

TEST REPORT

FCC DTS Test for SM-W767
Certification

APPLICANT
SAMSUNG Electronics Co., Ltd.

REPORT NO.
HCT-RF-1907-FC008

DATE OF ISSUE
06 August 2019

HCT Co., Ltd.

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A3LSMW767

Applicant

SAMSUNG Electronics Co., Ltd.

129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea

Eut Type Model Name

Note PC
SM-W767

Average Output Power

Ant.1: 802.11b: 18.04 dBm / 802.11g: 16.68 dBm / 802.11n(HT20): 16.02 dBm
Ant.2: 802.11b: 18.60 dBm / 802.11g: 16.98 dBm / 802.11n(HT20): 16.91 dBm
Ant.1&2: 802.11g: 19.84 dBm / 802.11n(HT20): 19.50 dBm

Modulation type

CCK/DSSS/OFDM

FCC Classification

Digital Transmission System(DTS)

FCC Rule Part(s)

Part 15.247

This test results were applied only to the test methods required by the standard.

Tested by
Jeong Ho Kim

(signature)

Technical Manager
Jong Seok Lee

(signature)

HCT CO., LTD.

Soo Chan Lee
SooChan Lee / CEO

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	06 August 2019	Initial Release

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.

Engineering Statement:

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

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1. EUT DESCRIPTION

Model	SM-W767		
Additional Model	-		
EUT Type	Note PC		
Power Supply	DC 7.70 V		
Battery Information	Model: EB-BW767ABY Type: Li-ion Battery		
Travel Adapter Information	Model : ED-TA800 Manufacture: SOLUM		
Data Cable Information	Model : ED-DW767JWE Manufacture: RFTECH		
Ear-jack Information	Model : EHS64AVFBE Manufacture: ALMUS		
CtoA Gender Information	Model : EE-UG970 Manufacture: RFTECH		
Frequency Range	2412 MHz - 2462 MHz		
Max. RF Output Power	Peak Power (For information only)	Ant. 1 (SISO)	802.11b : 20.46 dBm 802.11g : 24.60 dBm 802.11n(HT20) : 24.83 dBm
		Ant.2 (SISO)	802.11b : 21.22 dBm 802.11g : 24.46 dBm 802.11n(HT20) : 24.42 dBm
		Ant.1&2 (MIMO)	802.11g : 27.43 dBm 802.11n(HT20) : 27.48 dBm
	Average Power	Ant. 1 (SISO)	802.11b : 18.04 dBm 802.11g : 16.68 dBm 802.11n(HT20) : 16.02 dBm
		Ant.2 (SISO)	802.11b : 18.60 dBm 802.11g : 16.98 dBm 802.11n(HT20) : 16.91 dBm
		Ant.1&2 (MIMO)	802.11g : 19.84 dBm 802.11n(HT20) : 19.50 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n		
Number of Channels	13 Channels		
Antenna Specification	Antenna type: LDS Peak Gain Ant.1: -2.49 dBi / Ant.2: -2.30 dBi		
Date(s) of Tests	Conducted : June 18, 2019 ~ July 22, 2019 Radiated : July 2, 2019 ~ July 24, 2019		

ANTENNA CONFIGURATIONS

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

Configurations	SISO		SDM	CDD
	Ant1	Ant2	Ant1 + Ant2	Ant1 + Ant2
802.11b	O	O	X	X
802.11g	O	O	X	O
802.11n(HT20)	O	O	O	O

Note:

1. O = Support, X = Not Support
2. SISO = Single Input Single Output
3. SDM = Spatial Diversity Multiplexing
4. CDD = Cyclic Delay Diversity

2. This device supports simultaneous transmission operation, which allows for two SISO channels to operate independent of one another in the 2.4GHz and 5GHz bands simultaneously on each antenna.

The data for these configurations is contained in the UNII test report.

3. Directional Gain Calculation

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

Directional gain = $G_{ANT\ MAX} + 10 \log(N_{ANT}/N_{SS})$ dBi

($N_{ANT} = 2$, $N_{SS} = 2$, $G_{ANT\ MAX}$ is the gain of the antenna having the highest gain)

Band	Ant Gain (dBi)		N_{ANT}/N_{SS}	Directional Gain (= $G_{ANT\ MAX} + 10 \log(N_{ANT}/N_{SS})$) (dBi)
DTS	ANT1	-2.49	2 / 2	0.62
	ANT2	-2.30		

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 purpose 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.

GENERAL TEST PROCEDURES

Conducted Emissions

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

Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane below 1GHz. Above 1GHz with 1.5m using absorbers between the EUT and receive antenna. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3.75 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.6.5 of ANSI C63.10. (Version: 2013)

DESCRIPTION OF TEST MODES

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

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).

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.”

* The antennas of this E.U.T are permanently attached.

* 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.

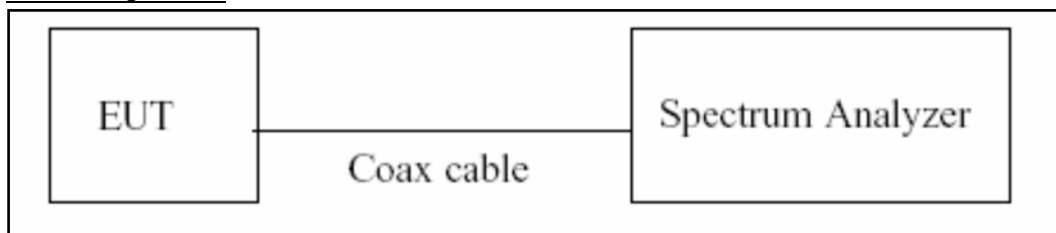
The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty ($\pm$ 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 available value of RBW is 8 MHz and VBW is 50 MHz.

The zero-span method of measuring duty cycle shall not be used if $T \leq 6.25$ 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 $> 50/T$.

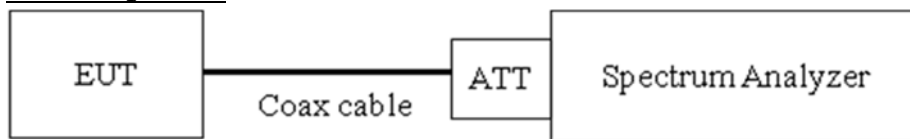
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ($\geq$ RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep > 100
6. Trace mode = Clear write
7. Measure T_{total} and T_{on}
8. Calculate Duty Cycle = $T_{\text{on}} / T_{\text{total}}$ and Duty Cycle Factor = $10 \cdot \log(1/\text{Duty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

7.2. 6dB 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 $\geq 3 \times$ 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.

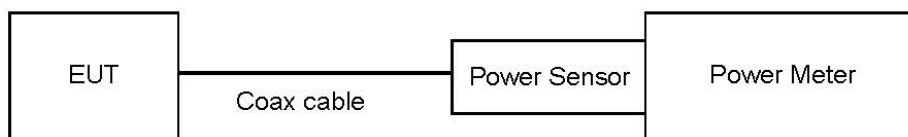
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

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

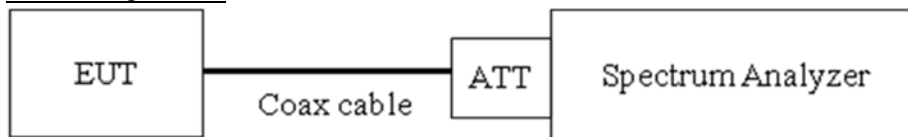
- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

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 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Set span to at least 1.5 times the OBW.
- 3) $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$.
- 4) $VBW \geq 3 \times RBW$.
- 5) Sweep = auto couple
- 6) Detector = power averaging (rms) or sample detector (when rms not available).
- 7) Ensure that the number of measurement points in the sweep $\geq [2 \times \text{span} / RBW]$.
- 8) Employ trace averaging (rms) mode over a minimum of 100 traces
- 9) Use the peak marker function to determine the maximum amplitude level.
- 10) 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

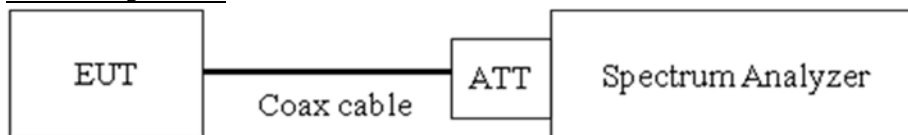
Limit

The maximum conducted (Average) 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

30 dB relative to the maximum in-band peak PSD level in 100 kHz.

[Conducted > 30 dBc]

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 $\geq 3 \times$ 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 $\geq 2 \times \text{Span} / \text{RBW}$
- 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	20.30
100	20.28
200	20.24
300	20.14
400	20.14
500	20.14
600	20.17
700	20.22
800	20.29
900	20.36
1000	20.41
2000	20.41
2400*	20.38
2500*	20.39
3000	20.48
4000	20.53
5000	20.63
6000	20.70
7000	20.77
8000	20.79
9000	20.81
10000	20.82
11000	20.81
12000	20.91
13000	20.94
14000	21.07
15000	21.16
16000	21.25
17000	21.27
18000	21.32
19000	21.39
20000	21.45
21000	21.56
22000	21.65
23000	21.53
24000	21.63
25000	21.64
26000	21.69

Note : 1. ‘*’ is fundamental frequency range.

2. Factor = Attenuator loss(20 dB) + Cable loss

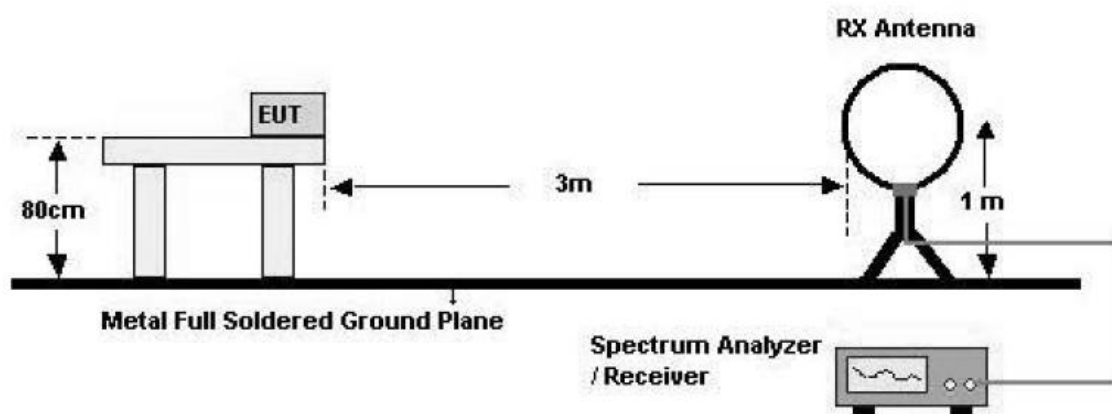
7.6. Radiated Test

Limit

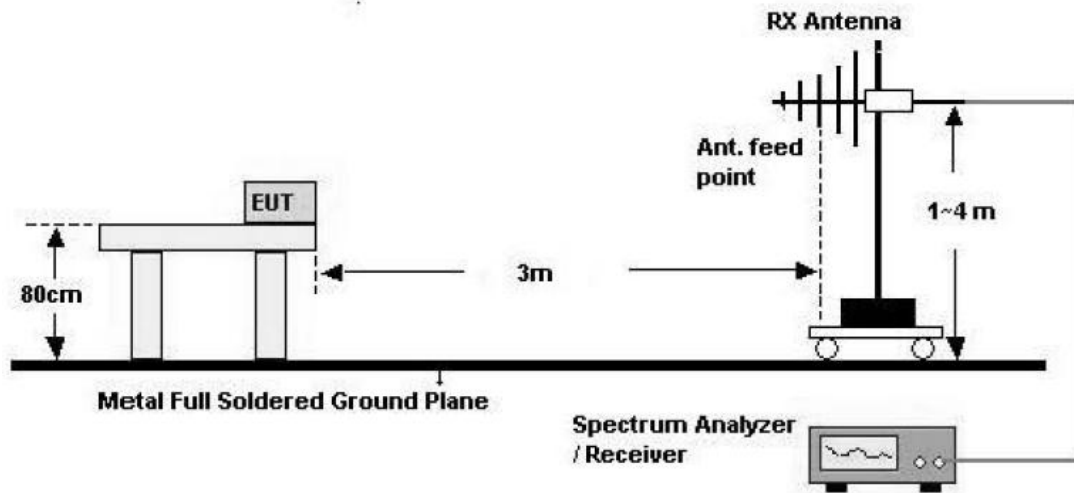
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	$2400/F(\text{kHz})$	300
0.490 – 1.705	$24000/F(\text{kHz})$	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

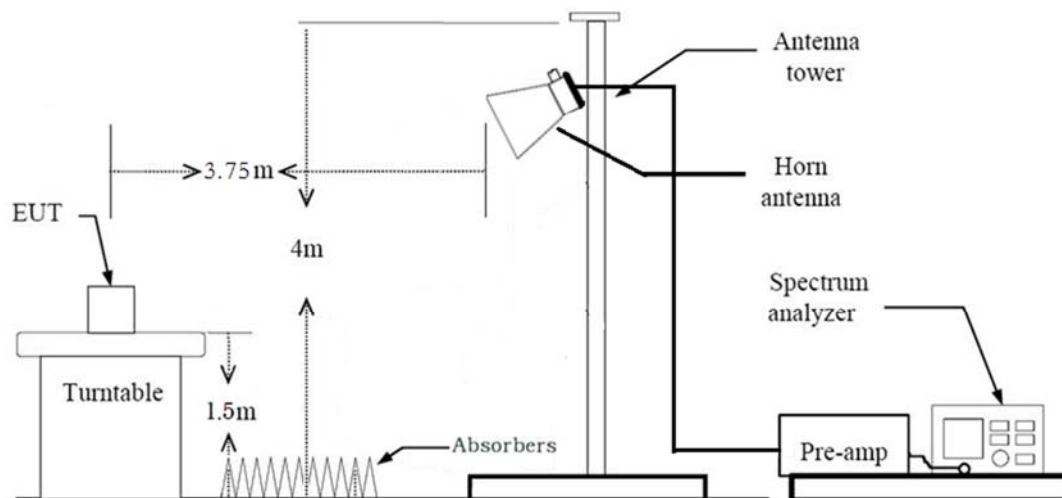
Below 30 MHz



30 MHz - 1 GHz



Above 1 GHz



Test Procedure of Radiated spurious emissions(Below 30 MHz)

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

KDB 414788 OFS and Chamber Correlation Justification

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

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

Test Procedure of Radiated spurious emissions(Below 1GHz)

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

5. Spectrum Setting**(1) Measurement Type(Peak):**

- Measured Frequency Range : 30 MHz – 1 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 100 kHz
- VBW $\geq$ 3*RBW

(2) Measurement Type(Quasi-peak):

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

*In general, (1) is used mainly

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

Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
*Distance extrapolation factor = $20 \cdot \log(\text{test distance} / \text{specific distance})$ (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. Spectrum Setting (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 $\geq 3 \cdot \text{RBW}$

(2) Measurement Type(Average): Duty cycle $\geq 98\%$

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW $\geq 3 \cdot \text{RBW}$
- Sweep time = auto.
- Trace mode = average (at least 100 traces).

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

- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)

- RBW = 1 MHz
- VBW $\geq 3 \times$ 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.

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(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 $\geq 98\%$)

= 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 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor(reference distance : 3 m).
*Distance extrapolation factor = $20 \times \log(\text{test distance} / \text{specific distance})$ (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.

7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

8. The unit was tested with its standard battery.

9. Spectrum Setting

(1) Measurement Type(Peak):

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW $\geq 3 \times$ RBW

(2) Measurement Type(Average): Duty cycle $\geq 98\%$,

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

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

- Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
- Detector = RMS
- Averaging type = power (*i.e.*, RMS)
- RBW = 1 MHz
- VBW $\geq 3 \times$ 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.

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(Measurement Type : Peak)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – AMP Gain (A.G)
+Attenuator(ATT)

Total(Measurement Type : Average, Duty cycle $\geq$ 98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – AMP Gain (A.G)
+Attenuator(ATT)

Total(Measurement Type : Average, Duty cycle < 98%)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F) – AMP Gain (A.G)
+Attenuator(ATT) + 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 μ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB μ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56*	56 to 46*
0.50 to 5	56	46
5 to 30	60	50

*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. Worst case configuration and mode

Radiated test

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

- Mode :

- (1) Stand alone (Open mode)
- (2) Stand alone (Closed mode),
- (3) Stand alone (Open mode) + External accessories(Travel Adapter, Earphone)
- (4) Stand alone (Closed mode) + Travel Adapter+ External accessories(Travel Adapter, Earphone)

- Worstcase : (1) Stand alone (Open mode)

2. EUT Axis

- Radiated Spurious Emissions : X
- Radiated Restricted Band Edge : X

3. Duty cycle factor applies only 802.11g/n(Duty cycle < 98%).

4. All data rate of operation were investigated and the test results are worst case in lowest data rate of each mode.

- 802.11b : 1Mbps
- 802.11g : 6Mbps
- 802.11n_HT20 : MCS0

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

- Mode : Ant1(SISO), Ant2(SISO), Ant1+Ant2(SDM), Ant1+Ant2(CDD)
- Worstcase : Ant1+Ant2(CDD)

AC Power line Conducted Emissions

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

- Mode : (1)Stand alone (Open mode) + Travel Adapter
- (2)stand alone (Closed mode) + Travel Adapter
- (3)Stand alone (Open mode) + Travel Adapter +Ear-jack
- (4)stand alone (Closed mode) + Travel Adapter+Ear-jack
- Worstcase : (1)Stand alone (open) + Travel Adapter

Conducted test

1. The EUT was configured with data rate of highest power.

8. SUMMARY TEST OF RESULTS

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 > 30 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

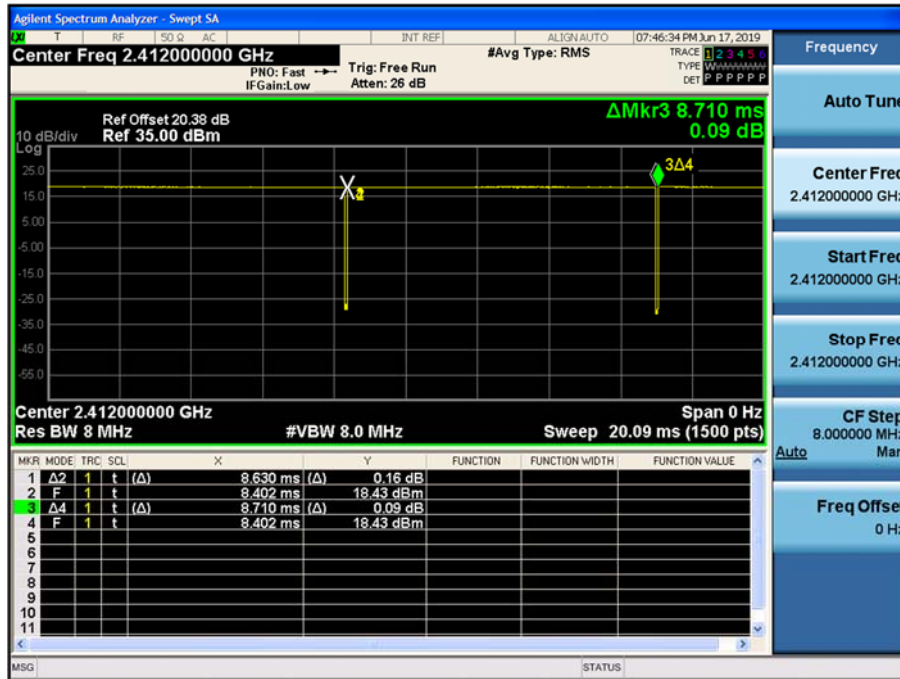
9. TEST RESULT

9.1 DUTY CYCLE

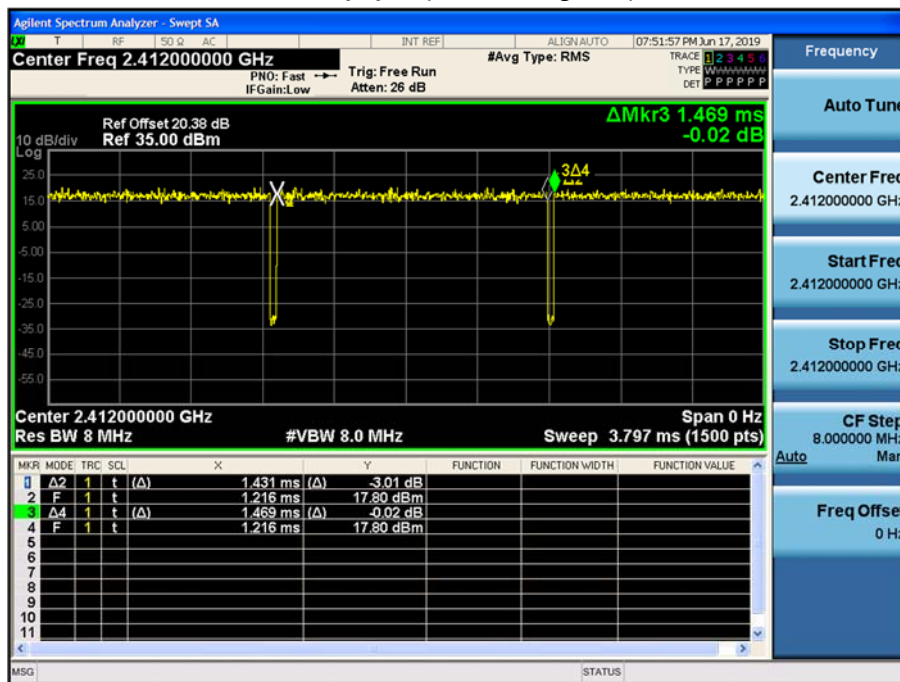
Mode	Data Rate (Mbps)	T _{on} (ms)	T _{total} (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	1	8.630	8.710	0.991	0.040
	2	4.410	4.491	0.982	0.079
	5.5	1.725	1.811	0.952	0.212
	11	0.958	1.037	0.925	0.341
802.11g	6	1.431	1.469	0.974	0.114
	9	0.960	0.997	0.963	0.162
	12	0.728	0.765	0.951	0.217
	18	0.492	0.529	0.930	0.317
	24	0.376	0.414	0.910	0.410
	36	0.256	0.292	0.876	0.573
	48	0.200	0.236	0.847	0.721
	54	0.180	0.216	0.833	0.794
802.11n (HT20)	6.5 (MCS0)	1.342	1.378	0.974	0.116
	13 (MCS1)	0.688	0.725	0.949	0.226
	19.5 (MCS2)	0.472	0.509	0.928	0.326
	26 (MCS3)	0.364	0.401	0.908	0.421
	39 (MCS4)	0.256	0.292	0.876	0.575
	52 (MCS5)	0.200	0.236	0.848	0.716
	58.5 (MCS6)	0.184	0.220	0.836	0.780
	65 (MCS7)	0.168	0.204	0.822	0.853

Test Plots

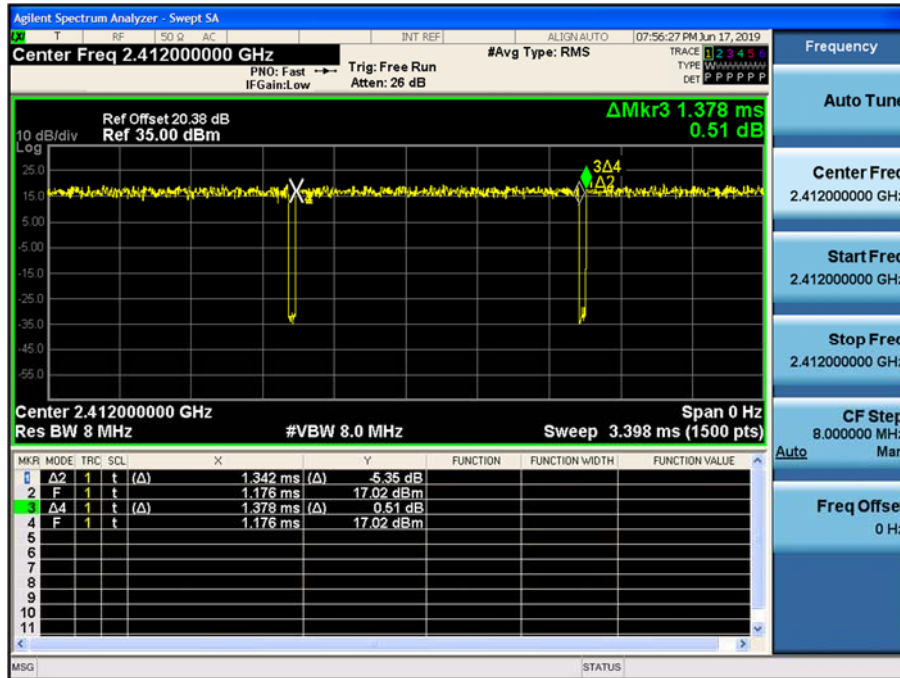
Duty cycle plot (802.11b(1Mbps))



Duty cycle plot (802.11g(6Mbps))



Duty cycle plot (802.11n(MCS0))



Note:

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

9.2 6dB BANDWIDTH

[ANT1]

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.122	0.5
2437	6	8.124	0.5
2462	11	8.122	0.5
2467	12	8.120	0.5
2472	13	8.570	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	13.79	0.5
2437	6	15.09	0.5
2462	11	13.83	0.5
2467	12	13.85	0.5
2472	13	12.63	0.5

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	13.85	0.5
2437	6	13.87	0.5
2462	11	15.06	0.5
2467	12	12.63	0.5
2472	13	15.07	0.5

[ANT2]

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	8.125	0.5
2437	6	8.124	0.5
2462	11	8.126	0.5
2467	12	8.119	0.5
2472	13	8.125	0.5

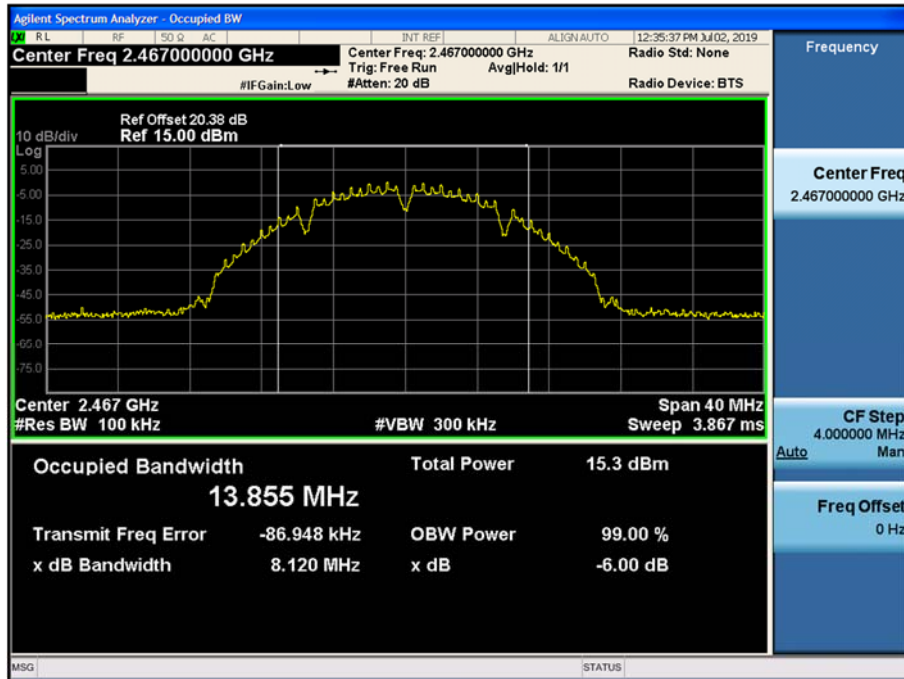
802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.08	0.5
2437	6	15.05	0.5
2462	11	15.05	0.5
2467	12	12.64	0.5
2472	13	15.03	0.5

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.05	0.5
2437	6	15.07	0.5
2462	11	11.39	0.5
2467	12	13.79	0.5
2472	13	15.07	0.5

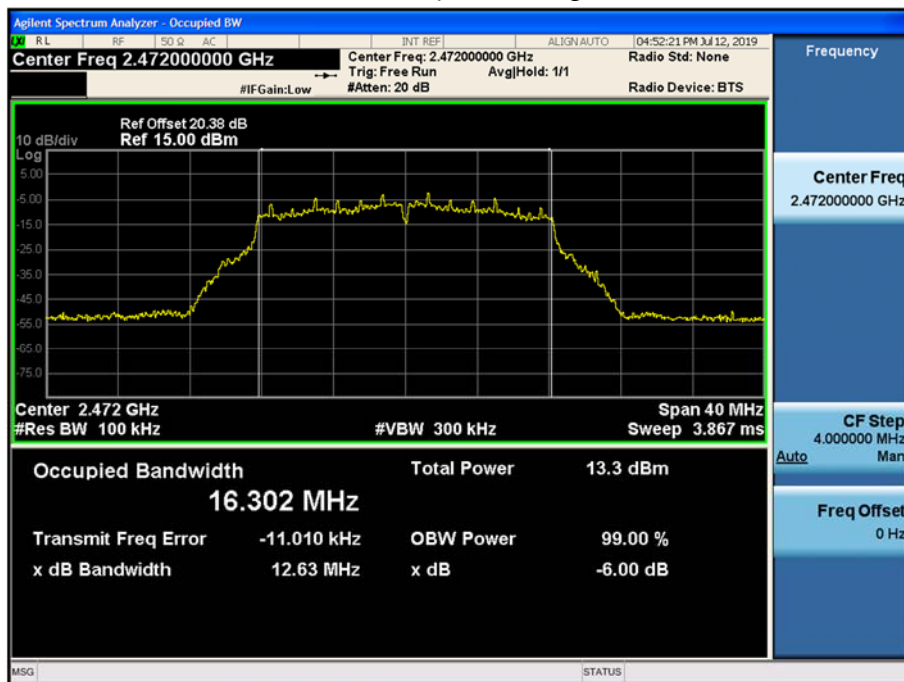
[ANT1]

■ Test Plots

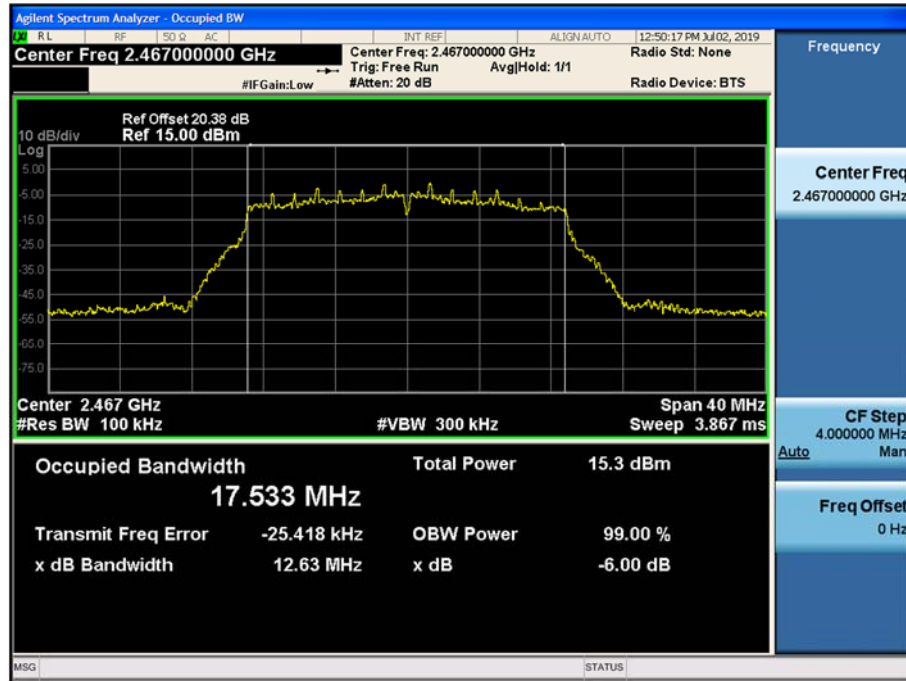
6dB Bandwidth plot (802.11b-CH 12)



6dB Bandwidth plot (802.11g-CH 13)



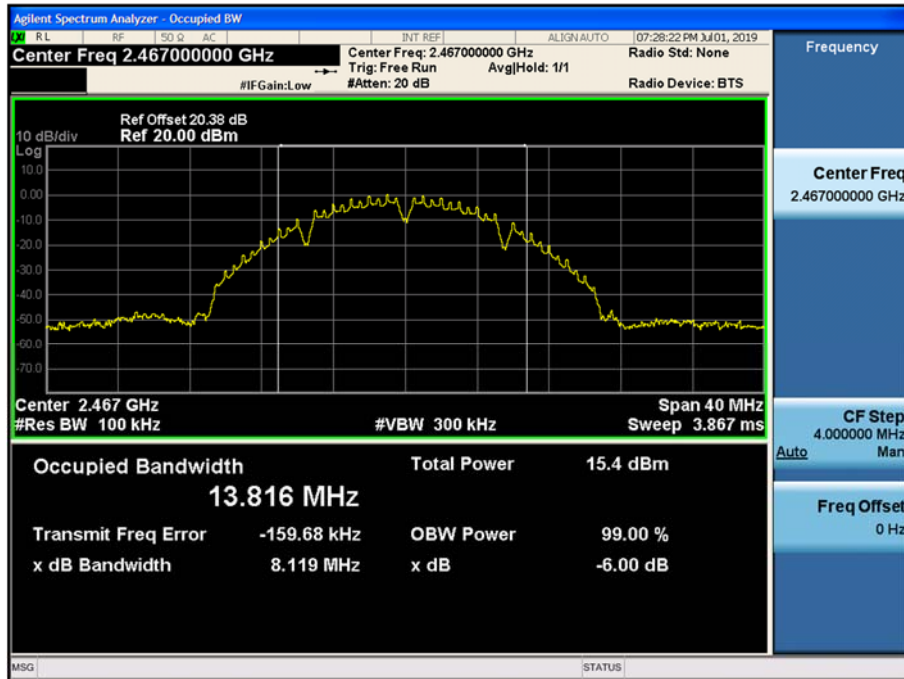
6dB Bandwidth plot (802.11n_HT20-CH 12)



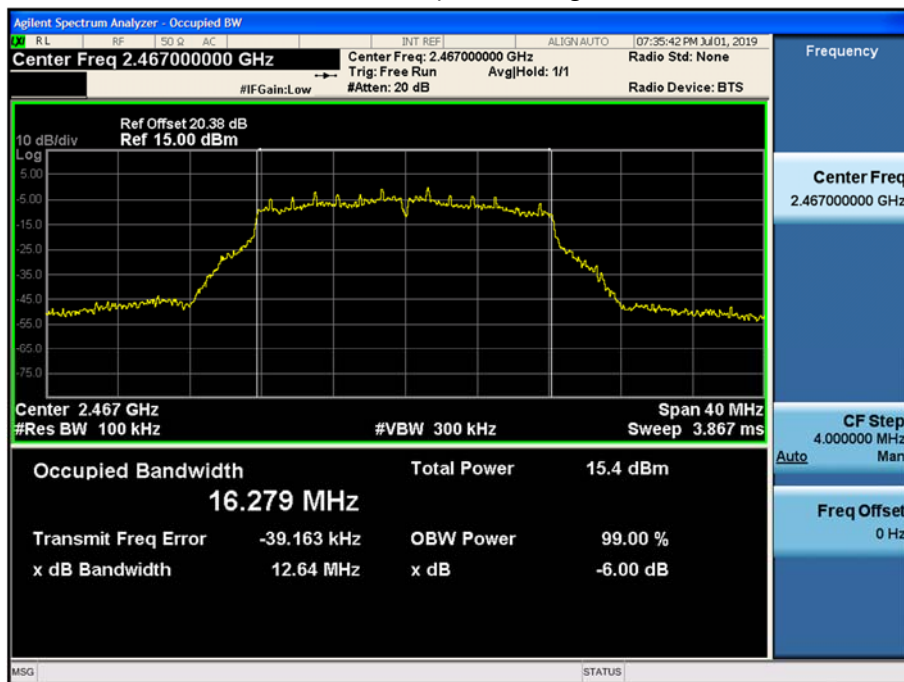
[ANT2]

■ Test Plots

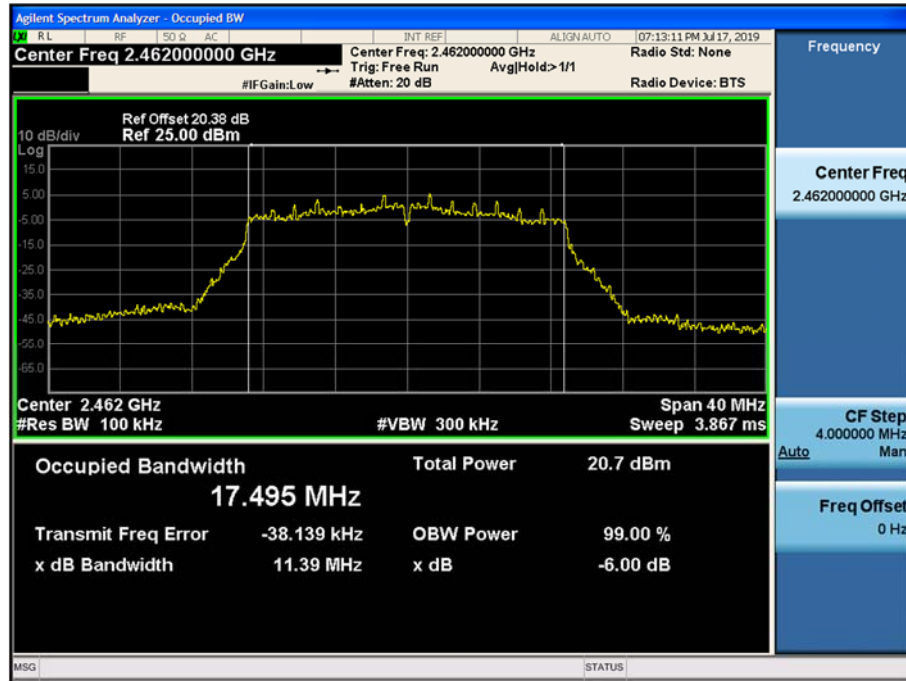
6dB Bandwidth plot (802.11b-CH 12)



6dB Bandwidth plot (802.11g-CH 12)



6dB Bandwidth plot (802.11n_HT20-CH 11)



Note:

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

9.3 OUTPUT POWER

Peak Power

1. Power Meter offset = Attenuator loss(20 dB) + Cable loss

2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.

So, 20.38 dB is offset for 2.4 GHz Band

[ANT1]

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.				
2412	1	1	20.17	30	18
		2	20.20	30	
		5.5	20.28	30	
		11	20.25	30	
2437	6	1	19.82	30	
		2	19.85	30	
		5.5	19.89	30	
		11	19.85	30	
2462	11	1	20.30	30	
		2	20.30	30	
		5.5	20.31	30	
		11	20.46	30	
2467	12	1	11.14	30	8
		2	11.13	30	
		5.5	11.19	30	
		11	11.20	30	
2472	13	1	9.16	30	6
		2	9.23	30	
		5.5	9.16	30	
		11	9.21	30	

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.				
2412	1	6	21.72	30	16
		9	21.78	30	
		12	21.59	30	
		18	24.15	30	
		24	23.63	30	
		36	24.24	30	
		48	24.26	30	
		54	24.26	30	
2437	6	6	21.24	30	
		9	21.48	30	
		12	21.33	30	
		18	23.38	30	
		24	22.79	30	
		36	24.59	30	
		48	24.58	30	
		54	24.60	30	
2462	11	6	21.65	30	
		9	21.59	30	
		12	21.57	30	
		18	23.81	30	
		24	23.23	30	
		36	24.36	30	
		48	24.42	30	
		54	24.49	30	
2467	12	6	13.98	30	8
		9	14.02	30	
		12	13.97	30	
		18	16.01	30	
		24	15.56	30	
		36	18.37	30	
		48	18.10	30	
		54	18.36	30	
2472	13	6	12.02	30	6
		9	11.90	30	
		12	11.70	30	
		18	14.06	30	
		24	13.31	30	
		36	16.17	30	
		48	15.93	30	
		54	16.13	30	

802.11n Mode		MCS Index	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.				
2412	1	0	20.68	30	15
		1	20.89	30	
		2	22.78	30	
		3	22.32	30	
		4	24.22	30	
		5	24.24	30	
		6	24.35	30	
		7	24.16	30	
2437	6	0	21.25	30	16
		1	21.30	30	
		2	23.14	30	
		3	22.70	30	
		4	24.83	30	
		5	24.52	30	
		6	24.58	30	
		7	24.49	30	
2462	11	0	19.63	30	14
		1	19.70	30	
		2	21.63	30	
		3	21.25	30	
		4	24.24	30	
		5	24.02	30	
		6	24.37	30	
		7	23.89	30	
2467	12	0	13.95	30	8
		1	13.97	30	
		2	15.79	30	
		3	15.44	30	
		4	18.23	30	
		5	18.41	30	
		6	19.38	30	
		7	18.12	30	
2472	13	0	11.98	30	6
		1	11.99	30	
		2	13.79	30	
		3	13.20	30	
		4	16.37	30	
		5	16.18	30	
		6	17.02	30	
		7	15.88	30	

[ANT2]

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.				
2412	1	1	20.81	30	18
		2	20.84	30	
		5.5	20.83	30	
		11	20.82	30	
2437	6	1	21.13	30	
		2	21.14	30	
		5.5	21.22	30	
		11	21.12	30	
2462	11	1	20.47	30	
		2	20.36	30	
		5.5	20.42	30	
		11	20.49	30	
2467	12	1	10.89	30	8
		2	10.86	30	
		5.5	10.84	30	
		11	10.86	30	
2472	13	1	8.39	30	6
		2	8.67	30	
		5.5	8.57	30	
		11	8.58	30	

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.				
2412	1	6	22.12	30	16
		9	22.29	30	
		12	22.12	30	
		18	23.78	30	
		24	23.55	30	
		36	24.46	30	
		48	24.38	30	
		54	24.37	30	
2437	6	6	22.12	30	
		9	22.23	30	
		12	22.07	30	
		18	23.94	30	
		24	23.79	30	
		36	24.25	30	
		48	24.21	30	
		54	24.21	30	
2462	11	6	21.51	30	
		9	21.62	30	
		12	21.45	30	
		18	23.16	30	
		24	22.72	30	
		36	23.79	30	
		48	23.75	30	
		54	23.82	30	
2467	12	6	13.64	30	8
		9	13.69	30	
		12	13.42	30	
		18	15.83	30	
		24	15.30	30	
		36	18.46	30	
		48	18.04	30	
		54	18.36	30	
2472	13	6	11.32	30	6
		9	11.11	30	
		12	11.32	30	
		18	13.65	30	
		24	12.72	30	
		36	15.87	30	
		48	15.50	30	
		54	16.05	30	

802.11n Mode		MCS Index	Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.				
2412	1	0	21.34	30	15
		1	21.29	30	
		2	22.93	30	
		3	22.75	30	
		4	24.28	30	
		5	24.30	30	
		6	24.42	30	
		7	24.32	30	
2437	6	0	22.15	30	16
		1	22.23	30	
		2	23.59	30	
		3	23.74	30	
		4	24.09	30	
		5	24.16	30	
		6	24.30	30	
		7	24.39	30	
2462	11	0	19.25	30	14
		1	19.07	30	
		2	21.41	30	
		3	20.86	30	
		4	22.93	30	
		5	22.82	30	
		6	23.14	30	
		7	22.87	30	
2467	12	0	13.73	30	8
		1	13.62	30	
		2	15.72	30	
		3	15.29	30	
		4	17.91	30	
		5	18.18	30	
		6	19.32	30	
		7	18.36	30	
2472	13	0	11.25	30	6
		1	11.30	30	
		2	13.15	30	
		3	12.63	30	
		4	16.25	30	
		5	15.78	30	
		6	16.89	30	
		7	15.53	30	

[MIMO]

802.11g Mode		Rate (Mbps)	ANT1 Measured Power(dBm)	ANT2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.						
2412	1	6	21.72	22.12	24.93	30	16
		9	21.78	22.29	25.06	30	
		12	21.59	22.12	24.87	30	
		18	24.15	23.78	26.98	30	
		24	23.63	23.55	26.60	30	
		36	24.24	24.46	27.36	30	
		48	24.26	24.38	27.33	30	
		54	24.26	24.37	27.33	30	
2437	6	6	21.24	22.12	24.71	30	
		9	21.48	22.23	24.89	30	
		12	21.33	22.07	24.73	30	
		18	23.38	23.94	26.68	30	
		24	22.79	23.79	26.33	30	
		36	24.59	24.25	27.43	30	
		48	24.58	24.21	27.41	30	
		54	24.60	24.21	27.42	30	
2462	11	6	21.65	21.51	24.59	30	
		9	21.59	21.62	24.62	30	
		12	21.57	21.45	24.52	30	
		18	23.81	23.16	26.51	30	
		24	23.23	22.72	25.99	30	
		36	24.36	23.79	27.09	30	
		48	24.42	23.75	27.11	30	
		54	24.49	23.82	27.18	30	
2467	12	6	13.98	13.64	16.83	30	8
		9	14.02	13.69	16.86	30	
		12	13.97	13.42	16.71	30	
		18	16.01	15.83	18.93	30	
		24	15.56	15.30	18.44	30	
		36	18.37	18.46	21.42	30	
		48	18.10	18.04	21.08	30	
		54	18.36	18.36	21.37	30	
2472	13	6	12.02	11.32	14.69	30	6
		9	11.90	11.11	14.53	30	
		12	11.70	11.32	14.52	30	
		18	14.06	13.65	16.87	30	
		24	13.31	12.72	16.03	30	
		36	16.17	15.87	19.03	30	
		48	15.93	15.50	18.73	30	
		54	16.13	16.05	19.10	30	

802.11n Mode		MCS Index	ANT1 Measured Power(dBm)	ANT2 Measured Power(dBm)	MIMO Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.						
2412	1	0	20.68	21.34	24.03	30	15
		1	20.89	21.29	24.10	30	
		2	22.78	22.93	25.87	30	
		3	22.32	22.75	25.55	30	
		4	24.22	24.28	27.26	30	
		5	24.24	24.30	27.28	30	
		6	24.35	24.42	27.39	30	
		7	24.16	24.32	27.25	30	
2437	6	0	21.25	22.15	24.73	30	16
		1	21.30	22.23	24.80	30	
		2	23.14	23.59	26.38	30	
		3	22.70	23.74	26.27	30	
		4	24.83	24.09	27.48	30	
		5	24.52	24.16	27.36	30	
		6	24.58	24.30	27.45	30	
		7	24.49	24.39	27.45	30	
2462	11	0	19.63	19.25	22.45	30	14
		1	19.70	19.07	22.41	30	
		2	21.63	21.41	24.53	30	
		3	21.25	20.86	24.07	30	
		4	24.24	22.93	26.65	30	
		5	24.02	22.82	26.47	30	
		6	24.37	23.14	26.81	30	
		7	23.89	22.87	26.42	30	
2467	12	0	13.95	13.73	16.85	30	8
		1	13.97	13.62	16.81	30	
		2	15.79	15.72	18.76	30	
		3	15.44	15.29	18.37	30	
		4	18.23	17.91	21.08	30	
		5	18.41	18.18	21.31	30	
		6	19.38	19.32	22.36	30	
		7	18.12	18.36	21.25	30	
2472	13	0	11.98	11.25	14.64	30	6
		1	11.99	11.30	14.67	30	
		2	13.79	13.15	16.49	30	
		3	13.20	12.63	15.94	30	
		4	16.37	16.25	19.32	30	
		5	16.18	15.78	19.00	30	
		6	17.02	16.89	19.97	30	
		7	15.88	15.53	18.72	30	

Average Power

1. Power Meter offset = Attenuator loss(20 dB) + Cable loss
2. We apply to the offset in the 2.4 GHz range that was rounded off to the closest tenth dB.
So, 20.38 dB is offset for 2.4 GHz Band.

[ANT1]

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	17.70	0.040	17.74	30	18
		2	17.69	0.079	17.77	30	
		5.5	17.60	0.212	17.82	30	
		11	17.43	0.341	17.77	30	
2437	6	1	17.35	0.040	17.39	30	
		2	17.29	0.079	17.37	30	
		5.5	17.25	0.212	17.46	30	
		11	17.07	0.341	17.41	30	
2462	11	1	17.85	0.040	17.89	30	
		2	17.82	0.079	17.90	30	
		5.5	17.83	0.212	18.04	30	
		11	17.62	0.341	17.96	30	
2467	12	1	8.15	0.040	8.19	30	8
		2	8.12	0.079	8.20	30	
		5.5	8.04	0.212	8.26	30	
		11	7.88	0.341	8.22	30	
2472	13	1	5.89	0.040	5.93	30	6
		2	5.85	0.079	5.93	30	
		5.5	5.75	0.212	5.96	30	
		11	5.59	0.341	5.93	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	15.76	0.114	15.88	30	16
		9	15.65	0.162	15.81	30	
		12	15.59	0.217	15.80	30	
		18	16.36	0.317	16.68	30	
		24	16.14	0.410	16.55	30	
		36	15.33	0.573	15.90	30	
		48	15.21	0.721	15.93	30	
		54	15.12	0.794	15.92	30	
2437	6	6	15.44	0.114	15.55	30	
		9	15.35	0.162	15.52	30	
		12	15.27	0.217	15.49	30	
		18	15.89	0.317	16.20	30	
		24	15.64	0.410	16.05	30	
		36	14.90	0.573	15.47	30	
		48	14.79	0.721	15.51	30	
		54	14.69	0.794	15.49	30	
2462	11	6	15.82	0.114	15.93	30	
		9	15.71	0.162	15.87	30	
		12	15.64	0.217	15.86	30	
		18	16.30	0.317	16.61	30	
		24	16.08	0.410	16.49	30	
		36	15.37	0.573	15.94	30	
		48	15.25	0.721	15.98	30	
		54	15.15	0.794	15.95	30	
2467	12	6	7.92	0.114	8.03	30	8
		9	7.82	0.162	7.98	30	
		12	7.73	0.217	7.95	30	
		18	8.35	0.317	8.67	30	
		24	8.11	0.410	8.52	30	
		36	7.46	0.573	8.03	30	
		48	7.35	0.721	8.07	30	
		54	7.26	0.794	8.05	30	
2472	13	6	5.68	0.114	5.79	30	6
		9	5.57	0.162	5.73	30	
		12	5.50	0.217	5.72	30	
		18	6.11	0.317	6.43	30	
		24	5.89	0.410	6.30	30	
		36	5.13	0.573	5.70	30	
		48	5.01	0.721	5.73	30	
		54	4.94	0.794	5.73	30	

802.11n 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	14.61	0.116	14.72	30	15
		1	14.39	0.226	14.62	30	
		2	15.09	0.326	15.42	30	
		3	15.02	0.421	15.44	30	
		4	14.42	0.575	14.99	30	
		5	14.26	0.716	14.98	30	
		6	14.24	0.780	15.02	30	
		7	14.11	0.853	14.96	30	
2437	6	0	15.23	0.116	15.35	30	16
		1	15.02	0.226	15.25	30	
		2	15.67	0.326	16.00	30	
		3	15.60	0.421	16.02	30	
		4	14.94	0.575	15.51	30	
		5	14.81	0.716	15.53	30	
		6	14.78	0.780	15.57	30	
		7	14.65	0.853	15.50	30	
2462	11	0	13.62	0.116	13.74	30	14
		1	13.40	0.226	13.63	30	
		2	14.06	0.326	14.39	30	
		3	13.99	0.421	14.41	30	
		4	13.40	0.575	13.98	30	
		5	13.25	0.716	13.97	30	
		6	13.24	0.780	14.02	30	
		7	13.10	0.853	13.95	30	
2467	12	0	7.74	0.116	7.85	30	8
		1	7.52	0.226	7.74	30	
		2	8.17	0.326	8.50	30	
		3	8.09	0.421	8.51	30	
		4	7.53	0.575	8.10	30	
		5	7.38	0.716	8.09	30	
		6	7.35	0.780	8.13	30	
		7	7.23	0.853	8.09	30	
2472	13	0	5.53	0.116	5.65	30	6
		1	5.30	0.226	5.53	30	
		2	5.95	0.326	6.28	30	
		3	5.87	0.421	6.29	30	
		4	5.21	0.575	5.79	30	
		5	5.05	0.716	5.77	30	
		6	5.04	0.780	5.82	30	
		7	4.95	0.853	5.80	30	

[ANT2]

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	18.21	0.040	18.25	30	18
		2	18.16	0.079	18.24	30	
		5.5	18.16	0.212	18.38	30	
		11	17.94	0.341	18.28	30	
2437	6	1	18.46	0.040	18.50	30	
		2	18.44	0.079	18.52	30	
		5.5	18.39	0.212	18.60	30	
		11	18.19	0.341	18.53	30	
2462	11	1	18.02	0.040	18.06	30	
		2	17.99	0.079	18.07	30	
		5.5	18.12	0.212	18.34	30	
		11	17.83	0.341	18.18	30	
2467	12	1	7.97	0.040	8.01	30	8
		2	7.88	0.079	7.96	30	
		5.5	7.83	0.212	8.04	30	
		11	7.66	0.341	8.00	30	
2472	13	1	5.04	0.040	5.08	30	6
		2	4.99	0.079	5.07	30	
		5.5	4.94	0.212	5.15	30	
		11	4.75	0.341	5.09	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	16.20	0.114	16.31	30	16
		9	16.08	0.162	16.24	30	
		12	16.01	0.217	16.23	30	
		18	16.65	0.317	16.97	30	
		24	16.45	0.410	16.86	30	
		36	15.67	0.573	16.24	30	
		48	15.57	0.721	16.29	30	
		54	15.46	0.794	16.26	30	
2437	6	6	16.18	0.114	16.29	30	
		9	16.07	0.162	16.23	30	
		12	16.00	0.217	16.22	30	
		18	16.67	0.317	16.98	30	
		24	16.50	0.410	16.91	30	
		36	15.78	0.573	16.36	30	
		48	15.68	0.721	16.40	30	
		54	15.59	0.794	16.39	30	
2462	11	6	15.76	0.114	15.87	30	
		9	15.65	0.162	15.81	30	
		12	15.59	0.217	15.81	30	
		18	16.22	0.317	16.54	30	
		24	16.00	0.410	16.41	30	
		36	15.27	0.573	15.84	30	
		48	15.15	0.721	15.87	30	
		54	15.04	0.794	15.83	30	
2467	12	6	7.77	0.114	7.88	30	8
		9	7.65	0.162	7.81	30	
		12	7.56	0.217	7.78	30	
		18	8.18	0.317	8.50	30	
		24	7.97	0.410	8.38	30	
		36	7.29	0.573	7.86	30	
		48	7.19	0.721	7.91	30	
		54	7.08	0.794	7.88	30	
2472	13	6	5.03	0.114	5.14	30	6
		9	4.90	0.162	5.06	30	
		12	4.84	0.217	5.05	30	
		18	5.43	0.317	5.75	30	
		24	5.21	0.410	5.62	30	
		36	4.52	0.573	5.09	30	
		48	4.45	0.721	5.17	30	
		54	4.32	0.794	5.11	30	

802.11n 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	14.87	0.116	14.99	30	15
		1	14.65	0.226	14.87	30	
		2	15.39	0.326	15.71	30	
		3	15.32	0.421	15.74	30	
		4	14.83	0.575	15.40	30	
		5	14.68	0.716	15.39	30	
		6	14.62	0.780	15.40	30	
		7	14.51	0.853	15.36	30	
2437	6	0	15.98	0.116	16.10	30	16
		1	15.75	0.226	15.97	30	
		2	16.47	0.326	16.80	30	
		3	16.48	0.421	16.91	30	
		4	15.85	0.575	16.42	30	
		5	15.70	0.716	16.42	30	
		6	15.45	0.780	16.23	30	
		7	15.55	0.853	16.40	30	
2462	11	0	13.17	0.116	13.28	30	14
		1	12.80	0.226	13.03	30	
		2	13.66	0.326	13.99	30	
		3	13.59	0.421	14.01	30	
		4	12.84	0.575	13.41	30	
		5	12.71	0.716	13.43	30	
		6	12.70	0.780	13.48	30	
		7	12.53	0.853	13.38	30	
2467	12	0	7.56	0.116	7.68	30	8
		1	7.34	0.226	7.56	30	
		2	8.02	0.326	8.34	30	
		3	7.94	0.421	8.36	30	
		4	7.35	0.575	7.93	30	
		5	7.21	0.716	7.93	30	
		6	7.18	0.780	7.96	30	
		7	7.06	0.853	7.91	30	
2472	13	0	4.84	0.116	4.96	30	6
		1	4.60	0.226	4.83	30	
		2	5.27	0.326	5.59	30	
		3	5.20	0.421	5.62	30	
		4	4.63	0.575	5.20	30	
		5	4.47	0.716	5.19	30	
		6	4.44	0.780	5.22	30	
		7	4.33	0.853	5.18	30	

[MIMO]

802.11g Mode		Rate (Mbps)	ANT1 Measured Power(dBm) + Duty Cycle Factor	ANT2 Measured Power(dBm) + Duty Cycle Factor	MIMO Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	6	15.88	16.31	19.11	30	16
		9	15.81	16.24	19.04	30	
		12	15.80	16.23	19.03	30	
		18	16.68	16.97	19.84	30	
		24	16.55	16.86	19.72	30	
		36	15.90	16.24	19.08	30	
		48	15.93	16.29	19.13	30	
		54	15.92	16.26	19.10	30	
2437	6	6	15.55	16.29	18.95	30	
		9	15.52	16.23	18.90	30	
		12	15.49	16.22	18.88	30	
		18	16.20	16.98	19.62	30	
		24	16.05	16.91	19.51	30	
		36	15.47	16.36	18.95	30	
		48	15.51	16.40	18.99	30	
		54	15.49	16.39	18.97	30	
2462	11	6	15.93	15.87	18.91	30	
		9	15.87	15.81	18.85	30	
		12	15.86	15.81	18.84	30	
		18	16.61	16.54	19.59	30	
		24	16.49	16.41	19.46	30	
		36	15.94	15.84	18.90	30	
		48	15.98	15.87	18.93	30	
		54	15.95	15.83	18.90	30	
2467	12	6	8.03	7.88	10.97	30	8
		9	7.98	7.81	10.91	30	
		12	7.95	7.78	10.88	30	
		18	8.67	8.50	11.59	30	
		24	8.52	8.38	11.46	30	
		36	8.03	7.86	10.96	30	
		48	8.07	7.91	11.00	30	
		54	8.05	7.88	10.98	30	
2472	13	6	5.79	5.14	8.49	30	6
		9	5.73	5.06	8.42	30	
		12	5.72	5.05	8.41	30	
		18	6.43	5.75	9.11	30	
		24	6.30	5.62	8.98	30	
		36	5.70	5.09	8.42	30	
		48	5.73	5.17	8.47	30	
		54	5.73	5.11	8.44	30	

802.11n Mode		MCS Index	ANT1 Measured Power(dBm) + Duty Cycle Factor	ANT2 Measured Power(dBm) + Duty Cycle Factor	MIMO Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency [MHz]	Channel No.						
2412	1	0	14.72	14.99	17.87	30	15
		1	14.62	14.87	17.76	30	
		2	15.42	15.71	18.58	30	
		3	15.44	15.74	18.60	30	
		4	14.99	15.40	18.21	30	
		5	14.98	15.39	18.20	30	
		6	15.02	15.40	18.22	30	
		7	14.96	15.36	18.18	30	
2437	6	0	15.35	16.10	18.75	30	16
		1	15.25	15.97	18.64	30	
		2	16.00	16.80	19.42	30	
		3	16.02	16.91	19.50	30	
		4	15.51	16.42	19.00	30	
		5	15.53	16.42	19.01	30	
		6	15.57	16.23	18.92	30	
		7	15.50	16.40	18.99	30	
2462	11	0	13.74	13.28	16.53	30	14
		1	13.63	13.03	16.35	30	
		2	14.39	13.99	17.20	30	
		3	14.41	14.01	17.23	30	
		4	13.98	13.41	16.72	30	
		5	13.97	13.43	16.72	30	
		6	14.02	13.48	16.77	30	
		7	13.95	13.38	16.69	30	
2467	12	0	7.85	7.68	10.78	30	8
		1	7.74	7.56	10.66	30	
		2	8.50	8.34	11.43	30	
		3	8.51	8.36	11.44	30	
		4	8.10	7.93	11.03	30	
		5	8.09	7.93	11.02	30	
		6	8.13	7.96	11.06	30	
		7	8.09	7.91	11.01	30	
2472	13	0	5.65	4.96	8.33	30	6
		1	5.53	4.83	8.20	30	
		2	6.28	5.59	8.96	30	
		3	6.29	5.62	8.98	30	
		4	5.79	5.20	8.51	30	
		5	5.77	5.19	8.50	30	
		6	5.82	5.22	8.54	30	
		7	5.80	5.18	8.51	30	

9.4 POWER SPECTRAL DENSITY

[ANT1]

Mode	Frequency (MHz)	Channel No.	Test Result			
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11b	2412	1	-5.649	0.212	-5.437	8
	2437	6	-6.820	0.212	-6.608	
	2462	11	-7.238	0.212	-7.026	
	2467	12	-17.337	0.212	-17.125	
	2472	13	-18.812	0.212	-18.600	
802.11g	2412	1	-13.732	0.317	-13.415	
	2437	6	-14.071	0.317	-13.754	
	2462	11	-13.719	0.317	-13.402	
	2467	12	-21.494	0.317	-21.177	
	2472	13	-23.537	0.317	-23.220	
802.11n	2412	1	-13.619	0.421	-13.198	
	2437	6	-13.334	0.421	-12.913	
	2462	11	-15.217	0.421	-14.796	
	2467	12	-20.500	0.421	-20.079	
	2472	13	-22.904	0.421	-22.483	

[ANT2]

Mode	Frequency (MHz)	Channel No.	Test Result			
			Measured PSD (dBm)	Duty Cycle Factor	Measured PSD(dBm) + Duty Cycle Factor	Limit (dBm)
802.11b	2412	1	-7.135	0.212	-6.923	8
	2437	6	-5.985	0.212	-5.773	
	2462	11	-6.960	0.212	-6.748	
	2467	12	-16.425	0.212	-16.213	
	2472	13	-19.709	0.212	-19.497	
802.11g	2412	1	-13.373	0.317	-13.056	
	2437	6	-13.253	0.317	-12.936	
	2462	11	-13.690	0.317	-13.373	
	2467	12	-21.248	0.317	-20.931	
	2472	13	-24.311	0.317	-23.994	
802.11n	2412	1	-13.716	0.421	-13.295	
	2437	6	-12.121	0.421	-11.700	
	2462	11	-15.077	0.421	-14.656	
	2467	12	-20.870	0.421	-20.449	
	2472	13	-23.689	0.421	-23.268	

[MIMO]

Mode	Frequency (MHz)	Channel No.	Test Result			
			ANT 1 Measured PSD(dBm) + Duty Cycle Factor	ANT 2 Measured PSD(dBm) + Duty Cycle Factor	MIMO Result (dBm)	Limit (dBm)
802.11g	2412	1	-13.415	-13.056	-10.222	8
	2437	6	-13.754	-12.936	-10.316	
	2462	11	-13.402	-13.373	-10.377	
	2467	12	-21.177	-20.931	-18.042	
	2472	13	-23.220	-23.994	-20.580	
802.11n	2412	1	-13.198	-13.295	-10.236	
	2437	6	-12.913	-11.700	-9.254	
	2462	11	-14.796	-14.656	-11.715	
	2467	12	-20.079	-20.449	-17.250	
	2472	13	-22.483	-23.268	-19.848	

Note :

1. Spectrum reading values are not plot data.

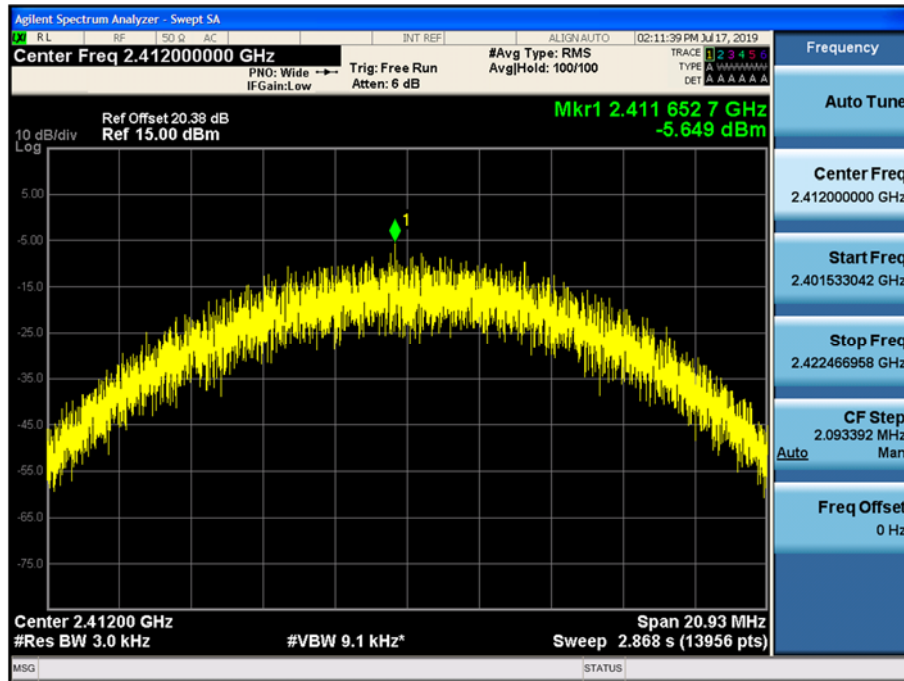
The PSD results in plot is already including the actual values of loss for the attenuator and cable combination.

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

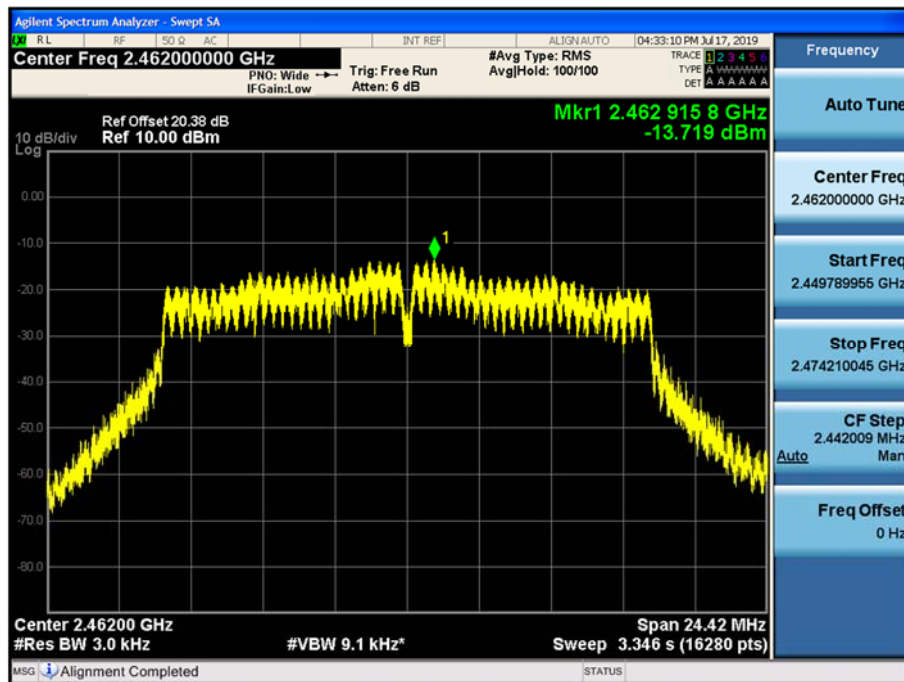
3. 20.38 dB is offset for 2.4 GHz Band.

Test Plots [ANT1]

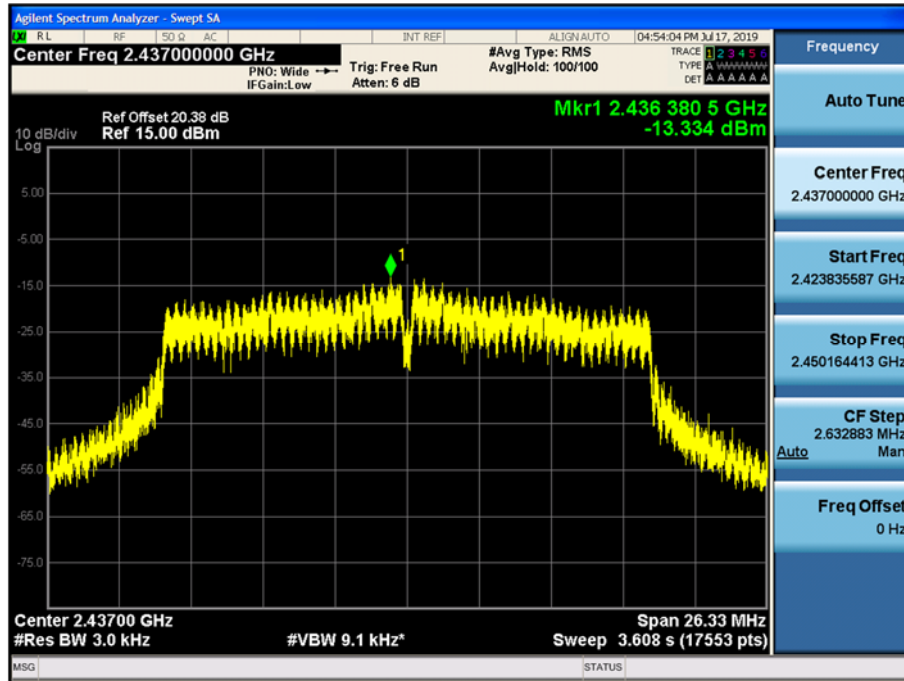
Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11g-CH 11)

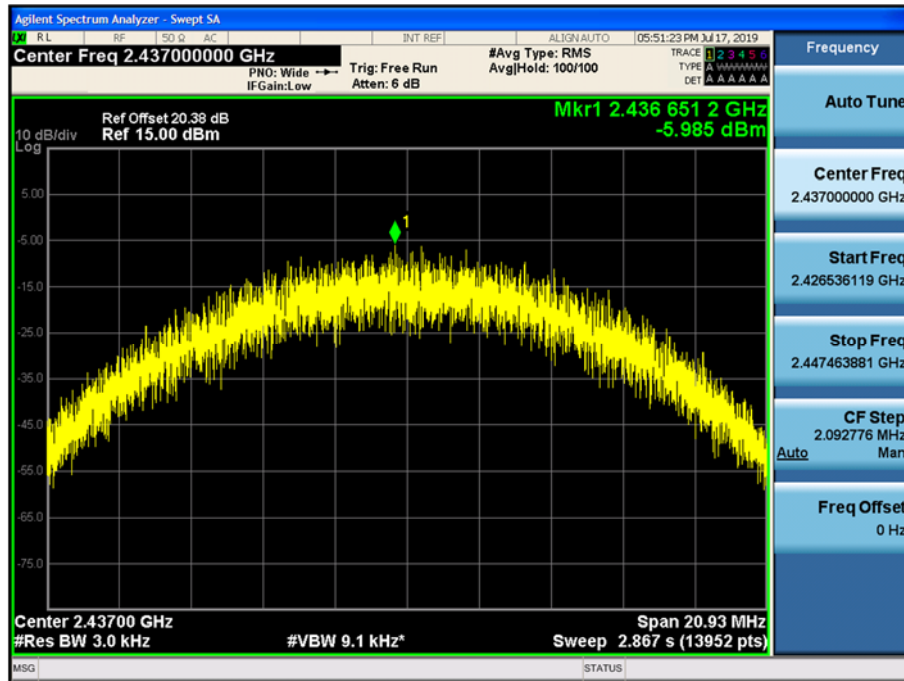


Power Spectral Density (802.11n_HT20 -CH 6)

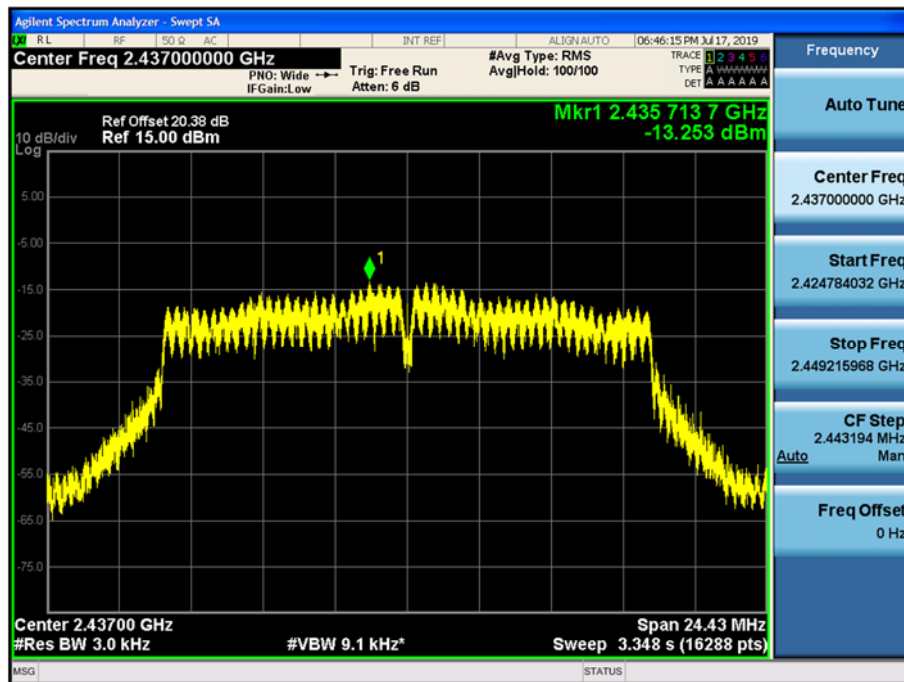


Test Plots [ANT2]

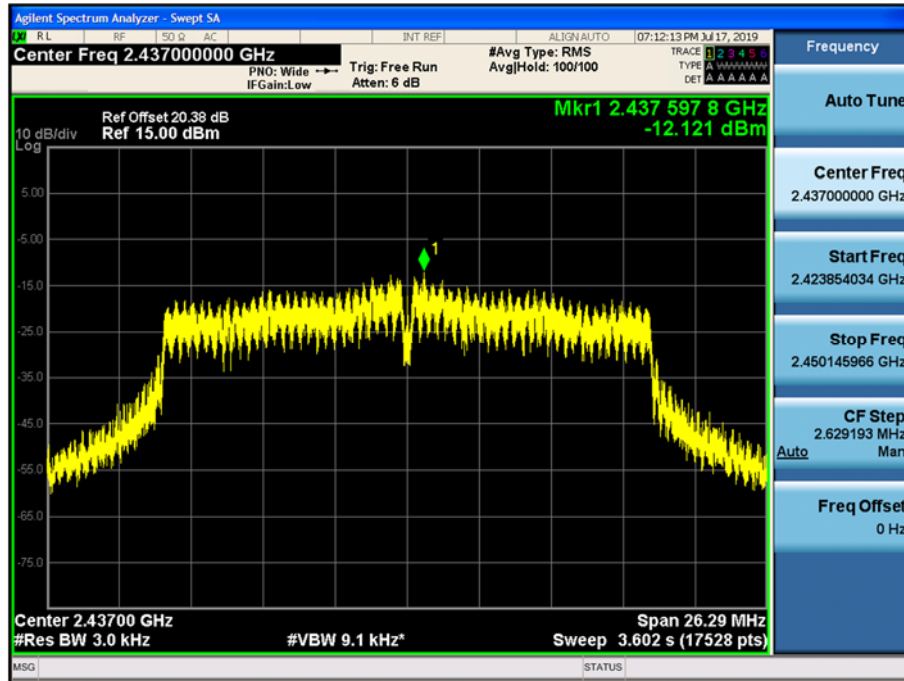
Power Spectral Density (802.11b-CH 6)



Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n_HT20 -CH 6)



Note :

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

9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS

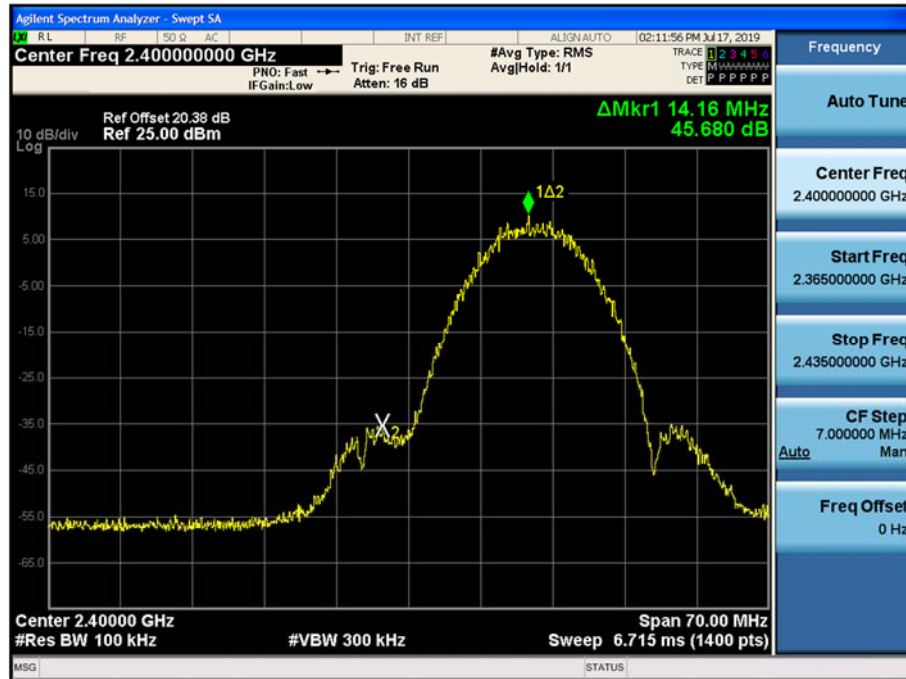
Test Result : please refer to the plot below.

In order to simplify the report, attached plots were only the worst case channel and data rate.

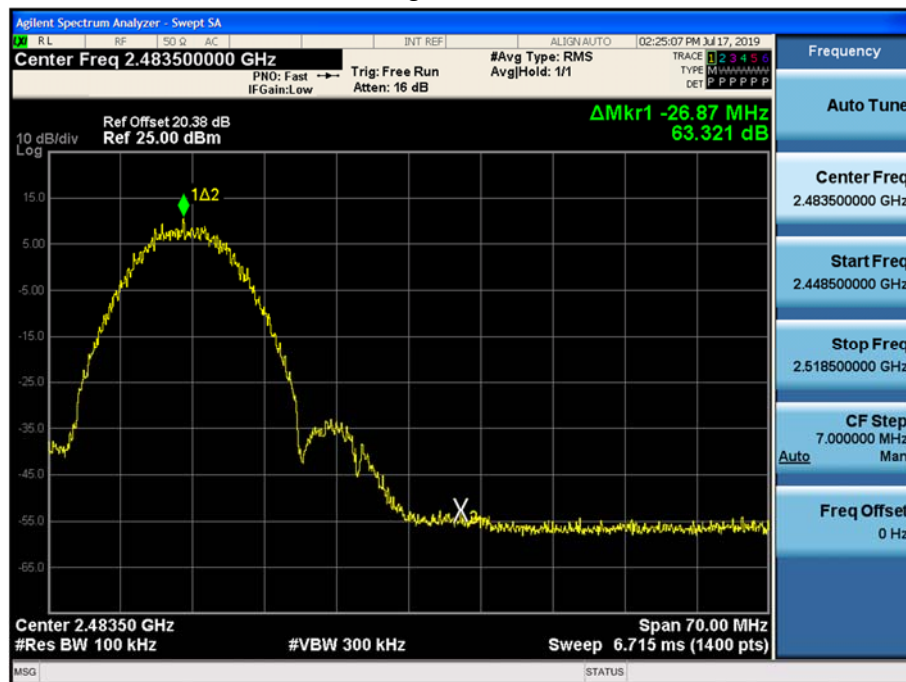
[ANT1]

▣ Test Plots(BandEdge)

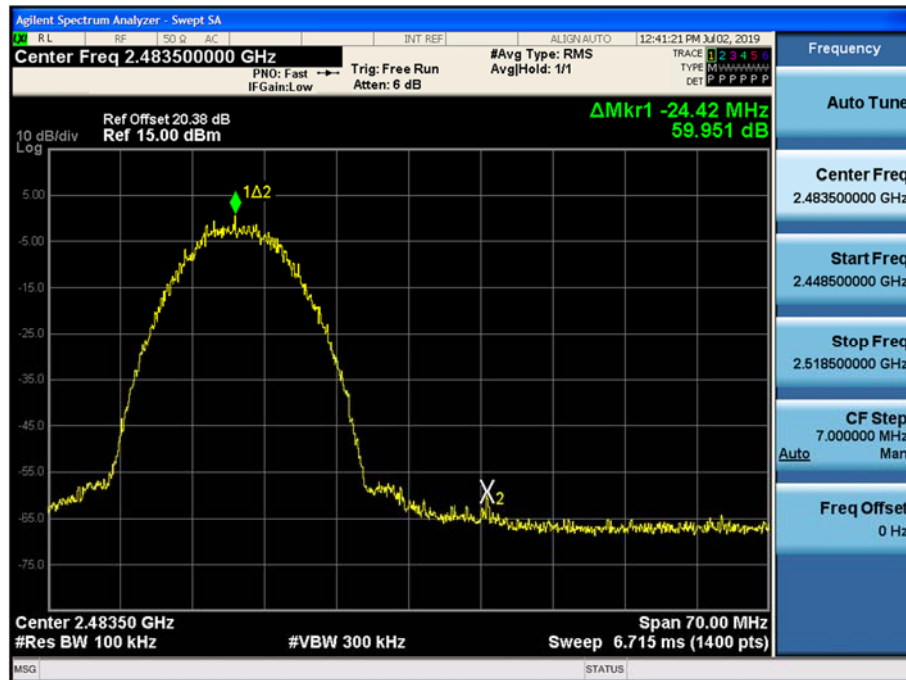
Band Edge (802.11b-CH1)



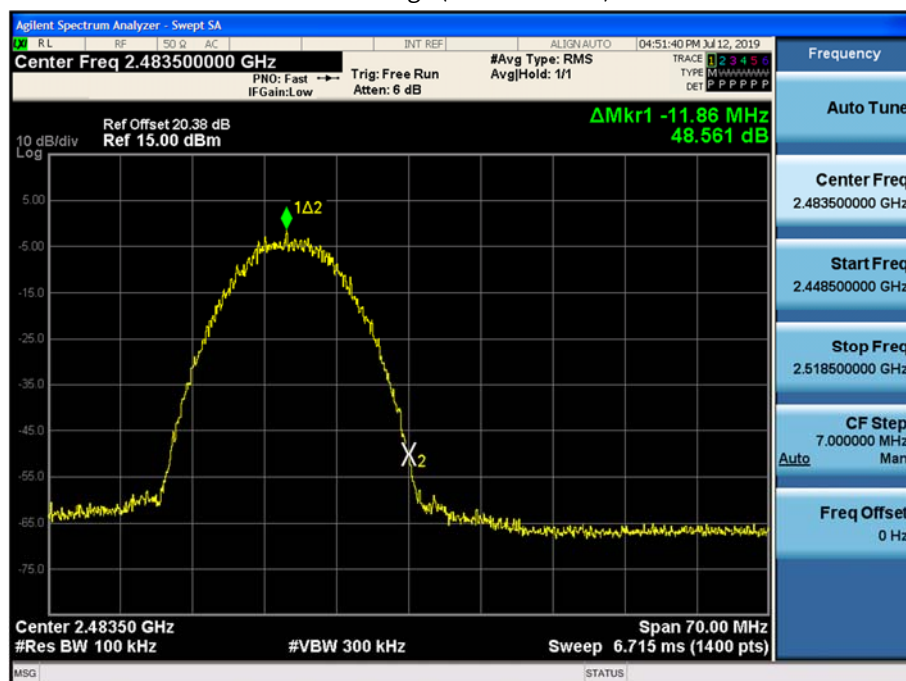
Band Edge (802.11b-CH11)



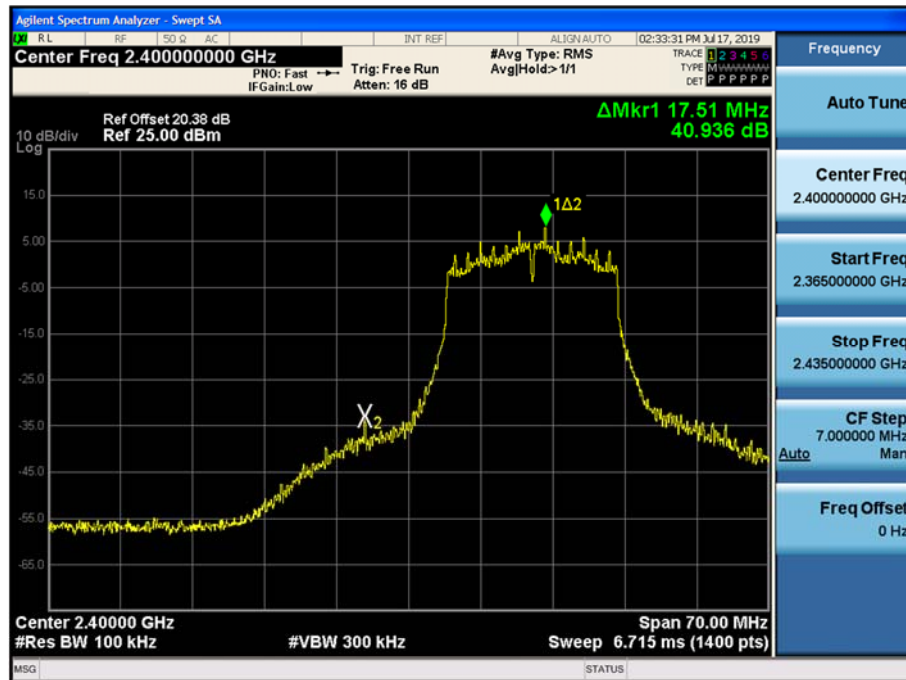
Band Edge (802.11b-CH12)



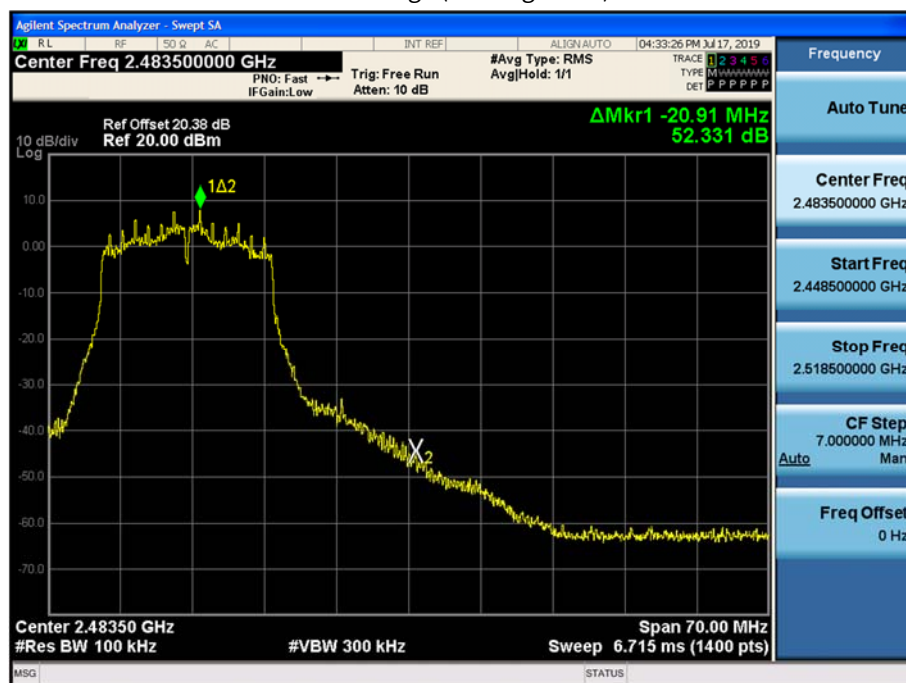
Band Edge (802.11b-CH13)



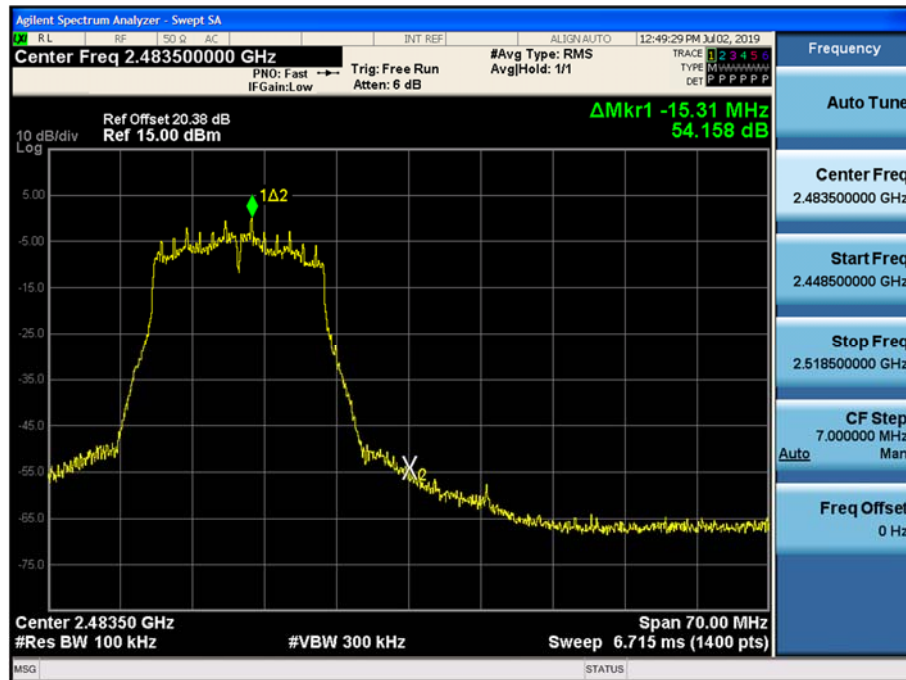
Band Edge (802.11g-CH1)



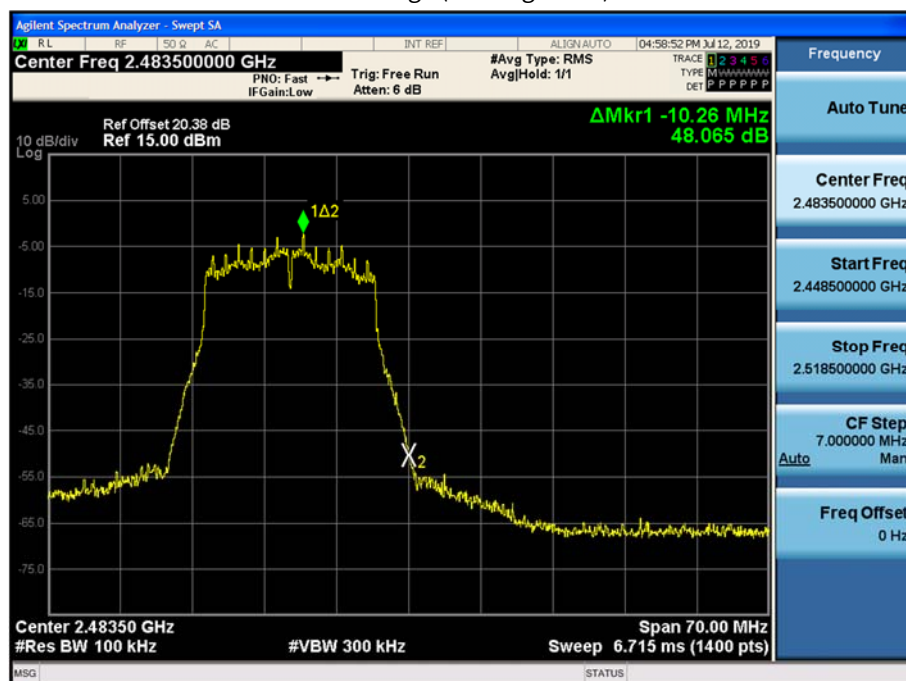
Band Edge (802.11g-CH11)



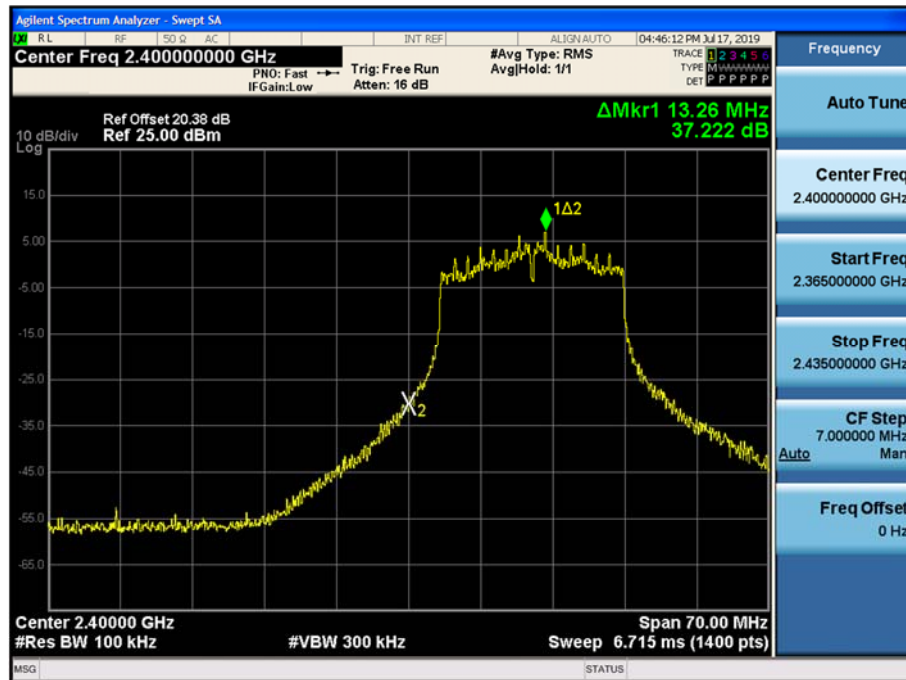
Band Edge (802.11g-CH12)



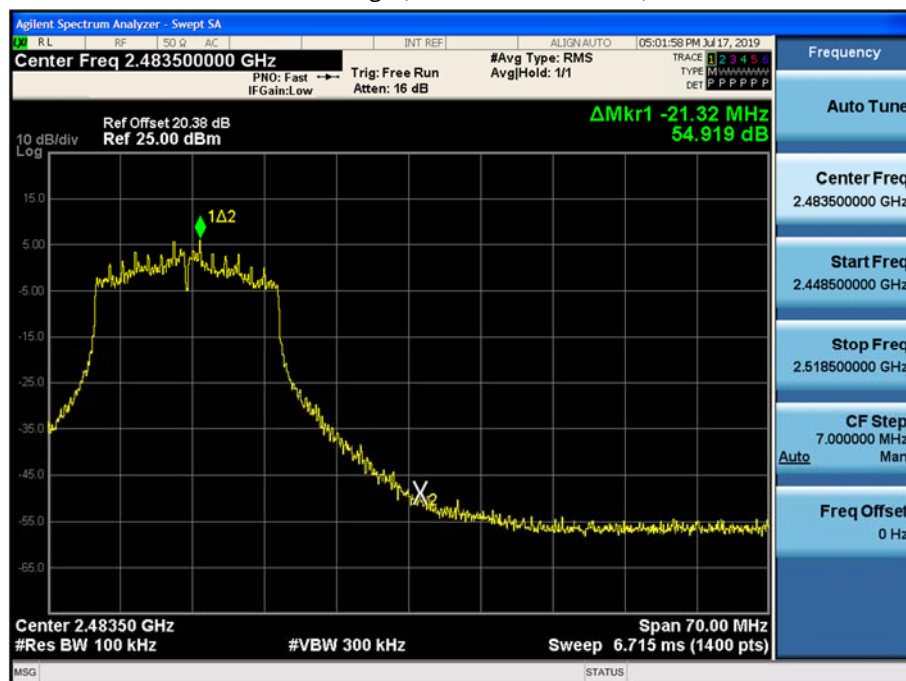
Band Edge (802.11g-CH13)



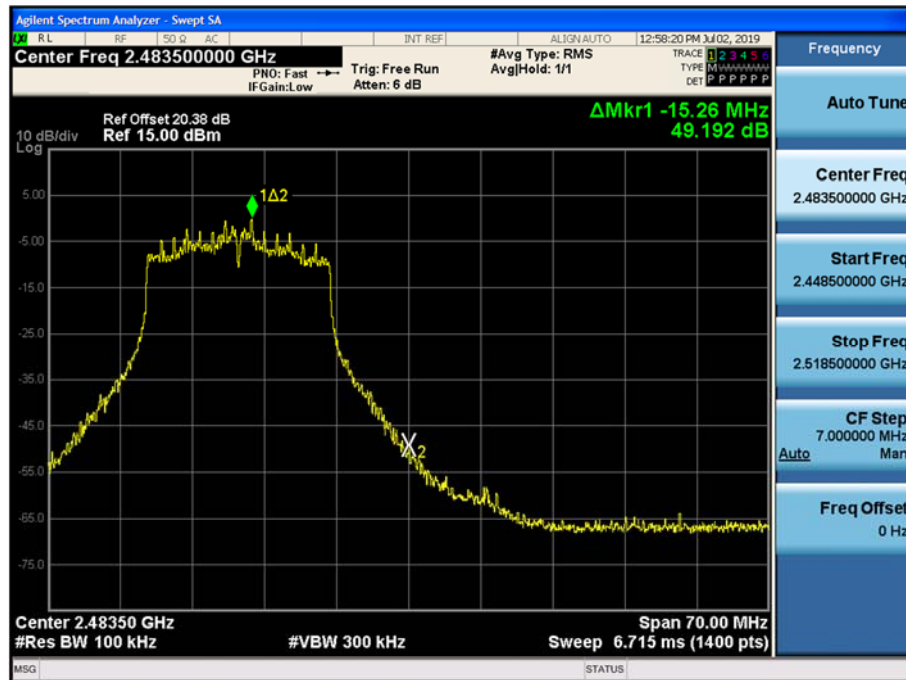
Band Edge (802.11n_HT20 -CH1)



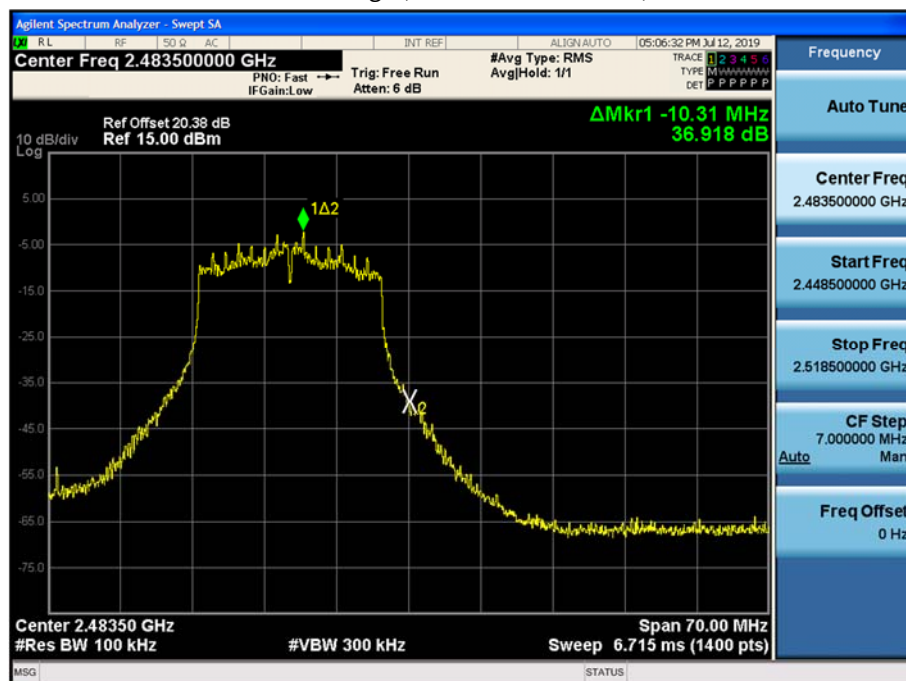
Band Edge (802.11n_HT20 -CH11)



Band Edge (802.11n_HT20 -CH12)



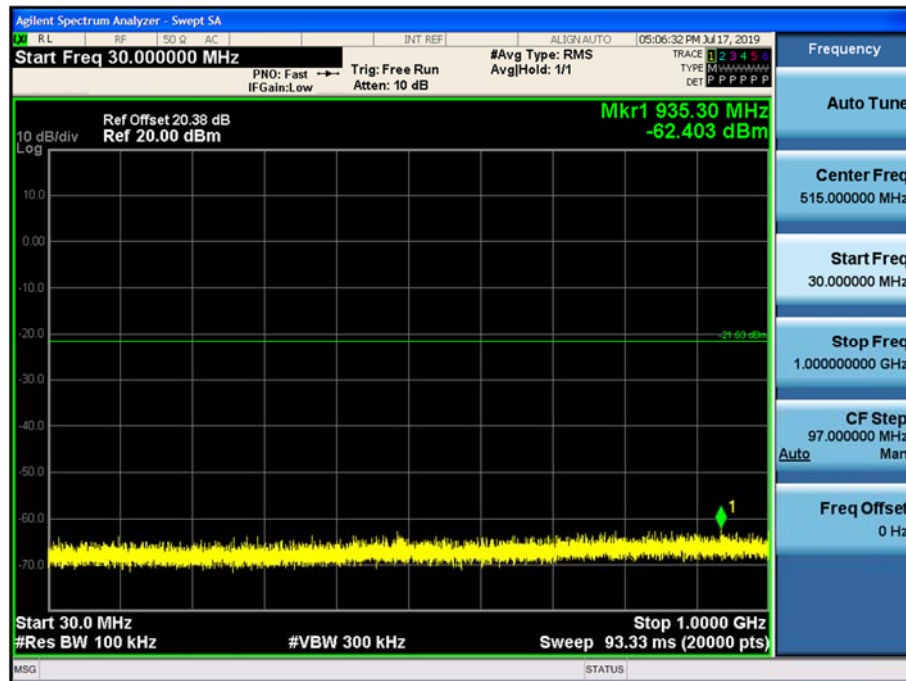
Band Edge (802.11n_HT20 -CH13)



Test Plots(Conducted Spurious Emission)

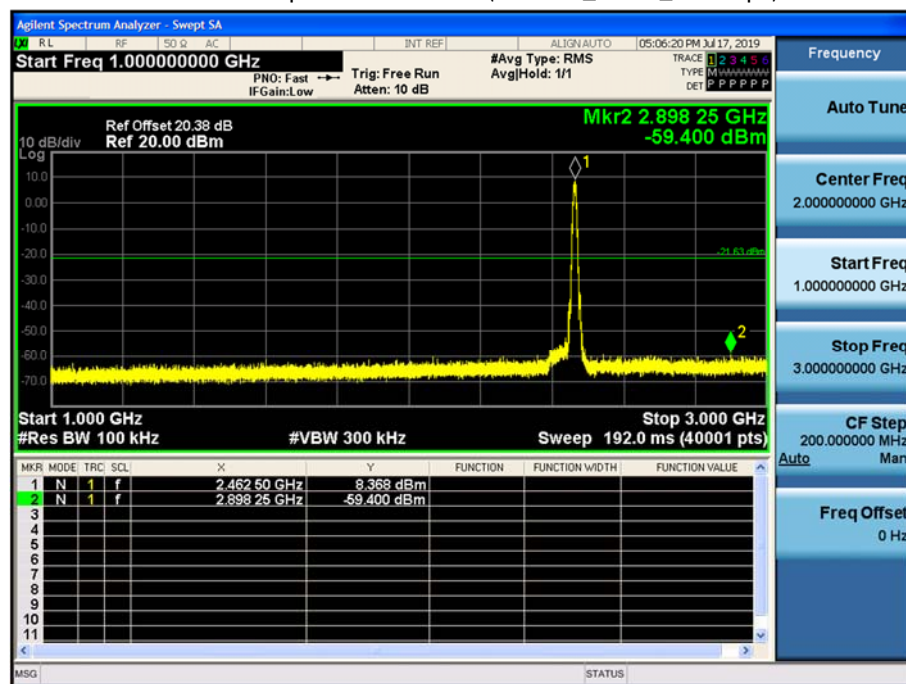
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



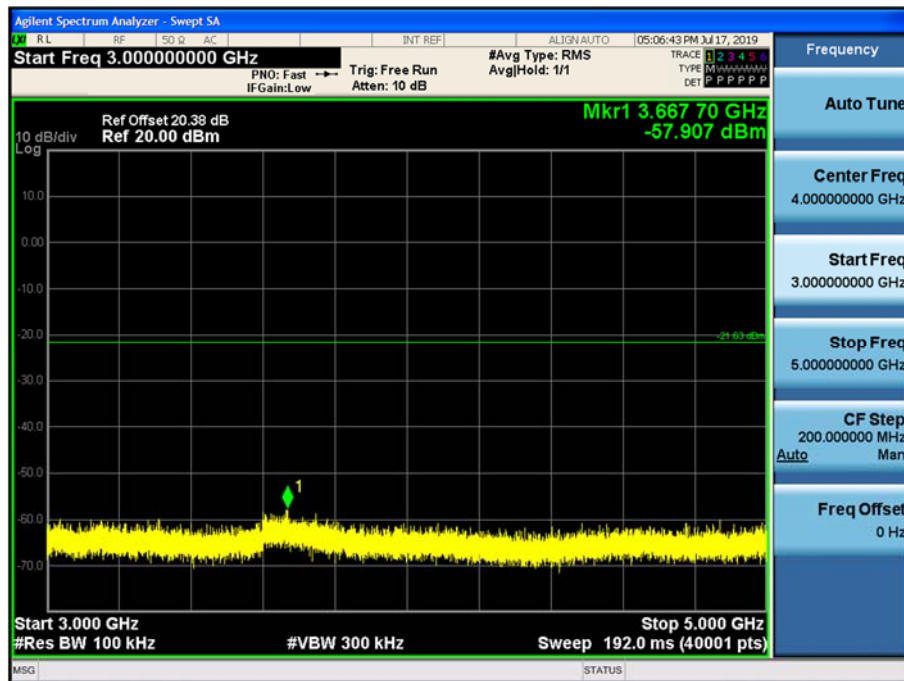
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



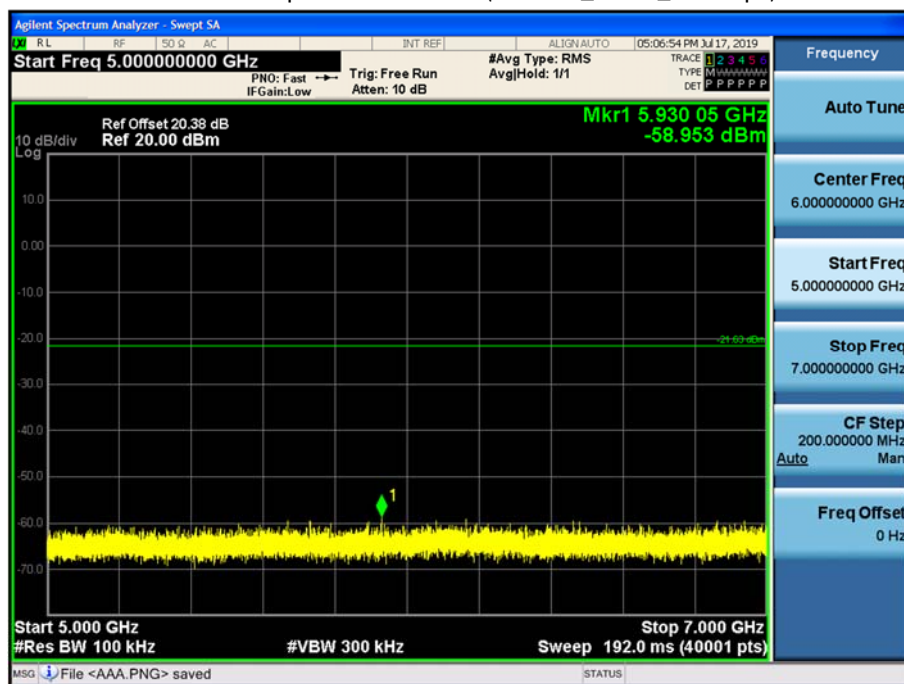
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



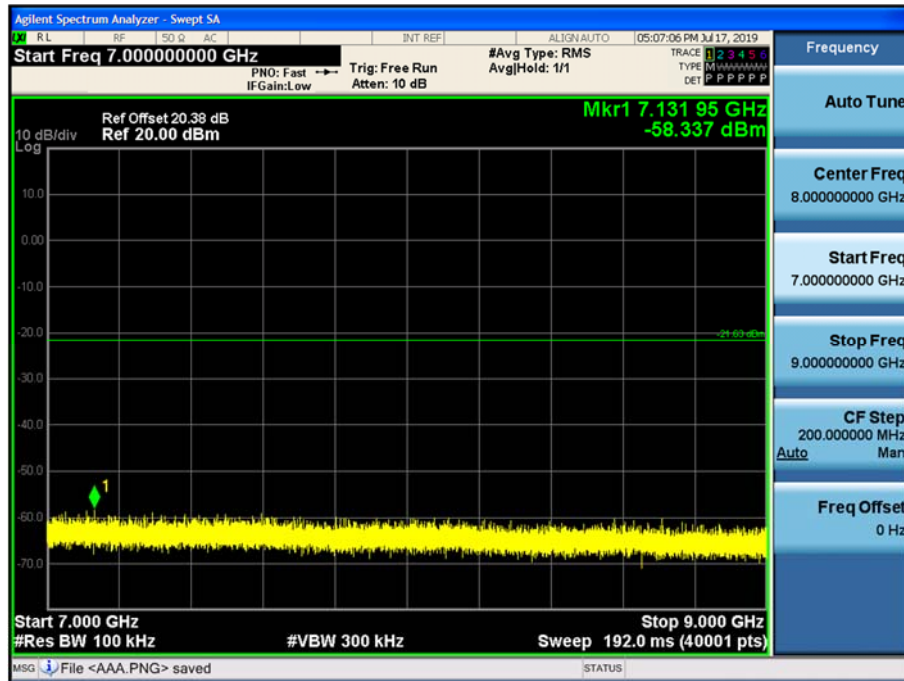
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



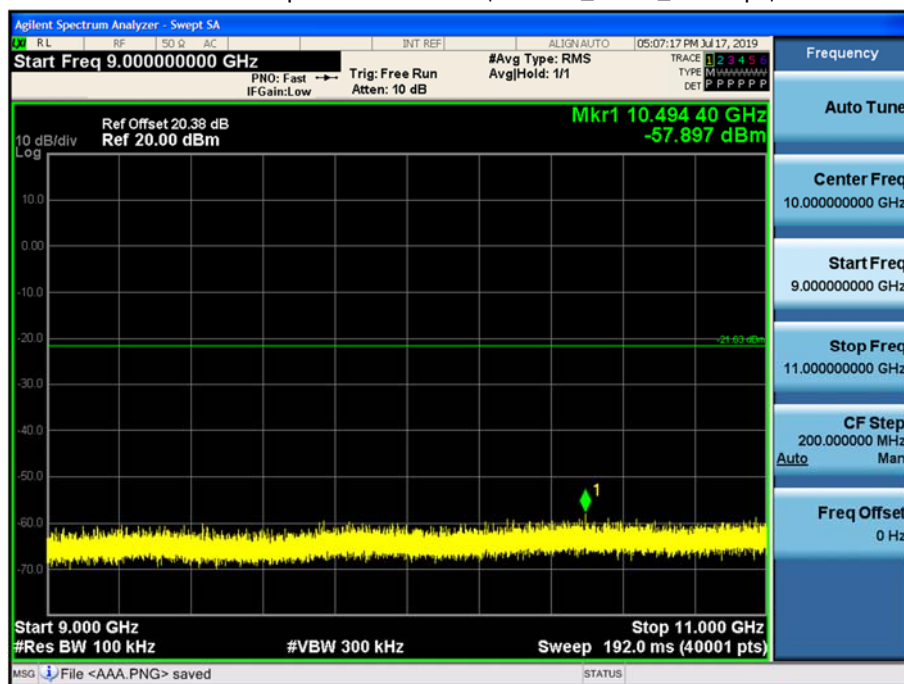
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



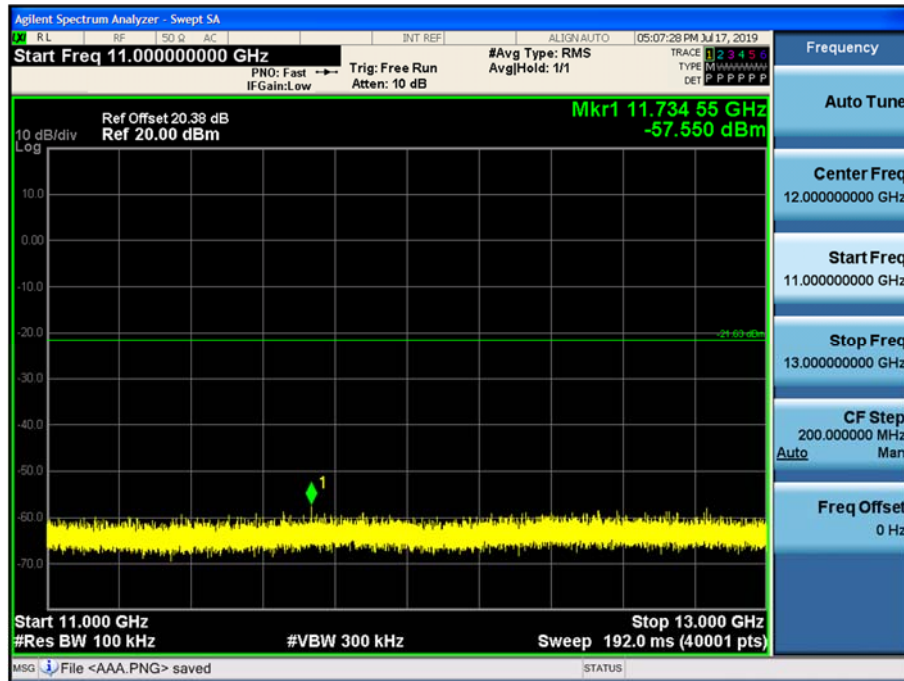
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



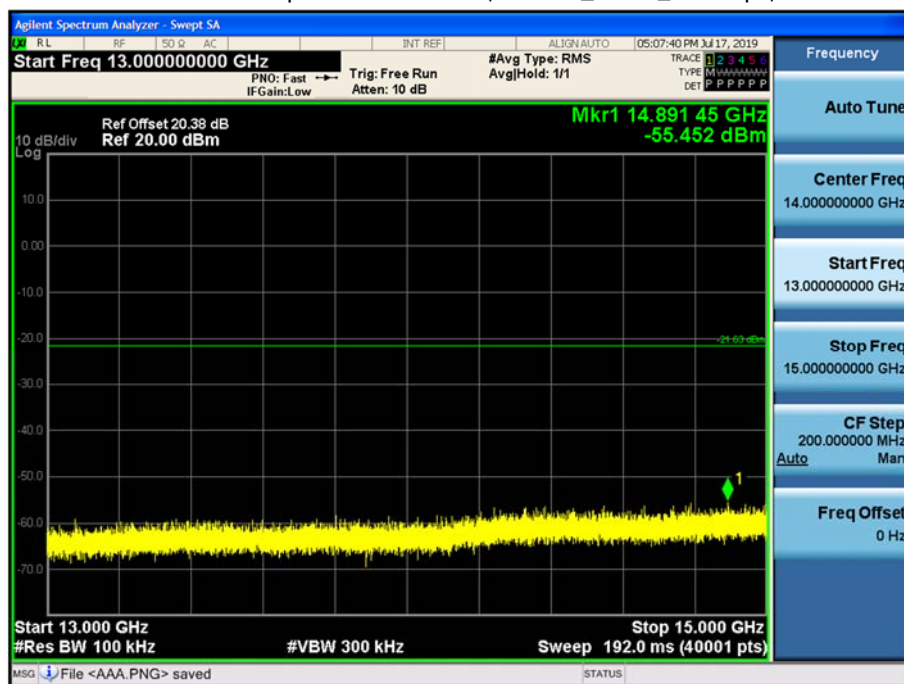
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



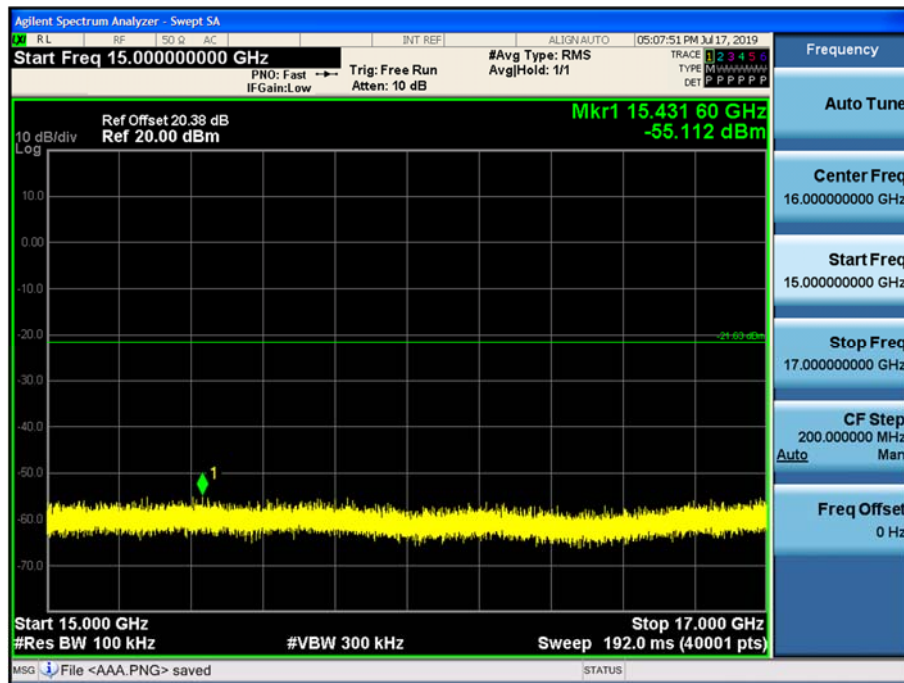
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)



17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11b_Ch.11_5.5 Mbps)

