Nemko Korea Co., Ltd.

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FCC EVALUATION REPORT FOR CERTIFICATION

Applicant :

KAONMEDIA Co., Ltd.
KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, 13517, South Korea
Attn. : Hee Sung Park

Dates of Issue : June 28, 2019
Test Report No. : NK-19-R-031
Test Site : Nemko Korea Co., Ltd.

FCC ID	**WQTCG3000**
Brand Name	**KAONMEDIA Co., Ltd.**
Contact Person	**KAONMEDIA Co., Ltd.** **KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, 13517, South Korea** **Hee Sung Park** **Telephone No. : 82-31-724-8500**

Applied Standard: FCC 47 CFR Part 15.407
Classification: Unlicensed National Information Infrastructure (NII)
EUT Type: DOCSIS3.1 Gateway (IT)

The device bearing the brand name and model specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. The client should not use it to claim product endorsement by TAF or any government agencies. The test results in the report only apply to the tested sample.

I attest to the accuracy of data and all measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Jun.28.2019

Tested By : Yonghwan Kim
Engineer

Jun.28.2019

Reviewed By : Seungyong Shin
Technical Manager

TABLE OF CONTENTS

1. SCOPE

Measurement and determination of electromagnetic emissions (EME) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission under FCC part 15.

Responsible Party :	KAONMEDIA Co., Ltd. KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, 13517, South Korea
Contact Person :	Hee Sung Park
Manufacturer :	KAONMEDIA Co., Ltd. KAONMEDIA Building, 884-3, Seongnam-daero, Bundang-gu, Seongnam-si, Gyeonggi-do, 13517, South Korea

- FCC ID: WQTCG3000
- Model: CG3000
- Variant Model: CG3000-LD42J, CG3000-LD4NJ, SR820ac
- Brand Name: KAONMEDIA Co., Ltd.
- EUT Type: DOCSIS3.1 Gateway (IT)
- Classification: Unlicensed National Information Infrastructure (NII)
- Applied Standard: FCC 47 CFR Part 15.407
- Test Procedure(s): 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices – Part 15, Subpart E”.
- Dates of Test: January 24, 2019 ~ June 4, 2019
- Place of Tests: Nemko Korea Co., Ltd.

2. INTRODUCTION

2.1 Test facility

The measurement procedure described in American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz (ANSI C63.4-2014), the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013) was used in determining radiated and conducted emissions emanating from **KAONMEDIA Co., Ltd. FCC ID : WQTCG3000.**

These measurement tests were conducted at ***Nemko Korea Co., Ltd. EMC Laboratory*** .
The site address 155 & 159, Osan-Ro, Mohyeon- Eup, Cheoin-Gu, Yongin-Si, Gyeonggi-Do 16885 KOREA, REPULIC OF.
The area of Nemko Korea Corporation Ltd. EMC Test Site is located in a mountain area at 80 km (48 miles) southeast and Incheon International Airport (Incheon Airport), 30 km (18miles) south-southeast from central Seoul.
It is located in the valley surrounded by mountains in all directions where ambient radio signal conditions are quiet and a favorable area to measure the radio frequency interference on open field test site for the computing and ISM devices manufactures.
The detailed description of the measurement facility was found to be in compliance with the requirements of ANSI C63.4-2014 according to §2.948.

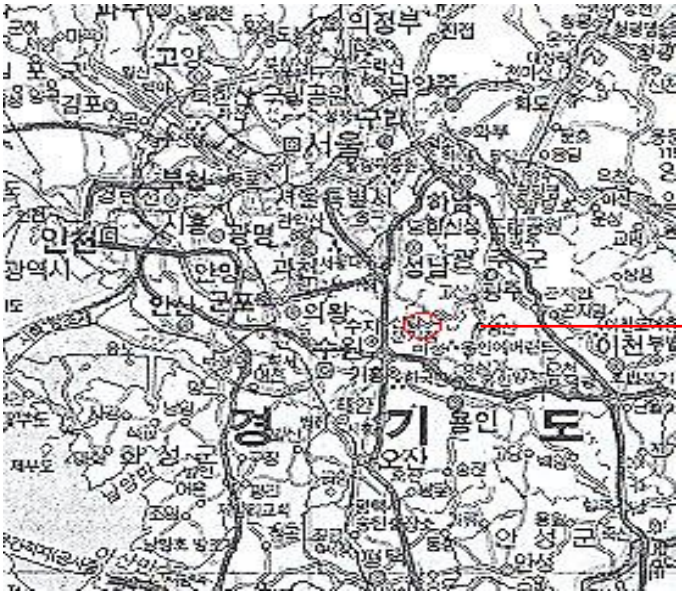

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Fig. 1. The map above shows the Seoul in Korea vicinity area.
The map also shows Nemko Korea Corporation Ltd. EMC Lab. and Incheon Airport.

2.2 Accreditation and listing

Accreditation type		Accreditation number
	CAB Accreditation for DOC	Designation No. KR0026
	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. 155
	Canada IC Registered site	Site No. 2040E
	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
	EMC CBTL	-
	KCC(RRL)Designated Lab.	Registration No. KR0026

3. TEST CONDITIONS & EUT INFORMATION

3.1 Operation During Test

The EUT is the SISO, CDD, MIMO transceiver which is module supporting the 802.11a/b/g/n/ac mode (802.11a/b/g/n(20,40MHz)/ac(20,40,80MHz) : 1TX/1RX, 4TX/4RX).
The Laptop was used to control the EUT to transmit the wanted TX channel continuously (duty cycle< 98%) by the testing program (accessMtool) supported by manufacturer.
The operating voltage of EUT was 12 Vdc supplied from AC/DC adapter.
The EUT was tested at the lowest, middle and the highest channels with the maximum output power in accordance with the manufacturer's specifications. The worst data were recorded in the report.

3.1.1 Table of test power setting

Frequency	Mode	Power setting Level (1TX)	Power setting Level (4TX)
5180 MHz	802.11a	52	50
	802.11n (20 MHz)	52	50
	802.11ac (20 MHz)	52	50
5220 MHz	802.11a	77	64
	802.11n (20 MHz)	75	65
	802.11ac (20 MHz)	75	67
5240 MHz	802.11a	77	63
	802.11n (20 MHz)	75	70
	802.11ac (20 MHz)	75	70
5190 MHz	802.11n (40 MHz)	51	42
	802.11ac (40 MHz)	51	42
5230 MHz	802.11n (40 MHz)	76	45
	802.11ac (40 MHz)	76	45
5210 MHz	802.11ac (80 MHz)	58	52
5260 MHz	802.11a	75	39
	802.11n (20 MHz)	75	40
	802.11ac (20 MHz)	75	40
5300 MHz	802.11a	75	39
	802.11n (20 MHz)	75	40
	802.11ac (20 MHz)	75	40

Frequency	Mode	Power setting Level (1TX)	Power setting Level (4TX)
5320 MHz	802.11a	60	39
	802.11n (20 MHz)	60	40
	802.11ac (20 MHz)	60	40
5270 MHz	802.11n (40 MHz)	75	50
	802.11ac (40 MHz)	75	50
5310 MHz	802.11n (40 MHz)	48	47
	802.11ac (40 MHz)	48	47
5290 MHz	802.11ac (80 MHz)	55	50
5500 MHz	802.11a	62	38
	802.11n (20 MHz)	62	39
	802.11ac (20 MHz)	62	39
5600 MHz	802.11a	75	38
	802.11n (20 MHz)	75	39
	802.11ac (20 MHz)	75	39
5700 MHz	802.11a	47	20
	802.11n (20 MHz)	47	20
	802.11ac (20 MHz)	47	20
5510 MHz	802.11n (40 MHz)	52	42
	802.11ac (40 MHz)	52	42
5590 MHz	802.11n (40 MHz)	70	56
	802.11ac (40 MHz)	70	56
5670 MHz	802.11n (40 MHz)	62	56
	802.11ac (40 MHz)	62	56
5530 MHz	802.11ac (80 MHz)	58	56
5610 MHz	802.11ac (80 MHz)	78	70
5720 MHz	802.11a	75	40
	802.11n (20 MHz)	75	42
	802.11ac (20 MHz)	75	42
5710 MHz	802.11n (40 MHz)	70	62
	802.11ac (40 MHz)	70	58
5690 MHz	802.11ac (80 MHz)	78	70

Frequency	Mode	Power setting Level (1TX)	Power setting Level (4TX)
5745 MHz	802.11a	72	66
	802.11n (20 MHz)	69	65
	802.11ac (20 MHz)	69	65
5785 MHz	802.11a	72	66
	802.11n (20 MHz)	69	65
	802.11ac (20 MHz)	69	65
5825 MHz	802.11a	72	66
	802.11n (20 MHz)	69	65
	802.11ac (20 MHz)	69	65
5755 MHz	802.11n (40 MHz)	69	67
	802.11ac (40 MHz)	69	67
5795 MHz	802.11n (40 MHz)	69	67
	802.11ac (40 MHz)	69	67
5775 MHz	802.11ac (80 MHz)	76	74

Note:
*1. *Open loop mode in program setting and Other setting is Close loop mode.*

3.1.2 Table of test channels

Frequency band	Mode	Test Channel (CH)	Frequency (MHz)
U-NII-1	802.11a,n,ac (20MHz)	36	5180
		44	5220
		48	5240
	802.11n,ac (40MHz)	38	5190
		46	5230
	802.11ac (80MHz)	42	5210
U-NII-2A	802.11a,n,ac (20MHz)	52	5260
		60	5300
		64	5320
	802.11n,ac (40MHz)	54	5270
		62	5310
	802.11ac (80MHz)	58	5290

Frequency band	Mode	Test Channel (CH)	Frequency (MHz)
U-NII-2C	802.11a,n,ac (20MHz)	100	5500
		120	5600
		140	5700
	802.11n,ac (40MHz)	102	5510
		118	5590
		134	5670
	802.11ac (80MHz)	106	5530
		122	5610
Straddle	802.11a,n,ac (20MHz)	144	5720
	802.11n,ac (40MHz)	142	5710
	802.11ac (80MHz)	138	5690
U-NII-3	802.11a,n,ac (20MHz)	149	5745
		157	5785
		165	5825
	802.11n,ac (40MHz)	151	5755
		159	5795
	802.11ac (80MHz)	155	5775

3.1.3 Antenna information:

Frequency band	Mode	Data rate	Antenna TX mode	Support CDD	Support MIMO
5 GHz	802.11a	All	■ 1TX, ■ 4TX	■ Yes, □ No	□ Yes, ■ No
	802.11n (20 MHz)	MCS 0~7	■ 1TX, ■ 4TX	■ Yes, □ No	□ Yes, ■ No
		MCS 8~23	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
		MCS 24~31	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
	802.11n (40 MHz)	MCS 0~7	■ 1TX, ■ 4TX	■ Yes, □ No	□ Yes, ■ No
		MCS 8~23	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
		MCS 24~31	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No

Frequency band	Mode	Data rate	Antenna TX mode	Support CDD	Support MIMO
5 GHz	802.11ac (20 MHz)	MCS0NSS1~ MCS8NSS1	■ 1TX, ■ 4TX	■ Yes, □ No	□ Yes, ■ No
		MCS0NSS2~ MCS8NSS3	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
		MCS0NSS4~ MCS8NSS4	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
	802.11ac (40 MHz)	MCS0NSS1~ MCS9NSS1	■ 1TX, ■ 4TX	■ Yes, □ No	□ Yes, ■ No
		MCS0NSS2~ MCS9NSS3	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
		MCS0NSS4~ MCS9NSS4	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
	802.11ac (80 MHz)	MCS0NSS1~ MCS9NSS1	■ 1TX, ■ 4TX	■ Yes, □ No	□ Yes, ■ No
		MCS0NSS2~ MCS9NSS3	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No
		MCS0NSS4~ MCS9NSS4	□ 1TX, ■ 4TX	□ Yes, ■ No	■ Yes, □ No

Note :

1. CDD mode is Cyclic Delay Diversity mode.
2. For 802.11n(20 MHz),EUT support CDD mode for MCS0~7 and MIMO mode for MCS8~31.
3. For 802.11n(40 MHz),EUT support CDD mode for MCS0~7 and MIMO mode for MCS8~31.
4. For 802.11ac(20 MHz),EUT support CDD mode for MCS0NSS1~MCS8NSS1 and MIMO mode for MCS0NSS2~MCS8NSS4.
5. For 802.11ac(40 MHz),EUT support CDD mode for MCS0NSS1~MCS9NSS1 and MIMO mode for MCS0NSS2~MCS9NSS4.
6. For 802.11ac(80 MHz),EUT support CDD mode for MCS0NSS1~MCS9NSS1 and MIMO mode for MCS0NSS2~MCS9NSS4.
7. CDD mode, N_{SS}=1, MIMO mode, N_{SS}= 2 or 3 or 4, where N_{SS} = number of spatial streams.
8. MIMO mode means SM-MIMO transmission and is combined with beamforming.
Lowest value of Nss=2 is applied to caculate directional gain.

3.1.4 Additional Information Related to Testing

The cable and attenuator loss from 30MHz to 26.5GHz was reflected in spectrum analyzer with correction factor for all conducted testing.

3.1.5 Table of test modes

Test Items	Mode	*Data rate (Mbps)	Test Channel (CH)
Conducted Emissions	802.11ac (20 MHz)	MCS0NSS1	48
Radiated Emissions	802.11ac (20 MHz)	MCS0NSS1	52
26 dB Bandwidth	802.11a	6	36/44/48 52/60/64 100/120/140 144/149/157/165
	802.11n (20 MHz)	MCS0	
	802.11ac (20 MHz)	MCS0NSS1	
	802.11n (40 MHz)	MCS0	38/46 54/62 102/118/134 142/151/159
	802.11ac (40 MHz)	MCS0NSS1	
	802.11ac (80 MHz)	MCS0NSS1	42/58/106 122/138/155
6 dB Bandwidth	802.11a	6	144/149 157/165
	802.11n (20 MHz)	MCS0	
	802.11ac (20 MHz)	MCS0NSS1	
	802.11n (40 MHz)	MCS0	142/151/159
	802.11ac (40 MHz)	MCS0NSS1	
	802.11ac (80 MHz)	MCS0NSS1	138/155
Maximum conducted Output Power	802.11a	6	36/44/48 52/60/64 100/120/140 144/149/157/165
	802.11n (20 MHz)	MCS0	
	802.11ac (20 MHz)	MCS0NSS1	
	802.11n (40 MHz)	MCS0	38/46 54/62 102/118/134 142/151/159
	802.11ac (40 MHz)	MCS0NSS1	

Test Items	Mode	*Data rate (Mbps)	Test Channel (CH)
Maximum conducted Output Power	802.11ac (80 MHz)	MCS0NSS1	42/58/106 122/138/155
Power Spectral Density	802.11a	6	36/44/48 52/60/64 100/120/140 144/149/157/165
	802.11n (20 MHz)	MCS0	
	802.11ac (20 MHz)	MCS0NSS1	
	802.11n (40 MHz)	MCS0	38/46 54/62 102/118/134 142/151/159
	802.11ac (40 MHz)	MCS0NSS1	
	802.11ac (80 MHz)	MCS0NSS1	42/58/106 122/138/155
Radiated Spurious Emission	802.11ac (20 MHz)	MCS0	36/44/48 52/60/64 100/120/140 144/149/157/165
Radiated Band edge Emission	802.11ac (20 MHz)	MCS0NSS1	36/48 52/64 100/140 144/149/165
	802.11ac (40 MHz)	MCS0NSS1	38/46 54/62 102/134 142/151/159
	802.11ac (80 MHz)	MCS0NSS1	42/58/106 122/138/155

Note :

*1. *The worst data rate was determined by the conducted output power that generates the highest emission performing pre-scan testing in all data rates of each mode.*

3.1.6 Table of actual operating channels

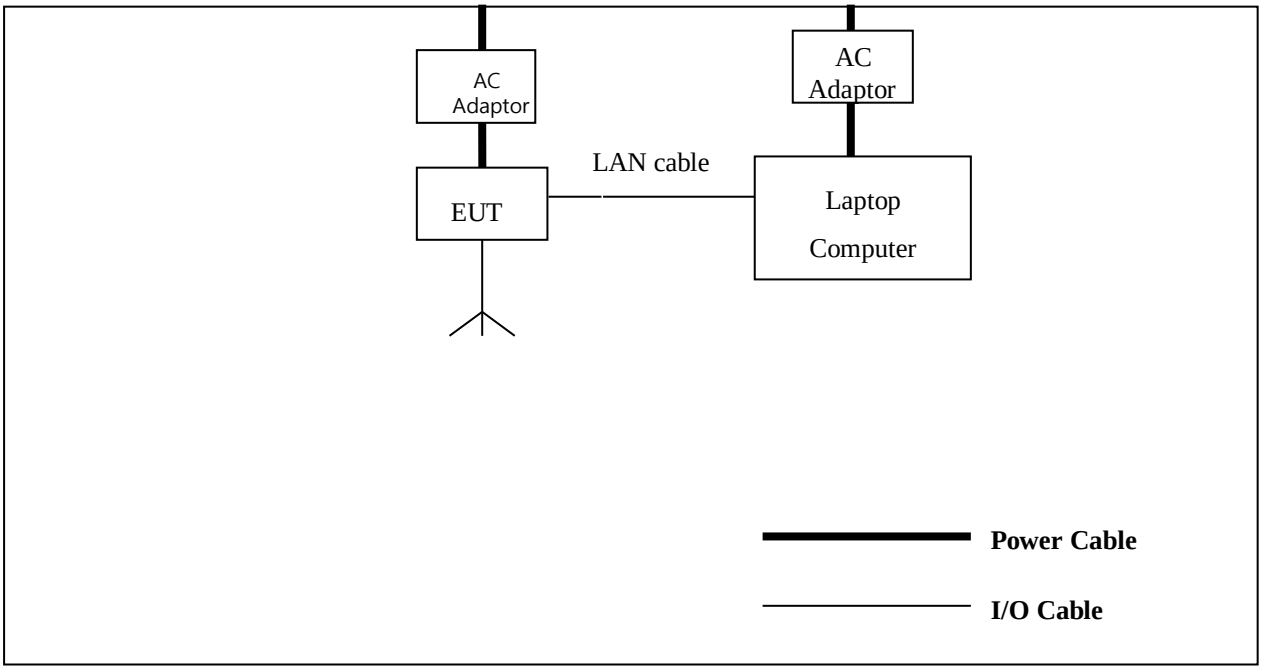
Frequency band	Bandwidth	channel	Frequency (MHz)
UNII-1	20MHz	36	5180
		40	5200
		44	5220
		48	5240
	40MHz	38	5190
		46	5230
	80MHz	42	5210
U-NII-2A	20MHz	52	5260
		56	5280
		60	5300
		64	5320
	40MHz	54	5270
		62	5310
	80MHz	58	5290
U-NII-2C	20MHz	100	5500
		104	5520
		108	5540
		112	5560
		116	5580
		120	5600
		124	5620
		128	5640
		132	5660
		136	5680
		140	5700
	40MHz	102	5510
		110	5550
		118	5590
		126	5630
		134	5670

Frequency band	Bandwidth	channel	Frequency (MHz)
U-NII-2C	80MHz	106	5530
		122	5610
Straddle	20MHz	144	5720
	40MHz	142	5710
	80MHz	138	5690
UNII-3	20MHz	149	5745
		153	5765
		157	5785
		161	5805
		165	5825
	40MHz	151	5755
		159	5795
	80MHz	155	5775

3.2 Support Equipment

EUT	KAONMEDIA Co., Ltd. Model : CG3000	S/N: N/A
Laptop Computer	LG Electronics Co., Ltd. Model : 14Z970	FCC DOC S/N : N/A
AC/DC Adapter	Lien Chang Electronic Enterprise Co., Ltd Model : LCAP48-WK 1.5 m unshielded power cable	FCC DOC S/N : N/A

3.3 Setup Drawing



3.4 EUT Information

The EUT is the **KAONMEDIA Co., Ltd. DOCSIS3.1 Gateway (IT) FCC ID: WQTCG3000.**

Specifications:

EUT Type	DOCSIS3.1 Gateway (IT)
Model Name	CG3000
Variant Model Name	CG3000-LD42J, CG3000-LD4NJ, SR820ac
Brand Name	KAONMEDIA Co., Ltd.
Frequency of Operation	For U-NII-1 Band 802.11a,n,ac(20 MHz): 5180 MHz ~ 5240 MHz 802.11n,ac(40 MHz): 5190 MHz ~ 5230 MHz 802.11ac(80 MHz): 5210 MHz For U-NII-2A Band 802.11a,n,ac(20 MHz): 5260 MHz ~ 5320 MHz 802.11n,ac(40 MHz): 5270 MHz ~ 5310 MHz 802.11ac(80 MHz): 5290 MHz For U-NII-2C Band 802.11a,n,ac(20 MHz): 5500 MHz ~ 5720 MHz 802.11n,ac(40 MHz): 5510 MHz ~ 5710 MHz 802.11ac(80 MHz): 5530 MHz ~ 5690 MHz For U-NII-3 Band 802.11a,n,ac(20 MHz): 5745 MHz ~ 5825 MHz 802.11n,ac(40 MHz): 5755 MHz ~ 5795 MHz 802.11ac(80 MHz): 5775 MHz
Maximum Conducted Output Power	For U-NII-1 Band 802.11a : 24.42 dBm 802.11n(20 MHz) : 24.32 dBm 802.11n(40 MHz) : 19.75 dBm 802.11ac(20 MHz) : 24.39 dBm 802.11ac(40 MHz) : 20.00 dBm 802.11ac(80 MHz) : 16.93 dBm For U-NII-2A Band 802.11a : 20.23 dBm 802.11n(20 MHz) : 20.26 dBm 802.11n(40 MHz) : 19.84 dBm 802.11ac(20 MHz) : 20.28 dBm 802.11ac(40 MHz) : 20.08 dBm 802.11ac(80 MHz) : 16.06 dBm For U-NII-2C Band 802.11a : 19.65 dBm 802.11n(20 MHz) : 19.74 dBm 802.11n(40 MHz) : 21.11 dBm 802.11ac(20 MHz) : 19.71 dBm 802.11ac(40 MHz) : 21.17 dBm 802.11ac(80 MHz) : 21.56 dBm

	For U-NII-3 Band 802.11a : 23.36 dBm 802.11n(20 MHz) : 23.17 dBm 802.11n(40 MHz) : 22.91 dBm 802.11ac(20 MHz) : 23.10 dBm 802.11ac(40 MHz) : 22.69 dBm 802.11ac(80 MHz) : 23.18 dBm
FCC Classification	Unlicensed National Information Infrastructure (NII)
Number of Channels	For U-NII-1 Band 802.11a,n,ac(20 MHz): 4ch 802.11n,ac(40 MHz): 2ch 802.11ac(80 MHz): 1ch For U-NII-2A Band 802.11a,n,ac(20 MHz): 4ch 802.11n,ac(40 MHz): 2ch 802.11ac(80 MHz): 1ch For U-NII-2C Band 802.11a,n,ac(20 MHz): 12ch 802.11n,ac(40 MHz): 6ch 802.11ac(80 MHz): 3ch For U-NII-3 Band 802.11a,n,ac(20 MHz): 5ch 802.11n,ac(40 MHz): 2ch 802.11ac(80 MHz): 1ch
Modulations	OFDM(BPSK,QPSK,16QAM,64QAM, 256QAM) for 802.11a,n,ac
Antenna Gain (peak)	Ant : 2.0 dBi
Antenna Setup	802.11a/n(20,40MHz)/ac(20,40,80MHz) : 1TX / 1RX, 4TX / 4RX
Voltage	12 Vdc
Temperature Range	-20 ℃ ~ +50 ℃
Size (W x H x D)	About 50 mm x 240 mm x 190 mm
Weight	About 692 g
Remarks	-

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	Result	Remark
Conducted Emission	15.207	Complies	
Radiated Emission	15.209	Complies	
26 dB Spectrum Bandwidth and 99% Occupied bandwidth	15.407(a)	Complies	
6 dB Bandwidth	15.407(e)	Complies	
Maximum Conducted Output Power	15.407(a)	Complies	
Power Spectral Density	15.407(a)	Complies	
Radiated Spurious Emission	15.407(b)	Complies	
DFS	15.407(h)	Complies	
Maximum Permissible Exposure	1.1307(b)	Complies	

5. RECOMMENDATION/CONCLUSION

The data collected shows that the **KAONMEDIA Co., Ltd. DOCSIS3.1 Gateway (IT) FCC ID: WQTCG3000** is in compliance with Part 15.407 of the FCC.

6. ANTENNA REQUIREMENTS

§15.203 of the FCC Rules part 15 Subpart C
: 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 shall be considered sufficient to comply with the provisions of this section.

The antenna of the **KAONMEDIA Co., Ltd. DOCSIS3.1 Gateway (IT) FCC ID: WQTCG3000** is **permanently attached** and there are no provisions for connection to an external antenna. It complies with the requirement of §15.203.

Directional gain was be calculated according to "**662911 D01 Multiple Transmitter Output v02r01**" and would be found at end of average output power and PSD results in this report.

7. DESCRIPTION OF TESTS

7.1 Conducted Emissions

The Line conducted emission test facility is located inside a 4 x 7 x 2.5 meter shielded enclosure. It is manufactured by EM engineering. The shielding effectiveness of the shielded room is in accordance with MIL-STD-285 or NSA 65-6. A 1 m x 1.5 m wooden table 0.8 m height is placed 0.4 m away from the vertical wall and 1.5 m away from the side of wall of the shielded room. Rohde & Schwarz (ESH3-Z5) and (ESH2-Z5) of the 50 ohm/50 µH Line Impedance Stabilization Network (LISN) are bonded to the shielded room. The EUT is powered from the Rohde & Schwarz LISN (ESH3-Z5) and the support equipment is powered from the Rohde & Schwarz LISN (ESH2-Z5). Power to the LISNs are filtered by high-current high insertion loss Power line filters. The purpose of filter is to attenuate ambient signal interference and this filter is also bonded to shielded enclosure. All electrical cables are shielded by tinned copper zipper tubing with inner diameter of 1 / 2 ". If DC power device, power will be derived from the source power supply it normally will be powered from and this supply lines will be connected to the LISNs, All interconnecting cables more than 1 meter were shortened by non-inductive bundling (serpentinefashion) to a 1 meter length. Sufficient time for EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the spectrum analyzer to determine the frequency producing the maximum EME from the EUT. The spectrum was scanned from 150 kHz to 30 MHz with 200 msec sweep time. The frequency producing the maximum level was re-examined using the EMI test receiver. (Rohde & Schwarz ESCS30). The detector functions were set to CISPR quasi-peak mode & average mode. The bandwidth of receiver was set to 9 kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each EME emission. Each emission was maximized by; switching power lines; varying the mode of operation or resolution; clock or data exchange speed; scrolling H pattern to the EUT and of support equipment, and powering the monitor from the floor mounted outlet box and computer aux AC outlet, if applicable; whichever determined the worst case emission.
Each EME reported was calibrated using the R&S signal generator.

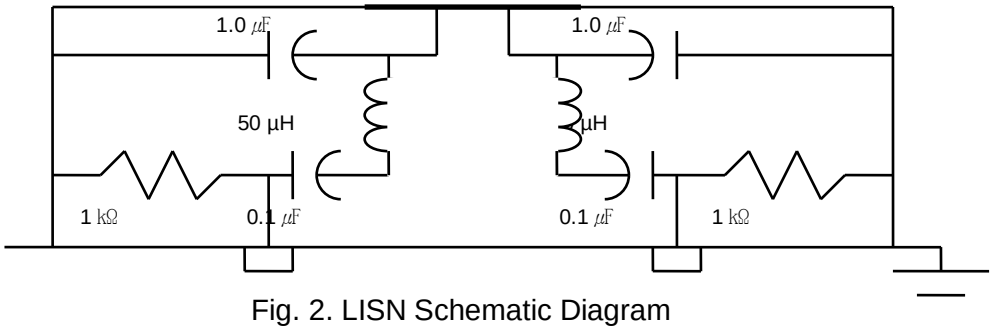


Fig. 2. LISN Schematic Diagram

7.2 Radiated Emissions

The measurement was performed at the test site that is specified in accordance with ANSI C63.10-2013.
The spurious emission was scanned from 9 kHz to 30 MHz using Loop Antenna(Rohde&Schwarz, HFH2-Z2) and 30 to 1000 MHz using Trilog broadband test antenna(Schwarzbeck, VULB 9163). Above 1 GHz, Horn antenna (Schwarzbeck BBHA 9120D: up to 18 GHz, Q-par Angus QSH20S20 : 18 to 26.5 GHz, Q-par Angus QSH22K20 : 26.5 to 40 GHz) was used.
For emissions testing at below 1GHz, The test equipment was placed on turntable with 0.8 m above ground. For emission measurements above 1 GHz, The test equipment was placed on turntable with 1.5 m above ground. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The EUT, cable, wire arrangement and mode of operation that has the highest amplitude relative to the limit was selected. Then, the turn table was rotated from 0˚ to 360˚ and an antenna mast was moved from 1 m to 4 m height to maximize the suspected highest amplitude signal. The final maximized level was recorded.

Unwanted emissions in the restricted bands

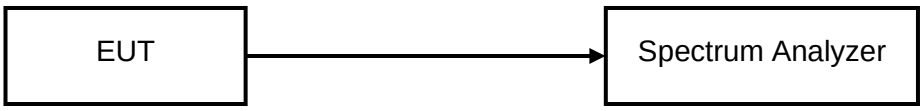
At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection.
At frequencies above 1000 MHz, measurements performed using the peak and average measurement procedures described in KDB “789033 D02 General UNII Test Procedures New Rules v02r01”in section G)5) and G)6). Peak emission levels was measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = max hold. Average emission levels was measured using the “Method VB” by setting the analyzer RBW = 1 MHz, VBW = 3 kHz (VBW ≤ RBW/100), Detector = Peak , if the EUT is configured to transmit with duty cycle ≥ 98 percent. When the duty cycle ≤ 98 percent, VBW ≥ 1/T(T = minimum transmission duration over which the transmitter is on) was used, and allow max hold to run for at least 50 times (1/duty cycle) traces.

Unwanted emissions outside of the restricted bands

At frequencies below 1000 MHz, measurements performed using the CISPR quasi-peak detection.
At frequencies above 1000 MHz, measurements performed using the peak measurement procedures described in KDB “789033 D02 General UNII Test Procedures New Rules v02r01” in section G)5). Peak emission levels was measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = max hold. If the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

7.3 26 dB Bandwidth and 99% Occupied bandwidth

Test Setup

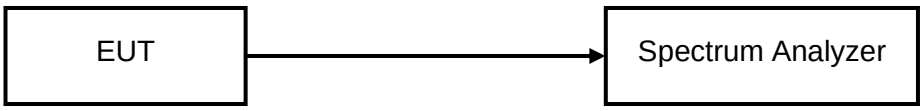


Test Procedure

EUTs 26 dB bandwidth is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.
The spectrum analyzer setting is as follows.
RBW = approximately 1 % of the emission bandwidth
VBW ≥ 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
The bandwidth measurement function on the spectrum analyzer is used to measure the 26 dB bandwidth and 99% occupied bandwidth.

7.4 6 dB Bandwidth

Test Setup

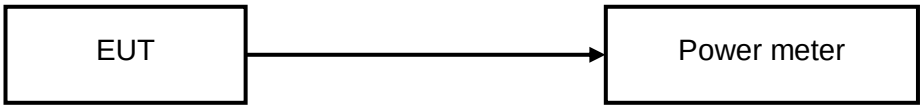


Test Procedure

EUTs 6 dB bandwidth is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.
The spectrum analyzer setting is as follows.
RBW = 100 kHz
VBW > 3 x RBW
Detector = Peak
Trace mode = max hold
Sweep = auto couple
The bandwidth measurement function on the spectrum analyzer is used to measure the 6 dB bandwidth.

7.5 Maximum Conducted Output Power (average)

Test Setup

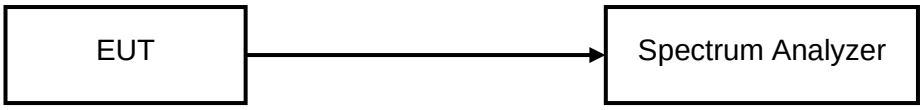


Test Procedure

EUTs Maximum Conducted Output Power (average) is measured at low, middle, high channels with a Power meter connected to the antenna terminal while the EUTs operating at its maximum power control level.
Add 10 log (1/x), where x is the duty cycle

7.6 Maximum Power Spectral Density (average)

Test Setup

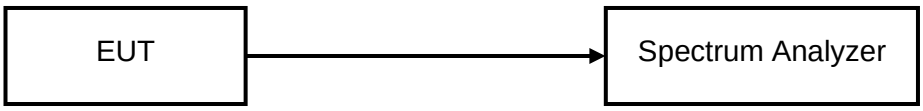


Test Procedure

EUTs Maximum Power Spectral Density (average) is measured at low, middle, high channels with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level.
Measure the duty cycle, x, of the transmitter output signal
The spectrum analyzer setting is as follows.
Span = encompass the EBW of the signal.
RBW = 1 MHz for UNII-1, 2A, 2C band or 500kHz for UNII-3 band
VBW ≥ 3 RBW
Number of points in sweep ≥ 2 Span / RBW
Sweep time = auto
Detector = RMS
Trace average at least 100 traces in power averaging mode
Use the peak search function on the instrument to find the peak of the spectrum.

7.7 Duty Cycle

Test Setup



Test Procedure

EUTs duty cycle are measured at middle channel with a spectrum analyzer connected to the antenna terminal while the EUTs operating at its maximum power control level. The spectrum analyzer setting is as follows.

Center frequency = Center frequency of the transmission
Span = zero
RBW = 8 MHz
VBW = 8 MHz
Detector = peak
Sweep time = at least 3 ms
Sweep mode = Single
The marker function on the spectrum analyzer is used to determine the duty cycle

The results of the duty cycle measurement according to the above test procedure

	Data rate	On time (ms)	On + Off time (ms)	Duty Cycle (%)	Duty Factor (dB)
a mode	6Mbps	2.063	2.171	95.0	0.22
n(20MHz) mode	MCS0	1.919	2.020	95.0	0.22
n(40MHz) mode	MCS0	0.944	1.043	90.5	0.43
ac(20MHz) mode	MCS0	1.928	1.958	98.5	0.07
ac(40MHz) mode	MCS0	0.952	0.982	97.0	0.14
ac(80MHz) mode	MCS0	0.460	0.490	93.9	0.27

8. TEST DATA

8.1 Conducted Emissions

FCC §15.207

Result

Frequency	Level (dBμV)		*) Factor	**) Line	Limit (dBμV)		Margin (dB)	
(MHz)	Q-Peak	Average	(dB)		Q-Peak	Average	Q-Peak	Average
0.17	44.8	33.1	10.50	N	65.2	55.2	20.4	22.1
0.17	45.7	31.0	10.50	L	64.8	54.8	19.1	23.8
0.18	43.8	26.1	10.50	L	64.4	54.4	20.6	28.3
0.20	41.4	28.2	10.60	N	63.5	53.5	22.1	25.3
0.24	36.0	23.3	10.50	L	62.2	52.2	26.2	28.9
0.27	34.0	21.6	10.40	N	61.2	51.2	27.2	29.6

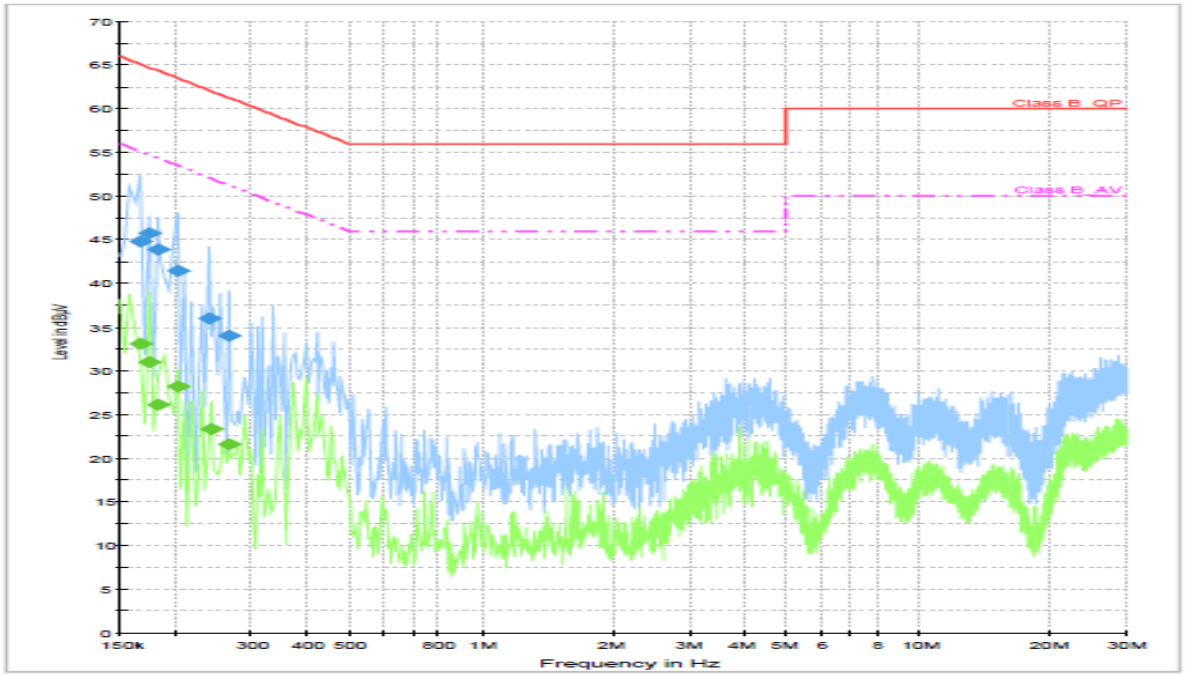
Line Conducted Emissions Tabulated Data

Notes:

1. Measurements using CISPR quasi-peak mode & average mode.
2. All modes of operation were investigated and the worst -case emission are reported. See attached Plots.
*3. *) Factor = LISN + Cable Loss*
*4. **) LINE : L = Line , N = Neutral*
5. The limit is on FCC §15.207(a)

PLOTS OF EMISSIONS

Conducted Emission at the Mains port (Line + Neutral)_ac(20) mode 5240MHz



TEST DATA

8.2 Radiated Emissions

FCC §15.209

Frequency (MHz)	Reading (dBµV/m)	Pol* (H/V)	Antenna Heights (cm)	Turntable Angles (°)	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
31.40	55.16	V	100	206	-25.9	29.3	40.0	10.7
98.39	60.66	V	100	213	-25.0	35.7	43.5	7.8
101.83	59.75	V	100	140	-25.2	34.6	43.5	9.0
138.26	63.12	V	100	248	-28.4	34.7	43.5	8.8
148.07	64.58	V	100	227	-28.1	36.5	43.5	7.0
151.57	63.80	V	100	284	-28.0	35.8	43.5	7.7

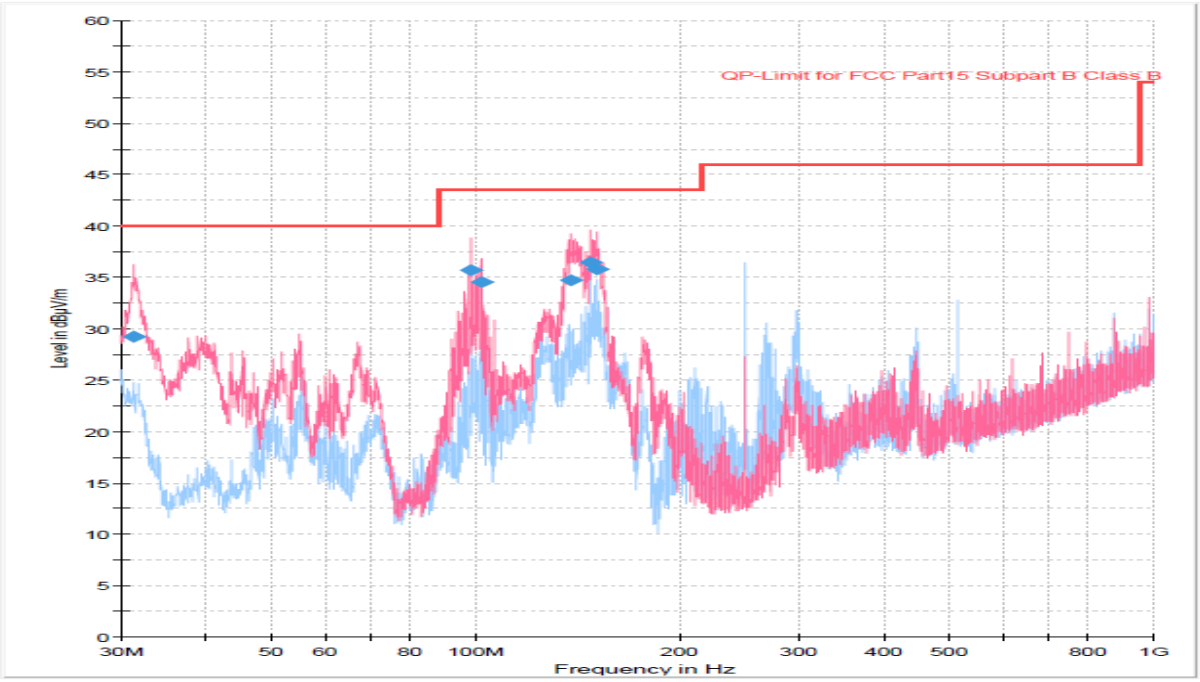
Radiated Measurements at 3meters

Notes:

1. *All modes were measured and the worst-case emission was reported.*
2. *The radiated limits are shown on Figure 3. Above 1 GHz the limit is 500 µV/m.*
3. **Pol. H = Horizontal, V = Vertical*
4. ***AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.*
5. *Measurements using CISPR quasi-peak mode below 1 GHz.*
6. *The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, Vertical polarization. The worst data was recorded.*
7. *Lowest channel (5260MHz) in ac (20MHz) mode is the worst case.*
8. *No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).*
9. *The limit is on the FCC §15.209.*

PLOTS OF EMISSIONS

Radiated emission below 1GHz_ ac (20MHz) mode_ 5260 MHz



8.3 26 dB Bandwidth and 99 % Occupied bandwidth

8.3.1 26 dB Bandwidth and 99 % Occupied bandwidth – U-NII-1 band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11a mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5180	21.25	20.91	16.83	16.61
Middle	5220	21.86	21.21	16.93	16.67
Highest	5240	21.69	21.09	16.91	16.71

802.11n (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5180	21.78	21.43	17.92	17.89
Middle	5220	21.97	21.28	18.01	17.89
Highest	5240	26.11	21.73	17.99	17.91

802.11n (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5190	39.88	39.58	36.29	36.21
Highest	5230	49.67	39.79	36.49	36.25

TEST DATA

802.11ac (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5180	21.65	21.29	17.94	17.84
Middle	5220	26.17	21.66	18.02	17.89
Highest	5240	23.25	21.60	18.03	17.91

802.11ac (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5190	39.92	39.62	36.31	36.21
Highest	5230	45.40	39.61	36.42	36.23

802.11ac (80 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Middle	5210	80.77	80.03	74.85	74.77

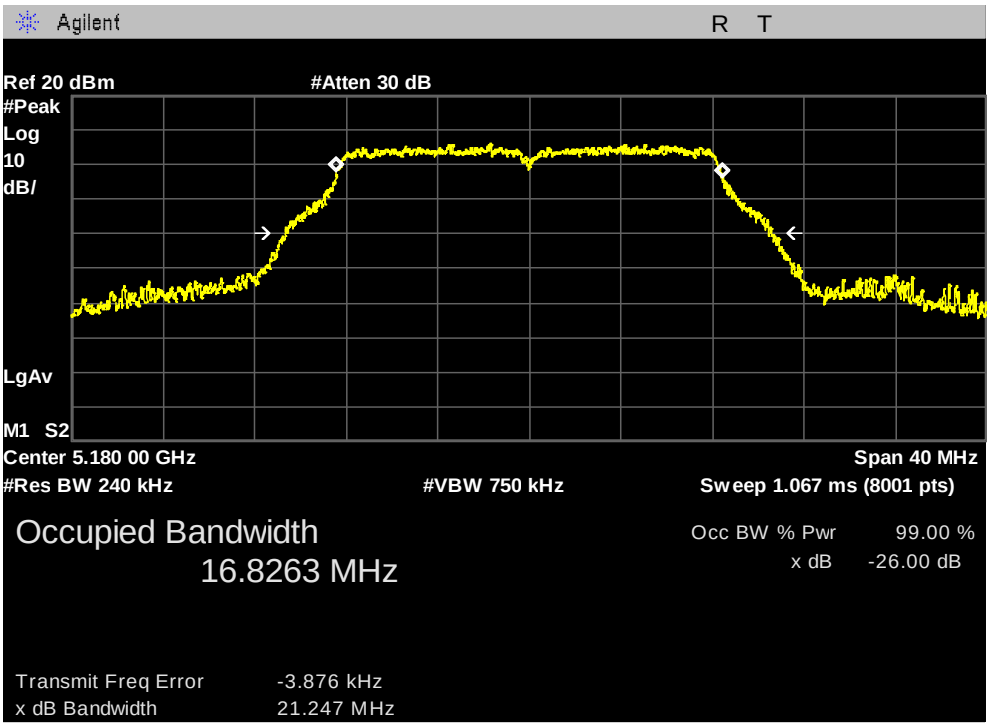
Note:
The worst ant port was determined by the conducted output power that generates the highest emission performing pre-scan testing in all ant port of each mode.

PLOTS OF EMISSIONS

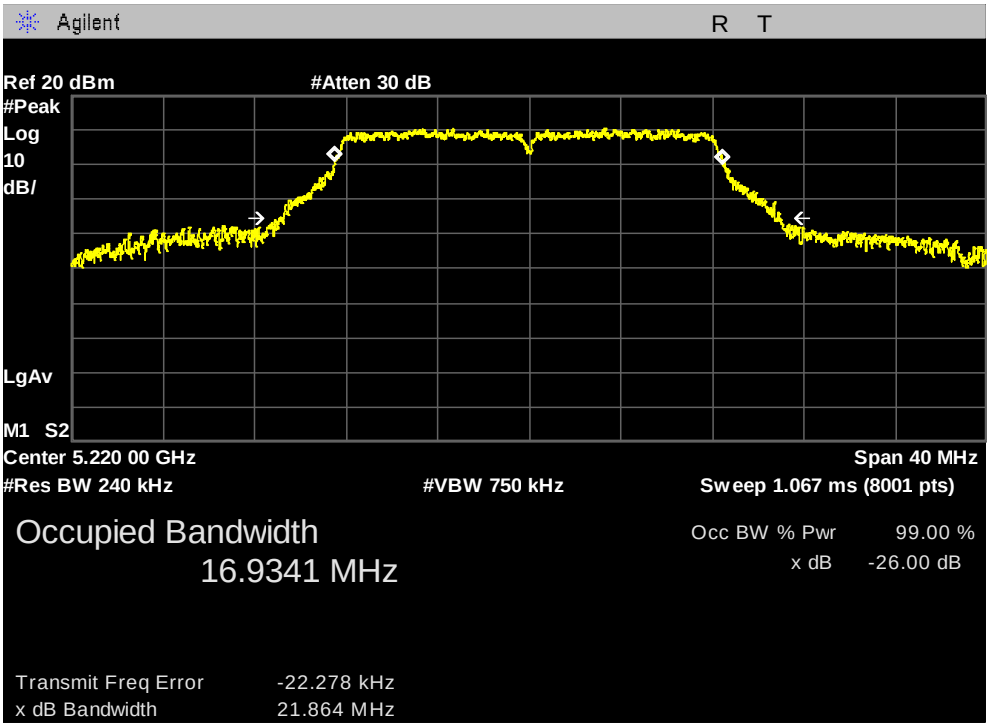
802.11a mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5180 MHz)

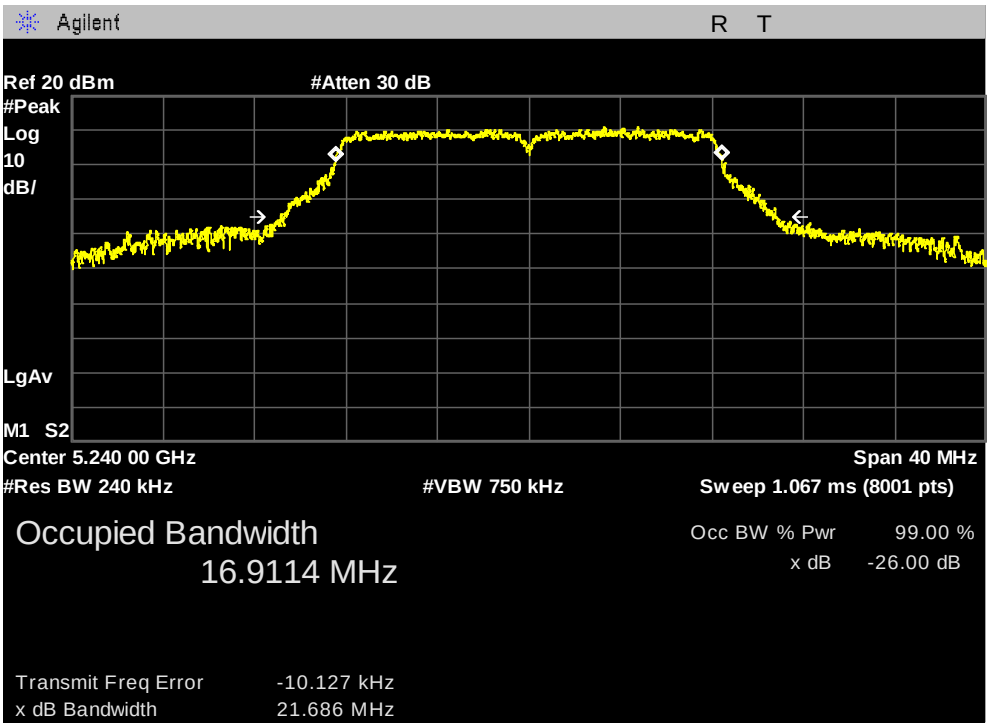


26 dB Bandwidth, Middle Channel (5220 MHz)



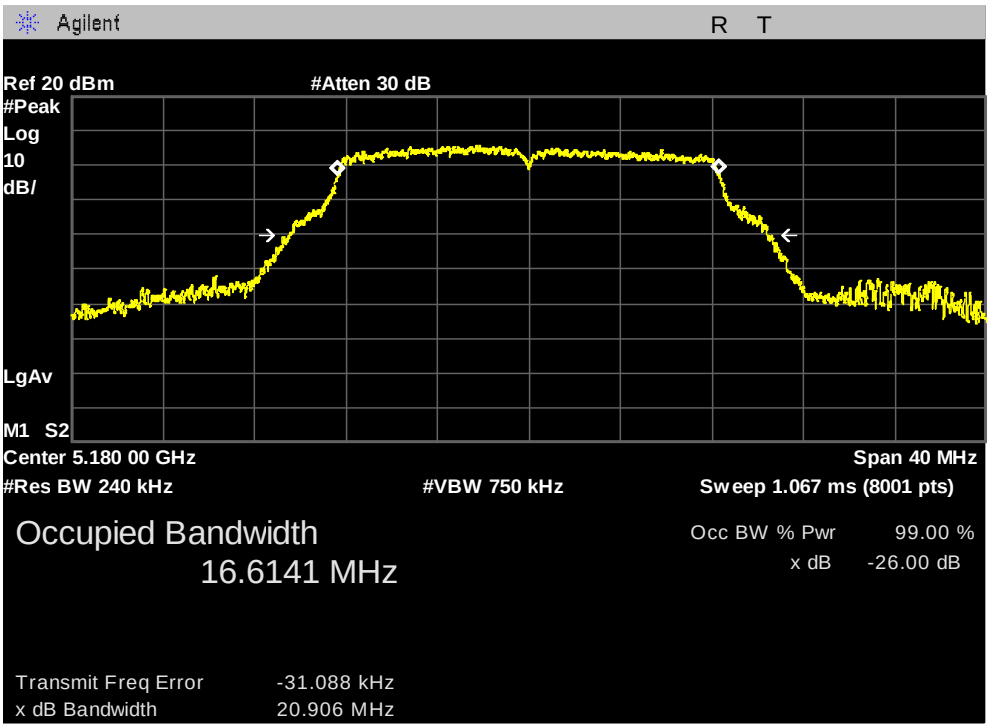
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5240 MHz)



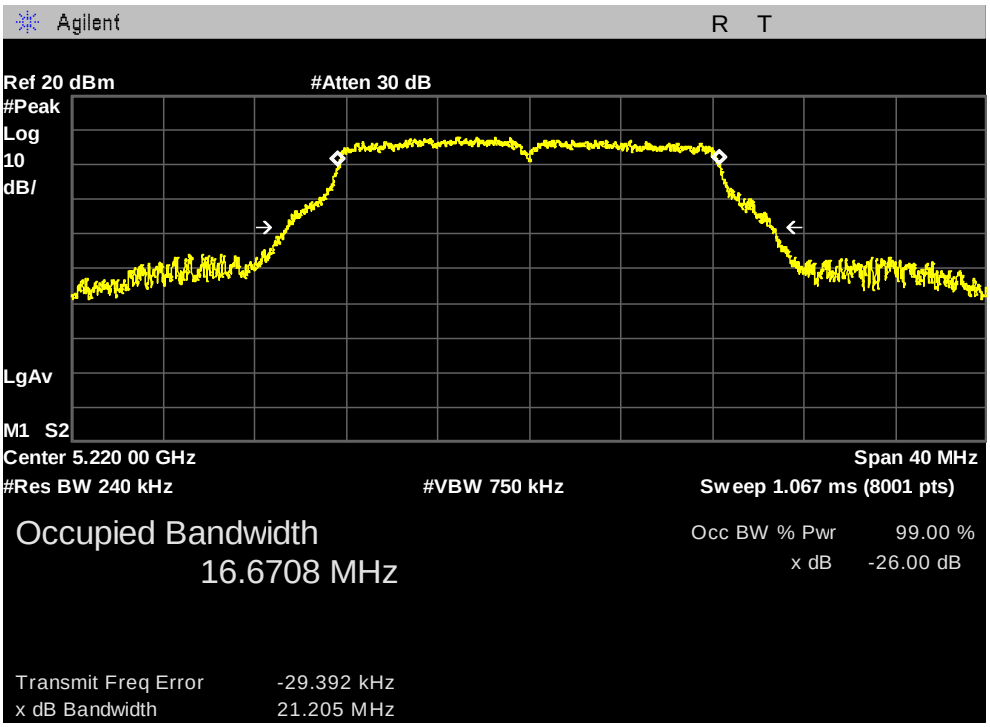
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5180 MHz)

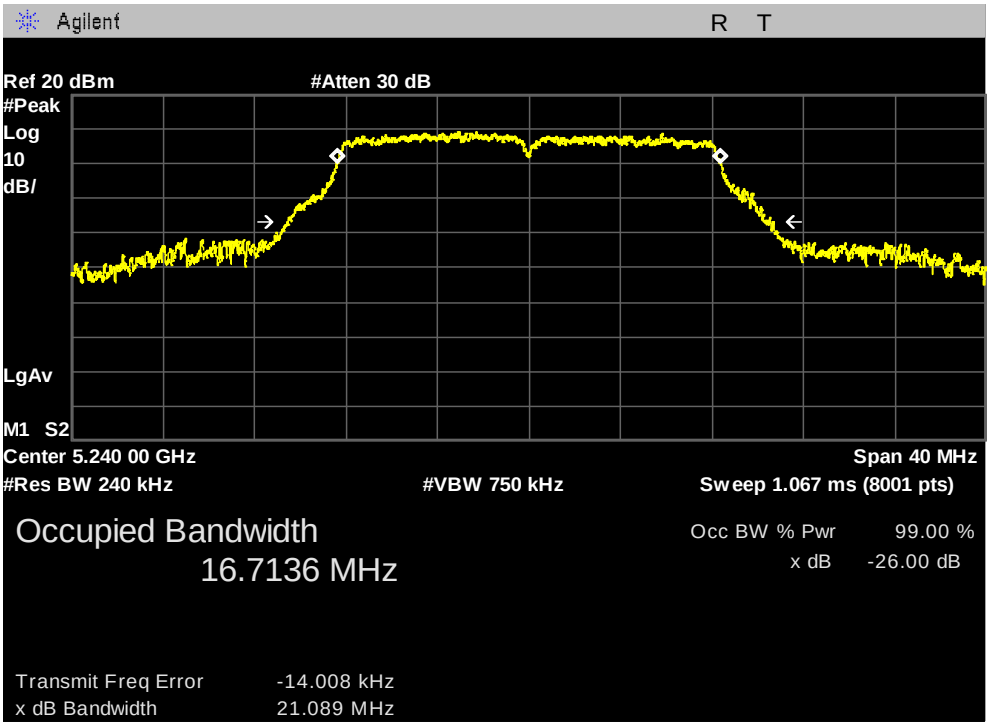


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5220 MHz)



26 dB Bandwidth, Highest Channel (5240 MHz)

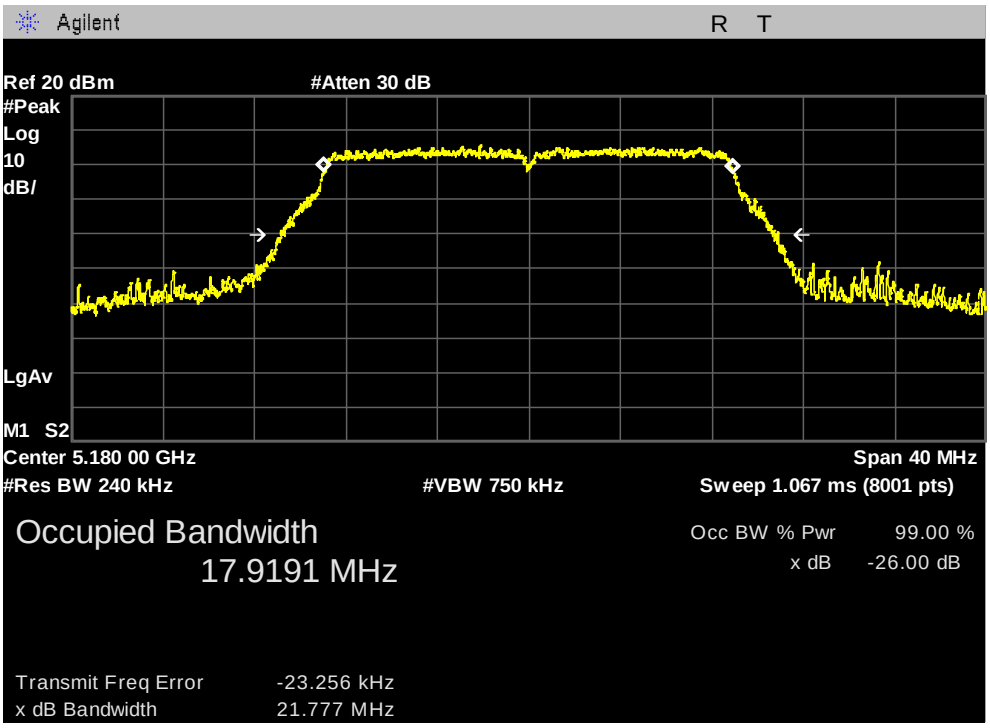


PLOTS OF EMISSIONS

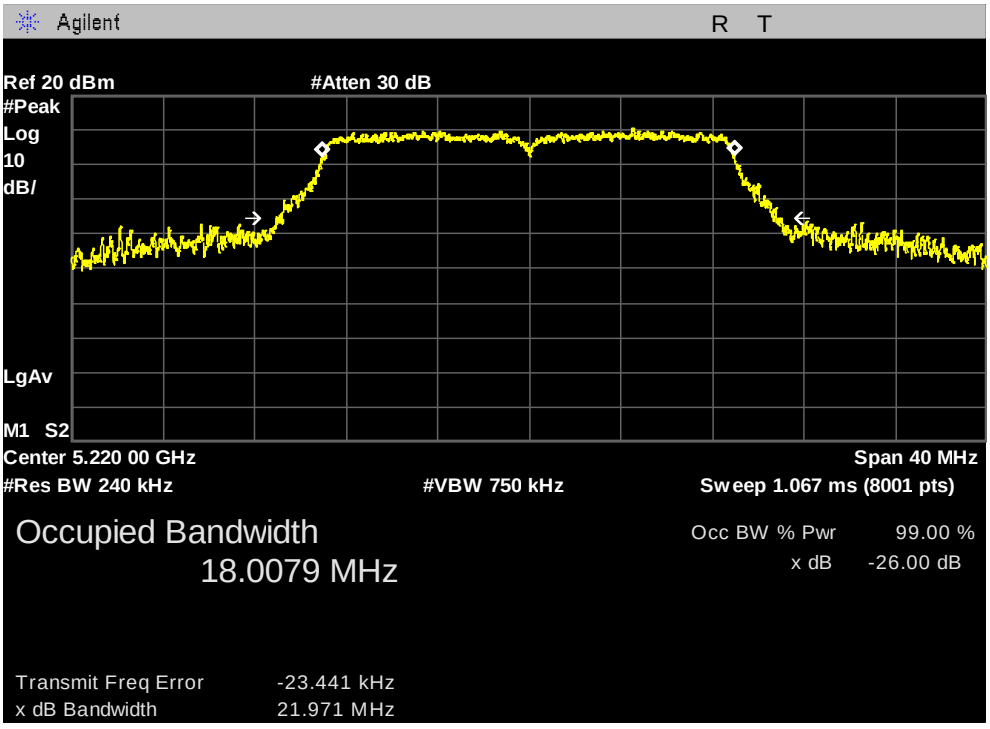
802.11n (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5180 MHz)

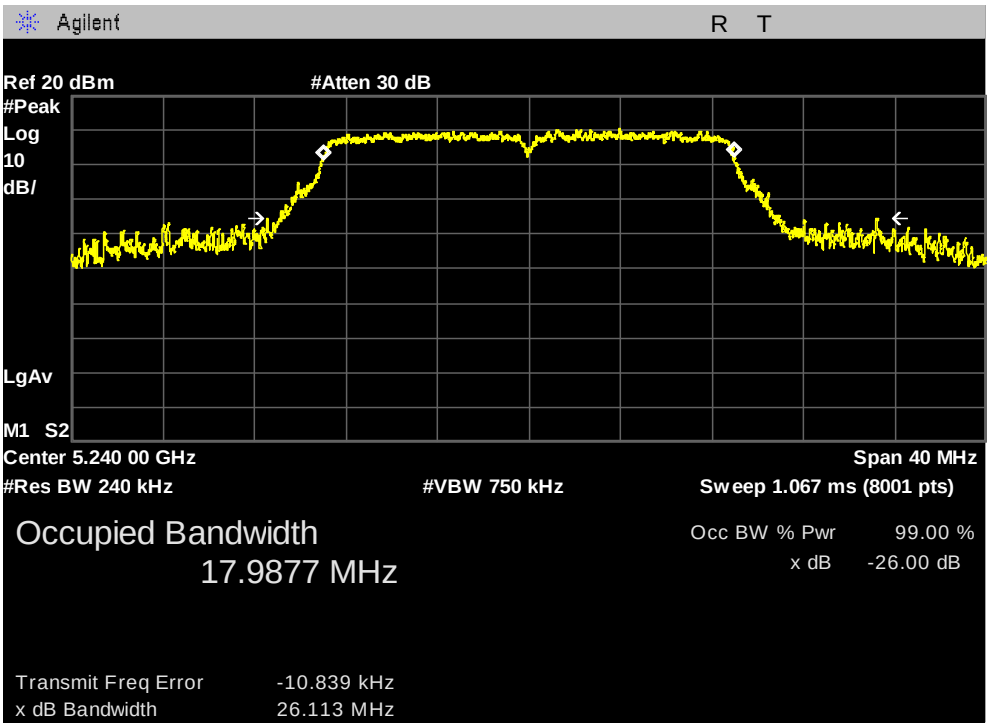


26 dB Bandwidth, Middle Channel (5220 MHz)



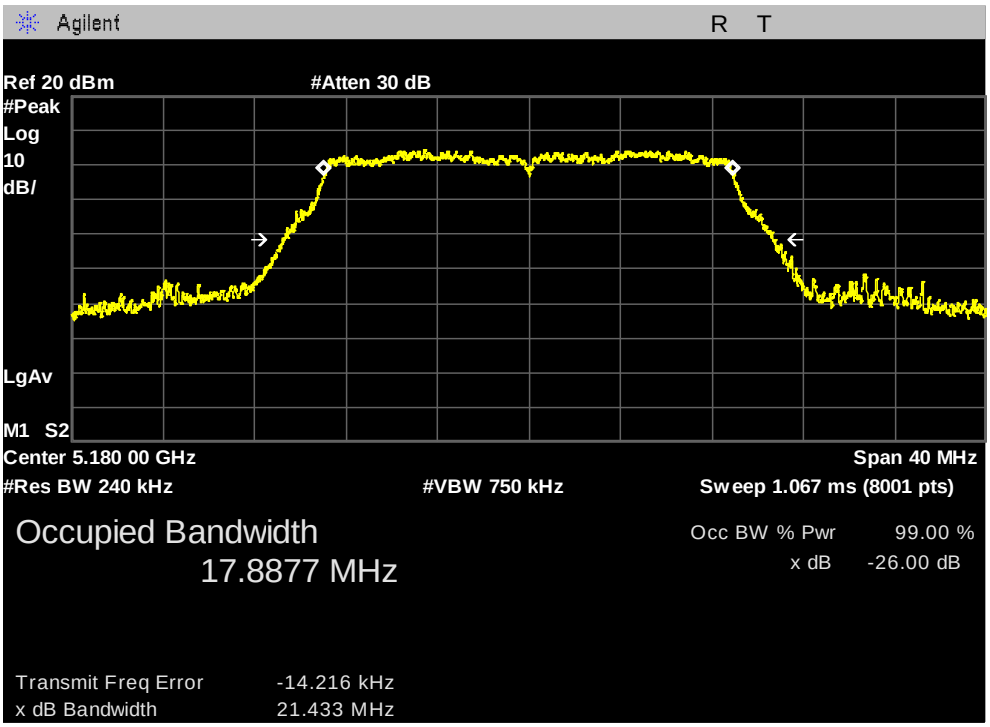
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5240 MHz)



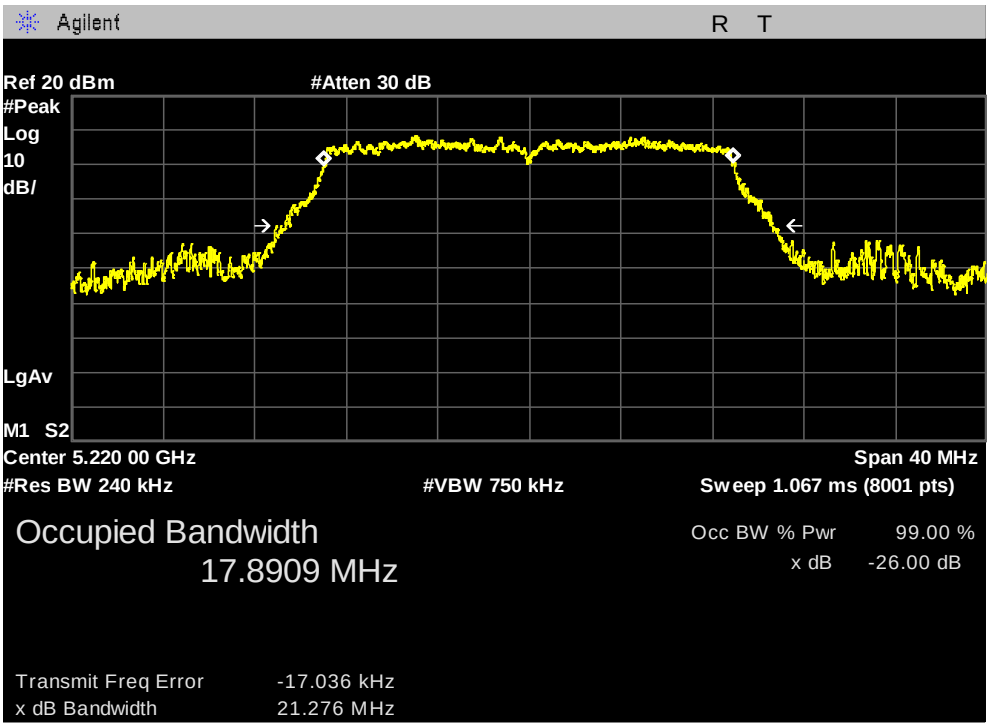
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5180 MHz)

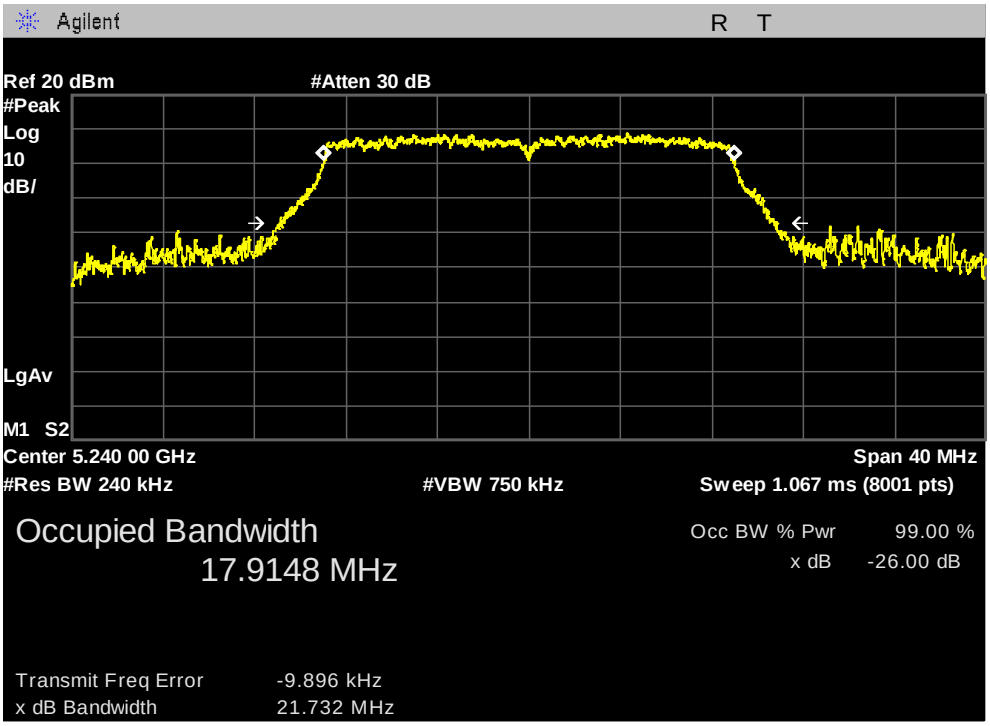


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5220 MHz)



26 dB Bandwidth, Highest Channel (5240 MHz)

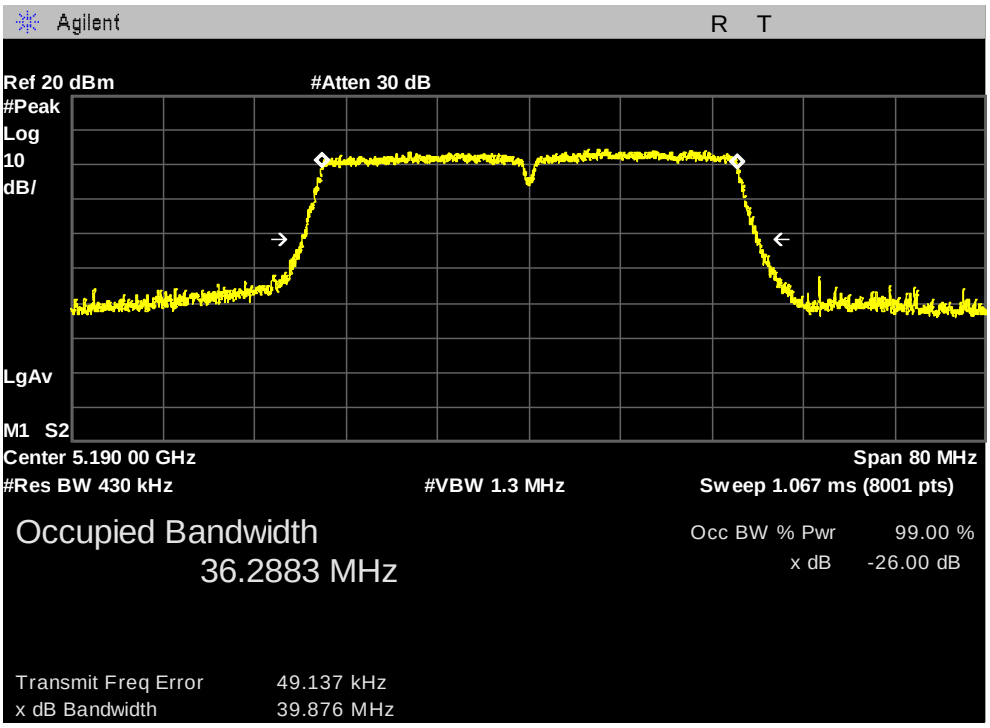


PLOTS OF EMISSIONS

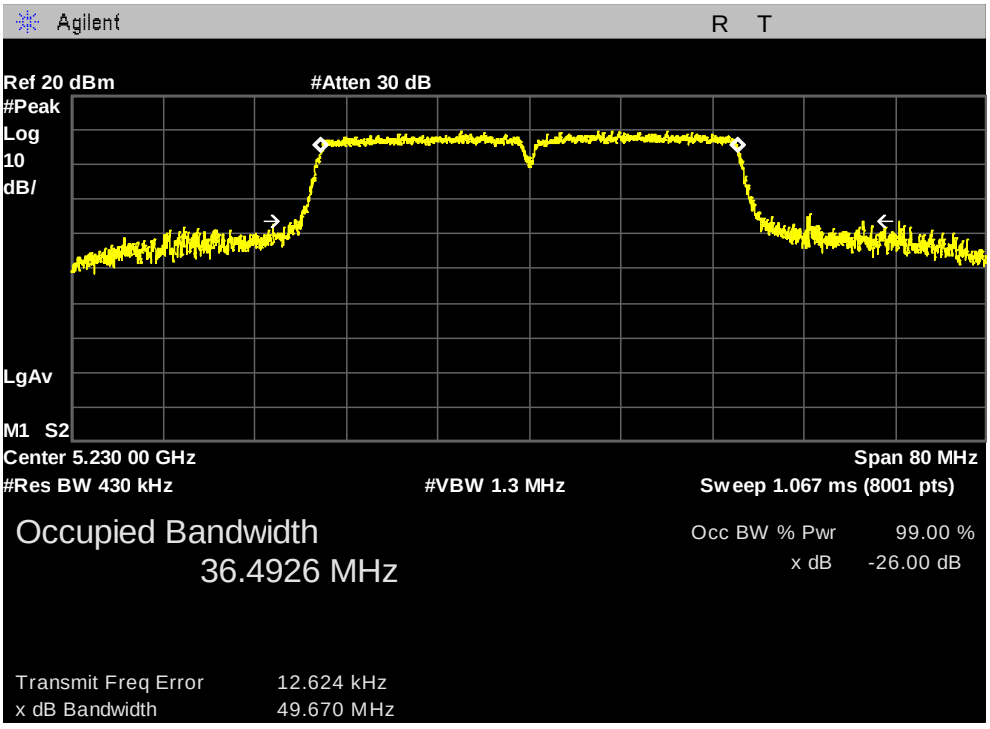
802.11n (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5190 MHz)



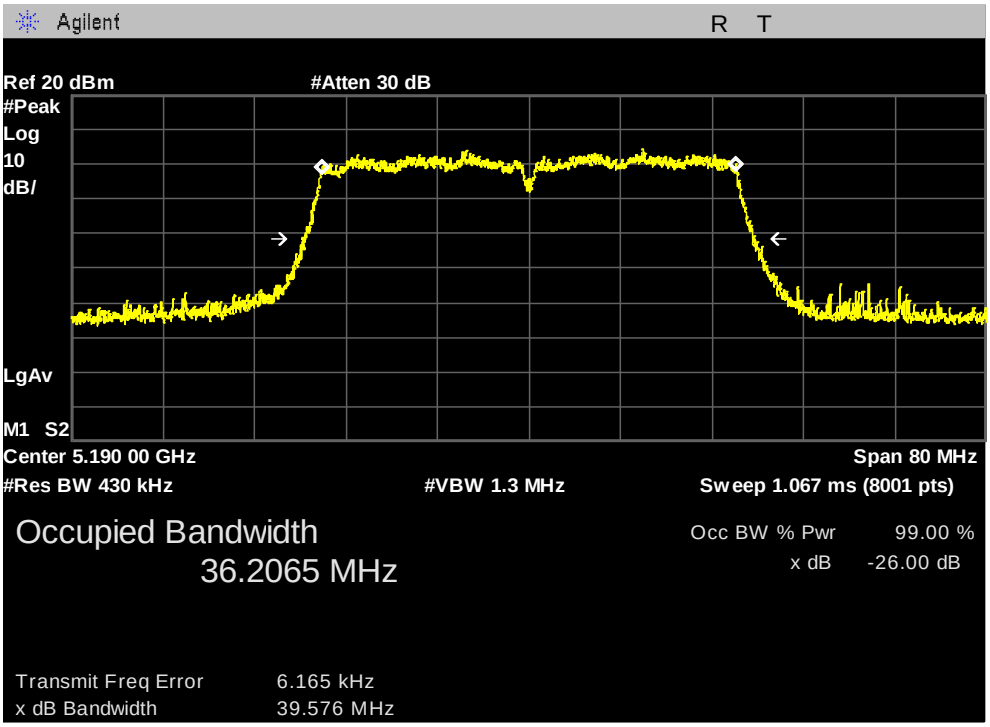
26 dB Bandwidth, Highest Channel (5230 MHz)



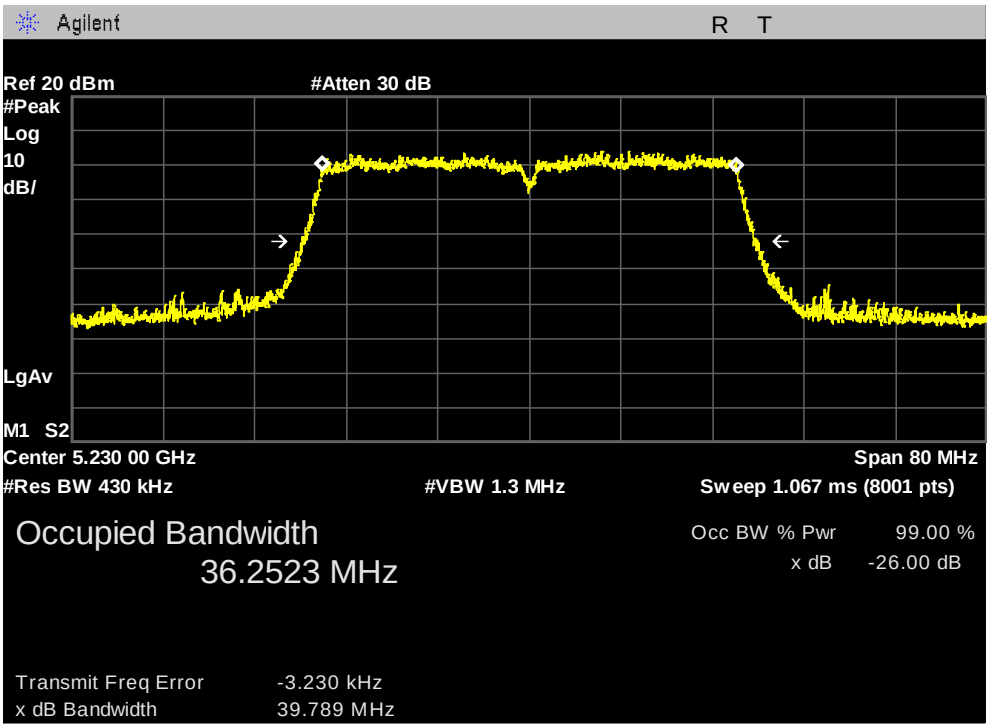
PLOTS OF EMISSIONS

Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5190 MHz)



26 dB Bandwidth, Highest Channel (5230 MHz)

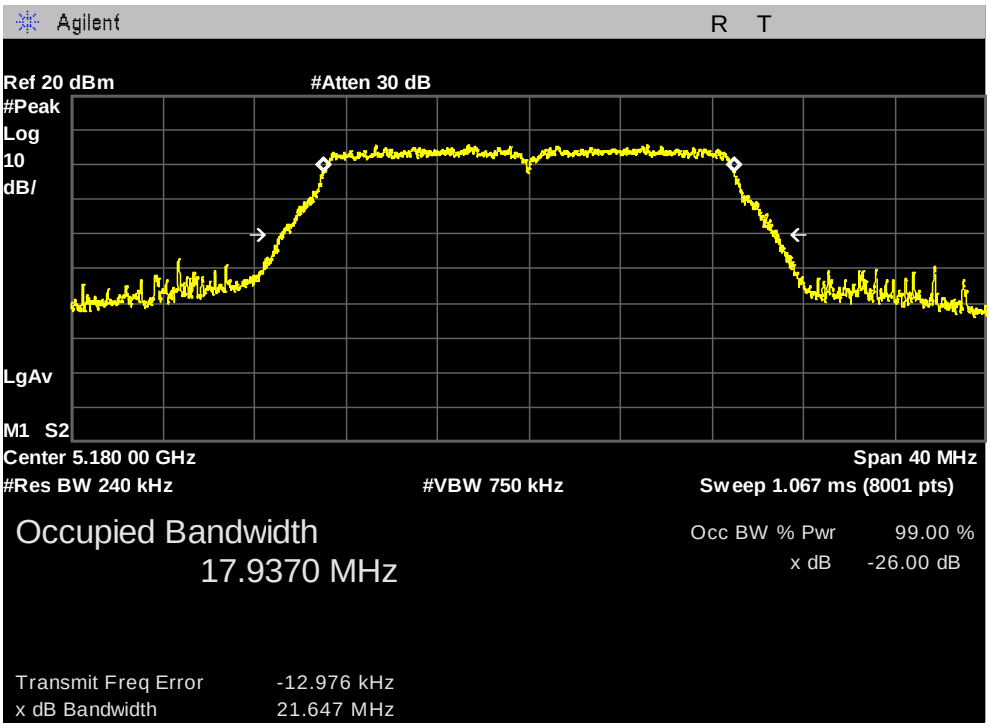


PLOTS OF EMISSIONS

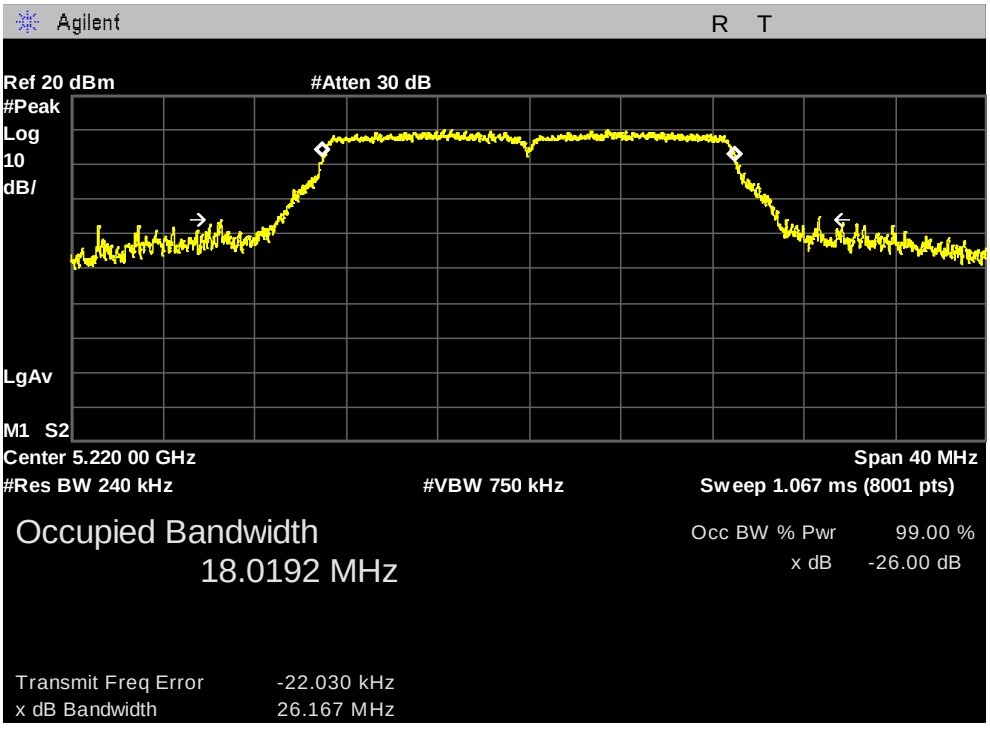
802.11ac (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5180 MHz)

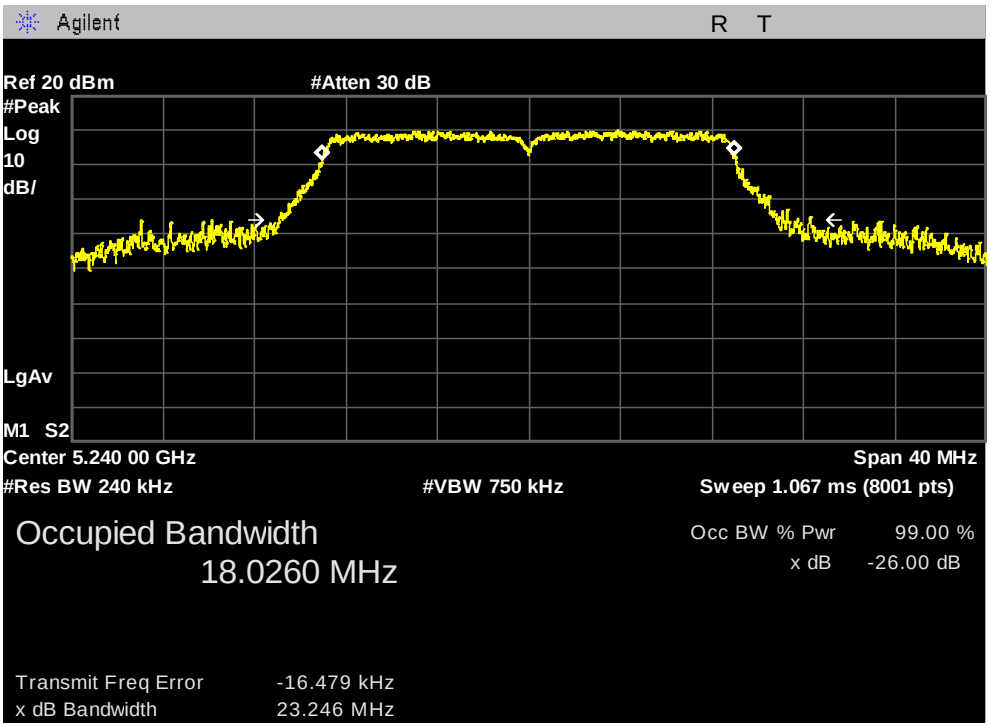


26 dB Bandwidth, Middle Channel (5220 MHz)



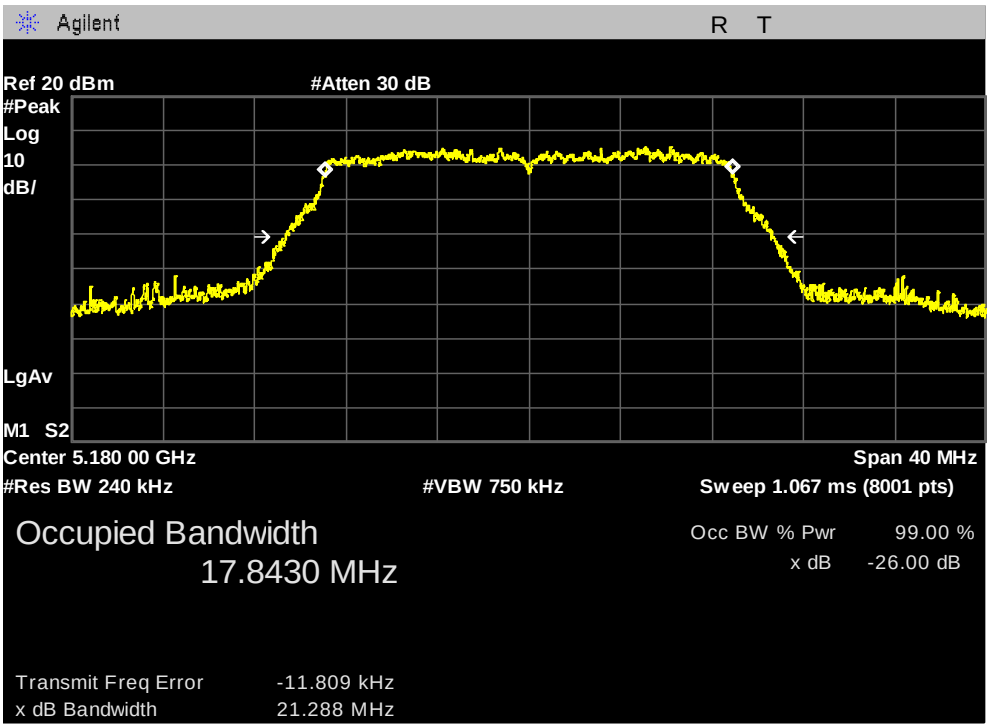
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5240 MHz)



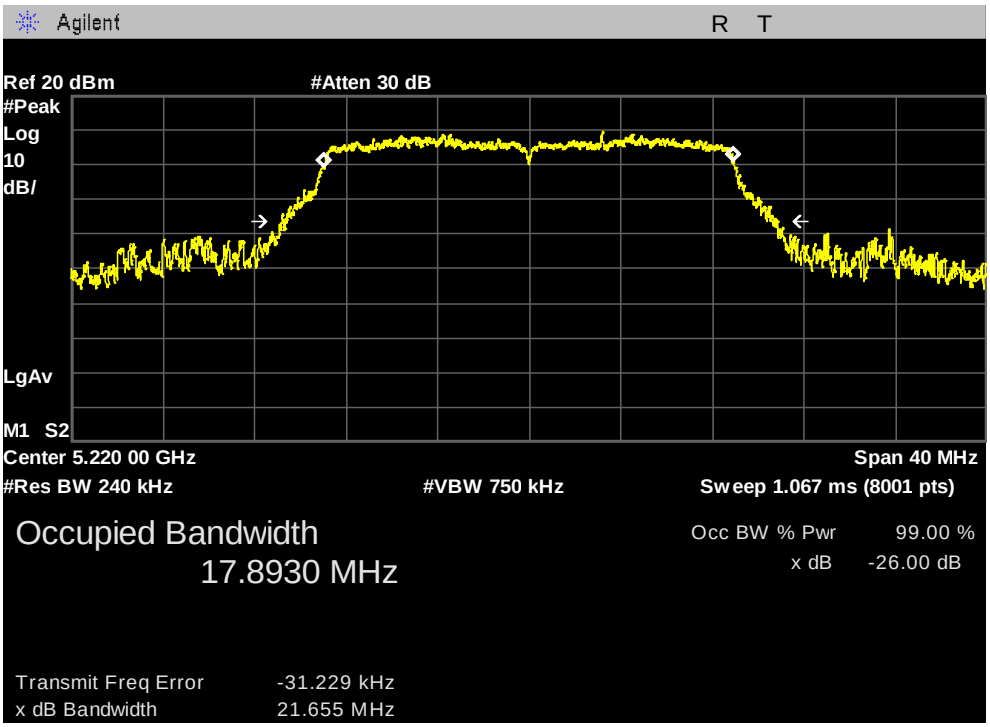
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5180 MHz)

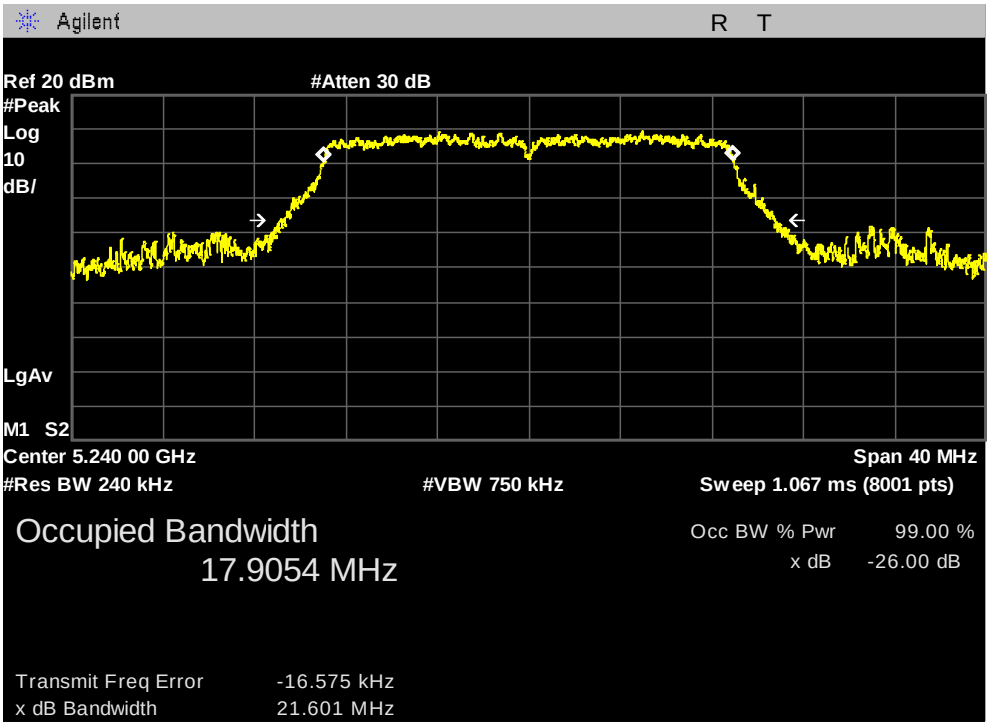


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5220 MHz)



26 dB Bandwidth, Highest Channel (5240 MHz)

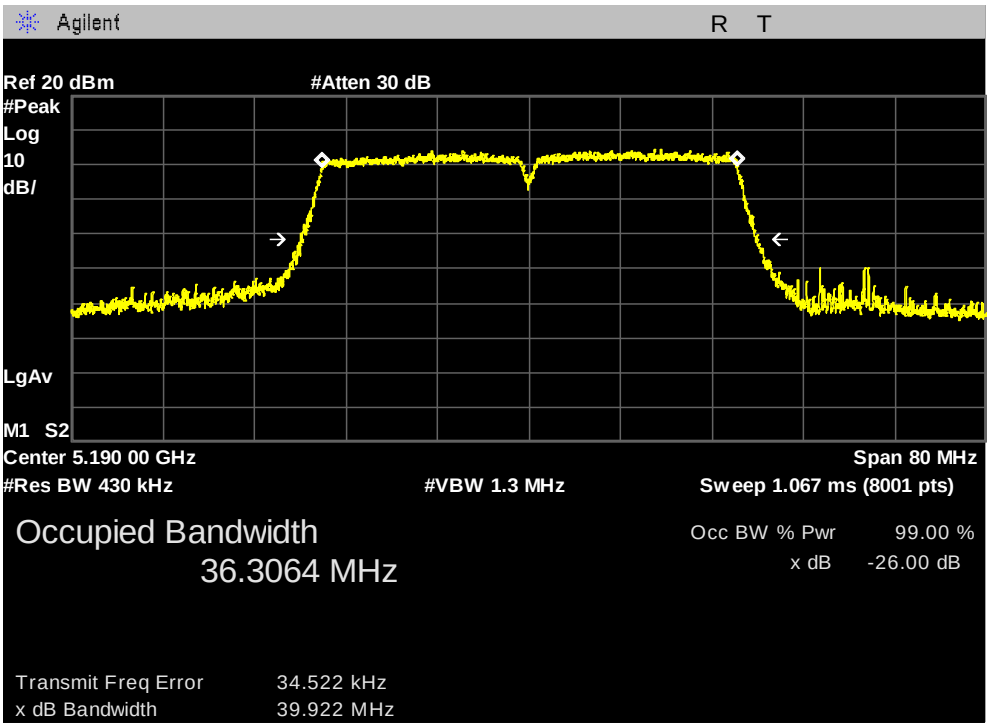


PLOTS OF EMISSIONS

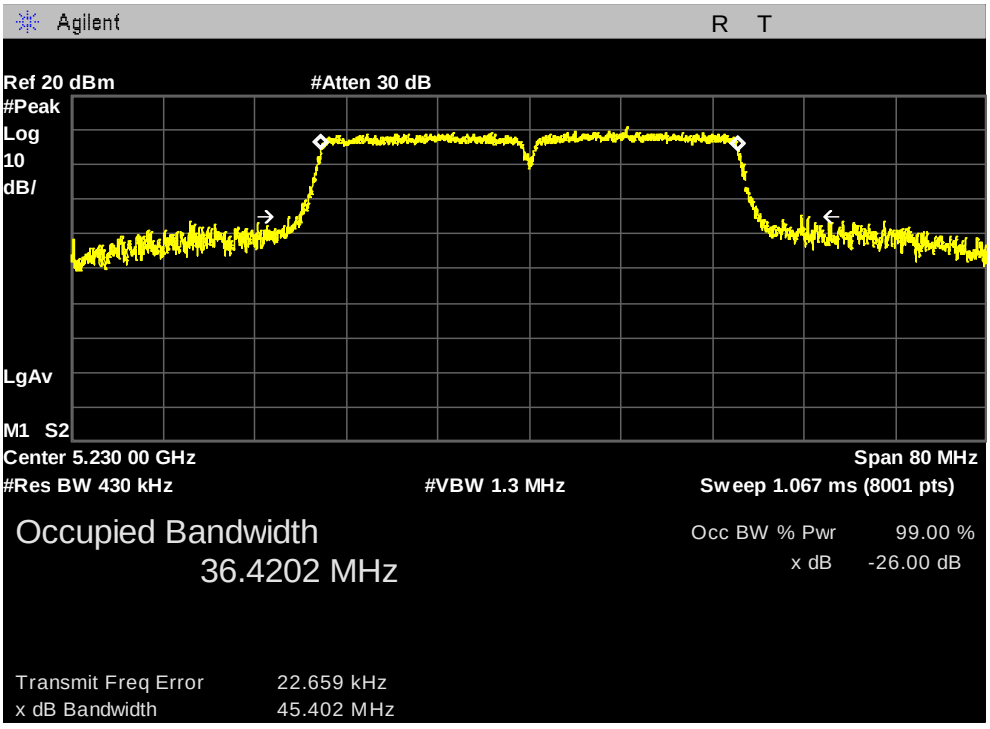
802.11ac (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5190 MHz)



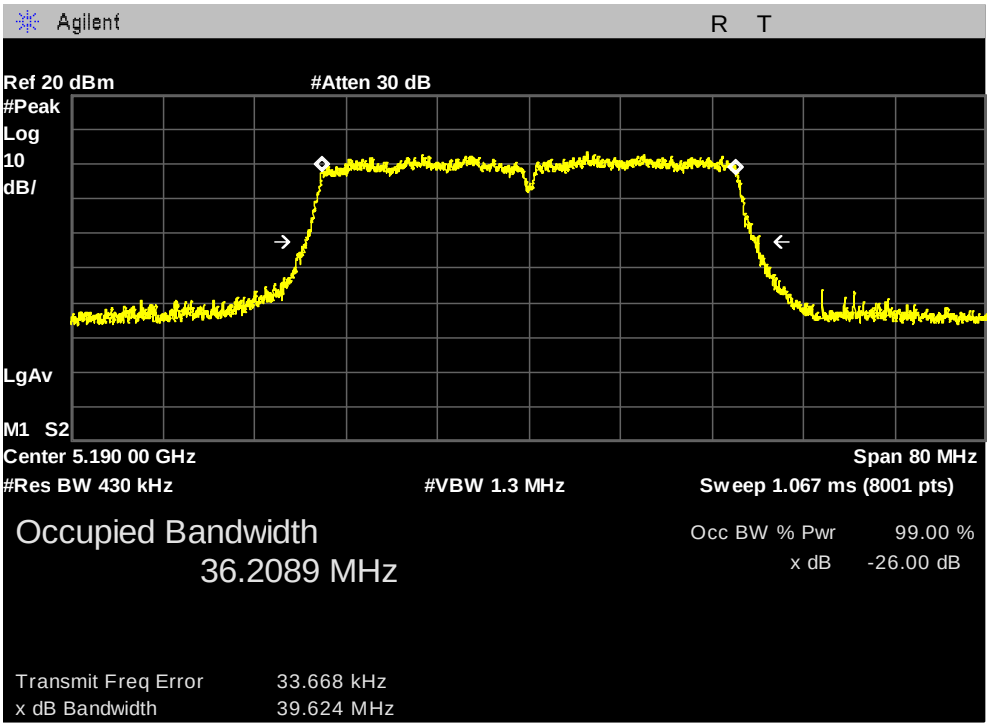
26 dB Bandwidth, Highest Channel (5230 MHz)



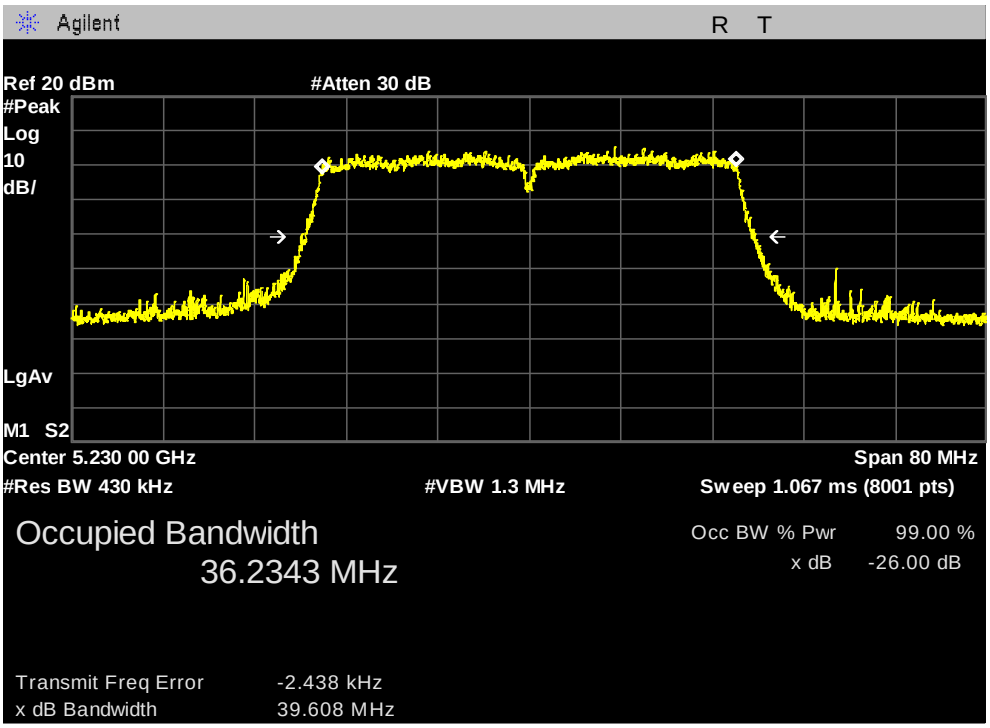
PLOTS OF EMISSIONS

Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5190 MHz)



26 dB Bandwidth, Highest Channel (5230 MHz)

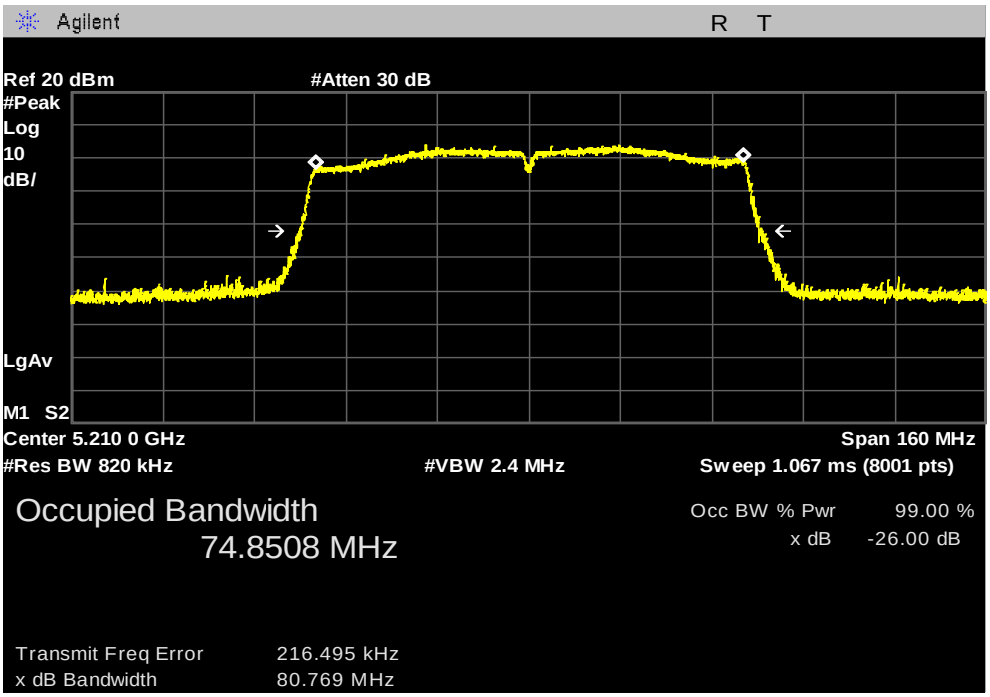


PLOTS OF EMISSIONS

802.11ac (80 MHz) mode

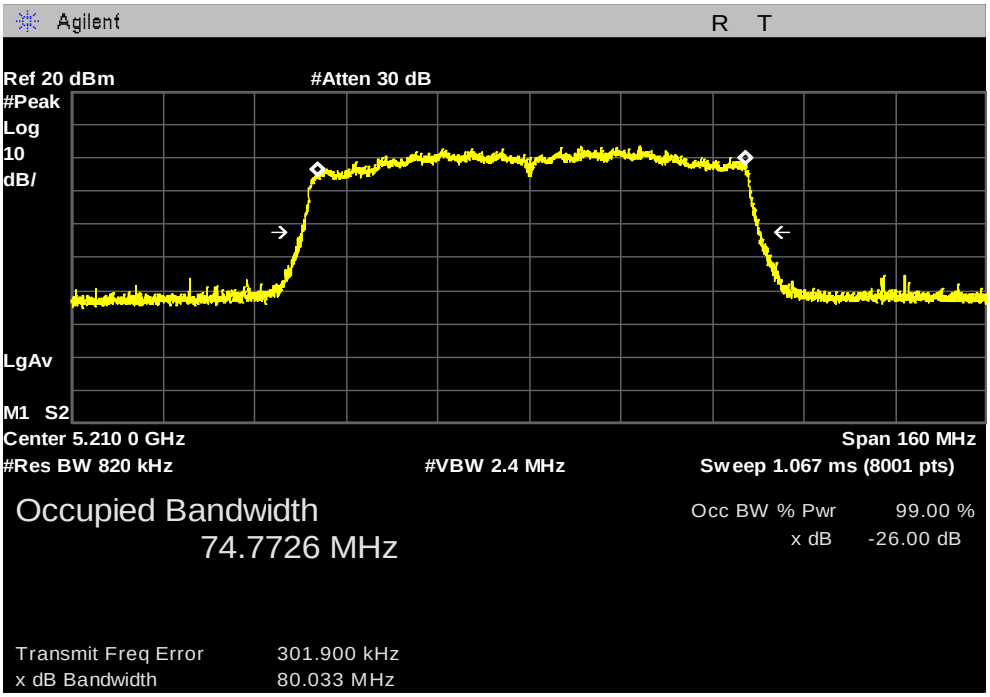
Chain 2 (1TX)

26 dB Bandwidth, Channel (5210 MHz)



Chain 2 (4TX)

26 dB Bandwidth, Channel (5210 MHz)



8.3.2 26 dB Bandwidth and 99 % Occupied bandwidth – U-NII-2A band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11a mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5260	21.82	21.26	16.92	16.69
Middle	5300	21.79	21.08	17.01	16.70
Highest	5320	21.39	21.12	16.85	16.68

802.11n (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5260	24.48	21.42	18.00	17.84
Middle	5300	22.61	21.55	18.10	17.86
Highest	5320	21.53	21.27	17.98	17.85

802.11n (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5270	40.80	39.56	36.40	36.27
Highest	5310	39.87	39.67	36.33	36.25

TEST DATA

802.11ac (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5260	22.72	21.42	18.04	17.87
Middle	5300	27.00	21.43	18.08	17.84
Highest	5320	21.45	21.44	17.95	17.83

802.11ac (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5270	46.85	39.56	36.38	36.24
Highest	5310	40.10	39.59	36.30	36.26

802.11ac (80 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Middle	5290	81.54	80.78	75.68	75.66

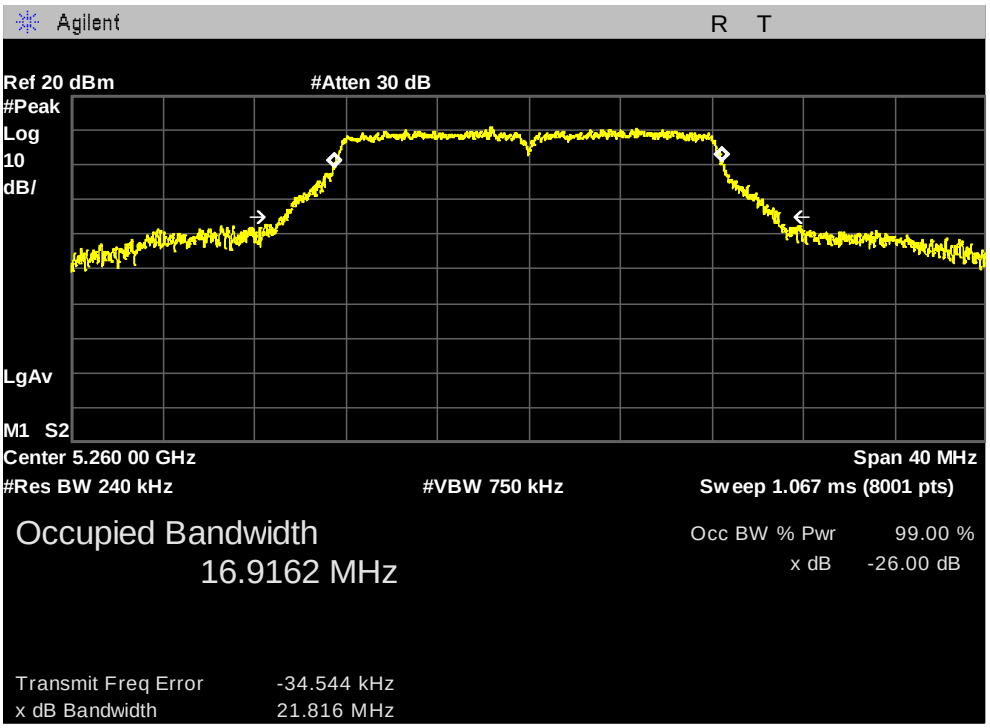
Note:
The worst ant port was determined by the conducted output power that generates the highest emission performing pre-scan testing in all ant port of each mode.

PLOTS OF EMISSIONS

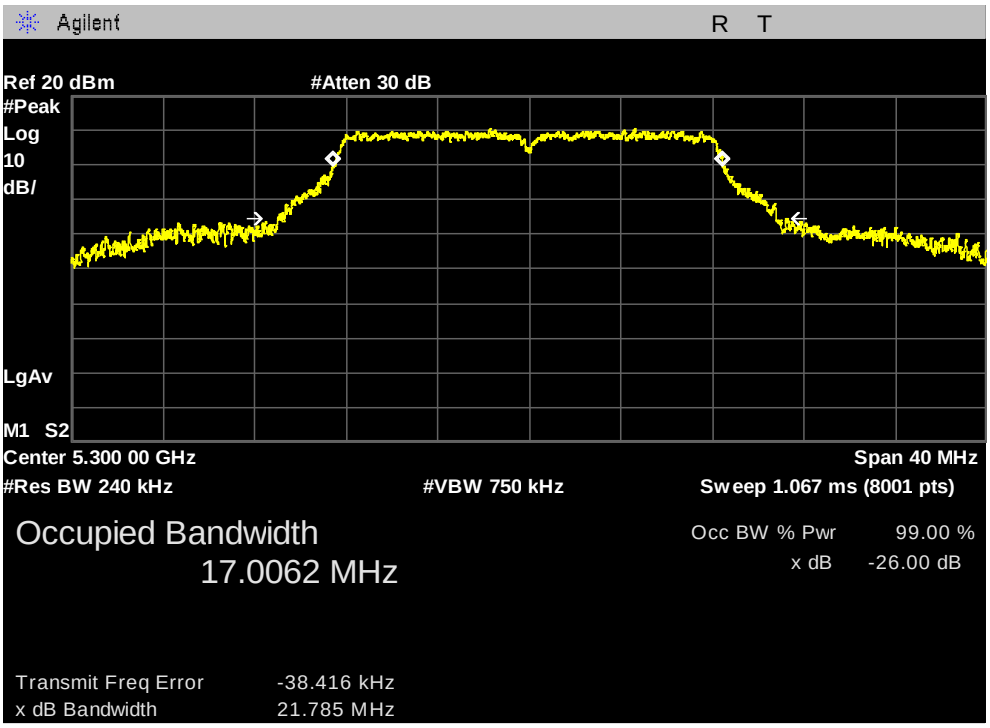
802.11a mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5260 MHz)

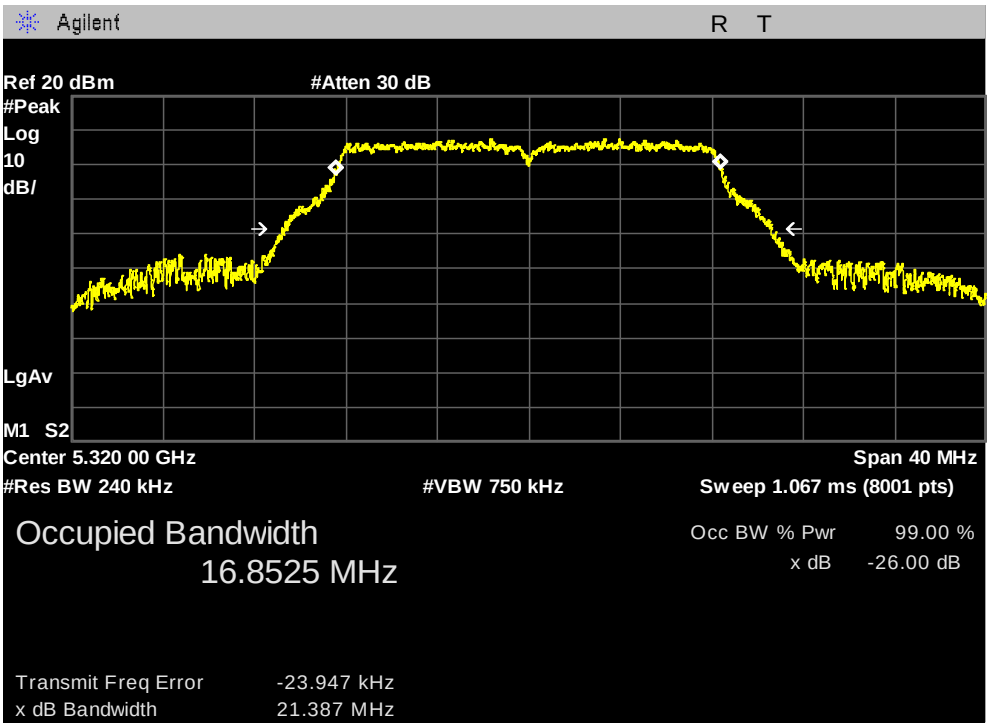


26 dB Bandwidth, Middle Channel (5300 MHz)



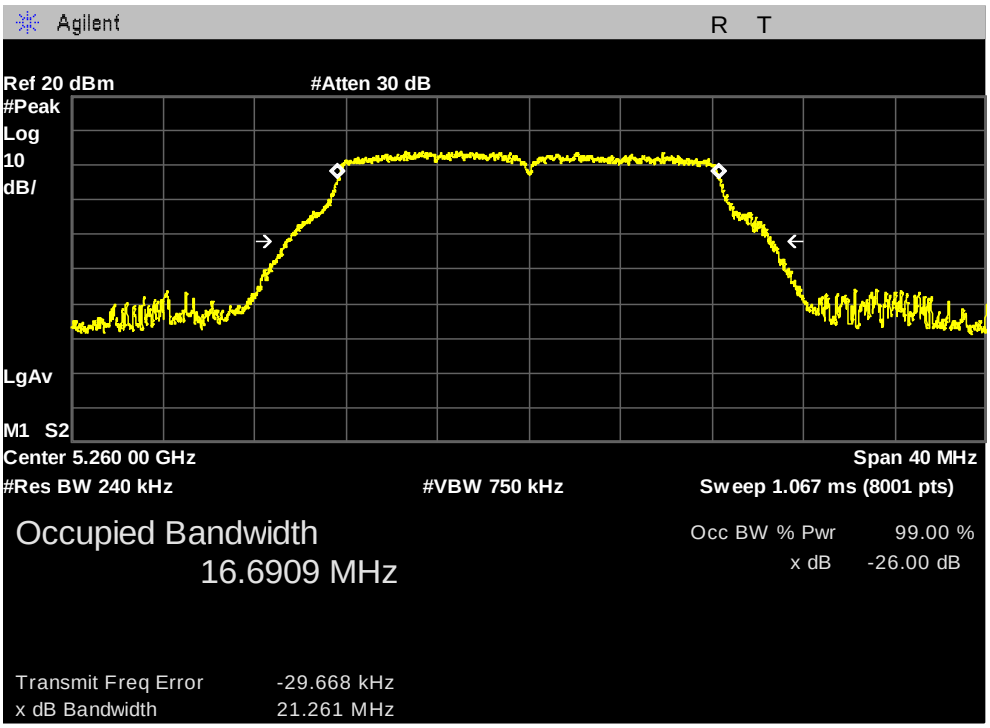
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5320 MHz)



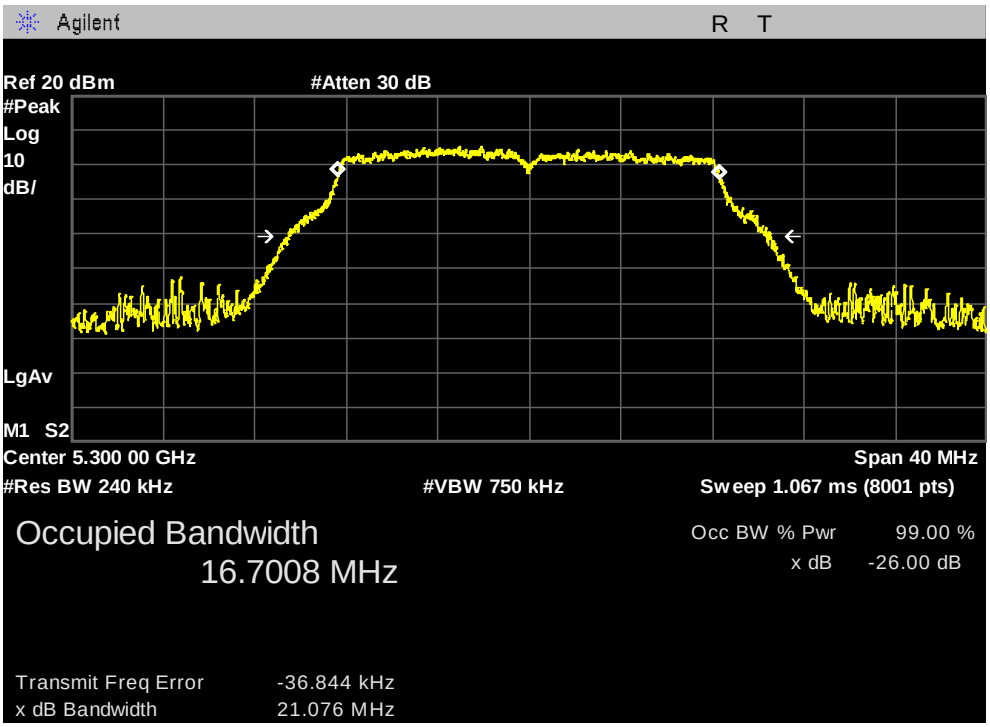
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5260 MHz)

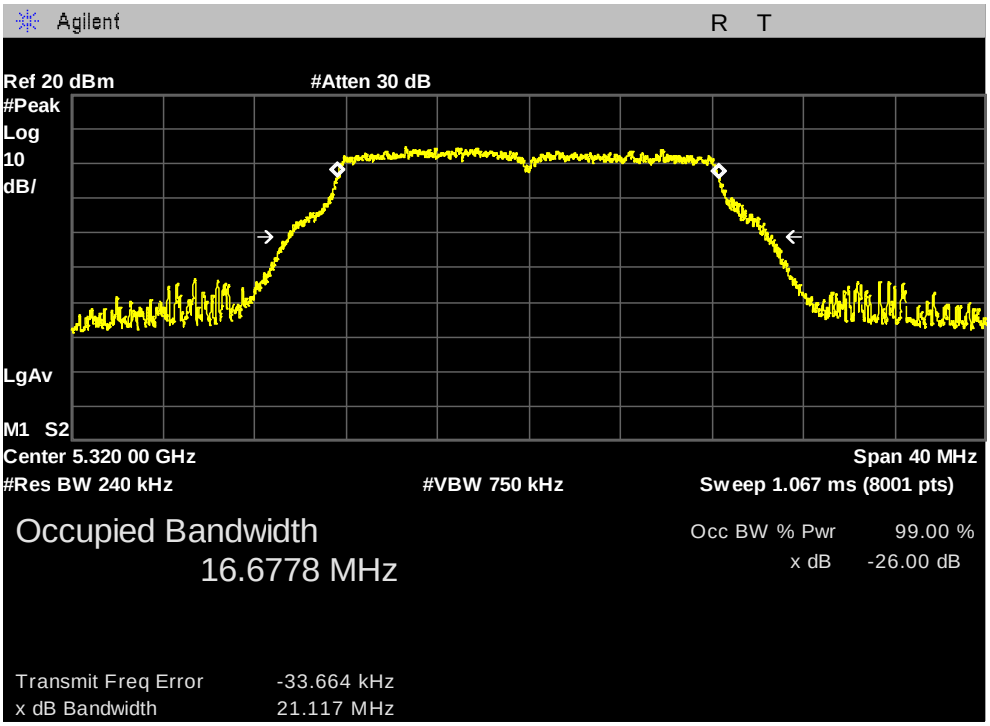


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5300 MHz)



26 dB Bandwidth, Highest Channel (5320 MHz)

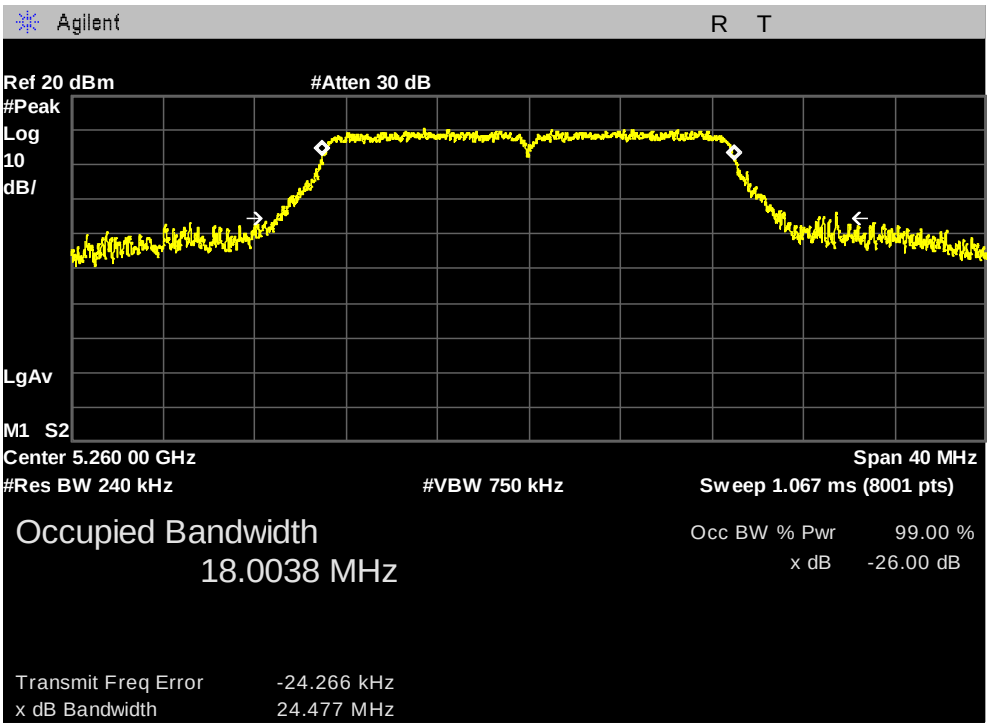


PLOTS OF EMISSIONS

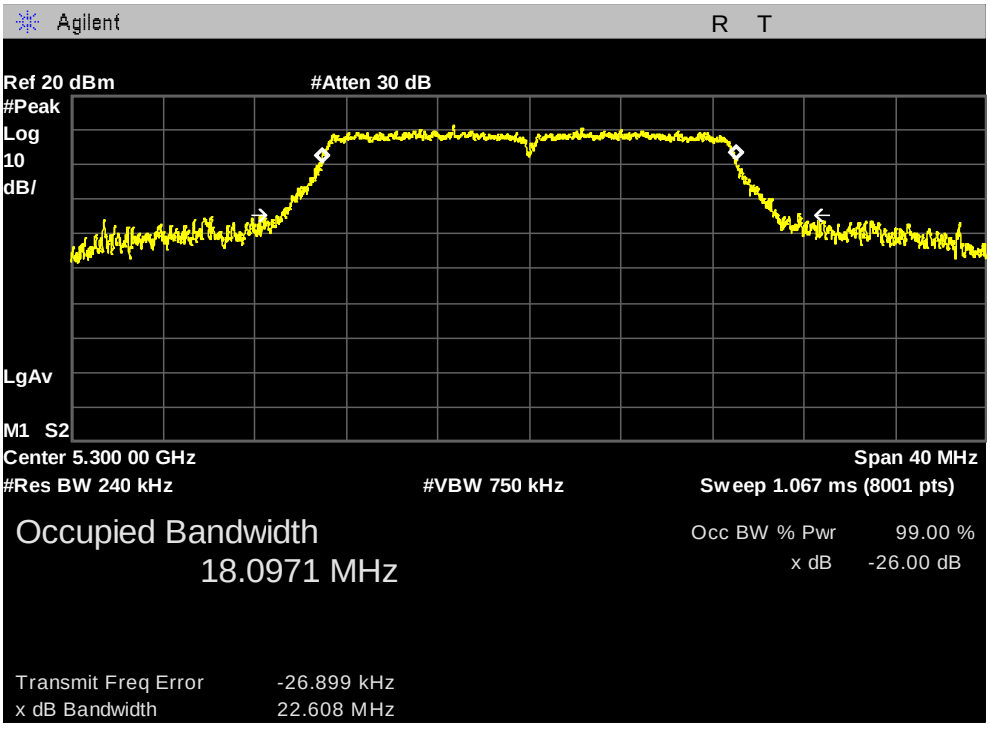
802.11n (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5260 MHz)

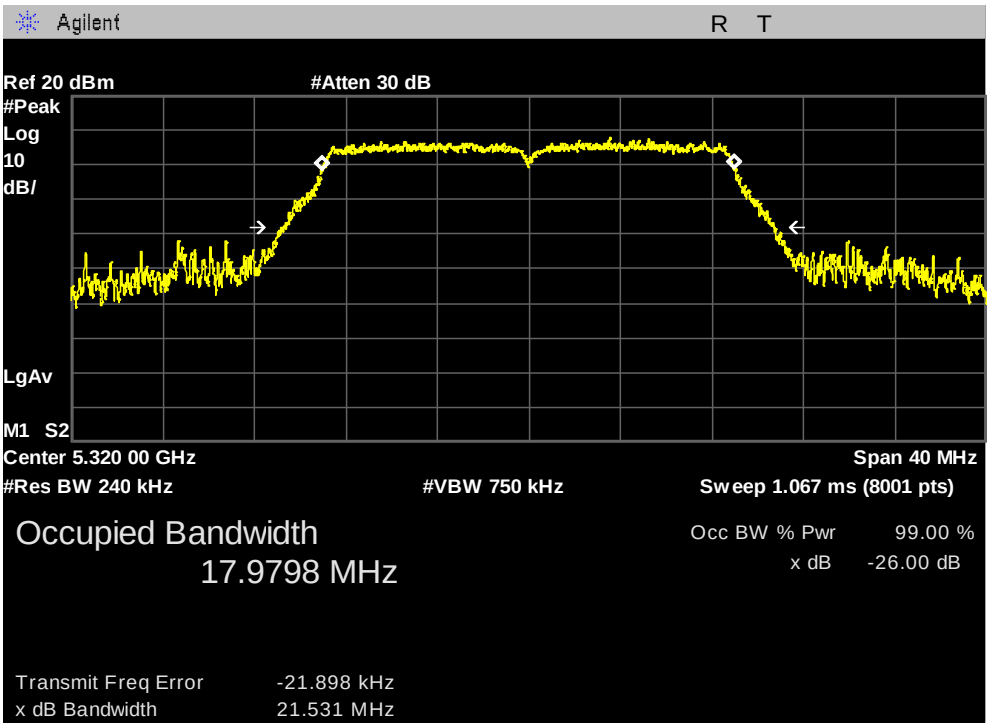


26 dB Bandwidth, Middle Channel (5300 MHz)



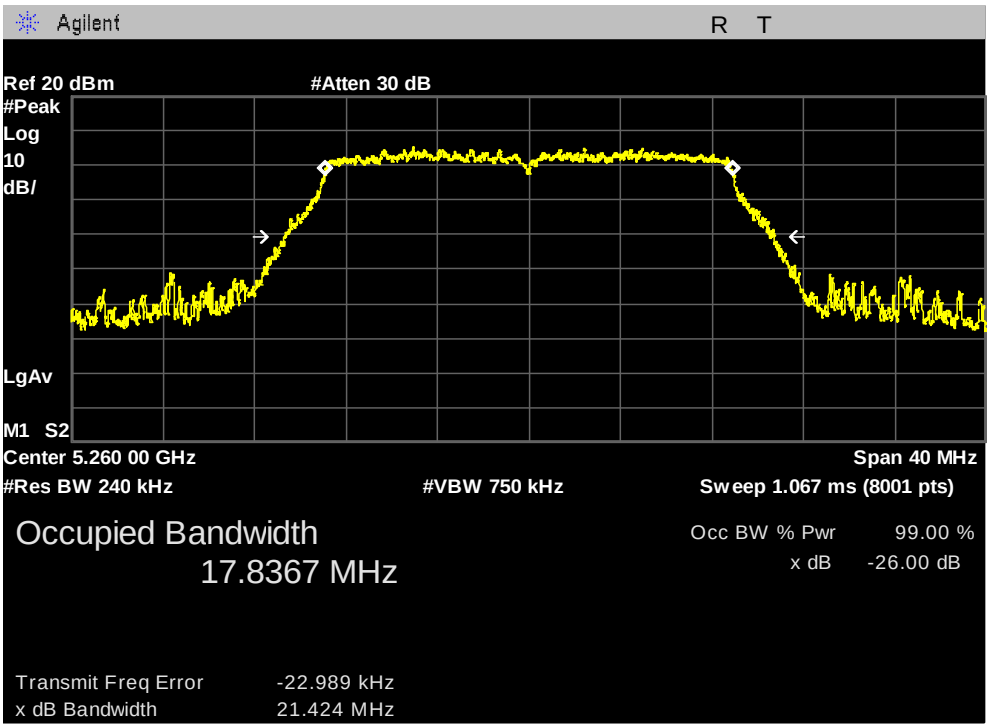
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5320 MHz)



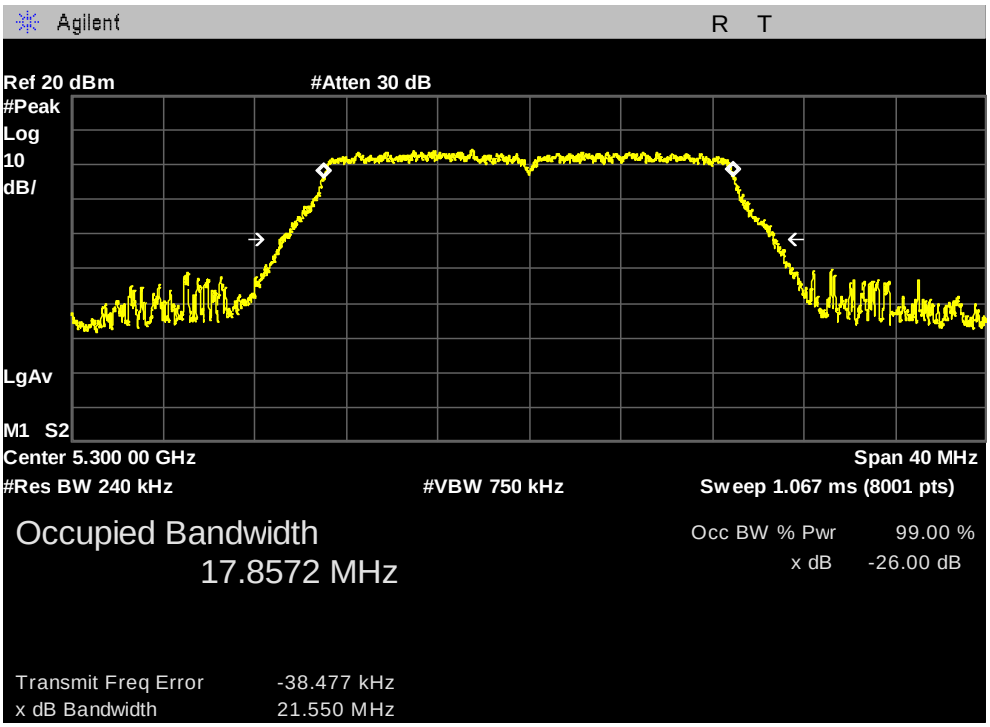
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5260 MHz)

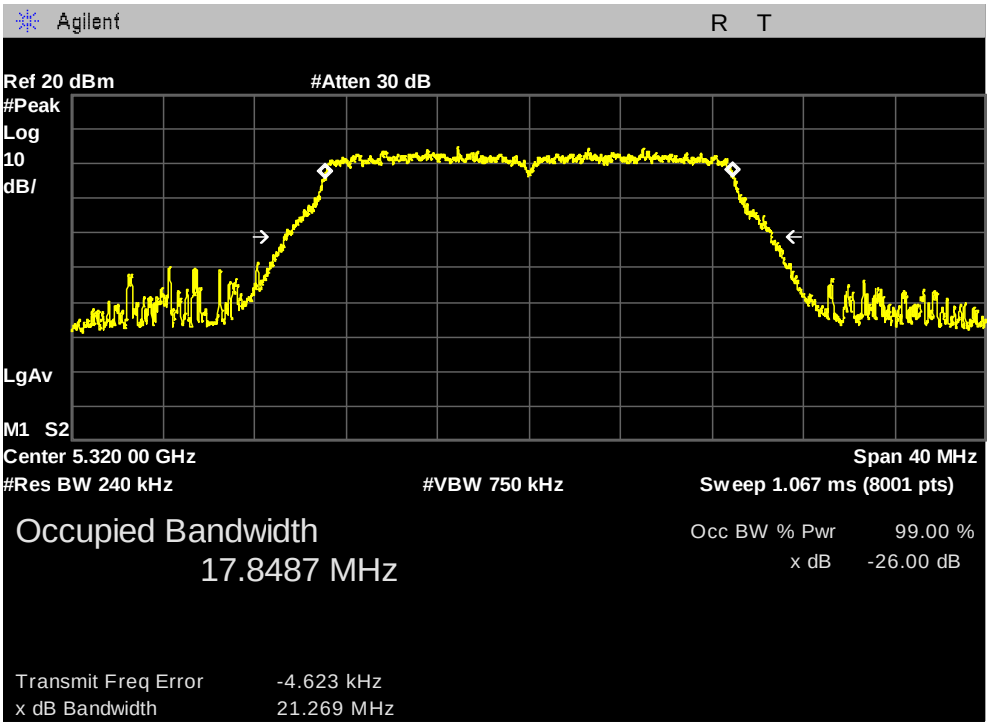


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5300 MHz)



26 dB Bandwidth, Highest Channel (5320 MHz)

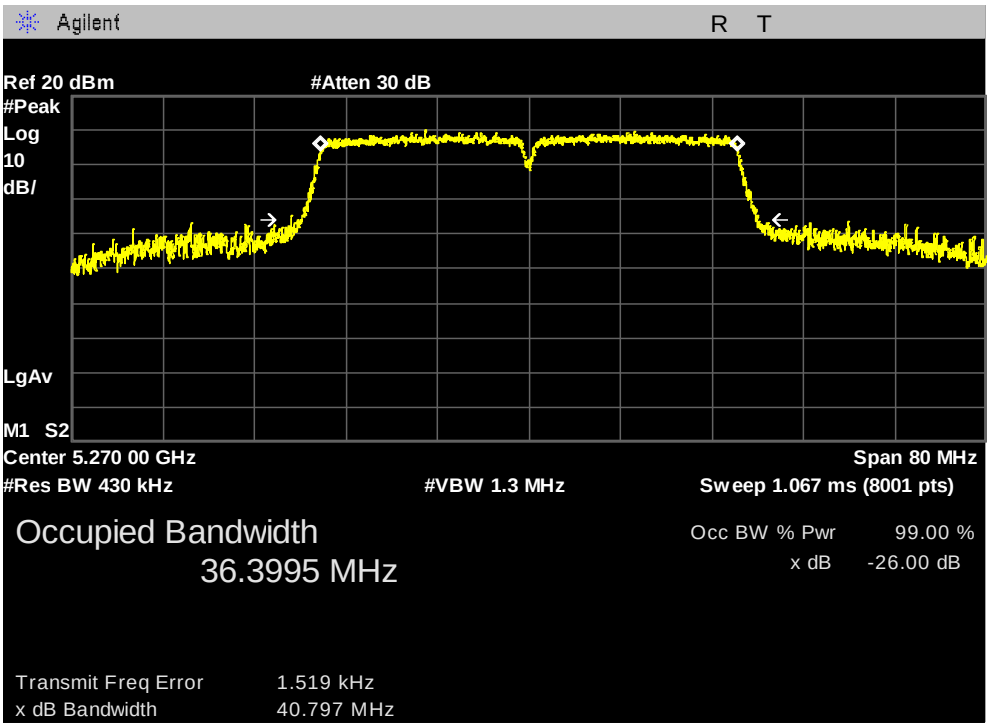


PLOTS OF EMISSIONS

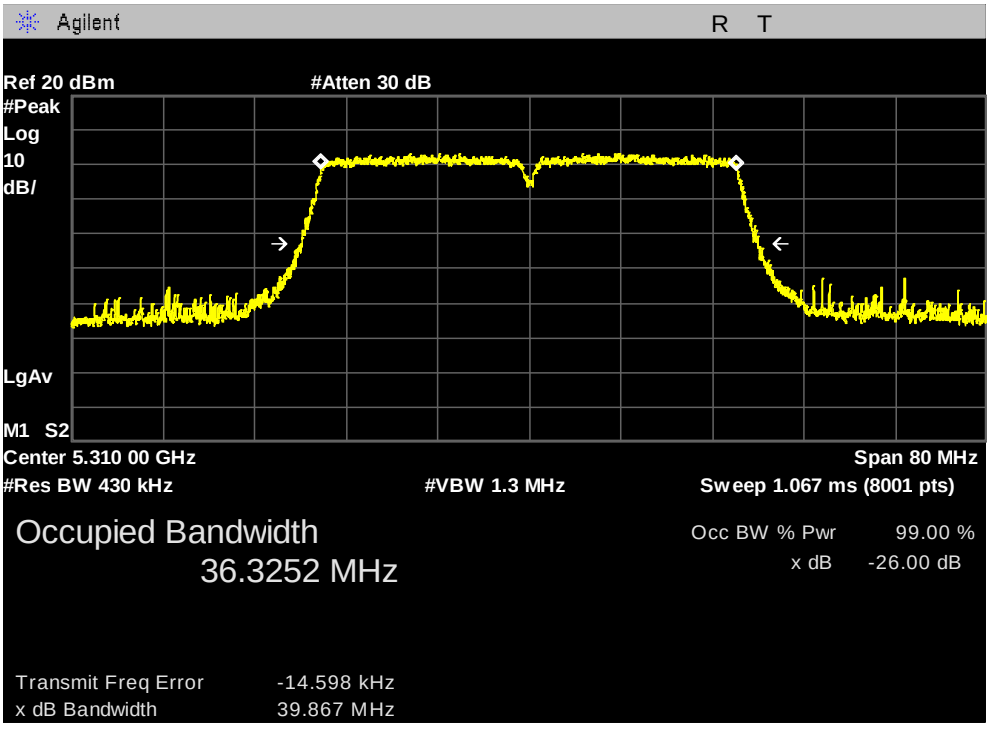
802.11n (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5270 MHz)



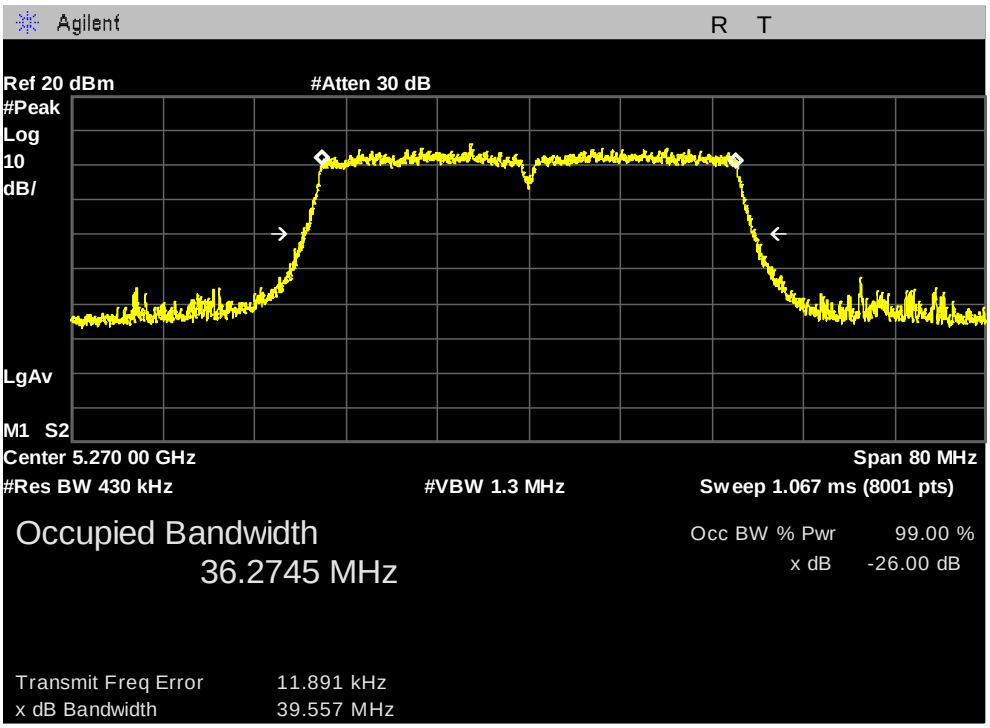
26 dB Bandwidth, Highest Channel (5310 MHz)



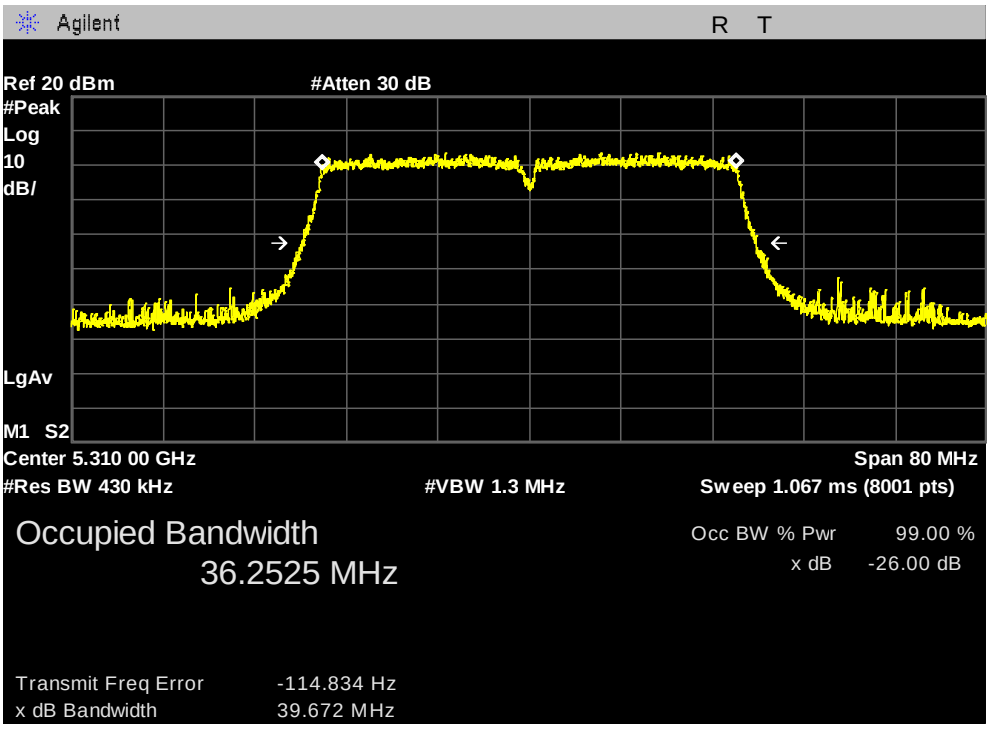
PLOTS OF EMISSIONS

Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5270 MHz)



26 dB Bandwidth, Highest Channel (5310 MHz)

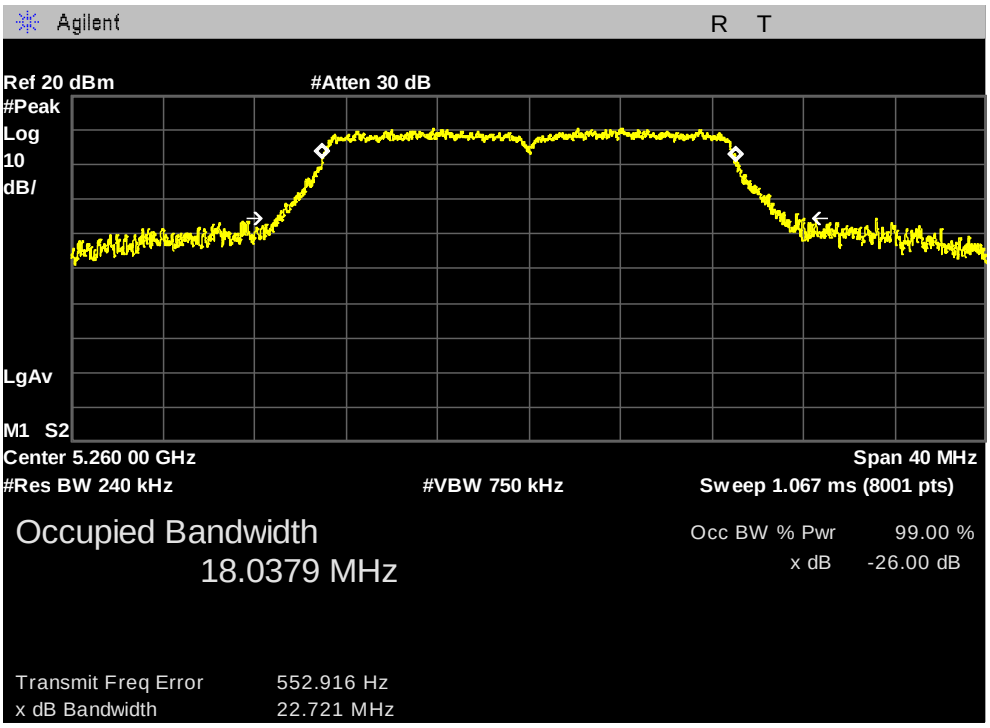


PLOTS OF EMISSIONS

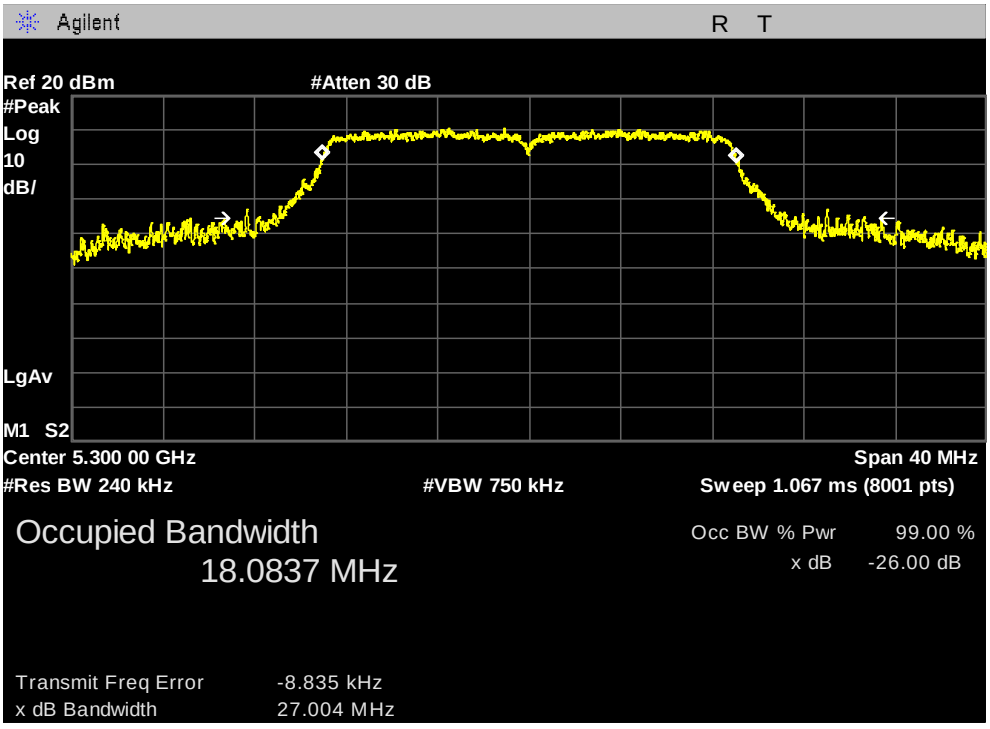
802.11ac (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5260 MHz)

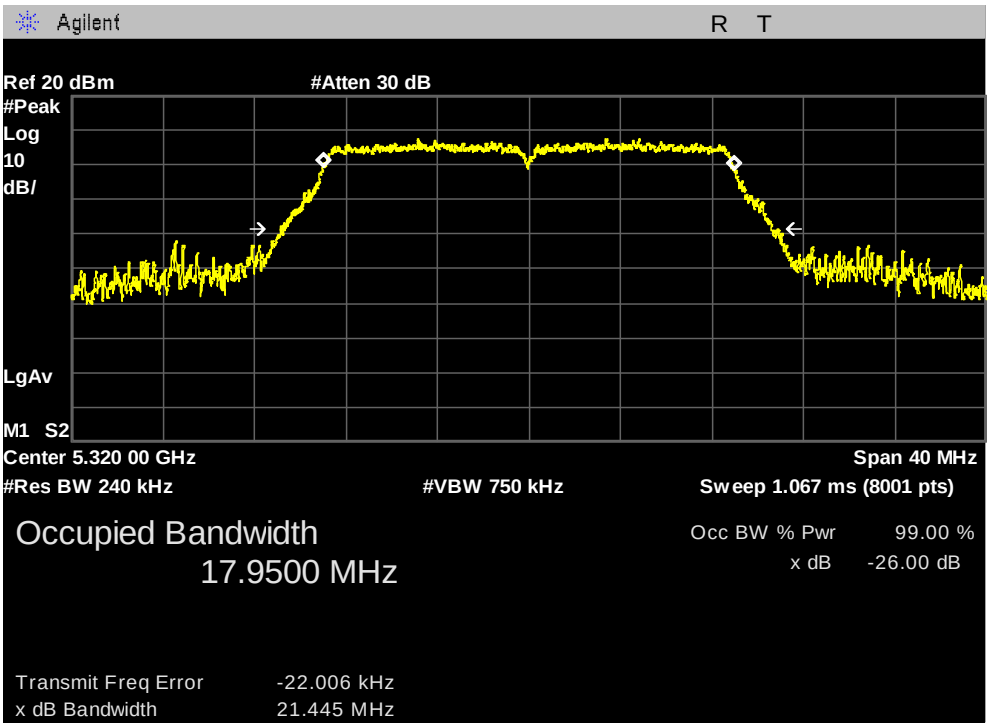


26 dB Bandwidth, Middle Channel (5300 MHz)



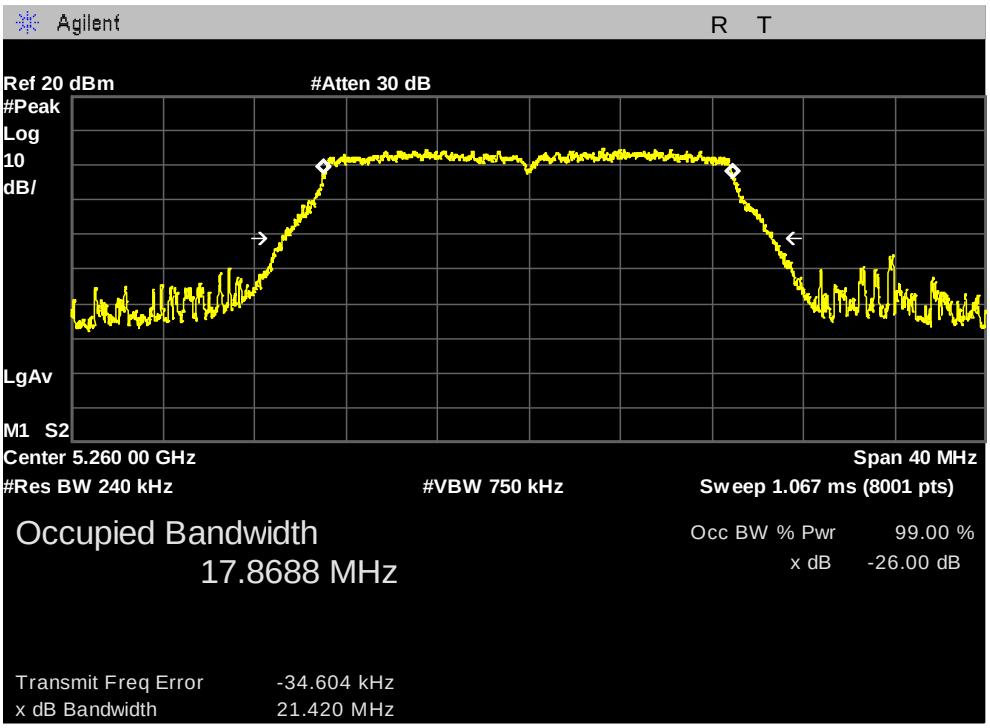
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5320 MHz)



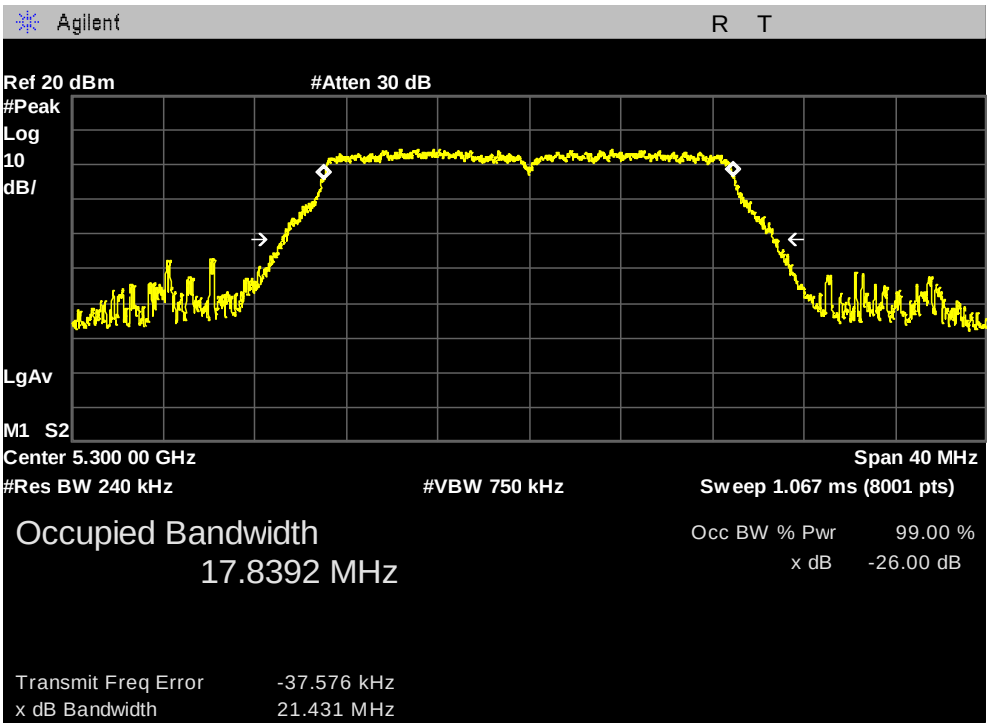
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5260 MHz)

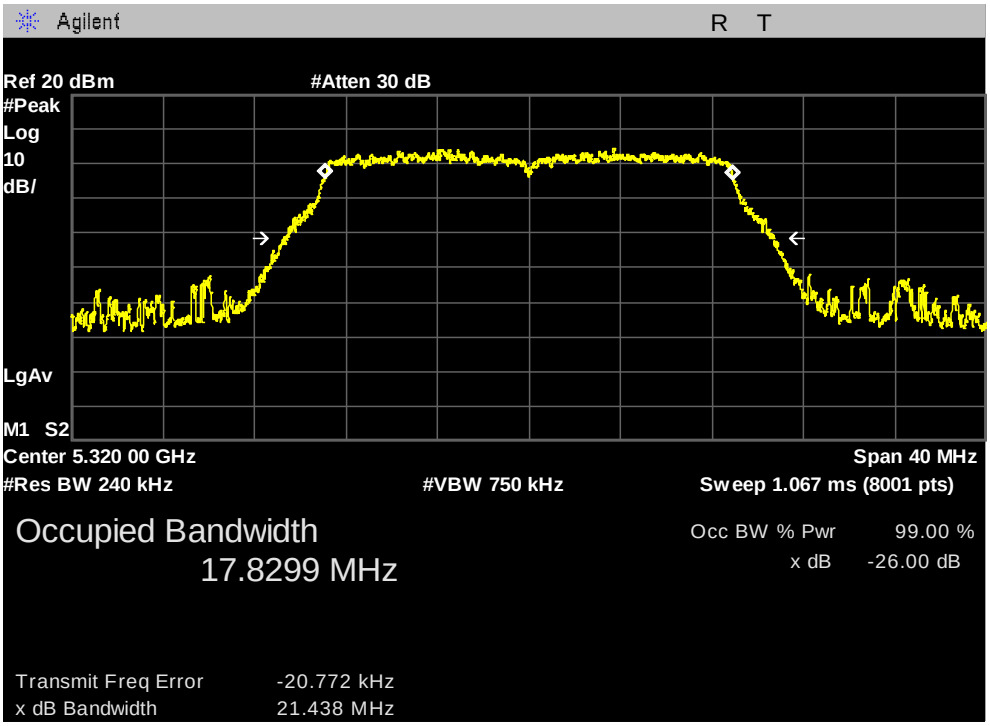


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5300 MHz)



26 dB Bandwidth, Highest Channel (5320 MHz)

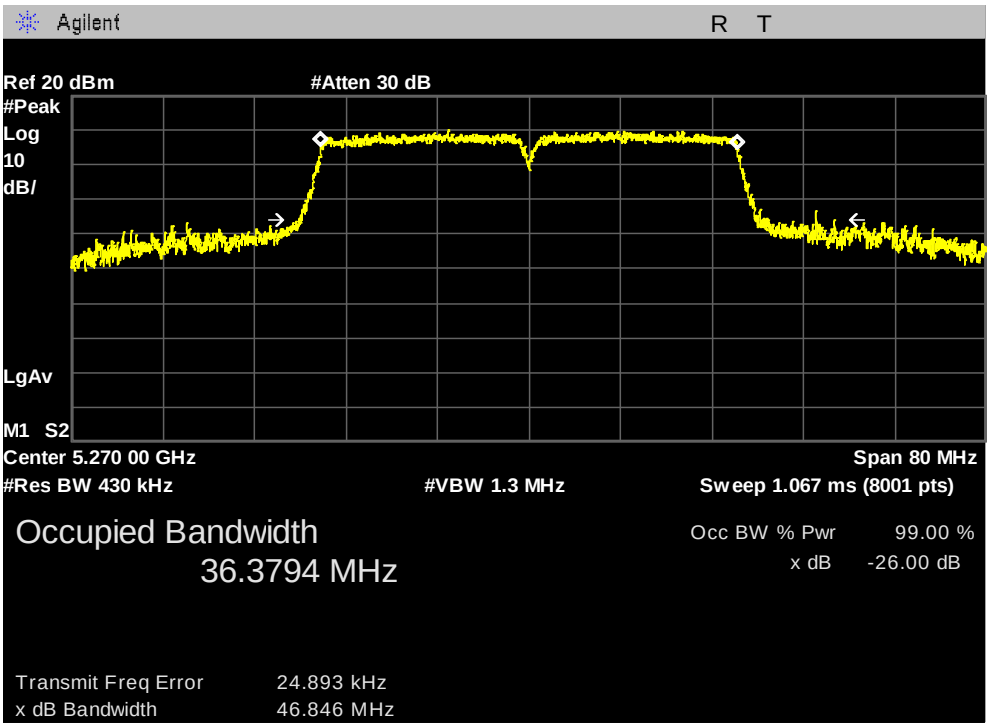


PLOTS OF EMISSIONS

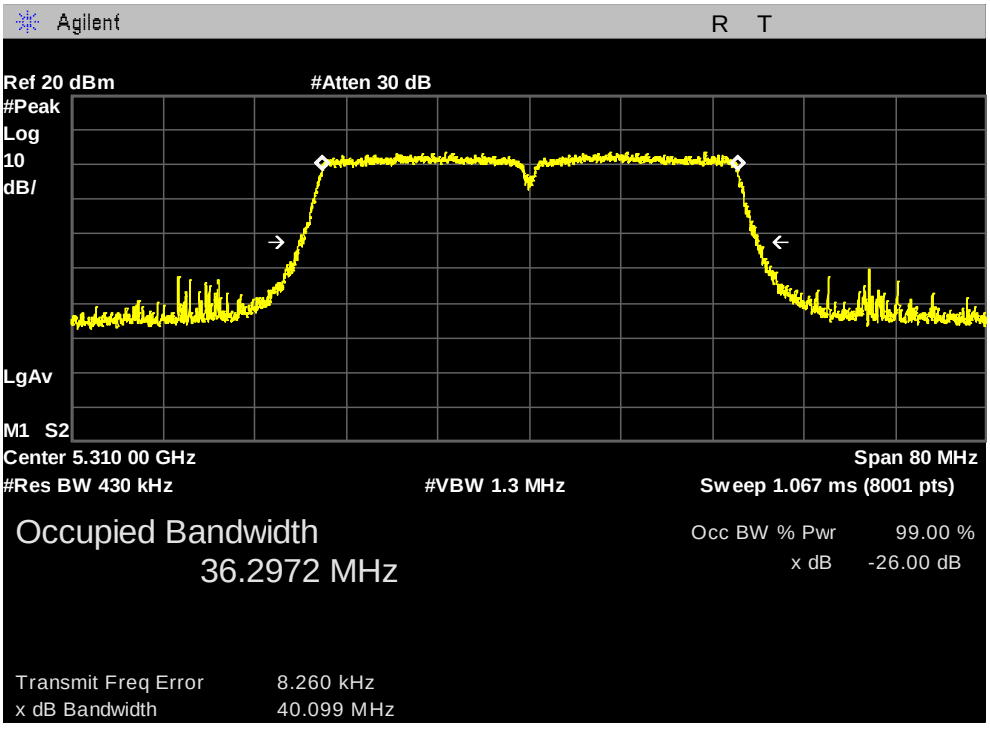
802.11ac (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5270 MHz)



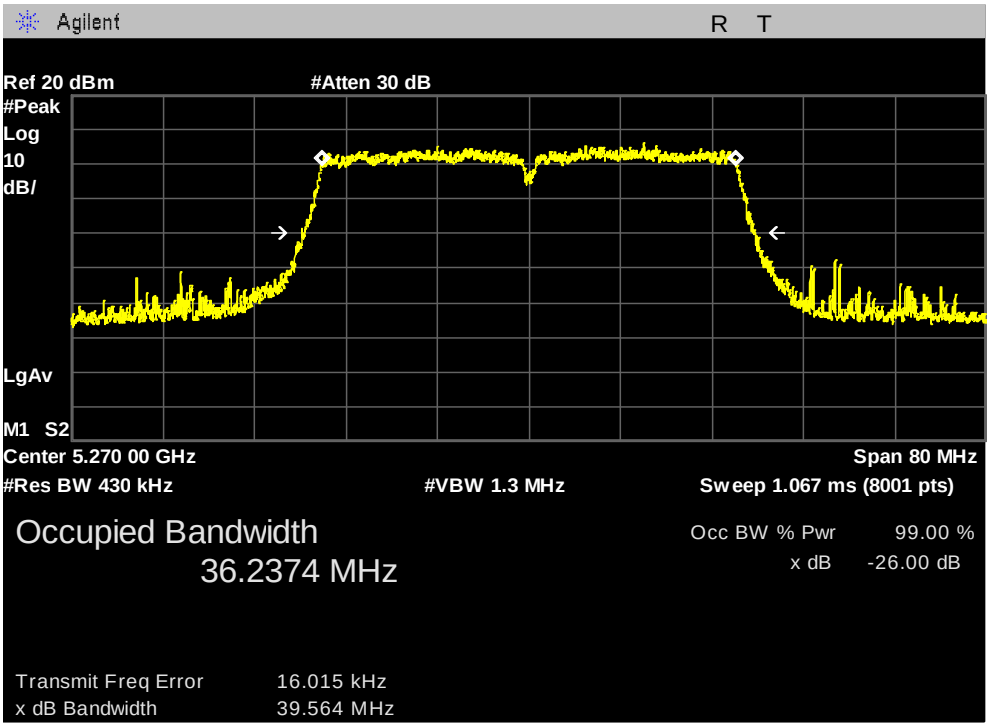
26 dB Bandwidth, Highest Channel (5310 MHz)



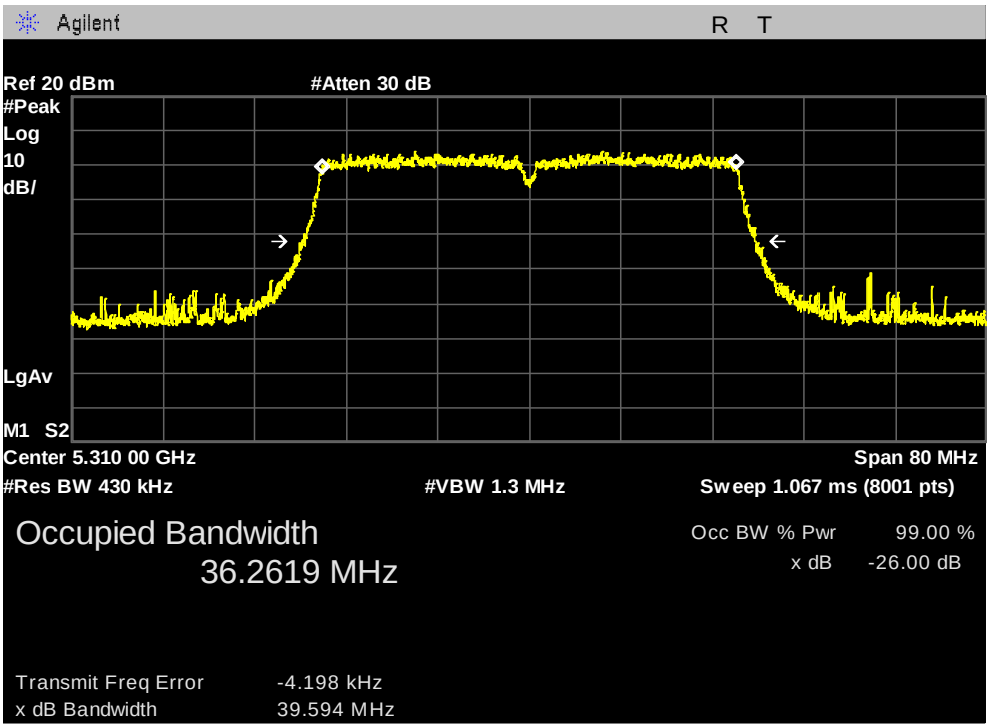
PLOTS OF EMISSIONS

Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5270 MHz)



26 dB Bandwidth, Highest Channel (5310 MHz)

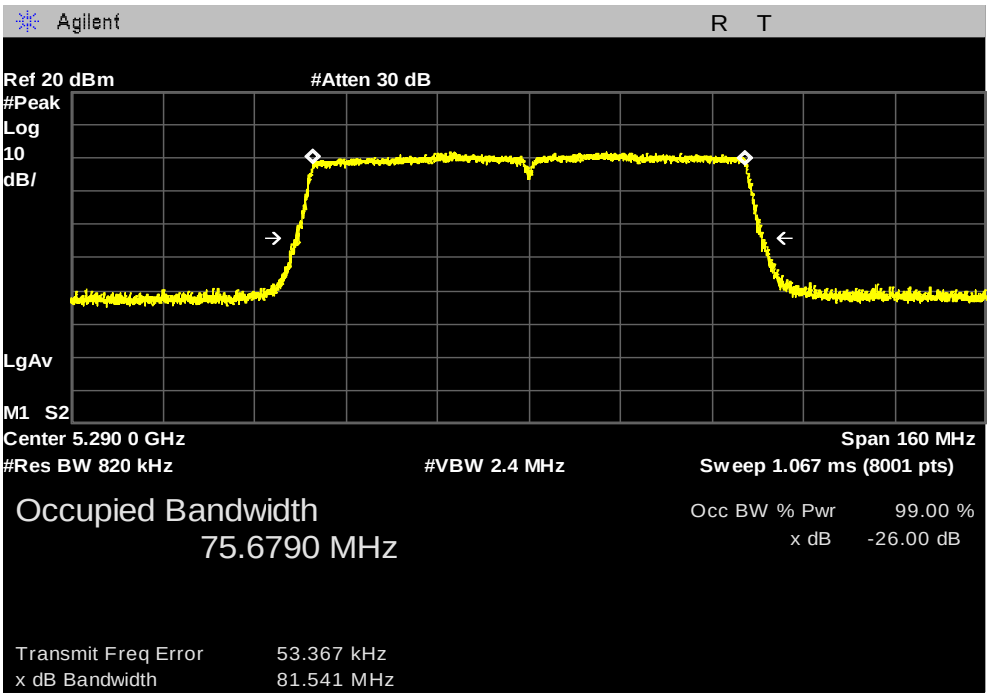


PLOTS OF EMISSIONS

802.11ac (80 MHz) mode

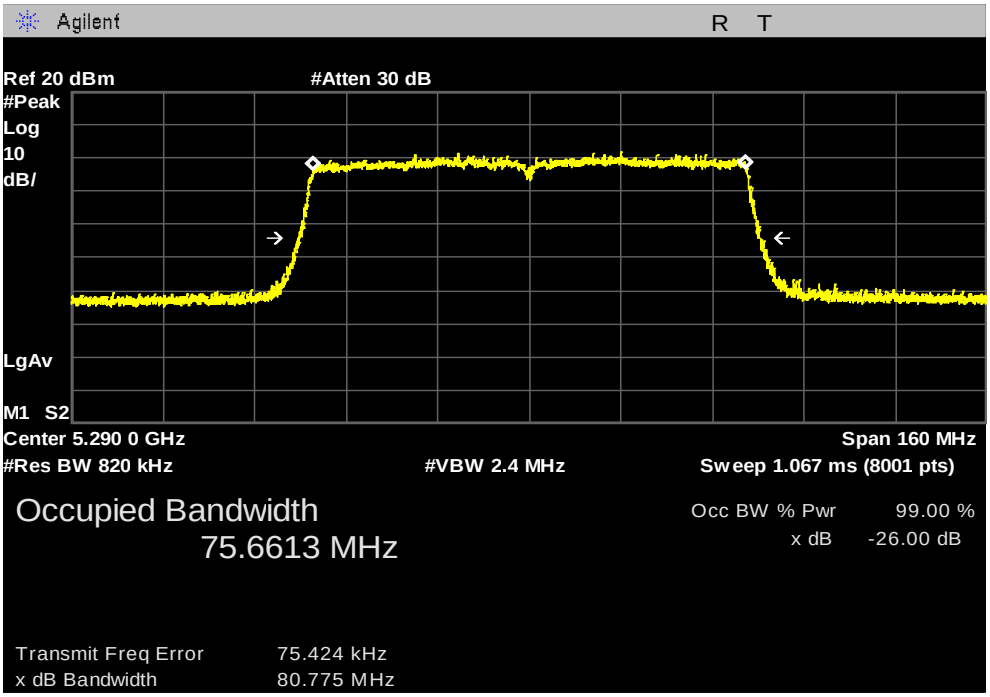
Chain 2 (1TX)

26 dB Bandwidth, Channel (5290 MHz)



Chain 2 (4TX)

26 dB Bandwidth, Channel (5290 MHz)



8.3.3 26 dB Bandwidth and 99 % Occupied bandwidth – U-NII-2C band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel, Straddle channel

802.11a mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5500	21.39	21.18	16.85	16.72
Middle	5600	23.64	21.17	17.00	16.74
Highest	5700	21.36	21.22	16.77	16.69
Straddle	5720	17.69	15.62	13.48	13.50

802.11n (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5500	21.69	21.46	17.95	17.85
Middle	5600	27.10	21.44	18.06	17.88
Highest	5700	21.62	21.37	17.94	17.83
Straddle	5720	15.74	15.87	13.95	14.04

802.11n (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5510	39.88	39.60	36.35	36.34
Middle	5590	48.72	39.48	36.42	36.32
Highest	5670	39.94	39.67	36.32	36.29
Straddle	5710	34.76	34.71	33.13	33.15

TEST DATA

802.11ac (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5500	21.74	21.43	17.97	17.86
Middle	5600	26.66	21.56	18.07	17.83
Highest	5700	21.52	21.41	17.93	17.85
Straddle	5720	15.82	15.76	14.13	14.00

802.11ac (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5510	39.70	39.59	36.32	36.32
Middle	5590	48.75	39.50	36.33	36.33
Highest	5670	40.14	39.79	36.32	36.30
Straddle	5710	35.01	34.74	33.04	33.07

802.11ac (80 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Lowest	5530	81.37	81.49	75.72	75.70
Highest	5610	86.06	80.48	75.78	75.78
Straddle	5690	75.70	75.90	72.90	72.90

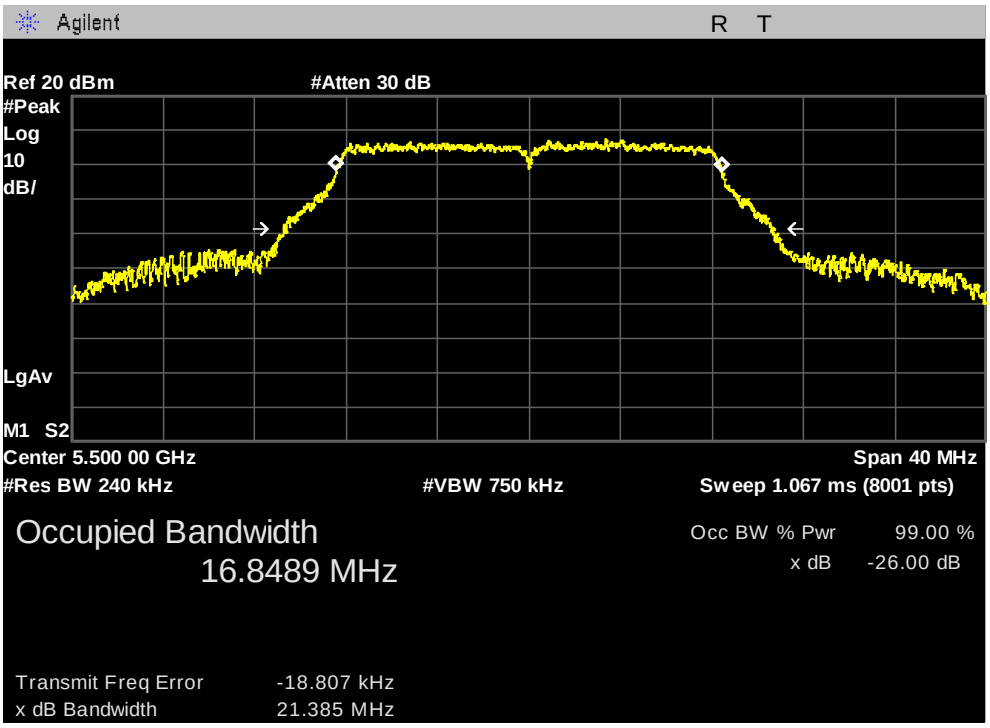
Note:
The worst ant port was determined by the conducted output power that generates the highest emission performing pre-scan testing in all ant port of each mode.

PLOTS OF EMISSIONS

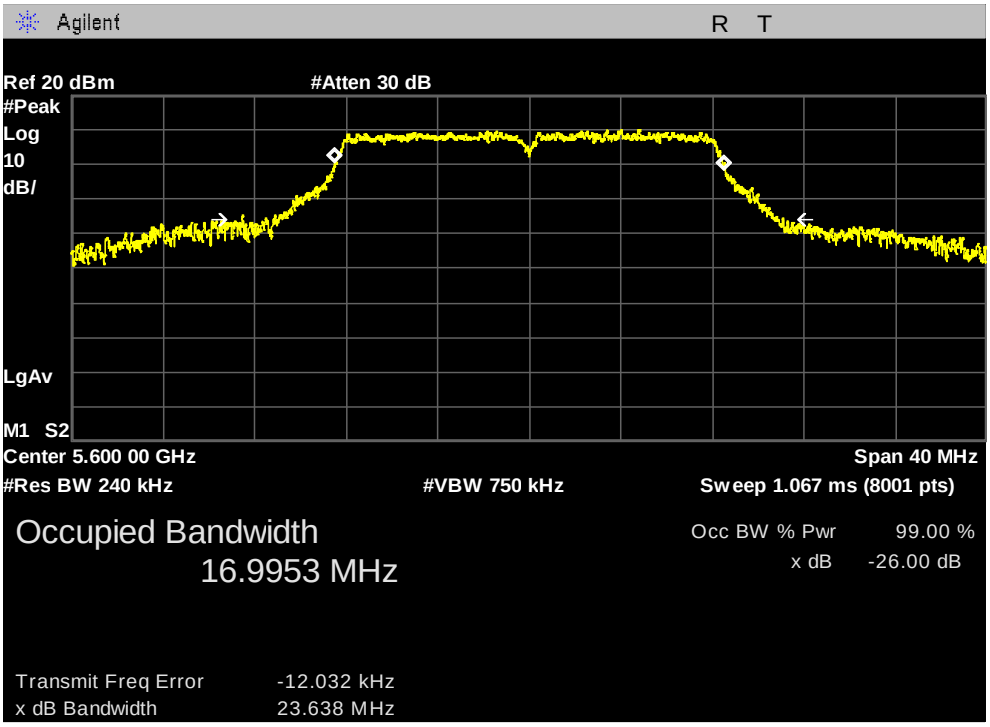
802.11a mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5500 MHz)

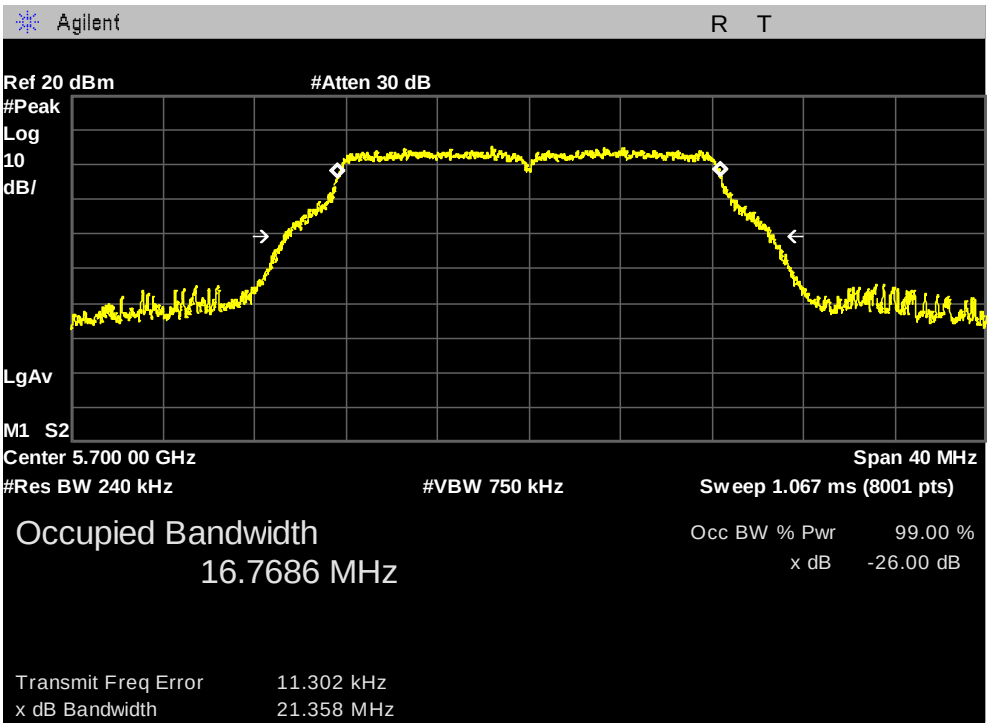


26 dB Bandwidth, Middle Channel (5600 MHz)

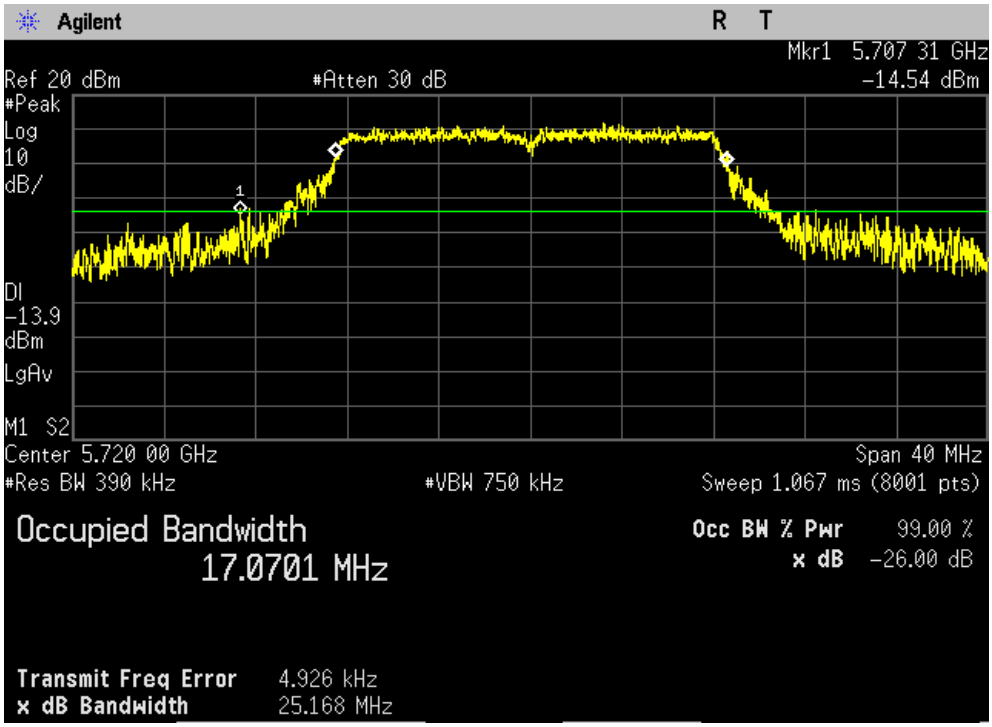


PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5700 MHz)

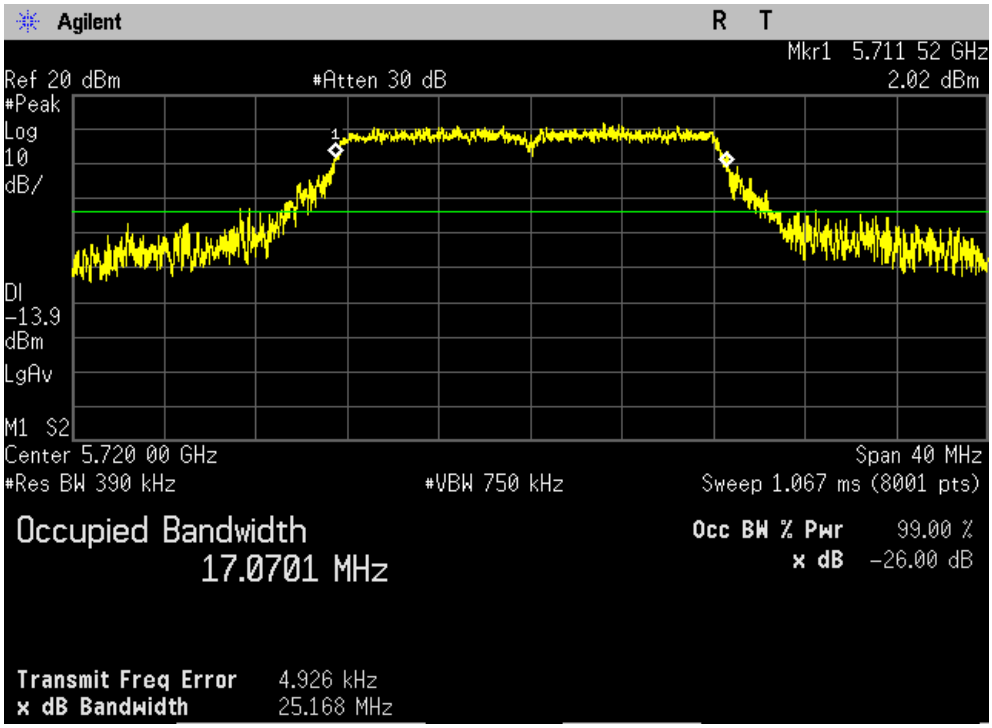


26 dB Bandwidth, Straddle Channel (5720 MHz)



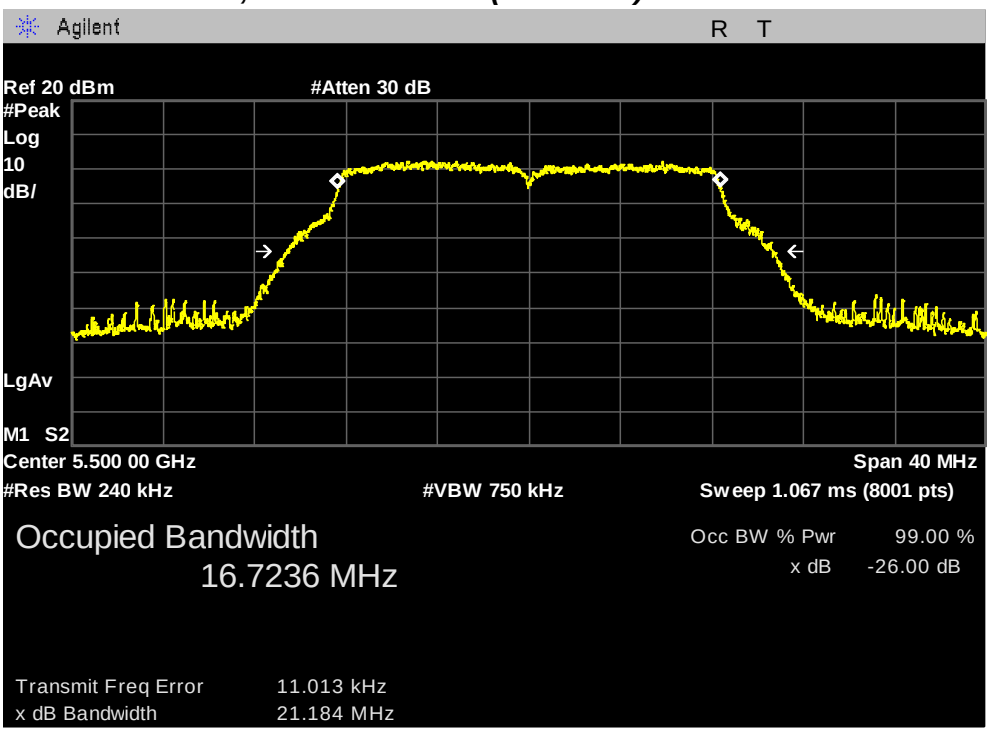
PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5720 MHz)



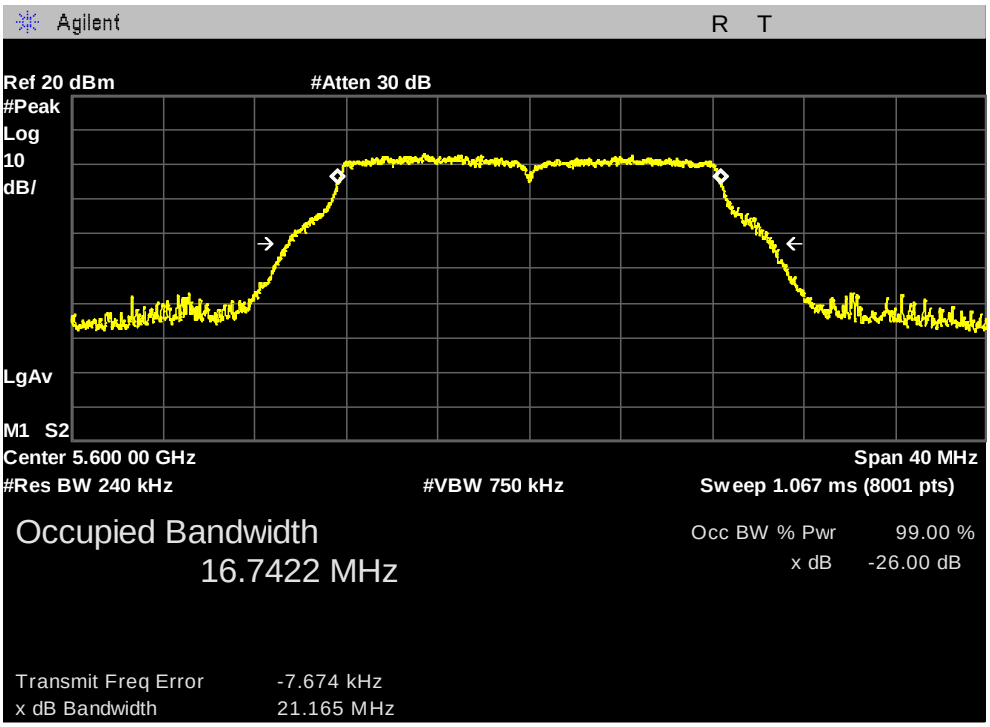
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5500 MHz)

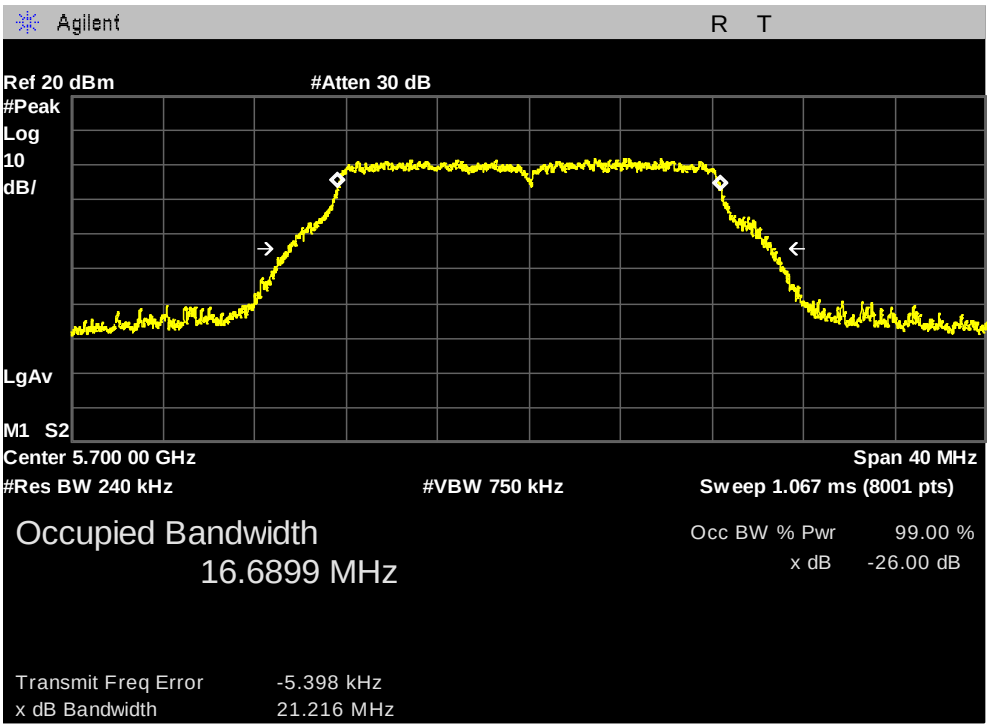


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5600 MHz)

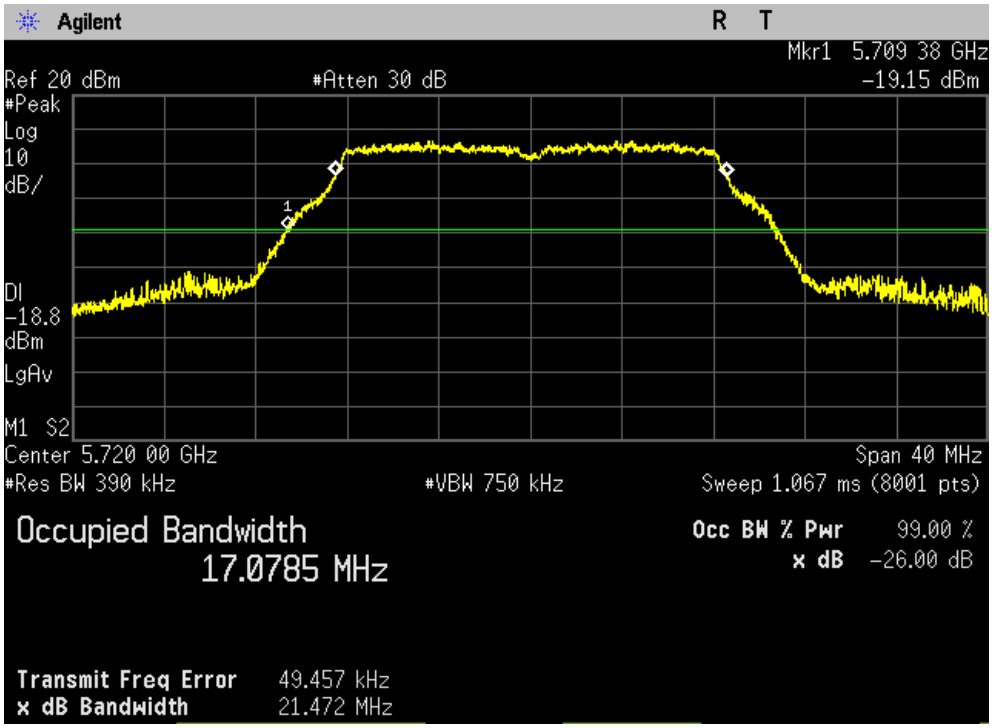


26 dB Bandwidth, Highest Channel (5700 MHz)

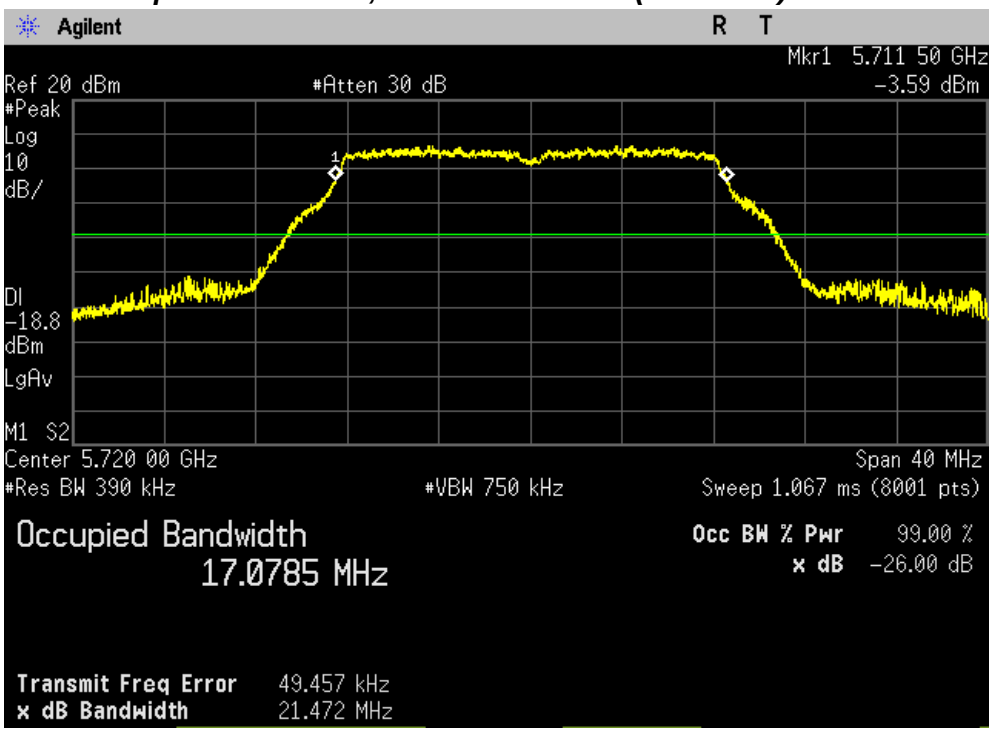


PLOTS OF EMISSIONS

26 dB Bandwidth, Straddle Channel (5720 MHz)



99 % Occupied bandwidth, Straddle Channel (5720 MHz)

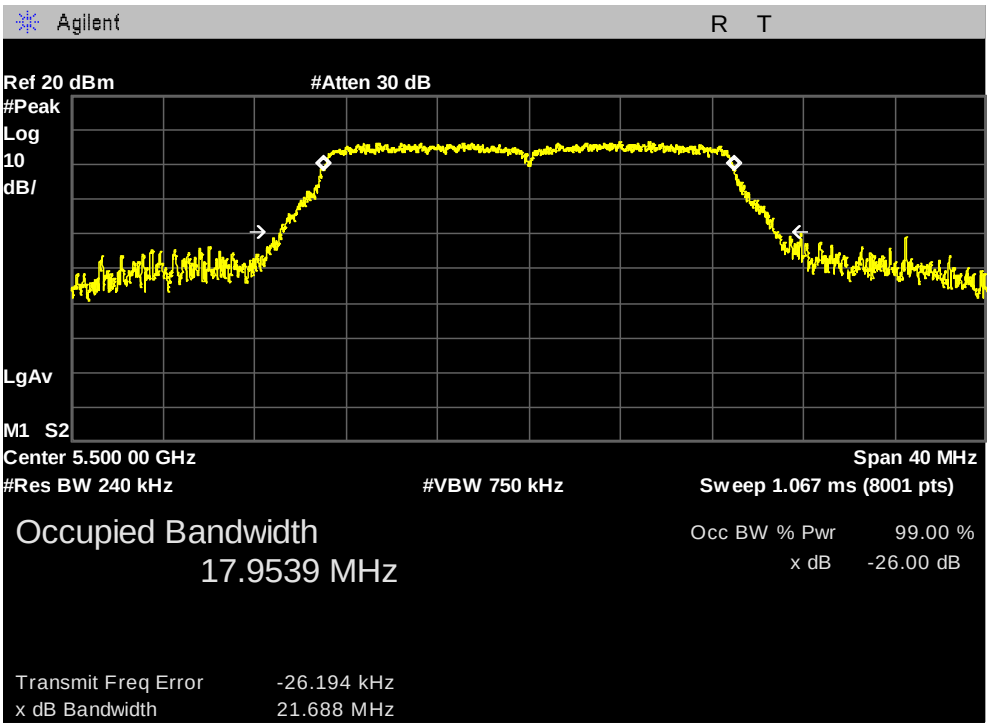


PLOTS OF EMISSIONS

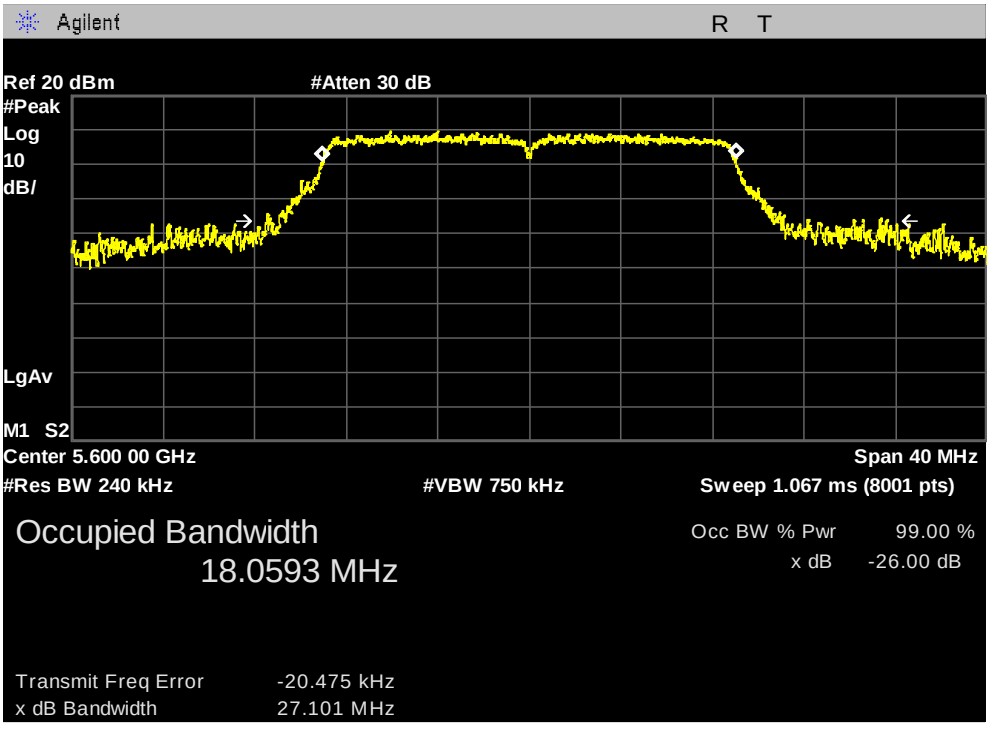
802.11n (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5500 MHz)

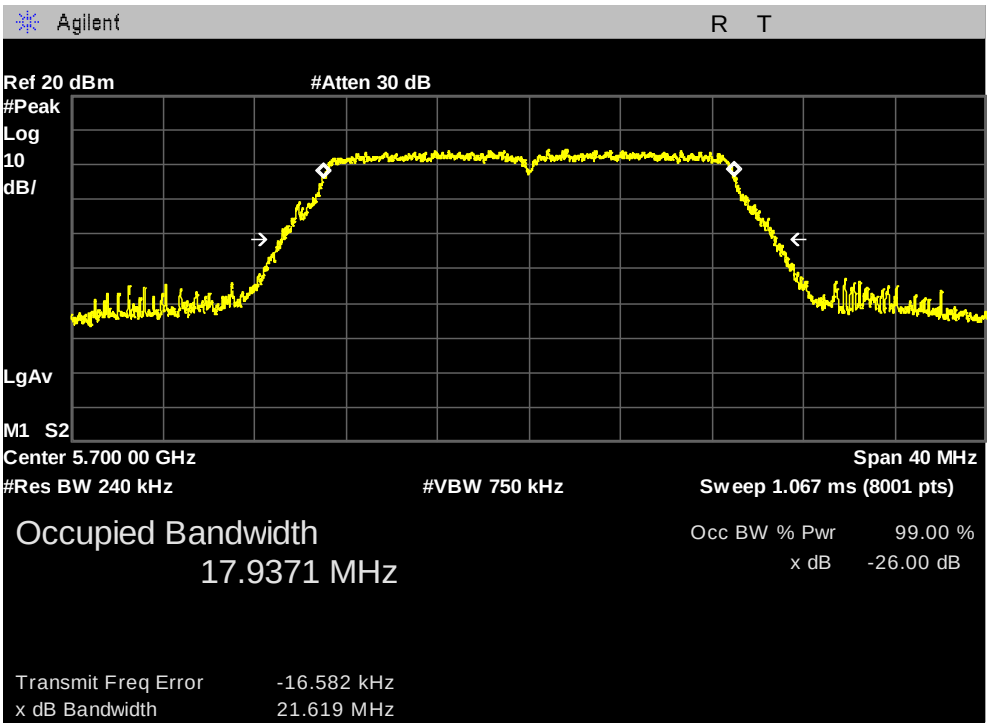


26 dB Bandwidth, Middle Channel (5600 MHz)

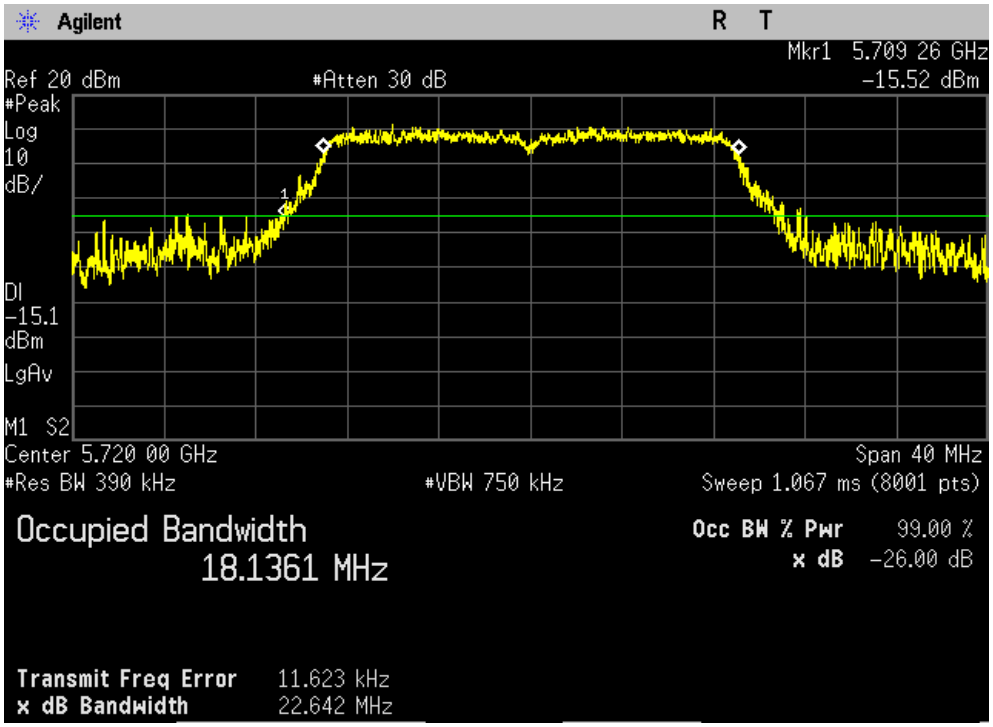


PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5700 MHz)

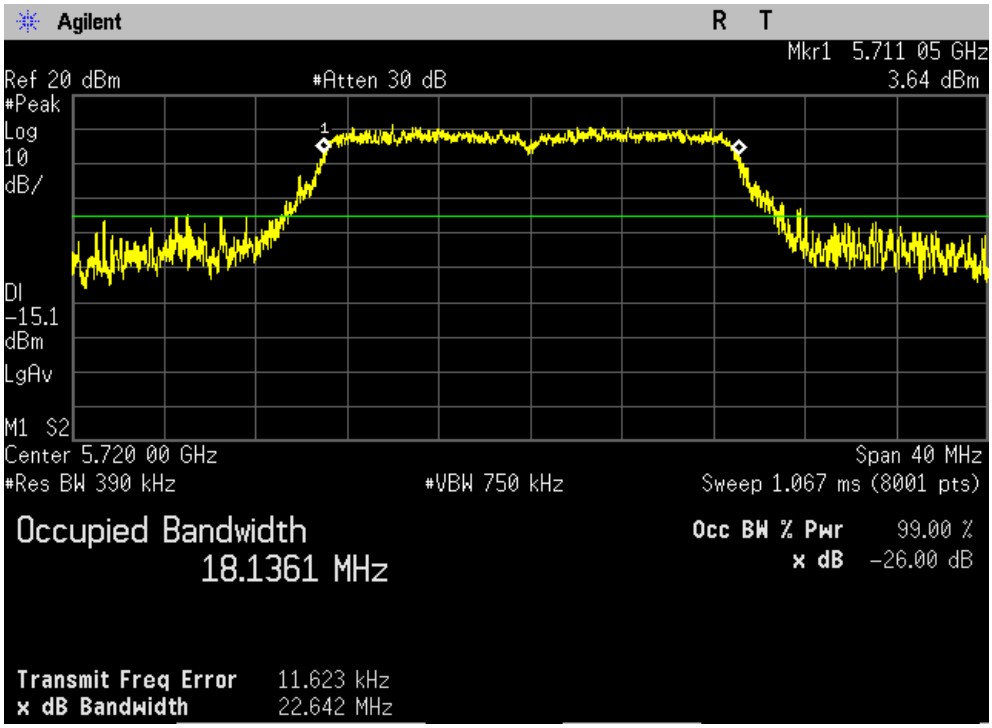


26 dB Bandwidth, Straddle Channel (5720 MHz)



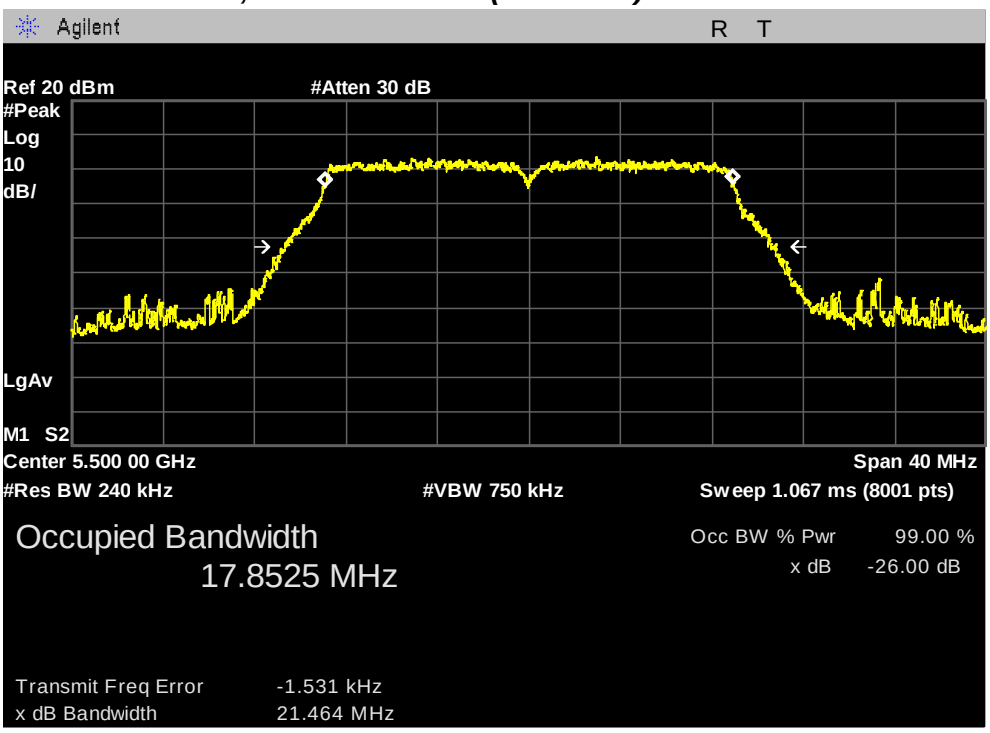
PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5720 MHz)



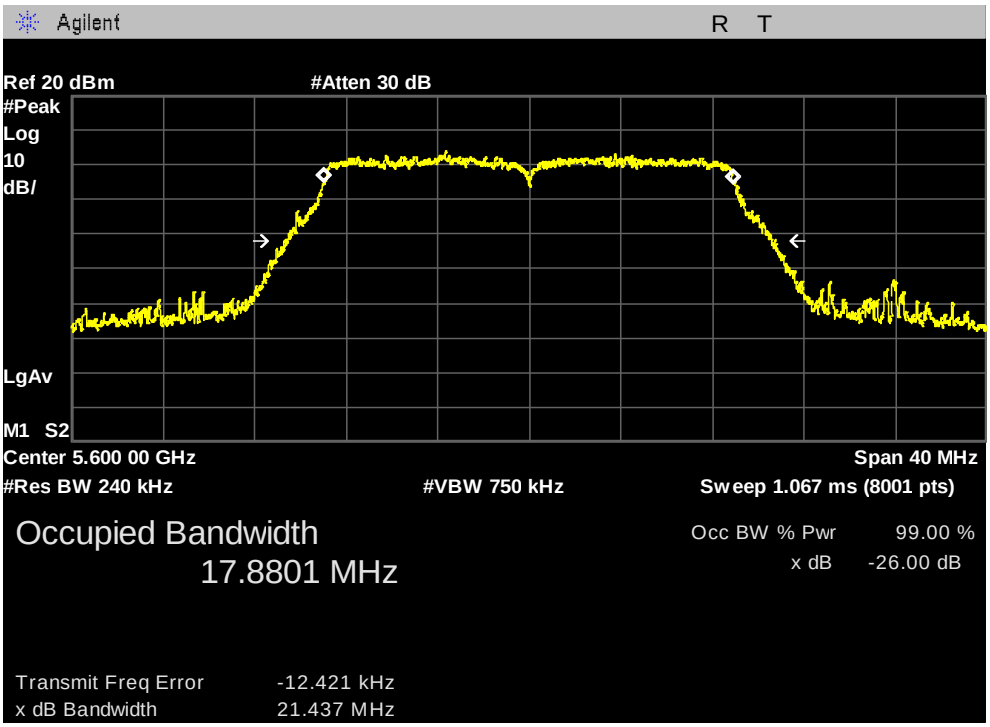
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5500 MHz)

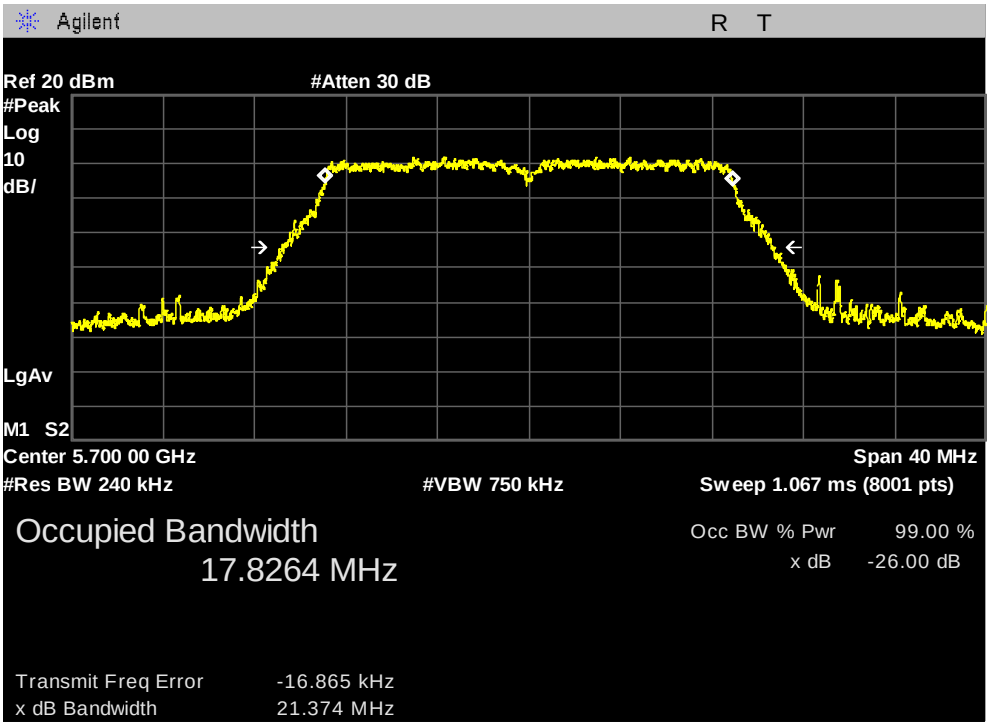


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5600 MHz)

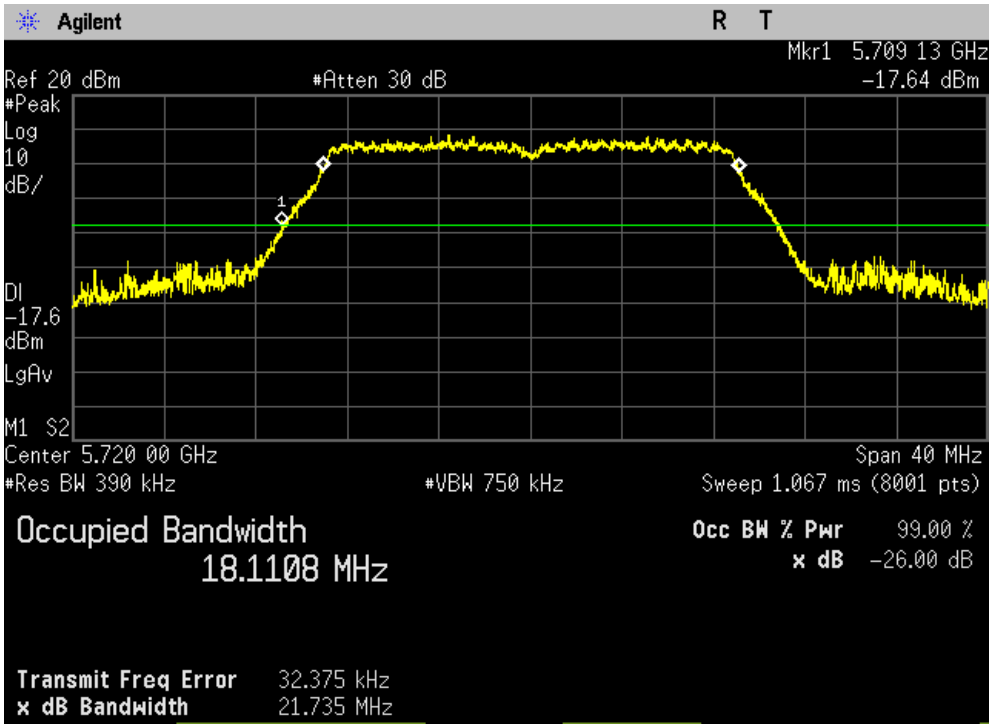


26 dB Bandwidth, Highest Channel (5700 MHz)

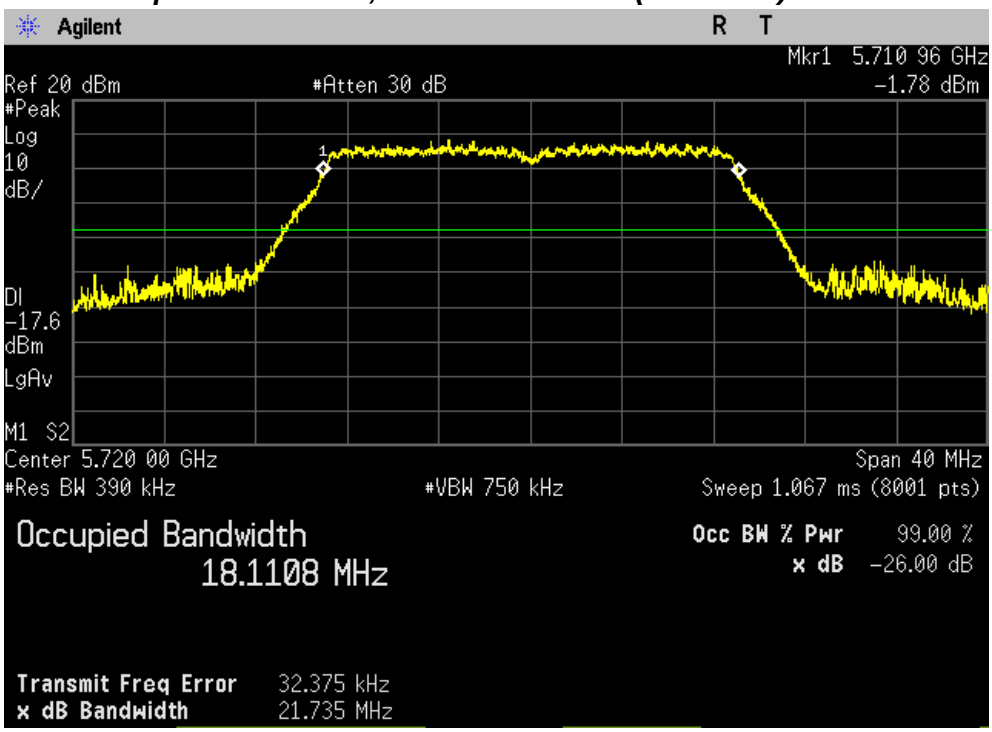


PLOTS OF EMISSIONS

26 dB Bandwidth, Straddle Channel (5720 MHz)



99 % Occupied bandwidth, Straddle Channel (5720 MHz)

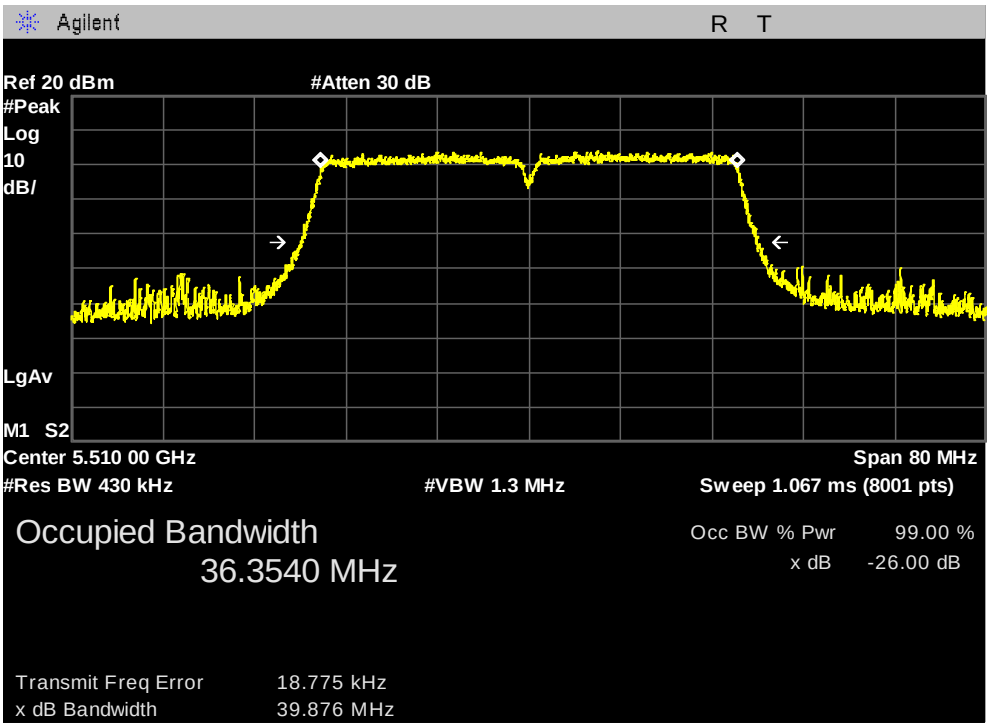


PLOTS OF EMISSIONS

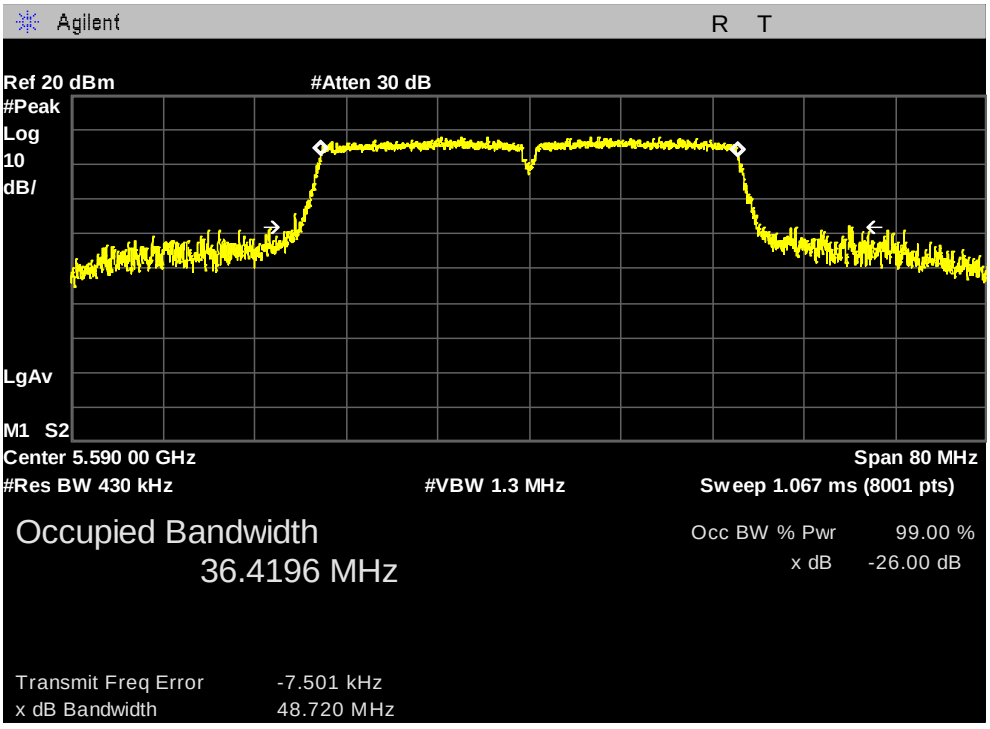
802.11n (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5510 MHz)

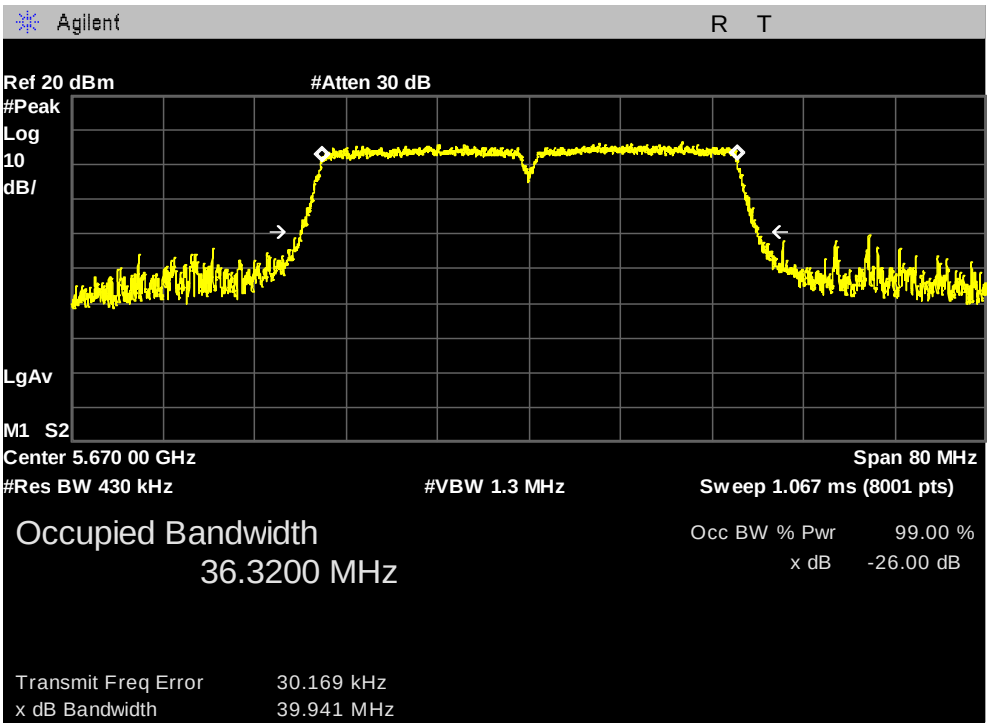


26 dB Bandwidth, Middle Channel (5590 MHz)

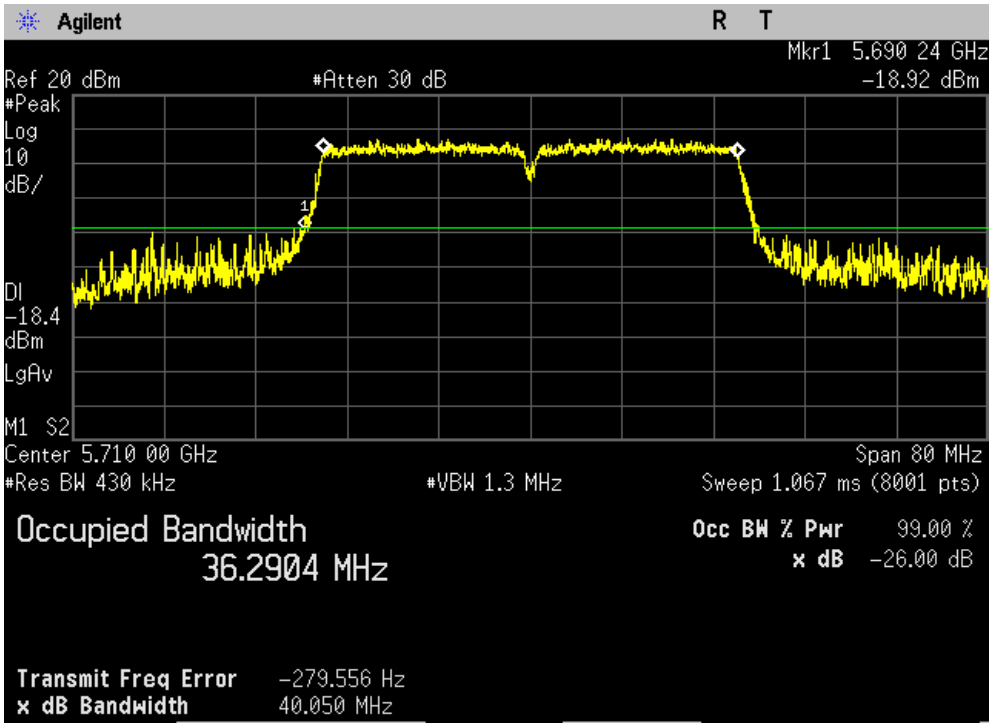


PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5670 MHz)

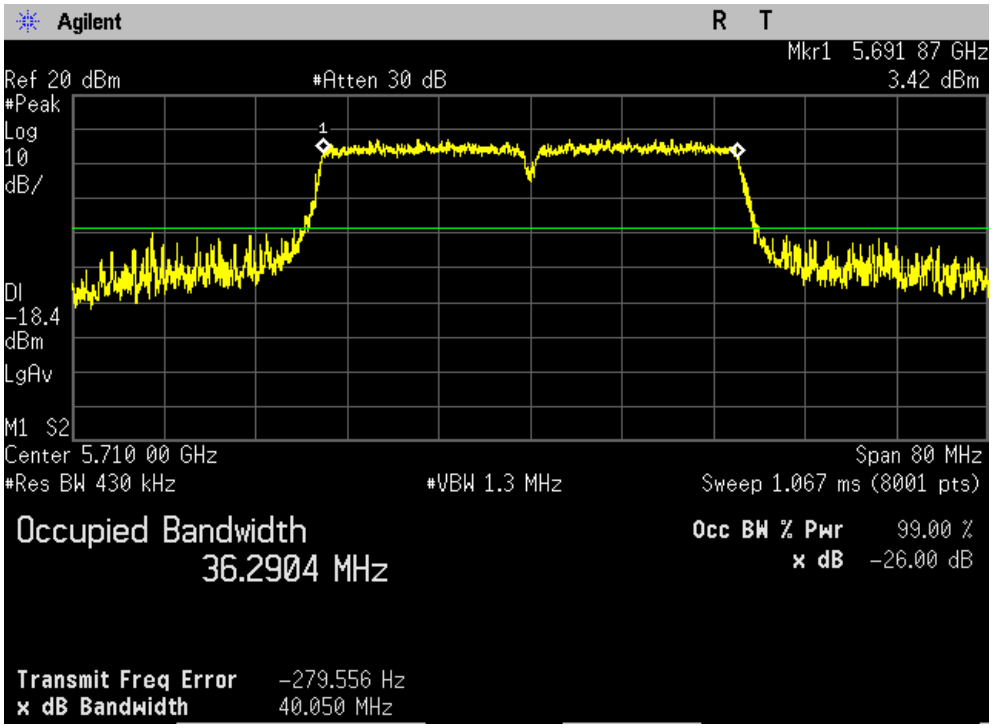


26 dB Bandwidth, Straddle Channel (5710 MHz)



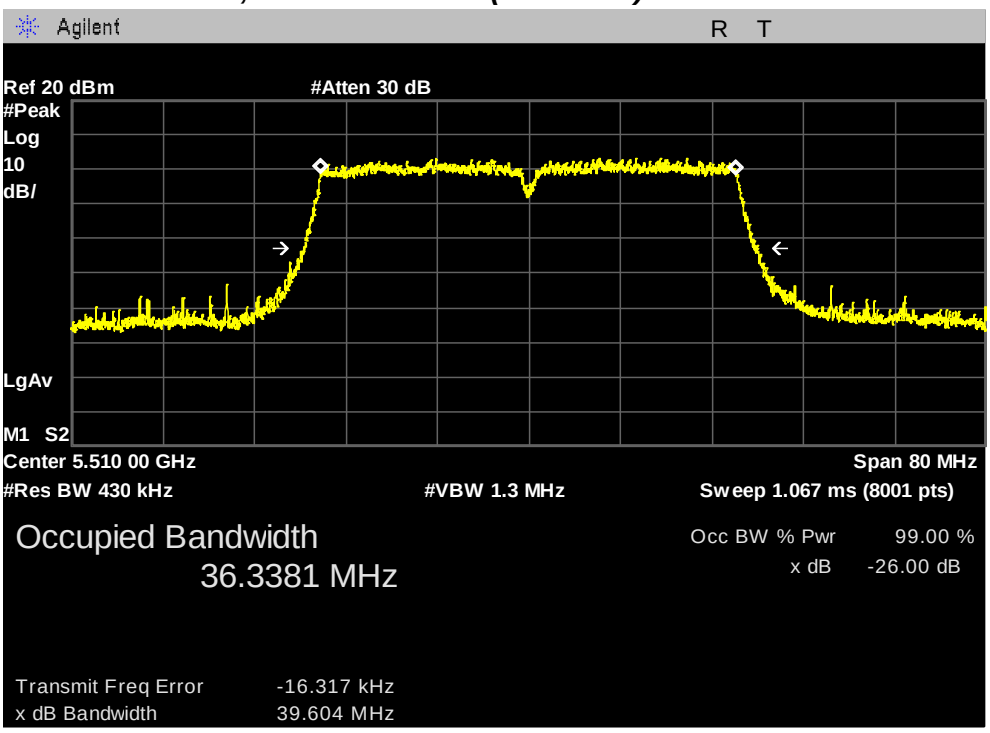
PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5710 MHz)



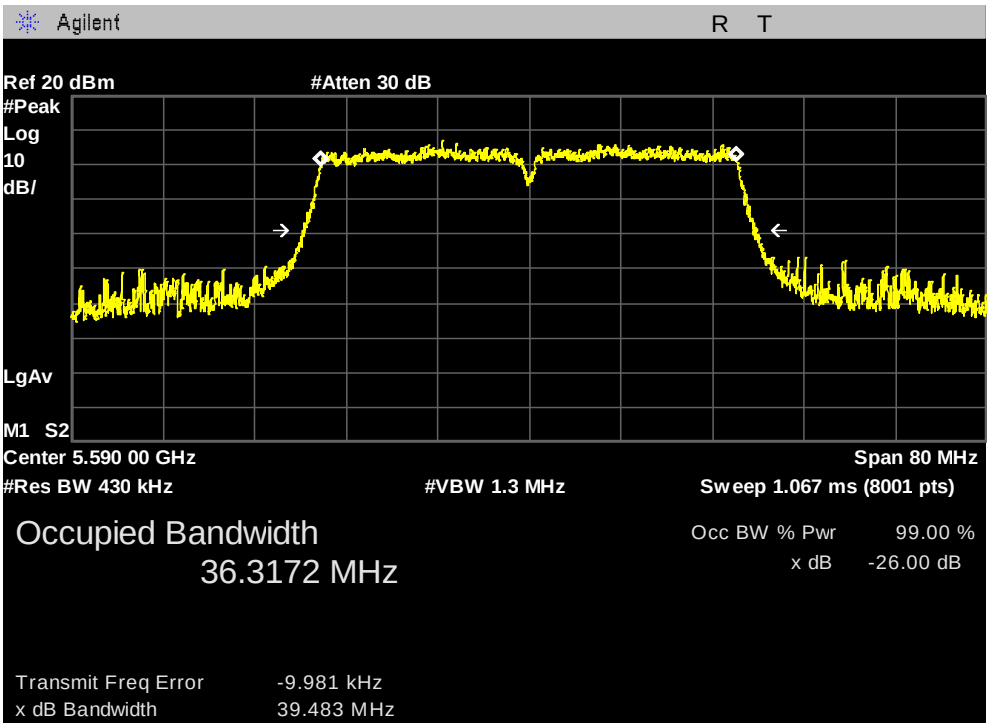
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5510 MHz)

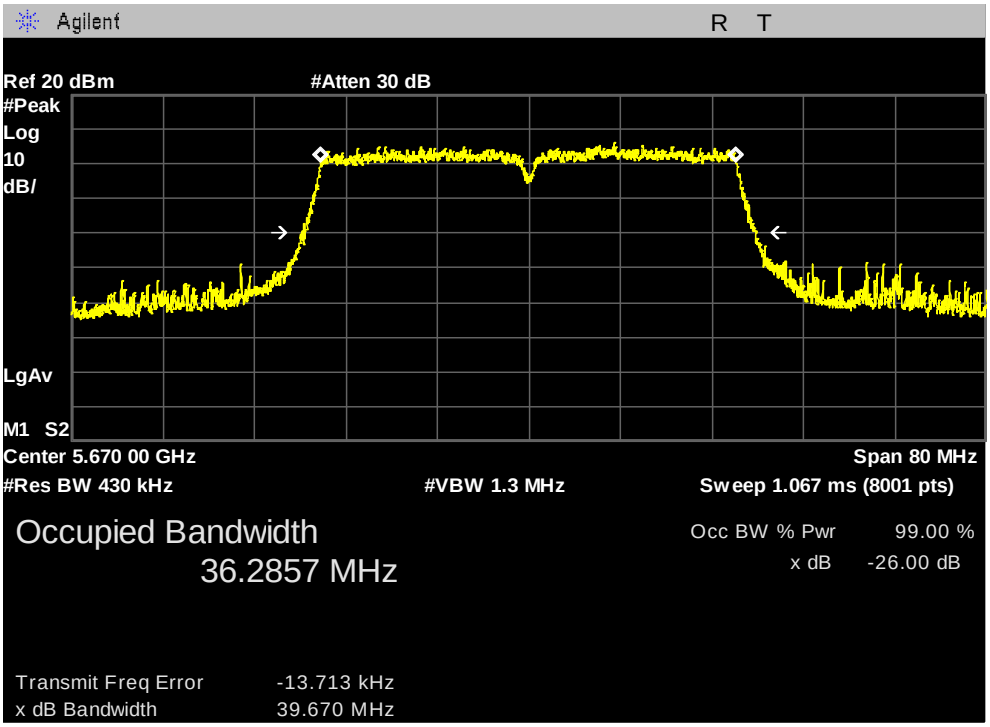


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5590 MHz)

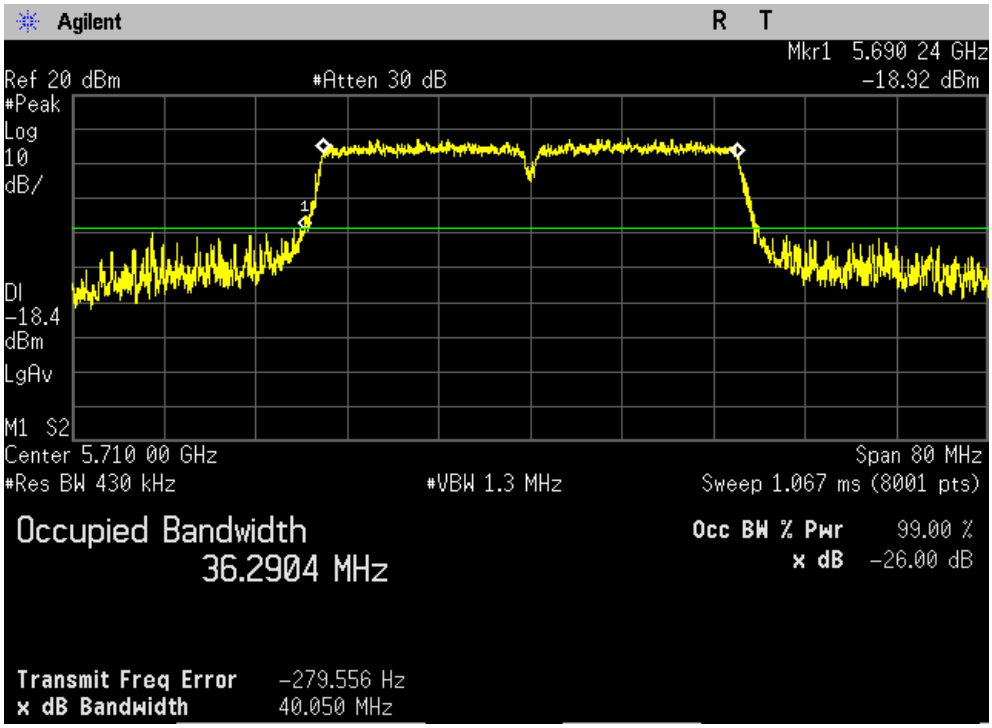


26 dB Bandwidth, Highest Channel (5670 MHz)

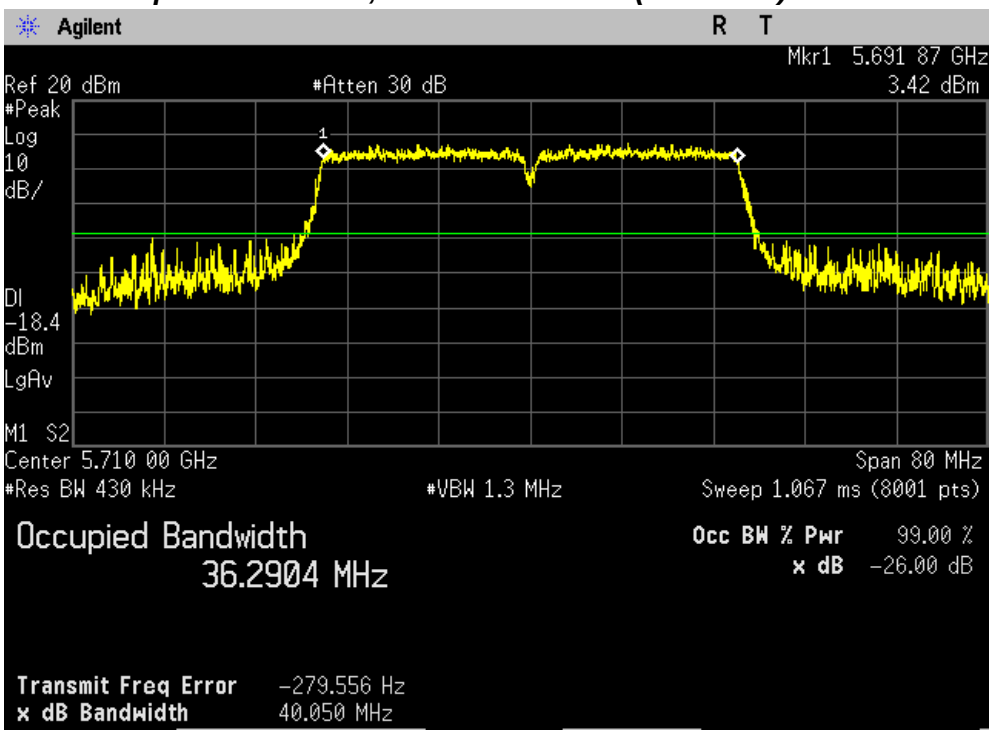


PLOTS OF EMISSIONS

26 dB Bandwidth, Straddle Channel (5710 MHz)



99 % Occupied bandwidth, Straddle Channel (5710 MHz)

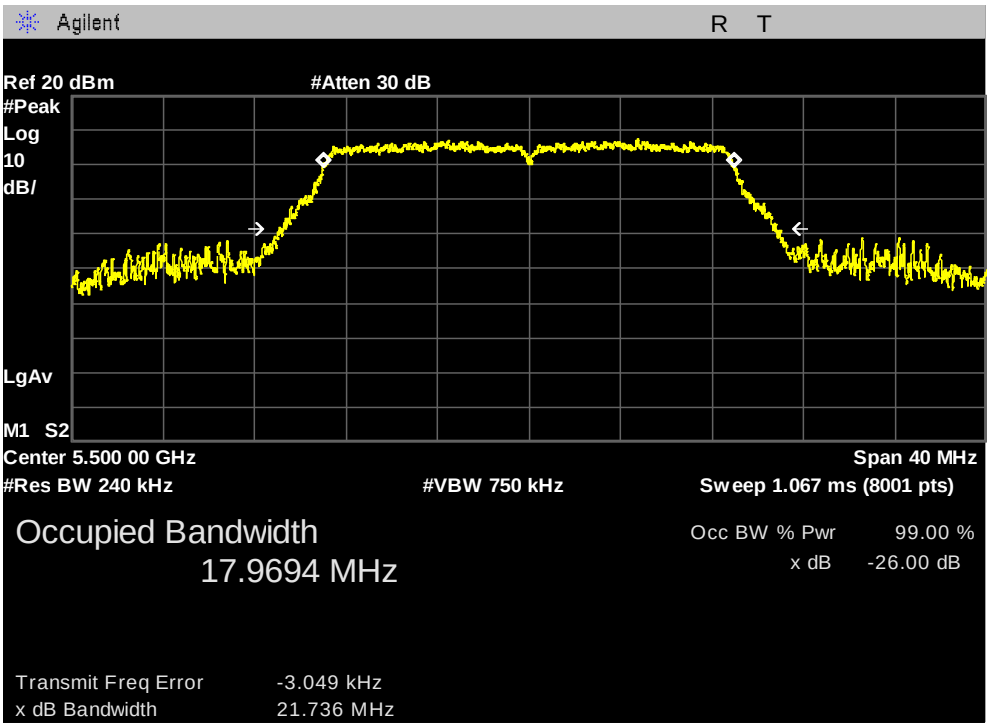


PLOTS OF EMISSIONS

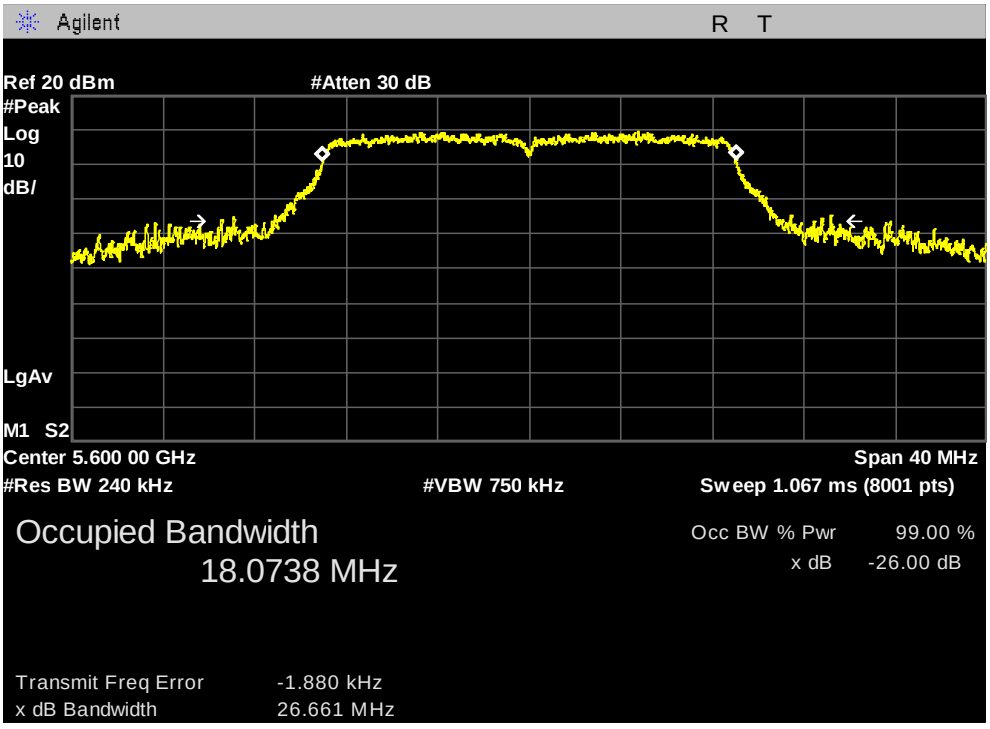
802.11ac (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5500 MHz)

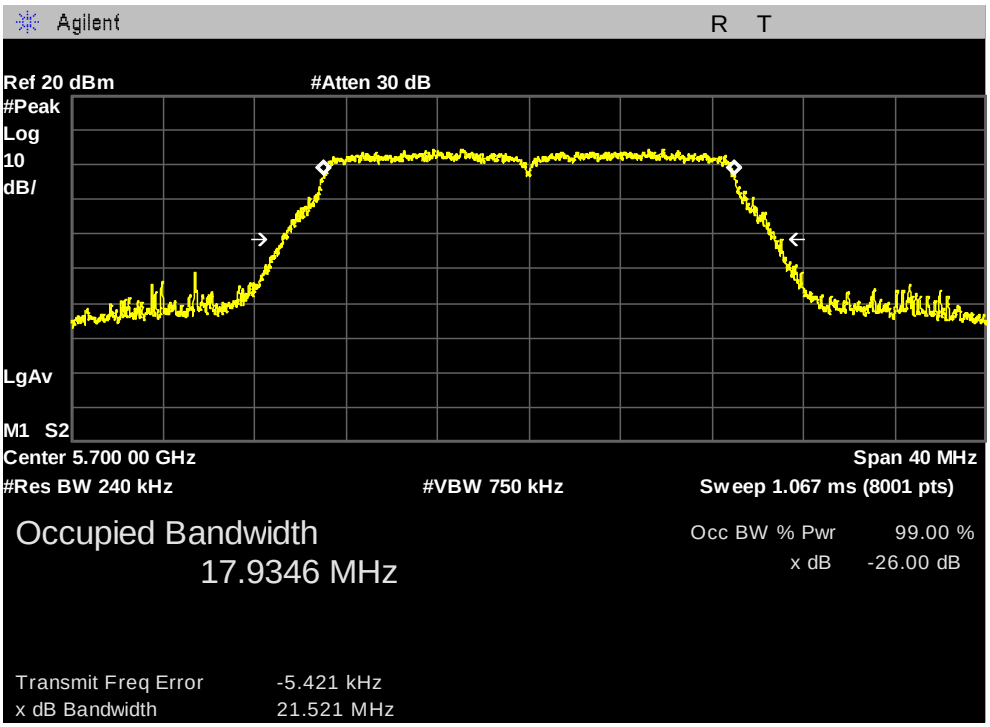


26 dB Bandwidth, Middle Channel (5600 MHz)

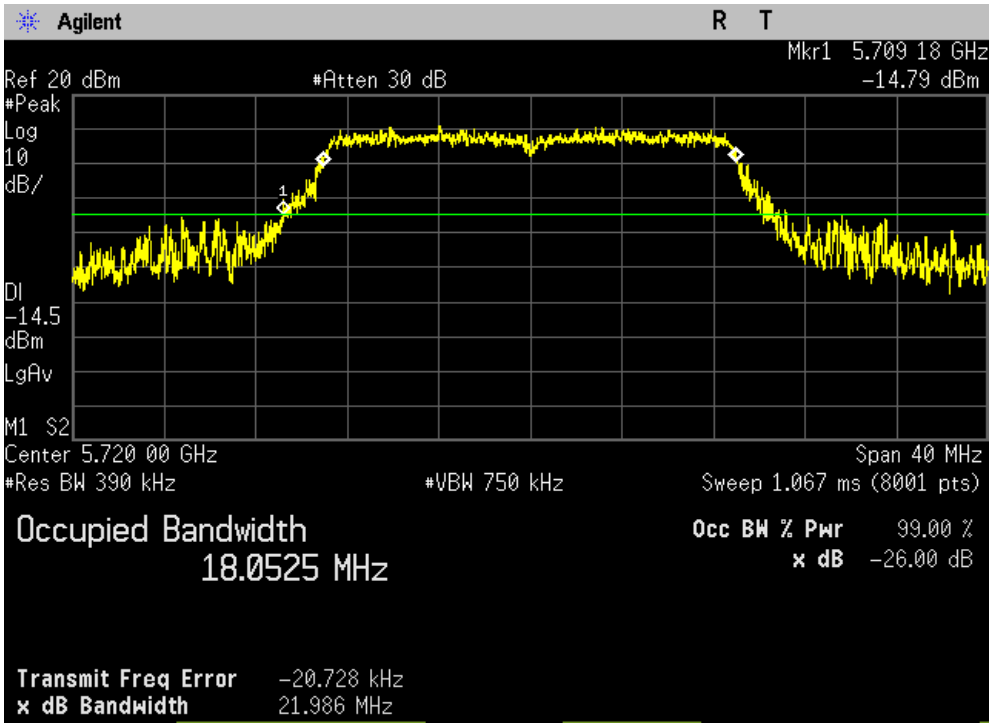


PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5700 MHz)

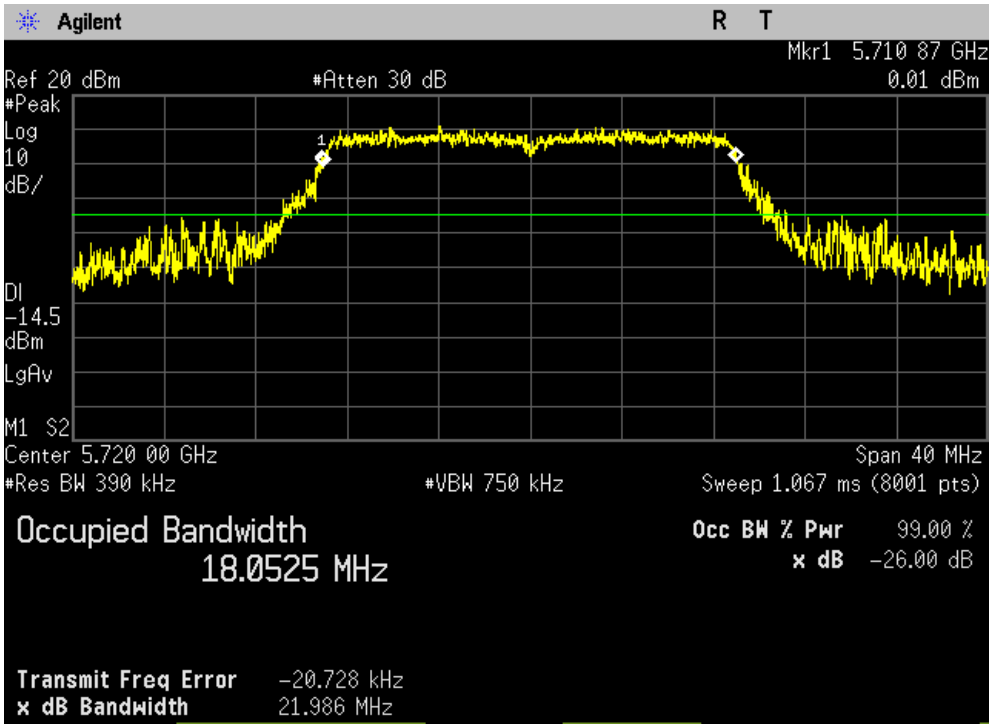


26 dB Bandwidth, Straddle Channel (5720 MHz)



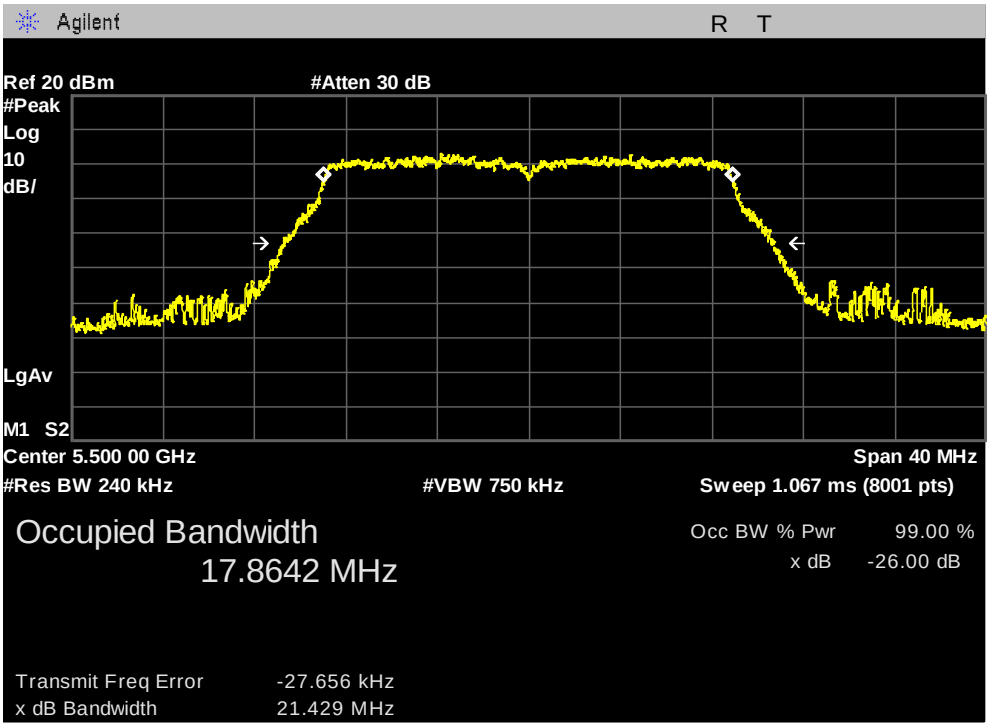
PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5720 MHz)



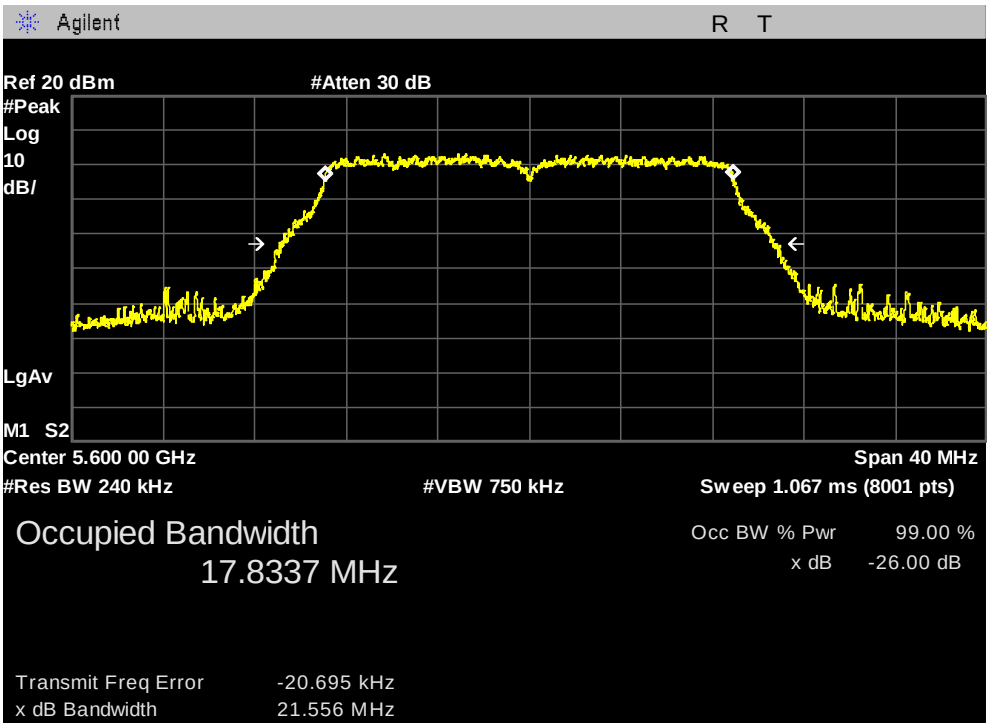
Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5500 MHz)

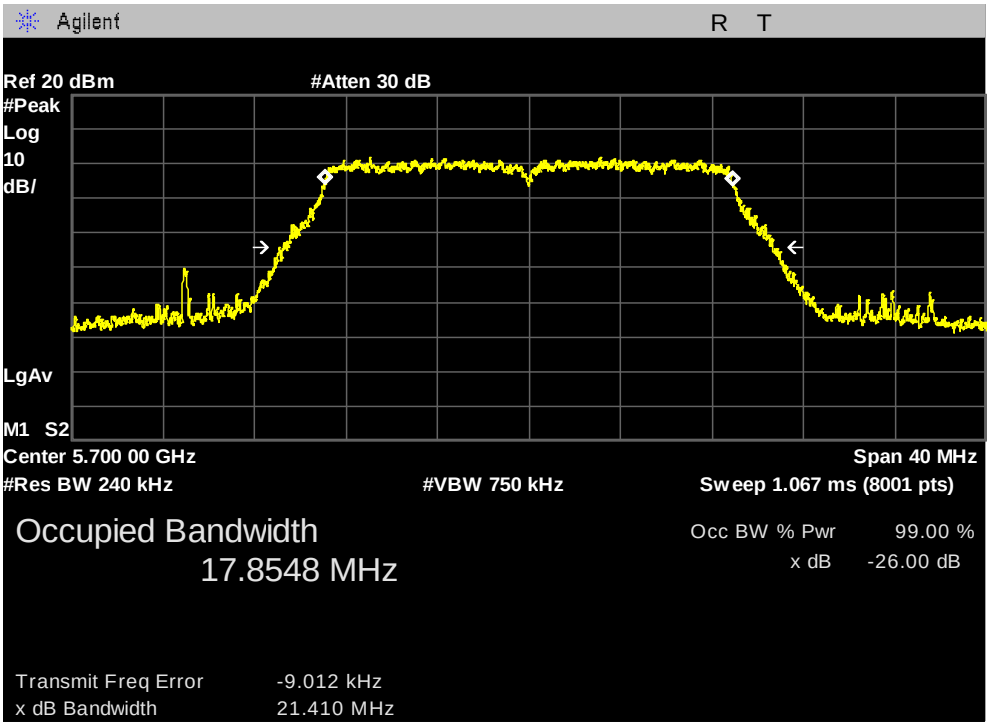


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5600 MHz)

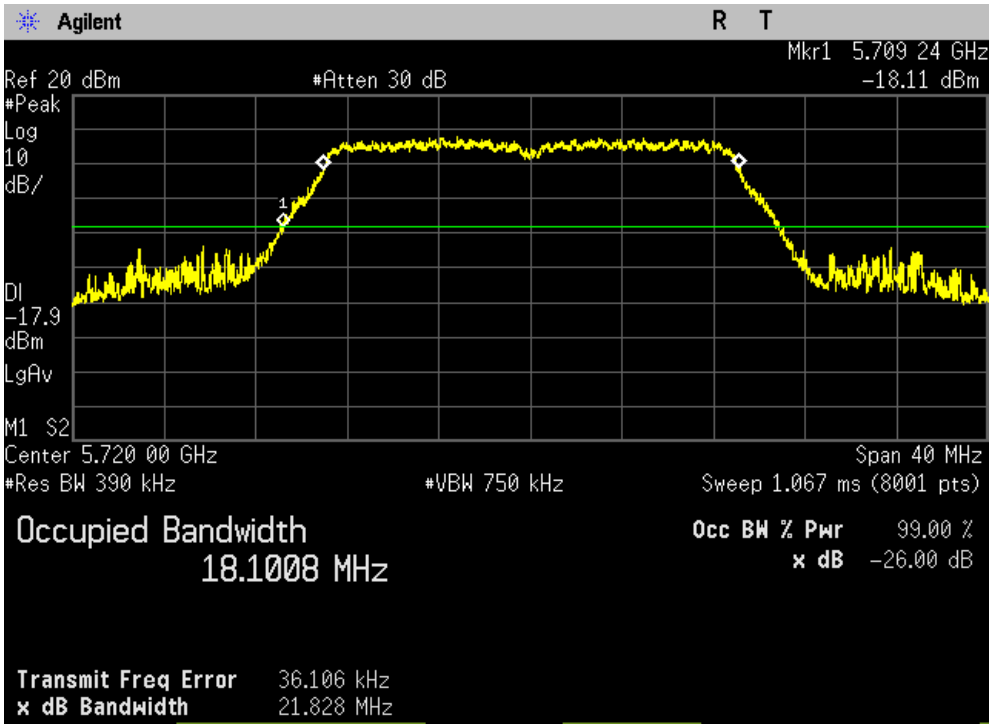


26 dB Bandwidth, Highest Channel (5700 MHz)

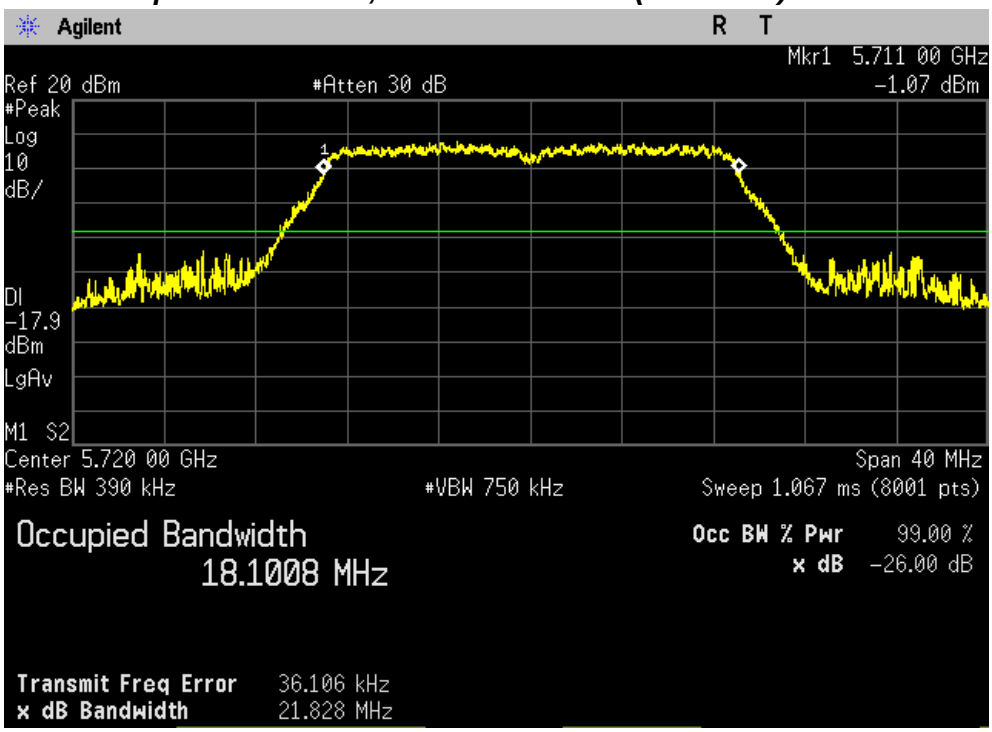


PLOTS OF EMISSIONS

26 dB Bandwidth, Straddle Channel (5720 MHz)



99 % Occupied bandwidth, Straddle Channel (5720 MHz)

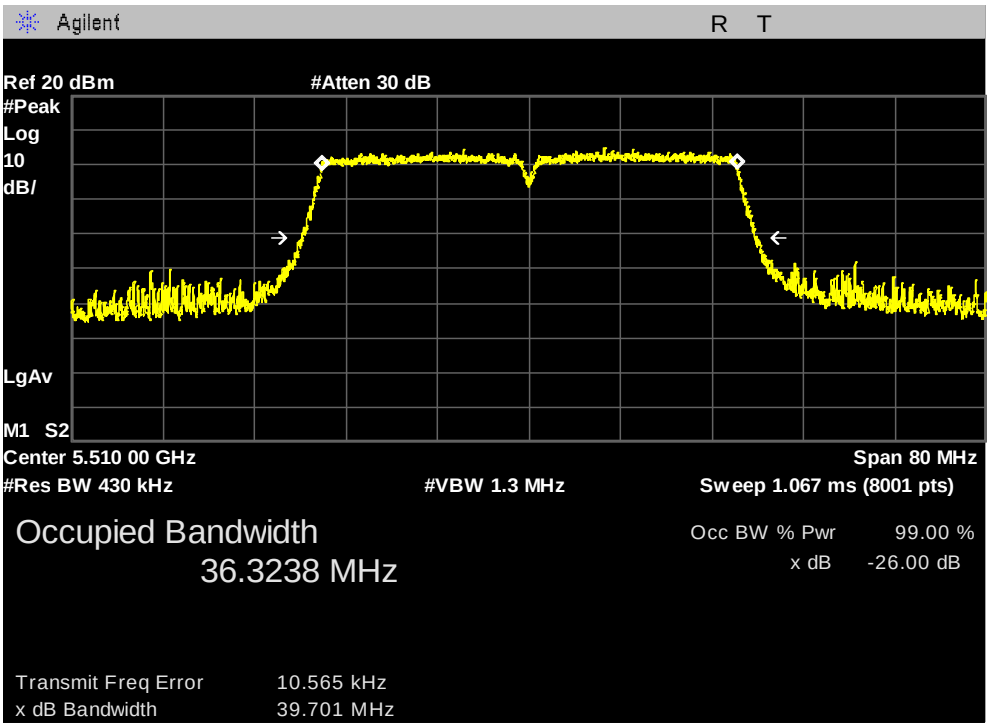


PLOTS OF EMISSIONS

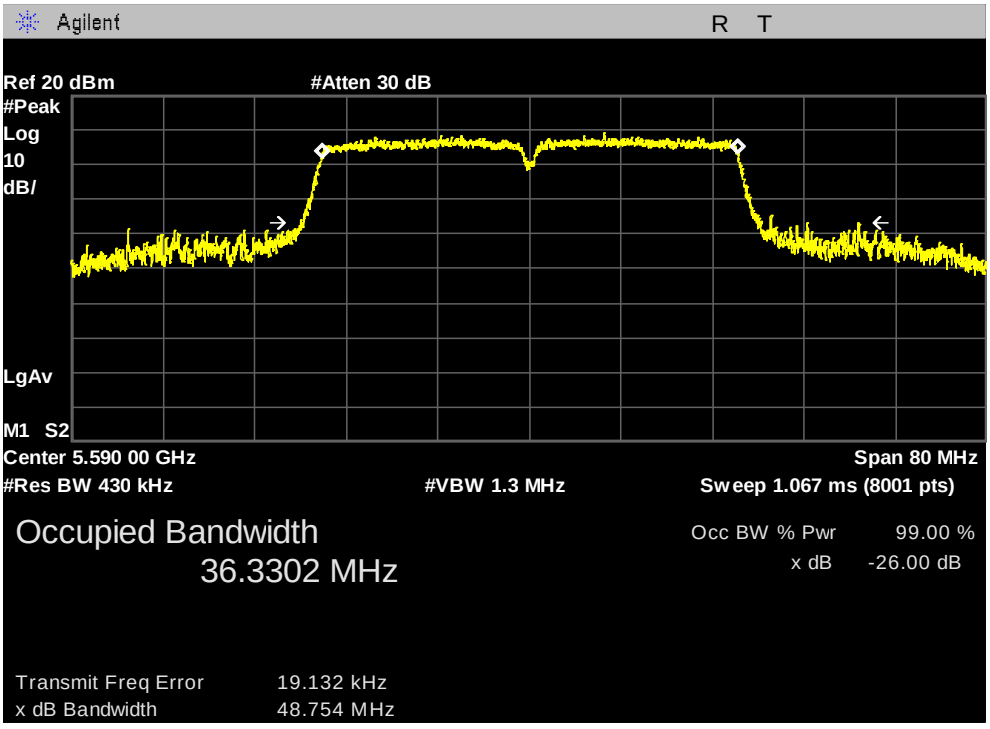
802.11ac (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5510 MHz)

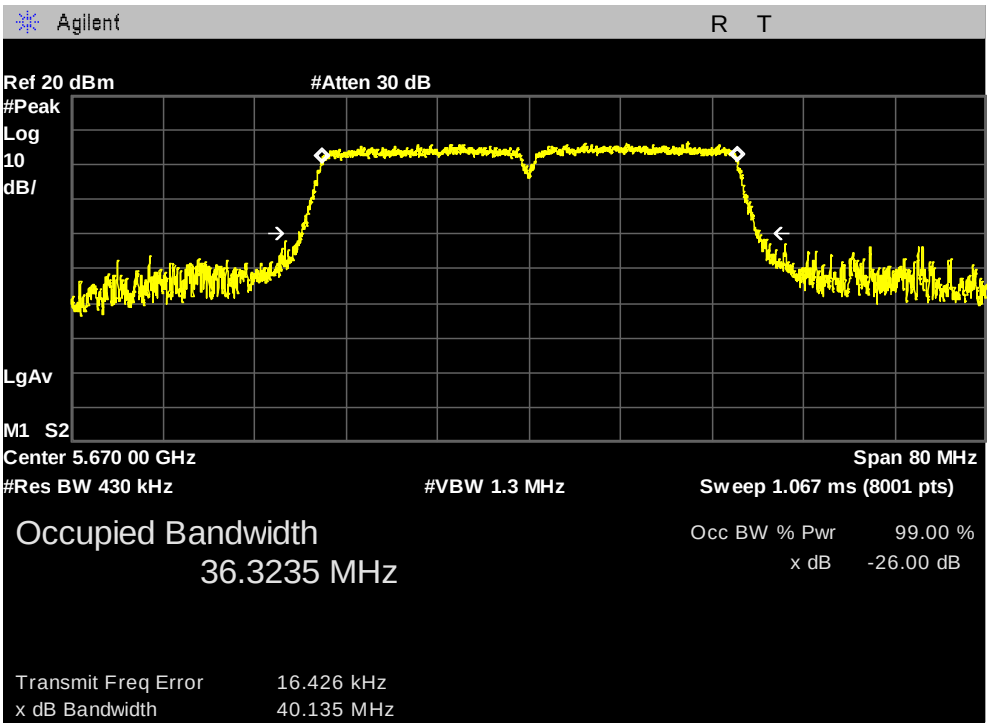


26 dB Bandwidth, Middle Channel (5590 MHz)

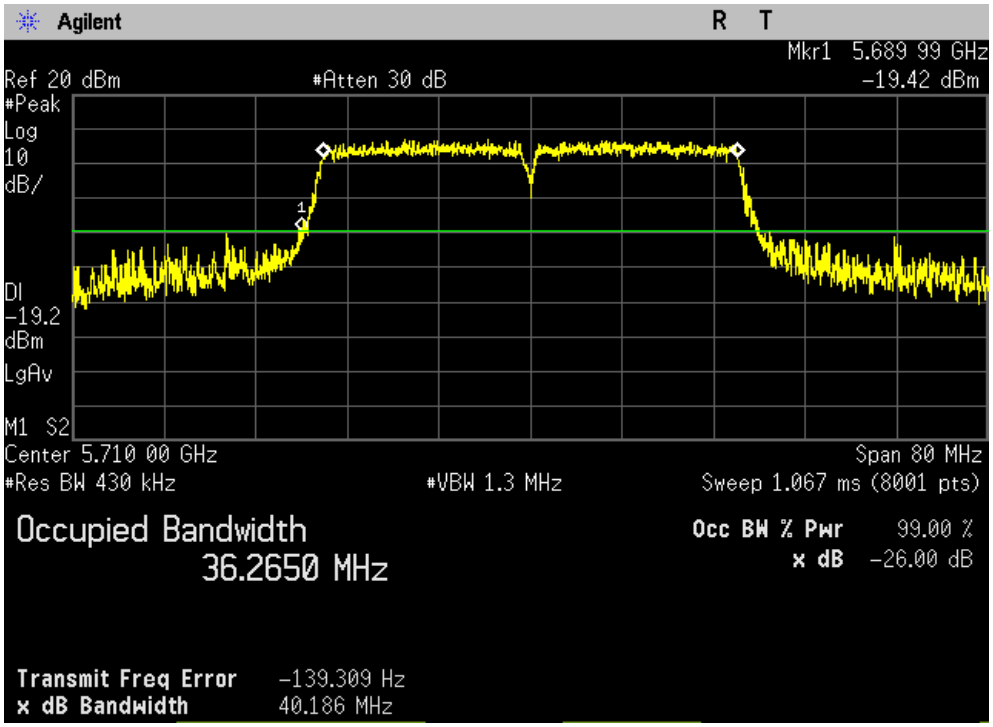


PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5670 MHz)

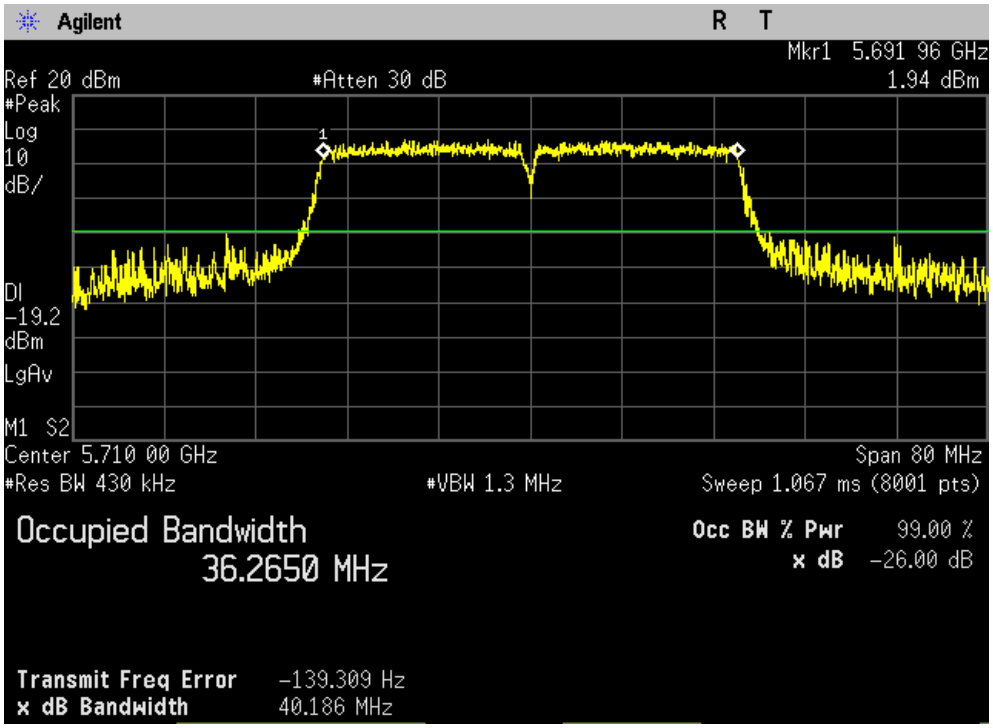


26 dB Bandwidth, Straddle Channel (5710 MHz)



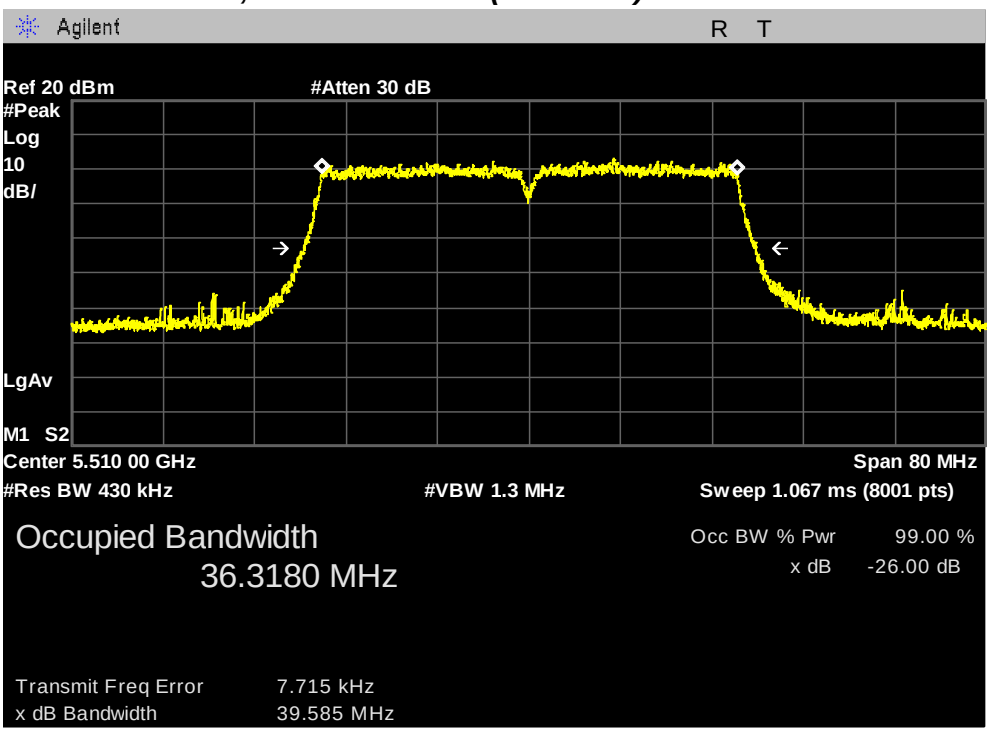
PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5710 MHz)



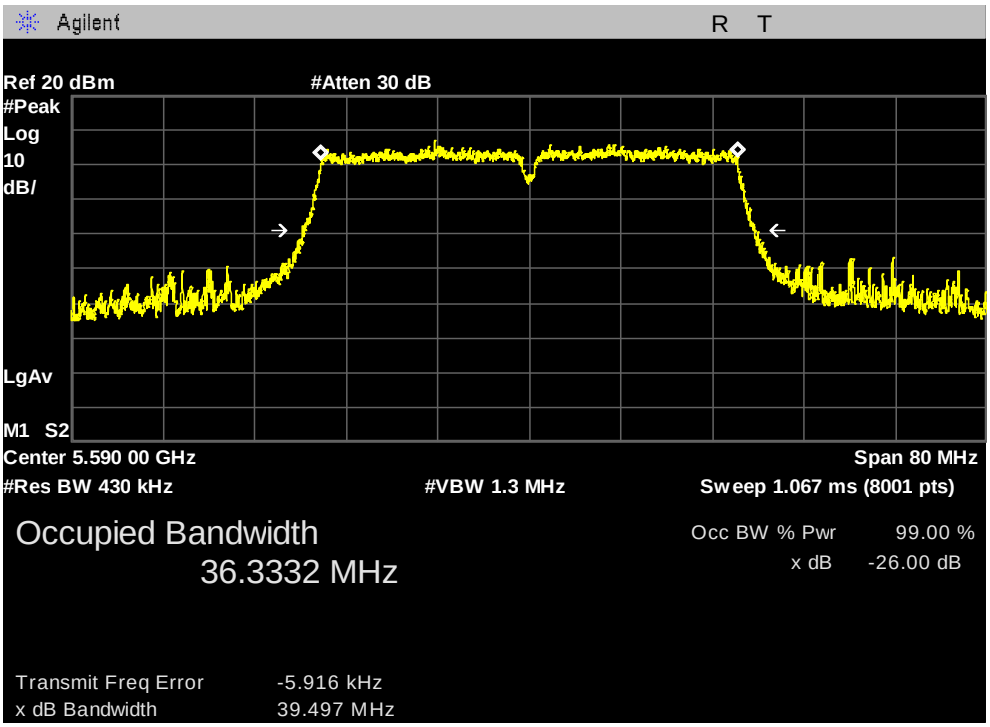
<u>Chain 2 (4TX)</u>

26 dB Bandwidth, Lowest Channel (5510 MHz)

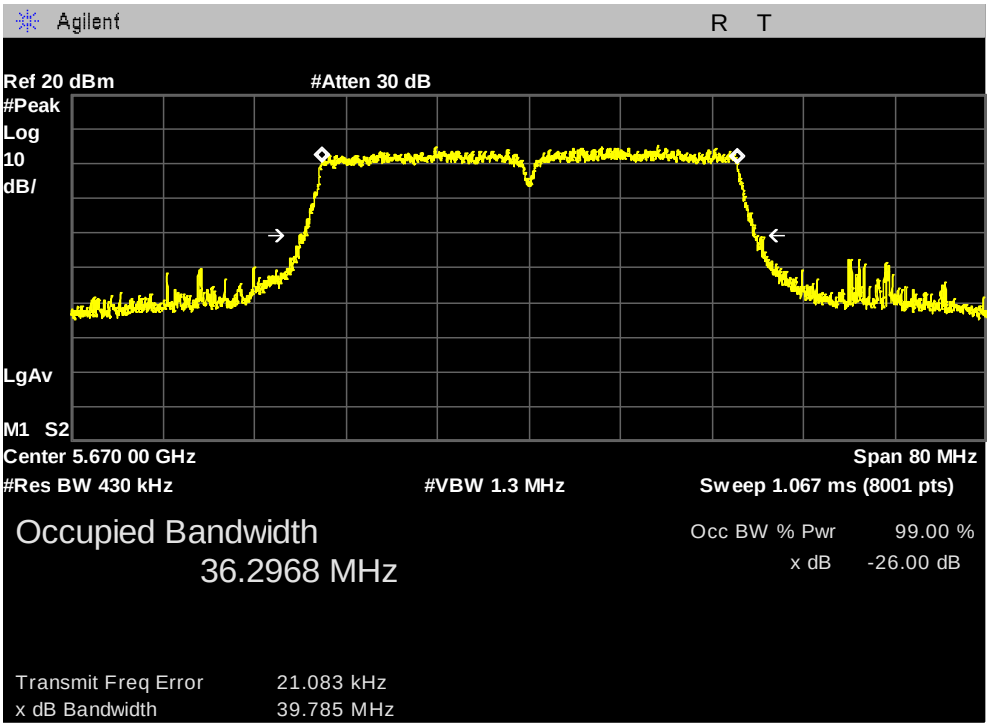


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5590 MHz)

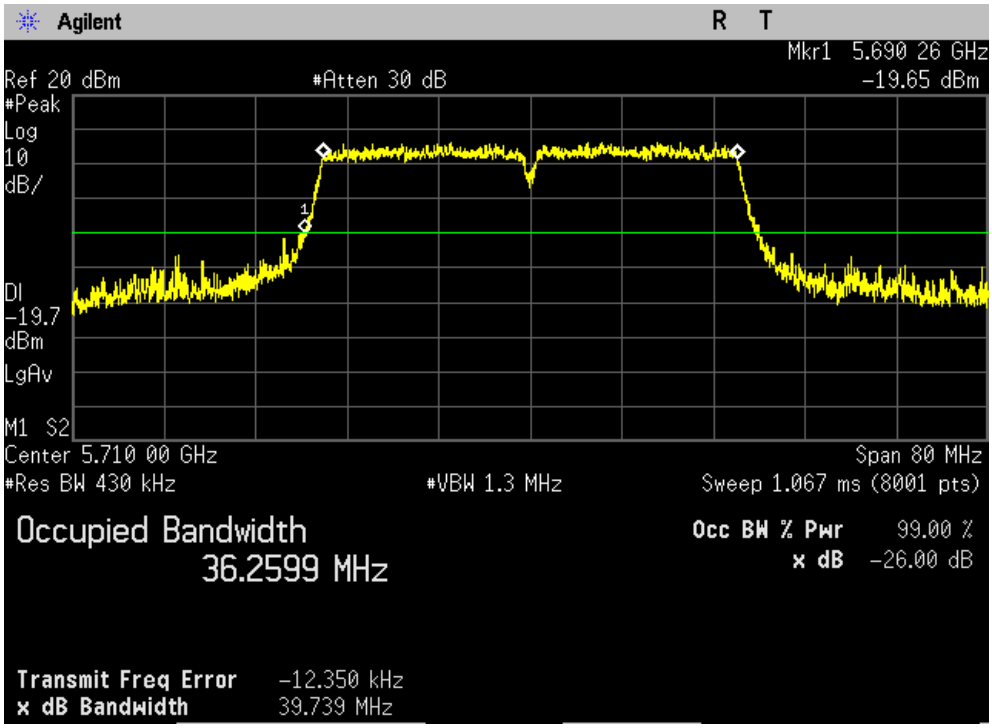


26 dB Bandwidth, Highest Channel (5670 MHz)

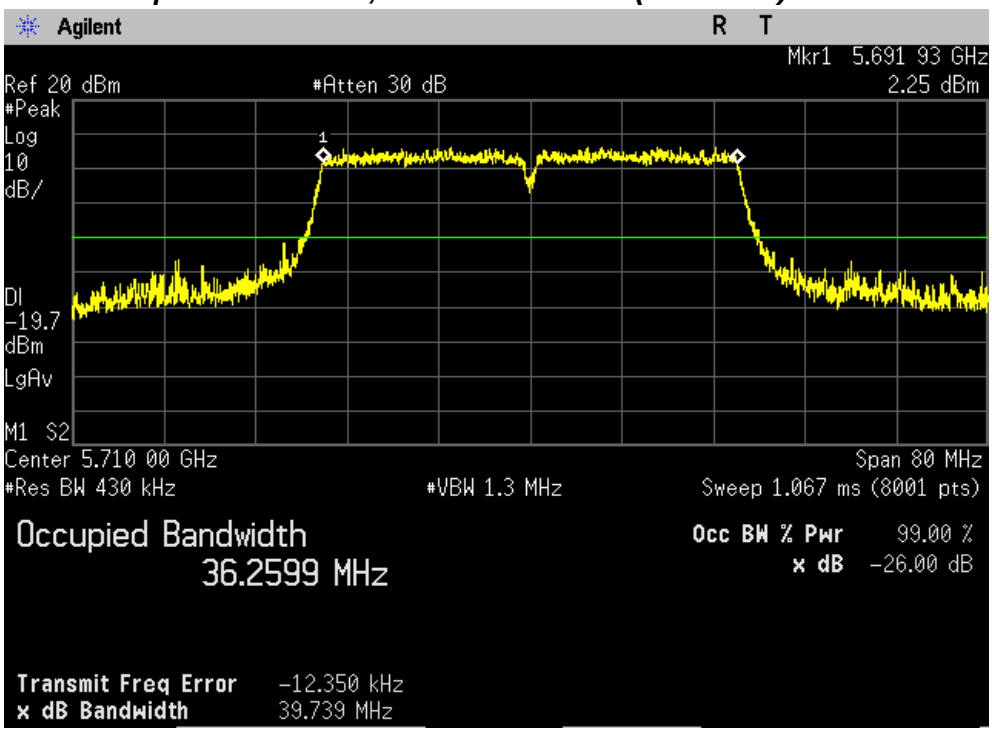


PLOTS OF EMISSIONS

26 dB Bandwidth, Straddle Channel (5710 MHz)



99 % Occupied bandwidth, Straddle Channel (5710 MHz)

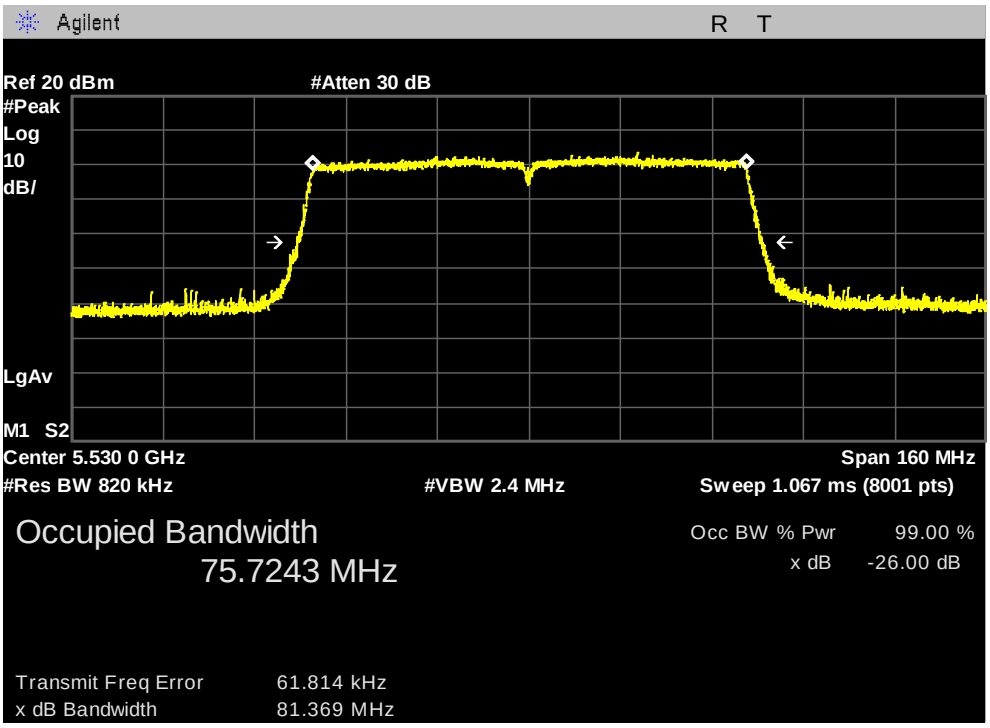


PLOTS OF EMISSIONS

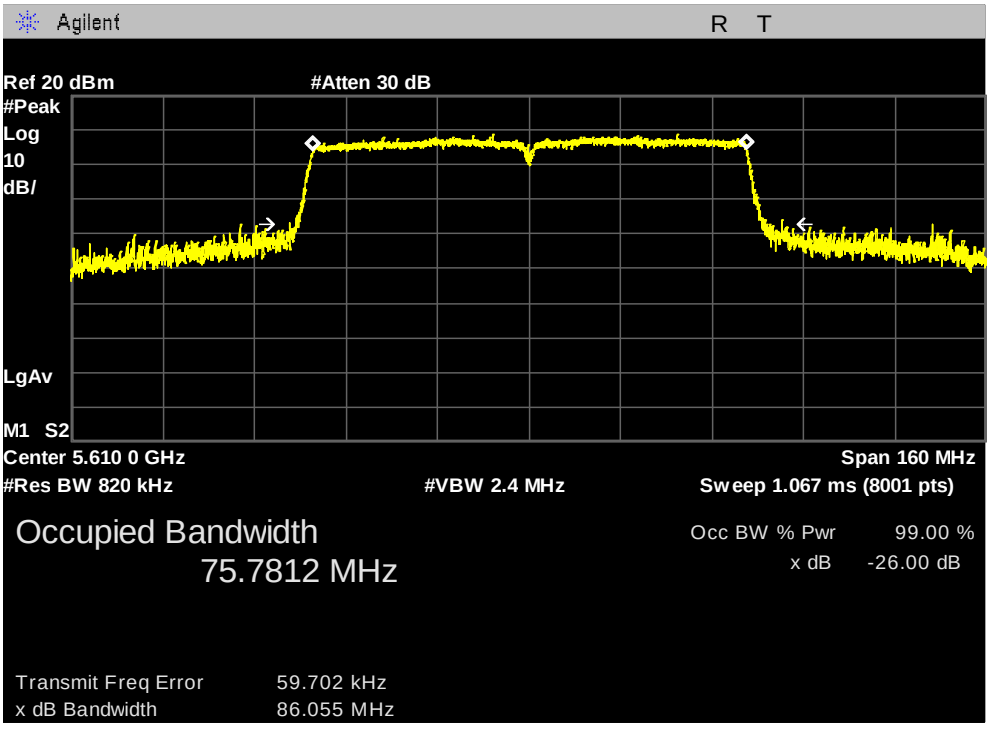
802.11ac (80 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Lowest Channel (5530 MHz)

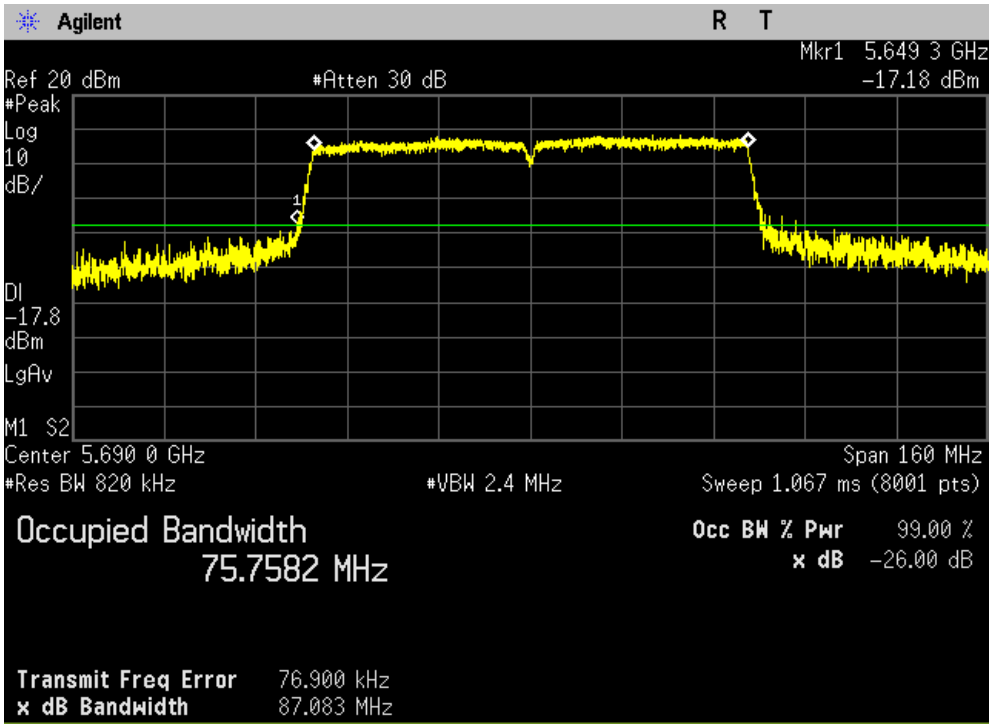


26 dB Bandwidth, Highest Channel (5610 MHz)

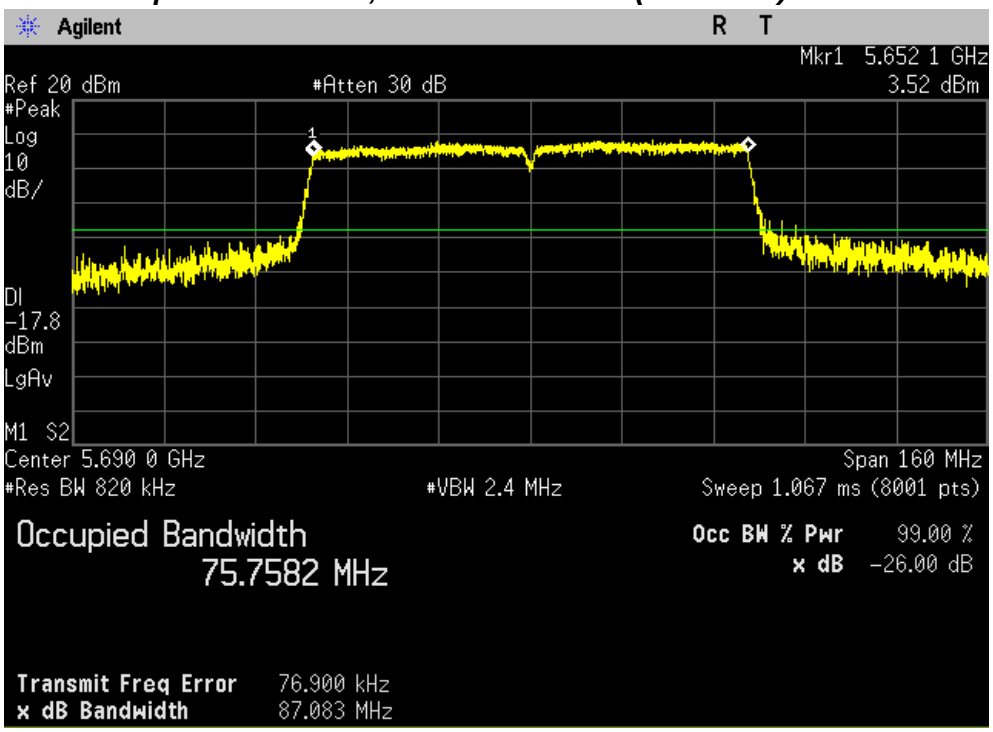


PLOTS OF EMISSIONS

26 dB Bandwidth, Straddle Channel (5690 MHz)



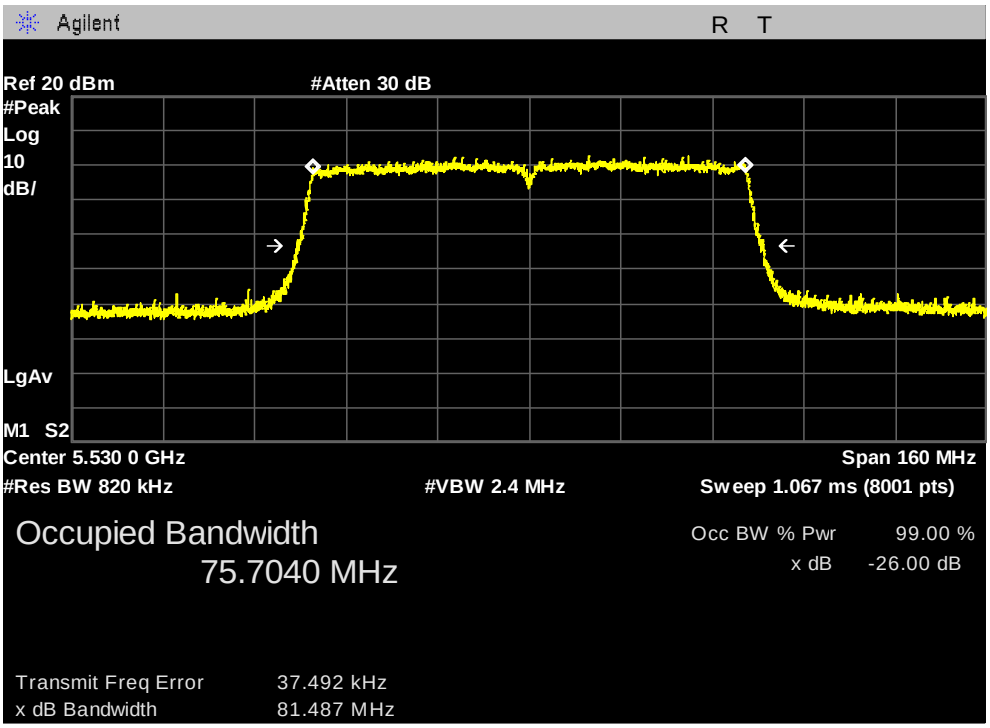
99 % Occupied bandwidth, Straddle Channel (5690 MHz)



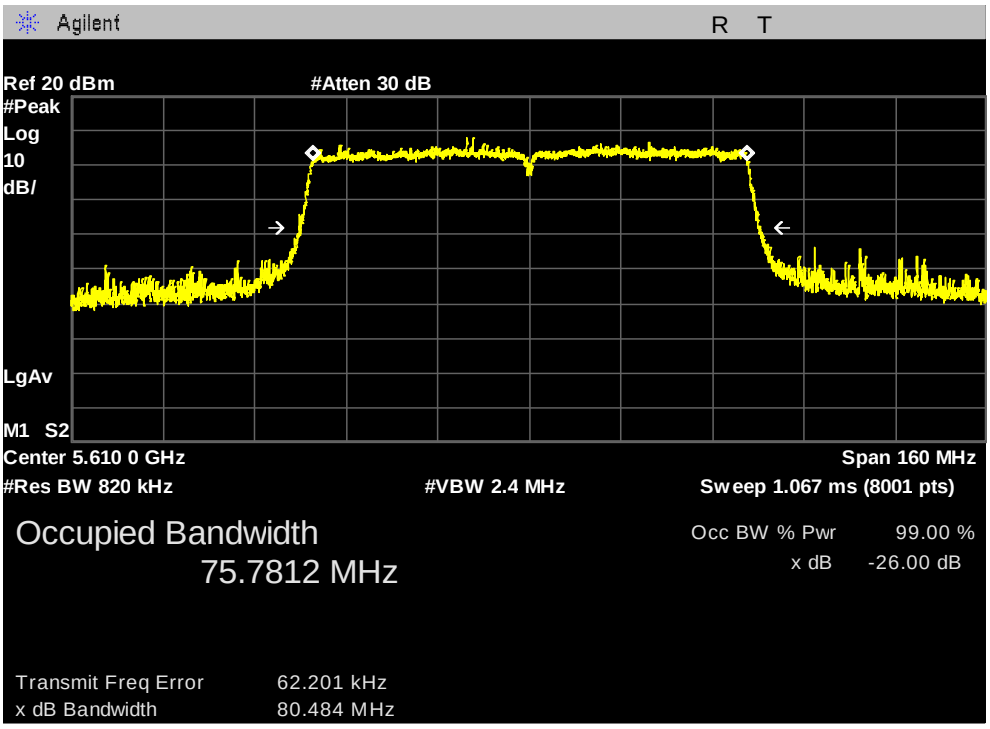
PLOTS OF EMISSIONS

Chain 2 (4TX)

26 dB Bandwidth, Lowest Channel (5530 MHz)

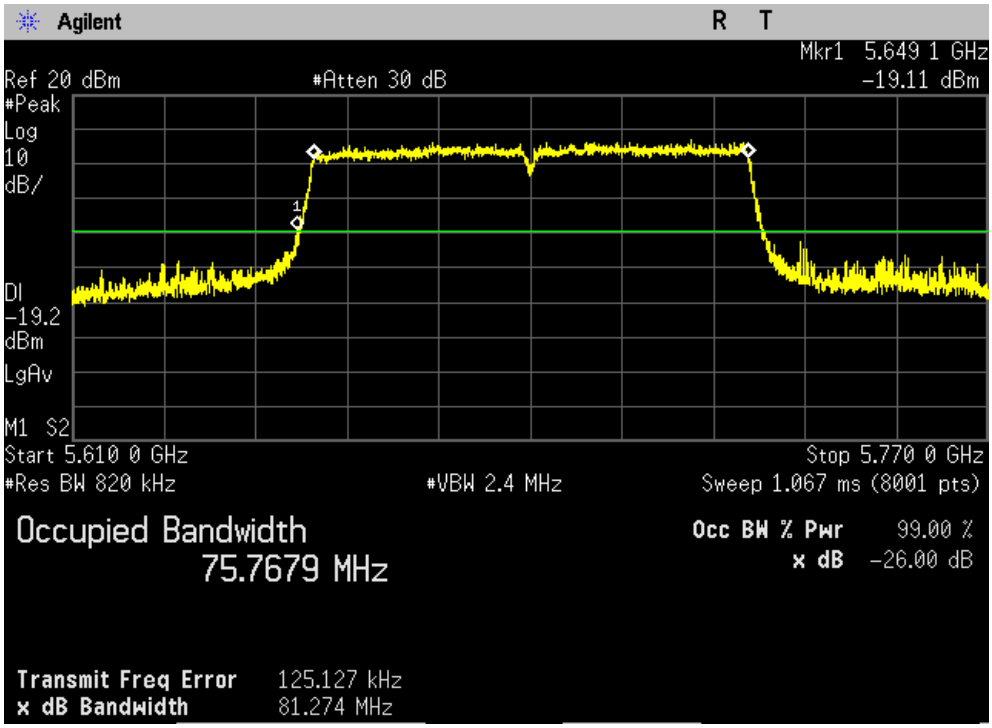


26 dB Bandwidth, Highest Channel (5610 MHz)

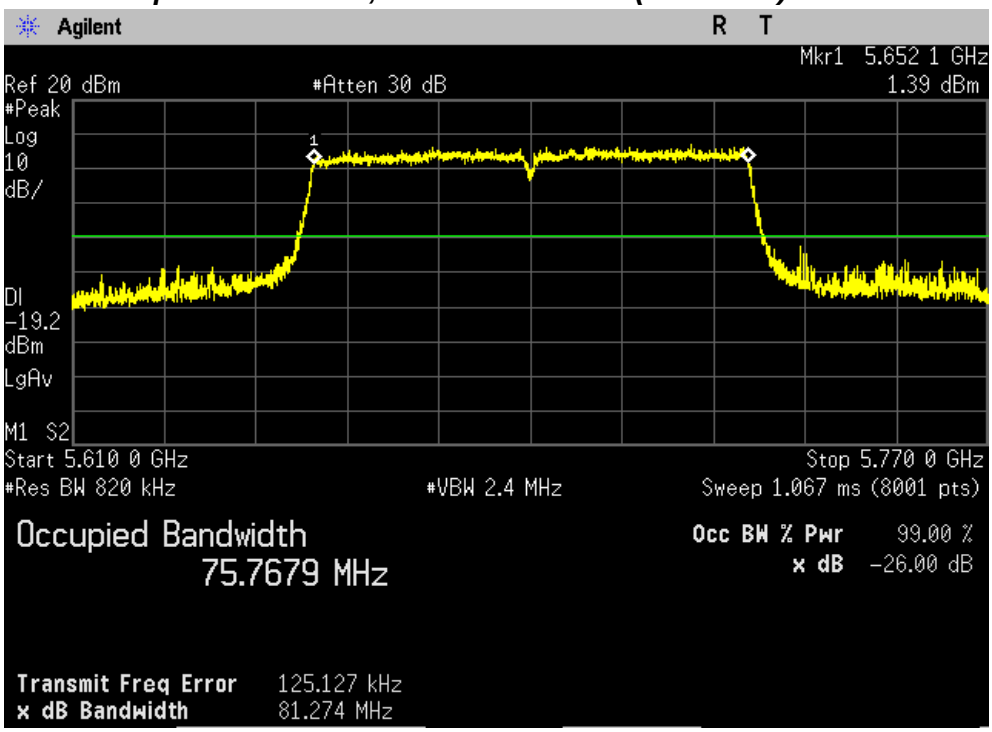


PLOTS OF EMISSIONS

26 dB Bandwidth, Straddle Channel (5690 MHz)



99 % Occupied bandwidth, Straddle Channel (5690 MHz)



8.3.4 26 dB Bandwidth and 99 % Occupied bandwidth – U-NII-3 band

FCC §15.407(a)

Test Mode : Set to Straddle channel, Lowest channel, Middle channel and Highest channel

802.11a mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Straddle	5720	7.48	5.85	3.59	3.58
Lowest	5745	21.72	21.24	16.87	16.77
Middle	5785	21.62	21.49	16.92	16.79
Highest	5825	23.54	21.36	16.95	16.79

802.11n (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Straddle	5720	6.90	5.87	4.19	4.07
Lowest	5745	25.12	23.02	18.02	17.92
Middle	5785	21.74	21.52	17.98	17.91
Highest	5825	26.33	21.61	18.05	17.90

802.11n (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Straddle	5710	5.29	5.23	3.16	3.19
Lowest	5755	39.86	39.93	36.39	36.31
Highest	5795	46.55	39.76	36.36	36.31

TEST DATA

802.11ac (20 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Straddle	5720	6.17	6.07	3.92	4.10
Lowest	5745	25.55	24.11	17.98	17.90
Middle	5785	26.98	22.37	17.99	17.90
Highest	5825	24.54	21.49	17.99	17.88

802.11ac (40 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Straddle	5710	5.18	5.00	3.23	3.19
Lowest	5755	53.38	39.63	36.35	36.30
Highest	5795	51.97	43.61	36.41	36.33

802.11ac (80 MHz) mode

Channel	Frequency (MHz)	26 dB Bandiwidth (MHz)		99% Occupied Bandwidth (MHz)	
		Chain 2 (1TX)	Chain 2 (4TX)	Chain 2 (1TX)	Chain 2 (4TX)
Straddle	5690	11.38	5.37	2.86	2.87
Lowest	5775	92.42	81.15	75.80	75.78

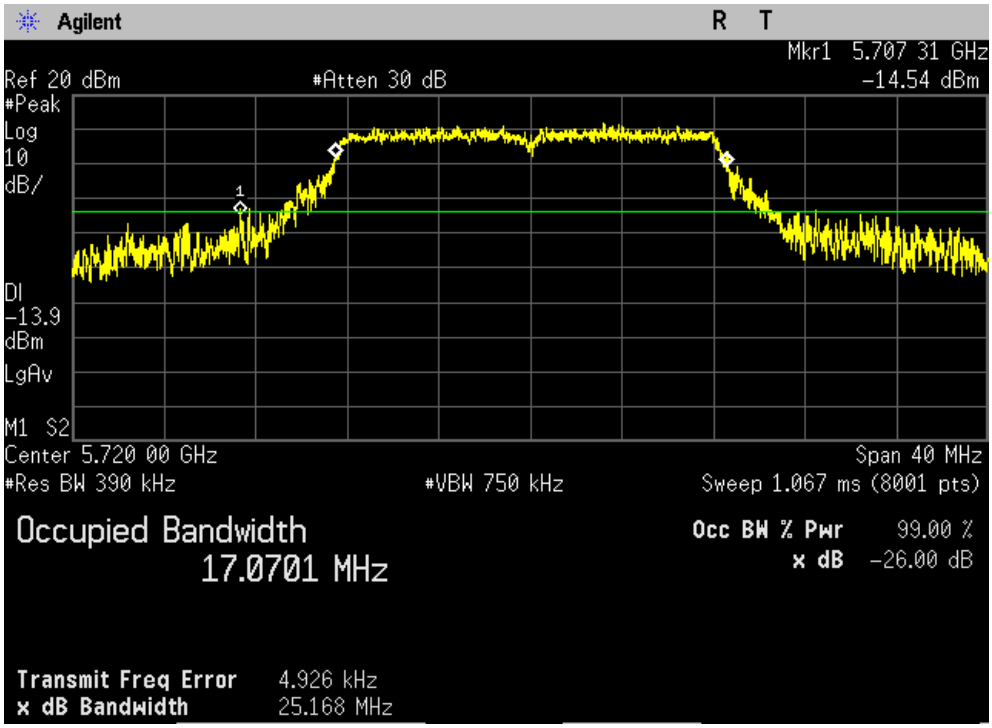
Note:
The worst ant port was determined by the conducted output power that generates the highest emission performing pre-scan testing in all ant port of each mode.

PLOTS OF EMISSIONS

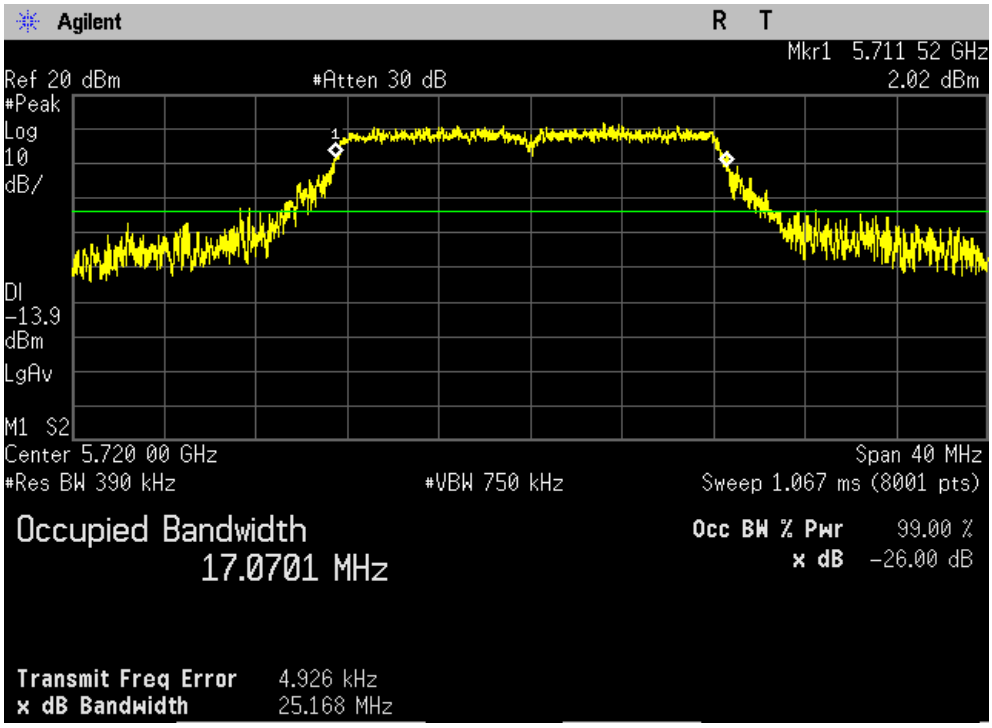
802.11a mode

Chain 2 (1TX)

26 dB Bandwidth, Straddle Channel (5720 MHz)

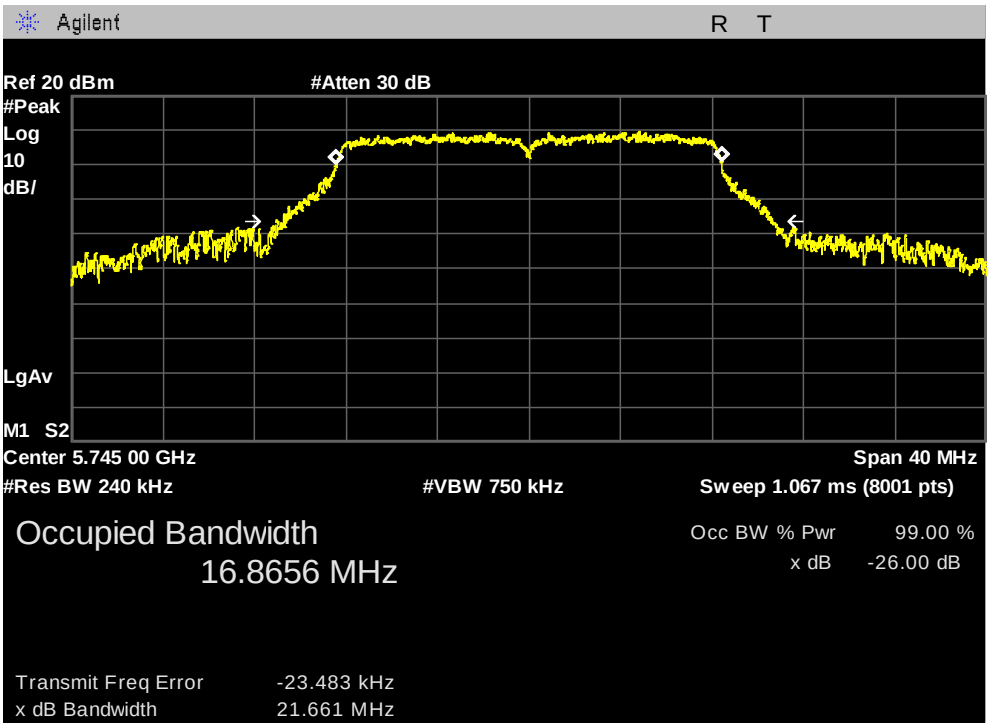


99 % Occupied bandwidth, Straddle Channel (5720 MHz)

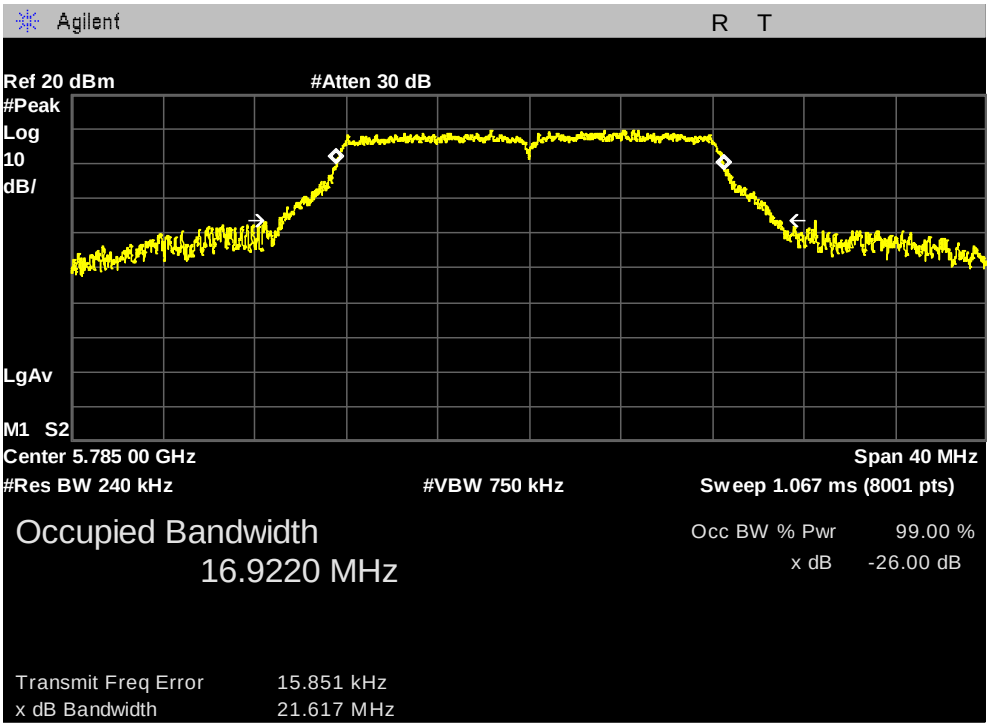


PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5745 MHz)

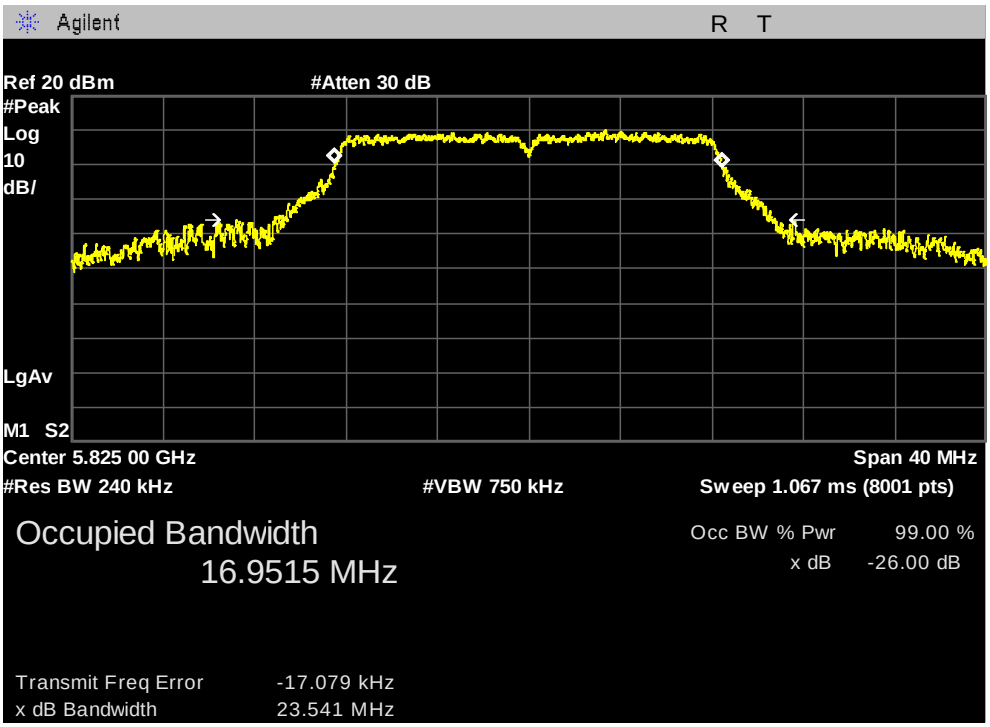


26 dB Bandwidth, Middle Channel (5785 MHz)



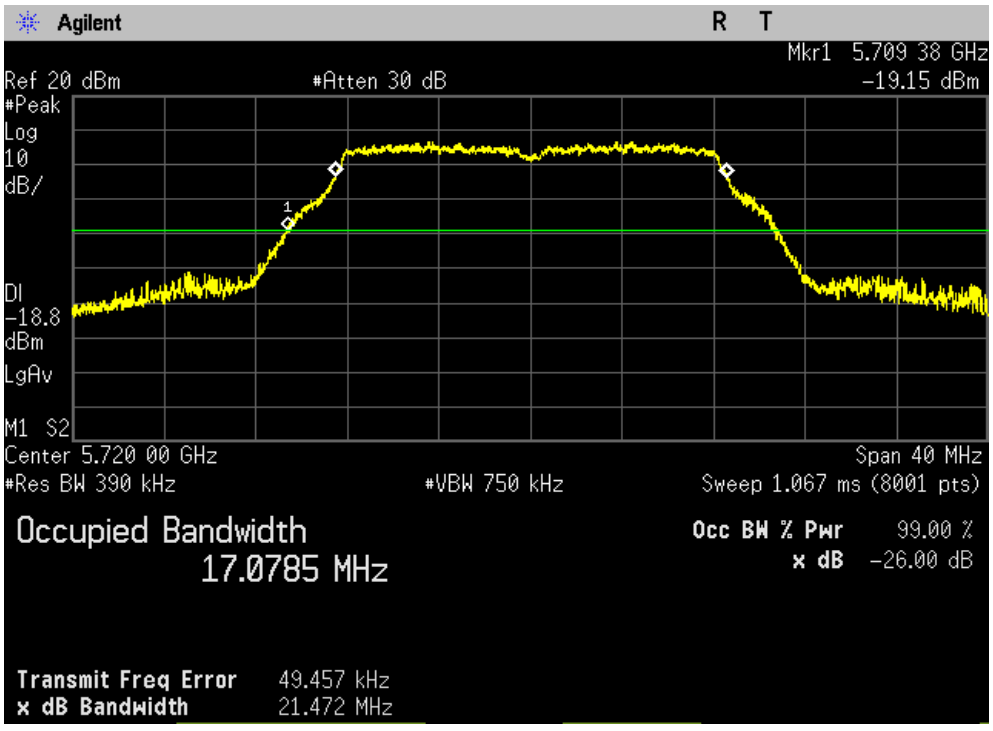
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5825 MHz)



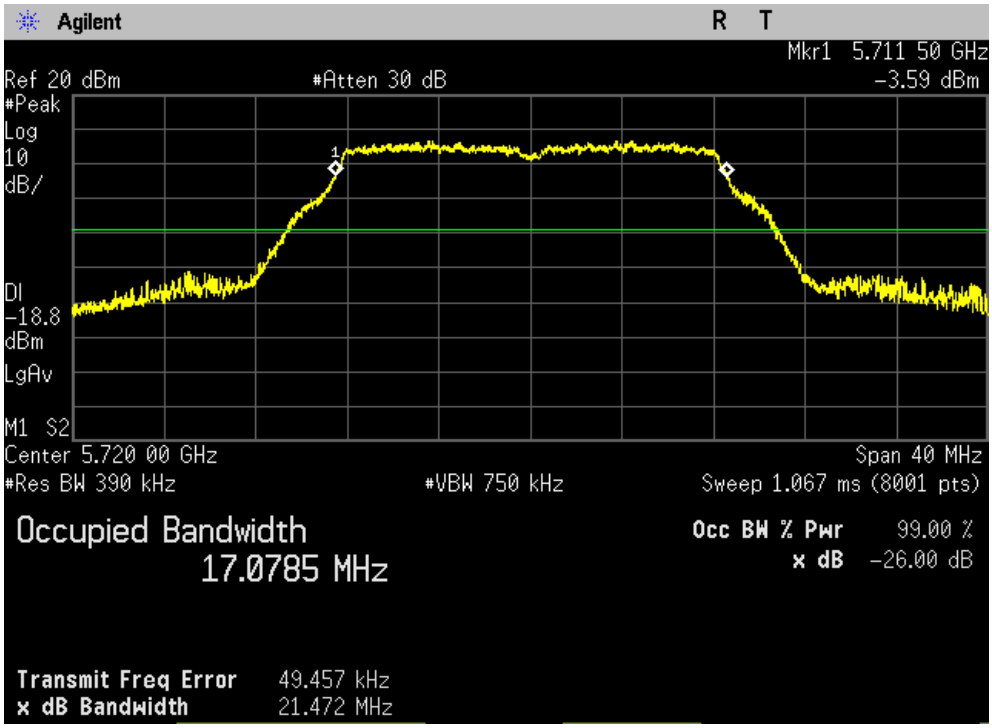
Chain 2 (4TX)

26 dB Bandwidth, Straddle Channel (5720 MHz)

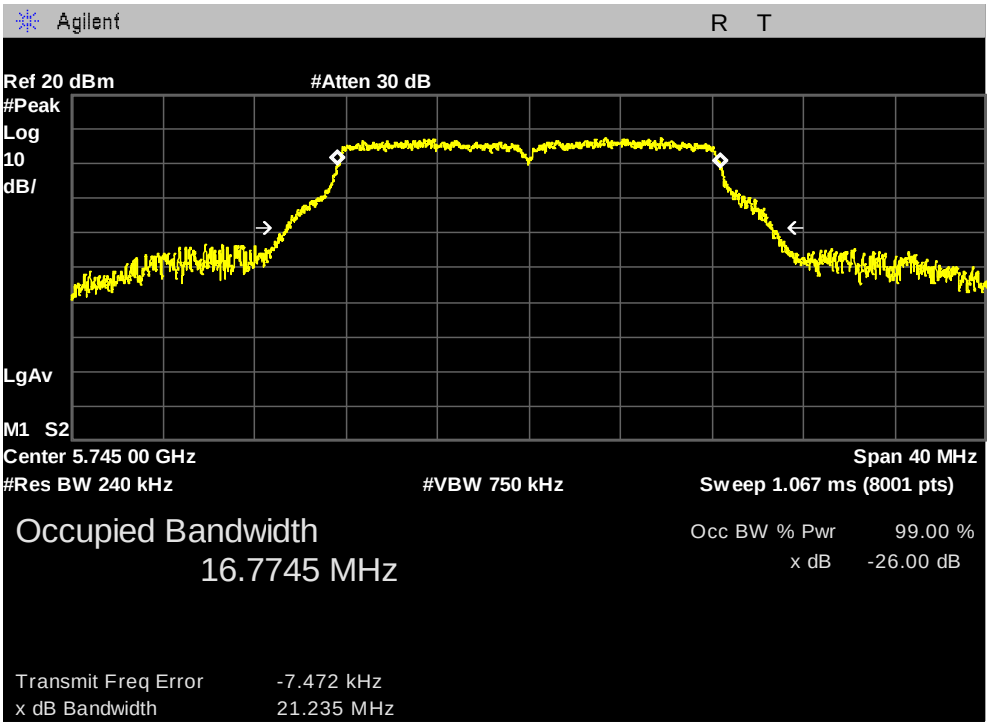


PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5720 MHz)

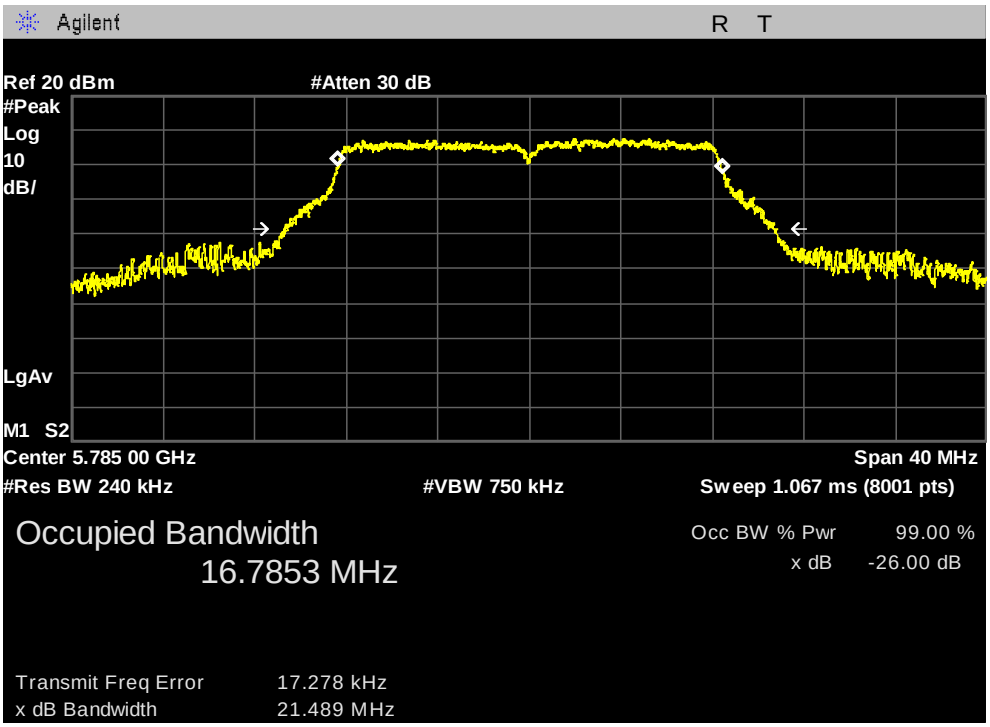


26 dB Bandwidth, Lowest Channel (5745 MHz)

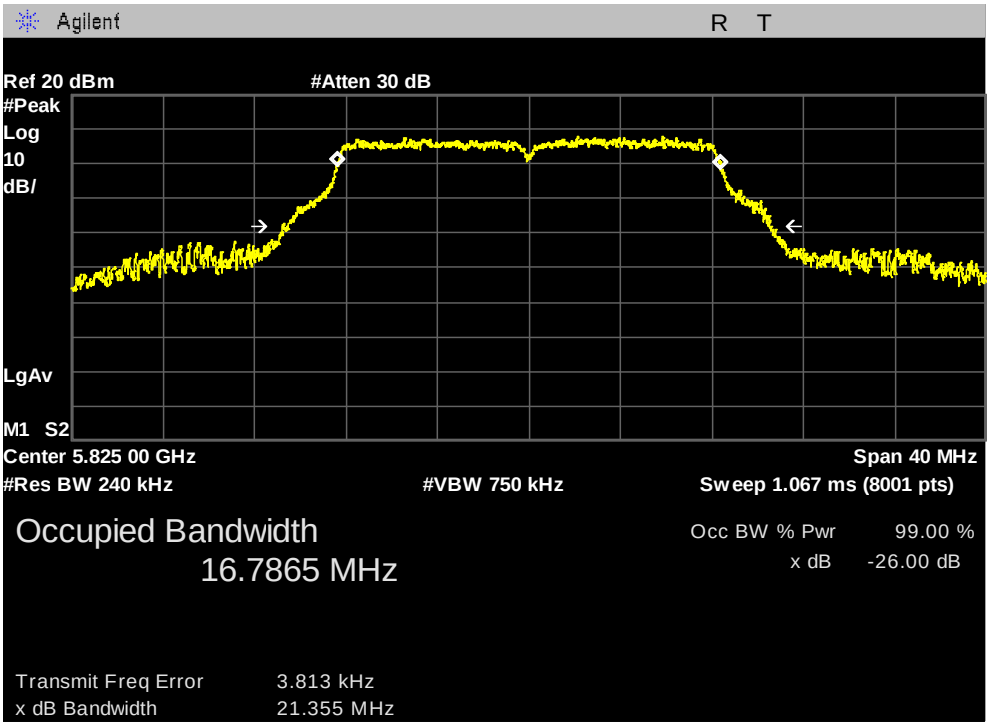


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5785 MHz)



26 dB Bandwidth, Highest Channel (5825 MHz)

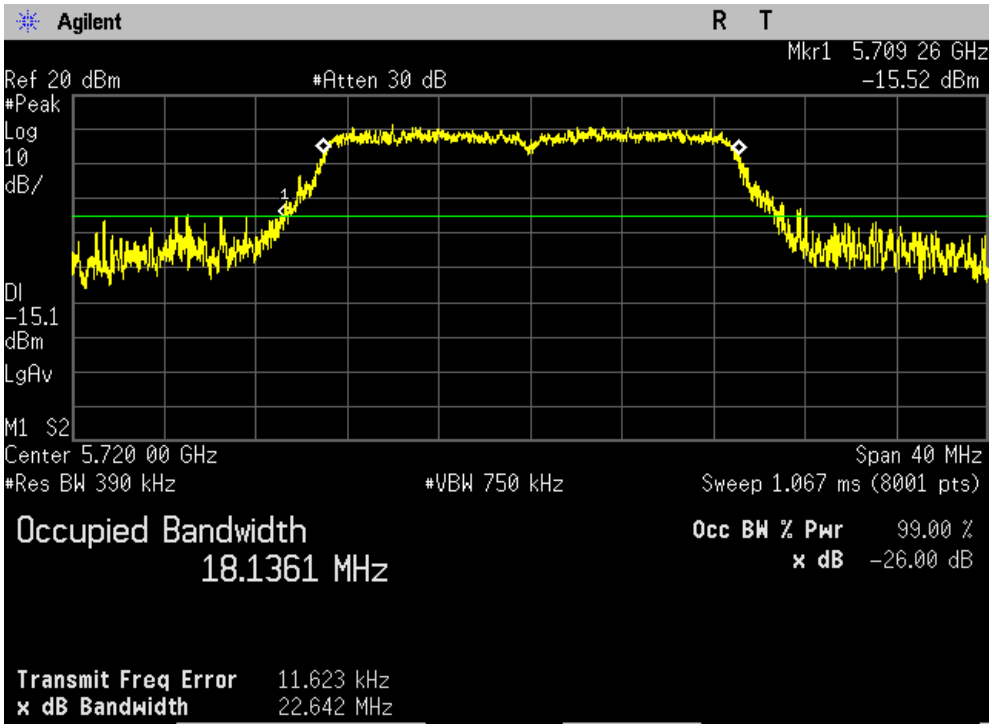


PLOTS OF EMISSIONS

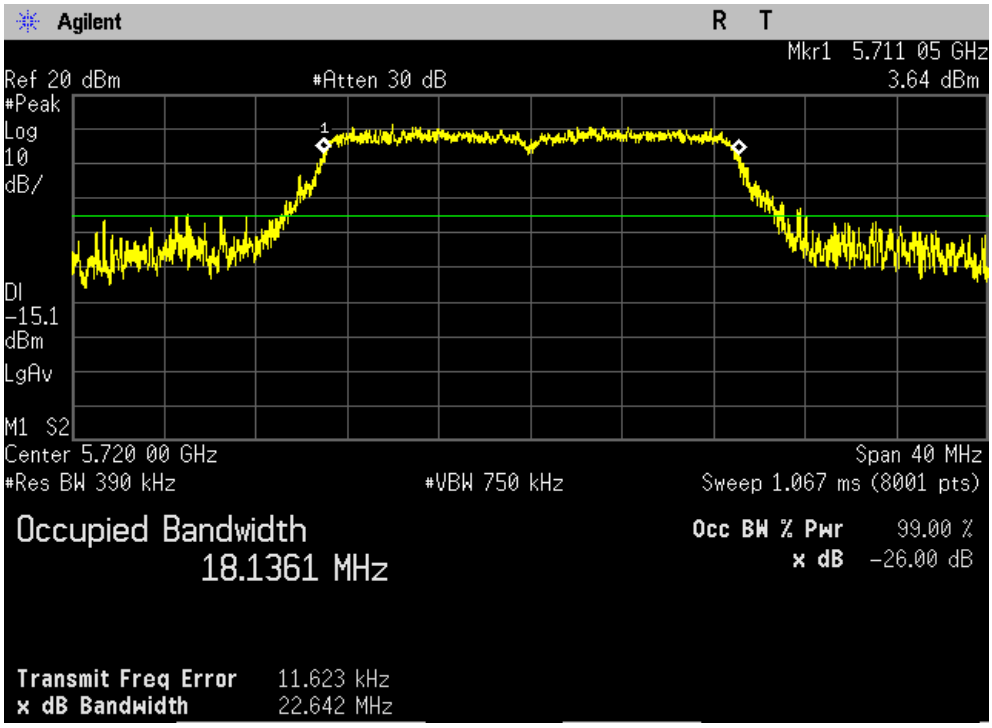
802.11n (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Straddle Channel (5720 MHz)

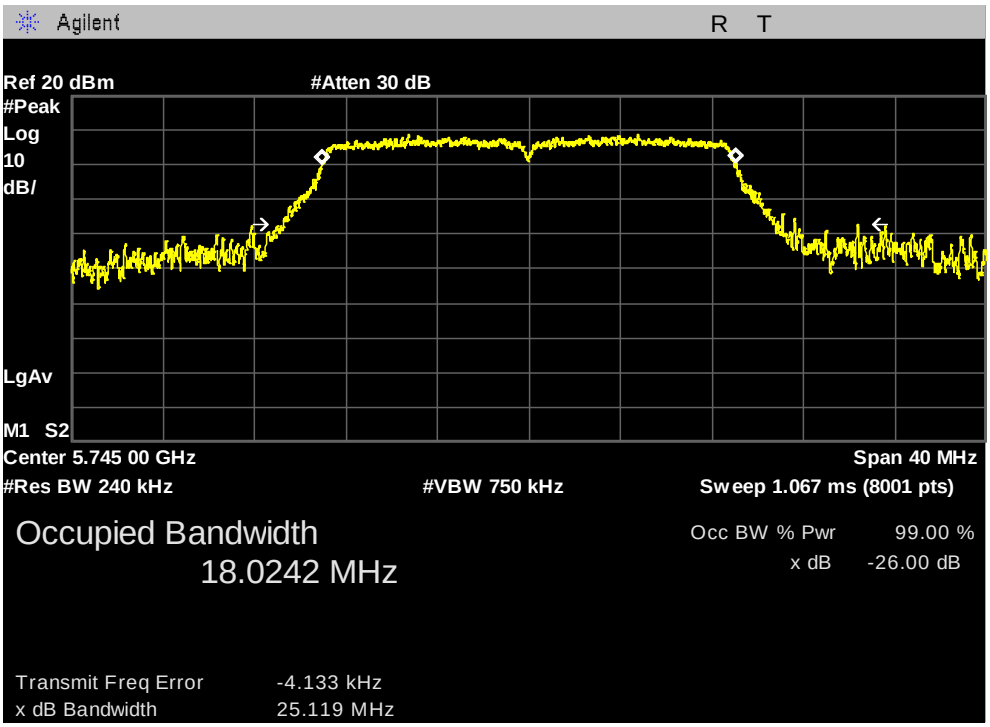


99 % Occupied bandwidth, Straddle Channel (5720 MHz)

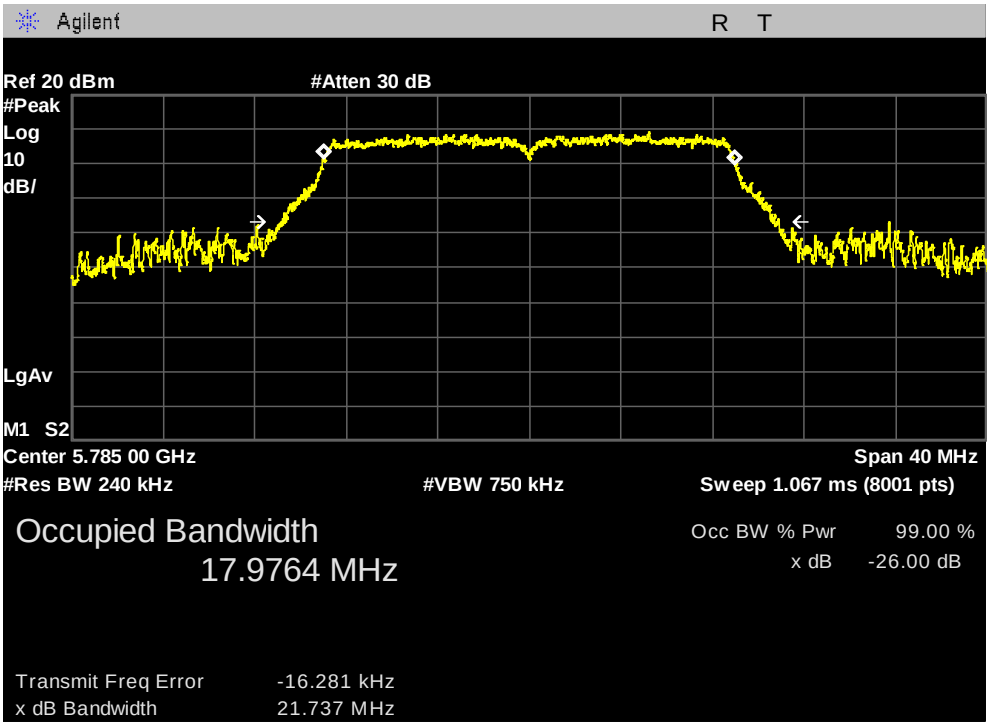


PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5745 MHz)

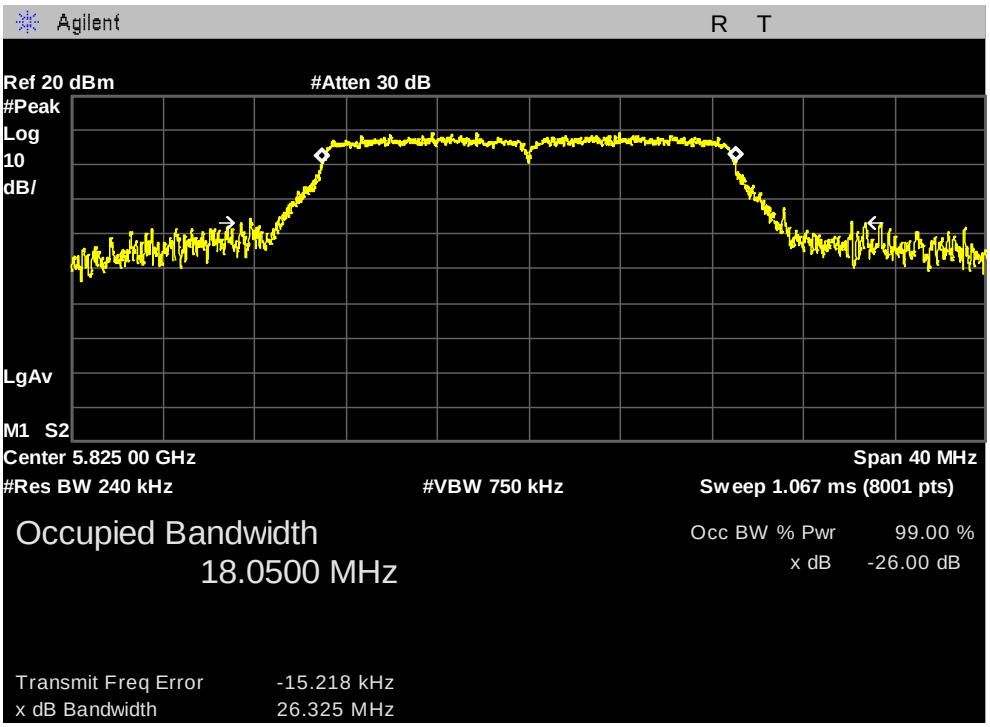


26 dB Bandwidth, Middle Channel (5785 MHz)



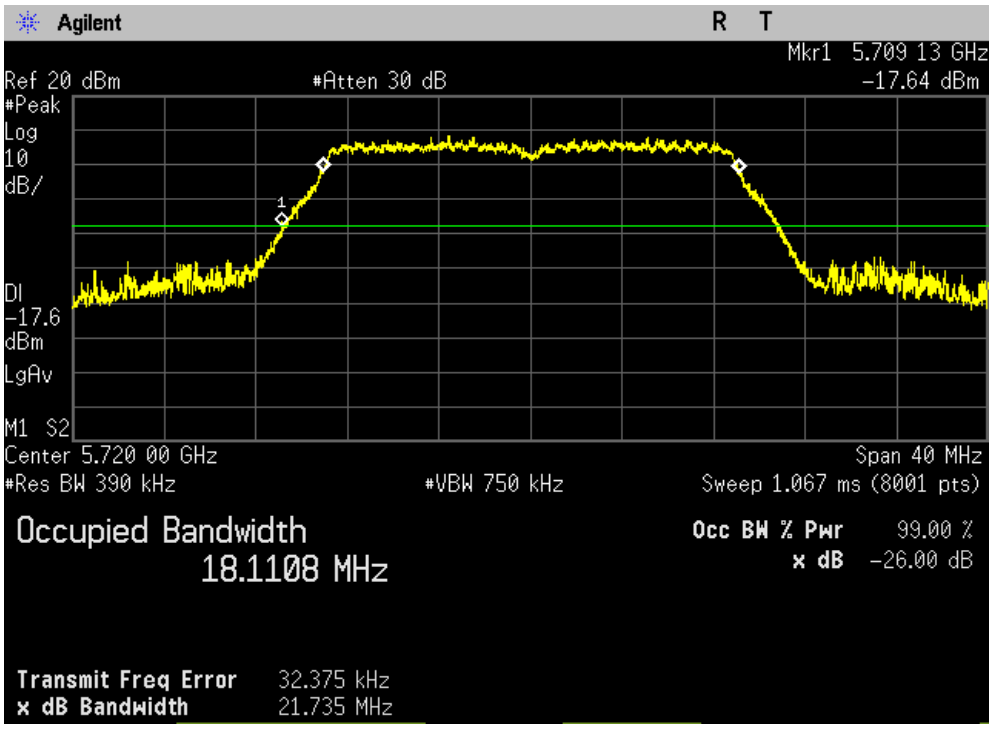
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5825 MHz)



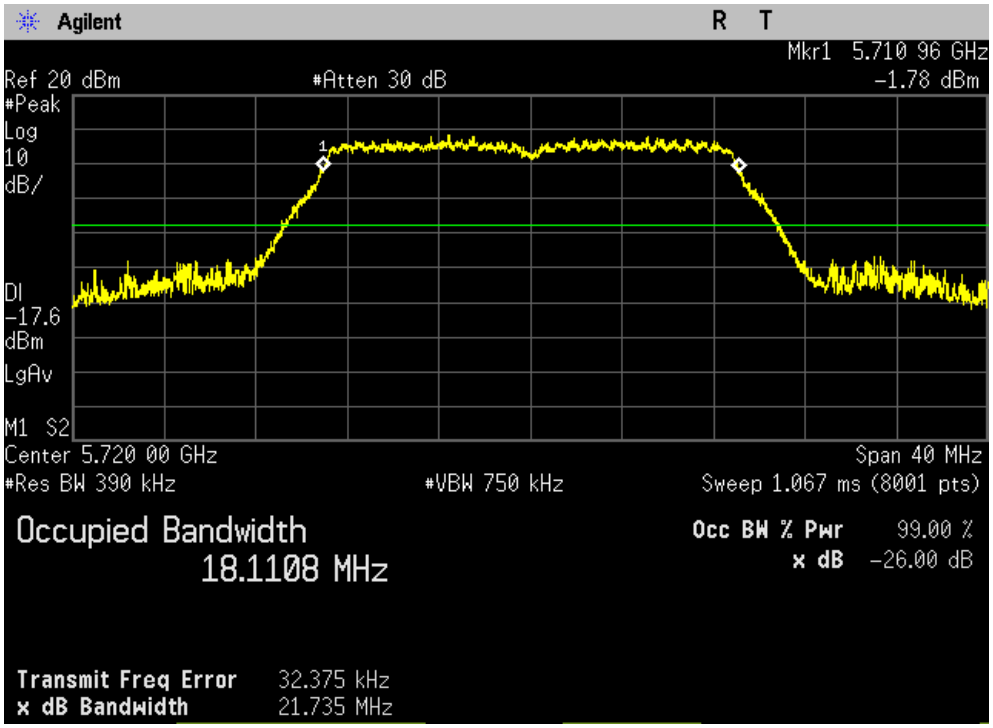
Chain 2 (4TX)

26 dB Bandwidth, Straddle Channel (5720 MHz)

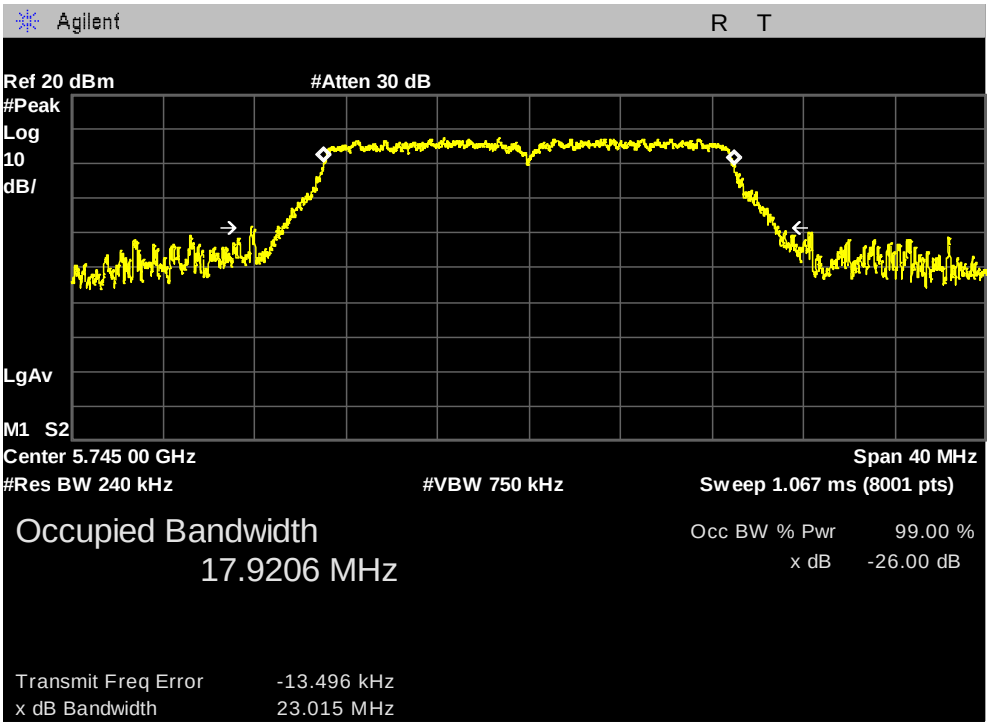


PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5720 MHz)

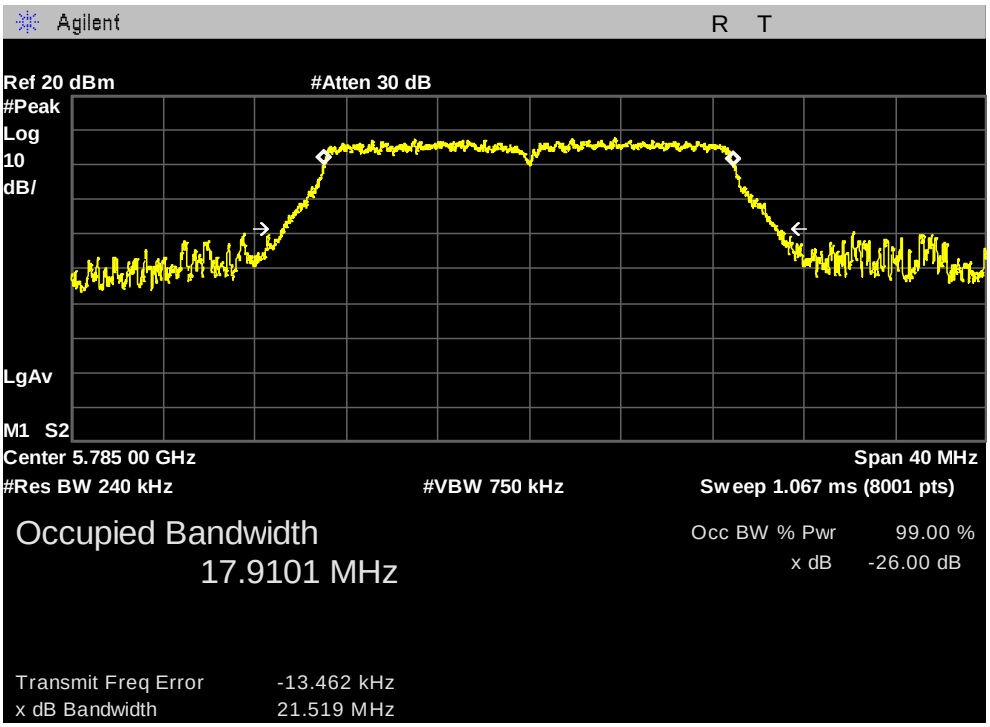


26 dB Bandwidth, Lowest Channel (5745 MHz)

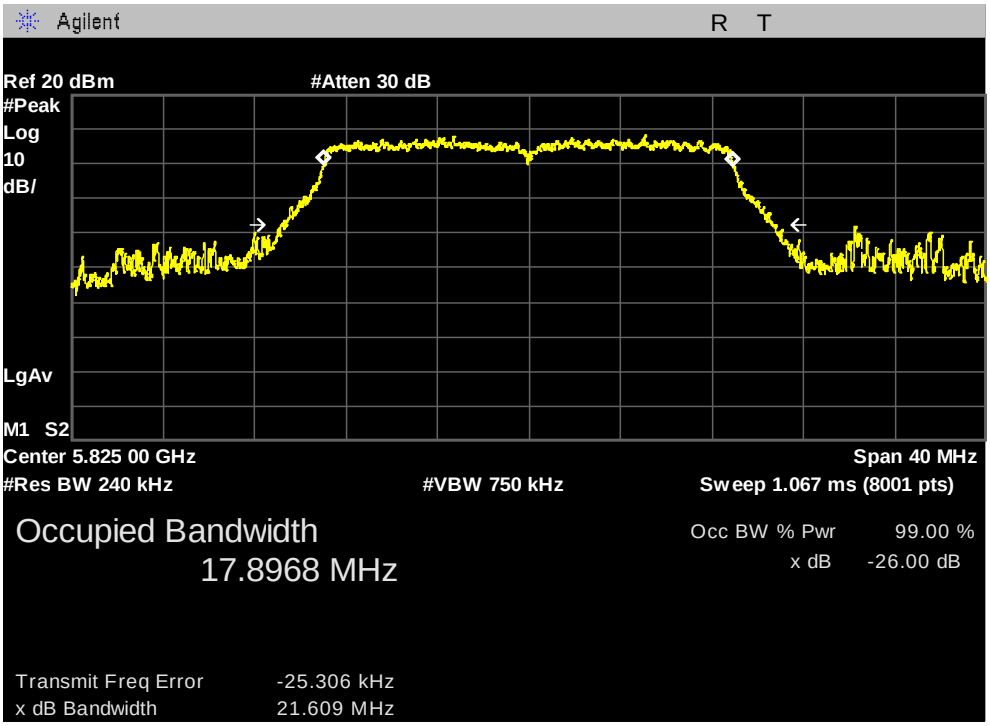


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5785 MHz)



26 dB Bandwidth, Highest Channel (5825 MHz)

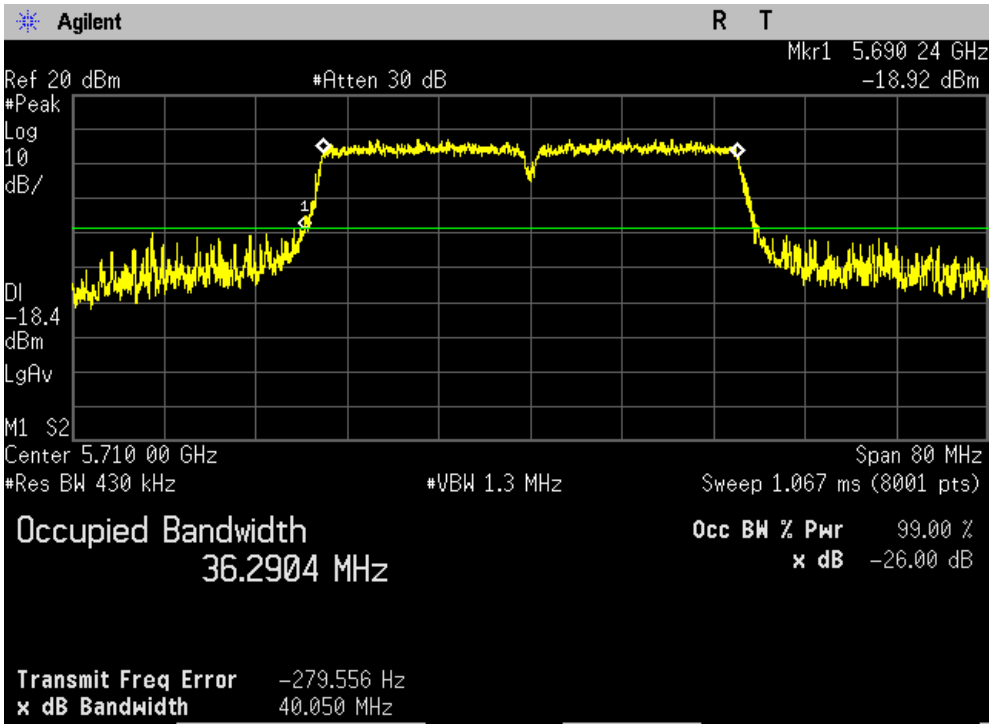


PLOTS OF EMISSIONS

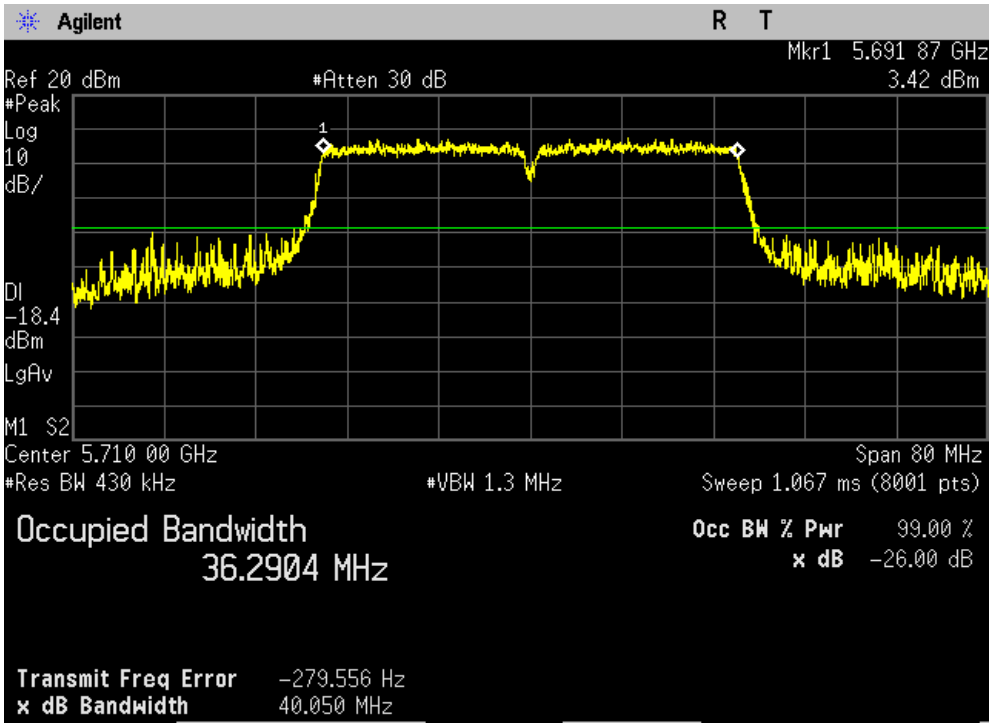
802.11n (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Straddle Channel (5710 MHz)

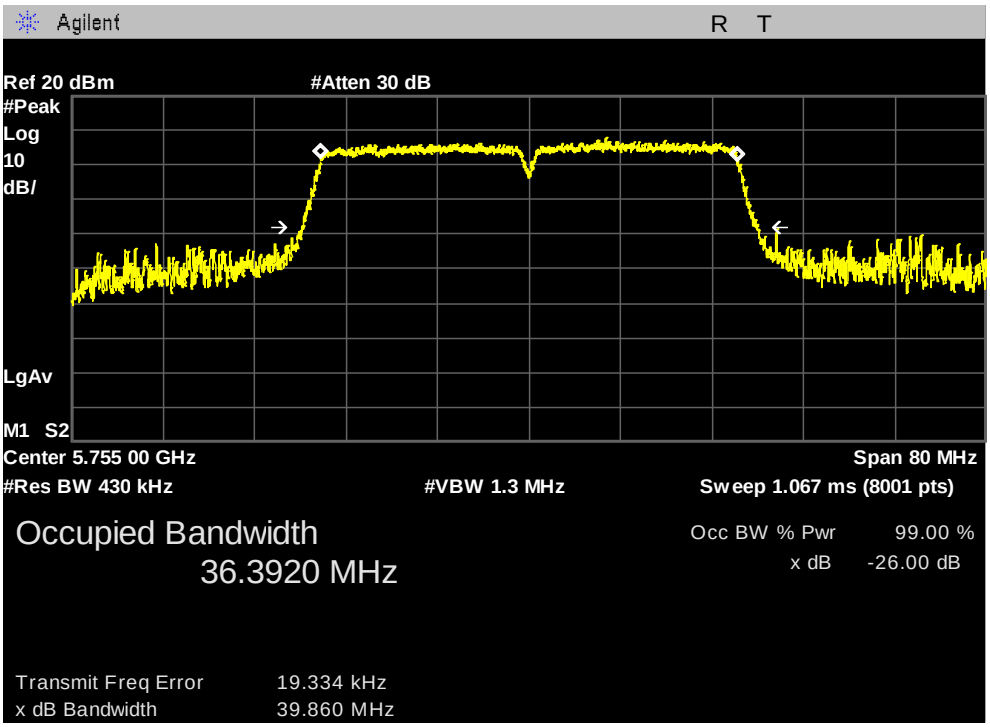


99 % Occupied bandwidth, Straddle Channel (5710 MHz)

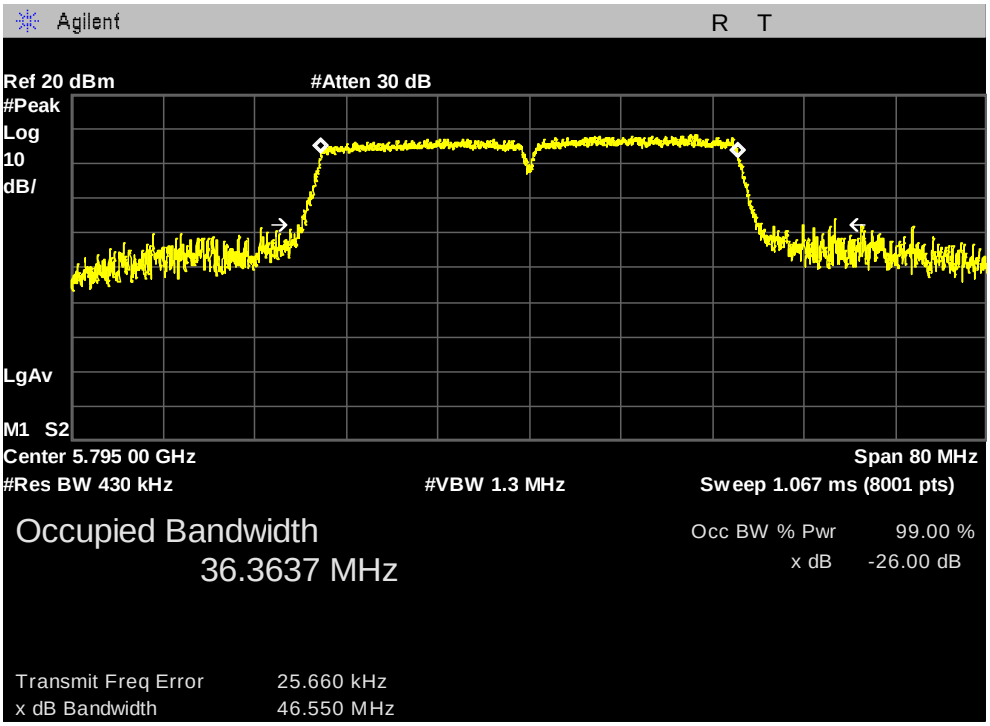


PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5755 MHz)



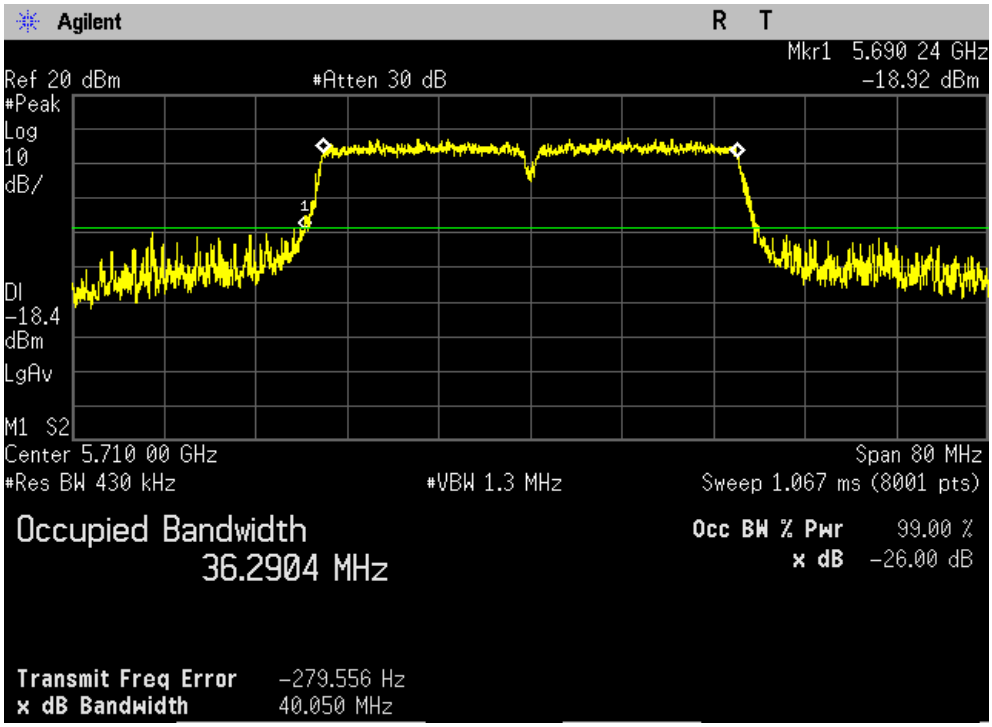
26 dB Bandwidth, Highest Channel (5795 MHz)



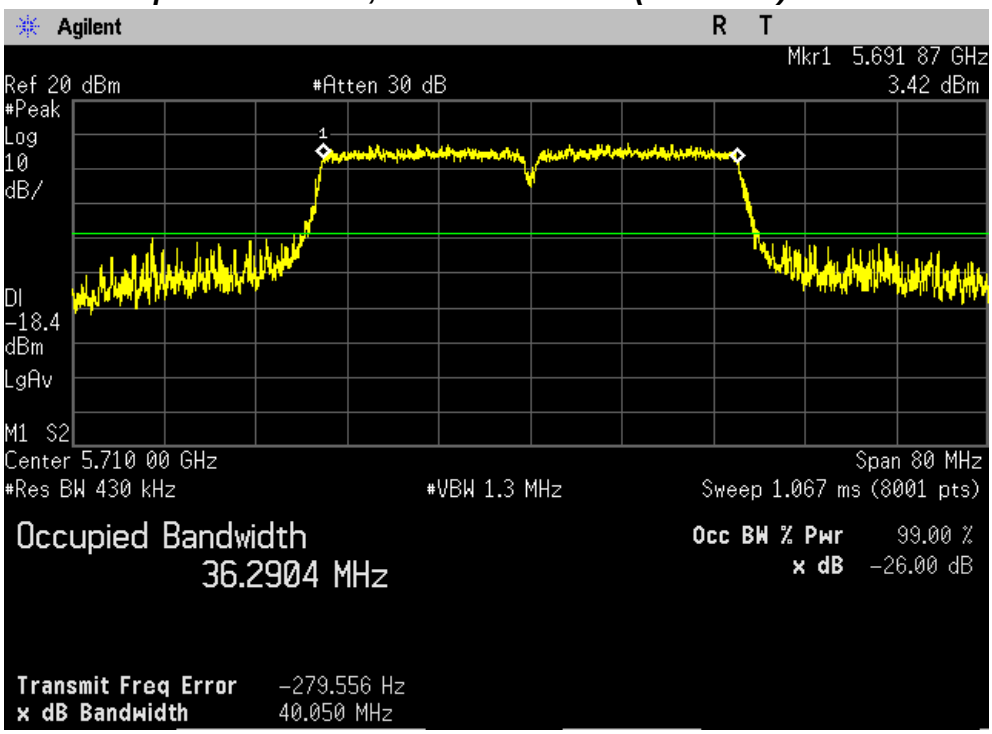
PLOTS OF EMISSIONS

Chain 2 (4TX)

26 dB Bandwidth, Straddle Channel (5710 MHz)

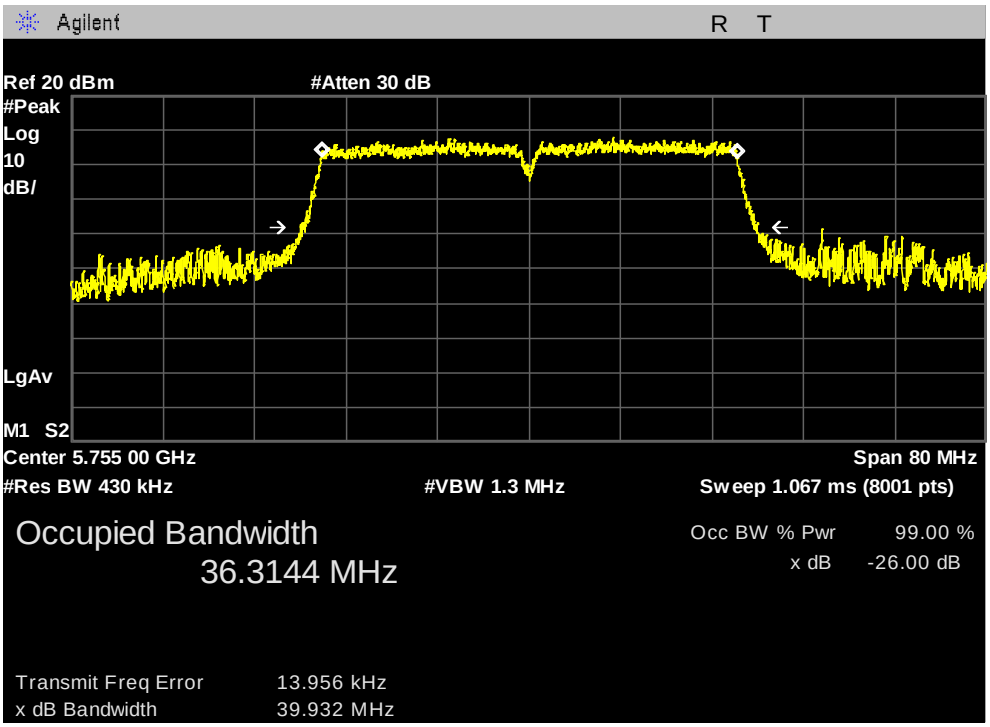


99 % Occupied bandwidth, Straddle Channel (5710 MHz)

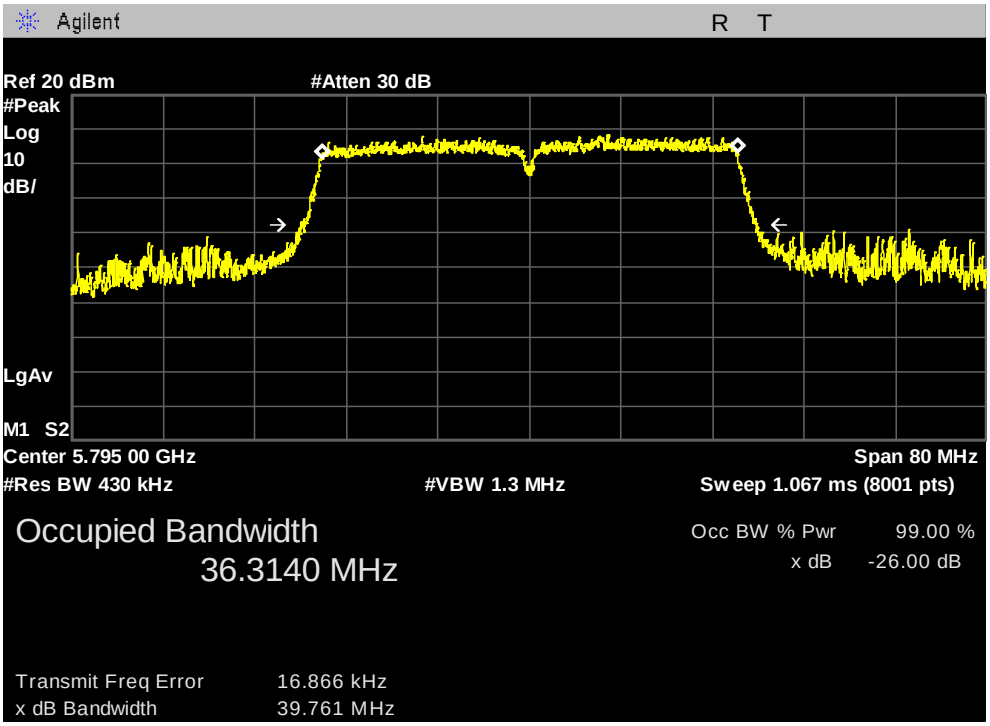


PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5755 MHz)



26 dB Bandwidth, Highest Channel (5795 MHz)

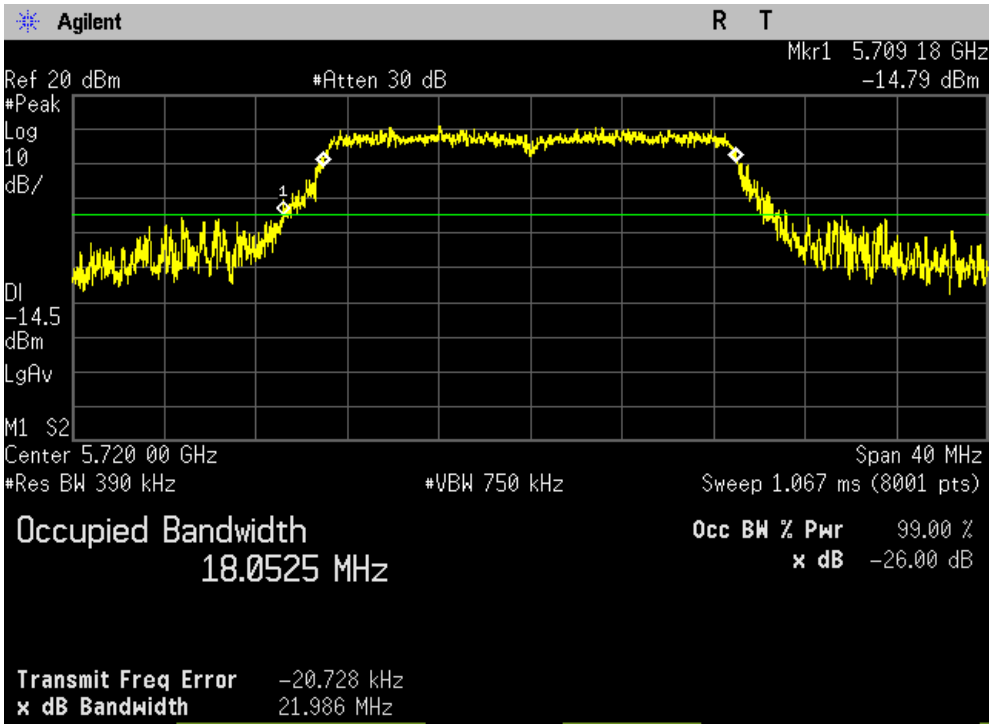


PLOTS OF EMISSIONS

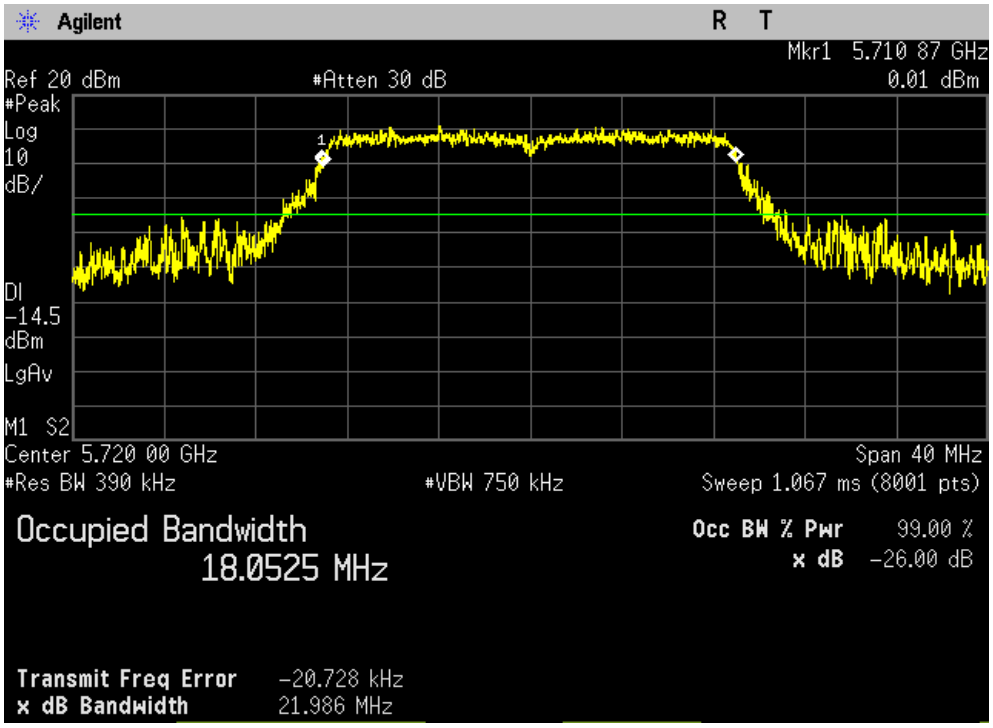
802.11ac (20 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Straddle Channel (5720 MHz)

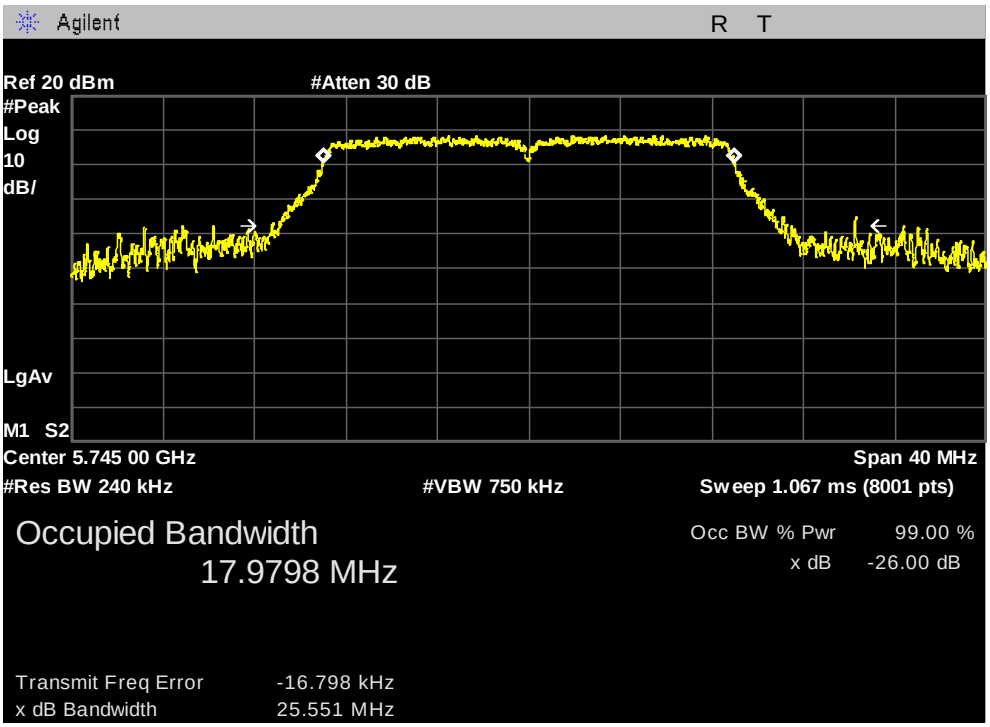


99 % Occupied bandwidth, Straddle Channel (5720 MHz)

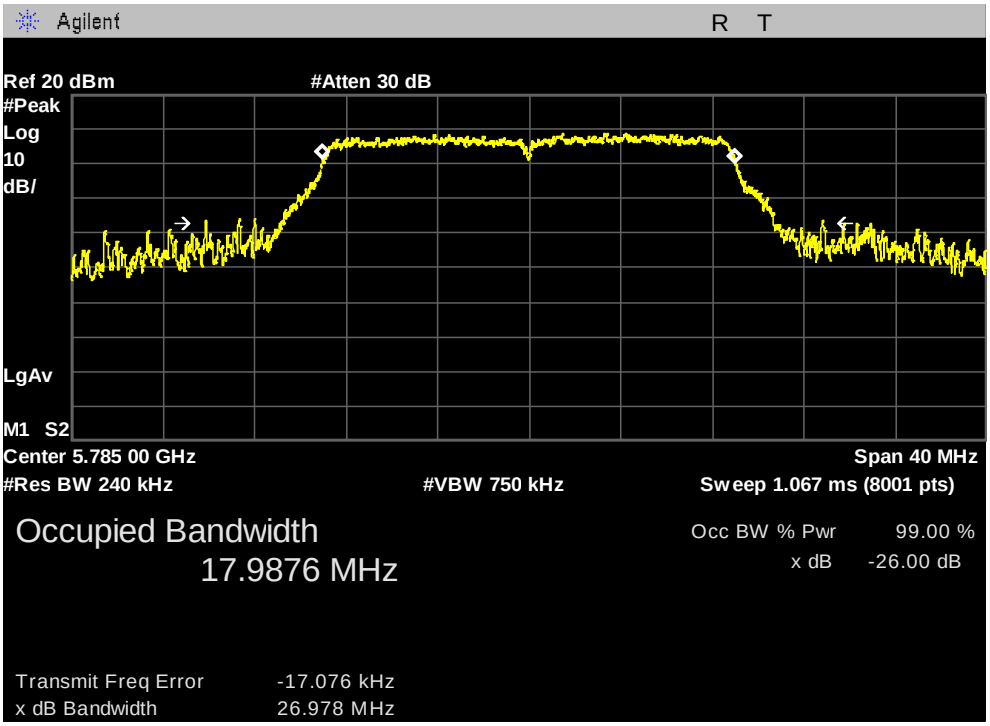


PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5745 MHz)

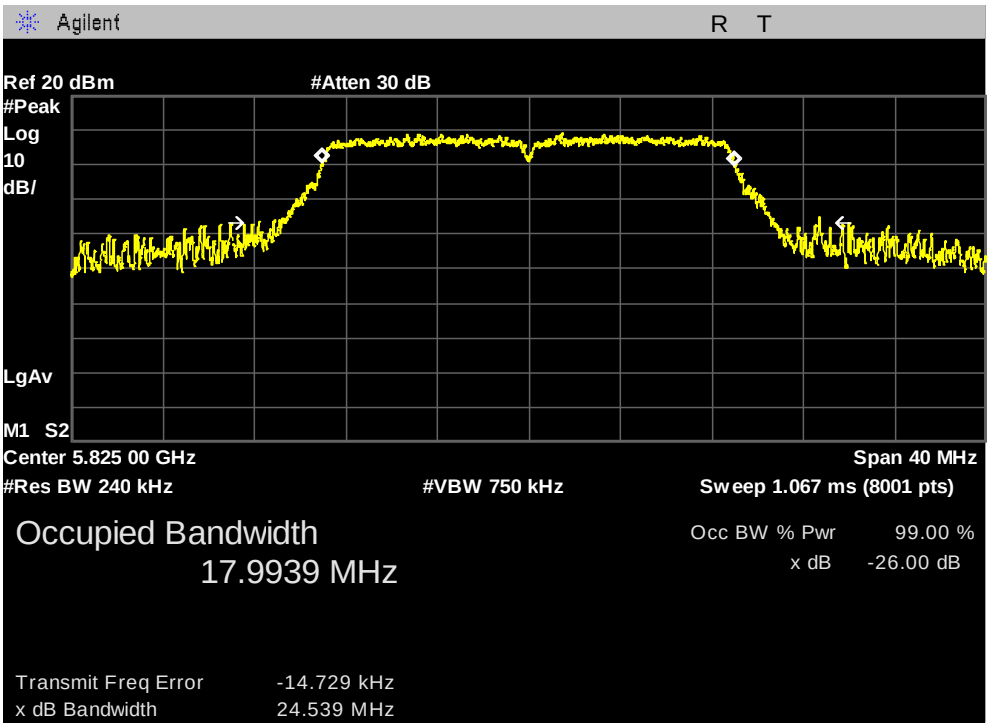


26 dB Bandwidth, Middle Channel (5785 MHz)



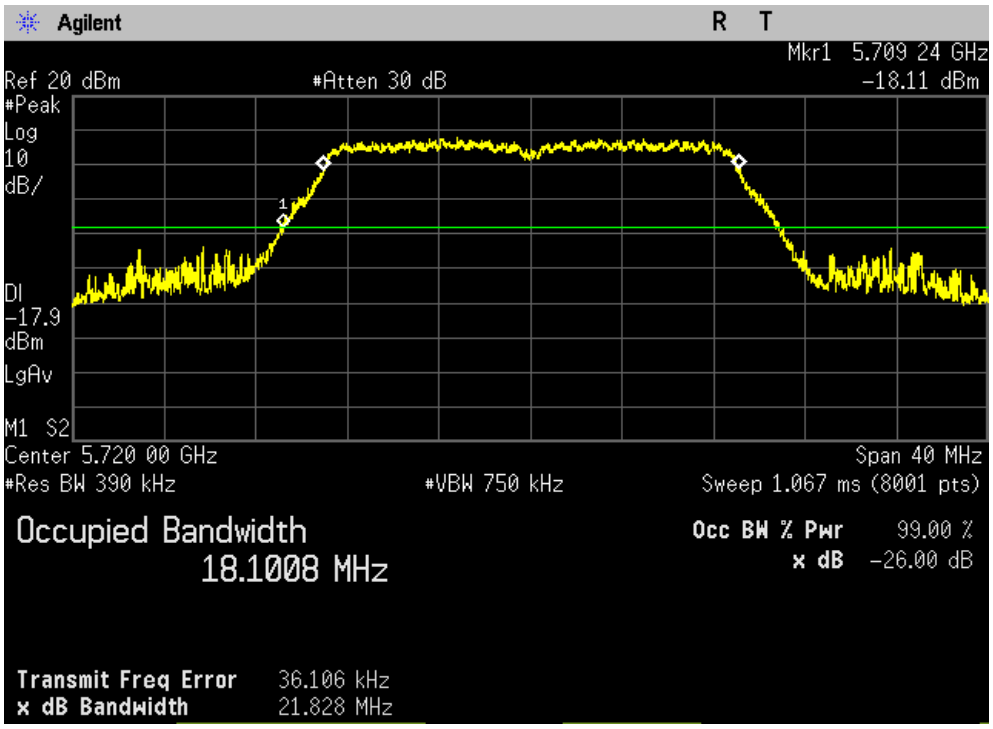
PLOTS OF EMISSIONS

26 dB Bandwidth, Highest Channel (5825 MHz)



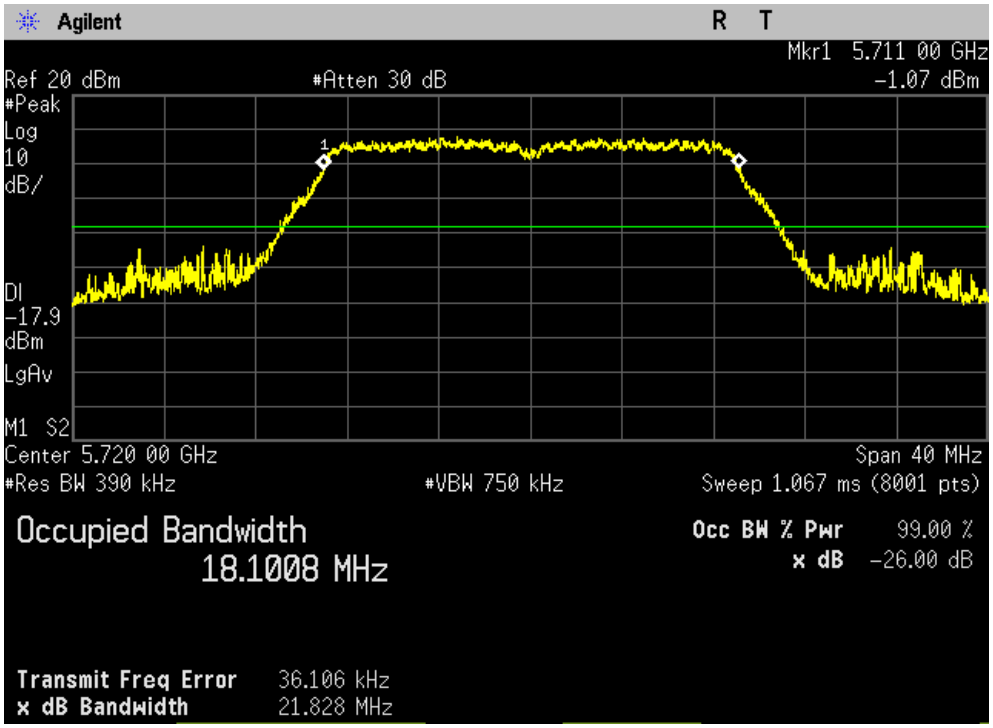
Chain 2 (4TX)

26 dB Bandwidth, Straddle Channel (5720 MHz)

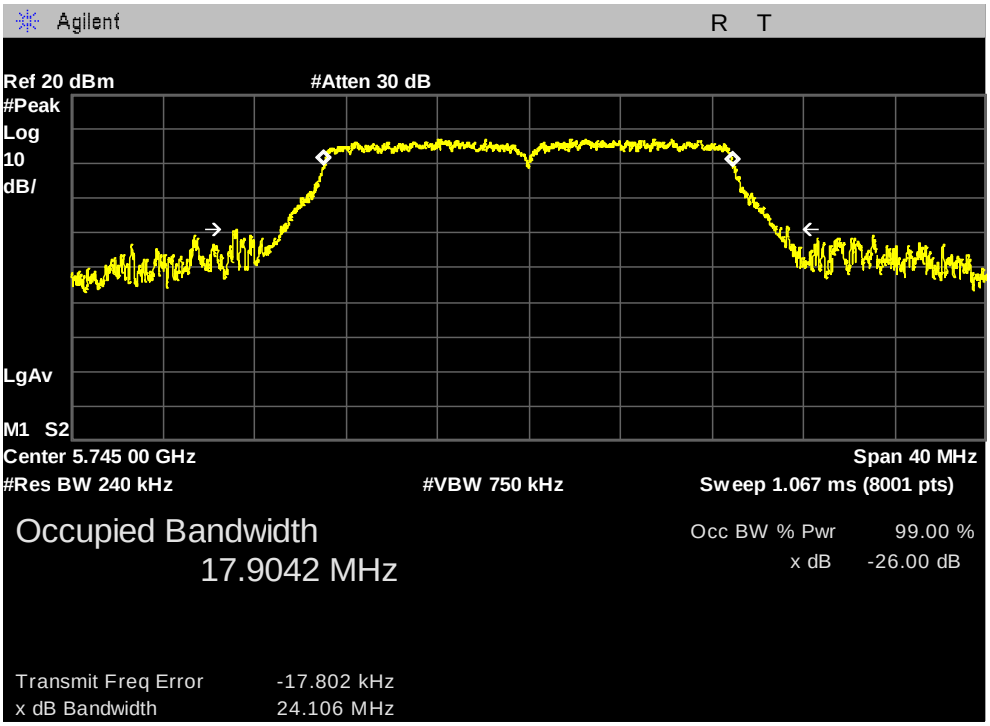


PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5720 MHz)

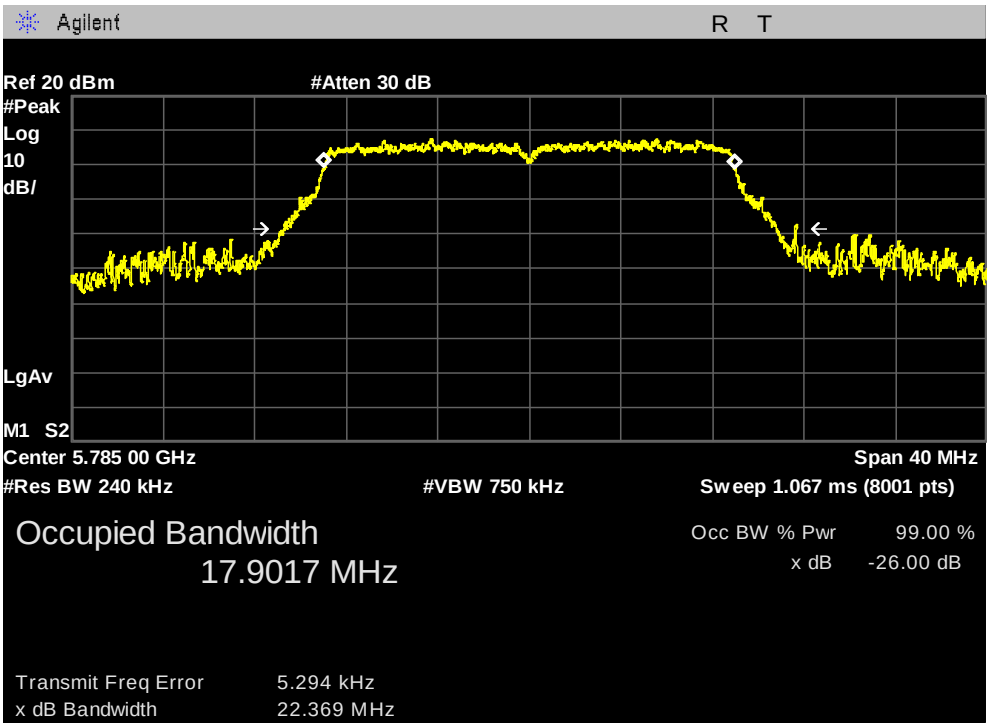


26 dB Bandwidth, Lowest Channel (5745 MHz)

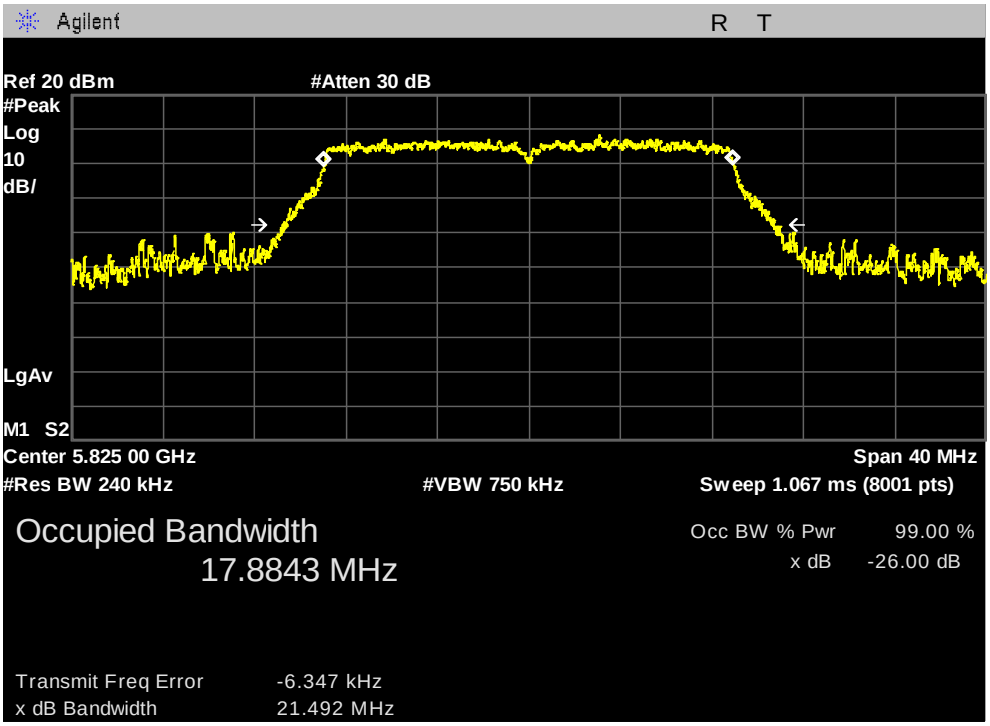


PLOTS OF EMISSIONS

26 dB Bandwidth, Middle Channel (5785 MHz)



26 dB Bandwidth, Highest Channel (5825 MHz)

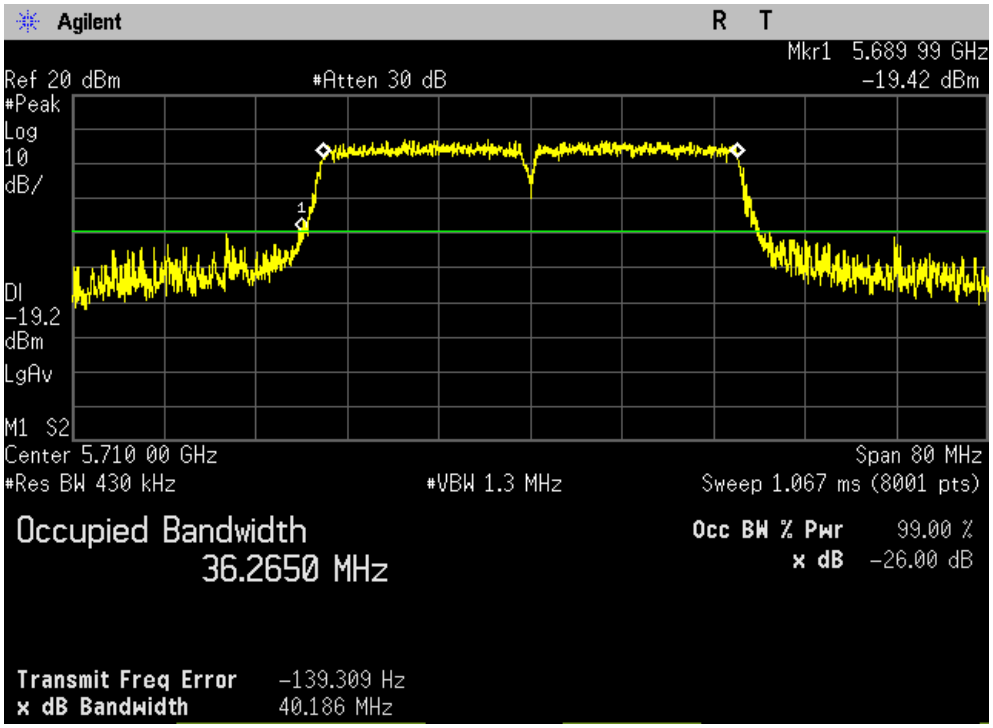


PLOTS OF EMISSIONS

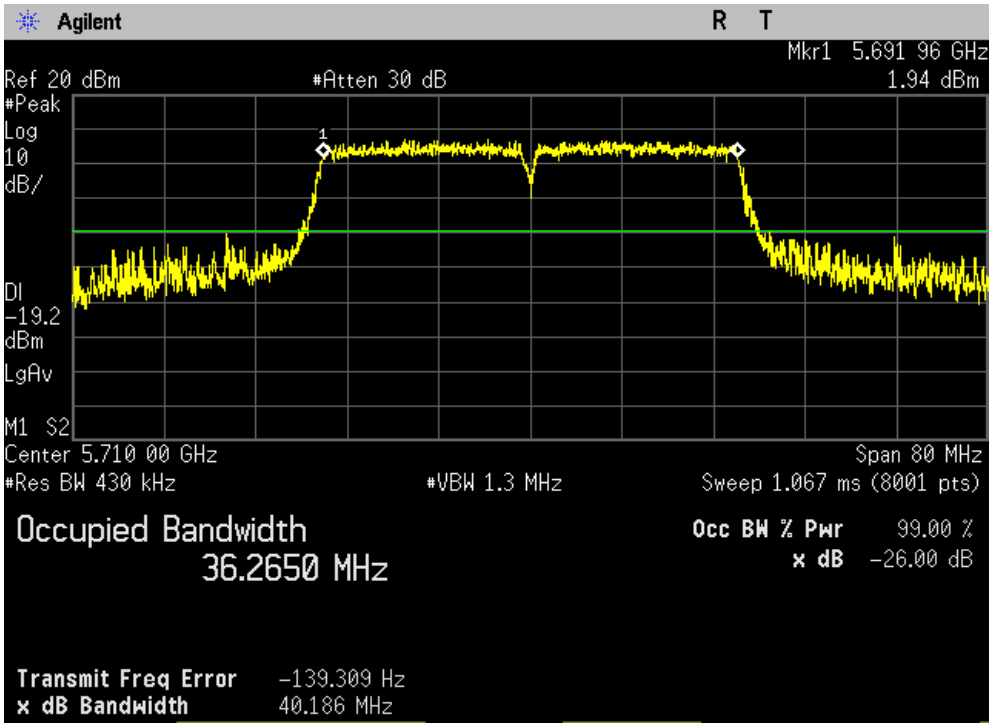
802.11ac (40 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Straddle Channel (5710 MHz)

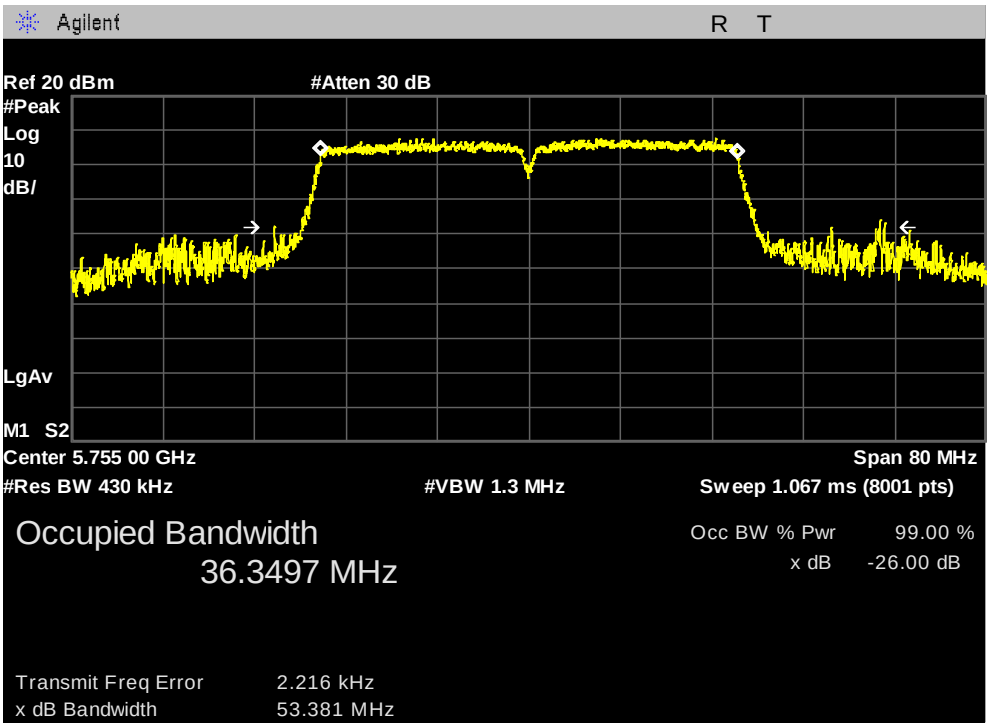


99 % Occupied bandwidth, Straddle Channel (5710 MHz)

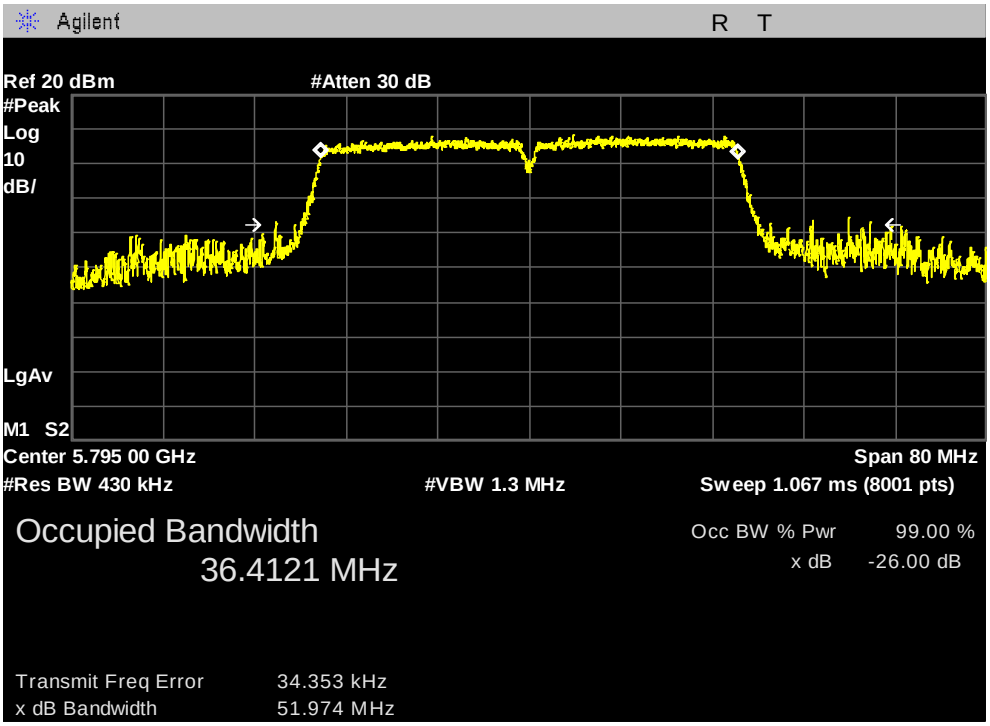


PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5755 MHz)



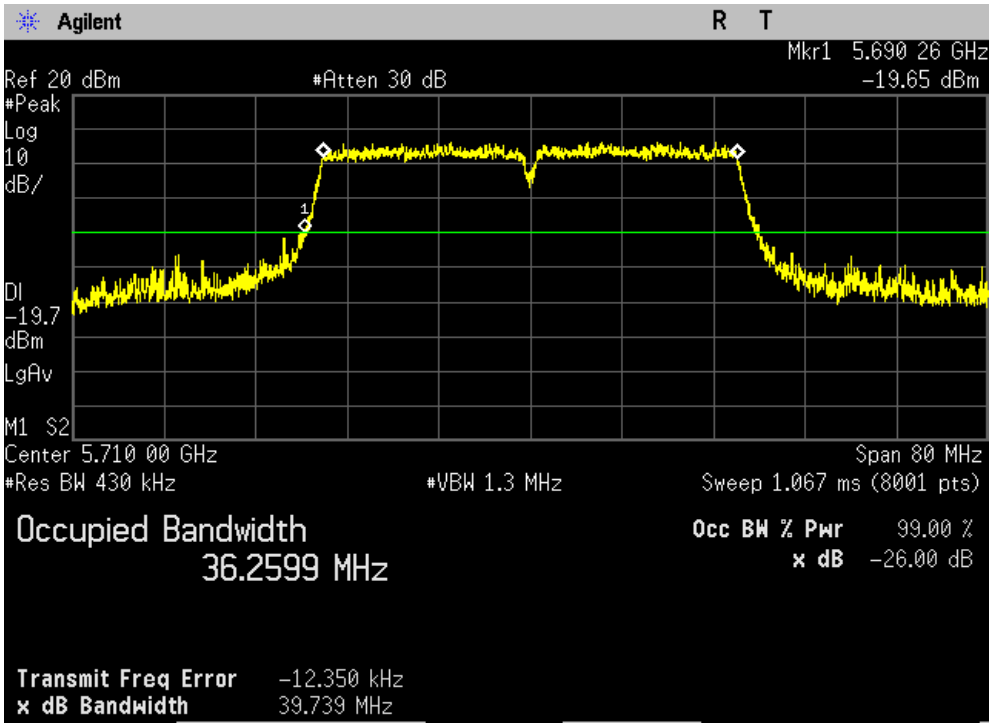
26 dB Bandwidth, Highest Channel (5795 MHz)



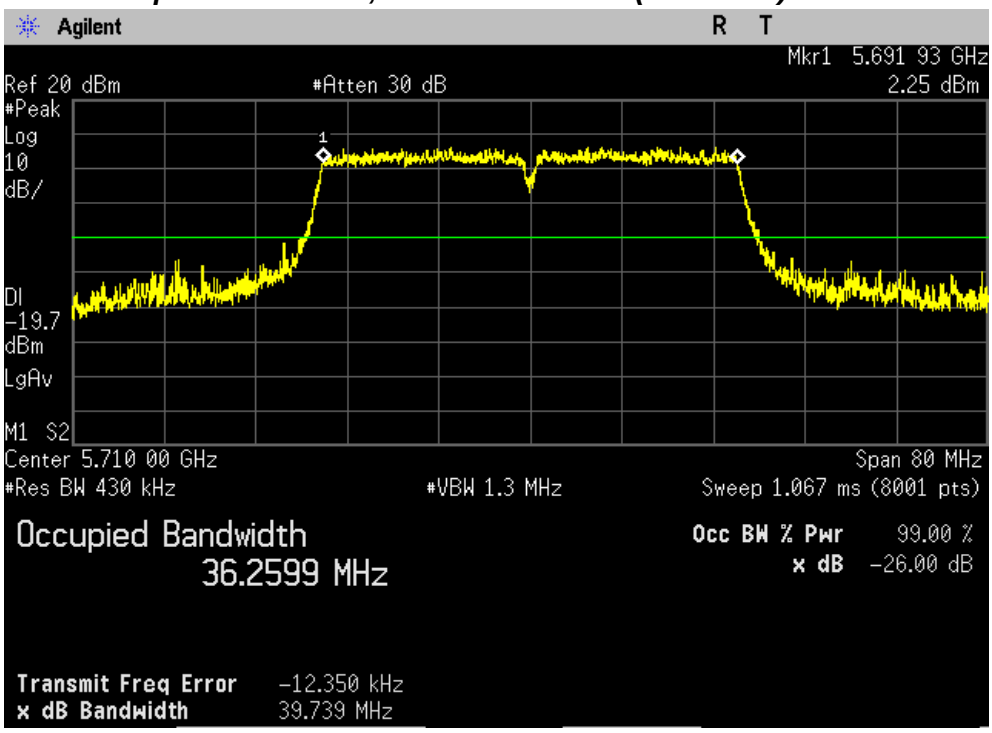
PLOTS OF EMISSIONS

Chain 2 (4TX)

26 dB Bandwidth, Straddle Channel (5710 MHz)

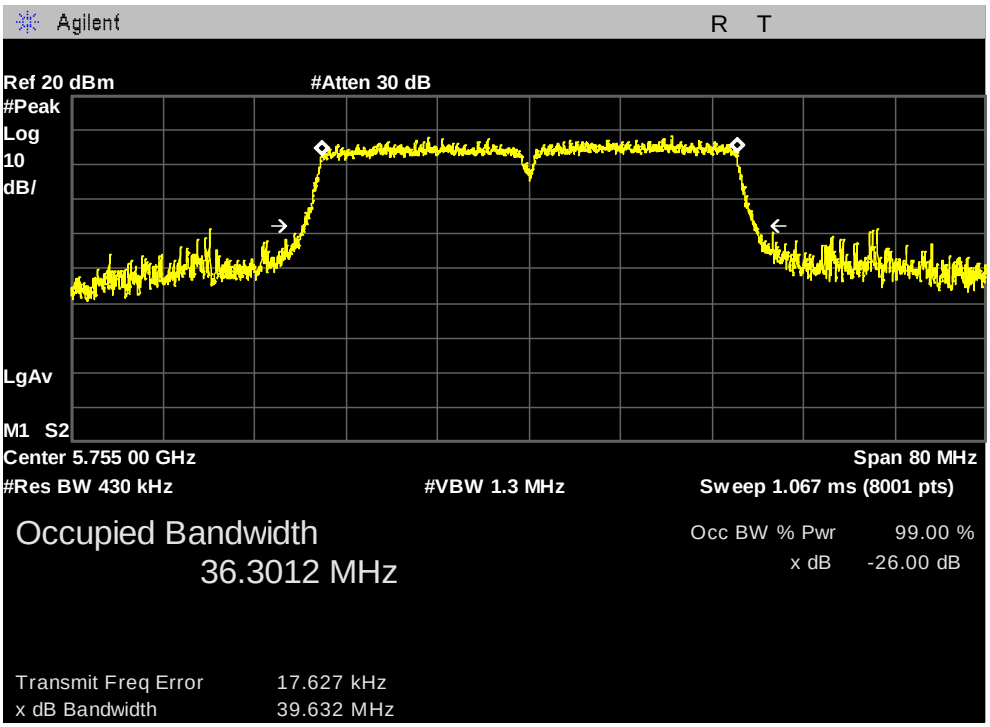


99 % Occupied bandwidth, Straddle Channel (5710 MHz)

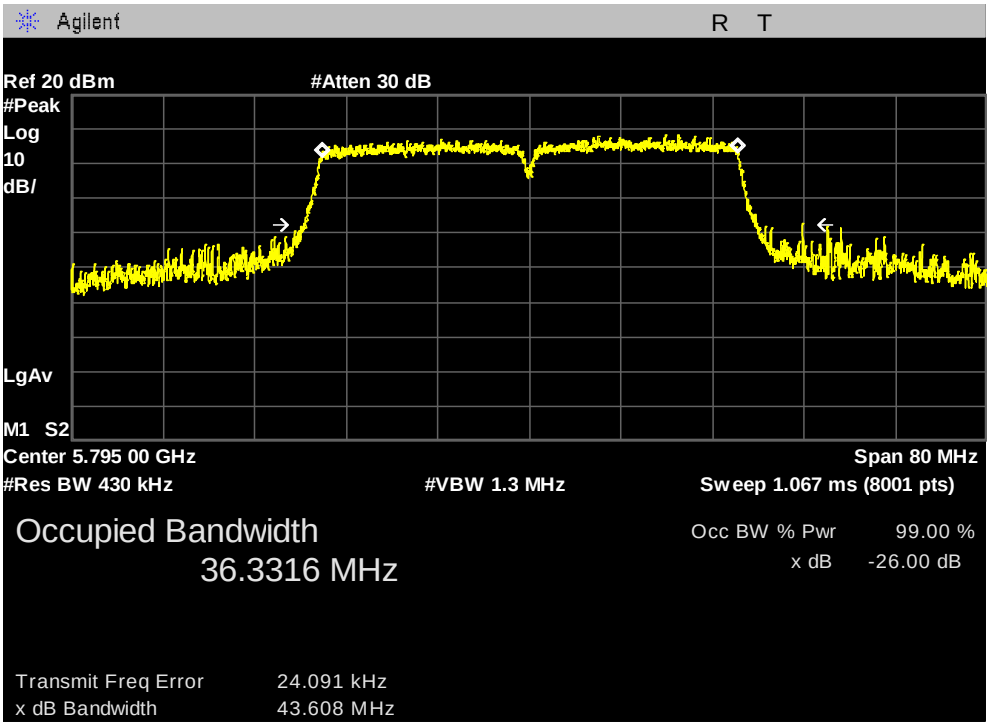


PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5755 MHz)



26 dB Bandwidth, Highest Channel (5795 MHz)

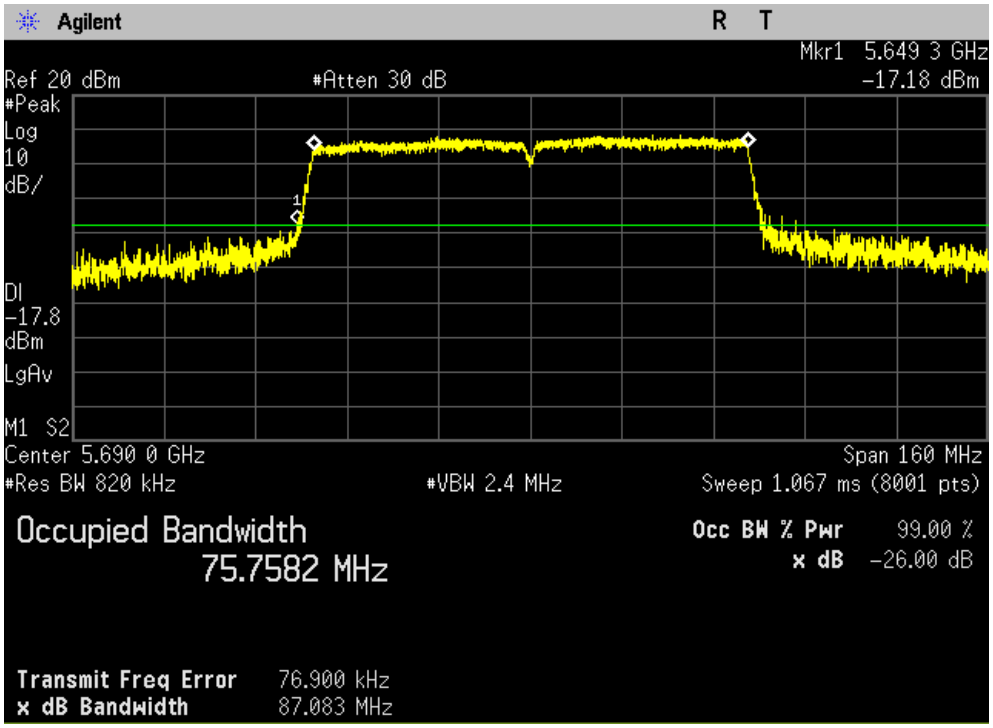


PLOTS OF EMISSIONS

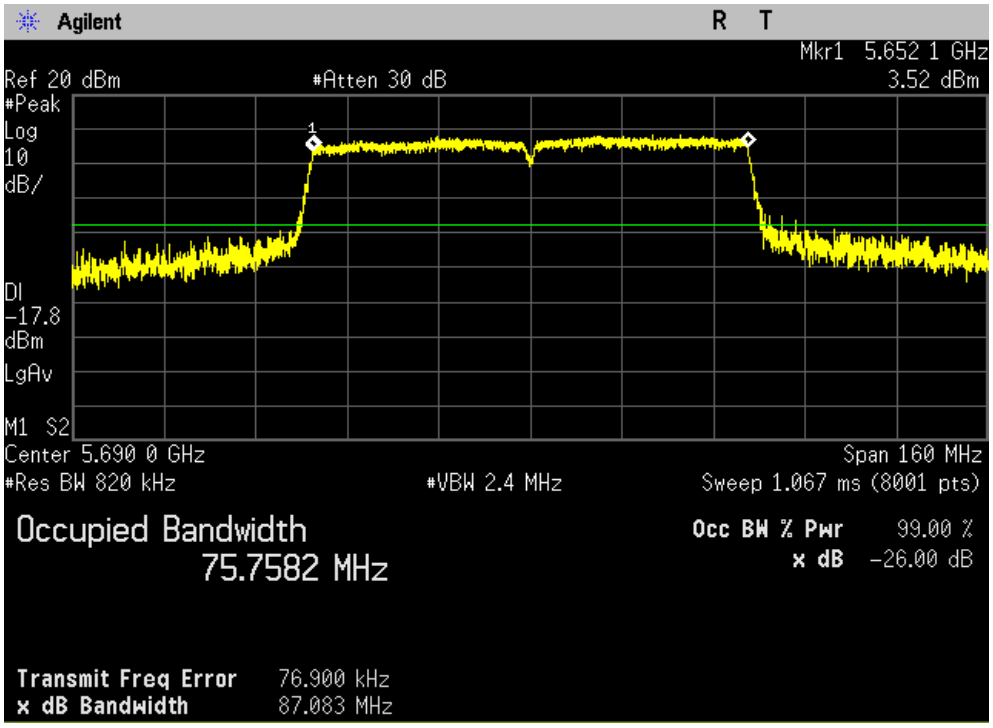
802.11ac (80 MHz) mode

Chain 2 (1TX)

26 dB Bandwidth, Straddle Channel (5690 MHz)

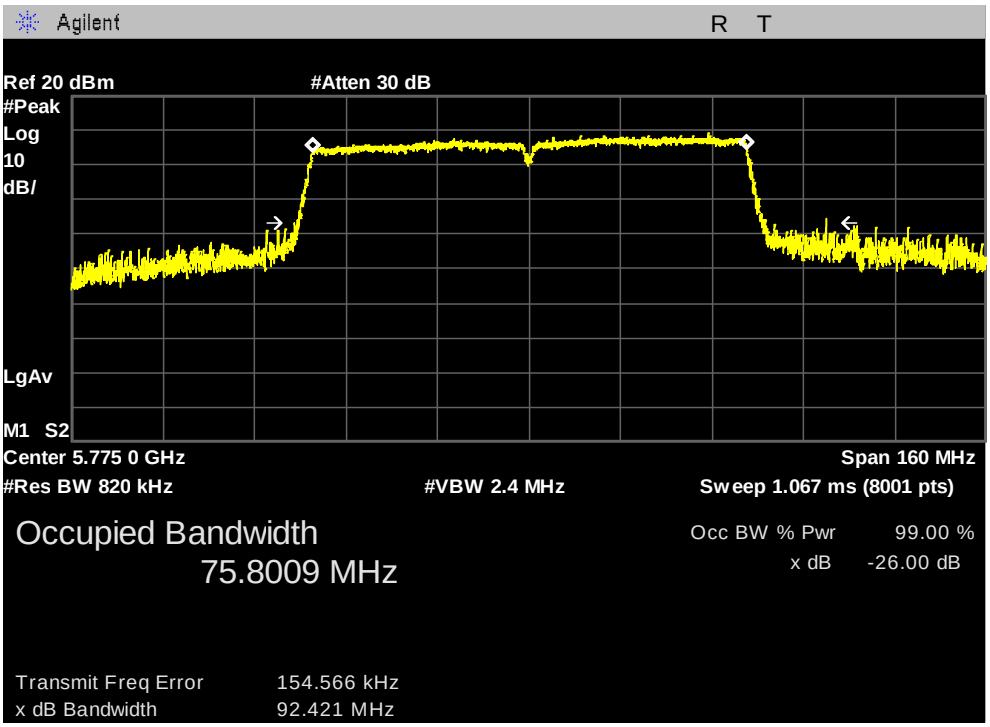


99 % Occupied bandwidth, Straddle Channel (5690 MHz)



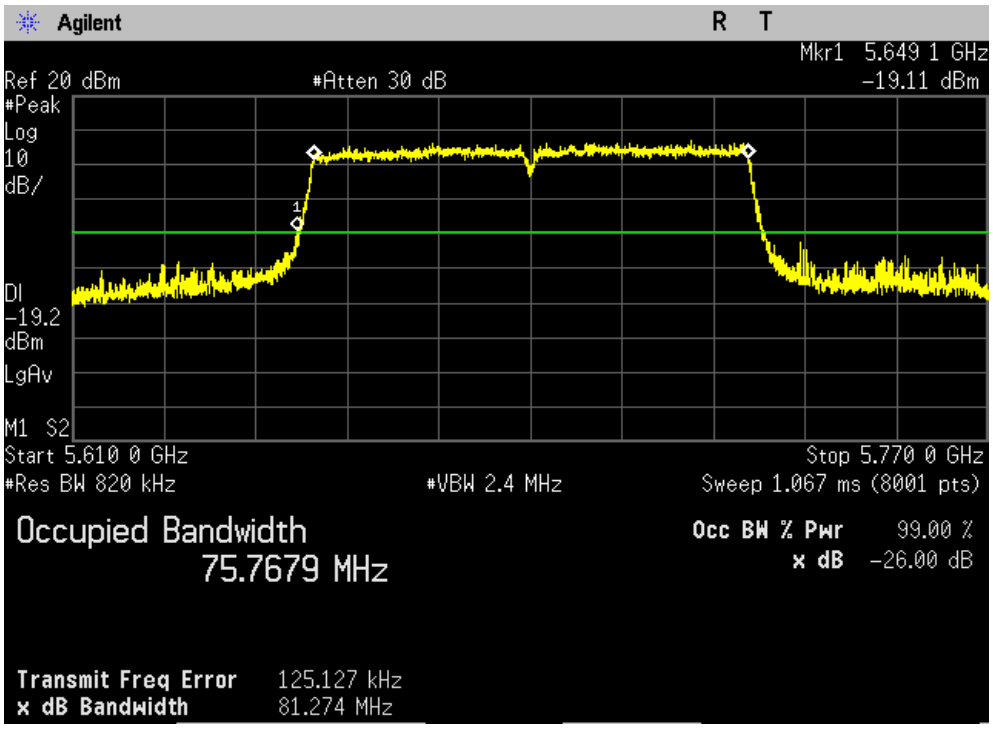
PLOTS OF EMISSIONS

26 dB Bandwidth, Lowest Channel (5775 MHz)



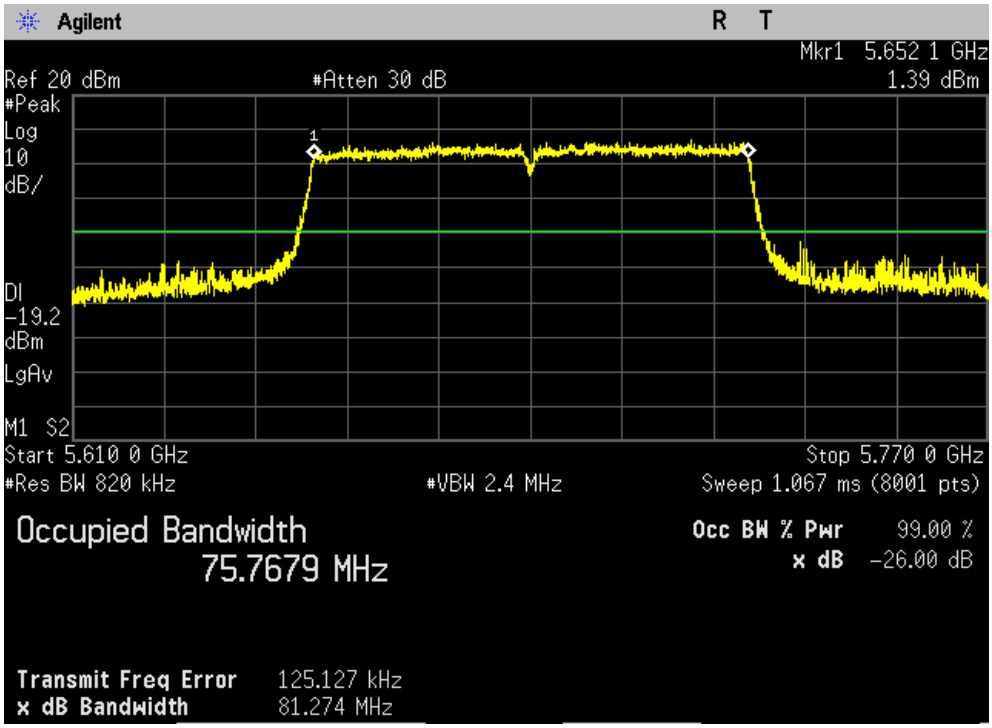
Chain 2 (4TX)

26 dB Bandwidth, Straddle Channel (5690 MHz)

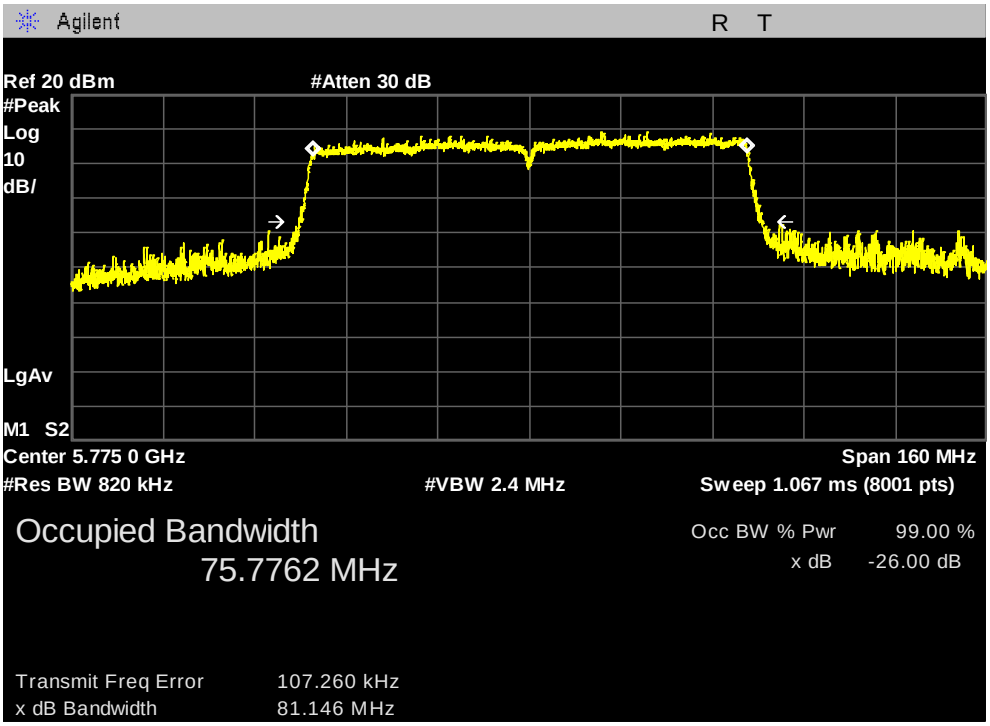


PLOTS OF EMISSIONS

99 % Occupied bandwidth, Straddle Channel (5690 MHz)



26 dB Bandwidth, Lowest Channel (5775 MHz)



TEST DATA

8.4 6 dB Bandwidth – UNII-3 band

FCC §15.407(e)

Test Mode : Set to Straddle channel, Lowest channel, Middle channel and Highest channel

802.11a mode

Channel	Frequency(MHz)	6dB Emission Bandwidth(MHz)		Limit (kHz)
		Chain 2 (1TX)	Chain 2 (4TX)	
Straddle	5720	3.19	3.20	>500
Lowest	5745	16.35	16.38	
Middle	5785	16.39	16.36	
Highest	5825	16.37	16.38	

802.11n (20 MHz) mode

Channel	Frequency(MHz)	6dB Emission Bandwidth(MHz)		Limit (kHz)
		Chain 2 (1TX)	Chain 2 (4TX)	
Straddle	5720	3.76	3.84	>500
Lowest	5745	17.59	17.62	
Middle	5785	17.61	17.61	
Highest	5825	17.61	17.60	

802.11n (40 MHz) mode

Channel	Frequency(MHz)	6dB Emission Bandwidth(MHz)		Limit (kHz)
		Chain 2 (1TX)	Chain 2 (4TX)	
Straddle	5710	3.15	3.18	>500
Lowest	5755	36.35	36.31	
Highest	5795	36.09	36.33	

TEST DATA

802.11ac (20 MHz) mode

Channel	Frequency(MHz)	6dB Emission Bandwidth(MHz)		Limit (kHz)
		Chain 2 (1TX)	Chain 2 (4TX)	
Straddle	5720	3.78	3.82	>500
Lowest	5745	17.57	17.61	
Middle	5785	17.59	17.59	
Highest	5825	17.60	17.61	

802.11ac (40 MHz) mode

Channel	Frequency(MHz)	6dB Emission Bandwidth(MHz)		Limit (kHz)
		Chain 2 (1TX)	Chain 2 (4TX)	
Straddle	5710	3.15	3.19	>500
Lowest	5755	36.31	36.34	
Highest	5795	36.09	36.33	

802.11ac (80 MHz) mode

Channel	Frequency(MHz)	6dB Emission Bandwidth(MHz)		Limit (kHz)
		Chain 2 (1TX)	Chain 2 (4TX)	
Straddle	5690	3.10	3.20	>500
Middle	5775	75.74	74.74	

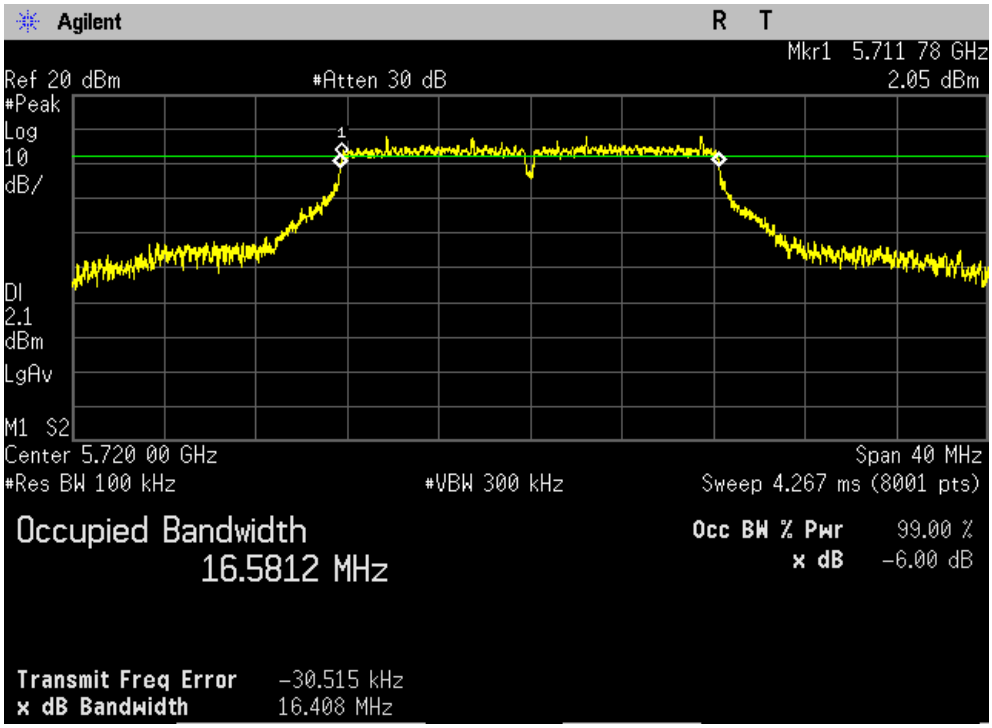
Note:
The worst ant port was determined by the conducted output power that generates the highest emission performing pre-scan testing in all ant port of each mode.

PLOTS OF EMISSIONS

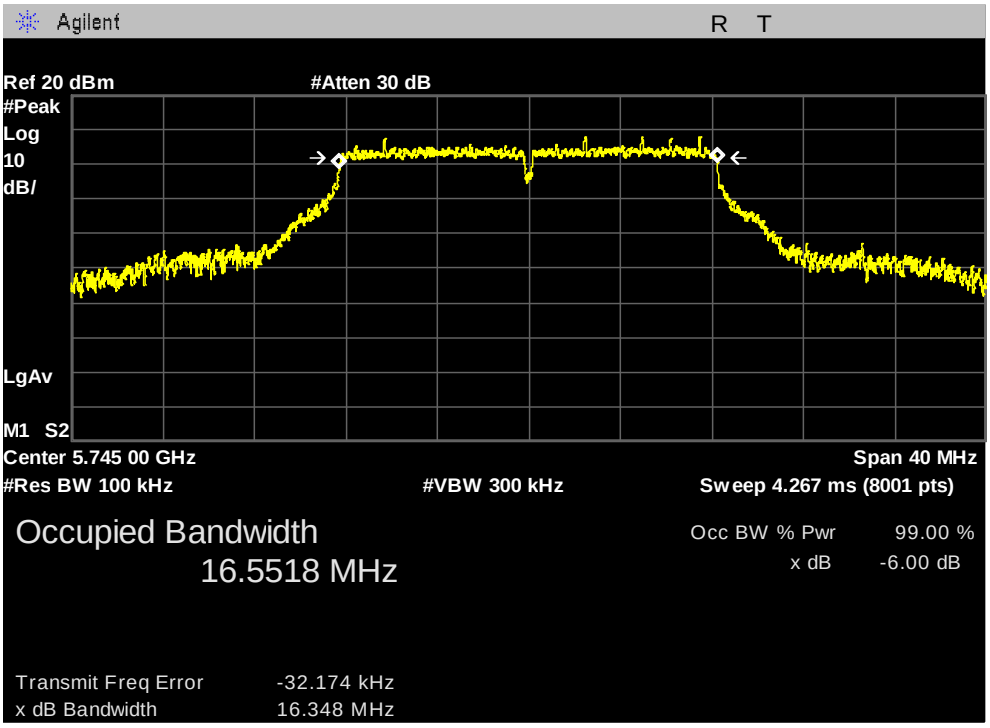
802.11a mode

Chain 2 (1TX)

6 dB Bandwidth, Straddle Channel (5720 MHz)

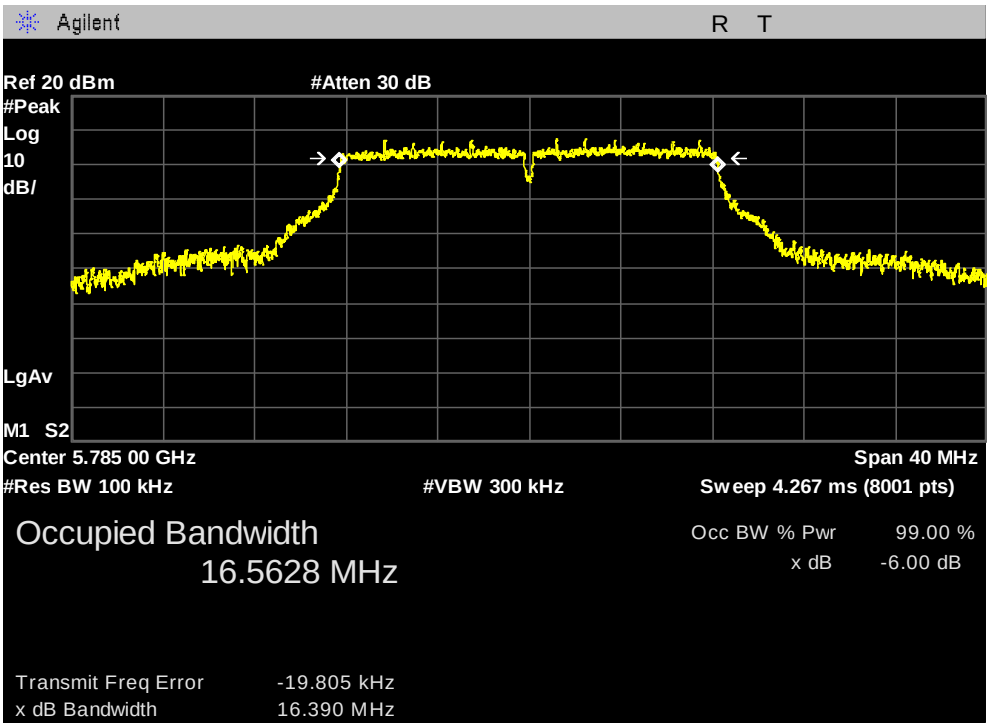


6 dB Bandwidth, Lowest Channel (5745 MHz)

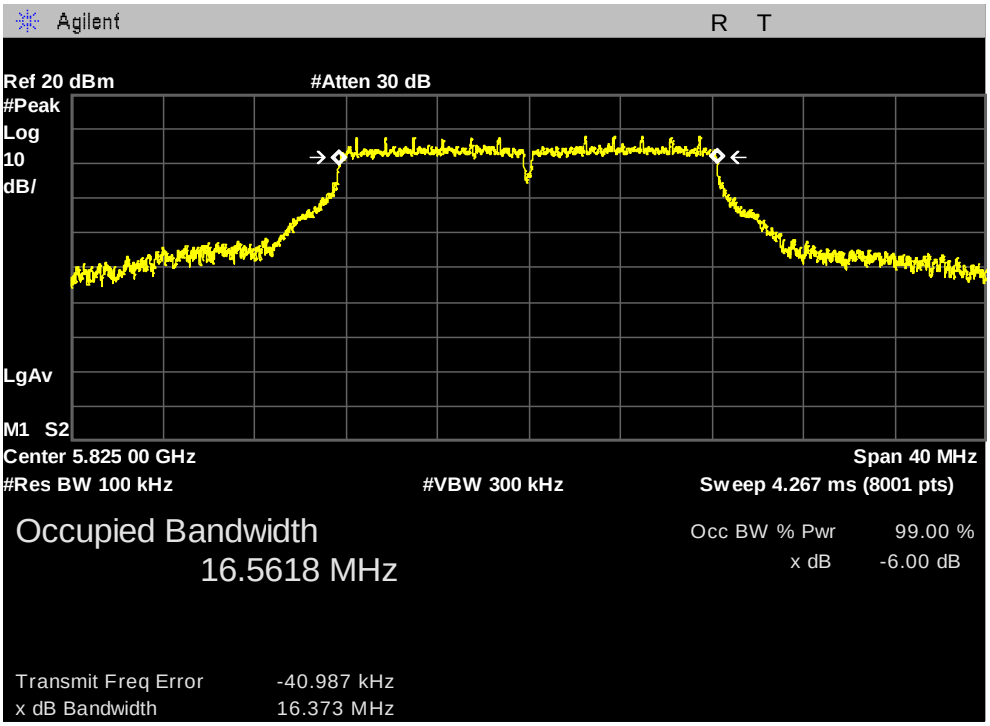


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (5785 MHz)



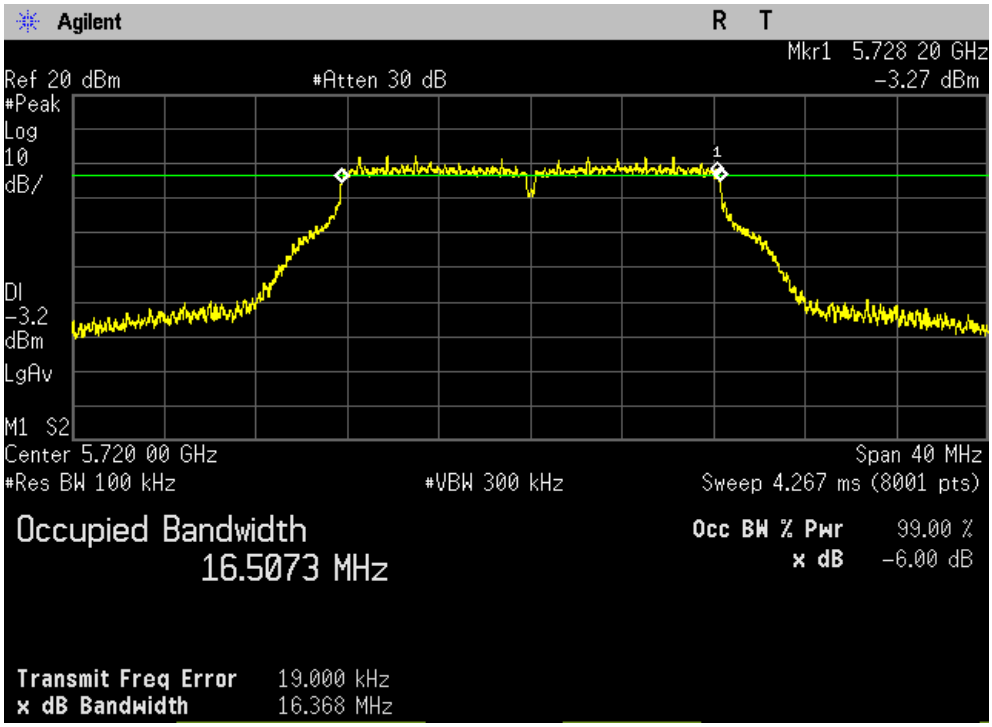
6 dB Bandwidth, Highest Channel (5825 MHz)



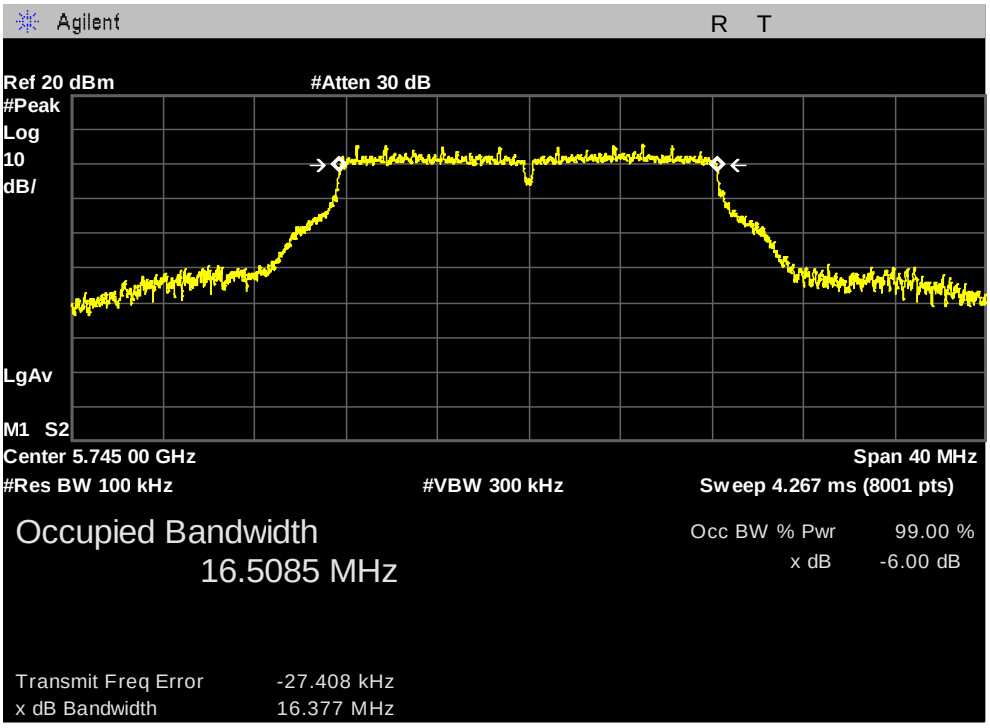
PLOTS OF EMISSIONS

Chain 2 (4TX)

6 dB Bandwidth, Straddle Channel (5720 MHz)

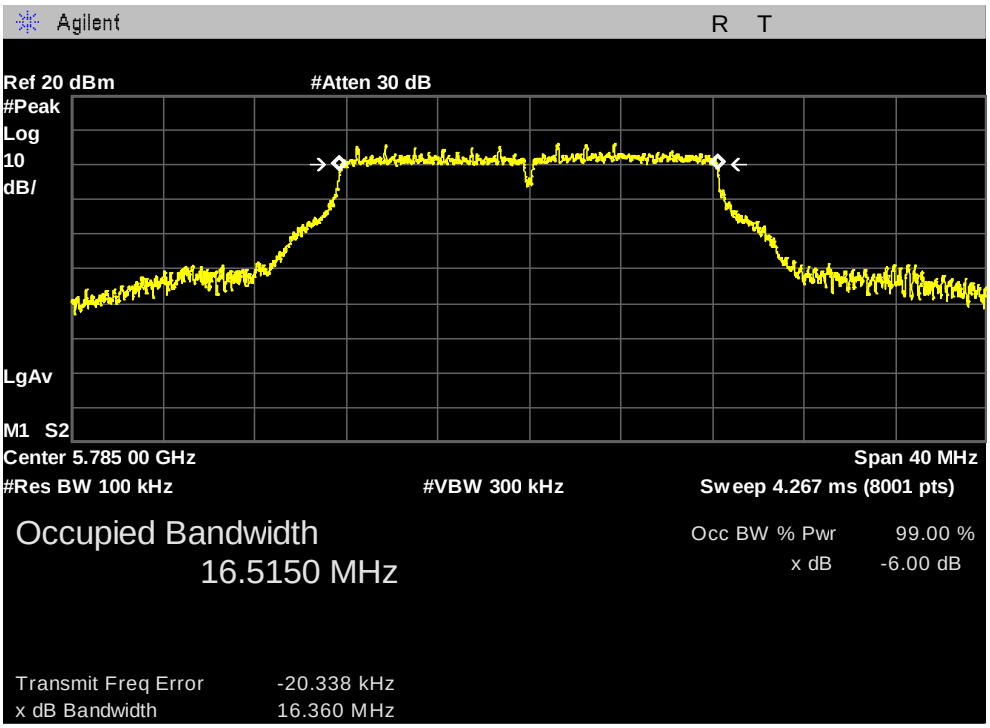


6 dB Bandwidth, Lowest Channel (5745 MHz)

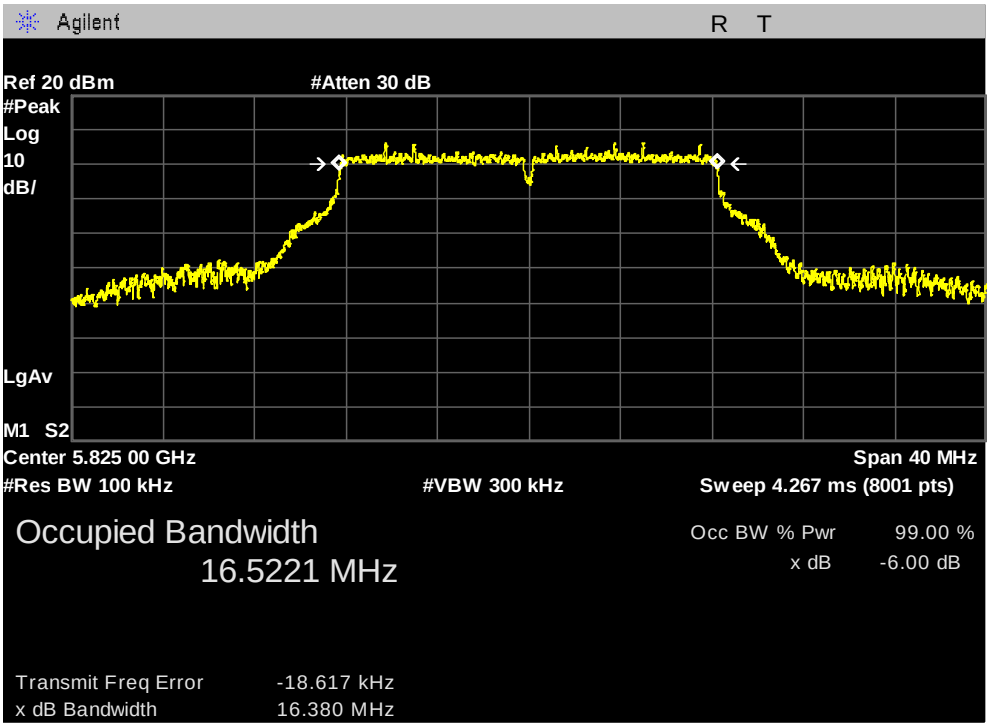


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (5785 MHz)



6 dB Bandwidth, Highest Channel (5825 MHz)

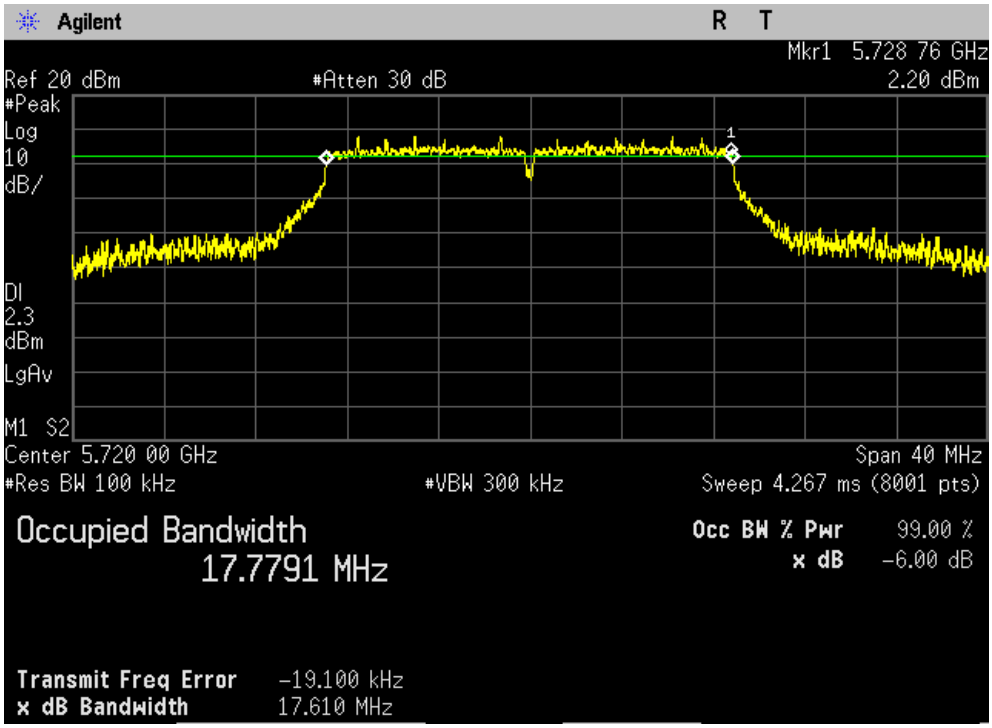


PLOTS OF EMISSIONS

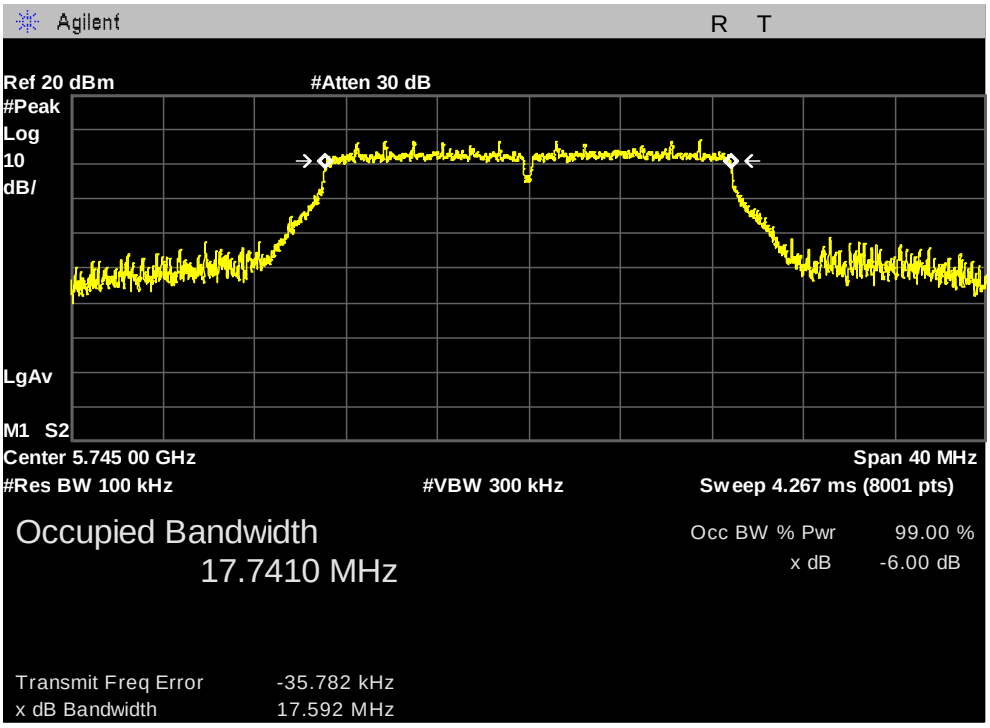
802.11n (20 MHz) mode

Chain 2 (1TX)

6 dB Bandwidth, Straddle Channel (5720 MHz)

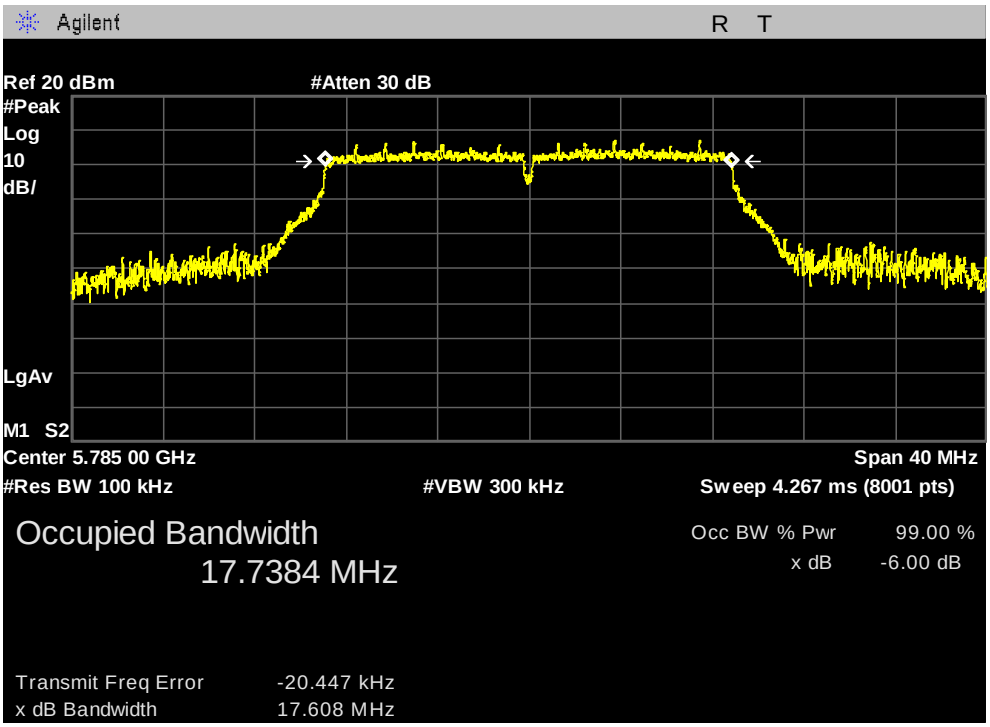


6 dB Bandwidth, Lowest Channel (5745 MHz)

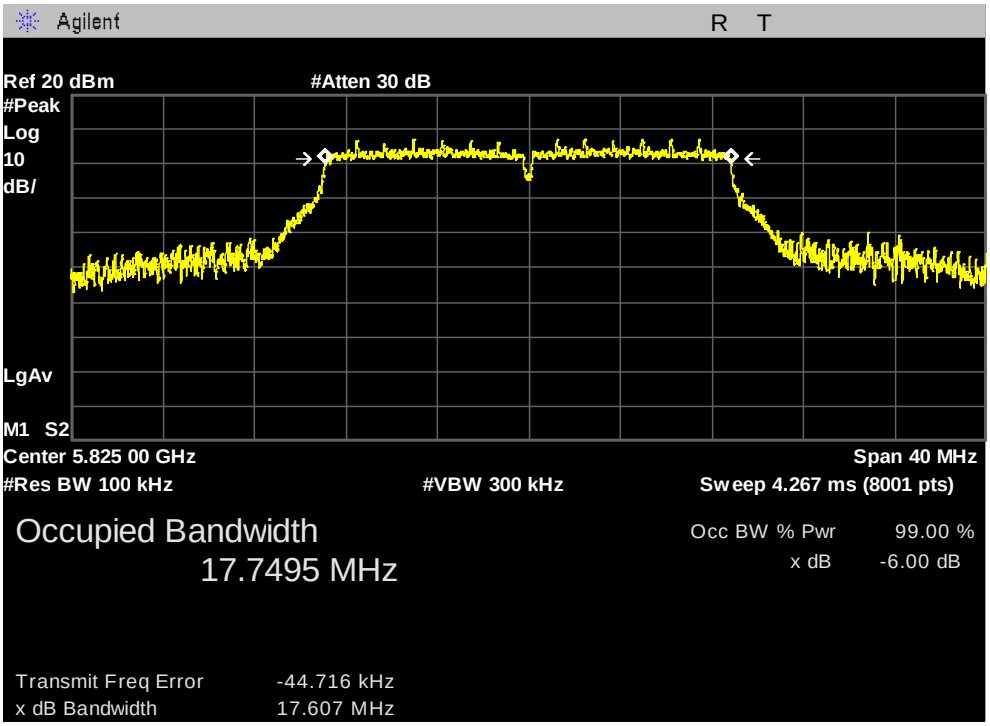


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (5785 MHz)



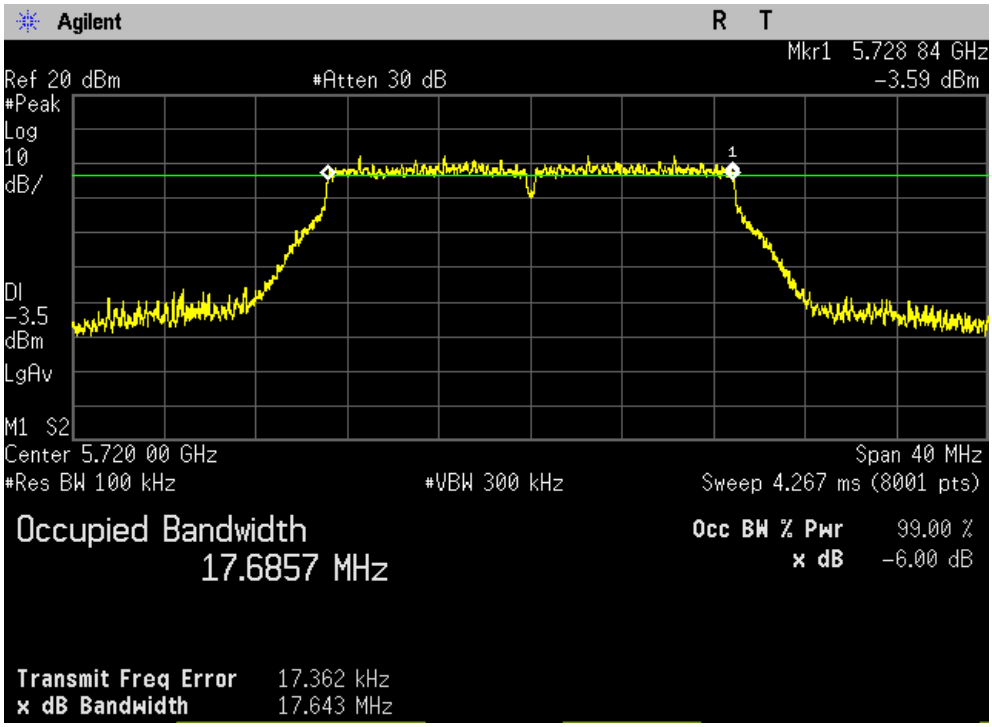
6 dB Bandwidth, Highest Channel (5825 MHz)



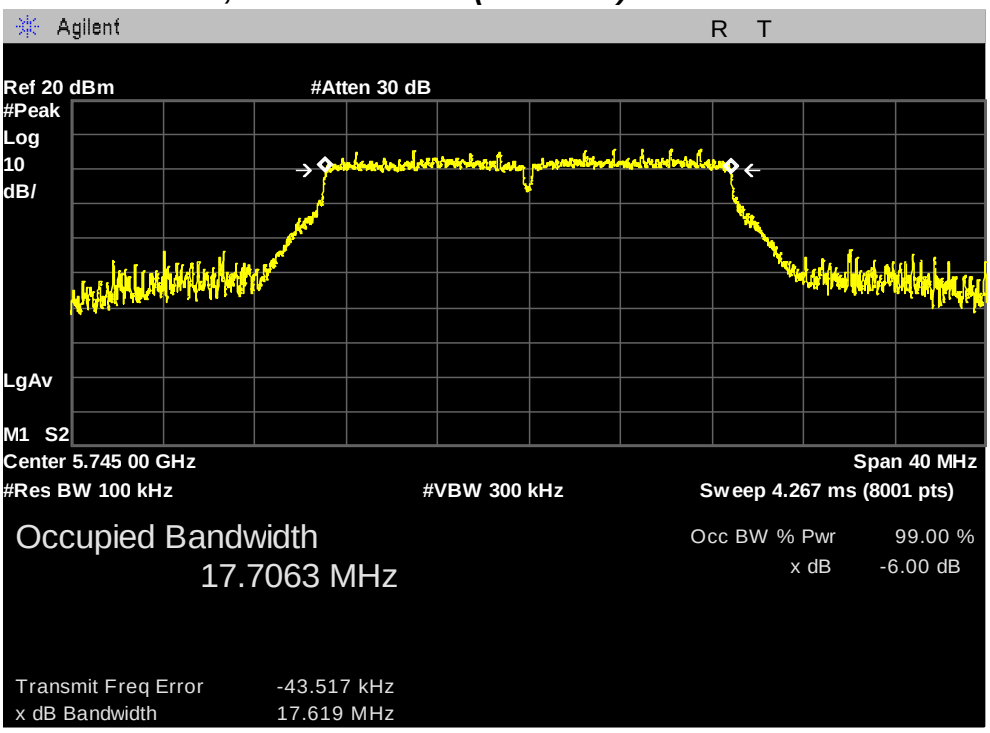
PLOTS OF EMISSIONS

Chain 2 (4TX)

6 dB Bandwidth, Straddle Channel (5720 MHz)

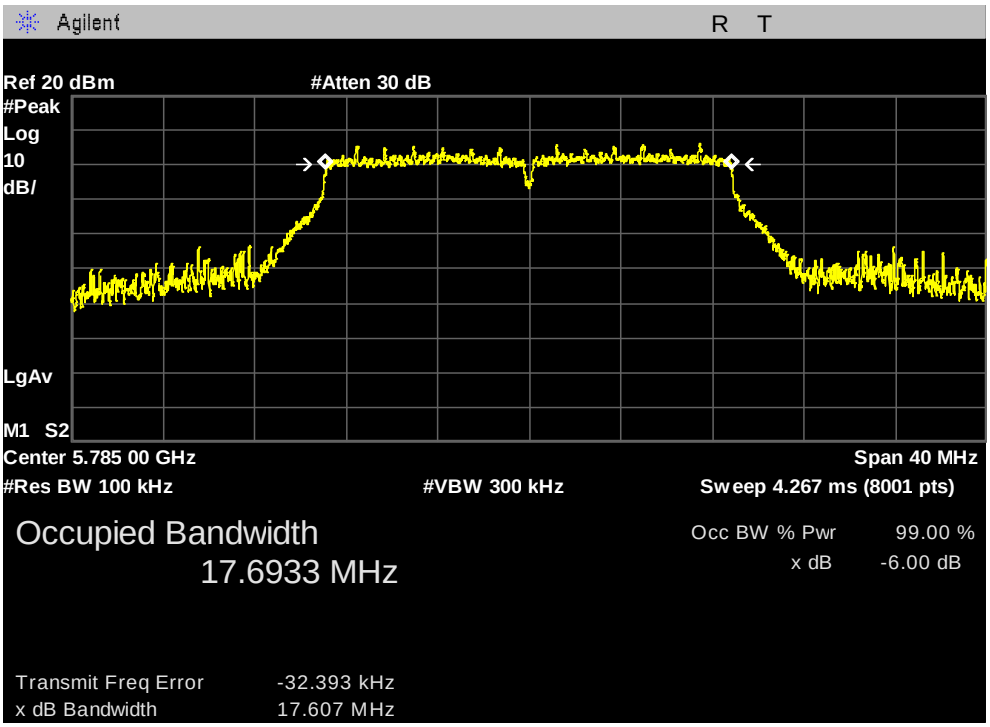


6 dB Bandwidth, Lowest Channel (5745 MHz)

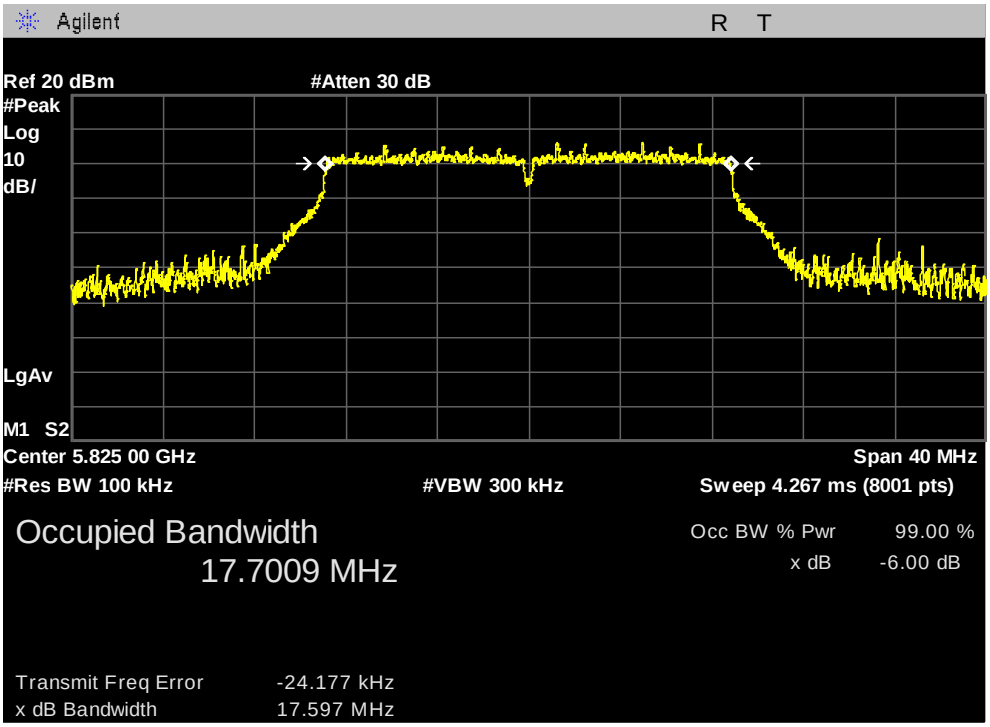


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (5785 MHz)



6 dB Bandwidth, Highest Channel (5825 MHz)

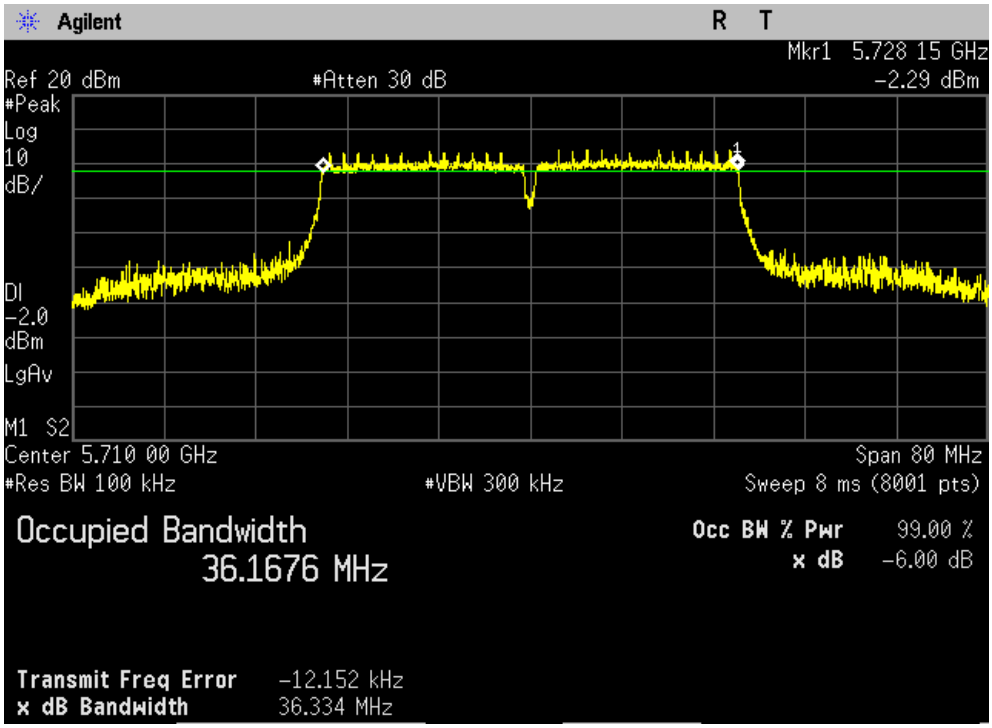


PLOTS OF EMISSIONS

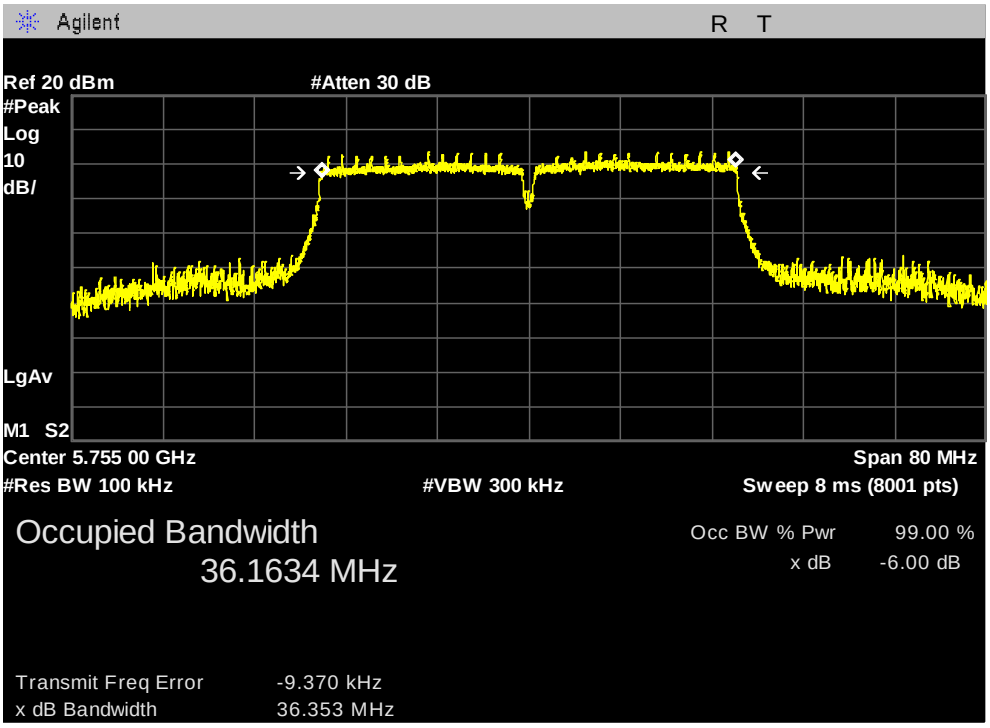
802.11n (40 MHz) mode

Chain 2 (1TX)

6 dB Bandwidth, Straddle Channel (5710 MHz)

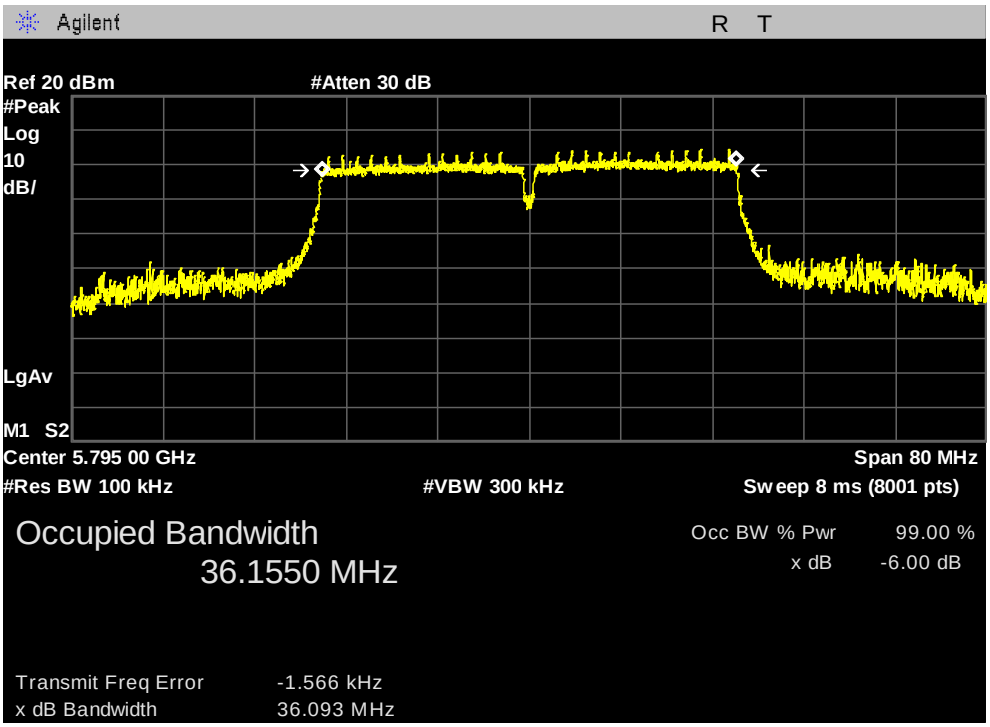


6 dB Bandwidth, Lowest Channel (5755 MHz)



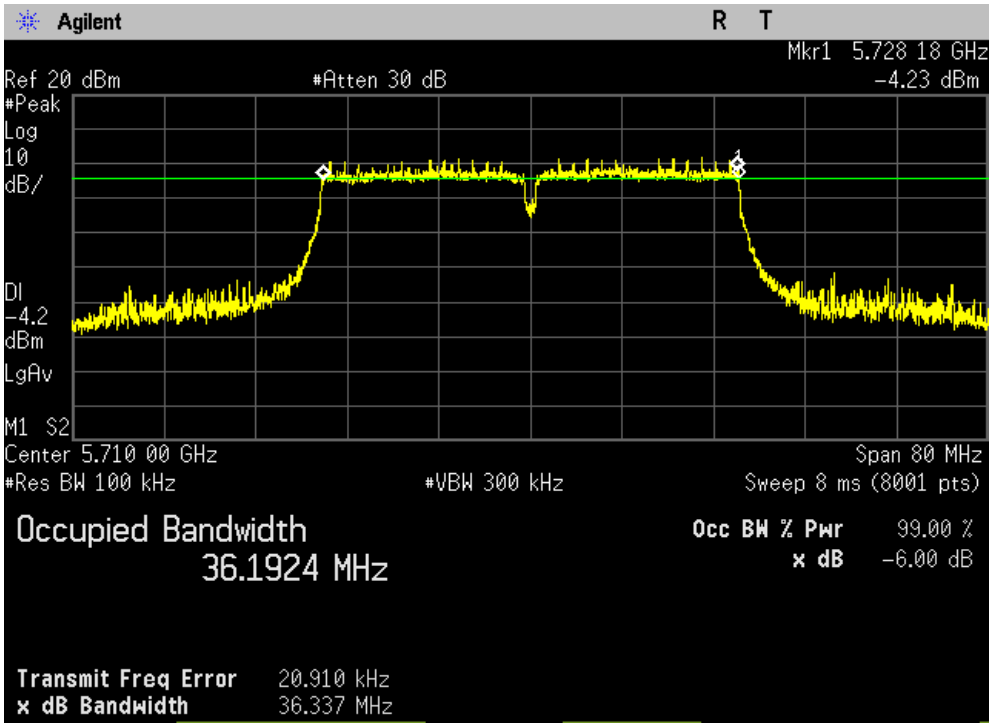
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (5795 MHz)



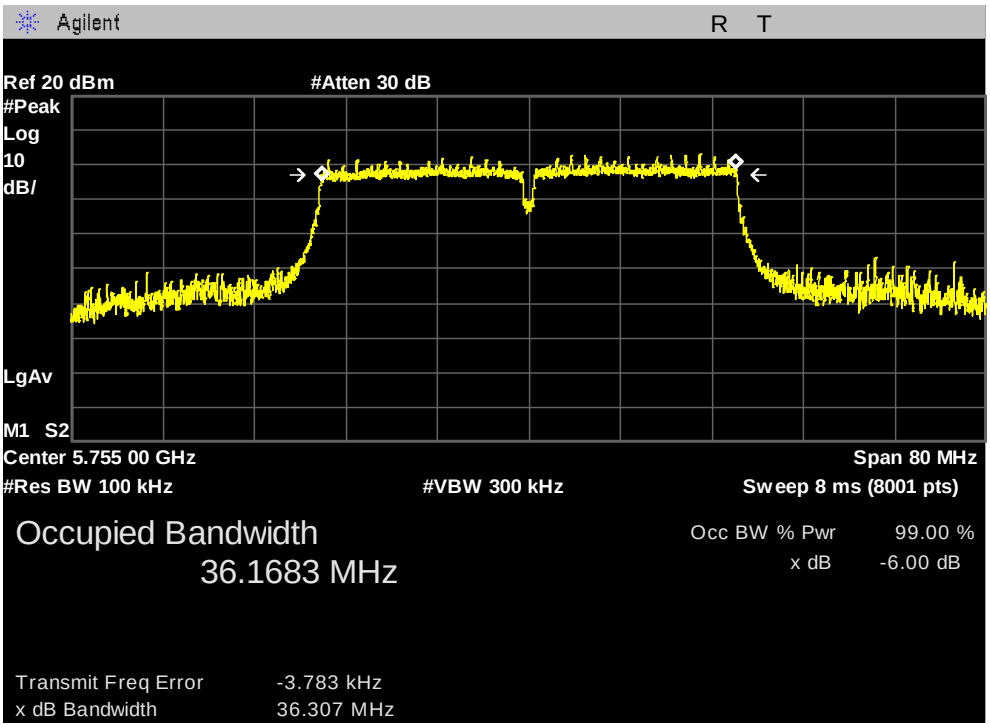
Chain 2 (4TX)

6 dB Bandwidth, Straddle Channel (5710 MHz)

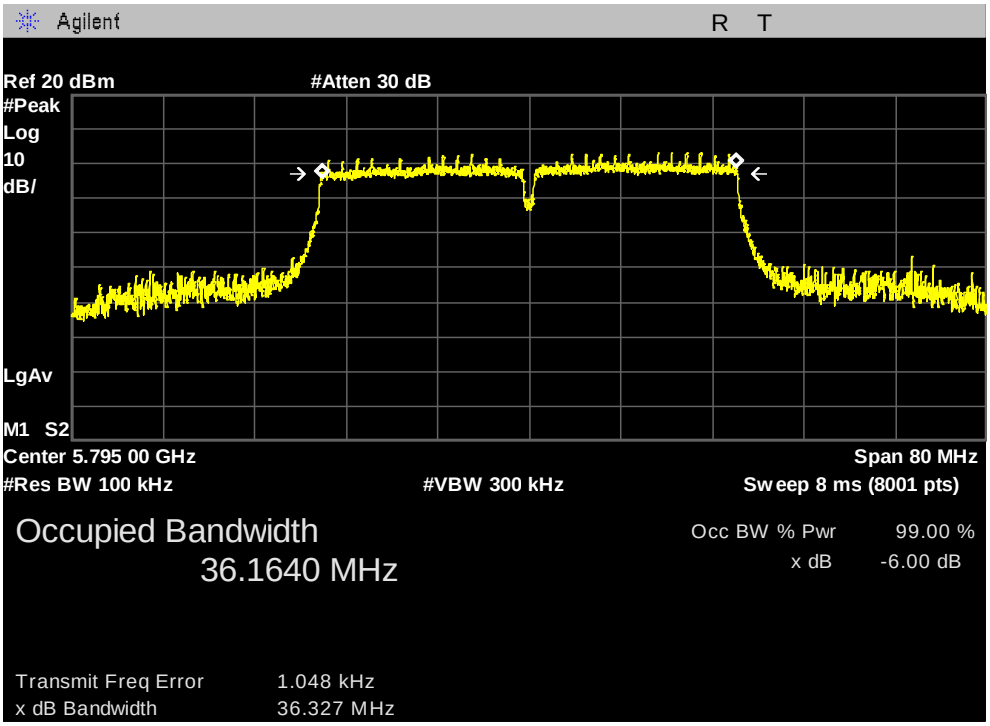


PLOTS OF EMISSIONS

6 dB Bandwidth, Lowest Channel (5755 MHz)



6 dB Bandwidth, Highest Channel (5795 MHz)

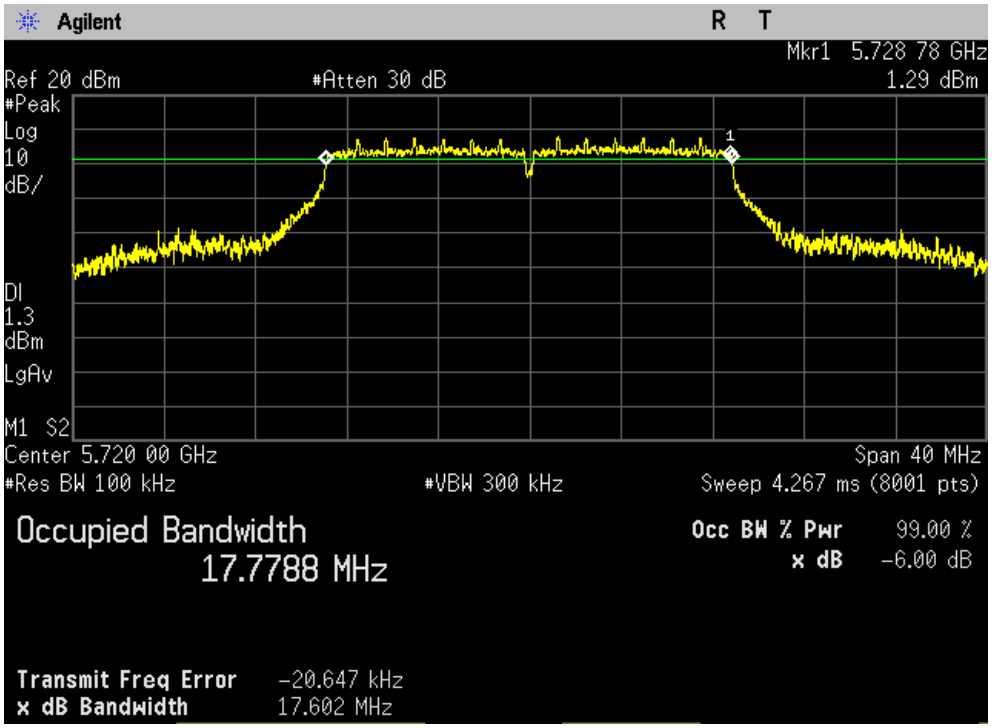


PLOTS OF EMISSIONS

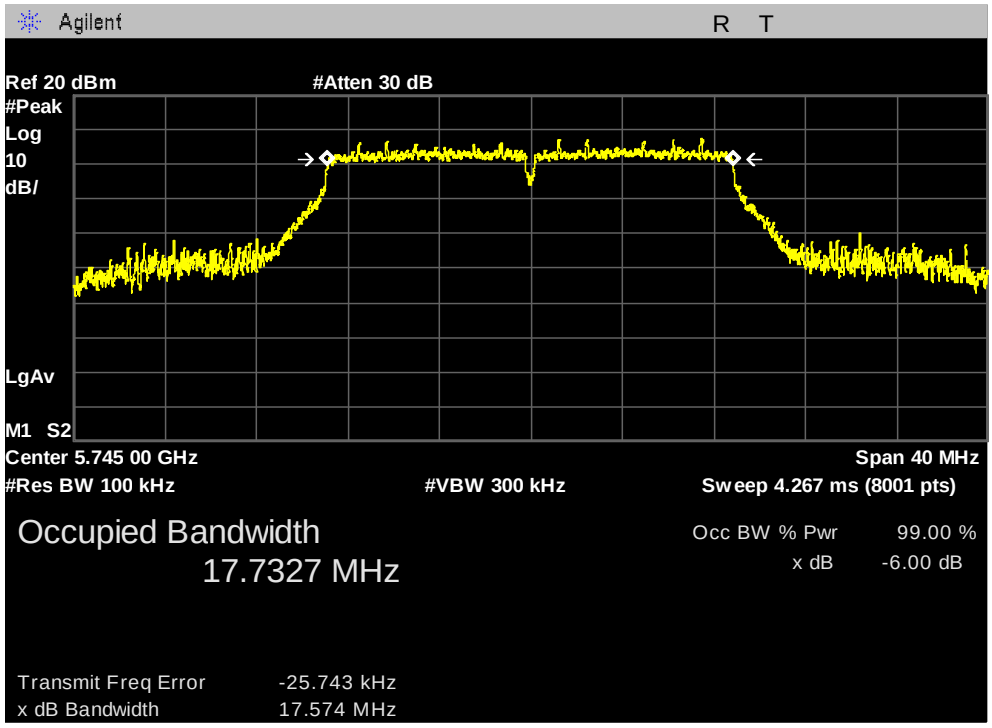
802.11ac (20 MHz) mode

Chain 2 (1TX)

6 dB Bandwidth, Straddle Channel (5720 MHz)

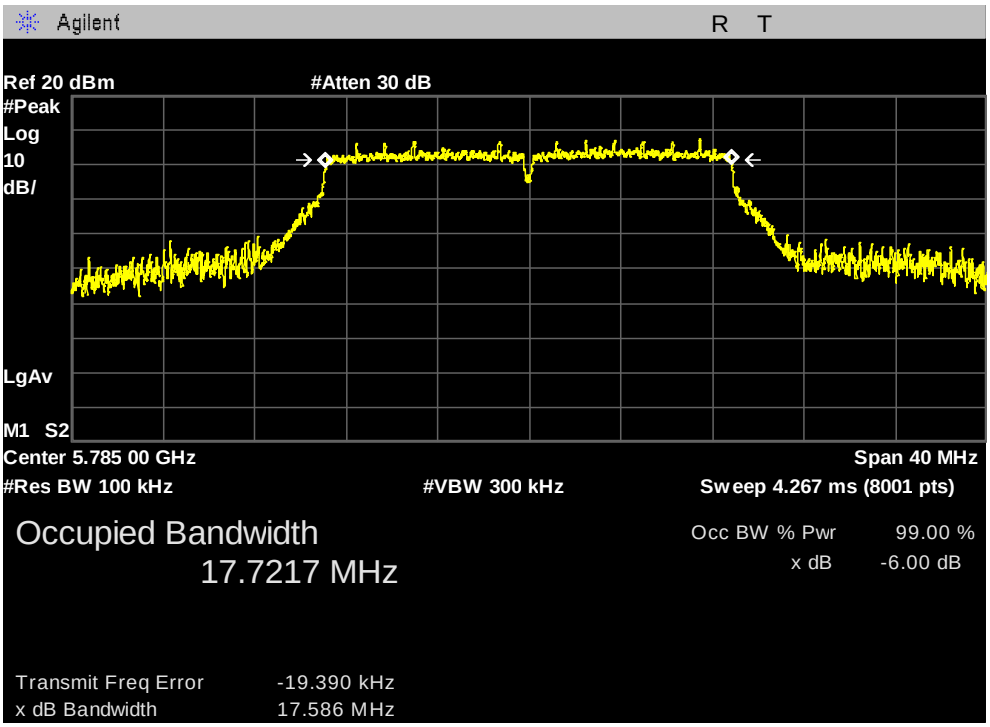


6 dB Bandwidth, Lowest Channel (5745 MHz)

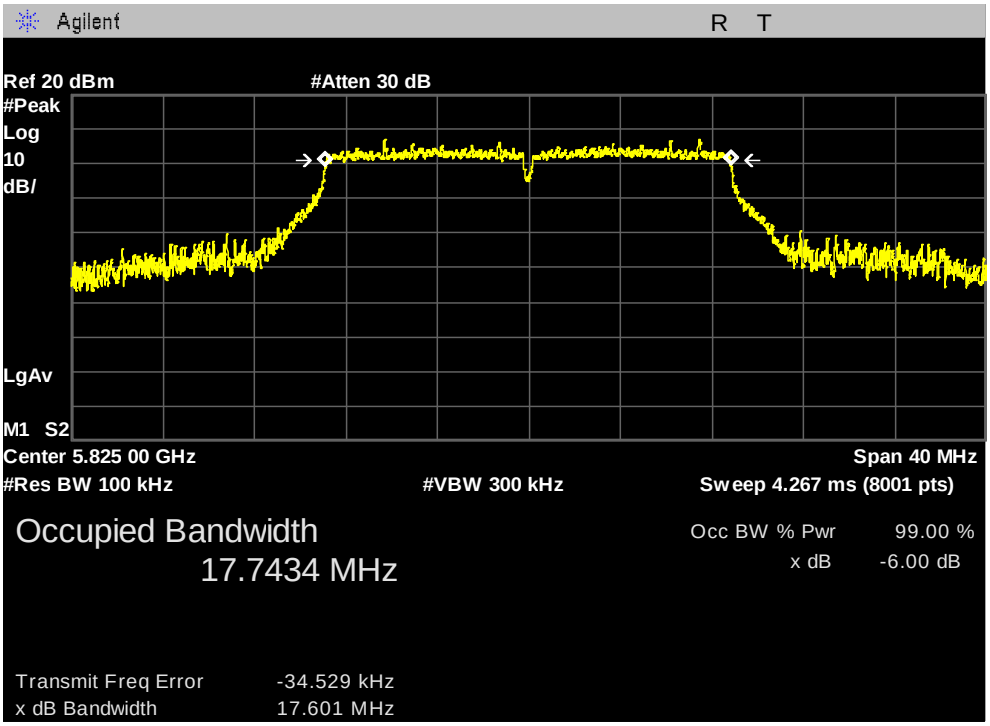


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (5785 MHz)



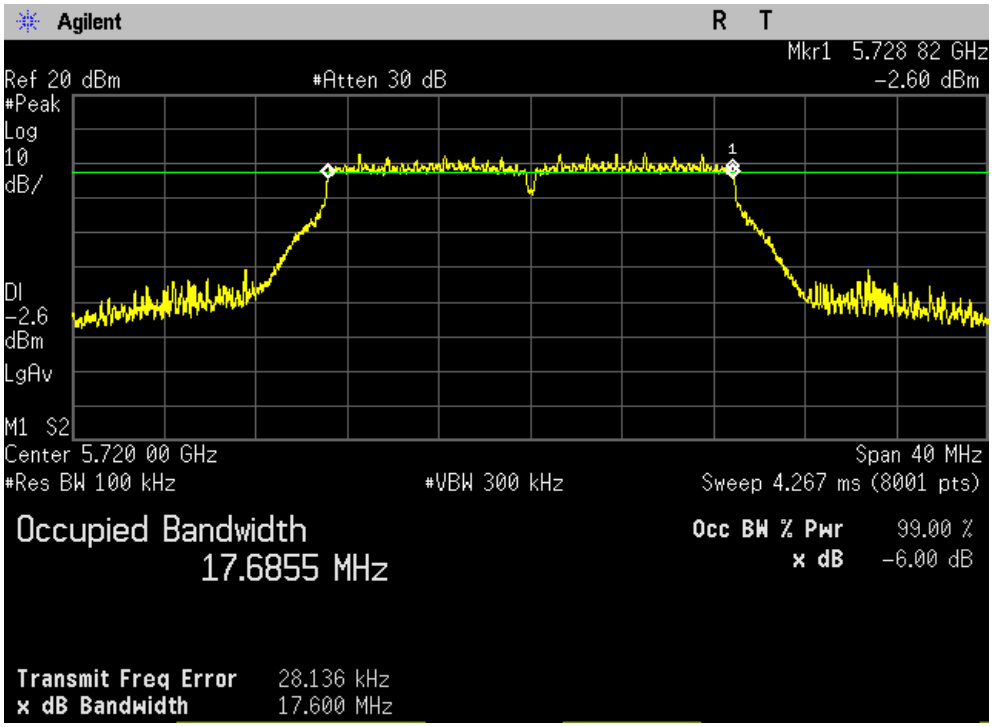
6 dB Bandwidth, Highest Channel (5825 MHz)



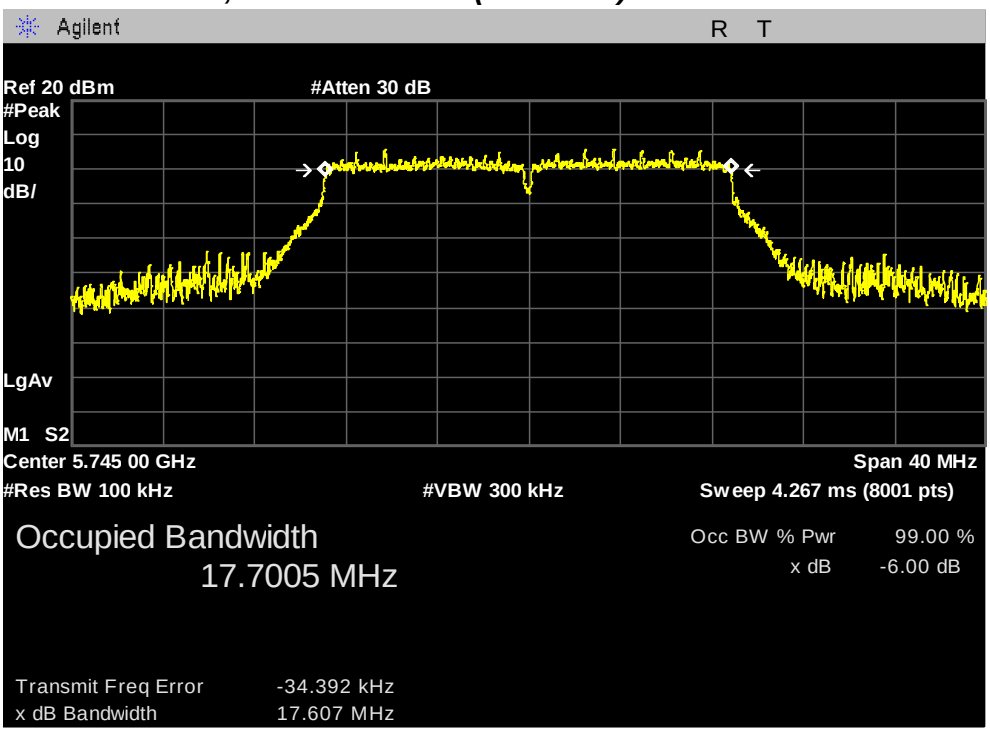
PLOTS OF EMISSIONS

Chain 2 (4TX)

6 dB Bandwidth, Straddle Channel (5720 MHz)

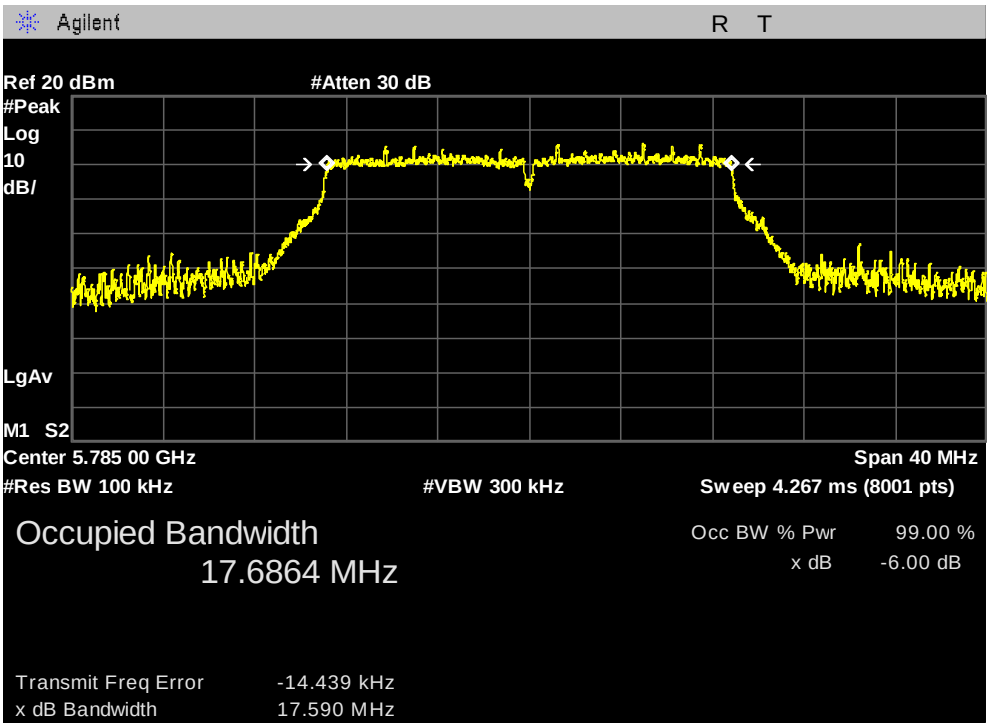


6 dB Bandwidth, Lowest Channel (5745 MHz)

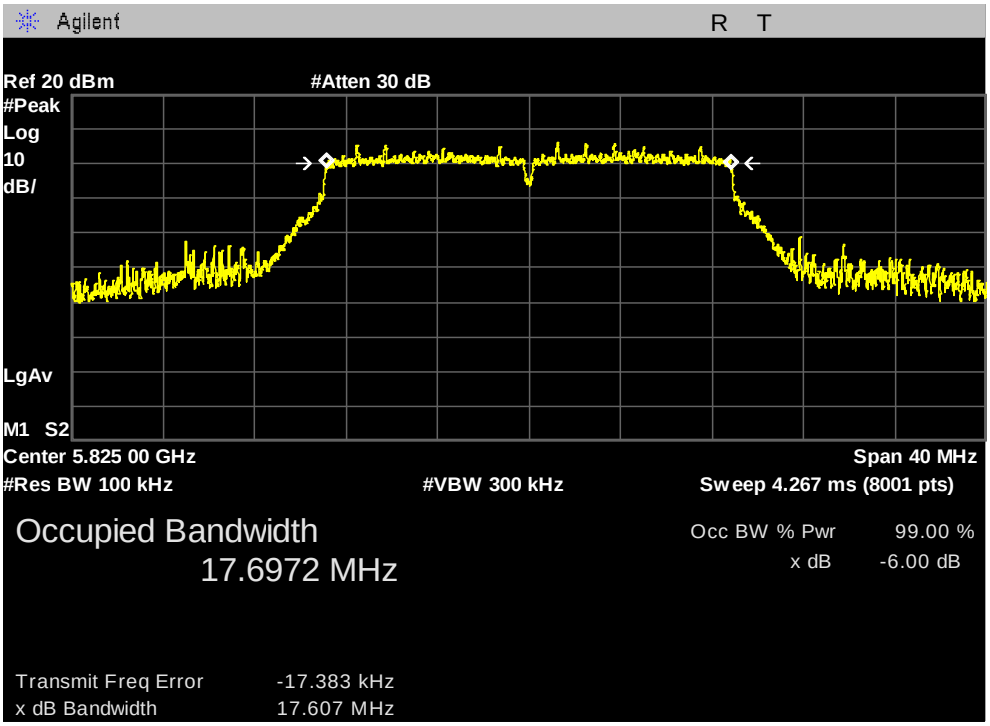


PLOTS OF EMISSIONS

6 dB Bandwidth, Middle Channel (5785 MHz)



6 dB Bandwidth, Highest Channel (5825 MHz)

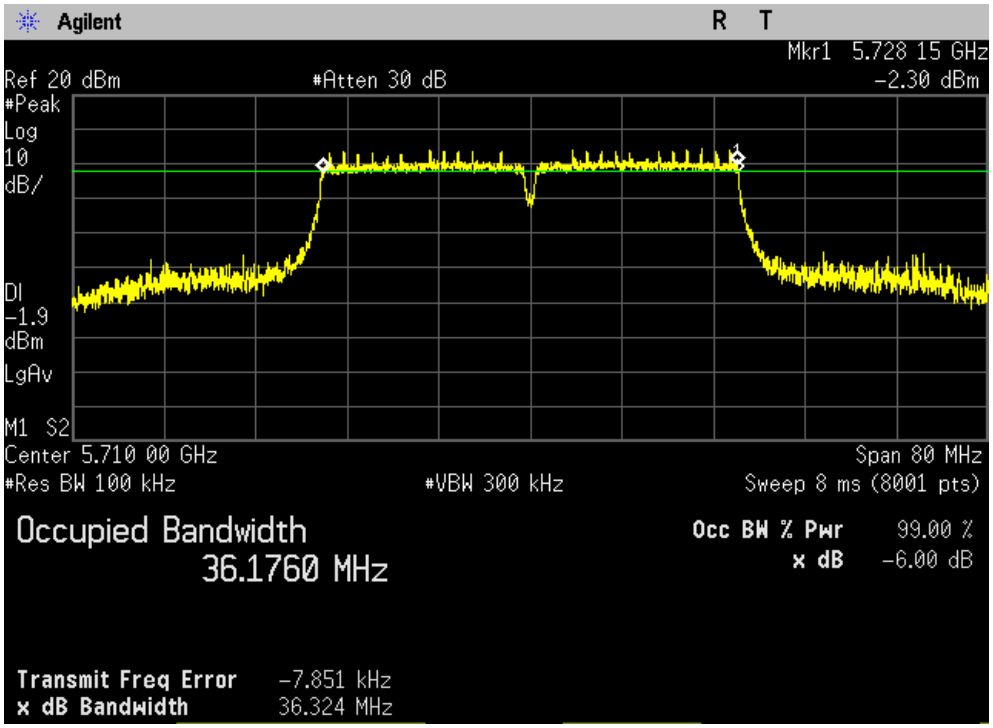


PLOTS OF EMISSIONS

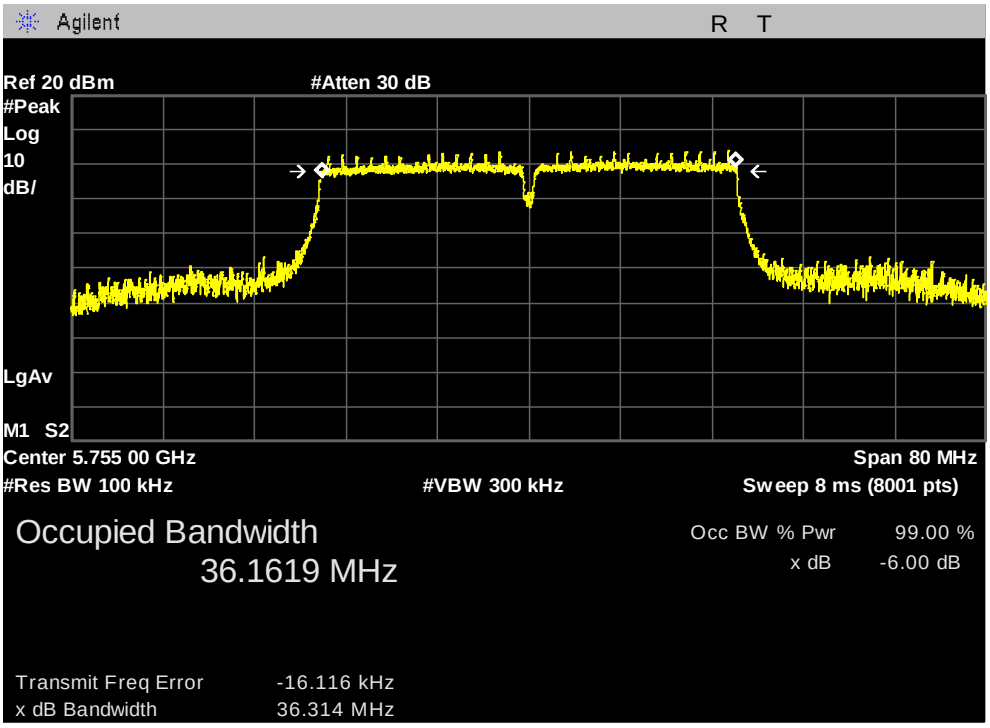
802.11ac (40 MHz) mode

Chain 2 (1TX)

6 dB Bandwidth, Straddle Channel (5710 MHz)

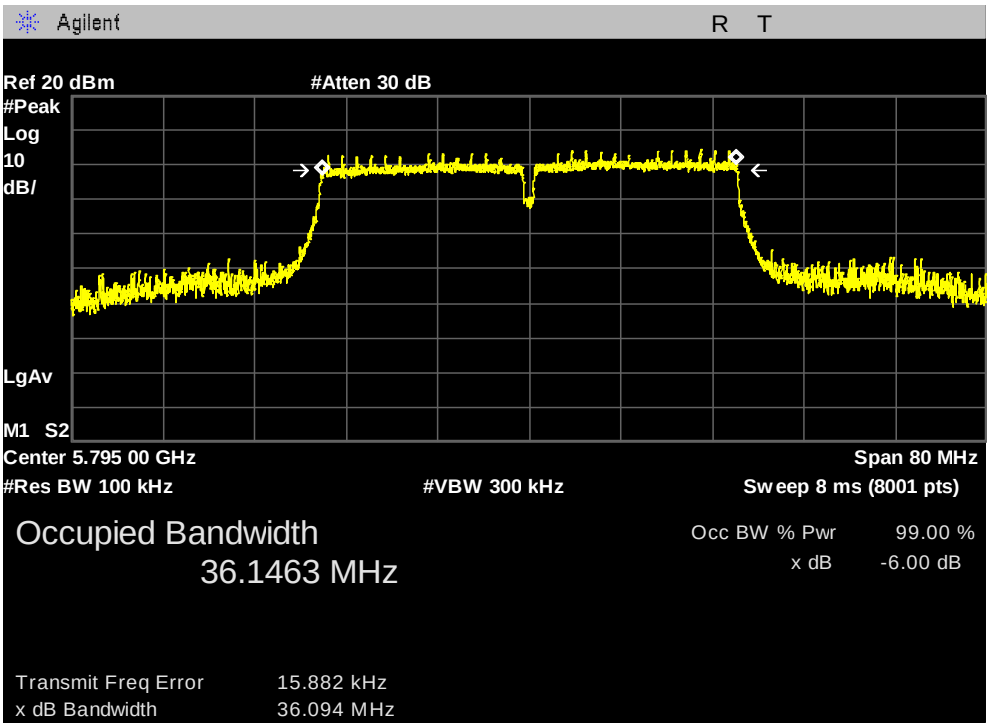


6 dB Bandwidth, Lowest Channel (5755 MHz)



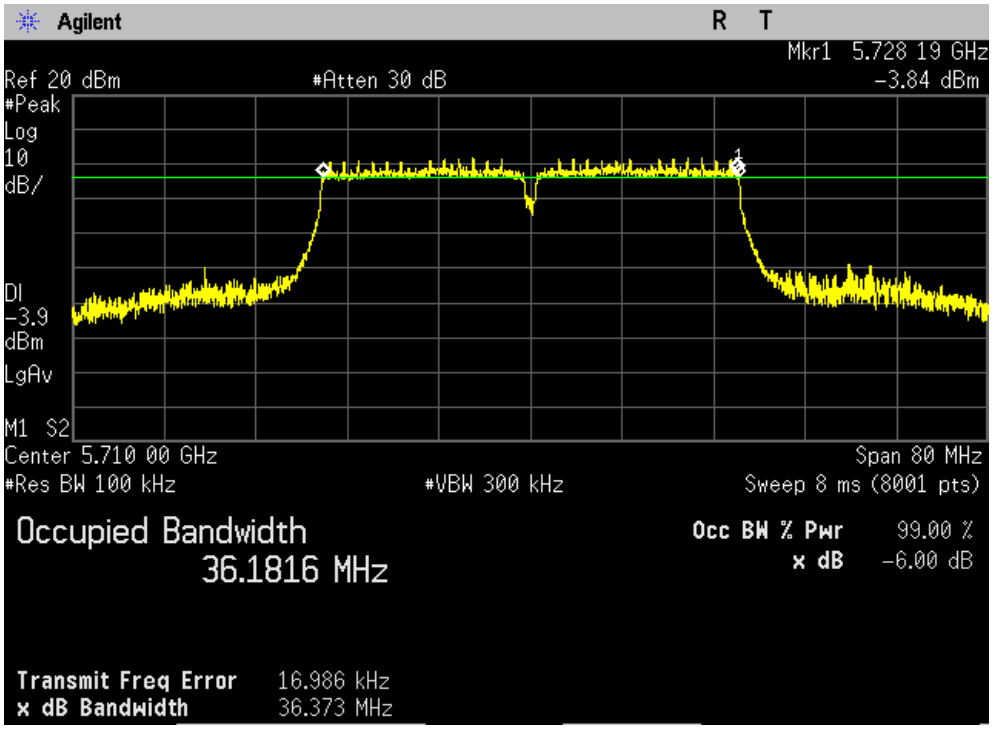
PLOTS OF EMISSIONS

6 dB Bandwidth, Highest Channel (5795 MHz)



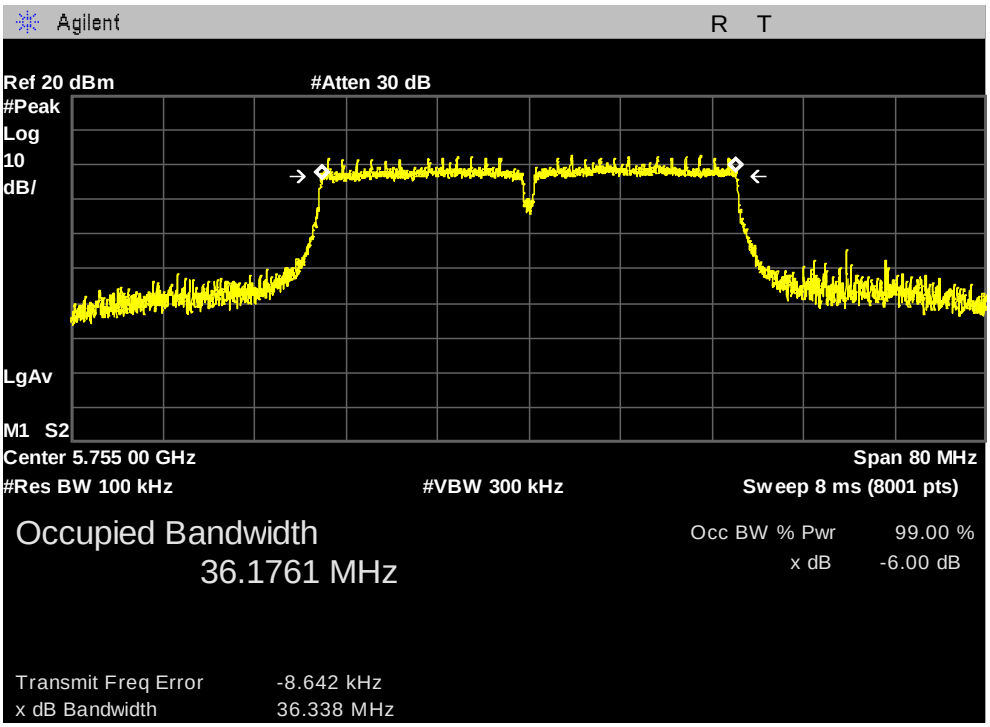
Chain 2 (4TX)

6 dB Bandwidth, Straddle Channel (5710 MHz)

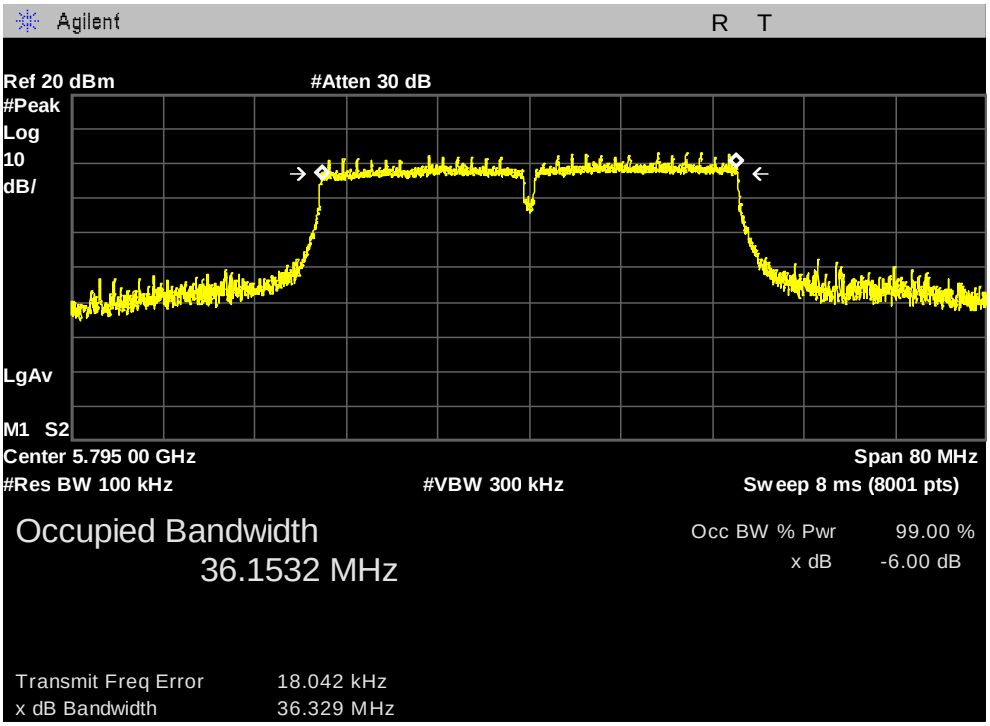


PLOTS OF EMISSIONS

6 dB Bandwidth, Lowest Channel (5755 MHz)



6 dB Bandwidth, Highest Channel (5795 MHz)

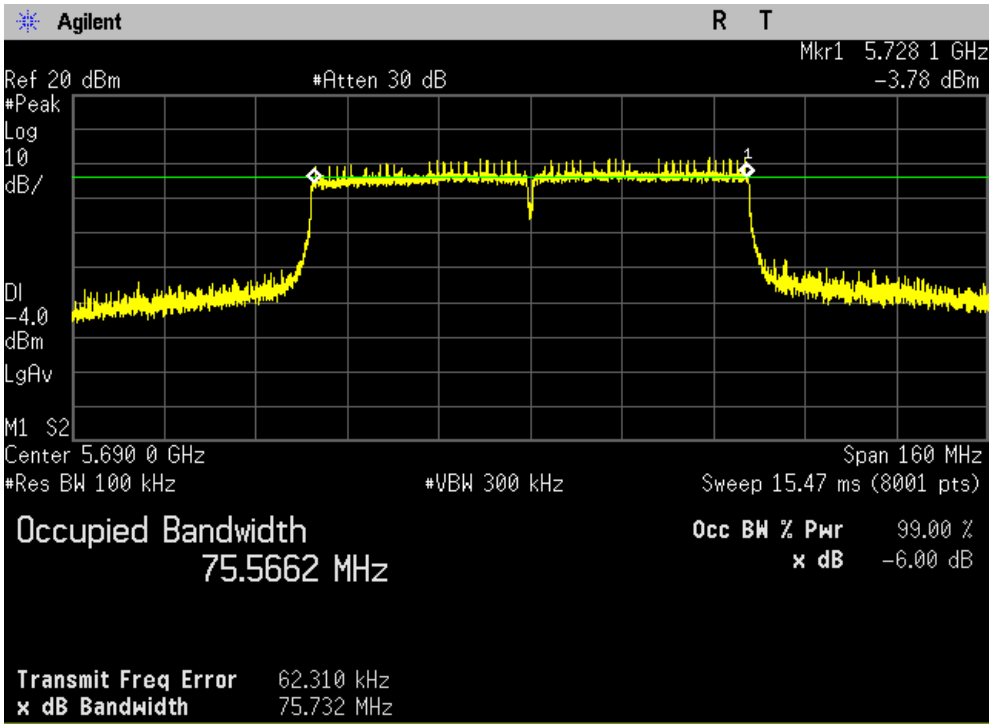


PLOTS OF EMISSIONS

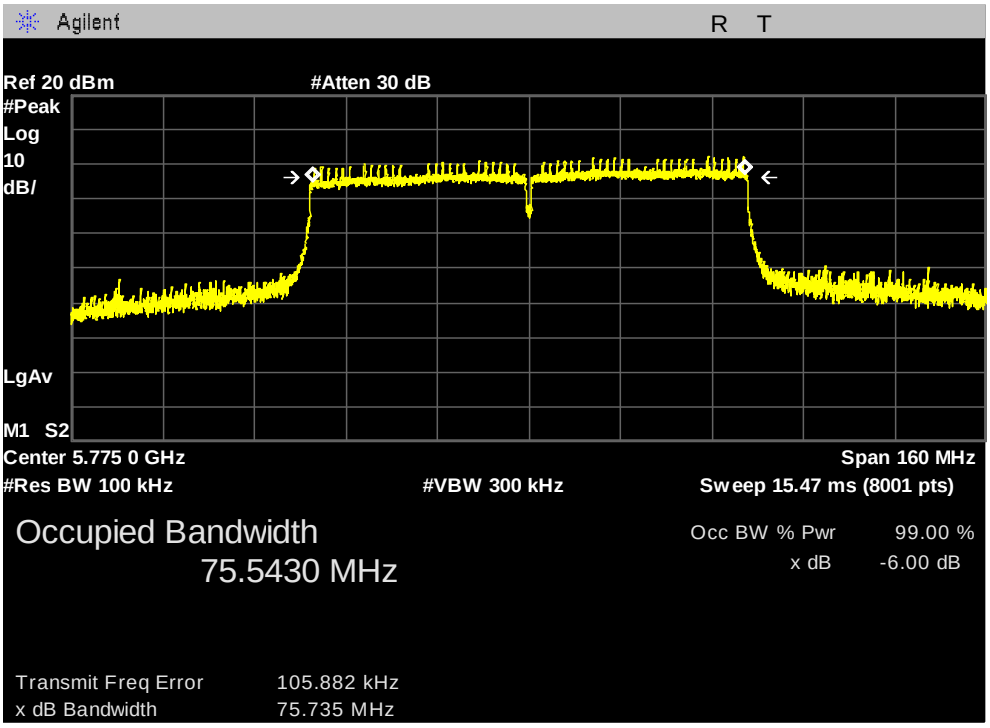
802.11ac (80 MHz) mode

Chain 2 (1TX)

6 dB Bandwidth, Straddle Channel (5690 MHz)



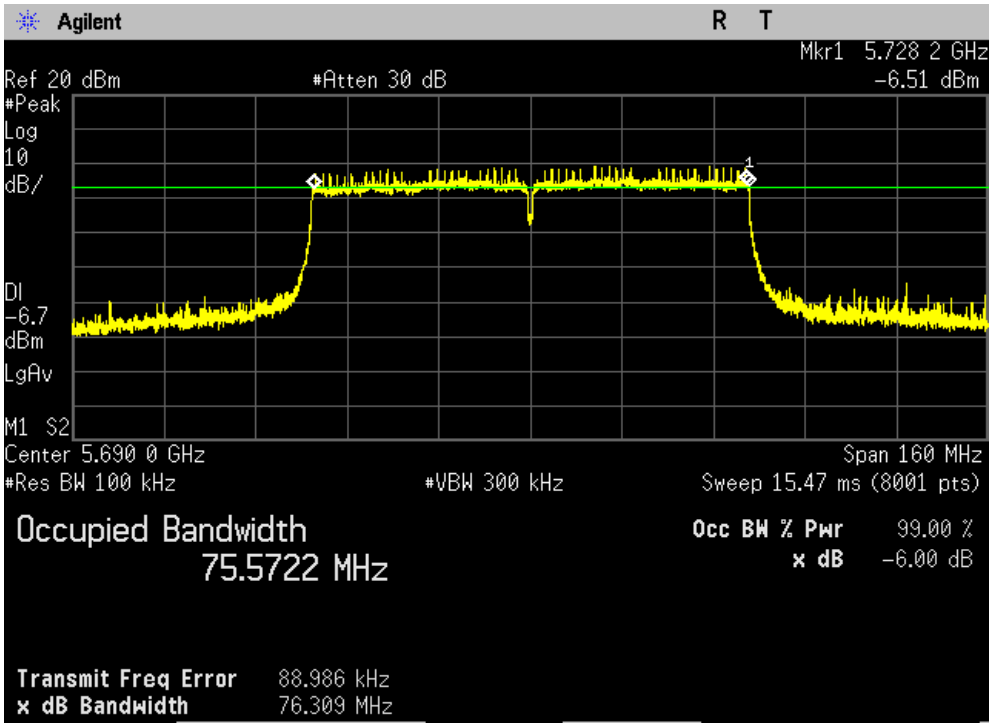
6 dB Bandwidth, Lowest Channel (5775 MHz)



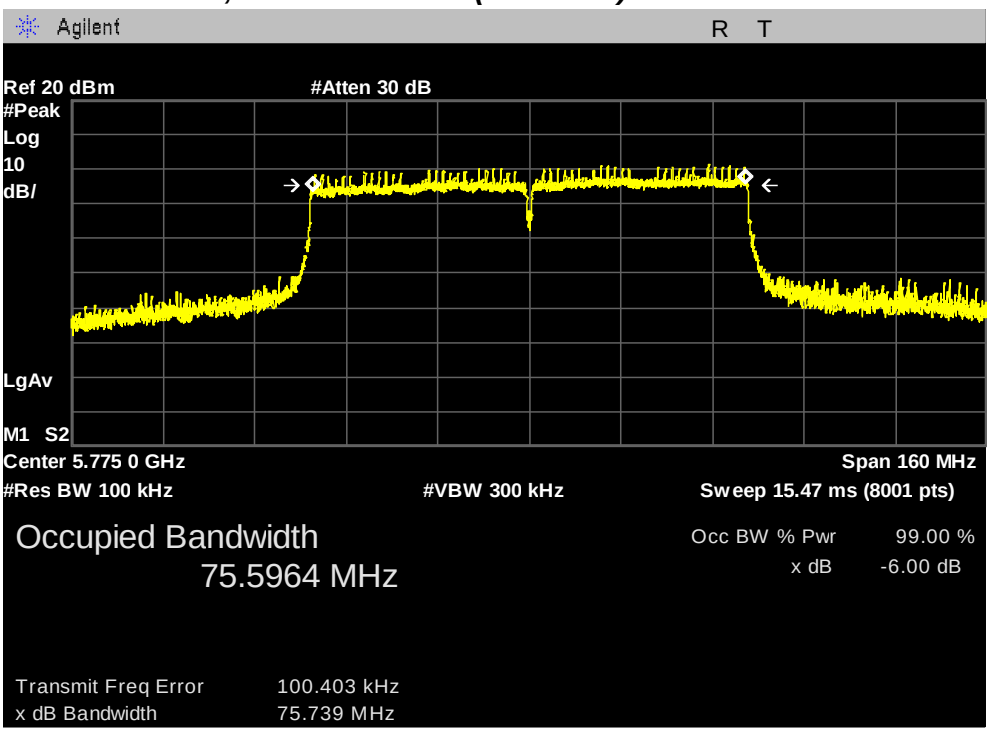
PLOTS OF EMISSIONS

Chain 2 (4TX)

6 dB Bandwidth, Straddle Channel (5690 MHz)



6 dB Bandwidth, Lowest Channel (5775 MHz)



8.5 Maximum Conducted Output Power (average)

8.5.1 Maximum Conducted Output Power – U-NII-1 band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11a mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5180	15.27	0.22	15.49	30.00
Middle	5220	20.12	0.22	20.34	30.00
Highest	5240	20.11	0.22	20.33	30.00

802.11a mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5180	14.49	14.56	14.71	14.38	0.22	20.78	30.00
Middle	5220	17.04	16.89	17.14	17.09	0.22	23.28	30.00
Highest	5240	18.18	18.15	18.32	18.05	0.22	24.42	30.00

TEST DATA

802.11n (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5180	15.13	0.22	15.35	30.00
Middle	5220	19.71	0.22	19.93	30.00
Highest	5240	19.81	0.22	20.03	30.00

802.11n (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5180	13.68	13.74	13.95	13.87	0.22	20.05	30.00
Middle	5220	16.84	16.88	17.10	16.96	0.22	23.19	30.00
Highest	5240	17.95	18.02	18.20	18.12	0.22	24.32	30.00

802.11n (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5190	13.95	0.43	14.38	30.00
Highest	5230	19.32	0.43	19.75	30.00

TEST DATA

802.11n (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5190	11.75	11.64	11.91	11.79	0.43	18.23	30.00
Highest	5230	12.05	11.98	12.20	12.13	0.43	18.54	30.00

802.11ac (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5180	15.24	0.07	15.31	30.00
Middle	5220	19.82	0.07	19.89	30.00
Highest	5240	20.07	0.07	20.14	30.00

802.11ac (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5180	14.25	14.18	14.33	14.31	0.07	20.36	30.00
Middle	5220	17.67	17.46	17.79	17.75	0.07	23.76	30.00
Highest	5240	18.35	18.08	18.44	18.33	0.07	24.39	30.00

TEST DATA

802.11ac (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5190	14.25	0.14	14.39	30.00
Highest	5230	19.86	0.14	20.00	30.00

802.11ac (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5190	11.69	11.58	11.76	11.36	0.14	17.76	30.00
Highest	5230	12.74	12.75	12.81	12.60	0.14	18.88	30.00

802.11ac (80MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5210	12.88	0.27	13.15	30.00

802.11ac (80MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5210	10.56	10.64	10.86	10.48	0.27	16.93	30.00

TEST DATA

Note:

1. *Maximum Conducted (average) Power = Measured conducted power + Duty Factor*
2. *Total output power = 10 log [10^{(Chain 0 Power + duty factor)/10} + 10^{(Chain 1 Power + duty factor)/10} + 10^{(Chain 2 Power + duty factor)/10}+ 10^{(Chain 3 Power + duty factor)/10}]*
3. *For CDD transmission, directional gain is.* ***2.0 dBi.***
   For MIMO transmission, directional gain is ***5.01 dBi.***
   Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
   For power measurements on IEEE 802.11 devices employing CDD, directional gain is as follows,
   Directional gain = G_{ANT} + Array Gain = 2.0 dBi + 0 dB = 2.0 dBi.
   Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
   Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
   Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.
   For power measurements on all devices employing MIMO, directional gain is as follows,
   ***Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 2.0 dBi + 10 log(4/2) dB = 5.01 dBi**.*
   where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
   For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and the lowest N_{SS}=2 with beamforming.
4. *The following equation was used for spectrum offset:*
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

8.5.2 Maximum Conducted Output Power – U-NII-2A band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11a mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5260	20.00	0.22	20.22	23.98
Middle	5300	20.01	0.22	20.23	23.98
Highest	5320	16.84	0.22	17.06	23.98

802.11a mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5260	13.29	13.36	13.46	13.15	0.22	19.56	23.98
Middle	5300	13.56	13.61	13.68	13.41	0.22	19.81	23.98
Highest	5320	13.31	13.24	13.39	13.22	0.22	19.53	23.98

TEST DATA

802.11n (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5260	19.92	0.22	20.14	23.98
Middle	5300	19.93	0.22	20.15	23.98
Highest	5320	16.64	0.22	16.86	23.98

802.11n (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5260	14.02	13.87	14.12	14.06	0.22	20.26	23.98
Middle	5300	13.59	13.68	13.89	13.69	0.22	19.96	23.98
Highest	5320	13.03	13.08	13.15	12.99	0.22	19.31	23.98

802.11n (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5270	19.24	0.43	19.67	23.98
Highest	5310	13.26	0.43	13.69	23.98

TEST DATA

802.11n (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5270	13.42	13.38	13.47	13.26	0.43	19.84	23.98
Highest	5310	12.49	12.44	12.53	12.39	0.43	18.92	23.98

802.11ac (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5260	20.21	0.07	20.28	23.98
Middle	5300	20.16	0.07	20.23	23.98
Highest	5320	16.77	0.07	16.84	23.98

802.11ac (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5260	13.98	13.94	14.14	14.02	0.07	20.11	23.98
Middle	5300	13.84	13.86	14.10	13.94	0.07	20.02	23.98
Highest	5320	13.15	13.05	13.30	13.21	0.07	19.27	23.98

TEST DATA

802.11ac (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5270	19.83	0.14	19.97	23.98
Highest	5310	13.64	0.14	13.78	23.98

802.11ac (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5270	13.78	13.95	14.02	13.96	0.14	20.08	23.98
Highest	5310	12.85	12.81	12.93	12.89	0.14	19.03	23.98

802.11ac (80MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5290	11.77	0.27	12.04	23.98

802.11ac (80MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5290	9.68	9.78	9.84	9.77	0.27	16.06	23.98

TEST DATA

Note:

1. Maximum Conducted (average) Power = Measured conducted power + Duty Factor
2. Total output power = 10 log [10^{(Chain 0 Power + duty factor)/10} + 10^{(Chain 1 Power + duty factor)/10} + 10^{(Chain 2 Power + duty factor)/10}+ 10^{(Chain 3 Power + duty factor)/10}]
3. For CDD transmission, directional gain is. ***2.0 dBi.***
   For MIMO transmission, directional gain is ***5.01 dBi.***
   Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
   For power measurements on IEEE 802.11 devices employing CDD, directional gain is as follows,
   Directional gain = G_{ANT} + Array Gain = 2.0 dBi + 0 dB = 2.0 dBi.
   Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
   Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
   Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.
   For power measurements on all devices employing MIMO, directional gain is as follows,
   Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 2.0 dBi + 10 log(4/2) dB = 5.01 dBi.
   where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
   For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and the lowest N_{SS}=2 with beamforming.
4. FCC conducted output power limit = 250 mW or 11 dBm + 10 log B, whichever power is less.
   B is the 26 dB emission bandwidth in megahertz.
5. The following equation was used for spectrum offset:
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)
6. A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW (26.99dBm) for FCC.

8.5.3 Maximum Conducted Output Power – U-NII-2C band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel, Straddle channel

802.11a mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5500	16.64	0.22	16.86	23.98
Middle	5600	19.43	0.22	19.65	23.98
Highest	5700	14.11	0.22	14.33	23.98
Straddle	5720	18.38	0.22	18.60	23.48

802.11a mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5500	11.89	11.81	11.93	11.79	0.22	18.10	23.98
Middle	5600	12.05	12.12	12.34	12.01	0.22	18.37	23.98
Highest	5700	9.28	9.19	9.40	9.15	0.22	15.50	23.98
Straddle	5720	12.38	12.29	12.49	12.41	0.22	18.64	22.94

TEST DATA

802.11n (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5500	16.47	0.22	16.69	23.98
Middle	5600	19.52	0.22	19.74	23.98
Highest	5700	13.94	0.22	14.16	23.98
Straddle	5720	18.29	0.22	18.51	22.97

802.11n (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5500	12.41	12.34	12.47	12.39	0.22	18.65	23.98
Middle	5600	12.18	12.1	12.41	12.24	0.22	18.48	23.98
Highest	5700	10.09	10.07	10.20	10.13	0.22	16.37	23.98
Straddle	5720	12.89	12.84	13.01	12.99	0.22	19.18	23.01

TEST DATA

802.11n (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5510	13.63	0.43	14.06	23.98
Middle	5590	17.98	0.43	18.41	23.98
Highest	5670	15.92	0.43	16.35	23.98
Straddle	5710	17.36	0.43	17.79	23.98

802.11n (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5510	11.65	11.77	11.86	11.81	0.43	18.23	23.98
Middle	5590	14.24	14.17	14.40	14.02	0.43	20.66	23.98
Highest	5670	13.74	13.89	13.99	13.87	0.43	20.33	23.98
Straddle	5710	14.59	14.67	14.70	14.65	0.43	21.11	23.98

TEST DATA

802.11ac (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5500	16.88	0.07	16.95	23.98
Middle	5600	19.64	0.07	19.71	23.98
Highest	5700	14.11	0.07	14.18	23.98
Straddle	5720	18.42	0.07	18.49	22.99

802.11ac (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5500	12.17	12.05	12.27	12.19	0.07	18.26	23.98
Middle	5600	12.34	12.47	12.70	12.39	0.07	18.56	23.98
Highest	5700	9.87	9.84	9.96	9.88	0.07	15.98	23.98
Straddle	5720	12.89	12.94	13.07	13.02	0.07	19.07	22.98

TEST DATA

802.11ac (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5510	13.87	0.14	14.01	23.98
Middle	5590	18.31	0.14	18.45	23.98
Highest	5670	15.98	0.14	16.12	23.98
Straddle	5710	17.39	0.14	17.53	23.98

802.11ac (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5510	11.38	11.40	11.45	11.29	0.14	17.54	23.98
Middle	5590	14.34	14.23	14.67	14.58	0.14	20.61	23.98
Highest	5670	13.71	13.93	13.98	13.86	0.14	20.03	23.98
Straddle	5710	14.96	14.99	15.07	15.03	0.14	21.17	23.98

TEST DATA

802.11ac (80MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Lowest	5530	12.37	0.27	12.64	23.98
Highest	5610	18.26	0.27	18.53	23.98
Straddle	5690	17.87	0.27	18.14	23.98

802.11ac (80MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Lowest	5530	10.98	10.96	11.11	11.04	0.27	17.32	23.98
Highest	5610	14.76	14.81	14.99	14.57	0.27	21.08	23.98
Straddle	5690	15.26	15.18	15.36	15.24	0.27	21.56	23.98

TEST DATA

Note:

1. *Maximum Conducted (average) Power = Measured conducted power + Duty Factor*
2. *Total output power = 10 log [10^{(Chain 0 Power + duty factor)/10} + 10^{(Chain 1 Power + duty factor)/10} + 10^{(Chain 2 Power + duty factor)/10}+ 10^{(Chain 3 Power + duty factor)/10}]*
3. *For CDD transmission, directional gain is.* ***2.0 dBi.***
   For MIMO transmission, directional gain is ***5.01 dBi.***
   Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
   For power measurements on IEEE 802.11 devices employing CDD, directional gain is as follows,
   Directional gain = G_{ANT} + Array Gain = 2.0 dBi + 0 dB = 2.0 dBi.
   Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
   Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
   Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.
   For power measurements on all devices employing MIMO, directional gain is as follows,
   ***Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 2.0 dBi + 10 log(4/2) dB = 5.01 dBi**.*
   where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
   For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and the lowest N_{SS}=2 with beamforming.
4. *FCC conducted output power limit = 250 mW or 11 dBm + 10 log B, whichever power is less.*
   B is the 26 dB emission bandwidth in megahertz.
5. *The following equation was used for spectrum offset:*
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)
6. *A TPC mechanism is not required for systems with an e.i.r.p. of less than 500 mW (26.99dBm) for FCC.*

8.5.4 Maximum Conducted Output Power – U-NII-3 band

FCC §15.407(a)

Test Mode : Set to Straddle channel, Lowest channel, Middle channel and Highest channel

802.11a mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Straddle	5720	12.41	0.22	12.63	30.00
Lowest	5745	18.95	0.22	19.17	30.00
Middle	5785	18.89	0.22	19.11	30.00
Highest	5825	19.15	0.22	19.37	30.00

802.11a mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Straddle	5720	6.38	6.26	6.49	6.43	0.22	12.63	30.00
Lowest	5745	16.85	16.80	16.97	16.92	0.22	23.13	30.00
Middle	5785	17.02	16.95	17.13	17.05	0.22	23.28	30.00
Highest	5825	17.12	16.99	17.23	17.11	0.22	23.36	30.00

TEST DATA

802.11n (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Straddle	5720	12.49	0.22	12.71	30.00
Lowest	5745	18.04	0.22	18.26	30.00
Middle	5785	18.18	0.22	18.40	30.00
Highest	5825	18.60	0.22	18.82	30.00

802.11n (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Straddle	5720	7.41	7.34	7.51	7.41	0.22	13.66	30.00
Lowest	5745	16.84	16.95	17.01	16.86	0.22	23.16	30.00
Middle	5785	16.78	16.90	16.91	16.75	0.22	23.08	30.00
Highest	5825	16.80	16.93	17.05	16.92	0.22	23.17	30.00

802.11n (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Straddle	5710	7.11	0.43	7.54	30.00
Lowest	5755	17.46	0.43	17.89	30.00
Highest	5795	17.77	0.43	18.20	30.00

802.11n (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Straddle	5710	4.57	4.38	4.67	4.53	0.43	10.99	30.00
Lowest	5755	16.07	16.10	16.26	16.15	0.43	22.60	30.00
Highest	5795	16.39	16.43	16.52	16.48	0.43	22.91	30.00

802.11ac (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Straddle	5720	12.81	0.07	12.88	30.00
Lowest	5745	18.57	0.07	18.64	30.00
Middle	5785	18.54	0.07	18.61	30.00
Highest	5825	18.61	0.07	18.68	30.00

802.11ac (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Straddle	5720	7.48	7.42	7.62	7.54	0.07	13.60	30.00
Lowest	5745	16.79	16.84	16.96	16.84	0.07	22.95	30.00
Middle	5785	16.84	16.76	16.97	16.92	0.07	22.96	30.00
Highest	5825	16.99	16.94	17.08	17.05	0.07	23.10	30.00

TEST DATA

802.11ac (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Straddle	5710	7.37	0.14	7.51	30.00
Lowest	5755	17.47	0.14	17.61	30.00
Highest	5795	17.79	0.14	17.93	30.00

802.11ac (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Straddle	5710	4.87	4.86	5.00	4.83	0.14	11.05	30.00
Lowest	5755	16.24	16.21	16.38	16.29	0.14	22.44	30.00
Highest	5795	16.49	16.49	16.61	16.54	0.14	22.69	30.00

802.11ac (80MHz) mode – 1TX

Channel	Frequency (MHz)	Measured conducted power (dBm)	Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 2			
Straddle	5690	4.26	0.27	4.53	30.00
Lowest	5775	18.12	0.27	18.39	30.00

TEST DATA

802.11ac (80MHz) mode – 4TX

Channel	Frequency (MHz)	Measured conducted power (dBm)				Duty Factor (dB)	Maximum Conducted Power (dBm)	FCC Limit (dBm)
		Chain 0	Chain 1	Chain 2	Chain 3		Total output power	
Straddle	5690	1.75	1.65	1.76	1.58	0.27	7.98	30.00
Lowest	5775	16.84	16.76	16.97	16.95	0.27	23.18	30.00

Note:

1. Maximum Conducted (average) Power = Measured conducted power + Duty Factor

2. Total output power = 10 log [10^{(Chain 0 Power + duty factor)/10} + 10^{(Chain 1 Power + duty factor)/10} + 10^{(Chain 2 Power + duty factor)/10}+ 10^{(Chain 3 Power + duty factor)/10}]

3. For CDD transmission, directional gain is. ***2.0 dBi.***
For MIMO transmission, directional gain is ***5.01 dBi.***
Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
For power measurements on IEEE 802.11 devices employing CDD, directional gain is as follows,
Directional gain = G_{ANT} + Array Gain = 2.0 dBi + 0 dB = 2.0 dBi.
Array Gain = 0 dB (i.e., no array gain) for $N_{ANT} \leq 4$;
Array Gain = 0 dB (i.e., no array gain) for channel widths ≥ 40 MHz for any N_{ANT};
Array Gain = 5 log(N_{ANT}/N_{SS}) dB or 3 dB, whichever is less, for 20-MHz channel widths with $N_{ANT} \geq 5$.
For power measurements on all devices employing MIMO, directional gain is as follows,
***Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 2.0 dBi + 10 log(4/2) dB = 5.01 dBi**.*
where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and the lowest N_{SS}=2 with beamforming.

4. The following equation was used for spectrum offset:
Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

TEST DATA

8.6 Maximum Power Spectral Density (average)

8.6.1 Maximum Power Spectral Density – U-NII-1 band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11a mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5180	4.81	0.22	5.03	17.00
Middle	5220	9.16	0.22	9.38	17.00
Highest	5240	9.13	0.22	9.35	17.00

802.11a mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5180	4.67	0.22	10.91	14.98
Middle	5220	6.98	0.22	13.22	14.98
Highest	5240	7.26	0.22	13.50	14.98

TEST DATA

802.11n (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5180	4.46	0.22	4.68	17.00
Middle	5220	8.82	0.22	9.04	17.00
Highest	5240	8.81	0.22	9.03	17.00

802.11n (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5180	3.41	0.22	9.65	14.98
Middle	5220	6.52	0.22	12.76	14.98
Highest	5240	7.59	0.22	13.83	14.98

802.11n (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5190	0.15	0.43	0.58	17.00
Highest	5230	5.40	0.43	5.83	17.00

TEST DATA

802.11n (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5190	-1.45	0.43	5.00	14.98
Highest	5230	-1.42	0.43	5.03	14.98

802.11ac (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5180	4.26	0.07	4.33	17.00
Middle	5220	8.76	0.07	8.83	17.00
Highest	5240	8.92	0.07	8.99	17.00

802.11ac (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5180	3.79	0.07	9.88	14.98
Middle	5220	7.51	0.07	13.60	14.98
Highest	5240	7.72	0.07	13.81	14.98

TEST DATA

802.11ac (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5190	0.51	0.14	0.65	17.00
Highest	5230	5.94	0.14	6.08	17.00

802.11ac (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5190	-1.61	0.14	4.55	14.98
Highest	5230	-0.62	0.14	5.54	14.98

802.11ac (80MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5210	-3.16	0.27	-2.89	17.00

802.11ac (80MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5210	-4.4	0.27	1.89	14.98

TEST DATA

Note:

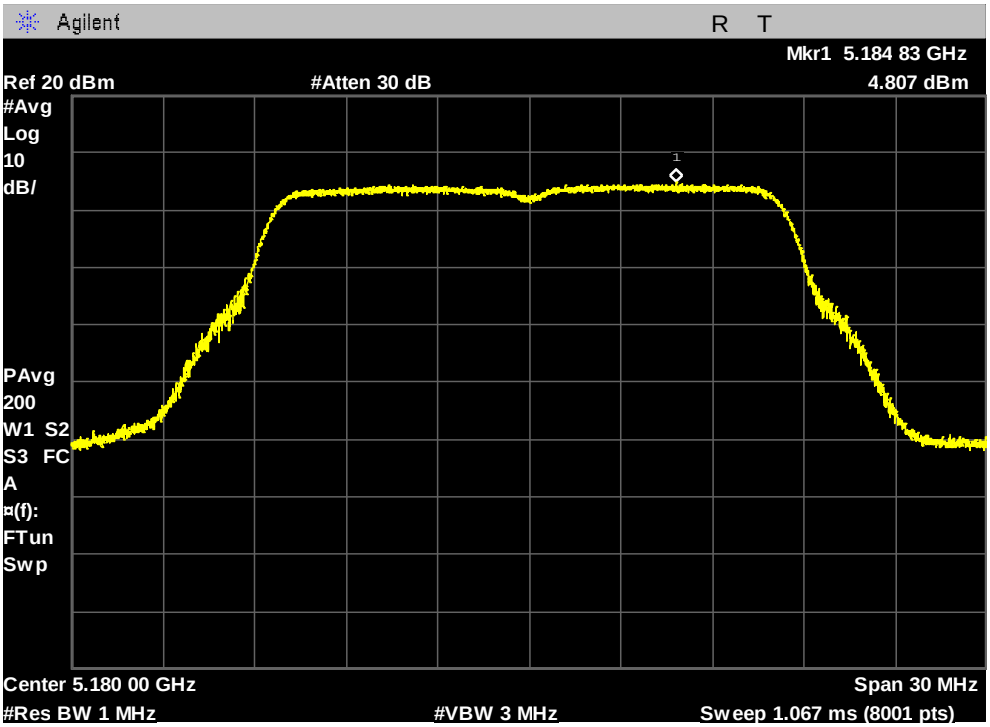
1. *Maximum PSD = Measured PSD + Duty Factor*
2. *"Measure and add 10 log(N_{ANT}) dB, where N_{ANT} is the number of outputs" was used for measuring in-band Total PSD.*
   Total PSD = Chain 3 PSD + duty factor + 10 log(N_{ANT})
3. *For CDD transmission, directional gain is.* ***8.02 dBi***
   For MIMO transmission, directional gain is ***5.01 dBi****.*
   Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
   For power spectral density (PSD) measurements on all devices employing CDD, directional gain is as follows,
   Directional gain = GANT + Array Gain = 2 dBi + 6.02 dB = 8.02 dBi
   Array Gain = 10 log(N_{ANT}/N_{SS}) dB = 10 log(4/1) = 6.02 dB.
   where N_{SS} = the number of independent spatial streams of data and GANT is the antenna gain in dBi.
   For CDD mode of this device, NSS=1.
   For power spectral density (PSD) measurements on all devices employing MIMO, directional gain is as follows,
   Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 2 dBi + 10 log(4/2) dB = 5.01 dBi*.*
   where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
   For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and the lowest N_{SS}=2 with beamforming.
4. *For FCC PSD Limit, If transmitting antennas of directional gain greater than 6 dBi was used, maximum power spectral density was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.*
5. *Power Spectral Density(PSD) was measured by same method with conducted output power according to II.F.1 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01.*
6. *The following equation was used for spectrum offset:*
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

PLOTS OF EMISSIONS

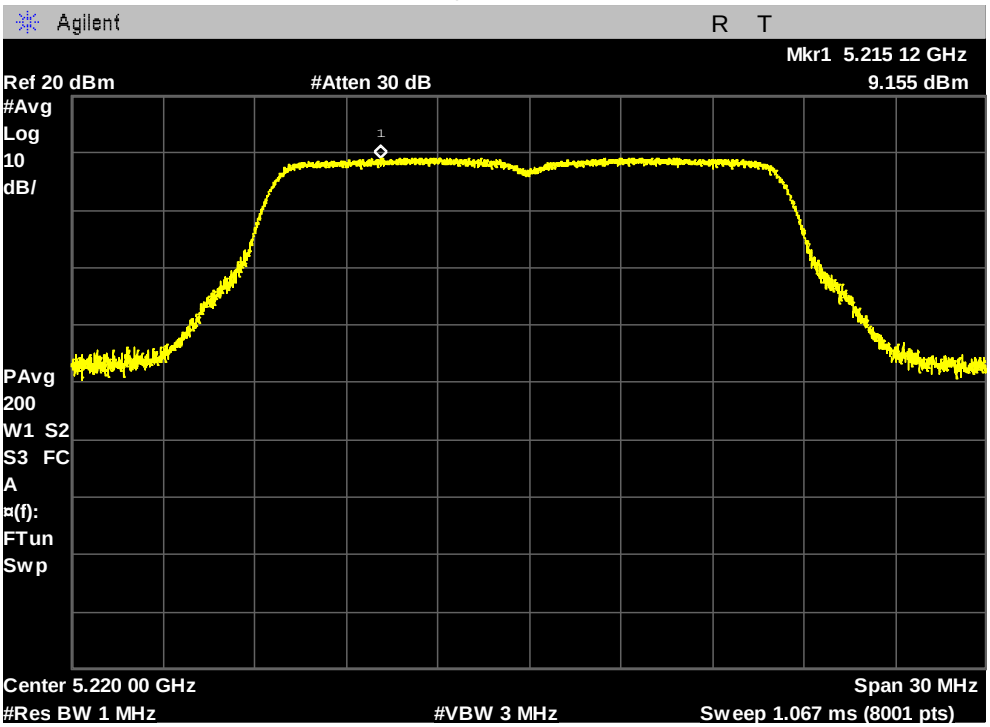
802.11a mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5180 MHz)

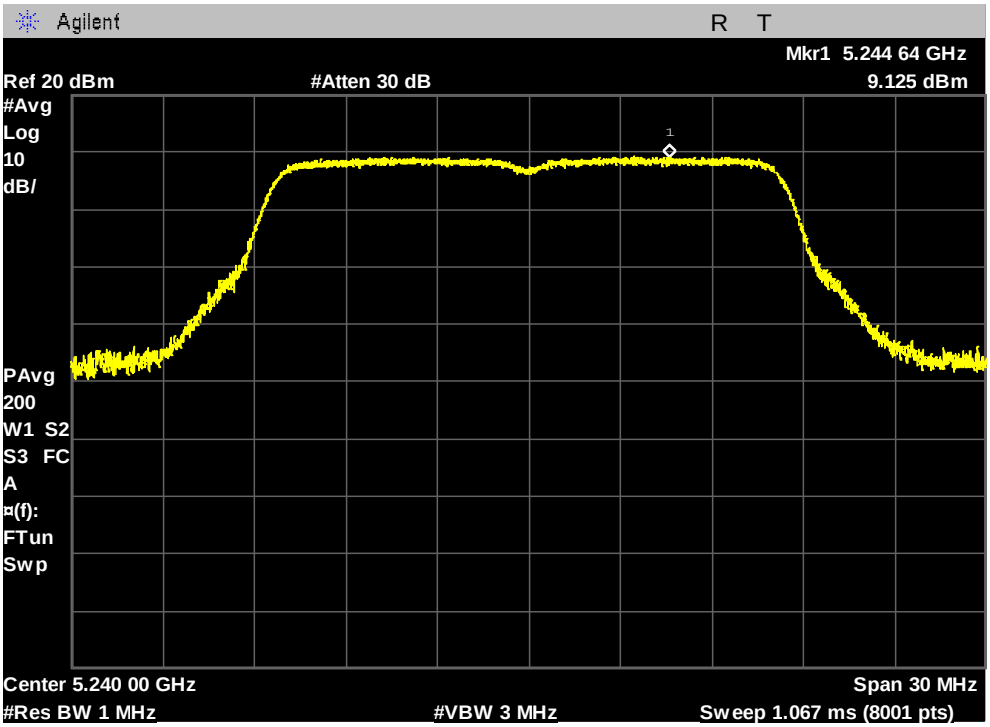


Maximum Power Spectral Density, Middle Channel (5220 MHz)



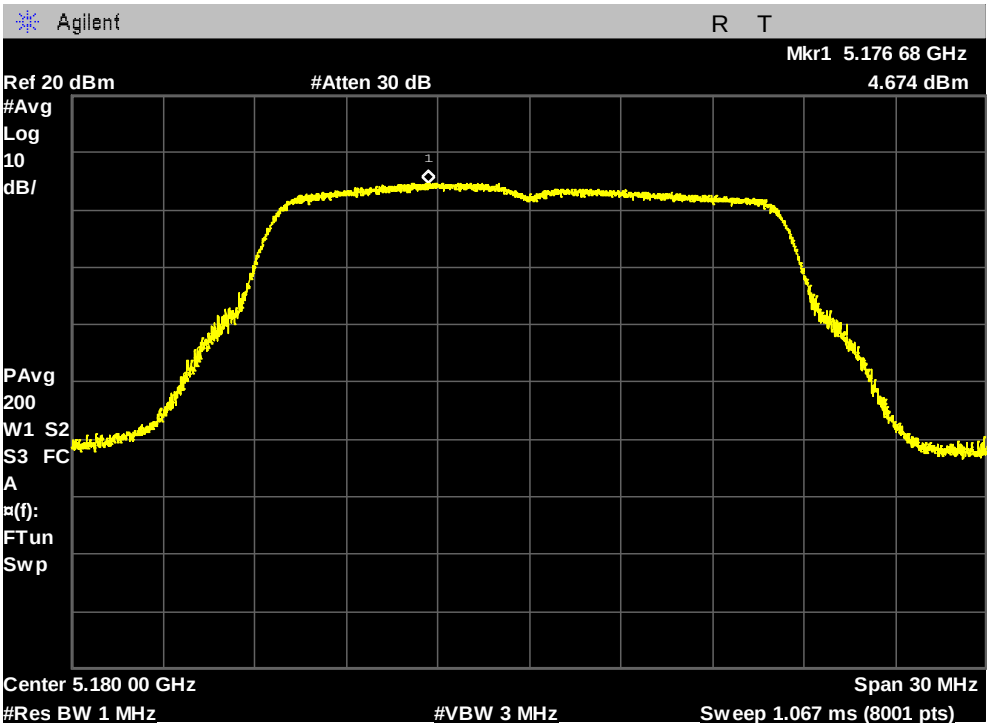
PLOTS OF EMISSIONS

Maximum Power Spectral Density, Highest Channel (5240 MHz)



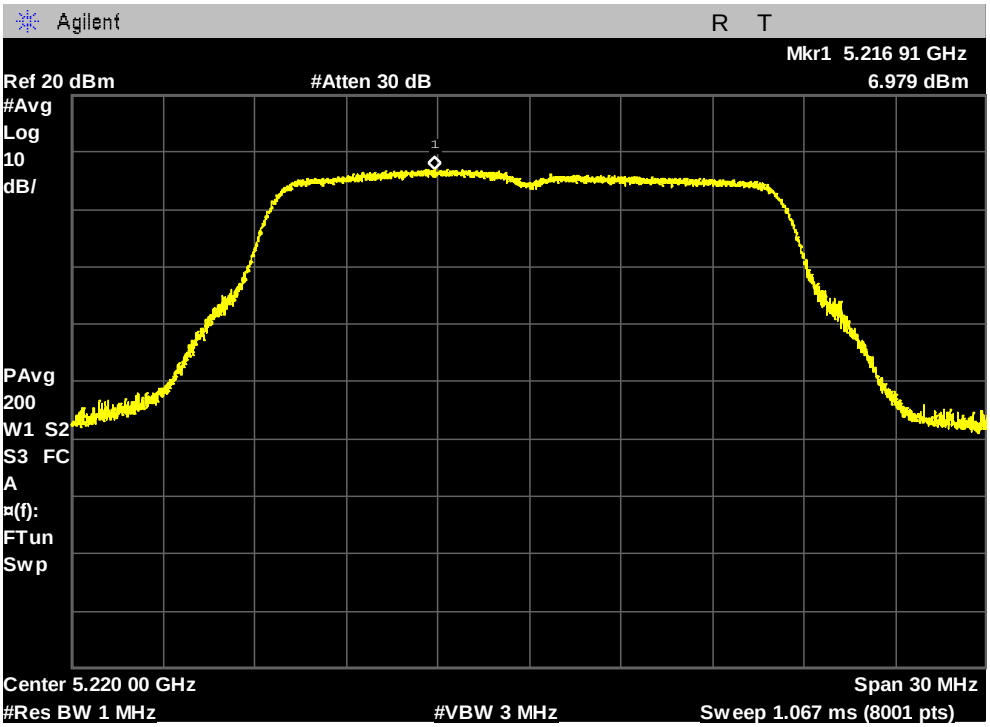
Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5180 MHz)

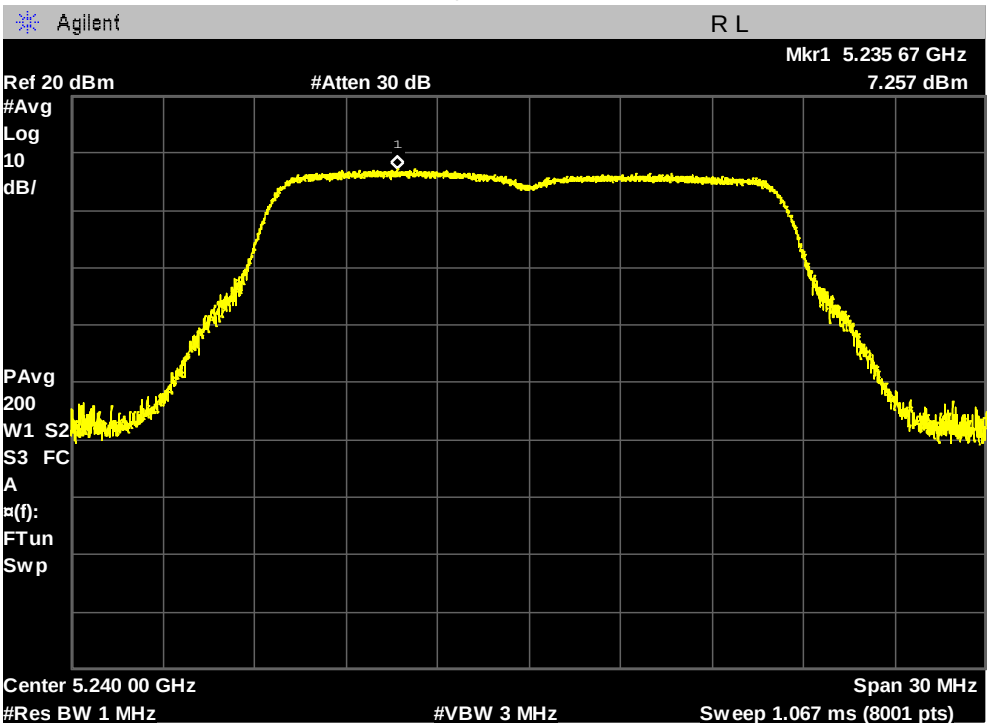


PLOTS OF EMISSIONS

Maximum Power Spectral Density, Middle Channel (5220 MHz)



Maximum Power Spectral Density, Highest Channel (5240 MHz)

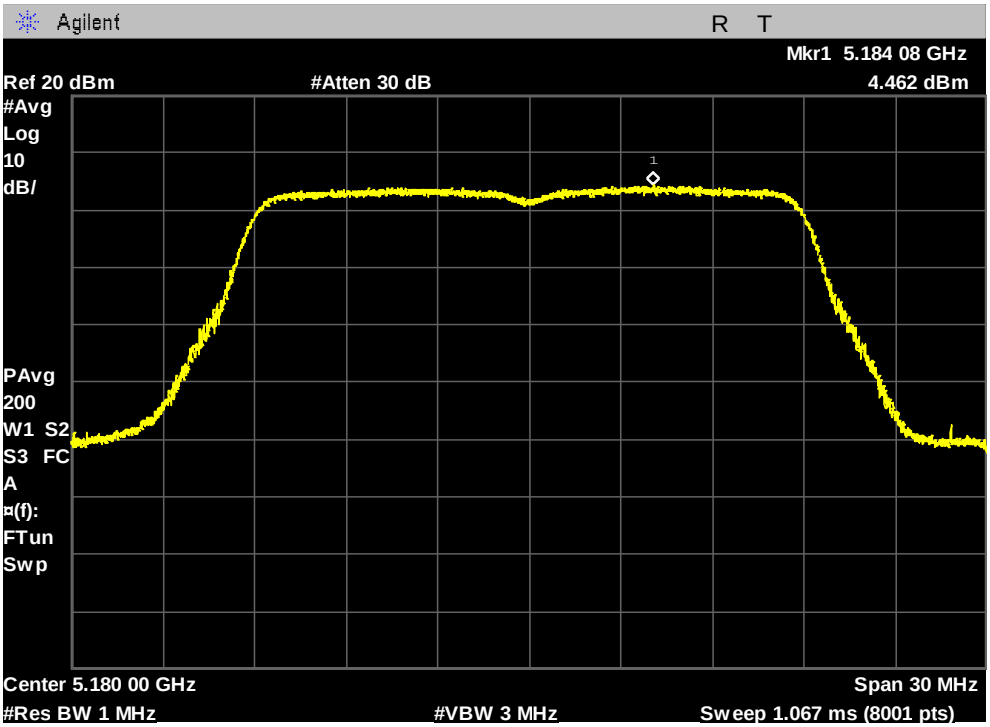


PLOTS OF EMISSIONS

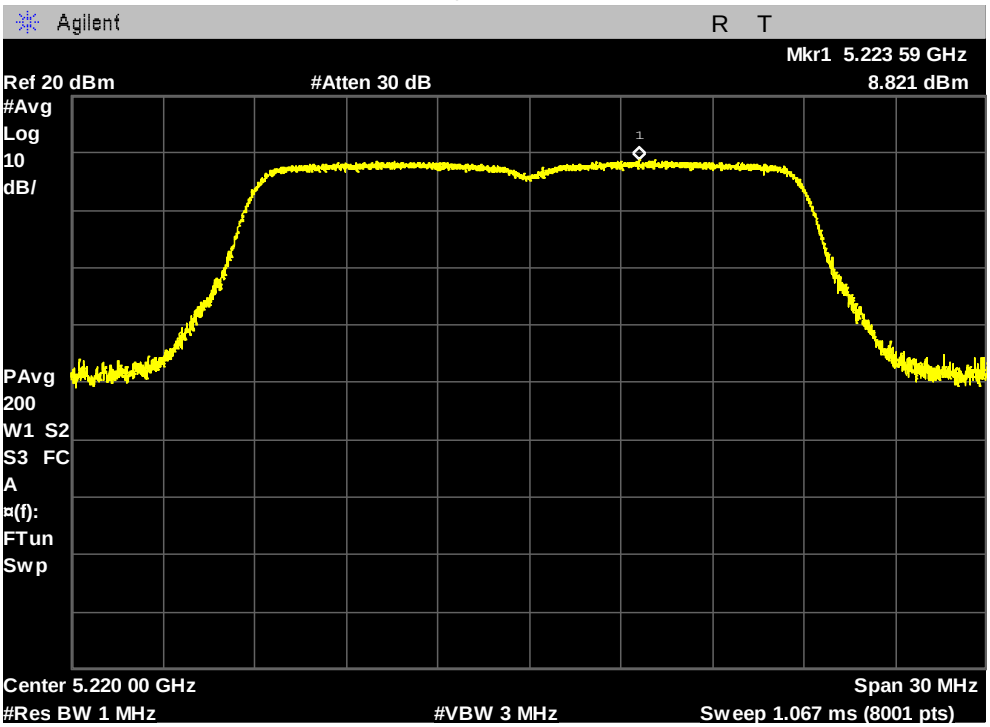
802.11n (20 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5180 MHz)

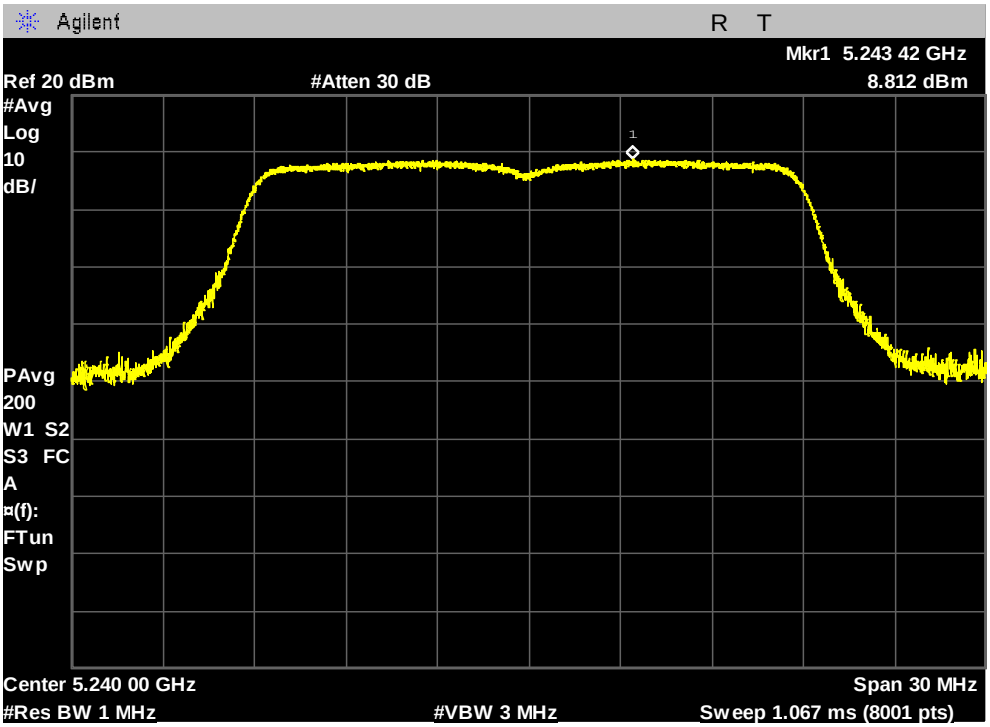


Maximum Power Spectral Density, Middle Channel (5220 MHz)



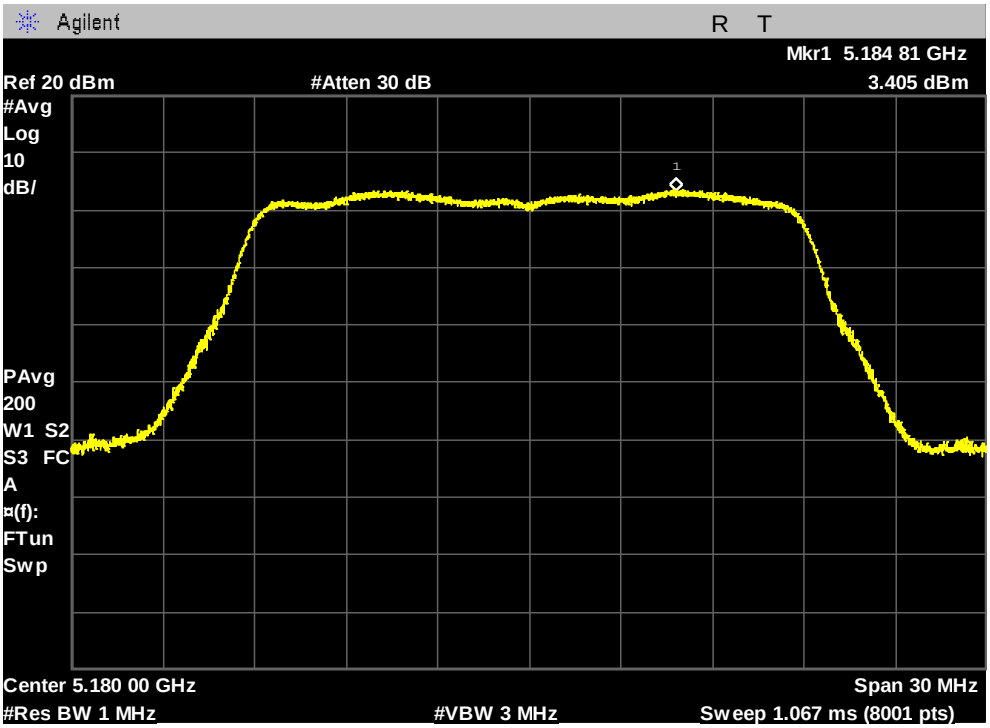
PLOTS OF EMISSIONS

Maximum Power Spectral Density, Highest Channel (5240 MHz)



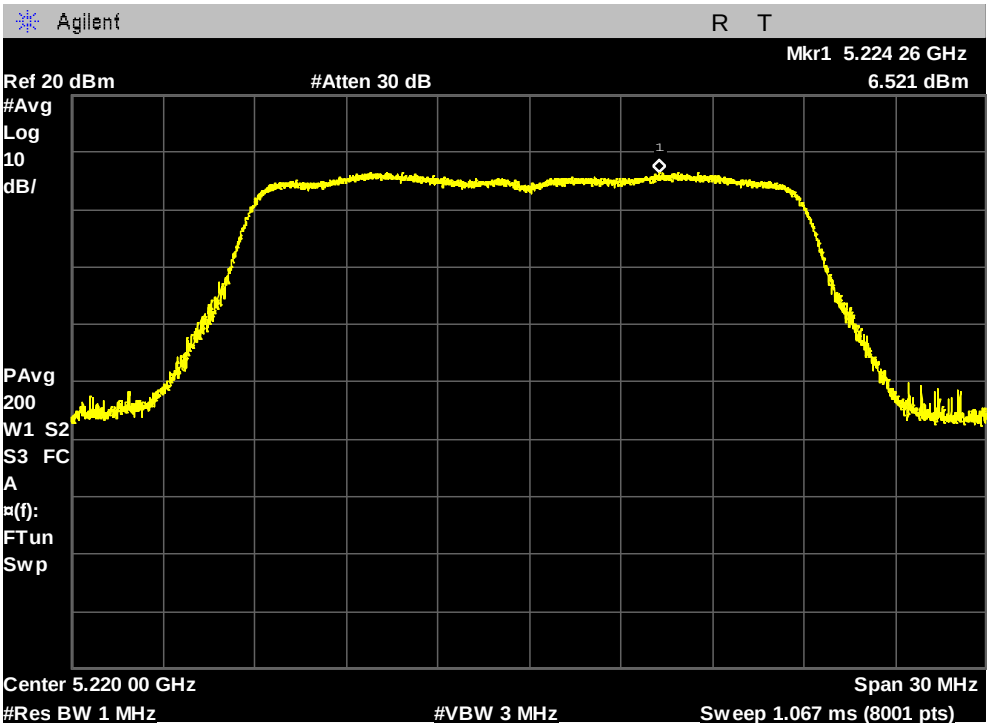
Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5180 MHz)

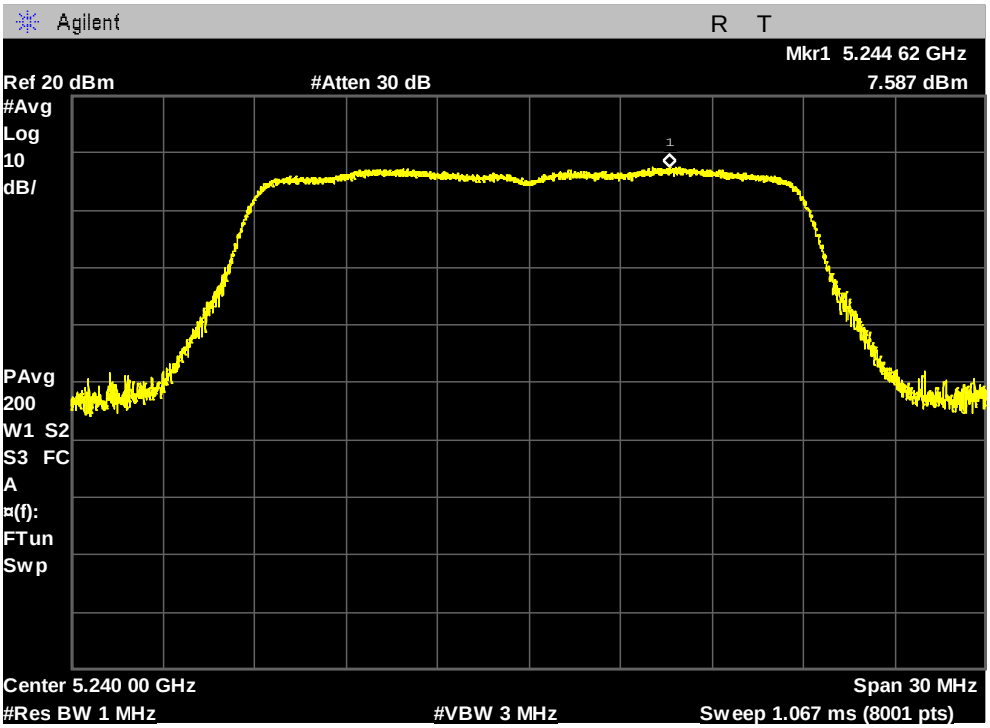


PLOTS OF EMISSIONS

Maximum Power Spectral Density, Middle Channel (5220 MHz)



Maximum Power Spectral Density, Highest Channel (5240 MHz)

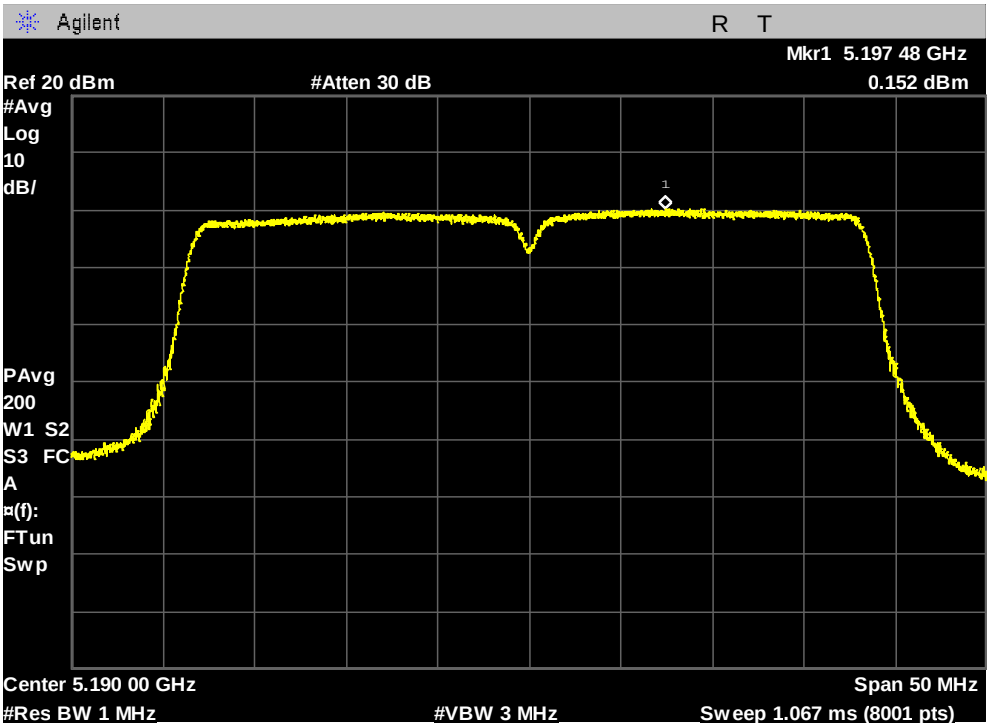


PLOTS OF EMISSIONS

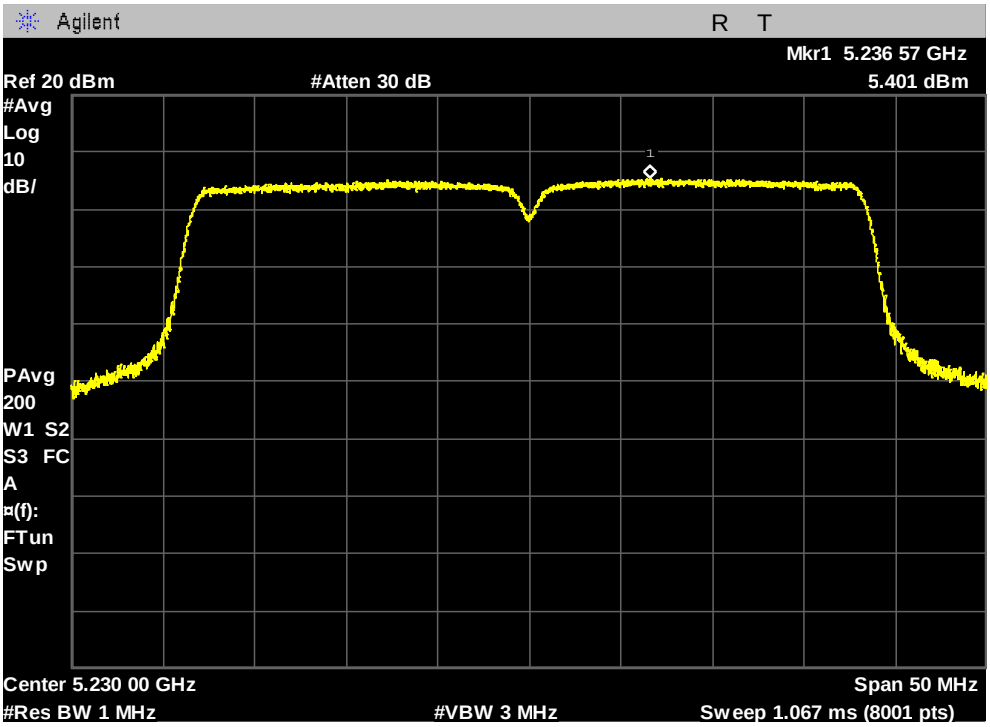
802.11n (40 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5190 MHz)



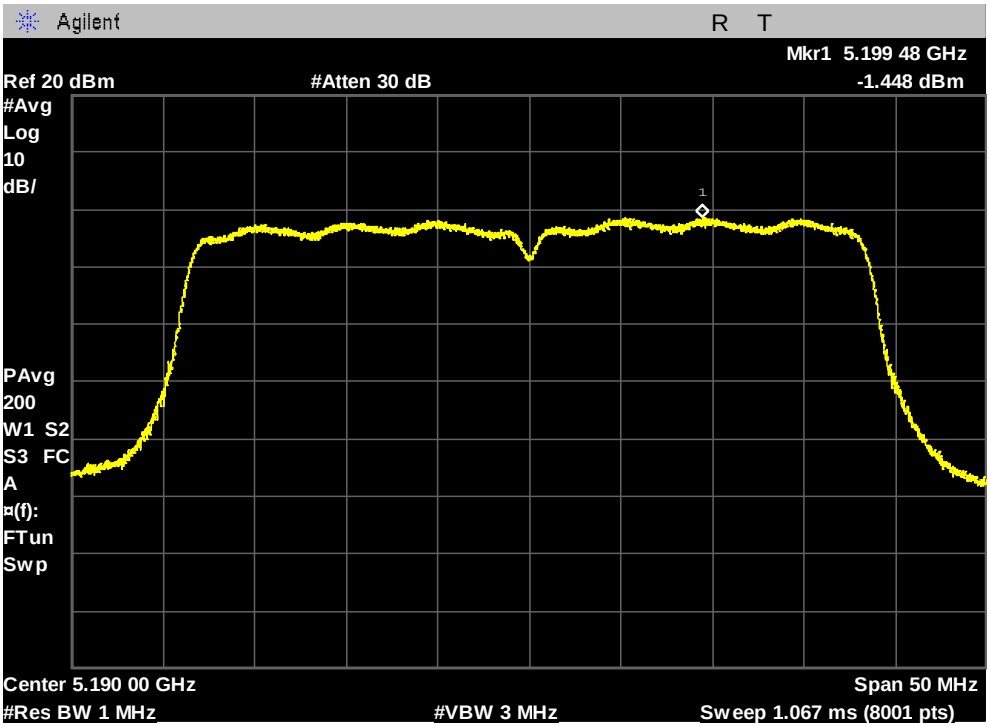
Maximum Power Spectral Density, Highest Channel (5230 MHz)



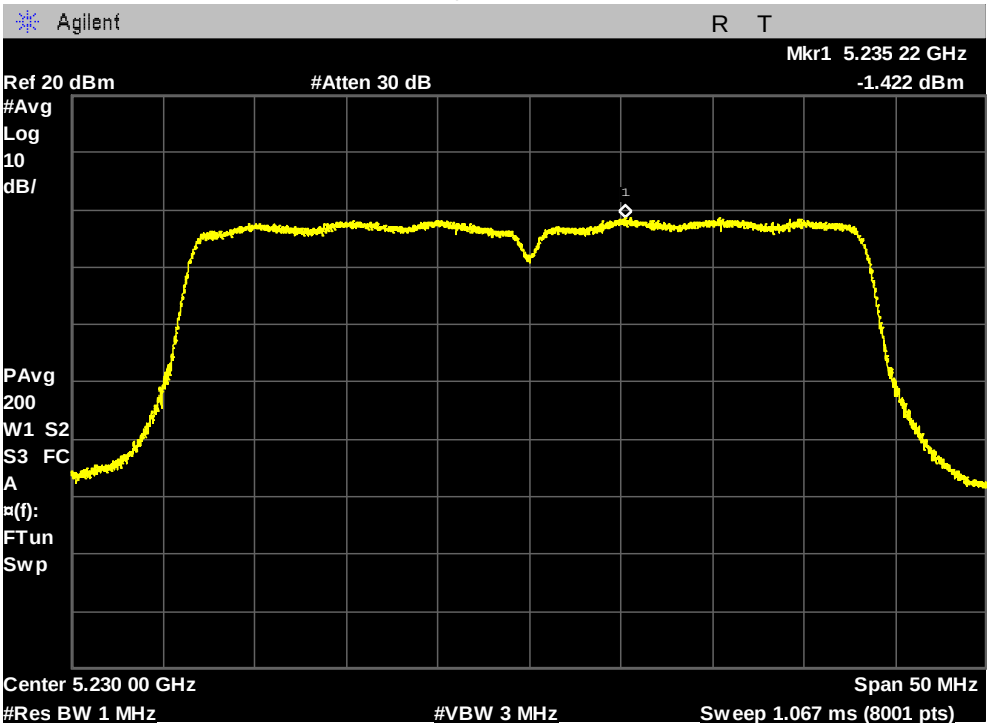
PLOTS OF EMISSIONS

Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5190 MHz)



Maximum Power Spectral Density, Highest Channel (5230 MHz)

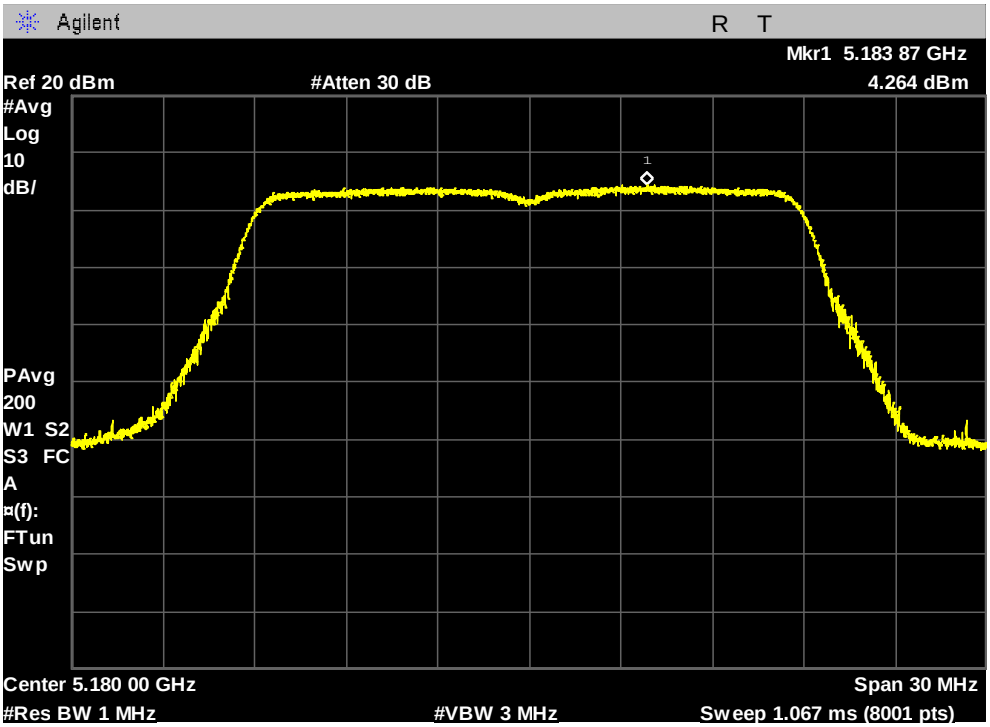


PLOTS OF EMISSIONS

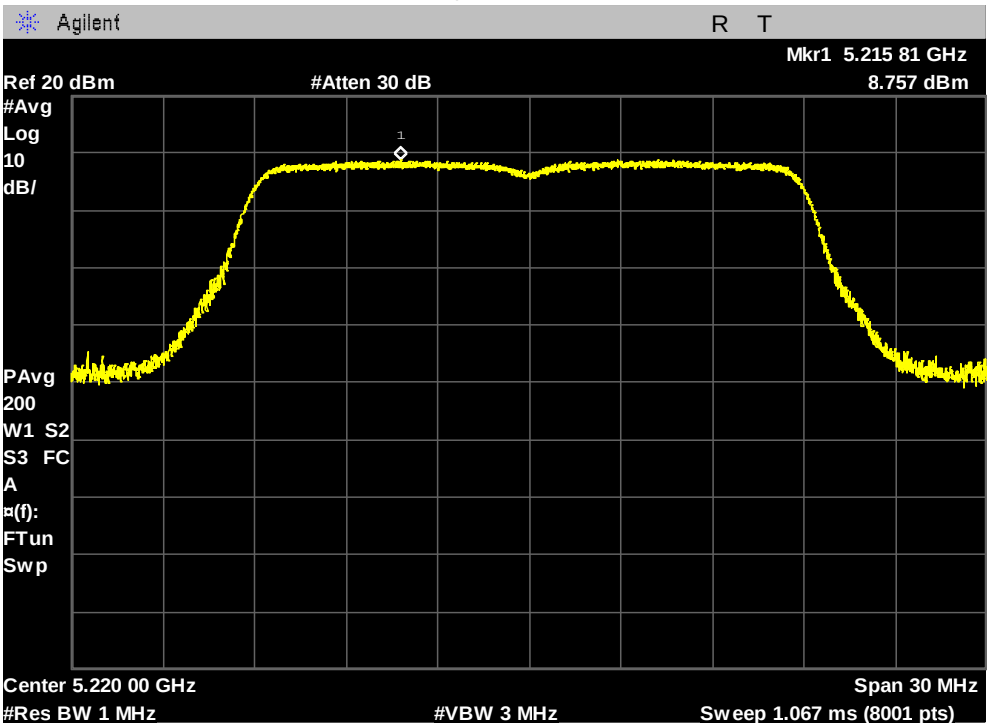
802.11ac (20 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5180 MHz)

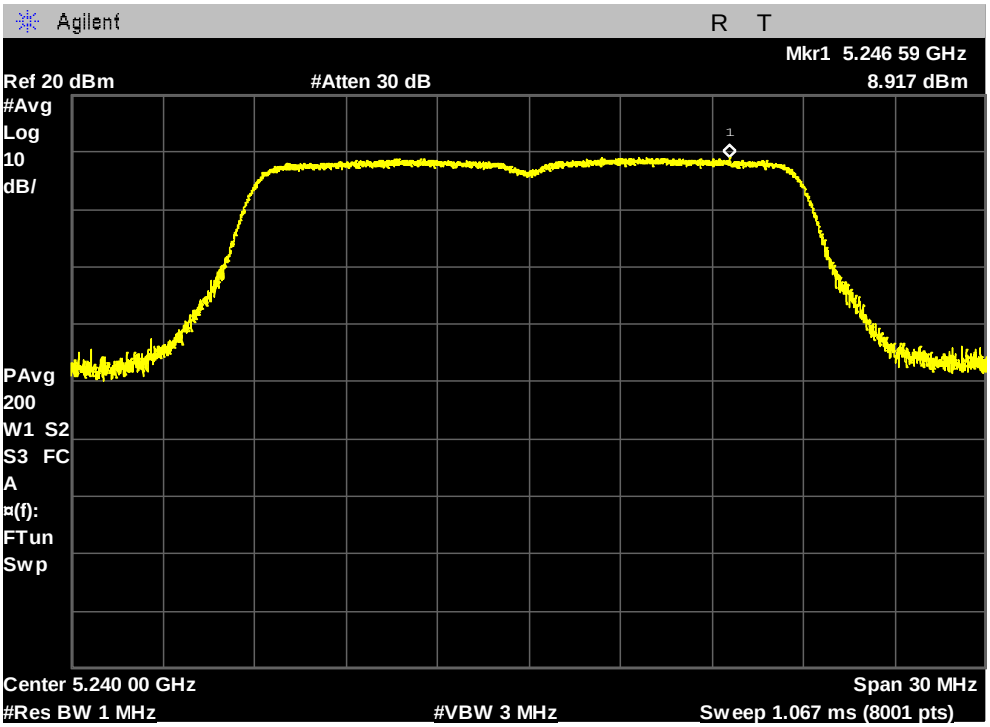


Maximum Power Spectral Density, Middle Channel (5220 MHz)



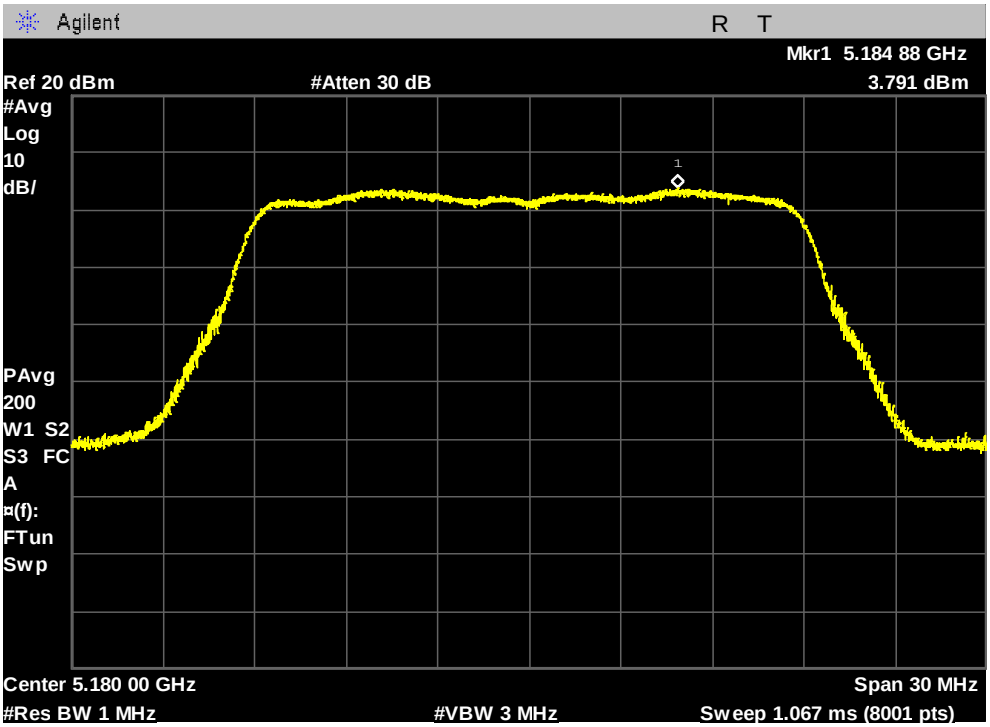
PLOTS OF EMISSIONS

Maximum Power Spectral Density, Highest Channel (5240 MHz)



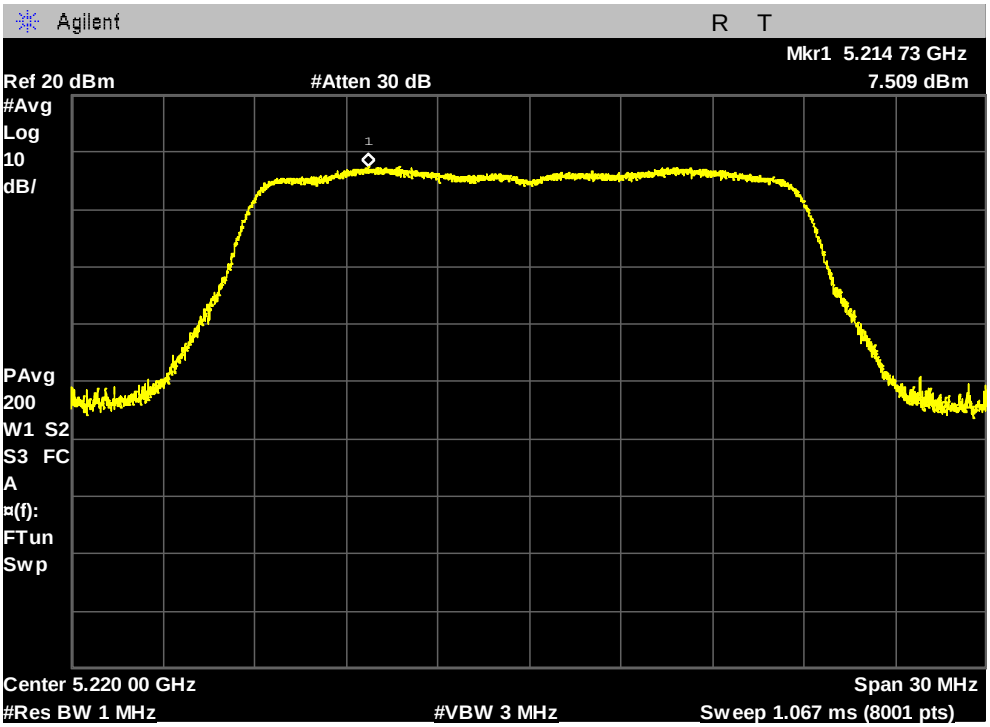
Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5180 MHz)

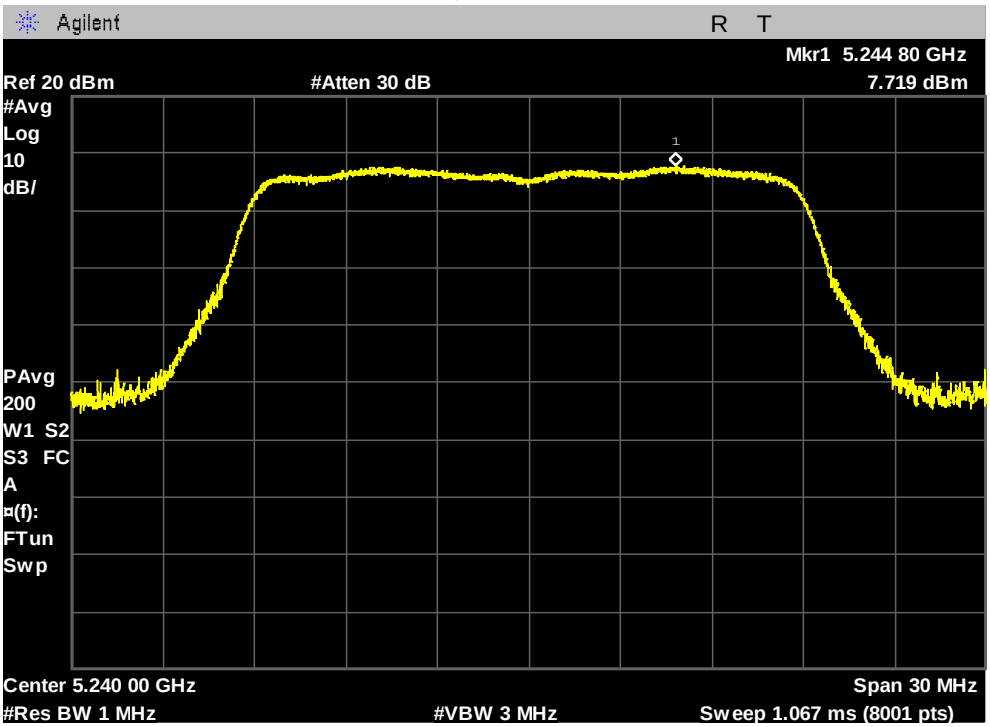


PLOTS OF EMISSIONS

Maximum Power Spectral Density, Middle Channel (5220 MHz)



Maximum Power Spectral Density, Highest Channel (5240 MHz)

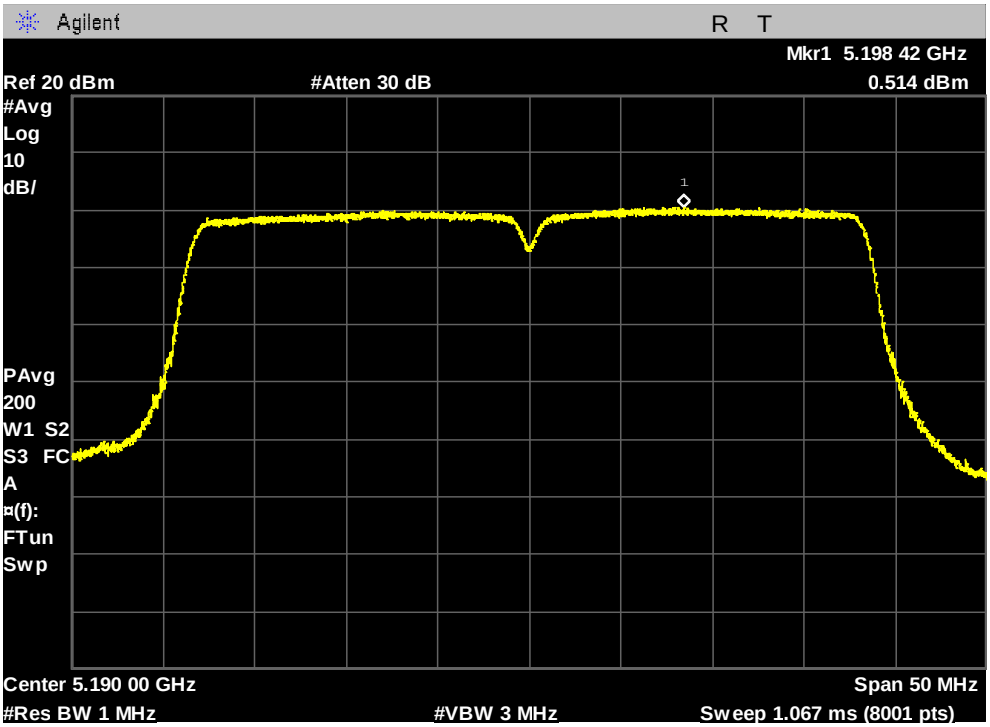


PLOTS OF EMISSIONS

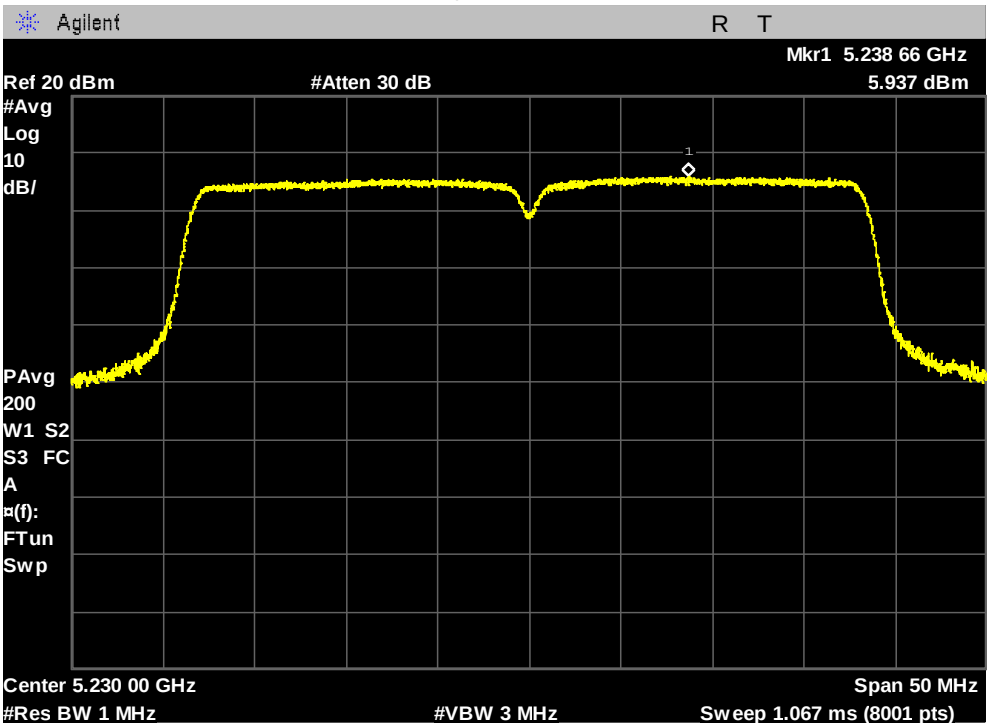
802.11ac (40 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5190 MHz)



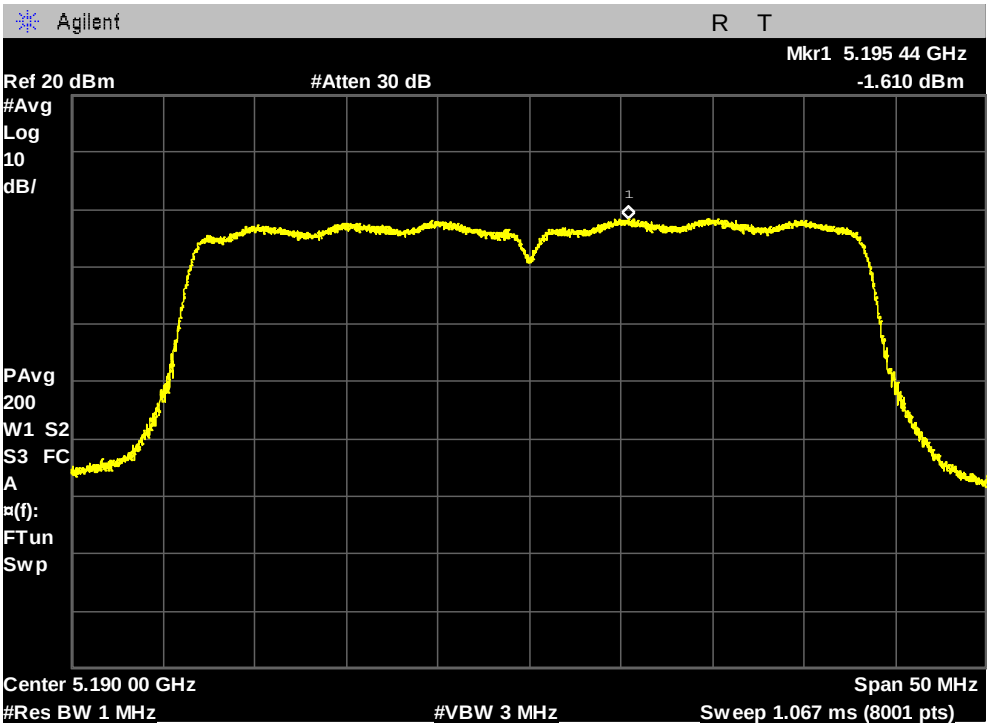
Maximum Power Spectral Density, Highest Channel (5230 MHz)



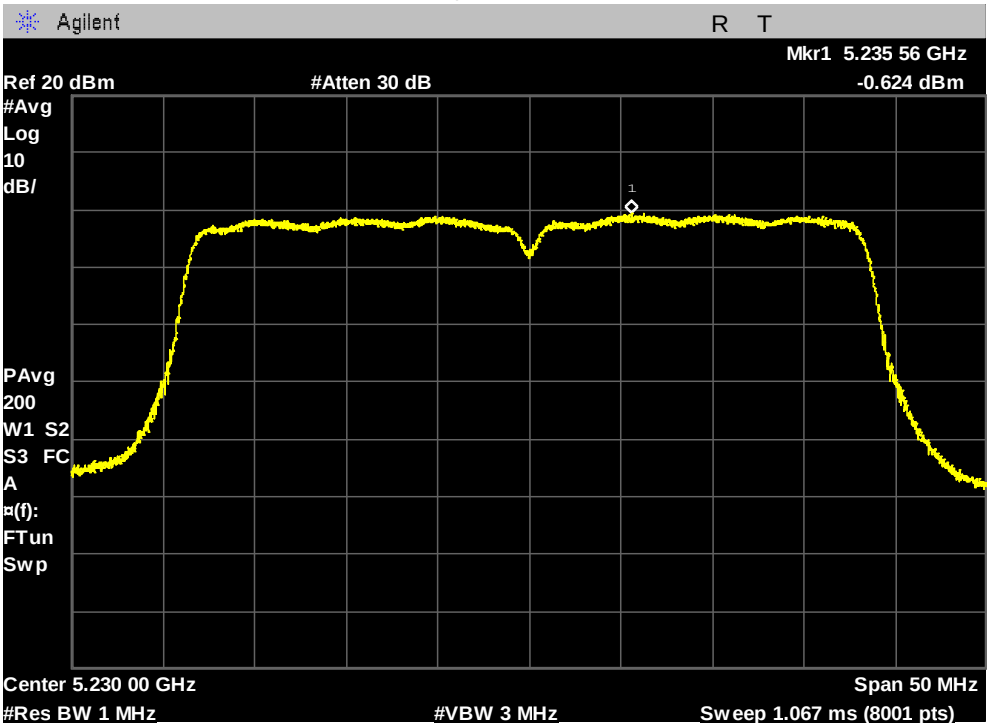
PLOTS OF EMISSIONS

Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5190 MHz)



Maximum Power Spectral Density, Highest Channel (5230 MHz)

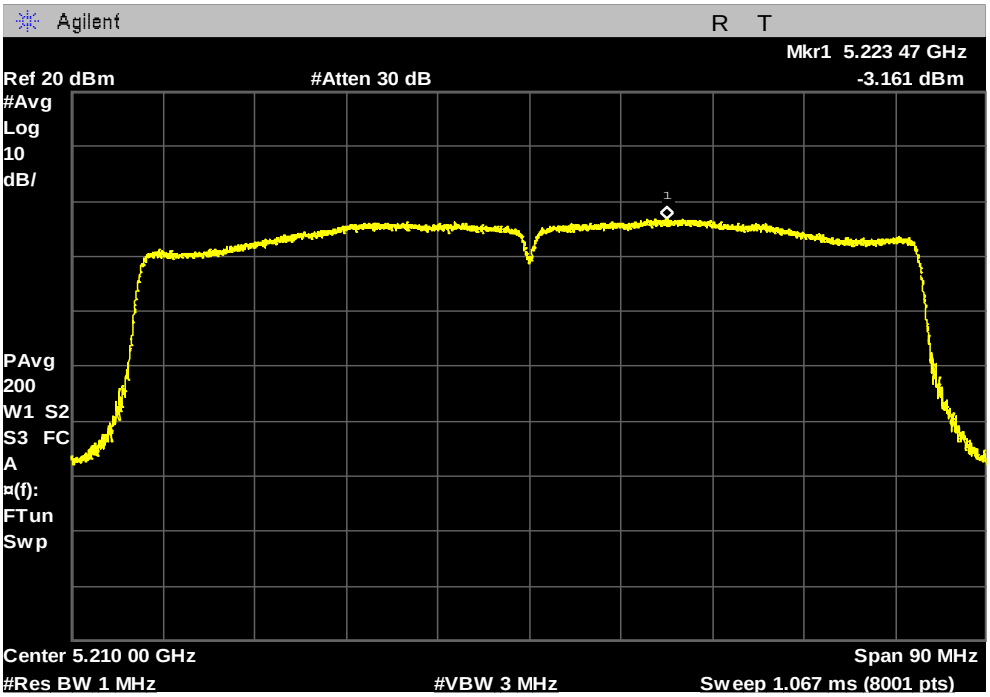


PLOTS OF EMISSIONS

802.11ac (80 MHz) mode

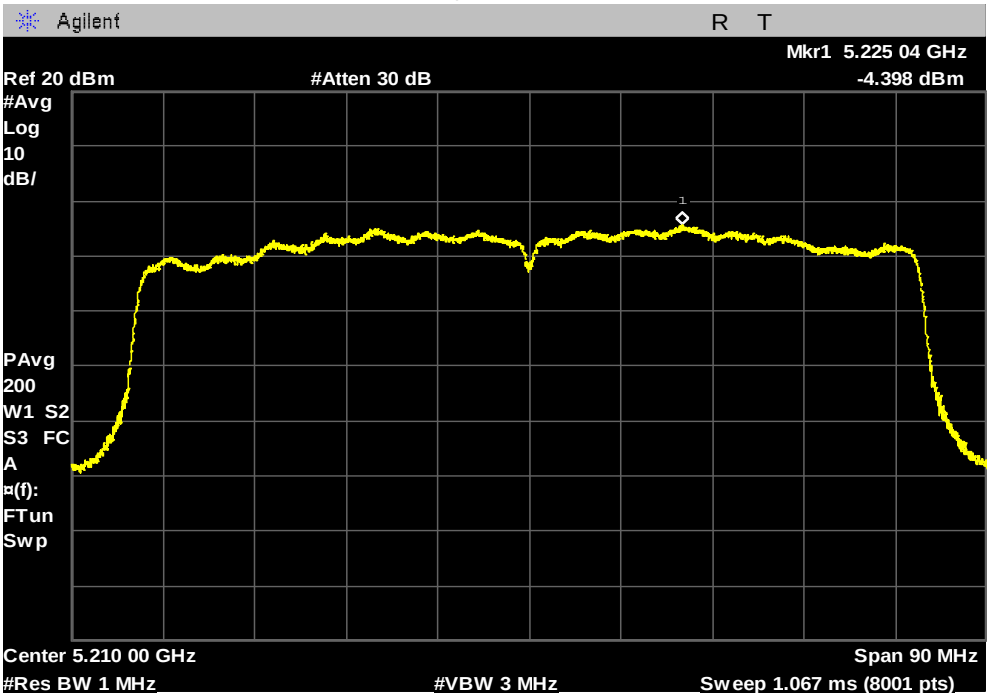
Chain 2 (1TX)

Maximum Power Spectral Density, Channel (5210 MHz)



Chain 2 (4TX)

Maximum Power Spectral Density, Channel (5210 MHz)



8.6.2 Maximum Power Spectral Density – U-NII-2A band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel

802.11a mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5260	9.12	0.22	9.34	11.00
Middle	5300	9.20	0.22	9.42	11.00
Highest	5320	5.96	0.22	6.18	11.00

802.11a mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5260	1.65	0.22	7.89	8.98
Middle	5300	1.19	0.22	7.43	8.98
Highest	5320	1.22	0.22	7.46	8.98

TEST DATA

802.11n (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5260	9.00	0.22	9.22	11.00
Middle	5300	8.73	0.22	8.95	11.00
Highest	5320	5.75	0.22	5.97	11.00

802.11n (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5260	1.55	0.22	7.79	8.98
Middle	5300	1.63	0.22	7.87	8.98
Highest	5320	1.52	0.22	7.76	8.98

802.11n (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5270	5.76	0.43	6.19	11.00
Highest	5310	-0.69	0.43	-0.26	11.00

TEST DATA

802.11n (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5270	-0.23	0.43	6.22	8.98
Highest	5310	-1.42	0.43	5.03	8.98

802.11ac (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5260	8.53	0.07	8.60	11.00
Middle	5300	9.24	0.07	9.31	11.00
Highest	5320	5.93	0.07	6.00	11.00

802.11ac (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5260	1.52	0.07	7.61	8.98
Middle	5300	1.38	0.07	7.47	8.98
Highest	5320	1.59	0.07	7.68	8.98

TEST DATA

802.11ac (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5270	5.94	0.14	6.08	11.00
Highest	5310	-0.21	0.14	-0.08	11.00

802.11ac (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5270	0.27	0.14	6.43	8.98
Highest	5310	-0.72	0.14	5.44	8.98

802.11ac (80MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5290	-5.30	0.27	-5.03	11.00

802.11ac (80MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5290	-6.77	0.27	-0.48	8.98

TEST DATA

Note:

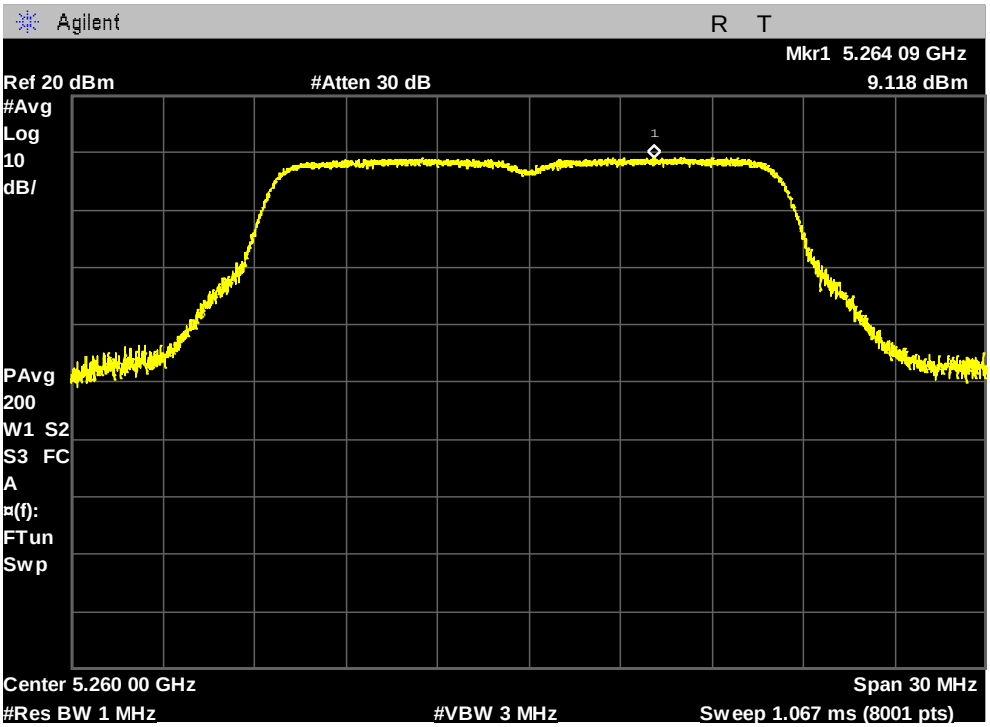
1. *Maximum PSD = Measured PSD + Duty Factor*
2. *"Measure and add 10 log(N_{ANT}) dB, where N_{ANT} is the number of outputs" was used for measuring in-band Total PSD.*
   Total PSD = Chain 3 PSD + duty factor + 10 log(N_{ANT})
3. *For CDD transmission, directional gain is.* ***8.02 dBi***
   For MIMO transmission, directional gain is ***5.01 dBi****.*
   Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
   For power spectral density (PSD) measurements on all devices employing CDD, directional gain is as follows,
   Directional gain = GANT + Array Gain = 2 dBi + 6.02 dB = 8.02 dBi
   Array Gain = 10 log(N_{ANT}/N_{SS}) dB = 10 log(4/1) = 6.02 dB.
   where N_{SS} = the number of independent spatial streams of data and GANT is the antenna gain in dBi.
   For CDD mode of this device, NSS=1.
   For power spectral density (PSD) measurements on all devices employing MIMO, directional gain is as follows,
   Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 2 dBi + 10 log(4/2) dB = 5.01 dBi*.*
   where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
   For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and the lowest N_{SS}=2 with beamforming.
4. *For FCC PSD Limit, If transmitting antennas of directional gain greater than 6 dBi was used, maximum power spectral density was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.*
5. *Power Spectral Density(PSD) was measured by same method with conducted output power according to II.F.1 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01.*
6. *The following equation was used for spectrum offset:*
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

PLOTS OF EMISSIONS

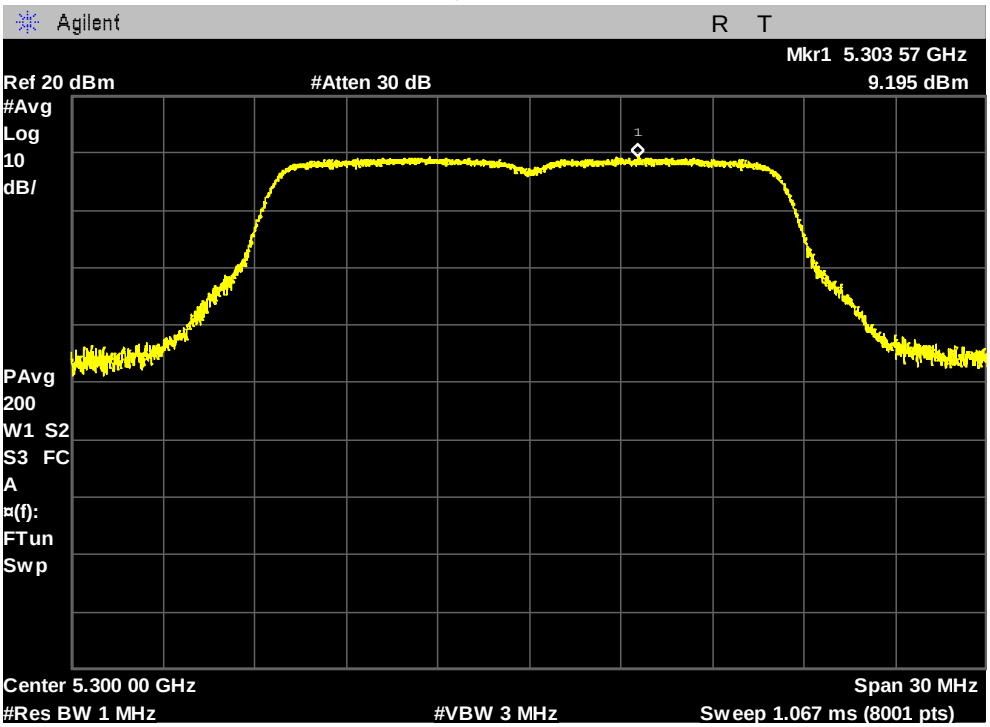
802.11a mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5260 MHz)

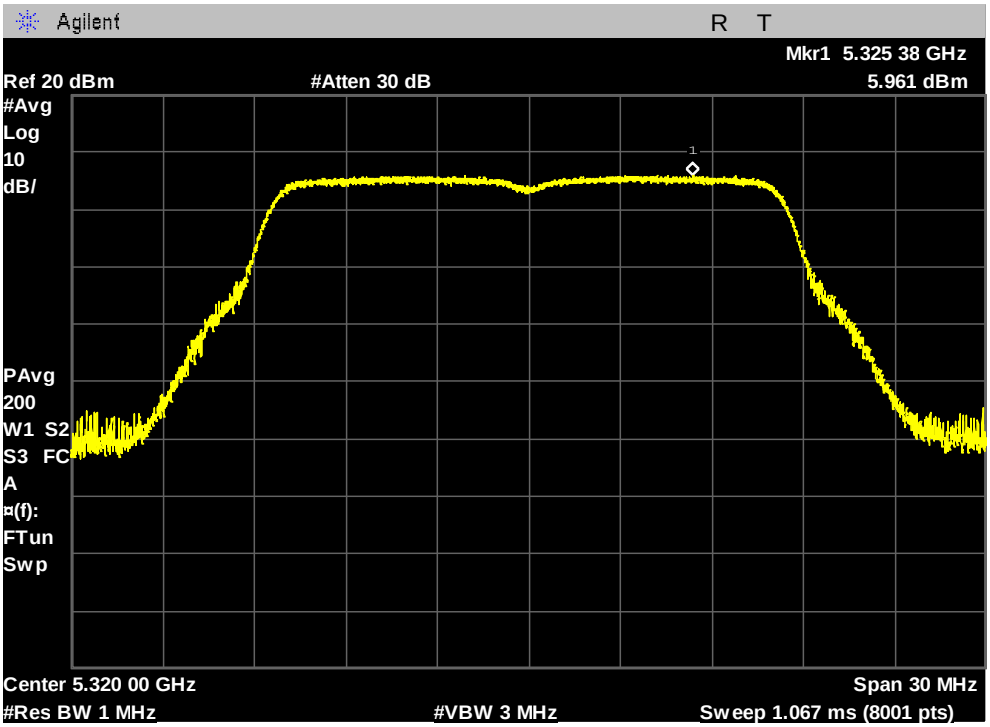


Maximum Power Spectral Density, Middle Channel (5300 MHz)



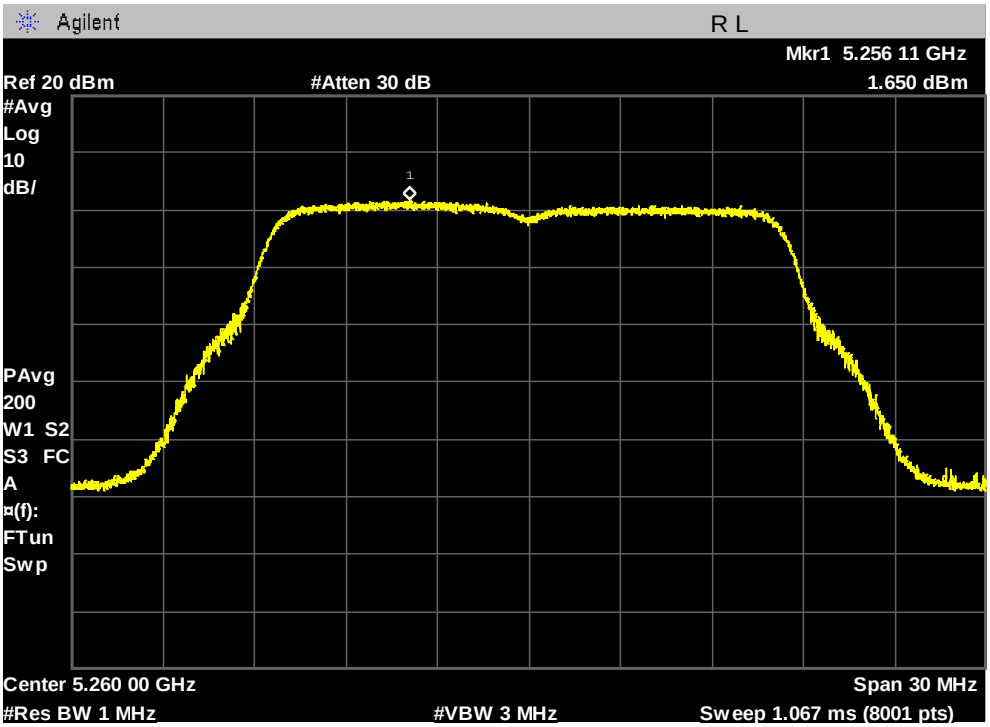
PLOTS OF EMISSIONS

Maximum Power Spectral Density, Highest Channel (5320 MHz)



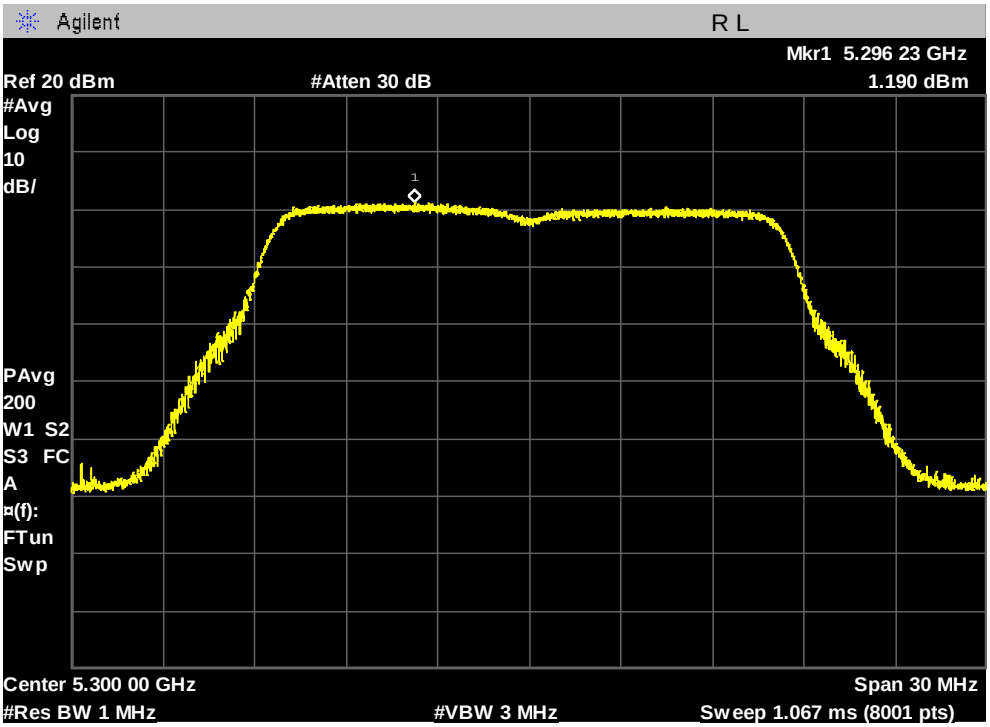
Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5260 MHz)

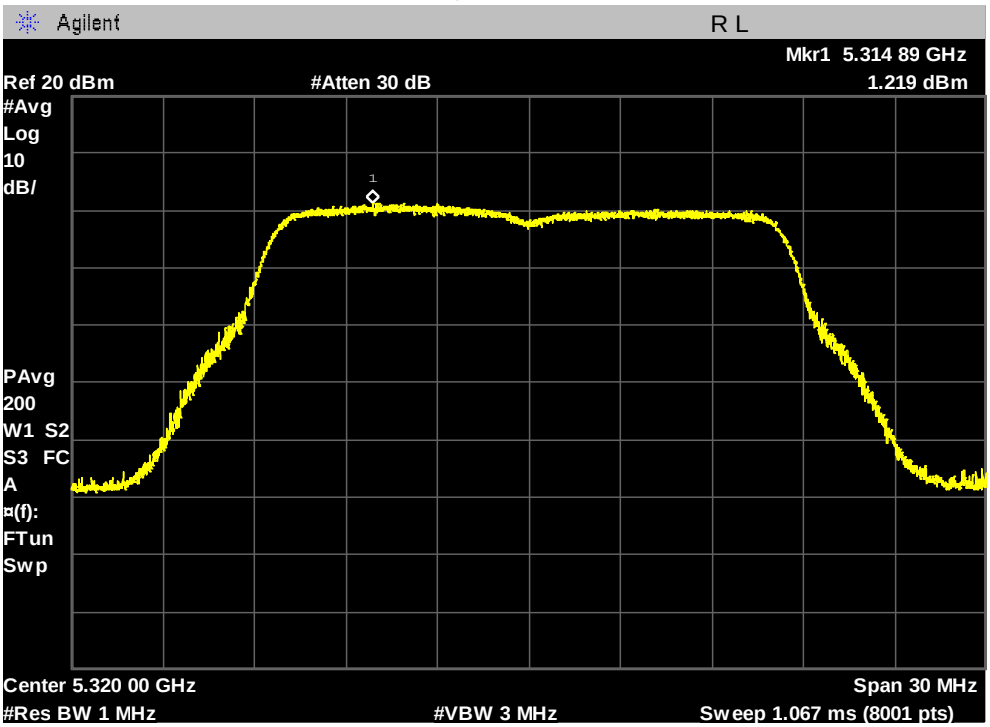


PLOTS OF EMISSIONS

Maximum Power Spectral Density, Middle Channel (5300 MHz)



Maximum Power Spectral Density, Highest Channel (5320 MHz)

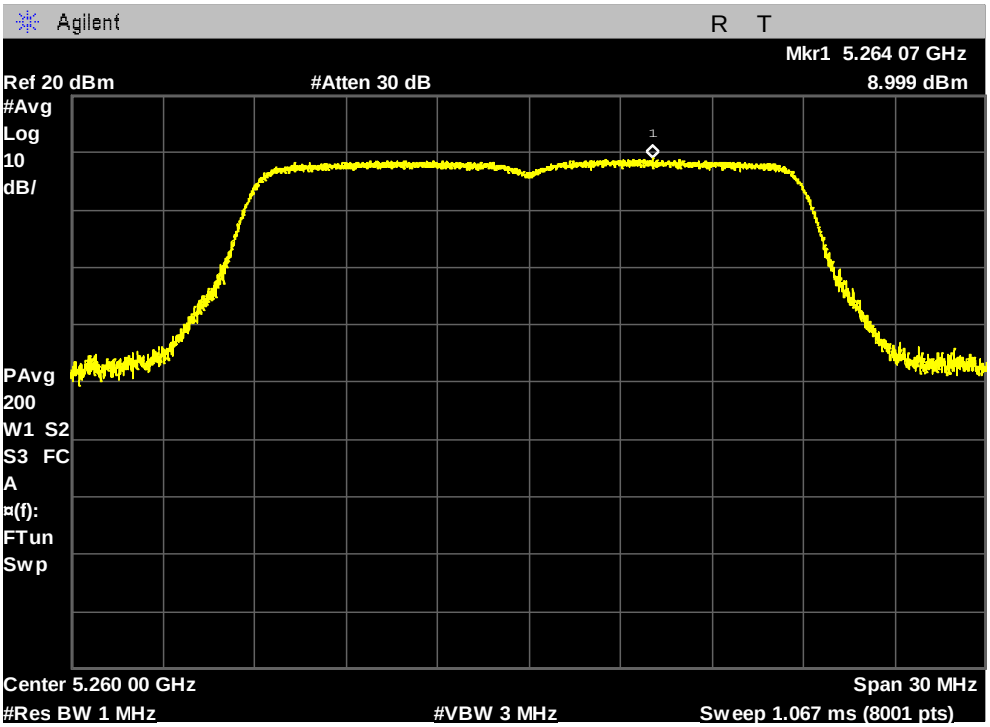


PLOTS OF EMISSIONS

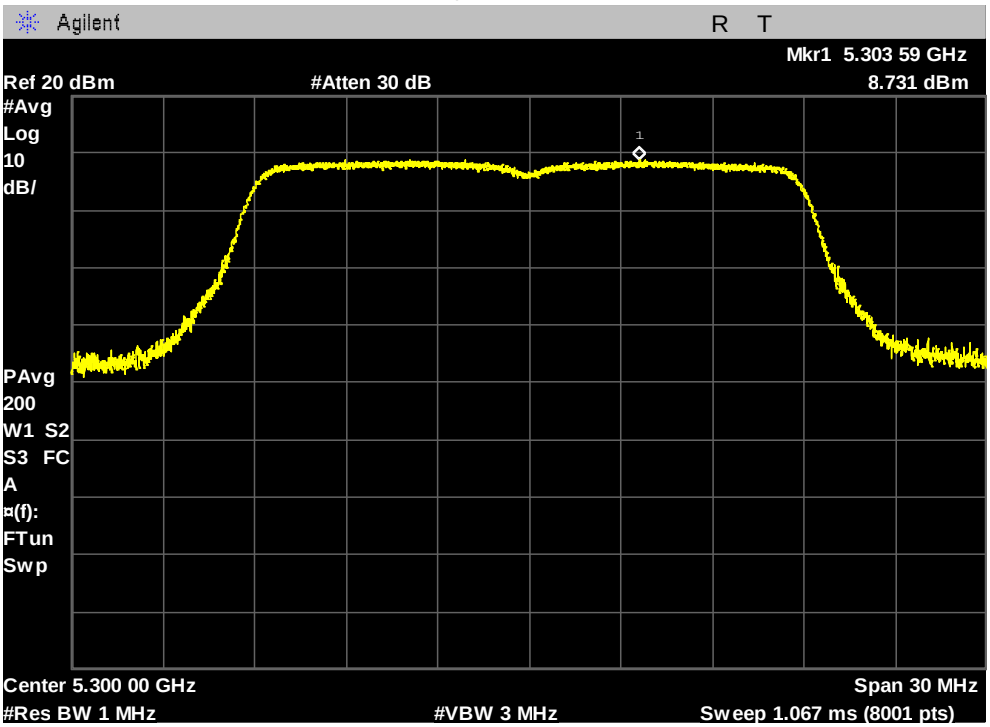
802.11n (20 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5260 MHz)

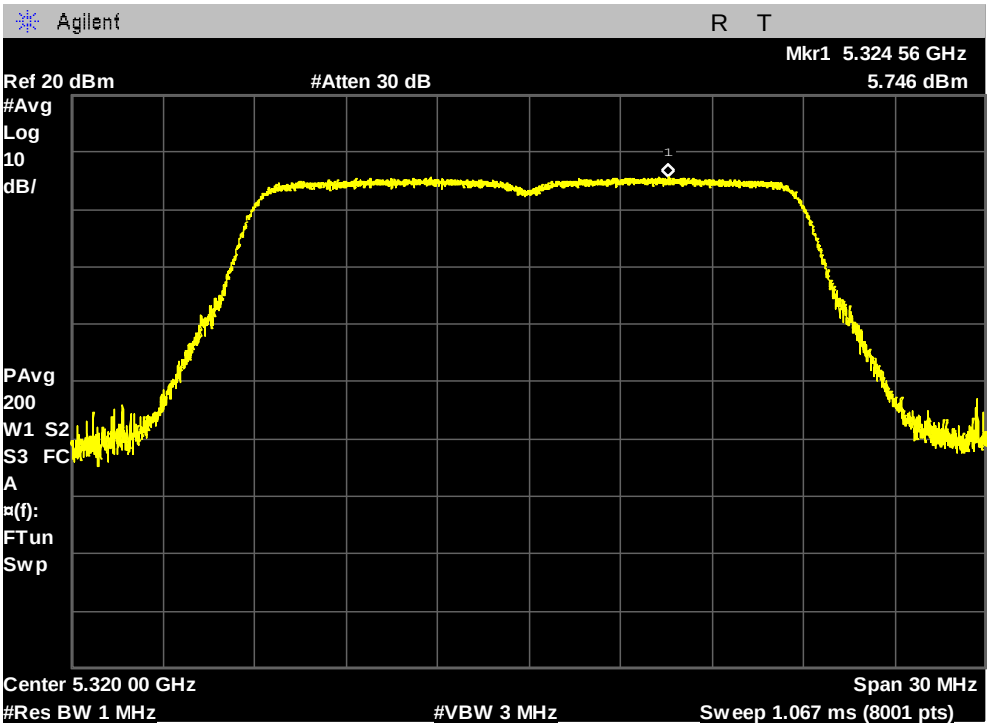


Maximum Power Spectral Density, Middle Channel (5300 MHz)



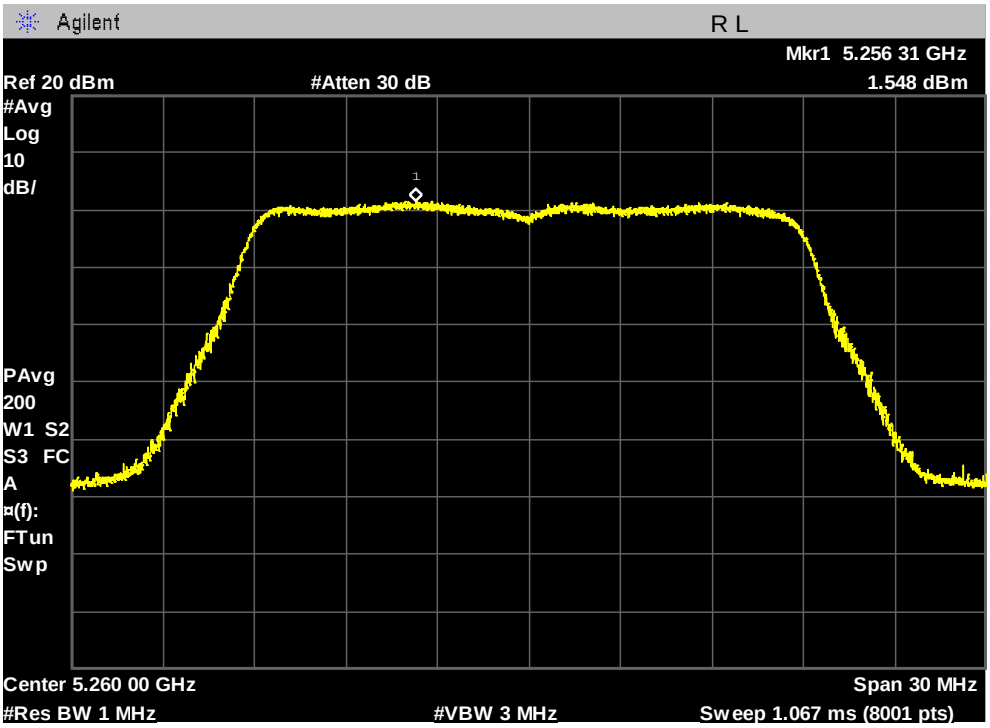
PLOTS OF EMISSIONS

Maximum Power Spectral Density, Highest Channel (5320 MHz)



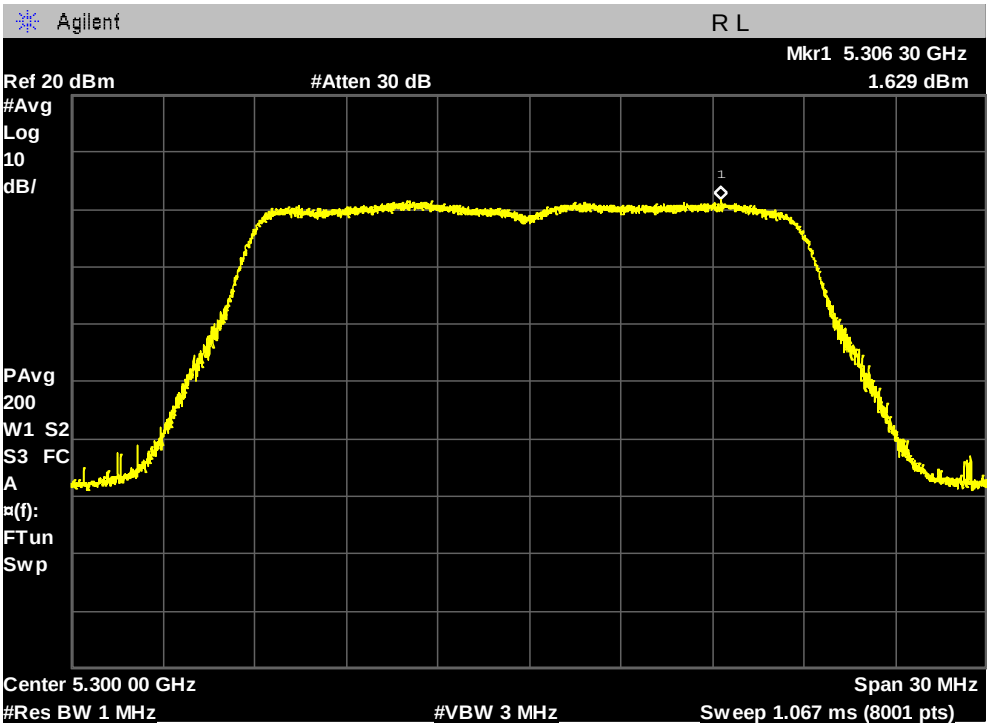
Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5260 MHz)

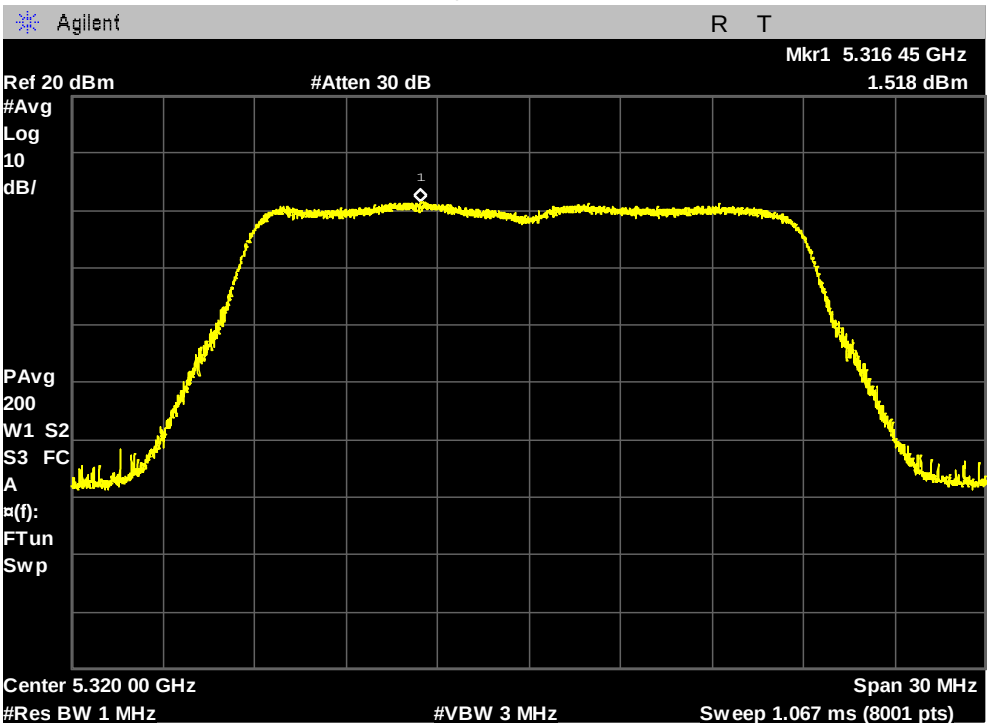


PLOTS OF EMISSIONS

Maximum Power Spectral Density, Middle Channel (5300 MHz)



Maximum Power Spectral Density, Highest Channel (5320 MHz)

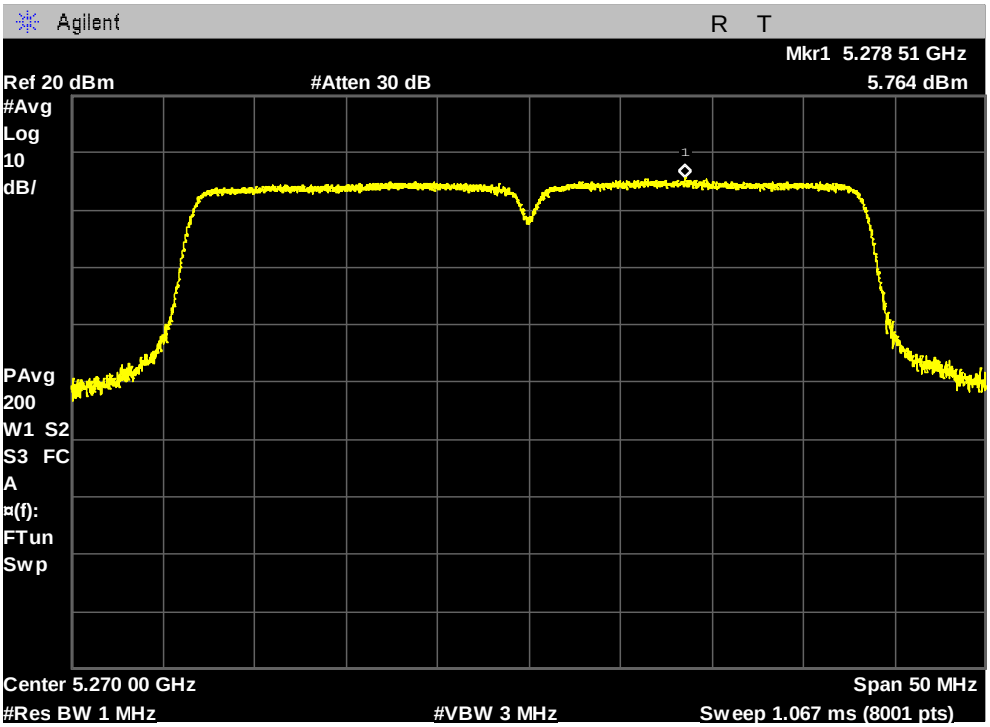


PLOTS OF EMISSIONS

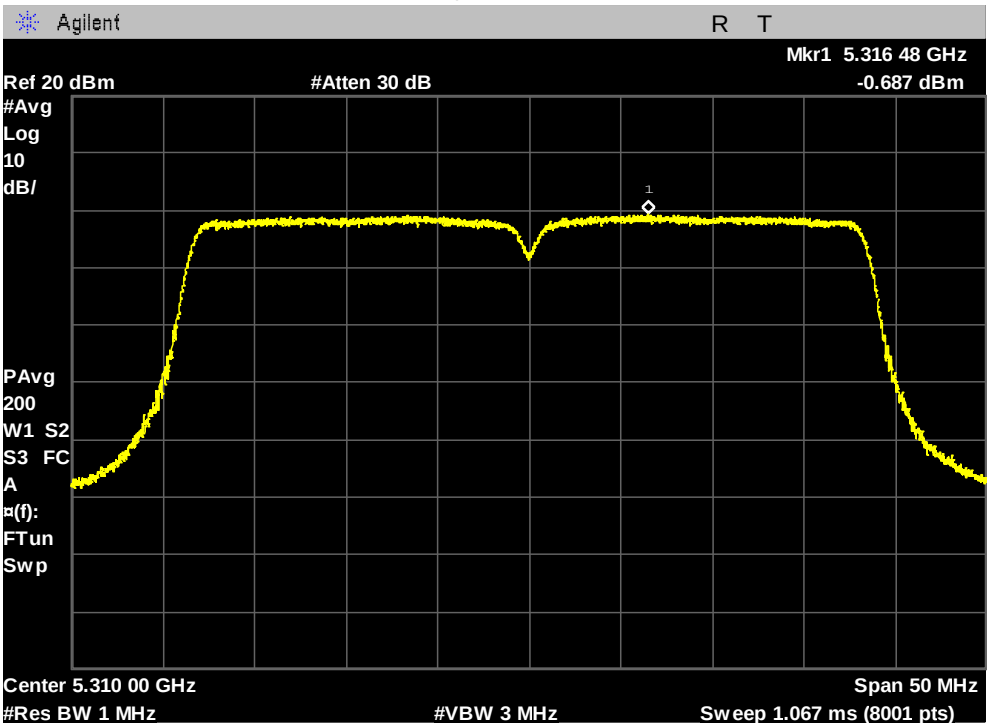
802.11n (40 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5270 MHz)



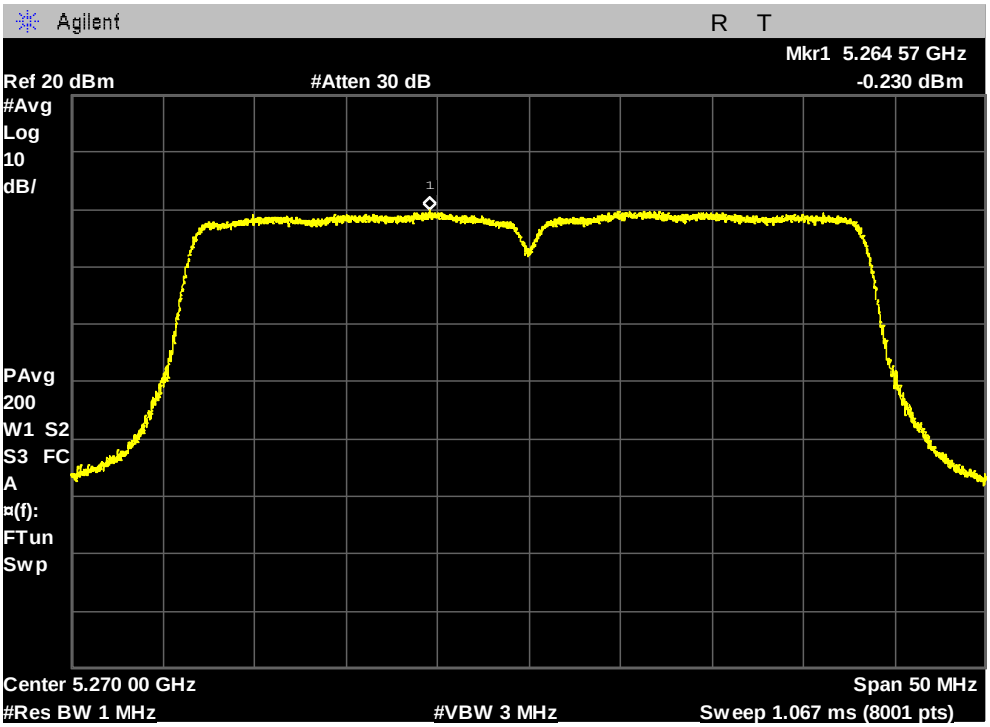
Maximum Power Spectral Density, Highest Channel (5310 MHz)



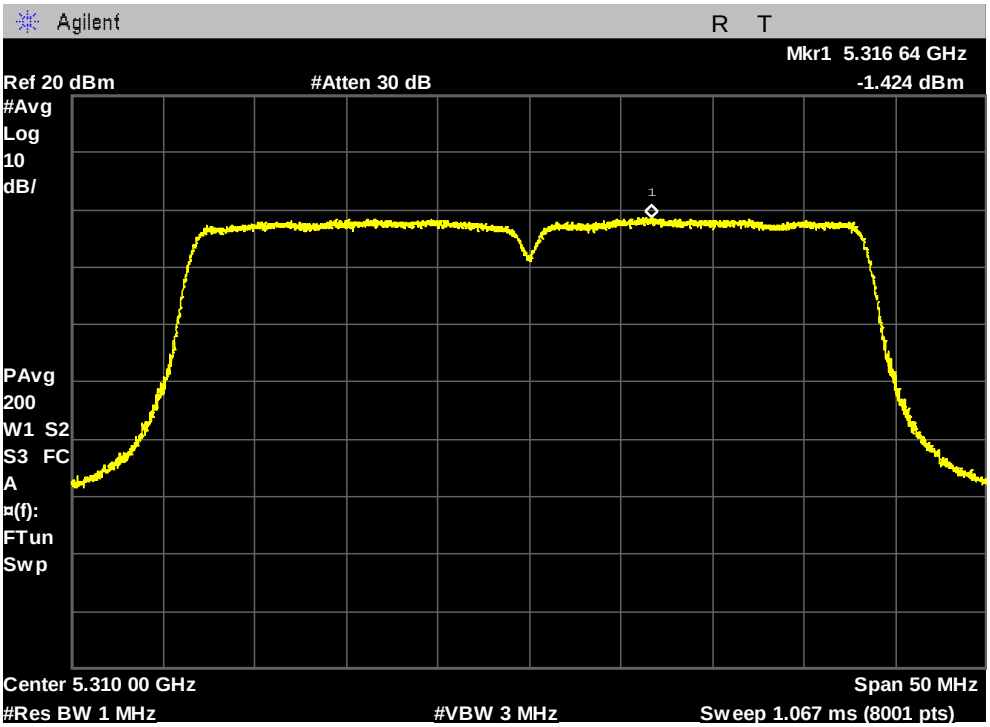
PLOTS OF EMISSIONS

Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5270 MHz)



Maximum Power Spectral Density, Highest Channel (5310 MHz)

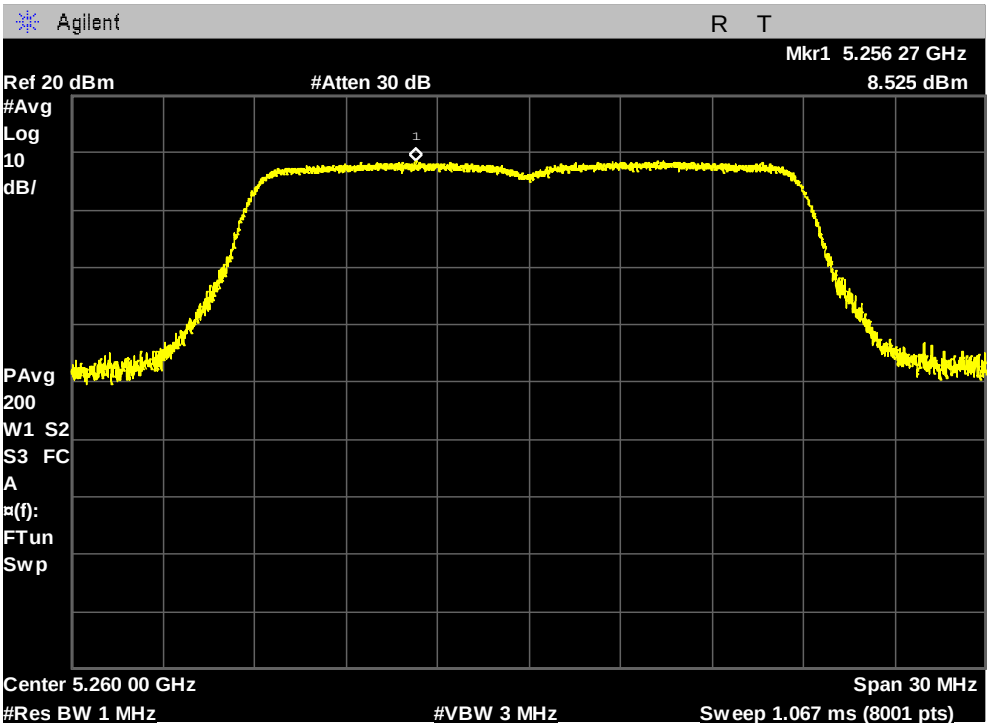


PLOTS OF EMISSIONS

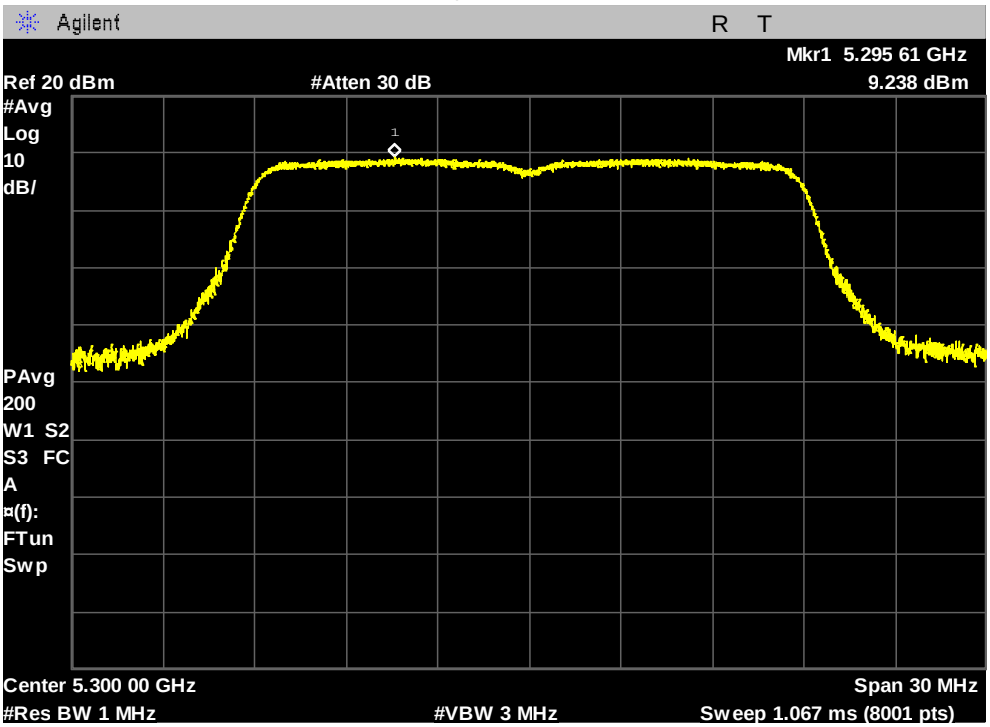
802.11ac (20 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5260 MHz)

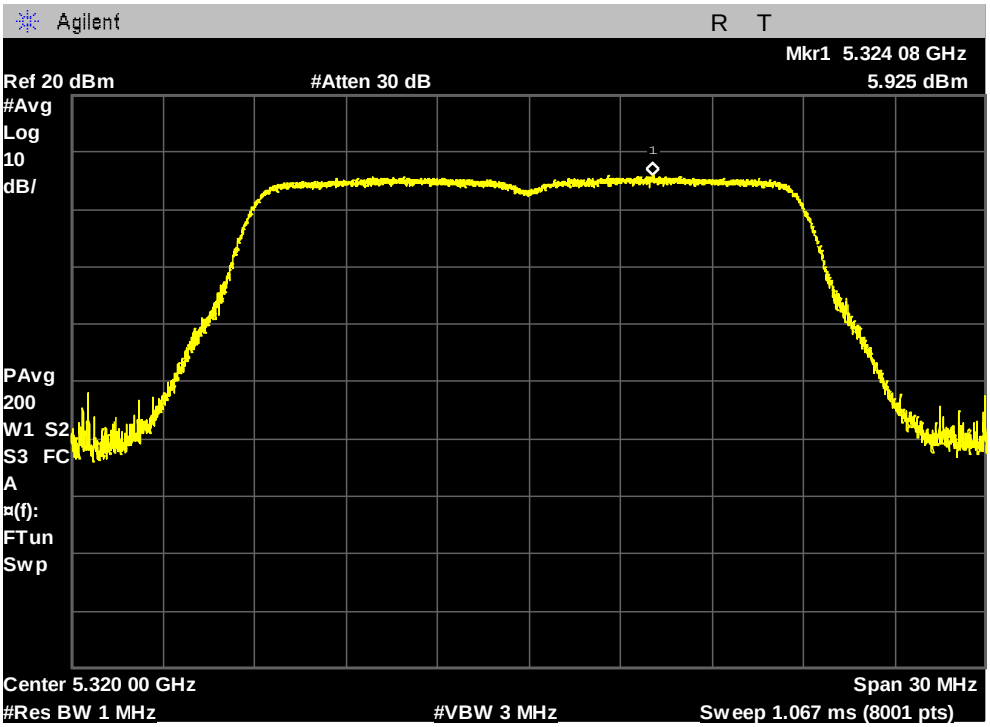


Maximum Power Spectral Density, Middle Channel (5300 MHz)



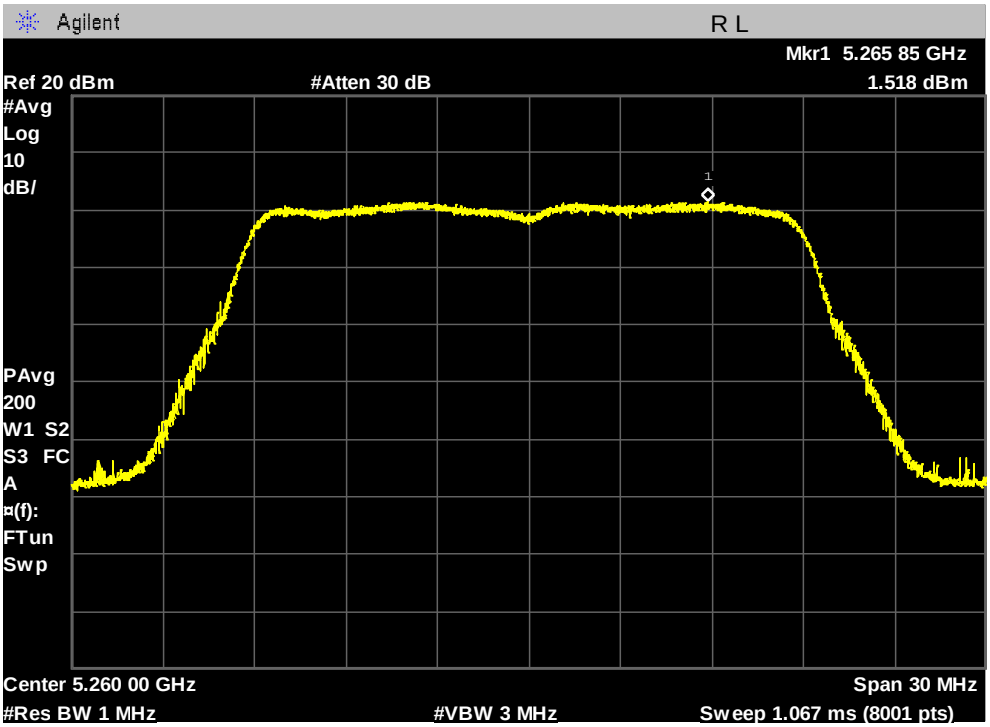
PLOTS OF EMISSIONS

Maximum Power Spectral Density, Highest Channel (5320 MHz)



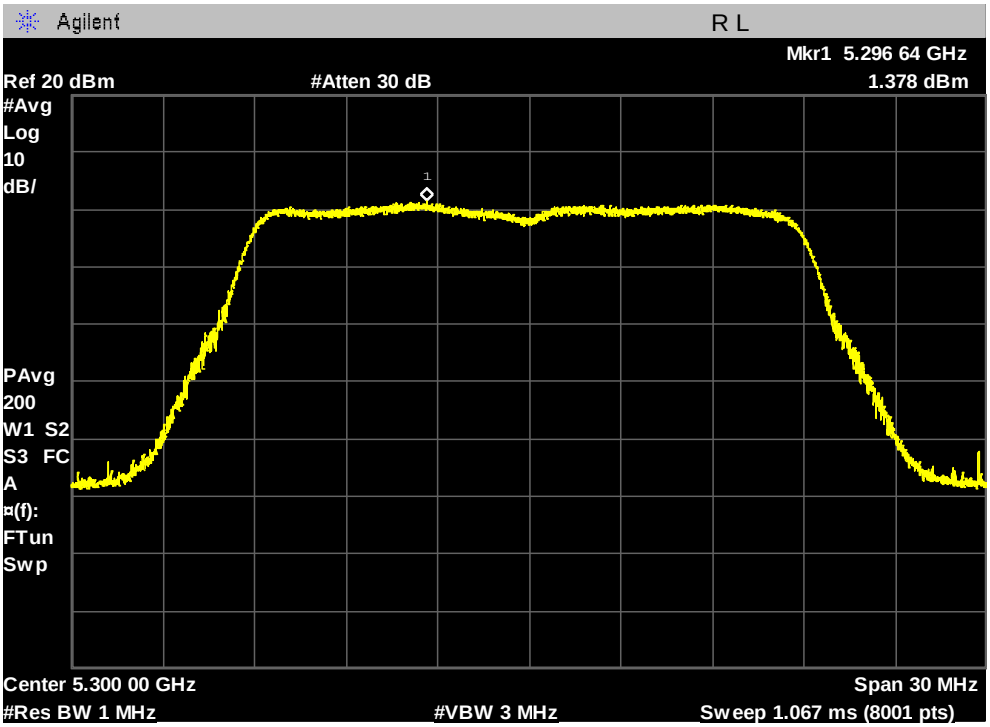
Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5260 MHz)

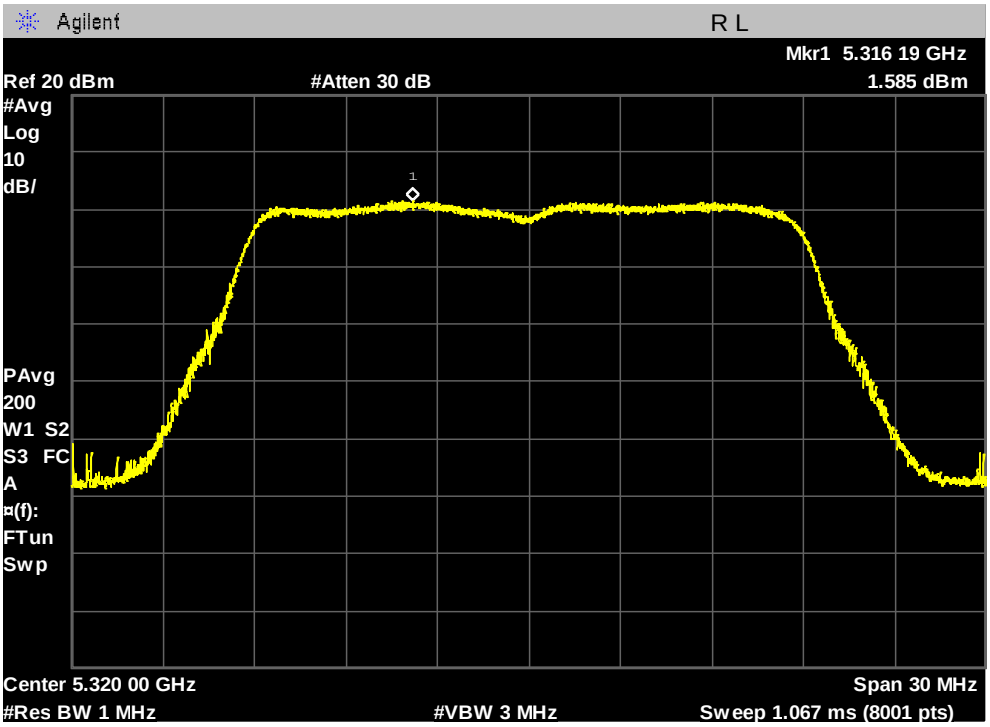


PLOTS OF EMISSIONS

Maximum Power Spectral Density, Middle Channel (5300 MHz)



Maximum Power Spectral Density, Highest Channel (5320 MHz)

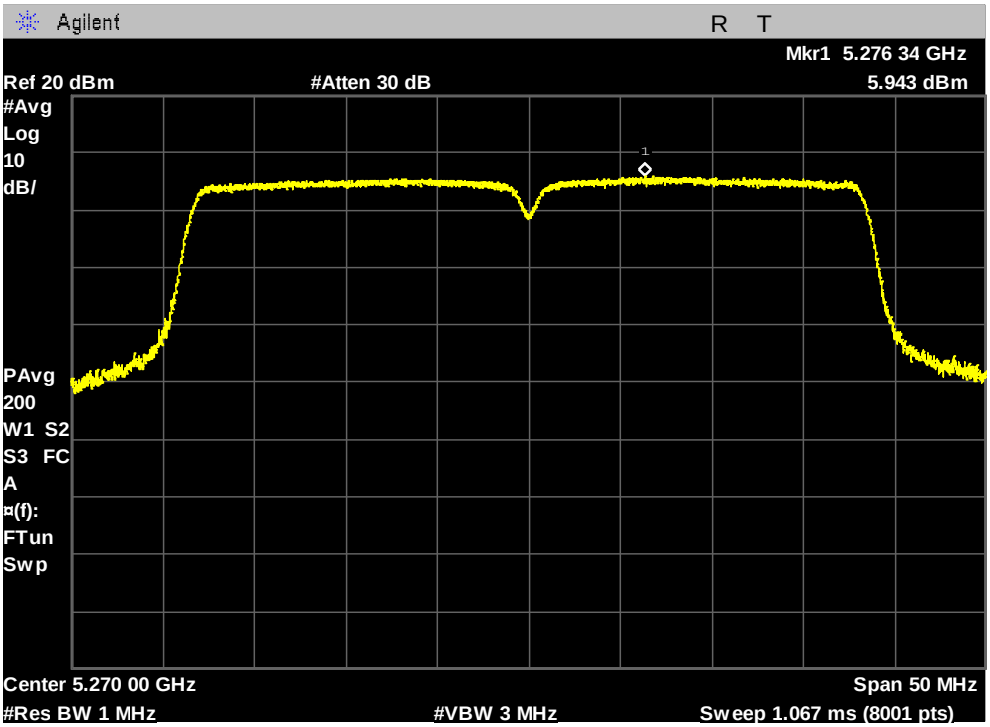


PLOTS OF EMISSIONS

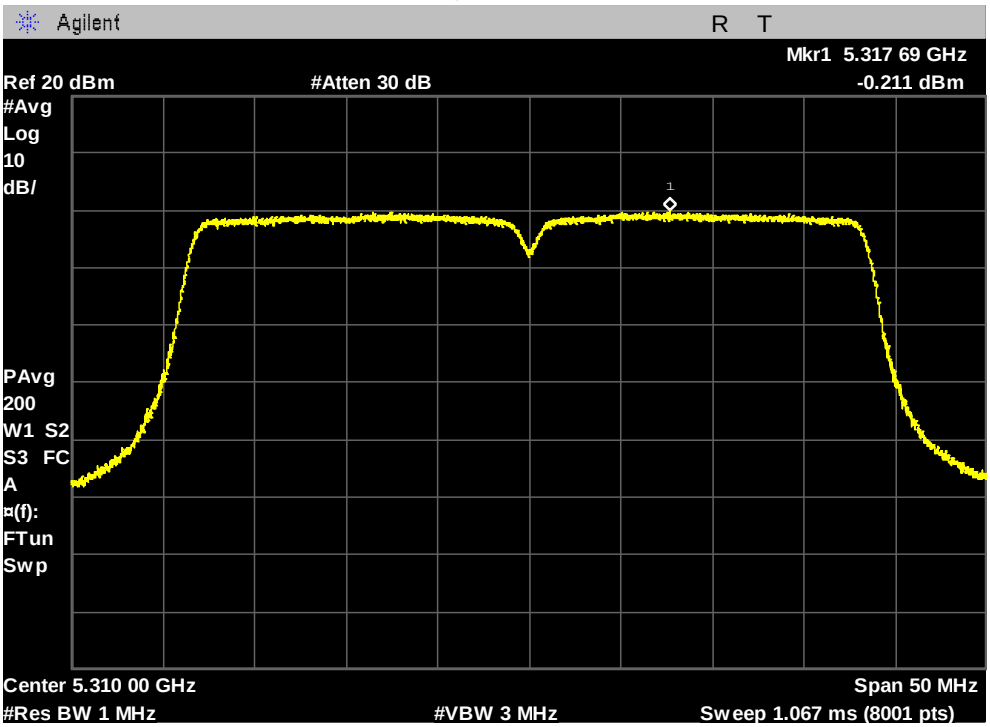
802.11ac (40 MHz) mode

Chain 2 (1TX)

Maximum Power Spectral Density, Lowest Channel (5270 MHz)



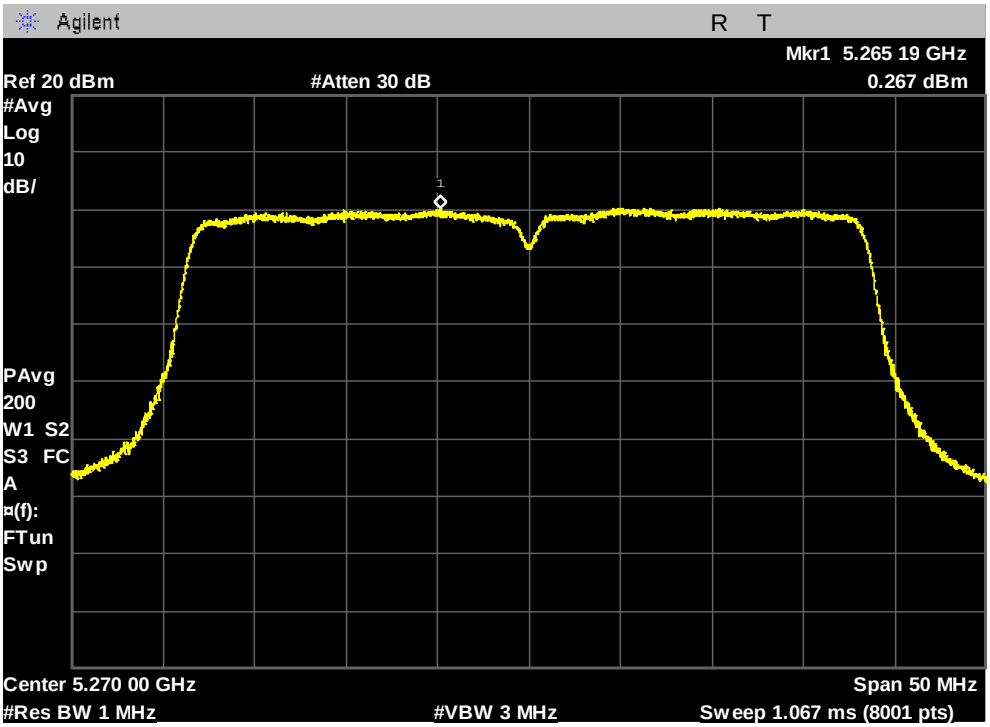
Maximum Power Spectral Density, Highest Channel (5310 MHz)



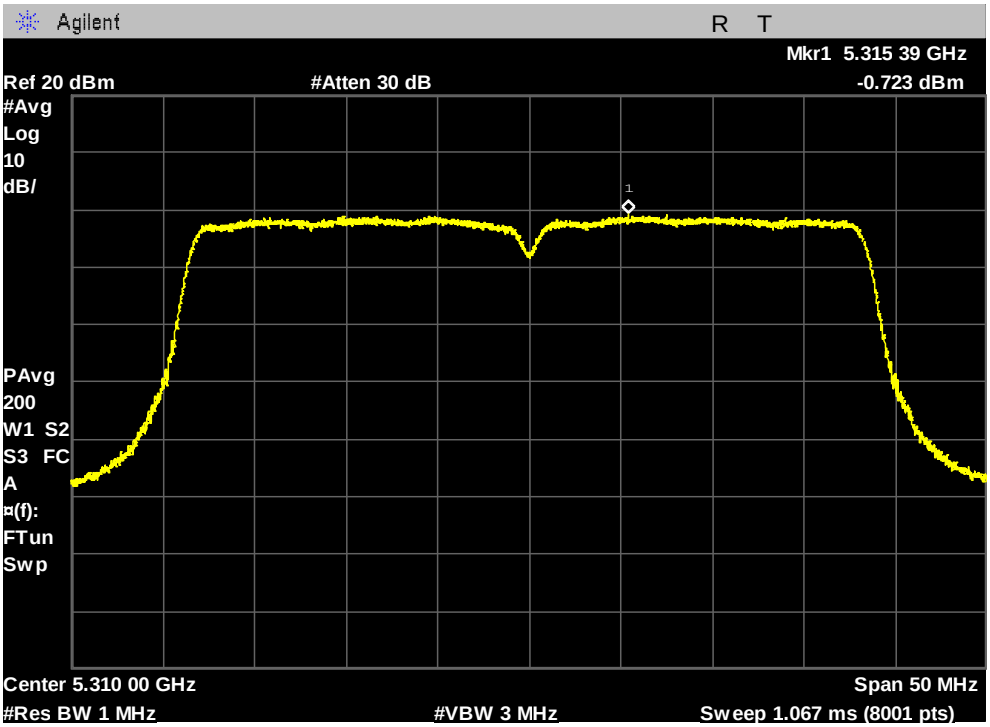
PLOTS OF EMISSIONS

Chain 2 (4TX)

Maximum Power Spectral Density, Lowest Channel (5270 MHz)



Maximum Power Spectral Density, Highest Channel (5310 MHz)

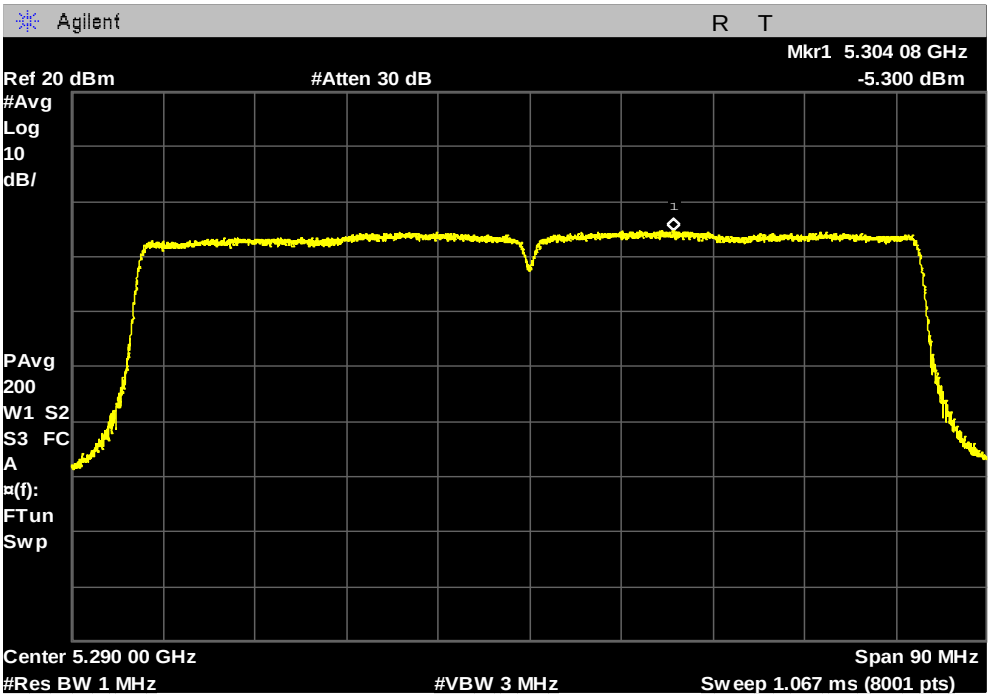


PLOTS OF EMISSIONS

802.11ac (80 MHz) mode

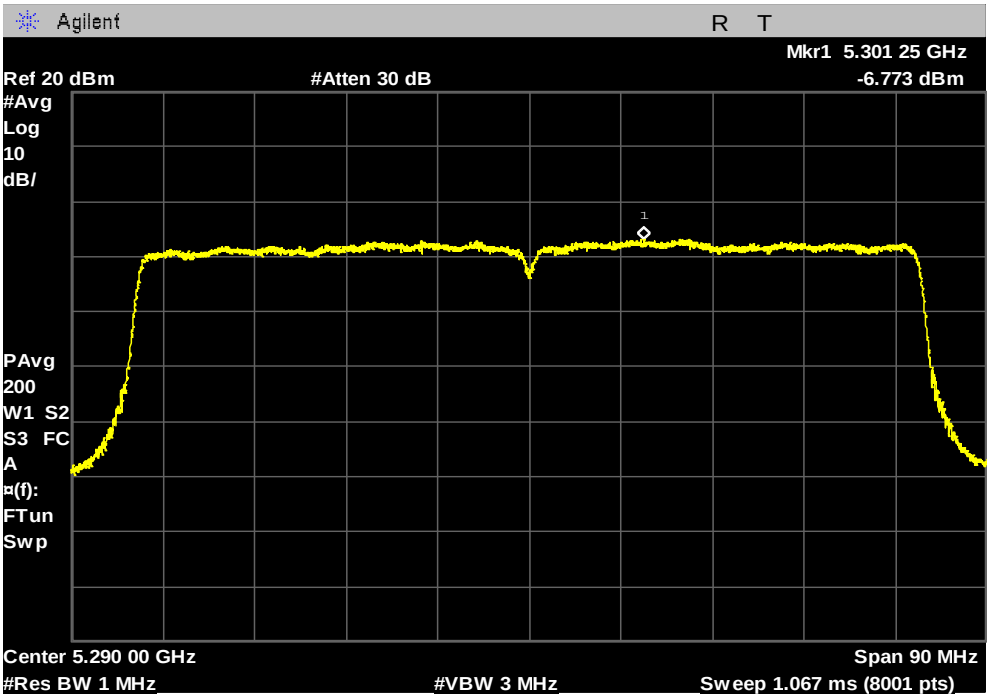
Chain 2 (1TX)

Maximum Power Spectral Density, Channel (5290 MHz)



Chain 2 (4TX)

Maximum Power Spectral Density, Channel (5290 MHz)



8.6.3 Maximum Power Spectral Density – U-NII-2C band

FCC §15.407(a)

Test Mode : Set to Lowest channel, Middle channel and Highest channel, Straddle channel

802.11a mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5500	5.92	0.22	6.14	11.00
Middle	5600	8.58	0.22	8.80	11.00
Highest	5700	3.34	0.22	3.56	11.00
Straddle	5720	8.69	0.22	8.91	11.00

802.11a mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5500	1.61	0.22	7.85	8.98
Middle	5600	1.52	0.22	7.76	8.98
Highest	5700	-0.91	0.22	5.33	8.98
Straddle	5720	1.38	0.22	7.62	8.98

TEST DATA

802.11n (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5500	5.37	0.22	5.59	11.00
Middle	5600	8.29	0.22	8.51	11.00
Highest	5700	3.00	0.22	3.22	11.00
Straddle	5720	8.45	0.22	8.67	11.00

802.11n (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5500	1.25	0.22	7.49	8.98
Middle	5600	1.27	0.22	7.51	8.98
Highest	5700	-0.72	0.22	5.52	8.98
Straddle	5720	1.38	0.22	7.62	8.98

TEST DATA

802.11n (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5510	0.09	0.43	0.52	11.00
Middle	5590	3.83	0.43	4.26	11.00
Highest	5670	2.11	0.43	2.54	11.00
Straddle	5710	3.85	0.43	4.28	11.00

802.11n (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5510	-1.69	0.43	4.76	8.98
Middle	5590	0.96	0.43	7.41	8.98
Highest	5670	0.24	0.43	6.69	8.98
Straddle	5710	1.49	0.43	7.94	8.98

TEST DATA

802.11ac (20MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5500	5.92	0.07	5.99	11.00
Middle	5600	8.45	0.07	8.52	11.00
Highest	5700	3.13	0.07	3.20	11.00
Straddle	5720	8.54	0.07	8.61	11.00

802.11ac (20MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5500	1.55	0.07	7.64	8.98
Middle	5600	1.66	0.07	7.75	8.98
Highest	5700	-0.88	0.07	5.21	8.98
Straddle	5720	1.41	0.07	7.50	8.98

TEST DATA

802.11ac (40MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5510	-0.15	0.14	-0.02	11.00
Middle	5590	4.44	0.14	4.58	11.00
Highest	5670	2.19	0.14	2.33	11.00
Straddle	5710	4.00	0.14	4.14	11.00

802.11ac (40MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5510	-2.38	0.14	3.78	8.98
Middle	5590	1.18	0.14	7.34	8.98
Highest	5670	0.34	0.14	6.50	8.98
Straddle	5710	1.23	0.14	7.39	8.98

802.11ac (80MHz) mode – 1TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2			
Lowest	5530	-4.59	0.27	-4.32	11.00
Highest	5610	1.31	0.27	1.58	11.00
Straddle	5690	1.01	0.27	1.28	11.00

TEST DATA

802.11ac (80MHz) mode – 4TX

Channel	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/ MHz)
		Chain 2		Total PSD	
Lowest	5530	-5.42	0.27	0.87	8.98
Highest	5610	-1.52	0.27	4.77	8.98
Straddle	5690	-1.23	0.27	5.06	8.98

Note:

1. *Maximum PSD = Measured PSD + Duty Factor*
2. *"Measure and add 10 log(N_{ANT}) dB, where N_{ANT} is the number of outputs" was used for measuring in-band Total PSD.*
   Total PSD = Chain 3 PSD + duty factor + 10 log(N_{ANT})
3. *For CDD transmission, directional gain is.* ***8.02 dBi***
   For MIMO transmission, directional gain is ***5.01 dBi****.*
   Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
   For power spectral density (PSD) measurements on all devices employing CDD, directional gain is as follows,
   Directional gain = GANT + Array Gain = 2 dBi + 6.02 dB = 8.02 dBi
   Array Gain = 10 log(N_{ANT}/Nss) dB = 10 log(4/1) = 6.02 dB.
   where N_{SS} = the number of independent spatial streams of data and GANT is the antenna gain in dBi.
   For CDD mode of this device, NSS=1.
   For power spectral density (PSD) measurements on all devices employing MIMO, directional gain is as follows,
   Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 2 dBi + 10 log(4/2) dB = 5.01 dBi*.*
   where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi
   For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and the lowest N_{SS}=2 with beamforming.
4. *For FCC PSD Limit, If transmitting antennas of directional gain greater than 6 dBi was used, maximum power spectral density was reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.*
5. *Power Spectral Density(PSD) was measured by same method with conducted output power according to II.F.1 in KDB 789033 D02 General UNII Test Procedures New Rules v02r01.*
6. *The following equation was used for spectrum offset:*
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)