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**HCT**

# TEST REPORT

FCC/IC DTS Test for ETPFBTRP01

Certification

**APPLICANT**

LG Innotek Co., Ltd.

**REPORT NO.**

HCT-RF-1910-FI001-R1

**DATE OF ISSUE**

October 21, 2019

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REPORT NO.  
HCT-RF-1910-FI001-R1

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FCC ID/IC  
YZP-ETPFBTRP01/7414C-ETPFBTRP01

Applicant LG Innotek Co., Ltd.  
26, Hanamsandan 5beon-ro Gwangsan-gu, Gwangju, 506-731, South Korea

Eut Type Model Name PoE WiFi Bridge  
ETPFBTRP01

Modulation type CCK/DSSS/OFDM

FCC Classification Digital Transmission System(DTS)

FCC Rule Part(s) Part 15.247

IC Rule Part(s) RSS-247 Issue 2 (February 2017), RSS-Gen Issue 5(April 2018)

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

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

Tested by  
Jung Ki Lim

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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	October 14, 2019	Initial Release
1	October 21, 2019	Revised the Antenna type

### 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 / IC Rules under normal use and maintenance.

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## 1. EUT DESCRIPTION

Model	ETPFBTRP01		
EUT Type	PoE WiFi Bridge		
Power Supply	AC 100 ~ AC 130		
Frequency Range	2412 MHz - 2462 MHz		
Manufacturer	LG Innotek Co., Ltd.		
Factory	PT. LG INNOTEK INDONESIA Bekasi International Industrial Estate, Blok C8 NO. 12 & 12 A, Desa Cibatu, Cikarang Selatan, Bekasi 17750 - Indonesia		
Max. RF Output Power	<b>Peak Power</b>	Ant. 1 (SISO)	802.11b: 20.88 dBm 802.11g: 25.39 dBm 802.11n(HT20): 25.12 dBm 802.11n(HT40): 25.18 dBm
		Ant. 2 (SISO)	802.11b: 21.74 dBm 802.11g: 25.81 dBm 802.11n(HT20): 25.63 dBm 802.11n(HT40): 25.16 dBm
		Ant. 1 + Ant. 2 (MIMO)	802.11b: 20.98 dBm 802.11g: 27.56 dBm 802.11n(HT20): 27.48 dBm 802.11n(HT40): 26.72 dBm
	<b>Average Power</b>	Ant. 1 (SISO)	802.11b: 18.22 dBm 802.11g: 16.31 dBm 802.11n(HT20): 16.29 dBm 802.11n(HT40): 16.22 dBm
		Ant. 2 (SISO)	802.11b: 19.41 dBm 802.11g: 17.09 dBm 802.11n(HT20): 16.90 dBm 802.11n(HT40): 15.93 dBm
		Ant. 1 + Ant. 2 (MIMO)	802.11b: 18.30 dBm 802.11g: 17.85 dBm 802.11n(HT20): 18.16 dBm 802.11n(HT40): 17.21 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n		
Number of Channels	11 Channels		
Antenna Specification	Antenna type Ant.1 : External Antenna / Ant.2 : PCB printed antenna Peak Gain Ant.1: 3.27 dBi / Ant.2: 1.50 dBi		
Date(s) of Tests	September 24, 2019 ~ October 11, 2019		
PMN(Product Marketing Number)	PoE WiFi Bridge		
HVIN(Hardware Version Identification Number)	ETPFBTRP01		
FVIN(Firmware Version Identification Number)	v1.63_r233		
HMN(Host Marketing Name)	N/A		

**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	O
802.11g	O	O	X	O
802.11n(HT20)	O	O	O	O
802.11n(HT40)	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. Directional Gain Calculation

- If any transmit signals are correlated with each other(802.11b/g/n\_HT20),

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

**Antenna Gain**

2.4 GHz Band

Antenna Gain	802.11b/g/n	Ant 0	3.27 dBi
		Ant 1	1.50 dBi
Directional Antenna Gain	802.11b/g/n	Ant 0 & 1	5.48 dBi

## 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. / 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 3.75 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 ).

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.

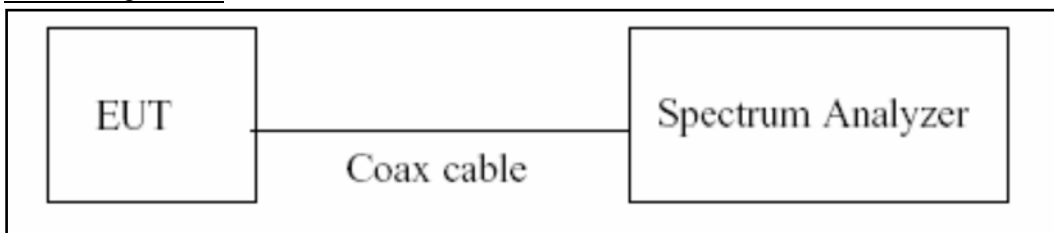
The measurement data shown herein meets or exceeds the  $U_{CISPR}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded Uncertainty ( $\pm$ 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  $> 50/T$ .

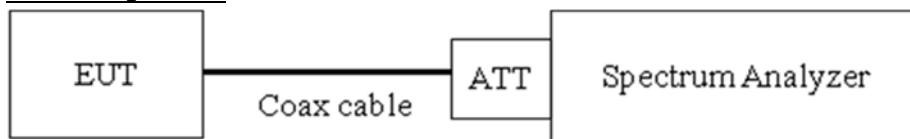
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ( $\geq$  RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep  $> 100$
6. Trace mode = Clear write
7. Measure  $T_{total}$  and  $T_{on}$
8. Calculate Duty Cycle =  $T_{on}/T_{total}$  and Duty Cycle Factor =  $10\log(1/Duty\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

## 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  $\geq 3 \times$  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.

### Test Procedure (99 % Bandwidth for IC)

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW  $\cong 3 \times$  RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

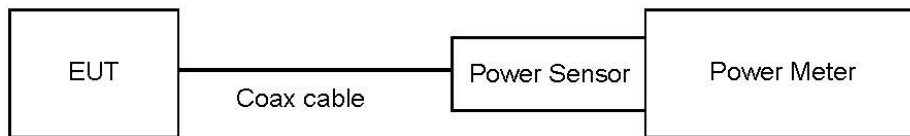
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

### 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

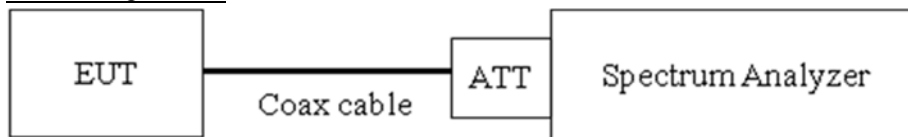
- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

## 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 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)  $RBW = 3 \text{ kHz} \leq RBW \leq 100 \text{ kHz}$ .
- 4)  $VBW \geq 3 \times RBW$ .
- 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

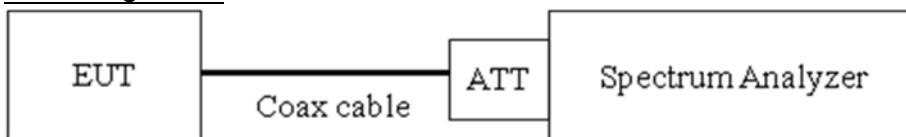
## 7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

### Limit

The maximum conducted (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 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

[ Conducted > 20 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 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  $\geq$  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	11.30
100	9.83
200	10.19
300	10.13
400	10.23
500	10.25
600	10.32
700	10.35
800	10.35
900	10.34
1000	10.39
2000	10.64
2400	10.65
2500	10.67
3000	10.68
4000	10.89
5000	11.07
6000	11.06
7000	11.35
8000	11.32
9000	11.48
10000	11.56
11000	11.56
12000	11.68
13000	11.83
14000	11.90
15000	11.98
16000	12.04
17000	12.02
18000	12.08
19000	12.07
20000	12.14
21000	12.17
22000	12.31
23000	12.60
24000	12.34
25000	12.53
26000	11.07

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

#### IC

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

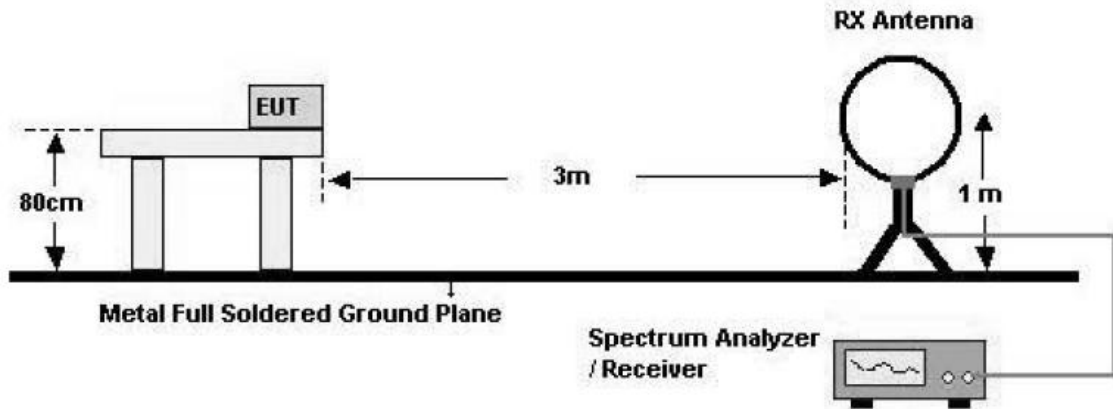
#### FCC&IC

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

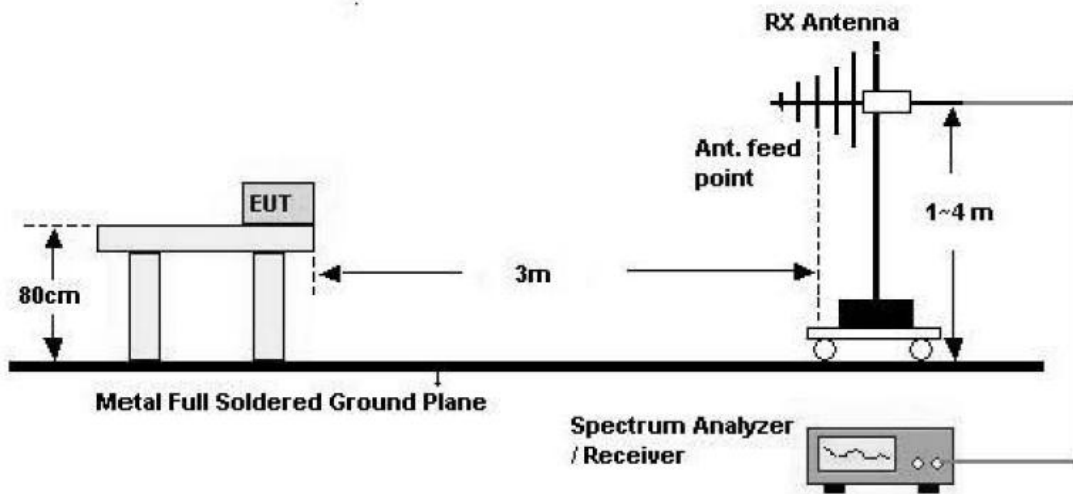


### Test Configuration

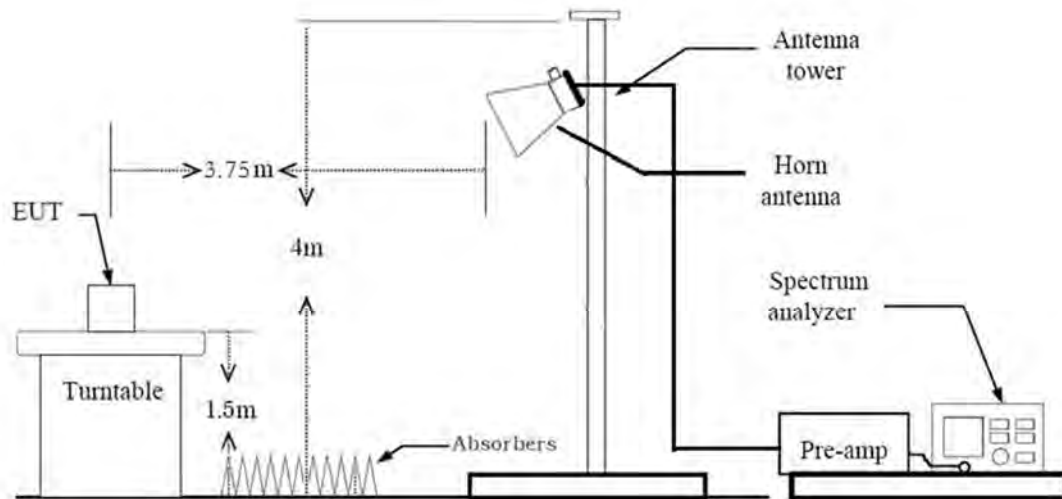
Below 30 MHz



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) =  $40\log(3\text{ m}/300\text{ m}) = -80\text{ dB}$   
Measurement Distance : 3 m
7. Distance Correction Factor(0.490 MHz – 30 MHz) =  $40\log(3\text{ m}/30\text{ m}) = -40\text{ dB}$   
Measurement Distance : 3 m
8. Spectrum Setting
  - Frequency Range = 9 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 9 kHz
  - VBW  $\geq 3 \times$  RBW
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

10. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

#### **KDB 414788 OFS and Chamber Correlation Justification**

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

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

#### **Test Procedure of Radiated spurious emissions(Below 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 x RBW

##### (2) Measurement Type(Quasi-peak):

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

In general, (1) is used mainly

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

7. Measurement value only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.

### Test Procedure of Radiated spurious emissions (Above 1 GHz)

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor( reference distance : 3 m).
  - ◆ Distance extrapolation factor =  $20\log(\text{test distance} / \text{specific distance})$  (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. 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  $\geq 3 \times$  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  $\geq 3 \times$  RBW
    - Sweep time = auto.
    - Trace mode = average (at least 100 traces).
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. 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)

### 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 =  $20\log(\text{test distance} / \text{specific distance})$  (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. 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 x 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 x RBW
    - Sweep time = auto.
    - Trace mode = average (at least 100 traces).

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. Total(Measurement Type : Peak)

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

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

= Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

## 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  $\mu$ H/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56 <sup>(a)</sup>	56 to 46 <sup>(a)</sup>
0.50 to 5	56	46
5 to 30	60	50

<sup>(a)</sup>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

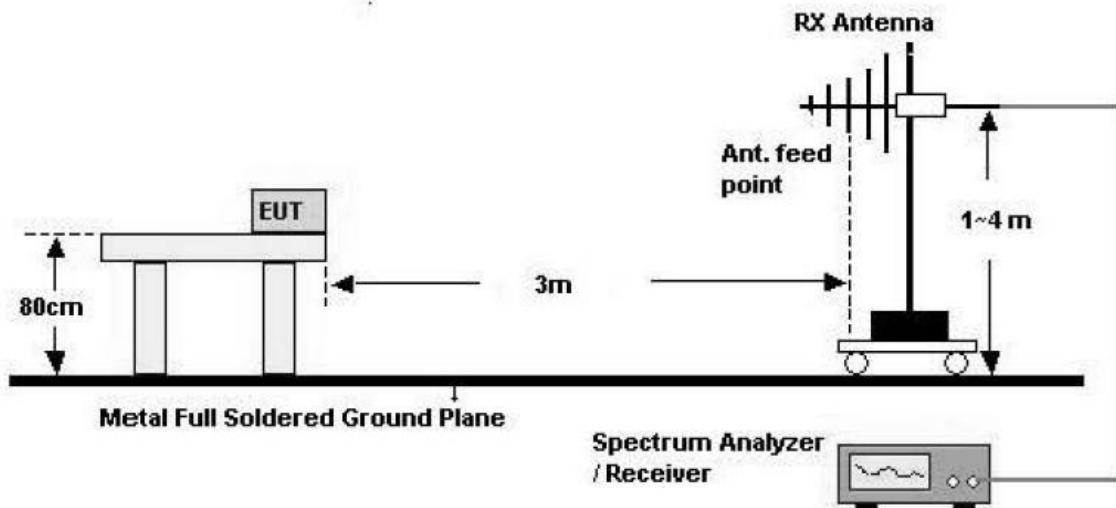
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

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

### Test Configuration

30 MHz - 1 GHz

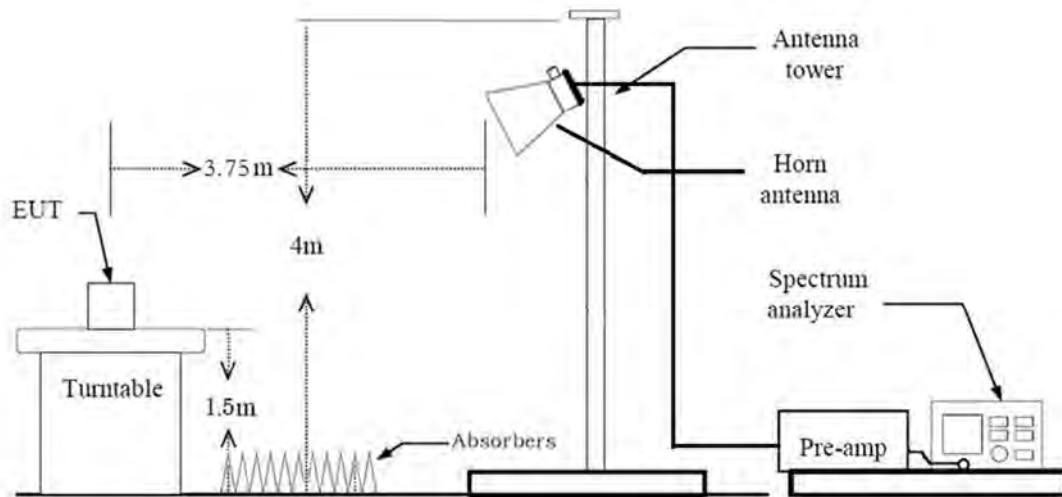




### Test Procedure of Receiver Spurious Emissions (Below 1GHz)

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. 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 x RBW
  - (2) Measurement Type(Quasi-peak):
    - Measured Frequency Range : 30 MHz – 1 GHz
    - Detector = Quasi-Peak
    - RBW = 120 kHz
6. 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 3.75 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 =  $20 \log (\text{test distance} / \text{specific distance})$  (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 : 1 GHz – 25 GHz
    - Detector = Peak

- Trace = Maxhold
- RBW = 1 MHz
- VBW  $\geq 3 \times$  RBW

(2) Measurement Type(Average):

- We performed using a reduced video BW method was done with the analyzer in linear mode
- Measured Frequency Range : 1 GHz – 25 GHz
- Detector = Peak
- Trace = Maxhold
- RBW = 1 MHz
- VBW  $\geq 1/\tau$  Hz, where  $\tau$  = pulse width in seconds

The actual setting value of VBW = 1 kHz

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) + Distance Factor(D.F)

## 7.9. Worst case configuration and mode

### Radiated test

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

- Mode : Ant1(SISO), Ant2(SISO), Ant1+Ant2(MIMO)

2. EUT Axis

- Radiated Spurious Emissions : X,Y

- Radiated Restricted Band Edge : X,Z

3. 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.

### 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 : Ant1(SISO), Ant2(SISO), Ant1+Ant2(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 > 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

**IC Part**

Test Description	IC 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		PASS
Radiated Spurious Emissions	RSS-GEN, 8.9	cf. Section 7.6		Radiated
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	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	-	-	-	-
802.11g	-	-	-	-
802.11n (HT20)	-	-	-	-
802.11n (HT40)	-	-	-	-

**Note:**

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

## 9.2 6dB BANDWIDTH &amp; 99 % BANDWIDTH

[ANT1]

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	10.102	0.5
2437	6	10.103	0.5
2462	11	10.104	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.620	0.5
2437	6	16.618	0.5
2462	11	16.380	0.5

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.856	0.5
2437	6	17.610	0.5
2462	11	17.850	0.5

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	35.480	> 0.5
2437	6	36.507	> 0.5
2452	9	36.493	> 0.5



**[ANT2]**

802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	10.099	0.5
2437	6	10.096	0.5
2462	11	10.103	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.620	0.5
2437	6	16.619	0.5
2462	11	16.390	0.5

802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.844	0.5
2437	6	17.844	0.5
2462	11	17.620	0.5

802.11n(HT40) Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2422	3	36.509	> 0.5
2437	6	36.518	> 0.5
2452	9	35.360	> 0.5

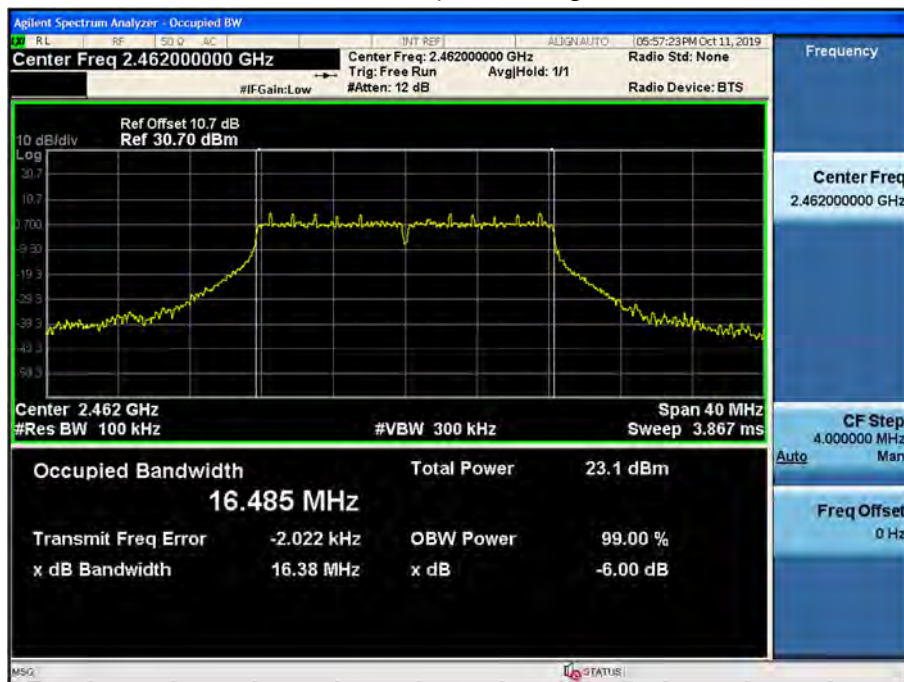
[ANT1]

▣ Test Plots

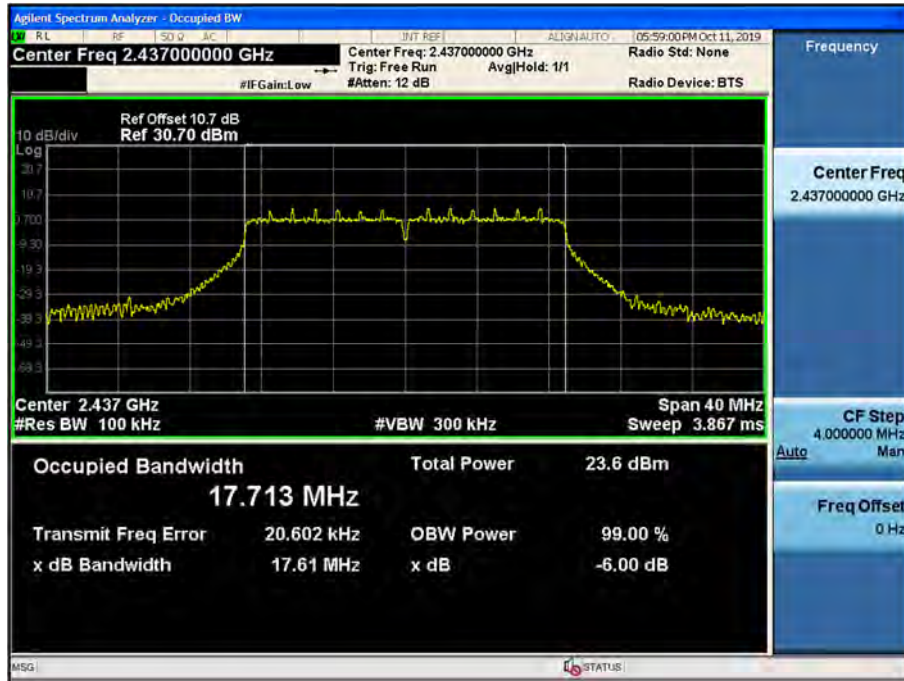
6dB Bandwidth plot (802.11b-CH 1)



6dB Bandwidth plot (802.11g-CH 11)



6dB Bandwidth plot (802.11n\_HT20-CH 6)



6dB Bandwidth plot (802.11n\_HT40-CH 3)



[ANT2]

▣ Test Plots

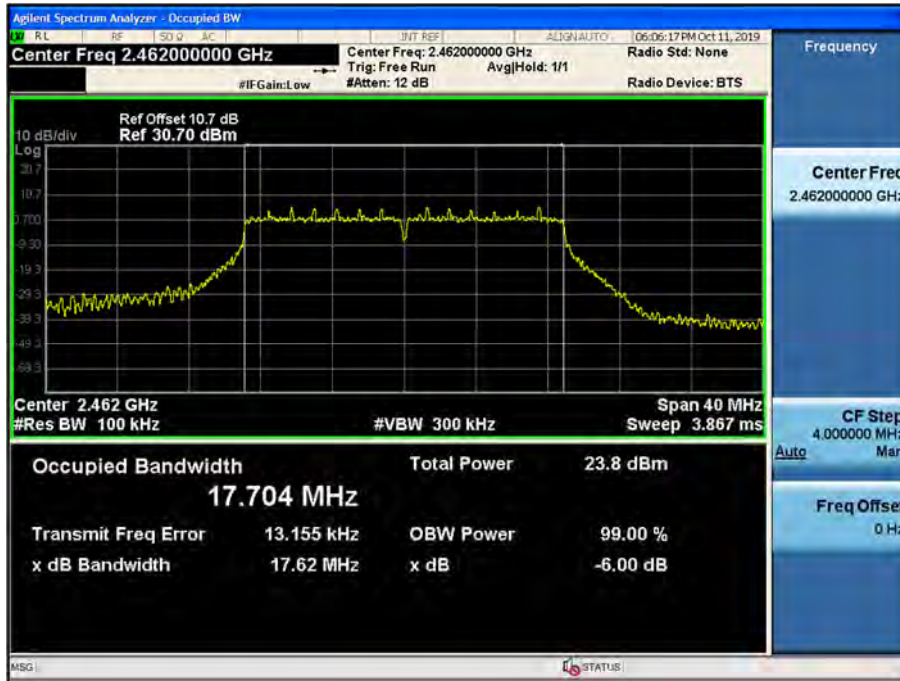
6dB Bandwidth plot (802.11b-CH 6)



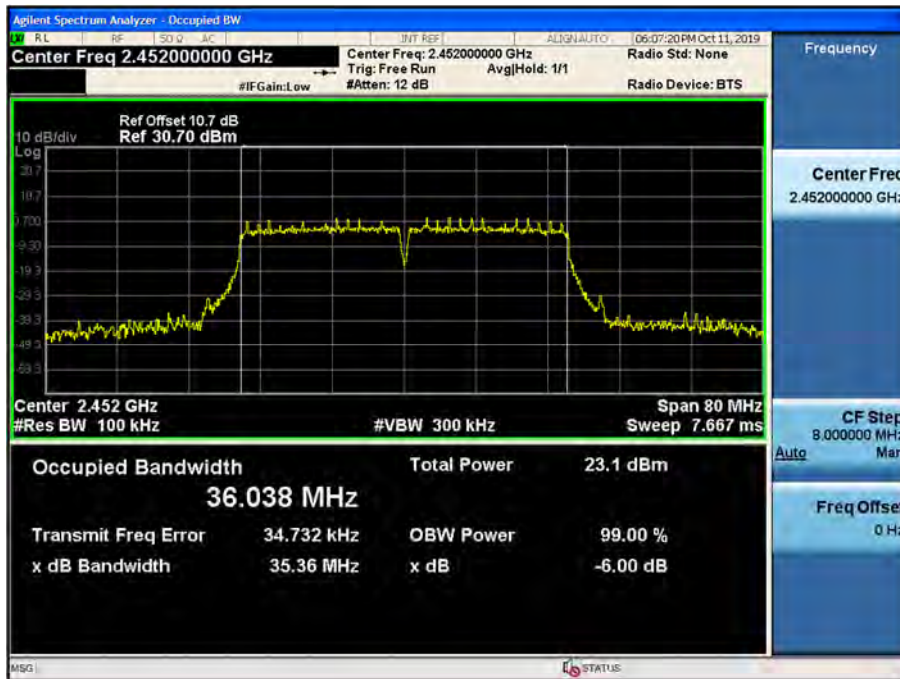
6dB Bandwidth plot (802.11g-CH 11)



6dB Bandwidth plot (802.11n\_HT20-CH 11)



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.

**IC**
**[ANT1]**

802.11b Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.078	N/A
2437	6	15.097	N/A
2462	11	15.101	N/A

802.11g Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.258	N/A
2437	6	17.250	N/A
2462	11	17.254	N/A

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	18.247	N/A
2437	6	18.237	N/A
2462	11	18.226	N/A

802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2422	3	36.589	N/A
2437	6	36.638	N/A
2452	9	36.583	N/A

**[ANT2]**

802.11b Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	15.123	N/A
2437	6	15.132	N/A
2462	11	15.129	N/A

802.11g Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.239	N/A
2437	6	17.279	N/A
2462	11	17.287	N/A

802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	18.238	N/A
2437	6	18.239	N/A
2462	11	18.239	N/A

802.11n(HT40) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2422	3	36.534	N/A
2437	6	36.594	N/A
2452	9	36.577	N/A

▣ Test Plots\_[ANT1]

99% Bandwidth plot (802.11b-CH 11)



99% Bandwidth plot (802.11g-CH 1)

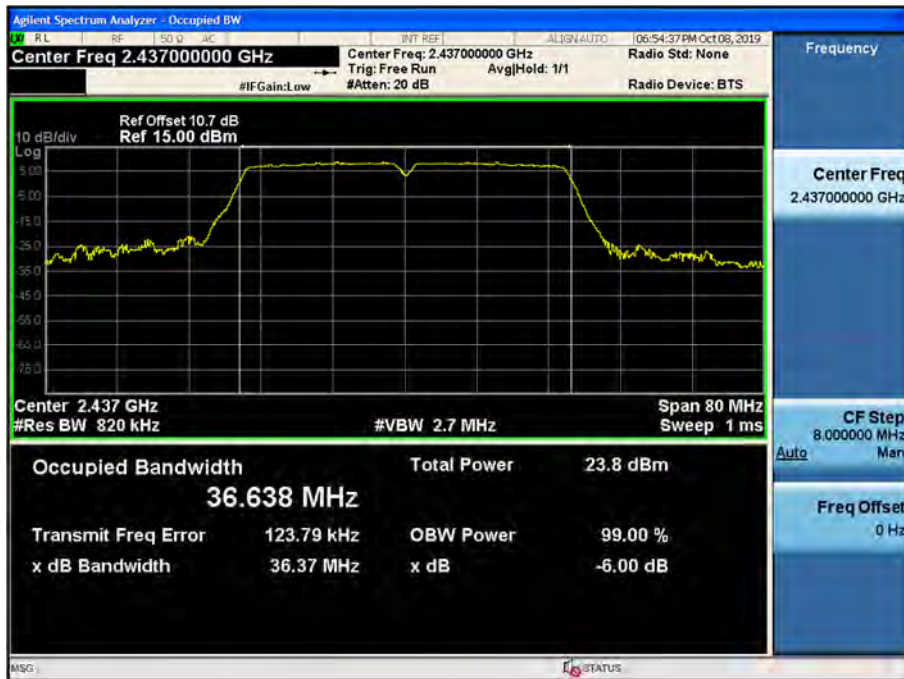




99% Bandwidth plot (802.11n\_HT20-CH 1)



99% Bandwidth plot (802.11n\_HT40-CH 6)

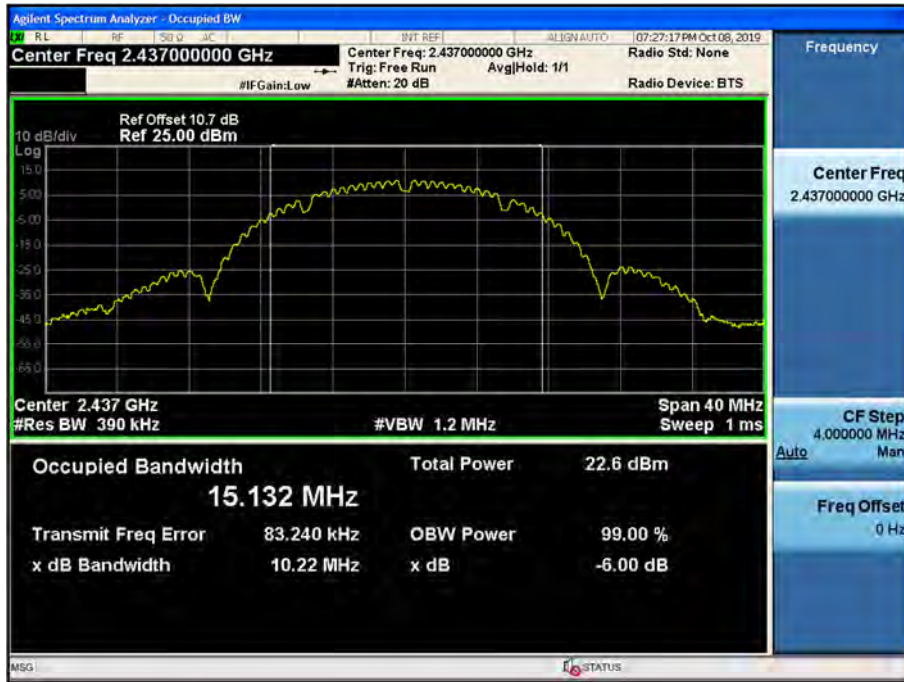


**Note:**

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

▣ Test Plots\_[ANT2]

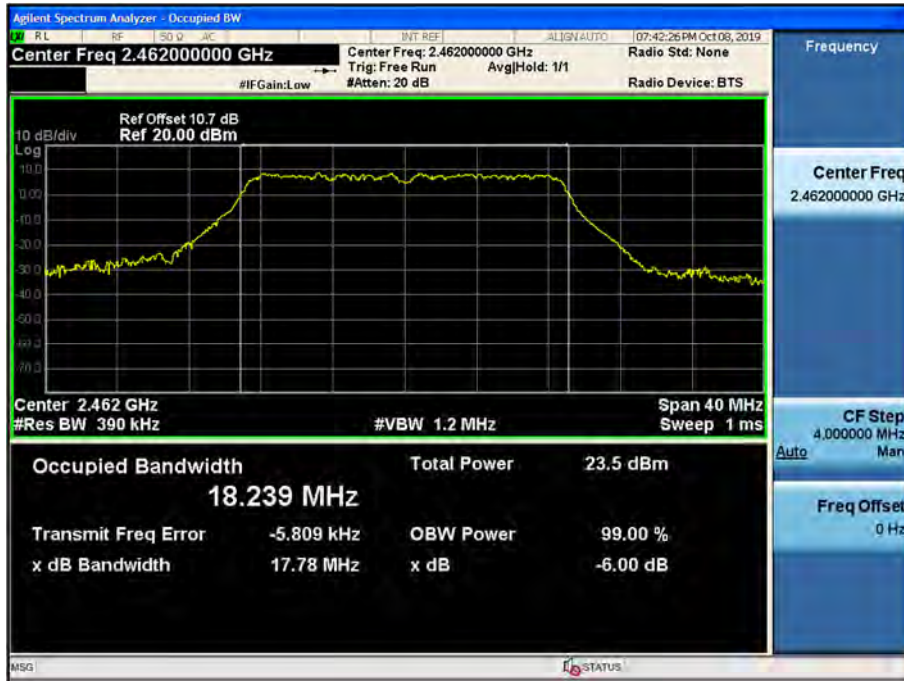
99% Bandwidth plot (802.11b-CH 6)



99% Bandwidth plot (802.11g-CH 11)



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, 10.7 dB is offset for 2.4 GHz Band

#### [ANT1]

802.11b Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	19.97	30	40
2437	6	20.88		42
2462	11	19.91		40

802.11g Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	25.01	30	45
2437	6	25.39		46
2462	11	25.33		46

802.11n(HT20) Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	24.70	30	45
2437	6	25.12		46
2462	11	25.07		46

802.11n(HT40) BW Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2422	3	24.50	30	46
2437	6	25.18		48
2452	9	25.14		48

[ANT2]

802.11b Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	20.59	30	40
2437	6	21.74		42
2462	11	21.00		40

802.11g Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	25.65	30	45
2437	6	25.81		45
2462	11	25.75		45

802.11n(HT20) Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	25.40	30	45
2437	6	25.63		45
2462	11	25.44		44

802.11n(HT40) BW Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2422	3	24.95	30	45
2437	6	25.06		45
2452	9	25.16		45

**[MIMO]**

802.11b Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2412	1	17.20	17.10	20.16	30	36/36
2437	6	17.95	17.98	20.98		37/37
2462	11	17.34	17.79	20.58		36/36

802.11g Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2412	1	23.56	23.48	26.53	30	43/40
2437	6	24.81	24.28	27.56		46/43
2462	11	23.57	23.45	26.52		43/40

802.11n(HT20) Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2412	1	23.22	23.29	26.27	30	43/40
2437	6	24.22	24.70	27.48		46/43
2462	11	22.78	22.37	25.59		42/39

802.11n(HT40) Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2422	3	22.44	22.97	25.72	30	43/40
2437	6	23.52	23.90	26.72		46/43
2452	9	22.37	22.87	25.64		43/40

**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, 10.7 dB is offset for 2.4 GHz Band.
3. Test was performed with continuous Tx.

**[ANT1]**

802.11b Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	17.42	30	40
2437	6	18.22		42
2462	11	17.41		40

802.11g Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	15.75	30	45
2437	6	16.31		46
2462	11	16.23		46

802.11n(HT20) Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	15.70	30	45
2437	6	16.29		46
2462	11	16.22		46

802.11n(HT40) Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2422	3	15.19	30	46
2437	6	16.22		48
2452	9	16.17		48

**[ANT2]**

802.11b Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	18.25	30	40
2437	6	19.41		42
2462	11	18.72		40

802.11g Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	16.59	30	45
2437	6	16.96		45
2462	11	17.09		45

802.11n(HT20) Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2412	1	16.52	30	45
2437	6	16.90		45
2462	11	16.61		44

802.11n(HT40) Mode		Measured Power(dBm)	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.			
2422	3	15.55	30	45
2437	6	15.74		45
2452	9	15.93		45



## [MIMO]

802.11b Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2412	1	14.75	14.47	17.62	30	36/36
2437	6	15.20	15.37	18.30		37/37
2462	11	14.67	15.20	17.95		36/36

802.11g Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2412	1	13.52	12.93	16.25	30	43/40
2437	6	15.24	14.40	17.85		46/43
2462	11	13.50	13.33	16.43		43/40

802.11n(HT20) Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2412	1	13.51	13.41	16.47	30	43/40
2437	6	15.10	15.20	18.16		46/43
2462	11	13.10	13.41	16.27		42/39

802.11n(HT40) Mode		ANT1	ANT2	MIMO	Limit (dBm)	Power Level Setting
Frequency[MHz]	Channel No.	Measured Power(dBm)	Measured Power(dBm)	Measured Power(dBm)		
2422	3	12.40	12.42	15.42	30	43/40
2437	6	14.10	14.30	17.21		46/43
2452	9	12.38	12.68	15.54		43/40

## 9.4 POWER SPECTRAL DENSITY

[ANT1]

Mode	Frequency (MHz)	Channel No.	Test Result	
			Measured PSD (dBm)	Limit (dBm)
802.11b	2412	1	-12.194	8
	2437	6	-11.276	
	2462	11	-12.134	
802.11g	2412	1	-12.616	
	2437	6	-11.910	
	2462	11	-11.990	
802.11n(HT20)	2412	1	-12.139	
	2437	6	-11.293	
	2462	11	-11.600	
802.11n(HT40)	2422	3	-13.055	
	2437	6	-12.201	
	2452	9	-12.139	

[ANT2]

Mode	Frequency (MHz)	Channel No.	Test Result	
			Measured PSD (dBm)	Limit (dBm)
802.11b	2412	1	-11.648	8
	2437	6	-10.344	
	2462	11	-11.020	
802.11g	2412	1	-11.913	
	2437	6	-12.013	
	2462	11	-11.572	
802.11n(HT20)	2412	1	-11.943	
	2437	6	-11.507	
	2462	11	-11.410	
802.11n(HT40)	2422	3	-12.533	
	2437	6	-12.001	
	2452	9	-12.182	

**Note :**

1. Spectrum reading values are not plot data.

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

2. Spectrum offset = Attenuator loss + Cable loss

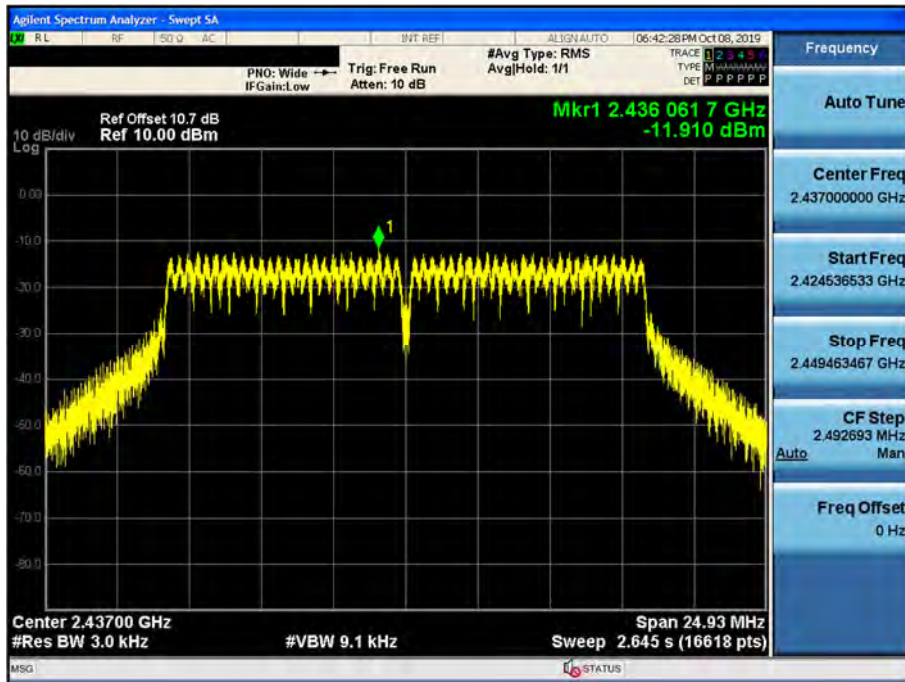
3. 10.7 dB is offset for 2.4 GHz Band.

▣ Test Plots [ANT1]

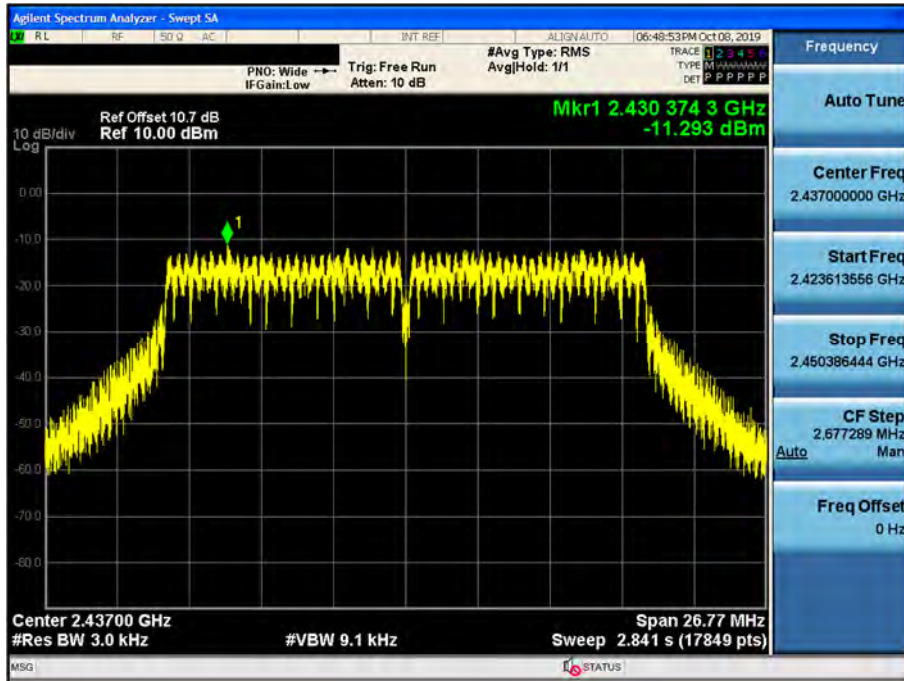
Power Spectral Density (802.11b-CH 6)



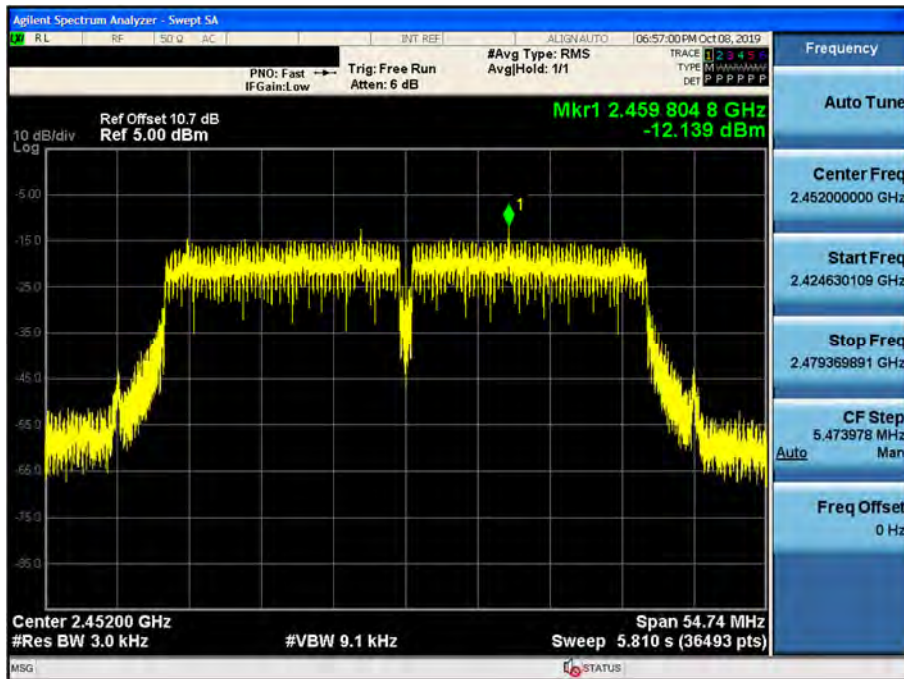
Power Spectral Density (802.11g-CH 6)



Power Spectral Density (802.11n\_HT20 - CH 6)



Power Spectral Density (802.11n\_HT40 - CH 9)

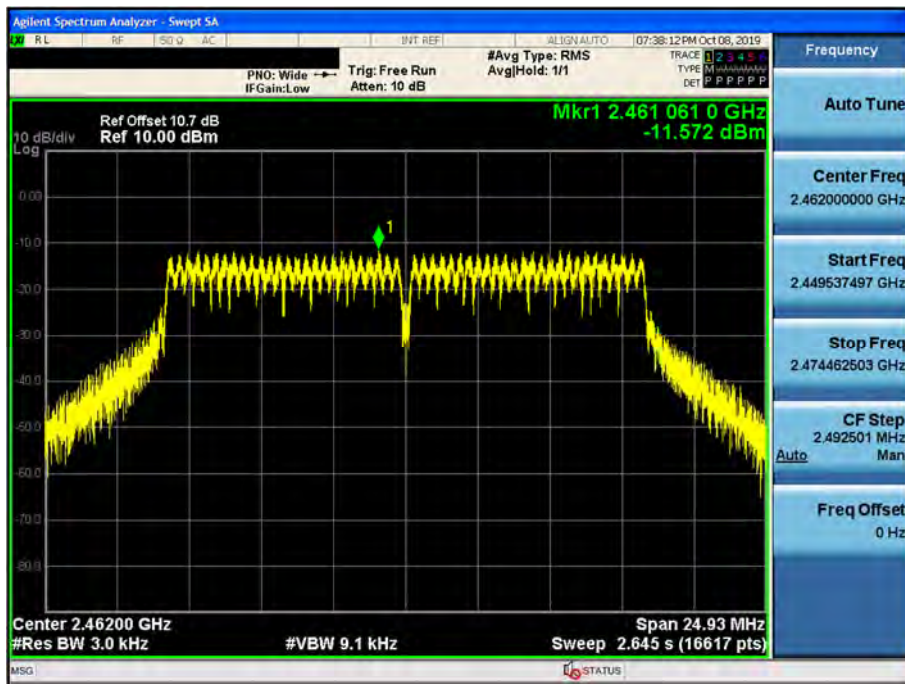


▣ Test Plots [ANT2]

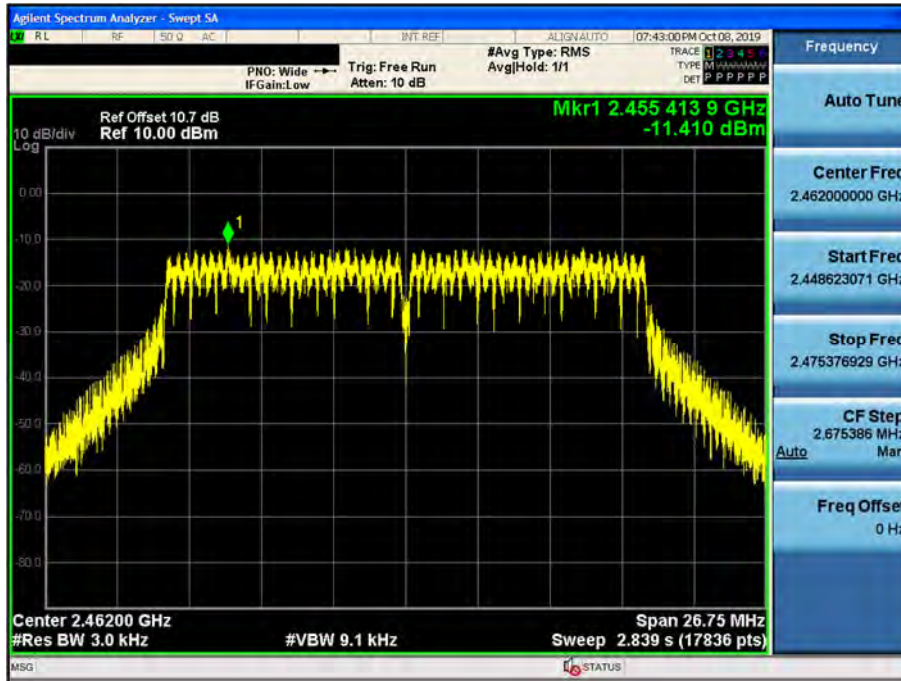
Power Spectral Density (802.11b-CH 6)



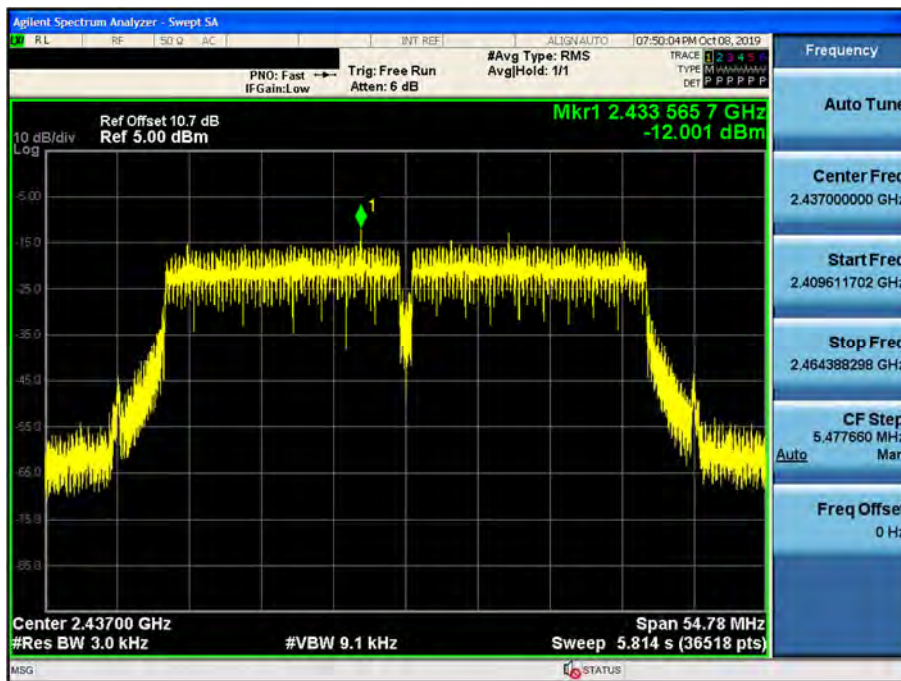
Power Spectral Density (802.11g-CH 11)



Power Spectral Density (802.11n\_HT20 -CH 11)



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.



[ANT1]

▣ Test Plots(BandEdge)

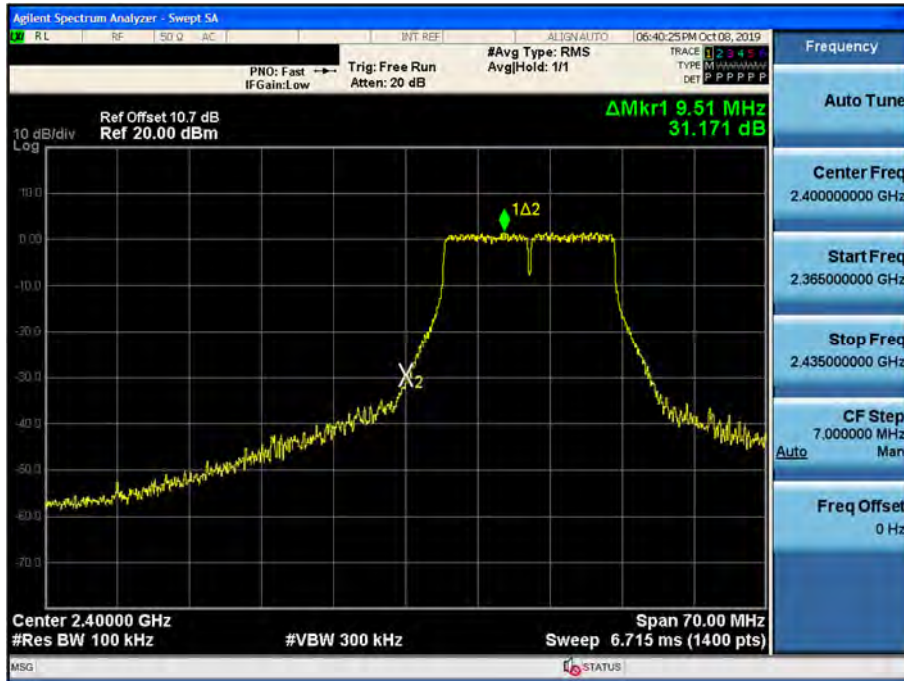
Band Edge (802.11b-CH1)



Band Edge (802.11b-CH11)



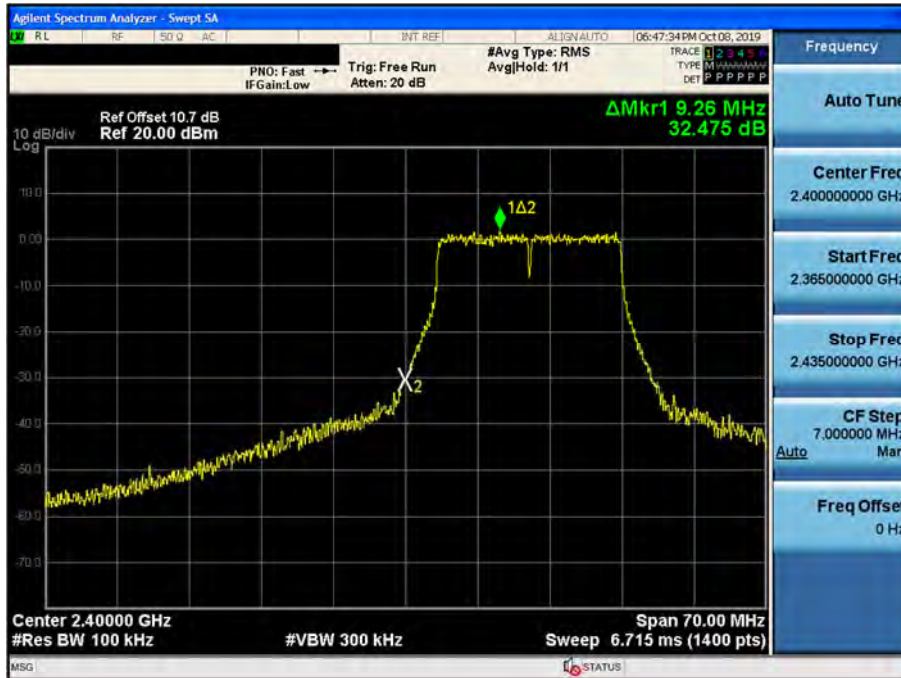
Band Edge (802.11g-CH1)



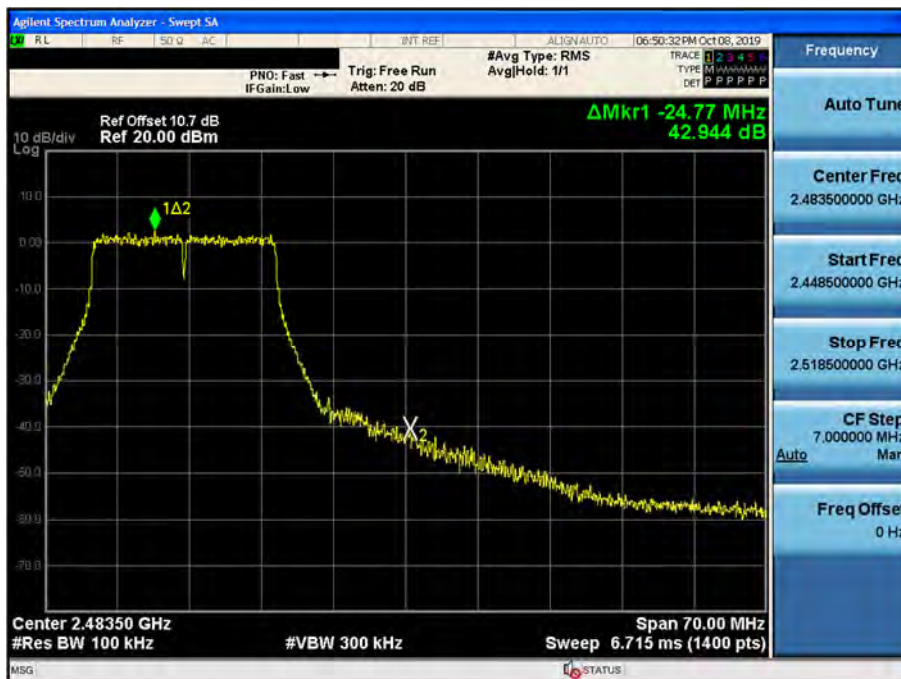
Band Edge (802.11g-CH11)



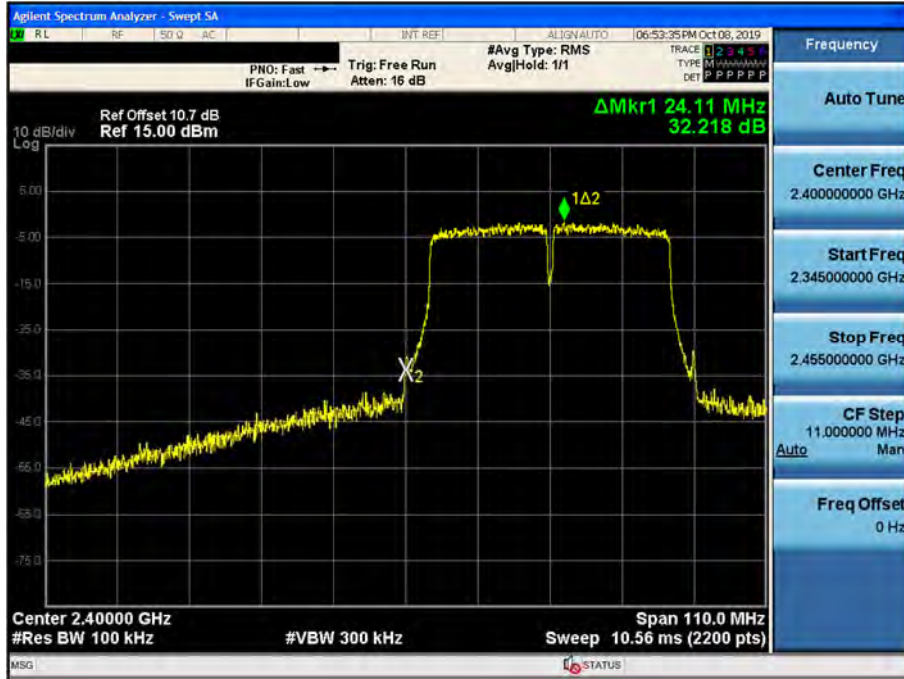
Band Edge (802.11n\_HT20 -CH1)



Band Edge (802.11n\_HT20 -CH11)



Band Edge (802.11n\_HT40 -CH3)



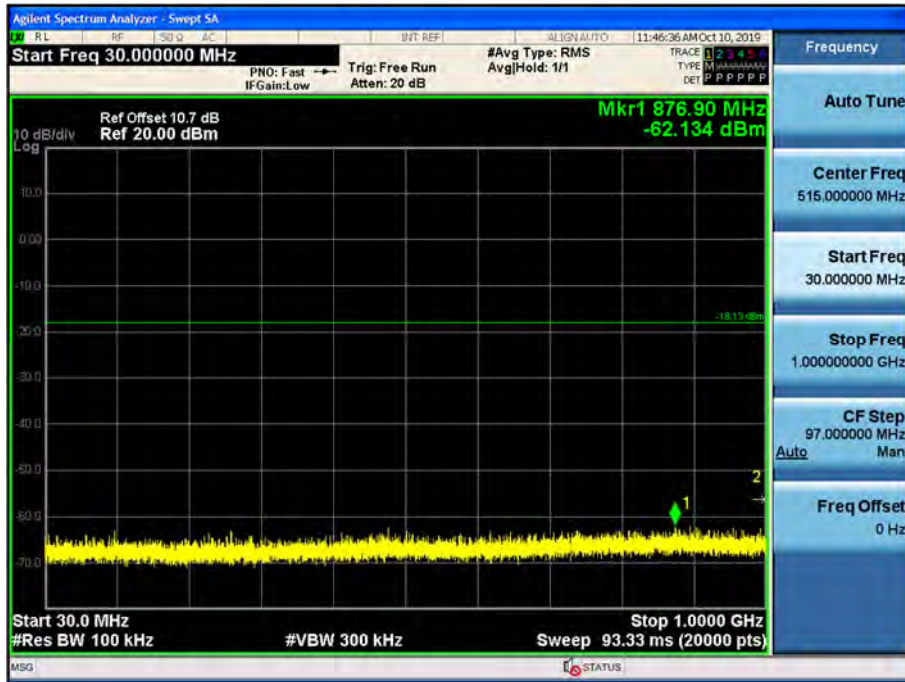
Band Edge (802.11n\_HT40 -CH9)



▣ Test Plots(Conducted Spurious Emission)

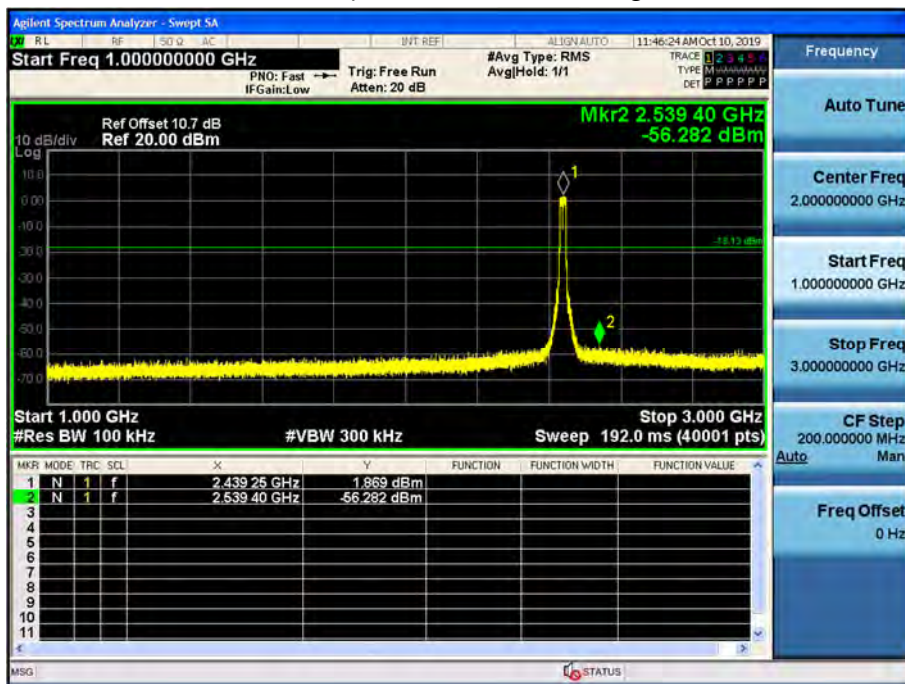
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



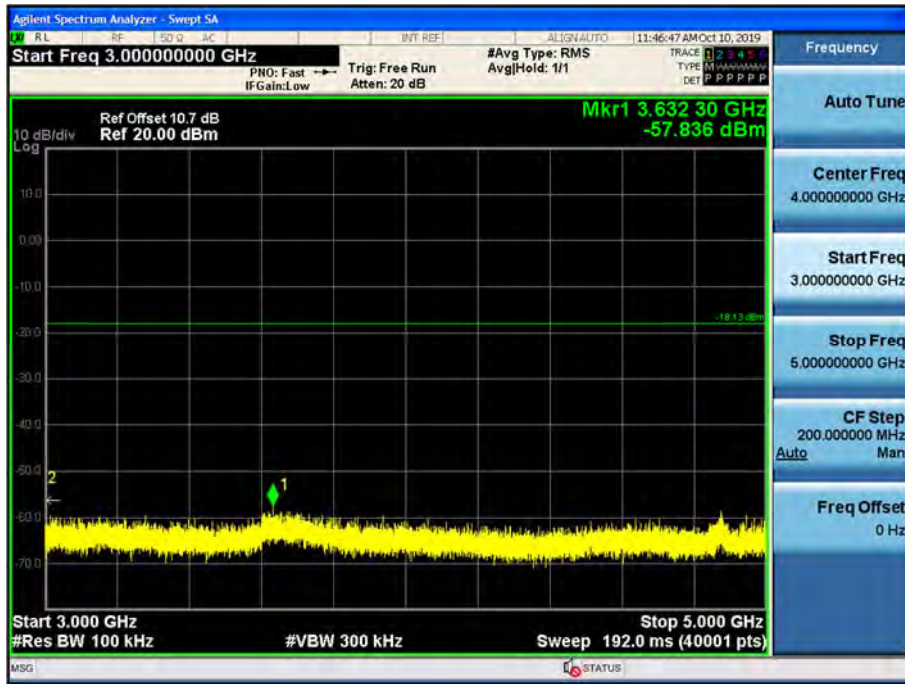
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



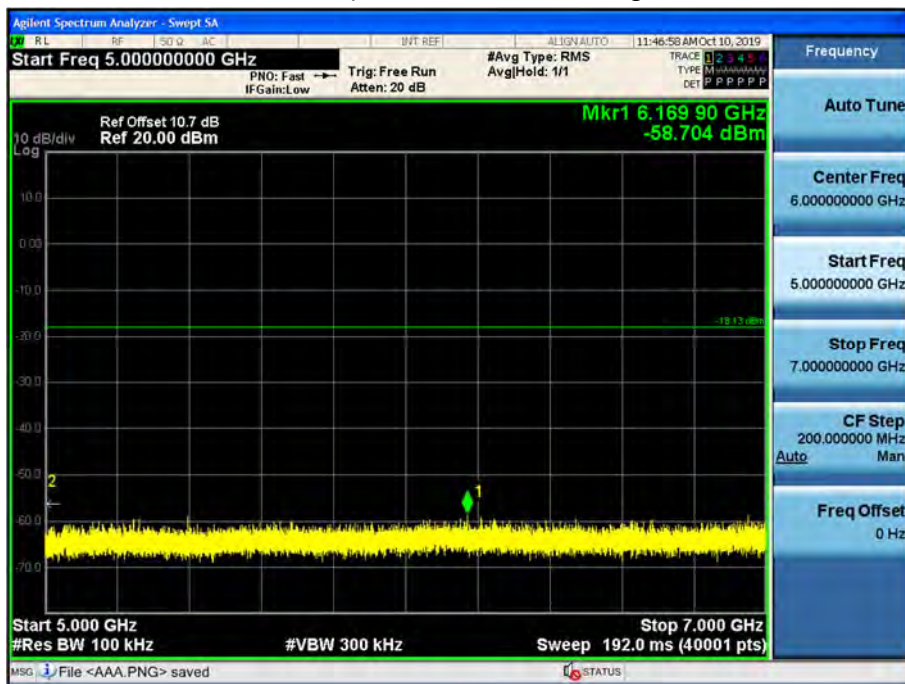
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



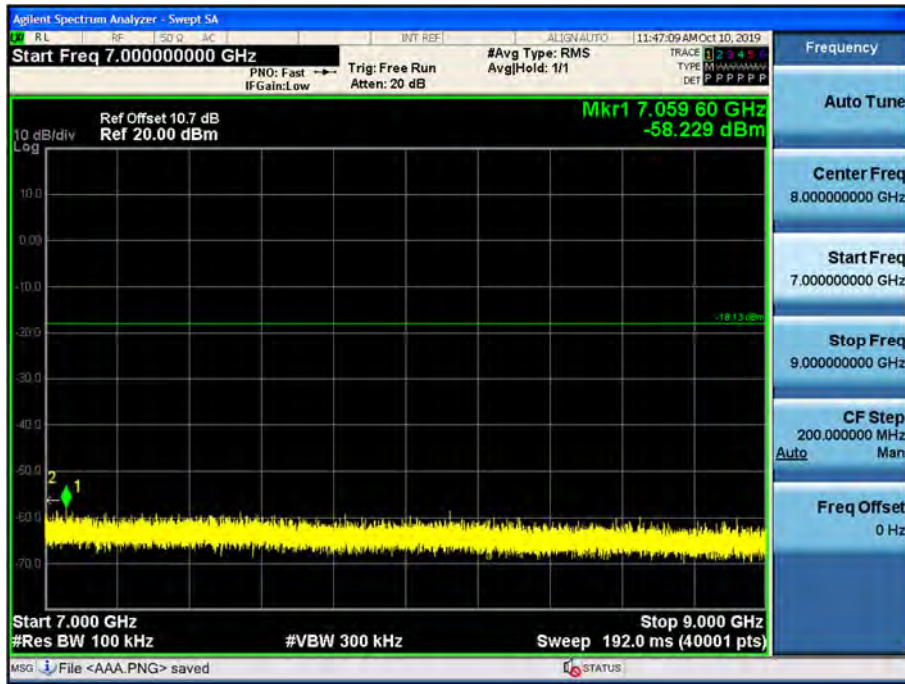
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



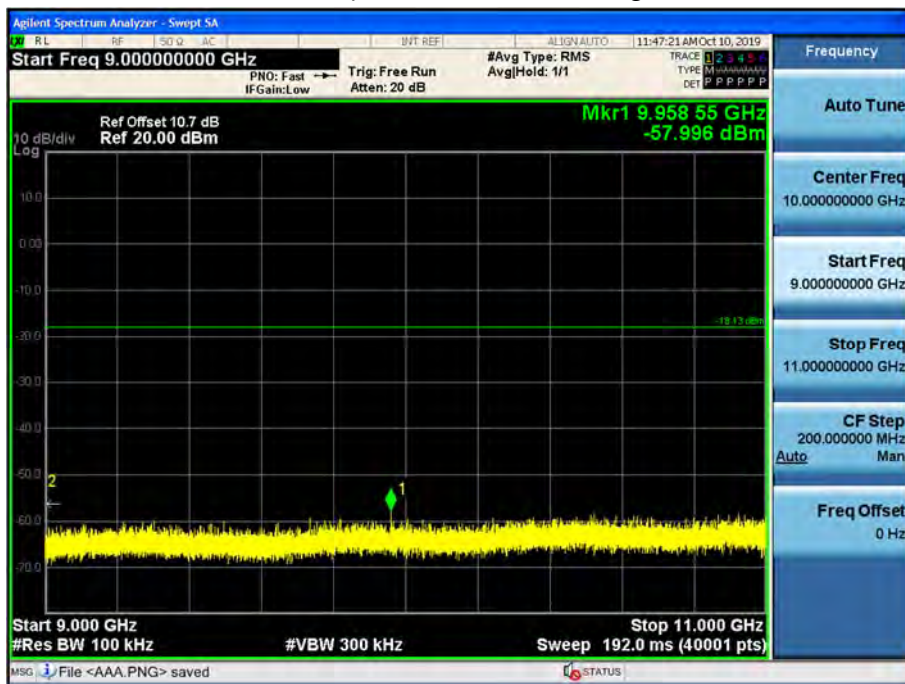
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



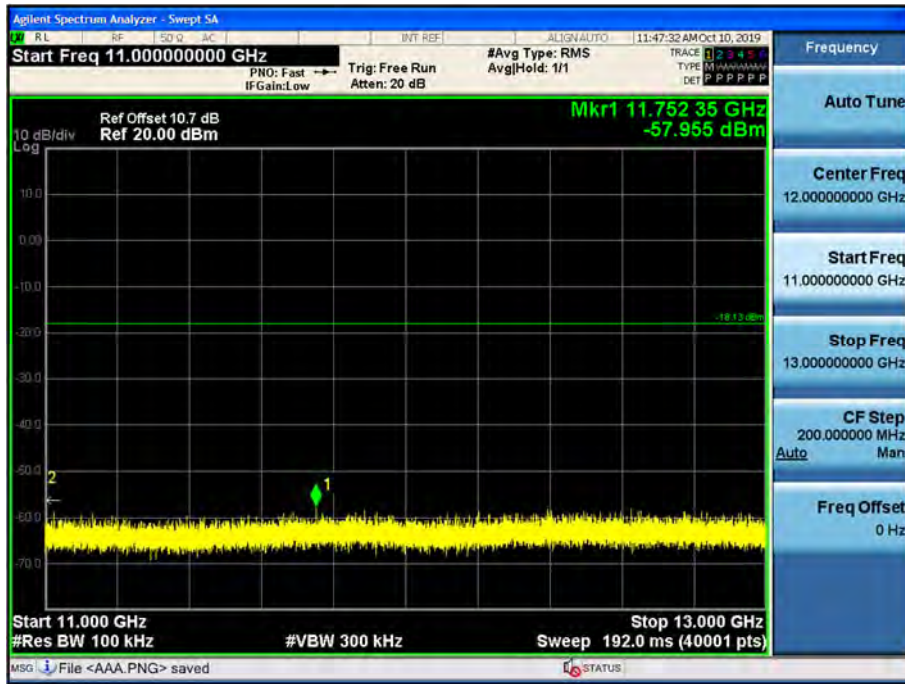
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



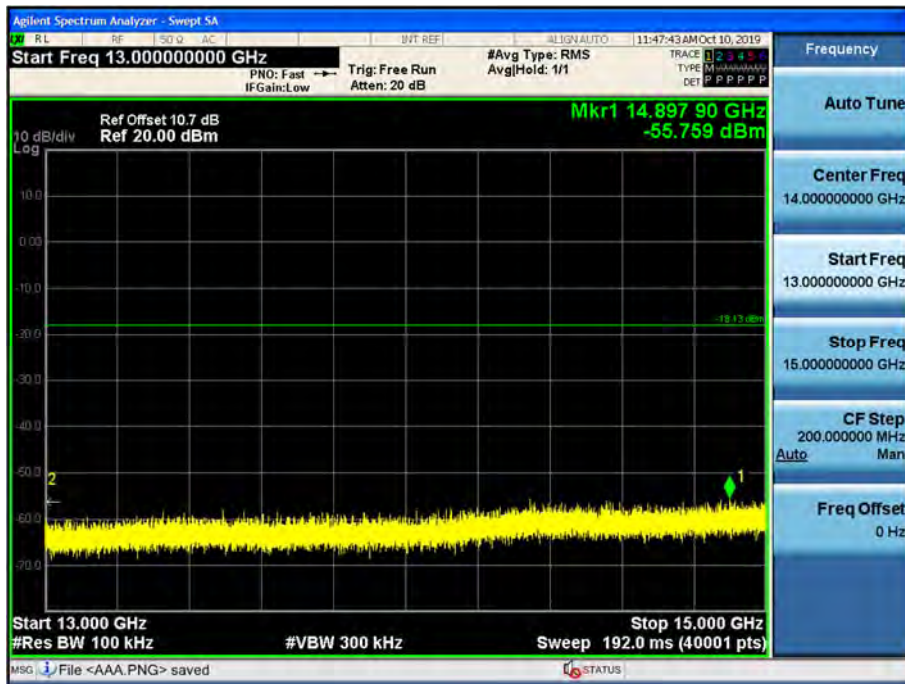
11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



13 GHz ~ 15 GHz

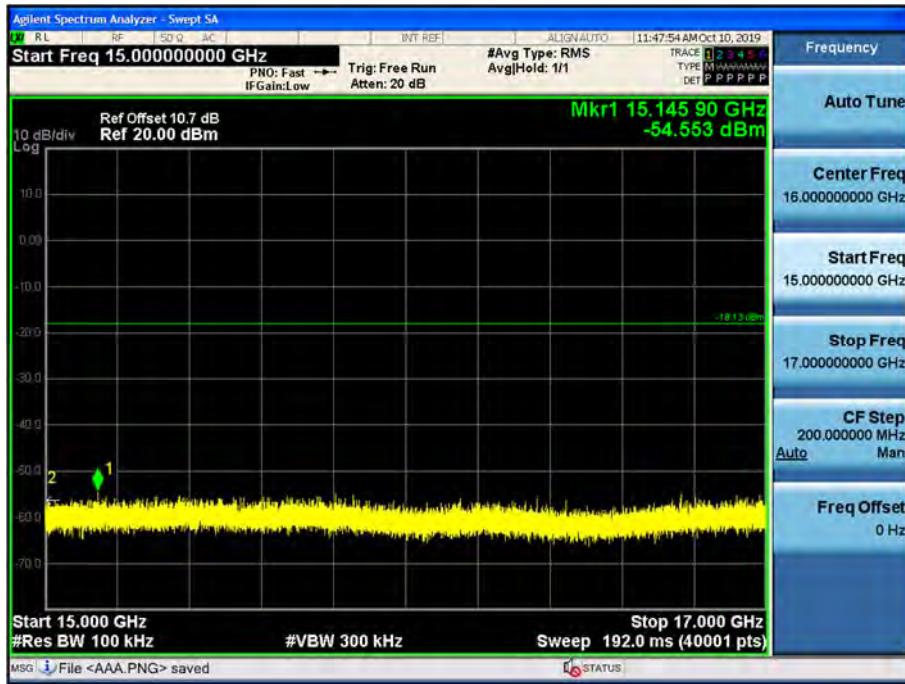
Conducted Spurious Emission (802.11g\_Ch.6)





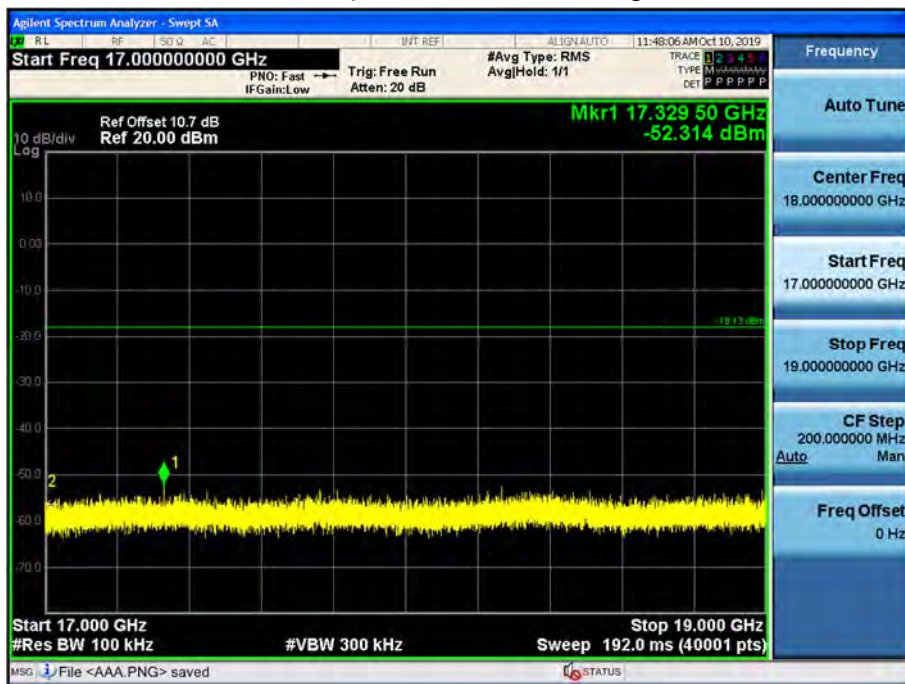
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



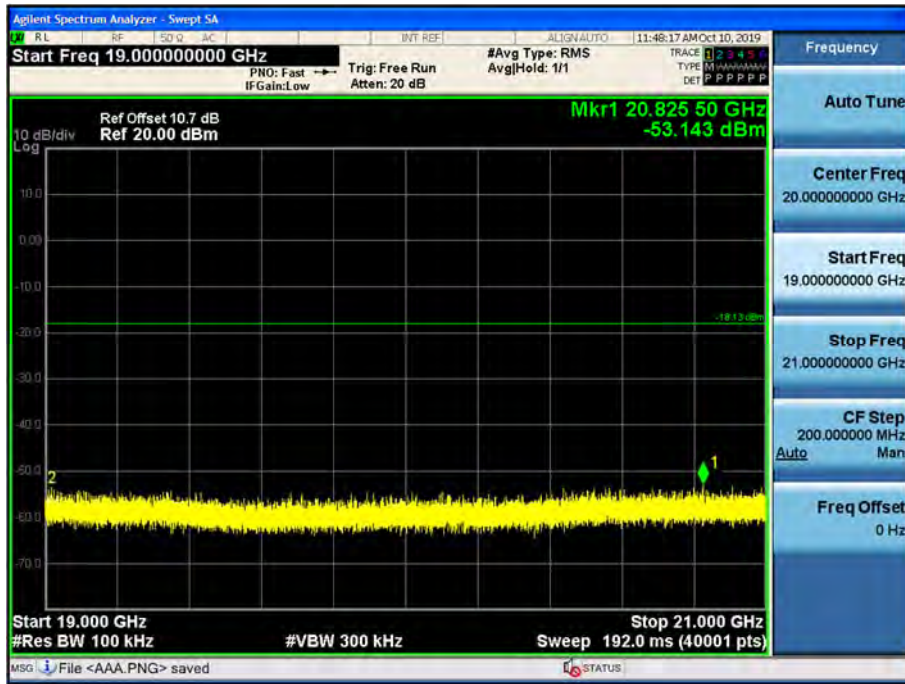
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



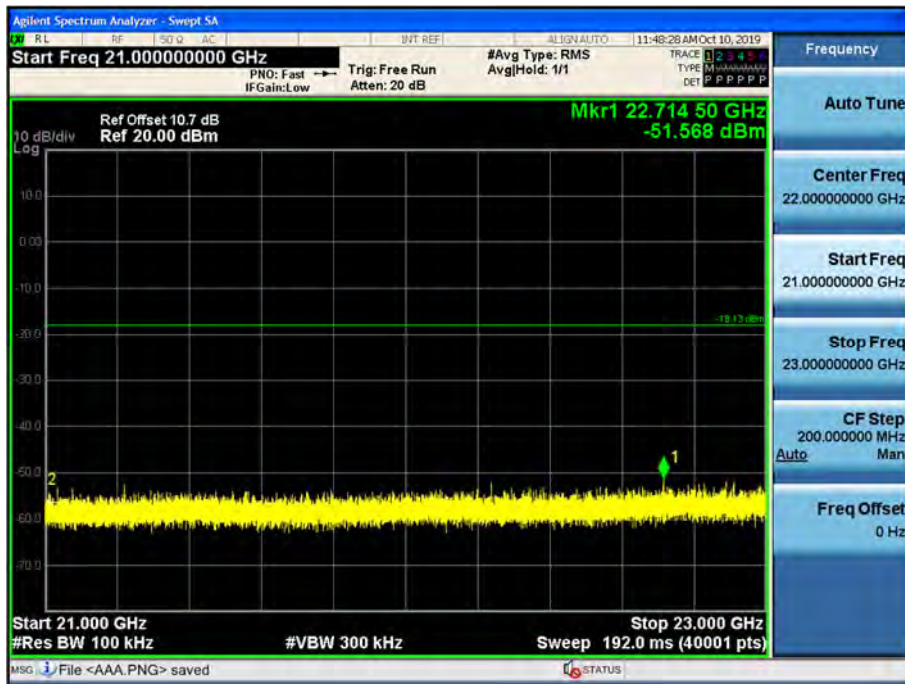
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



[ANT2]

☐ Test Plots(BandEdge)

Band Edge (802.11b-CH1)



Band Edge (802.11b-CH11)



Band Edge (802.11g-CH1)



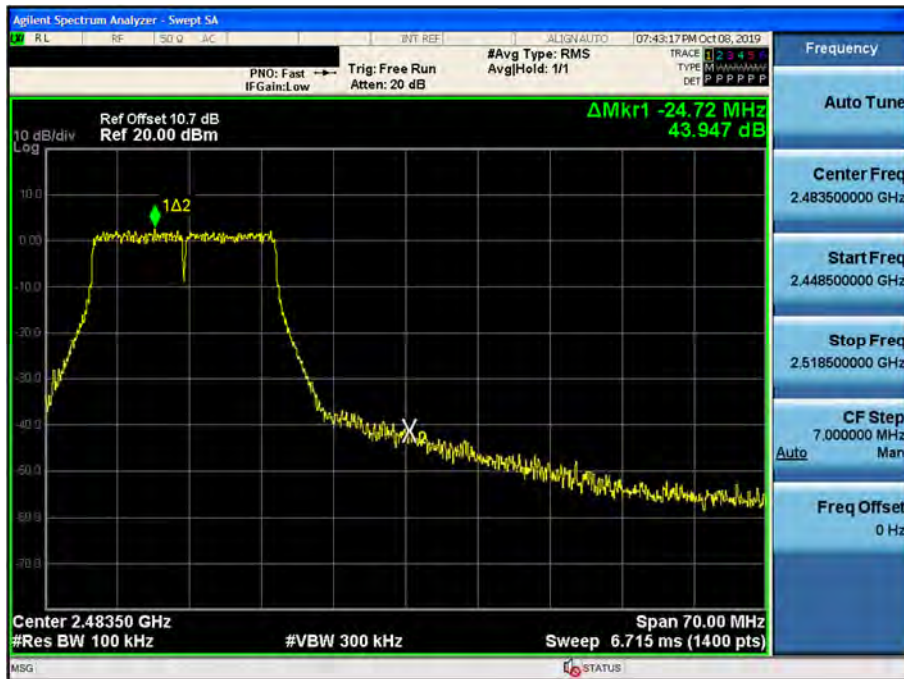
Band Edge (802.11g-CH11)



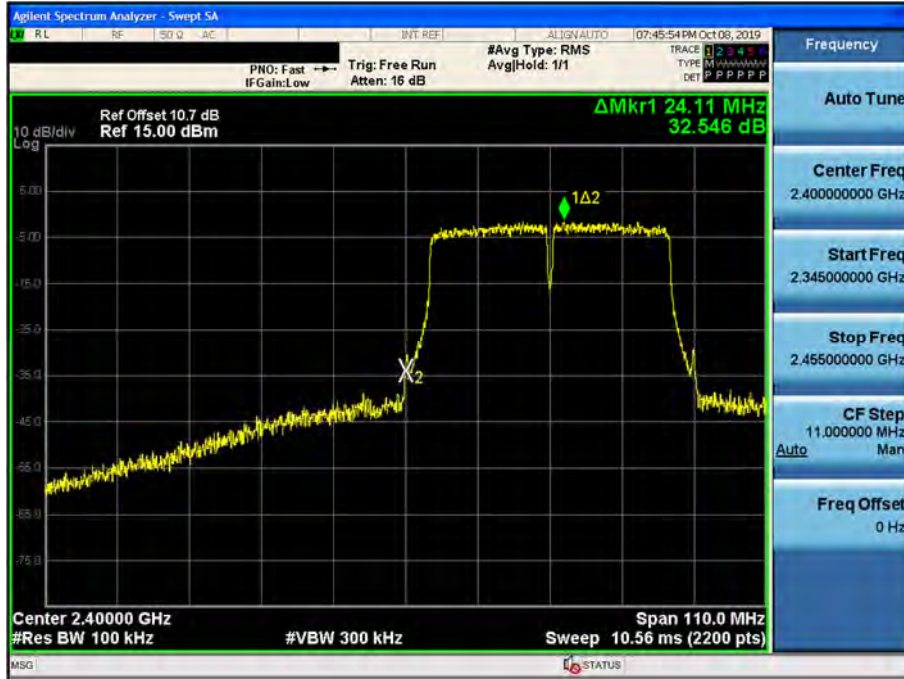
Band Edge (802.11n\_HT20 -CH1)



Band Edge (802.11n\_HT20 -CH11)



Band Edge (802.11n\_HT40 -CH3)



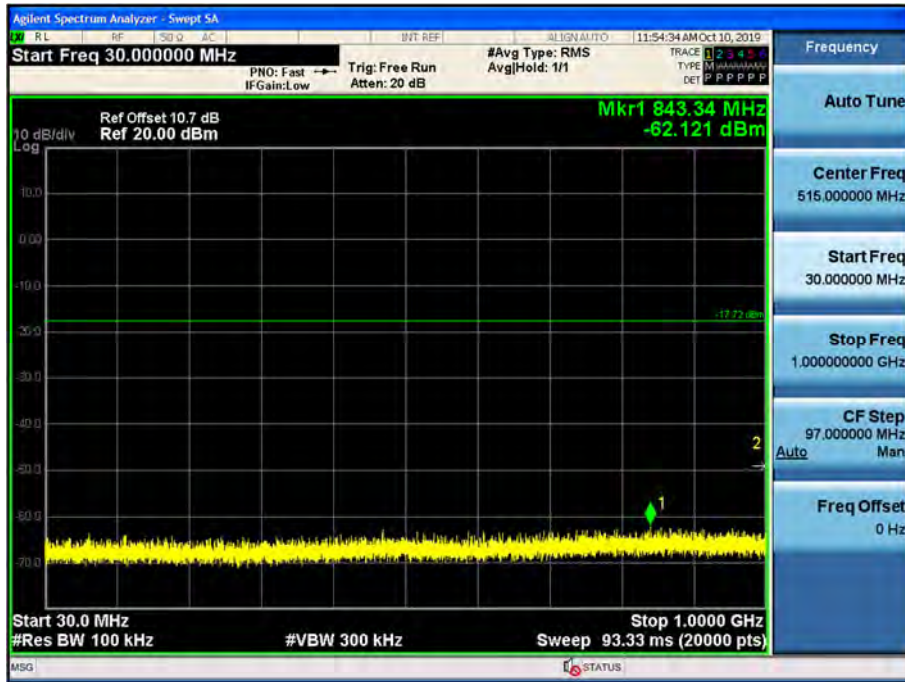
Band Edge (802.11n\_HT40 -CH9)



▣ Test Plots(Conducted Spurious Emission)

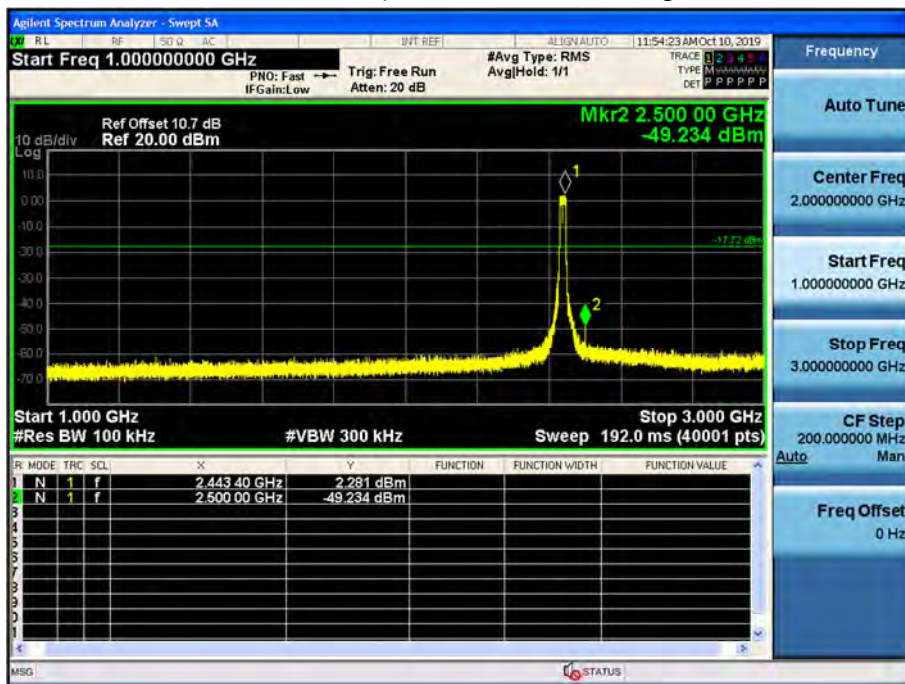
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



1 GHz ~ 3 GHz

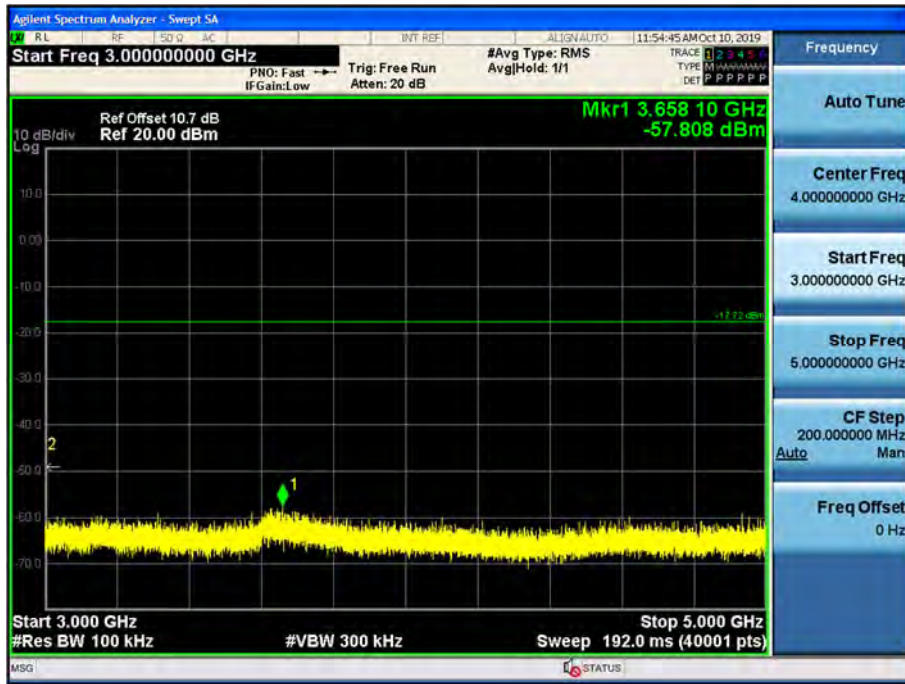
Conducted Spurious Emission (802.11g)





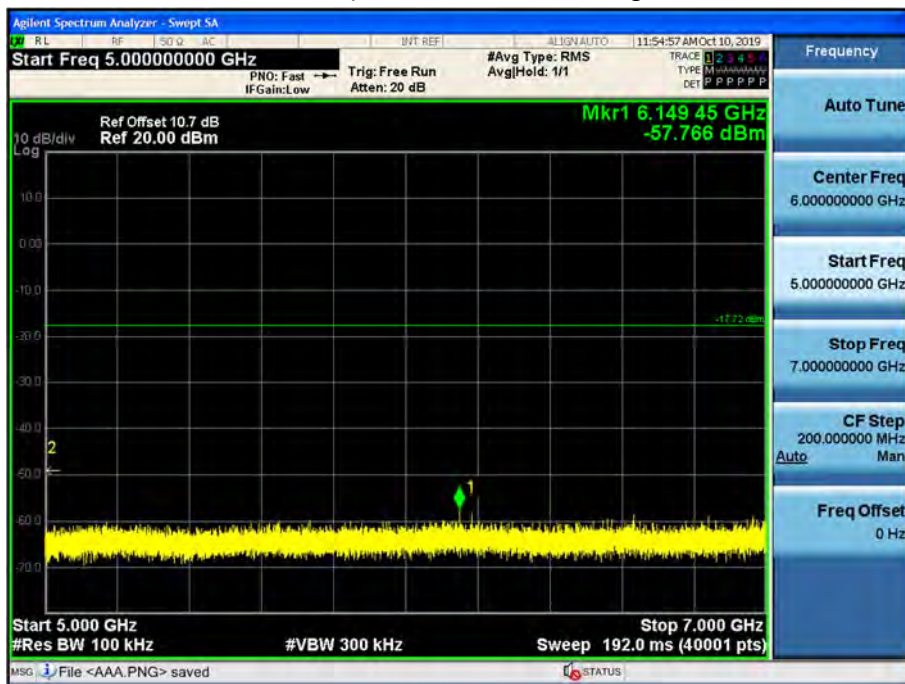
3 GHz ~ 5 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



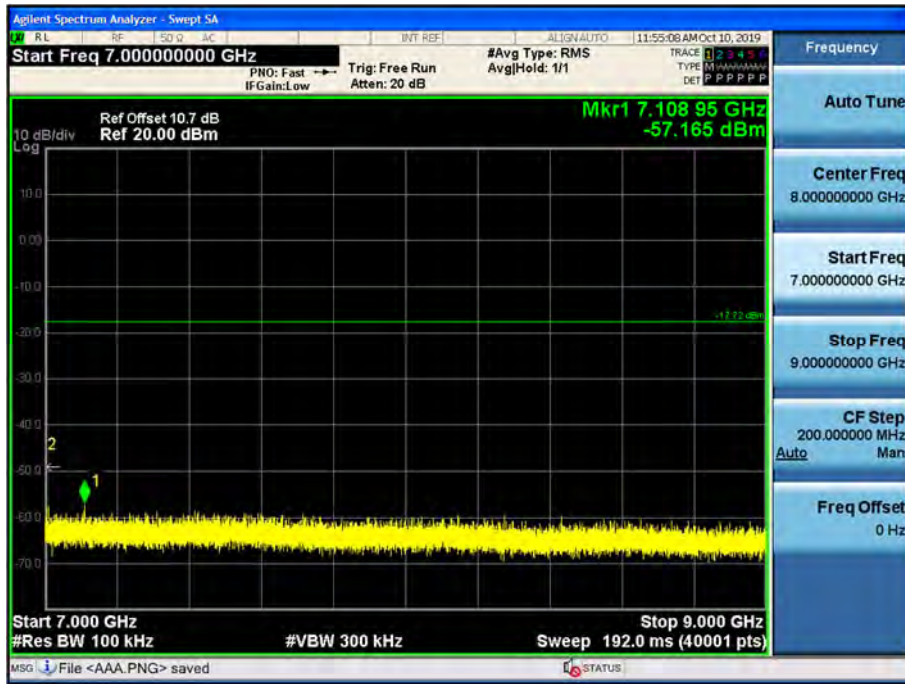
5 GHz ~ 7 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



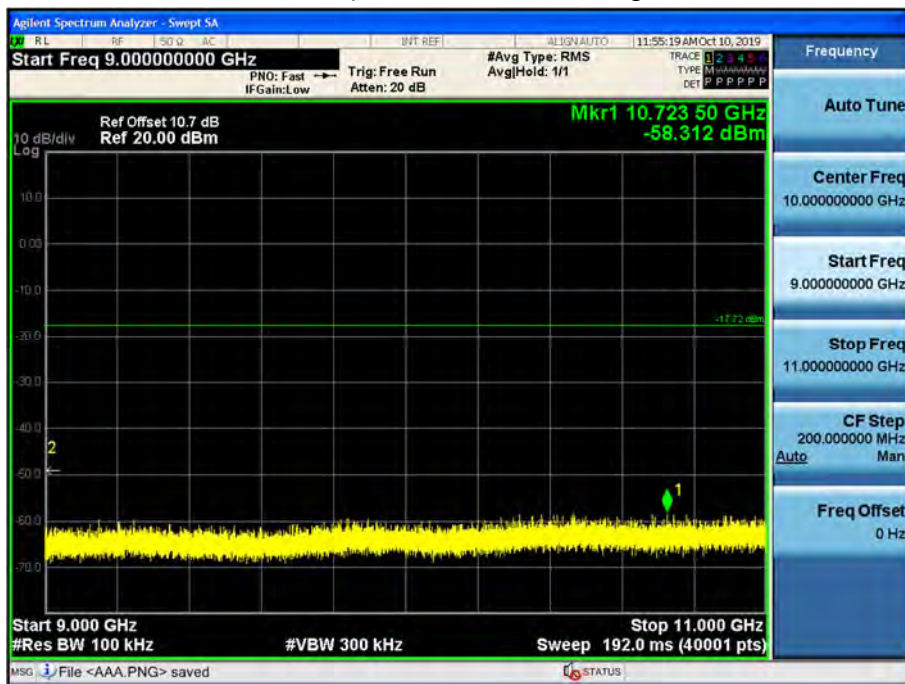
7 GHz ~ 9 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



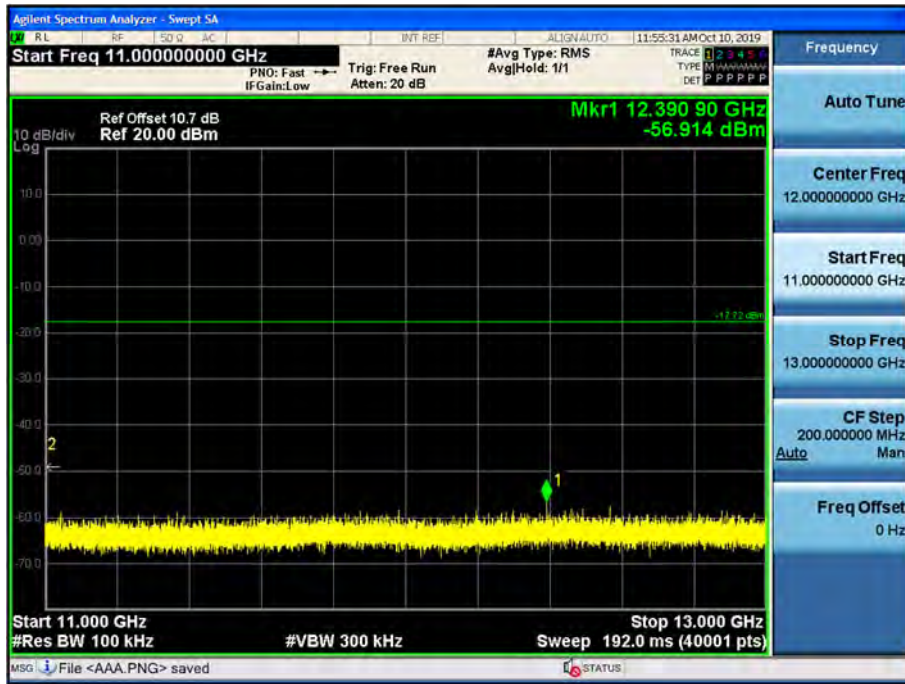
9 GHz ~ 11 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



11 GHz ~ 13 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



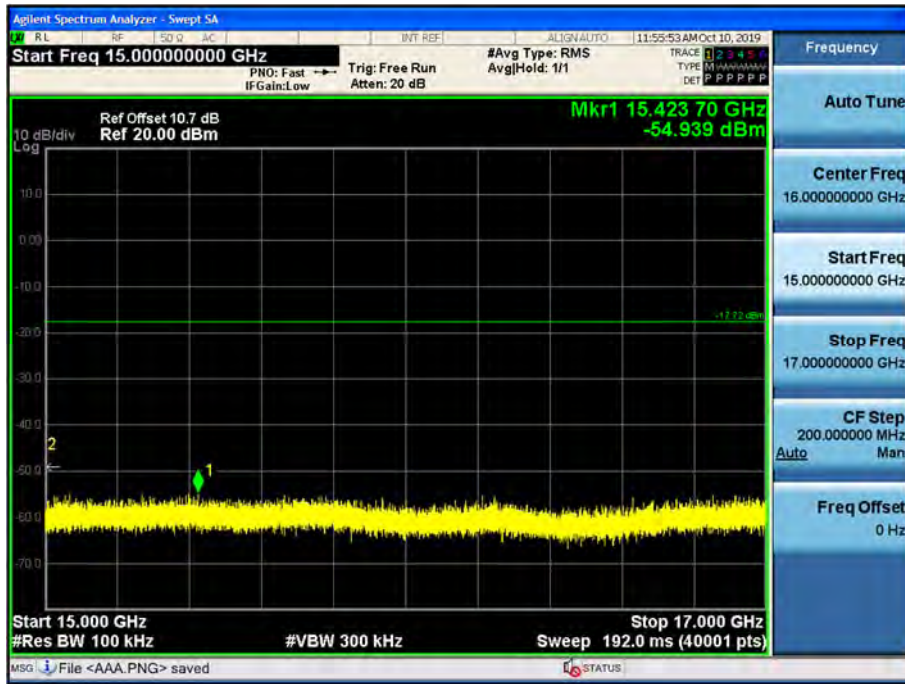
13 GHz ~ 15 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



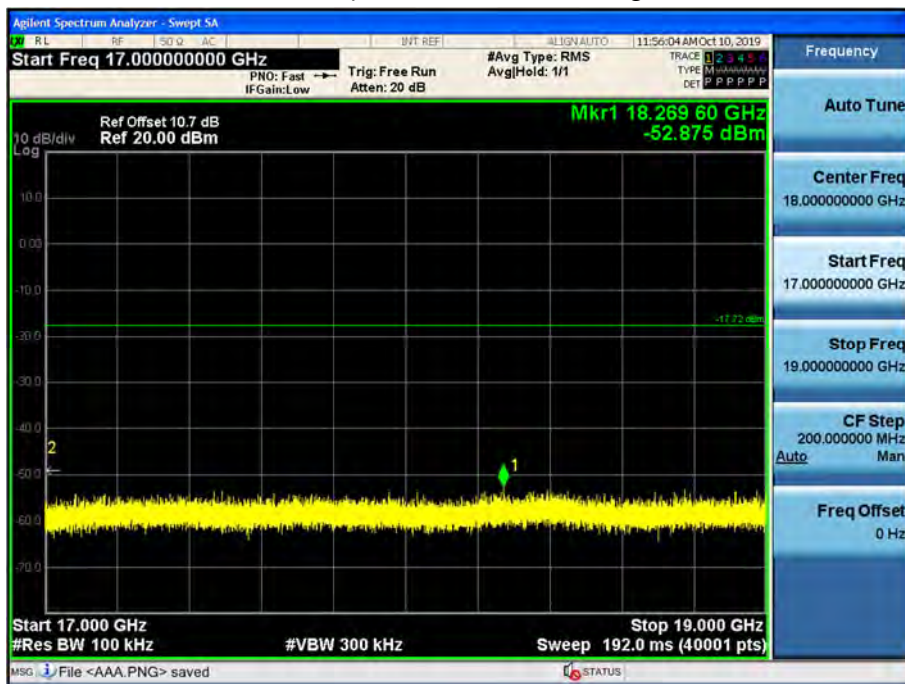
15 GHz ~ 17 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



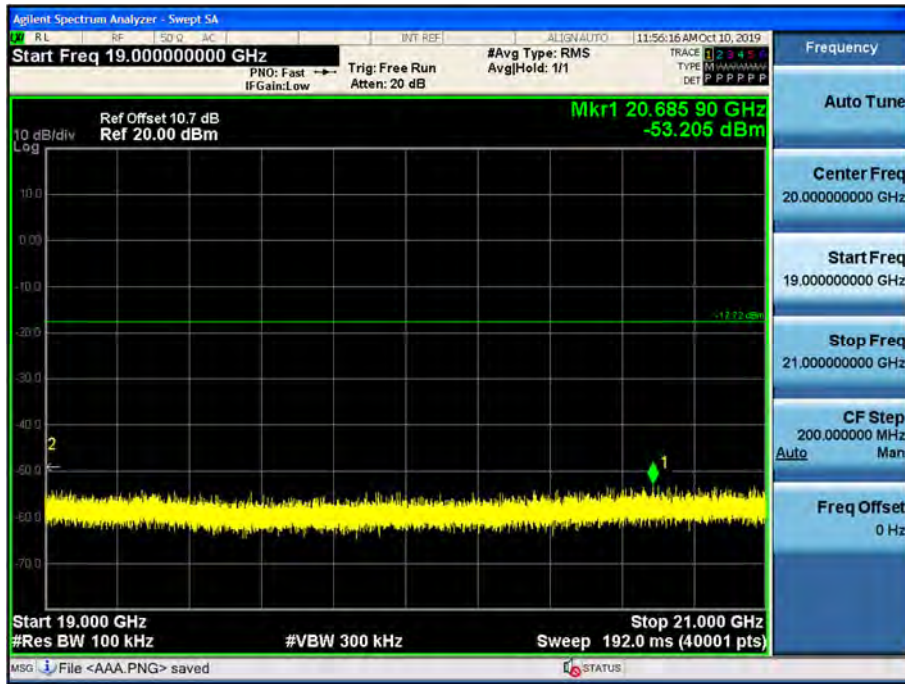
17 GHz ~ 19 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



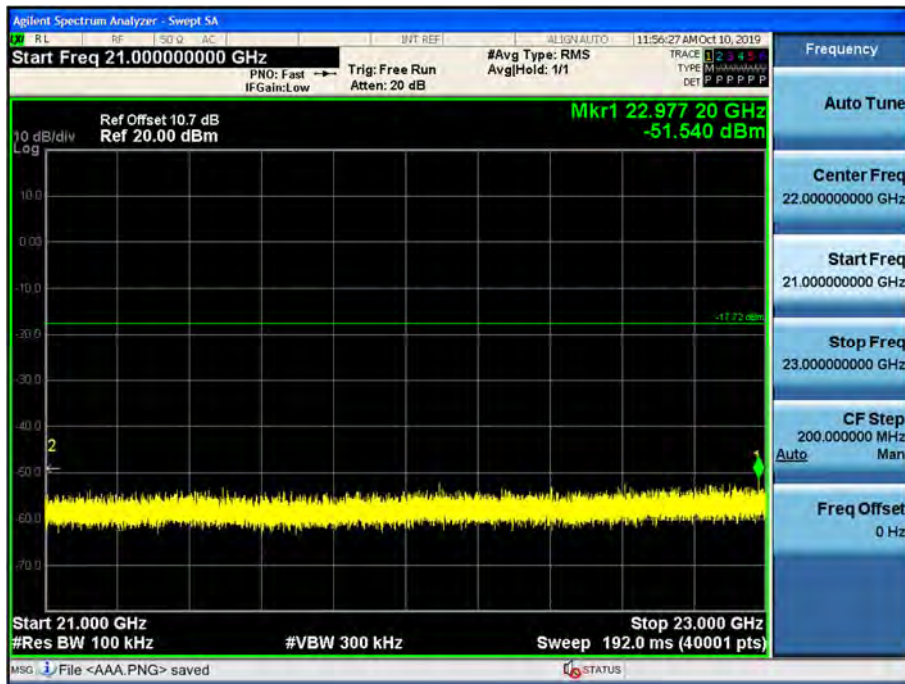
19 GHz ~ 21 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



21 GHz ~ 23 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



23 GHz ~ 25 GHz

Conducted Spurious Emission (802.11g\_Ch.6)



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 =  $40 \log(\text{specific distance} / \text{test distance})$  (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.

**[ANT1\_SISO]**
**Frequency Range : Above 1 GHz**

Operation Mode: 802.11b  
 Operating Frequency: 2412  
 Channel No.: 01 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	54.30	0.76	V	55.06	73.98	18.93	PK
4824	49.72	0.76	V	50.48	53.98	3.51	AV
7236	48.51	9.77	V	58.28	73.98	15.70	PK
7236	38.18	9.77	V	47.95	53.98	6.03	AV
4824	54.06	0.76	H	54.82	73.98	19.17	PK
4824	48.45	0.76	H	49.21	53.98	4.77	AV
7236	47.72	9.77	H	57.49	73.98	16.49	PK
7236	37.58	9.77	H	47.35	53.98	6.63	AV

Operation Mode: 802.11b  
 Operating Frequency: 2437  
 Channel No.: 06 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	53.69	0.97	V	54.66	73.98	19.33	PK
4874	48.75	0.97	V	49.72	53.98	4.26	AV
7311	49.68	9.26	V	58.94	73.98	15.04	PK
7311	40.77	9.26	V	50.03	53.98	3.95	AV
4874	52.89	0.97	H	53.86	73.98	20.13	PK
4874	48.11	0.97	H	49.08	53.98	4.90	AV
7311	49.34	9.26	H	58.60	73.98	15.38	PK
7311	40.08	9.26	H	49.34	53.98	4.64	AV



Operation Mode: 802.11b  
 Operating Frequency: 2462  
 Channel No.: 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	54.65	0.86	V	55.51	73.98	18.48	PK
4924	49.73	0.86	V	50.59	53.98	3.40	AV
7386	48.60	9.38	V	57.98	73.98	16.00	PK
7386	39.20	9.38	V	48.58	53.98	5.40	AV
4924	54.11	0.86	H	54.97	73.98	19.02	PK
4924	49.31	0.86	H	50.17	53.98	3.82	AV
7386	48.27	9.38	H	57.65	73.98	16.33	PK
7386	38.88	9.38	H	48.26	53.98	5.72	AV

Operation Mode: 802.11g  
 Operating Frequency: 2412  
 Channel No.: 01 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4824	52.55	0.76	V	53.31	73.98	20.68	PK
4824	40.04	0.76	V	40.80	53.98	13.19	AV
7236	50.16	9.77	V	59.93	73.98	14.05	PK
7236	36.33	9.77	V	46.10	53.98	7.88	AV
4824	51.89	0.76	H	52.65	73.98	21.34	PK
4824	39.95	0.76	H	40.71	53.98	13.28	AV
7236	48.86	9.77	H	58.63	73.98	15.35	PK
7236	36.25	9.77	H	46.02	53.98	7.96	AV

Operation Mode: 802.11g  
 Operating Frequency: 2437  
 Channel No.: 06 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4874	50.58	0.97	V	51.55	73.98	22.44	PK
4874	38.48	0.97	V	39.45	53.98	14.54	AV
7311	50.28	9.26	V	59.54	73.98	14.44	PK
7311	37.20	9.26	V	46.46	53.98	7.52	AV
4874	49.06	0.97	H	50.03	73.98	23.96	PK
4874	38.31	0.97	H	39.28	53.98	14.71	AV
7311	49.40	9.26	H	58.66	73.98	15.32	PK
7311	37.03	9.26	H	46.29	53.98	7.69	AV

Operation Mode: 802.11g  
 Operating Frequency: 2462  
 Channel No.: 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4924	53.14	0.86	V	54.00	73.98	19.99	PK
4924	40.01	0.86	V	40.87	53.98	13.12	AV
7386	49.76	9.38	V	59.14	73.98	14.84	PK
7386	36.97	9.38	V	46.35	53.98	7.63	AV
4924	52.43	0.86	H	53.29	73.98	20.70	PK
4924	39.82	0.86	H	40.68	53.98	13.31	AV
7386	48.89	9.38	H	58.27	73.98	15.71	PK
7386	36.84	9.38	H	46.22	53.98	7.76	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4824	52.20	0.76	V	52.96	73.98	21.03	PK
4824	39.83	0.76	V	40.59	53.98	13.40	AV
7236	49.95	9.77	V	59.72	73.98	14.26	PK
7236	36.31	9.77	V	46.08	53.98	7.90	AV
4824	52.11	0.76	H	52.87	73.98	21.12	PK
4824	39.58	0.76	H	40.34	53.98	13.65	AV
7236	48.54	9.77	H	58.31	73.98	15.67	PK
7236	36.20	9.77	H	45.97	53.98	8.01	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4874	49.94	0.97	V	50.91	73.98	23.08	PK
4874	38.42	0.97	V	39.39	53.98	14.60	AV
7311	50.18	9.26	V	59.44	73.98	14.54	PK
7311	37.14	9.26	V	46.40	53.98	7.58	AV
4874	48.85	0.97	H	49.82	73.98	24.17	PK
4874	38.28	0.97	H	39.25	53.98	14.74	AV
7311	49.12	9.26	H	58.38	73.98	15.60	PK
7311	37.08	9.26	H	46.34	53.98	7.64	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4924	53.01	0.86	V	53.87	73.98	20.12	PK
4924	39.99	0.86	V	40.85	53.98	13.14	AV
7386	49.11	9.38	V	58.49	73.98	15.49	PK
7386	36.95	9.38	V	46.33	53.98	7.65	AV
4924	52.75	0.86	H	53.61	73.98	20.38	PK
4924	39.85	0.86	H	40.71	53.98	13.28	AV
7386	48.74	9.38	H	58.12	73.98	15.86	PK
7386	36.89	9.38	H	46.27	53.98	7.71	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4844	50.20	0.94	V	51.14	73.98	22.85	PK
4844	38.71	0.94	V	39.65	53.98	14.34	AV
7266	46.98	9.48	V	56.46	73.98	17.53	PK
7266	34.85	9.48	V	44.33	53.98	9.65	AV
4844	50.05	0.94	H	50.99	73.98	23.00	PK
4844	38.56	0.94	H	39.50	53.98	14.49	AV
7266	46.25	9.48	H	55.73	73.98	18.26	PK
7266	34.71	9.48	H	44.19	53.98	9.79	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4874	49.12	0.97	V	50.09	73.98	23.90	PK
4874	37.30	0.97	V	38.27	53.98	15.72	AV
7311	47.87	9.26	V	57.13	73.98	16.85	PK
7311	35.76	9.26	V	45.02	53.98	8.96	AV
4874	48.30	0.97	H	49.27	73.98	24.72	PK
4874	37.25	0.97	H	38.22	53.98	15.77	AV
7311	47.15	9.26	H	56.41	73.98	17.57	PK
7311	35.53	9.26	H	44.79	53.98	9.19	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4904	49.54	0.90	V	50.44	73.98	23.55	PK
4904	37.70	0.90	V	38.60	53.98	15.39	AV
7356	47.47	9.30	V	56.77	73.98	17.21	PK
7356	35.68	9.30	V	44.98	53.98	9.00	AV
4904	48.72	0.90	H	49.62	73.98	24.37	PK
4904	37.59	0.90	H	38.49	53.98	15.50	AV
7356	46.48	9.30	H	55.78	73.98	18.20	PK
7356	35.53	9.30	H	44.83	53.98	9.15	AV

**[ANT2\_SISO]**
**Frequency Range : Above 1 GHz**

Operation Mode: 802.11b  
 Operating Frequency: 2412  
 Channel No.: 01 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	50.45	0.76	V	51.21	73.98	22.78	PK
4824	41.96	0.76	V	42.72	53.98	11.27	AV
7236	46.48	9.77	V	56.25	73.98	17.73	PK
7236	35.40	9.77	V	45.17	53.98	8.81	AV
4824	51.08	0.76	H	51.84	73.98	22.15	PK
4824	41.98	0.76	H	42.74	53.98	11.25	AV
7236	46.35	9.77	H	56.12	73.98	17.86	PK
7236	35.12	9.77	H	44.89	53.98	9.09	AV

Operation Mode: 802.11b  
 Operating Frequency: 2437  
 Channel No.: 06 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	48.54	0.97	V	49.51	73.98	24.48	PK
4874	39.88	0.97	V	40.85	53.98	13.14	AV
7311	47.94	9.26	V	57.20	73.98	16.78	PK
7311	36.56	9.26	V	45.82	53.98	8.16	AV
4874	49.10	0.97	H	50.07	73.98	23.92	PK
4874	40.10	0.97	H	41.07	53.98	12.92	AV
7311	46.88	9.26	H	56.14	73.98	17.84	PK
7311	36.40	9.26	H	45.66	53.98	8.32	AV



Operation Mode: 802.11b  
 Operating Frequency: 2462  
 Channel No.: 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	49.15	0.86	V	50.01	73.98	23.98	PK
4924	40.73	0.86	V	41.59	53.98	12.40	AV
7386	47.02	9.38	V	56.40	73.98	17.58	PK
7386	35.60	9.38	V	44.98	53.98	9.00	AV
4924	49.31	0.86	H	50.17	73.98	23.82	PK
4924	40.90	0.86	H	41.76	53.98	12.23	AV
7386	46.22	9.38	H	55.60	73.98	18.38	PK
7386	35.48	9.38	H	44.86	53.98	9.12	AV

Operation Mode: 802.11g  
 Operating Frequency: 2412  
 Channel No.: 01 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4824	49.02	0.76	V	49.78	73.98	24.21	PK
4824	37.88	0.76	V	38.64	53.98	15.35	AV
7236	45.89	9.77	V	55.66	73.98	18.32	PK
7236	34.51	9.77	V	44.28	53.98	9.70	AV
4824	49.33	0.76	H	50.09	73.98	23.90	PK
4824	37.96	0.76	H	38.72	53.98	15.27	AV
7236	45.55	9.77	H	55.32	73.98	18.66	PK
7236	34.48	9.77	H	44.25	53.98	9.73	AV

Operation Mode: 802.11g  
 Operating Frequency: 2437  
 Channel No.: 06 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4874	48.04	0.97	V	49.01	73.98	24.98	PK
4874	36.40	0.97	V	37.37	53.98	16.62	AV
7311	46.83	9.26	V	56.09	73.98	17.89	PK
7311	34.80	9.26	V	44.06	53.98	9.92	AV
4874	48.67	0.97	H	49.64	73.98	24.35	PK
4874	36.55	0.97	H	37.52	53.98	16.47	AV
7311	45.99	9.26	H	55.25	73.98	18.73	PK
7311	34.75	9.26	H	44.01	53.98	9.97	AV

Operation Mode: 802.11g  
 Operating Frequency 2462  
 Channel No. 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4924	48.96	0.86	V	49.82	73.98	24.17	PK
4924	37.21	0.86	V	38.07	53.98	15.92	AV
7386	46.28	9.38	V	55.66	73.98	18.32	PK
7386	34.67	9.38	V	44.05	53.98	9.93	AV
4924	49.50	0.86	H	50.36	73.98	23.63	PK
4924	37.30	0.86	H	38.16	53.98	15.83	AV
7386	46.21	9.38	H	55.59	73.98	18.39	PK
7386	34.50	9.38	H	43.88	53.98	10.10	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4824	48.58	0.76	V	49.34	73.98	24.65	PK
4824	37.91	0.76	V	38.67	53.98	15.32	AV
7236	45.55	9.77	V	55.32	73.98	18.66	PK
7236	34.44	9.77	V	44.21	53.98	9.77	AV
4824	48.91	0.76	H	49.67	73.98	24.32	PK
4824	37.85	0.76	H	38.61	53.98	15.38	AV
7236	46.18	9.77	H	55.95	73.98	18.03	PK
7236	34.59	9.77	H	44.36	53.98	9.62	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4874	48.61	0.97	V	49.58	73.98	24.41	PK
4874	36.38	0.97	V	37.35	53.98	16.64	AV
7311	46.59	9.26	V	55.85	73.98	18.13	PK
7311	34.85	9.26	V	44.11	53.98	9.87	AV
4874	48.51	0.97	H	49.48	73.98	24.51	PK
4874	36.60	0.97	H	37.57	53.98	16.42	AV
7311	46.12	9.26	H	55.38	73.98	18.60	PK
7311	34.78	9.26	H	44.04	53.98	9.94	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4924	48.61	0.86	V	49.47	73.98	24.52	PK
4924	37.29	0.86	V	38.15	53.98	15.84	AV
7386	46.33	9.38	V	55.71	73.98	18.27	PK
7386	34.60	9.38	V	43.98	53.98	10.00	AV
4924	49.44	0.86	H	50.30	73.98	23.69	PK
4924	37.18	0.86	H	38.04	53.98	15.95	AV
7386	46.48	9.38	H	55.86	73.98	18.12	PK
7386	34.55	9.38	H	43.93	53.98	10.05	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4844	48.24	0.94	V	49.18	73.98	24.81	PK
4844	37.71	0.94	V	38.65	53.98	15.34	AV
7266	46.87	9.48	V	56.35	73.98	17.64	PK
7266	34.84	9.48	V	44.32	53.98	9.66	AV
4844	49.90	0.94	H	50.84	73.98	23.15	PK
4844	37.55	0.94	H	38.49	53.98	15.50	AV
7266	45.97	9.48	H	55.45	73.98	18.54	PK
7266	34.76	9.48	H	44.24	53.98	9.75	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4874	47.88	0.97	V	48.85	73.98	25.14	PK
4874	36.40	0.97	V	37.37	53.98	16.62	AV
7311	46.05	9.26	V	55.31	73.98	18.67	PK
7311	34.90	9.26	V	44.16	53.98	9.82	AV
4874	48.50	0.97	H	49.47	73.98	24.52	PK
4874	36.57	0.97	H	37.54	53.98	16.45	AV
7311	46.62	9.26	H	55.88	73.98	18.10	PK
7311	34.71	9.26	H	43.97	53.98	10.01	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measure ment Type
4904	47.59	0.90	V	48.49	73.98	25.50	PK
4904	36.46	0.90	V	37.36	53.98	16.63	AV
7356	47.57	9.30	V	56.87	73.98	17.11	PK
7356	34.68	9.30	V	43.98	53.98	10.00	AV
4904	48.73	0.90	H	49.63	73.98	24.36	PK
4904	36.76	0.90	H	37.66	53.98	16.33	AV
7356	45.86	9.30	H	55.16	73.98	18.82	PK
7356	34.46	9.30	H	43.76	53.98	10.22	AV

**[ANT1&ANT2\_MIMO(CDD)]**

Operation Mode: 802.11b  
 Operating Frequency: 2412  
 Channel No.: 01 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	53.39	0.76	V	54.15	73.98	19.84	PK
4824	47.27	0.76	V	48.03	53.98	5.95	AV
7236	47.56	9.77	V	57.33	73.98	16.65	PK
7236	35.72	9.77	V	45.49	53.98	8.49	AV
4824	51.60	0.76	H	52.36	73.98	21.63	PK
4824	43.90	0.76	H	44.66	53.98	9.33	AV
7236	46.90	9.77	H	56.67	73.98	17.31	PK
7236	35.56	9.77	H	45.33	53.98	8.65	AV

Operation Mode: 802.11b  
 Operating Frequency: 2437  
 Channel No.: 06 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	52.18	0.97	V	53.15	73.98	20.84	PK
4874	46.70	0.97	V	47.67	53.98	6.31	AV
7311	47.16	9.26	V	56.42	73.98	17.56	PK
7311	36.15	9.26	V	45.41	53.98	8.57	AV
4874	49.35	0.97	H	50.32	73.98	23.67	PK
4874	42.11	0.97	H	43.08	53.98	10.91	AV
7311	46.84	9.26	H	56.10	73.98	17.88	PK
7311	36.08	9.26	H	45.34	53.98	8.64	AV



Operation Mode: 802.11b  
 Operating Frequency: 2462  
 Channel No.: 11 Ch

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	53.43	0.86	V	54.29	73.98	19.70	PK
4924	47.93	0.86	V	48.79	53.98	5.20	AV
7386	47.93	9.38	V	57.31	73.98	16.67	PK
7386	36.08	9.38	V	45.46	53.98	8.52	AV
4924	50.96	0.86	H	51.82	73.98	22.17	PK
4924	43.51	0.86	H	44.37	53.98	9.62	AV
7386	46.31	9.38	H	55.69	73.98	18.29	PK
7386	35.91	9.38	H	45.29	53.98	8.69	AV

Operation Mode: 802.11g  
 Operating Frequency: 2412  
 Channel No.: 01 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	53.51	0.00	0.76	V	54.27	73.98	19.72	PK
4824	39.92	0.00	0.76	V	40.68	53.98	13.31	AV
7236	49.63	0.00	9.77	V	59.40	73.98	14.58	PK
7236	35.59	0.00	9.77	V	45.36	53.98	8.62	AV
4824	53.19	0.00	0.76	H	53.95	73.98	20.04	PK
4824	39.68	0.00	0.76	H	40.44	53.98	13.55	AV
7236	47.94	0.00	9.77	H	57.71	73.98	16.27	PK
7236	35.48	0.00	9.77	H	45.25	53.98	8.73	AV

Operation Mode: 802.11g  
 Operating Frequency: 2437  
 Channel No.: 06 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	51.11	0.00	0.97	V	52.08	73.98	21.91	PK
4874	37.95	0.00	0.97	V	38.92	53.98	15.07	AV
7311	49.87	0.00	9.26	V	59.13	73.98	14.85	PK
7311	35.77	0.00	9.26	V	45.03	53.98	8.95	AV
4874	50.73	0.00	0.97	H	51.70	73.98	22.29	PK
4874	37.88	0.00	0.97	H	38.85	53.98	15.14	AV
7311	49.09	0.00	9.26	H	58.35	73.98	15.63	PK
7311	35.60	0.00	9.26	H	44.86	53.98	9.12	AV

Operation Mode: 802.11g  
 Operating Frequency 2462  
 Channel No. 11 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	53.33	0.00	0.86	V	54.19	73.98	19.80	PK
4924	39.88	0.00	0.86	V	40.74	53.98	13.25	AV
7386	48.12	0.00	9.38	V	57.50	73.98	16.48	PK
7386	34.61	0.00	9.38	V	43.99	53.98	9.99	AV
4924	52.98	0.00	0.86	H	53.84	73.98	20.15	PK
4924	39.50	0.00	0.86	H	40.36	53.98	13.63	AV
7386	47.73	0.00	9.38	H	57.11	73.98	16.87	PK
7386	34.35	0.00	9.38	H	43.73	53.98	10.25	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	51.10	0.00	0.76	V	51.86	73.98	22.13	PK
4824	39.30	0.00	0.76	V	40.06	53.98	13.93	AV
7236	49.28	0.00	9.77	V	59.05	73.98	14.93	PK
7236	35.53	0.00	9.77	V	45.30	53.98	8.68	AV
4824	50.00	0.00	0.76	H	50.76	73.98	23.23	PK
4824	39.17	0.00	0.76	H	39.93	53.98	14.06	AV
7236	48.44	0.00	9.77	H	58.21	73.98	15.77	PK
7236	35.44	0.00	9.77	H	45.21	53.98	8.77	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	50.64	0.00	0.97	V	51.61	73.98	22.38	PK
4874	37.81	0.00	0.97	V	38.78	53.98	15.21	AV
7311	49.95	0.00	9.26	V	59.21	73.98	14.77	PK
7311	35.81	0.00	9.26	V	45.07	53.98	8.91	AV
4874	50.55	0.00	0.97	H	51.52	73.98	22.47	PK
4874	37.54	0.00	0.97	H	38.51	53.98	15.48	AV
7311	49.30	0.00	9.26	H	58.56	73.98	15.42	PK
7311	35.58	0.00	9.26	H	44.84	53.98	9.14	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	52.86	0.00	0.86	V	53.72	73.98	20.27	PK
4924	39.81	0.00	0.86	V	40.67	53.98	13.32	AV
7386	47.51	0.00	9.38	V	56.89	73.98	17.09	PK
7386	34.44	0.00	9.38	V	43.82	53.98	10.16	AV
4924	52.40	0.00	0.86	H	53.26	73.98	20.73	PK
4924	39.43	0.00	0.86	H	40.29	53.98	13.70	AV
7386	47.12	0.00	9.38	H	56.50	73.98	17.48	PK
7386	34.20	0.00	9.38	H	43.58	53.98	10.40	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4844	49.59	0.00	0.94	V	50.53	73.98	23.46	PK
4844	38.45	0.00	0.94	V	39.39	53.98	14.60	AV
7266	47.58	0.00	9.48	V	57.06	73.98	16.93	PK
7266	34.70	0.00	9.48	V	44.18	53.98	9.80	AV
4844	49.40	0.00	0.94	H	50.34	73.98	23.65	PK
4844	38.04	0.00	0.94	H	38.98	53.98	15.01	AV
7266	46.05	0.00	9.48	H	55.53	73.98	18.46	PK
7266	34.45	0.00	9.48	H	43.93	53.98	10.06	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	48.99	0.00	0.97	V	49.96	73.98	24.03	PK
4874	37.48	0.00	0.97	V	38.45	53.98	15.54	AV
7311	48.19	0.00	9.26	V	57.45	73.98	16.53	PK
7311	35.48	0.00	9.26	V	44.74	53.98	9.24	AV
4874	48.72	0.00	0.97	H	49.69	73.98	24.30	PK
4874	37.32	0.00	0.97	H	38.29	53.98	15.70	AV
7311	48.40	0.00	9.26	H	57.66	73.98	16.32	PK
7311	35.40	0.00	9.26	H	44.66	53.98	9.32	AV

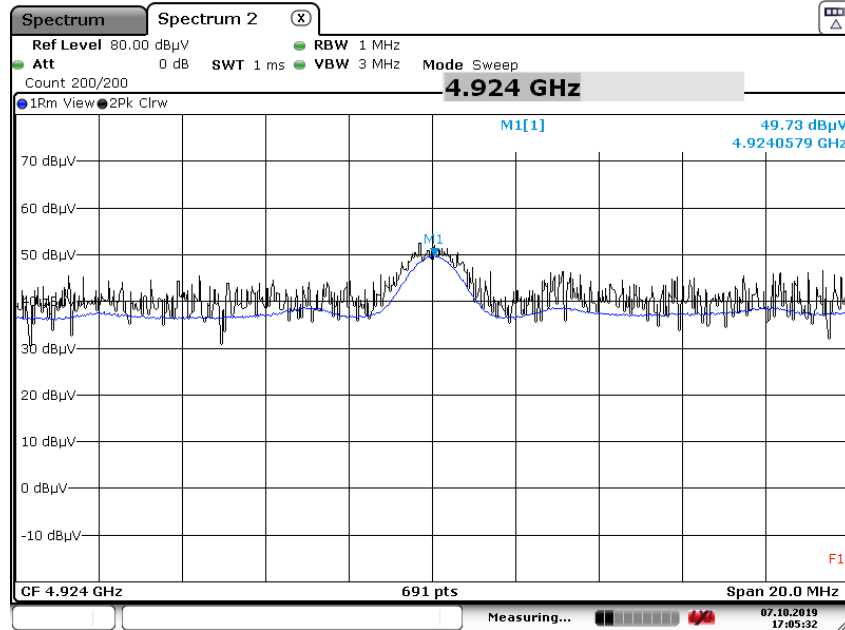
Operation Mode: 802.11n (HT40)  
 Operating Frequency: 2452  
 Channel No.: 9 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4904	49.96	0.00	0.90	V	50.86	73.98	23.13	PK
4904	37.49	0.00	0.90	V	38.39	53.98	15.60	AV
7356	46.82	0.00	9.30	V	56.12	73.98	17.86	PK
7356	34.42	0.00	9.30	V	43.72	53.98	10.26	AV
4904	48.86	0.00	0.90	H	49.76	73.98	24.23	PK
4904	37.20	0.00	0.90	H	38.10	53.98	15.89	AV
7356	45.56	0.00	9.30	H	54.86	73.98	19.12	PK
7356	34.12	0.00	9.30	H	43.42	53.98	10.56	AV

[ANT1\_SISO]

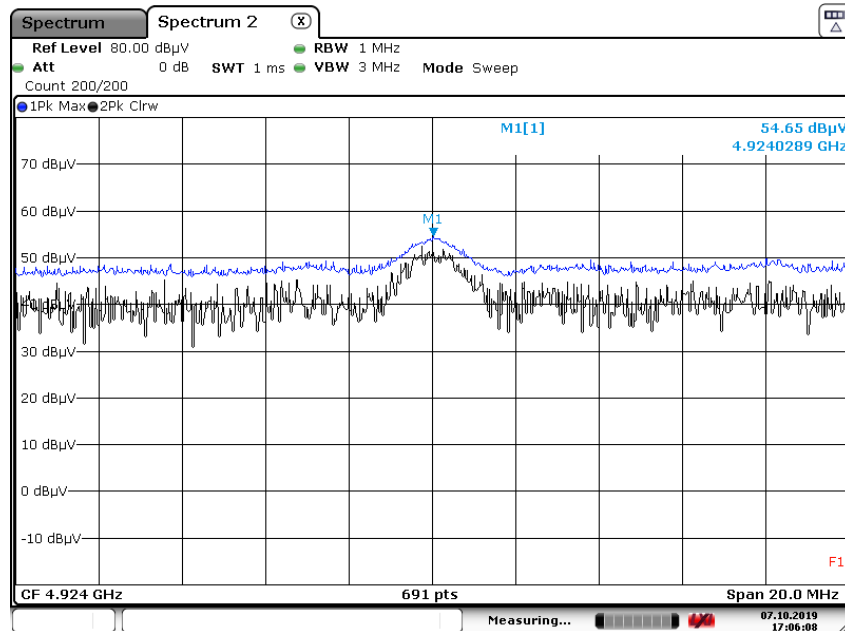
▣ Test Plots (Worst case : Y-V)

Radiated Spurious Emissions plot – Average Reading (802.11b\_1Mbps, Ch.11 2nd Harmonic)



Date: 7.OCT.2019 17:05:32

Radiated Spurious Emissions plot – Peak Reading (802.11b\_1Mbps, Ch.11 2nd Harmonic)



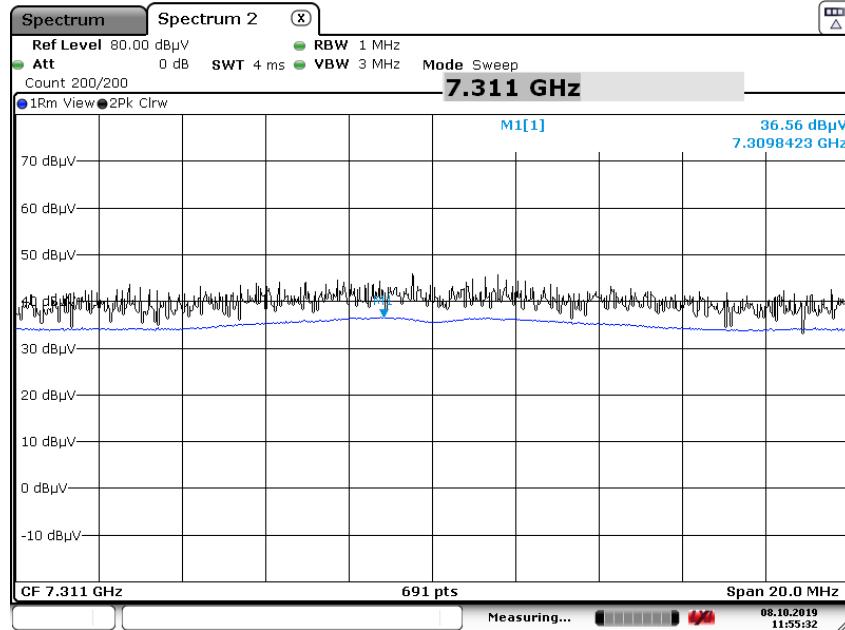
Date: 7.OCT.2019 17:06:09



[ANT2\_SISO]

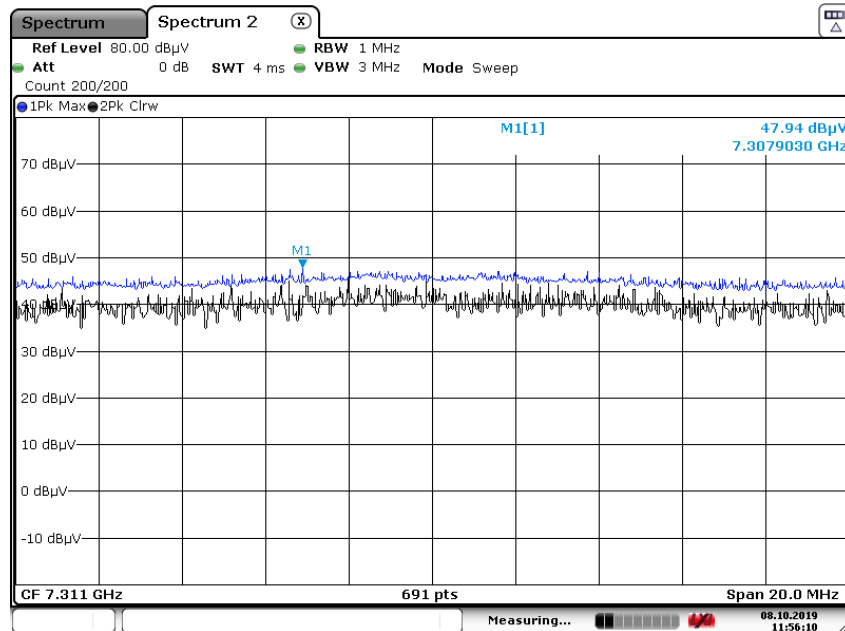
## ☐ Test Plots (Worst case : X-V)

Radiated Spurious Emissions plot – Average Reading (802.11b\_1Mbps, Ch.6 3rd Harmonic)



Date: 8.OCT.2019 11:55:32

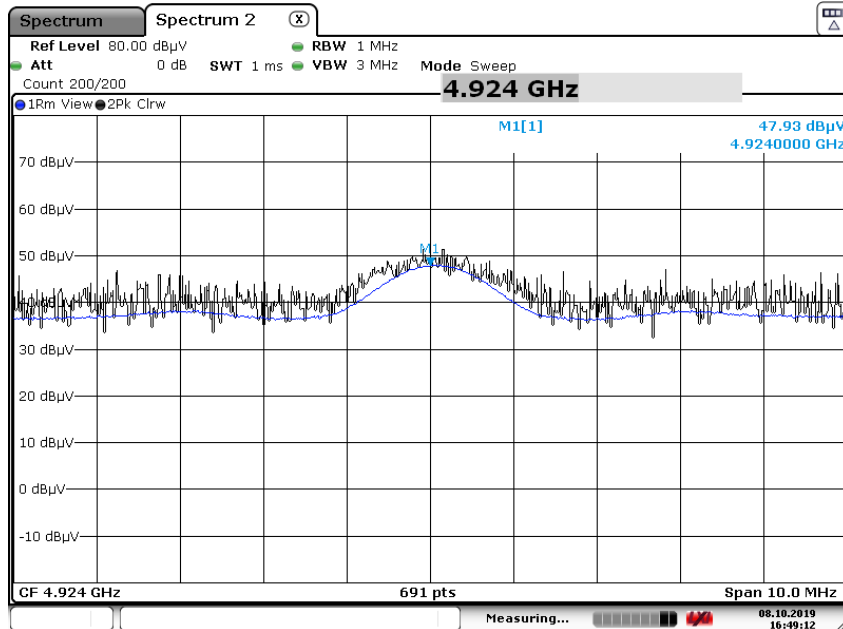
Radiated Spurious Emissions plot – Peak Reading (802.11b\_1Mbps, Ch.6 3rd Harmonic)



Date: 8.OCT.2019 11:56:10

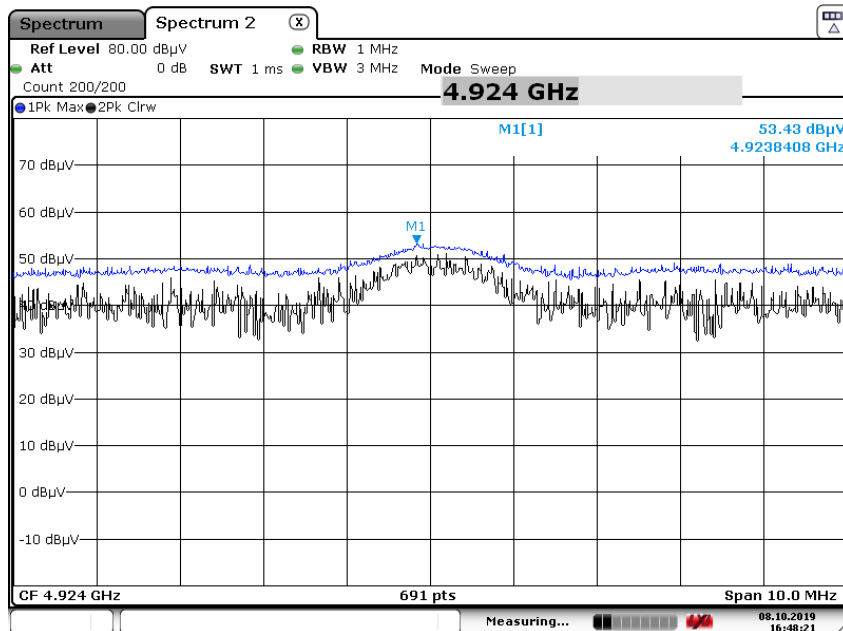
[ANT1&ANT2\_MIMO(CDD)]\_(Worst case : Y-V)

Radiated Spurious Emissions plot – Average Reading (802.11b\_1Mbps, 11 Ch 2nd Harmonic)



Date: 8.OCT.2019 16:49:13

Radiated Spurious Emissions plot – Peak Reading (802.11b\_1Mbps, 11 Ch 2nd Harmonic)



Date: 8.OCT.2019 16:48:20

**Note:**

Plot of worst case are only reported.

## 9.7 RADIATED RESTRICTED BAND EDGES

**[ANT1\_SISO]**

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F. -A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	26.090	33.69	H	59.78	73.98	14.20	PK
2390.0	15.506	33.69	H	49.20	53.98	4.78	AV
2390.0	25.881	33.69	V	59.57	73.98	14.41	PK
2390.0	15.113	33.69	V	48.80	53.98	5.18	AV
2483.5	25.034	33.19	H	58.22	73.98	15.76	PK
2483.5	14.057	33.19	H	47.25	53.98	6.73	AV
2483.5	24.761	33.19	V	57.95	73.98	16.03	PK
2483.5	13.818	33.19	V	47.01	53.98	6.97	AV

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F. -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	31.019	33.69	H	64.71	73.98	9.27	PK
2390.0	17.966	33.69	H	51.66	53.98	2.32	AV
2390.0	30.894	33.69	V	64.58	73.98	9.40	PK
2390.0	17.772	33.69	V	51.46	53.98	2.52	AV
2483.5	33.555	33.19	V	66.75	73.98	7.24	PK
# 2483.5~2484.5	17.069	33.19	V	50.26	53.98	3.72	AV
# 2484.5~2485.5	16.660	33.19	V	49.85	53.98	4.13	AV
2485.5	16.780	33.19	V	49.97	53.98	4.01	AV
2483.5	33.950	33.19	H	67.14	73.98	6.84	PK
# 2483.5~2484.5	17.720	33.19	H	50.91	53.98	3.07	AV
# 2484.5~2485.5	17.230	33.19	H	50.42	53.98	3.56	AV
2485.5	17.536	33.19	H	50.73	53.98	3.25	AV

**Note:**

# integration method Used (ANSI C63.10 Section11.13.3)

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F -A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measureme nt Type
2390.0	36.560	33.69	V	70.25	73.98	3.73	PK
# 2388~2389	16.550	33.69	V	50.24	53.98	3.74	AV
# 2389~2390	17.510	33.69	V	51.20	53.98	2.78	AV
2388.0	16.180	33.69	V	49.87	53.98	4.11	AV
2390.0	36.963	33.69	H	70.65	73.98	3.33	PK
# 2388~2389	16.820	33.69	H	50.51	53.98	3.47	AV
# 2389~2390	17.730	33.69	H	51.42	53.98	2.56	AV
2388.0	16.473	33.69	H	50.16	53.98	3.82	AV
2483.5	36.840	33.19	V	70.03	73.98	3.95	PK
# 2483.5~2484.5	18.440	33.19	V	51.63	53.98	2.35	AV
# 2484.5~2485.5	17.090	33.19	V	50.28	53.98	3.70	AV
2485.5	17.480	33.19	V	50.67	53.98	3.31	AV
2483.5	37.173	33.19	H	70.36	73.98	3.62	PK
# 2483.5~2484.5	18.620	33.19	H	51.81	53.98	2.17	AV
# 2484.5~2485.5	17.310	33.19	H	50.50	53.98	3.48	AV
2485.5	17.605	33.19	H	50.80	53.98	3.19	AV

**Note:**

# integration method Used (ANSI C63.10 Section11.13.3)

Operation Mode: 802.11n (HT40)  
 Operating Frequency: 2422 MHz, 2452 MHz  
 Channel No.: 03 Ch, 9 Ch

Frequency [MHz]	Reading [dBUV]	A.F.+C.L.+D.F -A.G+ATT. [dB]	ANT. POL [H/V]	Total [dBUV/m]	Limit [dBUV/m]	Margin [dB]	Measurement Type
2390.0	33.540	33.69	H	67.23	73.98	6.75	PK
2390.0	17.799	33.69	H	51.49	53.98	2.49	AV
2390.0	32.984	33.69	V	66.67	73.98	7.31	PK
2390.0	17.413	33.69	V	51.10	53.98	2.88	AV
2483.5	34.110	33.19	V	67.30	73.98	6.68	PK
# 2483.5~2484.5	17.350	33.19	V	50.54	53.98	3.44	AV
# 2484.5~2485.5	17.010	33.19	V	50.20	53.98	3.78	AV
2485.5	17.250	33.19	V	50.44	53.98	3.54	AV
2483.5	34.678	33.19	H	67.87	73.98	6.11	PK
# 2483.5~2484.5	17.780	33.19	H	50.97	53.98	3.01	AV
# 2484.5~2485.5	17.370	33.19	H	50.56	53.98	3.42	AV
2485.5	17.697	33.19	H	50.89	53.98	3.09	AV

**Note:**

# integration method Used (ANSI C63.10 Section11.13.3)

**[ANT2\_SISO]**

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F.-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	22.483	33.69	H	56.17	73.98	17.81	PK
2390.0	12.304	33.69	H	45.99	53.98	7.99	AV
2390.0	22.301	33.69	V	55.99	73.98	17.99	PK
2390.0	12.119	33.69	V	45.81	53.98	8.17	AV
2483.5	23.180	33.19	H	56.37	73.98	17.61	PK
2483.5	11.591	33.19	H	44.78	53.98	9.20	AV
2483.5	22.262	33.19	V	55.45	73.98	18.53	PK
2483.5	11.423	33.19	V	44.61	53.98	9.37	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	34.642	0.00	33.69	H	68.33	73.98	5.65	PK
2390.0	17.466	0.00	33.69	H	51.16	53.98	2.82	AV
2390.0	34.392	0.00	33.69	V	68.08	73.98	5.90	PK
2390.0	16.749	0.00	33.69	V	50.44	53.98	3.54	AV
2483.5	28.799	0.00	33.19	H	61.99	73.98	11.99	PK
2483.5	16.295	0.00	33.19	H	49.49	53.98	4.50	AV
2483.5	28.094	0.00	33.19	V	61.28	73.98	12.70	PK
2483.5	15.797	0.00	33.19	V	48.99	53.98	4.99	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	36.228	0.00	33.69	H	69.92	73.98	4.06	PK
2390.0	17.532	0.00	33.69	H	51.22	53.98	2.76	AV
2390.0	35.994	0.00	33.69	V	69.68	73.98	4.30	PK
2390.0	17.381	0.00	33.69	V	51.07	53.98	2.91	AV
2483.5	30.207	0.00	33.19	H	63.40	73.98	10.58	PK
2483.5	15.945	0.00	33.19	H	49.14	53.98	4.85	AV
2483.5	30.427	0.00	33.19	V	63.62	73.98	10.36	PK
2483.5	15.737	0.00	33.19	V	48.93	53.98	5.05	AV

Operation Mode: 802.11n (HT40)  
 Operating Frequency: 2422 MHz, 2452 MHz  
 Channel No.: 03 Ch, 9 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	28.231	0.00	33.69	H	61.92	73.98	12.06	PK
2390.0	15.084	0.00	33.69	H	48.77	53.98	5.21	AV
2390.0	27.951	0.00	33.69	V	61.64	73.98	12.34	PK
2390.0	14.990	0.00	33.69	V	48.68	53.98	5.30	AV
2483.5	30.791	0.00	33.19	H	63.98	73.98	10.00	PK
2483.5	16.460	0.00	33.19	H	49.65	53.98	4.33	AV
2483.5	30.551	0.00	33.19	V	63.74	73.98	10.24	PK
2483.5	16.080	0.00	33.19	V	49.27	53.98	4.71	AV

**[ANT1&ANT2\_MIMO(CDD)]**

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

Frequency [MHz]	Reading [dBuV]	A.F.+C.L.+D.F.-A.G+ATT [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	24.815	33.69	H	58.51	73.98	15.48	PK
2390.0	13.415	33.69	H	47.11	53.98	6.88	AV
2390.0	23.758	33.69	V	57.45	73.98	16.53	PK
2390.0	13.331	33.69	V	47.02	53.98	6.96	AV
2483.5	24.905	33.19	H	58.10	73.98	15.89	PK
2483.5	13.821	33.19	H	47.01	53.98	6.97	AV
2483.5	24.553	33.19	V	57.74	73.98	16.24	PK
2483.5	13.751	33.19	V	46.94	53.98	7.04	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	26.314	0.00	33.69	H	60.00	73.98	13.98	PK
2390.0	14.687	0.00	33.69	H	48.38	53.98	5.60	AV
2390.0	25.643	0.00	33.69	V	59.33	73.98	14.65	PK
2390.0	14.073	0.00	33.69	V	47.76	53.98	6.22	AV
2483.5	26.461	0.00	33.19	H	59.65	73.98	14.33	PK
2483.5	14.745	0.00	33.19	H	47.94	53.98	6.05	AV
2483.5	25.883	0.00	33.19	V	59.07	73.98	14.91	PK
2483.5	14.314	0.00	33.19	V	47.50	53.98	6.48	AV



Operation Mode: 802.11g  
 Operating Frequency: 2417 MHz, 2457 MHz  
 Channel No.: 02 Ch, 10 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	28.958	0.000	33.69	H	62.65	73.98	11.33	PK
2390.0	15.354	0.000	33.69	H	49.04	53.98	4.94	AV
2483.5	27.966	0.000	33.19	H	61.16	73.98	12.82	PK
2483.5	14.670	0.000	33.19	H	47.86	53.98	6.12	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	26.772	0.00	33.69	H	60.46	73.98	13.52	PK
2390.0	14.421	0.00	33.69	H	48.11	53.98	5.87	AV
2390.0	25.026	0.00	33.69	V	58.72	73.98	15.26	PK
2390.0	14.201	0.00	33.69	V	47.89	53.98	6.09	AV
2483.5	26.760	0.00	33.19	H	59.95	73.98	14.03	PK
2483.5	14.943	0.00	33.19	H	48.13	53.98	5.85	AV
2483.5	26.286	0.00	33.19	V	59.48	73.98	14.50	PK
2483.5	14.335	0.00	33.19	V	47.53	53.98	6.46	AV

Operation Mode: 802.11n (HT20)  
 Operating Frequency: 2417 MHz, 2457 MHz  
 Channel No.: 02 Ch, 10 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	27.387	0.00	33.69	H	61.08	73.98	12.90	PK
2390.0	14.960	0.00	33.69	H	48.65	53.98	5.33	AV
2483.5	25.309	0.00	33.19	H	58.50	73.98	15.48	PK
2483.5	14.077	0.00	33.19	H	47.27	53.98	6.71	AV

Operation Mode: 802.11n (HT40)  
 Operating Frequency: 2422 MHz, 2452 MHz  
 Channel No.: 03 Ch, 9 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.- A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	25.925	0.00	33.69	H	59.62	73.98	14.37	PK
2390.0	14.500	0.00	33.69	H	48.19	53.98	5.79	AV
2390.0	24.476	0.00	33.69	V	58.17	73.98	15.81	PK
2390.0	14.120	0.00	33.69	V	47.81	53.98	6.17	AV
2483.5	28.696	0.00	33.19	H	61.89	73.98	12.09	PK
2483.5	17.047	0.00	33.19	H	50.24	53.98	3.74	AV
2483.5	27.369	0.00	33.19	V	60.56	73.98	13.42	PK
2483.5	15.805	0.00	33.19	V	49.00	53.98	4.99	AV

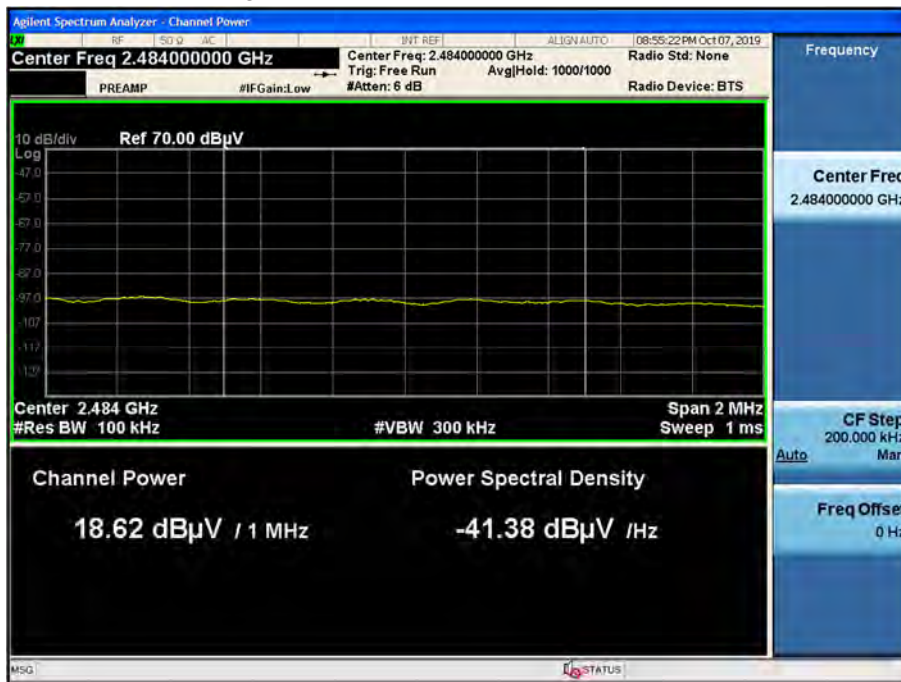
Operation Mode: 802.11n (HT40)  
 Operating Frequency 2427 MHz, 2447 MHz  
 Channel No. 04 Ch, 8 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor [dB]	A.F.+C.L.-A.G+D.F. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	28.116	0.00	33.69	H	61.81	73.98	12.17	PK
2390.0	16.339	0.00	33.69	H	50.03	53.98	3.95	AV
2483.5	28.481	0.00	33.19	H	61.67	73.98	12.31	PK
2483.5	16.436	0.00	33.19	H	49.63	53.98	4.35	AV

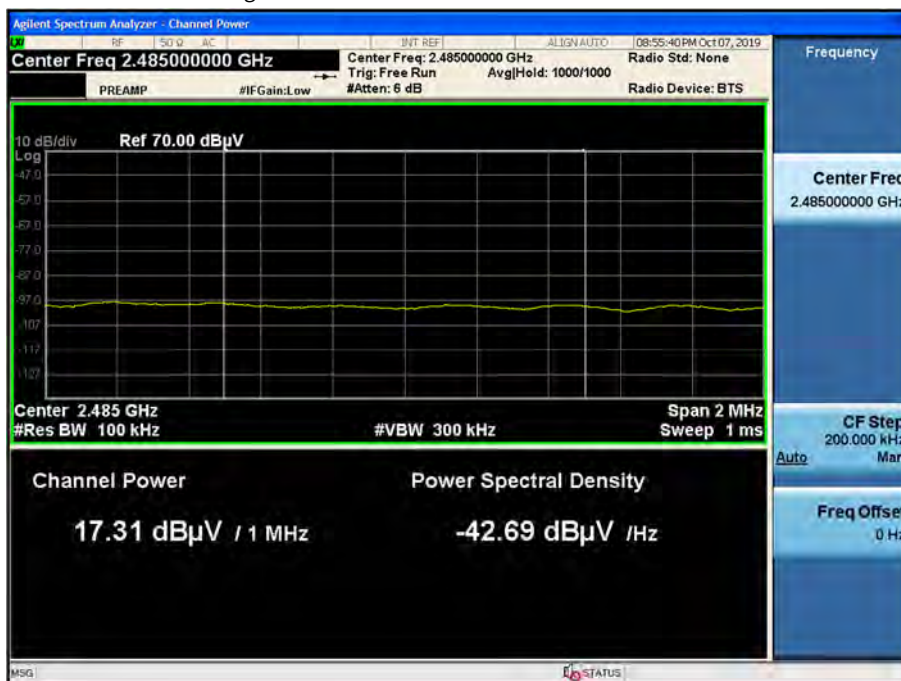
[ANT1]

▣ Test Plots (Worst case : Z-1-H)

Radiated Restricted Band Edges plot – Average Reading (802.11n(HT20), Ch.11)  
 integration method Used 2 483.5 MHz ~ 2 484.5 MHz



Radiated Restricted Band Edges plot – Peak Reading (802.11n(HT20), Ch.11)  
 integration method Used 2 484.5 MHz ~ 2 485.5 MHz



Radiated Restricted Band Edges plot – Average Reading (802.11n(HT20), Ch.11)  
2 485.5 MHz ~ 2500 MHz



Radiated Restricted Band Edges plot – Peak Reading (802.11n(HT20), Ch.11)  
2 483.5 MHz ~ 2500 MHz



**Note:**

Plot of worst case are only reported.

[ANT2]

▣ Test Plots (Worst case : X-H)

Radiated Restricted Band Edges plot – Average Reading (802.11n(HT20), Ch.1)



Radiated Restricted Band Edges plot – Peak Reading (802.11n(HT20), Ch.1)



**Note:**

Plot of worst case are only reported.

[ANT1&ANT2\_MIMO(CDD)]

▣ Test Plots (Worst case : Z-1-H)

Radiated Restricted Band Edges plot – Average Reading (802.11n(HT40), Ch.9)



Radiated Restricted Band Edges plot – Peak Reading (802.11n(HT40), Ch.9)



**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 MODE L1

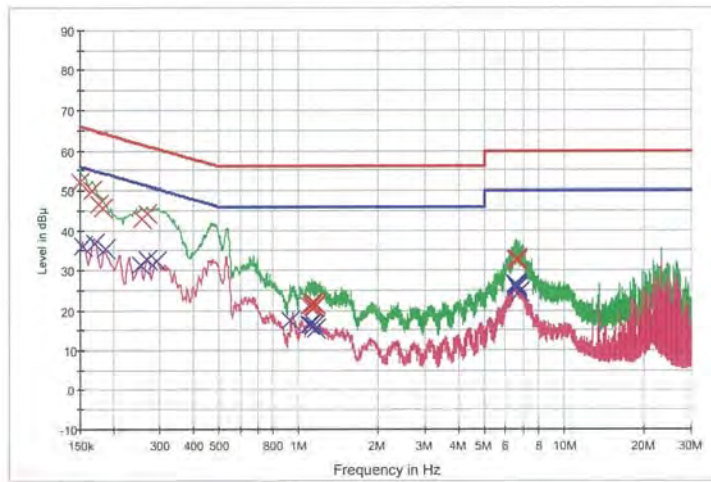
1 / 2

## HCT TEST Report

### Common Information

EUT: ETPFBRT01  
 Manufacturer: LG INNOTEK  
 Test Site: SHIELD ROOM  
 Operating Conditions: 2.4G WLAN MODE L1

FCC CLASS B\_Exten Cable



— FCC CLASS B\_OP     
 — FCC CLASS B\_AV     
 — Preview Result 1-PK+  
— Preview Result 2-AVG     
 x Final Result 1-QPK     
 x Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	52.1	9.000	Off	L1	9.8	13.9	66.0
0.166000	50.1	9.000	Off	L1	9.8	15.1	65.2
0.176000	46.7	9.000	Off	L1	9.8	18.0	64.7
0.182000	45.7	9.000	Off	L1	9.8	18.7	64.4
0.258000	43.0	9.000	Off	L1	9.8	18.5	61.5
0.268000	44.3	9.000	Off	L1	9.8	16.9	61.2
1.100000	21.2	9.000	Off	L1	9.9	34.8	56.0
1.126000	21.3	9.000	Off	L1	9.9	34.7	56.0
1.132000	20.7	9.000	Off	L1	9.9	35.3	56.0
1.138000	21.8	9.000	Off	L1	9.9	34.2	56.0
1.142000	20.9	9.000	Off	L1	9.9	35.1	56.0
1.166000	21.6	9.000	Off	L1	9.9	34.4	56.0
6.592000	32.8	9.000	Off	L1	10.1	27.2	60.0
6.608000	33.0	9.000	Off	L1	10.2	27.0	60.0
6.618000	33.0	9.000	Off	L1	10.2	27.0	60.0
6.634000	32.6	9.000	Off	L1	10.2	27.4	60.0
6.638000	32.7	9.000	Off	L1	10.2	27.3	60.0
6.674000	32.4	9.000	Off	L1	10.2	27.6	60.0

2019-09-25

오전 11:02:48

2.4G WLAN MODE L1

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154000	36.1	9.000	Off	L1	9.8	19.7	55.8
0.170000	36.6	9.000	Off	L1	9.8	18.3	55.0
0.188000	35.3	9.000	Off	L1	9.8	18.8	54.1
0.254000	31.3	9.000	Off	L1	9.8	20.4	51.6
0.270000	32.7	9.000	Off	L1	9.8	18.4	51.1
0.292000	32.4	9.000	Off	L1	9.8	18.1	50.5
0.932000	17.4	9.000	Off	L1	9.9	28.6	46.0
1.100000	16.5	9.000	Off	L1	9.9	29.5	46.0
1.104000	16.5	9.000	Off	L1	9.9	29.5	46.0
1.132000	16.0	9.000	Off	L1	9.9	30.0	46.0
1.142000	16.3	9.000	Off	L1	9.9	29.7	46.0
1.166000	15.6	9.000	Off	L1	9.9	30.4	46.0
6.542000	26.7	9.000	Off	L1	10.1	23.3	50.0
6.592000	26.2	9.000	Off	L1	10.1	23.8	50.0
6.618000	26.2	9.000	Off	L1	10.2	23.8	50.0
6.638000	25.9	9.000	Off	L1	10.2	24.1	50.0
6.674000	25.4	9.000	Off	L1	10.2	24.6	50.0
6.762000	24.5	9.000	Off	L1	10.2	25.5	50.0

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Conducted Emissions (Line 2)

2.4G WLAN MODE N

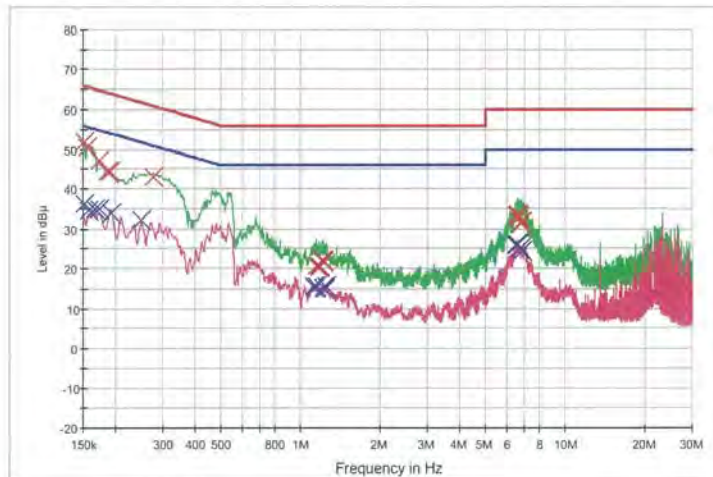
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## HCT TEST Report

### Common Information

EUT: ETPFBRTP01  
 Manufacturer: LG INNOTEK  
 Test Site: SHIELD ROOM  
 Operating Conditions: 2.4G WLAN MODE N

FCC CLASS B\_Exten Cable



— FCC CLASS B\_QP      — FCC CLASS B\_AV      — Preview Result 1-PK+  
 — Preview Result 2-AVG      × Final Result 1-QPK      × Final Result 2-CAV

### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	51.7	9.000	Off	N	9.8	14.2	65.9
0.156000	50.5	9.000	Off	N	9.8	15.2	65.7
0.172000	47.2	9.000	Off	N	9.8	17.6	64.9
0.186000	44.2	9.000	Off	N	9.8	20.0	64.2
0.190000	44.3	9.000	Off	N	9.8	19.8	64.0
0.276000	43.2	9.000	Off	N	9.8	17.7	60.9
1.142000	20.8	9.000	Off	N	9.9	35.2	56.0
1.168000	20.5	9.000	Off	N	9.9	35.5	56.0
1.174000	20.4	9.000	Off	N	9.9	35.6	56.0
1.202000	21.9	9.000	Off	N	9.9	34.1	56.0
1.210000	21.7	9.000	Off	N	9.9	34.3	56.0
1.216000	21.9	9.000	Off	N	9.9	34.1	56.0
6.550000	33.1	9.000	Off	N	10.2	26.9	60.0
6.566000	33.3	9.000	Off	N	10.2	26.7	60.0
6.574000	33.4	9.000	Off	N	10.2	26.6	60.0
6.640000	33.0	9.000	Off	N	10.2	27.0	60.0
6.736000	31.5	9.000	Off	N	10.2	28.5	60.0
6.840000	31.6	9.000	Off	N	10.2	28.4	60.0

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2.4G WLAN MODE N

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.152000	36.2	9.000	Off	N	9.8	19.7	55.9
0.158000	34.5	9.000	Off	N	9.8	21.1	55.6
0.166000	35.0	9.000	Off	N	9.8	20.2	55.2
0.172000	35.0	9.000	Off	N	9.8	19.9	54.9
0.192000	34.1	9.000	Off	N	9.8	19.9	53.9
0.250000	32.1	9.000	Off	N	9.8	19.6	51.8
1.122000	15.7	9.000	Off	N	9.9	30.3	46.0
1.136000	15.2	9.000	Off	N	9.9	30.8	46.0
1.142000	15.4	9.000	Off	N	9.9	30.6	46.0
1.216000	15.4	9.000	Off	N	9.9	30.6	46.0
1.222000	15.1	9.000	Off	N	9.9	30.9	46.0
1.238000	15.4	9.000	Off	N	9.9	30.6	46.0
6.504000	25.7	9.000	Off	N	10.2	24.3	50.0
6.526000	26.2	9.000	Off	N	10.2	23.8	50.0
6.550000	26.3	9.000	Off	N	10.2	23.7	50.0
6.574000	26.2	9.000	Off	N	10.2	23.8	50.0
6.736000	25.0	9.000	Off	N	10.2	25.0	50.0
6.840000	24.5	9.000	Off	N	10.2	25.5	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	12/12/2018	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/18/2019	Annual	100033
ESPAC	SU-642 / Temperature Chamber	03/12/2019	Annual	0093008124
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	01/10/2019	Annual	MY49431210
Rohde & Schwarz	OSP 120 / Power Measurement Set	07/24/2019	Annual	101231
Agilent	N1911A / Power Meter	04/10/2019	Annual	MY45100523
Agilent	N1921A / Power Sensor	04/10/2019	Annual	MY52260025
Agilent	87300B / Directional Coupler	11/20/2018	Annual	3116A03621
Hewlett Packard	11667B / Power Splitter	05/24/2019	Annual	05001
Hewlett Packard	E3632A / DC Power Supply	06/18/2019	Annual	KR75303960
Agilent	8493C / Attenuator(10 dB)	07/02/2019	Annual	07560
Rohde & Schwarz	EMC32 / Software	N/A	N/A	N/A
HCT CO., LTD.	FCC WLAN&BT&BLE Conducted Test Software v3.0	N/A	N/A	N/A

### Note:

1. Equipment listed above that calibrated during the testing period was set for test after the calibration.
2. Equipment listed above that has a calibration due date during the testing period, the testing is completed before equipment expiration date.

**Radiated Test**

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Innco system	CO3000 / Controller(Antenna mast)	N/A	N/A	CO3000-4p
Innco system	MA4640/800-XP-EP / Antenna Position Tower	N/A	N/A	N/A
Audix	EM1000 / Controller	N/A	N/A	060520
Audix	Turn Table	N/A	N/A	N/A
Rohde & Schwarz	Loop Antenna	08/23/2018	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	03/22/2019	Biennial	760
Schwarzbeck	VULB 9160 / TRILOG Antenna	08/09/2018	Biennial	9160-3368
Schwarzbeck	BBHA 9120D / Horn Antenna	04/29/2019	Biennial	9120D-937
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 30 GHz) / Spectrum Analyzer	05/09/2019	Annual	100854
Rohde & Schwarz	FSV40-N / Spectrum Analyzer	09/26/2019	Annual	101068-SZ
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	05/23/2019	Annual	8
Wainwright Instruments	WHKX7.0/18G-8SS / High Pass Filter	05/03/2019	Annual	29
Wainwright Instruments	WRCJV2400/2483.5-2370/2520-60/12SS / Band Reject Filter	06/19/2019	Annual	2
Wainwright Instruments	WRCJV5100/5850-40/50-8EEK / Band Reject Filter	01/03/2019	Annual	2
Api tech.	18B-03 / Attenuator (3 dB)	06/04/2019	Annual	1
Agilent	8493C-10 / Attenuator(10 dB)	07/15/2019	Annual	08285
CERNEX	CBLU1183540 / Power Amplifier	07/01/2019	Annual	22964
CERNEX	CBL06185030 / Power Amplifier	07/01/2019	Annual	22965
CERNEX	CBL18265035 / Power Amplifier	01/03/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/18/2019	Annual	25956

**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.

## 11. ANNEX A\_ TEST SETUP PHOTO

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

No.	Description
1	HCT-RF-1910-FI001-P