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# TEST REPORT

## FCC/IC DTS Test for WFM60-SFP202 Certification

**APPLICANT**  
I&C TECHNOLOGY CO. LTD.

**REPORT NO.**  
HCT-RF-1911-FI017

**DATE OF ISSUE**  
November 19, 2019

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WFM60-SFP202

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FCC ID/IC  
2ADXS-WFM60-SFP202 / 12641A-WFM60SFP202

Applicant	I&C TECHNOLOGY CO. LTD. I&C Building, 24, Pangyo-ro 255beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, 13486, Korea
Eut Type Model Name	Wi-Fi Module WFM60-SFP202
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  
Jeong Ho Kim

(signature)

Technical Manager  
Jong Seok Lee

(signature)

HCT CO., LTD.

Soo Chan Lee

SooChan Lee / CEO  
Accredited by KOLAS, Republic of KOREA

## REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	November 19, 2019	Initial Release

### Engineering Statement:

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

This laboratory is not accredited for the test results marked \*.

The above Test Report is the accredited test result by KOLAS(Korea Laboratory Accreditation Scheme), which signed the ILAC-MRA. (HCT Accreditation No.: KT197)

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**1. EUT DESCRIPTION**

Model	WFM60-SFP202	
EUT Type	Wi-Fi Module	
Power Supply	DC 5.0 V	
Frequency Range	2412 MHz - 2462 MHz	
Max. RF Output Power	<u>Peak Power</u>	802.11b: 20.67 dBm 802.11g: 24.09 dBm 802.11n(HT20): 23.90 dBm
	<u>Average Power</u>	802.11b: 17.29 dBm 802.11g: 17.53 dBm 802.11n(HT20): 17.24 dBm
Modulation Type	DSSS/CCK : 802.11b OFDM : 802.11g, 802.11n(HT20)	
Number of Channels	11 Channels	
Antenna Specification	Antenna type: PCB Antenna Peak Gain : 2.65 dBi (Frequency range : 2412 MHz ~ 2462 MHz)	
Date(s) of Tests	October 10, 2019 ~ November 12, 2019	
PMN(Product Marketing Number)	WFM60-SFP202	
HVIN(Hardware Version Identification Number)	WFM60-SFP202	
FVIN(Firmware Version Identification Number)	4749	
HMN(Host Marketing Name)	N/A	

## 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.

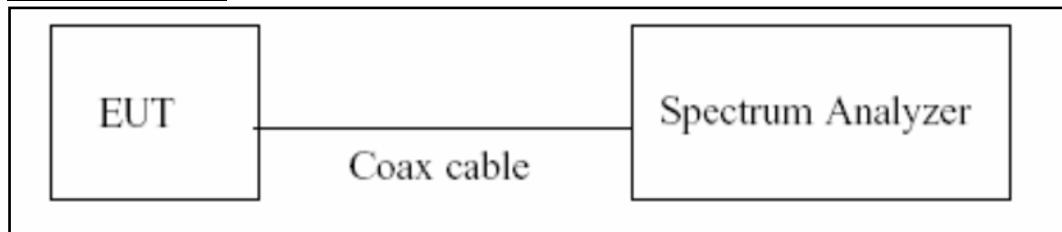
The measurement data shown herein meets or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

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  $> 50/T$ .

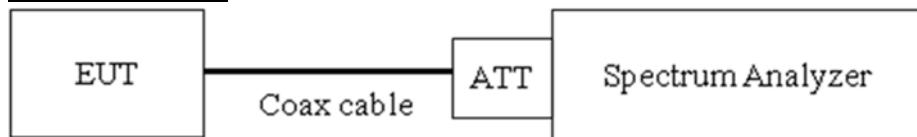
1. RBW = 8 MHz (the largest available value)
2. VBW = 8 MHz ( $\geq$  RBW)
3. SPAN = 0 Hz
4. Detector = Peak
5. Number of points in sweep  $> 100$
6. Trace mode = Clear write
7. Measure  $T_{total}$  and  $T_{on}$
8. Calculate Duty Cycle =  $T_{on}/T_{total}$  and Duty Cycle Factor =  $10\log(1/\text{Duty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

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

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

The transmitter output is connected to the spectrum analyzer.

RBW = 1% ~ 5% of the occupied bandwidth

VBW  $\approx$  3 x RBW

Detector = Peak

Trace mode = max hold

Sweep = auto couple

Allow the trace to stabilize

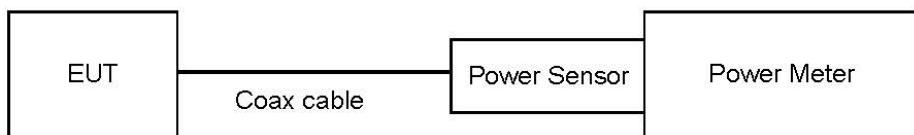
Note : We tested OBW using the automatic bandwidth measurement capability of a spectrum analyzer.

### 7.3. Output Power

#### Limit

The maximum permissible conducted output power is 1 Watt.

#### Test Configuration



#### Test Procedure

The transmitter output is connected to the Power Meter.

- Peak Power (Procedure 11.9.1.3 in ANSI 63.10-2013)
  - : Measure the peak power of the transmitter.
  
- Average Power (Procedure 11.9.2.3 in ANSI 63.10-2013)
  - 1) Measure the duty cycle.
  - 2) Measure the average power of the transmitter. This measurement is an average over both the on and off periods of the transmitter.
  - 3) Add  $10 \log (1/x)$ , where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times.

#### Sample Calculation

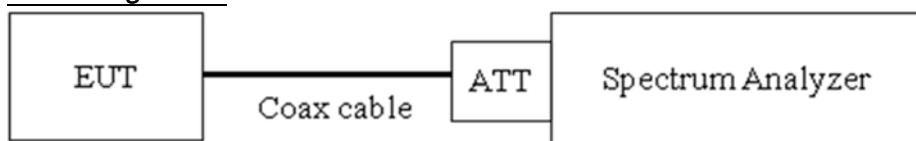
- Conducted Output Power(Peak) = Reading Value + ATT loss + Cable loss
- Conducted Output Power(Average) = Reading Value + ATT loss + Cable loss + Duty Cycle Factor

#### 7.4. Power Spectral Density

##### Limit

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

##### Test Configuration



##### Test Procedure

The transmitter output is connected to the Spectrum Analyzer.

We tested according to Procedure 8.4 in KDB 558074 v05r02, Procedure 11.10 in ANSI 63.10-2013.

The spectrum analyzer is set to :

- 1) Set analyzer center frequency to DTS channel center frequency.
- 2) Span = 1.5 times the DTS channel bandwidth.
- 3) RBW = 3 kHz ≤ RBW ≤ 100 kHz.
- 4) VBW ≥ 3 x RBW.
- 5) Sweep = auto couple
- 6) Detector = peak
- 7) Trace Mode = max hold
- 8) Allow trace to fully stabilize.
- 9) Use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

##### Sample Calculation

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

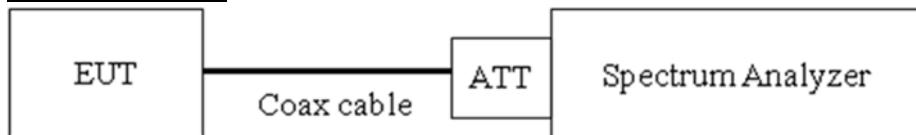
## 7.5. Conducted Band Edge(Out of Band Emissions) & Conducted Spurious Emissions

### Limit

The maximum conducted (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	10.09
100	10.12
200	10.17
300	10.22
400	10.25
500	10.26
600	10.26
700	10.28
800	10.29
900	10.31
1000	10.32
2000	10.46
2400	10.50
2500	10.52
3000	10.57
4000	10.65
5000	10.76
6000	10.78
7000	10.85
8000	10.90
9000	10.96
10000	11.02
11000	11.07
12000	11.15
13000	11.24
14000	11.21
15000	11.26
16000	11.27
17000	11.30
18000	11.35
19000	11.37
20000	11.41
21000	11.53
22000	11.60
23000	11.60
24000	11.64
25000	11.73
26000	11.74

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

2. Factor = Attenuator loss + Cable loss

**7.6. Radiated Test****Limit****FCC**

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

**IC**

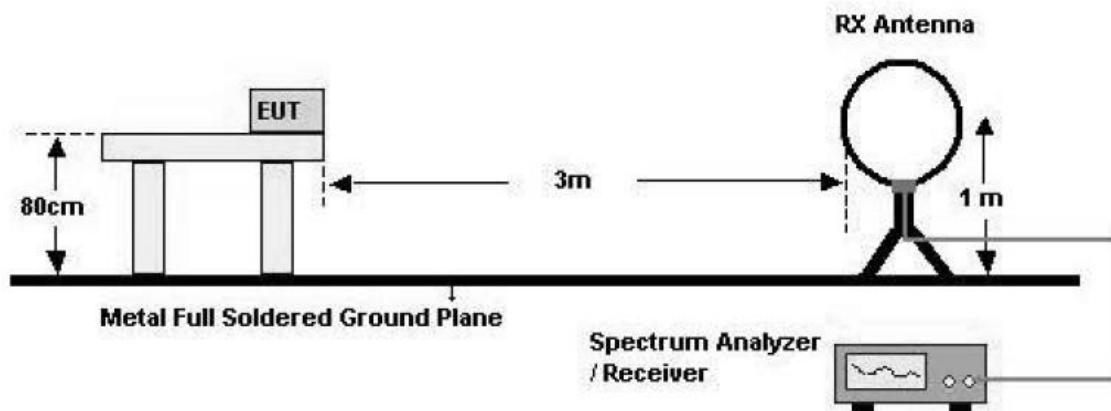
Frequency (MHz)	Field Strength (uA/m)	Measurement Distance (m)
0.009 – 0.490	6.37/F(kHz)	300
0.490 – 1.705	63.7/F(kHz)	30
1.705 – 30	0.08	30

**FCC&IC**

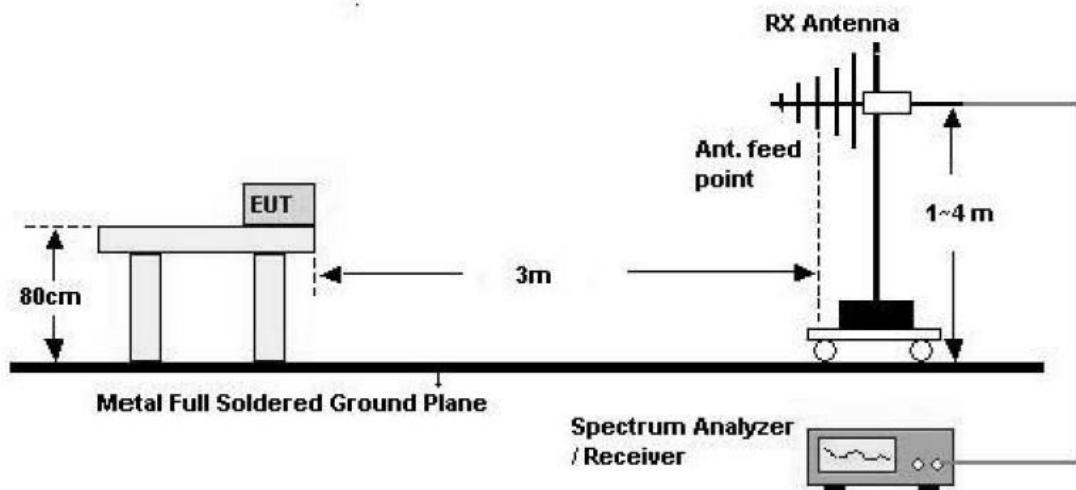
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Test Configuration

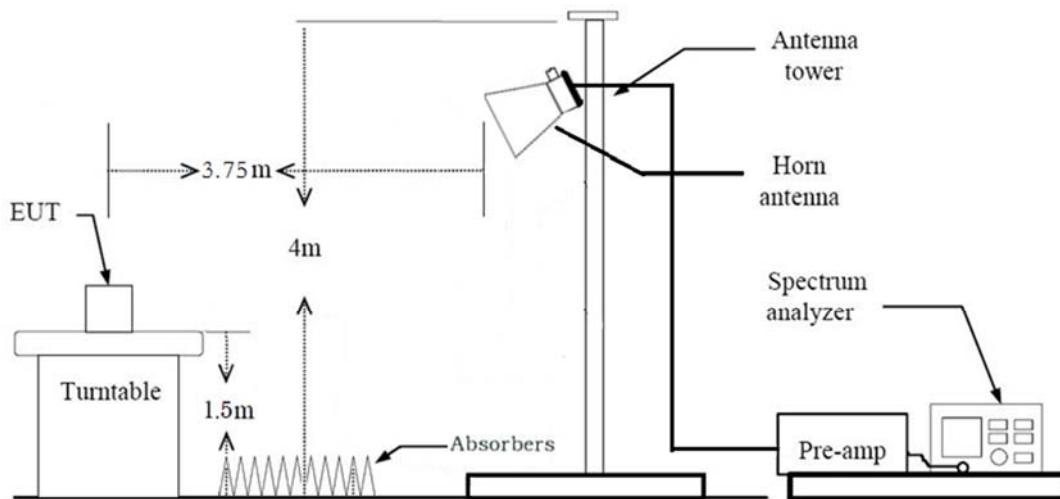
Below 30 MHz



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( $0.009 \text{ MHz} - 0.490 \text{ MHz}$ ) =  $40\log(3 \text{ m}/300 \text{ m}) = -80 \text{ dB}$   
Measurement Distance : 3 m
7. Distance Correction Factor( $0.490 \text{ MHz} - 30 \text{ MHz}$ ) =  $40\log(3 \text{ m}/30 \text{ m}) = -40 \text{ dB}$   
Measurement Distance : 3 m
8. Spectrum Setting
  - Frequency Range = 9 kHz ~ 30 MHz
  - Detector = Peak
  - Trace = Maxhold
  - RBW = 9 kHz
  - VBW  $\geq 3 \times \text{RBW}$
9. Total = Reading Value + Antenna Factor(A.F) + Cable Loss(C.L) + Distance Factor(D.F)

**KDB 414788 OFS and Chamber Correlation Justification**

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

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

**Test Procedure of Radiated spurious emissions(Below 1GHz)**

1. The EUT was placed on a non-conductive table located on semi-anechoic chamber.
2. The EUT is placed on a turntable, which is 0.8m above ground plane.
3. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
4. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
5. Spectrum Setting
  - (1) Measurement Type(Peak):
    - Measured Frequency Range : 30 MHz – 1 GHz
    - Detector = Peak
    - Trace = Maxhold
    - RBW = 100 kHz
    - VBW  $\geq$  3 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)

**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 (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).
  - (3) Measurement Type(Average): Duty cycle  $< 98\%$ , duty cycle variations are less than  $\pm 2\%$ 
    - Measured Frequency Range : 1 GHz – 25 GHz
    - Detector = RMS
    - Averaging type = power (*i.e.*, RMS)
    - RBW = 1 MHz
    - VBW  $\geq 3 \times$  RBW

- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

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

11. Total(Measurement Type : Peak)

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

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

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

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

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

+ Duty Cycle Factor

**Test Procedure of Radiated Restricted Band Edge**

1. The EUT is placed on a turntable, which is 1.5 m above ground plane.
2. We have done x, y, z planes in EUT and horizontal and vertical polarization in detecting antenna.
3. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
4. EUT is set 3.75 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
5. According to SVSWR requirement in ANSI 63.4-2014, We performed the radiated test at 3.75 m distance from center of turn table. So, we applied the distance factor( reference distance : 3 m).
  - ◆ Distance extrapolation factor =  $20\log(\text{test distance} / \text{specific distance})$  (dB)
6. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
7. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
8. The unit was tested with its standard battery.
9. Spectrum Setting
  - (1) Measurement Type(Peak):
    - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
    - Detector = Peak
    - Trace = Maxhold
    - RBW = 1 MHz
    - VBW  $\geq 3 \times$  RBW
  - (2) Measurement Type(Average): Duty cycle  $\geq 98\%$ ,
    - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
    - Detector = RMS
    - Averaging type = power (*i.e.*, RMS)
    - RBW = 1 MHz
    - VBW  $\geq 3 \times$  RBW
    - Sweep time = auto.
    - Trace mode = average (at least 100 traces).
  - (3) Measurement Type(Average): Duty cycle  $< 98\%$ , duty cycle variations are less than  $\pm 2\%$ 
    - Measured Frequency Range : 2310 MHz ~ 2390 MHz/ 2483.5 MHz ~ 2500 MHz
    - Detector = RMS
    - Averaging type = power (*i.e.*, RMS)
    - RBW = 1 MHz
    - VBW  $\geq 3 \times$  RBW

- Sweep time = auto.
- Trace mode = average (at least 100 traces).
- Correction factor shall be added to the measurement results prior to comparing to the emission limit in order to compute the emission level that would have been measured had the test been performed at 100 percent duty cycle.
- Duty Cycle Factor (dB) : Please refer to the please refer to section 9.1.

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

11. Total(Measurement Type : Peak)

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

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

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

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

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

## 7.7. AC Power line Conducted Emissions

### Limit

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

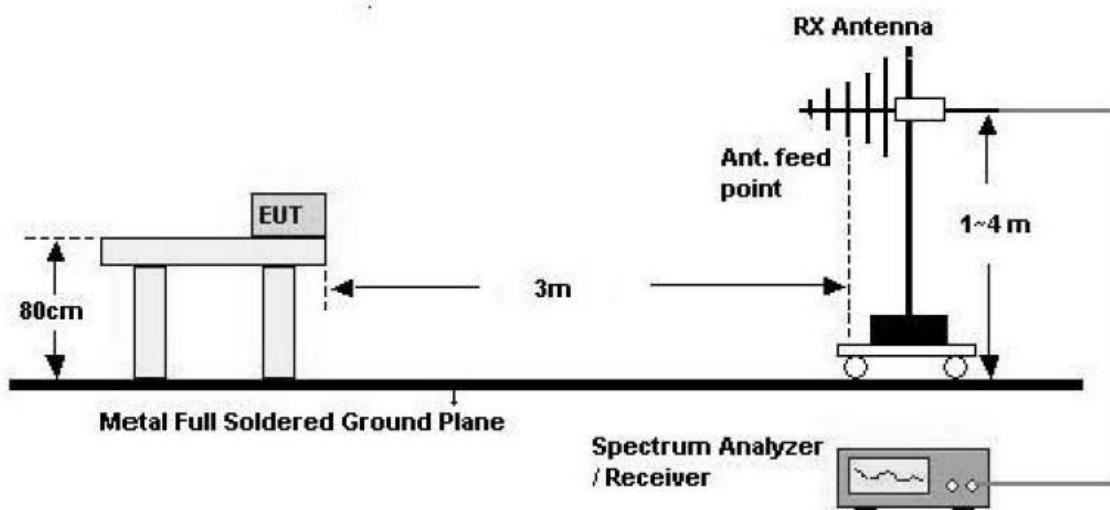
Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Note:

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

### Test Configuration

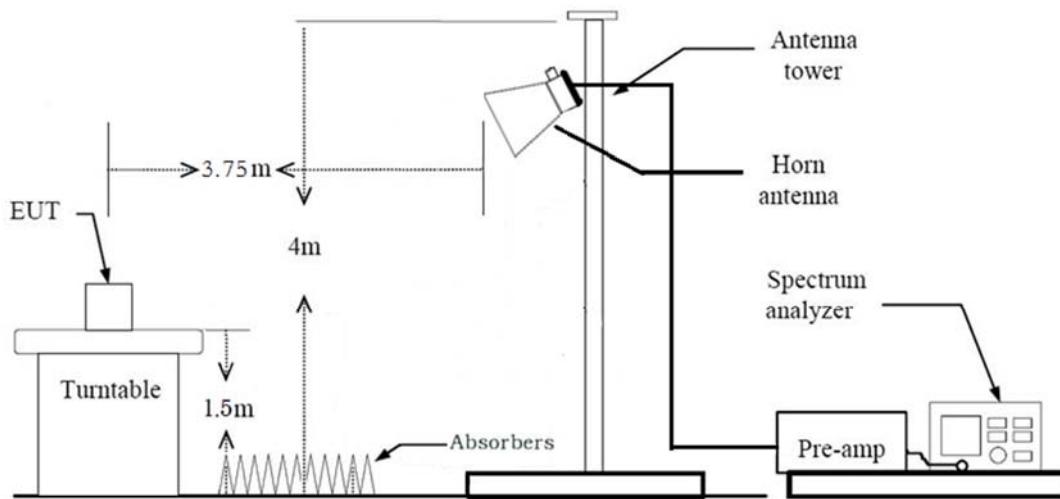
30 MHz - 1 GHz



**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 x RBW

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

### 2. EUT Axis

- Radiated Spurious Emissions : Z-H

- Radiated Restricted Band Edge : 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.

- Mode : Stand alone

### Conducted test

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

## 8. SUMMARY TEST OF RESULTS

### FCC Part

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

**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	PASS
Receiver Spurious Emissions	RSS-GEN, 7	cf. Section 7.8		PASS
Radiated Restricted Band Edge	RSS-GEN, 8.10	cf. Section 7.6		PASS

## 9. TEST RESULT

### 9.1 DUTY CYCLE

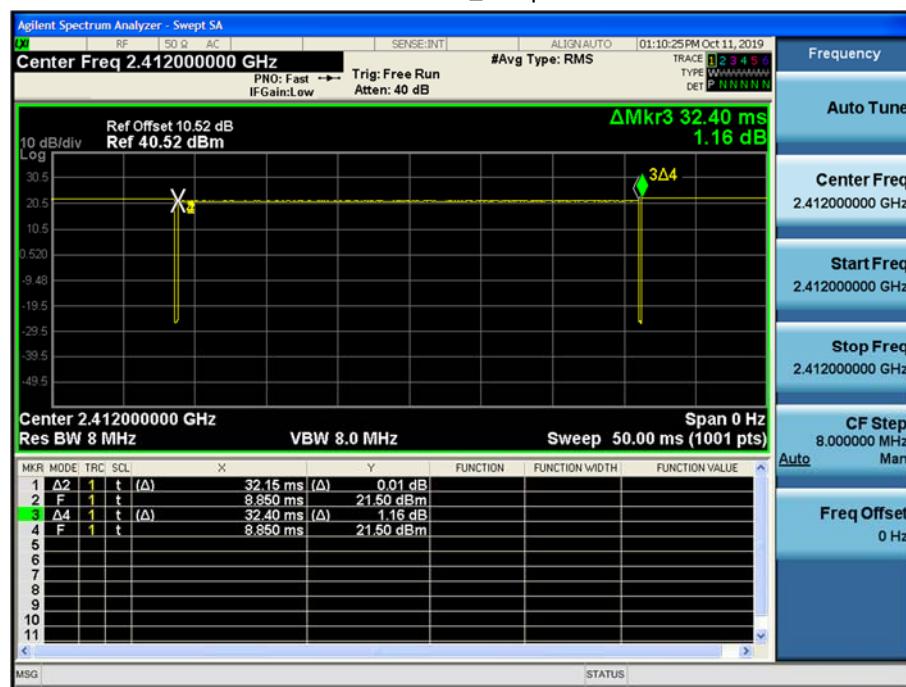
Mode	T <sub>on</sub> (ms)	T <sub>total</sub> (ms)	Duty Cycle	Duty Cycle Factor (dB)
802.11b	32.15	32.40	0.99	0.03
802.11g	5.35	5.43	0.99	0.06
802.11n (HT20)	4.72	4.80	0.98	0.07

**Note:**

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

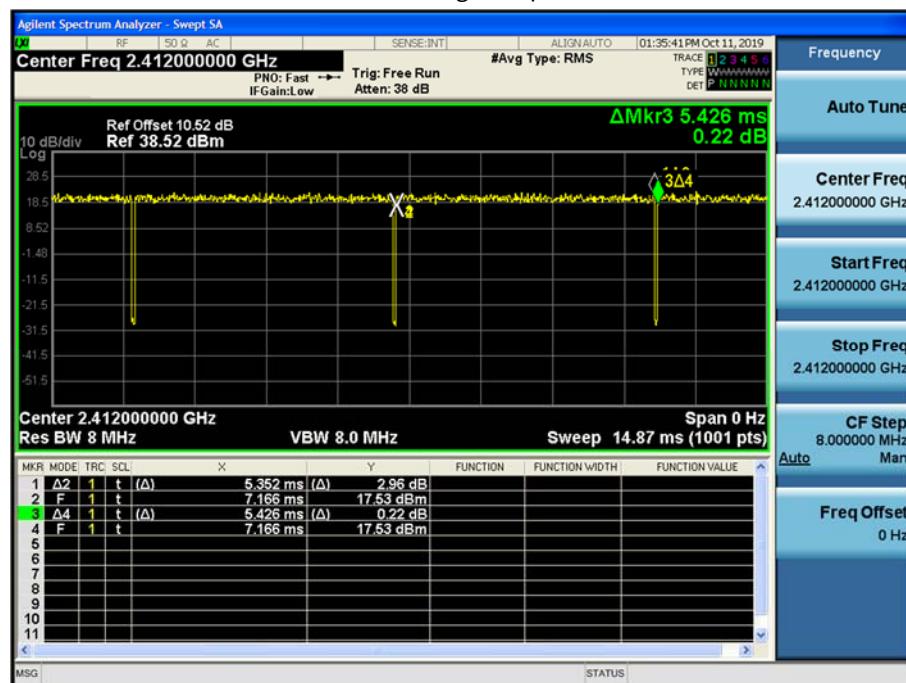
Test Plots

802.11b\_1Mbps

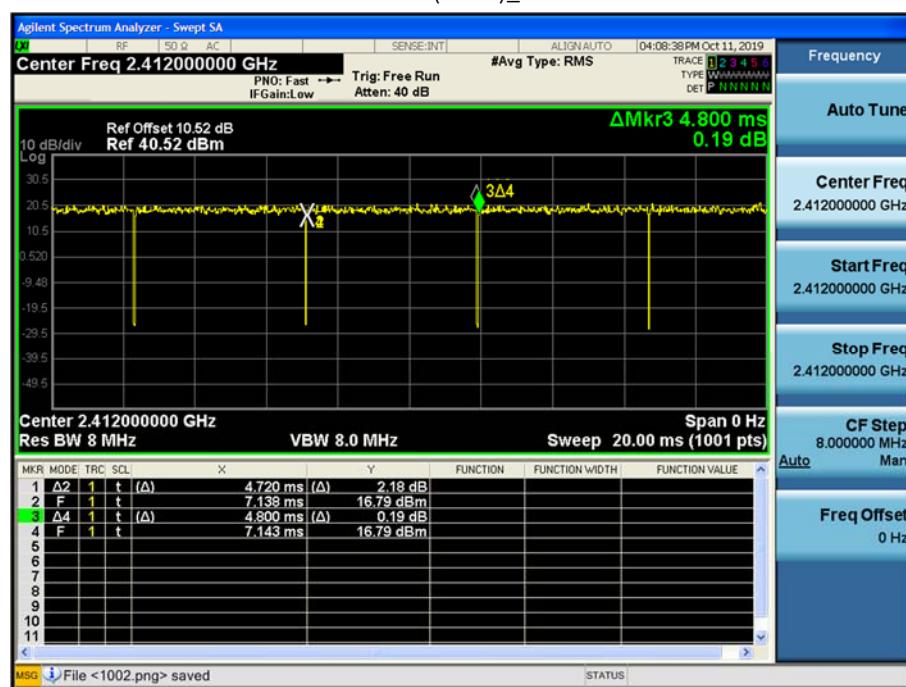


□ Test Plots

802.11g\_6Mbps



802.11n(HT20)\_MCS0



**9.2 6dB BANDWIDTH & 99 % BANDWIDTH**

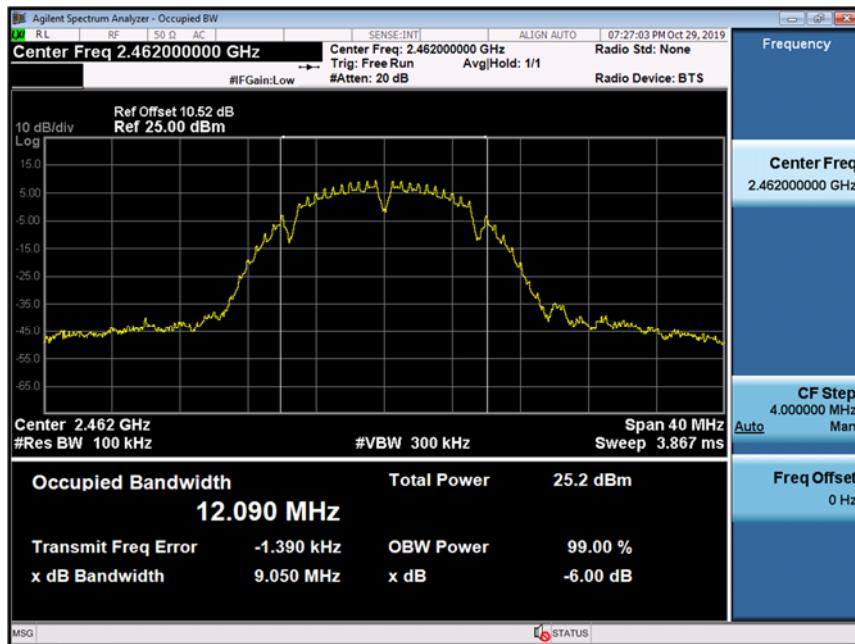
802.11b Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	9.061	0.5
2437	6	9.064	0.5
2462	11	9.050	0.5

802.11g Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.359	0.5
2437	6	16.342	0.5
2462	11	16.292	0.5

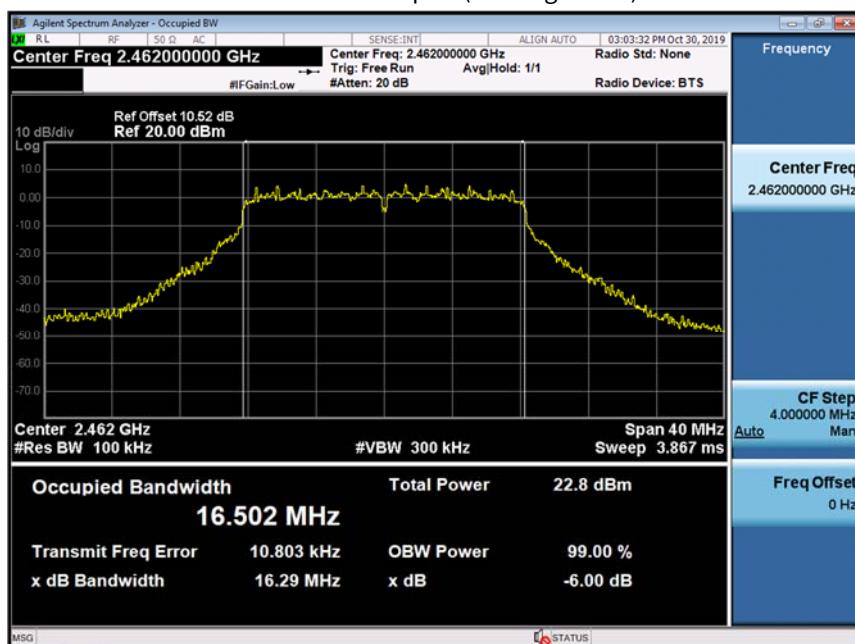
802.11n Mode		Measured Bandwidth [MHz]	Minimum Bandwidth [MHz]
Frequency [MHz]	Channel No.		
2412	1	16.357	0.5
2437	6	16.346	0.5
2462	11	16.308	0.5

Test Plots

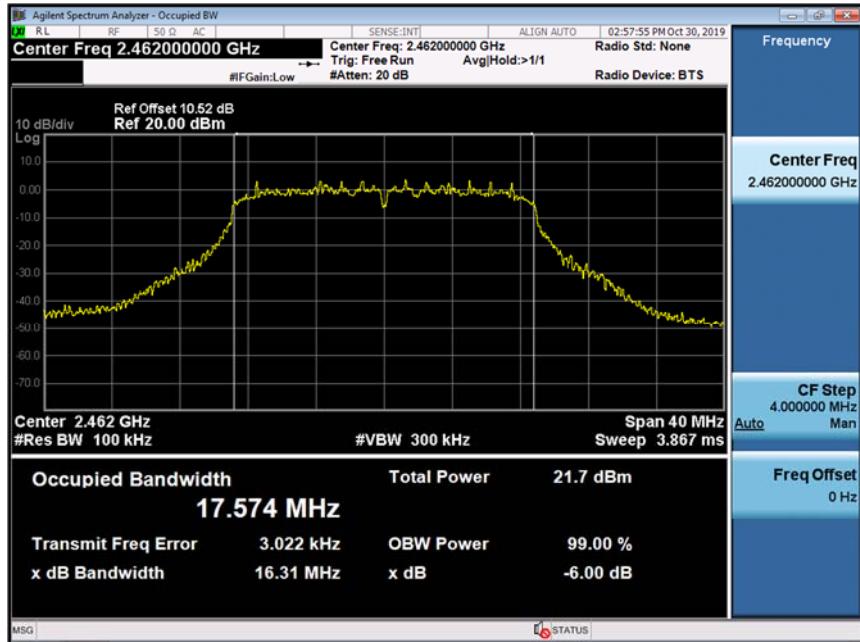
6dB Bandwidth plot (802.11b-CH 11)



6dB Bandwidth plot (802.11g-CH 11)



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

**Note:**

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

IC

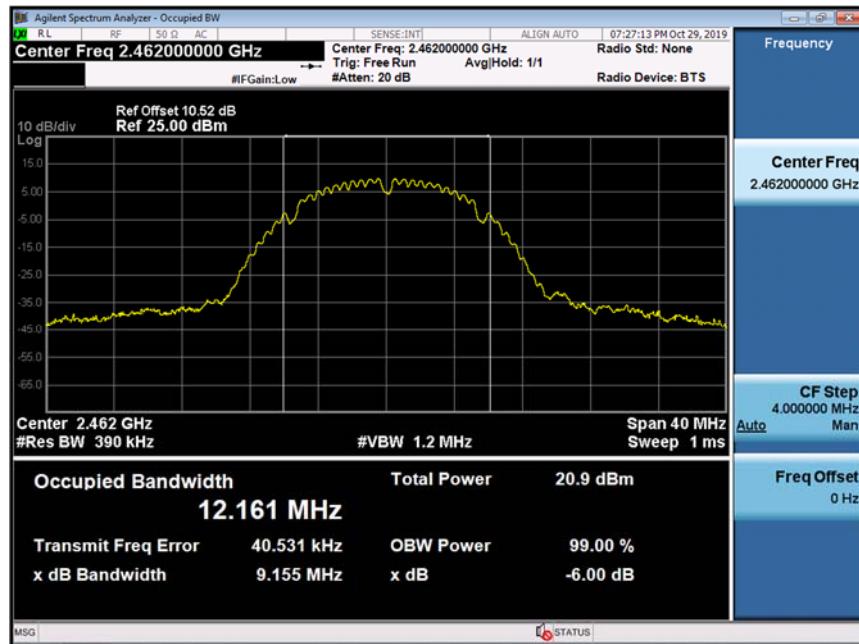
802.11b Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	12.142	N/A
2437	6	12.111	N/A
2462	11	12.161	N/A

802.11g Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	17.296	N/A
2437	6	17.314	N/A
2462	11	17.181	N/A

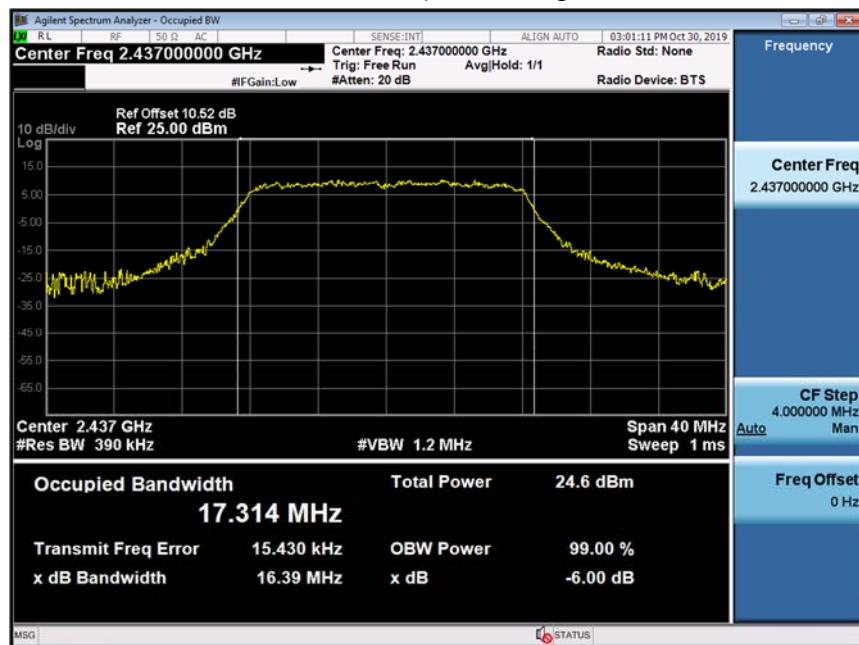
802.11n(HT20) Mode		OBW Bandwidth [MHz]	Limit [MHz]
Frequency [MHz]	Channel No.		
2412	1	18.036	N/A
2437	6	18.083	N/A
2462	11	17.981	N/A

**□ Test Plots**

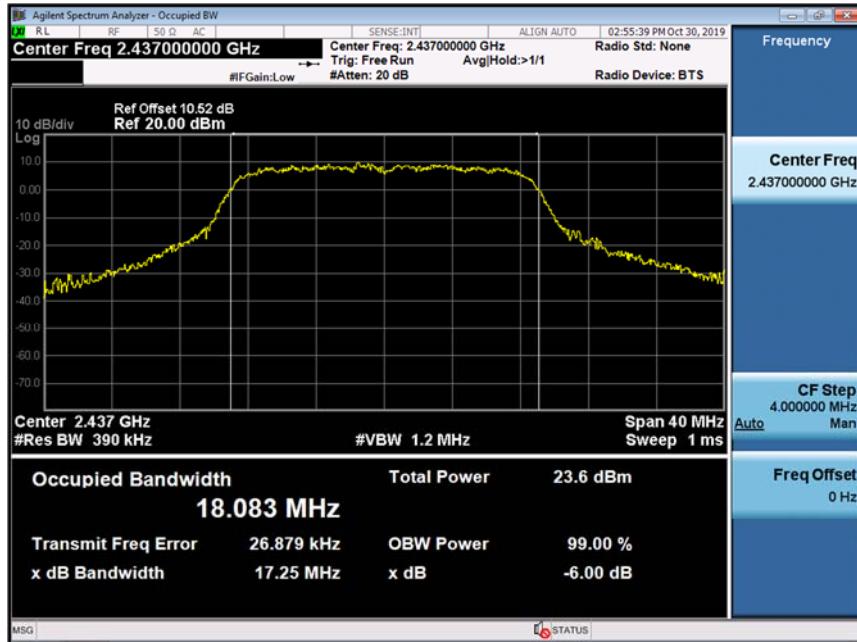
99% Bandwidth plot (802.11b-CH 11)



99% Bandwidth plot (802.11g-CH 6)



99% Bandwidth plot (802.11n\_HT20-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 twentieth dB.  
So, 10.52 dB is offset for 2.4 GHz Band

802.11b Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	1	20.57	30
		2	20.61	30
		5.5	20.43	30
		11	20.60	30
2437	6	1	20.26	30
		2	20.15	30
		5.5	20.01	30
		11	20.23	30
2462	11	1	20.42	30
		2	20.56	30
		5.5	20.37	30
		11	20.67	30

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6	23.39	30
		9	24.09	30
		12	24.03	30
		18	23.97	30
		24	23.90	30
		36	23.82	30
		48	23.51	30
		54	23.53	30
2417	2	6	22.98	30
		9	23.99	30
		12	24.01	30
		18	23.91	30
		24	23.88	30
		36	23.92	30
		48	23.49	30
		54	23.50	30
2422	3	6	23.02	30
		9	23.88	30
		12	23.98	30
		18	23.91	30
		24	23.84	30
		36	23.87	30
		48	23.40	30
		54	23.48	30
2437	6	6	24.05	30
		9	24.02	30
		12	23.99	30
		18	23.93	30
		24	23.82	30
		36	23.92	30
		48	23.46	30
		54	23.53	30
2452	9	6	23.12	30
		9	23.98	30
		12	23.96	30
		18	23.91	30
		24	23.86	30
		36	23.87	30
		48	23.51	30
		54	23.48	30

802.11g Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2457	10	6	22.80	30
		9	23.98	30
		12	24.01	30
		18	23.85	30
		24	23.80	30
		36	23.93	30
		48	23.50	30
		54	23.40	30
2462	11	6	22.98	30
		9	23.94	30
		12	24.00	30
		18	24.01	30
		24	23.80	30
		36	23.82	30
		48	23.78	30
		54	23.35	30

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2412	1	6	22.84	30
		9	23.45	30
		12	23.61	30
		18	23.22	30
		24	23.40	30
		36	22.98	30
		48	23.22	30
		54	23.23	30
2417	2	6	22.75	30
		9	23.46	30
		12	23.60	30
		18	23.22	30
		24	23.32	30
		36	22.94	30
		48	23.18	30
		54	23.22	30
2422	3	6	23.47	30
		9	23.38	30
		12	23.60	30
		18	23.24	30
		24	23.39	30
		36	22.97	30
		48	23.19	30
		54	23.24	30
2437	6	6	23.51	30
		9	23.27	30
		12	23.52	30
		18	23.08	30
		24	23.20	30
		36	22.81	30
		48	23.08	30
		54	23.09	30
2452	9	6	23.60	30
		9	23.43	30
		12	23.65	30
		18	23.33	30
		24	23.57	30
		36	23.22	30
		48	23.26	30
		54	23.25	30

802.11n Mode		Rate (Mbps)	Measured Power(dBm)	Limit (dBm)
Frequency[MHz]	Channel No.			
2457	10	6	23.30	30
		9	23.48	30
		12	23.73	30
		18	23.39	30
		24	23.60	30
		36	23.17	30
		48	23.34	30
		54	23.32	30
2462	11	6	23.01	30
		9	23.72	30
		12	23.90	30
		18	23.54	30
		24	23.64	30
		36	23.17	30
		48	23.41	30
		54	23.34	30

**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 twentieth dB.  
So, 10.52 dB is offset for 2.4 GHz Band.
3. Test was performed with continuous Tx.

802.11b Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	1	17.25	0.034	17.28	30
		2	17.22	0.067	17.29	30
		5.5	17.03	0.145	17.17	30
		11	16.95	0.305	17.26	30
2437	6	1	16.75	0.034	16.78	30
		2	16.73	0.067	16.80	30
		5.5	16.52	0.145	16.66	30
		11	16.45	0.305	16.76	30
2462	11	1	17.20	0.034	17.23	30
		2	17.15	0.067	17.22	30
		5.5	17.02	0.145	17.16	30
		11	16.95	0.305	17.26	30

802.11g Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6	15.82	0.060	15.88	30
		9	17.14	0.089	17.23	30
		12	17.33	0.118	17.45	30
		18	17.28	0.145	17.42	30
		24	17.15	0.234	17.38	30
		36	16.25	0.356	16.61	30
		48	15.50	0.416	15.92	30
		54	14.75	0.462	15.21	30
2417	2	6	15.50	0.060	15.56	30
		9	16.95	0.089	17.04	30
		12	17.19	0.118	17.31	30
		18	17.10	0.145	17.24	30
		24	17.03	0.234	17.26	30
		36	16.18	0.356	16.54	30
		48	15.40	0.416	15.82	30
		54	14.76	0.462	15.22	30
2422	3	6	15.40	0.060	15.46	30
		9	16.89	0.089	16.98	30
		12	17.10	0.118	17.22	30
		18	17.05	0.145	17.19	30
		24	16.88	0.234	17.11	30
		36	16.04	0.356	16.40	30
		48	15.22	0.416	15.64	30
		54	14.55	0.462	15.01	30
2437	6	6	17.38	0.060	17.44	30
		9	17.06	0.089	17.15	30
		12	17.15	0.118	17.27	30
		18	17.05	0.145	17.19	30

		24	16.92	0.234	17.15	30
		36	16.10	0.356	16.46	30
		48	15.28	0.416	15.70	30
		54	14.55	0.462	15.01	30
2452	9	6	15.84	0.060	15.90	30
		9	17.33	0.089	17.42	30
		12	17.41	0.118	17.53	30
		18	17.32	0.145	17.46	30
		24	17.25	0.234	17.48	30
		36	16.42	0.356	16.78	30
		48	15.64	0.416	16.06	30
		54	14.92	0.462	15.38	30
2457	10	6	15.38	0.060	15.44	30
		9	17.02	0.089	17.11	30
		12	17.27	0.118	17.39	30
		18	17.24	0.145	17.38	30
		24	17.18	0.234	17.41	30
		36	16.35	0.356	16.71	30
		48	15.51	0.416	15.93	30
		54	14.86	0.462	15.32	30
2462	11	6	15.46	0.060	15.52	30
		9	16.97	0.089	17.06	30
		12	17.18	0.118	17.30	30
		18	17.12	0.145	17.26	30
		24	17.10	0.234	17.33	30
		36	16.24	0.356	16.60	30
		48	15.46	0.416	15.88	30
		54	14.76	0.462	15.22	30

802.11n Mode		Rate (Mbps)	Measured Power (dBm)	Duty Cycle Factor	Measured Power(dBm) + Duty Cycle Factor	Limit (dBm)
Frequency [MHz]	Channel No.					
2412	1	6	15.25	0.073	15.32	30
		9	16.84	0.144	16.98	30
		12	16.65	0.198	16.85	30
		18	16.68	0.256	16.94	30
		24	16.61	0.336	16.95	30
		36	15.83	0.437	16.27	30
		48	15.25	0.512	15.76	30
		54	14.04	0.562	14.60	30
2417	2	6	15.28	0.073	15.35	30
		9	16.70	0.144	16.84	30
		12	16.57	0.198	16.77	30
		18	16.54	0.256	16.80	30
		24	16.42	0.336	16.76	30
		36	15.71	0.437	16.15	30
		48	15.18	0.512	15.69	30
		54	13.90	0.562	14.46	30
2422	3	6	16.78	0.073	16.85	30
		9	16.62	0.144	16.76	30
		12	16.50	0.198	16.70	30
		18	16.48	0.256	16.74	30
		24	16.32	0.336	16.66	30
		36	15.67	0.437	16.11	30
		48	15.10	0.512	15.61	30
		54	13.83	0.562	14.39	30
2437	6	6	17.04	0.073	17.11	30
		9	16.27	0.144	16.41	30
		12	16.24	0.198	16.44	30
		18	16.25	0.256	16.51	30

		24	16.05	0.336	16.39	30
		36	15.43	0.437	15.87	30
		48	14.82	0.512	15.33	30
		54	13.54	0.562	14.10	30
2452	9	6	17.15	0.073	17.22	30
		9	16.93	0.144	17.07	30
		12	16.90	0.198	17.10	30
		18	16.92	0.256	17.18	30
		24	16.90	0.336	17.24	30
		36	16.03	0.437	16.47	30
		48	15.46	0.512	15.97	30
		54	14.18	0.562	14.74	30
2457	10	6	15.88	0.073	15.95	30
		9	16.78	0.144	16.92	30
		12	16.95	0.198	17.15	30
		18	16.89	0.256	17.15	30
		24	16.76	0.336	17.10	30
		36	16.05	0.437	16.49	30
		48	15.44	0.512	15.95	30
		54	14.15	0.562	14.71	30
2462	11	6	15.52	0.073	15.59	30
		9	17.05	0.144	17.19	30
		12	17.03	0.198	17.23	30
		18	16.98	0.256	17.24	30
		24	16.86	0.336	17.20	30
		36	16.09	0.437	16.53	30
		48	15.47	0.512	15.98	30
		54	14.18	0.562	14.74	30

#### 9.4 POWER SPECTRAL DENSITY

Mode	Frequency (MHz)	Channel No.	Test Result	
			Measured PSD (dBm)	Limit (dBm)
802.11b	2412	1	-3.722	8
	2437	6	-5.365	
	2462	11	-5.460	
802.11g	2412	1	-6.960	-6.537
	2437	6	-6.065	
	2462	11		
802.11n(HT20)	2412	1		-7.709
	2437	6		-8.116
	2462	11		-7.622

**Note :**

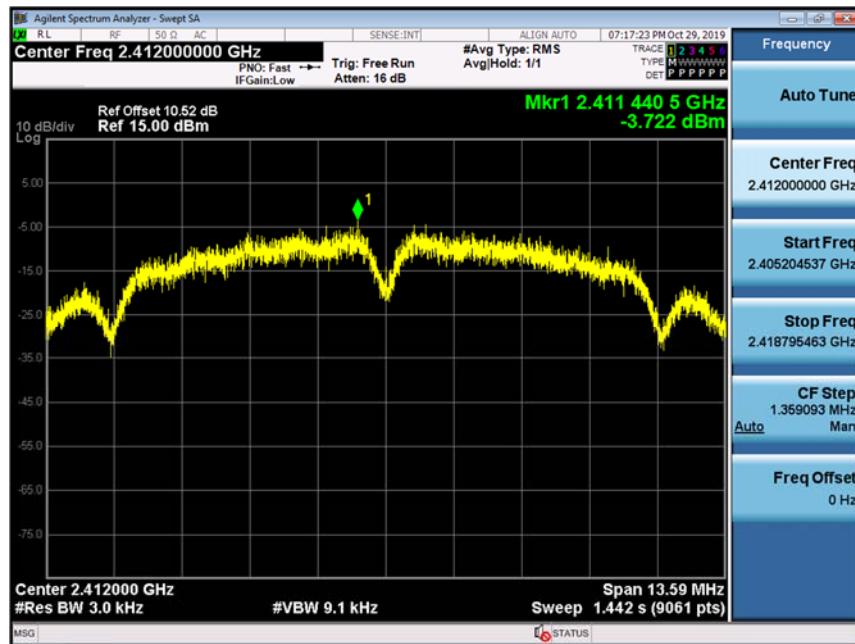
1. Spectrum reading values are not plot data.

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

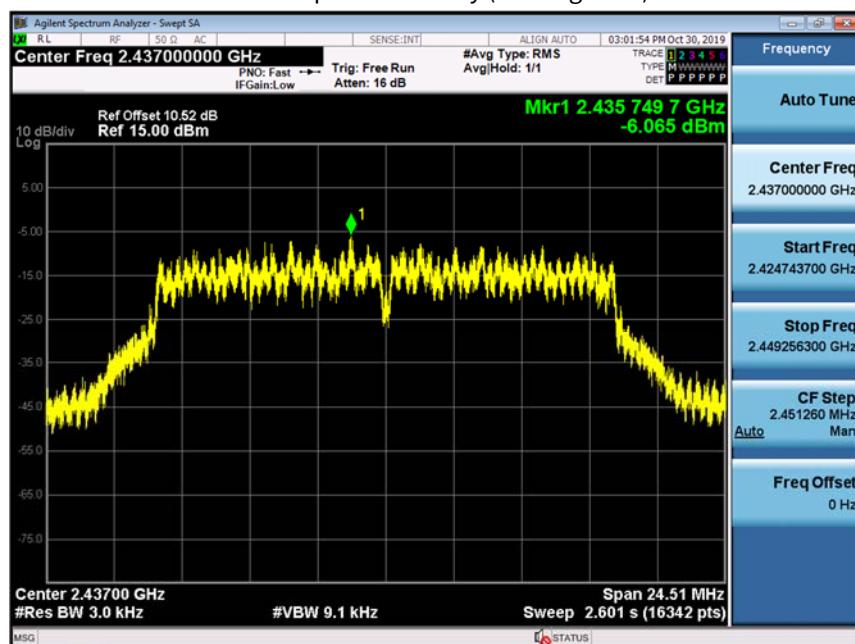
2. Spectrum offset = Attenuator loss + Cable loss
3. 10.52 dB is offset for 2.4 GHz Band.

**□ Test Plots**

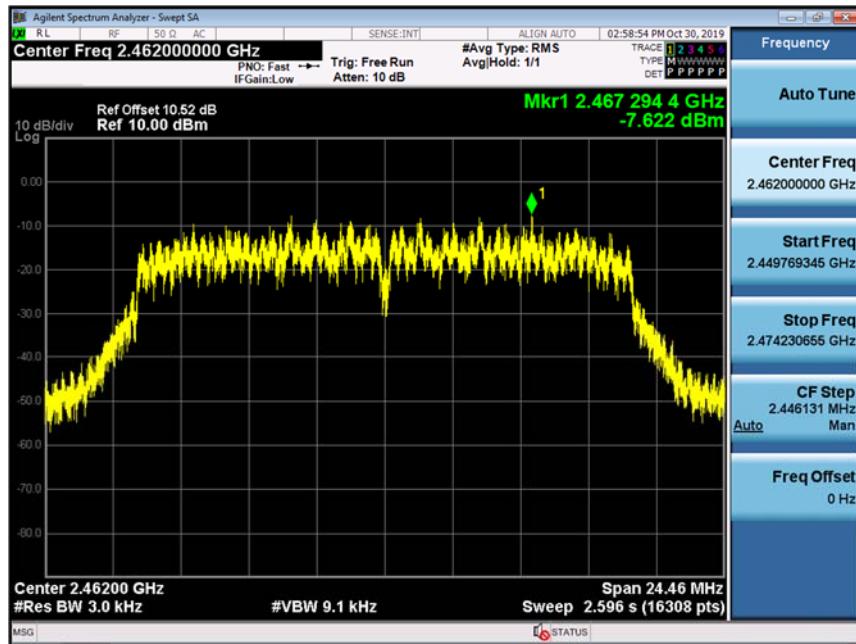
Power Spectral Density (802.11b-CH 1)



Power Spectral Density (802.11g-CH 6)



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

**Note :**

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

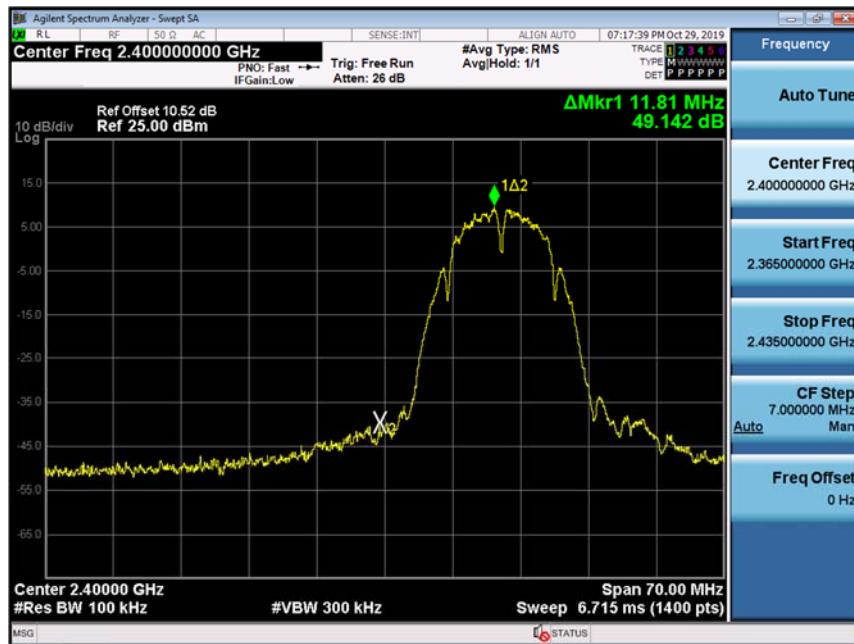
**9.5 BAND EDGE/ CONDUCTED SPURIOUS EMISSIONS**

Test Result : please refer to the plot below.

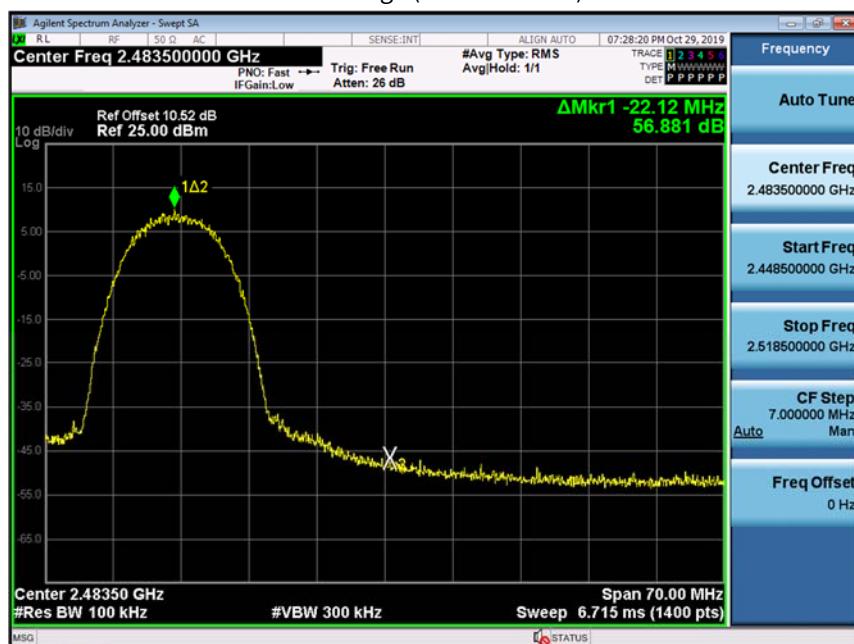
In order to simplify the report, attached plots were only the worst case channel and data rate.

□ Test Plots(BandEdge)

Band Edge (802.11b-CH1)



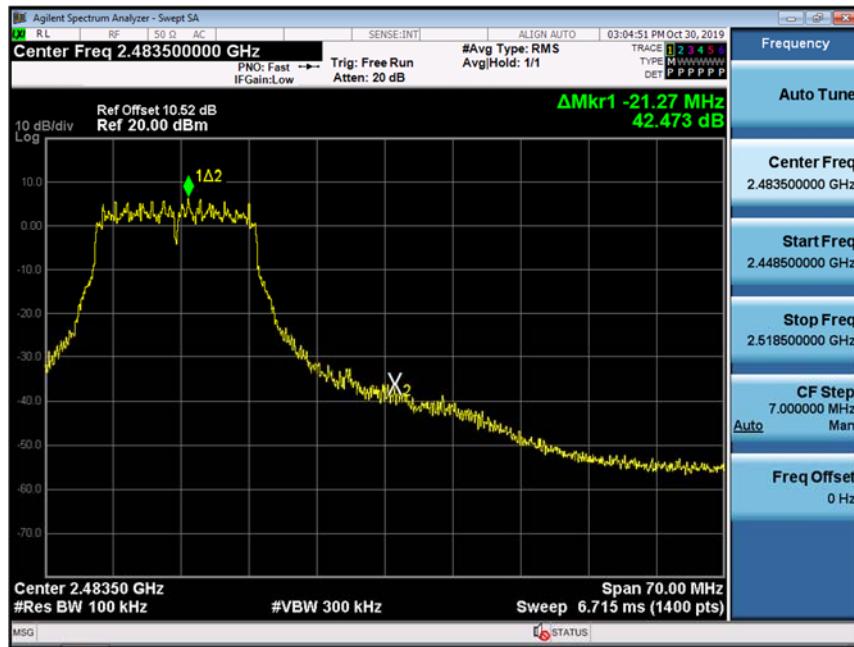
Band Edge (802.11b-CH11)



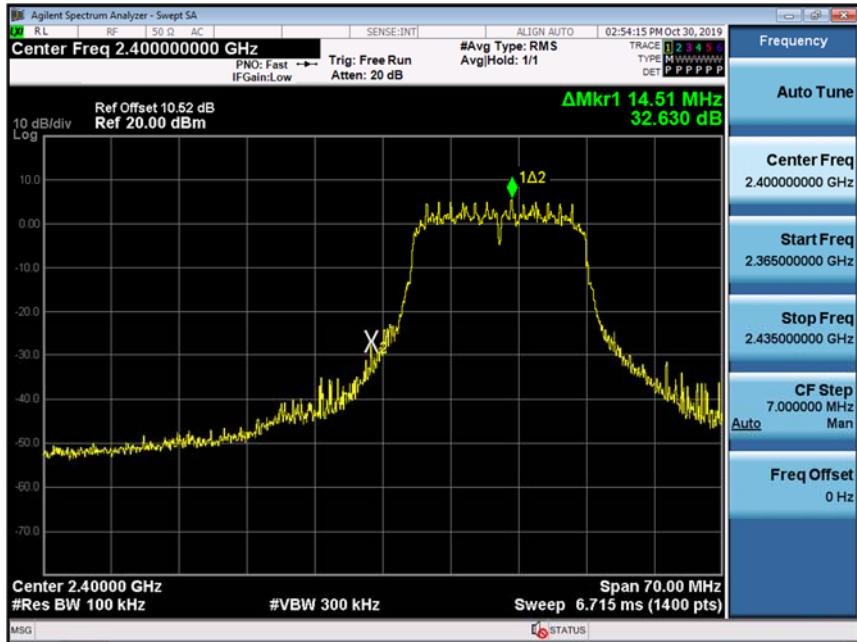
## Band Edge (802.11g-CH1)



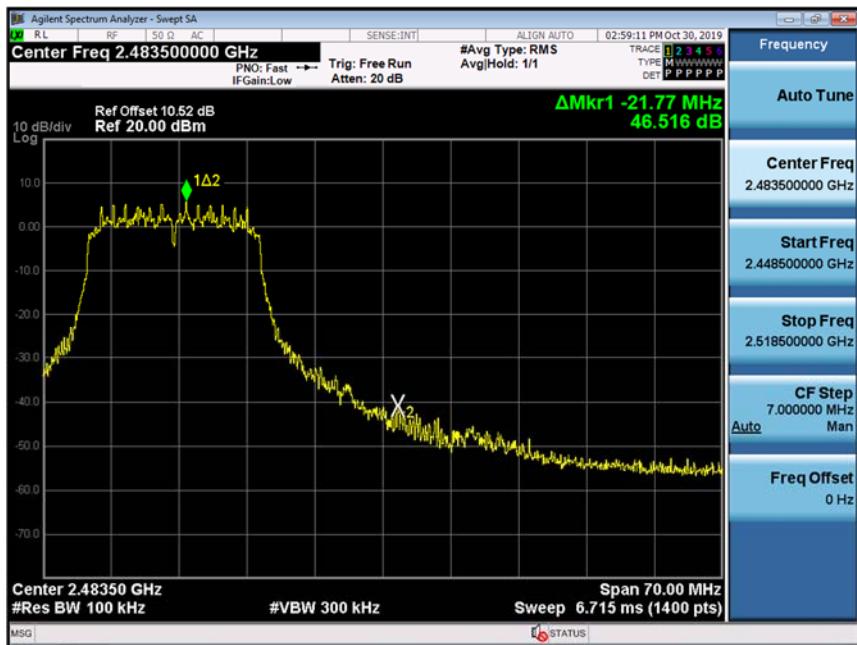
## Band Edge (802.11g-CH11)



## Band Edge (802.11n\_HT20 -CH1)



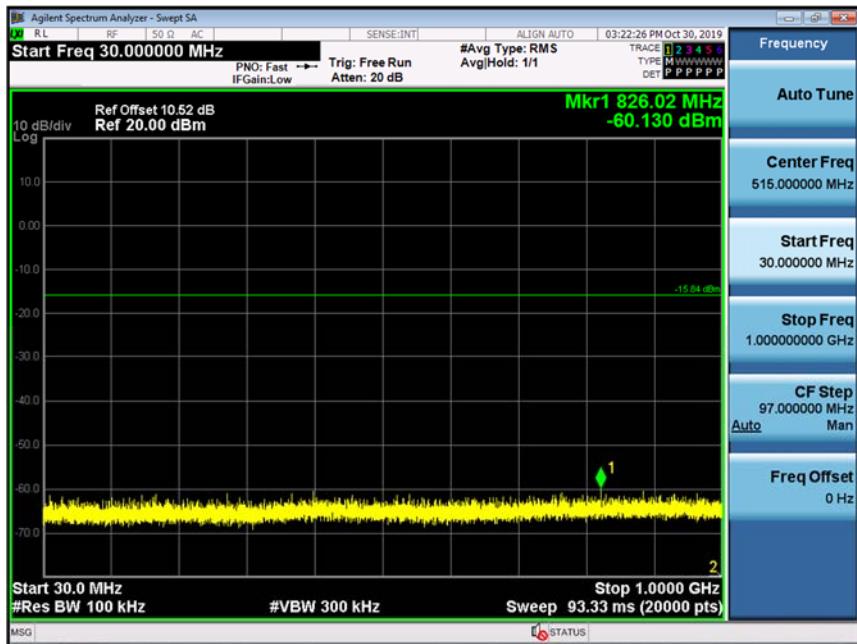
## Band Edge (802.11n\_HT20 -CH11)



## Test Plots(Conducted Spurious Emission)

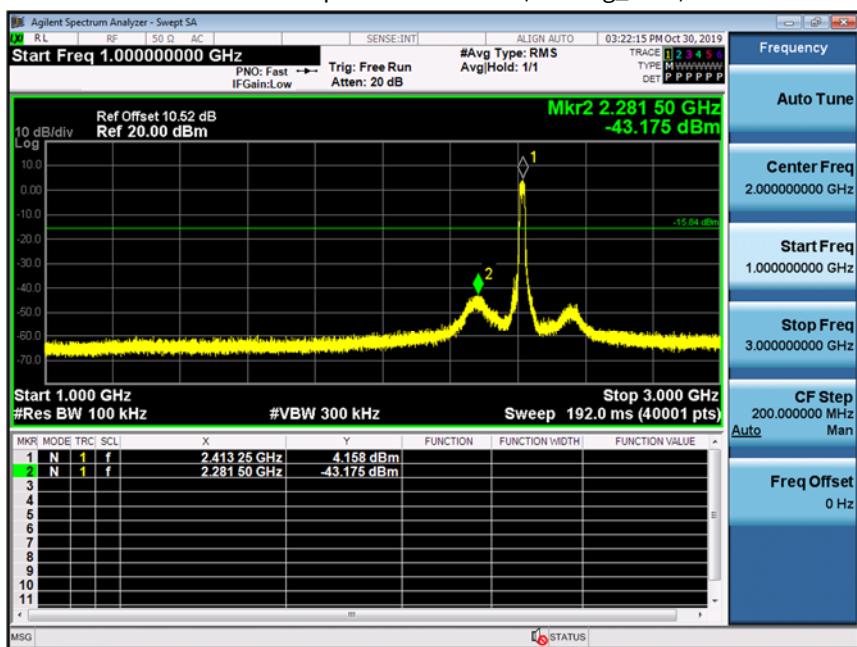
30 MHz ~ 1 GHz

Conducted Spurious Emission (802.11g\_Ch.1)



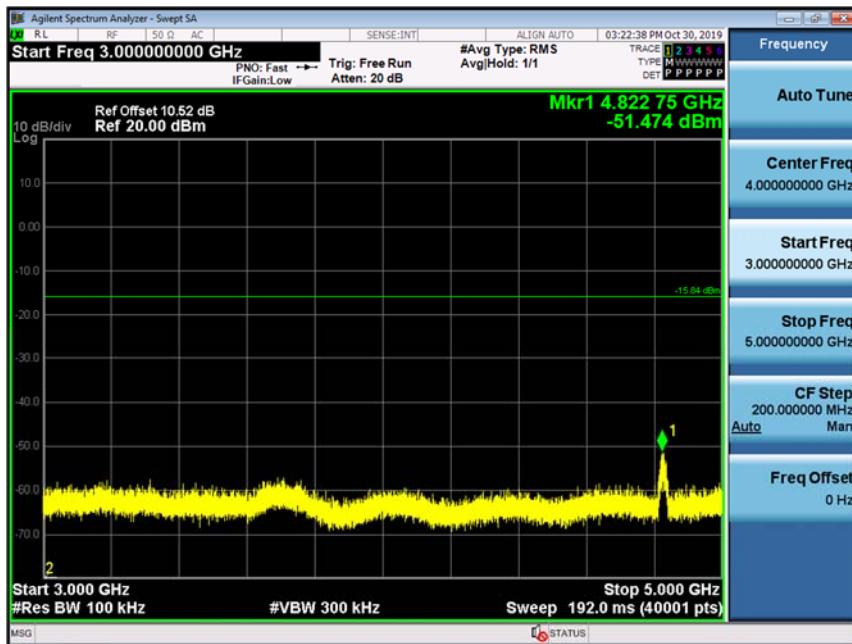
1 GHz ~ 3 GHz

Conducted Spurious Emission (802.11g\_Ch.1)



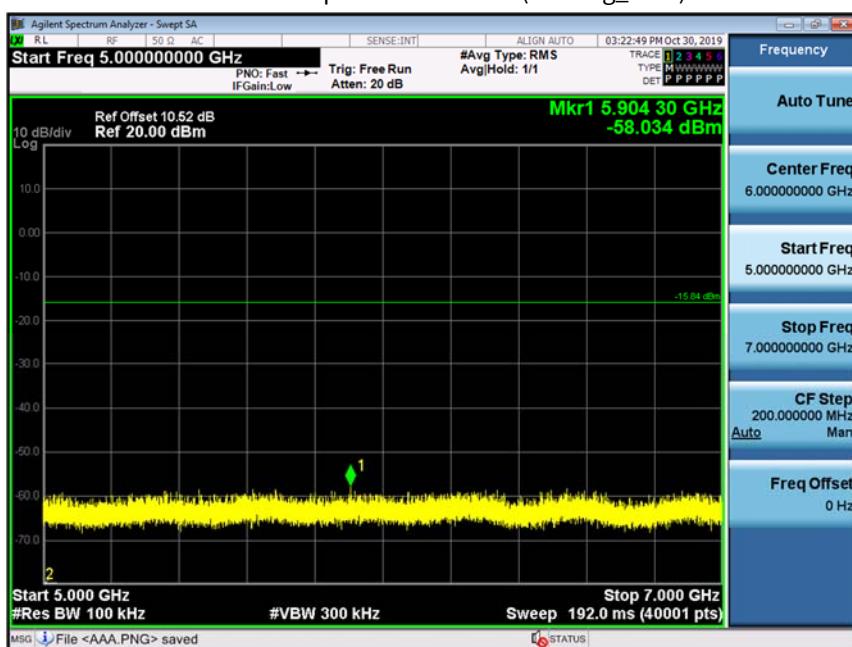
3 GHz ~ 5 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



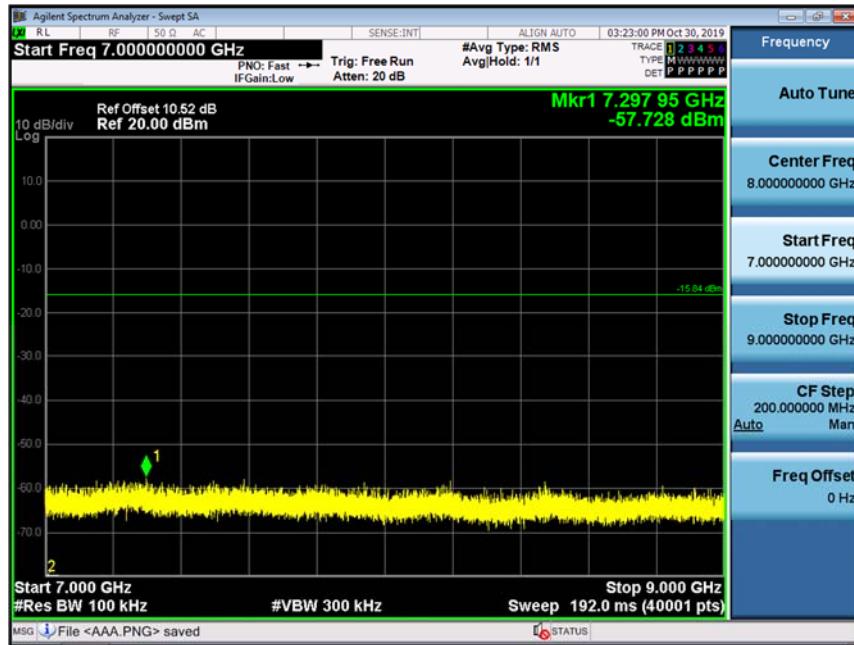
5 GHz ~ 7 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



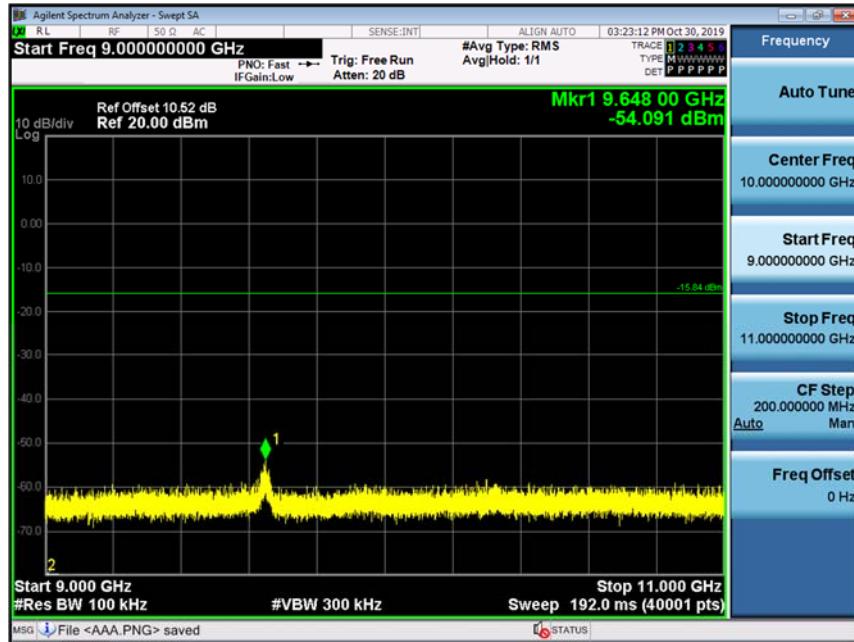
7 GHz ~ 9 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



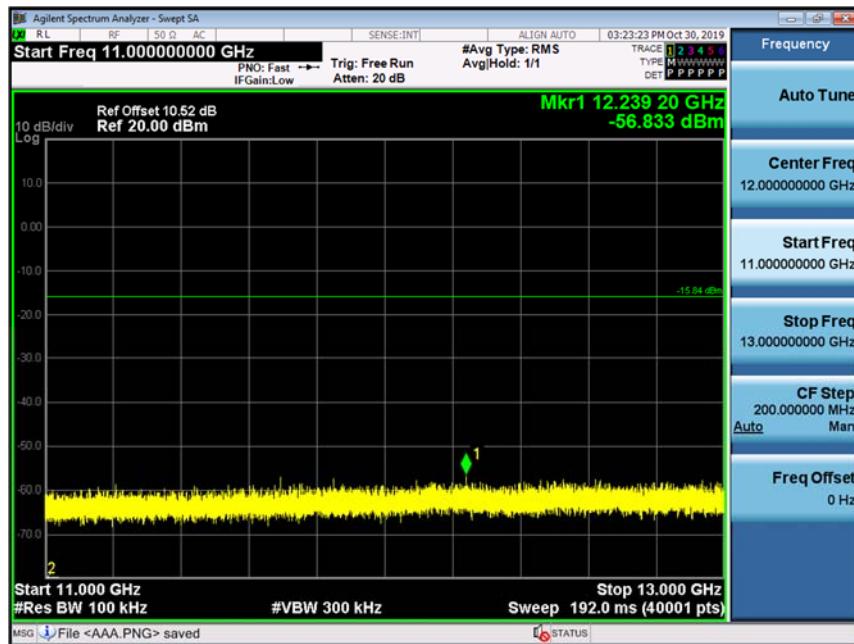
9 GHz ~ 11 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



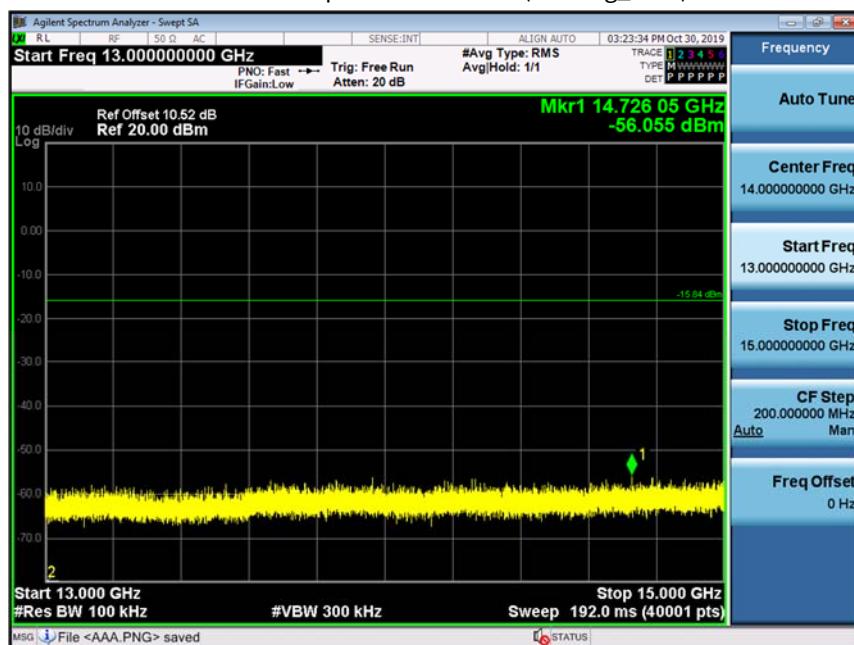
11 GHz ~ 13 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



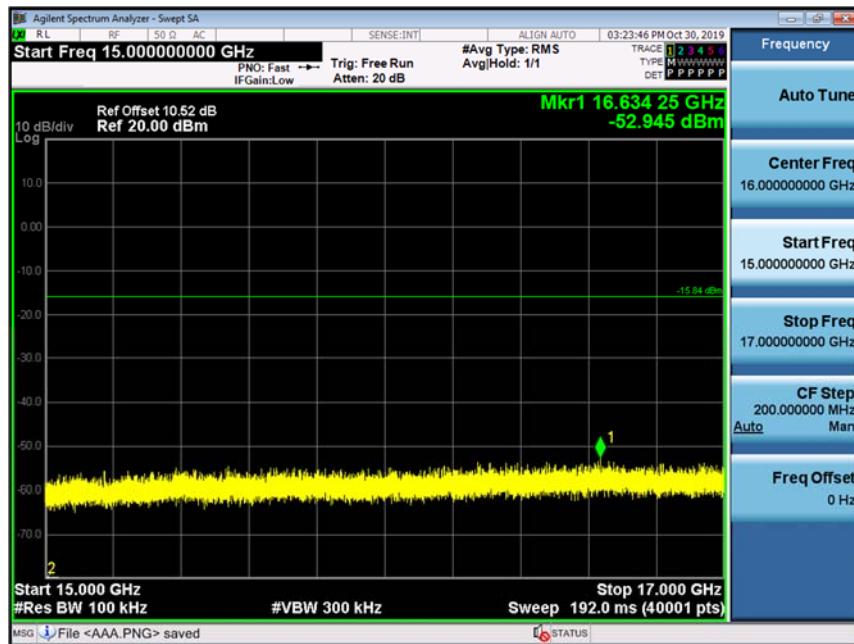
13 GHz ~ 15 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



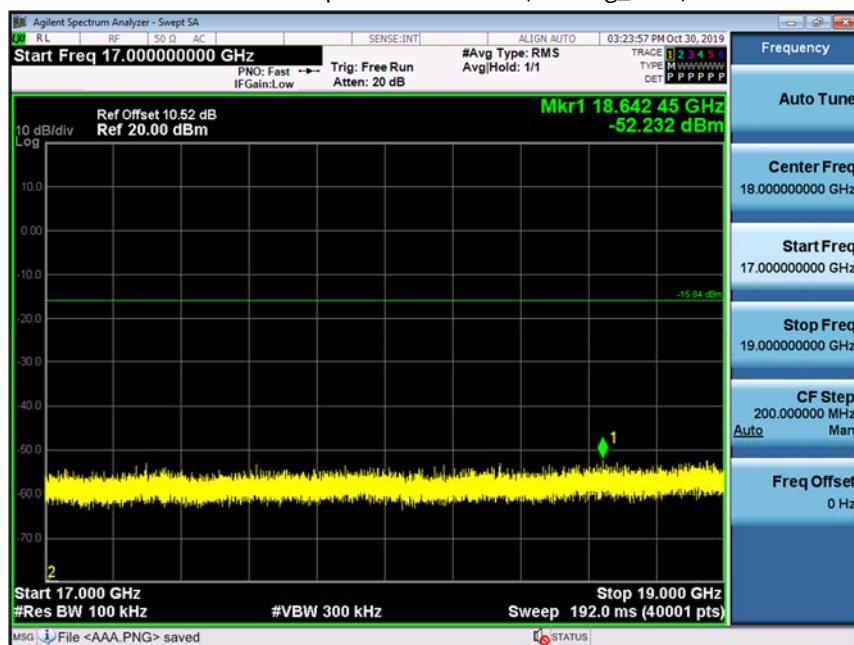
15 GHz ~ 17 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



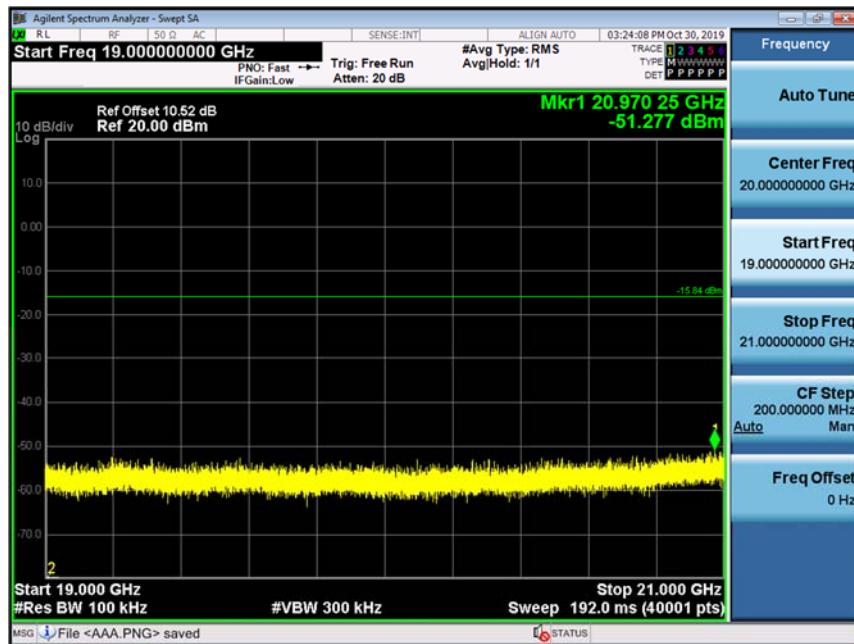
17 GHz ~ 19 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



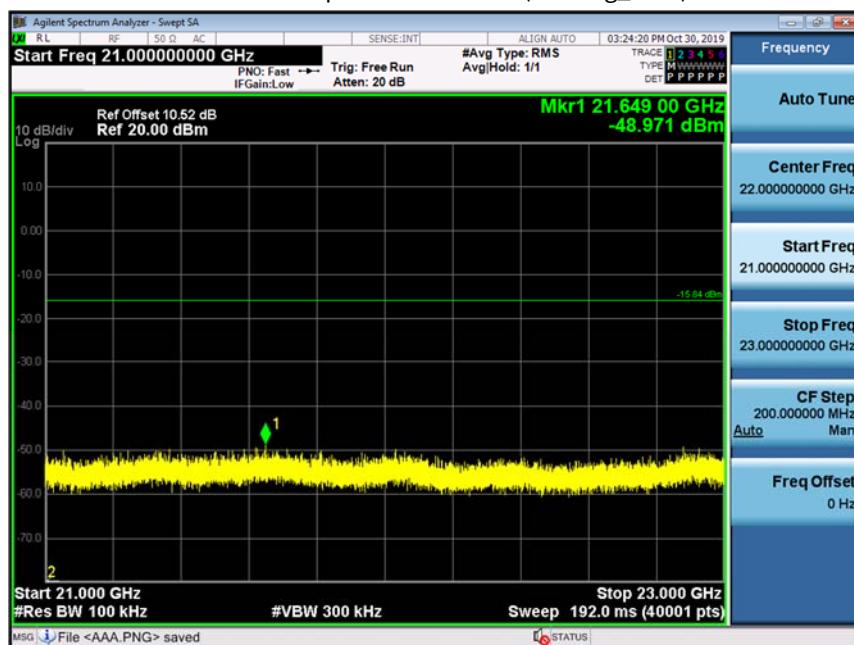
19 GHz ~ 21 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



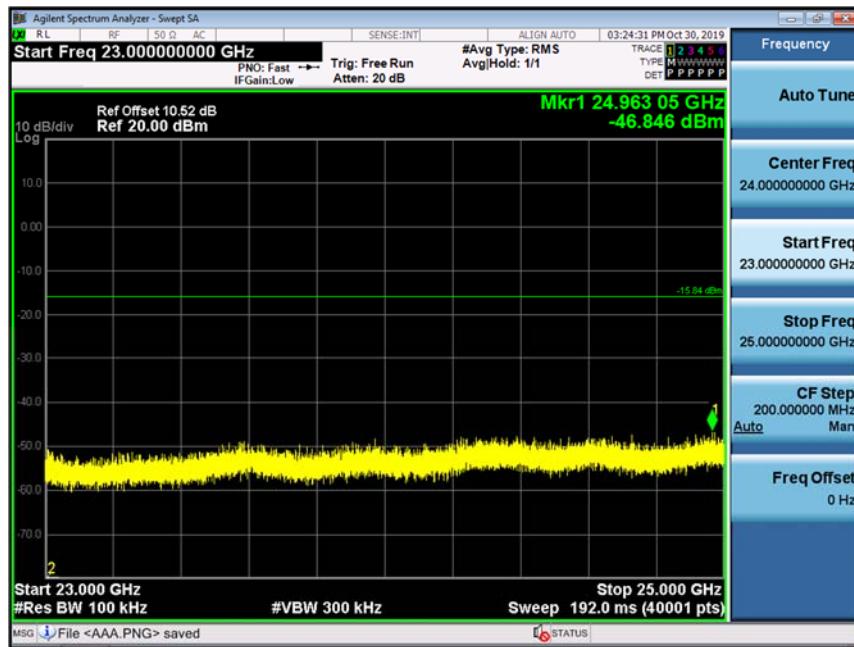
21 GHz ~ 23 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



23 GHz ~ 25 GHz

## Conducted Spurious Emission (802.11g\_Ch.1)



## 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.

**Frequency Range : Above 1 GHz**

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

Frequency [MHz]	Reading [dBuV]	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	53.96	1.95	V	55.91	73.98	18.07	PK
4824	46.15	1.95	V	48.10	53.98	5.88	AV
				60.15	73.98	13.83	PK
7236	50.29	9.86	V	47.79	53.98	6.19	AV
				56.58	73.98	17.40	PK
4824	47.64	1.95	H	49.59	53.98	4.39	AV
7236	51.17	9.86	H	61.03	73.98	12.95	PK
				50.17	53.98	3.81	AV

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

Frequency [MHz]	Reading [dBuV]	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	54.85	2.33	V	57.18	73.98	16.80	PK
4874	46.79	2.33	V	49.12	53.98	4.86	AV
7311	50.29	10.14	V	60.43	73.98	13.55	PK
				48.90	53.98	5.08	AV
4874	55.22	2.33	H	57.55	73.98	16.43	PK
4874	47.99	2.33	H	50.32	53.98	3.66	AV
7311	52.17	10.14	H	62.31	73.98	11.67	PK
				50.27	53.98	3.71	AV

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

Frequency [MHz]	Reading [dBuV]	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	54.21	2.28	V	56.49	73.98	17.49	PK
4924	47.62	2.28	V	49.90	53.98	4.08	AV
	49.60	9.81		59.41	73.98	14.57	PK
7386	38.61	9.81	V	48.42	53.98	5.56	AV
4924	55.20	2.28	H	57.48	73.98	16.50	PK
	48.72	2.28		51.00	53.98	2.98	AV
7386	49.84	9.81	H	59.65	73.98	14.33	PK
	38.86	9.81		48.67	53.98	5.31	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	53.07	0.00	1.95	V	55.02	73.98	18.96	PK
4824	39.85	0.05	1.95	V	41.85	53.98	12.13	AV
7236	50.70	0.00	9.86	V	60.56	73.98	13.42	PK
7236	38.00	0.05	9.86	V	47.91	53.98	6.07	AV
4824	53.66	0.00	1.95	H	55.61	73.98	18.37	PK
4824	39.88	0.05	1.95	H	41.88	53.98	12.10	AV
7236	50.75	0.00	9.86	H	60.61	73.98	13.37	PK
7236	38.24	0.05	9.86	H	48.15	53.98	5.83	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	54.36	0.00	2.33	V	56.69	73.98	17.29	PK
4874	40.61	0.05	2.33	V	42.99	53.98	10.99	AV
7311	49.78	0.00	10.14	V	59.92	73.98	14.06	PK
7311	37.57	0.05	10.14	V	47.76	53.98	6.22	AV
4874	54.97	0.00	2.33	H	57.30	73.98	16.68	PK
4874	41.88	0.05	2.33	H	44.26	53.98	9.72	AV
7311	50.42	0.00	10.14	H	60.56	73.98	13.42	PK
7311	37.68	0.05	10.14	H	47.87	53.98	6.11	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	51.26	0.00	2.28	V	53.54	73.98	20.44	PK
4924	38.18	0.05	2.28	V	40.51	53.98	13.47	AV
7386	47.96	0.00	9.81	V	57.77	73.98	16.21	PK
7386	36.52	0.05	9.81	V	46.38	53.98	7.60	AV
4924	51.88	0.00	2.28	H	54.16	73.98	19.82	PK
4924	39.38	0.05	2.28	H	41.71	53.98	12.27	AV
7386	48.89	0.00	9.81	H	58.70	73.98	15.28	PK
7386	37.02	0.05	9.81	H	46.88	53.98	7.10	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4824	52.38	0.00	1.95	V	54.33	73.98	19.65	PK
4824	39.63	0.08	1.95	V	41.66	53.98	12.32	AV
7236	50.23	0.00	9.86	V	60.09	73.98	13.89	PK
7236	37.99	0.08	9.86	V	47.93	53.98	6.05	AV
4824	52.27	0.00	1.95	H	54.22	73.98	19.76	PK
4824	39.46	0.08	1.95	H	41.49	53.98	12.49	AV
7236	50.20	0.00	9.86	H	60.06	73.98	13.92	PK
7236	38.14	0.08	9.86	H	48.08	53.98	5.90	AV

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

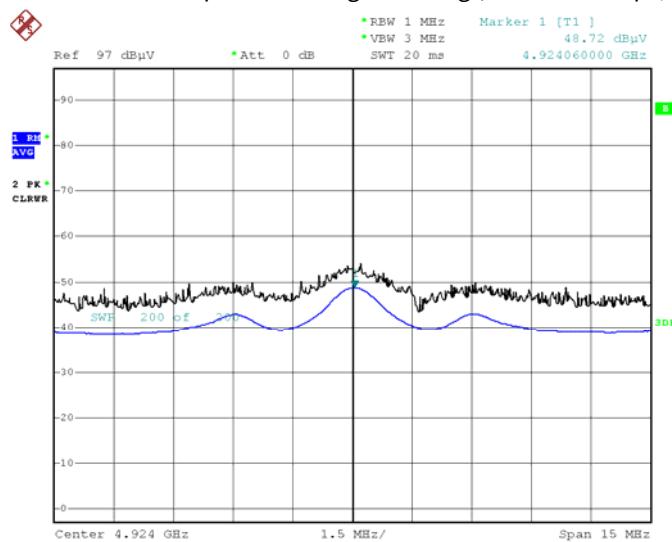
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4874	52.09	0.00	2.33	V	54.42	73.98	19.56	PK
4874	39.90	0.08	2.33	V	42.31	53.98	11.67	AV
7311	49.79	0.00	10.14	V	59.93	73.98	14.05	PK
7311	37.59	0.08	10.14	V	47.81	53.98	6.17	AV
4874	53.30	0.00	2.33	H	55.63	73.98	18.35	PK
4874	40.60	0.08	2.33	H	43.01	53.98	10.97	AV
7311	50.09	0.00	10.14	H	60.23	73.98	13.75	PK
7311	37.70	0.08	10.14	H	47.92	53.98	6.06	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP G+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
4924	50.50	0.00	2.28	V	52.78	73.98	21.20	PK
4924	38.19	0.08	2.28	V	40.55	53.98	13.43	AV
7386	49.36	0.00	9.81	V	59.17	73.98	14.81	PK
7386	36.51	0.08	9.81	V	46.40	53.98	7.58	AV
4924	50.72	0.00	2.28	H	53.00	73.98	20.98	PK
4924	39.02	0.08	2.28	H	41.38	53.98	12.60	AV
7386	49.68	0.00	9.81	H	59.49	73.98	14.49	PK
7386	36.97	0.08	9.81	H	46.86	53.98	7.12	AV

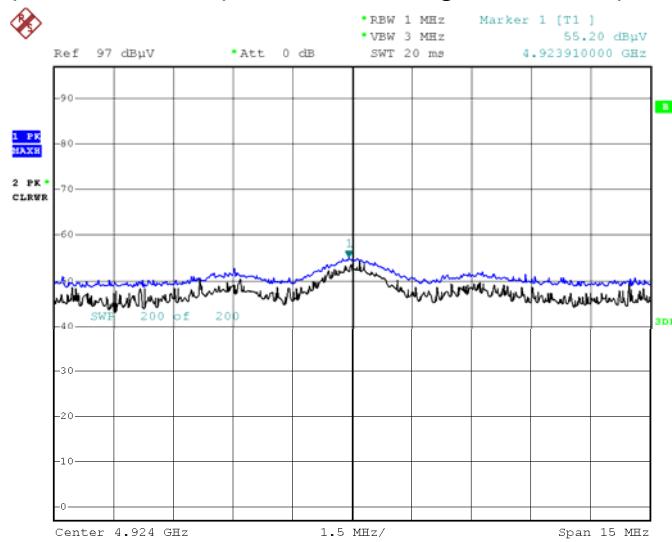
**□ Test Plots (Worst case : Z-H)**

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



Date: 5.NOV.2019 15:06:01

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



Date: 5.NOV.2019 15:07:52

**Note:**

Plot of worst case are only reported.

**9.7 RADIATED RESTRICTED BAND EDGES**

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

Frequency [MHz]	Reading [dBuV]	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	59.50	0.85	H	60.35	73.98	13.63	PK
2390.0	49.21	0.85		50.06	53.98	3.92	AV
2390.0	58.92	0.85		59.77	73.98	14.21	PK
2390.0	48.97	0.85	V	49.82	53.98	4.16	AV
2483.5	59.59	1.13	H	60.72	73.98	13.26	PK
	49.00	1.13		50.13	53.98	3.85	AV
	59.20	1.13	V	60.33	73.98	13.65	PK
	48.32	1.13		49.45	53.98	4.53	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	63.68	0.00	0.85	H	64.53	73.98	9.45	PK
2390.0	49.90	0.05	0.85	H	50.80	53.98	3.18	AV
2390.0	62.55	0.00	0.85	V	63.40	73.98	10.58	PK
	48.64	0.05	0.85		49.54	53.98	4.44	AV
2483.5	64.36	0.00	1.13		65.49	73.98	8.49	PK
	49.37	0.05	1.13	H	50.55	53.98	3.43	AV
	64.02	0.00	1.13		65.15	73.98	8.83	PK
2483.5	48.82	0.05	1.13	V	50.00	53.98	3.98	AV

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

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	63.78	0.00	0.85	H	64.63	73.98	9.35	PK
2390.0	47.03	0.05	0.85		47.93	53.98	6.05	AV
2390.0	62.26	0.00	0.85		63.11	73.98	10.87	PK
2390.0	46.82	0.05	0.85	V	47.72	53.98	6.26	AV
2483.5	62.11	0.00	1.13	H	63.24	73.98	10.74	PK
2483.5	46.12	0.05	1.13		47.30	53.98	6.68	AV
2483.5	60.13	0.00	1.13		61.26	73.98	12.72	PK
2483.5	45.72	0.05	1.13		46.90	53.98	7.08	AV

Operation Mode: 802.11g  
Operating Frequency 2422 MHz, 2452 MHz  
Channel No. 03 Ch, 09 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	58.75	0.00	0.85	H	59.60	73.98	14.38	PK
2390.0	48.53	0.05	0.85		49.43	53.98	4.55	AV
2390.0	57.99	0.00	0.85		58.84	73.98	15.14	PK
2390.0	48.11	0.05	0.85	V	49.01	53.98	4.97	AV
2483.5	55.64	0.00	1.13	V	56.77	73.98	17.21	PK
2483.5	44.71	0.05	1.13		45.89	53.98	8.09	AV
2483.5	54.82	0.00	1.13		55.95	73.98	18.03	PK
2483.5	43.51	0.05	1.13		44.69	53.98	9.29	AV

Operation Mode: 802.11g  
Operating Frequency 2427 MHz, 2447 MHz  
Channel No. 04 Ch, 08 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	62.36	0.00	0.85	H	63.21	73.98	10.77	PK
2390.0	50.06	0.05	0.85		50.96	53.98	3.02	AV
2390.0	62.11	0.00	0.85		62.96	73.98	11.02	PK
2390.0	49.80	0.05	0.85	V	50.70	53.98	3.28	AV
2483.5	66.57	0.00	1.13	H	67.70	73.98	6.28	PK
2483.5	50.76	0.05	1.13		51.94	53.98	2.04	AV
2483.5	66.11	0.00	1.13		67.24	73.98	6.74	PK
2483.5	49.62	0.05	1.13		50.80	53.98	3.18	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	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	58.97	0.00	0.85	H	59.82	73.98	14.16	PK
2390.0	47.24	0.08	0.85	H	48.17	53.98	5.81	AV
	57.66	0.00	0.85		58.51	73.98	15.47	PK
2390.0	47.02	0.08	0.85	V	47.95	53.98	6.03	AV
	63.27	0.00	1.13		64.40	73.98	9.58	PK
2483.5	49.04	0.08	1.13	H	50.25	53.98	3.73	AV
	62.96	0.00	1.13		64.09	73.98	9.89	PK
2483.5	48.68	0.08	1.13	V	49.89	53.98	4.09	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	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	57.42	0.00	0.85	H	58.27	73.98	15.71	PK
2390.0	46.72	0.08	0.85	H	47.65	53.98	6.33	AV
2390.0	59.11	0.00	0.85	V	59.96	73.98	14.02	PK
	45.84	0.08	0.85		46.77	53.98	7.21	AV
2483.5	57.42	0.00	1.13	H	58.55	73.98	15.43	PK
	46.09	0.08	1.13		47.30	53.98	6.68	AV
2483.5	56.02	0.00	1.13	V	57.15	73.98	16.83	PK
	45.78	0.08	1.13		46.99	53.98	6.99	AV

Operation Mode:	802.11n (HT20)
Operating Frequency	2422 MHz, 2452 MHz
Channel No.	03 Ch, 09 Ch

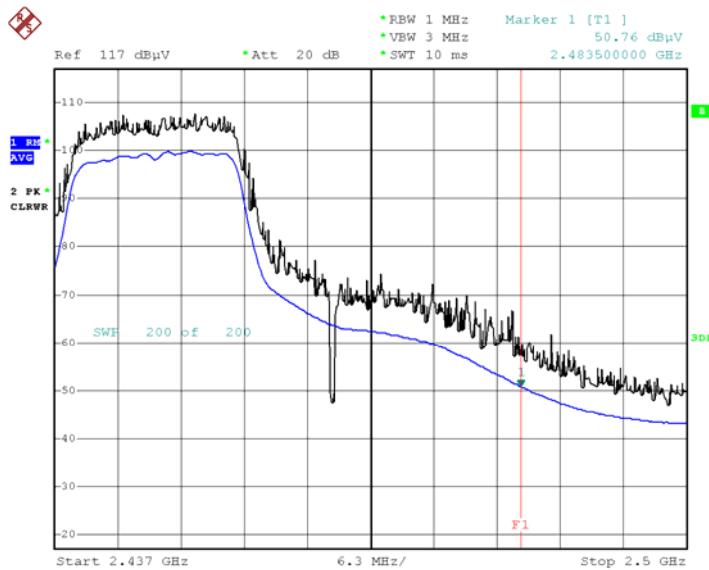
Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	59.56	0.00	0.85	H	60.41	73.98	13.57	PK
2390.0	48.33	0.08	0.85		49.26			
2390.0	58.49	0.00	0.85		59.34			
2390.0	48.02	0.08	0.85	V	48.95	53.98	5.03	AV
2483.5	61.53	0.00	1.13	H	62.66	73.98	11.32	PK
2483.5	45.32	0.08	1.13	H	46.53	53.98	7.45	AV
2483.5	59.99	0.00	1.13		61.12			
2483.5	44.75	0.08	1.13		45.96			

Operation Mode:	802.11n (HT20)
Operating Frequency	2427 MHz, 2447 MHz
Channel No.	04 Ch, 08 Ch

Frequency [MHz]	Reading [dBuV]	Duty Cycle Factor	A.F+C.L-AMP+ATT+D.F [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Measurement Type
2390.0	60.38	0.00	0.85	H	61.23	73.98	12.75	PK
2390.0	49.32	0.08	0.85		50.25			
2390.0	60.01	0.00	0.85		60.86			
2390.0	48.66	0.08	0.85	V	49.59	73.98	13.12	AV
2483.5	63.43	0.00	1.13	H	64.56	73.98	9.42	PK
2483.5	48.23	0.08	1.13	H	49.44	53.98	4.54	AV
2483.5	62.31	0.00	1.13		63.44			
2483.5	46.23	0.08	1.13		47.44			

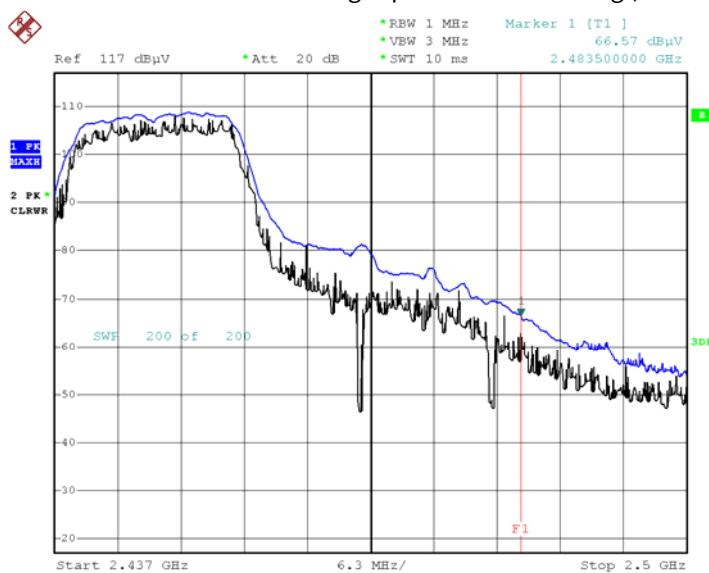
**Test Plots**

Radiated Restricted Band Edges plot – Average Reading (802.11g, Ch.8)



Date: 11.NOV.2019 11:56:57

Radiated Restricted Band Edges plot – Peak Reading (802.11g, Ch.8)



Date: 11.NOV.2019 11:58:10

**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)

WFM-SFP202(2.4G\_WLAN\_N)

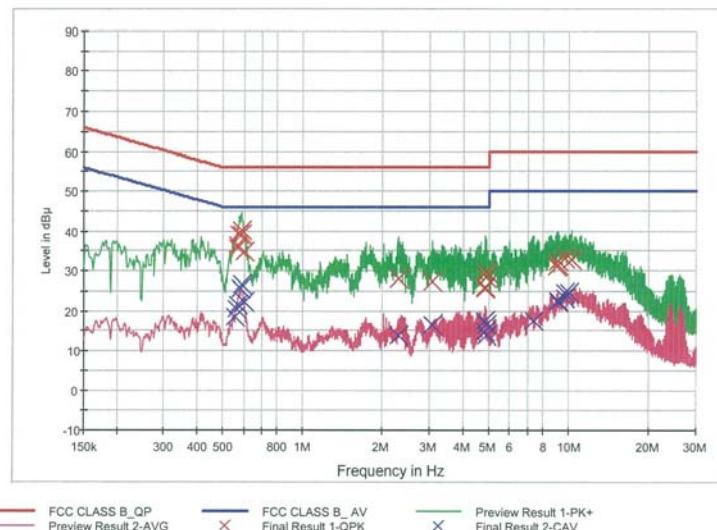
1 / 2

## HCT TEST Report

### Common Information

EUT: WFM-SFP202  
Manufacturer: I&C Tech.  
Test Site: SHIELD ROOM  
Operating Conditions: 2.4G WLAN\_N

FCC CLASS B\_Exten Cable



### Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.566000	35.8	9.000	Off	N	9.8	20.2	56.0
0.570000	36.5	9.000	Off	N	9.8	19.5	56.0
0.578000	39.3	9.000	Off	N	9.8	16.7	56.0
0.586000	40.0	9.000	Off	N	9.8	16.0	56.0
0.590000	39.2	9.000	Off	N	9.8	16.8	56.0
0.604000	34.7	9.000	Off	N	9.8	21.3	56.0
2.276000	28.1	9.000	Off	N	9.9	27.9	56.0
3.052000	27.3	9.000	Off	N	9.9	28.7	56.0
4.842000	25.4	9.000	Off	N	10.1	30.6	56.0
4.866000	26.0	9.000	Off	N	10.1	30.0	56.0
4.876000	29.6	9.000	Off	N	10.1	26.4	56.0
4.882000	28.2	9.000	Off	N	10.1	27.8	56.0
9.006000	30.9	9.000	Off	N	10.3	29.1	60.0
9.050000	31.2	9.000	Off	N	10.3	28.8	60.0
9.088000	32.3	9.000	Off	N	10.3	27.7	60.0
9.098000	32.4	9.000	Off	N	10.3	27.6	60.0
9.668000	33.2	9.000	Off	N	10.3	26.8	60.0
10.190000	32.8	9.000	Off	N	10.4	27.2	60.0

WFM-SFP202(2.4G\_WLAN\_N)

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.554000	18.6	9.000	Off	N	9.8	27.4	46.0
0.562000	20.6	9.000	Off	N	9.8	25.4	46.0
0.566000	21.4	9.000	Off	N	9.8	24.6	46.0
0.580000	25.7	9.000	Off	N	9.8	20.3	46.0
0.588000	26.7	9.000	Off	N	9.8	19.3	46.0
0.600000	22.3	9.000	Off	N	9.8	23.7	46.0
2.276000	13.6	9.000	Off	N	9.9	32.4	46.0
3.052000	16.5	9.000	Off	N	9.9	29.5	46.0
4.842000	14.6	9.000	Off	N	10.1	31.4	46.0
4.866000	17.5	9.000	Off	N	10.1	28.5	46.0
4.876000	13.8	9.000	Off	N	10.1	32.2	46.0
4.882000	16.5	9.000	Off	N	10.1	29.5	46.0
7.384000	17.4	9.000	Off	N	10.2	32.6	50.0
9.050000	22.5	9.000	Off	N	10.3	27.5	50.0
9.060000	22.2	9.000	Off	N	10.3	27.8	50.0
9.668000	24.7	9.000	Off	N	10.3	25.3	50.0
9.694000	23.3	9.000	Off	N	10.3	26.7	50.0
9.952000	24.6	9.000	Off	N	10.3	25.4	50.0

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Conducted Emissions (Line 2)

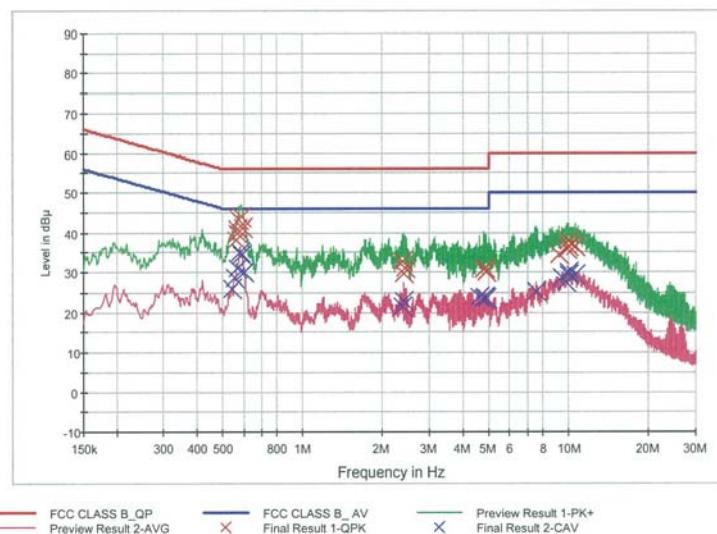
WFM-SFP202(2.4G\_WLAN\_L1)

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**HCT TEST Report****Common Information**

EUT: WFM-SFP202  
Manufacturer: I&C Tech.  
Test Site: SHIELD ROOM  
Operating Conditions: 2.4G WLAN\_L1

FCC CLASS B\_Exten Cable

**Final Result 1**

Frequency (MHz)	QuasiPeak (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.562000	38.3	9.000	Off	L1	9.8	17.7	56.0
0.568000	39.7	9.000	Off	L1	9.8	16.3	56.0
0.572000	40.9	9.000	Off	L1	9.8	15.1	56.0
0.578000	43.2	9.000	Off	L1	9.8	12.8	56.0
0.586000	43.9	9.000	Off	L1	9.8	12.1	56.0
0.598000	41.0	9.000	Off	L1	9.8	15.0	56.0
2.368000	32.6	9.000	Off	L1	9.9	23.4	56.0
2.390000	29.6	9.000	Off	L1	9.9	26.4	56.0
2.440000	30.9	9.000	Off	L1	9.9	25.1	56.0
4.806000	30.5	9.000	Off	L1	10.0	25.5	56.0
4.828000	31.0	9.000	Off	L1	10.0	25.0	56.0
4.872000	30.1	9.000	Off	L1	10.1	26.0	56.0
9.228000	34.4	9.000	Off	L1	10.3	25.6	60.0
9.820000	35.6	9.000	Off	L1	10.3	24.4	60.0
9.982000	36.6	9.000	Off	L1	10.3	23.4	60.0
10.000000	37.7	9.000	Off	L1	10.3	22.3	60.0
10.004000	36.5	9.000	Off	L1	10.3	23.5	60.0
10.572000	36.4	9.000	Off	L1	10.3	23.6	60.0

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WFM-SFP202(2.4G\_WLAN\_L1)

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**Final Result 2**

Frequency (MHz)	CAverage (dBuV)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.542000	26.0	9.000	Off	L1	9.8	20.0	46.0
0.558000	28.6	9.000	Off	L1	9.8	17.4	46.0
0.568000	30.9	9.000	Off	L1	9.8	15.1	46.0
0.580000	35.1	9.000	Off	L1	9.8	10.9	46.0
0.590000	34.4	9.000	Off	L1	9.8	11.6	46.0
0.604000	30.0	9.000	Off	L1	9.8	16.0	46.0
2.368000	21.7	9.000	Off	L1	9.9	24.3	46.0
2.390000	22.9	9.000	Off	L1	9.9	23.1	46.0
4.618000	24.0	9.000	Off	L1	10.0	22.0	46.0
4.806000	23.6	9.000	Off	L1	10.0	22.4	46.0
4.830000	24.0	9.000	Off	L1	10.0	22.0	46.0
4.888000	23.7	9.000	Off	L1	10.1	22.3	46.0
7.524000	25.4	9.000	Off	L1	10.2	24.6	50.0
9.456000	28.8	9.000	Off	L1	10.3	21.2	50.0
9.716000	27.7	9.000	Off	L1	10.3	22.3	50.0
9.992000	29.2	9.000	Off	L1	10.3	20.8	50.0
10.002000	29.9	9.000	Off	L1	10.3	20.1	50.0
10.572000	29.2	9.000	Off	L1	10.3	20.8	50.0

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**10. LIST OF TEST EQUIPMENT****Conducted Test**

Manufacturer	Model / Equipment	Calibration Date	Calibration Interval	Serial No.
Rohde & Schwarz	ENV216 / LISN	12/12/2018	Annual	102245
Rohde & Schwarz	ESCI / Test Receiver	06/18/2019	Annual	100033
ESPACE	SU-642 /Temperature Chamber	03/12/2019	Annual	0093008124
Agilent	N9020A / Signal Analyzer	05/23/2019	Annual	MY51110085
Agilent	N9030A / Signal Analyzer	11/20/2018	Annual	MY49431210
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	5001
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
Rohde & Schwarz	CBT / Bluetooth Tester	05/16/2019	Annual	100422

**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	01/18/2019	Biennial	1513-175
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/31/2018	Biennial	00895
Schwarzbeck	VULB 9168 / Hybrid Antenna	08/09/2018	Biennial	3368
Schwarzbeck	BBHA 9120D / Horn Antenna	06/28/2019	Biennial	1300
Schwarzbeck	BBHA9170 / Horn Antenna(15 GHz ~ 40 GHz)	12/04/2017	Biennial	BBHA9170541
Rohde & Schwarz	FSP(9 kHz ~ 40 GHz) / Spectrum Analyzer	07/16/2019	Annual	100843
Wainwright Instruments	WHK3.0/18G-10EF / High Pass Filter	01/03/2019	Annual	F6
Wainwright Instruments	WHFX7.0/18G-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	CBLU1183540B-01 / Power Amplifier	12/21/2018	Annual	25540
CERNEX	CBL06185030 / Power Amplifier	03/26/2019	Annual	28550
CERNEX	CBL18265035 / Power Amplifier	01/03/2019	Annual	22966
CERNEX	CBL26405040 / Power Amplifier	06/18/2019	Annual	25956
TESCOM	TC-3000C / Bluetooth Tester	03/26/2019	Annual	3000C000276

**Note:**

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

**11. ANNEX A\_ TEST SETUP PHOTO**

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

No.	Description
1	HCT-RF-1911-FI017-P