

**FCC 47 CFR PART 15 SUBPART C
INDUSTRY CANADA RSS-247 ISSUE 2 February 2017**

CERTIFICATION TEST REPORT

For

Product Name: 5" Digital Video Baby Monitor With Wi-Fi® Internet Viewing

Model No.: MBP855CONNECTBU

Trademark: motorola

FCC ID: VLJ-MBP88G

IC: 4522A-MBP88G

HVIN: MBP88G

Report No.: ES181009051W01

Issue Date: October 17, 2018

Prepared for

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Prepared by

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1 TEST RESULT CERTIFICATION

Applicant:	Binatone Electronics International Ltd. Floor 23A, 9 Des Voeux Road West, Sheung Wan, Hong Kong
Manufacturer:	VTech (Dongguan) Telecommunications Ltd. VTech Science Park Xia Ling Bei Management Zone Liaobu, Dongguan 523411, Guangdong, China
EUT Description:	5" Digital Video Baby Monitor With Wi-Fi® Internet Viewing
Model Number:	MBP855CONNECTBU

Measurement Procedure Used:

APPLICABLE STANDARDS	
STANDARD	TEST RESULT
FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C RSS-Gen, Issue 5, April 2018 RSS-247 Issue 2, February 2017	PASS

The above equipment was tested by EMTEK (SHENZHEN) CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with the requirements of FCC Rules Part 2, Part 15.247, IC RSS-247 IC RSS-GEN.

The test results of this report relate only to the tested sample identified in this report.

Date of Test : July 01, 2018 to October 17, 2018

Prepared by : Yaping Shen
YapingShen /Tester

Reviewer : Joe Xia
Joe Xia/ Supervisor

Approve & Authorized Signer : Lisa Wang
Lisa Wang/Manager



2 EUT TECHNICAL DESCRIPTION

The EUT is a baby unit(Camera) which supports Wi-Fi 802.11 b/g/n and general 2.4GHz wireless technologies. This report for Wi-Fi 802.11 b/g/n wireless operation only.

Characteristics	Description
IEEE 802.11 WLAN Mode Supported	<input checked="" type="checkbox"/> 802.11b <input checked="" type="checkbox"/> 802.11g <input checked="" type="checkbox"/> 802.11n(20MHz channel bandwidth) <input checked="" type="checkbox"/> 802.11n(40MHz channel bandwidth)
Data Rate	802.11 b:1,2,5.5,11Mbps; 802.11 g:6,9,12,18,24,36,48,54Mbps; 802.11n(HT20):MCS0-MCS7; 802.11n(HT40): MCS0-MCS7;
Modulation	DSSS with DBPSK/DQPSK/CCK for 802.11b; OFDM with BPSK/QPSK/16QAM/64QAM for 802.11g/n;
Operating Frequency Range	2412-2462MHz for 802.11b/g/n(HT20); 2422-2452MHz for 802.11n(HT40);
Number of Channels	11 channels for 802.11b/g n(HT20); 7 channels for 802.11n(HT40)
Transmit Power Max	21.82dBm for 802.11b; 24.22dBm for 802.11g; 23.99dBm for 802.11n(HT20); 23.50dBm for 802.11n(HT40);
Antenna Type	Internal Antenna
Antenna Gain	0 dBi
Operating Voltage	DC 5.0V 1500mA input via AC/DC adapter DC 3.6V 900mAh input via internal Ni-MH battery
AC/DC Adapter 1#	Model: S012CDU0500150 Input: AC 100-240V~50/60Hz,400mA Output: DC 5.0V~1500mA
Battery 1#	Model: AAA (JUSTHIGH) DC 3.6V@900mAh Ni-MH battery
Battery 2#	Model: GPRHCH93C021 (GPI) DC 3.6V@900mAh Ni-MH battery
Temperature Range	-10°C ~ +50°C

3 SUMMARY OF TEST RESULT

FCC&IC Part Clause	Test Parameter	Verdict	Remark
FCC Part 15.247(a)(2) RSS-247 Clause 5.2(a)	DTS (6dB) Bandwidth	Pass	--
FCC Part 15.247(b)(3) RSS-247 Clause 5.4(d)	Maximum Peak Conducted Output Power	Pass	--
RSS-Gen Clause 6.7	99% Occupied Bandwidth	Pass	--
FCC Part 15.247(e) RSS-247 Clause 5.2(b)	Maximum Power Spectral Density Level	Pass	--
FCC Part 15.247(d) RSS-247 Clause 5.5	Unwanted emissions		
FCC Part 15.247(d)&15.205 RSS-247 Clause 3.3	Radiated Spurious Emission	Pass	--
FCC Part 15.207(a) RSS-Gen Clause 8.8	Conducted Spurious Emission Test	Pass	--
FCC Part 15.203 RSS-Gen Clause 6.8	Antenna Application	Pass	--
	NOTE1: N/A (Not Applicable) NOTE2: According to FCC OET KDB 558074, the report use radiated measurements in the restricted frequency bands. In addition, the radiated test is also performed to ensure the emissions emanating from the device cabinet also comply with the applicable limits.		

RELATED SUBMITTAL(S) / GRANT(S):

This submittal(s) (test report) is intended for FCC ID: VLJ-MBP88G filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

This submittal(s) (test report) is intended for IC: 4522A-MBP88G filing to comply with RSS-247 Issue 2 and RSS-Gen, Issue 5

4 TEST METHODOLOGY

4.1 GENERAL DESCRIPTION OF APPLIED STANDARDS

According to its specifications, the EUT must comply with the requirements of the following standards:

FCC 47 CFR Part 2, Subpart J

FCC 47 CFR Part 15, Subpart C

ANSI C63.10: 2013

FCC KDB 558074 D01 DTS Meas Guidance v05

RSS-Gen, Issue 5, April 2018

RSS-247, Issue 2 February 2017

4.2 MEASUREMENT EQUIPMENT USED

4.2.1 Conducted Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Test Receiver	R&S	ESCS30	828985/018	05/20/2018	05/20/2019
L.I.S.N.	Schwarzbeck	NNLK8129	8129203	05/20/2018	05/20/2019
50Ω Coaxial Switch	Anritsu	MP59B	M20531	N/A	N/A
Pulse Limiter	R&S	ESH3-Z2	100006	05/20/2018	05/20/2019

4.2.2 Radiated Emission Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
EMI Test Receiver	R&S	ESU	1302.6005.26	05/20/2018	05/20/2019
Pre-Amplifier	HP	8447D	2944A07999	05/20/2018	05/20/2019
Bilog Antenna	Schwarzbeck	VULB9163	142	05/20/2018	05/20/2019
Loop Antenna	ARA	PLA-1030/B	1029	05/20/2018	05/20/2019
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170399	05/20/2018	05/20/2019
Horn Antenna	Schwarzbeck	BBHA 9120	D143	05/20/2018	05/20/2019
Cable	Schwarzbeck	AK9513	ACRX1	05/20/2018	05/20/2019
Cable	Rosenberger	N/A	FP2RX2	05/20/2018	05/20/2019
Cable	Schwarzbeck	AK9513	CRPX1	05/20/2018	05/20/2019
Cable	Schwarzbeck	AK9513	CRRX2	05/20/2018	05/20/2019

4.2.3 Radio Frequency Test Equipment

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	DUE CAL.
Spectrum Analyzer	Agilent	E4407B	88156318	05/20/2018	05/20/2019
Power meter	Anritsu	ML2495A	0824006	05/20/2018	05/20/2019
Power sensor	Anritsu	MA2411B	0738172	05/20/2018	05/20/2019
Spectrum Analyzer	Agilent	N9010A	My53470879	05/20/2018	05/20/2019

Remark: Each piece of equipment is scheduled for calibration once a year.

4.3 DESCRIPTION OF TEST MODES

The EUT has been tested under its typical operating condition.

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

Test of channel included the lowest and middle and highest frequency to perform the test, then record on this report.

Those data rates (802.11b:1 Mbps; 802.11g: 6 Mbps;802.11n(HT20): MCS0; 802.11(HT40): MCS0) were used for all test.

Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

☒ Frequency and Channel list for 802.11 b/g/n(HT20):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	5	2432	9	2452
2	2417	6	2437	10	2457
3	2422	7	2442	11	2462
4	2427	8	2447		

☒ Frequency and Channel list for 802.11 n (HT40):

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	5	2432	8	2447
4	2427	6	2437	9	2452
		7	2442		

☒ Test Frequency and Channel for 802.11 b/g/n (HT20):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2412	6	2437	11	2462

☒ Test Frequency and channel for 802.11n (HT40):

Lowest Frequency		Middle Frequency		Highest Frequency	
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	6	2437	9	2452

5 FACILITIES AND ACCREDITATIONS

5.1 FACILITIES

All measurement facilities used to collect the measurement data are located at

Bldg 69, Majialong Industry Zone District, Nanshan District, Shenzhen, China

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.10 and CISPR Publication 22.

5.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.

- : Accredited by CNAS, 2016.10.24
The certificate is valid until 2022.10.28
The Laboratory has been assessed and proved to be in compliance with CNAS-CL01: 2006(identical to ISO/IEC17025: 2005)
The Certificate Registration Number is L229
- : Accredited by TUV Rheinland Shenzhen, 2016.5.19
The Laboratory has been assessed according to the requirements ISO/IEC 17025.
- : Accredited by FCC, August 06, 2018
The certificate is valid until August 07, 2020
Designation Number: CN1204
Test Firm Registration Number: 882943
- : Accredited by Industry Canada, November 24, 2015
The Certificate Registration Number is 4480A.

6 TEST SYSTEM UNCERTAINTY

The following measurement uncertainty levels have been estimated for tests performed on the apparatus:

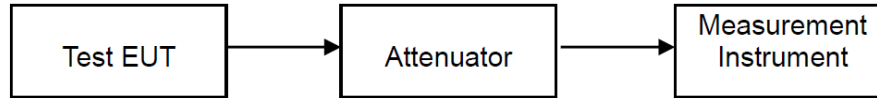
Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-5}$
Maximum Peak Output Power Test	$\pm 1.0\text{dB}$
Conducted Emissions Test	$\pm 2.0\text{dB}$
Radiated Emission Test	$\pm 2.0\text{dB}$
Power Density	$\pm 2.0\text{dB}$
Occupied Bandwidth Test	$\pm 1.0\text{dB}$
Band Edge Test	$\pm 3\text{dB}$
All emission, radiated	$\pm 3\text{dB}$
Antenna Port Emission	$\pm 3\text{dB}$
Temperature	$\pm 0.5^{\circ}\text{C}$
Humidity	$\pm 3\%$

Measurement Uncertainty for a level of Confidence of 95%

7 SETUP OF EQUIPMENT UNDER TEST

7.1 RADIO FREQUENCY TEST SETUP 1

The WLAN component's antenna ports(s) of the EUT are connected to the measurement instrument per an appropriate attenuator. The EUT is controlled by PC/software to emit the specified signals for the purpose of measurements.



7.2 RADIO FREQUENCY TEST SETUP 2

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4 dB according to the standards: ANSI C63.10. The test distance is 3m. The setup is according to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 and CAN/CSA-CEI/IEC CISPR 22.

Below 30MHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna (loop antenna). The Antenna should be positioned with its plane vertical at the specified distance from the EUT and rotated about its vertical axis for maximum response at each azimuth about the EUT. The center of the loop shall be 1 m above the ground. For certain applications, the loop antenna plane may also need to be positioned horizontally at the specified distance from the EUT.

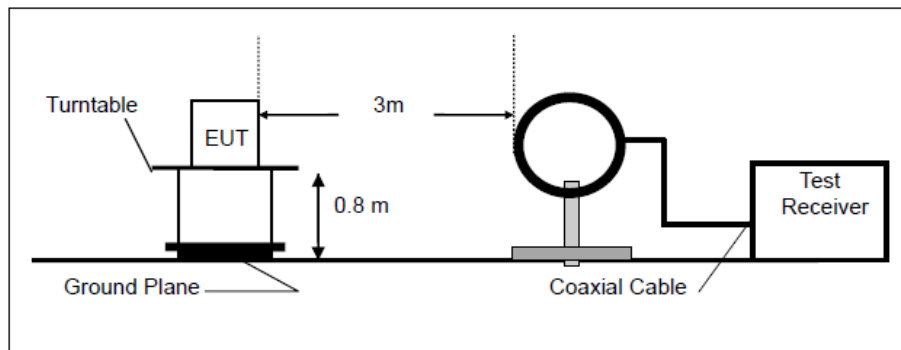
30MHz-1GHz:

The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

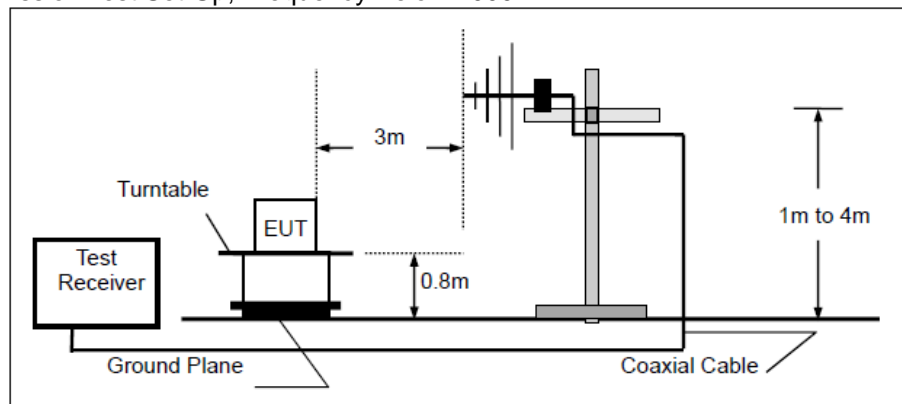
Above 1GHz:

The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).

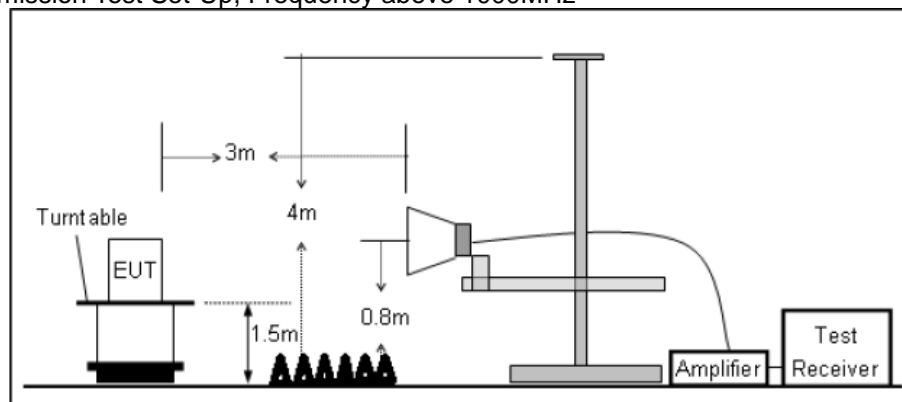
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



(b) Radiated Emission Test Set-Up, Frequency Below 1000MHz



(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

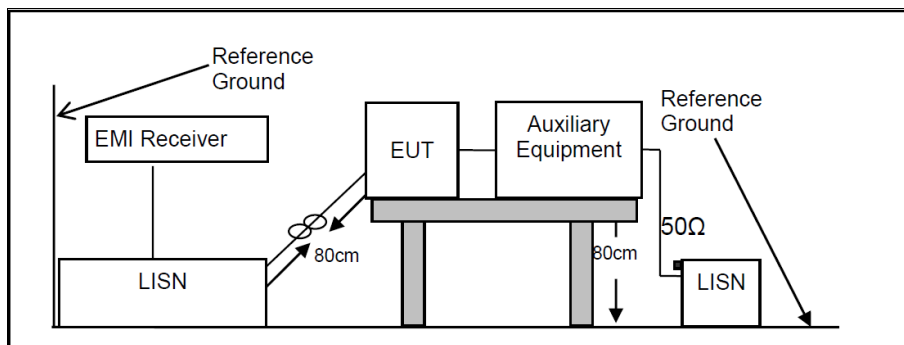


7.3 CONDUCTED EMISSION TEST SETUP

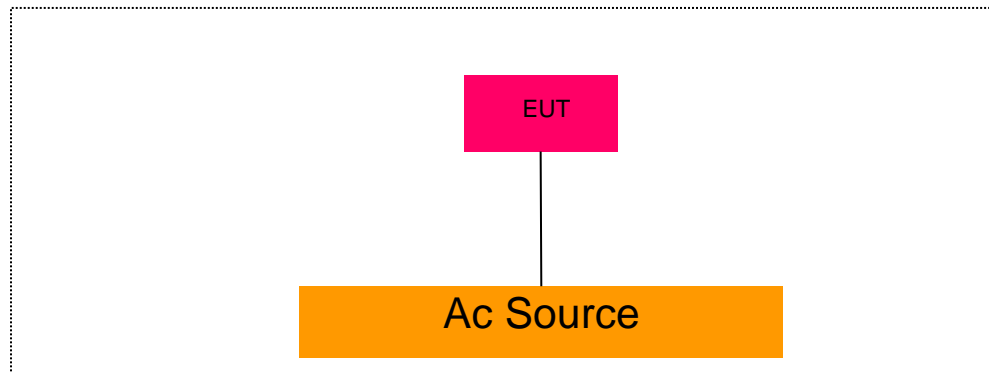
The mains cable of the EUT (maybe per AC/DC Adapter) must be connected to LISN. The LISN shall be placed 0.8 m from the boundary of EUT and bonded to a ground reference plane for LISN mounted on top of the ground reference plane. This distance is between the closest points of the LISN and the EUT. All other units of the EUT and associated equipment shall be at least 0.8m from the LISN.

Ground connections, where required for safety purposes, shall be connected to the reference ground point of the LISN and, where not otherwise provided or specified by the manufacturer, shall be of same length as the mains cable and run parallel to the mains connection at a separation distance of not more than 0.1 m.

According to the requirements in Section 13.1.4.1 of ANSI C63.10-2013 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30 MHz using CISPR Quasi-Peak and average detector mode.



7.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



7.5 SUPPORT EQUIPMENT

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Note
1	-	-	-	-	-

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

8 TEST REQUIREMENTS

8.1 DTS (6DB)BANDWIDTH

8.1.1 Applicable Standard

According to FCC Part 15.247(a)(2) and KDB558074 DTS 01 Meas. Guidance v05
According to RSS-247 Clause 5.2(a)

8.1.2 Conformance Limit

The minimum -6 dB bandwidth shall be at least 500 kHz.

8.1.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.1.4 Test Procedure

The EUT was operating in IEEE 802.11b/g/n mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 100 kHz.

Set the video bandwidth (VBW) = 300kHz.

Set Span = 2 times OBW

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

Allow the trace to stabilize.

Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

Measure and record the results in the test report.

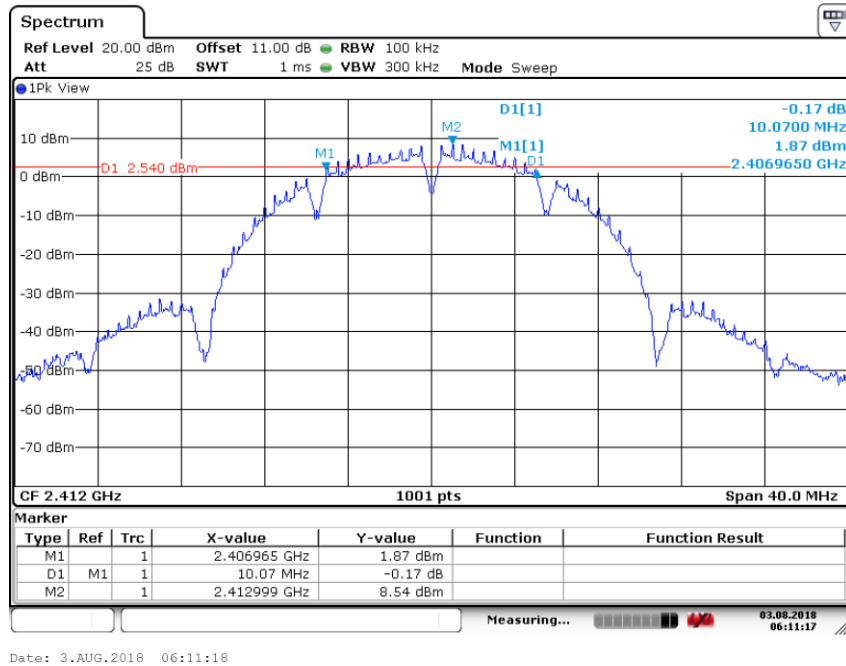
8.1.5 Test Results

Temperature :	26°C	Test Date :	August 03, 2018
Humidity :	60 %	Test By:	King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (MHz)	Limit (kHz)	Verdict
802.11b	1	2412	10.070	>500	PASS
	6	2437	10.085	>500	PASS
	11	2462	10.060	>500	PASS
802.11g	1	2412	16.344	>500	PASS
	6	2437	16.399	>500	PASS
	11	2462	16.374	>500	PASS
802.11n (HT20)	1	2412	17.582	>500	PASS
	6	2437	17.597	>500	PASS
	11	2462	17.572	>500	PASS
802.11n (HT40)	3	2422	35.245	>500	PASS
	6	2437	35.245	>500	PASS
	9	2452	35.245	>500	PASS

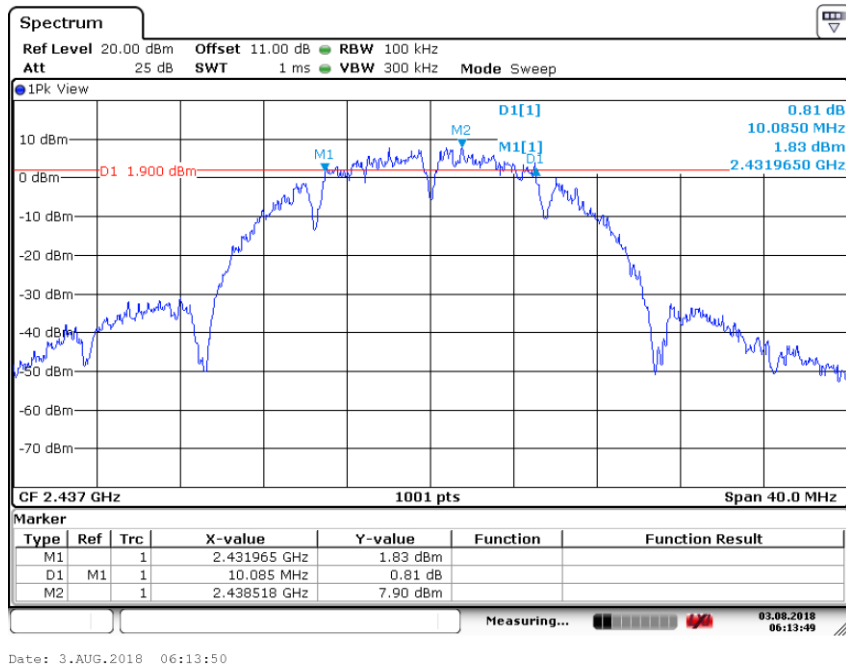
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 1: 2412MHz



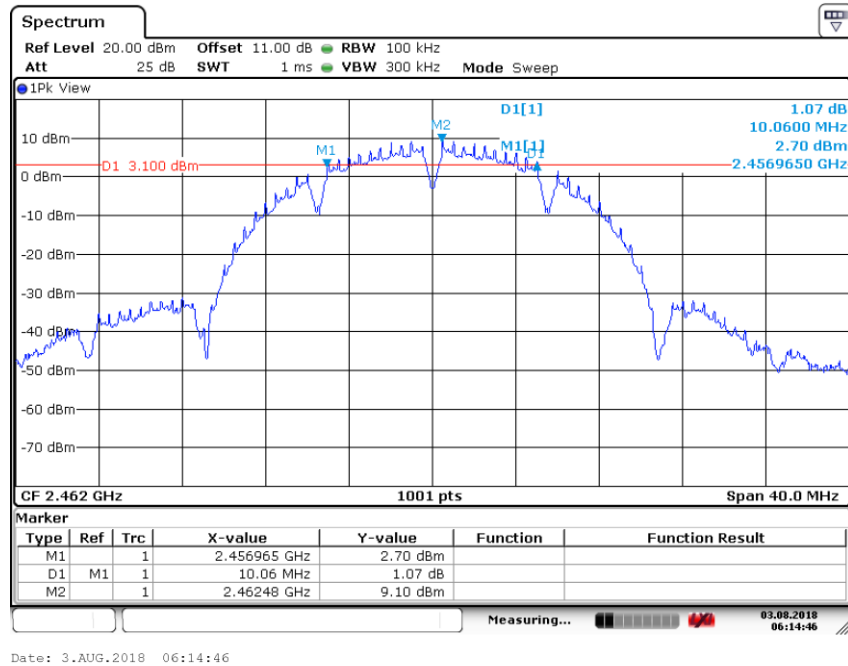
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 6: 2437MHz



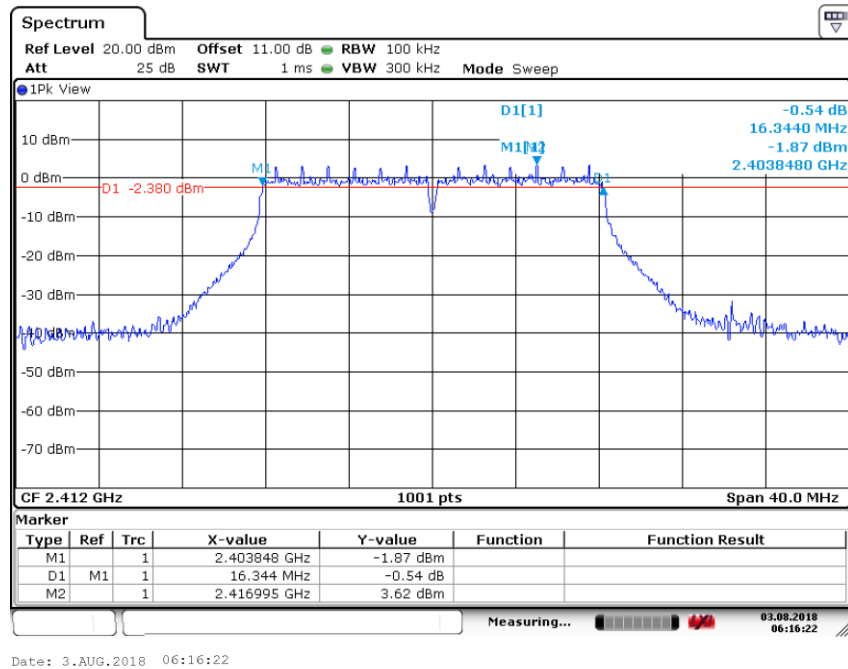
Test Model

DTS (6dB) Bandwidth
802.11b
Channel 11: 2462MHz



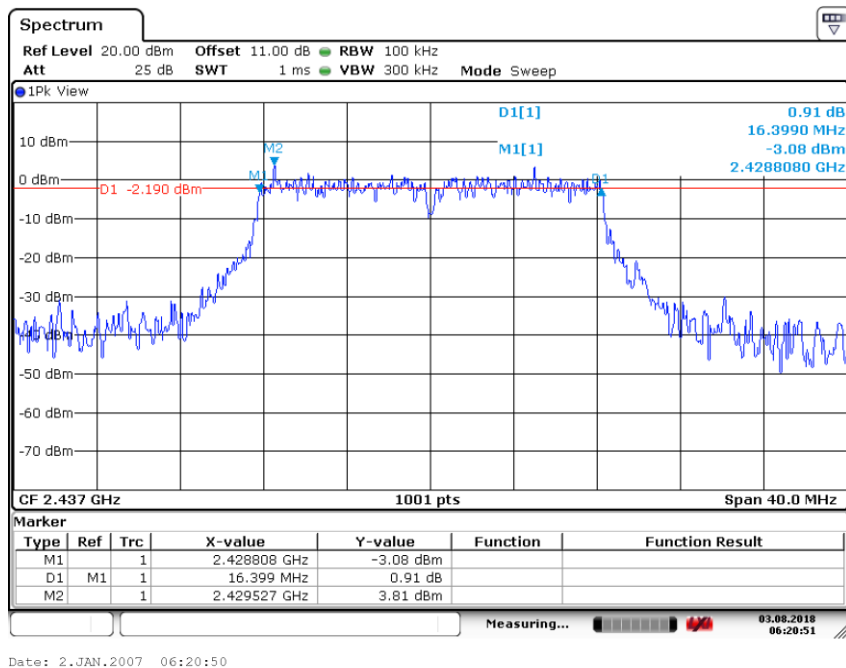
Test Model

DTS (6dB) Bandwidth
802.11g
Channel 1: 2412MHz



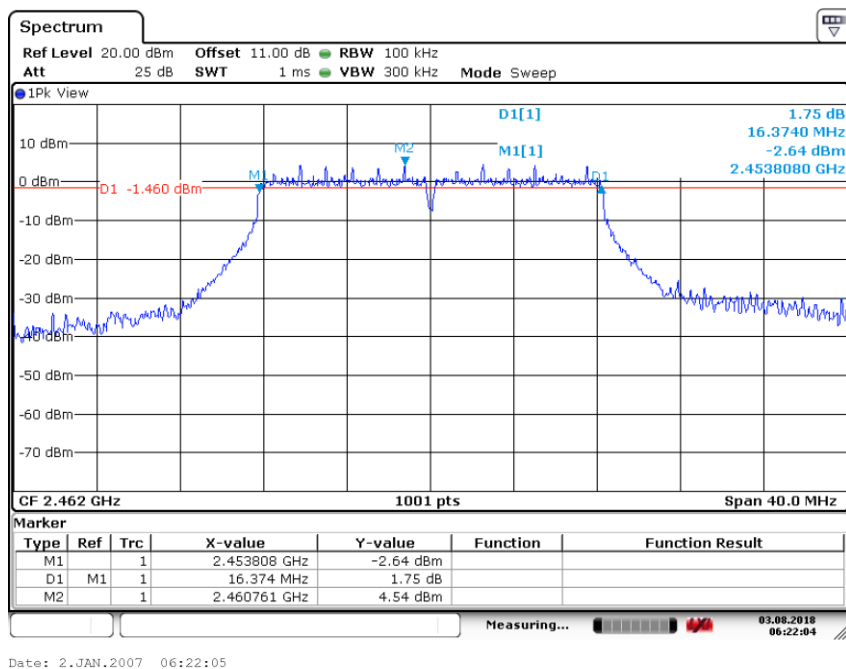
Test Model

DTS (6dB) Bandwidth
802.11g
Channel 6: 2437MHz



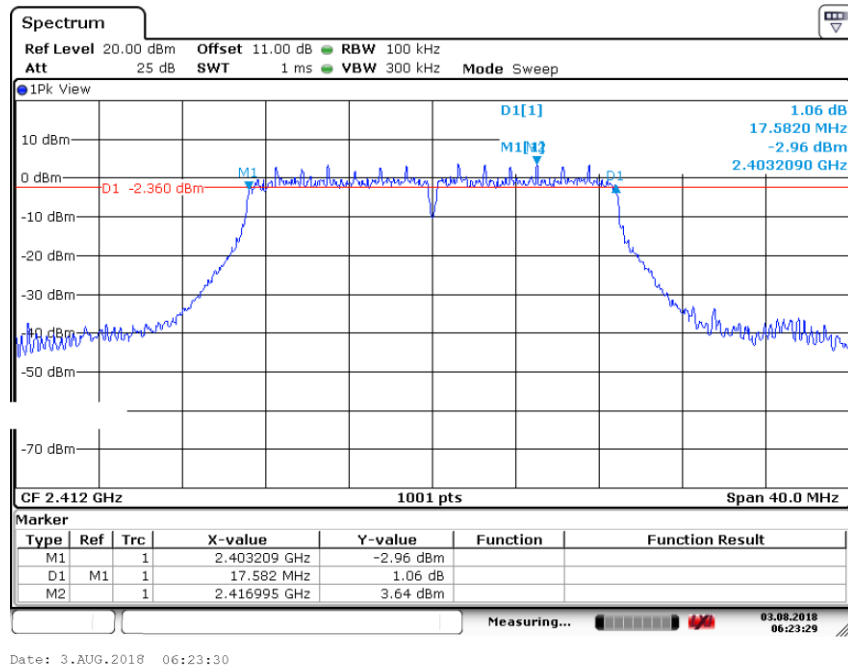
Test Model

DTS (6dB) Bandwidth
802.11g
Channel 11: 2462MHz



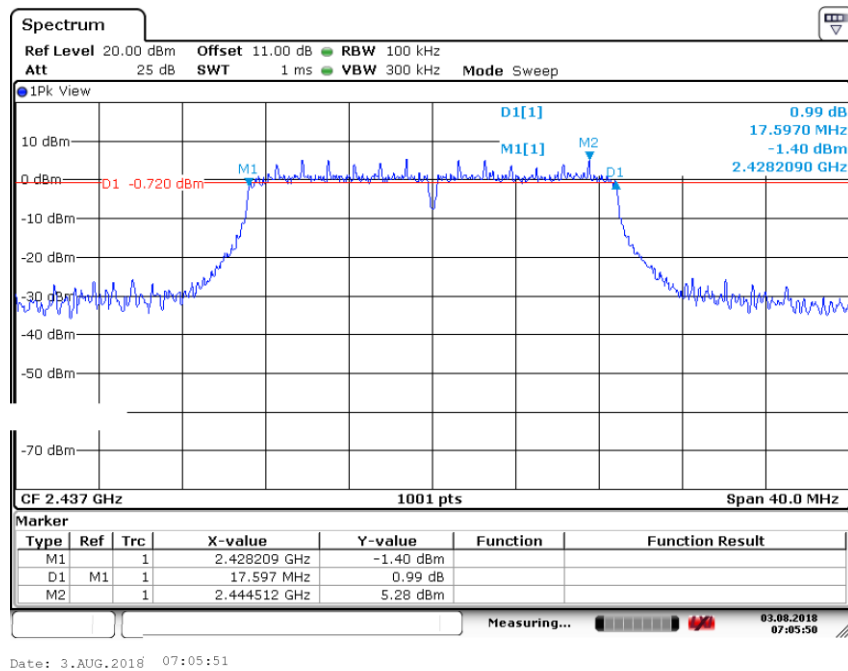
Test Model

DTS (6dB) Bandwidth
802.11n (HT20)
Channel 1: 2412MHz



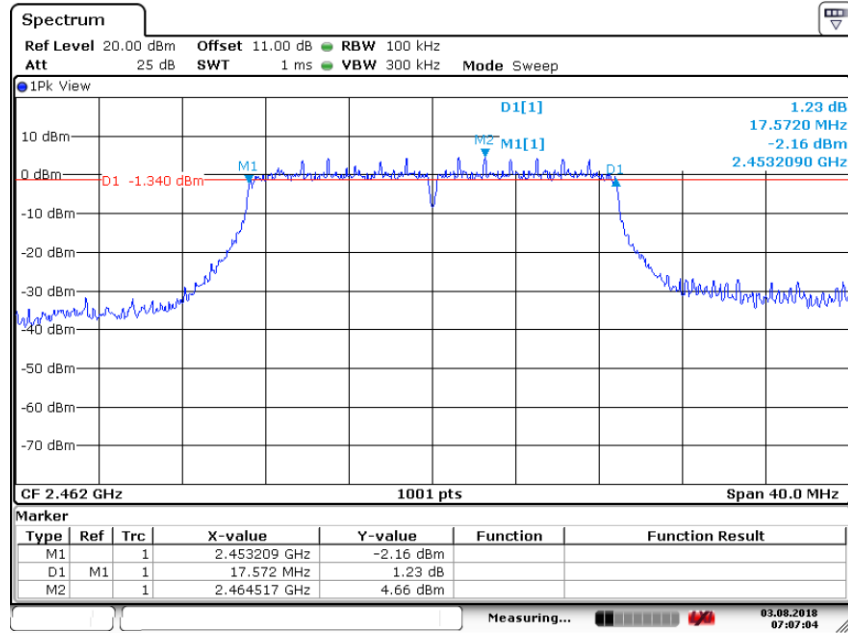
Test Model

DTS (6dB) Bandwidth
802.11n (HT20)
Channel 6: 2437MHz



Test Model

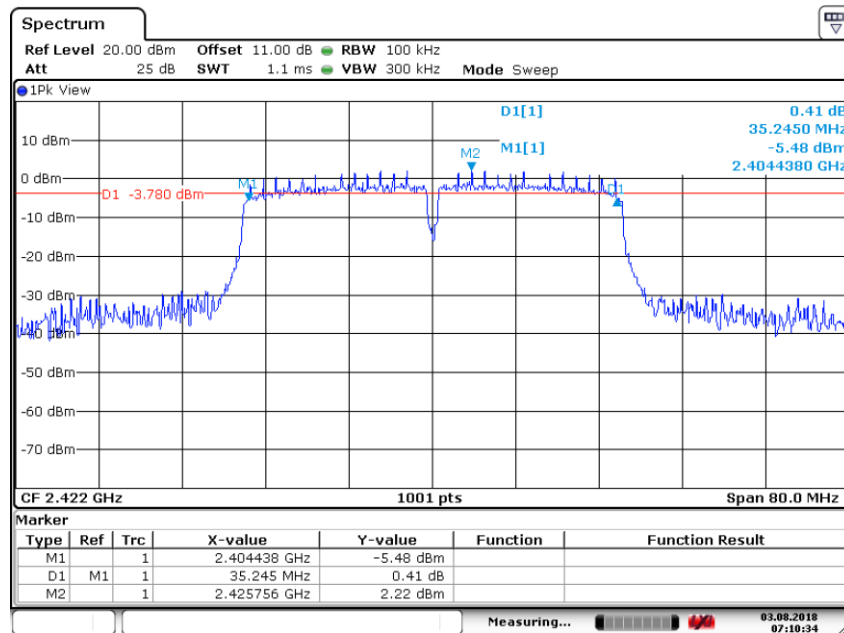
DTS (6dB) Bandwidth
802.11n (HT20)
Channel 11: 2462MHz



Date: 3.AUG.2018 07:07:05

Test Model

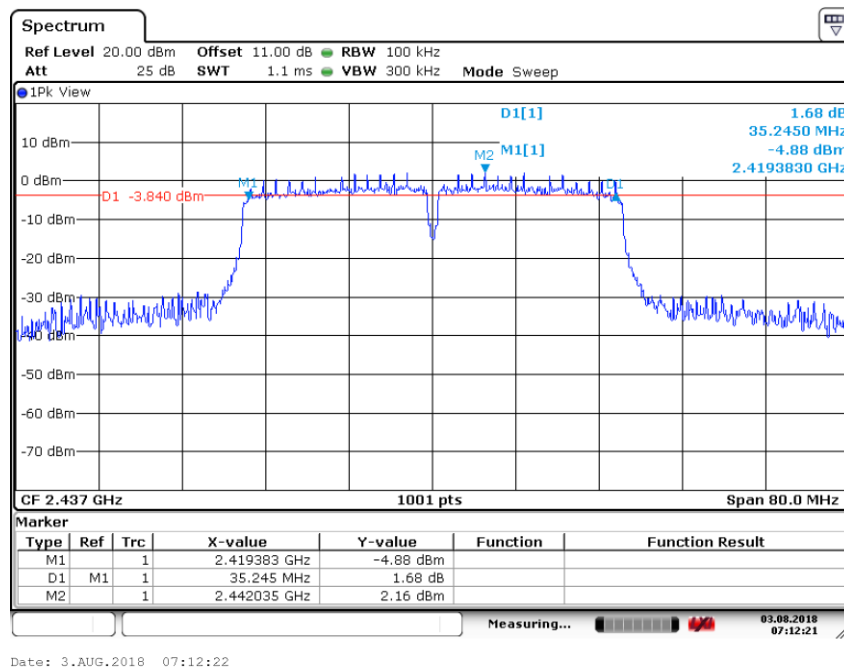
DTS (6dB) Bandwidth
802.11n (HT40)
Channel 3: 2422MHz



Date: 3.AUG.2018 07:10:35

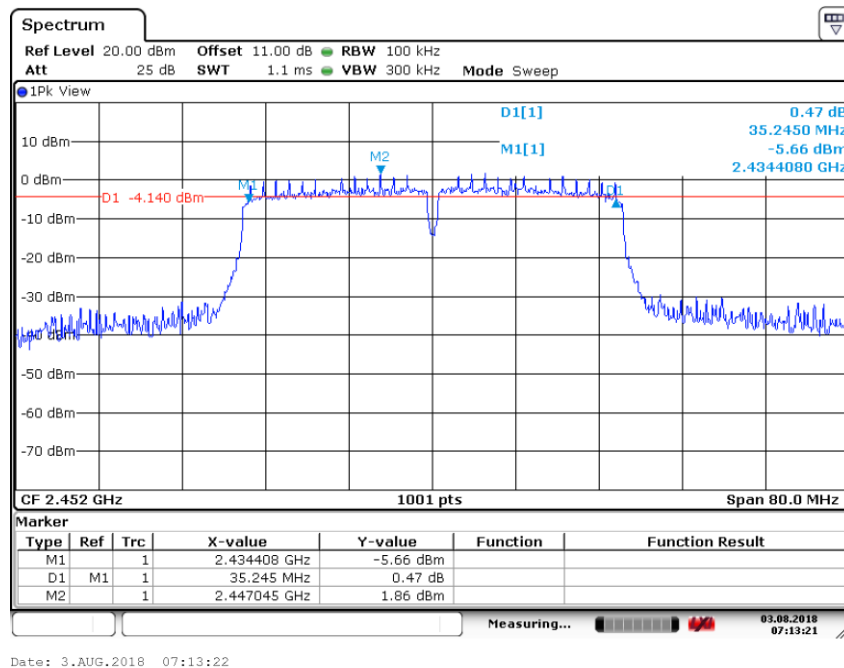
Test Model

DTS (6dB) Bandwidth
802.11n (HT40)
Channel 6: 2437MHz



Test Model

DTS (6dB) Bandwidth
802.11n (HT40)
Channel 9: 2452MHz



8.2 99% OCCUPIED BANDWIDTH

8.2.1 Applicable Standard

According to RSS-Gen Clause 6.7

8.2.2 Conformance Limit

No limit requirement.

8.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup

8.2.4 Test Procedure

The EUT was operating in Bluetooth transmitter mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.

The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum power setting and enable the EUT transmit continuously

Set RBW = 1-5% of 99% occupied bandwidth.

Set the video bandwidth (VBW) $\geq 3 \times \text{RBW}$.

Set Span= approximately 2 to 3 times the 20 dB bandwidth

Set Detector = Peak.

Set Trace mode = max hold.

Set Sweep = auto couple.

The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the markerdelta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

Measure and record the results in the test report.

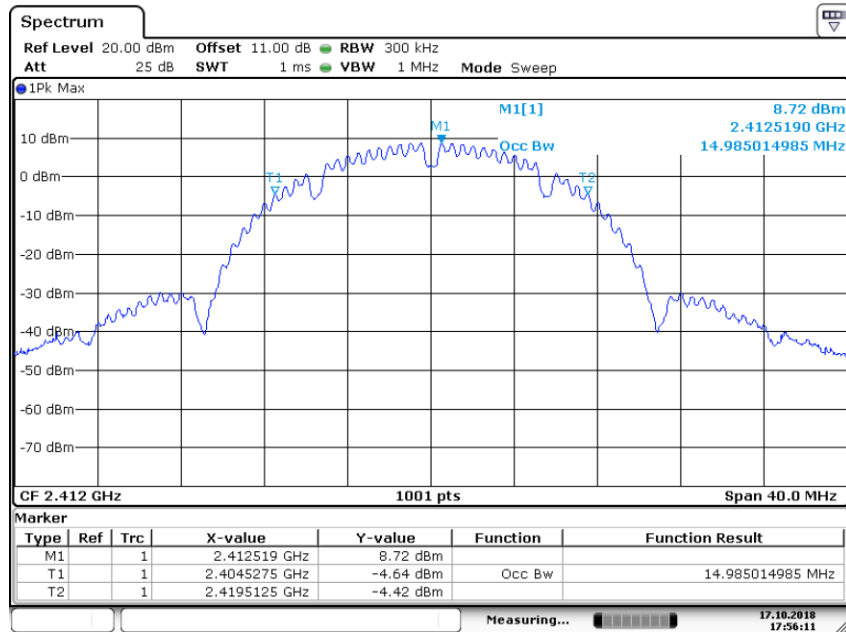
8.2.5 Test Results

Temperature :	28°C	Test Date:	October 17, 2018
Humidity :	65 %	Test By:	King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (MHz)	Verdict
802.11b	1	2412	14.985	PASS
	6	2437	15.025	PASS
	11	2462	15.025	PASS
802.11g	1	2412	16.863	PASS
	6	2437	16.863	PASS
	11	2462	16.903	PASS
802.11n(HT20)	1	2412	17.902	PASS
	6	2437	17.902	PASS
	11	2462	17.902	PASS
802.11n(HT40)	3	2422	36.283	PASS
	6	2437	36.363	PASS
	9	2452	36.444	PASS

Test Model

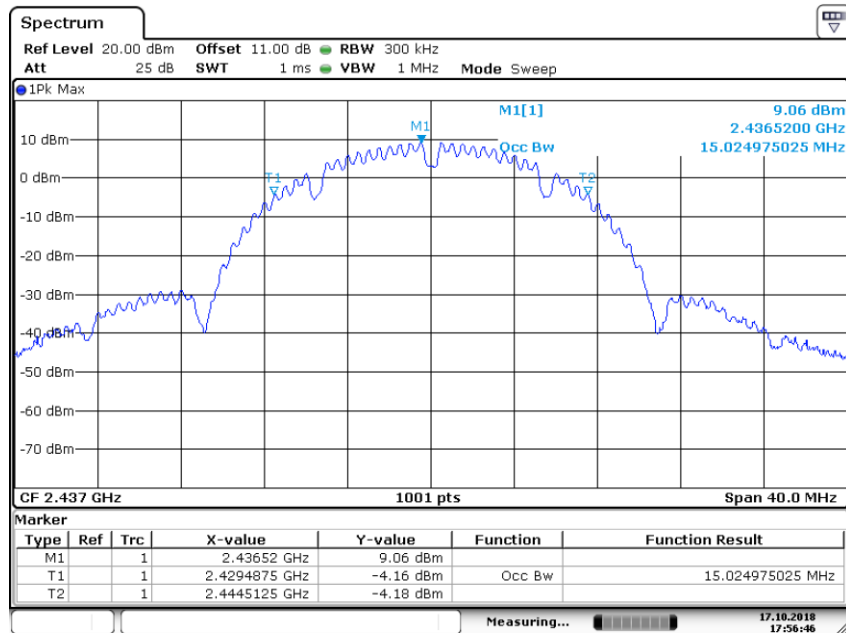
99% Occupied Bandwidth
802.11b
Channel 1: 2412MHz



Date: 17.OCT.2018 17:56:11

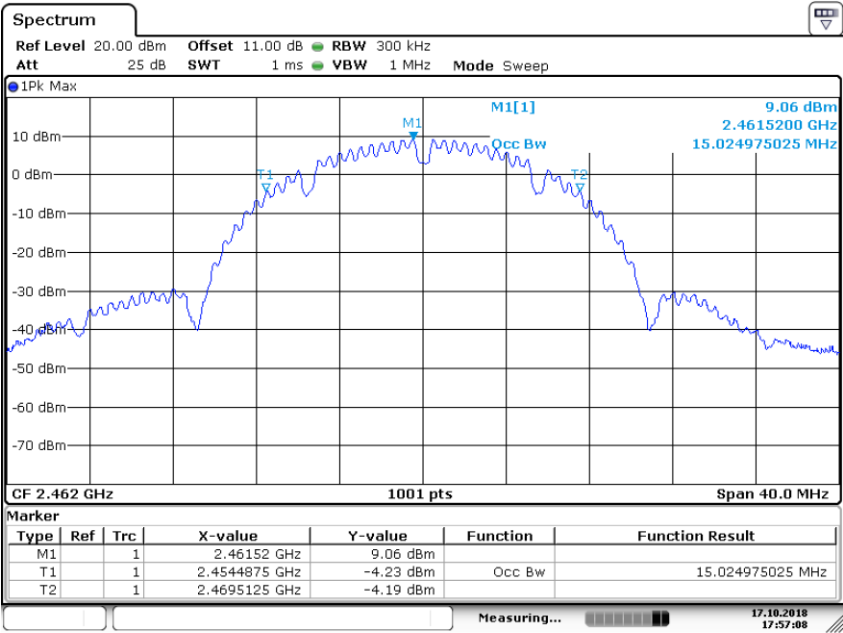
Test Model

99% Occupied Bandwidth
802.11b
Channel 6: 2437MHz



Date: 17.OCT.2018 17:56:45

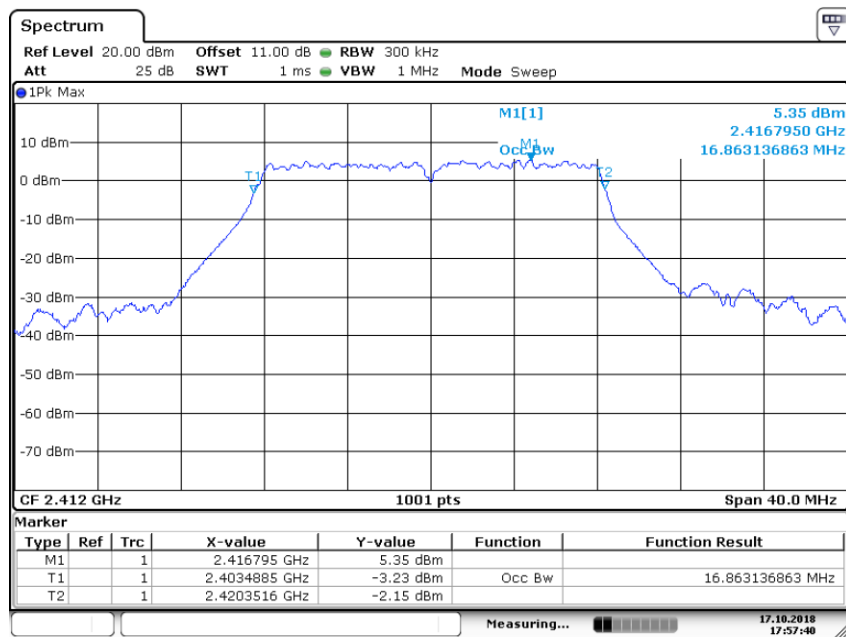
Test Model	99% Occupied Bandwidth 802.11b Channel 11: 2462MHz
------------	--



Date: 17.OCT.2018 17:57:08

Test Model

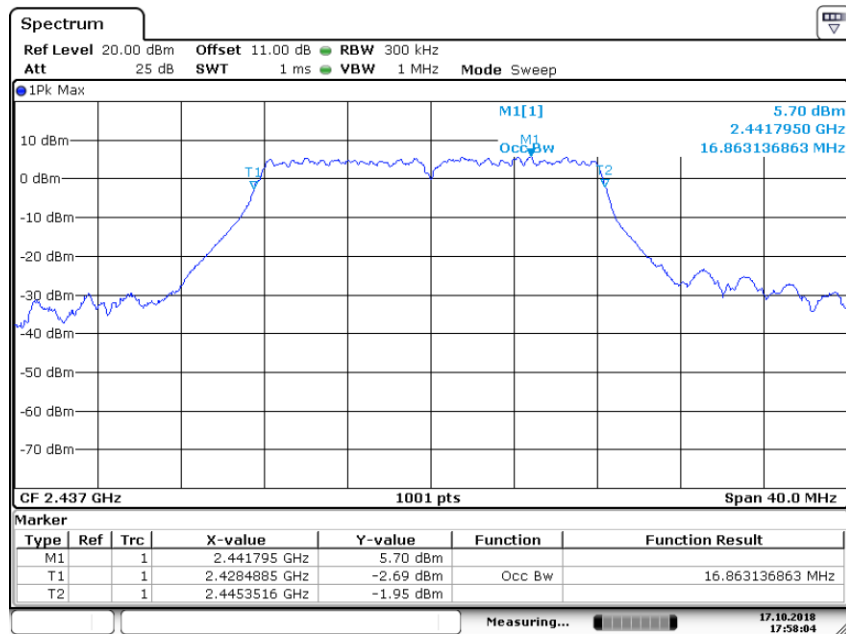
99% Occupied Bandwidth
802.11g
Channel 1: 2412MHz



Date: 17.OCT.2018 17:57:40

Test Model

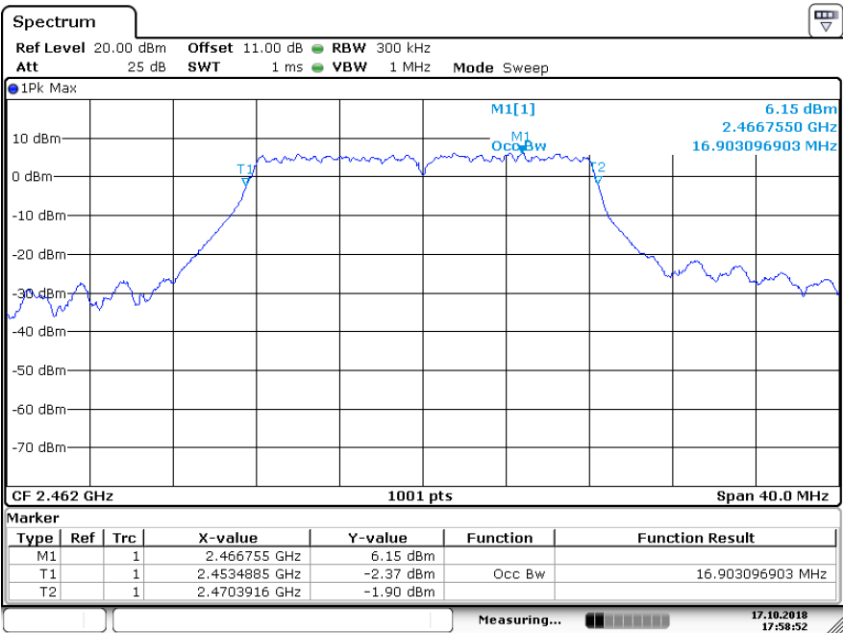
99% Occupied Bandwidth
802.11g
Channel 6: 2437MHz



Date: 17.OCT.2018 17:58:04

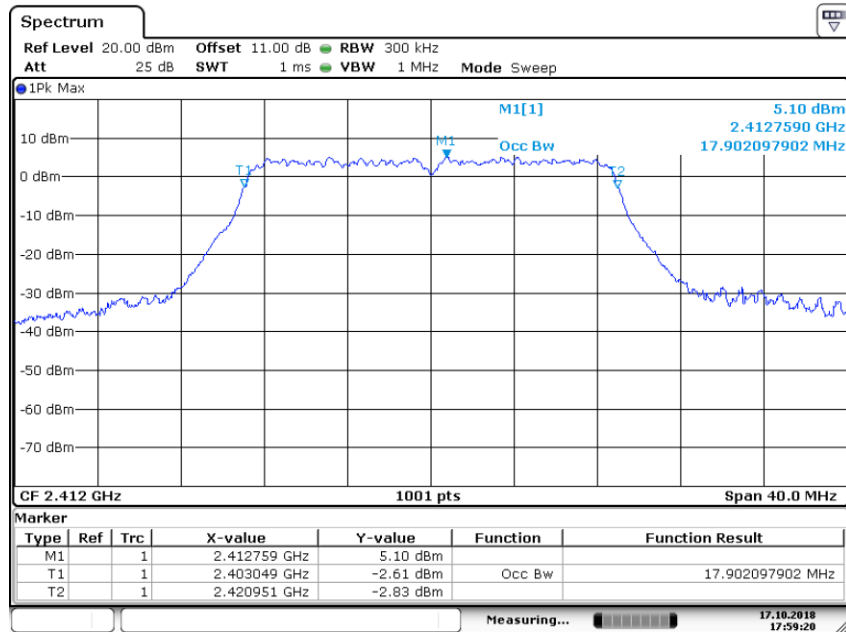
Test Model

99% Occupied Bandwidth
802.11g
Channel 11: 2462MHz



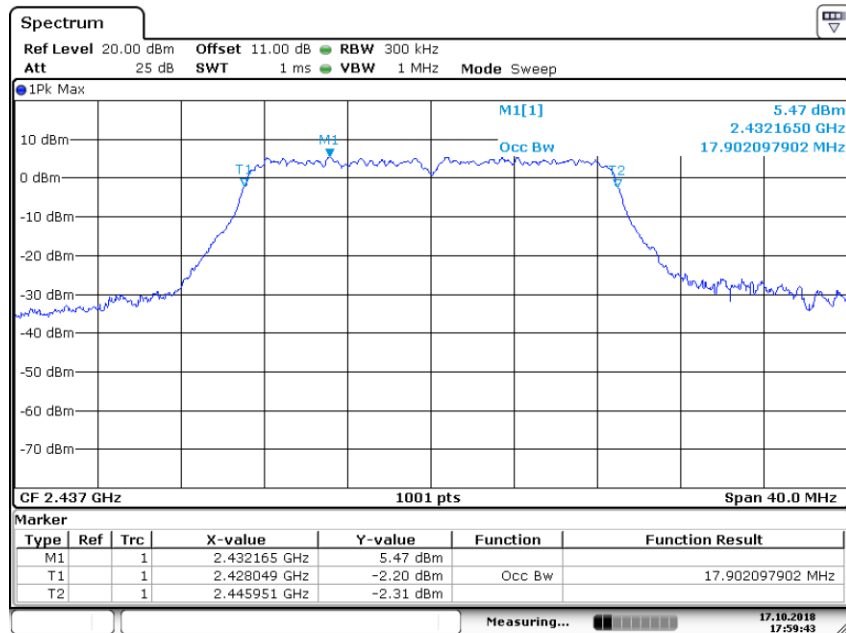
Date: 17.OCT.2018 17:58:52

Test Model 99% Occupied Bandwidth
802.11n (HT20)
Channel 1: 2412MHz



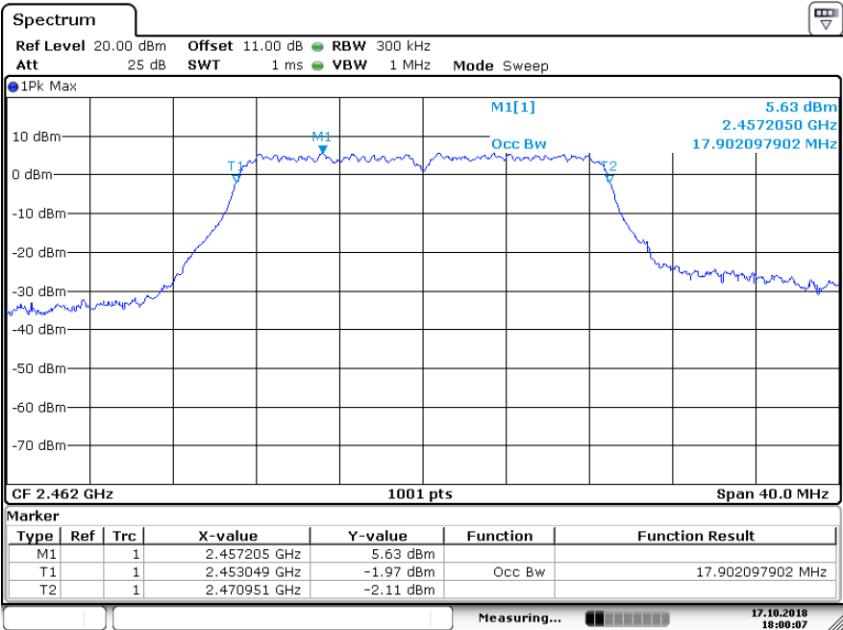
Date: 17.OCT.2018 17:59:20

Test Model 99% Occupied Bandwidth
802.11n (HT20)
Channel 6: 2437MHz



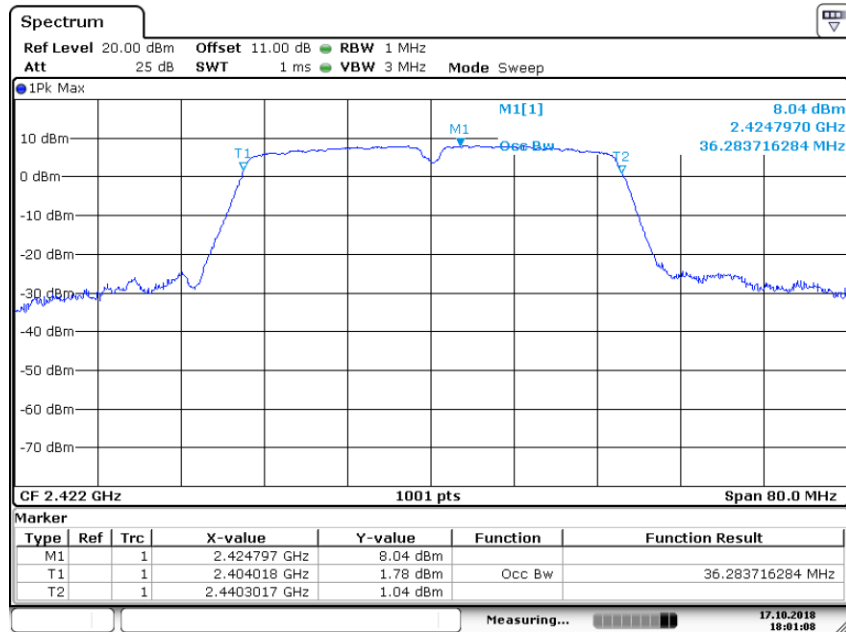
Date: 17.OCT.2018 17:59:43

Test Model 99% Occupied Bandwidth
802.11n (HT20)
Channel 11: 2462MHz



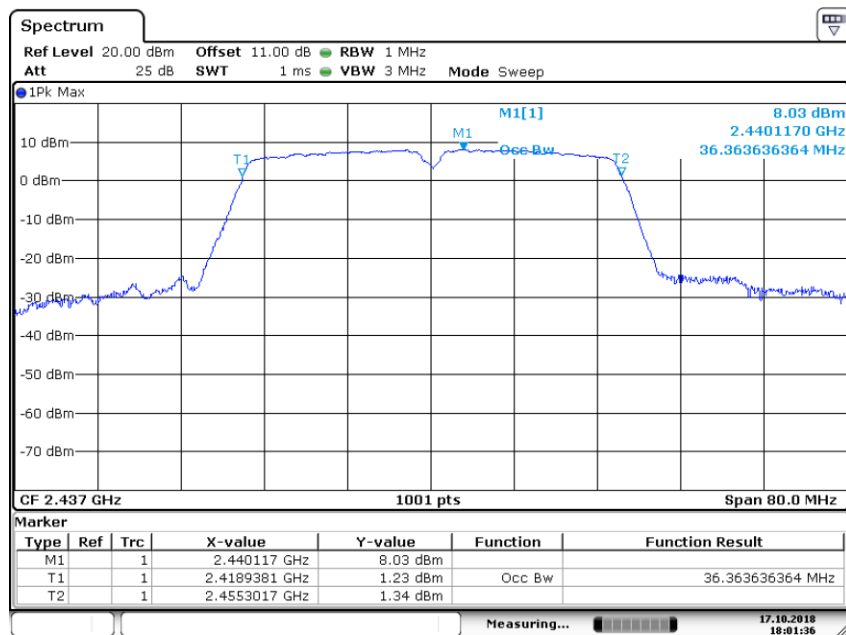
Date: 17.OCT.2018 18:00:07

Test Model 99% Occupied Bandwidth
802.11n (HT40)
Channel 3: 2422MHz



Date: 17.OCT.2018 18:01:08

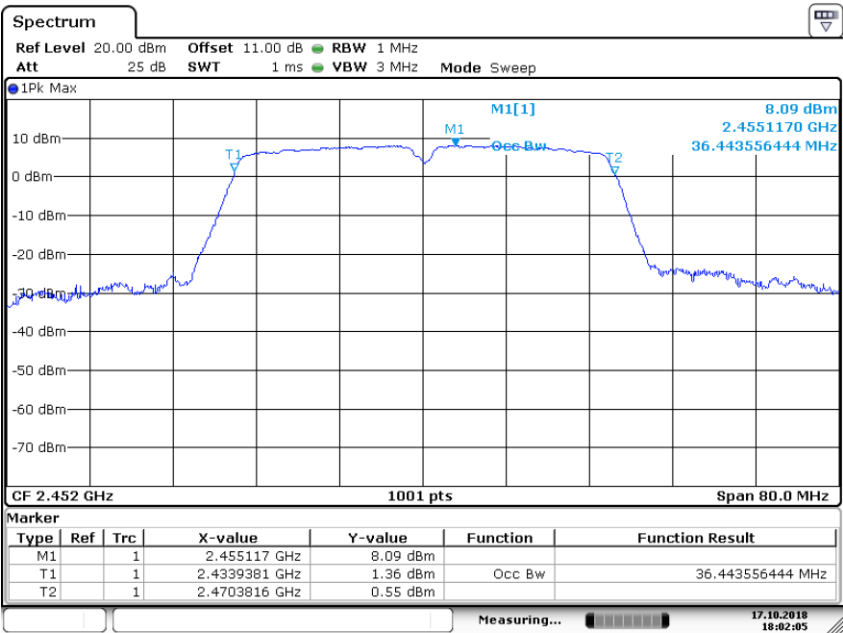
Test Model 99% Occupied Bandwidth
802.11n (HT20)
Channel 6: 2437MHz



Date: 17.OCT.2018 18:01:36

Test Model

99% Occupied Bandwidth
802.11n (HT20)
Channel 9: 2452MHz



Date: 17.OCT.2018 18:02:05

8.3 MAXIMUM PEAK CONDUCTED OUTPUT POWER

8.3.1 Applicable Standard

According to FCC Part 15.247(b)(3) and KDB558074 DTS 01 Meas. Guidance v05

According to RSS-247 Clause 5.4(d)

8.3.2 Conformance Limit

FCC:

The maximum peak conducted output power of the intentional radiator for systems using digital modulation in the 2400 - 2483.5 MHz bands shall not exceed: 1 Watt (30dBm).

IC:

For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W. The e.i.r.p. shall not exceed 4 W.

8.3.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.3.4 Test Procedure

■ According to FCC Part 15.247(b)(3)

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

The RF output of EUT was connected to the power meter by RF cable and attenuator. The path loss was compensated to the results for each measurement.

Set to the maximum output power setting and enable the EUT transmit continuously.

Measure the conducted output power with cable loss and record the results in the test report.

Measure and record the results in the report.

■ According to FCC Part 15.247(b)(4):

Conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Note: If antenna Gain exceeds 6 dBi, then Output power Limit=30-(Gain- 6)

8.3.5 Test Results

Temperature : 26°C Test Date : August 03, 2018
 Humidity : 60 % Test By: King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	EIRP (dBm)	Limit for peak conducted output power (dBm)	Limit for EIRP (dBm)	Verdict
802.11b	1	2412	20.49	20.49	30	36	PASS
	6	2437	21.82	21.82	30	36	PASS
	11	2462	21.70	21.70	30	36	PASS
802.11g	1	2412	22.84	22.84	30	36	PASS
	6	2437	24.22	24.22	30	36	PASS
	11	2462	23.93	23.93	30	36	PASS
802.11n (HT20)	1	2412	22.84	22.84	30	36	PASS
	6	2437	23.99	23.99	30	36	PASS
	11	2462	23.98	23.98	30	36	PASS
802.11n (HT40)	3	2422	23.49	23.49	30	36	PASS
	6	2437	23.26	23.26	30	36	PASS
	9	2452	23.50	23.50	30	36	PASS
Note: The antenna gain is 0dBi							

8.4 MAXIMUM POWER SPECTRAL DENSITY

8.4.1 Applicable Standard

According to FCC Part 15.247(e) and KDB558074 DTS 01 Meas. Guidance v05

According to RSS-247 Clause 5.2(b)

8.4.2 Conformance Limit

The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.4.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.4.4 Test Procedure

This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance

The transmitter output (antenna port) was connected to the spectrum analyzer

Set analyzer center frequency to DTS channel center frequency.

Set the span to 1.5 times the DTS bandwidth.

Set the RBW to: 3 kHz

Set the VBW to:10 kHz.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum amplitude level within the RBW.

Note: If antenna Gain exceeds 6 dBi, then PSD Limit=8-(Gain- 6)

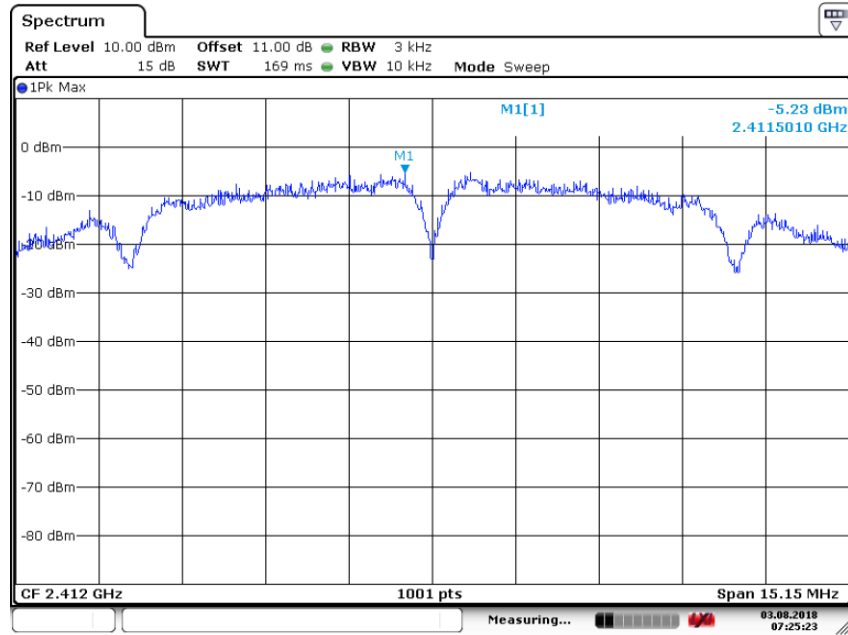
8.4.5 Test Results

Temperature :	26°C	Test Date :	August 03, 2018
Humidity :	60 %	Test By:	King Kong

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
802.11b	1	2412	-5.23	8	PASS
	6	2437	-3.78	8	PASS
	11	2462	-4.85	8	PASS
802.11g	1	2412	-10.30	8	PASS
	6	2437	-9.21	8	PASS
	11	2462	-9.60	8	PASS
802.11n (HT20)	1	2412	-10.02	8	PASS
	6	2437	-9.93	8	PASS
	11	2462	-9.56	8	PASS
802.11n (HT40)	3	2422	-13.38	8	PASS
	6	2437	-13.10	8	PASS
	9	2452	-14.37	8	PASS

Test Model

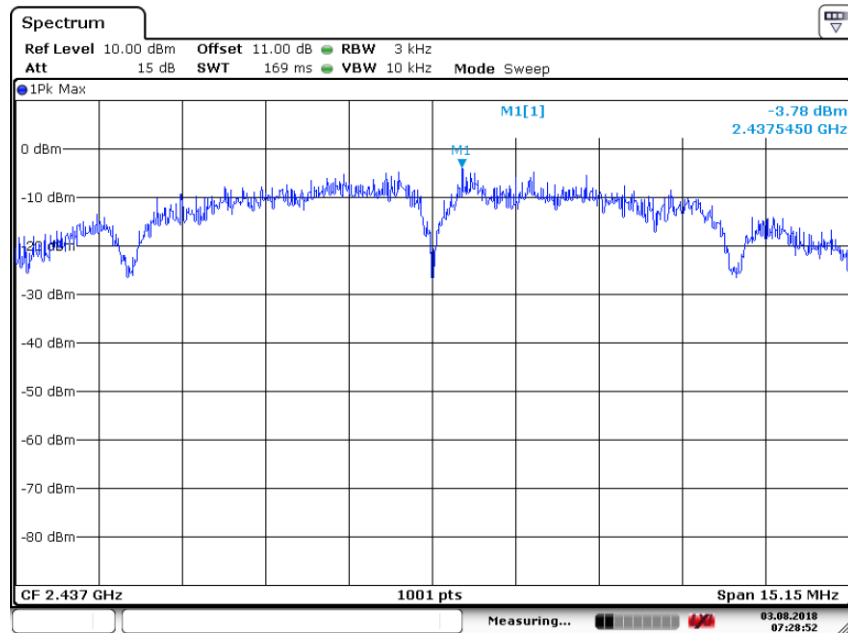
Power Spectral Density
802.11b
Channel 1: 2412MHz



Date: 3.AUG.2018 07:25:24

Test Model

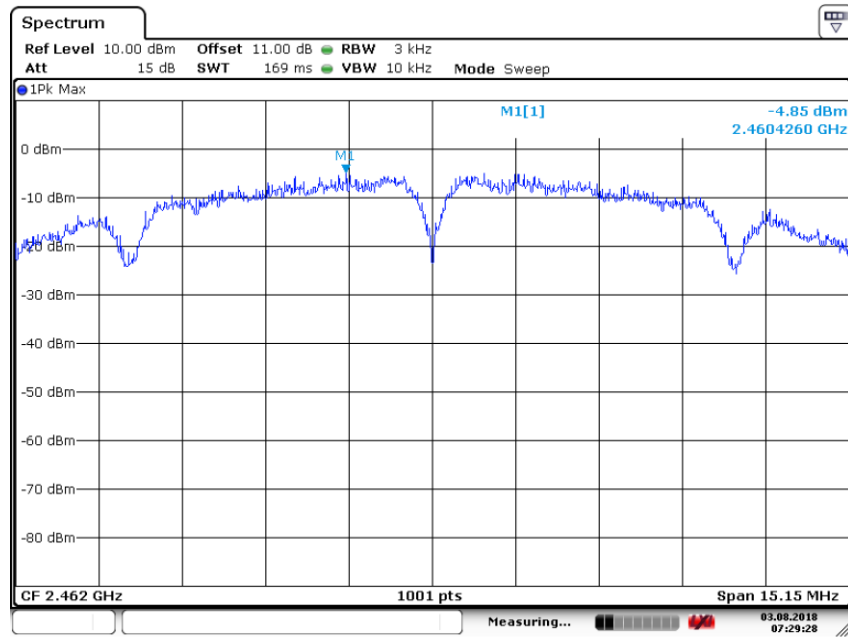
Power Spectral Density
802.11b
Channel 6: 2437MHz



Date: 3.AUG.2018 07:28:53

Test Model

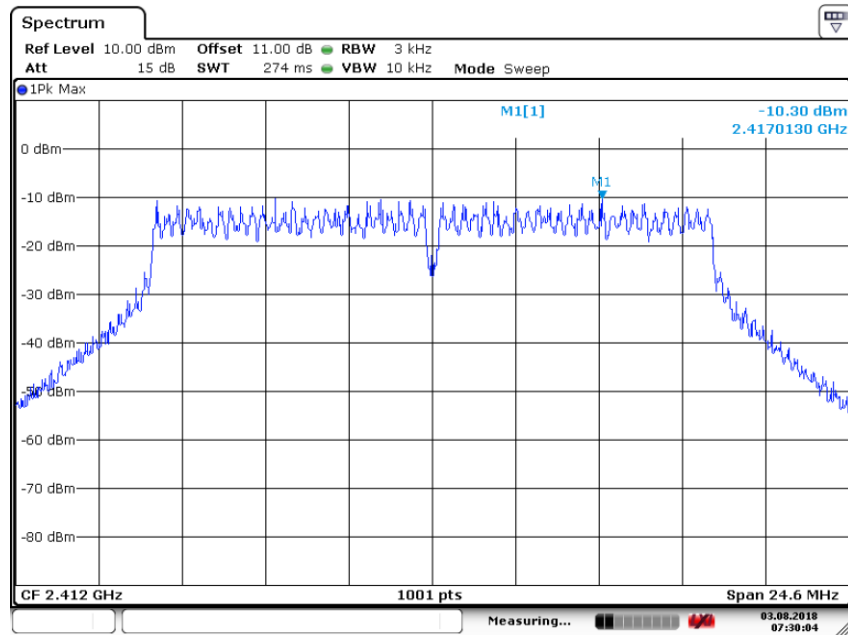
Power Spectral Density
802.11b
Channel 11: 2462MHz



Date: 3.AUG.2018 07:29:29

Test Model

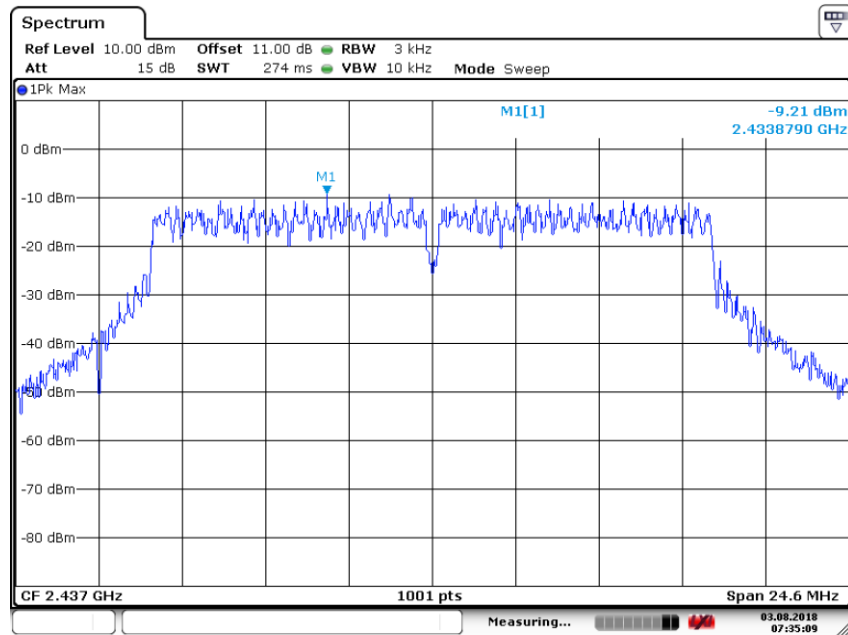
Power Spectral Density
802.11g
Channel 1: 2412MHz



Date: 3.AUG.2018 07:30:05

Test Model

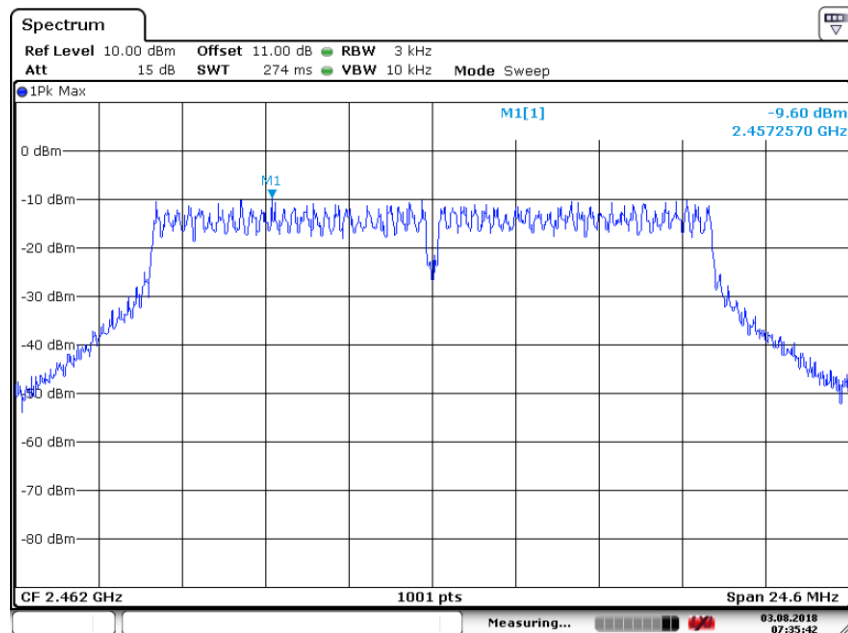
Power Spectral Density
802.11g
Channel 6: 2437MHz



Date: 3.AUG.2018 07:35:09

Test Model

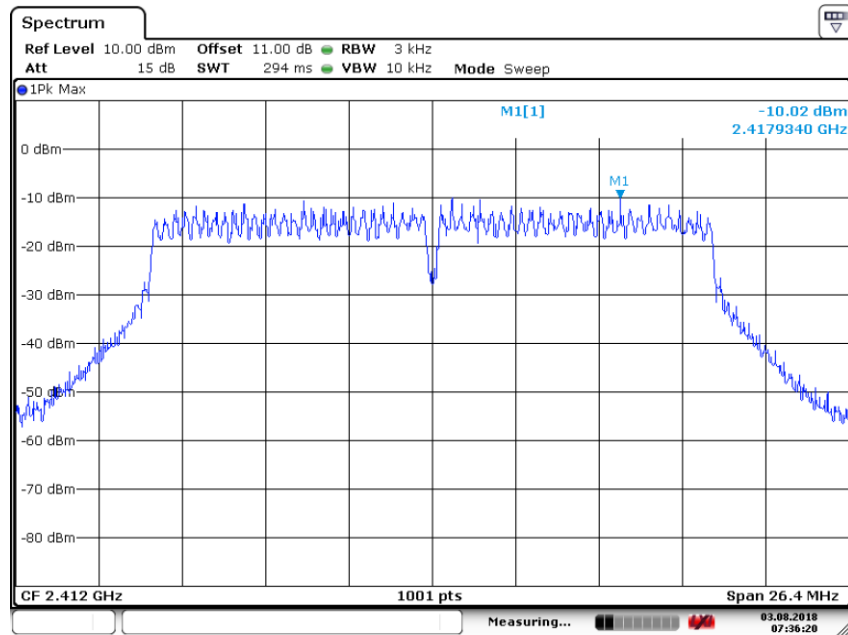
Power Spectral Density
802.11g
Channel 11: 2462MHz



Date: 3.AUG.2018 07:35:43

Test Model

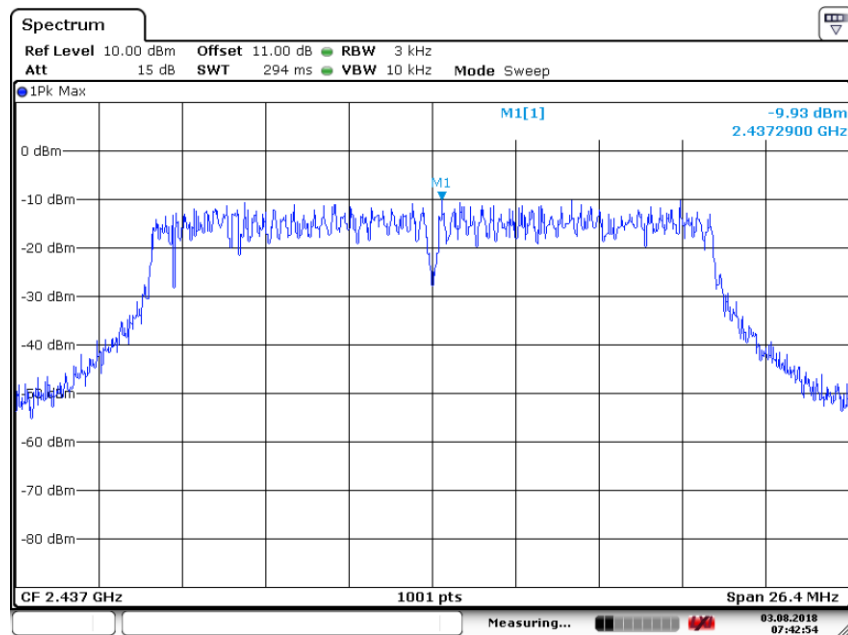
Power Spectral Density
802.11n (HT20)
Channel 1: 2412MHz



Date: 3.AUG.2018 07:36:21

Test Model

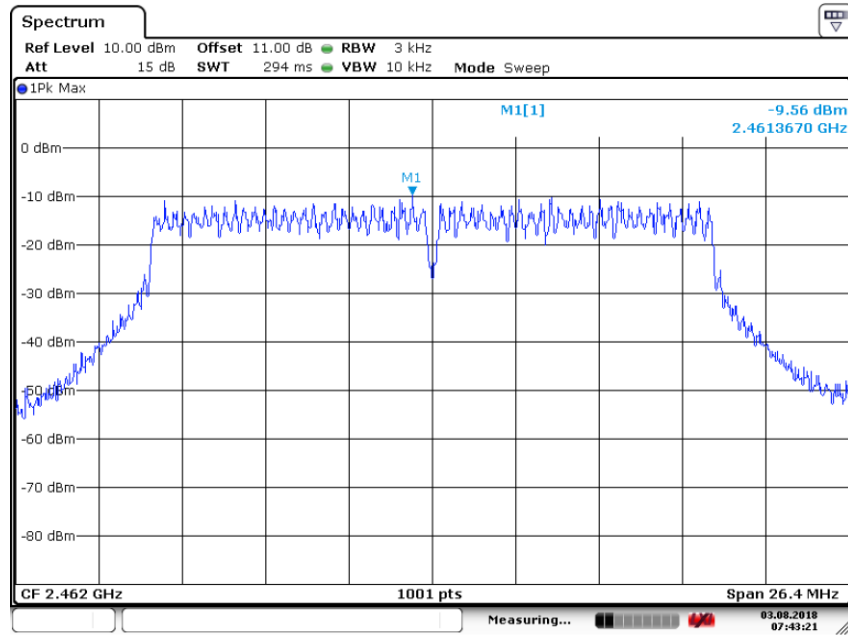
Power Spectral Density
802.11n (HT20)
Channel 6: 2437MHz



Date: 3.AUG.2018 07:42:55

Test Model

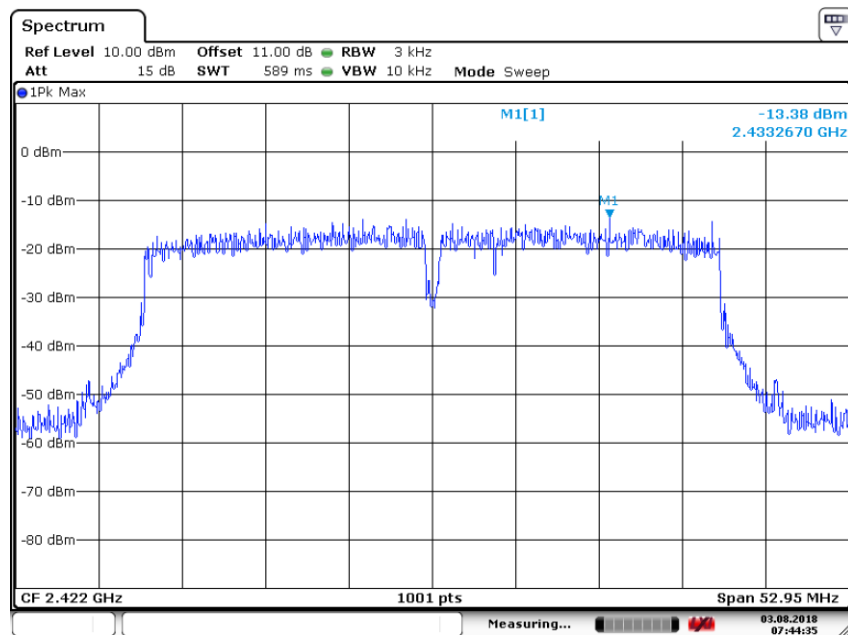
Power Spectral Density
802.11n (HT20)
Channel 11: 2462MHz



Date: 3.AUG.2018 07:43:22

Test Model

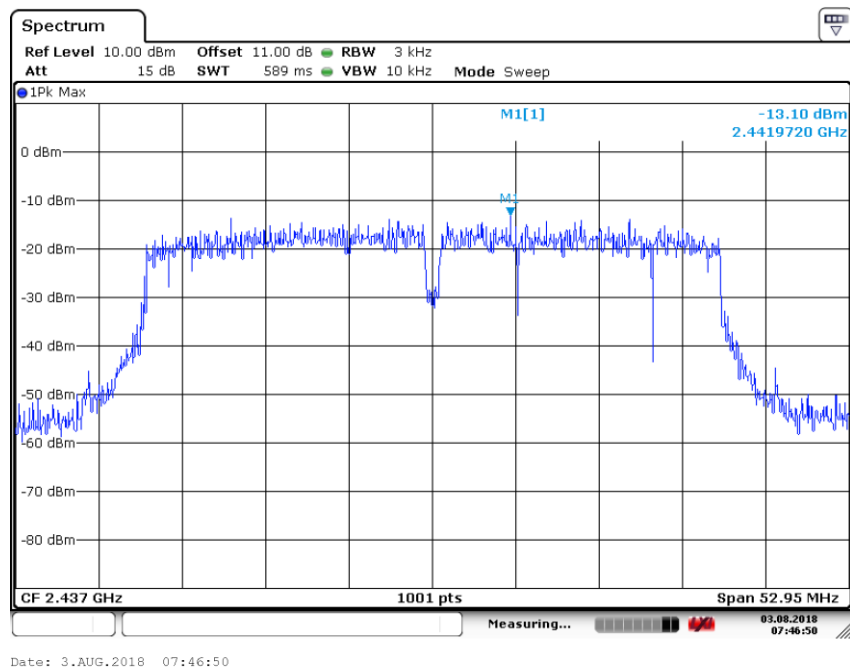
Power Spectral Density
802.11n (HT40)
Channel 3: 2422MHz



Date: 3.AUG.2018 07:44:36

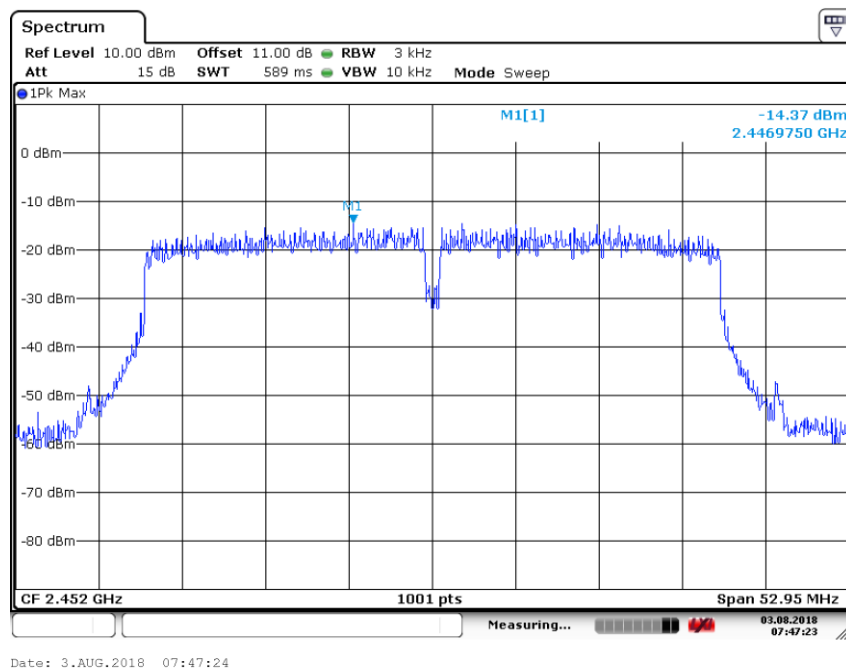
Test Model

Power Spectral Density
802.11n (HT40)
Channel 6: 2437MHz



Test Model

Power Spectral Density
802.11n (HT40)
Channel 9: 2452MHz



8.5 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

8.5.1 Applicable Standard

According to FCC Part 15.247(d) and KDB558074 DTS 01 Meas. Guidance v05
According to RSS- Gen Clause 6.13 and RSS-247 Clause 5.5

8.5.2 Conformance Limit

According to FCC Part 15.247(d):

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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

8.5.3 Test Configuration

Test according to clause 7.1 radio frequency test setup 1

8.5.4 Test Procedure

The transmitter output (antenna port) was connected to the spectrum analyzer

■ Reference level measurement

Establish a reference level by using the following procedure:

Set instrument center frequency to DTS channel center frequency.

Set the span to ≥ 1.5 times the DTS bandwidth.

Set the RBW = 100 kHz.

Set the VBW $\geq 3 \times$ RBW.

Set Detector = peak.

Set Sweep time = auto couple.

Set Trace mode = max hold.

Allow trace to fully stabilize.

Use the peak marker function to determine the maximum PSD level.

Note that the channel found to contain the maximum PSD level can be used to establish the reference level.

■ Emission level measurement

Set the center frequency and span to encompass frequency range to be measured.

Set the RBW = 100 kHz.

Set the VBW = 300 kHz.

Set Detector = peak

Sweep time = auto couple.

Trace mode = max hold.

Allow trace to fully stabilize.

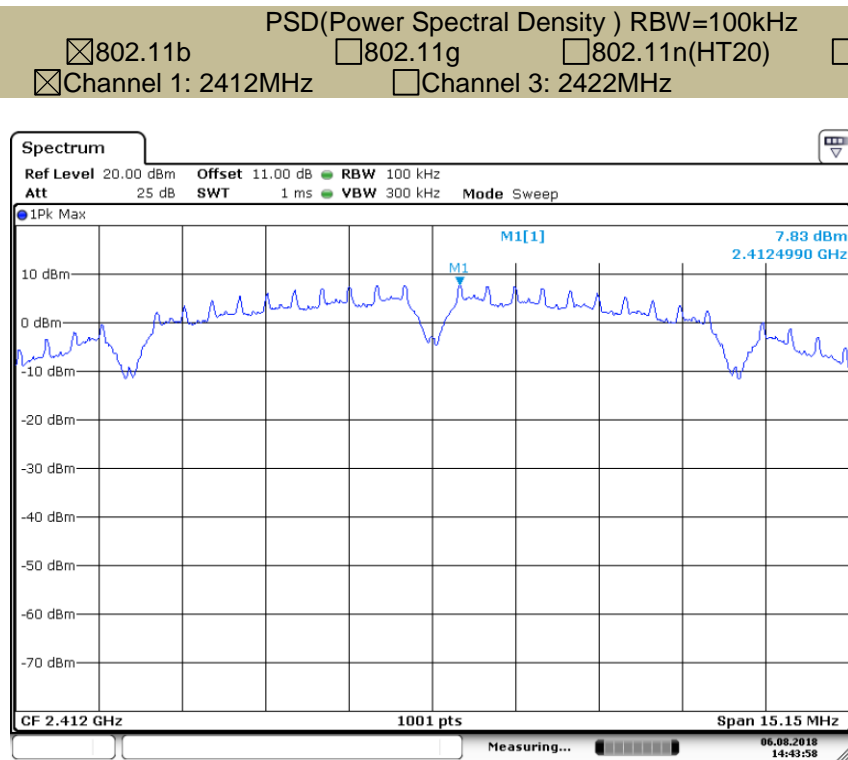
Use the peak marker function to determine the maximum amplitude level.

Ensure that the amplitude of all unwanted emissions outside of the authorized frequency band (excluding restricted frequency bands) are attenuated by at least the minimum requirements. Report the three highest emissions relative to the limit.

8.5.5 Test Results

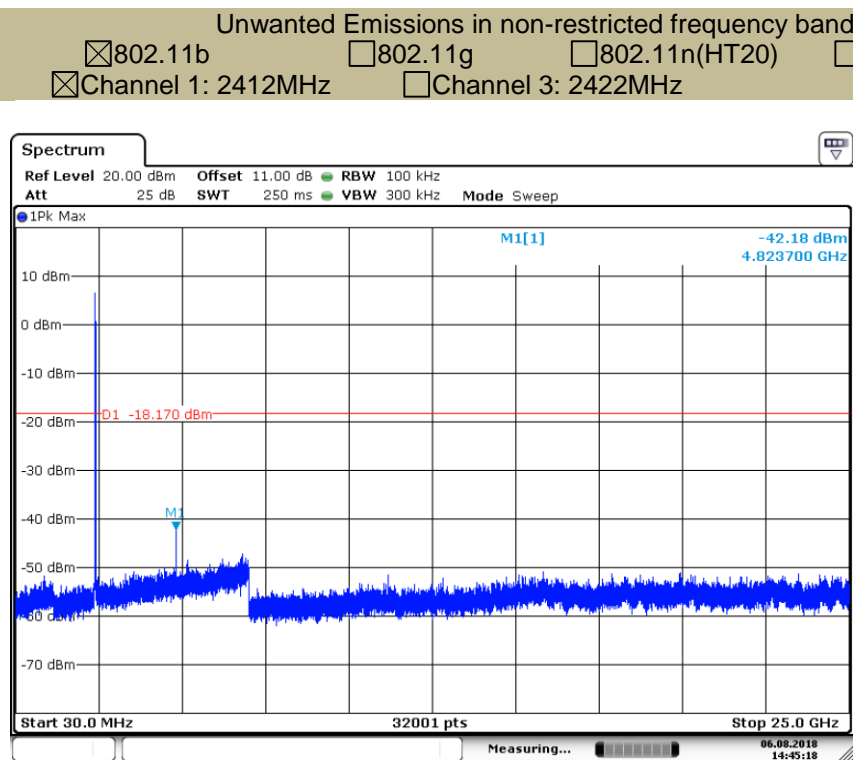
All modes 2.4G 802.11b/g/n(HT20)/n(HT40) have been tested, and the worst result recorded was report as below:

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 1: 2412MHz ☐ Channel 3: 2422MHz



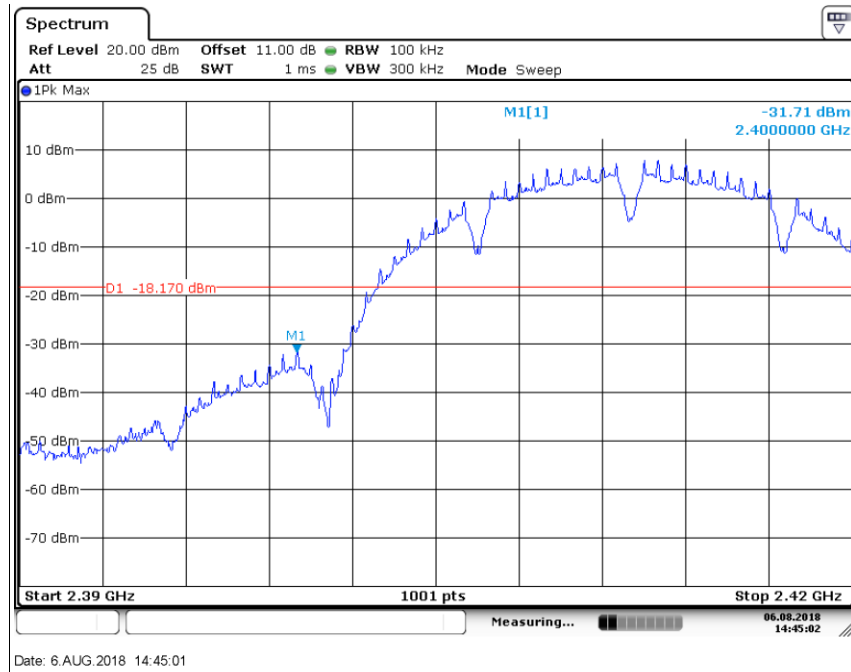
Date: 6.AUG.2018 14:43:57

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 1: 2412MHz ☐ Channel 3: 2422MHz

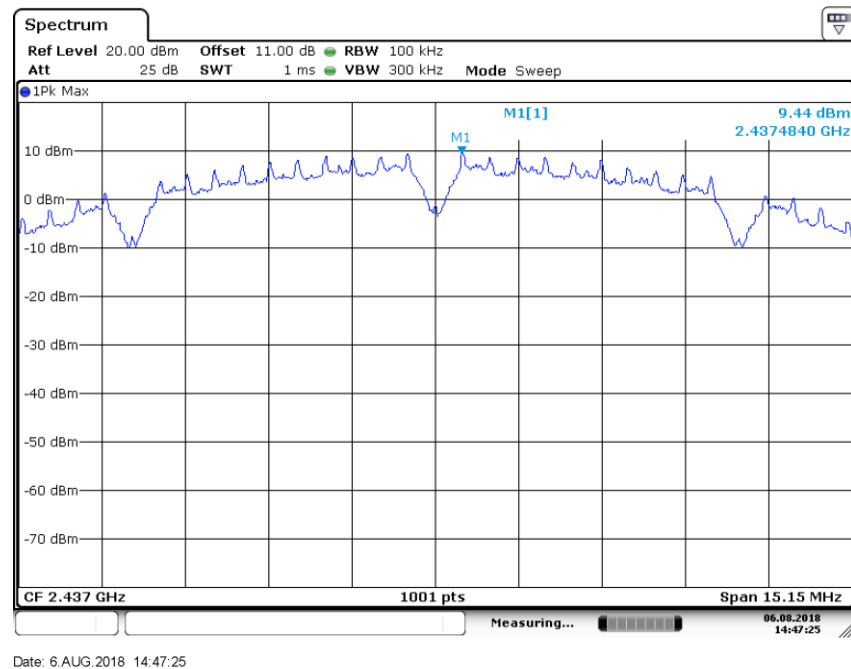


Date: 6.AUG.2018 14:45:18

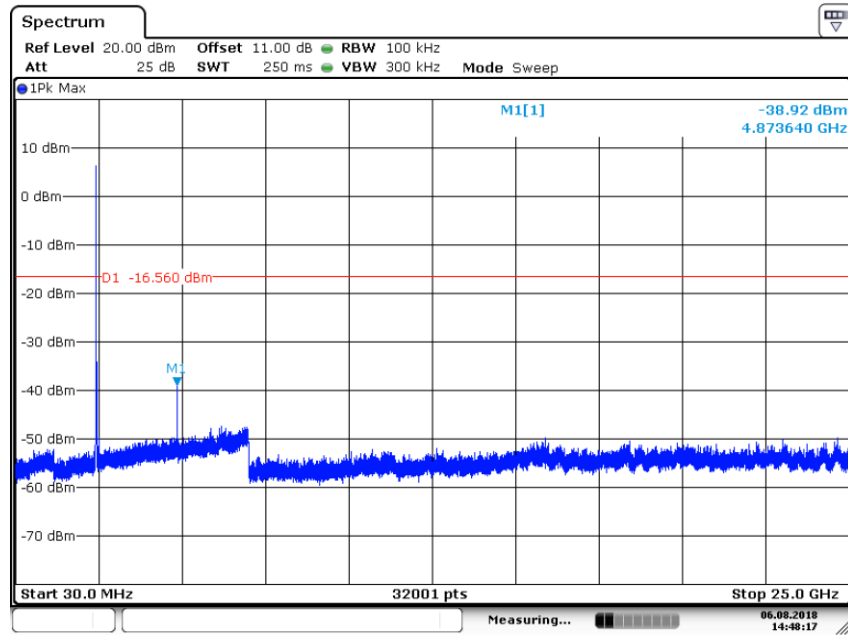
Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 1: 2412MHz ☐ Channel 3: 2422MHz



Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
Channel 6: 2437MHz

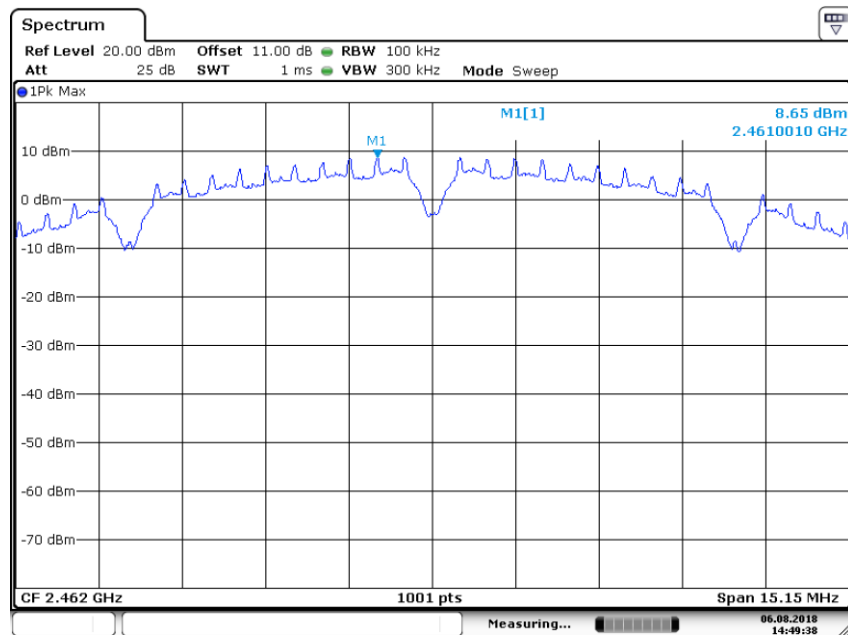


Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
Channel 6: 2437MHz



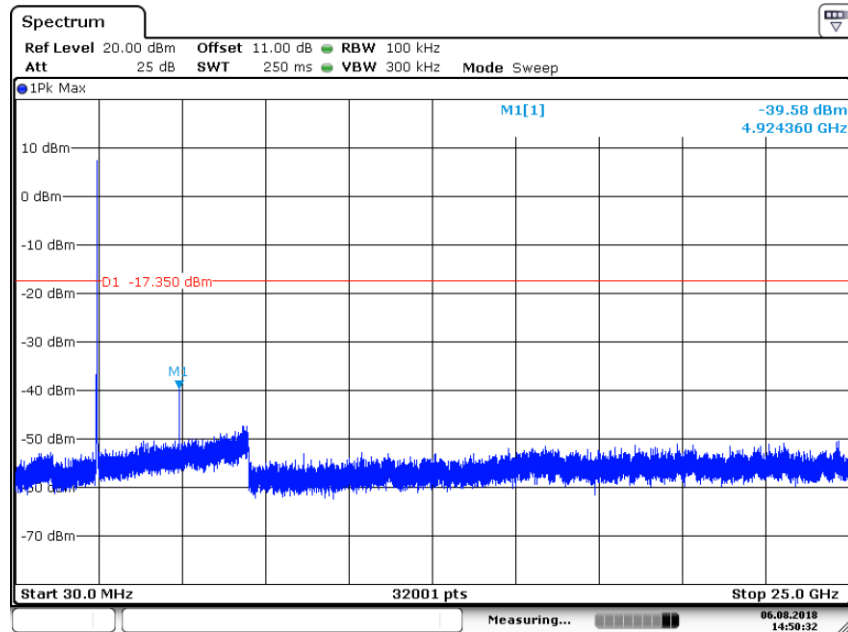
Date: 6.AUG.2018 14:48:17

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 11: 2462MHz ☐ Channel 9: 2452MHz



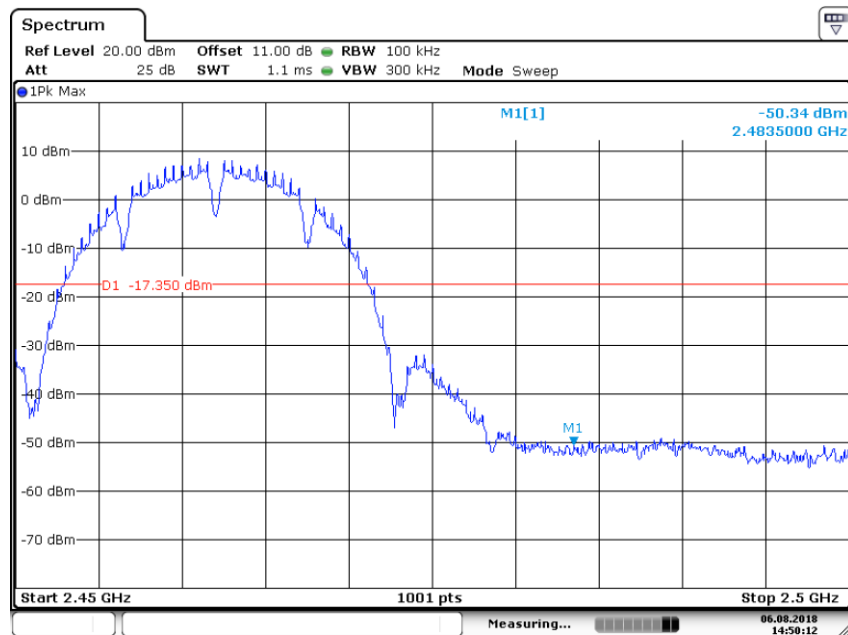
Date: 6.AUG.2018 14:49:39

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 11: 2462MHz ☐ Channel 9: 2452MHz



Date: 6.AUG.2018 14:50:32

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 11: 2462MHz ☐ Channel 9: 2452MHz



Date: 6.AUG.2018 14:50:12

8.6 RADIATED SPURIOUS EMISSION

8.6.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB558074 DTS 01 Meas. Guidance v05
According to RSS-247 Clause 3.3

8.6.2 Conformance Limit

According to FCC Part 15.247(d): radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
According to FCC Part 15.205, Restricted bands

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
10.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	(2)
13.36-13.41			

According to FCC Part 15.205, the level of any transmitter spurious emission in Restricted bands shall not exceed the level of the emission specified in the following table

Restricted Frequency(MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength ($\text{dB}\mu\text{V/m}$)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log ($\mu\text{V/m}$)	300
0.490-1.705	2400/F(KHz)	20 log ($\mu\text{V/m}$)	30
1.705-30	30	29.5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

8.6.3 Test Configuration

Test according to clause 7.2 radio frequency test setup 2

8.6.4 Test Procedure

This test is required for any spurious emission that falls in a Restricted Band, as defined in Section 15.205. It must be performed with the highest gain of each type of antenna proposed for use with the EUT. Use the following spectrum analyzer settings:

The EUT was placed on a turn table which is 0.8m above ground plane.

Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Span = wide enough to fully capture the emission being measured

RBW = 1 MHz for $f \geq 1$ GHz (1GHz to 25GHz), 100 kHz for $f < 1$ GHz (30MHz to 1GHz), 200Hz for $f < 150$ KHz (9KHz to 150KHz), 9KHz for $f < 30$ MHz (150KHz to 30KHz)

VBW \geq RBW

Sweep = auto

Detector function = peak

Trace = max hold

Follow the guidelines in ANSI C63.10-2013 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization, etc. A pre-amp and a high pass filter are required for this test, in order to provide the measuring system with sufficient sensitivity. Allow the trace to stabilize. The peak reading of the emission, after being corrected by the antenna factor, cable loss, pre-amp gain, etc., is the peak field strength, which must comply with the limit specified in Section 15.35(b). Submit this data. Now set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from $20\log(\text{dwell time}/100 \text{ ms})$, in an effort to demonstrate compliance with the 15.209 limit. Submit this data. Repeat above procedures until all frequency measured was complete.

8.6.5 Test Results

■ Spurious Emission below 30MHz(9KHz to 30MHz)

Temperature:	24°C	Test Date:	August 03, 2018
Humidity:	53 %	Test By:	King Kong
Test mode:	TX Mode		

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
--	--	--	--	--	--	--	--

Note: the amplitude of spurious emission that is attenuated by more than 20dB below the permissible limit has no need to be reported.

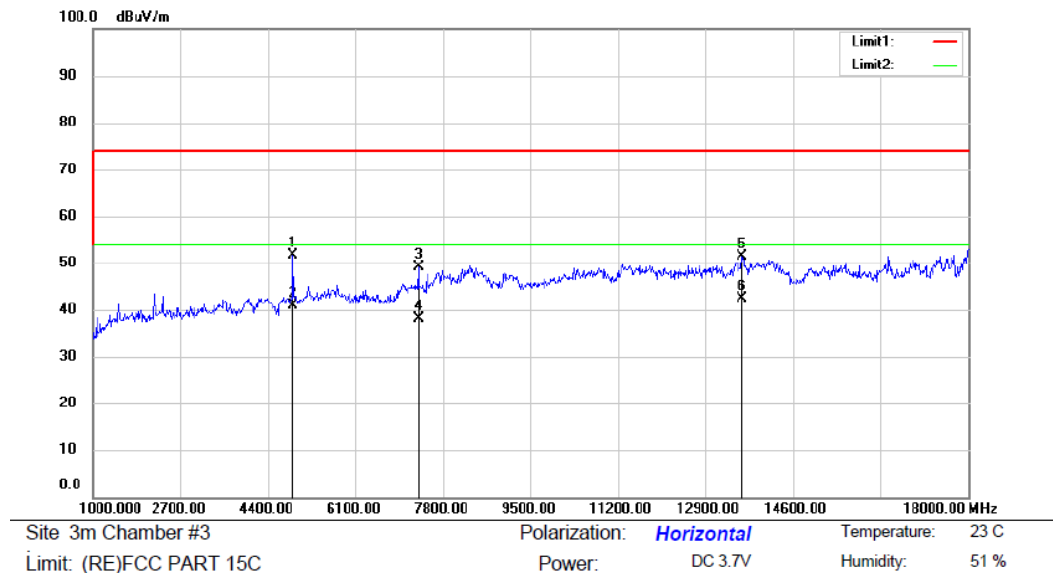
Distance extrapolation factor = $40\log(\text{Specific distance}/ \text{test distance})$ (dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor

■ Spurious Emission Above 1GHz(1GHz to 25GHz)

This testing was carried out on all operation modes, but only the worst case (802.11b) was presented in this report.

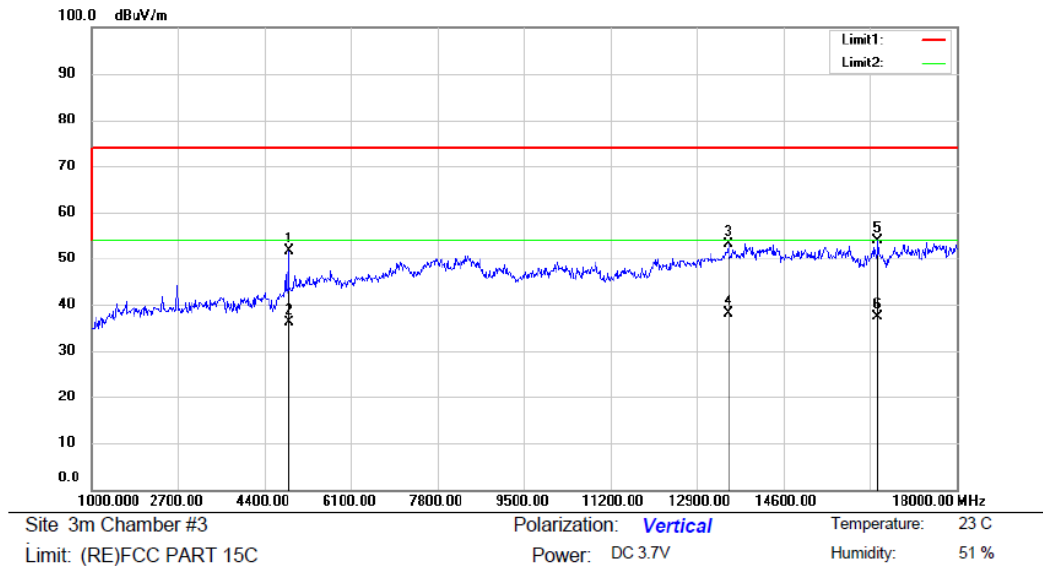
Temperature : 26°C
Humidity : 60 %
Test mode: 802.11b

Test Date : August 03, 2018
Test By: King Kong
Frequency: Channel 1: 2412MHz



Mode:WIFI 802.11b 2412
Note:

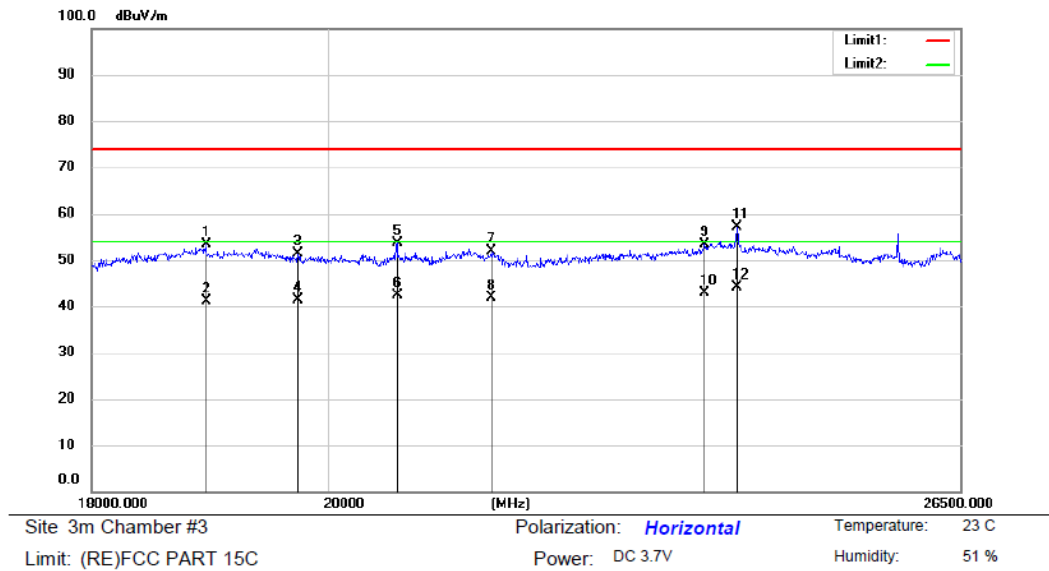
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		4893.850	55.67	-4.13	51.54	74.00	-22.46	peak		
2		4893.850	44.93	-4.13	40.80	54.00	-13.20	AVG		
3		7338.450	47.54	1.71	49.25	74.00	-24.75	peak		
4		7338.450	36.39	1.71	38.10	54.00	-15.90	AVG		
5		13622.50	40.12	11.35	51.47	74.00	-22.53	peak		
6	*	13622.50	30.95	11.35	42.30	54.00	-11.70	AVG		



Mode:WIFI 802.11b 2412

Note:

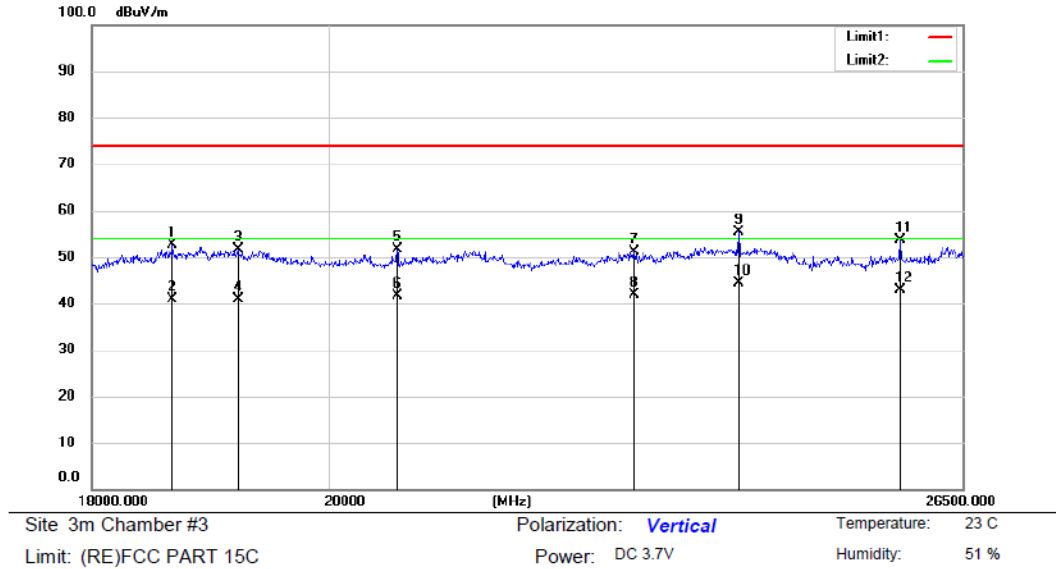
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		4892.150	55.83	-4.14	51.69	74.00	-22.31	peak		
2		4892.150	40.24	-4.14	36.10	54.00	-17.90	AVG		
3		13512.85	42.15	11.03	53.18	74.00	-20.82	peak		
4	*	13512.85	27.17	11.03	38.20	54.00	-15.80	AVG		
5		16462.35	44.46	9.31	53.77	74.00	-20.23	peak		
6		16462.35	28.09	9.31	37.40	54.00	-16.60	AVG		



Mode:WIFI 802.11b 2412

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		18942.83	52.27	1.16	53.43	74.00	-20.57	peak			
2		18942.83	40.04	1.16	41.20	54.00	-12.80	AVG			
3		19735.59	51.32	0.02	51.34	74.00	-22.66	peak			
4		19735.59	41.48	0.02	41.50	54.00	-12.50	AVG			
5		20625.24	52.83	0.86	53.69	74.00	-20.31	peak			
6		20625.24	41.44	0.86	42.30	54.00	-11.70	AVG			
7		21505.04	51.05	0.83	51.88	74.00	-22.12	peak			
8		21505.04	40.97	0.83	41.80	54.00	-12.20	AVG			
9		23651.66	49.27	4.20	53.47	74.00	-20.53	peak			
10		23651.66	38.70	4.20	42.90	54.00	-11.10	AVG			
11		23992.56	51.92	5.24	57.16	74.00	-16.84	peak			
12	*	23992.56	38.96	5.24	44.20	54.00	-9.80	AVG			



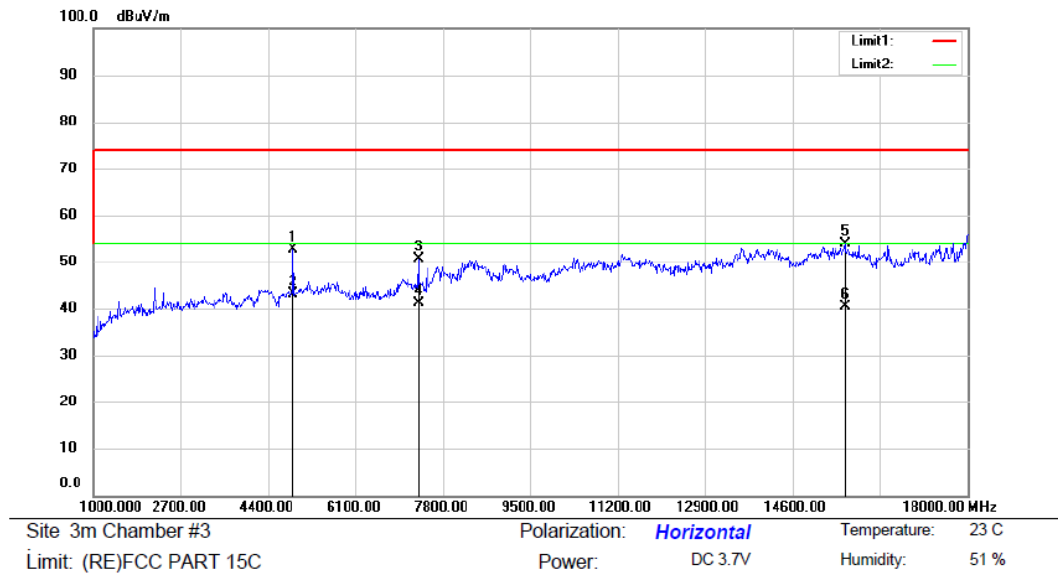
Mode: WIFI 802.11b 2412

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		18659.24	52.13	0.47	52.60	74.00	-21.40	peak		
2		18659.24	40.33	0.47	40.80	54.00	-13.20	AVG		
3		19208.43	50.72	0.94	51.66	74.00	-22.34	peak		
4		19208.43	40.06	0.94	41.00	54.00	-13.00	AVG		
5		20617.27	50.69	0.83	51.52	74.00	-22.48	peak		
6		20617.27	40.77	0.83	41.60	54.00	-12.40	AVG		
7		22904.45	49.13	2.00	51.13	74.00	-22.87	peak		
8		22904.45	39.80	2.00	41.80	54.00	-12.20	AVG		
9		23992.56	50.22	5.24	55.46	74.00	-18.54	peak		
10	*	23992.56	39.16	5.24	44.40	54.00	-9.60	AVG		
11		25782.18	50.90	2.82	53.72	74.00	-20.28	peak		
12		25782.18	40.08	2.82	42.90	54.00	-11.10	AVG		

Temperature : 26°C
Humidity : 60 %
Test mode: 802.11b

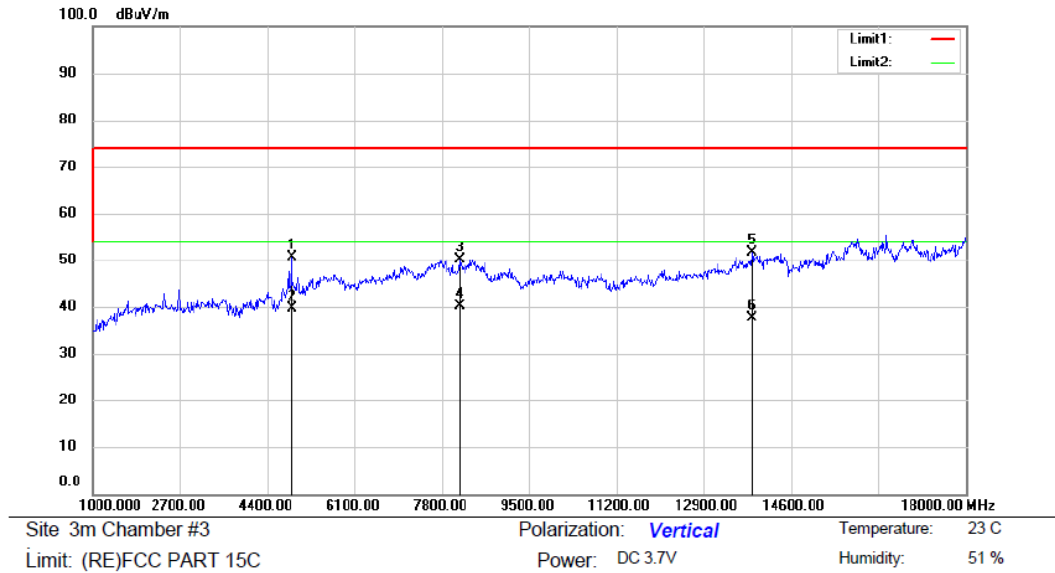
Test Date : August 03, 2018
Test By: King Kong
Frequency: Channel 6: 2437MHz



Mode:WIFI 802.11g 2437

Note:

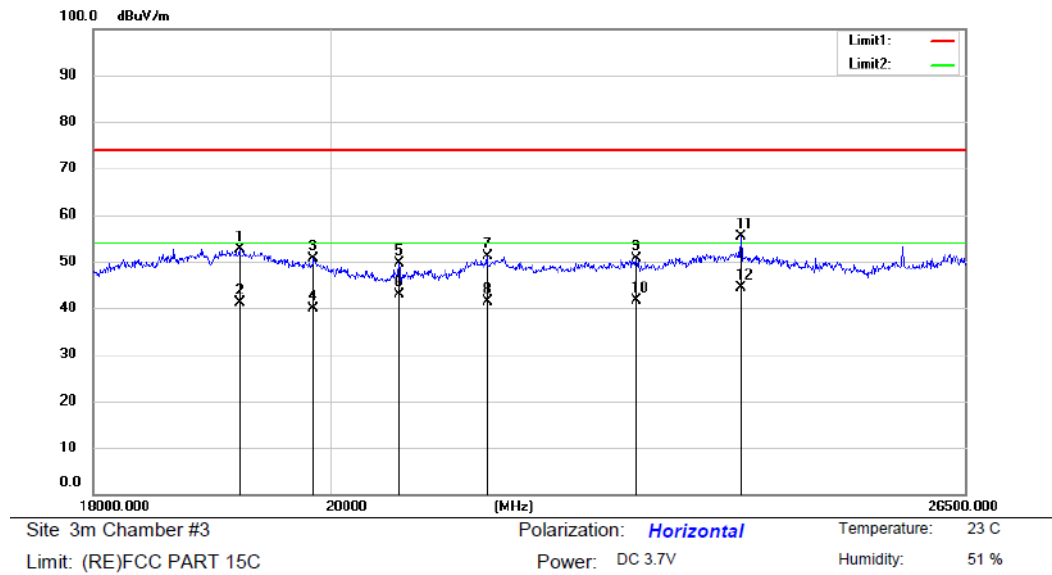
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		4893.850	56.67	-4.13	52.54	74.00	-21.46	peak		
2	*	4893.850	47.23	-4.13	43.10	54.00	-10.90	AVG		
3		7338.450	49.04	1.71	50.75	74.00	-23.25	peak		
4		7338.450	39.49	1.71	41.20	54.00	-12.80	AVG		
5		15624.25	44.13	9.70	53.83	74.00	-20.17	peak		
6		15624.25	30.80	9.70	40.50	54.00	-13.50	AVG		



Mode:WIFI 802.11g 2437

Note:

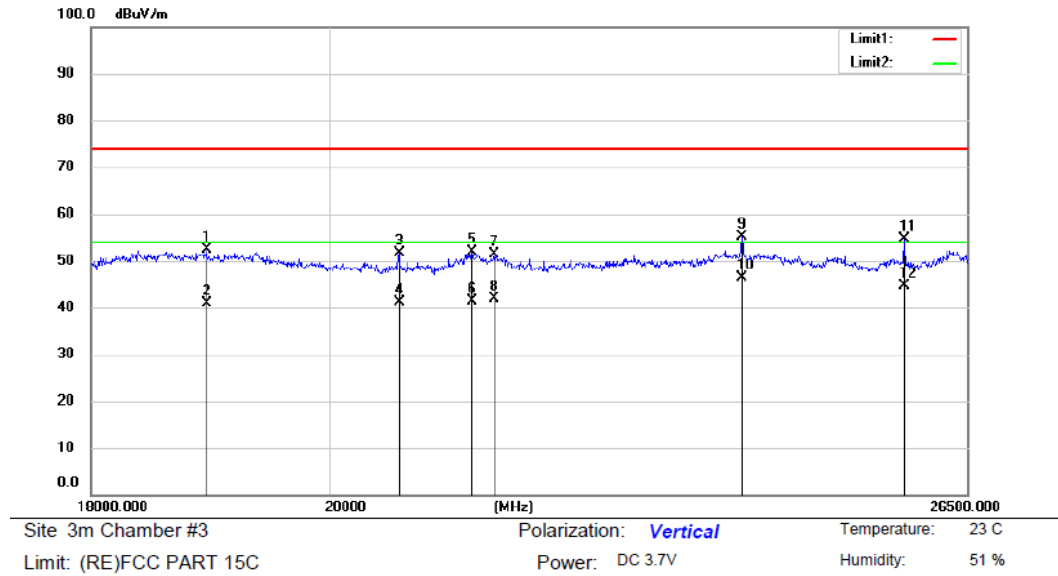
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		4892.150	54.83	-4.14	50.69	74.00	-23.31	peak			
2		4892.150	43.74	-4.14	39.60	54.00	-14.40	AVG			
3		8143.400	48.10	2.05	50.15	74.00	-23.85	peak			
4	*	8143.400	38.05	2.05	40.10	54.00	-13.90	AVG			
5		13849.45	39.59	12.01	51.60	74.00	-22.40	peak			
6		13849.45	25.59	12.01	37.60	54.00	-16.40	AVG			



Mode:WIFI 802.11b 2437

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		19208.43	51.72	0.94	52.66	74.00	-21.34	peak		
2		19208.43	40.26	0.94	41.20	54.00	-12.80	AVG		
3		19850.42	50.83	-0.17	50.66	74.00	-23.34	peak		
4		19850.42	40.17	-0.17	40.00	54.00	-14.00	AVG		
5		20617.27	48.69	0.83	49.52	74.00	-24.48	peak		
6		20617.27	41.97	0.83	42.80	54.00	-11.20	AVG		
7		21438.60	50.11	0.94	51.05	74.00	-22.95	peak		
8		21438.60	40.46	0.94	41.40	54.00	-12.60	AVG		
9		22904.45	48.63	2.00	50.63	74.00	-23.37	peak		
10		22904.45	39.60	2.00	41.60	54.00	-12.40	AVG		
11		23992.56	50.22	5.24	55.46	74.00	-18.54	peak		
12	*	23992.56	39.26	5.24	44.50	54.00	-9.50	AVG		



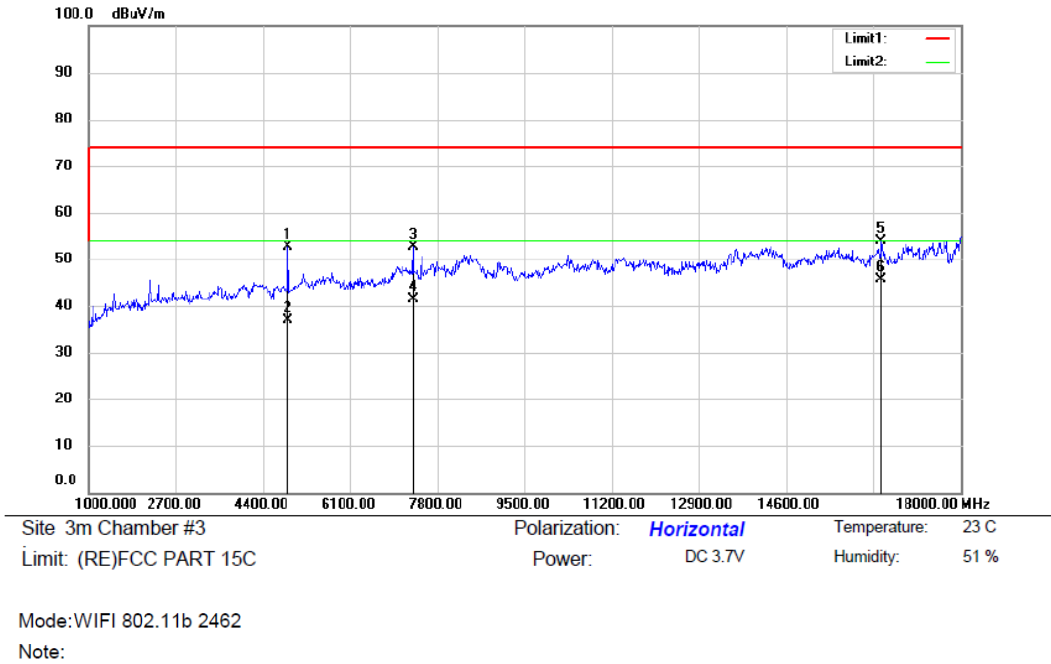
Mode:WIFI 802.11b 2437

Note:

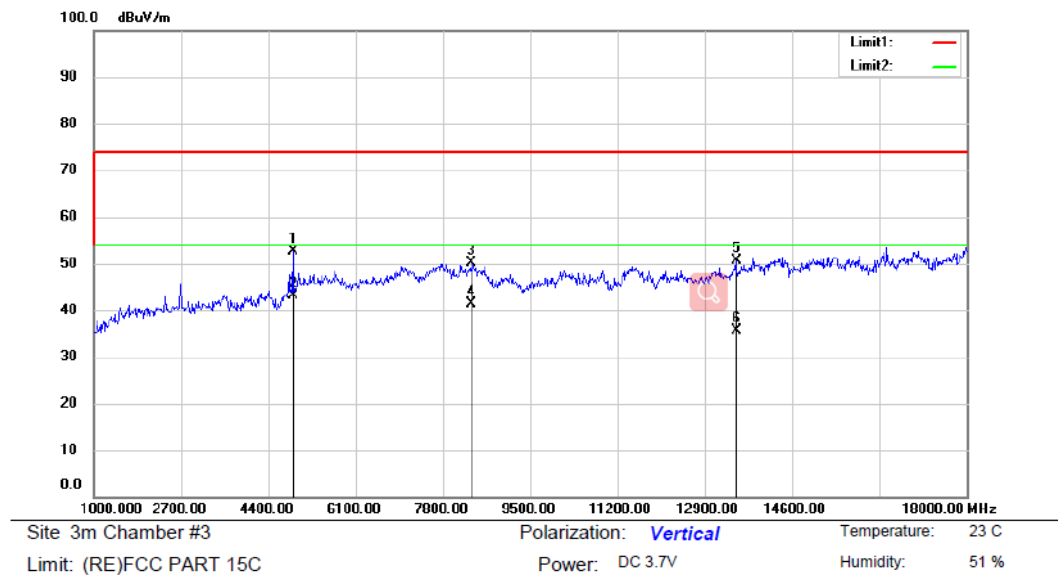
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector	Antenna Height cm	Table Degree	Comment
1		18942.83	51.27	1.16	52.43	74.00	-21.57	peak			
2		18942.83	39.64	1.16	40.80	54.00	-13.20	AVG			
3		20625.24	50.83	0.86	51.69	74.00	-22.31	peak			
4		20625.24	40.24	0.86	41.10	54.00	-12.90	AVG			
5		21298.10	50.66	1.16	51.82	74.00	-22.18	peak			
6		21298.10	40.34	1.16	41.50	54.00	-12.50	AVG			
7		21505.04	50.55	0.83	51.38	74.00	-22.62	peak			
8		21505.04	41.07	0.83	41.90	54.00	-12.10	AVG			
9		23992.56	49.92	5.24	55.16	74.00	-18.84	peak			
10	*	23992.56	41.26	5.24	46.50	54.00	-7.50	AVG			
11		25772.21	51.89	2.82	54.71	74.00	-19.29	peak			
12		25772.21	41.88	2.82	44.70	54.00	-9.30	AVG			

Temperature : 26°C
Humidity : 60 %
Test mode: 802.11b

Test Date : August 03, 2018
Test By: King Kong
Frequency: Channel 11: 2462MHz



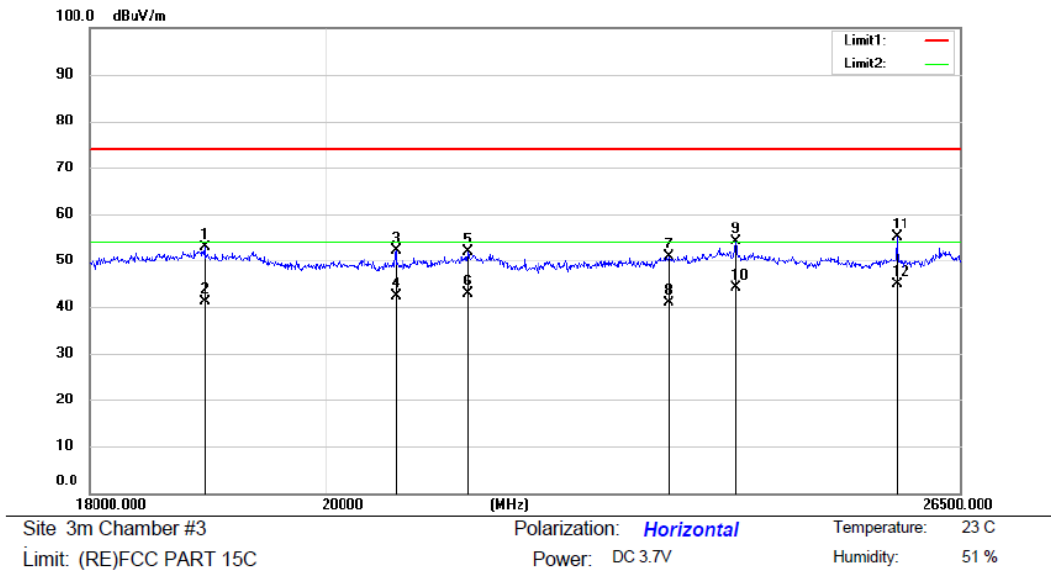
No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		4893.850	56.67	-4.13	52.54	74.00	-21.46	peak		
2		4893.850	41.03	-4.13	36.90	54.00	-17.10	AVG		
3		7338.450	51.04	1.71	52.75	74.00	-21.25	peak		
4		7338.450	39.59	1.71	41.30	54.00	-12.70	AVG		
5		16464.05	44.69	9.31	54.00	74.00	-20.00	peak		
6	*	16464.05	36.29	9.31	45.60	54.00	-8.40	AVG		



Mode:WIFI 802.11b 2462

Note:

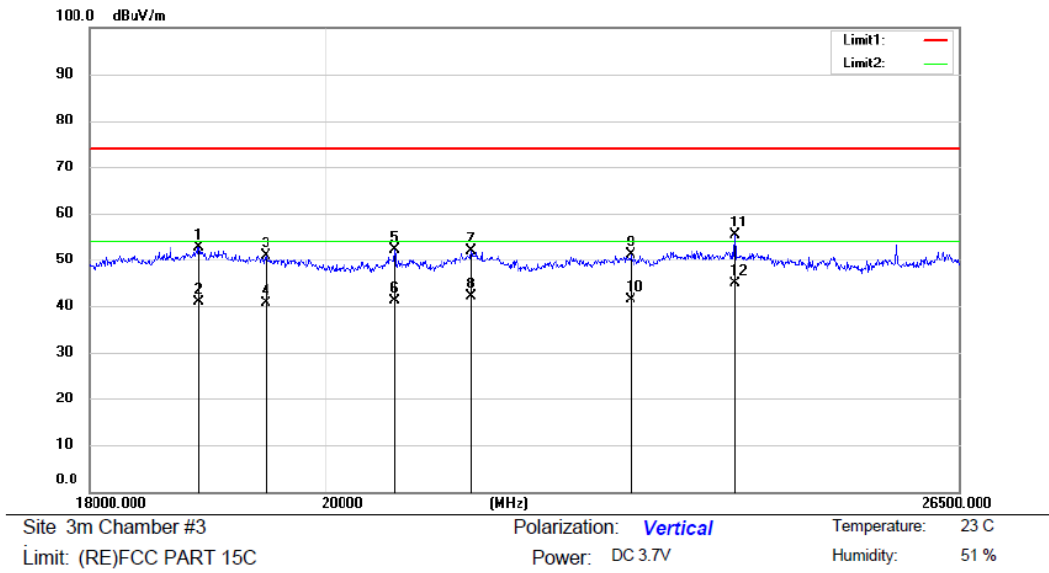
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		4892.150	56.83	-4.14	52.69	74.00	-21.31	peak		
2	*	4892.150	47.24	-4.14	43.10	54.00	-10.90	AVG		
3		8349.100	48.18	1.89	50.07	74.00	-23.93	peak		
4		8349.100	39.61	1.89	41.50	54.00	-12.50	AVG		
5		13512.85	39.65	11.03	50.68	74.00	-23.32	peak		
6		13512.85	24.57	11.03	35.60	54.00	-18.40	AVG		



Mode: WIFI 802.11b 2462

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		18942.83	51.77	1.16	52.93	74.00	-21.07	peak		
2		18942.83	39.94	1.16	41.10	54.00	-12.90	AVG		
3		20625.24	51.33	0.86	52.19	74.00	-21.81	peak		
4		20625.24	41.64	0.86	42.50	54.00	-11.50	AVG		
5		21298.10	50.66	1.16	51.82	74.00	-22.18	peak		
6		21298.10	41.74	1.16	42.90	54.00	-11.10	AVG		
7		23288.56	47.79	3.08	50.87	74.00	-23.13	peak		
8		23288.56	37.72	3.08	40.80	54.00	-13.20	AVG		
9		23992.56	48.92	5.24	54.16	74.00	-19.84	peak		
10		23992.56	38.86	5.24	44.10	54.00	-9.90	AVG		
11		25772.21	52.39	2.82	55.21	74.00	-18.79	peak		
12	*	25772.21	42.08	2.82	44.90	54.00	-9.10	AVG		



Mode:WIFI 802.11b 2462

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		18898.92	51.56	1.05	52.61	74.00	-21.39	peak		
2		18898.92	39.75	1.05	40.80	54.00	-13.20	AVG		
3		19470.23	50.27	0.49	50.76	74.00	-23.24	peak		
4		19470.23	40.21	0.49	40.70	54.00	-13.30	AVG		
5		20617.27	51.19	0.83	52.02	74.00	-21.98	peak		
6		20617.27	40.37	0.83	41.20	54.00	-12.80	AVG		
7		21331.07	50.81	1.10	51.91	74.00	-22.09	peak		
8		21331.07	41.00	1.10	42.10	54.00	-11.90	AVG		
9		22904.45	49.13	2.00	51.13	74.00	-22.87	peak		
10		22904.45	39.50	2.00	41.50	54.00	-12.50	AVG		
11		23992.56	50.22	5.24	55.46	74.00	-18.54	peak		
12	*	23992.56	39.56	5.24	44.80	54.00	-9.20	AVG		

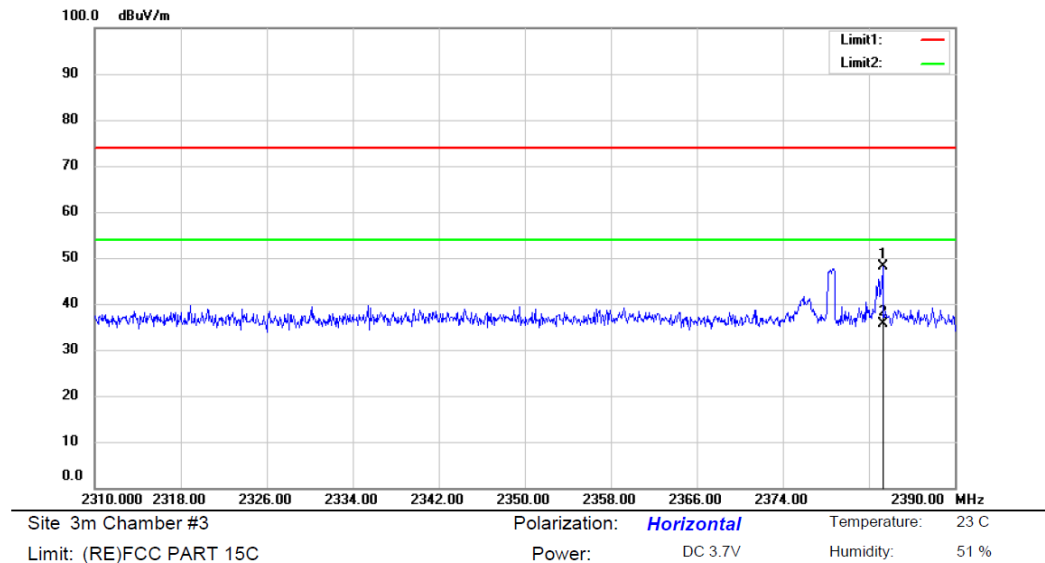
■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz

This testing was carried out on all operation modes, but only the worst case (802.11b) was presented in this report.

Spurious Emission in Restricted Band 2310-2390MHz

Test Model	<input checked="" type="checkbox"/> 802.11b	<input type="checkbox"/> 802.11g	<input type="checkbox"/> 802.11n(HT20)	<input type="checkbox"/> 802.11n(HT40)
	<input checked="" type="checkbox"/> Channel 1: 2412MHz	<input type="checkbox"/> Channel 3: 2422MHz		
	VBW=3MHz			

Polarity: H
Test By: King Kong



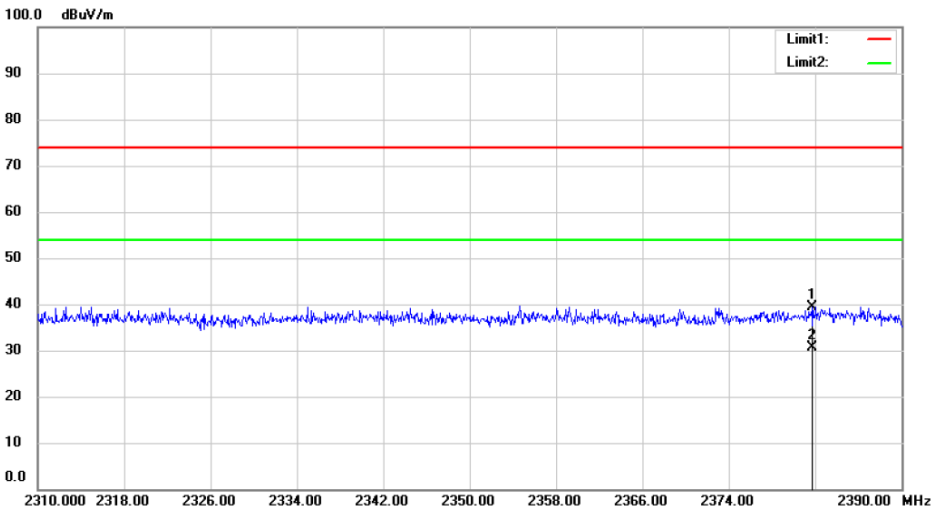
Mode:WIFI 802.11b

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2383.280	58.85	-10.83	48.02	74.00	-25.98	peak		
2	*	2383.280	46.43	-10.83	35.60	54.00	-18.40	AVG		

Spurious Emission in Restricted Band 2310-2390MHz

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 1: 2412MHz ☐ Channel 3: 2422MHz Polarity: V
VBW=3MHz Test By: King Kong



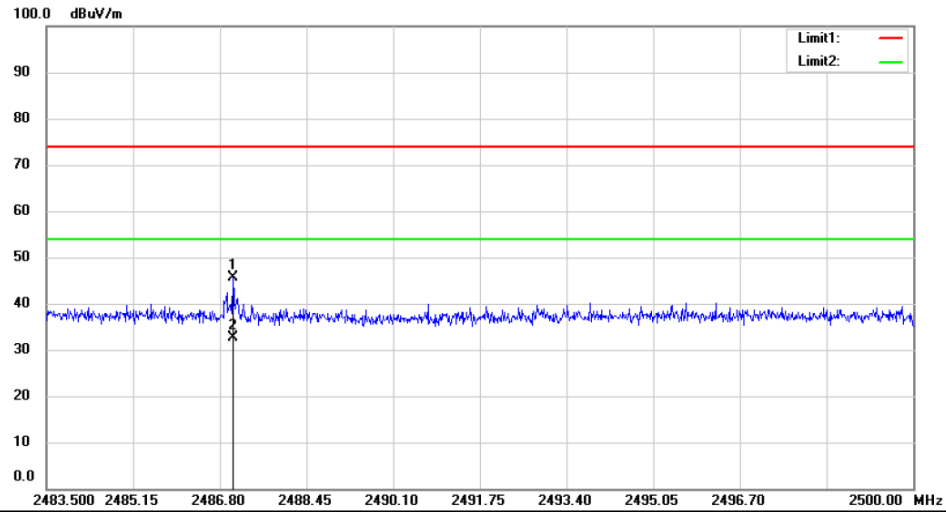
Site 3m Chamber #3 Polarization: **Vertical** Temperature: 23 C
Limit: (RE)FCC PART 15C Power: DC 3.7V Humidity: 51 %

Mode: WIFI 802.11b
Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree Comment
1		2381.720	50.16	-10.84	39.32	74.00	-34.68	peak		
2	*	2381.720	41.44	-10.84	30.60	54.00	-23.40	AVG		

Spurious Emission in Restricted Band 2483.5-2500MHz

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 11: 2462MHz ☐ Channel 9: 2452MHz Polarity: H
 VBW=3MHz Test By: King Kong



Site 3m Chamber #3

Polarization: **Horizontal**

Temperature: 23 C

Limit: (RE)FCC PART 15C

Power: DC 3.7V

Humidity: 51 %

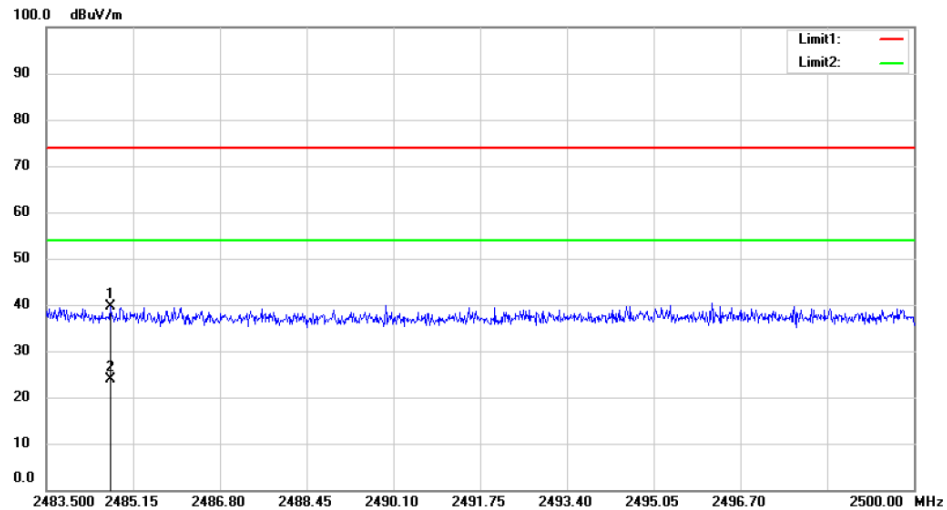
Mode:WIFI 802.11b

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	cm	degree	Comment
1		2487.063	56.15	-10.55	45.60	74.00	-28.40	peak		
2	*	2487.063	43.25	-10.55	32.70	54.00	-21.30	AVG		

Spurious Emission in Restricted Band 2483.5-2500MHz

Test Model ☒ 802.11b ☐ 802.11g ☐ 802.11n(HT20) ☐ 802.11n(HT40)
☒ Channel 11: 2462MHz ☐ Channel 9: 2452MHz Polarity: V
 VBW=3MHz Test By: King Kong



Site 3m Chamber #3

Polarization: **Vertical**

Temperature: 23 C

Limit: (RE)FCC PART 15C

Power: DC 3.7V

Humidity: 51 %

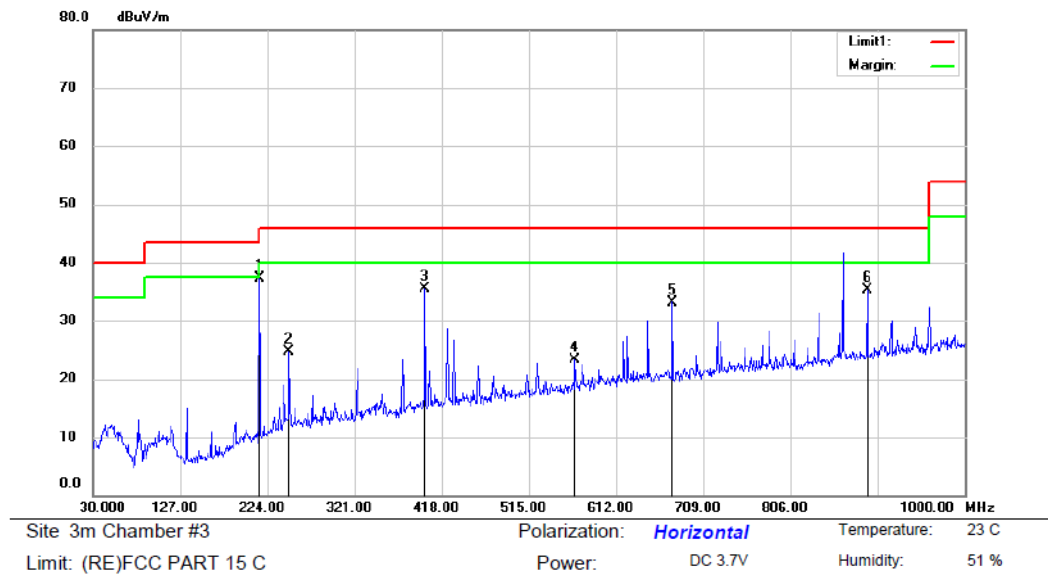
Mode:WIFI 802.11b

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		2484.723	50.09	-10.56	39.53	74.00	-34.47	peak		
2	*	2484.723	34.36	-10.56	23.80	54.00	-30.20	AVG		

■ Spurious Emission below 1GHz (30MHz to 1GHz)

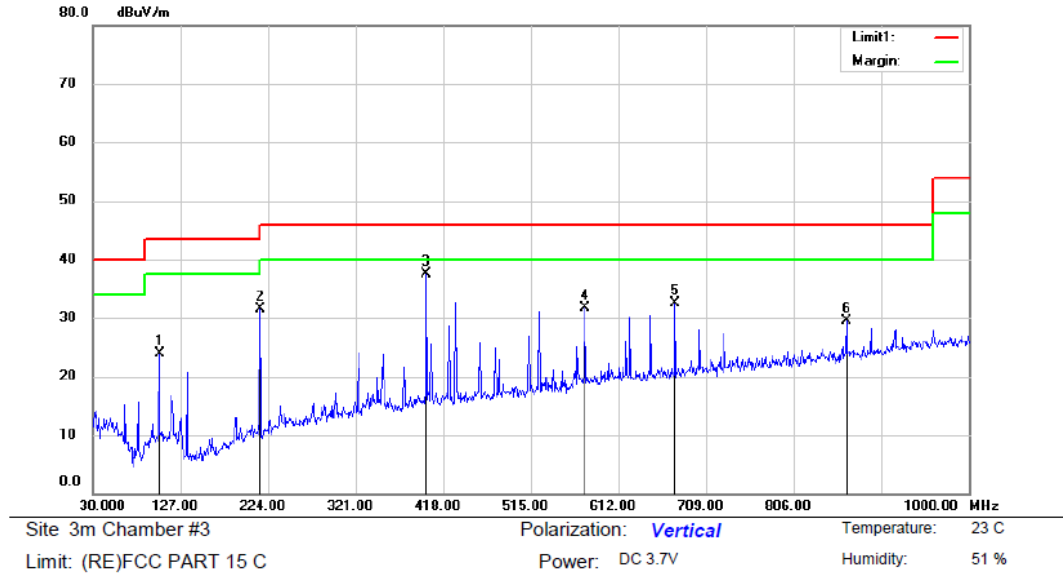
This testing was carried out on all operation modes, but only the worst case (802.11b) was presented in this report.



Mode:WIFI 802.11b 2412

Note:

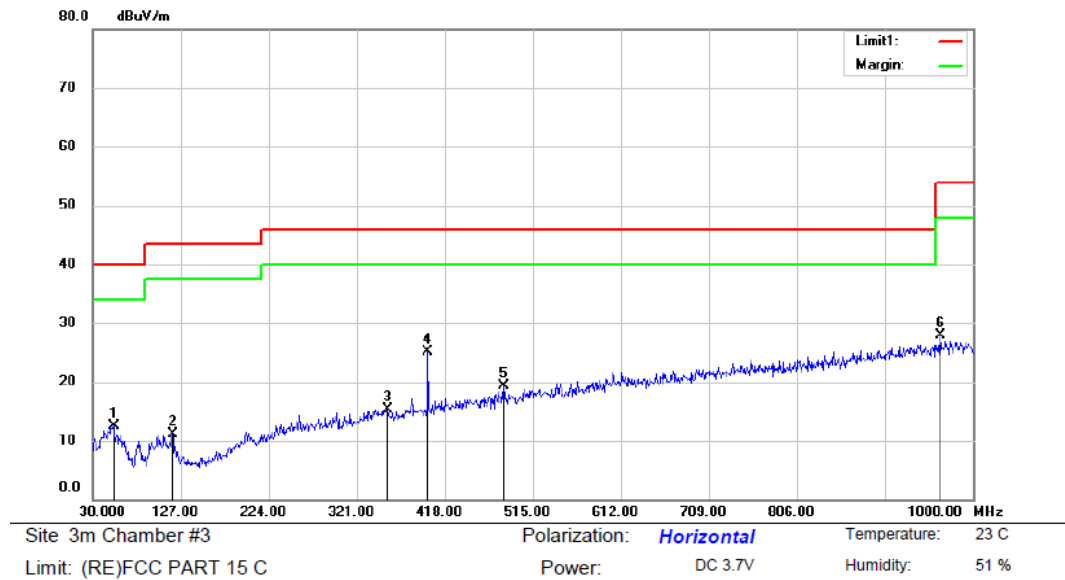
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1	*	215.7550	53.32	-15.99	37.33	43.50	-6.17	QP		
2		248.2500	39.10	-14.43	24.67	46.00	-21.33	QP		
3		400.0550	46.28	-10.79	35.49	46.00	-10.51	QP		
4		566.8950	30.65	-7.38	23.27	46.00	-22.73	QP		
5		675.0500	38.58	-5.38	33.20	46.00	-12.80	QP		
6		891.3600	37.32	-2.03	35.29	46.00	-10.71	QP		



Mode:WIFI 802.11b 2412

Note:

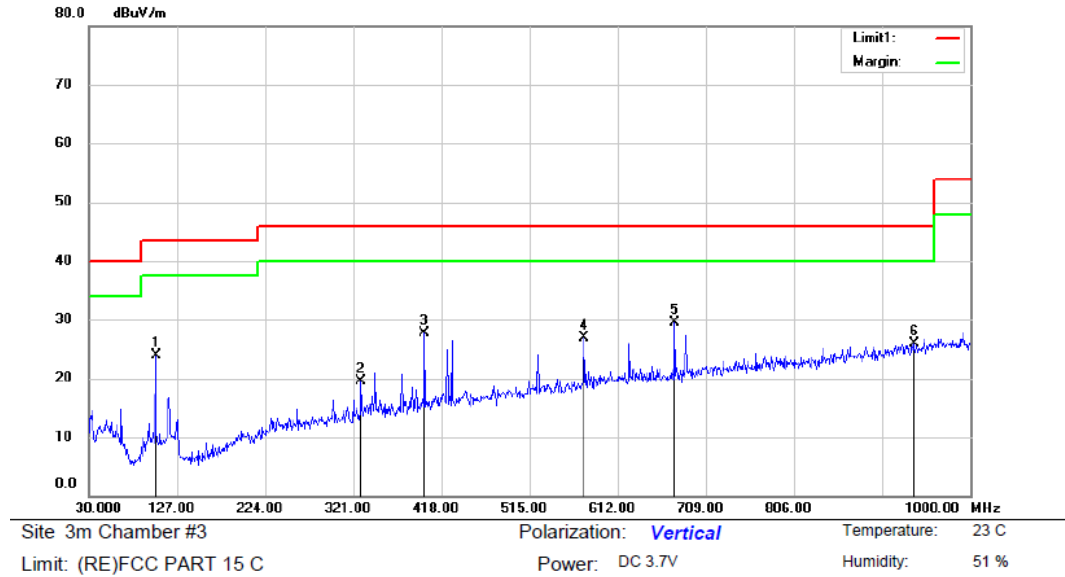
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Detector	Comment
1		104.2050	39.96	-16.13	23.83	43.50	-19.67			QP	
2		215.7550	47.53	-15.99	31.54	43.50	-11.96			QP	
3	*	400.0550	48.30	-10.79	37.51	46.00	-8.49			QP	
4		575.1400	38.72	-7.07	31.65	46.00	-14.35			QP	
5		675.0500	37.85	-5.38	32.47	46.00	-13.53			QP	
6		864.2000	31.80	-2.29	29.51	46.00	-16.49			QP	



Mode:WIFI 802.11b 2437

Note:

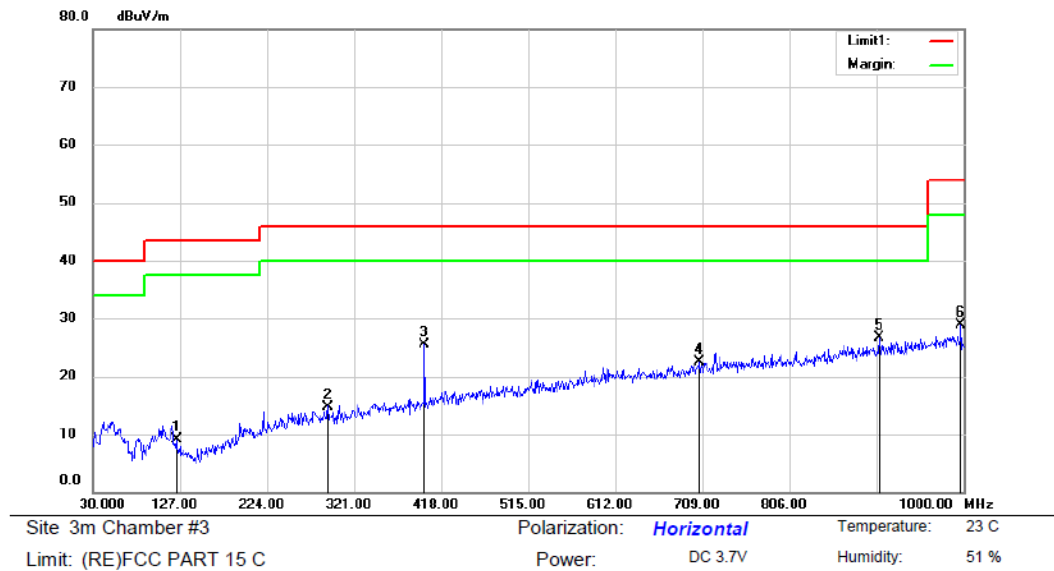
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Comment
1		53.2800	27.04	-14.56	12.48	40.00	-27.52	QP		
2		118.2700	28.90	-17.73	11.17	43.50	-32.33	QP		
3		355.4350	26.79	-11.47	15.32	46.00	-30.68	QP		
4	*	400.0550	35.97	-10.79	25.18	46.00	-20.82	QP		
5		482.9900	28.28	-8.90	19.38	46.00	-26.62	QP		
6		964.5950	28.74	-0.77	27.97	54.00	-26.03	QP		



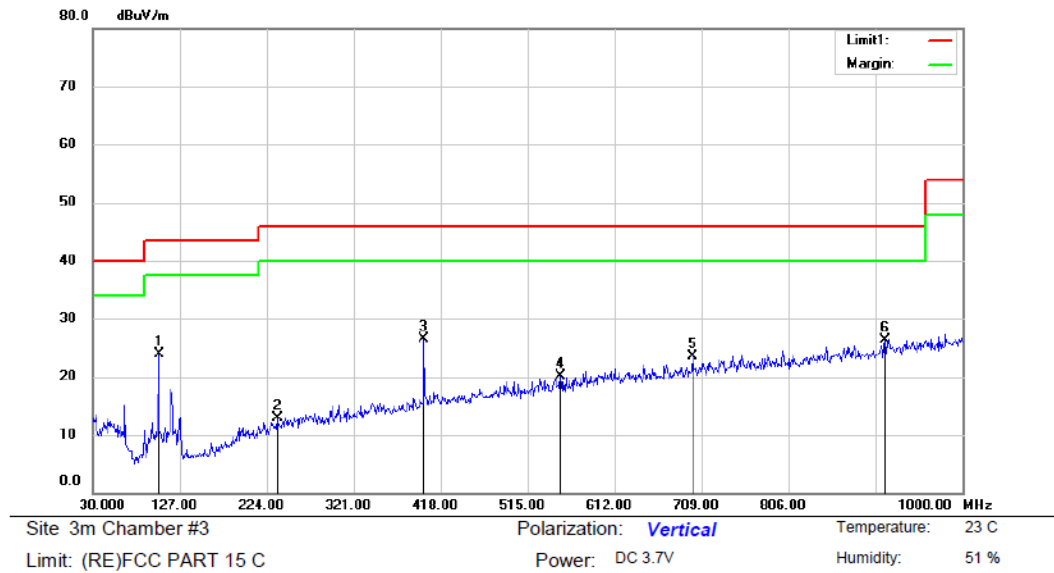
Mode:WIFI 802.11b 2437

Note:

No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree	Detector	Comment
1		104.2050	40.01	-16.13	23.88	43.50	-19.62			QP	
2		330.2150	31.74	-12.19	19.55	46.00	-26.45			QP	
3		400.0550	38.51	-10.79	27.72	46.00	-18.28			QP	
4		575.1400	33.95	-7.07	26.88	46.00	-19.12			QP	
5	*	675.0500	34.81	-5.38	29.43	46.00	-16.57			QP	
6		938.4050	26.93	-1.02	25.91	46.00	-20.09			QP	



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Antenna Height cm	Table Degree degree	Comment
1		123.1200	27.66	-18.56	9.10	43.50	-34.40	QP		
2		291.9000	27.99	-13.19	14.80	46.00	-31.20	QP		
3		400.0550	36.24	-10.79	25.45	46.00	-20.55	QP		
4		706.5750	27.32	-4.75	22.57	46.00	-23.43	QP		
5	*	906.3950	28.21	-1.54	26.67	46.00	-19.33	QP		
6		997.5750	29.04	-0.22	28.82	54.00	-25.18	QP		



Mode:WIFI 802.11b 2462

Note:

No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree
1		104.2050	40.06	-16.13	23.93	43.50	-19.57	QP		
2		236.1250	27.57	-14.69	12.88	46.00	-33.12	QP		
3	*	400.0550	37.35	-10.79	26.56	46.00	-19.44	QP		
4		551.8600	27.96	-7.78	20.18	46.00	-25.82	QP		
5		699.7850	28.59	-4.99	23.60	46.00	-22.40	QP		
6		913.6700	27.68	-1.38	26.30	46.00	-19.70	QP		

8.7 CONDUCTED EMISSIONS TEST

8.7.1 Applicable Standard

According to FCC Part 15.207(a)

According to RSS-Gen Clause 8.8

8.7.2 Conformance Limit

Frequency(MHz)	Conducted Emission Limit	
	Quasi-peak	Average
0.15-0.5	66-56	56-46
0.5-5.0	56	46
5.0-30.0	60	50

Note: 1. The lower limit shall apply at the transition frequencies

2. The limit decreases in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

8.7.3 Test Configuration

Test according to clause 7.3conducted emission test setup

8.7.4 Test Procedure

The EUT was placed on a table which is 0.8m above ground plane.

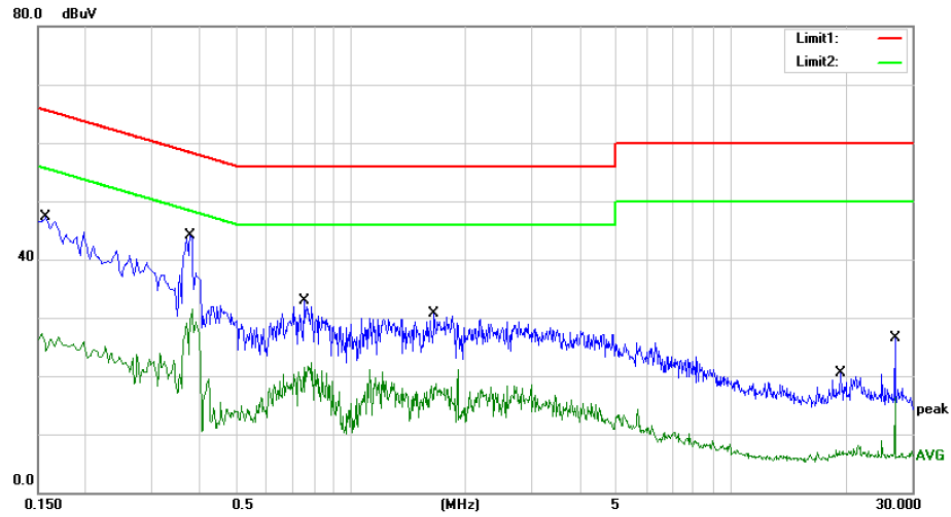
Maximum procedure was performed on the highest emissions to ensure EUT compliance.

Repeat above procedures until all frequency measured were complete.

8.7.5 Test Results

Pass

AC 120V/60Hz have been tested, and the worst result recorded was report as below:

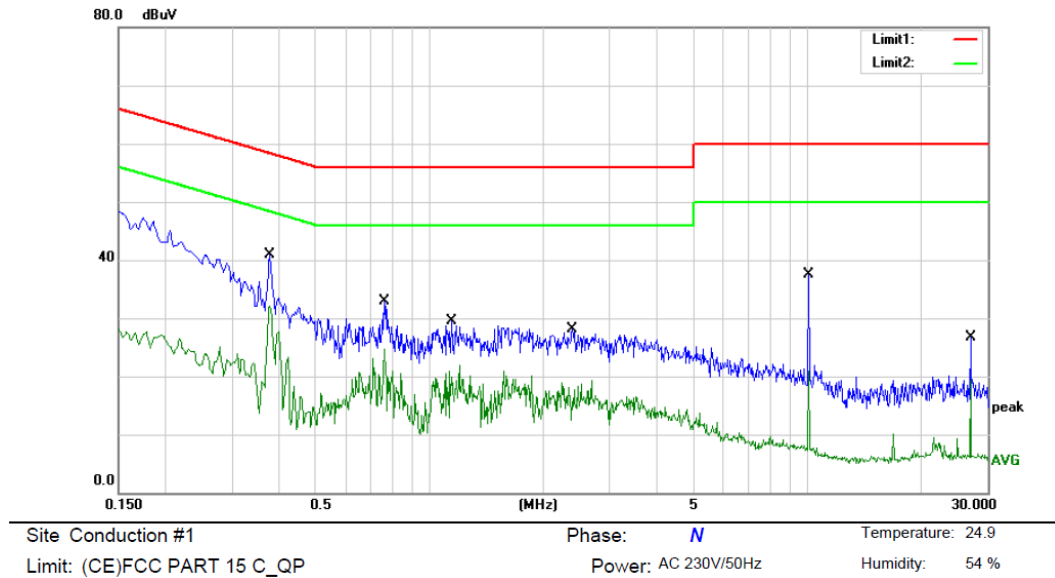


Site Conduction #1
Limit: (CE)FCC PART 15 C_QP

Phase: **L1** Temperature: 24.9
Power: AC 230V/50Hz Humidity: 54 %

Mode: Charging+2.4G WIRELESS CONNECTING
Note:

No. Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit		Detector	Comment
	MHz	dBuV	dB	dBuV	dBuV	dB		
1	0.1580	37.73	9.56	47.29	65.57	-18.28	QP	
2	0.1580	17.65	9.56	27.21	55.57	-28.36	AVG	
3 *	0.3780	34.50	9.57	44.07	58.32	-14.25	QP	
4	0.3780	21.88	9.57	31.45	48.32	-16.87	AVG	
5	0.7540	23.32	9.58	32.90	56.00	-23.10	QP	
6	0.7540	12.78	9.58	22.36	46.00	-23.64	AVG	
7	1.6580	21.16	9.60	30.76	56.00	-25.24	QP	
8	1.6580	11.41	9.60	21.01	46.00	-24.99	AVG	
9	19.5300	10.49	9.96	20.45	60.00	-39.55	QP	
10	19.5300	-1.85	9.96	8.11	50.00	-41.89	AVG	
11	27.0060	16.46	10.06	26.52	60.00	-33.48	QP	
12	27.0060	6.23	10.06	16.29	50.00	-33.71	AVG	



Mode: Charging+2.4G WIRELESS CONNECTING

Note:

No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector	Comment
1	0.3780	31.41	9.57	40.98	58.32	-17.34	QP	
2 *	0.3780	22.54	9.57	32.11	48.32	-16.21	AVG	
3	0.7620	23.33	9.58	32.91	56.00	-23.09	QP	
4	0.7620	15.13	9.58	24.71	46.00	-21.29	AVG	
5	1.1420	19.89	9.59	29.48	56.00	-26.52	QP	
6	1.1420	12.34	9.59	21.93	46.00	-24.07	AVG	
7	2.3860	18.43	9.61	28.04	56.00	-27.96	QP	
8	2.3860	9.59	9.61	19.20	46.00	-26.80	AVG	
9	10.0740	27.75	9.79	37.54	60.00	-22.46	QP	
10	10.0740	11.09	9.79	20.88	50.00	-29.12	AVG	
11	27.0020	16.71	10.06	26.77	60.00	-33.23	QP	
12	27.0020	9.28	10.06	19.34	50.00	-30.66	AVG	

8.8 ANTENNA APPLICATION

8.8.1 Antenna Requirement

Standard	Requirement
FCC CRF Part15.203 RSS-Gen Clause 6.8	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. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, 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. And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

For intentional device, according to RSS-Gen Issue 5 Section 6.8:

The applicant for equipment certification, as per RSP-100, must provide a list of all antenna types that may be used with the licence-exempt transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna.

Licence-exempt transmitters that have received equipment certification may operate with different types of antennas. However, it is not permissible to exceed the maximum equivalent isotropically radiated power (e.i.r.p.) limits specified in the applicable standard (RSS) for licence-exempt apparatus.

RSS-247 Section 5.4

(i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

8.8.2 Result

PASS.

The EUT has an internal antenna for Wi-Fi, the gain is 0 dBi

Note: ☒ Antenna use a permanently attached antenna which is not replaceable.
☐ Not using a standard antenna jack or electrical connector for antenna replacement
☐ The antenna has to be professionally installed (please provide method of installation)

which in accordance to section 15.203, please refer to the internal photos.