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TEST REPORT

FCC UNII Test for LAN5900WR

Certification

APPLICANT
LG Electronics Inc.

REPORT NO.
HCT-RF-1912-FC021-R1

DATE OF ISSUE
December 24, 2019

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FCC ID
BEJLAN5900WR

Applicant	**LG Electronics Inc.** 10, Magokjungang 10-ro, Gangseo-gu, Seoul, Republic of Korea
Eut Type Model Name	RADIO – CAR LAN5900WR
Modulation type	OFDM
FCC Classification	Unlicensed National Information Infrastructure(UNII)
FCC Rule Part(s)	Part 15.407

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.

Tested by
Kwon Jeong (signature)

Technical Manager
Jong Seok Lee (signature)

HCT CO., LTD.
Soo Chan Lee
SooChan Lee / CEO

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	December 18, 2019	Initial Release
1	December 24, 2019	Added the note on page 5

The front design of LAN5900WR is changed by applied RENAULT vehicle variant without PCB and circuit design.

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

CONTENTS

1. GENERAL INFORMATION

EUT DESCRIPTION

Model	LAN5900WR	
EUT Type	RADIO – CAR	
Power Supply	DC 12 V	
Modulation Type	OFDM : 802.11a, 802.11n, 802.11ac	
Frequency Range (MHz)	U-NII-1	20MHz BW : 5180 - 5240 40MHz BW : 5190 - 5230 80MHz BW : 5210
	U-NII-3	20MHz BW : 5745 - 5825 40MHz BW : 5755 - 5795 80MHz BW : 5775
Antenna type	Multilayer Chip Antenna	
Antenna Peak Gain	4.6 dBi(UNII 1), 3.5 dBi(UNII 3)	
Straddle channel	Not Supported	
TDWR Band	Not Supported	
Dynamic Frequency Selection	Not Supported	
Date(s) of Tests	November 11, 2019 ~ December 17, 2019	

Note

: The front design of LAN5900WR is changed by applied RENAULT vehicle variant without PCB and circuit design

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)
UNII1	802.11a	12.70	0.019
	802.11n (HT20)	12.45	0.018
	802.11n (HT40)	12.04	0.016
	802.11ac (VHT20)	8.39	0.007
	802.11ac (VHT40)	8.81	0.008
	802.11ac (VHT80)	8.94	0.008
UNII3	802.11a	13.20	0.021
	802.11n (HT20)	12.82	0.019
	802.11n (HT40)	12.96	0.020
	802.11ac (VHT20)	8.81	0.008
	802.11ac (VHT40)	8.81	0.008
	802.11ac (VHT80)	9.32	0.009

3. TEST METHODOLOGY

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

EUT CONFIGURATION

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

EUT EXERCISE

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

GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 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 Publication22. Detailed description of test facility was submitted to the Commission and accepted dated April 02, 2018 (Registration Number: KR0032).

5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.
All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

6. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203, § 15.407:

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

(1) The antennas of this E.U.T are permanently attached.

(2) The E.U.T Complies with the requirement of § 15.203, § 15.407

7. MEASUREMENT UNCERTAINTY

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

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

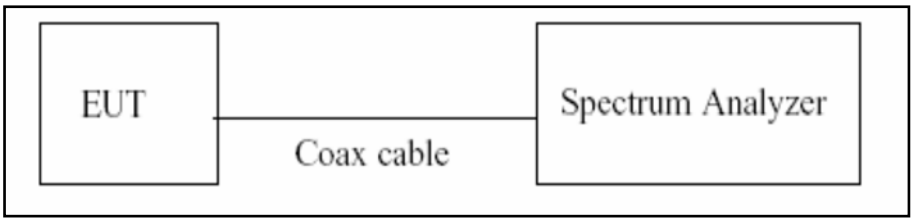
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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

8. DESCRIPTION OF TESTS

8.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

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

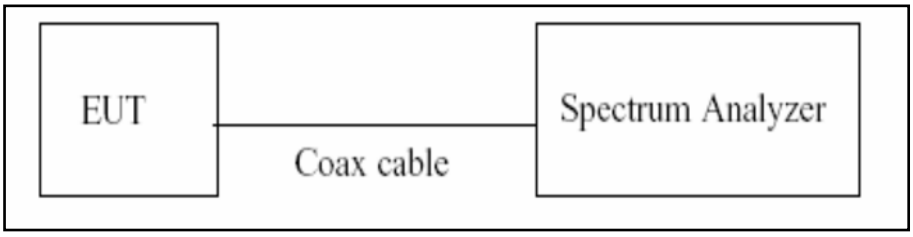
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

8.2. 6dB Bandwidth & 26dB Bandwidth

Limit

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

Test Configuration



Test Procedure(26dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

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

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

Test Procedure (6dB Bandwidth)

The transmitter output is connected to the Spectrum Analyzer.

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

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

Note:

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

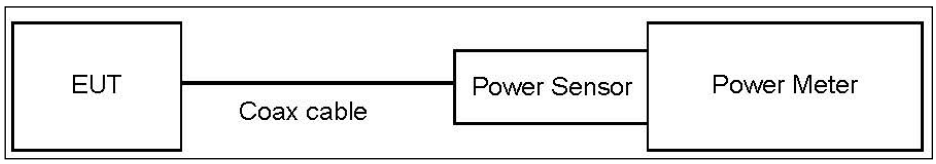
8.3. Output Power Measurement

Limit

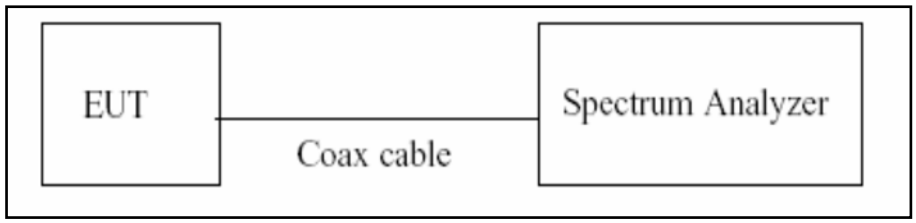
Band	Limit
UNII 1	- Master : Not exceed 1 W(=30dBm) - Slave : Not exceed 250 mW(=23.98 dBm)
UNII 3	Not exceed 1 W(=30dBm)

Test Configuration

Power Meter



Spectrum Analyzer(Only Straddle Channel)



Test Procedure(Power Meter)

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

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

Test Procedure(Spectrum Analyzer)

The transmitter output is connected to the Spectrum Analyzer.

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

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

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

Sample Calculation

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

Note

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

Band	Loss(dB)
UNII 1	20.83
UNII 3	20.83

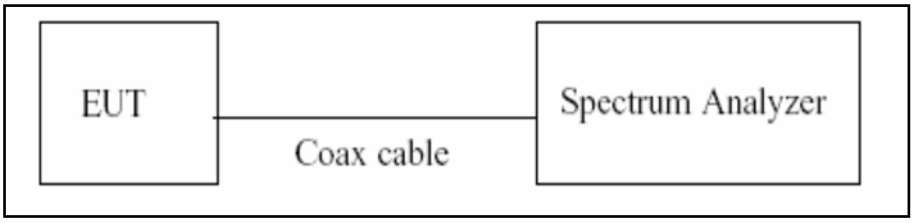
(Actual value of loss for the attenuator and cable combination)

8.4. Power Spectral Density

Limit

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

Test Configuration



Test Procedure

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

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

Sample Calculation

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

Note

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

Band	Loss(dB)
UNII 1	20.83
UNII 3	20.83

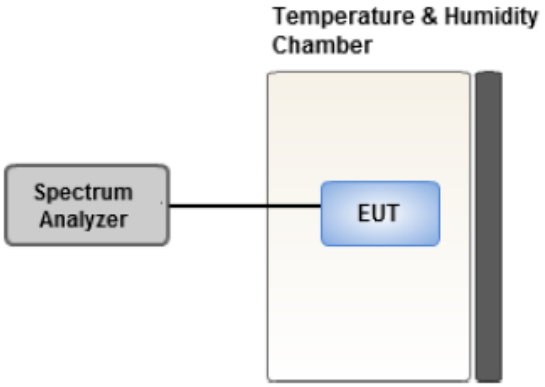
(Actual value of loss for the attenuator and cable combination)

8.5. Frequency Stability

Limit

Maintained within the band

Test Configuration



Test Procedure

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

8.6. AC Power line Conducted Emissions

Limit

For an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dBμV)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56[a]	56 to 46[a]
0.50 to 5	56	46
5 to 30	60	50

[a]Decreases with the logarithm of the frequency.

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

Test Configuration

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

Test Procedure

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

Sample Calculation

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

8.7. Radiated Test

Limit

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

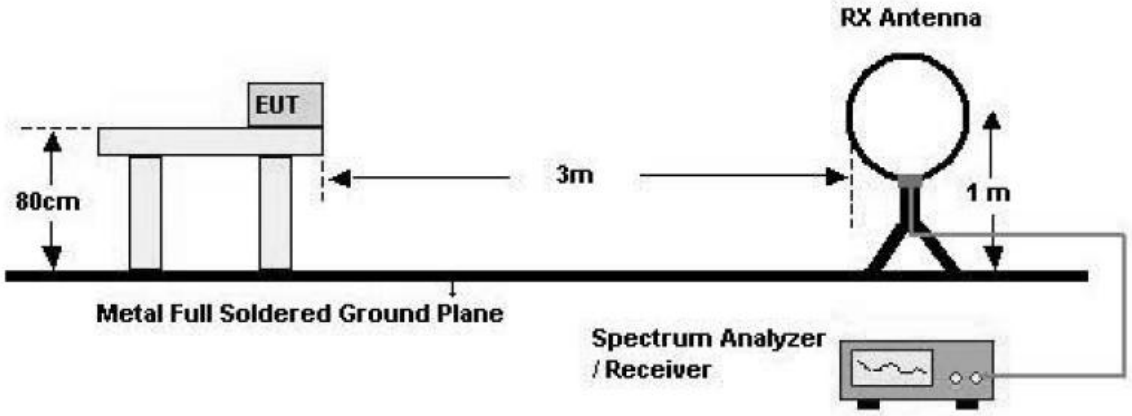
3. UNII 3: All emissions shall be limited to a level of －27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below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

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

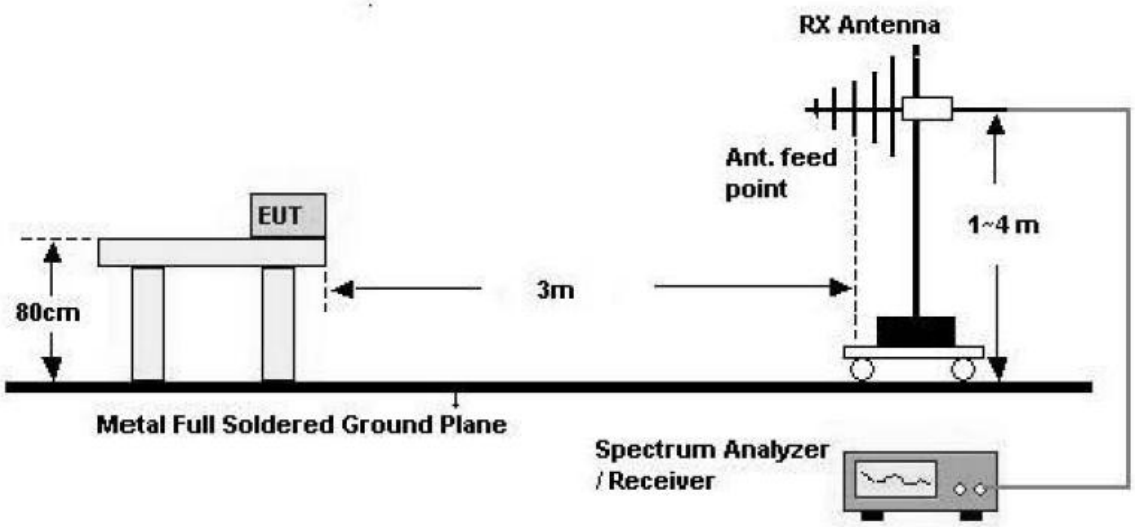
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

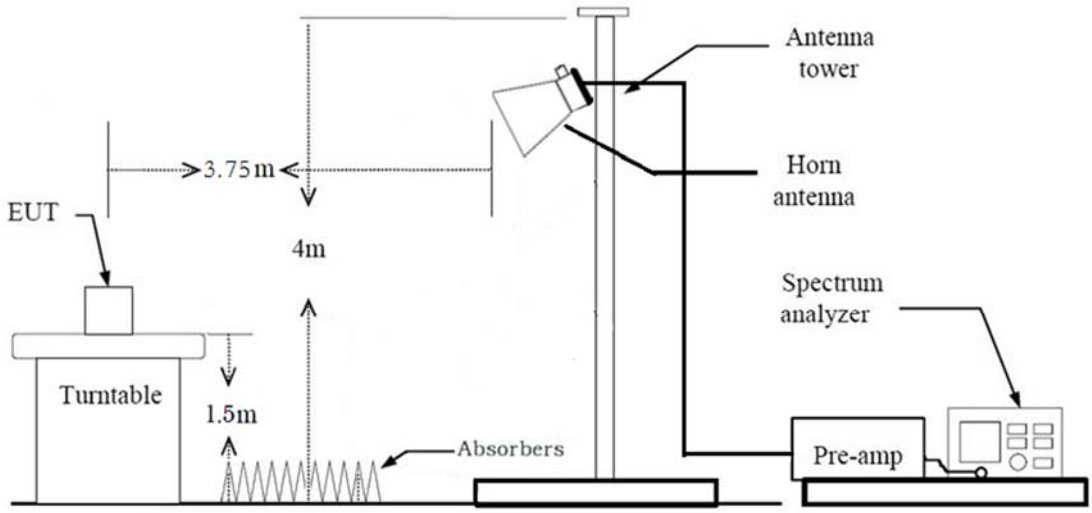
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The loop antenna was placed at a location 3m from the EUT
3. The EUT is placed on a turntable, which is 0.8m above ground plane.
4. .We have done x, y, z planes in EUT and horizontal and vertical polarization and Parallel to the ground plane in detecting antenna.
5. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
6. Distance Correction Factor(0.009 MHz – 0.490 MHz) = 40log(3 m/300 m) = - 80 dB
   Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) = 40log(3 m/30 m) = - 40 dB
   Measurement Distance : 3 m
8. Spectrum Setting
   - Frequency Range = 9 kHz ~ 30 MHz
   - Detector = Peak
   - Trace = Maxhold
   - RBW = 9 kHz
   - VBW ≥ 3 x RBW

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

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions(Below 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. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.

4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

5. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW ≥ 3 x RBW

(2) Measurement Type(Quasi-peak):

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Quasi-Peak
- RBW = 120 kHz

In general, (1) is used mainly

6. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)

7. 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 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
   - ◆ Distance extrapolation factor = 20log (test distance / specific distance) (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. Spectrum Setting

   (1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep Time = auto
   - Trace mode = max hold
   - Allow sweeps to continue until the trace stabilizes.

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

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

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
11. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency
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 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
   - ◆ Distance extrapolation factor = 20log (test distance / specific distance) (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. Spectrum Setting

   (1) Measurement Type(Peak, G.5 in KDB 789033 v02r01):
   - RBW = 1 MHz
   - VBW ≥ 3 MHz
   - Detector = Peak
   - Sweep Time = auto
   - Trace mode = max hold
   - Allow sweeps to continue until the trace stabilizes.

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

   (2) Measurement Type(Average, G.6.d in KDB 789033 v02r01):
   - RBW = 1 MHz
   - VBW(Duty cycle ≥ 98 percent) = VBW ≤ RBW/100(i.e., 10 kHz) but not less than 10 Hz.
   - VBW(Duty cycle is < 98 percent) = VBW ≥ 1/T, where T is the minimum transmission duration.
   - The analyzer is set to linear detector mode.
   - Detector = Peak.
   - Sweep time = auto.
   - Trace mode = max hold.

- Allow max hold to run for at least 50 traces if the transmitted signal is continuous or has at least 98 percent duty cycle. For lower duty cycles, increase the minimym number of traces by a factor of 1/x, where x is the duty cycle.

10. Measured Frequency Range :
- 4500MHz ~ 5150MHz
- 5350MHz ~ 5460MHz
- 5460MHz ~ 5470MHz
- (75 MHz or more below the 5725MHz) ~ 5725MHz
- 5850MHz ~ (75 MHz or more above the 5850MHz)

11. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + 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	0.935	0.291	1000
802.11n(HT20)	MCS 0	0.930	0.315	1000
802.11n(HT40)	MCS 0	0.868	0.616	3000
802.11ac(VHT20)	MCS 0	0.929	0.318	1000
802.11ac(VHT40)	MCS 0	0.869	0.612	3000
802.11ac(VHT80)	MCS 0	0.767	1.151	10000

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
   - Worstcase : Stand alone
2. EUT Axis
   - Radiated Spurious Emissions : X
   - Radiated Restricted Band Edge : X
3. All datarate of operation were investigated and the worst case datarate results are reported
   - 802.11a : 6Mbps
   - 802.11n : MCS0
   - 802.11ac : MCS0
4. All position of loop antenna were investigated and the test result is a no critical peak found at all positions.
   - Position : Horizontal, Vertical, Parallel to the ground plane

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

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

Note:

We don’t perform AC Conducted Emissions test. Because this EUT is used with vehicle.

10. TEST RESULT

10.1 DUTY CYCLE

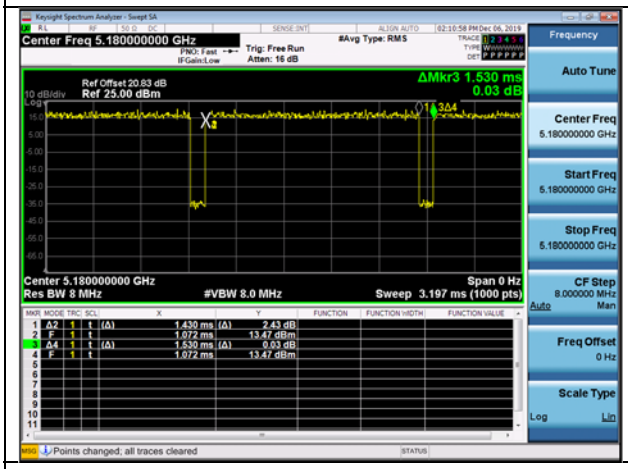
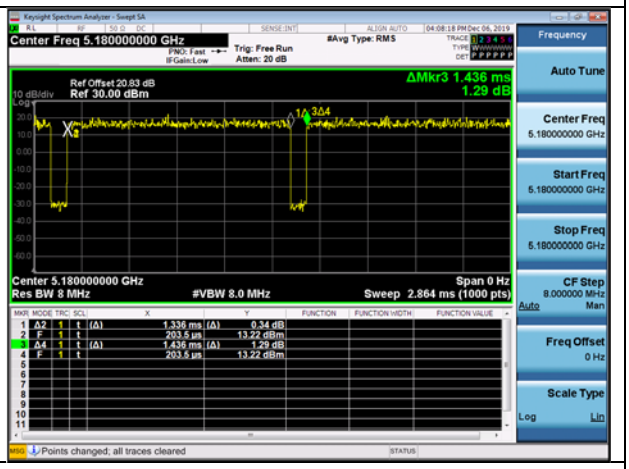
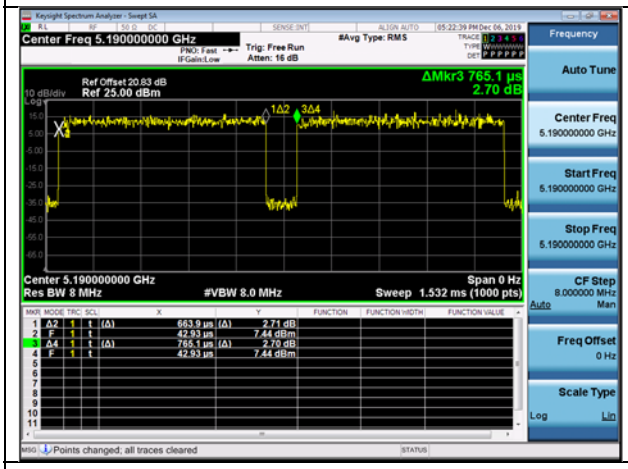
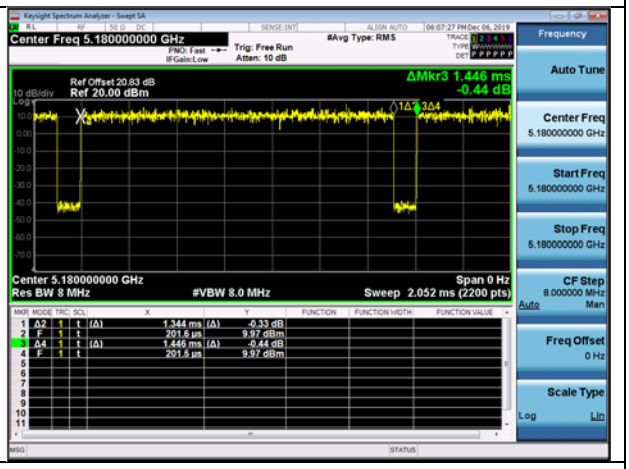
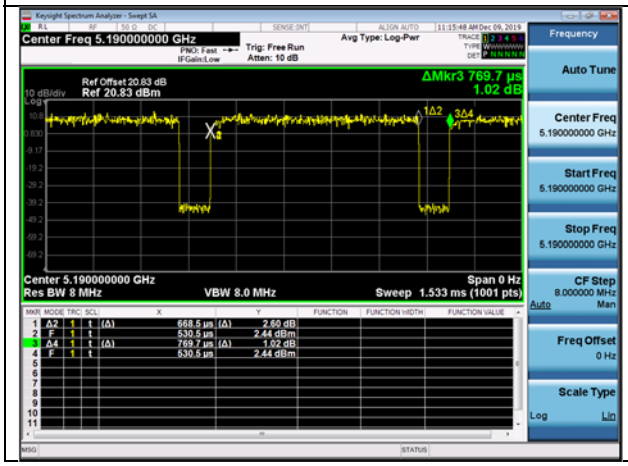
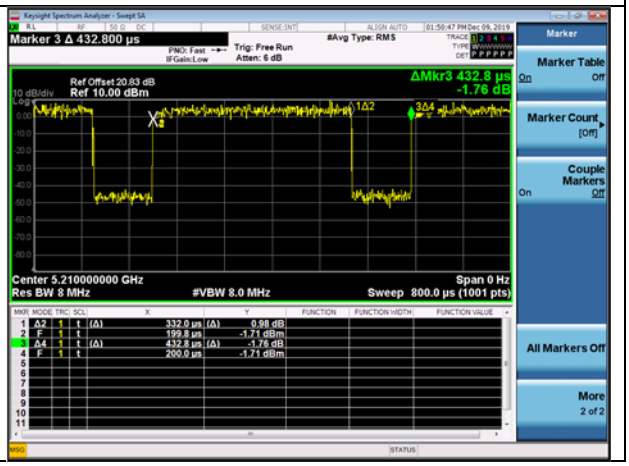
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11a	6	1.430	1.530	0.935	0.291
	9	0.960	1.062	0.904	0.440
	12	0.723	0.826	0.876	0.575
	18	0.493	0.594	0.829	0.812
	24	0.372	0.474	0.786	1.045
	36	0.256	0.357	0.717	1.447
	48	0.197	0.298	0.660	1.804
	54	0.180	0.282	0.640	1.938

Mode	MCS Index	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor(dB)
802.11n (HT20)	0	1.336	1.436	0.930	0.315
	1	0.688	0.789	0.873	0.592
	2	0.471	0.573	0.822	0.851
	3	0.364	0.466	0.783	1.064
	4	0.256	0.357	0.717	1.447
	5	0.199	0.301	0.662	1.793
	6	0.184	0.285	0.645	1.903
	7	0.168	0.270	0.623	2.055
802.11n (HT40)	0	0.664	0.765	0.868	0.616
	1	0.352	0.452	0.778	1.093
	2	0.249	0.350	0.710	1.487
	3	0.197	0.298	0.659	1.809
	4	0.144	0.246	0.586	2.320
	5	0.116	0.218	0.535	2.715
	6	0.108	0.209	0.516	2.876
	7	0.100	0.202	0.496	3.049

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	0.318
	1	0.693	0.794	0.873	0.590
	2	0.476	0.578	0.823	0.846
	3	0.369	0.470	0.784	1.055
	4	0.260	0.362	0.719	1.432
	5	0.204	0.306	0.668	1.755
	6	0.188	0.290	0.650	1.870
	7	0.172	0.274	0.628	2.021
	8	0.152	0.254	0.599	2.223
802.11ac (VHT40)	0	0.669	0.770	0.869	0.612
	1	0.356	0.457	0.779	1.085
	2	0.252	0.353	0.714	1.461
	3	0.200	0.302	0.663	1.784
	4	0.148	0.250	0.593	2.268
	5	0.120	0.222	0.543	2.655
	6	0.112	0.214	0.525	2.796
	7	0.104	0.206	0.507	2.954
	8	0.096	0.197	0.488	3.117
	9	0.088	0.189	0.466	3.317
802.11ac (VHT80)	0	0.332	0.433	0.767	1.151
	1	0.188	0.289	0.651	1.867
	2	0.140	0.242	0.580	2.365
	3	0.116	0.217	0.533	2.732
	4	0.092	0.194	0.475	3.231
	5	0.080	0.182	0.441	3.560
	6	0.076	0.177	0.428	3.685
	7	0.072	0.173	0.417	3.799
	8	0.068	0.169	0.402	3.953
	9	0.064	0.165	0.387	4.128

Note:

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

802.11a	802.11n(HT20)
	
802.11n(HT40)	**802.11ac(VHT20)**
	
802.11ac(VHT40)	**802.11ac(VHT80)**
	

10.2 26DB BANDWIDTH

Straddle channel data in the table below are for reporting purposes only.
Straddle channel data were added in section 10.7.1.

802.11a Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.00	16.535
5200	40	20.72	16.639
5240	48	21.04	16.577
5745	149	20.50	16.546
5785	157	20.40	16.659
5825	165	20.96	16.539

802.11n(HT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	21.00	17.697
5200	40	21.26	17.800
5240	48	20.84	17.733
5745	149	21.18	17.688
5785	157	20.95	17.661
5825	165	21.31	17.740

802.11n(HT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.18	36.052
5230	46	39.25	36.165
5755	151	39.10	36.051
5795	159	39.36	36.265

802.11ac(VHT20) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5180	36	20.83	17.724
5200	40	20.97	17.735
5240	48	21.42	17.777
5745	149	20.97	17.736
5785	157	20.87	17.773
5825	165	21.03	17.744

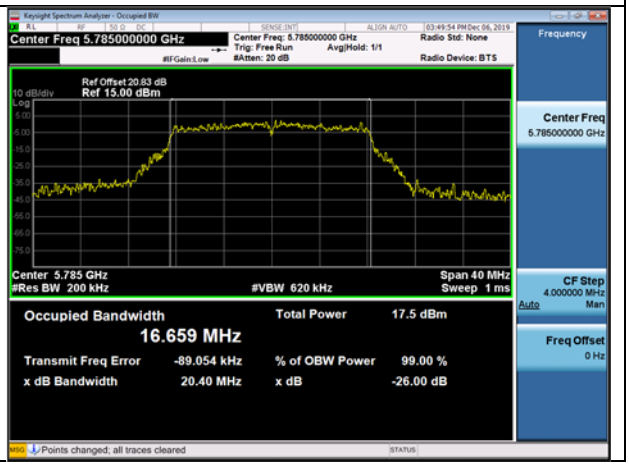
802.11ac(VHT40) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5190	38	39.12	36.087
5230	46	39.32	36.048
5755	151	39.20	36.006
5795	159	39.10	36.228

802.11ac(VHT80) Mode		26dB Bandwidth [MHz]	99% bandwidth [MHz]
Frequency [MHz]	Channel No.		
5210	42	80.32	75.531
5775	155	80.95	75.339

▣ Test Plots(802.11a)

Note:

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

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

▣ Test Plots(802.11n(HT20))

Note:

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

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

▣ Test Plots(802.11n(HT40))

Note:

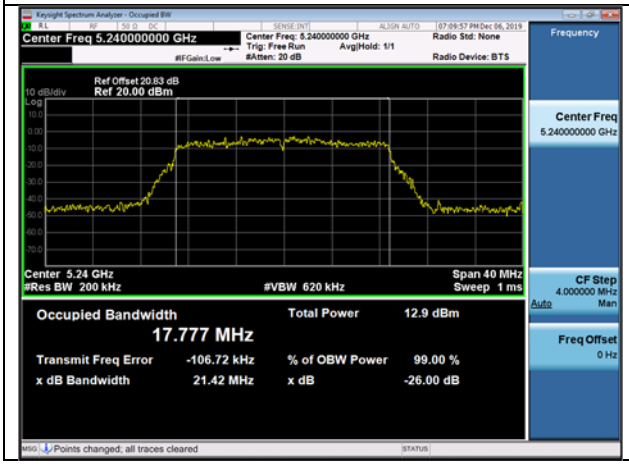
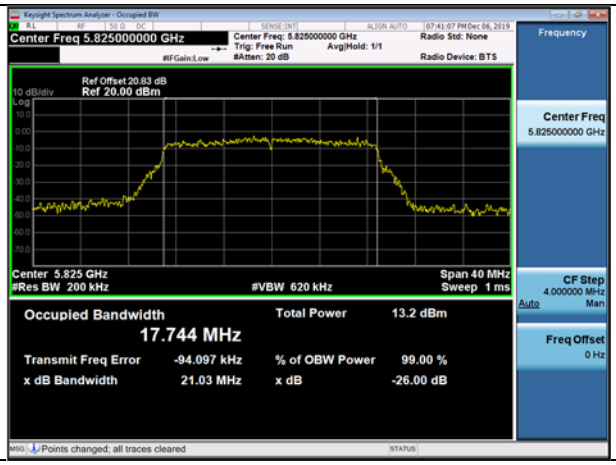
In order to simplify the report, attached plots were only the most wide channel.

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

▣ Test Plots(802.11ac(VHT20))

Note:

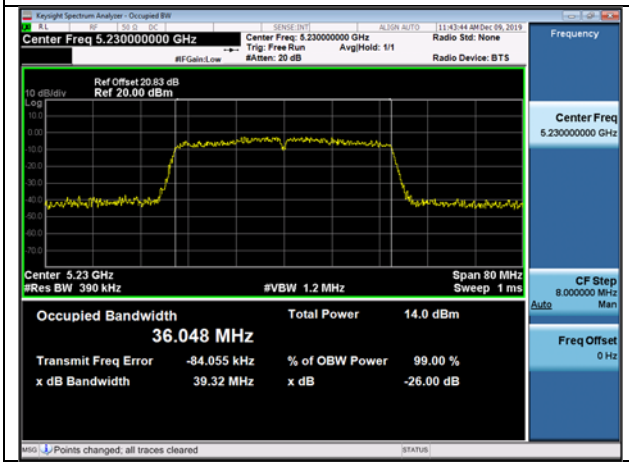
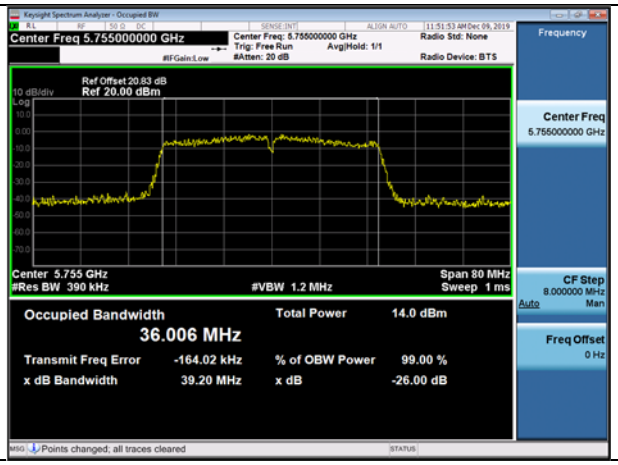
In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT20 UNII 1 BAND 26dB Bandwidth(CH 48)	802.11ac_VHT20 UNII 3 BAND 26dB Bandwidth(CH 165)
	

▣ Test Plots(802.11ac(VHT40))

Note:

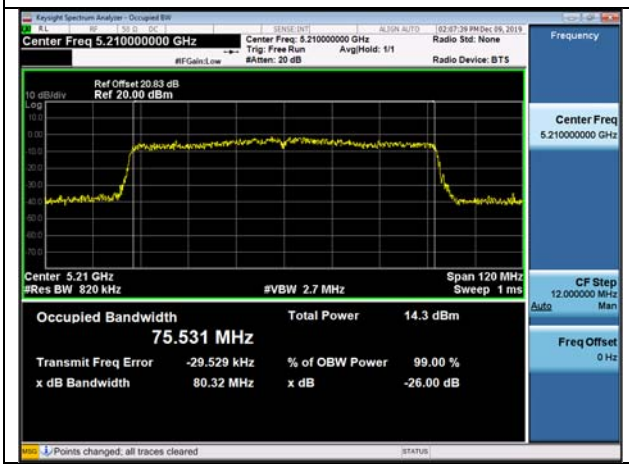
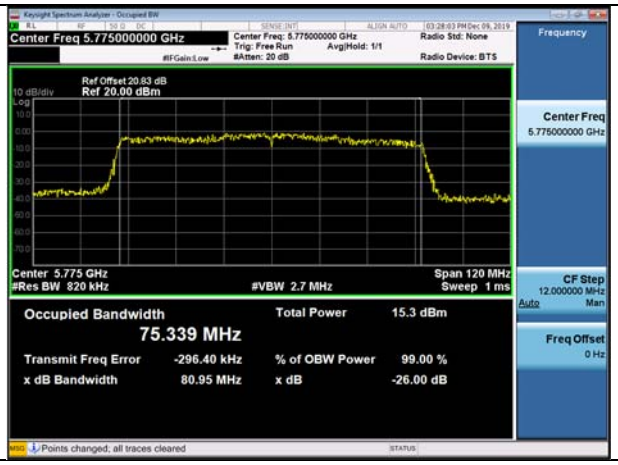
In order to simplify the report, attached plots were only the most wide channel.

802.11ac_VHT40 UNII 1 BAND 26dB Bandwidth(CH 46)	802.11ac_VHT40 UNII 3 BAND 26dB Bandwidth (CH 151)
	

▣ Test Plots(802.11ac(VHT80))

Note:

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

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

10.3 6DB BANDWIDTH

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

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.59	> 0.5	Pass
5785	157	16.16	> 0.5	Pass
5825	165	16.95	> 0.5	Pass

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	33.86	> 0.5	Pass
5795	159	35.26	> 0.5	Pass

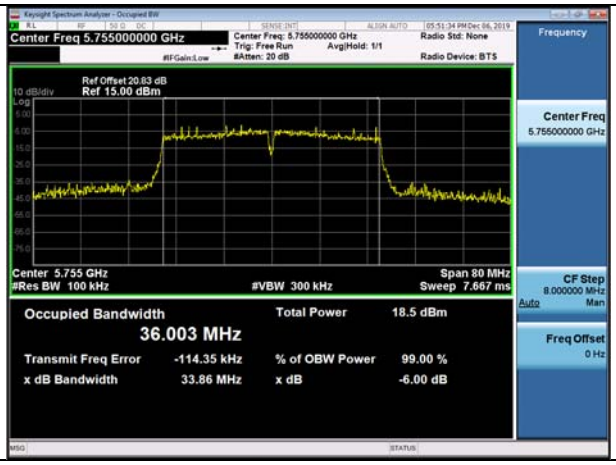
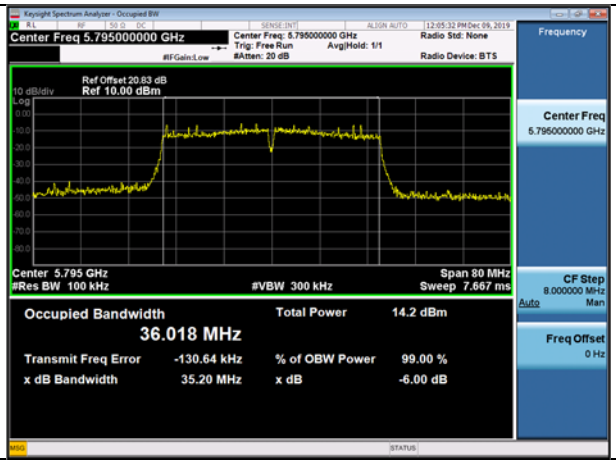
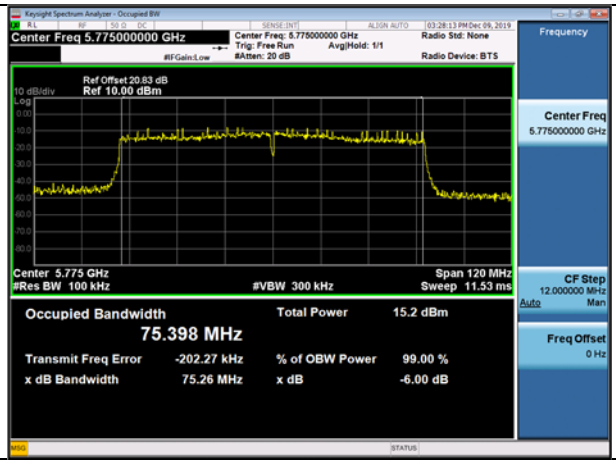
802.11ac(VHT20) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5745	149	17.37	> 0.5	Pass
5785	157	17.57	> 0.5	Pass
5825	165	17.70	> 0.5	Pass

802.11ac(VHT40) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5755	151	35.20	> 0.5	Pass
5795	159	35.20	> 0.5	Pass

802.11ac(VHT80) Mode		Measured Bandwidth [MHz]	Limit [MHz]	Pass / Fail
Frequency [MHz]	Channel No.			
5775	155	75.26	> 0.5	Pass

▣ Test Plots

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

802.11a (CH.149)	802.11n(HT20) (CH.157)
	
802.11n(HT40) (CH.151)	**802.11ac(VHT20) (CH.149)**
	
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]	Limit (dBm)
Frequency [MHz]	Channel No.				
5180	36	11.99	0.58	12.56	23.98
5200	40	12.13	0.58	12.70	
5240	48	12.24	0.29	12.53	
5745	149	12.62	0.58	13.20	30
5785	157	12.08	0.58	12.65	
5825	165	11.75	0.58	12.32	

802.11n(20MHz) Mode		Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)
Frequency [MHz]	Channel No.				
5180	36	10.48	1.90	12.38	23.98
5200	40	11.86	0.59	12.45	
5240	48	11.48	0.85	12.33	
5745	149	12.51	0.31	12.82	30
5785	157	12.12	0.31	12.44	
5825	165	11.84	0.31	12.15	

802.11n(40MHz) Mode		Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)
Frequency [MHz]	Channel No.				
5190	38	10.18	1.81	11.98	23.98
5230	46	10.95	1.09	12.04	
5755	151	12.35	0.62	12.96	30
5795	159	9.30	3.05	12.35	

802.11ac(20MHz) Mode		Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)
Frequency [MHz]	Channel No.				
5180	36	8.08	0.32	8.39	23.98
5200	40	7.33	0.85	8.18	
5240	48	7.18	0.59	7.77	
5745	149	7.96	0.85	8.81	30
5785	157	7.80	0.59	8.39	
5825	165	7.49	0.85	8.34	

802.11ac(40MHz) Mode		Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)
Frequency [MHz]	Channel No.				
5190	38	6.16	2.66	8.81	23.98
5230	46	7.69	1.08	8.78	
5755	151	6.54	2.27	8.81	30
5795	159	5.44	3.32	8.76	

802.11ac(80MHz) Mode		Measured Power [dBm]	Duty Cycle Factor (dB)	Total Power [dBm]	Limit (dBm)
Frequency [MHz]	Channel No.				
5210	42	6.58	2.36	8.94	23.98
5775	155	8.17	1.15	9.32	30

10.5 POWER SPECTRAL DENSITY

802.11a Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	1.591	0.575	2.166	11 dBm/MHz
5200	40	2.035	0.575	2.610	
5240	48	2.004	0.291	2.295	
5745	149	-0.630	0.575	-0.055	30 dBm/500kHz
5785	157	-1.067	0.575	-0.492	
5825	165	-1.250	0.575	-0.675	

802.11n(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-0.734	1.903	1.169	11 dBm/MHz
5200	40	1.475	0.592	2.067	
5240	48	0.926	0.851	1.777	
5745	149	-0.122	0.315	0.193	30 dBm/500kHz
5785	157	-0.950	0.315	-0.635	
5825	165	-1.199	0.315	-0.884	

802.11n(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-2.845	1.809	-1.036	11 dBm/MHz
5230	46	-2.307	1.093	-1.214	
5755	151	-3.784	0.616	-3.168	30 dBm /500kHz
5795	159	-5.565	3.049	-2.516	

802.11ac(20MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5180	36	-2.624	0.318	-2.306	11 dBm/MHz
5200	40	-2.906	0.846	-2.060	
5240	48	-3.240	0.590	-2.650	
5745	149	-4.953	0.846	-4.107	30 dBm/500kHz
5785	157	-5.599	0.590	-5.009	
5825	165	-5.070	0.846	-4.224	

802.11ac(40MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5190	38	-6.874	2.655	-4.219	11 dBm/MHz
5230	46	-5.812	1.085	-4.727	
5755	151	-9.565	2.268	-7.297	30 dBm/500kHz
5795	159	-10.009	3.317	-6.692	

802.11ac(80MHz) Mode		Measured PSD [dBm]	Duty Cycle Factor (dB)	Total PSD [dBm]	Limit
Frequency [MHz]	Channel No.				
5210	42	-10.010	2.365	-7.645	11 dBm/MHz
5775	155	-10.692	1.151	-9.541	30 dBm/500kHz

▣ Test Plots(802.11a)

Note:

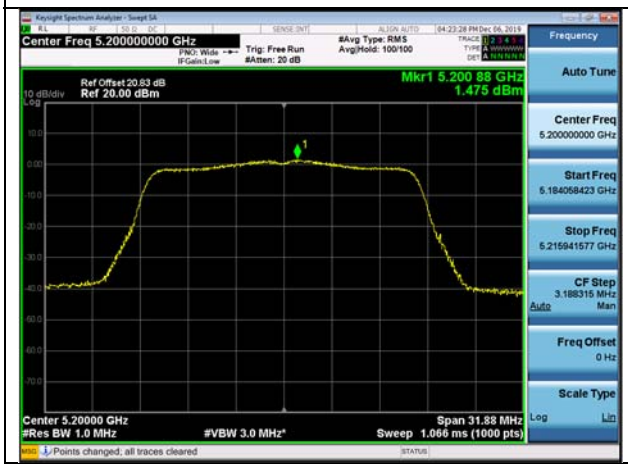
In order to simplify the report, attached plots were only channel of highest power.

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

▣ Test Plots(802.11n(HT20))

Note:

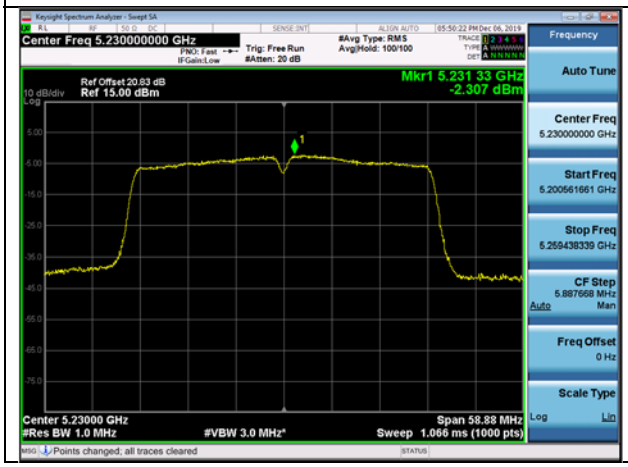
In order to simplify the report, attached plots were only channel of highest power.

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

▣ Test Plots(802.11n(HT40))

Note:

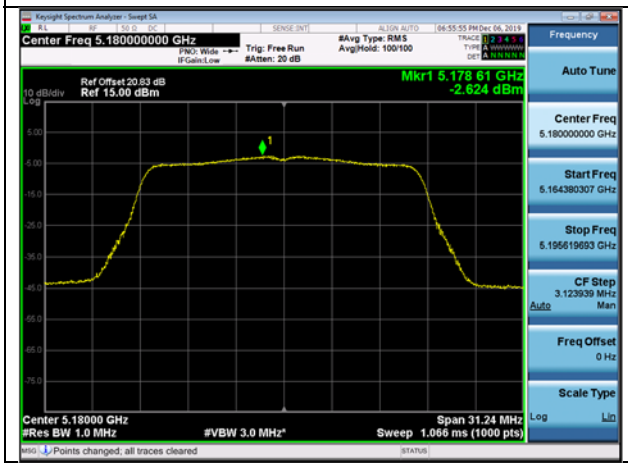
In order to simplify the report, attached plots were only channel of highest power.

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

▣ Test Plots(802.11ac(VHT20))

Note:

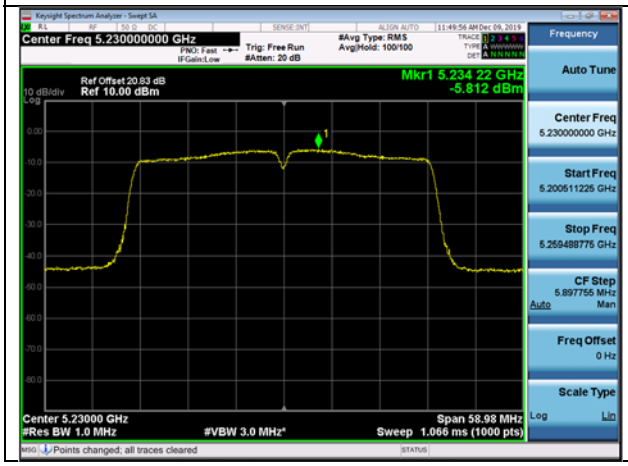
In order to simplify the report, attached plots were only channel of highest power.

UNII 1 (Ch. 36)	UNII 3 (Ch. 149)
	

▣ Test Plots(802.11ac(VHT40))

Note:

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

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

▣ 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 3 (Ch. 155)
	

10.6 FREQUENCY STABILITY.

10.6.1 80MHz BW

Startup after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210012.70	12.70
100%		-30	5210064.51	64.51
100%		-20	5210001.02	1.02
100%		-10	5210095.17	95.17
100%		0	5210041.74	41.74
100%		+10	5210029.79	29.79
100%		+30	5210065.69	65.69
100%		+40	5210031.16	31.16
100%		+50	5210007.24	7.24
Low	13.8	+20	5210072.78	72.78
High	10.2	+20	5210031.09	31.09

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775080.74	80.74
100%		-30	5775013.88	13.88
100%		-20	5775070.16	70.16
100%		-10	5775079.86	79.86
100%		0	5775045.22	45.22
100%		+10	5775057.44	57.44
100%		+30	5775087.31	87.31
100%		+40	5775095.12	95.12
100%		+50	5775087.60	87.60
Low	13.8	+20	5775069.80	69.80
High	10.2	+20	5775081.54	81.54

Note:

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

2 minutes after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210095.62	95.62
100%		-30	5210080.88	80.88
100%		-20	5210036.65	36.65
100%		-10	5210070.93	70.93
100%		0	5210023.62	23.62
100%		+10	5210085.23	85.23
100%		+30	5210010.83	10.83
100%		+40	5210005.04	5.04
100%		+50	5210051.78	51.78
Low	13.8	+20	5210052.27	52.27
High	10.2	+20	5210027.84	27.84

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775088.11	88.11
100%		-30	5775078.77	78.77
100%		-20	5775028.83	28.83
100%		-10	5775098.70	98.7
100%		0	5775075.77	75.77
100%		+10	5775083.09	83.09
100%		+30	5775063.23	63.23
100%		+40	5775073.06	73.06
100%		+50	5775028.93	28.93
Low	13.8	+20	5775018.38	18.38
High	10.2	+20	5775086.02	86.02

Note:

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

5 minutes after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210072.78	72.78
100%		-30	5210077.97	77.97
100%		-20	5210092.18	92.18
100%		-10	5210095.94	95.94
100%		0	5210016.17	16.17
100%		+10	5210053.19	53.19
100%		+30	5210021.35	21.35
100%		+40	5210048.29	48.29
100%		+50	5210041.81	41.81
Low	13.8	+20	5210066.34	66.34
High	10.2	+20	5210032.55	32.55

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775050.35	50.35
100%		-30	5775047.86	47.86
100%		-20	5775021.06	21.06
100%		-10	5775065.68	65.68
100%		0	5775070.71	70.71
100%		+10	5775026.24	26.24
100%		+30	5775019.09	19.09
100%		+40	5775073.70	73.7
100%		+50	5775046.95	46.95
Low	13.8	+20	5775076.57	76.57
High	10.2	+20	5775040.47	40.47

Note:

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

10 minutes after the EUT is energized

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5210049.10	49.10
100%		-30	5210027.53	27.53
100%		-20	5210059.54	59.54
100%		-10	5210061.65	61.65
100%		0	5210039.93	39.93
100%		+10	5210090.97	90.97
100%		+30	5210026.09	26.09
100%		+40	5210073.71	73.71
100%		+50	5210070.42	70.42
Low	13.8	+20	5210041.04	41.04
High	10.2	+20	5210050.07	50.07

Note:

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

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

Voltage (%)	Power (VDC)	Temp. (°C)	Frequency (kHz)	Frequency Error (kHz)
100%	12.00	+20(Ref)	5775071.58	71.58
100%		-30	5775066.87	66.87
100%		-20	5775051.34	51.34
100%		-10	5775068.80	68.8
100%		0	5775080.49	80.49
100%		+10	5775098.88	98.88
100%		+30	5775009.82	9.82
100%		+40	5775094.14	94.14
100%		+50	5775009.38	9.38
Low	13.8	+20	5775065.57	65.57
High	10.2	+20	5775027.35	27.35

Note:

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

10.7 RADIATED SPURIOUS EMISSIONS

Frequency Range : 9 kHz – 30MHz

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

Note:

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

Frequency Range : Below 1 GHz

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

Note:

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

Frequency Range : Above 1 GHz

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

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	50.57	4.10	V	54.67	68.20	13.53	PK
15540	47.06	5.36	V	52.42	73.98	21.56	PK
15540	33.64	5.36	V	39.00	53.98	14.98	AV
10360	50.23	4.10	H	54.33	68.20	13.87	PK
15540	47.02	5.36	H	52.38	73.98	21.60	PK
15540	33.51	5.36	H	38.87	53.98	15.11	AV

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

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	51.39	3.87	V	55.26	68.20	12.94	PK
15600	47.56	4.75	V	52.31	73.98	21.67	PK
15600	33.86	4.75	V	38.61	53.98	15.37	AV
10400	51.52	3.87	H	55.39	68.20	12.81	PK
15600	47.77	4.75	H	52.52	73.98	21.46	PK
15600	33.98	4.75	H	38.73	53.98	15.25	AV

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

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	50.16	4.52	V	54.68	68.20	13.52	PK
15720	47.04	3.58	V	50.62	73.98	23.36	PK
15720	33.52	3.58	V	37.10	53.98	16.88	AV
10480	50.05	4.52	H	54.57	68.20	13.63	PK
15720	46.86	3.58	H	50.44	73.98	23.54	PK
15720	33.46	3.58	H	37.04	53.98	16.94	AV

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

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	52.12	4.19	V	56.31	73.98	17.67	PK
11490	45.39	4.19	V	49.58	53.98	4.40	AV
17235	47.28	9.09	V	56.37	68.20	11.83	PK
11490	52.21	4.19	H	56.40	73.98	17.58	PK
11490	45.57	4.19	H	49.76	53.98	4.22	AV
17235	47.35	9.09	H	56.44	68.20	11.76	PK

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

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	51.39	4.83	V	56.22	73.98	17.76	PK
11570	43.71	4.83	V	48.54	53.98	5.44	AV
17355	46.38	9.81	V	56.19	68.20	12.01	PK
11570	51.62	4.83	H	56.45	73.98	17.53	PK
11570	43.76	4.83	H	48.59	53.98	5.39	AV
17355	46.53	9.81	H	56.34	68.20	11.86	PK

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

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	51.29	3.70	V	54.99	73.98	18.99	PK
11650	44.18	3.70	V	47.88	53.98	6.10	AV
17475	48.56	10.25	V	58.81	68.20	9.39	PK
11650	51.48	3.70	H	55.18	73.98	18.80	PK
11650	44.21	3.70	H	47.91	53.98	6.07	AV
17475	48.62	10.25	H	58.87	68.20	9.33	PK

Band :	UNII 1
Operation Mode:	802.11 n(HT20)
Transfer MCS Index:	MCS0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	50.74	4.10	V	54.84	68.20	13.36	PK
15540	46.93	5.36	V	52.29	73.98	21.69	PK
15540	33.52	5.36	V	38.88	53.98	15.10	AV
10360	50.54	4.10	H	54.64	68.20	13.56	PK
15540	46.86	5.36	H	52.22	73.98	21.76	PK
15540	33.51	5.36	H	38.87	53.98	15.11	AV

Band :	UNII 1
Operation Mode:	802.11 n(HT20)
Transfer MCS Index:	MCS0
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	51.63	3.87	V	55.50	68.20	12.70	PK
15600	48.12	4.75	V	52.87	73.98	21.11	PK
15600	33.86	4.75	V	38.61	53.98	15.37	AV
10400	51.39	3.87	H	55.26	68.20	12.94	PK
15600	47.95	4.75	H	52.70	73.98	21.28	PK
15600	33.69	4.75	H	38.44	53.98	15.54	AV

Band :	UNII 1
Operation Mode:	802.11 n(HT20)
Transfer MCS Index:	MCS0
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	50.01	4.52	V	54.53	68.20	13.67	PK
15720	46.96	3.58	V	50.54	73.98	23.44	PK
15720	33.65	3.58	V	37.23	53.98	16.75	AV
10480	49.95	4.52	H	54.47	68.20	13.73	PK
15720	46.84	3.58	H	50.42	73.98	23.56	PK
15720	33.59	3.58	H	37.17	53.98	16.81	AV

Band :	UNII 3
Operation Mode:	802.11 n(HT20)
Transfer MCS Index:	MCS0
Operating Frequency	5745MHz
Channel No.	149 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	51.48	4.19	V	55.67	73.98	18.31	PK
11490	45.26	4.19	V	49.45	53.98	4.53	AV
17235	47.11	9.09	V	56.20	68.20	12.00	PK
11490	51.69	4.19	H	55.88	73.98	18.10	PK
11490	45.43	4.19	H	49.62	53.98	4.36	AV
17235	47.29	9.09	H	56.38	68.20	11.82	PK

Band :	UNII 3
Operation Mode:	802.11 n(HT20)
Transfer MCS Index:	MCS0
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	51.48	4.83	V	56.31	73.98	17.67	PK
11570	43.58	4.83	V	48.41	53.98	5.57	AV
17355	46.29	9.81	V	56.10	68.20	12.10	PK
11570	51.58	4.83	H	56.41	73.98	17.57	PK
11570	43.69	4.83	H	48.52	53.98	5.46	AV
17355	46.56	9.81	H	56.37	68.20	11.83	PK

Band :	UNII 3
Operation Mode:	802.11 n(HT20)
Transfer MCS Index:	MCS0
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	51.28	3.70	V	54.98	73.98	19.00	PK
11650	44.12	3.70	V	47.82	53.98	6.16	AV
17475	47.63	10.25	V	57.88	68.20	10.32	PK
11650	51.35	3.70	H	55.05	73.98	18.93	PK
11650	44.28	3.70	H	47.98	53.98	6.00	AV
17475	47.67	10.25	H	57.92	68.20	10.28	PK

Band :	UNII 1
Operation Mode:	802.11 ac(VHT20)
Transfer MCS Index:	MCS0
Operating Frequency	5180 MHz
Channel No.	36 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10360	50.65	4.10	V	54.75	68.20	13.45	PK
15540	46.88	5.36	V	52.24	73.98	21.74	PK
15540	33.59	5.36	V	38.95	53.98	15.03	AV
10360	50.56	4.10	H	54.66	68.20	13.54	PK
15540	46.76	5.36	H	52.12	73.98	21.86	PK
15540	33.39	5.36	H	38.75	53.98	15.23	AV

Band :	UNII 1
Operation Mode:	802.11 ac(VHT20)
Transfer MCS Index:	MCS0
Operating Frequency	5200 MHz
Channel No.	40 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10400	51.71	3.87	V	55.58	68.20	12.62	PK
15600	47.56	4.75	V	52.31	73.98	21.67	PK
15600	33.91	4.75	V	38.66	53.98	15.32	AV
10400	51.68	3.87	H	55.55	68.20	12.65	PK
15600	47.39	4.75	H	52.14	73.98	21.84	PK
15600	33.84	4.75	H	38.59	53.98	15.39	AV

Band :	UNII 1
Operation Mode:	802.11 ac(VHT20)
Transfer MCS Index:	MCS0
Operating Frequency	5240 MHz
Channel No.	48 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10480	50.54	4.52	V	55.06	68.20	13.14	PK
15720	47.18	3.58	V	50.76	73.98	23.22	PK
15720	33.57	3.58	V	37.15	53.98	16.83	AV
10480	50.43	4.52	H	54.95	68.20	13.25	PK
15720	47.05	3.58	H	50.63	73.98	23.35	PK
15720	33.43	3.58	H	37.01	53.98	16.97	AV

Band :	UNII 3
Operation Mode:	802.11 ac(VHT20)
Transfer MCS Index:	MCS0
Operating Frequency	5745MHz
Channel No.	149 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11490	52.72	4.19	V	56.91	73.98	17.07	PK
11490	45.39	4.19	V	49.58	53.98	4.40	AV
17235	46.11	9.09	V	55.20	68.20	13.00	PK
11490	52.88	4.19	H	57.07	73.98	16.91	PK
11490	45.40	4.19	H	49.59	53.98	4.39	AV
17235	46.23	9.09	H	55.32	68.20	12.88	PK

Band :	UNII 3
Operation Mode:	802.11 ac(VHT20)
Transfer MCS Index:	MCS0
Operating Frequency	5785 MHz
Channel No.	157 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11570	51.34	4.83	V	56.17	73.98	17.81	PK
11570	43.45	4.83	V	48.28	53.98	5.70	AV
17355	46.12	9.81	V	55.93	68.20	12.27	PK
11570	51.39	4.83	H	56.22	73.98	17.76	PK
11570	43.57	4.83	H	48.40	53.98	5.58	AV
17355	46.23	9.81	H	56.04	68.20	12.16	PK

Band :	UNII 3
Operation Mode:	802.11 ac(VHT20)
Transfer MCS Index:	MCS0
Operating Frequency	5825 MHz
Channel No.	165 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11650	50.73	3.70	V	54.43	73.98	19.55	PK
11650	43.96	3.70	V	47.66	53.98	6.32	AV
17475	47.69	10.25	V	57.94	68.20	10.26	PK
11650	50.96	3.70	H	54.66	73.98	19.32	PK
11650	44.06	3.70	H	47.76	53.98	6.22	AV
17475	47.85	10.25	H	58.10	68.20	10.10	PK

Band :	UNII 1
Operation Mode:	802.11 n(HT40)
Transfer MCS Index:	MCS0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10380	51.24	4.09	V	55.33	68.20	12.87	PK
15570	47.32	4.73	V	52.05	73.98	21.93	PK
15570	34.68	4.73	V	39.41	53.98	14.57	AV
10380	51.16	4.09	H	55.25	68.20	12.95	PK
15570	47.26	4.73	H	51.99	73.98	21.99	PK
15570	34.51	4.73	H	39.24	53.98	14.74	AV

Band :	UNII 1
Operation Mode:	802.11 n(HT40)
Transfer MCS Index:	MCS0
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10460	50.32	4.54	V	54.86	68.20	13.34	PK
15690	47.22	3.69	V	50.91	73.98	23.07	PK
15690	34.49	3.69	V	38.18	53.98	15.80	AV
10460	50.31	4.54	H	54.85	68.20	13.35	PK
15690	47.18	3.69	H	50.87	73.98	23.11	PK
15690	34.28	3.69	H	37.97	53.98	16.01	AV

Band :	UNII 3
Operation Mode:	802.11 n(HT40)
Transfer MCS Index:	MCS0
Operating Frequency	5755 MHz
Channel No.	151 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11510	51.29	4.20	V	55.49	73.98	18.49	PK
11510	44.39	4.20	V	48.59	53.98	5.39	AV
17265	46.08	9.64	V	55.72	68.20	12.48	PK
11510	51.35	4.20	H	55.55	73.98	18.43	PK
11510	44.56	4.20	H	48.76	53.98	5.22	AV
17265	46.17	9.64	H	55.81	68.20	12.39	PK

Band :	UNII 3
Operation Mode:	802.11 n(HT40)
Transfer MCS Index:	MCS0
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11590	49.99	4.91	V	54.90	73.98	19.08	PK
11590	43.58	4.91	V	48.49	53.98	5.49	AV
17385	46.89	10.20	V	57.09	68.20	11.11	PK
11590	50.06	4.91	H	54.97	73.98	19.01	PK
11590	43.80	4.91	H	48.71	53.98	5.27	AV
17385	47.00	10.20	H	57.20	68.20	11.00	PK

Band :	UNII 1
Operation Mode:	802.11 ac(VHT40)
Transfer MCS Index:	MCS0
Operating Frequency	5190 MHz
Channel No.	38 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10380	51.44	4.09	V	55.53	68.20	12.67	PK
15570	47.56	4.73	V	52.29	73.98	21.69	PK
15570	34.55	4.73	V	39.28	53.98	14.70	AV
10380	51.26	4.09	H	55.35	68.20	12.85	PK
15570	47.44	4.73	H	52.17	73.98	21.81	PK
15570	34.41	4.73	H	39.14	53.98	14.84	AV

Band :	UNII 1
Operation Mode:	802.11 ac(VHT40)
Transfer MCS Index:	MCS0
Operating Frequency	5230 MHz
Channel No.	46 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10460	50.44	4.54	V	54.98	68.20	13.22	PK
15690	47.51	3.69	V	51.20	73.98	22.78	PK
15690	34.52	3.69	V	38.21	53.98	15.77	AV
10460	50.28	4.54	H	54.82	68.20	13.38	PK
15690	47.39	3.69	H	51.08	73.98	22.90	PK
15690	34.29	3.69	H	37.98	53.98	16.00	AV

Band :	UNII 3
Operation Mode:	802.11 ac(VHT40)
Transfer MCS Index:	MCS0
Operating Frequency	5755 MHz
Channel No.	151 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11510	51.28	4.20	V	55.48	73.98	18.50	PK
11510	44.57	4.20	V	48.77	53.98	5.21	AV
17265	46.39	9.64	V	56.03	68.20	12.17	PK
11510	51.39	4.20	H	55.59	73.98	18.39	PK
11510	44.60	4.20	H	48.80	53.98	5.18	AV
17265	46.58	9.64	H	56.22	68.20	11.98	PK

Band :	UNII 3
Operation Mode:	802.11 ac(VHT40)
Transfer MCS Index:	MCS0
Operating Frequency	5795 MHz
Channel No.	159 Ch

Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11590	51.21	4.91	V	56.12	73.98	17.86	PK
11590	43.96	4.91	V	48.87	53.98	5.11	AV
17385	47.05	10.20	V	57.25	68.20	10.95	PK
11590	51.24	4.91	H	56.15	73.98	17.83	PK
11590	44.00	4.91	H	48.91	53.98	5.07	AV
17385	47.17	10.20	H	57.37	68.20	10.83	PK

Band :	UNII 1
Operation Mode:	802.11 ac(VHT80)
Transfer MCS Index:	MCS0
Operating Frequency	5210 MHz
Channel No.	42 Ch

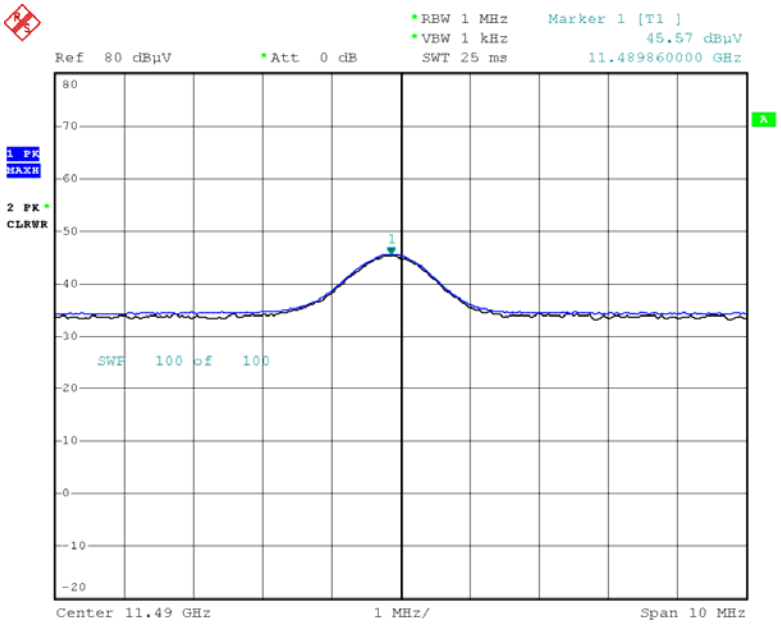
Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
10420	49.76	3.79	V	53.55	68.20	14.65	PK
15630	47.56	4.02	V	51.58	73.98	22.40	PK
15630	35.84	4.02	V	39.86	53.98	14.12	AV
10420	49.89	3.79	H	53.68	68.20	14.52	PK
15630	47.62	4.02	H	51.64	73.98	22.34	PK
15630	35.99	4.02	H	40.01	53.98	13.97	AV

Band :	UNII 3
Operation Mode:	802.11 ac(VHT80)
Transfer MCS Index:	MCS0
Operating Frequency	5775 MHz
Channel No.	155 Ch

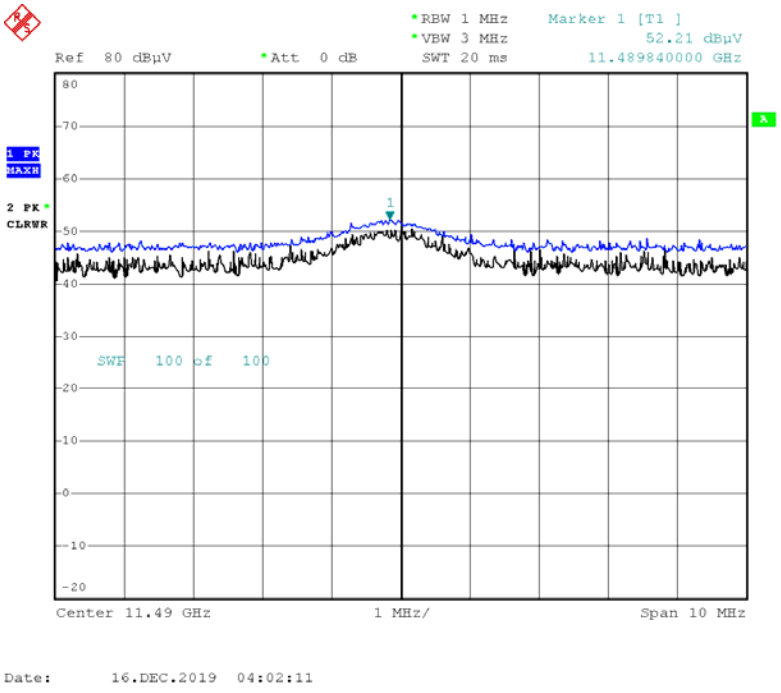
Frequency [MHz]	Reading [dBuV]	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
11550	51.18	4.50	V	55.68	73.98	18.30	PK
11550	44.86	4.50	V	49.36	53.98	4.62	AV
17325	46.88	10.22	V	57.10	68.20	11.10	PK
11550	51.22	4.50	H	55.72	73.98	18.26	PK
11550	44.98	4.50	H	49.48	53.98	4.50	AV
17325	47.01	10.22	H	57.23	68.20	10.97	PK

▣ Test Plots

Average Reading (802.11a, Ch.149 2nd Harmonic, X-H)



Peak Reading (802.11a, Ch.149 2nd Harmonic, X-H)



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 [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	52.91	11.06	H	63.97	73.98	10.01	PK
5150	35.46	11.06	H	46.52	53.98	7.46	AV
5150	53.13	11.06	V	64.19	73.98	9.79	PK
5150	35.51	11.06	V	46.57	53.98	7.41	AV

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

Frequency [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	47.36	11.06	H	58.42	73.98	15.56	PK
5150	35.28	11.06	H	46.34	53.98	7.64	AV
5150	47.63	11.06	V	58.69	73.98	15.29	PK
5150	35.42	11.06	V	46.48	53.98	7.50	AV

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

Frequency [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	47.18	11.06	H	58.24	73.98	15.74	PK
5150	33.84	11.06	H	44.9	53.98	9.08	AV
5150	47.36	11.06	V	58.42	73.98	15.56	PK
5150	33.97	11.06	V	45.03	53.98	8.95	AV

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

Frequency [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	53.48	11.06	H	64.54	73.98	9.44	PK
5150	39.15	11.06	H	50.21	53.98	3.77	AV
5150	54.20	11.06	V	65.26	73.98	8.72	PK
5150	39.90	11.06	V	50.96	53.98	3.02	AV

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

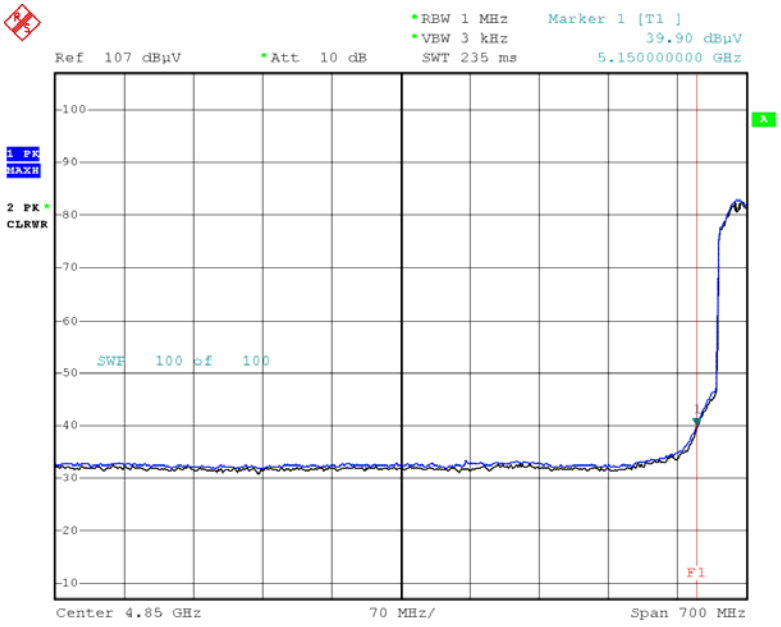
Frequency [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	47.14	11.06	H	58.20	73.98	15.78	PK
5150	35.75	11.06	H	46.81	53.98	7.17	AV
5150	47.45	11.06	V	58.51	73.98	15.47	PK
5150	35.94	11.06	V	47	53.98	6.98	AV

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

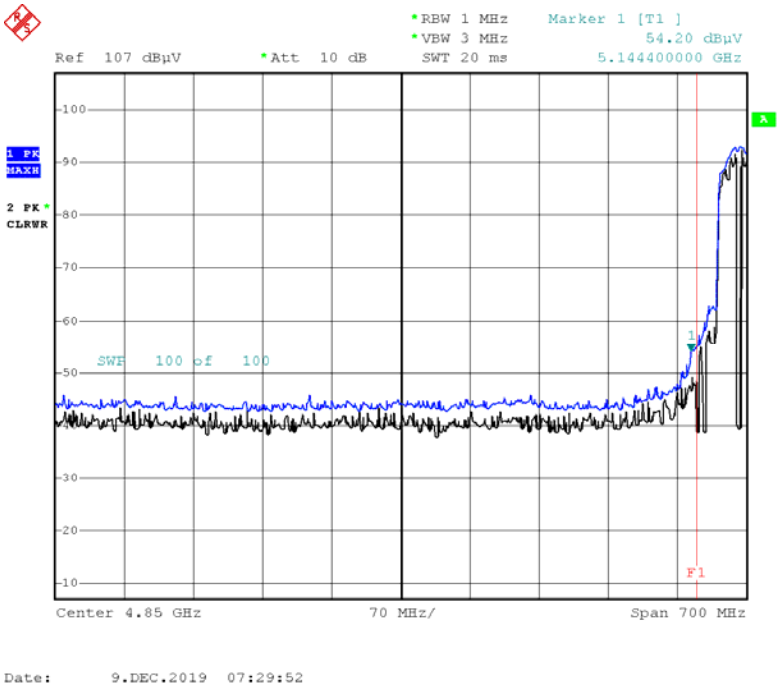
Frequency [MHz]	Reading dBuV	CL+AF+DF-AG [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
5150	49.86	11.06	H	60.92	73.98	13.06	PK
5150	38.96	11.06	H	50.02	53.98	3.96	AV
5150	50.14	11.06	V	61.2	73.98	12.78	PK
5150	39.10	11.06	V	50.16	53.98	3.82	AV

▣ Test Plots(UNII 1)

Average Reading (802.11n(40), Ch.38 , X-V)



Peak Reading (802.1111n(40), Ch.38, X-V)

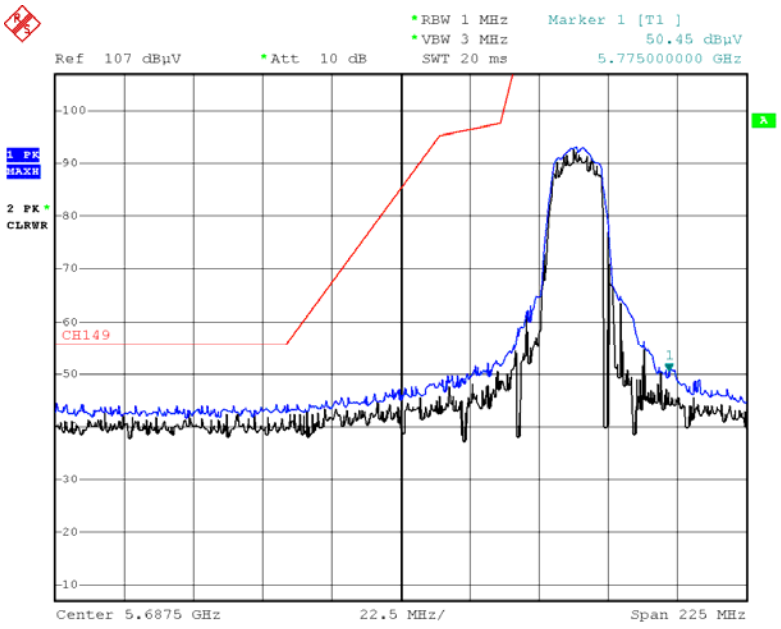


Note :

Only the worst case plots for Radiated Restricted Band Edge.

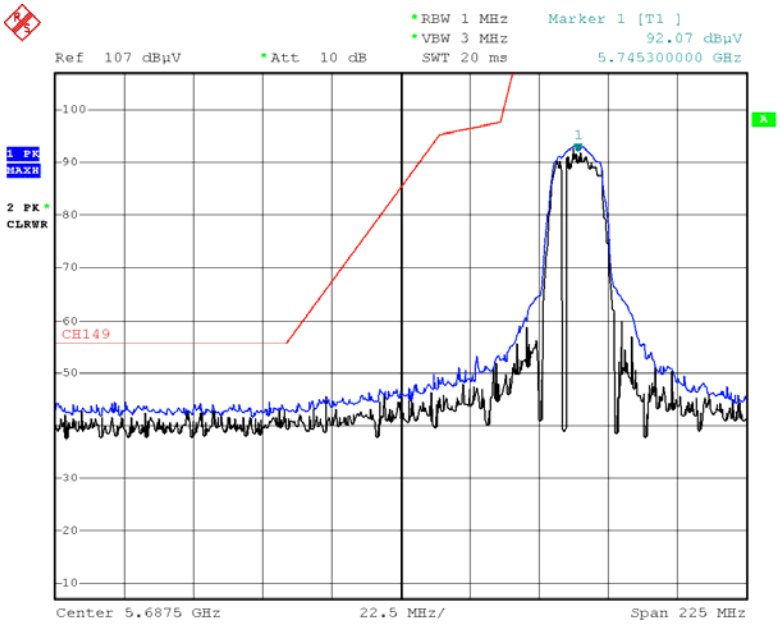
▣ Test Plots(UNII 3)

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



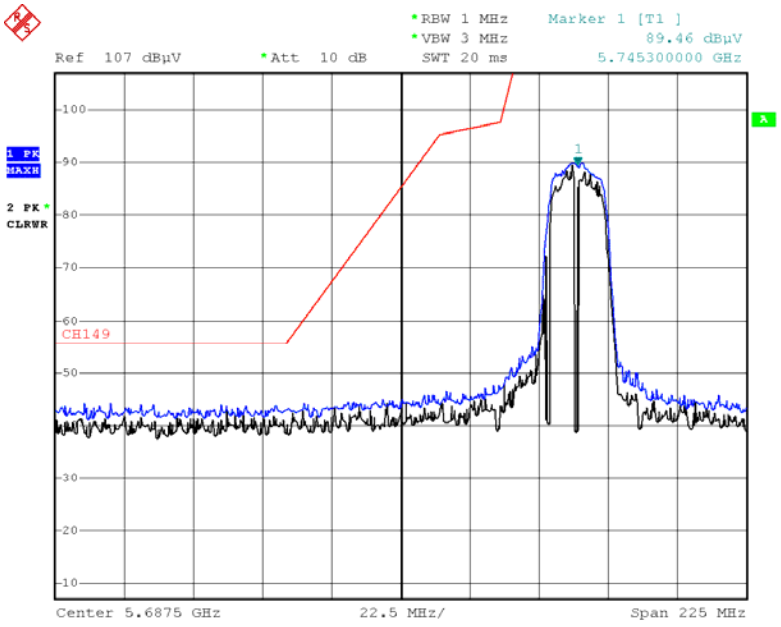
Date: 9.DEC.2019 07:58:46

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

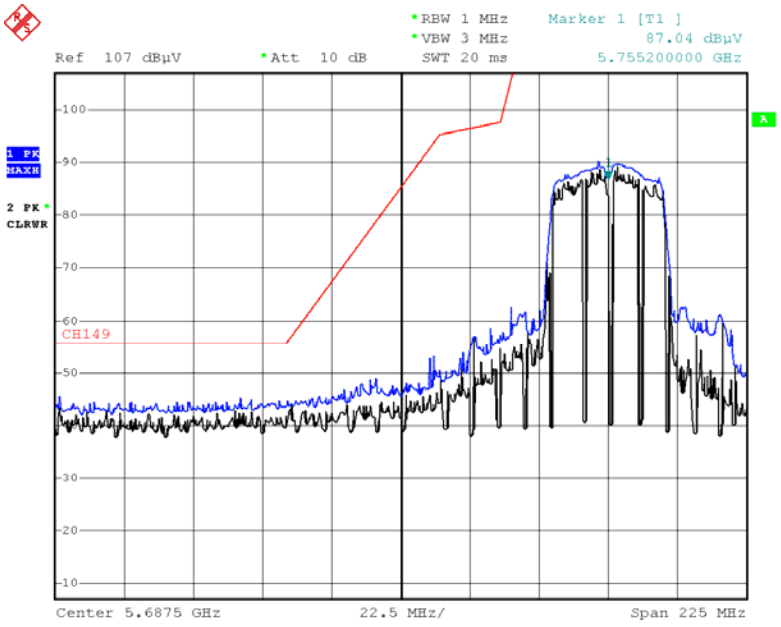


Date: 9.DEC.2019 07:59:18

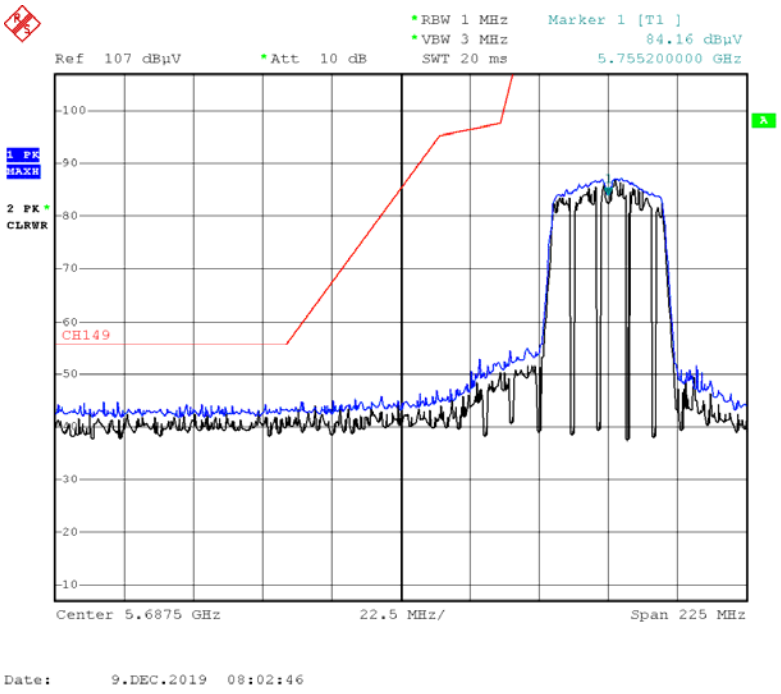
Peak Reading (802.11ac_VHT20, Ch.149, X-V)



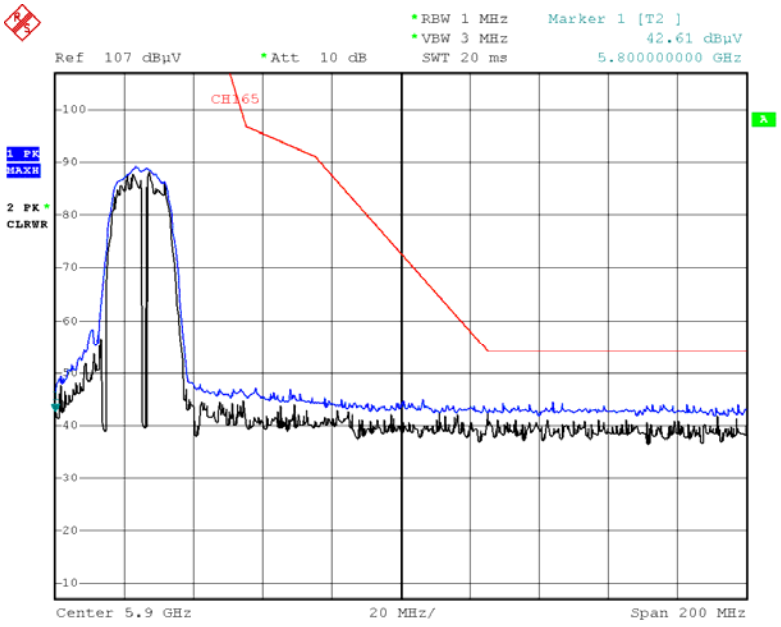
Peak Reading (802.11n_HT40, Ch.151, X-V)



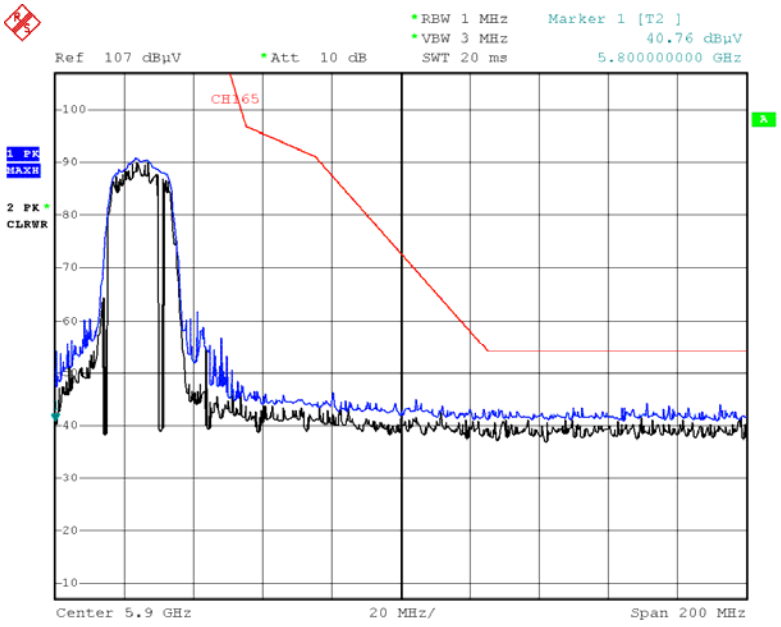
Peak Reading (802.11ac_VHT40, Ch.151, X-V)



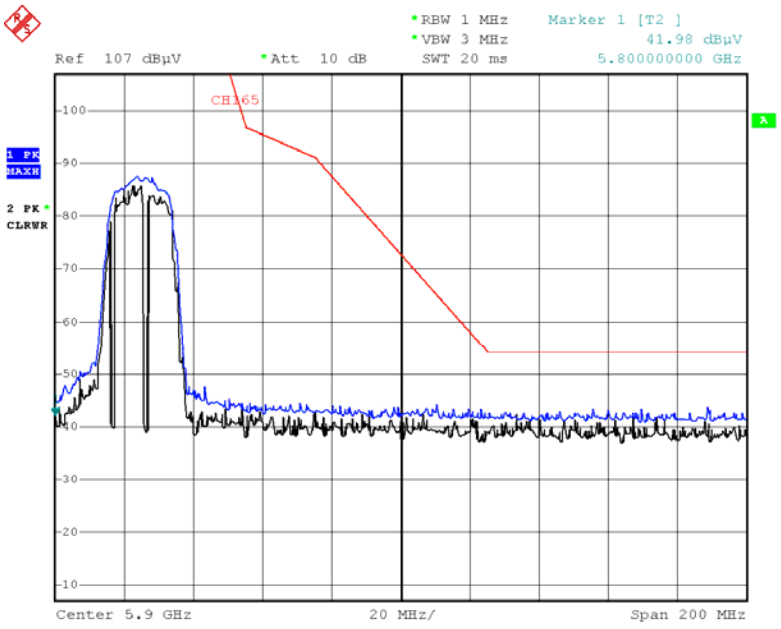
Peak Reading (802.11a, Ch.165, X-V)



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

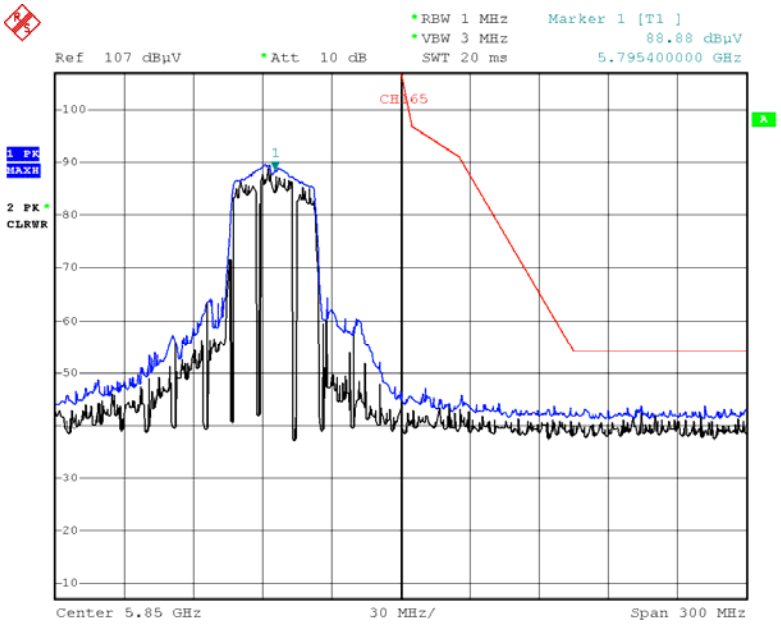


Peak Reading (802.11ac_VHT20, Ch.165, X-V)



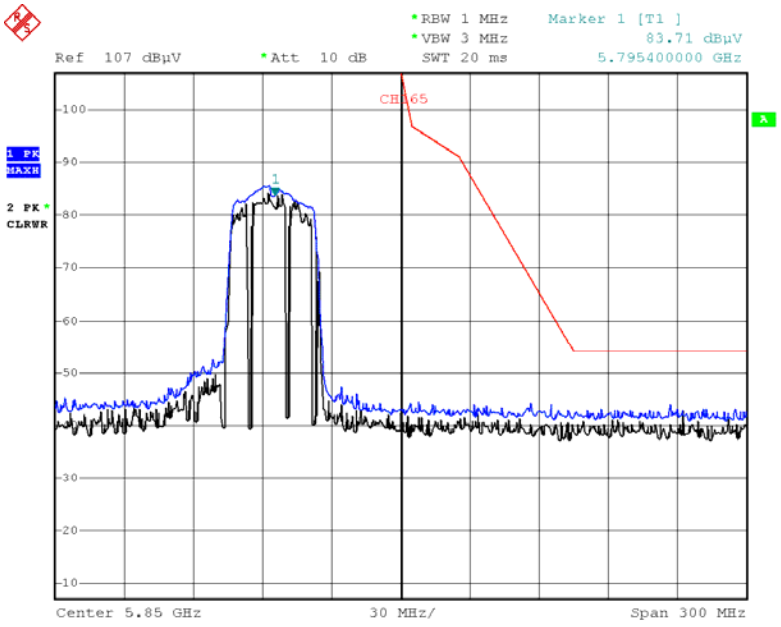
Date: 9.DEC.2019 07:48:54

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



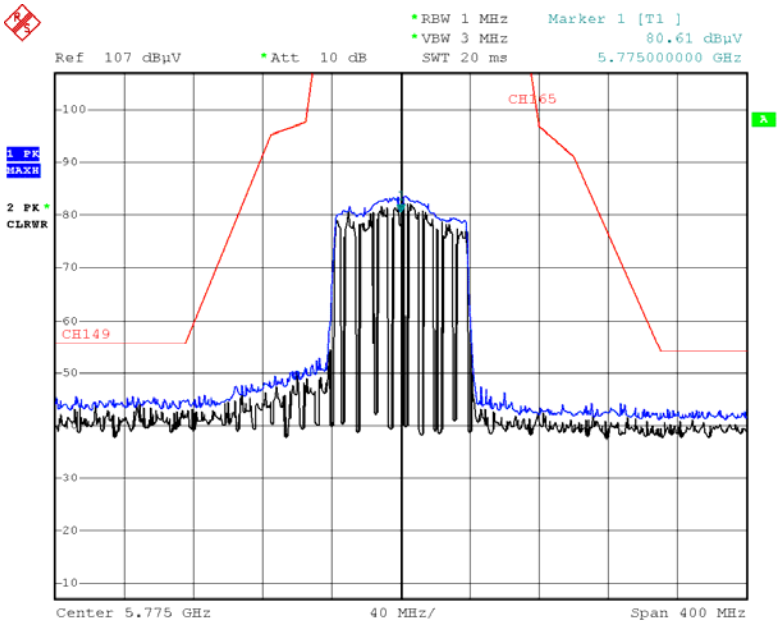
Date: 9.DEC.2019 07:53:45

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



Date: 9.DEC.2019 07:52:17

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



Date: 9.DEC.2019 07:56:48

11. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/11/2019	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/18/2019	Annual	100033
ESPAC	SU-642 /Temperature Chamber	03/12/2019	Annual	0093008124
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	01/10/2019	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/24/2019	Annual	101231
Agilent	N1911A / Power Meter	04/10/2019	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/10/2019	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/11/2019	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/24/2019	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/18/2019	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/02/2019	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A

Note:

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

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Emco	2090 / Controller	N/A	N/A	060520
Ets	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	01/18/2019	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/31/2018	Biennial	00895
Schwarzbeck	BBHA 9120D / Horn Antenna	11/18/2019	Biennial	9120D-1191
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	11/29/2019	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	09/11/2019	Annual	836650/016
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/26/2019	Annual	101068-SZ
Wainwright Instruments	WHKX10-2700-3000-18000-40SS / High Pass Filter	01/03/2019	Annual	4
Wainwright Instruments	WHKX8-6090-7000-18000-40SS / High Pass Filter	01/03/2019	Annual	5
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/19/2019	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2019	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/04/2019	Annual	2
WEINSCHEL	56-10 / Attenuator(10 dB)	10/08/2019	Annual	72316
CERNEX	CBLU1183540B-01/Broadband Bench Top LNA	01/03/2019	Annual	28549
CERNEX	CBL06185030 / Broadband Low Noise Amplifier	01/03/2019	Annual	24615
CERNEX	CBL18265035 / Power Amplifier	01/03/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/18/2019	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	03/26/2019	Annual	3000C000276

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.

12. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-1912-FC021-P