Nemko Korea Co., Ltd.

165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do,17042, Republic of Korea
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FCC & IC EVALUATION REPORT FOR CERTIFICATION

Project No. : NK-24-R-201
Applicant : DRTECH Corporation
Suite No. 1,2 Floor / Suite No. 2,3 Floor, 29, Dunchon-daero 541 beon-gil, Jungwon-gu, Seongnam-si, , Gyeonggi-do, 13216, Korea

Dates of receipt : May 3, 2024
Dates of Issue : October 7, 2024
Test Site :
Nemko Korea Co., Ltd.

FCC ID :	**RNH-TOP8812BU**
IC :	**29808-TOP8812BU**
FCC Applicant :	**DRTECH Corporation**
IC Applicant :	**Drtech Corporation**
Brand Name :	**DRTECH**

Model:	**TOP-8812BU**
EUT Type:	**WiFi Module**
Classification:	**Unlicensed National Information Infrastructure(NII)**
Date of Test:	**May 14, 2024 ~ September 3, 2024**
Applied Standard:	**FCC 47 CFR Part 15.407** **RSS-Gen Issue 5, RSS-247 Issue 3**

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.

Tested By : Wonjae Song
Test Engineer

Reviewed By : Hoonpyo Lee
Technical Manager

Revision History

Rev.	Issue Date	Revisions	Revised By
00	October 7, 2024	Initial issue	Wonjae Song

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1. INTRODUCTION

1.1 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.

These measurement tests were conducted at **Nemko Korea Co., Ltd.**
The site address 165-51, Yurim-ro, Cheoin-gu, Yongin-si, Gyeonggi-do, 17042, Rep. of Korea.

1.2 Accreditation and listing

Accreditation type		Accreditation number
FC	CAB Accreditation for DOC	Designation No. KR0026
KOLAS	KOLAS Accredited Lab. (Korea Laboratory Accreditation Scheme)	Registration No. KT155
Industry Canada	Canada IC Registered site	Site No. 29506
VCCI	VCCI registration site(RE/CE/Telecom CE)	Member No. 2118
IECEE CB SCHEME	EMC CBTL	TL124
KC	KCC(RRL)Designated Lab.	Registration No. KR0026

2. EUT INFORMATION & TEST CONDITIONS

2.1 EUT Information

2.1.1 Specifications

EUT Type	WiFi Module	
Model Name	TOP-8812BU	
Frequency of Operation	For U-NII-1 Band 5 180 MHz to 5 240 MHz : 802.11a,n,ac (20 MHz) 5 190 MHz to 5 230 MHz : 802.11n,ac (40 MHz) 5 210 MHz : 802.11ac (80 MHz) For U-NII-3 Band 5 745 MHz to 5 805 MHz : 802.11a,n,ac (20 MHz) 5 755 MHz to 5 795 MHz : 802.11n,ac (40 MHz) 5 775 MHz : 802.11ac (80 MHz)	
Maximum Conducted Output Power	802.11a : 15.48 dBm 802.11n (20 MHz) : 16.06 dBm 802.11n (40 MHz) : 14.37 dBm 802.11ac (20 MHz) : 16.45 dBm 802.11ac (40 MHz) : 14.41 dBm 802.11ac (80 MHz) : 12.68 dBm	
Number of Channels	For U-NII-1 Band 802.11a,n,ac (20 MHz) : 4 ch 802.11n,ac (40 MHz) : 2 ch 802.11ac (80 MHz) : 1 ch For U-NII-3 Band 802.11a,n,ac (20 MHz) : 4 ch 802.11n,ac (40 MHz) : 2 ch 802.11ac (80 MHz) : 1 ch	
Modulations	CCK, BPSK, QPSK, 16QAM, 64QAM, 256QAM	
Antenna Gain (peak)	APDR-600WT	APDR-600WS
	U-NII-1 : 0.7 dBi U-NII-3 : 1.1 dBi	U-NII-1 : -0.4 dBi U-NII-3 : -0.5 dBi
Antenna Setup	2TX / 2RX	
EUT Rated Voltage	DC 3.3 V	
EUT Test Voltage	DC 5.0 V	
HVIN (Hardware Version Number)	TOP8812BU	
FVIN (Firmware Version Identification Number)	GEN_HW3.00.00_V3_SW0.0.01	
Remarks	-	

2.2 Operation During Test

The EUT is the transceiver which is module supporting the 802.11a/b/g/n/ac mode(802.11a/b/g/n(20,40 MHz)/ac(20,40,80 MHz) : 2TX/2RX).
The Laptop was used to control the EUT to transmit the wanted TX channel continuously (duty cycle > 98%) by the testing program(MPtool version 3.3.5) which manufacturer supported.

The cable and attenuator loss from 30 MHz to 26 GHz was reflected in spectrum analyzer with correction factor for all conducted testing.

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.

2.2.1 Table of Test power setting

Frequency [MHz]	Mode	Power setting Level (SISO)	Power setting Level (MIMO)
5 180	802.11a	46	-
5 220		46	-
5 240		46	-
5 180	802.11n HT20	46	46
5 220		46	46
5 240		46	46
5 180	802.11ac VHT20	46	46
5 220		46	46
5 240		46	46
5 190	802.11n HT40	40	40
5 230		40	40
5 190	802.11ac VHT40	40	40
5 230		40	40
5 210	802.11ac VHT80	38	38

Frequency [MHz]	Mode	Power setting Level (SISO)	Power setting Level (MIMO)
5 745	802.11a	42	-
5 785		42	-
5 805		42	-
5 745	802.11n HT20	42	42
5 785		42	42
5 805		42	42
5 745	802.11ac VHT20	42	42
5 785		42	42
5 805		42	42
5 755	802.11n HT40	36	36
5 795		36	36
5 755	802.11ac VHT40	36	36
5 795		36	36
5 775	802.11ac VHT80	34	34

2.2.2 Table of Test frequency

Frequency band	Modulation	Test Channel (CH)	Frequency (MHz)
U-NII-1	802.11a,n,ac(20 MHz)	36	5 180
		44	5 220
		48	5 240
	802.11n,ac(40 MHz)	38	5 190
		46	5 230
	802.11ac(80 MHz)	42	5 210
U-NII-3	802.11a,n,ac(20 MHz)	149	5 745
		157	5 785
		161	5 805
	802.11n,ac(40 MHz)	151	5 755
		159	5 795
	802.11n,ac(80 MHz)	155	5 775

2.2.3 Antenna Information

Frequency band	Mode	Data rate	Antenna TX mode	Support CDD	Support MIMO
U-NII-1 U-NII-3	802.11a	All	■ 1TX, □ 2TX	□ Yes, ■ No	□ Yes, ■ No
	802.11n (20MHz)	MCS 0~7	■ 1TX, ■ 2TX	■ Yes, □ No	□ Yes, ■ No
		MCS 8~15	□ 1TX, ■ 2TX	□ Yes, ■ No	■ Yes, □ No
	802.11n (40MHz)	MCS 0~7	■ 1TX, ■ 2TX	■ Yes, □ No	□ Yes, ■ No
		MCS 8~15	□ 1TX, ■ 2TX	□ Yes, ■ No	■ Yes, □ No
	802.11ac (20MHz)	NSS1MCS0~ NSS1MCS8	■ 1TX, ■ 2TX	■ Yes, □ No	□ Yes, ■ No
		NSS2MCS0~ NSS2MCS8	□ 1TX, ■ 2TX	□ Yes, ■ No	■ Yes, □ No
	802.11ac (40MHz)	NSS1MCS0~ NSS1MCS9	■ 1TX, ■ 2TX	■ Yes, □ No	□ Yes, ■ No
		NSS2MCS0~ NSS2MCS9	□ 1TX, ■ 2TX	□ Yes, ■ No	■ Yes, □ No
	802.11ac (80MHz)	NSS1MCS0~ NSS1MCS9	■ 1TX, ■ 2TX	■ Yes, □ No	□ Yes, ■ No
		NSS2MCS0~ NSS2MCS9	□ 1TX, ■ 2TX	□ Yes, ■ No	■ Yes, □ No

2.2.4 Additional Information Related to Testing

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

2.2.5 Worst-case Configuration and Mode

Radiated emission below 1GHz was performed with the EUT set to transmit at the channel with highest output power as worst-case scenario.
Radiated emission above 1GHz was performed with the EUT set to transmit low/mid/high channels.
The emissions (Band-edge & spurious emissions) were investigated in three orthogonal orientations X, Y and Z.
Accordingly, the orientation was determined and tested as shown in the table below:

Test Items	X	Y	Z
Band-edge	O	-	-
Spurious emissions	O	-	-

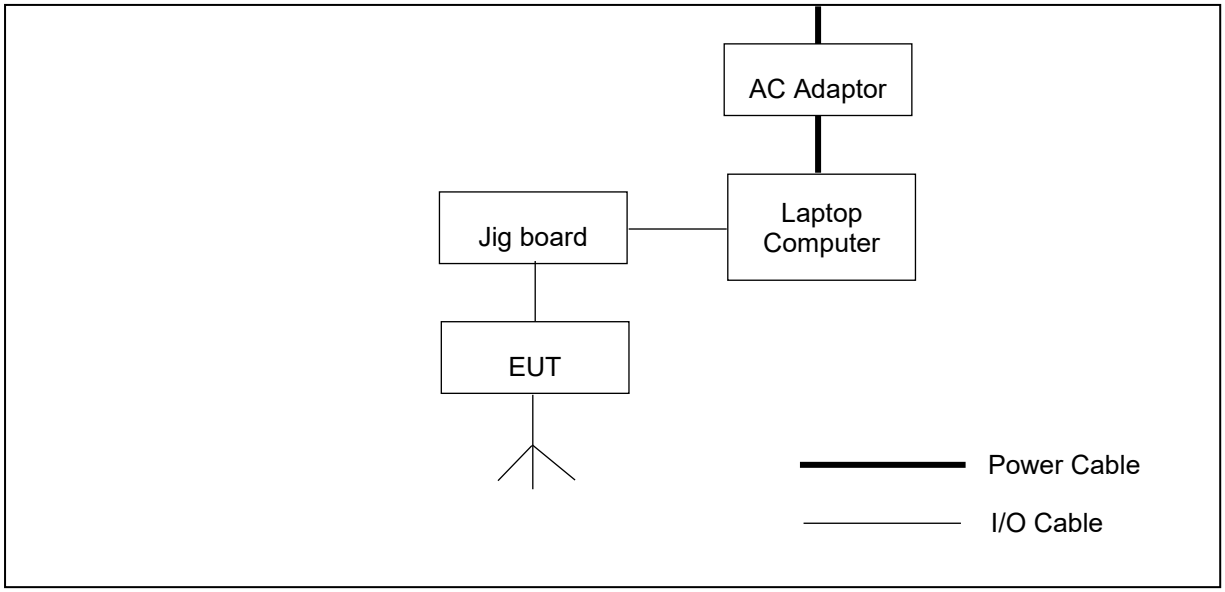
2.2.6 Additional model covered by this report

- N/A

2.3 Support Equipment

EUT	DRTECH Corporation Model : TOP-8812BU	S/N: N/A
Laptop Computer	HP Model : G62-355TU	FCC DOC S/N : CNF0489WDT
AC Adapter	HP Model : PPP009D	FCC DOC S/N : WBGSV0ACXZH162

2.4 Setup Drawing



3. ANTENNA REQUIREMENTS

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 and RSS-Gen.

§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.

RSS-Gen Section 6.8

: The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below)

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.
Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

The transmitter has attached PCB antenna on board.

Used Antenna	
Model name	5 150 MHz ~ 5 250 MHz 5 725 MHz ~ 5 850 MHz
	Max. peak gain (dBi)
APDR-600WT	U-NII-1 : 0.7 U-NII-3 : 1.1
APDR-600S	U-NII-1 :-0.4 U-NII-3 : -0.5

4. SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specification:

Name of Test	FCC Paragraph No.	IC Paragraph No.	Test Limit	Test Condition	Result	Remark
26dB Bandwidth	15.407(a)(2)	RSS-247 (6.2)	> 500 kHz	Conducted	Complies	-
6dB Bandwidth	15.407(e)	RSS-247 (6.2)	> 500 kHz		Complies	-
Occupied Bandwidth	-	RSS-247 (6.2)				-
Conducted Output Power	15.407(a)	RSS-247 (6.2)	< 1 Watt < 4 Watt(e.i.r.p.)		Complies	-
Power Spectral Density	15.407(a)	RSS-247 (6.2)	< 11 dBm/MHz		Complies	-
Radiated Spurious Emission	15.407(b) 15.205, 15.209	RSS-Gen (8.9),(8.10)	< 74 dBμV/m (PK) < 54 dBμV/m (AV) Radiated limits detailed in 15.209	Radiated	Complies	-
AC Line Conducted Emission	15.207	RSS-Gen (8.8)	FCC 15.207 Limits	Line Conducted	Complies	-

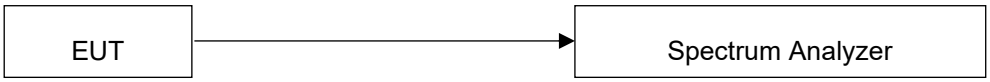
5. TEST METHODOLOGY

1. FCC CFR 47 Part 2.
2. FCC CFR 47 Part 15.
3. KDB 789033 D02 General UNII Test Procedures New Rules v02r01.
4. RSS-Gen Issue 5
5. RSS-247 Issue 3
6. ANSI C63.10-2013.

6. DESCRIPTION OF TESTS

6.1 6 dB Bandwidth / Occupied Bandwidth

Test Setup



Test Measurement Method

ANSI C63.10-2013, Section 12.4
KDB 789033 D02 v02r01, Section C
RSS-Gen section 6.7

Test Procedure

- 6 dB Bandwidth
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
Allow trace to fully stabilize.
The bandwidth measurement function on the spectrum analyzer is used to measure the 6 dB bandwidth.

6.2 Maximum Conducted Output Power(average)

Test Setup

Test Measurement Method

ANSI C63.10-2013, Section 12.3
KDB 789033 D02 v02r01, Section E

Test Procedure

EUTs Maximum Conducted Output Power(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.
The spectrum analyzer setting is as follows.
Measure the duty cycle, x, of the transmitter output signal.
Span to at least 1.5 times the OBW.
RBW = 1 – 5 % of the OBW, not to exceed 1 MHz
VBW ≥ 3 x RBW
Number of points in sweep ≥ 2 x span / RBW
Sweep time = auto couple
Detector = RMS
Trace average at least 100 traces in power averaging mode.
Add 10 log(1/x), where x is the duty cycle.
Compute power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with band limits set equal to the OBW band edges.

6.3 Power Spectral Density

Test Setup

Test Measurement Method

ANSI C63.10-2013, Section 12.5
KDB 789033 D02 v02r01, Section F

Test Procedure

EUTs Power Spectral Density 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.
Center frequency = Channel center frequency
Span = encompass the EBW of the signal
RBW ≥ 1 MHz for UNII-1 band or 500 kHz for UNII-3 band
VBW ≥ 3 x RBW
Detector = RMS
Sweep time = auto couple
Trace average at least 100 traces in power averaging mode
Allow the trace to stabilize.
The peak search function on the spectrum analyzer is used to determine the maximum amplitude level within the RBW.

6.4 Radiated Emissions

Test Measurement Method

ANSI C63.10-2013, Section 6.6.4.3, Section 12.7
KDB 789033 D02 v02r01, Section G

Test Procedure

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 and 30 to 1000 MHz using Trilog broadband test antenna. Above 1 GHz, Horn antenna 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.

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 ANSI 63.10-2013 section 11.12. Peak emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 3 MHz, Detector = Peak, Trace mode = max hold. Average emission levels were measured by setting the analyzer RBW = 1 MHz, VBW = 10 kHz, Detector = Peak, Trace mode = max hold. Allow max hold to run for at least 50 times (1/duty cycle) traces.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009–0.490	2400/F(kHz)	300
0.490–1.705	24000/F(kHz)	30
1.705–30.0	30	30
30–88	100	3
88–216	150	3
216–960	200	3
Above 960	500	3

Radiated Emissions Limits per 47 CFR 15.209(a) & RSS-Gen (8.9)

6.5 AC Line Conducted Emissions

Test Measurement Method

ANSI C63.10-2013, Section 6.2

Test Procedure

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 (ENV216) 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. 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 (serpentine fashion) 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 ESCI). 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.

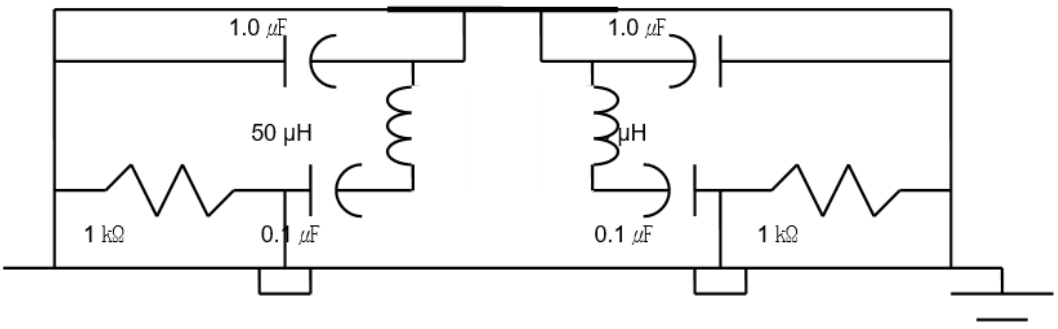


Fig. 2. LISN Schematic Diagram

7. TEST DATA

7.1 26 dB Bandwidth / 6 dB Bandwidth / Occupied Bandwidth

7.1.1 26 dB Bandwidth / Occupied Bandwidth U-NII-1 Band

FCC §15.407(a)
RSS-247 (6.2)

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

Result

802.11a mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 180	21.92	16.61
Middle	5 220	20.91	16.66
Highest	5 240	21.64	16.66

802.11n(20MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 180	23.56	17.81
Middle	5 220	22.40	17.75
Highest	5 240	22.37	17.77

802.11ac(20MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 180	22.06	17.73
Middle	5 220	21.09	17.72
Highest	5 240	21.40	17.71

802.11n(40MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 190	42.64	36.34
Highest	5 230	42.99	36.36

802.11ac(40MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 190	43.40	36.35
Highest	5 230	42.95	36.36

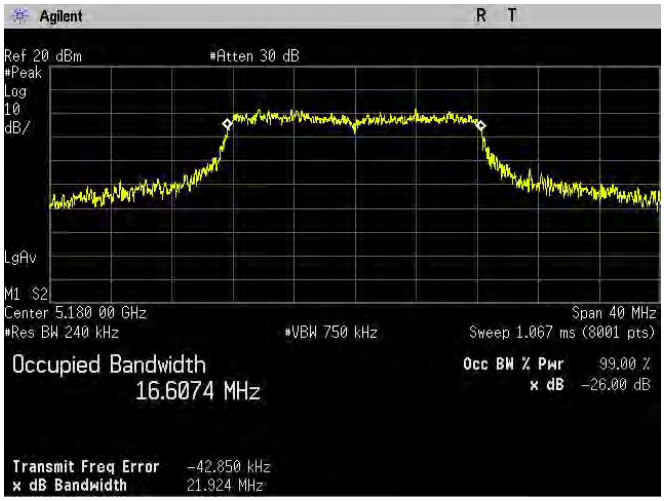
802.11ac(80MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Middle	5 210	81.04	75.50

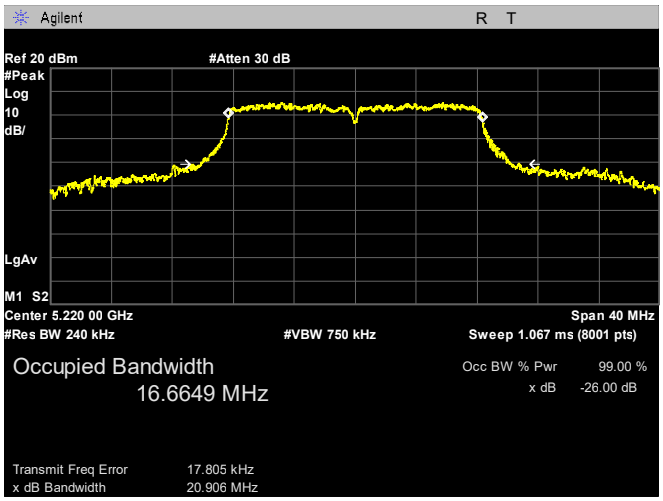
PLOTS OF EMISSIONS

802.11a mode_26dB Bandwidth, Occupied Bandwidth

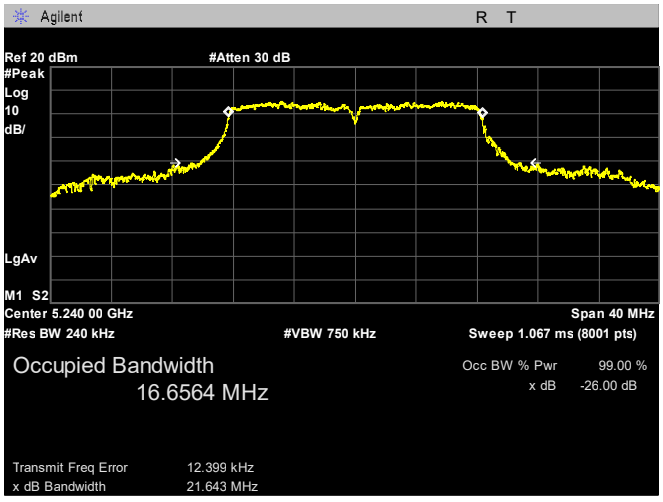
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

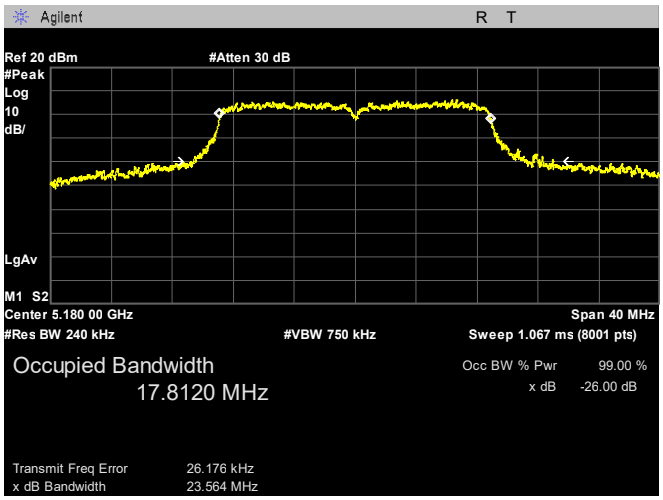


Highest Channel (5 240 MHz)

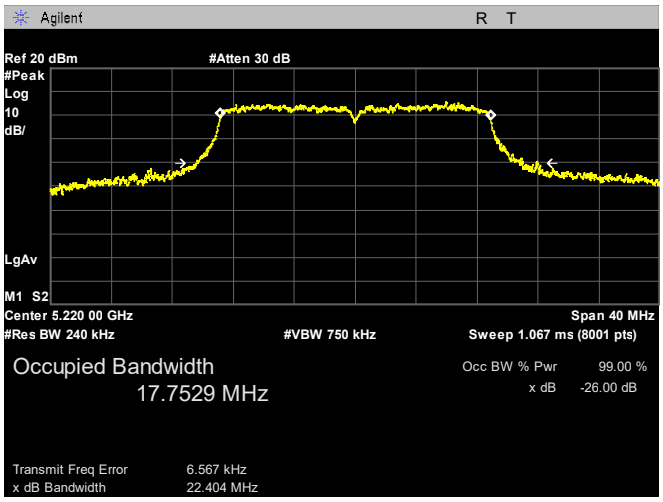


802.11n(20 MHz) mode_26dB Bandwidth, Occupied Bandwidth

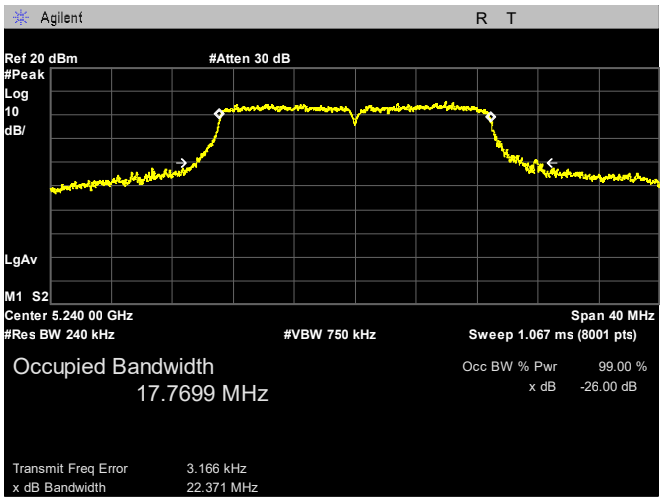
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

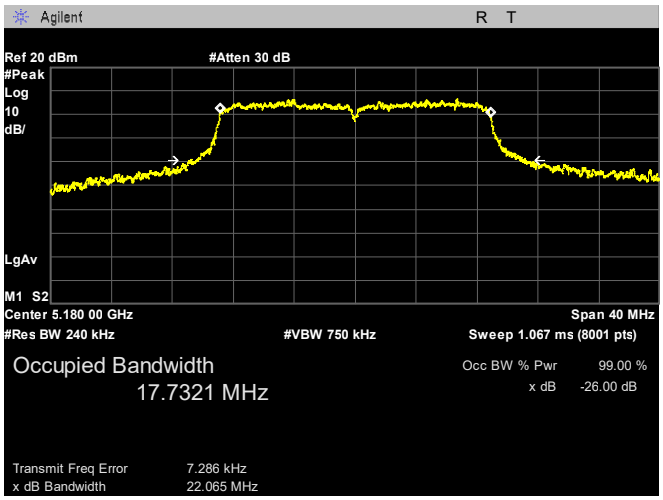


Highest Channel (5 240 MHz)

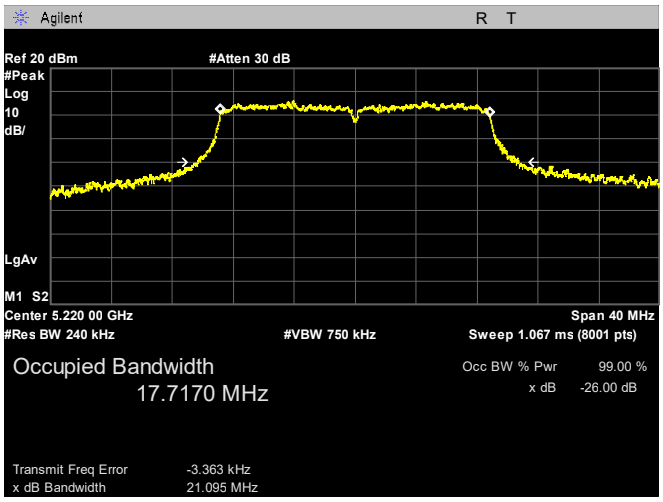


802.11ac(20 MHz) mode_26dB Bandwidth, Occupied Bandwidth

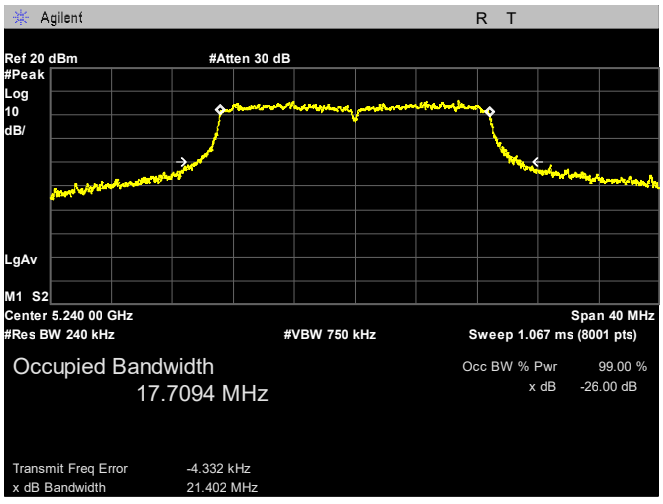
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

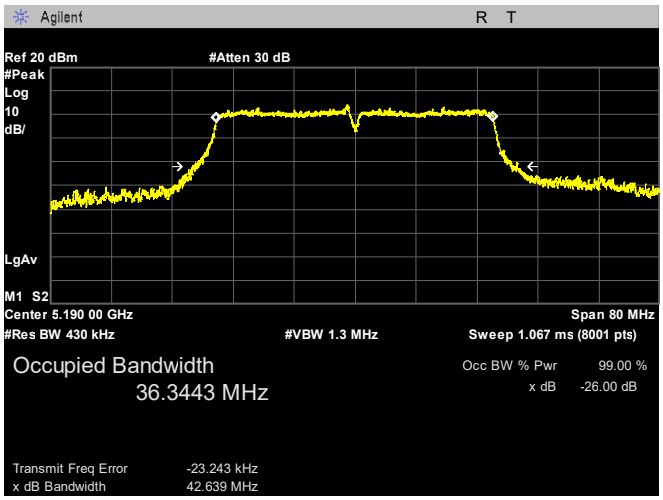


Highest Channel (5 240 MHz)

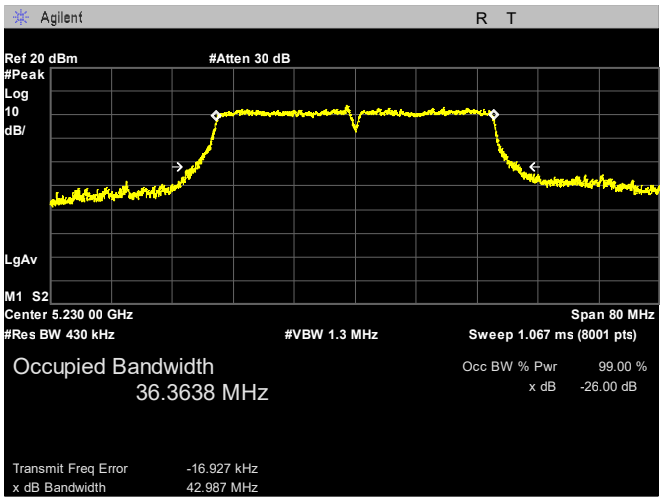


802.11n(40 MHz) mode_26dB Bandwidth, Occupied Bandwidth

Lowest Channel (5 190 MHz)

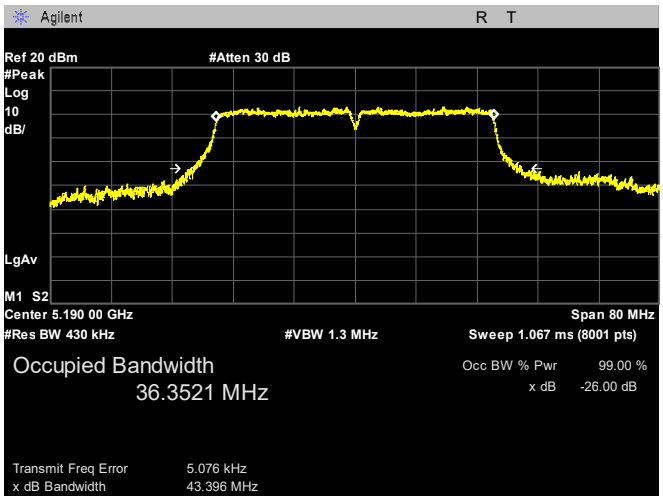


Highest Channel (5 230 MHz)

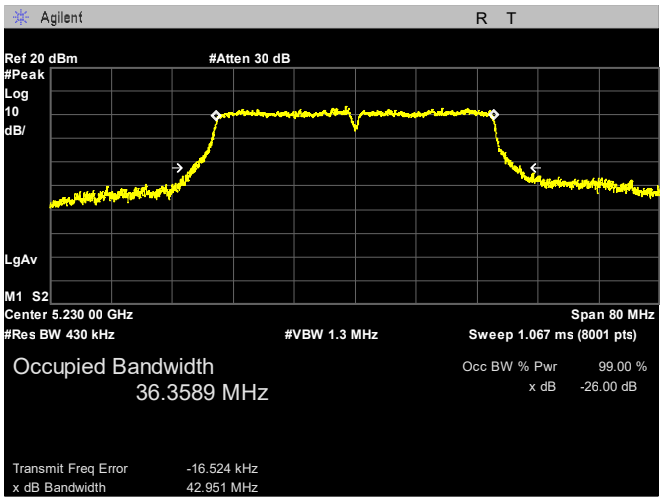


802.11ac(40 MHz) mode_26dB Bandwidth, Occupied Bandwidth

Lowest Channel (5 190 MHz)

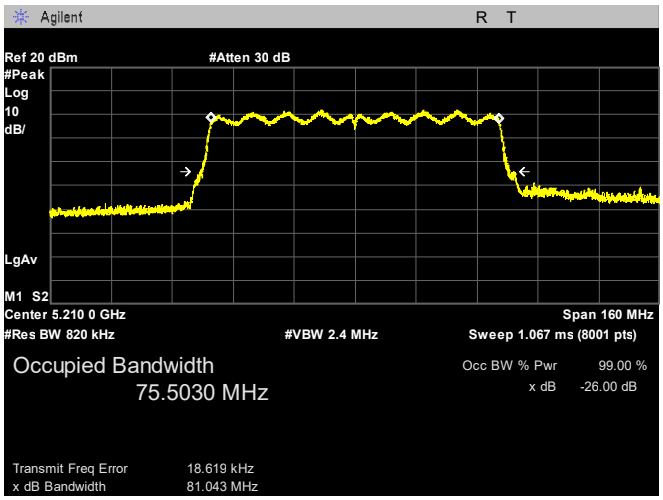


Highest Channel (5 230 MHz)



802.11ac(80 MHz) mode_26dB Bandwidth, Occupied Bandwidth

Middle Channel (5 210 MHz)



7.1.2 26 dB Bandwidth / Occupied Bandwidth U-NII-3 Band

FCC §15.407(a)(2)
RSS-247 (6.2)

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

Result

802.11a mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 745	20.56	16.53
Middle	5 785	20.61	16.52
Highest	5 805	20.21	16.51

802.11n(20MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 745	20.69	17.66
Middle	5 785	20.35	17.64
Highest	5 805	20.53	17.65

802.11ac(20MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 745	21.39	17.72
Middle	5 785	21.19	17.70
Highest	5 805	21.36	17.70

802.11n(40MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 755	41.87	36.32
Highest	5 795	41.64	36.31

802.11ac(40MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Lowest	5 755	41.59	36.34
Highest	5 795	41.34	36.34

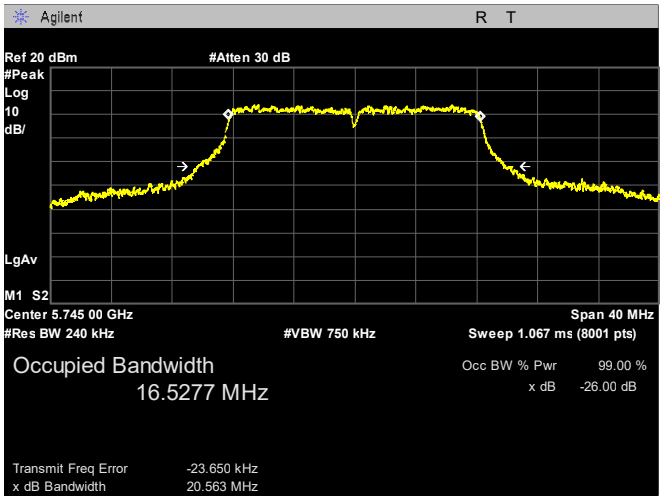
802.11ac(80MHz) mode

Channel	Frequency (MHz)	26 dB Bandwidth (MHz)	99% Occupied Bandwidth (MHz)
Middle	5 775	81.02	75.48

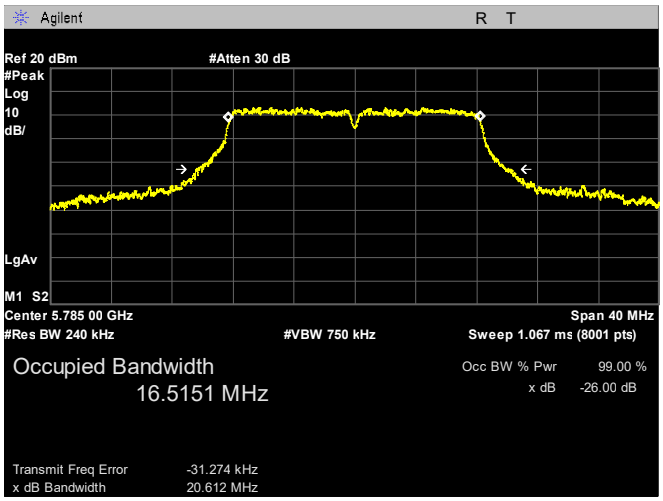
PLOTS OF EMISSIONS

802.11a mode_26dB Bandwidth, Occupied Bandwidth

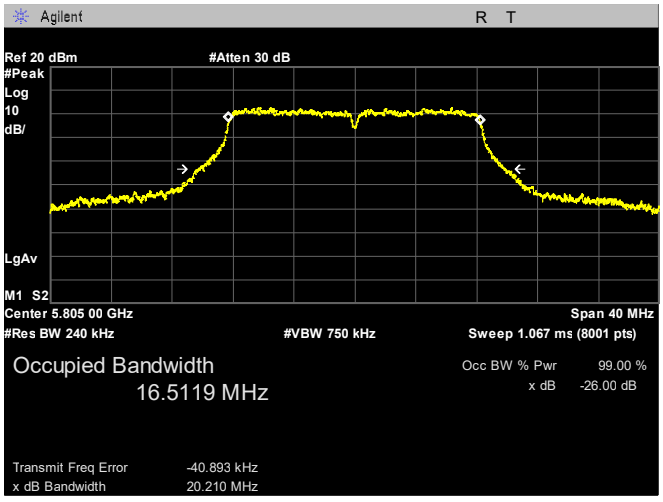
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

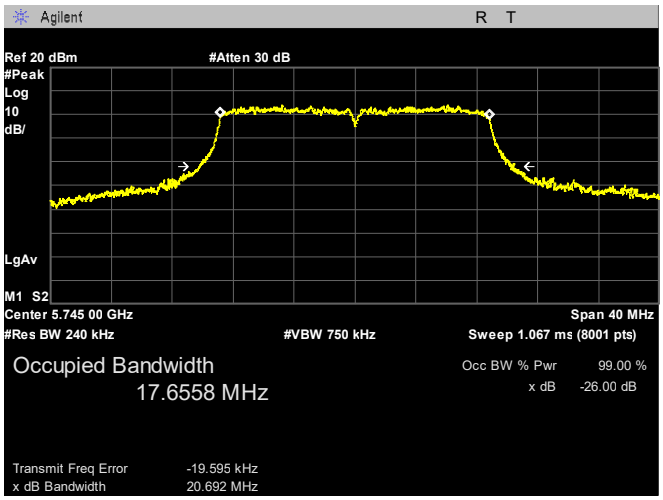


Highest Channel (5 805 MHz)

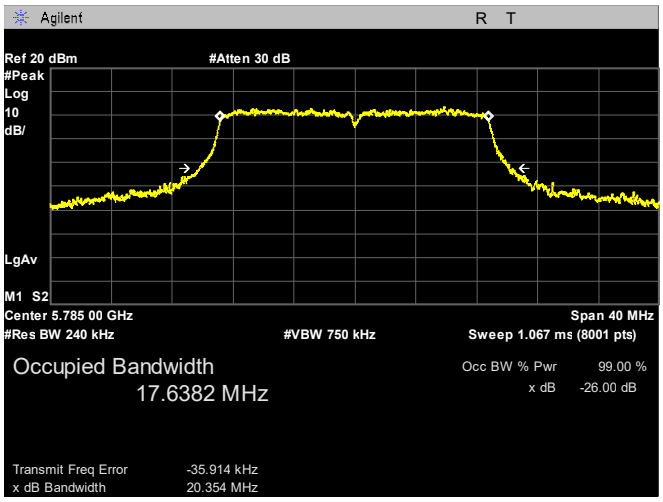


802.11n(20 MHz) mode_26dB Bandwidth, Occupied Bandwidth

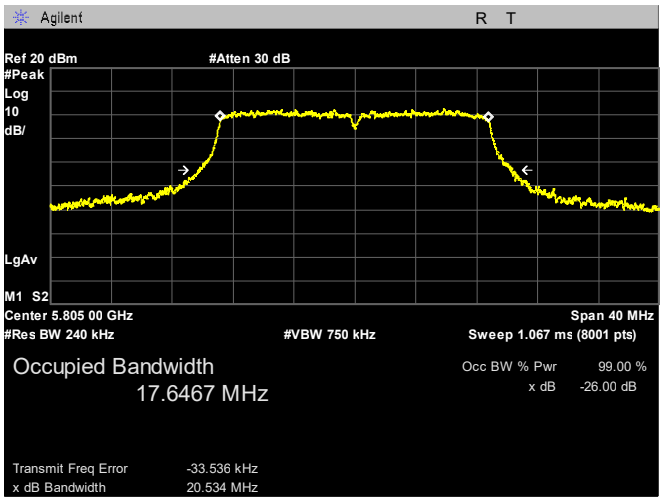
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

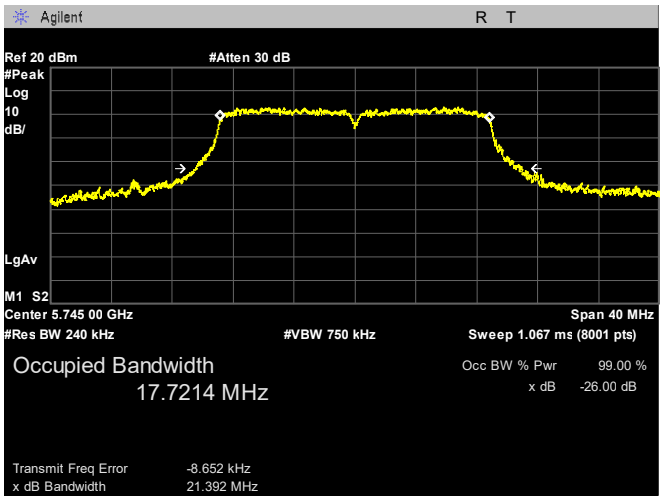


Highest Channel (5 805 MHz)

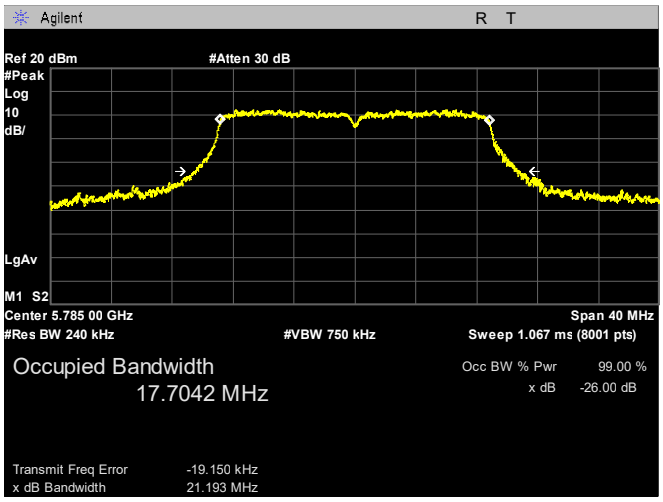


802.11ac(20 MHz) mode_26dB Bandwidth, Occupied Bandwidth

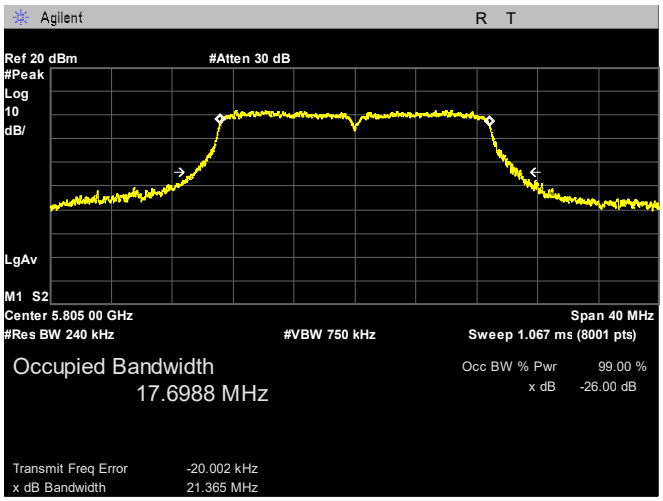
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

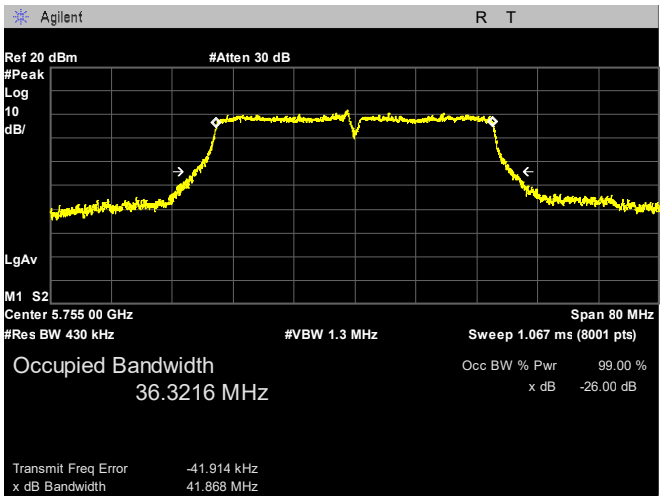


Highest Channel (5 805 MHz)

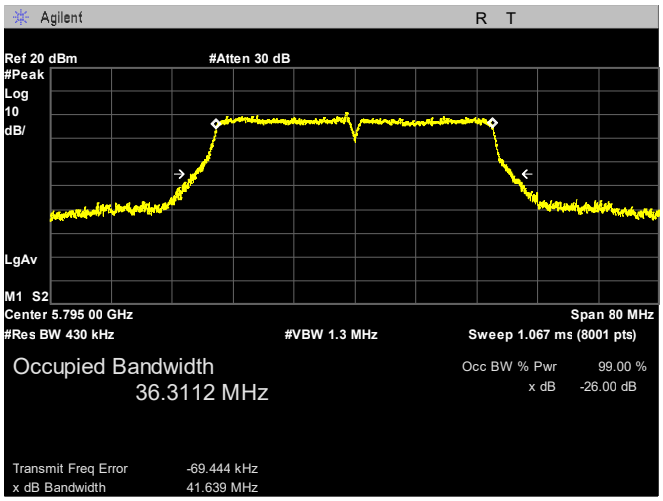


802.11n(40 MHz) mode_26dB Bandwidth, Occupied Bandwidth

Lowest Channel (5 755 MHz)

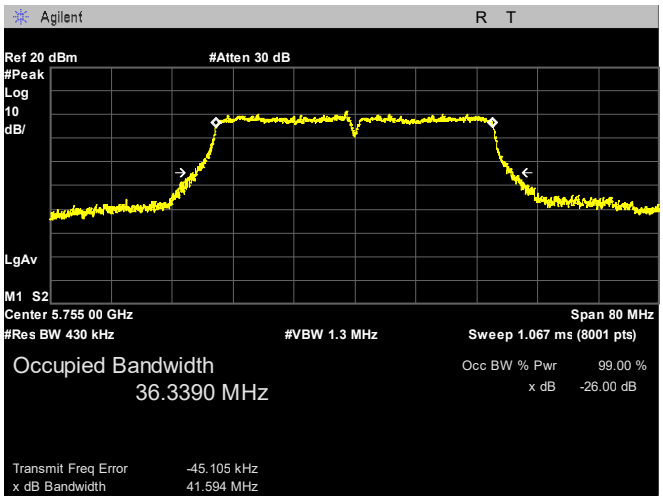


Highest Channel (5 795 MHz)

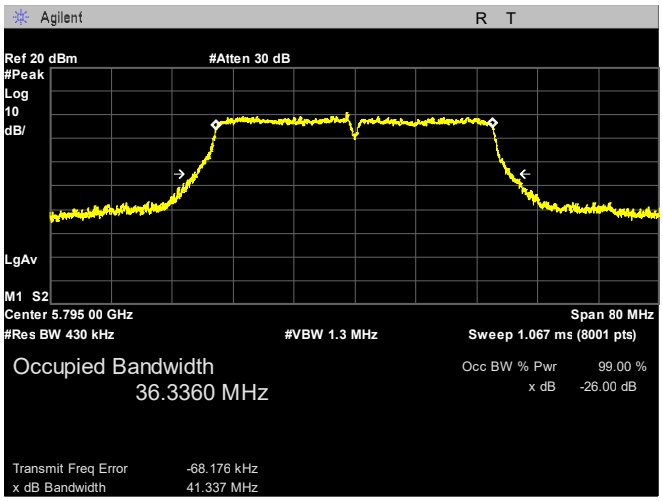


802.11ac(40 MHz) mode_26dB Bandwidth, Occupied Bandwidth

Lowest Channel (5 755 MHz)

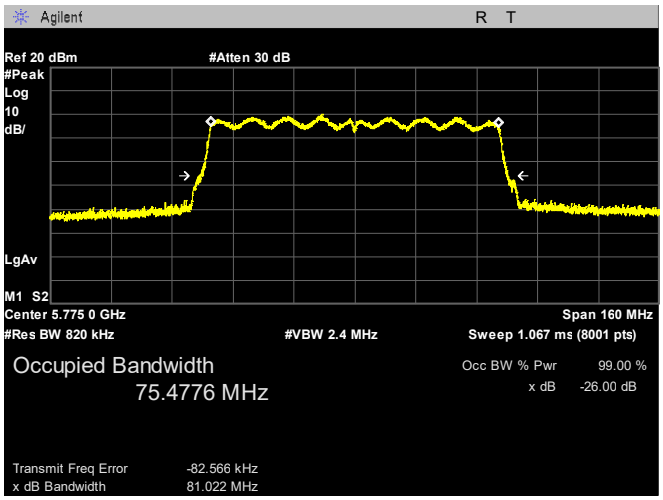


Highest Channel (5 795 MHz)



802.11ac(80 MHz) mode_26dB Bandwidth, Occupied Bandwidth

Middle Channel (5 775 MHz)



7.1.3 6 dB Bandwidth U-NII-3 Band

FCC §15.407(e)
RSS-247 (6.2)

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

Result

802.11a mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
Lowest	5 745	16.51	> 500
Middle	5 785	16.50	
Highest	5 805	16.50	

802.11n(20 MHz) mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
Lowest	5 745	17.70	> 500
Middle	5 785	17.70	
Highest	5 805	17.70	

802.11ac(20 MHz) mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
Lowest	5 745	17.72	> 500
Middle	5 785	17.73	
Highest	5 805	17.73	

802.11n(40 MHz) mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
Lowest	5 755	36.40	> 500
Highest	5 795	36.44	

802.11ac(40 MHz) mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
Lowest	5 745	36.46	> 500
Highest	5 805	36.41	

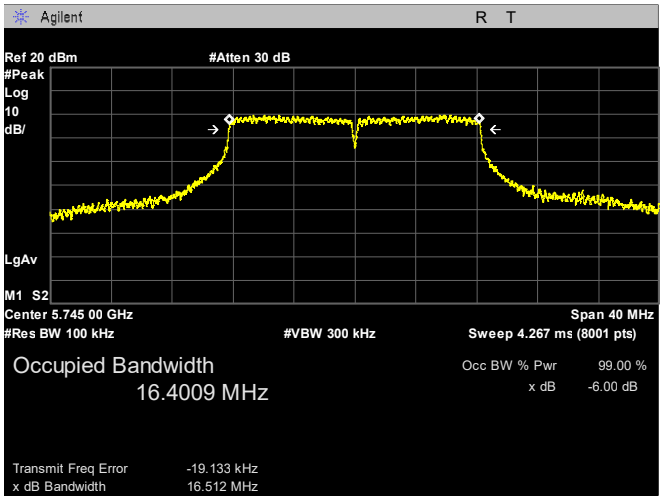
802.11ac(80 MHz) mode

Channel	Frequency (MHz)	6 dB Bandwidth (MHz)	Limit (kHz)
Middle	5 775	76.01	> 500

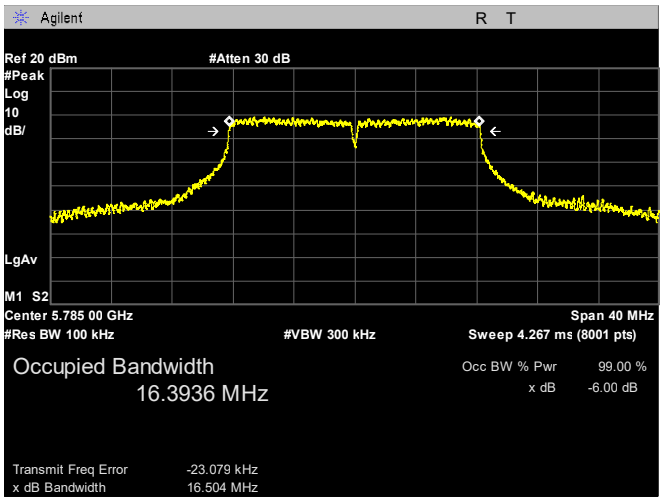
PLOTS OF EMISSIONS

802.11a mode_6dB Bandwidth

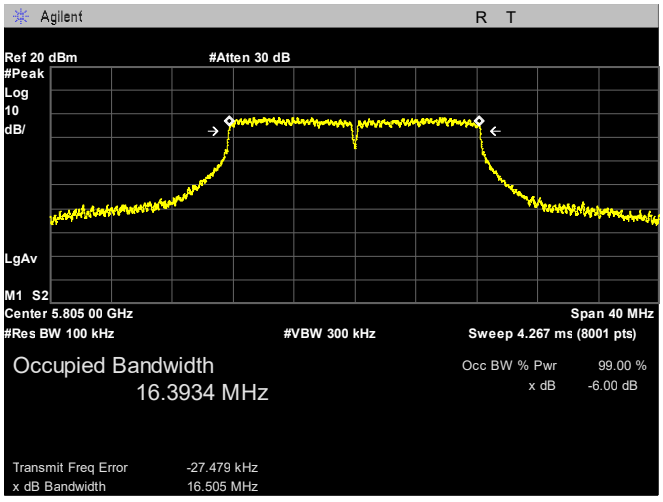
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

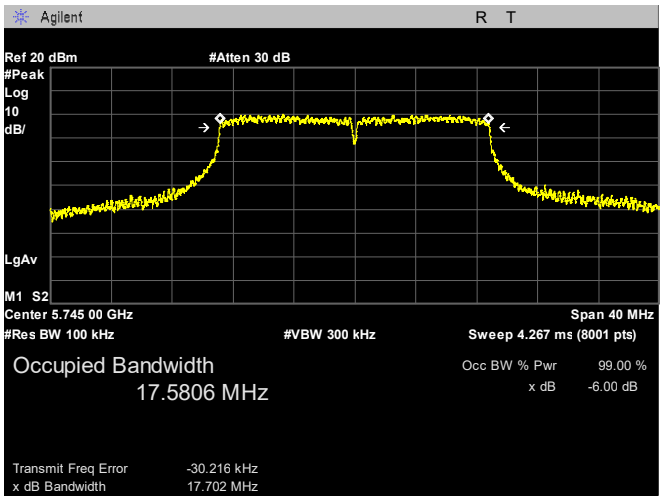


Highest Channel (5 805 MHz)

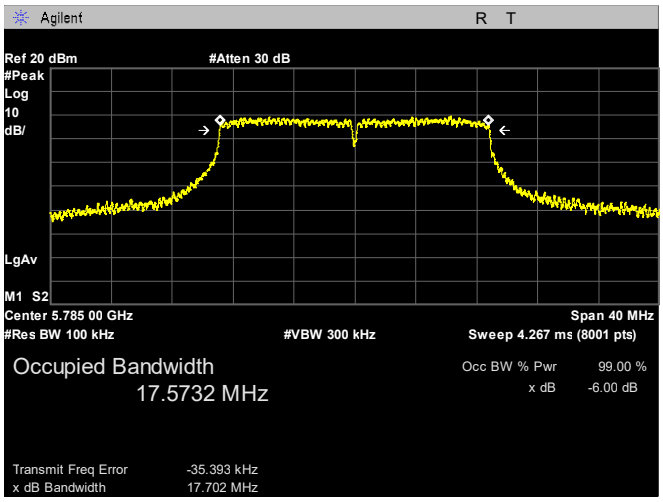


802.11n(20 MHz) mode_6dB Bandwidth

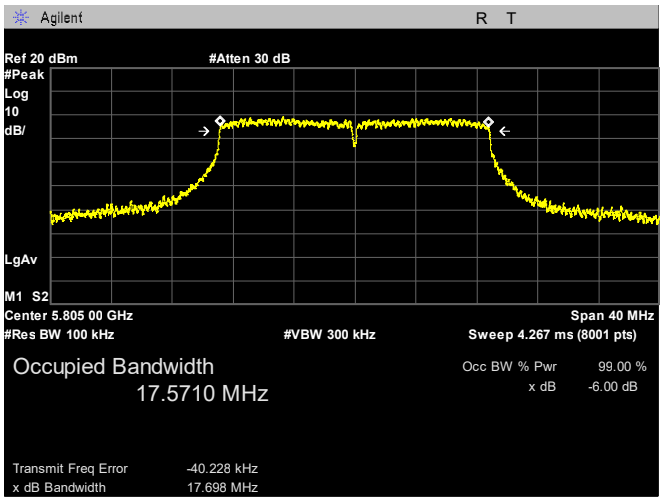
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

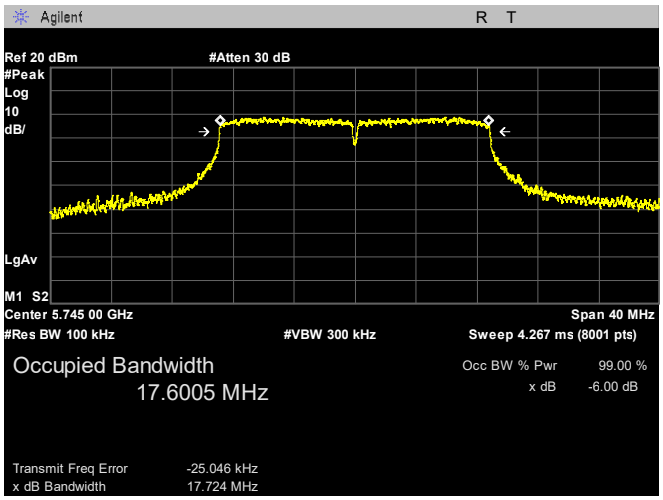


Highest Channel (5 805 MHz)

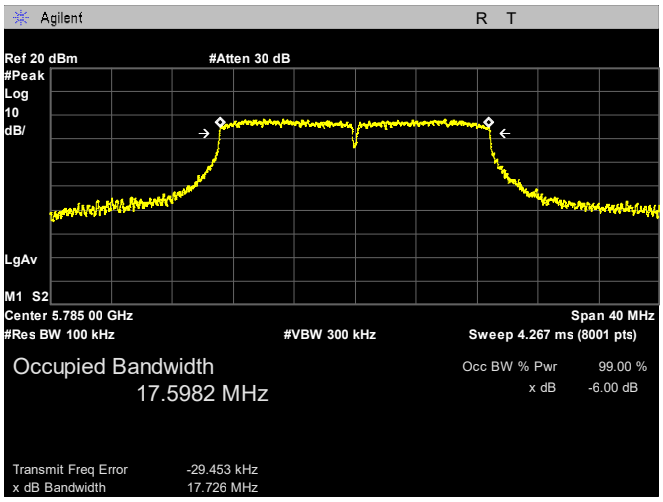


802.11ac(20 MHz) mode_6dB Bandwidth

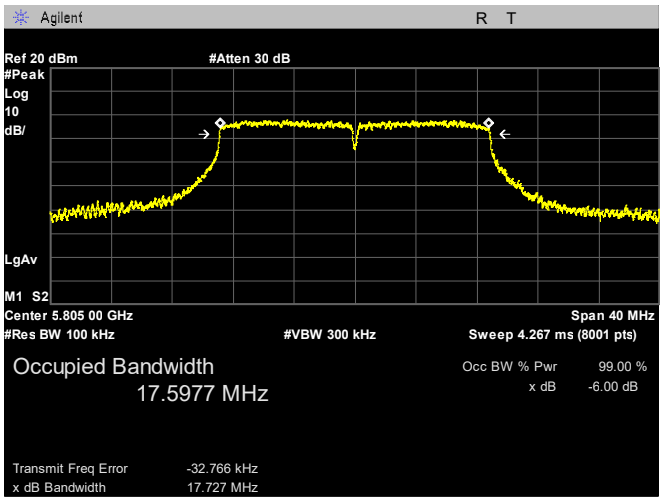
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

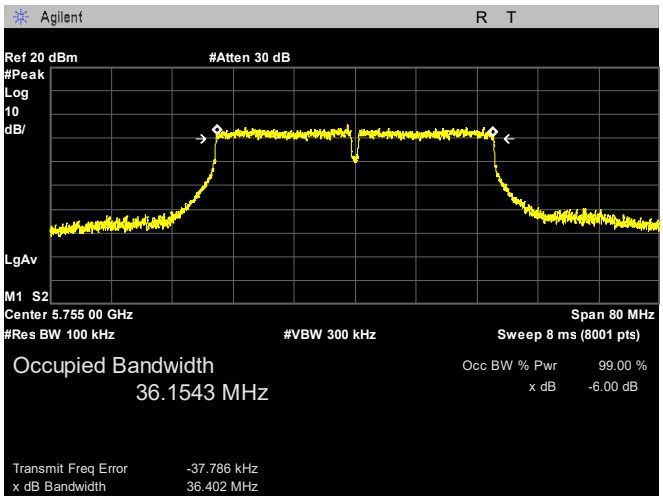


Highest Channel (5 805 MHz)

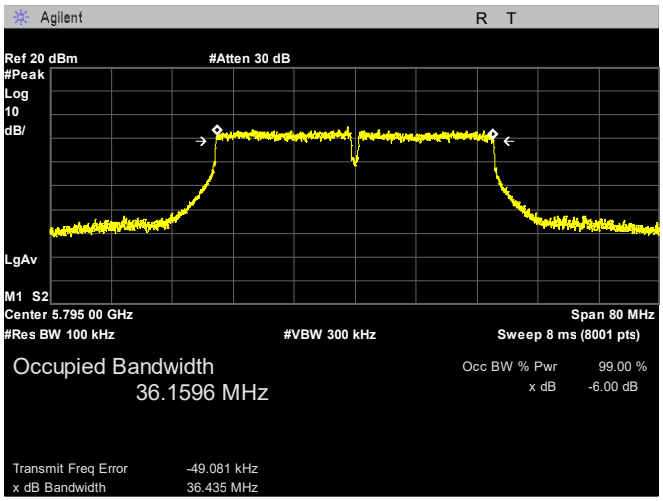


802.11n(40 MHz) mode_6dB Bandwidth

Lowest Channel (5 755 MHz)

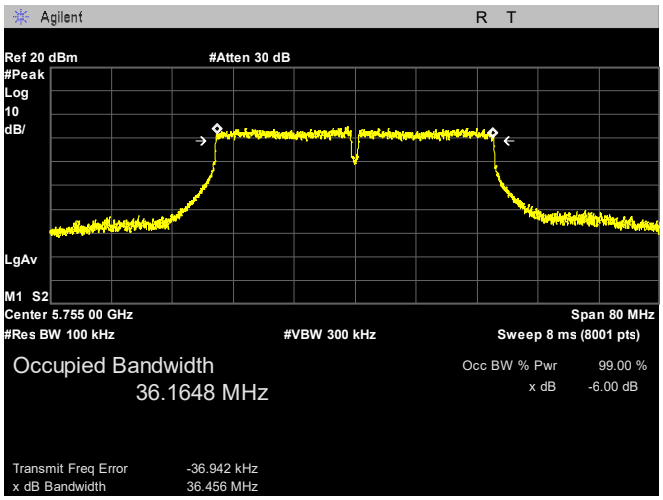


Highest Channel (5 795 MHz)

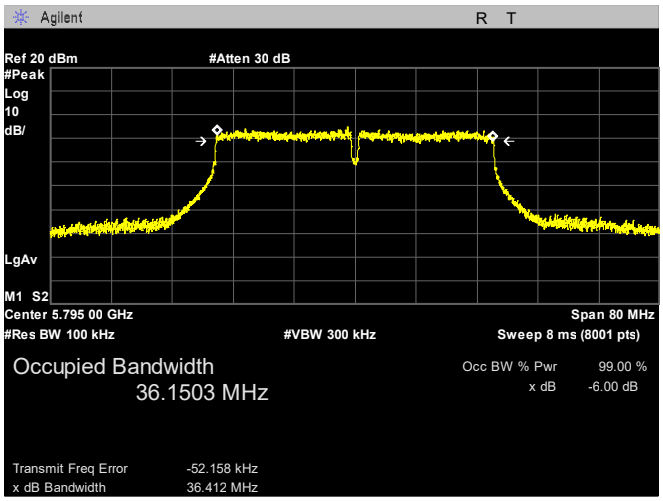


802.11ac(40 MHz) mode_6dB Bandwidth

Lowest Channel (5 755 MHz)

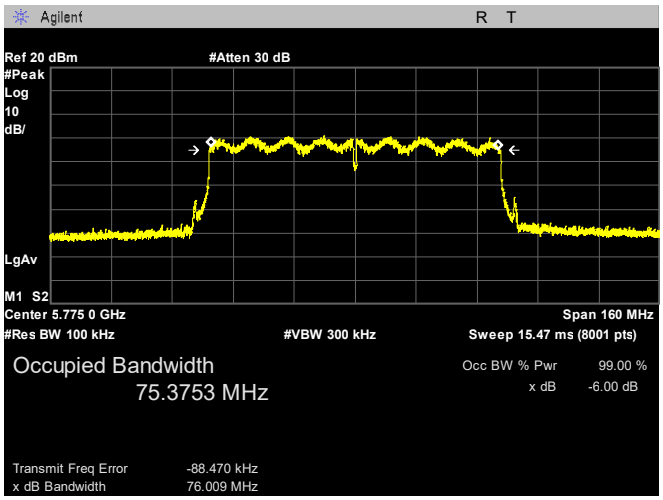


Highest Channel (5 795 MHz)



802.11ac(80 MHz) mode_6dB Bandwidth

Middle Channel (5 775 MHz)



7.2 Maximum Conducted Output Power(average) and E.I.R.P

7.2.1 Maximum Conducted Output Power(average) and E.I.R.P – U-NII-1 Band

FCC §15.407(a)
RSS-247(6.2)

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

Result

802.11a mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
36	5 180	15.16	0.32	15.48	23.98	16.18	22.23
44	5 220	14.95	0.32	15.27	23.98	15.97	22.22
48	5 240	14.93	0.32	15.25	23.98	15.95	22.22

802.11n(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
36	5 180	15.24	0.34	15.58	23.98	16.28	22.51
44	5 220	14.86	0.34	15.20	23.98	15.90	22.49
48	5 240	14.80	0.34	15.14	23.98	15.84	22.50

802.11ac(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
36	5 180	15.02	1.17	16.19	23.98	16.89	22.49
44	5 220	14.86	1.17	16.03	23.98	16.73	22.48
48	5 240	14.82	1.14	15.96	23.98	16.66	22.48

802.11n(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
38	5 190	12.44	1.68	14.12	23.98	14.82	23.01
46	5 230	12.69	1.68	14.37	23.98	15.07	23.01

802.11ac(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
38	5 190	12.76	1.65	14.41	23.98	15.11	23.01
46	5 230	12.63	1.63	14.26	23.98	14.96	23.01

802.11ac(80 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
42	5 210	10.58	2.10	12.68	23.98	13.38	23.01

802.11n(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
		Ant 1	Ant 2		Total output power			
36	5 180	13.25	12.08	0.34	16.06	23.98	16.76	22.79
44	5 220	12.56	11.22	0.34	15.29	23.98	15.99	22.79
48	5 240	12.36	11.13	0.34	15.14	23.98	15.84	22.79

802.11ac(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
		Ant 1	Ant 2		Total output power			
36	5 180	12.65	11.86	1.17	16.45	23.98	17.15	22.79
44	5 220	12.33	10.93	1.17	15.86	23.98	16.56	22.79
48	5 240	12.17	11.07	1.14	15.81	23.98	16.51	22.79

802.11n(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
		Ant 1	Ant 2		Total output power			
38	5 190	9.90	9.03	1.68	14.18	23.98	14.88	22.79
46	5 230	9.89	8.69	1.68	14.02	23.98	14.72	22.79

802.11ac(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
		Ant 1	Ant 2		Total output power			
38	5 190	9.56	8.83	1.65	13.87	23.98	14.57	22.79
46	5 230	9.52	8.54	1.63	13.70	23.98	14.40	22.79

802.11ac(80 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	e.i.r.p. (dBm)	IC e.i.r.p Limit (dBm)
		Ant 1	Ant 2		Total output power			
42	5 210	7.92	6.94	2.10	12.56	23.98	13.26	22.79

Notes:

1. *Maximum Conducted(average) Power = Measured conducted power + Duty Factor
2. Total output power = 10 log [$10^{\{(\text{Chain 1 Power + duty factor})/10\}}$ + $10^{\{(\text{Chain 2 Power + duty factor})/10\}}$]
3. The following equation was used for spectrum offset :
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)
4. For CDD transmission, directional gain is ***0.7 dBi***.

   For MIMO transmission, directional gain is ***0.7 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 = 0.7 dBi + 0 dB = 0.7 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 $\geq$ 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 = 0.7 dBi + 10 log(2/2) dB = 0.7 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 N_{ss} = 2
5. *E.I.R.P* = Maximum conducted Power + Duty Cycle Factor + Antenna gain.
   E.I.R.P was calculated by following equation according to KDB412172 D01 Determining ERP and EIRP v01.

E.I.R.P = P_T + G_T – L_C

P_T = Peak output power (dBm)

G_T = Gain of the transmitting antenna in dBi, Directional antenna gain is 0.7 dBi.

L_C = Signal attenuation in the connecting cable between the transmitter and antenna in dB. This factor of an integral antenna is negligible.

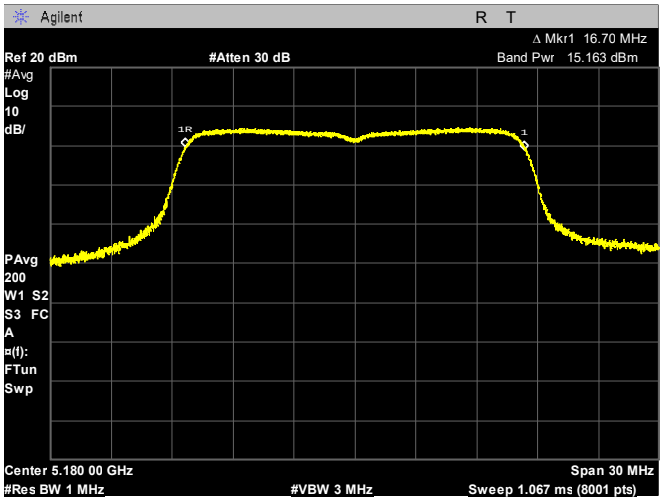
6. IC conducted output power limit = 250 mW or 11 dBm + 10 log B, whichever power is less.
B is the 99% emission bandwidth in megahertz,

IC *E.I.R.P* Limit = 1.0 W (30dBm) or 17 + 10 $\log_{10}$B dBm, whichever power is less.
B is the 99% emission bandwidth in megahertz,

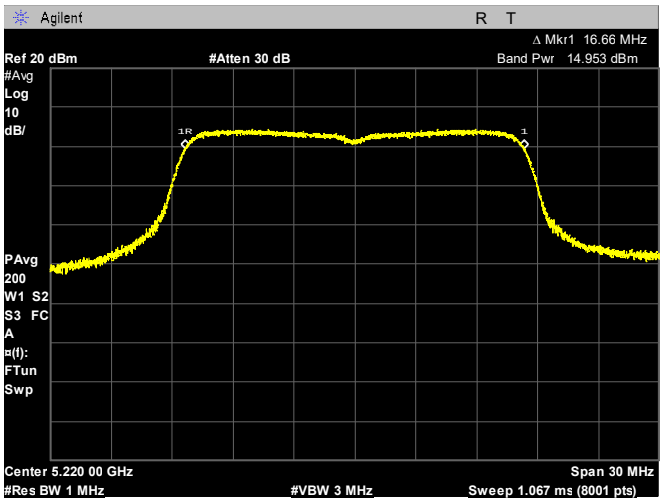
PLOTS OF EMISSIONS

802.11a mode _1TX

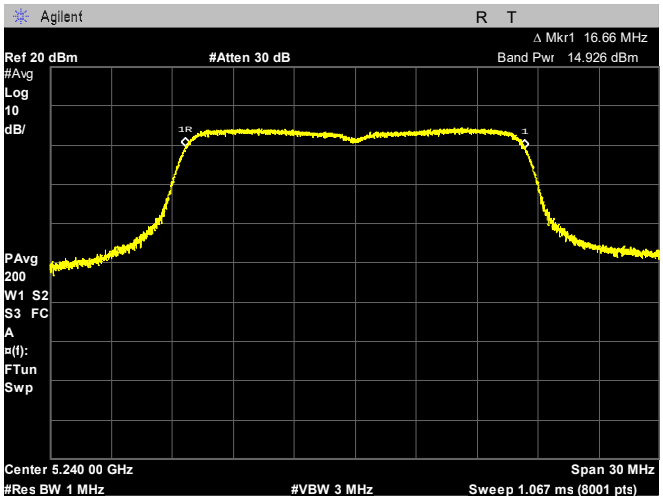
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

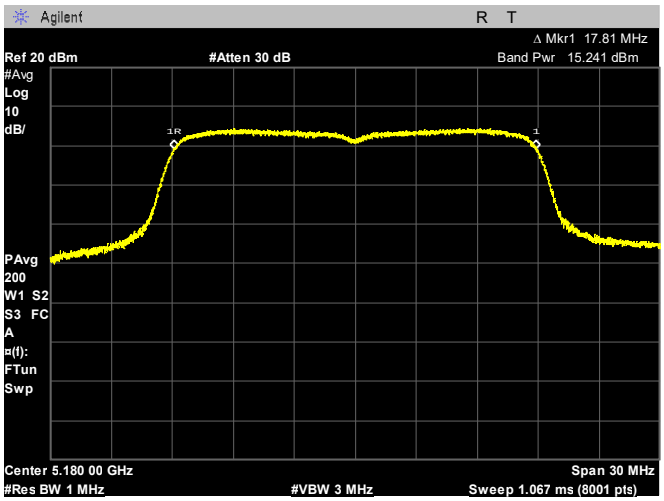


Highest Channel (5 240 MHz)

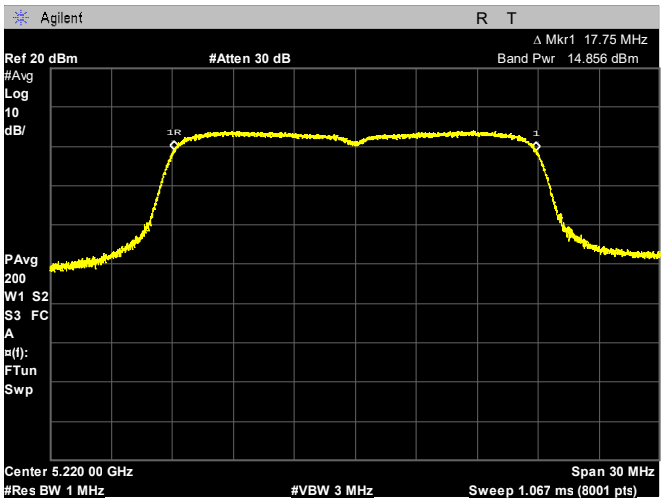


802.11n mode _1TX

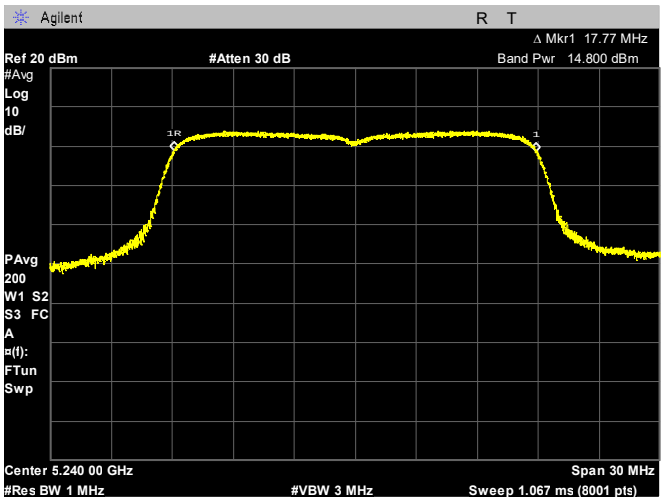
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

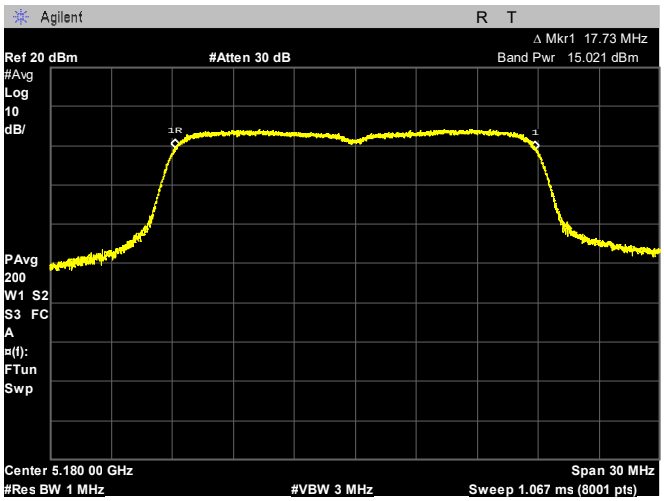


Highest Channel (5 240 MHz)

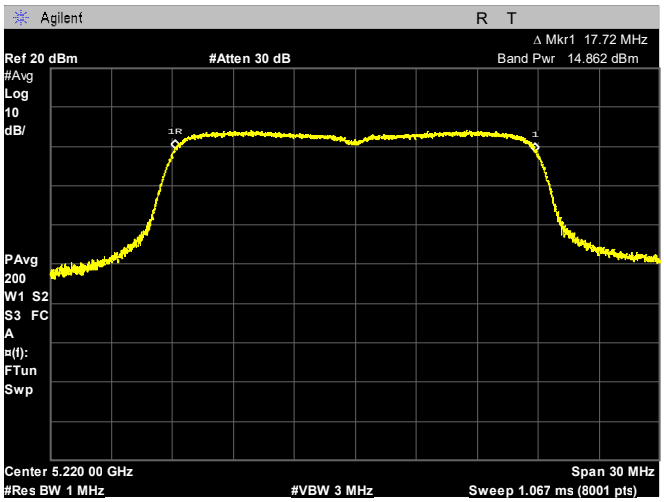


802.11ac mode _1TX

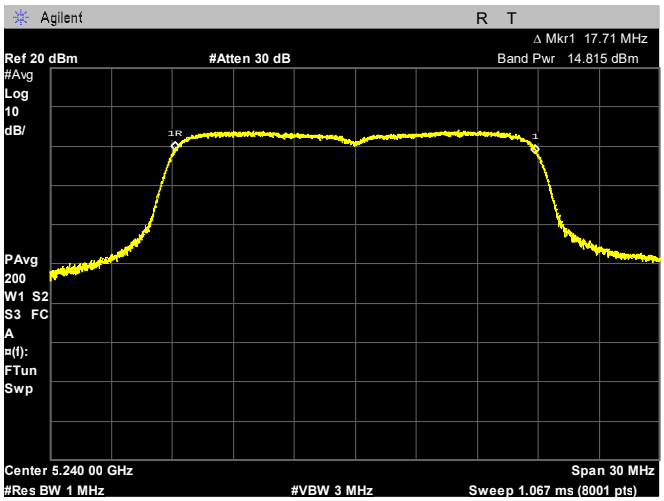
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

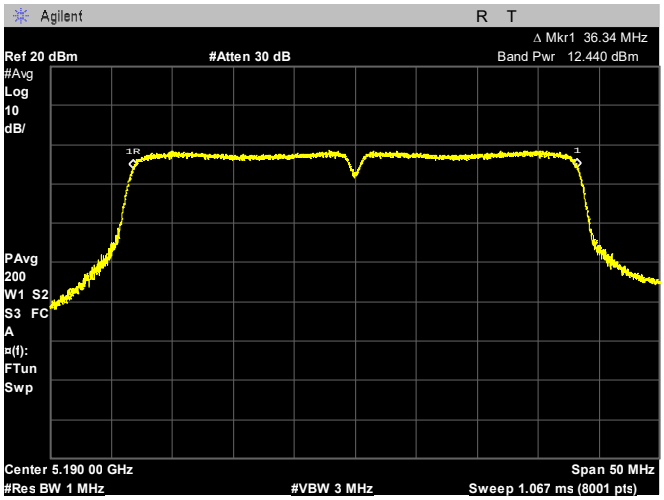


Highest Channel (5 240 MHz)

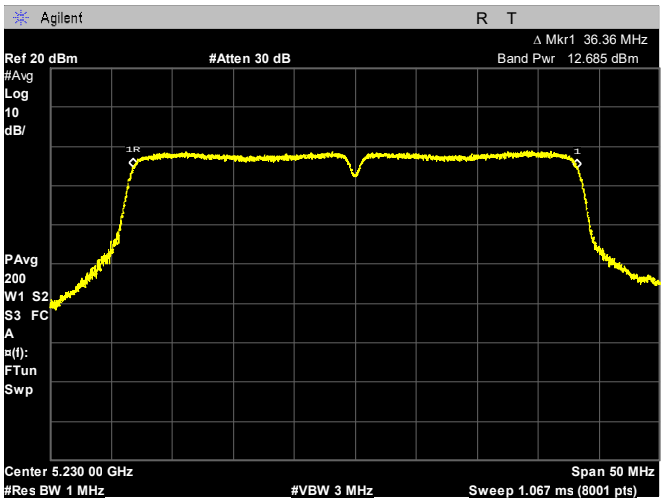


802.11n(40 MHz) mode _1TX

Lowest Channel (5 190 MHz)

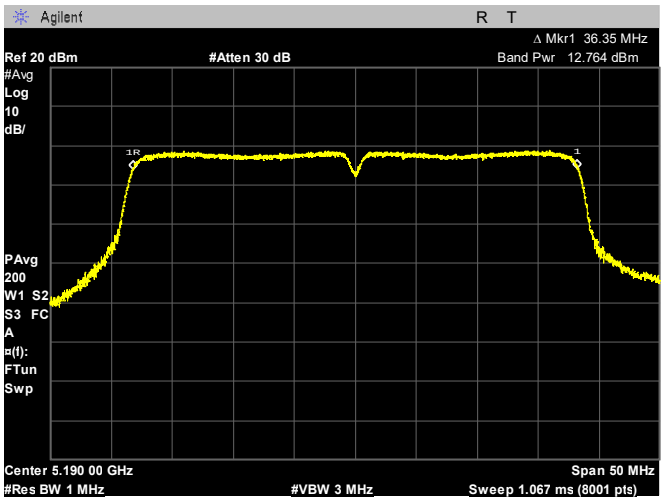


Highest Channel (5 230 MHz)

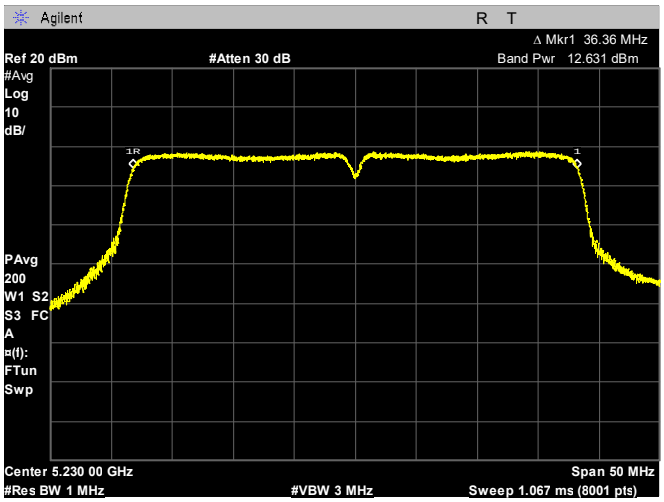


802.11ac(40 MHz) mode _1TX

Lowest Channel (5 190 MHz)

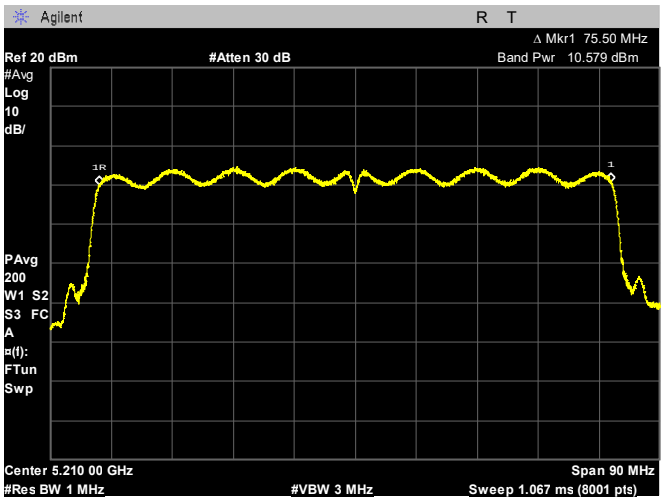


Highest Channel (5 230 MHz)



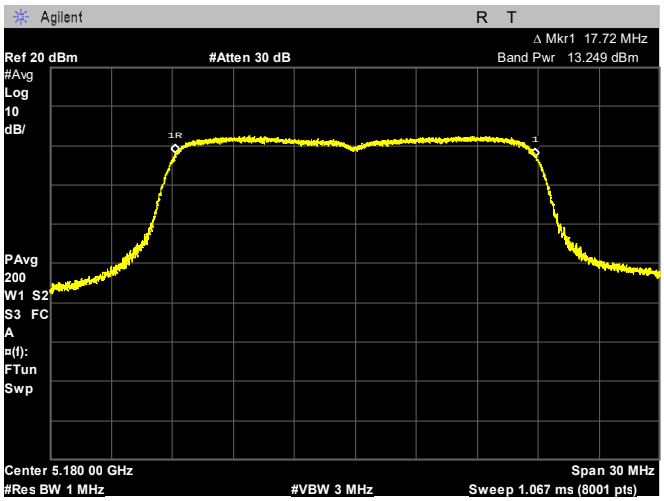
802.11ac(80 MHz) mode _1TX

Middle Channel (5 210 MHz)

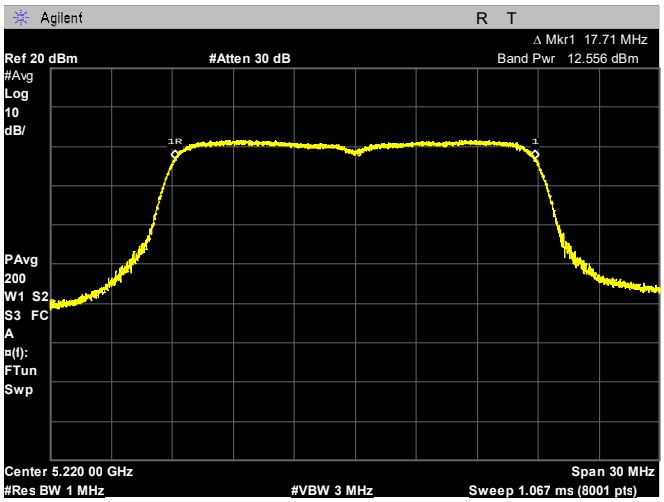


802.11n mode _2TX

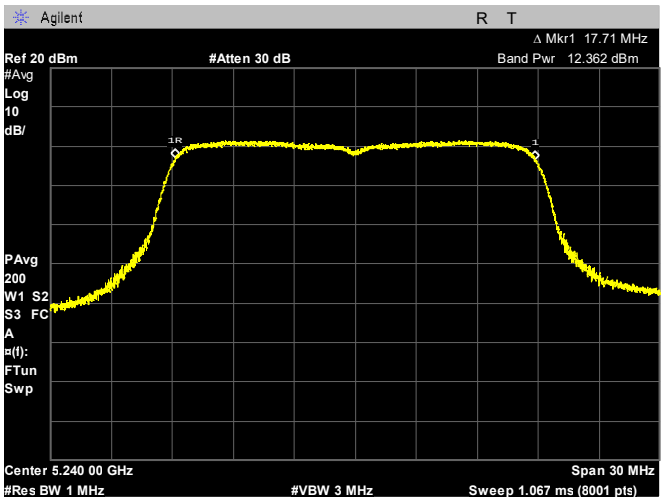
Lowest Channel (5 180 MHz), Chain 0



Middle Channel (5 220 MHz), Chain 0

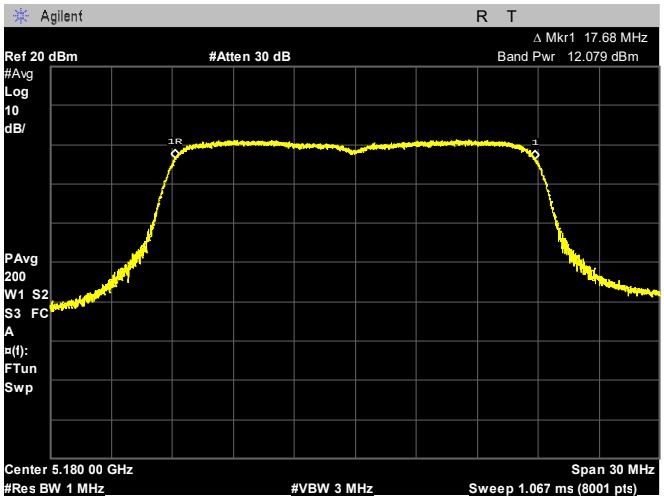


Highest Channel (5 240 MHz), Chain 0

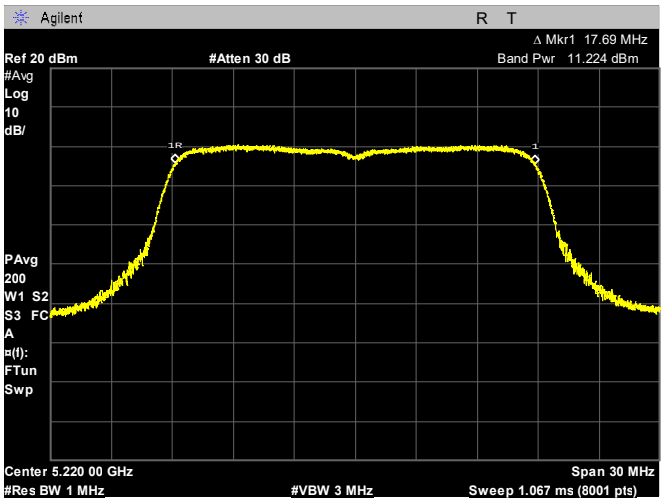


802.11n mode _2TX

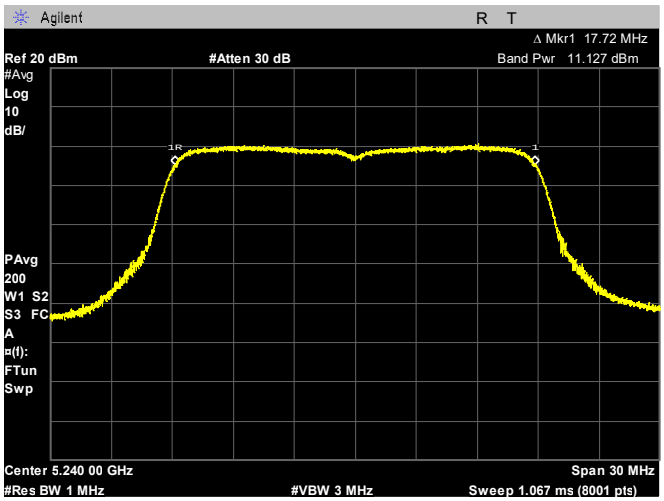
Lowest Channel (5 180 MHz), Chain 1



Middle Channel (5 220 MHz), Chain 1

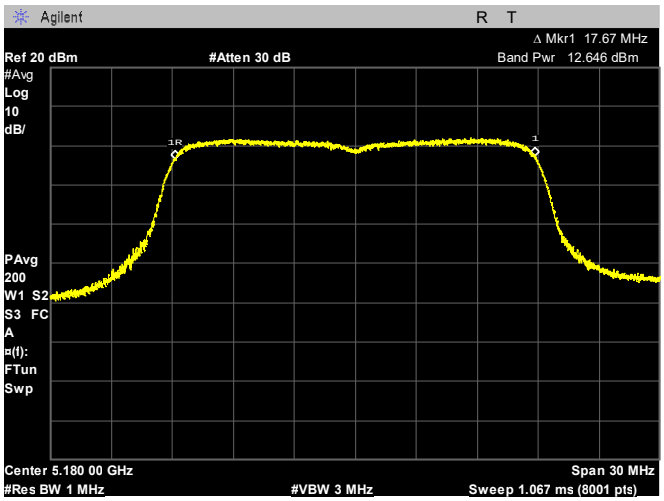


Highest Channel (5 240 MHz), Chain 1

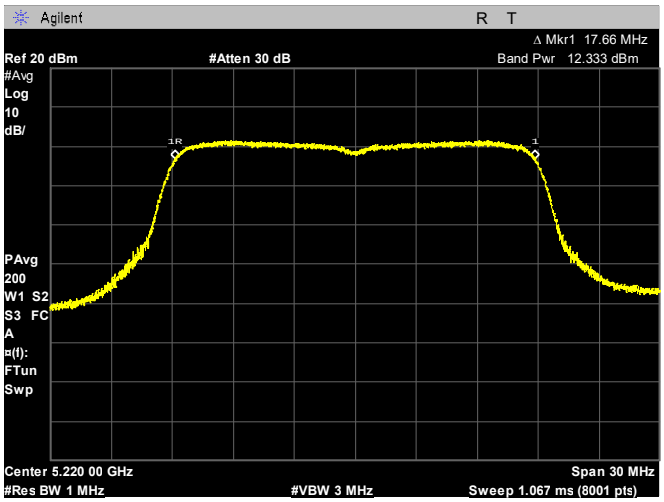


802.11ac mode _2TX

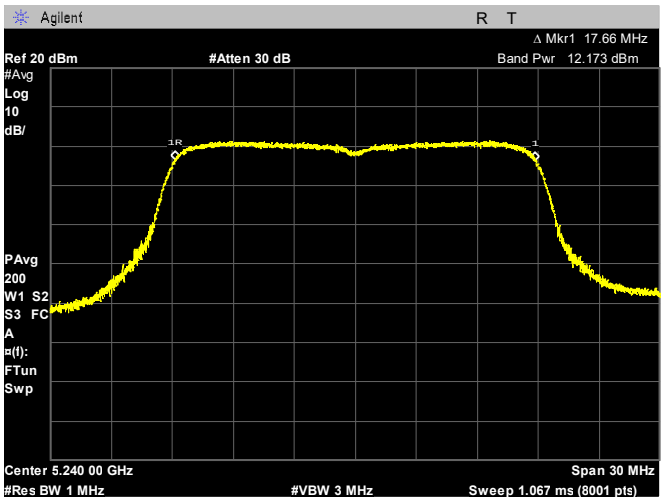
Lowest Channel (5 180 MHz), Chain 0



Middle Channel (5 220 MHz), Chain 0

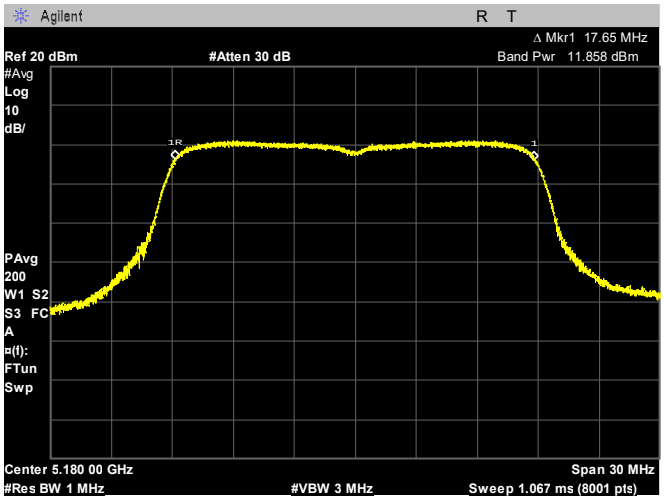


Highest Channel (5 240 MHz), Chain 0

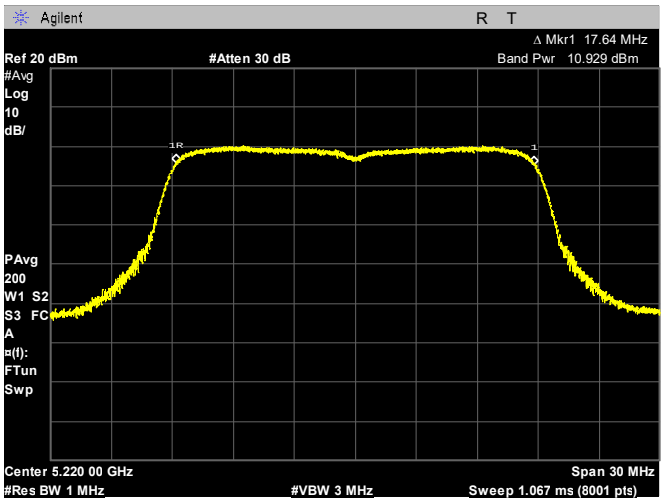


802.11ac mode _2TX

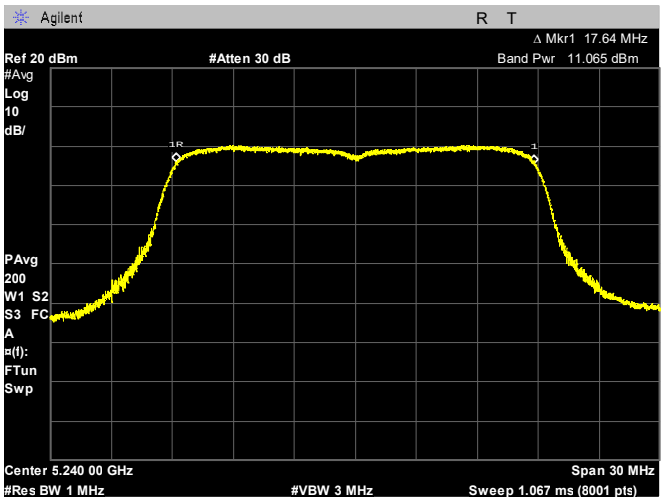
Lowest Channel (5 180 MHz), Chain 1



Middle Channel (5 220 MHz), Chain 1

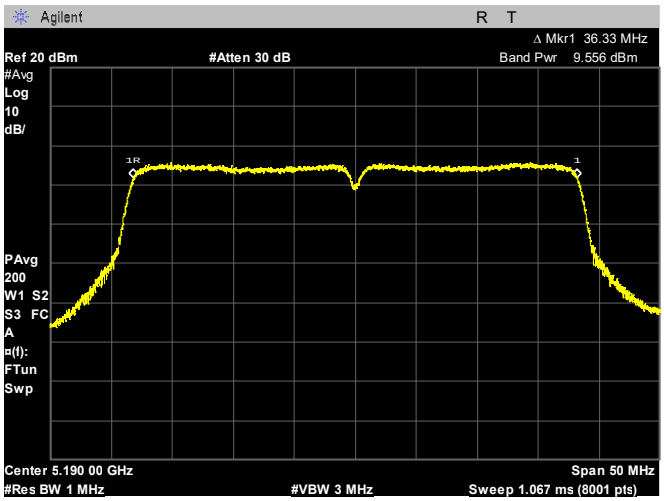


Highest Channel (5 240 MHz), Chain 1

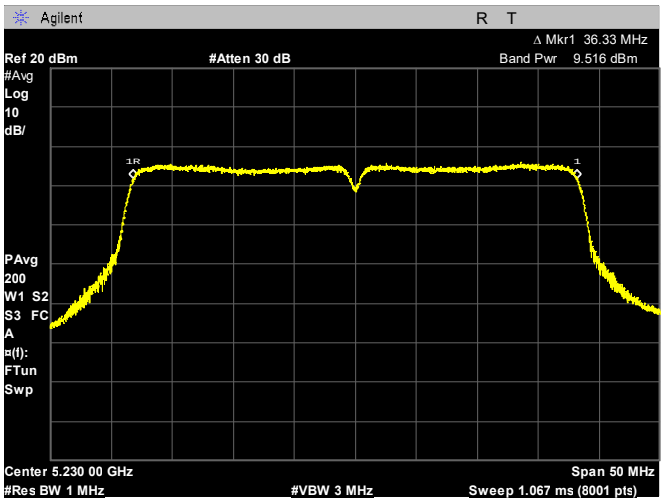


802.11ac(40 MHz) mode _2TX

Lowest Channel (5 190 MHz), Chain 0

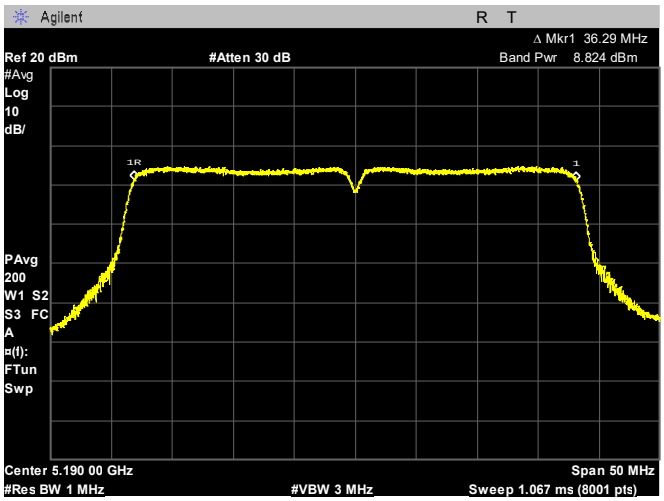


Highest Channel (5 230 MHz), Chain 0

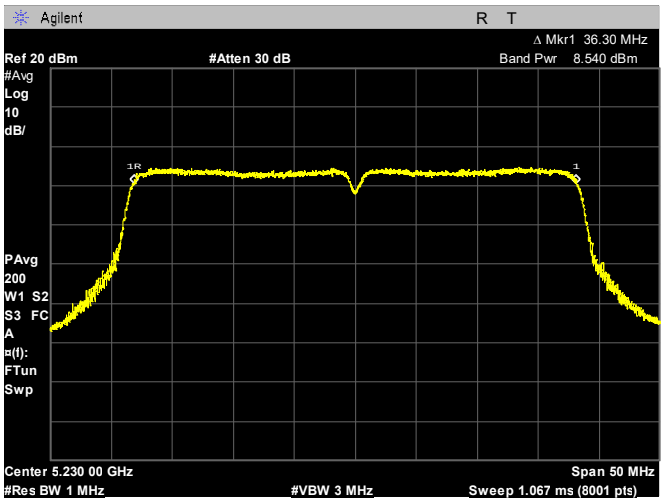


802.11ac(40 MHz) mode _2TX

Lowest Channel (5 190 MHz), Chain 1

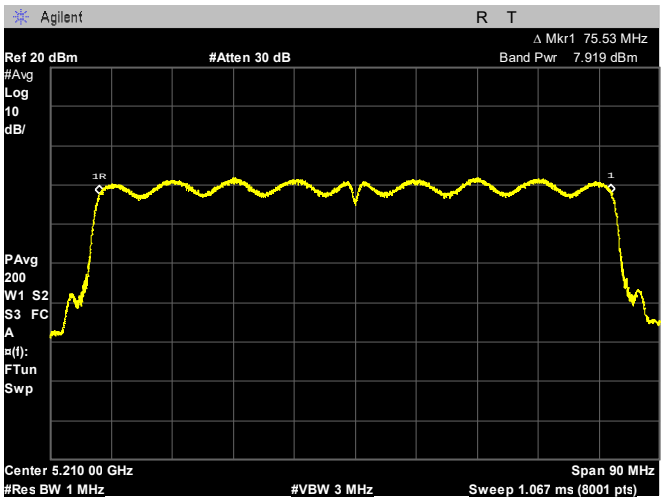


Highest Channel (5 230 MHz), Chain 1

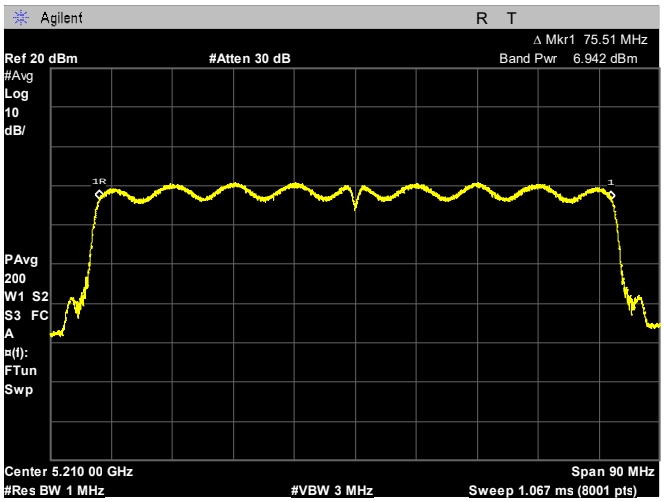


802.11ac(80 MHz) mode _2TX

Middle Channel (5 210 MHz), Chain 0



Middle Channel (5 210 MHz), Chain 1



7.2.2 Maximum Conducted Output Power(average) and E.I.R.P – U-NII-3 Band

FCC §15.407(a)
RSS-247(6.2)

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

Result

802.11a mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
149	5 745	13.31	0.47	13.78	30.0	22.18
157	5 785	12.74	0.47	13.21	30.0	22.18
161	5 805	12.21	0.47	12.68	30.0	22.18

802.11n(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
149	5 745	13.11	0.62	13.73	30.0	22.47
157	5 785	12.55	0.62	13.17	30.0	22.46
161	5 805	12.05	0.62	12.67	30.0	22.47

802.11ac(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
149	5 745	12.87	0.34	13.21	30.0	22.48
157	5 785	12.36	0.34	12.70	30.0	22.48
161	5 805	11.90	0.34	12.24	30.0	22.48

802.11n(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
151	5 755	10.01	1.68	11.69	30.0	23.01
159	5 795	9.38	1.68	11.06	30.0	23.01

802.11ac(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
151	5 755	9.90	1.72	11.62	30.0	23.01
159	5 795	9.35	1.68	11.03	30.0	23.01

802.11ac(80 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)	Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
155	5 775	8.41	2.10	10.51	30.0	23.01

802.11n(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
		Ant 1	Ant 2		Total output power		
149	5 745	11.13	7.06	0.62	13.18	30.0	22.79
157	5 785	9.65	6.76	0.62	12.07	30.0	22.79
161	5 805	9.34	6.39	0.62	11.74	30.0	22.79

802.11ac(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
		Ant 1	Ant 2		Total output power		
149	5 745	10.40	7.00	0.34	12.38	30.0	22.79
157	5 785	9.61	6.72	0.34	11.75	30.0	22.79
161	5 805	9.02	6.23	0.34	11.19	30.0	22.79

802.11n(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
		Ant 1	Ant 2		Total output power		
151	5 755	7.98	4.42	1.68	11.25	30.0	22.79
159	5 795	7.13	4.11	1.68	10.57	30.0	22.79

802.11ac(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
		Ant 1	Ant 2		Total output power		
151	5 755	7.51	4.23	1.72	10.90	30.0	22.79
159	5 795	6.79	3.94	1.68	10.29	30.0	22.79

802.11ac(80 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured Conducted Power (dBm)		Duty Factor (dB)	*Maximum Conducted Power (dBm)	FCC Limit (dBm)	IC Limit (dBm)
		Ant 1	Ant 2		Total output power		
155	5 775	6.52	3.19	2.10	10.27	30.0	22.79

Notes:

1. *Maximum Conducted(average) Power = Measured conducted power + Duty Factor
2. Total output power = 10 log [$10^{\{(\text{Chain 1 Power + duty factor})/10\}}$ + $10^{\{(\text{Chain 2 Power + duty factor})/10\}}$]
3. The following equation was used for spectrum offset :
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)
4. For CDD transmission, directional gain is ***1.1 dBi***.

   For MIMO transmission, directional gain is ***1.1 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 = 1.1 dBi + 0 dB = 1.1 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,

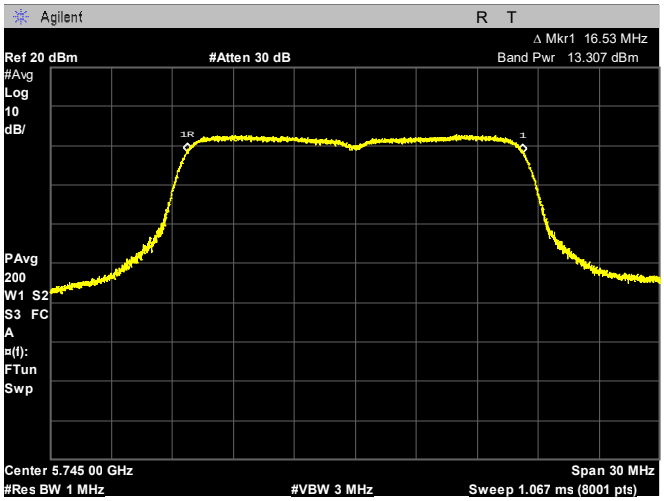
   Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 1.1 dBi + 10 log(2/2) dB = 1.1 dBi.

   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 N_{ss} = 2

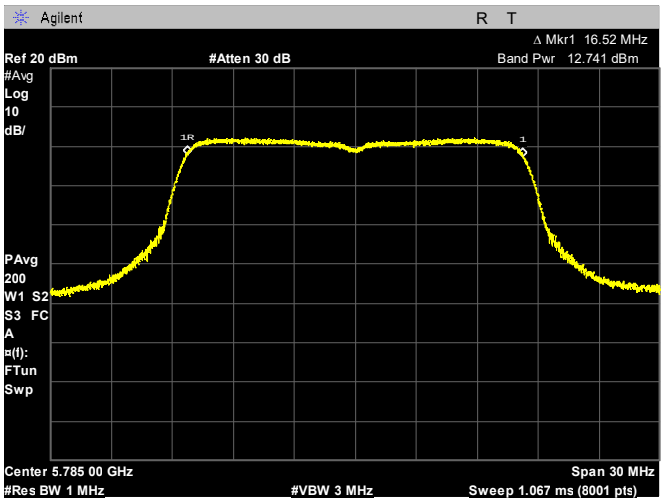
PLOTS OF EMISSIONS

802.11a mode _1TX

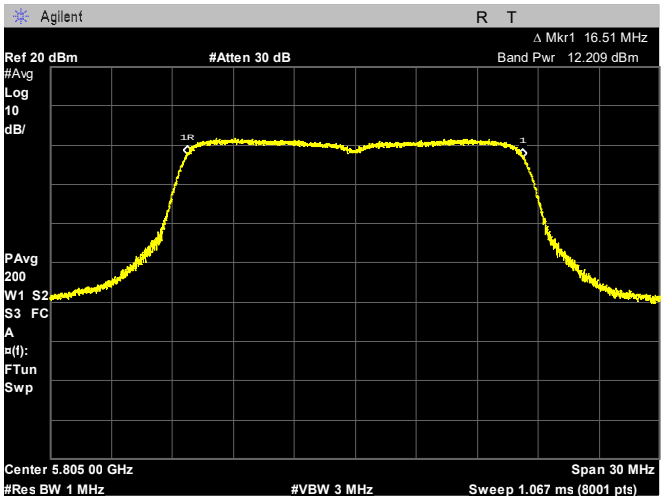
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

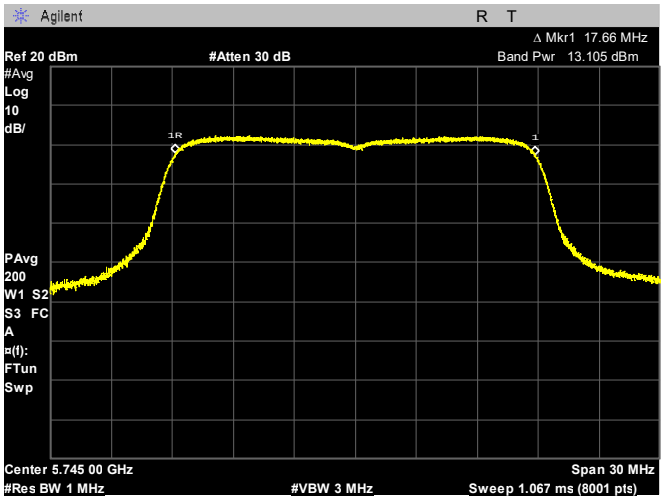


Highest Channel (5 805 MHz)

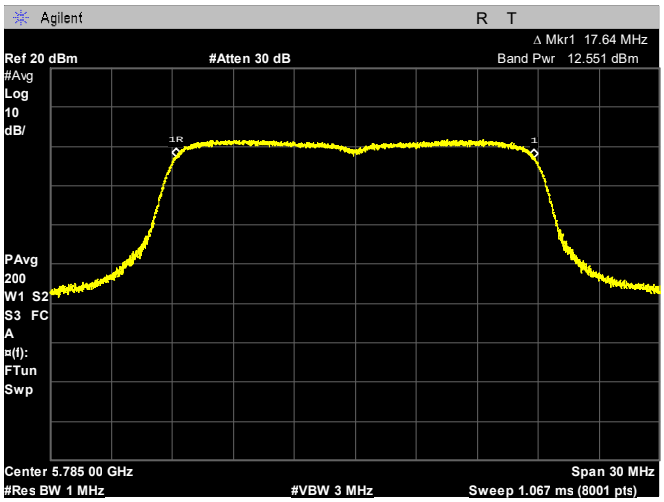


802.11n mode _1TX

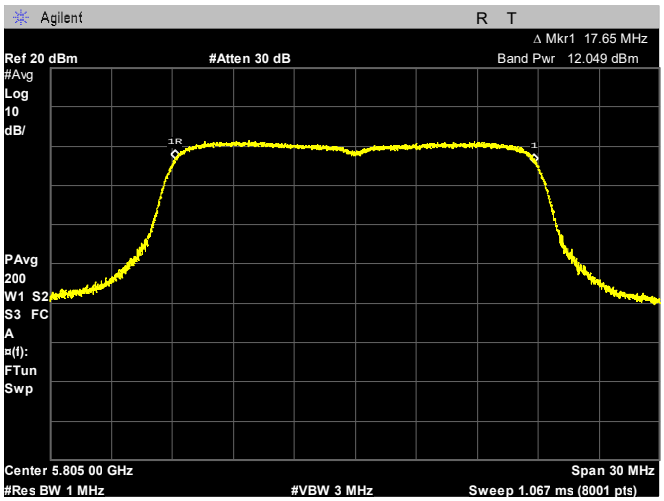
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

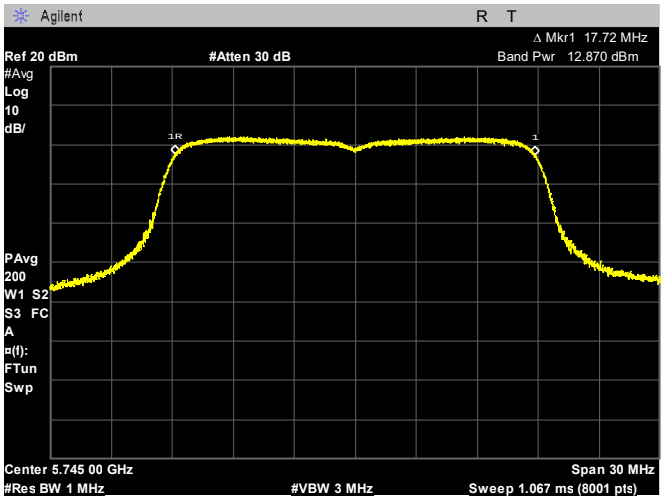


Highest Channel (5 805 MHz)

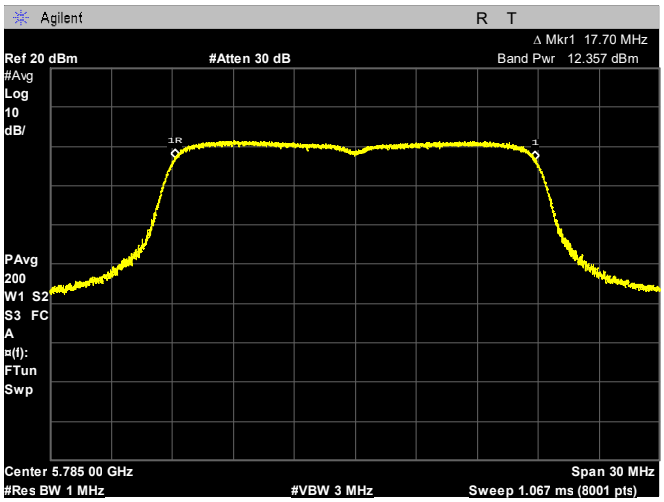


802.11ac mode _1TX

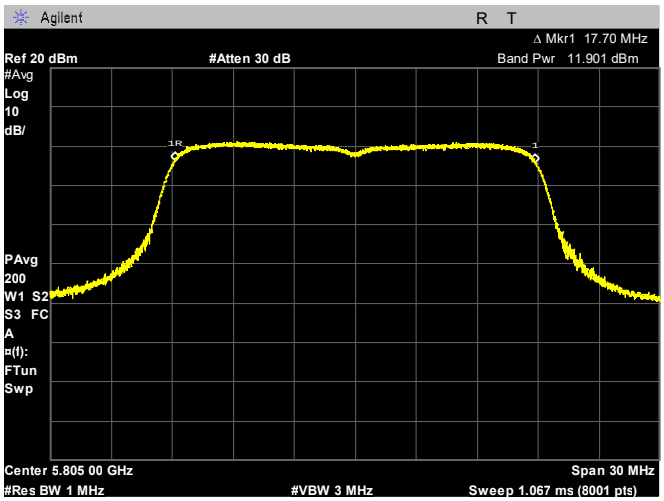
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

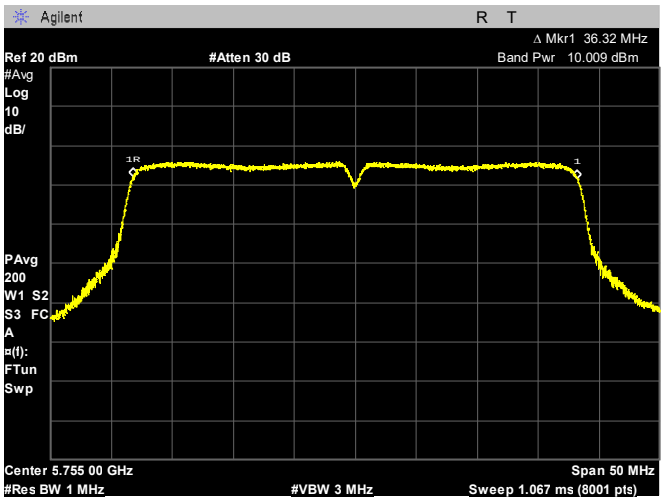


Highest Channel (5 805 MHz)

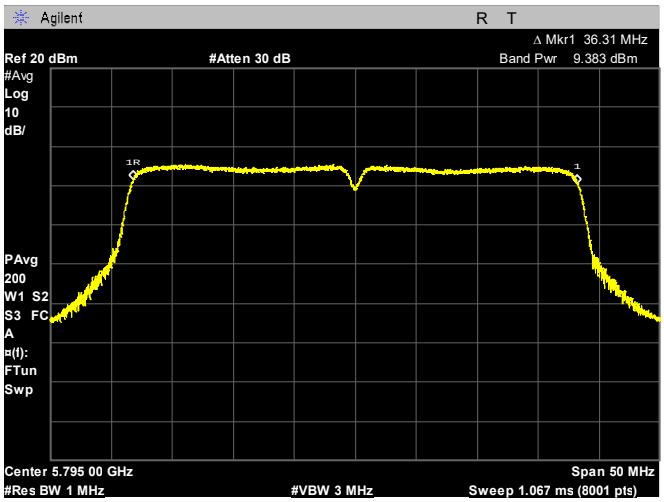


802.11n(40 MHz) mode _1TX

Lowest Channel (5 755 MHz)

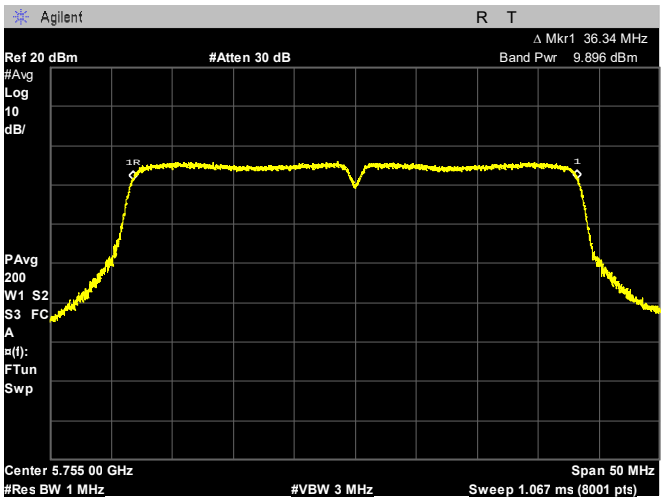


Highest Channel (5 795 MHz)

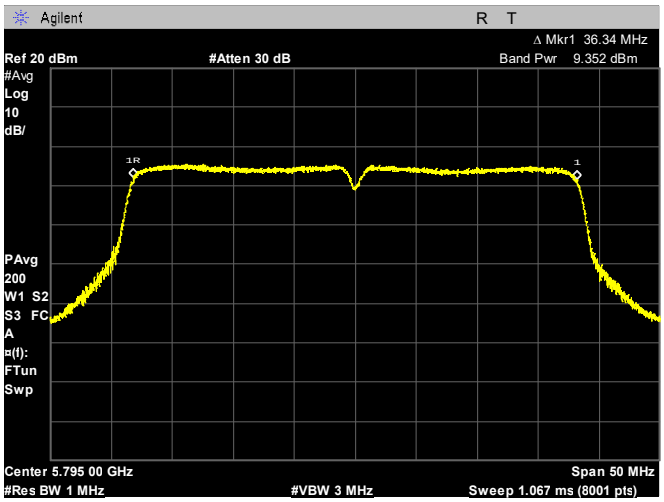


802.11ac(40 MHz) mode _1TX

Lowest Channel (5 755 MHz)

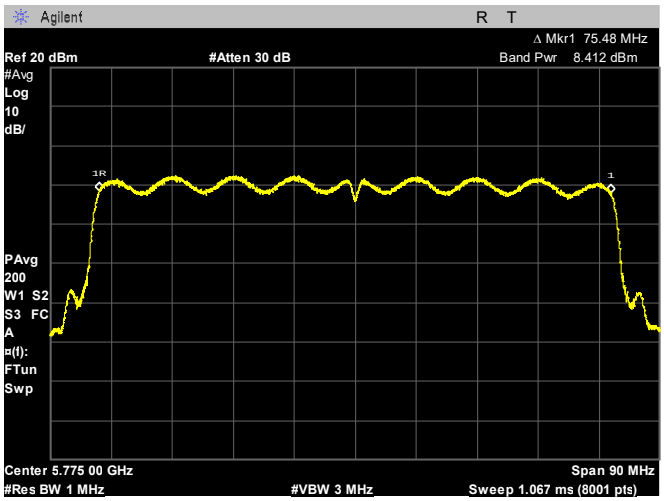


Highest Channel (5 795 MHz)



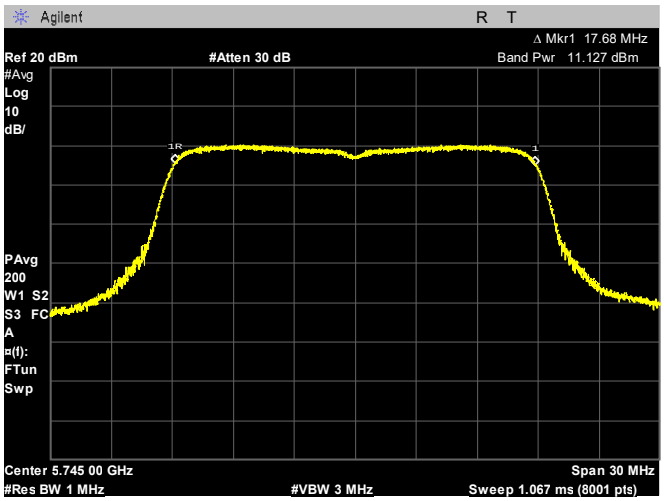
802.11ac(80 MHz) mode _1TX

Middle Channel (5 775 MHz)

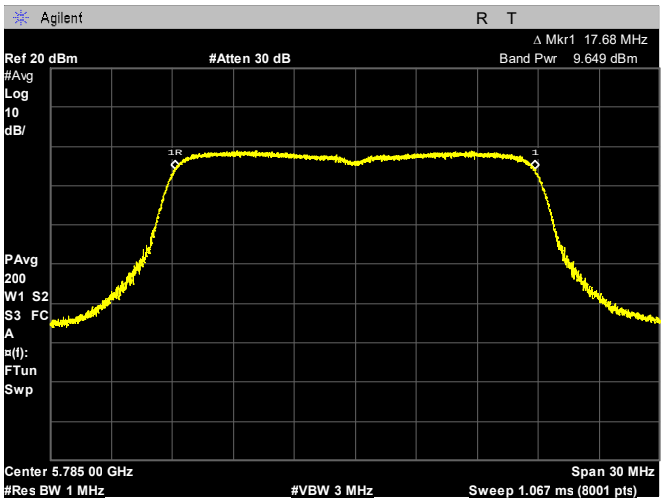


802.11n mode _2TX

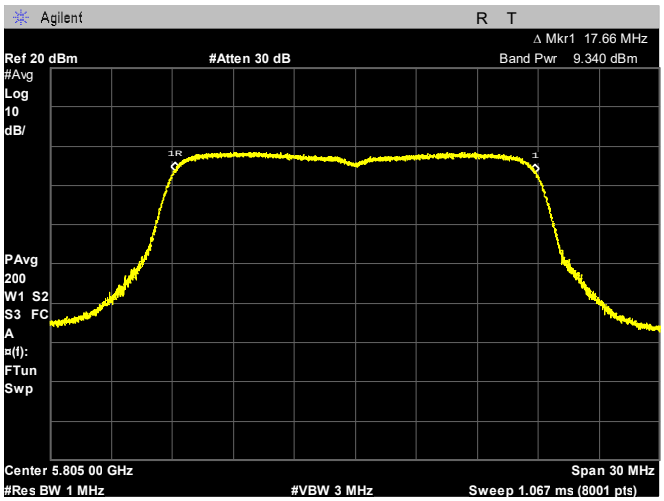
Lowest Channel (5 745 MHz), Chain 0



Middle Channel (5 785 MHz), Chain 0

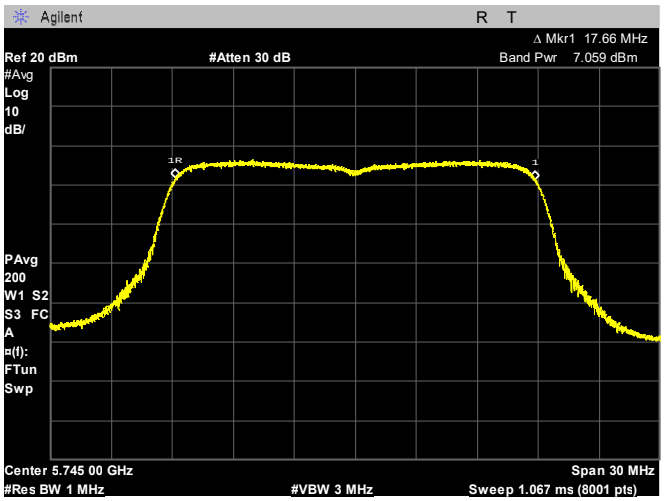


Highest Channel (5 805 MHz), Chain 0

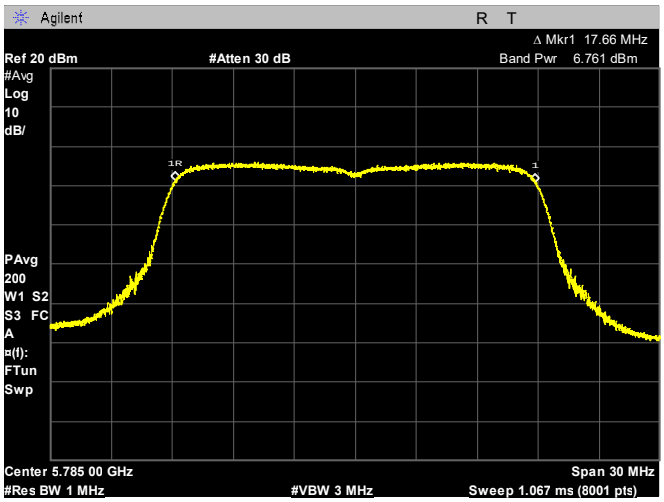


802.11n mode _2TX

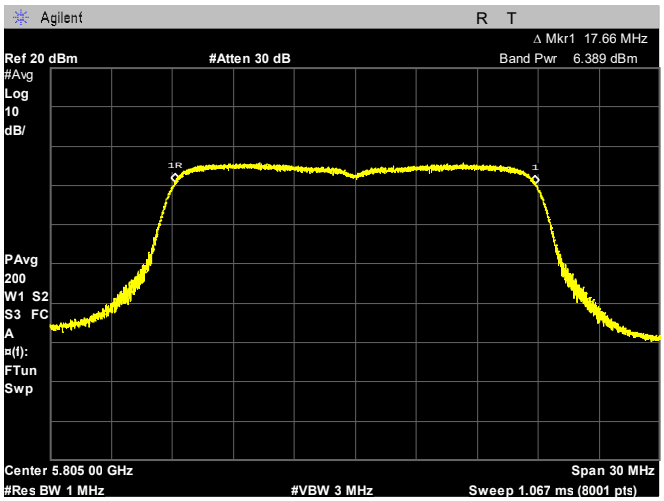
Lowest Channel (5 745 MHz), Chain 1



Middle Channel (5 785 MHz), Chain 1

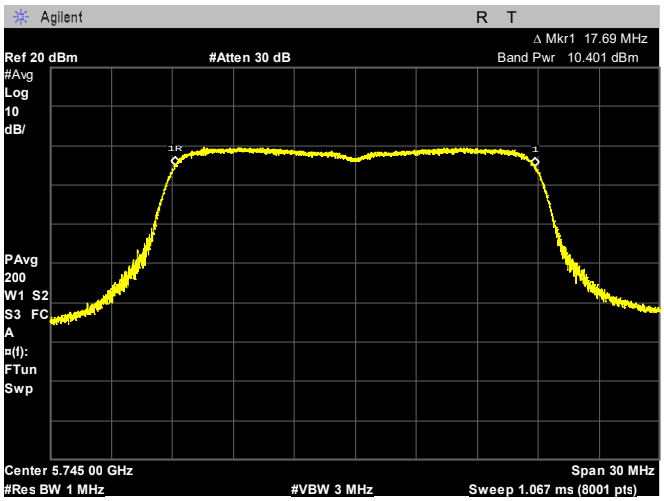


Highest Channel (5 805 MHz), Chain 1

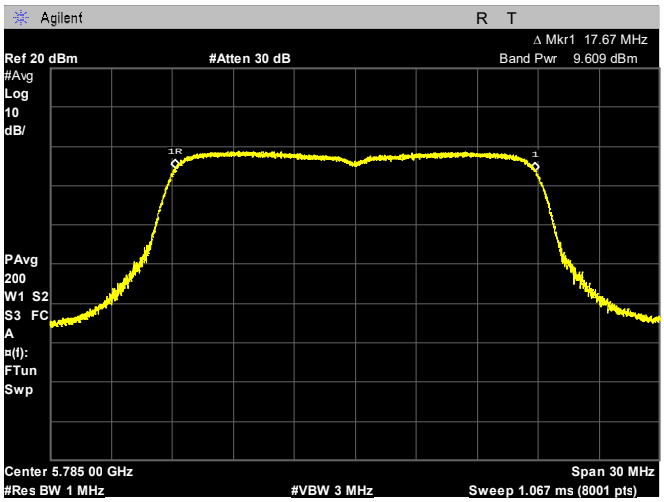


802.11ac mode _2TX

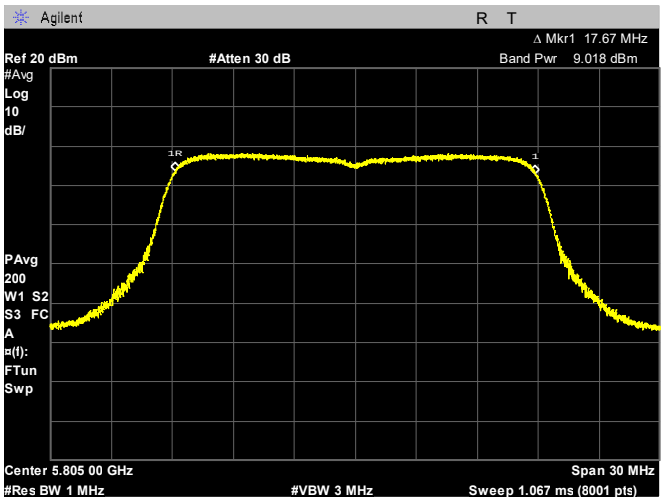
Lowest Channel (5 745 MHz), Chain 0



Middle Channel (5 785 MHz), Chain 0

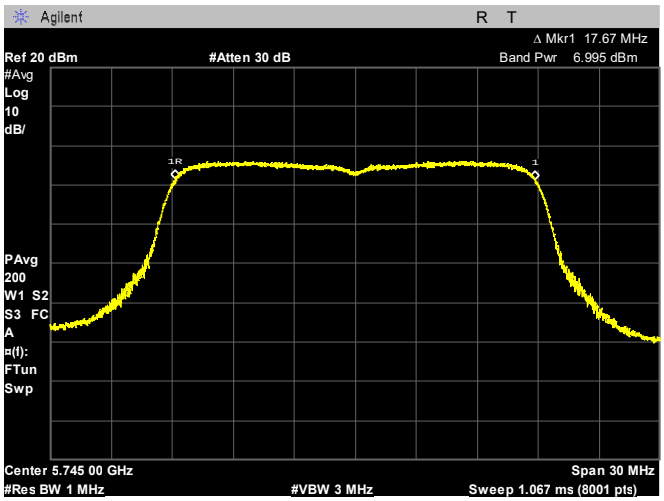


Highest Channel (5 805 MHz), Chain 0

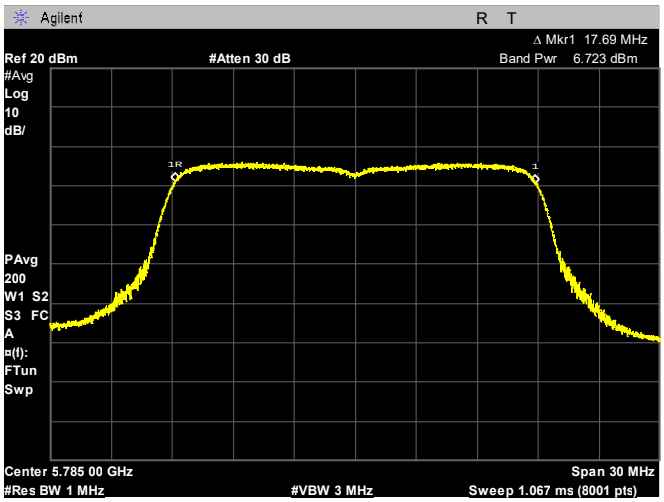


802.11ac mode _2TX

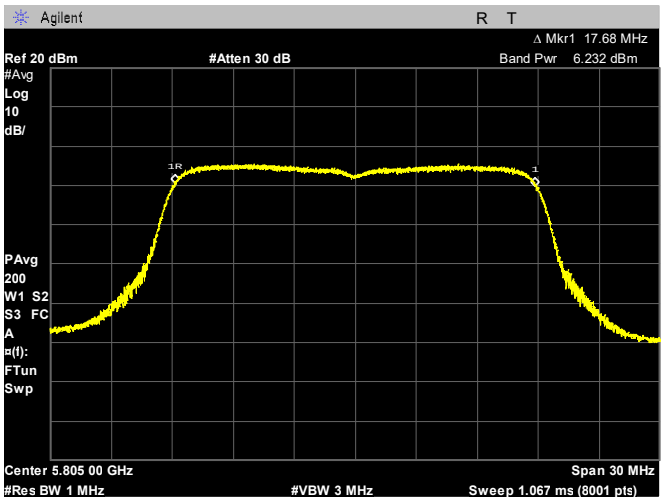
Lowest Channel (5 745 MHz), Chain 1



Middle Channel (5 785 MHz), Chain 1

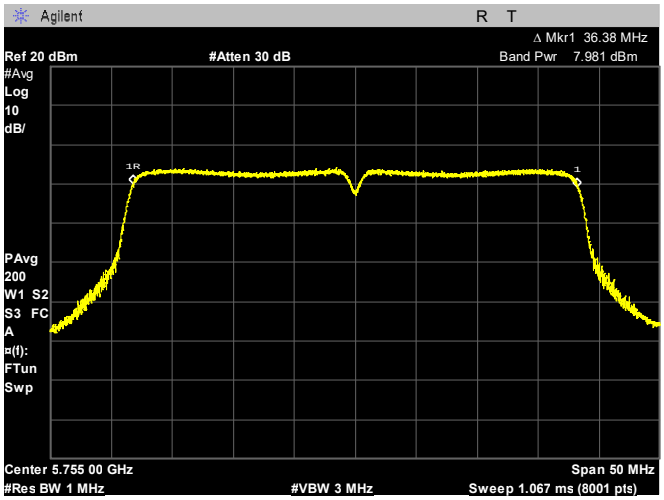


Highest Channel (5 805 MHz), Chain 1

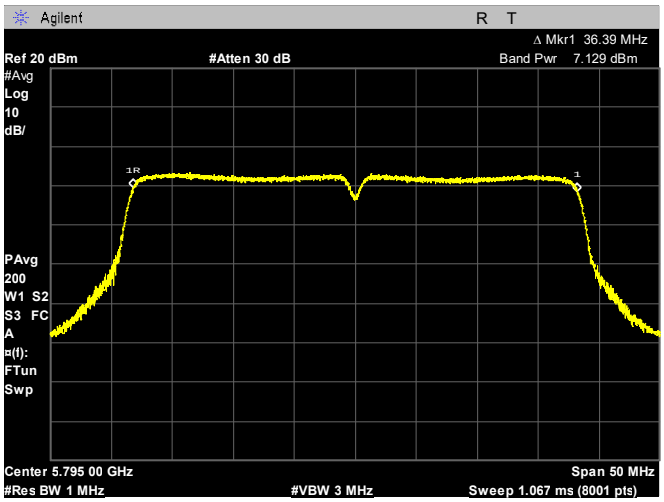


802.11n(40 MHz) mode _2TX

Lowest Channel (5 755 MHz), Chain 0

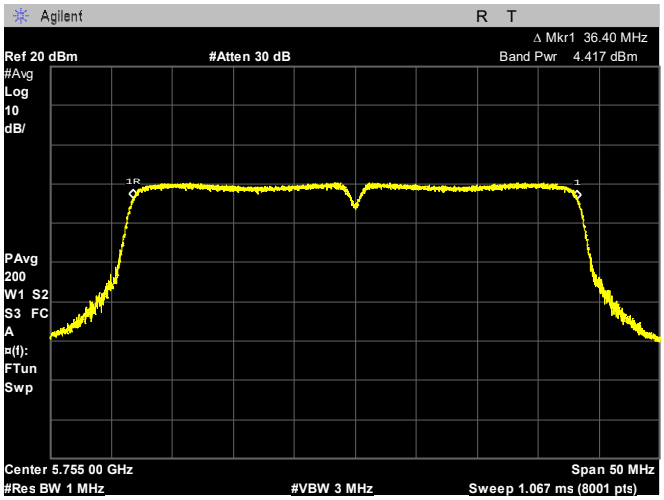


Highest Channel (5 795 MHz), Chain 0

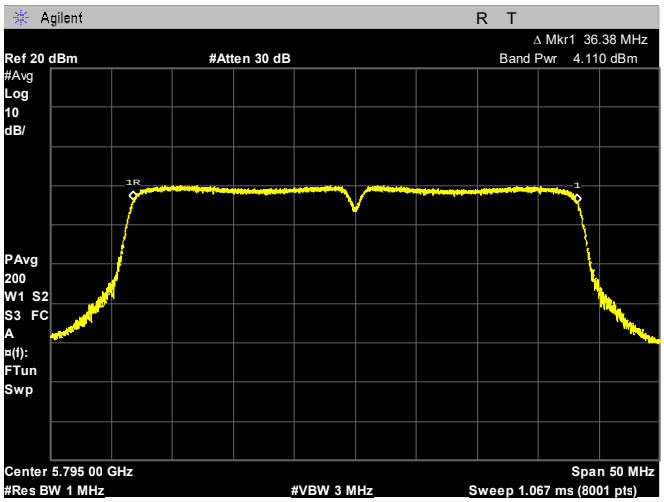


802.11n(40 MHz) mode _2TX

Lowest Channel (5 755 MHz), Chain 1

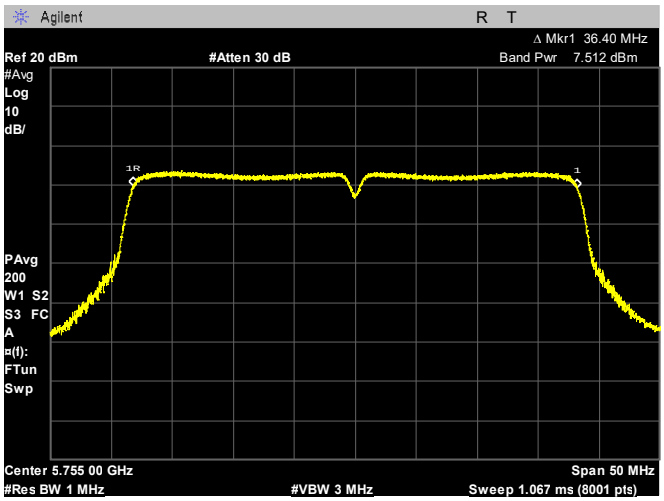


Highest Channel (5 795 MHz), Chain 1

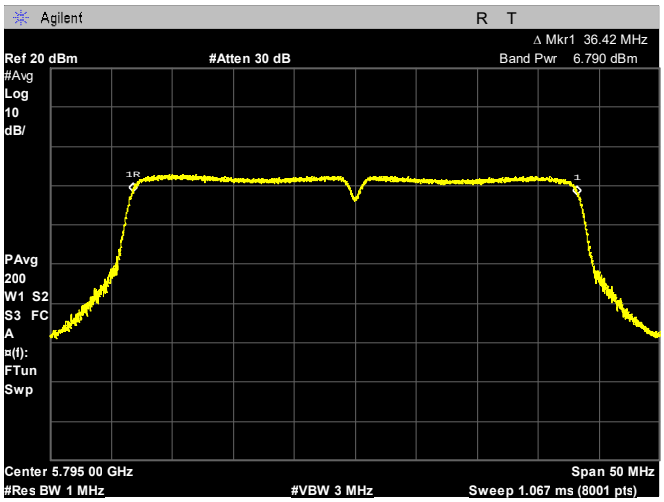


802.11ac(40 MHz) mode _2TX

Lowest Channel (5 755 MHz), Chain 0

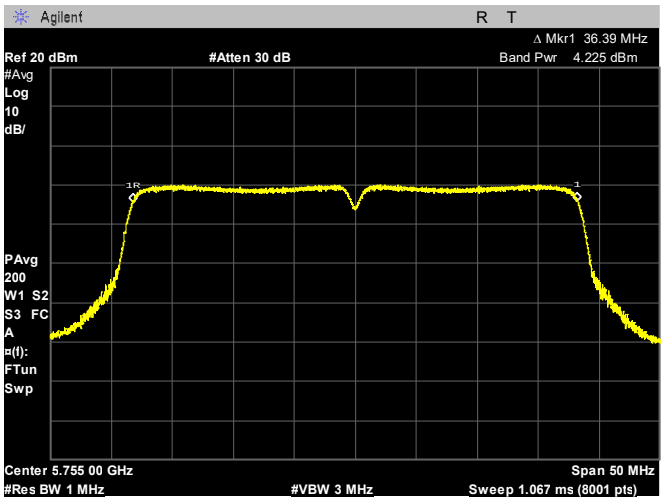


Highest Channel (5 795 MHz), Chain 0

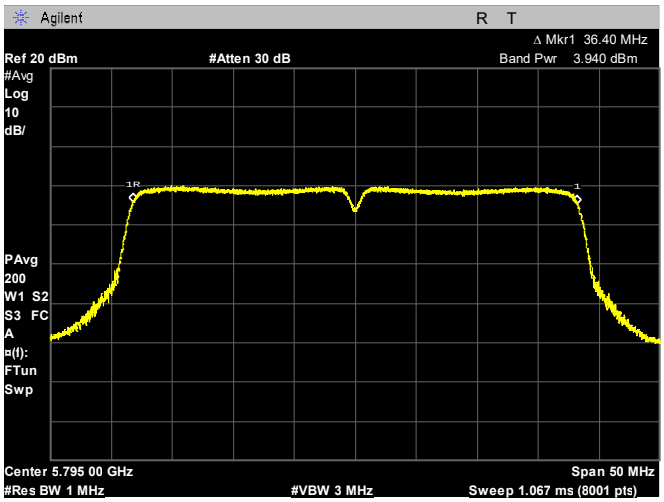


802.11ac(40 MHz) mode _2TX

Lowest Channel (5 755 MHz), Chain 1

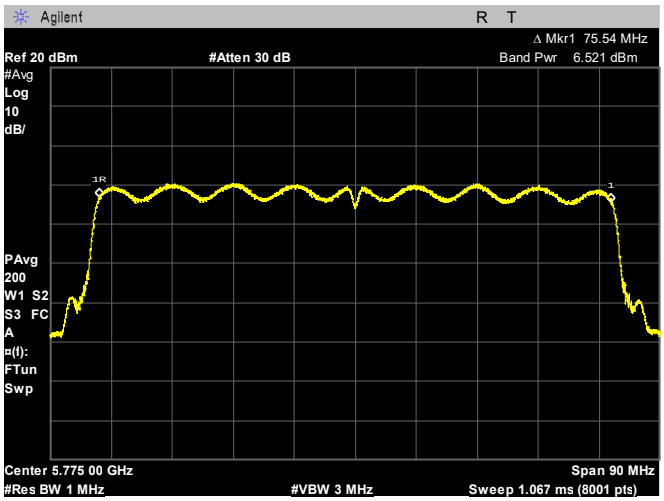


Highest Channel (5 795 MHz), Chain 1

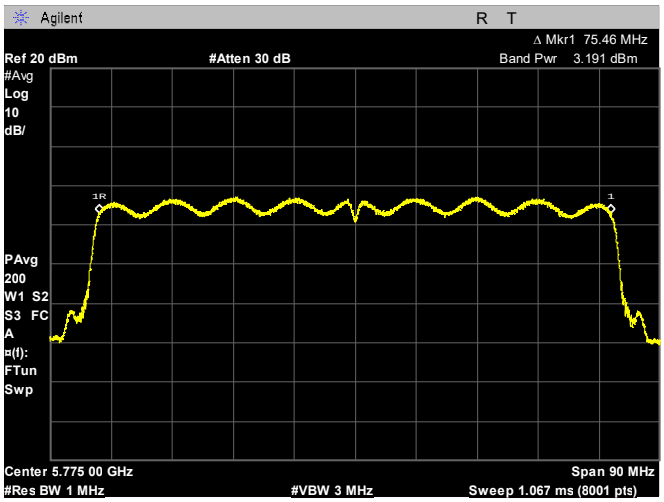


802.11ac(80 MHz) mode _2TX

Middle Channel (5 775 MHz), Chain 0



Middle Channel (5 775 MHz), Chain 1



7.3 Power Spectral Density

7.3.1 Power Spectral Density – U-NII-1 Band

FCC §15.407(a)
RSS-247(6.2)

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

Result

802.11a mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
36	5 180	4.62	0.32	4.94	11.00	5.64	10.00
44	5 220	4.37	0.32	4.69	11.00	5.39	10.00
48	5 240	4.35	0.32	4.67	11.00	5.37	10.00

802.11n(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
36	5 180	4.45	0.34	4.79	11.00	5.49	10.00
44	5 220	3.98	0.34	4.32	11.00	5.02	10.00
48	5 240	4.10	0.34	4.44	11.00	5.14	10.00

802.11ac(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
36	5 180	4.17	1.17	5.34	11.00	6.04	10.00
44	5 220	4.05	1.17	5.22	11.00	5.92	10.00
48	5 240	3.93	1.14	5.07	11.00	5.77	10.00

802.11n(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
38	5 190	-1.34	1.68	0.34	11.00	1.04	10.00
46	5 230	-1.00	1.68	0.68	11.00	1.38	10.00

802.11ac(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
38	5 190	-0.97	1.65	0.68	11.00	1.38	10.00
46	5 230	-1.22	1.63	0.41	11.00	1.11	10.00

802.11ac(80 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
42	5 210	-5.16	2.10	-3.06	11.00	-2.36	10.00

802.11n(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
				Total PSD			
36	5 180	2.64	0.34	5.99	11.00	6.69	10.00
44	5 220	1.77	0.34	5.12	11.00	5.82	10.00
48	5 240	1.65	0.34	5.00	11.00	5.70	10.00

802.11ac(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz) Total PSD	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
36	5 180	1.98	1.17	6.16	11.00	6.86	10.00
44	5 220	1.74	1.17	5.92	11.00	6.62	10.00
48	5 240	1.46	1.14	5.61	11.00	6.31	10.00

802.11n(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz) Total PSD	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
38	5 190	-3.59	1.68	1.10	11.00	1.80	10.00
46	5 230	-4.06	1.68	0.63	11.00	1.33	10.00

802.11ac(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz) Total PSD	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
38	5 190	-4.18	1.65	0.48	11.00	1.18	10.00
46	5 230	-4.18	1.63	0.46	11.00	1.16	10.00

802.11ac(80 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz) Total PSD	FCC Limit (dBm/MHz)	E.I.R.P (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
42	5 210	-4.98	2.10	-2.88	11.00	-2.18	10.00

Notes:

1. The following equation was used for spectrum offset:
   Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)
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 = Measured PSD + duty factor + 10 log(N_{ANT})

3. For CDD transmission, directional gain is. ***3.71 dBi.*** *For MIMO transmission, directional gain is* ***0.7 dBi.***
Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
For PSD measurements on all devices employing CDD, directional gain is as follows,

Directional gain = G_{ANT} + Array Gain = 0.7 dBi + 3.01 dB = 3.71 dBi

Array Gain = 10 log(N_{ANT}/N_{SS}) dB = 10 log(2/1) = 3.01 dB.

where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi.

For CDD mode of this device, N_{SS}=1.

For PSD measurements on all devices employing MIMO, directional gain is as follows,

***Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 0.7 dBi + 10 log(2/2) dB = 0.7 dBi**.*

where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi

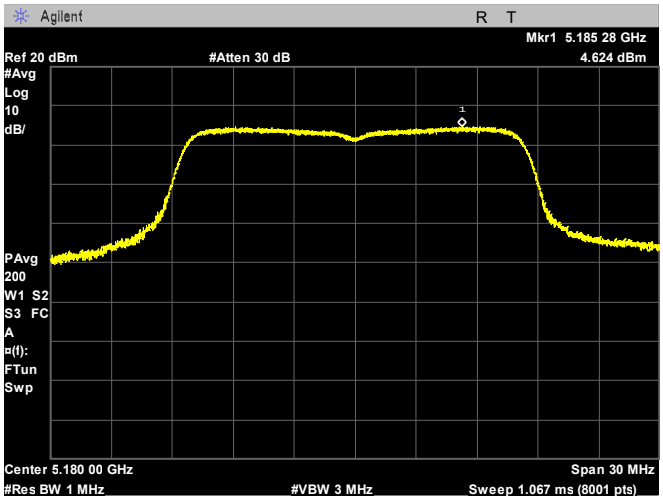
For this device, MIMO mode means SM-MIMO(Spatial Multiplexing) transmission and N_{SS}=2.

4. For FCC PSD Limit, if transmitting antennas of directional gain greater than 6 dBi was used, maximum pwer spectral density was reduced by amount in dB that the directional gain of the antenna exceeds 6 dBi.

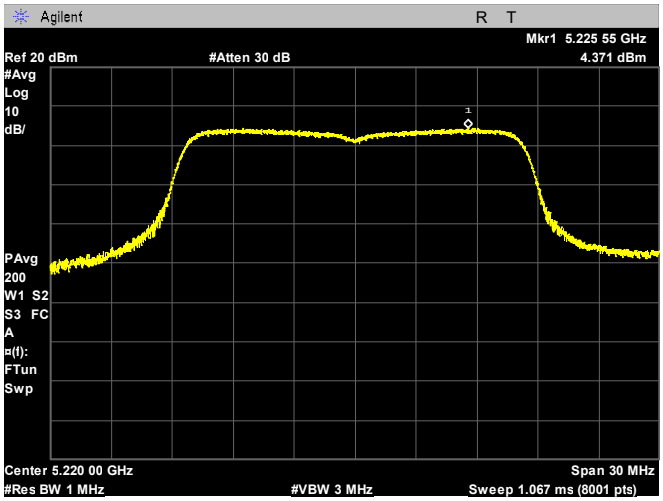
PLOTS OF EMISSIONS

802.11a mode 1Tx

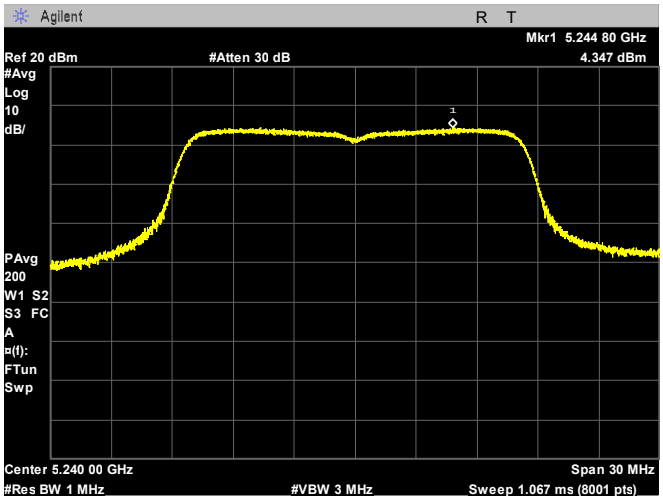
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

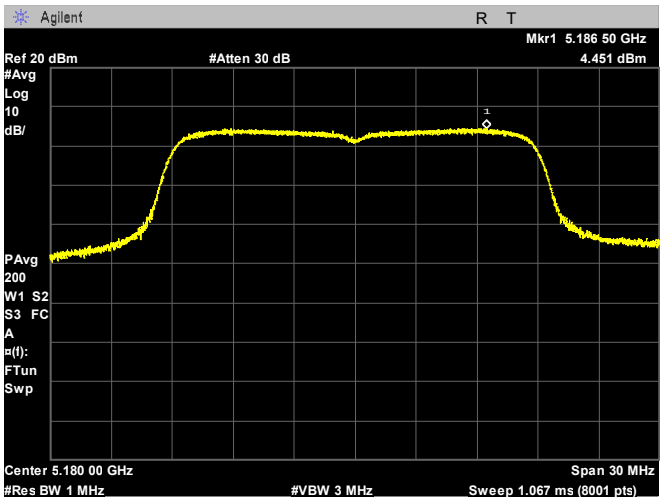


Highest Channel (5 240 MHz)

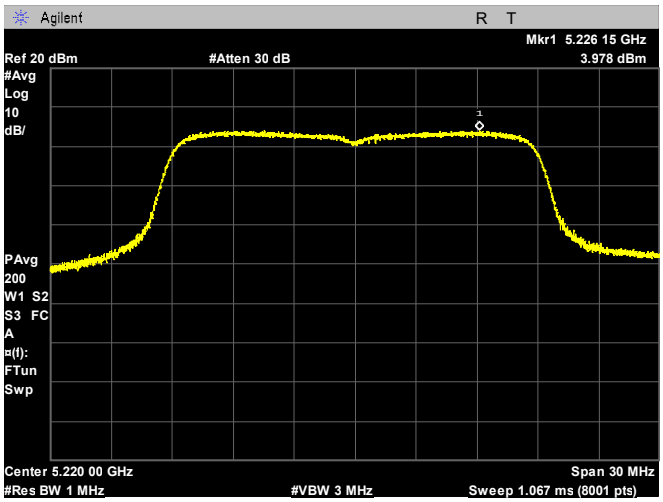


802.11n(20 MHz) mode 1Tx

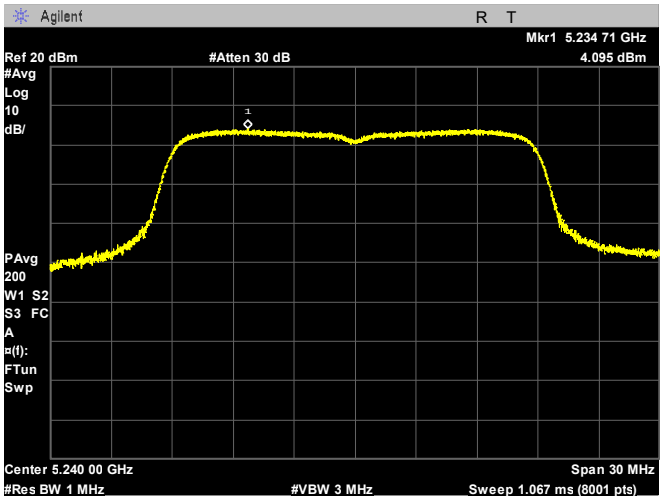
Lowest Channel (5 180 MHz)



Middle Channel (5 220 MHz)

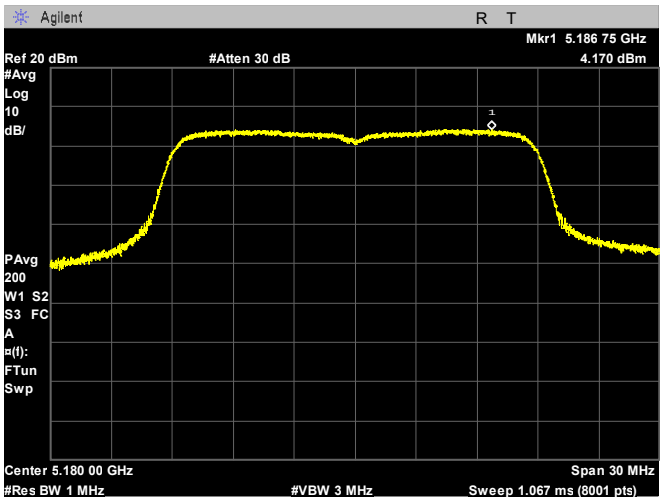


Highest Channel (5 240 MHz)

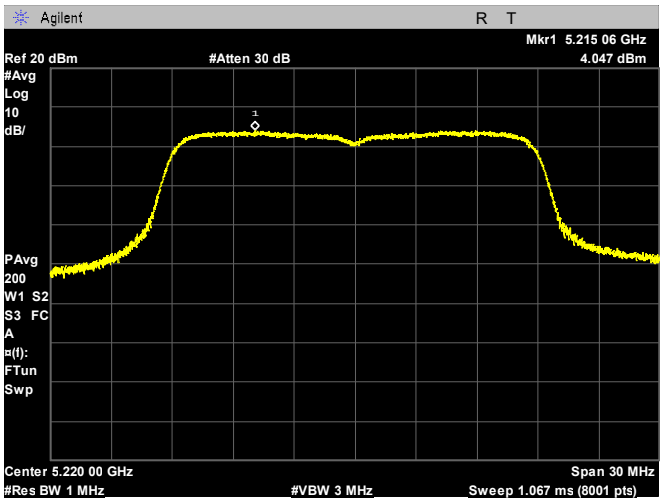


802.11ac(20 MHz) mode 1Tx

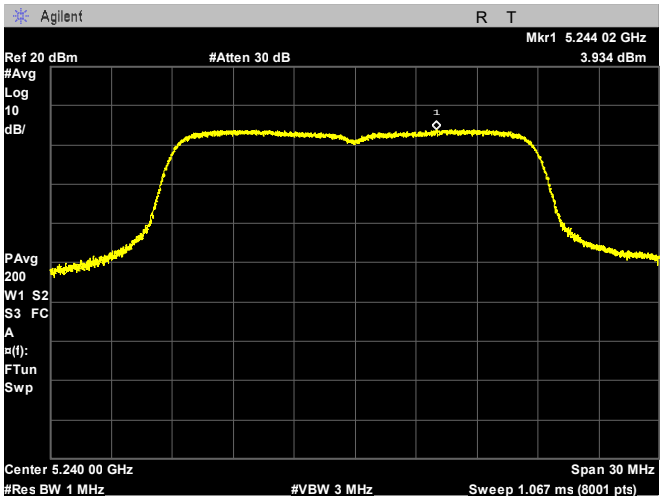
Lowest Channel (5 180MHz)



Middle Channel (5 220 MHz)

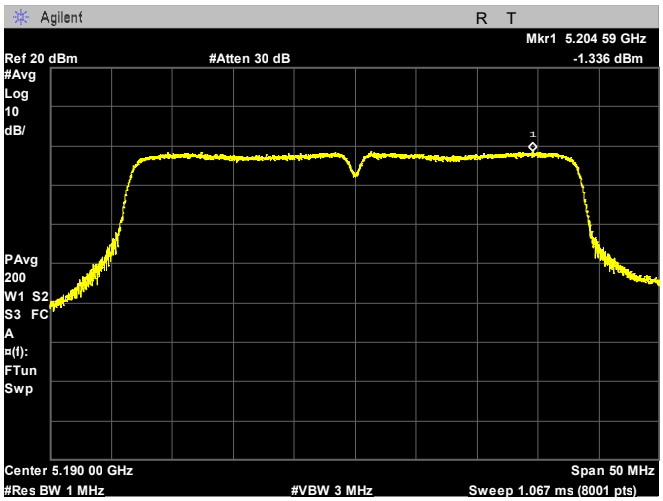


Highest Channel (5 240 MHz)

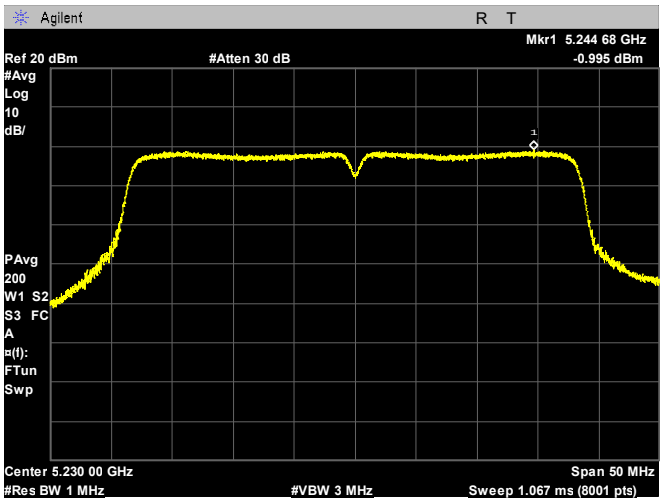


802.11n(40 MHz) mode 1Tx

Lowest Channel (5 190 MHz)

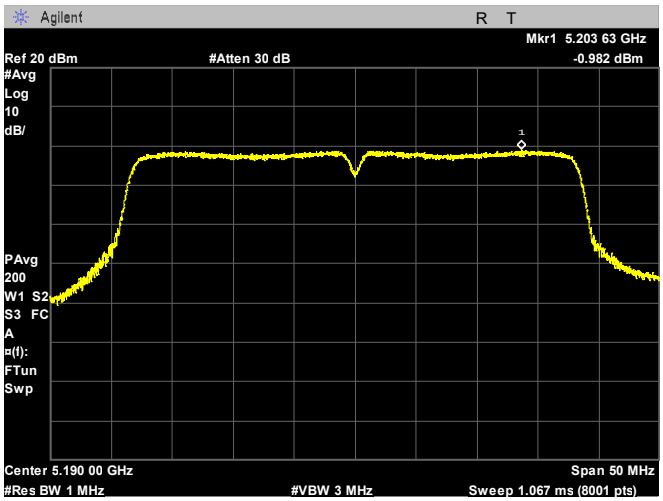


Highest Channel (5 230 MHz)

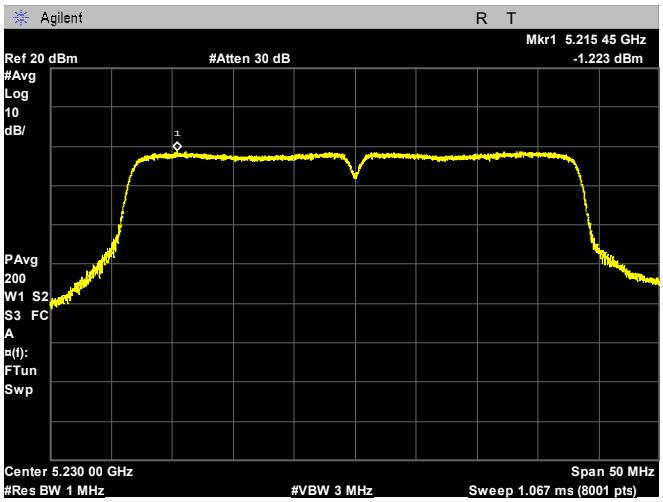


802.11ac(40 MHz) mode 1Tx

Lowest Channel (5 190 MHz)

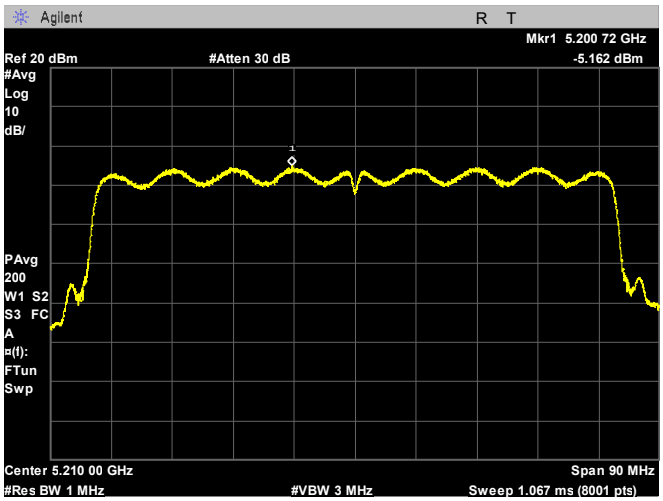


Highest Channel (5 230 MHz)



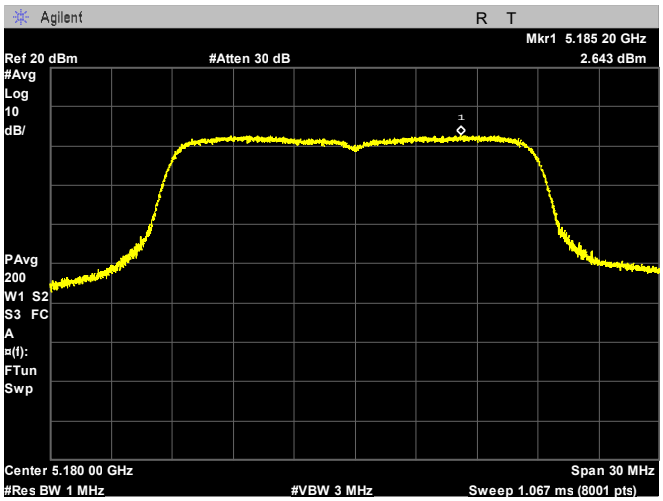
802.11ac(80 MHz) mode 1Tx

Middle Channel (5 210 MHz)

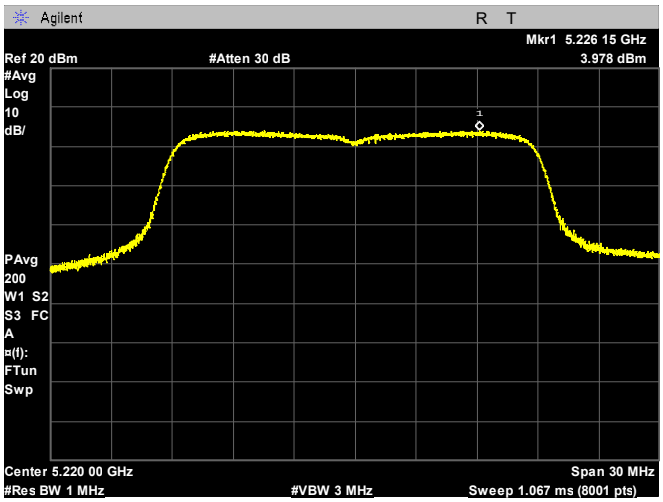


802.11n(20 MHz) mode 2Tx

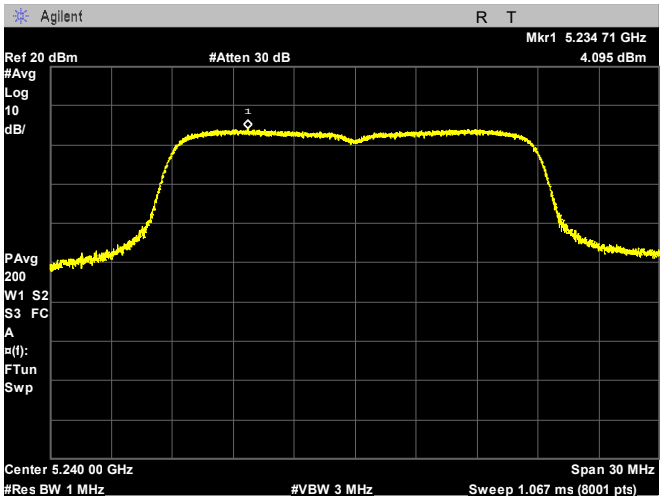
Lowest Channel (5 180 MHz), Chain 0



Middle Channel (5 220 MHz), Chain 0

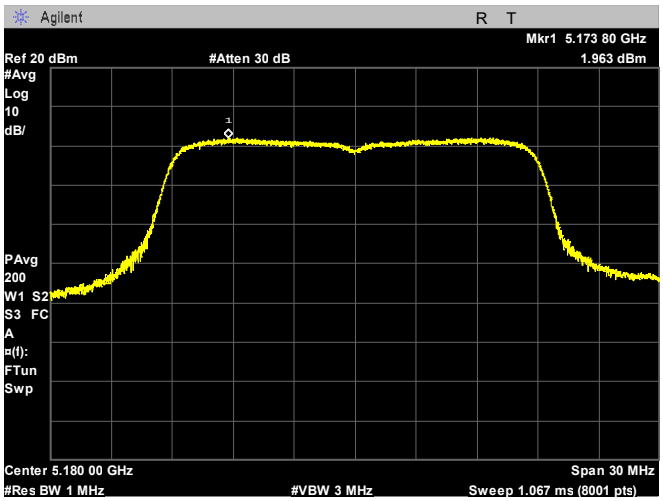


Highest Channel (5 240 MHz), Chain 0

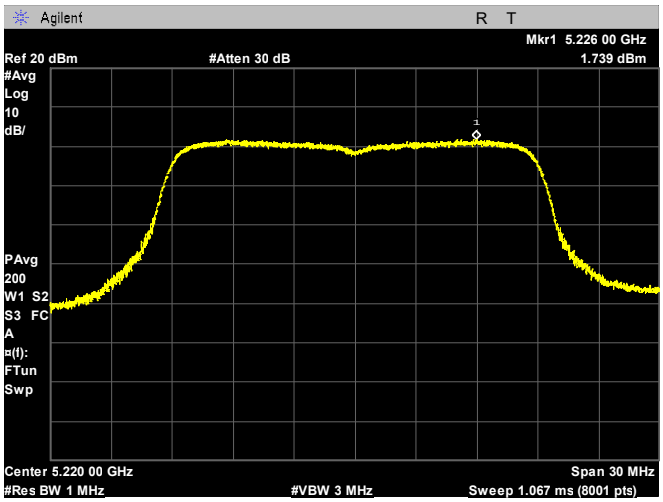


802.11ac(20 MHz) mode 2Tx

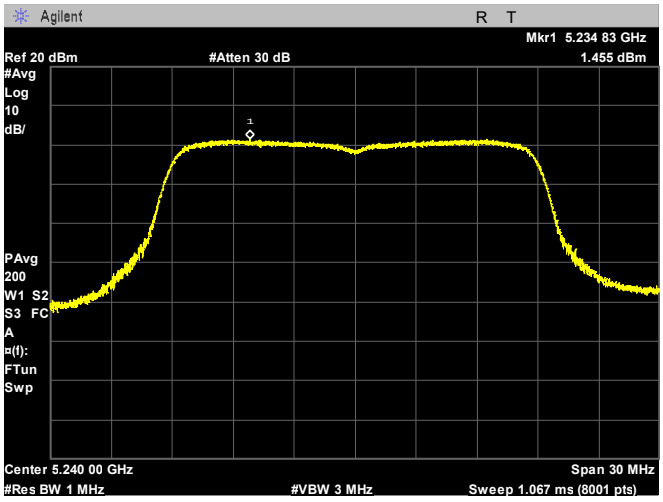
Lowest Channel (5 180 MHz), Chain 0



Middle Channel (5 220 MHz), Chain 0

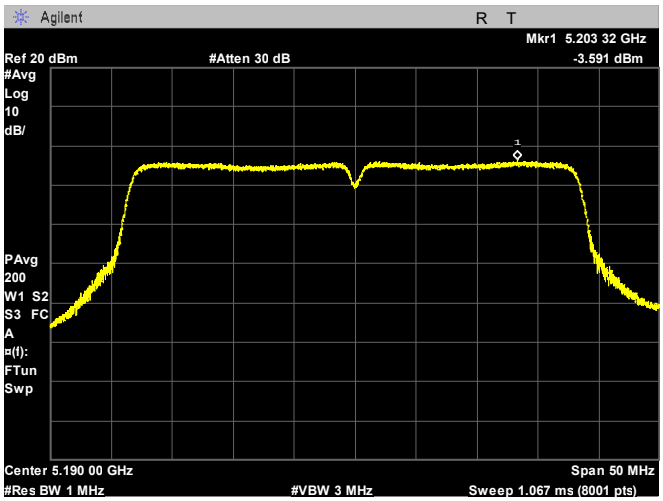


Highest Channel (5 240 MHz), Chain 0

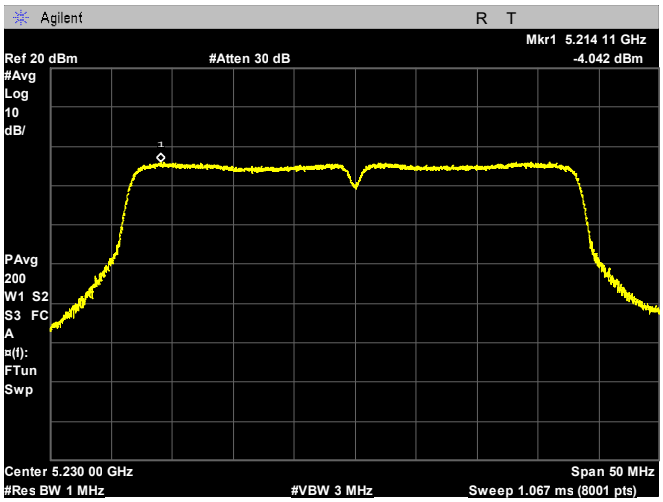


802.11n(40 MHz) mode 2Tx

Lowest Channel (5 190 MHz), Chain 0

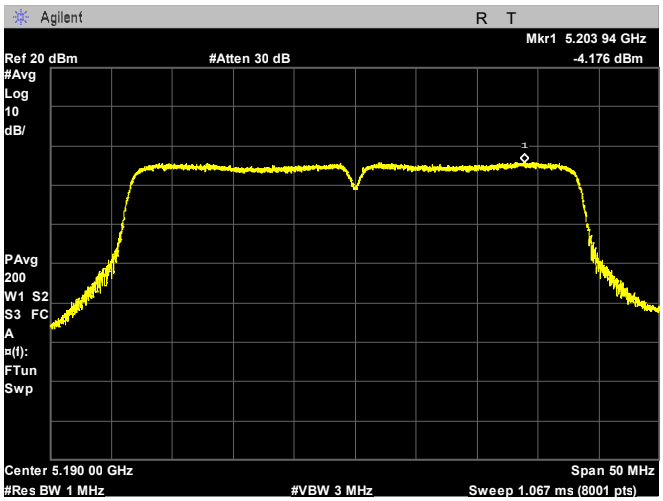


Highest Channel (5 230 MHz), Chain 0

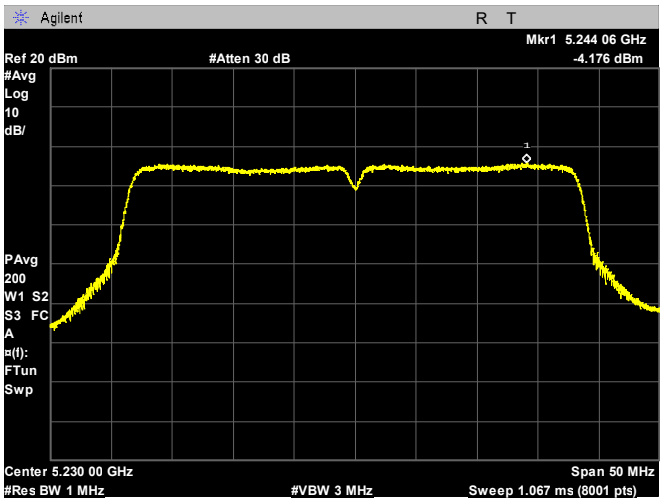


802.11ac(40 MHz) mode 2Tx

Lowest Channel (5 190 MHz), Chain 0

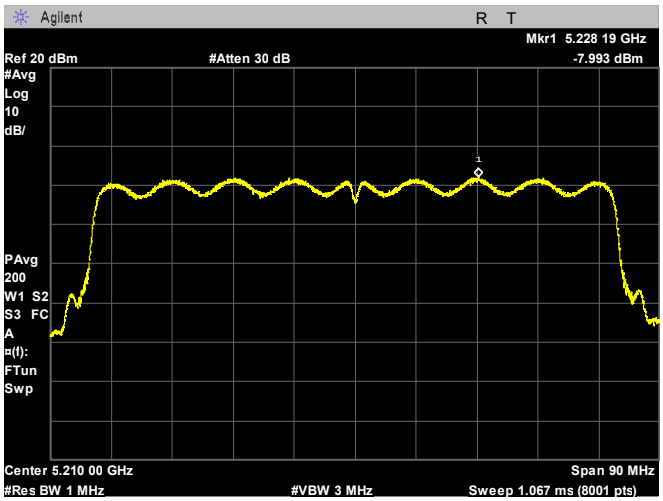


Highest Channel (5 230 MHz), Chain 0



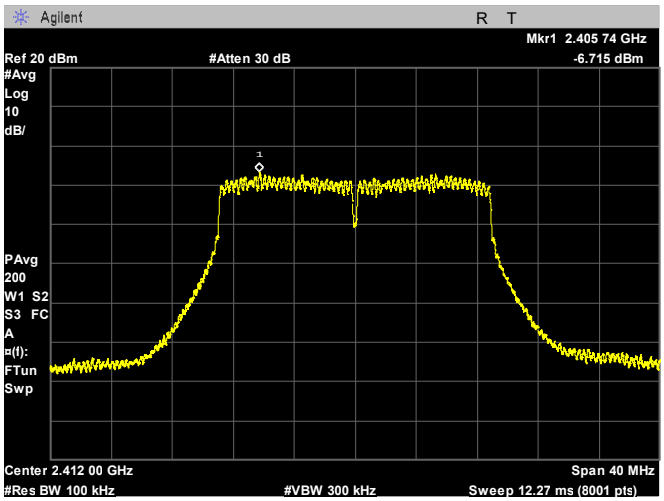
802.11ac(80 MHz) mode 2Tx

Middle Channel (5 210 MHz), Chain 0

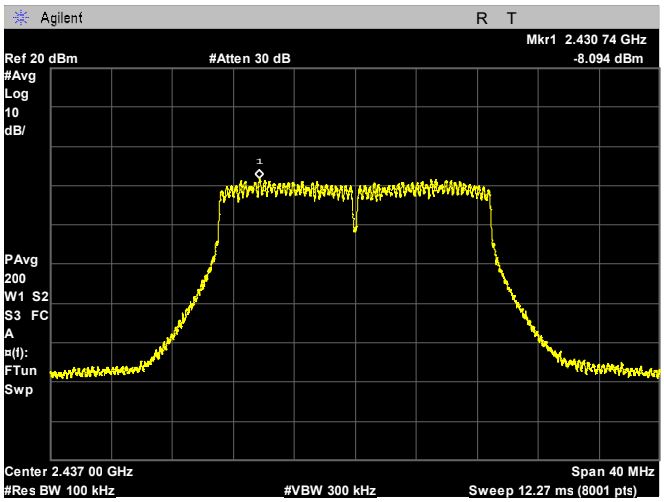


802.11n(20 MHz) mode 2Tx

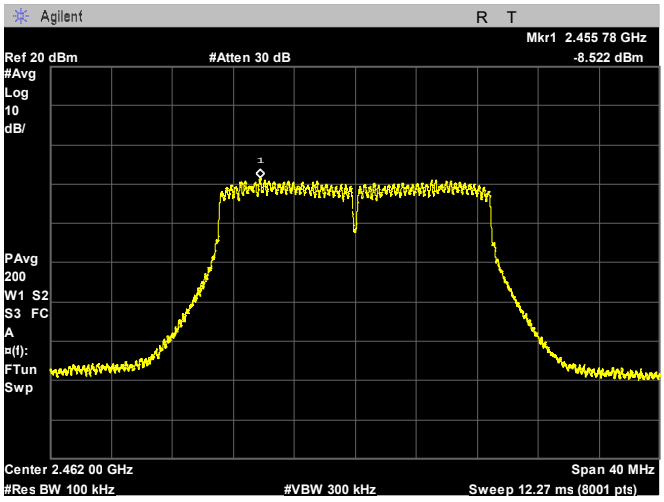
Lowest Channel (2 412 MHz)



Middle Channel (2 437 MHz)

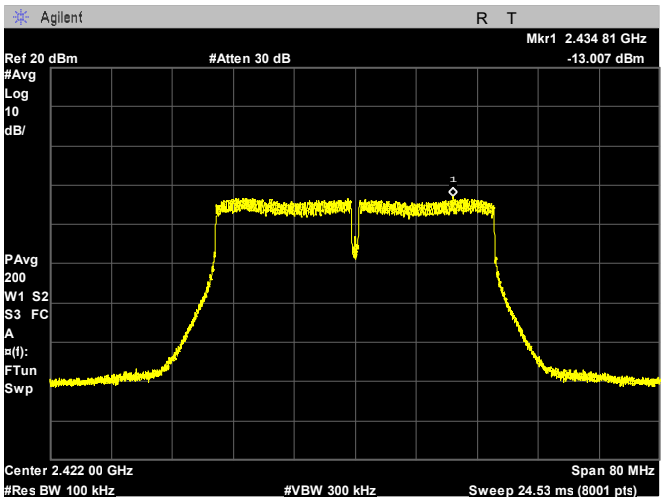


Highest Channel (2 462 MHz)

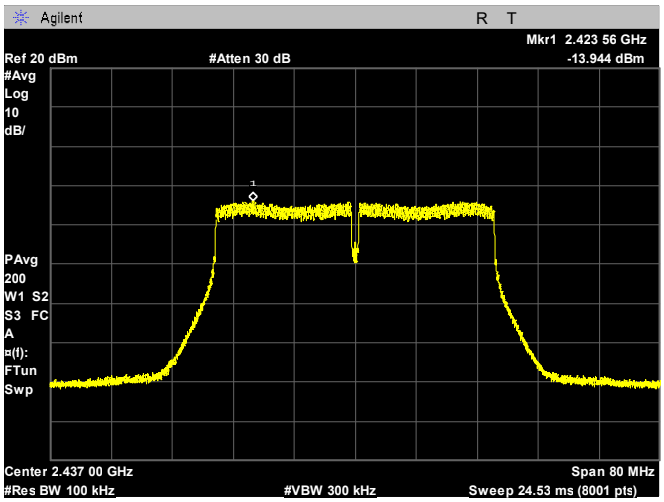


802.11n(40 MHz) mode 2Tx

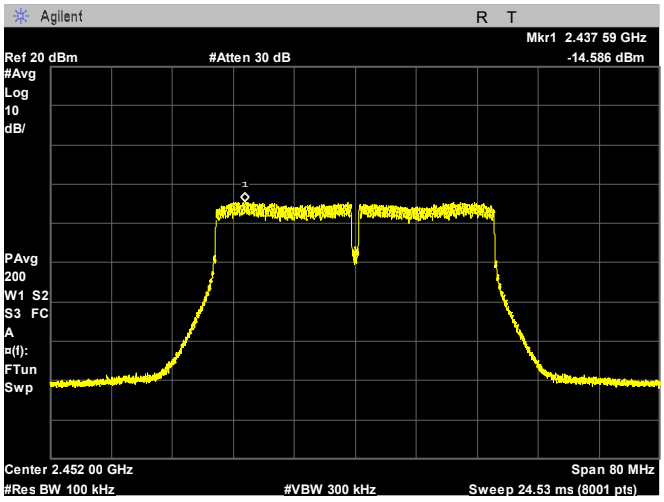
Lowest Channel (2 422 MHz)



Middle Channel (2 437 MHz)



Highest Channel (2 452 MHz)



7.3.2 Power Spectral Density – U-NII-3 Band

FCC §15.407(a)
RSS-247(6.2)

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

Result

802.11a mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor (dB)	Maximum PSD (dBm/500kHz)	FCC Limit (dBm/500kHz)	IC Limit (dBm/500kHz)
140	5 745	-0.14	0.47	0.33	30.00	30.00
157	5 785	-0.75	0.47	-0.28	30.00	30.00
161	5 805	-1.35	0.47	-0.88	30.00	30.00

802.11n(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor (dB)	Maximum PSD (dBm/500kHz)	FCC Limit (dBm/500kHz)	IC Limit (dBm/500kHz)
140	5 745	-0.67	0.62	-0.05	30.00	30.00
157	5 785	-1.14	0.62	-0.52	30.00	30.00
161	5 805	-1.54	0.62	-0.92	30.00	30.00

802.11ac(20 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor (dB)	Maximum PSD (dBm/500kHz)	FCC Limit (dBm/500kHz)	IC Limit (dBm/500kHz)
140	5 745	-0.91	0.34	-0.57	30.00	30.00
157	5 785	-1.49	0.34	-1.15	30.00	30.00
161	5 805	-1.73	0.34	-1.40	30.00	30.00

802.11n(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor (dB)	Maximum PSD (dBm/500kHz)	FCC Limit (dBm/500kHz)	IC Limit (dBm/500kHz)
151	5 755	-7.06	1.68	-5.38	30.00	30.00
159	5 795	-7.36	1.68	-5.68	30.00	30.00

802.11ac(40 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor (dB)	Maximum PSD (dBm/500kHz)	FCC Limit (dBm/500kHz)	IC Limit (dBm/500kHz)
151	5 755	-7.16	1.72	-5.44	30.00	30.00
159	5 795	-7.24	1.68	-5.56	30.00	30.00

802.11ac(80 MHz) mode_1Tx

Ch	Frequency (MHz)	Measured PSD (dBm/500kHz)	Duty Factor (dB)	Maximum PSD (dBm/500kHz)	FCC Limit (dBm/500kHz)	IC Limit (dBm/500kHz)
155	5 775	-10.27	2.10	-8.17	30.00	30.00

802.11n(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
				Total PSD		
140	5 745	-2.52	0.62	1.11	30.00	30.00
157	5 785	-4.05	0.62	-0.42	30.00	30.00
161	5 805	-4.22	0.62	-0.59	30.00	30.00

802.11ac(20 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
				Total PSD		
140	5 745	-3.40	0.34	-0.05	30.00	30.00
157	5 785	-4.11	0.34	-0.76	30.00	30.00
161	5 805	-4.54	0.34	-1.20	30.00	30.00

802.11n(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
				Total PSD		
151	5 755	-8.93	1.68	-4.24	30.00	30.00
159	5 795	-9.74	1.68	-5.05	30.00	30.00

802.11ac(40 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
				Total PSD		
151	5 755	-9.55	1.72	-4.82	30.00	30.00
159	5 795	-10.01	1.68	-5.32	30.00	30.00

802.11ac(80 MHz) mode_2Tx

Ch	Frequency (MHz)	Measured PSD (dBm/MHz)	Duty Factor (dB)	Maximum PSD (dBm/MHz)	FCC Limit (dBm/MHz)	IC E.I.R.P Limit (dBm/MHz)
				Total PSD		
155	5 775	-12.20	2.10	-7.09	30.00	30.00

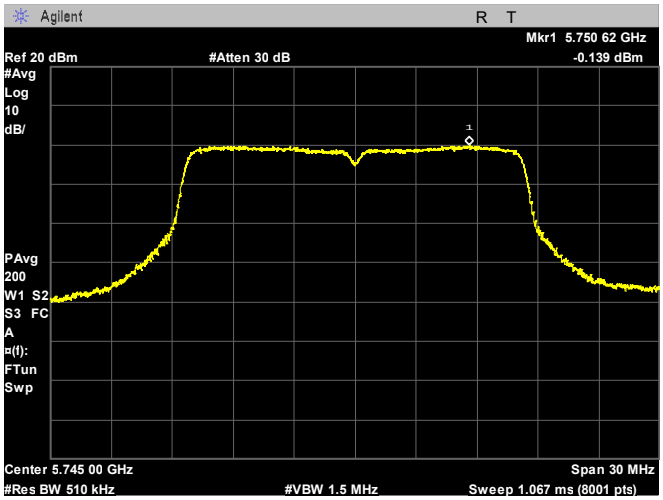
Notes:
1. The following equation was used for spectrum offset:
Spectrum offset (dB) = Attenuator (dB) + Cable Loss (dB) + SMA Type Connector Loss (dB)

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 = Measured PSD + duty factor + 10 log(N_{ANT})
3. For CDD transmission, directional gain is. **4.11 dBi.** For MIMO transmission, directional gain is **1.1 dBi.**
   Directional gain was calculated according to KDB662911 D01 Multiple Transmitter Output v02r01.
   For PSD measurements on all devices employing CDD, directional gain is as follows,
   Directional gain = G_{ANT} + Array Gain = 1.1 dBi + 3.01 dB = 4.11 dBi
   Array Gain = 10 log(N_{ANT}/N_{SS}) dB = 10 log(2/1) = 3.01 dB.
   where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi.
   For CDD mode of this device, N_{SS}=1.
   For PSD measurements on all devices employing MIMO, directional gain is as follows,
   Directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi = 1.1 dBi + 10 log(2/2) dB = 1.1 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 N_{SS}=2.
4. For FCC PSD Limit, if transmitting antennas of directional gain greater than 6 dBi was used, maximum pwer spectral density was reduced by amount in dB that the directional gain of the antenna exceeds 6 dBi.

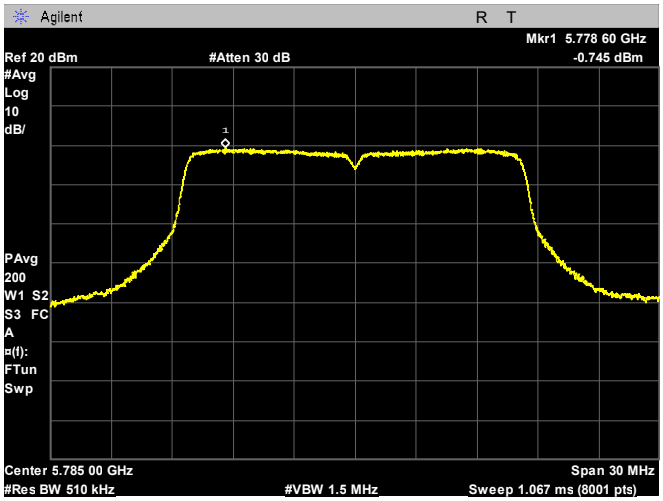
PLOTS OF EMISSIONS

802.11a mode 1Tx

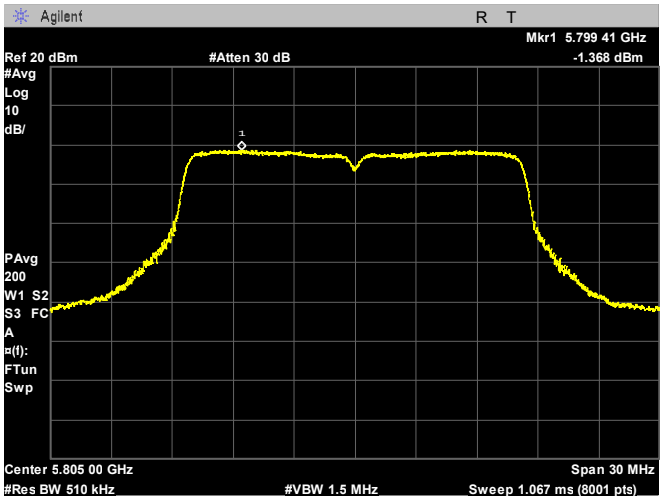
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

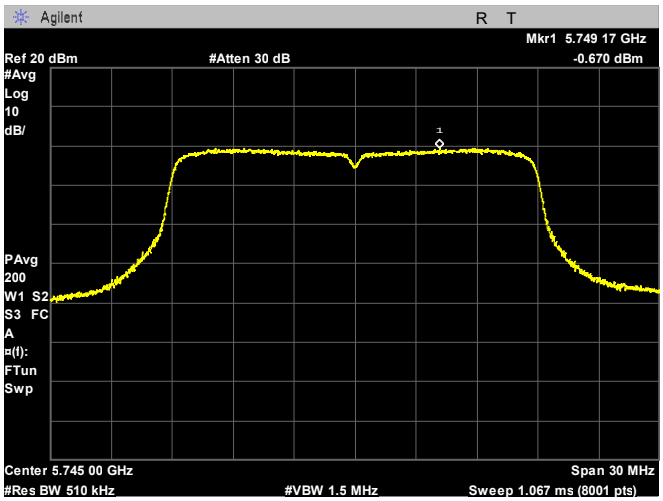


Highest Channel (5 805 MHz)

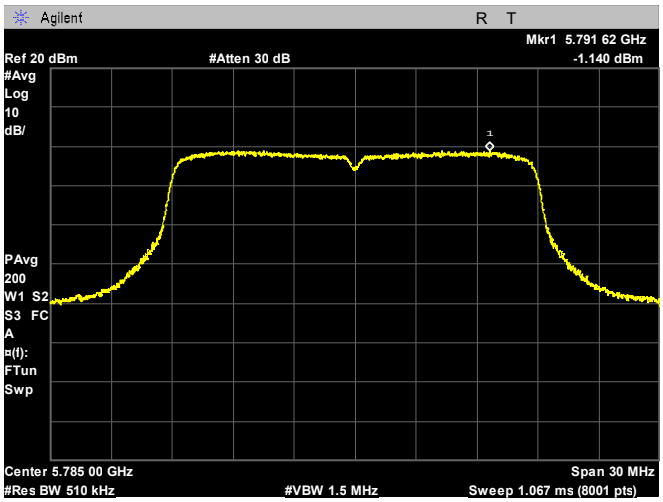


802.11n(20 MHz) mode 1Tx

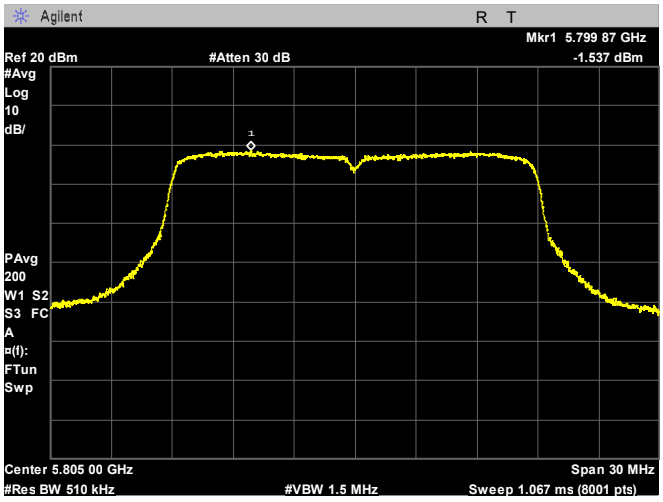
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

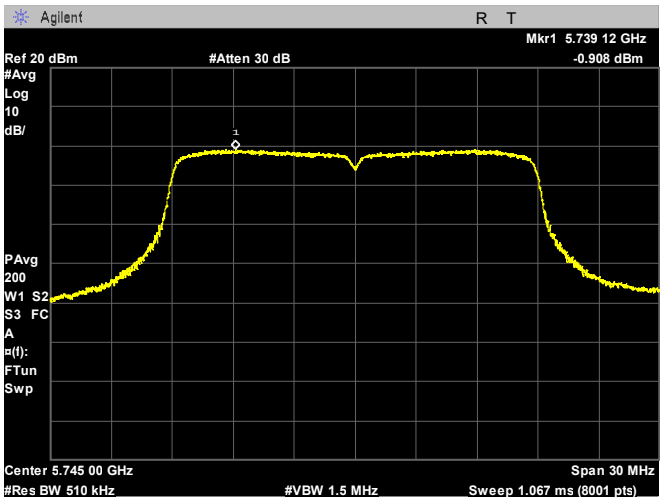


Highest Channel (5 805 MHz)

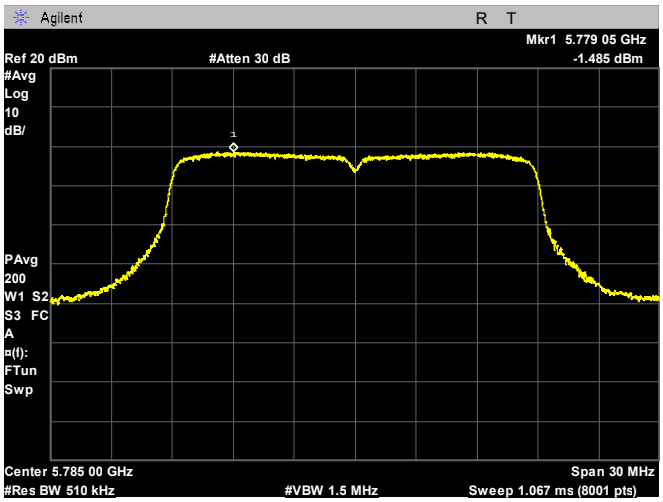


802.11ac(20 MHz) mode 1Tx

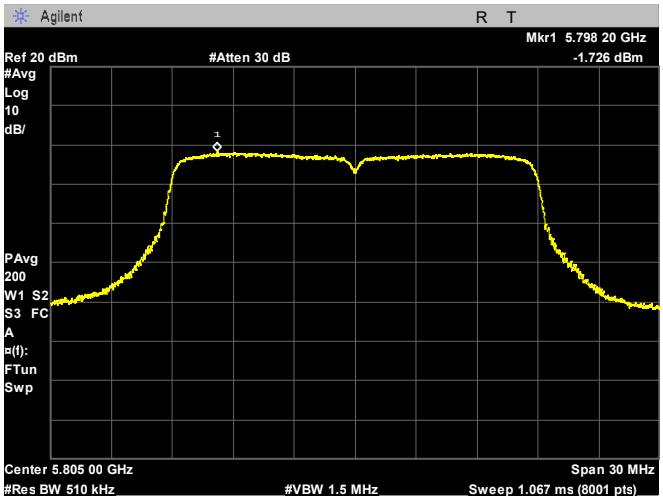
Lowest Channel (5 745 MHz)



Middle Channel (5 785 MHz)

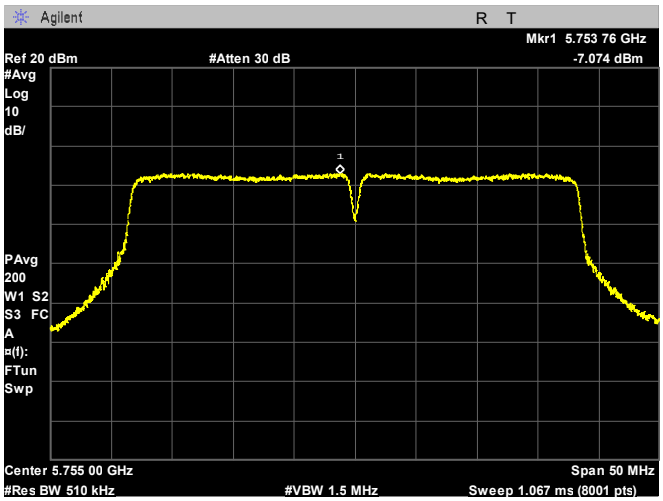


Highest Channel (5 805 MHz)

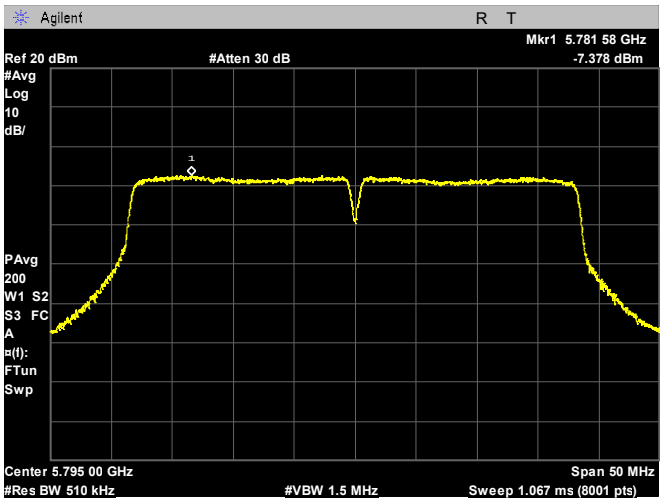


802.11n(40 MHz) mode 1Tx

Lowest Channel (5 755 MHz)

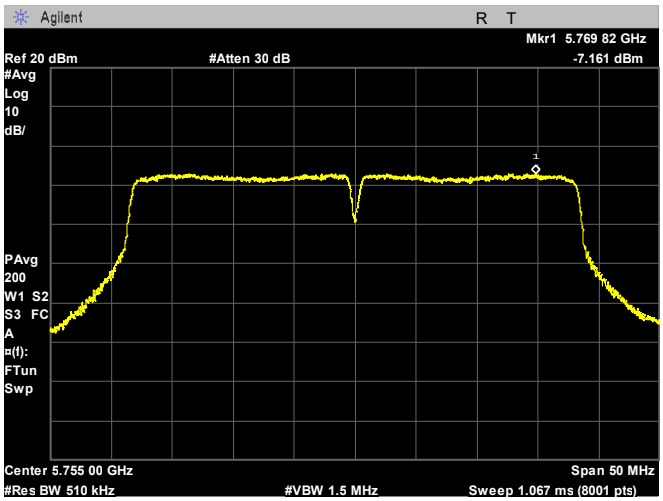


Highest Channel (5 795 MHz)

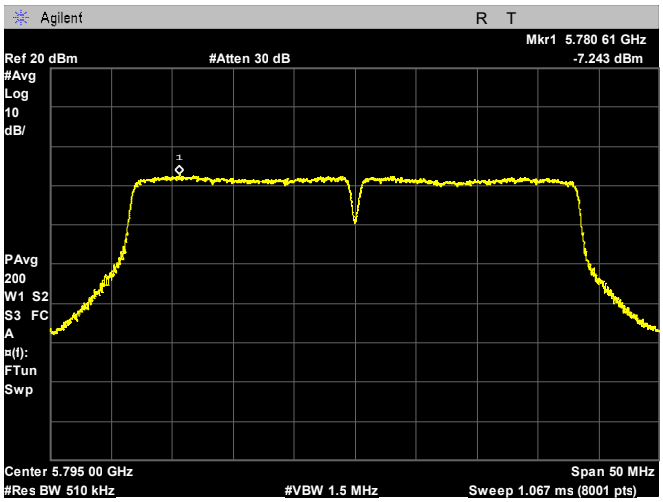


802.11ac(40 MHz) mode 1Tx

Lowest Channel (5 755 MHz)

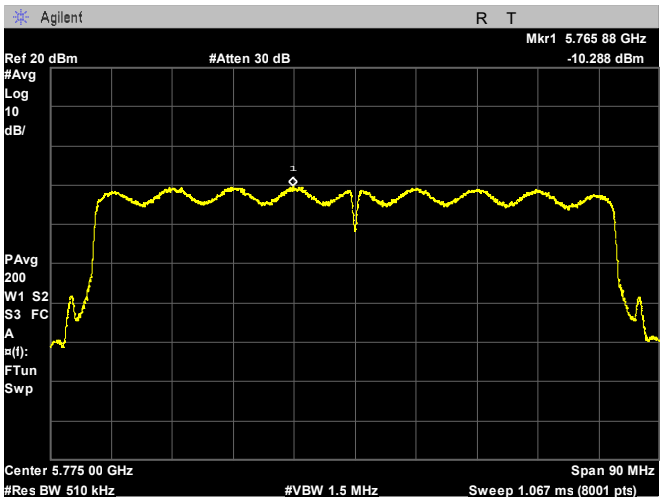


Highest Channel (5 795 MHz)



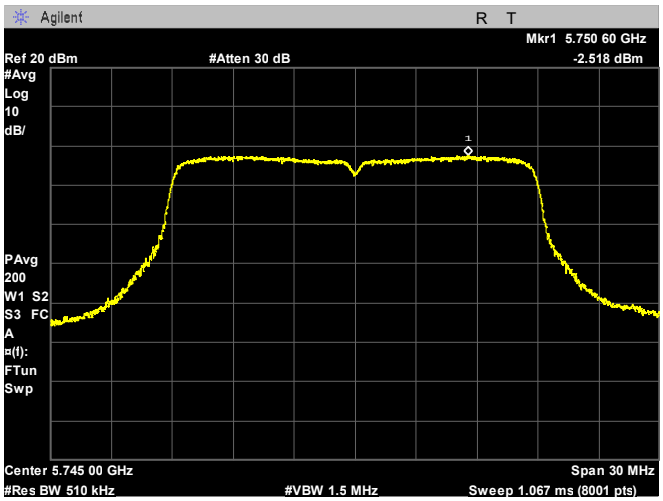
802.11ac(80 MHz) mode 1Tx

Middle Channel (5 775 MHz)

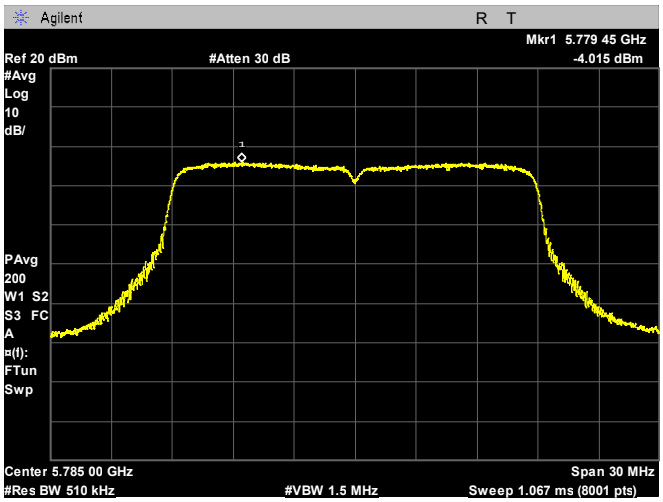


802.11n(20 MHz) mode 2Tx

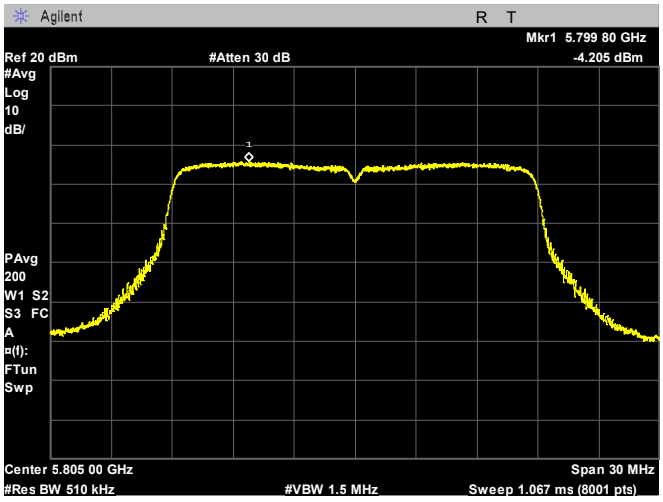
Lowest Channel (5 745 MHz), Chain 0



Middle Channel (5 785 MHz), Chain 0

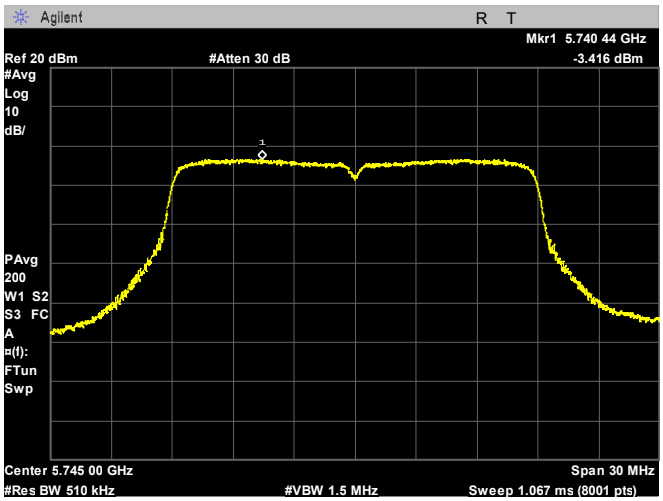


Highest Channel (5 805 MHz), Chain 0

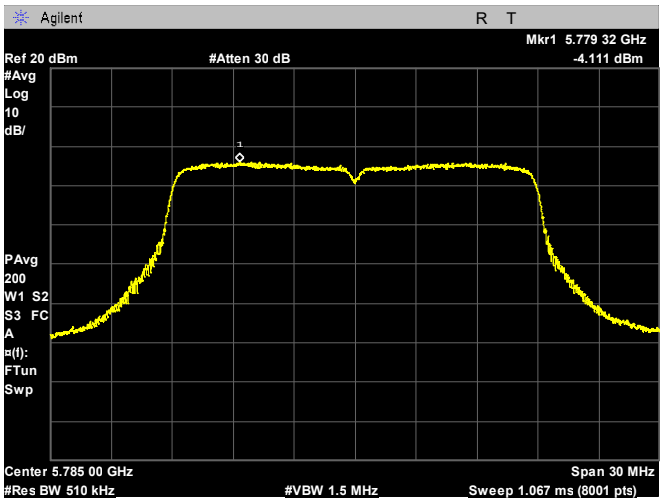


802.11ac(20 MHz) mode 2Tx

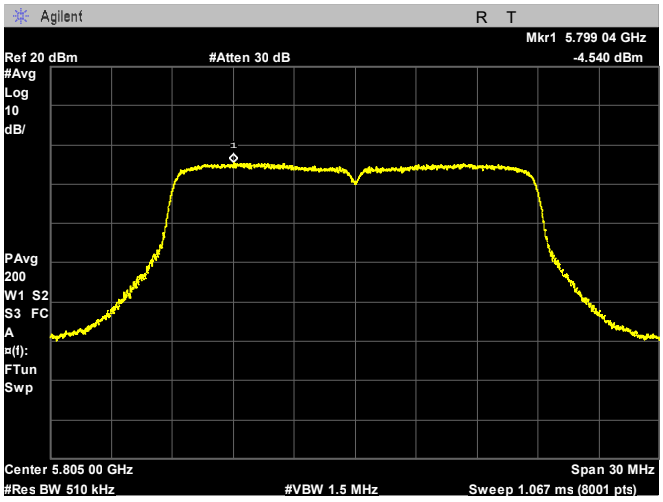
Lowest Channel (5 745 MHz), Chain 0



Middle Channel (5 785 MHz), Chain 0

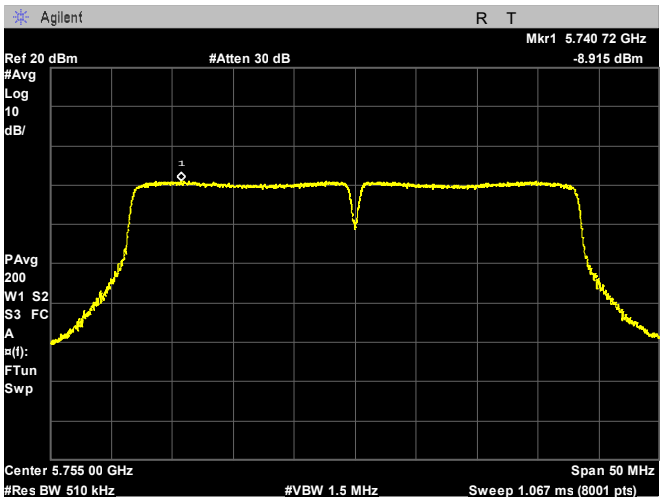


Highest Channel (5 805 MHz), Chain 0

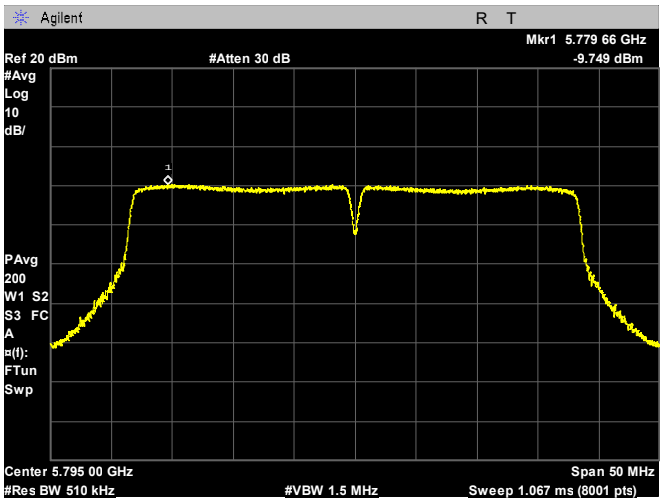


802.11n(40 MHz) mode 2Tx

Lowest Channel (5 755 MHz), Chain 0

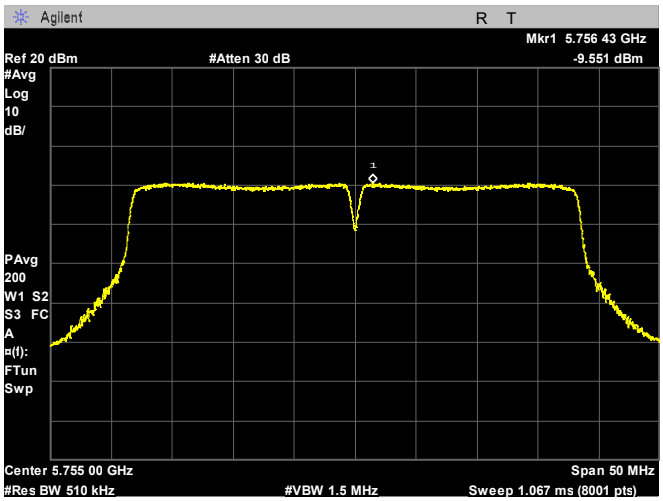


Highest Channel (5 795 MHz), Chain 0

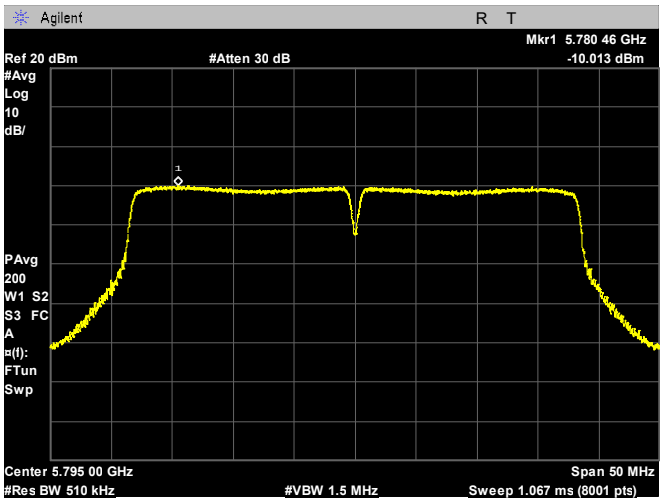


802.11ac(40 MHz) mode 2Tx

Lowest Channel (5 755 MHz), Chain 0

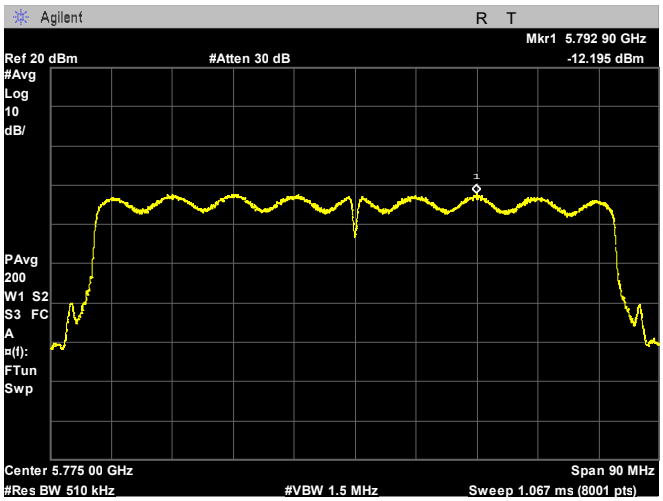


Highest Channel (5 795 MHz), Chain 0



802.11ac(80 MHz) mode 2Tx

Middle Channel (5 775 MHz), Chain 0



7.4 Radiated Spurious Emissions

7.4.1 Radiated Spurious Emissions – U-NII-1 Band

FCC §15.209, §15.407(b)
RSS-Gen (8.9),(8.10), RSS-247 5.5 & 6.2

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

Result

802.11 a mode

Lowest channel *(5 180 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 294.28	55.33	V	PK	-4.3	51.02	68.20	17.18
4 970.05	43.25	H	PK	6.8	50.05	68.20	18.15
***6 906.78	44.90	V	PK	10.1	54.98	68.20	13.22
***6 906.74	39.73	V	AV	10.1	49.81	54.00	4.19
12 533.80	41.34	V	PK	15.7	56.99	68.20	11.21
12 697.68	30.35	V	AV	16.3	46.64	54.00	7.36
17 853.50	35.15	V	PK	18.0	53.16	68.20	15.04
17 913.90	26.42	H	AV	18.2	44.62	54.00	9.38

Middle channel *(5 220 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
***2 164.45	55.31	V	PK	-5.2	50.14	68.20	18.06
4 961.80	42.58	H	PK	6.7	49.30	68.20	18.90
***6 960.12	44.87	V	PK	10.3	55.18	68.20	13.02
***6 960.04	38.95	V	AV	10.3	49.26	54.00	4.74
12 698.44	41.06	V	PK	16.3	57.36	68.20	10.84
12 695.76	30.32	H	AV	16.3	46.60	54.00	7.40
17 887.10	36.76	V	PK	18.1	54.87	68.20	13.33
17 782.13	28.04	H	AV	17.9	45.89	54.00	8.11

Highest channel *(5 240 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
***2 466.55	54.21	V	PK	-3.5	50.69	68.20	17.51
4 783.60	42.80	V	PK	6.2	48.96	68.20	19.24
***6 986.62	44.55	V	PK	10.5	55.04	68.20	13.16
***6 986.70	39.54	V	AV	10.5	50.02	54.00	3.98
12 691.54	41.07	V	PK	16.3	57.32	68.20	10.88
12 692.31	30.37	V	AV	16.3	46.62	54.00	7.38
17 718.30	36.26	V	PK	17.9	54.13	68.20	14.07
17 987.14	27.64	V	AV	18.1	45.78	54.00	8.22

802.11 n(20 MHz) mode

Lowest channel *(5 180 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
***2 192.10	55.19	H	PK	-4.9	50.34	68.20	17.86
4 931.00	43.08	H	PK	6.4	49.46	68.20	18.74
***6 907.06	44.85	V	PK	10.1	54.92	68.20	13.28
***6 906.86	39.86	V	AV	10.1	49.93	54.00	4.07
10 701.66	42.83	H	PK	14.0	56.84	68.20	11.36
12 681.38	30.42	V	AV	16.2	46.59	54.00	7.41
17 952.23	39.05	V	PK	18.2	57.25	68.20	10.95
17 913.90	26.39	H	AV	18.2	44.59	54.00	9.41

Middle channel *(5 220 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 355.28	54.85	V	PK	-4.1	50.76	68.20	17.44
***6 960.24	43.53	V	PK	10.3	53.85	68.20	14.35
***6 960.16	36.07	V	AV	10.3	46.38	54.00	7.62
12 696.53	41.05	V	PK	16.3	57.33	68.20	10.87
12 689.05	30.22	H	AV	16.2	46.45	54.00	7.55
17 773.73	39.34	V	PK	17.8	57.18	68.20	11.02
17 855.63	28.03	H	AV	18.0	46.05	54.00	7.95

Highest channel *(5 240 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 296.40	54.10	V	PK	-4.3	49.82	68.20	18.38
4 770.24	43.29	H	PK	6.1	49.37	68.20	18.83
***6 986.80	43.82	V	PK	10.5	54.30	68.20	13.90
***6 986.84	37.26	V	AV	10.5	47.74	54.00	6.26
11 963.21	41.73	V	PK	15.7	57.41	68.20	10.79
12 692.31	30.52	V	AV	16.3	46.77	54.00	7.23
17 913.64	38.38	H	PK	18.2	56.58	68.20	11.62
17 906.00	27.11	V	AV	18.2	45.28	54.00	8.72

802.11 n(40 MHz) mode

Lowest channel *(5 190 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
***1 993.00	55.40	V	PK	-5.1	50.34	68.20	17.86
***6 920.29	44.37	V	PK	10.1	54.43	68.20	13.77
***6 920.17	38.50	V	AV	10.1	48.56	54.00	5.44
12 689.63	40.77	H	PK	16.2	57.00	68.20	11.20
12 506.58	30.40	V	AV	15.6	46.00	54.00	8.00
17 985.30	35.30	H	PK	18.1	53.44	68.20	14.76
17 907.30	26.66	H	AV	18.2	44.84	54.00	9.16

Highest channel *(5 230 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 312.95	54.64	V	PK	-4.4	50.27	68.20	17.93
4 782.70	43.66	H	PK	6.2	49.81	68.20	18.39
***6 973.60	43.37	V	PK	10.4	53.81	68.20	14.39
***6 973.60	36.35	V	AV	10.4	46.79	54.00	7.21
12 669.88	41.19	H	PK	16.1	57.27	68.20	10.93
12 706.11	30.50	H	AV	16.3	46.80	54.00	7.20
17 835.15	38.70	H	PK	18.0	56.66	68.20	11.54
17 767.95	27.84	H	AV	17.8	45.67	54.00	8.33

802.11 ac(80 MHz) mode

Middle channel *(5 210 MHz)*

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
***1 998.50	59.10	V	PK	-5.1	54.03	68.20	14.17
4 958.17	43.02	V	PK	6.7	49.71	68.20	18.49
***6 946.91	44.07	V	PK	10.2	54.27	68.20	13.93
***6 946.87	38.87	V	AV	10.2	49.07	54.00	4.93
12 630.78	40.86	H	PK	15.8	56.70	68.20	11.50
12 681.58	30.23	V	AV	16.2	46.40	54.00	7.60
12 700.36	40.60	H	PK	16.3	56.90	68.20	11.30
12 734.28	30.35	V	AV	16.3	46.62	54.00	7.38
17 724.10	35.93	H	PK	17.8	53.76	68.20	14.44
17 935.40	26.10	H	AV	18.2	44.30	54.00	9.70

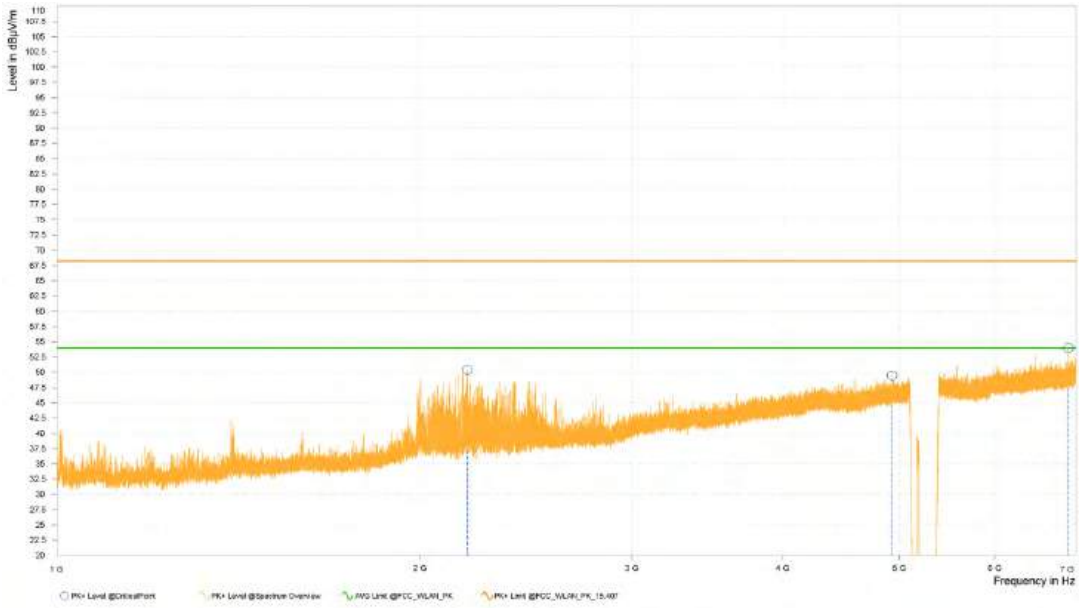
Notes:

1. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, AV = Average
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. *** Non-restricted band
4. Nothing detected above 18GHz
5. Other spurious was under 20 dB below Fundamental.
6. 802.11 n(20 MHz) mode Lowest channel (5 180 MHz) was the worst condition.
7. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, vertical polarization.
8. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.
9. Average emissions were measured using RBW = 1 MHz, VBW = 10 kHz, Detector = Peak.
10. The spectrum was measured from 1 GHz to 10th harmonic and the worst-case emissions were reported.

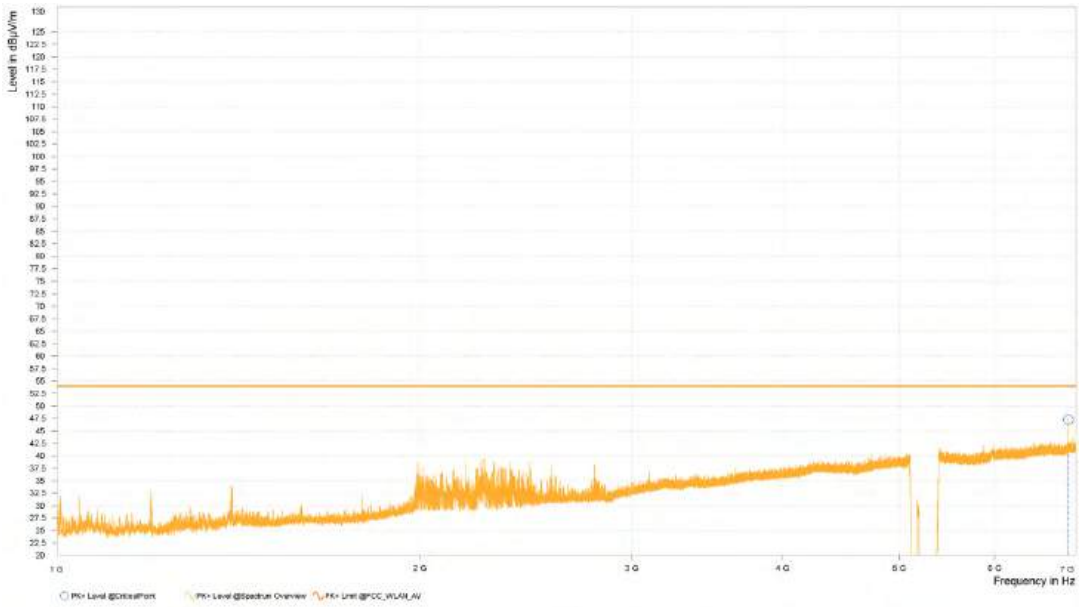
PLOTS OF EMISSIONS

Worst Case

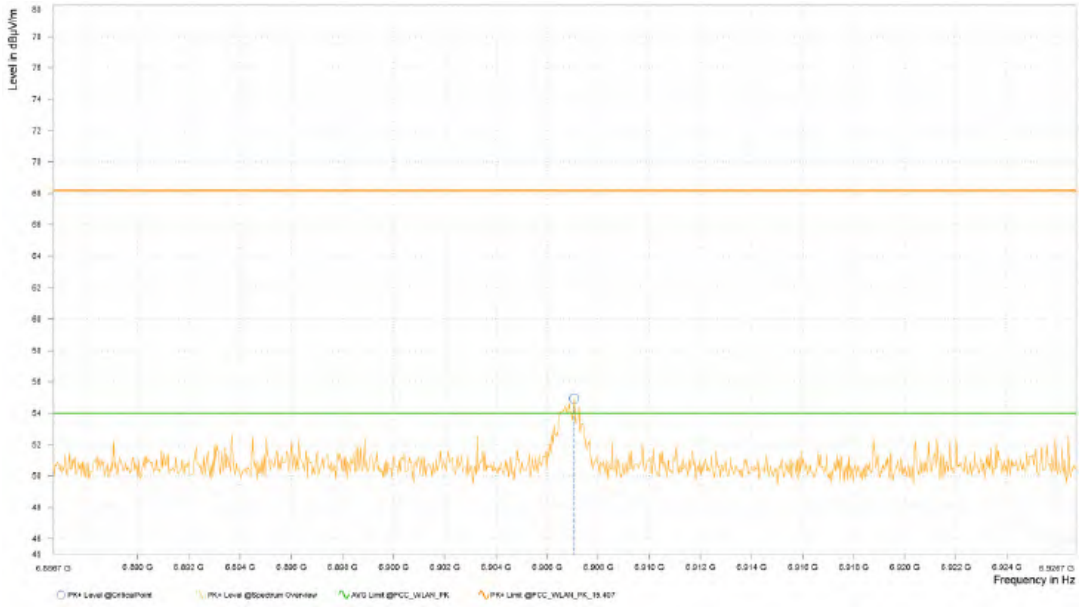
802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 1 GHz to 7 GHz_Peak



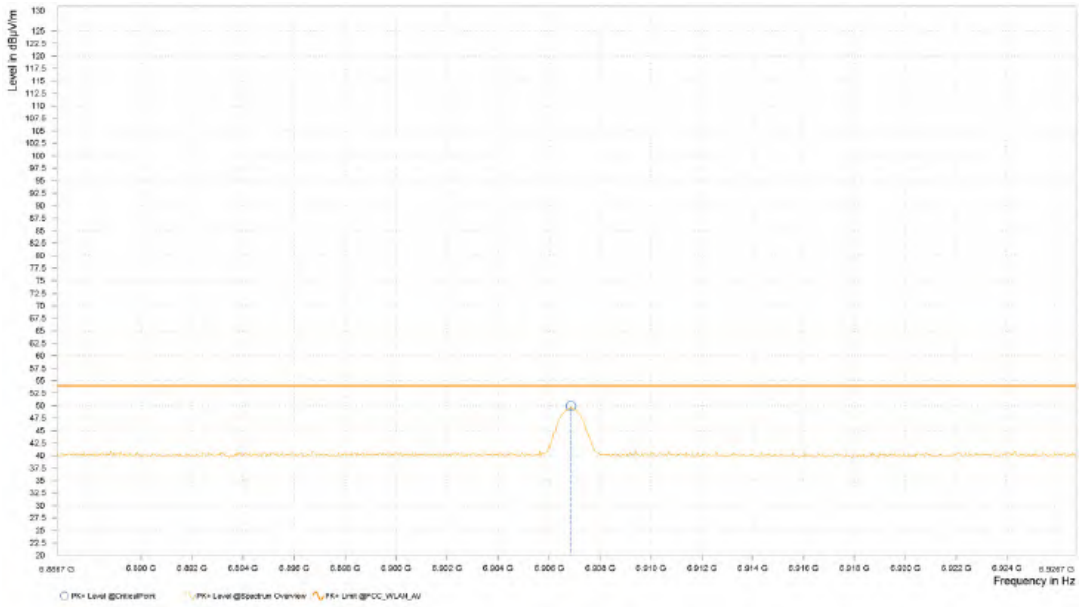
802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 1 GHz to 7 GHz_Average



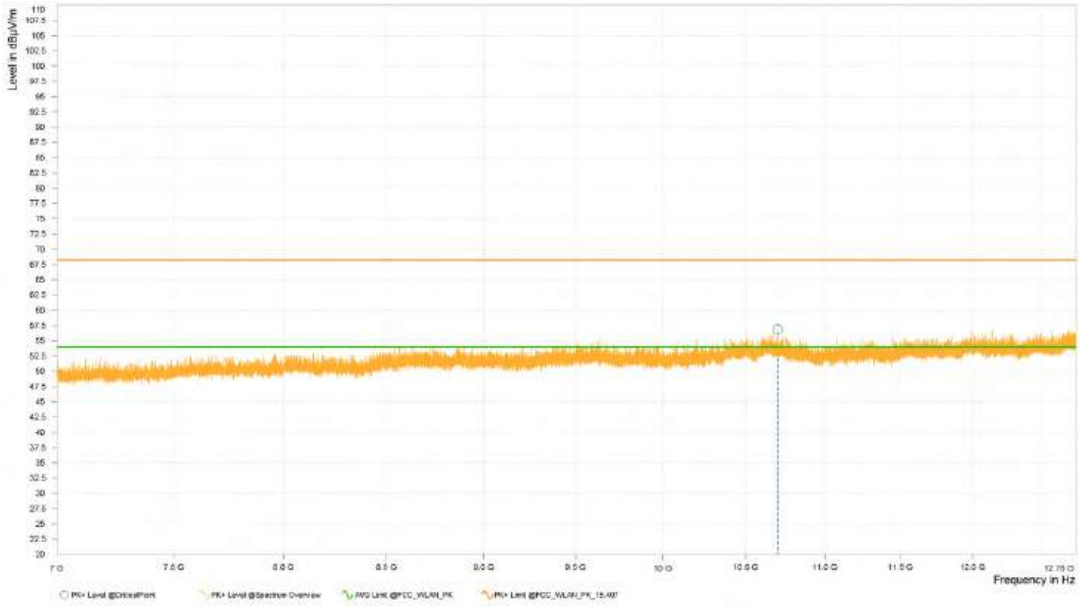
802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 6 900 MHz Zoom scan_Peak



802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 6 900 MHz Zoom scan_Average

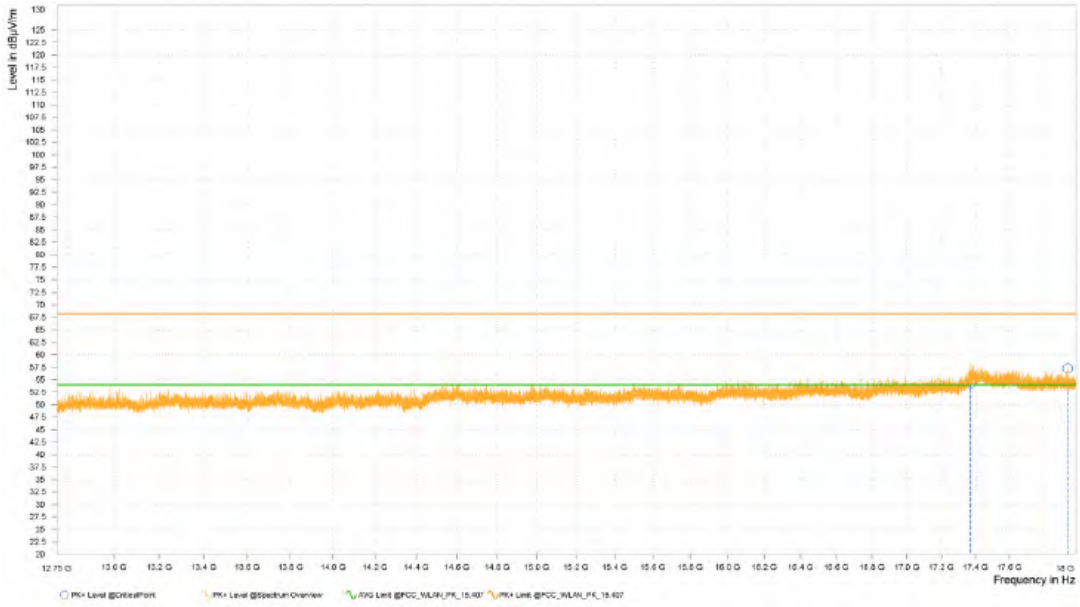


802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 7 GHz to 12.75 GHz_Peak

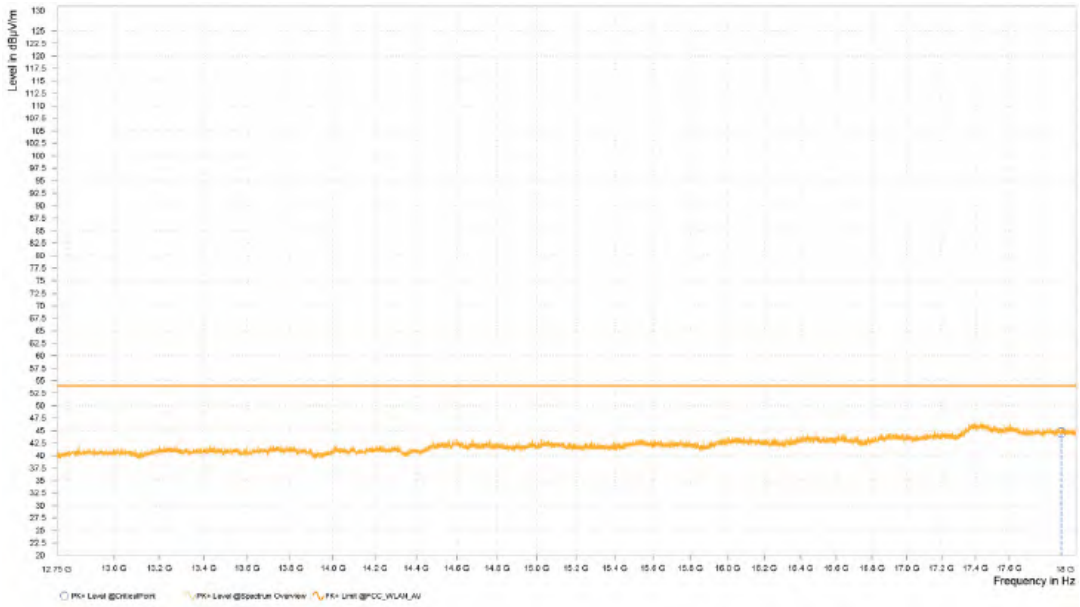


802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 7 GHz to 12.75 GHz_Average

802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 12.75 GHz to 18 GHz_Peak



802.11 n(20 MHz) mode Lowest Channel (5 180 MHz) : 12.75 GHz to 18 GHz_Average



7.4.2 Radiated Spurious Emissions – U-NII-3 Band

FCC §15.209, §15.407(b)
RSS-Gen (8.9),(8.10), RSS-247 5.5 & 6.2

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

Result

802.11 a mode

Lowest channel *(5 745 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 374.33	55.66	V	PK	-4.0	51.63	68.20	16.57
4 768.17	43.68	H	PK	6.0	49.64	68.20	18.56
7 660.12	43.86	V	PK	10.9	54.71	68.20	13.49
7 659.96	37.46	H	AV	10.9	48.31	54.00	5.69
11 978.44	41.56	V	PK	15.6	57.16	68.20	11.04
17 968.24	39.14	V	PK	18.2	57.31	68.20	10.89
17 884.50	26.90	H	AV	18.1	45.00	54.00	9.00

Middle channel *(5 785 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 254.40	55.12	V	PK	-4.6	50.57	68.20	17.63
5 388.95	42.10	V	PK	7.5	49.62	68.20	18.58
5 405.55	33.08	V	AV	7.6	40.70	54.00	13.30
7 713.04	43.25	V	PK	10.9	54.18	68.20	14.02
7 713.36	37.36	V	AV	10.9	48.29	54.00	5.71
12 687.46	40.81	H	PK	16.2	57.02	68.20	11.18
17 827.80	35.84	V	PK	17.9	53.78	68.20	14.42
17 887.90	26.81	V	AV	18.1	44.92	54.00	9.08

Highest channel *(5 805 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 072.50	42.40	V	PK	6.9	49.25	68.20	18.95
5 060.67	33.71	H	AV	6.8	40.46	54.00	13.54
7 739.96	44.47	V	PK	11.1	55.54	68.20	12.66
7 740.12	36.88	H	AV	11.1	47.95	54.00	6.05
12 667.91	40.87	V	PK	16.1	56.93	68.20	11.27
12 743.28	40.79	H	PK	16.3	57.05	68.20	11.15
17 907.60	36.69	V	PK	18.2	54.87	68.20	13.33

802.11 n(20 MHz) mode

Lowest channel *(5 745 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
***1 996.67	55.42	V	PK	-5.0	50.44	68.20	17.76
4 853.33	43.69	V	PK	6.3	49.99	68.20	18.21
4 783.67	34.03	H	AV	6.3	40.30	54.00	13.70
***6 792.83	42.09	V	PK	10.5	52.56	68.20	15.64
7 660.02	43.41	V	PK	10.9	54.26	68.20	13.94
7 660.22	36.37	H	AV	10.9	47.22	54.00	6.78
12 695.76	41.00	V	PK	16.3	57.27	68.20	10.93
17 837.25	38.31	V	PK	18.0	56.28	68.20	11.92
17 843.81	27.92	H	AV	18.0	45.91	54.00	8.09

Middle channel *(5 785 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 318.00	43.03	V	PK	7.0	50.04	68.20	18.16
4 852.67	34.30	H	AV	6.3	40.61	54.00	13.39
7 713.74	42.50	V	PK	10.9	53.43	68.20	14.77
7 713.58	35.41	V	AV	10.9	46.34	54.00	7.66
12 693.46	41.22	H	PK	16.3	57.48	68.20	10.72
11 989.47	30.99	H	AV	15.5	46.53	54.00	7.47
17 902.35	38.76	H	PK	18.2	56.92	68.20	11.28
17 890.01	27.56	V	AV	18.1	45.68	54.00	8.32

Highest channel *(5 805 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 336.83	55.12	V	PK	-4.2	50.94	68.20	17.26
5 327.33	42.44	V	PK	7.1	49.50	68.20	18.70
5 414.83	31.48	V	AV	7.7	39.14	54.00	14.86
7 740.40	42.85	V	PK	11.1	53.92	68.20	14.28
7 740.12	36.97	H	AV	11.1	48.04	54.00	5.96
12 024.62	41.90	H	PK	15.4	57.27	68.20	10.93
12 699.14	30.22	H	AV	16.3	46.52	54.00	7.48
17 984.25	38.69	H	PK	18.1	56.83	68.20	11.37
17 772.41	27.90	H	AV	17.8	45.73	54.00	8.27

802.11 n(40 MHz) mode

Lowest channel *(5 755 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
2 322.00	56.35	V	PK	-4.4	51.97	68.20	16.23
2 340.83	46.04	V	AV	-4.1	41.90	54.00	12.10
5 436.33	42.94	H	PK	7.9	50.82	68.20	17.38
4 940.50	34.04	H	AV	6.6	40.61	54.00	13.39
7 673.55	44.38	H	PK	10.9	55.32	68.20	12.88
7 673.58	37.05	H	AV	10.9	47.99	54.00	6.01
12 692.06	41.21	V	PK	16.3	57.46	68.20	10.74
12 683.74	30.11	V	AV	16.2	46.29	54.00	7.71
17 986.61	39.16	V	PK	18.1	57.30	68.20	10.90
17 852.70	26.90	H	AV	18.0	44.91	54.00	9.09

Highest channel *(5 795 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
***1 996.67	57.57	V	PK	-5.0	52.59	68.20	15.61
5 259.33	42.34	V	PK	7.2	49.52	68.20	18.68
5 073.67	33.92	H	AV	6.9	40.78	54.00	13.22
7 726.89	42.87	H	PK	11.0	53.86	68.20	14.34
7 726.93	36.16	H	AV	11.0	47.15	54.00	6.85
12 674.54	41.27	V	PK	16.1	57.38	68.20	10.82
12 698.69	30.08	H	AV	16.3	46.38	54.00	7.62
17 797.60	37.51	V	PK	17.9	55.39	68.20	12.81
17 988.40	27.35	H	AV	18.1	45.48	54.00	8.52

802.11 ac(80 MHz) mode

Middle channel *(5 775 MHz)*

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
***1 997.00	58.03	V	PK	-5.0	53.06	68.20	15.14
5 388.33	42.77	H	PK	7.5	50.29	68.20	17.91
4 969.50	34.00	V	AV	6.8	40.77	54.00	13.23
7 700.48	42.94	V	PK	10.9	53.88	68.20	14.32
7 700.28	35.58	V	AV	10.9	46.52	54.00	7.48
12 696.57	41.17	V	PK	16.3	57.45	68.20	10.75
12 699.31	30.22	H	AV	16.3	46.52	54.00	7.48
17 910.23	38.36	H	PK	18.2	56.55	68.20	11.65
17 890.00	27.89	H	AV	18.1	46.01	54.00	7.99

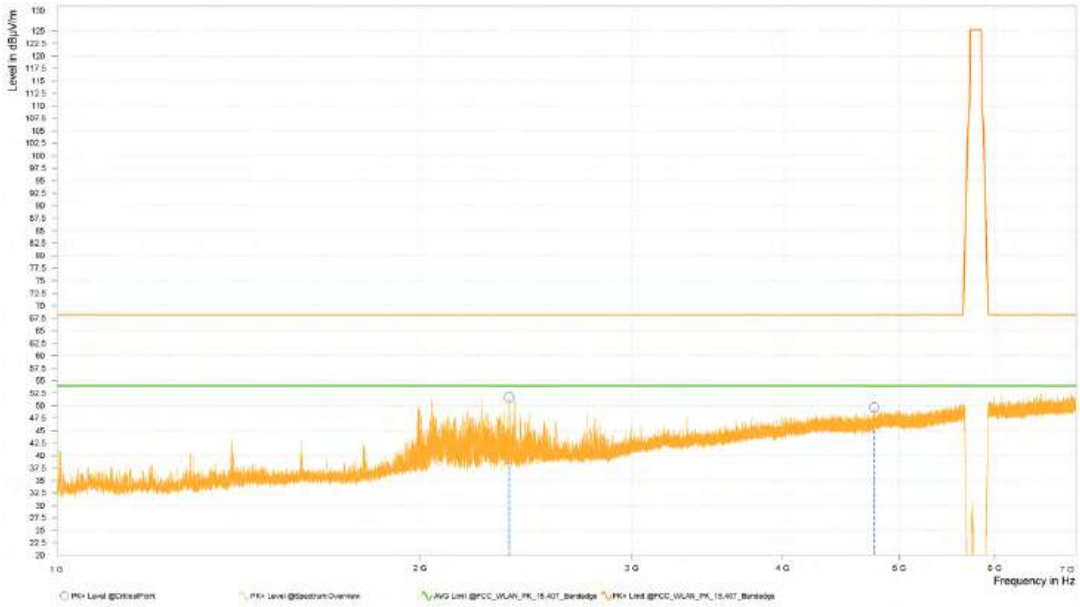
Notes:

1. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, AV = Average
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. *** Non-restricted band
4. Nothing detected above 18GHz
5. Other spurious was under 20 dB below Fundamental.
6. 802.11 a mode Lowest channel (5 745 MHz) was the worst condition.
7. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, vertical polarization.
8. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.
9. Average emissions were measured using RBW = 1 MHz, VBW = 10 kHz, Detector = Peak.
10. The spectrum was measured from 1 GHz to 10th harmonic and the worst-case emissions were reported.

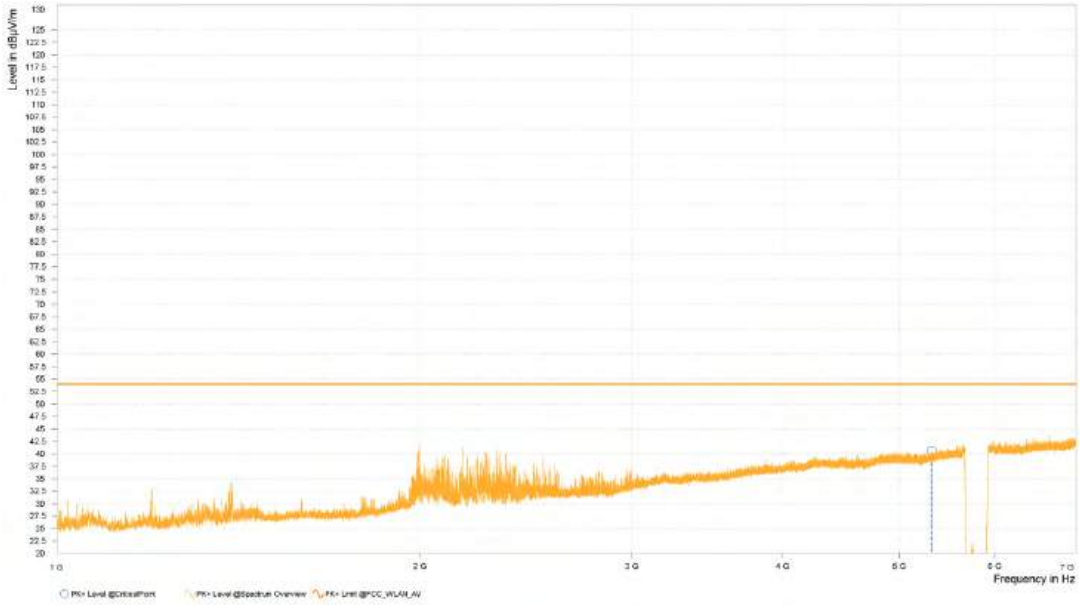
PLOTS OF EMISSIONS

Worst Case

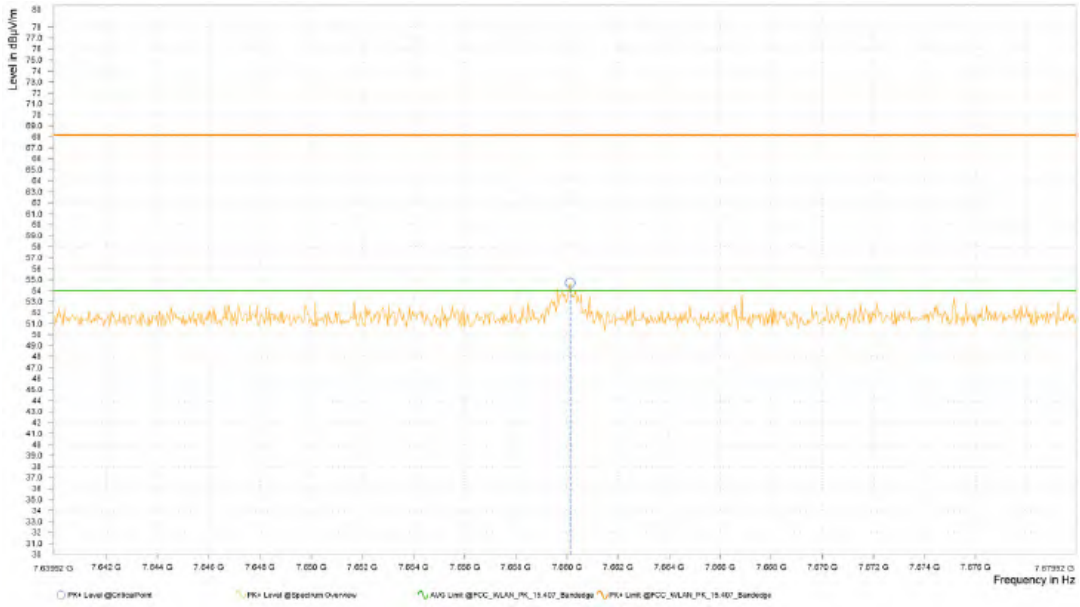
802.11 a mode Lowest Channel (5 745 MHz) : 1 GHz to 7 GHz_Peak



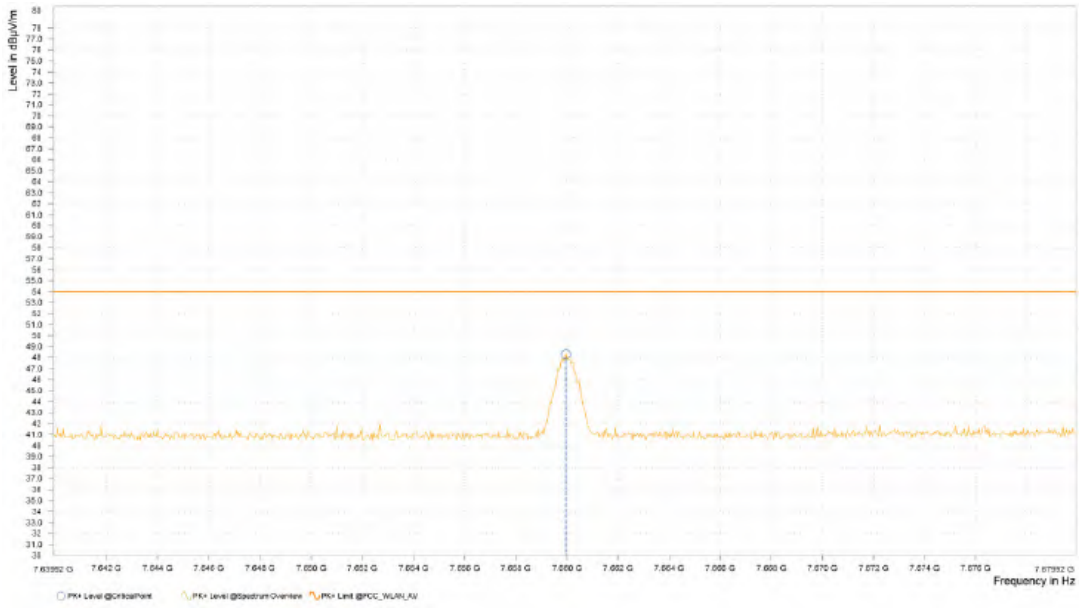
802.11 a mode Lowest Channel (5 745 MHz) : 1 GHz to 7 GHz_Average



802.11 a mode Lowest Channel (5 745 MHz) : 7 600 MHz Zoom scan_Peak

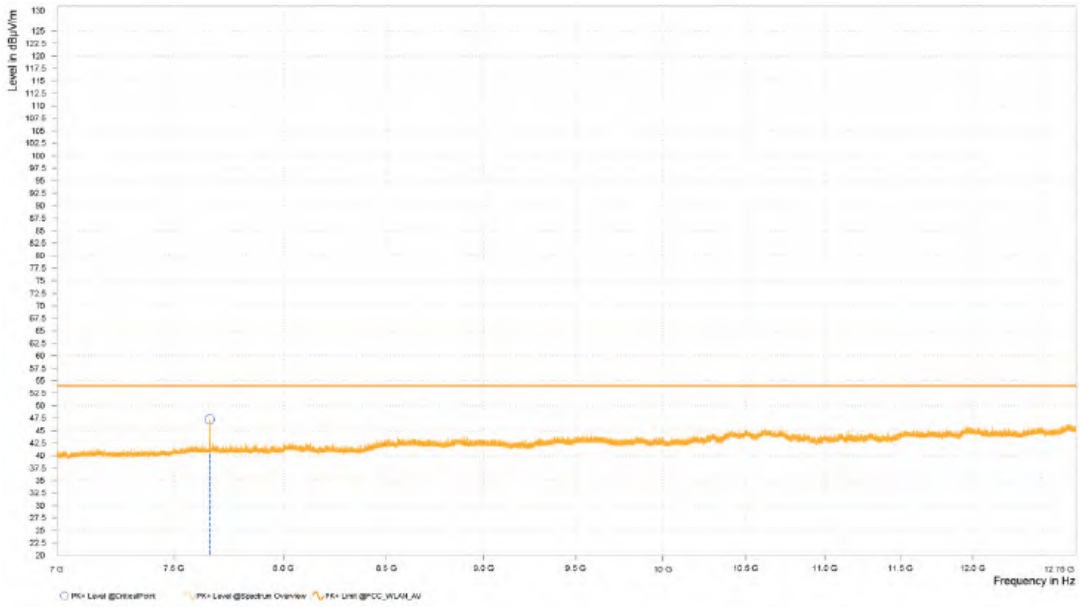


802.11 a mode Lowest Channel (5 745 MHz) : 7 600 MHz Zoom scan_Average



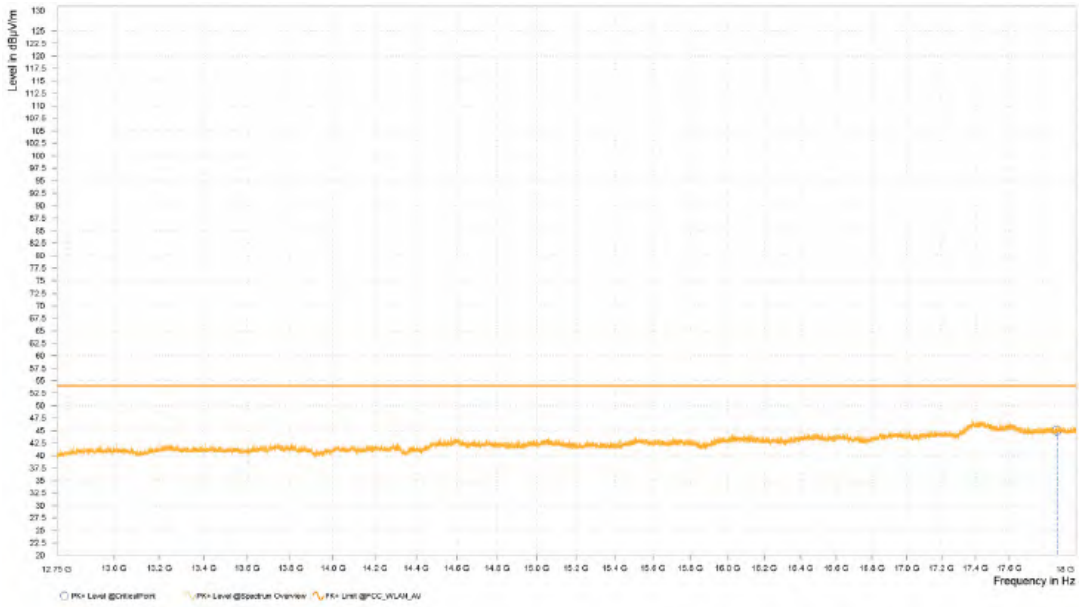
802.11 a mode Lowest Channel (5 745 MHz) : 7 GHz to 12.75 GHz_Peak

802.11 a mode Lowest Channel (5 745 MHz) : 7 GHz to 12.75 GHz_Average



802.11 a mode Lowest Channel (5 745 MHz) : 12.75 GHz to 18 GHz_Peak

802.11 a mode Lowest Channel (5 745 MHz) : 12.75 GHz to 18 GHz_Average



7.5 Radiated Band Edge

7.5.1 Radiated Band Edge – U-NII-1 Band

FCC §15.209, §15.407
RSS-Gen (8.9),(8.10), RSS-247 5.5 & 6.2

Test Mode : Set to Lowest channel and Highest channel

Result

802.11 a mode

Lowest Channel (5 180 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 149.82	57.42	H	PK	4.7	62.10	68.20	6.10
5 149.57	41.10	H	AV	4.7	45.78	54.00	8.22
5 149.98	52.68	H	PK	4.7	57.36	68.20	10.84
5 149.98	39.91	H	AV	4.7	44.59	54.00	9.41

Highest Channel (5 240 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 350.00	47.51	V	PK	5.4	52.89	68.20	15.31
5 350.00	37.02	V	AV	5.4	42.40	54.00	11.60
5 430.22	50.07	V	PK	5.7	55.77	68.20	12.43
5 403.60	38.37	H	AV	5.6	43.99	54.00	10.01

802.11 n(20 MHz) mode

Lowest Channel (5 180 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
4 989.09	50.42	V	PK	4.9	55.28	68.20	12.92
4 997.08	39.55	V	AV	4.9	44.44	54.00	9.56
5 150.00	47.96	H	PK	4.7	52.64	68.20	15.56
5 150.00	37.20	H	AV	4.7	41.88	54.00	12.12

Highest Channel (5 240 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 350.00	46.84	H	PK	5.4	52.22	68.20	15.98
5 350.00	36.80	H	AV	5.4	42.18	54.00	11.82
5 430.05	49.88	H	PK	5.7	55.58	68.20	12.62
5 394.55	38.43	H	AV	5.6	44.02	54.00	9.98

802.11 n(40 MHz) mode

Lowest Channel (5 190 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 149.04	52.36	H	PK	4.7	57.04	68.20	11.16
5 149.39	41.48	H	AV	4.7	46.16	54.00	7.84
5 150.00	50.25	H	PK	4.7	54.93	68.20	13.27
5 150.00	40.55	H	AV	4.7	45.23	54.00	8.77

Highest Channel (5 230 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 350.00	47.46	H	PK	5.4	52.84	68.20	15.36
5 350.00	37.18	H	AV	5.4	42.56	54.00	11.44
5 432.63	50.01	H	PK	5.7	55.72	68.20	12.48
5 434.07	38.09	H	AV	5.7	43.80	54.00	10.20

802.11 ac(80 MHz) mode

Middle Channel (5 210 MHz)

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
5 350.01	46.90	H	PK	5.4	52.28	68.20	15.92
5 350.03	37.48	H	AV	5.4	42.86	54.00	11.14
5 451.72	51.14	H	PK	5.8	56.90	68.20	11.30
5 430.87	38.39	V	AV	5.7	44.09	54.00	9.91

Notes:

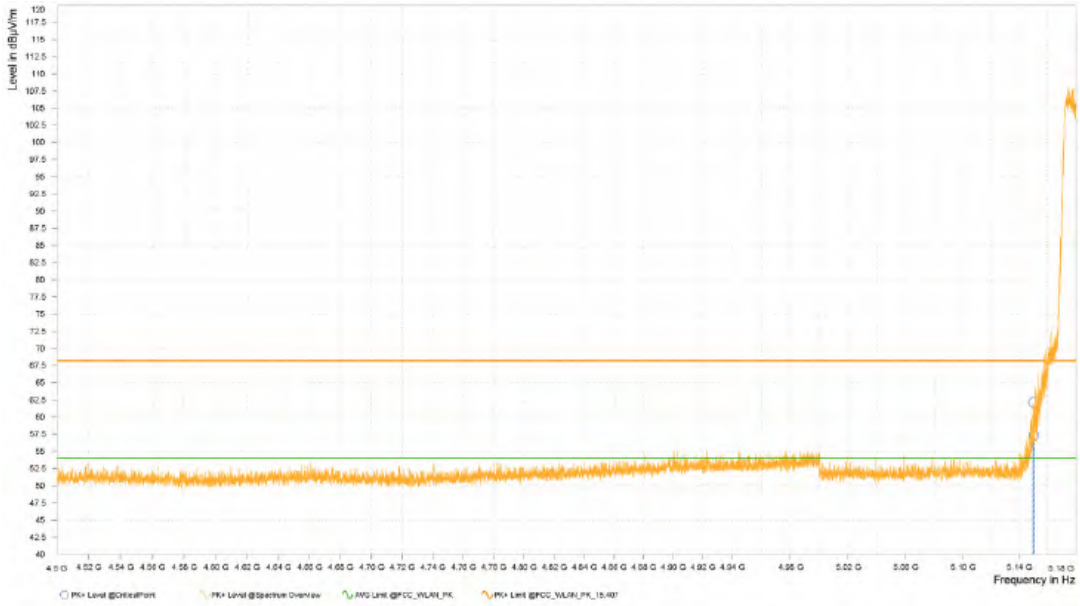
1. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, AV = Average
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. 802.11 a mode Lowest channel (5 180 MHz) was the worst condition.
4. Other spurious was under 20 dB below Fundamental.
5. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, vertical polarization.
6. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.
7. Average emissions were measured using RBW = 1 MHz, VBW = 10 kHz, Detector = Peak.

PLOTS OF EMISSIONS

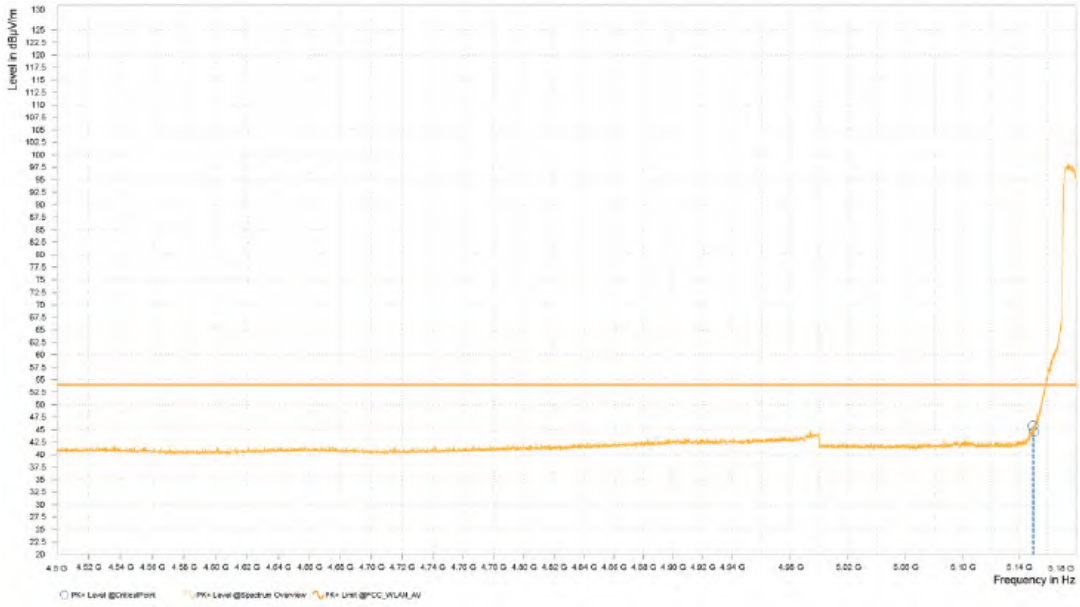
Worst Case

802.11 a mode

Lowest Channel (5 180 MHz)_Peak

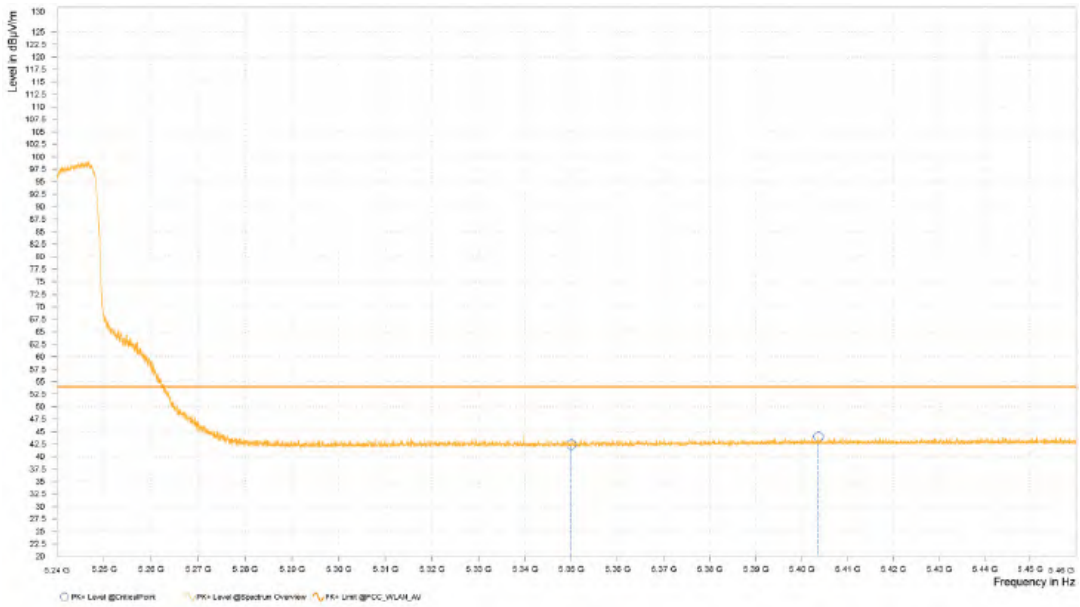


Lowest Channel (5 180 MHz)_Average



Highest Channel (5 240 MHz)_Peak

Highest Channel (5 240 MHz)_Average



7.5.2 Radiated Band Edge – U-NII-3 Band

FCC §15.209, §15.407
RSS-Gen (8.9),(8.10), RSS-247 5.5 & 6.2

Test Mode : Set to Lowest channel and Highest channel

Result

802.11 a mode

Lowest Channel (5 745 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 369.73	49.96	V	PK	5.5	55.43	68.20	12.77
5 432.77	38.20	H	AV	5.7	43.91	54.00	10.09
5 459.98	47.32	V	PK	5.8	53.09	68.20	15.11
5 459.98	37.01	H	AV	5.8	42.78	54.00	11.22

Highest Channel (5 805 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 752.28	50.16	V	PK	5.8	55.96	125.20	69.24

802.11 n(20 MHz) mode

Lowest Channel (5 745 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 445.49	49.74	V	PK	5.8	55.49	68.20	12.71
5 450.63	38.19	H	AV	5.8	43.95	54.00	10.05
5 459.96	49.20	H	PK	5.8	54.97	68.20	13.23
5 459.96	37.18	H	AV	5.8	42.95	54.00	11.05

Highest Channel (5 805 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 764.79	50.66	H	PK	5.8	56.48	125.20	68.72

802.11 n(40 MHz) mode

Lowest Channel (5 755 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 610.45	49.98	V	PK	6.0	55.94	68.20	12.26

Highest Channel (5 795 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 630.85	49.89	V	PK	5.9	55.81	68.20	12.39
5 757.54	50.52	V	PK	5.8	56.33	125.20	68.87

802.11 ac(80 MHz) mode

Middle Channel (5 775 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
5 614.06	49.81	H	PK	6.0	55.77	68.20	12.43

Notes:

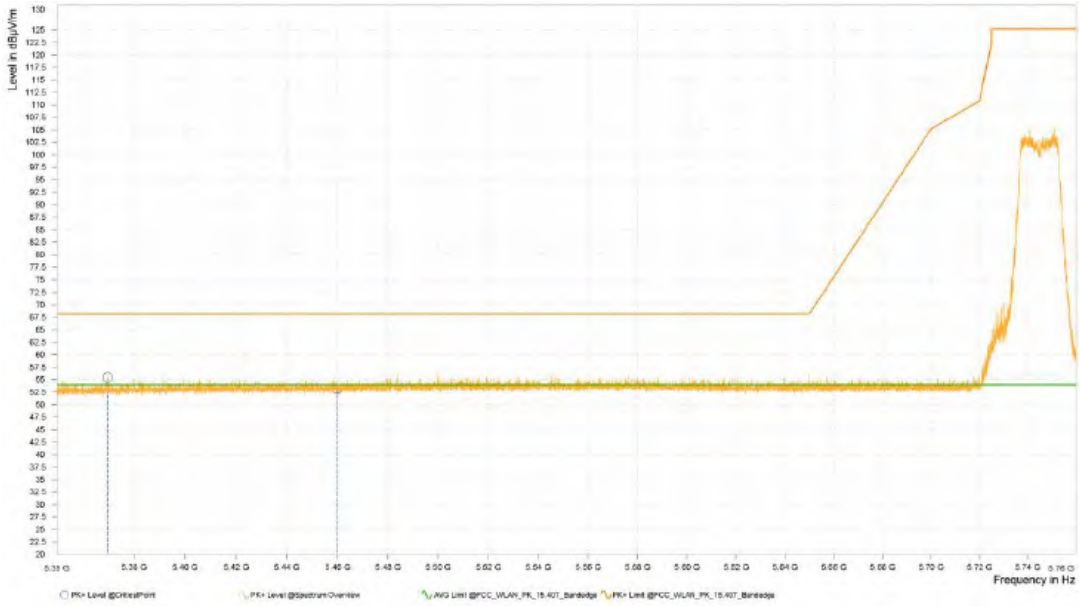
1. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, AV = Average
2. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
3. 802.11 a mode Lowest channel (5 745 MHz) was the worst condition.
4. Other spurious was under 20 dB below Fundamental.
5. The radiated emissions testing were made by rotating EUT through three orthogonal axes and rotating the receive antenna with horizontal, vertical polarization.
6. Peak emissions were measured using RBW = 1 MHz, VBW = 3 MHz, Detector = Peak.
7. Average emissions were measured using RBW = 1 MHz, VBW = 10 kHz, Detector = Peak.

PLOTS OF EMISSIONS

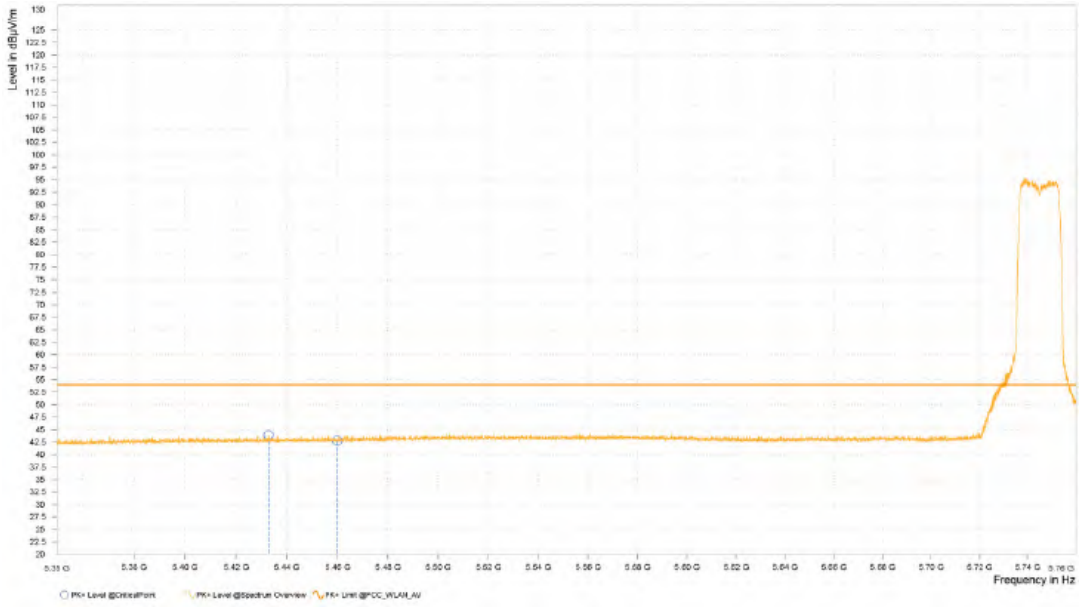
Worst Case

802.11 a mode

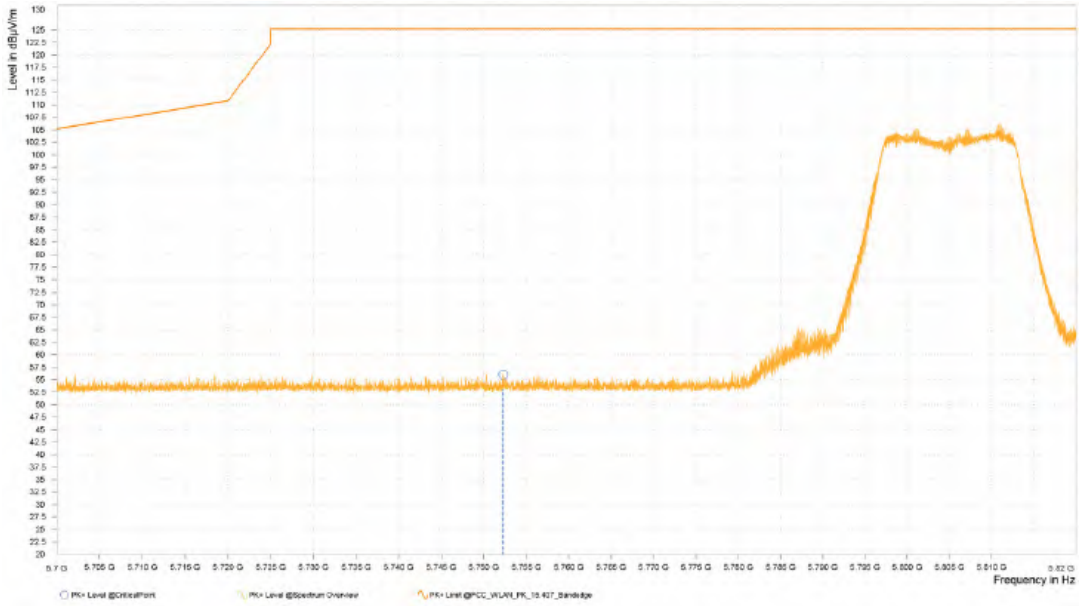
Lowest Channel (5 745 MHz)_Peak



Lowest Channel (5 745 MHz)_Average



Highest Channel (5 805 MHz)_Peak



7.6 Radiated Emissions_Below 1GHz

7.6.1 Radiated Emissions Below 1GHz – U-NII-1 Band

FCC §15.209
RSS-Gen (8.9)

Result

802.11 ac mode Lowest Channel (5 180 MHz)

Frequency (MHz)	Reading (dBμV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBμV/m)	Limit (dBμV/m)	Margin (dB)
55.25	26.57	V	QP	-5.8	20.77	40.00	19.23
201.11	35.63	H	QP	-6.4	29.21	43.50	14.29
216.85	40.11	H	QP	-6.5	33.57	46.00	12.43
237.77	41.25	H	QP	-4.9	36.35	46.00	9.65
279.52	31.72	H	QP	-4.3	27.43	46.00	18.57
359.96	30.25	H	QP	-2.8	27.49	46.00	18.51

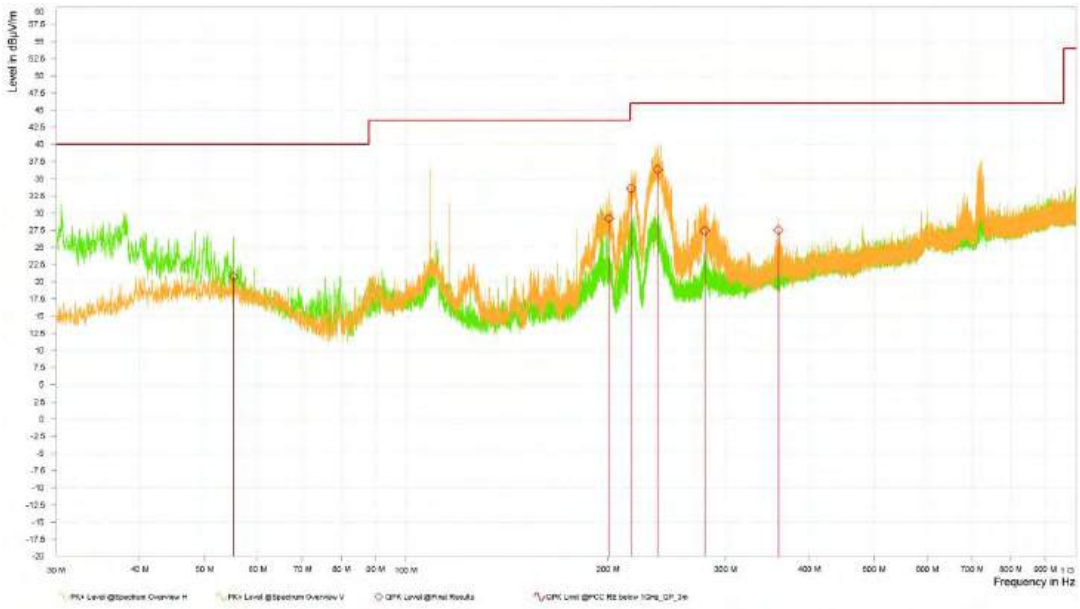
Radiated Measurements at 3meters

Notes:
1. The worst-case emission was reported.
2. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, QP = Qusi-Peak
3. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
4. Measurements using CISPR quasi-peak mode below 1 GHz.
5. 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.
6. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz). Per FCC part 15.31(o), test results were not reported.
   Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
   Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.
7. The limit is on the FCC §15.209.

PLOTS OF EMISSIONS

Worst Case

Radiated emission below 1GHz, Lowest Channel (5 180 MHz)



7.6.2 Radiated Emissions Below 1GHz – U-NII-3 Band

FCC §15.209
RSS-Gen (8.9)

Result

802.11 a mode Lowest Channel (5 745 MHz)

Frequency (MHz)	Reading (dBµV)	Pol* (H/V)	Mode*	AF+CL+Amp (dB)**	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
79.47	29.24	V	QP	-12.4	16.86	40.00	23.14
111.03	26.69	H	QP	-7.3	19.44	43.50	24.06
179.99	35.68	H	QP	-8.6	27.10	43.50	16.40
217.82	38.10	H	QP	-6.6	31.54	46.00	14.46
236.29	39.97	H	QP	-5.0	34.99	46.00	11.01
280.42	32.25	H	QP	-4.3	27.99	46.00	18.01

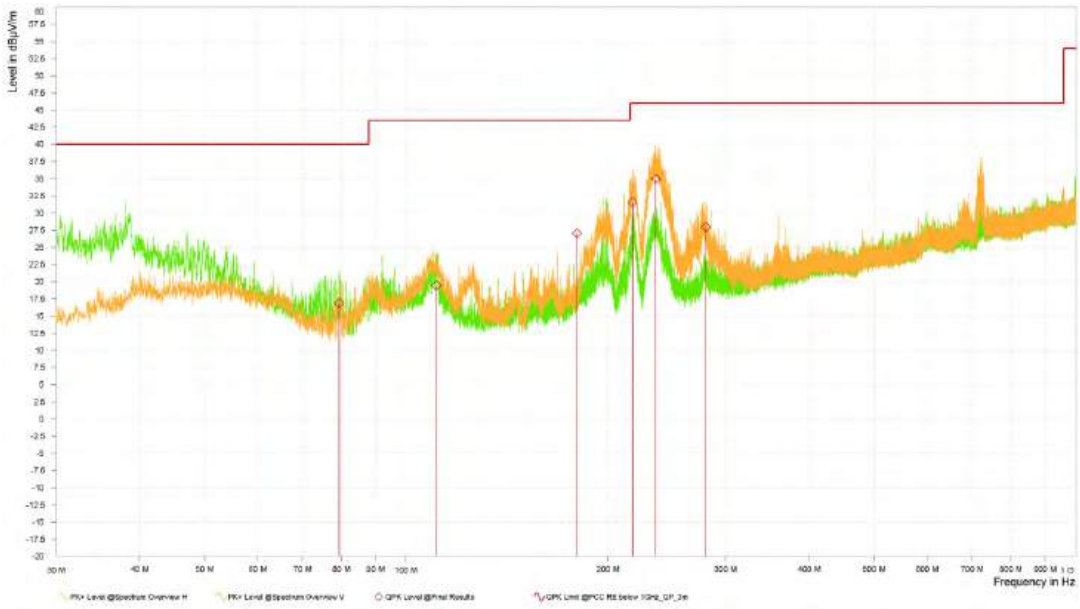
Radiated Measurements at 3meters

Notes:
1. The worst-case emission was reported.
2. *Pol. : H = Horizontal, V = Vertical, Mode : PK = Peak, QP = Qusi-Peak
3. **AF + CL + Amp. = Antenna Factor + Cable Loss + Amplifier.
4. Measurements using CISPR quasi-peak mode below 1 GHz.
5. 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.
6. No emission found between lowest internal used/generated frequency to 30MHz (9kHz~30MHz).
   Per FCC part 15.31(o), test results were not reported.
   Although these tests were performed other than open field test site, adequate comparison measurements were confirmed against 30 m open are test site.
   Therefore, sufficient tests were made to demonstrate that the alternative site produces results that correlate with the one of tests made in an open field based on KDB 414788.
7. The limit is on the FCC §15.209.

PLOTS OF EMISSIONS

Worst Case

Radiated emission below 1GHz, Lowest Channel (5 180 MHz)



7.7 AC Line Conducted

FCC §15.207
RSS-Gen(8.8)

Result :

802.11 ac mode, Lowest Channel (5 180 MHz)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV)	CAverage (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Corr. (dB)
0.157463	---	23.64	55.08	31.44	9.000	L1	9.9
0.157463	54.28	---	65.08	10.80	9.000	L1	9.9
0.164925	53.34	---	64.71	11.37	9.000	N	10.1
0.164925	---	22.54	54.71	32.17	9.000	N	10.1
0.189800	55.91	---	63.61	7.70	9.000	N	10.0
0.189800	---	38.57	53.61	15.04	9.000	N	10.0
0.204725	54.11	---	63.02	8.90	9.000	L1	9.9
0.204725	---	35.95	53.02	17.07	9.000	L1	9.9
4.187213	40.14	---	56.00	15.86	9.000	L1	9.7
4.187213	---	30.74	46.00	15.26	9.000	L1	9.7
19.579863	---	31.08	50.00	18.92	9.000	N	9.9
19.579863	41.78	---	60.00	18.22	9.000	N	9.9

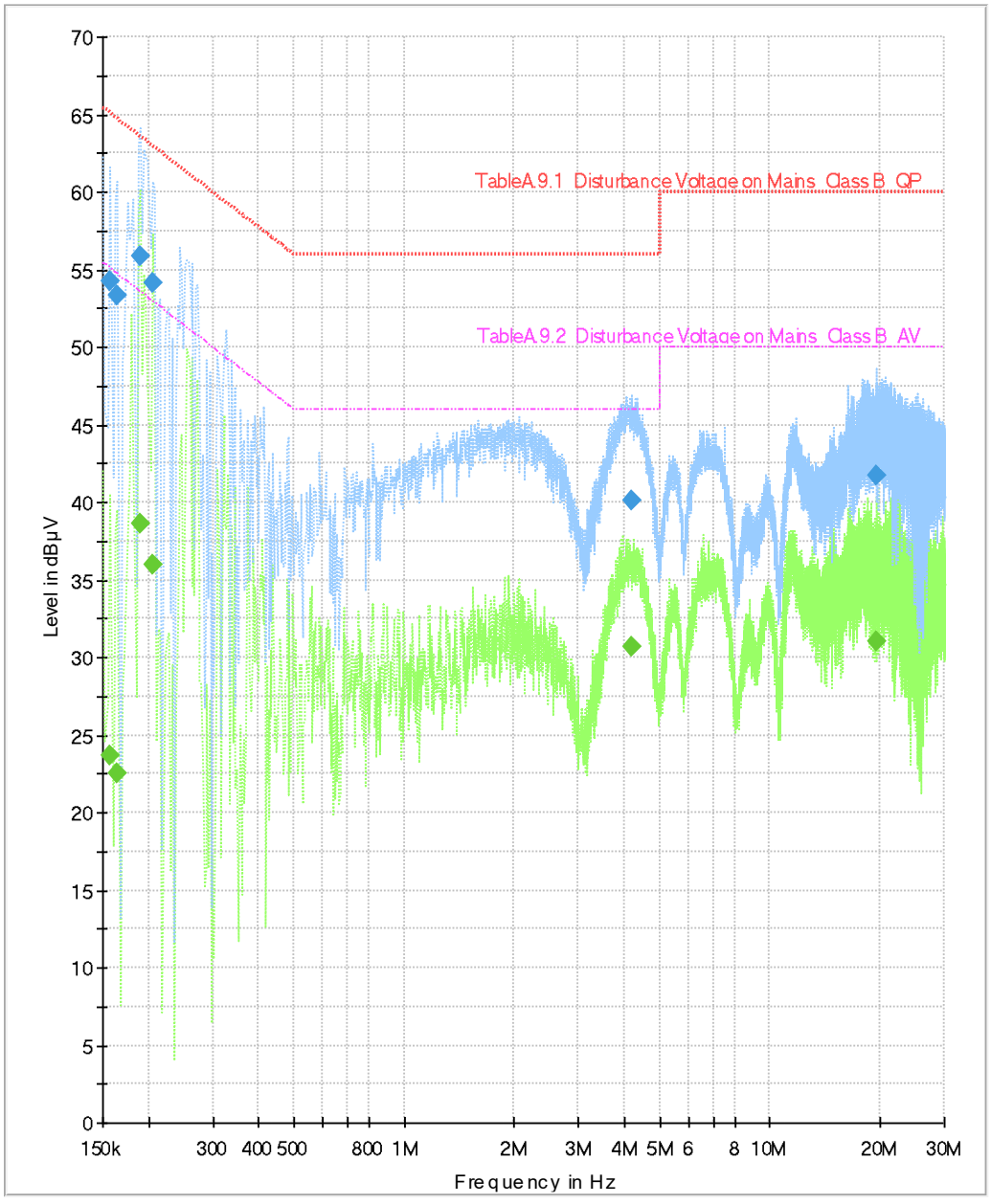
Line Conducted Emission Tabulated Data

Notes:
1. Measurement using CISPR quasi-peak mode & average mode.
2. The worst channel was investigated and the worst-case emission are reported. See attached Plots.
3. Lowest channel (5 180 MHz) is the worst case.
4. *) Factor = LISN + Cable loss
5. **) LINE : L = Line, N = Neutral
6. The limit is on the FCC §15.207

PLOTS OF EMISSIONS

Worst Case

AC Line Conducted emission, 802.11 ac mode, Lowest Channel (5 180 MHz)



8. TEST EQUIPMENT

No.	Instrument	Manufacture	Model	Serial No.	Calibration Date	Next Calibration Date
1	DIGITAL MULTIMETER	EZ DIGITAL	DM-334	2111395	2023-10-11	2024-10-11
2	Humidity Temperature	Lutron	MHB-382SD	AK.26553	2023-10-18	2024-10-18
3	Spectrum Analyzer	Agilent	E4440A	MY44303257	2023-10-10	2024-10-10
4	System DC Power Supply	H.P	6654A	3639A02419	2024-03-28	2025-03-28
5	10 dB Attenuator	API technologies corp	40A2W-10	1917	2024-01-10	2025-01-10
6	Signal Generator	R&S	SMB100A	175861	2024-03-29	2025-03-29
7	EMI TEST RECEIVER	R&S	ESW44	103318	2024-01-08	2025-01-08
8	Trilog-Broadband antenna	Schwarzbeck	VULB9163	01431	2022-11-16	2024-11-16
9	DOUBLE RIDGED HORN ANTENNA	R&S	HF907	103175	2024-01-11	2025-01-11
10	Horn Antenna	Q-par Angus	QMS-00208	17519	2024-03-29	2025-03-29
11	Horn Antenna	Steatite Antennas	QMS-00225	32226	2024-01-11	2025-01-11
12	Horn Antenna	Steatite Antennas	QMS-00238	32225	2024-01-11	2025-01-11
13	AMPLIFIER	HP	8447F	2805A03406	2024-01-09	2025-01-09
14	Signal Conditioning Unit	R&S	SCU-18F	101056	2024-01-09	2025-01-09
15	Signal Conditioning Unit	R&S	SCU26F	100750	2024-01-11	2025-01-11
16	Signal Conditioning Unit	R&S	SCU40-F	100727	2024-01-11	2025-01-11
17	Open Switch and Control Unit	R&S	OSP220	102977	N/A	N/A
18	WiFi Filter Bank	R&S	U082	N/A	N/A	N/A
19	HYGROMETER	O-230	DRETEC	N/A	2024-01-12	2025-01-12
20	EMI TEST RECEIVER	R&S	ESR3	102930	2024-07-02	2025-07-02
21	TWO-LINE V-NETWORK	R&S	ENV216	102829	2024-07-03	2025-07-03

9. ACCURACY OF MEASUREMENT & DECISION RULE

9.1 Uncertainty Calculation

The Measurement Uncertainties stated were calculated in accordance with the requirements of measurement uncertainty contained in CISPR 16-4-2 with the confidence level of 95%

PARAMETER	UNCERTAINTY
Radiated Disturbance, Below 30 MHz	4.50 dB
Radiated Disturbance, 30 MHz to 1 GHz	4.40 dB
Radiated Disturbance, Above 1 GHz	4.58 dB

9.2 Decision rule

The choice of whether or not to include the measurement uncertainty of the measuring system used in the test in the conformance determination.:

☐ Application of internal procedures used in type testing where traceability of measurement uncertainty is established.
☒ Applying the decision that the standard used for type testing does not require it.

END REPORT