



Test Report

Date : 2023-05-26
No. : HMD23050005

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Applicant : The Singing Machine Company, Inc.
6301 NW 5th Way, Suite 2900, Fort Lauderdale, FL 33309, USA

Supplier / Manufacturer : ZHUHAI FULLWING ELECTRONIC CO., LTD ZHONGSHAN
BRANCH
4/F&5/F, No 10, Xingye Road, Xinxu, San Xiang, Zhongshan,
Guangdong, China

Description of Sample(s) : Submitted sample(s) said to be
Product: CUBE SINGCAST
Brand Name: Singing Machine
Model No.: SMC2068
FCC ID: 2AAXO-SMC2068

Date Samples Received : 2023-05-08

Date Tested : 2023-05-08 to 2023-05-25

Investigation Requested : Perform Electro Magnetic Interference measurement in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15 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/n40)
For additional model(s) details, please see page 3.

Test by Susu


Dr.CHAN Kwok Hung, Brian
Authorized Signatory



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1.0 General Details

1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.
EMC Laboratory
10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong Kong
Telephone: 852 2666 1888
Fax: 852 2664 4353

1.2 Equipment Under Test [EUT]

Description of Sample(s)

Product: CUBE SINGCAST
Manufacturer: ZHUHAI FULLWING ELECTRONIC CO., LTD
ZHONGSHAN BRANCH
4/F&5/F, No 10, Xingye Road, Xinxu, San Xiang, Zhongshan,
Guangdong, China
Brand Name: Singing Machine
Model Number: SMC2068
Additional model numbers: SMC2072, SMC2075
Rating: 9.0Vd.c. by adapter or
7.4Vd.c. (lithium battery * 1)

The AC/DC adapter was provided by the applicant with following details:

Brand name: REYIPOWER; Model no.: RY24D090100US

Input: 100-240Va.c. 50-60Hz 0.8A, Output:9.0Vd.c. 1000mA

Remark: AC mains mode and battery mode have been investigated and the worst-case test results are recorded in this report.

1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a CUBE SINGCAST. The transmission signal is digital modulated with channel frequency range 2412-2462MHz.

1.3 Antenna Details

Antenna Type: integral antenna
Antenna Gain: 0 dBi

1.4 Date of Order

2023-05-08

1.5 Submitted Sample(s):

1 Sample

1.6 Test Duration

2023-05-08 to 2023-05-25

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 Regulations and ANSI C63.10:2013 for FCC Certification. According FCC KDB 558074 DTS Measurement Guidance, Duty cycle $\geq 98\%$. 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 and no the RF power for select..

```
命令提示符 - adb shell
C:\Users\STC-EMD>adb shell
root@rk3036:/ # ifconfig wlan0 down
/system/bin/sh: ifconfig: not found
127|root@rk3036:/ # ifconfig wlan0 up
/system/bin/sh: ifconfig: not found
priv wla127|root@rk3036:/ # iwpriv wlan0 mp_ctx stop
0M=0, shortGI=0
iwpriv wlan0 mp_ant_tx a
iwpriv wlan0 mp_rate 6
iwpriv wlan0 mp_ctx background, pkt
iwpriv wlan0 mp_pwrctldm startwlan0      mp_ctx:Error: can't tx ,not in MP mode.

root@rk3036:/ # iwpriv wlan0 mp_stop
root@rk3036:/ # iwpriv wlan0 mp_start
wlan0    mp_start:mp_start ok

root@rk3036:/ # iwpriv wlan0 mp_channel 1
wlan0    mp_channel:Change channel 1 to channel 1
an0 mp_bandwidth 40M=0, shortGI=0
wlan0    mp_bandwidth:Change BW 0 to BW 0

root@rk3036:/ # iwpriv wlan0 mp_ant_tx a
wlan0    mp_ant_tx:switch Tx antenna to a
root@rk3036:/ # iwpriv wlan0 mp_rate 6
wlan0    mp_rate:Set data rate to 6 index 0
root@rk3036:/ # iwpriv wlan0 mp_ctx background, pkt
wlan0    mp_ctx:
Start continuous DA=ffffffffffff len=1500 count=0

root@rk3036:/ # iwpriv wlan0 mp_pwrctldm start
```

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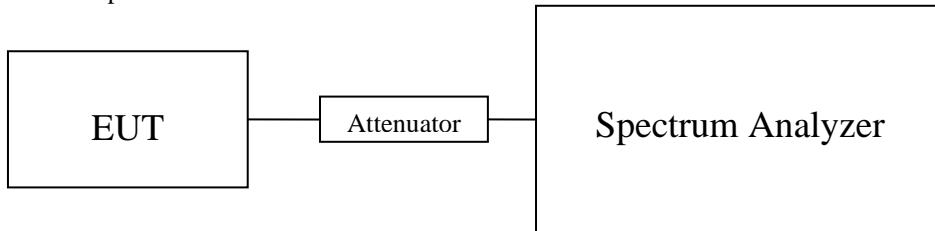
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2.1.1 EUT Duty cycle

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

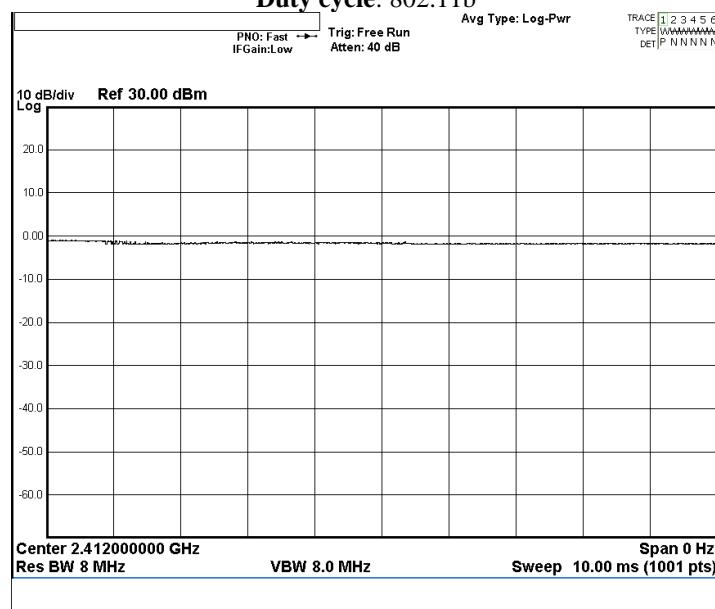


Results

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
802.11n40	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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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	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Spectral Density	FCC 47CFR 15.247(e)	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Band Edge Emissions	FCC 47CFR 15.247(d)	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna requirement	FCC 47CFR 15.203	ANSI C63.10:2013	N/A	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

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

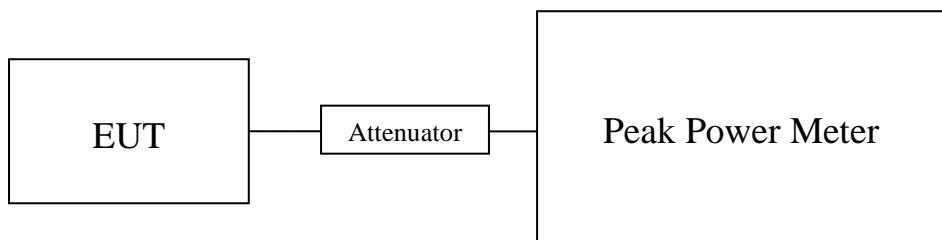
Test Date: 2023-05-10
Mode of Operation: WIFI Tx mode

Ambient Temperature: 25°C 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)

Channel	Frequency (MHz)	Conducted power(dBm)	Antenna Gain(dBi)	E.I.R.P(dBm)	E.I.R.P (Watt)
Low	2412	18.716	0	18.716	0.074405
Middle	2437	18.247	0	18.247	0.066788
High	2462	18.055	0	18.055	0.063900

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

Channel	Frequency (MHz)	Conducted power(dBm)	Antenna Gain(dBi)	E.I.R.P(dBm)	E.I.R.P (Watt)
Low	2412	14.428	0	14.428	0.027720
Middle	2437	14.316	0	14.316	0.027015
High	2462	14.057	0	14.057	0.025451

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

Channel	Frequency (MHz)	Conducted power(dBm)	Antenna Gain(dBi)	E.I.R.P(dBm)	E.I.R.P (Watt)
Low	2412	15.014	0	15.014	0.031725
Middle	2437	14.925	0	14.925	0.031081
High	2462	14.731	0	14.731	0.029724

Results of WiFi mode 802.11 n20, (2422MHz to 2452MHz) : Pass (TX Unit)

Channel	Frequency (MHz)	Conducted power(dBm)	Antenna Gain(dBi)	E.I.R.P(dBm)	E.I.R.P (Watt)
Low	2422	13.305	0	13.305	0.021404
Middle	2437	13.085	0	13.085	0.020347
High	2452	12.996	0	12.996	0.019934

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: 2023-05-09 to 2023-05-12
Mode of Operation: WIFI Tx mode

Ambient Temperature: 24°C 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
Registration Number: HK0001
Test Firm Registration Number: 367672

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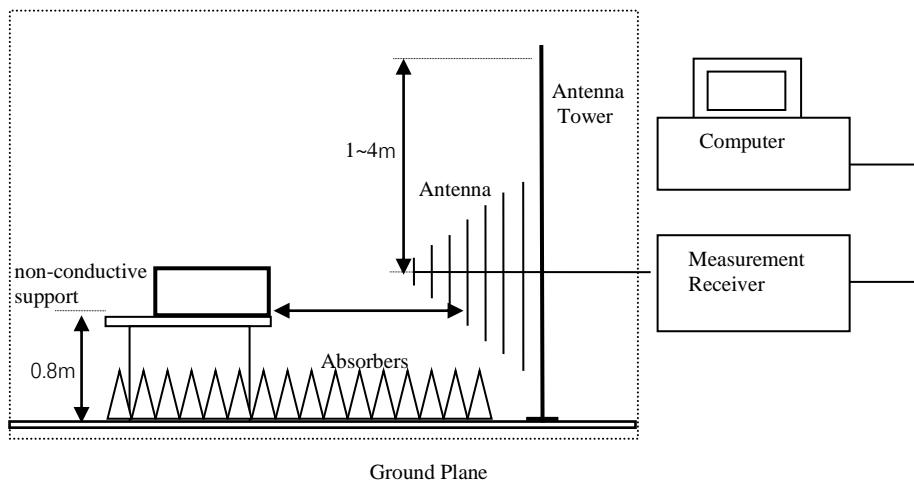
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Spectrum Analyzer Setting:

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:



- 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 [MHz]	Quasi-Peak Limits [μ V/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
Above 960	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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4824.0	58.0	0.82	58.8	74.0	15.2	Vertical
4824.0	58.1	0.52	58.6	74.0	15.4	Horizontal
7236.0	50.0	7.00	57.0	74.0	17.0	Vertical
7236.0	50.5	6.50	57.0	74.0	17.0	Horizontal
9648.0	47.1	8.50	55.6	74.0	18.4	Vertical
9648.0	47.0	8.30	55.3	74.0	18.7	Horizontal
12060.0	45.2	10.90	56.1	74.0	17.9	Vertical
12060.0	45.3	10.80	56.1	74.0	17.9	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4824.0	41.5	0.82	42.3	54.0	11.7	Vertical
4824.0	42.0	0.52	42.5	54.0	11.5	Horizontal
7236.0	35.0	7.00	42.0	54.0	12.0	Vertical
7236.0	35.2	6.50	41.7	54.0	12.3	Horizontal
9648.0	31.3	8.50	39.8	54.0	14.2	Vertical
9648.0	31.1	8.30	39.4	54.0	14.6	Horizontal
12060.0	29.2	10.90	40.1	54.0	13.9	Vertical
12060.0	29.3	10.80	40.1	54.0	14.0	Horizontal

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

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	57.8	0.82	58.6	74.0	15.4	Vertical
4874.0	57.3	0.52	57.8	74.0	16.2	Horizontal
7311.0	50.5	7.00	57.5	74.0	16.5	Vertical
7311.0	51.2	6.50	57.7	74.0	16.3	Horizontal
9748.0	48.1	8.50	56.6	74.0	17.4	Vertical
9748.0	47.3	8.30	55.6	74.0	18.4	Horizontal
12185.0	45.1	10.90	56.0	74.0	18.0	Vertical
12185.0	45.4	10.80	56.2	74.0	17.8	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	41.5	0.82	42.3	54.0	11.7	Vertical
4874.0	41.4	0.52	41.9	54.0	12.1	Horizontal
7311.0	35.0	7.00	42.0	54.0	12.0	Vertical
7311.0	35.2	6.50	41.7	54.0	12.3	Horizontal
9748.0	33.4	8.50	41.9	54.0	12.1	Vertical
9748.0	32.9	8.30	41.2	54.0	12.8	Horizontal
12185.0	30.6	10.90	41.5	54.0	12.5	Vertical
12185.0	30.3	10.80	41.1	54.0	13.0	Horizontal

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

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4924.0	57.5	0.82	58.3	74.0	15.7	Vertical
4924.0	58.2	0.52	58.7	74.0	15.3	Horizontal
7386.0	50.6	7.00	57.6	74.0	16.4	Vertical
7386.0	50.7	6.50	57.2	74.0	16.8	Horizontal
9848.0	47.3	8.50	55.8	74.0	18.2	Vertical
9848.0	47.6	8.30	55.9	74.0	18.1	Horizontal
12310.0	45.6	10.90	56.5	74.0	17.5	Vertical
12310.0	45.4	10.80	56.2	74.0	17.8	Horizontal

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Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4924.0	41.7	0.82	42.5	54.0	11.5	Vertical
4924.0	42.0	0.52	42.5	54.0	11.5	Horizontal
7386.0	35.2	7.00	42.2	54.0	11.8	Vertical
7386.0	35.5	6.50	42.0	54.0	12.0	Horizontal
9848.0	32.9	8.50	41.4	54.0	12.6	Vertical
9848.0	33.6	8.30	41.9	54.0	12.1	Horizontal
12310.0	29.9	10.90	40.8	54.0	13.2	Vertical
12310.0	30.4	10.80	41.2	54.0	12.8	Horizontal

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

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4824.0	57.4	0.82	58.2	74.0	15.8	Vertical
4824.0	57.6	0.52	58.1	74.0	15.9	Horizontal
7236.0	49.9	7.00	56.9	74.0	17.1	Vertical
7236.0	50.8	6.50	57.3	74.0	16.7	Horizontal
9648.0	48.9	8.50	57.4	74.0	16.6	Vertical
9648.0	47.7	8.30	56.0	74.0	18.0	Horizontal
12060.0	45.1	10.90	56.0	74.0	18.0	Vertical
12060.0	45.0	10.80	55.8	74.0	18.2	Horizontal

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Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4824.0	42.0	0.82	42.8	54.0	11.2	Vertical
4824.0	41.5	0.52	42.0	54.0	12.0	Horizontal
7236.0	34.1	7.00	41.1	54.0	12.9	Vertical
7236.0	35.3	6.50	41.8	54.0	12.2	Horizontal
9648.0	31.7	8.50	40.2	54.0	13.8	Vertical
9648.0	33.2	8.30	41.5	54.0	12.5	Horizontal
12060.0	30.6	10.90	41.5	54.0	12.5	Vertical
12060.0	30.0	10.80	40.8	54.0	13.2	Horizontal

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

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	57.1	0.82	57.9	74.0	16.1	Vertical
4874.0	57.7	0.52	58.2	74.0	15.8	Horizontal
7311.0	49.9	7.00	56.9	74.0	17.1	Vertical
7311.0	50.4	6.50	56.9	74.0	17.1	Horizontal
9748.0	47.4	8.50	55.9	74.0	18.1	Vertical
9748.0	47.4	8.30	55.7	74.0	18.3	Horizontal
12185.0	45.2	10.90	56.1	74.0	17.9	Vertical
12185.0	45.5	10.80	56.3	74.0	17.7	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	41.4	0.82	42.2	54.0	11.8	Vertical
4874.0	41.9	0.52	42.4	54.0	11.6	Horizontal
7311.0	34.7	7.00	41.7	54.0	12.3	Vertical
7311.0	35.4	6.50	41.9	54.0	12.1	Horizontal
9748.0	31.4	8.50	39.9	54.0	14.1	Vertical
9748.0	32.3	8.30	40.6	54.0	13.4	Horizontal
12185.0	31.2	10.90	42.1	54.0	11.9	Vertical
12185.0	30.6	10.80	41.4	54.0	12.6	Horizontal

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

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4924.0	57.4	0.82	58.2	74.0	15.8	Vertical
4924.0	57.5	0.52	58.0	74.0	16.0	Horizontal
7386.0	50.1	7.00	57.1	74.0	16.9	Vertical
7386.0	51.4	6.50	57.9	74.0	16.1	Horizontal
9848.0	47.7	8.50	56.2	74.0	17.8	Vertical
9848.0	47.5	8.30	55.8	74.0	18.2	Horizontal
12310.0	45.1	10.90	56.0	74.0	18.0	Vertical
12310.0	45.2	10.80	56.0	74.0	18.0	Horizontal

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Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4924.0	41.4	0.82	42.2	54.0	11.8	Vertical
4924.0	41.5	0.52	42.0	54.0	12.0	Horizontal
7386.0	35.1	7.00	42.1	54.0	11.9	Vertical
7386.0	36.2	6.50	42.7	54.0	11.3	Horizontal
9848.0	33.4	8.50	41.9	54.0	12.1	Vertical
9848.0	32.8	8.30	41.1	54.0	12.9	Horizontal
12310.0	29.9	10.90	40.8	54.0	13.2	Vertical
12310.0	31.0	10.80	41.8	54.0	12.2	Horizontal

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

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4824.0	56.9	0.82	57.7	74.0	16.3	Vertical
4824.0	57.4	0.52	57.9	74.0	16.1	Horizontal
7236.0	50.0	7.00	57.0	74.0	17.0	Vertical
7236.0	50.0	6.50	56.5	74.0	17.5	Horizontal
9648.0	47.1	8.50	55.6	74.0	18.4	Vertical
9648.0	47.6	8.30	55.9	74.0	18.1	Horizontal
12060.0	45.2	10.90	56.1	74.0	17.9	Vertical
12060.0	45.5	10.80	56.3	74.0	17.7	Horizontal

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Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4824.0	41.3	0.82	42.1	54.0	11.9	Vertical
4824.0	41.6	0.52	42.1	54.0	11.9	Horizontal
7236.0	35.0	7.00	42.0	54.0	12.0	Vertical
7236.0	35.4	6.50	41.9	54.0	12.1	Horizontal
9648.0	31.8	8.50	40.3	54.0	13.7	Vertical
9648.0	33.5	8.30	41.8	54.0	12.2	Horizontal
12060.0	30.4	10.90	41.3	54.0	12.7	Vertical
12060.0	30.7	10.80	41.5	54.0	12.5	Horizontal

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

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	57.1	0.82	57.9	74.0	16.1	Vertical
4874.0	57.3	0.52	57.8	74.0	16.2	Horizontal
7311.0	49.7	7.00	56.7	74.0	17.3	Vertical
7311.0	50.5	6.50	57.0	74.0	17.0	Horizontal
9748.0	47.1	8.50	55.6	74.0	18.4	Vertical
9748.0	47.4	8.30	55.7	74.0	18.3	Horizontal
12185.0	45.2	10.90	56.1	74.0	17.9	Vertical
12185.0	45.4	10.80	56.2	74.0	17.8	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	41.4	0.82	42.2	54.0	11.8	Vertical
4874.0	41.6	0.52	42.1	54.0	11.9	Horizontal
7311.0	35.3	7.00	42.3	54.0	11.7	Vertical
7311.0	35.4	6.50	41.9	54.0	12.1	Horizontal
9748.0	34.1	8.50	42.6	54.0	11.4	Vertical
9748.0	32.7	8.30	41.0	54.0	13.0	Horizontal
12185.0	30.5	10.90	41.4	54.0	12.6	Vertical
12185.0	30.9	10.80	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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Field Strength μ V/m	Limit μ V/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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4924.0	57.4	0.82	58.2	74.0	15.8	Vertical
4924.0	56.8	0.52	57.3	74.0	16.7	Horizontal
7386.0	49.9	7.00	56.9	74.0	17.1	Vertical
7386.0	50.8	6.50	57.3	74.0	16.7	Horizontal
9848.0	47.0	8.50	55.5	74.0	18.5	Vertical
9848.0	47.1	8.30	55.4	74.0	18.6	Horizontal
12310.0	45.2	10.90	56.1	74.0	17.9	Vertical
12310.0	45.2	10.80	56.0	74.0	18.0	Horizontal

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Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4924.0	41.3	0.82	42.1	54.0	11.9	Vertical
4924.0	41.5	0.52	42.0	54.0	12.0	Horizontal
7386.0	34.1	7.00	41.1	54.0	12.9	Vertical
7386.0	35.0	6.50	41.5	54.0	12.5	Horizontal
9848.0	32.2	8.50	40.7	54.0	13.3	Vertical
9848.0	32.8	8.30	41.1	54.0	12.9	Horizontal
12310.0	31.0	10.90	41.9	54.0	12.1	Vertical
12310.0	30.7	10.80	41.5	54.0	12.5	Horizontal

Result of Tx mode (2422.0 MHz) (802.11n40) (9kHz – 30MHz): Pass

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

Result of Tx mode (2422.0 MHz) (802.11n40) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4844.0	56.8	0.82	57.6	74.0	16.4	Vertical
4844.0	56.9	0.52	57.4	74.0	16.6	Horizontal
7266.0	49.7	7.00	56.7	74.0	17.3	Vertical
7266.0	3.0	6.50	9.5	74.0	64.5	Horizontal
9688.0	46.9	8.50	55.4	74.0	18.6	Vertical
9688.0	47.2	8.30	55.5	74.0	18.5	Horizontal
12110.0	45.2	10.90	56.1	74.0	17.9	Vertical
12110.0	45.6	10.80	56.4	74.0	17.7	Horizontal

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Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4844.0	41.1	0.82	41.9	54.0	12.1	Vertical
4844.0	41.6	0.52	42.1	54.0	11.9	Horizontal
7266.0	35.1	7.00	42.1	54.0	11.9	Vertical
7266.0	35.3	6.50	41.8	54.0	12.2	Horizontal
9688.0	32.8	8.50	41.3	54.0	12.7	Vertical
9688.0	33.2	8.30	41.5	54.0	12.5	Horizontal
12110.0	30.2	10.90	41.1	54.0	12.9	Vertical
12110.0	30.7	10.80	41.5	54.0	12.5	Horizontal

Result of Tx mode (2437.0 MHz) (802.11n40) (9kHz – 30MHz): Pass

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

Result of Tx mode (2437.0 MHz) (802.11n40) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions						
Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	56.7	0.82	57.5	74.0	16.5	Vertical
4874.0	56.9	0.52	57.4	74.0	16.6	Horizontal
7311.0	50.1	7.00	57.1	74.0	16.9	Vertical
7311.0	50.3	6.50	56.8	74.0	17.2	Horizontal
9748.0	47.2	8.50	55.7	74.0	18.3	Vertical
9748.0	47.5	8.30	55.8	74.0	18.2	Horizontal
12185.0	45.4	10.90	56.3	74.0	17.7	Vertical
12185.0	45.4	10.80	56.2	74.0	17.8	Horizontal

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Field Strength of Spurious Emissions Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4874.0	41.4	0.82	42.2	54.0	11.8	Vertical
4874.0	41.3	0.52	41.8	54.0	12.2	Horizontal
7311.0	35.1	7.00	42.1	54.0	11.9	Vertical
7311.0	35.5	6.50	42.0	54.0	12.0	Horizontal
9748.0	32.4	8.50	40.9	54.0	13.1	Vertical
9748.0	32.3	8.30	40.6	54.0	13.4	Horizontal
12185.0	30.2	10.90	41.1	54.0	12.9	Vertical
12185.0	30.9	10.80	41.7	54.0	12.3	Horizontal

Result of Tx mode (2452.0 MHz) (802.11n40) (9kHz – 30MHz): Pass

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

Result of Tx mode (2452.0 MHz) (802.11n40) (1GHz-25GHz): Pass

Field Strength of Spurious Emissions Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4904.0	56.9	0.82	57.7	74.0	16.3	Vertical
4904.0	56.7	0.52	57.2	74.0	16.8	Horizontal
7356.0	49.9	7.00	56.9	74.0	17.1	Vertical
7356.0	49.4	6.50	55.9	74.0	18.1	Horizontal
9808.0	47.0	8.50	55.5	74.0	18.5	Vertical
9808.0	47.3	8.30	55.6	74.0	18.4	Horizontal
12260.0	45.1	10.90	56.0	74.0	18.0	Vertical
12260.0	45.3	10.80	56.1	74.0	17.9	Horizontal

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Field Strength of Spurious Emissions						
Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
4904.0	41.2	0.82	42.0	54.0	12.0	Vertical
4904.0	41.4	0.52	41.9	54.0	12.1	Horizontal
7356.0	34.3	7.00	41.3	54.0	12.7	Vertical
7356.0	35.7	6.50	42.2	54.0	11.8	Horizontal
9808.0	32.5	8.50	41.0	54.0	13.0	Vertical
9808.0	34.2	8.30	42.5	54.0	11.5	Horizontal
12260.0	31.1	10.90	42.0	54.0	12.0	Vertical
12260.0	30.5	10.80	41.3	54.0	12.7	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 (9kHz-30MHz): 2.0dB
uncertainty (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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	67.8	-4.8	63.0	74.0	11.0	Vertical
2390.0	67.1	-4.7	62.4	74.0	11.6	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	52.7	-4.8	47.9	54.0	6.1	Vertical
2390.0	52.4	-4.7	47.7	54.0	6.3	Horizontal

Result: RF Radiated Emissions (Highest) -802.11b

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	67.9	-4.8	63.1	74.0	10.9	Vertical
2483.5	67.4	-4.7	62.7	74.0	11.3	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	50.4	-4.8	45.6	54.0	8.4	Vertical
2483.5	51.5	-4.7	46.8	54.0	7.2	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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	68.3	-4.8	63.5	74.0	10.5	Vertical
2390.0	68.5	-4.7	63.8	74.0	10.2	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	51.4	-4.8	46.6	54.0	7.4	Vertical
2390.0	52.2	-4.7	47.5	54.0	6.5	Horizontal

Result: RF Radiated Emissions (Highest) -802.11g

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	70.1	-4.8	65.3	74.0	8.7	Vertical
2483.5	68.5	-4.7	63.8	74.0	10.2	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	54.7	-4.8	49.9	54.0	4.1	Vertical
2483.5	54.0	-4.7	49.3	54.0	4.7	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 dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	68.1	-4.8	63.3	74.0	10.7	Horizontal
2390.0	68.5	-4.7	63.8	74.0	10.2	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	54.3	-4.8	49.5	54.0	4.5	Vertical
2390.0	52.8	-4.7	48.1	54.0	5.9	Horizontal

Result: RF Radiated Emissions (Highest) -802.11n20

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	70.1	-4.8	65.3	74.0	8.7	Vertical
2483.5	68.9	-4.7	64.2	74.0	9.8	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	53.3	-4.8	48.5	54.0	5.5	Horizontal
2483.5	54.1	-4.7	49.4	54.0	4.6	Horizontal

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Result: RF Radiated Emissions (Lowest)-802.11n40

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	68.6	-4.8	63.8	74.0	10.2	Vertical
2390.0	69.0	-4.7	64.3	74.0	9.7	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2390.0	53.8	-4.8	49.0	54.0	5.0	Vertical
2390.0	54.1	-4.7	49.4	54.0	4.6	Horizontal

Result: RF Radiated Emissions (Highest) -802.11n40

Field Strength of Band-edge Compliance Peak Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	70.1	-4.8	65.3	74.0	8.7	Vertical
2483.5	69.9	-4.7	65.2	74.0	8.8	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency MHz	Measured Level @3m dB μ V	Correction Factor dB/m	Field Strength dB μ V/m	Limit @3m dB μ V/m	Margin dB	E-Field Polarity
2483.5	54.2	-4.8	49.4	54.0	4.6	Horizontal
2483.5	54.4	-4.7	49.7	54.0	4.3	Horizontal

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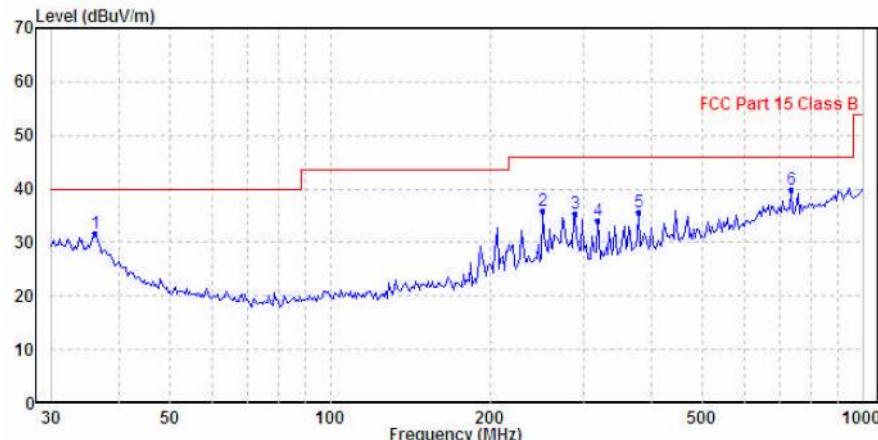
Limits for Radiated Emissions FCC 47 CFR 15.247]:

Frequency Range [MHz]	Quasi-Peak Limits [μ V/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
Above 960	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		Over	Remark	Pol/Phase
		Line	Limit			
1	36.254	31.69	40.00	-8.31	QP	Horizontal
2	251.180	36.03	46.00	-9.97	QP	Horizontal
3	289.002	35.30	46.00	-10.70	QP	Horizontal
4	318.817	33.97	46.00	-12.03	QP	Horizontal
5	379.914	35.69	46.00	-10.31	QP	Horizontal
6	734.491	39.93	46.00	-6.07	QP	Horizontal

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Limits for Radiated Emissions FCC 47 CFR 15.247 Class B:

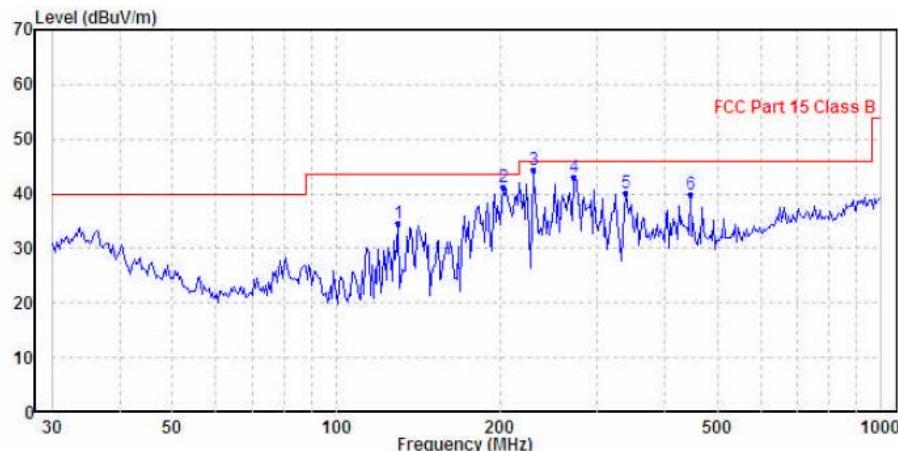
Frequency Range [MHz]	Quasi-Peak Limits [μ V/m]
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above 960	500

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	Line	Limit	Over	Pol/Phase
			Limit	Remark	
1	129.923	34.50	43.50	-9.00 QP	Vertical
2	202.100	41.34	43.50	-2.16 QP	Vertical
3	229.293	44.29	46.00	-1.71 QP	Vertical
4	273.234	43.14	46.00	-2.86 QP	Vertical
5	339.589	40.13	46.00	-5.87 QP	Vertical
6	446.414	39.87	46.00	-6.13 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: 2025-05-24
Mode of Operation: WIFI TX mode
Test Voltage: 120V a.c. 60Hz

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

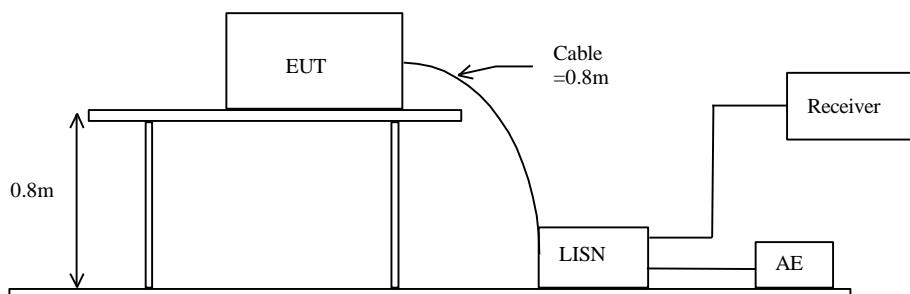
Test Method:

The test was performed in accordance with 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:



Limits for Conducted Emissions (FCC 47 CFR 15.207):

Frequency Range [MHz]	Quasi-Peak Limits [dB μ V]	Average [dB μ V]
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.

Remarks:

Calculated measurement uncertainty (0.15MHz – 30MHz): 3.25dB

-* - Emission(s) that is far below the corresponding limit line.

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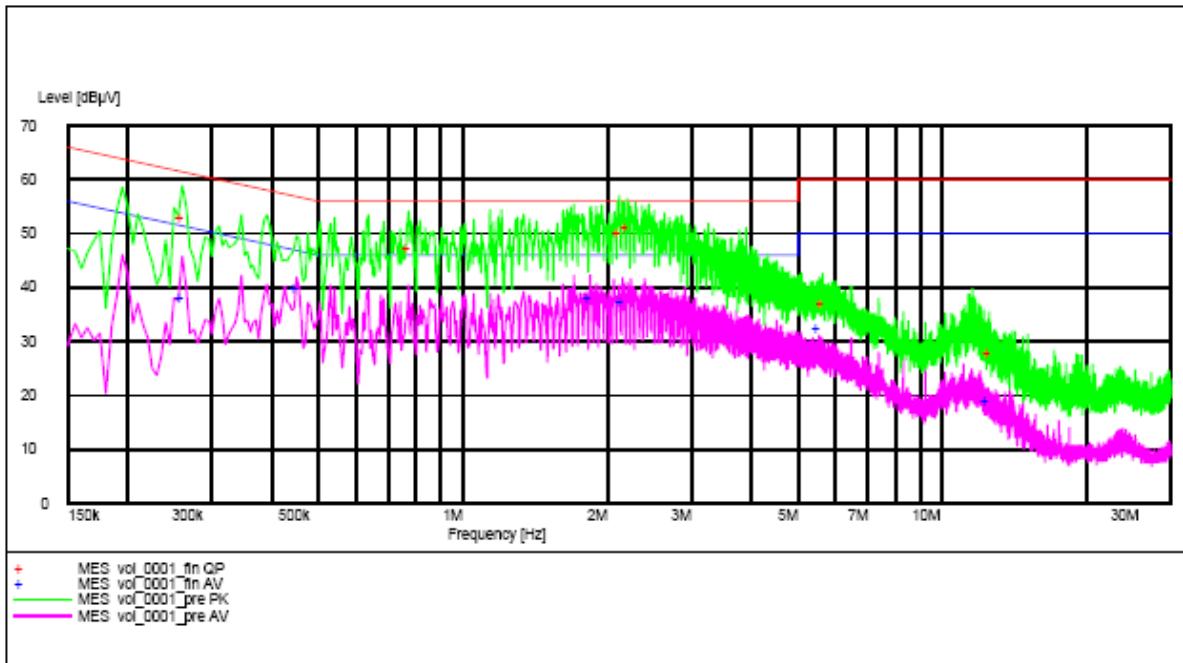
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Results of WIFI TX mode (L): PASS

Please refer to the following diagram for individual results.



MEASUREMENT RESULT: "vol_0001_fin QP"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.260000	53.00	9.7	61	8.5	L1	GND
0.770000	47.20	9.7	56	8.8	L1	GND
2.120000	50.00	9.8	56	6.0	L1	GND
2.205000	51.00	9.8	56	5.0	L1	GND
5.640000	37.00	9.9	60	23.0	L1	GND
12.550000	27.90	10.1	60	32.1	L1	GND

MEASUREMENT RESULT: "vol_0001_fin AV"

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.260000	38.00	9.7	51	13.0	L1	GND
0.450000	39.70	9.7	47	7.3	L1	GND
1.845000	38.20	9.8	46	7.8	L1	GND
2.155000	37.40	9.8	46	8.6	L1	GND
5.535000	32.40	9.9	50	17.6	L1	GND
12.440000	19.10	10.1	50	30.9	L1	GND

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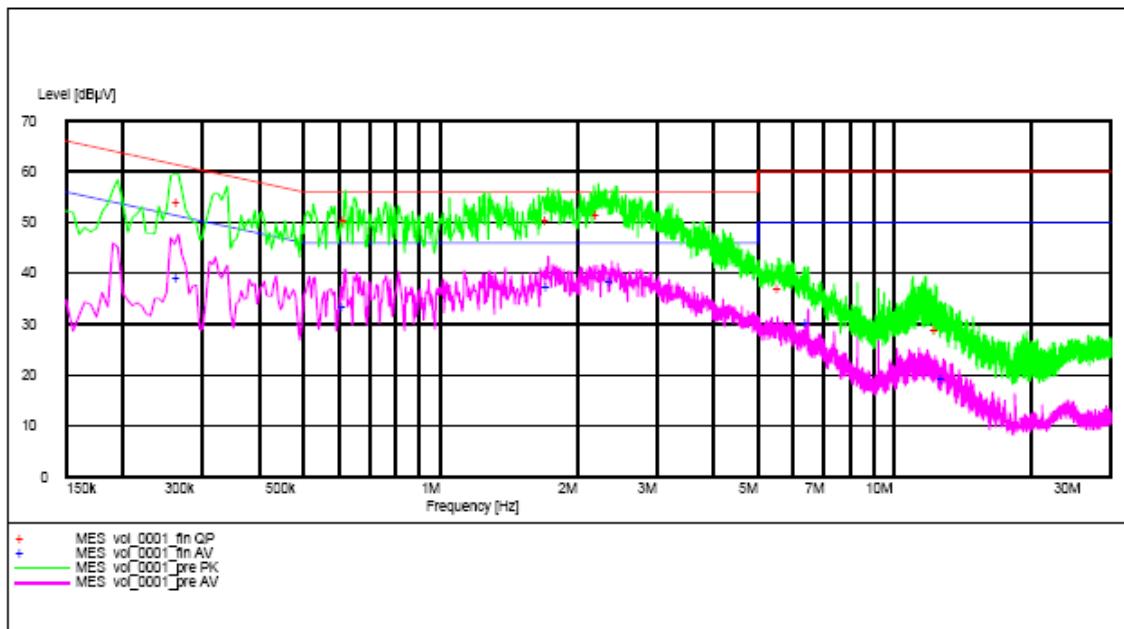
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Results of WIFI TX mode (N): PASS

Please refer to the following diagram for individual results.



MEASUREMENT RESULT: "vol_0001_fin QP"

5/24/2023 3:20PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.265000	53.90	9.7	61	7.1	N	GND
0.620000	50.30	9.7	56	5.7	N	GND
1.725000	50.20	9.8	56	5.8	N	GND
2.230000	51.50	9.8	56	4.5	N	GND
5.600000	36.90	9.9	60	23.1	N	GND
12.415000	28.90	10.1	60	31.1	N	GND

MEASUREMENT RESULT: "vol_0001_fin AV"

5/24/2023 3:20PM

Frequency MHz	Level dB μ V	Transd dB	Limit dB μ V	Margin dB	Line	PE
0.265000	39.00	9.7	51	12.0	N	GND
0.615000	33.50	9.7	46	12.5	N	GND
1.730000	37.40	9.8	46	8.6	N	GND
2.385000	38.50	9.8	46	7.5	N	GND
6.460000	30.10	9.9	50	19.9	N	GND
12.845000	19.30	10.1	50	30.7	N	GND

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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: 2023-05-05
Mode of Operation: WIFI TX mode

Ambient Temperature: 25°C 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 exceed 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 $BWCF=10\log(3\text{ kHz}/100\text{ kHz})=-15.2\text{ dB}$

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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	-7.094	8dBm
2437.0	-7.523	8dBm
2462.0	-6.916	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	-13.353	8dBm
2437.0	-14.833	8dBm
2462.0	-14.740	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	-14.274	8dBm
2437.0	-14.615	8dBm
2462.0	-14.551	8dBm

Results of WIFI TX Mode 802.11 n40 (Tx:2422MHz to 2422MHz): 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
2422.0	-14.681	8dBm
2437.0	-15.917	8dBm
2452.0	-16.127	8dBm

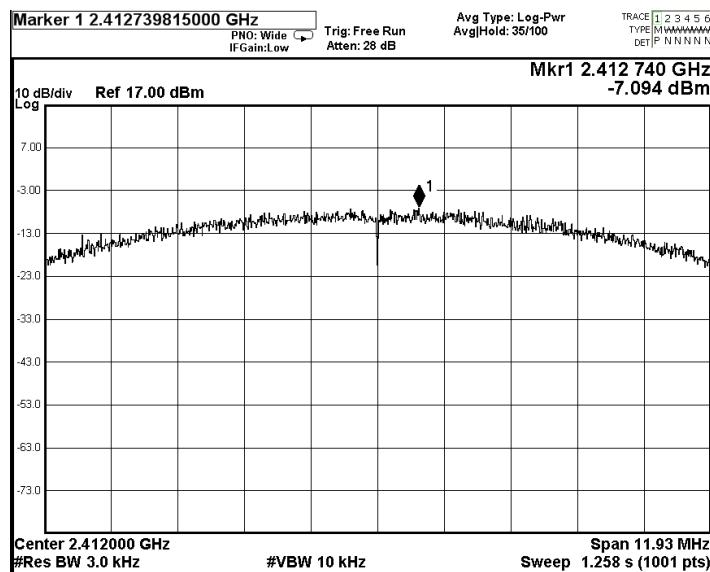


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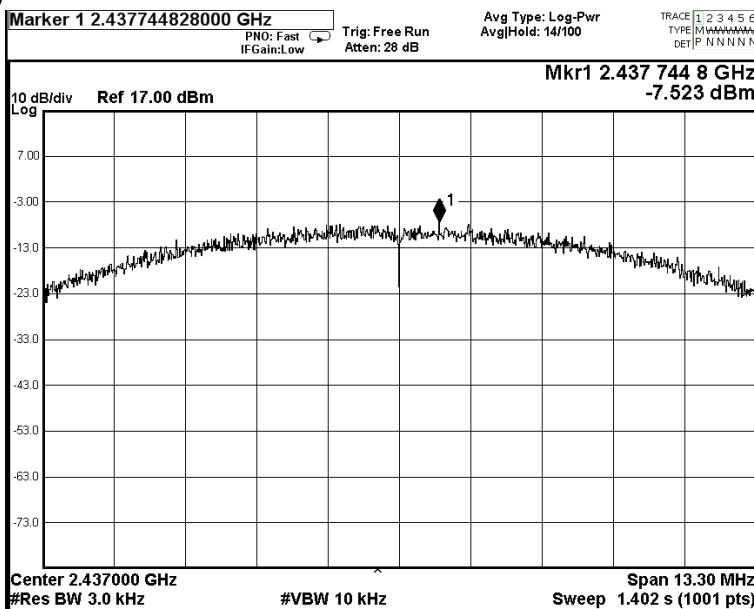
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WiFi mode 802.11 b
CH 1 (2412.0 MHz)



CH 6 (2437.0 MHz)



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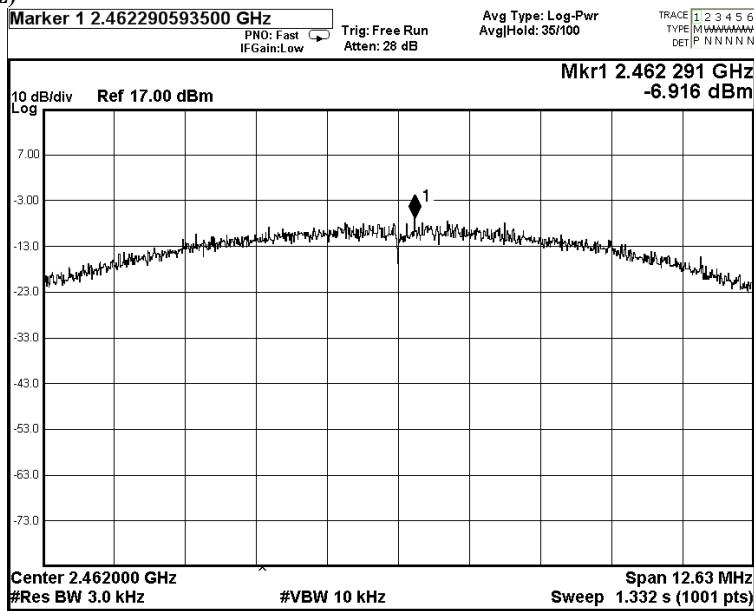


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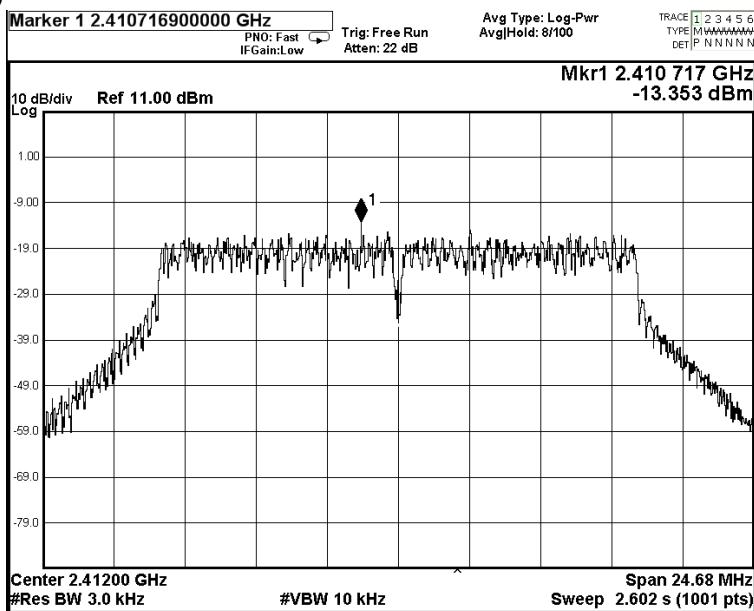
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CH 11 (2462.0 MHz)



WiFi mode 802.11 g CH 1 (2412.0 MHz)



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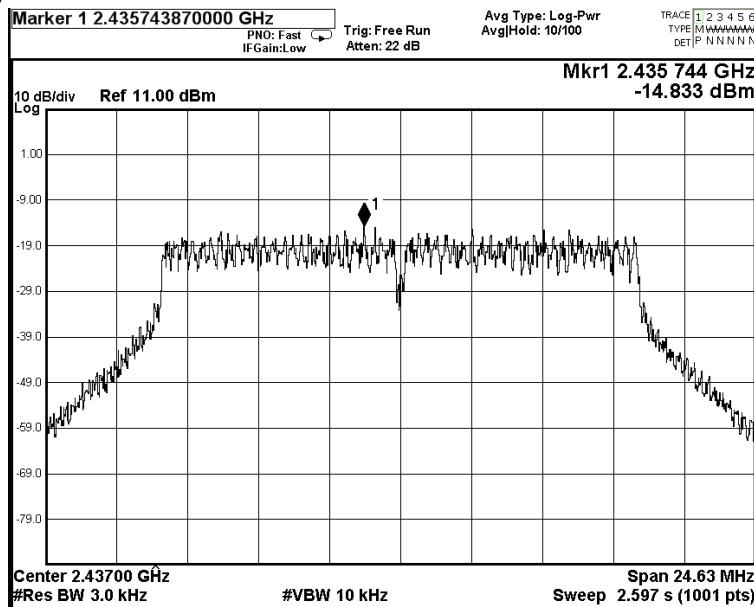


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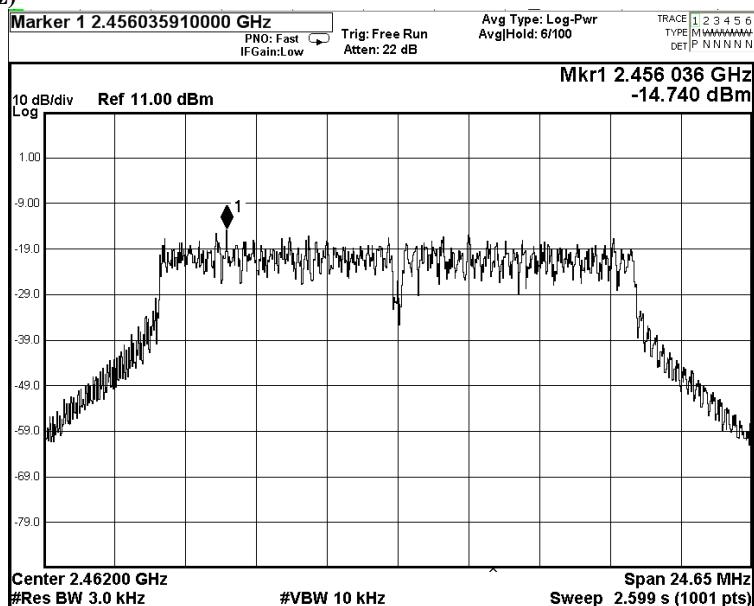
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CH 6 (2437.0 MHz)



CH 11 (2462.0 MHz)



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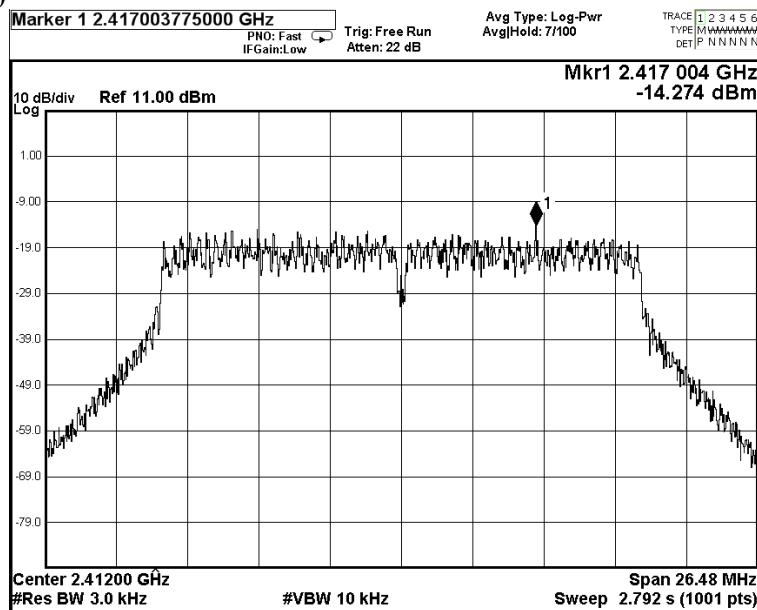
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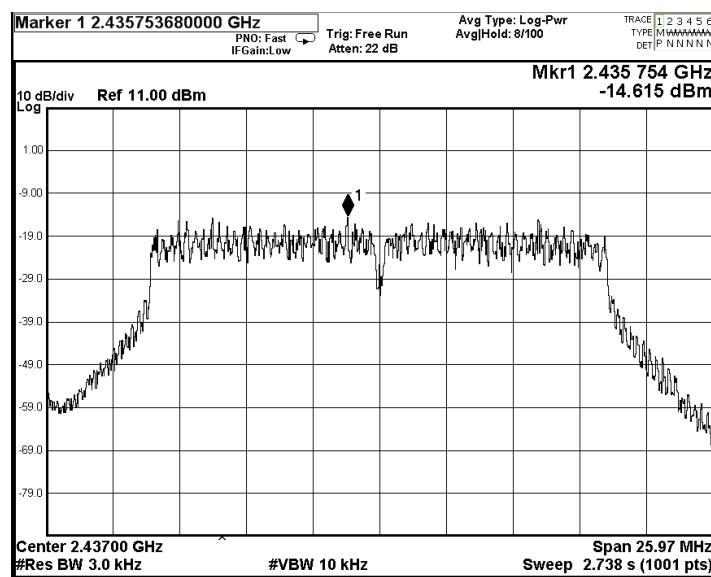
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WiFi mode 802.11 n20
 CH 1 (2412.0 MHz)



CH 6 (2437.0 MHz)



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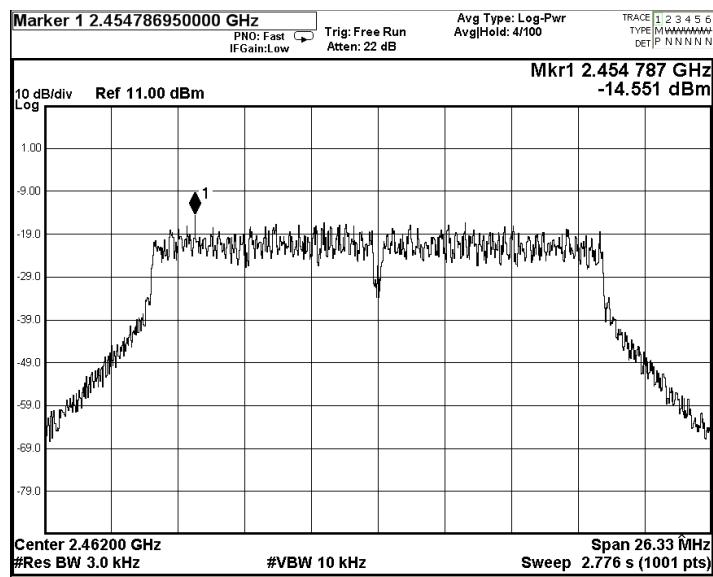


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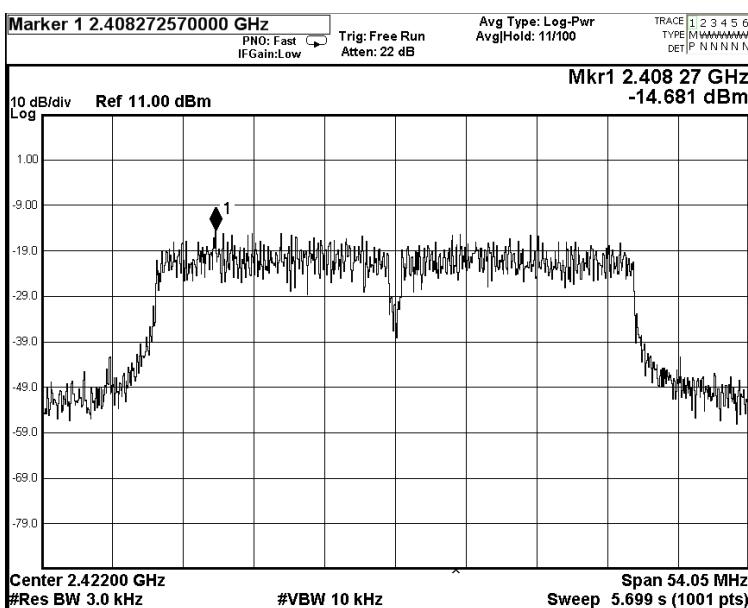
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CH 11 (2462.0 MHz)



WiFi mode 802.11 n40

CH 3 (2422.0 MHz)



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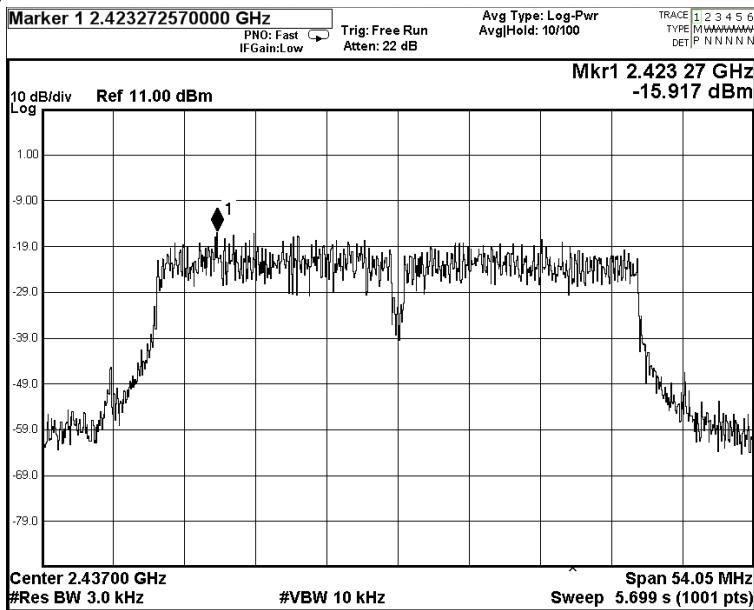
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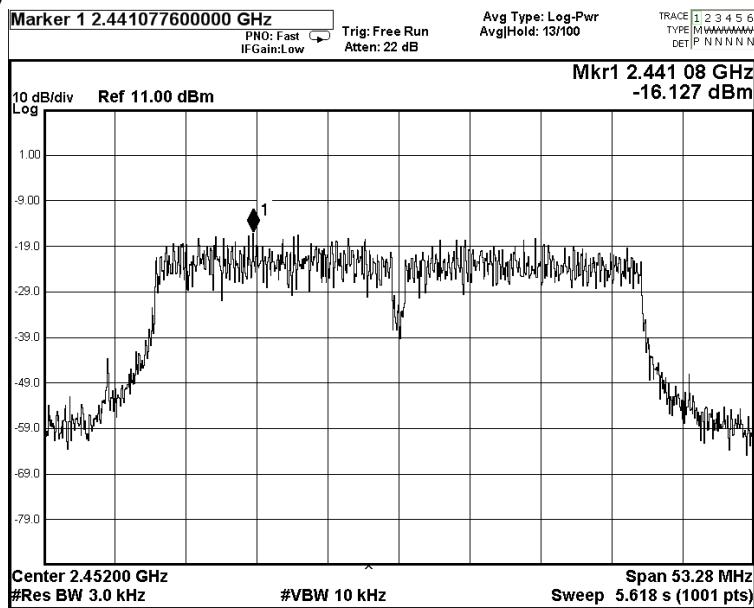
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CH 6 (2437.0 MHz)



CH 9 (2452.0 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: 2023-05-06
Mode of Operation: WIFI TX mode

Ambient Temperature: 25°C 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 \geq 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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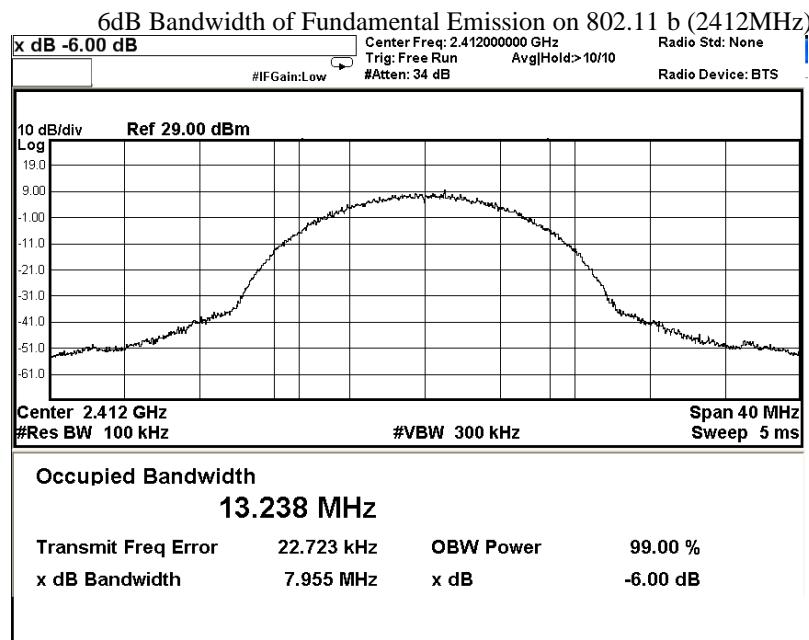
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Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	7.955	> 500



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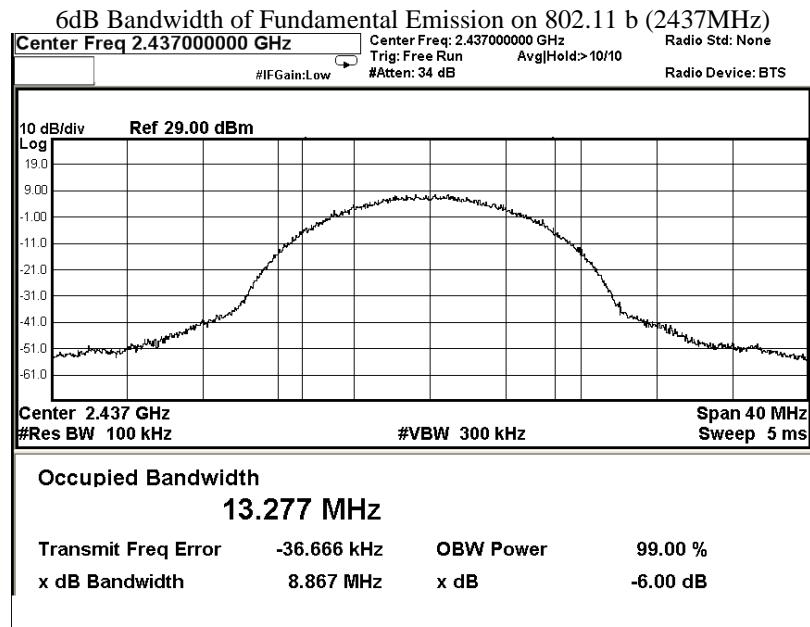
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	8.867	> 500



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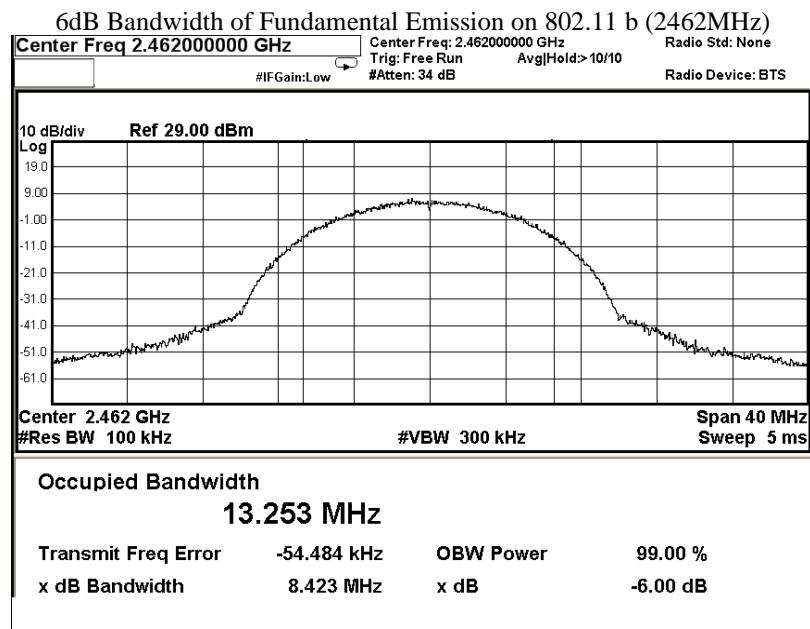
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	8.423	> 500



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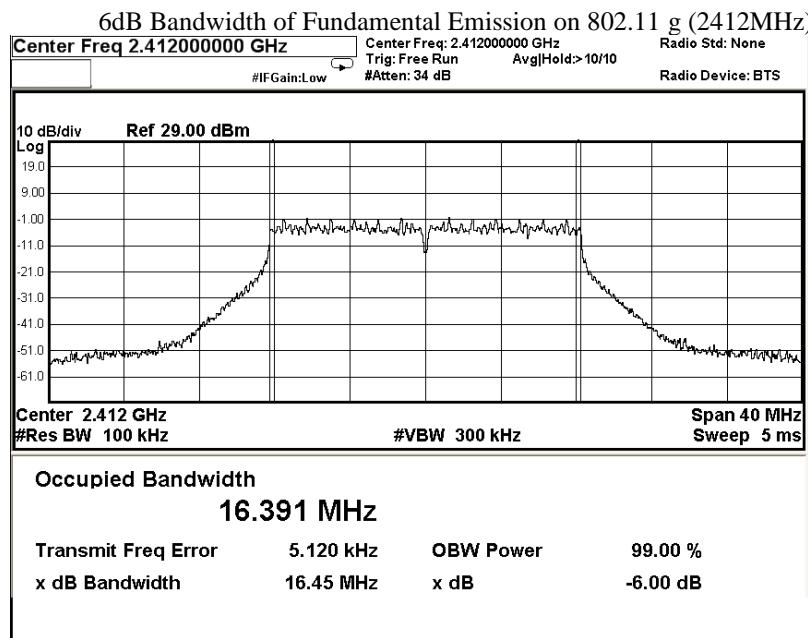
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Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	16.45	> 500



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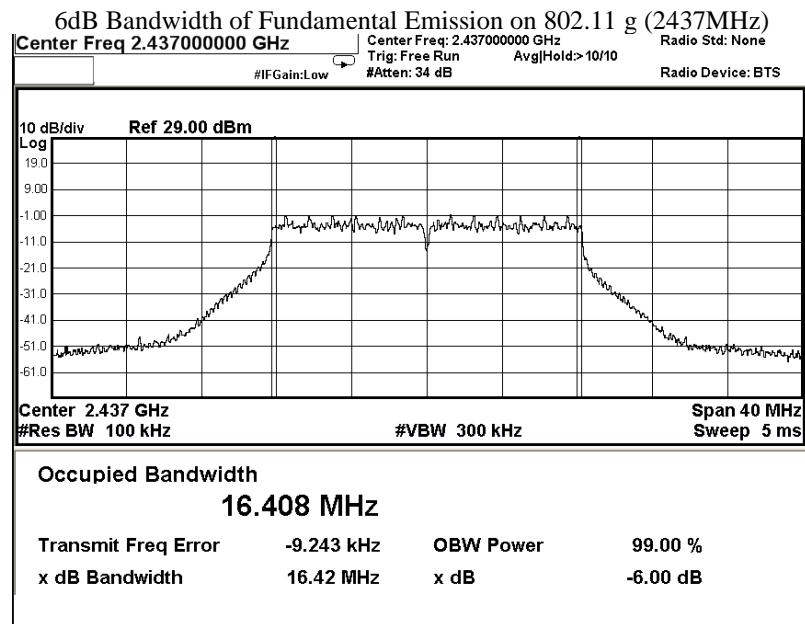
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	16.42	> 500



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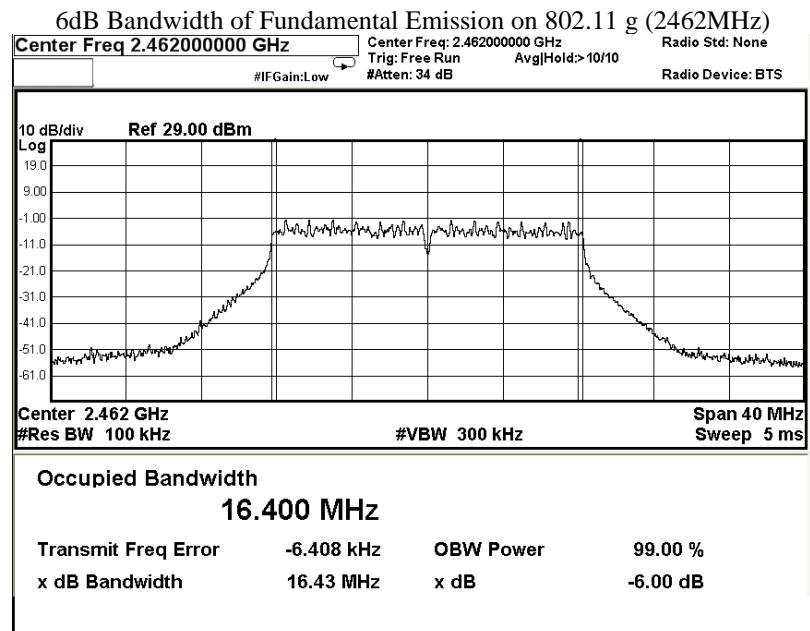
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	16.43	> 500



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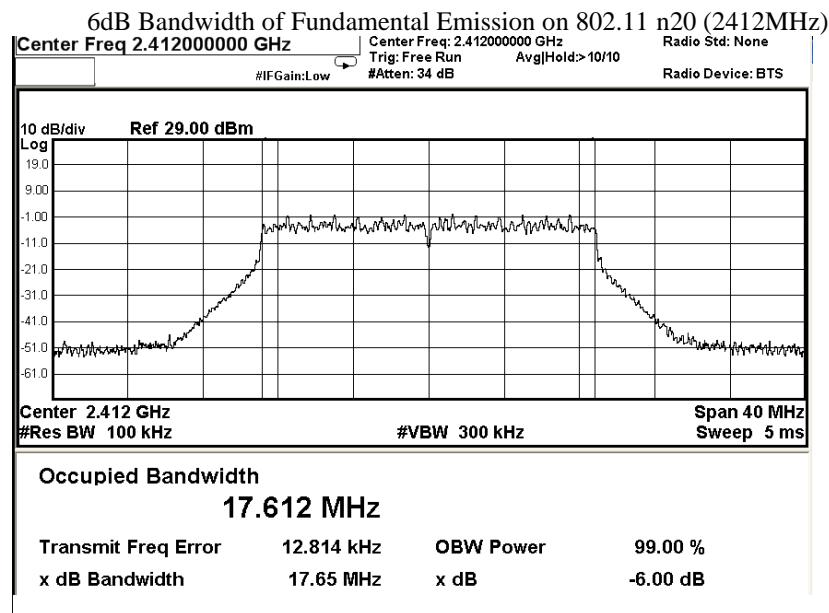
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Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2412.0	17.65	> 500



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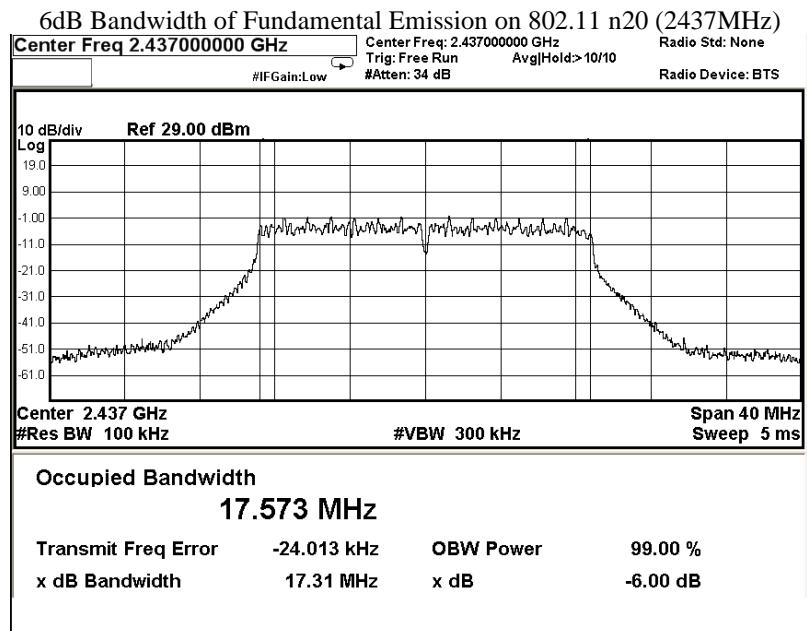
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	17.31	> 500



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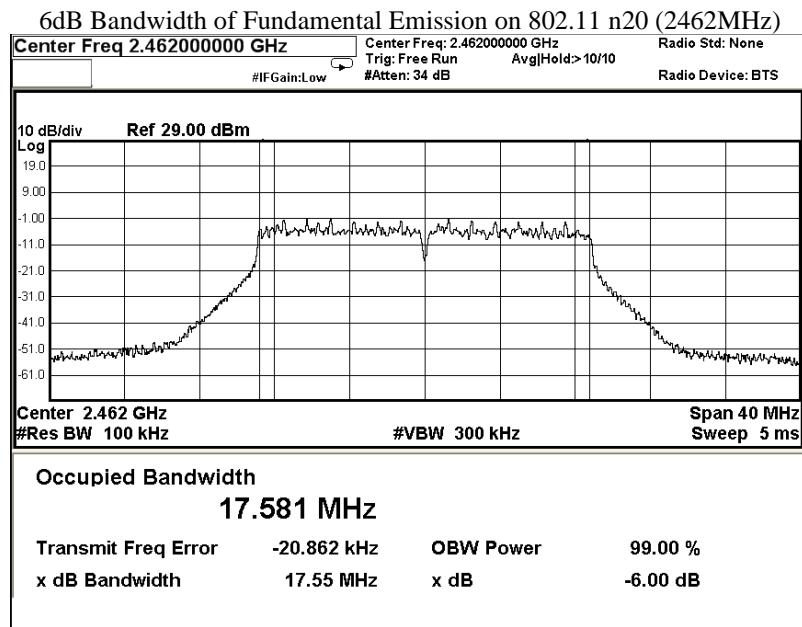
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2462.0	17.55	> 500



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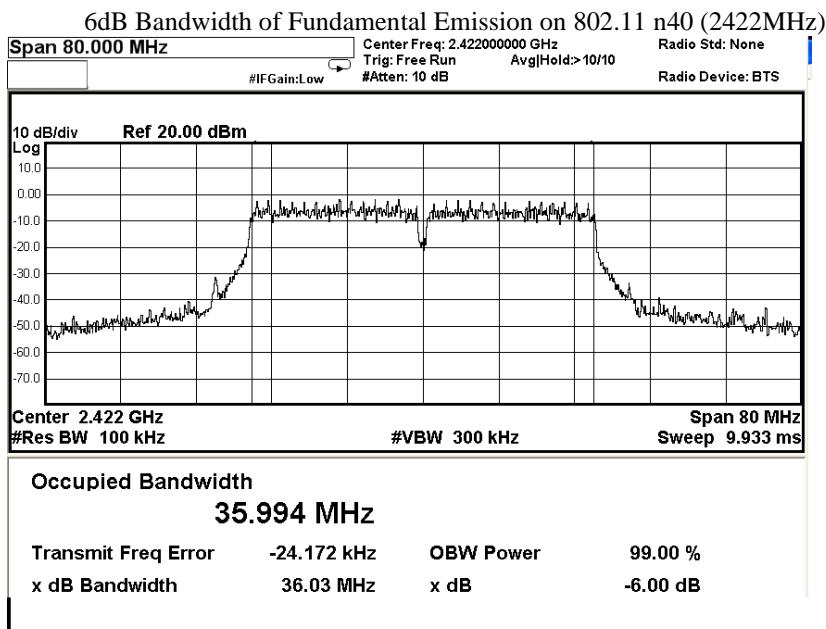
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Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2422.0	36.03	> 500



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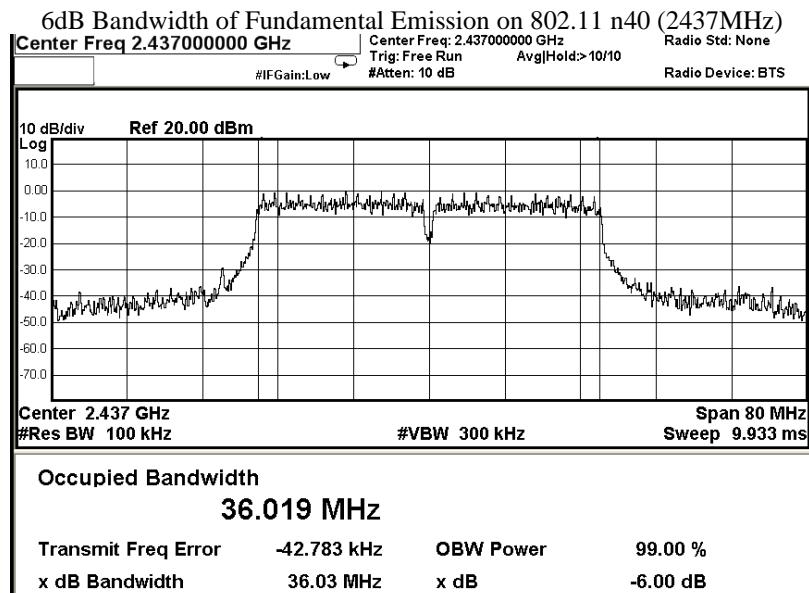
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2437.0	36.03	> 500



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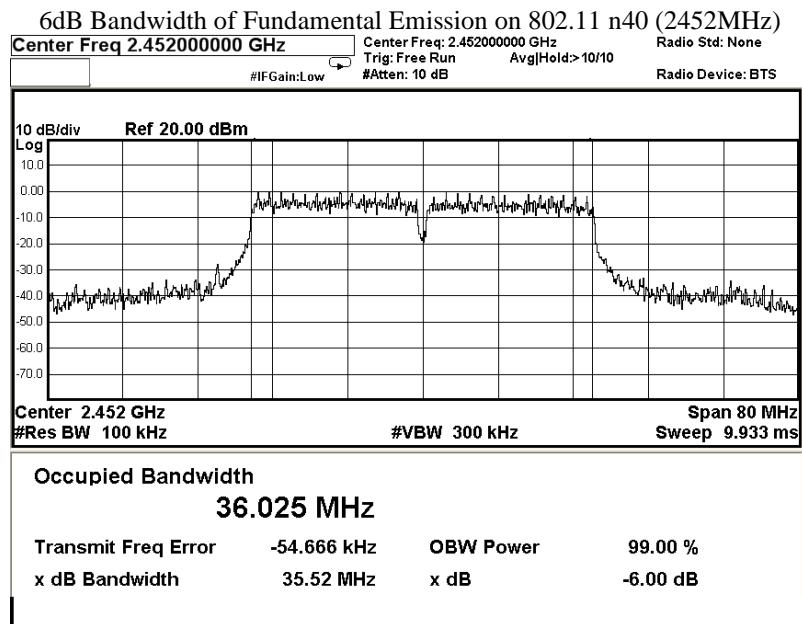
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Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range [MHz]	6dB Bandwidth [MHz]	FCC Limits [kHz]
2452.0	35.52	> 500



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3.1.6 Band Edges Measurement

Test Requirement: FCC 47CFR 15.247

Test Method: ANSI C63.10:2013

Test Date: 2023-05-07

Mode of Operation: WIFI TX mode

Ambient Temperature: 25°C

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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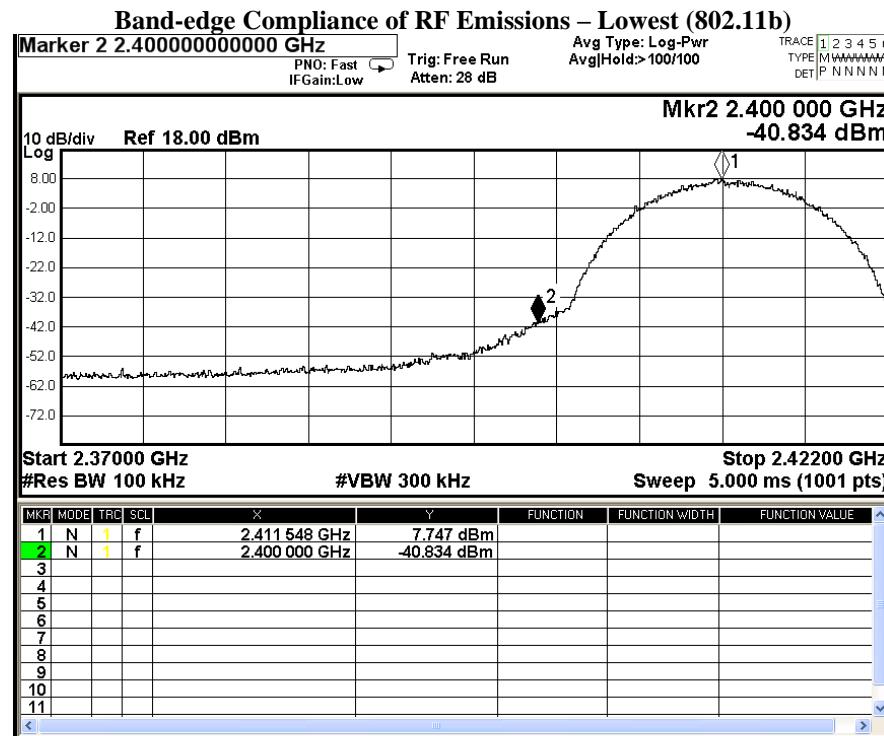
Band-edge Compliance of RF Conducted Emissions Measurement:

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)	7.747	-12.253	-40.834	Pass



Test Report

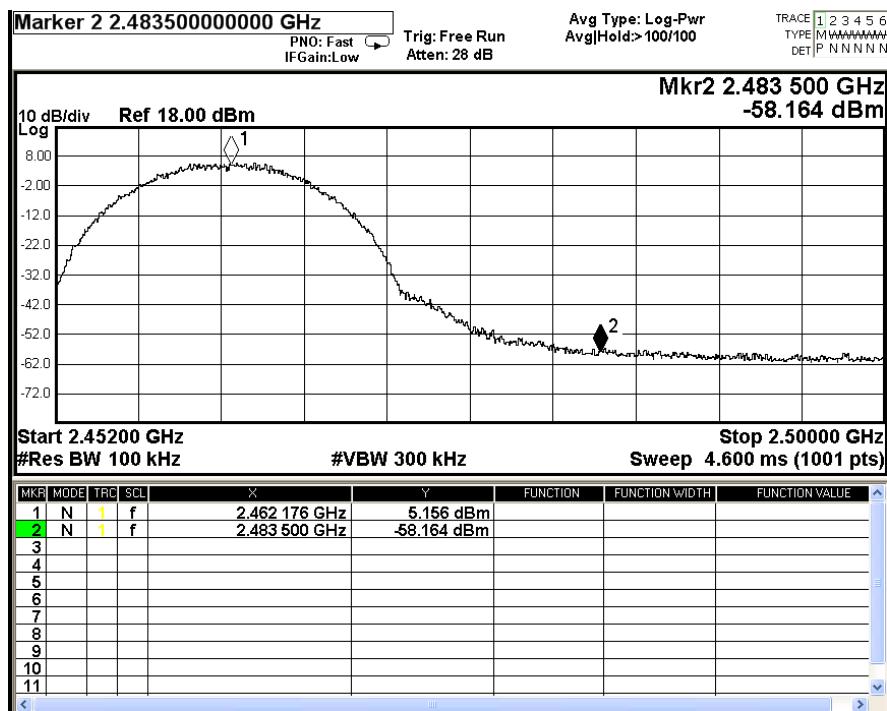
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 – Highest Fundamental (2462)	5.156	-14.844	-58.164	Pass

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



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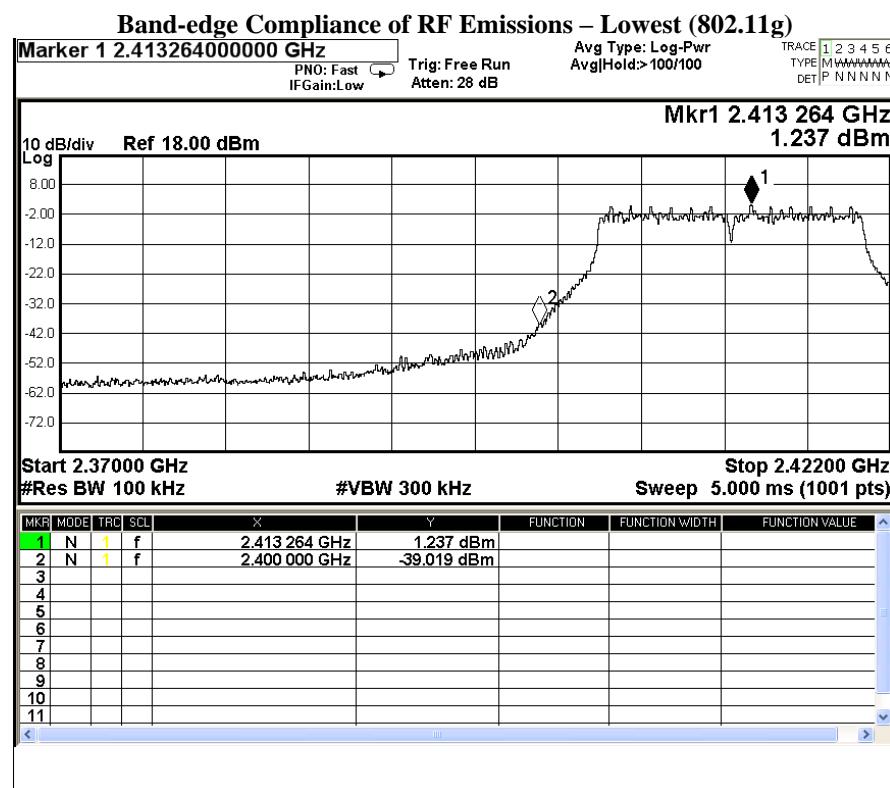
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2412)	1.237	-18.763	-39.019	Pass



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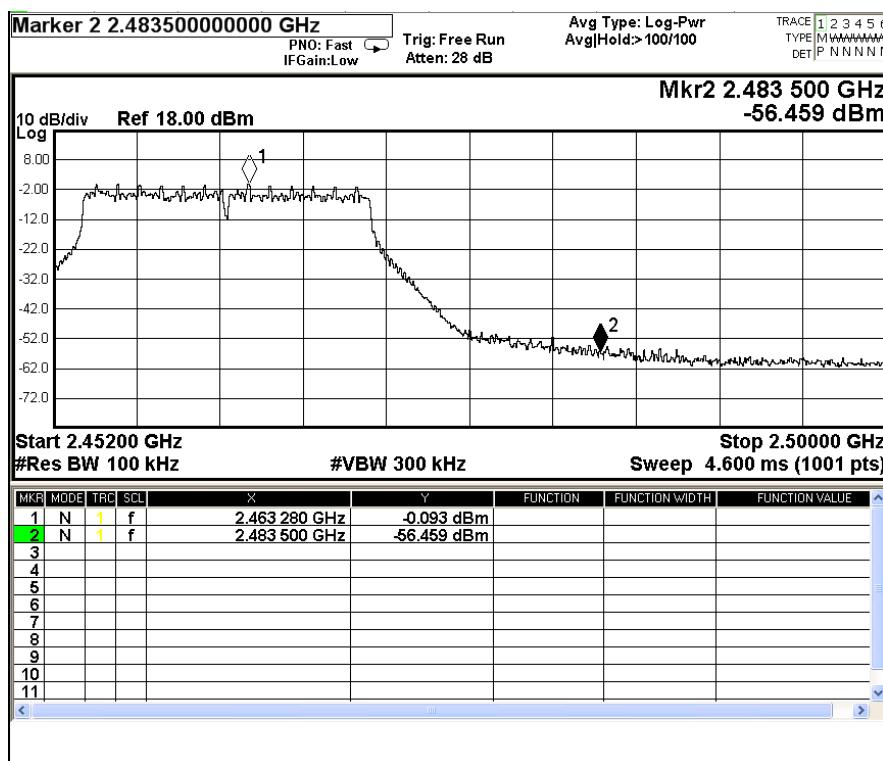
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 – Highest Fundamental (2462)	-0.093	-20.093	-56.459	Pass

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



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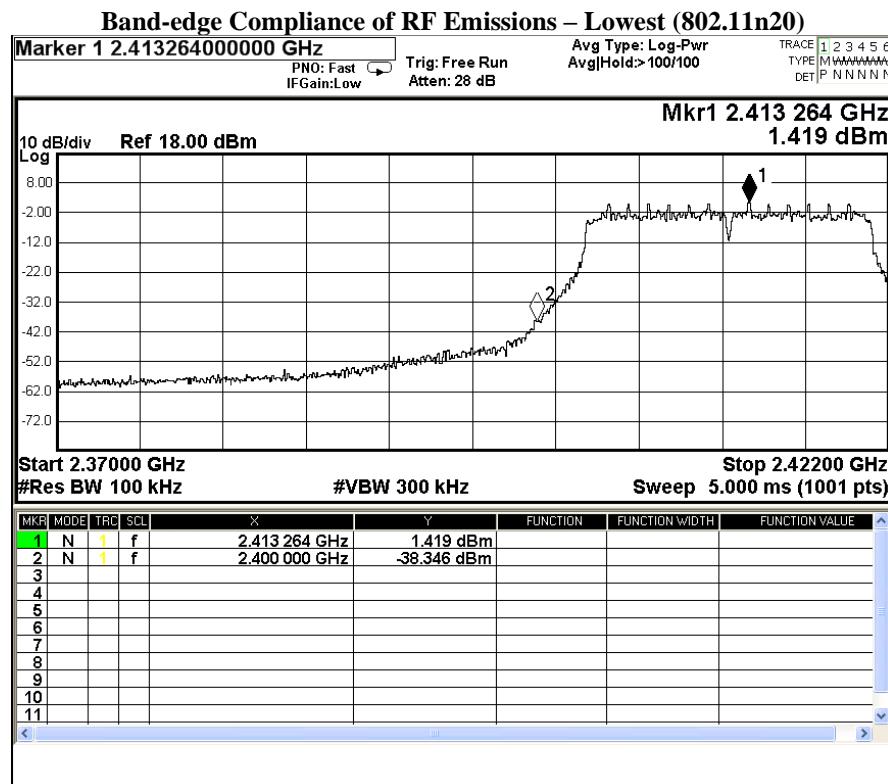
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2412)	1.419	-18.581	-38.346	Pass



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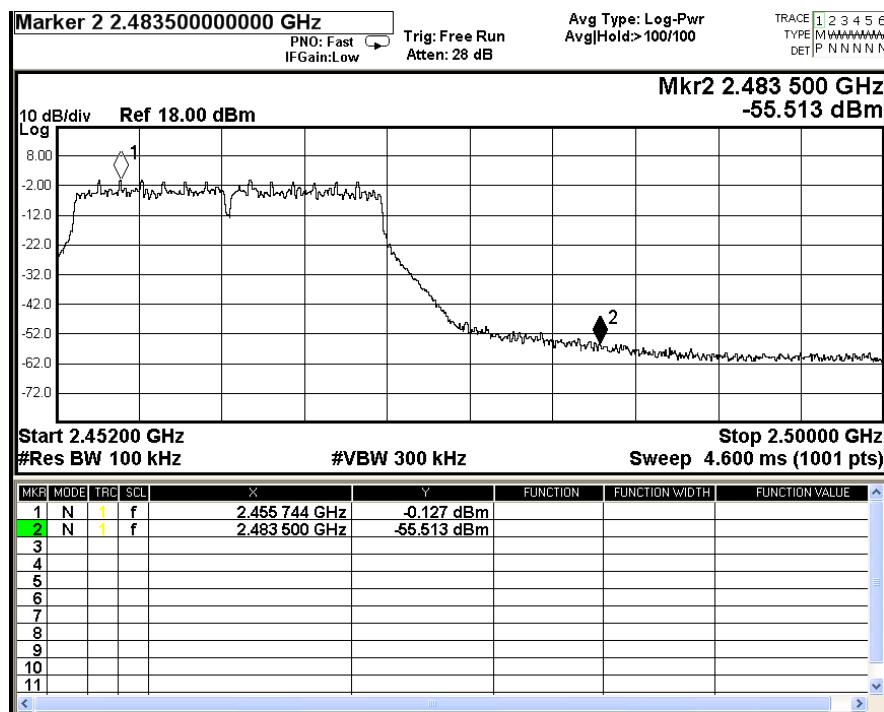
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 – Highest Fundamental (2462)	-0.127	-20.127	-55.513	Pass

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



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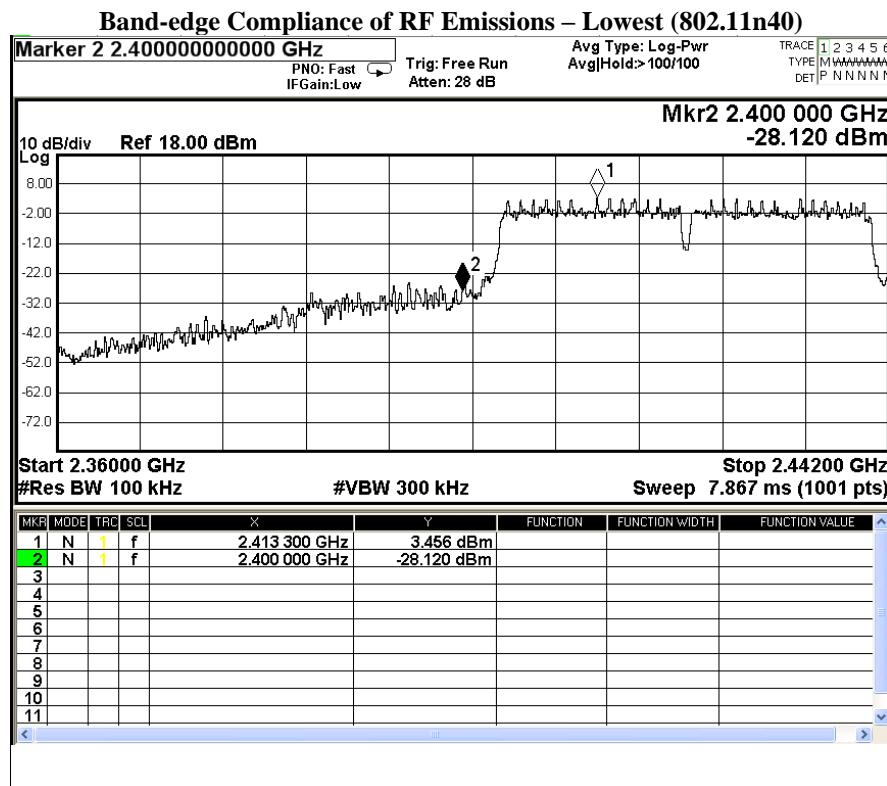
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2400 – Lowest Fundamental (2422)	3.456	-16.544	-28.120	Pass



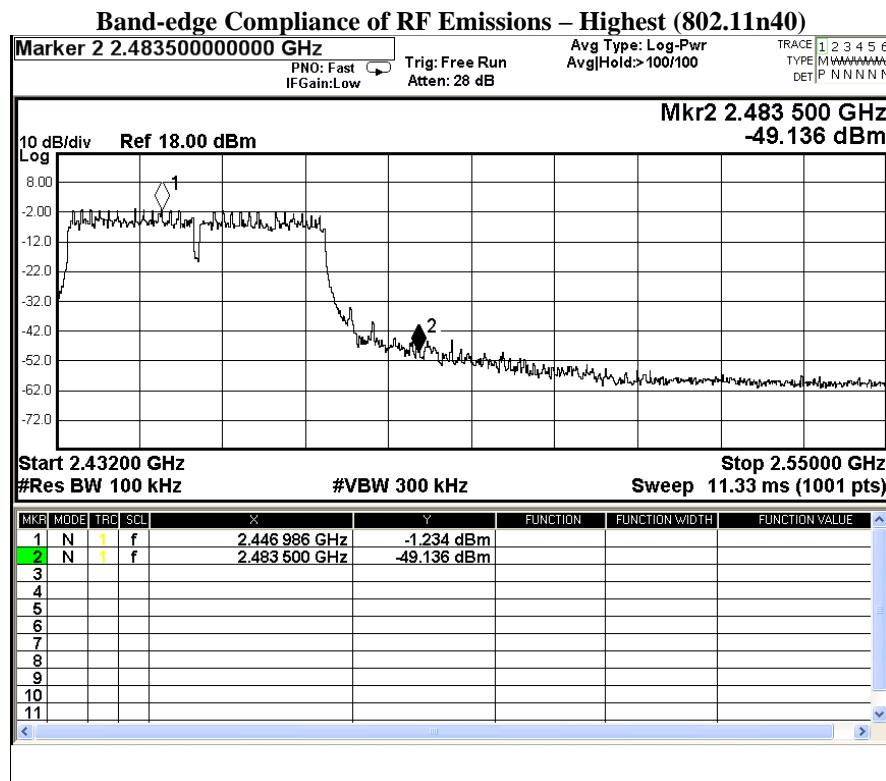
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Band-edge Compliance of RF Conducted Emissions Measurement:

Frequency Range	Reference level	Limit	The highest conducted band edge emission	Result
[MHz]	[dBm]	[dBm]	[dBm]	
2483.5 – Highest Fundamental (2452)	-1.234	-21.234	-49.136	Pass



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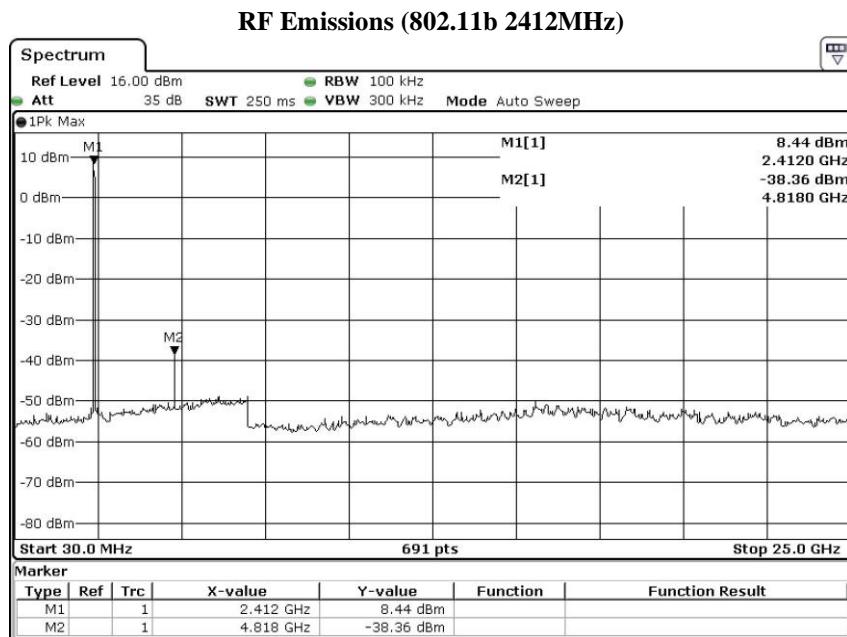
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RF Conducted Emissions Measurement:

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.



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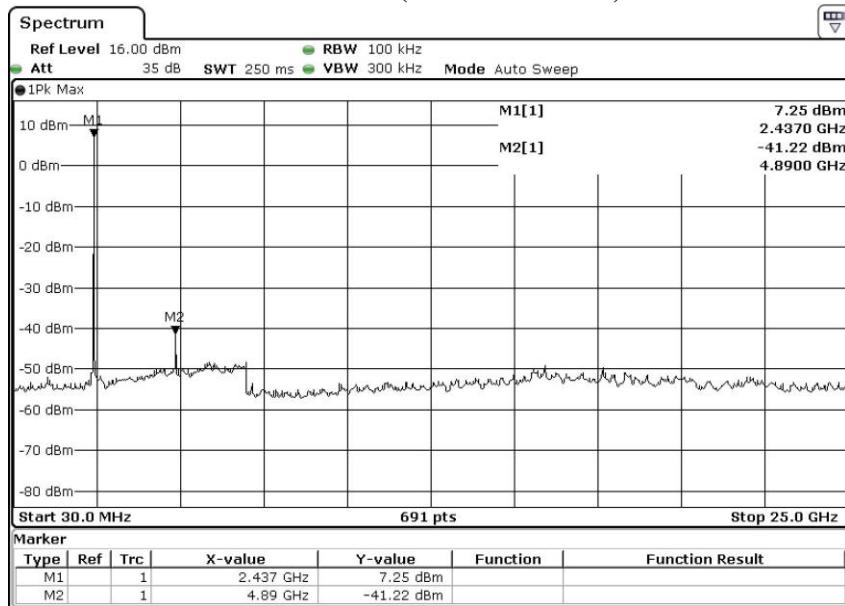


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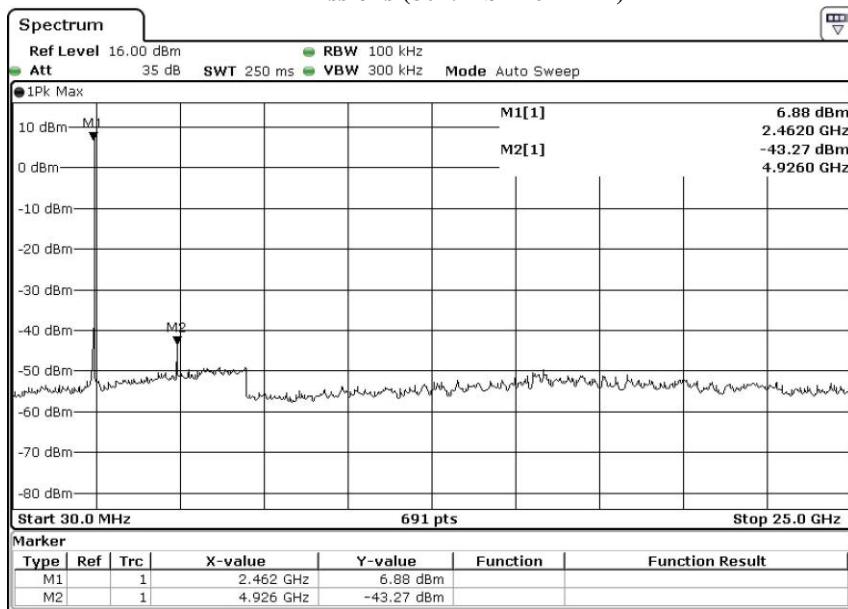
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RF Emissions (802.11b 2437MHz)



RF Emissions (802.11b 2462MHz)



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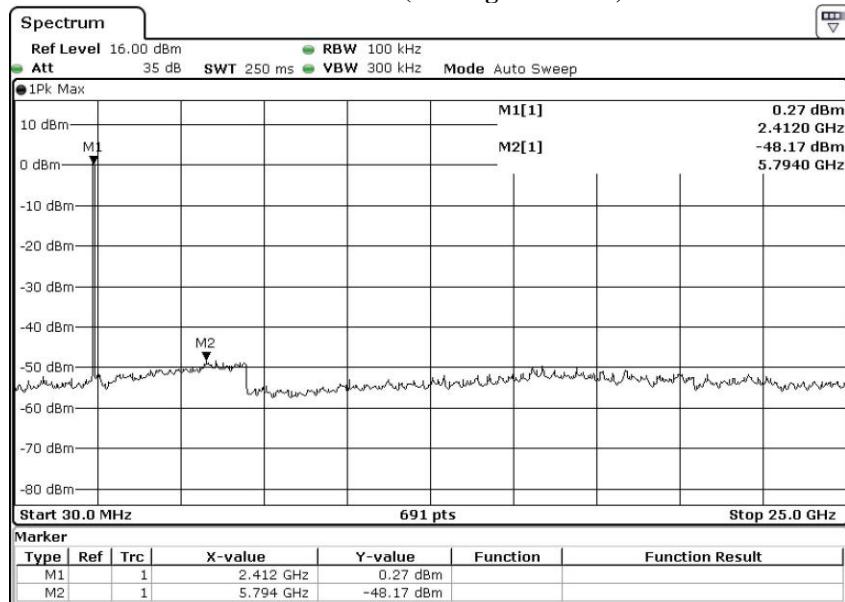
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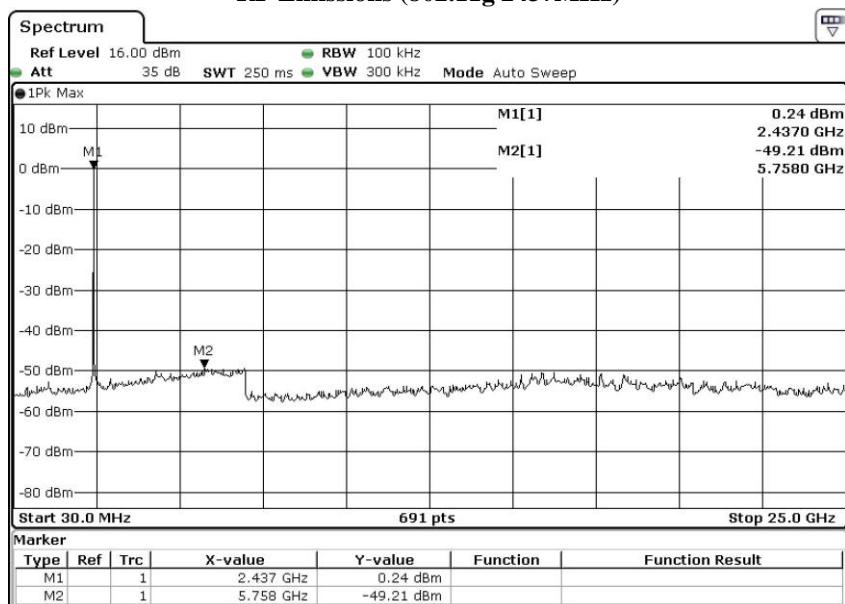
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RF Emissions (802.11g 2412MHz)



RF Emissions (802.11g 2437MHz)



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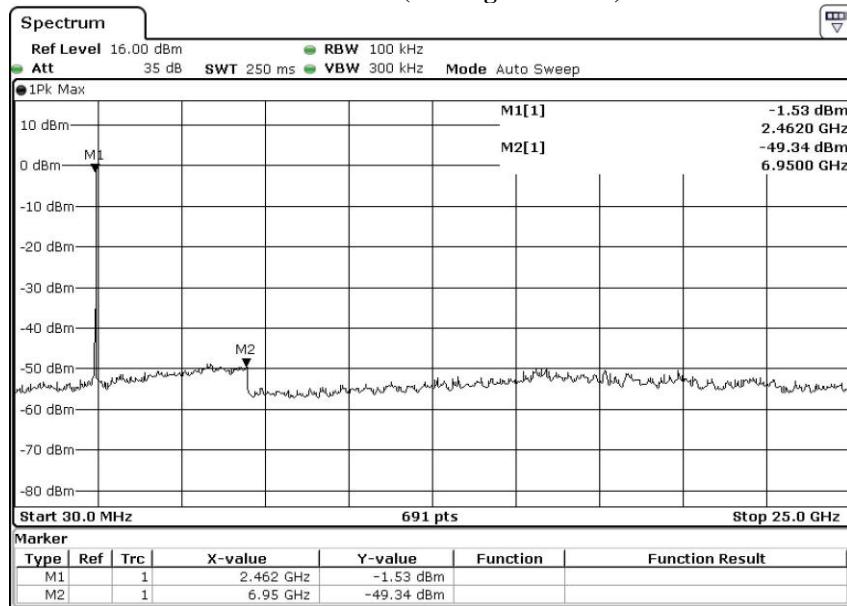


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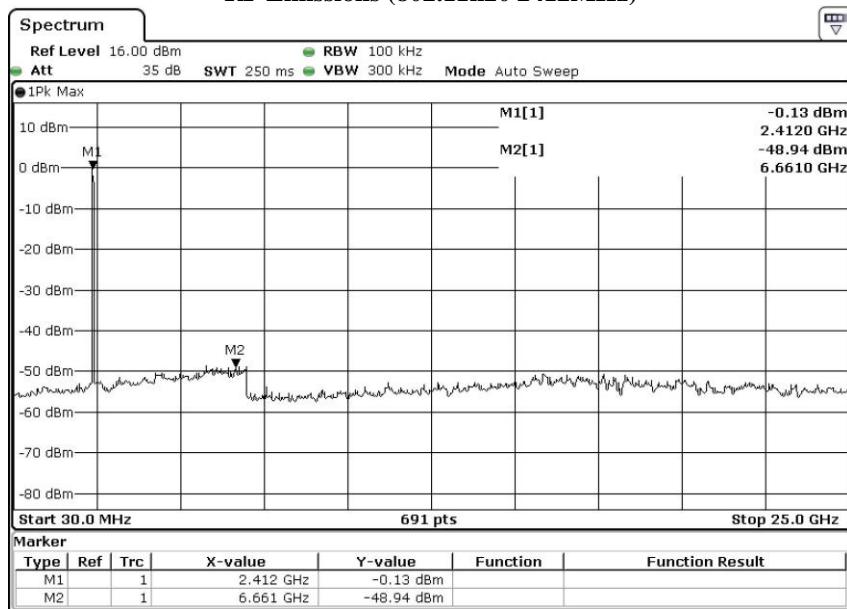
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RF Emissions (802.11g 2462MHz)



RF Emissions (802.11n20 2412MHz)



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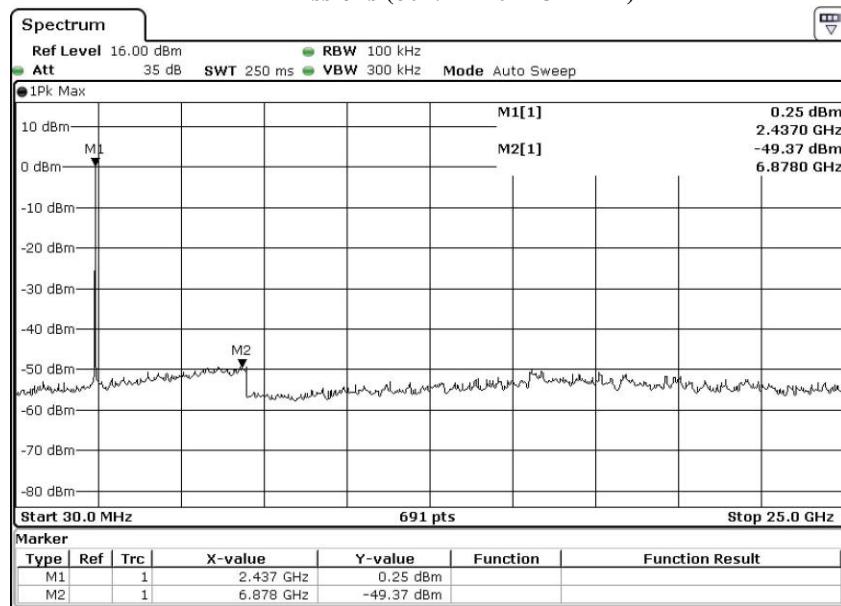


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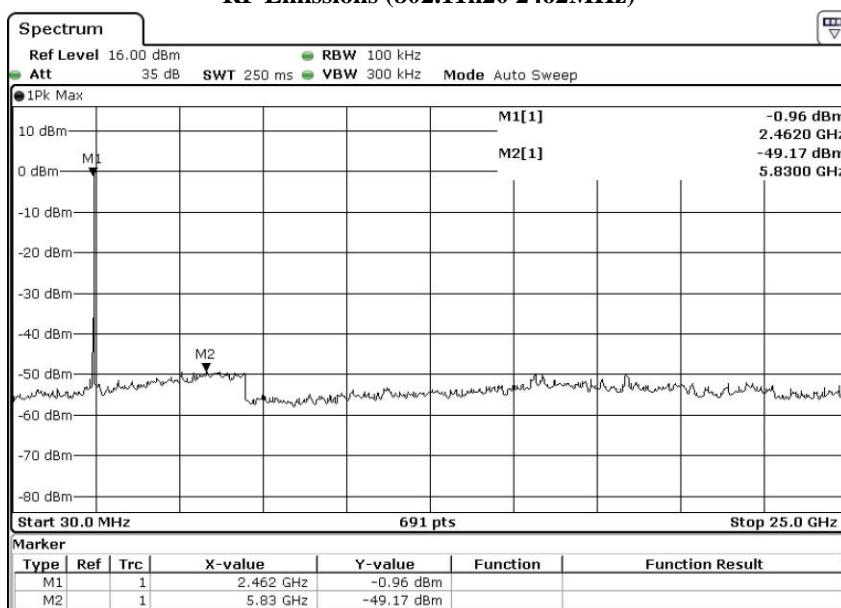
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RF Emissions (802.11n20 2437MHz)



RF Emissions (802.11n20 2462MHz)



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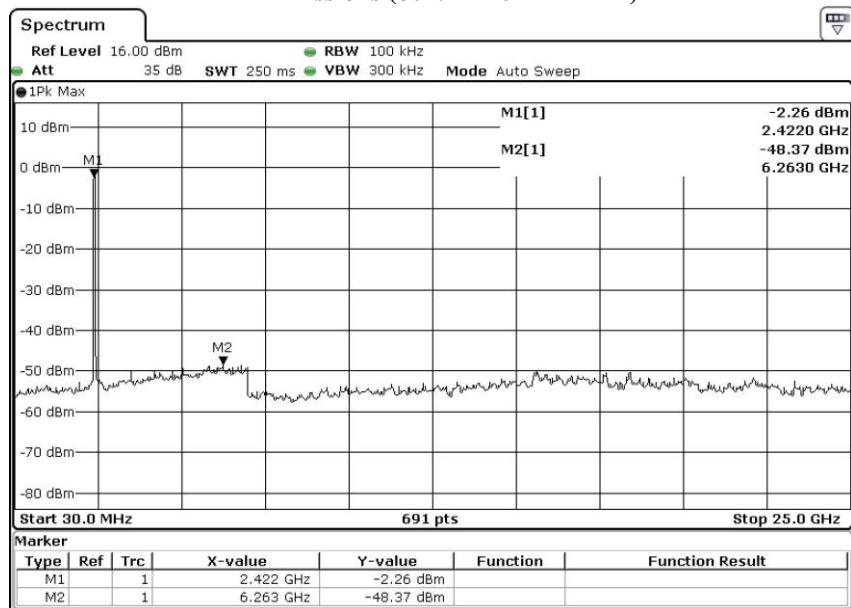


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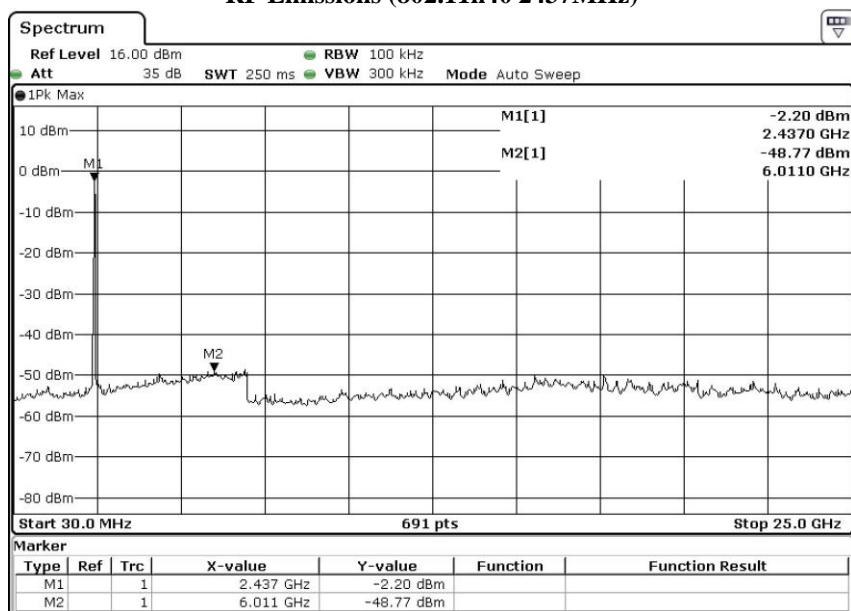
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RF Emissions (802.11n40 2422MHz)



RF Emissions (802.11n40 2437MHz)



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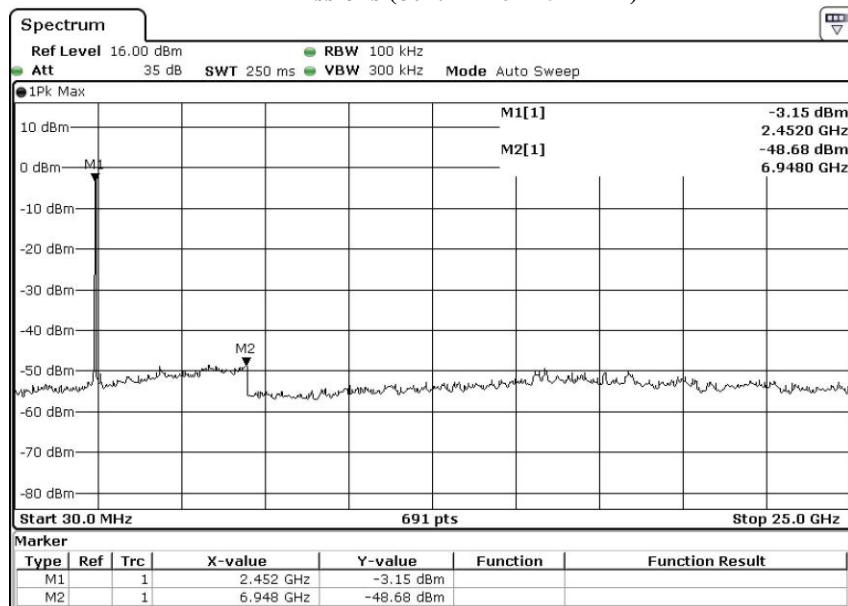


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RF Emissions (802.11n40 2452MHz)



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3.1.7 Antenna Requirement

Ambient Temperature: 25°C 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 integral antenna. There is no external antenna, the antenna gain = 0.0 dBi. 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	--	2019/04/16	2024/04/16
EM356	ANTENNA POSITIONING TOWER	ETS-LINDGREN	2171B	00150346	N/A	N/A
EM293	SPECTRUM ANALYZER	AGILENT TECHNOLOGIES	N9020A	MY50510152	2022/11/25	2024/11/25
EM299	BROADBAND HORN ANTENNA	ETS-LINDGREN	3115	00114120	2022/11/24	2024/11/24
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2022/11/25	2024/11/25
EM301	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-10	00130988	2022/11/25	2024/11/25
EM353	LOOP ANTENNA	ETS-LINDGREN	6502	00206533	2022/06/10	2024/09/10
EM355	Biconilog Antenna	ETS-Lindgren	3143B	00094856	2022/06/17	2024/09/17
EM200	DUAL CHANNEL POWER METER	R & S	NRVD	100592	2022/10/11	2025/10/11
EM012	PRE-AMPLIFIER	HP	HP8448B	3008A00262	2022/11/08	2025/11/08
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A

Line Conducted

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM232	LISN	SCHAFFNER	NNB41	04/100082	2022/07/20	2023/07/20
EM181	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESIB7	100072	2022/05/30	2023/05/30
EM179	PULSE LIMITER	ROHDE & SCHWARZ	ESH3-Z2	357.8810.52/54	2023/03/17	2025/03/17
EM154	SHIELDING ROOM	SIEMENS MATSUSHITA COMPONENTS	N/A	803-740-057-99A	2022/02/02	2027/02/02
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

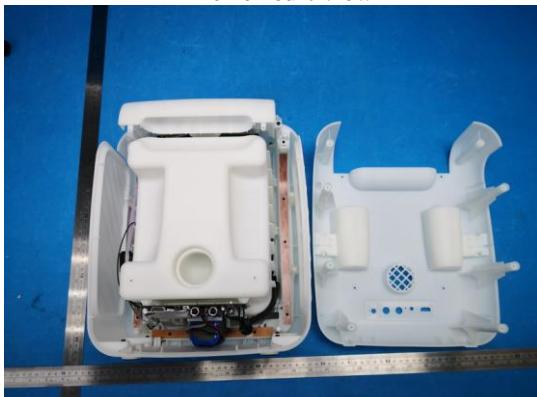
View of the product



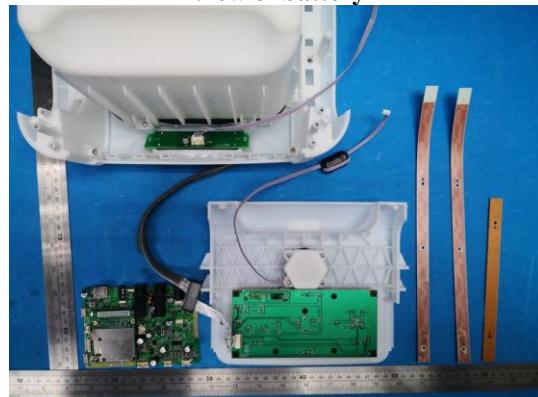
View of the product



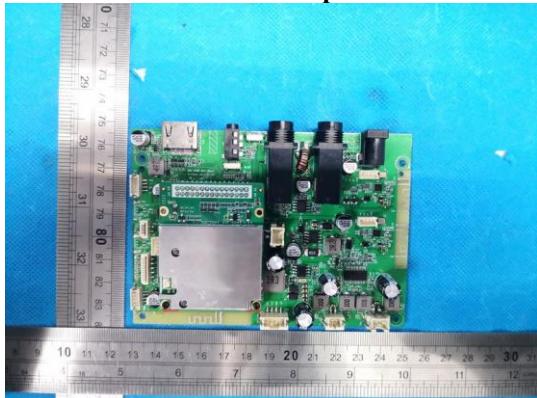
Inner circuit view



View of battery



Inner circuit top view



Inner circuit bottom view



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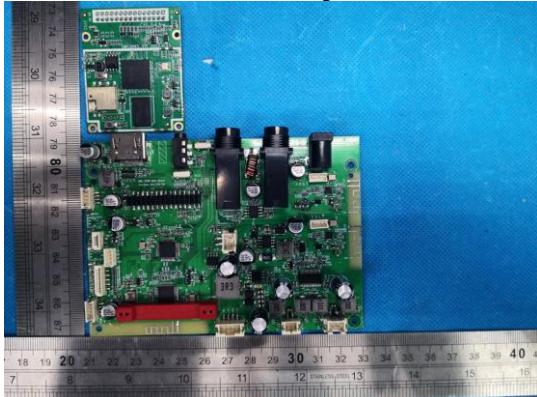
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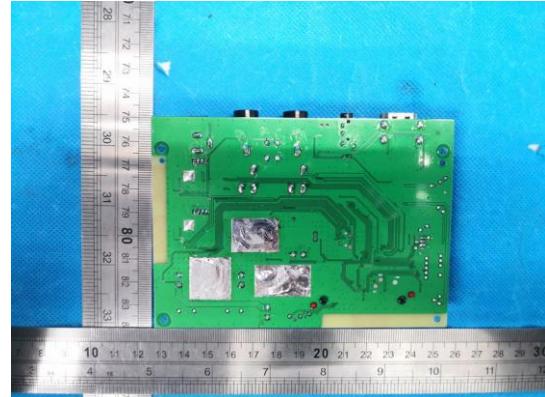
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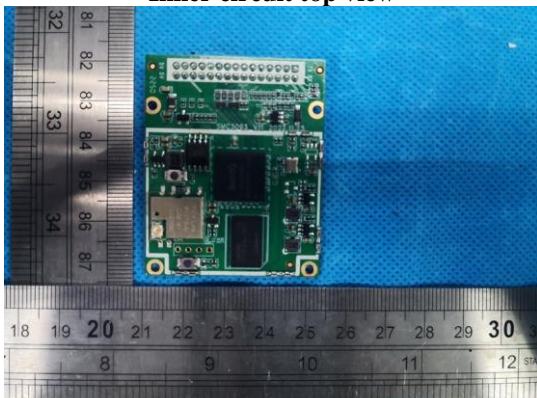
Inner circuit top view



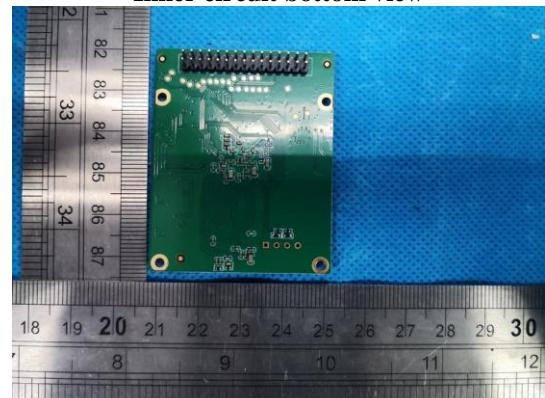
Inner circuit bottom view



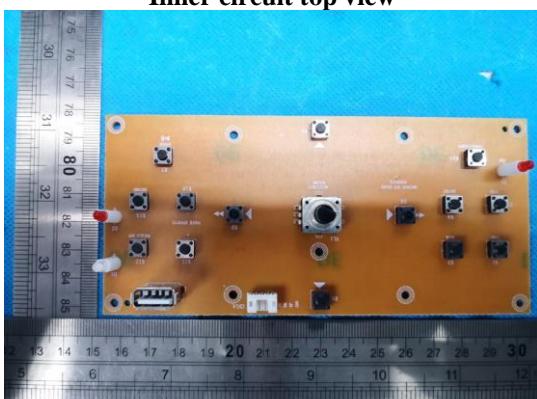
Inner circuit top view



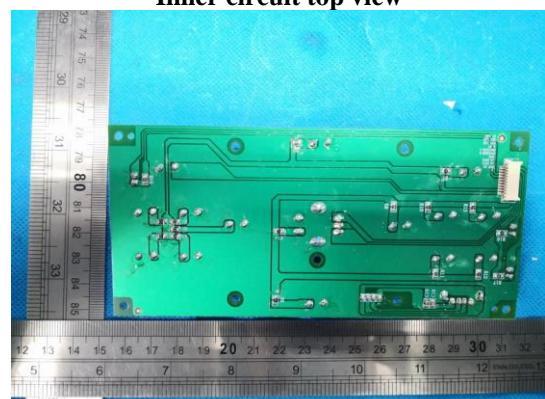
Inner circuit bottom view



Inner circuit top view



Inner circuit top view



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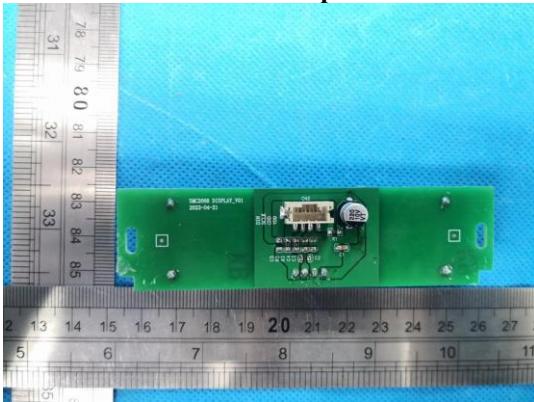
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Inner circuit top view



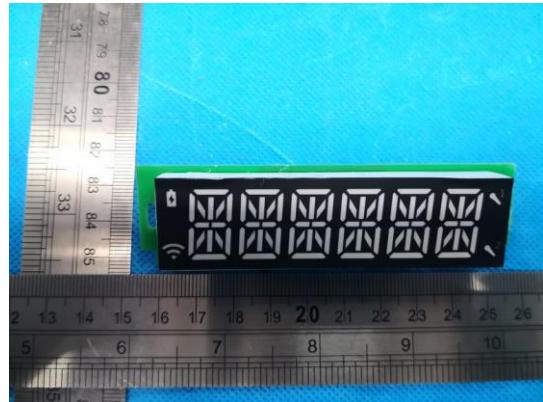
Inner circuit top view



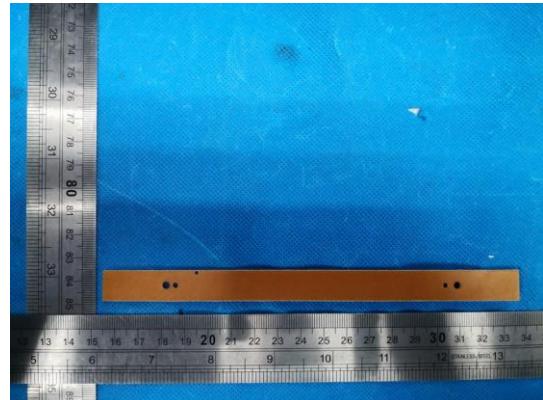
Inner circuit top view



Inner circuit bottom view



Inner circuit bottom view



Inner circuit top view





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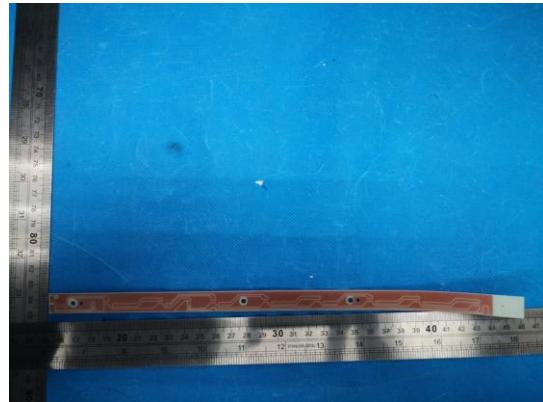
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Inner circuit top view



Inner circuit bottom view



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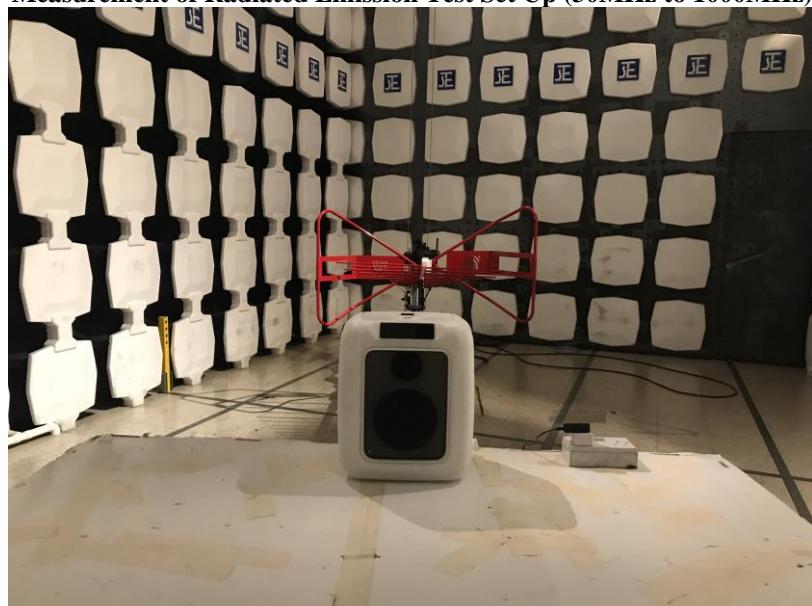
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Photographs of EUT

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



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



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Photographs of EUT

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



Measurement of Conducted Emission Test Set Up



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