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TEST REPORT

FCC/ISED DTS Test for ETPFFRPP01

APPLICANT
LG Innotek Co., Ltd.

REPORT NO.
HCT-RF-2101-FI004

DATE OF ISSUE
January 19, 2021

Tested by
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Additional Model
-

Applicant	**LG Innotek Co., Ltd.** 26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea
Eut Type Model Name	4PPoE WLAN Bridge ETPFFRPP01
FCC ID IC	YZP-ETPFFRPP01 7414C-ETPFFRPP01
Modulation type	CCK/DSSS/OFDM
FCC Classification	Digital Transmission System(DTS)
FCC Rule Part(s)	Part 15.247
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	January 19, 2021	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.

CONTENTS

1. EUT DESCRIPTION

Model	ETPFFRPP01		
Additional Model	-		
EUT Type	4PPoE WLAN Bridge		
Power Supply	AC 110 [V] (Input : 100-130 [V]) / Operating Voltage : DC 52[V])		
Frequency Range	2412 MHz - 2462 MHz		
Max. RF Output Power	Peak Power	Ant.A (SISO)	802.11b: 26.32 dBm 802.11g: 27.01 dBm 802.11n(HT20): 26.41dBm 802.11n(HT40): 24.29 dBm
		Ant.B (SISO)	802.11b: 27.06 dBm 802.11g: 27.02 dBm 802.11n(HT20): 26.65 dBm 802.11n(HT40): 24.36 dBm
		Ant.A + Ant.B (MIMO)	802.11n(HT20): 26.52 dBm 802.11n(HT40): 22.27 dBm
	Average Power	Ant.A (SISO)	802.11b: 20.46 dBm 802.11g: 19.97 dBm 802.11n(HT20): 19.87 dBm 802.11n(HT40): 17.84 dBm
		Ant.B (SISO)	802.11b: 21.28 dBm 802.11g: 19.76 dBm 802.11n(HT20): 19.92 dBm 802.11n(HT40): 17.75 dBm
		Ant.A + Ant.B (MIMO)	802.11n(HT20): 19.99 dBm 802.11n(HT40): 15.48 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n(HT20, HT40)		
Number of Channels	11 Channels (n40M ch.3~9)		
Antenna type	Ant.A: PCB printed antenna Ant.B: Dipole antenna		
Antenna Peak Gain	Ant.A: 1.37 dBi Ant.B: 3.27 dBi		
Date(s) of Tests	November 23, 2020 ~ January 18, 2021		
PMN (Product Marketing Number)	4PPoE WLAN Bridge		
HVIN (Hardware Version Identification Number)	ETPFFRPP01		
FVIN (Firmware Version Identification Number)	v1.0		
HMN (Host Marketing Name)	N/A		
EUT serial numbers	Radiated: ETPFFRPP01_001 Conducted: ETPFFRPP01_002		

ANTENNA CONFIGURATIONS

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

Configurations	SISO (Antenna Selection)		MIMO(SDM)
	Ant A(Printed)	Ant B (External)	Ant A + Ant B
802.11b	O	O	X
802.11g	O	O	X
802.11n(HT20)	O	O	O
802.11n(HT40)	O	O	O

Note:

1. O = Support, X = Not Support
2. SISO = Single Input Single Output
3. MIMO = Multiple Input Multiple Output
4. SDM = Spatial Diversity Multiplexing
5. ANT A= PCB Printed Antenna(internal) / ANT B= Dipole Antenna(external)

2. Directional Gain Calculation

According to KDB 662911 D01 Multiple Transmitter Output v02r01 F) 2) e) (iii)

- ✓ Directional gain(Spatial Multiplexing) = $G_{ANT\ MAX}$ -10*log(N_{ANT}/N_{SS})

Ant Gain (dBi)		N_{ANT}/ N_{SS}	Directional Gain (dBi)
Ant.A	1.37	2 / 2	3.27
Ant.B	3.27		

2. TEST METHODOLOGY

FCC KDB 558074 D01 15.247 Meas Guidance v05r02 dated April 02, 2019 entitled “guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices and the measurement procedure described in ANSI C63.10(Version : 2013) ‘the American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices’.

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 purpse of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C. / 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 30MHz using CISPR Quasi-peak and average detector modes.

Radiated Emissions

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

DESCRIPTION OF TEST MODES

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

3. 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).

4. FACILITIES AND ACCREDITATIONS

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).

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."

5. ANTENNA REQUIREMENTS

According to FCC 47 CFR § 15.203:

"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

6. 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.

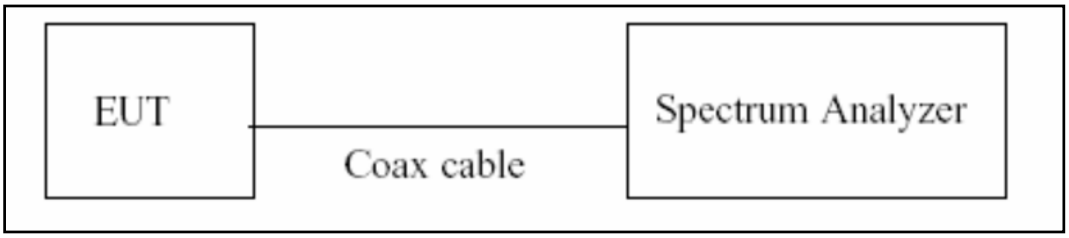
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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

7. DESCRIPTION OF TESTS

7.1. Duty Cycle

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to the zero-span measurement method.

The largest availble value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if T ≤ 6.25 microseconds. (50/6.25 = 8)

The zero-span method was used because all measured T data are > 6.25 microseconds and both RBW and VBW are > 50/ *T*.

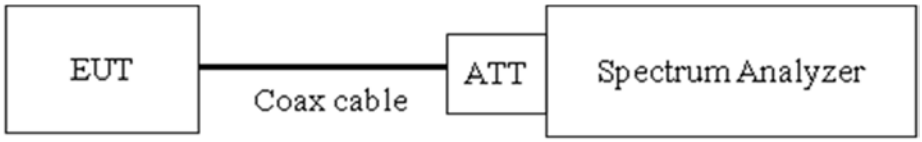
1. RBW = 8 MHz (the largest availble value)
2. VBW = 8 MHz (≥ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = T_{on}/ T_{total} and Duty Cycle Factor = 10log(1/Duty Cycle)

7.2. 6dB Bandwidth & 99 % Bandwidth

Limit

The minimum permissible 6 dB bandwidth is 500 kHz.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

The Spectrum Analyzer is set to (Procedure 11.8.1 in ANSI 63.10-2013)

1) RBW = 100 kHz
2) VBW ≥ 3 x RBW
3) Detector = Peak
4) Trace mode = max hold
5) Sweep = auto couple
6) Allow the trace to stabilize
7) We tested 6 dB bandwidth using the automatic bandwidth measurement capability of a spectrum analyzer. X dB is set 6 dB.

Test Procedure (99 % Bandwidth for ISED)

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW ≒ 3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

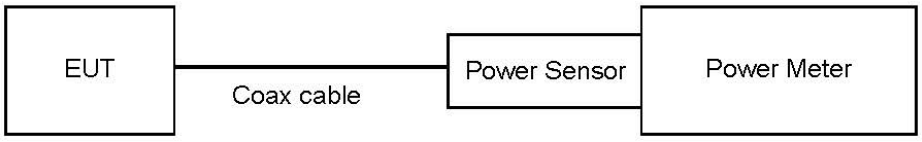
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

7.3. Output Power

Limit

The maximum permissible conducted output power is 1 Watt.

Test Configuration



Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)
  : Measure the peak power of the transmitter.

- Average Power (Procedure 11.9.2.3 in ANSI 63.10-2013)
  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.

Sample Calculation

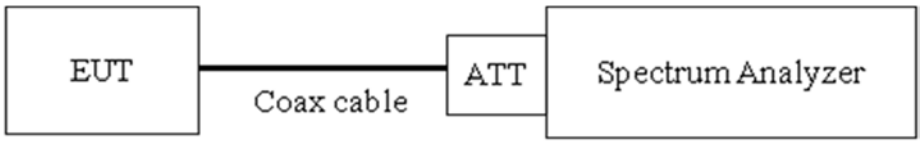
- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

7.4. Power Spectral Density

Limit

The transmitter power density average over 1-second interval shall not be greater than 8dBm in any 3kHz BW.

Test Configuration



Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10.2 in ANSI 63.10-2013.

The spectrum analyzer is set to :

1) Set analyzer center frequency to DTS channel center frequency.
2) Span = 1.5 times the DTS channel bandwidth.
3) RBW = 3 kHz ≤ RBW ≤ 100 kHz.
4) VBW ≥ 3 x RBW.
5) Sweep = auto couple
6) Detector = peak
7) Trace Mode = max hold
8) Allow trace to fully stabilize.
9) Use the peak marker function to determine the maximum amplitude level within the RBW.
   If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Sample Calculation

- Power Spectral Density = Reading Value + ATT loss + Cable loss

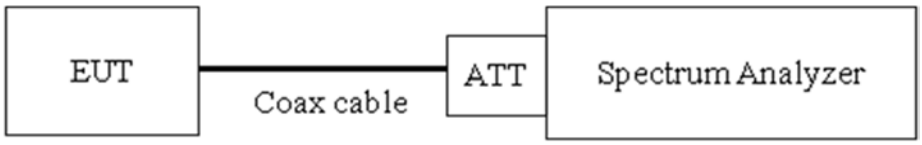
7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

Limit

The maximum conducted (peak) output power was used to demonstrate compliance, then the peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30dBc relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 30dBc]

Test Configuration



Test Procedure

The transmitter output is connected to the spectrum analyzer.

(Procedure 11.11 in ANSI 63.10-2013)

1) RBW = 100 kHz
2) VBW ≥ 3 x RBW
3) Set span to encompass the spectrum to be examined
4) Detector = Peak
5) Trace Mode = max hold
6) Sweep time = auto couple
7) Ensure that the number of measurement points ≥ 2 x Span/RBW
8) Allow trace to fully stabilize.
9) Use peak marker function to determine the maximum amplitude level.

Measurements are made over the 30 MHz to 25 GHz range with the transmitter set to the lowest, middle, and highest channels.

Factors for frequency

Freq(MHz)	Factor(dB)
30	20.19
100	20.22
200	20.37
300	20.42
400	20.55
500	20.56
600	20.66
700	20.68
800	20.79
900	20.81
1000	20.92
2000	21.06
2400	21.30
2480	21.32
2500	21.72
3000	22.17
4000	22.55
5000	22.86
5150	22.96
5850	23.28
6000	23.38
7000	23.45
8000	23.50
9000	23.56
10000	24.02
11000	24.07
12000	24.15
13000	24.34
14000	24.31
15000	24.56
16000	24.57
17000	24.60
18000	24.85
19000	24.87
20000	24.91
21000	25.13
22000	25.20
23000	25.20
24000	25.44
25000	25.53
26000	25.74

Note : 1. 2400 ~ 2500 MHz is fundamental frequency range.

2. Factor = Attenuator loss + Cable loss

7.6. Radiated Test

Limit

FCC

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

ISED

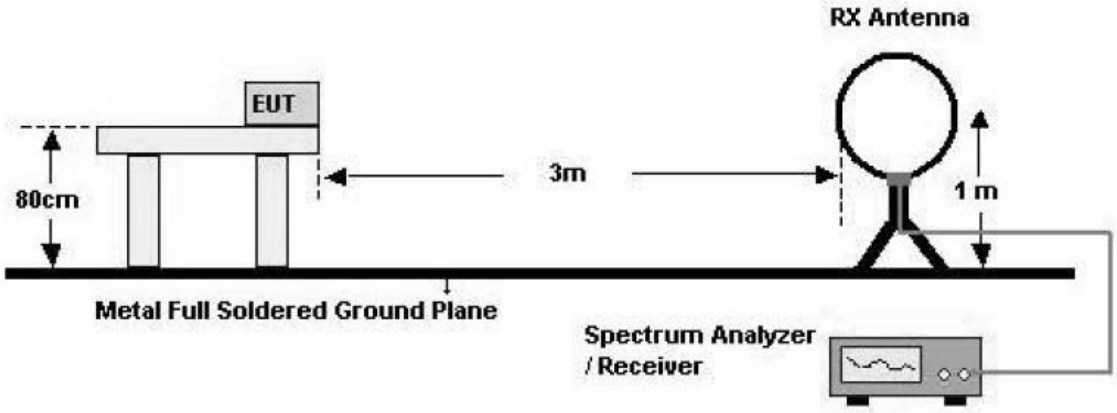
Frequency (MHz)	Field Strength (uA/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

FCC&ISED

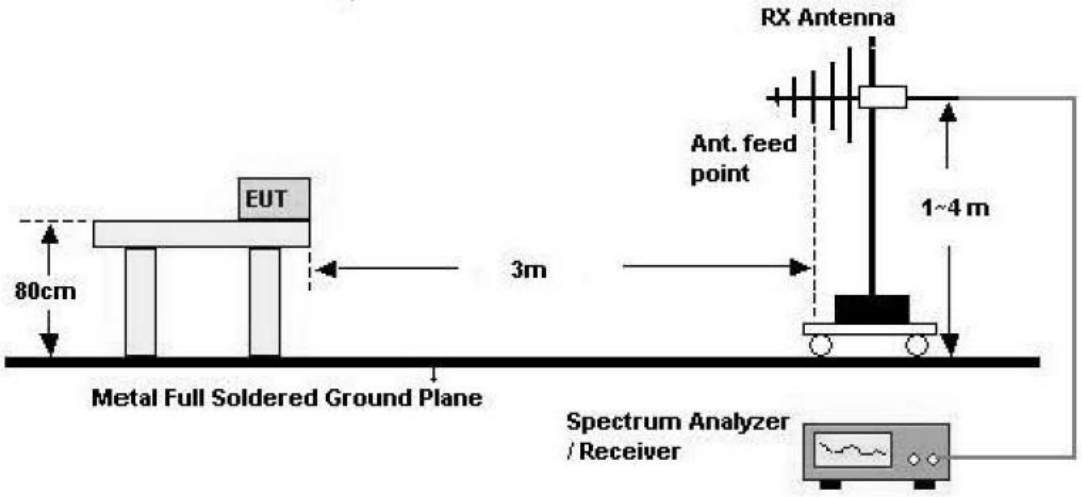
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

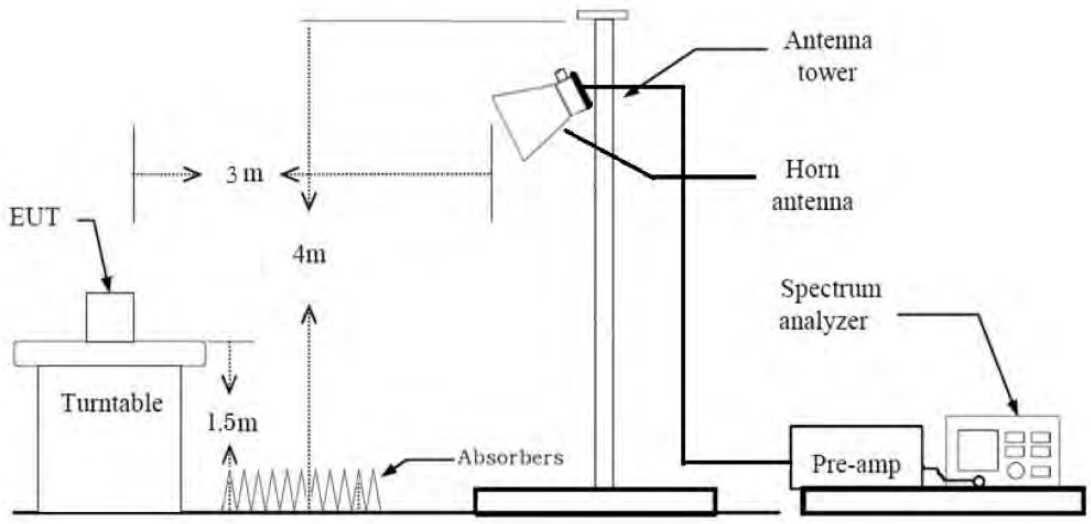
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

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

   ※In general, (1) is used mainly
7. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L)
8. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.

2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting (Method 8.6 in KDB 558074 v05r02, Procedure 11.12 in ANSI 63.10-2013)
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Average): Duty cycle ≥ 98%
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = RMS
      - Averaging type = power (*i.e.*, RMS)
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
      - Sweep time = auto.
      - Trace mode = average (at least 100 traces).

   (3) Measurement Type(Average): Duty cycle < 98%, duty cycle variations are less than ±2%
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = RMS
      - Averaging type = power (*i.e.*, RMS)
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
      - Sweep time = auto.
      - Trace mode = average (at least 100 traces).
      - Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had

the test been performed at 100 percent duty cycle.

- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

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

Total(Measurement Type : Average, Duty cycle ≥ 98%)
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle < 98%)
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Distance Factor(D.F)
+ Duty Cycle Factor

Test Procedure of Radiated Restricted Band Edge

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
(1) Measurement Type(Peak):
- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW ≥ 3 x RBW

(2) Measurement Type(Average): Duty cycle ≥ 98%,

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW ≥ 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).

(3) Measurement Type(Average): Duty cycle < 98%, duty cycle variations are less than ±2%

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW ≥ 3 x RBW
- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

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

Total(Measurement Type : Average, Duty cycle ≥ 98%)
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Attenuator + Distance Factor(D.F)

Total(Measurement Type : Average, Duty cycle < 98%)
= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) - Amp Gain(G) + Attenuator + Distance Factor(D.F) + Duty Cycle Factor

7.7. 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

7.8. Receiver Spurious Emissions

Limit

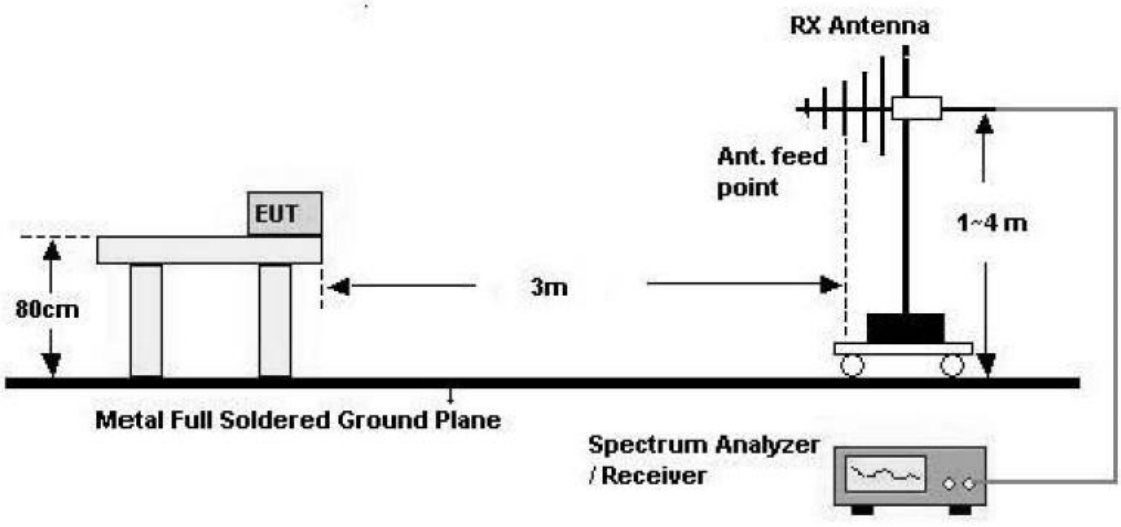
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

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

Test Configuration

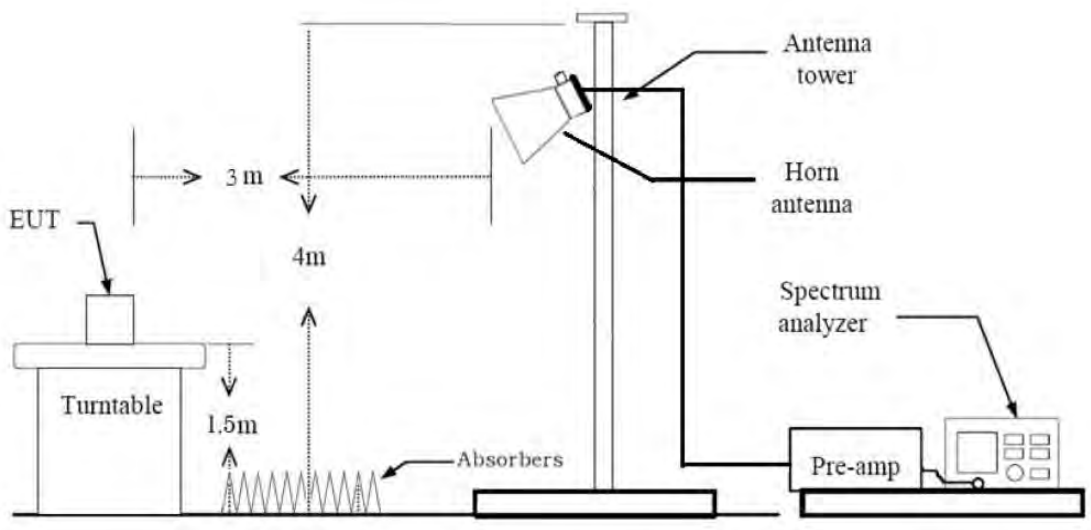
30 MHz - 1 GHz



Test Procedure of Receiver Spurious Emissions (Below 1GHz)

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

Above 1 GHz



Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
6. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
7. The unit was tested with its standard battery.
8. Spectrum Setting
   (1) Measurement Type(Peak):
      - Measured Frequency Range : 1 GHz – 25 GHz
      - Detector = Peak
      - Trace = Maxhold
      - RBW = 1 MHz
      - VBW ≥ 3 x RBW
   (2) Measurement Type(Average):
      - We performed using a reduced video BW method was done with the analyzer in linear mode

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW ≥ 3 x RBW

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

7.9. Worst case configuration and mode

Radiated test

1. All modes of operation were investigated and the worst case configuration results are reported.
2. All configurations of antenna were investigated and the worst case configuration results are reported.
   - Mode : SISO (Antenna Selection), Ant A + Ant B(MIMO(SDM))
   - Worstcase : SISO Ant B (External)
3. EUT Axis
   - Radiated Spurious Emissions : Y
   - Radiated Restricted Band Edge : X
4. Duty cycle factor applies only 802.11b/g/n20/n40 (Duty cycle < 98%).
5. All datarate of operation were investigated and the worst case datarate results are reported
   - 802.11b : 1Mbps
   - 802.11g : 6Mbps
   - 802.11n(20M) : MCS0
   - 802.11n(40M) : MCS0
   - 802.11n(20M)_SDM : MCS8
   - 802.11n(40M)_SDM : MCS8

6. 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. All modes of operation were investigated and the worst case configuration results are reported.
   - Mode : Stand alone + External accessories(Earphone, etc)+Travel Adapter,
     Stand alone + Travel Adapter
   - Worstcase : Stand alone + Travel Adapter

Conducted test

1. The EUT was configured with data rate of highest power.
2. SISO & MIMO were tested and the all case results are reported.
   - Mode : AntA(SISO), AntB(SISO), AntA+AntB(MIMO)

8. SUMMARY TEST OF RESULTS

FCC Part

Test Description	FCC Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	§ 15.247(a)(2)	> 500 kHz	Conducted	PASS
Conducted Maximum Output Power	§ 15.247(b)(3)	< 1 Watt		PASS
Power Spectral Density	§ 15.247(e)	< 8 dBm / 3 kHz Band		PASS
Band Edge (Out of Band Emissions)	§ 15.247(d)	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	§ 15.207	cf. Section 7.7		PASS
Radiated Spurious Emissions	§ 15.247(d), 15.205, 15.209	cf. Section 7.6	Radiated	PASS
Radiated Restricted Band Edge	§ 15.247(d), 15.205, 15.209	cf. Section 7.6		PASS

ISED Part

Test Description	ISED Part Section(s)	Test Limit	Test Condition	Test Result
6 dB Bandwidth	RSS-247, 5.2	> 500 kHz	Conducted	PASS
99% Bandwidth	RSS-GEN, 6.7	N/A		PASS
Conducted Maximum Peak Output Power And e.i.r.p.	RSS-247, 5.4.	< 1 Watt <4 Watt(e.i.r.p.)		PASS
Power Spectral Density	RSS-247, 5.2	< 8 dBm / 3 kHz Band		PASS
Band Edge(Out of Band Emissions)	RSS-247, 5.5	Conducted > 20 dBc		PASS
AC Power line Conducted Emissions	RSS-GEN, 8.8	cf. Section 7.7		N/A (Note1)
Radiated Spurious Emissions	RSS-GEN, 8.9	cf. Section 7.6	Radiated	PASS
Receiver Spurious Emissions	RSS-GEN, 7	cf. Section 7.8		PASS
Radiated Restricted Band Edge	RSS-GEN, 8.10	cf. Section 7.6		PASS

9. TEST RESULT

9.1 DUTY CYCLE

Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.187	8.689	0.942	0.258
	2	4.199	4.699	0.894	0.489
	5.5	1.652	2.152	0.768	1.148
	11	0.920	1.424	0.646	1.897
802.11g	6	1.360	1.866	0.729	1.372
	9	0.912	1.416	0.644	1.911
	12	0.692	1.196	0.578	2.378
	18	0.469	0.970	0.483	3.160
	24	0.355	0.858	0.414	3.829
	36	0.244	0.747	0.327	4.853
	48	0.189	0.692	0.273	5.635
	54	0.173	0.676	0.256	5.911
802.11n (HT20) SISO	6.5 (MCS0)	1.272	1.774	0.717	1.444
	13 (MCS1)	0.655	1.159	0.565	2.478
	19.5 (MCS2)	0.449	0.953	0.471	3.269
	26 (MCS3)	0.347	0.851	0.408	3.895
	39 (MCS4)	0.243	0.747	0.325	4.875
	52 (MCS5)	0.192	0.694	0.276	5.583
	58.5 (MCS6)	0.176	0.678	0.259	5.860
	65 (MCS7)	0.160	0.662	0.242	6.170
802.11n (HT20) MIMO	13 (MCS8)	0.660	1.164	0.567	2.463
	26 (MCS9)	0.352	0.856	0.411	3.857
	39 (MCS10)	0.248	0.750	0.330	4.808
	52 (MCS11)	0.196	0.699	0.281	5.514
	78 (MCS12)	0.144	0.647	0.222	6.529
	104 (MCS13)	0.119	0.623	0.192	7.172
	117 (MCS14)	0.112	0.615	0.182	7.400
	130 (MCS15)	0.103	0.607	0.170	7.683
802.11n (HT40) SISO	13.5 (MCS0)	0.632	1.136	0.557	2.542
	27 (MCS1)	0.335	0.839	0.400	3.979
	40.5 (MCS2)	0.236	0.739	0.320	4.955
	54 (MCS3)	0.189	0.692	0.273	5.643
	81 (MCS4)	0.135	0.638	0.212	6.746
	108 (MCS5)	0.112	0.615	0.182	7.398
	121.5 (MCS6)	0.103	0.607	0.170	7.683
	135 (MCS7)	0.096	0.598	0.160	7.947

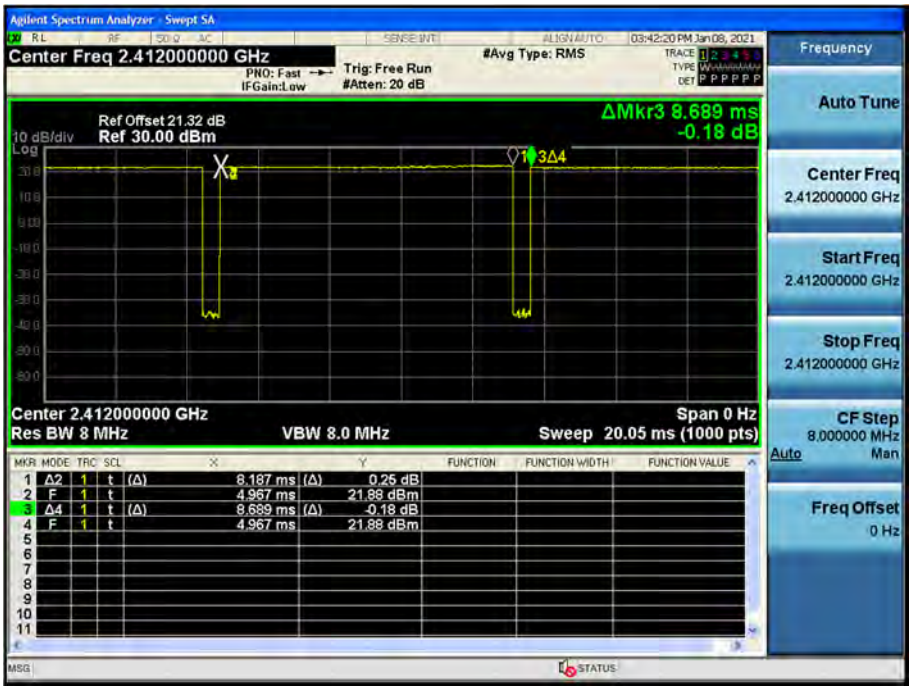
Mode	Data Rate (Mbps)	T_{on} (ms)	T_{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11n (HT40) MIMO	27 (MCS8)	0.341	0.844	0.405	3.931
	54 (MCS9)	0.191	0.695	0.274	5.618
	81 (MCS10)	0.139	0.643	0.217	6.637
	108 (MCS11)	0.117	0.620	0.188	7.252
	162 (MCS12)	0.093	0.595	0.156	8.063
	216 (MCS13)	0.080	0.584	0.138	8.605
	243 (MCS14)	0.076	0.579	0.131	8.823
	270 (MCS15)	0.071	0.575	0.124	9.057

Note:

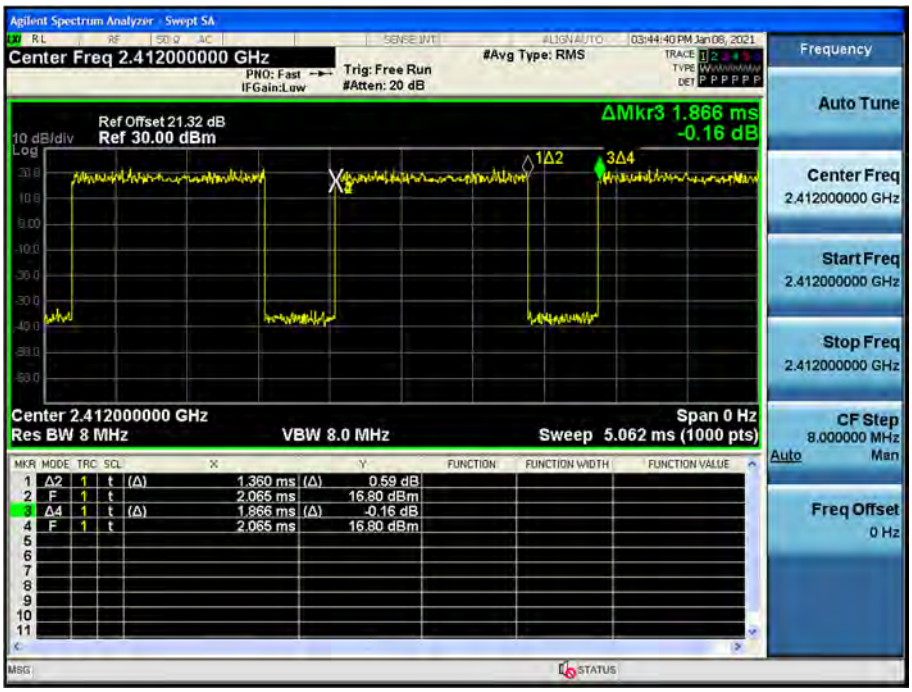
1. Duty Cycle Factor = 10Xlog(1/Duty Cycle). where, Duty Cycle = T_{on} / T_{total}
2. Test was performed with continuous Tx.

▣ Test Plots

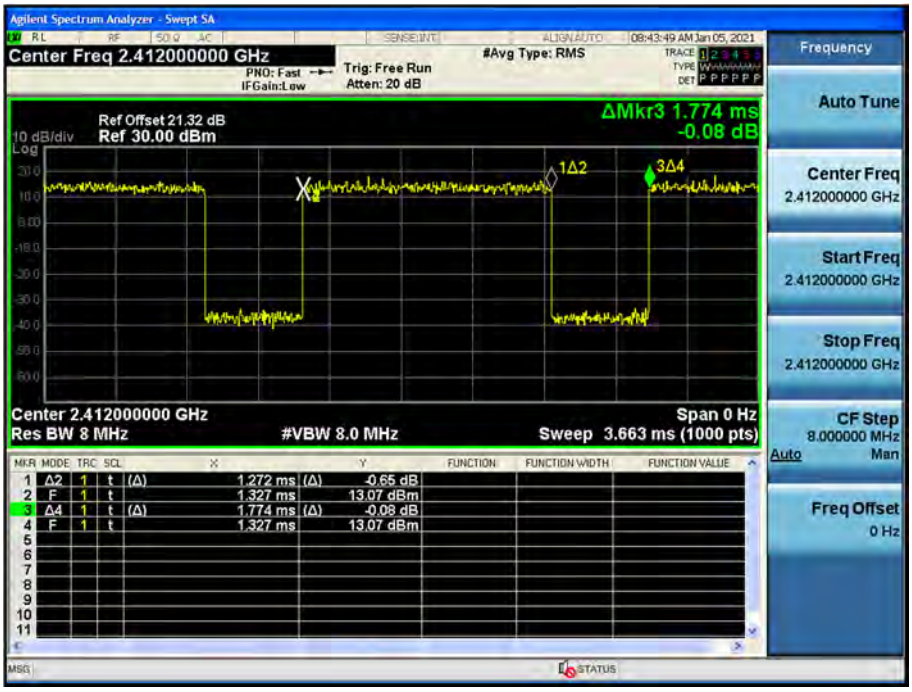
Duty cycle plot (802.11b(1Mbps))



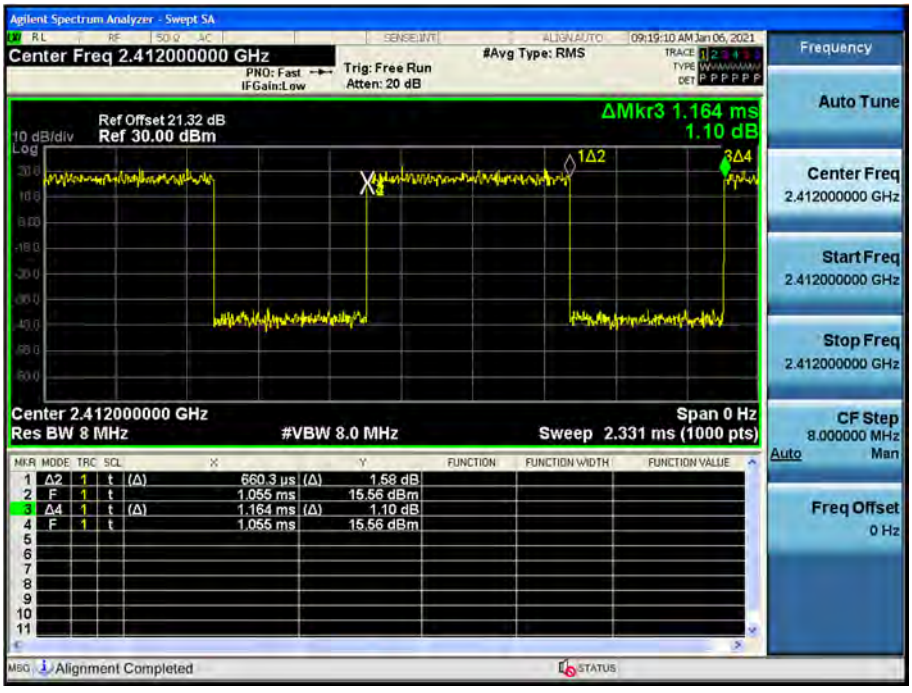
Duty cycle plot (802.11g(6Mbps))



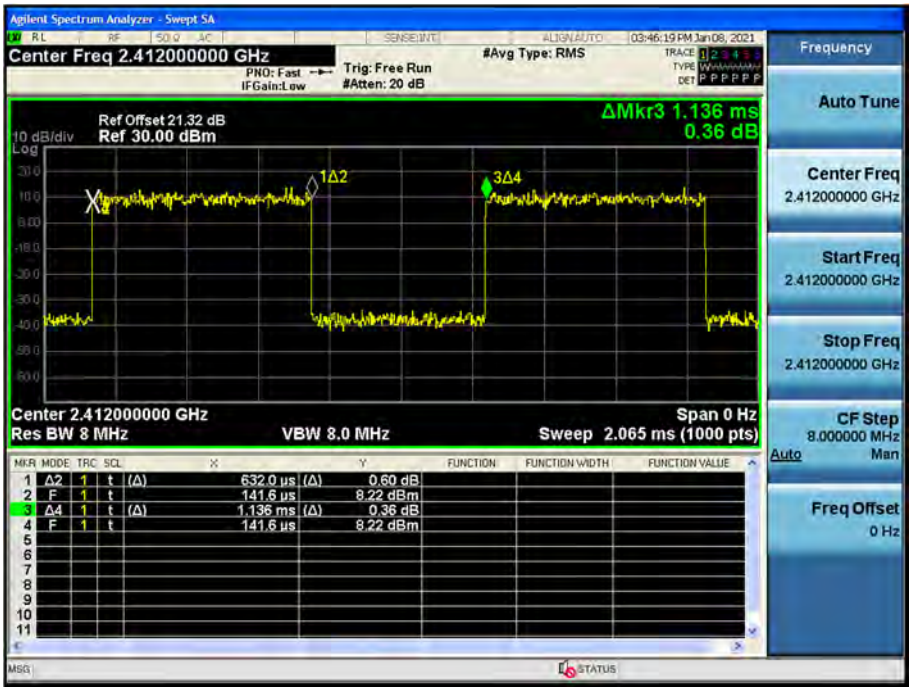
Duty cycle plot (802.11n_HT20 (MCS0)_SISO)



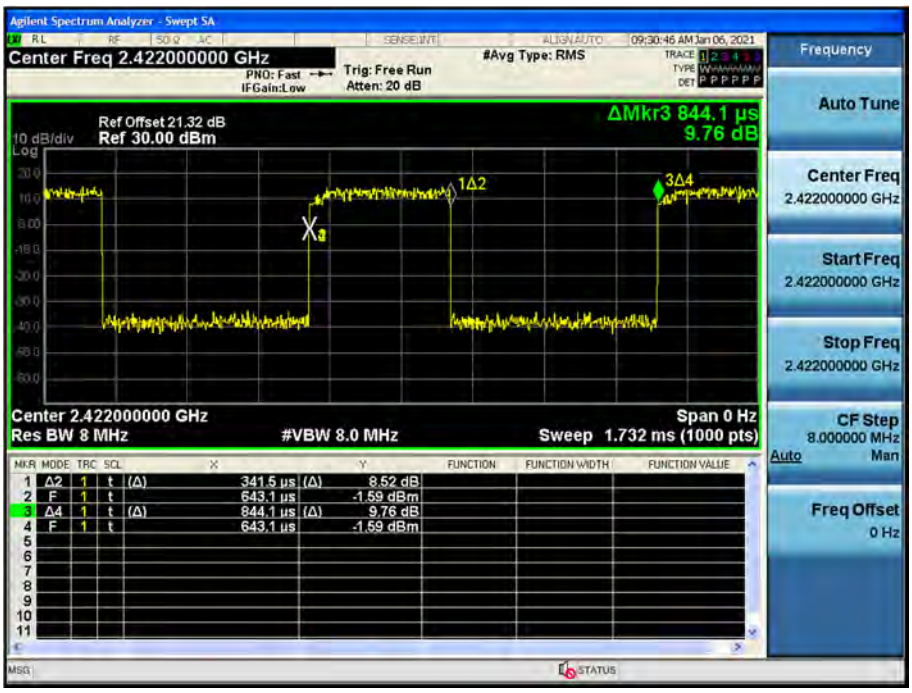
Duty cycle plot (802.11n_HT20 (MCS0)_MIMO)



Duty cycle plot (802.11n_HT40 (MCS0)_SISO)



Duty cycle plot (802.11n_HT40 (MCS8)_MIMO)



Note:

In order to simplify the report, attached plots were only the most lowest data rate.

9.2 6dB BANDWIDTH & 99 % BANDWIDTH

FCC

[ANT.A]

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	10.12	> 0.5
2437	6	10.14	> 0.5
2462	11	10.11	> 0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.08	> 0.5
2437	6	15.12	> 0.5
2462	11	15.13	> 0.5

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.06	> 0.5
2437	6	13.86	> 0.5
2462	11	15.07	> 0.5

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	23.88	> 0.5
2437	6	23.88	> 0.5
2452	9	23.86	> 0.5

[ANT.B]

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	10.14	> 0.5
2437	6	10.15	> 0.5
2462	11	10.15	> 0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.11	> 0.5
2437	6	15.07	> 0.5
2462	11	15.04	> 0.5

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.09	> 0.5
2437	6	15.09	> 0.5
2462	11	15.13	> 0.5

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	25.09	> 0.5
2437	6	25.06	> 0.5
2452	9	25.08	> 0.5

[MIMO_ANT.A]

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.09	> 0.5
2437	6	15.09	> 0.5
2462	11	15.11	> 0.5

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	25.13	> 0.5
2437	6	25.14	> 0.5
2452	9	25.07	> 0.5

[MIMO_ANT.B]

802.11n(HT20) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.08	> 0.5
2437	6	15.10	> 0.5
2462	11	15.09	> 0.5

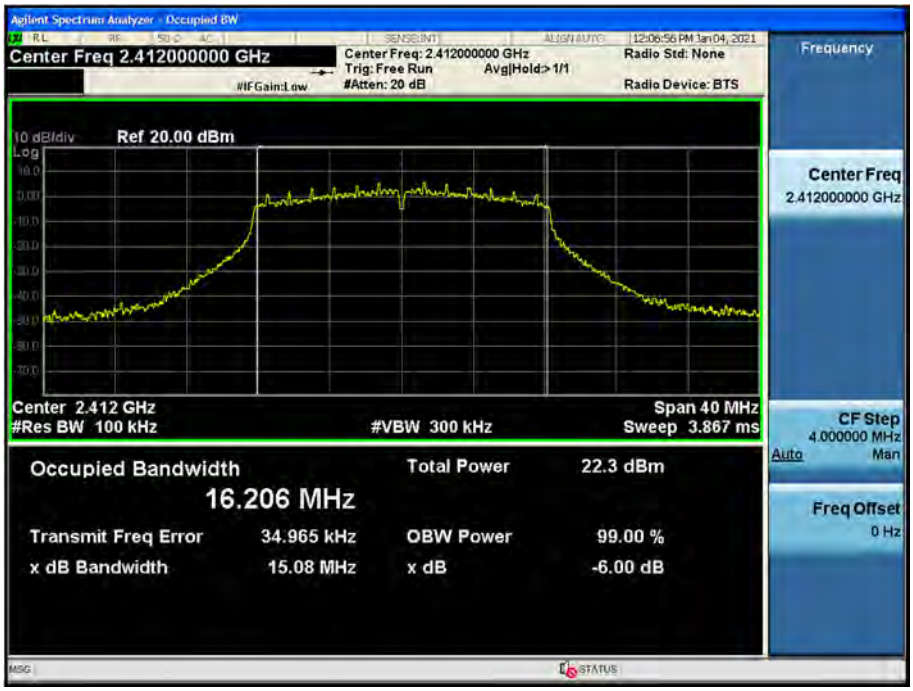
802.11n(HT40) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	23.87	> 0.5
2437	6	25.11	> 0.5
2452	9	22.69	> 0.5

[ANT.A]

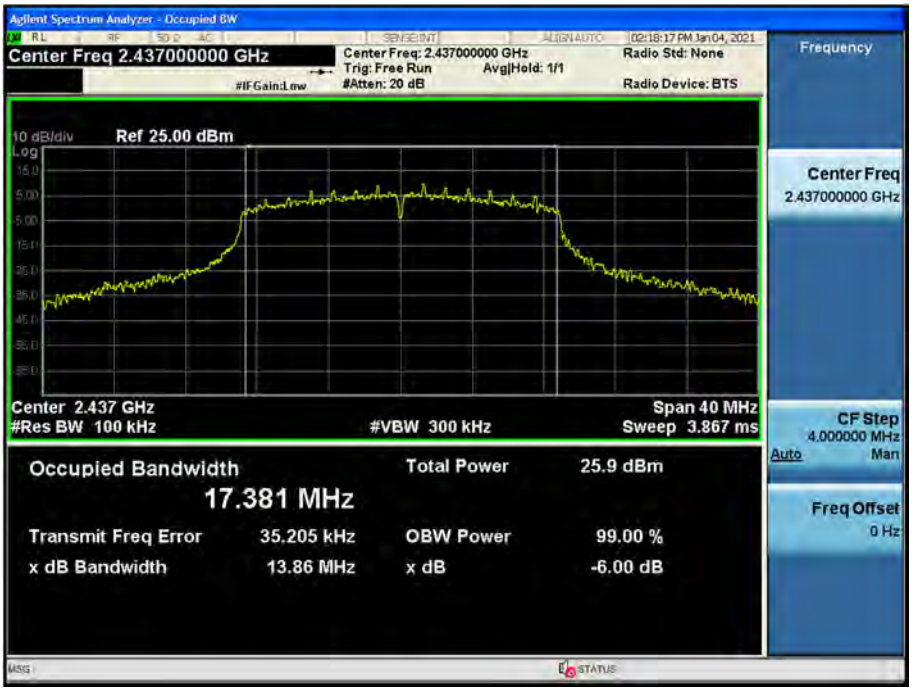
▣ Test Plots

6dB Bandwidth plot (802.11b-CH 11)

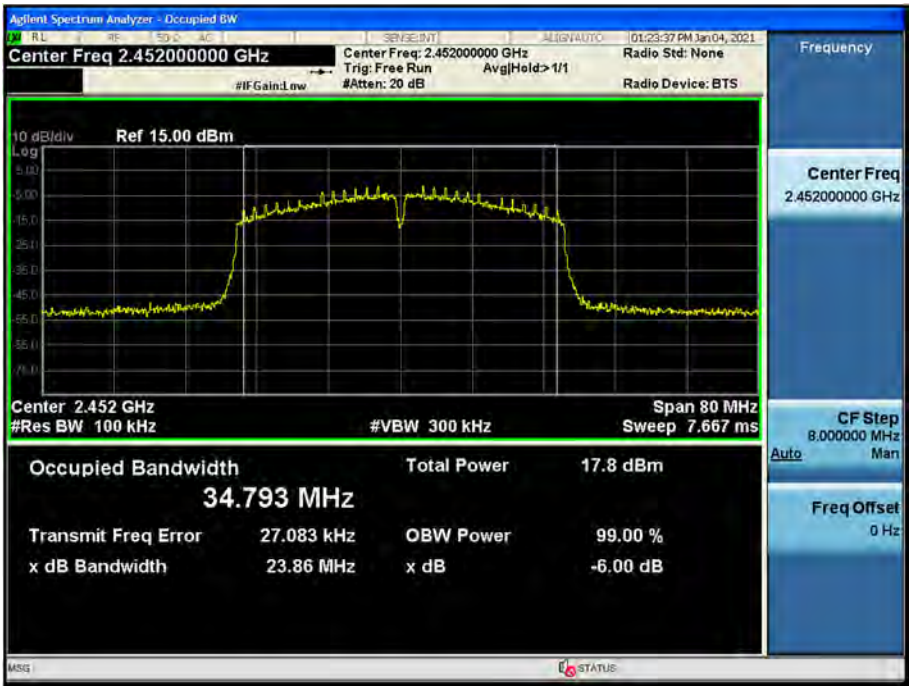
6dB Bandwidth plot (802.11g-CH 1)



6dB Bandwidth plot (802.11n_HT20-CH 6)



6dB Bandwidth plot (802.11n_HT40-CH 9)



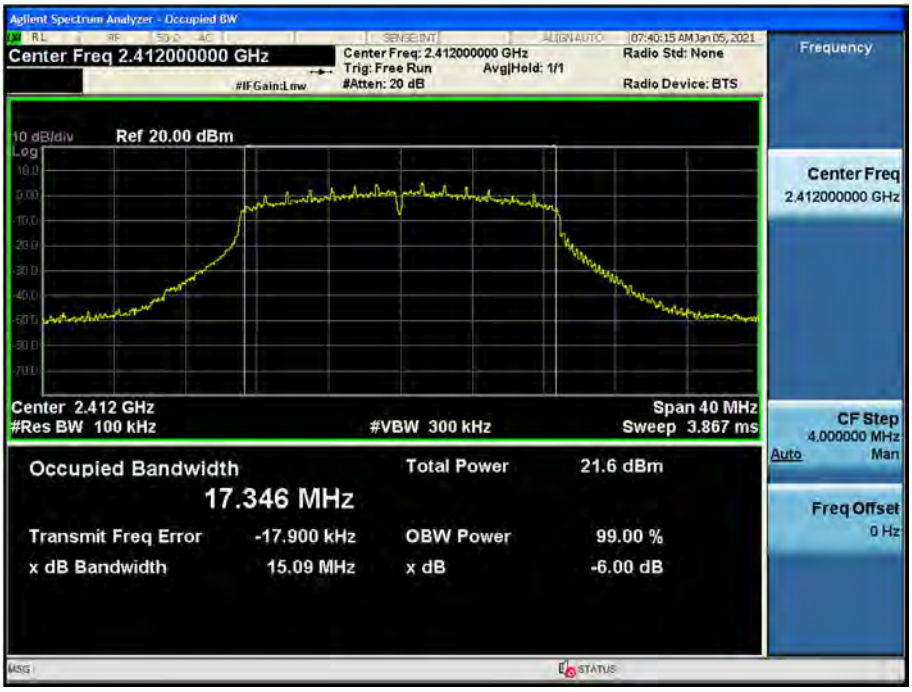
[ANT.B]

▣ Test Plots

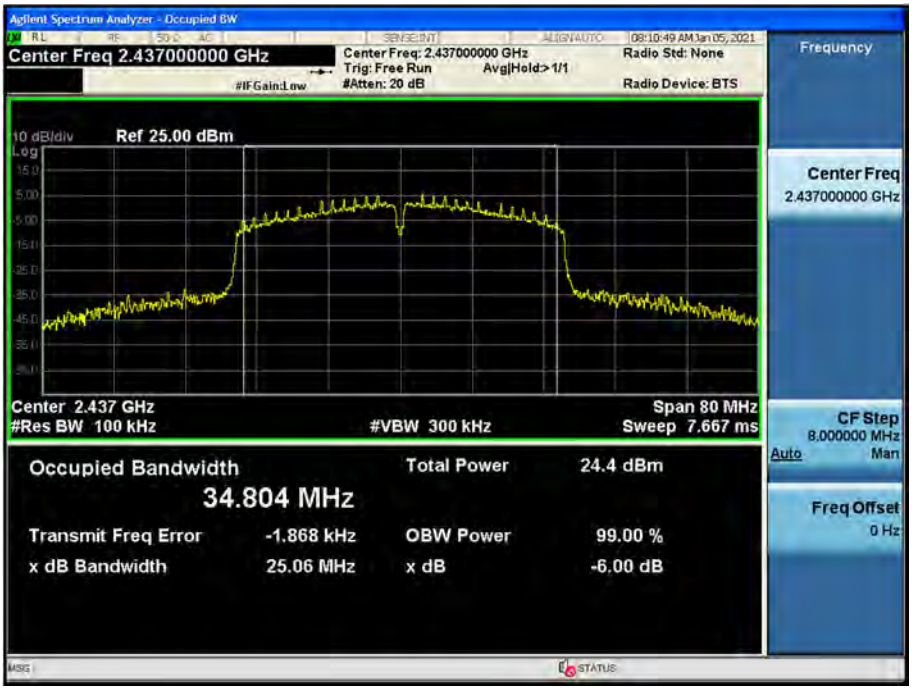
6dB Bandwidth plot (802.11b-CH 1)

6dB Bandwidth plot (802.11g-CH 11)

6dB Bandwidth plot (802.11n_HT20-CH 1)



6dB Bandwidth plot (802.11n_HT40-CH 6)



[MIMO_ANT.A]

▣ Test Plots

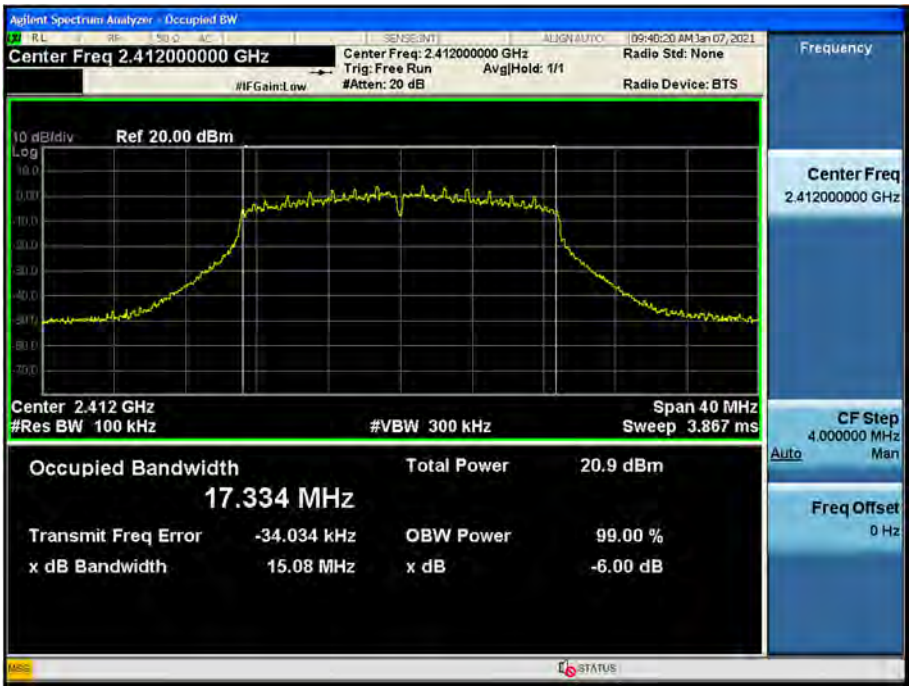
6dB Bandwidth plot (802.11n_HT20-CH 6)

6dB Bandwidth plot (802.11n_HT40-CH 9)

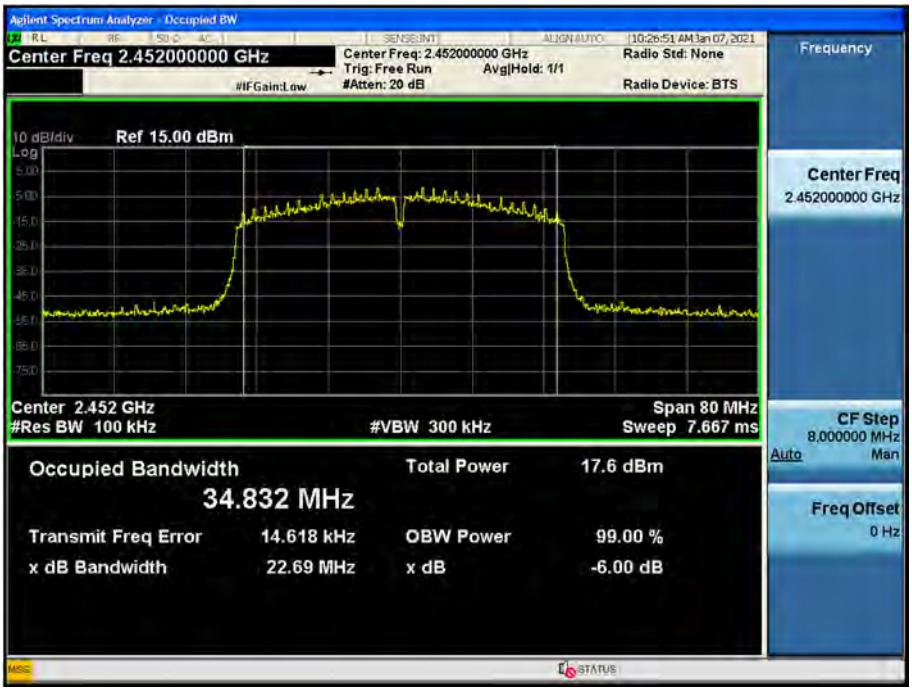
[MIMO_ANT.B]

▣ Test Plots

6dB Bandwidth plot (802.11n_HT20-CH 1)



6dB Bandwidth plot (802.11n_HT40-CH 9)



Note:
In order to simplify the report, attached plots were only the most narrow 6 dB BW channel.

99% Bandwidth Measurements(ISED)

[ANT.A]

802.11b Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	13.809	N/A
2437	6	13.847	N/A
2462	11	13.863	N/A

802.11g Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.477	N/A
2437	6	16.539	N/A
2462	11	16.462	N/A

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.583	N/A
2437	6	17.632	N/A
2462	11	17.578	N/A

802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2422	3	34.523	N/A
2437	6	34.641	N/A
2452	9	34.485	N/A

[ANT.B]

802.11b Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	13.812	N/A
2437	6	13.852	N/A
2462	11	13.937	N/A

802.11g Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.472	N/A
2437	6	16.548	N/A
2462	11	16.479	N/A

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.572	N/A
2437	6	17.632	N/A
2462	11	17.587	N/A

802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2422	3	34.588	N/A
2437	6	34.665	N/A
2452	9	34.544	N/A

[MIMO_ANT.A]

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.581	N/A
2437	6	17.560	N/A
2462	11	17.583	N/A

802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	34.471	N/A
2437	6	34.471	N/A
2462	11	34.394	N/A

[MIMO_ANT.B]

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.429	N/A
2437	6	17.439	N/A
2462	11	17.446	N/A

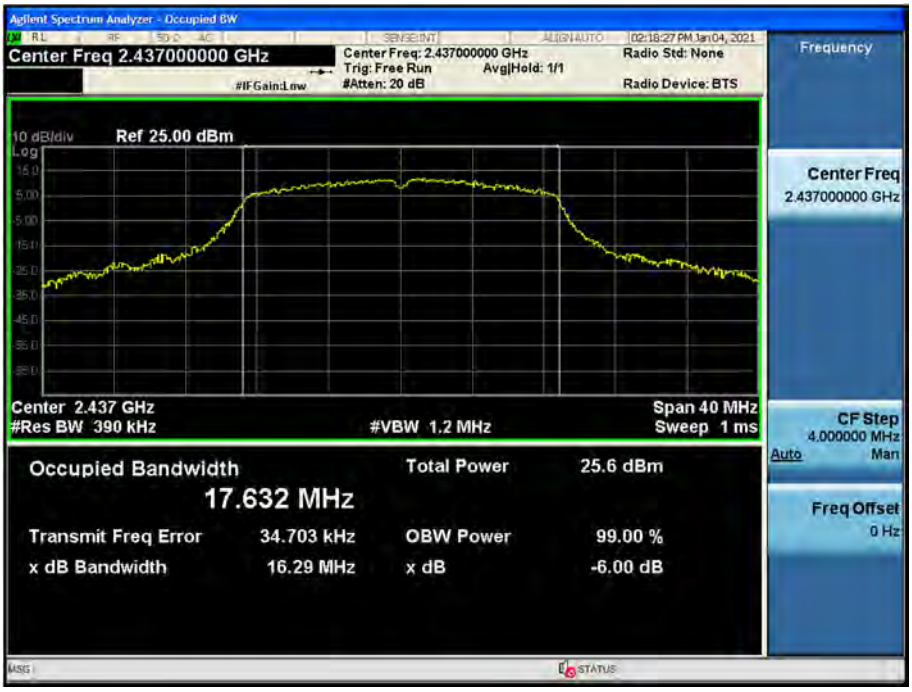
802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	34.541	N/A
2437	6	34.580	N/A
2462	11	34.515	N/A

▣ Test Plots_[ANT.A]

99% Bandwidth plot (802.11b-CH 11)

99% Bandwidth plot (802.11g-CH 6)

99% Bandwidth plot (802.11n_HT20-CH 6)



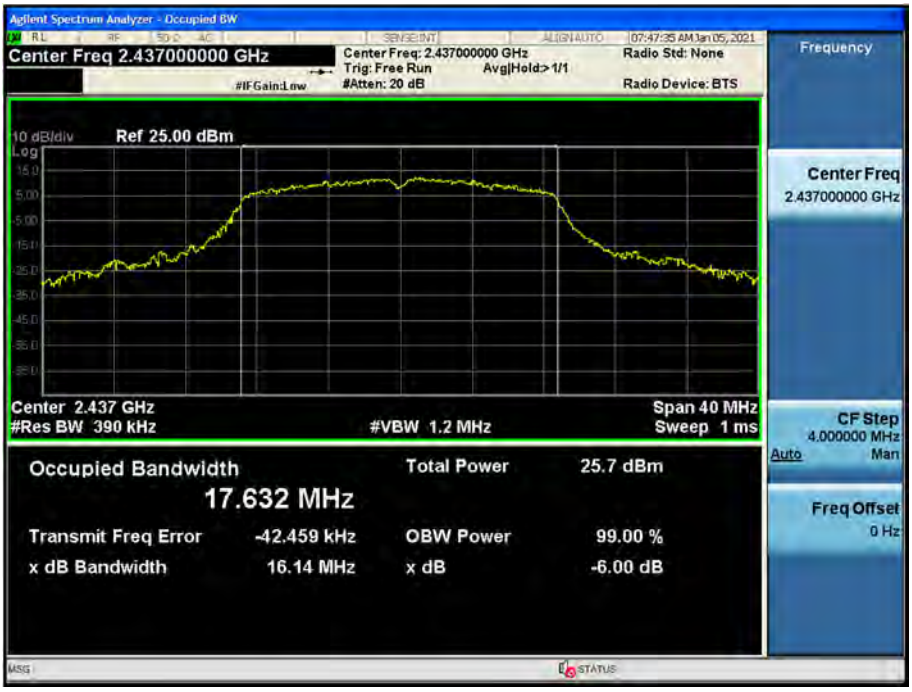
99% Bandwidth plot (802.11n_HT40-CH 6)

▣ Test Plots_[ANT.B]

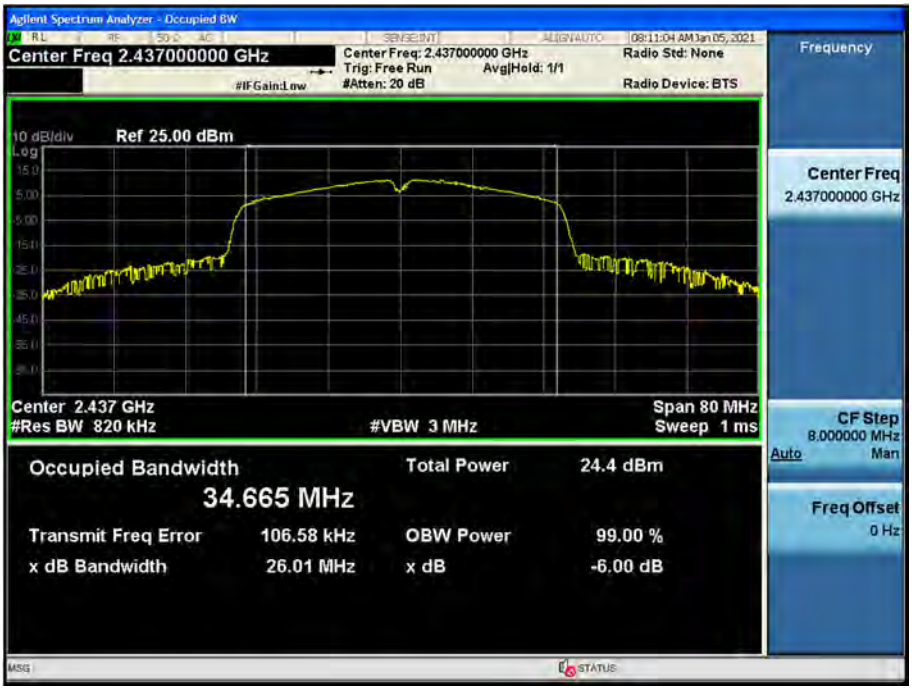
99% Bandwidth plot (802.11b-CH 11)

99% Bandwidth plot (802.11g-CH 6)

99% Bandwidth plot (802.11n_HT20-CH 6)



99% Bandwidth plot (802.11n_HT40-CH 6)



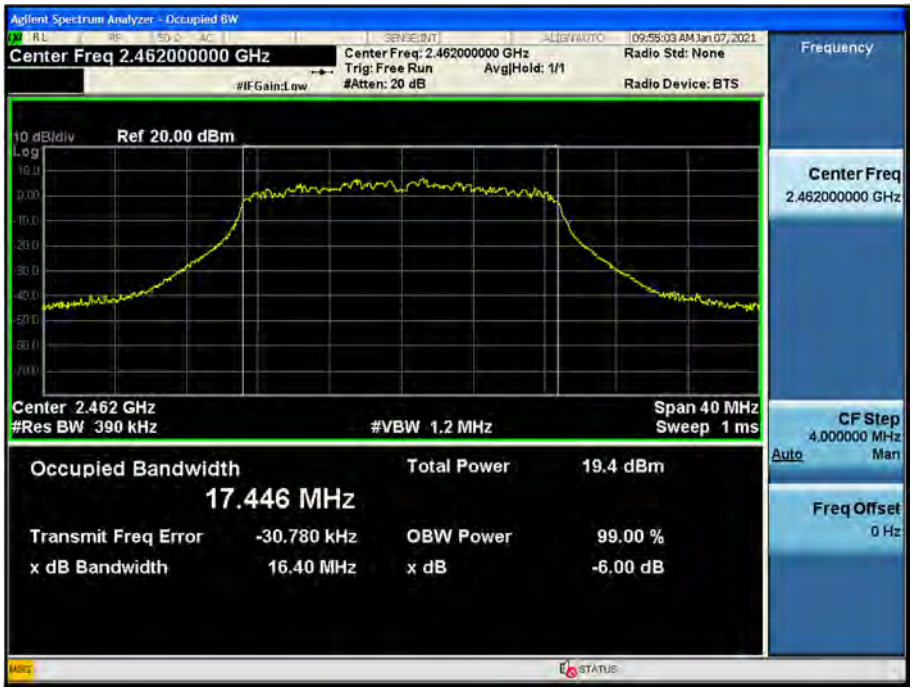
▣ Test Plots_[MIMO_ANT.A]

99% Bandwidth plot (802.11n_HT20-CH 11)

99% Bandwidth plot (802.11n_HT40-CH 6)

▣ Test Plots_[MIMO_ANT.B]

99% Bandwidth plot (802.11n_HT20-CH 11)



99% Bandwidth plot (802.11n_HT40-CH 6)

Note:

In order to simplify the report, attached plots were only the most wide 99% Bandwidth channel.

9.3 OUTPUT POWER

Peak Power

1. Power Meter offset = Attenuator loss+ Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
So, 21.32 dB is offset for 2.4 GHz Band

[ANT.A]

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	1	22.11	30	91
		2	22.31	30	
		5.5	23.91	30	
		11	25.51	30	
2437	6	1	22.35	30	
		2	22.66	30	
		5.5	24.32	30	
		11	26.10	30	
2462	11	1	22.56	30	
		2	22.90	30	
		5.5	24.56	30	
		11	26.32	30	

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	6	22.96	30	76
		9	23.03	30	
		12	22.32	30	
		18	22.13	30	
		24	21.35	30	
		36	23.00	30	
		48	23.05	30	
		54	22.92	30	
2437	6	6	26.18	30	91
		9	26.60	30	
		12	26.21	30	
		18	26.07	30	
		24	26.88	30	
		36	26.97	30	
		48	27.01	30	
		54	26.89	30	
2462	11	6	21.18	30	67
		9	21.27	30	
		12	20.75	30	
		18	20.61	30	
		24	21.36	30	
		36	21.39	30	
		48	21.31	30	
		54	21.29	30	

802.11n(HT20) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	0	21.63	30	73
		1	21.31	30	
		2	21.18	30	
		3	21.74	30	
		4	21.84	30	
		5	21.63	30	
		6	21.85	30	
		7	21.72	30	
2437	6	0	25.96	30	91
		1	25.69	30	
		2	25.63	30	
		3	26.10	30	
		4	26.34	30	
		5	26.12	30	
		6	26.38	30	
		7	26.41	30	
2462	11	0	19.83	30	63
		1	19.53	30	
		2	19.40	30	
		3	19.83	30	
		4	19.97	30	
		5	19.86	30	
		6	19.97	30	
		7	20.00	30	

802.11n(HT40) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2422	3	0	18.93	30	64
		1	18.12	30	
		2	18.19	30	
		3	18.55	30	
		4	18.39	30	
		5	18.23	30	
		6	18.55	30	
		7	17.92	30	
2437	6	0	24.29	30	85
		1	23.69	30	
		2	23.65	30	
		3	24.08	30	
		4	23.97	30	
		5	23.82	30	
		6	24.09	30	
		7	23.48	30	
2452	9	0	17.75	30	57
		1	17.05	30	
		2	17.03	30	
		3	17.44	30	
		4	17.30	30	
		5	17.12	30	
		6	17.43	30	
		7	16.78	30	

[ANT.B]

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	1	22.11	30	91
		2	22.39	30	
		5.5	23.95	30	
		11	25.61	30	
2437	6	1	22.63	30	
		2	22.92	30	
		5.5	24.59	30	
		11	26.29	30	
2462	11	1	23.20	30	
		2	23.71	30	
		5.5	25.35	30	
		11	27.06	30	

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	6	22.37	30	76
		9	22.39	30	
		12	22.00	30	
		18	21.86	30	
		24	22.58	30	
		36	22.56	30	
		48	22.50	30	
		54	22.56	30	
2437	6	6	26.37	30	91
		9	26.81	30	
		12	26.34	30	
		18	26.17	30	
		24	26.95	30	
		36	26.91	30	
		48	26.92	30	
		54	27.02	30	
2462	11	6	21.37	30	67
		9	21.45	30	
		12	20.93	30	
		18	20.75	30	
		24	21.51	30	
		36	21.48	30	
		48	21.44	30	
		54	21.36	30	

802.11n(HT20) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2412	1	0	21.96	30	73
		1	21.51	30	
		2	21.38	30	
		3	21.70	30	
		4	21.84	30	
		5	21.63	30	
		6	21.72	30	
		7	21.81	30	
2437	6	0	26.23	30	91
		1	26.23	30	
		2	26.05	30	
		3	26.43	30	
		4	26.60	30	
		5	26.64	30	
		6	26.65	30	
		7	26.61	30	
2462	11	0	20.22	30	63
		1	19.82	30	
		2	19.69	30	
		3	20.10	30	
		4	20.21	30	
		5	20.09	30	
		6	20.17	30	
		7	20.18	30	

802.11n(HT40) Mode		MCS Index	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.				
2422	3	0	18.79	30	64
		1	18.02	30	
		2	18.02	30	
		3	18.39	30	
		4	18.29	30	
		5	18.15	30	
		6	18.41	30	
		7	17.78	30	
2437	6	0	24.36	30	85
		1	23.71	30	
		2	23.66	30	
		3	24.07	30	
		4	23.89	30	
		5	23.73	30	
		6	24.02	30	
		7	23.34	30	
2452	9	0	17.80	30	57
		1	17.07	30	
		2	17.11	30	
		3	17.43	30	
		4	17.40	30	
		5	17.23	30	
		6	17.52	30	
		7	16.86	30	

[MIMO]

802.11n(HT20) Mode		MCS Index	Ant.A	Ant.B	MIMO	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.		Measured Power(dBm)				
2412	1	8	21.46	21.38	24.43	30	73
		9	20.98	20.53	23.77	30	
		10	21.32	20.44	23.91	30	
		11	21.56	20.94	24.27	30	
		12	21.61	21.03	24.34	30	
		13	21.67	21.01	24.36	30	
		14	21.73	20.79	24.29	30	
		15	21.61	21.37	24.50	30	
2437	6	8	23.15	23.15	26.16	30	80
		9	22.70	22.45	25.59	30	
		10	23.03	22.43	25.75	30	
		11	23.46	23.12	26.31	30	
		12	23.47	23.11	26.30	30	
		13	23.56	23.23	26.41	30	
		14	23.65	23.06	26.37	30	
		15	23.51	23.51	26.52	30	
2462	11	8	19.26	19.74	22.52	30	63
		9	18.71	18.89	21.81	30	
		10	19.01	18.92	21.97	30	
		11	19.41	19.47	22.45	30	
		12	19.34	19.53	22.45	30	
		13	19.42	19.51	22.48	30	
		14	19.46	19.37	22.43	30	
		15	19.43	19.93	22.70	30	

802.11n(HT40) Mode		MCS Index	Ant.A	Ant.B	MIMO	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.		Measured Power(dBm)				
2422	3	8	18.85	18.77	21.82	30	65
		9	17.88	17.42	20.67	30	
		10	18.03	17.76	20.91	30	
		11	18.27	17.75	21.03	30	
		12	18.43	18.02	21.24	30	
		13	18.00	17.68	20.85	30	
		14	18.27	17.94	21.12	30	
		15	18.09	17.68	20.90	30	
2437	6	8	19.12	19.39	22.27	30	65
		9	18.19	18.02	21.12	30	
		10	18.37	18.35	21.37	30	
		11	18.61	18.37	21.50	30	
		12	18.73	18.66	21.70	30	
		13	18.36	18.29	21.33	30	
		14	18.63	18.46	21.55	30	
		15	18.43	18.28	21.37	30	
2452	9	8	17.36	17.36	20.37	30	57
		9	16.44	16.44	19.45	30	
		10	16.55	16.55	19.56	30	
		11	16.83	16.83	19.84	30	
		12	16.95	16.95	19.96	30	
		13	16.58	16.58	19.59	30	
		14	16.89	16.89	19.90	30	
		15	16.69	16.69	19.70	30	

Note:

✓ MIMO Power(Peak) $= 10 * \log(\left(10^{\frac{ANT\ A}{10}}\right) + \left(10^{\frac{ANT\ B}{10}}\right))$ ➔ ANT.A(mW) +ANT.B(mW)=MIMO(dBm)

Average Power

1. Power Meter offset = Attenuator loss + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
   So, 21.32 dB is offset for 2.4 GHz Band.

[ANT.A]

802.11b Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	1	18.86	0.258	19.12	30	91
		2	18.67	0.489	19.15	30	
		5.5	18.36	1.148	19.51	30	
		11	17.68	1.897	19.58	30	
2437	6	1	19.29	0.258	19.54	30	
		2	19.04	0.489	19.53	30	
		5.5	18.62	1.148	19.77	30	
		11	17.99	1.897	19.89	30	
2462	11	1	19.35	0.258	19.60	30	
		2	19.30	0.489	19.79	30	
		5.5	18.89	1.148	20.04	30	
		11	18.56	1.897	20.46	30	

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	6	13.75	1.372	15.13	30	76
		9	13.23	1.911	15.14	30	
		12	12.55	2.378	14.93	30	
		18	12.10	3.160	15.26	30	
		24	11.53	3.829	15.36	30	
		36	10.62	4.853	15.48	30	
		48	10.21	5.635	15.84	30	
		54	9.85	5.911	15.76	30	
2437	6	6	17.14	1.372	18.51	30	91
		9	16.97	1.911	18.88	30	
		12	16.42	2.378	18.80	30	
		18	15.94	3.160	19.10	30	
		24	15.41	3.829	19.24	30	
		36	14.60	4.853	19.46	30	
		48	14.33	5.635	19.97	30	
		54	13.94	5.911	19.85	30	
2462	11	6	11.90	1.372	13.27	30	67
		9	11.66	1.911	13.57	30	
		12	11.13	2.378	13.51	30	
		18	10.60	3.160	13.76	30	
		24	9.85	3.829	13.68	30	
		36	9.19	4.853	14.04	30	
		48	8.25	5.635	13.88	30	
		54	8.05	5.911	13.96	30	

802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	0	12.61	1.444	14.05	30	73
		1	11.85	2.478	14.33	30	
		2	11.12	3.269	14.39	30	
		3	10.78	3.895	14.67	30	
		4	9.81	4.875	14.68	30	
		5	9.18	5.583	14.77	30	
		6	8.96	5.860	14.82	30	
		7	8.61	6.170	14.78	30	
2437	6	0	17.32	1.444	18.76	30	91
		1	16.35	2.478	18.83	30	
		2	16.03	3.269	19.30	30	
		3	15.40	3.895	19.30	30	
		4	14.68	4.875	19.56	30	
		5	14.29	5.583	19.87	30	
		6	13.92	5.860	19.78	30	
		7	13.56	6.170	19.73	30	
2462	11	0	10.88	1.444	12.33	30	63
		1	10.05	2.478	12.53	30	
		2	9.36	3.269	12.63	30	
		3	9.14	3.895	13.04	30	
		4	7.88	4.875	12.76	30	
		5	7.63	5.583	13.22	30	
		6	7.58	5.860	13.44	30	
		7	7.04	6.170	13.21	30	

802.11n(HT40) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2422	3	0	9.09	2.542	11.63	30	64
		1	8.01	3.979	11.99	30	
		2	6.74	4.955	11.69	30	
		3	6.46	5.643	12.11	30	
		4	5.37	6.746	12.11	30	
		5	4.82	7.398	12.22	30	
		6	4.42	7.683	12.10	30	
		7	4.23	7.947	12.18	30	
2437	6	0	14.49	2.542	17.03	30	85
		1	13.01	3.979	16.99	30	
		2	12.43	4.955	17.39	30	
		3	11.73	5.643	17.38	30	
		4	11.09	6.746	17.84	30	
		5	10.26	7.398	17.66	30	
		6	9.90	7.683	17.59	30	
		7	9.70	7.947	17.65	30	
2452	9	0	7.76	2.542	10.30	30	57
		1	6.38	3.979	10.36	30	
		2	5.74	4.955	10.70	30	
		3	5.39	5.643	11.03	30	
		4	4.12	6.746	10.87	30	
		5	3.60	7.398	11.00	30	
		6	3.36	7.683	11.04	30	
		7	2.69	7.947	10.64	30	

[ANT.B]

802.11b Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	1	18.98	0.258	19.24	30	91
		2	18.84	0.489	19.33	30	
		5.5	18.44	1.148	19.59	30	
		11	17.77	1.897	19.67	30	
2437	6	1	19.44	0.258	19.70	30	
		2	19.33	0.489	19.82	30	
		5.5	18.71	1.148	19.86	30	
		11	18.53	1.897	20.43	30	
2462	11	1	20.06	0.258	20.31	30	
		2	20.05	0.489	20.53	30	
		5.5	19.52	1.148	20.67	30	
		11	19.38	1.897	21.28	30	

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	6	13.42	1.372	14.79	30	76
		9	12.66	1.911	14.57	30	
		12	12.24	2.378	14.62	30	
		18	11.57	3.160	14.73	30	
		24	11.13	3.829	14.96	30	
		36	10.34	4.853	15.19	30	
		48	9.46	5.635	15.09	30	
		54	9.33	5.911	15.24	30	
2437	6	6	17.46	1.372	18.83	30	91
		9	17.51	1.911	19.42	30	
		12	16.75	2.378	19.13	30	
		18	15.97	3.160	19.13	30	
		24	15.46	3.829	19.29	30	
		36	14.46	4.853	19.31	30	
		48	14.12	5.635	19.76	30	
		54	13.75	5.911	19.66	30	
2462	11	6	12.39	1.372	13.76	30	67
		9	12.28	1.911	14.19	30	
		12	11.34	2.378	13.72	30	
		18	10.63	3.160	13.79	30	
		24	10.16	3.829	13.99	30	
		36	9.51	4.853	14.36	30	
		48	8.50	5.635	14.14	30	
		54	8.41	5.911	14.33	30	

802.11n(HT20) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	0	13.08	1.444	14.53	30	73
		1	12.11	2.478	14.59	30	
		2	11.14	3.269	14.41	30	
		3	10.86	3.895	14.75	30	
		4	9.89	4.875	14.76	30	
		5	9.18	5.583	14.77	30	
		6	9.13	5.860	14.99	30	
		7	8.72	6.170	14.89	30	
2437	6	0	17.45	1.444	18.89	30	91
		1	16.39	2.478	18.86	30	
		2	15.81	3.269	19.08	30	
		3	15.43	3.895	19.32	30	
		4	14.74	4.875	19.62	30	
		5	14.23	5.583	19.81	30	
		6	14.06	5.860	19.92	30	
		7	13.49	6.170	19.66	30	
2462	11	0	11.26	1.444	12.71	30	63
		1	10.28	2.478	12.76	30	
		2	9.47	3.269	12.74	30	
		3	9.03	3.895	12.93	30	
		4	8.29	4.875	13.17	30	
		5	7.51	5.583	13.10	30	
		6	7.48	5.860	13.34	30	
		7	7.06	6.170	13.23	30	

802.11n(HT40) Mode		MCS Index	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2422	3	0	9.04	2.542	11.59	30	64
		1	7.36	3.979	11.34	30	
		2	6.70	4.955	11.66	30	
		3	6.06	5.643	11.70	30	
		4	5.00	6.746	11.75	30	
		5	4.53	7.398	11.92	30	
		6	4.05	7.683	11.74	30	
		7	3.99	7.947	11.94	30	
2437	6	0	14.57	2.542	17.11	30	85
		1	13.38	3.979	17.36	30	
		2	12.24	4.955	17.19	30	
		3	11.73	5.643	17.37	30	
		4	11.01	6.746	17.75	30	
		5	9.76	7.398	17.16	30	
		6	9.85	7.683	17.54	30	
		7	9.48	7.947	17.43	30	
2452	9	0	8.15	2.542	10.69	30	57
		1	6.36	3.979	10.34	30	
		2	5.95	4.955	10.91	30	
		3	4.88	5.643	10.52	30	
		4	4.31	6.746	11.06	30	
		5	3.53	7.398	10.93	30	
		6	3.23	7.683	10.92	30	
		7	2.88	7.947	10.83	30	

[MIMO]

802.11n(HT20) Mode		MCS Index	Ant.A	Ant.B	MIMO	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.		Measured Power(dBm)				
2412	1	8	13.85	13.63	16.75	30	73
		9	14.05	13.91	16.99	30	
		10	14.60	13.82	17.24	30	
		11	14.42	13.88	17.17	30	
		12	14.94	14.32	17.65	30	
		13	14.92	14.48	17.72	30	
		14	14.90	14.13	17.54	30	
		15	15.23	14.54	17.91	30	
2437	6	8	15.75	15.56	18.66	30	80
		9	15.97	15.20	18.61	30	
		10	16.10	15.83	18.98	30	
		11	16.35	16.19	19.28	30	
		12	16.75	16.41	19.59	30	
		13	17.01	16.57	19.80	30	
		14	16.72	16.48	19.61	30	
		15	17.12	16.82	19.99	30	
2462	11	8	11.80	11.94	14.88	30	63
		9	11.95	12.23	15.10	30	
		10	12.27	12.58	15.44	30	
		11	12.47	12.54	15.51	30	
		12	12.50	12.74	15.64	30	
		13	12.77	12.90	15.85	30	
		14	12.92	12.84	15.89	30	
		15	13.03	12.99	16.02	30	

802.11n(HT40M) Mode		MCS Index	Ant.A	Ant.B	MIMO	Limit (dBm)
Frequency [MHz]	Channel No.		Measured Power(dBm)			
2422	3	8	11.68	11.41	14.56	30
		9	11.44	11.28	14.37	30
		10	11.66	12.22	14.96	30
		11	11.89	11.59	14.75	30
		12	11.99	11.79	14.90	30
		13	12.19	11.74	14.98	30
		14	11.33	11.94	14.66	30
		15	12.05	12.15	15.11	30
2437	6	8	12.20	11.84	15.03	30
		9	11.87	12.13	15.01	30
		10	12.10	12.24	15.18	30
		11	12.22	12.09	15.16	30
		12	12.50	12.41	15.47	30
		13	12.33	11.59	14.99	30
		14	12.34	12.22	15.29	30
		15	12.51	12.43	15.48	30
2452	9	8	9.71	10.49	13.13	30
		9	10.09	10.25	13.18	30
		10	10.40	10.16	13.29	30
		11	10.51	10.38	13.46	30
		12	10.66	10.62	13.65	30
		13	10.95	10.73	13.85	30
		14	10.76	10.94	13.86	30
		15	10.73	10.78	13.77	30

Note:

- ✓ ANT.A Measured Power(dBm) = ANT.A(ANT ALL_SDM) Measured Power Avg + Duty Cycle Factor
- ✓ ANT.B Measured Power(dBm) = ANT.B(ANT ALL_SDM) Measured Power Avg + Duty Cycle Factor
- ✓ MIMO Power(Avg) $= 10 * \log((10^{\frac{ANT\ A}{10}}) + (10^{\frac{ANT\ B}{10}}))$ ➔ ANT.A(mW) +ANT.B(mW)=MIMO(dBm)

9.4 POWER SPECTRAL DENSITY

[ANT.A]

Mode	Frequency (MHz)	Channel No.	Test Result	
			Measured PSD (dBm)	Limit (dBm)
802.11b	2412	1	-4.568	8
	2437	6	-3.715	
	2462	11	-3.444	
802.11g	2412	1	-9.568	
	2437	6	-5.311	
	2462	11	-12.248	
802.11n(HT20)	2412	1	-12.821	
	2437	6	-7.793	
	2462	11	-14.554	
802.11n(HT40)	2422	3	-14.725	
	2437	6	-9.324	
	2452	9	-15.903	

[ANT.B]

XMode	Frequency (MHz)	Channel No.	Test Result	
			Measured PSD (dBm)	Limit (dBm)
802.11b	2412	1	-4.464	8
	2437	6	-3.467	
	2462	11	-2.868	
802.11g	2412	1	-11.075	
	2437	6	-7.453	
	2462	11	-11.856	
802.11n(HT20)	2412	1	-8.904	
	2437	6	-7.891	
	2462	11	-10.511	
802.11n(HT40)	2422	3	-14.887	
	2437	6	-9.371	
	2452	9	-15.778	

[MIMO]

Mode	Frequency (MHz)	Channel No.	Test Result			Limit (dBm)
			ANT.A	ANT.B	MIMO	
			Measured PSD (dBm)			
802.11n(HT20)	2412	1	-13.402	-10.077	-8.418	8
	2437	6	-11.408	-8.143	-6.465	
	2462	11	-15.727	-12.747	-10.976	
802.11n(HT40)	2422	3	-13.690	-19.357	-12.648	
	2437	6	-12.991	-15.514	-11.062	
	2452	9	-14.627	-16.891	-12.603	

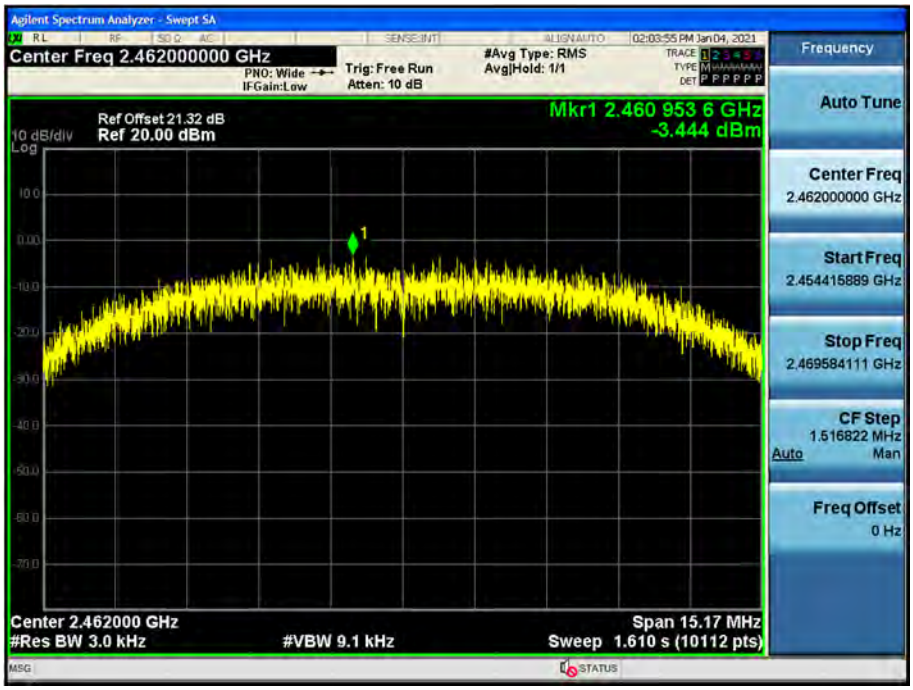
Note :

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(1ea)
3. 21.32 dB is offset for 2.4 GHz Band.
4.
   - ✓ ANT.A Measured PSD = ANT.A(ANT ALL_SDM) Measured Power density(Peak)
   - ✓ ANT.B Measured PSD = ANT.B(ANT ALL_SDM) Measured Power density(Peak)
   - ✓ MIMO PSD $= 10 * \log(\left(10^{\frac{ANT\ A}{10}}\right) + \left(10^{\frac{ANT\ B}{10}}\right))$ ➔ ANT1(mW) +ANT2(mW)=MIMO(dBm)

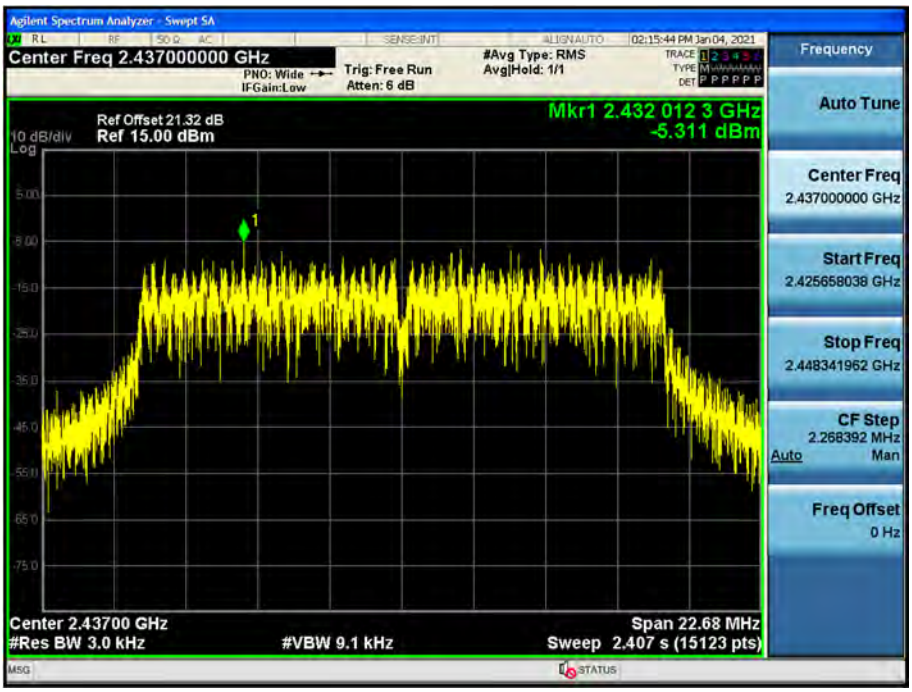
[ANT.A]

▣ Test Plots

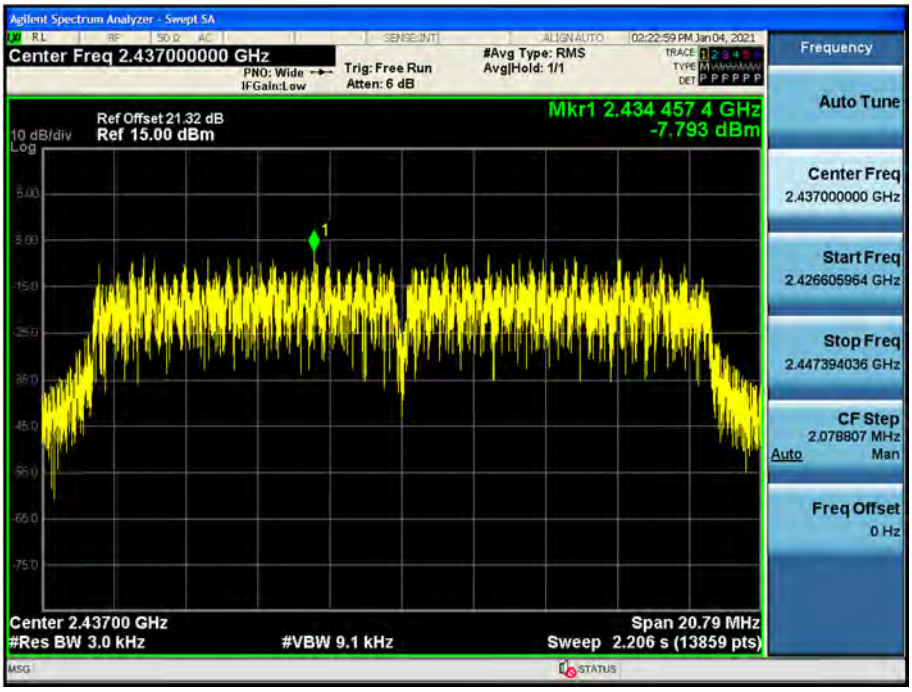
Power Spectral Density (802.11b-CH 11)



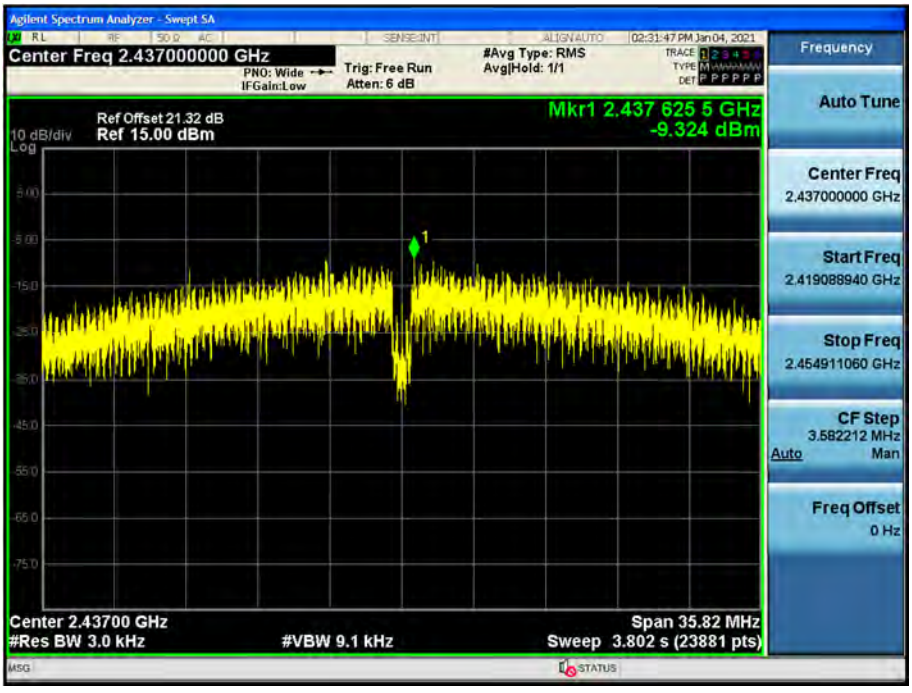
Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20 -CH 6)



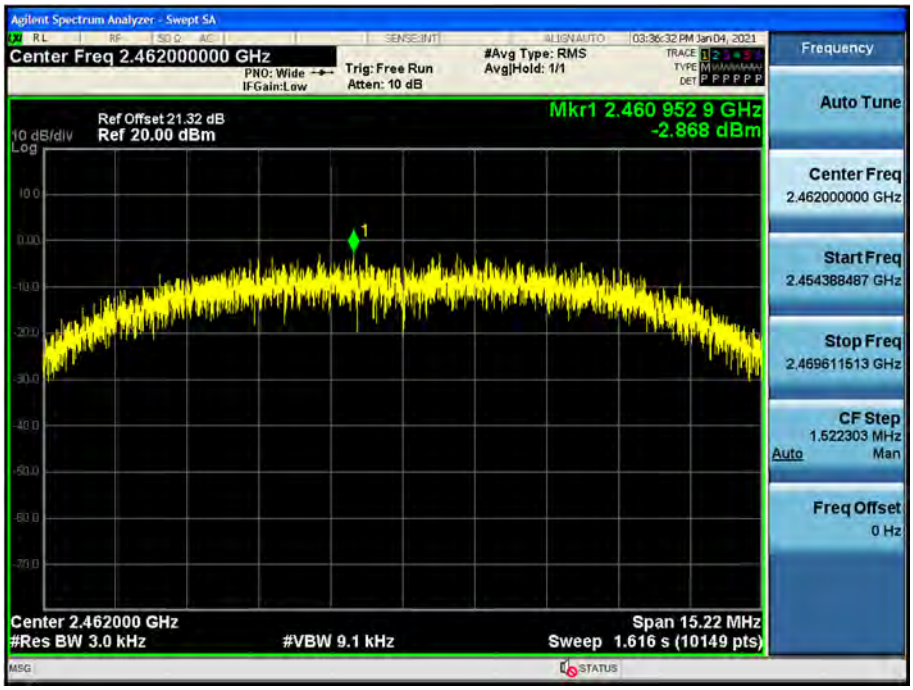
Power Spectral Density (802.11n_HT40 -CH 6)



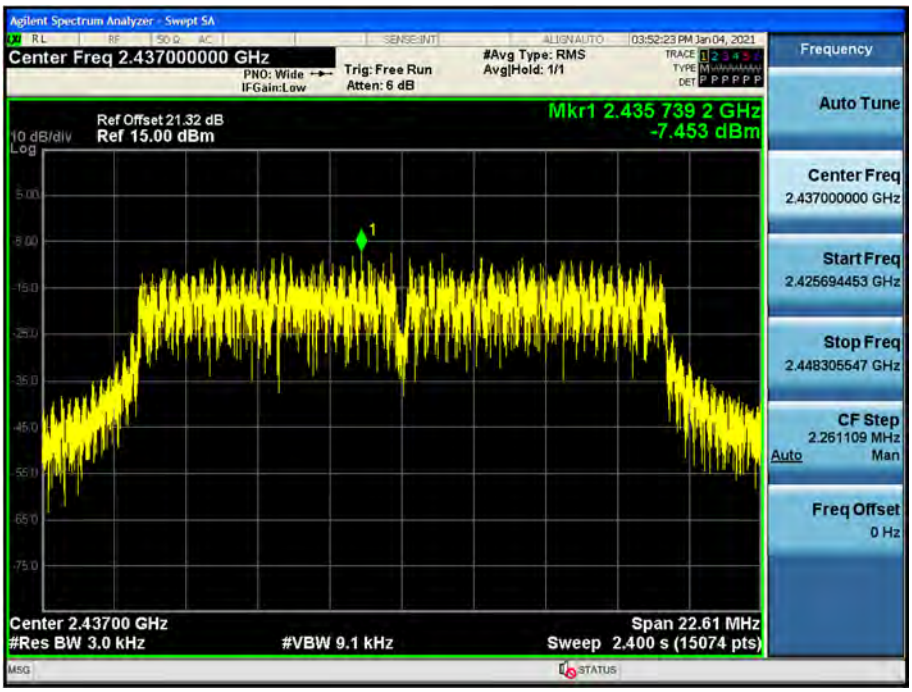
[ANT.B]

▣ Test Plots

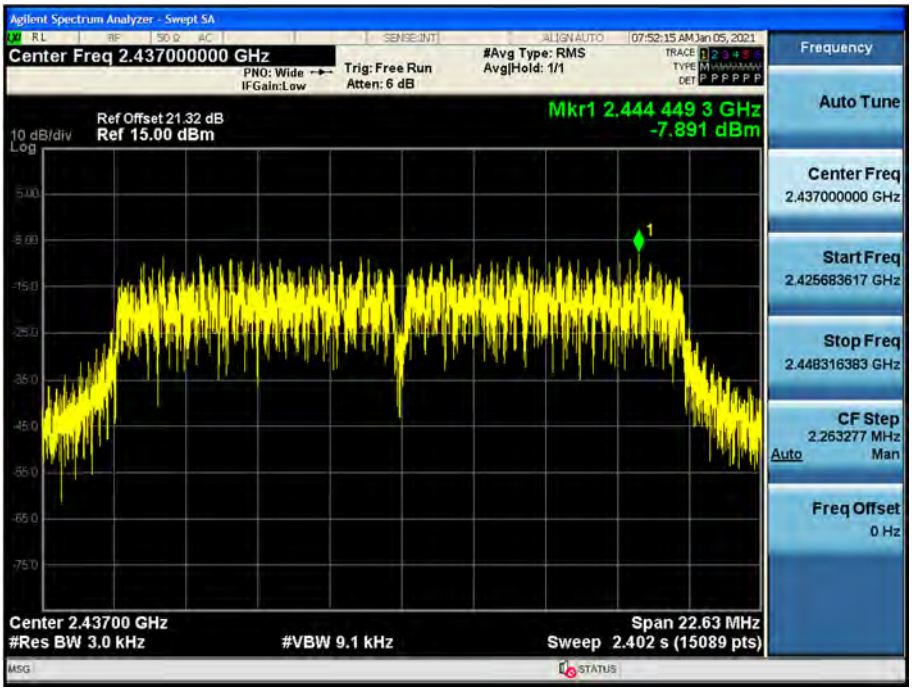
Power Spectral Density (802.11b-CH 11)



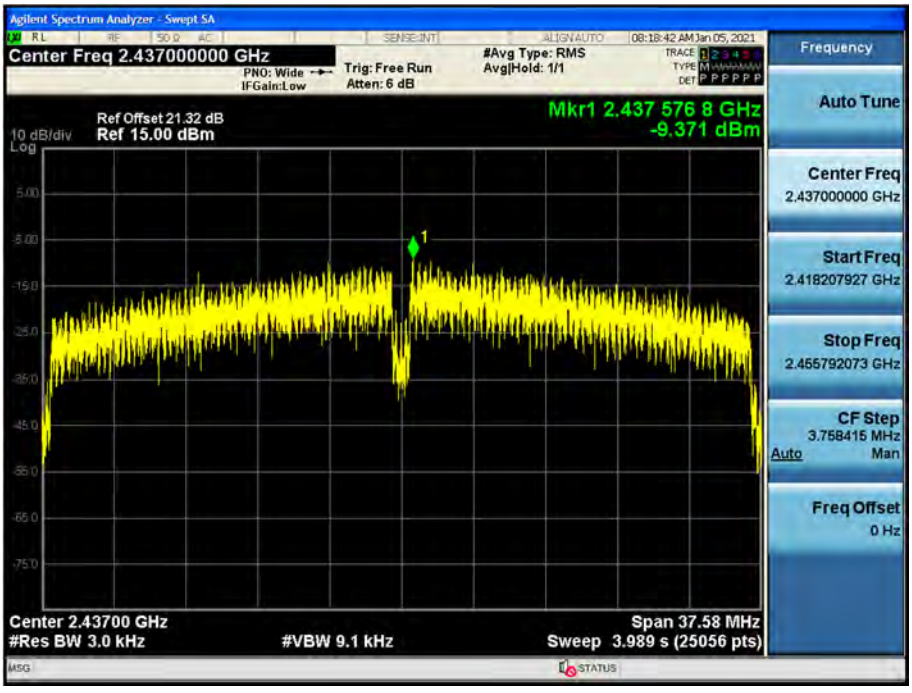
Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20 -CH 6)



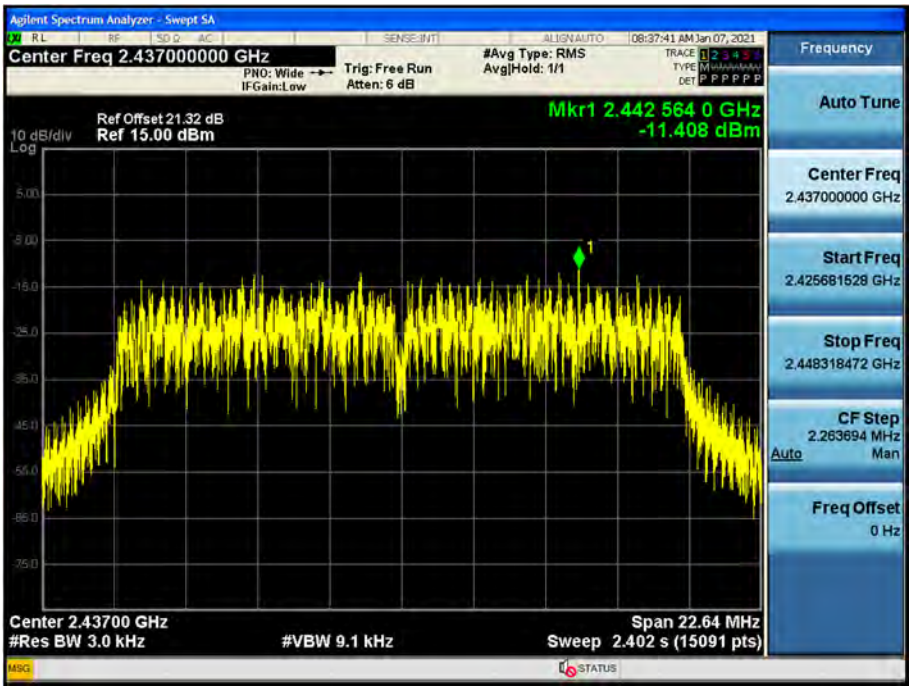
Power Spectral Density (802.11n_HT40 -CH 6)



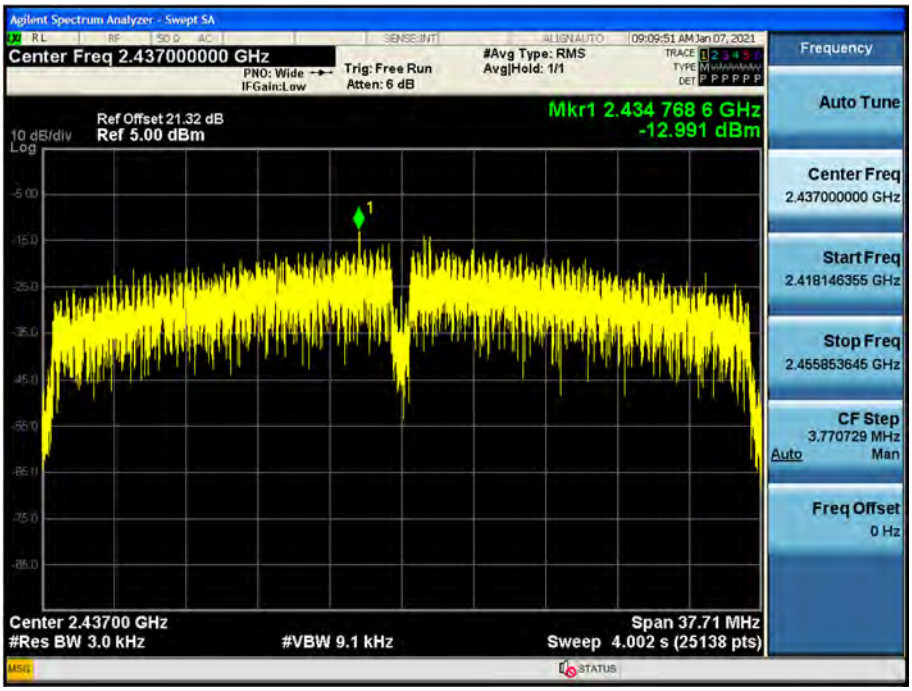
[MIMO_ANT.A]

▣ Test Plots

Power Spectral Density (802.11n_HT20 –CH 6)



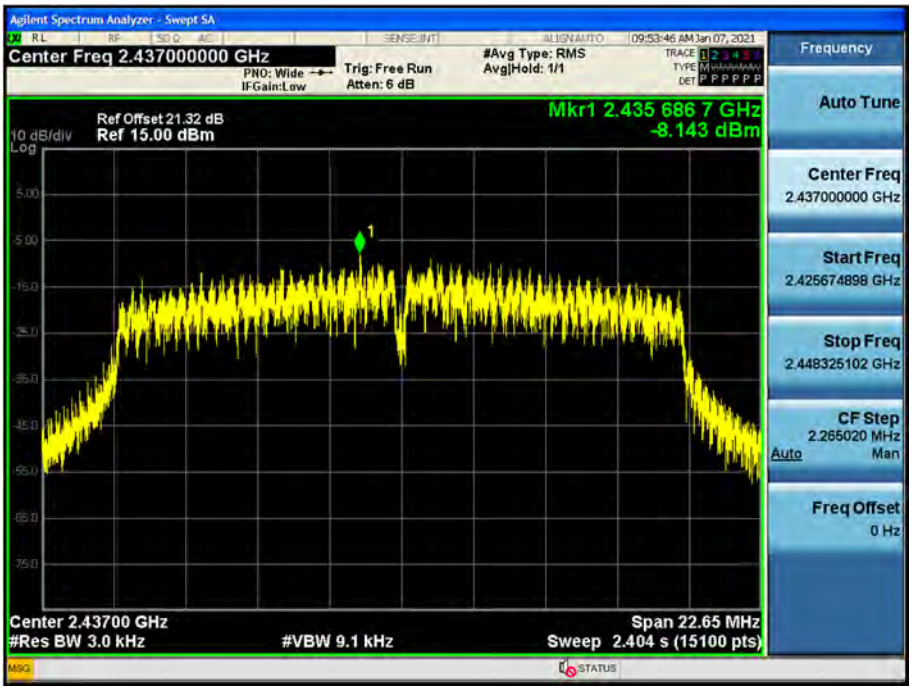
Power Spectral Density (802.11n_HT40 -CH 6)



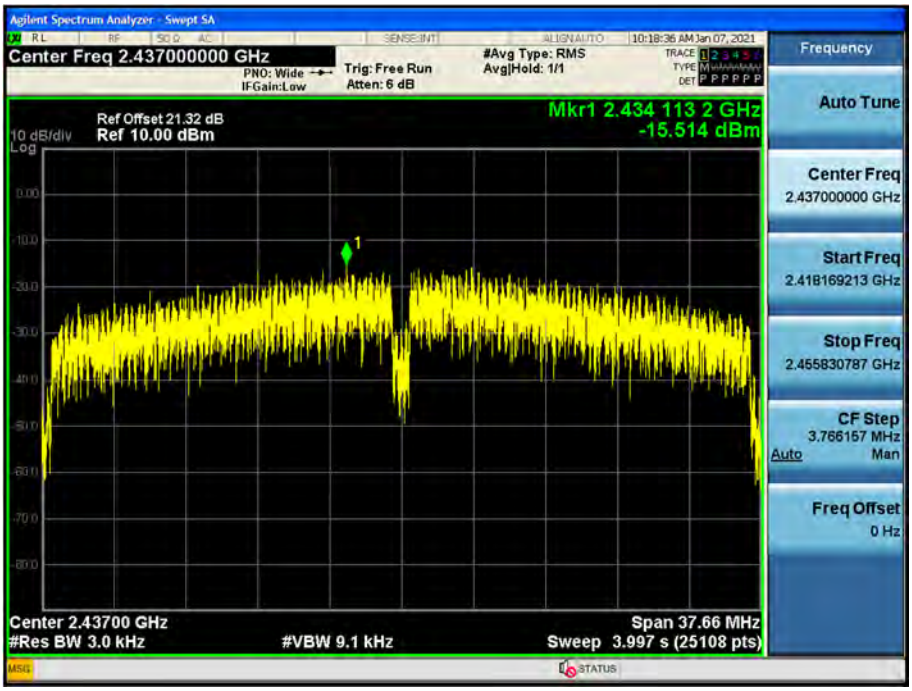
[MIMO_ANT.B]

▣ Test Plots

Power Spectral Density (802.11n_HT20 –CH 6)



Power Spectral Density (802.11n_HT40 -CH 6)



Note :

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

9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

Test Result : please refer to the plot below.
In order to simplify the report, attached plots were only the worst case channel and data rate.

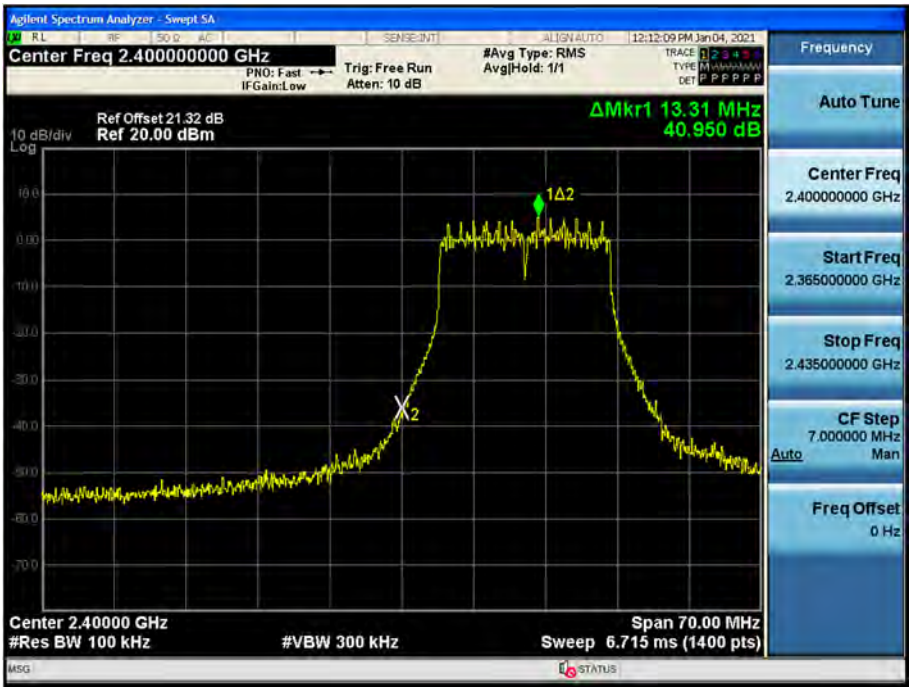
[ANT.A]

▣ Test Plots(BandEdge)

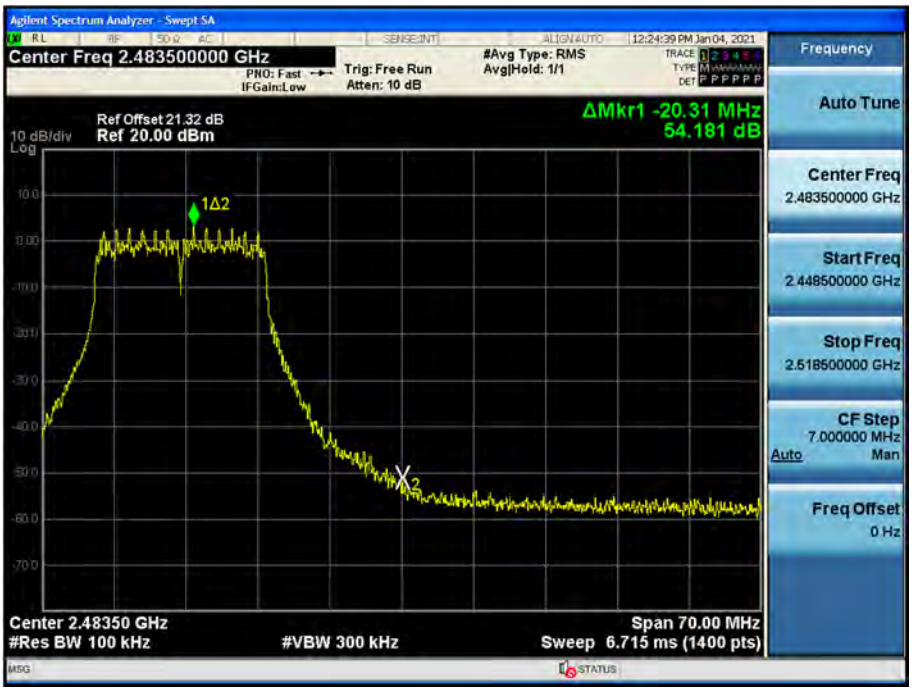
Band Edge (802.11b-CH1)

Band Edge (802.11b-CH11)

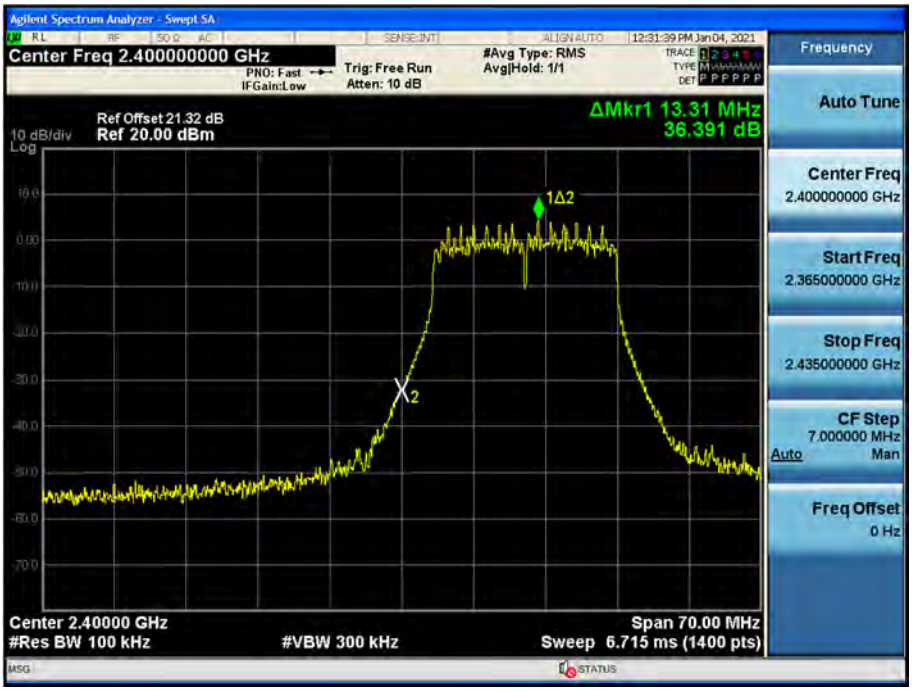
Band Edge (802.11g-CH1)



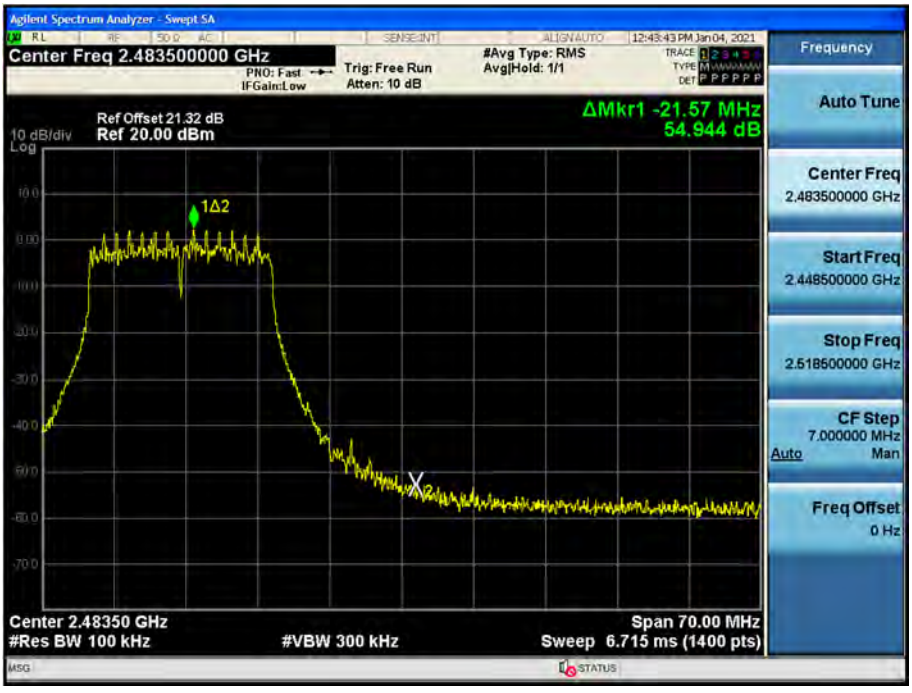
Band Edge (802.11gCH11)



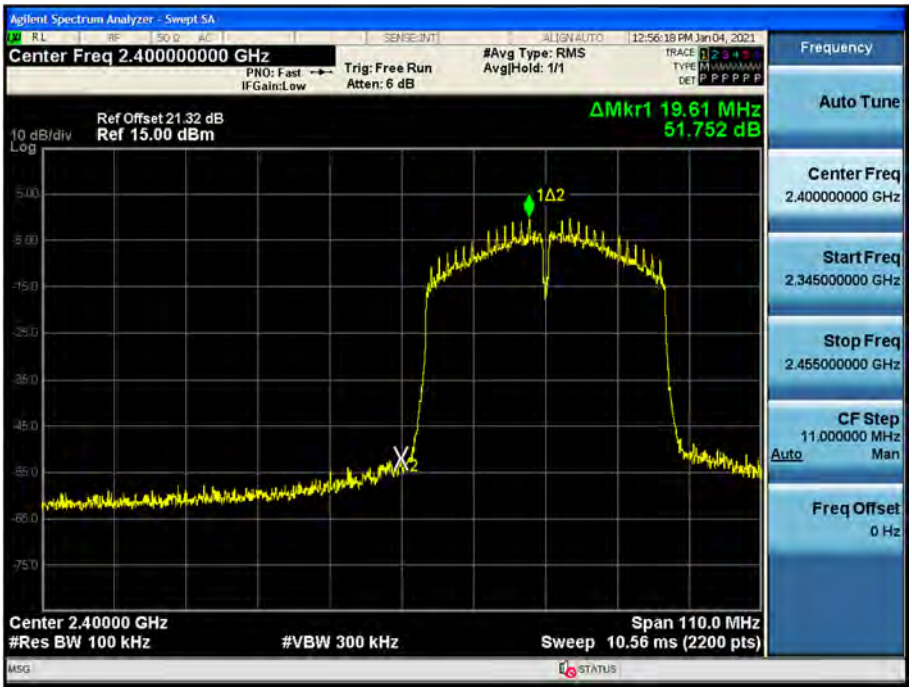
Band Edge (802.11n_HT20 -CH1)



Band Edge (802.11n_HT20 -CH11)



Band Edge (802.11n_HT40 -CH3)

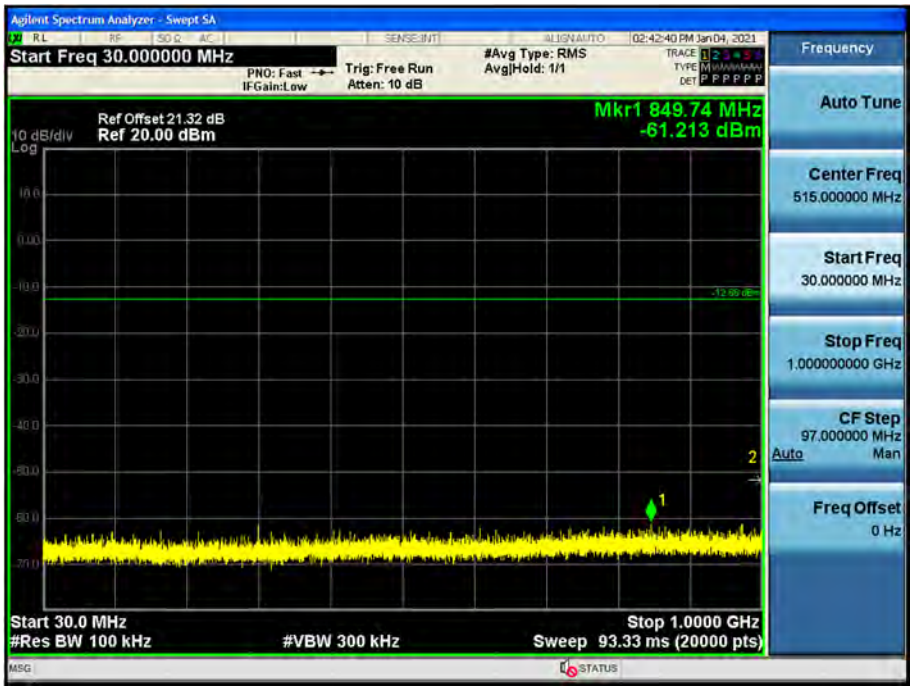


Band Edge (802.11n_HT40 –CH9)

▣ Test Plots(Conducted Spurious Emission)

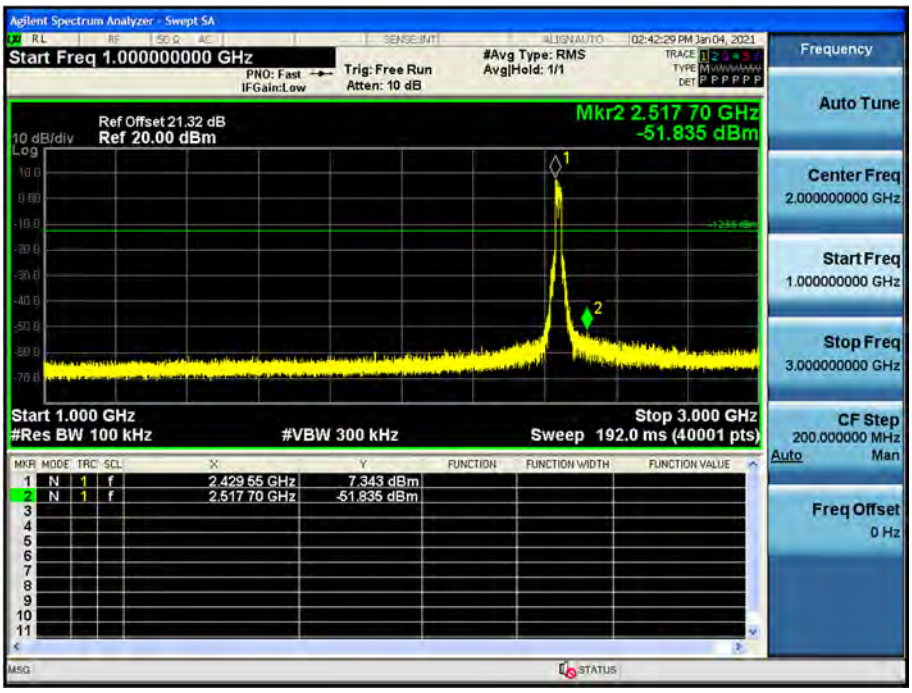
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



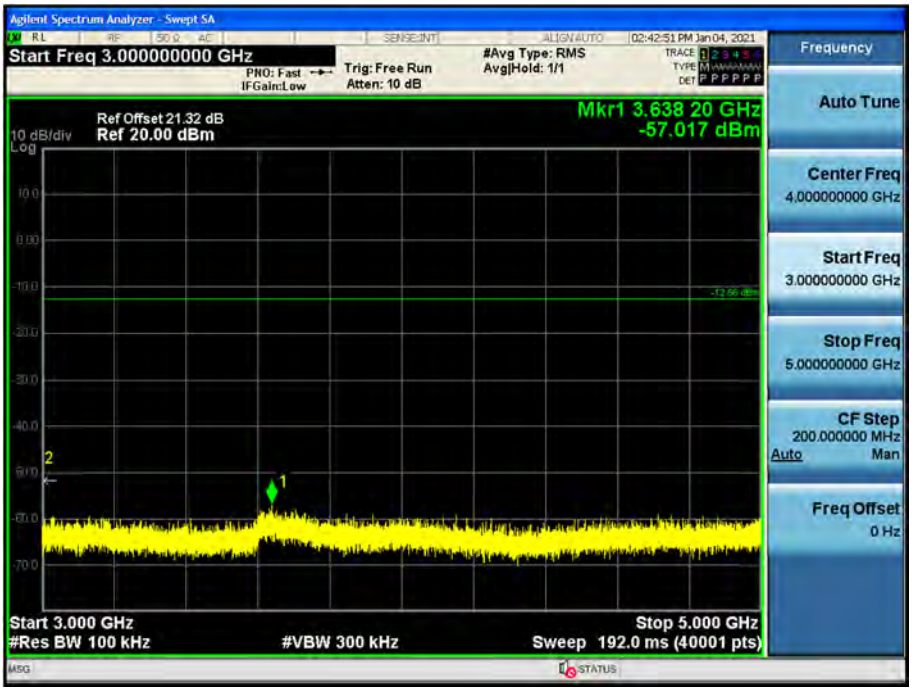
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



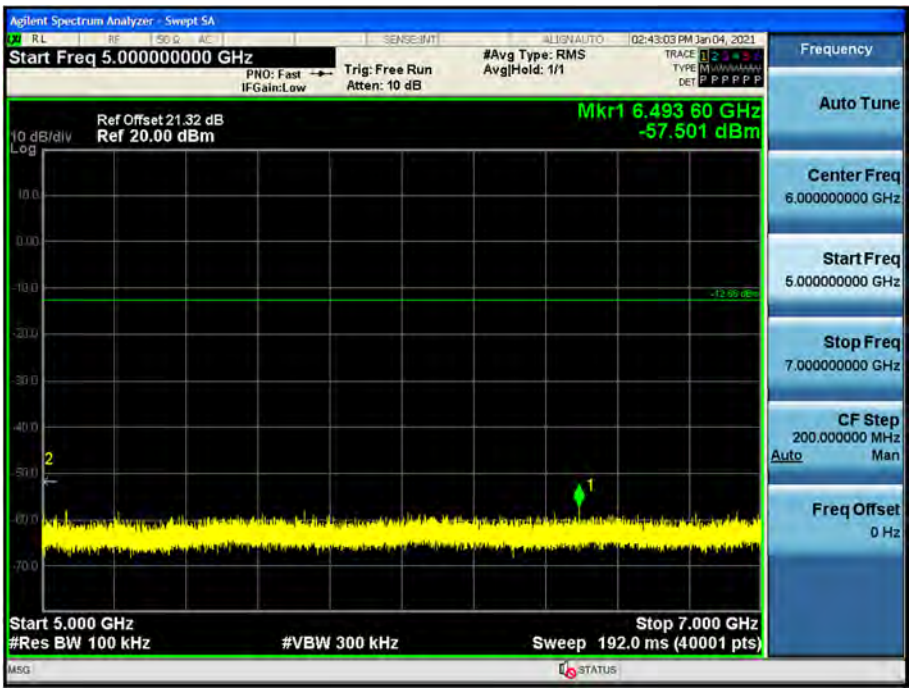
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



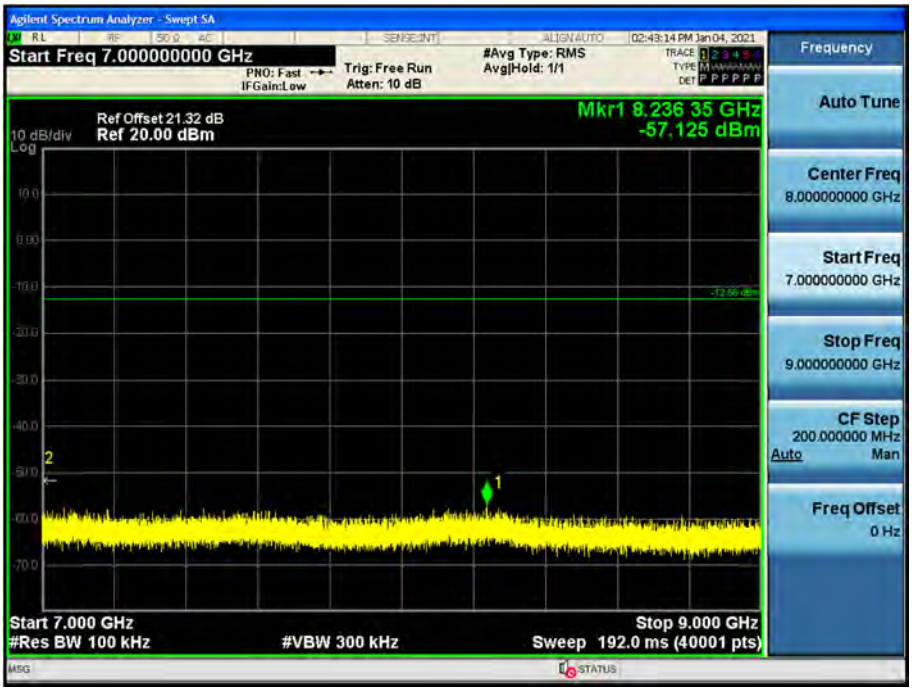
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



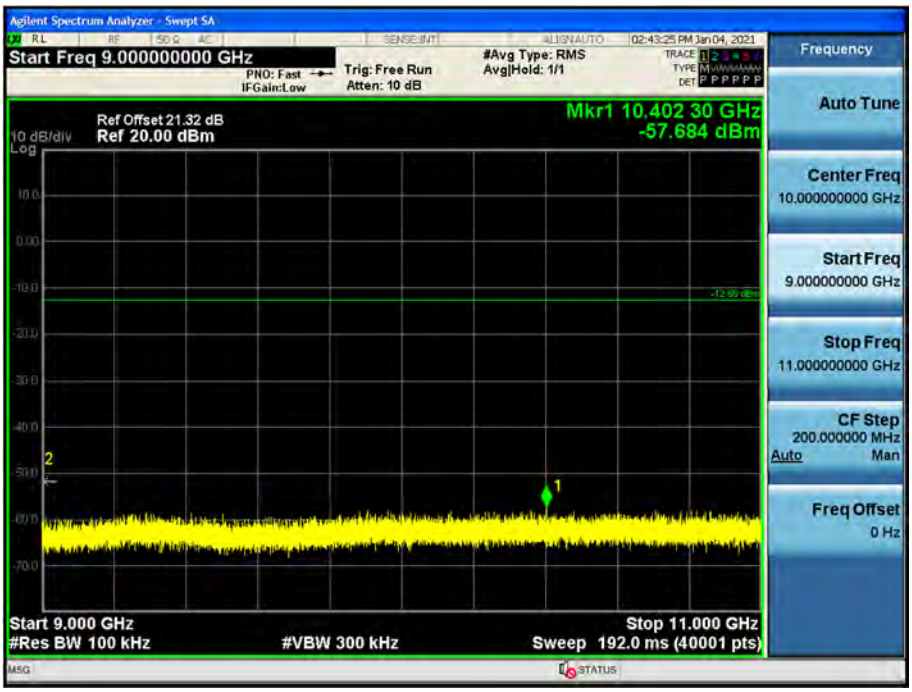
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



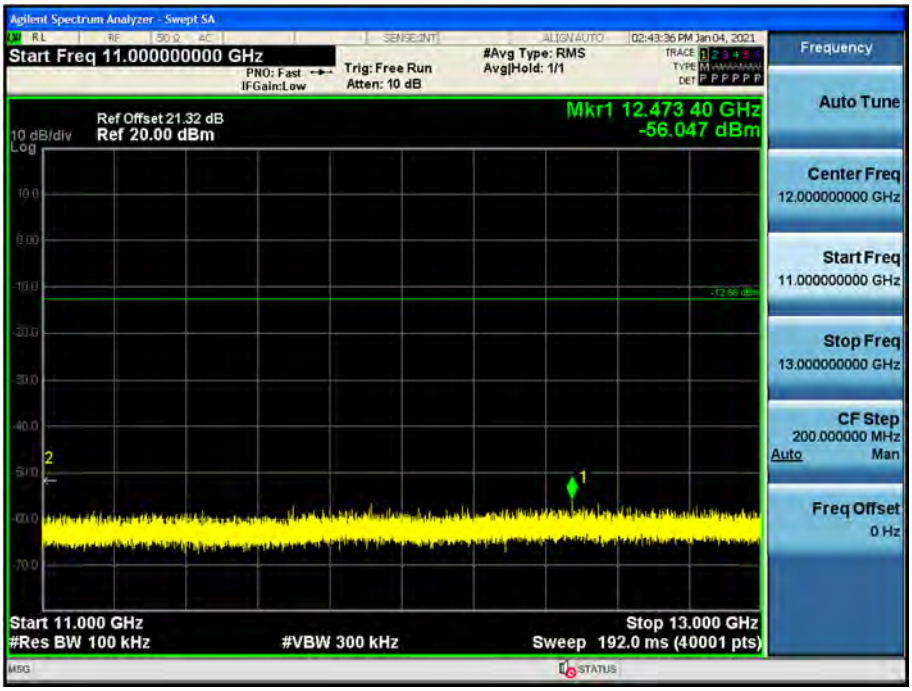
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



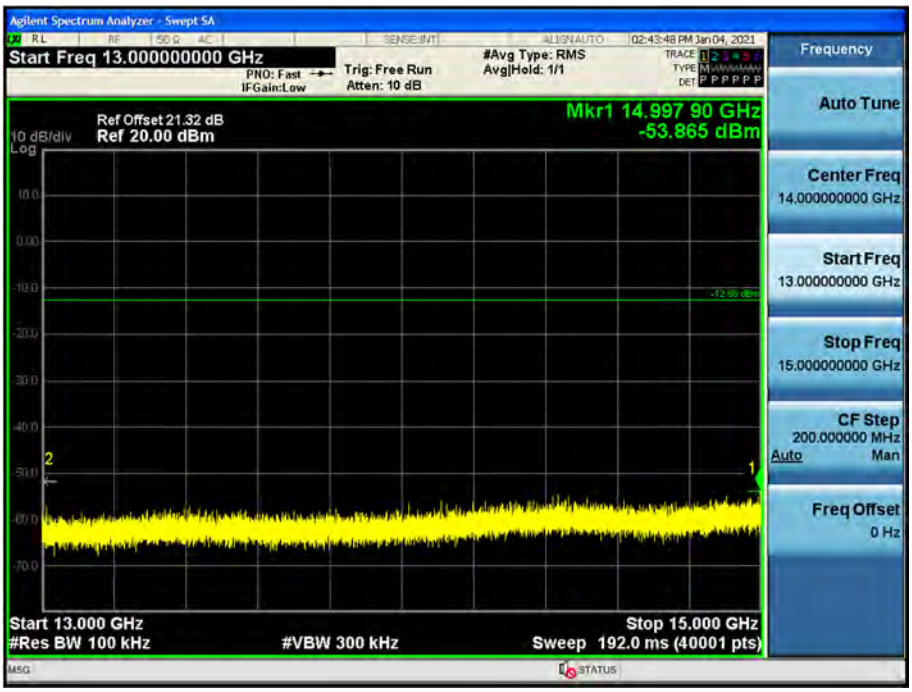
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



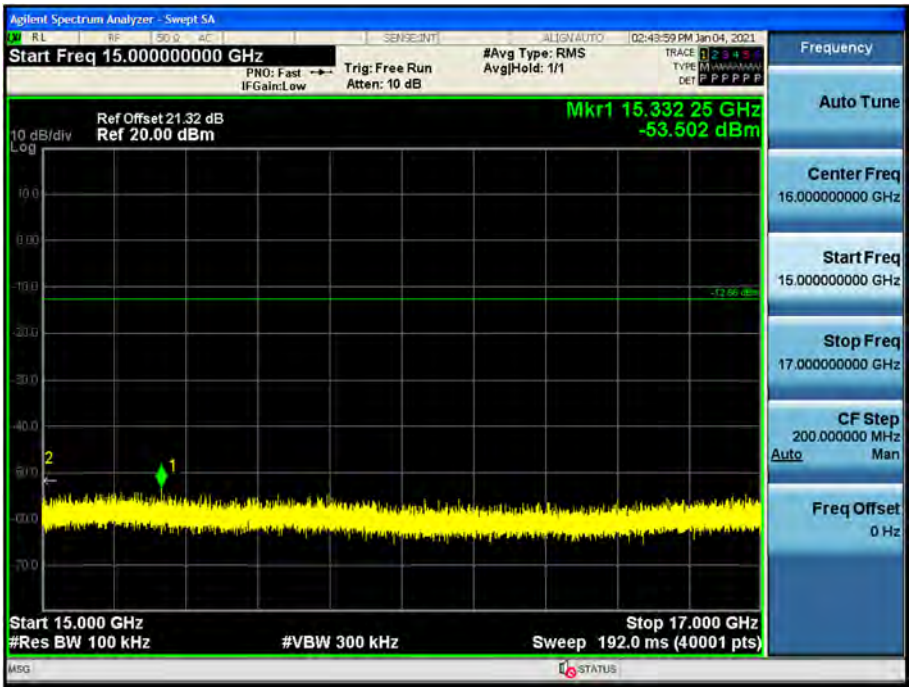
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



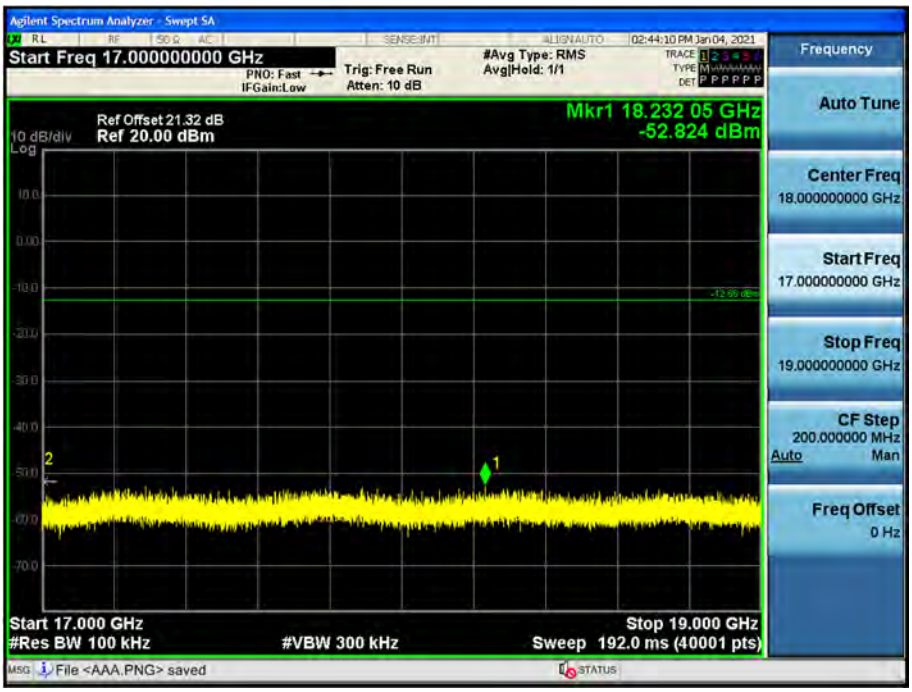
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



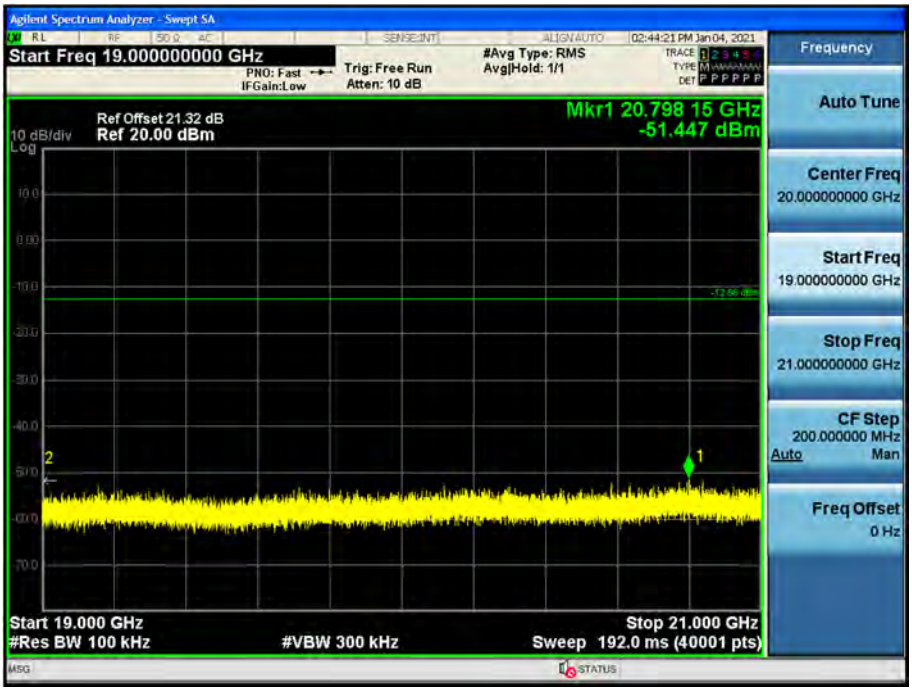
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



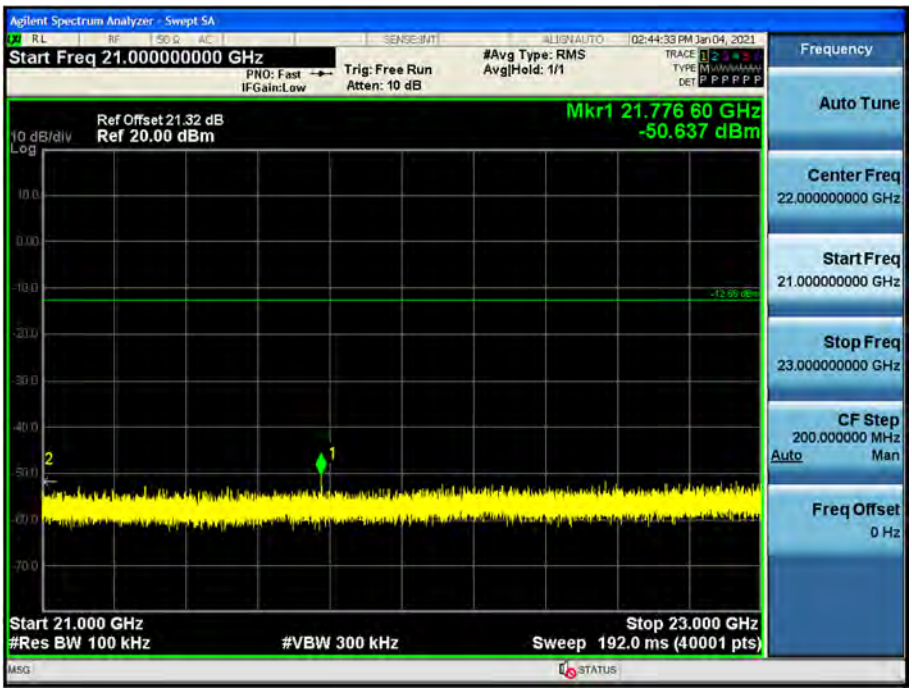
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11g_Ch.6_48 Mbps)

[ANT.B]

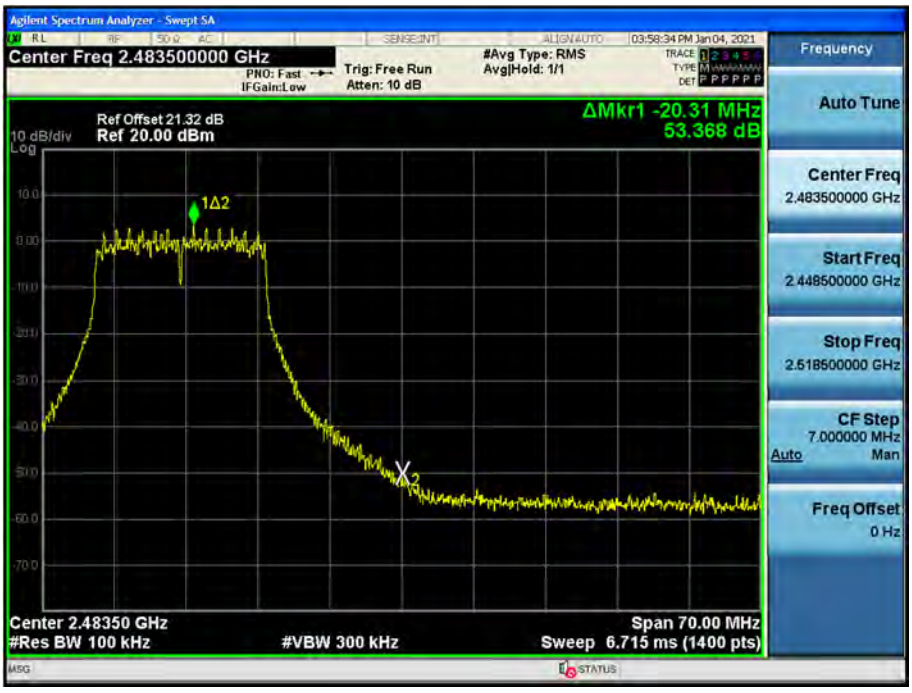
▣ Test Plots(BandEdge)

Band Edge (802.11b-CH1)

Band Edge (802.11b-CH11)

Band Edge (802.11g-CH1)

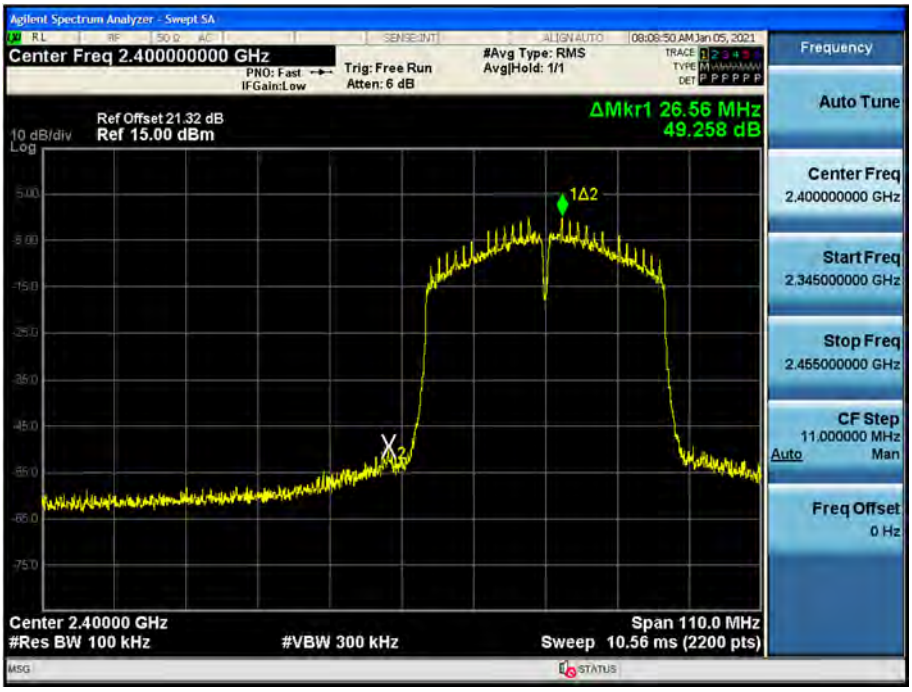
Band Edge (802.11gCH11)



Band Edge (802.11n_HT20 -CH1)

Band Edge (802.11n_HT20 -CH11)

Band Edge (802.11n_HT40 -CH3)

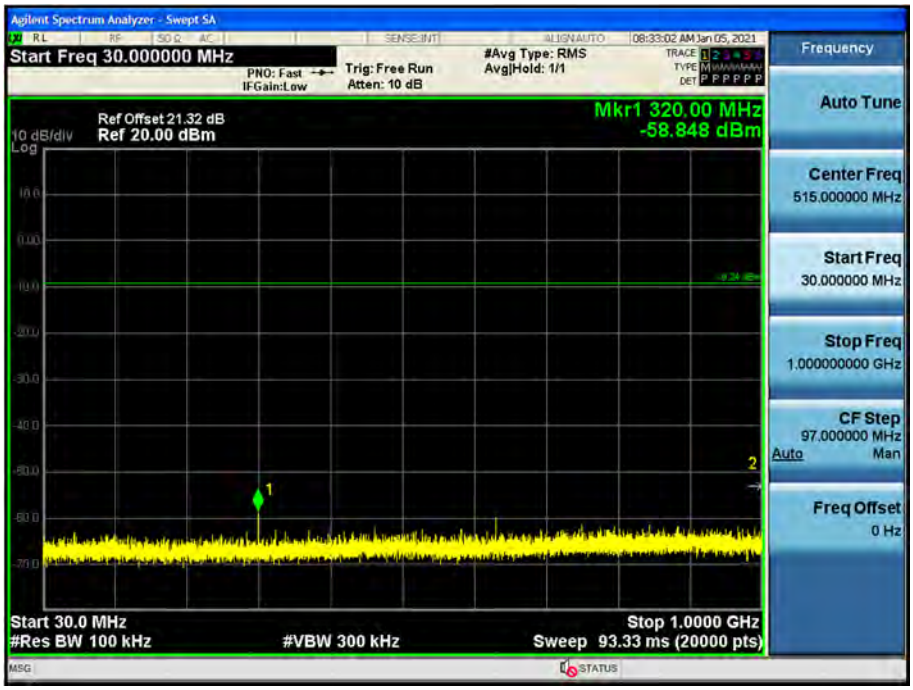


Band Edge (802.11n_HT40 –CH9)

▣ Test Plots(Conducted Spurious Emission)

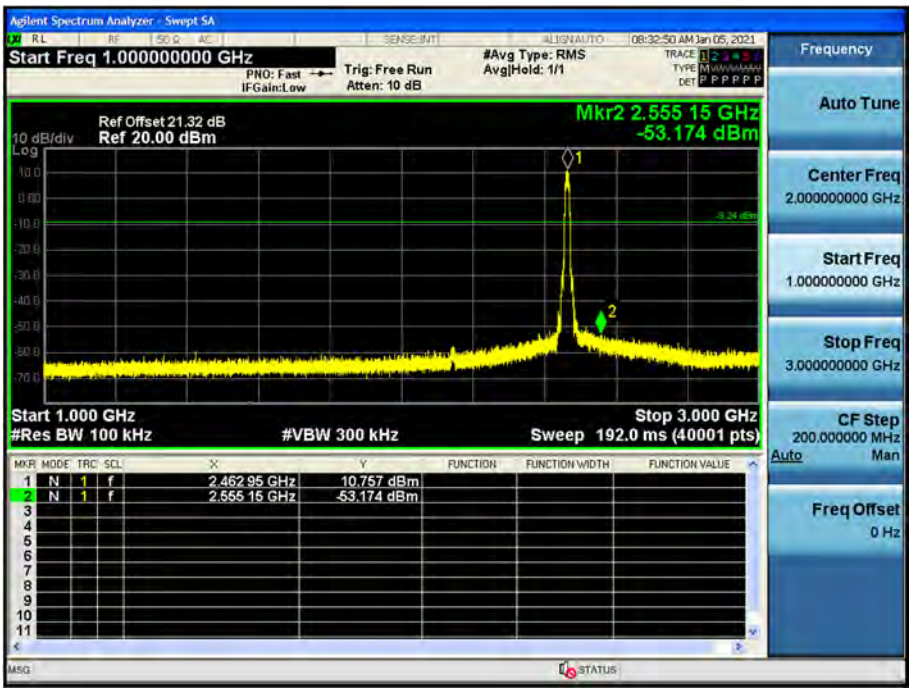
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



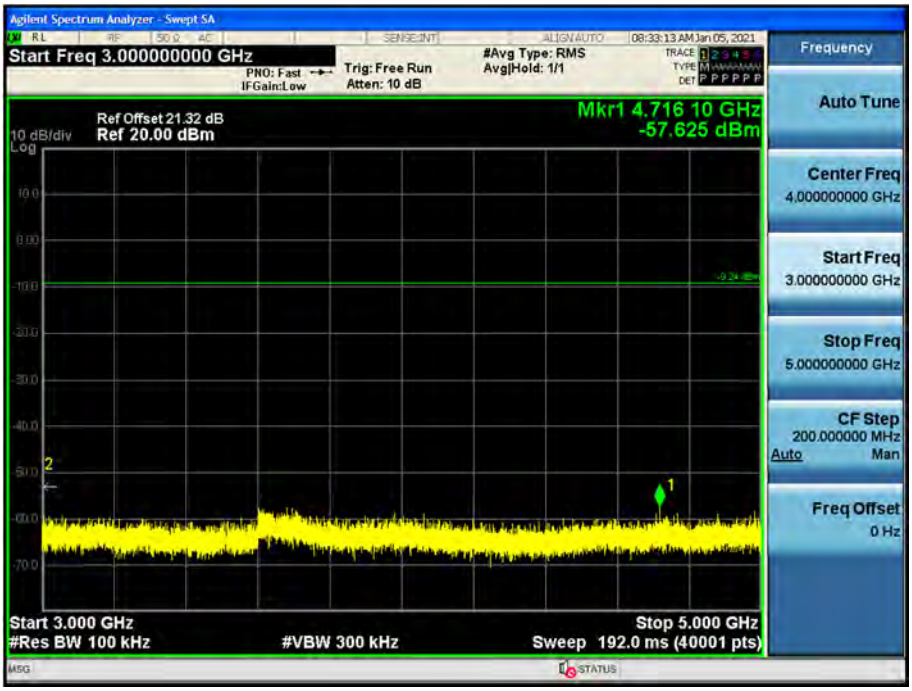
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



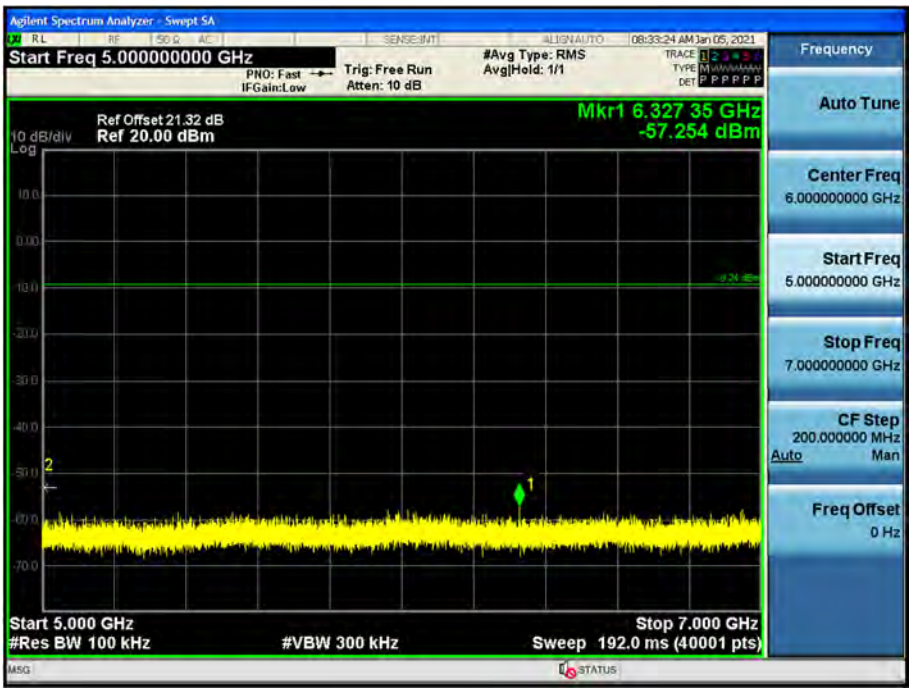
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



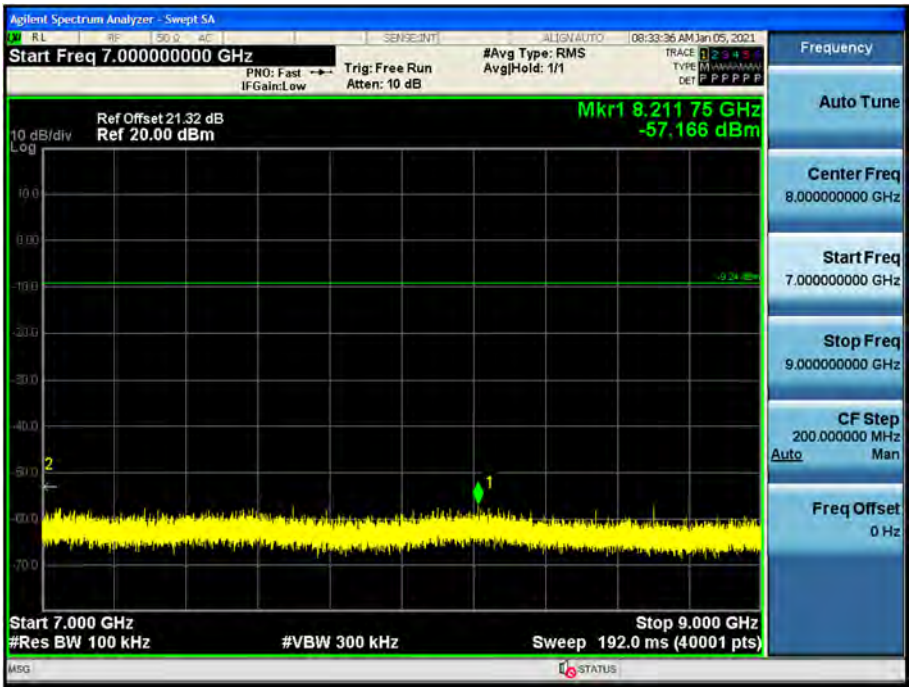
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



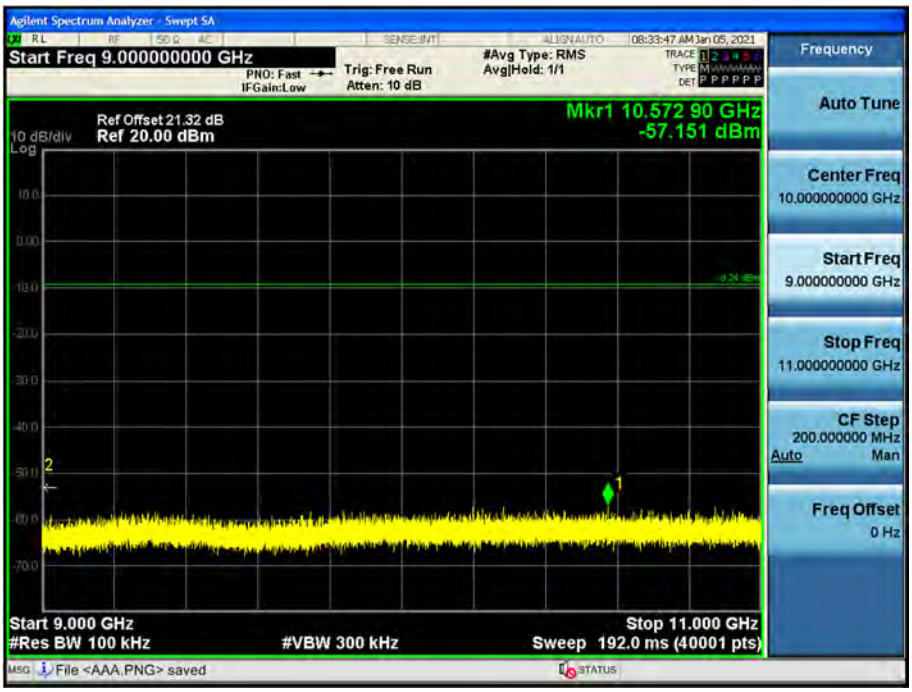
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



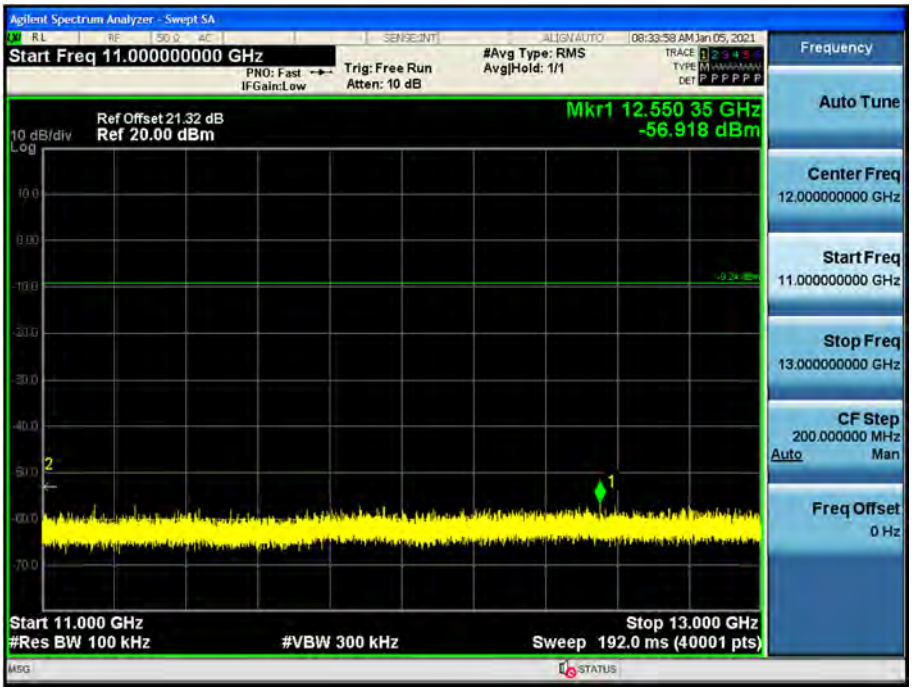
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



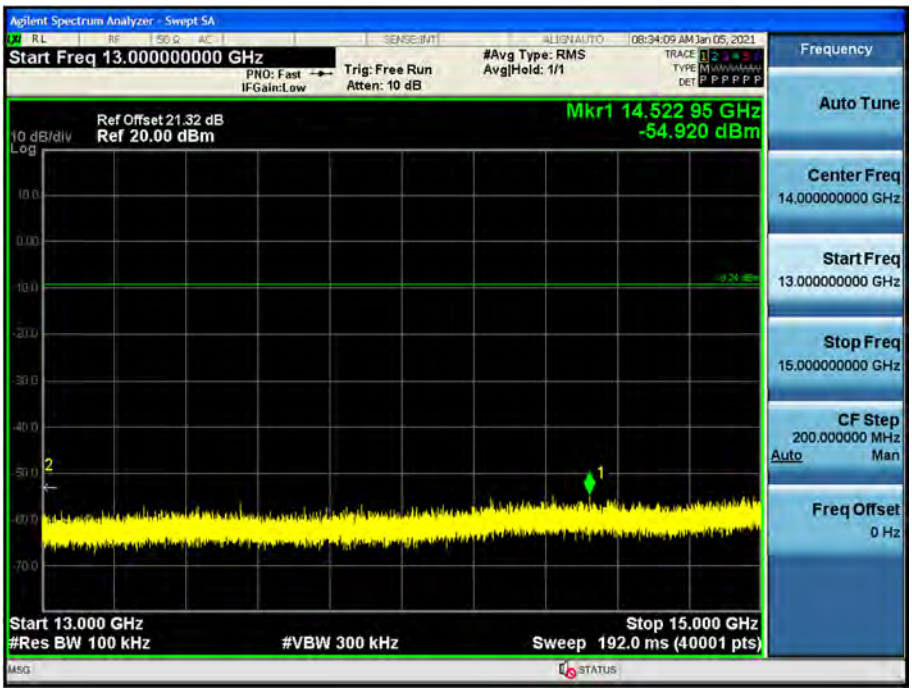
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



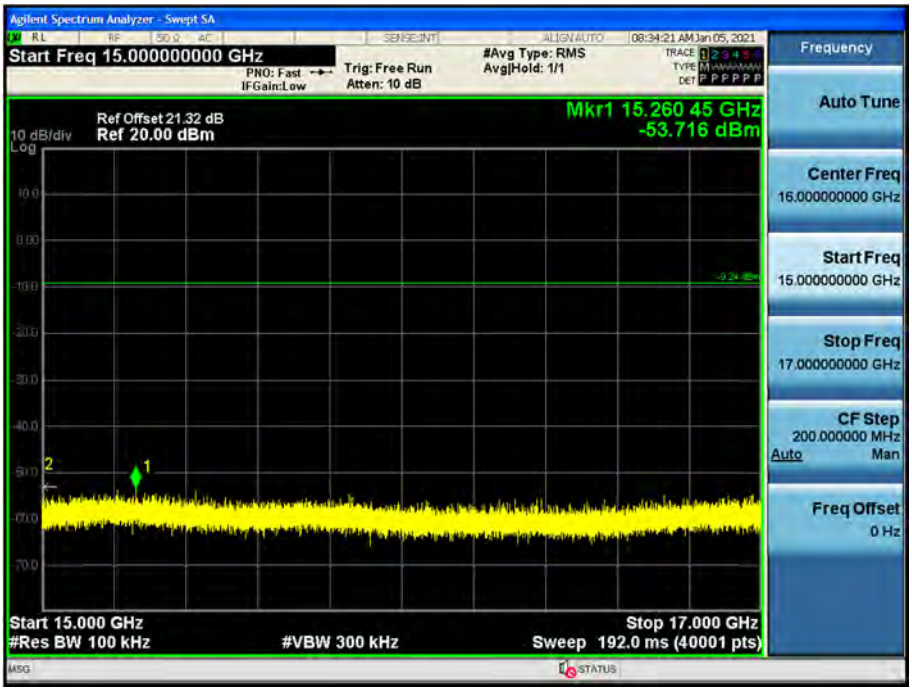
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



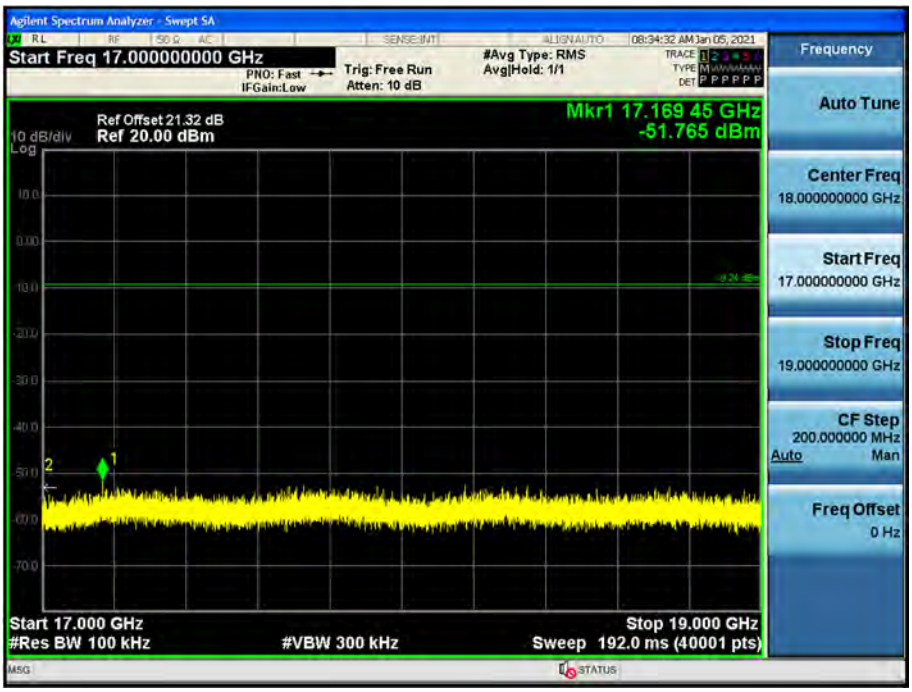
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



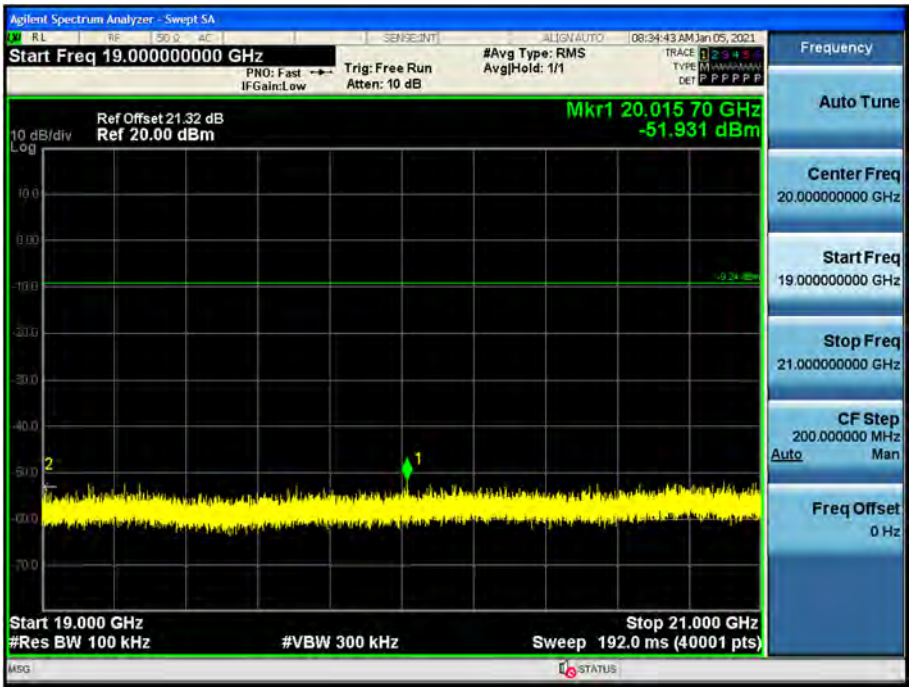
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



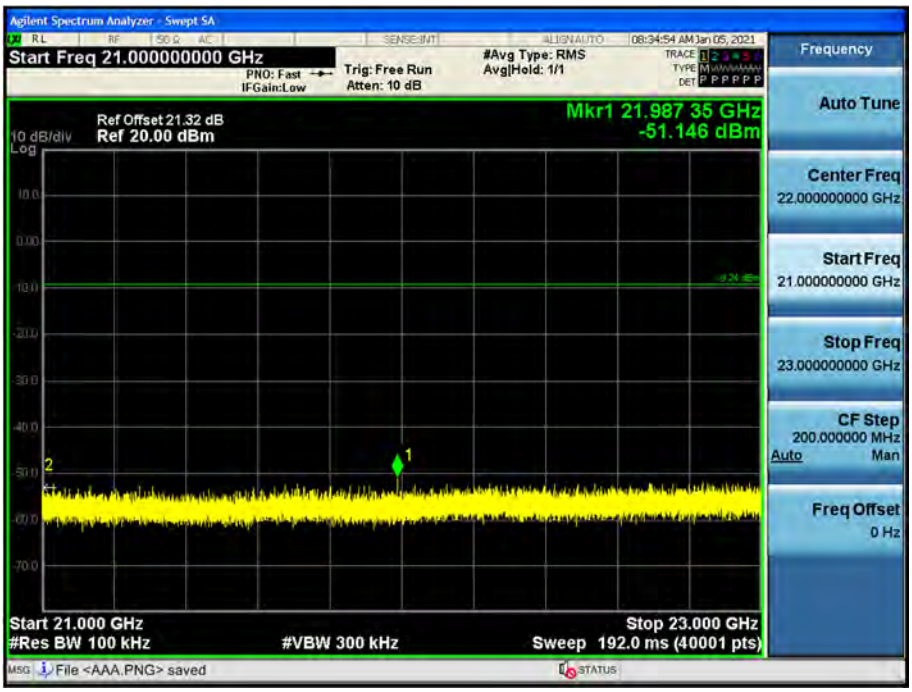
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)



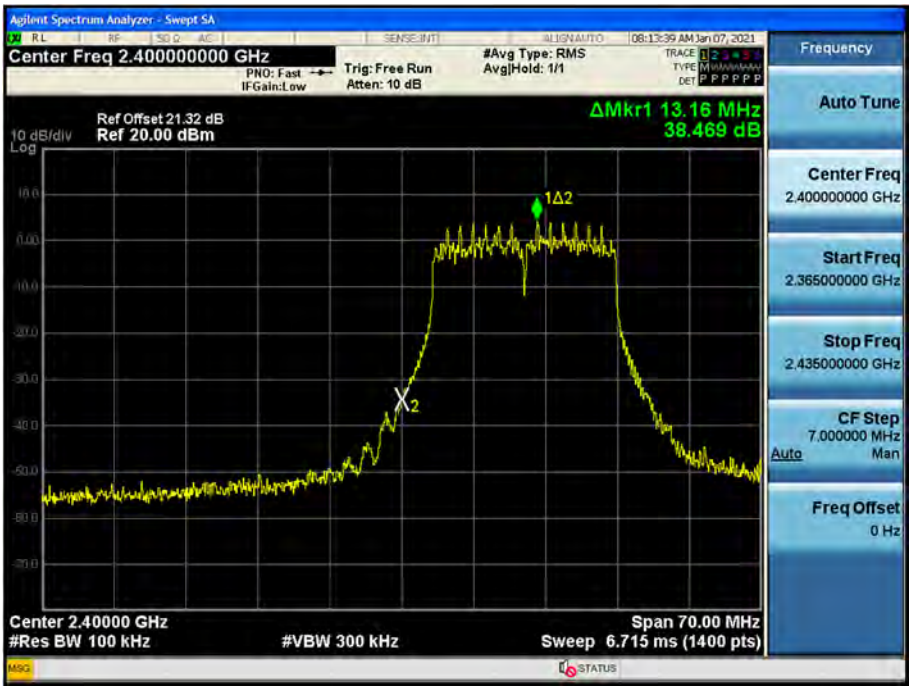
23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11b_Ch.11_11 Mbps)

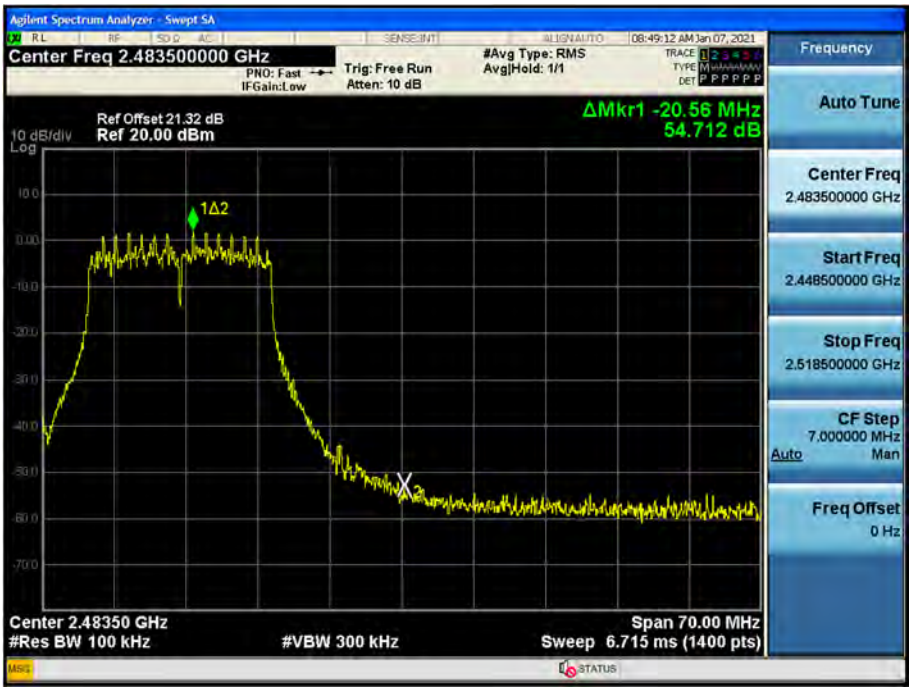
[MIMO_ANT.A]

▣ Test Plots(BandEdge)

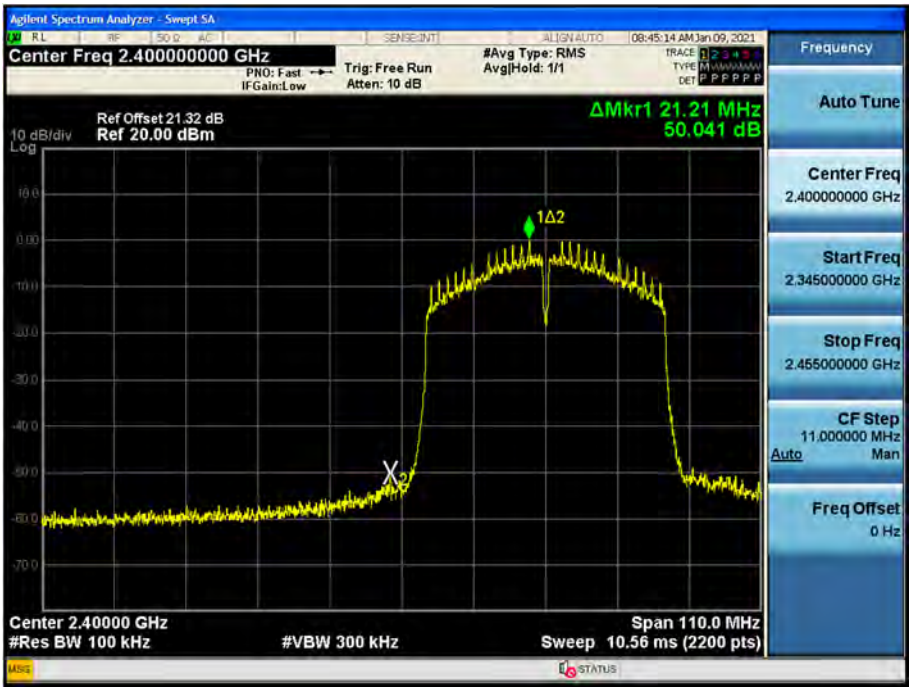
Band Edge (802.11n_HT20 -CH1)



Band Edge (802.11n_HT20 -CH11)



Band Edge (802.11n_HT40 -CH3)

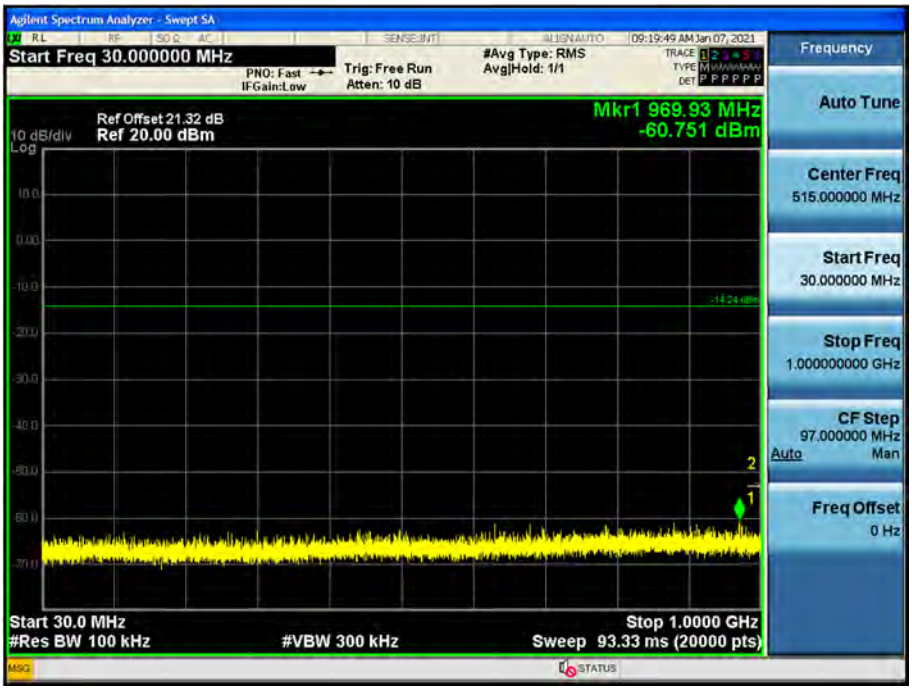


Band Edge (802.11n_HT40 –CH9)

▣ Test Plots(Conducted Spurious Emission)

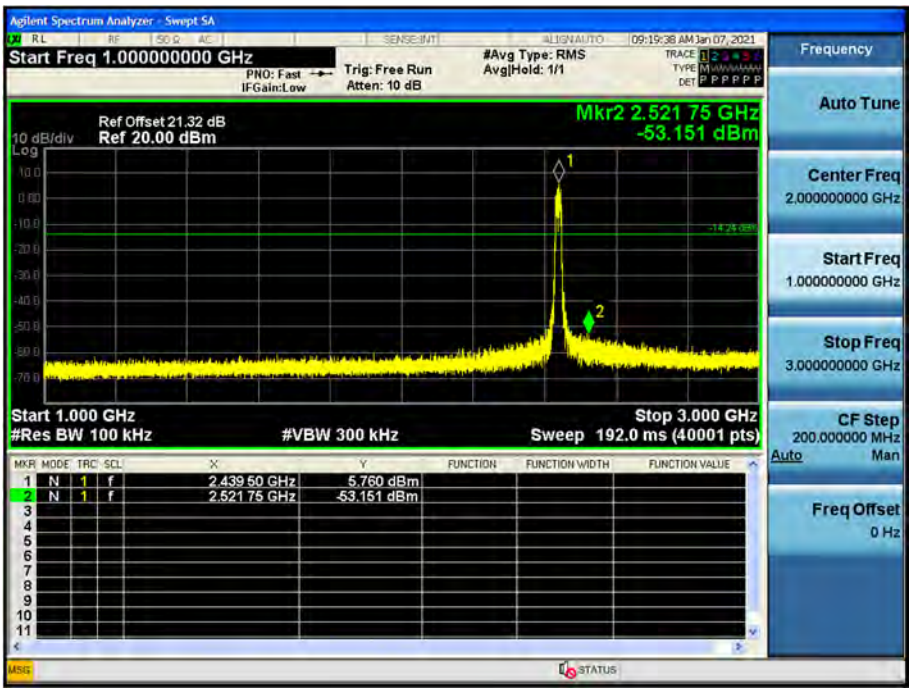
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



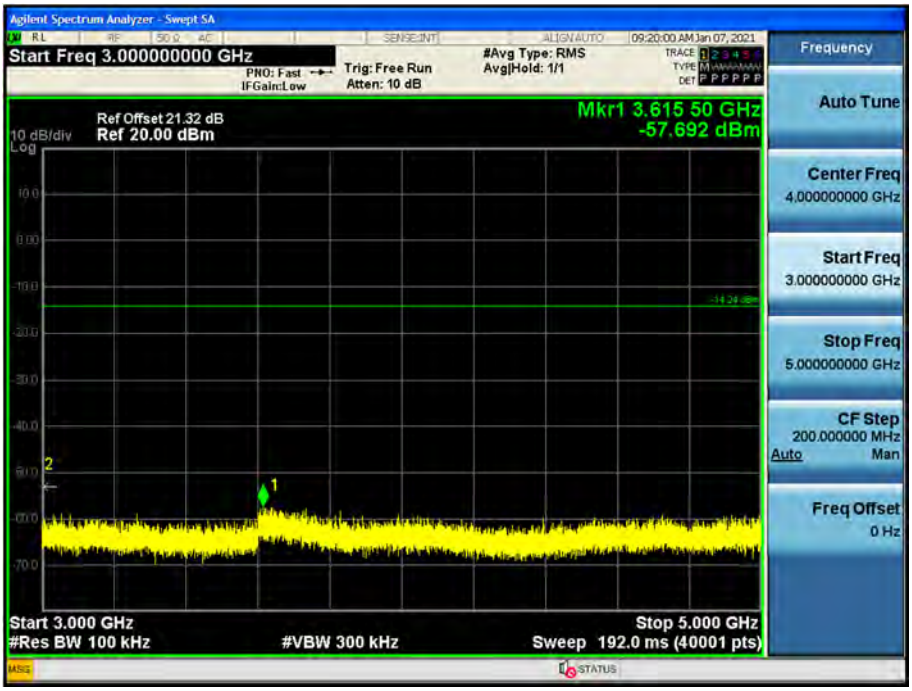
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



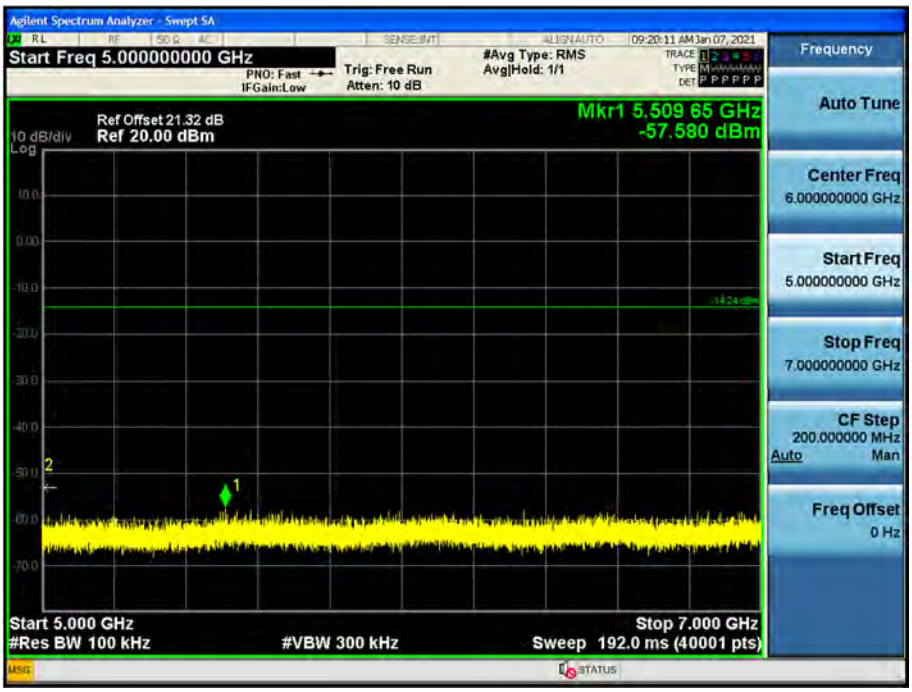
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



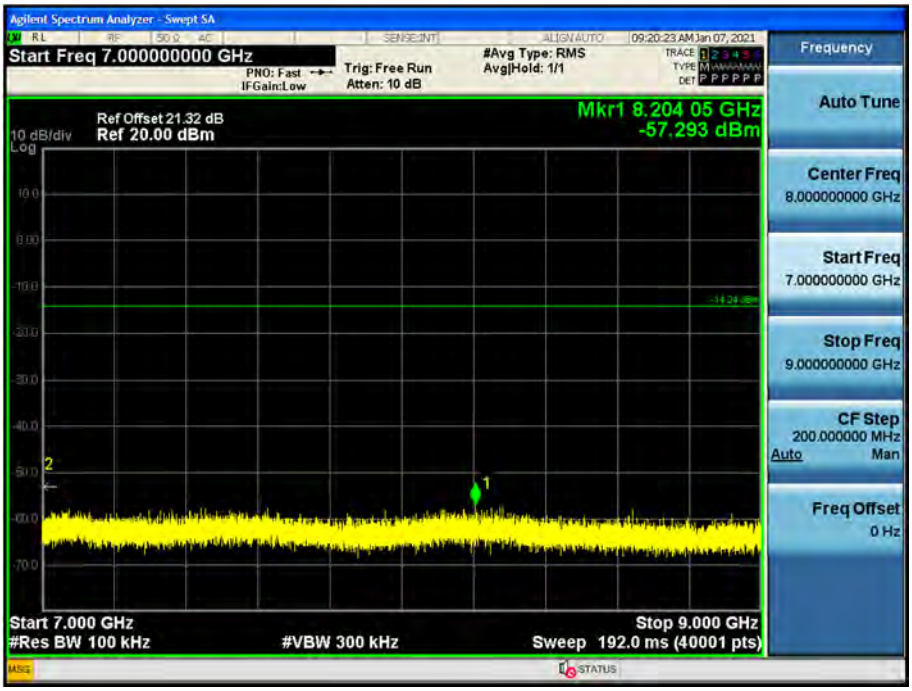
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



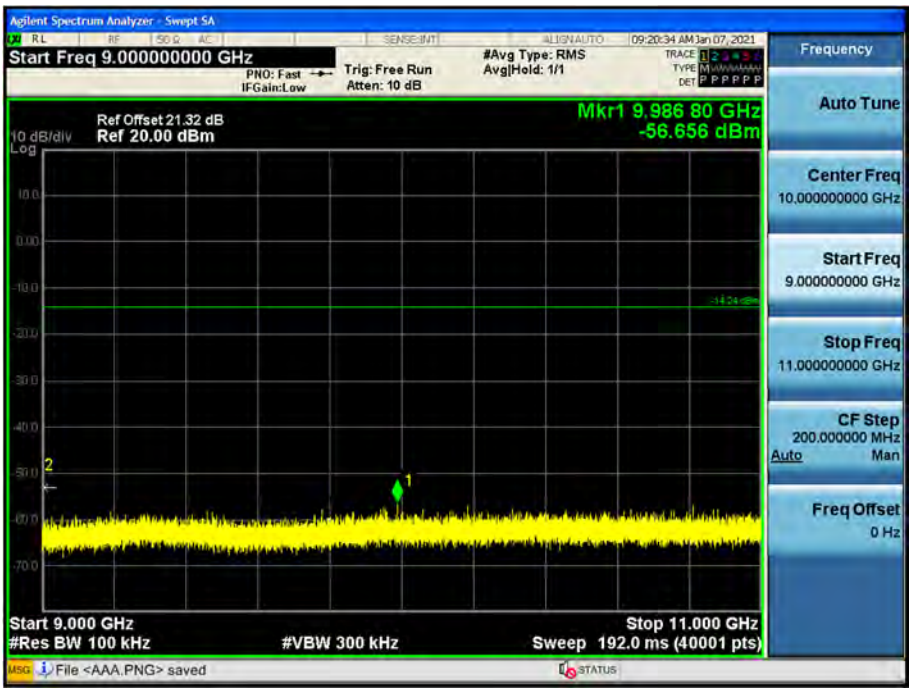
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



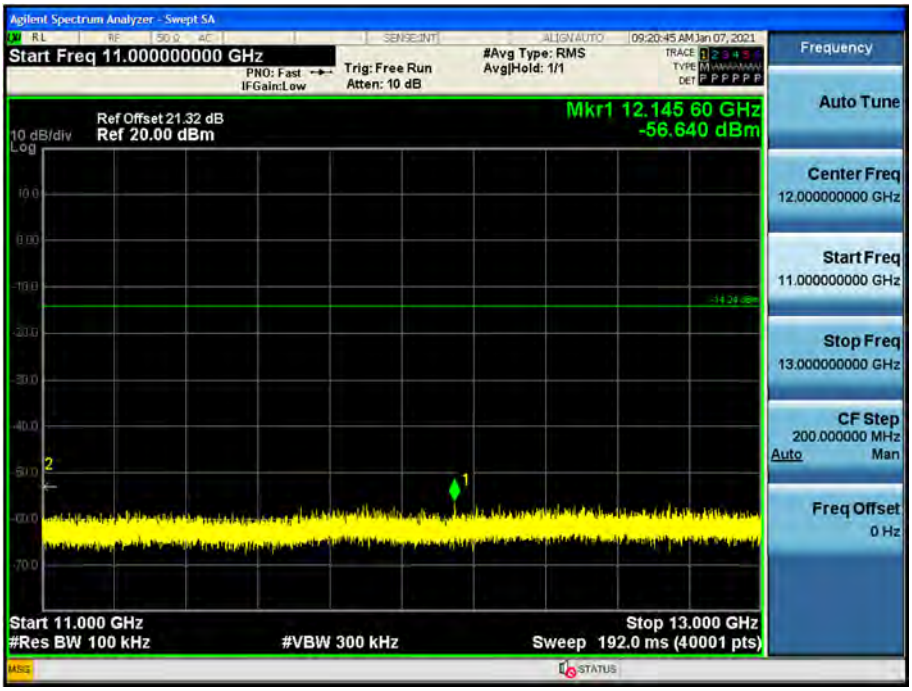
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



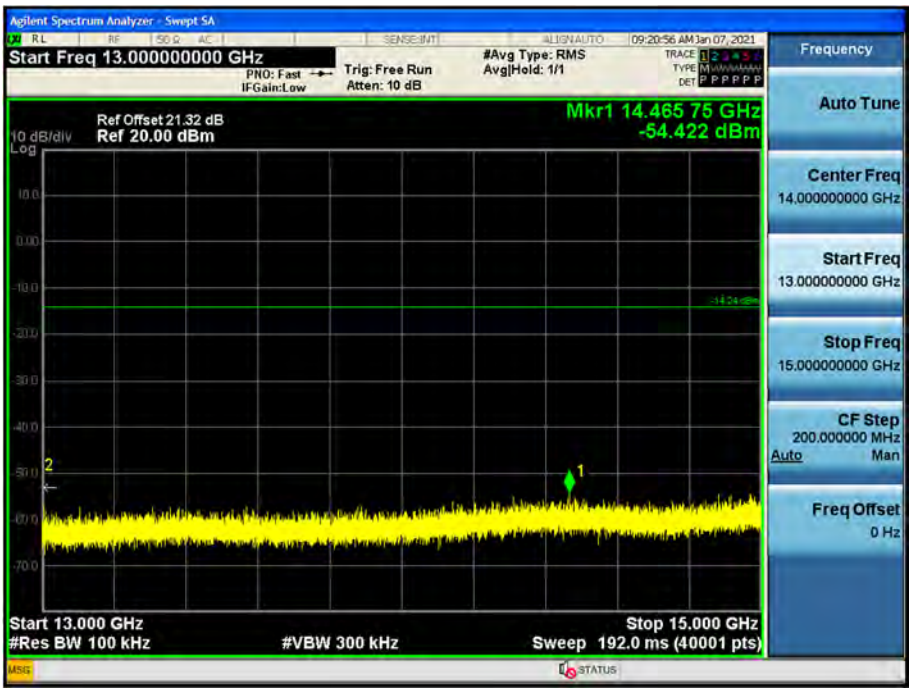
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



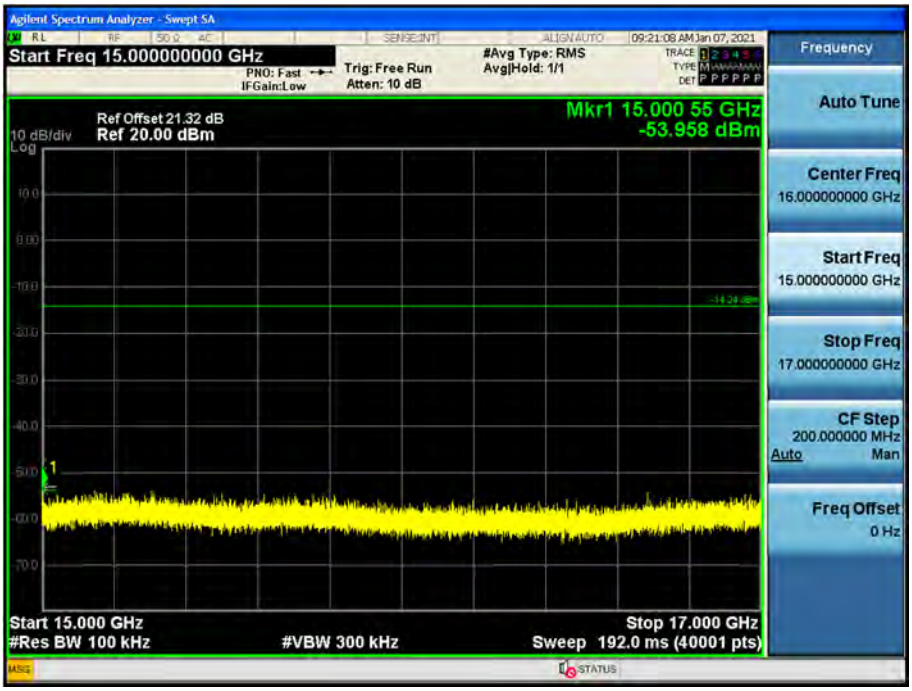
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



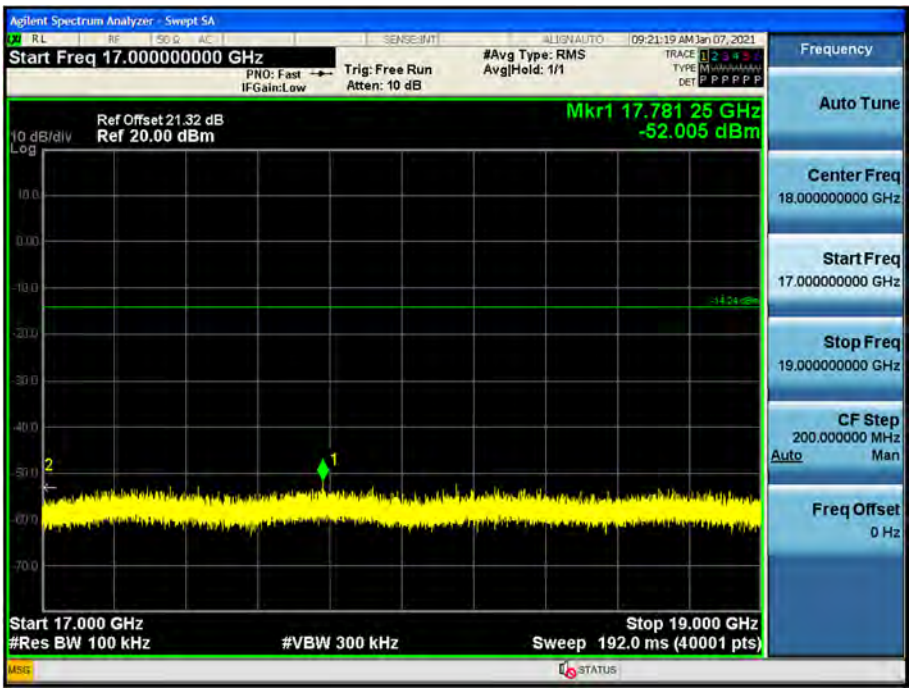
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



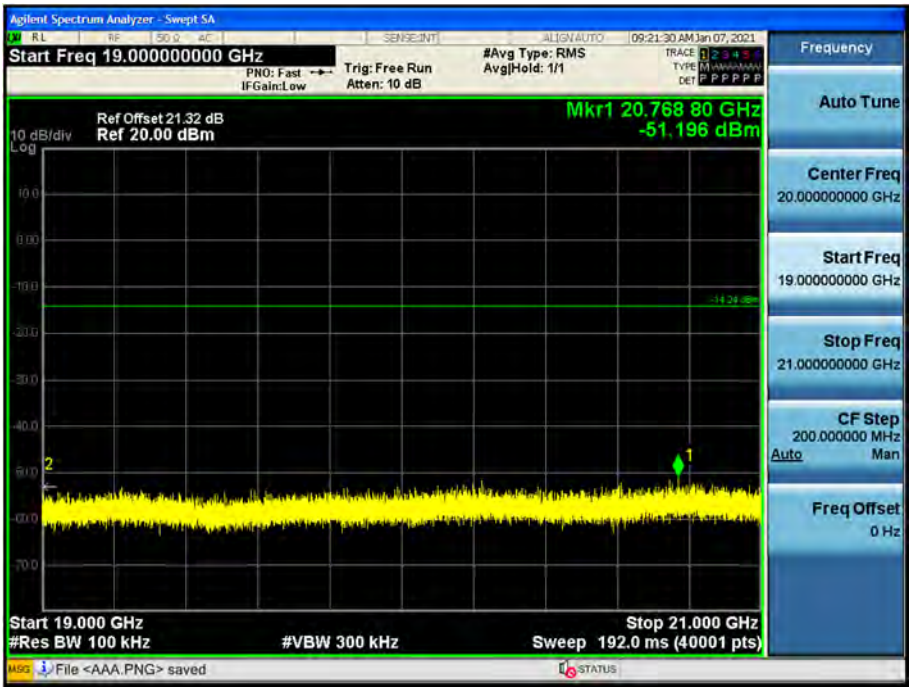
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



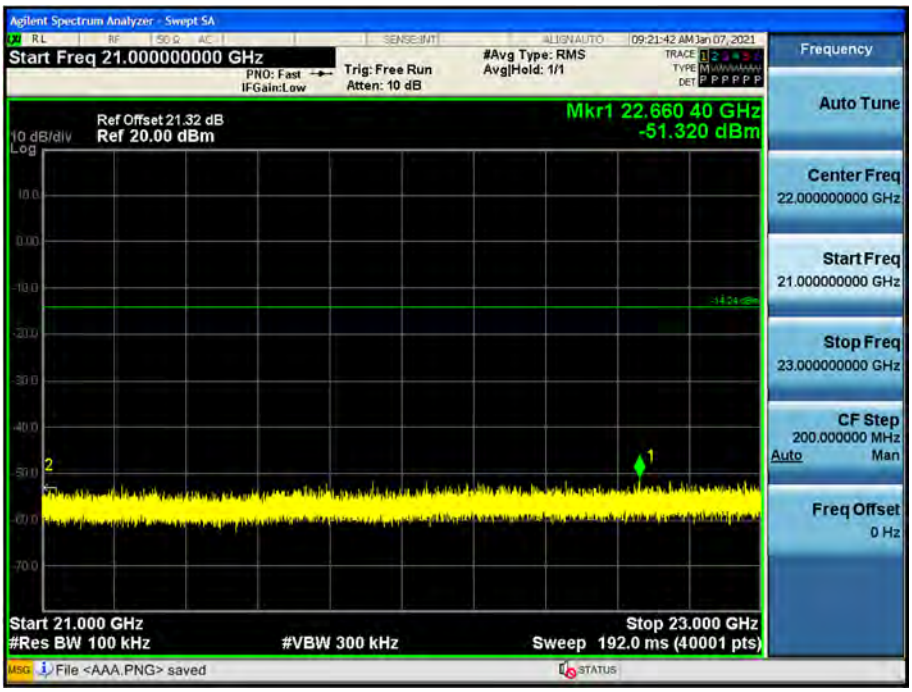
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



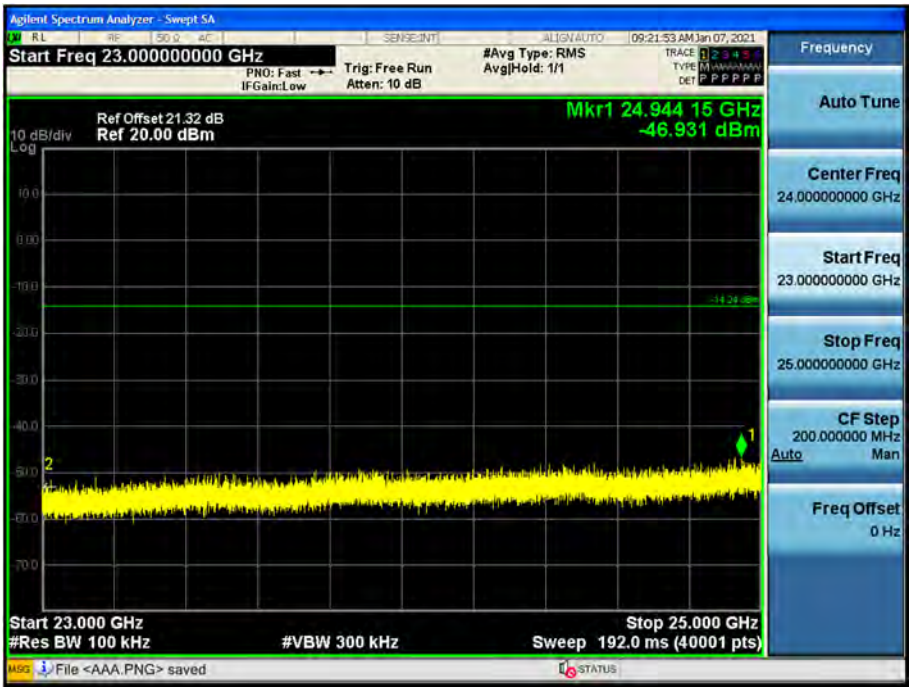
21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



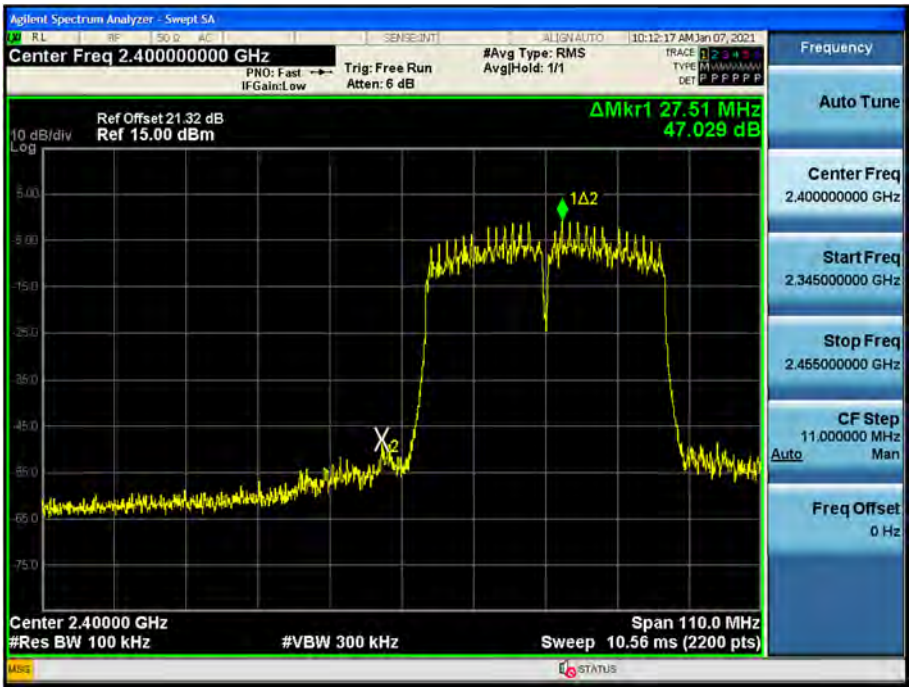
[MIMO_ANT.B]

▣ Test Plots(BandEdge)

Band Edge (802.11n_HT20 -CH1)

Band Edge (802.11n_HT20 -CH11)

Band Edge (802.11n_HT40 -CH3)

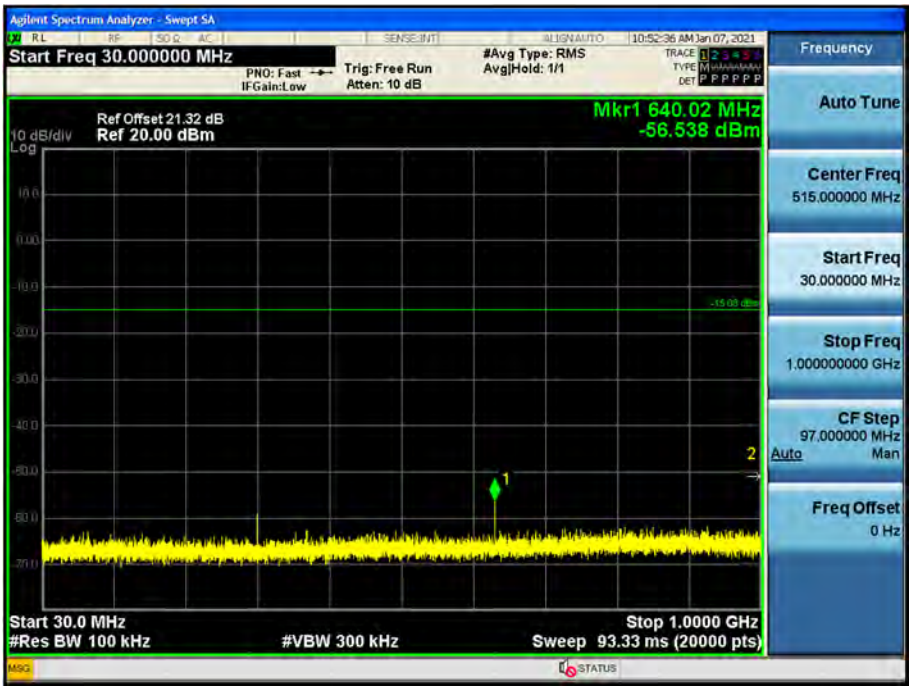


Band Edge (802.11n_HT40 –CH9)

▣ Test Plots(Conducted Spurious Emission)

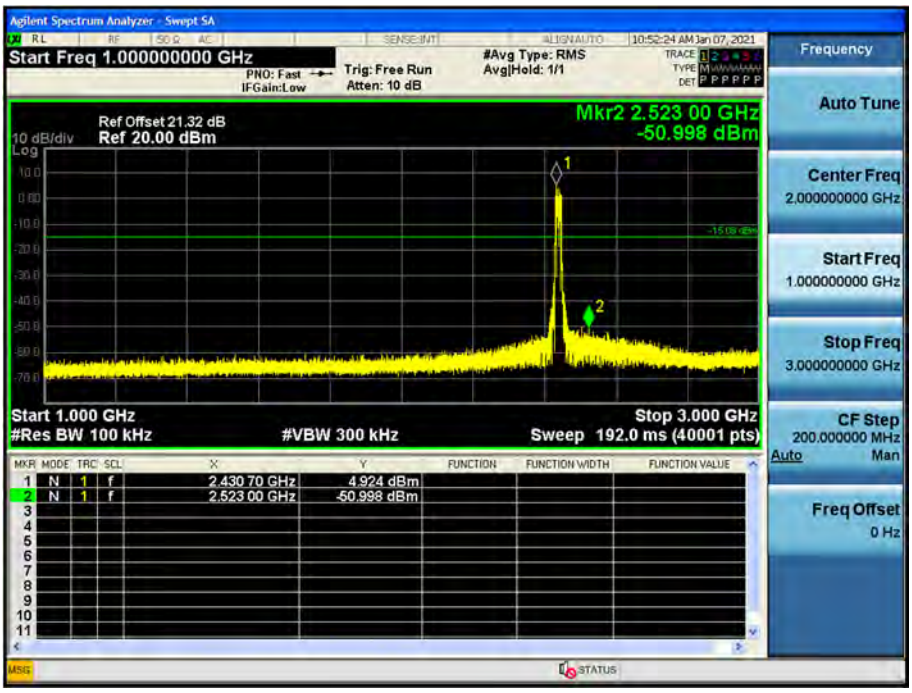
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



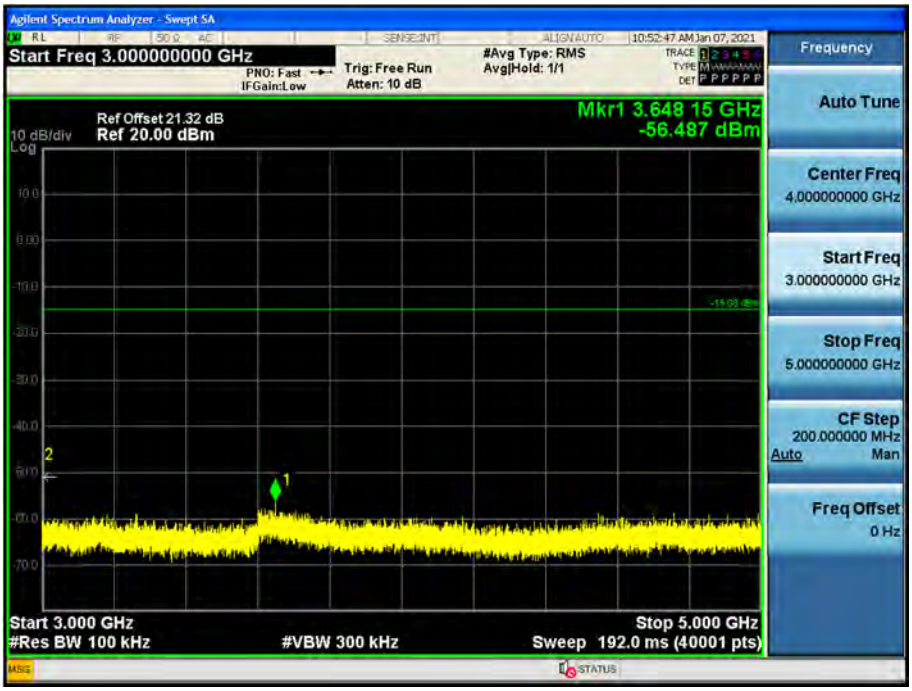
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



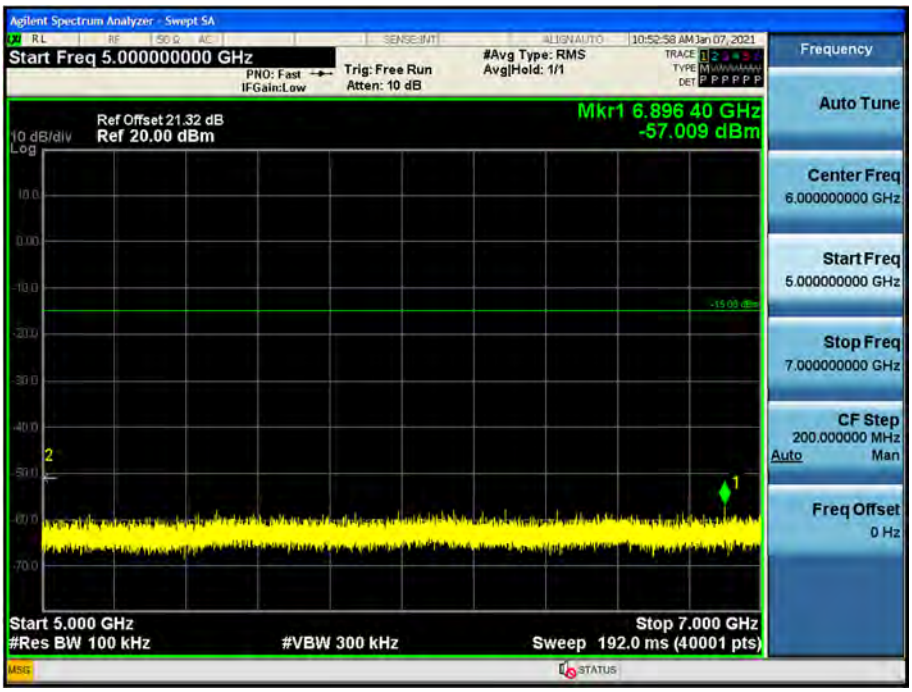
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



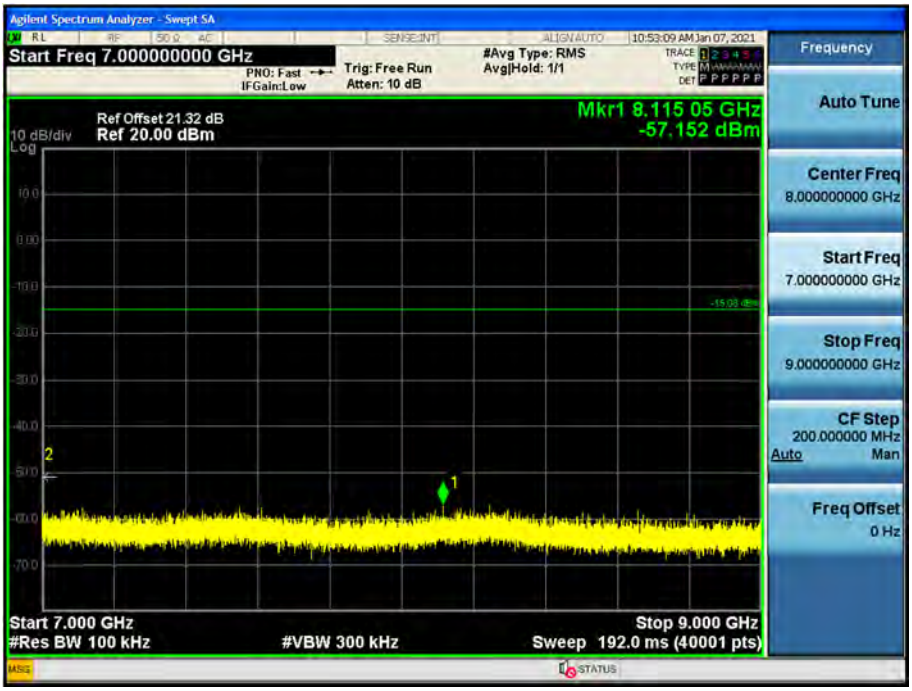
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



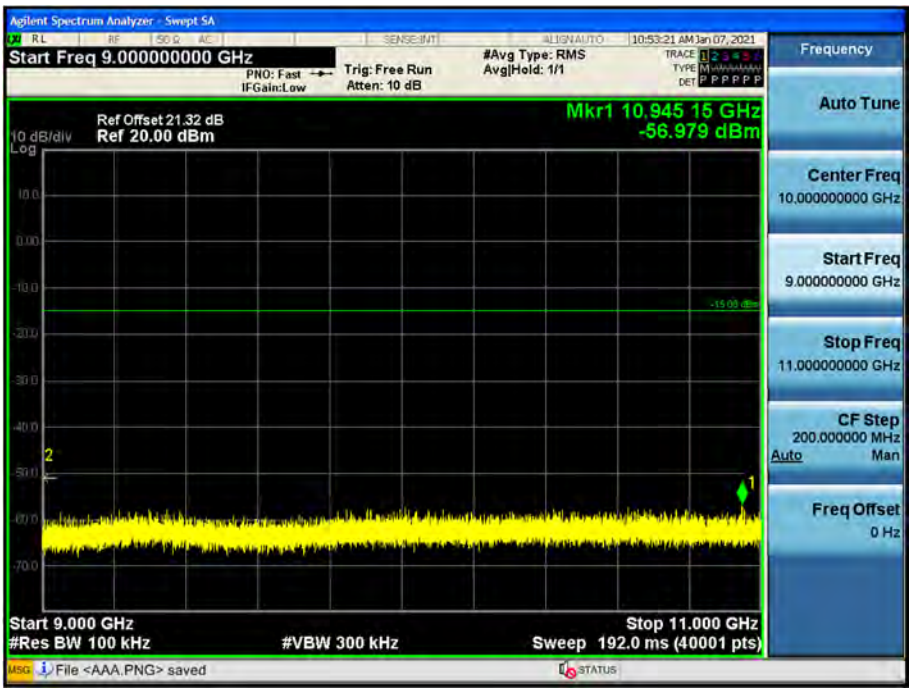
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



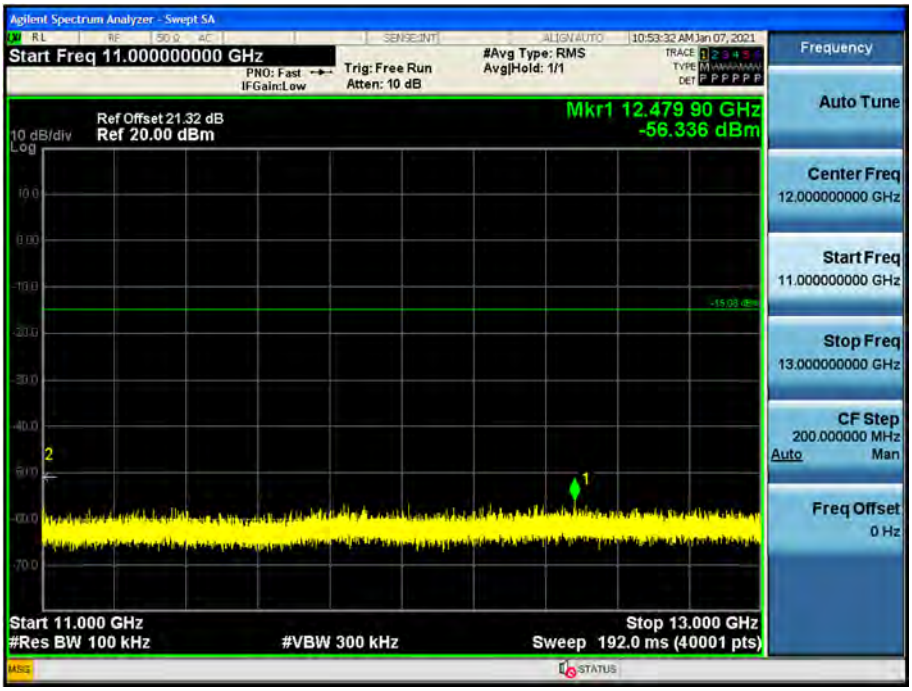
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



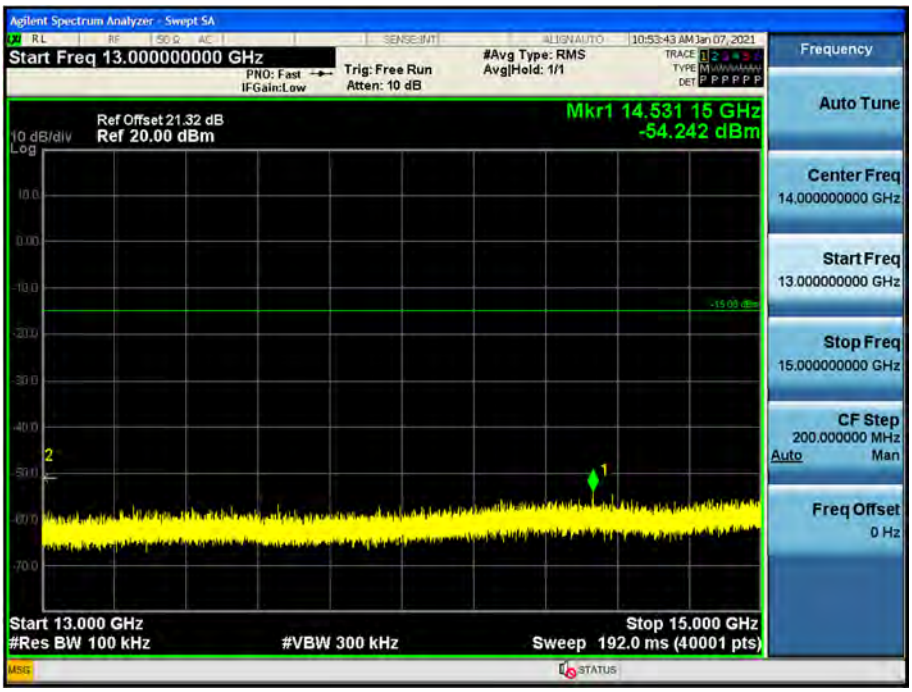
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



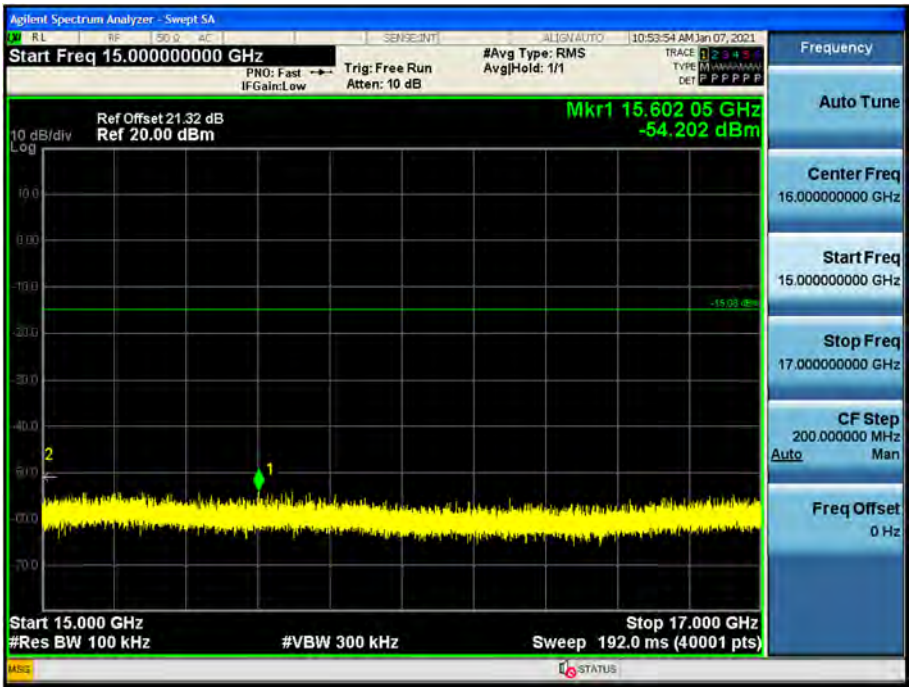
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



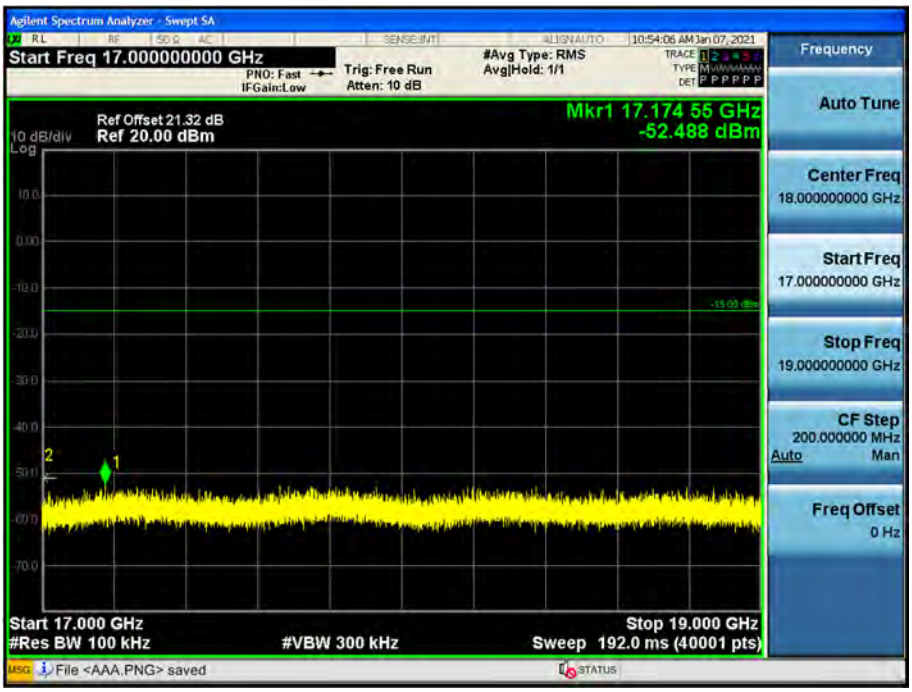
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



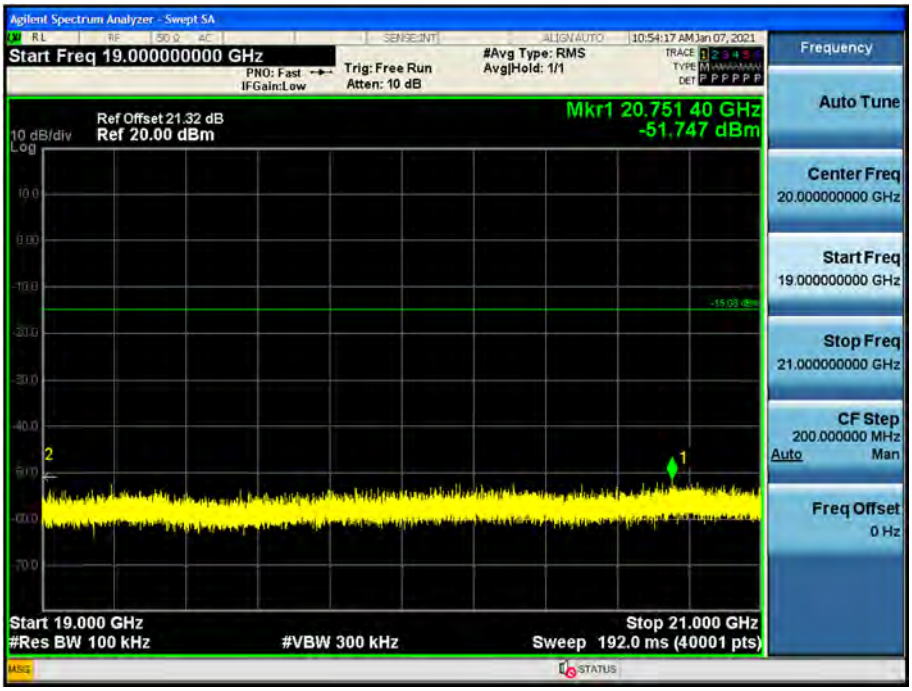
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



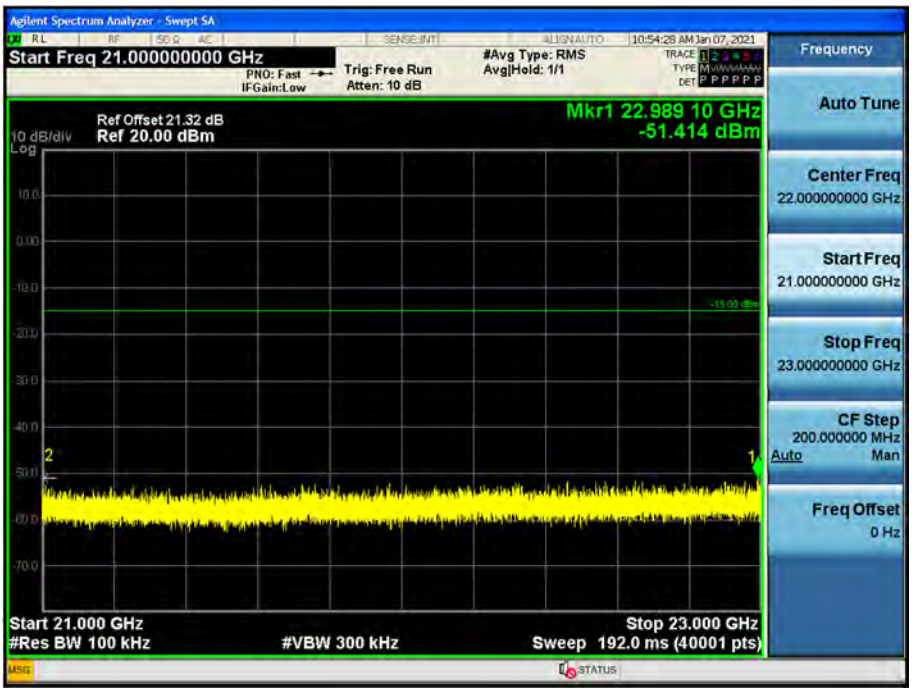
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



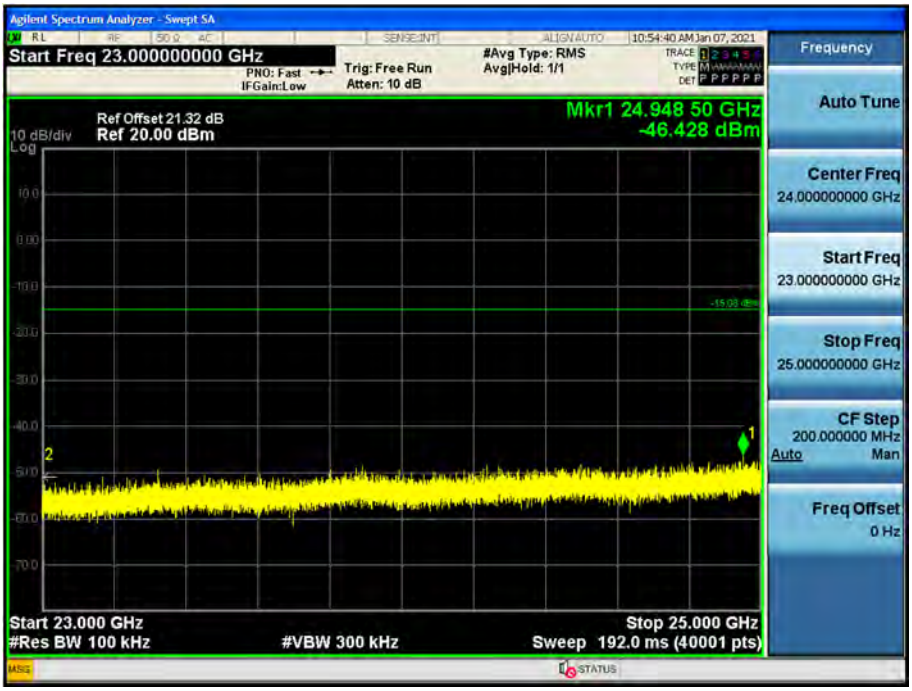
21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11n_HT20_Ch.6_MCS14)



9.6 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.

[SISO_Ant.B]

Frequency Range : Above 1 GHz

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4824	48.20	0.00	3.62	V	51.82	73.98	22.16	PK
4824	44.28	0.26	3.62	V	48.16	53.98	5.82	AV
7236	39.79	0.00	9.26	V	49.05	73.98	24.93	PK
7236	28.00	0.26	9.26	V	37.52	53.98	16.46	AV
4824	49.40	0.00	3.62	H	53.02	73.98	20.96	PK
4824	46.11	0.26	3.62	H	49.99	53.98	3.99	AV
7236	39.45	0.00	9.26	H	48.71	73.98	25.27	PK
7236	27.69	0.26	9.26	H	37.21	53.98	16.77	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4874	49.20	0.00	3.36	V	52.56	73.98	21.42	PK
4874	45.72	0.26	3.36	V	49.33	53.98	4.65	AV
7311	39.64	0.00	10.27	V	49.91	73.98	24.07	PK
7311	27.48	0.26	10.27	V	38.01	53.98	15.97	AV
4874	50.45	0.00	3.36	H	53.81	73.98	20.17	PK
4874	47.16	0.26	3.36	H	50.77	53.98	3.21	AV
7311	39.09	0.00	10.27	H	49.36	73.98	24.62	PK
7311	27.29	0.26	10.27	H	37.82	53.98	16.16	AV

Operation Mode:	802.11b
Transfer Rate:	1 Mbps
Operating Frequency	2462
Channel No.	11 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4924	50.50	0.00	2.80	V	53.30	73.98	20.68	PK
4924	47.47	0.26	2.80	V	50.53	53.98	3.45	AV
7386	40.06	0.00	11.07	V	51.13	73.98	22.85	PK
7386	28.56	0.26	11.07	V	39.89	53.98	14.09	AV
4924	50.06	0.00	2.80	H	52.86	73.98	21.12	PK
4924	46.79	0.26	2.80	H	49.85	53.98	4.13	AV
7386	39.79	0.00	11.07	H	50.86	73.98	23.12	PK
7386	28.14	0.26	11.07	H	39.47	53.98	14.51	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2412
Channel No.	01 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4824	45.11	0.00	3.62	V	48.73	73.98	25.25	PK
4824	31.75	1.37	3.62	V	36.74	53.98	17.24	AV
7236	39.30	0.00	9.26	V	48.56	73.98	25.42	PK
7236	27.51	1.37	9.26	V	38.14	53.98	15.84	AV
4824	46.07	0.00	3.62	H	49.69	73.98	24.29	PK
4824	32.30	1.37	3.62	H	37.29	53.98	16.69	AV
7236	39.01	0.00	9.26	H	48.27	73.98	25.71	PK
7236	27.40	1.37	9.26	H	38.03	53.98	15.95	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4874	48.76	0.00	3.36	V	52.12	73.98	21.86	PK
4874	33.43	1.37	3.36	V	38.16	53.98	15.82	AV
7311	39.40	0.00	10.27	V	49.67	73.98	24.31	PK
7311	27.14	1.37	10.27	V	38.78	53.98	15.20	AV
4874	49.49	0.00	3.36	H	52.85	73.98	21.13	PK
4874	34.80	1.37	3.36	H	39.53	53.98	14.45	AV
7311	39.17	0.00	10.27	H	49.44	73.98	24.54	PK
7311	27.01	1.37	10.27	H	38.65	53.98	15.33	AV

Operation Mode:	802.11g
Transfer Rate:	6 Mbps
Operating Frequency	2462
Channel No.	11 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4924	45.41	0.00	2.80	V	48.21	73.98	25.77	PK
4924	31.52	1.37	2.80	V	35.69	53.98	18.29	AV
7386	39.36	0.00	11.07	V	50.43	73.98	23.55	PK
7386	27.19	1.37	11.07	V	39.63	53.98	14.35	AV
4924	43.99	0.00	2.80	H	46.79	73.98	27.19	PK
4924	31.11	1.37	2.80	H	35.28	53.98	18.70	AV
7386	39.28	0.00	11.07	H	50.35	73.98	23.63	PK
7386	27.14	1.37	11.07	H	39.58	53.98	14.40	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2412
Channel No.	01 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4824	43.87	0.00	3.62	V	47.49	73.98	26.49	PK
4824	31.47	1.44	3.62	V	36.53	53.98	17.45	AV
7236	39.69	0.00	9.26	V	48.95	73.98	25.03	PK
7236	27.54	1.44	9.26	V	38.24	53.98	15.74	AV
4824	44.57	0.00	3.62	H	48.19	73.98	25.79	PK
4824	31.75	1.44	3.62	H	36.81	53.98	17.17	AV
7236	38.93	0.00	9.26	H	48.19	73.98	25.79	PK
7236	27.46	1.44	9.26	H	38.16	53.98	15.82	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4874	46.93	0.00	3.36	V	50.29	73.98	23.69	PK
4874	33.47	1.44	3.36	V	38.27	53.98	15.71	AV
7311	38.88	0.00	10.27	V	49.15	73.98	24.83	PK
7311	27.10	1.44	10.27	V	38.81	53.98	15.17	AV
4874	47.44	0.00	3.36	H	50.80	73.98	23.18	PK
4874	34.53	1.44	3.36	H	39.33	53.98	14.65	AV
7311	38.46	0.00	10.27	H	48.73	73.98	25.25	PK
7311	27.01	1.44	10.27	H	38.72	53.98	15.26	AV

Operation Mode:	802.11n (HT20)
Transfer MCS Index:	0
Operating Frequency	2462
Channel No.	11 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4924	42.49	0.00	2.80	V	45.29	73.98	28.69	PK
4924	30.81	1.44	2.80	V	35.05	53.98	18.93	AV
7386	39.07	0.00	11.07	V	50.14	73.98	23.84	PK
7386	27.13	1.44	11.07	V	39.65	53.98	14.33	AV
4924	41.39	0.00	2.80	H	44.19	73.98	29.79	PK
4924	30.47	1.44	2.80	H	34.71	53.98	19.27	AV
7386	38.48	0.00	11.07	H	49.55	73.98	24.43	PK
7386	27.11	1.44	11.07	H	39.63	53.98	14.35	AV

Operation Mode:	802.11n (HT40)
Operating Frequency	2422
Channel No.	03 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4844	41.48	0.00	3.74	V	45.22	73.98	28.76	PK
4844	30.27	2.54	3.74	V	36.56	53.98	17.42	AV
7266	39.67	0.00	9.44	V	49.11	73.98	24.87	PK
7266	27.34	2.54	9.44	V	39.32	53.98	14.66	AV
4844	41.23	0.00	3.74	H	44.97	73.98	29.01	PK
4844	30.23	2.54	3.74	H	36.52	53.98	17.46	AV
7266	39.72	0.00	9.44	H	49.16	73.98	24.82	PK
7266	27.45	2.54	9.44	H	39.43	53.98	14.55	AV

Operation Mode:	802.11n (HT40)
Operating Frequency	2437
Channel No.	06 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4874	44.47	0.00	3.36	V	47.83	73.98	26.15	PK
4874	31.51	2.54	3.36	V	37.41	53.98	16.57	AV
7311	40.02	0.00	10.27	V	50.29	73.98	23.69	PK
7311	27.10	2.54	10.27	V	39.91	53.98	14.07	AV
4874	41.13	0.00	3.36	H	44.49	73.98	29.49	PK
4874	29.41	2.54	3.36	H	35.31	53.98	18.67	AV
7311	40.00	0.00	10.27	H	50.27	73.98	23.71	PK
7311	27.09	2.54	10.27	H	39.90	53.98	14.08	AV

Operation Mode:	802.11n (HT40)
Operating Frequency	2452
Channel No.	9 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L-AMP+D.F	ANT. POL	Total	Limit	Margin	Detect
[MHz]	dBuV	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
4904	40.87	0.00	3.19	V	44.06	73.98	29.92	PK
4904	29.35	2.54	3.19	V	35.08	53.98	18.90	AV
7356	39.61	0.00	10.51	V	50.12	73.98	23.86	PK
7356	27.07	2.54	10.51	V	40.13	53.98	13.85	AV
4904	40.22	0.00	3.19	H	43.41	73.98	30.57	PK
4904	29.27	2.54	3.19	H	35.00	53.98	18.98	AV
7356	39.37	0.00	10.51	H	49.88	73.98	24.10	PK
7356	27.01	2.54	10.51	H	40.07	53.98	13.91	AV

Note:

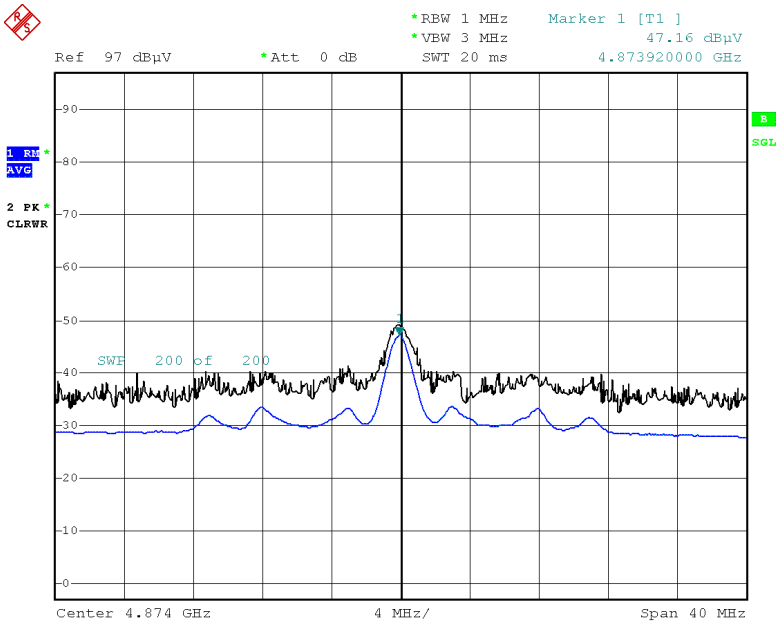
All configurations of antenna were investigated and the worst case configuration results are reported.

- Mode : SISO (Antenna Selection), Ant A + Ant B(MIMO(SDM))

- Worstcase : SISO Ant B (External)

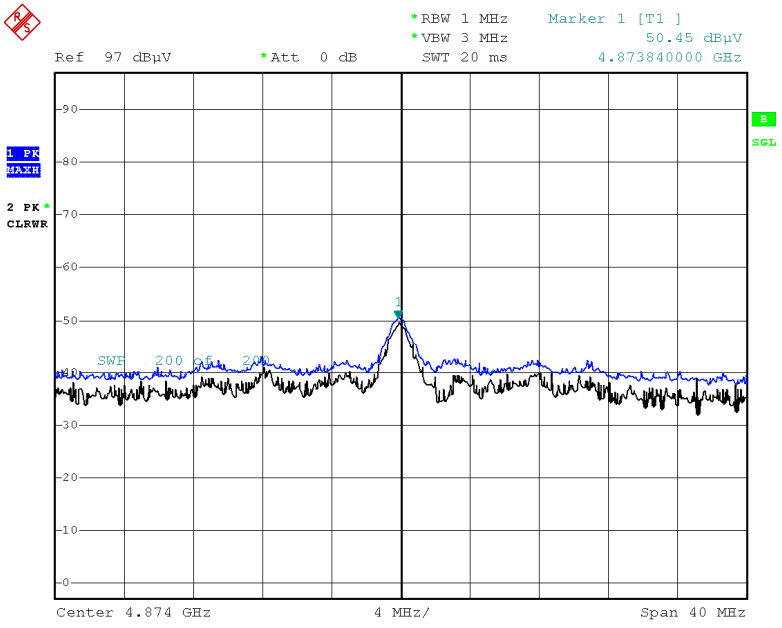
▣ Test Plots (Worst case : H) [SISO_Ant.B]

Radiated Spurious Emissions plot – Average Reading (802.11b, Ch.6 2nd Harmonic)



Date: 16.DEC.2020 18:28:49

Radiated Spurious Emissions plot – Peak Reading (802.11b, Ch.6 2nd Harmonic)



Date: 16.DEC.2020 18:29:08

Note:

Plot of worst case are only reported.

9.7 RADIATED RESTRICTED BAND EDGES

[SISO_Ant.B]

Operation Mode: 802.11b
Transfer Rate: 1 Mbps
Operating Frequency 2412 MHz, 2462 MHz
Channel No. 01 Ch, 11 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L -AMP+D.F+ATT	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	61.09	0.00	0.94	H	61.09	73.98	12.89	PK
2390.0	47.81	0.26	0.94	H	48.07	53.98	5.91	AV
2390.0	60.14	0.00	0.94	V	60.14	73.98	13.84	PK
2390.0	46.12	0.26	0.94	V	46.38	53.98	7.60	AV
2483.5	62.29	0.00	1.20	H	62.29	73.98	11.69	PK
2483.5	48.69	0.26	1.20	H	48.95	53.98	5.03	AV
2483.5	59.87	0.00	1.20	V	59.87	73.98	14.11	PK
2483.5	46.03	0.26	1.20	V	46.29	53.98	7.69	AV

Operation Mode: 802.11g
Transfer Rate: 6 Mbps
Operating Frequency 2412 MHz, 2462 MHz
Channel No. 01 Ch, 11 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L -AMP+D.F+ATT	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	63.53	0.00	0.94	H	64.47	73.98	9.51	PK
2390.0	48.09	1.37	0.94	H	50.40	53.98	3.58	AV
2390.0	60.39	0.00	0.94	V	61.33	73.98	12.65	PK
2390.0	45.01	1.37	0.94	V	47.32	53.98	6.66	AV
2483.5	65.01	0.00	1.20	H	66.21	73.98	7.77	PK
2483.5	48.34	1.37	1.20	H	50.91	53.98	3.07	AV
2483.5	62.11	0.00	1.20	V	63.31	73.98	10.67	PK
2483.5	45.58	1.37	1.20	V	48.15	53.98	5.83	AV

Operation Mode:	802.11n (HT20)
Transfer Rate:	0
Operating Frequency	2412 MHz, 2462 MHz
Channel No.	01 Ch, 11 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L -AMP+D.F+ATT	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	69.50	0.00	0.94	H	70.44	73.98	3.54	PK
2390.0	48.33	1.44	0.94	H	50.72	53.98	3.26	AV
2390.0	65.74	0.00	0.94	V	66.68	73.98	7.30	PK
2390.0	45.14	1.44	0.94	V	47.53	53.98	6.45	AV
2483.5	67.87	0.00	1.20	H	69.07	73.98	4.91	PK
2483.5	47.96	1.44	1.20	H	50.60	53.98	3.38	AV
2483.5	63.82	0.00	1.20	V	65.02	73.98	8.96	PK
2483.5	43.58	1.44	1.20	V	46.22	53.98	7.76	AV

Operation Mode:	802.11n (HT40)
Transfer Rate:	0
Operating Frequency	2422 MHz, 2452 MHz
Channel No.	03 Ch, 09 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L -AMP+D.F+ATT	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	68.18	0.00	0.94	H	69.12	73.98	4.86	PK
2390.0	46.63	2.54	0.94	H	50.11	53.98	3.87	AV
2390.0	67.01	0.00	0.94	V	67.95	73.98	6.03	PK
2390.0	45.98	2.54	0.94	V	49.46	53.98	4.52	AV
2483.5	67.33	0.00	1.20	H	68.53	73.98	5.45	PK
2483.5	46.74	2.54	1.20	H	50.48	53.98	3.50	AV
2483.5	65.79	0.00	1.20	V	66.99	73.98	6.99	PK
2483.5	44.85	2.54	1.20	V	48.59	53.98	5.39	AV

Operation Mode:	802.11n (HT40)
Transfer Rate:	0
Operating Frequency	2437 MHz
Channel No.	6 Ch

Frequency	Reading	Duty Cycle Factor	A.F+C.L -AMP+D.F+ATT	ANT. POL	Total	Limit	Margin	Measurement Type
[MHz]	[dBuV]	[dB]	[dB]	[H/V]	[dBuV/m]	[dBuV/m]	[dB]	
2390.0	68.71	0.00	0.94	H	69.65	73.98	4.33	PK
2390.0	46.64	2.54	0.94	H	50.12	53.98	3.86	AV
2390.0	66.33	0.00	0.94	V	67.27	73.98	6.71	PK
2390.0	45.12	2.54	0.94	V	48.60	53.98	5.38	AV
2483.5	68.61	0.00	1.20	H	69.81	73.98	4.17	PK
2483.5	46.88	2.54	1.20	H	50.62	53.98	3.36	AV
2483.5	65.90	0.00	1.20	V	67.10	73.98	6.88	PK
2483.5	45.09	2.54	1.20	V	48.83	53.98	5.15	AV

Note:

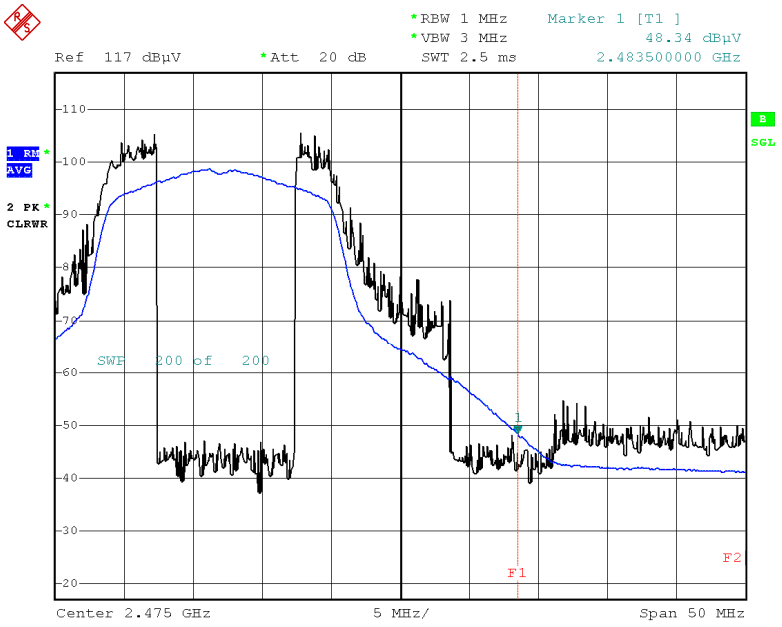
All configurations of antenna were investigated and the worst case configuration results are reported.

- Mode : SISO (Antenna Selection), Ant A + Ant B(MIMO(SDM))

- Worstcase : SISO Ant B (External)

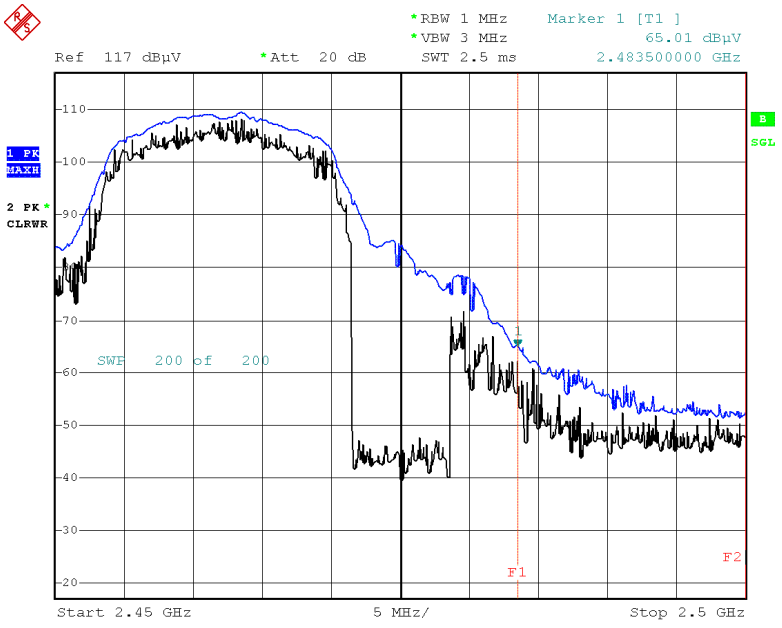
▣ Test Plots [SISO_Ant.B]

Radiated Restricted Band Edges plot – Average Reading (802.11g Ch.11)



Date: 11.DEC.2020 19:35:19

Radiated Restricted Band Edges plot – Peak Reading (802.11g Ch.11)



Date: 11.DEC.2020 19:34:45

Note:

Plot of worst case are only reported.

9.8 RECEIVER SPURIOUS EMISSIONS

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

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							

9.9 POWERLINE CONDUCTED EMISSIONS

Conducted Emissions (Line 1)

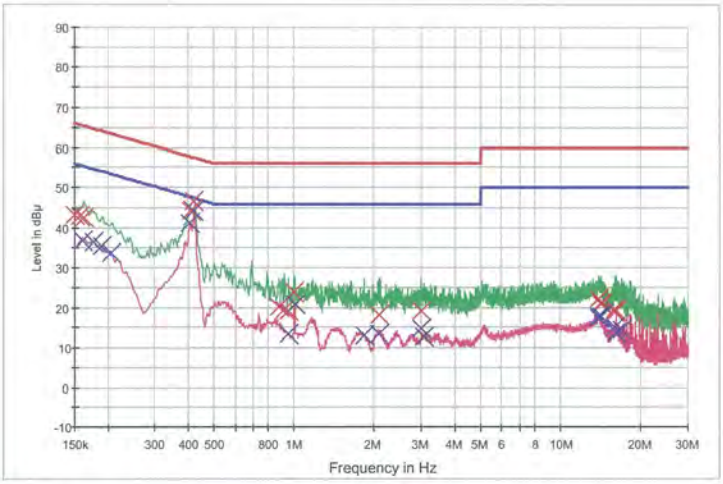
2.4G WLAN_L1 1 / 2

HCT TEST Report

Common Information

EUT:	ETPFFRPP01
Manufacturer:	LG Innotek Co., Ltd.
Test Site:	SHIELD ROOM
Operating Conditions:	2.4G WLAN MODE_L1

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	43.3	9.000	Off	L1	9.8	22.7	66.0
0.156750	43.0	9.000	Off	L1	9.8	22.6	65.6
0.163500	42.7	9.000	Off	L1	9.8	22.6	65.3
0.408750	44.3	9.000	Off	L1	9.8	13.4	57.7
0.413250	44.6	9.000	Off	L1	9.8	13.0	57.6
0.420000	46.5	9.000	Off	L1	9.8	11.0	57.4
0.878000	20.1	9.000	Off	L1	9.8	35.9	56.0
0.920750	19.5	9.000	Off	L1	9.8	36.5	56.0
0.952250	19.3	9.000	Off	L1	9.8	36.7	56.0
1.001750	23.9	9.000	Off	L1	9.8	32.1	56.0
2.093000	18.3	9.000	Off	L1	9.9	37.8	56.0
3.006500	19.1	9.000	Off	L1	9.9	36.9	56.0
13.880750	22.1	9.000	Off	L1	10.3	37.9	60.0
14.128250	21.1	9.000	Off	L1	10.3	38.9	60.0
14.166500	20.8	9.000	Off	L1	10.3	39.2	60.0
15.912500	18.8	9.000	Off	L1	10.4	41.2	60.0
15.919250	19.6	9.000	Off	L1	10.4	40.4	60.0
16.061000	19.1	9.000	Off	L1	10.4	40.9	60.0

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2.4G WLAN_L1 2 / 2

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.161250	36.9	9.000	Off	L1	9.8	18.5	55.4
0.177000	36.4	9.000	Off	L1	9.8	18.2	54.6
0.190500	35.3	9.000	Off	L1	9.8	18.7	54.0
0.206250	33.6	9.000	Off	L1	9.8	19.7	53.4
0.406500	41.2	9.000	Off	L1	9.8	6.5	47.7
0.422250	44.1	9.000	Off	L1	9.8	3.3	47.4
0.952250	13.3	9.000	Off	L1	9.8	32.7	46.0
1.004000	20.9	9.000	Off	L1	9.8	25.1	46.0
1.827500	13.0	9.000	Off	L1	9.9	33.0	46.0
2.095250	13.5	9.000	Off	L1	9.9	32.5	46.0
3.008750	14.6	9.000	Off	L1	9.9	31.4	46.0
3.051500	12.6	9.000	Off	L1	9.9	33.4	46.0
13.842500	17.6	9.000	Off	L1	10.3	32.4	50.0
13.862750	17.7	9.000	Off	L1	10.3	32.3	50.0
14.213750	17.7	9.000	Off	L1	10.3	32.3	50.0
15.921500	15.2	9.000	Off	L1	10.4	34.8	50.0
16.058750	13.8	9.000	Off	L1	10.4	36.2	50.0
16.961000	14.4	9.000	Off	L1	10.4	35.6	50.0

2020-12-17 오전 9:22:22

Conducted Emissions (Line 2)

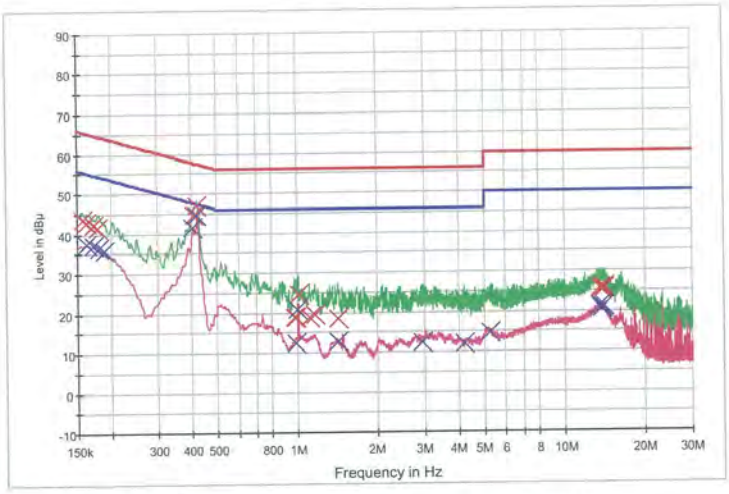
2.4G WLAN_N 1 / 2

HCT TEST Report

Common Information

EUT:	ETPFFRPP01
Manufacturer:	LG Innotek Co., Ltd.
Test Site:	SHIELD ROOM
Operating Conditions:	2.4G WLAN MODE_N

FCC CLASS B_Exten Cable



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.156750	43.4	9.000	Off	N	9.8	22.2	65.6
0.163500	43.0	9.000	Off	N	9.8	22.3	65.3
0.172500	42.2	9.000	Off	N	9.8	22.6	64.8
0.179250	41.5	9.000	Off	N	9.8	23.0	64.5
0.411000	44.7	9.000	Off	N	9.8	12.9	57.6
0.420000	46.8	9.000	Off	N	9.8	10.6	57.4
0.972500	18.9	9.000	Off	N	9.8	37.1	56.0
0.986000	18.9	9.000	Off	N	9.8	37.1	56.0
1.004000	24.4	9.000	Off	N	9.8	31.6	56.0
1.109750	18.8	9.000	Off	N	9.8	37.2	56.0
1.166000	19.4	9.000	Off	N	9.8	36.6	56.0
1.413500	18.3	9.000	Off	N	9.8	37.7	56.0
13.579250	25.5	9.000	Off	N	10.4	34.5	60.0
13.691750	25.3	9.000	Off	N	10.4	34.7	60.0
13.865000	25.6	9.000	Off	N	10.4	34.4	60.0
13.910000	25.6	9.000	Off	N	10.4	34.4	60.0
14.029250	26.1	9.000	Off	N	10.4	33.9	60.0
14.033750	25.6	9.000	Off	N	10.4	34.4	60.0

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2.4G WLAN_N

Final Result 2

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.163500	37.5	9.000	Off	N	9.8	17.8	55.3
0.172500	37.0	9.000	Off	N	9.8	17.8	54.8
0.181500	36.5	9.000	Off	N	9.8	18.0	54.4
0.190500	35.7	9.000	Off	N	9.8	18.3	54.0
0.406500	41.4	9.000	Off	N	9.8	6.4	47.7
0.422250	44.4	9.000	Off	N	9.8	3.0	47.4
0.983750	12.5	9.000	Off	N	9.8	33.5	46.0
1.001750	20.9	9.000	Off	N	9.8	25.1	46.0
1.415750	12.8	9.000	Off	N	9.8	33.2	46.0
2.941250	12.5	9.000	Off	N	9.9	33.6	46.0
4.183250	12.2	9.000	Off	N	10.0	33.8	46.0
5.274500	14.6	9.000	Off	N	10.0	35.4	50.0
13.604000	21.2	9.000	Off	N	10.4	28.8	50.0
13.691750	20.7	9.000	Off	N	10.4	29.3	50.0
13.892000	20.8	9.000	Off	N	10.4	29.2	50.0
13.910000	20.9	9.000	Off	N	10.4	29.1	50.0
13.941500	20.9	9.000	Off	N	10.4	29.1	50.0
14.029250	21.2	9.000	Off	N	10.4	28.8	50.0

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10. LIST OF TEST EQUIPMENT

Conducted Test

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	09/04/2020	Annual	102245
Rohde & Schwarz	ESR / EMI Test Receiver	09/16/2020	Annual	101910
ESPEC	SU-642 /Temperature Chamber	07/30/2020	Annual	0093000718
Agilent	N9030A / Signal Analyzer	03/23/2020	Annual	MY49432108
Agilent	N1911A / Power Meter	04/07/2020	Annual	MY45100523
Agilent	N1921A / Power Sensor	06/08/2020	Annual	MY57820067
Agilent	87300B / Directional Coupler	11/10/2020	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	02/14/2020	Annual	10545
HP	E3632A / DC Power Supply	09/16/2020	Annual	MY40004427
KIKUSUI	PCR4000M / AC/DC Power supply(270V/40A)	10/14/2020	Annual	VM002269
HP	8493C / Attenuator(10 dB)(DC-26.5 GHz)	06/26/2020	Annual	07560
HP	8493C / Attenuator(10 dB)(DC-26.5 GHz)	07/03/2020	Annual	08285
Rohde & Schwarz	18N-20dB / Attenuator(20 dB)	03/23/2020	Annual	8
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
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
TNM system	FBSM-01B / Amp & Filter Bank Switch Controller	N/A	N/A	N/A
Schwarzbeck	Loop Antenna	05/18/2020	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/02/2019	Biennial	01039
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	04/29/2019	Biennial	BBHA9170342
Rohde & Schwarz	FSP(10 Hz ~ 40 GHz) / Spectrum Analyzer	05/13/2020	Annual	101055
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	01/21/2020	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	02/10/2020	Annual	1
CERNEX	CBL18265035 / Power Amplifier	12/04/2020	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	03/23/2020	Annual	25956
TNM system	FBSM-05B / HPF(3~18GHz) + LNA1(1~18GHz)	01/21/2020	Annual	F6
TNM system	FBSM-05B / ATT(10dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / ATT(3dB) + LNA1(1~18GHz)	01/21/2020	Annual	None
TNM system	FBSM-05B / LNA1(1~18GHz)	01/21/2020	Annual	25540
TNM system	FBSM-05B / HPF(7~18GHz) + LNA2(6~18GHz)	01/21/2020	Annual	28550
TNM system	FBSM-05B / Thru(30MHz ~ 18GHz)	01/21/2020	Annual	None
Weinschel	2-3 / Attenuator (3 dB)	10/07/2020	Annual	BR0617
H+S	5910-N-50-010 / Attenuator(10 dB)	10/28/2020	Annual	None
Rohde & Schwarz	ESCI / Test Receiver	06/10/2020	Annual	100584

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).

11. ANNEX A_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-2101-FI004-P