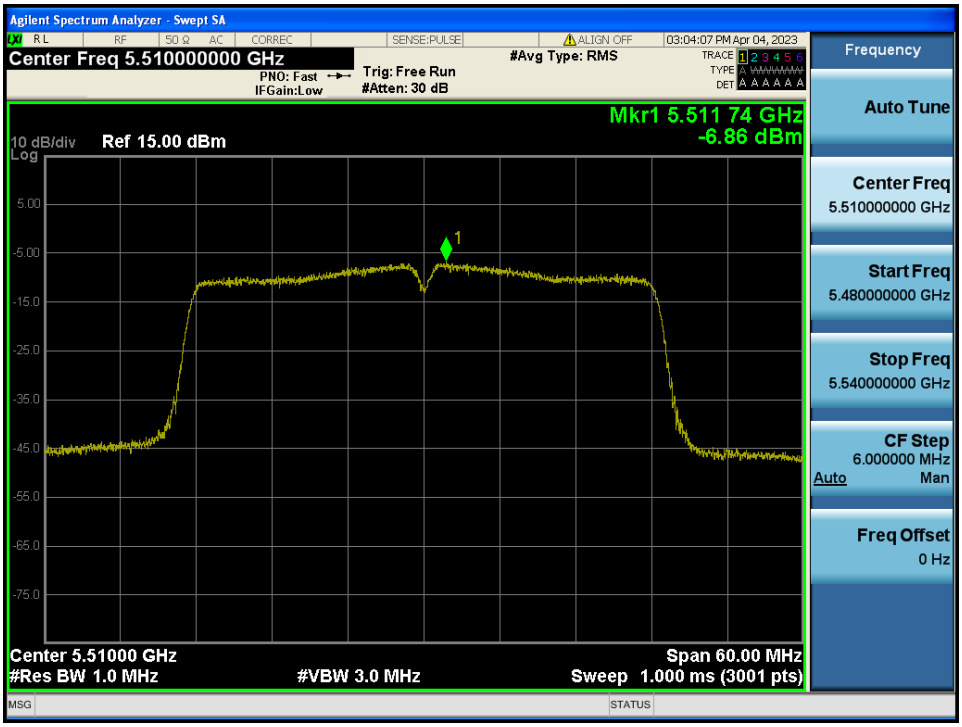

Maximum Power Spectral Density

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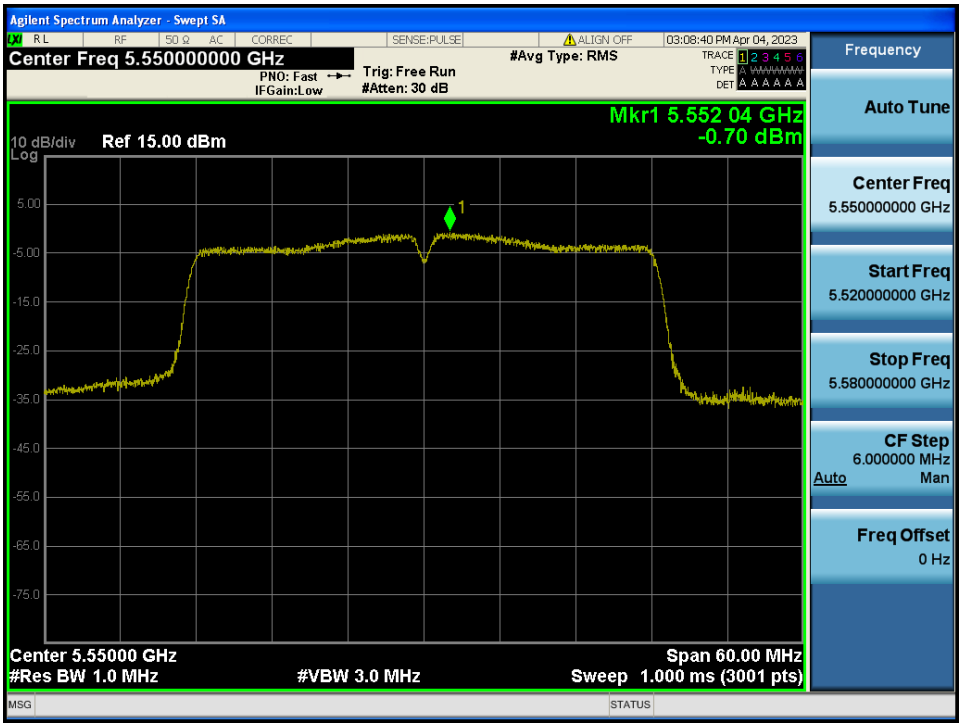

Maximum Power Spectral Density Test Mode: TM 3 & ANT 1 & Ch.142