74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA
TEL: +82-31-645-6300 **FAX: +82-31-645-6401**

FCC UNII REPORT

Certification

Applicant Name:
SAMSUNG Electronics Co., Ltd.

Address:
129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Date of Issue:
January 29, 2021

Test Site/Location:
74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2101-FC095-R1

FCC ID:	**A3LSMA325F**
APPLICANT:	**SAMSUNG Electronics Co., Ltd.**

According to the Evaluation report, all of the data contained herein is reused from the reference FCC ID : A3LSMA325F report.

Model:	SM-A325F/DS
Additional Model:	SM-A325F
EUT Type:	Mobile Phone
Modulation type	OFDM
FCC Classification:	Unlicensed National Information Infrastructure(NII)
FCC Rule Part(s):	Part 15.407

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance.

REVIEWED BY

Report prepared by : Woong Jin Kim
Engineer of Telecommunication Testing Center

Report approved by : Jong Seok Lee
Manager of Telecommunication Testing Center

This test results were applied only to the test methods required by the standard.

This laboratory is not accredited for the test results marked *.
The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2101-FC095	January 22, 2021	- First Approval Report
HCT-RF-2101-FC095-R1	January 29, 2021	- Revised the 26dB Bandwidth channel labelling - Added the Ch 140 conducted power and R.S.E - Added the test condition in section 8.8 - Added retest date on page 5

Table of Contents

REVIEWED BY 2
1. GENERAL INFORMATION 5
EUT DESCRIPTION 5
2. MAXIMUM OUTPUT POWER 6
3. TEST METHODOLOGY 7
EUT CONFIGURATION 7
EUT EXERCISE 7
GENERAL TEST PROCEDURES 7
DESCRIPTION OF TEST MODES 7
4. INSTRUMENT CALIBRATION 8
5. FACILITIES AND ACCREDITATIONS 8
5.1 FACILITIES 8
5.2 EQUIPMENT 8
6. ANTENNA REQUIREMENTS 8
7. MEASUREMENT UNCERTAINTY 9
8. DESCRIPTION OF TESTS 10
9. SUMMARY OF TEST RESULTS 27
10. TEST RESULT 28
10.1 DUTY CYCLE 28
10.2 26 dB BANDWIDTH 31
10.3 6dB BANDWIDTH 40
10.4 OUTPUT POWER MEASUREMENT 42
10.5 POWER SPECTRAL DENSITY 45
10.6 FREQUENCY STABILITY. 54
10.6.1 80MHz BW 54
10.7 STRADDLE CHANNEL 70
10.7.1 26dB Bandwidth 70
10.7.2 6dB Bandwidth 73
10.7.3 Output Power 76
10.7.4 Power Spectral Density 79
10.8 RADIATED SPURIOUS EMISSIONS 82
10.9 RADIATED RESTRICTED BAND EDGE 93
10.10 POWERLINE CONDUCTED EMISSIONS 119
11. LIST OF TEST EQUIPMENT 123
12. ANNEX A_ TEST SETUP PHOTO 125

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	SM-A325F/DS	
Additional Model	SM-A325F	
EUT Type	Mobile Phone	
Power Supply	DC 3.86 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20MHz BW : 5180 - 5240 40MHz BW : 5190 - 5230 80MHz BW : 5210
	U-NII-2A	20MHz BW : 5260 - 5320 40MHz BW : 5270 - 5310 80MHz BW : 5290
	U-NII-2C	20MHz BW : 5500 - 5720 40MHz BW : 5510 - 5710 80MHz BW : 5530 – 5690
	U-NII-3	20MHz BW : 5745 - 5825 40MHz BW : 5755 - 5795 80MHz BW : 5775
Straddle channel	Supported	
TDWR Band	Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	December 23, 2020 ~ January 20, 2021 Retest : January 26, 2021	
Serial number	Radiated : R38NC01F3VV Conducted : R38NC01F2JD	

2. MAXIMUM OUTPUT POWER

The transmitter has a maximum total conducted average output power as follows:

Band	Mode	Output Power	
		(dBm)	(W)
UNII1	802.11a	16.38	0.043
	802.11n (HT20)	15.05	0.032
	802.11n (HT40)	14.16	0.026
	802.11ac (VHT20)	15.33	0.034
	802.11ac (VHT40)	14.17	0.026
	802.11ac (VHT80)	13.27	0.021
UNII2A	802.11a	16.35	0.043
	802.11n (HT20)	15.18	0.033
	802.11n (HT40)	14.26	0.027
	802.11ac (VHT20)	15.16	0.033
	802.11ac (VHT40)	14.28	0.027
	802.11ac (VHT80)	13.22	0.021
UNII2C	802.11a	15.59	0.036
	802.11n (HT20)	14.39	0.027
	802.11n (HT40)	13.63	0.023
	802.11ac (VHT20)	14.40	0.028
	802.11ac (VHT40)	13.73	0.024
	802.11ac (VHT80)	12.83	0.019
UNII3	802.11a	14.23	0.026
	802.11n (HT20)	13.54	0.023
	802.11n (HT40)	13.49	0.022
	802.11ac (VHT20)	13.64	0.023
	802.11ac (VHT40)	13.50	0.022
	802.11ac (VHT80)	12.72	0.019

3. TEST METHODOLOGY

The measurement procedure described in FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01 dated December 14, 2017 entitled “Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part15, Subpart E” and ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’ were used in the measurement.

EUT CONFIGURATION

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

EUT EXERCISE

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

GENERAL TEST PROCEDURES

Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 6.2 of ANSI C63.10. (Version :2013) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

4. INSTRUMENT CALIBRATION

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

Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.

Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements.

Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of §15.203, §15.407

7. MEASUREMENT UNCERTAINTY

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of k = 2 to indicate a 95 % level of confidence.

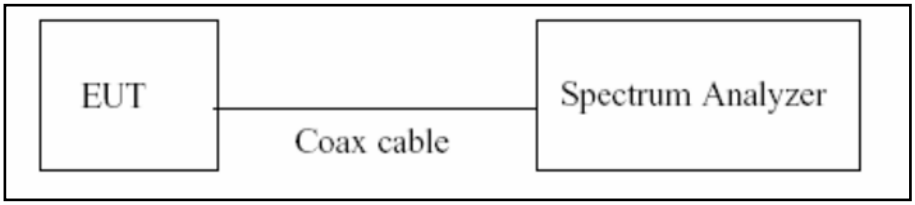
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05

8. DESCRIPTION OF TESTS

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure B.2 in KDB 789033 D02 v02r01.

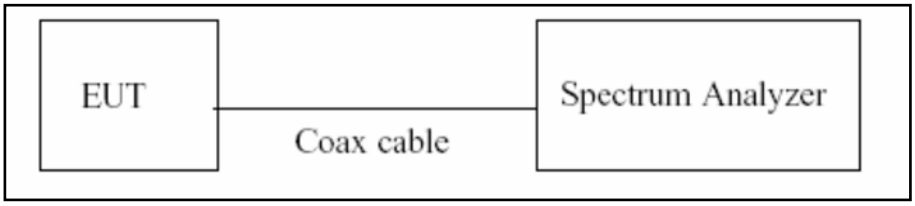
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

8.2. 6dB Bandwidth & 26dB Bandwidth

Limit

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

Test Configuration



Test Procedure(26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.1 in KDB 789033 D02 v02r01.

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

Test Procedure (6dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure C.2 in KDB 789033 D02 v02r01.

1. RBW = 100 kHz
2. VBW ≥ 3 x RBW
3. Detector = Peak
4. Trace mode = max hold
5. Allow the trace to stabilize
6. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points(upper and lower frequencies) that are attenuated by 6 dB relative to the maximum lever measured in the fundamental emission.

Note:

1. We tested X dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.
2. DFS test channels should be defined. So, We performed the OBW test to prove that no part of the fundamental emissions of any channels belong to UNII1 and UNII3 band for DFS.
3. The 26 dB bandwidth is used to determine the conducted power limits.

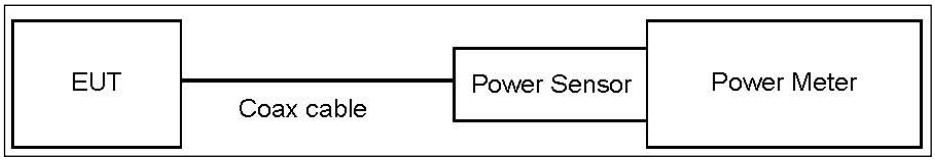
8.3. Output Power Measurement

Limit

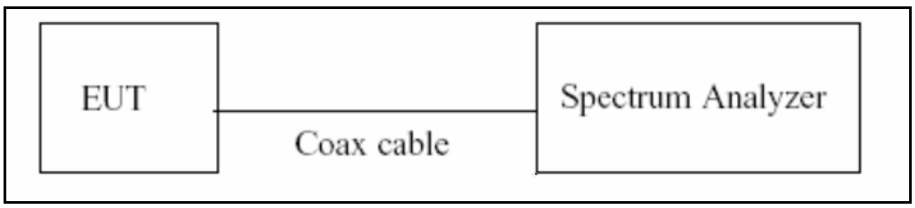
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

We tested according to Procedure E.3.a in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
3. Add 10 log (1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

We use the spectrum analyzer's integrated band power measurement function.

We tested according to Procedure E.2.d) in KDB 789033 D02 v02r01.

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW ≥ 3 MHz.
5. Number of points in sweep ≥ 2 x span/RBW.
6. Sweep time = auto.
7. Detector = RMS.
8. Do not use sweep triggering. Allow the sweep to "free run".
9. Trace average at least 100 traces in power averaging(RMS) mode
10. Integrated bandwidth = OBW
11. Add 10log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

Sample Calculation

Total Power(dBm) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum reading values are not plot data.
   The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss(10 dB) + Cable loss + EUT Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	10.93
UNII 2A	10.93
UNII 2C	10.93
UNII 3	10.93

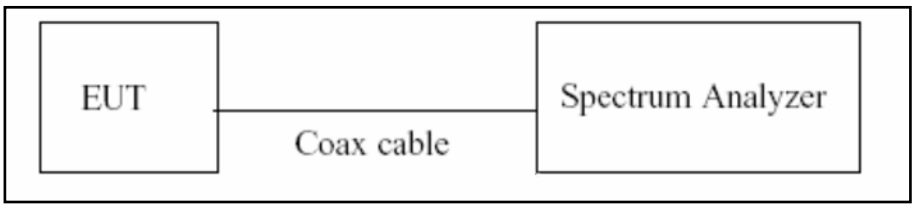
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1	11 dBm/MHz
UNII 2A, 2C	11 dBm/MHz
UNII 3	30 dBm/500 kHz

Test Configuration



Test Procedure

We tested according to Procedure F in KDB 789033 D02 v02r01.

1. Set span to encompass the entire emission bandwidth(EBW) of the signal.
2. RBW = 1 MHz(510 kHz for UNII 3)
3. VBW ≥ 3 MHz
4. Number of points in sweep ≥ 2 x span/RBW.
5. Sweep time = auto.
6. Detector = RMS(i.e., power averaging), if available. Otherwise, use sample detector mode.
7. Do not use sweep triggering. Allow the sweep to “free run”.
8. Trace average at least 100 traces in power averaging(RMS) mode
9. Use the peak search function on the spectrum analyzer to find the peak of the spectrum.
10. If Method SA-2 was used, add 10 log(1/x), where x is the duty cycle, to the peak of the spectrum.

Sample Calculation

Total PSD(dBm) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss(10 dB) + Cable loss + EUT Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	10.93
UNII 2A	10.93
UNII 2C	10.93
UNII 3	10.93

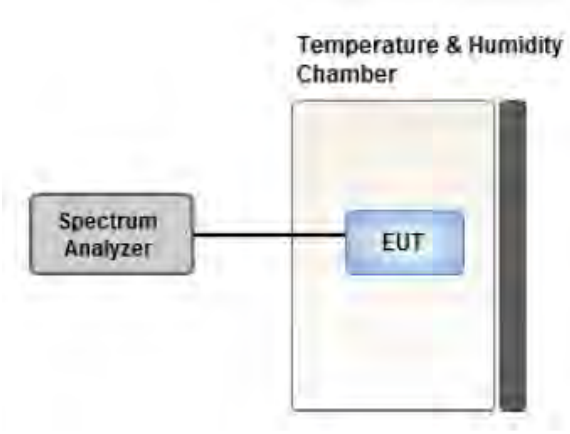
(Actual value of loss for the attenuator and cable combination)

8.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

1. The EUT was placed inside an environmental chamber as the temperature in the chamber was varied between -30 ℃ and 50 ℃.
2. The temperature was incremented by 10 ℃ intervals and the unit was allowed to stabilize at each temperature before each measurement. The center frequency of the transmitting channel was evaluated at each temperature and the frequency deviation from the channel's center frequency was recorded.
3. The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced to the battety operating end point which shall be specified by the manufacturer.
4. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.

8.6. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56[(a)]	56 to 46[(a)]
0.50 to 5	56	46
5 to 30	60	50

[(a)]Decreases with the logarithm of the frequency.

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

Test Configuration

See test photographs attached in Annex A for the actual connections between EUT and support equipment.

Test Procedure

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors : Quasi Peak and Average Detector.

Sample Calculation

Quasi-peak(Final Result) = Reading Value + Correction Factor

8.7. Radiated Test

Limit

1. UNII 1: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of −27 dBm/MHz.

2. UNII 2A, 2C: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of −27 dBm/MHz.

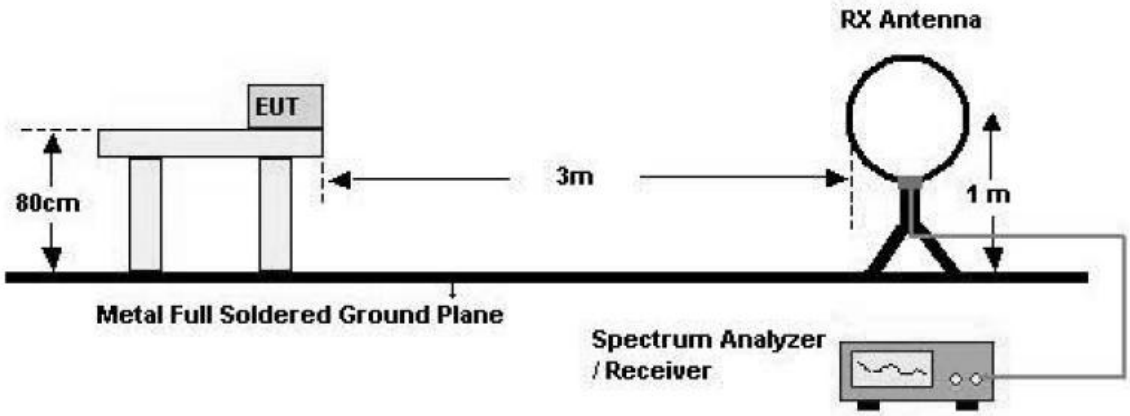
3. UNII 3: All emissions shall be limited to a level of −27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

4. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Section 15.209.

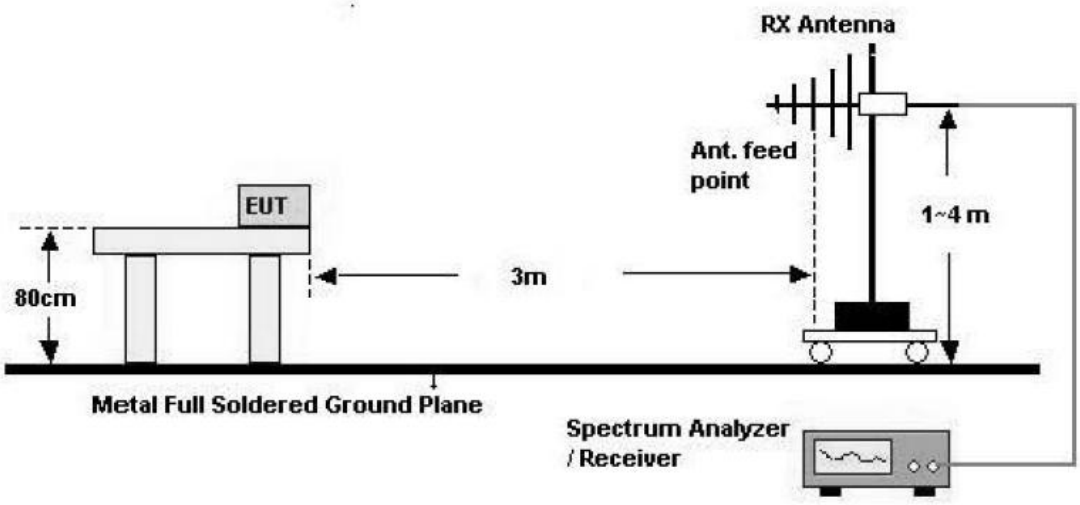
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

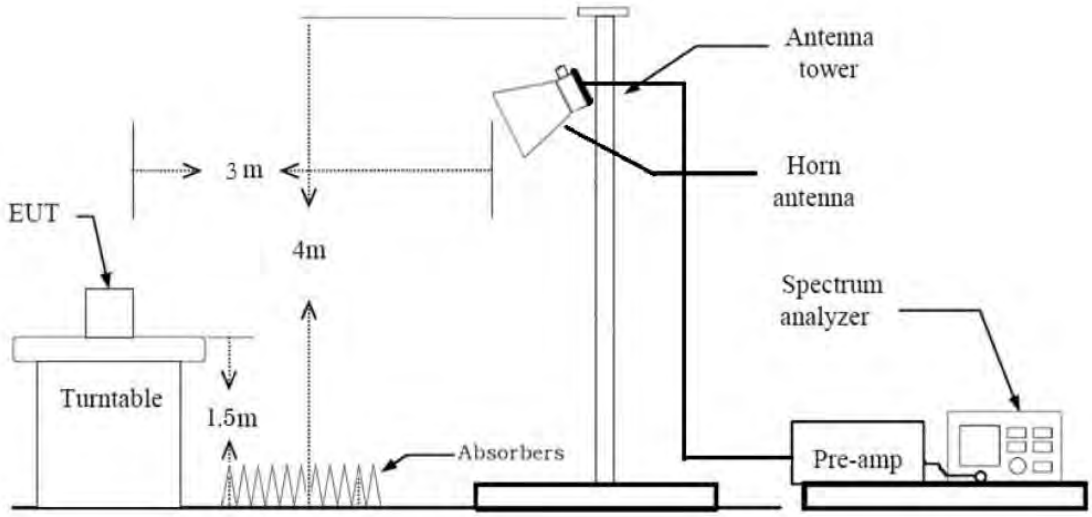
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. .We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making
measurements in the near field.
OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 100 kHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Quasi-peak):
      - Measured Frequency Range : 30 MHz – 1 GHz
      - Detector = Quasi-Peak
      - RBW = 120 kHz

   ※In general, (1) is used mainly
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting

(1) Measurement Type (Peak, G.5 in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep Time = auto
- Trace mode = max hold
- Allow sweeps to continue until the trace stabilizes.

Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

(2) Measurement Type (Average, G.6.d in KDB 789033 v02r01):

- RBW = 1 MHz
- VBW(Duty cycle ≥ 98 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = VBW ≥ 1/T, where T is the minimum transmission duration.
- The analyzer is set to linear detector mode.
- Detector = Peak.
- Sweep time = auto.
- Trace mode = max hold.
- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor
10. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
11. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
12. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
   (1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep Time = auto
   - Trace mode = max hold
   - Allow sweeps to continue until the trace stabilizes.
     Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately 1/x, where x is the duty cycle.

   (2) Measurement Type(Average, G.6.d in KDB 789033 v02r01):
   - RBW = 1 MHz
   - VBW(Duty cycle ≥ 98 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
   - VBW(Duty cycle is < 98 percent) = VBW ≥ 1/T, where T is the minimum transmission duration.
   - The analyzer is set to linear detector mode.
   - Detector = Peak.
   - Sweep time = auto.
   - Trace mode = max hold.
   - Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

9. Measured Frequency Range :
   - 4 500 MHz ~ 5 150 MHz
   - 5 350 MHz ~ 5 460 MHz
   - 5 460 MHz ~ 5 470 MHz
   - (75 MHz or more below the 5 725 MHz) ~ 5 725 MHz
   - 5 850 MHz ~ (75 MHz or more above the 5 850 MHz)
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Attenuator + Distance Factor(D.F)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.968	0.140	1000
802.11n(HT20)	MCS 0	0.966	0.150	1000
802.11n(HT40)	MCS 0	0.934	0.295	2000
802.11ac(VHT20)	MCS 0	0.966	0.148	1000
802.11ac(VHT40)	MCS 0	0.934	0.295	2000
802.11ac(VHT80)	MCS 0	0.877	0.571	5000

8.8. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : Y, Z
   - Radiated Restricted Band Edge : Y
3. All datarate of operation were investigated and the worst case datarate results are reported
   - 802.11a : 6 Mbps
   - 802.11n_HT20 : MCS0
   - 802.11n_HT40 : MCS0
   - 802.11ac_VHT20 : MCS0
   - 802.11ac_VHT40 : MCS0
   - 802.11ac_VHT80 : MCS0
4. Radiated Spurious Emission
   All modulation of operation were investigated and the test results are worst case modulation of each mode.
   (Worst case : 802.11a 6Mbps)
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane
6. SM-A325M/DS, SM-A325M were tested and the worst case results are reported.
(Worst case : SM-A325M/DS)
7. We were performed the RSE test in condition of co-location. There has no significant emission raised.
(WWAN+WLAN 5GHz+BT)

Radiated test(DBS)

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone, Stand alone + External accessories(Earphone, etc)
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : Y
3. The following tables show the worst case configurations determined during testing.

Description	Bluetooth Emission	5 GHz Emission
Antenna	WIFI/BT	WIFI/BT
Channel	0	120
Data Rate	1 Mbps	MCS 0
Mode	GFSK : DH5	802.11a

AC Power line Conducted Emissions

1. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + External accessories(Earphone, etc)+Travel Adapter,
     Stand alone + Travel Adapter
   - Worstcase : Stand alone + Travel Adapter
2. SM-A325M/DS, SM-A325M were tested and the worst case results are reported.

(Worst case : SM-A325M/DS)

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. SM-A325M/DS, SM-A325M were tested and the worst case results are reported.

(Worst case : SM-A325M/DS)

9. SUMMARY OF TEST RESULTS

Test Description	FCC Part Section (s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§15.407(a)(1)	< 250 mW(5150-5250 MHz) < 250 mW or 11+10log$_{10}$ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10log$_{10}$ (BW) dBm (5470-5725 MHz) <1 W(5725-5850 MHz)		PASS
Peak Power Spectral Density	§15.407(a)(1),(5)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§15.407(g) §2.1055	Maintained within the band		PASS
AC Conducted Emissions 150 kHz-30 MHz	15.207	<FCC 15.207 limits		PASS
Undesirable Emissions	§15.407(b)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 8.7 (UNII 3)	Radiated	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(5), (6)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

10. TEST RESULT

10.1 DUTY CYCLE

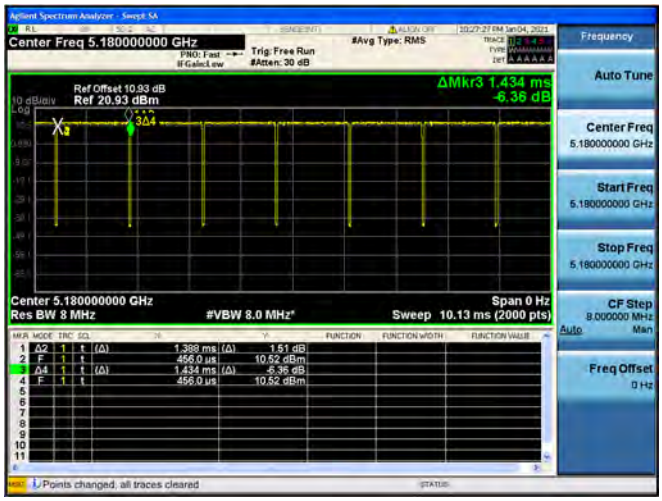
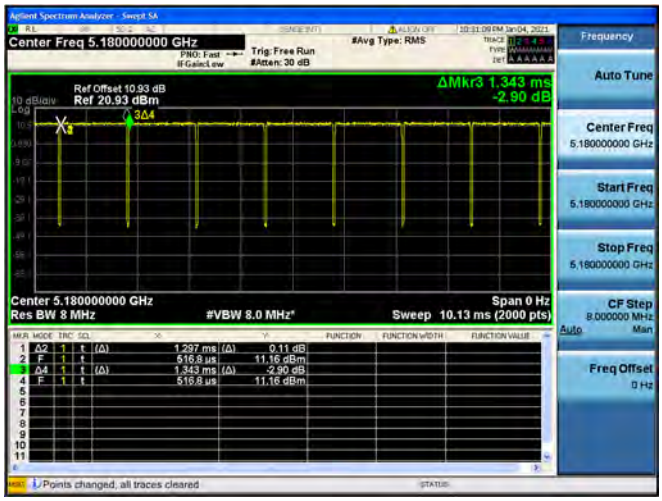
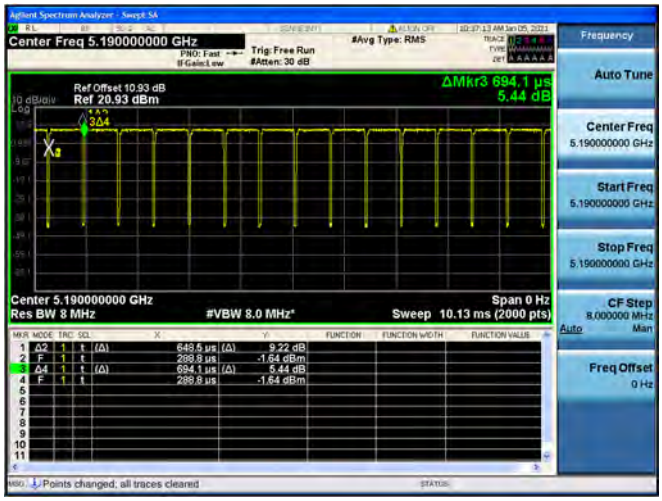
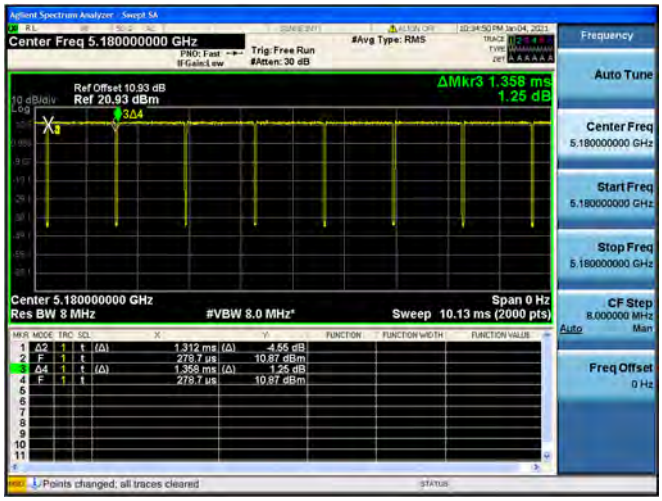
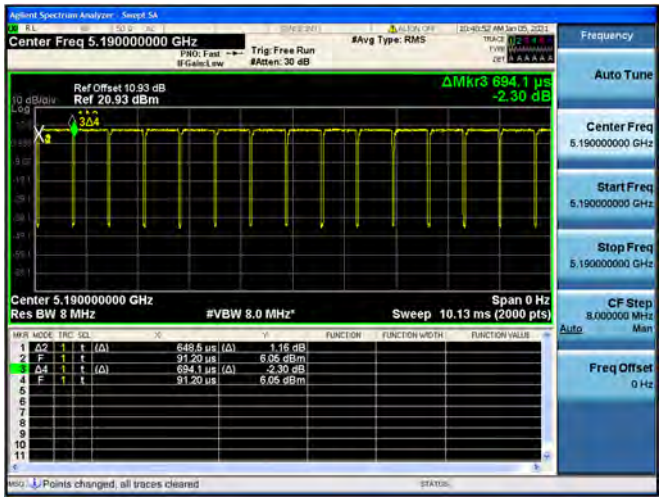
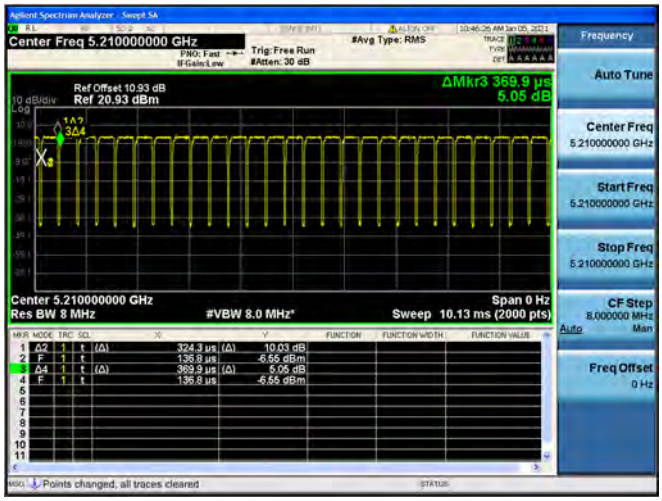
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.388	1.434	0.968	0.140
	9	0.937	0.983	0.954	0.206
	12	0.709	0.755	0.940	0.271
	18	0.481	0.527	0.913	0.393
	24	0.365	0.410	0.889	0.512
	36	0.253	0.299	0.847	0.719
	48	0.187	0.233	0.804	0.946
	54	0.177	0.223	0.795	0.994

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.297	1.343	0.966	0.150
	1	0.664	0.709	0.936	0.289
	2	0.461	0.507	0.910	0.410
	3	0.355	0.400	0.886	0.525
	4	0.248	0.294	0.845	0.732
	5	0.193	0.238	0.809	0.923
	6	0.177	0.223	0.795	0.994
	7	0.162	0.208	0.780	1.076
802.11n (HT40)	0	0.649	0.694	0.934	0.295
	1	0.345	0.390	0.883	0.540
	2	0.243	0.284	0.857	0.669
	3	0.187	0.233	0.804	0.946
	4	0.142	0.187	0.757	1.210
	5	0.117	0.162	0.719	1.434
	6	0.106	0.147	0.724	1.402
	7	0.101	0.142	0.714	1.461

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.312	1.358	0.966	0.148
	1	0.674	0.719	0.937	0.284
	2	0.461	0.507	0.910	0.410
	3	0.360	0.405	0.887	0.518
	4	0.253	0.299	0.847	0.719
	5	0.198	0.243	0.813	0.902
	6	0.187	0.228	0.822	0.850
	7	0.167	0.213	0.786	1.047
	8	0.147	0.193	0.763	1.174
802.11ac (VHT40)	0	0.649	0.694	0.934	0.295
	1	0.345	0.390	0.883	0.540
	2	0.243	0.289	0.842	0.746
	3	0.198	0.238	0.830	0.810
	4	0.147	0.193	0.763	1.174
	5	0.122	0.162	0.750	1.249
	6	0.111	0.152	0.733	1.347
	7	0.106	0.147	0.724	1.402
	8	0.091	0.137	0.667	1.761
	9	0.091	0.137	0.667	1.761
802.11ac (VHT80)	0	0.324	0.370	0.877	0.571
	1	0.182	0.228	0.800	0.969
	2	0.137	0.177	0.771	1.127
	3	0.111	0.157	0.710	1.489
	4	0.086	0.132	0.654	1.845
	5	0.076	0.122	0.625	2.041
	6	0.076	0.117	0.652	1.856
	7	0.071	0.117	0.609	2.156
	8	0.064	0.117	0.548	2.613
	9	0.064	0.118	0.544	2.642

Note:

In order to simplify the report, attached plots were only lowest datarate.

802.11a	802.11n(HT20)
	
802.11n(HT40)	**802.11ac(VHT20)**
	
802.11ac(VHT40)	**802.11ac(VHT80)**
	

10.2 26 dB BANDWIDTH

Straddle channel data in the table below are for reporting purposes only.

Straddle channel data were added in section 10.7.1.

802.11a Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	19.77	16.464
5200	40	20.06	16.535
5240	48	19.68	16.478
5260	52	19.64	16.504
5300	60	19.70	16.490
5320	64	19.70	16.496
5500	100	20.78	16.604
5600	120	22.05	16.629
5720	144	24.80	16.598
5745	149	23.65	16.587
5785	157	23.32	16.627
5825	165	22.18	16.626

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	20.18	17.606
5200	40	20.17	17.589
5240	48	20.01	17.593
5260	52	19.94	17.609
5300	60	20.17	17.610
5320	64	20.14	17.604
5500	100	23.79	17.671
5600	120	23.14	17.665
5720	144	21.73	17.653
5745	149	21.38	17.638
5785	157	21.61	17.644
5825	165	20.97	17.640

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	40.23	36.069
5230	46	40.24	36.134
5270	54	40.69	36.096
5310	62	40.26	36.057
5510	102	40.14	35.968
5590	118	57.16	36.152
5710	142	42.62	36.126
5755	151	41.08	36.106
5795	159	53.53	36.078

802.11ac(VHT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	20.25	17.600
5200	40	19.92	17.592
5240	48	20.09	17.555
5260	52	20.40	17.584
5300	60	20.08	17.567
5320	64	20.28	17.593
5500	100	20.17	17.624
5600	120	22.84	17.650
5720	144	20.21	17.638
5745	149	20.41	17.634
5785	157	21.94	17.660
5825	165	20.08	17.619

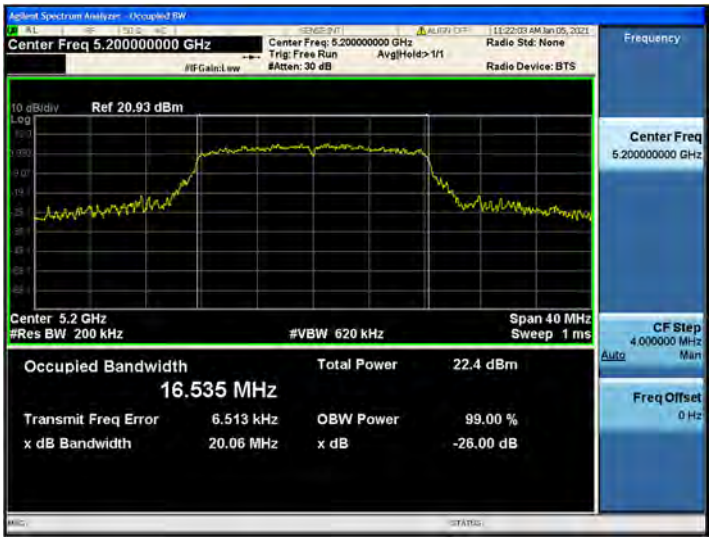
802.11ac(VHT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	40.25	36.052
5230	46	40.17	35.995
5270	54	40.09	35.985
5310	62	40.29	36.045
5510	102	40.45	35.994
5590	118	40.02	36.041
5710	142	40.97	36.014
5755	151	40.27	36.041
5795	159	40.27	36.042

802.11ac(VHT80) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	80.73	75.202
5290	58	80.58	75.204
5530	106	80.43	75.252
5610	122	80.44	75.313
5690	138	80.51	75.254
5775	155	80.59	75.255

▣ Test Plots(802.11a)

Note:

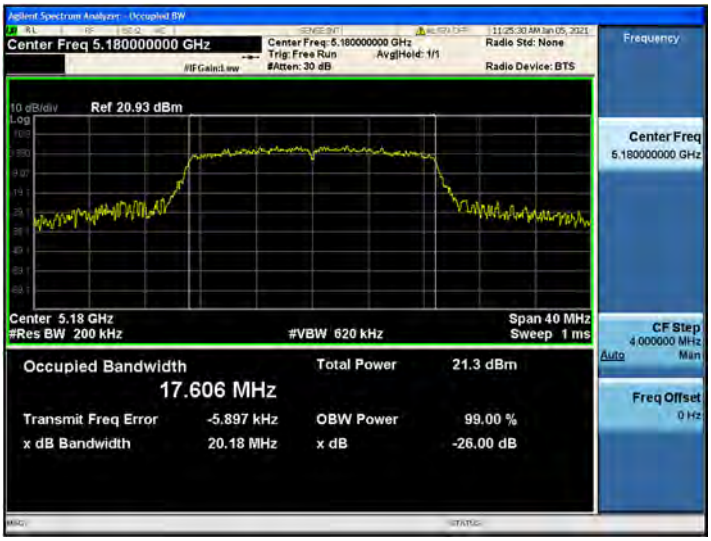
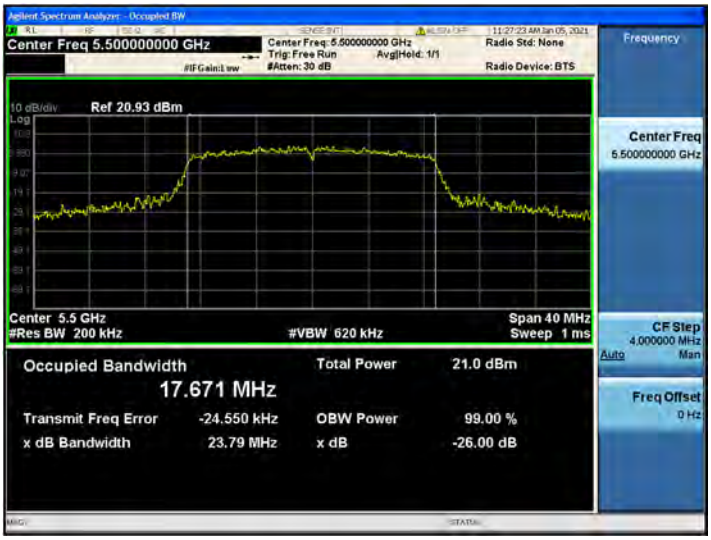
In order to simplify the report, attached plots were only the most wide channel.

802.11a UNII 1 BAND 26dB Bandwidth (CH 40)	802.11a UNII 2A BAND 26dB Bandwidth (CH 60)
	
802.11a UNII 2C BAND 26dB Bandwidth (CH 144)	**802.11a UNII 3 BAND 26dB Bandwidth (CH 149)**
	

▣ Test Plots(802.11n(HT20))

Note:

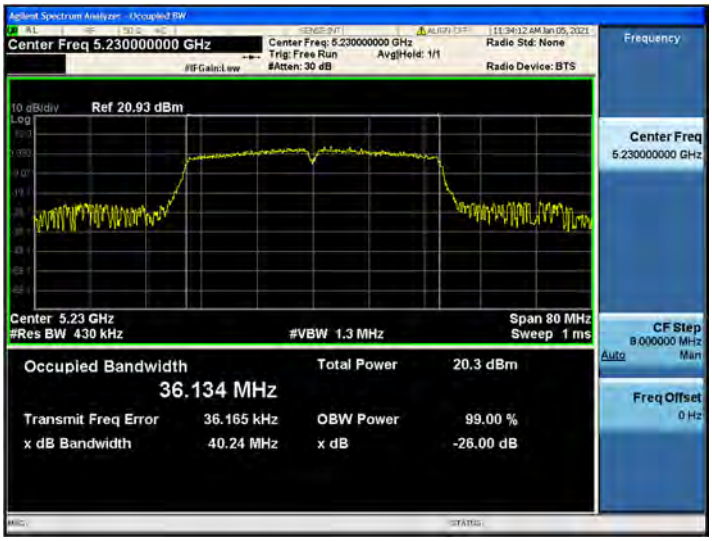
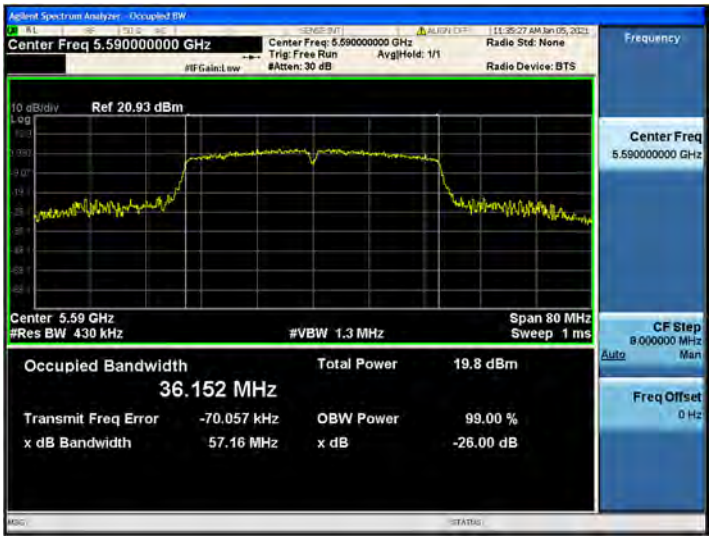
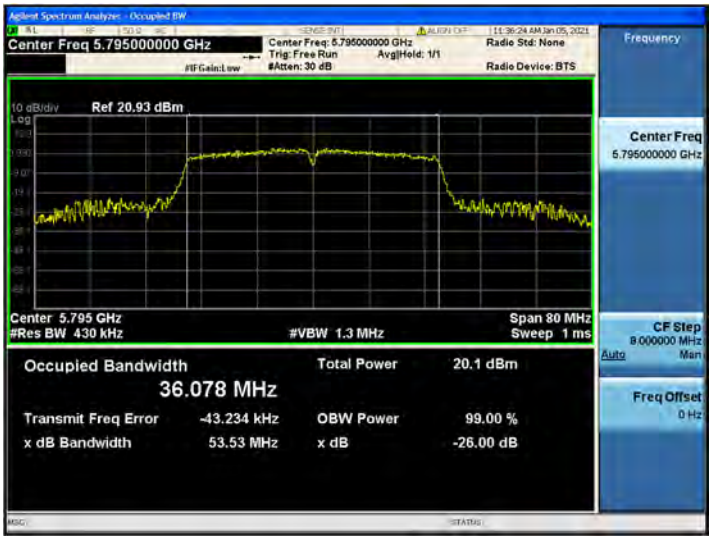
In order to simplify the report, attached plots were only the most wide channel.

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 36)	802.11n_HT20 UNII 2A BAND 26dB Bandwidth(CH 60)
	
802.11n_HT20 UNII 2C BAND 26dB Bandwidth(CH 100)	**802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 157)**
	

▣ Test Plots(802.11n(HT40))

Note:

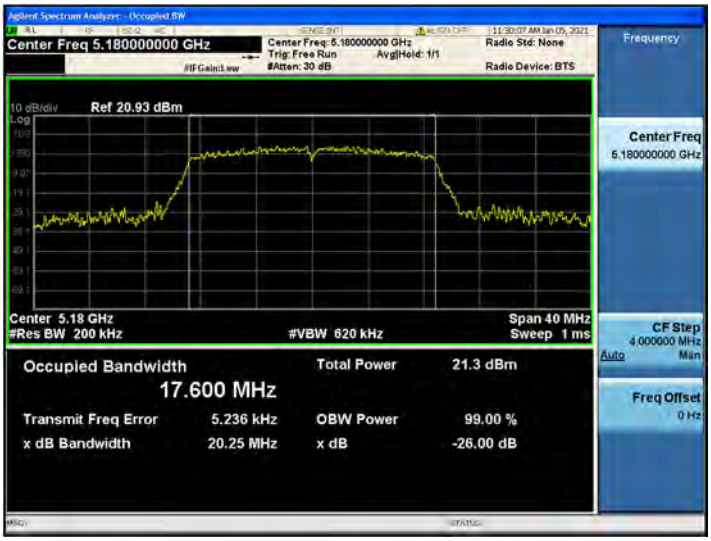
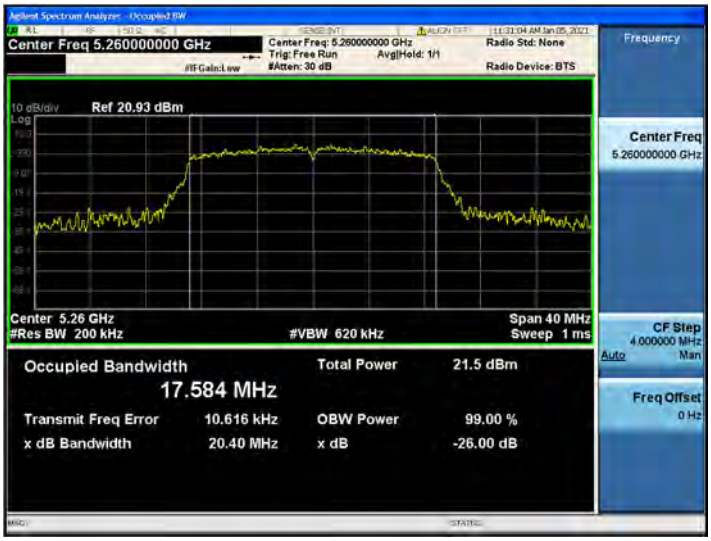
In order to simplify the report, attached plots were only the most wide channel.

802.11n_HT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_HT40 UNII 2A BAND 26dB Bandwidth (CH 54)
	
802.11n_HT40 UNII 2C BAND 26dB Bandwidth(CH 118)	**802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)**
	

▣ Test Plots(802.11ac(VHT20))

Note:

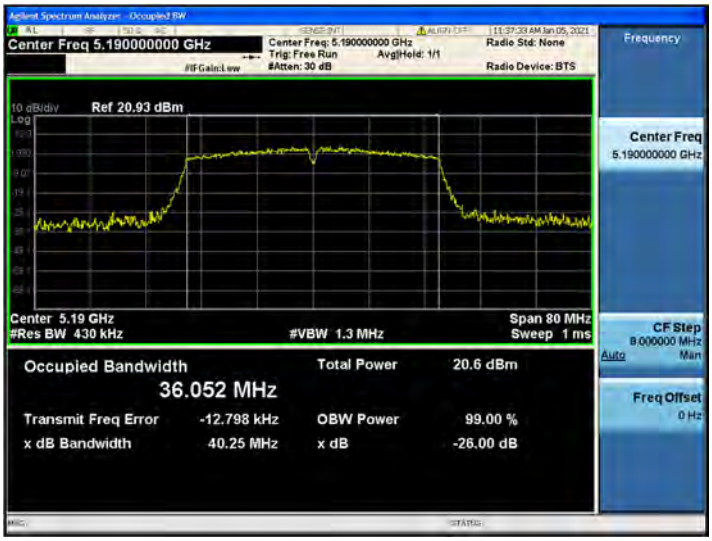
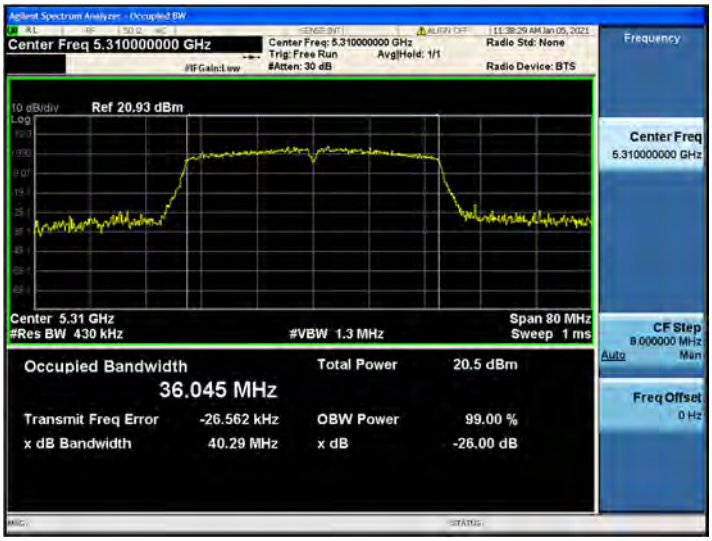
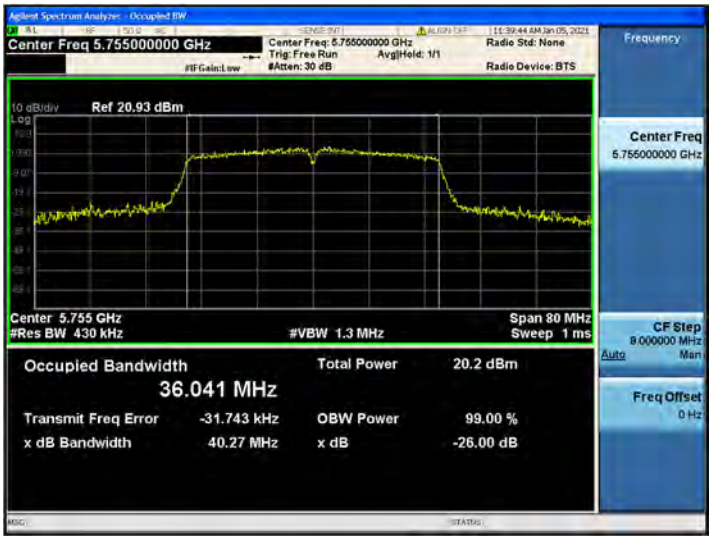
In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 36)	802.11ac_VHT20 UNII 2A BAND 26dB Bandwidth(CH 52)
	
802.11ac_VHT20 UNII 2C BAND 26dB Bandwidth(CH 120)	**802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 157)**
	

▣ Test Plots(802.11ac(VHT40))

Note:

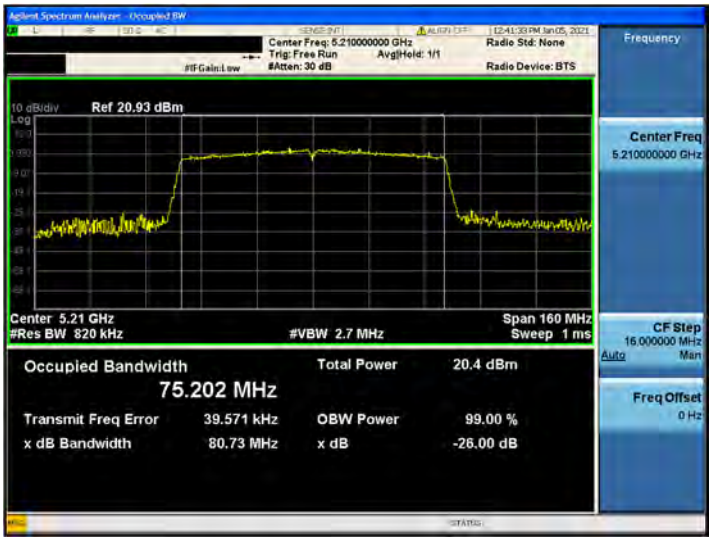
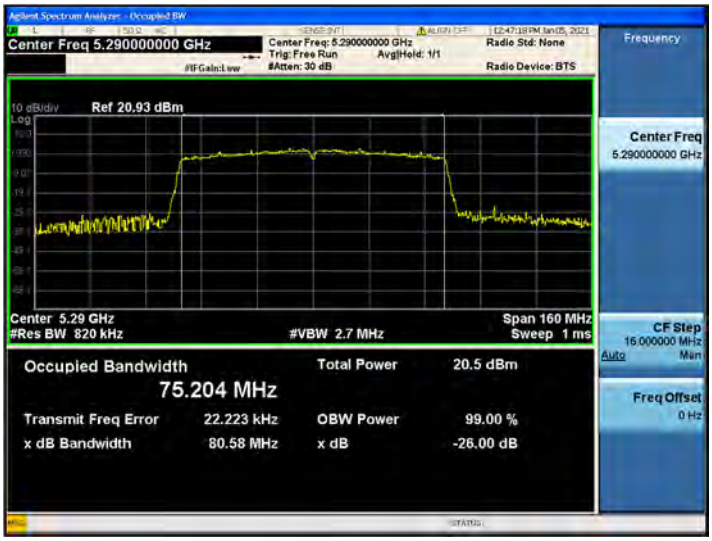
In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 38)	802.11ac_VHT40 UNII 2A BAND 26dB Bandwidth (CH 62)
	
802.11ac_VHT40 UNII 2C BAND 26dB Bandwidth(CH 142)	**802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 151)**
	

▣ Test Plots(802.11ac(VHT80))

Note:

In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 2A BAND 26dB Bandwidth (CH 58)
	
802.11ac_VHT80 UNII 2C BAND 26dB Bandwidth(CH 138)	**802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth (CH 155)**
	

10.3 6dB BANDWIDTH

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.17	> 0.5	Pass
5785	157	13.93	> 0.5	Pass
5825	165	15.05	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	13.92	> 0.5	Pass
5785	157	15.15	> 0.5	Pass
5825	165	15.09	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.15	> 0.5	Pass
5795	159	35.14	> 0.5	Pass

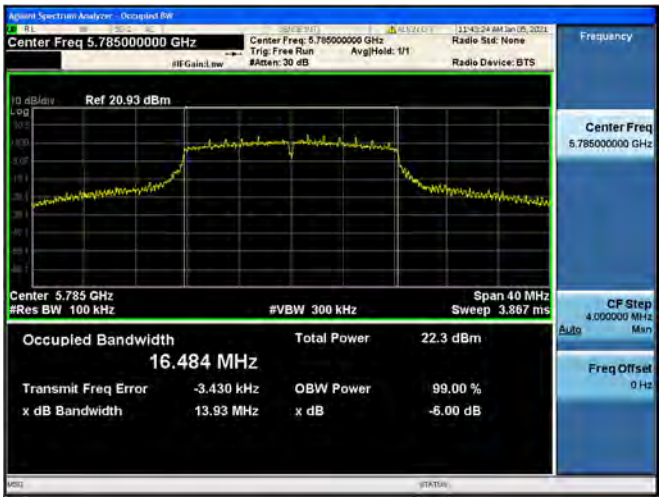
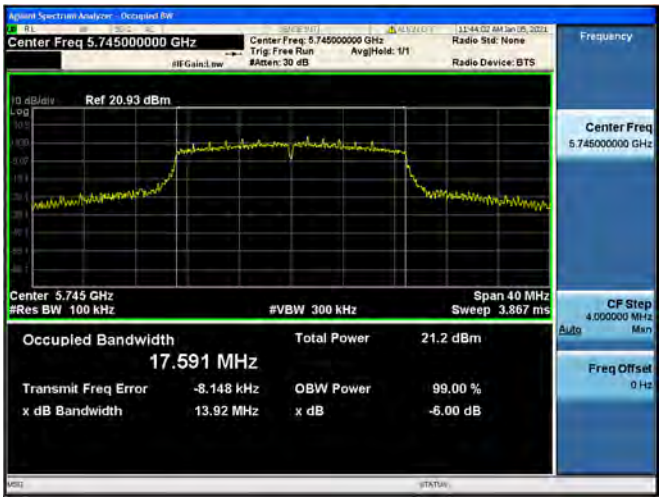
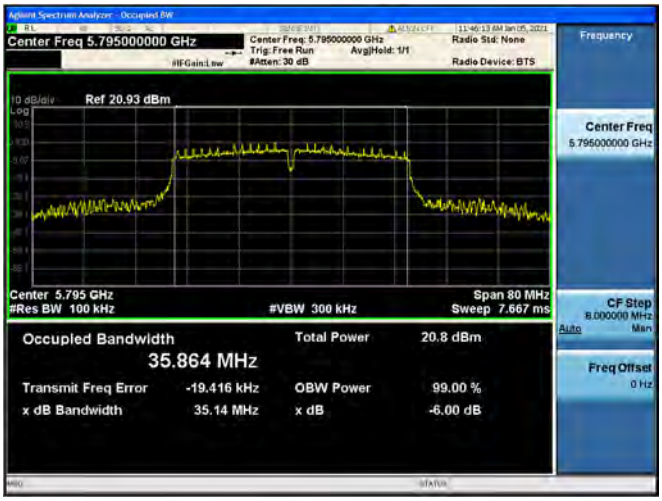
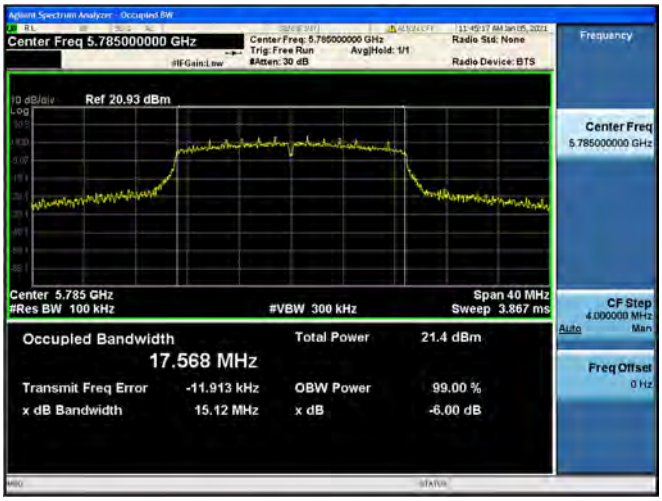
802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.17	> 0.5	Pass
5785	157	15.12	> 0.5	Pass
5825	165	15.14	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.11	> 0.5	Pass
5795	159	35.15	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.13	> 0.5	Pass

▣ Test Plots

Note: In order to simplify the report, attached plots were only the most narrow channel.

802.11a (CH.157)	802.11n(HT20) (CH.149)
	
802.11n(HT40) (CH.159)	**802.11ac(VHT20) (CH.157)**
	
802.11ac(VHT40) (CH.151)	**802.11ac(VHT80) (CH.155)**
	

10.4 OUTPUT POWER MEASUREMENT

Straddle channel data in the table below are for reporting purposes only.

Straddle channel data were added in section 10.7.3.

802.11a Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase Datarate (Mbps)
Frequency [MHz]	Channel No.						
5180	36	16	16.02	0.206	16.22	23.98	9 Mbps
5200	40	16	16.05	0.206	16.26	23.98	9 Mbps
5240	48	16	15.98	0.393	16.38	23.98	18 Mbps
5260	52	16	16.08	0.271	16.35	23.93	12 Mbps
5300	60	16	16.15	0.206	16.35	23.95	9 Mbps
5320	64	16	16.07	0.271	16.34	23.94	12 Mbps
5500	100	14	12.69	0.946	13.64	23.98	48 Mbps
5600	120	16	14.64	0.946	15.59	23.98	48 Mbps
5700	140	16	15.04	0.393	15.43	23.98	18 Mbps
5720	144	14	12.82	0.719	13.54	23.98	36 Mbps
5745	149	14	14.02	0.206	14.23	30.00	9 Mbps
5785	157	13	12.59	0.140	12.73	30.00	6 Mbps
5825	165	12	11.68	0.206	11.89	30.00	9 Mbps

802.11n(20MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5180	36	15	14.43	0.525	14.95	23.98	MCS3
5200	40	15	14.82	0.150	14.97	23.98	MCS0
5240	48	15	14.32	0.732	15.05	23.98	MCS4
5260	52	15	14.08	0.994	15.07	23.98	MCS6
5300	60	15	15.03	0.150	15.18	23.98	MCS0
5320	64	15	14.21	0.923	15.13	23.98	MCS5
5500	100	14	12.69	0.923	13.62	23.98	MCS5
5600	120	15	13.98	0.410	14.39	23.98	MCS2
5700	140	15	13.75	0.525	14.28	23.98	MCS3
5720	144	14	12.49	0.923	13.42	23.98	MCS5
5745	149	14	13.02	0.525	13.54	30.00	MCS3
5785	157	13	11.76	0.923	12.69	30.00	MCS5
5825	165	12	11.53	0.289	11.82	30.00	MCS1

802.11n(40MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5190	38	14	13.58	0.540	14.12	23.98	MCS1
5230	46	14	13.62	0.540	14.16	23.98	MCS1
5270	54	14	13.26	0.946	14.21	23.98	MCS3
5310	62	14	13.32	0.946	14.26	23.98	MCS3
5510	102	11	10.36	0.295	10.66	23.98	MCS0
5590	118	14	13.09	0.540	13.63	23.98	MCS1
5710	142	14	12.55	0.946	13.49	23.98	MCS3
5755	151	14	12.06	1.434	13.49	30.00	MCS5
5795	159	13	11.73	0.946	12.68	30.00	MCS3

802.11ac(20MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5180	36	15	13.93	1.174	15.11	23.98	MCS8
5200	40	15	14.02	1.174	15.19	23.98	MCS8
5240	48	15	14.92	0.410	15.33	23.98	MCS2
5260	52	15	14.84	0.284	15.13	23.98	MCS1
5300	60	15	14.44	0.719	15.16	23.98	MCS4
5320	64	15	15.01	0.148	15.16	23.98	MCS0
5500	100	14	12.90	0.719	13.62	23.98	MCS4
5600	120	15	13.50	0.902	14.40	23.98	MCS5
5700	140	15	13.27	1.047	14.32	23.98	MCS7
5720	144	14	12.48	0.902	13.38	23.98	MCS5
5745	149	14	13.23	0.410	13.64	30.00	MCS2
5785	157	13	12.61	0.148	12.76	30.00	MCS0
5825	165	12	11.59	0.284	11.87	30.00	MCS1

802.11ac(40MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5190	38	14	13.57	0.540	14.11	23.98	MCS1
5230	46	14	13.87	0.295	14.17	23.98	MCS0
5270	54	14	13.46	0.746	14.20	23.98	MCS2
5310	62	14	13.53	0.746	14.28	23.98	MCS2
5510	102	11	9.42	1.174	10.59	23.98	MCS4
5590	118	14	12.98	0.746	13.73	23.98	MCS2
5710	142	14	13.24	0.295	13.54	23.98	MCS0
5755	151	14	12.75	0.746	13.50	30.00	MCS2
5795	159	13	12.37	0.295	12.67	30.00	MCS0

802.11ac(80MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5210	42	13	12.30	0.969	13.27	23.98	MCS1
5290	58	13	12.25	0.969	13.22	23.98	MCS1
5530	106	11	9.26	1.489	10.75	23.98	MCS3
5610	122	13	12.26	0.571	12.83	23.98	MCS0
5690	138	13	11.67	0.969	12.63	23.98	MCS1
5775	155	13	12.15	0.571	12.72	30.00	MCS0

10.5 POWER SPECTRAL DENSITY

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	5.725	0.206	5.931	11 dBm/MHz
5200	40	5.630	0.206	5.836	
5240	48	5.573	0.393	5.966	
5260	52	5.927	0.271	6.198	
5300	60	6.040	0.206	6.246	
5320	64	6.046	0.271	6.317	
5500	100	4.776	0.946	5.722	
5600	120	4.651	0.946	5.597	
5720	144	4.700	0.719	5.419	
5745	149	2.257	0.206	2.463	30 dBm/500kHz
5785	157	2.179	0.140	2.319	
5825	165	2.444	0.206	2.650	

802.11n(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	3.945	0.525	4.470	11 dBm/MHz
5200	40	4.581	0.150	4.731	
5240	48	3.970	0.732	4.702	
5260	52	4.052	0.994	5.046	
5300	60	4.379	0.150	4.529	
5320	64	4.027	0.923	4.950	
5500	100	1.944	0.923	2.867	
5600	120	2.917	0.410	3.327	
5720	144	1.895	0.923	2.818	
5745	149	-0.317	0.525	0.208	30 dBm/500kHz
5785	157	-1.668	0.923	-0.745	
5825	165	-2.111	0.289	-1.822	

802.11n(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	0.341	0.540	0.881	11 dBm/MHz
5230	46	0.649	0.540	1.189	
5270	54	0.199	0.946	1.145	
5310	62	0.649	0.946	1.595	
5510	102	-3.139	0.295	-2.844	
5590	118	0.024	0.540	0.564	
5710	142	-0.610	0.946	0.336	
5755	151	-3.602	1.434	-2.168	30 dBm /500kHz
5795	159	-4.435	0.946	-3.489	

802.11ac(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	3.661	1.174	4.835	11 dBm/MHz
5200	40	3.548	1.174	4.722	
5240	48	4.474	0.410	4.884	
5260	52	4.696	0.284	4.980	
5300	60	4.389	0.719	5.108	
5320	64	4.658	0.148	4.806	
5500	100	2.644	0.719	3.363	
5600	120	3.578	0.902	4.480	
5720	144	2.186	0.902	3.088	
5745	149	0.035	0.410	0.445	30 dBm/500kHz
5785	157	-0.681	0.148	-0.533	
5825	165	-1.671	0.284	-1.387	

802.11ac(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	0.505	0.540	1.045	11 dBm/MHz
5230	46	0.600	0.295	0.895	
5270	54	0.041	0.746	0.787	
5310	62	0.433	0.746	1.179	
5510	102	-3.449	1.174	-2.275	
5590	118	-0.427	0.746	0.319	
5710	142	-0.119	0.295	0.176	
5755	151	-2.936	0.746	-2.190	30 dBm/500kHz
5795	159	-3.684	0.295	-3.389	

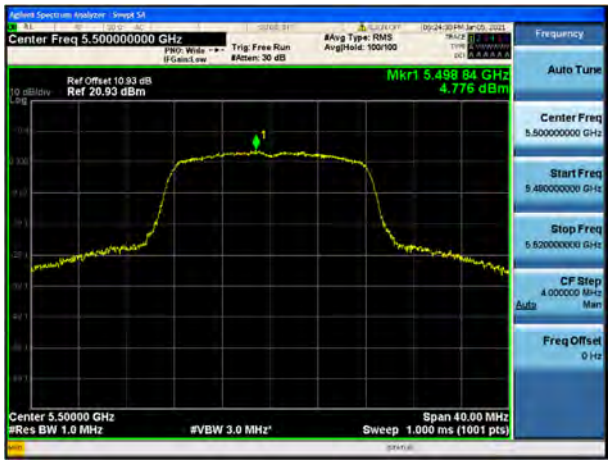
802.11ac(80MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5210	42	-3.827	0.969	-2.858	11 dBm/MHz
5290	58	-3.893	0.969	-2.924	
5530	106	-6.714	1.489	-5.225	
5610	122	-4.285	0.571	-3.714	
5690	138	-4.303	0.969	-3.334	
5775	155	-7.326	0.571	-6.755	30 dBm/500kHz

▣ Test Plots(802.11a)

Note:

In order to simplify the report, attached plots were only channel of highest power.

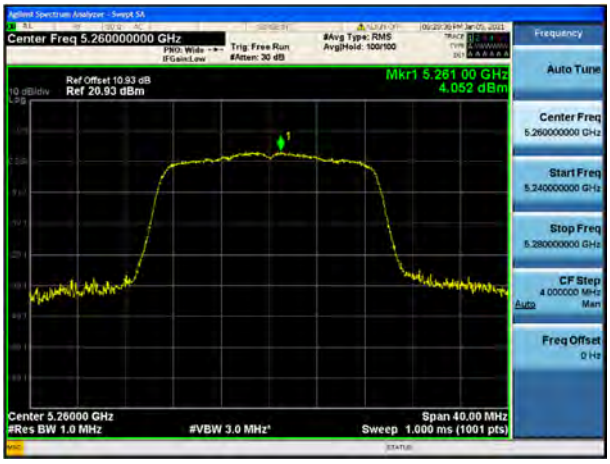
UNII 1 (Ch. 48)	UNII 2A (Ch. 60)
	

UNII 2C (Ch. 100)	UNII 3 (Ch. 165)
	

▣ Test Plots(802.11n(HT20))

Note:

In order to simplify the report, attached plots were only channel of highest power.

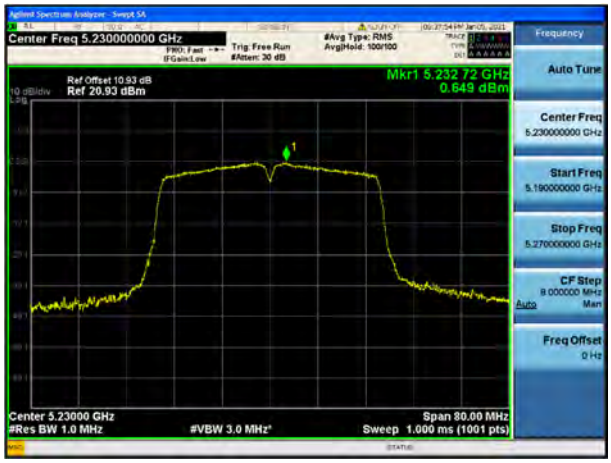
UNII 1 (Ch. 40)	UNII 2A (Ch. 52)
	

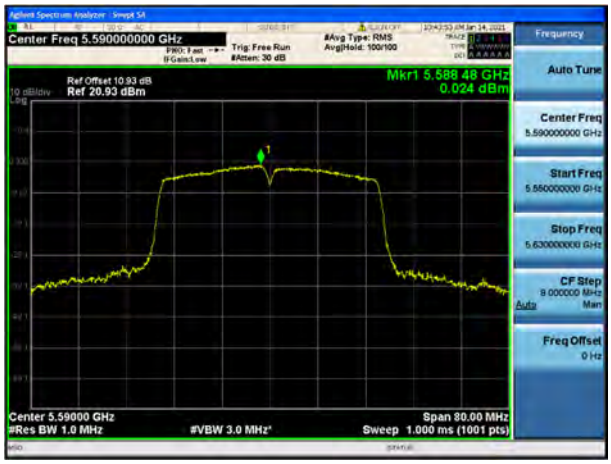
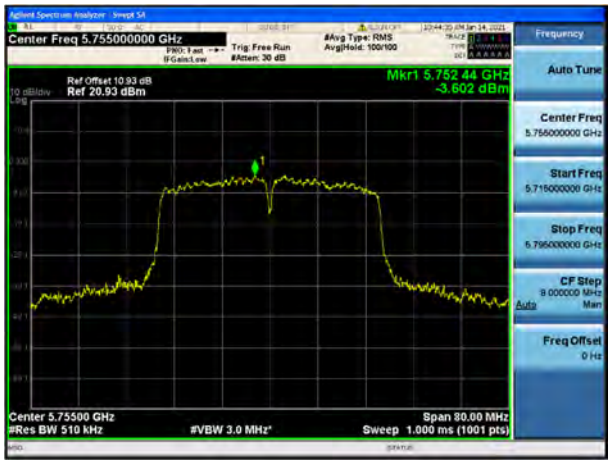
UNII 2C (Ch. 120)	UNII 3 (Ch. 149)
	

▣ Test Plots(802.11n(HT40))

Note:

In order to simplify the report, attached plots were only channel of highest power.

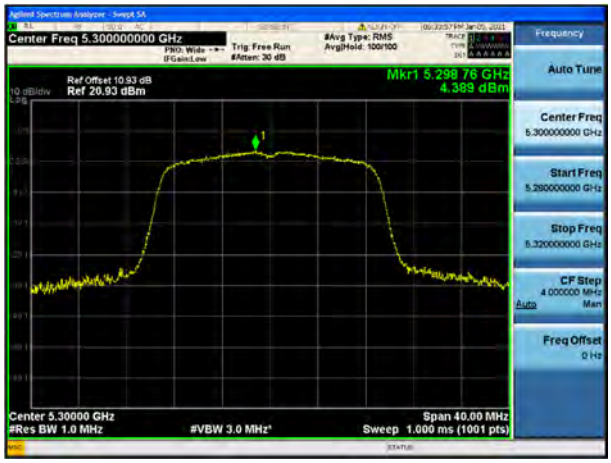
UNII 1 (Ch. 46)	UNII 2A (Ch. 62)
	

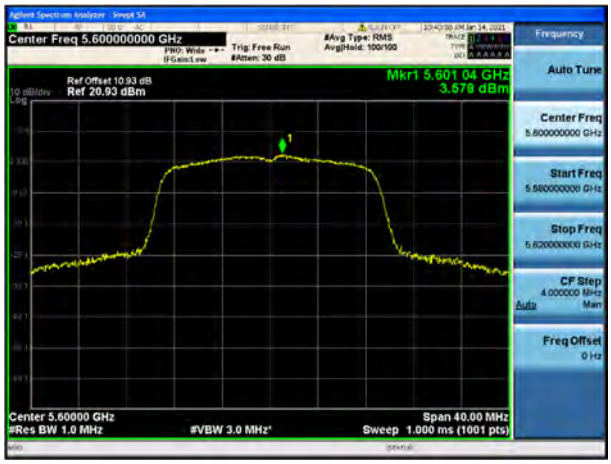
UNII 2C (Ch. 118)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT20))

Note:

In order to simplify the report, attached plots were only channel of highest power.

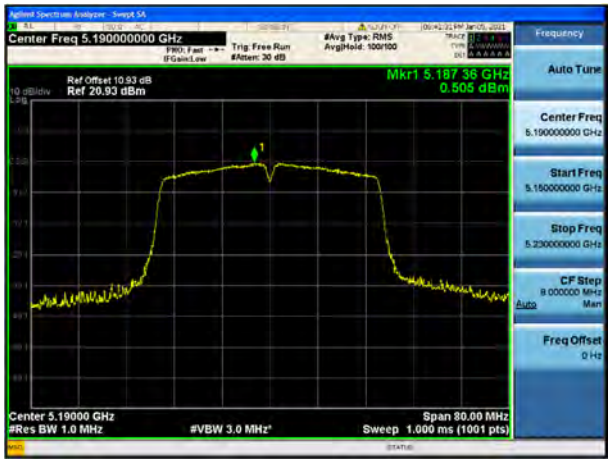
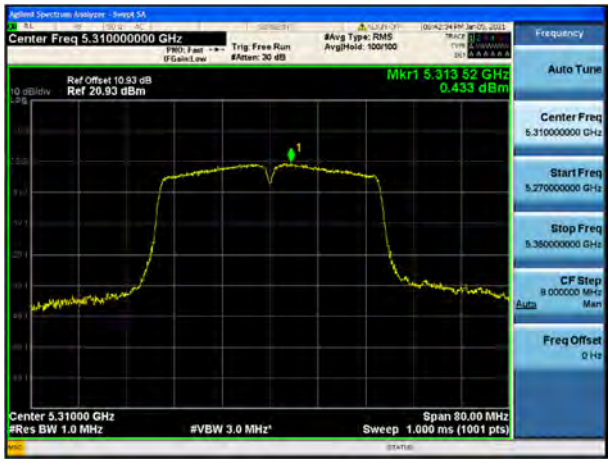
UNII 1 (Ch. 48)	UNII 2A (Ch. 60)
	

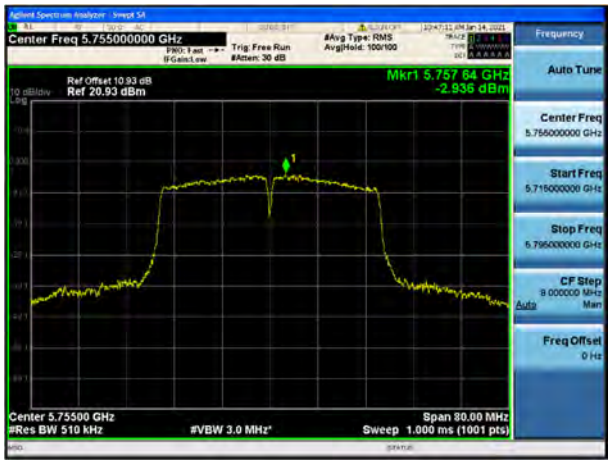
UNII 2C (Ch. 120)	UNII 3 (Ch. 149)
	

▣ Test Plots(802.11ac(VHT40))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 38)	UNII 2A (Ch. 62)
	

UNII 2C (Ch. 118)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT80))

Note:

In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 42)	UNII 2A (Ch. 58)
	

UNII 2C (Ch. 138)	UNII 3 (Ch. 155)
	

10.6 FREQUENCY STABILITY.

10.6.1 80MHz BW

Startup after the EUT is energized

OPERATING BAND: UNII Band 1
OPERATING FREQUENCY: 5,210,000,000 Hz
CHANNEL: 42
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210058.93	58.93
100%		-30	5210062.35	62.35
100%		-20	5210074.87	74.87
100%		-10	5210069.55	69.55
100%		0	5210083.52	83.52
100%		+10	5210093.19	93.19
100%		+30	5210094.62	94.62
100%		+40	5210096.56	96.56
100%		+50	5210005.88	5.88
Batt. Endpoint	3.4	+20	5210070.10	70.10

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2A
OPERATING FREQUENCY: 5,290,000,000 Hz
CHANNEL: 58
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290061.27	61.27
100%		-30	5290034.73	34.73
100%		-20	5290096.13	96.13
100%		-10	5290022.15	22.15
100%		0	5290015.50	15.5
100%		+10	5290068.79	68.79
100%		+30	5290005.16	5.16
100%		+40	5290004.72	4.72
100%		+50	5290099.49	99.49
Batt. Endpoint	3.4	+20	5290093.92	93.92

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2C
OPERATING FREQUENCY: 5,530,000,000 Hz
CHANNEL: 106
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530093.84	93.84
100%		-30	5530051.02	51.02
100%		-20	5530098.98	98.98
100%		-10	5530081.42	81.42
100%		0	5530027.76	27.76
100%		+10	5530045.02	45.02
100%		+30	5530093.14	93.14
100%		+40	5530048.65	48.65
100%		+50	5530047.23	47.23
Batt. Endpoint	3.4	+20	5530068.38	68.38

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 3
OPERATING FREQUENCY: 5,775,000,000 Hz
CHANNEL: 155
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775027.53	27.53
100%		-30	5775030.14	30.14
100%		-20	5775085.53	85.53
100%		-10	5775075.77	75.77
100%		0	5775015.99	15.99
100%		+10	5775089.23	89.23
100%		+30	5775043.31	43.31
100%		+40	5775001.21	1.21
100%		+50	5775091.26	91.26
Batt. Endpoint	3.4	+20	5775089.11	89.11

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210050.56	50.56
100%		-30	5210036.36	36.36
100%		-20	5210051.41	51.41
100%		-10	5210008.78	8.78
100%		0	5210090.64	90.64
100%		+10	5210083.63	83.63
100%		+30	5210095.81	95.81
100%		+40	5210094.09	94.09
100%		+50	5210073.04	73.04
Batt. Endpoint	3.4	+20	5210021.38	21.38

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2A
OPERATING FREQUENCY: 5,290,000,000 Hz
CHANNEL: 58
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290017.39	17.39
100%		-30	5290050.25	50.25
100%		-20	5290088.46	88.46
100%		-10	5290089.98	89.98
100%		0	5290010.65	10.65
100%		+10	5290058.26	58.26
100%		+30	5290038.73	38.73
100%		+40	5290059.51	59.51
100%		+50	5290075.82	75.82
Batt. Endpoint	3.4	+20	5290099.92	99.92

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2C
OPERATING FREQUENCY: 5,530,000,000 Hz
CHANNEL: 106
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530083.16	83.16
100%		-30	5530062.94	62.94
100%		-20	5530019.29	19.29
100%		-10	5530068.65	68.65
100%		0	5530089.89	89.89
100%		+10	5530083.35	83.35
100%		+30	5530077.65	77.65
100%		+40	5530048.24	48.24
100%		+50	5530054.74	54.74
Batt. Endpoint	3.4	+20	5530017.92	17.92

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 3
OPERATING FREQUENCY: 5,775,000,000 Hz
CHANNEL: 155
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775097.83	97.83
100%		-30	5775076.43	76.43
100%		-20	5775054.91	54.91
100%		-10	5775063.99	63.99
100%		0	5775088.13	88.13
100%		+10	5775087.22	87.22
100%		+30	5775034.06	34.06
100%		+40	5775076.13	76.13
100%		+50	5775032.17	32.17
Batt. Endpoint	3.4	+20	5775010.28	10.28

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210055.92	55.92
100%		-30	5210074.10	74.10
100%		-20	5210087.17	87.17
100%		-10	5210009.58	9.58
100%		0	5210098.89	98.89
100%		+10	5210036.98	36.98
100%		+30	5210069.54	69.54
100%		+40	5210084.97	84.97
100%		+50	5210032.78	32.78
Batt. Endpoint	3.4	+20	5210084.17	84.17

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2A
OPERATING FREQUENCY: 5,290,000,000 Hz
CHANNEL: 58
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290006.06	6.06
100%		-30	5290020.10	20.10
100%		-20	5290008.71	8.71
100%		-10	5290017.81	17.81
100%		0	5290084.16	84.16
100%		+10	5290015.75	15.75
100%		+30	5290058.86	58.86
100%		+40	5290069.60	69.6
100%		+50	5290042.56	42.56
Batt. Endpoint	3.4	+20	5290014.27	14.27

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2C
OPERATING FREQUENCY: 5,530,000,000 Hz
CHANNEL: 106
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530054.49	54.49
100%		-30	5530057.48	57.48
100%		-20	5530045.23	45.23
100%		-10	5530089.17	89.17
100%		0	5530049.70	49.7
100%		+10	5530089.17	89.17
100%		+30	5530085.30	85.3
100%		+40	5530011.15	11.15
100%		+50	5530024.30	24.30
Batt. Endpoint	3.4	+20	5530010.48	10.48

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 3
OPERATING FREQUENCY: 5,775,000,000 Hz
CHANNEL: 155
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775096.41	96.41
100%		-30	5775050.29	50.29
100%		-20	5775005.76	5.76
100%		-10	5775049.90	49.9
100%		0	5775089.74	89.74
100%		+10	5775098.92	98.92
100%		+30	5775043.04	43.04
100%		+40	5775004.33	4.33
100%		+50	5775054.69	54.69
Batt. Endpoint	3.4	+20	5775029.39	29.39

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210048.99	48.99
100%		-30	5210096.44	96.44
100%		-20	5210078.62	78.62
100%		-10	5210098.81	98.81
100%		0	5210096.70	96.70
100%		+10	5210017.67	17.67
100%		+30	5210092.28	92.28
100%		+40	5210063.09	63.09
100%		+50	5210017.74	17.74
Batt. Endpoint	3.4	+20	5210069.07	69.07

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2A
OPERATING FREQUENCY: 5,290,000,000 Hz
CHANNEL: 58
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290039.90	39.90
100%		-30	5290030.10	30.10
100%		-20	5290007.47	7.47
100%		-10	5290042.97	42.97
100%		0	5290075.40	75.4
100%		+10	5290095.51	95.51
100%		+30	5290062.04	62.04
100%		+40	5290079.31	79.31
100%		+50	5290027.77	27.77
Batt. Endpoint	3.4	+20	5290094.78	94.78

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 2C
OPERATING FREQUENCY: 5,530,000,000 Hz
CHANNEL: 106
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530017.71	17.71
100%		-30	5530043.37	43.37
100%		-20	5530027.90	27.9
100%		-10	5530075.50	75.5
100%		0	5530017.32	17.32
100%		+10	5530059.24	59.24
100%		+30	5530033.98	33.98
100%		+40	5530047.44	47.44
100%		+50	5530020.68	20.68
Batt. Endpoint	3.4	+20	5530032.79	32.79

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.

OPERATING BAND: UNII Band 3
OPERATING FREQUENCY: 5,775,000,000 Hz
CHANNEL: 155
REFERENCE VOLTAGE: 3.86 VDC

Voltage (%)	Power (VDC)	Temp. (℃)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775038.32	38.32
100%		-30	5775063.13	63.13
100%		-20	5775071.51	71.51
100%		-10	5775018.49	18.49
100%		0	5775090.72	90.72
100%		+10	5775068.06	68.06
100%		+30	5775011.65	11.65
100%		+40	5775026.28	26.28
100%		+50	5775031.44	31.44
Batt. Endpoint	3.4	+20	5775029.70	29.70

Note:

Based on the results of the frequency stability test shown above the frequency deviation results measured are very small. As such it is determined that the channels at the band edge would remain in-band when the maximum measured frequency error noted during the frequency stability tests is applied. Therefore the device is determined to remain operating in band over the temperature and voltage range as tested.\

10.7 STRADDLE CHANNEL

10.7.1 26dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5710.12	14.88
802.11n(HT20)				5709.28	15.72
802.11ac(VHT20)				5710.08	14.92
802.11a	UNII 3	5720	144	5729.92	4.92
802.11n(HT20)				5731.24	6.24
802.11ac(VHT20)				5729.92	4.92

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5689.76	35.24
802.11ac(VHT40)				5689.84	35.16
802.11n(HT40)	UNII 3	5710	142	5729.84	4.84
802.11ac(VHT40)				5730.16	5.16

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.68	75.32
	UNII 3	5690	138	5730.00	5.00

Note:

[UNII 2C] 26dB Bandwidth = 5 725 MHz **-** Measured Frequency[MHz]

[UNII 3C] 26dB Bandwidth = Measured Frequency[MHz] – 5 725 MHz

▣ Test Plots (26dB Bandwidth)

802.11a UNII Band	802.11n(HT20) UNII Band
	

802.11ac(VHT20) UNII Band


▣ Test Plots (26dB Bandwidth)

802.11n(HT40) UNII Band	802.11ac(VHT40) UNII Band
	

802.11ac(VHT80) UNII Band


10.7.2 6dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5728.20	3.20	> 0.5
802.11n(HT20)				5728.52	3.52	> 0.5
802.11ac(VHT20)				5727.52	2.52	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5727.6	2.60	> 0.5
802.11ac(VHT40)				5727.6	2.60	> 0.5

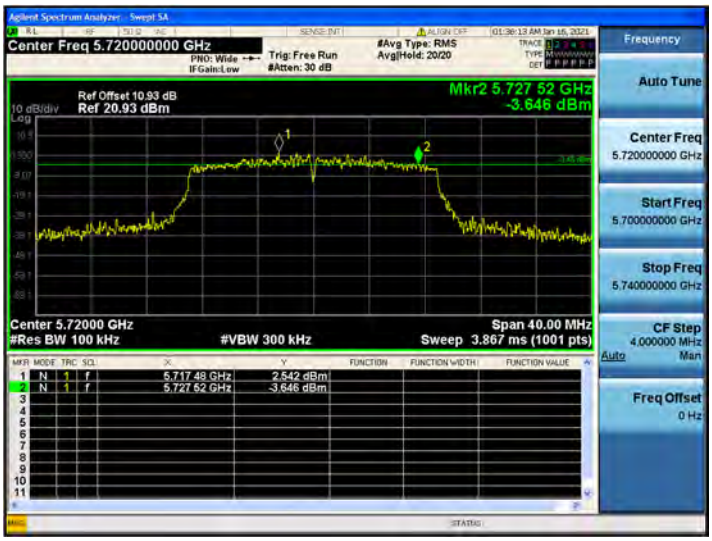
Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11ac(VHT80)	UNII 3	5690	138	5727.76	2.76	> 0.5

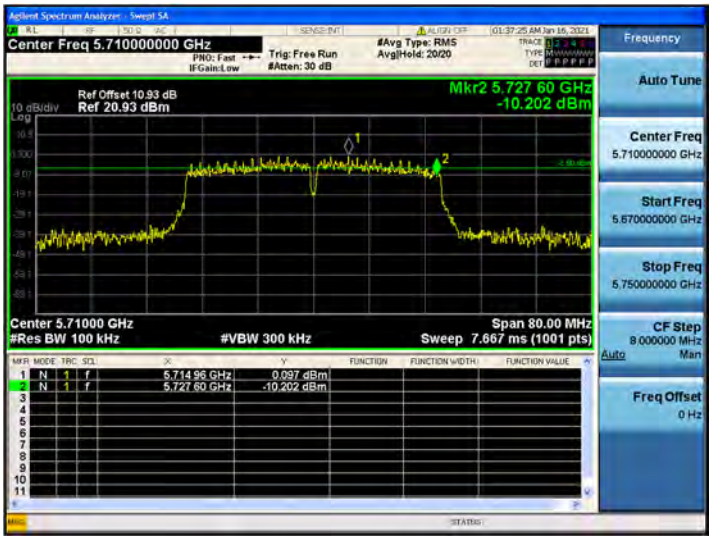
Note:

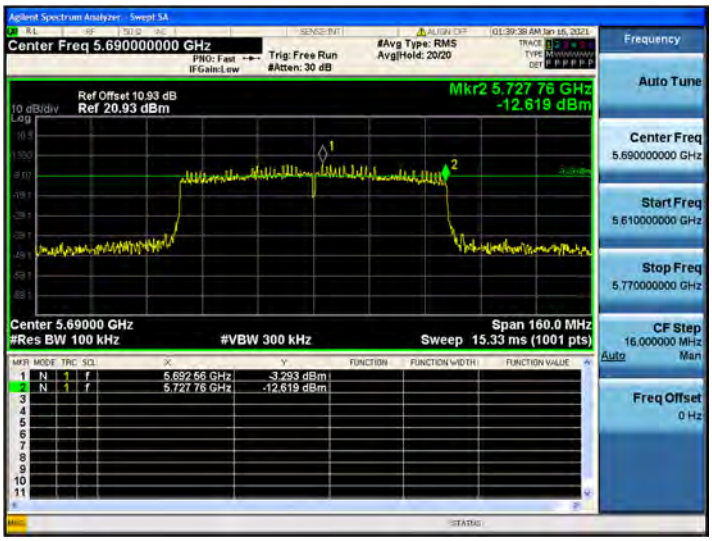
6dB Bandwidth = Measured Frequency[MHz] – 5725MHz

▣ Test Plots(UNII 3 Band 6dB Bandwidth)

802.11a CH.144	802.11n_HT20 CH.144
	

802.11ac_VHT20 CH.144


802.11n_HT40 CH.142	802.11ac_VHT40 CH.142
	

802.11ac_VHT80 CH.138


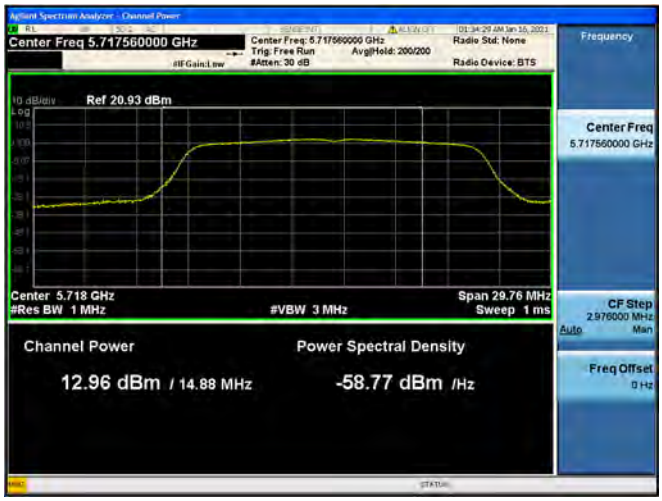
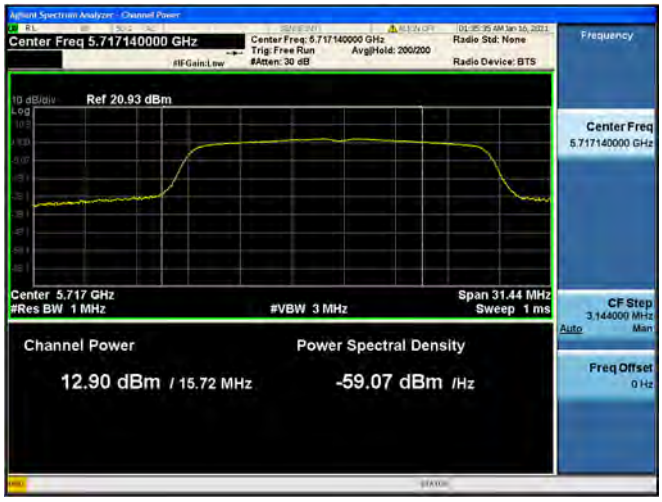
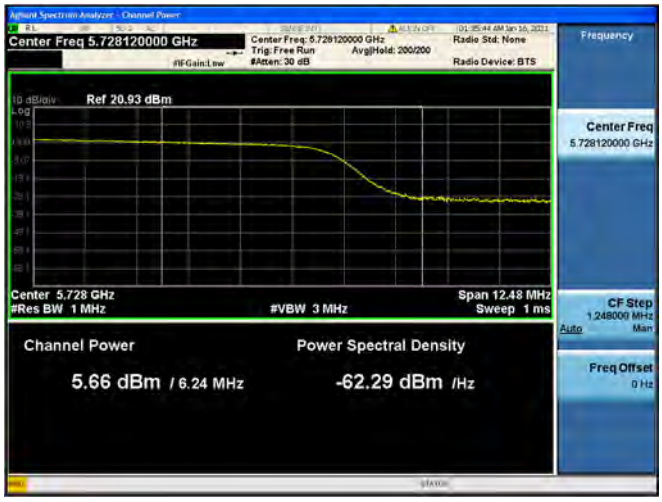
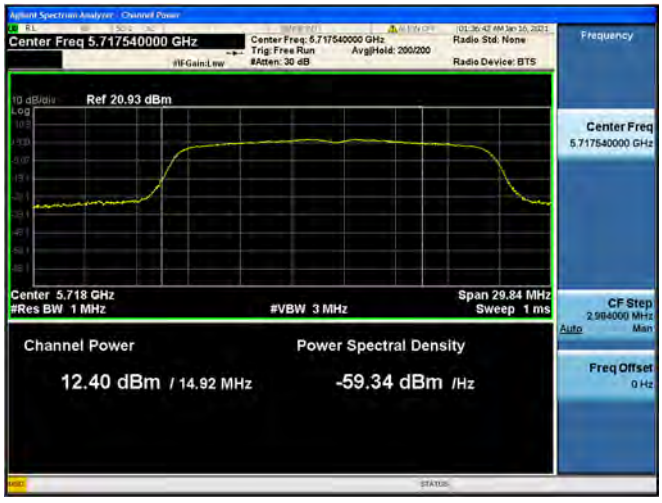
10.7.3 Output Power

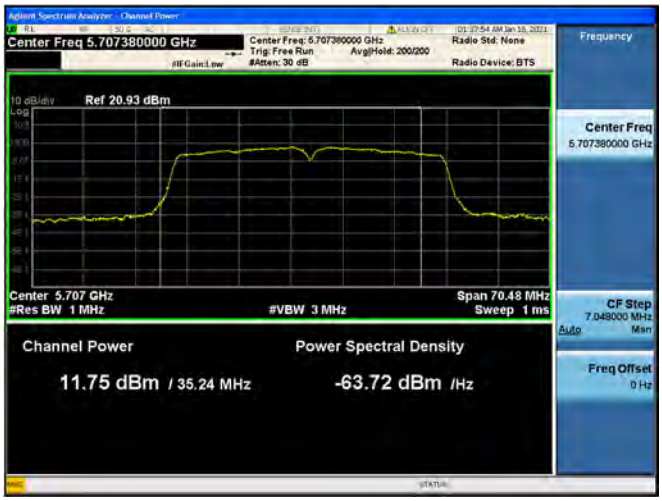
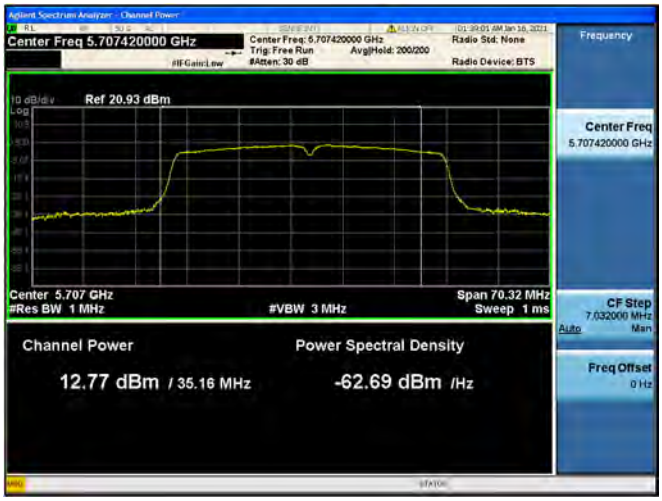
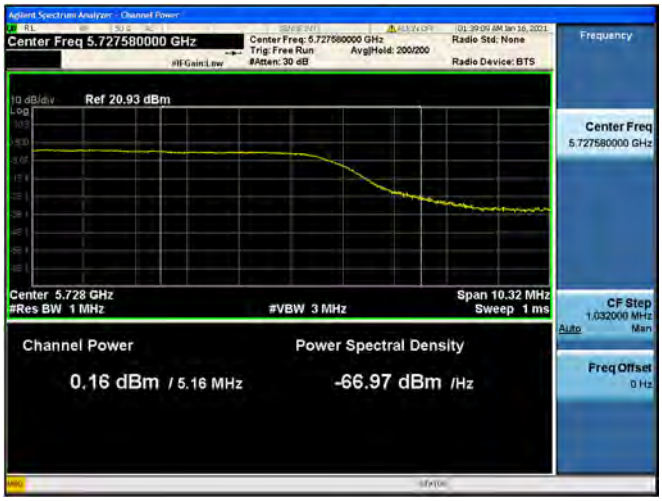
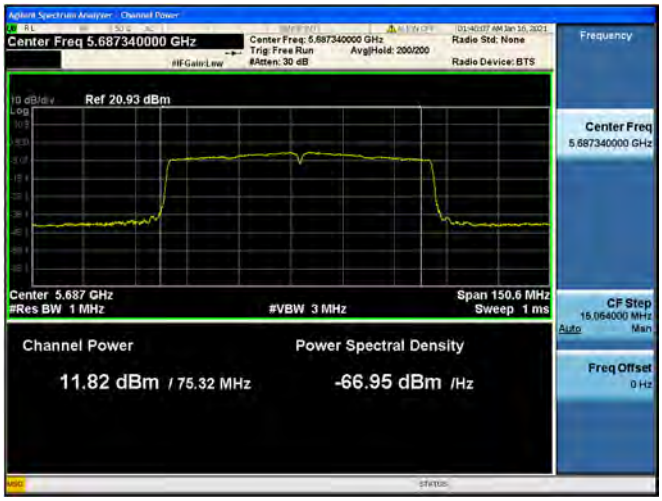
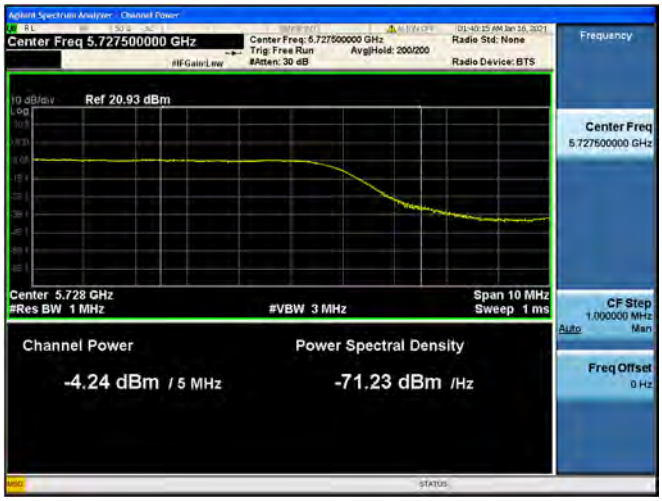
Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11a	5720 (UNII 2C Band)	144	12.96	0.140	13.10	22.73
802.11n(HT20)			12.90	0.149	13.05	22.96
802.11ac(VHT20)			12.40	0.580	12.98	22.74
802.11a	5720 (UNII 3 Band)	144	5.26	0.140	5.40	30.00
802.11n(HT20)			5.66	0.149	5.81	30.00
802.11ac(VHT20)			5.13	0.580	5.71	30.00

Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11n(HT40)	5710 (UNII 2C Band)	142	11.75	1.614	13.37	23.98
802.11ac(VHT40)			12.77	0.746	13.51	23.98
802.11n(HT40)	5710 (UNII 3 Band)	142	-0.71	1.614	0.91	30.00
802.11ac(VHT40)			0.16	0.746	0.90	30.00

Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11ac(VHT80)	5690 (UNII 2C Band)	138	11.82	0.969	12.79	23.98
	5690 (UNII 3 Band)	138	-4.24	0.969	-3.27	30.00

▣ Test Plots_

802.11a UNII 2C Band	802.11a UNII 3 Band
	
802.11n(HT20) UNII 2C Band	**802.11n(HT20) UNII 3 Band**
	
802.11ac(VHT20) UNII 2C Band	**802.11ac(VHT20) UNII 3 Band**
	

802.11n(HT40) UNII 2C Band	802.11n(HT40) UNII 3 Band
	
802.11ac(VHT40) UNII 2C Band	**802.11ac(VHT40) UNII 3 Band**
	
802.11ac(VHT80) UNII 2C Band	**802.11ac(VHT80) UNII 3 Band**
	

10.7.4 Power Spectral Density

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11a	5720 (UNII 2C Band)	144	3.589	0.140	3.730	11dBm/ MHz
802.11n(HT20)			3.372	0.149	3.522	
802.11ac(VHT20)			2.962	0.580	3.542	
802.11a	5720 (UNII 3 Band)	144	-0.932	0.140	-0.792	30 dBm/ 500kHz
802.11n(HT20)			-1.193	0.149	-1.044	
802.11ac(VHT20)			-2.024	0.580	-1.444	

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11n(HT40)	5710 (UNII 2C Band)	142	-0.549	1.614	1.065	11dBm/ MHz
802.11ac(VHT40)			-0.174	0.746	0.572	
802.11n(HT40)	5710 (UNII 3 Band)	142	-7.247	1.614	-5.633	30 dBm/ 500kHz
802.11ac(VHT40)			-7.099	0.746	-6.352	

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11ac(VHT80)	5690 (UNII 2C Band)	138	-4.116	0.969	-3.147	11dBm/ MHz
	5690 (UNII 3 Band)	138	-11.141	0.969	-10.172	30 dBm/ 500kHz

▣ Test Plots

802.11a UNII 2C Band	802.11a UNII 3 Band
	
802.11n(HT20) UNII 2C Band	**802.11n(HT20) UNII 3 Band**
	
802.11ac(VHT20) UNII 2C Band	**802.11ac(VHT20) UNII 3 Band**
	

802.11n(HT40) UNII 2C Band	802.11n(HT40) UNII 3 Band
	
802.11ac(VHT40) UNII 2C Band	**802.11ac(VHT40) UNII 3 Band**
	
802.11ac(VHT80) UNII 2C Band	**802.11ac(VHT80) UNII 3 Band**
	

10.8 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Note:

1. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
2. Distance extrapolation factor = 40log (specific distance / test distance) (dB)
3. Limit line = specific Limits (dBuV) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Reading	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dBuV/m	dBm/m	dBm	(H/V)	dBuV/m	dBuV/m	dB
No Critical peaks found							

Note:

1. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode

Frequency Range : Above 1 GHz

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	59.52	0.49	V	60.01	68.20	8.19	PK
15540	50.48	2.62	V	53.10	73.98	20.88	PK
15540	36.98	2.62	V	39.60	53.98	14.38	AV
10360	59.23	0.49	H	59.72	68.20	8.48	PK
15540	50.77	2.62	H	53.39	73.98	20.59	PK
15540	37.27	2.62	H	39.89	53.98	14.09	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	58.42	1.38	V	59.80	68.20	8.40	PK
15600	46.85	1.50	V	48.35	73.98	25.63	PK
15600	36.85	1.50	V	38.35	53.98	15.63	AV
10400	58.06	1.38	H	59.44	68.20	8.76	PK
15600	50.05	1.50	H	51.55	73.98	22.43	PK
15600	37.10	1.50	H	38.60	53.98	15.38	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	58.97	-0.33	V	58.64	68.20	9.56	PK
15720	50.85	0.56	V	51.41	73.98	22.57	PK
15720	36.85	0.56	V	37.41	53.98	16.57	AV
10480	58.55	-0.33	H	58.22	68.20	9.98	PK
15720	51.02	0.56	H	51.58	73.98	22.40	PK
15720	37.26	0.56	H	37.82	53.98	16.16	AV

Band :	UNII 2A
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5260 MHz
Channel No.	52 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10520	59.65	-0.06	V	59.59	68.20	8.61	PK
15780	50.25	0.96	V	51.21	73.98	22.77	PK
15780	37.02	0.96	V	37.98	53.98	16.00	AV
10520	59.42	-0.06	H	59.36	68.20	8.84	PK
15780	50.65	0.96	H	51.61	73.98	22.37	PK
15780	37.40	0.96	H	38.36	53.98	15.62	AV

Band :	UNII 2A
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5300 MHz
Channel No.	60 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10600	59.29	-0.18	V	59.11	73.98	14.87	PK
10600	46.63	-0.18	V	46.45	53.98	7.53	AV
15900	51.48	-0.13	V	51.35	73.98	22.63	PK
15900	37.52	-0.13	V	37.39	53.98	16.59	AV
10600	58.98	-0.18	H	58.80	73.98	15.18	PK
10600	46.12	-0.18	H	45.94	53.98	8.04	AV
15900	51.76	-0.13	H	51.63	73.98	22.35	PK
15900	37.91	-0.13	H	37.78	53.98	16.20	AV

Band :	UNII 2A
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10640	58.66	-0.04	V	58.62	73.98	15.36	PK
10640	45.91	-0.04	V	45.87	53.98	8.11	AV
15960	50.22	-0.36	V	49.86	73.98	24.12	PK
15960	37.12	-0.36	V	36.76	53.98	17.22	AV
10640	58.35	-0.04	H	58.31	73.98	15.67	PK
10640	45.54	-0.04	H	45.50	53.98	8.48	AV
15960	50.46	-0.36	H	50.10	73.98	23.88	PK
15960	37.59	-0.36	H	37.23	53.98	16.75	AV

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11000	56.74	1.75	V	58.49	73.98	15.24	PK
11000	44.00	1.75	V	45.75	53.98	8.19	AV
16500	50.48	1.06	V	51.54	68.20	16.66	PK
11000	56.99	1.75	H	58.74	73.98	15.49	PK
11000	44.04	1.75	H	45.79	53.98	8.23	AV
16500	50.77	1.06	H	51.83	68.20	16.37	PK

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5600 MHz
Channel No.	120 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11200	59.75	0.26	V	60.01	73.98	13.97	PK
11200	46.98	0.26	V	47.24	53.98	6.74	AV
16800	51.65	3.41	V	55.06	68.20	13.14	PK
11200	59.87	0.26	H	60.13	73.98	13.85	PK
11200	47.20	0.26	H	47.46	53.98	6.52	AV
16800	51.95	3.41	H	55.36	68.20	12.84	PK

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5700 MHz
Channel No.	140 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11400	58.05	0.42	V	58.47	73.98	15.51	PK
11400	45.26	0.42	V	45.68	53.98	8.30	AV
17100	50.58	4.21	V	54.79	68.20	13.41	PK
11400	57.11	0.42	H	57.53	73.98	16.45	PK
11400	45.20	0.42	H	45.62	53.98	8.36	AV
17100	50.69	4.21	H	54.90	68.20	13.30	PK

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5720 MHz
Channel No.	144 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11440	56.81	0.74	V	57.55	73.98	16.43	PK
11440	33.98	0.74	V	34.72	53.98	19.26	AV
17160	50.48	5.47	V	55.95	68.20	12.25	PK
11440	56.95	0.74	H	57.69	73.98	16.29	PK
11440	44.04	0.74	H	44.78	53.98	9.20	AV
17160	50.56	5.47	H	56.03	68.20	12.17	PK

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5745MHz
Channel No.	149 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	56.21	0.57	V	56.78	73.98	17.20	PK
11490	43.55	0.57	V	44.12	53.98	9.86	AV
17235	50.85	5.22	V	56.07	68.20	12.13	PK
11490	56.38	0.57	H	56.95	73.98	17.03	PK
11490	43.69	0.57	H	44.26	53.98	9.72	AV
17235	51.03	5.22	H	56.25	68.20	11.95	PK

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	54.78	0.73	V	55.51	73.98	18.47	PK
11570	41.68	0.73	V	42.41	53.98	11.57	AV
17355	37.33	6.04	V	43.37	68.20	24.83	PK
11570	54.84	0.73	H	55.57	73.98	18.41	PK
11570	41.78	0.73	H	42.51	53.98	11.47	AV
17355	37.45	6.04	H	43.49	68.20	24.71	PK

Band :	UNII 3
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading [dBuV]	A.F+C.L-A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	53.25	-0.65	V	52.60	73.98	21.38	PK
11650	40.02	-0.65	V	39.37	53.98	14.61	AV
17475	49.26	7.62	V	56.88	68.20	11.32	PK
11650	53.38	-0.65	H	52.73	73.98	21.25	PK
11650	40.20	-0.65	H	39.55	53.98	14.43	AV
17475	49.41	7.62	H	57.03	68.20	11.17	PK

Note:

All Modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

UNII 1, 2A, 2C, 3 : 802.11a

[DBS Mode]

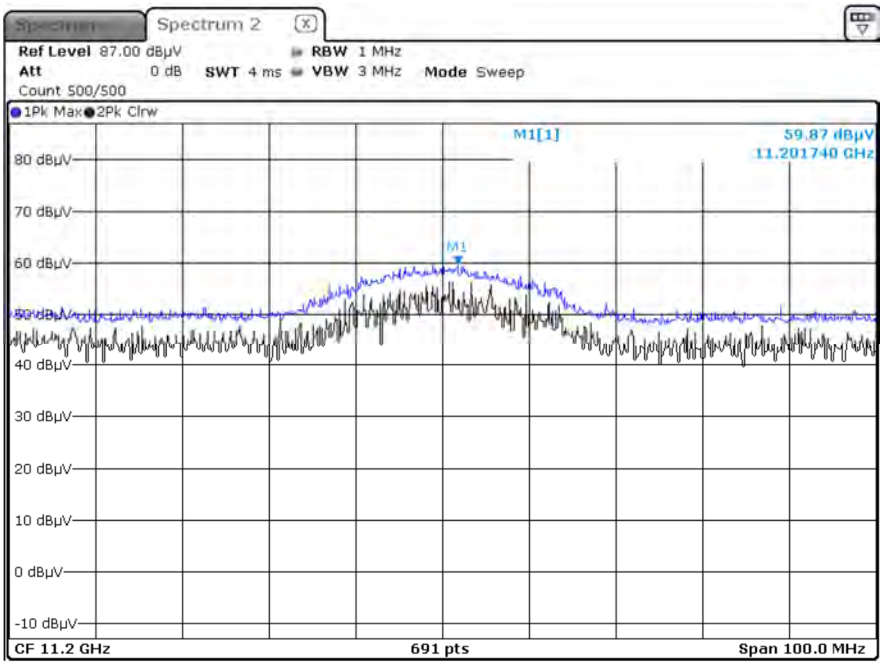
BT/WLAN Ant : Bluetooth Ch 0 (GFSK) & 802.11a ch 120

Operation Mode:	802.11a & GFSK
Transfer Rate (MCS Index):	MCS0 & 1 Mbps
Operating Frequency	5600 MHz & 2402 MHz
Channel No.	120 Ch & 0 Ch

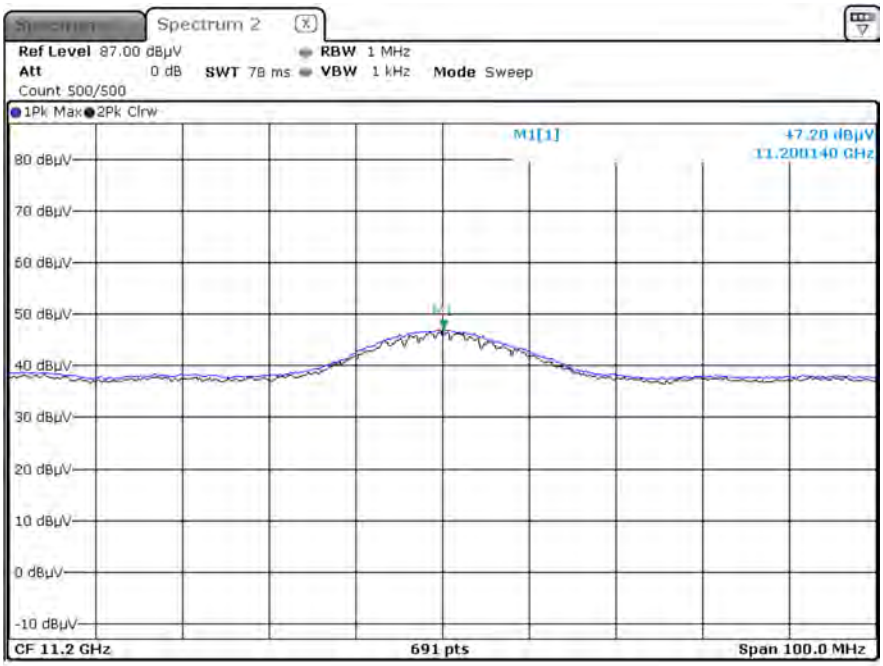
Frequency [MHz]	Reading [dBuV]	A.F+CL-AMP G [dB]	Pol. [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11200	58.55	0.26	V	58.81	73.98	15.17	PK
11200	45.71	0.26	V	45.97	53.98	8.01	AV
16800	51.02	3.41	V	54.43	68.20	13.77	PK
11200	58.65	0.26	H	58.91	73.98	15.07	PK
11200	45.86	0.26	H	46.12	53.98	7.86	AV
16800	51.80	3.41	H	55.21	68.20	12.99	PK

▣ Test Plots

Peak Reading (802.11a, Ch.120 2nd Harmonic, Y-H)



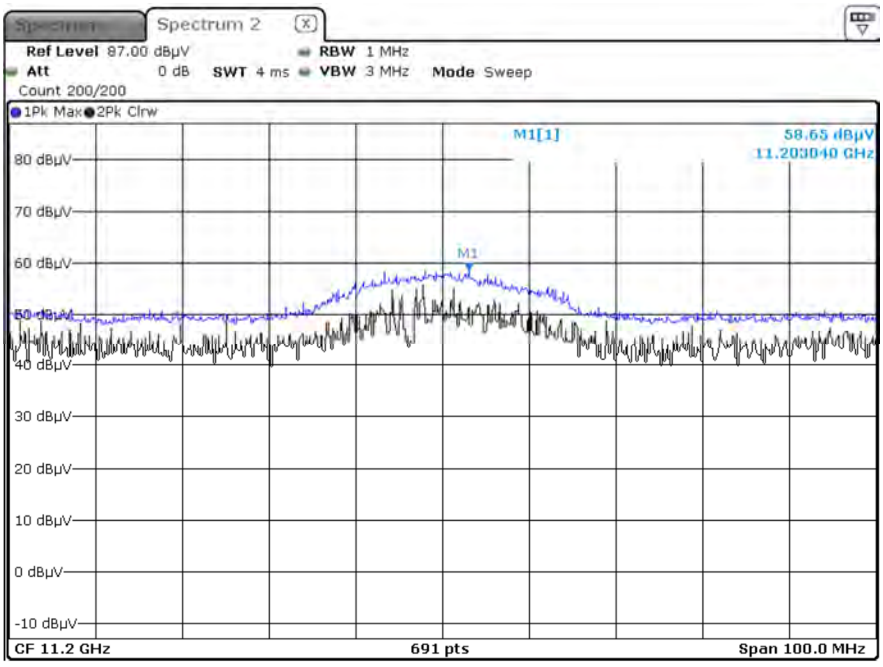
Average Reading (802.11a, Ch.120 2nd Harmonic, Y-H)



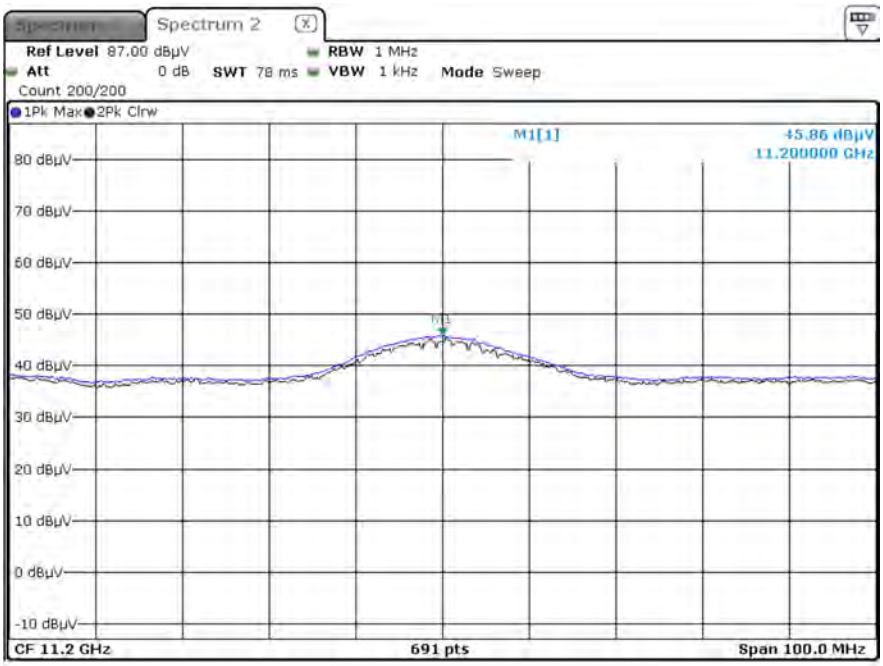
Note:

Only the worst case plots for Radiated Spurious Emissions.

Peak Reading[DBS Mode] (802.11a, Ch.120 2nd Harmonic, Y-H)



Average Reading[DBS Mode] (802.11a, Ch.120 2nd Harmonic, Y-H)



Note:

Only the worst case plots for Radiated Spurious Emissions.

10.9 RADIATED RESTRICTED BAND EDGE

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	46.81	12.72	H	59.53	73.98	14.45	PK
5150	31.99	12.72	H	44.71	53.98	9.27	AV
5150	46.23	12.72	V	58.95	73.98	15.03	PK
5150	31.64	12.72	V	44.36	53.98	9.62	AV

Band :	UNII 2A
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	58.15	12.38	H	70.53	73.98	3.45	PK
5350	36.44	12.38	H	48.82	53.98	5.16	AV
5350	56.44	12.38	V	68.82	73.98	5.16	PK
5350	34.21	12.38	V	46.59	53.98	7.39	AV

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	51.39	7.05	H	58.44	73.98	15.54	PK
5460	33.16	7.05	H	40.21	53.98	13.77	AV
5470	55.90	6.59	H	62.49	68.20	5.71	PK
5460	51.01	7.05	V	58.06	73.98	15.92	PK
5460	32.68	7.05	V	39.73	53.98	14.25	AV
5470	55.67	6.59	V	62.26	68.20	5.94	PK

Band :	UNII 1
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	48.31	12.72	H	61.03	73.98	12.95	PK
5150	31.26	12.72	H	43.98	53.98	10.00	AV
5150	48.12	12.72	V	60.84	73.98	13.14	PK
5150	31.02	12.72	V	43.74	53.98	10.24	AV

Band :	UNII 2A
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	55.01	12.38	H	67.39	73.98	6.59	PK
5350	32.03	12.38	H	44.41	53.98	9.57	AV
5350	54.99	12.38	V	67.37	73.98	6.61	PK
5350	31.99	12.38	V	44.37	53.98	9.61	AV

Band :	UNII 2C
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	51.27	7.05	H	58.32	73.98	15.66	PK
5460	33.22	7.05	H	40.27	53.98	13.71	AV
5470	56.30	6.59	H	62.89	68.20	5.31	PK
5460	50.98	7.05	V	58.03	73.98	15.95	PK
5460	32.98	7.05	V	40.03	53.98	13.95	AV
5470	56.01	6.59	V	62.60	68.20	5.60	PK

Band :	UNII 1
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	46.48	12.72	H	59.20	73.98	14.78	PK
5150	30.76	12.72	H	43.48	53.98	10.50	AV
5150	46.25	12.72	V	58.97	73.98	15.01	PK
5150	30.24	12.72	V	42.96	53.98	11.02	AV

Band :	UNII 2A
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	52.81	12.38	H	65.19	73.98	8.79	PK
5350	31.94	12.38	H	44.32	53.98	9.66	AV
5350	52.02	12.38	V	64.40	73.98	9.58	PK
5350	31.85	12.38	V	44.23	53.98	9.75	AV

Band :	UNII 2C
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	50.67	7.05	H	57.72	73.98	16.26	PK
5460	33.31	7.05	H	40.36	53.98	13.62	AV
5470	55.81	6.59	H	62.40	68.20	5.80	PK
5460	50.25	7.05	V	57.30	73.98	16.68	PK
5460	33.05	7.05	V	40.10	53.98	13.88	AV
5470	55.12	6.59	V	61.71	68.20	6.49	PK

Band :	UNII 1
Operation Mode:	802.11 n_HT40
Transfer MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	53.40	12.72	H	66.12	73.98	7.86	PK
5150	32.02	12.72	H	44.74	53.98	9.24	AV
5150	52.85	12.72	V	65.57	73.98	8.41	PK
5150	31.56	12.72	V	44.28	53.98	9.70	AV

Band :	UNII 2A
Operation Mode:	802.11 n_HT40
Transfer MCS Index:	0
Operating Frequency	5310 MHz
Channel No.	62 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	55.98	12.38	H	68.36	73.98	5.62	PK
5350	34.82	12.38	H	47.20	53.98	6.78	AV
5350	55.45	12.38	V	67.83	73.98	6.15	PK
5350	33.48	12.38	V	45.86	53.98	8.12	AV

Band :	UNII 2C
Operation Mode:	802.11 n_HT40
Transfer MCS Index:	0
Operating Frequency	5510 MHz
Channel No.	102 Ch

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	47.90	7.05	H	54.95	73.98	19.03	PK
5460	31.30	7.05	H	38.35	53.98	15.63	AV
5470	55.65	6.59	H	62.24	68.20	5.96	PK
5460	46.54	7.05	V	53.59	73.98	20.39	PK
5460	30.25	7.05	V	37.3	53.98	16.68	AV
5470	53.25	6.59	V	59.84	68.20	8.36	PK

Band :	UNII 1
Operation Mode:	802.11 ac_VHT40
Transfer MCS Index:	0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	49.39	12.72	H	62.11	73.98	11.87	PK
5150	33.16	12.72	H	45.88	53.98	8.10	AV
5150	48.45	12.72	V	61.17	73.98	12.81	PK
5150	32.15	12.72	V	44.87	53.98	9.11	AV

Band :	UNII 2A
Operation Mode:	802.11 ac_VHT40
Transfer MCS Index:	0
Operating Frequency	5310 MHz
Channel No.	62 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	55.06	12.38	H	67.44	73.98	6.54	PK
5350	34.18	12.38	H	46.56	53.98	7.42	AV
5350	54.95	12.38	V	67.33	73.98	6.65	PK
5350	32.15	12.38	V	44.53	53.98	9.45	AV

Band :	UNII 2C
Operation Mode:	802.11 ac_VHT40
Transfer MCS Index:	0
Operating Frequency	5510 MHz
Channel No.	102 Ch

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	46.90	7.05	H	53.95	73.98	20.03	PK
5460	31.37	7.05	H	38.42	53.98	15.56	AV
5470	54.94	6.59	H	61.53	68.20	6.67	PK
5460	45.86	7.05	V	52.91	73.98	21.07	PK
5460	30.56	7.05	V	37.61	53.98	16.37	AV
5470	54.58	6.59	V	61.17	68.20	7.03	PK

Band :	UNII 1
Operation Mode:	802.11 ac_VHT80
Transfer MCS Index:	0
Operating Frequency	5210 MHz
Channel No.	42 Ch

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	48.30	12.72	H	61.02	73.98	12.96	PK
5150	34.38	12.72	H	47.10	53.98	6.88	AV
5150	47.75	12.72	V	60.47	73.98	13.51	PK
5150	33.98	12.72	V	46.70	53.98	7.28	AV

Band :	UNII 2A
Operation Mode:	802.11 ac_VHT80
Transfer MCS Index:	0
Operating Frequency	5290 MHz
Channel No.	58 Ch

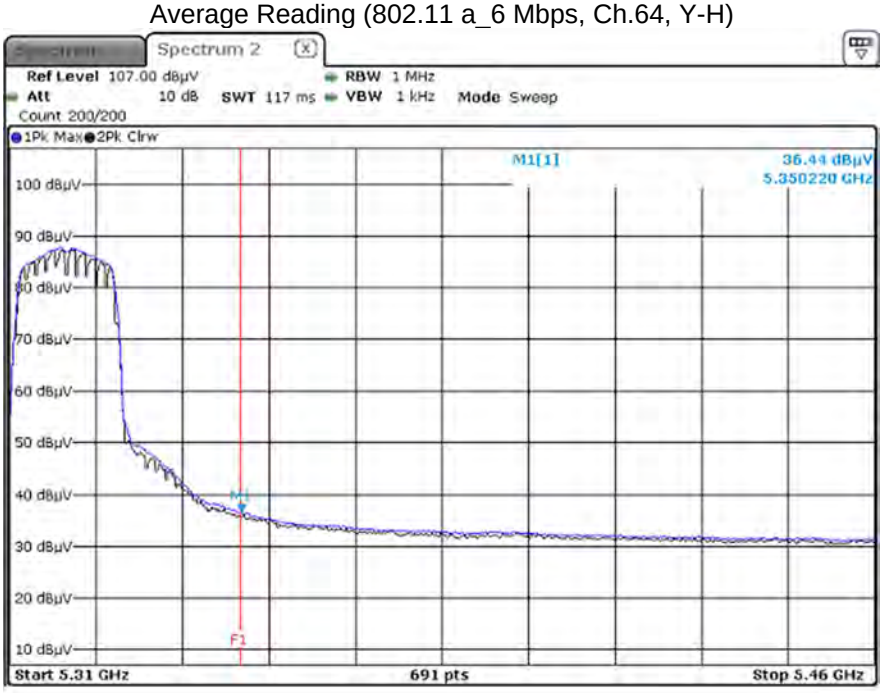
Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	52.90	12.38	H	65.28	73.98	8.70	PK
5350	36.71	12.38	H	49.09	53.98	4.89	AV
5350	51.56	12.38	V	63.94	73.98	10.04	PK
5350	34.98	12.38	V	47.36	53.98	6.62	AV

Band :	UNII 2C
Operation Mode:	802.11 ac_VHT80
Transfer MCS Index:	0
Operating Frequency	5530 MHz
Channel No.	106 Ch

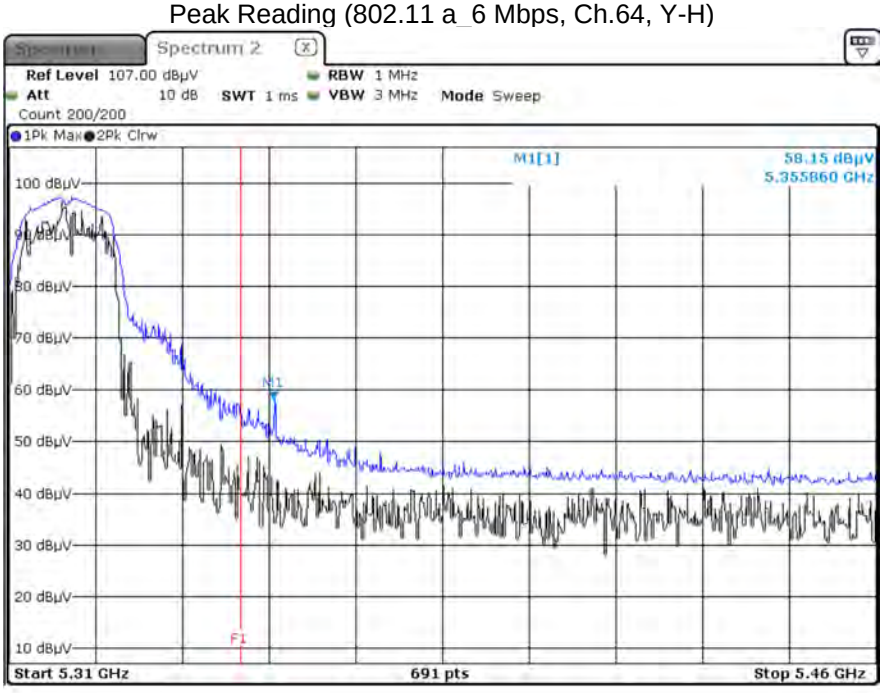
Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	47.43	13.91	H	61.34	73.98	12.64	PK
5460	33.52	13.91	H	47.43	53.98	6.55	AV
5470	48.59	13.46	H	62.05	68.20	6.15	PK
5460	46.98	13.91	V	60.89	73.98	13.09	PK
5460	33.03	13.91	V	46.94	53.98	7.04	AV
5470	47.98	13.46	V	61.44	68.20	6.76	PK

▣ Test Plots(UNII 1, 2A, 2C)

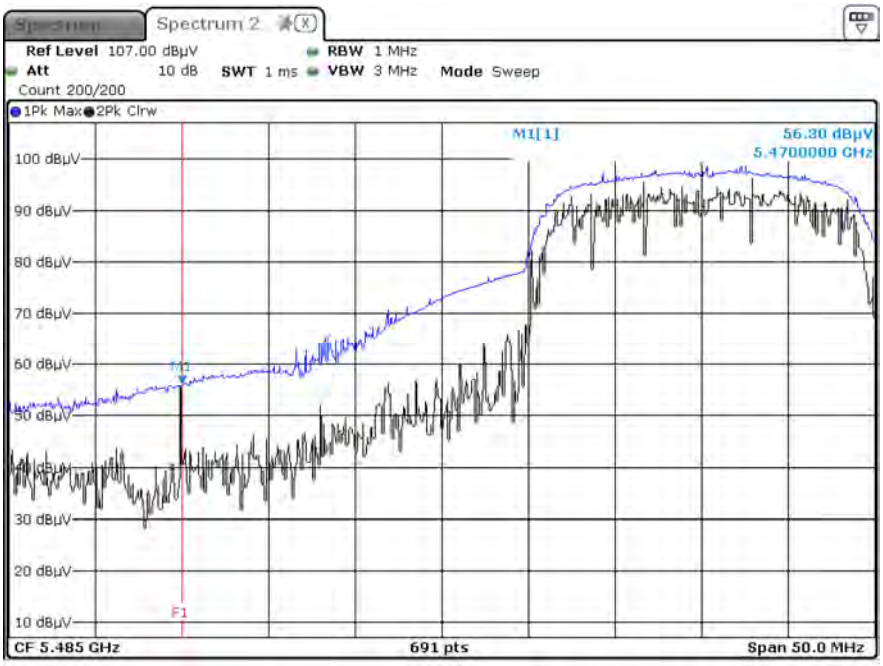
Average Reading (802.11 a_6 Mbps, Ch.64, Y-H)



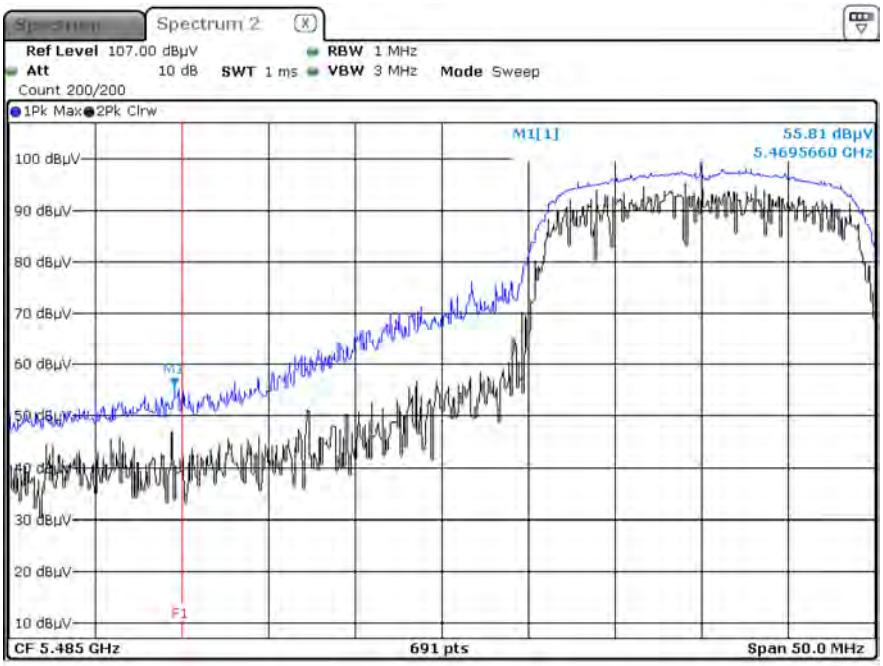
Peak Reading (802.11 a_6 Mbps, Ch.64, Y-H)



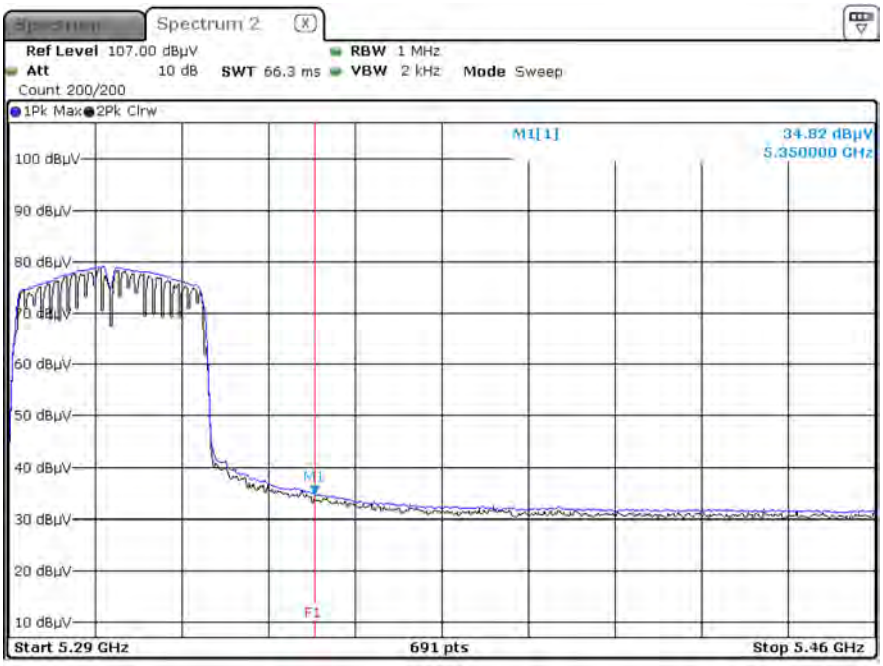
Peak Reading (802.11 n(HT20)_MCS0, Ch.100, Y-H)



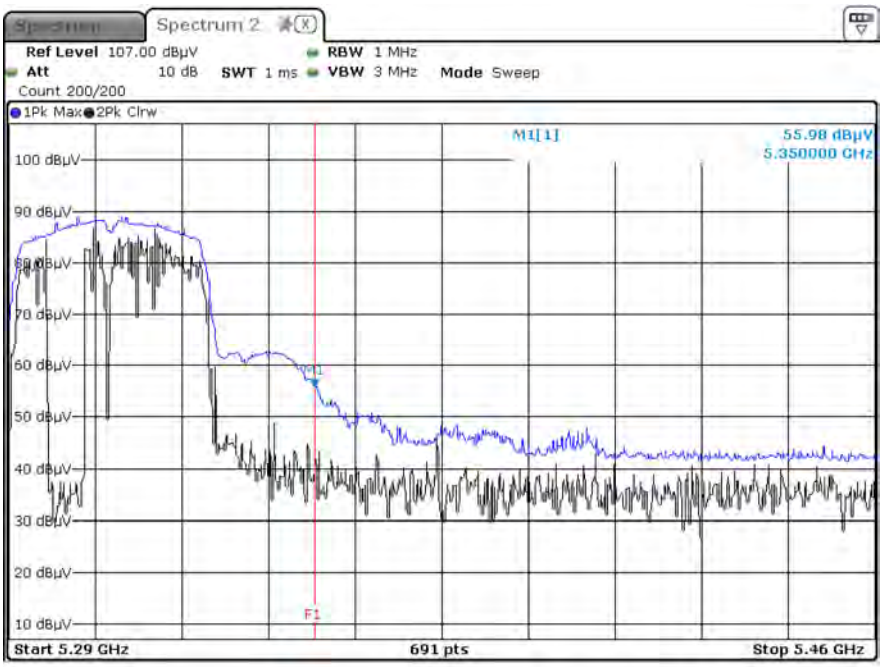
Peak Reading (802.11 ac(VHT20)_MCS0, Ch.100, Y-H)



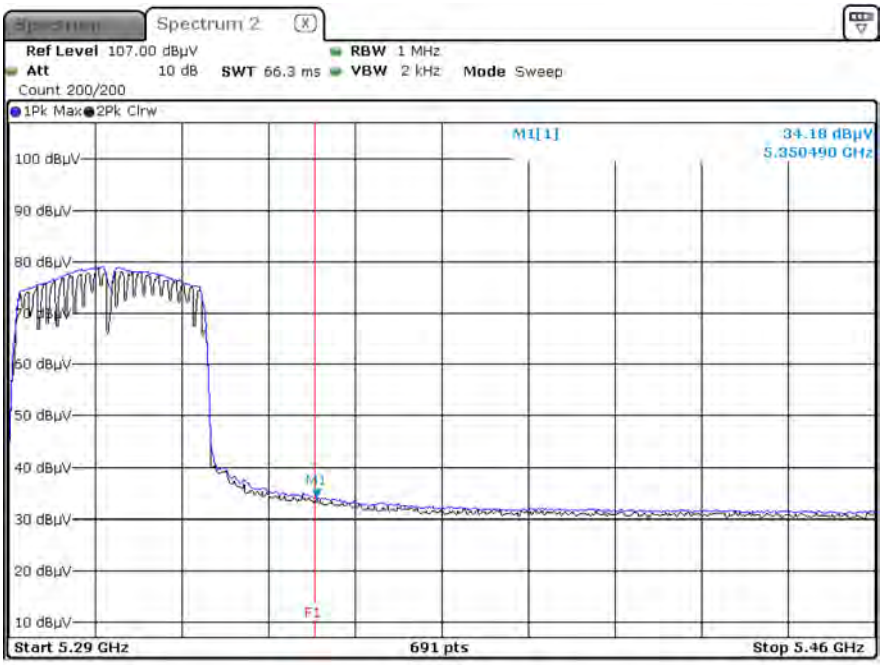
Average Reading (802.11 n(HT40)_MCS0, Ch.62, Y-H)



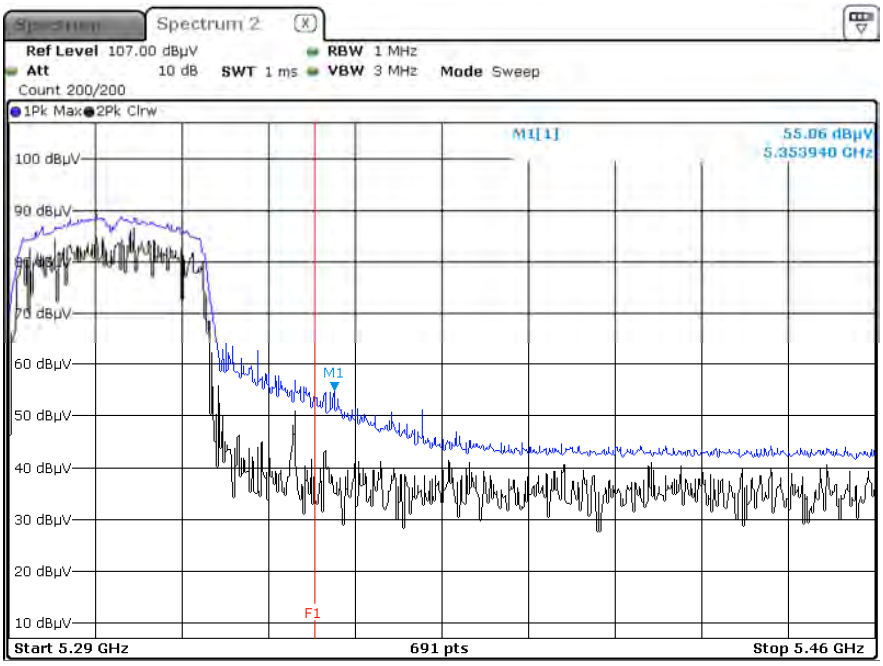
Peak Reading (802.11 n(HT40)_MCS0, Ch.62, Y-H)



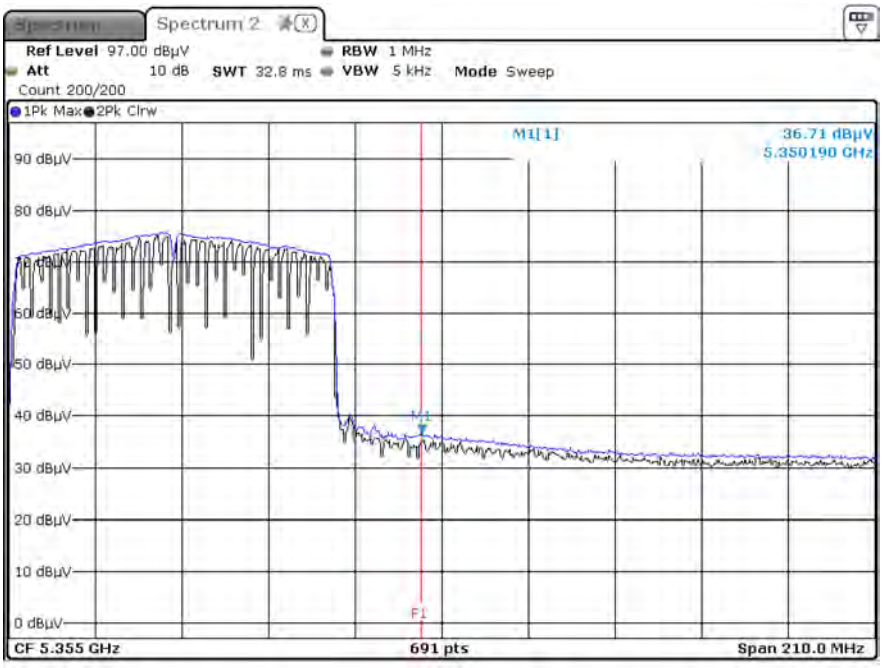
Average Reading (802.11 ac(VHT40)_MCS0, Ch.62, Y-H)



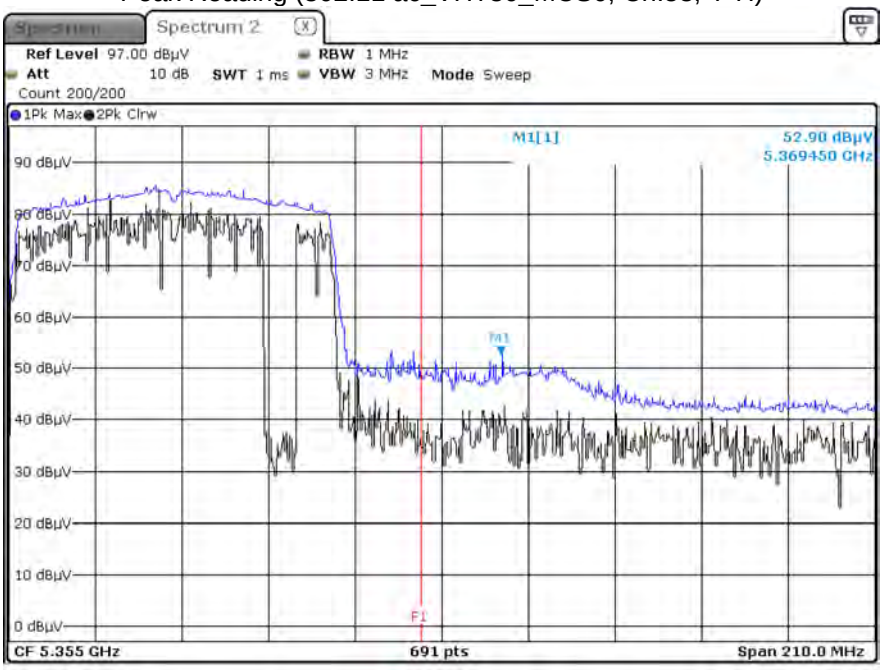
Peak Reading (802.11 ac(VHT40)_MCS0, Ch.62, Y-H)



Average Reading (802.11 ac_VHT80_MCS0, Ch.58, Y-H)



Peak Reading (802.11 ac_VHT80_MCS0, Ch.58, Y-H)

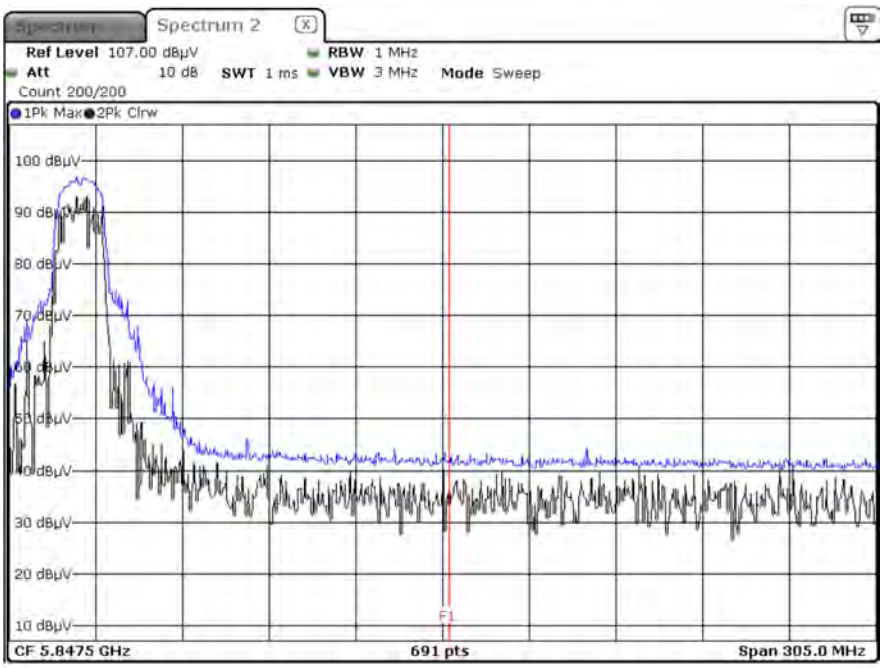


Note:

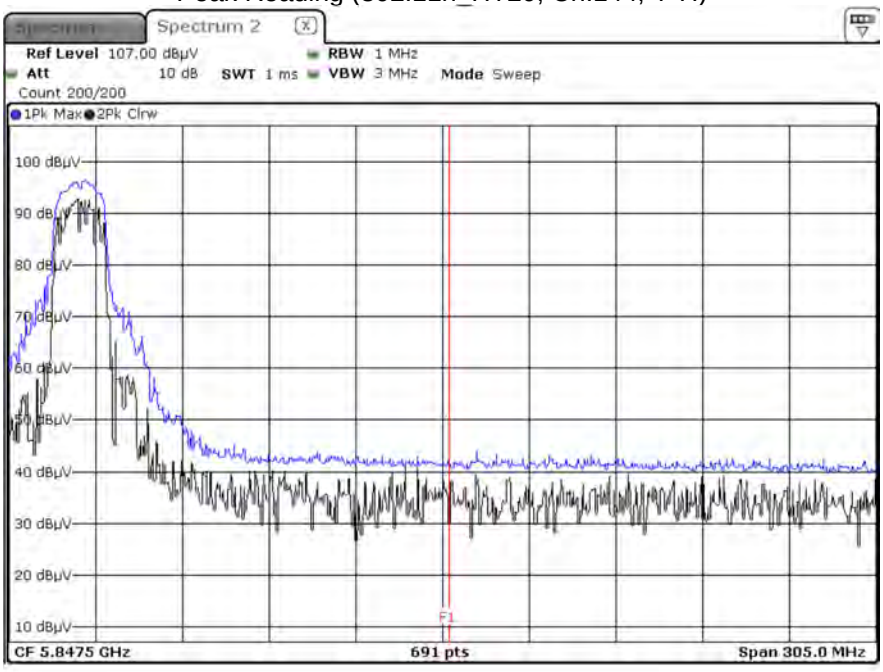
Only the worst case plots for Radiated Restricted Band Edge.

▣ Test Plots(Straddle Channel)

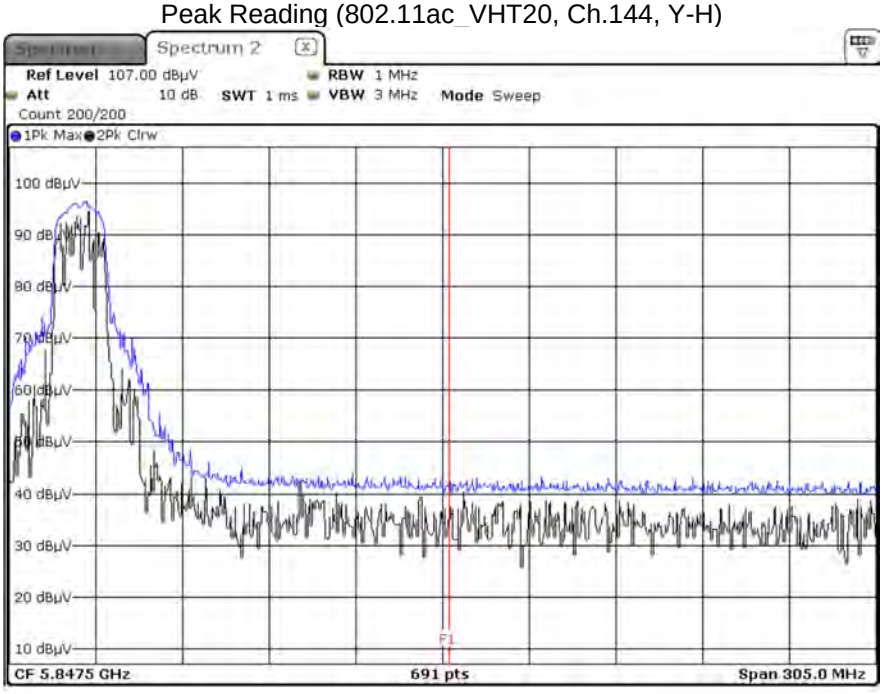
Peak Reading (802.11a, Ch.144, Y-H)



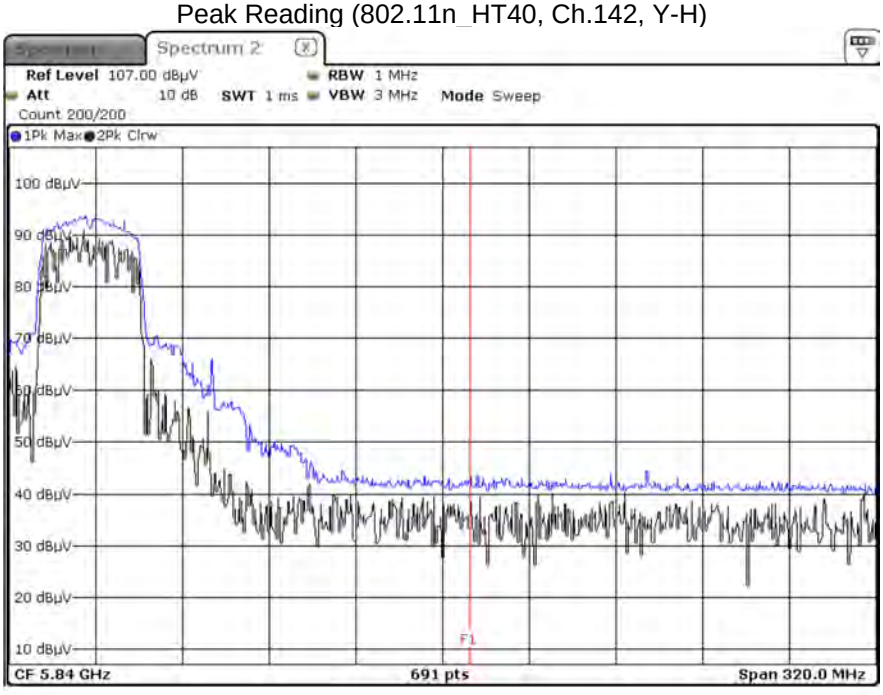
Peak Reading (802.11n_HT20, Ch.144, Y-H)



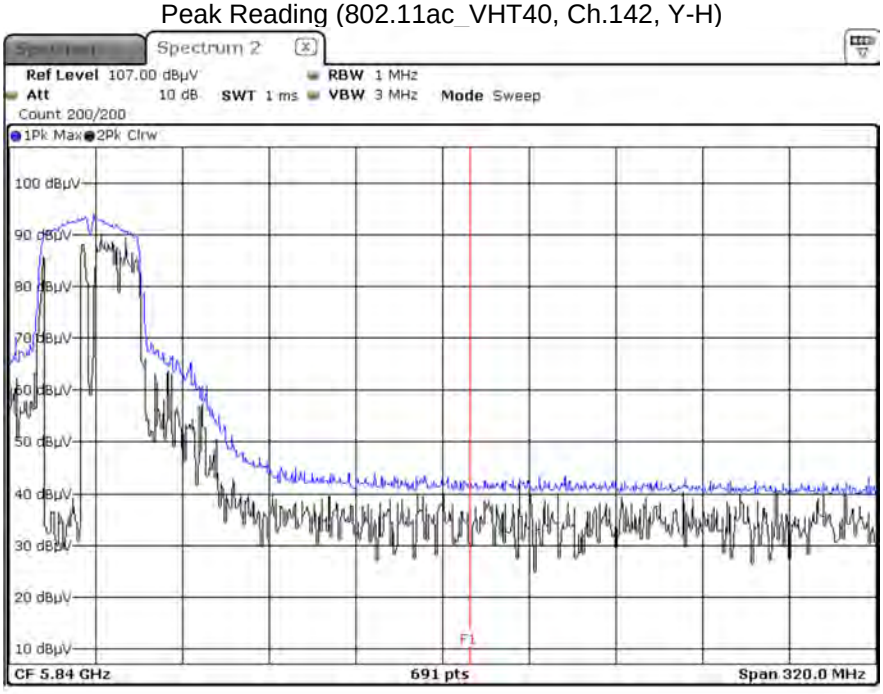
Peak Reading (802.11ac_VHT20, Ch.144, Y-H)



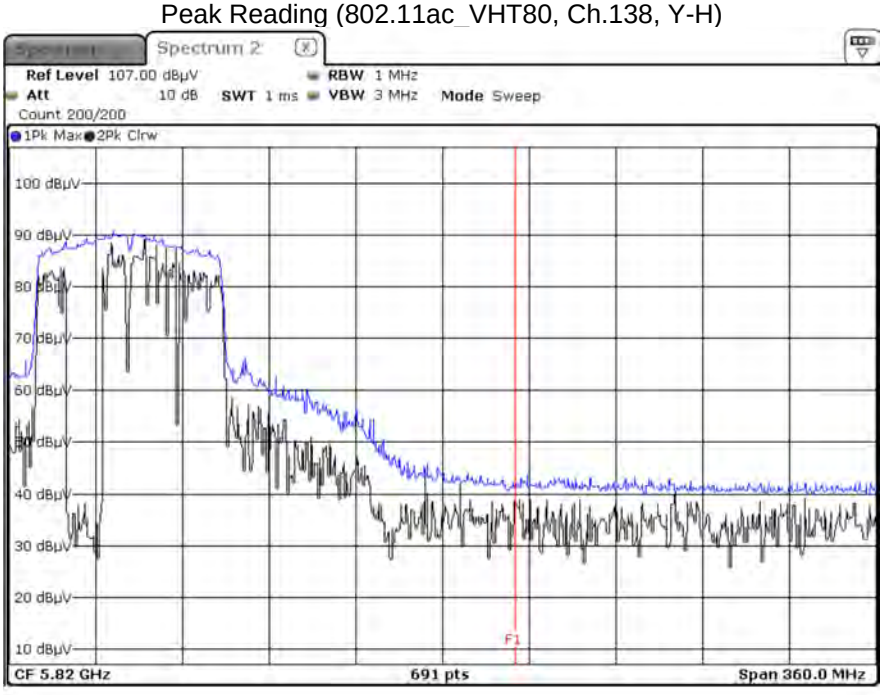
Peak Reading (802.11n_HT40, Ch.142, Y-H)



Peak Reading (802.11ac_VHT40, Ch.142, Y-H)



Peak Reading (802.11ac_VHT80, Ch.138, Y-H)

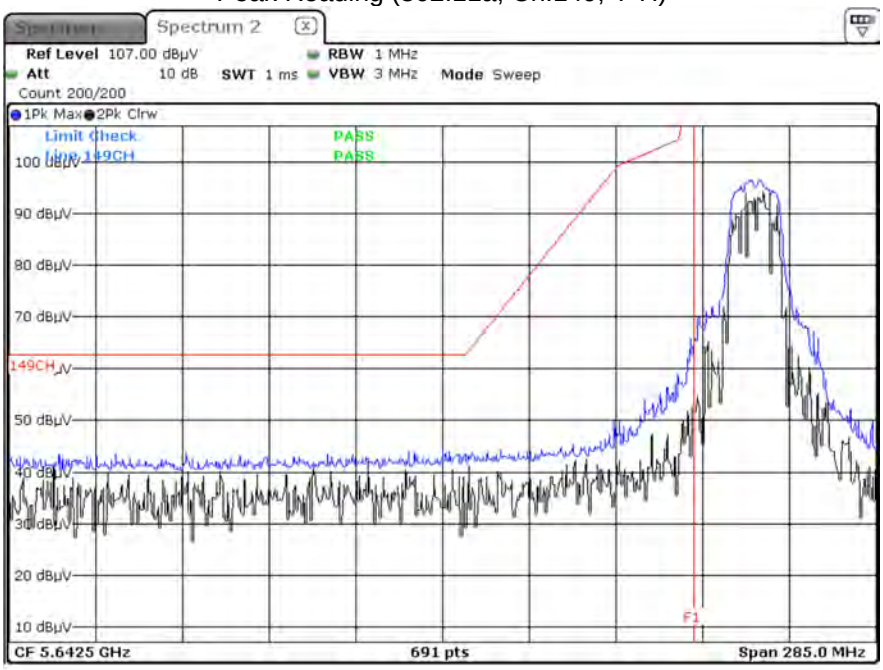


Note :

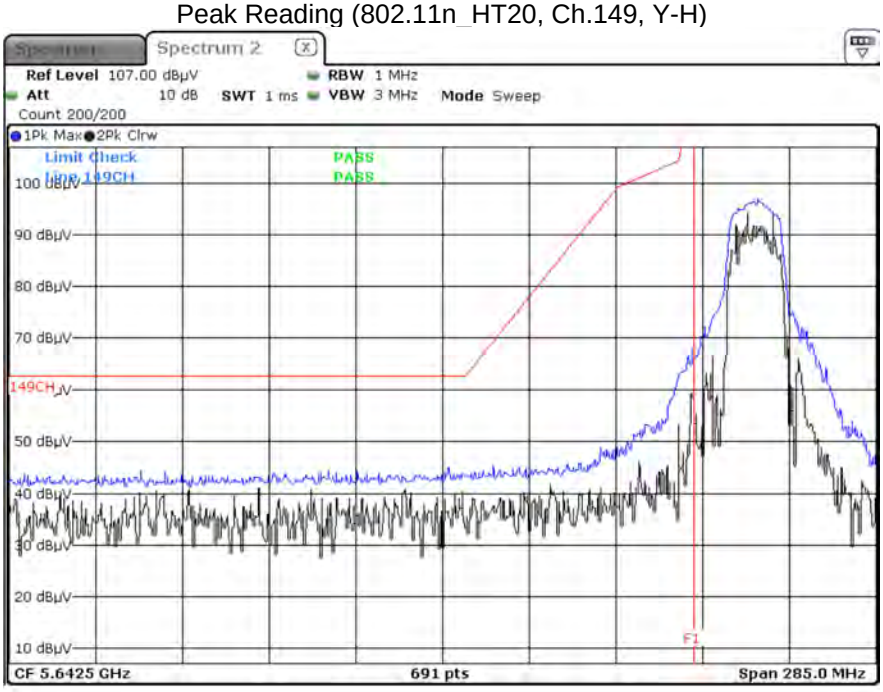
1. Only the worst case plots for Radiated Restricted Band Edge.
2. Red line : 5 850 MHz
3. Ambient Noise (Because of ambient noise, We attached only the worst plot without a data table)

▣ Test Plots(UNII 3)

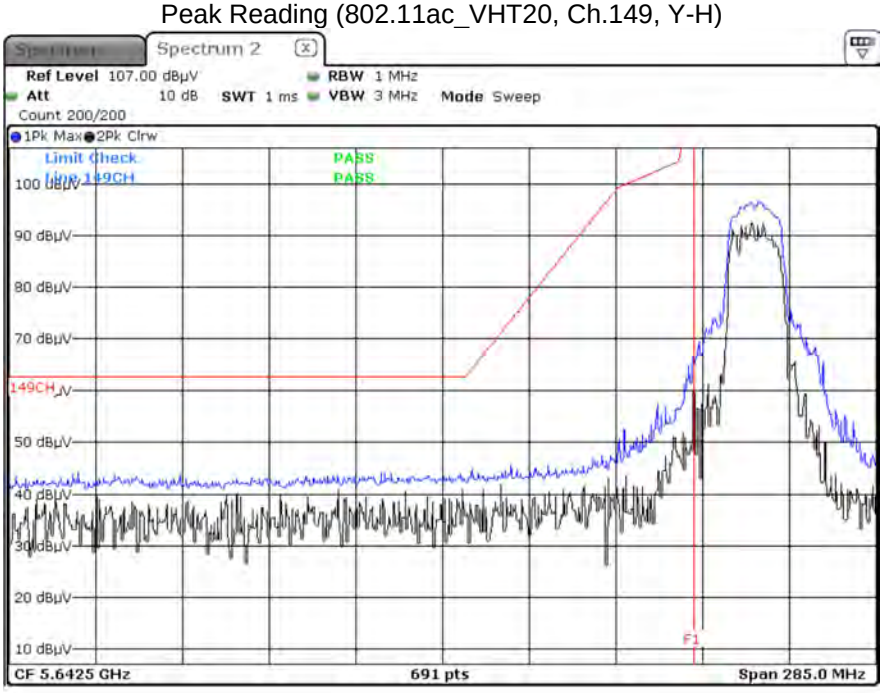
Peak Reading (802.11a, Ch.149, Y-H)



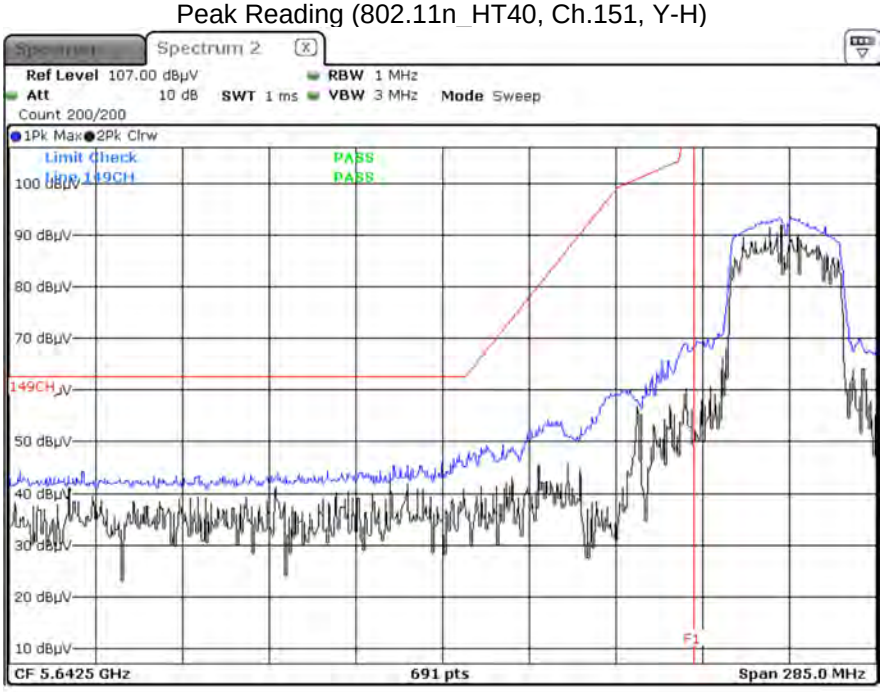
Peak Reading (802.11n_HT20, Ch.149, Y-H)



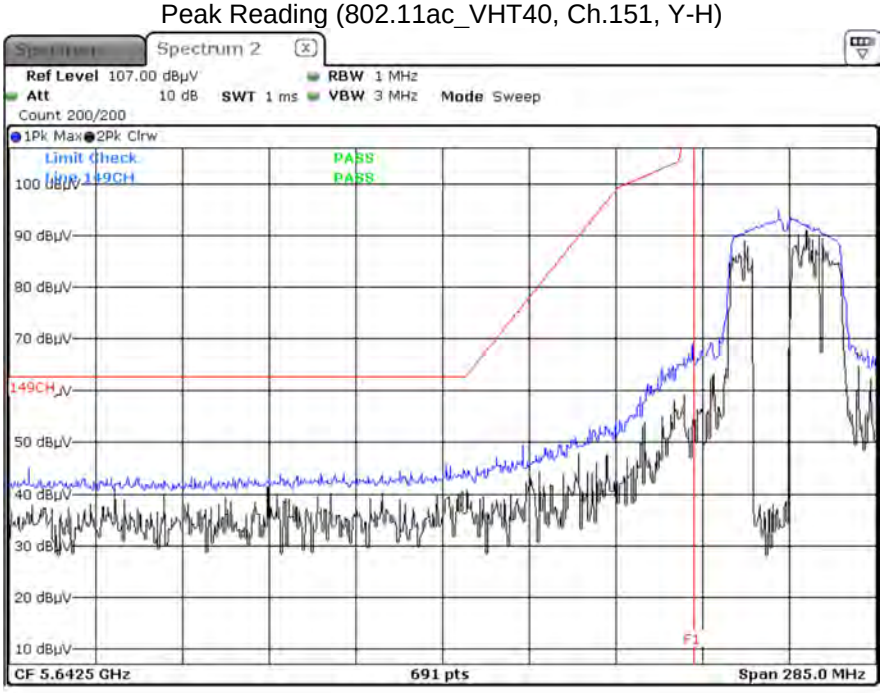
Peak Reading (802.11ac_VHT20, Ch.149, Y-H)



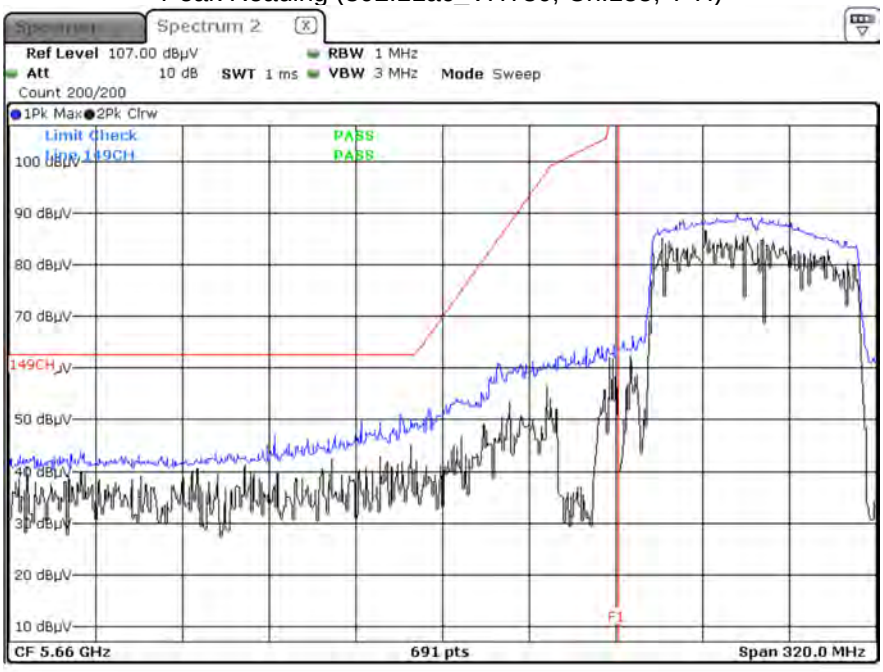
Peak Reading (802.11n_HT40, Ch.151, Y-H)



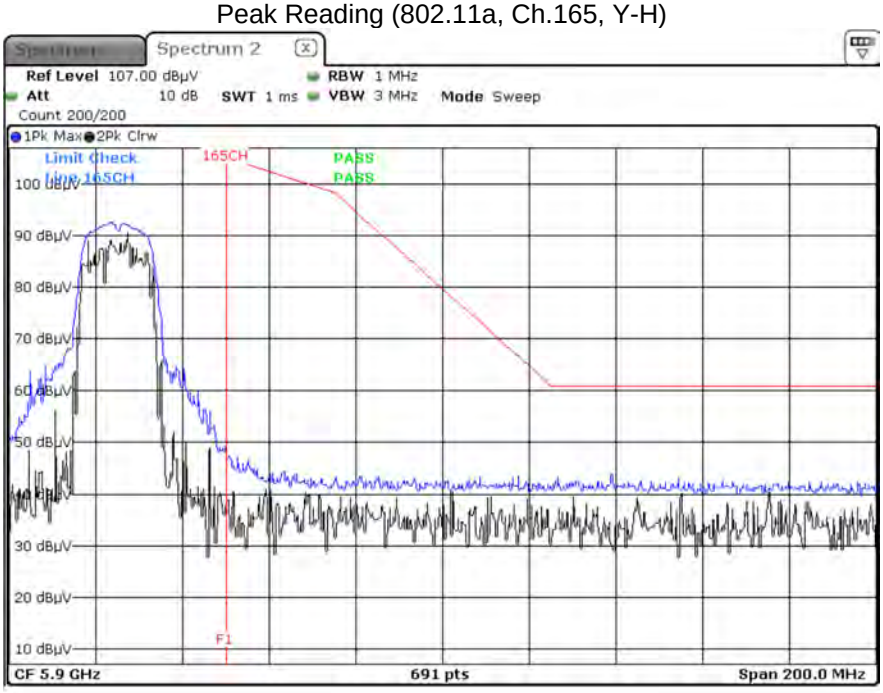
Peak Reading (802.11ac_VHT40, Ch.151, Y-H)



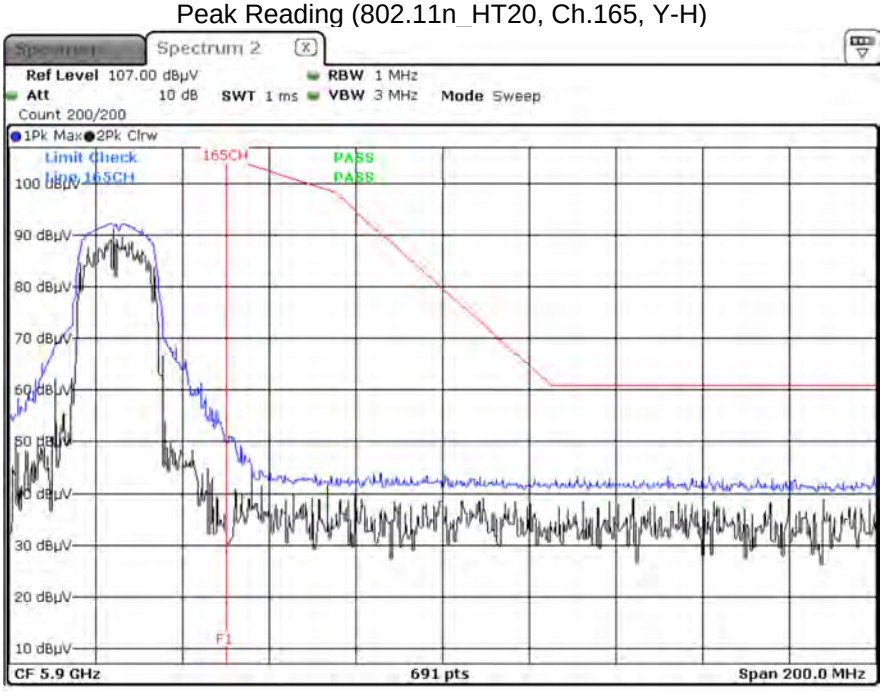
Peak Reading (802.11ac_VHT80, Ch.155, Y-H)



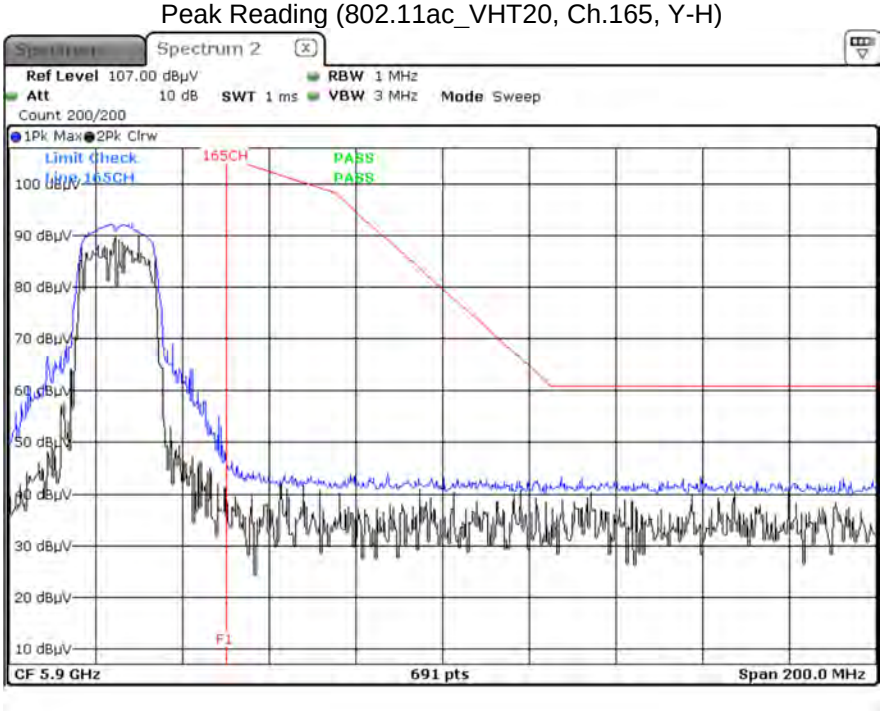
Peak Reading (802.11a, Ch.165, Y-H)



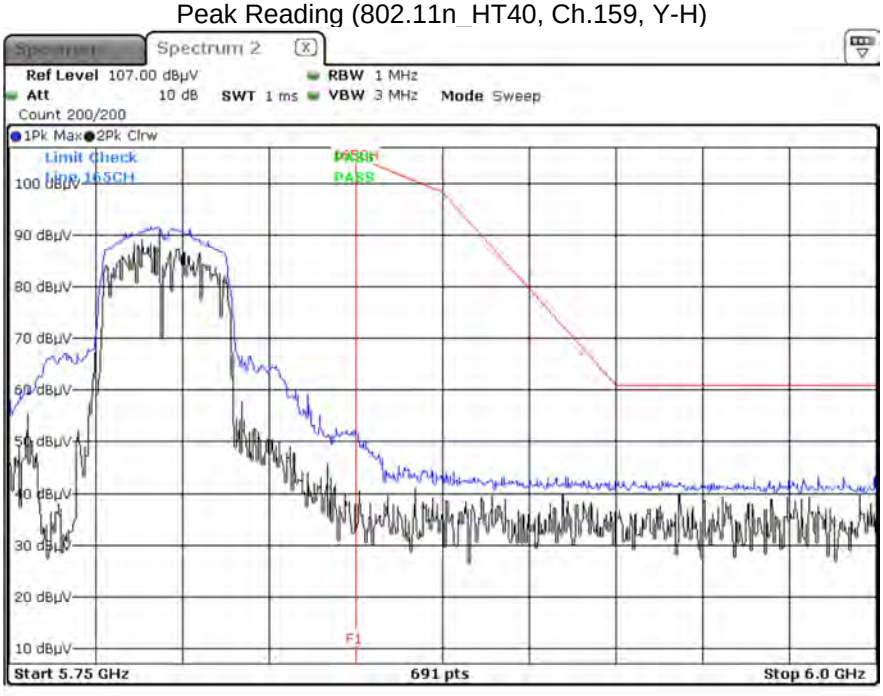
Peak Reading (802.11n_HT20, Ch.165, Y-H)



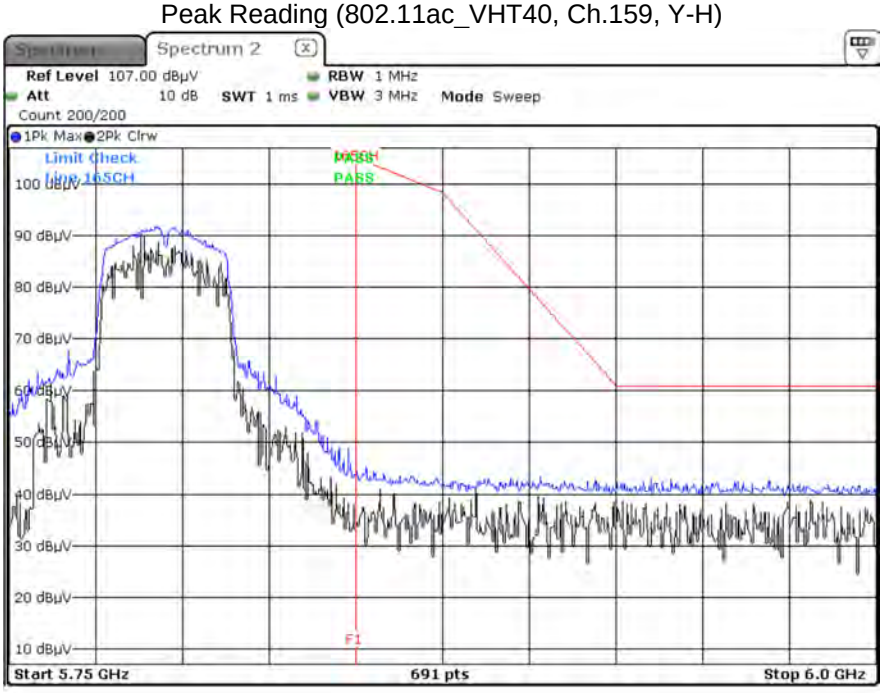
Peak Reading (802.11ac_VHT20, Ch.165, Y-H)



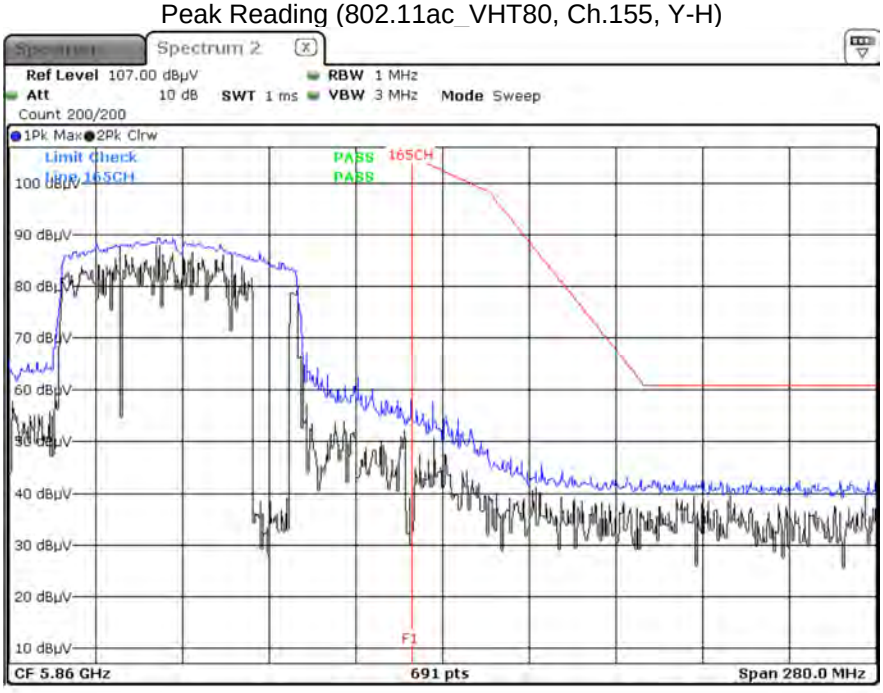
Peak Reading (802.11n_HT40, Ch.159, Y-H)



Peak Reading (802.11ac_VHT40, Ch.159, Y-H)



Peak Reading (802.11ac_VHT80, Ch.155, Y-H)



10.10 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

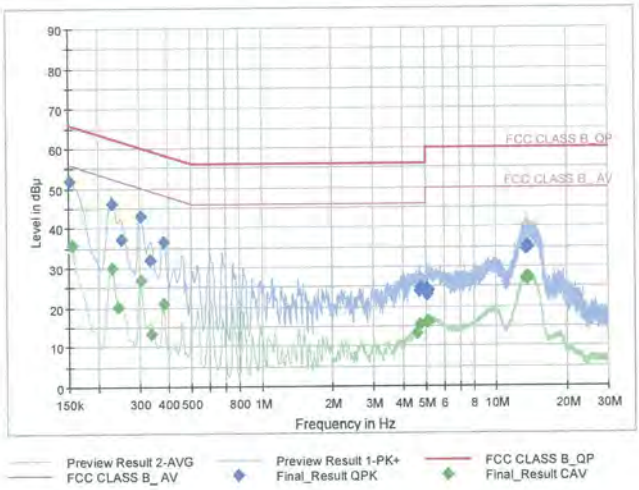
5G L1 1 / 2

Test Report

Common Information

EUT :	SM-A325M/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	5G WLAN L1
Operator Name:	
Comment:	

Full Spectrum



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.152250	51.83	65.88	14.04	9.000	L1	OFF	9.6
0.228750	46.12	62.50	16.37	9.000	L1	OFF	9.6
0.251250	37.34	61.72	24.37	9.000	L1	OFF	9.6
0.303000	42.95	60.16	17.21	9.000	L1	OFF	9.6
0.334500	32.07	59.34	27.27	9.000	L1	OFF	9.6
0.379500	36.64	58.29	21.65	9.000	L1	OFF	9.6
4.673750	24.00	56.00	32.00	9.000	L1	OFF	9.9
4.752500	24.72	56.00	31.28	9.000	L1	OFF	9.9
5.047250	23.17	60.00	36.83	9.000	L1	OFF	9.9
5.054000	23.52	60.00	36.48	9.000	L1	OFF	9.9
5.076500	24.55	60.00	35.45	9.000	L1	OFF	9.9
5.150750	24.14	60.00	35.86	9.000	L1	OFF	9.9
13.356500	34.73	60.00	25.27	9.000	L1	OFF	10.2
13.435250	35.04	60.00	24.96	9.000	L1	OFF	10.2
13.514000	34.91	60.00	25.09	9.000	L1	OFF	10.2
13.541000	35.41	60.00	24.59	9.000	L1	OFF	10.2
13.642250	34.88	60.00	25.12	9.000	L1	OFF	10.2
13.671500	34.87	60.00	25.13	9.000	L1	OFF	10.2

Final_Result_CAV

2021-01-07 오후 3:03:02

5G L1

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.154500	35.72	55.75	20.03	9.000	L1	OFF	9.6
0.231000	30.06	52.41	22.35	9.000	L1	OFF	9.6
0.244500	20.19	51.94	31.75	9.000	L1	OFF	9.6
0.303000	26.92	50.16	23.24	9.000	L1	OFF	9.6
0.339000	13.31	49.23	35.92	9.000	L1	OFF	9.6
0.379500	21.17	48.29	27.12	9.000	L1	OFF	9.6
4.595000	13.29	46.00	32.71	9.000	L1	OFF	9.9
4.750250	15.63	46.00	30.37	9.000	L1	OFF	9.9
5.045000	16.14	50.00	33.86	9.000	L1	OFF	9.9
5.051750	16.23	50.00	33.77	9.000	L1	OFF	9.9
5.130500	16.19	50.00	33.81	9.000	L1	OFF	9.9
5.150750	16.41	50.00	33.59	9.000	L1	OFF	9.9
13.354250	26.98	50.00	23.02	9.000	L1	OFF	10.2
13.437500	27.12	50.00	22.88	9.000	L1	OFF	10.2
13.464500	27.27	50.00	22.73	9.000	L1	OFF	10.2
13.543250	27.27	50.00	22.73	9.000	L1	OFF	10.2
13.592750	27.30	50.00	22.70	9.000	L1	OFF	10.2
13.673750	27.18	50.00	22.82	9.000	L1	OFF	10.2

2021-01-07

오후 3:03:02

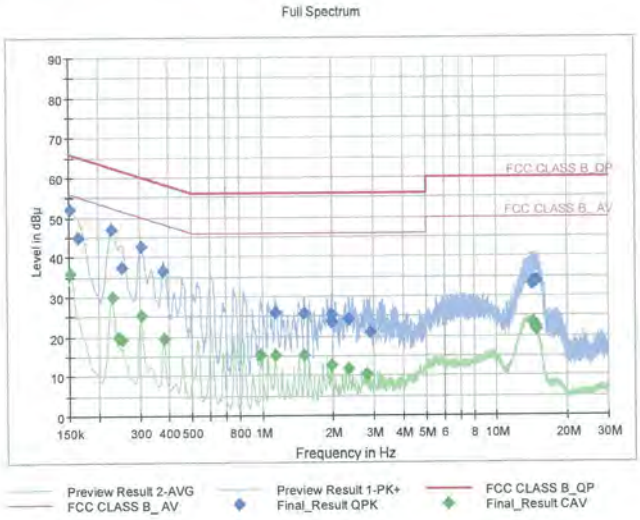
Conducted Emissions (Line 2)

5G N 1 / 2

Test Report

Common Information

EUT :	SM-A325M/DS
Manufacturer :	SAMSUNG
Test Site:	SHIELD ROOM
Operating Conditions :	5G WLAN N
Operator Name:	
Comment:	



Final_Result_QPK

Frequency (MHz)	QuasiPeak	Limit (dBuV	Margin	Bandwidth	Line	Filter	Corr. (dB)
0.152250	52.11	65.88	13.77	9.000	N	OFF	9.6
0.163500	45.04	65.28	20.25	9.000	N	OFF	9.6
0.226500	47.10	62.58	15.47	9.000	N	OFF	9.6
0.251250	37.49	61.72	24.23	9.000	N	OFF	9.6
0.303000	42.65	60.16	17.51	9.000	N	OFF	9.6
0.377250	36.73	58.34	21.61	9.000	N	OFF	9.6
1.132250	26.02	56.00	29.98	9.000	N	OFF	9.7
1.510250	25.81	56.00	30.19	9.000	N	OFF	9.7
1.967000	25.44	56.00	30.56	9.000	N	OFF	9.7
1.976000	23.73	56.00	32.27	9.000	N	OFF	9.7
2.342750	24.33	56.00	31.67	9.000	N	OFF	9.7
2.889500	20.92	56.00	35.08	9.000	N	OFF	9.8
14.191250	33.18	60.00	26.82	9.000	N	OFF	10.3
14.267750	33.24	60.00	26.76	9.000	N	OFF	10.3
14.342000	33.76	60.00	26.24	9.000	N	OFF	10.3
14.418500	33.65	60.00	26.35	9.000	N	OFF	10.3
14.702000	33.90	60.00	26.10	9.000	N	OFF	10.3
14.783000	33.86	60.00	26.14	9.000	N	OFF	10.3

Final_Result_CAV

2021-01-07 오후 3:08:28

5G N

Frequency (MHz)	CAverage (dBuV)	Limit (dBuV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.152250	35.94	55.88	19.94	9.000	N	OFF	9.6
0.228750	29.95	52.50	22.54	9.000	N	OFF	9.6
0.244500	20.03	51.94	31.92	9.000	N	OFF	9.6
0.251250	19.41	51.72	32.31	9.000	N	OFF	9.6
0.303000	25.50	50.16	24.66	9.000	N	OFF	9.6
0.379500	19.76	48.29	28.53	9.000	N	OFF	9.6
0.983750	15.27	46.00	30.73	9.000	N	OFF	9.7
1.134500	15.31	46.00	30.69	9.000	N	OFF	9.7
1.512500	15.29	46.00	30.71	9.000	N	OFF	9.7
1.967000	12.77	46.00	33.23	9.000	N	OFF	9.7
2.345000	11.88	46.00	34.12	9.000	N	OFF	9.7
2.799500	10.36	46.00	35.64	9.000	N	OFF	9.8
14.218250	23.29	50.00	26.71	9.000	N	OFF	10.3
14.564750	22.62	50.00	27.38	9.000	N	OFF	10.3
14.623250	22.34	50.00	27.66	9.000	N	OFF	10.3
14.641250	22.40	50.00	27.60	9.000	N	OFF	10.3
14.780750	21.70	50.00	28.30	9.000	N	OFF	10.3
14.828000	21.75	50.00	28.25	9.000	N	OFF	10.3

2021-01-07

오후 3:08:28

11. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESR / EMI Test Receiver	09/16/2020	Annual	101910
ESPAC	SU-642 /Temperature Chamber	03/18/2020	Annual	0093008124
Agilent	N9030A / Signal Analyzer	01/11/2021	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/02/2020	Annual	101231
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Keysight	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/25/2020	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/12/2020	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	06/26/2020	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

Radiated Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	07/28/2020	Annual	102168
Agilent	N9030A / Signal Analyzer	01/11/2021	Annual	MY49431210
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/06/2021	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	03/02/2020	Annual	8
Wainwright Instruments	WHKX8-6090-7000-18000-40SS/ High Pass Filter	03/02/2020	Annual	25
Api tech.	18B-03 / Attenuator (3 dB)	03/02/2020	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	03/02/2020	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	03/02/2020	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	03/02/2020	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956

Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
3. Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5(Version : 2017).

12. ANNEX A_ TEST SETUP PHOTO

Please refer to test setup photo file no. as follows;

No.	Description
1	HCT-RF-2101-FC095-P