

FCC UNII REPORT

Certification

Applicant Name:

SAMSUNG Electronics Co., Ltd.

Date of Issue:

January 20, 2021

Address:

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

Test Site/Location:

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA

Report No.: HCT-RF-2101-FC041-R4**FCC ID:** A3LSMA725M**APPLICANT:** SAMSUNG Electronics Co., Ltd.**Model:** SM-A725M/DS**Additional Model:** SM-A725M**EUT Type:** Mobile Phone**Modulation type** OFDM**FCC Classification:** Unlicensed National Information Infrastructure(NII)**FCC Rule Part(s):** Part 15.407**Engineering Statement:**

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

Report No.: HCT-RF-2101-FC041-R4

REVIEWED BY



Report prepared by : Se Wook Park
Engineer of Telecommunication Testing Center

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

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

This laboratory is not accredited for the test results marked *.

The above Test Report is the accredited test result by (KS Q) ISO/IEC 17025 and KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-2101-FC041	January 11, 2021	- First Approval Report
HCT-RF-2101-FC041-R1	January 15, 2021	- Added the Conducted test Worst datarate case
HCT-RF-2101-FC041-R2	January 19, 2021	- Revised the Radiation test Worst case (page: 25) - Revised Straddle Channel Output Power (Page: 75 & 77) - Added Calibration Date (Page: 123)
HCT-RF-2101-FC041-R3	January 19, 2021	- Added the test condition in section 8.8 (page 25)
HCT-RF-2101-FC041-R4	January 20, 2021	- Revised the test condition in section 8.8 (page 25)

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1. GENERAL INFORMATION

EUT DESCRIPTION

Model	SM-A725M/DS	
Additional Model	SM-A725M	
EUT Type	Mobile Phone	
Power Supply	DC 3.86 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20MHz BW : 5180 - 5240 40MHz BW : 5190 - 5230 80MHz BW : 5210
	U-NII-2A	20MHz BW : 5260 - 5320 40MHz BW : 5270 - 5310 80MHz BW : 5290
	U-NII-2C	20MHz BW : 5500 - 5720 40MHz BW : 5510 - 5710 80MHz BW : 5530 - 5690
	U-NII-3	20MHz BW : 5745 - 5825 40MHz BW : 5755 - 5795 80MHz BW : 5775
Straddle channel	Supported	
TDWR Band	Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	December 03, 2020 ~ January 07, 2021	
Serial number	Radiated : R38NA01DDMT	
	Conducted : R38NA01D9JX	

2. MAXIMUM OUTPUT POWER

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

Band	Mode	Output Power	
		(dBm)	(W)
UNII1	802.11a	16.78	0.048
	802.11n (HT20)	16.76	0.047
	802.11n (HT40)	15.96	0.039
	802.11ac (VHT20)	16.75	0.047
	802.11ac (VHT40)	15.95	0.039
	802.11ac (VHT80)	12.49	0.018
UNII2A	802.11a	16.98	0.050
	802.11n (HT20)	16.92	0.049
	802.11n (HT40)	15.98	0.040
	802.11ac (VHT20)	16.93	0.049
	802.11ac (VHT40)	15.98	0.040
	802.11ac (VHT80)	12.86	0.019
UNII2C	802.11a	16.93	0.049
	802.11n (HT20)	16.88	0.049
	802.11n (HT40)	15.93	0.039
	802.11ac (VHT20)	16.81	0.048
	802.11ac (VHT40)	15.92	0.039
	802.11ac (VHT80)	12.86	0.019
UNII3	802.11a	16.97	0.050
	802.11n (HT20)	16.96	0.050
	802.11n (HT40)	15.40	0.035
	802.11ac (VHT20)	16.89	0.049
	802.11ac (VHT40)	15.44	0.035
	802.11ac (VHT80)	12.14	0.016

3. TEST METHODOLOGY

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

EUT CONFIGURATION

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

EUT EXERCISE

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

GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

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

DESCRIPTION OF TEST MODES

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

4. INSTRUMENT CALIBRATION

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

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

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

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

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

5.2 EQUIPMENT

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

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

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

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203, §15.407:

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

- (1) The antennas of this E.U.T are permanently attached.
- (2) The E.U.T Complies with the requirement of §15.203, §15.407

7. MEASUREMENT UNCERTAINTY

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

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

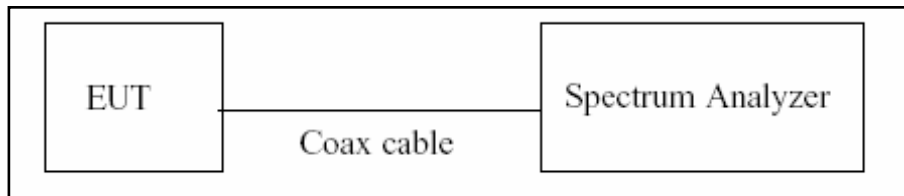
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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

8. DESCRIPTION OF TESTS

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

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

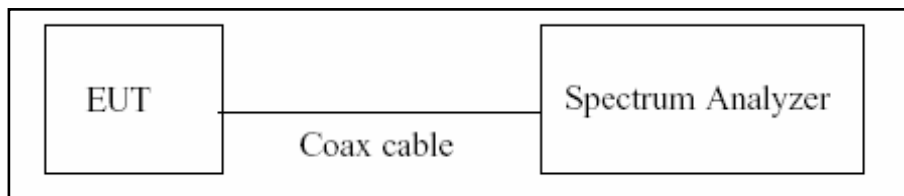
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ($\geq$ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = $T_{\text{on}} / T_{\text{total}}$ and Duty Cycle Factor = $10\log(1/\text{Duty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

8.2. 6dB Bandwidth & 26dB Bandwidth

Limit

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

Test Configuration



Test Procedure(26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

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

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

Test Procedure (6dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

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

1. RBW = 100 kHz
2. VBW $\geq 3 \times$ 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.

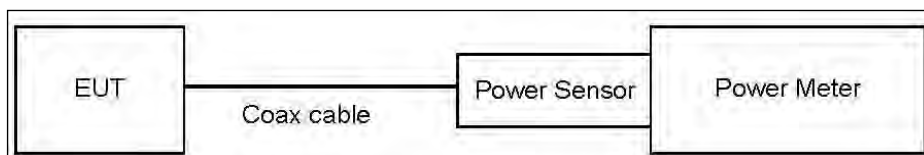
8.3. Output Power Measurement

Limit

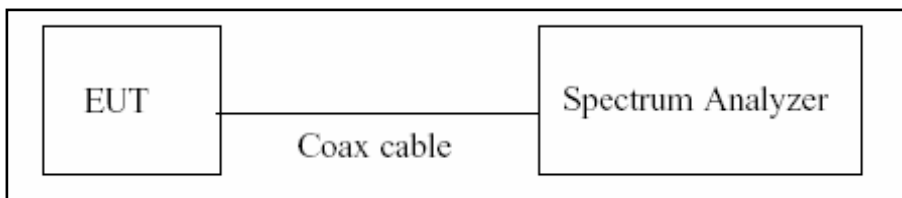
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(=30dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

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

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

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

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

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

1. Measure the duty cycle.
2. Set span to encompass the 26 dB EBW of the signal.
3. RBW = 1 MHz.
4. VBW $\geq$ 3 MHz.
5. Number of points in sweep $\geq$ 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) = Reading Value(dBm) + ATT loss(dB) + Cable loss(dB) + Duty Cycle Factor(dB)

Note

1. Spectrum reading values are not plot data.

The power results in plot is already including the actual values of loss for the attenuator and cable combination.

2. Spectrum offset = Attenuator loss(10 dB) + Cable loss + EUT Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	10.73
UNII 2A	10.73
UNII 2C	10.73
UNII 3	10.73

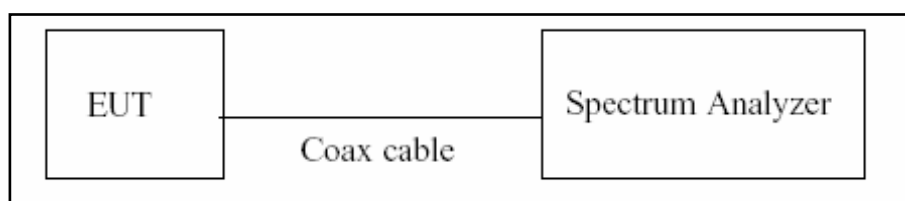
(Actual value of loss for the attenuator and cable combination)

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

Sample Calculation

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

Note

1. Spectrum reading values are not plot data.

The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.

2. Spectrum offset = Attenuator loss(10 dB) + Cable loss + EUT Cable loss

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

Band	Loss(dB)
UNII 1	10.73
UNII 2A	10.73
UNII 2C	10.73
UNII 3	10.73

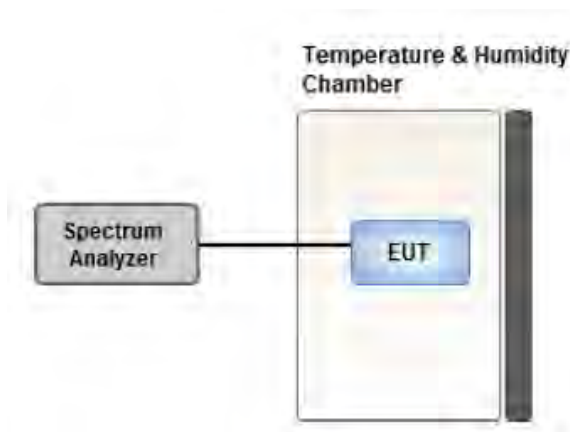
(Actual value of loss for the attenuator and cable combination)

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 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 ^(a)	56 to 46 ^(a)
0.50 to 5	56	46
5 to 30	60	50

^(a)Decreases with the logarithm of the frequency.

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

Test Configuration

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

Test Procedure

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

Sample Calculation

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

8.7. Radiated Test

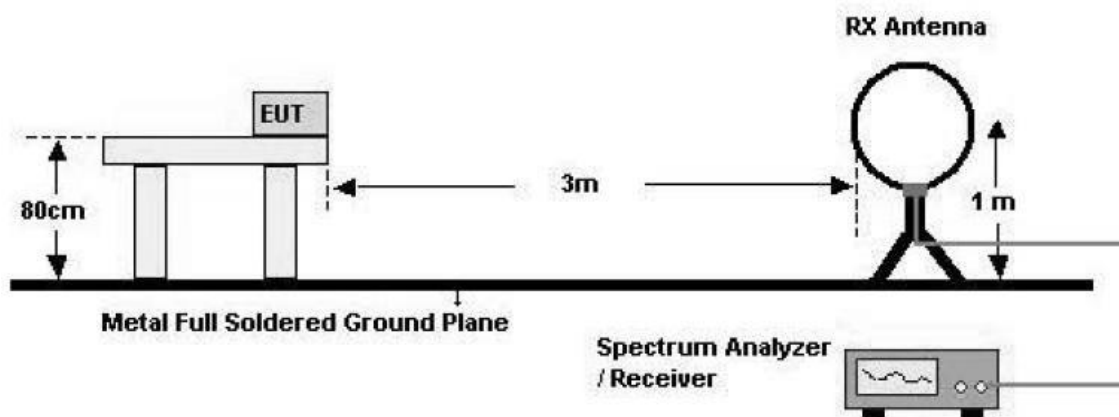
Limit

1. UNII 1: All emissions outside of the 5.15-5.35 GHz band shall not exceed an EIRP of -27 dBm/MHz.
2. UNII 2A, 2C: All emissions outside of the 5.47-5.725 GHz band shall not exceed an EIRP of -27 dBm/MHz.
3. UNII 3: All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.
4. All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in Section 15.209.

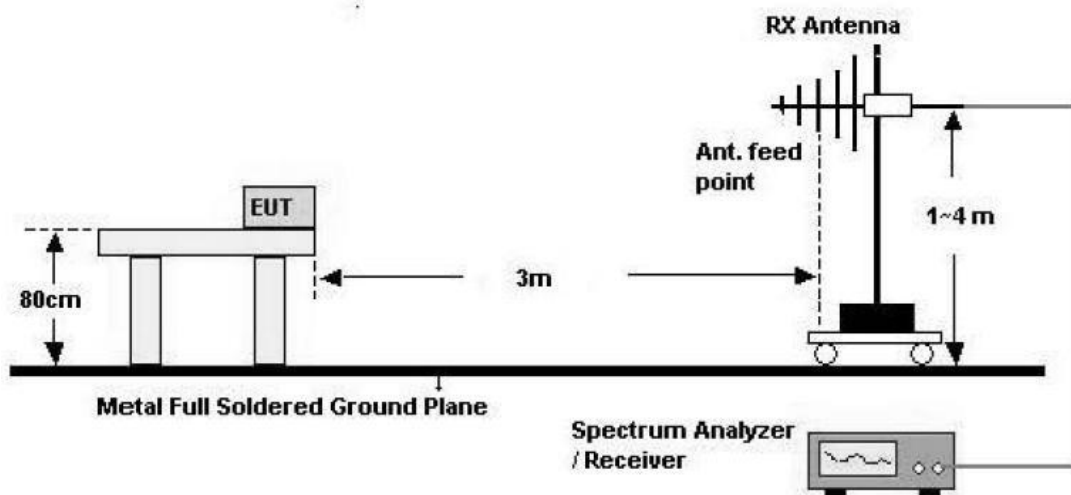
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

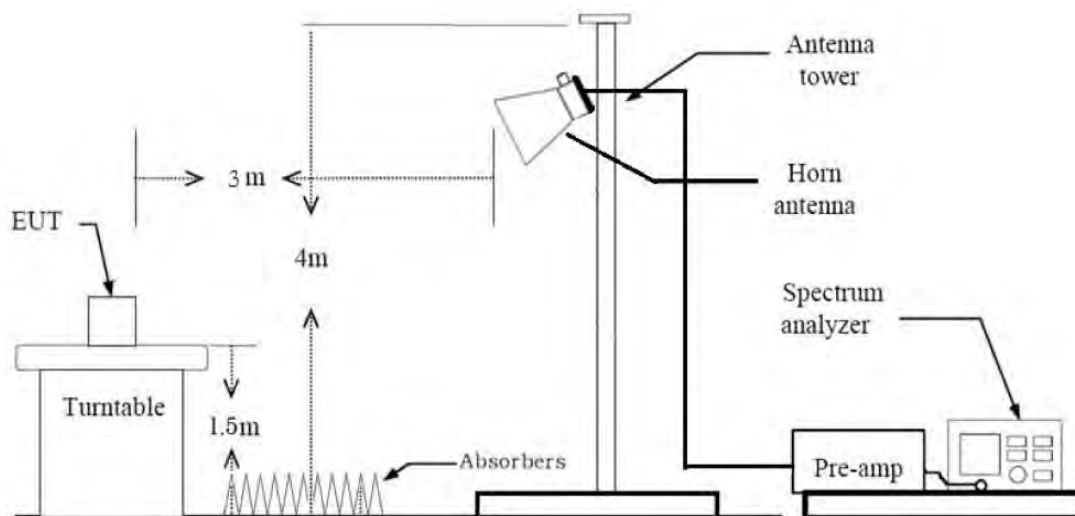
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

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

KDB 414788 OFS and Chamber Correlation Justification

Base on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in the regulations; however, an attempt should be made to avoid making measurements in the near field.

OFS and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. The Hybrid antenna was placed at a location 3m from the EUT, which is varied from 1m to 4m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW $\geq 3 \times$ RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
- ※ In general, (1) is used mainly
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

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

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

- RBW = 1 MHz
- VBW $\geq$ 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 percent) = VBW $\leq$ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = 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 percent 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 = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Test Procedure of Radiated Restricted Band Edge

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

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

- RBW = 1 MHz
- VBW $\geq$ 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 percent) = $\text{VBW} \leq \text{RBW}/100$ (i.e., 10 kHz) but not less than 10 Hz.
- VBW(Duty cycle is < 98 percent) = $\text{VBW} \geq 1/T$, 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 percent 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 = $20\log$ (test distance / specific distance) (dB)

11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Attenuator
+ Distance Factor(D.F)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.976	0.106	1000
802.11n(HT20)	MCS 0	0.971	0.130	1000
802.11n(HT40)	MCS 0	0.950	0.224	2000
802.11ac(VHT20)	MCS 0	0.974	0.113	1000
802.11ac(VHT40)	MCS 0	0.950	0.223	2000
802.11ac(VHT80)	MCS 0	0.904	0.438	3000

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 : X
3. All datarate of operation were investigated and the worst case datarate results are reported
4. 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
5. Radiated Spurious Emission
 - All modulation of operation were investigated and the worst case modulation results are reported.(Worstcase : 802.11a 6 Mbps)
6. SM-A725M/DS, SM-A725M were tested and the worst case results are reported.
(Worst case : SM-A725M/DS)
7. We were performed the RSE test in condition of co-location. There has no significant emission raised.
(WWAN+WLAN 5GHz+BT)

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-A725M/DS, SM-A725M were tested and the worst case results are reported.
(Worst case : SM-A725M/DS)

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. SM-A725M/DS, SM-A725M were tested and the worst case results are reported.
(Worst case : SM-A725M/DS)

9. SUMMARY OF TEST RESULTS

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

10. TEST RESULT

10.1 DUTY CYCLE

Mode	Data Rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.434	1.469	0.976	0.106
	9	0.958	0.998	0.959	0.180
	12	0.730	0.765	0.954	0.206
	18	0.491	0.532	0.924	0.344
	24	0.375	0.415	0.902	0.446
	36	0.258	0.294	0.879	0.559
	48	0.203	0.238	0.851	0.700
	54	0.182	0.218	0.837	0.772

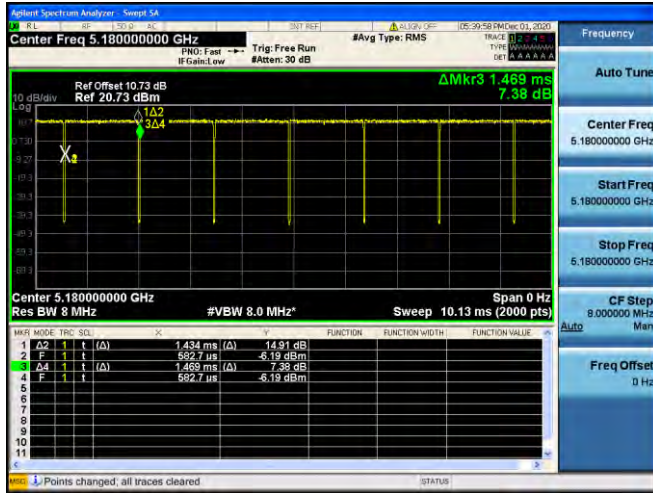
Mode	MCS Index	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.338	1.378	0.971	0.130
	1	0.689	0.725	0.951	0.218
	2	0.476	0.512	0.931	0.312
	3	0.365	0.400	0.911	0.403
	4	0.258	0.294	0.879	0.559
	5	0.198	0.238	0.830	0.810
	6	0.187	0.223	0.841	0.752
	7	0.172	0.208	0.829	0.813
802.11n (HT40)	0	0.669	0.704	0.950	0.224
	1	0.355	0.390	0.909	0.414
	2	0.248	0.284	0.875	0.580
	3	0.198	0.233	0.848	0.717
	4	0.147	0.182	0.806	0.939
	5	0.117	0.152	0.767	1.154
	6	0.106	0.142	0.750	1.249
	7	0.101	0.137	0.741	1.303

Mode	MCS Index	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.348	1.383	0.974	0.113
	1	0.694	0.735	0.945	0.246
	2	0.476	0.517	0.922	0.355
	3	0.370	0.405	0.913	0.398
	4	0.258	0.294	0.879	0.559
	5	0.203	0.238	0.851	0.700
	6	0.187	0.223	0.841	0.752
	7	0.172	0.208	0.829	0.813
	8	0.152	0.187	0.811	0.911
802.11ac (VHT40)	0	0.674	0.709	0.950	0.223
	1	0.360	0.395	0.910	0.408
	2	0.253	0.289	0.877	0.569
	3	0.203	0.238	0.851	0.700
	4	0.147	0.182	0.806	0.939
	5	0.122	0.157	0.774	1.112
	6	0.111	0.147	0.759	1.200
	7	0.106	0.142	0.750	1.249
	8	0.096	0.132	0.731	1.362
	9	0.091	0.127	0.720	1.427
	10	0.086	0.122	0.710	1.488
802.11ac (VHT80)	0	0.334	0.370	0.904	0.438
	1	0.187	0.223	0.841	0.752
	2	0.142	0.177	0.800	0.969
	3	0.117	0.152	0.767	1.154
	4	0.091	0.132	0.692	1.597
	5	0.076	0.117	0.652	1.856
	6	0.076	0.111	0.682	1.663
	7	0.071	0.106	0.667	1.761
	8	0.071	0.106	0.667	1.761
	9	0.061	0.096	0.632	1.996
	10	0.056	0.091	0.622	2.057

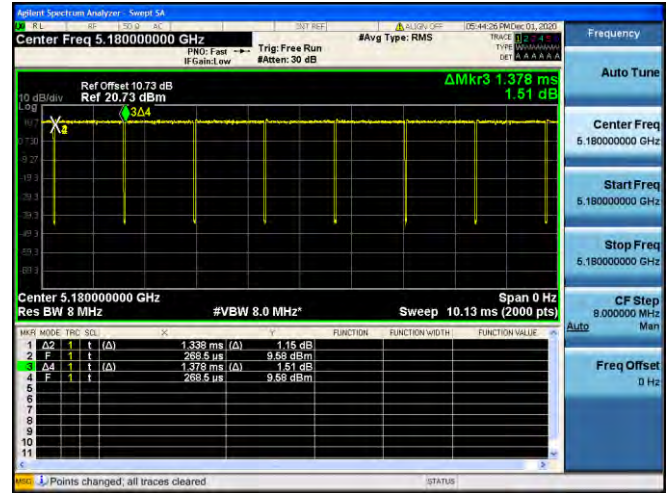
Note:

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

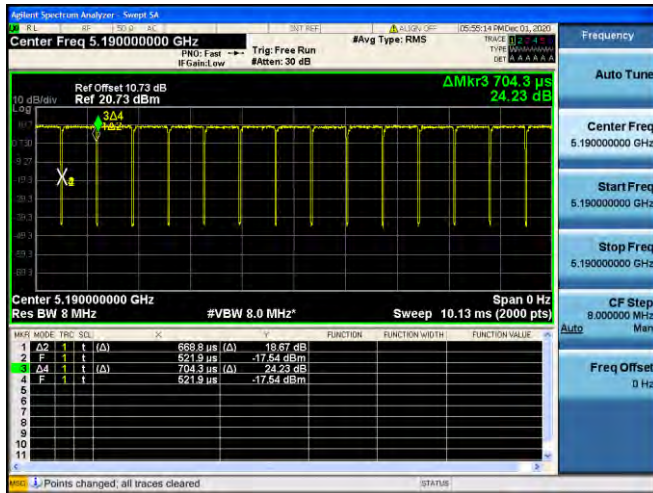
802.11a



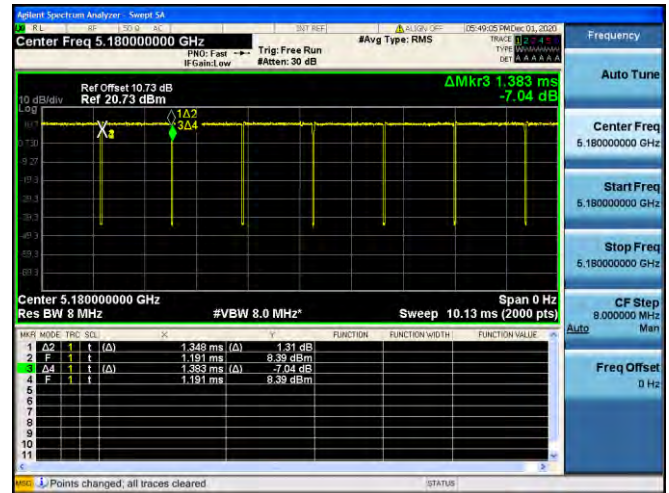
802.11n(HT20)



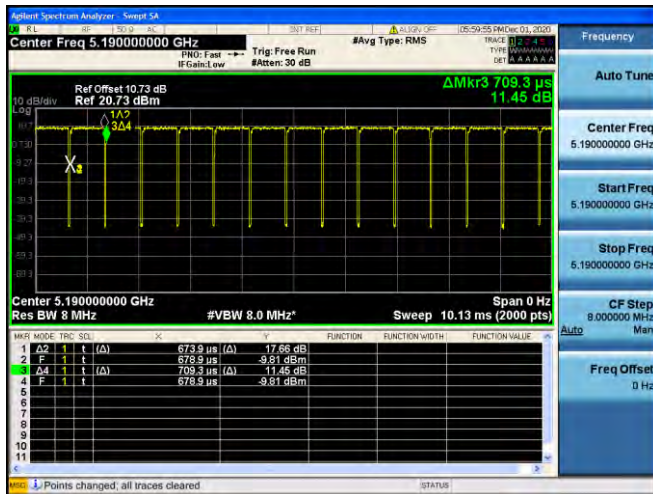
802.11n(HT40)



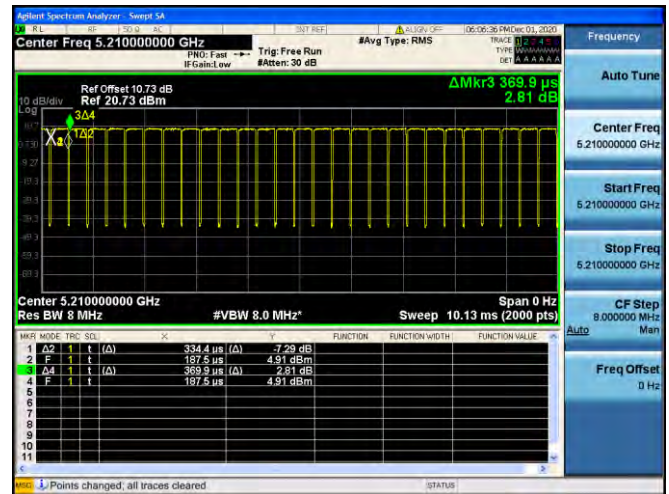
802.11ac(VHT20)



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	20.60	16.425
5200	40	20.20	16.407
5240	48	20.16	16.388
5260	52	19.67	16.389
5300	60	19.72	16.387
5320	64	21.79	16.414
5500	100	20.42	16.411
5600	120	20.92	16.412
5720	144	20.22	16.394
5745	149	19.71	16.402
5785	157	21.69	16.434
5825	165	20.34	16.403

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.15	17.591
5200	40	20.64	17.597
5240	48	22.35	17.591
5260	52	20.60	17.580
5300	60	22.11	17.593
5320	64	21.61	17.606
5500	100	21.48	17.593
5600	120	20.99	17.589
5720	144	21.03	17.589
5745	149	21.24	17.592
5785	157	20.54	17.564
5825	165	21.00	17.585

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.71	35.961
5230	46	39.80	36.013
5270	54	40.09	35.946
5310	62	39.98	35.986
5510	102	40.21	36.019
5590	118	39.95	35.956
5710	142	39.77	36.022
5755	151	40.07	36.004
5795	159	40.16	35.935

802.11ac(VHT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.85	17.608
5200	40	20.90	17.572
5240	48	21.92	17.585
5260	52	20.67	17.570
5300	60	20.89	17.586
5320	64	21.07	17.589
5500	100	21.71	17.618
5600	120	21.49	17.580
5720	144	21.65	17.586
5745	149	21.74	17.590
5785	157	21.44	17.580
5825	165	20.88	17.579

802.11ac(VHT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	40.31	35.980
5230	46	40.27	35.950
5270	54	40.38	35.986
5310	62	39.77	35.975
5510	102	39.90	35.953
5590	118	39.82	35.974
5710	142	40.34	36.014
5755	151	40.34	36.017
5795	159	40.23	35.981

802.11ac(VHT80) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	81.51	75.208
5290	58	81.39	75.180
5530	106	80.88	75.152
5610	122	81.40	75.257
5690	138	81.28	75.122
5775	155	80.81	75.183

■ Test Plots(802.11a)

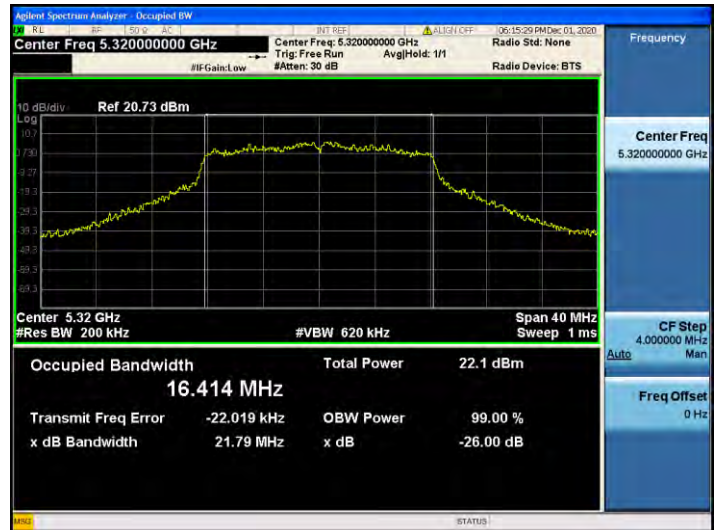
Note:

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

802.11a UNII 1 BAND 26dB Bandwidth (CH 36)



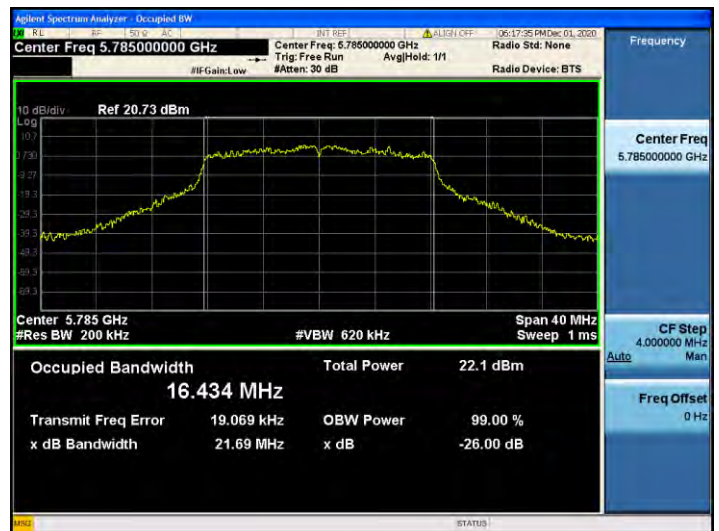
802.11a UNII 2A BAND 26dB Bandwidth (CH 64)



802.11a UNII 2C BAND 26dB Bandwidth (CH 120)



802.11a UNII 3 BAND 26dB Bandwidth (CH 157)



Test Plots(802.11n(HT20))

Note:

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

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 48)



802.11n_HT20 UNII 2A BAND 26dB Bandwidth(CH 60)



802.11n_HT20 UNII 2C BAND 26dB Bandwidth(CH 100)



802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 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 26dB Bandwidth(CH 46)



802.11n_HT40 UNII 2A BAND 26dB Bandwidth (CH 54)



802.11n_HT40 UNII 2C BAND 26dB Bandwidth(CH 102)



802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)

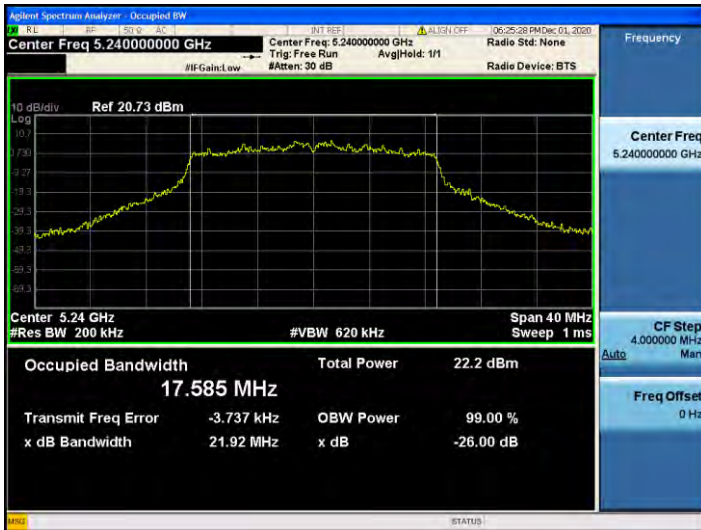


Test Plots(802.11ac(VHT20))

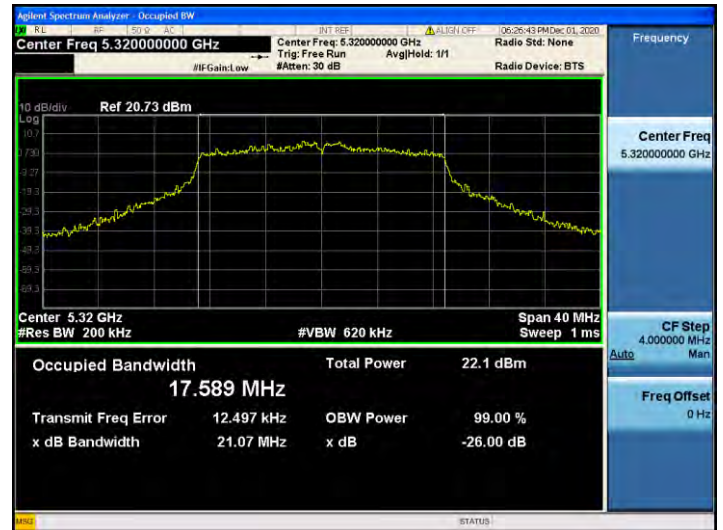
Note:

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

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 48)



802.11ac_VHT20 UNII 2A BAND 26dB Bandwidth(CH 64)



802.11ac_VHT20 UNII 2C BAND 26dB Bandwidth(CH 100)



802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 149)

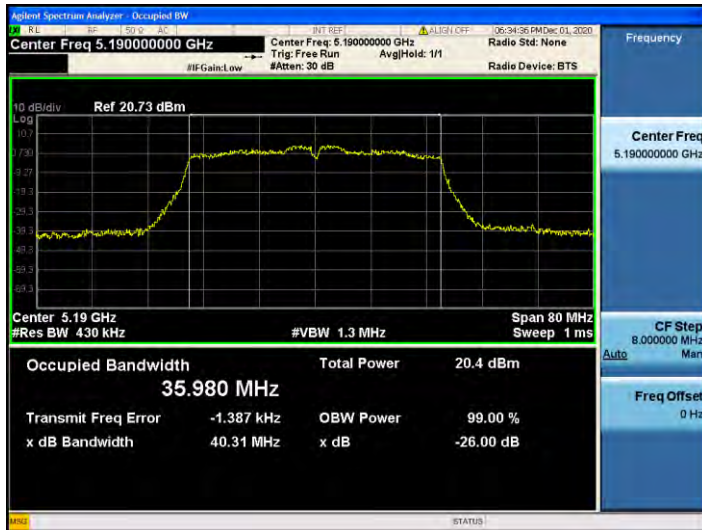


Test Plots(802.11ac(VHT40))

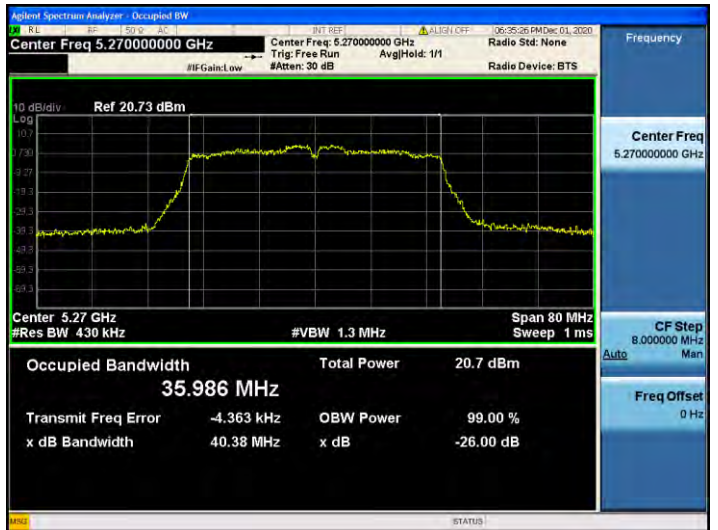
Note:

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

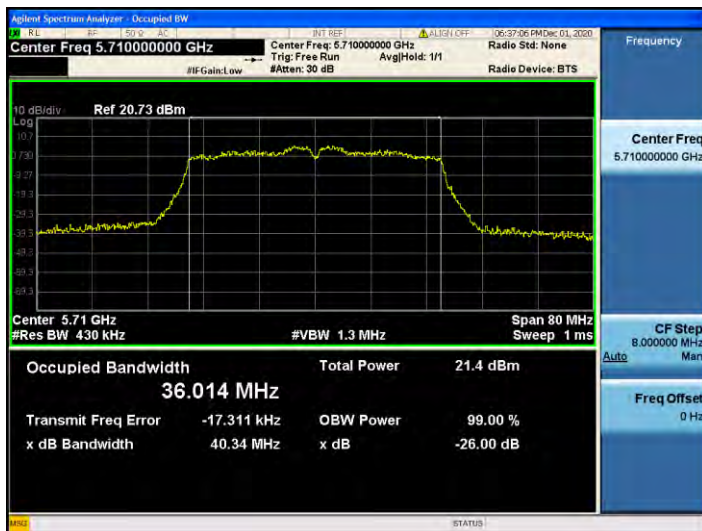
802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 38)



802.11ac_VHT40 UNII 2A BAND 26dB Bandwidth (CH 54)



802.11ac_VHT40 UNII 2C BAND 26dB Bandwidth(CH 142)



802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 151)

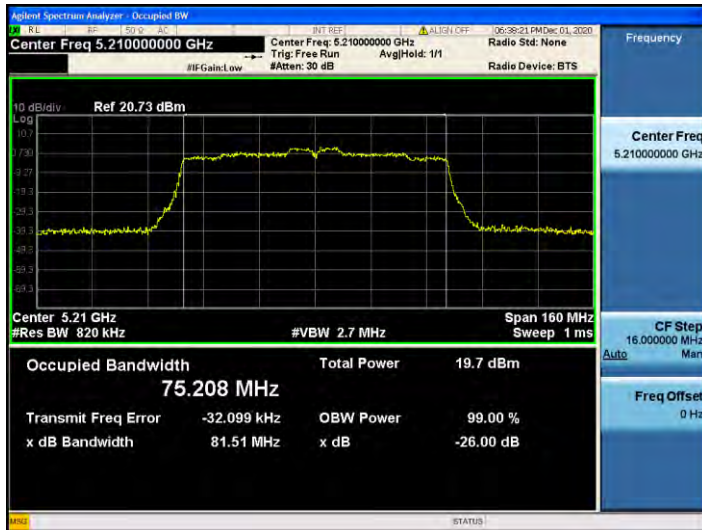


Test Plots(802.11ac(VHT80))

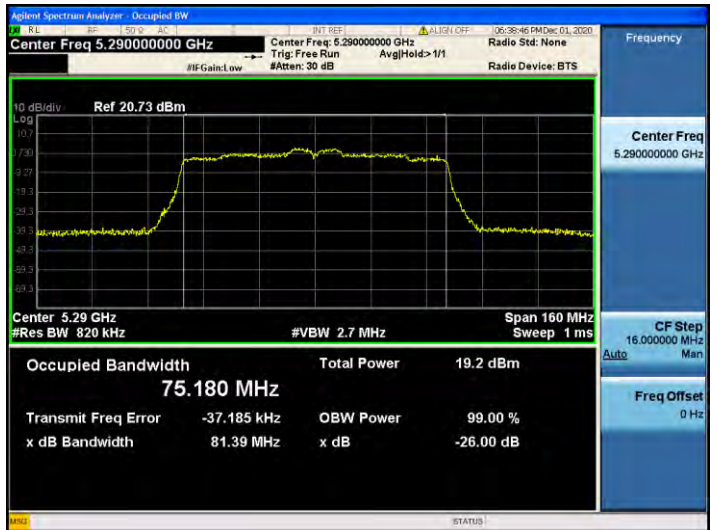
Note:

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

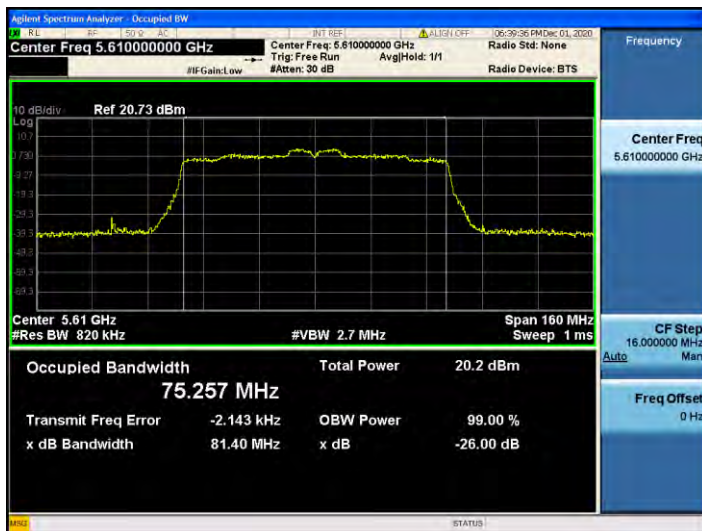
802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)



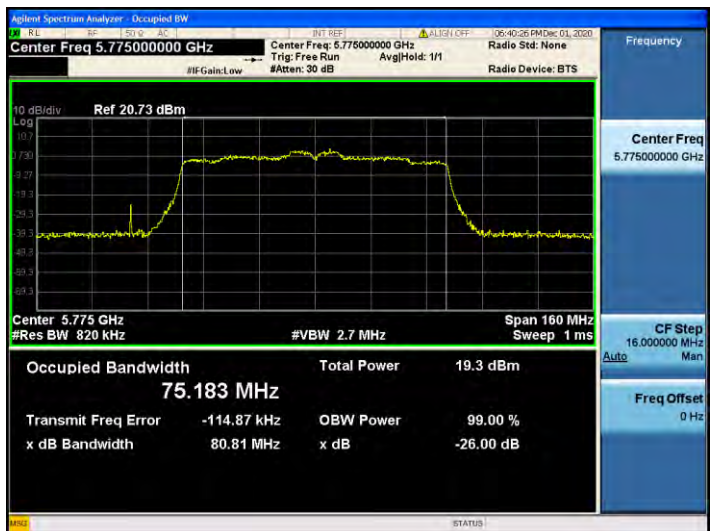
802.11ac_VHT80 UNII 2A BAND 26dB Bandwidth (CH 58)



802.11ac_VHT80 UNII 2C BAND 26dB Bandwidth(CH 122)



802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth (CH 155)



10.3 6dB BANDWIDTH

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	14.98	> 0.5	Pass
5785	157	12.63	> 0.5	Pass
5825	165	12.55	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	15.07	> 0.5	Pass
5785	157	15.11	> 0.5	Pass
5825	165	15.06	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.06	> 0.5	Pass
5795	159	30.11	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	13.82	> 0.5	Pass
5785	157	10.16	> 0.5	Pass
5825	165	11.31	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	33.83	> 0.5	Pass
5795	159	35.07	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	72.53	> 0.5	Pass

☐ Test Plots

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

802.11a (CH.165)



802.11n(HT20) (CH.165)



802.11n(HT40) (CH.159)



802.11ac(VHT20) (CH.157)



802.11ac(VHT40) (CH.151)



802.11ac(VHT80) (CH.155)



10.4 OUTPUT POWER MEASUREMENT

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

Straddle channel data were added in section 10.7.3.

802.11a Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase Datarate (Mbps)
Frequency [MHz]	Channel No.						
5180	36	16	15.62	0.446	16.07	23.98	24
5200	40	16	15.91	0.344	16.26	23.98	18
5240	48	16	16.44	0.344	16.78	23.98	18
5260	52	16	16.49	0.446	16.94	23.98	24
5300	60	16	16.51	0.446	16.96	23.98	24
5320	64	16	16.63	0.344	16.98	23.98	18
5500	100	16	15.17	0.446	15.62	23.98	24
5600	120	16	16.48	0.446	16.93	23.98	24
5720	144	16	16.33	0.344	16.68	23.98	18
5745	149	16	15.63	0.446	16.08	30.00	24
5785	157	16	15.84	0.344	16.18	30.00	18
5825	165	16	16.52	0.446	16.97	30.00	24

802.11n(20MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5180	36	16	15.71	0.312	16.02	23.98	MCS2
5200	40	16	15.85	0.403	16.25	23.98	MCS3
5240	48	16	16.36	0.403	16.76	23.98	MCS3
5260	52	16	16.54	0.312	16.85	23.98	MCS2
5300	60	16	16.51	0.403	16.92	23.98	MCS3
5320	64	16	16.52	0.312	16.83	23.98	MCS2
5500	100	16	15.09	0.403	15.49	23.98	MCS3
5600	120	16	16.48	0.403	16.88	23.98	MCS3
5720	144	16	16.08	0.403	16.48	23.98	MCS3
5745	149	16	15.51	0.403	15.91	30.00	MCS3
5785	157	16	15.69	0.312	16.00	30.00	MCS2
5825	165	16	16.55	0.403	16.96	30.00	MCS3

802.11n(40MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5190	38	15	15.03	0.580	15.61	23.98	MCS2
5230	46	15	15.38	0.580	15.96	23.98	MCS2
5270	54	15	15.25	0.717	15.97	23.98	MCS3
5310	62	15	15.40	0.580	15.98	23.98	MCS2
5510	102	15	13.83	0.717	14.54	23.98	MCS3
5590	118	15	15.35	0.580	15.93	23.98	MCS2
5710	142	15	15.13	0.717	15.85	23.98	MCS3
5755	151	15	14.35	0.717	15.07	30.00	MCS3
5795	159	15	14.68	0.717	15.40	30.00	MCS3

802.11ac(20MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5180	36	16	15.65	0.355	16.05	23.98	MCS3
5200	40	16	15.80	0.398	16.20	23.98	MCS3
5240	48	16	16.40	0.355	16.75	23.98	MCS2
5260	52	16	16.54	0.355	16.89	23.98	MCS2
5300	60	16	16.57	0.355	16.93	23.98	MCS2
5320	64	16	16.52	0.355	16.87	23.98	MCS2
5500	100	16	15.05	0.355	15.41	23.98	MCS2
5600	120	16	16.46	0.355	16.81	23.98	MCS2
5720	144	16	16.10	0.355	16.45	23.98	MCS2
5745	149	16	15.45	0.355	15.80	30.00	MCS2
5785	157	16	15.57	0.355	15.92	30.00	MCS2
5825	165	16	16.54	0.355	16.89	30.00	MCS2

802.11ac(40MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5190	38	15	14.99	0.569	15.56	23.98	MCS2
5230	46	15	15.25	0.700	15.95	23.98	MCS3
5270	54	15	15.28	0.700	15.98	23.98	MCS3
5310	62	15	15.28	0.700	15.98	23.98	MCS3
5510	102	15	13.79	0.700	14.49	23.98	MCS3
5590	118	15	15.22	0.700	15.92	23.98	MCS3
5710	142	15	15.14	0.700	15.84	23.98	MCS3
5755	151	15	14.49	0.569	15.06	30.00	MCS2
5795	159	15	14.74	0.700	15.44	30.00	MCS3

802.11ac(80MHz) Mode		Power Level Setting	Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)	Worstcase MCS Index
Frequency [MHz]	Channel No.						
5210	42	11.5	11.34	1.154	12.49	23.98	MCS3
5290	58	12	11.89	0.969	12.86	23.98	MCS2
5530	106	12	10.94	1.154	12.09	23.98	MCS3
5610	122	11.5	11.50	1.154	12.65	23.98	MCS3
5690	138	12	11.89	0.969	12.86	23.98	MCS2
5775	155	12	11.18	0.969	12.14	30.00	MCS2

10.5 POWER SPECTRAL DENSITY

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Worstcase Datarate (Mbps)	Limit
Frequency [MHz]	Channel No.					
5180	36	6.528	0.446	6.974	24	11 dBm/MHz
5200	40	6.519	0.344	6.863	18	
5240	48	6.918	0.344	7.262	18	
5260	52	7.777	0.446	8.223	24	
5300	60	7.559	0.446	8.005	24	
5320	64	7.366	0.344	7.710	18	
5500	100	6.665	0.446	7.111	24	
5600	120	7.884	0.446	8.330	24	
5720	144	7.391	0.344	7.735	18	
5745	149	4.351	0.446	4.797	24	30 dBm/500kHz
5785	157	4.245	0.344	4.589	18	
5825	165	5.210	0.446	5.656	24	

802.11n(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	5.904	0.312	6.216	MCS2	11 dBm/MHz
5200	40	6.066	0.403	6.469	MCS3	
5240	48	6.336	0.403	6.739	MCS3	
5260	52	7.400	0.312	7.712	MCS2	
5300	60	7.672	0.403	8.075	MCS3	
5320	64	6.930	0.312	7.242	MCS2	
5500	100	6.305	0.403	6.708	MCS3	
5600	120	7.327	0.403	7.730	MCS3	
5720	144	7.414	0.403	7.817	MCS3	
5745	149	3.635	0.403	4.038	MCS3	30 dBm/500 kHz
5785	157	4.250	0.312	4.562	MCS2	
5825	165	4.892	0.403	5.295	MCS3	

802.11n(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	2.363	0.580	2.943	MCS2	11 dBm/MHz
5230	46	2.692	0.580	3.272	MCS2	
5270	54	3.818	0.717	4.535	MCS3	
5310	62	3.618	0.580	4.198	MCS2	
5510	102	2.270	0.717	2.987	MCS3	
5590	118	3.640	0.580	4.220	MCS2	
5710	142	3.791	0.717	4.508	MCS3	
5755	151	0.280	0.717	0.997	MCS3	30 dBm /500kHz
5795	159	0.155	0.717	0.872	MCS3	

802.11ac(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5180	36	6.120	0.355	6.475	MCS3	11 dBm/MHz
5200	40	6.089	0.355	6.444	MCS3	
5240	48	6.656	0.355	7.011	MCS2	
5260	52	7.600	0.355	7.955	MCS2	
5300	60	7.466	0.355	7.821	MCS2	
5320	64	7.186	0.355	7.541	MCS2	
5500	100	6.020	0.355	6.375	MCS2	
5600	120	7.371	0.355	7.726	MCS2	
5720	144	6.968	0.355	7.323	MCS2	
5745	149	3.832	0.355	4.187	MCS2	30 dBm/500kHz
5785	157	3.917	0.355	4.272	MCS2	
5825	165	5.062	0.355	5.417	MCS2	

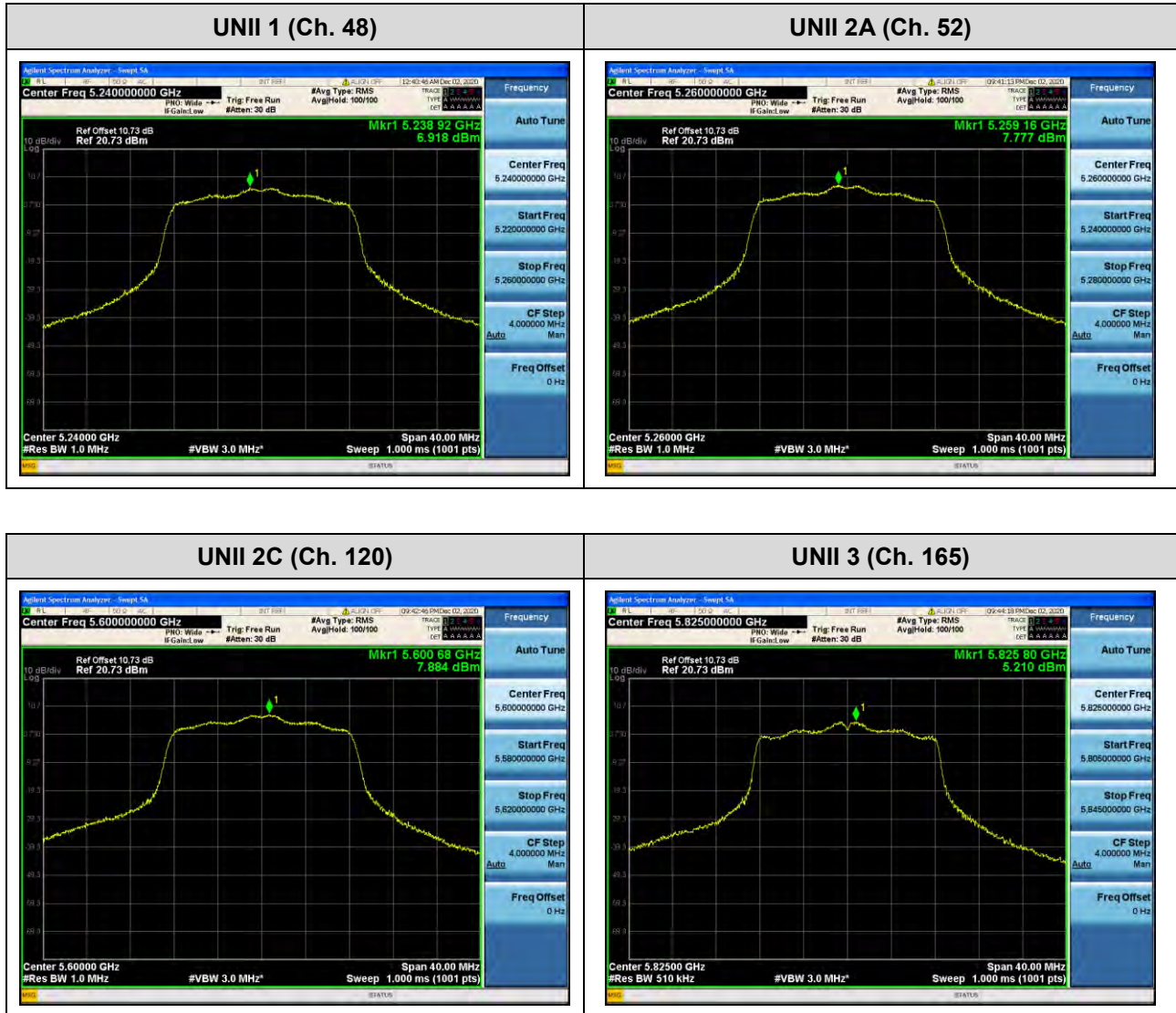
802.11ac(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5190	38	1.333	0.569	1.902	MCS2	11 dBm/MHz
5230	46	1.678	0.700	2.378	MCS3	
5270	54	3.615	0.700	4.315	MCS3	
5310	62	3.875	0.700	4.575	MCS3	
5510	102	2.117	0.700	2.817	MCS3	
5590	118	3.491	0.700	4.191	MCS3	
5710	142	3.725	0.700	4.425	MCS3	30 dBm/500kHz
5755	151	0.065	0.569	0.634	MCS2	
5795	159	0.474	0.700	1.174	MCS3	

802.11ac(80MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Worstcase MCS Index	Limit
Frequency [MHz]	Channel No.					
5210	42	-3.434	1.154	-2.280	MCS3	11 dBm/MHz
5290	58	-2.907	0.969	-1.938	MCS2	
5530	106	-3.644	1.154	-2.490	MCS3	
5610	122	-2.306	1.154	-1.152	MCS3	
5690	138	-2.389	0.969	-1.420	MCS2	
5775	155	-6.416	0.969	-5.447	MCS2	30 dBm/500kHz

■ Test Plots(802.11a)

Note:

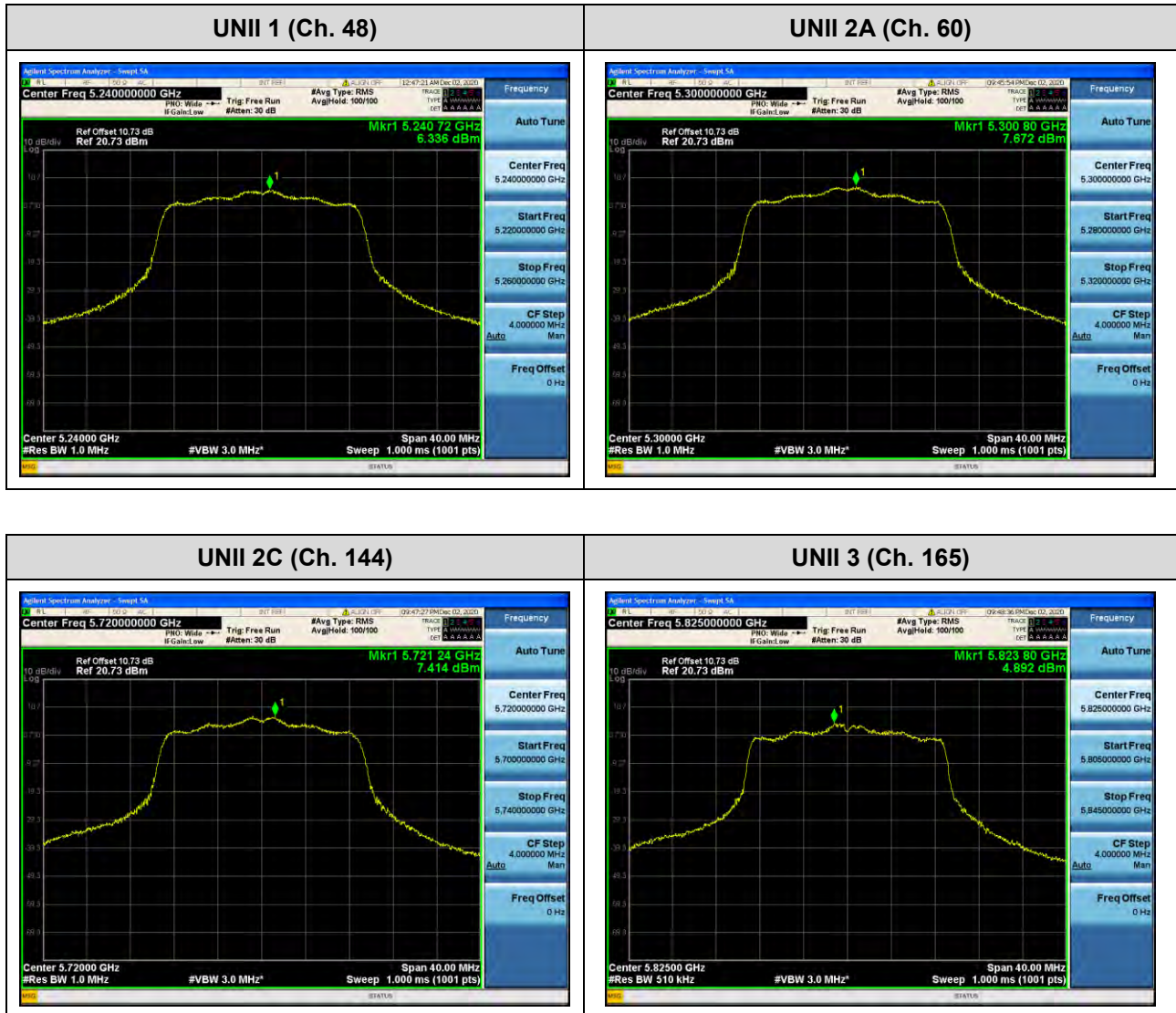
In order to simplify the report, attached plots were only channel of highest power.



□ Test Plots(802.11n(HT20))

Note:

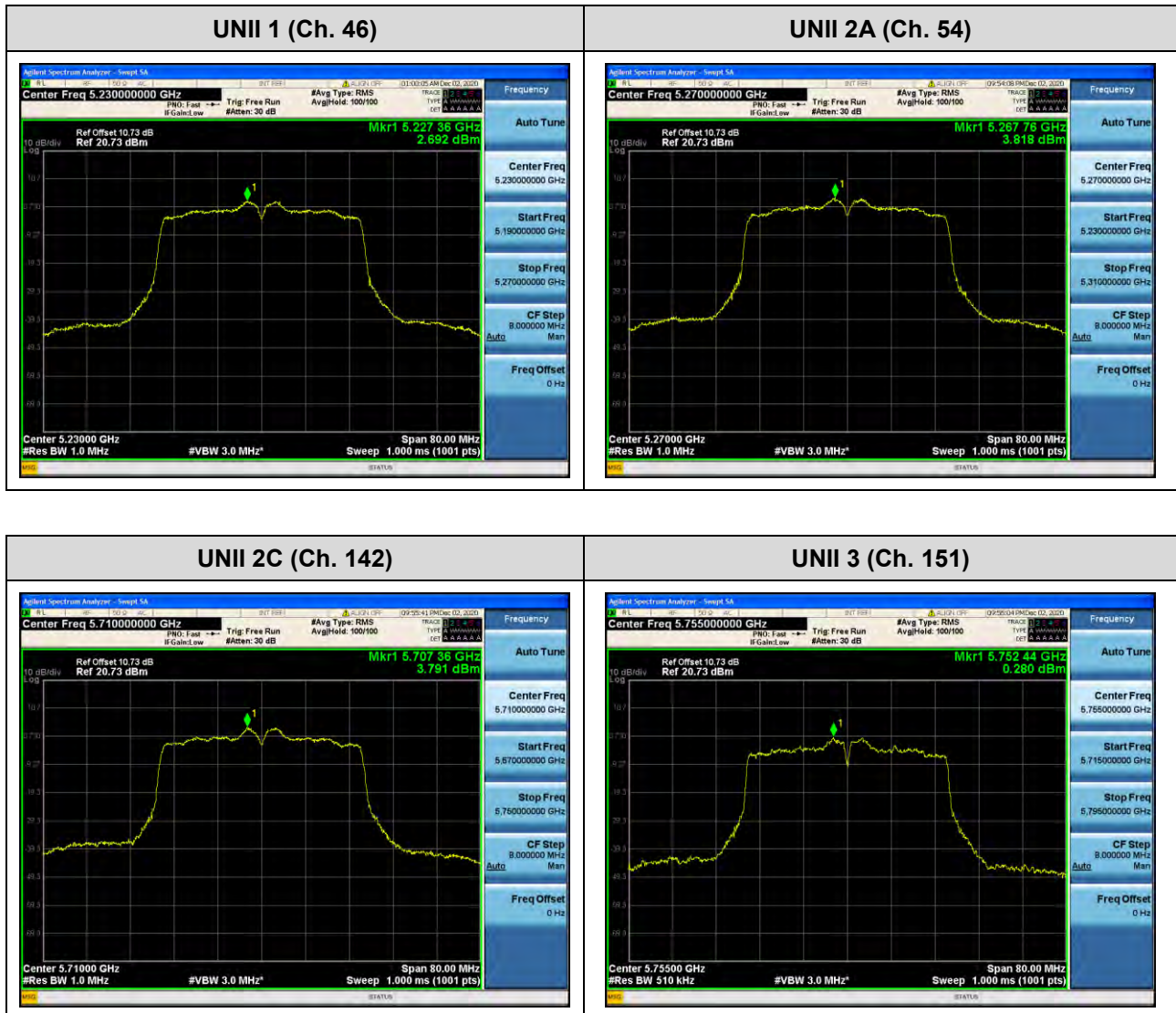
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11n(HT40))

Note:

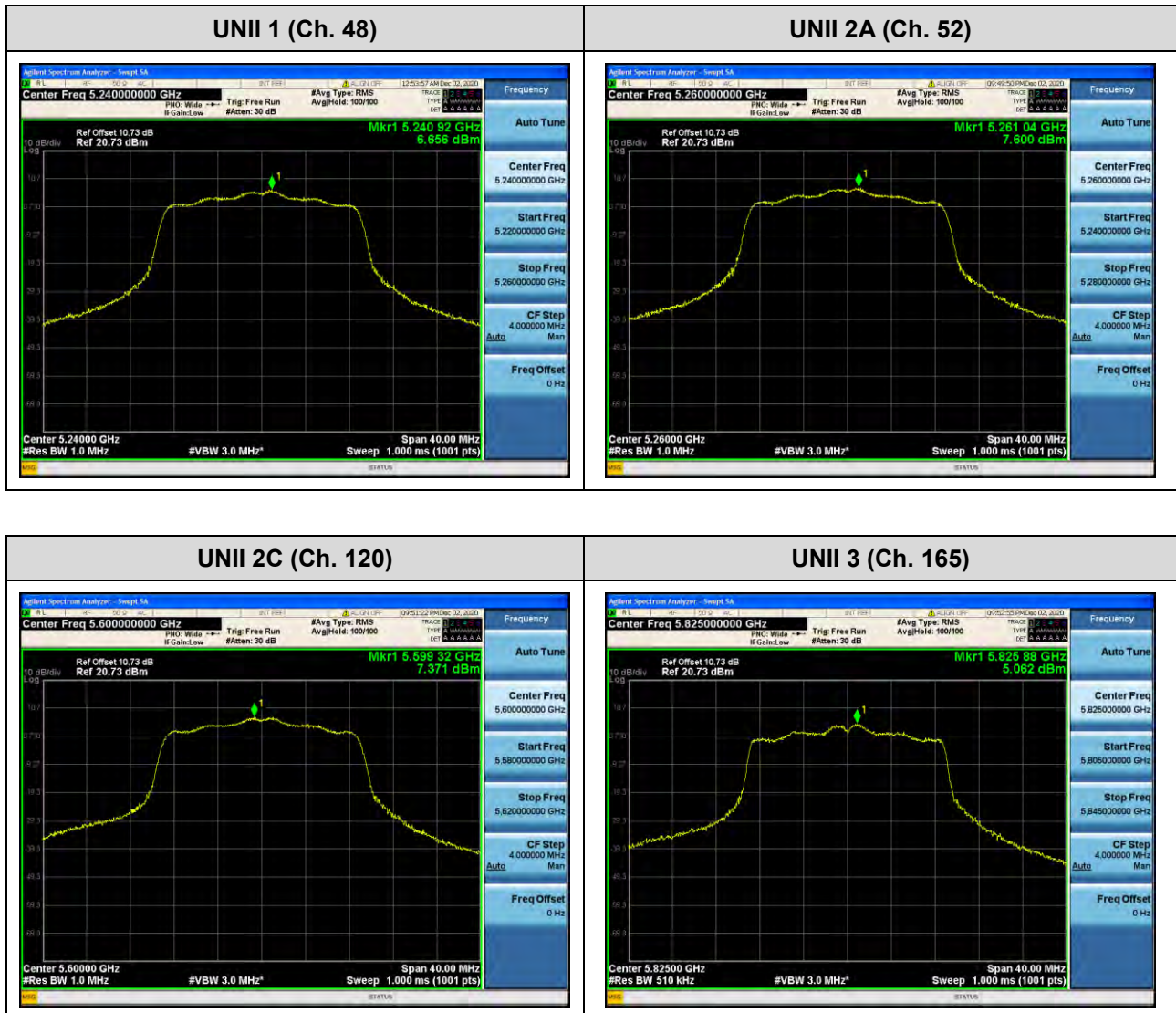
In order to simplify the report, attached plots were only channel of highest power.



☐ Test Plots(802.11ac(VHT20))

Note:

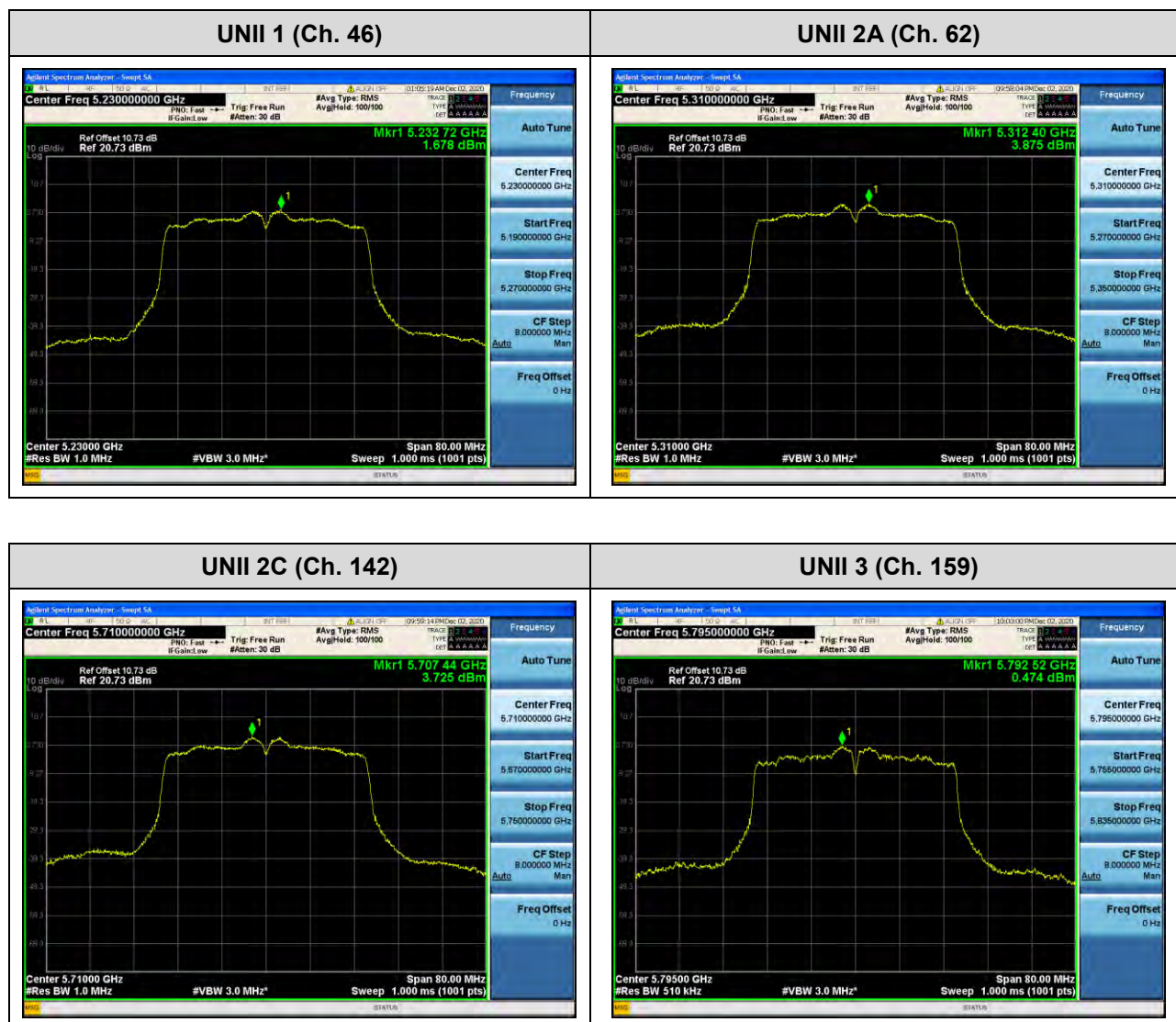
In order to simplify the report, attached plots were only channel of highest power.



☐ 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 80MHz BW

Startup after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210076.13	76.13
100%		-30	5210067.68	67.68
100%		-20	5210039.80	39.80
100%		-10	5210079.06	79.06
100%		0	5210039.80	39.80
100%		+10	5210098.76	98.76
100%		+30	5210014.70	14.70
100%		+40	5210018.47	18.47
100%		+50	5210093.86	93.86
Batt. Endpoint	3.40	+20	5210015.25	15.25

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290090.64	90.64
100%		-30	5290094.06	94.06
100%		-20	5290060.02	60.02
100%		-10	5290045.91	45.91
100%		0	5290020.22	20.22
100%		+10	5290053.49	53.49
100%		+30	5290006.54	6.54
100%		+40	5290044.36	44.36
100%		+50	5290078.73	78.73
Batt. Endpoint	3.40	+20	5290025.32	25.32

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530066.98	66.98
100%		-30	5530034.97	34.97
100%		-20	5530024.47	24.47
100%		-10	5530057.58	57.58
100%		0	5530055.96	55.96
100%		+10	5530062.45	62.45
100%		+30	5530026.70	26.70
100%		+40	5530020.98	20.98
100%		+50	5530032.13	32.13
Batt. Endpoint	3.40	+20	5530060.83	60.83

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775054.43	54.43
100%		-30	5775094.34	94.34
100%		-20	5775092.84	92.84
100%		-10	5775051.89	51.89
100%		0	5775097.06	97.06
100%		+10	5775064.26	64.26
100%		+30	5775078.20	78.20
100%		+40	5775098.24	98.24
100%		+50	5775098.61	98.61
Batt. Endpoint	3.40	+20	5775032.91	32.91

Note:

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

2 minutes after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210053.21	53.21
100%		-30	5210020.39	20.39
100%		-20	5210095.10	95.10
100%		-10	5210002.51	2.51
100%		0	5210074.13	74.13
100%		+10	5210065.35	65.35
100%		+30	5210047.19	47.19
100%		+40	5210035.71	35.71
100%		+50	5210018.09	18.09
Batt. Endpoint	3.40	+20	5210041.84	41.84

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290069.65	69.65
100%		-30	5290057.35	57.35
100%		-20	5290049.50	49.50
100%		-10	5290066.36	66.36
100%		0	5290009.03	9.03
100%		+10	5290074.47	74.47
100%		+30	5290002.26	2.26
100%		+40	5290006.31	6.31
100%		+50	5290090.66	90.66
Batt. Endpoint	3.40	+20	5290074.40	74.40

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530010.47	10.47
100%		-30	5530046.19	46.19
100%		-20	5530084.67	84.67
100%		-10	5530058.73	58.73
100%		0	5530061.55	61.55
100%		+10	5530009.52	9.52
100%		+30	5530052.11	52.11
100%		+40	5530075.89	75.89
100%		+50	5530057.27	57.27
Batt. Endpoint	3.40	+20	5530035.35	35.35

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775012.26	12.26
100%		-30	5775073.87	73.87
100%		-20	5775039.71	39.71
100%		-10	5775098.96	98.96
100%		0	5775036.88	36.88
100%		+10	5775069.11	69.11
100%		+30	5775018.97	18.97
100%		+40	5775082.04	82.04
100%		+50	5775077.22	77.22
Batt. Endpoint	3.40	+20	5775048.24	48.24

Note:

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

5 minutes after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210086.69	86.69
100%		-30	5210021.60	21.60
100%		-20	5210011.34	11.34
100%		-10	5210023.97	23.97
100%		0	5210097.11	97.11
100%		+10	5210037.60	37.60
100%		+30	5210090.12	90.12
100%		+40	5210018.69	18.69
100%		+50	5210064.40	64.40
Batt. Endpoint	3.40	+20	5210007.65	7.65

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290058.37	58.37
100%		-30	5290067.39	67.39
100%		-20	5290042.18	42.18
100%		-10	5290086.45	86.45
100%		0	5290009.81	9.81
100%		+10	5290098.74	98.74
100%		+30	5290043.14	43.14
100%		+40	5290037.25	37.25
100%		+50	5290007.15	7.15
Batt. Endpoint	3.40	+20	5290029.32	29.32

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530070.19	70.19
100%		-30	5530079.24	79.24
100%		-20	5530015.31	15.31
100%		-10	5530040.95	40.95
100%		0	5530049.48	49.48
100%		+10	5530075.65	75.65
100%		+30	5530079.85	79.85
100%		+40	5530087.28	87.28
100%		+50	5530077.58	77.58
Batt. Endpoint	3.40	+20	5530048.08	48.08

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775053.48	53.48
100%		-30	5775040.95	40.95
100%		-20	5775035.60	35.60
100%		-10	5775060.97	60.97
100%		0	5775003.62	3.62
100%		+10	5775001.95	1.95
100%		+30	5775098.38	98.38
100%		+40	5775019.45	19.45
100%		+50	5775013.05	13.05
Batt. Endpoint	3.40	+20	5775087.40	87.40

Note:

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

10 minutes after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5210042.68	42.68
100%		-30	5210092.05	92.05
100%		-20	5210047.72	47.72
100%		-10	5210097.24	97.24
100%		0	5210002.13	2.13
100%		+10	5210034.57	34.57
100%		+30	5210083.85	83.85
100%		+40	5210078.26	78.26
100%		+50	5210055.94	55.94
Batt. Endpoint	3.40	+20	5210073.66	73.66

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5290083.46	83.46
100%		-30	5290064.62	64.62
100%		-20	5290061.96	61.96
100%		-10	5290013.43	13.43
100%		0	5290038.89	38.89
100%		+10	5290090.50	90.50
100%		+30	5290007.80	7.80
100%		+40	5290096.55	96.55
100%		+50	5290034.23	34.23
Batt. Endpoint	3.40	+20	5290021.79	21.79

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5530043.29	43.29
100%		-30	5530023.89	23.89
100%		-20	5530026.48	26.48
100%		-10	5530015.10	15.10
100%		0	5530019.20	19.20
100%		+10	5530042.34	42.34
100%		+30	5530012.22	12.22
100%		+40	5530033.46	33.46
100%		+50	5530048.98	48.98
Batt. Endpoint	3.40	+20	5530031.46	31.46

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	3.86	+20(Ref)	5775091.88	91.88
100%		-30	5775034.42	34.42
100%		-20	5775046.20	46.20
100%		-10	5775073.34	73.34
100%		0	5775004.76	4.76
100%		+10	5775030.32	30.32
100%		+30	5775090.19	90.19
100%		+40	5775094.43	94.43
100%		+50	5775082.61	82.61
Batt. Endpoint	3.40	+20	5775099.09	99.09

Note:

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

10.7 STRADDLE CHANNEL

10.7.1 26dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5710.64	14.36
802.11n(HT20)				5709.92	15.08
802.11ac(VHT20)				5710.12	14.88
802.11a	UNII 3	5720	144	5729.48	4.48
802.11n(HT20)				5729.84	4.84
802.11ac(VHT20)				5729.88	4.88

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5690.16	34.84
802.11ac(VHT40)				5690.48	34.52
802.11n(HT40)	UNII 3	5710	142	5729.92	4.92
802.11ac(VHT40)				5729.92	4.92

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.84	75.16
	UNII 3	5690	138	5730.80	5.80

Note:

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

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

□ Test Plots (26dB Bandwidth)

802.11a UNII Band



802.11n(HT20) UNII Band



802.11ac(VHT20) UNII Band



□ Test Plots (26dB Bandwidth)

802.11n(HT40) UNII Band



802.11ac(VHT40) UNII Band



802.11ac(VHT80) UNII Band



10.7.2 6dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5727.56	2.56	> 0.5
802.11n(HT20)				5728.48	3.48	> 0.5
802.11ac(VHT20)				5727.56	2.56	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5727.60	2.60	> 0.5
802.11ac(VHT40)				5727.68	2.68	> 0.5

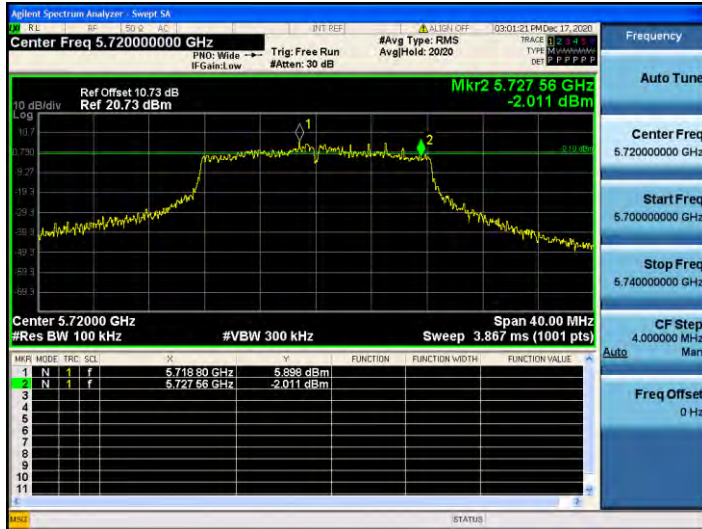
Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
802.11ac(VHT80)	UNII 3	5690	138	5727.76	2.76	> 0.5

Note:

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

Test Plots(UNII 3 Band 6dB Bandwidth)

802.11a CH.144



802.11n_HT20 CH.144



802.11ac_VHT20 CH.144



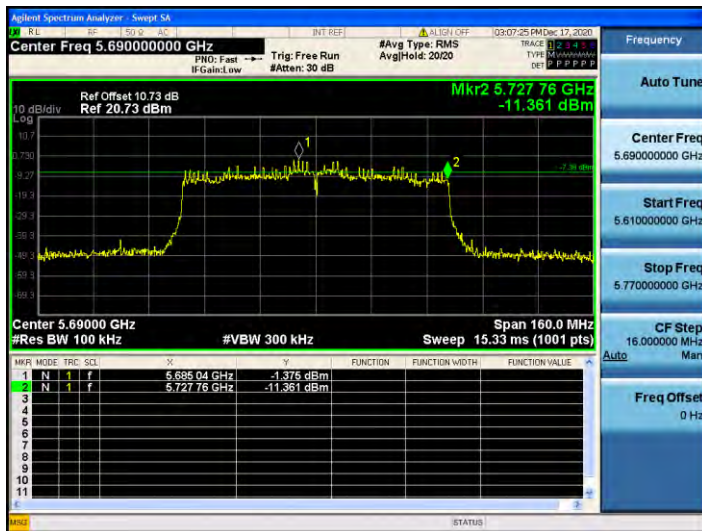
802.11n_HT40 CH.142



802.11ac_VHT40 CH.142



802.11ac_VHT80 CH.138



10.7.3 Output Power

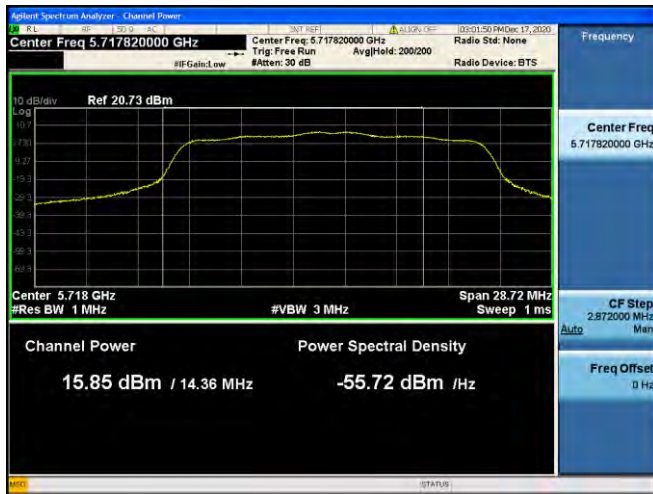
Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)	Worstcase Datarate
802.11a	5720	144	15.85	0.344	16.20	22.57	18 Mbps
802.11n(HT20)	(UNII 2C		15.56	0.403	15.96	22.78	MCS3
802.11ac(VHT20)	Band)		15.66	0.355	16.01	22.73	MCS2
802.11a	5720	144	7.62	0.344	7.97	30.00	18 Mbps
802.11n(HT20)	(UNII 3		7.78	0.403	8.18	30.00	MCS3
802.11ac(VHT20)	Band)		7.91	0.355	8.27	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	14.97	0.717	15.69	23.98	MCS3
802.11ac(VHT40)	(UNII 2C Band)		14.90	0.700	15.60	23.98	MCS3
802.11n(HT40)	5710	142	2.09	0.717	2.81	30.00	MCS3
802.11ac(VHT40)	(UNII 3 Band)		2.03	0.700	2.73	30.00	MCS3

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	11.83	0.969	12.80	23.98	MCS2
	5690 (UNII 3 Band)	138	-4.28	0.969	-3.31	30.00	MCS2

☐ Test Plots

802.11a UNII 2C Band



802.11a UNII 3 Band



802.11n(HT20) UNII 2C Band



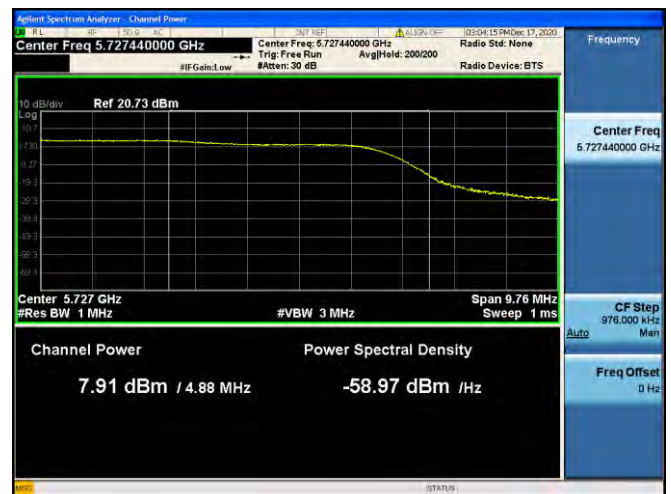
802.11n(HT20) UNII 3 Band



802.11ac(VHT20) UNII 2C Band



802.11ac(VHT20) UNII 3 Band



802.11n(HT40) UNII 2C Band



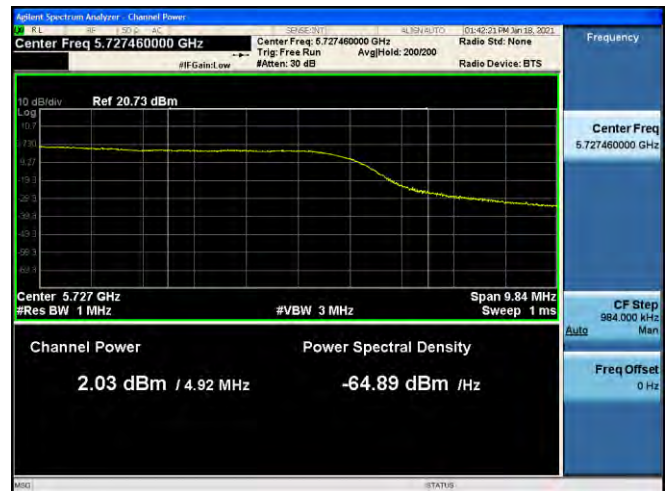
802.11n(HT40) UNII 3 Band



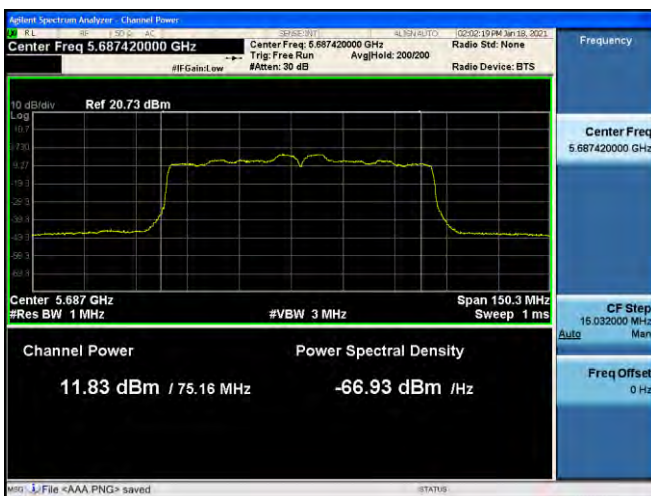
802.11ac(VHT40) UNII 2C Band



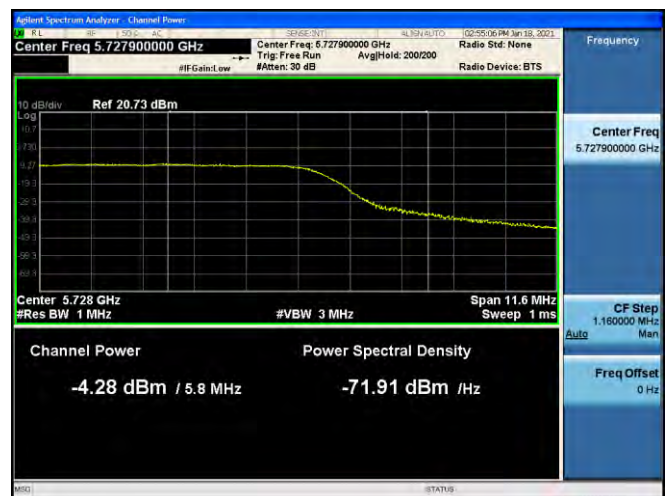
802.11ac(VHT40) UNII 3 Band



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	7.812	0.344	8.156	11dBm/ MHz	18 Mbps
802.11n(HT20)	(UNII 2C		7.393	0.403	7.796		MCS3
802.11ac(VHT20)	Band)		7.296	0.355	7.651		MCS2
802.11a	5720 (UNII 3 Band)	144	1.975	0.344	2.319	30 dB	18 Mbps
802.11n(HT20)			1.405	0.403	1.808	m/500k	MCS3
802.11ac(VHT20)			1.660	0.355	2.015	Hz	MCS2

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)	Worstcase Datarate
802.11n(HT40)	5710	142	3.514	0.717	4.231	11dBm/ MHz	MCS3
802.11ac(VHT40)	(UNII 2C Band)		3.737	0.700	4.437		MCS3
802.11n(HT40)	5710	142	-4.616	0.717	-3.899	30 dBm	MCS3
802.11ac(VHT40)	(UNII 3 Band)		-4.441	0.700	-3.741	/ 500kHz	MCS3

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)	Worstcase Datarate
802.11ac(VHT80)	5690 (UNII 2C Band)	138	-2.518	0.969	-1.549	11dBm/ MHz	MCS2
	5690 (UNII 3 Band)	138	-10.221	0.969	-9.252	30 dBm/ 500kHz	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



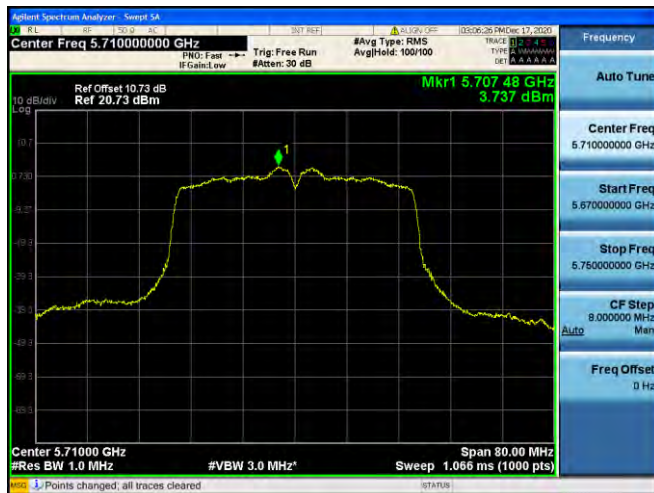
802.11n(HT40) UNII 2C Band



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



10.8 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

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

Note:

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

Frequency Range : Below 1 GHz

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

Note:

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

Frequency Range : Above 1 GHz

Band : UNII 1

Operation Mode: 802.11 a

Transfer Rate: 6 Mbps

Operating Frequency 5180 MHz

Channel No. 36 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	60.10	0.49	V	60.59	68.20	7.61	PK
15540	48.46	2.62	V	51.08	73.98	22.90	PK
15540	35.98	2.62	V	38.60	53.98	15.38	AV
10360	59.79	0.49	H	60.28	68.20	7.92	PK
15540	47.44	2.62	H	50.06	73.98	23.92	PK
15540	35.86	2.62	H	38.48	53.98	15.50	AV

Band : UNII 1

Operation Mode: 802.11 a

Transfer Rate: 6 Mbps

Operating Frequency 5200 MHz

Channel No. 40 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	59.02	1.38	V	60.40	68.20	7.80	PK
15600	48.19	1.50	V	49.69	73.98	24.29	PK
15600	35.29	1.50	V	36.79	53.98	17.19	AV
10400	58.51	1.38	H	59.89	68.20	8.31	PK
15600	49.16	1.50	H	50.66	73.98	23.32	PK
15600	35.39	1.50	H	36.89	53.98	17.09	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	61.58	-0.33	V	61.25	68.20	6.95	PK
15720	49.10	0.56	V	49.66	73.98	24.32	PK
15720	35.77	0.56	V	36.33	53.98	17.65	AV
10480	60.57	-0.33	H	60.24	68.20	7.96	PK
15720	48.71	0.56	H	49.27	73.98	24.71	PK
15720	35.66	0.56	H	36.22	53.98	17.76	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10520	62.46	-0.06	V	62.40	68.20	5.80	PK
15780	49.30	0.96	V	50.26	73.98	23.72	PK
15780	36.10	0.96	V	37.06	53.98	16.92	AV
10520	61.03	-0.06	H	60.97	68.20	7.23	PK
15780	48.61	0.96	H	49.57	73.98	24.41	PK
15780	35.84	0.96	H	36.80	53.98	17.18	AV

Band : UNII 2A

Operation Mode: 802.11 a

Transfer Rate: 6 Mbps

Operating Frequency 5300 MHz

Channel No. 60 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10600	61.35	-0.18	V	61.17	73.98	12.81	PK
10600	47.70	-0.18	V	47.52	53.98	6.46	AV
15900	48.76	-0.13	V	48.63	73.98	25.35	PK
15900	36.42	-0.13	V	36.29	53.98	17.69	AV
10600	57.52	-0.18	H	57.34	73.98	16.64	PK
10600	44.32	-0.18	H	44.14	53.98	9.84	AV
15900	48.51	-0.13	H	48.38	73.98	25.60	PK
15900	36.39	-0.13	H	36.26	53.98	17.72	AV

Band : UNII 2A

Operation Mode: 802.11 a

Transfer Rate: 6 Mbps

Operating Frequency 5320 MHz

Channel No. 64 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10640	61.03	-0.04	V	60.99	73.98	12.99	PK
10640	47.38	-0.04	V	47.34	53.98	6.64	AV
15960	48.82	-0.36	V	48.46	73.98	25.52	PK
15960	35.84	-0.36	V	35.48	53.98	18.50	AV
10640	57.77	-0.04	H	57.73	73.98	16.25	PK
10640	44.78	-0.04	H	44.74	53.98	9.24	AV
15960	49.39	-0.36	H	49.03	73.98	24.95	PK
15960	35.78	-0.36	H	35.42	53.98	18.56	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11000	53.89	1.75	V	55.64	73.98	18.34	PK
11000	40.73	1.75	V	42.48	53.98	11.50	AV
16500	48.24	1.06	V	49.30	68.20	18.90	PK
11000	56.23	1.75	H	57.98	73.98	16.00	PK
11000	42.62	1.75	H	44.37	53.98	9.61	AV
16500	47.91	1.06	H	48.97	68.20	19.23	PK

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11200	55.31	0.26	V	55.57	73.98	18.41	PK
11200	42.10	0.26	V	42.36	53.98	11.62	AV
16800	48.79	3.41	V	52.20	68.20	16.00	PK
11200	55.46	0.26	H	55.72	73.98	18.26	PK
11200	42.23	0.26	H	42.49	53.98	11.49	AV
16800	48.76	3.41	H	52.17	68.20	16.03	PK

Band : UNII 2C

Operation Mode: 802.11 a

Transfer Rate: 6 Mbps

Operating Frequency 5720 MHz

Channel No. 144 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11440	53.17	0.74	V	53.91	73.98	20.07	PK
11440	40.55	0.74	V	41.29	53.98	12.69	AV
17160	48.88	5.47	V	54.35	68.20	13.85	PK
11440	52.66	0.74	H	53.40	73.98	20.58	PK
11440	40.01	0.74	H	40.75	53.98	13.23	AV
17160	48.20	5.47	H	53.67	68.20	14.53	PK

Band : UNII 3

Operation Mode: 802.11 a

Transfer Rate: 6 Mbps

Operating Frequency 5745MHz

Channel No. 149 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	51.81	0.57	V	52.38	73.98	21.60	PK
11490	39.07	0.57	V	39.64	53.98	14.34	AV
17235	49.29	5.22	V	54.51	68.20	13.69	PK
11490	51.52	0.57	H	52.09	73.98	21.89	PK
11490	38.54	0.57	H	39.11	53.98	14.87	AV
17235	48.79	5.22	H	54.01	68.20	14.19	PK

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	50.76	0.73	V	51.49	73.98	22.49	PK
11570	38.57	0.73	V	39.30	53.98	14.68	AV
17355	49.50	6.04	V	55.54	68.20	12.66	PK
11570	51.73	0.73	H	52.46	73.98	21.52	PK
11570	39.35	0.73	H	40.08	53.98	13.90	AV
17355	49.35	6.04	H	55.39	68.20	12.81	PK

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L. -A.G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	51.02	-0.65	V	50.37	73.98	23.61	PK
11650	39.24	-0.65	V	38.59	53.98	15.39	AV
17475	48.55	7.62	V	56.17	68.20	12.03	PK
11650	52.53	-0.65	H	51.88	73.98	22.10	PK
11650	40.01	-0.65	H	39.36	53.98	14.62	AV
17475	48.97	7.62	H	56.59	68.20	11.61	PK

Note:

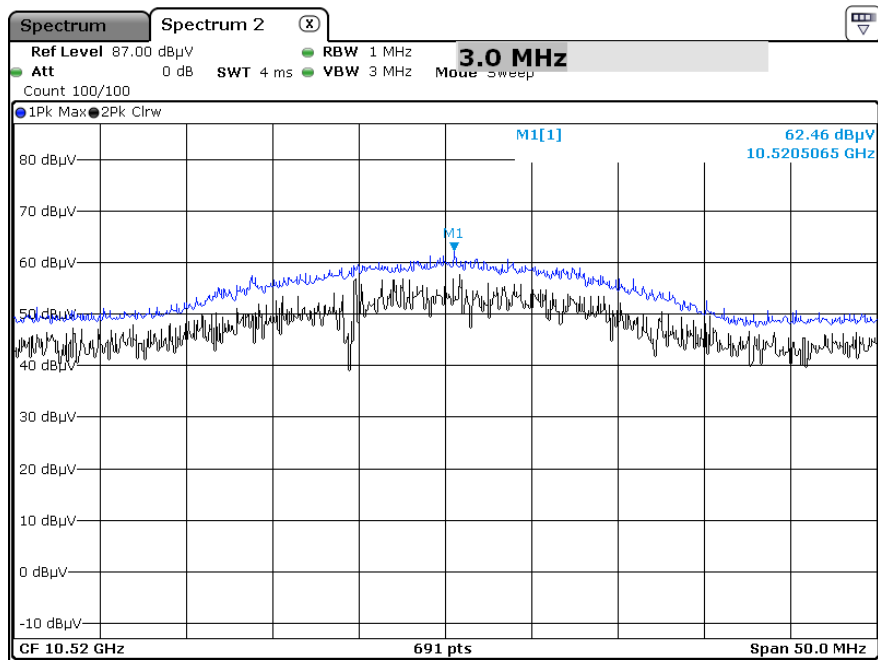
All Modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

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

■ Test Plots

Peak Reading (802.11a, Ch.52 2nd Harmonic, 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]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	56.05	5.75	H	61.80	73.98	12.18	PK
5150	36.34	5.75	H	42.09	53.98	11.89	AV
5150	58.39	5.75	V	64.14	73.98	9.84	PK
5150	36.04	5.75	V	41.79	53.98	12.19	AV

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	57.82	5.52	H	63.34	73.98	10.64	PK
5350	36.38	5.52	H	41.9	53.98	12.08	AV
5350	55.92	5.52	V	61.44	73.98	12.54	PK
5350	35.07	5.52	V	40.59	53.98	13.39	AV

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

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	53.91	7.05	H	60.96	73.98	13.02	PK
5460	33.20	7.05	H	40.25	53.98	13.73	AV
5470	59.34	6.59	H	65.93	68.20	2.27	PK
5460	52.59	7.05	V	59.64	73.98	14.34	PK
5460	32.31	7.05	V	39.36	53.98	14.62	AV
5470	57.12	6.59	V	63.71	68.20	4.49	PK

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	55.84	5.75	H	61.59	73.98	12.39	PK
5150	37.11	5.75	H	42.86	53.98	11.12	AV
5150	59.24	5.75	V	64.99	73.98	8.99	PK
5150	36.69	5.75	V	42.44	53.98	11.54	AV

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	57.68	5.52	H	63.20	73.98	10.78	PK
5350	36.57	5.52	H	42.09	53.98	11.89	AV
5350	56.55	5.52	V	62.07	73.98	11.91	PK
5350	35.89	5.52	V	41.41	53.98	12.57	AV

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

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	54.47	7.05	H	61.52	73.98	12.46	PK
5460	33.19	7.05	H	40.24	53.98	13.74	AV
5470	59.37	6.59	H	65.96	68.20	2.24	PK
5460	52.31	7.05	V	59.36	73.98	14.62	PK
5460	32.45	7.05	V	39.5	53.98	14.48	AV
5470	57.15	6.59	V	63.74	68.20	4.46	PK

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	52.64	5.75	H	58.39	73.98	15.59	PK
5150	36.85	5.75	H	42.6	53.98	11.38	AV
5150	57.45	5.75	V	63.2	73.98	10.78	PK
5150	36.80	5.75	V	42.55	53.98	11.43	AV

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	57.75	5.52	H	63.27	73.98	10.71	PK
5350	36.27	5.52	H	41.79	53.98	12.19	AV
5350	56.61	5.52	V	62.13	73.98	11.85	PK
5350	35.78	5.52	V	41.3	53.98	12.68	AV

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

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	52.33	7.05	H	59.38	73.98	14.60	PK
5460	33.24	7.05	H	40.29	53.98	13.69	AV
5470	59.05	6.59	H	65.64	68.20	2.56	PK
5460	51.80	7.05	V	58.85	73.98	15.13	PK
5460	32.67	7.05	V	39.72	53.98	14.26	AV
5470	56.58	6.59	V	63.17	68.20	5.03	PK

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	50.11	12.72	H	62.83	73.98	11.15	PK
5150	38.08	12.72	H	50.8	53.98	3.18	AV
5150	50.15	12.72	V	62.87	73.98	11.11	PK
5150	37.78	12.72	V	50.5	53.98	3.48	AV

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	52.61	12.38	H	64.99	73.98	8.99	PK
5350	37.45	12.38	H	49.83	53.98	4.15	AV
5350	52.34	12.38	V	64.72	73.98	9.26	PK
5350	37.11	12.38	V	49.49	53.98	4.49	AV

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

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	48.86	13.91	H	62.77	73.98	11.21	PK
5460	33.90	13.91	H	47.81	53.98	6.17	AV
5470	51.65	13.46	H	65.11	68.20	3.09	PK
5460	48.54	13.91	V	62.45	73.98	11.53	PK
5460	33.26	13.91	V	47.17	53.98	6.81	AV
5470	51.11	13.46	V	64.57	68.20	3.63	PK

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	50.01	12.72	H	62.73	73.98	11.25	PK
5150	37.71	12.72	H	50.43	53.98	3.55	AV
5150	49.57	12.72	V	62.29	73.98	11.69	PK
5150	37.65	12.72	V	50.37	53.98	3.61	AV

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	53.11	12.38	H	65.49	73.98	8.49	PK
5350	37.67	12.38	H	50.05	53.98	3.93	AV
5350	52.78	12.38	V	65.16	73.98	8.82	PK
5350	37.43	12.38	V	49.81	53.98	4.17	AV

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

Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	48.97	13.91	H	62.88	73.98	11.10	PK
5460	33.73	13.91	H	47.64	53.98	6.34	AV
5470	51.71	13.46	H	65.17	68.20	3.03	PK
5460	46.79	13.91	V	60.7	73.98	13.28	PK
5460	32.80	13.91	V	46.71	53.98	7.27	AV
5470	50.00	13.46	V	63.46	68.20	4.74	PK

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

Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	46.56	12.72	H	59.28	73.98	14.70	PK
5150	36.74	12.72	H	49.46	53.98	4.52	AV
5150	47.25	12.72	V	59.97	73.98	14.01	PK
5150	35.98	12.72	V	48.7	53.98	5.28	AV

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

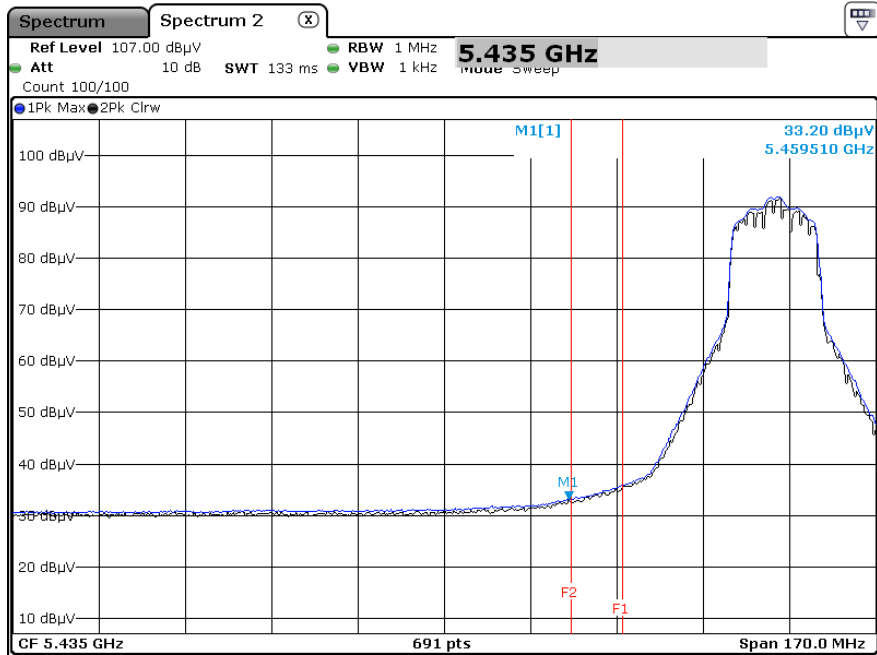
Frequency [MHz]	Reading dBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5350	48.11	12.38	H	60.49	73.98	13.49	PK
5350	35.32	12.38	H	47.7	53.98	6.28	AV
5350	47.56	12.38	V	59.94	73.98	14.04	PK
5350	35.01	12.38	V	47.39	53.98	6.59	AV

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

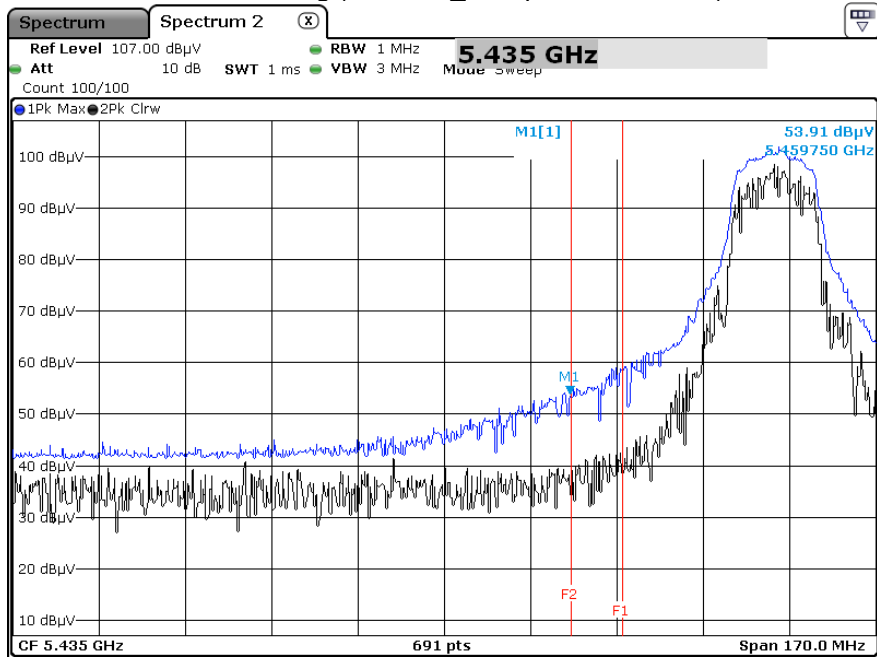
Frequency [MHz]	Reading DBuV	C.L+A.F+ D.F-A.G + ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5460	46.27	13.91	H	60.18	73.98	13.80	PK
5460	34.24	13.91	H	48.15	53.98	5.83	AV
5470	48.12	13.46	H	61.58	68.20	6.62	PK
5460	46.02	13.91	V	59.93	73.98	14.05	PK
5460	34.09	13.91	V	48	53.98	5.98	AV
5470	47.50	13.46	V	60.96	68.20	7.24	PK

■ Test Plots(UNII 1, 2A, 2C)

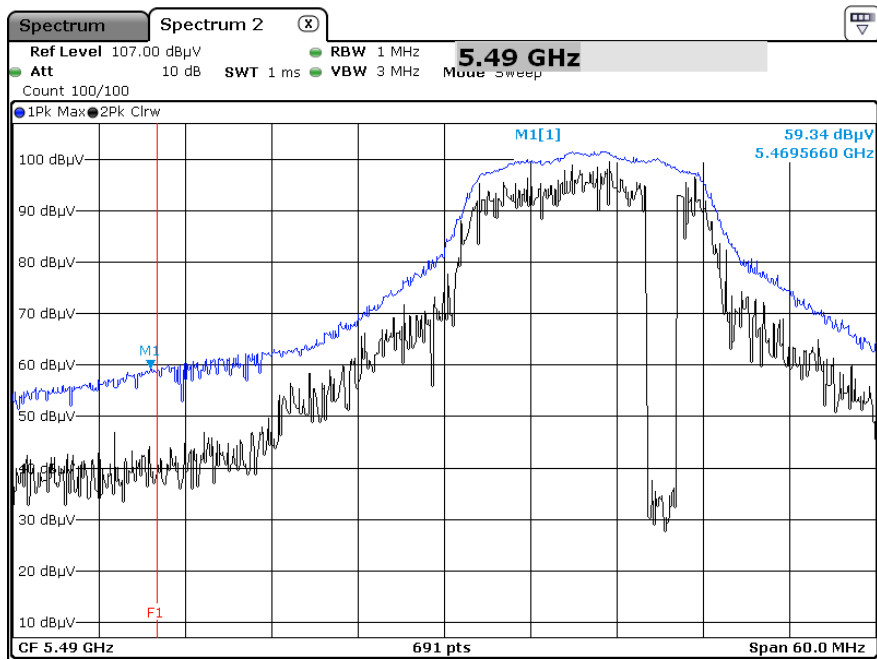
Average Reading (802.11 a_6 Mbps, Ch.100, X-H)



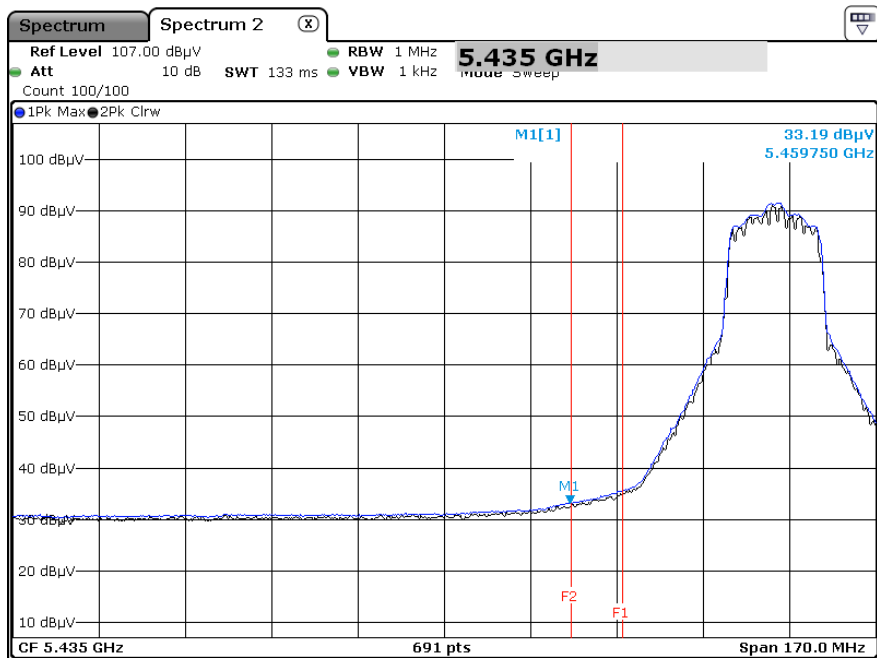
Peak Reading (802.11 a_6 Mbps, Ch.100, X-H)



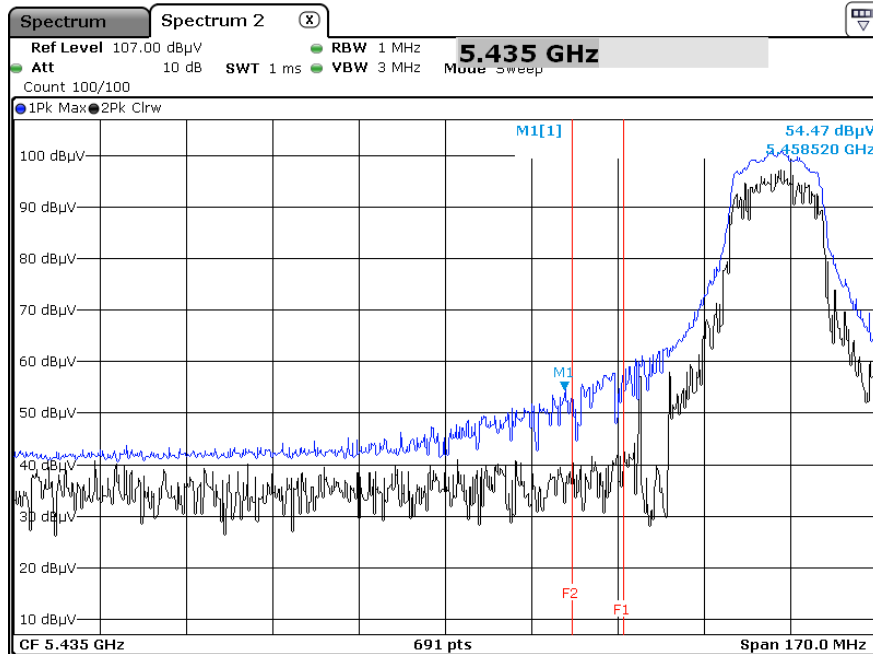
Peak Reading (802.11 a_6 Mbps, Ch.100, X-H)



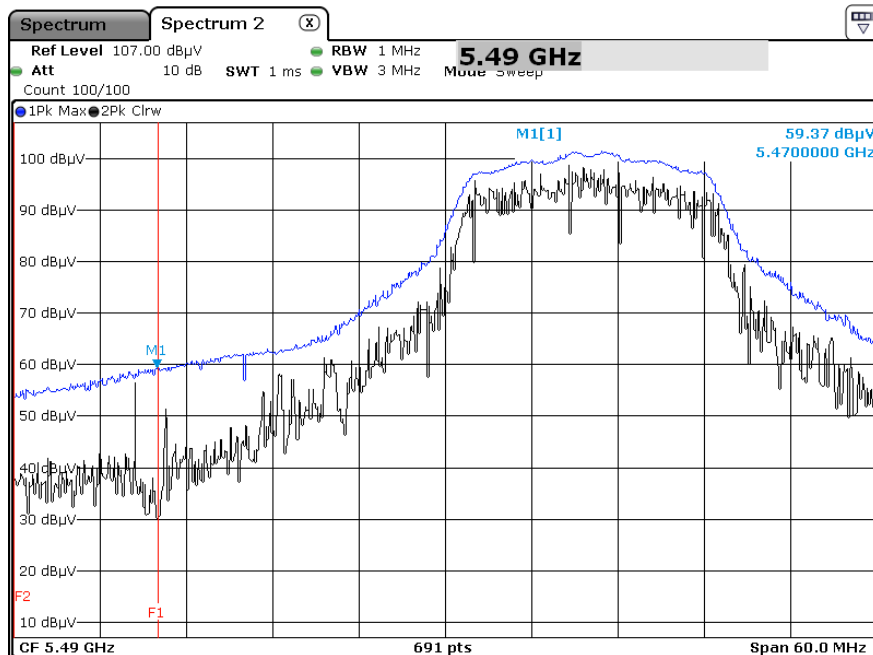
Average Reading (802.11 n(HT20)_MCS0, Ch.100, X-H)



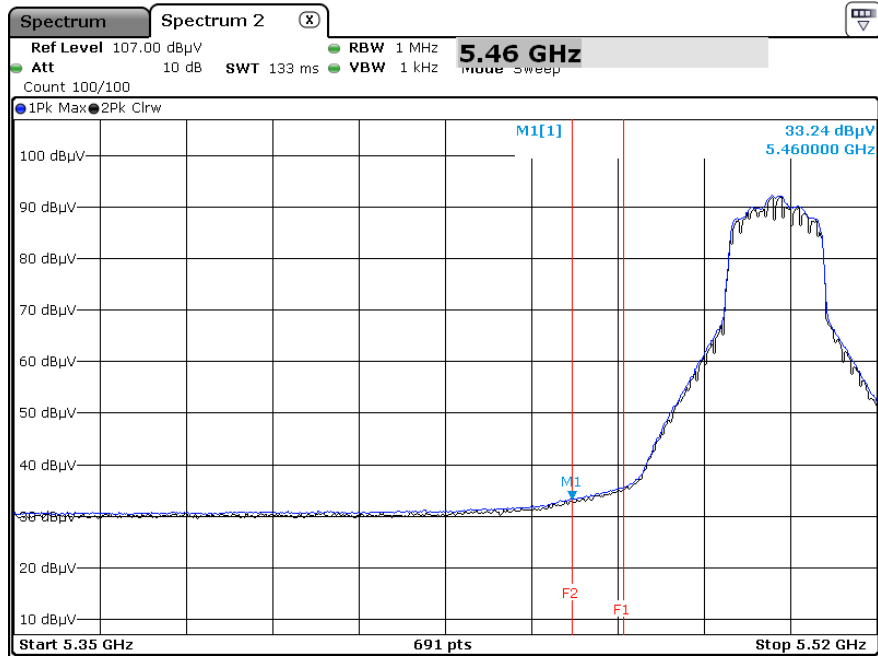
Peak Reading (802.11 n(HT20)_MCS0, Ch.100, X-H)



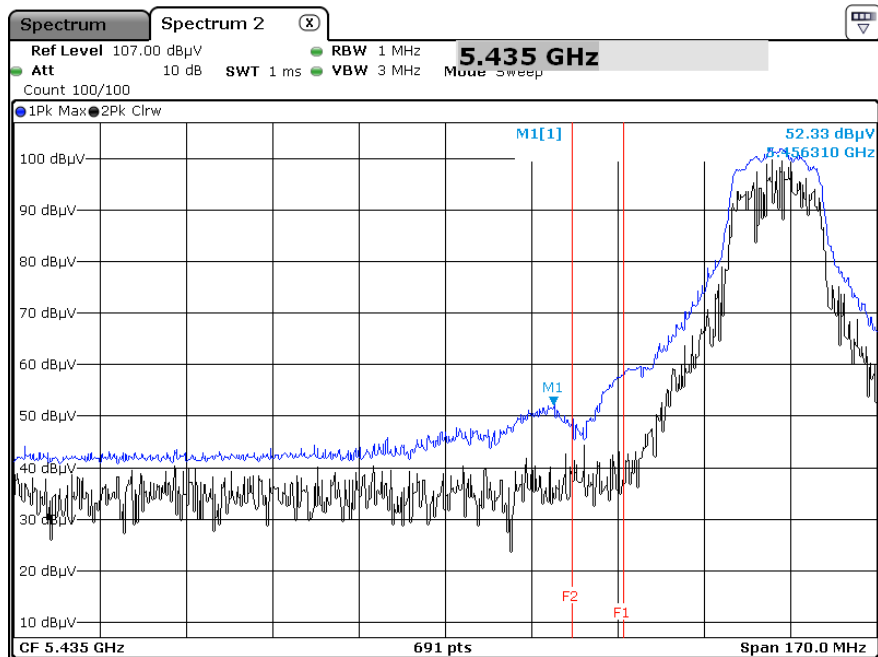
Peak Reading (802.11 n(HT20)_MCS0, Ch.100, X-H)



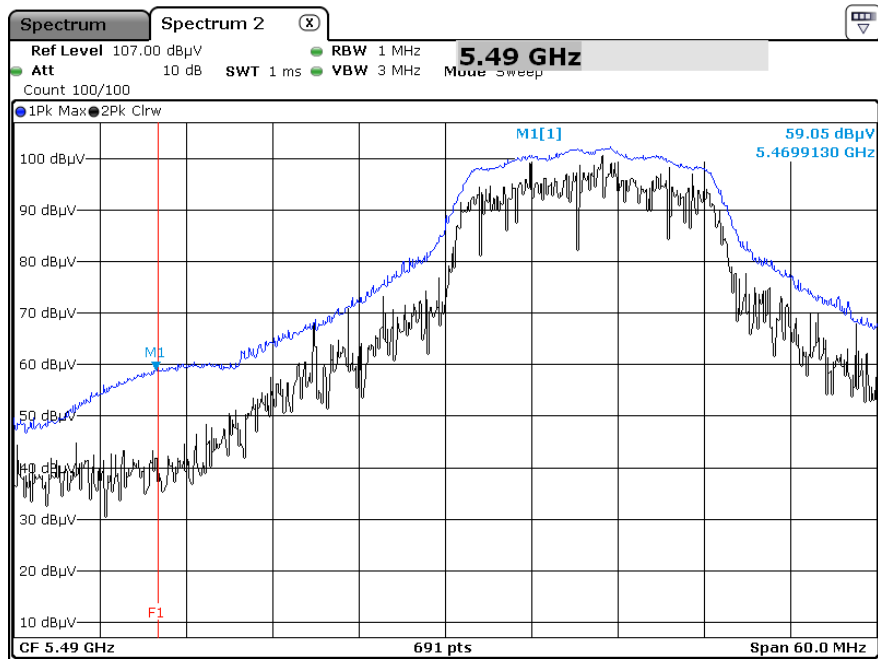
Average Reading (802.11 ac(VHT20)_MCS0, Ch.100, X-H)



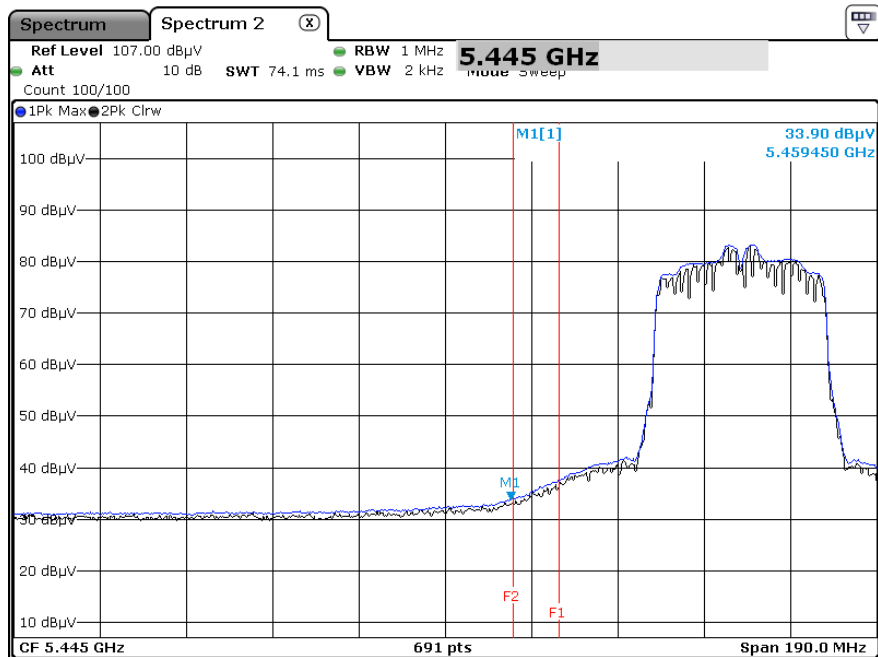
Peak Reading (802.11 ac(VHT20)_MCS0, Ch.100, X-H)



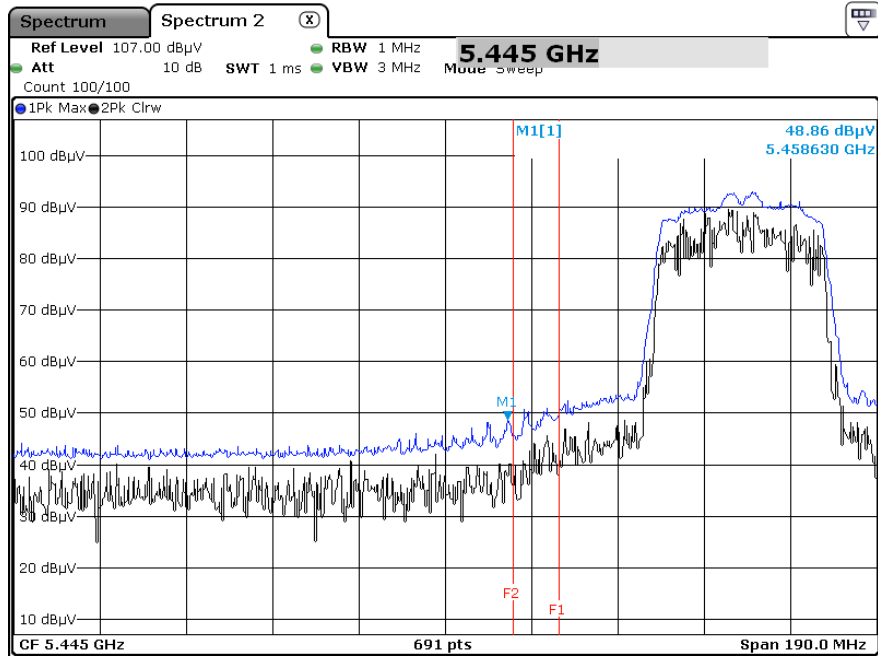
Peak Reading (802.11 ac(VHT20)_MCS0, Ch.100, X-H)



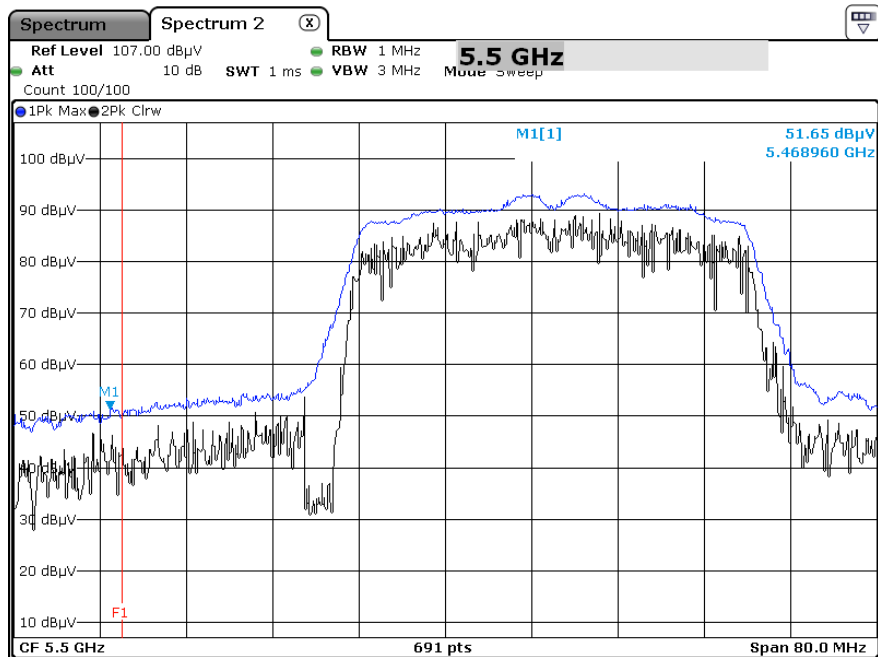
Average Reading (802.11 n(HT40)_MCS0, Ch.102, X-H)



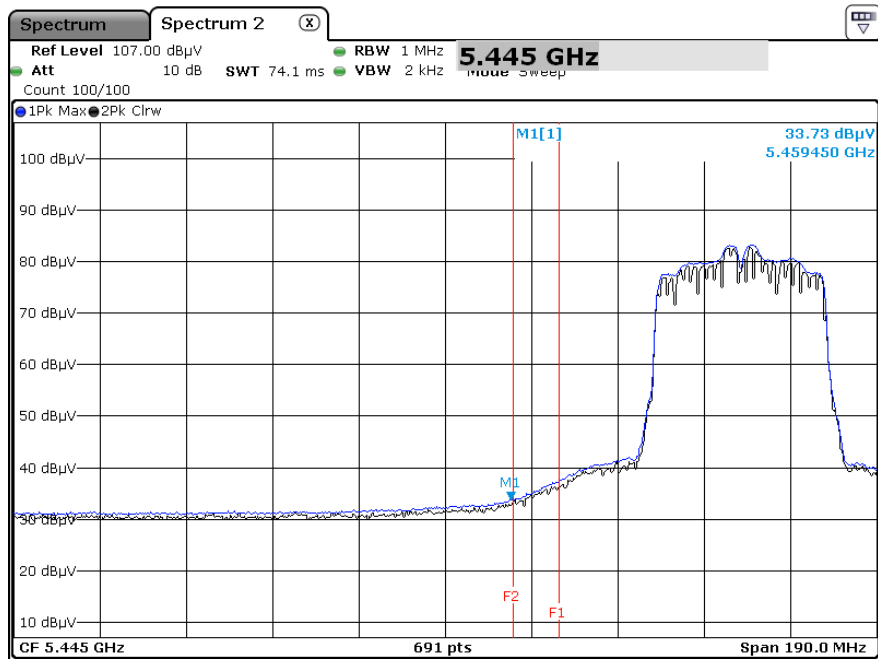
Peak Reading (802.11 n(HT40)_MCS0, Ch.102, X-H)



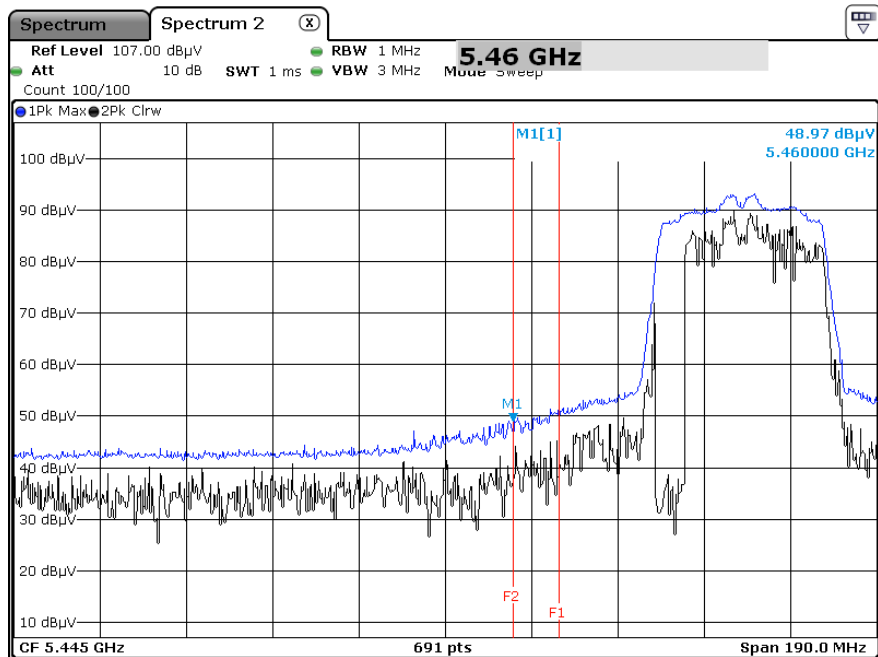
Peak Reading (802.11 n(HT40)_MCS0, Ch.102, X-H)



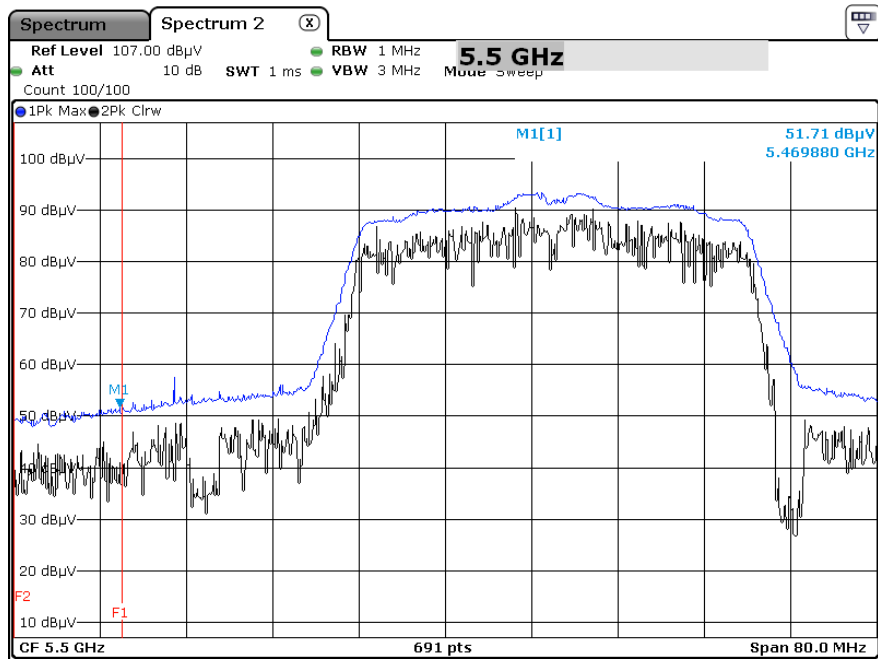
Average Reading (802.11 ac(VHT40)_MCS0, Ch.102, X-H)



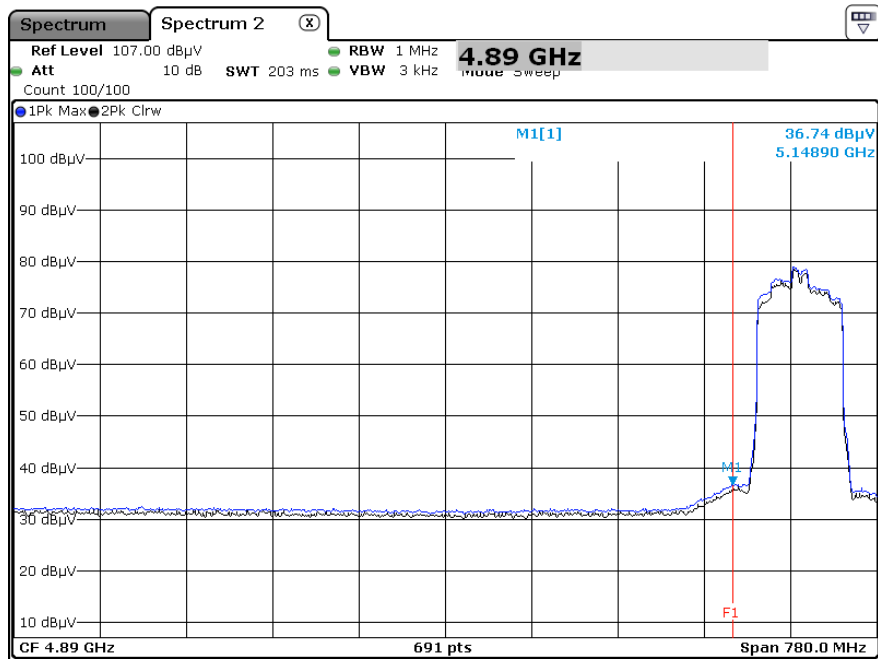
Peak Reading (802.11 ac(VHT40)_MCS0, Ch.102, X-H)



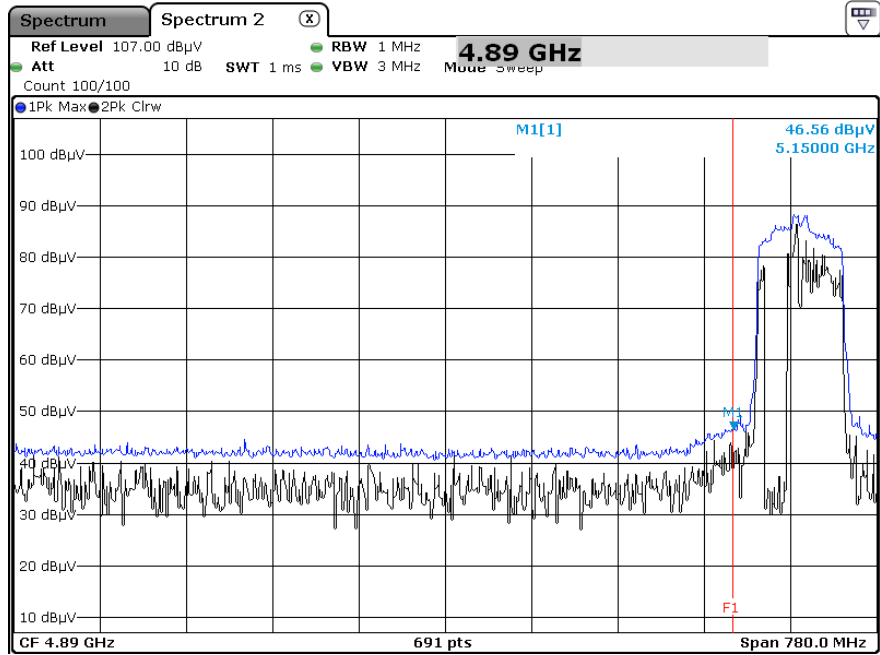
Peak Reading (802.11 ac(VHT40)_MCS0, Ch.102, X-H)



Average Reading (802.11 ac_VHT80_MCS0, Ch.42, X-H)



Peak Reading (802.11 ac_VHT80_MCS0, Ch.42, X-H)

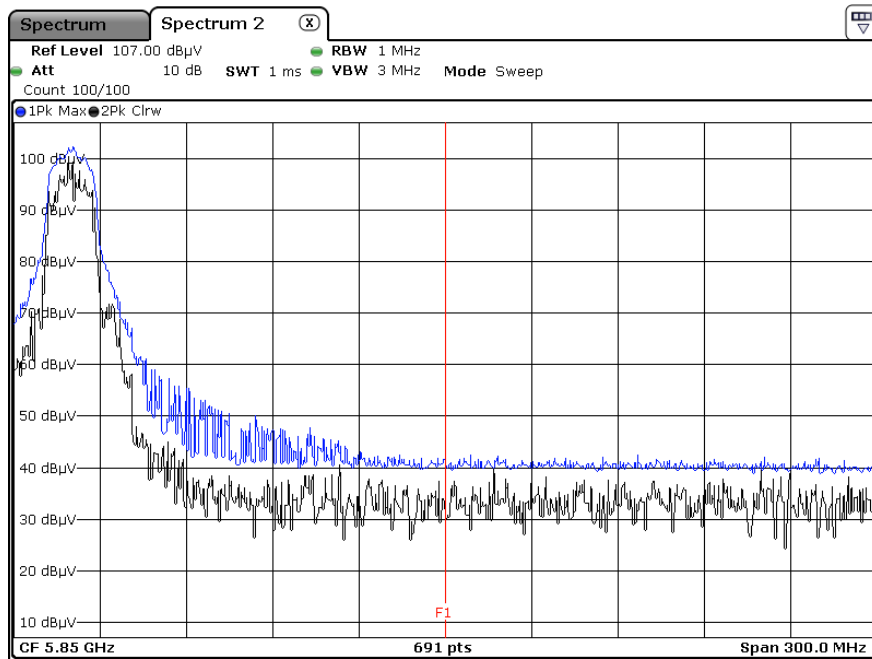


Note:

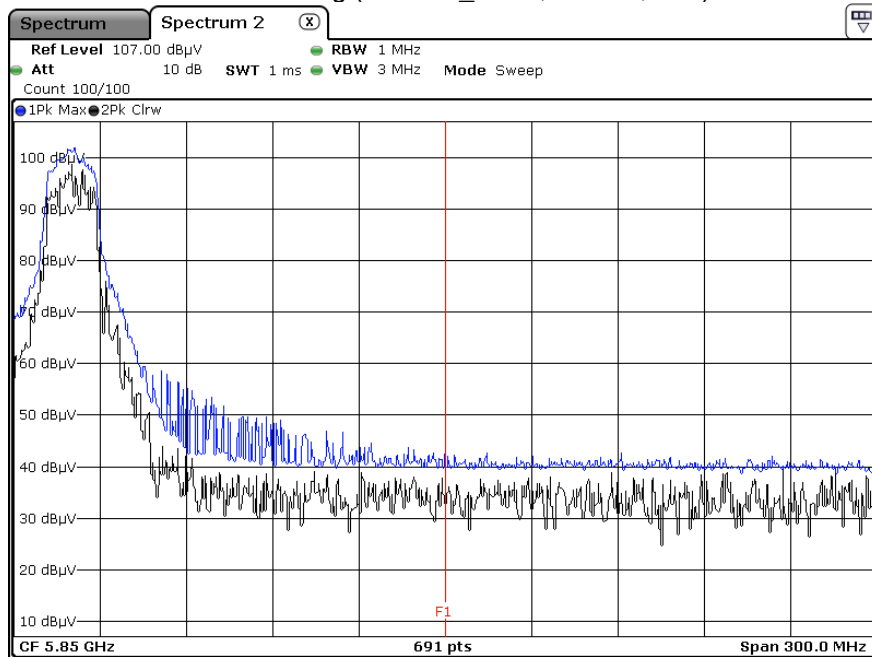
Only the worst case plots for Radiated Restricted Band Edge.

■ Test Plots(Straddle Channel)

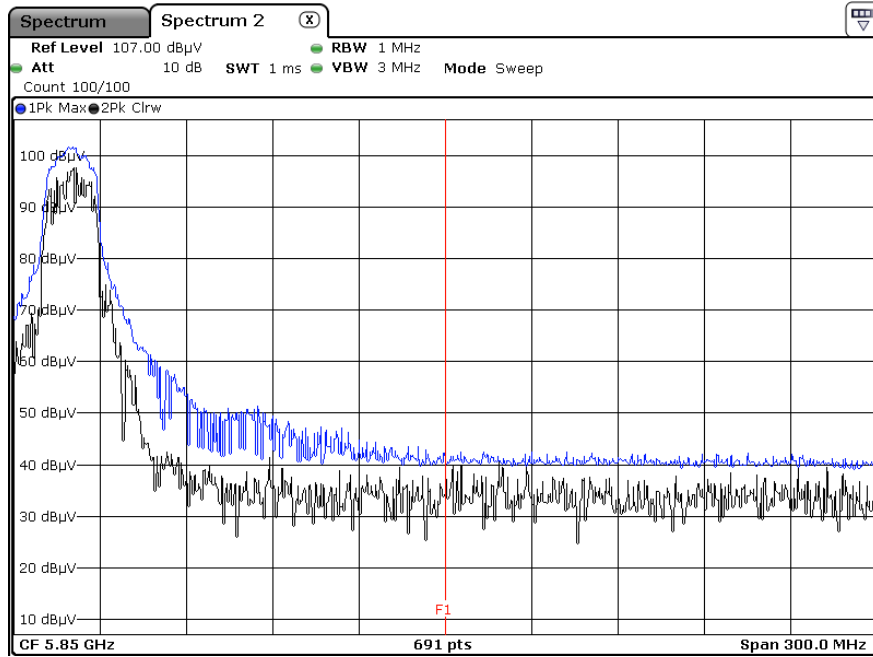
Peak Reading (802.11a, Ch.144, X-H)



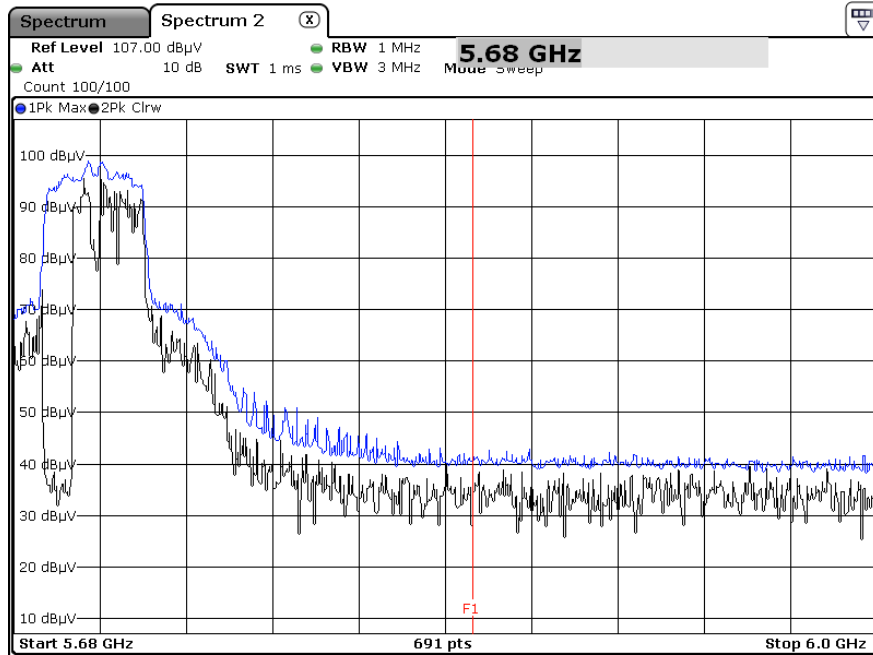
Peak Reading (802.11n_HT20, Ch.144, X-H)



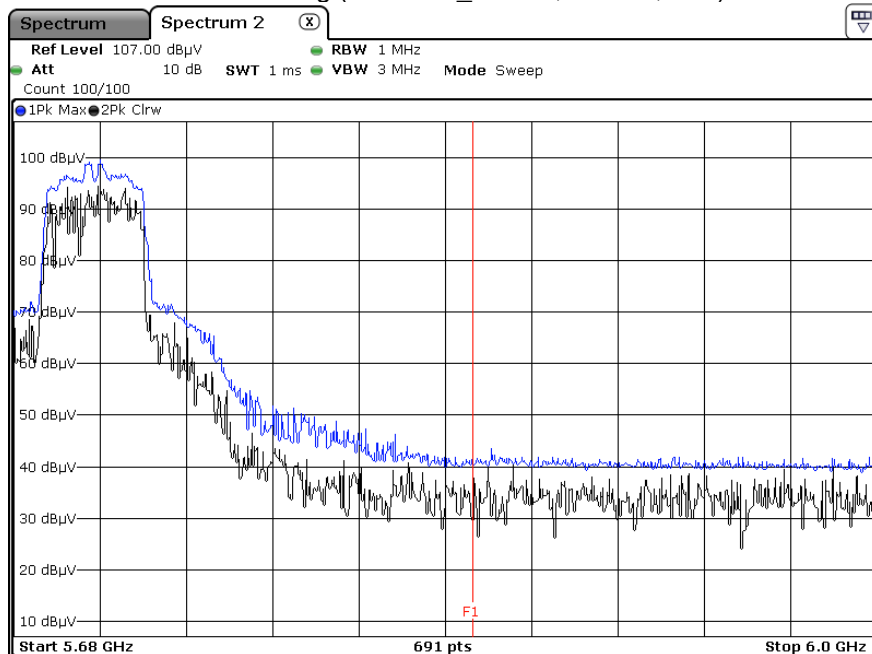
Peak Reading (802.11ac_VHT20, Ch.144, X-H)



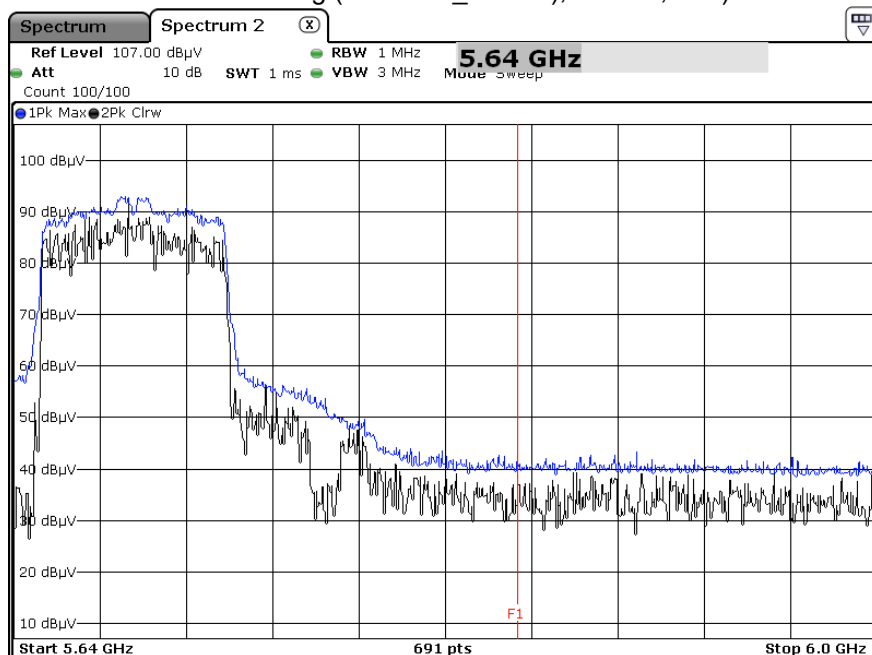
Peak Reading (802.11n_HT40, Ch.142, X-H)



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



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

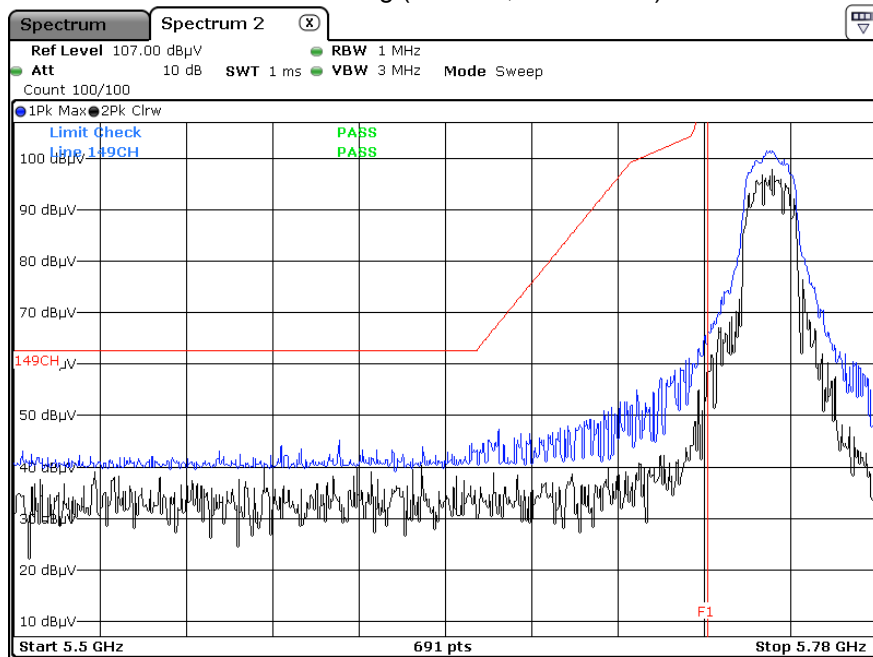


Note :

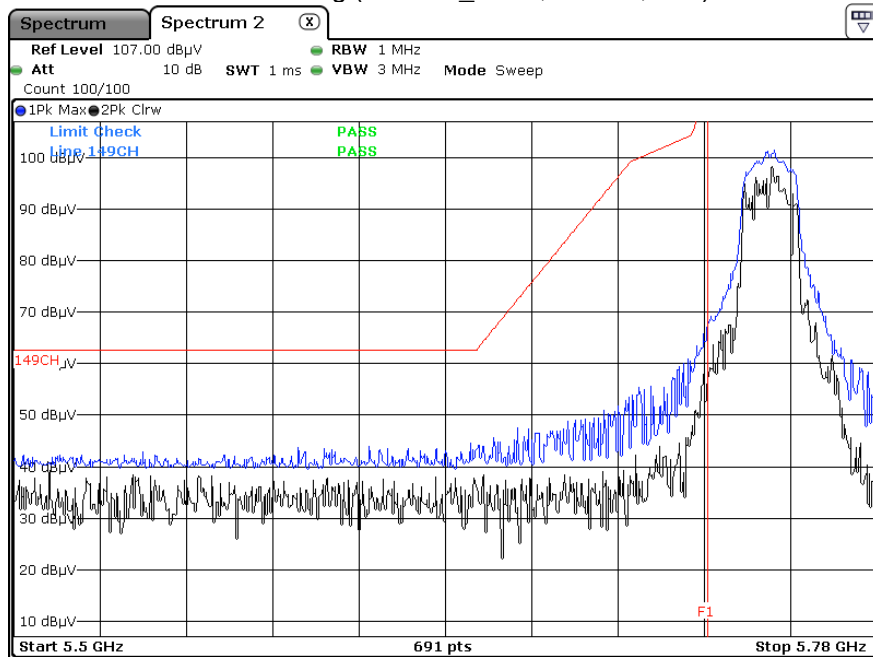
1. Only the worst case plots for Radiated Restricted Band Edge.
2. Red line : 5 850 MHz
3. Ambient Noise (Because of ambient noise, We attached only the worst plot without a data table)

■ Test Plots(UNII 3)

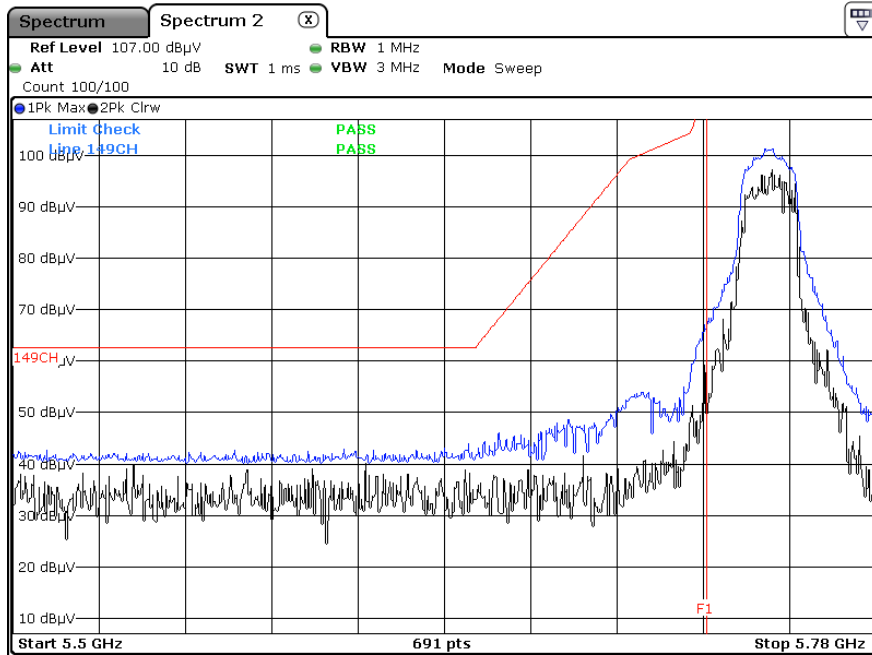
Peak Reading (802.11a, Ch.149X-H)



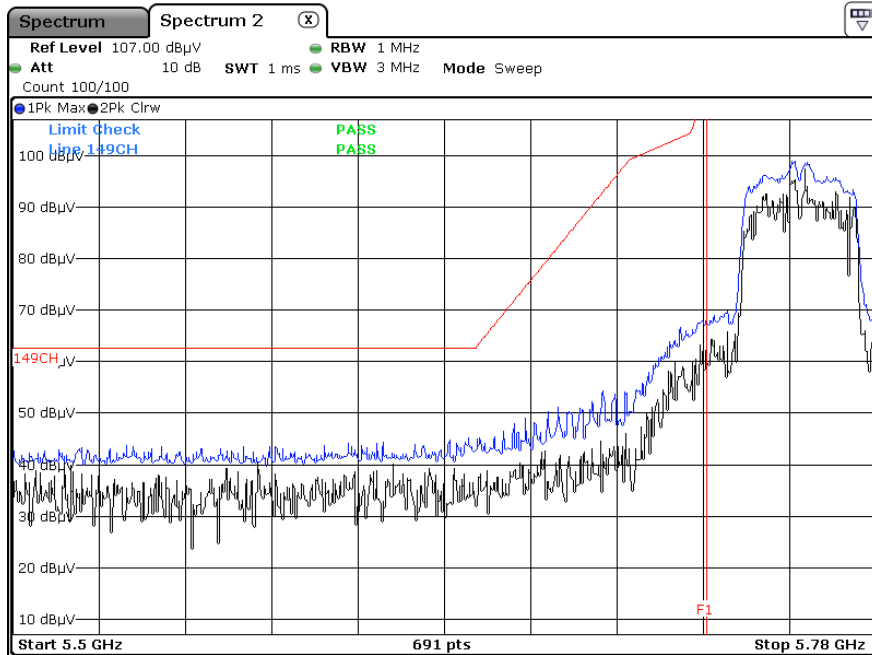
Peak Reading (802.11n_HT20, Ch.149, X-H)



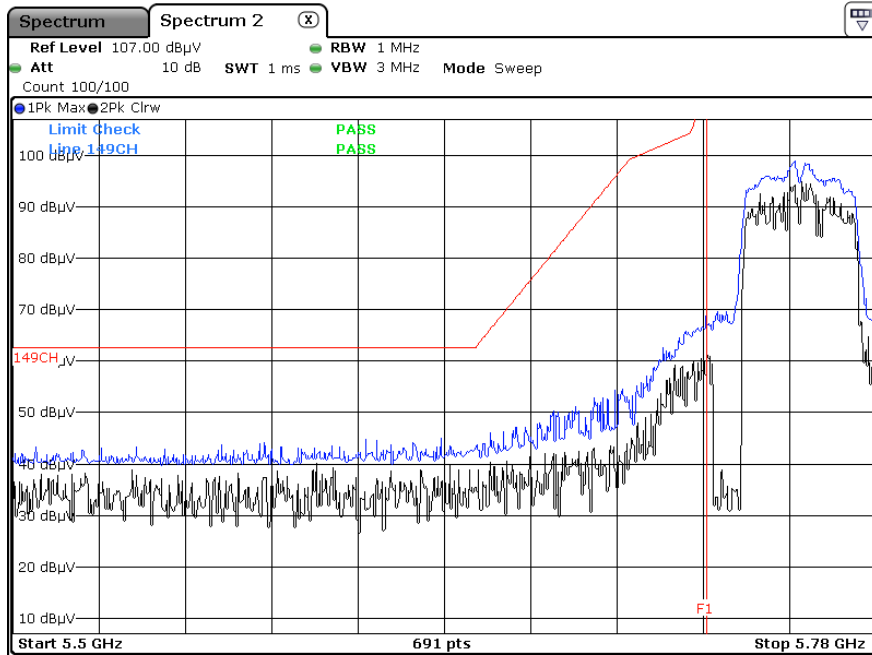
Peak Reading (802.11ac_VHT20, Ch.149, X-H)



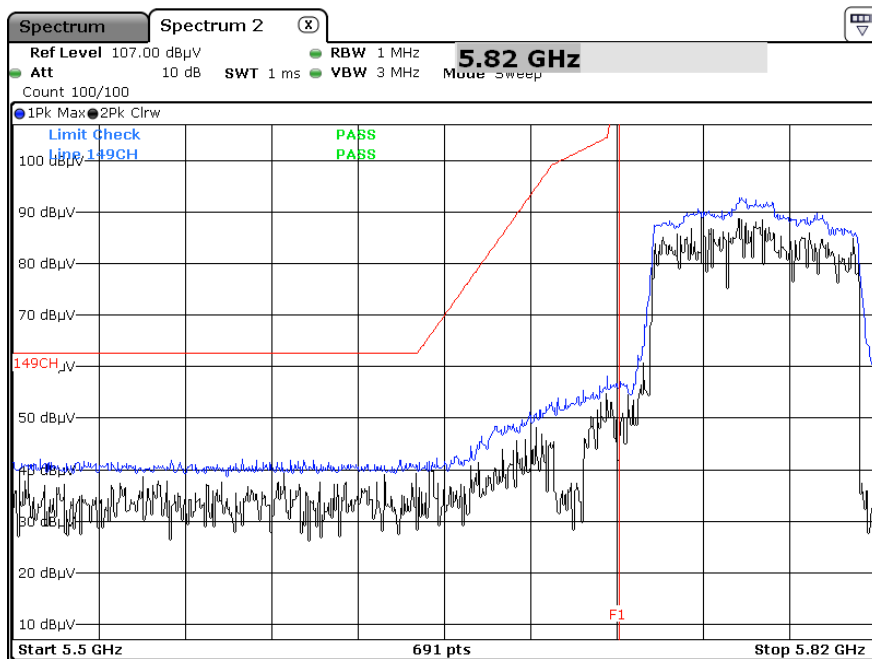
Peak Reading (802.11n_HT40, Ch.151, X-H)



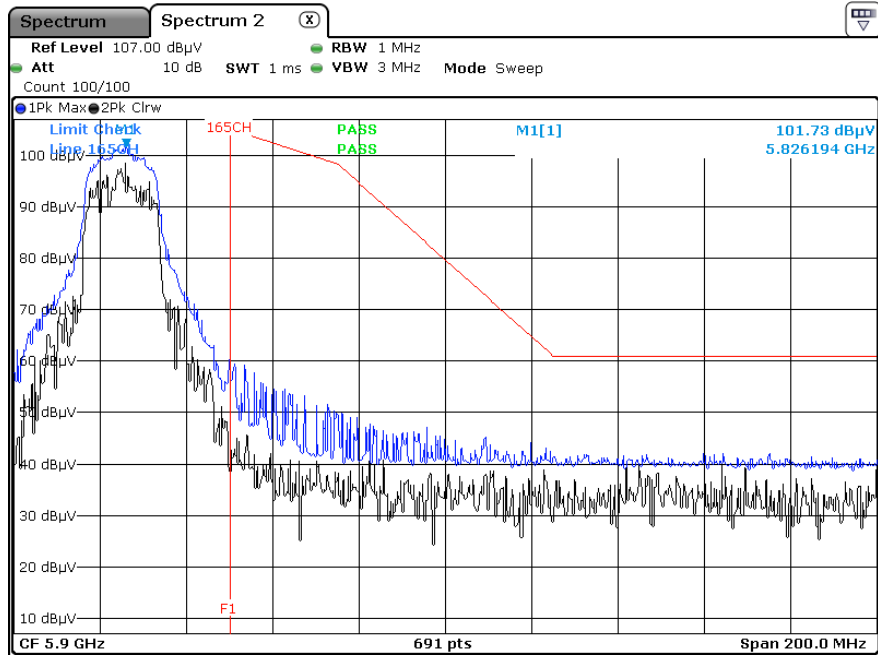
Peak Reading (802.11ac_VHT40, Ch.151, X-H)



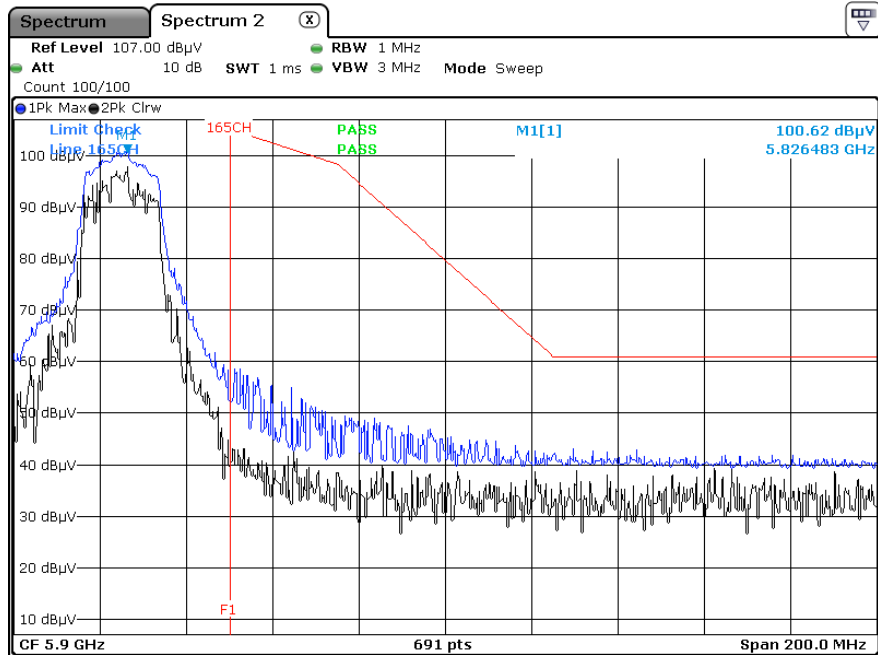
Peak Reading (802.11ac_VHT80, Ch.155, X-H)



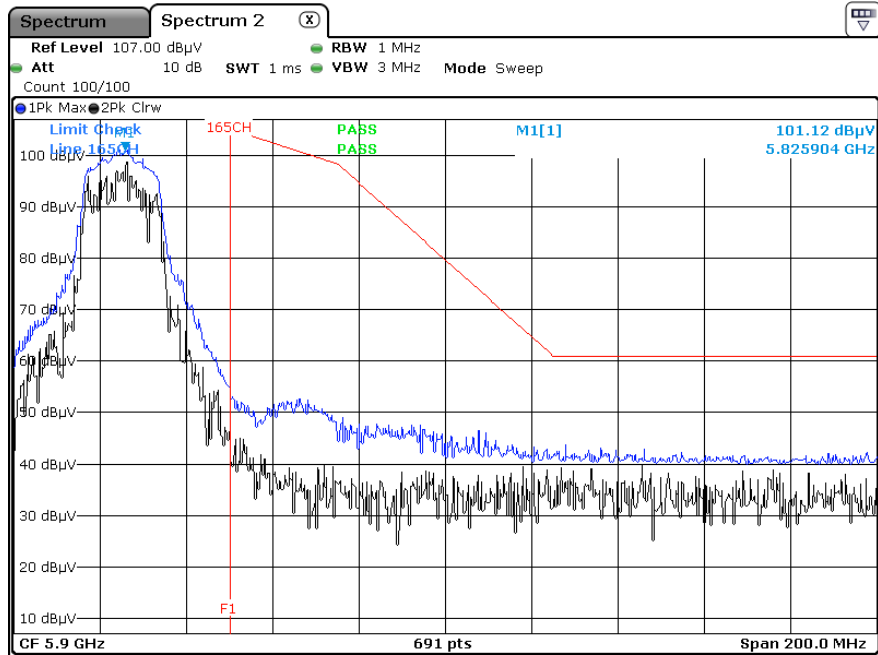
Peak Reading (802.11a, Ch.165, X-H)



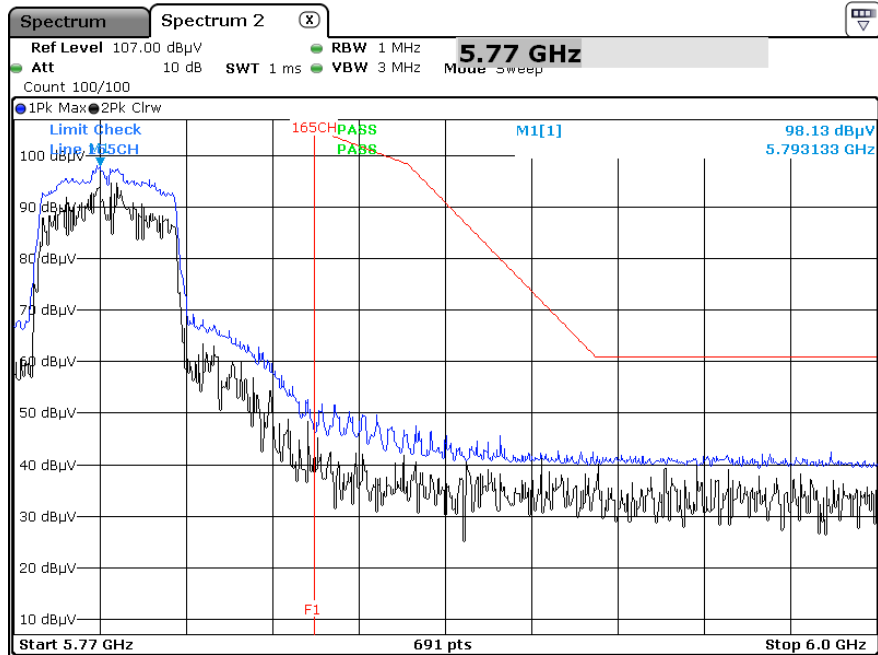
Peak Reading (802.11n_HT20, Ch.165, X-H)



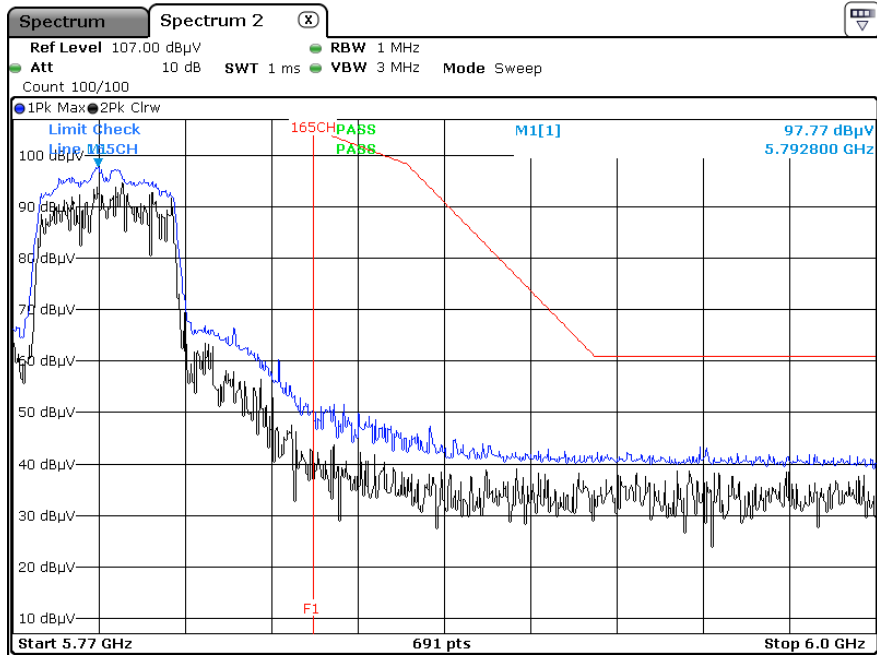
Peak Reading (802.11ac_VHT20, Ch.165, X-H)



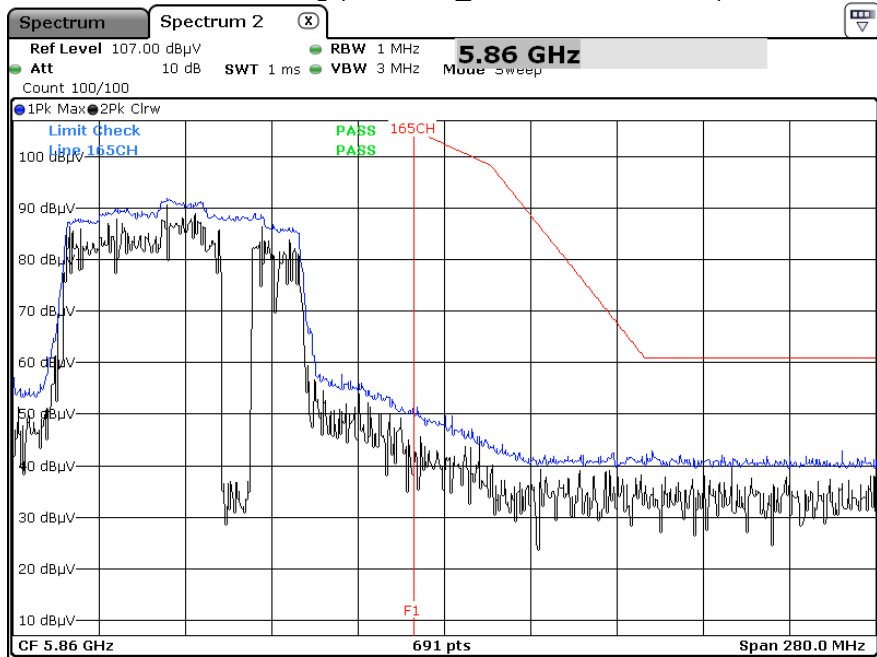
Peak Reading (802.11n_HT40, Ch.159, X-H)



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



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



10.10 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

Test

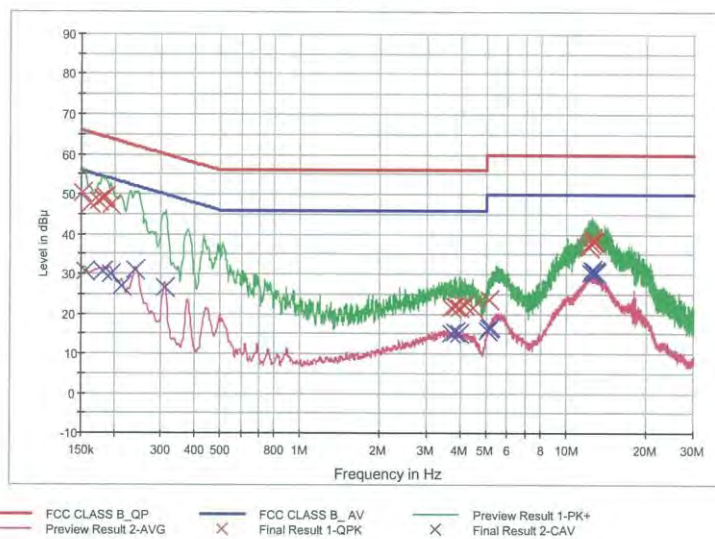
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HCT TEST Report

Common Information

EUT: SM-A725M/DS
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: WLAN 5G_L1

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152250	50.4	9.000	Off	L1	9.8	15.5	65.9
0.163500	47.8	9.000	Off	L1	9.8	17.5	65.3
0.174750	48.3	9.000	Off	L1	9.8	16.4	64.7
0.181500	49.1	9.000	Off	L1	9.8	15.3	64.4
0.186000	49.2	9.000	Off	L1	9.8	15.0	64.2
0.195000	47.3	9.000	Off	L1	9.8	16.5	63.8
3.690500	21.7	9.000	Off	L1	9.9	34.3	56.0
3.807500	22.0	9.000	Off	L1	9.9	34.0	56.0
3.951500	21.4	9.000	Off	L1	9.9	34.6	56.0
4.149500	22.2	9.000	Off	L1	10.0	33.8	56.0
4.455500	21.5	9.000	Off	L1	10.0	34.5	56.0
5.146250	23.5	9.000	Off	L1	10.0	36.5	60.0
12.062750	37.0	9.000	Off	L1	10.3	23.0	60.0
12.197750	36.9	9.000	Off	L1	10.3	23.1	60.0
12.299000	37.8	9.000	Off	L1	10.3	22.2	60.0
12.503750	39.1	9.000	Off	L1	10.3	20.9	60.0
12.686000	38.2	9.000	Off	L1	10.3	21.8	60.0
12.809750	38.3	9.000	Off	L1	10.3	21.7	60.0

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Test

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154500	30.8	9.000	Off	L1	9.8	25.0	55.8
0.181500	30.8	9.000	Off	L1	9.8	23.6	54.4
0.195000	29.8	9.000	Off	L1	9.8	24.0	53.8
0.213000	26.9	9.000	Off	L1	9.8	26.2	53.1
0.240000	31.0	9.000	Off	L1	9.8	21.1	52.1
0.309750	26.7	9.000	Off	L1	9.8	23.2	50.0
3.688250	15.0	9.000	Off	L1	9.9	31.0	46.0
3.807500	15.3	9.000	Off	L1	9.9	30.7	46.0
3.951500	14.9	9.000	Off	L1	9.9	31.1	46.0
5.094500	15.6	9.000	Off	L1	10.0	34.4	50.0
5.144000	16.5	9.000	Off	L1	10.0	33.5	50.0
5.166500	16.8	9.000	Off	L1	10.0	33.2	50.0
12.301250	30.4	9.000	Off	L1	10.3	19.6	50.0
12.503750	30.9	9.000	Off	L1	10.3	19.1	50.0
12.564500	30.4	9.000	Off	L1	10.3	19.6	50.0
12.710750	30.7	9.000	Off	L1	10.3	19.3	50.0
12.746750	30.6	9.000	Off	L1	10.3	19.4	50.0
12.868250	30.4	9.000	Off	L1	10.3	19.6	50.0

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Conducted Emissions (Line 2)

Test

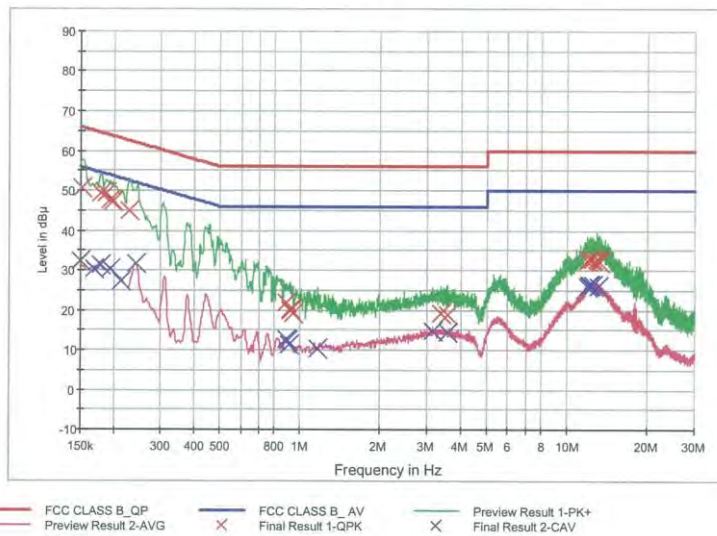
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HCT TEST Report

Common Information

EUT: SM-A725M/DS
Manufacturer: SAMSUNG
Test Site: SHIELD ROOM
Operating Conditions: WLAN 5G_N

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152250	50.7	9.000	Off	N	9.8	15.1	65.9
0.179250	49.3	9.000	Off	N	9.8	15.2	64.5
0.188250	49.4	9.000	Off	N	9.8	14.7	64.1
0.195000	47.7	9.000	Off	N	9.8	16.1	63.8
0.199500	47.3	9.000	Off	N	9.8	16.3	63.6
0.228750	44.9	9.000	Off	N	9.8	17.6	62.5
0.891500	22.0	9.000	Off	N	9.8	34.0	56.0
0.914000	20.2	9.000	Off	N	9.8	35.8	56.0
0.923000	19.8	9.000	Off	N	9.8	36.2	56.0
0.936500	19.2	9.000	Off	N	9.8	36.8	56.0
3.368750	19.3	9.000	Off	N	9.9	36.7	56.0
3.551000	18.9	9.000	Off	N	9.9	37.1	56.0
11.963750	32.4	9.000	Off	N	10.3	27.6	60.0
12.141500	32.8	9.000	Off	N	10.3	27.2	60.0
12.494750	32.8	9.000	Off	N	10.4	27.2	60.0
12.994250	32.7	9.000	Off	N	10.4	27.3	60.0
13.151750	32.2	9.000	Off	N	10.4	27.8	60.0
13.300250	32.0	9.000	Off	N	10.4	28.0	60.0

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Test

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Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	32.3	9.000	Off	N	9.8	23.7	56.0
0.168000	30.3	9.000	Off	N	9.8	24.7	55.1
0.179250	31.2	9.000	Off	N	9.8	23.3	54.5
0.195000	30.3	9.000	Off	N	9.8	23.5	53.8
0.213000	27.3	9.000	Off	N	9.8	25.8	53.1
0.242250	31.6	9.000	Off	N	9.8	20.4	52.0
0.887000	12.7	9.000	Off	N	9.8	33.3	46.0
0.896000	12.3	9.000	Off	N	9.8	33.7	46.0
0.911750	11.3	9.000	Off	N	9.8	34.7	46.0
1.163750	10.4	9.000	Off	N	9.8	35.6	46.0
3.128000	14.6	9.000	Off	N	9.9	31.4	46.0
3.551000	14.2	9.000	Off	N	9.9	31.8	46.0
11.966000	26.1	9.000	Off	N	10.3	23.9	50.0
12.017750	26.2	9.000	Off	N	10.3	23.8	50.0
12.139250	26.4	9.000	Off	N	10.3	23.6	50.0
12.254000	26.4	9.000	Off	N	10.3	23.6	50.0
12.427250	26.4	9.000	Off	N	10.4	23.6	50.0
13.151750	25.9	9.000	Off	N	10.4	24.1	50.0

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11. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESR / EMI Test Receiver	09/16/2020	Annual	101910
ESPACE	SU-642 / Temperature Chamber	03/18/2020	Annual	0093008124
Agilent	N9030A / Signal Analyzer	01/13/2020	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/02/2020	Annual	101231
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Keysight	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/25/2020	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/12/2020	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	06/26/2020	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A

Note:

- Equipment listed above that calibrated during the testing period was set for test after the calibration.
- Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.
- N9030A : Updated calibration date due to retest (01/11/2021 ~ 01/11/2022)

Radiated Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	07/28/2020	Annual	102168
Agilent	N9030A / Signal Analyzer	01/13/2020	Annual	MY49431210
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/21/2020	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	03/02/2020	Annual	8
Wainwright Instruments	WHKX8-6090-7000-18000-40SS/ High Pass Filter	03/02/2020	Annual	25
Api tech.	18B-03 / Attenuator (3 dB)	03/02/2020	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	03/02/2020	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	03/02/2020	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	03/02/2020	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956

Note:

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

12. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2101-FC041-P