

TEST REPORT

FCC/ISED UNII Test for VT231SNAN&VT231SNKN

APPLICANT
HYUNDAI MOBIS CO., LTD.

REPORT NO.
HCT-RF-2202-FI001

DATE OF ISSUE
February 11, 2022

Tested by
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**TEST
REPORT**

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VT231SNKN

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Additional Model
-

Applicant **HYUNDAI MOBIS CO., LTD.**
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Eut Type CAR AUDIO SYSTEM
FCC Model Name VT231SNAN
ISED Model Name VT231SNKN

FCC ID TQ8-VT231SNAN
IC 5074A-VT231SNKN

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	February 11, 2022	Initial Release

Engineering Statement:

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

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

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1. GENERAL INFORMATION

EUT DESCRIPTION

FCC Model	VT231SNAN	
ISED Model	VT231SNKN	
FCC Additional Model	-	
ISED Additional Model	-	
EUT Type	CAR AUDIO SYSTEM	
Power Supply	DC 9 V ~ 16 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20 MHz BW : 5180 - 5240 40 MHz BW : 5190 - 5230 80 MHz BW : 5210
	U-NII-2A	20 MHz BW : 5260 - 5320 40 MHz BW : 5270 - 5310 80 MHz BW : 5290
	U-NII-2C	20 MHz BW : 5500 - 5720 40 MHz BW : 5510 - 5710 80 MHz BW : 5530 - 5690
	U-NII-3	20 MHz BW : 5745 - 5825 40 MHz BW : 5755 - 5795 80 MHz BW : 5775
Antenna Specification	Antenna type: Wi-Fi Dual Band Antenna Peak Gain : UNII-1: 0.59 dBi, UNII-2A: 2.00 dBi UNII-2C: 4.58 dBi, UNII-3: 4.19 dBi	
Straddle channel	Supported	
TDWR Band	Not Supported	
Dynamic Frequency Selection	Slave without radar detection	
Date(s) of Tests	January 03, 2022 ~ February 11, 2022	
PMN (Product Marketing Number)	VT231SNKN	
HVIN (Hardware Version Identification Number)	VT231SNKN	
FVIN (Firmware Version Identification Number)	QX_23. USA.0000.V041.001.210914	
HMN (Host Marketing Name)	N/A	
EUT serial numbers	Conducted : 96560-K2370MDD (FCC), 96560-K2360MDD (ISED) Radiated : 96560-K2370MDD (FCC), 96560-K2360MDD (ISED)	

2. MAXIMUM OUTPUT POWER

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

Band	Mode	RF Output Power (dBm)	RF Output Power (W)
UNII-1	802.11a	9.32	0.009
	802.11n (HT20)	9.08	0.008
	802.11n (HT40)	4.62	0.003
	802.11ac (VHT20)	9.02	0.008
	802.11ac (VHT40)	4.65	0.003
	802.11ac (VHT80)	4.16	0.003
UNII-2A	802.11a	8.97	0.008
	802.11n (HT20)	8.83	0.008
	802.11n (HT40)	8.40	0.007
	802.11ac (VHT20)	8.95	0.008
	802.11ac (VHT40)	8.47	0.007
	802.11ac (VHT80)	7.21	0.005
UNII-2C	802.11a	8.09	0.006
	802.11n (HT20)	7.97	0.006
	802.11n (HT40)	6.78	0.005
	802.11ac (VHT20)	7.85	0.006
	802.11ac (VHT40)	6.98	0.005
	802.11ac (VHT80)	7.05	0.005
UNII-3	802.11a	7.98	0.006
	802.11n (HT20)	8.01	0.006
	802.11n (HT40)	7.10	0.005
	802.11ac (VHT20)	7.94	0.006
	802.11ac (VHT40)	7.23	0.005
	802.11ac (VHT80)	6.97	0.005

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.

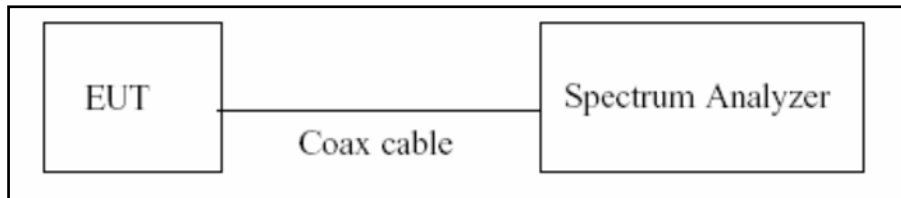
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance

Parameter	Expanded Uncertainty (\pm 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.

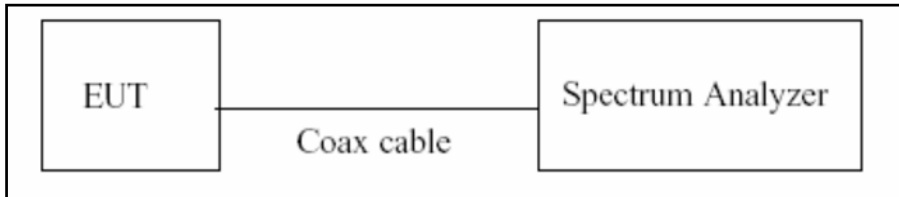
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz (\geq RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on} / T_{total} and Duty Cycle Factor = $10\log(1/\text{Duty Cycle})$

8.2. 6 dB Bandwidth & 26 dB Bandwidth & 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 \geq 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 level measured in the fundamental emission.

Note:

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

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

Test Procedure (99 % Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW \cong 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

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

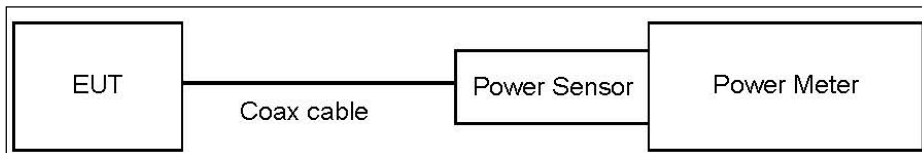
8.3. Output Power Measurement

Limit

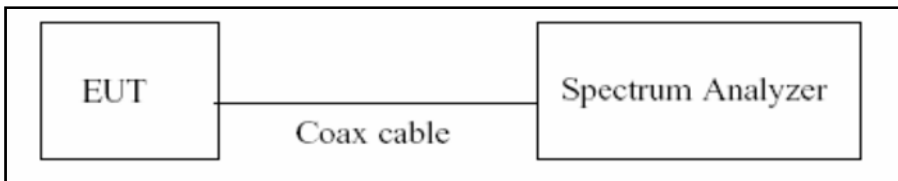
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30 dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 2A, 2C	Not exceed the lesser of 250 mW or 11 dBm + 10 log B, (where B is the 26 dB emission bandwidth in megahertz.)
UNII 3	Not exceed 1 W(= 30 dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

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

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

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

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

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

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

Sample Calculation

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

Note

1. Spectrum reading values are not plot data.

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

2. Spectrum offset = Attenuator loss(20 dB) + Cable loss

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

Band	Loss(dB)
UNII 1	22.07
UNII 2A	22.07
UNII 2C	22.07
UNII 3	22.07

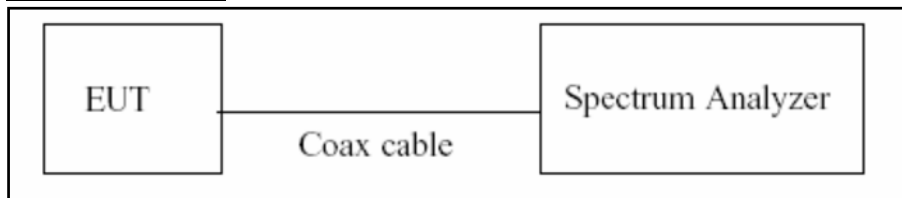
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

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

Test Configuration



Test Procedure

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

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

Sample Calculation

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

Note

1. Spectrum reading values are not plot data.

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

2. Spectrum offset = Attenuator loss(20 dB) + Cable loss

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

Band	Loss(dB)
UNII 1	22.07
UNII 2A	22.07
UNII 2C	22.07
UNII 3	22.07

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

8.5. Radiated Test

Limit

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

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

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

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

FCC

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

ISED

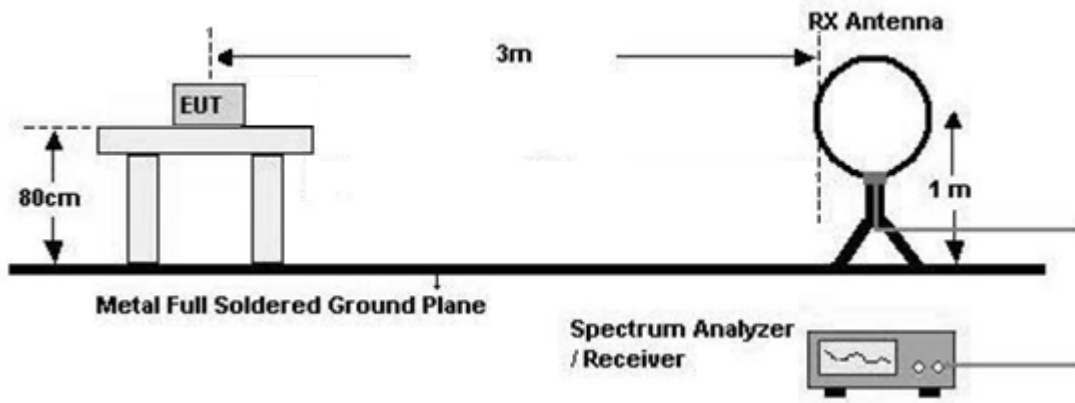
Frequency (MHz)	Field Strength (μ A/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC&ISED

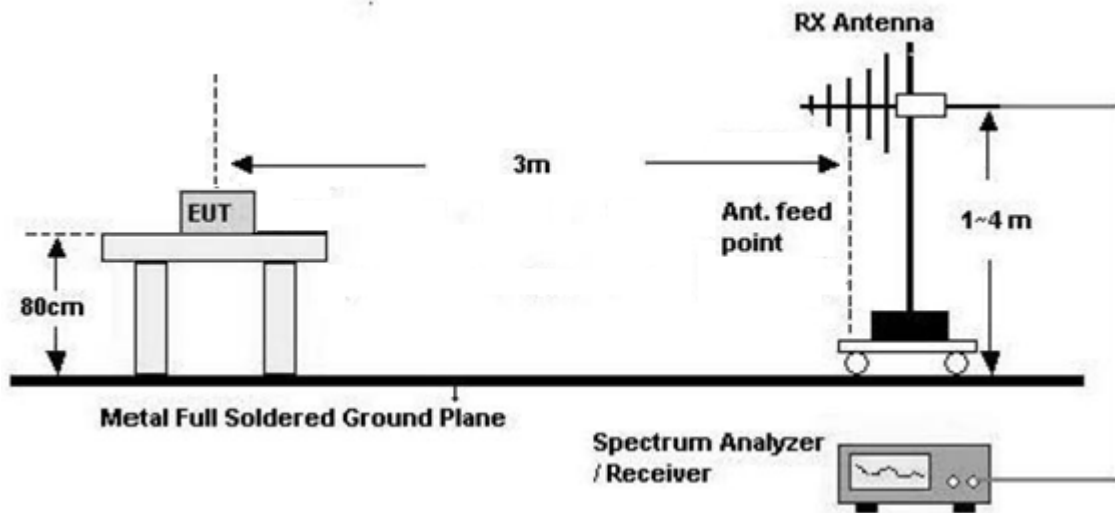
Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

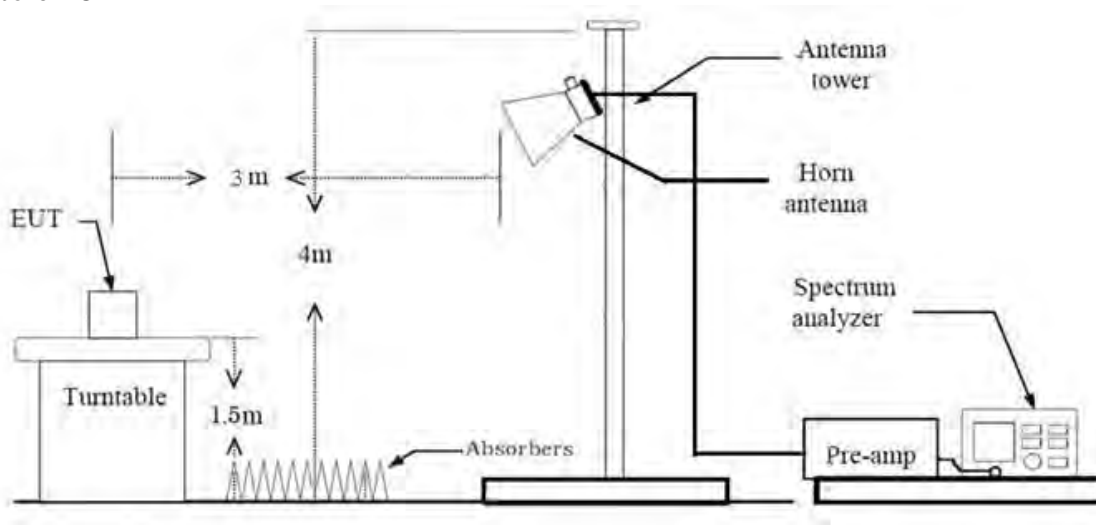
Below 30 MHz



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) = $40\log(3\text{ m}/300\text{ m}) = -80\text{ dB}$
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$
Measurement Distance : 3 m
8. Spectrum Setting
 - Frequency Range = 9 kHz ~ 30 MHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 9 kHz
 - VBW $\geq 3 \times$ RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)
10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions(Below 1 GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8 m above ground plane.
3. The Hybrid antenna was placed at a location 3 m from the EUT, which is varied from 1 m to 4 m to find out the highest emissions.
4. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Spectrum Setting
 - (1) Measurement Type(Peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Peak
 - Trace = Maxhold
 - RBW = 100 kHz
 - VBW \geq 3 x RBW
 - (2) Measurement Type(Quasi-peak):
 - Measured Frequency Range : 30 MHz – 1 GHz
 - Detector = Quasi-Peak
 - RBW = 120 kHz
- ※In general, (1) is used mainly
7. Total = 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 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.

8. Spectrum Setting

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

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

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

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

- RBW = 1 MHz
- VBW \geq 3 MHz
- The analyzer is set to linear detector mode.
- Averaging type = power (*i.e.*, RMS)
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- If a specific emission is demonstrated to be continuous (100 % duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.

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

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1 m to 4 m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
 - (1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):
 - RBW = 1 MHz
 - VBW \geq 3 MHz
 - Detector = Peak
 - Sweep Time = auto
 - Trace mode = max hold
 - Allow sweeps to continue until the trace stabilizes.
Note that if the transmission is not continuous, the time required for the trace to stabilize will increase by a factor of approximately $1/x$, where x is the duty cycle.
 - (2) Measurement Type (Average, G.6.c in KDB 789033 v02r01):
 - RBW = 1 MHz
 - VBW \geq 3 MHz
 - The analyzer is set to linear detector mode.
 - Averaging type = power (*i.e.*, RMS)
 - Sweep time = auto.
 - Trace mode = average (at least 100 traces).
 - If a specific emission is demonstrated to be continuous (100 % duty cycle) rather than turning on and off with the transmit cycle, no duty cycle correction is required for that emission.
9. Measured Frequency Range :
 - 4500 MHz ~ 5150 MHz
 - 5350 MHz ~ 5460 MHz
 - 5460 MHz ~ 5470 MHz

- (75 MHz or more below the 5725 MHz) ~ 5725 MHz
- 5850 MHz ~ (75 MHz or more above the 5850 MHz)
- 10. Distance extrapolation factor = $20\log(\text{test distance} / \text{specific distance})$ (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	0.933	0.301	1000
802.11n(HT20)	MCS 0(6.5)	0.929	0.321	1000
802.11n(HT40)	MCS 0(13.5)	0.868	0.617	2000
802.11ac(VHT20)	MCS 0(6.5)	0.929	0.319	1000
802.11ac(VHT40)	MCS 0(13.5)	0.862	0.645	2000
802.11ac(VHT80)	MCS 0(29.3)	0.767	1.154	4000

8.6. Receiver Spurious Emissions

Limit

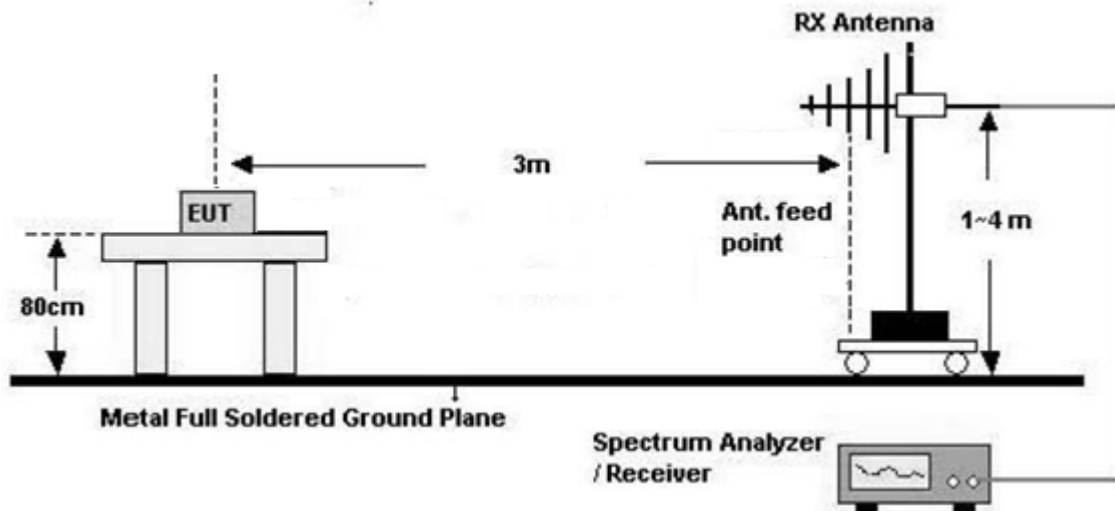
Frequency (MHz)	Field Strength ($\mu\text{V}/\text{m}$)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

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

Test Configuration

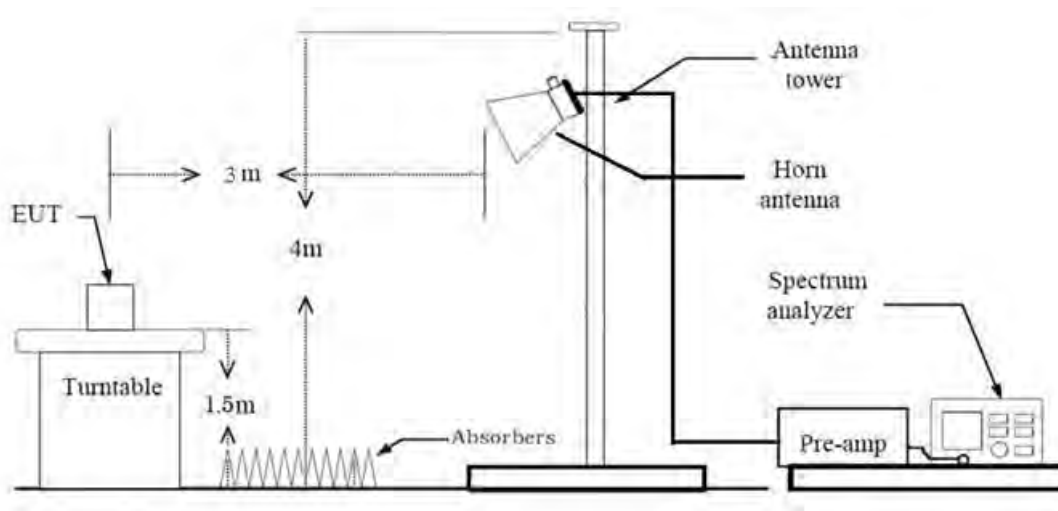
30 MHz - 1 GHz



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 $\geq 3 \times$ 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 \geq 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 $\geq 1/\tau$ 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 = $20\log(\text{test distance} / \text{specific distance})$ (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.
 - Mode : Stand alone , Stand alone + Shark Antenna
 - Mode : Stand alone + Shark Antenna
2. EUT Axis
 - Radiated Spurious Emissions : X
 - Radiated Restricted Band Edge : X
3. All datarate of operation were investigated and the worst case datarate results are reported
 - 802.11a : 6Mbps
 - 802.11n_HT20 : MCS0
 - 802.11n_HT40 : MCS0
 - 802.11ac_VHT20 : MCS0
 - 802.11ac_VHT40 : MCS0
 - 802.11ac_VHT80 : MCS0
4. Radiated Spurious Emission
 - All modulation of operation were investigated and the worst case modulation results are reported.
(Worstcase : 802.11a_6 Mbps)
5. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
 - Position : Horizontal, Vertical, Parallel to the ground plane

AC Power line Conducted Emissions

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

Conducted test

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

9. SUMMARY OF TEST RESULTS

FCC

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
26 dB Bandwidth	§ 15.407 (for Power Measurement)	N/A	Conducted	PASS
6 dB Bandwidth	§ 15.407(e)	>500 kHz (5725-5850 MHz)		PASS
Maximum Conducted Output Power	§ 15.407(a)(1),(2),(3)	< 250 mW(5150-5250 MHz) < 250 mW or 11+10log ₁₀ (BW) dBm (5250-5350 MHz) < 250 mW or 11+10log ₁₀ (BW) dBm (5470-5725 MHz) <1 W(5725-5850 MHz)		PASS
Peak Power Spectral Density	§ 15.407(a)(1),(2),(3)	<11 dBm/ MHz (5150-5250 MHz) <11 dBm/ MHz (5250-5350 MHz) <11 dBm/ MHz (5470-5725 MHz) <30 dBm/500 kHz(5725-5850 MHz)	Radiated	PASS
AC Conducted Emissions 150 kHz-30 MHz	§ 15.207 § 15.407(b)(8)	<FCC 15.207 limits		N/A (#Note1)
Undesirable Emissions	§ 15.407(b) (1)(2)(3)(4)	<-27 dBm/MHz EIRP (UNII1, 2A, 2C) cf. Section 8.7 (UNII 3)		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		PASS	
6 dB Bandwidth	RSS-247, 6.2.4.1	> 500 kHz (5725~5850 MHz)		PASS	
Maximum Conducted Output Power,	RSS-247, 6.2	< 250 mW or $11+10 \log_{10}$ (BW) dBm (5470-5600, 5650-5725 MHz) Whichever power is less	CONDUCTED	PASS	
	RSS-247, 6.2.4.1	< 1 W (5725-5850 MHz)			
Maximum e.i.r.p	RSS-247, 6.2	< 30 mW or $1.76+10 \log_{10}$ (BW) dBm (5150-5250 MHz) < 30 mW or $1.76+10 \log_{10}$ (BW) dBm (5250-5350 MHz) < 1 W or $17+10 \log_{10}$ (BW) dBm (5470-5725 MHz) Whichever power is less		PASS	
		RSS-247 6.2			< 10 dBm/ MHz(e.i.r.p.) (5150-5250 MHz) < 11 dBm/MHz(Conducted) (5250-5350 MHz, 5470-5600 MHz, 5650-5725 MHz)
Power Spectral Density	RSS-247, 6.2.4.1	< 30 dBm/500 kHz(Conducted) (5725-5850 MHz)		PASS	
	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)		RADIATED	PASS
	RSS-247, 6.2	< -27 dBm/ MHz EIRP (5150-5350 MHz, 5470-5725 MHz)			PASS
	RSS-247, 6.2.4.2	cf. Section 9.8.1 (UNII 3)			PASS
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	1.429	1.531	0.933	0.301
	9	0.960	1.061	0.905	0.436
	12	0.724	0.825	0.877	0.569
	18	0.491	0.593	0.828	0.819
	24	0.373	0.474	0.786	1.044
	36	0.256	0.358	0.716	1.452
	48	0.196	0.298	0.659	1.814
	54	0.180	0.282	0.639	1.944

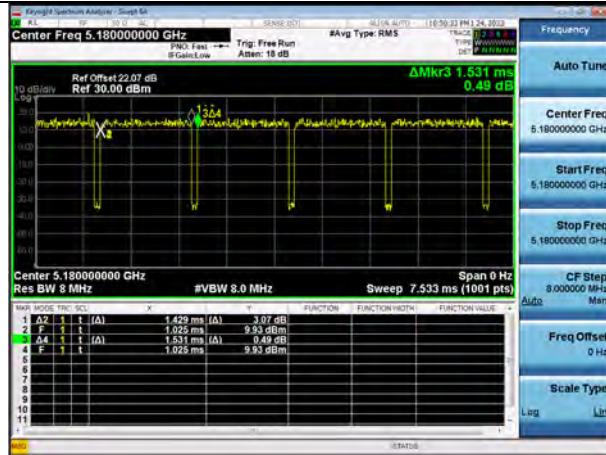
Mode	MCS Index	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.336	1.438	0.929	0.321
	1	0.688	0.790	0.871	0.600
	2	0.472	0.574	0.822	0.850
	3	0.364	0.466	0.782	1.069
	4	0.256	0.357	0.717	1.444
	5	0.200	0.302	0.663	1.784
	6	0.184	0.286	0.644	1.910
	7	0.168	0.270	0.623	2.054
802.11n (HT40)	0	0.663	0.765	0.868	0.617
	1	0.353	0.454	0.777	1.095
	2	0.248	0.349	0.711	1.483
	3	0.196	0.297	0.660	1.806
	4	0.144	0.245	0.587	2.312
	5	0.116	0.217	0.534	2.726
	6	0.108	0.209	0.515	2.884
	7	0.100	0.201	0.497	3.040

Mode	MCS Index	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11ac (VHT20)	0	1.344	1.446	0.929	0.319
	1	0.692	0.794	0.872	0.597
	2	0.477	0.578	0.825	0.835
	3	0.368	0.470	0.783	1.060
	4	0.260	0.362	0.721	1.423
	5	0.204	0.305	0.669	1.749
	6	0.188	0.289	0.649	1.880
	7	0.172	0.273	0.629	2.010
	8	0.152	0.253	0.600	2.216
802.11ac (VHT40)	0	0.663	0.769	0.862	0.645
	1	0.356	0.458	0.779	1.085
	2	0.252	0.353	0.714	1.463
	3	0.200	0.301	0.664	1.777
	4	0.148	0.249	0.594	2.261
	5	0.120	0.222	0.542	2.662
	6	0.112	0.214	0.524	2.805
	7	0.104	0.205	0.507	2.949
	8	0.097	0.198	0.488	3.112
	9	0.088	0.189	0.465	3.322
802.11ac (VHT80)	0	0.332	0.434	0.767	1.154
	1	0.188	0.289	0.651	1.867
	2	0.140	0.242	0.579	2.370
	3	0.112	0.217	0.514	2.892
	4	0.092	0.193	0.474	3.243
	5	0.080	0.182	0.438	3.582
	6	0.076	0.177	0.428	3.681
	7	0.072	0.173	0.415	3.815
	8	0.068	0.169	0.403	3.948
	9	0.064	0.165	0.388	4.113

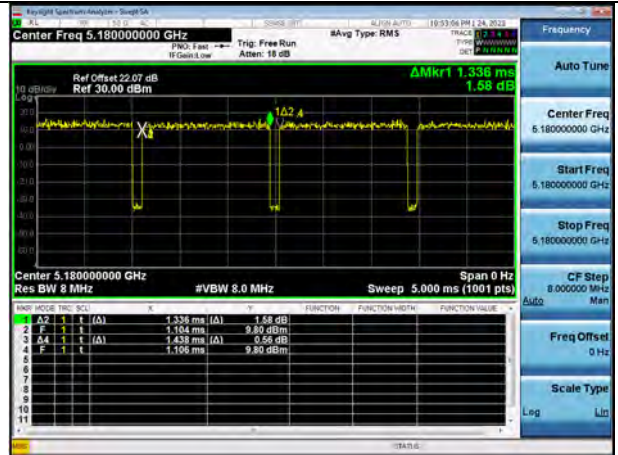
Note:

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

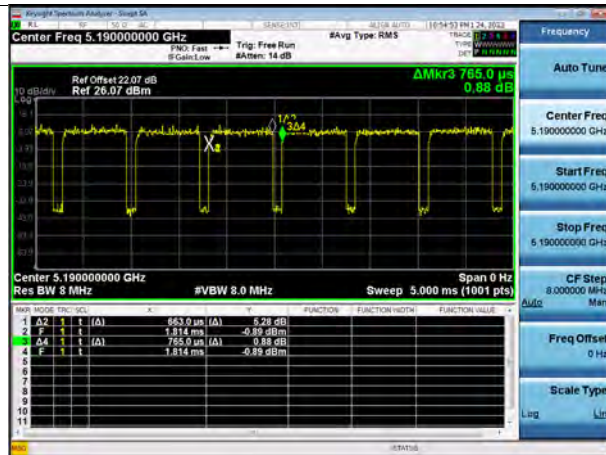
802.11a



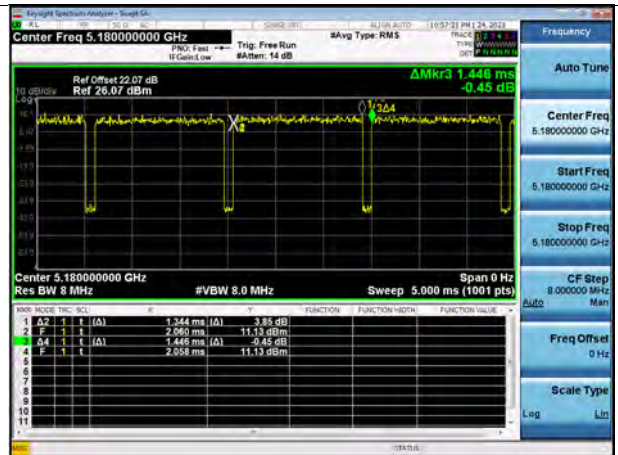
802.11n(HT20)



802.11n(HT40)



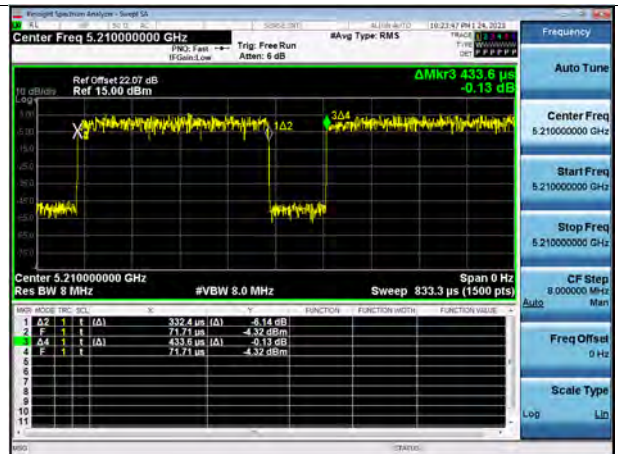
802.11ac(VHT20)



802.11ac(VHT40)



802.11ac(VHT80)



10.2 26 dB BANDWIDTH & 99 % BANDWIDTH

FCC

802.11a Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.22	16.886
5200	40	20.80	16.830
5240	48	21.19	16.861
5260	52	21.00	16.857
5300	60	21.42	16.804
5320	64	20.91	16.845
5500	100	21.45	16.885
5580	116	21.36	16.848
5720	144	21.11	16.843
5745	149	21.03	16.852
5785	157	21.32	16.837
5825	165	21.27	16.869

802.11n(HT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.33	17.878
5200	40	21.48	17.898
5240	48	21.59	17.932
5260	52	21.67	17.966
5300	60	21.48	17.857
5320	64	21.49	17.915
5500	100	21.55	17.964
5580	116	21.52	17.858
5720	144	21.36	17.861
5745	149	21.53	17.880
5785	157	21.40	17.938
5825	165	21.46	17.923

802.11n(HT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.25	36.007
5230	46	39.51	36.178
5270	54	39.68	36.082
5310	62	39.43	36.133
5510	102	39.92	36.217
5550	110	39.53	36.025
5710	142	39.53	36.103
5755	151	39.52	36.175
5795	159	39.52	36.070

802.11ac(VHT20) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.53	17.911
5200	40	21.40	17.795
5240	48	21.39	17.947
5260	52	21.55	17.892
5300	60	21.39	17.870
5320	64	21.76	17.892
5500	100	21.63	17.840
5580	116	21.56	17.900
5720	144	21.44	17.934
5745	149	21.57	17.925
5785	157	21.67	17.956
5825	165	21.45	17.899

802.11ac(VHT40) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.44	36.075
5230	46	39.68	36.197
5270	54	39.54	36.110
5310	62	39.43	36.135
5510	102	39.73	36.219
5550	110	39.39	36.124
5710	142	39.72	36.144
5755	151	39.91	36.159
5795	159	39.47	36.071

802.11ac(VHT80) Mode		26 dB Bandwidth [MHz]	99 % bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	81.32	75.327
5290	58	81.07	75.157
5530	106	81.88	75.786
5690	138	81.42	75.532
5775	155	82.45	75.497

▣ Test Plots(802.11a)

Note:

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

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



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



802.11a UNII 2C BAND 26 dB Bandwidth (CH100)



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



▣ Test Plots(802.11n(HT20))

Note:

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

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



802.11n_HT20 UNII 2A BAND 26 dB Bandwidth(CH 52)



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



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



▣ Test Plots(802.11n(HT40))

Note:

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

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



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



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



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



▣ Test Plots(802.11ac(VHT20))

Note:

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

802.11ac_VHT20 UNII 1 BAND 26 dB Bandwidth(CH 36)



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



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



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



▣ Test Plots(802.11ac(VHT40))

Note:

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

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



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



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



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



▣ Test Plots(802.11ac(VHT80))

Note:

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

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



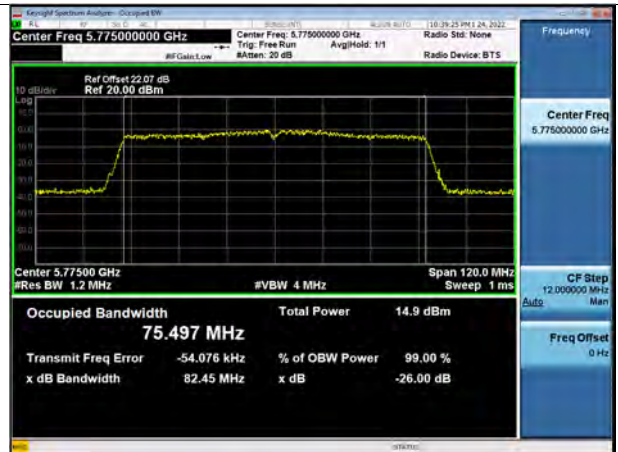
802.11ac_VHT80 UNII 2A BAND 26 dB Bandwidth (CH 58)



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



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



99 % bandwidth UNII-3 (ISED)

802.11a Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	17.148
5200	40	17.197
5240	48	17.232
5260	52	17.243
5300	60	17.147
5320	64	17.199
5500	100	17.207
5580	116	17.167
5720	144	17.180
5745	149	17.223
5785	157	17.160
5825	165	17.210

802.11n(HT20) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	18.145
5200	40	18.172
5240	48	18.220
5260	52	18.159
5300	60	18.120
5320	64	18.240
5500	100	18.211
5580	116	18.165
5720	144	18.205
5745	149	18.162
5785	157	18.150
5825	165	18.197

802.11n(HT40) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.142
5230	46	36.444
5270	54	36.222
5310	62	36.214
5510	102	36.384
5550	110	36.205
5710	142	36.252
5755	151	36.356
5795	159	36.299

802.11ac(VHT20) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5180	36	18.145
5200	40	18.126
5240	48	18.199
5260	52	18.221
5300	60	18.150
5320	64	18.159
5500	100	18.085
5580	116	18.149
5720	144	18.129
5745	149	18.146
5785	157	18.162
5825	165	18.167

802.11ac(VHT40) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5190	38	36.150
5230	46	36.353
5270	54	36.266
5310	62	36.250
5510	102	36.434
5550	110	36.141
5710	142	36.229
5755	151	36.285
5795	159	36.193

802.11ac(VHT80) Mode		99 % bandwidth [MHz]
Frequency [MHz]	Channel No.	
5210	42	75.500
5290	58	75.417
5530	106	75.852
5690	138	75.851
5775	155	75.880

▣ Test Plots(802.11a)

Note:

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

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



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



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



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



▣ Test Plots(802.11n(HT40))

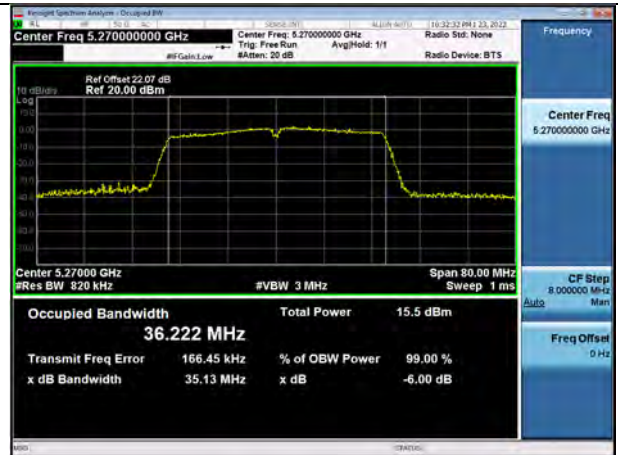
Note:

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

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



802.11n_HT40 UNII 2A BAND 99 % Bandwidth (CH 54)



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



802.11n_HT40 UNII 3 BAND 99 % Bandwidth (CH 151)

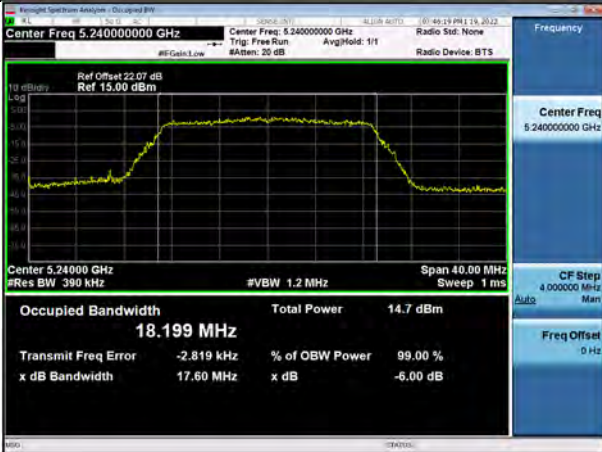


▣ Test Plots(802.11ac(VHT20))

Note:

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

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



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



802.11ac_VHT20 UNII 2C BAND 99 % Bandwidth(CH 116)



802.11ac_VHT20 UNII 3 BAND 99 % Bandwidth(CH 165)



▣ Test Plots(802.11ac(VHT40))

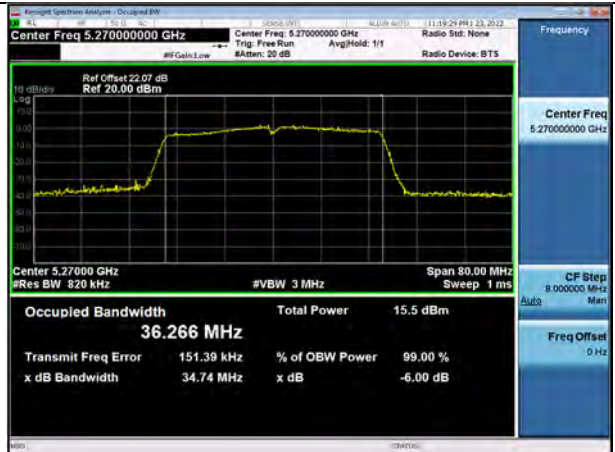
Note:

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

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



802.11ac_VHT40 UNII 2A BAND 99 % Bandwidth (CH 54)



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



802.11ac_VHT40 UNII 3 BAND 99 % Bandwidth (CH 151)



▣ Test Plots(802.11ac(VHT80))

Note:

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

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



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



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



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



10.3 6 DB BANDWIDTH

802.11a Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	16.38	> 0.5	Pass
5785	157	16.35	> 0.5	Pass
5825	165	16.34	> 0.5	Pass

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.60	> 0.5	Pass
5785	157	17.32	> 0.5	Pass
5825	165	17.37	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.60	> 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	17.60	> 0.5	Pass
5785	157	17.57	> 0.5	Pass
5825	165	17.60	> 0.5	Pass

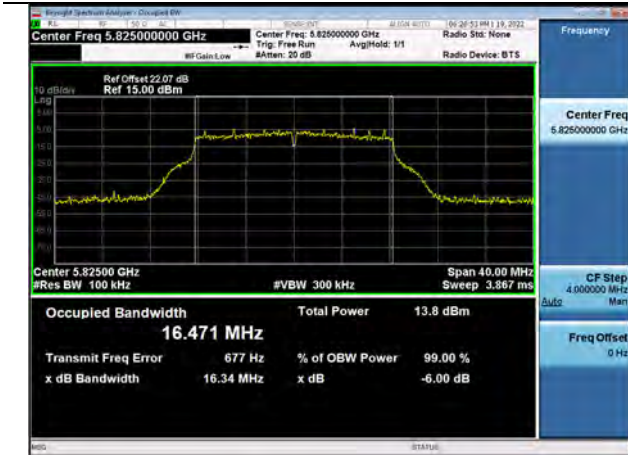
802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.53	> 0.5	Pass
5795	159	35.30	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.33	> 0.5	Pass

Test Plots

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

802.11a (CH.165)



802.11n(HT20) (CH.157)



802.11n(HT40) (CH.159)



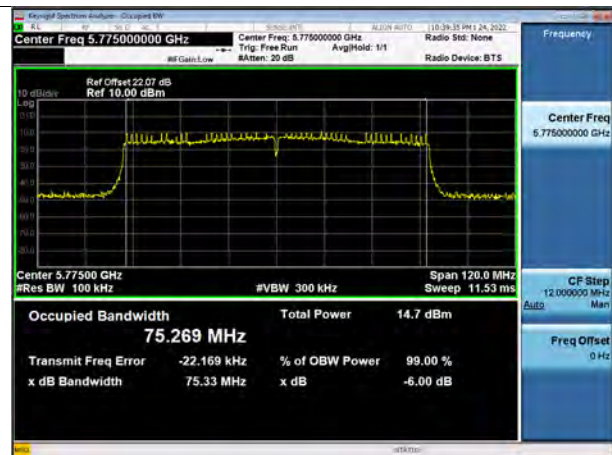
802.11ac(VHT20) (CH.157)



802.11ac(VHT40) (CH.159)



802.11ac(VHT80) (CH.155)



10.4 OUTPUT POWER MEASUREMENT

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

Straddle channel data were added in section 10.7.3.

802.11a Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	8.70	0.30	9.00	0.59	9.59	14.02	23.98
5200	40	9.02	0.30	9.32	0.59	9.91		
5240	48	8.00	0.30	8.30	0.59	8.89		
5260	52	8.20	0.30	8.50	2.00	10.50	14.01	23.25
5300	60	8.67	0.30	8.97	2.00	10.97		
5320	64	8.18	0.30	8.48	2.00	10.48		
5500	100	7.65	0.30	7.95	-	-	23.26	23.26
5580	116	7.79	0.30	8.09	-	-		
5720	144	6.43	0.30	6.73	-	-		
5745	149	7.14	0.30	7.44	-	-	30.00	30.00
5785	157	7.67	0.30	7.98	-	-		
5825	165	6.85	0.30	7.15	-	-		

802.11n(HT20) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	8.59	0.32	8.91	0.59	9.50	14.28	23.98
5200	40	8.76	0.32	9.08	0.59	9.67		
5240	48	7.77	0.32	8.09	0.59	8.68		
5260	52	7.80	0.32	8.12	2.00	10.12	14.28	23.52
5300	60	8.51	0.32	8.83	2.00	10.83		
5320	64	7.90	0.32	8.22	2.00	10.22		
5500	100	7.44	0.32	7.76	-	-	23.52	23.52
5580	116	7.65	0.32	7.97	-	-		
5720	144	6.39	0.32	6.71	-	-		
5745	149	6.78	0.32	7.10	-	-	30.00	30.00
5785	157	7.69	0.32	8.01	-	-		
5825	165	6.77	0.32	7.09	-	-		

802.11ac(VHT20) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5180	36	8.54	0.32	8.86	0.59	9.45	14.26	23.98
5200	40	8.70	0.32	9.02	0.59	9.61		
5240	48	7.74	0.32	8.06	0.59	8.65		
5260	52	7.82	0.32	8.14	2.00	10.14	14.28	23.52
5300	60	8.63	0.32	8.95	2.00	10.95		
5320	64	7.87	0.32	8.19	2.00	10.19		
5500	100	7.53	0.32	7.85	-	-	23.51	23.51
5580	116	7.50	0.32	7.82	-	-		
5720	144	6.35	0.32	6.67	-	-		
5745	149	6.64	0.32	6.96	-	-	30.00	30.00
5785	157	7.62	0.32	7.94	-	-		
5825	165	6.74	0.32	7.06	-	-		

802.11n(HT40) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5190	38	4.00	0.62	4.62	0.59	5.21	14.77	23.98
5230	46	3.25	0.62	3.87	0.59	4.46		
5270	54	7.59	0.62	8.21	2.00	10.21	14.77	23.98
5310	62	7.78	0.62	8.40	2.00	10.40		
5510	102	6.17	0.62	6.78	-	-	23.98	23.98
5550	110	5.87	0.62	6.49	-	-		
5710	142	6.01	0.62	6.63	-	-		
5755	151	6.48	0.62	7.10	-	-	30.00	30.00
5795	159	6.45	0.62	7.06	-	-		

802.11ac(VHT40) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5190	38	4.01	0.64	4.65	0.59	5.24	14.77	23.98
5230	46	3.27	0.64	3.92	0.59	4.51		
5270	54	7.73	0.64	8.38	2.00	10.38	14.77	23.98
5310	62	7.82	0.64	8.47	2.00	10.47		
5510	102	6.34	0.64	6.98	-	-	23.98	23.98
5550	110	6.11	0.64	6.75	-	-		
5710	142	6.07	0.64	6.71	-	-		
5755	151	6.59	0.64	7.23	-	-	30.00	30.00
5795	159	6.43	0.64	7.07	-	-		

802.11ac(VHT80) Mode		Measured Power [dBm]	Duty Cycle Factor [dB]	Total Power [dBm]	Ant Gain [dBi]	EIRP [dBm]	ISED Limit [dBm]	FCC Limit [dBm]
Frequency [MHz]	Channel No.							
5210	42	3.01	1.15	4.16	0.59	4.75	14.77	23.98
5290	58	6.06	1.15	7.21	2.00	9.21	14.77	23.98
5530	106	5.64	1.15	6.79	-	-	23.98	23.98
5690	138	5.90	1.15	7.05	-	-		
5775	155	5.82	1.15	6.97	-	-	30.00	30.00

Note :

FCC&ISED Worst Limit applied

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

10.5 POWER SPECTRAL DENSITY

FCC & ISED

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-1.634	0.301	-1.333	11 dBm/MHz
5200	40	-1.274	0.301	-0.973	
5240	48	-2.086	0.301	-1.785	
5260	52	-2.062	0.301	-1.761	
5300	60	-1.386	0.301	-1.085	
5320	64	-2.127	0.301	-1.826	
5500	100	-2.506	0.301	-2.205	
5580	116	-2.211	0.301	-1.910	
5720	144	-3.761	0.301	-3.460	
5745	149	-5.832	0.301	-5.531	
5785	157	-5.220	0.301	-4.919	
5825	165	-5.979	0.301	-5.678	

802.11n(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-1.979	0.321	-1.658	11 dBm/MHz
5200	40	-1.480	0.321	-1.159	
5240	48	-2.709	0.321	-2.388	
5260	52	-2.615	0.321	-2.294	
5300	60	-1.730	0.321	-1.409	
5320	64	-2.459	0.321	-2.138	
5500	100	-2.664	0.321	-2.343	
5580	116	-2.535	0.321	-2.214	
5720	144	-4.060	0.321	-3.739	
5745	149	-6.333	0.321	-6.012	
5785	157	-5.184	0.321	-4.863	
5825	165	-6.355	0.321	-6.034	

802.11n(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-9.198	0.617	-8.581	11 dBm/MHz
5230	46	-10.026	0.617	-9.409	
5270	54	-5.602	0.617	-4.985	
5310	62	-5.632	0.617	-5.015	
5510	102	-7.125	0.617	-6.508	
5500	110	-7.240	0.617	-6.623	
5710	142	-7.144	0.617	-6.527	
5755	151	-9.559	0.617	-8.942	30 dBm /500 kHz
5795	159	-9.464	0.617	-8.847	

802.11ac(20 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-1.795	0.319	-1.476	11 dBm/MHz
5200	40	-1.591	0.319	-1.272	
5240	48	-2.546	0.319	-2.227	
5260	52	-2.487	0.319	-2.168	
5300	60	-1.575	0.319	-1.256	
5320	64	-2.393	0.319	-2.074	
5500	100	-2.969	0.319	-2.650	
5580	116	-3.040	0.319	-2.721	
5720	144	-4.146	0.319	-3.827	
5745	149	-6.584	0.319	-6.265	30 dBm/500 kHz
5785	157	-5.557	0.319	-5.238	
5825	165	-6.412	0.319	-6.093	

802.11ac(40 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-9.159	0.645	-8.514	11 dBm/MHz
5230	46	-9.920	0.645	-9.275	
5270	54	-5.430	0.645	-4.785	
5310	62	-5.176	0.645	-4.531	
5510	102	-6.864	0.645	-6.219	
5500	110	-6.801	0.645	-6.156	
5710	142	-7.233	0.645	-6.588	30 dBm/500 kHz
5755	151	-9.770	0.645	-9.125	
5795	159	-9.719	0.645	-9.074	

802.11ac(80 MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5210	42	-13.345	1.154	-12.191	11 dBm/MHz
5290	58	-10.076	1.154	-8.922	
5530	106	-10.870	1.154	-9.716	
5690	138	-10.358	1.154	-9.204	
5775	155	-13.438	1.154	-12.284	30 dBm/500 kHz

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

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5180	36	-1.634	0.301	-1.333	0.59	-0.743	10 dBm/MHz
5200	40	-1.274	0.301	-0.973	0.59	-0.383	
5240	48	-2.086	0.301	-1.785	0.59	-1.195	

802.11n(HT20) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5180	36	-1.979	0.321	-1.658	0.59	-1.068	10 dBm/MHz
5200	40	-1.480	0.321	-1.159	0.59	-0.569	
5240	48	-2.709	0.321	-2.388	0.59	-1.798	

802.11n(HT40) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5190	38	-9.198	0.617	-8.581	0.59	-7.991	10 dBm/MHz
5230	46	-10.026	0.617	-9.409	0.59	-8.819	

802.11ac(VHT20) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5180	36	-1.795	0.319	-1.476	0.59	-0.886	10 dBm/MHz
5200	40	-1.591	0.319	-1.272	0.59	-0.682	
5240	48	-2.546	0.319	-2.227	0.59	-1.637	

802.11ac(VHT40)Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5190	38	-9.159	0.645	-8.514	0.59	-7.924	10 dBm/MHz
5230	46	-9.920	0.645	-9.275	0.59	-8.685	

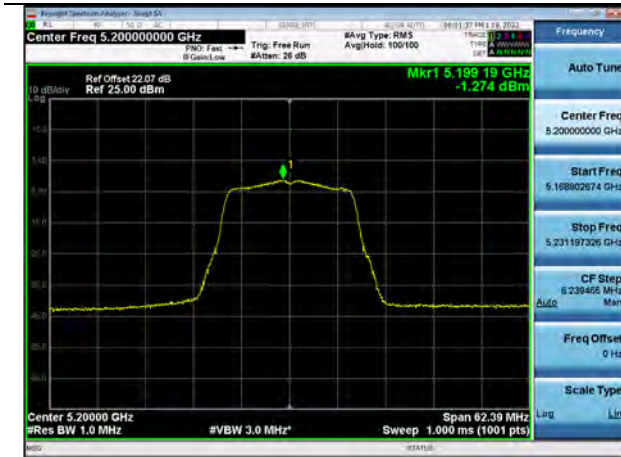
802.11ac(VHT80)Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Ant. Gain (dBi)	EIRP PSD (dBm)	EIRP PSD Limit
Frequency [MHz]	Channel No.						
5210	42	-13.345	1.154	-12.191	0.59	-11.601	10 dBm/MHz

▣ Test Plots(802.11a)

Note:

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

UNII 1 (Ch. 40)



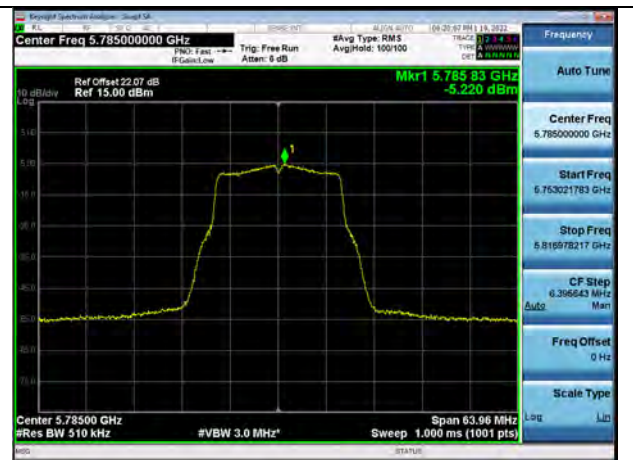
UNII 2A (Ch. 60)



UNII 2C (Ch. 116)



UNII 3 (Ch. 157)

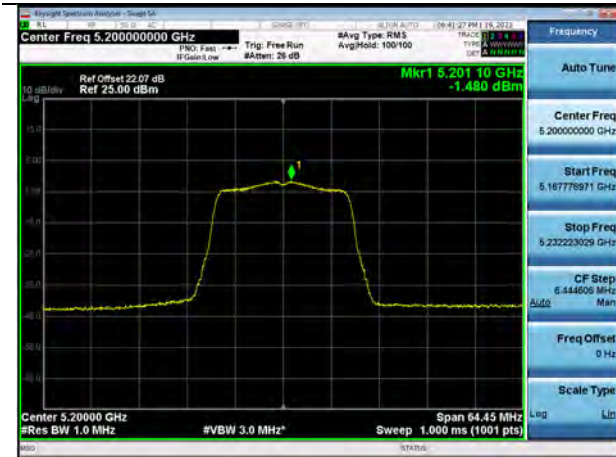


▣ Test Plots(802.11n(HT20))

Note:

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

UNII 1 (Ch. 40)



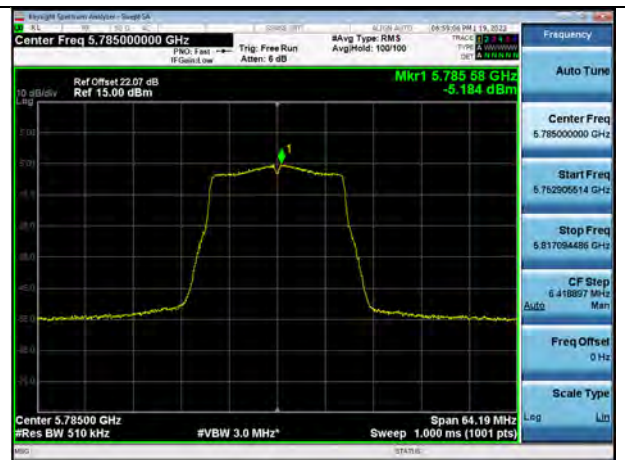
UNII 2A (Ch. 60)



UNII 2C (Ch. 116)



UNII 3 (Ch. 157)



▣ Test Plots(802.11n(HT40))

Note:

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

UNII 1 (Ch. 38)



UNII 2A (Ch. 54)



UNII 2C (Ch. 102)



UNII 3 (Ch. 159)



▣ Test Plots(802.11ac(VHT20))

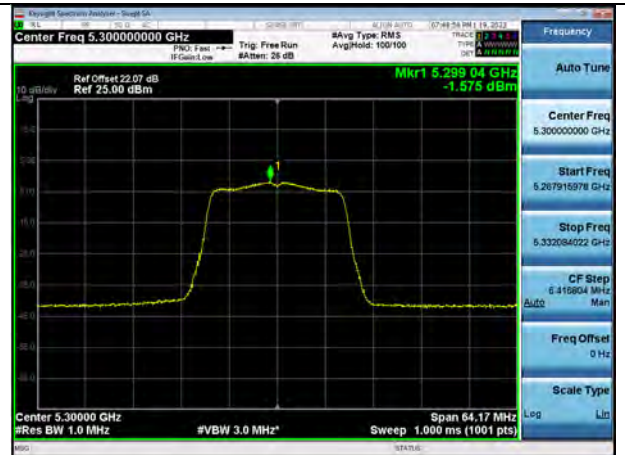
Note:

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

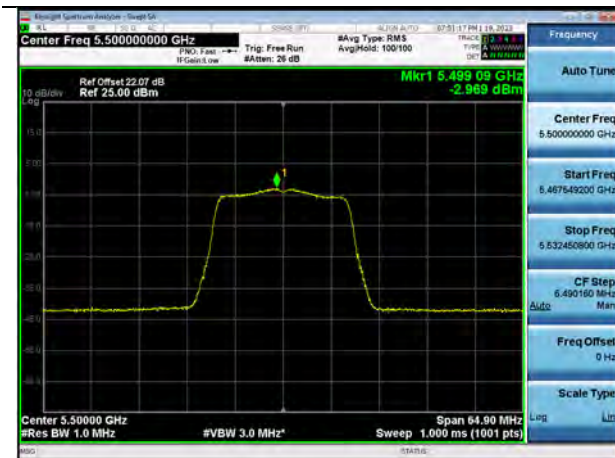
UNII 1 (Ch. 40)



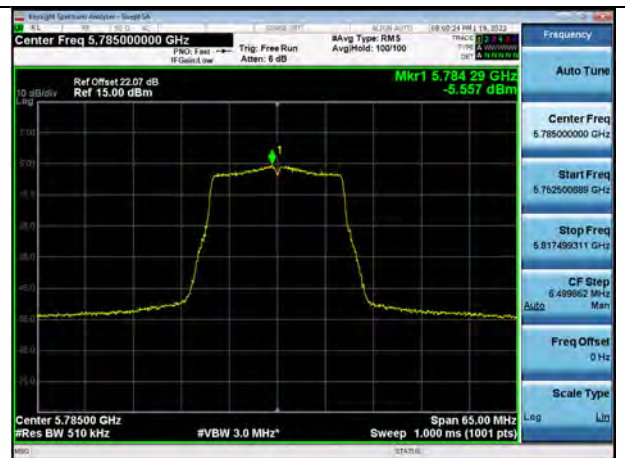
UNII 2A (Ch. 60)



UNII 2C (Ch. 100)



UNII 3 (Ch. 157)

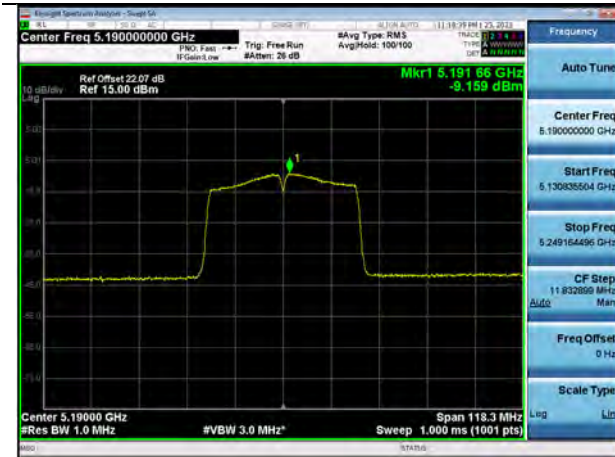


▣ Test Plots(802.11ac(VHT40))

Note:

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

UNII 1 (Ch. 38)



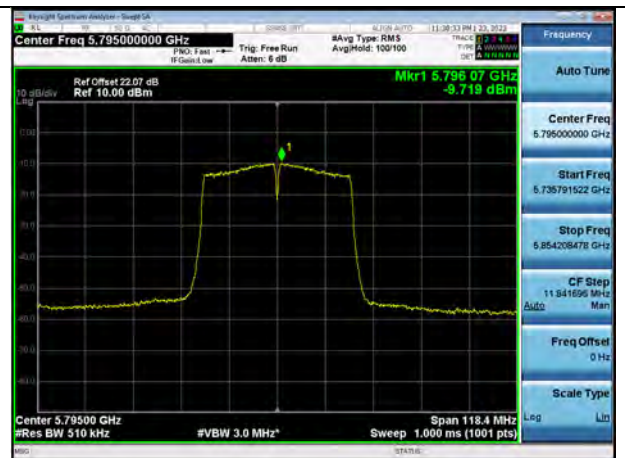
UNII 2A (Ch. 62)



UNII 2C (Ch. 110)



UNII 3 (Ch. 159)

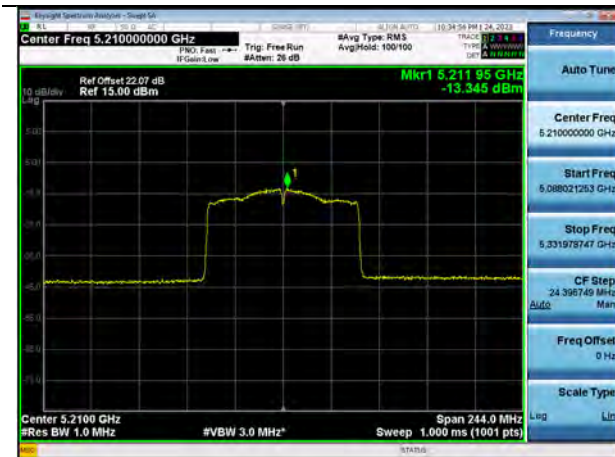


▣ Test Plots(802.11ac(VHT80))

Note:

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

UNII 1 (Ch. 42)



UNII 2A (Ch. 58)



UNII 2C (Ch. 138)



UNII 3 (Ch. 155)



10.6 STRADDLE CHANNEL

10.6.1 26 dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11a	UNII 2C	5720	144	5709.40	15.60
802.11n(HT20)				5709.28	15.72
802.11ac(VHT20)				5709.32	15.68
802.11a	UNII 3	5720	144	5730.48	5.48
802.11n(HT20)				5730.68	5.68
802.11ac(VHT20)				5730.76	5.76

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11n(HT40)	UNII 2C	5710	142	5690.24	34.76
802.11ac(VHT40)				5690.16	34.84
802.11n(HT40)	UNII 3	5710	142	5729.68	4.68
802.11ac(VHT40)				5729.84	4.84

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	26 dB Bandwidth [MHz]
802.11ac(VHT80)	UNII 2C	5690	138	5649.32	75.68
	UNII 3	5690	138	5730.56	5.56

Note:

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

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

▣ Test Plots (26 dB Bandwidth)

802.11a UNII Band



802.11n(HT20) UNII Band



802.11ac(VHT20) UNII Band



▣ Test Plots (26 dB Bandwidth)

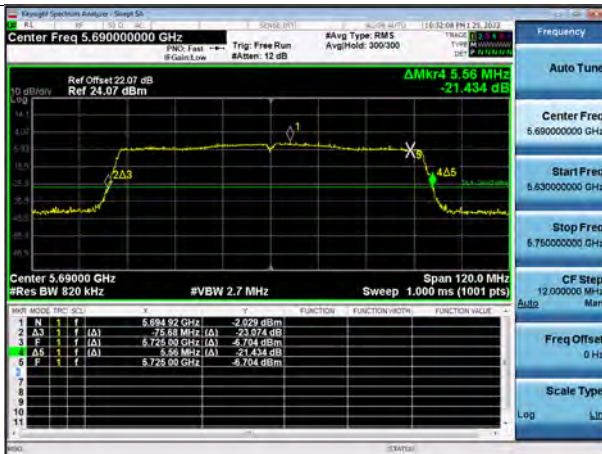
802.11n(HT40) UNII Band



802.11ac(VHT40) UNII Band



802.11ac(VHT80) UNII Band



10.6.2 6 dB Bandwidth

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11a	UNII 3	5720	144	5728.20	3.20	> 0.5
802.11n(HT20)				5728.84	3.84	> 0.5
802.11ac(VHT20)				5728.80	3.80	> 0.5

Mode	Band	Frequency [MHz]	Channel	Measured Frequency [MHz]	6 dB Bandwidth [MHz]	Limit [MHz]
802.11n(HT40)	UNII 3	5710	142	5728.00	3.00	> 0.5
802.11ac(VHT40)				5727.84	2.84	> 0.5

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

Note:

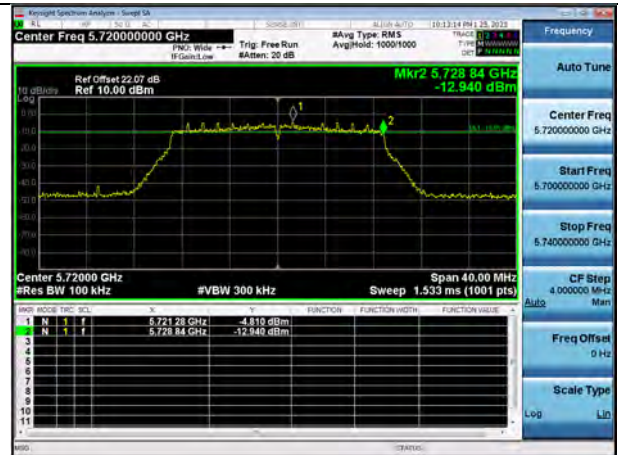
6 dB Bandwidth = Measured Frequency[MHz] – 5725 MHz

Test Plots (UNII 3 Band 6 dB Bandwidth)

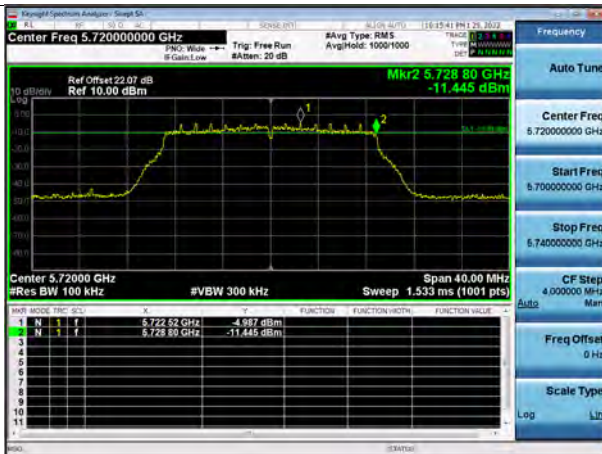
802.11a CH.144



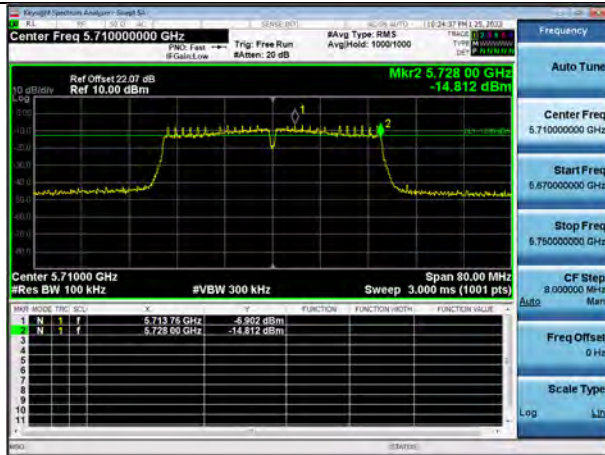
802.11n_HT20 CH.144



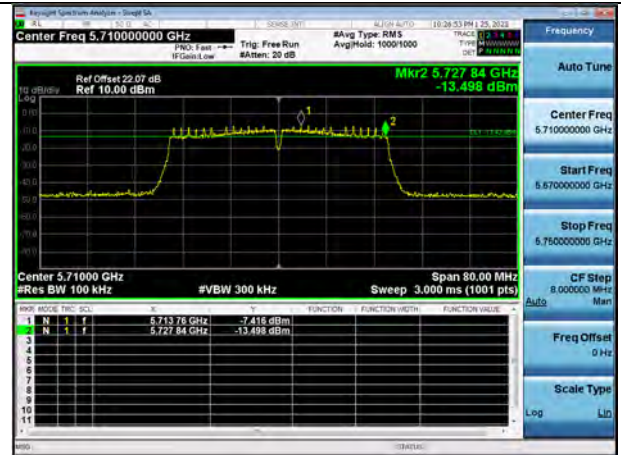
802.11ac_VHT20 CH.144



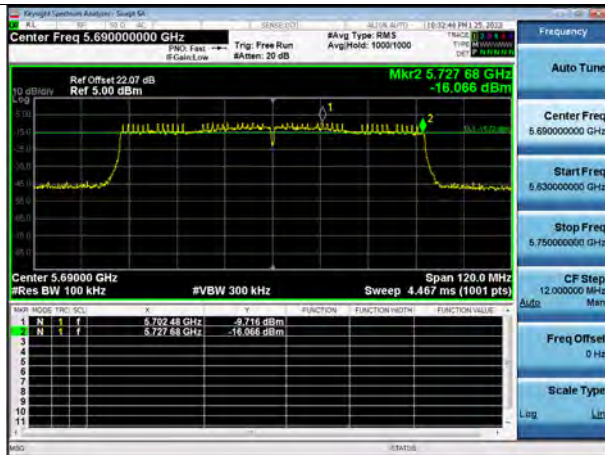
802.11n_HT40 CH.142



802.11ac_VHT40 CH.142



802.11ac_VHT80 CH.138



10.6.3 Output Power

Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11a	5720 (UNII 2C Band)	144	5.88	0.301	6.18	22.93
802.11n(HT20)			5.59	0.321	5.92	22.96
802.11ac(VHT20)			5.51	0.319	5.83	22.95
802.11a	5720 (UNII 3 Band)	144	-1.50	0.301	-1.20	30.00
802.11n(HT20)			-1.11	0.321	-0.79	30.00
802.11ac(VHT20)			-1.32	0.319	-1.01	30.00

Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11n(HT40)	5710 (UNII 2C Band)	142	6.22	0.617	6.84	23.98
802.11ac(VHT40)			5.88	0.645	6.53	23.98
802.11n(HT40)	5710 (UNII 3 Band)	142	-5.59	0.617	-4.97	30.00
802.11ac(VHT40)			-5.84	0.645	-5.20	30.00

Mode	Frequency [MHz]	Channel	Measured Power (dBm)	Duty Cycle Factor (dB)	Total Power (dBm)	Limit (dBm)
802.11ac(VHT80)	5690 (UNII 2C Band)	138	6.24	1.154	7.40	23.98
	5690 (UNII 3 Band)	138	-8.89	1.154	-7.73	30.00

Test Plots

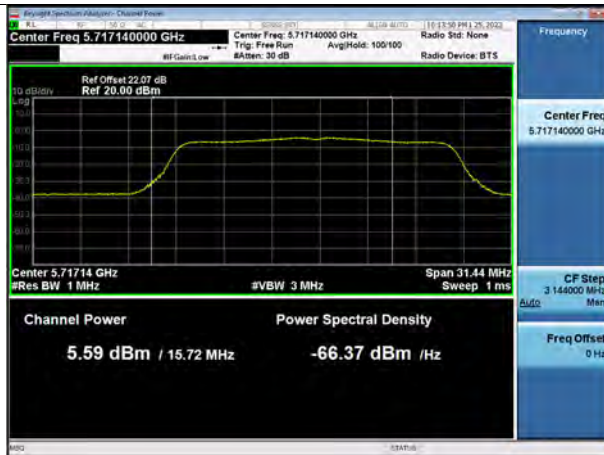
802.11a UNII 2C Band



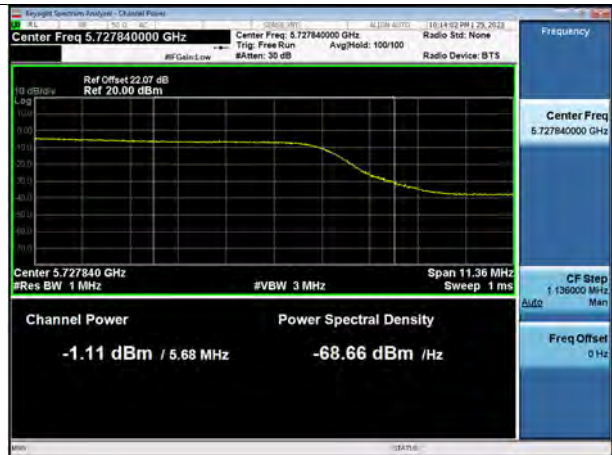
802.11a UNII 3 Band



802.11n(HT20) UNII 2C Band



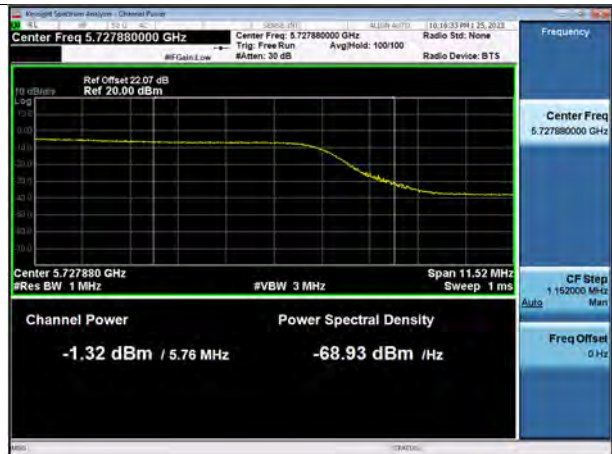
802.11n(HT20) UNII 3 Band



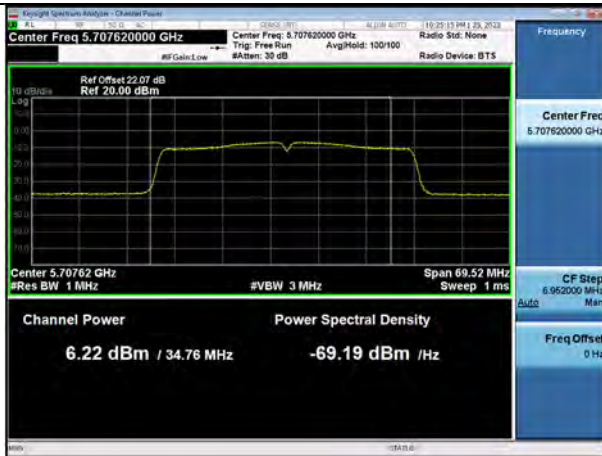
802.11ac(VHT20) UNII 2C Band



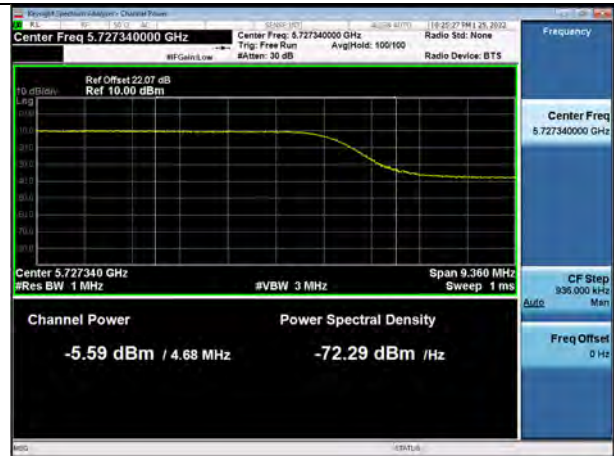
802.11ac(VHT20) UNII 3 Band



802.11n(HT40) UNII 2C Band



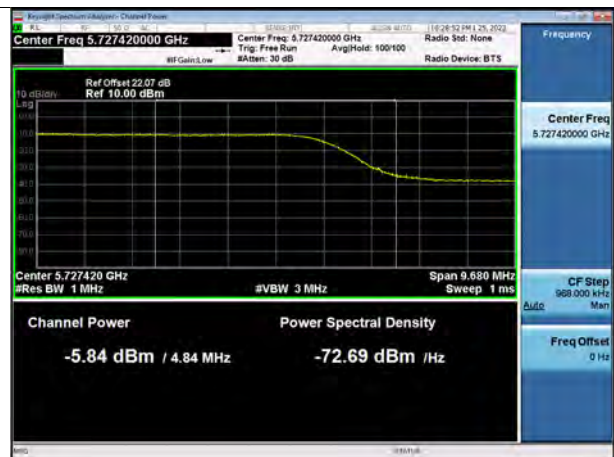
802.11n(HT40) UNII 3 Band



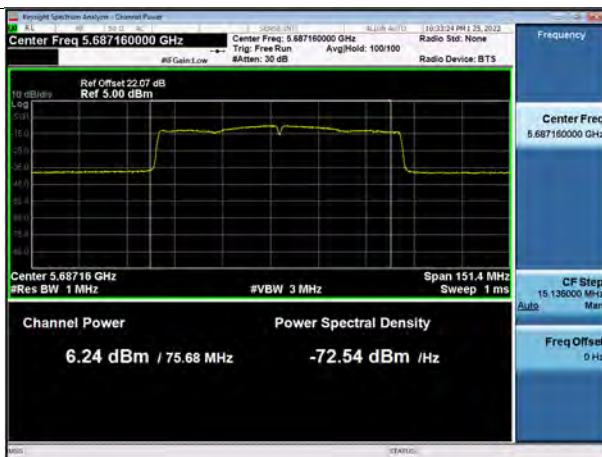
802.11ac(VHT40) UNII 2C Band



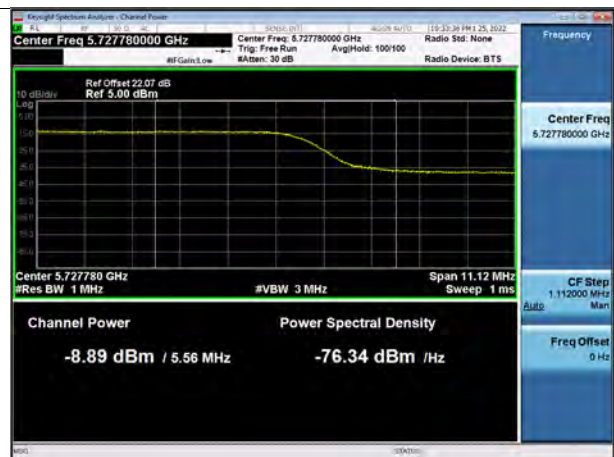
802.11ac(VHT40) UNII 3 Band



802.11ac(VHT80) UNII 2C Band



802.11ac(VHT80) UNII 3 Band



10.6.4 Power Spectral Density

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11a	5720 (UNII 2C Band)	144	-3.603	0.301	-3.302	11 dBm/ MHz
802.11n(HT20)			-4.002	0.321	-3.681	
802.11ac(VHT20)			-4.069	0.319	-3.750	
802.11a	5720 (UNII 3 Band)	144	-8.609	0.301	-8.308	30 dBm
802.11n(HT20)			-9.194	0.321	-8.873	/
802.11ac(VHT20)			-9.288	0.319	-8.969	500 kHz

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11n(HT40)	5710 (UNII 2C Band)	142	-6.817	0.617	-6.200	11 dBm/ MHz
802.11ac(VHT40)			-7.056	0.645	-6.411	
802.11n(HT40)	5710 (UNII 3 Band)	142	-12.915	0.617	-12.298	30 dBm/ 500 kHz
802.11ac(VHT40)			-13.117	0.645	-12.472	

Mode	Frequency [MHz]	Channel	Measured Density (dBm)	Duty Cycle Factor (dB)	Total PSD (dBm)	Limit (dBm)
802.11ac(VHT80)	5690 (UNII 2C Band)	138	-10.021	1.154	-8.867	11 dBm/ MHz
	5690 (UNII 3 Band)	138	-16.466	1.154	-15.312	30 dBm/ 500 kHz

Test Plots

802.11a UNII 2C Band



802.11a UNII 3 Band



802.11n(HT20) UNII 2C Band



802.11n(HT20) UNII 3 Band



802.11ac(VHT20) UNII 2C Band



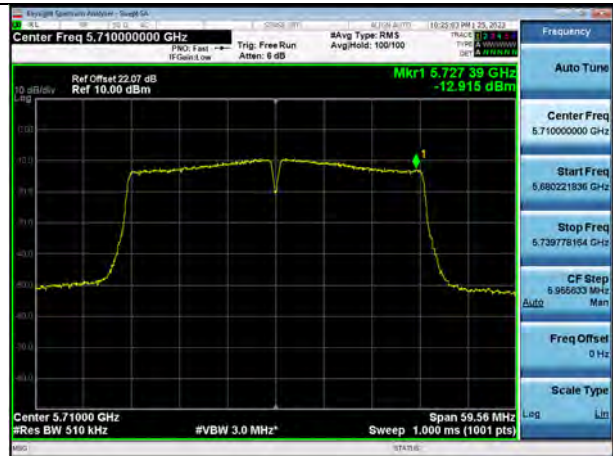
802.11ac(VHT20) UNII 3 Band



802.11n(HT40) UNII 2C Band



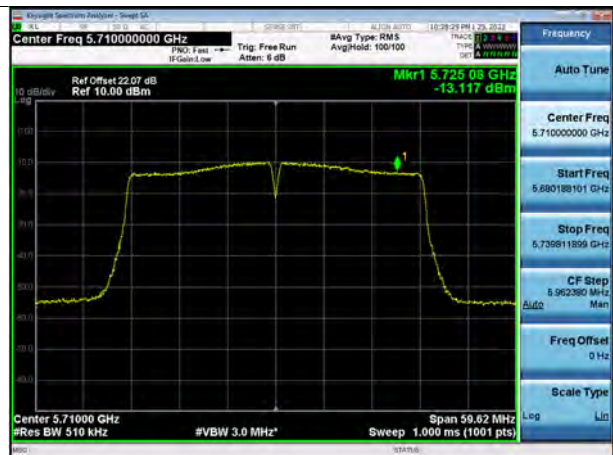
802.11n(HT40) UNII 3 Band



802.11ac(VHT40) UNII 2C Band



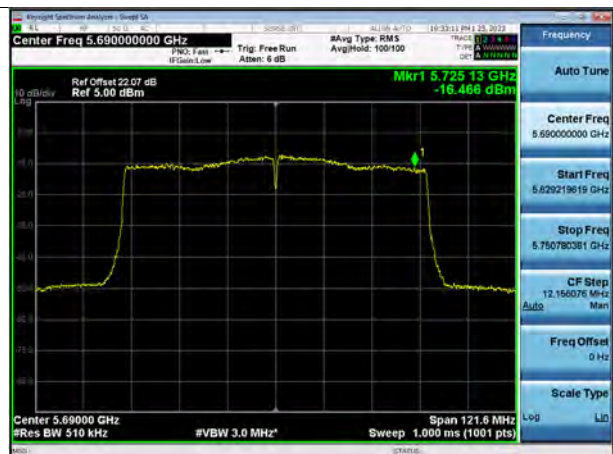
802.11ac(VHT40) UNII 3 Band



802.11ac(VHT80) UNII 2C Band



802.11ac(VHT80) UNII 3 Band



10.7 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30 MHz

Frequency	Measured Level	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V/m	dBm/m	dBm	(H/V)	dB μ V/m	dB μ V/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 (dB μ V) + Distance extrapolation factor

Frequency Range : Below 1 GHz

Frequency	Measured Level	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V/m	dBm/m	dBm	(H/V)	dB μ V/m	dB μ V/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	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10360	49.18	4.78	V	53.96	68.20	14.24	PK
15540	48.32	4.74	V	53.06	73.98	20.92	PK
15540	34.04	4.74	V	38.78	53.98	15.20	AV
10360	48.86	4.78	H	53.64	68.20	14.56	PK
15540	48.27	4.74	H	53.01	73.98	20.97	PK
15540	34.01	4.74	H	38.75	53.98	15.23	AV

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10400	48.37	4.37	V	52.74	68.20	15.46	PK
15600	48.73	4.20	V	52.93	73.98	21.05	PK
15600	34.05	4.20	V	38.25	53.98	15.73	AV
10400	48.32	4.37	H	52.69	68.20	15.51	PK
15600	48.53	4.20	H	52.73	73.98	21.25	PK
15600	33.98	4.20	H	38.18	53.98	15.80	AV

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10480	48.05	5.17	V	53.22	68.20	14.98	PK
15720	50.59	3.76	V	54.35	73.98	19.63	PK
15720	34.21	3.76	V	37.97	53.98	16.01	AV
10480	47.99	5.17	H	53.16	68.20	15.04	PK
15720	49.85	3.76	H	53.61	73.98	20.37	PK
15720	34.07	3.76	H	37.83	53.98	16.15	AV

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10520	48.46	4.93	V	53.39	68.20	14.81	PK
15780	50.53	4.08	V	54.61	73.98	19.37	PK
15780	34.03	4.08	V	38.11	53.98	15.87	AV
10520	48.27	4.93	H	53.20	68.20	15.00	PK
15780	50.15	4.08	H	54.23	73.98	19.75	PK
15780	33.93	4.08	H	38.01	53.98	15.97	AV

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10600	48.73	5.16	V	53.89	73.98	20.09	PK
10600	36.75	5.16	V	41.91	53.98	12.07	AV
15900	47.23	5.46	V	52.69	73.98	21.29	PK
15900	32.87	5.46	V	38.33	53.98	15.65	AV
10600	48.33	5.16	H	53.49	73.98	20.49	PK
10600	36.48	5.16	H	41.64	53.98	12.34	AV
15900	47.09	5.46	H	52.55	73.98	21.43	PK
15900	32.23	5.46	H	37.69	53.98	16.29	AV

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10640	48.43	5.36	V	53.79	73.98	20.19	PK
10640	37.39	5.36	V	42.75	53.98	11.23	AV
15960	47.92	4.92	V	52.84	73.98	21.14	PK
15960	33.41	4.92	V	38.33	53.98	15.65	AV
10640	48.15	5.36	H	53.51	73.98	20.47	PK
10640	37.21	5.36	H	42.57	53.98	11.41	AV
15960	47.57	4.92	H	52.49	73.98	21.49	PK
15960	33.34	4.92	H	38.26	53.98	15.72	AV

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11000	48.07	5.57	V	53.64	73.98	20.34	PK
11000	34.69	5.57	V	40.26	53.98	13.72	AV
16500	49.11	7.18	V	56.29	68.20	11.91	PK
11000	47.99	5.57	H	53.56	73.98	20.42	PK
11000	34.64	5.57	H	40.21	53.98	13.77	AV
16500	48.93	7.18	H	56.11	68.20	12.09	PK

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11160	48.05	4.75	V	52.80	73.98	21.18	PK
11160	34.63	4.75	V	39.38	53.98	14.60	AV
16740	49.05	9.10	V	58.15	68.20	10.05	PK
11160	48.01	4.75	H	52.76	73.98	21.22	PK
11160	34.62	4.75	H	39.37	53.98	14.61	AV
16740	48.73	9.10	H	57.83	68.20	10.37	PK

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11440	47.13	5.08	V	52.21	73.98	21.77	PK
11440	34.66	5.08	V	39.74	53.98	14.24	AV
17160	48.93	8.92	V	57.85	68.20	10.35	PK
11440	47.02	5.08	H	52.10	73.98	21.88	PK
11440	34.38	5.08	H	39.46	53.98	14.52	AV
17160	49.57	8.92	H	58.49	68.20	9.71	PK

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	
11490	47.27	5.07	V	52.34	73.98	21.64	PK
11490	35.54	5.07	V	40.61	53.98	13.37	AV
17235	48.94	9.49	V	58.43	68.20	9.77	PK
11490	47.15	5.07	H	52.22	73.98	21.76	PK
11490	35.27	5.07	H	40.34	53.98	13.64	AV
17235	49.20	9.49	H	58.69	68.20	9.51	PK

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11570	47.07	5.07	V	52.14	73.98	21.84	PK
11570	35.78	5.07	V	40.85	53.98	13.13	AV
17355	49.37	10.87	V	60.24	68.20	7.96	PK
11570	47.02	5.07	H	52.09	73.98	21.89	PK
11570	35.32	5.07	H	40.39	53.98	13.59	AV
17355	49.70	10.87	H	60.57	68.20	7.63	PK

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

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11650	46.83	4.76	V	51.59	73.98	22.39	PK
11650	35.35	4.76	V	40.11	53.98	13.87	AV
17475	50.62	10.29	V	60.91	68.20	7.29	PK
11650	46.52	4.76	H	51.28	73.98	22.70	PK
11650	35.24	4.76	H	40.00	53.98	13.98	AV
17475	51.39	10.29	H	61.68	68.20	6.52	PK

Band :	UNII 1
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10360	47.69	4.78	V	52.47	68.20	15.73	PK
15540	47.24	4.74	V	51.98	73.98	22.00	PK
15540	32.58	4.74	V	37.32	53.98	16.66	AV
10360	47.28	4.78	H	52.06	68.20	16.14	PK
15540	46.93	4.74	H	51.67	73.98	22.31	PK
15540	35.20	4.74	H	39.94	53.98	14.04	AV

Band :	UNII 1
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10400	47.40	4.37	V	51.77	68.20	16.43	PK
15600	48.50	4.20	V	52.70	73.98	21.28	PK
15600	32.72	4.20	V	36.92	53.98	17.06	AV
10400	47.23	4.37	H	51.60	68.20	16.60	PK
15600	48.27	4.20	H	52.47	73.98	21.51	PK
15600	32.51	4.20	H	36.71	53.98	17.27	AV

Band :	UNII 1
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10480	47.13	5.17	V	52.30	68.20	15.90	PK
15720	47.84	3.76	V	51.60	73.98	22.38	PK
15720	32.70	3.76	V	36.46	53.98	17.52	AV
10480	46.91	5.17	H	52.08	68.20	16.12	PK
15720	47.69	3.76	H	51.45	73.98	22.53	PK
15720	32.62	3.76	H	36.38	53.98	17.60	AV

Band :	UNII 2A
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5260 MHz
Channel No.	52 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10520	46.80	4.93	V	51.73	68.20	16.47	PK
15780	49.44	4.08	V	53.52	73.98	20.46	PK
15780	32.65	4.08	V	36.73	53.98	17.25	AV
10520	46.58	4.93	H	51.51	68.20	16.69	PK
15780	49.17	4.08	H	53.25	73.98	20.73	PK
15780	32.32	4.08	H	36.40	53.98	17.58	AV

Band :	UNII 2A
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5300 MHz
Channel No.	60 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10600	47.55	5.16	V	52.71	73.98	21.27	PK
10600	35.80	5.16	V	40.96	53.98	13.02	AV
15900	48.51	5.46	V	53.97	73.98	20.01	PK
15900	31.70	5.46	V	37.16	53.98	16.82	AV
10600	47.32	5.16	H	52.48	73.98	21.50	PK
10600	35.39	5.16	H	40.55	53.98	13.43	AV
15900	48.33	5.46	H	53.79	73.98	20.19	PK
15900	31.51	5.46	H	36.97	53.98	17.01	AV

Band :	UNII 2A
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5320 MHz
Channel No.	64 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
10640	47.36	5.36	V	52.72	73.98	21.26	PK
10640	35.64	5.36	V	41.00	53.98	12.98	AV
15960	48.03	4.92	V	52.95	73.98	21.03	PK
15960	32.39	4.92	V	37.31	53.98	16.67	AV
10640	47.22	5.36	H	52.58	73.98	21.40	PK
10640	35.51	5.36	H	40.87	53.98	13.11	AV
15960	47.93	4.92	H	52.85	73.98	21.13	PK
15960	31.59	4.92	H	36.51	53.98	17.47	AV

Band :	UNII 2C
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5500 MHz
Channel No.	100 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11000	46.49	5.57	V	52.06	73.98	21.92	PK
11000	33.65	5.57	V	39.22	53.98	14.76	AV
16500	47.70	7.18	V	54.88	68.20	13.32	PK
11000	46.15	5.57	H	51.72	73.98	22.26	PK
11000	33.27	5.57	H	38.84	53.98	15.14	AV
16500	47.18	7.18	H	54.36	68.20	13.84	PK

Band :	UNII 2C
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5580 MHz
Channel No.	116 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11160	47.30	4.75	V	52.05	73.98	21.93	PK
11160	34.53	4.75	V	39.28	53.98	14.70	AV
16740	45.53	9.10	V	54.63	68.20	13.57	PK
11160	47.06	4.75	H	51.81	73.98	22.17	PK
11160	34.21	4.75	H	38.96	53.98	15.02	AV
16740	44.96	9.10	H	54.06	68.20	14.14	PK

Band :	UNII 2C
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5720 MHz
Channel No.	144 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11440	47.27	5.08	V	52.35	73.98	21.63	PK
11440	34.69	5.08	V	39.77	53.98	14.21	AV
17160	50.68	8.92	V	59.60	68.20	8.60	PK
11440	47.03	5.08	H	52.11	73.98	21.87	PK
11440	34.51	5.08	H	39.59	53.98	14.39	AV
17160	51.80	8.92	H	60.72	68.20	7.48	PK

Band :	UNII 3
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5745 MHz
Channel No.	149 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11490	47.75	5.07	V	52.82	73.98	21.16	PK
11490	35.19	5.07	V	40.26	53.98	13.72	AV
17235	49.82	9.49	V	59.31	68.20	8.89	PK
11490	47.32	5.07	H	52.39	73.98	21.59	PK
11490	34.86	5.07	H	39.93	53.98	14.05	AV
17235	50.34	9.49	H	59.83	68.20	8.37	PK

Band :	UNII 3
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11570	46.52	5.07	V	51.59	73.98	22.39	PK
11570	34.96	5.07	V	40.03	53.98	13.95	AV
17355	50.68	10.87	V	61.55	68.20	6.65	PK
11570	46.18	5.07	H	51.25	73.98	22.73	PK
11570	34.68	5.07	H	39.75	53.98	14.23	AV
17355	51.72	10.87	H	62.59	68.20	5.61	PK

Band :	UNII 3
Operation Mode:	802.11ac(20)
Transfer Rate:	6.5 Mbps
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency	Measured Level	AN.+CL-AMP G	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	
11650	47.76	4.76	V	52.52	73.98	21.46	PK
11650	35.73	4.76	V	40.49	53.98	13.49	AV
17475	52.28	10.29	V	62.57	68.20	5.63	PK
11650	47.53	4.76	H	52.29	73.98	21.69	PK
11650	35.61	4.76	H	40.37	53.98	13.61	AV
17475	53.52	10.29	H	63.81	68.20	4.39	PK

Note:

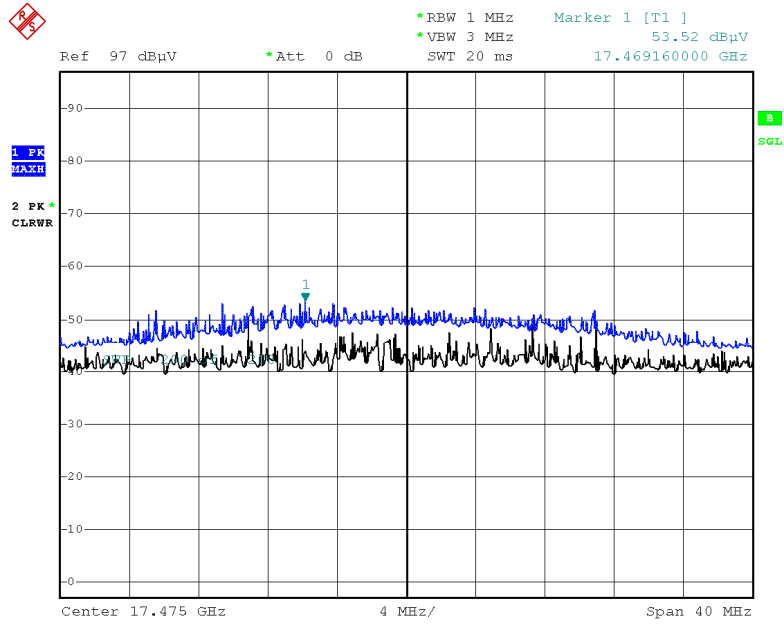
All Modes of operation were investigated and the worst case configuration results are reported.

[Worst case]

- Worstcase : UNII 1, 2A, 2C, 3 : 802.11a, 802.11ac(20)

Test Plots

Peak Result (802.11ac(20), Ch.165 3rd Harmonic, H)



Date: 26.JAN.2022 11:55:37

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]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5150	42.98	12.12	H	55.10	73.98	18.88	PK
5150	29.42	12.12	H	41.54	53.98	12.44	AV
5150	43.29	12.12	V	55.41	73.98	18.57	PK
5150	29.46	12.12	V	41.58	53.98	12.40	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5350	40.86	12.14	H	53.00	73.98	20.98	PK
5350	28.22	12.14	H	40.36	53.98	13.62	AV
5350	41.10	12.14	V	53.24	73.98	20.74	PK
5350	28.27	12.14	V	40.41	53.98	13.57	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	41.73	12.67	H	54.40	73.98	19.58	PK
5460	28.05	12.67	H	40.72	53.98	13.26	AV
5470	41.29	12.70	H	53.99	68.20	14.21	PK
5460	41.94	12.67	V	54.61	73.98	19.37	PK
5460	28.07	12.67	V	40.74	53.98	13.24	AV
5470	41.38	12.70	V	54.08	68.20	14.12	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]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5150	42.33	12.12	H	54.45	73.98	19.53	PK
5150	28.45	12.12	H	40.57	53.98	13.41	AV
5150	42.65	12.12	V	54.77	73.98	19.21	PK
5150	28.50	12.12	V	40.62	53.98	13.36	AV

Band :	UNII 2A
Operation Mode:	802.11 n_HT20
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]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5350	41.27	12.14	H	53.41	73.98	20.57	PK
5350	28.41	12.14	H	40.55	53.98	13.43	AV
5350	41.56	12.14	V	53.70	73.98	20.28	PK
5350	28.45	12.14	V	40.59	53.98	13.39	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	41.29	12.67	H	53.96	73.98	20.02	PK
5460	28.07	12.67	H	40.74	53.98	13.24	AV
5470	41.60	12.70	H	54.30	68.20	13.90	PK
5460	41.48	12.67	V	54.15	73.98	19.83	PK
5460	28.09	12.67	V	40.76	53.98	13.22	AV
5470	41.78	12.70	V	54.48	68.20	13.72	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]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5150	42.52	12.12	H	54.64	73.98	19.34	PK
5150	28.69	12.12	H	40.81	53.98	13.17	AV
5150	42.66	12.12	V	54.78	73.98	19.20	PK
5150	28.74	12.12	V	40.86	53.98	13.12	AV

Band :	UNII 2A
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]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5350	41.08	12.14	H	53.22	73.98	20.76	PK
5350	28.51	12.14	H	40.65	53.98	13.33	AV
5350	41.45	12.14	V	53.59	73.98	20.39	PK
5350	28.57	12.14	V	40.71	53.98	13.27	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	41.95	12.67	H	54.62	73.98	19.36	PK
5460	28.11	12.67	H	40.78	53.98	13.20	AV
5470	41.69	12.70	H	54.39	68.20	13.81	PK
5460	42.43	12.67	V	55.10	73.98	18.88	PK
5460	28.12	12.67	V	40.79	53.98	13.19	AV
5470	41.84	12.70	V	54.54	68.20	13.66	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]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5150	42.44	12.12	H	54.56	73.98	19.42	PK
5150	29.68	12.12	H	41.80	53.98	12.18	AV
5150	42.67	12.12	V	54.79	73.98	19.19	PK
5150	29.84	12.12	V	41.96	53.98	12.02	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5350	43.24	12.14	H	55.38	73.98	18.60	PK
5350	31.08	12.14	H	43.22	53.98	10.76	AV
5350	44.43	12.14	V	56.57	73.98	17.41	PK
5350	31.33	12.14	V	43.47	53.98	10.51	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5460	41.99	12.67	H	54.66	73.98	19.32	PK
5460	29.68	12.67	H	42.35	53.98	11.63	AV
5470	42.78	12.70	H	55.48	68.20	12.72	PK
5460	42.59	12.67	V	55.26	73.98	18.72	PK
5460	30.01	12.67	V	42.68	53.98	11.30	AV
5470	43.21	12.70	V	55.91	68.20	12.29	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]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5150	42.37	12.12	H	54.49	73.98	19.49	PK
5150	29.86	12.12	H	41.98	53.98	12.00	AV
5150	42.52	12.12	V	54.64	73.98	19.34	PK
5150	29.92	12.12	V	42.04	53.98	11.94	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5350	44.37	12.14	H	56.51	73.98	17.47	PK
5350	31.42	12.14	H	43.56	53.98	10.42	AV
5350	44.69	12.14	V	56.83	73.98	17.15	PK
5350	31.55	12.14	V	43.69	53.98	10.29	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5460	42.25	12.67	H	54.92	73.98	19.06	PK
5460	29.83	12.67	H	42.50	53.98	11.48	AV
5470	42.10	12.70	H	54.80	68.20	13.40	PK
5460	42.69	12.67	V	55.36	73.98	18.62	PK
5460	30.23	12.67	V	42.90	53.98	11.08	AV
5470	42.92	12.70	V	55.62	68.20	12.58	PK

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5150	43.51	12.12	H	55.63	73.98	18.35	PK
5150	32.27	12.12	H	44.39	53.98	9.59	AV
5150	43.59	12.12	V	55.71	73.98	18.27	PK
5150	32.56	12.12	V	44.68	53.98	9.30	AV

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

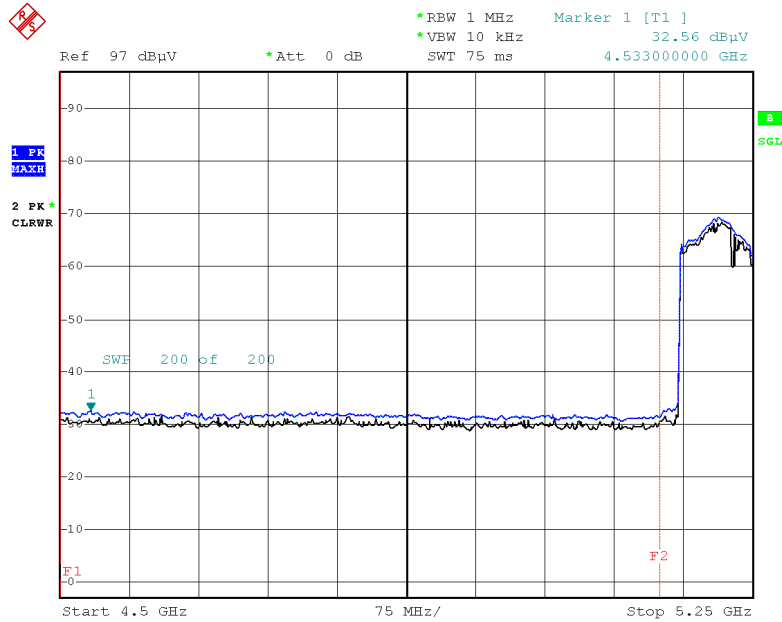
Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dB μ V]	[dB]	[H/V]	[dB μ V/m]	[dB μ V/m]	[dB]	Type
5350	41.99	12.14	H	54.13	73.98	19.85	PK
5350	31.27	12.14	H	43.41	53.98	10.57	AV
5350	42.83	12.14	V	54.97	73.98	19.01	PK
5350	31.43	12.14	V	43.57	53.98	10.41	AV

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

Frequency	Measured Level	CL+AF+DF-AG	ANT. POL	Total	Limit	Margin	Measurement
[MHz]	[dBμV]	[dB]	[H/V]	[dBμV/m]	[dBμV/m]	[dB]	Type
5460	43.28	12.67	H	55.95	73.98	18.03	PK
5460	31.65	12.67	H	44.32	53.98	9.66	AV
5470	44.08	12.70	H	56.78	68.20	11.42	PK
5460	43.85	12.67	V	56.52	73.98	17.46	PK
5460	31.84	12.67	V	44.51	53.98	9.47	AV
5470	44.24	12.70	V	56.94	68.20	11.26	PK

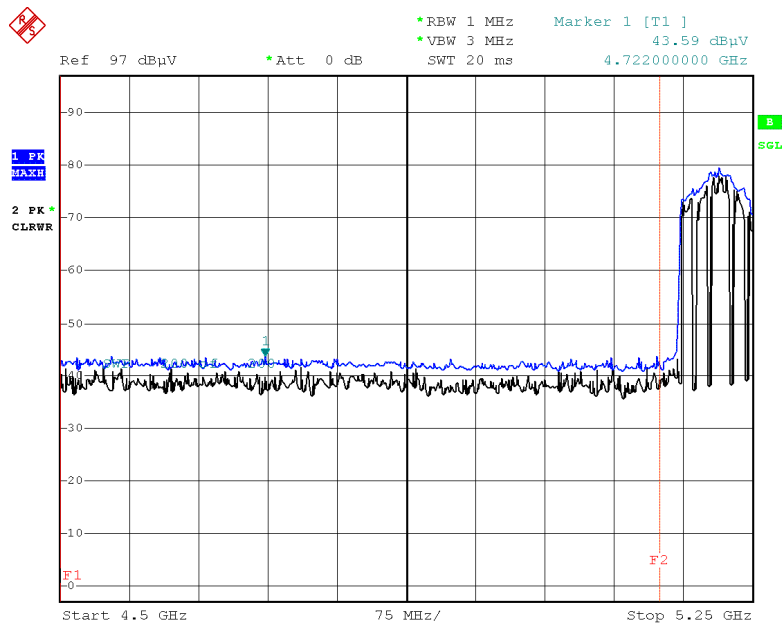
Test Plots(UNII 1, 2A, 2C)(X-V)

Average Result (802.11ac(80M), Ch.42)



Date: 25.JAN.2022 11:37:46

Peak Result (802.11a, Ch.42)



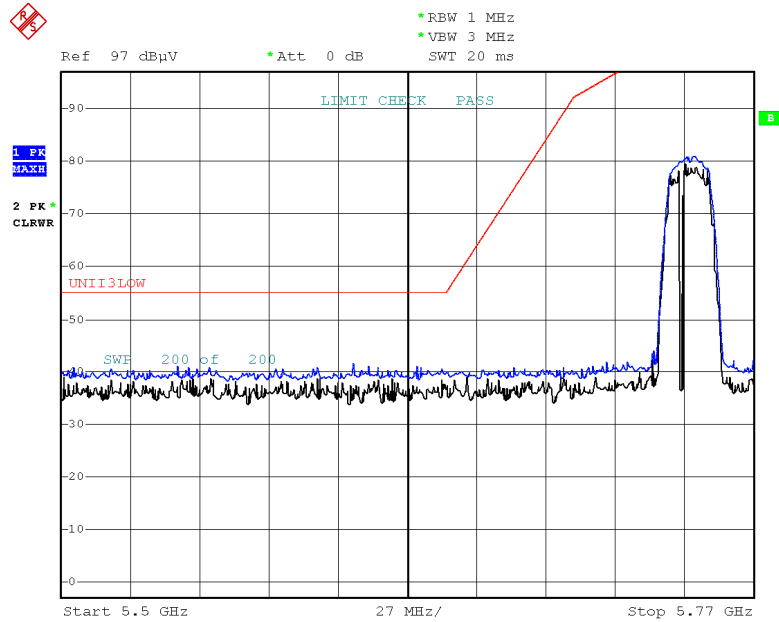
Date: 25.JAN.2022 11:38:53

Note:

Only the worst case plots for Radiated Restricted Band Edge.

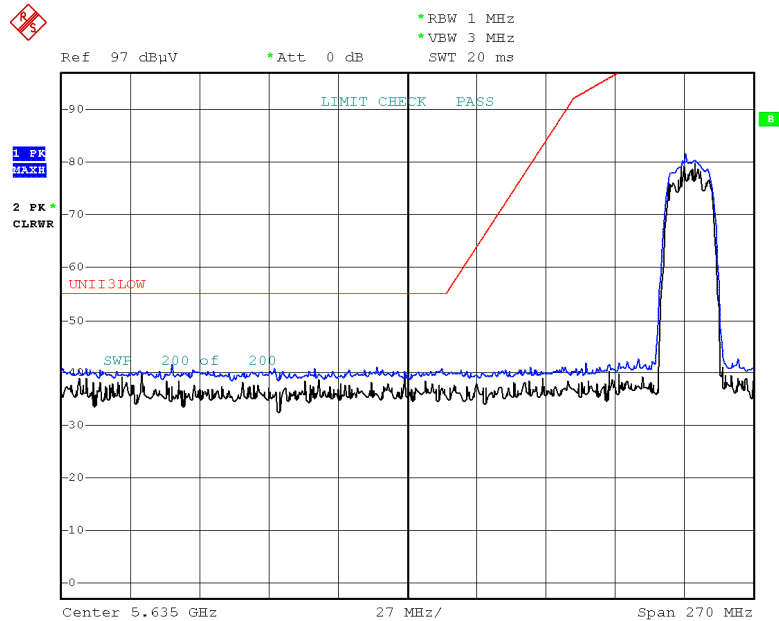
Test Plots(UNII 3)

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



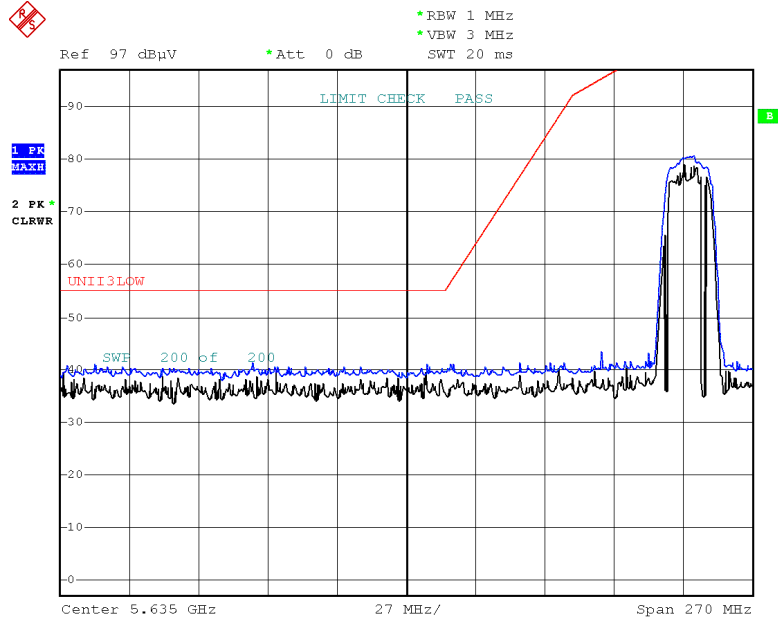
Date: 24.JAN.2022 11:56:29

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



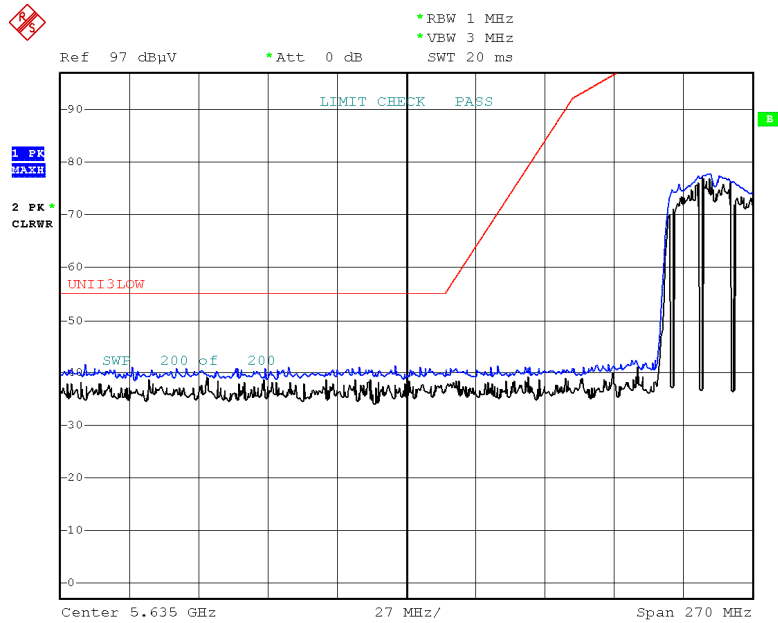
Date: 24.JAN.2022 11:58:26

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



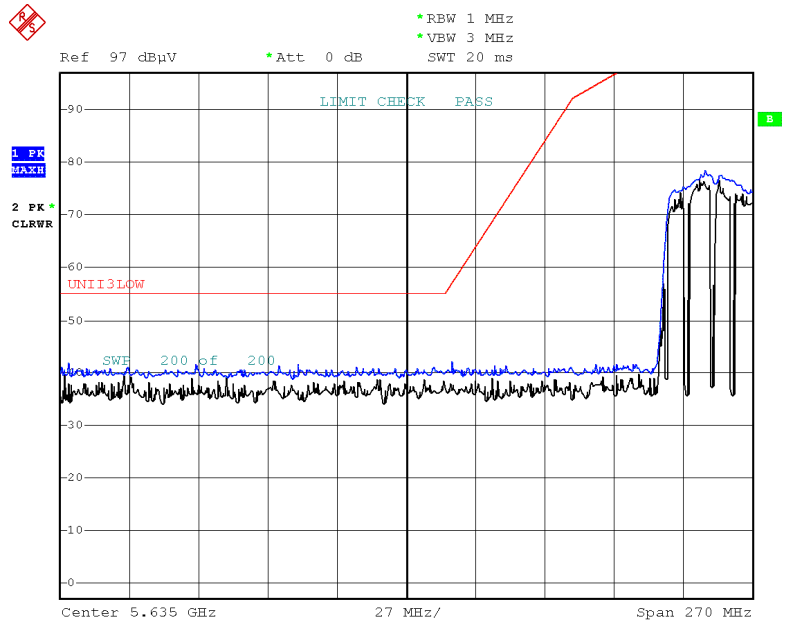
Date: 24.JAN.2022 11:59:37

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



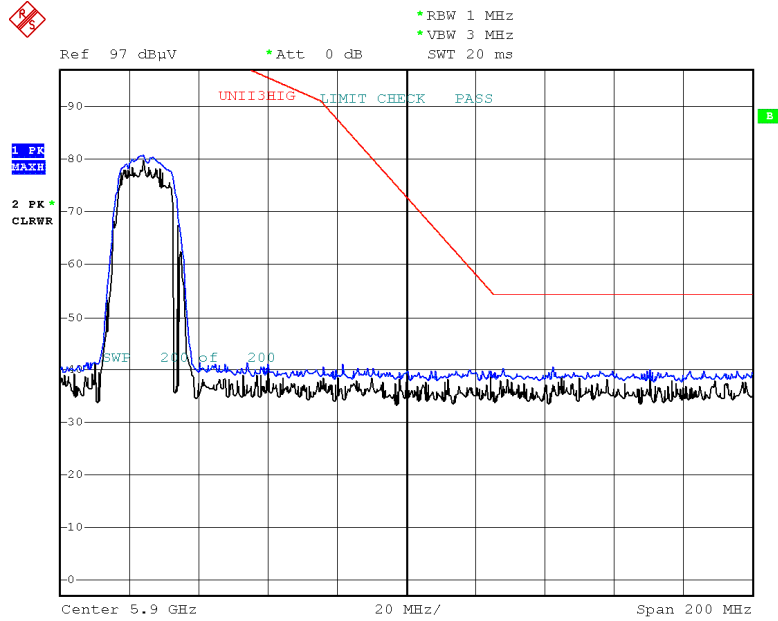
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Peak Result (802.11ac_VHT40, Ch.151, X-V)



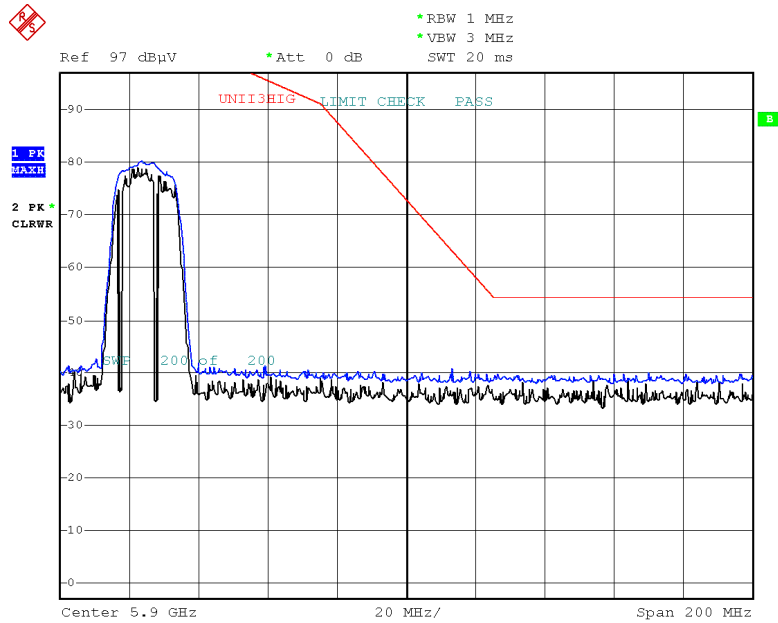
Date: 24.JAN.2022 13:05:15

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



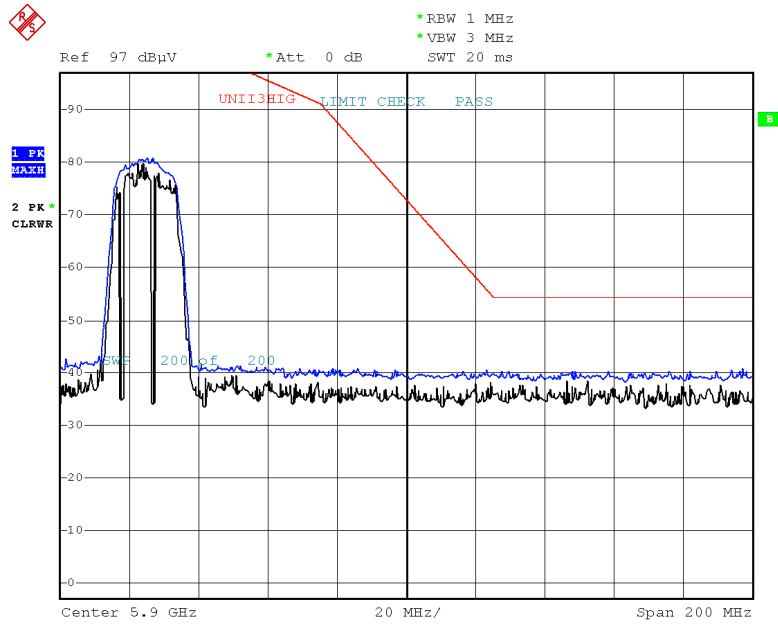
Date: 24.JAN.2022 13:30:15

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



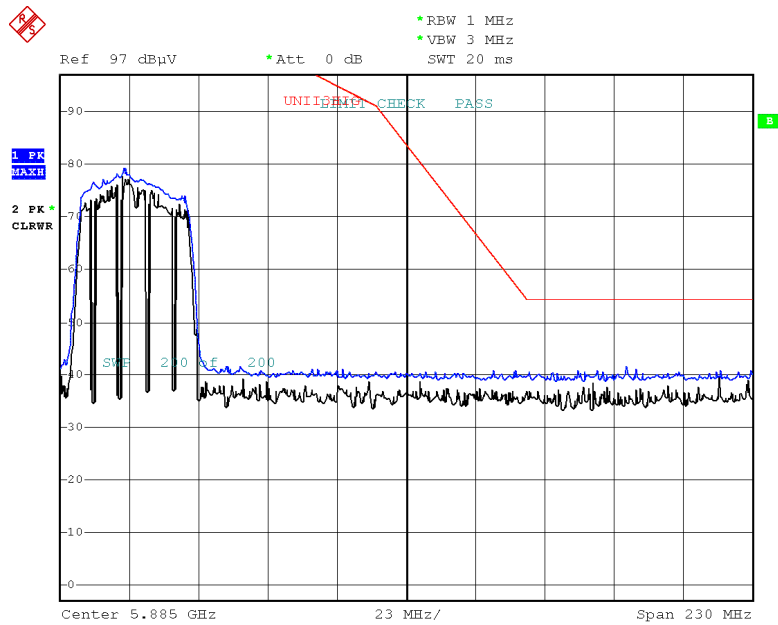
Date: 24.JAN.2022 13:31:32

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



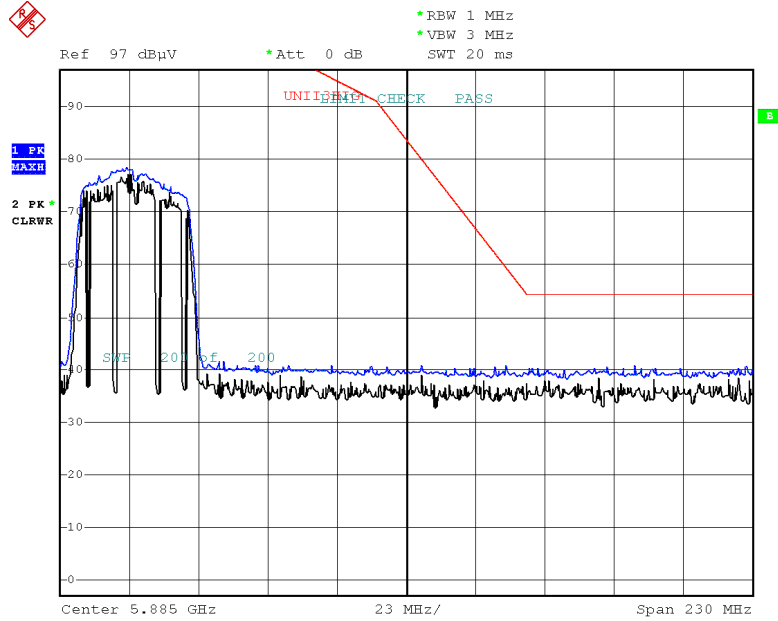
Date: 24.JAN.2022 13:33:53

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



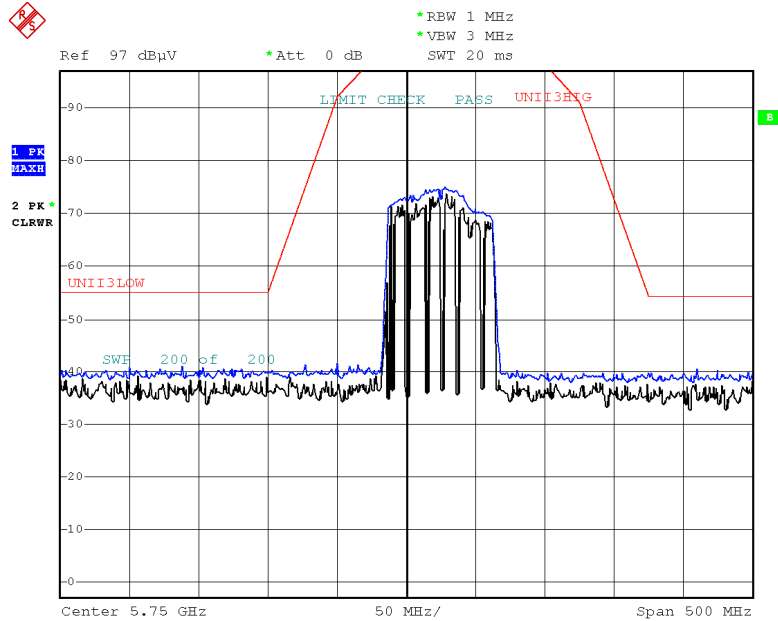
Date: 24.JAN.2022 13:19:50

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



Date: 24.JAN.2022 13:22:20

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



Date: 24.JAN.2022 13:10:01

Note :

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

10.10 RECEIVER SPURIOUS EMISSIONS

Frequency Range : Below 1 GHz

Frequency	Measured Level	Ant. factor	Cable loss	Ant. POL	Total	Limit	Margin
MHz	dB μ V/m	dBm/m	dBm	(H/V)	dB μ V/m	dB μ V/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	dB μ V/m	dBm/m	dBm	(H/V)	dB μ V/m	dB μ V/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	MY52440870	09/02/2022	Annual
Signal Analyzer	N9030A	Agilent	MY49431210	01/11/2023	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 (10 dB)	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	1	06/29/2022	Annual
Band Reject Filter	WRCJV5100/5850-40/50-8EEK	Wainwright Instruments	1	02/07/2023	Annual
Attenuator (10 dB)	CBLU1183540B-01	CERNEX	N/A	12/22/2022	Annual
56-10	56-10	WEINSCHTEL			
Broadband Low Noise Amplifier	CBL06185030	CERNEX	N/A	12/22/2022	Annual
Attenuator (3 dB)	18B-03	Api tech.			
High Pass Filter	WHKX10-2700-3000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
High Pass Filter	WHKX8-6090-7000-18000-40SS	Wainwright Instruments	N/A	12/22/2022	Annual
Thru	COAXIAL ATTENUATOR	T&M SYSTEM	N/A	12/22/2022	Annual
Power Amplifier	CBL18265035	CERNEX	22966	12/02/2022	Annual
Power Amplifier	CBL26405040	CERNEX	25956	03/23/2022	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-2202-FI001-P