

# FCC UNII REPORT

## Certification

<b>Applicant Name:</b> SAMSUNG Electronics Co., Ltd.	<b>Date of Issue:</b> July 15, 2022
<b>Address:</b> 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea	<b>Test Site/Location:</b> 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
	<b>Report No.:</b> HCT-RF-2207-FC010

<b>FCC ID:</b>	<b>A3LSMA047M</b>
<b>APPLICANT:</b>	<b>SAMSUNG Electronics Co., Ltd.</b>
<b>Model:</b>	SM-A047M/DS
<b>Additional Model:</b>	SM-A047M
<b>EUT Type:</b>	Mobile Phone
<b>Modulation type</b>	OFDM
<b>FCC Classification:</b>	Unlicensed National Information Infrastructure(NII)
<b>FCC Rule Part(s):</b>	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.

Report No.: HCT-RF-2207-FC010

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REVIEWED BY



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Report prepared by : Chang Hee Hwang  
Engineer of Telecommunication Testing Center

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Report approved by : Seul Ki 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)

\* The report shall not be reproduced except in full(only partly) without approval of the laboratory.

## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2207-FC010	July 15, 2022	- First Approval Report

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## 1. GENERAL INFORMATION

### EUT DESCRIPTION

<b>Model</b>	SM-A047M/DS	
<b>Additional Model</b>	SM-A047M	
<b>EUT Type</b>	Mobile Phone	
<b>Power Supply</b>	DC 3.85 V	
<b>Modulation Type</b>	OFDM : 802.11a, 802.11n, 802.11ac	
<b>Frequency Range (MHz)</b>	U-NII-1	20 MHz BW : 5180 - 5240 40 MHz BW : 5190 - 5230 80 MHz BW : 5210
	U-NII-2A	20 MHz BW : 5260 - 5320 40 MHz BW : 5270 - 5310 80 MHz BW : 5290
	U-NII-2C	20 MHz BW : 5500 - 5720 40 MHz BW : 5510 - 5710 80 MHz BW : 5530 - 5690
	U-NII-3	20 MHz BW : 5745 - 5825 40 MHz BW : 5755 - 5795 80 MHz BW : 5775
<b>Straddle channel</b>	Supported	
<b>TDWR Band</b>	Supported	
<b>Dynamic Frequency Selection</b>	Slave without radar detection	
<b>Date(s) of Tests</b>	July 04, 2022 ~ July 14, 2022	
<b>Serial number</b>	Radiated : R38T500FL9F Conducted : R38T500RXPL	

## 2. MAXIMUM OUTPUT POWER

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

Band	Mode	Power	
		(dBm)	(W)
UNII1	802.11a	15.78	0.038
	802.11n (HT20)	15.88	0.039
	802.11n (HT40)	14.80	0.030
	802.11ac (VHT20)	15.60	0.036
	802.11ac (VHT40)	14.66	0.029
	802.11ac (VHT80)	7.65	0.006
UNII2A	802.11a	15.62	0.036
	802.11n (HT20)	15.55	0.036
	802.11n (HT40)	14.63	0.029
	802.11ac (VHT20)	15.40	0.035
	802.11ac (VHT40)	14.26	0.027
	802.11ac (VHT80)	7.94	0.006
UNII2C	802.11a	15.75	0.038
	802.11n (HT20)	15.47	0.035
	802.11n (HT40)	14.92	0.031
	802.11ac (VHT20)	15.60	0.036
	802.11ac (VHT40)	14.81	0.030
	802.11ac (VHT80)	12.56	0.018
UNII3	802.11a	15.80	0.038
	802.11n (HT20)	15.67	0.037
	802.11n (HT40)	14.52	0.028
	802.11ac (VHT20)	15.48	0.035
	802.11ac (VHT40)	14.40	0.028
	802.11ac (VHT80)	11.66	0.015

### **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 30 MHz 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 1 GHz. Above 1 GHz with 1.5 m 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.

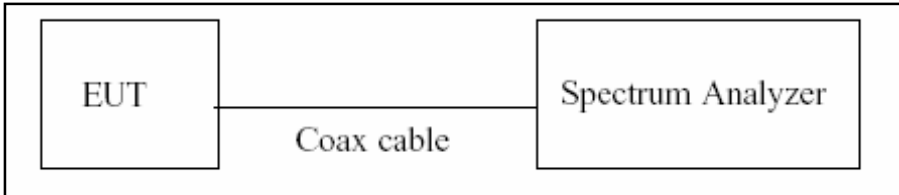
The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty (dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	2.00 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (9 kHz ~ 30 MHz)	4.40 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (30 MHz ~ 1 GHz)	5.74 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (1 GHz ~ 18 GHz)	5.51 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (18 GHz ~ 40 GHz)	5.92 ( Confidence level about 95 %, $k=2$ )
Radiated Disturbance (Above 40 GHz)	5.48 ( Confidence level about 95 %, $k=2$ )

## 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.

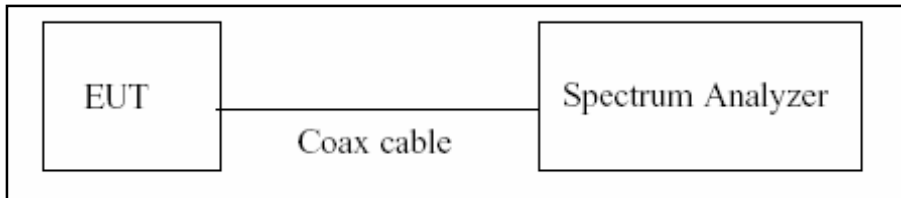
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ( $\geq$  RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure  $T_{total}$  and  $T_{on}$
8. Calculate Duty Cycle =  $T_{on} / T_{total}$  and Duty Cycle Factor =  $10\log(1/\text{Duty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

## 8.2. 6 dB Bandwidth & 26 dB Bandwidth

### Limit

Within the 5.725-5.85 GHz(NII-3), the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.

### Test Configuration



### Test Procedure(26 dB 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 (6 dB 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  $\geq 3 \times$  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 level 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.

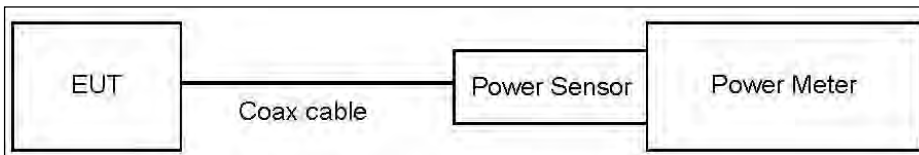
**8.3. Output Power Measurement**

**Limit**

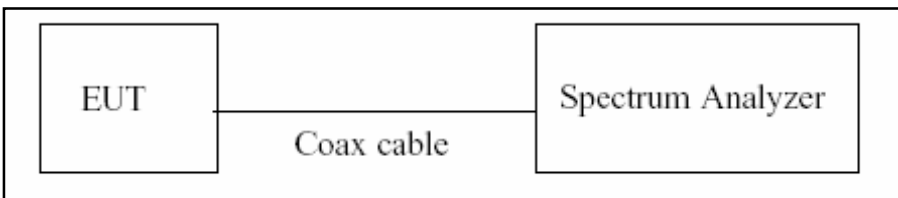
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30 dBm)

**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  $10\log(1/x)$ , where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

**Sample Calculation**

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

**Note**

1. Spectrum Measured Levels 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 Loss = Attenuator loss(10 dB) + Cable loss

3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	10.80
UNII 2A	10.80
UNII 2C	10.80
UNII 3	10.80

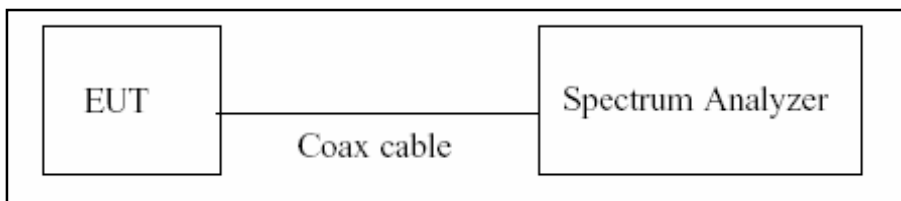
(Actual value of loss for the attenuator and cable combination)

**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) = Measured Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

**Note**

1. Spectrum Measured Levels 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 Loss = Attenuator loss(10 dB) + Cable loss

3. Actual value of loss for the attenuator and cable combination is below table.

<b>Band</b>	<b>Loss(dB)</b>
UNII 1	10.80
UNII 2A	10.80
UNII 2C	10.80
UNII 3	10.80

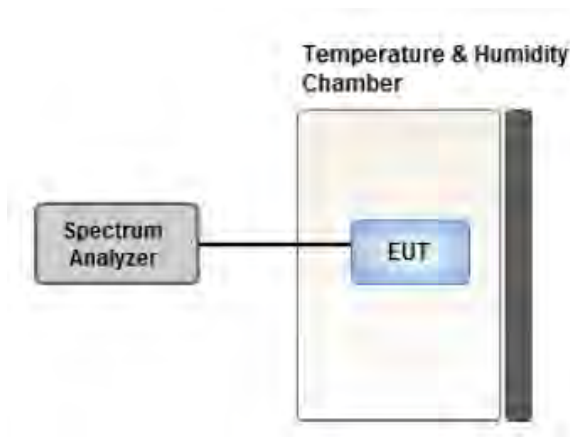
(Actual value of loss for the attenuator and cable combination)

## 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 °C and 50 °C.
2. The temperature was incremented by 10 °C 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 battery 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  $\mu$ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 <sup>(a)</sup>	56 to 46 <sup>(a)</sup>
0.50 to 5	56	46
5 to 30	60	50

<sup>(a)</sup>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) = Measured Value + Correction Factor

### 8.7. Radiated Test

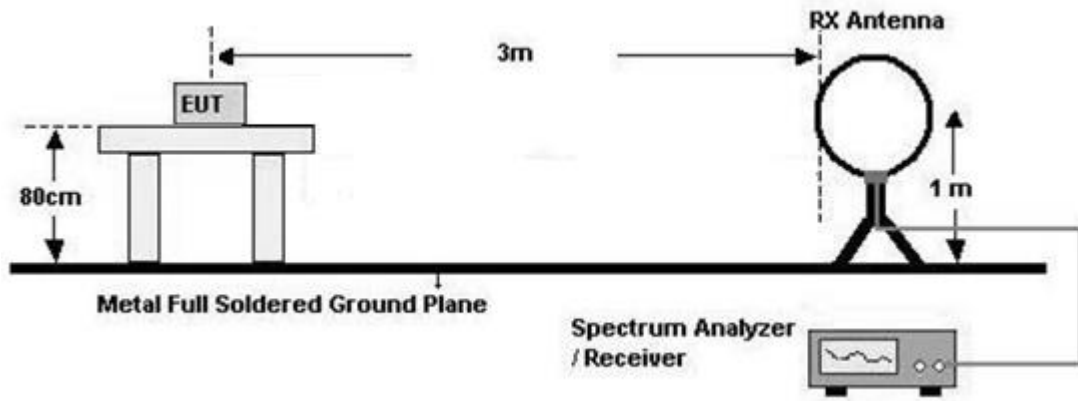
#### Limit

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.

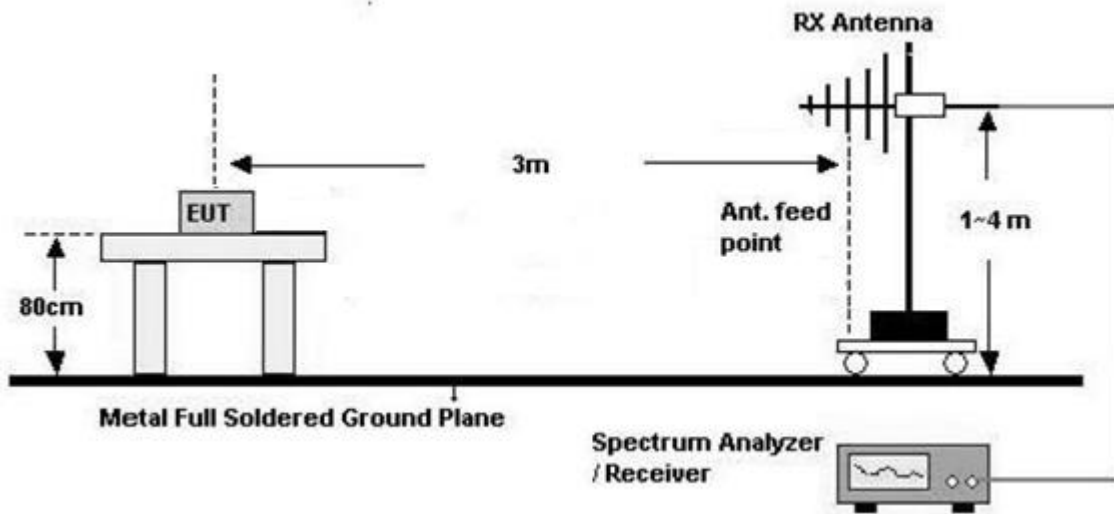
Frequency (MHz)	Field Strength ( $\mu\text{V/m}$ )	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

**Test Configuration**

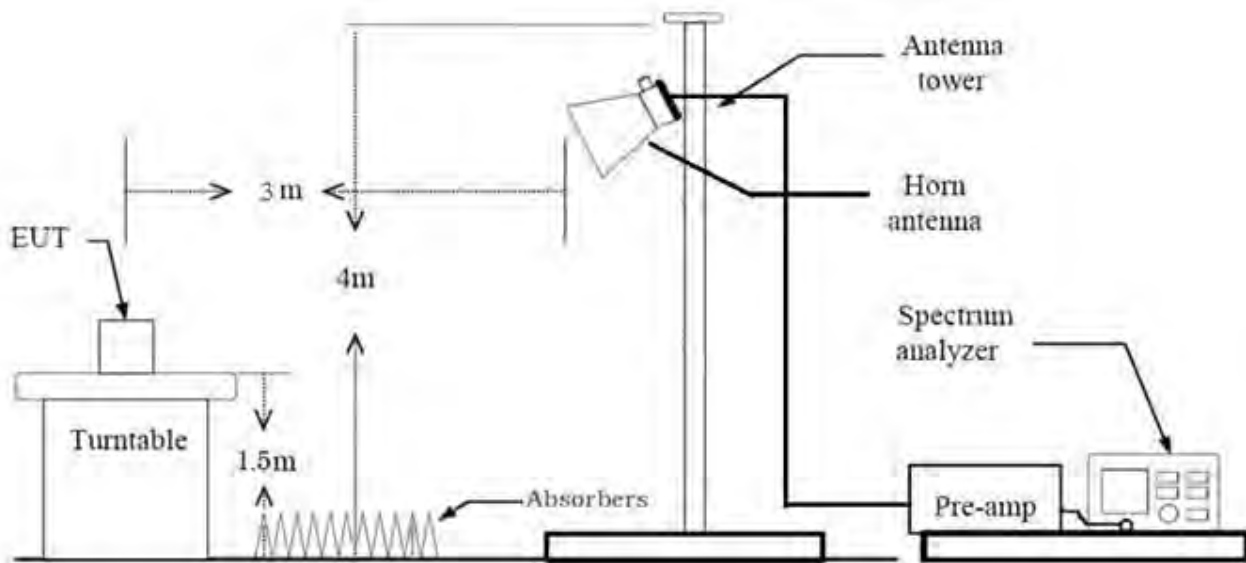
Below 30 MHz



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 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m 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) =  $40\log(3\text{ m}/300\text{ m}) = -80\text{ dB}$   
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) =  $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$   
Measurement Distance : 3 m
8. Spectrum Setting
  - Frequency Range = 9 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 9 kHz
  - VBW  $\geq 3 \times$  RBW
9. Total = Measured 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 1 GHz)**

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 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m 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  $\geq$  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 = Measured 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.

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**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 1 m to 4 m 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  $\geq$  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  $\geq$  98 %) =  $VBW \leq RBW/100$ (i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is  $<$  98 %) =  $VBW \geq 1/T$ , 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 % duty cycle. For lower duty cycles, increase the minimum 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 =  $20\log(\text{test distance} / \text{specific distance})$  (dB)
12. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.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 1 m to 4 m 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  $\geq$  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  $\geq$  98 %) =  $VBW \leq RBW/100$ (i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 %) =  $VBW \geq 1/T$ , 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 % duty cycle. For lower duty cycles, increase the minimum 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 =  $20\log(\text{test distance} / \text{specific distance})$  (dB)

11. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Attenuator(ATT)  
+ 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	0.926	0.332	1000
802.11n(HT20)	MCS0	0.923	0.348	1000
802.11n(HT40)	MCS0	0.852	0.695	2000
802.11ac(VHT20)	MCS0	0.927	0.330	1000
802.11ac(VHT40)	MCS0	0.853	0.690	2000
802.11ac(VHT80)	MCS0	0.743	1.292	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 : X
  - 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 worst case modulation results are reported.  
(Worstcase : 802.11a\_6 Mbps)
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-A047M/DS, SM-A047M were tested and the worst case results are reported.  
(Worst case : SM-A047M/DS)

### 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-A047M/DS, SM-A047M were tested and the worst case results are reported.  
(Worst case : SM-A047M/DS)

### Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. SM-A047M/DS, SM-A047M were tested and the worst case results are reported.  
(Worst case : SM-A047M/DS)

**9. SUMMARY OF TEST RESULTS**

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26 dB Bandwidth	§15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§15.407(e)	> 500 kHz (5725-5850 MHz)(UNII-3)		PASS
Maximum Conducted Output Power	§15.407(a)(1),(2),(3)	< 250 mW(5150-5250 MHz)  < 250 mW or 11+10log <sub>10</sub> (BW) dBm (5250-5350 MHz)  < 250 mW or 11+10log <sub>10</sub> (BW) dBm (5470-5725 MHz)  <1 W (5725-5850 MHz)		PASS
Maximum Power Spectral Density	§15.407(a)(1),(2),(3)	<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
AC Conducted Emissions 150 kHz-30 MHz	15.207 15.407(b)(9)	<FCC 15.207 limits		PASS
Frequency Stability	§15.407(g) §2.1055	Maintained within the band		PASS
Undesirable Emissions	§15.407(b) (1),(2),(3),(4)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 8.6 (UNII 3)	Radiated	PASS
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	15.205, 15.407(b)(9),(10)	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 <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.429	1.543	0.926	0.332
	9	0.961	1.085	0.886	0.527
	12	0.724	0.847	0.855	0.683
	18	0.492	0.607	0.811	0.911
	24	0.372	0.486	0.766	1.159
	36	0.257	0.371	0.693	1.595
	48	0.196	0.310	0.631	2.000
	54	0.180	0.294	0.611	2.140

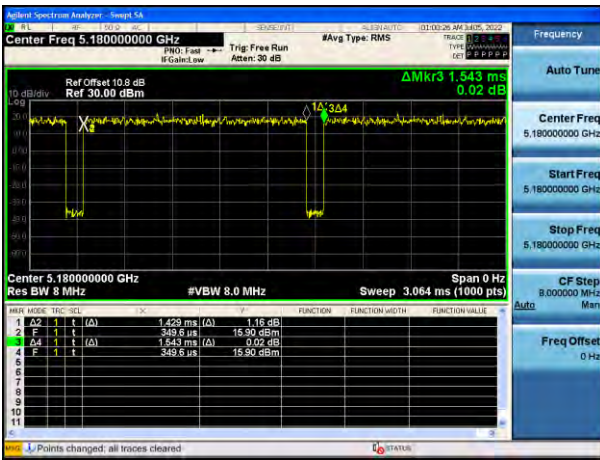
Mode	MCS Index	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.339	1.451	0.923	0.348
	1	0.688	0.802	0.857	0.668
	2	0.472	0.587	0.804	0.947
	3	0.364	0.478	0.762	1.183
	4	0.256	0.370	0.692	1.600
	5	0.200	0.315	0.636	1.963
	6	0.184	0.299	0.617	2.097
	7	0.168	0.283	0.596	2.251
802.11n (HT40)	0	0.664	0.779	0.852	0.695
	1	0.352	0.467	0.753	1.230
	2	0.248	0.363	0.683	1.657
	3	0.196	0.310	0.631	1.998
	4	0.144	0.249	0.576	2.392
	5	0.116	0.222	0.525	2.798
	6	0.108	0.223	0.484	3.147
	7	0.100	0.215	0.465	3.330

Mode	MCS Index	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.344	1.451	0.927	0.330
	1	0.692	0.798	0.868	0.617
	2	0.477	0.591	0.806	0.934
	3	0.368	0.482	0.763	1.172
	4	0.261	0.375	0.695	1.581
	5	0.204	0.319	0.639	1.942
	6	0.188	0.303	0.621	2.072
	7	0.172	0.296	0.583	2.345
	8	0.152	0.266	0.570	2.438
802.11ac (VHT40)	0	0.669	0.784	0.853	0.690
	1	0.356	0.470	0.757	1.210
	2	0.252	0.358	0.705	1.520
	3	0.200	0.306	0.654	1.841
	4	0.148	0.254	0.584	2.334
	5	0.120	0.235	0.512	2.904
	6	0.112	0.227	0.494	3.062
	7	0.104	0.219	0.477	3.219
	8	0.096	0.211	0.456	3.413
	9	0.088	0.212	0.416	3.809
802.11ac (VHT80)	0	0.331	0.446	0.743	1.292
	1	0.188	0.294	0.639	1.944
	2	0.140	0.255	0.549	2.606
	3	0.116	0.222	0.524	2.806
	4	0.092	0.198	0.466	3.316
	5	0.080	0.195	0.410	3.875
	6	0.076	0.191	0.398	4.006
	7	0.072	0.187	0.387	4.124
	8	0.068	0.183	0.371	4.301
	9	0.064	0.179	0.358	4.466

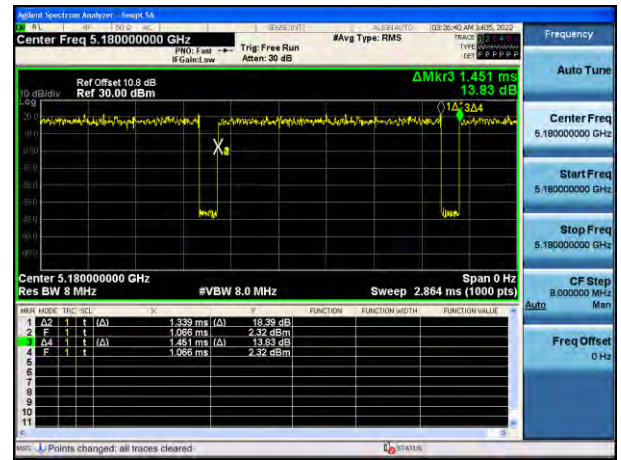
**Note:**

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

**802.11a**



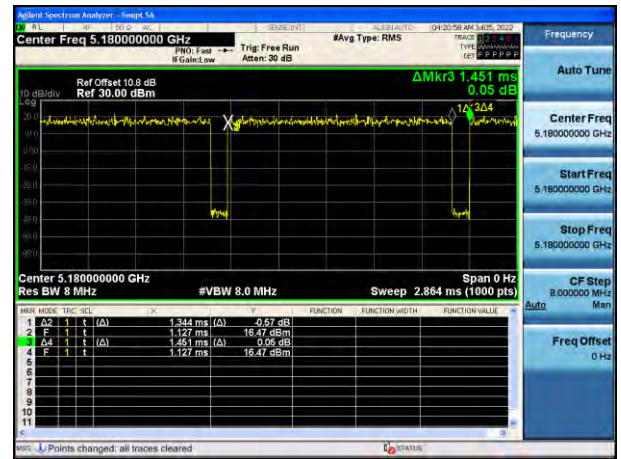
**802.11n(HT20)**



**802.11n(HT40)**



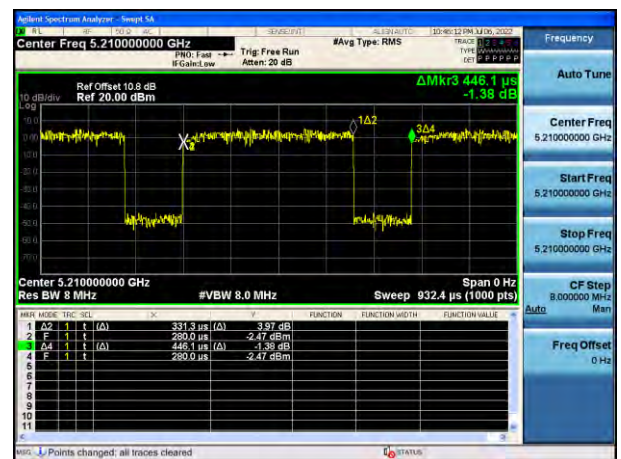
**802.11ac(VHT20)**



**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	20.37	16.479
5200	40	21.63	16.516
5240	48	20.81	16.540
5260	52	21.42	16.507
5300	60	20.68	16.497
5320	64	20.68	16.492
5500	100	19.84	16.451
5600	120	20.69	16.502
5720	144	21.03	16.510
5745	149	20.57	16.519
5785	157	20.72	16.490
5825	165	20.61	16.454

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.12	17.560
5200	40	21.90	17.636
5240	48	21.92	17.620
5260	52	21.05	17.600
5300	60	20.95	17.606
5320	64	21.00	17.597
5500	100	20.88	17.551
5600	120	21.66	17.629
5720	144	21.65	17.613
5745	149	21.89	17.649
5785	157	21.05	17.616
5825	165	21.07	17.590

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	42.46	36.664
5230	46	72.84	37.406
5270	54	59.69	37.531
5310	62	42.69	37.070
5510	102	42.15	37.167
5590	118	71.20	37.716
5710	142	71.07	37.437
5755	151	71.12	37.393
5795	159	59.15	37.395

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.11	17.580
5200	40	21.62	17.627
5240	48	21.81	17.623
5260	52	20.81	17.609
5300	60	21.23	17.602
5320	64	21.07	17.598
5500	100	20.51	17.561
5600	120	21.83	17.625
5720	144	21.46	17.614
5745	149	21.33	17.651
5785	157	21.33	17.601
5825	165	21.16	17.609

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	42.54	36.793
5230	46	46.90	36.838
5270	54	46.27	37.005
5310	62	42.55	36.649
5510	102	42.29	36.551
5590	118	47.25	36.953
5710	142	45.87	36.830
5755	151	46.73	36.795
5795	159	47.02	37.248

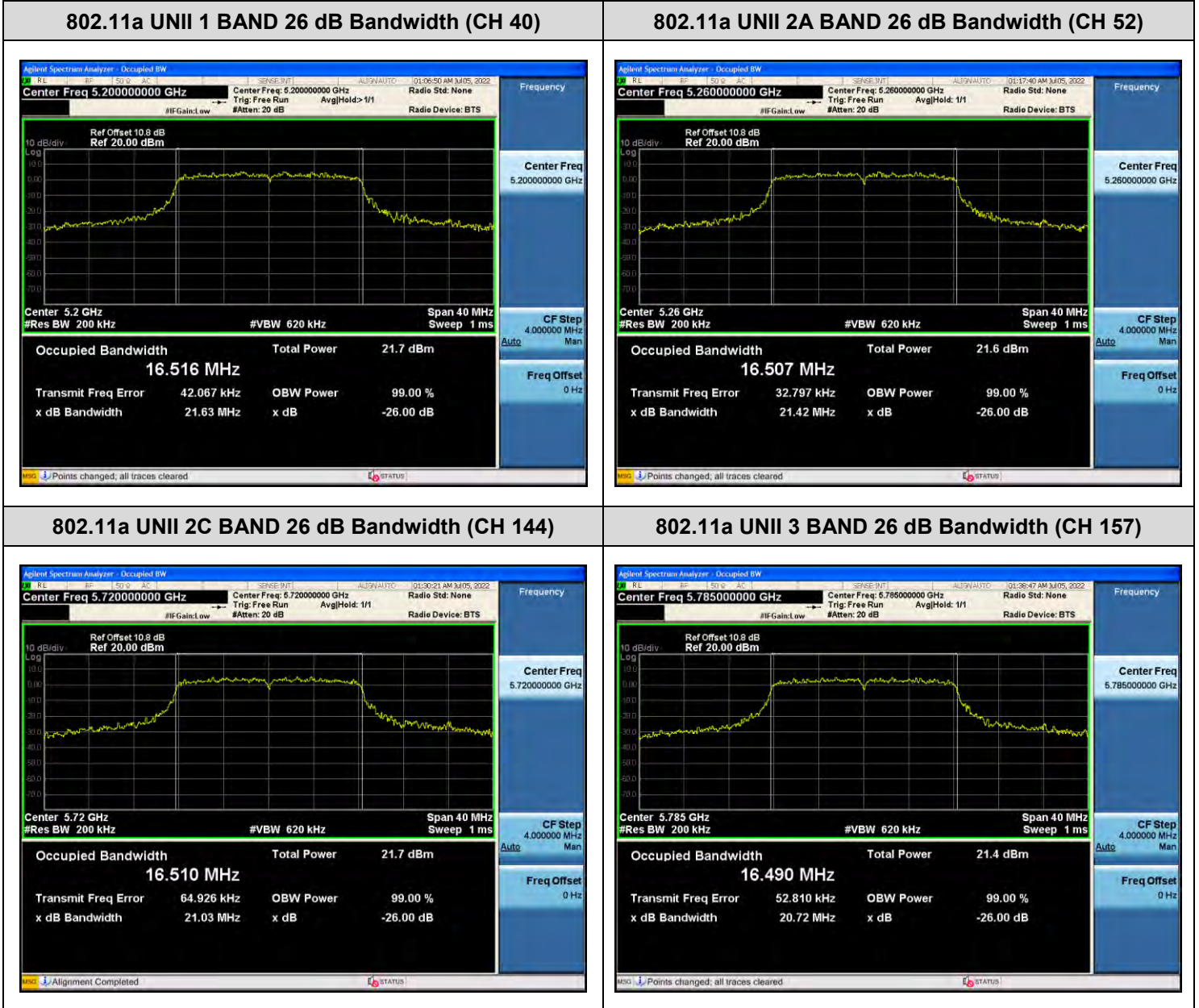
802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	79.98	75.232
5290	58	80.02	75.195
5530	106	80.20	75.211
5610	122	80.15	75.283
5690	138	80.14	75.189
5775	155	80.15	75.208



☐ Test Plots(802.11a)

Note:

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

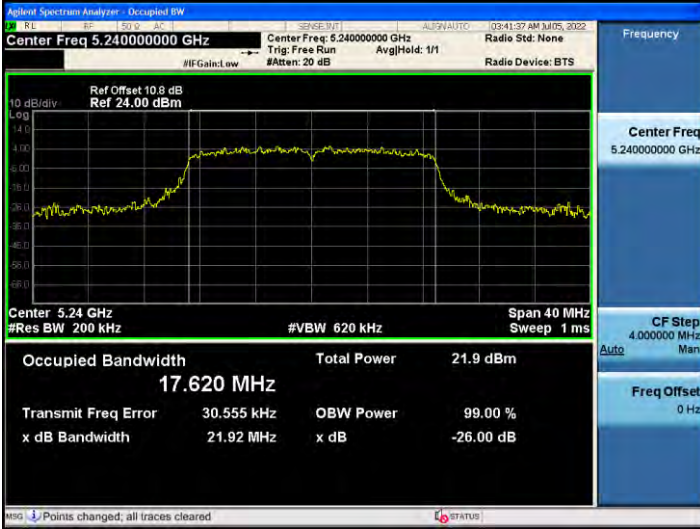


☐ Test Plots(802.11n(HT20))

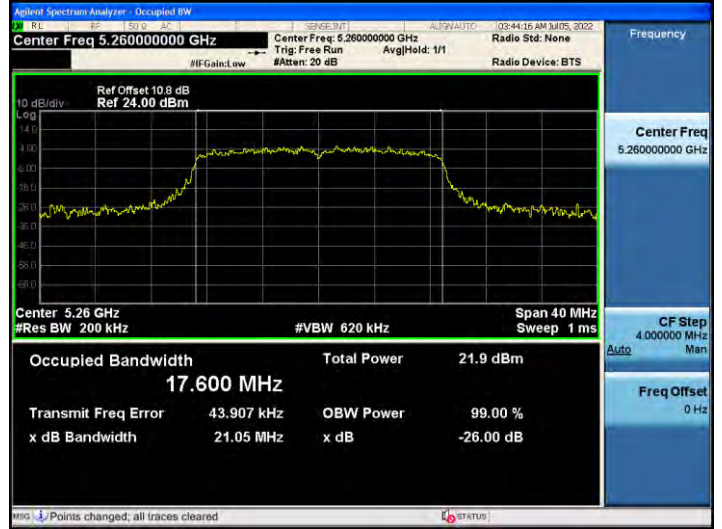
Note:

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

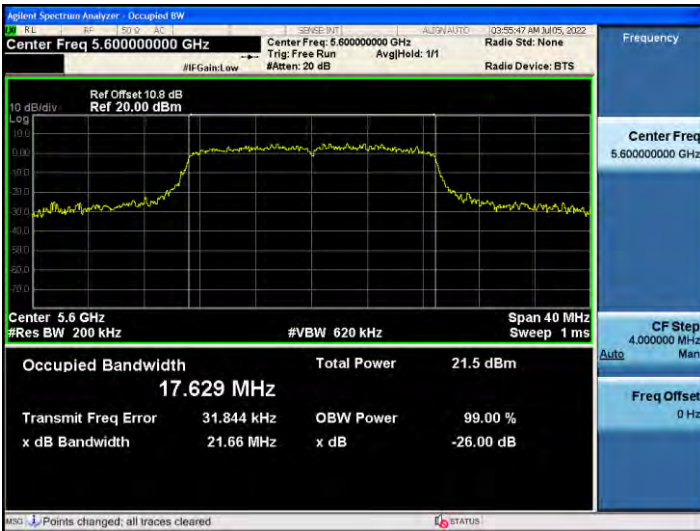
802.11n\_HT20 UNII 1 BAND 26 dB Bandwidth(CH 48)



802.11n\_HT20 UNII 2A BAND 26 dB Bandwidth(CH 52)



802.11n\_HT20 UNII 2C BAND 26 dB Bandwidth(CH 120)



802.11n\_HT20 UNII 3 BAND 26 dB Bandwidth(CH 149)



☐ Test Plots(802.11n(HT40))

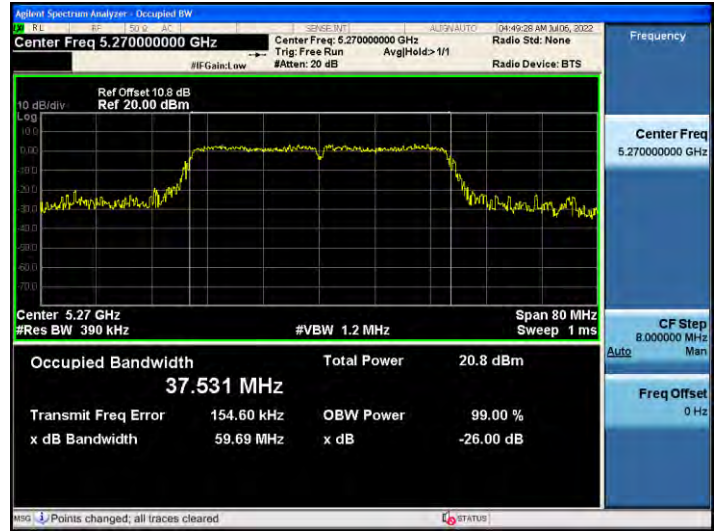
Note:

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

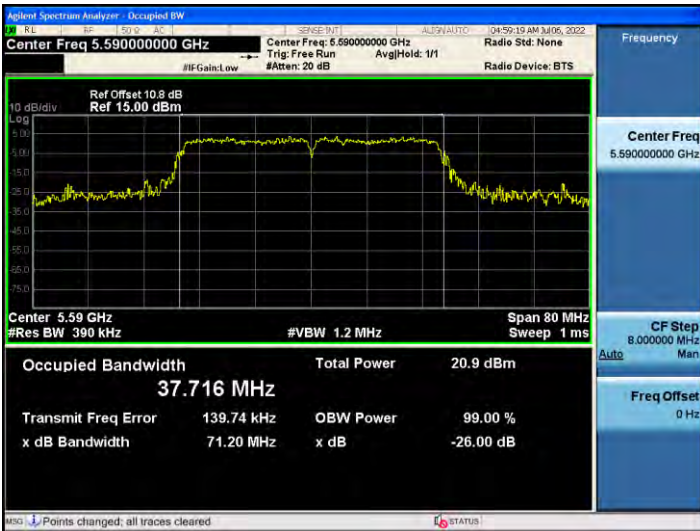
**802.11n\_HT40 UNII 1 BAND 26 dB Bandwidth(CH 46)**



**802.11n\_HT40 UNII 2A BAND 26 dB Bandwidth (CH 54)**



**802.11n\_HT40 UNII 2C BAND 26 dB Bandwidth(CH 118)**



**802.11n\_HT40 UNII 3 BAND 26 dB Bandwidth (CH 151)**

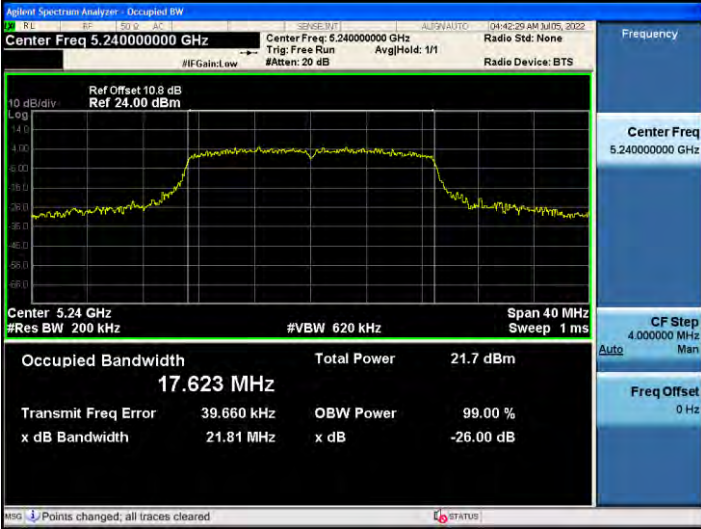


☐ Test Plots(802.11ac(VHT20))

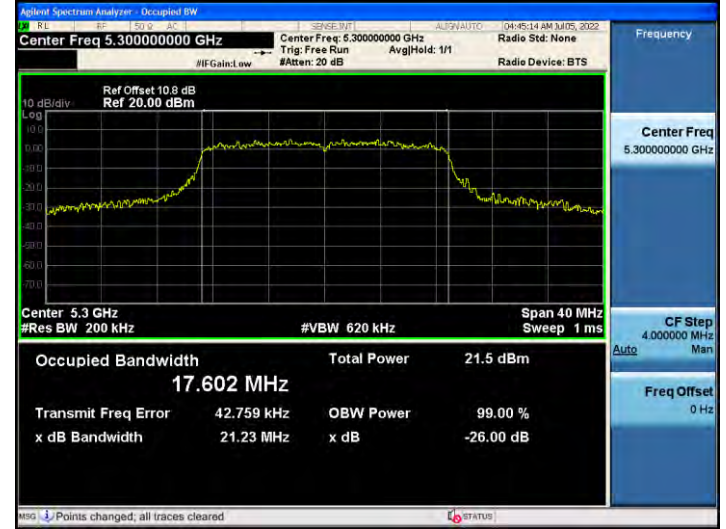
Note:

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

802.11ac\_VHT20 UNII 1 BAND 26 dB Bandwidth(CH 48)



802.11ac\_VHT20 UNII 2A BAND 26 dB Bandwidth(CH 60)



802.11ac\_VHT20 UNII 2C BAND 26 dB Bandwidth(CH 120)



802.11ac\_VHT20 UNII 3 BAND 26 dB Bandwidth(CH 157)

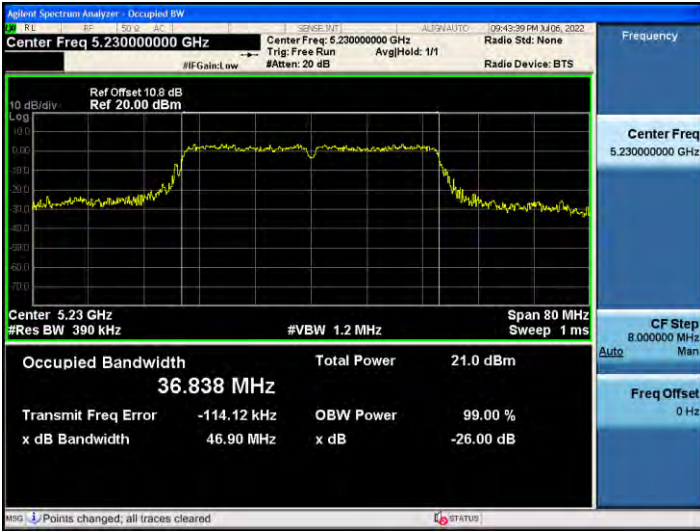


☐ Test Plots(802.11ac(VHT40))

Note:

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

**802.11ac\_VHT40 UNII 1 BAND 26 dB Bandwidth(CH 46)**



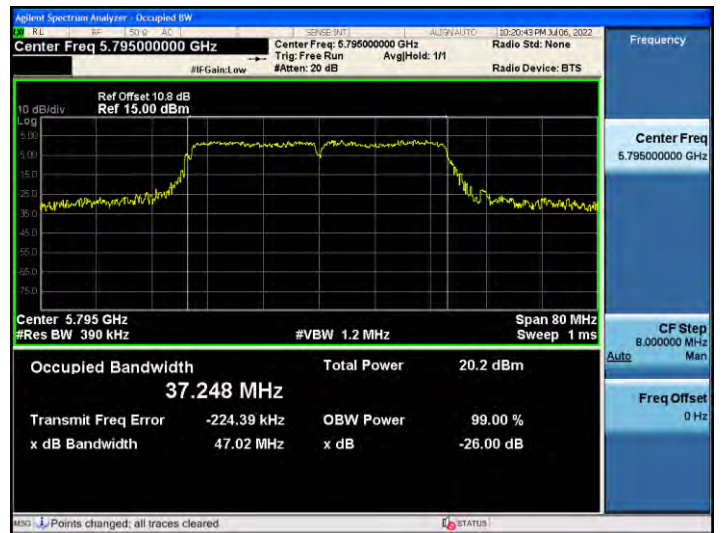
**802.11ac\_VHT40 UNII 2A BAND 26 dB Bandwidth (CH 54)**



**802.11ac\_VHT40 UNII 2C BAND 26 dB Bandwidth(CH 118)**



**802.11ac\_VHT40 UNII 3 BAND 26 dB Bandwidth (CH 159)**

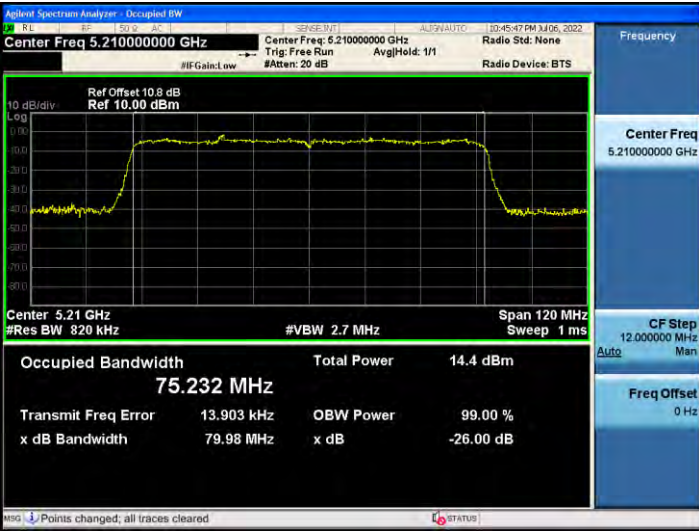


☐ Test Plots(802.11ac(VHT80))

Note:

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

**802.11ac\_VHT80 UNII 1 BAND 26 dB Bandwidth(CH 42)**



**802.11ac\_VHT80 UNII 2A BAND 26 dB Bandwidth (CH 58)**



**802.11ac\_VHT80 UNII 2C BAND 26 dB Bandwidth(CH 106)**



**802.11ac\_VHT80 UNII 3 BAND 26 dB Bandwidth (CH 155)**



**10.3 6 dB BANDWIDTH**

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.29	> 0.5	Pass
5785	157	16.07	> 0.5	Pass
5825	165	16.05	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.58	> 0.5	Pass
5785	157	15.93	> 0.5	Pass
5825	165	15.73	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.62	> 0.5	Pass
5795	159	35.68	> 0.5	Pass

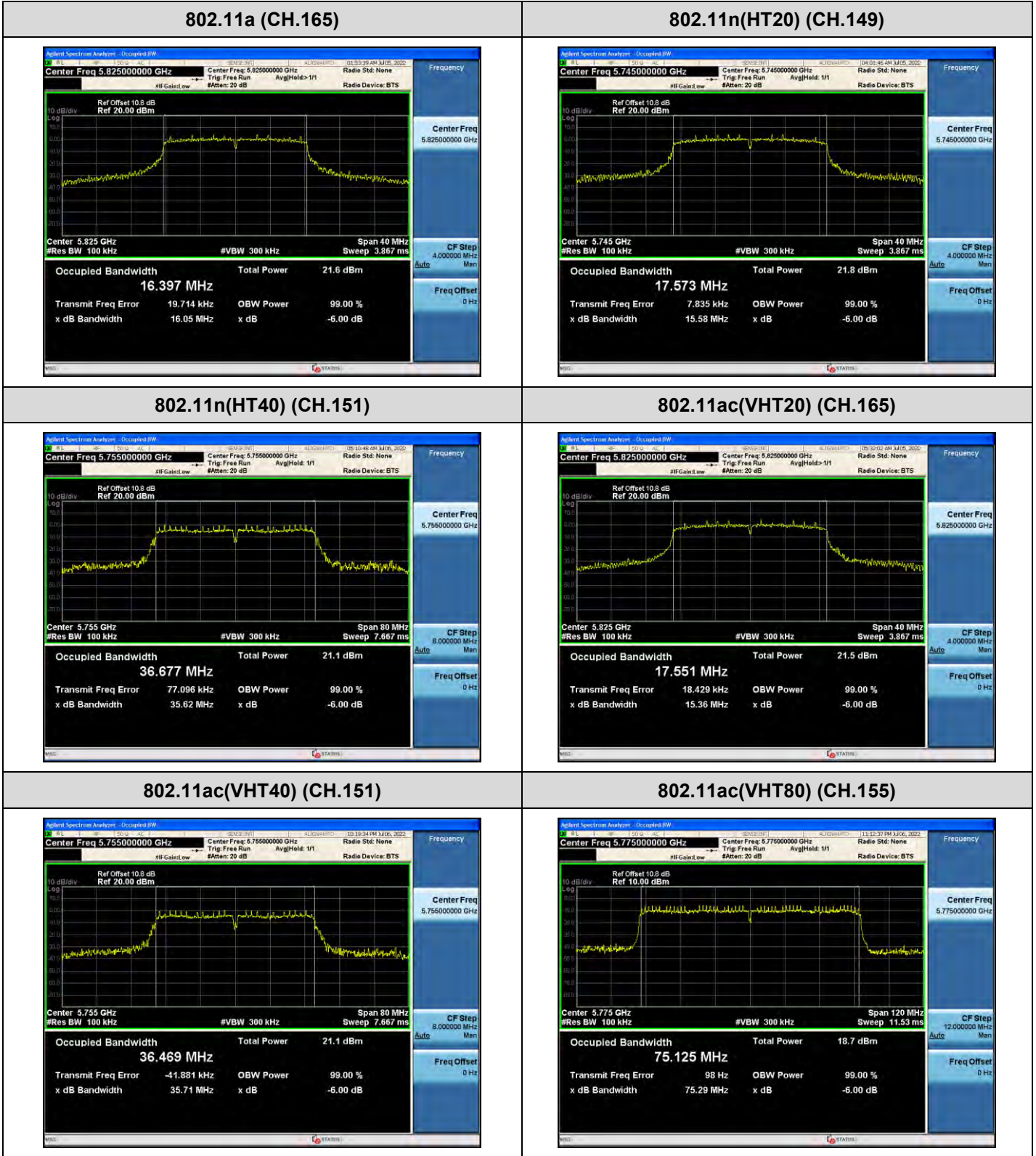
802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.25	> 0.5	Pass
5785	157	16.71	> 0.5	Pass
5825	165	15.36	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.71	> 0.5	Pass
5795	159	35.77	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.29	> 0.5	Pass

**Test Plots**

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





### 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.

# Limit

(UNII 1) : 23.98 dBm

(UNII 2A, 2C) : 23.98 dBm or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)

(UNII 3) : 30.00 dBm

802.11a Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate [Mbps]
Frequency [MHz]	Channel No.					
5180	36	12.96	1.595	14.56	23.98	36M
5200	40	14.07	1.595	15.66	23.98	36M
5240	48	14.18	1.595	15.78	23.98	36M
5260	52	14.03	1.595	15.62	23.98	36M
5300	60	13.74	1.595	15.33	23.98	36M
5320	64	13.67	1.595	15.26	23.98	36M
5500	100	12.08	1.595	13.68	23.98	36M
5600	120	14.14	1.595	15.74	23.98	36M
5720	144	14.16	1.595	15.75	23.98	36M
5745	149	14.20	1.595	15.80	30.00	36M
5785	157	13.63	1.595	15.22	30.00	36M
5825	165	13.76	1.595	15.35	30.00	36M

802.11n(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	13.55	0.947	14.50	23.98	MCS2
5200	40	14.58	0.947	15.52	23.98	MCS2
5240	48	14.93	0.947	15.88	23.98	MCS2
5260	52	14.60	0.947	15.55	23.98	MCS2
5300	60	14.24	0.947	15.19	23.98	MCS2
5320	64	14.17	0.947	15.12	23.98	MCS2
5500	100	12.54	0.947	13.48	23.98	MCS2
5600	120	14.52	0.947	15.46	23.98	MCS2
5720	144	14.53	0.947	15.47	23.98	MCS2
5745	149	14.72	0.947	15.67	30.00	MCS2
5785	157	14.13	0.947	15.08	30.00	MCS2
5825	165	14.35	0.947	15.30	30.00	MCS2

802.11n(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	7.32	1.657	8.98	23.98	MCS2
5230	46	13.14	1.657	14.80	23.98	MCS2
5270	54	12.97	1.657	14.63	23.98	MCS2
5310	62	6.99	1.657	8.65	23.98	MCS2
5510	102	7.00	1.657	8.66	23.98	MCS2
5590	118	13.13	1.657	14.78	23.98	MCS2
5710	142	13.26	1.657	14.92	23.98	MCS2
5755	151	12.87	1.657	14.52	30.00	MCS2
5795	159	12.55	1.657	14.20	30.00	MCS2

802.11ac(20 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5180	36	13.54	0.934	14.47	23.98	MCS2
5200	40	14.50	0.934	15.43	23.98	MCS2
5240	48	14.67	0.934	15.60	23.98	MCS2
5260	52	14.46	0.934	15.40	23.98	MCS2
5300	60	14.19	0.934	15.13	23.98	MCS2
5320	64	14.22	0.934	15.15	23.98	MCS2
5500	100	12.46	0.934	13.39	23.98	MCS2
5600	120	14.32	0.934	15.25	23.98	MCS2
5720	144	14.66	0.934	15.60	23.98	MCS2
5745	149	14.54	0.934	15.48	30.00	MCS2
5785	157	14.12	0.934	15.06	30.00	MCS2
5825	165	14.12	0.934	15.05	30.00	MCS2

802.11ac(40 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5190	38	7.32	1.520	8.84	23.98	MCS2
5230	46	13.14	1.520	14.66	23.98	MCS2
5270	54	12.74	1.520	14.26	23.98	MCS2
5310	62	6.83	1.520	8.35	23.98	MCS2
5510	102	7.01	1.520	8.53	23.98	MCS2
5590	118	13.13	1.520	14.65	23.98	MCS2
5710	142	13.29	1.520	14.81	23.98	MCS2
5755	151	12.88	1.520	14.40	30.00	MCS2
5795	159	12.61	1.520	14.13	30.00	MCS2

802.11ac(80 MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase MCS Index
Frequency [MHz]	Channel No.					
5210	42	5.05	2.606	7.65	23.98	MCS2
5290	58	5.33	2.606	7.94	23.98	MCS2
5530	106	5.35	2.606	7.96	23.98	MCS2
5610	122	9.67	2.606	12.27	23.98	MCS2
5690	138	9.95	2.606	12.56	23.98	MCS2
5775	155	9.05	2.606	11.66	30.00	MCS2

**10.5 POWER SPECTRAL DENSITY**

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase Datarate [Mbps]	Limit
Frequency [MHz]	Channel No.					
5180	36	2.566	1.595	4.161	36M	11 dBm/MHz
5200	40	3.959	1.595	5.554	36M	
5240	48	3.774	1.595	5.369	36M	
5260	52	3.436	1.595	5.031	36M	
5300	60	3.377	1.595	4.972	36M	
5320	64	3.371	1.595	4.966	36M	
5500	100	1.817	1.595	3.412	36M	
5600	120	3.863	1.595	5.458	36M	
5720	144	3.665	1.595	5.260	36M	
5745	149	1.141	1.595	2.736	36M	
5785	157	0.714	1.595	2.309	36M	30 dBm/500 kHz
5825	165	0.550	1.595	2.145	36M	

802.11n(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	2.817	0.947	3.764	MCS2	11 dBm/MHz
5200	40	3.732	0.947	4.679	MCS2	
5240	48	3.837	0.947	4.784	MCS2	
5260	52	3.527	0.947	4.474	MCS2	
5300	60	3.178	0.947	4.125	MCS2	
5320	64	3.309	0.947	4.256	MCS2	
5500	100	1.625	0.947	2.572	MCS2	
5600	120	3.555	0.947	4.502	MCS2	
5720	144	3.810	0.947	4.757	MCS2	
5745	149	1.051	0.947	1.998	MCS2	
5785	157	0.932	0.947	1.879	MCS2	30 dBm/500 kHz
5825	165	1.054	0.947	2.001	MCS2	

802.11n(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	-6.826	1.657	-5.169	MCS2	11 dBm/MHz
5230	46	-0.783	1.657	0.874	MCS2	
5270	54	-0.965	1.657	0.692	MCS2	
5310	62	-6.989	1.657	-5.332	MCS2	
5510	102	-6.805	1.657	-5.148	MCS2	
5590	118	-0.707	1.657	0.950	MCS2	
5710	142	-0.523	1.657	1.134	MCS2	
5755	151	-3.685	1.657	-2.028	MCS2	30 dBm /500 kHz
5795	159	-4.174	1.657	-2.517	MCS2	

802.11ac(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	2.513	0.934	3.447	MCS2	11 dBm/MHz
5200	40	3.537	0.934	4.471	MCS2	
5240	48	3.943	0.934	4.877	MCS2	
5260	52	3.739	0.934	4.673	MCS2	
5300	60	3.375	0.934	4.309	MCS2	
5320	64	3.373	0.934	4.307	MCS2	
5500	100	1.644	0.934	2.578	MCS2	
5600	120	3.258	0.934	4.192	MCS2	
5720	144	3.872	0.934	4.806	MCS2	
5745	149	1.012	0.934	1.946	MCS2	
5785	157	0.497	0.934	1.431	MCS2	30 dBm/500 kHz
5825	165	0.354	0.934	1.288	MCS2	

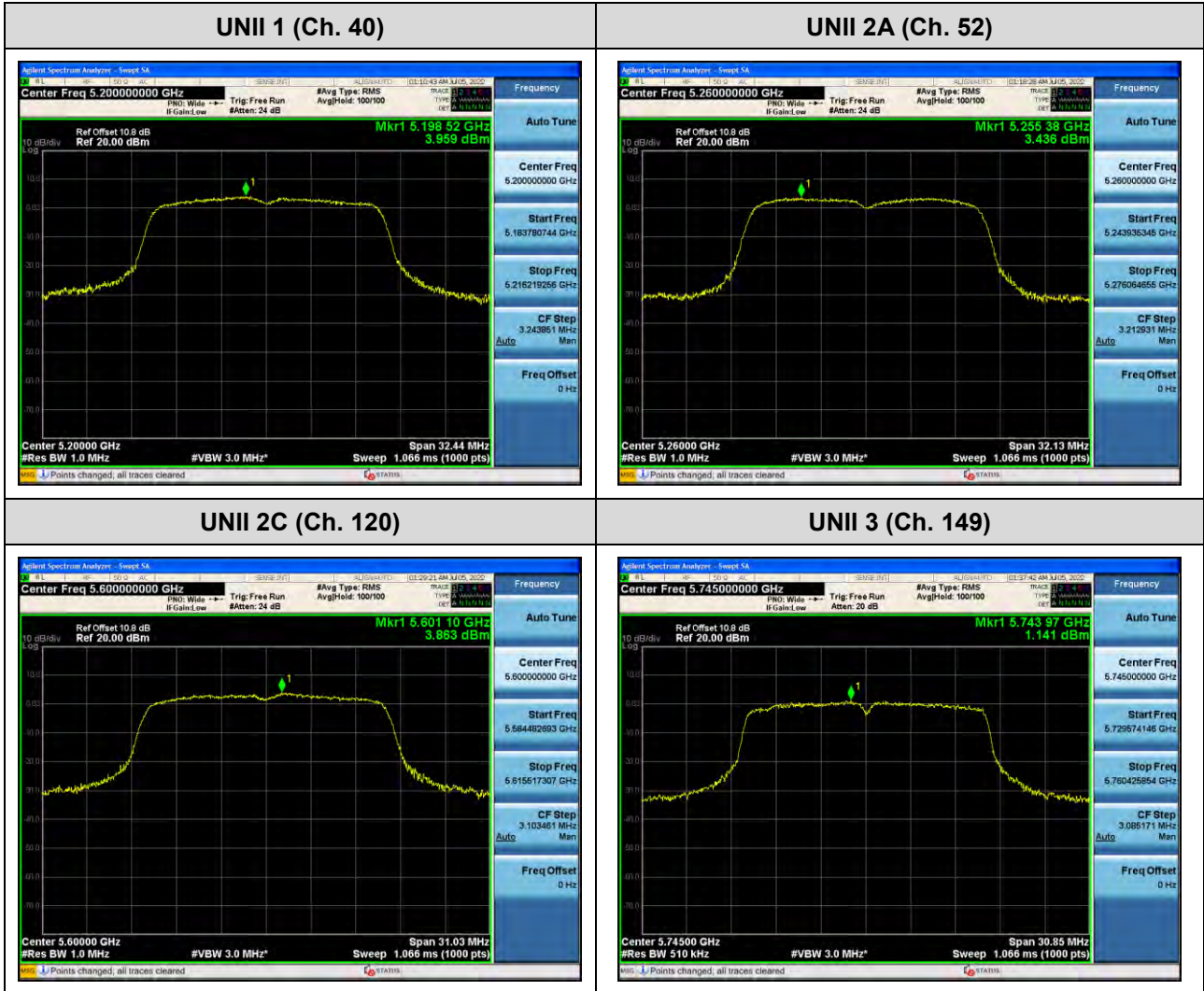
802.11ac(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	-6.582	1.520	-5.062	MCS2	11 dBm/MHz
5230	46	-1.059	1.520	0.461	MCS2	
5270	54	-1.194	1.520	0.326	MCS2	
5310	62	-6.922	1.520	-5.402	MCS2	
5510	102	-6.592	1.520	-5.072	MCS2	
5590	118	-1.044	1.520	0.476	MCS2	
5710	142	-0.600	1.520	0.920	MCS2	
5755	151	-3.557	1.520	-2.037	MCS2	30 dBm/500 kHz
5795	159	-4.071	1.520	-2.551	MCS2	

802.11ac(80 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm/MHz]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5210	42	-11.785	2.606	-9.179	MCS2	11 dBm/MHz
5290	58	-11.266	2.606	-8.660	MCS2	
5530	106	-11.505	2.606	-8.899	MCS2	
5610	122	-7.278	2.606	-4.672	MCS2	
5690	138	-7.230	2.606	-4.624	MCS2	
5775	155	-10.024	2.606	-7.418	MCS2	30 dBm/500 kHz

☐ Test Plots(802.11a)

Note:

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

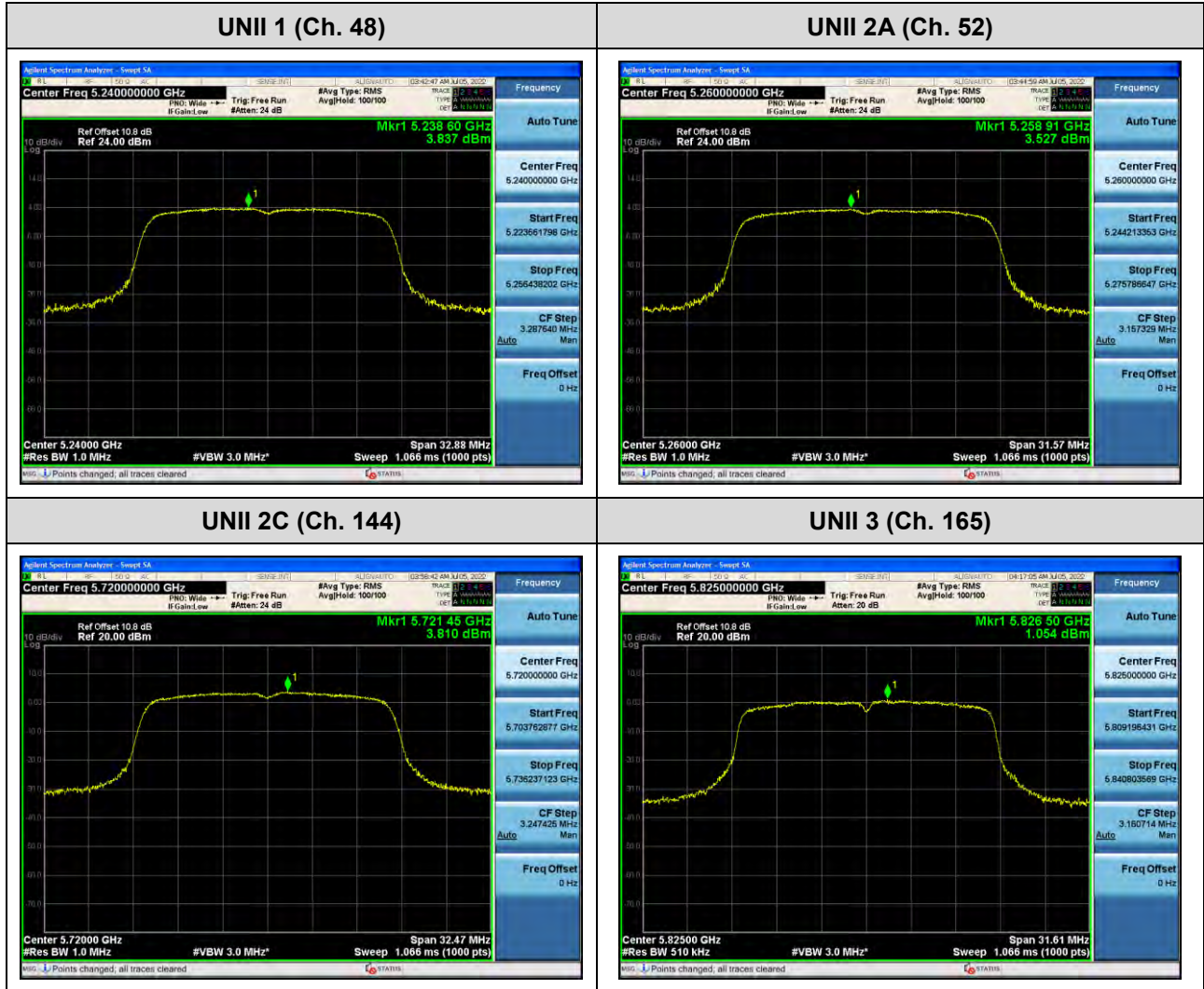




☐ Test Plots(802.11n(HT20))

Note:

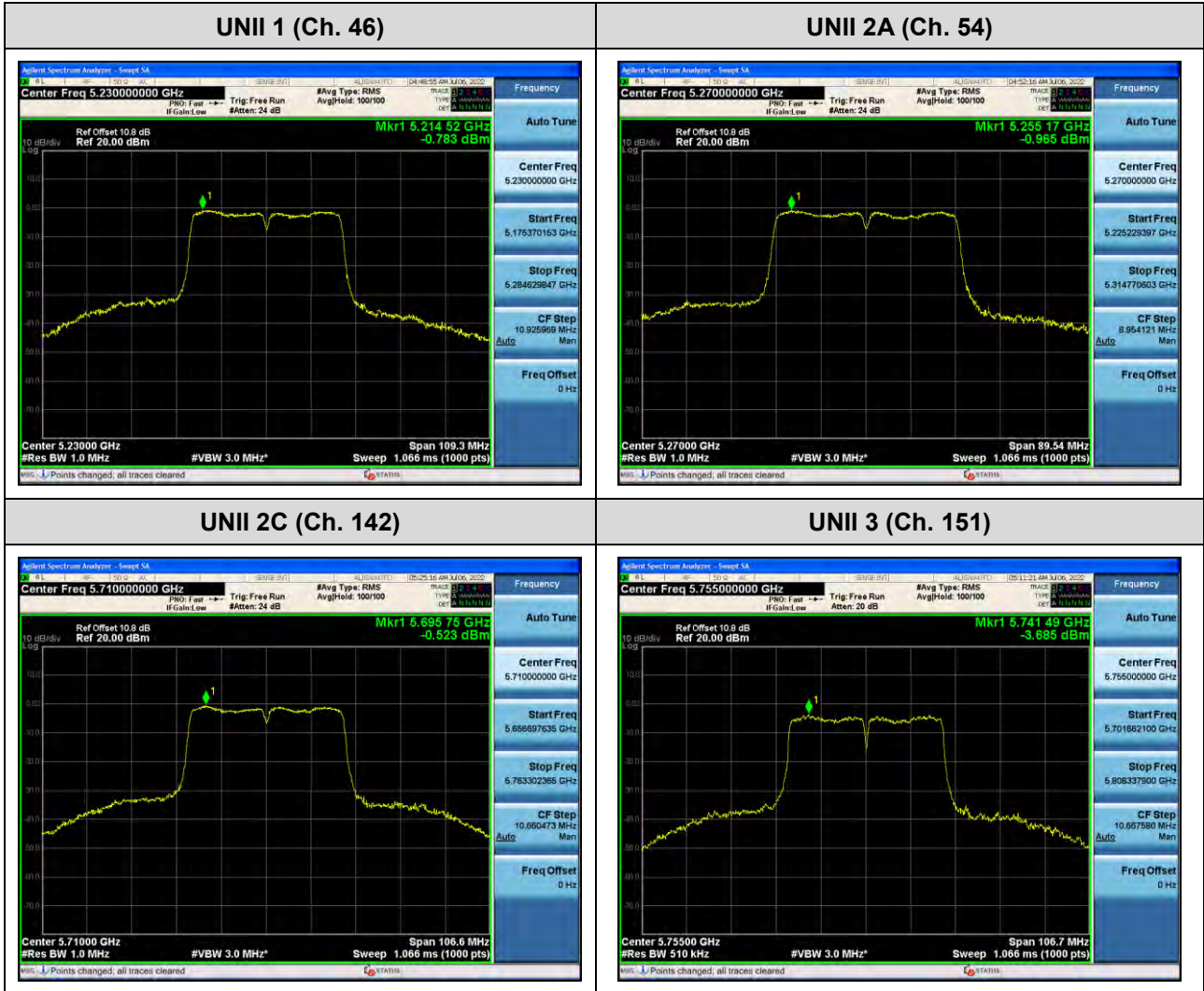
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11n(HT40))

Note:

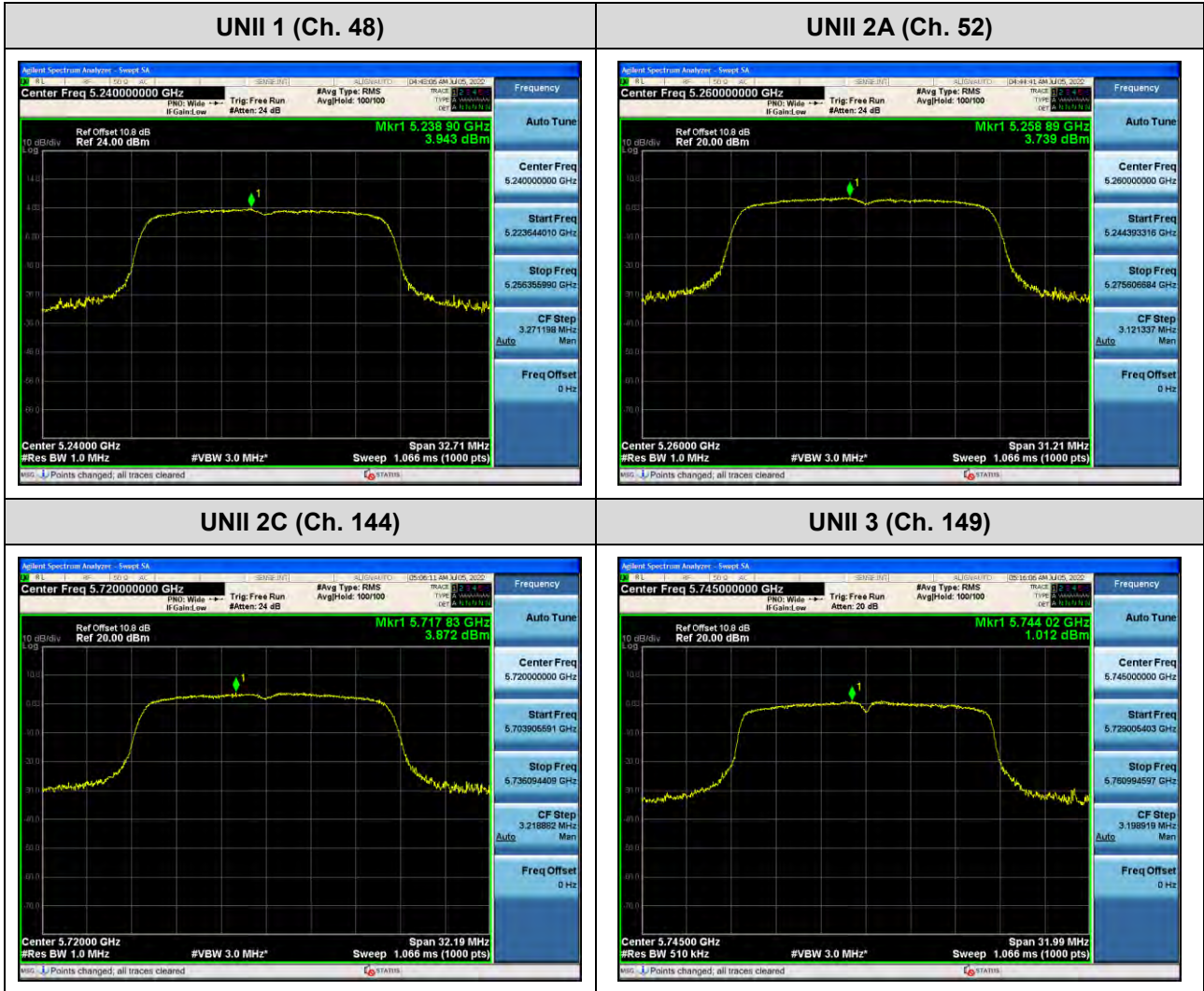
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11ac(VHT20))

Note:

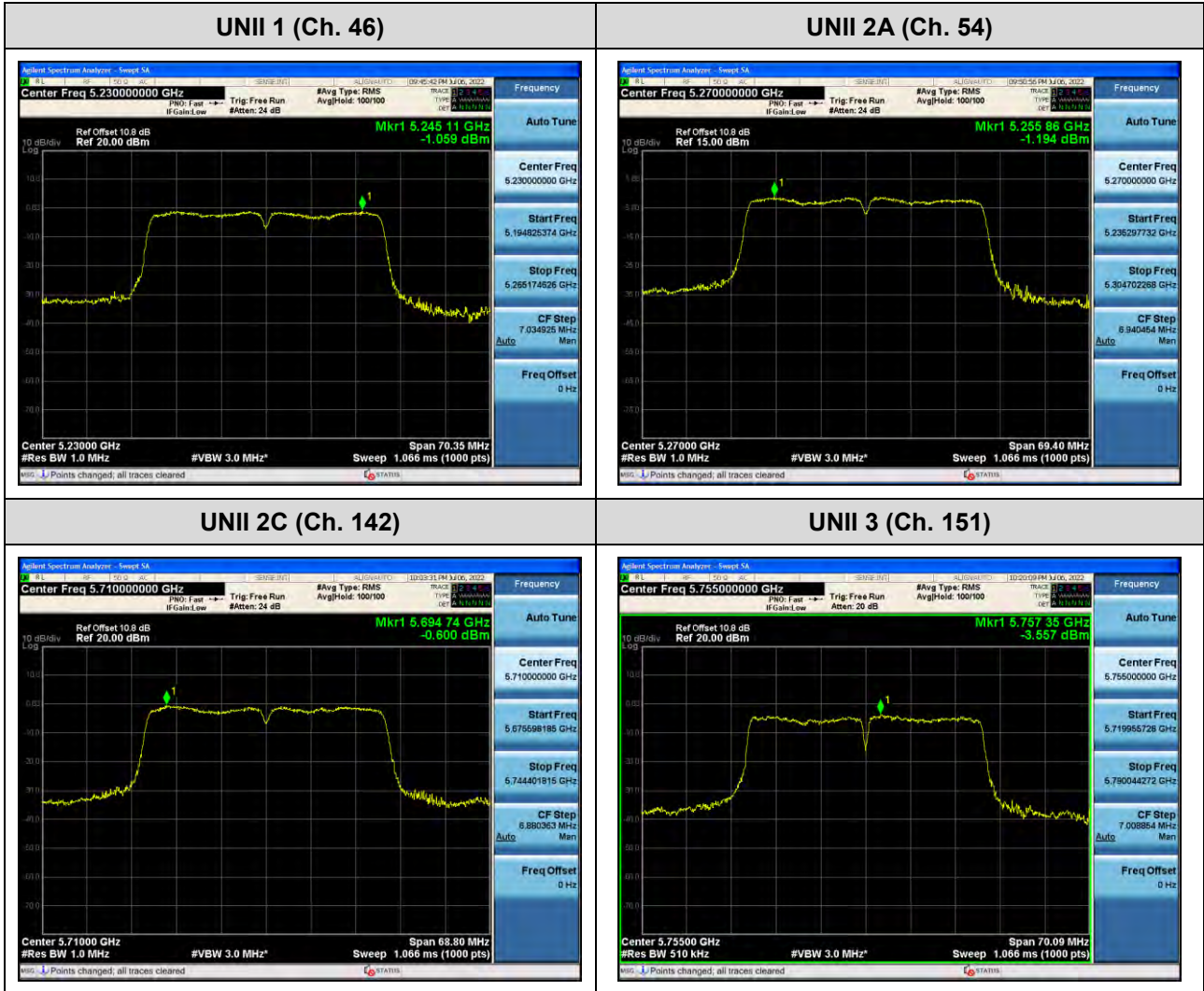
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11ac(VHT40))

Note:

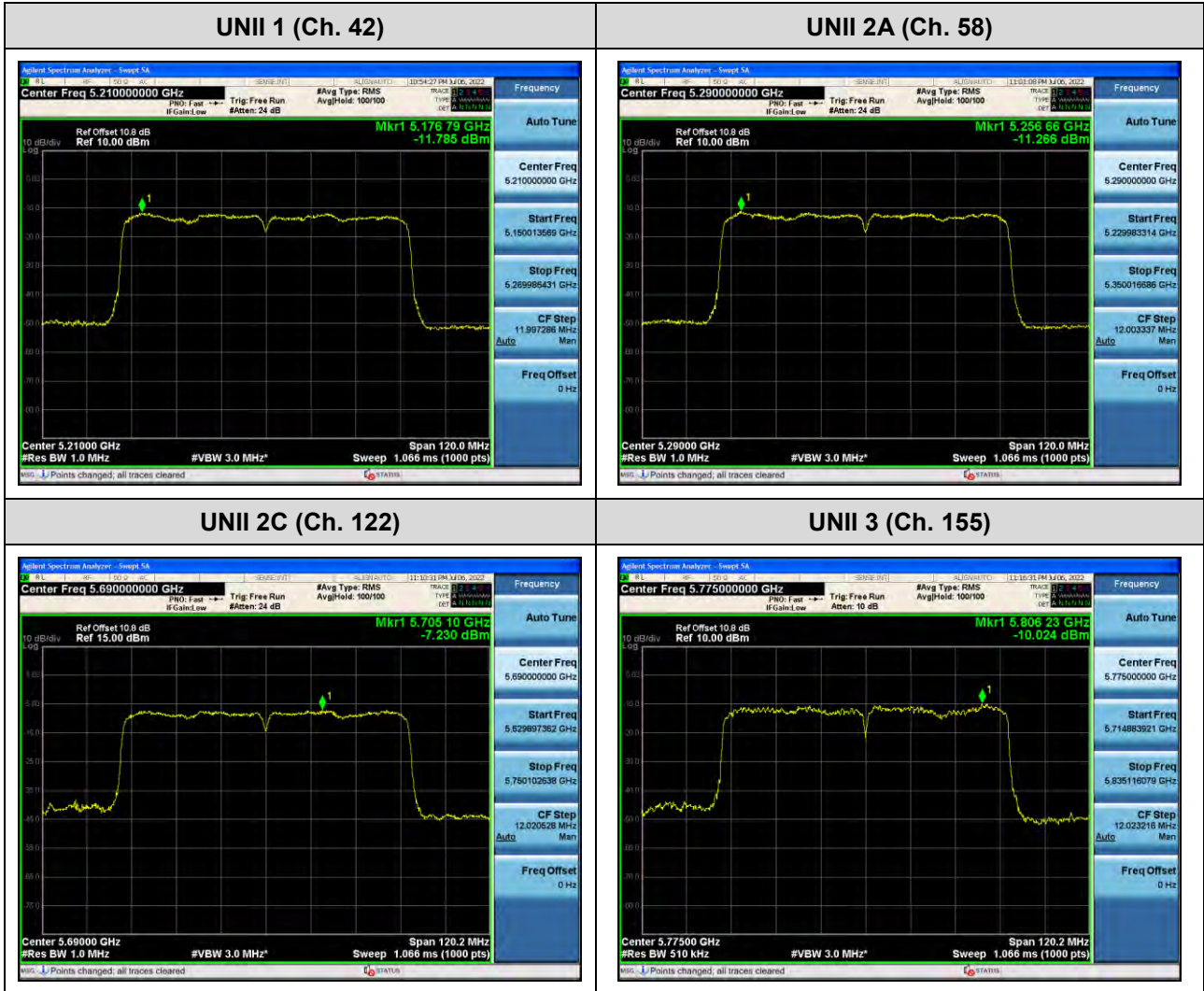
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11ac(VHT80))

Note:

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



**10.6 FREQUENCY STABILITY.**

**10.6.1 80 MHz BW**

**Startup after the EUT is energized**

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210053.76	53.76
100%		-30	5210010.93	10.93
100%		-20	5210013.83	13.83
100%		-10	5210016.79	16.79
100%		0	5210020.49	20.49
100%		+10	5210026.93	26.93
100%		+30	5210035.33	35.33
100%		+40	5210042.08	42.08
100%		+50	5210054.07	54.07
Batt. Endpoint		2.75	+20	5210054.27

**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 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290051.75	51.75
100%		-30	5290007.50	7.50
100%		-20	5290010.81	10.81
100%		-10	5290015.06	15.06
100%		0	5290023.44	23.44
100%		+10	5290029.22	29.22
100%		+30	5290036.99	36.99
100%		+40	5290050.36	50.36
100%		+50	5290052.25	52.25
Batt. Endpoint	2.75	+20	5290051.29	51.29

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530050.95	50.95
100%		-30	5530006.75	6.75
100%		-20	5530011.51	11.51
100%		-10	5530018.12	18.12
100%		0	5530022.62	22.62
100%		+10	5530026.77	26.77
100%		+30	5530038.02	38.02
100%		+40	5530043.96	43.96
100%		+50	5530053.15	53.15
Batt. Endpoint	2.75	+20	5530054.92	54.92

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775053.42	53.42
100%		-30	5775006.34	6.34
100%		-20	5775011.42	11.42
100%		-10	5775015.46	15.46
100%		0	5775020.69	20.69
100%		+10	5775029.98	29.98
100%		+30	5775038.41	38.41
100%		+40	5775042.50	42.50
100%		+50	5775057.71	57.71
Batt. Endpoint	2.75	+20	5775053.47	53.47

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210050.53	50.53
100%		-30	5210010.51	10.51
100%		-20	5210011.70	11.70
100%		-10	5210020.92	20.92
100%		0	5210021.79	21.79
100%		+10	5210025.53	25.53
100%		+30	5210038.69	38.69
100%		+40	5210046.05	46.05
100%		+50	5210058.38	58.38
Batt. Endpoint		2.75	+20	5210051.20

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290054.90	54.90
100%		-30	5290010.05	10.05
100%		-20	5290013.72	13.72
100%		-10	5290019.17	19.17
100%		0	5290020.76	20.76
100%		+10	5290028.50	28.5
100%		+30	5290038.78	38.78
100%		+40	5290050.28	50.28
100%		+50	5290050.26	50.26
Batt. Endpoint	2.75	+20	5290055.45	55.45

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530055.33	55.33
100%		-30	5530006.14	6.14
100%		-20	5530013.13	13.13
100%		-10	5530020.63	20.63
100%		0	5530021.76	21.76
100%		+10	5530026.14	26.14
100%		+30	5530035.38	35.38
100%		+40	5530046.20	46.2
100%		+50	5530058.92	58.92
Batt. Endpoint	2.75	+20	5530052.36	52.36

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775052.90	52.90
100%		-30	5775005.87	5.87
100%		-20	5775010.29	10.29
100%		-10	5775017.24	17.24
100%		0	5775023.99	23.99
100%		+10	5775028.59	28.59
100%		+30	5775037.08	37.08
100%		+40	5775041.14	41.14
100%		+50	5775056.52	56.52
Batt. Endpoint		2.75	+20	5775050.49

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210051.08	51.08
100%		-30	5210007.13	7.13
100%		-20	5210012.88	12.88
100%		-10	5210018.12	18.12
100%		0	5210024.47	24.47
100%		+10	5210025.74	25.74
100%		+30	5210036.92	36.92
100%		+40	5210045.13	45.13
100%		+50	5210050.14	50.14
Batt. Endpoint		2.75	+20	5210054.99

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290050.40	50.40
100%		-30	5290008.91	8.91
100%		-20	5290013.90	13.9
100%		-10	5290020.99	20.99
100%		0	5290023.92	23.92
100%		+10	5290030.50	30.5
100%		+30	5290038.91	38.91
100%		+40	5290042.81	42.81
100%		+50	5290059.83	59.83
Batt. Endpoint	2.75	+20	5290052.61	52.61

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530050.22	50.22
100%		-30	5530005.24	5.24
100%		-20	5530012.50	12.5
100%		-10	5530016.36	16.36
100%		0	5530021.51	21.51
100%		+10	5530029.31	29.31
100%		+30	5530035.64	35.64
100%		+40	5530046.05	46.05
100%		+50	5530059.79	59.79
Batt. Endpoint	2.75	+20	5530053.55	53.55

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775051.93	51.93
100%		-30	5775006.75	6.75
100%		-20	5775014.97	14.97
100%		-10	5775016.20	16.2
100%		0	5775023.99	23.99
100%		+10	5775025.16	25.16
100%		+30	5775038.66	38.66
100%		+40	5775045.37	45.37
100%		+50	5775051.12	51.12
Batt. Endpoint	2.75	+20	5775055.26	55.26

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5210053.37	53.37
100%		-30	5210010.16	10.16
100%		-20	5210013.43	13.43
100%		-10	5210018.39	18.39
100%		0	5210020.23	20.23
100%		+10	5210028.40	28.40
100%		+30	5210037.86	37.86
100%		+40	5210040.18	40.18
100%		+50	5210053.79	53.79
Batt. Endpoint		2.75	+20	5210051.68

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5290053.88	53.88
100%		-30	5290009.38	9.38
100%		-20	5290014.43	14.43
100%		-10	5290017.17	17.17
100%		0	5290024.73	24.73
100%		+10	5290026.05	26.05
100%		+30	5290040.77	40.77
100%		+40	5290048.42	48.42
100%		+50	5290052.18	52.18
Batt. Endpoint	2.75	+20	5290051.58	51.58

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5530052.54	52.54
100%		-30	5530007.78	7.78
100%		-20	5530015.06	15.06
100%		-10	5530019.54	19.54
100%		0	5530020.45	20.45
100%		+10	5530030.18	30.18
100%		+30	5530040.09	40.09
100%		+40	5530040.16	40.16
100%		+50	5530053.71	53.71
Batt. Endpoint	2.75	+20	5530055.26	55.26

**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:	3.85 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.85	+20(Ref)	5775051.64	51.64
100%		-30	5775009.13	9.13
100%		-20	5775013.55	13.55
100%		-10	5775015.84	15.84
100%		0	5775021.82	21.82
100%		+10	5775026.87	26.87
100%		+30	5775037.58	37.58
100%		+40	5775048.60	48.6
100%		+50	5775050.27	50.27
Batt. Endpoint	2.75	+20	5775055.20	55.2

**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 26 dB Bandwidth**

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5709.00	16.00
802.11n(HT20)				5709.44	15.56
802.11ac(VHT20)				5709.24	15.76
802.11a	UNII 3	5720	144	5730.84	5.84
802.11n(HT20)				5730.64	5.64
802.11ac(VHT20)				5732.24	7.24

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5674.80	50.20
802.11ac(VHT40)				5686.32	38.68
802.11n(HT40)	UNII 3	5710	142	5746.48	21.48
802.11ac(VHT40)				5733.60	8.60

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.92	75.08
	UNII 3	5690	138	5730.20	5.20

**Note:**

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

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

Test Plots (26 dB Bandwidth)

802.11a UNII Band



802.11n(HT20) UNII Band



802.11ac(VHT20) UNII Band



☐ Test Plots (26 dB Bandwidth)

**802.11n(HT40) UNII Band**



**802.11ac(VHT40) UNII Band**



**802.11ac(VHT80) UNII Band**





**10.7.2 6 dB Bandwidth**

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5727.88	2.88	> 0.5
802.11n(HT20)				5728.44	3.44	> 0.5
802.11ac(VHT20)				5728.56	3.56	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5727.92	2.92	> 0.5
802.11ac(VHT40)				5727.84	2.84	> 0.5

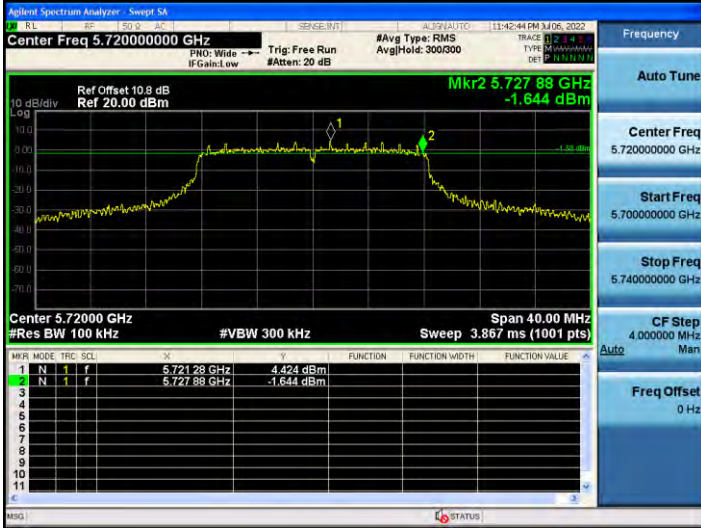
Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11ac(VHT80)	UNII 3	5690	138	5727.68	2.68	> 0.5

**Note:**

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

Test Plots (UNII 3 Band 6 dB Bandwidth)

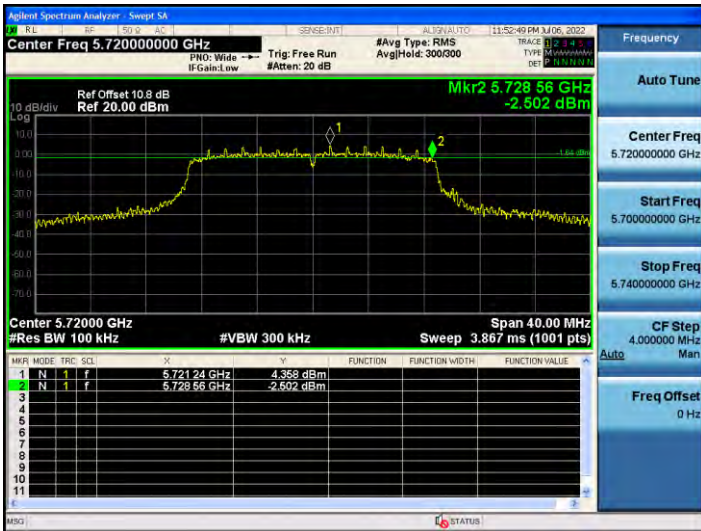
802.11a CH.144



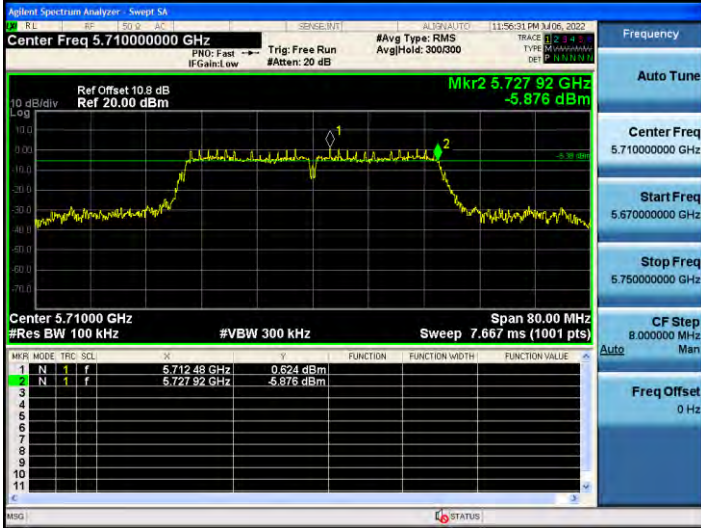
802.11n\_HT20 CH.144



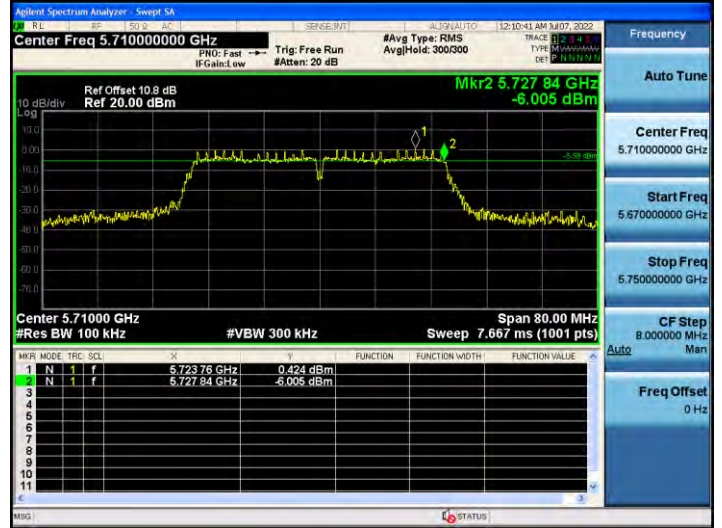
802.11ac\_VHT20 CH.144



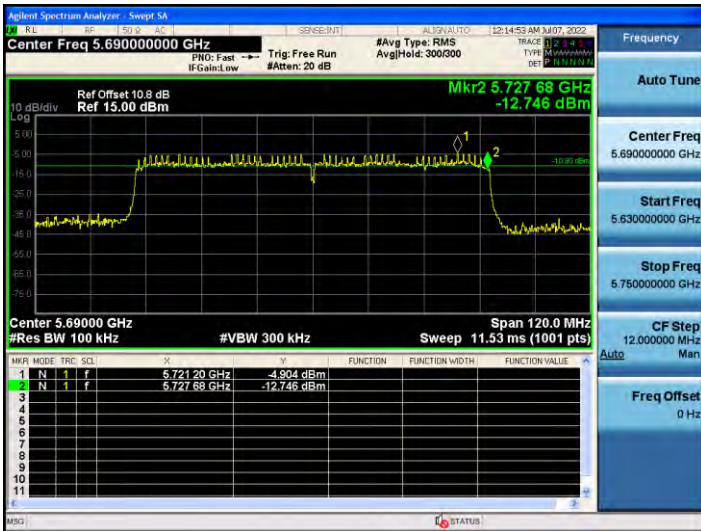
**802.11n\_HT40 CH.142**



**802.11ac\_VHT40 CH.142**



**802.11ac\_VHT80 CH.138**



### 10.7.3 Output Power

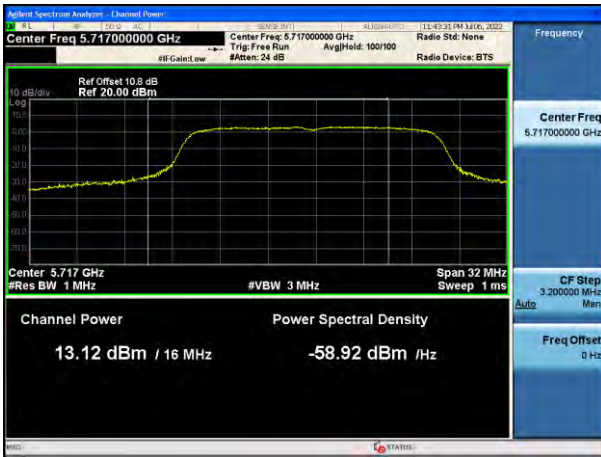
Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11a	5720	144	13.12	1.595	14.71	23.04	36 Mbps
802.11n(HT20)	(UNII 2C		13.51	0.947	14.46	22.92	MCS2
802.11ac(VHT20)	Band)		13.55	0.934	14.49	22.98	MCS2
802.11a	5720	144	6.26	1.595	7.85	30.00	36 Mbps
802.11n(HT20)	(UNII 3		7.13	0.947	8.08	30.00	MCS2
802.11ac(VHT20)	Band)		7.17	0.934	8.11	30.00	MCS2

Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710	142	12.66	1.657	14.31	23.98	MCS2
802.11ac(VHT40)	(UNII 2C Band)		12.68	1.520	14.20	23.98	MCS2
802.11n(HT40)	5710	142	2.72	1.657	4.38	30.00	MCS2
802.11ac(VHT40)	(UNII 3 Band)		2.53	1.520	4.05	30.00	MCS2

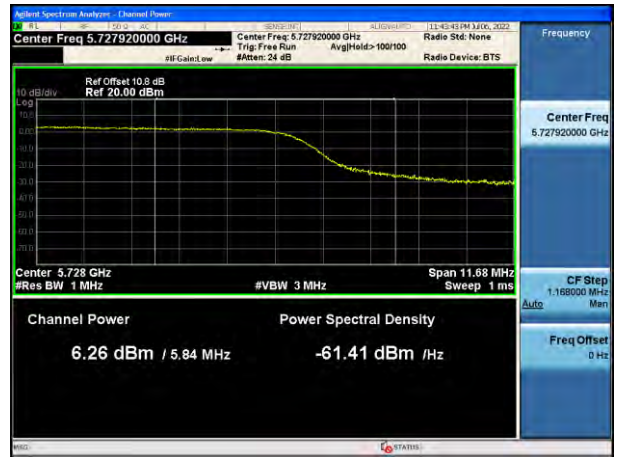
Mode	Frequency [MHz]	Channel	Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	9.74	2.606	12.34	23.98	MCS2
	5690 (UNII 3 Band)	138	-4.73	2.606	-2.13	30.00	MCS2

**Test Plots**

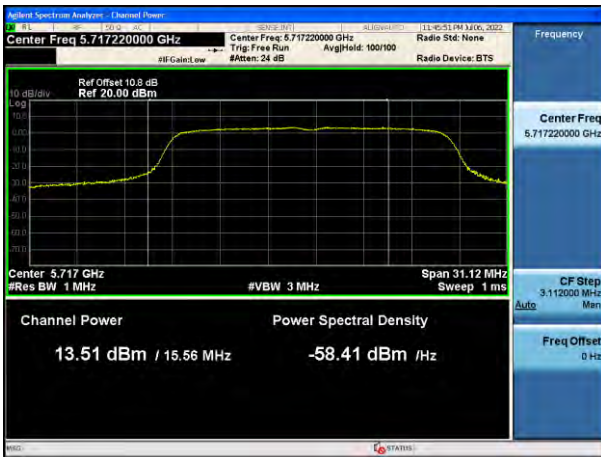
**802.11a UNII 2C Band**



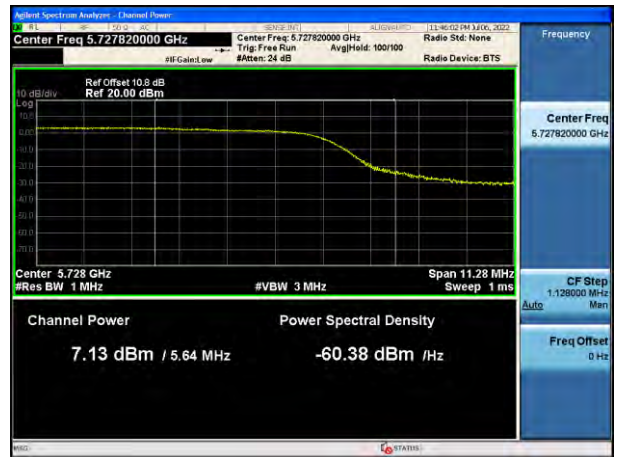
**802.11a UNII 3 Band**



**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**



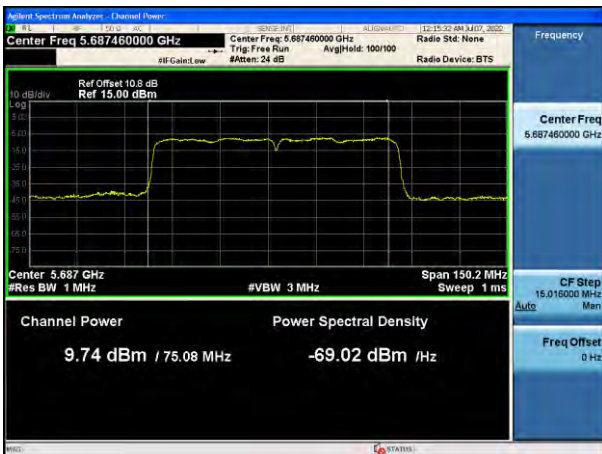
**802.11ac(VHT40) UNII 2C Band**



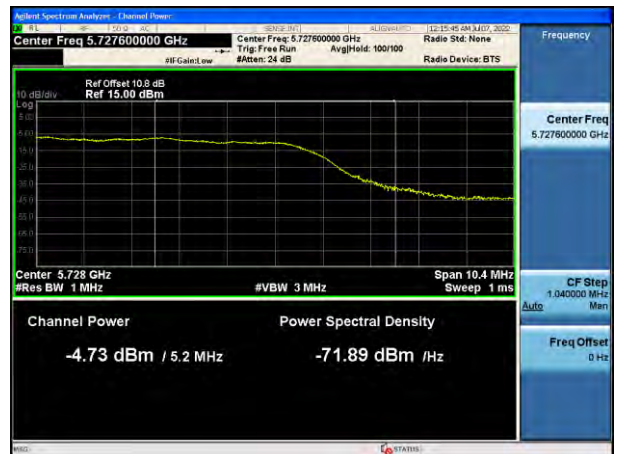
**802.11ac(VHT40) UNII 3 Band**



**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]	Worstcase Datarate
802.11a	5720	144	3.303	1.595	4.898	11 dBm/ MHz	36 Mbps
802.11n(HT20)	(UNII 2C		3.641	0.947	4.588		MCS2
802.11ac(VHT20)	Band)		3.593	0.934	4.527		MCS2
802.11a	5720	144	-0.670	1.595	0.925	30 dBm/500 kHz	36 Mbps
802.11n(HT20)	(UNII 3		-0.250	0.947	0.697		MCS2
802.11ac(VHT20)	Band)		-0.260	0.934	0.674		MCS2

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11n(HT40)	5710	142	-0.873	1.657	0.784	11 dBm/ MHz	MCS2
802.11ac(VHT40)	(UNII 2C Band)		-0.908	1.520	0.612		MCS2
802.11n(HT40)	5710	142	-3.946	1.657	-2.289	30 dBm/ 500 kHz	MCS2
802.11ac(VHT40)	(UNII 3 Band)		-3.989	1.520	-2.469		MCS2

Mode	Frequency [MHz]	Channel	Measured Density [dBm]	Duty Cycle Factor [dB]	Total PSD [dBm]	Limit [dBm]	Worstcase Datarate
802.11ac(VHT80)	5690	138	-6.504	2.606	-3.898	11 dBm/ MHz	MCS2
	(UNII 2C Band)						
	5690	138	-10.356	2.606	-7.750	30 dBm/ 500 kHz	MCS2
	(UNII 3 Band)						

**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 – 30 MHz**

Frequency	Measured Value	A.F+D.F+C.L	POL	Total	Limit	Margin
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]
No Critical peaks found						

**Note:**

1. The Measured Value 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 =  $40\log(\text{specific distance} / \text{test distance})$  (dB)
3. Limit line = specific Limits (dBµV) + Distance extrapolation factor

**Frequency Range : Below 1 GHz**

Frequency	Measured Value	A.F+C.L	POL	Total	Limit	Margin
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/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]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10360	54.43	-0.94	V	53.49	68.20	14.71	PK
15540	54.57	1.57	V	56.14	73.98	17.84	PK
15540	41.21	1.57	V	42.78	53.98	11.20	AV
10360	53.81	-0.94	H	52.87	68.20	15.33	PK
15540	53.21	1.57	H	54.78	73.98	19.20	PK
15540	40.98	1.57	H	42.55	53.98	11.43	AV

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10400	53.73	-0.07	V	53.66	68.20	14.54	PK
15600	54.64	1.52	V	56.16	73.98	17.82	PK
15600	40.75	1.52	V	42.27	53.98	11.71	AV
10400	52.31	-0.07	H	52.24	68.20	15.96	PK
15600	53.46	1.52	H	54.98	73.98	19.00	PK
15600	40.02	1.52	H	41.54	53.98	12.44	AV

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10480	54.19	-0.97	V	53.22	68.20	14.98	PK
15720	54.30	0.64	V	54.94	73.98	19.04	PK
15720	40.60	0.64	V	41.24	53.98	12.74	AV
10480	53.90	-0.97	H	52.93	68.20	15.27	PK
15720	53.37	0.64	H	54.01	73.98	19.97	PK
15720	40.43	0.64	H	41.07	53.98	12.91	AV

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10520	56.11	-1.06	V	55.06	68.20	13.15	PK
15780	53.74	0.59	V	54.33	73.98	19.65	PK
15780	40.19	0.59	V	40.78	53.98	13.20	AV
10520	54.10	-1.06	H	53.05	68.20	15.16	PK
15780	51.92	0.59	H	52.51	73.98	21.47	PK
15780	39.96	0.59	H	40.55	53.98	13.43	AV

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
<b>10600</b>	<b>56.06</b>	<b>-0.61</b>	<b>V</b>	<b>55.45</b>	<b>73.98</b>	<b>18.53</b>	<b>PK</b>
<b>10600</b>	<b>46.33</b>	<b>-0.61</b>	<b>V</b>	<b>45.72</b>	<b>53.98</b>	<b>8.26</b>	<b>AV</b>
15900	54.85	0.25	V	55.10	73.98	18.88	PK
15900	40.49	0.25	V	40.74	53.98	13.24	AV
10600	53.21	-0.61	H	52.60	73.98	21.38	PK
10600	45.77	-0.61	H	45.16	53.98	8.82	AV
15900	53.81	0.25	H	54.06	73.98	19.92	PK
15900	40.35	0.25	H	40.60	53.98	13.38	AV

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10640	54.81	-0.73	V	54.08	73.98	19.90	PK
10640	45.31	-0.73	V	44.58	53.98	9.40	AV
15960	54.02	0.53	V	54.55	73.98	19.43	PK
15960	41.03	0.53	V	41.56	53.98	12.42	AV
10640	53.91	-0.73	H	53.18	73.98	20.80	PK
10640	44.92	-0.73	H	44.19	53.98	9.79	AV
15960	53.09	0.53	H	53.62	73.98	20.36	PK
15960	40.21	0.53	H	40.74	53.98	13.24	AV

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11000	54.50	-0.18	V	54.32	73.98	19.66	PK
11000	45.31	-0.18	V	45.13	53.98	8.85	AV
16500	51.82	0.60	V	52.42	68.20	15.78	PK
11000	53.26	-0.18	H	53.08	73.98	20.90	PK
11000	44.62	-0.18	H	44.44	53.98	9.54	AV
16500	52.93	0.60	H	53.53	68.20	14.67	PK

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
11200	54.59	-1.01	V	53.58	73.98	20.40	PK
11200	44.01	-1.01	V	43.00	53.98	10.98	AV
16800	52.16	-0.07	V	52.09	68.20	16.11	PK
11200	53.94	-1.01	H	52.93	73.98	21.05	PK
11200	42.72	-1.01	H	41.71	53.98	12.27	AV
16800	53.81	-0.07	H	53.74	68.20	14.46	PK

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
11440	54.40	-0.52	V	53.88	73.98	20.10	PK
11440	41.91	-0.52	V	41.39	53.98	12.59	AV
17160	53.26	0.64	V	53.90	68.20	14.30	PK
11440	53.49	-0.52	H	52.97	73.98	21.01	PK
11440	40.88	-0.52	H	40.36	53.98	13.62	AV
17160	54.39	0.64	H	55.03	68.20	13.17	PK

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11490	53.19	-0.38	V	52.81	73.98	21.17	PK
11490	43.16	-0.38	V	42.78	53.98	11.20	AV
17235	54.09	1.04	V	55.13	68.20	13.07	PK
11490	52.17	-0.38	H	51.79	73.98	22.19	PK
11490	42.76	-0.38	H	42.38	53.98	11.60	AV
17235	52.93	1.04	H	53.97	68.20	14.23	PK

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
11570	54.82	-0.29	V	54.53	73.98	19.46	PK
11570	45.02	-0.29	V	44.73	53.98	9.26	AV
17355	53.44	1.14	V	54.58	68.20	13.63	PK
11570	53.65	-0.29	H	53.36	73.98	20.63	PK
11570	43.65	-0.29	H	43.36	53.98	10.63	AV
17355	52.16	1.14	H	53.30	68.20	14.91	PK



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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
11650	54.79	-1.16	V	53.63	73.98	20.35	PK
11650	46.34	-1.16	V	45.18	53.98	8.80	AV
17475	53.12	2.16	V	55.28	68.20	12.92	PK
11650	54.13	-1.16	H	52.97	73.98	21.01	PK
11650	45.22	-1.16	H	44.06	53.98	9.92	AV
17475	52.36	2.16	H	54.52	68.20	13.68	PK

Band :	UNII 2A
Operation Mode:	802.11n(HT20)
Transfer MCS Index:	0
Operating Frequency	5260 MHz
Channel No.	52 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10520	54.66	-1.06	V	53.61	68.20	14.60	PK
15780	52.06	0.59	V	52.65	73.98	21.33	PK
15780	39.52	0.59	V	40.11	53.98	13.87	AV
10520	53.17	-1.06	H	52.12	68.20	16.09	PK
15780	51.36	0.59	H	51.95	73.98	22.03	PK
15780	38.02	0.59	H	38.61	53.98	15.37	AV

Band :	UNII 2A
Operation Mode:	802.11n(HT20)
Transfer MCS Index:	0
Operating Frequency	5300 MHz
Channel No.	60 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10600	54.98	-0.61	V	54.37	73.98	19.61	PK
10600	45.70	-0.61	V	45.09	53.98	8.89	AV
15900	53.27	0.25	V	53.52	73.98	20.46	PK
15900	40.48	0.25	V	40.73	53.98	13.25	AV
10600	53.76	-0.61	H	53.15	73.98	20.83	PK
10600	44.92	-0.61	H	44.31	53.98	9.67	AV
15900	52.28	0.25	H	52.53	73.98	21.45	PK
15900	39.07	0.25	H	39.32	53.98	14.66	AV

Band : UNII 2A  
 Operation Mode: 802.11n(HT20)  
 Transfer MCS Index: 0  
 Operating Frequency 5320 MHz  
 Channel No. 64 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10640	54.63	-0.73	V	53.90	73.98	20.08	PK
10640	45.45	-0.73	V	44.72	53.98	9.26	AV
15960	53.32	0.53	V	53.85	73.98	20.13	PK
15960	40.70	0.53	V	41.23	53.98	12.75	AV
10640	53.29	-0.73	H	52.56	73.98	21.42	PK
10640	43.78	-0.73	H	43.05	53.98	10.93	AV
15960	51.96	0.53	H	52.49	73.98	21.49	PK
15960	40.36	0.53	H	40.89	53.98	13.09	AV

Band : UNII 2A  
 Operation Mode: 802.11n(HT40)  
 Transfer MCS Index: 0  
 Operating Frequency 5270 MHz  
 Channel No. 54 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10540	54.66	-0.88	V	53.78	68.20	14.42	PK
15810	54.62	0.67	V	55.29	73.98	18.69	PK
15810	39.15	0.67	V	39.82	53.98	14.16	AV
10540	53.60	-0.88	H	52.72	68.20	15.48	PK
15810	52.08	0.67	H	52.75	73.98	21.23	PK
15810	39.01	0.67	H	39.68	53.98	14.30	AV

Band : UNII 2A  
 Operation Mode: 802.11n(HT40)  
 Transfer MCS Index: 0  
 Operating Frequency 5310 MHz  
 Channel No. 62 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10620	54.79	-1.12	V	53.68	73.98	20.31	PK
10620	46.69	-1.12	V	45.58	53.98	8.41	AV
15930	52.51	0.40	V	52.91	73.98	21.07	PK
15930	39.69	0.40	V	40.09	53.98	13.89	AV
10620	53.78	-1.12	H	52.67	73.98	21.32	PK
10620	45.48	-1.12	H	44.37	53.98	9.62	AV
15930	51.76	0.40	H	52.16	73.98	21.82	PK
15930	39.62	0.40	H	40.02	53.98	13.96	AV

Band : UNII 2A  
 Operation Mode: 802.11ac(VHT20)  
 Transfer MCS Index: 0  
 Operating Frequency 5260 MHz  
 Channel No. 52 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10520	54.71	-1.06	V	53.66	68.20	14.55	PK
15780	52.45	0.59	V	53.04	73.98	20.94	PK
15780	39.03	0.59	V	39.62	53.98	14.36	AV
10520	53.94	-1.06	H	52.89	68.20	15.32	PK
15780	50.92	0.59	H	51.51	73.98	22.47	PK
15780	38.55	0.59	H	39.14	53.98	14.84	AV

Band : UNII 2A  
 Operation Mode: 802.11ac(VHT20)  
 Transfer MCS Index: 0  
 Operating Frequency 5300 MHz  
 Channel No. 60 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
10600	55.02	-0.61	V	54.41	73.98	19.57	PK
10600	45.91	-0.61	V	45.30	53.98	8.68	AV
15900	52.83	0.25	V	53.08	73.98	20.90	PK
15900	39.67	0.25	V	39.92	53.98	14.06	AV
10600	53.87	-0.61	H	53.26	73.98	20.72	PK
10600	44.72	-0.61	H	44.11	53.98	9.87	AV
15900	51.77	0.25	H	52.02	73.98	21.96	PK
15900	39.51	0.25	H	39.76	53.98	14.22	AV

Band :	UNII 2A
Operation Mode:	802.11ac(VHT20)
Transfer MCS Index:	0
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10640	55.86	-0.73	V	55.13	73.98	18.85	PK
10640	45.48	-0.73	V	44.75	53.98	9.23	AV
15960	52.26	0.53	V	52.79	73.98	21.19	PK
15960	39.86	0.53	V	40.39	53.98	13.59	AV
10640	53.85	-0.73	H	53.12	73.98	20.86	PK
10640	44.93	-0.73	H	44.20	53.98	9.78	AV
15960	51.94	0.53	H	52.47	73.98	21.51	PK
15960	38.99	0.53	H	39.52	53.98	14.46	AV

Band :	UNII 2A
Operation Mode:	802.11ac(VHT40)
Transfer MCS Index:	0
Operating Frequency	5270 MHz
Channel No.	54 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10540	54.55	-0.88	V	53.67	68.20	14.53	PK
15810	51.51	0.67	V	52.18	73.98	21.80	PK
15810	39.18	0.67	V	39.85	53.98	14.13	AV
10540	53.39	-0.88	H	52.51	68.20	15.69	PK
15810	50.85	0.67	H	51.52	73.98	22.46	PK
15810	38.94	0.67	H	39.61	53.98	14.37	AV

Band :	UNII 2A
Operation Mode:	802.11ac(VHT40)
Transfer MCS Index:	0
Operating Frequency	5310 MHz
Channel No.	62 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10620	54.90	-1.12	V	53.79	73.98	20.20	PK
10620	46.63	-1.12	V	45.52	53.98	8.47	AV
15930	52.66	0.40	V	53.06	73.98	20.92	PK
15930	39.53	0.40	V	39.93	53.98	14.05	AV
10620	54.02	-1.12	H	52.91	73.98	21.08	PK
10620	45.81	-1.12	H	44.70	53.98	9.29	AV
15930	51.59	0.40	H	51.99	73.98	21.99	PK
15930	39.45	0.40	H	39.85	53.98	14.13	AV

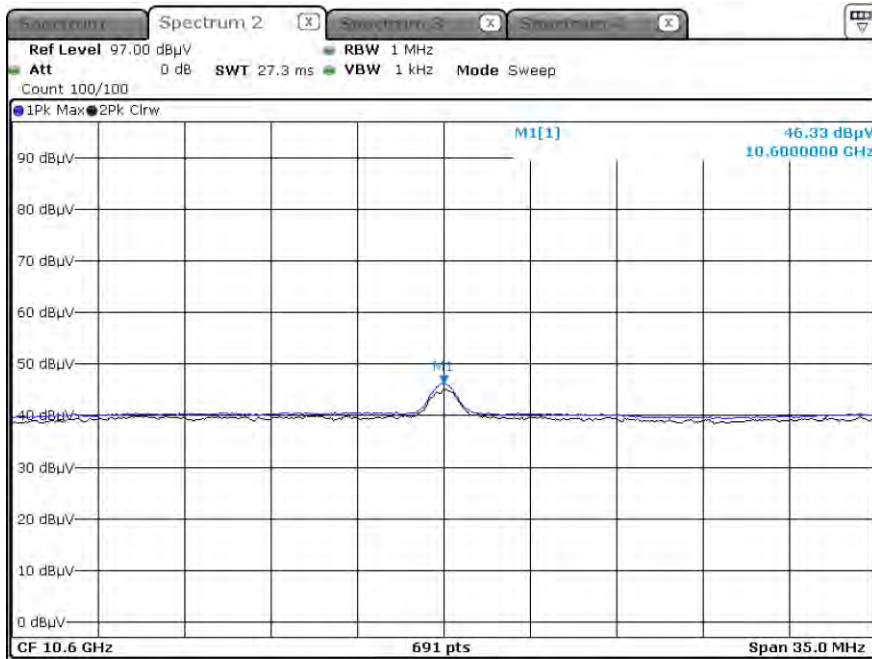
Band :	UNII 2A
Operation Mode:	802.11ac(VHT80)
Transfer MCS Index:	0
Operating Frequency	5290 MHz
Channel No.	58 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG [dB/m]	POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
10580	54.89	-0.63	V	54.26	68.20	13.94	PK
15870	51.17	0.47	V	51.64	73.98	22.34	PK
15870	37.95	0.47	V	38.42	53.98	15.56	AV
10580	54.31	-0.63	H	53.68	68.20	14.52	PK
15870	50.62	0.47	H	51.09	73.98	22.89	PK
15870	36.88	0.47	H	37.35	53.98	16.63	AV

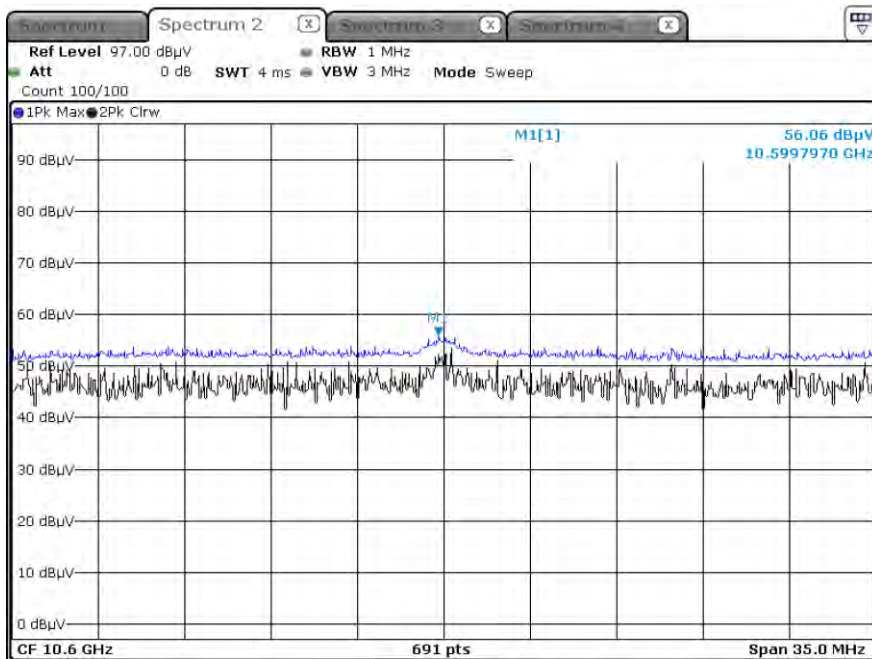


▣ Test Plots

Average Result (802.11a, Ch.60 Spurious Emissions, X-V)



Peak Result (802.11a, Ch.60 Spurious Emissions, X-V)



**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]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	51.34	13.64	H	64.98	73.98	9.00	PK
<b>5150</b>	<b>38.17</b>	<b>13.64</b>	<b>H</b>	<b>51.81</b>	<b>53.98</b>	<b>2.17</b>	<b>AV</b>
5150	50.98	13.64	V	64.62	73.98	9.36	PK
5150	37.25	13.64	V	50.89	53.98	3.09	AV

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	51.68	14.22	H	65.90	73.98	8.08	PK
5350	36.22	14.22	H	50.44	53.98	3.54	AV
5350	50.59	14.22	V	64.81	73.98	9.17	PK
5350	35.77	14.22	V	49.99	53.98	3.99	AV

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5460	42.36	14.69	H	57.05	73.98	16.93	PK
5460	30.44	14.69	H	45.13	53.98	8.85	AV
5470	47.39	15.03	H	62.42	68.20	5.78	PK
5460	41.85	14.69	V	56.54	73.98	17.44	PK
5460	30.05	14.69	V	44.74	53.98	9.24	AV
5470	46.23	15.03	V	61.26	68.20	6.94	PK

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	56.35	13.64	H	69.99	73.98	3.99	PK
5150	37.35	13.64	H	50.99	53.98	2.99	AV
5150	55.64	13.64	V	69.28	73.98	4.70	PK
5150	36.95	13.64	V	50.59	53.98	3.39	AV

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	52.44	14.22	H	66.66	73.98	7.32	PK
5350	35.69	14.22	H	49.91	53.98	4.07	AV
5350	49.23	14.22	V	63.45	73.98	10.53	PK
5350	34.58	14.22	V	48.8	53.98	5.18	AV

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

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5460	44.33	14.69	H	59.02	73.98	14.96	PK
5460	30.46	14.69	H	45.15	53.98	8.83	AV
<b>5470</b>	<b>51.10</b>	<b>15.03</b>	<b>H</b>	<b>66.13</b>	<b>68.20</b>	<b>2.07</b>	<b>PK</b>
5460	43.92	14.69	V	58.61	73.98	15.37	PK
5460	30.12	14.69	V	44.81	53.98	9.17	AV
5470	50.91	15.03	V	65.94	68.20	2.26	PK

Band : UNII 1  
 Operation Mode: 802.11 ac\_VHT20  
 Transfer MCS Index: 0  
 Operating Frequency 5180 MHz  
 Channel No. 36 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5150	49.11	13.64	H	62.75	73.98	11.23	PK
5150	37.03	13.64	H	50.67	53.98	3.31	AV
5150	48.42	13.64	V	62.06	73.98	11.92	PK
5150	36.55	13.64	V	50.19	53.98	3.79	AV

Band : UNII 2A  
 Operation Mode: 802.11 ac\_VHT20  
 Transfer MCS Index: 0  
 Operating Frequency 5320 MHz  
 Channel No. 64 Ch

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5350	52.47	14.22	H	66.69	73.98	7.29	PK
5350	36.23	14.22	H	50.45	53.98	3.53	AV
5350	51.99	14.22	V	66.21	73.98	7.77	PK
5350	35.91	14.22	V	50.13	53.98	3.85	AV

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5460	45.20	14.69	H	59.89	73.98	14.09	PK
5460	30.63	14.69	H	45.32	53.98	8.66	AV
5470	50.81	15.03	H	65.84	68.20	2.36	PK
5460	43.84	14.69	V	58.53	73.98	15.45	PK
5460	30.28	14.69	V	44.97	53.98	9.01	AV
5470	49.52	15.03	V	64.55	68.20	3.65	PK

Band : UNII 1  
 Operation Mode: 802.11 n\_HT40  
 Transfer MCS Index: 0  
 Operating Frequency 5190 MHz  
 Channel No. 38 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	52.14	13.64	H	65.78	73.98	8.20	PK
5150	36.93	13.64	H	50.57	53.98	3.41	AV
5150	51.11	13.64	V	64.75	73.98	9.23	PK
5150	35.66	13.64	V	49.30	53.98	4.68	AV

Band : UNII 2A  
 Operation Mode: 802.11 n\_HT40  
 Transfer MCS Index: 0  
 Operating Frequency 5310 MHz  
 Channel No. 62 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	44.43	14.22	H	58.65	73.98	15.33	PK
5350	31.91	14.22	H	46.13	53.98	7.85	AV
5350	43.63	14.22	V	57.85	73.98	16.13	PK
5350	30.68	14.22	V	44.90	53.98	9.08	AV



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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5460	44.20	14.69	H	58.89	73.98	15.09	PK
5460	32.29	14.69	H	46.98	53.98	7.00	AV
5470	49.42	15.03	H	64.45	68.20	3.75	PK
5460	43.22	14.69	V	57.91	73.98	16.07	PK
5460	31.94	14.69	V	46.63	53.98	7.35	AV
5470	48.26	15.03	V	63.29	68.20	4.91	PK

Band : UNII 1

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Operation Mode: 802.11 ac\_VHT40

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Transfer MCS Index: 0

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Operating Frequency 5190 MHz

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Channel No. 38 Ch

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Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5150	52.79	13.64	H	66.43	73.98	7.55	PK
5150	37.13	13.64	H	50.77	53.98	3.21	AV
5150	49.13	13.64	V	62.77	73.98	11.21	PK
5150	36.56	13.64	V	50.20	53.98	3.78	AV

Band : UNII 2A

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Operation Mode: 802.11 ac\_VHT40

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Transfer MCS Index: 0

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Operating Frequency 5310 MHz

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Channel No. 62 Ch

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Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5350	43.92	14.22	H	58.14	73.98	15.84	PK
5350	32.47	14.22	H	46.69	53.98	7.29	AV
5350	42.85	14.22	V	57.07	73.98	16.91	PK
5350	31.91	14.22	V	46.13	53.98	7.85	AV

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

Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5460	45.77	14.69	H	60.46	73.98	13.52	PK
5460	32.84	14.69	H	47.53	53.98	6.45	AV
5470	49.39	15.03	H	64.42	68.20	3.78	PK
5460	44.69	14.69	V	59.38	73.98	14.60	PK
5460	31.78	14.69	V	46.47	53.98	7.51	AV
5470	48.65	15.03	V	63.68	68.20	4.52	PK

Band : UNII 1

Operation Mode: 802.11 ac\_VHT80

Transfer MCS Index: 0

Operating Frequency 5210 MHz

Channel No. 42 Ch

Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5150	52.17	13.64	H	65.81	73.98	8.17	PK
5150	37.98	13.64	H	51.62	53.98	2.36	AV
5150	51.26	13.64	V	64.9	73.98	9.08	PK
5150	36.88	13.64	V	50.52	53.98	3.46	AV

Band : UNII 2A

Operation Mode: 802.11 ac\_VHT80

Transfer MCS Index: 0

Operating Frequency 5290 MHz

Channel No. 58 Ch

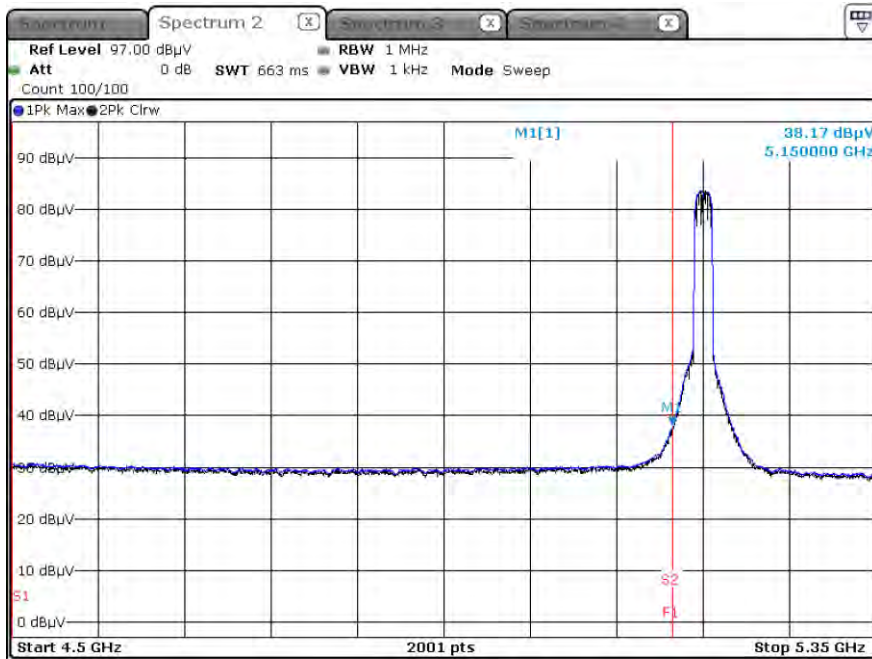
Frequency [MHz]	Measured Value [dBμV]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dBμV/m]	Limit [dBμV/m]	Margin [dB]	Measurement Type
5350	48.61	14.22	H	62.83	73.98	11.15	PK
5350	35.72	14.22	H	49.94	53.98	4.04	AV
5350	46.09	14.22	V	60.31	73.98	13.67	PK
5350	34.65	14.22	V	48.87	53.98	5.11	AV

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

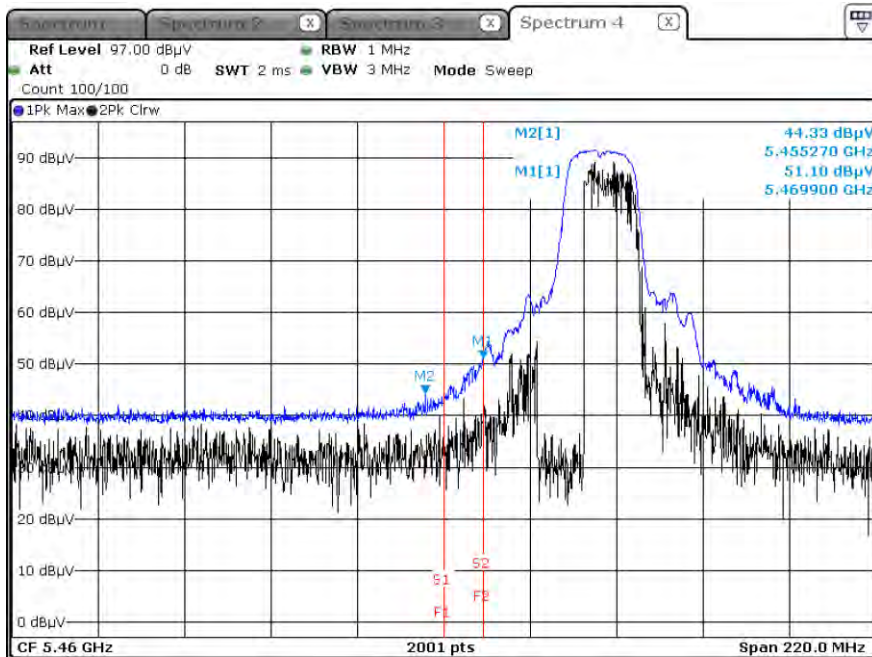
Frequency [MHz]	Measured Value [dB $\mu$ V]	CL+AF+DF-AG+ATT [dB/m]	ANT. POL [H/V]	Total [dB $\mu$ V/m]	Limit [dB $\mu$ V/m]	Margin [dB]	Measurement Type
5460	49.65	14.69	H	64.34	73.98	9.64	PK
5460	35.97	14.69	H	50.66	53.98	3.32	AV
5470	47.68	15.03	H	62.71	68.20	5.49	PK
5460	48.89	14.69	V	63.58	73.98	10.40	PK
5460	34.85	14.69	V	49.54	53.98	4.44	AV
5470	46.52	15.03	V	61.55	68.20	6.65	PK

▣ Test Plots(UNII 1, 2A, 2C)

Average Result (802.11a, Ch.36 Spurious Emissions, Y-H)



Peak Result (802.11n(HT20), Ch.100 Spurious Emissions, Y-H)

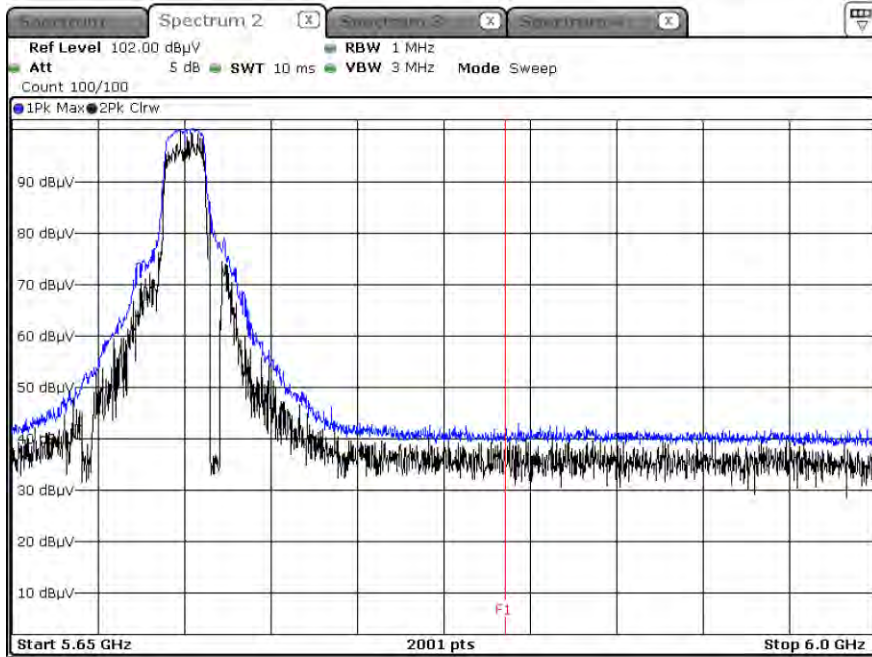


**Note:**

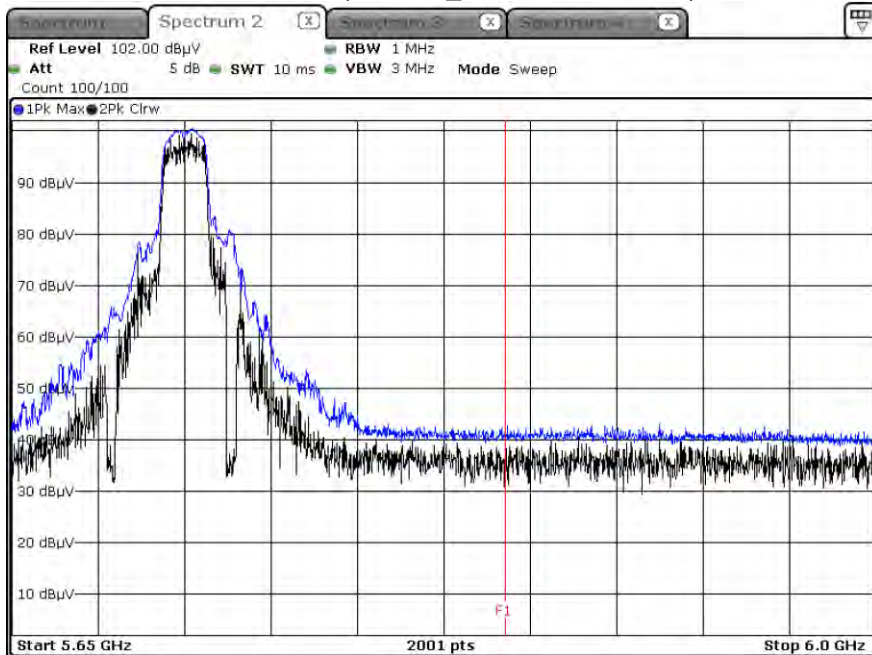
Only the worst case plots for Radiated Restricted Band Edge.

▣ Test Plots(Straddle Channel)

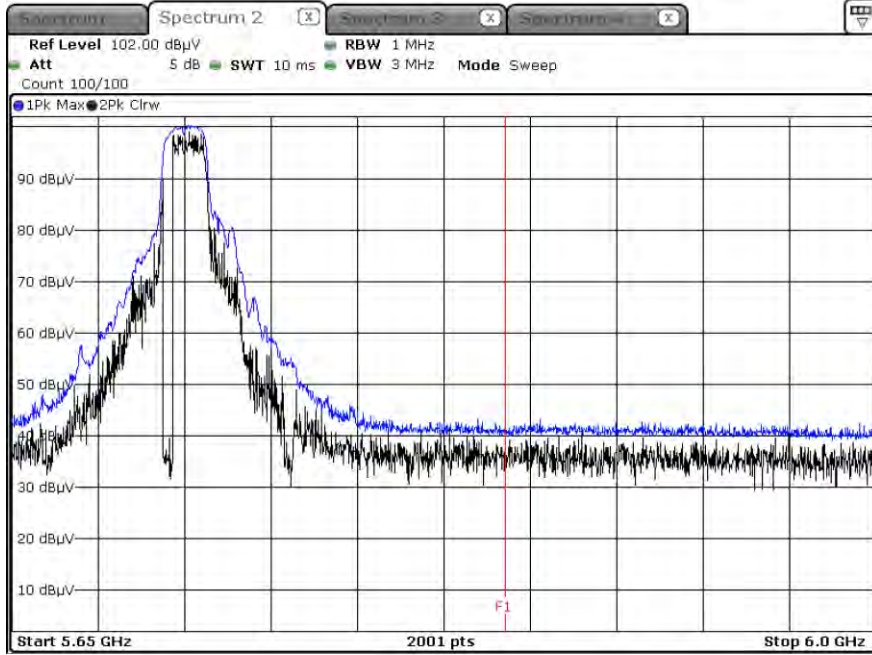
Peak Result (802.11a, Ch.144, X-H)



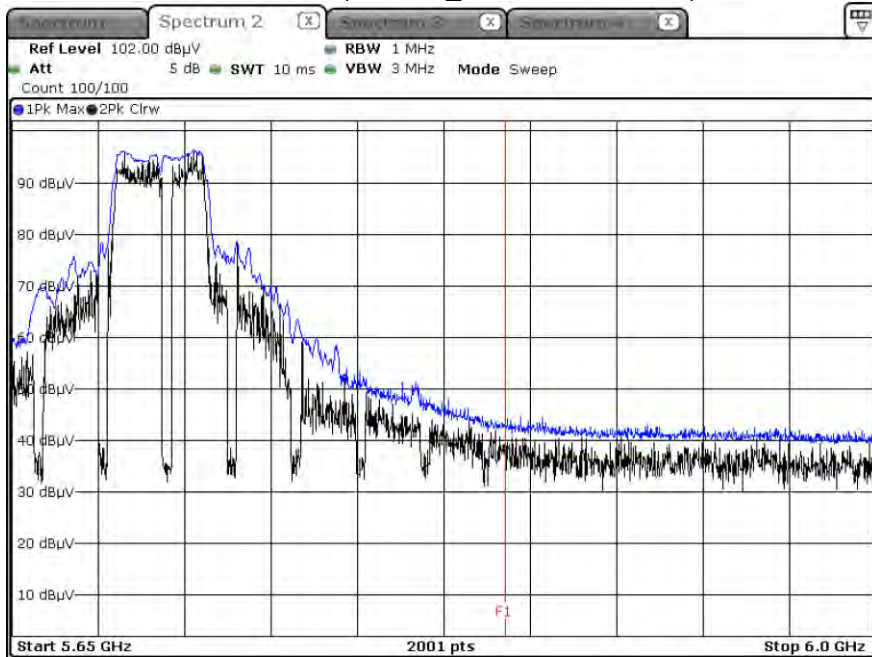
Peak Result (802.11n\_HT20, Ch.144, X-H)



Peak Result (802.11ac\_VHT20, Ch.144, X-H)

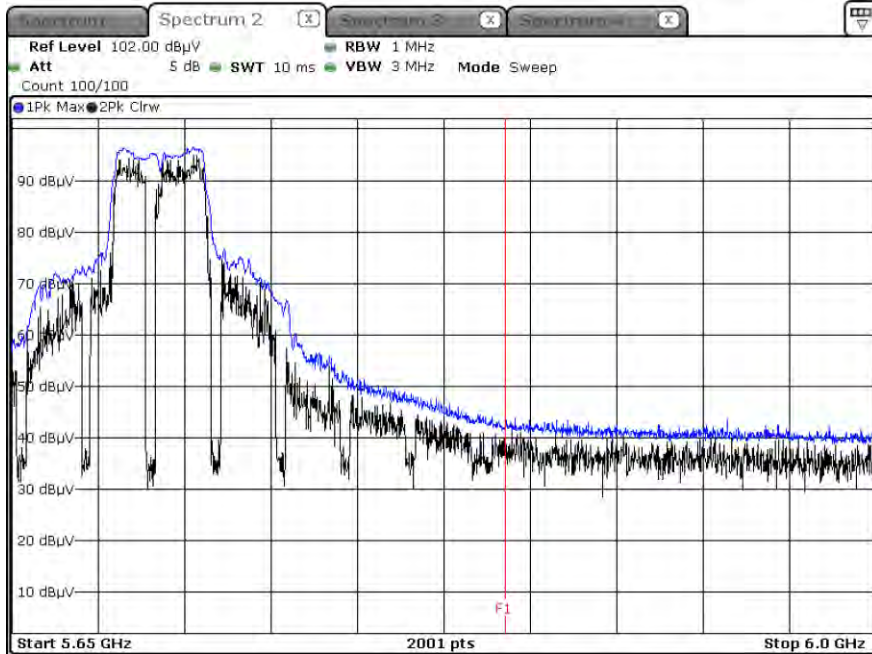


Peak Result (802.11n\_HT40, Ch.142, X-H)

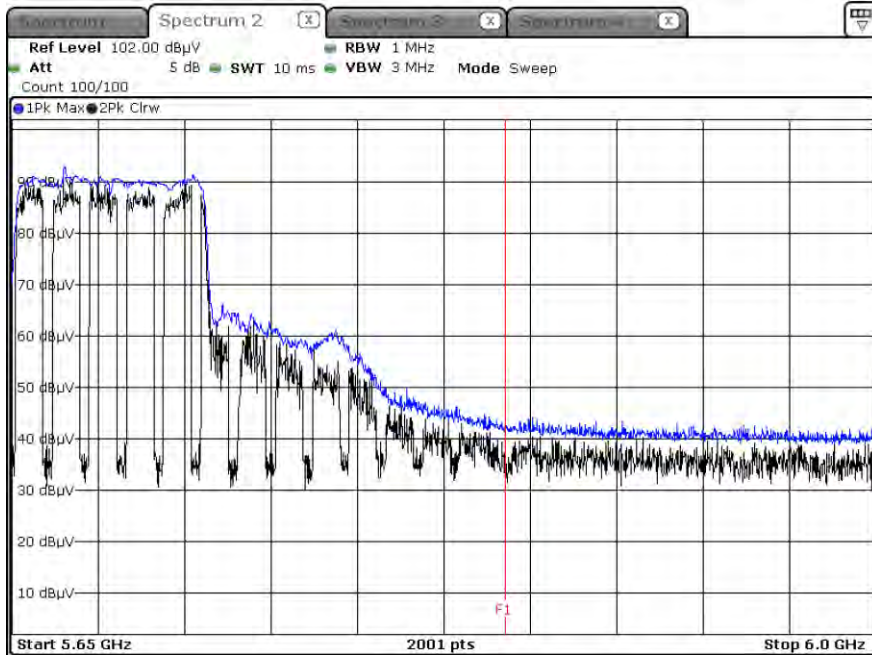




Peak Result (802.11ac\_VHT40, Ch.142, X-H)



Peak Result (802.11ac\_VHT80, Ch.138, X-H)

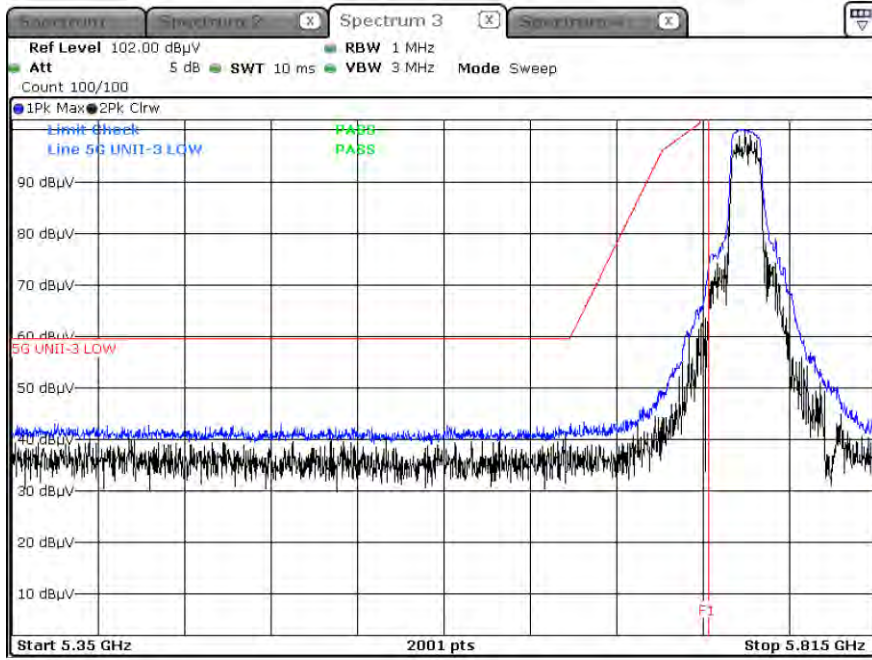


**Note :**

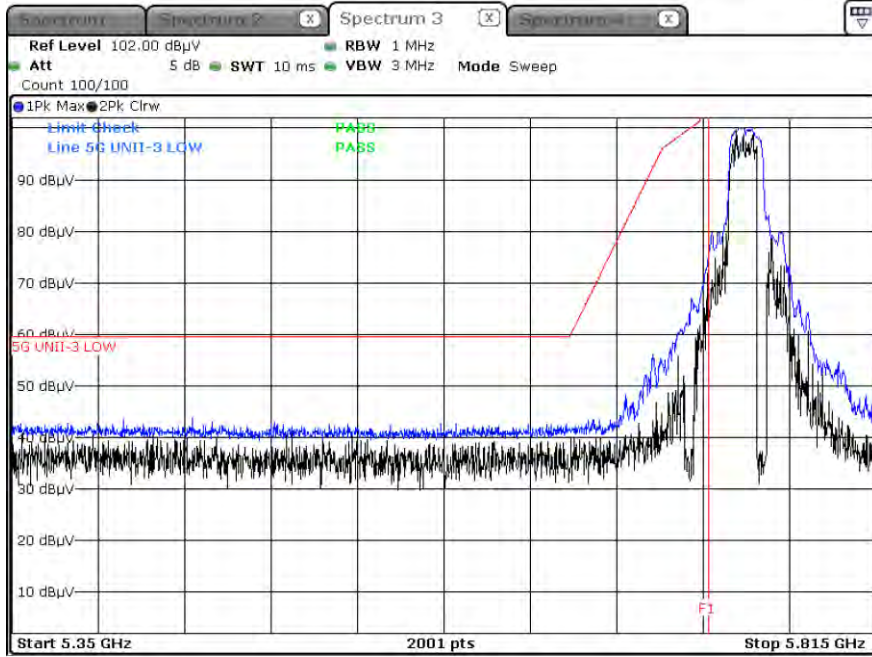
1. Only the worst case plots for Radiated Restricted Band Edge.
2. Red line : 5 850 MHz
3. Ambient Noise (Because of ambient noise, We attached only the worst plot without a data table)

▣ Test Plots(UNII 3)

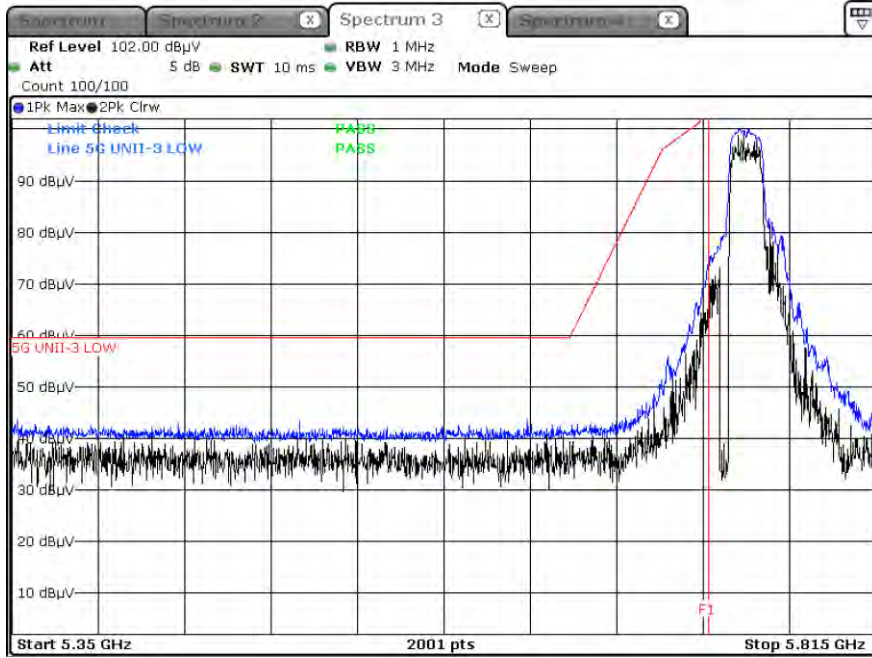
Peak Result (802.11a, Ch.149, Y-H)



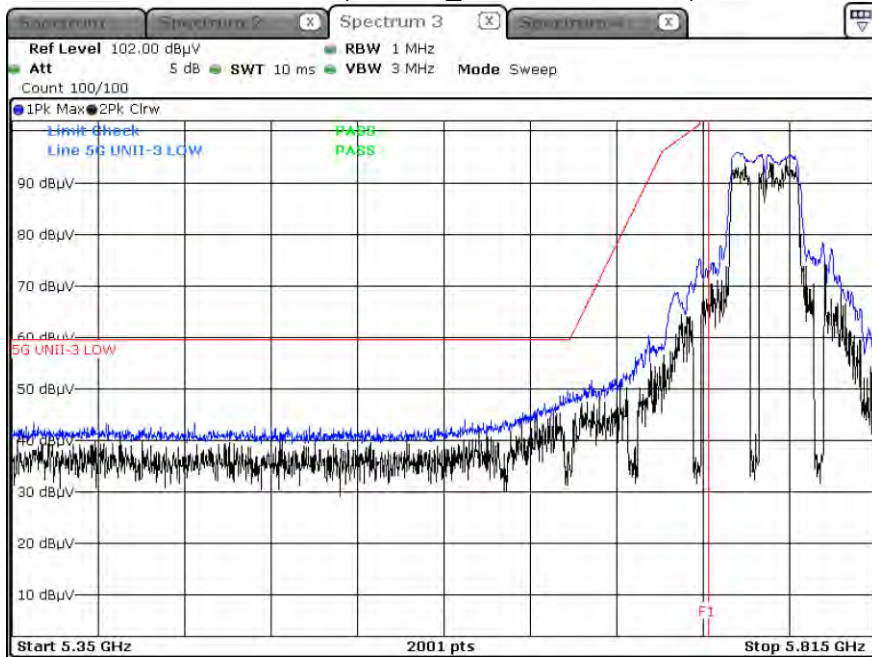
Peak Result (802.11n\_HT20, Ch.149, Y-H)



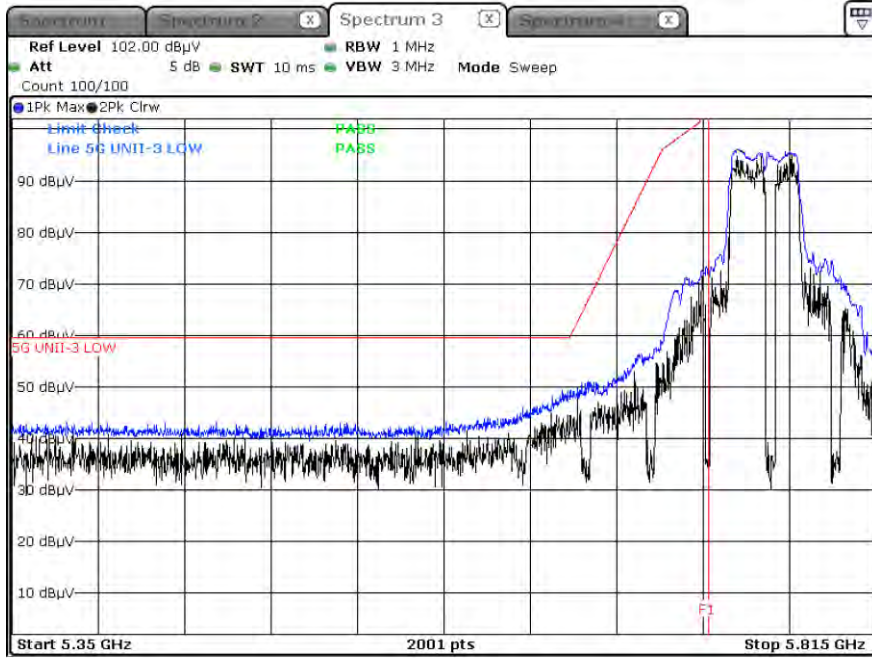
Peak Result (802.11ac\_VHT20, Ch.149, Y-H)



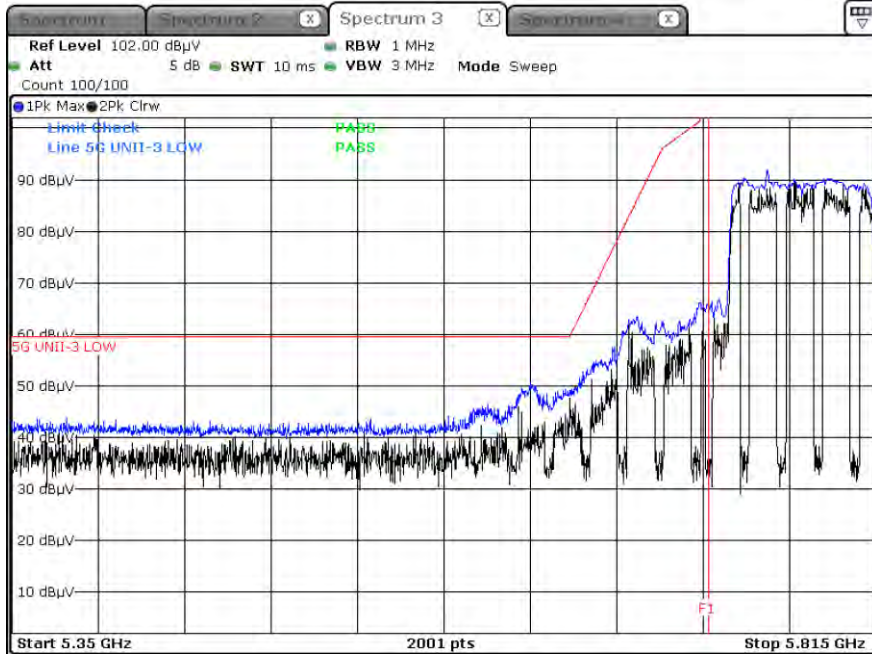
Peak Result (802.11n\_HT40, Ch.151, Y-H)



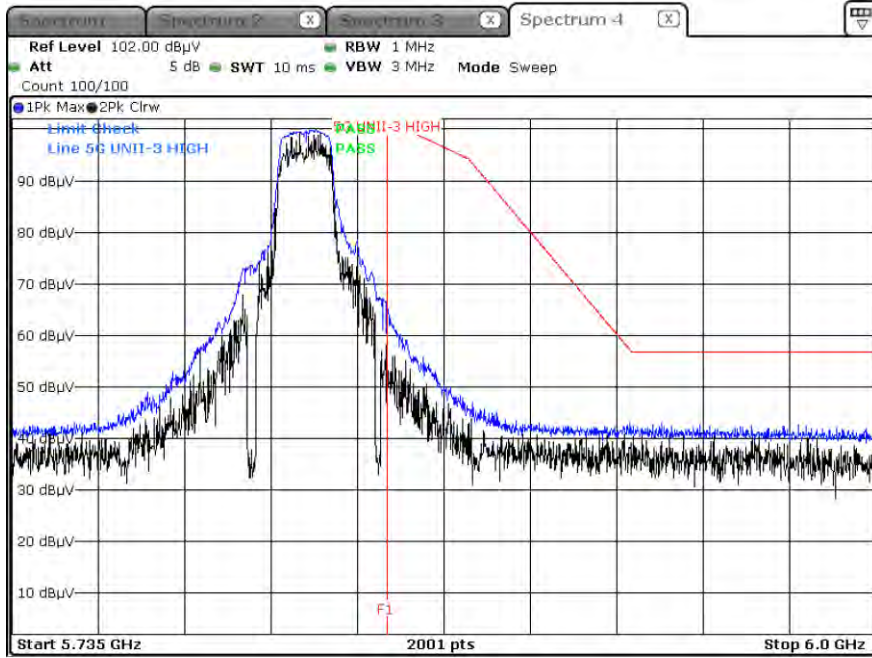
Peak Result (802.11ac\_VHT40, Ch.151, Y-H)



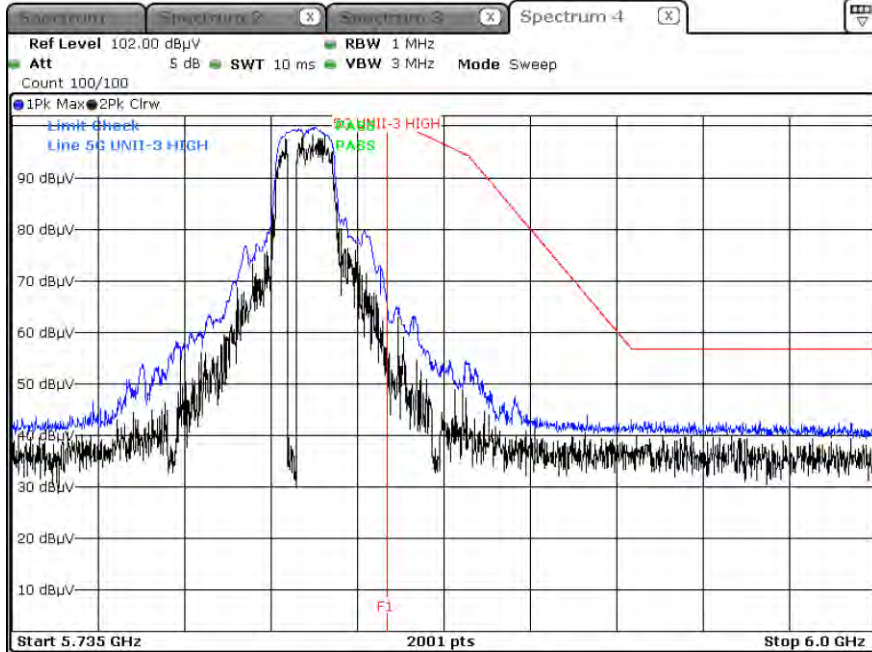
Peak Result (802.11ac\_VHT80, Ch.155, Y-H)



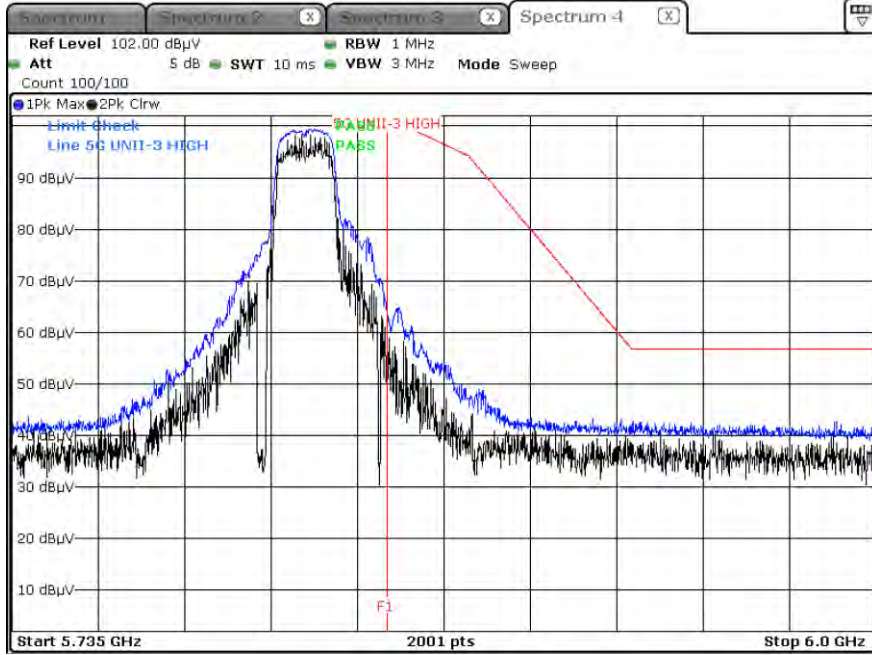
Peak Result (802.11a, Ch.165, Y-H)



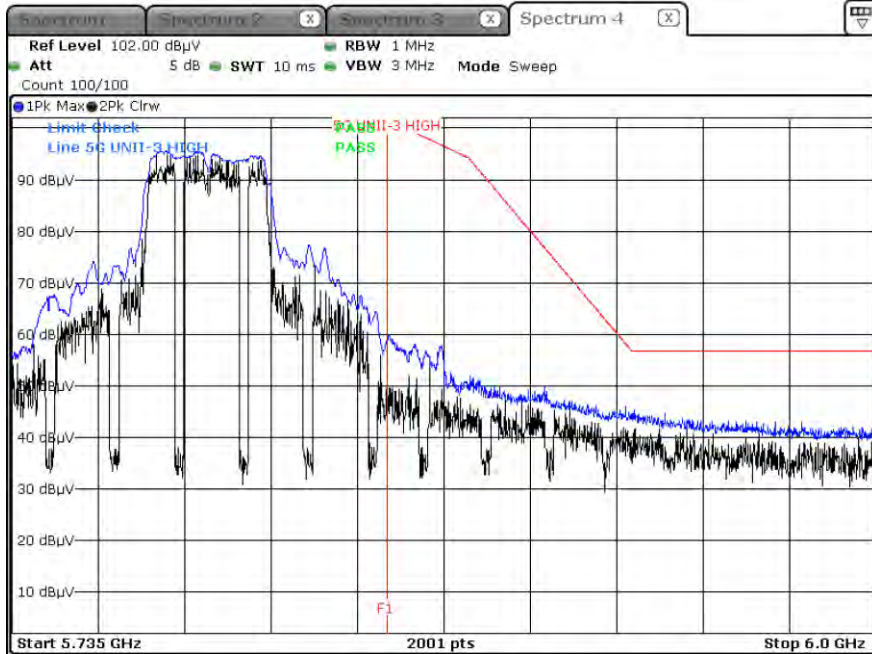
Peak Result (802.11n\_HT20, Ch.165, Y-H)



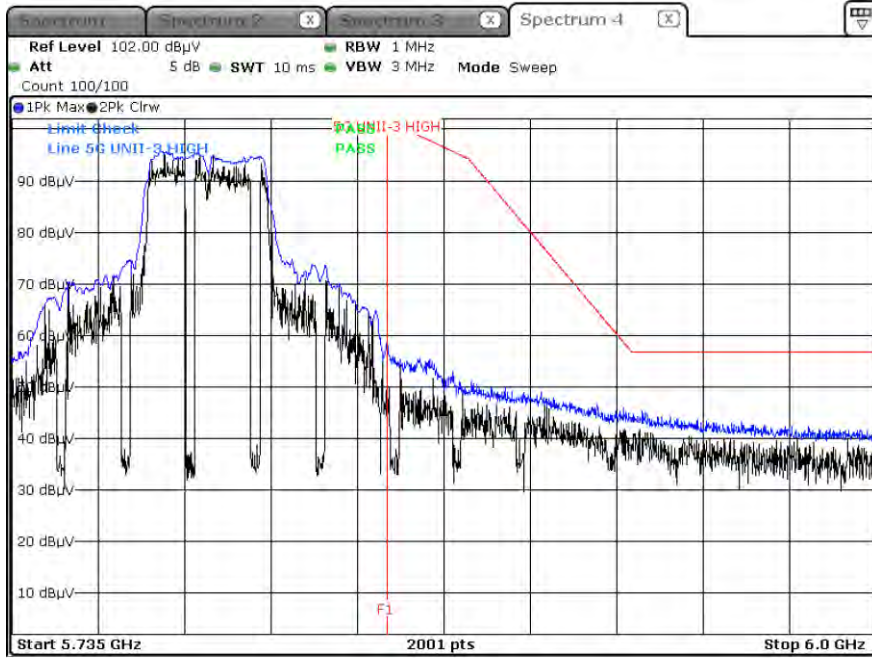
Peak Result (802.11ac\_VHT20, Ch.165, Y-H)



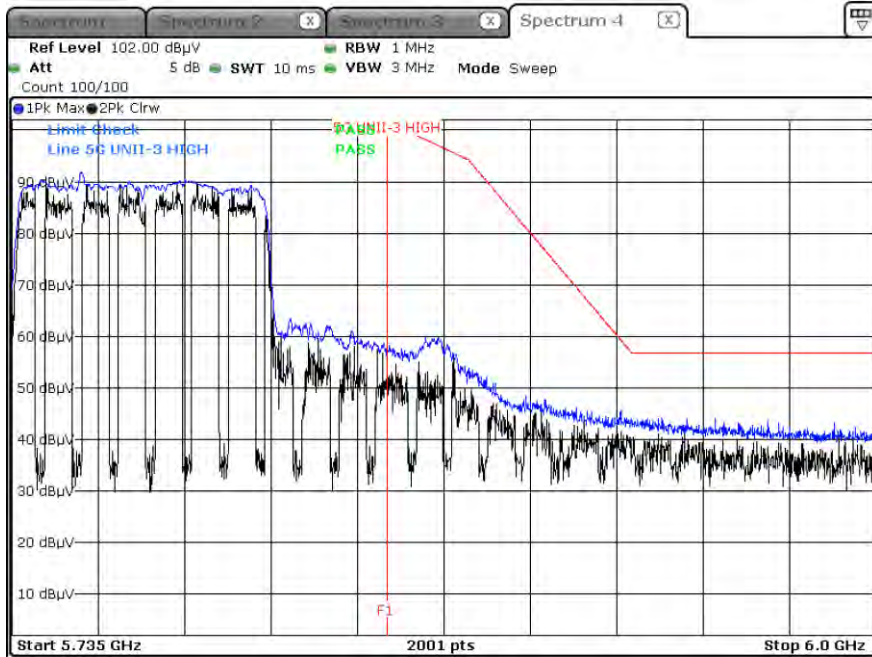
Peak Result (802.11n\_HT40, Ch.159, Y-H)



Peak Result (802.11ac\_VHT40, Ch.159, Y-H)



Peak Result (802.11ac\_VHT80, Ch.155, Y-H)



**Note :**

1. Only the worst case plots for U-NII-3 Out of Band e.i.r.p Emission.
2. U-NII-3 Low & High Band Edge RedLine is Final Test Limit about factor value compensation.

**10.10 POWERLINE CONDUCTED EMISSIONS**

**Conducted Emissions (Line 1)**

5G L1

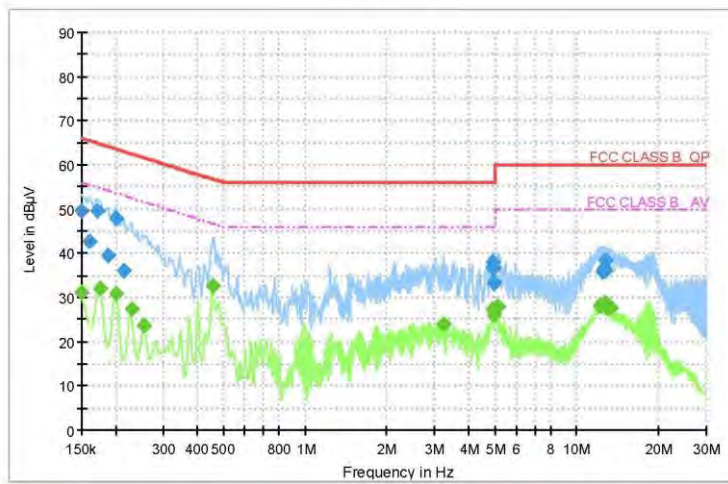
1 / 2

**Test Report**

**Common Information**

EUT : SM-A047M/DS  
 Manufacturer : SAMSUNG  
 Test Site: SHIELD ROOM  
 Operating Conditions : 5G L1

Full Spectrum



Preview Result 2-AVG      Preview Result 1-PK+      FCC CLASS B\_QP  
 FCC CLASS B\_AV      Final\_Result QPK      Final\_Result CAV

**Final Result QPK**

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	49.60	66.00	16.40	9.000	L1	OFF	9.6
0.1613	42.74	65.40	22.66	9.000	L1	OFF	9.6
0.1725	49.58	64.84	15.26	9.000	L1	OFF	9.6
0.1893	39.40	64.11	24.72	9.000	L1	OFF	9.6
0.2018	47.96	63.54	15.58	9.000	L1	OFF	9.6
0.2153	36.05	63.00	26.95	9.000	L1	OFF	9.6
4.8988	36.63	56.00	19.37	9.000	L1	OFF	9.8
4.9033	36.90	56.00	19.10	9.000	L1	OFF	9.8
4.9280	38.08	56.00	17.92	9.000	L1	OFF	9.8
4.9348	33.38	56.00	22.62	9.000	L1	OFF	9.8
4.9573	36.61	56.00	19.39	9.000	L1	OFF	9.8
4.9640	33.21	56.00	22.79	9.000	L1	OFF	9.8
12.4633	36.06	60.00	23.94	9.000	L1	OFF	10.1
12.4813	35.76	60.00	24.24	9.000	L1	OFF	10.1
12.5083	35.98	60.00	24.02	9.000	L1	OFF	10.1
12.5488	36.76	60.00	23.24	9.000	L1	OFF	10.1
12.7783	38.28	60.00	21.72	9.000	L1	OFF	10.1
12.8278	36.14	60.00	23.86	9.000	L1	OFF	10.1

**Final\_Result\_CAV**

2022-07-07



5G L1

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Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	31.07	56.00	24.93	9.000	L1	OFF	9.6
0.1748	32.14	54.73	22.59	9.000	L1	OFF	9.6
0.2018	30.75	53.54	22.79	9.000	L1	OFF	9.6
0.2288	27.46	52.50	25.03	9.000	L1	OFF	9.6
0.2558	23.51	51.57	28.05	9.000	L1	OFF	9.6
0.4560	32.60	46.77	14.17	9.000	L1	OFF	9.7
3.2450	23.85	46.00	22.15	9.000	L1	OFF	9.8
4.9010	27.40	46.00	18.60	9.000	L1	OFF	9.8
4.9280	27.34	46.00	18.66	9.000	L1	OFF	9.8
4.9550	26.74	46.00	19.26	9.000	L1	OFF	9.8
4.9820	25.92	46.00	20.08	9.000	L1	OFF	9.8
5.1283	27.92	50.00	22.08	9.000	L1	OFF	9.9
12.2045	28.17	50.00	21.83	9.000	L1	OFF	10.1
12.2315	27.88	50.00	22.12	9.000	L1	OFF	10.1
12.7783	28.78	50.00	21.22	9.000	L1	OFF	10.1
12.8053	28.86	50.00	21.14	9.000	L1	OFF	10.1
12.8570	27.80	50.00	22.20	9.000	L1	OFF	10.1
13.3543	27.63	50.00	22.37	9.000	L1	OFF	10.2

2022-07-07

**Conducted Emissions (Line 2)**

5G N

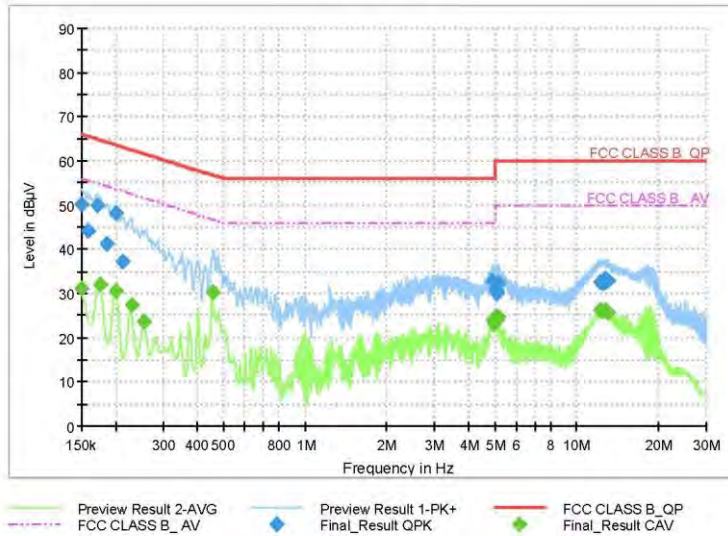
1 / 2

**Test Report**

**Common Information**

EUT : SM-A047M/DS  
 Manufacturer : SAMSUNG  
 Test Site: SHIELD ROOM  
 Operating Conditions : 5G N

Full Spectrum



**Final Result QPK**

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	50.22	66.00	15.78	9.000	N	OFF	9.6
0.1590	44.00	65.52	21.52	9.000	N	OFF	9.6
0.1725	49.96	64.84	14.87	9.000	N	OFF	9.6
0.1860	41.25	64.21	22.97	9.000	N	OFF	9.6
0.2018	48.10	63.54	15.44	9.000	N	OFF	9.6
0.2130	37.21	63.09	25.88	9.000	N	OFF	9.6
4.9280	32.91	56.00	23.09	9.000	N	OFF	9.8
4.9933	30.94	56.00	25.06	9.000	N	OFF	9.8
5.0225	30.47	60.00	29.53	9.000	N	OFF	9.9
5.0585	30.15	60.00	29.85	9.000	N	OFF	9.9
5.0878	30.05	60.00	29.95	9.000	N	OFF	9.9
5.1238	32.31	60.00	27.69	9.000	N	OFF	9.9
12.1775	32.50	60.00	27.50	9.000	N	OFF	10.1
12.2068	32.66	60.00	27.34	9.000	N	OFF	10.1
12.4340	32.44	60.00	27.56	9.000	N	OFF	10.2
12.7220	32.72	60.00	27.28	9.000	N	OFF	10.2
12.7513	33.51	60.00	26.49	9.000	N	OFF	10.2
13.0370	33.02	60.00	26.98	9.000	N	OFF	10.2

**Final\_Result\_CAV**

2022-07-06

5G N

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Frequency (MHz)	CAverage (dBμV)	Limit (dBμV)	Margin (dB)	Bandwidth (kHz)	Line	Filter	Corr. (dB)
0.1500	31.11	56.00	24.89	9.000	N	OFF	9.6
0.1748	32.15	54.73	22.58	9.000	N	OFF	9.6
0.2018	30.64	53.54	22.90	9.000	N	OFF	9.6
0.2288	27.41	52.50	25.08	9.000	N	OFF	9.6
0.2558	23.59	51.57	27.98	9.000	N	OFF	9.6
0.4560	30.16	46.77	16.60	9.000	N	OFF	9.7
4.8988	24.00	46.00	22.00	9.000	N	OFF	9.8
4.9640	23.10	46.00	22.90	9.000	N	OFF	9.8
5.0248	23.99	50.00	26.01	9.000	N	OFF	9.9
5.0630	23.93	50.00	26.07	9.000	N	OFF	9.9
5.0990	24.87	50.00	25.13	9.000	N	OFF	9.9
5.1260	24.92	50.00	25.08	9.000	N	OFF	9.9
12.2068	26.18	50.00	23.82	9.000	N	OFF	10.1
12.2765	25.98	50.00	24.02	9.000	N	OFF	10.2
12.4070	25.90	50.00	24.11	9.000	N	OFF	10.2
12.4340	26.03	50.00	23.97	9.000	N	OFF	10.2
12.7805	26.35	50.00	23.65	9.000	N	OFF	10.2
13.0370	25.60	50.00	24.40	9.000	N	OFF	10.2

2022-07-06

## 11. LIST OF TEST EQUIPMENT

### Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/23/2022	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/07/2023	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	03/04/2023	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	01/11/2023	Annual
Power Measurement Set	OSP 120	Rohde & Schwarz	101231	06/14/2023	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Keysight	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2022	Annual
Power Splitter	11667B	Hewlett Packard	05001	05/18/2023	Annual
DC Power Supply	E3646A	Agilent	MY40002937	12/14/2022	Annual
Attenuator(10 dB)	8493C	Hewlett Packard	07560	06/14/2023	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	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**

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Loop Antenna	FMZB 1513	Rohde & Schwarz	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	760	02/22/2023	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	02299	03/24/2024	Biennial
Horn Antenna (15GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170342	10/13/2022	Biennial
Spectrum Analyzer	FSV40-N	Rohde & Schwarz	102168	07/04/2023	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	01/11/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/13/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/13/2023	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/06/2023	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	02/07/2023	Annual
High Pass Filter	WHK3.0/18G-10EF	Wainwright Instruments	8	01/21/2023	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	25	01/21/2023	Annual
Attenuator (3 dB)	18B-03	Api tech.	1	01/21/2023	Annual
Attenuator(10 dB)	8493C-10	Agilent	08285	01/21/2023	Annual
Power Amplifier	CBLU1183540	CERNEX	22964	01/21/2023	Annual
Power Amplifier	CBL06185030	CERNEX	22965	01/21/2023	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/11/2023	Annual

**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-2207-FC010-P