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TEST REPORT

FCC/ISED UNII Test for DA3300AAN&DA3300AKN
Certification

APPLICANT
HYUNDAI MOBIS CO., LTD.

REPORT NO.
HCT-RF-2211-FI004-R1

DATE OF ISSUE
December 15, 2022

Tested by
Jin Gwan Lee

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Additional Model
-

Applicant	**HYUNDAI MOBIS CO., LTD.** 203, Teheran-ro, Gangnam-gu, Seoul, 135-977, South Korea
Eut Type	CAR AUDIO SYSTEM
FCC Model Name	DA3300AAN
ISED Model Name	DA3300AKN
FCC ID	TQ8-DA3300AAN
IC	5074A-DA3300AKN
Modulation type	OFDM
FCC Classification	Unlicensed National Information Infrastructure(NII)
FCC Rule Part(s)	Part 15.407
ISED Rule Part(s)	RSS-247 Issue 2 (February 2017) RSS-Gen Issue 5_Amendment 2 (February 2021)

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	November 30, 2022	Initial Release
1	December 15, 2022	Revised the Antenna type.

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 / ISED Rules under normal use and maintenance.

If this report is required to confirmation of authenticity, please contact to www.hct.co.kr

CONTENTS

1. GENERAL INFORMATION

EUT DESCRIPTION

FCC Model	DA3300AAN	
ISED Model	DA3300AKN	
FCC Additional Model	DA3300AGG, DA3310AGG, DA3320AGG, DA3300AGN, DA3310AGN, DA3300AGL, DA3300AGP, DA3300AFN, DA3300AMG, DA3310AMG, DA3300AEG, DA3310AEG, DA3300AEP, DA3310AEP, DA3320AEP, DA3320AEG, DA3300AUA, DA3310AAN, DA3300AAU, DA3300ARP, DA3301VGG, DA3311VGG, DA3301VMG, DA3311VMG, DA3301VFN, DA3301VEP, DA3301VAN, DA3311VEP, DA3321VGG, DA3301VUA	
ISED Additional Model	DA3301VKN	
EUT Type	CAR AUDIO SYSTEM	
Power Supply	DC 14.4 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20 MHz BW : 5180 - 5240 40 MHz BW : 5190 - 5230 80 MHz BW : 5210
	U-NII-2A	20 MHz BW : 5260 - 5320 40 MHz BW : 5270 - 5310 80 MHz BW : 5290
	U-NII-2C	20 MHz BW : 5500 - 5720 40 MHz BW : 5510 - 5710 80 MHz BW : 5530 – 5690
	U-NII-3	20 MHz BW : 5745 - 5825 40 MHz BW : 5755 - 5795 80 MHz BW : 5775
Antenna Specification	Antenna type: PCB Pattern ANT Peak Gain : UNII-1: -0.61 dBi, UNII-2A: -0.18 dBi UNII-2C: -0.77 dBi, UNII-3: -0.18 dBi	
Straddle channel	Supported	
TDWR Band	Not Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	October 26, 2022 ~ November 25, 2022	
PMN (Product Marketing Number)	DA3300AKN, DA3301VKN	
HVIN (Hardware Version Identification Number)	DA3300AKN, DA3301VKN	
FVIN (Firmware Version Identification Number)	CN7_PE.USA.0000.142.000.220906	
HMN (Host Marketing Name)	N/A	
EUT serial numbers	Conducted : 96160-AADA0 (FCC), 96160-AACA0 (ISED) Radiated : 96160-AADA0 (FCC), 96160-AACA0 (ISED)	

2. MAXIMUM OUTPUT POWER

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

Band	Mode	RF Output Power (dBm)	RF Output Power (W)
UNII-1	802.11a	7.89	0.006
	802.11n (HT20)	7.99	0.006
	802.11n (HT40)	3.72	0.002
	802.11ac (VHT20)	7.99	0.006
	802.11ac (VHT40)	3.53	0.002
	802.11ac (VHT80)	4.32	0.003
UNII-2A	802.11a	7.72	0.006
	802.11n (HT20)	7.98	0.006
	802.11n (HT40)	6.54	0.005
	802.11ac (VHT20)	8.04	0.006
	802.11ac (VHT40)	6.54	0.005
	802.11ac (VHT80)	6.59	0.005
UNII-2C	802.11a	5.23	0.003
	802.11n (HT20)	5.07	0.003
	802.11n (HT40)	4.97	0.003
	802.11ac (VHT20)	5.24	0.003
	802.11ac (VHT40)	5.00	0.003
	802.11ac (VHT80)	4.64	0.003
UNII-3	802.11a	2.59	0.002
	802.11n (HT20)	2.37	0.002
	802.11n (HT40)	1.96	0.002
	802.11ac (VHT20)	2.66	0.002
	802.11ac (VHT40)	1.79	0.002
	802.11ac (VHT80)	1.90	0.002

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. / RSS-Gen issue 5, RSS-247 issue 2.

GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

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

DESCRIPTION OF TEST MODES

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

4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipment's, which is traceable to recognized national standards.
Especially, all antenna for measurement is calibrated in accordance with the requirements of C63.5 (Version : 2017).

5. FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

The SAC(Semi-Anechoic Chamber) and conducted measurement facility used to collect the radiated data are located at the 74, Seoicheon-ro 578beon-gil,
Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA.
The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2014) and CISPR Publication 22.
Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).
For ISED, test facility was accepted dated February 14, 2019 (CAB identifier: 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 / RSS-Gen (Issue 5) Section 8:

"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.

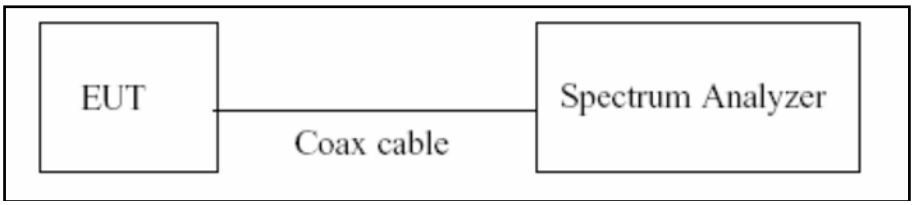
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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

8. DESCRIPTION OF TESTS

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

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

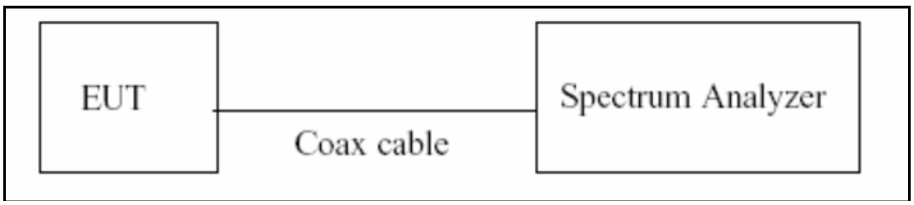
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

8.2. 6 dB Bandwidth & 26 dB Bandwidth & 99 % 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(26 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

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

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

Test Procedure (6 dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

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

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

Note:

1. We tested X dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer.

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

Test Procedure (99 % Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW ≒ 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

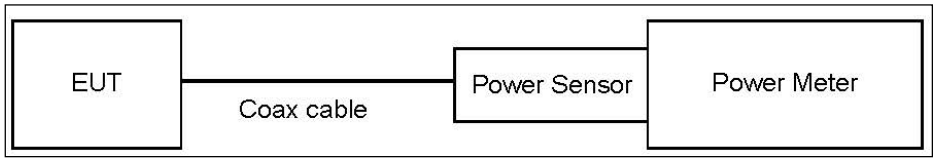
8.3. Output Power Measurement

Limit

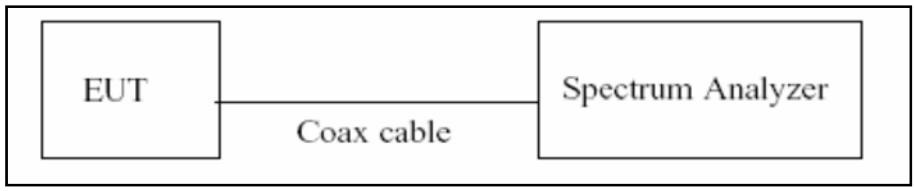
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(= 30 dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

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

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

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

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

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

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

Sample Calculation

Total Power(dBm) = Reading Level(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(20 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	22.02
UNII 2A	22.02
UNII 2C	22.02
UNII 3	22.02

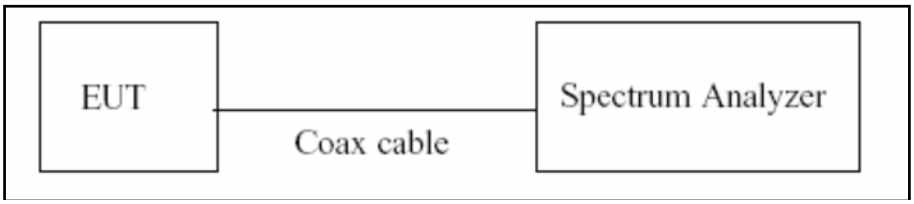
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

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

Test Configuration



Test Procedure

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

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

Sample Calculation

Total PSD(dBm) = Reading Level(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(20 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	22.02
UNII 2A	22.02
UNII 2C	22.02
UNII 3	22.02

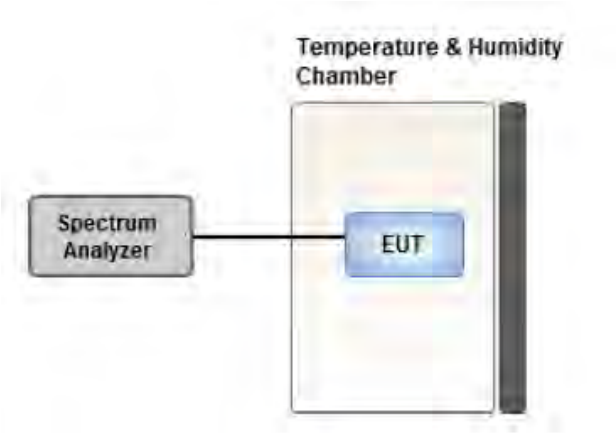
(Actual value of loss for the attenuator and cable combination)

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 battety operating end point which shall be specified by the manufacturer.
4. While maintaining a constant temperature inside the environmental chamber, turn the EUT ON
   and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after
   the EUT is energized. Four measurements in total are made.

8.6. 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.

FCC

Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30

ISED

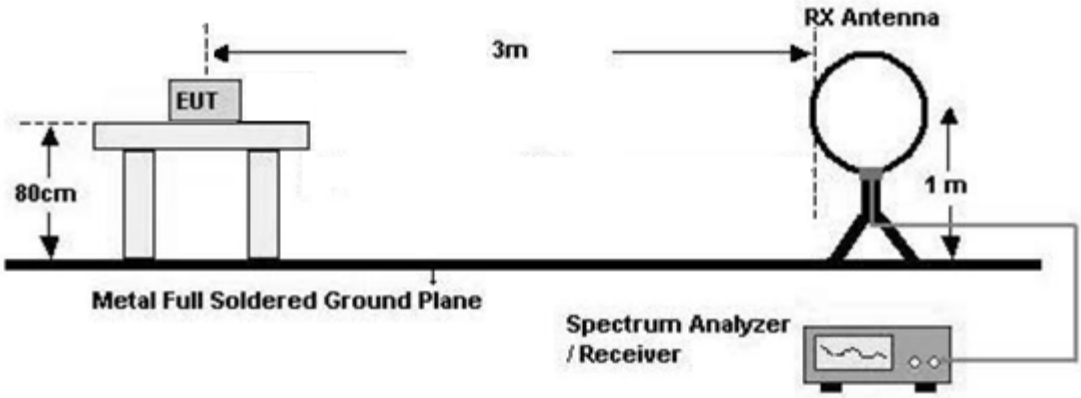
Frequency (MHz)	Field Strength (μA/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC&ISED

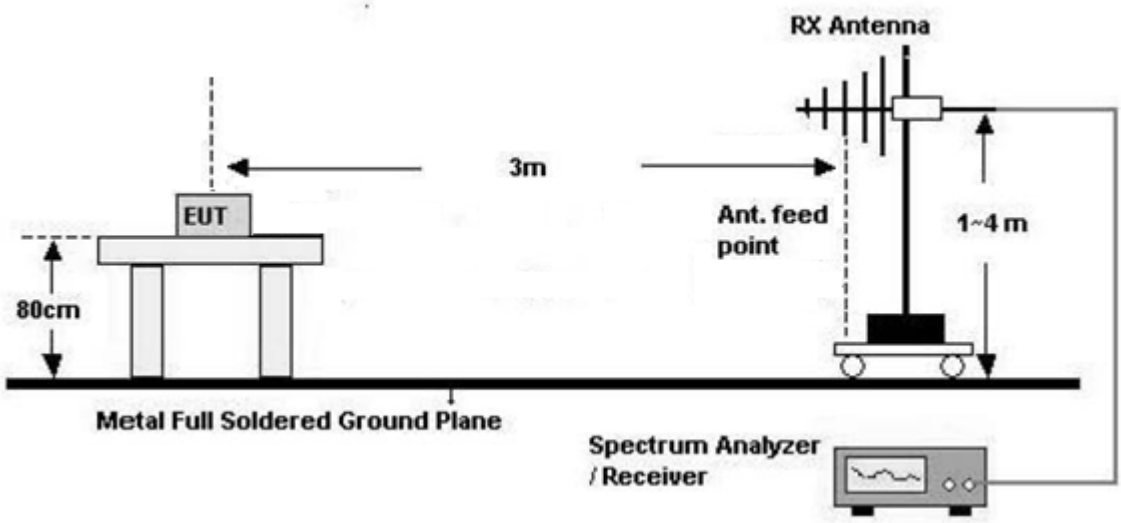
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

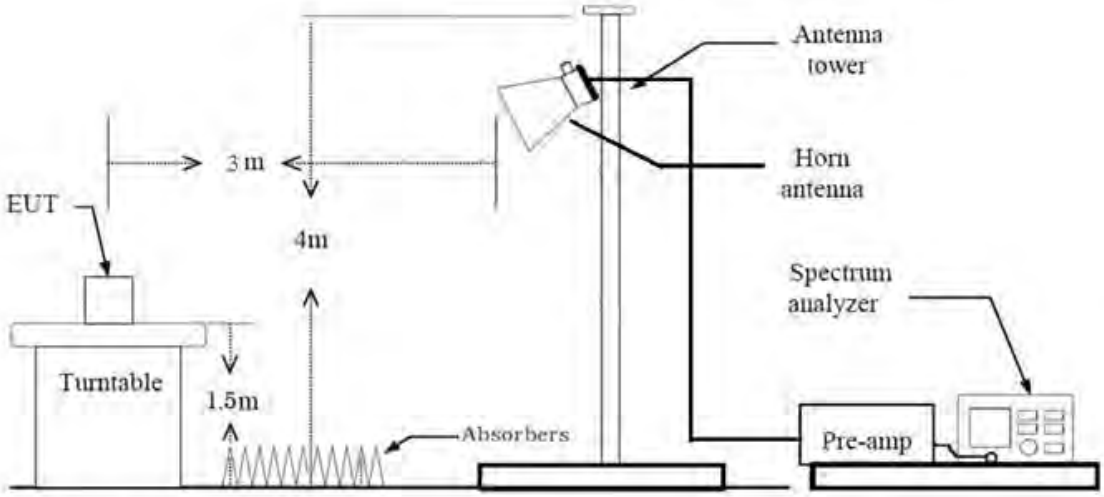
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3 m from the EUT
3. The EUT is placed on a turntable, which is 0.8 m above ground plane.
4. .We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m

7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x RBW
9. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

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

Test Procedure of Radiated spurious emissions(Below 1 GHz)

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

※In general, (1) is used mainly

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

Test Procedure of Radiated spurious emissions (Above 1 GHz)

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

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

- RBW = 1 MHz
- VBW ≥ 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.c in KDB 789033 v02r01):

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

98 % duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

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

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
   (1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):
      - RBW = 1 MHz
      - VBW ≥ 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.c in KDB 789033 v02r01):
      - RBW = 1 MHz
      - VBW(Duty cycle ≥ 98 %) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
      - VBW(Duty cycle is < 98 %) = VBW ≥ 1/T, where T is the minimum transmission duration.
      - The analyzer is set to linear detector mode.
      - Detector = Peak.
      - Sweep time = auto.
      - Trace mode = max hold.
      - Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 % duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.
9. Measured Frequency Range :
   - 4500 MHz ~ 5150 MHz
   - 5350 MHz ~ 5460 MHz
   - 5460 MHz ~ 5470 MHz
   - (75 MHz or more below the 5725 MHz) ~ 5725 MHz
   - 5850 MHz ~ (75 MHz or more above the 5850 MHz)
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Attenuator(ATT) + Distance Factor(D.F)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.954	0.205	1000
802.11n(HT20)	MCS 0(6.5)	0.949	0.229	1000
802.11n(HT40)	MCS 0(13.5)	0.903	0.442	2000
802.11ac(VHT20)	MCS 0(6.5)	0.951	0.218	1000
802.11ac(VHT40)	MCS 0(13.5)	0.904	0.438	2000
802.11ac(VHT80)	MCS 0(29.3)	0.819	0.870	3000

8.7. Receiver Spurious Emissions

Limit

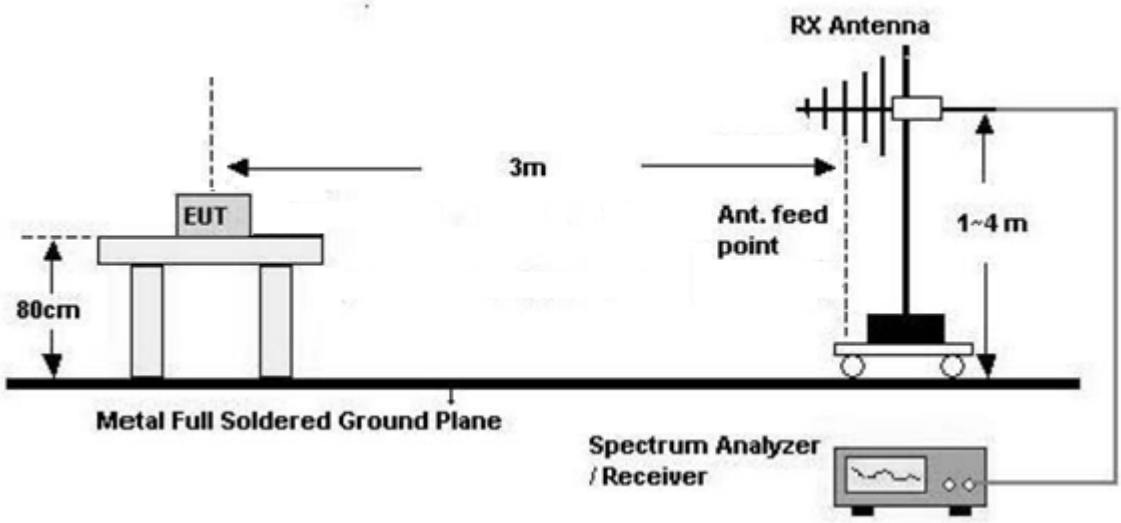
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

Measurements for compliance with the limits in table may be performed at distances other than 3 metres.

Test Configuration

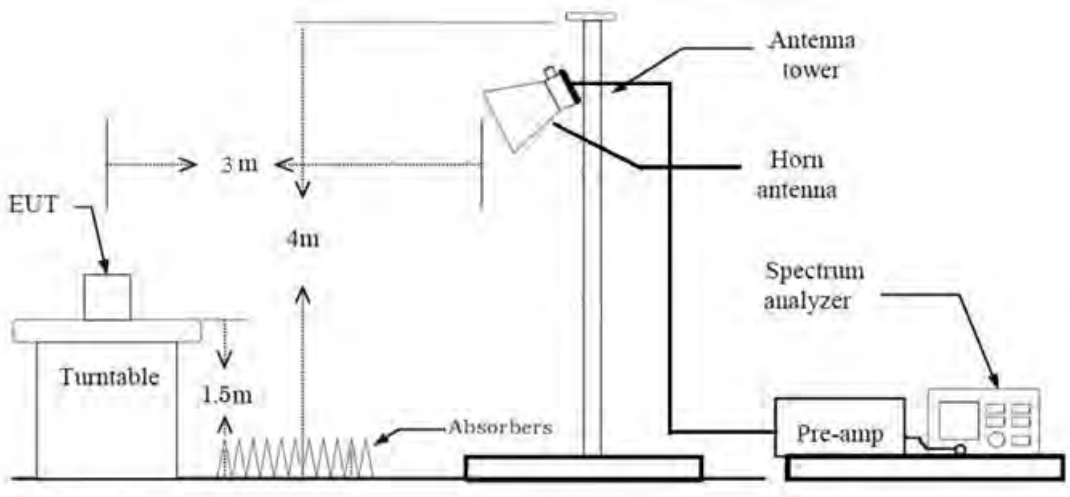
30 MHz - 1 GHz



Test Procedure of Receiver Spurious Emissions (Below 1GHz)

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

Above 1 GHz



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):
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Average):
      - We performed using a reduced video BW method was done with the analyzer in linear mode
      - Measured Frequency Range : 1 GHz – 25 GHz

- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW ≥ 1/τ Hz, where τ = pulse width in seconds
  The actual setting value of VBW = 1 kHz

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. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Measured Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(A.G) + Distance Factor(D.F)

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 + Shark Antenna
   - Mode : Stand alone + Shark Antenna
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
   - 802.11a : 6Mbps
   - 802.11n_HT20 : MCS0
   - 802.11n_HT40 : MCS0
   - 802.11ac_VHT20 : MCS0
   - 802.11ac_VHT40 : MCS0
   - 802.11ac_VHT80 : MCS0
4. Radiated Spuirous Emission
   -All modulation of operation were investigated and the worst case modulation results are reported.
   (Worstcase : 802.11a_6 Mbps)
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane
6. DA3300AAN(FCC)&DA3300AKN(ISED), Additional Models were tested and the worst case results are reported.

(Worst case : DA3300AAN(FCC)&DA3300AKN(ISED))

AC Power line Conducted Emissions

1. We don’t perform powerline conducted emission test. Because this EUT is used with vehicle.

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.
2. DA3300AAN(FCC)&DA3300AKN(ISED), Additional Models were tested and the worst case results are reported.

(Worst case : DA3300AAN(FCC)&DA3300AKN(ISED))

9. SUMMARY OF TEST RESULTS

FCC

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26 dB Bandwidth	§ 15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§ 15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§ 15.407(a)(1),(2),(3)	< 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),(2),(3)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)		PASS
Frequency Stability	§ 15.407(g) § 2.1055	Maintained within the band		PASS
AC Conducted Emissions 150 kHz-30 MHz	§ 15.207 § 15.407(b)(8)	<FCC 15.207 limits		N/A (#Note1)
Undesirable Emissions	§ 15.407(b) (1)(2)(3)(4)	<-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)(9), (10)	Emissions in restricted bands must meet the radiated limits detailed in 15.209		PASS

#Note1 : Not Tested.

ISED

Test Description	ISED Part Section(s)	Test Limit	Test Condition	Test Result
99 % Bandwidth	RSS-GEN, 6.7	N/A	CONDUCTED	PASS
6 dB Bandwidth	RSS-247, 6.2.4.1	> 500 kHz (5725~5850 MHz)		PASS
Maximum Conducted Output Power,	RSS-247, 6.2	< 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less		PASS
	RSS-247, 6.2.4 1	<1 W (5725-5850 MHz)		
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5150-5250 MHz) < 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5250-5350 MHz) < 1 W or 17+10 log $_{10}$ (BW) dBm (5470-5725 MHz) Whichever power is less		PASS
Power Spectral Density	RSS-247 6.2	<10 dBm/ MHz(e.i.r.p.) (5150-5250 MHz) <11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)		PASS
	RSS-247, 6.2.4 1	<30 dBm/500 kHz(Conducted) (5725-5850 MHz)		
Frequency Stability	RSS-GEN 8.11	should be kept within at least the central 80% of its permitted operating frequency band in order to minimize the possibility of out-of-band operation.		PASS
AC Conducted Emissions 150 kHz-30 MHz	RSS-GEN, 8.8	RSS-GEN section 8.8 table 4		N/A (#Note1)
Undesirable Emissions	RSS-247, 6.2.1 2	26 dBc at 5250~5350 MHz (5150~5350 MHz)		PASS
	RSS-247, 6.2	<-27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)	RADIATED	PASS
	RSS-247, 6.2.4 2	cf. Section 9.8.1 (UNII 3)		
General Field Strength Limits(Restricted Bands and Radiated Emission Limits)	RSS-Gen, 8.9 RSS-Gen, 8.10	RSS-Gen section 8.9 table 5, 6 section 8.10 table 7		PASS
Receiver Spurious Emissions	RSS-GEN, 5 RSS-GEN, 7.3	RSS-GEN section 7.3 table 3		PASS

#Note1 : Not Tested.

10. TEST RESULT

10.1 DUTY CYCLE

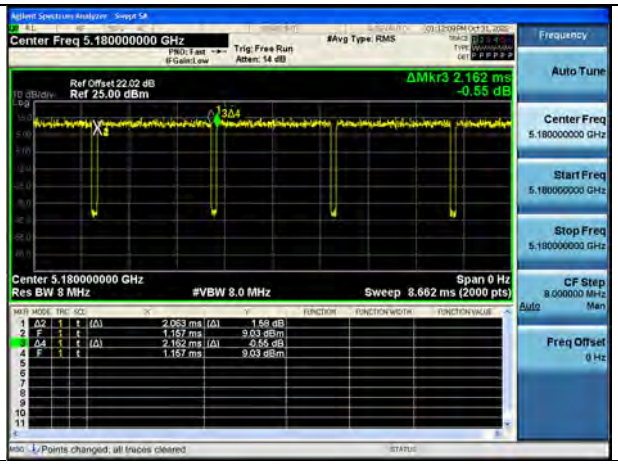
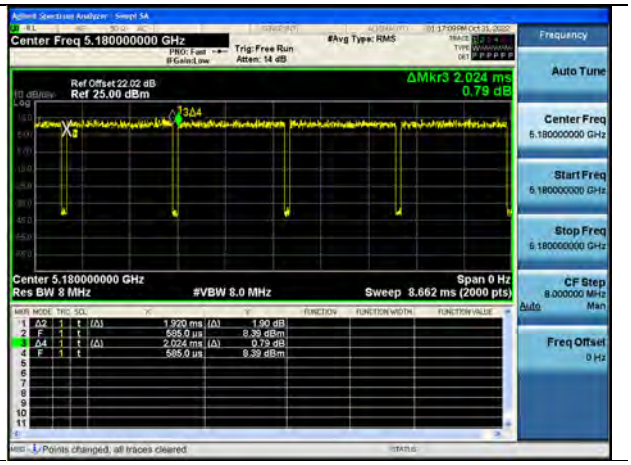
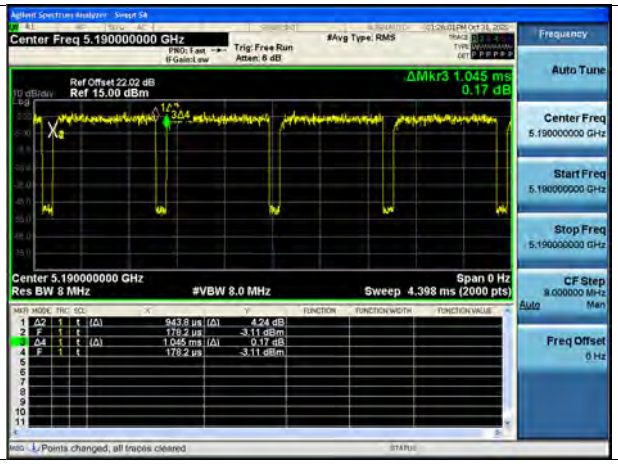
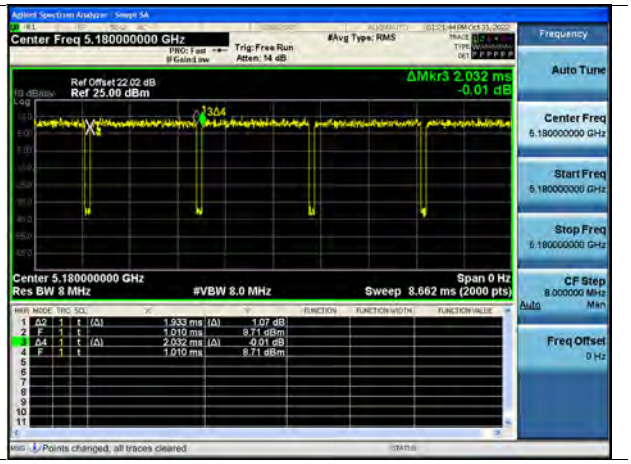
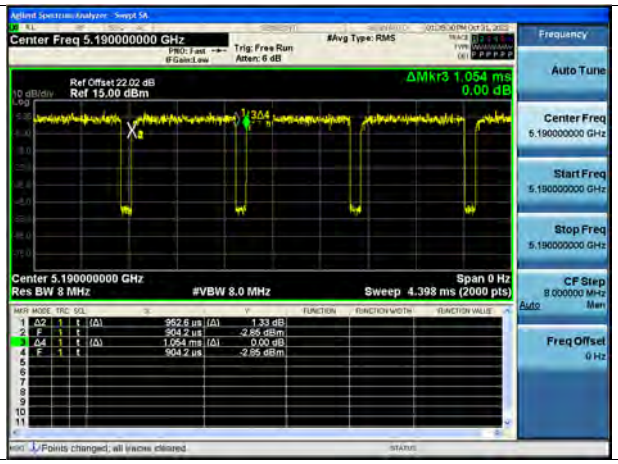
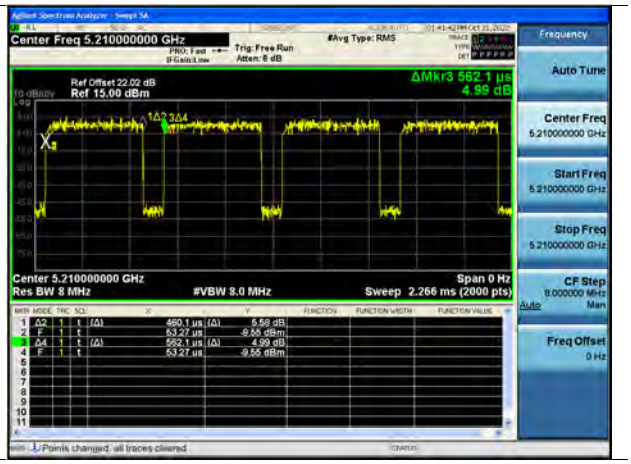
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	2.063	2.162	0.954	0.205
	9	1.385	1.485	0.932	0.304
	12	1.044	1.146	0.911	0.407
	18	0.704	0.804	0.875	0.580
	24	0.532	0.633	0.840	0.757
	36	0.364	0.465	0.782	1.067
	48	0.276	0.378	0.732	1.357
	54	0.248	0.349	0.710	1.489

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.920	2.024	0.949	0.229
	1	0.979	1.080	0.906	0.427
	2	0.664	0.766	0.868	0.616
	3	0.507	0.609	0.834	0.790
	4	0.352	0.453	0.776	1.100
	5	0.272	0.374	0.729	1.375
	6	0.248	0.349	0.710	1.489
	7	0.228	0.329	0.693	1.595
802.11n (HT40)	0	0.944	1.045	0.903	0.442
	1	0.491	0.593	0.829	0.814
	2	0.341	0.441	0.772	1.123
	3	0.264	0.365	0.724	1.400
	4	0.188	0.289	0.650	1.873
	5	0.152	0.253	0.600	2.218
	6	0.140	0.241	0.580	2.365
	7	0.128	0.229	0.558	2.532

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.933	2.032	0.951	0.218
	1	0.989	1.090	0.907	0.423
	2	0.672	0.773	0.869	0.612
	3	0.515	0.617	0.835	0.782
	4	0.356	0.458	0.778	1.088
	5	0.280	0.381	0.734	1.343
	6	0.252	0.354	0.713	1.468
	7	0.232	0.334	0.697	1.570
	8	0.200	0.302	0.662	1.788
802.11ac (VHT40)	0	0.953	1.054	0.904	0.438
	1	0.497	0.598	0.831	0.805
	2	0.344	0.445	0.774	1.113
	3	0.268	0.369	0.725	1.395
	4	0.192	0.293	0.654	1.842
	5	0.156	0.258	0.607	2.170
	6	0.144	0.245	0.587	2.316
	7	0.132	0.233	0.565	2.476
	8	0.117	0.217	0.536	2.706
	9	0.112	0.213	0.524	2.804
802.11ac (VHT80)	0	0.460	0.562	0.819	0.870
	1	0.253	0.354	0.715	1.457
	2	0.181	0.282	0.641	1.930
	3	0.148	0.249	0.594	2.259
	4	0.112	0.213	0.525	2.796
	5	0.096	0.197	0.485	3.145
	6	0.088	0.190	0.464	3.332
	7	0.084	0.186	0.455	3.423
	8	0.076	0.177	0.429	3.674
	9	0.072	0.174	0.417	3.800

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 & 99 % BANDWIDTH

FCC

802.11a Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	20.75	16.585
5200	40	21.00	16.600
5240	48	20.85	16.589
5260	52	21.16	16.624
5300	60	20.97	16.623
5320	64	20.99	16.610
5500	100	21.08	16.621
5580	116	20.90	16.581
5720	144	21.12	16.622
5745	149	20.87	16.628
5785	157	21.08	16.634
5825	165	21.22	16.608

802.11n(HT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.22	17.777
5200	40	21.55	17.785
5240	48	21.47	17.781
5260	52	21.26	17.758
5300	60	21.41	17.727
5320	64	21.27	17.726
5500	100	21.28	17.746
5580	116	21.24	17.779
5720	144	21.28	17.779
5745	149	21.43	17.782
5785	157	21.31	17.762
5825	165	21.41	17.779

802.11n(HT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.66	36.115
5230	46	39.58	36.140
5270	54	39.48	36.117
5310	62	39.37	36.121
5510	102	39.59	36.176
5550	110	39.36	36.115
5710	142	39.41	36.116
5755	151	39.40	36.131
5795	159	39.72	36.136

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.31	17.747
5200	40	21.15	17.782
5240	48	21.28	17.815
5260	52	21.31	17.813
5300	60	21.43	17.704
5320	64	21.24	17.797
5500	100	21.36	17.813
5580	116	21.59	17.779
5720	144	21.63	17.772
5745	149	21.47	17.789
5785	157	21.20	17.782
5825	165	21.32	17.822

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.62	36.133
5230	46	39.80	36.145
5270	54	39.37	36.107
5310	62	39.60	36.159
5510	102	39.66	36.097
5550	110	39.60	36.068
5710	142	39.61	36.040
5755	151	39.85	36.088
5795	159	39.32	36.108

802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	80.76	75.519
5290	58	81.71	75.519
5530	106	81.03	75.508
5690	138	80.86	75.462
5775	155	81.20	75.543

▣ Test Plots(802.11a)

Note:

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

802.11a UNII 1 BAND 26 dB Bandwidth (CH 40)

802.11a UNII 2A BAND 26 dB Bandwidth (CH 52)

802.11a UNII 2C BAND 26 dB Bandwidth (CH 144)

802.11a UNII 3 BAND 26 dB Bandwidth (CH 165)

▣ Test Plots(802.11n(HT20))

Note:

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

802.11n_HT20 UNII 1 BAND 26 dB Bandwidth(CH 40)

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

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

802.11n_HT20 UNII 3 BAND 26 dB Bandwidth(CH 149)

▣ Test Plots(802.11n(HT40))

Note:

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

802.11n_HT40 UNII 1 BAND 26 dB Bandwidth(CH 38)

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

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

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

▣ Test Plots(802.11ac(VHT20))

Note:

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

802.11ac_VHT20 UNII 1 BAND 26 dB Bandwidth(CH 36)	802.11ac_VHT20 UNII 2A BAND 26 dB Bandwidth(CH 60)
	
802.11ac_VHT20 UNII 2C BAND 26 dB Bandwidth(CH 144)	802.11ac_VHT20 UNII 3 BAND 26 dB Bandwidth(CH 149)
	

▣ Test Plots(802.11ac(VHT40))

Note:

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

802.11ac_VHT40 UNII 1 BAND 26 dB Bandwidth(CH 46)

802.11ac_VHT40 UNII 2A BAND 26 dB Bandwidth (CH 62)

802.11ac_VHT40 UNII 2C BAND 26 dB Bandwidth(CH 102)

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

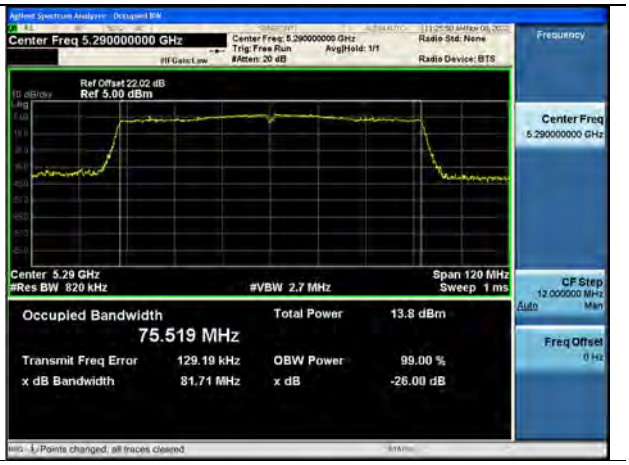
▣ Test Plots(802.11ac(VHT80))

Note:

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

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

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



802.11ac_VHT80 UNII 2C BAND 26 dB Bandwidth(CH 106)

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

99 % bandwidth UNII-3 (ISED)

802.11a Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	16.585
5200	40	16.600
5240	48	16.589
5260	52	16.624
5300	60	16.623
5320	64	16.610
5500	100	16.621
5580	116	16.581
5720	144	16.622
5745	149	16.622
5785	157	16.610
5825	165	16.625

802.11n(HT20) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.777
5200	40	17.785
5240	48	17.781
5260	52	17.758
5300	60	17.727
5320	64	17.726
5500	100	17.746
5580	116	17.779
5720	144	17.779
5745	149	17.803
5785	157	17.789
5825	165	17.762

802.11n(HT40) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.115
5230	46	36.140
5270	54	36.117
5310	62	36.121
5510	102	36.176
5550	110	36.115
5710	142	36.116
5755	151	36.102
5795	159	36.140

802.11ac(VHT20) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.747
5200	40	17.782
5240	48	17.815
5260	52	17.813
5300	60	17.704
5320	64	17.797
5500	100	17.813
5580	116	17.779
5720	144	17.772
5745	149	17.806
5785	157	17.816
5825	165	17.738

802.11ac(VHT40) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.133
5230	46	36.145
5270	54	36.107
5310	62	36.159
5510	102	36.097
5550	110	36.068
5710	142	36.040
5755	151	36.113
5795	159	36.130

802.11ac(VHT80) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	75.519
5290	58	75.519
5530	106	75.508
5690	138	75.462
5775	155	75.522

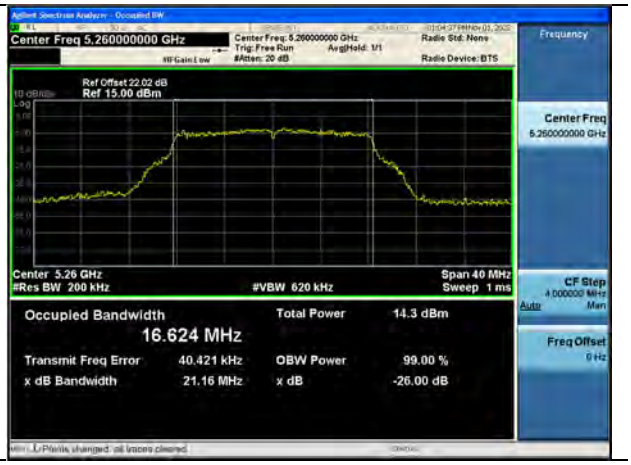
▣ Test Plots(802.11a)

Note:

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

802.11a UNII 1 BAND 99 % Bandwidth (CH 40)

802.11a UNII 2A BAND 99 % Bandwidth (CH 52)



802.11a UNII 2C BAND 99 % Bandwidth (CH 144)

802.11a UNII 3 BAND 99 % Bandwidth (CH 165)

▣ Test Plots(802.11n(HT20))

Note:

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

802.11n_HT20 UNII 1 BAND 99 % Bandwidth(CH 40)

802.11n_HT20 UNII 2A BAND 99 % Bandwidth(CH 52)

802.11n_HT20 UNII 2C BAND 99 % Bandwidth(CH 144)

802.11n_HT20 UNII 3 BAND 99 % Bandwidth(CH 149)

▣ Test Plots(802.11n(HT40))

Note:

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

802.11n_HT40 UNII 1 BAND 99 % Bandwidth(CH 46)

802.11n_HT40 UNII 2A BAND 99 % Bandwidth (CH 62)

802.11n_HT40 UNII 2C BAND 99 % Bandwidth(CH 102)

802.11n_HT40 UNII 3 BAND 99 % Bandwidth (CH 159)

▣ Test Plots(802.11ac(VHT20))

Note:

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

802.11ac_VHT20 UNII 1 BAND 99 % Bandwidth(CH 48)

802.11ac_VHT20 UNII 2A BAND 99 % Bandwidth(CH 52)

802.11ac_VHT20 UNII 2C BAND 99 % Bandwidth(CH 100)

802.11ac_VHT20 UNII 3 BAND 99 % Bandwidth(CH 157)

▣ Test Plots(802.11ac(VHT40))

Note:

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

802.11ac_VHT40 UNII 1 BAND 99 % Bandwidth(CH 46)

802.11ac_VHT40 UNII 2A BAND 99 % Bandwidth (CH 62)

802.11ac_VHT40 UNII 2C BAND 99 % Bandwidth(CH 102)

802.11ac_VHT40 UNII 3 BAND 99 % Bandwidth (CH 159)

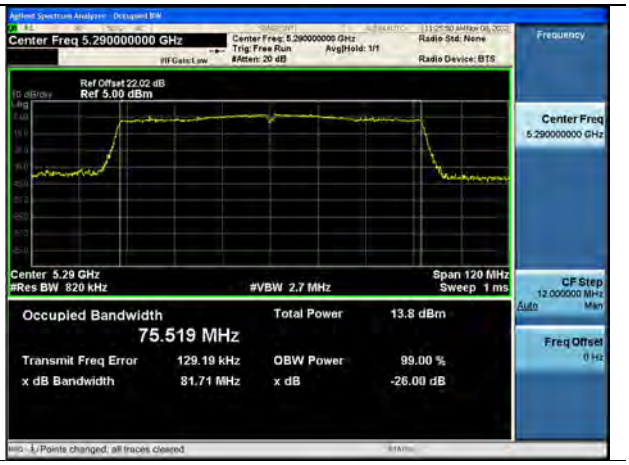
▣ Test Plots(802.11ac(VHT80))

Note:

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

802.11ac_VHT80 UNII 1 BAND 99 % Bandwidth(CH 42)

802.11ac_VHT80 UNII 2A BAND 99 % Bandwidth (CH 58)



802.11ac_VHT80 UNII 2C BAND 99 % Bandwidth(CH 106)

802.11ac_VHT80 UNII 3 BAND 99 % Bandwidth (CH 155)

10.3 6 dB BANDWIDTH

[FCC]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.41	> 0.5	Pass
5785	157	16.34	> 0.5	Pass
5825	165	16.38	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.61	> 0.5	Pass
5785	157	17.60	> 0.5	Pass
5825	165	17.59	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.50	> 0.5	Pass
5795	159	35.76	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.58	> 0.5	Pass
5785	157	17.32	> 0.5	Pass
5825	165	17.61	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.26	> 0.5	Pass
5795	159	35.24	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.34	> 0.5	Pass

▣ Test Plots

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

802.11a (CH.157)	802.11n(HT20) (CH.165)
	
802.11n(HT40) (CH.151)	**802.11ac(VHT20) (CH.157)**
	
802.11ac(VHT40) (CH.159)	**802.11ac(VHT80) (CH.155)**
	

[ISED]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.24	> 0.5	Pass
5785	157	16.12	> 0.5	Pass
5825	165	16.25	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.61	> 0.5	Pass
5785	157	17.52	> 0.5	Pass
5825	165	17.59	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	36.09	> 0.5	Pass
5795	159	35.73	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.65	> 0.5	Pass
5785	157	17.58	> 0.5	Pass
5825	165	17.64	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.86	> 0.5	Pass
5795	159	36.10	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	74.96	> 0.5	Pass

▣ Test Plots

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

802.11a (CH.157)	802.11n(HT20) (CH.157)
	
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		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	7.69	0.20	7.89	-0.61	7.28	13.96	23.98
5200	40	6.60	0.20	6.81	-0.61	6.20		
5240	48	6.58	0.20	6.79	-0.61	6.18		
5260	52	7.31	0.41	7.72	-0.18	7.54	13.96	23.98
5300	60	7.10	0.41	7.51	-0.18	7.33		
5320	64	7.20	0.41	7.60	-0.18	7.42		
5500	100	4.86	0.20	5.07	-	-	23.98	23.98
5580	116	4.59	0.41	5.00	-	-		
5720	144	4.82	0.41	5.23	-	-		
5745	149	2.39	0.20	2.59	-	-	30.00	30.00
5785	157	1.97	0.41	2.38	-	-		
5825	165	2.14	0.41	2.55	-	-		

802.11n(20MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	7.57	0.43	7.99	-0.61	7.38	14.26	23.98
5200	40	7.47	0.43	7.90	-0.61	7.29		
5240	48	7.49	0.43	7.92	-0.61	7.31		
5260	52	7.55	0.43	7.98	-0.18	7.80	14.25	23.98
5300	60	7.39	0.23	7.62	-0.18	7.44		
5320	64	7.10	0.23	7.33	-0.18	7.15		
5500	100	4.84	0.23	5.07	-	-	23.98	23.98
5580	116	4.69	0.23	4.92	-	-		
5720	144	4.84	0.23	5.07	-	-		
5745	149	0.74	1.60	2.33	-	-	30.00	30.00
5785	157	1.75	0.62	2.37	-	-		
5825	165	0.65	1.49	2.14	-	-		

802.11ac(20MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	7.77	0.22	7.99	-0.61	7.38	14.25	23.98
5200	40	7.34	0.61	7.96	-0.61	7.35		
5240	48	7.22	0.61	7.83	-0.61	7.22		
5260	52	7.43	0.61	8.04	-0.18	7.86	14.24	23.98
5300	60	7.44	0.22	7.65	-0.18	7.47		
5320	64	6.87	0.42	7.29	-0.18	7.11		
5500	100	4.38	0.61	4.99	-	-	23.98	23.98
5580	116	4.32	0.42	4.74	-	-		
5720	144	4.63	0.61	5.24	-	-		
5745	149	1.92	0.61	2.53	-	-	30.00	30.00
5785	157	2.05	0.61	2.66	-	-		
5825	165	2.10	0.22	2.32	-	-		

802.11n(40MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5190	38	1.14	2.53	3.67	-0.61	3.06	14.77	23.98
5230	46	1.18	2.53	3.72	-0.61	3.11		
5270	54	4.00	2.53	6.54	-0.18	6.36	14.77	23.98
5310	62	3.92	2.36	6.28	-0.18	6.10		
5510	102	2.35	2.53	4.89	-	-	23.98	23.98
5550	110	4.52	0.44	4.97	-	-		
5710	142	3.76	1.12	4.89	-	-		
5755	151	1.23	0.44	1.67	-	-	30.00	30.00
5795	159	-0.57	2.53	1.96	-	-		

802.11ac(40MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5190	38	0.58	2.80	3.38	-0.61	2.77	14.77	23.98
5230	46	1.05	2.48	3.53	-0.61	2.92		
5270	54	3.74	2.80	6.54	-0.18	6.36	14.77	23.98
5310	62	3.44	2.80	6.24	-0.77	5.47		
5510	102	2.68	2.32	5.00	-	-	23.98	23.98
5550	110	3.85	1.11	4.97	-	-		
5710	142	3.44	1.39	4.83	-	-		
5755	151	-1.01	2.80	1.79	-	-	30.00	30.00
5795	159	0.91	0.80	1.71	-	-		

802.11ac(80MHz) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5210	42	3.45	0.87	4.32	-0.61	3.71	14.77	23.98
5290	58	3.80	2.80	6.59	-0.18	6.41	14.77	23.98
5530	106	0.78	3.67	4.45	-	-	23.98	23.98
5690	138	2.71	1.93	4.64	-	-	23.98	23.98
5775	155	-0.90	2.80	1.90	-	-	30.00	30.00

Note :

FCC&ISED Worst Limit applied

U-NII-1	▶ISED Maximun E.I.R.P Worst Limit < 30 mW or 1.76+10 log 10 (BW) dBm (5150-5250 MHz)
U-NII-2A	▶ISED Maximun E.I.R.P Worst Limit < 30 mW or 1.76+10 log 10 (BW) dBm (5250-5350 MHz)
U-NII-2C	▶FCC&ISED Conducted Power Limit < 250 mW or 11+10 log $_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz)Whichever power is less

10.5 FREQUENCY STABILITY.

10.5.1 80 MHz BW

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5210060.15	60.15
100%		-30	5210079.98	79.98
100%		-20	5210076.39	76.39
100%		-10	5210070.96	70.96
100%		0	5210066.71	66.71
100%		+10	5210062.81	62.81
100%		+30	5210063.44	63.44
100%		+40	5210071.45	71.45
100%		+50	5210076.72	76.72
High	16.00	+20	5210079.42	79.42
Low	9.00	+20	5210079.81	79.81

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5290058.43	58.43
100%		-30	5290078.74	78.74
100%		-20	5290075.83	75.83
100%		-10	5290068.73	68.73
100%		0	5290065.15	65.15
100%		+10	5290061.22	61.22
100%		+30	5290061.18	61.18
100%		+40	5290070.60	70.60
100%		+50	5290075.91	75.91
High	16.00	+20	5290077.74	77.74
Low	9.00	+20	5290077.48	77.48

Note:

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

OPERATING BAND:	UNII Band 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5530061.88	61.88
100%		-30	5530081.65	81.65
100%		-20	5530078.92	78.92
100%		-10	5530072.91	72.91
100%		0	5530069.08	69.08
100%		+10	5530066.13	66.13
100%		+30	5530064.79	64.79
100%		+40	5530072.75	72.75
100%		+50	5530076.54	76.54
High	16.00	+20	5530079.67	79.67
Low	9.00	+20	5530079.04	79.04

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5775064.12	64.12
100%		-30	5775084.43	84.43
100%		-20	5775080.88	80.88
100%		-10	5775073.83	73.83
100%		0	5775069.99	69.99
100%		+10	5775066.41	66.41
100%		+30	5775066.34	66.34
100%		+40	5775075.33	75.33
100%		+50	5775079.44	79.44
High	16.00	+20	5775082.23	82.23
Low	9.00	+20	5775083.30	83.30

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5210068.40	68.40
100%		-30	5210088.79	88.79
100%		-20	5210086.47	86.47
100%		-10	5210079.92	79.92
100%		0	5210075.82	75.82
100%		+10	5210072.31	72.31
100%		+30	5210072.37	72.37
100%		+40	5210081.32	81.32
100%		+50	5210085.86	85.86
High	16.00	+20	5210086.94	86.94
Low	9.00	+20	5210085.86	85.86

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5290068.92	68.92
100%		-30	5290089.74	89.74
100%		-20	5290086.91	86.91
100%		-10	5290081.70	81.70
100%		0	5290078.30	78.30
100%		+10	5290074.62	74.62
100%		+30	5290071.46	71.46
100%		+40	5290082.11	82.11
100%		+50	5290087.08	87.08
High	16.00	+20	5290087.89	87.89
Low	9.00	+20	5290086.35	86.35

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 2C
OPERATING FREQUENCY:	5,530,000,000 Hz
CHANNEL:	106
REFERENCE VOLTAGE:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5530064.56	64.56
100%		-30	5530084.09	84.09
100%		-20	5530080.62	80.62
100%		-10	5530074.65	74.65
100%		0	5530070.55	70.55
100%		+10	5530067.69	67.69
100%		+30	5530068.60	68.60
100%		+40	5530078.24	78.24
100%		+50	5530082.95	82.95
High	16.00	+20	5530083.27	83.27
Low	9.00	+20	5530082.19	82.19

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5775066.26	66.26
100%		-30	5775085.95	85.95
100%		-20	5775082.36	82.36
100%		-10	5775075.50	75.50
100%		0	5775071.21	71.21
100%		+10	5775067.34	67.34
100%		+30	5775069.71	69.71
100%		+40	5775079.75	79.75
100%		+50	5775084.40	84.40
High	16.00	+20	5775084.91	84.91
Low	9.00	+20	5775083.25	83.25

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.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5210069.32	69.32
100%		-30	5210089.76	89.76
100%		-20	5210086.32	86.32
100%		-10	5210080.14	80.14
100%		0	5210076.59	76.59
100%		+10	5210072.70	72.70
100%		+30	5210071.94	71.94
100%		+40	5210081.68	81.68
100%		+50	5210087.27	87.27
High	16.00	+20	5210088.91	88.91
Low	9.00	+20	5210087.29	87.29

Note:

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

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5290072.58	72.58
100%		-30	5290092.09	92.09
100%		-20	5290089.68	89.68
100%		-10	5290083.92	83.92
100%		0	5290079.53	79.53
100%		+10	5290077.11	77.11
100%		+30	5290075.45	75.45
100%		+40	5290084.87	84.87
100%		+50	5290088.05	88.05
High	16.00	+20	5290089.76	89.76
Low	9.00	+20	5290091.01	91.01

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5530070.25	70.25
100%		-30	5530089.77	89.77
100%		-20	5530087.01	87.01
100%		-10	5530081.35	81.35
100%		0	5530076.59	76.59
100%		+10	5530073.20	73.20
100%		+30	5530073.38	73.38
100%		+40	5530081.07	81.07
100%		+50	5530084.82	84.82
High	16.00	+20	5530088.00	88.00
Low	9.00	+20	5530090.12	90.12

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5775074.18	74.18
100%		-30	5775093.25	93.25
100%		-20	5775090.21	90.21
100%		-10	5775084.82	84.82
100%		0	5775081.37	81.37
100%		+10	5775078.12	78.12
100%		+30	5775078.17	78.17
100%		+40	5775086.56	86.56
100%		+50	5775090.90	90.90
High	16.00	+20	5775092.52	92.52
Low	9.00	+20	5775091.52	91.52

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5210078.59	78.59
100%		-30	5210099.00	99.00
100%		-20	5210096.68	96.68
100%		-10	5210090.54	90.54
100%		0	5210086.80	86.80
100%		+10	5210084.61	84.61
100%		+30	5210080.92	80.92
100%		+40	5210091.57	91.57
100%		+50	5210097.22	97.22
High	16.00	+20	5210098.24	98.24
Low	9.00	+20	5210098.38	98.38

Note:

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

OPERATING BAND:	UNII Band 2A
OPERATING FREQUENCY:	5,290,000,000 Hz
CHANNEL:	58
REFERENCE VOLTAGE:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5290079.64	79.64
100%		-30	5290098.03	98.03
100%		-20	5290097.71	97.71
100%		-10	5290092.36	92.36
100%		0	5290087.69	87.69
100%		+10	5290084.13	84.13
100%		+30	5290082.57	82.57
100%		+40	5290090.77	90.77
100%		+50	5290094.83	94.83
High	16.00	+20	5290097.70	97.70
Low	9.00	+20	5290097.81	97.81

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:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5530080.24	80.24
100%		-30	5530099.72	99.72
100%		-20	5530097.84	97.84
100%		-10	5530092.33	92.33
100%		0	5530088.46	88.46
100%		+10	5530085.98	85.98
100%		+30	5530082.69	82.69
100%		+40	5530091.15	91.15
100%		+50	5530096.34	96.34
High	16.00	+20	5530099.43	99.43
Low	9.00	+20	5530098.11	98.11

Note:

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

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	14.4 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	14.40	+20(Ref)	5775082.15	82.15
100%		-30	5775099.64	99.64
100%		-20	5775098.16	98.16
100%		-10	5775092.16	92.16
100%		0	5775088.58	88.58
100%		+10	5775086.26	86.26
100%		+30	5775084.80	84.80
100%		+40	5775093.90	93.90
100%		+50	5775098.45	98.45
High	16.00	+20	5775098.70	98.70
Low	9.00	+20	5775099.16	99.16

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.

10.6 POWER SPECTRAL DENSITY

FCC & ISED

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-2.742	0.205	-2.537	11 dBm/MHz
5200	40	-3.496	0.205	-3.291	
5240	48	-3.524	0.205	-3.319	
5260	52	-2.602	0.407	-2.195	
5300	60	-2.614	0.407	-2.207	
5320	64	-2.759	0.407	-2.352	
5500	100	-5.197	0.205	-4.992	
5580	116	-5.268	0.407	-4.861	
5720	144	-5.325	0.407	-4.918	
5745	149	-10.297	0.205	-10.092	30 dBm/500 kHz
5785	157	-10.474	0.407	-10.067	
5825	165	-10.949	0.407	-10.542	

802.11n(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-2.883	0.427	-2.456	11 dBm/MHz
5200	40	-2.734	0.427	-2.307	
5240	48	-3.298	0.427	-2.871	
5260	52	-2.947	0.427	-2.520	
5300	60	-3.408	0.229	-3.179	
5320	64	-3.256	0.229	-3.027	
5500	100	-5.373	0.229	-5.144	
5580	116	-5.872	0.229	-5.643	
5720	144	-5.417	0.229	-5.188	
5745	149	-12.966	1.595	-11.371	30 dBm/500 kHz
5785	157	-11.149	0.616	-10.533	
5825	165	-13.176	1.489	-11.687	

802.11n(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-11.808	2.532	-9.276	11 dBm/MHz
5230	46	-11.520	2.532	-8.988	
5270	54	-9.017	2.532	-6.485	
5310	62	-9.215	2.365	-6.850	
5510	102	-10.518	2.532	-7.986	
5500	110	-8.713	0.442	-8.271	
5710	142	-9.460	1.123	-8.337	
5755	151	-14.762	0.442	-14.320	30 dBm /500 kHz
5795	159	-16.141	2.532	-13.609	

802.11ac(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-2.469	0.218	-2.251	11 dBm/MHz
5200	40	-2.992	0.612	-2.380	
5240	48	-3.285	0.612	-2.673	
5260	52	-2.906	0.612	-2.294	
5300	60	-3.042	0.218	-2.824	
5320	64	-3.315	0.423	-2.892	
5500	100	-5.977	0.612	-5.365	
5580	116	-5.392	0.423	-4.969	
5720	144	-5.577	0.612	-4.965	
5745	149	-10.881	0.612	-10.269	30 dBm/500 kHz
5785	157	-11.126	0.612	-10.514	
5825	165	-11.035	0.218	-10.817	

802.11ac(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-12.361	2.804	-9.557	11 dBm/MHz
5230	46	-11.795	2.476	-9.319	
5270	54	-9.440	2.804	-6.636	
5310	62	-9.371	2.804	-6.567	
5510	102	-9.733	2.316	-7.417	
5500	110	-9.620	1.113	-8.507	
5710	142	-9.866	1.395	-8.471	
5755	151	-16.520	2.804	-13.716	30 dBm/500 kHz
5795	159	-15.069	0.805	-14.264	

802.11ac(80 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5210	42	-12.847	0.870	-11.977	11 dBm/MHz
5290	58	-13.020	2.796	-10.224	
5530	106	-15.682	3.674	-12.008	
5690	138	-13.168	1.930	-11.238	
5775	155	-20.748	2.796	-17.952	30 dBm/500 kHz

ISED Only

EIRP(UNII-1) # NOTE : Only UNII1 bands were calculated as EIRP.

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5180	36	-2.742	0.205	-2.537	-0.61	-3.147	10 dBm/MHz
5200	40	-3.496	0.205	-3.291	-0.61	-3.901	
5240	48	-3.524	0.205	-3.319	-0.61	-3.929	

802.11n(HT20) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5180	36	-2.883	0.427	-2.456	-0.61	-3.066	10 dBm/MHz
5200	40	-2.734	0.427	-2.307	-0.61	-2.917	
5240	48	-3.298	0.427	-2.871	-0.61	-3.481	

802.11n(HT40) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5190	38	-11.808	2.532	-9.276	-0.61	-9.886	10 dBm/MHz
5230	46	-11.520	2.532	-8.988	-0.61	-9.598	

802.11ac(VHT20)Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5180	36	-2.469	0.218	-2.251	-0.61	-2.861	10 dBm/MHz
5200	40	-2.992	0.612	-2.380	-0.61	-2.990	
5240	48	-3.285	0.612	-2.673	-0.61	-3.283	

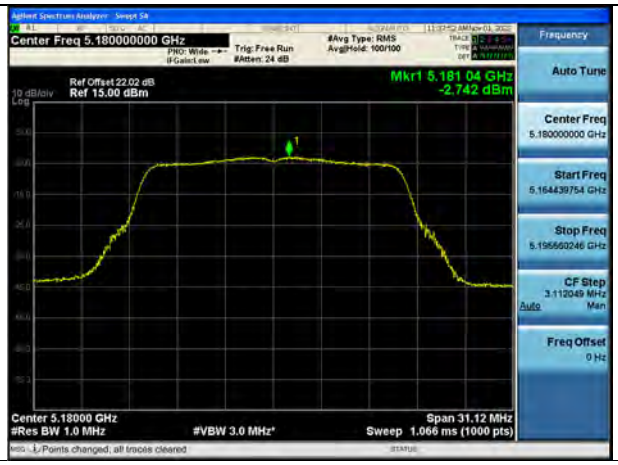
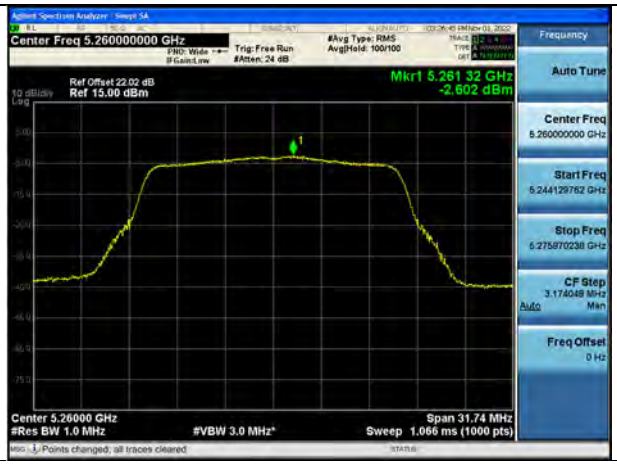
802.11ac(VHT40)Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5190	38	-12.361	2.804	-9.557	-0.61	-10.167	10 dBm/MHz
5230	46	-11.795	2.476	-9.319	-0.61	-9.929	

802.11ac(VHT80)Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5210	42	-12.847	0.870	-11.977	-0.61	-12.587	10 dBm/MHz

▣ Test Plots(802.11a)

Note:

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

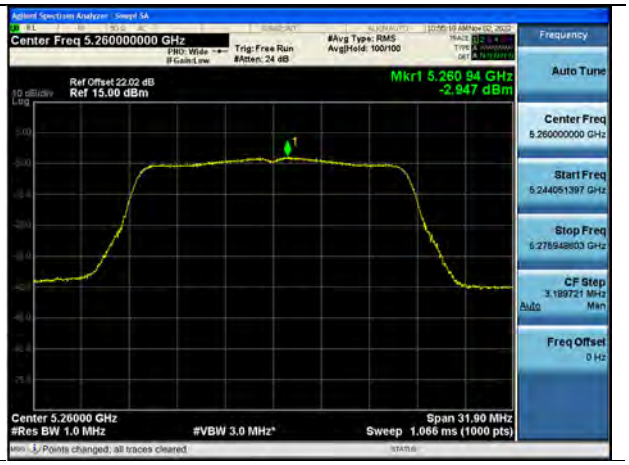
UNII 1 (Ch. 36)	UNII 2A (Ch. 52)
	

UNII 2C (Ch. 116)	UNII 3 (Ch. 157)
	

▣ Test Plots(802.11n(HT20))

Note:

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

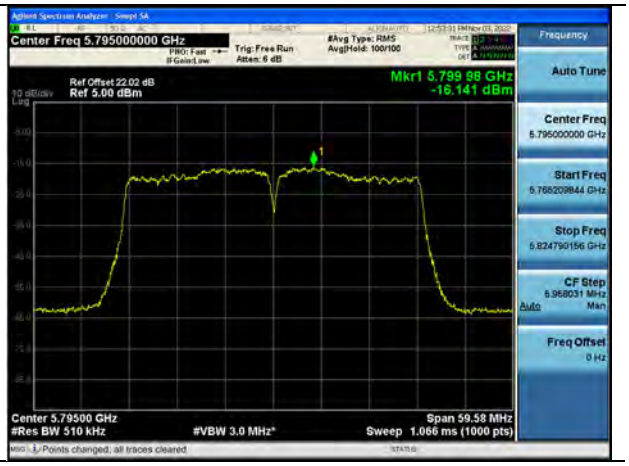
UNII 1 (Ch. 40)	UNII 2A (Ch. 52)
	
UNII 2C (Ch. 100)	UNII 3 (Ch. 157)
	

▣ Test Plots(802.11n(HT40))

Note:

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

UNII 1 (Ch. 46)	UNII 2A (Ch. 54)
	

UNII 2C (Ch. 102)	UNII 3 (Ch. 159)
	

▣ Test Plots(802.11ac(VHT20))

Note:

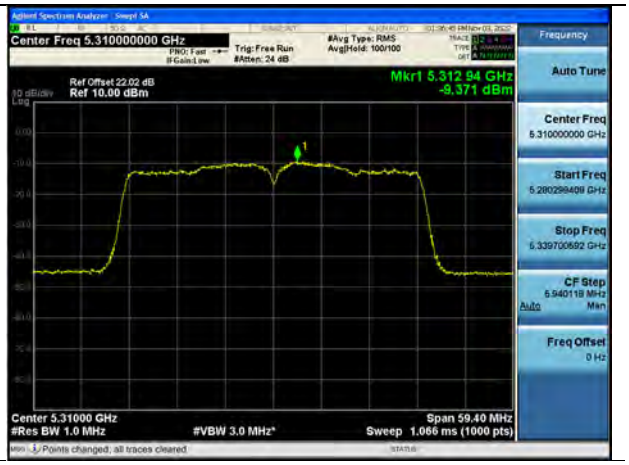
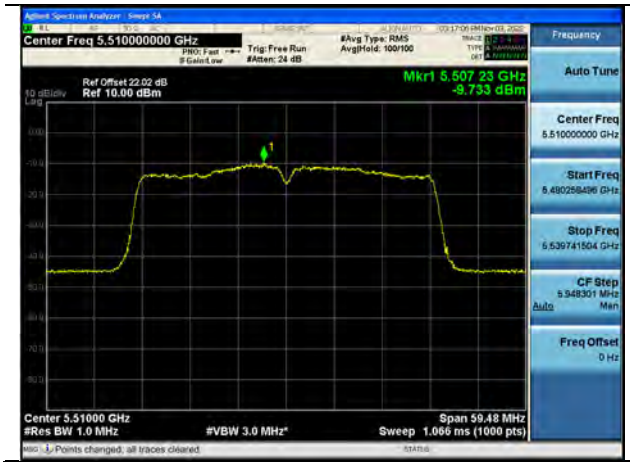
In order to simplify the report, attached plots were only channel of the highest power.

UNII 1 (Ch. 36)	UNII 2A (Ch. 52)
	
UNII 2C (Ch. 144)	UNII 3 (Ch. 149)
	

▣ Test Plots(802.11ac(VHT40))

Note:

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

UNII 1 (Ch. 46)	UNII 2A (Ch. 62)
	
UNII 2C (Ch. 102)	UNII 3 (Ch. 151)
	

▣ Test Plots(802.11ac(VHT80))

Note:

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

UNII 1 (Ch. 42)	UNII 2A (Ch. 58)
	
UNII 2C (Ch. 138)	UNII 3 (Ch. 155)
	

10.7 STRADDLE CHANNEL

10.7.1 26 dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5709.48	15.52
802.11n(HT20)				5709.36	15.64
802.11ac(VHT20)				5709.36	15.64
802.11a	UNII 3	5720	144	5730.48	5.48
802.11n(HT20)				5730.76	5.76
802.11ac(VHT20)				5730.80	5.80

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5690.32	34.68
802.11ac(VHT40)				5690.08	34.92
802.11n(HT40)	UNII 3	5710	142	5729.76	4.76
802.11ac(VHT40)				5729.60	4.60

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.44	75.56
	UNII 3	5690	138	5731.04	6.04

Note:

[UNII 2C] 26 dB Bandwidth = 5725 MHz - Measured Frequency[MHz]

[UNII 3C] 26 dB Bandwidth = Measured Frequency[MHz] -5725 MHz

▣ Test Plots (26 dB Bandwidth)

802.11a UNII Band

802.11n(HT20) UNII Band

802.11ac(VHT20) UNII Band

▣ Test Plots (26 dB Bandwidth)

802.11n(HT40) UNII Band

802.11ac(VHT40) UNII Band

802.11ac(VHT80) UNII Band

10.7.2 6 dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5728.24	3.24	> 0.5
802.11n(HT20)				5728.84	3.84	> 0.5
802.11ac(VHT20)				5728.80	3.80	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5728.00	3.00	> 0.5
802.11ac(VHT40)				5727.68	2.68	> 0.5

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

Note:

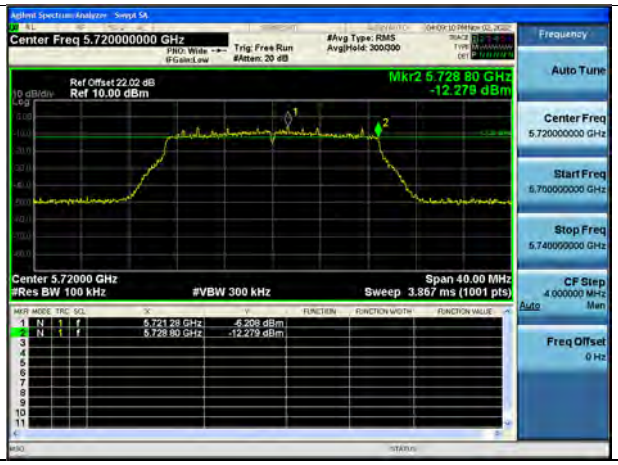
6 dB Bandwidth = Measured Frequency[MHz] – 5725 MHz

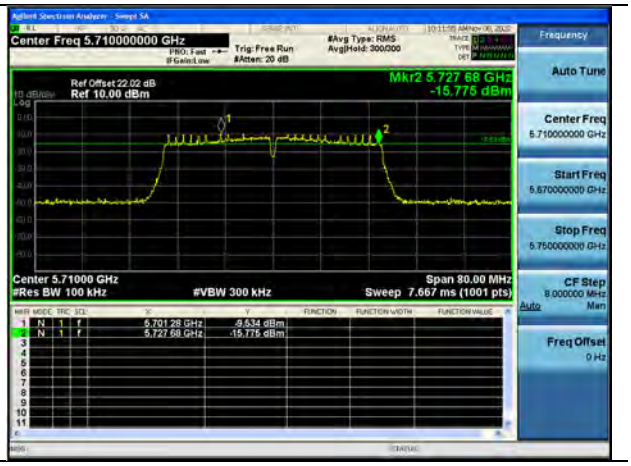
▣ Test Plots(UNII 3 Band 6 dB Bandwidth)

802.11a CH.144

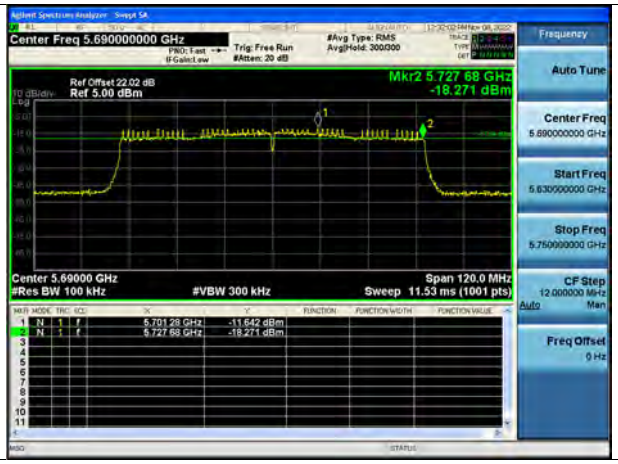
802.11n_HT20 CH.144

802.11ac_VHT20 CH.144



802.11n_HT40 CH.142	802.11ac_VHT40 CH.142
	

802.11ac_VHT80 CH.138



10.7.3 Output Power

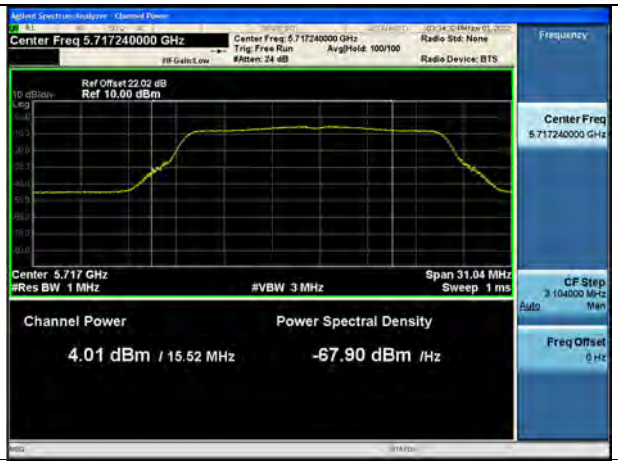
Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11a	5720 (UNII 2C Band)	144	4.01	0.407	4.42	22.91
802.11n(HT20)			4.45	0.229	4.68	22.94
802.11ac(VHT20)			3.82	0.612	4.43	22.94
802.11a	5720 (UNII 3 Band)	144	-3.21	0.407	-2.81	30.00
802.11n(HT20)			-2.27	0.229	-2.04	30.00
802.11ac(VHT20)			-2.91	0.612	-2.30	30.00

Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11n(HT40)	5710 (UNII 2C Band)	142	3.01	1.123	4.13	23.98
802.11ac(VHT40)			2.72	1.395	4.11	23.98
802.11n(HT40)	5710 (UNII 3 Band)	142	-8.55	1.123	-7.43	30.00
802.11ac(VHT40)			-8.97	1.395	-7.58	30.00

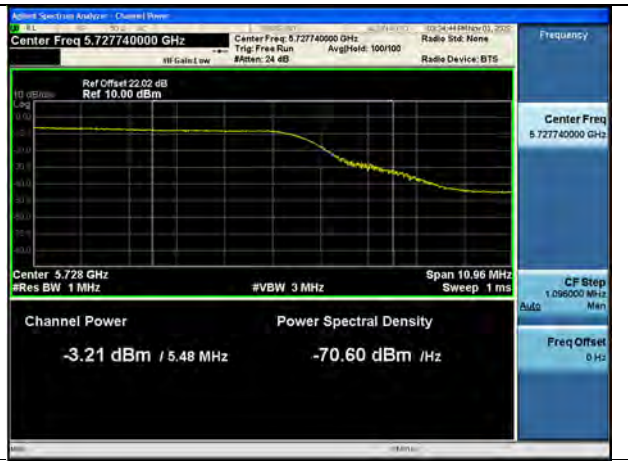
Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11ac(VHT80)	5690 (UNII 2C Band)	138	2.65	1.930	4.58	23.98
	5690 (UNII 3 Band)	138	-11.89	1.930	-9.96	30.00

▣ Test Plots_

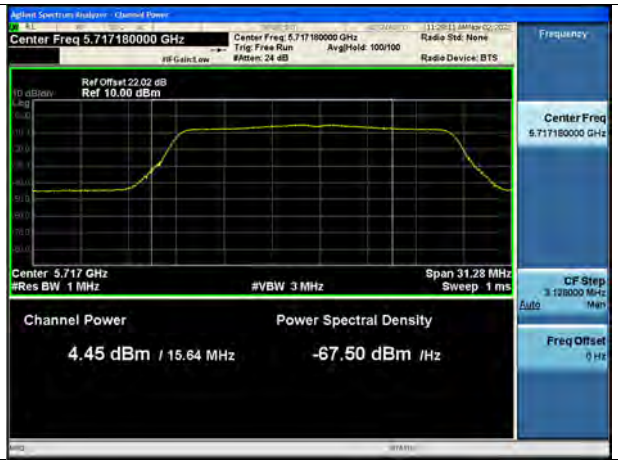
802.11a UNII 2C Band



802.11a UNII 3 Band



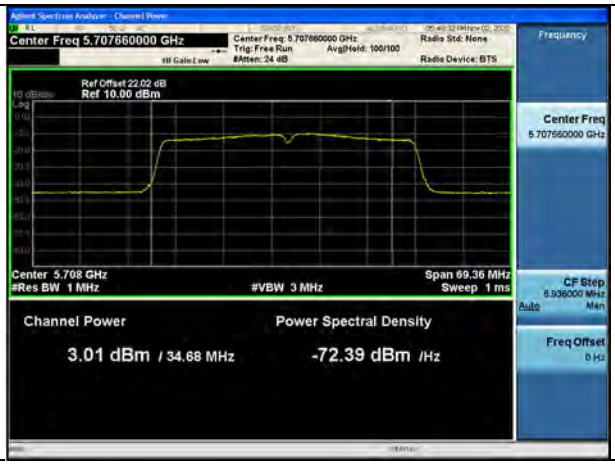
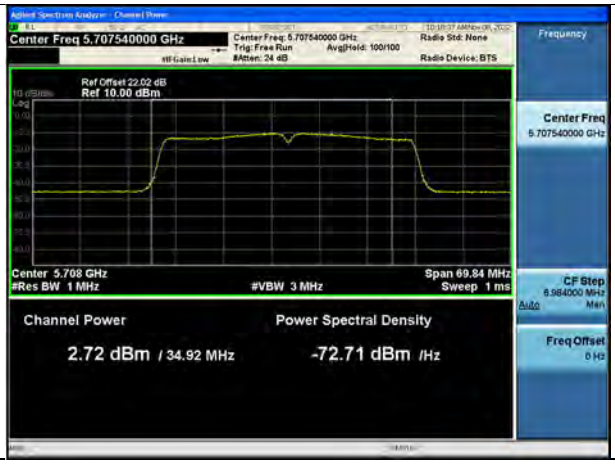
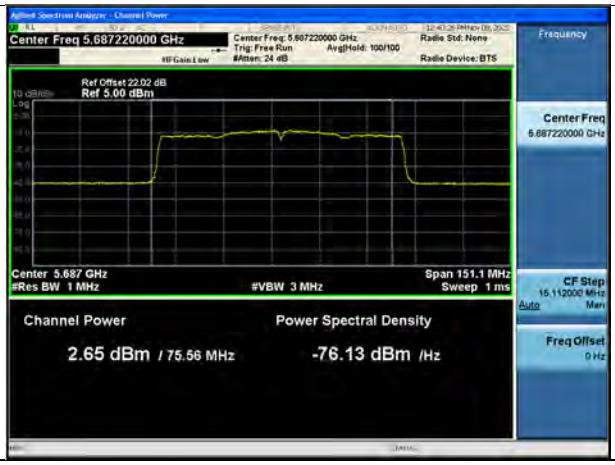
802.11n(HT20) UNII 2C Band



802.11n(HT20) UNII 3 Band

802.11ac(VHT20) UNII 2C Band

802.11ac(VHT20) UNII 3 Band

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

10.7.4 Power Spectral Density

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11a	5720 (UNII 2C Band)	144	-5.344	0.407	-4.937	11 dBm/ MHz
802.11n(HT20)			-5.419	0.229	-5.190	
802.11ac(VHT20)			-5.759	0.612	-5.147	
802.11a	5720 (UNII 3 Band)	144	-10.486	0.407	-10.079	30 dBm / 500 kHz
802.11n(HT20)			-10.310	0.229	-10.081	
802.11ac(VHT20)			-10.829	0.612	-10.217	

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11n(HT40)	5710 (UNII 2C Band)	142	-9.474	1.123	-8.351	11 dBm/ MHz
802.11ac(VHT40)			-9.726	1.395	-8.331	
802.11n(HT40)	5710 (UNII 3 Band)	142	-15.432	1.123	-14.309	30 dBm/ 500 kHz
802.11ac(VHT40)			-15.933	1.395	-14.538	

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11ac(VHT80)	5690 (UNII 2C Band)	138	-13.382	1.930	-11.452	11 dBm/ MHz
	5690 (UNII 3 Band)	138	-19.483	1.930	-17.553	30 dBm/ 500 kHz

▣ Test Plots_

802.11a UNII 2C Band

802.11a UNII 3 Band

802.11n(HT20) UNII 2C Band

802.11n(HT20) UNII 3 Band

802.11ac(VHT20) UNII 2C Band

802.11ac(VHT20) UNII 3 Band

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

10.8 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

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

Note:

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

Frequency Range : Below 1 GHz

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

Note:

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

Frequency Range : Above 1 GHz

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10360	46.32	8.12	V	54.44	68.20	13.76	PK
15540	40.69	12.95	V	53.64	73.98	20.34	PK
15540	26.96	12.95	V	39.91	53.98	14.07	AV
10360	46.12	8.12	H	54.24	68.20	13.96	PK
15540	40.58	12.95	H	53.53	73.98	20.45	PK
15540	26.91	12.95	H	39.86	53.98	14.12	AV

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
10400	45.14	8.14	V	53.28	68.20	14.92	PK
15600	40.67	13.29	V	53.96	73.98	20.02	PK
15600	26.63	13.29	V	39.92	53.98	14.06	AV
10400	44.98	8.14	H	53.12	68.20	15.08	PK
15600	40.55	13.29	H	53.84	73.98	20.14	PK
15600	26.51	13.29	H	39.80	53.98	14.18	AV

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10480	44.64	8.62	V	53.26	68.20	14.94	PK
15720	40.33	13.21	V	53.54	73.98	20.44	PK
15720	26.42	13.21	V	39.63	53.98	14.35	AV
10480	44.49	8.62	H	53.11	68.20	15.09	PK
15720	40.29	13.21	H	53.50	73.98	20.48	PK
15720	26.32	13.21	H	39.53	53.98	14.45	AV

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10520	45.02	8.85	V	53.87	68.20	14.33	PK
15780	40.86	12.87	V	53.73	73.98	20.25	PK
15780	27.12	12.87	V	39.99	53.98	13.99	AV
10520	44.89	8.85	H	53.74	68.20	14.46	PK
15780	40.77	12.87	H	53.64	73.98	20.34	PK
15780	26.99	12.87	H	39.86	53.98	14.12	AV

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10600	43.91	9.35	V	53.26	73.98	20.72	PK
10600	32.71	9.35	V	42.06	53.98	11.92	AV
15900	41.42	12.56	V	53.98	73.98	20.00	PK
15900	27.62	12.56	V	40.18	53.98	13.80	AV
10600	43.72	9.35	H	53.07	73.98	20.91	PK
10600	32.51	9.35	H	41.86	53.98	12.12	AV
15900	41.32	12.56	H	53.88	73.98	20.10	PK
15900	27.48	12.56	H	40.04	53.98	13.94	AV

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
10640	44.38	9.15	V	53.53	73.98	20.45	PK
10640	33.15	9.15	V	42.30	53.98	11.68	AV
15960	41.67	12.21	V	53.88	73.98	20.10	PK
15960	27.81	12.21	V	40.02	53.98	13.96	AV
10640	44.12	9.15	H	53.27	73.98	20.71	PK
10640	32.94	9.15	H	42.09	53.98	11.89	AV
15960	41.55	12.21	H	53.76	73.98	20.22	PK
15960	27.74	12.21	H	39.95	53.98	14.03	AV

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11000	44.32	10.19	V	54.51	73.98	19.47	PK
11000	33.32	10.19	V	43.51	53.98	10.47	AV
16500	41.68	12.17	V	53.85	68.20	14.35	PK
11000	44.22	10.19	H	54.41	73.98	19.57	PK
11000	33.12	10.19	H	43.31	53.98	10.67	AV
16500	41.77	12.17	H	53.94	68.20	14.26	PK

Band :	UNII 2C
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5580 MHz
Channel No.	116 Ch

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11160	44.12	10.46	V	54.58	73.98	19.40	PK
11160	33.22	10.46	V	43.68	53.98	10.30	AV
16740	43.31	12.65	V	55.96	68.20	12.24	PK
11160	44.52	10.46	H	54.98	73.98	19.00	PK
11160	33.61	10.46	H	44.07	53.98	9.91	AV
16740	43.22	12.65	H	55.87	68.20	12.33	PK

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11440	44.01	10.43	V	54.44	73.98	19.54	PK
11440	33.02	10.43	V	43.45	53.98	10.53	AV
17160	43.51	13.78	V	57.29	68.20	10.91	PK
11440	44.25	10.43	H	54.68	73.98	19.30	PK
11440	33.22	10.43	H	43.65	53.98	10.33	AV
17160	43.65	13.78	H	57.43	68.20	10.77	PK

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11490	42.55	10.81	V	53.36	73.98	20.62	PK
11490	30.41	10.81	V	41.22	53.98	12.76	AV
17235	40.61	14.28	V	54.89	68.20	13.31	PK
11490	42.39	10.81	H	53.20	73.98	20.78	PK
11490	30.32	10.81	H	41.13	53.98	12.85	AV
17235	40.72	14.28	H	55.00	68.20	13.20	PK

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11570	43.22	10.13	V	53.35	73.98	20.63	PK
11570	31.55	10.13	V	41.68	53.98	12.30	AV
17355	40.48	15.62	V	56.10	68.20	12.10	PK
11570	43.41	10.13	H	53.54	73.98	20.44	PK
11570	31.76	10.13	H	41.89	53.98	12.09	AV
17355	40.57	15.62	H	56.19	68.20	12.01	PK

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

Frequency	Measured Value	A.F+C.L-A.G+D.F	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	
11650	43.33	9.58	V	52.91	73.98	21.07	PK
11650	32.52	9.58	V	42.10	53.98	11.88	AV
17475	40.62	17.18	V	57.80	68.20	10.40	PK
11650	43.55	9.58	H	53.13	73.98	20.85	PK
11650	32.62	9.58	H	42.20	53.98	11.78	AV
17475	40.86	17.18	H	58.04	68.20	10.16	PK

Note:

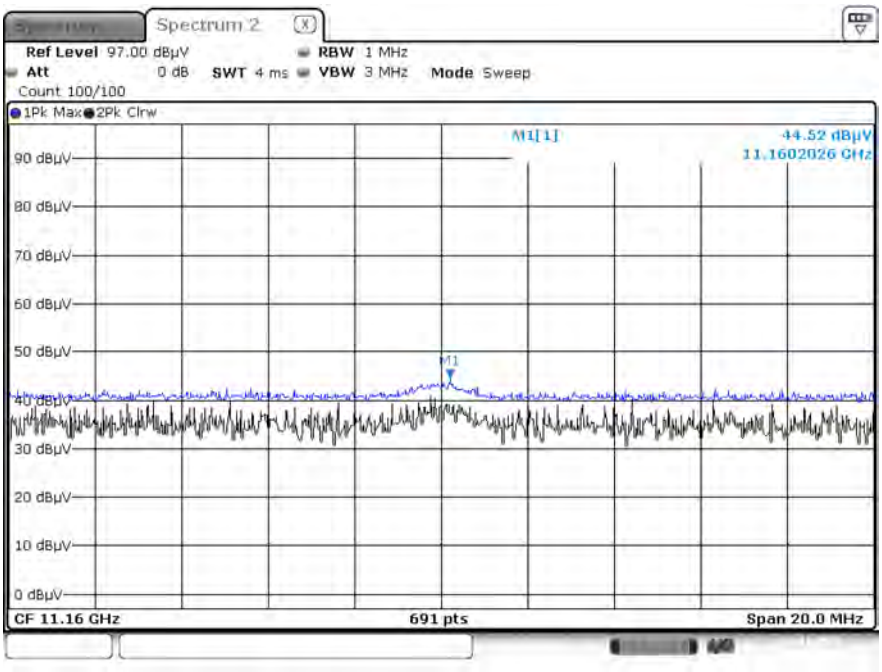
All Modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

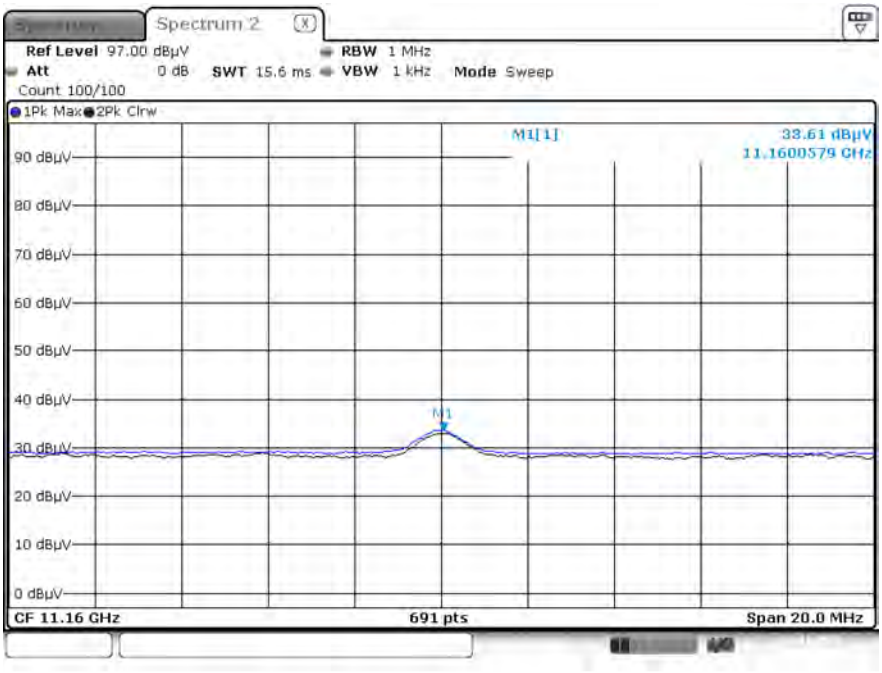
- UNII 1, 2A, 2C, 3 : 802.11a

▣ Test Plots

Peak Result (802.11a, Ch.116 2nd Harmonic, X-H)



Average Result (802.11a, Ch.116 2nd Harmonic, X-H)



Note:

Only the worst case plots for Radiated Spurious Emissions.

10.9 RADIATED RESTRICTED BAND EDGE

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
5150	41.59	8.43	H	50.02	73.98	23.96	PK
5150	28.62	8.43	H	37.05	53.98	16.93	AV
5150	41.81	8.43	V	50.24	73.98	23.74	PK
5150	28.75	8.43	V	37.18	53.98	16.80	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
5350	42.08	8.23	H	50.31	73.98	23.67	PK
5350	28.61	8.23	H	36.84	53.98	17.14	AV
5350	42.83	8.23	V	51.06	73.98	22.92	PK
5350	30.12	8.23	V	38.35	53.98	15.63	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	41.02	8.98	H	50.00	73.98	23.98	PK
5460	28.39	8.98	H	37.37	53.98	16.61	AV
5470	42.51	8.75	H	51.26	68.20	16.94	PK
5460	41.22	8.98	V	50.20	73.98	23.78	PK
5460	28.56	8.98	V	37.54	53.98	16.44	AV
5470	42.81	8.75	V	51.56	68.20	16.64	PK

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
5150	41.12	8.43	H	49.55	73.98	24.43	PK
5150	28.48	8.43	H	36.91	53.98	17.07	AV
5150	41.22	8.43	V	49.65	73.98	24.33	PK
5150	28.62	8.43	V	37.05	53.98	16.93	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
5350	41.92	8.23	H	50.15	73.98	23.83	PK
5350	28.48	8.23	H	36.71	53.98	17.27	AV
5350	43.10	8.23	V	51.33	73.98	22.65	PK
5350	29.99	8.23	V	38.22	53.98	15.76	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	40.75	8.98	H	49.73	73.98	24.25	PK
5460	28.22	8.98	H	37.20	53.98	16.78	AV
5470	42.69	8.75	H	51.44	68.20	16.76	PK
5460	40.89	8.98	V	49.87	73.98	24.11	PK
5460	28.37	8.98	V	37.35	53.98	16.63	AV
5470	42.78	8.75	V	51.53	68.20	16.67	PK

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5150	41.29	8.43	H	49.72	73.98	24.26	PK
5150	28.48	8.43	H	36.91	53.98	17.07	AV
5150	41.35	8.43	V	49.78	73.98	24.20	PK
5150	28.66	8.43	V	37.09	53.98	16.89	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5350	42.19	8.23	H	50.42	73.98	23.56	PK
5350	28.54	8.23	H	36.77	53.98	17.21	AV
5350	42.62	8.23	V	50.85	73.98	23.13	PK
5350	29.89	8.23	V	38.12	53.98	15.86	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
5460	41.29	8.98	H	50.27	73.98	23.71	PK
5460	28.22	8.98	H	37.20	53.98	16.78	AV
5470	42.48	8.75	H	51.23	68.20	16.97	PK
5460	41.35	8.98	V	50.33	73.98	23.65	PK
5460	28.42	8.98	V	37.40	53.98	16.58	AV
5470	42.64	8.75	V	51.39	68.20	16.81	PK

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5150	41.83	8.43	H	50.26	73.98	23.72	PK
5150	29.15	8.43	H	37.58	53.98	16.40	AV
5150	41.99	8.43	V	50.42	73.98	23.56	PK
5150	29.23	8.43	V	37.66	53.98	16.32	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5350	41.95	8.23	H	50.18	73.98	23.80	PK
5350	26.48	8.23	H	34.71	53.98	19.27	AV
5350	42.03	8.23	V	50.26	73.98	23.72	PK
5350	29.65	8.23	V	37.88	53.98	16.10	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	42.59	8.98	H	51.57	73.98	22.41	PK
5460	29.95	8.98	H	38.93	53.98	15.05	AV
5470	45.71	8.75	H	54.46	68.20	13.74	PK
5460	42.72	8.98	V	51.70	73.98	22.28	PK
5460	30.08	8.98	V	39.06	53.98	14.92	AV
5470	45.96	8.75	V	54.71	68.20	13.49	PK

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5150	41.22	8.43	H	49.65	73.98	24.33	PK
5150	29.12	8.43	H	37.55	53.98	16.43	AV
5150	41.26	8.43	V	49.69	73.98	24.29	PK
5150	29.22	8.43	V	37.65	53.98	16.33	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5350	42.12	8.23	H	50.35	73.98	23.63	PK
5350	29.32	8.23	H	37.55	53.98	16.43	AV
5350	42.32	8.23	V	50.55	73.98	23.43	PK
5350	29.55	8.23	V	37.78	53.98	16.20	AV

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	42.39	8.98	H	51.37	73.98	22.61	PK
5460	29.78	8.98	H	38.76	53.98	15.22	AV
5470	44.99	8.75	H	53.74	68.20	14.46	PK
5460	42.55	8.98	V	51.53	73.98	22.45	PK
5460	29.99	8.98	V	38.97	53.98	15.01	AV
5470	45.12	8.75	V	53.87	68.20	14.33	PK

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

Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5150	42.41	8.43	H	50.84	73.98	23.14	PK
5150	29.32	8.43	H	37.75	53.98	16.23	AV
5150	42.58	8.43	V	51.01	73.98	22.97	PK
5150	29.45	8.43	V	37.88	53.98	16.10	AV

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

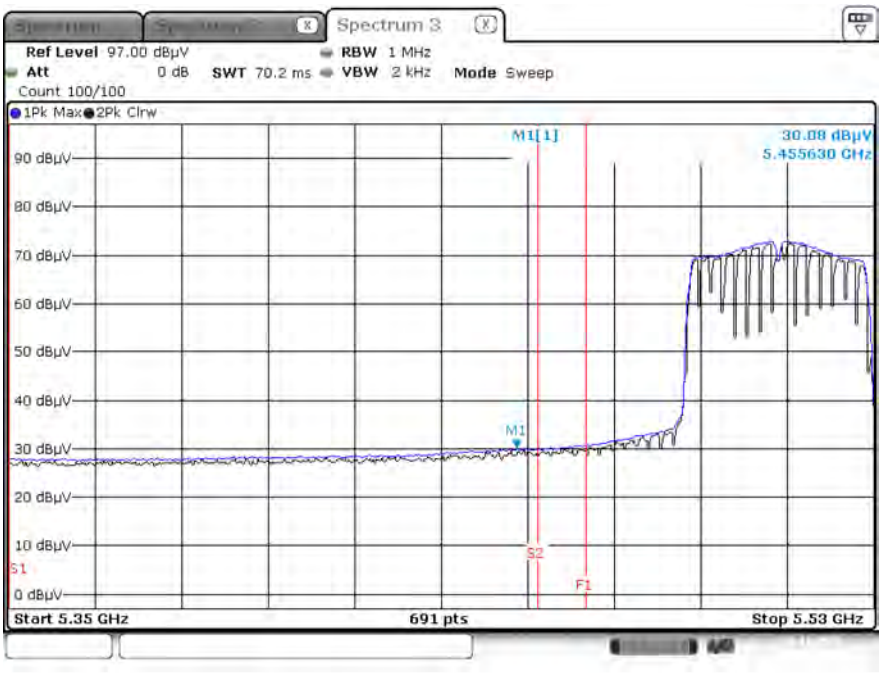
Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB/m]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5350	41.55	8.23	H	49.78	73.98	24.20	PK
5350	30.32	8.23	H	38.55	53.98	15.43	AV
5350	41.78	8.23	V	50.01	73.98	23.97	PK
5350	30.53	8.23	V	38.76	53.98	15.22	AV

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

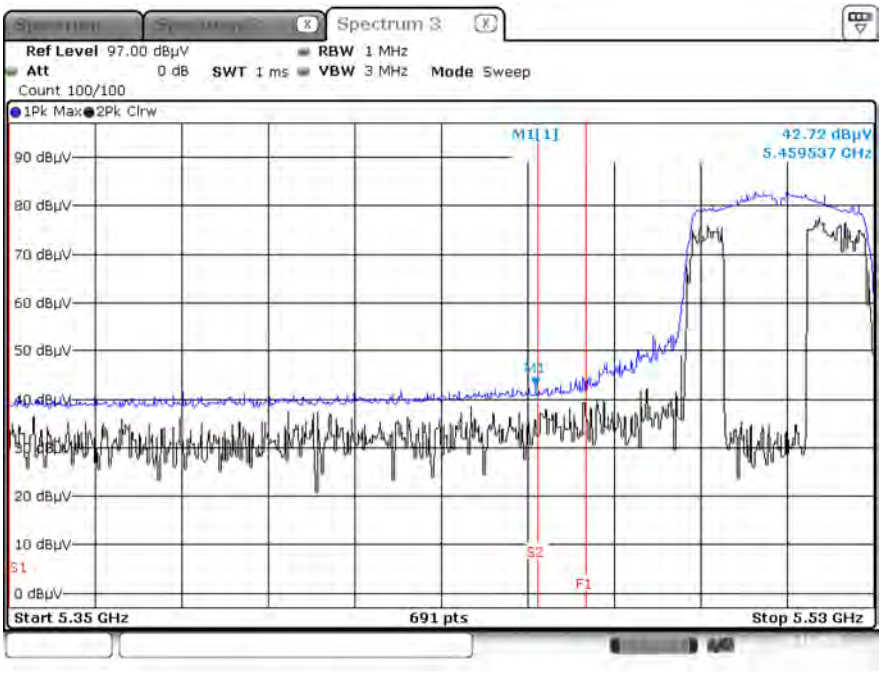
Frequency	Measured Value	A.F+C.L-A.G+ATT+D.F	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBµV]	[dB/m]	[H/V]	[dBµV/m]	[dBµV/m]	[dB]	Type
5460	42.55	8.98	H	51.53	73.98	22.45	PK
5460	29.48	8.98	H	38.46	53.98	15.52	AV
5470	43.94	8.75	H	52.69	68.20	15.51	PK
5460	42.72	8.98	V	51.70	73.98	22.28	PK
5460	29.69	8.98	V	38.67	53.98	15.31	AV
5470	44.12	8.75	V	52.87	68.20	15.33	PK

▣ Test Plots(UNII 1, 2A, 2C)_X-V

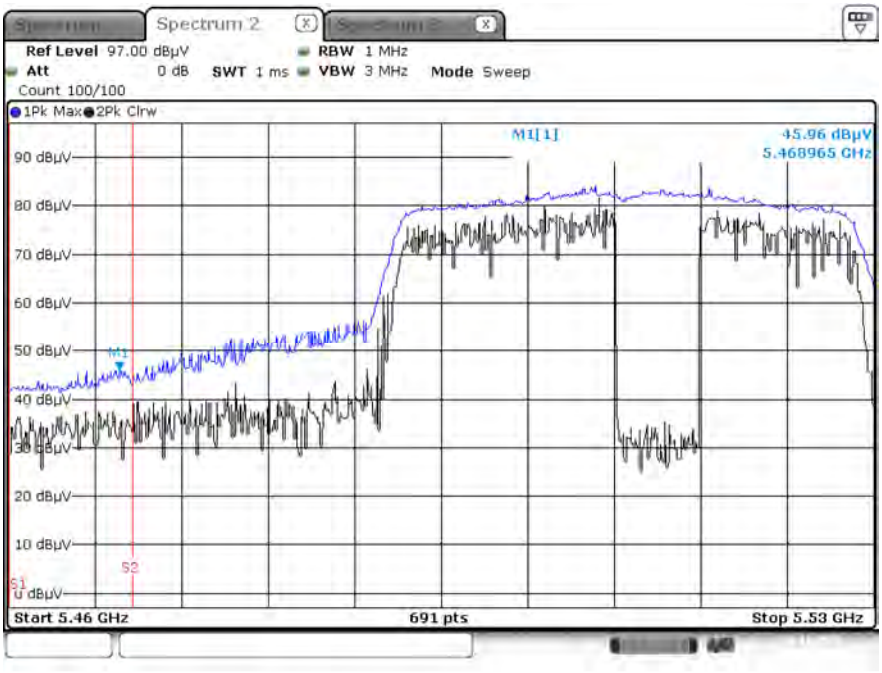
Average Result (802.11 n_HT40, Ch.102)



Peak Result (802.11 n_HT40, Ch.102)



Peak Result (802.11 n_HT40, Ch.102)

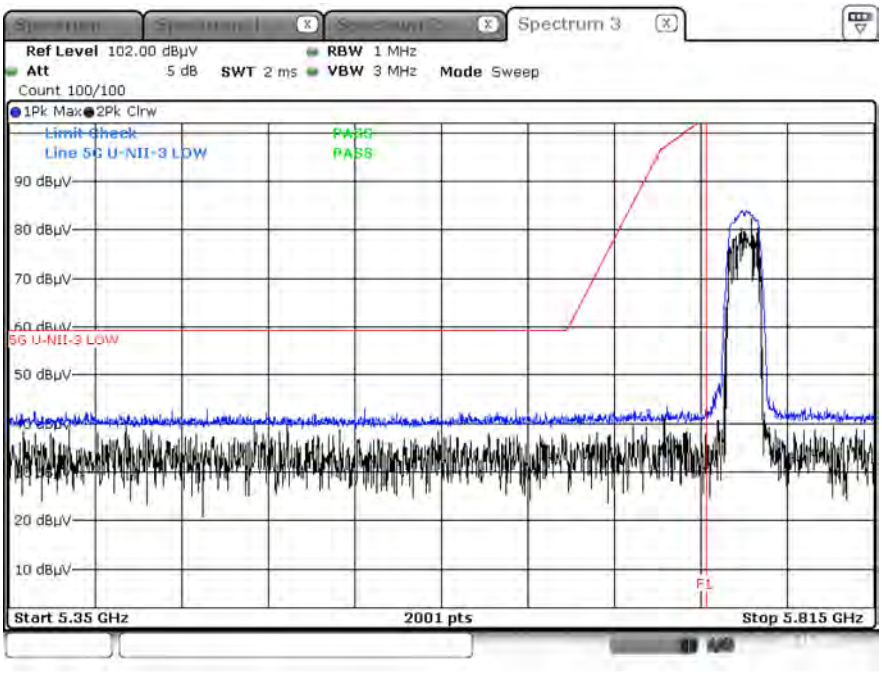


Note:

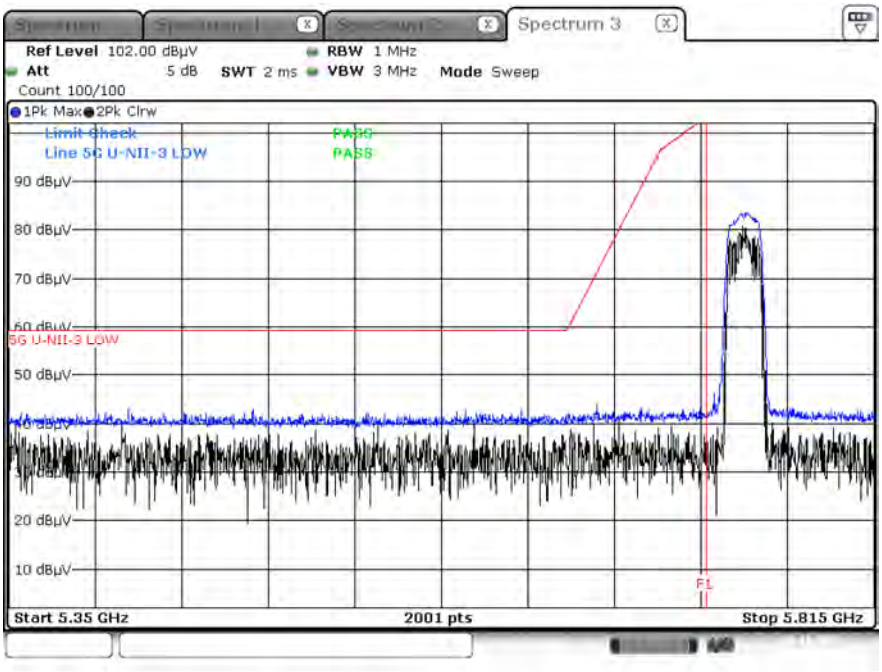
Only the worst case plots for Radiated Restricted Band Edge.

▣ Test Plots(UNII 3)

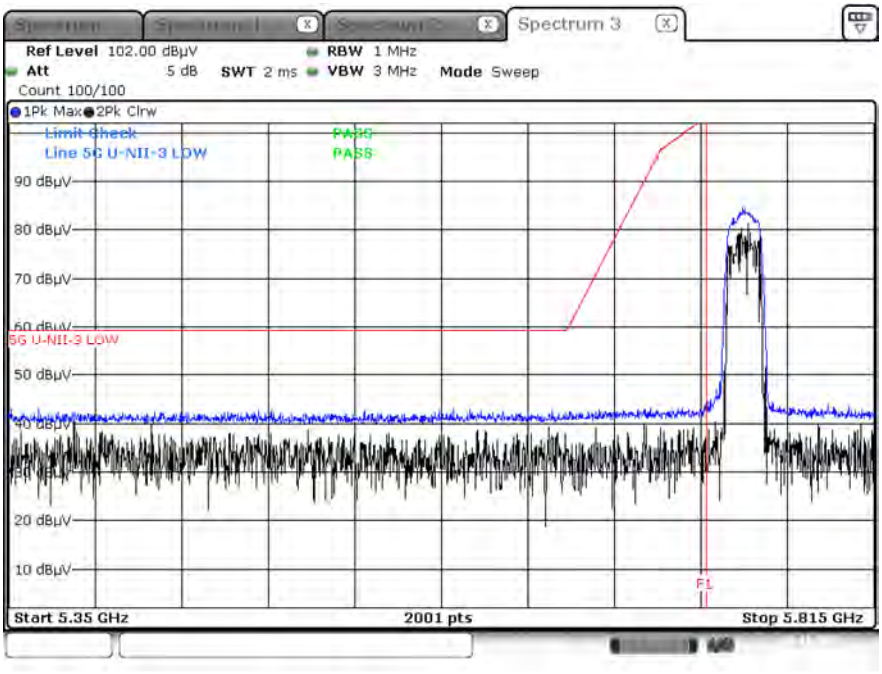
Peak Result (802.11a, Ch.149, X-V)



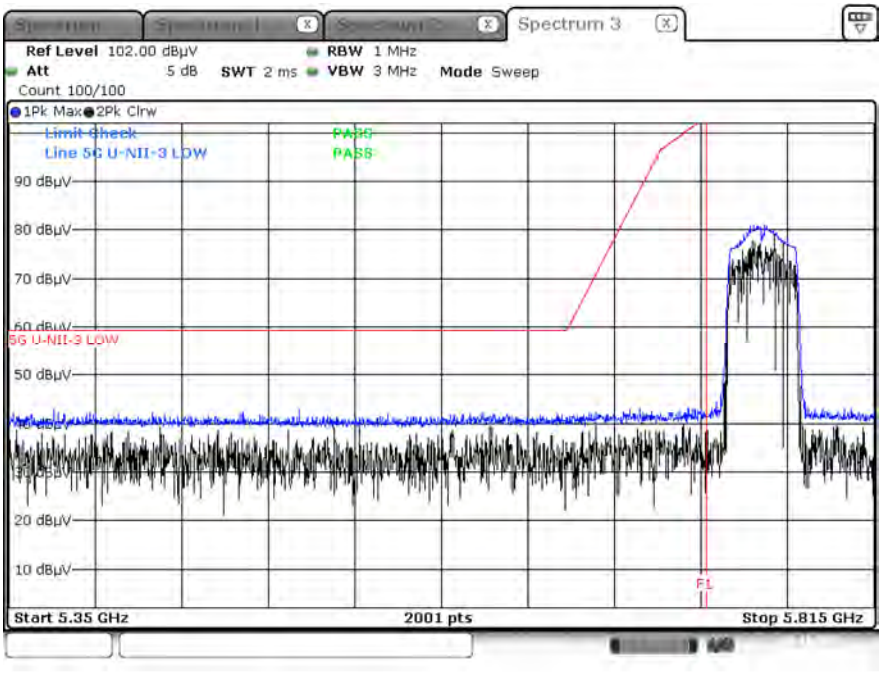
Peak Result (802.11n_HT20, Ch.149, X-V)



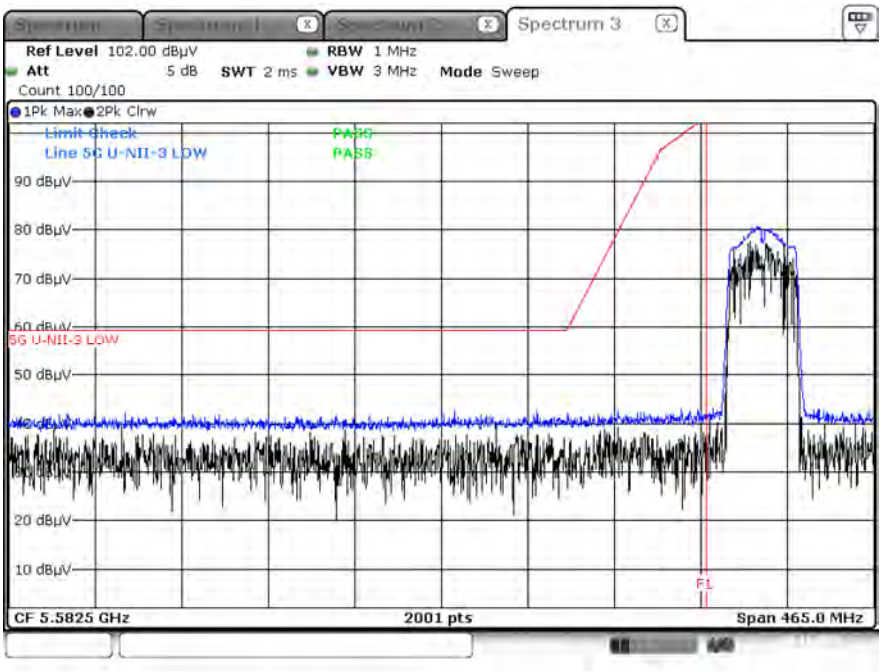
Peak Result (802.11ac_VHT20, Ch.149, X-V)



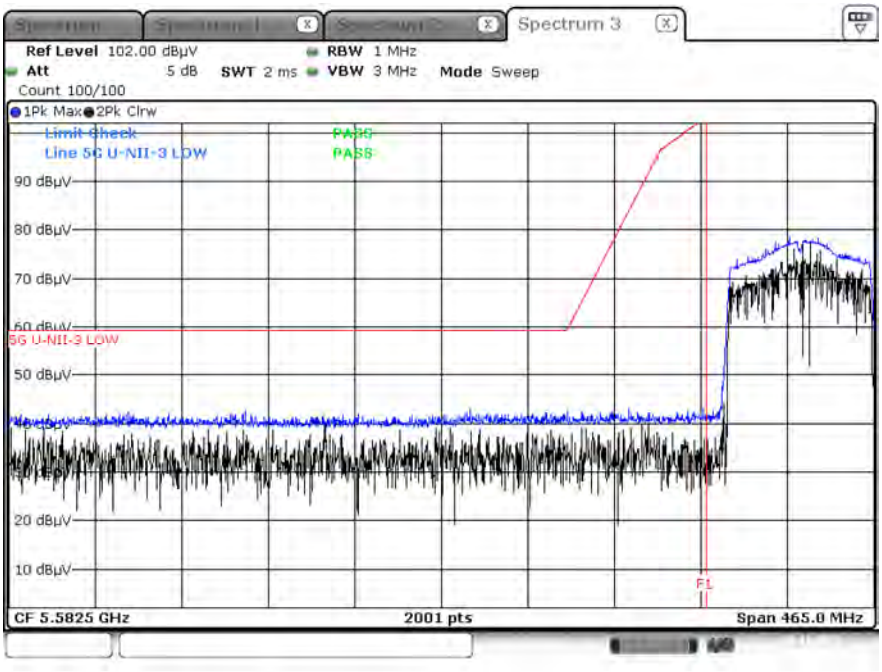
Peak Result (802.11n_HT40, Ch.151, X-V)



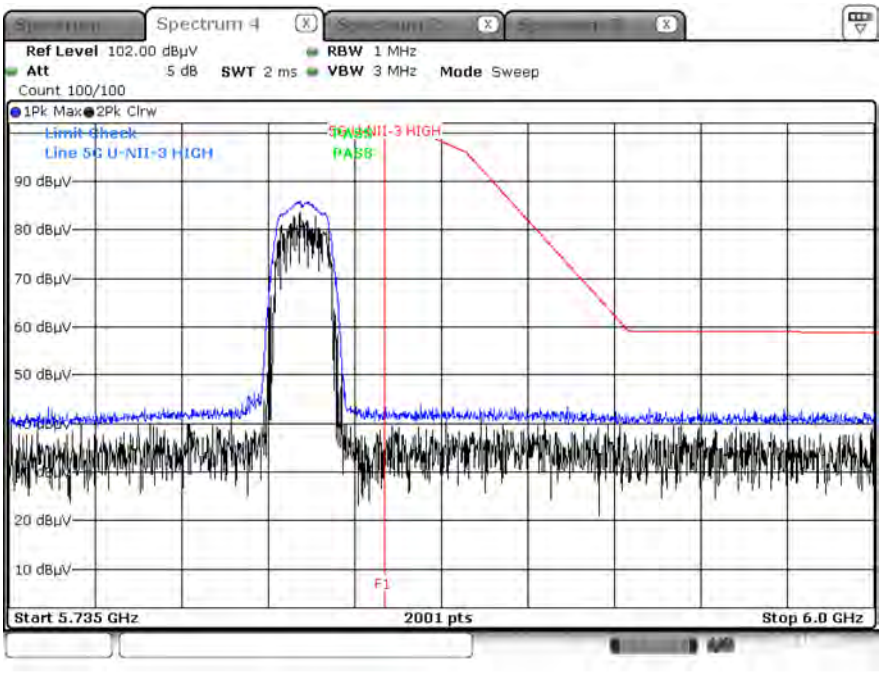
Peak Result (802.11ac_VHT40, Ch.151, X-V)



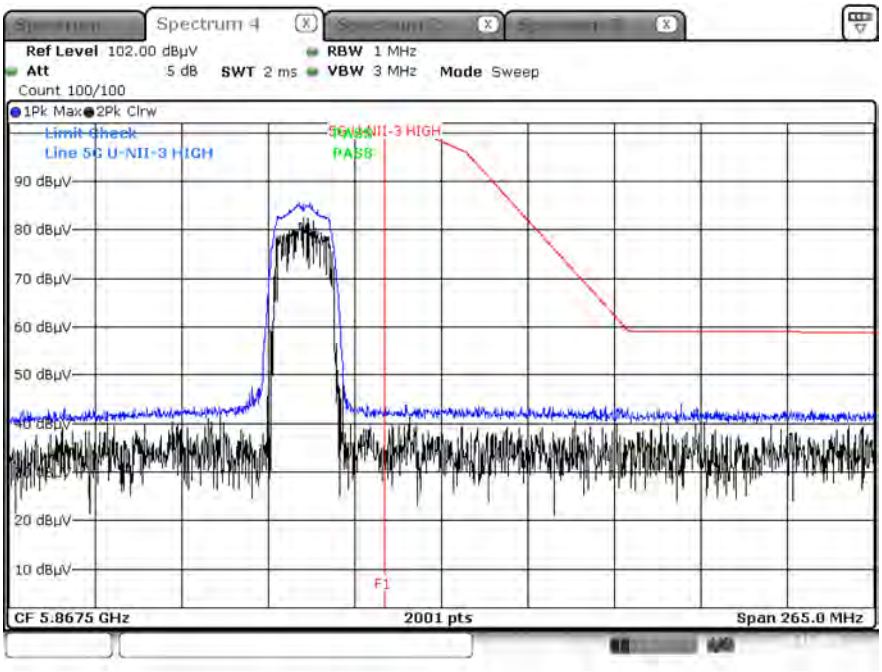
Peak Result (802.11ac_VHT80, Ch.155, X-V)



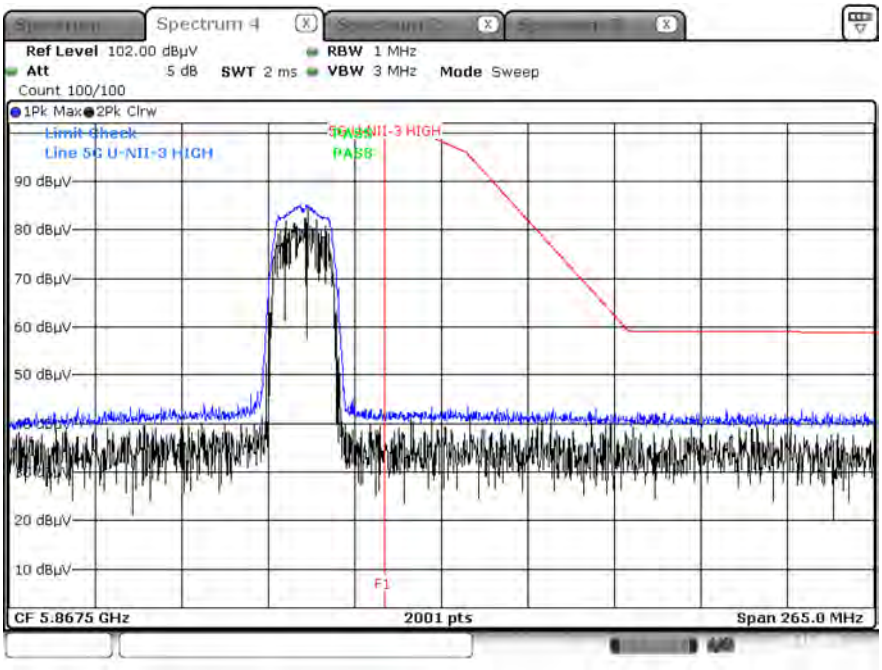
Peak Result (802.11a, Ch.165, X-V)



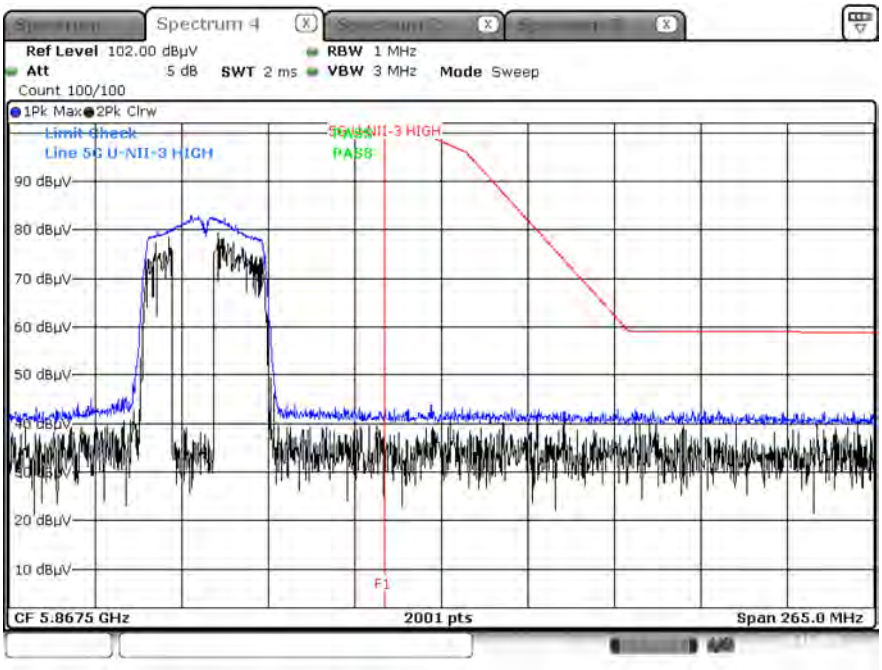
Peak Result (802.11n_HT20, Ch.165, X-V)



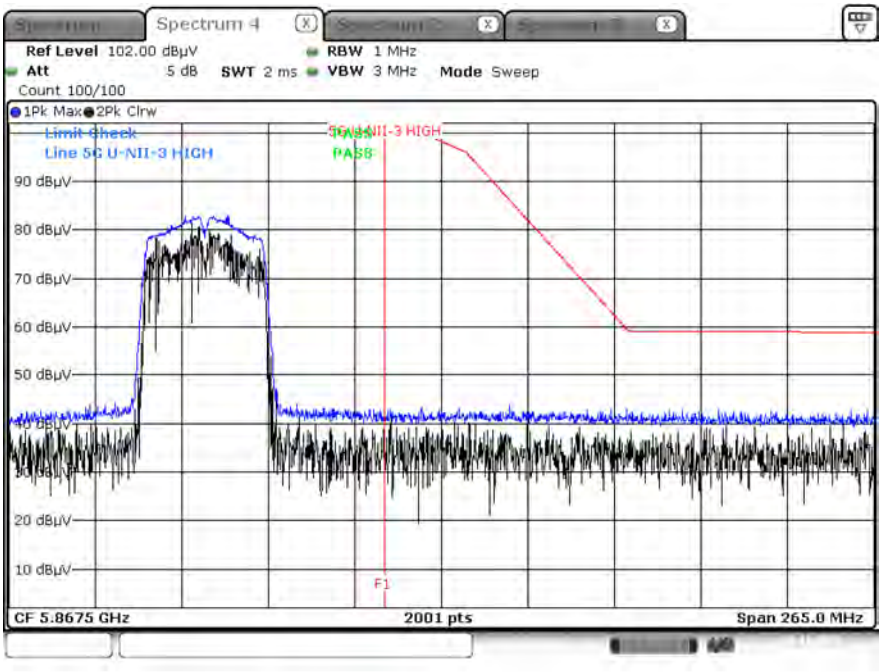
Peak Result (802.11ac_VHT20, Ch.165, X-V)



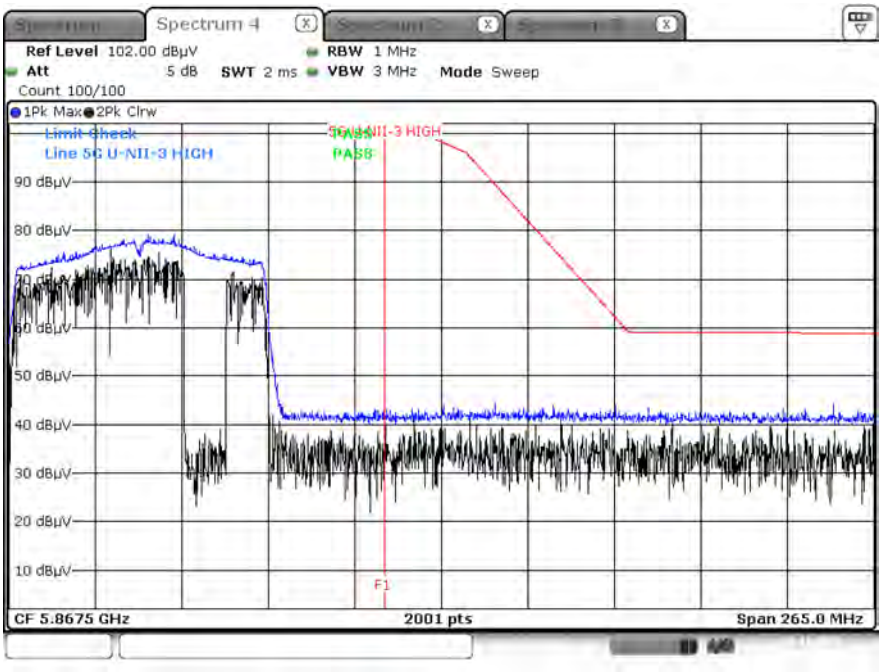
Peak Result (802.11n_HT40, Ch.159, X-V)



Peak Result (802.11ac_VHT40, Ch.159, X-V)



Peak Result (802.11ac_VHT80, Ch.155, X-V)



Note :

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

10.10 RECEIVER SPURIOUS EMISSIONS

Frequency Range : Below 1 GHz

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

Note:

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

Frequency Range : Above 1 GHz

Frequency	Measured Value	A.F+C.L-A.G+D.F	Ant. POL	Total	Limit	Margin
MHz	dBμV/m	dB/m	(H/V)	dBμV/m	dBμV/m	dB
No Critical peaks found						

11. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/22/2023	Annual
EMI Test Receiver	ESR	Rohde & Schwarz	101910	06/07/2023	Annual
Temperature Chamber	SU-642	ESPEC	0093008124	03/04/2023	Annual
Signal Analyzer	N9030A	Agilent	MY49432108	03/08/2023	Annual
Power Measurement Set	OSP 120	Rohde & Schwarz	101231	06/14/2023	Annual
Power Meter	N1911A	Agilent	MY45100523	03/24/2023	Annual
Power Sensor	N1921A	Agilent	MY57820067	03/24/2023	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2023	Annual
Power Splitter	11667B	Hewlett Packard	10545	02/03/2023	Annual
DC Power Supply	E3632A	Agilent	KR75303243	04/25/2023	Annual
Attenuator(20 dB)	18N-20dB	Rohde & Schwarz	8	03/07/2023	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	HCT CO., LTD.	N/A	N/A	N/A

Note:

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

Radiated Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller(Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
EM1000 / Controller	EM1000	Audix	060520	N/A	N/A
Turn Table	N/A	Audix	N/A	N/A	N/A
Amp & Filter Bank Switch Controller	FBSM-01B	TNM system	TM19050002	N/A	N/A
Loop Antenna	1513	Schwarzbeck	1513-333	03/17/2024	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	08/16/2024	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1300	01/18/2024	Biennial
Horn Antenna(15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170124	04/12/2023	Biennial
Spectrum Analyzer	FSV(10 Hz ~ 40 GHz)	Rohde & Schwarz	101055	05/16/2023	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/06/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	5	06/13/2023	Annual
Band Reject Filter	WRCJV12-4900-5100-5900-6100-50SS	Wainwright Instruments	6	06/13/2023	Annual
High Pass Filter(7 GHz ~ 18 GHz)	WHKX10-7150-8000-18000-50SS	Wainwright Instruments	1	03/11/2023	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/11/2023	Annual
HPF(3~18GHz) + LNA1(1~18GHz)	FMSR-05B	TNM system	F6	01/19/2023	Annual
ATT(10dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/19/2023	Annual
ATT(3dB) + LNA1(1~18GHz)	FMSR -05B	TNM system	None	01/19/2023	Annual
LNA1(1~18GHz)	FMSR -05B	TNM system	25540	01/19/2023	Annual
HPF(7~18GHz) + LNA2(6~18GHz)	FMSR -05B	TNM system	28550	01/19/2023	Annual
Thru(30MHz ~ 18GHz)	FMSR -05B	TNM system	None	01/19/2023	Annual

Note:

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

12. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2211-FI004-P