TEST REPORT

Report Number. ..... :	91055-24-72-24-PP004	
Date of issue..... :	Dec. 26, 2024	
Prepared by (+signature)..... :	Pale	
Reviewer (+signature)..... :	Duke	
Approved by (+signature) ..... :	Jason	
Testing Laboratory name ..... :	SLG-CPC Testlaboratory Co., Ltd.	
Address..... :	No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117	
Applicant's name ..... :	tala energy ltd.	
Address..... :	25B Vyner Street London E2 9DG United Kingdom	
Manufacturer's name ..... :	tala energy ltd.	
Address..... :	25B Vyner Street London E2 9DG United Kingdom	
Factory's name ..... :	Shenzhen KunHong Electronics Co., Ltd	
Address..... :	Suites 2108-2110, Tower C, Zhuoyue Times Plaza, Bao'an Center, Shenzhen, China	
Standard(s) ..... :	FCC 47 CFR Part 2, Subpart J FCC 47 CFR Part 15, Subpart C	
Test item description ..... :	WAKE	
Trade Mark ..... :	tala	
Model/Type reference ..... :	WAKE-G150-XX-TBL-01-US	
FCC ID ..... :	2A734-WAKE	
Date of receipt of test item..... :	Oct. 11, 2024	
Date (s) of performance of test:	Oct. 12, 2024 to Dec. 19, 2024	
Summary of Test Results ..... :	Pass	
The Summary of Test Results based on a technical opinion belongs to the standard(s).		

General disclaimer:

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Modified Information

Report No.	Revision Data	Summary
91055-24-72-24-PP004	Dec. 26, 2024	Original Version

Address:No.11,WuSongRoad,
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GuangdongProvince,China523117
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1 EUT TECHNICAL DESCRIPTION

Characteristics	Description
Product	WAKE
Model Number	WAKE-G150-XX-TBL-01-US (Note: XX represents the color of the lamp body.)
IEEE 802.11 WLAN Mode Supported	☒802.11b ☒802.11g ☒802.11n(20MHz channel bandwidth) ☒802.11n(40MHz channel bandwidth)
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	13.586 dBm
Antenna Type	PCB Antenna
Antenna Gain	2.21 dBi
Power Supply:	DC 5V from Adapter, Adapter Model: Model No:HPP-U15L05V Input:100V-240V ~50/60Hz 0.5A Max Output: 5V ⎓3A 15W;
Temperature Range:	-10°C ~ +40°C

Note: *for more details, please refer to the User's manual of the EUT.*

2 SUMMARY OF TEST RESULT

FCC Part Clause	Test Parameter	Verdict	Remark
15.247(a)(2)	DTS (6dB) Bandwidth	PASS	
15.247(b)(3)	Maximum Peak Conducted Output Power	PASS	
15.247(e)	Maximum Power Spectral Density Level	PASS	
15.247(d)	Unwanted Emission Into Non-Restricted Frequency Bands	PASS	
15.247(d) 15.209	Unwanted Emission Into Restricted Frequency Bands (conducted)	PASS	
15.247(d) 15.209 15.205	Radiated Spurious Emission	PASS	
15.207	Conducted Emission Test	PASS	
15.203	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: 2A734-WAKE filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules.

3 TEST METHODOLOGY

3.1 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
FCC KDB 558074 D01 15.247 Meas Guidance v05r02

3.2 MEASUREMENT EQUIPMENT USED

Equipment	Manufacturer	Model	S/N	Last Cal.	DUE Cal.
RF Connected Test					
Vector Signal Generater	Rohde & Schwarz	SMBV100B(6G)	101166	2024/05/14	1 year
Analog Signal Generator	Rohde & Schwarz	SMB100A(40G)	181333	2024/07/25	1 year
Signal Analyzer	Rohde & Schwarz	FSV40	101527	2024/04/02	1 year
Power Analyzer	Rohde & Schwarz	OSP-B157W8	N/A	2024/05/14	1 year
Wideband Radio Communication Tester	R&S	CMW270	101985	2024/05/14	1 year
Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	166898	2024/05/14	1 year
Temperature&Humidity test chamber	ESPEC	VC 4018	/	2024/03/14	1 year
Radiated Emission Test					
EMI Test Receiver	KEYSIGHT	N9010A	MY56070465	2024/12/03	1 year
EMI Test Receiver	Rohde & Schwarz	FSV40	101511	2024/02/22	1 year
Bilog Antenna	Schwarzbeck	VULB 9163	01335	2023/04/21	3 year
Broadband Antenna	Schwarzbeck	9162	139	2022/03/22	3 year
Power Amplifier	EMEC	EM330	060676	2022/12/07	3 year
Cable	Tuyue	F4309	L-400-NmNm-12000	2024/12/03	2 year
Horn Antenna	Schwarzbeck	BBHA9120D	1779	2022/04/21	3 year
Horn Antenna	Schwarzbeck	BBHA9170	00954	2022/09/13	3 year
Power Amplifier	Rohde & Schwarz	SCU-18F	180118	2022/04/21	3 year
Power Amplifier	Rohde & Schwarz	SCU40A	100499	2023/06/21	3 year
Active Loop Antenna	ETS LINDGREN	6512	41623	2022/04/23	3 year
Test Software	Farad	EZ-EMC	Ver.CPC-3A1	/	/
Conducted Emission Test					
LISN	Schwarzbeck	NSLK 8127	8127-892	2024/03/19	1 year
LISN	Schwarzbeck	NSLK 8127	8127-437	2024/07/02	1 year
EMI Test Receiver	R&S	ESR3	102124	2024/12/03	1 year
Triple loop	R&S	HM020	834206/006	2024/12/03	2 year
Pulse Limiter	R&S	ESH3-Z2	357.8810.52	2024/12/03	1 year
Test Software	Farad	EZ-EMC	Ver.CPC-3A1	/	/

3.3 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; ☒802.11n(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 802.11b/g/n (HT20):

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

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

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

☒Test Frequency and Channel for 802.11b/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

4 FACILITIES AND ACCREDITATIONS

4.1 FACILITIES

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

No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117
The sites are constructed in conformance with the requirements of ANSI C63.4, ANSI C63.10 and CISPR Publication 32.

4.2 LABORATORY ACCREDITATIONS AND LISTINGS

Site Description

EMC Lab.	:	Accredited by ISED, October 31 2023 CAB identifier: CN0126 Company Number: 27767 Accredited by A2LA, October 31 2023 The Certificate Registration Number is 6325.01 Accredited by FCC Designation Number: CN1287 Test Firm Registration Number: 394054
Name of Firm	:	SLG-CPC Testlaboratory Co., Ltd.
Site Location	:	No. 11, Wu Song Road, Dongcheng District, Dongguan, Guangdong Province, China 523117

5 TEST SYSTEM UNCERTAINTY

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

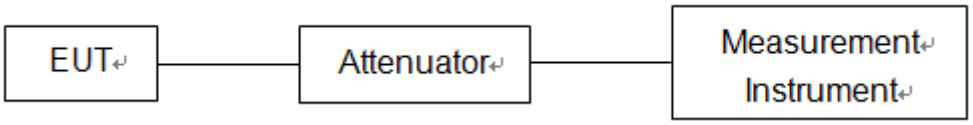
Parameter	Uncertainty
Radio Frequency	±1x10^-5
Maximum Peak Output Power Test	±1.0%
Conducted Emissions Test	±3.69dB
Radiated Emission Test	±3.46dB (Below 30MHz)
	±3.91dB (Below 1GHz)
	±3.25dB (Above 1GHz)
Power Density	±0.9%
Occupied Bandwidth Test	±2.3%
Band Edge Test	±1.2%
Antenna Port Emission	±3dB
Temperature	±3.2%
Humidity	±2.5%

Measurement Uncertainty for a level of Confidence of 95%

6 SETUP OF EQUIPMENT UNDER TEST

6.1 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.



6.2 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 32.

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 androtated about its vertical axis formaximum response at each azimuth about the EUT. The center of the loopshall be 1 m above the ground.For certain applications, the loop antennaplane may also need to be positioned horizontally at the specified distance from the EUT.

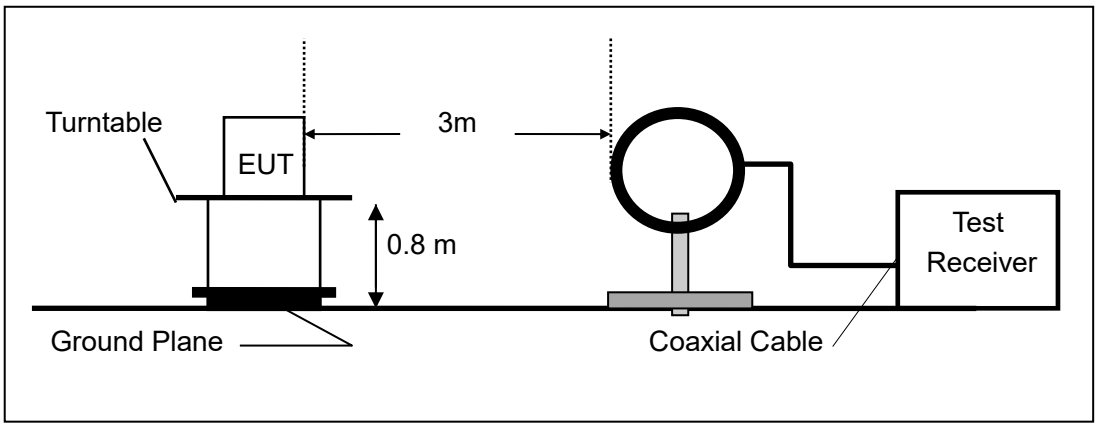
30MHz-1GHz：

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).

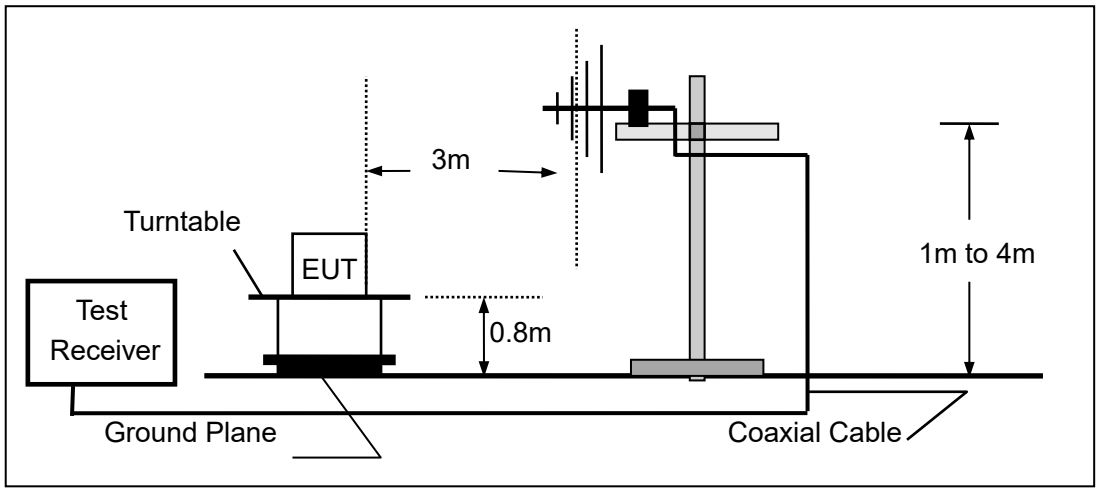
Above 1GHz：

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).

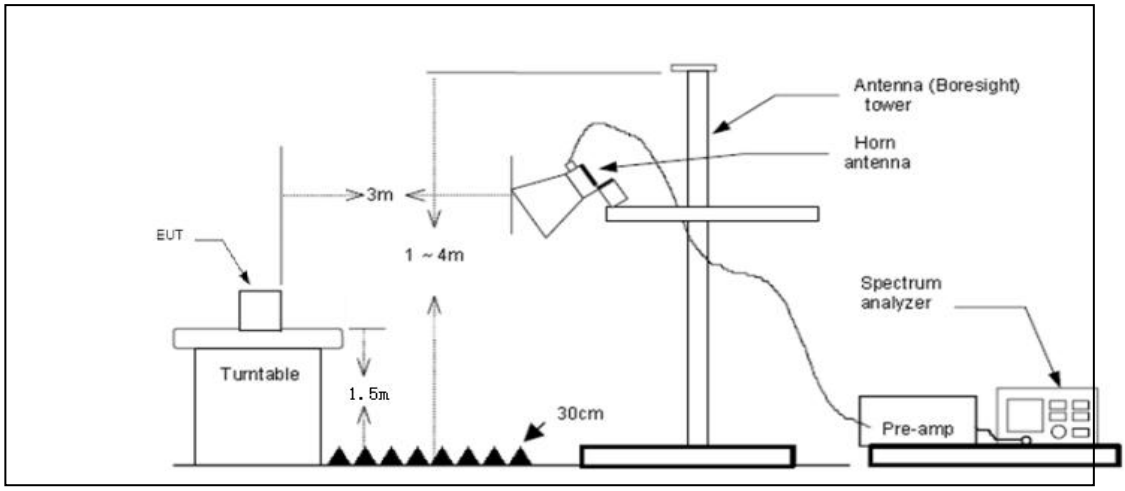
(a) Radiated Emission Test Set-Up, Frequency Below 30MHz



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

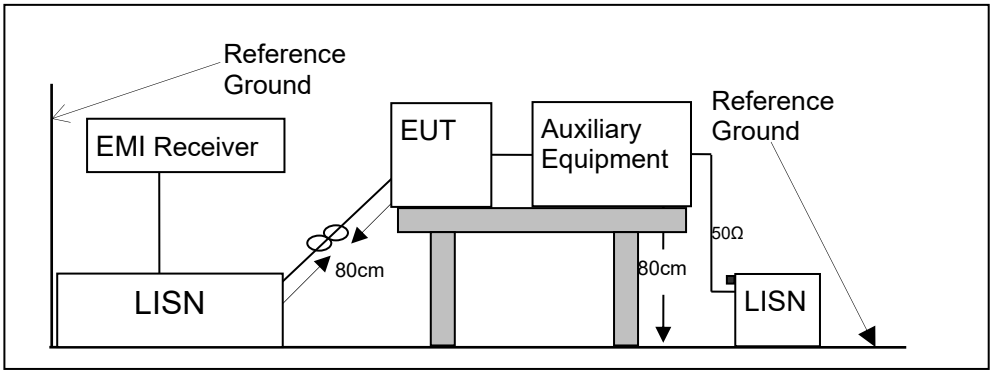


(c) Radiated Emission Test Set-Up, Frequency above 1000MHz

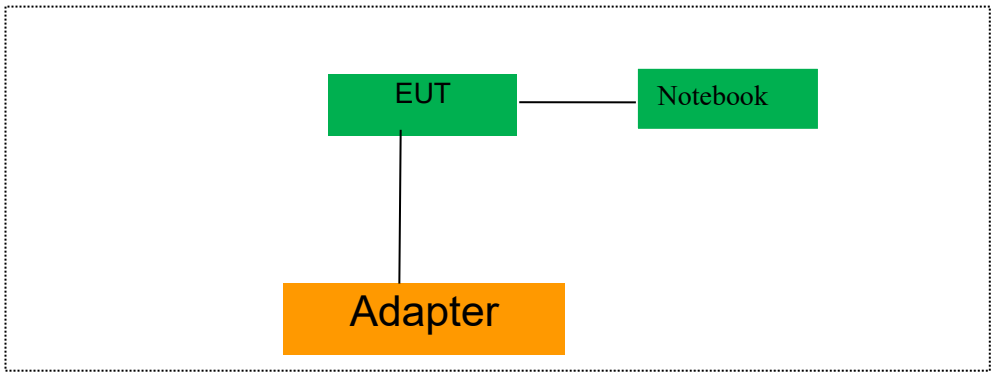


6.3 CONDUCTED EMISSION TEST SETUP

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.



6.4 BLOCK DIAGRAM CONFIGURATION OF TEST SYSTEM



6.5 SUPPORT EQUIPMENT

EUT Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Cable List and Details			
Cable Description	Length (m)	Shielded/Unshielded	With / Without Ferrite
/	/	/	/

Auxiliary Equipment List and Details			
Description	Manufacturer	Model	Serial Number
Notebook	Lenovo	MPNXB1505007	MP1XHYV7

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.*
3. *Unless otherwise denoted as EUT in 『Remark』 column , device(s) used in tested system is a support equipment*

7 TEST REQUIREMENTS

7.1 DTS (6DB) BANDWIDTH

7.1.1 Applicable Standard

According to FCC Part15.247 (a)(2) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.1.2 Conformance Limit

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

7.1.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.1.4 Test Procedure

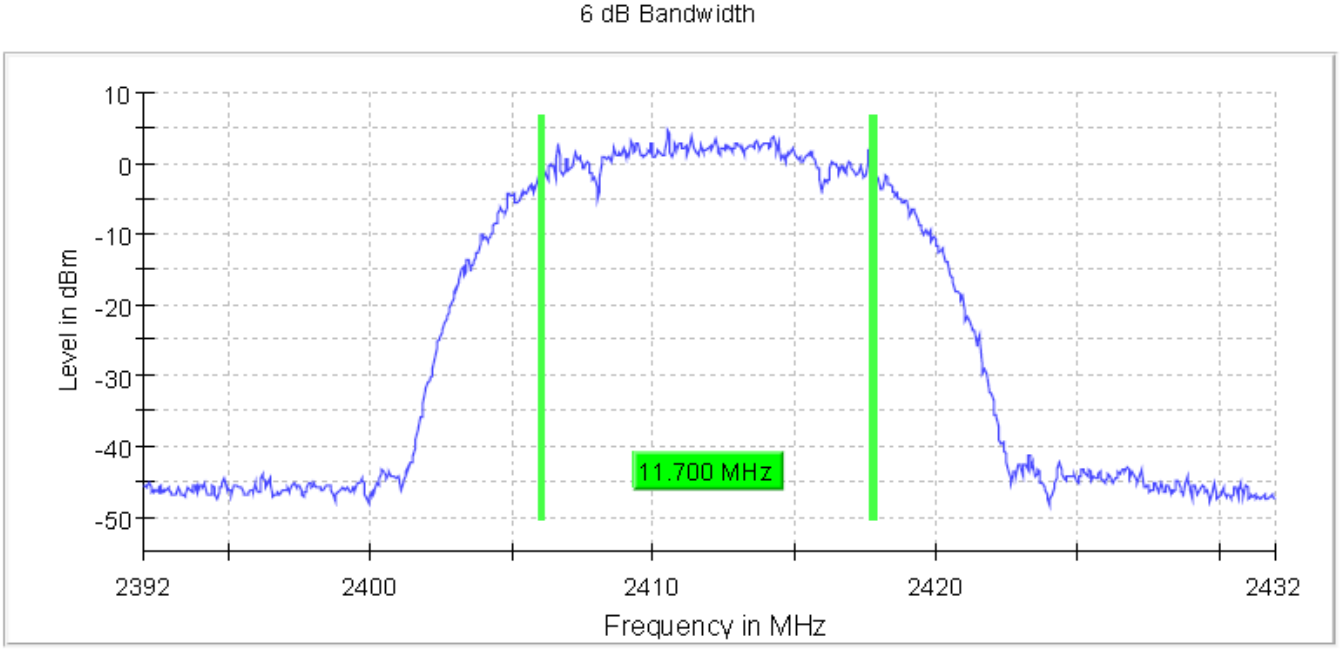
The EUT was operating in IEEE 802.11b/g/n mode and controlled its channel. Printed out the test result from the spectrum by hard copy function.
The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.
Set 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.

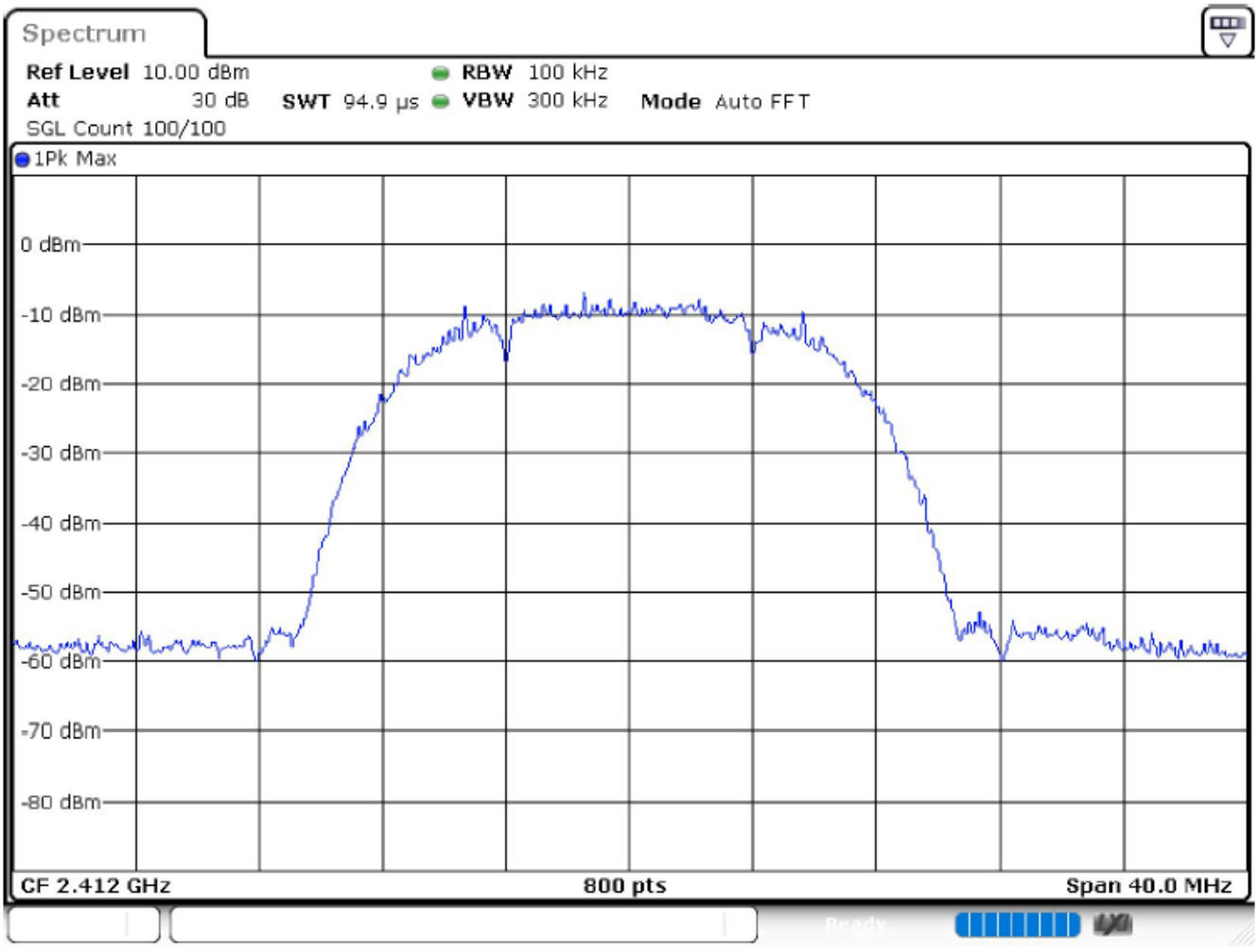
7.1.5 Test Results

Temperature:	26° C
Relative Humidity:	54%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Bandwidth (MHz)	Limit (kHz)	Verdict
802.11b	1	2412	11.700	>500	PASS
	6	2437	11.700	>500	PASS
	11	2462	12.400	>500	PASS
802.11g	1	2412	16.550	>500	PASS
	6	2437	16.500	>500	PASS
	11	2462	16.550	>500	PASS
802.11n (HT20)	1	2412	17.050	>500	PASS
	6	2437	17.200	>500	PASS
	11	2462	17.000	>500	PASS
802.11n (HT40)	3	2422	35.200	>500	PASS
	6	2437	35.200	>500	PASS
	9	2452	35.250	>500	PASS

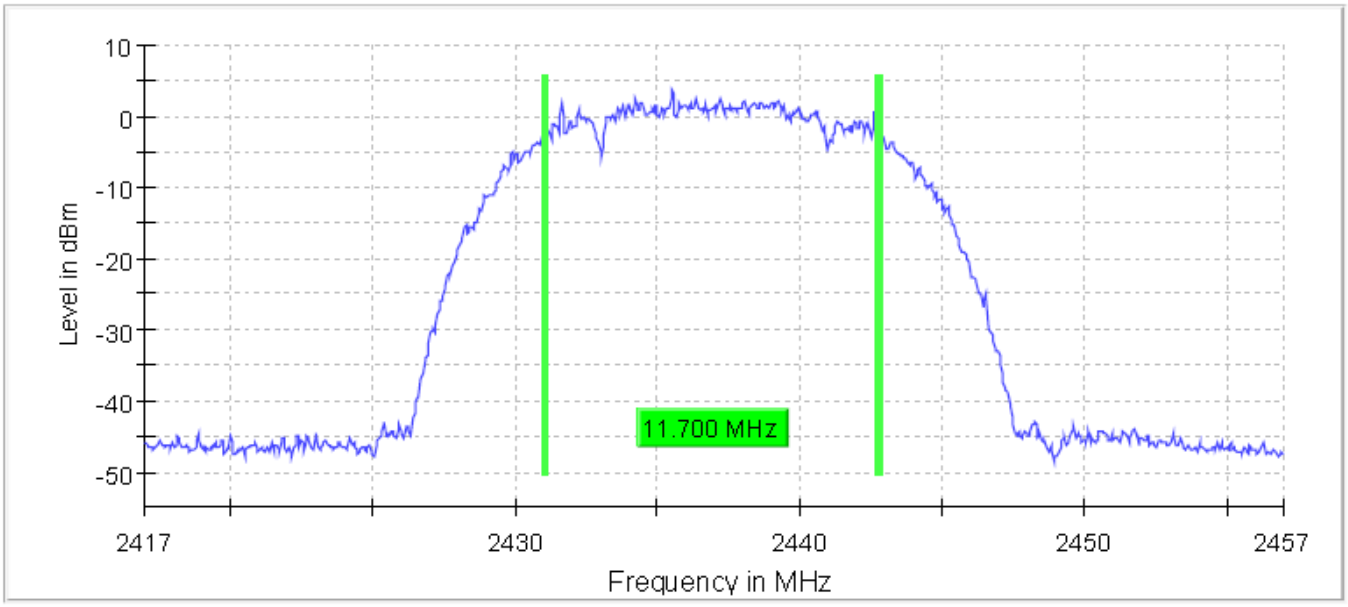
Test Model	DTS (6dB) Bandwidth 802.11b Channel 1: 2412MHz

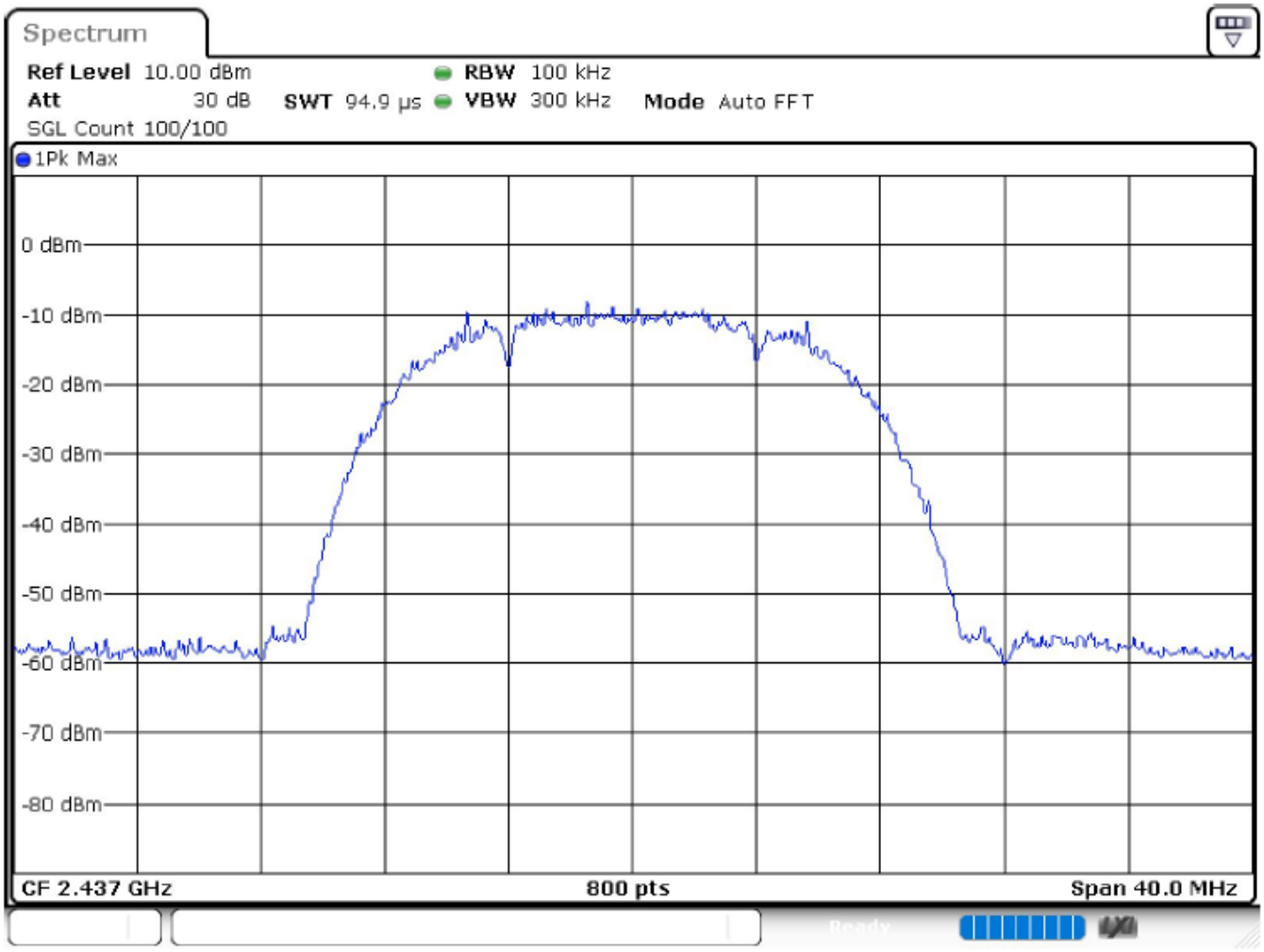




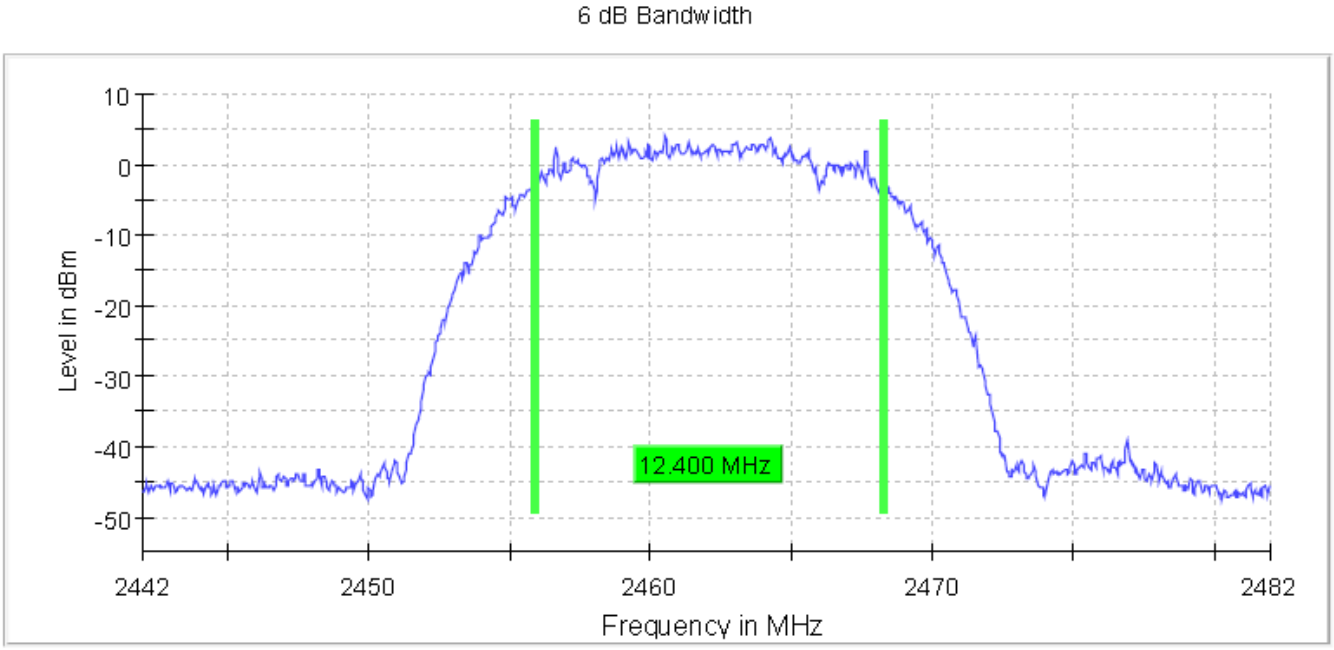
Test Model	DTS (6dB) Bandwidth 802.11b Channel 6: 2437MHz

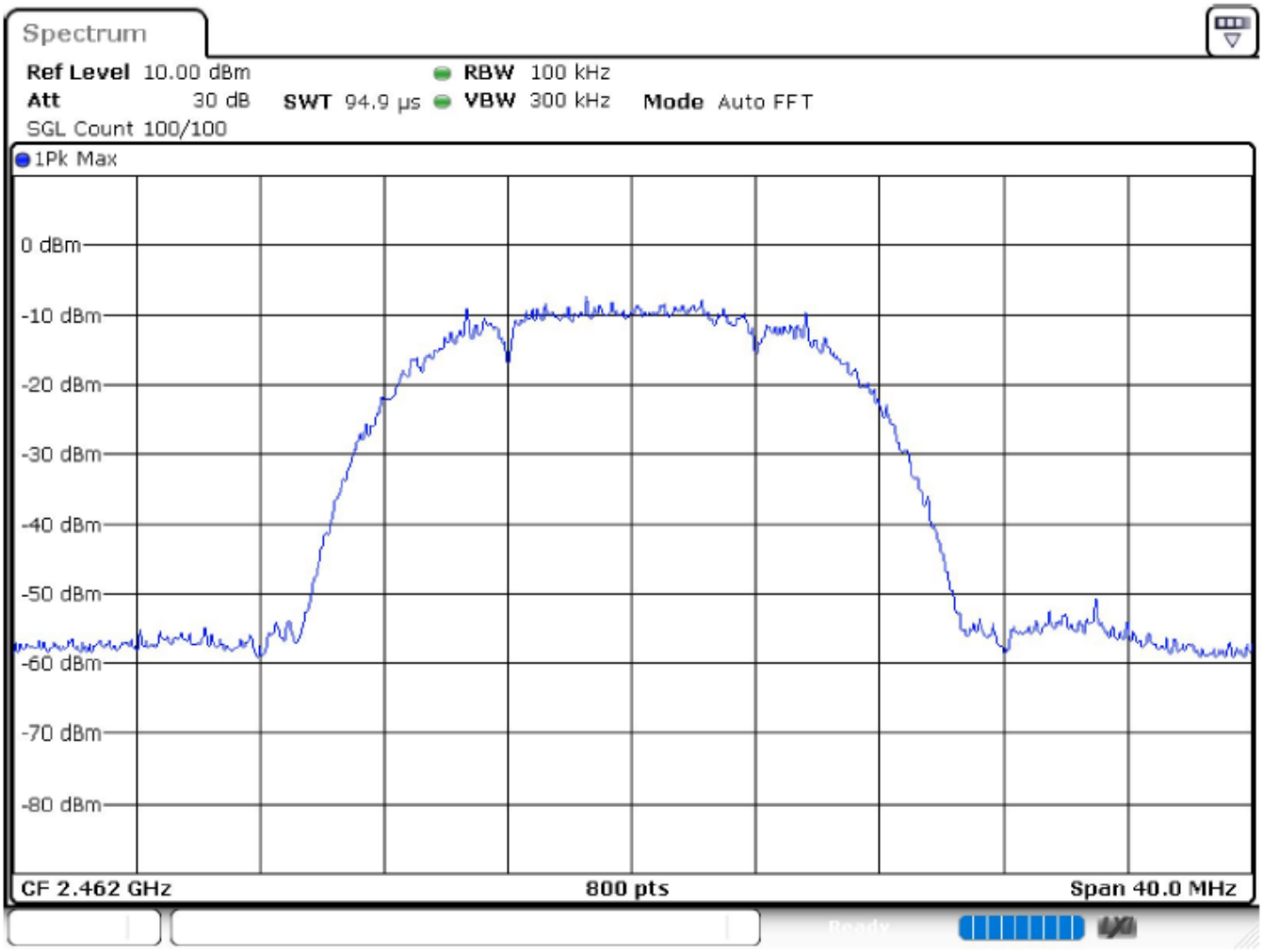
6 dB Bandwidth





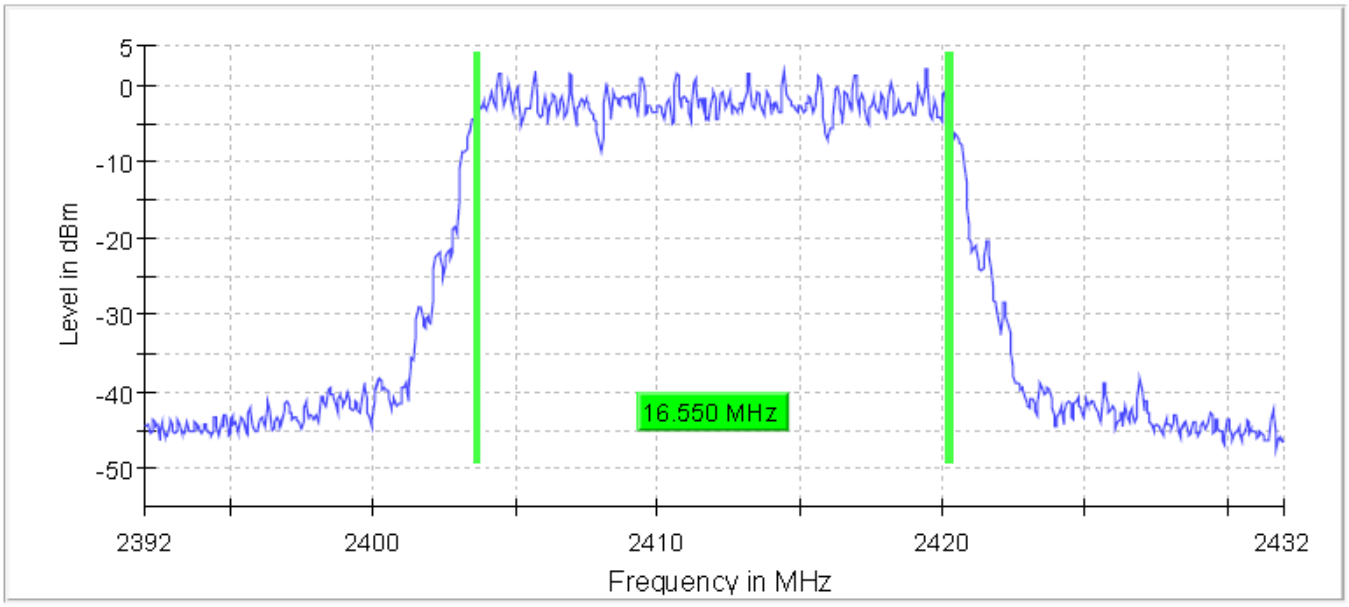
Test Model	DTS (6dB) Bandwidth 802.11b Channel 11: 2462MHz

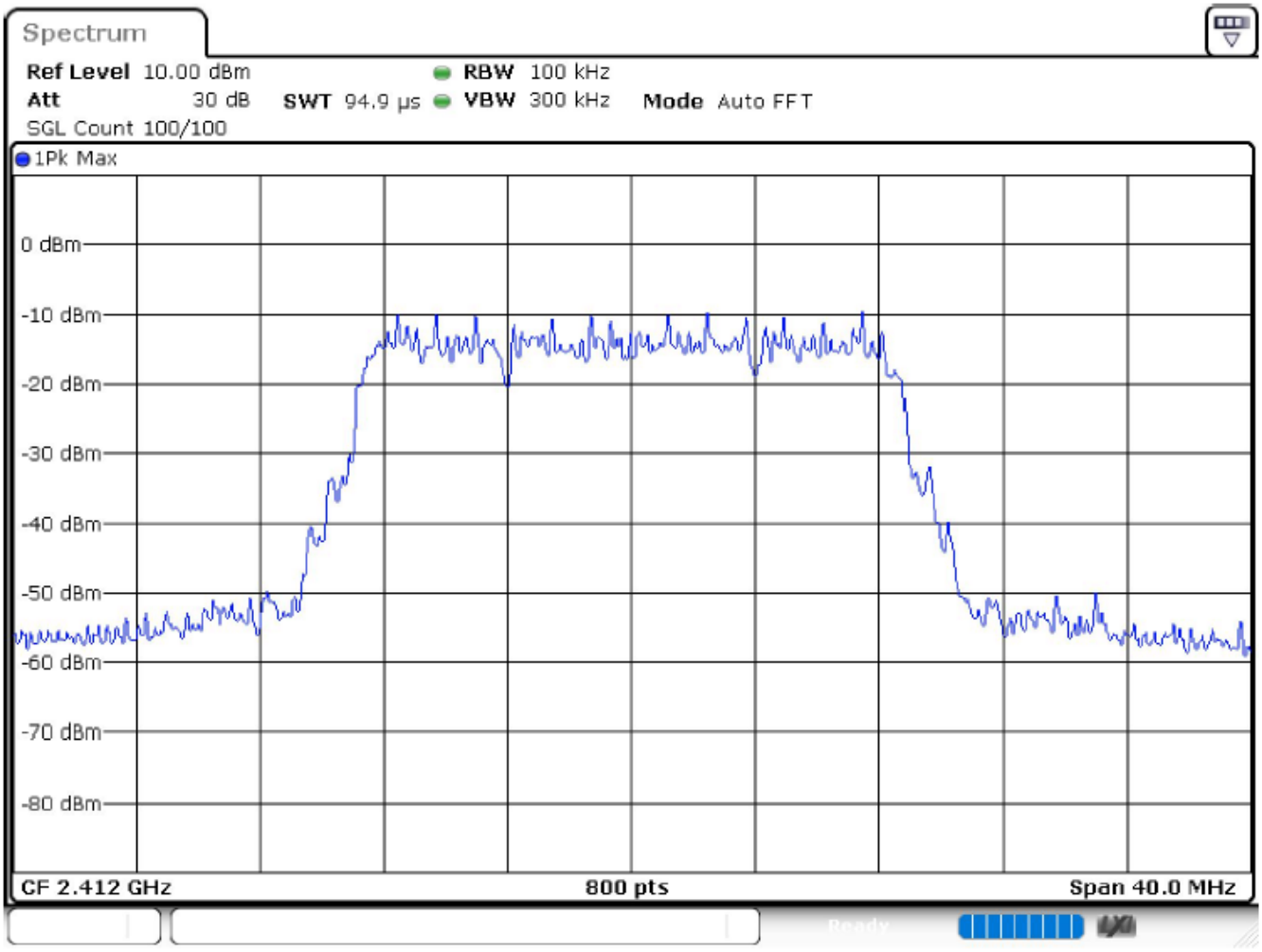




Test Model	DTS (6dB) Bandwidth 802.11g Channel 1: 2412MHz

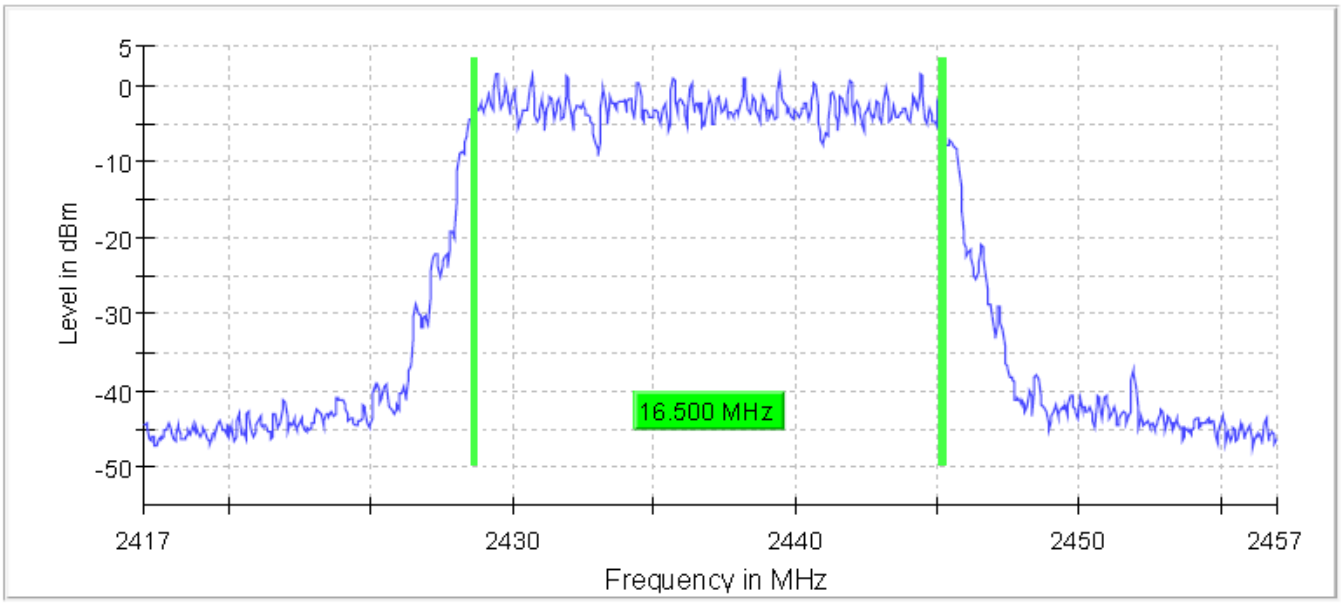
6 dB Bandwidth

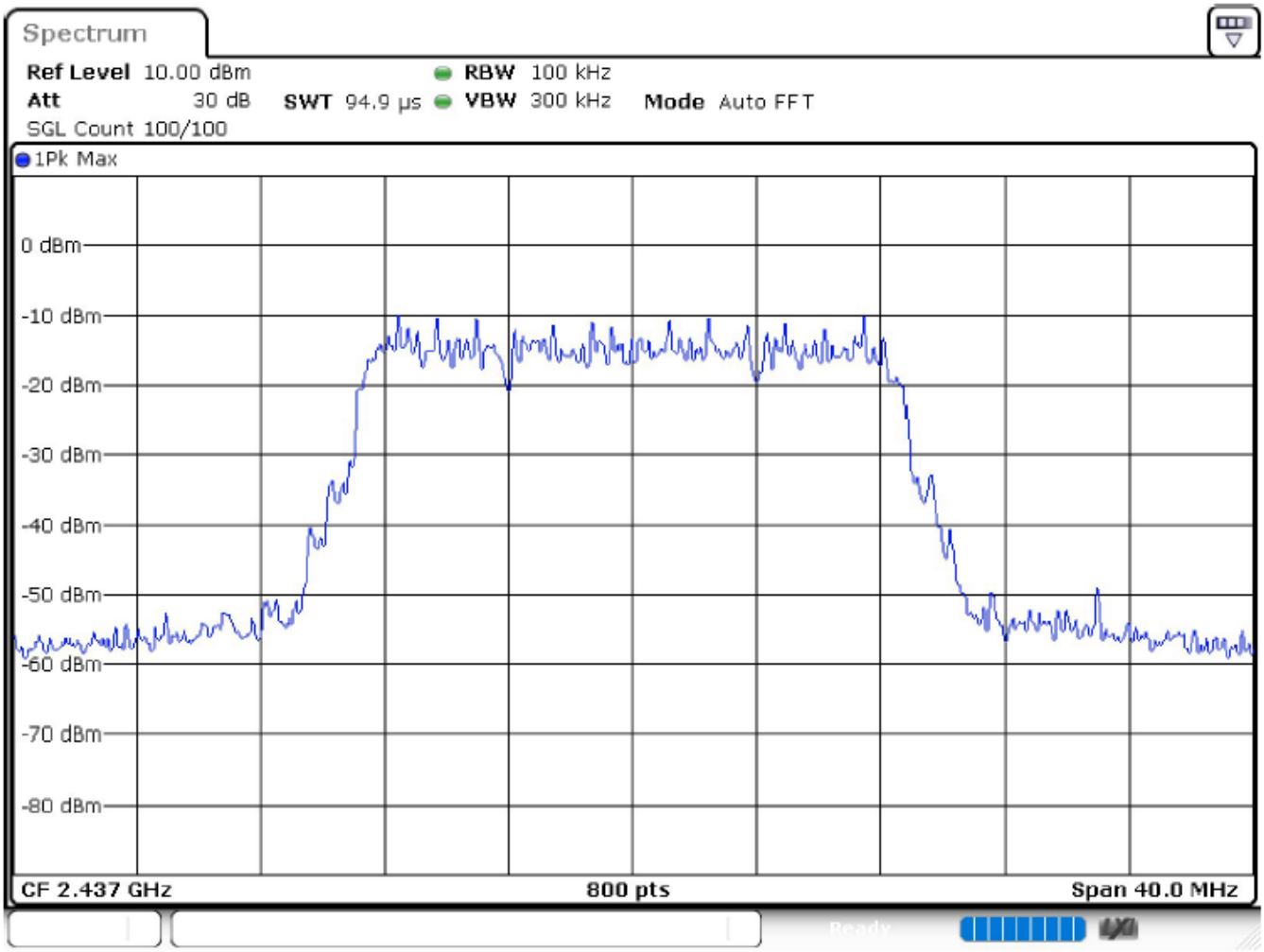




Test Model	DTS (6dB) Bandwidth 802.11g Channel 6: 2437MHz

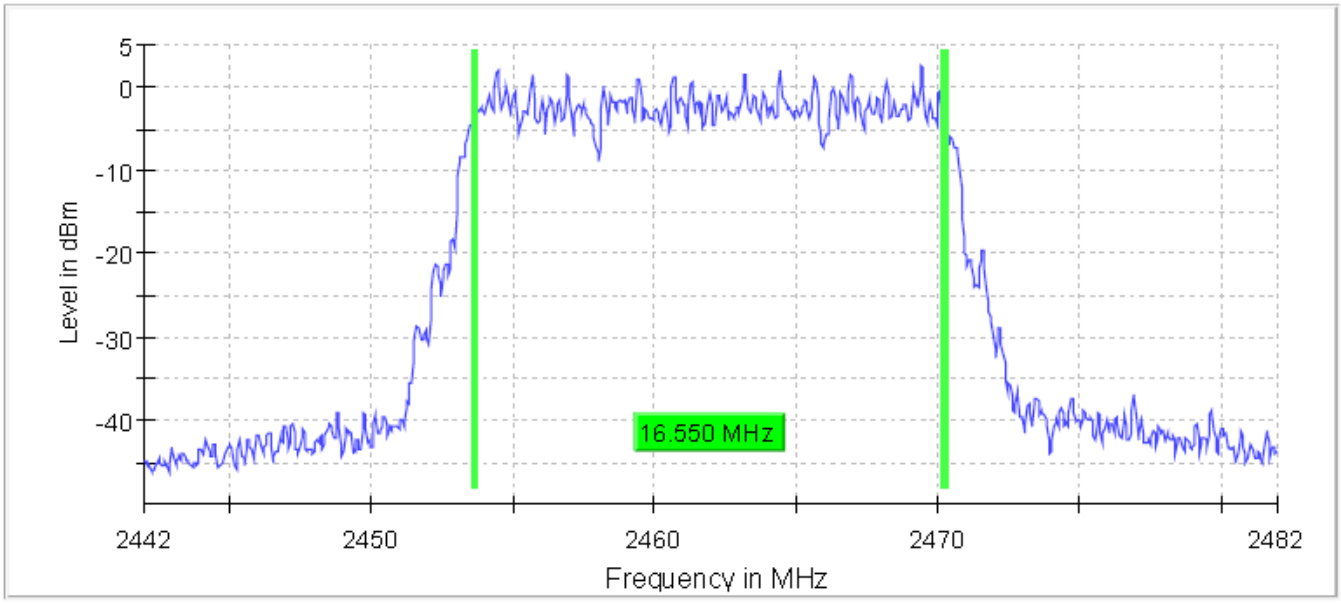
6 dB Bandwidth

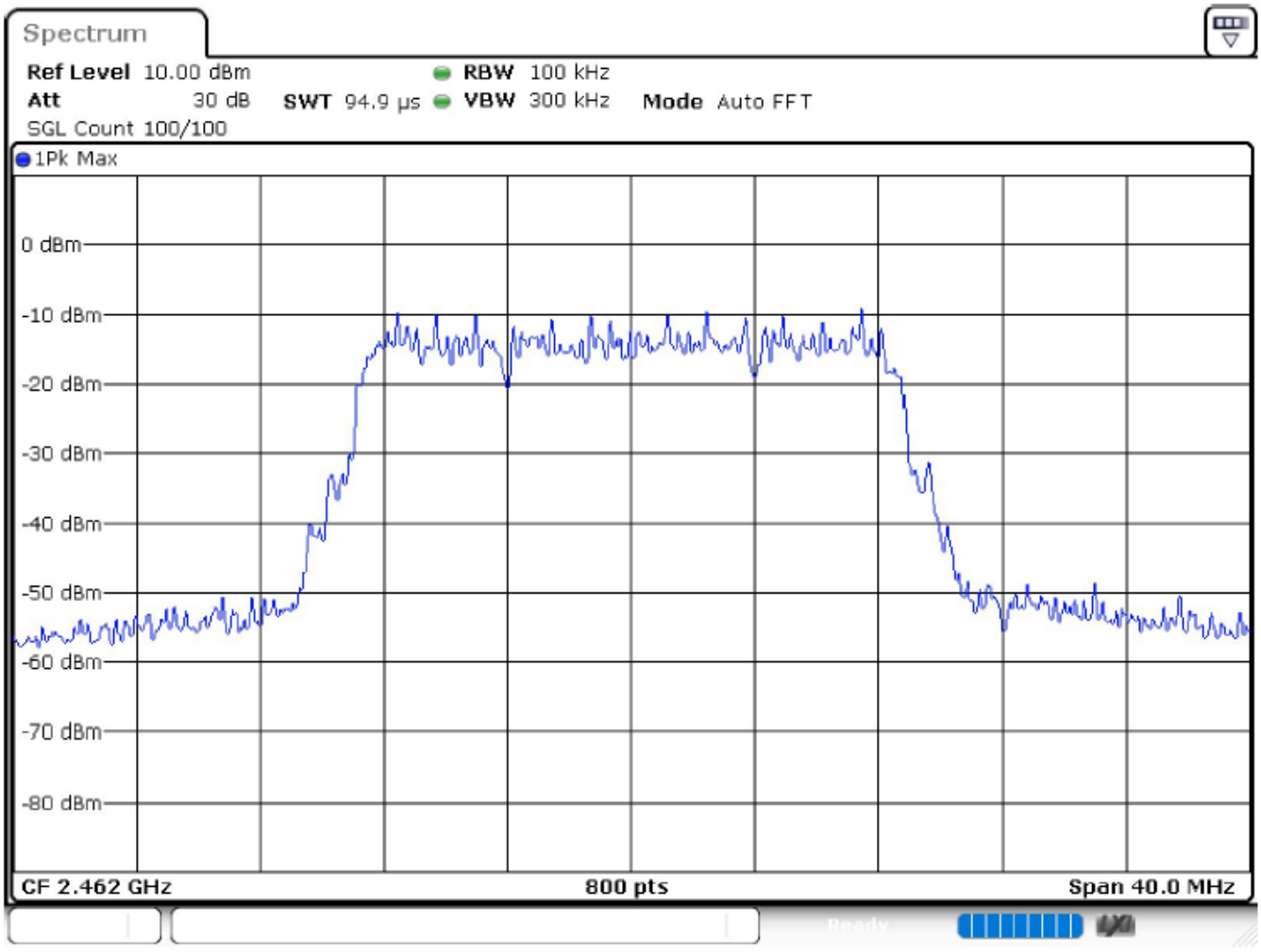




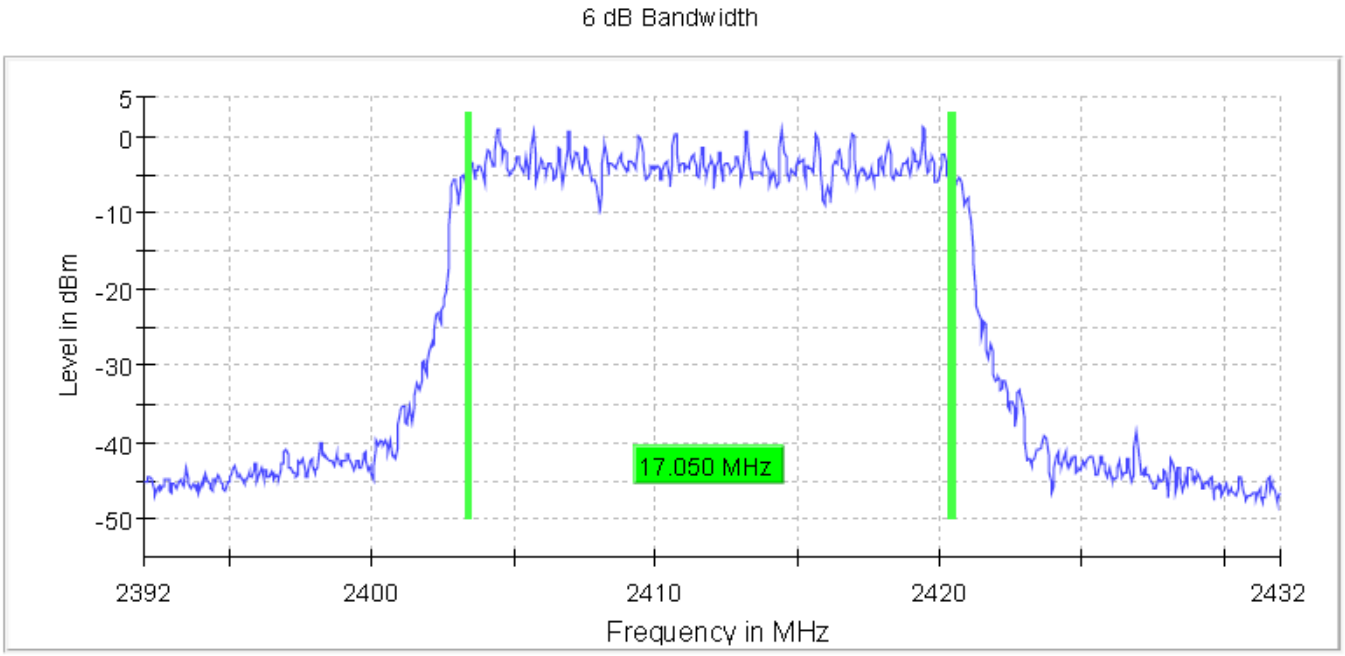
Test Model	DTS (6dB) Bandwidth 802.11g Channel 11: 2462MHz

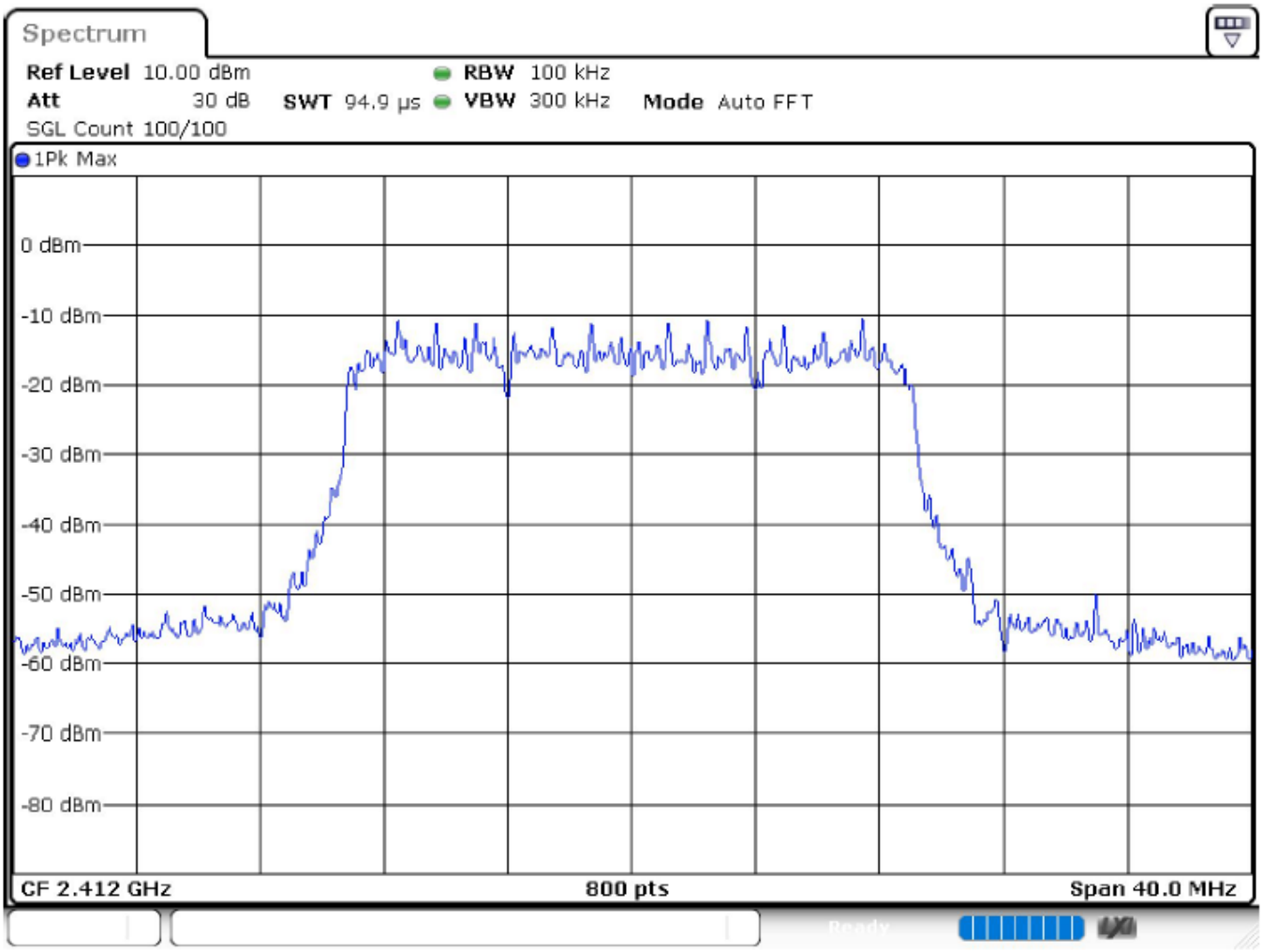
6 dB Bandwidth





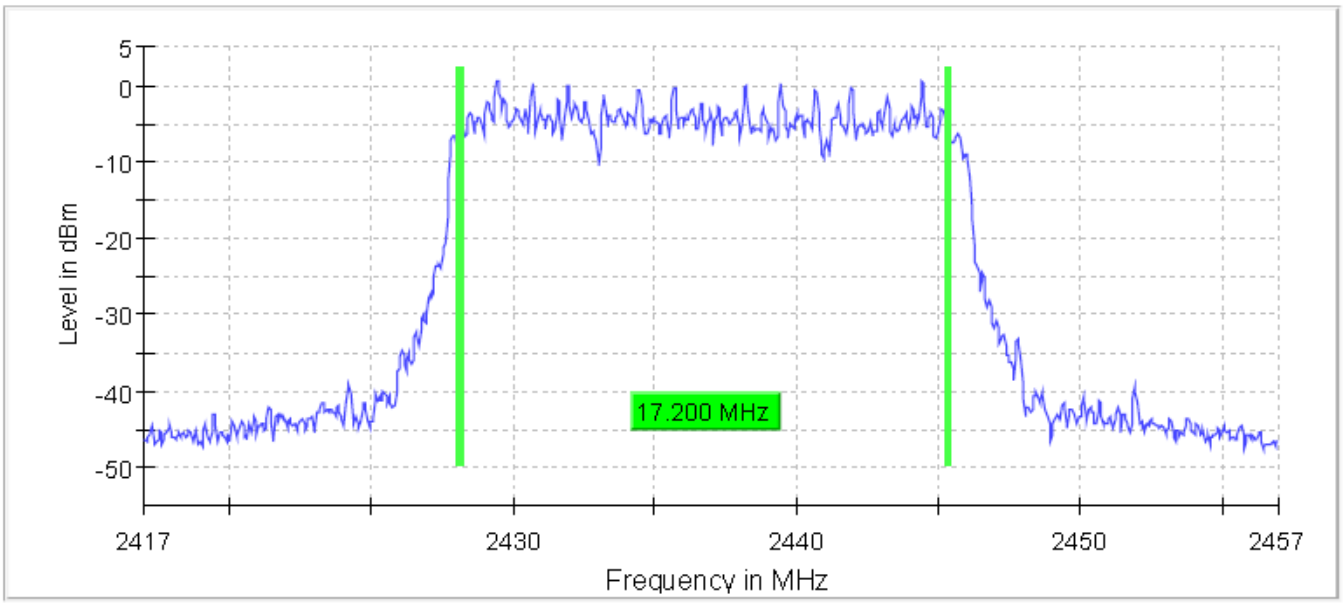
Test Model	DTS (6dB) Bandwidth 802.11n (HT20) Channel 1: 2412MHz

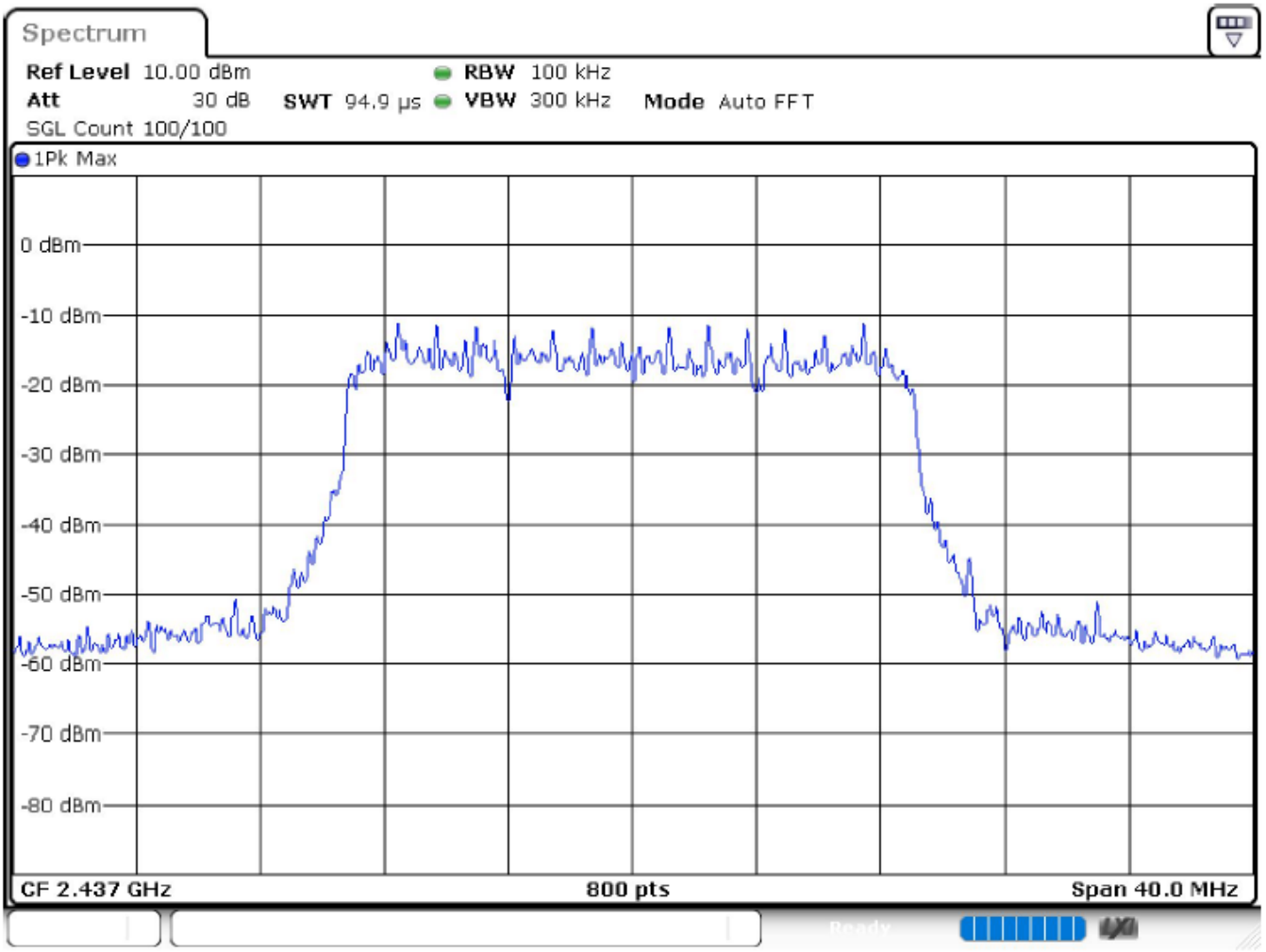




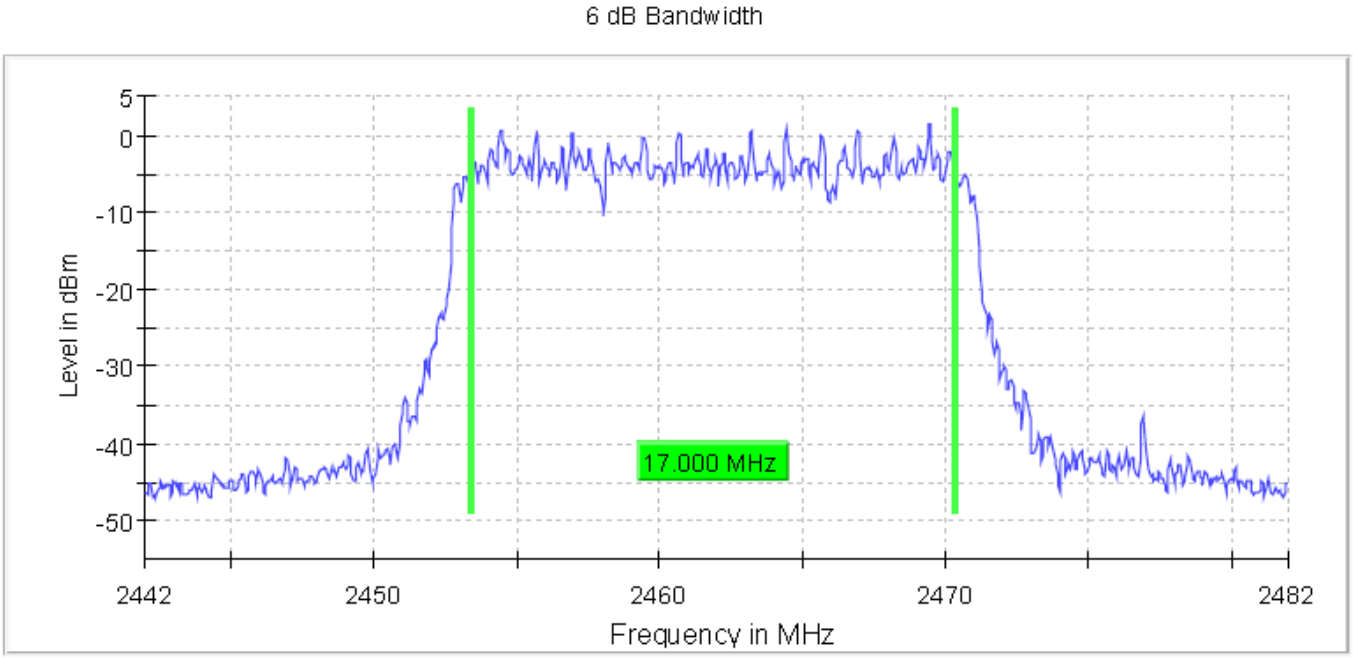
Test Model	DTS (6dB) Bandwidth 802.11n (HT20) Channel 6: 2437MHz

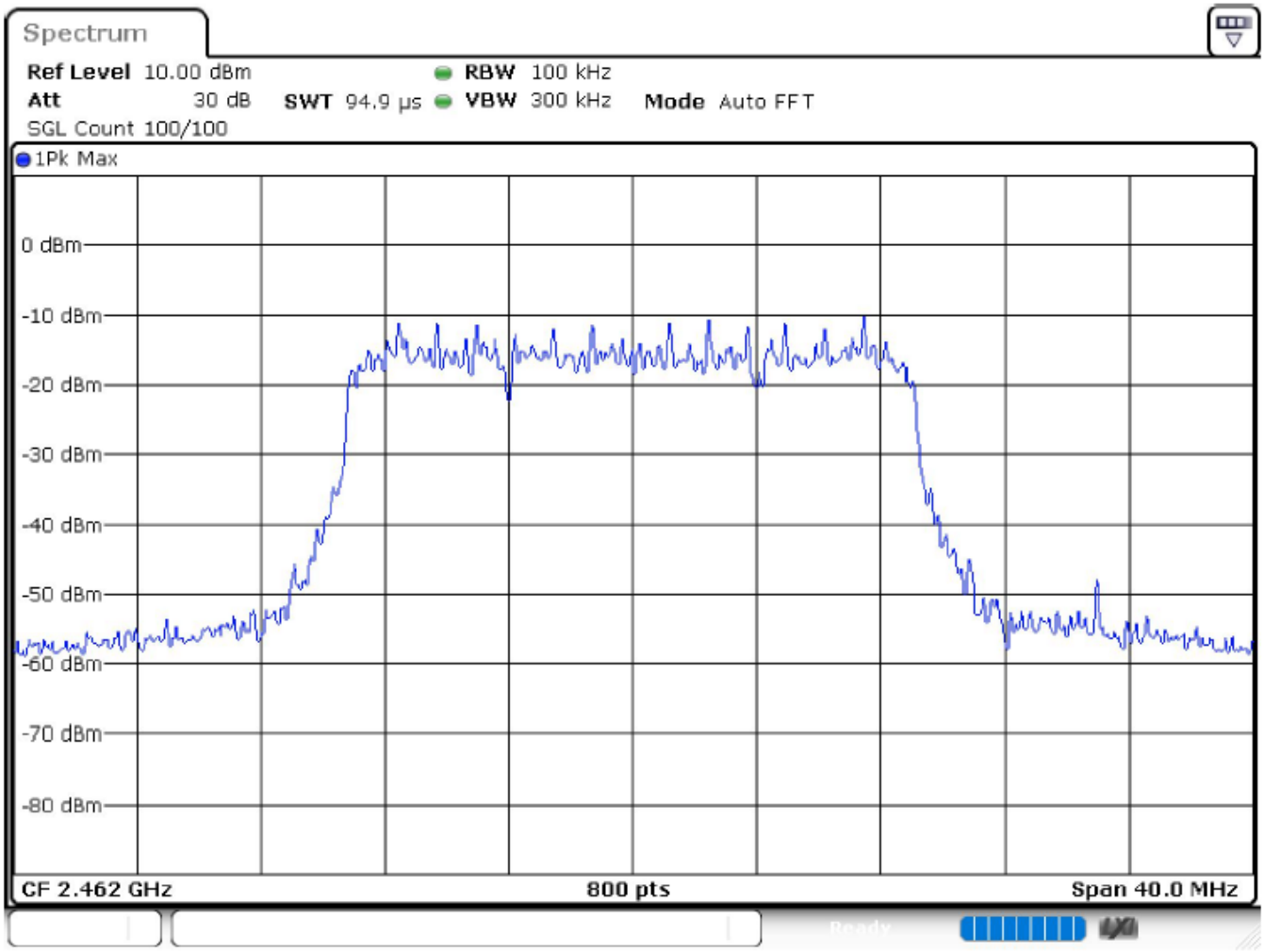
6 dB Bandwidth



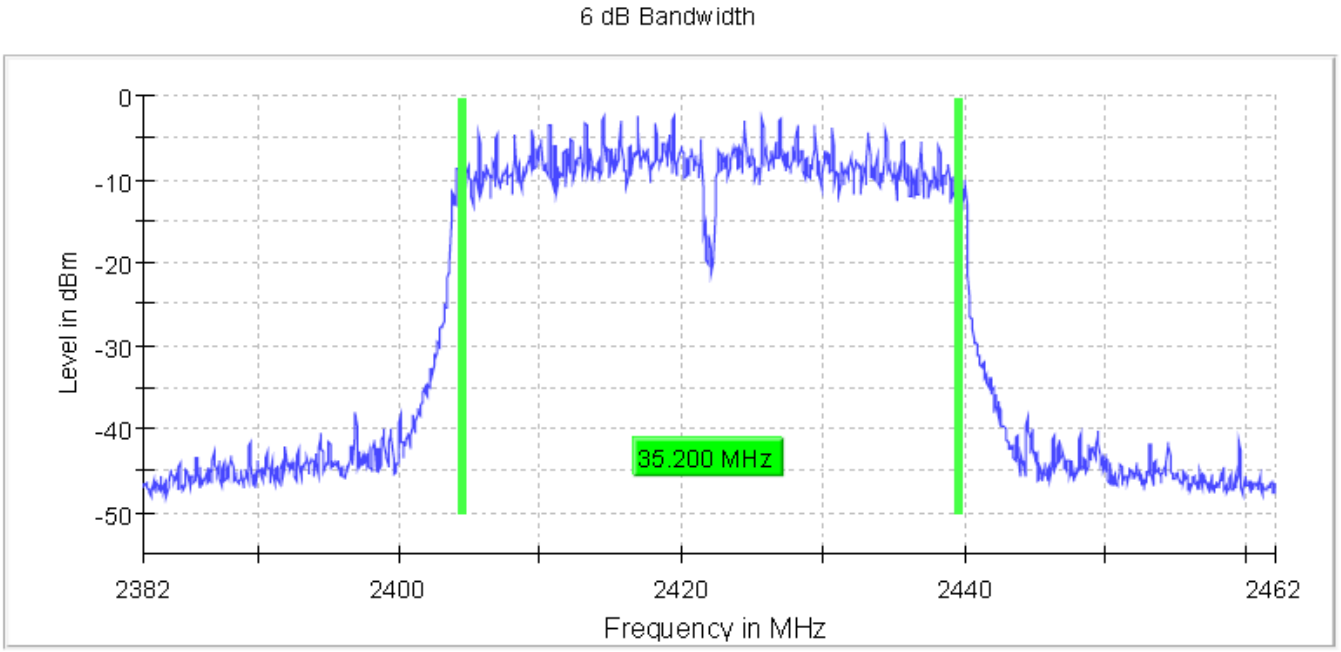


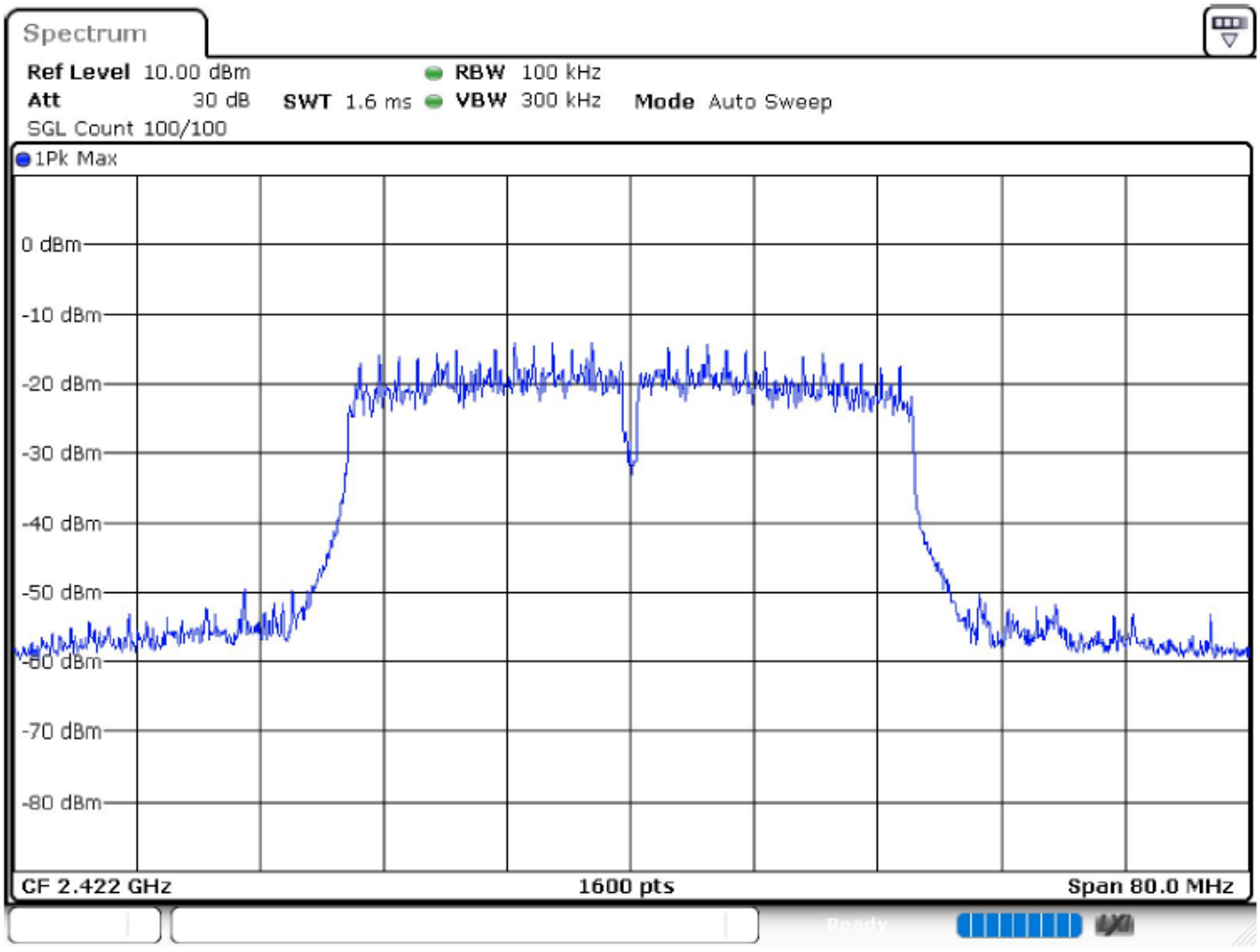
Test Model	DTS (6dB) Bandwidth 802.11n (HT20) Channel 11: 2462MHz





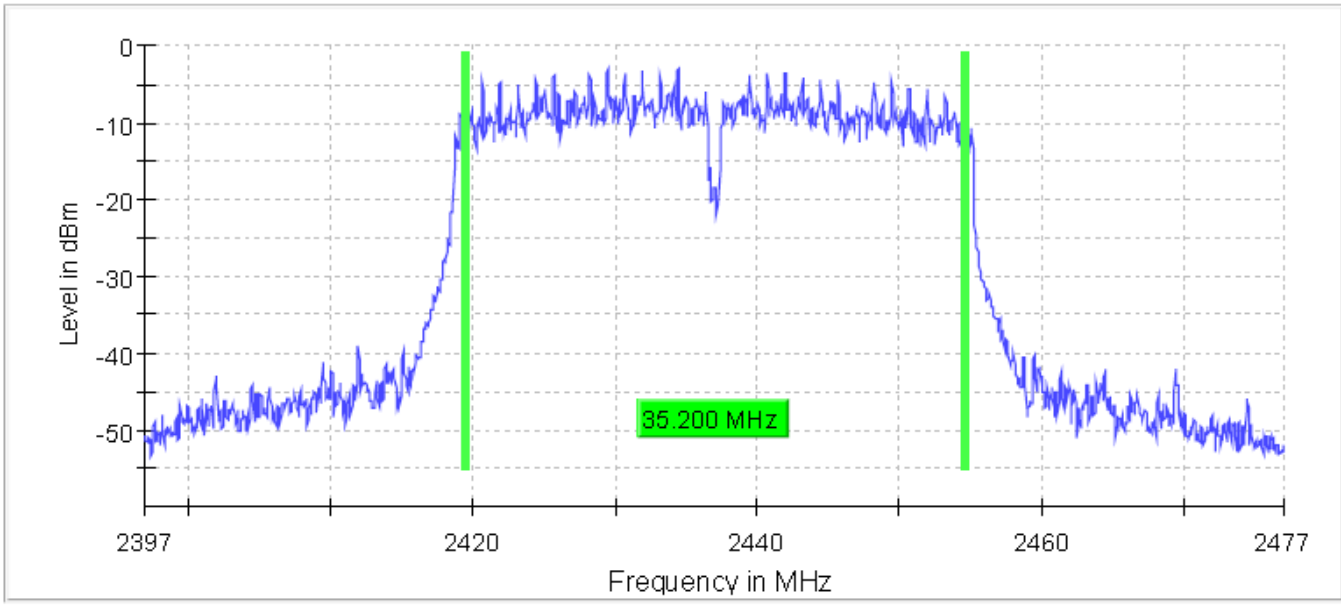
Test Model	DTS (6dB) Bandwidth 802.11n (HT40) Channel 3: 2422MHz

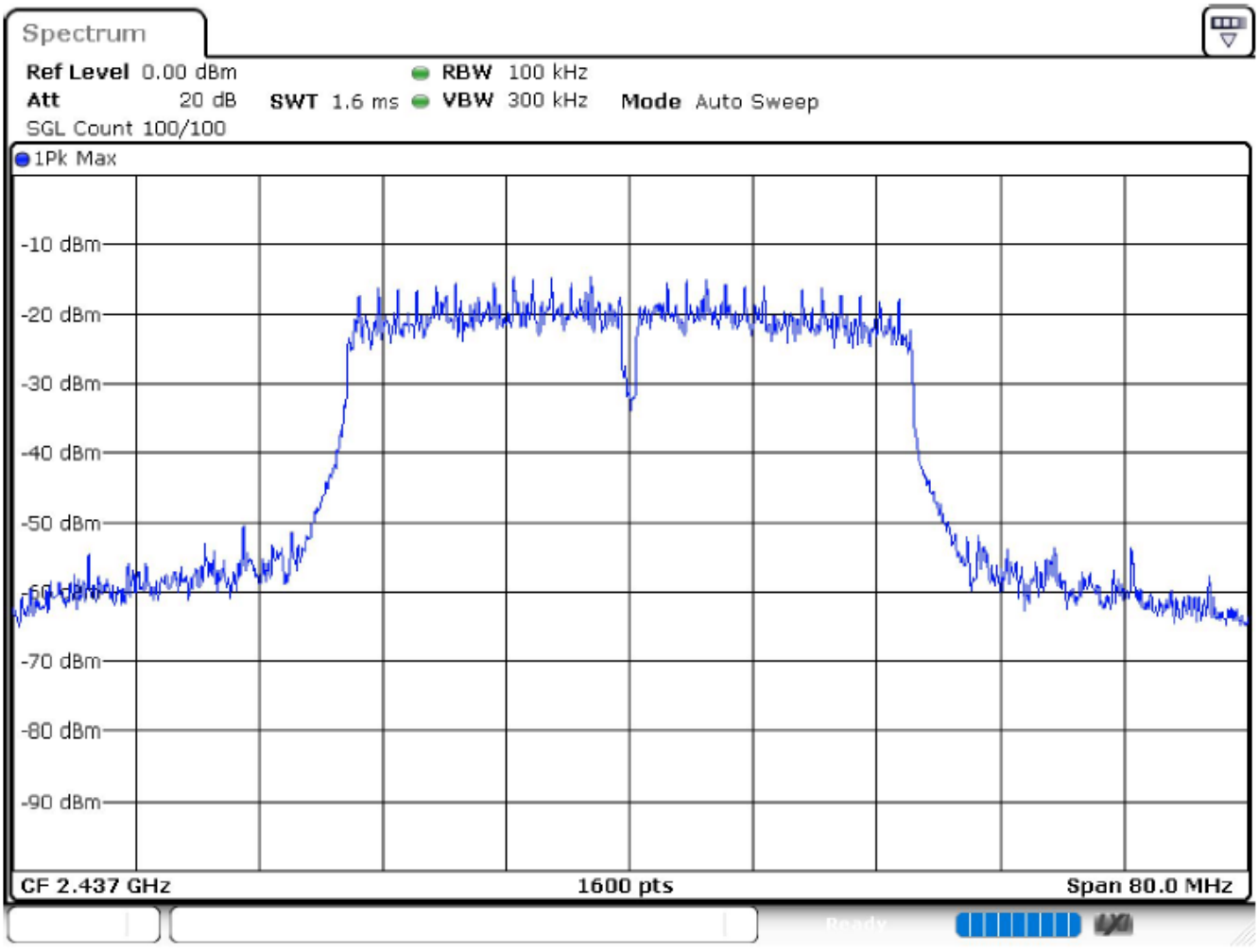




Test Model	DTS (6dB) Bandwidth 802.11n (HT40) Channel 6: 2437MHz

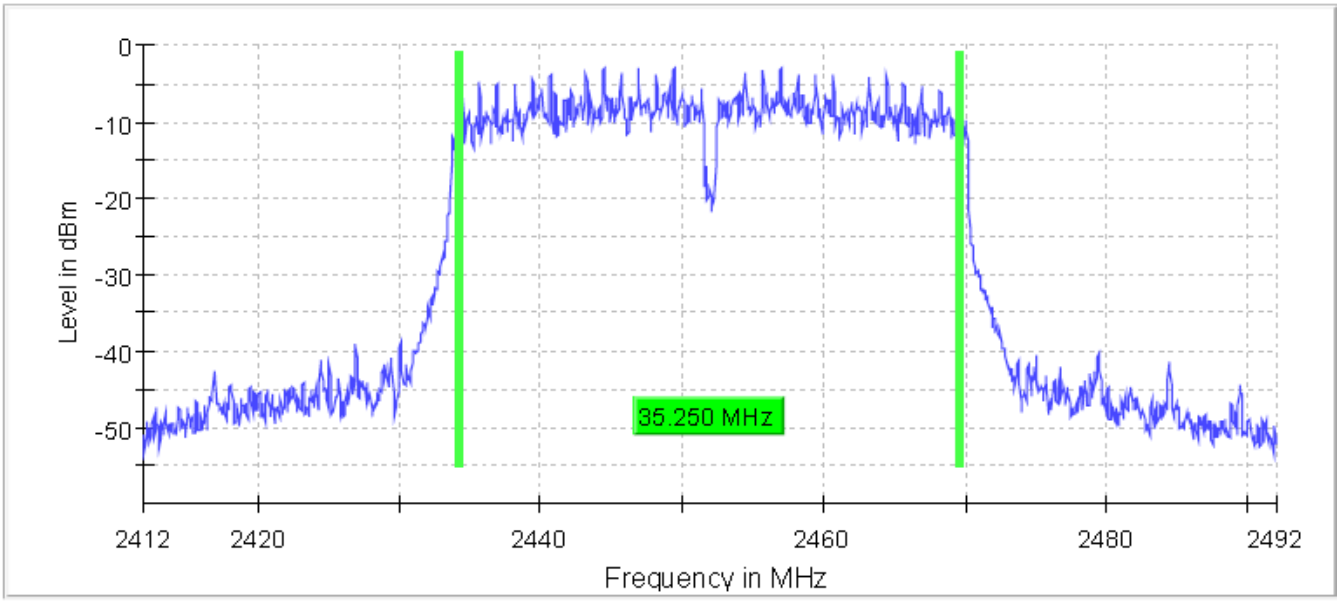
6 dB Bandwidth

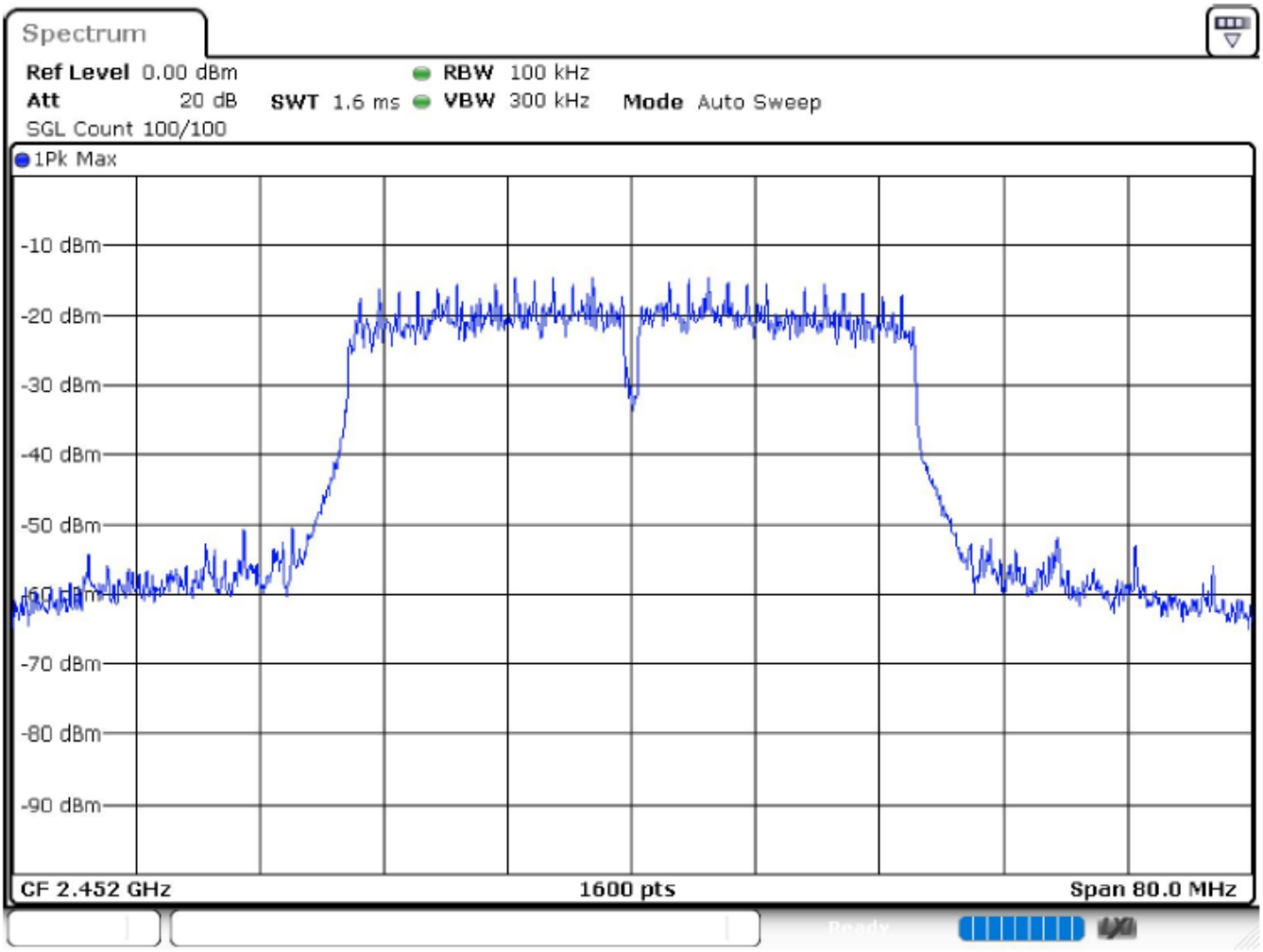




Test Model	DTS (6dB) Bandwidth 802.11n (HT40) Channel 9: 2452MHz

6 dB Bandwidth





7.2 MAXIMUM CONDUCTED OUTPUT POWER

7.2.1 Applicable Standard

According to FCC Part15.247 (b)(3) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.2.2 Conformance Limit

The maximum 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).

7.2.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.2.4 Test Procedure

■ According to FCC Part15.247(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 attnuator. 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)

7.2.5 Test Results

Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm)	Limit (dBm)	Verdict
802.11b	1	2412	13.586	30	PASS
	6	2437	13.148	30	PASS
	11	2462	13.523	30	PASS
802.11g	1	2412	12.522	30	PASS
	6	2437	12.535	30	PASS
	11	2462	12.751	30	PASS
802.11n (HT20)	1	2412	11.330	30	PASS
	6	2437	11.364	30	PASS
	11	2462	11.555	30	PASS
802.11n (HT40)	3	2422	10.393	30	PASS
	6	2437	10.087	30	PASS
	9	2452	10.135	30	PASS

7.3 MAXIMUM POWER SPECTRAL DENSITY

7.3.1 Applicable Standard

According to FCC Part15.247(e) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.3.2 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.

7.3.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.3.4 Test Procedure

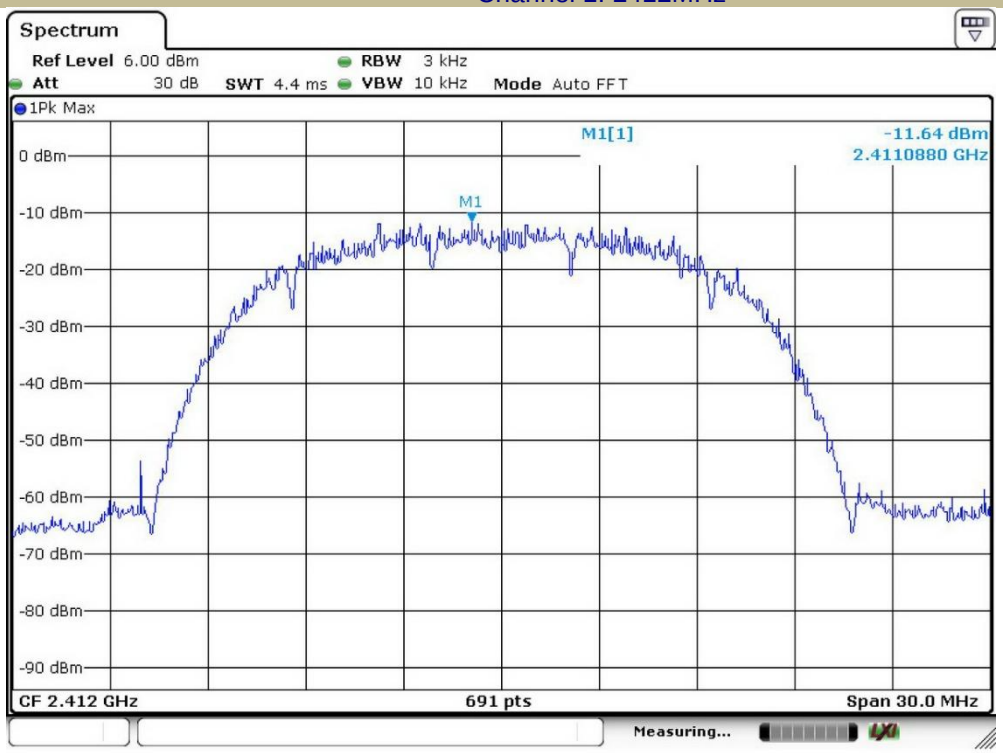
This procedure shall be used if maximum peak conducted output power was used to demonstrate compliance
The transmitter output (antenna port) was connected to the spectrum analyzer
Set analyzer center frequency to DTS channel center frequency.
Set the span to 1.5 times the DTS bandwidth.
Set the RBW to: 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)

7.3.5 Test Results

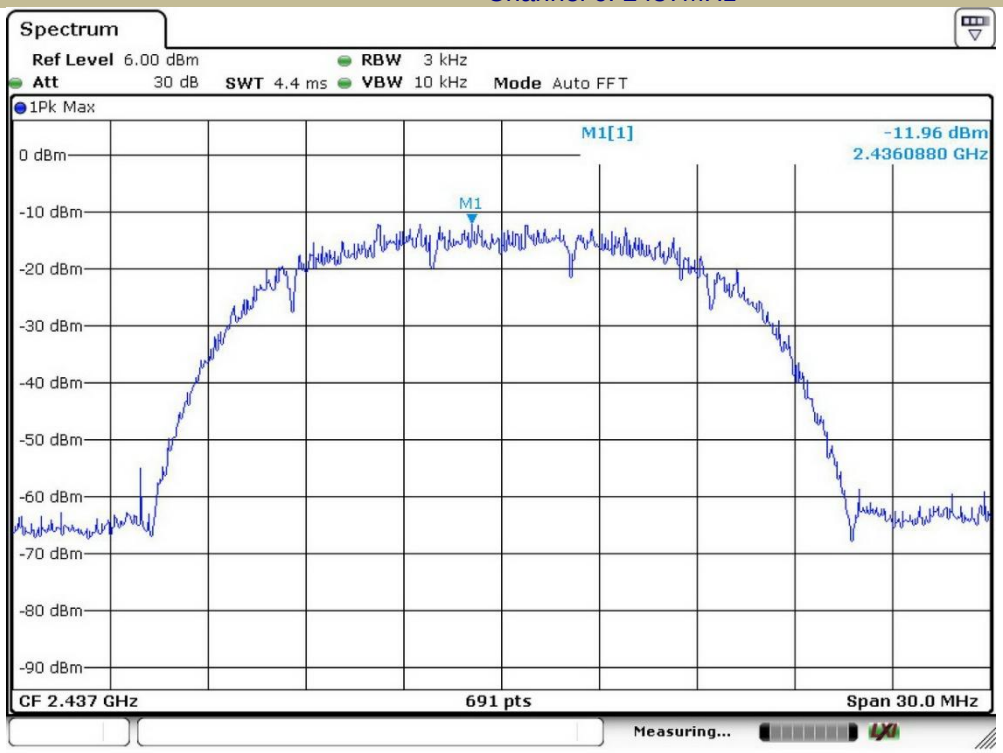
Temperature:	25° C
Relative Humidity:	53%
ATM Pressure:	1011 mbar

Operation Mode	Channel Number	Channel Frequency (MHz)	Measurement Level (dBm/3kHz)	Limit (dBm/3kHz)	Verdict
802.11b	1	2412	-11.64	8	PASS
	6	2437	-11.96	8	PASS
	11	2462	-10.99	8	PASS
802.11g	1	2412	-15.39	8	PASS
	6	2437	-15.38	8	PASS
	11	2462	-14.46	8	PASS
802.11n (HT20)	1	2412	-16.17	8	PASS
	6	2437	-16.01	8	PASS
	11	2462	-15.21	8	PASS
802.11n (HT40)	3	2422	-21.72	8	PASS
	6	2437	-21.91	8	PASS
	9	2452	-21.45	8	PASS

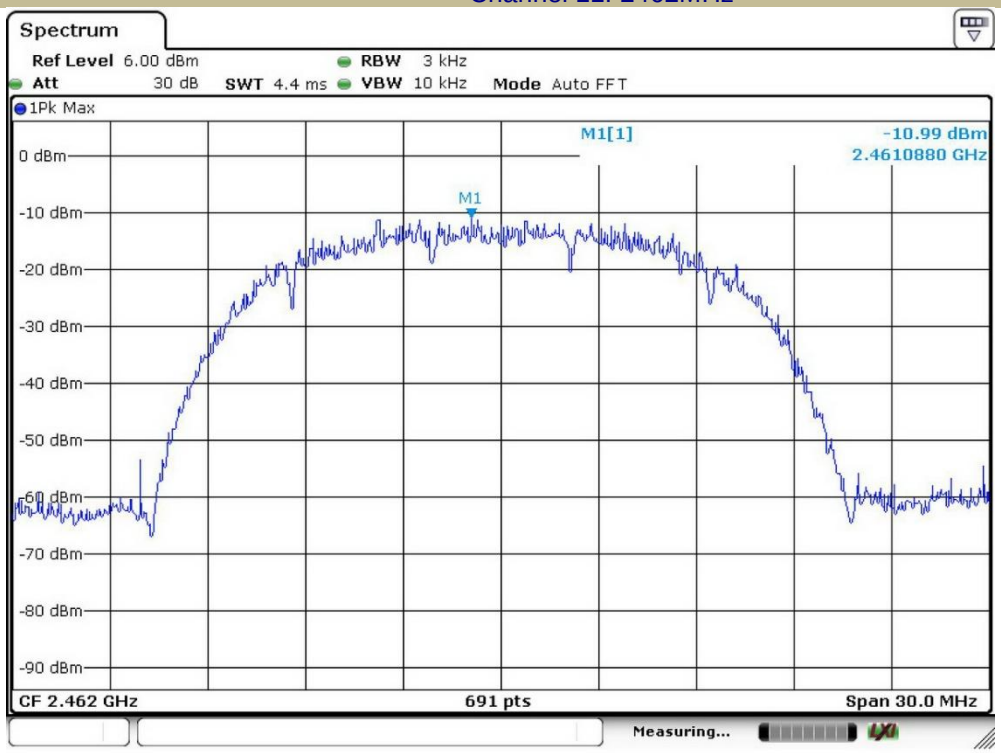
Test Model	Power Spectral Density 802.11b Channel 1: 2412MHz



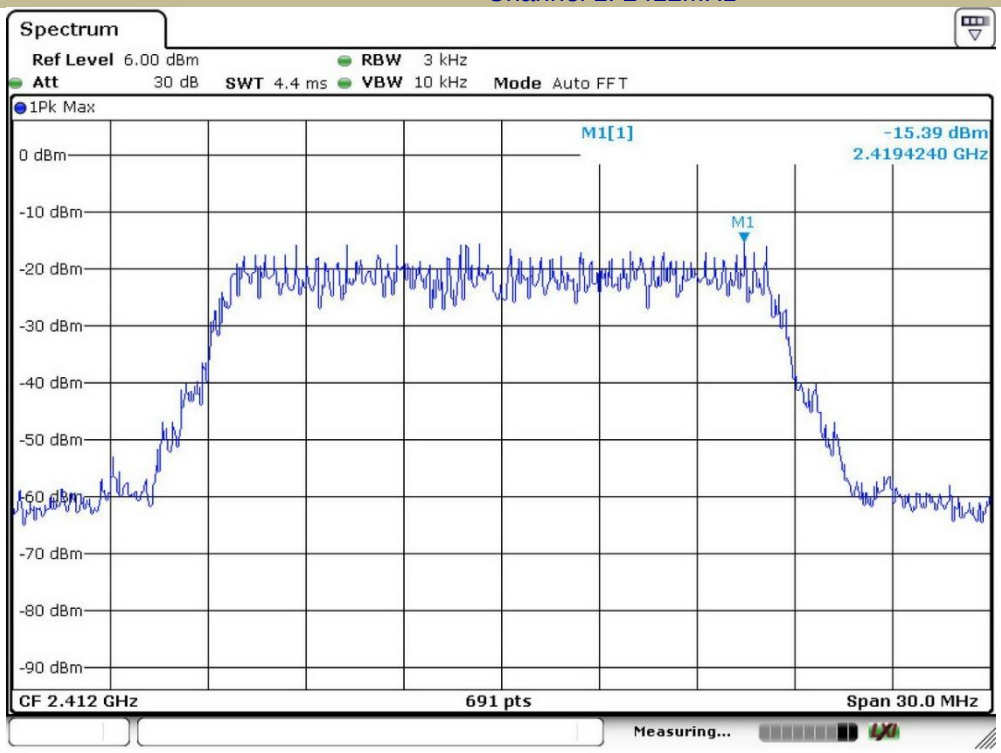
Test Model	Power Spectral Density 802.11b Channel 6: 2437MHz



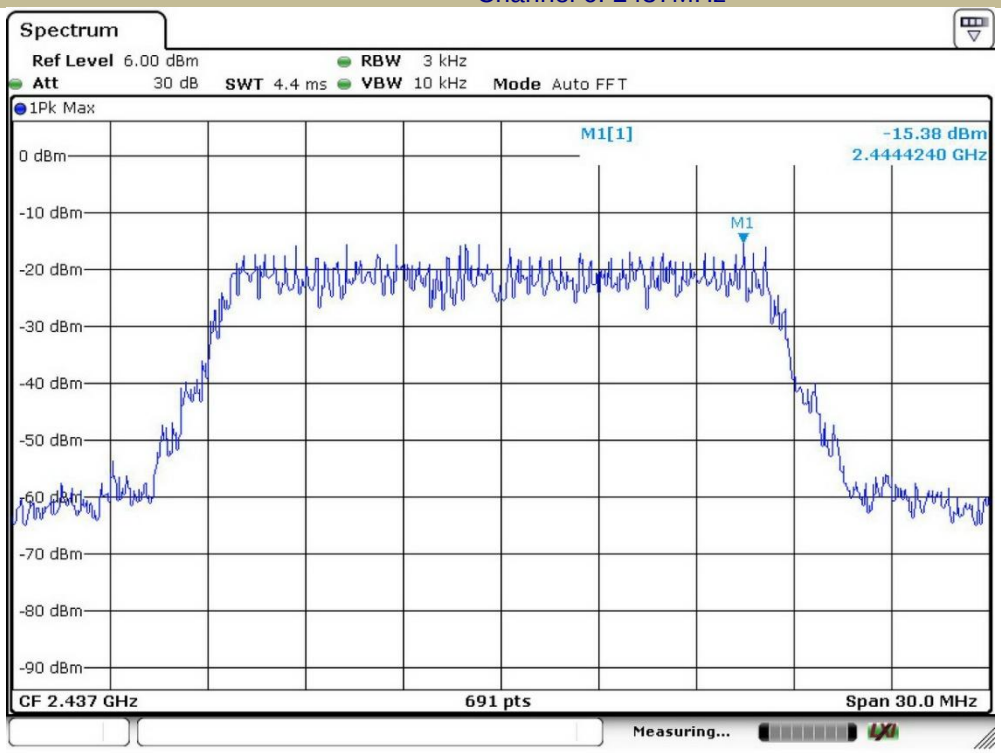
Test Model	Power Spectral Density 802.11b Channel 11: 2462MHz



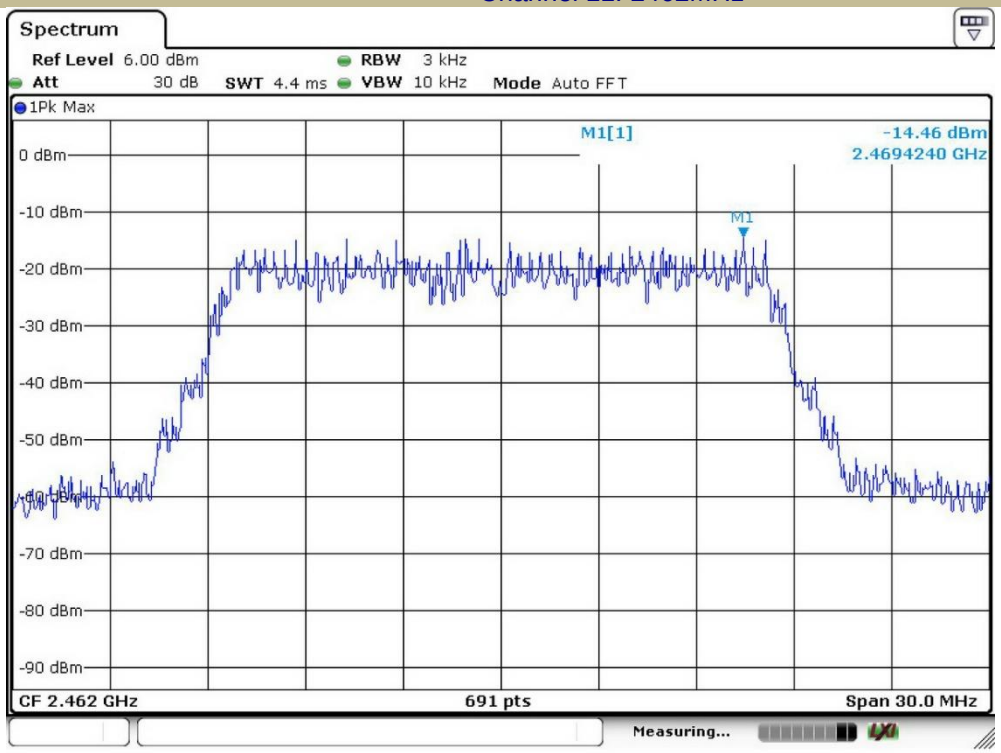
Test Model	Power Spectral Density 802.11g Channel 1: 2412MHz



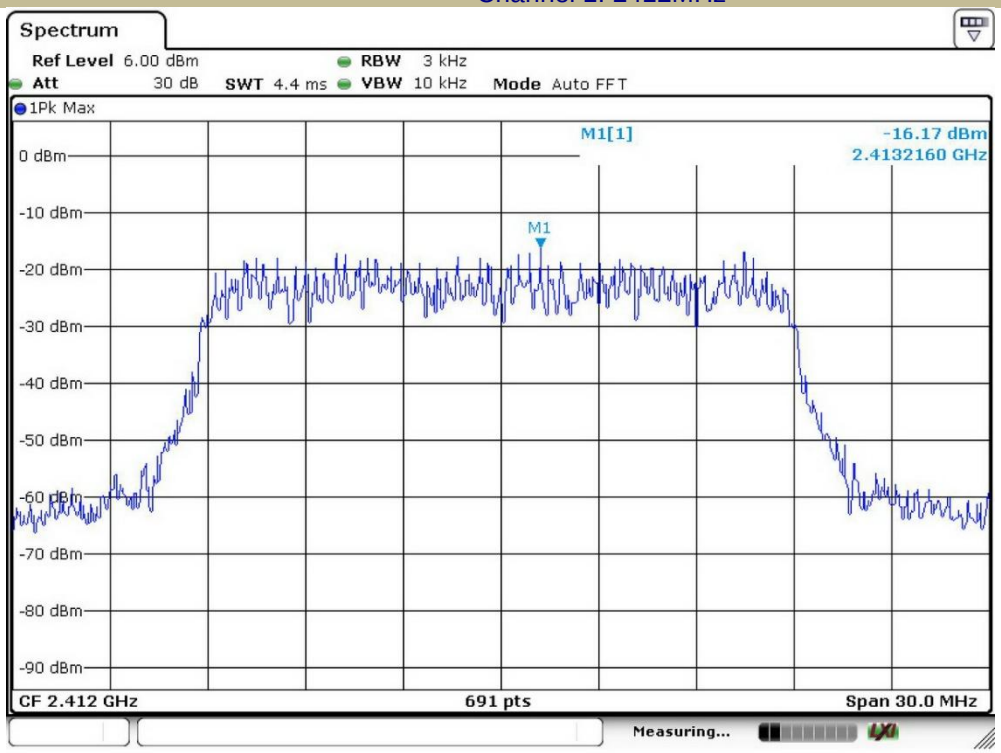
Test Model	Power Spectral Density 802.11g Channel 6: 2437MHz



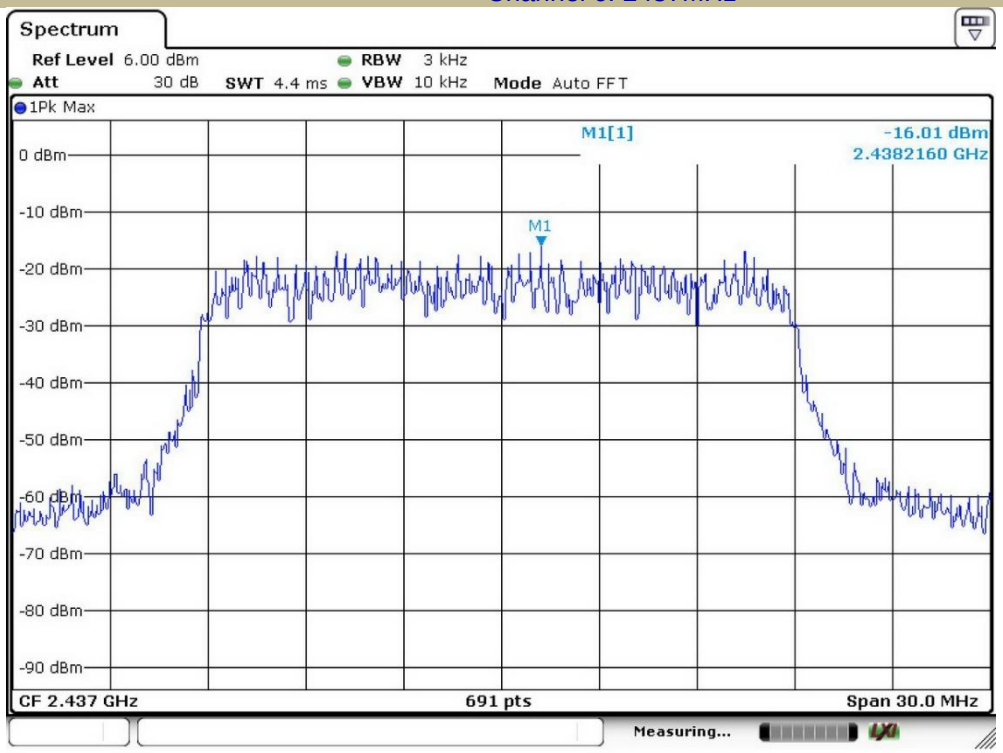
Test Model	Power Spectral Density 802.11g Channel 11: 2462MHz



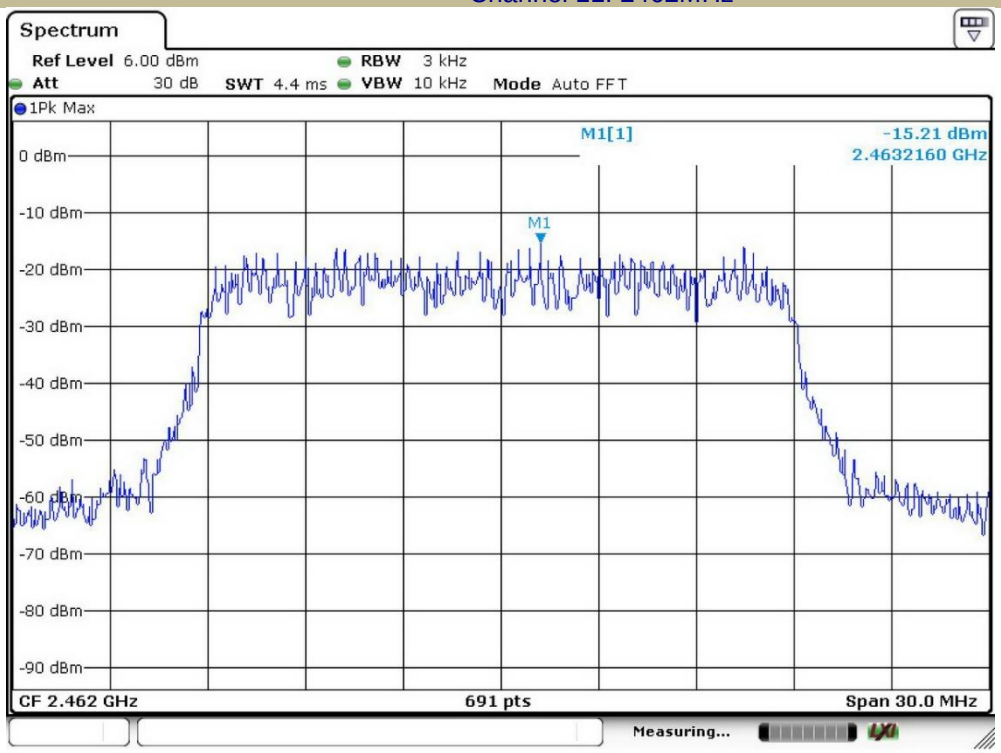
Test Model	Power Spectral Density 802.11n (HT20) Channel 1: 2412MHz



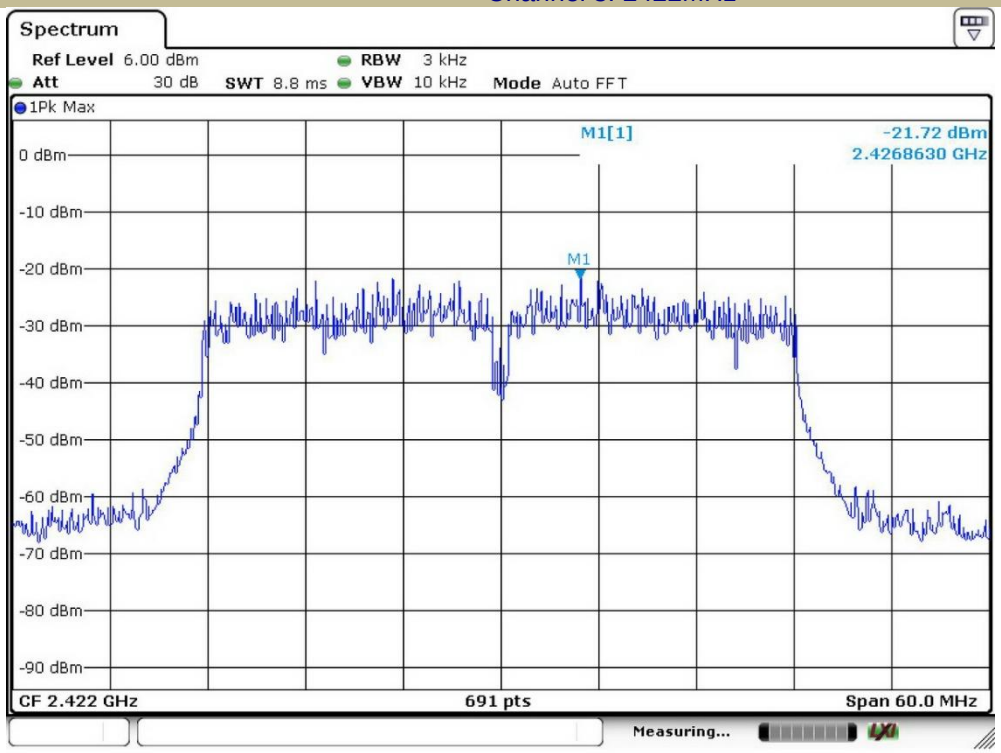
Test Model	Power Spectral Density 802.11n (HT20) Channel 6: 2437MHz



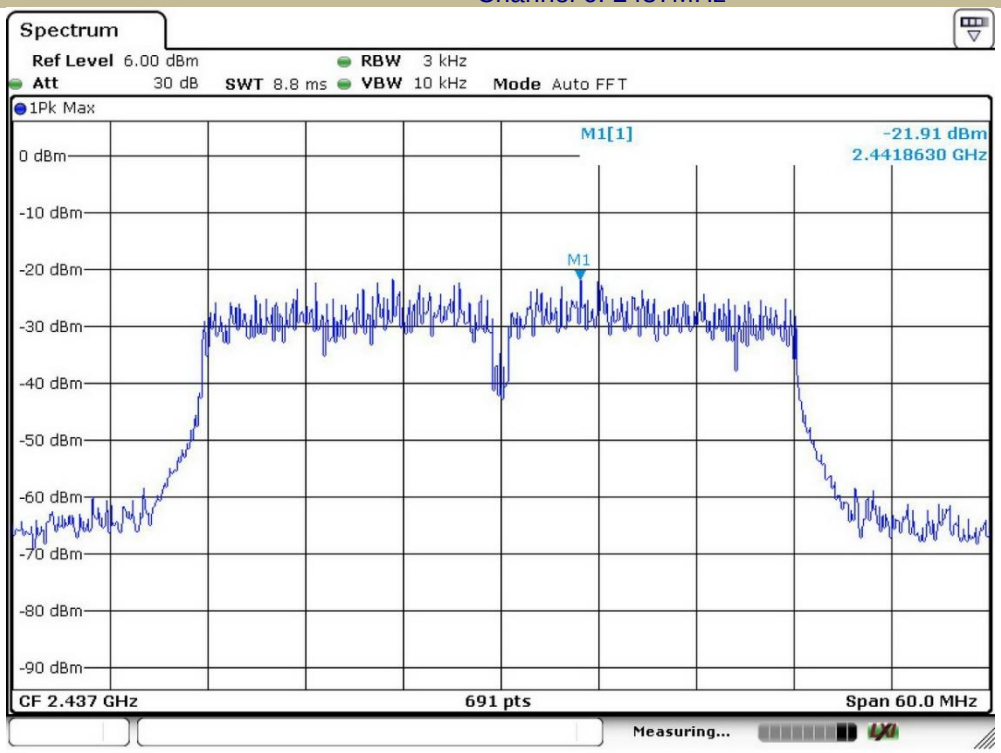
Test Model	Power Spectral Density 802.11n (HT20) Channel 11: 2462MHz



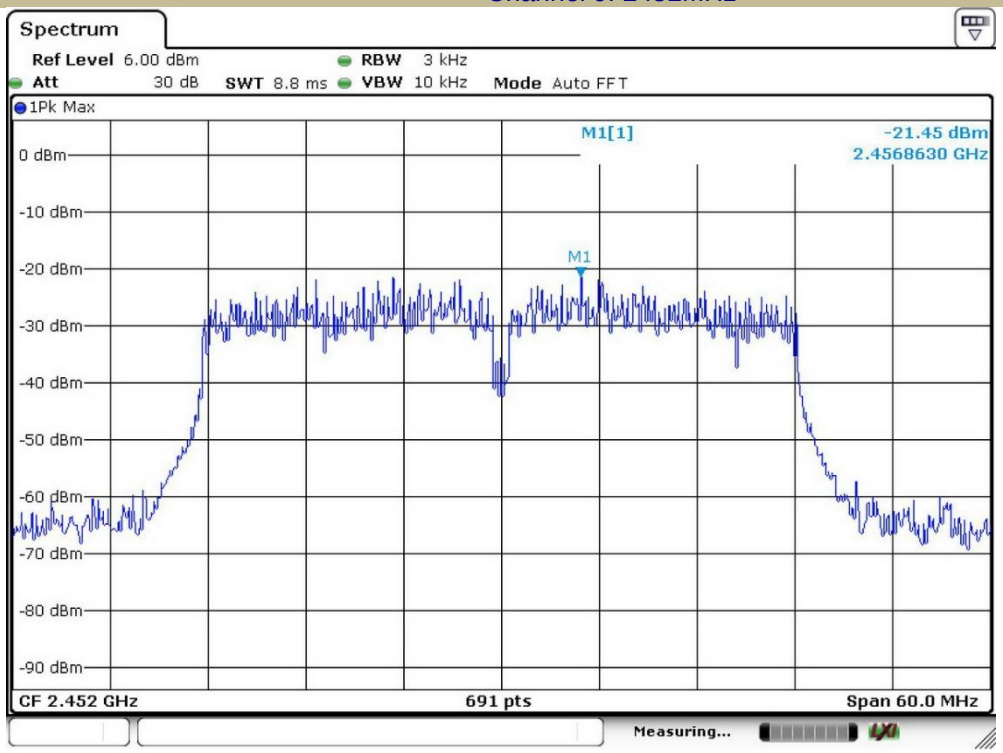
Test Model	Power Spectral Density 802.11n (HT40) Channel 3: 2422MHz



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



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



7.4 UNWANTED EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS

7.4.1 Applicable Standard

According to FCC Part15.247(d) and KDB 558074 D01 15.247 Meas Guidance v05r02

7.4.2 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.

7.4.3 Test Configuration

Test according to clause 6.1 radio frequency test setup 1

7.4.4 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 ≥ 3 x 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**

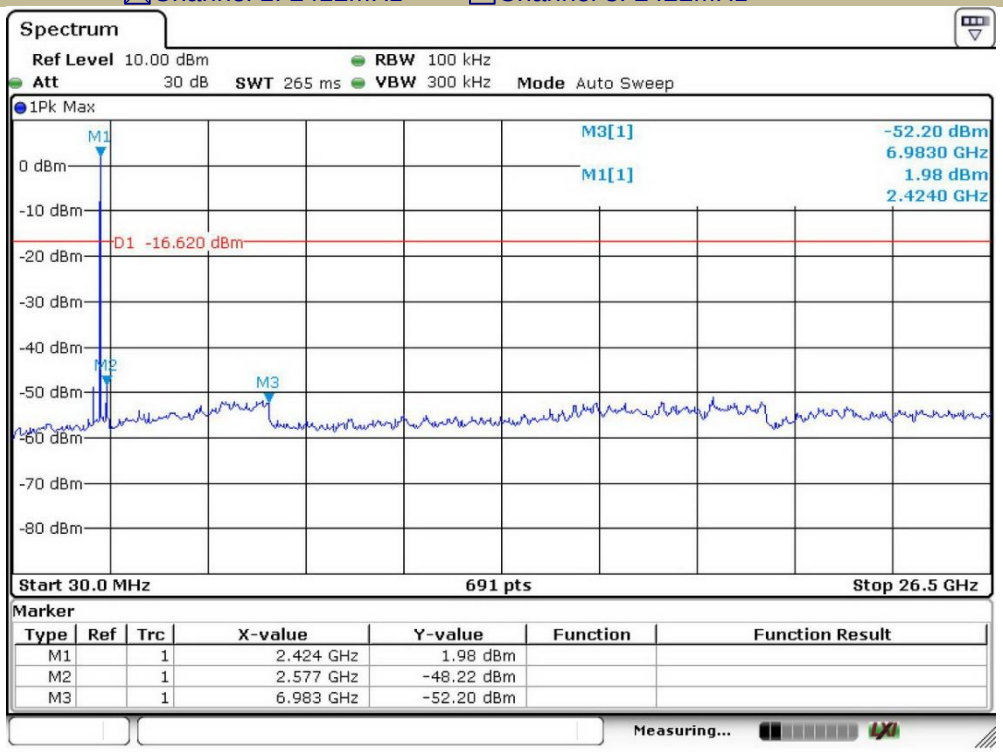
Set the center frequency and span to encompass frequency range to be measured.
Set the RBW = 100 kHz.
Set the VBW =300 kHz.
Set Detector = peak
Sweep time = auto couple.
Trace mode = max hold.
Allow trace to fully stabilize.
Use the peak marker function to determine the maximum amplitude level.
Ensure 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.

7.4.5 Test Results

All the antennas and modulation modes were tested, and the worst data for is shown in the table below.

PSD(Power Spectral Density) RBW=100kHz				
Test Model	☒802.11b	☐802.11g	☐802.11n(HT20)	☐802.11n(HT40)
☒Channel 1: 2412MHz	☐Channel 3: 2422MHz			

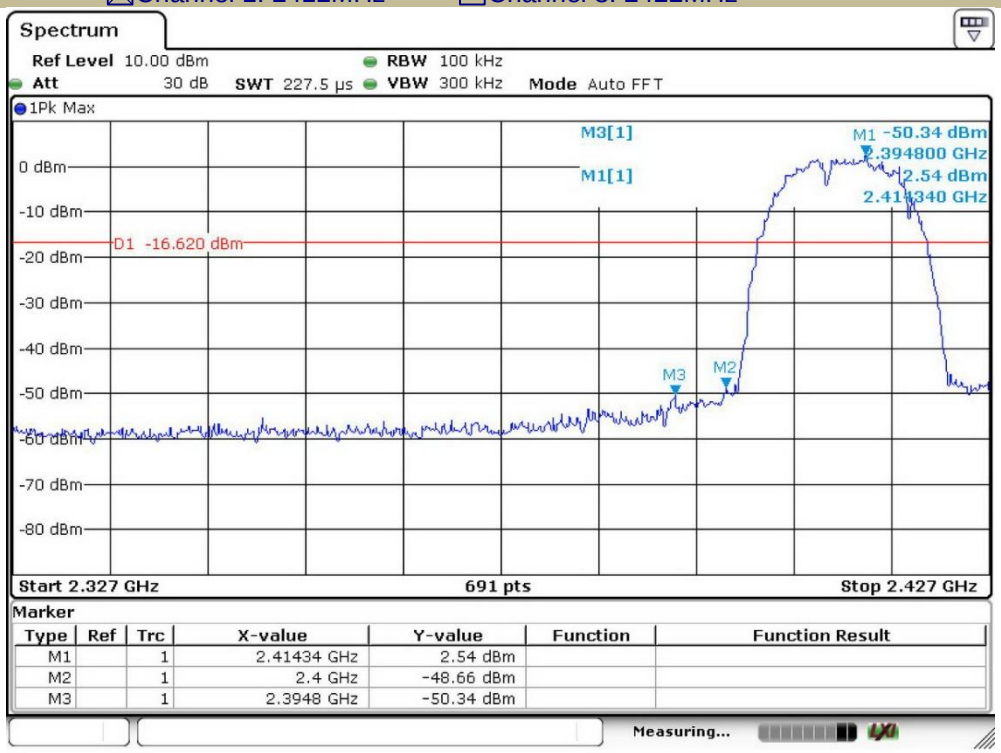
Unwanted Emissions in non-restricted frequency bands				
Test Model	☒802.11b	☐802.11g	☐802.11n(HT20)	☐802.11n(HT40)
☒Channel 1: 2412MHz	☐Channel 3: 2422MHz			



Band edge

Test Model ☒802.11b ☐802.11g ☐802.11n(HT20) ☐802.11n(HT40)

☒Channel 1: 2412MHz ☐Channel 3: 2422MHz

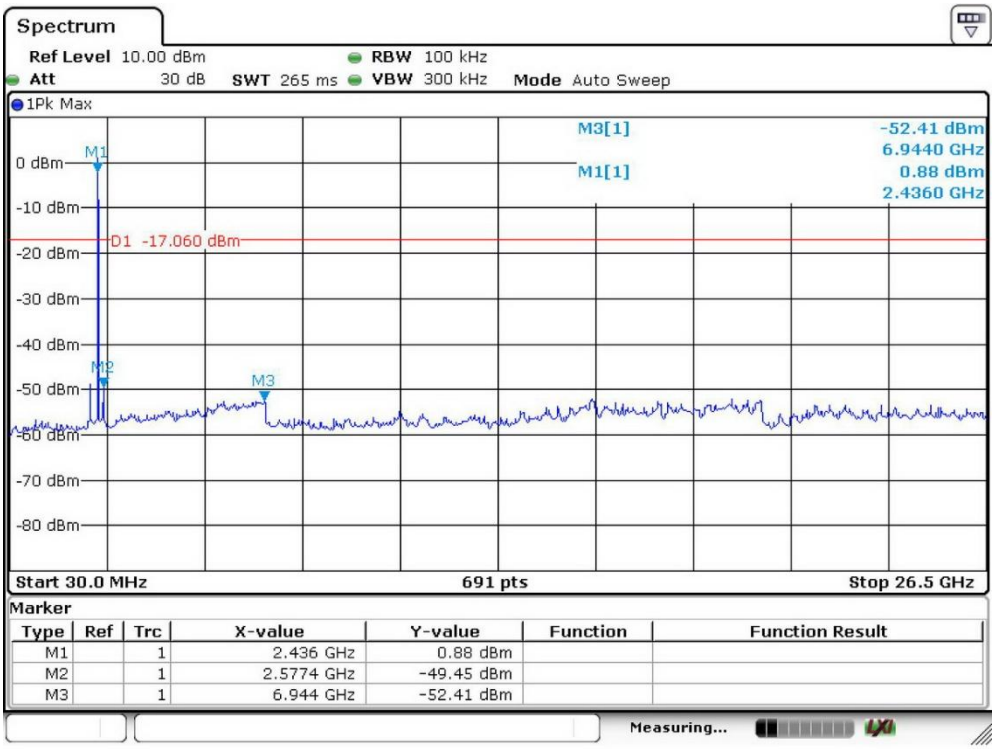


PSD(Power Spectral Density) RBW=100kHz

Test Model ☒802.11b ☐802.11g ☐802.11n(HT20) ☐802.11n(HT40)

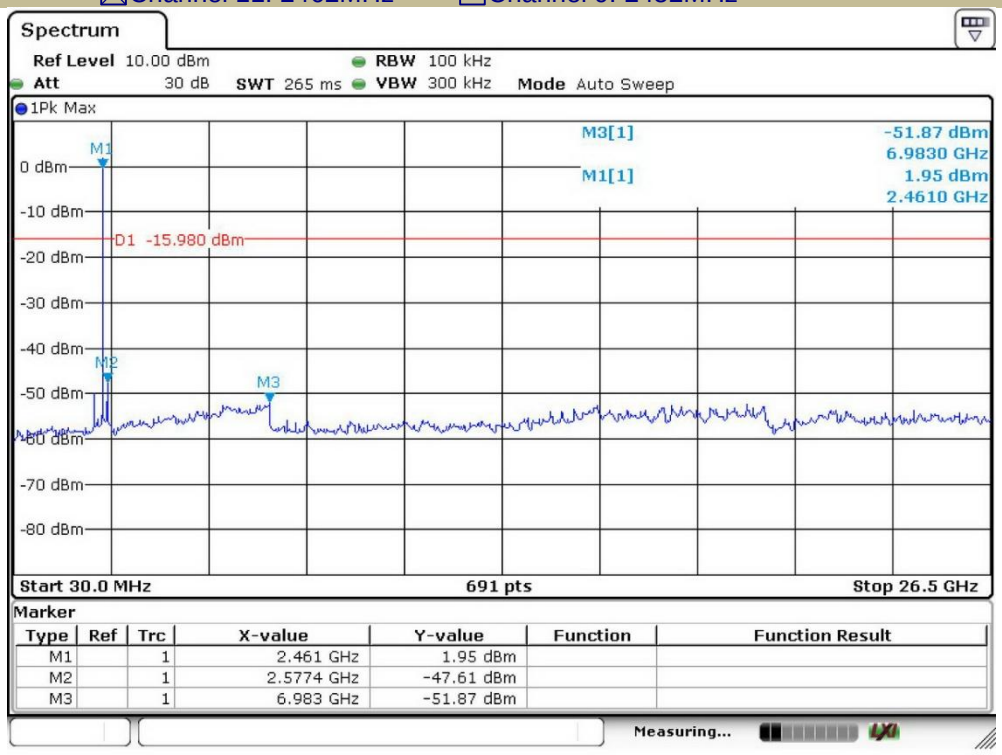
Channel 6: 2437MHz

Unwanted Emissions In Non-Restricted Frequency Bands				
Test Model	☒802.11b	☐802.11g	☐802.11n(HT20)	☐802.11n(HT40)
Channel 6: 2437MHz				

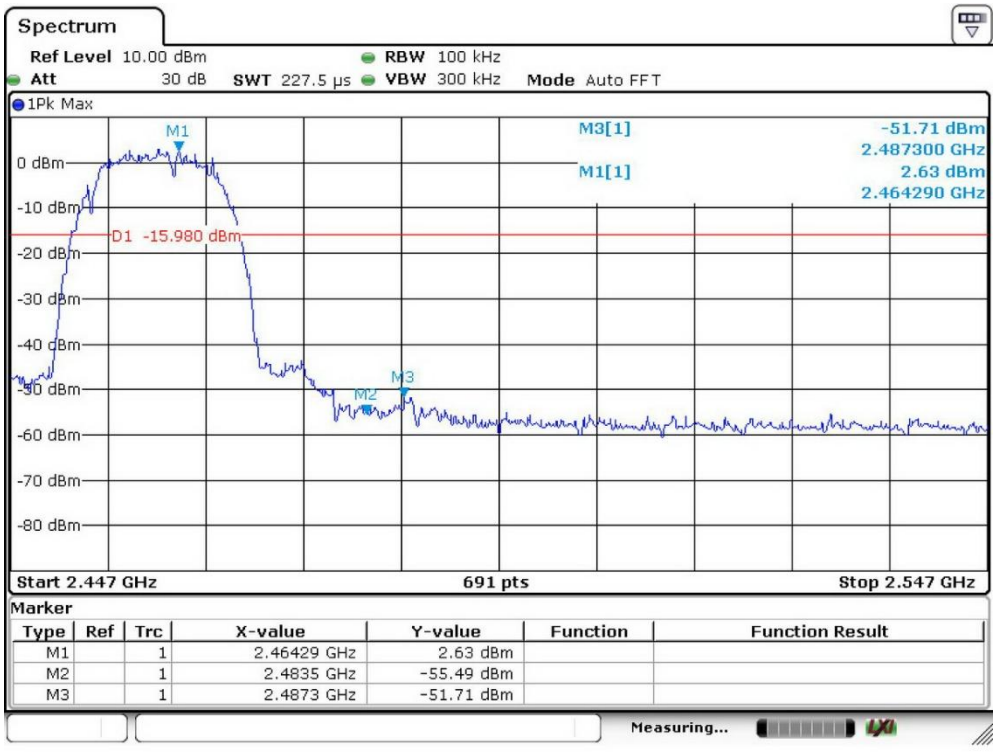


PSD(Power Spectral Density) RBW=100kHz				
Test Model	☒802.11b	☐802.11g	☐802.11n(HT20)	☐802.11n(HT40)
☒Channel 11: 2462MHz	☐Channel 9: 2452MHz			

Unwanted Emissions In Non-Restricted Frequency Bands
Test Model ☒802.11b ☐802.11g ☐802.11n(HT20) ☐802.11n(HT40) ☒Channel 11: 2462MHz ☐Channel 9: 2452MHz



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



7.5 RADIATED SPURIOUS EMISSION

7.5.1 Applicable Standard

According to FCC Part 15.247(d) and 15.209 and KDB 558074 D01 15.247 Meas Guidance v05r02

7.5.2 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 Part15.205, 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 Part15.205,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 (μV/m)	Field Strength (dBμV/m)	Measurement Distance
0.009-0.490	2400/F(KHz)	20 log (uV/m)	300
0.490-1.705	24000/F(KHz)	20 log (uV/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

7.5.3 Test Configuration

Test according to clause 6.2 radio frequency test setup 2

7.5.4 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 ≥ 1 GHz(1GHz to 25GHz), 100 kHz for f < 1 GHz(30MHz to 1GHz), 200Hz for f<150KHz(9KHz to 150KHz), 9KHz for f<30MHz(150KHz to 30KHz)
VBW ≥ 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 20log(dwell time/100 ms), in an effort to demonstrate compliance with the 15.209 limit. Submit this data.
Repeat above procedures until all frequency measured was complete.

7.5.5 Test Results

Temperature:	23° C
Relative Humidity:	51%
ATM Pressure:	1011 mbar

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

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m) PK	Emission Level(dBuV/m) AV	Limit 3m(dBuV/m) PK	Limit 3m(dBuV/m) AV	Over(dB) PK	Over(dB) 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 =40log(Specific distance/ test distance)(dB);
Limit line=Specific limits(dBuV) + distance extrapolation factor

- Spurious Emission Above 1GHz(1GHz to 25GHz)
- All modes 2.4G 802.11b/g/n have been tested, and the worst result recorded was report as below:

Antenna 1:

Test mode: 802.11 b Frequency: Channel 1: 2412MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4824.39	V	56.04	43.97	74	54	-17.96	-10.03
7237.99	V	52.95	39.64	74	54	-21.05	-14.36
10765.08	V	54.25	38.73	74	54	-19.75	-15.27
4825.41	H	51.41	40.52	74	54	-22.59	-13.48
7236.47	H	54.16	37.06	74	54	-19.84	-16.94
11018.29	H	56.19	41.29	74	54	-17.81	-12.71

Test mode: 802.11 b Frequency: Channel 6: 2437MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4701.70	V	56.42	41.70	74	54	-17.58	-12.3
7231.29	V	54.70	40.53	74	54	-19.3	-13.47
10692.50	V	55.45	42.99	74	54	-18.55	-11.01
4724.28	H	58.91	43.67	74	54	-15.09	-10.33
7068.98	H	54.04	40.46	74	54	-19.96	-13.54
10708.57	H	56.81	42.55	74	54	-17.19	-11.45

Test mode: 802.11 b Frequency: Channel 11: 2462MHz

Freq. (MHz)	Ant.Pol. H/V	Emission Level(dBuV/m)		Limit 3m(dBuV/m)		Over(dB)	
		PK	AV	PK	AV	PK	AV
4772.79	V	53.73	41.16	74	54	-20.27	-12.84
7179.87	V	57.19	39.63	74	54	-16.81	-14.37
10806.57	V	53.33	39.36	74	54	-20.67	-14.64
4721.35	H	54.98	42.58	74	54	-19.02	-11.42
7199.80	H	54.06	41.25	74	54	-19.94	-12.75
10652.64	H	58.58	42.42	74	54	-15.42	-11.58

Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).
(2) Emission Level= Reading Level+Correct Factor.
(3) The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

■ Spurious Emission in Restricted Band 2310-2390MHz and 2483.5-2500MHz
All modes 2.4G 802.11b/g/n have been tested, and the worst result recorded was report as below:

Antenna 1:

Test mode: 802.11 b Frequency: Channel 1: 2412MHz

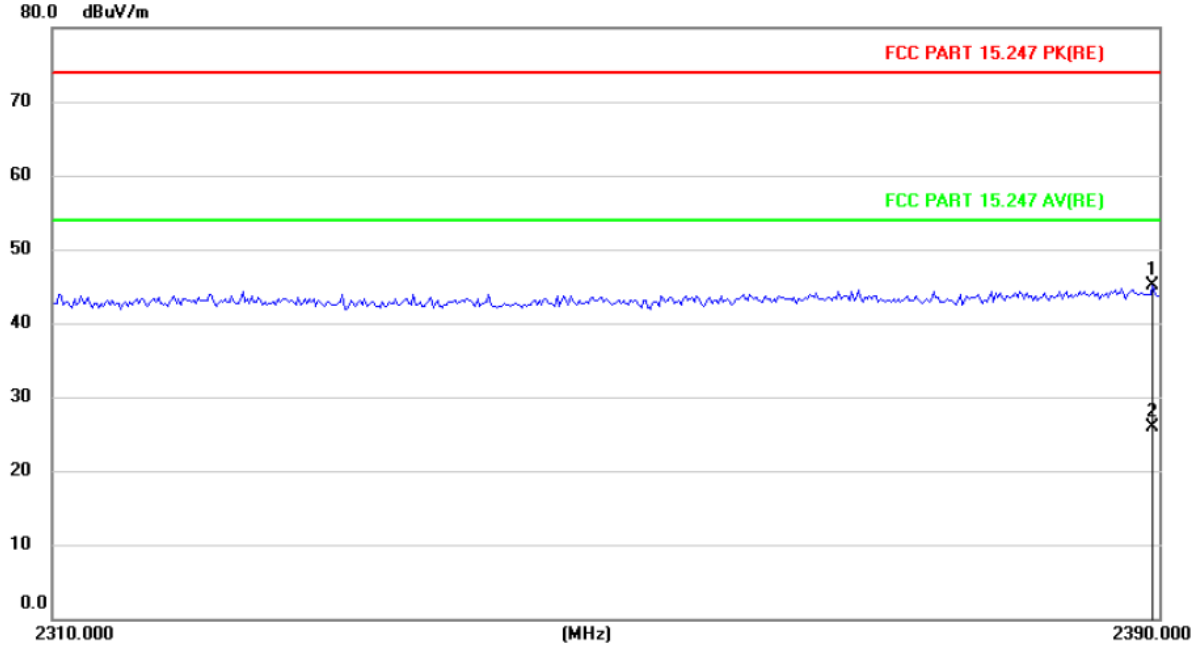
Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)
2389.520	H	45.18	74	25.81	54
2389.840	V	46.00	74	27.71	54

Test mode: 802.11 b Frequency: Channel 11: 2462MHz

Frequency (MHz)	Polarity	PK(dBuV/m) (VBW=3MHz)	Limit 3m (dBuV/m)	AV(dBuV/m) (VBW=10Hz)	Limit 3m (dBuV/m)
2484.028	H	47.88	74	29.05	54
2483.500	V	49.33	74	28.80	54

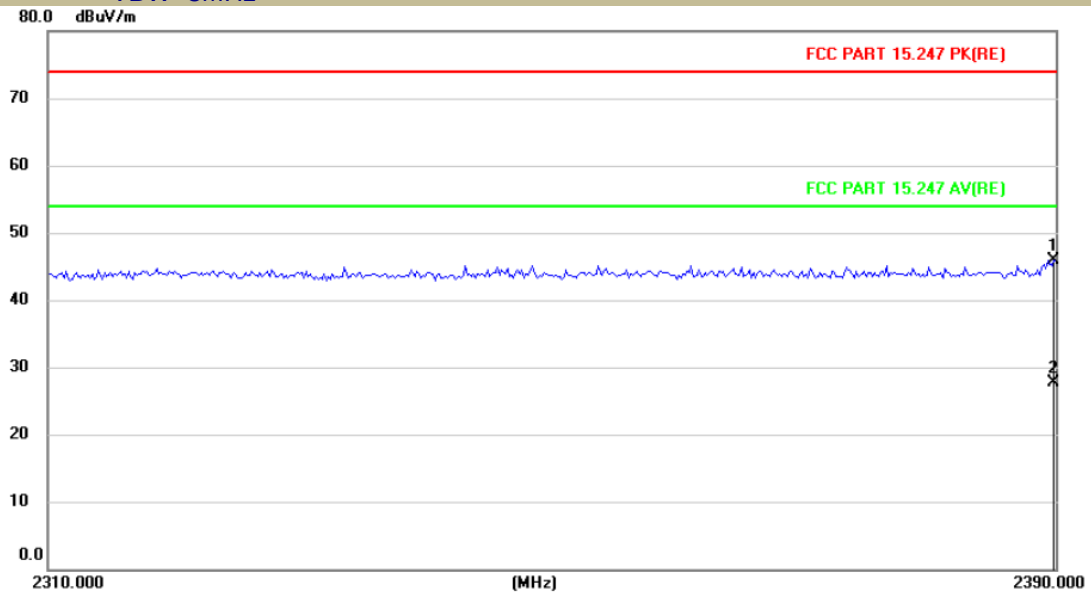
Note: (1) All Readings are Peak Value (VBW=3MHz) and Average Value (VBW=10Hz).
(2) Emission Level= Reading Level+Correct Factor.
(3) The reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

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: H
	VBW=3MHz			



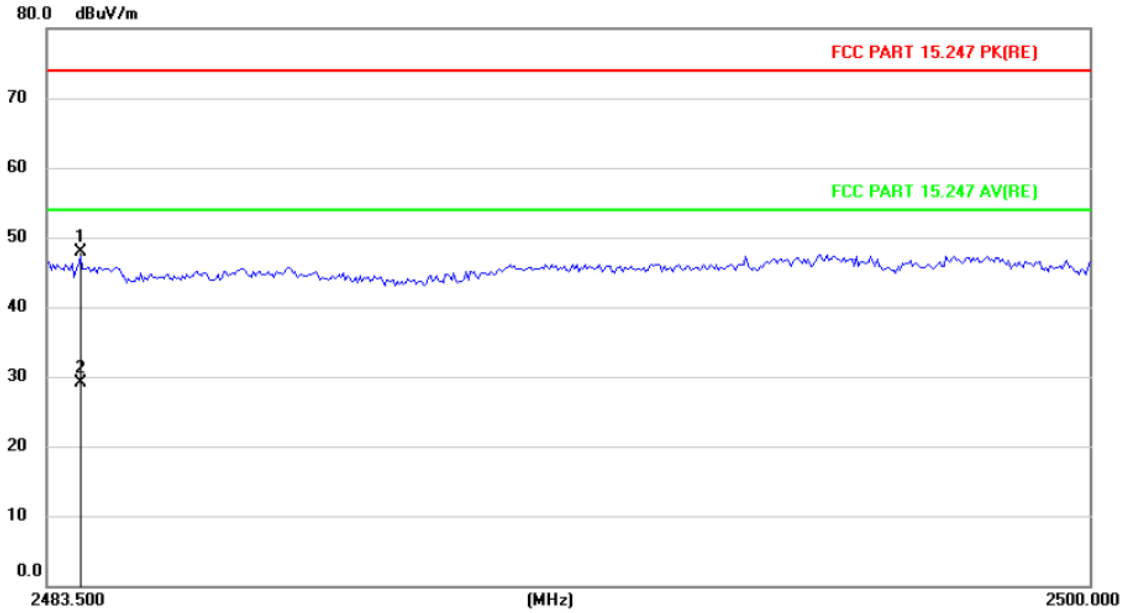
Site	Polarization: ***Horizontal***	Temperature:	23 °C
Limit: FCC PART 15.247 PK(RE)	Power: AC 120 V/60 Hz	Humidity:	58 %

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			



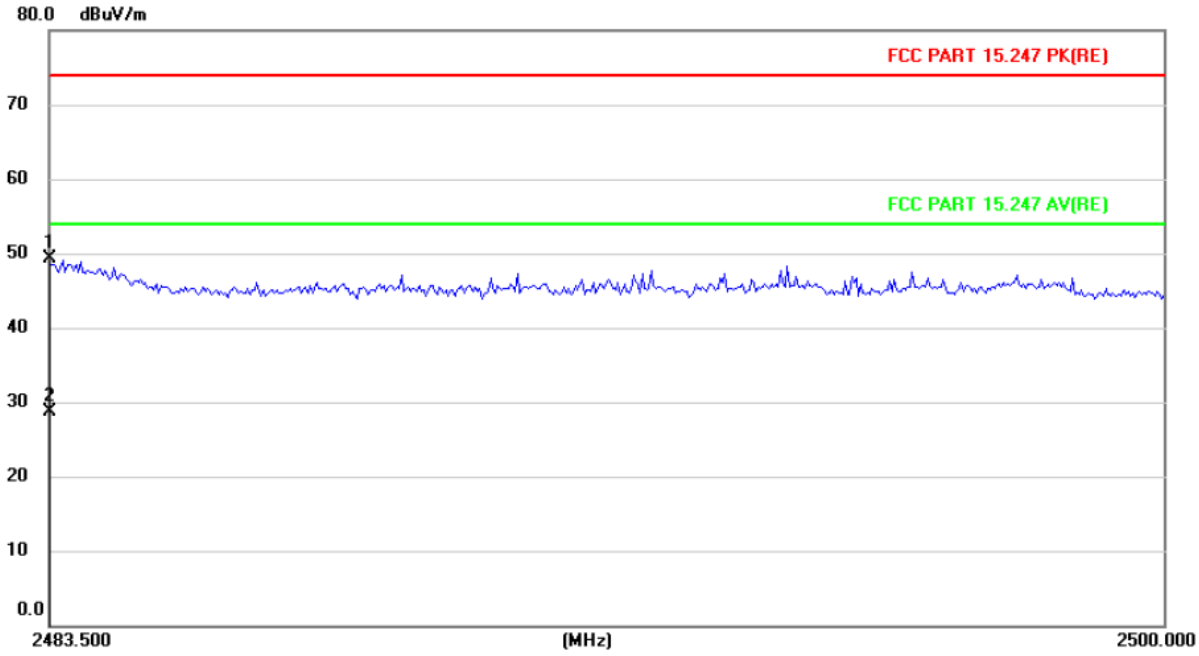
Site	Polarization: ***Vertical***	Temperature:	23 °C
Limit: FCC PART 15.247 PK(RE)	Power: AC 120 V/60 Hz	Humidity:	58 %

Test Model	Spurious Emission in Restricted Band 2483.5-2500MHz			
	☒802.11b	☐802.11g	☐802.11n(HT20)	☐802.11n(HT40)
	☒Channel 11: 2462MHz	☐Channel 9: 2452MHz		Polarity: H
	VBW=3MHz			



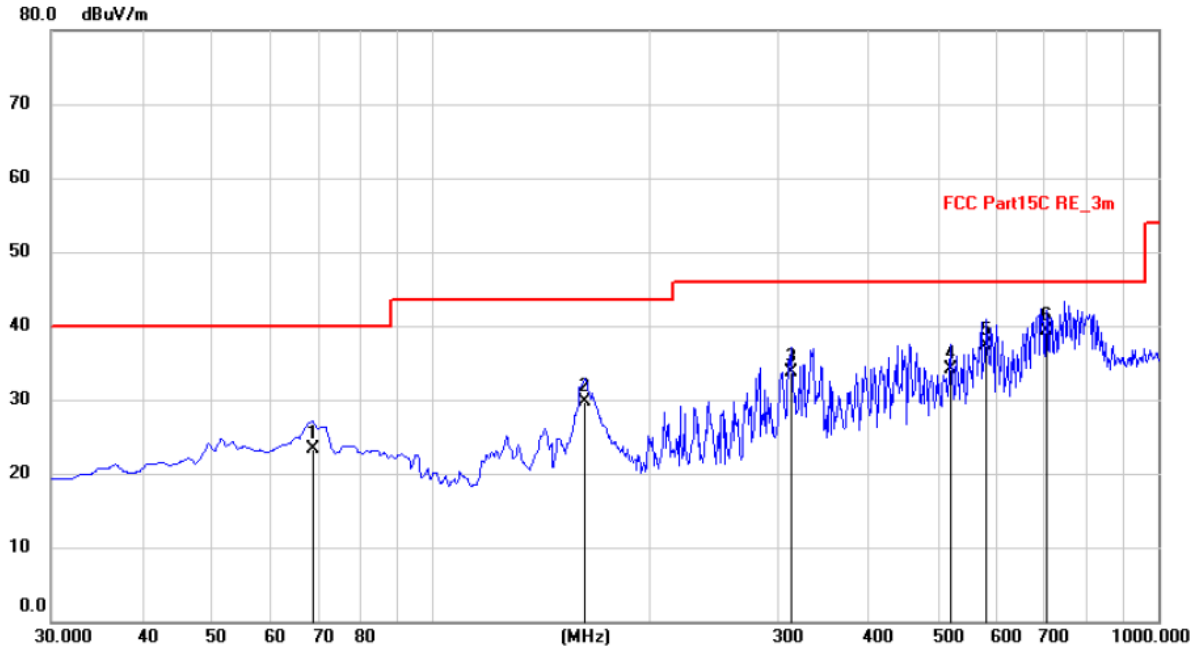
Site	Polarization: ***Horizontal***	Temperature:	23 °C
Limit: FCC PART 15.247 PK(RE)	Power: AC 120 V/60 Hz	Humidity:	58 %

Test Model	Spurious Emission in Restricted Band2483.5-2500MHz			
	☒802.11b	☐802.11g	☐802.11n(HT20)	☐802.11n(HT40)
	☒Channel 11: 2462MHz	☐Channel 9: 2452MHz		Polarity: V
	VBW=3MHz			



Site	Polarization: ***Vertical***	Temperature:	23 °C
Limit: FCC PART 15.247 PK(RE)	Power: AC 120 V/60 Hz	Humidity:	58 %

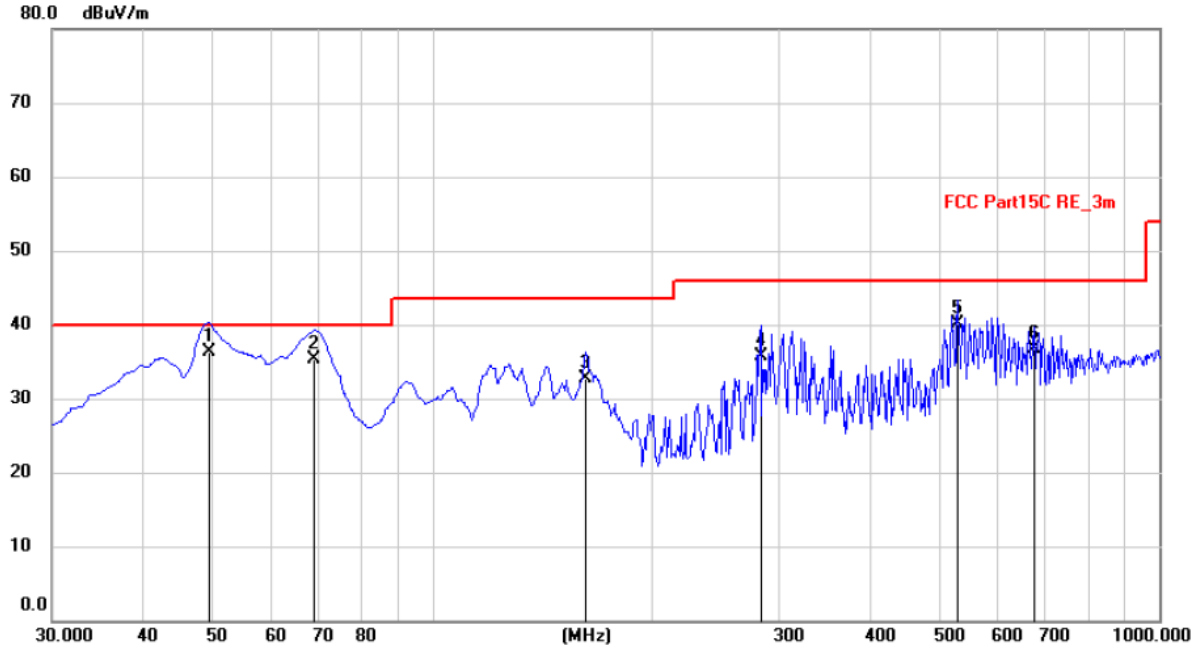
- Spurious Emission below 1GHz (30MHz to 1GHz)
- All antenna modes 2.4G 802.11b/g/n have been tested, and the worst result 802.11g recorded was report as below:



Site
Limit: FCC Part15C RE_3m
Polarization: Horizontal
Power: AC 120 V/60 Hz
Temperature: 25
Humidity: 60 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1		68.8000	36.19	-12.88	23.31	40.00	-16.69	QP
2		162.8900	44.15	-14.45	29.70	43.50	-13.80	QP
3		312.2700	42.51	-8.74	33.77	46.00	-12.23	QP
4		518.8800	38.15	-3.98	34.17	46.00	-11.83	QP
5		581.9300	40.25	-2.98	37.27	46.00	-8.73	QP
6	*	702.2100	40.22	-0.97	39.25	46.00	-6.75	QP

*:Maximum data x:Over limit !:over margin 〈Reference Only



Site

Limit: FCC Part15C RE_3m

Polarization: *Vertical*

Power: AC 120 V/60 Hz

Temperature: 25

Humidity: 60 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector
1	*	49.4000	46.79	-10.43	36.36	40.00	-3.64	QP
2		68.8000	48.19	-12.88	35.31	40.00	-4.69	QP
3		162.8900	47.15	-14.45	32.70	43.50	-10.80	QP
4		283.1700	45.21	-9.49	35.72	46.00	-10.28	QP
5		529.5500	44.15	-4.13	40.02	46.00	-5.98	QP
6		674.0800	37.84	-1.16	36.68	46.00	-9.32	QP

*:Maximum data x:Over limit !:over margin 〈Reference Only

7.6 CONDUCTED EMISSIONS TEST

7.6.1 Applicable Standard

According to FCC Part 15.207(a)

7.6.2 Conformance Limit

Conducted Emission Limit		
Frequency(MHz)	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.

Remark: Test results were obtained from the following equation:
Measurement (dBμV) = LISN Factor (dB) + Cable Loss (dB) + Reading (dBμV)
Over (dB) = Measurement (dBμV) - Limit (dBμV)

7.6.3 Test Configuration

Test according to clause 6.3 conducted emission test setup

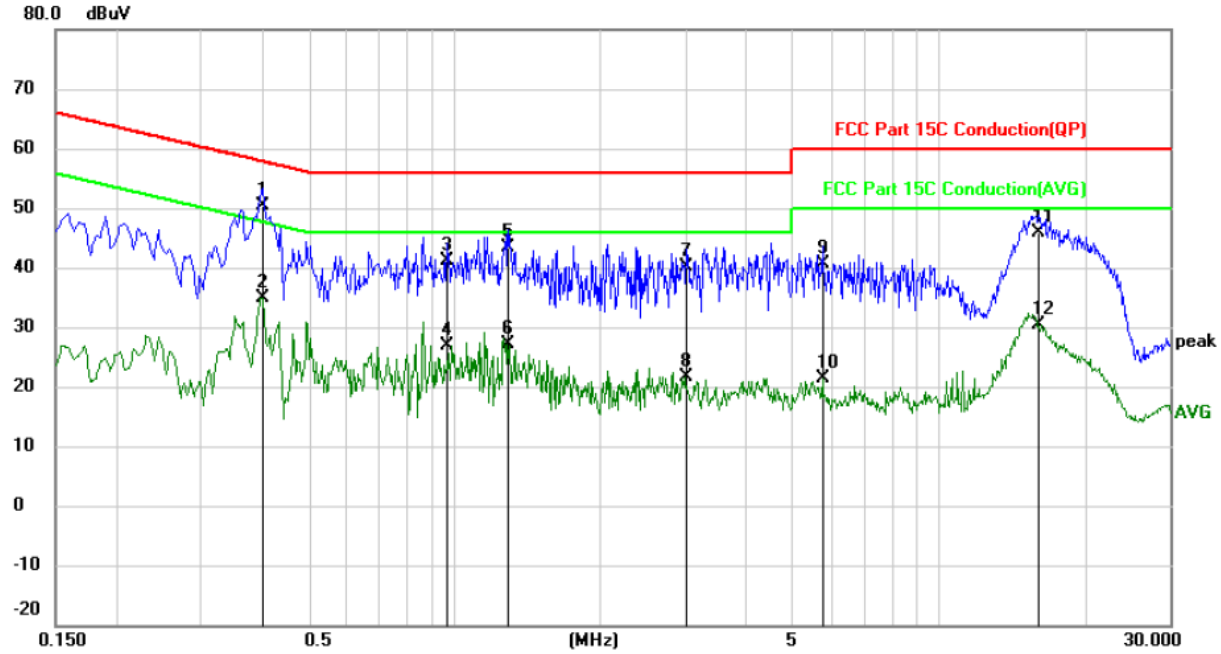
7.6.4 Test Procedure

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.

7.6.5 Test Results

PASS.

All mode have been tested, and the worst result recorded was report as below:

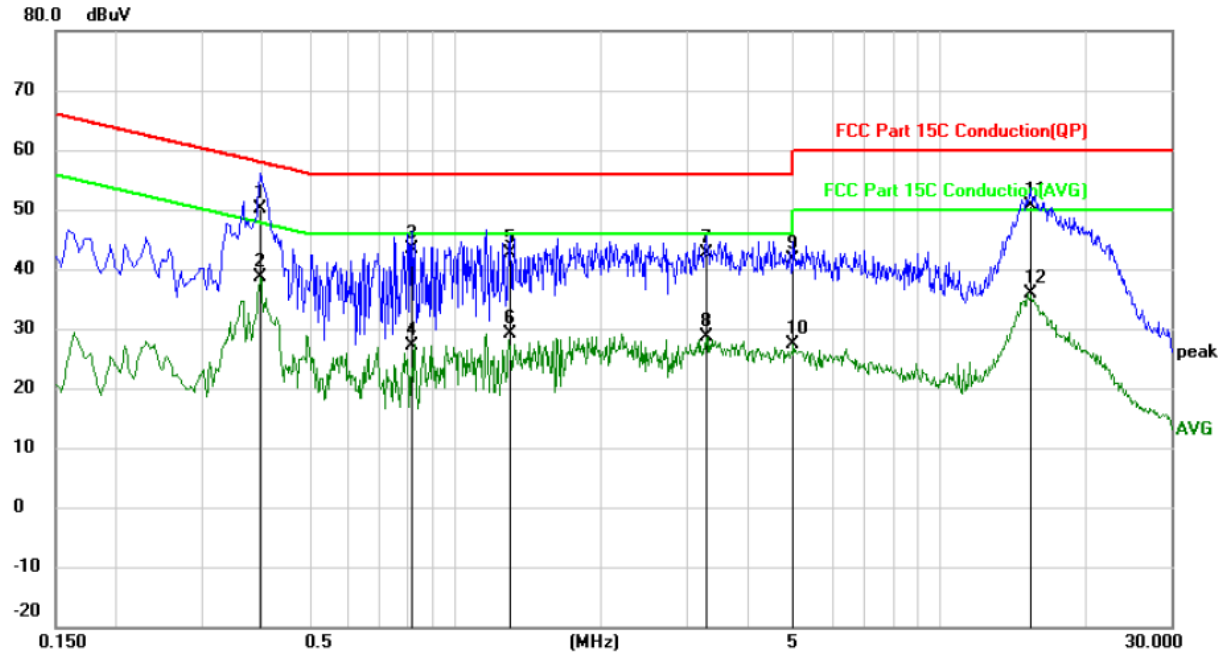


Site Phase: N Temperature: 22.5

Limit: FCC Part 15C Conduction(QP) Power: AC 120 V/60 Hz Humidity: 49 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.4020	40.40	10.02	50.42	57.81	-7.39	QP	
2		0.4020	24.76	10.02	34.78	47.81	-13.03	AVG	
3		0.9645	31.03	10.08	41.11	56.00	-14.89	QP	
4		0.9645	16.71	10.08	26.79	46.00	-19.21	AVG	
5		1.2930	33.37	10.08	43.45	56.00	-12.55	QP	
6		1.2930	17.10	10.08	27.18	46.00	-18.82	AVG	
7		3.0210	29.98	10.16	40.14	56.00	-15.86	QP	
8		3.0210	11.37	10.16	21.53	46.00	-24.47	AVG	
9		5.7660	30.27	10.26	40.53	60.00	-19.47	QP	
10		5.7660	11.14	10.26	21.40	50.00	-28.60	AVG	
11		16.1295	35.27	10.54	45.81	60.00	-14.19	QP	
12		16.1295	19.86	10.54	30.40	50.00	-19.60	AVG	

*:Maximum data x:Over limit !:over margin 〈Reference Only



Site Phase: L1 Temperature: 22.5

Limit: FCC Part 15C Conduction(QP) Power: AC 120 V/60 Hz Humidity: 49 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.3975	40.00	10.02	50.02	57.91	-7.89	QP	
2		0.3975	28.55	10.02	38.57	47.91	-9.34	AVG	
3		0.8160	33.48	10.02	43.50	56.00	-12.50	QP	
4		0.8160	17.23	10.02	27.25	46.00	-18.75	AVG	
5		1.2975	32.60	10.08	42.68	56.00	-13.32	QP	
6		1.2975	19.04	10.08	29.12	46.00	-16.88	AVG	
7		3.3000	32.54	10.17	42.71	56.00	-13.29	QP	
8		3.3000	18.49	10.17	28.66	46.00	-17.34	AVG	
9		4.9875	31.35	10.24	41.59	56.00	-14.41	QP	
10		4.9875	17.04	10.24	27.28	46.00	-18.72	AVG	
11		15.4230	40.10	10.50	50.60	60.00	-9.40	QP	
12		15.4230	25.32	10.50	35.82	50.00	-14.18	AVG	

*:Maximum data x:Over limit !:over margin 〈Reference Only

7.7 ANTENNA APPLICATION

7.7.1 Antenna Requirement

Standard	Requirement
FCC CRF Part15.203	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. 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.

7.7.2 Result

PASS.

- The EUT has 1 antennas:a PCB Antenna for Wifi model, the gain is 2.21 dBi

Note: ☒ Antenna uses 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.

--------- END OF REPORT --------

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