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TEST REPORT

FCC/ISED UNII Test for IAGL-NHT1
Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-2112-FI006-R1

DATE OF ISSUE
December 24, 2021

Tested by
Jin Gwan Lee

Technical Manager
Jong Seok Lee

Accredited by KOLAS, Republic of KOREA

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BongJai Huh / CEO

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Additional Model
-

Applicant	**LG Electronics Inc.** 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Republic of Korea
Eut Type Model Name	Lotus Gamma2 IAGL-NHT1
FCC ID IC	BEJIAGL-NHT1 2703H-IAGLNHT1
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 1 (March 2019)

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	December 14, 2021	Initial Release
1	December 24, 2021	- Revised IC number on page 2 - Revised Antenna gain on page 5

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.

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

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

CONTENTS

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	IAGL-NHT1	
Additional Model	-	
EUT Type	Lotus Gamma2	
Power Supply	DC 12.0 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20MHz BW : 5180 - 5240 40MHz BW : 5190 - 5230 80MHz BW : 5210
	U-NII-3	20MHz BW : 5745 - 5825 40MHz BW : 5755 - 5795 80MHz BW : 5775
Antenna Specification	Antenna type: dipole antenna Ant1 Peak Gain : 1.77 dBi(UNII 1)/ 1.99 dBi(UNII 3) Ant2 Peak Gain : 1.77 dBi(UNII 1)/ 1.99 dBi(UNII 3)	
Straddle channel	Supported	
TDWR Band	Not Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	November 02, 2021 ~ December 13, 2021	
PMN (Product Marketing Number)	Lotus Gamma2	
HVIN (Hardware Version Identification Number)	IAGL-NHT1	
FVIN (Firmware Version Identification Number)	IP10	
HMN (Host Marketing Name)	N/A	
EUT serial numbers	Radiated : IAGL-NHT1002 Conducted : IAGL-NHT1001	
Manufacturer	LG Electronics Inc. 222, LG-ro, Jinwi-myeon, Pyeongtaek-si, Gyeonggi-do, 451-713, Republic of Korea	

Factory	**1. LG INNOTEK YANTAI CO., LTD.** No. 36, Taibei North Road, Development Zone, Yantai 264006 Shandong P.R. China **2. LG Electronics Vietnam Hai Phong Co., Ltd.** Lot CN2, Trang Due Industrial Park, Le Loi Commune, An Duong District, Hai Phong City, Vietnam **3. LG Electronics Inc.** 222, LG-ro, Jinwi-myeon Pyeongtaek-si, Gyeonggi-do 17709 Republic of Korea **4. LG Electronics Mława Sp. z o.o.** ul. LG Electronics 706-500 Mława Poland **5. LG Electronics(Kunshan) Co., Ltd.** No. 88, Qianjin East Road, Kunshan City 215300 Jiangsu P.R. China **6. LG ELECTRONICS DO BRASIL LTDA** LG - FILIAL MANAUS RUA JAVARI 1004 DISTRITO INDUSTRIAL MANAUS - AM, 69075-110, Brazil **7. LG Electronics Nanjing Vehicle Component Co., Ltd.** No.346, Yaoxinda Road, Nanjing Economic and Technological Development Zone, 210038, P.R. China **8. Hitachi-LG Data Storage(Huizhou), Ltd.** Huifeng Fourth Road 42, Zhongkai Hi-Tech Industry Development Zone, Huizhou, Guangdong, 516006 P.R. China **9. HITACHI ELECTRONIC PRODUCTS (M) SDN. BHD** No. 12, Jalan Kemajuan, Bangi Industrial Estate, 43650 Bandar Baru Bangi, Selangor Darul Ehsan, Malaysia

ANTENNA CONFIGURATIONS

1. The device employs MIMO technology. Below are the possible configurations

Configurations	SISO		SDM	CDD
	Ant1	Ant2	Ant1 + Ant2	Ant1 + Ant2
802.11a	X	X	X	O
802.11n(HT20)	X	X	O	O
802.11n(HT40)	X	X	O	O
802.11ac(VHT20)	X	X	O	O
802.11ac(VHT40)	X	X	O	O
802.11ac(VHT80)	X	X	O	O

Note:

1. O = Support, X = Not Support
2. SISO = Single Input Single Output
3. SDM = Spatial Diversity Multiplexing
4. CDD = Cyclic Delay Diversity
5. SISO test was performed for the MIMO test result.

2. Directional Gain Calculation

According to KDB 662911 D01 Multiple Transmitter Output v02r01

Directional gain = $10*\log[(10^{G1/20}+10^{G2/20}+\ldots+10^{GN/20})^2/N]$ dBi

Band	Ant Gain (dBi)		Directional Gain = $10*\log[(10^{G1/20}+10^{G2/20}+\ldots+10^{GN/20})^2/N]$ dBi
UNII 1	Ant1	1.77	4.78
	Ant2	1.77	
UNII 3	Ant1	1.99	5.00
	Ant2	1.99	

2. MAXIMUM OUTPUT POWER

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

Band	Mode	SISO				MIMO	
		Ant1 Power		Ant2 Power		Ant 1 + Ant 2 Power	
		(dBm)	(W)	(dBm)	(W)	(dBm)	(W)
UNII1	802.11a	7.55	0.006	3.83	0.002	9.06	0.008
	802.11n (HT20)	7.43	0.006	3.71	0.002	8.96	0.008
	802.11n (HT40)	7.86	0.006	3.68	0.002	9.25	0.008
	802.11ac (VHT20)	7.43	0.006	3.83	0.002	9.01	0.008
	802.11ac (VHT40)	7.70	0.006	3.48	0.002	9.10	0.008
	802.11ac (VHT80)	7.89	0.006	3.56	0.002	9.26	0.008
UNII3	802.11a	11.98	0.016	12.70	0.019	15.37	0.034
	802.11n (HT20)	11.96	0.016	12.57	0.018	15.29	0.034
	802.11n (HT40)	11.36	0.014	12.42	0.017	14.87	0.031
	802.11ac (VHT20)	11.97	0.016	12.68	0.019	15.35	0.034
	802.11ac (VHT40)	11.40	0.014	12.37	0.017	14.92	0.031
	802.11ac (VHT80)	12.14	0.016	12.35	0.017	15.26	0.034

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.

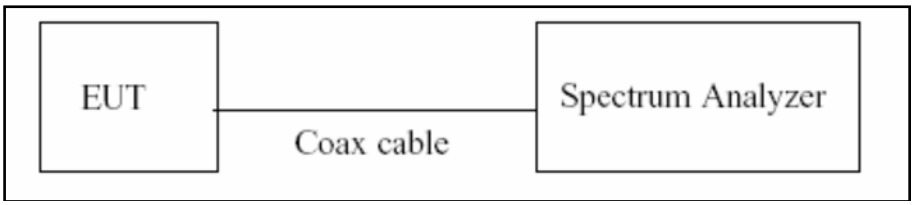
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance

Parameter	Expanded Uncertainty (±dB)
Conducted Disturbance (150 kHz ~ 30 MHz)	1.82 (Confidence level about 95 %, k=2)
Radiated Disturbance (9 kHz ~ 30 MHz)	3.40 (Confidence level about 95 %, k=2)
Radiated Disturbance (30 MHz ~ 1 GHz)	4.80 (Confidence level about 95 %, k=2)
Radiated Disturbance (1 GHz ~ 18 GHz)	5.70 (Confidence level about 95 %, k=2)
Radiated Disturbance (18 GHz ~ 40 GHz)	5.05 (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.

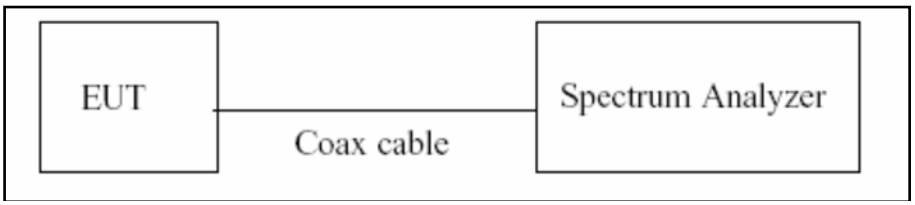
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

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.

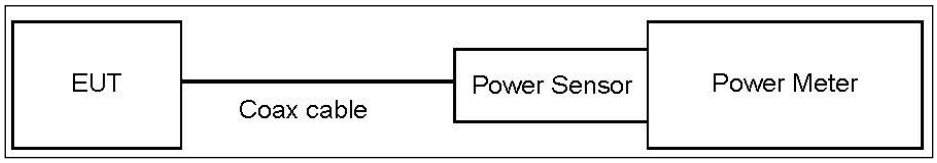
8.3. Output Power Measurement

Limit

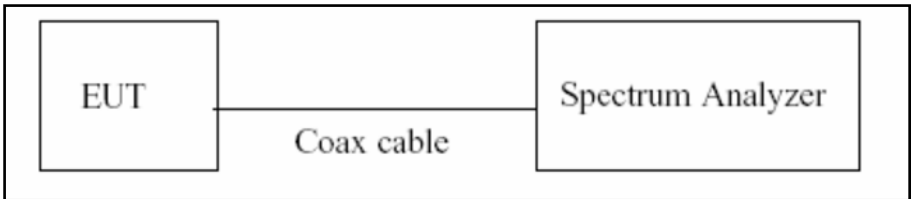
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 3	Not exceed 1 W(=30 dBm)

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

Note

1. Spectrum reading values are not plot data.
   The power results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss(20 dB) + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	21.89
UNII 3	21.89

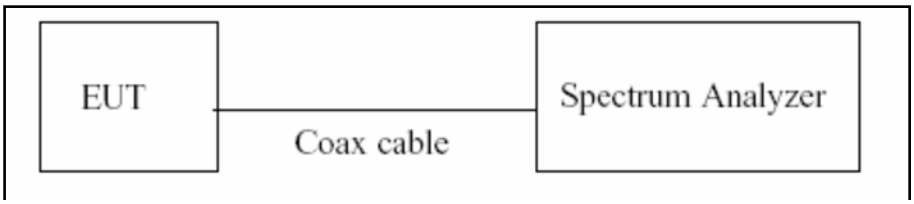
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

Band	Limit
UNII 1	11 dBm/MHz
UNII 3	30 dBm/500 kHz

Test Configuration



Test Procedure

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

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

Sample Calculation

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

Note

1. Spectrum reading values are not plot data.
   The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.
2. Spectrum offset = Attenuator loss(20 dB) + Cable loss
3. Actual value of loss for the attenuator and cable combination is below table.

Band	Loss(dB)
UNII 1	20.89
UNII 3	20.89

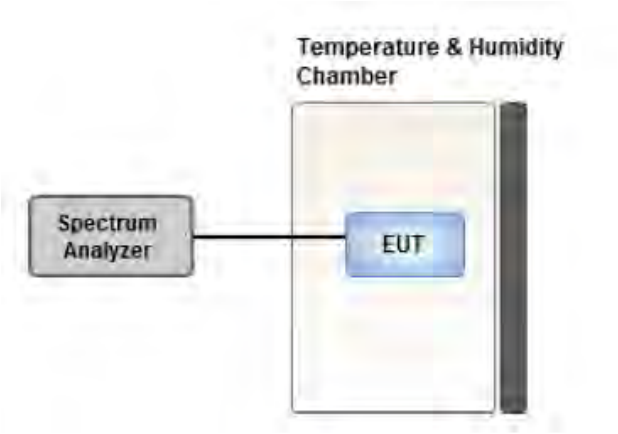
(Actual value of loss for the attenuator and cable combination)

8.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

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

8.6. 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 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.

3. 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

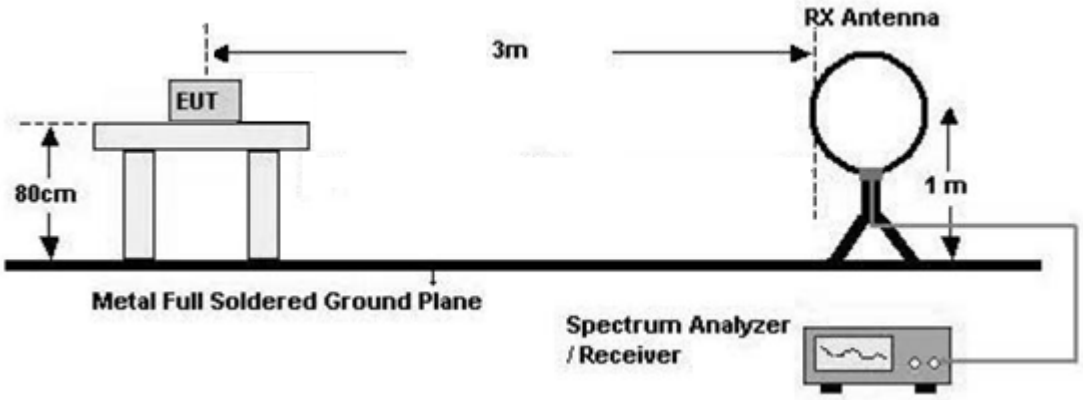
Frequency (MHz)	Field Strength (μA/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC&ISED

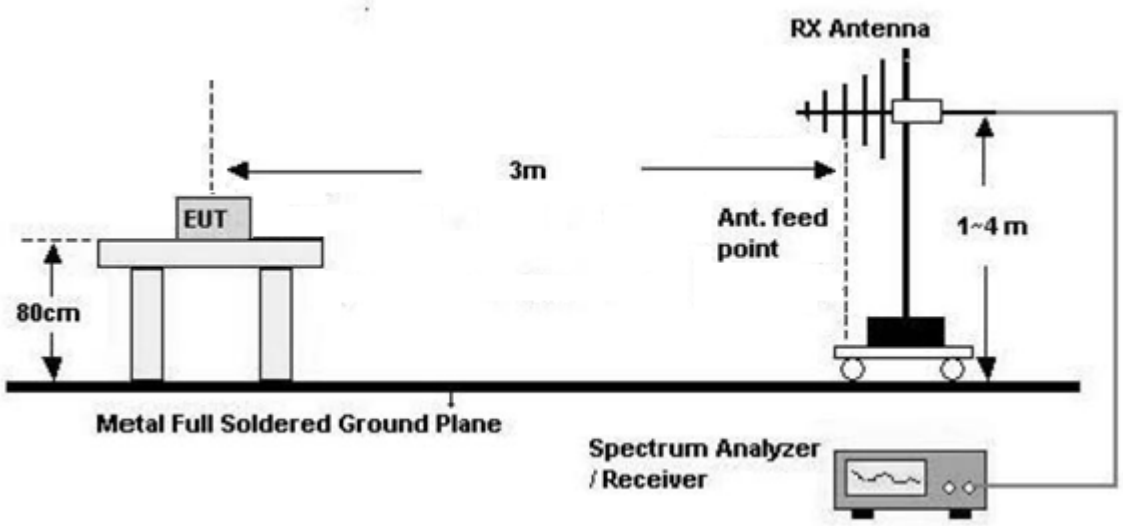
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

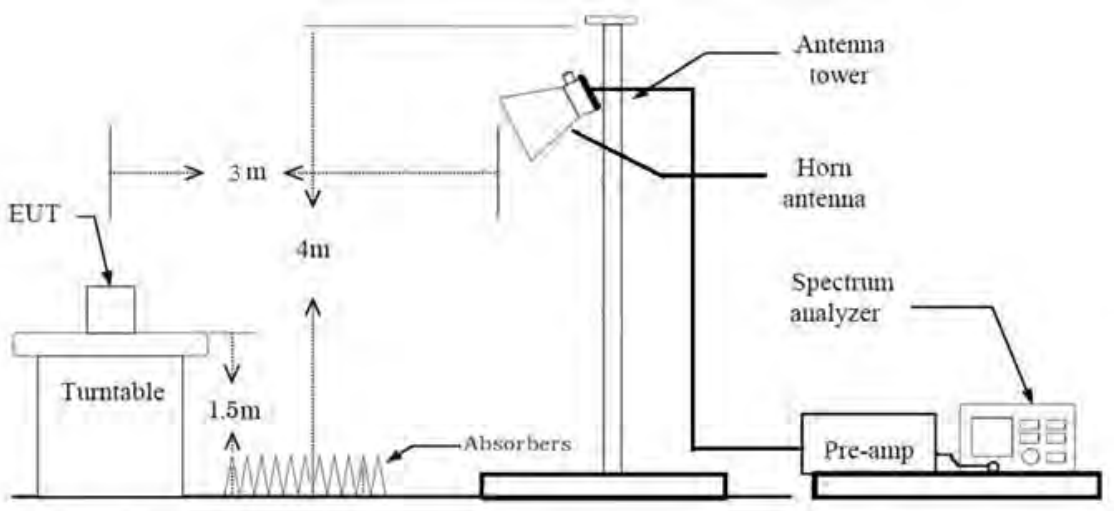
Below 30 MHz



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

KDB 414788 OFS and Chamber Correlation Justification

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

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

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

Test Procedure of Radiated spurious emissions (Above 1 GHz)

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

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

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

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

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

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

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

Test Procedure of Radiated Restricted Band Edge

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

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

9. Measured Frequency Range :
   - 4 500 MHz ~ 5 150 MHz
   - 5 250 MHz ~ 5 350 MHz
   - (75 MHz or more below the 5 725 MHz) ~ 5 725 MHz
   - 5 850 MHz ~ (75 MHz or more above the 5 850 MHz)
10. Distance extrapolation factor = 20log (test distance / specific distance) (dB)
11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Attenuator + Distance Factor(D.F)

The actual setting value of VBW

Mode	Worst Data rate (Mbps)	Duty Cycle	Duty Cycle Factor (dB)	The actual setting value of VBW (Hz)
802.11a	6	0.934	0.298	1 000
802.11n(HT20)	MCS 0(6.5)	0.930	0.315	1 000
802.11n(HT40)	MCS 0(13.5)	0.869	0.610	3 000
802.11ac(VHT20)	MCS 0(6.5)	0.930	0.313	1 000
802.11ac(VHT40)	MCS 0(13.5)	0.868	0.614	3 000
802.11ac(VHT80)	MCS 0(29.3)	0.767	1.154	10 000

8.7. Receiver Spurious Emissions

Limit

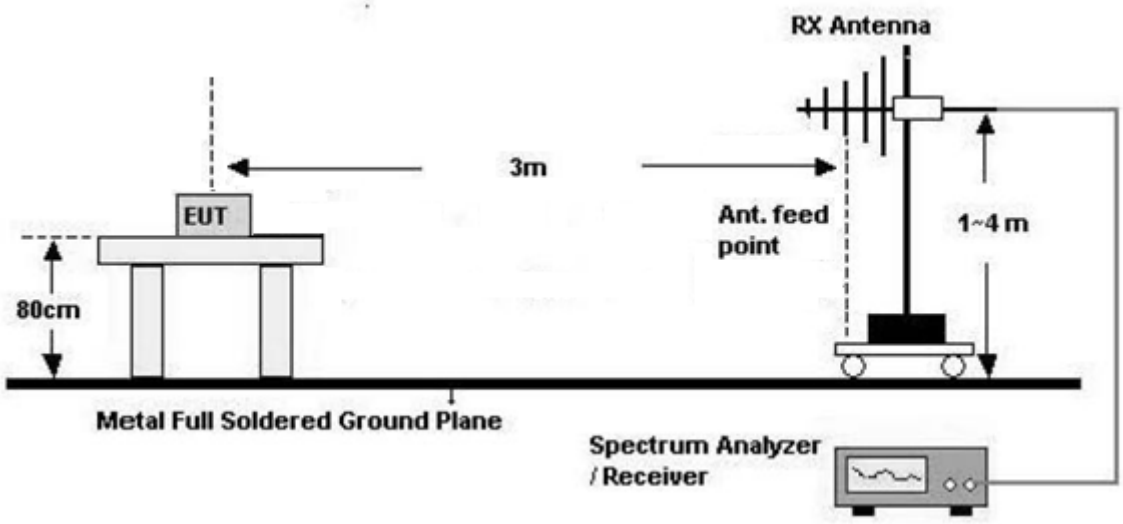
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

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

Test Configuration

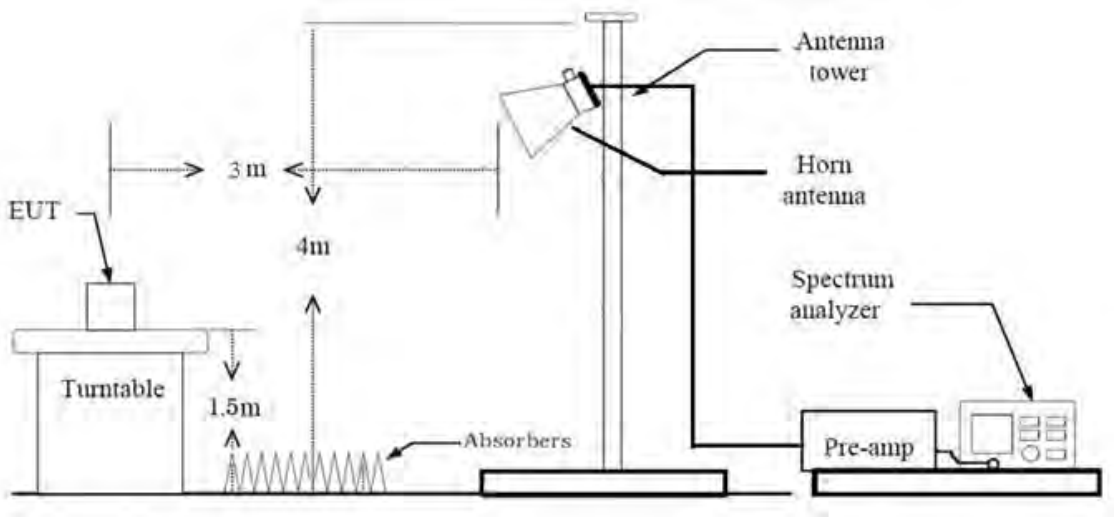
30 MHz - 1 GHz



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 = Reading 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 = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(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.
2. All configurations of antenna were investigated and the worst case configuration results are reported.
   - Mode : Ant1+Ant2(CDD,SDM)
   - Worstcase : Ant1+Ant2(CDD)
3. EUT Axis
   - Radiated Spurious Emissions : X
   - Radiated Restricted Band Edge : Z
4. All datarate of operation were investigated and the worst case datarate results are reported
   - 802.11a : 6Mbps
   - 802.11n : MCS0
   - 802.11ac : MCS0
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

AC Power line Conducted Emissions

1. We don't perform powerline conducted emission test. Because this EUT is used DC.

Conducted test

1. All datarate of operation were investigated and the worst case datarate results are reported.

2. MIMO were tested and the all case results are reported.
   - Mode : Ant1+Ant2(CDD)

9. SUMMARY OF TEST RESULTS

FCC

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26dB Bandwidth	§ 15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§ 15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§ 15.407(a)(1),(3)	< 250 mW(5150-5250 MHz) <1 W(5725-5850 MHz)		PASS
Peak Power Spectral Density	§ 15.407(a)(1),(3)	<11 dBm/ MHz (5150-5250 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) 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, 6.2.4 1	<1 W (5725-5850 MHz)		PASS
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or 1.76+10 log $_{10}$ (BW) dBm (5150-5250 MHz) Whichever power is less		PASS
Power Spectral Density	RSS-247, 6.2.4 1	<30 dBm/500 kHz(Conducted) (5725-5850 MHz)		PASS
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

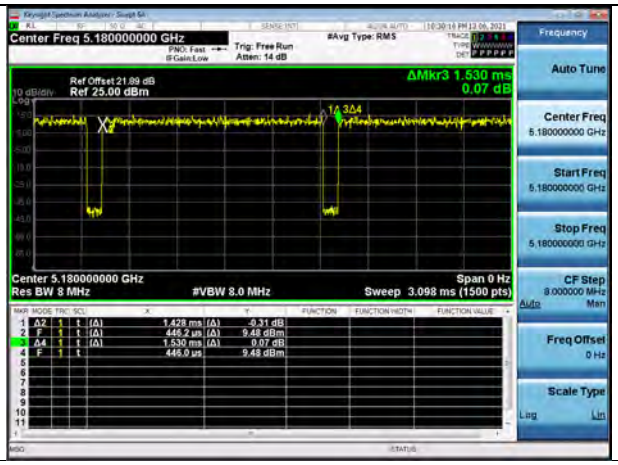
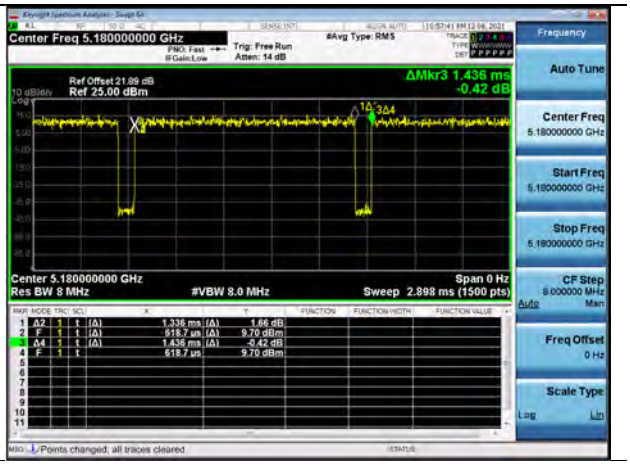
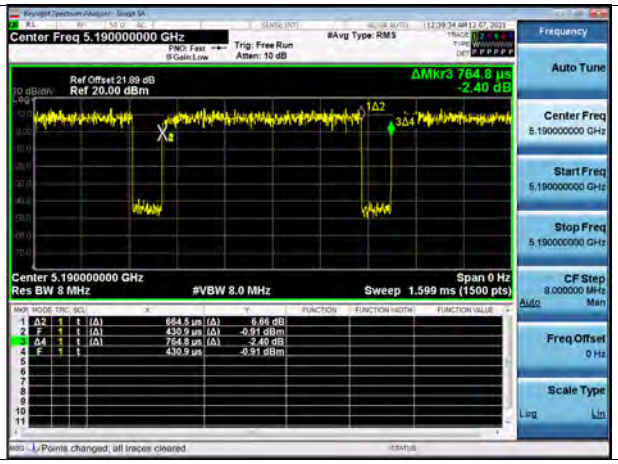
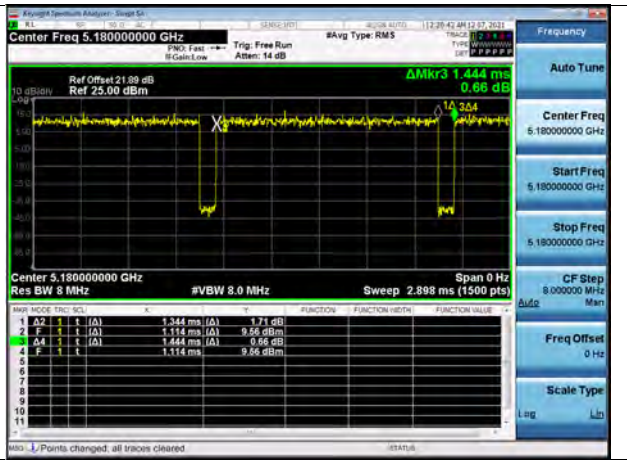
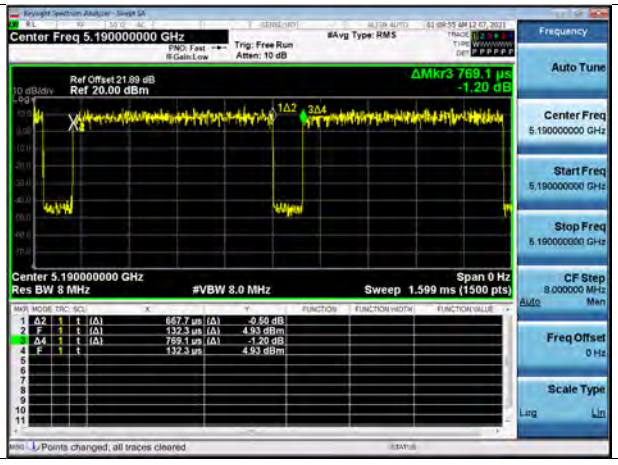
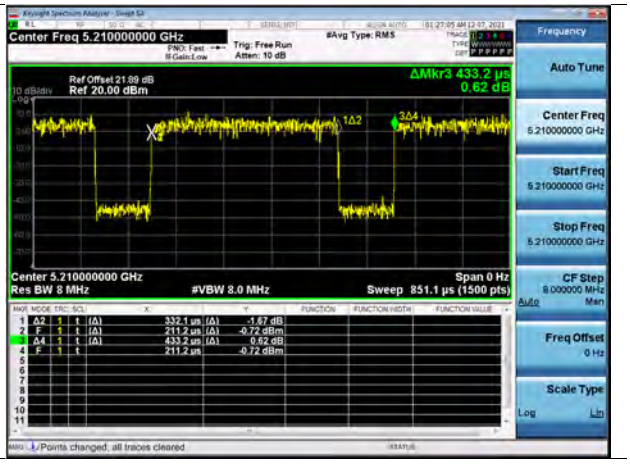
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.428	1.529	0.934	0.298
	9	0.959	1.061	0.904	0.440
	12	0.724	0.825	0.878	0.566
	18	0.492	0.593	0.829	0.812
	24	0.372	0.473	0.786	1.046
	36	0.256	0.358	0.717	1.446
	48	0.196	0.297	0.658	1.818
	54	0.196	0.297	0.660	1.808

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.336	1.436	0.930	0.315
	1	0.688	0.789	0.872	0.594
	2	0.472	0.573	0.824	0.843
	3	0.364	0.465	0.782	1.066
	4	0.256	0.357	0.717	1.446
	5	0.200	0.301	0.664	1.778
	6	0.184	0.258	0.712	1.474
	7	0.168	0.269	0.625	2.043
802.11n (HT40)	0	0.665	0.765	0.869	0.610
	1	0.353	0.453	0.778	1.090
	2	0.248	0.349	0.710	1.486
	3	0.196	0.297	0.660	1.806
	4	0.144	0.245	0.587	2.312
	5	0.116	0.217	0.535	2.713
	6	0.108	0.209	0.517	2.866
	7	0.100	0.201	0.498	3.030

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.344	1.444	0.930	0.313
	1	0.692	0.793	0.873	0.591
	2	0.475	0.576	0.824	0.838
	3	0.368	0.469	0.784	1.054
	4	0.260	0.362	0.720	1.425
	5	0.204	0.305	0.670	1.740
	6	0.188	0.289	0.650	1.871
	7	0.172	0.274	0.628	2.018
	8	0.152	0.253	0.601	2.213
802.11ac (VHT40)	0	0.668	0.769	0.868	0.614
	1	0.356	0.457	0.780	1.079
	2	0.252	0.353	0.713	1.468
	3	0.200	0.301	0.665	1.771
	4	0.148	0.249	0.594	2.263
	5	0.120	0.221	0.543	2.649
	6	0.112	0.213	0.526	2.792
	7	0.104	0.205	0.507	2.947
	8	0.096	0.197	0.487	3.122
	9	0.088	0.189	0.466	3.314
802.11ac (VHT80)	0	0.332	0.433	0.767	1.154
	1	0.188	0.289	0.652	1.856
	2	0.140	0.241	0.581	2.355
	3	0.116	0.217	0.534	2.726
	4	0.092	0.193	0.476	3.224
	5	0.080	0.181	0.444	3.524
	6	0.076	0.177	0.429	3.678
	7	0.072	0.173	0.416	3.809
	8	0.068	0.169	0.402	3.961
	9	0.064	0.165	0.386	4.135

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 26dB BANDWIDTH & 99 % BANDWIDTH

[ANT1]

802.11a Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.20	16.920
5200	40	21.08	16.891
5240	48	21.44	16.993
5745	149	21.44	16.913
5785	157	21.12	16.909
5825	165	21.55	16.940

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.42	17.947
5200	40	21.67	18.002
5240	48	21.59	18.046
5745	149	21.80	18.005
5785	157	21.61	17.976
5825	165	21.83	18.017

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.80	36.257
5230	46	39.96	36.186
5755	151	39.93	36.281
5795	159	39.93	36.333

802.11ac(VHT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.44	17.931
5200	40	21.42	17.982
5240	48	21.88	17.977
5745	149	21.82	17.998
5785	157	21.93	18.012
5825	165	21.53	17.984

802.11ac(VHT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.93	36.246
5230	46	39.78	36.157
5755	151	39.95	36.241
5795	159	39.85	36.334

802.11ac(VHT80) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	81.34	75.636
5775	155	82.54	75.596

[ANT2]

802.11a Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.44	16.815
5200	40	21.23	16.804
5240	48	21.34	16.815
5745	149	21.32	16.842
5785	157	21.29	16.797
5825	165	21.56	16.812

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.22	17.834
5200	40	21.53	17.810
5240	48	21.29	17.843
5745	149	21.46	17.860
5785	157	21.42	17.845
5825	165	21.39	17.866

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.28	36.127
5230	46	39.53	36.086
5755	151	39.71	36.200
5795	159	39.46	36.199

802.11ac(VHT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.25	17.815
5200	40	21.34	17.827
5240	48	21.25	17.858
5745	149	21.43	17.831
5785	157	21.49	17.910
5825	165	21.32	17.875

802.11ac(VHT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.46	36.148
5230	46	38.66	36.197
5755	151	39.25	36.202
5795	159	39.86	36.284

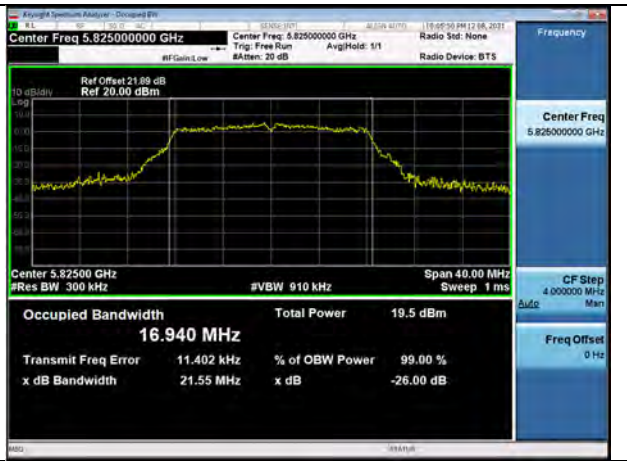
802.11ac(VHT80) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	81.22	75.439
5775	155	81.22	75.409

[ANT1]

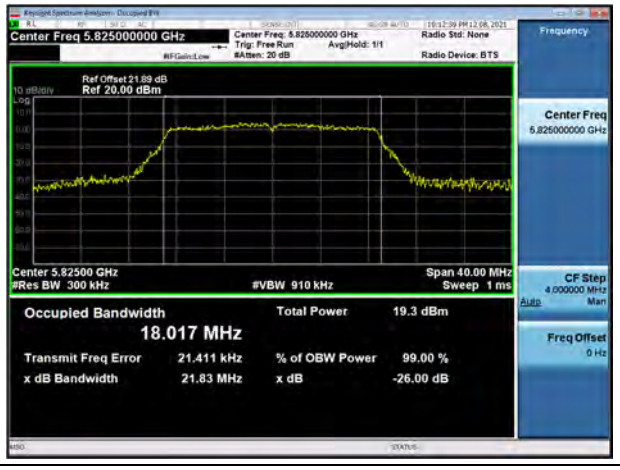
Note:

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

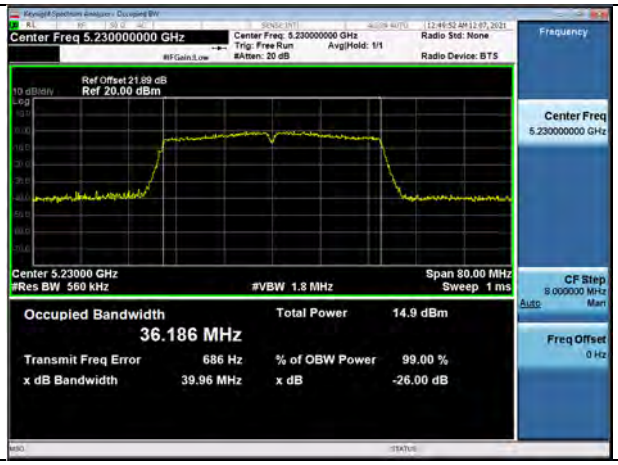
Test Plots(802.11a)

802.11a UNII 1 BAND 26dB Bandwidth (CH 48)	802.11a UNII 3 BAND 26dB Bandwidth (CH 165)
	

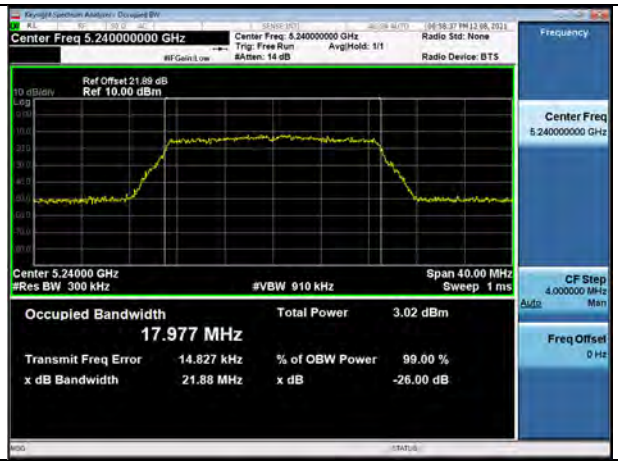
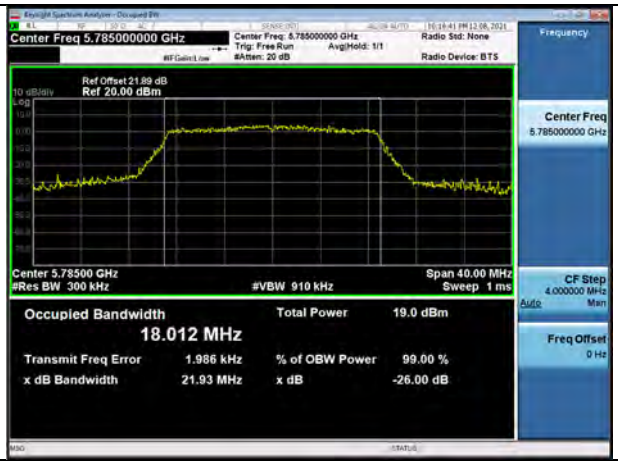
Test Plots(802.11n(HT20))

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 40)	802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 165)
	

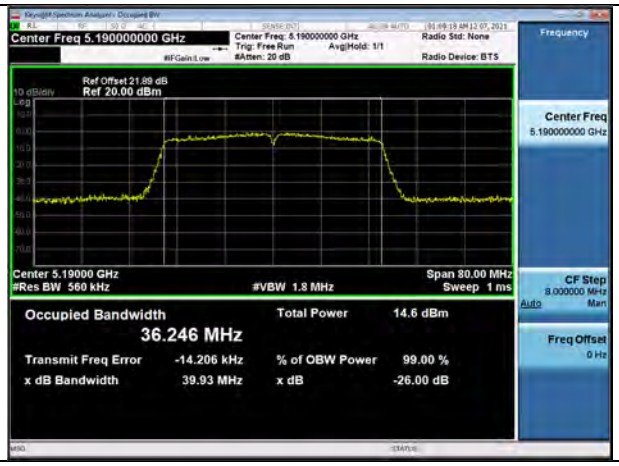
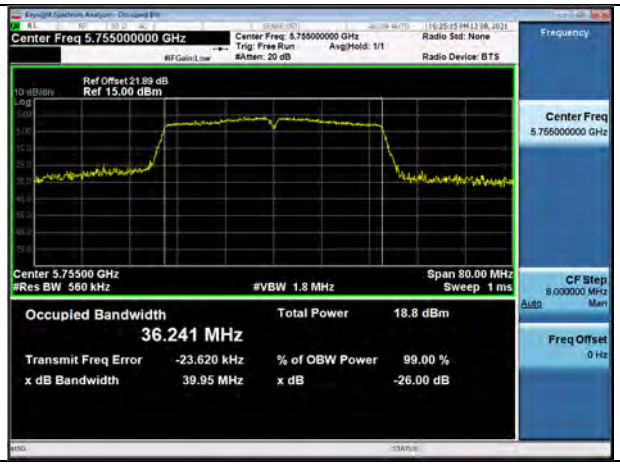
Test Plots(802.11n(HT40))

802.11n_HT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 159)
	

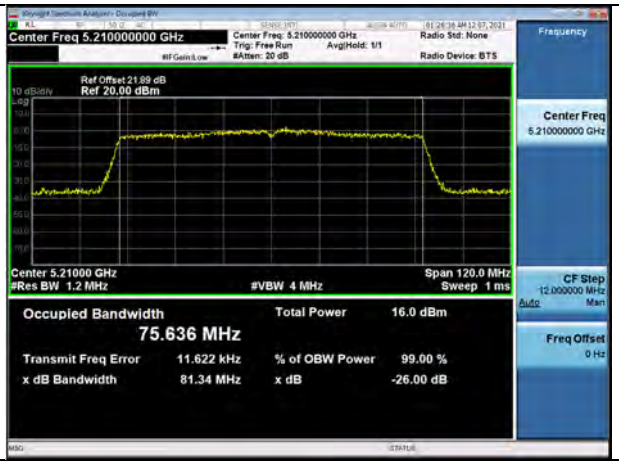
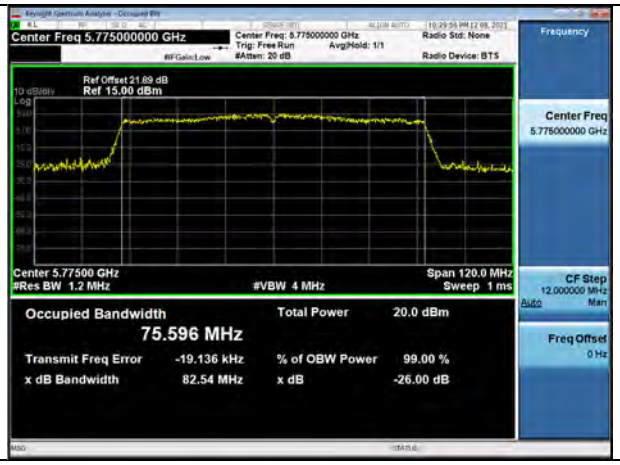
Test Plots(802.11ac(VHT20))

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 48)	802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 157)
	

Test Plots(802.11ac(VHT40))

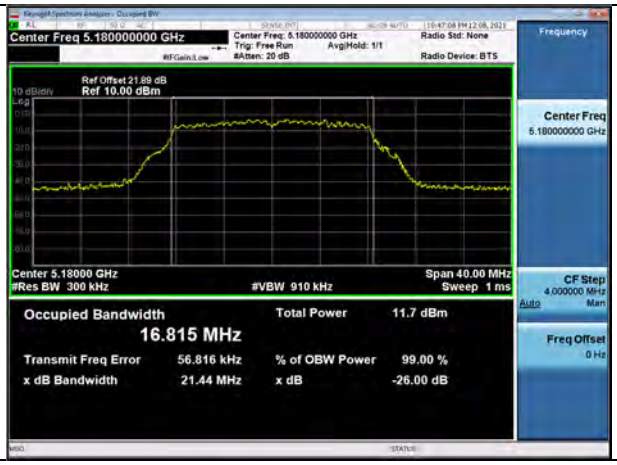
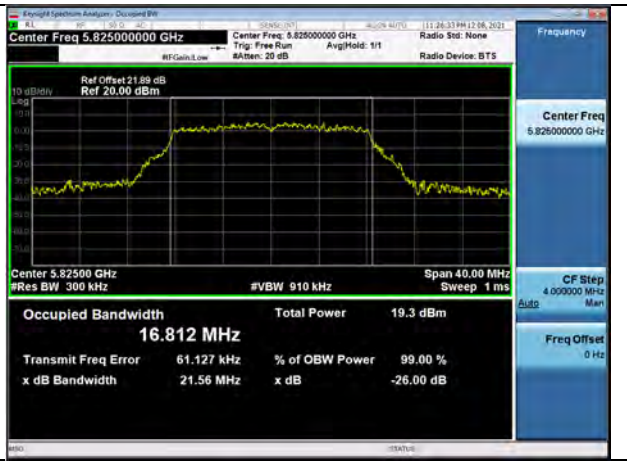
802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 38)	802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 151)
	

Test Plots(802.11ac(VHT80))

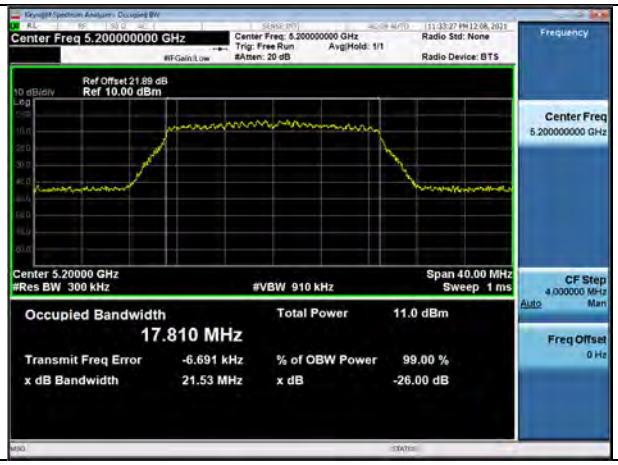
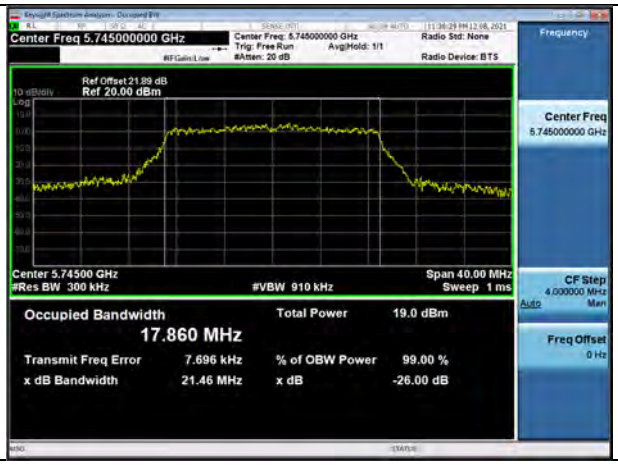
802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth (CH 155)
	

[ANT2]

Test Plots(802.11a)

802.11a UNII 1 BAND 26dB Bandwidth (CH 36)	802.11a UNII 3 BAND 26dB Bandwidth (CH 165)
	

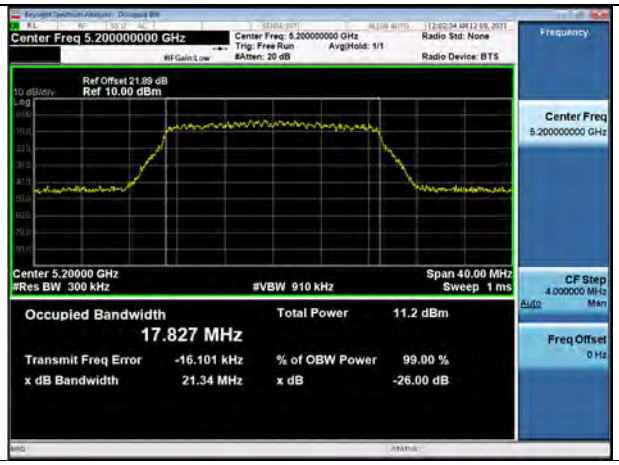
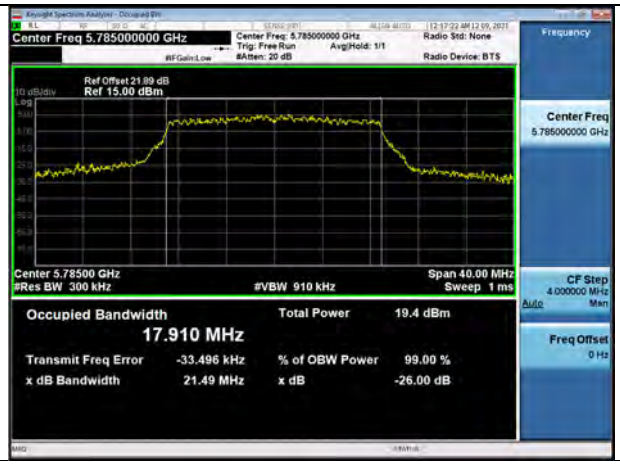
Test Plots(802.11n(HT20))

802.11n_HT20 UNII 1 BAND 26dB Bandwidth(CH 40)	802.11n_HT20 UNII 3 BAND 26dB Bandwidth(CH 149)
	

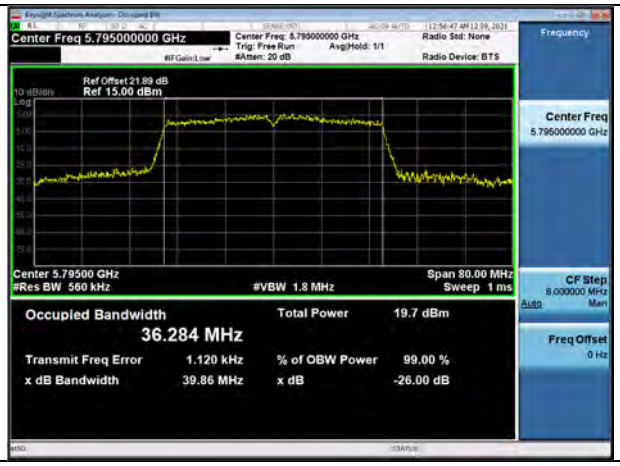
Test Plots(802.11n(HT40))

802.11n_HT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11n_HT40 UNII 3 BAND 26dB Bandwidth (CH 151)
	

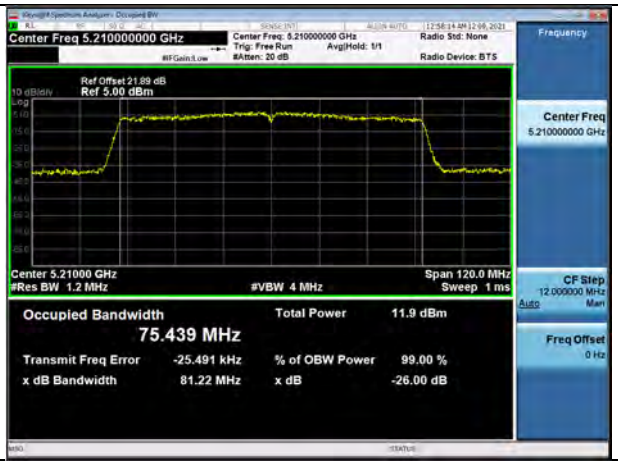
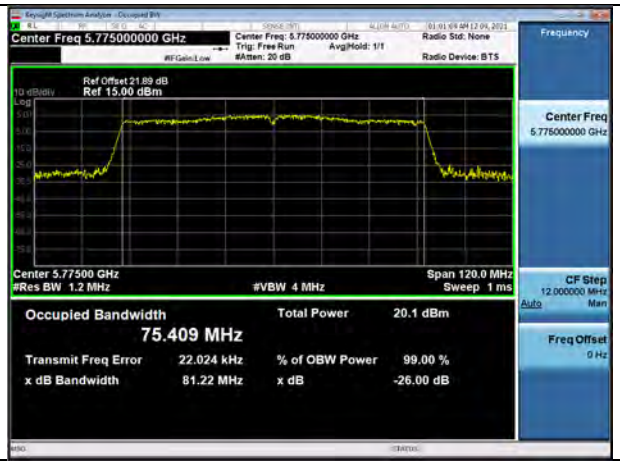
Test Plots(802.11ac(VHT20))

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 40)	802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 157)
	

Test Plots(802.11ac(VHT40))

802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 38)	802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 159)
	

Test Plots(802.11ac(VHT80))

802.11ac_VHT80 UNII 1 BAND 26dB Bandwidth(CH 42)	802.11ac_VHT80 UNII 3 BAND 26dB Bandwidth (CH 155)
	

10.3 6DB BANDWIDTH

[ANT1]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.36	> 0.5	Pass
5785	157	16.33	> 0.5	Pass
5825	165	16.33	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.58	> 0.5	Pass
5785	157	17.62	> 0.5	Pass
5825	165	17.57	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.32	> 0.5	Pass
5795	159	35.26	> 0.5	Pass

802.11ac(VHT20) 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	17.61	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.27	> 0.5	Pass
5795	159	35.64	> 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

[ANT2]

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.35	> 0.5	Pass
5785	157	16.37	> 0.5	Pass
5825	165	16.36	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.64	> 0.5	Pass
5785	157	17.60	> 0.5	Pass
5825	165	17.63	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.94	> 0.5	Pass
5795	159	35.35	> 0.5	Pass

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.59	> 0.5	Pass
5785	157	17.60	> 0.5	Pass
5825	165	17.62	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.79	> 0.5	Pass
5795	159	35.70	> 0.5	Pass

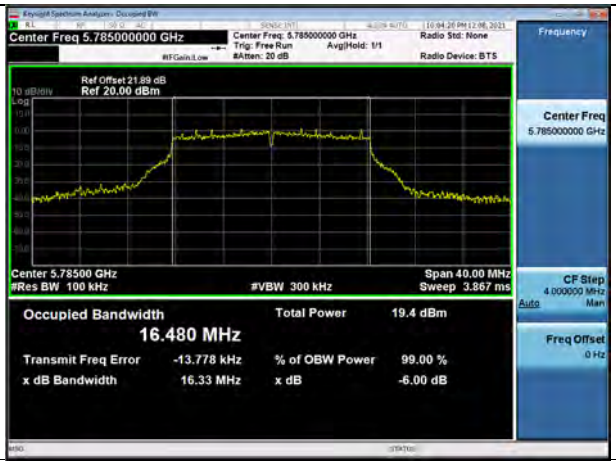
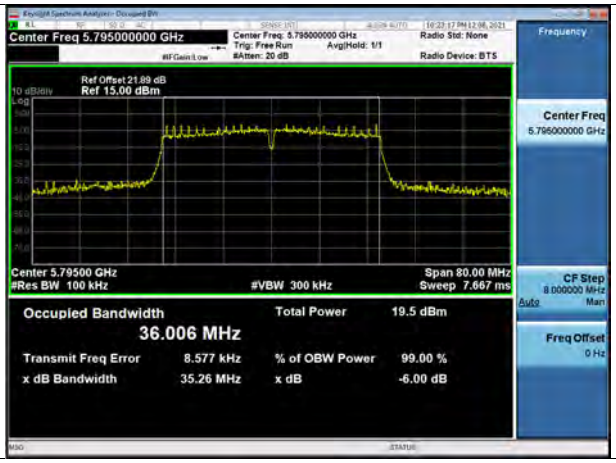
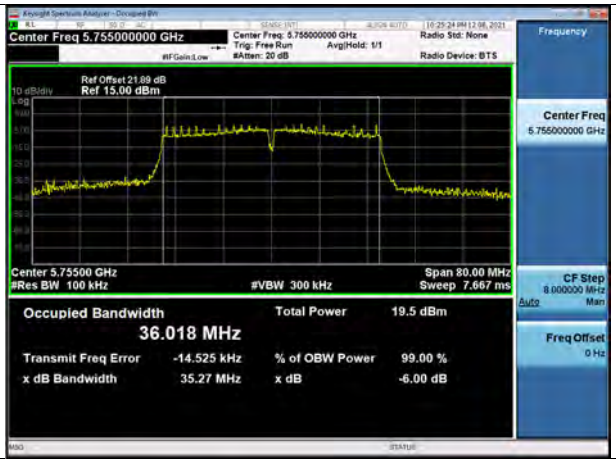
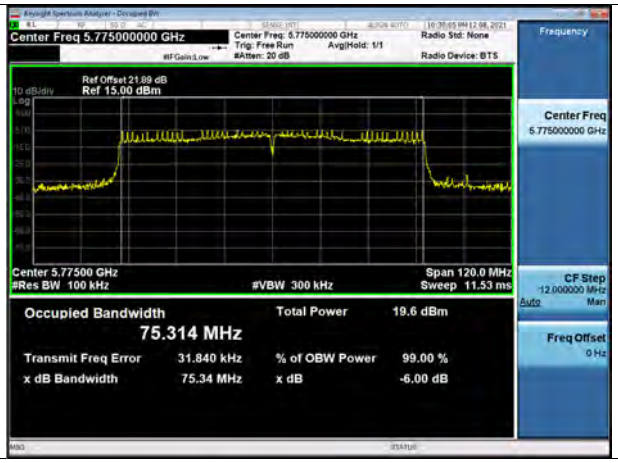
802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.51	> 0.5	Pass

[ANT1]

▣ Test Plots

Note:

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

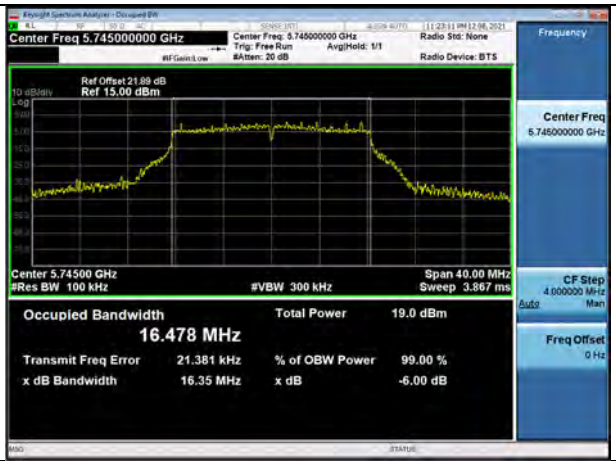
802.11a (CH.157)	802.11n(HT20) (CH.165)
	
802.11n(HT40) (CH.159)	802.11ac(VHT20) (CH.157)
	
802.11ac(VHT40) (CH.151)	802.11ac(VHT80) (CH.155)
	

[ANT2]

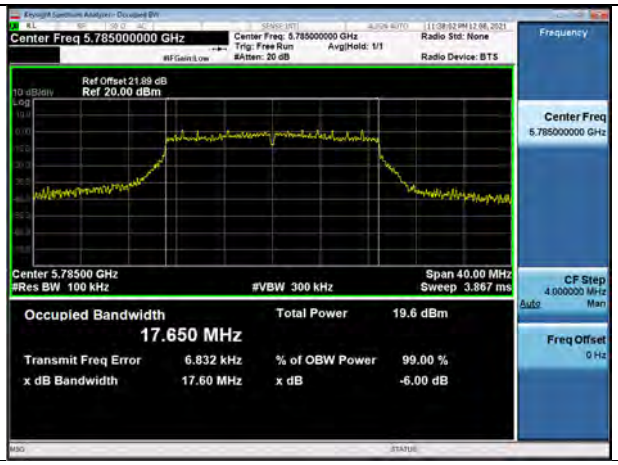
▣ Test Plots

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

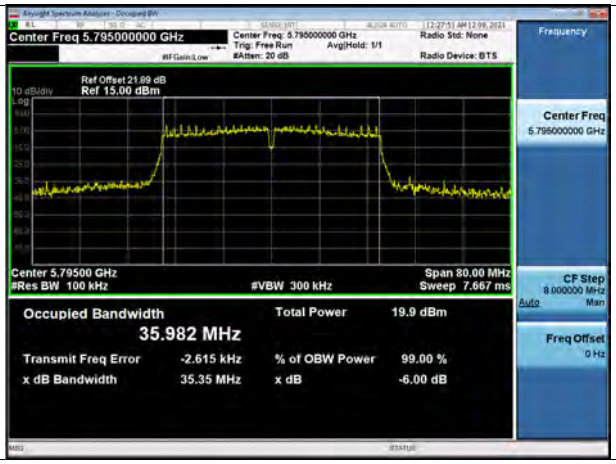
802.11a (CH.149)



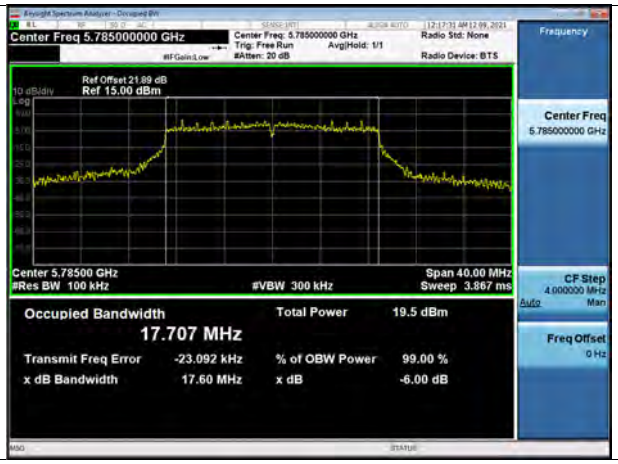
802.11n(HT20) (CH.157)



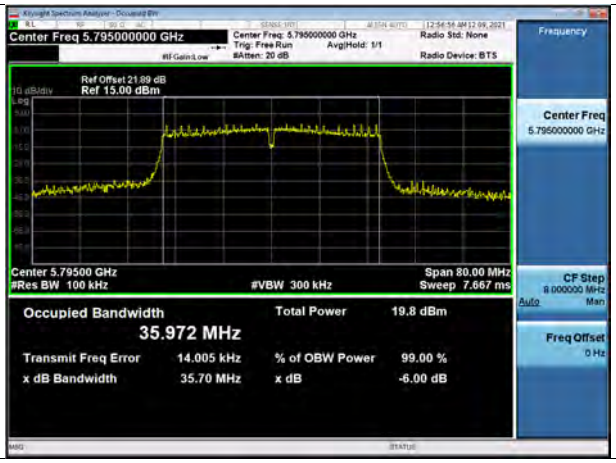
802.11n(HT40) (CH.159)



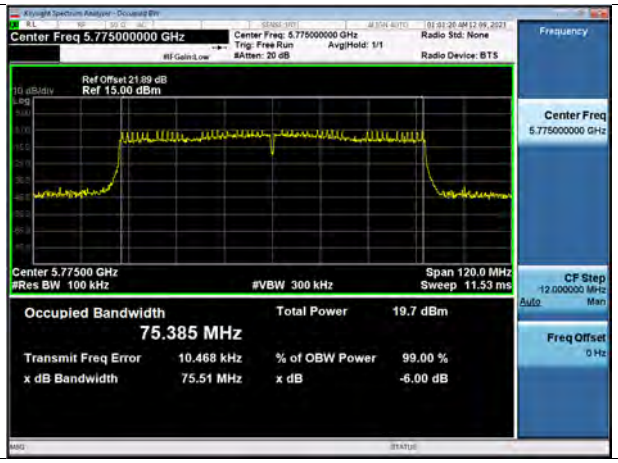
802.11ac(VHT20) (CH.157)



802.11ac(VHT40) (CH.159)



802.11ac(VHT80) (CH.155)



99 % Bandwidth measurement(ISED)

[ANT1]

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.134
5200	40	17.138
5240	48	17.172
5745	149	17.190
5785	157	17.150
5825	165	17.255

802.11n(HT20) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	18.160
5200	40	18.122
5240	48	18.361
5745	149	18.256
5785	157	18.244
5825	165	18.144

802.11n(HT40) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.261
5230	46	36.306
5755	151	36.344
5795	159	36.286

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	18.193
5200	40	18.124
5240	48	18.168
5745	149	18.221
5785	157	18.215
5825	165	18.246

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.289
5230	46	36.252
5755	151	36.249
5795	159	36.309

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	75.833
5775	155	76.089

[ANT2]

802.11a Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	16.961
5200	40	16.896
5240	48	16.979
5745	149	16.987
5785	157	16.951
5825	165	16.960

802.11n(HT20) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.961
5200	40	17.900
5240	48	17.931
5745	149	17.974
5785	157	17.971
5825	165	17.937

802.11n(HT40) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.201
5230	46	36.159
5755	151	36.259
5795	159	36.292

802.11ac(VHT20) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.965
5200	40	17.912
5240	48	17.941
5745	149	17.914
5785	157	18.089
5825	165	18.022

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.197
5230	46	36.259
5755	151	36.244
5795	159	36.295

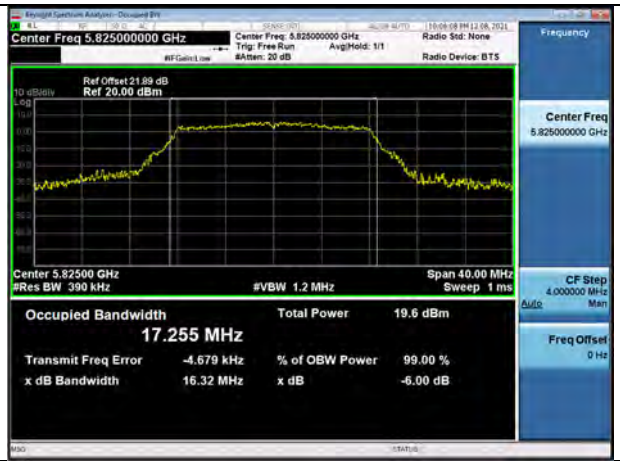
802.11ac(VHT80) Mode		Measured Bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	75.841
5775	155	75.676

[ANT1]

▣ Test Plots

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

802.11a (CH.165)



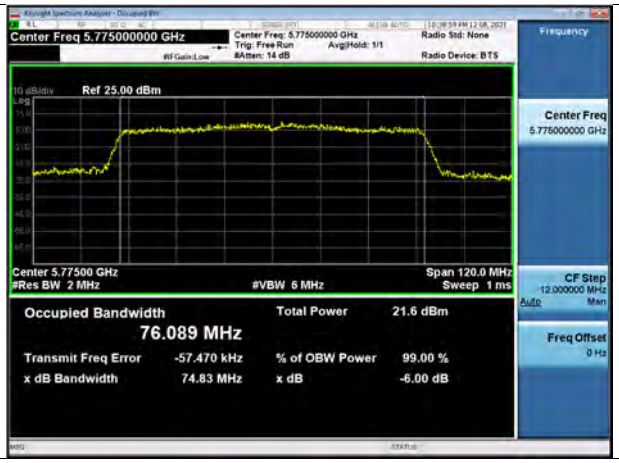
802.11n(HT20) (CH.48)

802.11n(HT40) (CH.151)

802.11ac(VHT20) (CH.165)

802.11ac(VHT40) (CH.159)

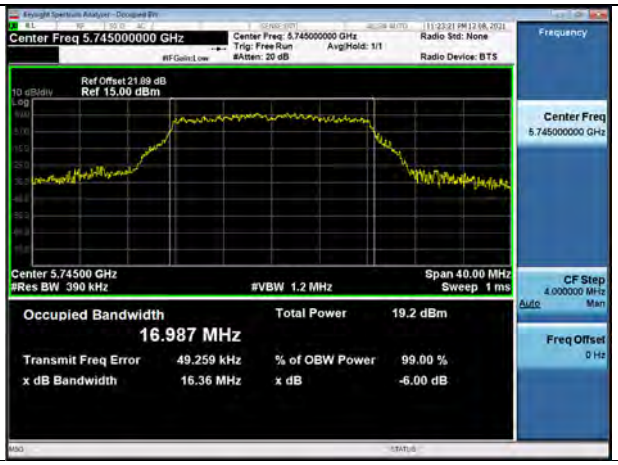
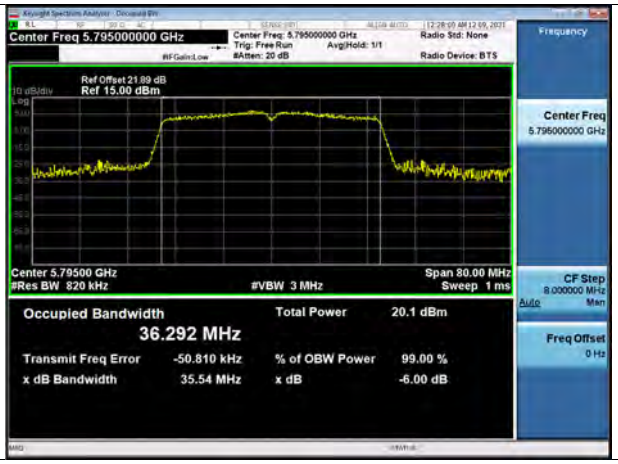
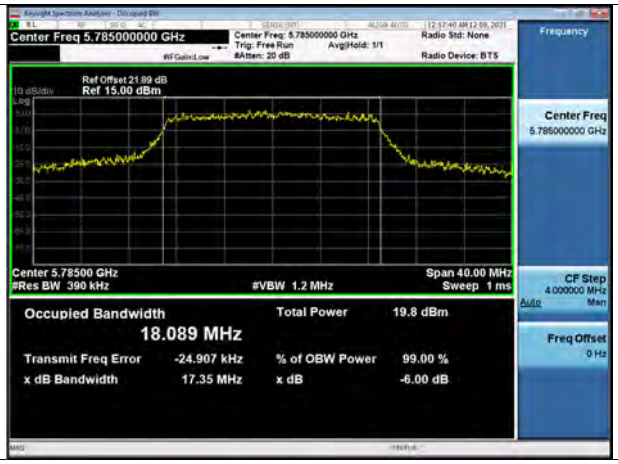
802.11ac(VHT80) (CH.155)



[ANT2]

▣ Test Plots

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

802.11a (CH.149)	802.11n(HT20) (CH.149)
	
802.11n(HT40) (CH.159)	**802.11ac(VHT20) (CH.157)**
	
802.11ac(VHT40) (CH.159)	**802.11ac(VHT80) (CH.42)**
	

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.

[Ant1]

FCC Limtis

UNII-1 : Total Power < 23.98 dBm

UNII-3 : Total Power < 30.00 dBm

ISED Limits (802.11a, 802.11n_HT20, 802.11ac_VHT20)

UNII-1 : E.I.R.P < 14.04dBm

UNII-3 : Total Power < 30.00 dBm:

ISED Limits (802.11n_HT40, 802.11ac_VHT40, 802.11ac_VHT80)

UNII-1 : E.I.R.P < 14.77 dBm

UNII-3 : Total Power < 30.00 dBm

802.11a Mode			Worstcase Datarate (Mbps)	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	6	7.25	0.298	7.55	1.77	9.32
	5200	40	6	7.21	0.298	7.51	1.77	9.28
	5240	48	6	-3.39	0.298	-3.09	1.77	-1.32

802.11a Mode			Worstcase Datarate (Mbps)	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)
UNII 3	5745	149	6	11.45	0.298	11.75
	5785	157	6	11.41	0.298	11.71
	5825	165	6	11.68	0.298	11.98

802.11n Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	MCS0	7.08	0.315	7.40	1.77	9.17
	5200	40	MCS0	7.11	0.315	7.43	1.77	9.20
	5240	48	MCS0	-3.85	0.315	-3.53	1.77	-1.76

802.11n Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)
UNII 3	5745	149	MCS0	11.55	0.315	11.87
	5785	157	MCS0	11.36	0.315	11.68
	5825	165	MCS0	11.65	0.315	11.96

802.11ac Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	MCS0	7.12	0.313	7.43	1.77	9.20
	5200	40	MCS0	7.07	0.313	7.38	1.77	9.15
	5240	48	MCS0	-3.44	0.313	-3.13	1.77	-1.36

802.11ac Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)
UNII 3	5745	149	MCS0	11.35	0.313	11.67
	5785	157	MCS0	11.36	0.313	11.68
	5825	165	MCS0	11.65	0.313	11.97

802.11n(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5190	38	MCS0	7.23	0.610	7.84	1.77	9.61
	5230	46	MCS0	7.25	0.610	7.86	1.77	9.63

802.11n(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)
UNII 3	5755	151	MCS0	10.75	0.610	11.36
	5795	159	MCS0	10.62	0.610	11.23

802.11ac(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5190	38	MCS0	7.09	0.614	7.70	1.77	9.47
	5230	46	MCS0	6.36	0.614	6.97	1.77	8.74

802.11ac(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)
UNII 3	5755	151	MCS0	10.79	0.614	11.40
	5795	159	MCS0	10.75	0.614	11.36

802.11ac(80MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5210	42	MCS0	6.74	1.152	7.89	1.77	9.66

802.11ac(80MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant1 Measured Power (dBm)	Duty Factor (dB)	Ant1 Power (dBm)
UNII 3	5775	155	MCS0	10.99	1.154	12.14

[Ant2]

FCC Limtis

UNII-1 : Total Power < 23.98 dBm

UNII-3 : Total Power < 30.00 dBm

ISED Limits (802.11a, 802.11n_HT20, 802.11ac_VHT20)

UNII-1 : E.I.R.P < 14.01 dBm

UNII-3 : Total Power < 30.00 dBm:

ISED Limits (802.11n_HT40, 802.11ac_VHT40, 802.11ac_VHT80)

UNII-1 : E.I.R.P < 14.77 dBm

UNII-3 : Total Power < 30.00 dBm

802.11a Mode			Worstcase Datarate (Mbps)	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	6	3.46	0.298	3.76	1.77	5.53
	5200	40	6	3.53	0.298	3.83	1.77	5.60
	5240	48	6	-12.28	0.298	-11.98	1.77	-10.21

802.11a Mode			Worstcase Datarate (Mbps)	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)
UNII 3	5745	149	6	12.04	0.298	12.34
	5785	157	6	12.17	0.298	12.47
	5825	165	6	12.41	0.298	12.70

802.11n Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	MCS0	3.39	0.315	3.71	1.77	5.48
	5200	40	MCS0	3.37	0.315	3.69	1.77	5.46
	5240	48	MCS0	-12.03	0.315	-11.71	1.77	-9.94

802.11n Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)
UNII 3	5745	149	MCS0	12.01	0.315	12.33
	5785	157	MCS0	12.14	0.315	12.45
	5825	165	MCS0	12.25	0.315	12.57

802.11ac Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	MCS0	3.52	0.313	3.83	1.77	5.60
	5200	40	MCS0	3.45	0.313	3.76	1.77	5.53
	5240	48	MCS0	-11.84	0.313	-11.52	1.77	-9.75

802.11ac Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)
UNII 3	5745	149	MCS0	12.01	0.313	12.33
	5785	157	MCS0	12.32	0.313	12.63
	5825	165	MCS0	12.37	0.313	12.68

802.11n(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5190	38	MCS0	3.07	0.610	3.68	1.77	5.45
	5230	46	MCS0	2.96	0.610	3.57	1.77	5.34

802.11n(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)
UNII 3	5755	151	MCS0	11.66	0.610	12.27
	5795	159	MCS0	11.81	0.610	12.42

802.11ac(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5190	38	MCS0	2.87	0.614	3.48	1.77	5.25
	5230	46	MCS0	1.66	0.614	2.28	1.77	4.05

802.11ac(40 MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)
UNII 3	5755	151	MCS0	11.76	0.614	12.37
	5795	159	MCS0	11.66	0.614	12.28

802.11ac(80MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)				
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)	Peak Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5210	42	MCS0	2.41	1.152	3.56	1.77	5.33

802.11ac(80MHz) Mode			Worstcase MCS Index	SISO Measured Power(dBm)		
Band	Frequency [MHz]	Channel No.		Ant2 Measured Power (dBm)	Duty Factor (dB)	Ant2 Power (dBm)
UNII 3	5775	155	MCS0	11.20	1.154	12.35

[MIMO]

FCC Limtis

UNII-1 : Total Power < 23.98 dBm

UNII-3 : Total Power < 30.00 dBm

ISED Limits (802.11a, 802.11n_HT20, 802.11ac_VHT20)

UNII-1 : E.I.R.P < 14.01 dBm

UNII-3 : Total Power < 30.00 dBm:

ISED Limits (802.11n_HT40, 802.11ac_VHT40, 802.11ac_VHT80)

UNII-1 : E.I.R.P < 14.77 dBm

UNII-3 : Total Power < 30.00 dBm

802.11a Mode			Worstcase Datarate (Mbps)	MIMO Total Power (dBm) (CDD)			
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)	Directional Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	6	**8.06**	**9.06**	4.78	13.84
	5200	40	6	**8.05**	**9.06**	4.78	13.84
	5240	48	6	**0.55**	**-2.57**	4.78	2.22

802.11a Mode			Worstcase Datarate (Mbps)	MIMO Total Power (dBm) (CDD)	
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)
UNII 3	5745	149	6	**32.09**	**15.06**
	5785	157	6	**32.46**	**15.11**
	5825	165	6	**34.41**	**15.37**

802.11n Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)			
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)	Directional Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	MCS0	**7.84**	**8.94**	4.78	13.72
	5200	40	MCS0	**7.86**	**8.96**	4.78	13.74
	5240	48	MCS0	**0.51**	**-2.92**	4.78	1.86

802.11n Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)	
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)
UNII 3	5745	149	MCS0	**32.48**	**15.12**
	5785	157	MCS0	**32.30**	**15.09**
	5825	165	MCS0	**33.78**	**15.29**

802.11ac Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)			
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)	Directional Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5180	36	MCS0	**7.95**	**9.01**	4.78	13.79
	5200	40	MCS0	**7.85**	**8.95**	4.78	13.73
	5240	48	MCS0	**0.56**	**-2.54**	4.78	2.24

802.11ac Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)	
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)
UNII 3	5745	149	MCS0	**31.77**	**15.02**
	5785	157	MCS0	**33.06**	**15.19**
	5825	165	MCS0	**34.27**	**15.35**

802.11n(40MHz) Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)			
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)	Directional Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5190	38	MCS0	**8.41**	**9.25**	4.78	14.03
	5230	46	MCS0	**8.38**	**9.23**	4.78	14.02

802.11n(40MHz) Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)	
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)
UNII 3	5755	151	MCS0	**30.54**	**14.85**
	5795	159	MCS0	**30.72**	**14.87**

802.11ac(40MHz) Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)			
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)	Directional Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5190	38	MCS0	**8.12**	**9.10**	4.78	13.88
	5230	46	MCS0	**6.67**	**8.24**	4.78	13.02

802.11ac(40MHz) Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)	
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)
UNII 3	5755	151	MCS0	**31.07**	**14.92**
	5795	159	MCS0	**30.59**	**14.86**

802.11ac(80MHz) Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)			
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)	Directional Ant Gain (dBi)	E.I.R.P (dBm)
UNII 1	5210	42	MCS0	**8.43**	**9.26**	4.78	14.04

802.11ac(80MHz) Mode			Worstcase MCS Index	MIMO Total Power (dBm) (CDD)	
Band	Frequency [MHz]	Channel No.		mW	SUM Power (dBm)
UNII 3	5775	155	MCS0	**33.57**	**15.26**

10.5 POWER SPECTRAL DENSITY

FCC & ISED

[Ant1]

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-2.381	0.298	-2.083	11 dBm/MHz
5200	40	-2.335	0.298	-2.037	
5240	48	-13.335	0.298	-13.037	
5745	149	-1.121	0.298	-0.823	30 dBm/500kHz
5785	157	-1.354	0.298	-1.056	
5825	165	-1.139	0.298	-0.841	

802.11n(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-2.654	0.315	-2.339	11 dBm/MHz
5200	40	-2.635	0.315	-2.320	
5240	48	-14.128	0.315	-13.813	
5745	149	-1.451	0.315	-1.136	30 dBm/500kHz
5785	157	-1.722	0.315	-1.407	
5825	165	-1.481	0.315	-1.166	

802.11n(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-5.840	0.610	-5.230	11 dBm/MHz
5230	46	-5.639	0.610	-5.029	
5755	151	-5.250	0.610	-4.640	30 dBm /500kHz
5795	159	-5.549	0.610	-4.939	

802.11ac(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-2.627	0.313	-2.314	11 dBm/MHz
5200	40	-2.619	0.313	-2.306	
5240	48	-13.852	0.313	-13.539	
5745	149	-1.690	0.313	-1.377	30 dBm/500kHz
5785	157	-1.816	0.313	-1.503	
5825	165	-1.620	0.313	-1.307	

802.11ac(40MHz) Mode		Measured	Duty Cycle	Total PSD	Limit
Frequency [MHz]	Channel No.	PSD [dBm]	Factor (dB)	[dBm]	
5190	38	-5.534	0.614	-4.920	11 dBm/MHz
5230	46	-6.903	0.614	-6.289	
5755	151	-5.045	0.614	-4.431	30 dBm/500kHz
5795	159	-5.253	0.614	-4.639	

802.11ac(80MHz) Mode		Measured	Duty Cycle	Total PSD	Limit
Frequency [MHz]	Channel No.	PSD [dBm]	Factor (dB)	[dBm]	
5210	42	-9.524	1.154	-8.370	11 dBm/MHz
5775	155	-8.203	1.154	-7.049	30 dBm/500kHz

[Ant2]

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-6.176	0.298	-5.878	11 dBm/MHz
5200	40	-5.869	0.298	-5.571	
5240	48	-22.245	0.298	-21.947	
5745	149	-0.654	0.298	-0.356	30 dBm/500kHz
5785	157	-0.851	0.298	-0.553	
5825	165	-0.347	0.298	-0.049	

802.11n(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-6.570	0.315	-6.255	11 dBm/MHz
5200	40	-6.579	0.315	-6.264	
5240	48	-22.609	0.315	-22.294	
5745	149	-1.219	0.315	-0.904	30 dBm/500kHz
5785	157	-0.396	0.315	-0.081	
5825	165	-0.834	0.315	-0.519	

802.11n(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-9.957	0.610	-9.347	11 dBm/MHz
5230	46	-10.003	0.610	-9.393	
5755	151	-4.191	0.610	-3.581	30 dBm /500kHz
5795	159	-4.143	0.610	-3.533	

802.11ac(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-6.336	0.313	-6.023	11 dBm/MHz
5200	40	-6.293	0.313	-5.980	
5240	48	-22.189	0.313	-21.876	
5745	149	-1.170	0.313	-0.857	30 dBm/500kHz
5785	157	-0.964	0.313	-0.651	
5825	165	-0.740	0.313	-0.427	

802.11ac(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-9.763	0.614	-9.149	11 dBm/MHz
5230	46	-11.676	3.314	-8.362	
5755	151	-4.051	0.614	-3.437	30 dBm/500kHz
5795	159	-4.204	0.614	-3.590	

802.11ac(80MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5210	42	-13.398	4.135	-9.263	11 dBm/MHz
5775	155	-8.696	1.154	-7.542	30 dBm/500kHz

[MIMO (CDD)]

802.11a Mode		Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.		
5180	36	-0.765	11 dBm/MHz
5200	40	-0.616	
5240	48	-13.387	
5745	149	2.423	30 dBm/500kHz
5785	157	2.209	
5825	165	2.574	

802.11n(20MHz) Mode		Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.		
5180	36	-1.068	11 dBm/MHz
5200	40	-1.060	
5240	48	-14.047	
5745	149	1.991	30 dBm/500kHz
5785	157	2.292	
5825	165	2.174	

802.11n(40MHz) Mode		Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.		
5190	38	-4.036	11 dBm/MHz
5230	46	-3.929	
5755	151	-1.084	30 dBm /500kHz
5795	159	-1.197	

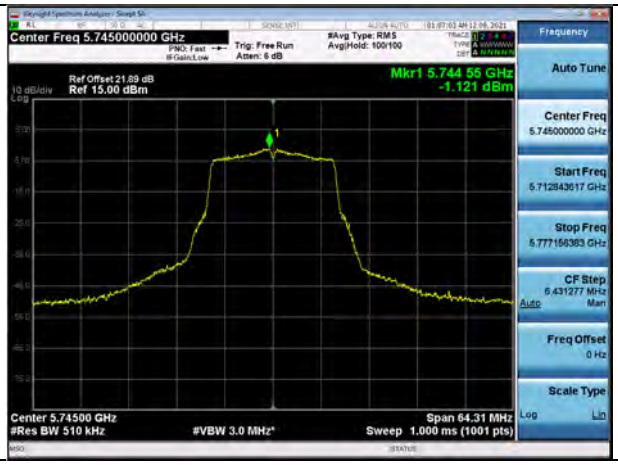
802.11ac(20MHz) Mode		Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.		
5180	36	-0.961	11 dBm/MHz
5200	40	-0.940	
5240	48	-13.733	
5745	149	1.898	30 dBm/500kHz
5785	157	1.944	
5825	165	2.155	

802.11ac(40MHz) Mode		Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.		
5190	38	-3.770	11 dBm/MHz
5230	46	-4.254	
5755	151	-0.910	30 dBm/500kHz
5795	159	-1.089	

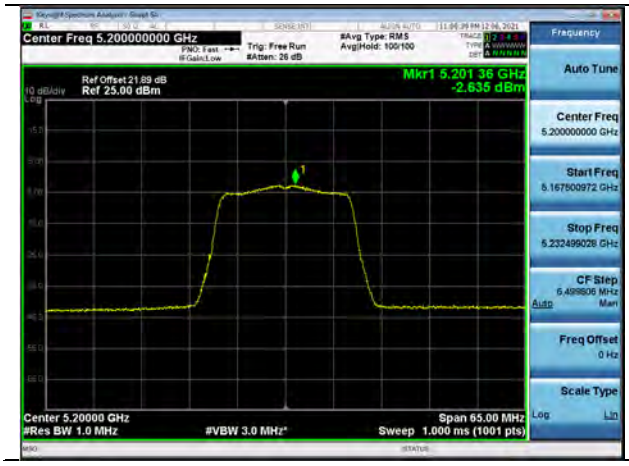
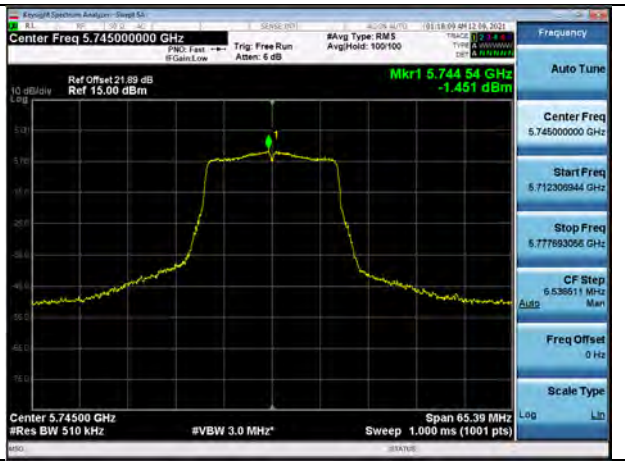
802.11ac(80MHz) Mode		Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.		
5210	42	-5.795	11 dBm/MHz
5775	155	-4.282	30 dBm/500kHz

[Ant1]

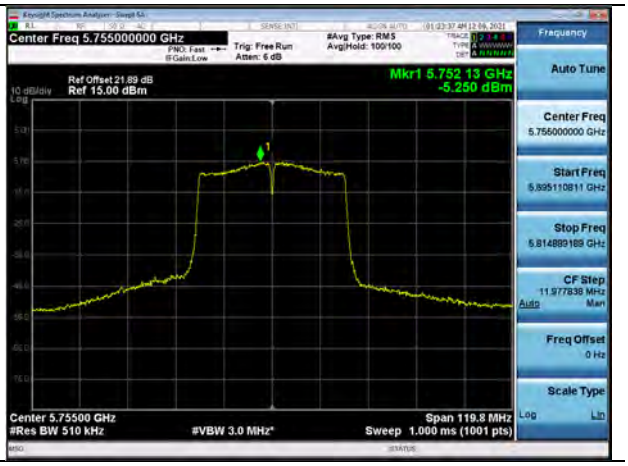
Test Plots(802.11a)

UNII 1 (Ch. 40)	UNII 3 (Ch. 149)
	

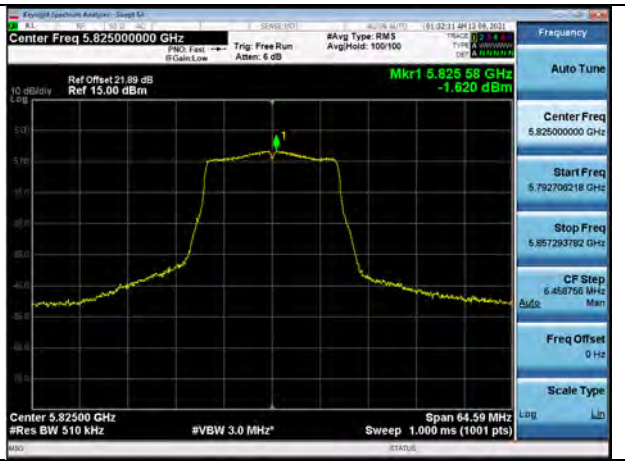
Test Plots(802.11n(HT20))

UNII 1 (Ch. 40)	UNII 3 (Ch. 149)
	

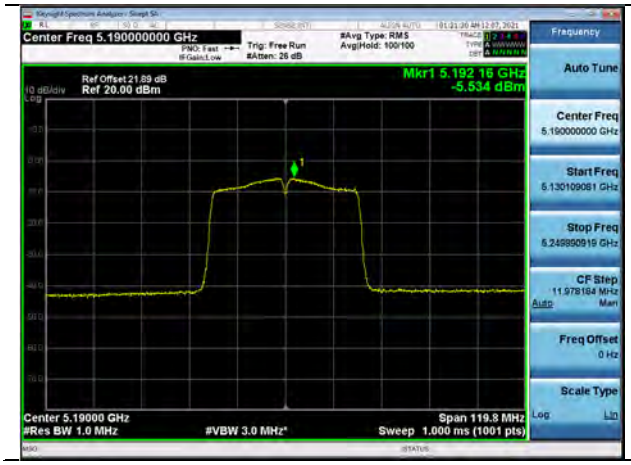
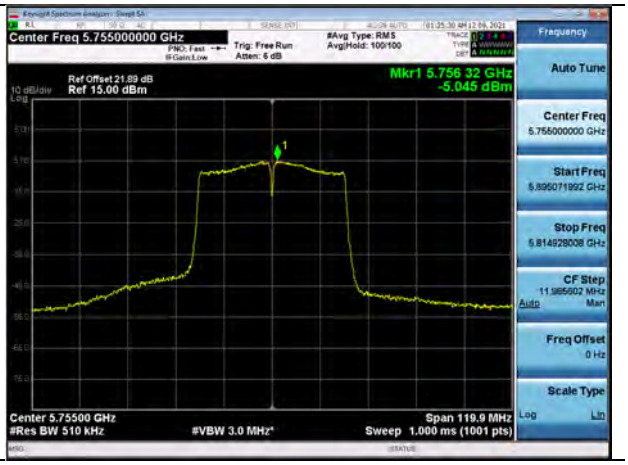
Test Plots(802.11n(HT40))

UNII 1 (Ch. 46)	UNII 3 (Ch. 151)
	

Test Plots(802.11ac(VHT20))

UNII 1 (Ch. 40)	UNII 3 (Ch. 165)
	

Test Plots(802.11ac(VHT40))

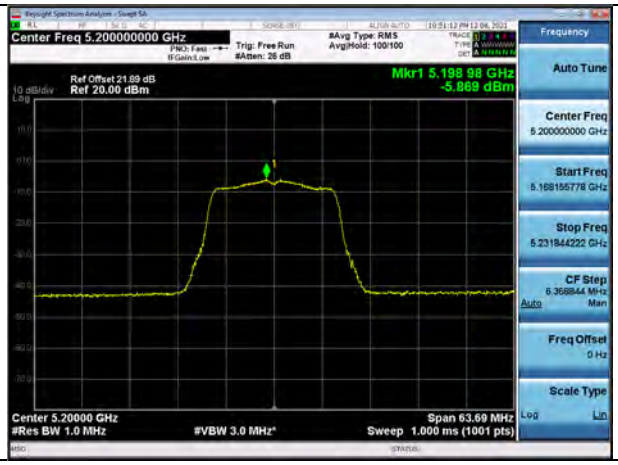
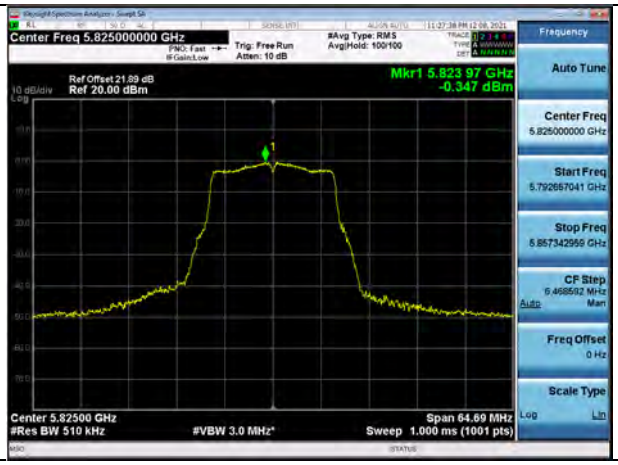
UNII 1 (Ch. 38)	UNII 3 (Ch. 151)
	

Test Plots(802.11ac(VHT80))

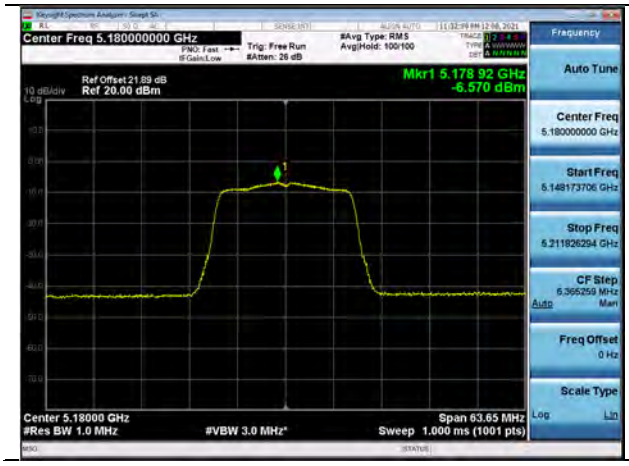
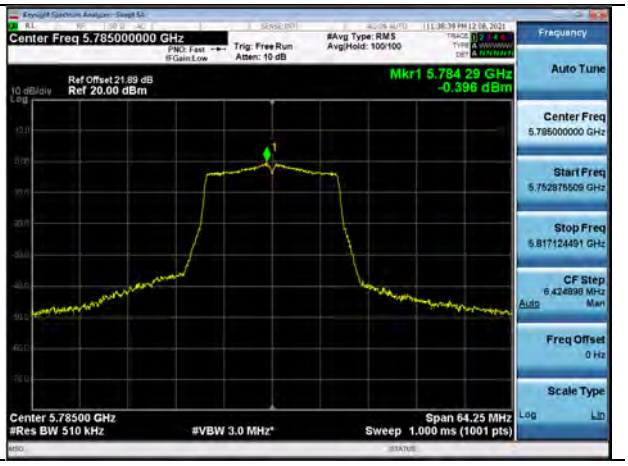
UNII 1 (Ch. 42)	UNII 3 (Ch. 155)
	

[Ant2]

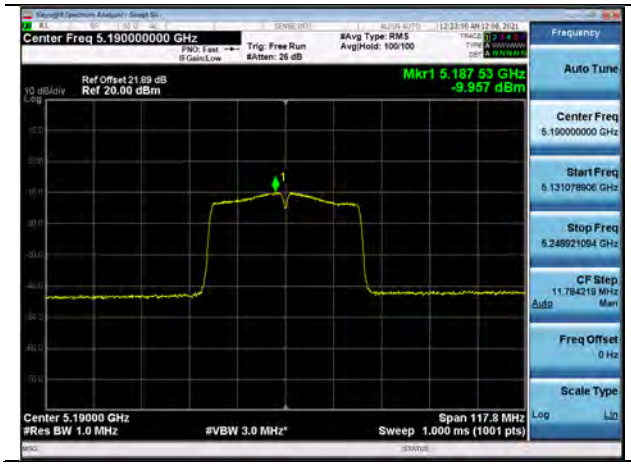
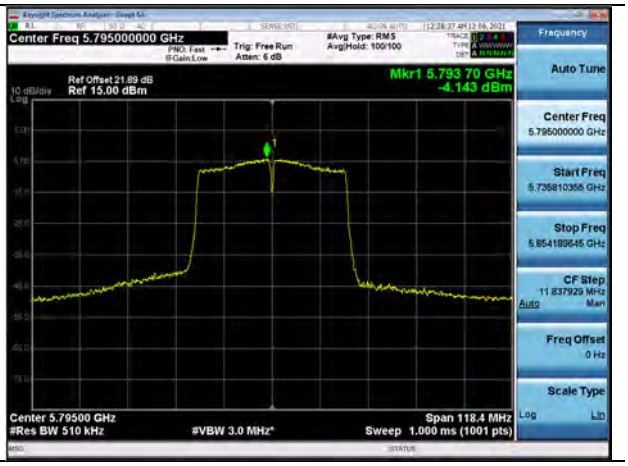
Test Plots(802.11a)

UNII 1 (Ch. 40)	UNII 3 (Ch. 165)
	

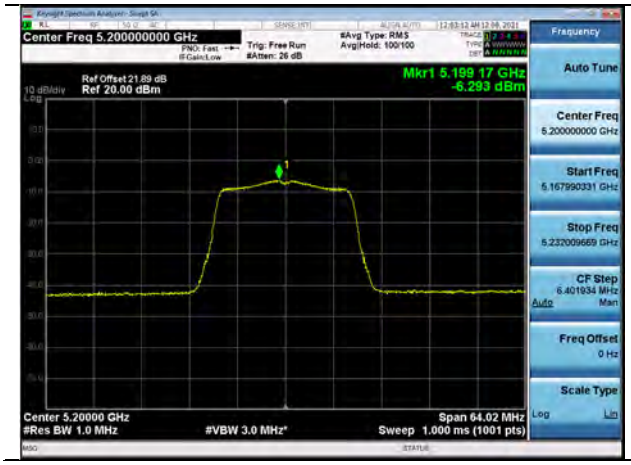
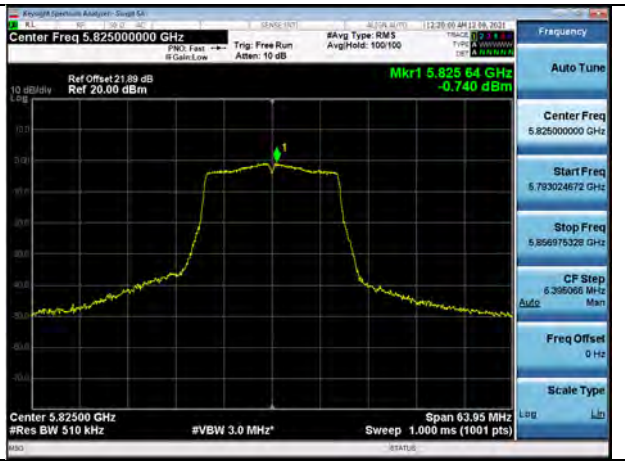
Test Plots(802.11n(HT20))

UNII 1 (Ch. 36)	UNII 3 (Ch. 157)
	

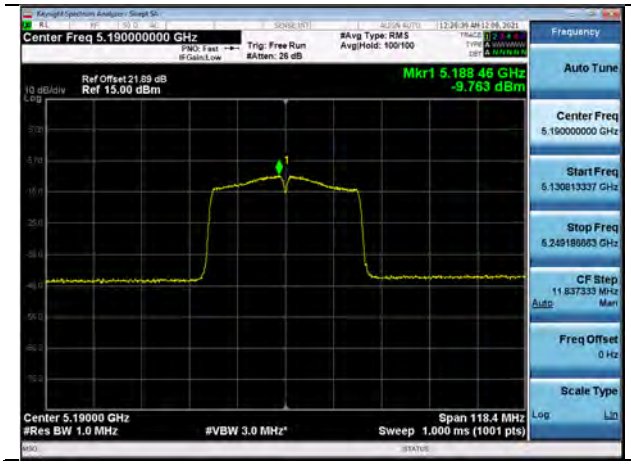
Test Plots(802.11n(HT40))

UNII 1 (Ch. 38)	UNII 3 (Ch. 159)
	

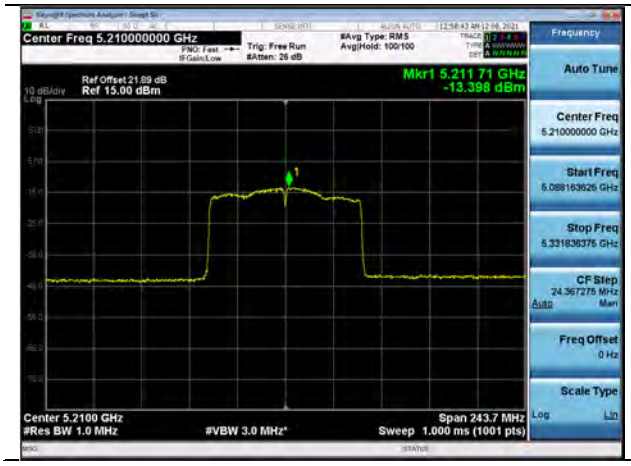
Test Plots(802.11ac(VHT20))

UNII 1 (Ch. 40)	UNII 3 (Ch. 165)
	

Test Plots(802.11ac(VHT40))

UNII 1 (Ch. 38)	UNII 3 (Ch. 151)
	

Test Plots(802.11ac(VHT80))

UNII 1 (Ch. 42)	UNII 3 (Ch. 155)
	

10.6 FREQUENCY STABILITY.

10.6.1 80MHz BW

[ANT1]

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210004.75	4.75
100%		-30	5210003.62	3.62
100%		-20	5210082.68	82.68
100%		-10	5210045.02	45.02
100%		0	5210050.51	50.51
100%		+10	5210098.38	98.38
100%		+30	5210087.72	87.72
100%		+40	5210055.12	55.12
100%		+50	5210074.85	74.85
Max	8	+20	5210037.99	37.99
Min	16	+20	5210046.25	46.25

Note:

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

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5775077.34	77.34
100%		-30	5775073.10	73.10
100%		-20	5775062.16	62.16
100%		-10	5775023.43	23.43
100%		0	5775020.89	20.89
100%		+10	5775017.94	17.94
100%		+30	5775054.52	54.52
100%		+40	5775003.44	3.44
100%		+50	5775042.10	42.10
Max	8	+20	5775022.51	22.51
Min	16	+20	5775074.03	74.03

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:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210063.98	63.98
100%		-30	5210051.93	51.93
100%		-20	5210078.72	78.72
100%		-10	5210054.09	54.09
100%		0	5210019.67	19.67
100%		+10	5210074.83	74.83
100%		+30	5210065.28	65.28
100%		+40	5210060.92	60.92
100%		+50	5210009.88	9.88
Max	8	+20	5210062.04	62.04
Min	16	+20	5210093.62	93.62

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:	12 VDC

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12	+20(Ref)	5775011.90	11.90
100%		-30	5775067.75	67.75
100%		-20	5775024.40	24.4
100%		-10	5775008.38	8.38
100%		0	5775032.26	32.26
100%		+10	5775056.66	56.66
100%		+30	5775075.46	75.46
100%		+40	5775024.62	24.62
100%		+50	5775001.47	1.47
Max	8	+20	5775013.80	13.80
Min	16	+20	5775040.38	40.38

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.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210063.31	63.31
100%		-30	5210024.02	24.02
100%		-20	5210075.91	75.91
100%		-10	5210066.87	66.87
100%		0	5210081.57	81.57
100%		+10	5210061.07	61.07
100%		+30	5210071.22	71.22
100%		+40	5210028.51	28.51
100%		+50	5210032.73	32.73
Max	8	+20	5210041.23	41.23
Min	16	+20	5210059.14	59.14

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:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5775021.94	21.94
100%		-30	5775007.10	7.10
100%		-20	5775011.29	11.29
100%		-10	5775072.91	72.91
100%		0	5775044.54	44.54
100%		+10	5775095.12	95.12
100%		+30	5775072.91	72.91
100%		+40	5775031.53	31.53
100%		+50	5775073.82	73.82
Max	8	+20	5775039.45	39.45
Min	16	+20	5775020.27	20.27

Note:

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

10 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210048.35	48.35
100%		-30	5210023.81	23.81
100%		-20	5210083.74	83.74
100%		-10	5210082.42	82.42
100%		0	5210051.10	51.10
100%		+10	5210014.88	14.88
100%		+30	5210066.49	66.49
100%		+40	5210044.45	44.45
100%		+50	5210067.33	67.33
Max	8	+20	5210081.21	81.21
Min	16	+20	5210034.23	34.23

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:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5775057.51	57.51
100%		-30	5775053.59	53.59
100%		-20	5775002.35	2.35
100%		-10	5775076.05	76.05
100%		0	5775095.04	95.04
100%		+10	5775061.26	61.26
100%		+30	5775090.91	90.91
100%		+40	5775097.12	97.12
100%		+50	5775031.65	31.65
Max	8	+20	5775049.47	49.47
Min	16	+20	5775078.15	78.15

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.

[ANT2]

Startup after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210042.14	42.14
100%		-30	5210068.64	68.64
100%		-20	5210085.55	85.55
100%		-10	5210019.69	19.69
100%		0	5210070.98	70.98
100%		+10	5210046.84	46.84
100%		+30	5210071.20	71.20
100%		+40	5210086.04	86.04
100%		+50	5210094.05	94.05
Max	8	+20	5210054.52	54.52
Min	16	+20	5210091.29	91.29

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 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5775038.85	38.85
100%		-30	5775018.05	18.05
100%		-20	5775028.60	28.6
100%		-10	5775058.02	58.02
100%		0	5775069.84	69.84
100%		+10	5775039.98	39.98
100%		+30	5775055.74	55.74
100%		+40	5775052.25	52.25
100%		+50	5775022.66	22.66
Max	8	+20	5775004.29	4.29
Min	16	+20	5775096.92	96.92

Note:

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

2 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210023.72	23.72
100%		-30	5210069.88	69.88
100%		-20	5210015.45	15.45
100%		-10	5210099.78	99.78
100%		0	5210053.05	53.05
100%		+10	5210096.04	96.04
100%		+30	5210065.12	65.12
100%		+40	5210017.04	17.04
100%		+50	5210055.23	55.23
Max	8	+20	5210048.51	48.51
Min	16	+20	5210012.57	12.57

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:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5775012.17	12.17
100%		-30	5775036.94	36.94
100%		-20	5775029.61	29.61
100%		-10	5775002.36	2.36
100%		0	5775054.06	54.06
100%		+10	5775099.02	99.02
100%		+30	5775043.22	43.22
100%		+40	5775024.99	24.99
100%		+50	5775028.07	28.07
Max	8	+20	5775098.07	98.07
Min	16	+20	5775011.48	11.48

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.

5 minutes after the EUT is energized

OPERATING BAND:	UNII Band 1
OPERATING FREQUENCY:	5,210,000,000 Hz
CHANNEL:	42
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210004.47	4.47
100%		-30	5210059.05	59.05
100%		-20	5210082.33	82.33
100%		-10	5210059.70	59.70
100%		0	5210051.31	51.31
100%		+10	5210057.78	57.78
100%		+30	5210013.25	13.25
100%		+40	5210095.58	95.58
100%		+50	5210085.70	85.70
Max	8	+20	5210038.73	38.73
Min	16	+20	5210078.99	78.99

Note:

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

OPERATING BAND:	UNII Band 3
OPERATING FREQUENCY:	5,775,000,000 Hz
CHANNEL:	155
REFERENCE VOLTAGE:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5775033.59	33.59
100%		-30	5775076.12	76.12
100%		-20	5775003.83	3.83
100%		-10	5775044.91	44.91
100%		0	5775086.48	86.48
100%		+10	5775043.38	43.38
100%		+30	5775094.67	94.67
100%		+40	5775004.48	4.48
100%		+50	5775014.55	14.55
Max	8	+20	5775075.40	75.40
Min	16	+20	5775067.97	67.97

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:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5210019.36	19.36
100%		-30	5210063.31	63.31
100%		-20	5210061.68	61.68
100%		-10	5210018.06	18.06
100%		0	5210007.82	7.82
100%		+10	5210032.57	32.57
100%		+30	5210077.78	77.78
100%		+40	5210021.45	21.45
100%		+50	5210086.18	86.18
Max	8	+20	5210099.91	99.91
Min	16	+20	5210077.15	77.15

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:	12 VDC

Voltage	Power	Temp.	Frequency	Frequency
(%)	(VDC)	(°C)	(kHz)	Error (kHz)
100%	12	+20(Ref)	5775072.79	72.79
100%		-30	5775050.13	50.13
100%		-20	5775013.99	13.99
100%		-10	5775063.73	63.73
100%		0	5775025.70	25.7
100%		+10	5775011.44	11.44
100%		+30	5775026.37	26.37
100%		+40	5775084.47	84.47
100%		+50	5775034.80	34.80
Max	8	+20	5775009.58	9.58
Min	16	+20	5775018.67	18.67

Note:

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

10.7 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

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

Note:

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

Frequency Range : Below 1 GHz

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

Note:

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

Frequency Range : Above 1 GHz

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
10360	47.97	4.78	V	52.75	68.20	15.45	PK
15540	48.21	4.74	V	52.95	73.98	21.03	PK
15540	33.15	4.74	V	37.89	53.98	16.09	AV
10360	47.75	4.78	H	52.53	68.20	15.67	PK
15540	50.40	4.74	H	55.14	73.98	18.84	PK
15540	33.77	4.74	H	38.51	53.98	15.47	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
10400	48.57	4.37	V	52.94	68.20	15.26	PK
15600	49.66	4.20	V	53.86	73.98	20.12	PK
15600	33.95	4.20	V	38.15	53.98	15.83	AV
10400	48.42	4.37	H	52.79	68.20	15.41	PK
15600	50.87	4.20	H	55.07	73.98	18.91	PK
15600	34.06	4.20	H	38.26	53.98	15.72	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
10480	48.11	5.17	V	53.28	68.20	14.92	PK
15720	46.55	3.76	V	50.31	73.98	23.67	PK
15720	32.92	3.76	V	36.68	53.98	17.30	AV
10480	47.93	5.17	H	53.10	68.20	15.10	PK
15720	48.66	3.76	H	52.42	73.98	21.56	PK
15720	33.48	3.76	H	37.24	53.98	16.74	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
11490	46.75	5.07	V	51.82	73.98	22.16	PK
11490	35.04	5.07	V	40.11	53.98	13.87	AV
17235	46.28	9.49	V	55.77	68.20	12.43	PK
11490	46.29	5.07	H	51.36	73.98	22.62	PK
11490	34.57	5.07	H	39.64	53.98	14.34	AV
17235	45.99	9.49	H	55.48	68.20	12.72	PK

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
11570	47.29	5.07	V	52.36	73.98	21.62	PK
11570	33.31	5.07	V	38.38	53.98	15.60	AV
17355	45.66	10.50	V	56.16	68.20	12.04	PK
11570	46.78	5.07	H	51.85	73.98	22.13	PK
11570	33.07	5.07	H	38.14	53.98	15.84	AV
17355	45.19	10.78	H	55.97	68.20	12.23	PK

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
11650	47.44	4.76	V	52.20	73.98	21.78	PK
11650	33.95	4.76	V	38.71	53.98	15.27	AV
17475	46.78	10.29	V	57.07	68.20	11.13	PK
11650	46.07	4.76	H	50.83	73.98	23.15	PK
11650	33.86	4.76	H	38.62	53.98	15.36	AV
17475	46.30	10.29	H	56.59	68.20	11.61	PK

Note:

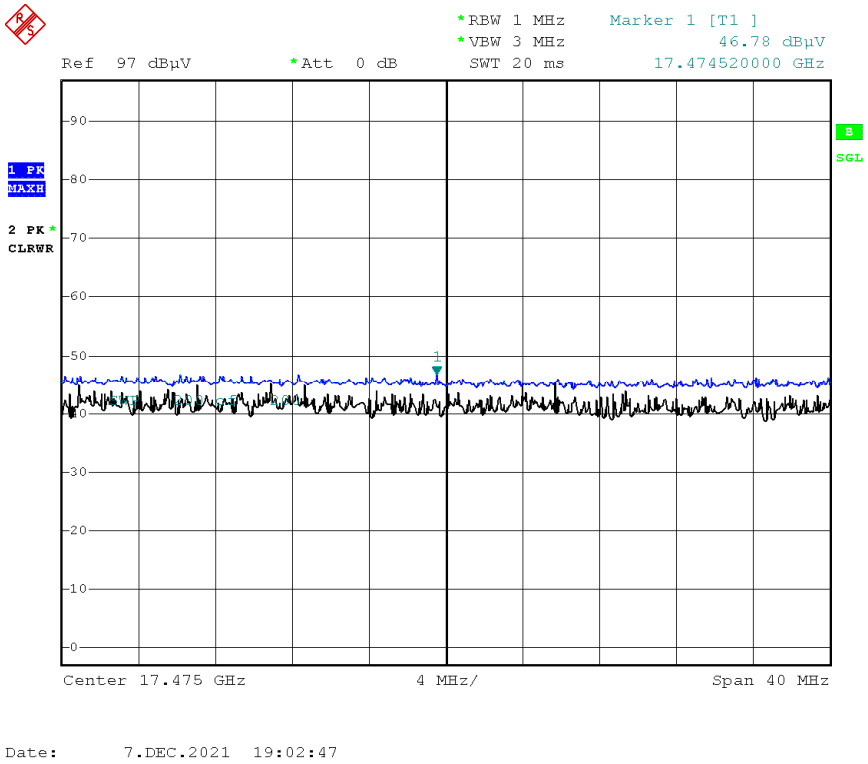
All Modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

- Worstcase : UNII 1, 3 : 802.11a

▣ Test Plots

Peak Reading (802.11a, Ch.165 3rd Harmonic, X-V)



Note:

Only the worst case plots for Radiated Spurious Emissions.

10.8 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 Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5400-5150	48.24	12.12	H	60.36	73.98	13.62	PK
5400-5150	34.76	12.12	H	46.88	53.98	7.10	AV
5400-5150	45.88	12.12	V	58.00	73.98	15.98	PK
5400-5150	33.04	12.12	V	45.16	53.98	8.82	AV

Band :	UNII 1
Operation Mode:	802.11 a
Transfer Rate:	6 Mbps
Operating Frequency	5320 MHz
Channel No.	48 Ch

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5250-5251	53.54	11.41	H	64.95	68.20	3.25	PK
5251-5252	49.21	11.41	H	60.62	68.20	7.58	PK
5252-5350	46.20	11.41	H	57.61	68.20	10.59	PK
5250-5251	53.07	11.41	H	64.48	68.20	3.72	PK
5251-5252	48.80	11.41	H	60.21	68.20	7.99	PK
5252-5350	46.44	11.41	H	57.85	68.20	10.35	PK

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5400-5150	47.89	12.12	H	60.01	73.98	13.97	PK
5400-5150	34.82	12.12	H	46.94	53.98	7.04	AV
5400-5150	47.09	12.12	V	59.21	73.98	14.77	PK
5400-5150	34.24	12.12	V	46.36	53.98	7.62	AV

Band :	UNII 1
Operation Mode:	802.11 n_HT20
Transfer MCS Index:	0
Operating Frequency	5320 MHz
Channel No.	48 Ch

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5250-5251	52.69	11.41	H	64.10	68.20	4.10	PK
5251-5252	47.93	11.41	H	59.34	68.20	8.86	PK
5252-5350	45.93	11.41	H	57.34	68.20	10.86	PK
5250-5251	53.70	11.41	V	65.11	68.20	3.09	PK
5251-5252	48.71	11.41	V	60.12	68.20	8.08	PK
5252-5350	46.70	11.41	V	58.11	68.20	10.09	PK

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5400-5150	47.15	12.12	H	59.27	73.98	14.71	PK
5400-5150	34.77	12.12	H	46.89	53.98	7.09	AV
5400-5150	46.38	12.12	V	58.50	73.98	15.48	PK
5400-5150	34.28	12.12	V	46.40	53.98	7.58	AV

Band :	UNII 1
Operation Mode:	802.11 ac_VHT20
Transfer MCS Index:	0
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5250-5251	51.39	11.41	H	62.80	68.20	5.40	PK
5251-5252	47.97	11.41	H	59.38	68.20	8.82	PK
5252-5350	44.57	11.41	H	55.98	68.20	12.22	PK
5250-5251	52.95	11.41	V	64.36	68.20	3.84	PK
5251-5252	48.44	11.41	V	59.85	68.20	8.35	PK
5252-5350	45.11	11.41	V	56.52	68.20	11.68	PK

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5400-5150	49.40	12.12	H	61.52	73.98	12.46	PK
5400-5150	37.93	12.12	H	50.05	53.98	3.93	AV
5400-5150	48.39	12.12	V	60.51	73.98	13.47	PK
5400-5150	37.07	12.12	V	49.19	53.98	4.79	AV

Band :	UNII 1
Operation Mode:	802.11 n_HT40
Transfer MCS Index:	0
Operating Frequency	5320 MHz
Channel No.	46 Ch

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5250-5251	53.38	11.41	H	64.79	68.20	3.41	PK
5251-5252	50.12	11.41	H	61.53	68.20	6.67	PK
5252-5350	50.50	11.41	H	61.91	68.20	6.29	PK
5250-5251	52.17	11.41	V	63.58	68.20	4.62	PK
5250-5251	49.24	11.41	V	60.65	68.20	7.55	PK
5251-5350	49.33	11.41	V	60.74	68.20	7.46	PK

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5400-5150	48.03	12.12	H	60.15	73.98	13.83	PK
5400-5150	35.87	12.12	H	47.99	53.98	5.99	AV
5400-5150	47.62	12.12	V	59.74	73.98	14.24	PK
5400-5150	35.04	12.12	V	47.16	53.98	6.82	AV

Band :	UNII 1
Operation Mode:	802.11 ac_VHT40
Transfer MCS Index:	0
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5250-5251	52.82	11.41	H	64.23	68.20	3.97	PK
5251-5252	49.50	11.41	H	60.91	68.20	7.29	PK
5252-5350	49.13	11.41	H	60.54	68.20	7.66	PK
5250-5251	51.66	11.41	V	63.07	68.20	5.13	PK
5250-5251	48.39	11.41	V	59.80	68.20	8.40	PK
5251-5350	48.19	11.41	V	59.60	68.20	8.60	PK

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

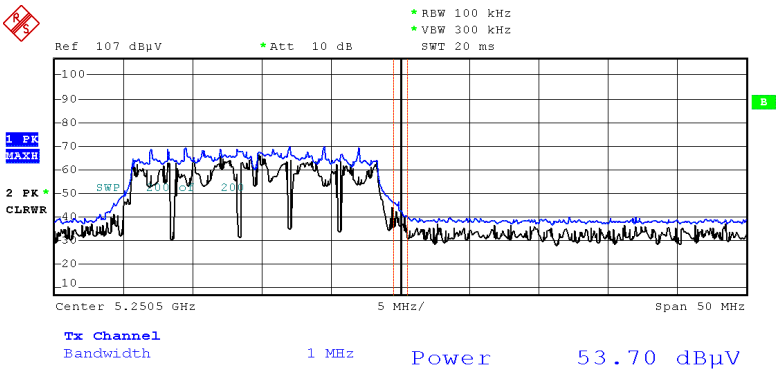
Frequency	Reading	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5400-5150	46.75	12.12	H	58.87	73.98	15.11	PK
5400-5150	36.02	12.12	H	48.14	53.98	5.84	AV
5400-5150	45.99	12.12	V	58.11	73.98	15.87	PK
5400-5150	35.40	12.12	V	47.52	53.98	6.46	AV

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

Frequency	Reading	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	dBuV	[dB/m]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	Type
5250-5251	53.48	11.41	H	64.89	68.20	3.31	PK
5251-5252	50.83	11.41	H	62.24	68.20	5.96	PK
5252-5350	51.42	11.41	H	62.83	68.20	5.37	PK
5250-5251	52.19	11.41	V	63.60	68.20	4.60	PK
5251-5252	49.24	11.41	V	60.65	68.20	7.55	PK
5252-5350	50.17	11.41	V	61.58	68.20	6.62	PK

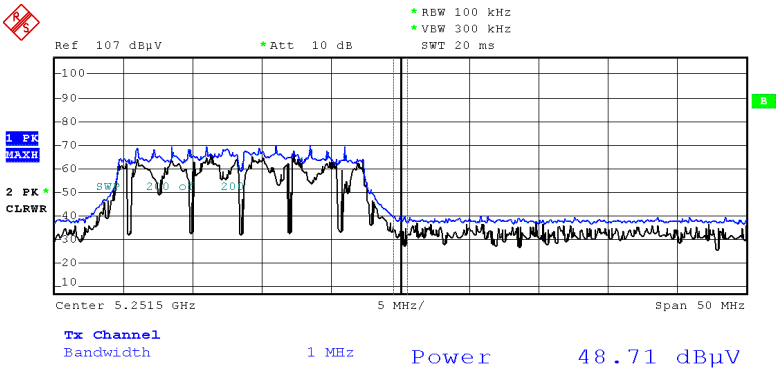
▣ Test Plots(UNII 1)(Y-V)

Peak Reading (802.11 n_HT20, Ch.48)_ 5250 MHz - 5251 MHz



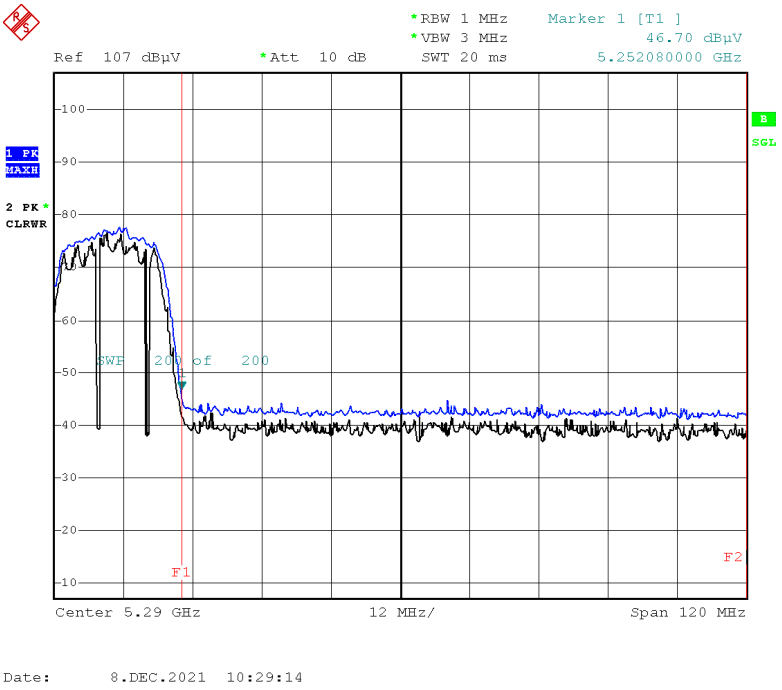
Date: 8.DEC.2021 10:30:26

Peak Reading (802.11 n_HT20, Ch.48)_ 5251 MHz - 5252 MHz



Date: 8.DEC.2021 10:31:26

Peak Reading (802.11 n_HT20, Ch.48)_ 5252 MHz - 5350 MHz

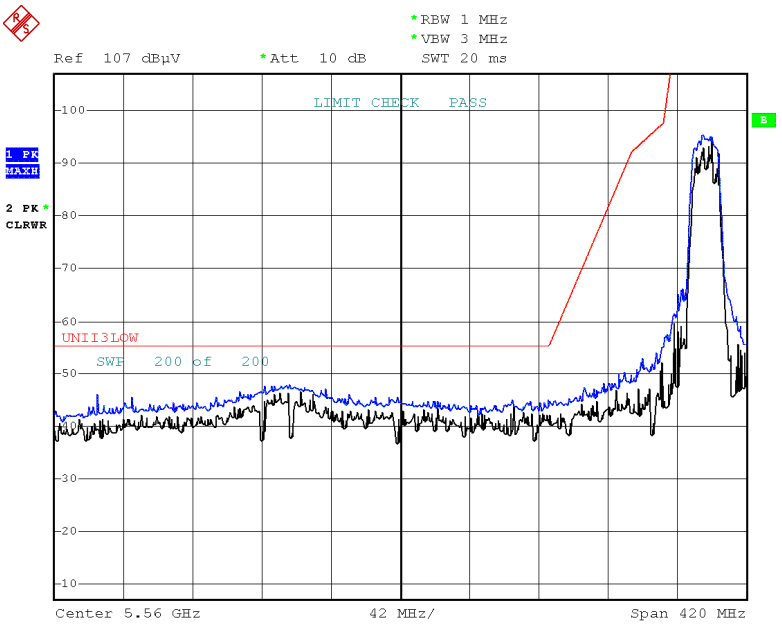


Note:

Only the worst case plots for Radiated Restricted Band Edge.

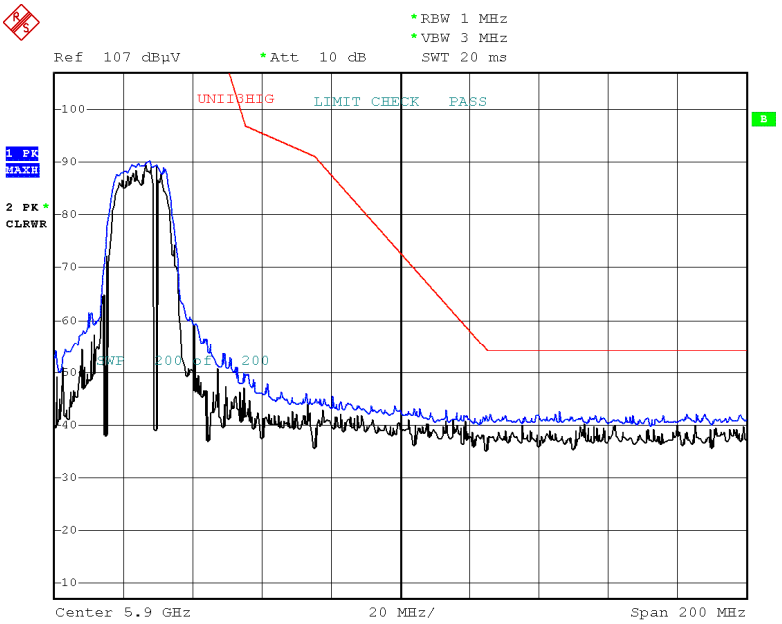
▣ Test Plots(UNII 3)

Peak Reading (802.11a)_Low



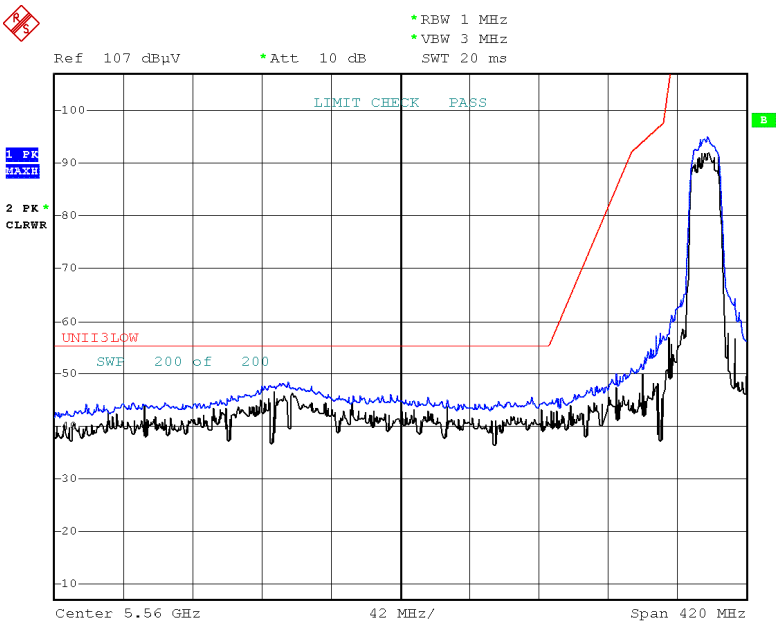
Date: 9.DEC.2021 16:49:35

Peak Reading (802.11a)_High



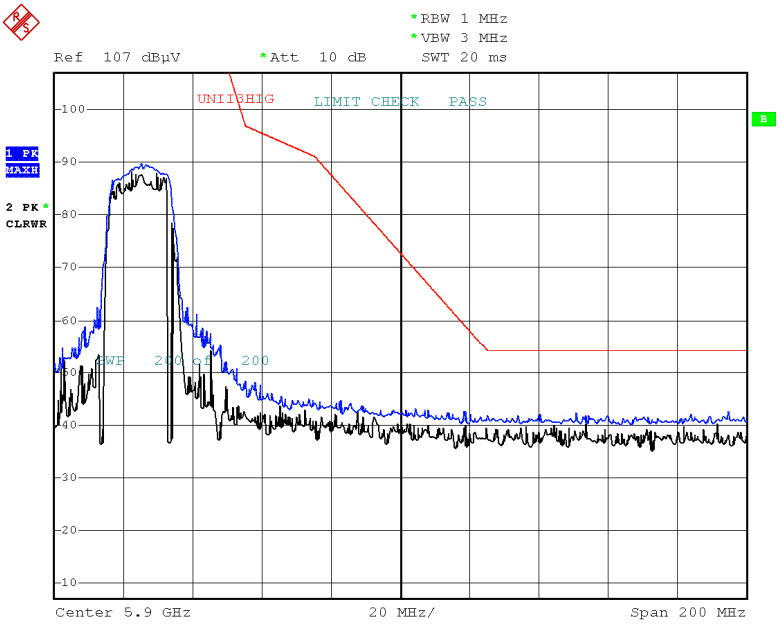
Date: 9.DEC.2021 16:37:55

Peak Reading (802.11n_HT20)_Low



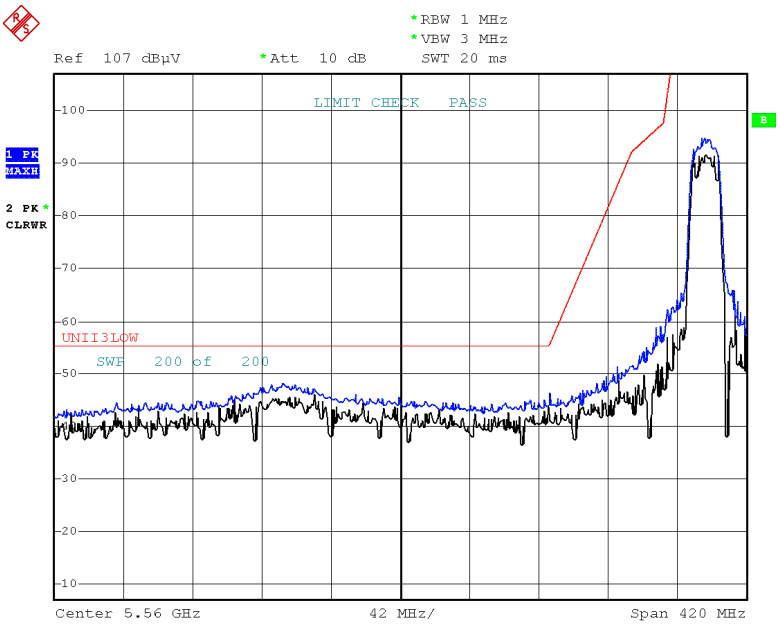
Date: 9.DEC.2021 16:50:48

Peak Reading (802.11n_HT20)_High



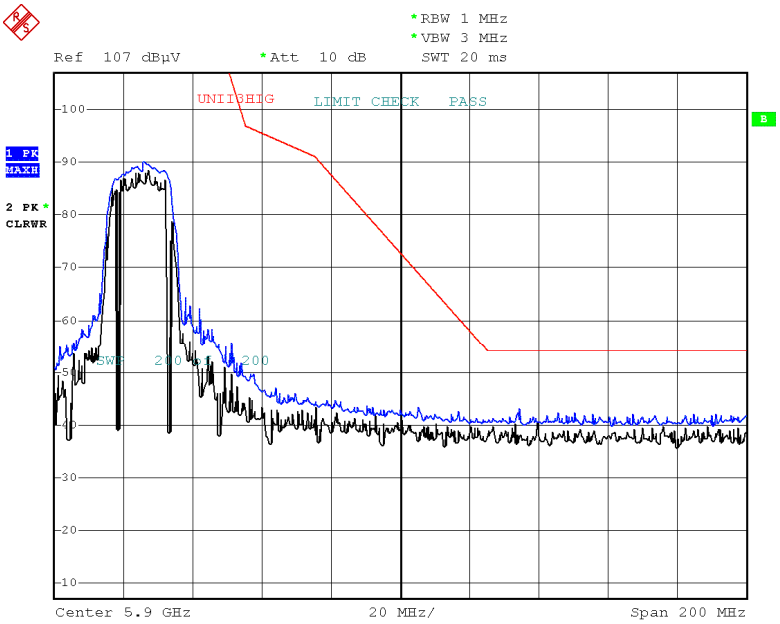
Date: 9.DEC.2021 16:39:20

Peak Reading (802.11ac_VHT20)_Low



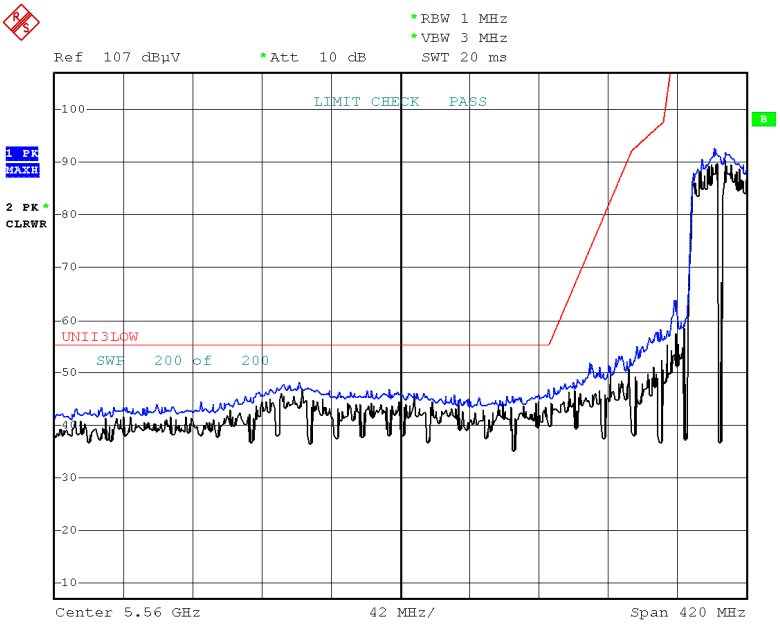
Date: 9.DEC.2021 16:51:40

Peak Reading (802.11ac_VHT20)_High



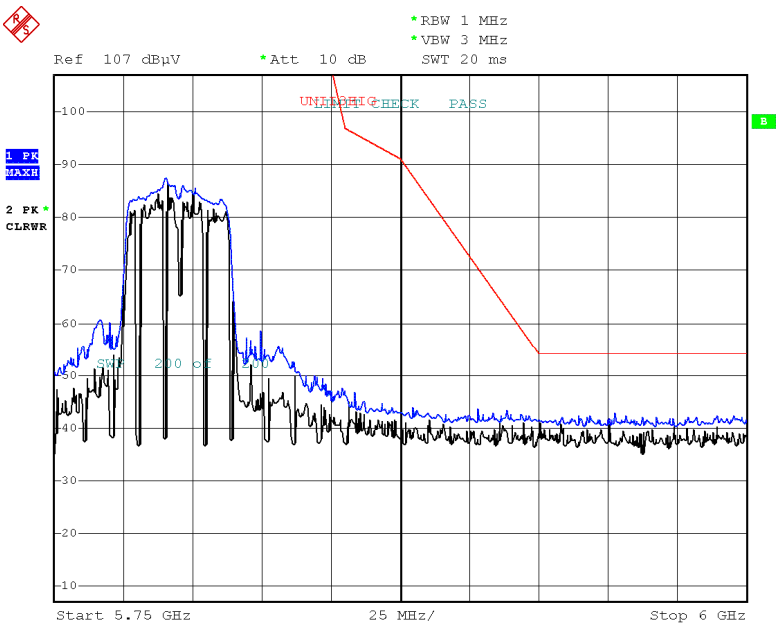
Date: 9.DEC.2021 16:40:07

Peak Reading (802.11n_HT40)_Low



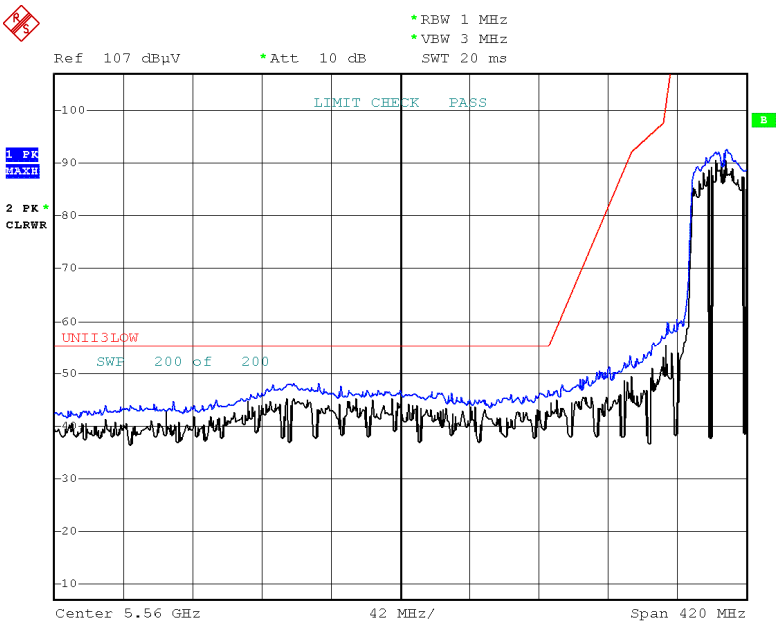
Date: 9.DEC.2021 16:52:27

Peak Reading (802.11n_HT40)_High



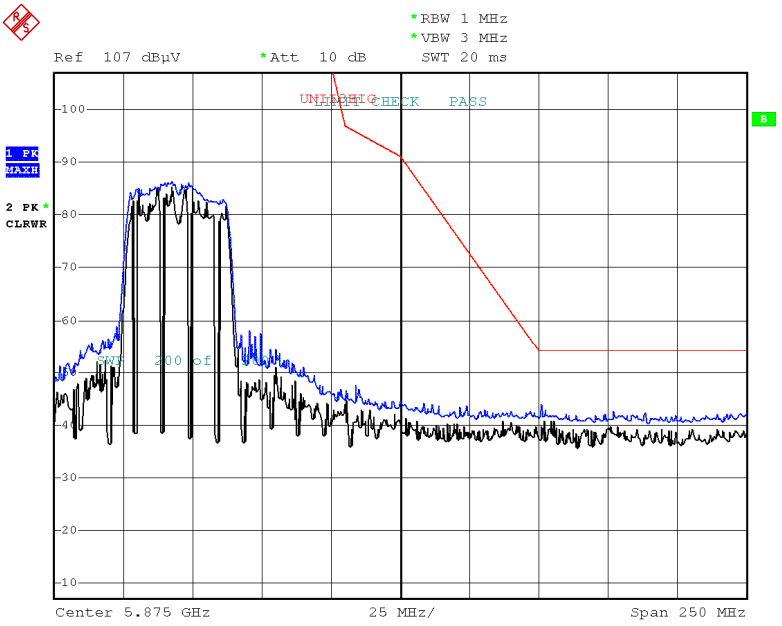
Date: 9.DEC.2021 16:41:33

Peak Reading (802.11ac_VHT40)_Low



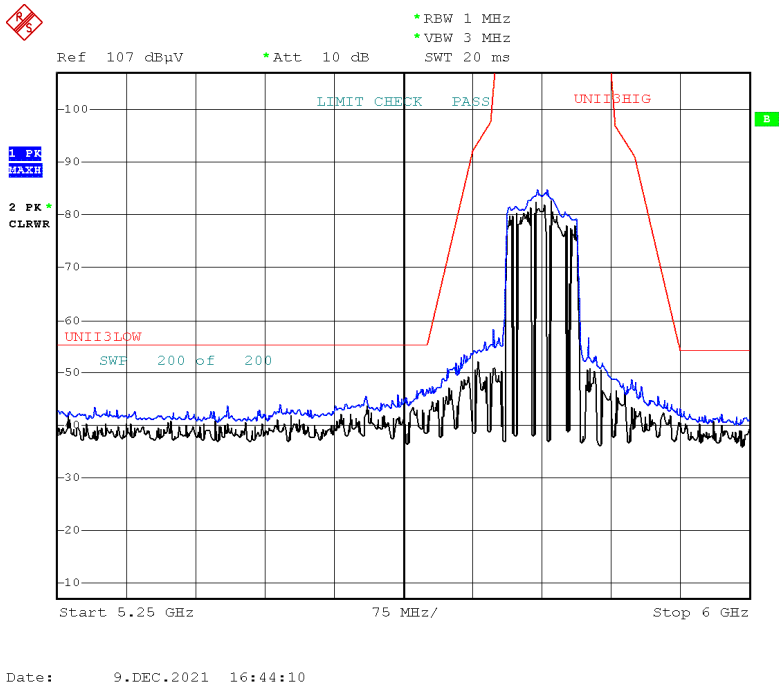
Date: 9.DEC.2021 16:54:11

Peak Reading (802.11ac_VHT40)_High



Date: 9.DEC.2021 16:42:41

Peak Reading (802.11ac_VHT80)



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.

10.9 RECEIVER SPURIOUS EMISSIONS

Frequency Range : Below 1 GHz

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

Note:

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

Frequency Range : Above 1 GHz

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

11. LIST OF TEST EQUIPMENT

Conducted Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
LISN	ENV216	Rohde & Schwarz	102245	08/23/2022	Annual
Test Receiver	ESCI	Rohde & Schwarz	100033	06/15/2022	Annual
Temperature Chamber	SU-642	ESPAC	0093008124	03/15/2022	Annual
Signal Analyzer	N9020A	Agilent	MY47380318	01/28/2022	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	01/11/2022	Annual
Power Meter	N1911A	Agilent	MY45100523	04/08/2022	Annual
Power Sensor	N1921A	Agilent	MY57820067	04/08/2022	Annual
Directional Coupler	87300B	Agilent	3116A03621	11/02/2022	Annual
Power Splitter	11667B	Hewlett Packard	05001	05/20/2022	Annual
DC Power Supply	E3632A	Hewlett Packard	KR75303960	06/10/2022	Annual
Attenuator	5910-N-50-010	H+S	00801	10/29/2022	Annual
Software	EMC32	Rohde & Schwarz	N/A	N/A	N/A
FCC WLAN&BT&BLE Conducted Test Software v3.0	FCC WLAN&BT&BLE Conducted Test Software v3.0	HCT CO., LTD.	N/A	N/A	N/A
Bluetooth Tester	CBT	Rohde & Schwarz	100422	05/04/2022	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.

Radiated Test

Equipment	Model	Manufacturer	Serial No.	Due to Calibration	Calibration Interval
Controller (Antenna mast)	CO3000	Innco system	CO3000-4p	N/A	N/A
Antenna Position Tower	MA4640/800-XP-EP	Innco system	N/A	N/A	N/A
Controller	2090	Emco	060520	N/A	N/A
Turn Table	Turn Table	Ets	N/A	N/A	N/A
Loop Antenna	Loop Antenna	Rohde & Schwarz	1513-333	03/19/2022	Biennial
Hybrid Antenna	VULB 9168	Schwarzbeck	9168-0895	09/04/2022	Biennial
Horn Antenna	BBHA 9120D	Schwarzbeck	9120D-1191	11/18/2023	Biennial
Horn Antenna (15 GHz ~ 40 GHz)	BBHA9170	Schwarzbeck	BBHA9170541	11/16/2023	Biennial
Spectrum Analyzer	FSP (9 kHz ~ 30 GHz)	Rohde & Schwarz	836650/016	09/13/2022	Annual
Spectrum Analyzer	FSV40-N	Rohde & Schwarz	101068-SZ	09/15/2022	Annual
Band Reject Filter	WRCJV2400/2483.5-2370/2520-60/12SS	Wainwright Instruments	2	01/06/2022	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	02/08/2022	Annual
Attenuator 56-10	CBLU1183540B-01 56-10	CERNEX WEINSCHEL	N/A	12/23/2021	Annual
Broadband Low Noise Amplifier Attenuator (3 dB)	CBL06185030 18B-03	CERNEX Api tech.	N/A	12/23/2021	Annual
High Pass Filter	WHKX10-2700-3000-18000-40SS	Wainwright Instruments	N/A	12/23/2021	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	N/A	12/23/2021	Annual
Thru	COAXIAL ATTENUATOR	T&M SYSTEM	N/A	12/23/2021	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/23/2022	Annual
Bluetooth Tester	TC-3000C	TESCOM	3000C000276	03/09/2022	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-2112-FI006-P