Test Report

Date : 2019-12-30
No. : HMD19120009

Applicant	:	DONGGUAN D-WIN LIGHTING CO., LTD No.23 Yanhe Road, Shachong Industrial Zone, Huangwu Village, Dongkeng Town, Dongguan City, Guangdong Province.
Supplier / Manufacturer	:	DONGGUAN D-WIN LIGHTING CO., LTD No.23 Yanhe Road, Shachong Industrial Zone, Huangwu Village, Dongkeng Town, Dongguan City, Guangdong Province.
Description of Sample(s)	:	Submitted sample(s) said to be Product: Smart Light Strip Brand Name: D-WIN Model No.: DW-50RGWF FCC ID: 2AVGU-DW-50RGWF
Date Samples Received	:	2019-12-17
Date Tested	:	2019-12-19 to 2019-12-24
Investigation Requested	:	Perform ElectroMagnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 and ANSI C63.10:2013 for FCC Certification.
Conclusions	:	The submitted product COMPLIED with the requirements of Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this Test Report.
Remarks	:	WIFI (802.11b/g/n20) For additional model(s) details, please see page 3.

CHEUNG Chi, Kenneth
Authorized Signatory

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Test Report

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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
Head Office: 10 Dai Wang Street, Taipo Industrial Estate, Tai Po, N.T., Hong Kong
Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Equipment Under Test [EUT]

Description of Sample(s)

Product:	Smart Light Strip
Manufacturer:	DONGGUAN D-WIN LIGHTING CO., LTD No.23 Yanhe Road, Shachong Industrial Zone, Huangwu Village, Dongkeng Town, Dongguan City, Guangdong Province.
Brand Name:	D-WIN
Additional Brand Name:	Lewentech
Model Number:	DW-50RGWF
Additional model numbers:	DW-50RGWF-10M, DW-50RGWF-5M, DW-50RGWF-3M
Rating:	12Vd.c. by Adapter
RF Power:	30mW-75mW

The AC/DC adapter was provided by the applicant with following details:
Brand name: XINGYUAN, Model no.: XY36SA-120300VQ-UW, Input: 100-240Va.c. 50/60Hz 900m A, Output: 12Vd.c. 3A

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Smart Light Strip with WIFI controller. The transmission signal is digital modulated with channel frequency range 2412-2462MHz.

1.3 Antenna Details

Antenna Type:	Onboard PCB antenna
Antenna Gain:	2dBi

1.4 Date of Order

2019-12-17

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2019-12-19 to 2019-12-24

1.7 Country of Origin

China

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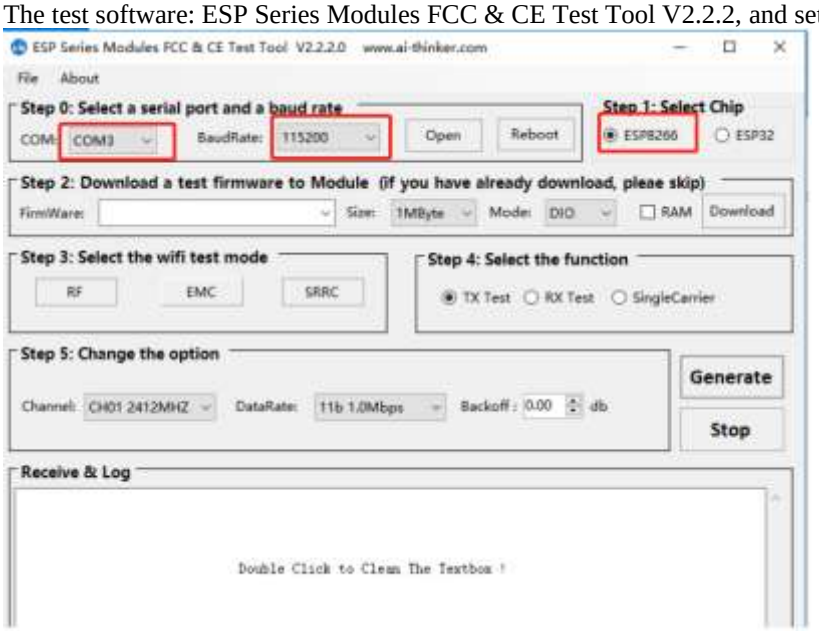
2.0 Technical Details

2.1 Investigations Requested

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2017 Regulations and ANSI C63.10:2013 for FCC Certification.
According FCC KDB 558074 DTS Measurement Guidance, Duty cycle ≧98%.
The test mode sample is provided by manufacturer.

2.1.0 Operating conditions for the EUT

The sample went into test mode handled by the manufacturer using the software.
The test software: ESP Series Modules FCC & CE Test Tool V2.2.2, and set the default power value.



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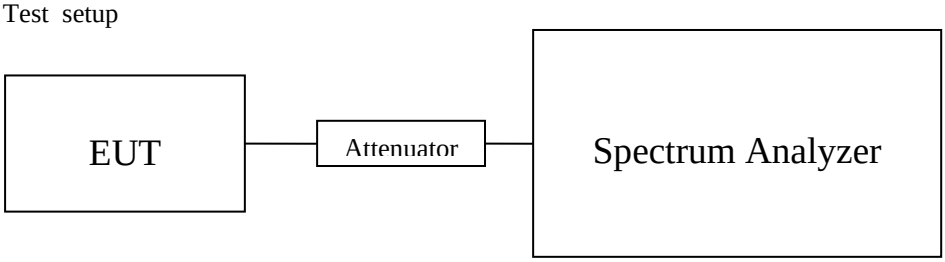
2.1.1 EUT Duty cycle

The EUT shall be configured or modified to transmit continuously. The intent is to test at 100% duty cycle; however, a small reduction in duty cycle (to no lower than 98%) is permitted if required by the EUT for amplitude control purposes.
The test mode sample is provided by manufacturer.

Test setup

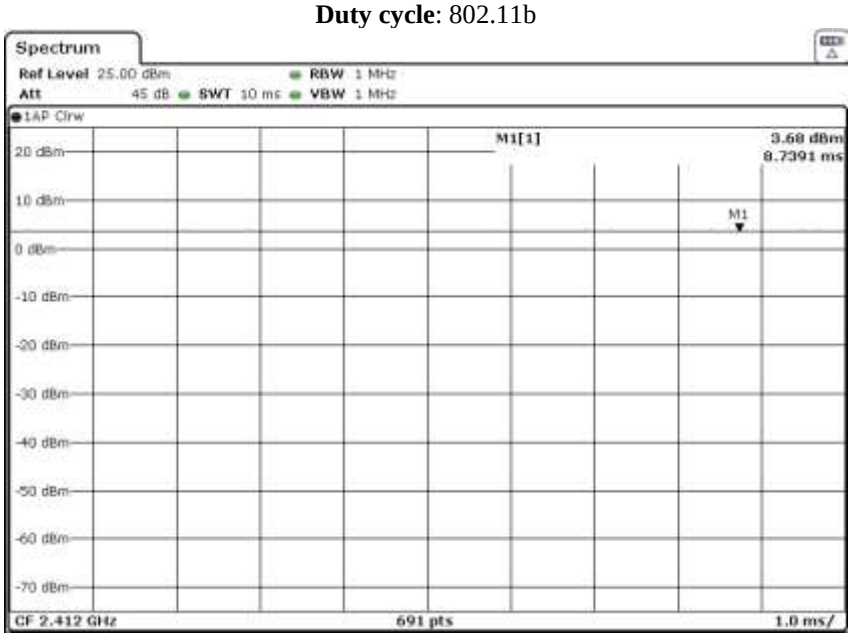


Results

Mode	On Time (msec)	Period (msec)	Duty Cycle X (Linear)	Duty Cycle (%)*
802.11b	1	1	1	100
802.11g	1	1	1	100
802.11n20	1	1	1	100

-*: If a specific emission is demonstrated to be continuous (100% duty cycle) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

Duty cycle: 802.11b



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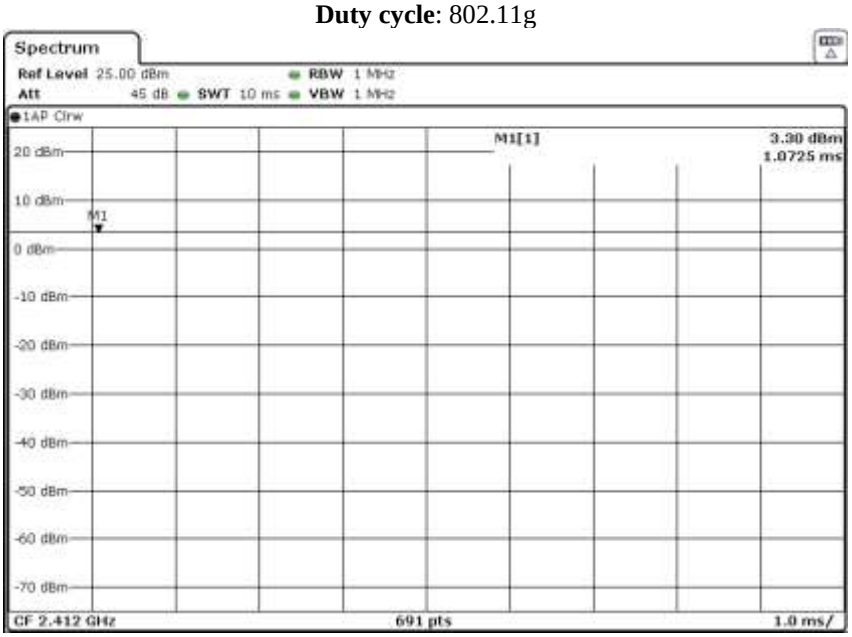
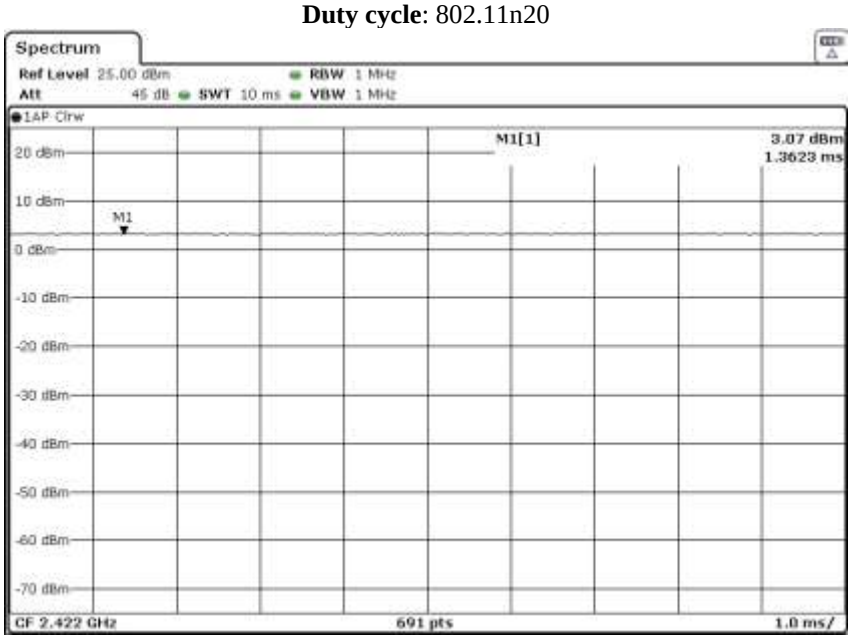
Duty cycle: 802.11g



Duty cycle: 802.11n20



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2.2 Test Standards and Results Summary Tables

EMISSION Results Summary						
Test Condition	Test Requirement	Test Method	Class / Severity	Test Result		
				Pass	Failed	N/A
Output Power of Fundamental Emissions	FCC 47CFR 15.247(b)(3)	ANSI C63.10:2013	N/A	☒	☐	☐
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	☒	☐	☐
Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A	☒	☐	☐
Power Spectral Density	FCC 47CFR 15.247(e)	N/A	N/A	☒	☐	☐
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	N/A	N/A	☒	☐	☐
Band Edge Emissions	FCC 47CFR 15.247(d)	N/A	N/A	☒	☐	☐
Antenna requirement	FCC 47CFR 15.203	N/A	N/A	☒	☐	☐

Note: N/A - Not Applicable

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3.0 Test Results

3.1 Emission

3.1.1 Maximum Peak Output Power

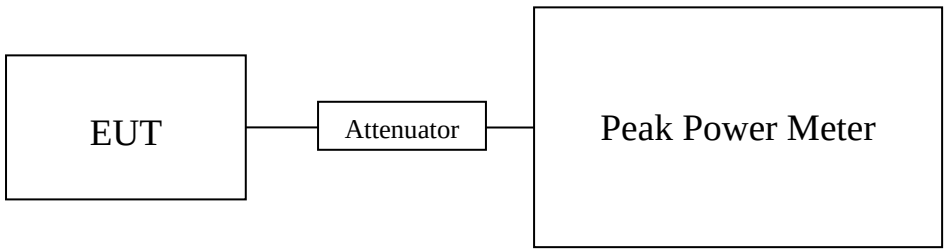
Test Requirement:	FCC 47CFR 15.247(b)(3)
Test Method:	ANSI C63.10: 2013
Test Date:	2019-12-20
Mode of Operation:	WIFI Tx mode

Ambient Temperature: 25℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

Test Method:

The RF output of the EUT was connected to the peak power meter. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in Watt.

Test Setup:



Note: a temporary antenna connector was soldered to the RF output.

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Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt (30dBm)

Results of WiFi mode 802.11 b, (2412MHz to 2462MHz) : Pass (TX Unit)
Maximum conducted output power

Channel	Frequency(MHz)	Output Power(Watt)
Low	2412	0.04529
Middle	2437	0.04335
High	2462	0.04375

Results of WiFi mode 802.11 g, (2412MHz to 2462MHz) : Pass (TX Unit)
Maximum conducted output power

Channel	Frequency(MHz)	Output Power(Watt)
Low	2412	0.03034
Middle	2437	0.02944
High	2462	0.02851

Results of WiFi mode 802.11 n20, (2412MHz to 2462MHz) : Pass (TX Unit)
Maximum conducted output power

Channel	Frequency(MHz)	Output Power(Watt)
Low	2412	0.02742
Middle	2437	0.02667
High	2462	0.02704

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB
1GHz to 26GHz 1.7dB

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3.1.2 Radiated Emissions

Test Requirement:	FCC 47CFR 15.209
Test Method:	ANSI C63.10:2013
Test Date:	2019-12-20 to 2019-12-23
Mode of Operation:	WIFI Tx mode

Ambient Temperature: 24℃ Relative Humidity: 52% Atmospheric Pressure: 101 kPa

Test Method:

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 607756.

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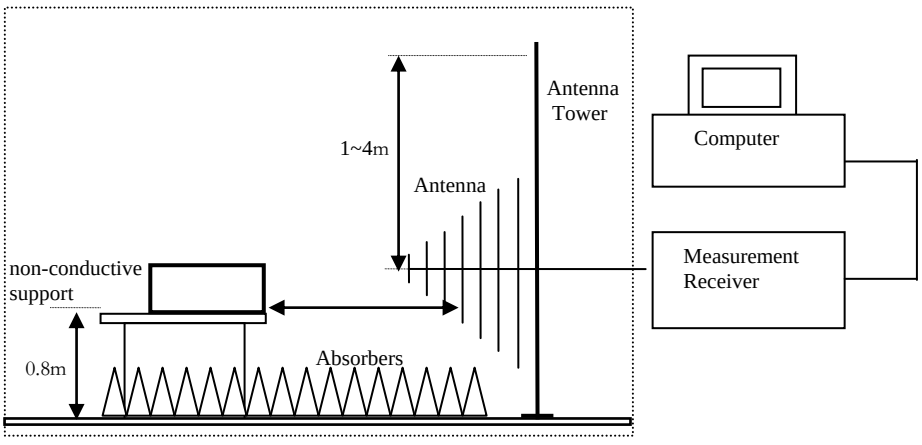
Spectrum Analyzer Setting:

9KHz – 30MHz (Pk & Av)	RBW:	10kHz
	VBW:	30kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
30MHz – 1GHz (QP)	RBW:	120kHz
	VBW:	120kHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
Above 1GHz (Pk)	RBW:	1MHz
	VBW:	1MHz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold
Above 1GHz (Av)	RBW:	1MHz
	VBW:	10Hz
	Sweep:	Auto
	Span:	Fully capture the emissions being measured
	Trace:	Max. hold

Test Setup:



Ground Plane

- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz horn antennas are used.

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Limits for Radiated Emissions FCC 47 CFR 15.247]:

Frequency Range	Quasi-Peak Limits
[MHz]	[µV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Result of Tx mode (2412.0 MHz) (802.11b) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2412.0 MHz) (802.11b) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4824.0	15.1	41.5	56.6	74.0	17.4	Vertical
4824.0	13.1	42.4	55.5	74.0	18.5	Horizontal
7236.0	10.6	45.1	55.7	74.0	18.3	Vertical
7236.0	8.9	46.2	55.1	74.0	18.9	Horizontal
9648.0	7.8	48	55.8	74.0	18.2	Vertical
9648.0	5.8	48.8	54.6	74.0	19.4	Horizontal
12060.0	3.9	51.5	55.4	74.0	18.6	Vertical
12060.0	2.9	52.4	55.3	74.0	18.7	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4824.0	2.0	41.5	43.5	54.0	10.5	Vertical
4824.0	-0.2	42.4	42.2	54.0	11.8	Horizontal
7236.0	-2.7	45.1	42.4	54.0	11.6	Vertical
7236.0	-5.2	46.2	41.0	54.0	13.0	Horizontal
9648.0	-6.7	48	41.3	54.0	12.7	Vertical
9648.0	-7.3	48.8	41.5	54.0	12.5	Horizontal
12060.0	-9.9	51.5	41.6	54.0	12.4	Vertical
12060.0	-10.2	52.4	42.2	54.0	11.8	Horizontal

Result of Tx mode (2437.0 MHz) (802.11b) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2437.0 MHz) (802.11b) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4874.0	15.7	41.6	57.3	74.0	16.7	Vertical
4874.0	13.7	42.5	56.2	74.0	17.8	Horizontal
7311.0	10.0	45.2	55.2	74.0	18.8	Vertical
7311.0	8.8	46.3	55.1	74.0	18.9	Horizontal
9748.0	7.1	48.1	55.2	74.0	18.8	Vertical
9748.0	7.0	48.9	55.9	74.0	18.1	Horizontal
12185.0	3.9	51.6	55.5	74.0	18.5	Vertical
12185.0	2.9	52.5	55.4	74.0	18.6	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBuV	Correction Factor dB/m	Field Strength dBuV/m	Limit @3m dBuV/m	Margin dB	E-Field Polarity
4874.0	1.5	41.6	43.1	54.0	10.9	Vertical
4874.0	0.4	42.5	42.9	54.0	11.1	Horizontal
7311.0	-3.3	45.2	41.9	54.0	12.1	Vertical
7311.0	-4.2	46.3	42.1	54.0	11.9	Horizontal
9748.0	-6.3	48.1	41.8	54.0	12.2	Vertical
9748.0	-6.6	48.9	42.3	54.0	11.7	Horizontal
12185.0	-10.2	51.6	41.4	54.0	12.6	Vertical
12185.0	-10.4	52.5	42.1	54.0	11.9	Horizontal

Result of Tx mode (2462.0 MHz) (802.11b) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2462.0 MHz) (802.11b) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4924.0	15.0	41.4	56.4	74.0	17.6	Vertical
4924.0	12.7	42.7	55.4	74.0	18.6	Horizontal
7386.0	8.9	45.6	54.5	74.0	19.5	Vertical
7386.0	8.4	46.5	54.9	74.0	19.1	Horizontal
9848.0	7.3	48.6	55.9	74.0	18.1	Vertical
9848.0	5.2	49.7	54.9	74.0	19.1	Horizontal
12310.0	3.5	51.7	55.2	74.0	18.8	Vertical
12310.0	2.8	52.7	55.5	74.0	18.5	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4924.0	0.9	41.4	42.3	54.0	11.7	Vertical
4924.0	-0.2	42.7	42.5	54.0	11.5	Horizontal
7386.0	-4.3	45.6	41.3	54.0	12.7	Vertical
7386.0	-5.3	46.5	41.2	54.0	12.8	Horizontal
9848.0	-6.3	48.6	42.3	54.0	11.7	Vertical
9848.0	-8.2	49.7	41.5	54.0	12.5	Horizontal
12310.0	-9.9	51.7	41.8	54.0	12.2	Vertical
12310.0	-10.8	52.7	41.9	54.0	12.1	Horizontal

Result of Tx mode (2412.0 MHz) (802.11g) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2412.0 MHz) (802.11g) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4824.0	14.9	41.5	56.4	74.0	17.6	Vertical
4824.0	13.2	42.4	55.6	74.0	18.4	Horizontal
7236.0	10.7	45.1	55.8	74.0	18.2	Vertical
7236.0	8.5	46.2	54.7	74.0	19.3	Horizontal
9648.0	7.9	48	55.9	74.0	18.1	Vertical
9648.0	5.6	48.8	54.4	74.0	19.6	Horizontal
12060.0	3.9	51.5	55.4	74.0	18.6	Vertical
12060.0	3.2	52.4	55.6	74.0	18.4	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4824.0	1.8	41.5	43.3	54.0	10.7	Vertical
4824.0	-0.9	42.4	41.5	54.0	12.5	Horizontal
7236.0	-3.0	45.1	42.1	54.0	11.9	Vertical
7236.0	-4.3	46.2	41.9	54.0	12.1	Horizontal
9648.0	-6.9	48	41.1	54.0	12.9	Vertical
9648.0	-7.2	48.8	41.6	54.0	12.4	Horizontal
12060.0	-9.5	51.5	42.0	54.0	12.0	Vertical
12060.0	-9.9	52.4	42.5	54.0	11.5	Horizontal

Result of Tx mode (2437.0 MHz) (802.11g) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2437.0 MHz) (802.11g) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4874.0	15.6	41.6	57.2	74.0	16.8	Vertical
4874.0	13.4	42.5	55.9	74.0	18.1	Horizontal
7311.0	10.5	45.2	55.7	74.0	18.3	Vertical
7311.0	9.1	46.3	55.4	74.0	18.6	Horizontal
9748.0	7.6	48.1	55.7	74.0	18.3	Vertical
9748.0	6.3	48.9	55.2	74.0	18.8	Horizontal
12185.0	4.0	51.6	55.6	74.0	18.4	Vertical
12185.0	3.5	52.5	56.0	74.0	18.0	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4874.0	2.1	41.6	43.7	54.0	10.3	Vertical
4874.0	0.6	42.5	43.1	54.0	10.9	Horizontal
7311.0	-3.3	45.2	41.9	54.0	12.1	Vertical
7311.0	-4.6	46.3	41.7	54.0	12.3	Horizontal
9748.0	-6.5	48.1	41.6	54.0	12.4	Vertical
9748.0	-6.4	48.9	42.5	54.0	11.5	Horizontal
12185.0	-10.2	51.6	41.4	54.0	12.6	Vertical
12185.0	-10.4	52.5	42.1	54.0	11.9	Horizontal

Result of Tx mode (2462.0 MHz) (802.11g) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2462.0 MHz) (802.11g) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4924.0	15.0	41.4	56.4	74.0	17.6	Vertical
4924.0	12.9	42.7	55.6	74.0	18.4	Horizontal
7386.0	9.5	45.6	55.1	74.0	18.9	Vertical
7386.0	8.0	46.5	54.5	74.0	19.5	Horizontal
9848.0	7.2	48.6	55.8	74.0	18.2	Vertical
9848.0	5.6	49.7	55.3	74.0	18.7	Horizontal
12310.0	3.7	51.7	55.4	74.0	18.6	Vertical
12310.0	2.2	52.7	54.9	74.0	19.1	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4924.0	1.2	41.4	42.6	54.0	11.4	Vertical
4924.0	-0.8	42.7	41.9	54.0	12.1	Horizontal
7386.0	-4.3	45.6	41.3	54.0	12.7	Vertical
7386.0	-5.3	46.5	41.2	54.0	12.8	Horizontal
9848.0	-6.2	48.6	42.4	54.0	11.6	Vertical
9848.0	-8.2	49.7	41.5	54.0	12.5	Horizontal
12310.0	-9.8	51.7	41.9	54.0	12.1	Vertical
12310.0	-11.5	52.7	41.2	54.0	12.8	Horizontal

Result of Tx mode (2412.0 MHz) (802.11n20) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2412.0 MHz) (802.11n20) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4824.0	14.9	41.5	56.4	74.0	17.6	Vertical
4824.0	13.3	42.4	55.7	74.0	18.3	Horizontal
7236.0	10.3	45.1	55.4	74.0	18.6	Vertical
7236.0	9.0	46.2	55.2	74.0	18.8	Horizontal
9648.0	7.9	48	55.9	74.0	18.1	Vertical
9648.0	5.7	48.8	54.5	74.0	19.5	Horizontal
12060.0	4.6	51.5	56.1	74.0	17.9	Vertical
12060.0	3.0	52.4	55.4	74.0	18.6	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4824.0	2.1	41.5	43.6	54.0	10.4	Vertical
4824.0	-0.3	42.4	42.1	54.0	11.9	Horizontal
7236.0	-2.6	45.1	42.5	54.0	11.5	Vertical
7236.0	-4.5	46.2	41.7	54.0	12.3	Horizontal
9648.0	-6.3	48	41.7	54.0	12.3	Vertical
9648.0	-7.8	48.8	41.0	54.0	13.0	Horizontal
12060.0	-9.5	51.5	42.0	54.0	12.0	Vertical
12060.0	-10.1	52.4	42.3	54.0	11.7	Horizontal

Result of Tx mode (2437.0 MHz) (802.11n20) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2437.0 MHz) (802.11n20) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4874.0	15.8	41.6	57.4	74.0	16.6	Vertical
4874.0	13.8	42.5	56.3	74.0	17.7	Horizontal
7311.0	10.6	45.2	55.8	74.0	18.2	Vertical
7311.0	9.1	46.3	55.4	74.0	18.6	Horizontal
9748.0	7.8	48.1	55.9	74.0	18.1	Vertical
9748.0	7.2	48.9	56.1	74.0	17.9	Horizontal
12185.0	3.7	51.6	55.3	74.0	18.7	Vertical
12185.0	3.8	52.5	56.3	74.0	17.7	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4874.0	2.1	41.6	43.7	54.0	10.3	Vertical
4874.0	0.4	42.5	42.9	54.0	11.1	Horizontal
7311.0	-3.6	45.2	41.6	54.0	12.4	Vertical
7311.0	-4.2	46.3	42.1	54.0	11.9	Horizontal
9748.0	-6.1	48.1	42.0	54.0	12.0	Vertical
9748.0	-6.5	48.9	42.4	54.0	11.6	Horizontal
12185.0	-10.0	51.6	41.6	54.0	12.4	Vertical
12185.0	-10.8	52.5	41.7	54.0	12.3	Horizontal

Result of Tx mode (2462.0 MHz) (802.11n20) (9kHz – 30MHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dBµV	Correction Factor dB/m	Field Strength dBµV/m	Field Strength µV/m	Limit µV/m	E-Field Polarity
Emissions detected are more than 20 dB below the FCC Limits						

Result of Tx mode (2462.0 MHz) (802.11n20) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4924.0	14.7	41.4	56.1	74.0	17.9	Vertical
4924.0	12.9	42.7	55.6	74.0	18.4	Horizontal
7386.0	9.1	45.6	54.7	74.0	19.3	Vertical
7386.0	8.6	46.5	55.1	74.0	18.9	Horizontal
9848.0	7.2	48.6	55.8	74.0	18.2	Vertical
9848.0	5.1	49.7	54.8	74.0	19.2	Horizontal
12310.0	3.5	51.7	55.2	74.0	18.8	Vertical
12310.0	2.7	52.7	55.4	74.0	18.6	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
4924.0	1.8	41.4	43.2	54.0	10.8	Vertical
4924.0	-0.3	42.7	42.4	54.0	11.6	Horizontal
7386.0	-4.3	45.6	41.3	54.0	12.7	Vertical
7386.0	-5.6	46.5	40.9	54.0	13.1	Horizontal
9848.0	-6.7	48.6	41.9	54.0	12.1	Vertical
9848.0	-8.6	49.7	41.1	54.0	12.9	Horizontal
12310.0	-10.3	51.7	41.4	54.0	12.6	Vertical
12310.0	-11.0	52.7	41.7	54.0	12.3	Horizontal

Remarks:
No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

* Denotes restricted band of operation.
Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty (9kHz-30MHz): 2.0dB
(30MHz -1GHz): 4.9dB
(1GHz -26GHz): 4.02dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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Radiated Emissions Measurement:

Limit：

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

Result： RF Radiated Emissions (Lowest)-802.11b

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2390.0	15.1	36.8	51.9	74.0	22.1	Vertical
2390.0	14.6	36.4	51.0	74.0	23.0	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2390.0	1.7	36.8	38.5	54.0	15.5	Vertical
2390.0	0.5	36.4	36.9	54.0	17.1	Horizontal

Result： RF Radiated Emissions (Highest) -802.11b

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2483.5	16.2	36.8	53.0	74.0	21.0	Vertical
2483.5	14.1	36.4	50.5	74.0	23.5	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2483.5	2.4	38.6	41.0	54.0	13.0	Vertical
2483.5	0.8	36.4	37.2	54.0	16.8	Horizontal

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Result： RF Radiated Emissions (Lowest)-802.11g

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2390.0	17.3	36.8	54.1	74.0	19.9	Vertical
2390.0	15.9	36.4	52.3	74.0	21.7	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2390.0	3.9	36.8	40.7	54.0	13.3	Vertical
2390.0	2.2	36.4	38.6	54.0	15.4	Horizontal

Result： RF Radiated Emissions (Highest) -802.11g

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2483.5	24.2	36.8	61.0	74.0	13.0	Vertical
2483.5	20.3	36.4	56.7	74.0	17.3	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2483.5	5.0	36.8	41.8	54.0	12.2	Vertical
2483.5	3.7	36.4	40.1	54.0	13.9	Horizontal

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Result： RF Radiated Emissions (Lowest)-802.11n20

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2390.0	16.3	36.8	53.1	74.0	20.9	Vertical
2390.0	15.5	36.4	51.9	74.0	22.1	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2390.0	3.5	36.8	40.3	54.0	13.7	Vertical
2390.0	2.4	36.4	38.8	54.0	15.2	Horizontal

Result： RF Radiated Emissions (Highest) -802.11n20

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2483.5	24.5	36.8	61.3	74.0	12.7	Vertical
2483.5	22.7	36.4	59.1	74.0	14.9	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dBµV	Correction Factor dB/m	Field Strength dBµV/m	Limit @3m dBµV/m	Margin dB	E-Field Polarity
2483.5	5.2	36.8	42.0	54.0	12.0	Horizontal
2483.5	4.1	36.4	40.5	54.0	13.5	Horizontal

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Limits for Radiated Emissions FCC 47 CFR 15.247]:

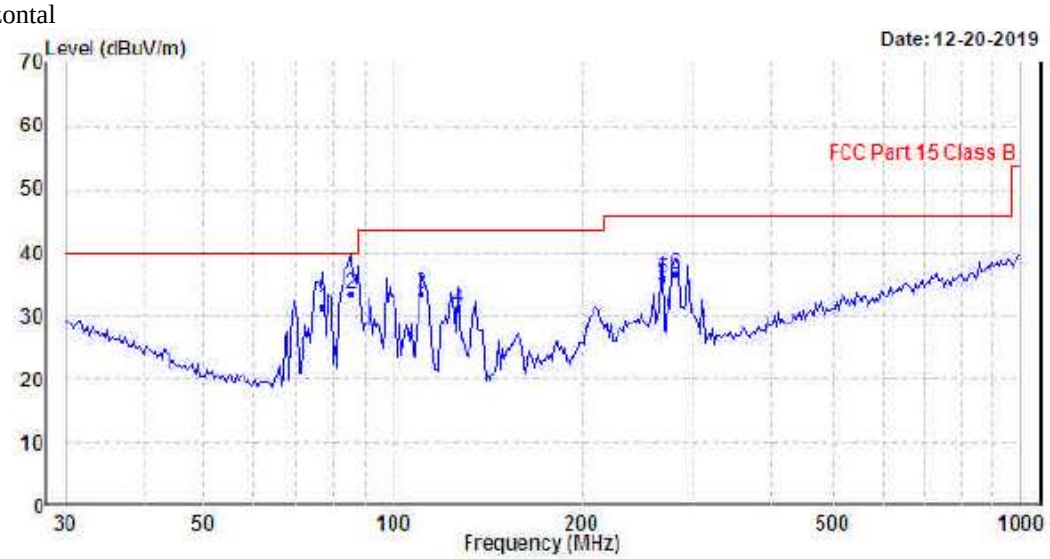
Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of WIFI TX mode: Pass

Please refer to the following table for result details(The data is the worst cases)

Horizontal



Ambient Temperature: 25C
Relative Humidity : 50%

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	77.321	31.52	40.00	-8.48	QP	Horizontal
2	85.898	33.60	40.00	-6.40	QP	Horizontal
3	110.569	33.57	43.50	-9.93	QP	Horizontal
4	126.329	31.21	43.50	-12.29	QP	Horizontal
5	267.546	35.83	46.00	-10.17	QP	Horizontal
6	281.008	36.77	46.00	-9.23	QP	Horizontal

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Limits for Radiated Emissions FCC 47 CFR 15.247 Class B]:

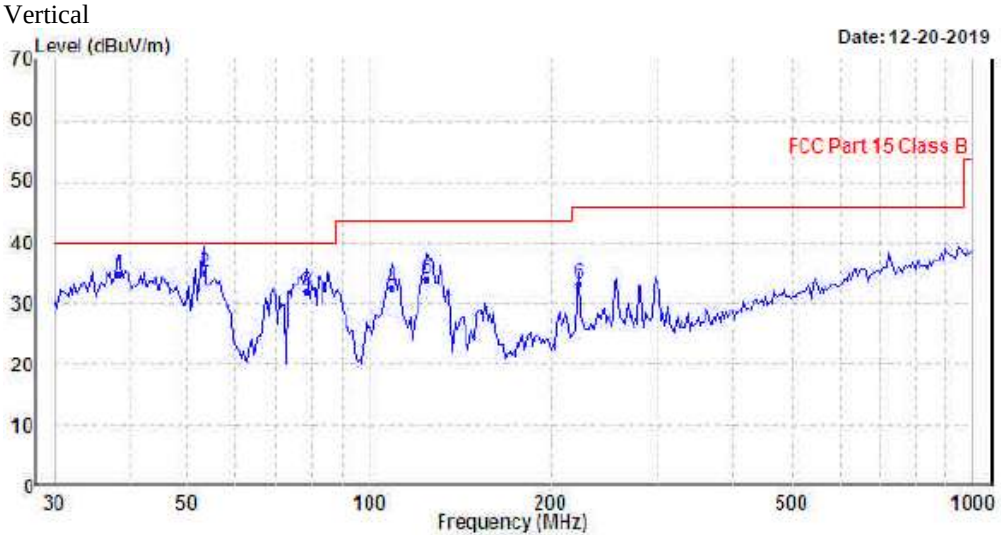
Frequency Range	Quasi-Peak Limits
[MHz]	[μV/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

Results of WIFI TX mode: Pass

Please refer to the following table for result details(The data is the worst cases)

Vertical



Ambient Temperature: 25C
Relative Humidity : 50%

	Freq	Level	Limit Line	Over Limit	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB		
1	38.346	34.92	40.00	-5.08	QP	Vertical
2	53.318	35.15	40.00	-4.85	QP	Vertical
3	78.965	31.99	40.00	-8.01	QP	Vertical
4	109.029	32.41	43.50	-11.09	QP	Vertical
5	124.569	34.05	43.50	-9.45	QP	Vertical
6	221.392	33.30	46.00	-12.70	QP	Vertical

Remarks: Calculated measurement uncertainty (30MHz – 1GHz): 4.9dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.

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3.1.3 AC Mains Conducted Emissions (0.15MHz to 30MHz)

Test Requirement:	FCC 47CFR 15.207
Test Method:	ANSI C63.10:2013
Test Date:	2019-12-19
Mode of Operation:	WIFI TX mode
Test Voltage:	120Va.c. 60Hz

Ambient Temperature: 25℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

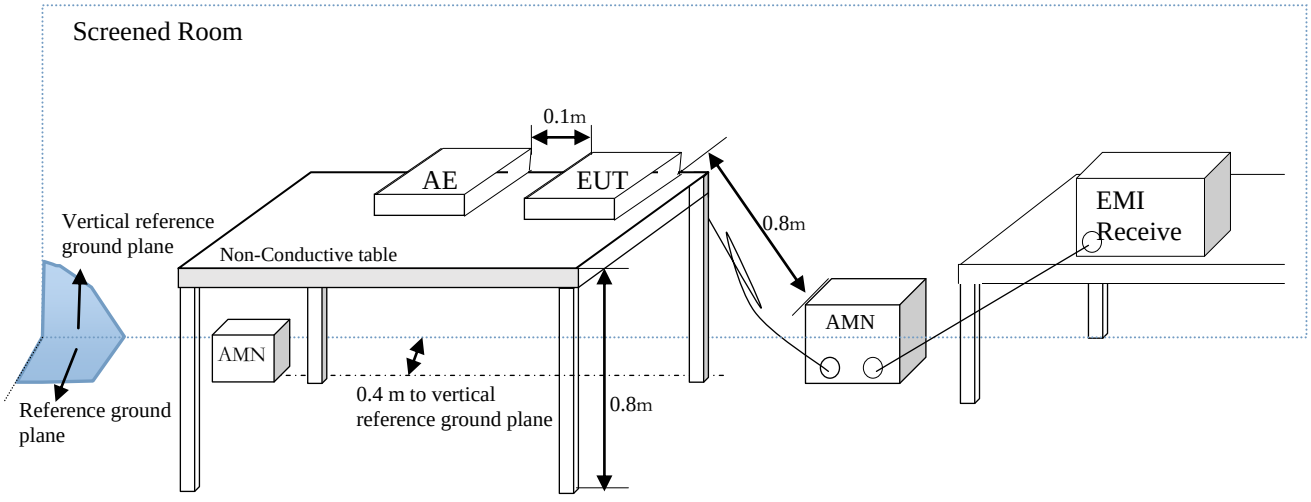
Test Method:

The test was performed in accordance with ANSI ANSI C63.10:2013, with the following: an initial measurement was performed in peak and average detection mode on the live line, any emissions recorded within 30dB of the relevant limit line were re-measured using quasi-peak and average detection on the live and neutral lines with the worst case recorded in the table of results.

Receiver Setting:

Bandw. = 9 kHz, Meas. Time= 10.0 ms, Step Width = 5.0kHz
Detector = MaxPeak and CISPR AV

Test Setup:



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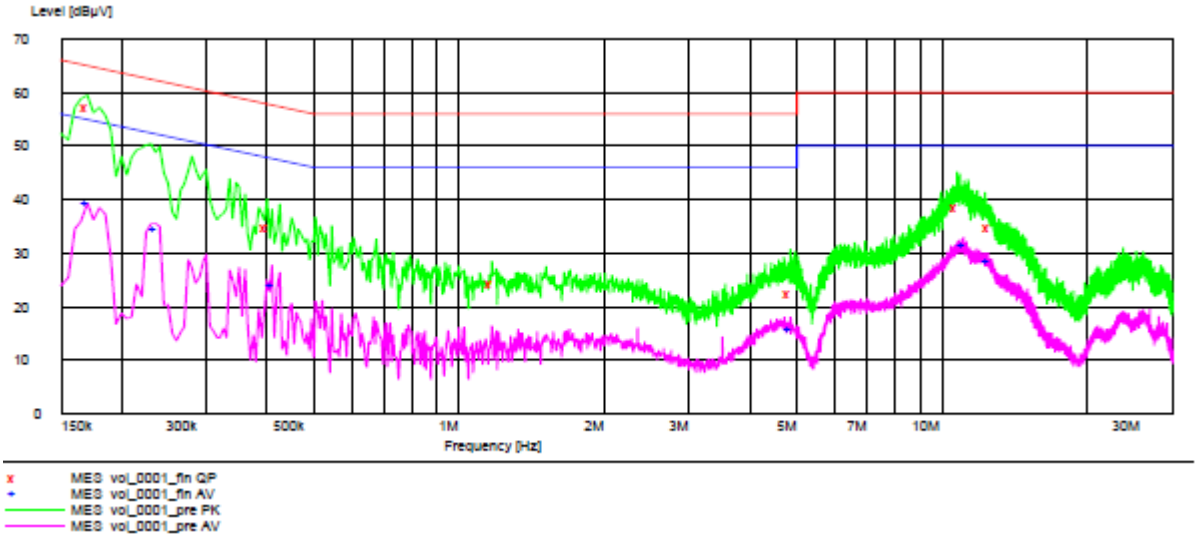
Limits for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dBµV]	Average [dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.

Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of WIFI TX mode (L): PASS
Please refer to the following diagram for individual results.



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MEASUREMENT RESULT: "vol_0001_fin QP"

12/19/2019 4:20PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.170000	57.10	9.7	65	7.9	L1	GND
0.400000	34.60	9.7	58	23.3	L1	GND
1.170000	24.30	9.7	56	31.7	L1	GND
4.855000	22.50	9.8	56	33.5	L1	GND
10.735000	38.40	10.0	60	21.6	L1	GND
12.545000	34.80	10.1	60	25.2	L1	GND

MEASUREMENT RESULT: "vol_0001_fin AV"

12/19/2019 4:20PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.170000	39.20	9.7	55	15.8	L1	GND
0.235000	34.50	9.7	52	17.8	L1	GND
0.410000	23.80	9.7	48	23.9	L1	GND
4.855000	15.70	9.8	46	30.3	L1	GND
11.090000	31.50	10.1	50	18.5	L1	GND
12.450000	28.30	10.1	50	21.7	L1	GND

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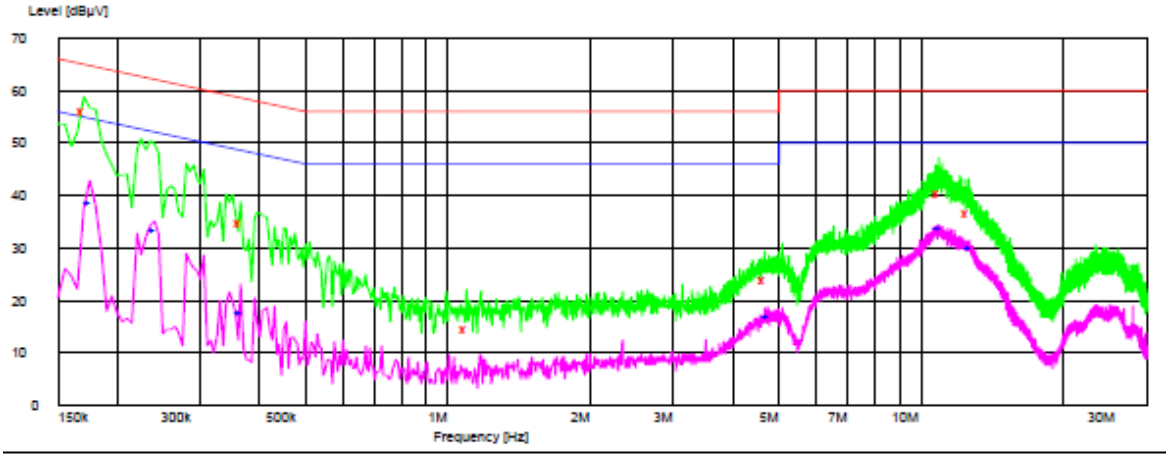
Frequency Range [MHz]	Quasi-Peak Limits [dBµV]	Average [dBµV]
0.15-0.5	66 to 56*	56 to 46*
0.5-5.0	56	46
5.0-30.0	60	50

* Decreases with the logarithm of the frequency.
Limits for Conducted Emissions Test, please refer to limit lines (Quasi-Peak and Average) in the following diagram.

Results of WIFI TX mode (N): PASS
Please refer to the following diagram for individual results.



MEASUREMENT RESULT: "vol_0001_fin QP"
12/19/2019 4:23PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.170000	56.00	9.7	65	8.9	N	GND
0.365000	34.70	9.7	59	23.9	N	GND
1.095000	14.80	9.7	56	41.2	N	GND
4.675000	24.00	9.8	56	32.0	N	GND
10.900000	40.40	10.0	60	19.6	N	GND
12.605000	36.70	10.1	60	23.3	N	GND

MEASUREMENT RESULT: "vol_0001_fin AV"
12/19/2019 4:23PM

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.175000	38.70	9.7	55	16.0	N	GND
0.240000	33.30	9.7	52	18.8	N	GND
0.365000	17.80	9.7	49	30.8	N	GND
4.745000	16.70	9.8	46	29.3	N	GND
10.915000	33.50	10.0	50	16.5	N	GND
12.665000	30.00	10.1	50	20.0	N	GND

Remarks:
Calculated measurement uncertainty (0.15MHz – 30MHz): 3.25dB
-*- Emission(s) that is far below the corresponding limit line.

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3.1.4 Power Spectral Density

Test Requirement:	FCC 47CFR 15.247(e)
Test Method:	ANSI C63.10:2013
Test Date:	2019-12-23
Mode of Operation:	WIFI TX mode

Ambient Temperature: 25℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

Test Method:

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=100kHz , VBW= 300KHz , Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple , Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

Test Limit:
The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF=10log (3 kHz/100 kHz=-15.2dB)

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Results of WIFI TX Mode 802.11 b (Tx:2412MHz to 2462MHz) : Pass (TX Unit)
Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2412.0	-6.73	8dBm
2437.0	-6.75	8dBm
2462.0	-7.53	8dBm

Results of WIFI TX Mode 802.11 g (Tx:2412MHz to 2462MHz) : Pass (TX Unit)
Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2412.0	-9.82	8dBm
2437.0	-9.78	8dBm
2462.0	-9.73	8dBm

Results of WIFI TX Mode 802.11 n20 (Tx:2412MHz to 2462MHz) : Pass (TX Unit)
Maximum power spectral density

Transmitter Frequency (MHz)	Maximum Power spectral density level / 3kHz band (dBm)	Maximum Power spectral density / 3kHz band limit
2412.0	-10.59	8dBm
2437.0	-10.39	8dBm
2462.0	-10.38	8dBm

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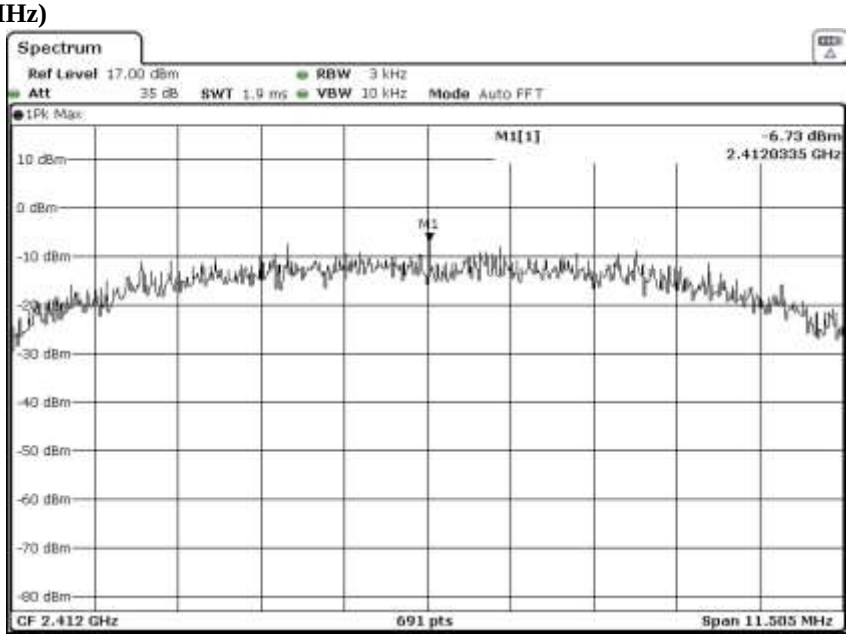
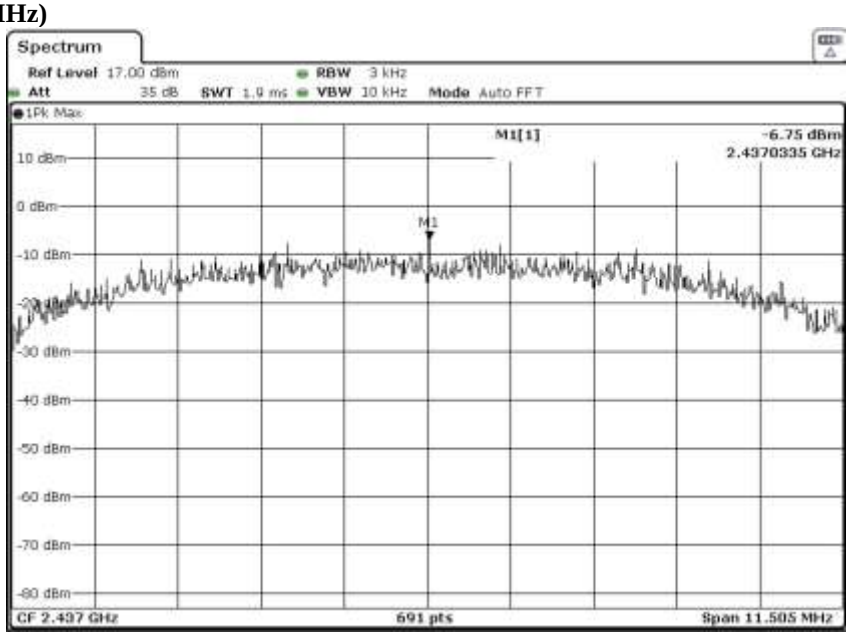
The following plots include cable losses :0.3dB (There is no Attenuator)
WiFi mode 802.11 b
CH 1 (2412.0 MHz)



CH 6 (2437.0 MHz)



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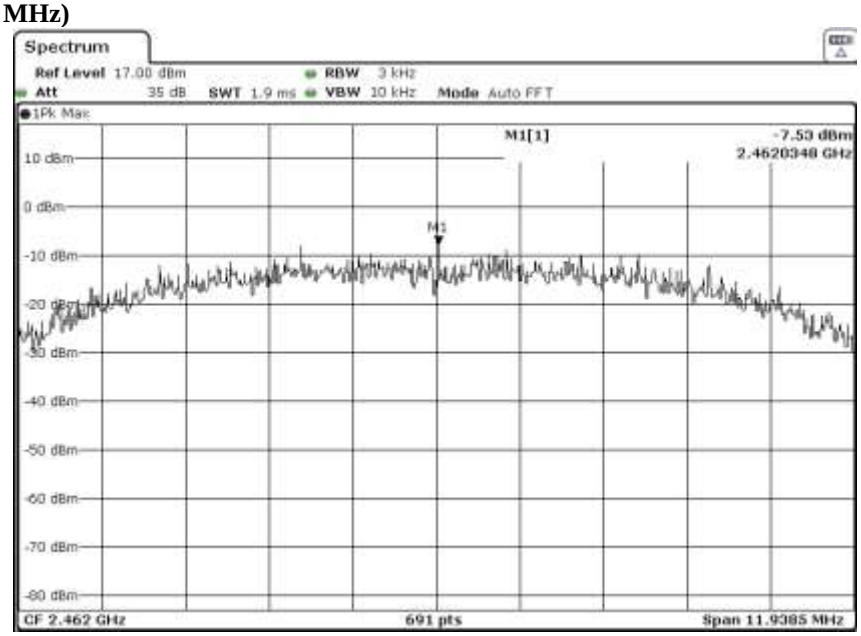
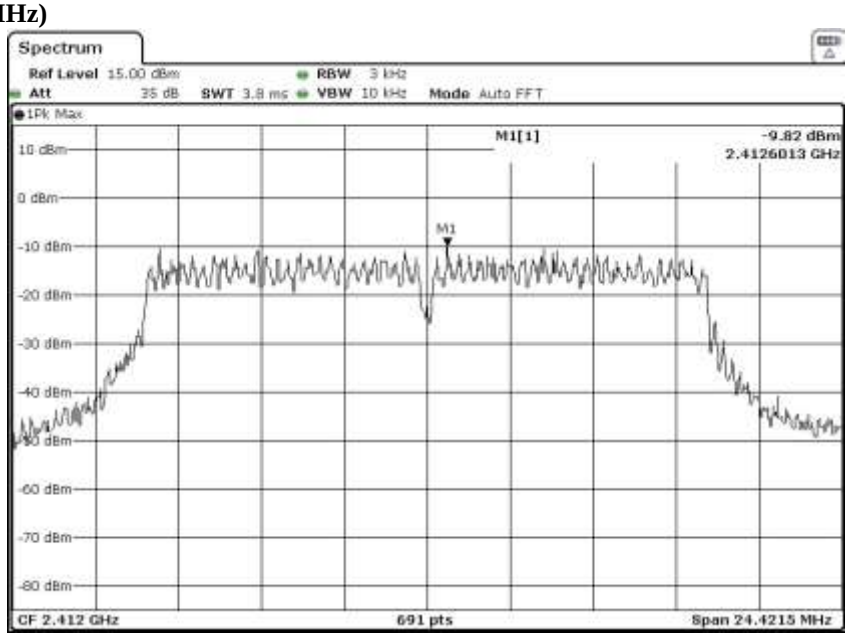
CH 11 (2462.0 MHz)



WiFi mode 802.11 g
CH 1 (2412.0 MHz)



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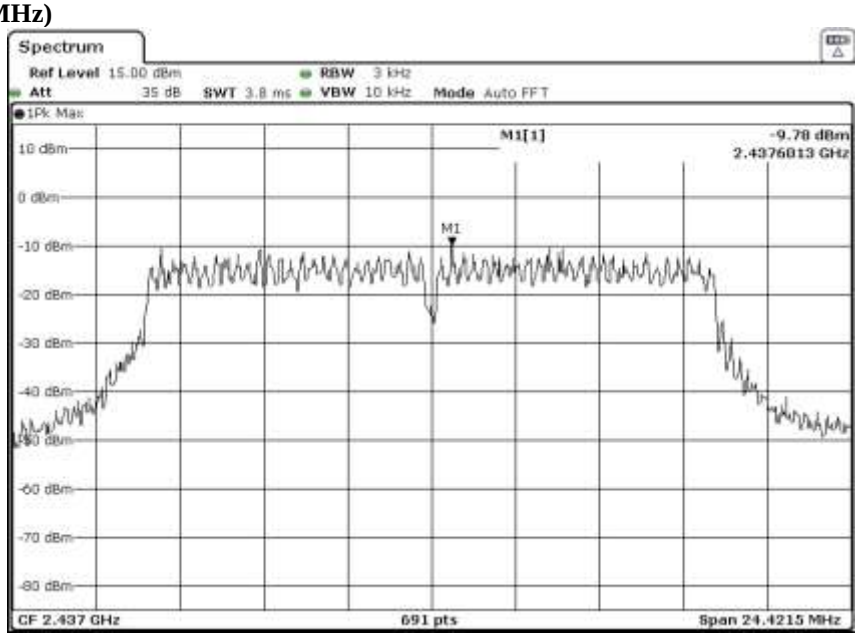
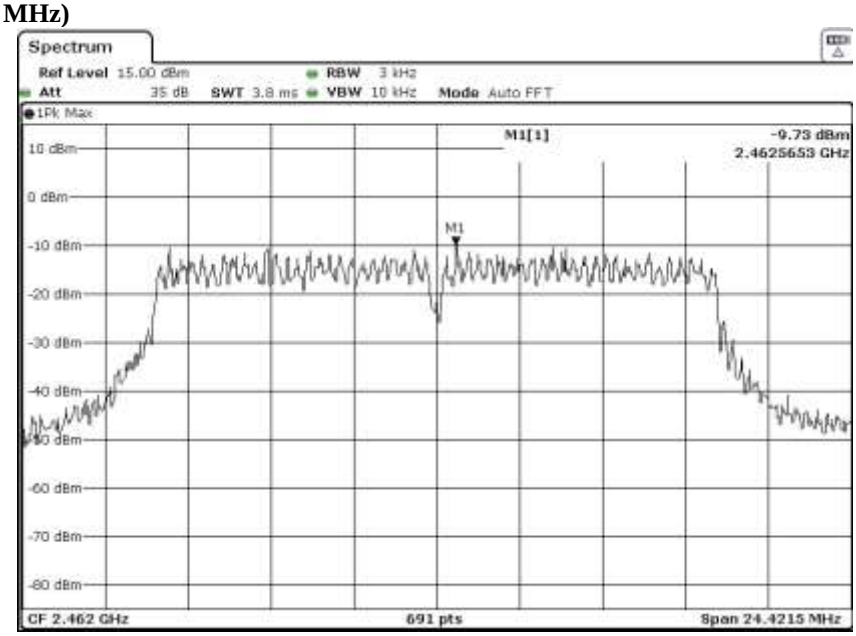
CH 6 (2437.0 MHz)



CH 11 (2462.0 MHz)



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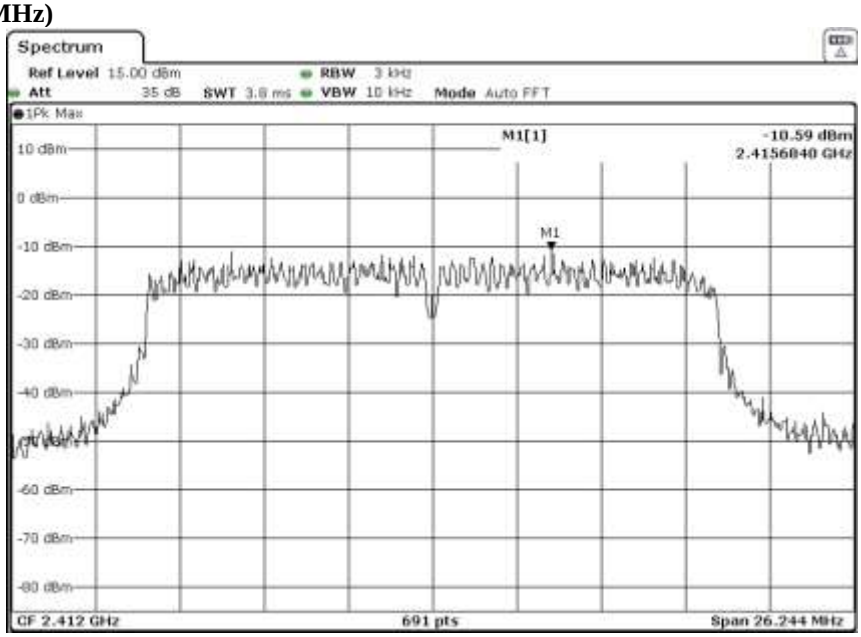
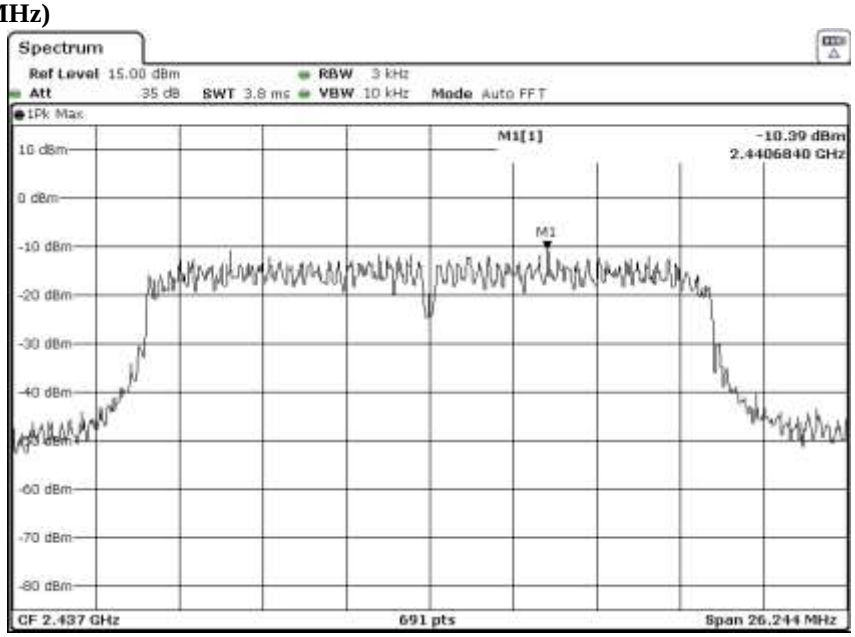
WiFi mode 802.11 n20
CH 1 (2412.0 MHz)



CH 6 (2437.0 MHz)



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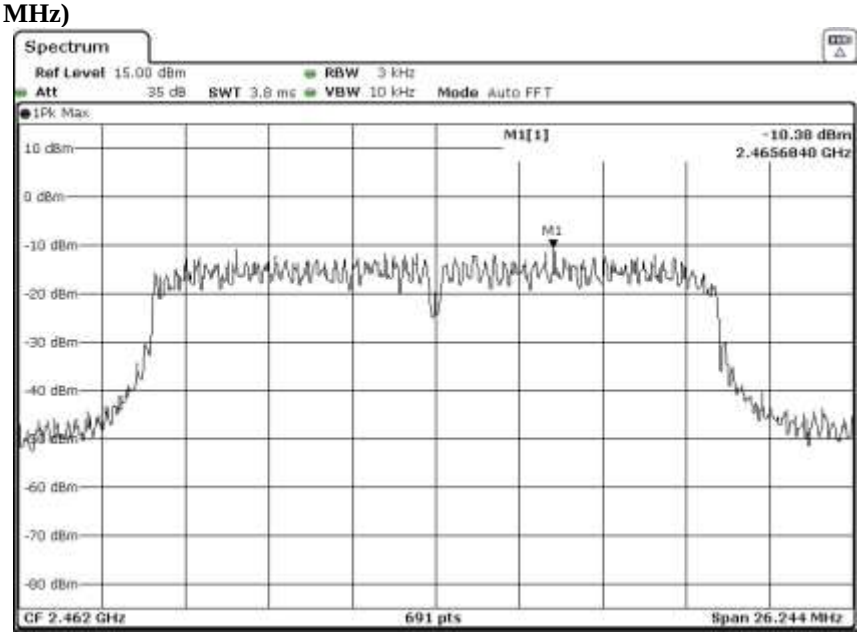
CH 11 (2462.0 MHz)



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3.1.5 6dB Spectrum Bandwidth Measurement

Test Requirement:	FCC 47CFR 15.247(a)(2)
Test Method:	ANSI C63.10:2013
Test Date:	2019-12-23
Mode of Operation:	WIFI TX mode

Ambient Temperature: 25℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

Test Method:

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

Spectrum Analyzer Setting:

RBW = 100kHz, VBW ≥ 3*RBW, Sweep = Auto couple
Detector = Peak, Trace = Max. hold

Test Setup:

As Test Setup of clause 3.1.1 in this test report.

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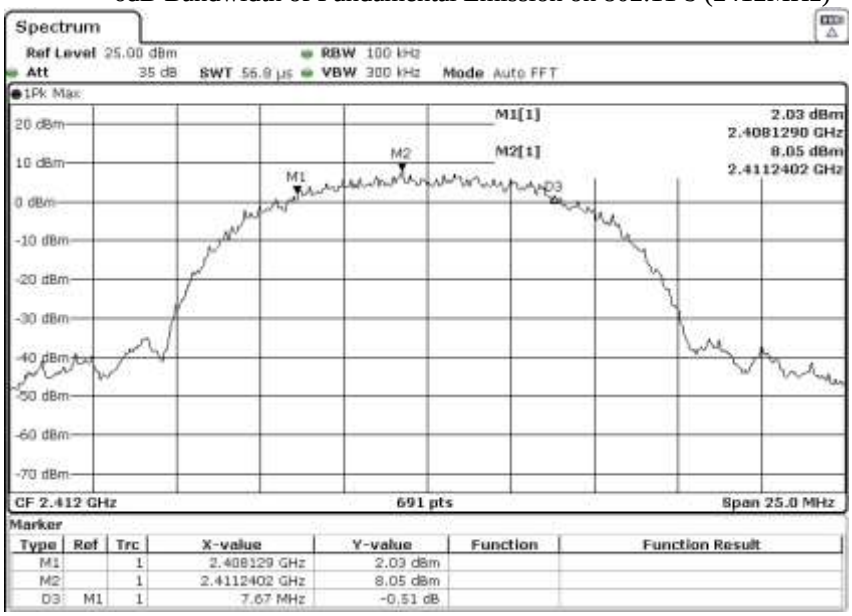
Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	7.670	> 500

6dB Bandwidth of Fundamental Emission on 802.11 b (2412MHz)



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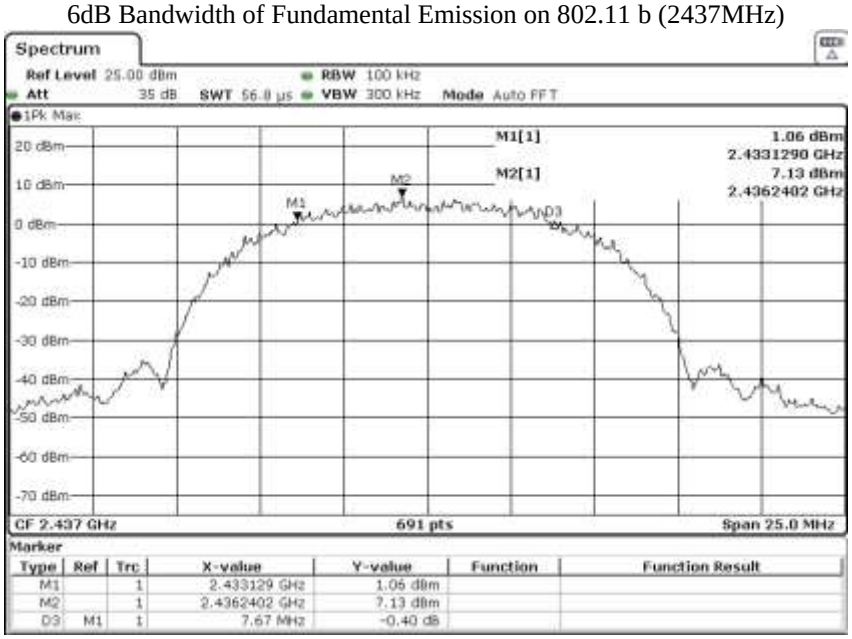
Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	7.670	> 500

6dB Bandwidth of Fundamental Emission on 802.11 b (2437MHz)



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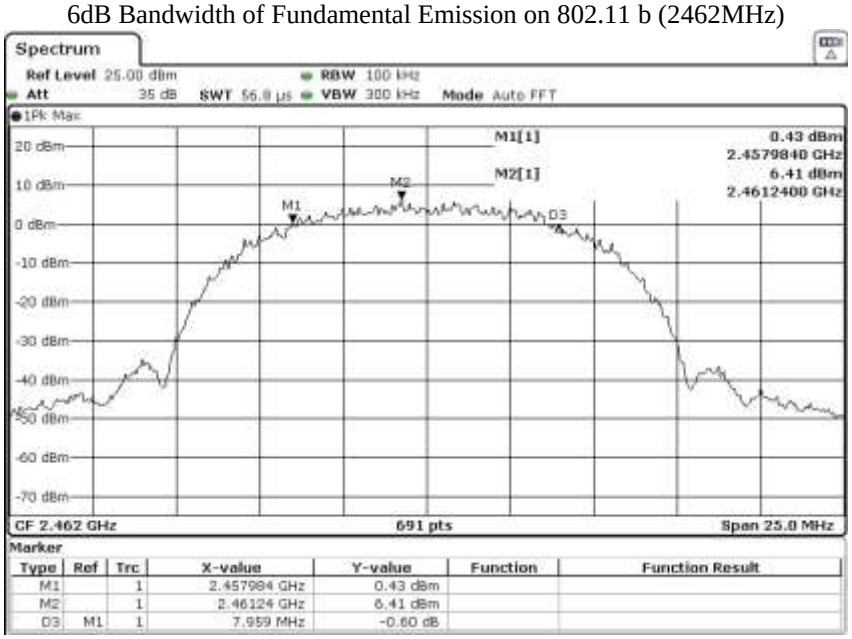
Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	7.959	> 500

6dB Bandwidth of Fundamental Emission on 802.11 b (2462MHz)



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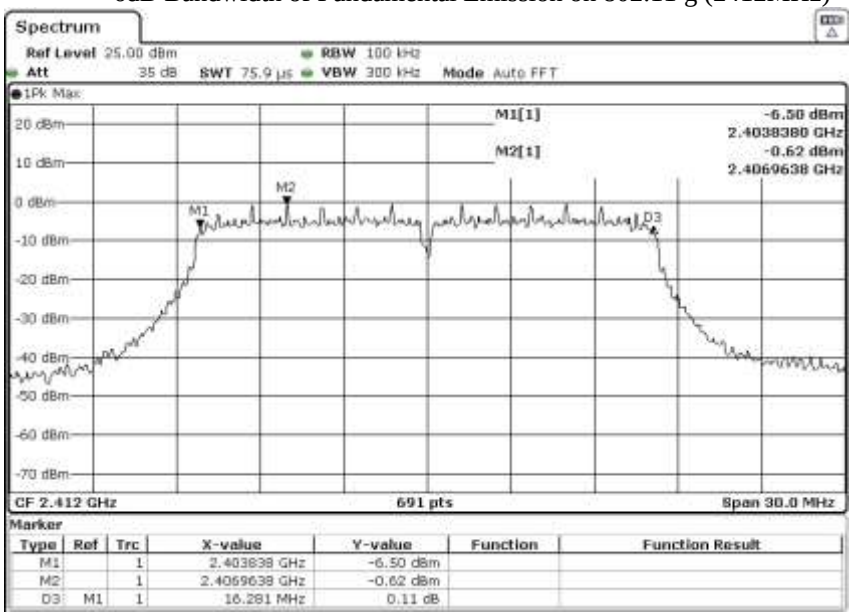
Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	16.281	> 500

6dB Bandwidth of Fundamental Emission on 802.11 g (2412MHz)



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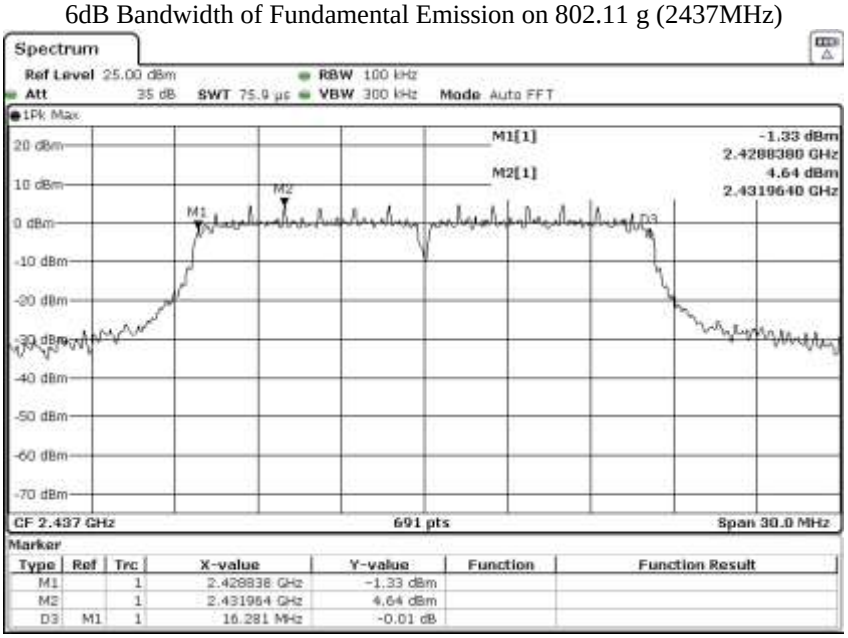
Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	16.281	> 500

6dB Bandwidth of Fundamental Emission on 802.11 g (2437MHz)



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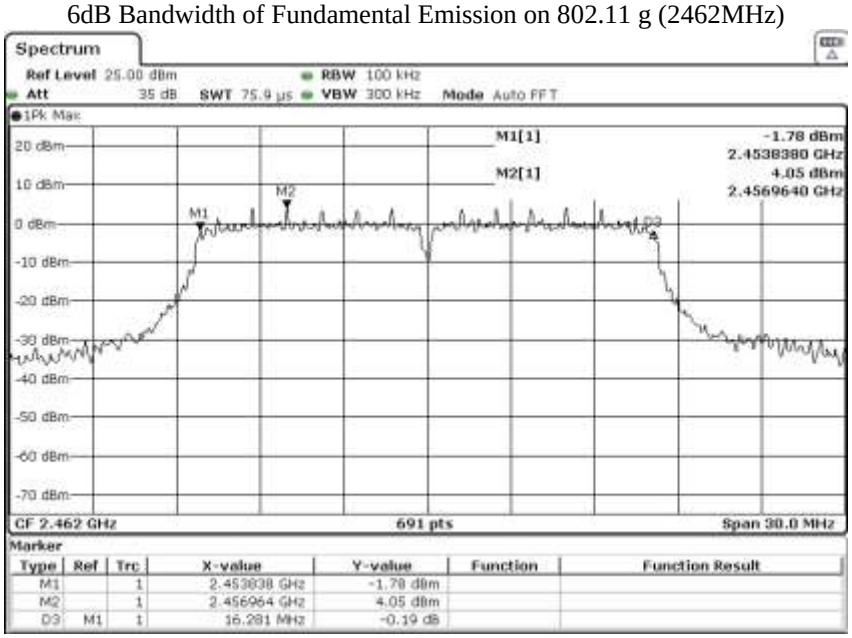
Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	16.281	> 500

6dB Bandwidth of Fundamental Emission on 802.11 g (2462MHz)



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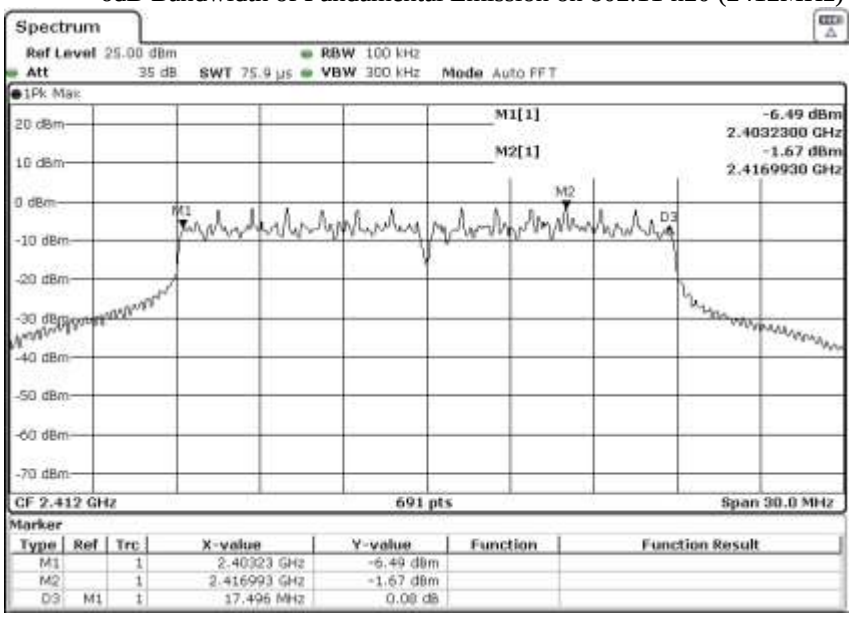
Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	17.496	> 500

6dB Bandwidth of Fundamental Emission on 802.11 n20 (2412MHz)



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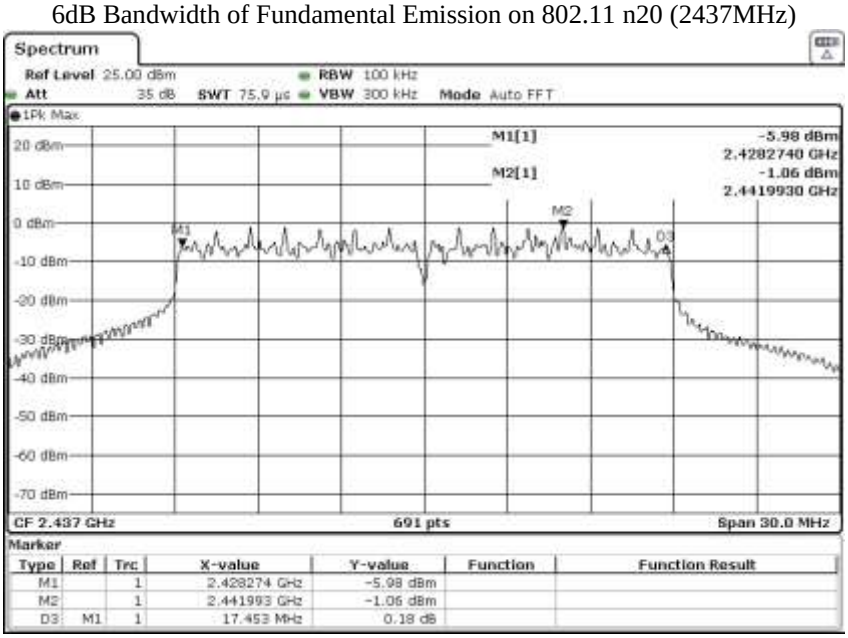
Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	17.453	> 500

6dB Bandwidth of Fundamental Emission on 802.11 n20 (2437MHz)



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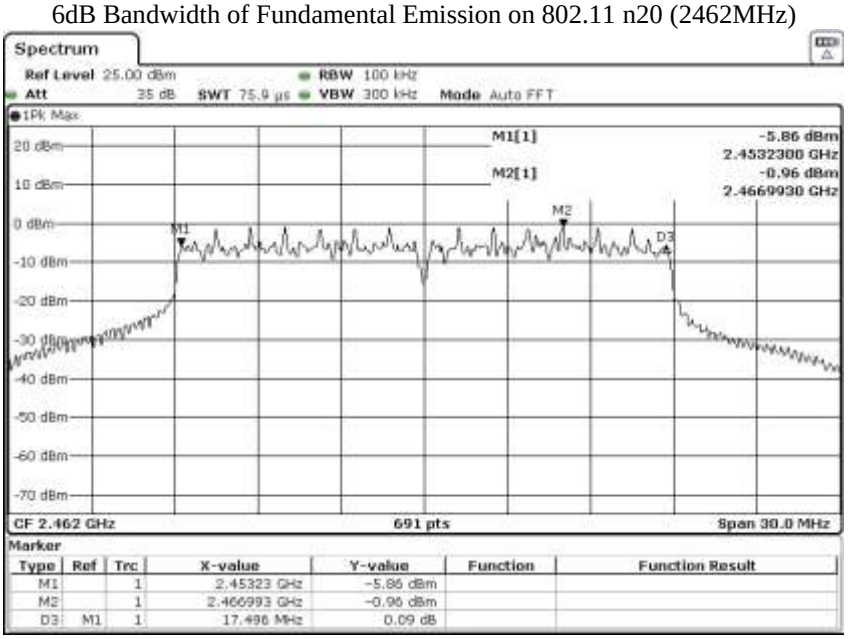
Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	17.496	> 500

6dB Bandwidth of Fundamental Emission on 802.11 n20 (2462MHz)



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3.1.6 Band Edges Measurement

Test Requirement:	FCC 47CFR 15.247
Test Method:	ANSI C63.10:2013
Test Date:	2019-12-23
Mode of Operation:	WIFI TX mode

Ambient Temperature: 25℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

Test Method:

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. The RBW are set to 100kHz and VBW are set to 300kHz for this measurement.

Test Setup:

As Test Setup of clause 3.1.2 in this test report.

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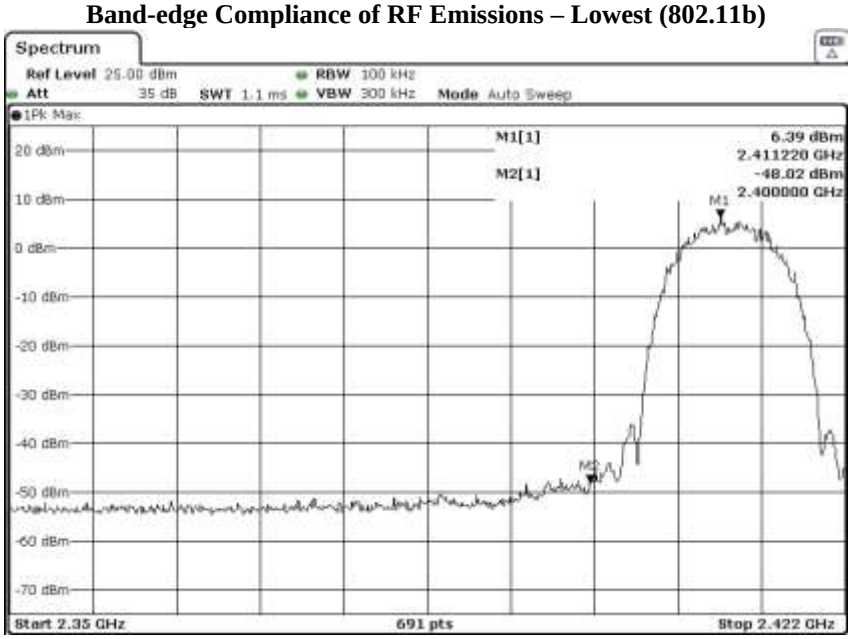
Band-edge Compliance of RF Conducted Emissions Measurement:

Limit：
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: The worst-case measurement results were recorded in the test report
The following plots include cable losses :0.3dB (There is no Attenuator)

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2412)	6.39	-13.61	-48.02	Pass

Band-edge Compliance of RF Emissions – Lowest (802.11b)



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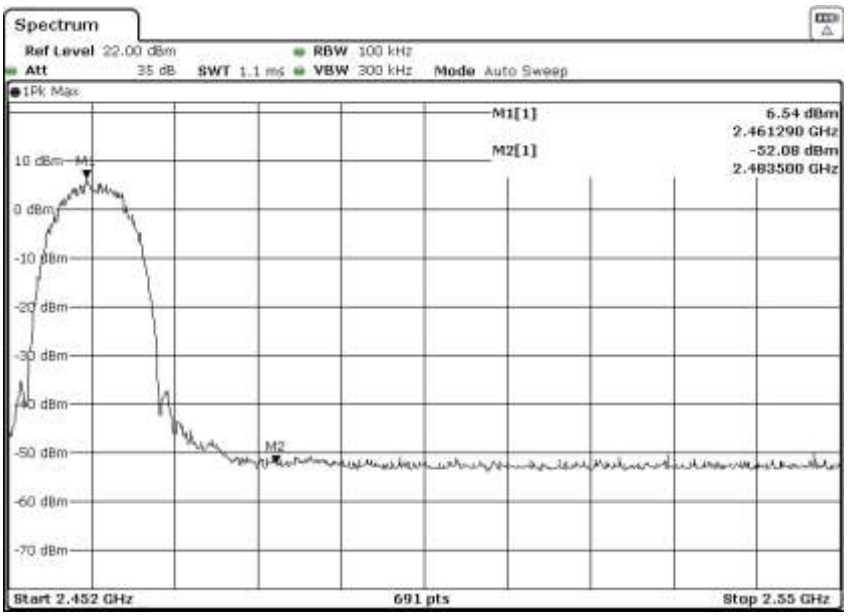
Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 – Highest Fundamental (2462)	6.54	-13.46	-52.08	Pass

Band-edge Compliance of RF Emissions – Highest (802.11b)



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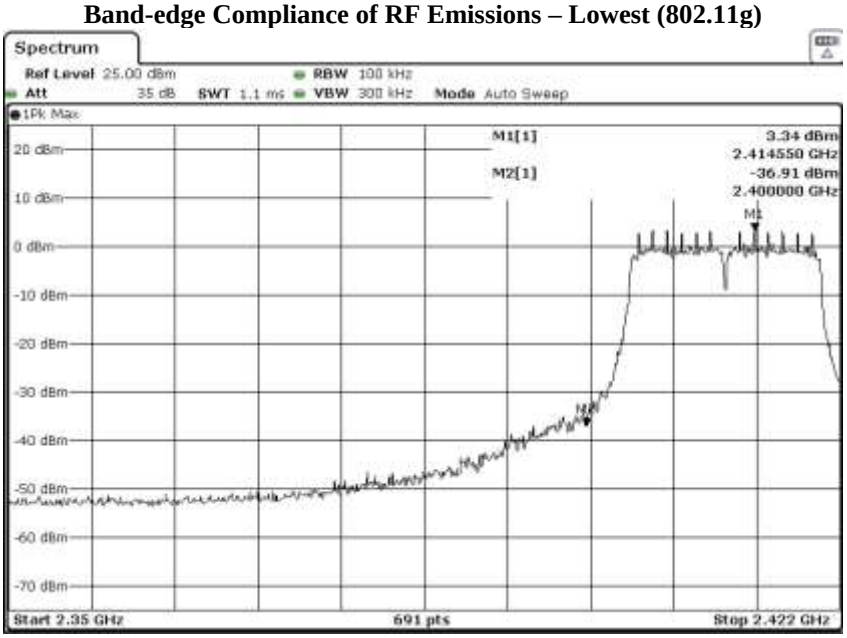
Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2412)	3.34	-16.66	-36.91	Pass

Band-edge Compliance of RF Emissions – Lowest (802.11g)



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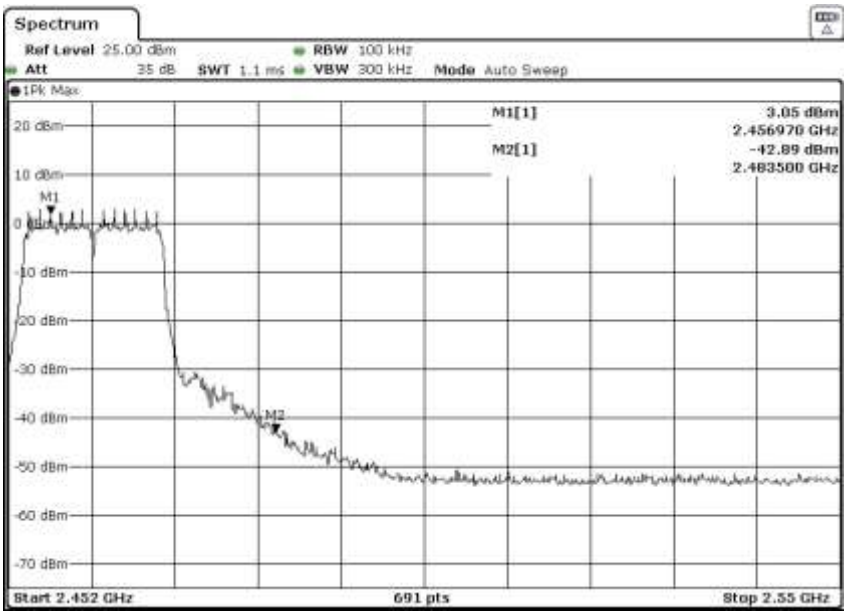
Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 – Highest Fundamental (2462)	3.05	-16.91	-42.89	Pass

Band-edge Compliance of RF Emissions – Highest (802.11g)



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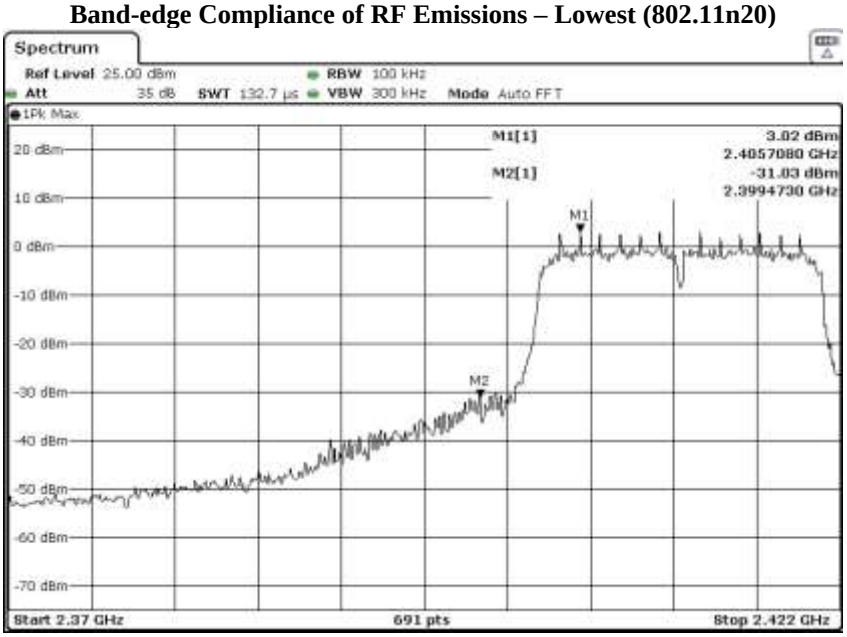
Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2412)	3.02	-16.98	-31.03	Pass

Band-edge Compliance of RF Emissions – Lowest (802.11n20)



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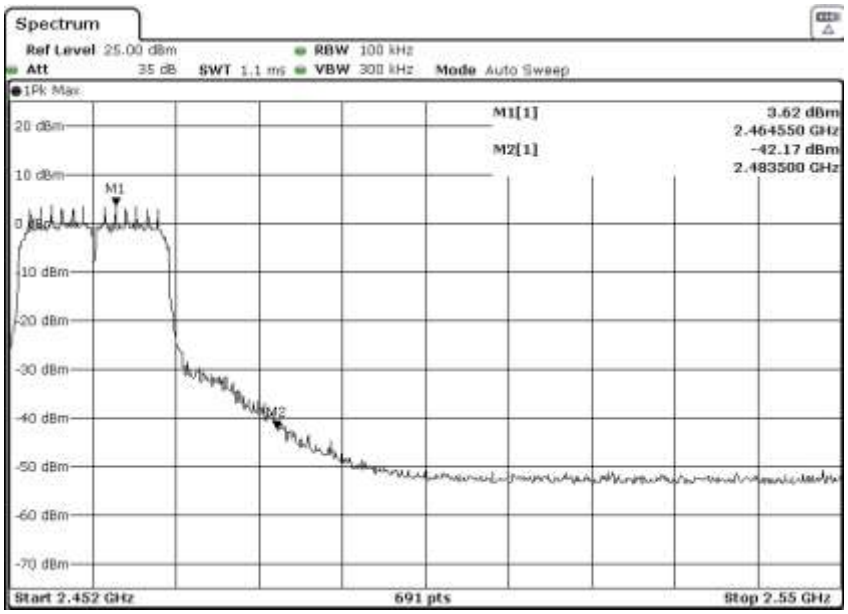
Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 – Highest Fundamental (2462)	3.62	-16.38	-42.17	Pass

Band-edge Compliance of RF Emissions – Highest (802.11n20)



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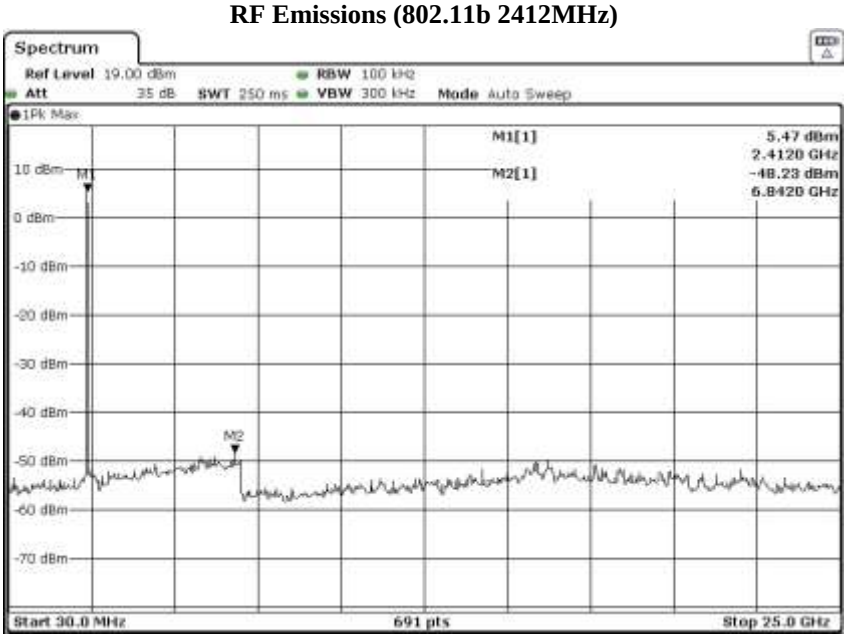
RF Conducted Emissions Measurement:

Limit：
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Remark: The worst-case measurement results were recorded in the test report
The following plots include cable losses :0.3dB (There is no Attenuator)

RF Emissions (802.11b 2412MHz)



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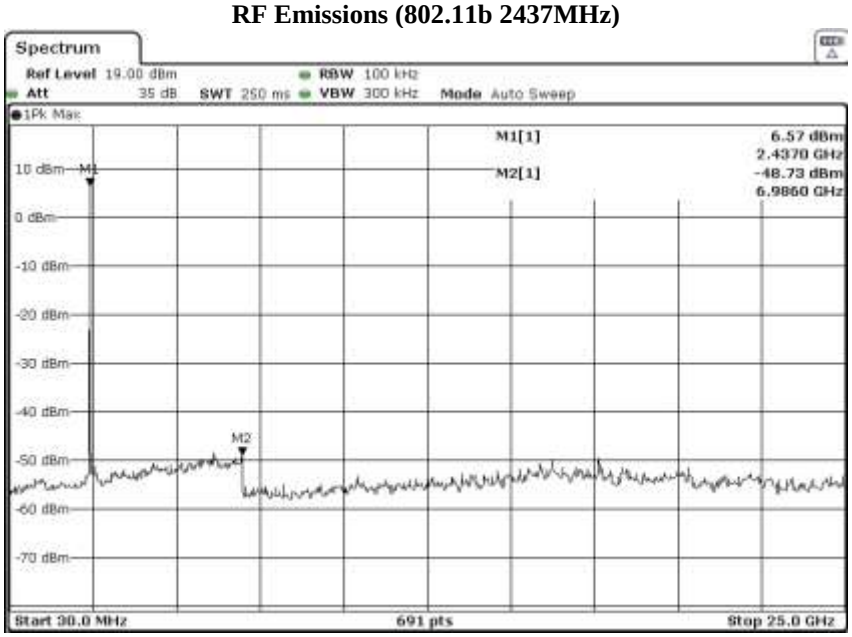
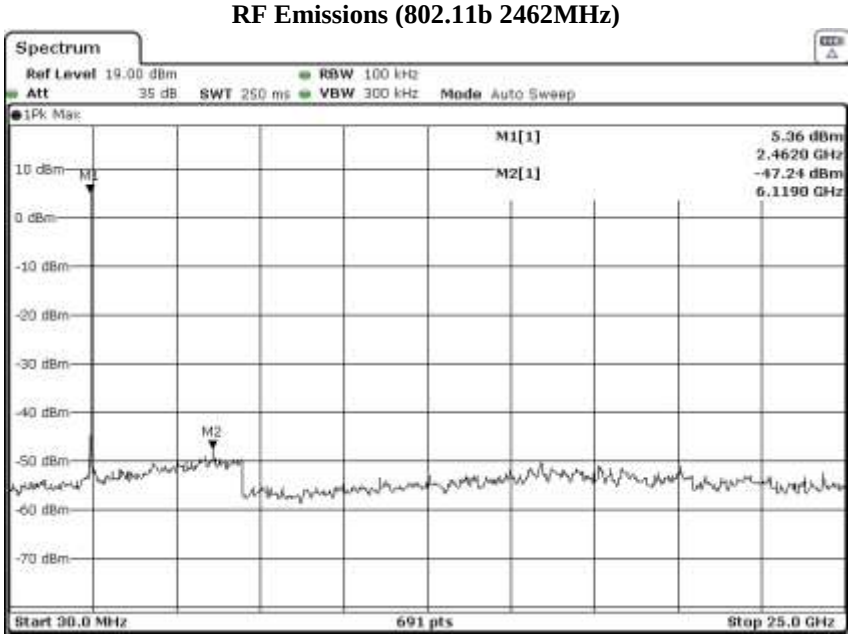
RF Emissions (802.11b 2437MHz)



RF Emissions (802.11b 2462MHz)



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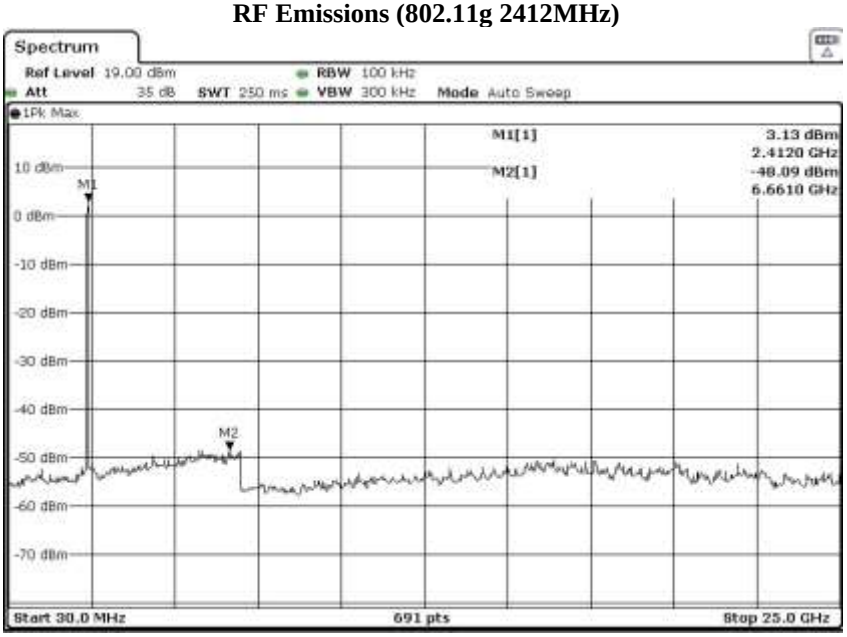
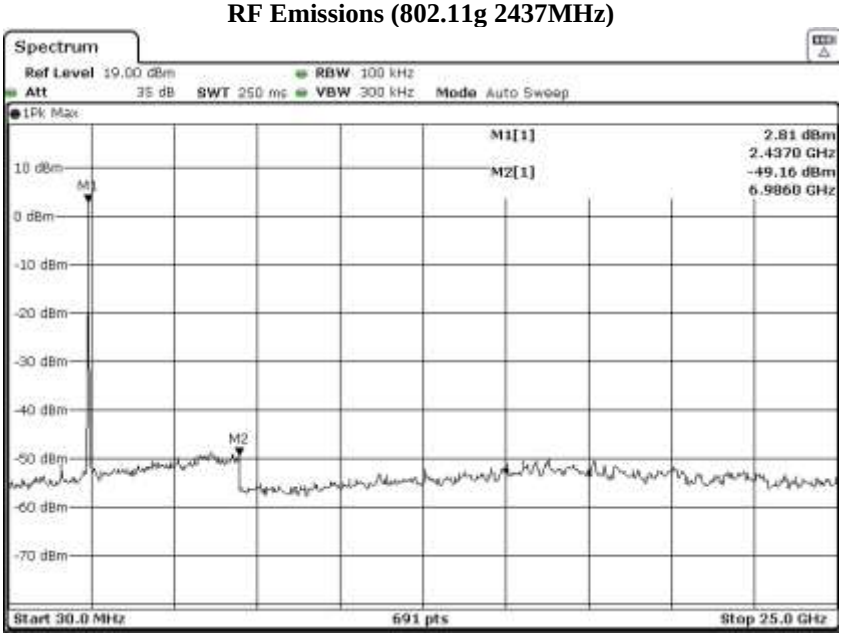
RF Emissions (802.11g 2412MHz)



RF Emissions (802.11g 2437MHz)



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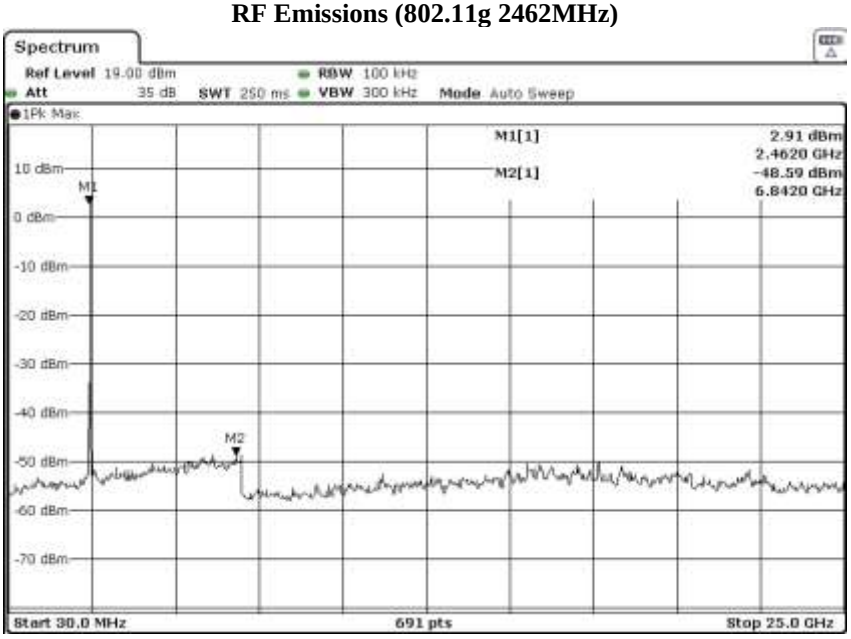
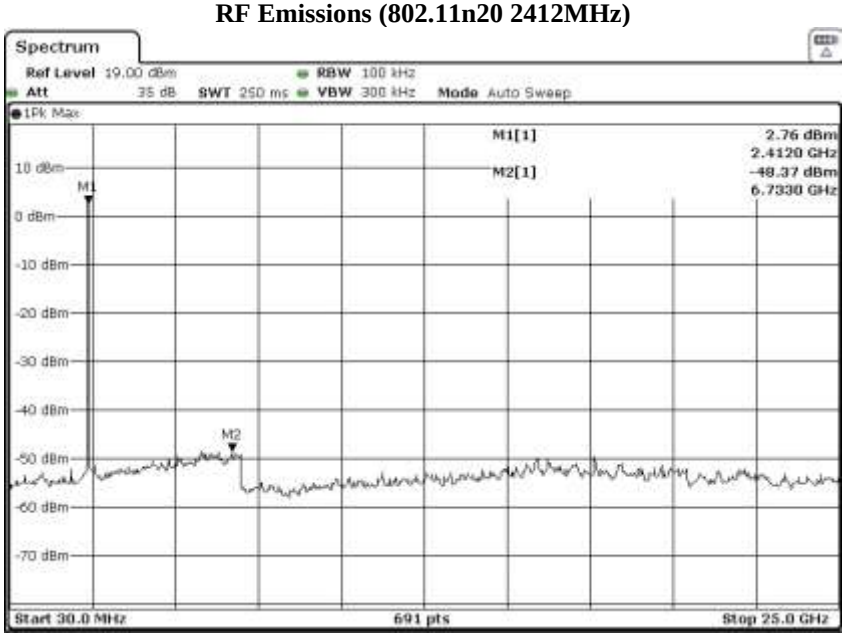
RF Emissions (802.11g 2462MHz)



RF Emissions (802.11n20 2412MHz)



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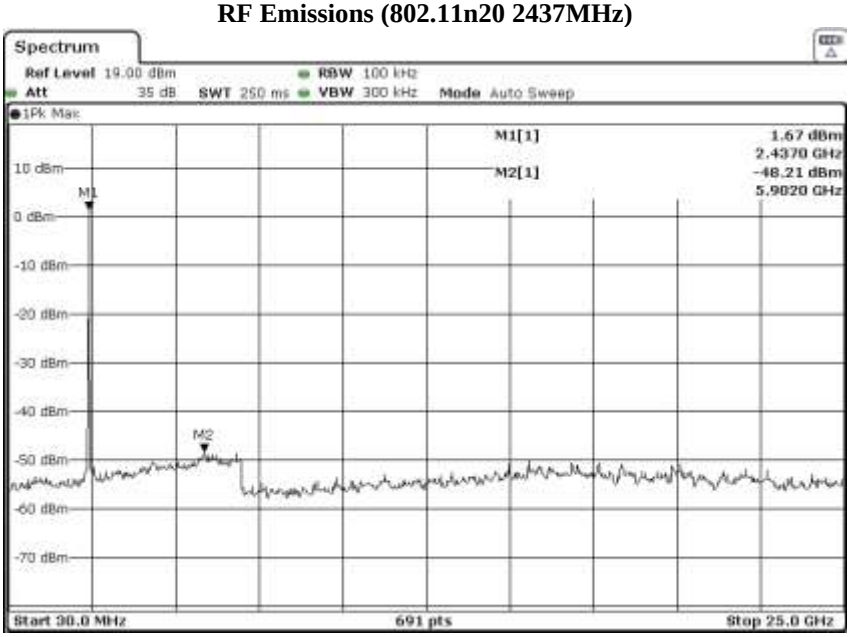
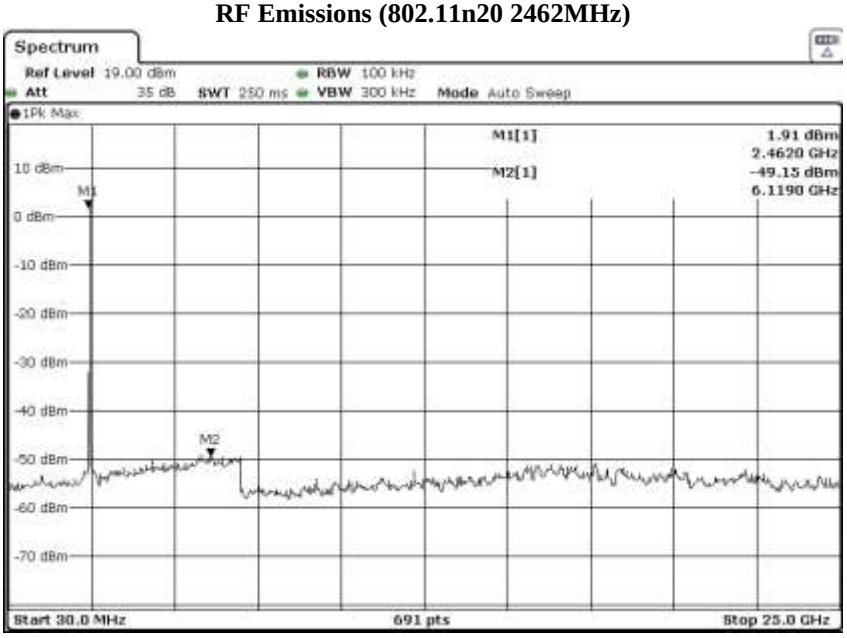
RF Emissions (802.11n20 2437MHz)



RF Emissions (802.11n20 2462MHz)



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3.1.7 Antenna Requirement

Ambient Temperature: 25℃ Relative Humidity: 51% Atmospheric Pressure: 101 kPa

Test Requirements: § 15.203

Test Specification:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Test Results:
This is PCB antenna. There is no external antenna, the antenna gain = 2dBi. User is unable to remove or changed the Antenna.

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Appendix A

List of Measurement Equipment

Radiated Emission

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3	--	2018/04/20	2020/04/20
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM354	BICONILOG ANTENNA	ETS-LINDGREN	3143B	00142073	2018/03/29	2020/03/29
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2018/06/01	2020/06/01
EM276	BROADBAND HORN ANTENNA	A-INFOMW	JXTXLB-10180-SF	J2031090903007	2018/04/27	2020/04/27
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2018/05/13	2020/05/13
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2018/05/13	2020/05/13
EM302	PRECISION OMNIDIRECTIONAL DIPOLE (1 – 6GHZ)	SEIBERSDORF LABORATORIES	POD 16	161806/L	2018/05/11	2020/05/11
EM303	PRECISION OMNIDIRECTIONAL DIPOLE (6 – 18GHZ)	SEIBERSDORF LABORATORIES	POD 618	6181908/L	2018/05/11	2020/05/11
EM353	LOOP ANTENNA	ETS_LINDGREN	6502	00206533	2018/04/16	2020/04/16
EM045	POWER METER	ROHDE & SCHWARZ	NRVD	843246/028	2018/06/01	2020/06/01

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM119	LISN	R & S	ESH3-Z5	0831.5518.52	2018/11/09	2020/11/09
EM145	EMI TEST RECEIVER	R & S	ESCS 30	830245/021	2018/06/01	2020/06/01
EM179	IMPULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	357-8810.52/54	2019/01/11	2020/01/11
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057-99A	2017/02/02	2022/02/02
N/A	MEASUREMENT AND EVALUATION SOFTWARE	ROHDE & SCHWARZ	BSIB-K1	V1.20	N/A	N/A

Remarks:-

CM Corrective Maintenance
N/A Not Applicable
TBD To Be Determined

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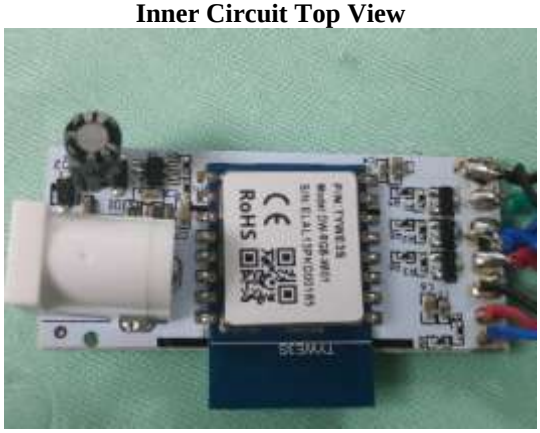
Appendix B

Photographs of EUT

View of the product

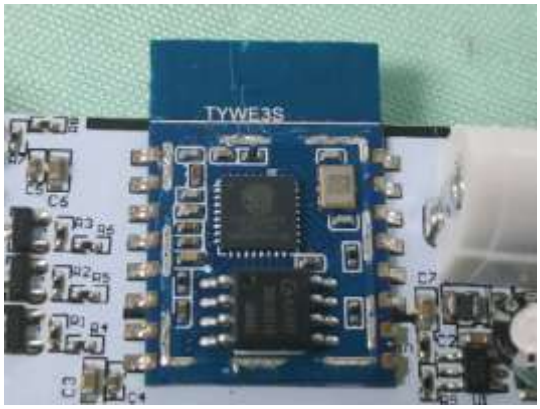
View of the product

Inner Circuit Top View



Inner Circuit Bottom View

Inner Circuit Bottom View



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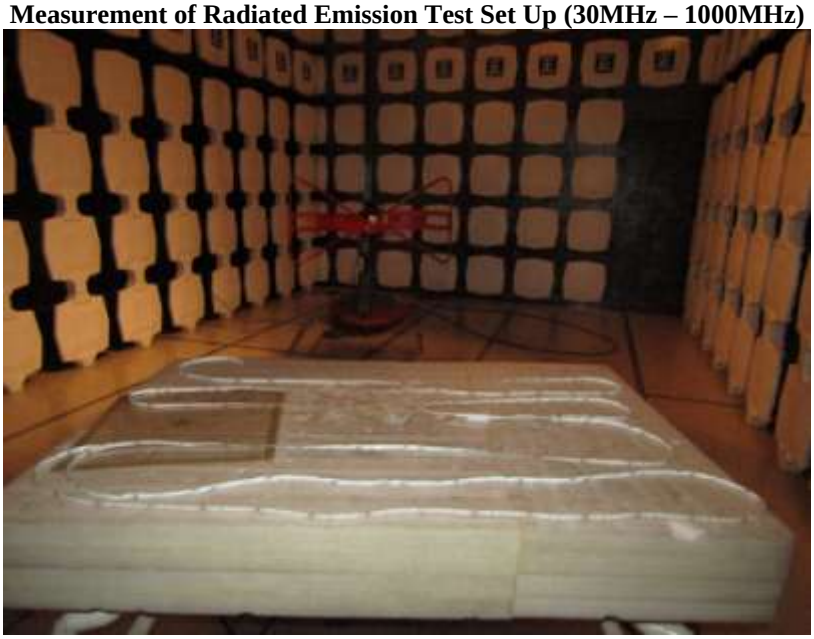
Photographs of EUT

Measurement of Radiated Emission Test Set Up (9kHz – 30MHz)

Measurement of Radiated Emission Test Set Up (30MHz – 1000MHz)



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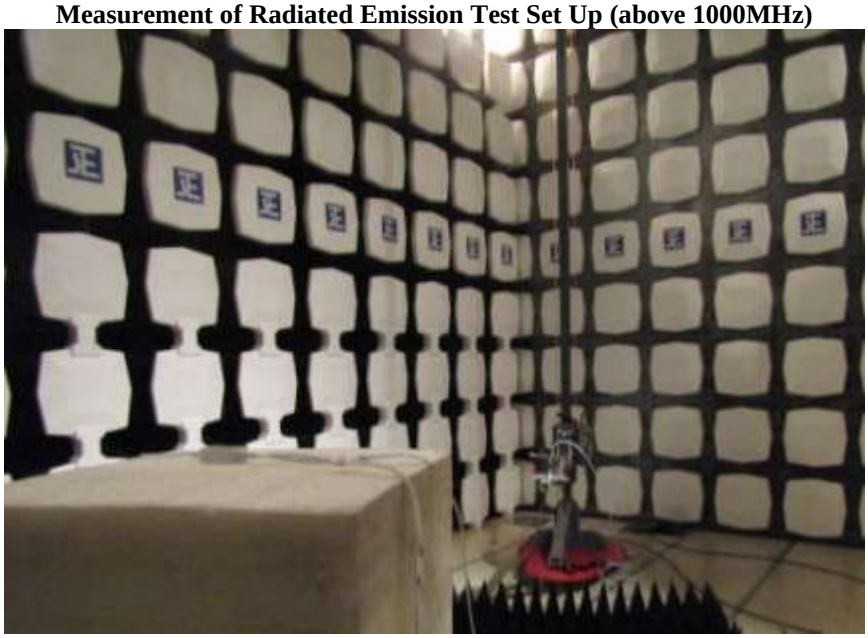
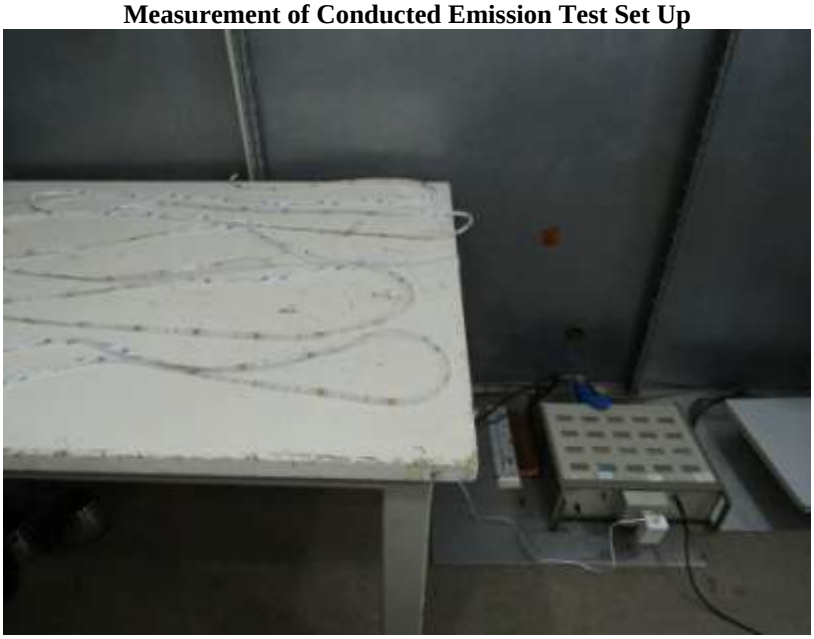
Photographs of EUT

Measurement of Radiated Emission Test Set Up (above 1000MHz)



Measurement of Conducted Emission Test Set Up



******* End of Test Report *******

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5. The results in Report apply only to the sample as received and do not apply to the bulk, unless the sampling has been carried out by the Company and is stated as such in the Report.

6. When a statement of conformity to a specification or standard is provided, the ILAC-G8 Guidance document (and/or IEC Guide 115 in the electrotechnical sector) will be adopted as a decision rule for the determination of conformity unless it is inherent in the requested specification or standard, or otherwise specified in the Report.

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11. Subject to the variable length of retention time for test data and report stored hereinto as to otherwise specifically required by individual accreditation authorities, the Company will only keep the supporting test data and information of this test report for a period of three years. The data and information will be disposed of after the aforementioned retention period has elapsed. Under no circumstances shall we provide any data and information which has been disposed of after the retention period. Under no circumstances shall we be liable for damages of any kind, including (but not limited to) compensatory damages, lost profits, lost data, or any form of special, incidental, indirect, consequential or punitive damages of any kind, whether based on breach of contract of warranty, tort (including negligence), product liability or otherwise, even if we are informed in advance of the possibility of such damages.

12. Issuance records of the Report are available on the internet at www.stc.group. Further enquiry of validity or verification of the Reports should be addressed to the Company.