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Report No.: 2211TW0105-U4
Report Version: 1.0
Issue Date: 2022-12-05

MEASUREMENT REPORT

FCC ID	:	2AR82-SKOWB822CU3
APPLICANT	:	Guangzhou Shikun Electronics Co., Ltd
Application Type	:	Certification
Product	:	IEEE 802.11 a/b/g/n/ac 2T2R USB Wi-Fi Module Integrated Bluetooth 2.1/3.0/4.2/5.0
Model No.	:	SKO.WB822CU.3
FCC Classification	:	(DTS) Digital Transmission System
FCC Rule Part(s)	:	Part 15.247
Test Procedure(s)	:	ANSI C63.10-2013
Received Date	:	November 17, 2022
Test Date	:	November 24, 2022 ~ November 30, 2022

Tested By : Peter Syu
(Peter Syu)

Reviewed By : Paddy Chen
(Paddy Chen)

Approved By : Chenz Ker
(Chenz Ker)

Testing Laboratory
3261

The test results only relate to the tested samples.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10 Test results reported herein relate only to the item(s) tested.

Revision History

Report No.	Version	Description	Issue Date	Note
2211TW0105-U4	1.0	Original Report	2022-12-05	

CONTENTS

§2.1033 General Information

Applicant	Guangzhou Shikun Electronics Co., Ltd
Applicant Address	NO.6 Liankun Road, Huangpu District, Guangzhou, China
Manufacturer	Guangzhou Shikun Electronics Co., Ltd
Manufacturer Address	NO.6 Liankun Road, Huangpu District, Guangzhou, China
Test Site	MRT Technology (Taiwan) Co., Ltd
Test Site Address	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
MRT FCC Registration No.	291082
FCC Rule Part(s)	Part 15.247
Test Device Serial No.:	#1-2 ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

1. MRT facility is a FCC registered (Reg. No. 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.
2. MRT facility is an IC registered (MRT Reg. No. 21723) test laboratory with the site description on file at Industry Canada.
3. MRT Lab is accredited to ISO 17025 by the Taiwan Accreditation Foundation (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC (Designation Number: TW3261), Industry Taiwan, EU and TELEC Rules.

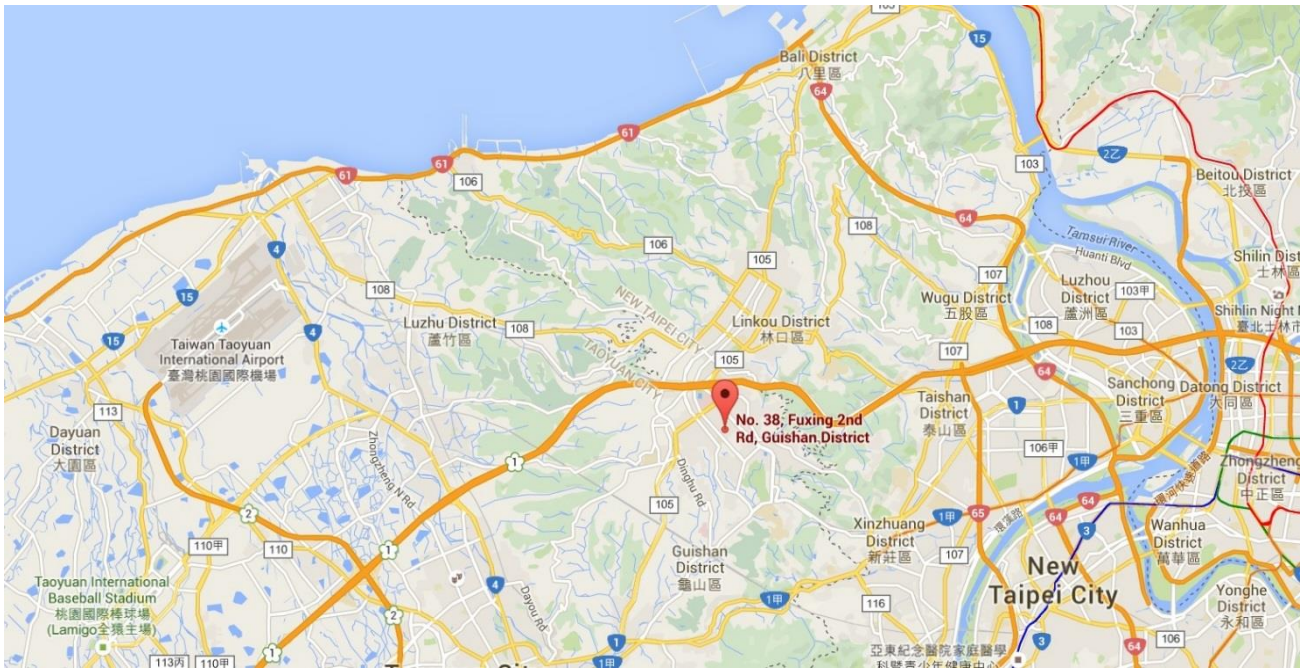
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name	IEEE 802.11 a/b/g/n/ac 2T2R USB Wi-Fi Module Integrated Bluetooth 2.1/3.0/4.2/5.0
Model No.	SKO.WB822CU.3
Supports Radios Spec.	**WLAN:** 2.4G: 802.11b/g/n-20/n-40 5G: 802.11a/n-20/ac-20/n-40/ac-40/ac-80, Band 1,2,3,4 **WPAN:** Bluetooth Dual Mode: V5.0
Wi-Fi Specification	802.11 b/g/n (2TX / 2RX)
Frequency Range	**2.4GHz:** For 802.11b/g/n-20: 2412 ~ 2462 MHz For 802.11n-40: 2422 ~ 2452 MHz
2.4GHz Maximum Output Power	802.11b_Ant 0: 17.09dBm 802.11b_Ant 1: 16.78dBm 802.11g_Ant 0: 14.65dBm 802.11g_Ant 1: 13.47dBm 802.11n-20_Ant 0+1: 16.11dBm 802.11n-40_Ant 0+1: 16.42dBm
Type of Modulation	802.11b: DSSS, DBPSK, DQPSK, CCK 802.11g/n-20/n-40: OFDM, BPSK, QPSK, 16QAM, 64QAM

2.2. Working Frequencies for this Report

802.11b/g/n-HT20

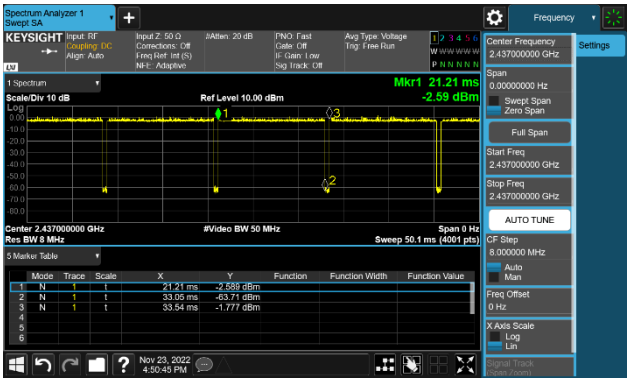
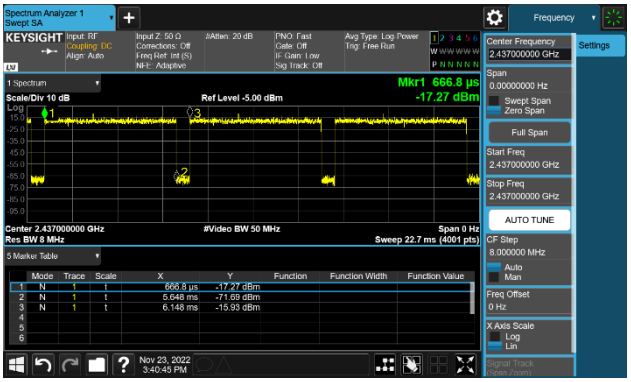
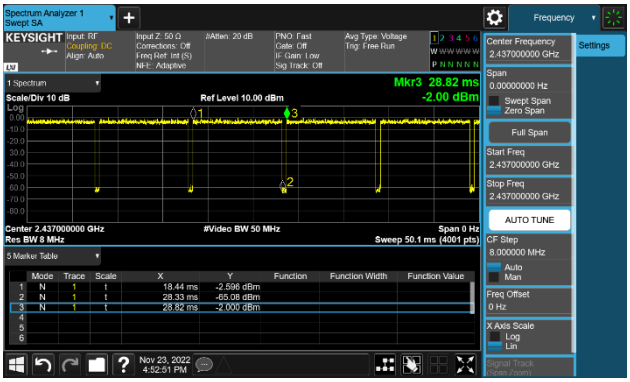
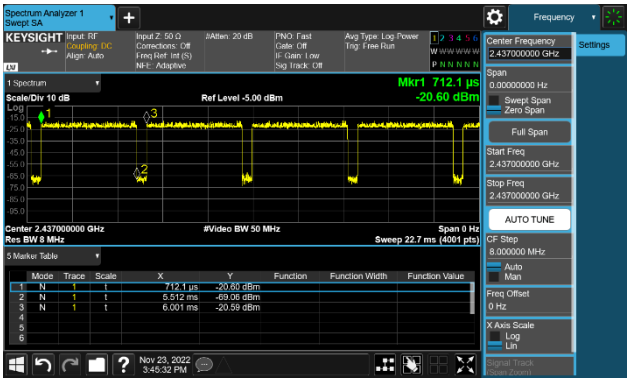
Channel	Frequency	Channel	Frequency	Channel	Frequency
01	2412 MHz	02	2417 MHz	03	2422 MHz
04	2427 MHz	05	2432 MHz	06	2437 MHz
07	2442 MHz	08	2447 MHz	09	2452 MHz
10	2457 MHz	11	2462 MHz	--	--

802.11n-HT40

Channel	Frequency	Channel	Frequency	Channel	Frequency
03	2422 MHz	04	2427 MHz	05	2432 MHz
06	2437 MHz	07	2442 MHz	08	2447 MHz
09	2452 MHz	--	--	--	--

Duty Cycle

Test Mode	Duty Cycle
802.11b	96.03%
802.11g	90.88%
802.11 n-HT20	95.28%
802.11 n-HT40	90.75%

802.11 b	802.11 g
	
802.11 n20	**802.11 n40**
	

2.3. Test Mode

Test Mode	Mode 1: Transmit by 802.11b_Ant 0
	Mode 2: Transmit by 802.11b_Ant 1
	Mode 3: Transmit by 802.11g_Ant 0
	Mode 4: Transmit by 802.11g_Ant 1
	Mode 5: Transmit by 802.11n-20_Ant 0+1
	Mode 6: Transmit by 802.11n-40_Ant 0+1

Note :

1. Regarding to the operation frequency, the lowest, middle and highest frequency are selected to perform the test.

2.4. Test Software

The test utility software used during testing was “MP-tool v10.01”.

2.5. Applied Standards

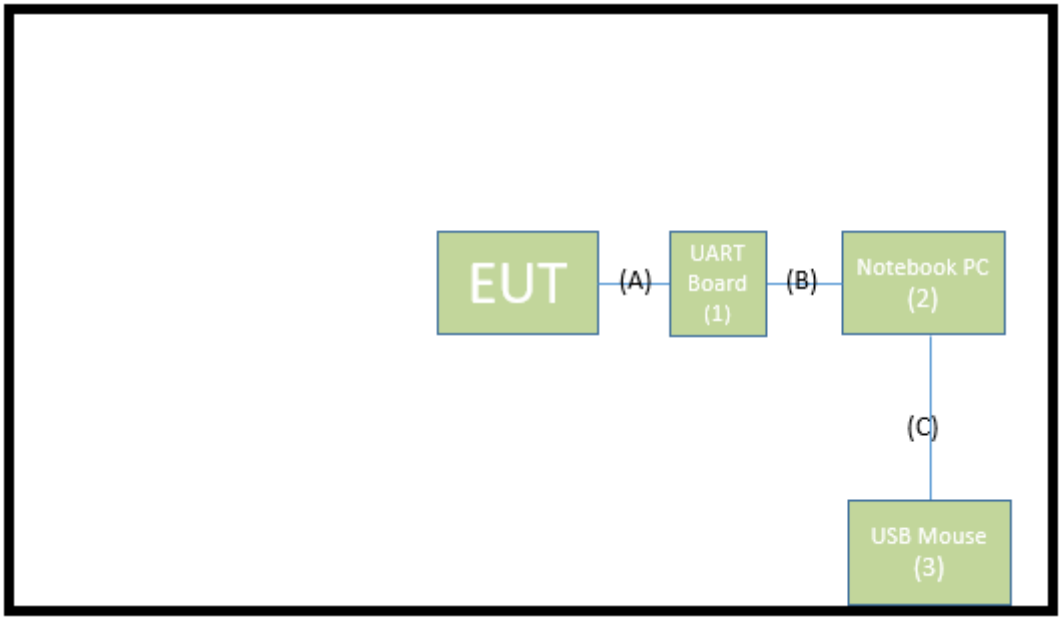
According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15.247
- KDB 558074 D01v05r02
- ANSI C63.10-2013

2.6. Test Configuration

This device was tested per the guidance of ANSI C63.10-2013. ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testing and AC line conducted testing.

Connection Diagram – Radiated Emission testing & AC Conducted Emissions



Cable Type		Cable Description
A	Signal Cable	Non-Shielded, 0.3m
B	USB Cable	Shielded, 1.0m
C	USB Mouse Cable	Shielded, 1.8m

2.7.Test System Details

No.	Product	Manufacturer	Model No.	S/N	Cable Description
1	UART Board	shikun	Power board	N/A	Non-shielded, 1.5m
2	Notebook PC	Lenovo	T450	N/A	Non-shielded, 0.8m
3	USB Mouse	Logitech	M90	N/A	N/A

2.8. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.9. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphlet supplied to the user and be readily visible to the purchaser at the time of purchase. However, when the device is so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label and label location.

3. DESCRIPTION of TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.10-2013), and the guidance provided in KDB 558074 D01v05 were used in the measurement of the device.

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an 9'x4'x3' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying: power lines, the mode of operation or data exchange speed, or support equipment which determined the worst-case emission. Once the worst case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

Line conducted emissions test results are shown in Section 7.8.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remote controlled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An 80cm high PVC support structure is placed on top of the turntable. For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-25GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, which produced the worst-case emissions. According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

Radiated emissions test results are shown in Section 7.6 & 7.7 .

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

"An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section."

- The antenna of the IEEE 802.11 a/b/g/n/ac 2T2R USB Wi-Fi Module Integrated Bluetooth 2.1/3.0/4.2/5.0**,** is permanently attached.
- There are no provisions for connection to an external antenna.

Conclusion:

The EUT unit complies with the requirement of §15.203.

Antenna List

Antenna Type	Frequency Band (MHz)	TX Paths	Max Antenna Gain (dBi)
PCB Antenna	2412 ~ 2462	2	1.61
	5150 ~ 5850	2	2.70

Note: All information declared by manufacturer.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions – SR2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV216	MRTTWA00019	1 year	2023/3/7
Cable	Rosnol	N1C50-RG400-B1C50-500CM	MRTTWE00013	1 year	2023/6/19
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2023/3/9

Radiated Emissions – AC2

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2022/12/4
Acitve Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2023/5/24
Broadband Hornantenna	RFSPIN	DRH18-E	MRTTWA00087	1 year	2023/5/10
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2023/3/29
Broadband Preamplifier	EMC Instruments corporation	EMC118A45SE	MRTTWA00088	1 year	2023/5/9
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2023/3/30
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2023/3/16
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2023/3/9
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2023/10/5
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2023/7/19
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00034	1 year	2023/6/27
Cable	HUBERSUHNER	EMC105-NM-NM-3000	MRTTWE00035	1 year	2023/6/27

Conducted Test Equipment – SR5

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2023/10/5
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTTWA00074	1 year	2023/7/19
USB Wideband Power Sensor	KEYSIGHT	U2021XA	MRTTWA00015	1 year	2023/3/16
20dB attenuator	Warison	WATT-218FS-20	MRTTWE00027	1 year	2023/6/15

Test Software

Software	Version	Function
e3	9.160520a	EMI Test Software
EMI	V3	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

Conducted Emission- Power Line
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 0.15MHz~30MHz: ± 2.53dB
Radiated Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz~30MHz: ± 3.92dB 30MHz~1GHz: ± 4.25dB 1GHz~18GHz: ± 4.40dB 18GHz~25GHz: ± 4.45dB
Frequency Error
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±78.4Hz
Conducted Power
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 0.84dB
Conducted Spurious Emission
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)):± 2.65 dB
Occupied Bandwidth
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ± 3.3%
Temp. / Humidity
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.82°C/ ±3%
DC Voltage
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): ±0.3%

7. TEST RESULT

7.1. Summary

Product Name: IEEE 802.11 a/b/g/n/ac 2T2R USB Wi-Fi Module Integrated Bluetooth 2.1/3.0/4.2/5.0

FCC Classification: **(DTS) Digital Transmission System**

Data Rate(s) Tested: **1Mbps ~ 11Mbps (b); 6Mbps ~ 54Mbps (g); 6.5/7.2Mbps ~ 130/144.4Mbps (n-20M); 13.5/15Mbps ~ 270/300Mbps (n-40M)**

FCC Part Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.247(a)(2)	6dB Bandwidth	≥ 500kHz	Conducted	Pass	Section 7.2
15.247(b)(3)	Output Power	≤ 30.00dBm		Pass	Section 7.3
15.247(e)	Power Spectral Density	≤ 8.00dBm/3kHz		Pass	Section 7.4
15.247(d)	Out-of-Band Emissions	Conducted ≥ 30dBc		Pass	Section 7.5
15.205 15.209	Spurious Emission	< FCC 15.209 limits	Radiated	Pass	Section 7.6
15.205 15.209	Band Edge Measurement	≦ 74dBuV/m(Peak) ≦ 54dBuV/m(Average)		Pass	Section 7.7
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.8

Notes:

1) Determining compliance is based on the test results met the regulation limits or requirements declared by clients, and the test results don't take into account the value of measurement uncertainty.
2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst case emissions.
3) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part of the system to connect the EUT to the analyzer at all frequencies of interest.
4) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables and attenuators.

7.2. 6dB Bandwidth Measurement

7.2.1. Test Limit

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

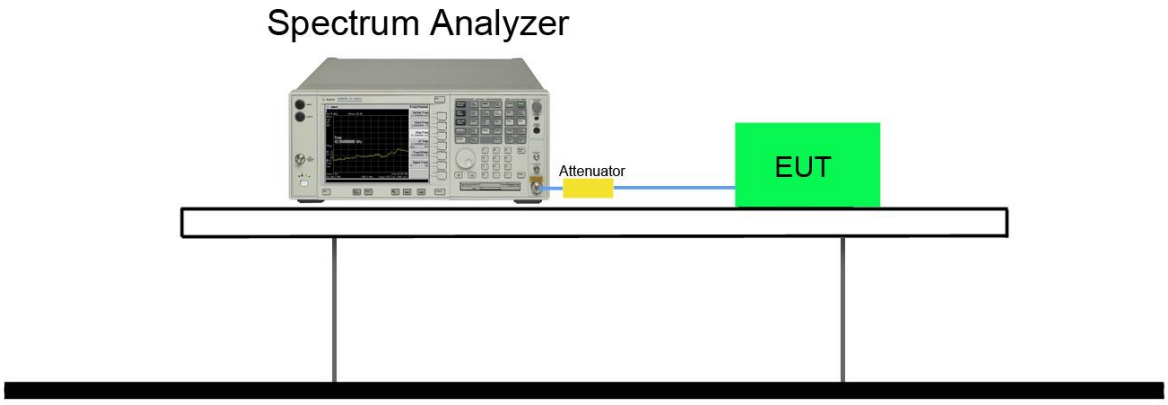
7.2.2. Test Procedure used

ANSI C63.10 - 2013 - Section 6.9.3, 11.8

7.2.3. Test Setting

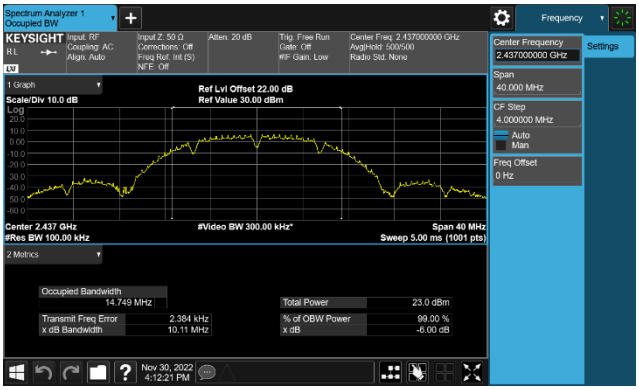
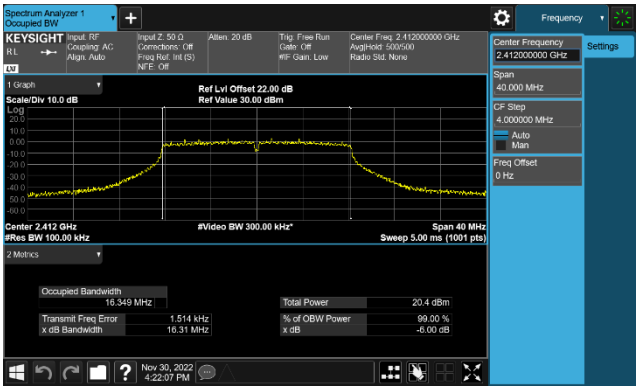
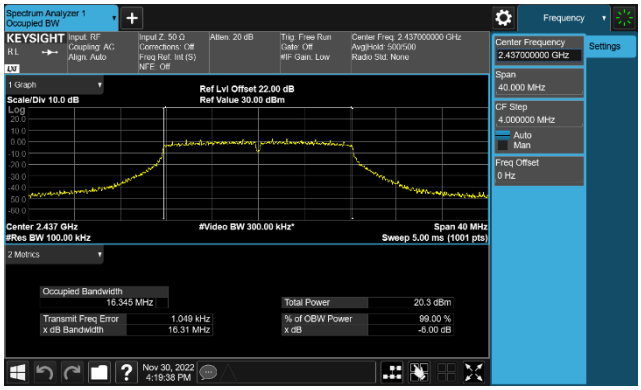
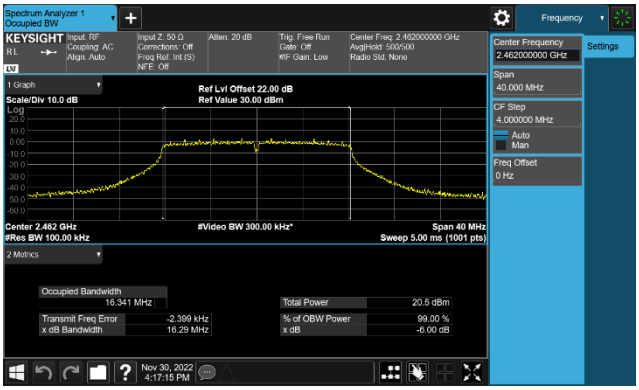
1. The Spectrum's automatic bandwidth measurement capability was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.
2. Set RBW = 100 kHz
3. VBW ≥ 3 × RBW
4. Detector = Peak
5. Trace mode = max hold
6. Sweep = auto couple
7. Allow the trace was allowed to stabilize

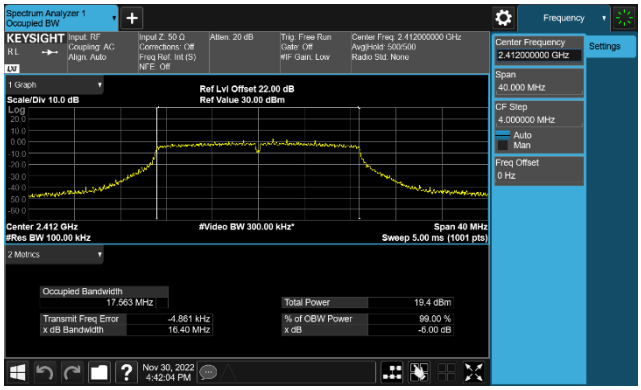
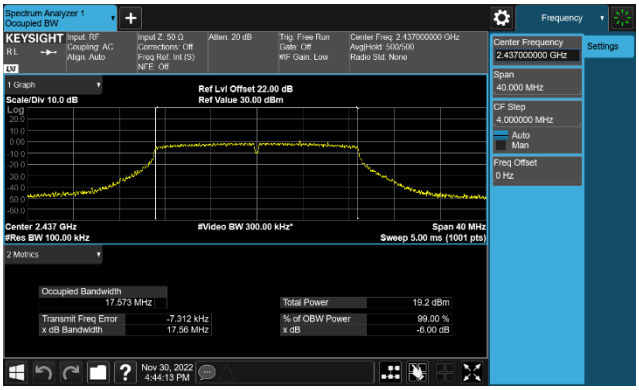
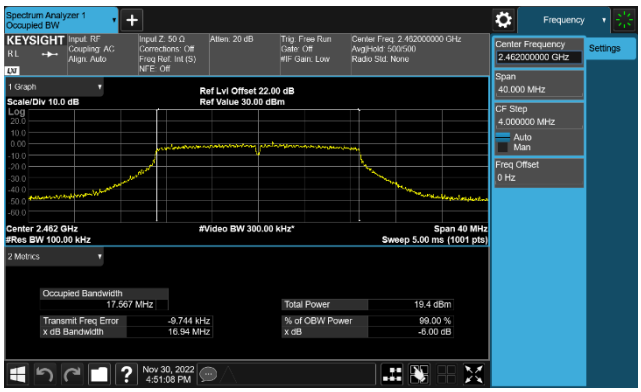
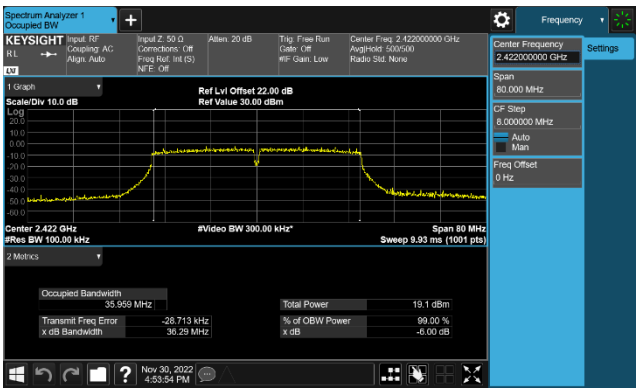
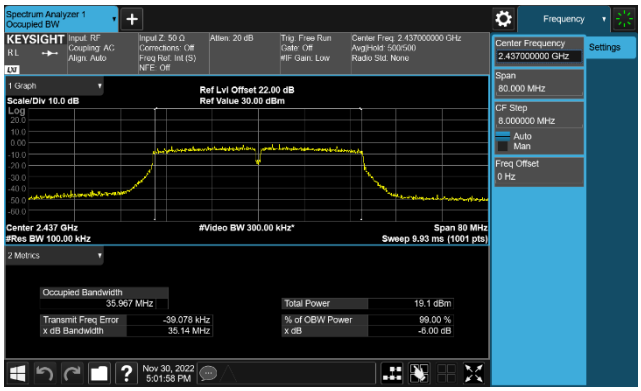
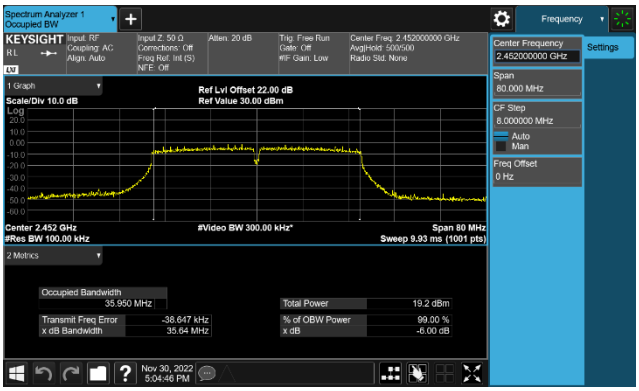
7.2.4. Test Setup



7.2.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)	Result
Ant 0						
802.11b	01	2412	10.110	14.724	≥ 0.5	Pass
802.11b	06	2437	10.110	14.749	≥ 0.5	Pass
802.11b	11	2462	10.100	14.770	≥ 0.5	Pass
802.11g	01	2412	16.310	16.349	≥ 0.5	Pass
802.11g	06	2437	16.310	16.345	≥ 0.5	Pass
802.11g	11	2462	16.290	16.341	≥ 0.5	Pass
802.11n-20M	01	2412	16.400	17.563	≥ 0.5	Pass
802.11n-20M	06	2437	17.560	17.573	≥ 0.5	Pass
802.11n-20M	11	2462	16.940	17.567	≥ 0.5	Pass
802.11n-40M	03	2422	36.290	35.959	≥ 0.5	Pass
802.11n-40M	06	2437	35.140	35.967	≥ 0.5	Pass
802.11n-40M	09	2452	35.640	35.950	≥ 0.5	Pass

802.11 b CH01 (2412MHz) Ant 0	802.11 b CH06 (2437MHz) Ant 0
	
802.11 b CH11 (2462MHz) Ant 0	**802.11 g CH01 (2412MHz) Ant 0**
	
802.11 g CH06 (2437MHz) Ant 0	**802.11 g CH11 (2462MHz) Ant 0**
	

802.11 n-20M CH01 (2412MHz) Ant 0	802.11 n-20M CH06 (2437MHz) Ant 0
	
802.11 n-20M CH11 (2462MHz) Ant 0	**802.11 n-40M CH03 (2422MHz) Ant 0**
	
802.11 n-40M CH 06 (2437MHz) Ant 0	**802.11 n-40M CH 09 (2452MHz) Ant 0**
	

7.3. Output Power Measurement

7.3.1. Test Limit

The maximum out power shall be less 1 Watt (30dBm).

7.3.2. Test Procedure Used

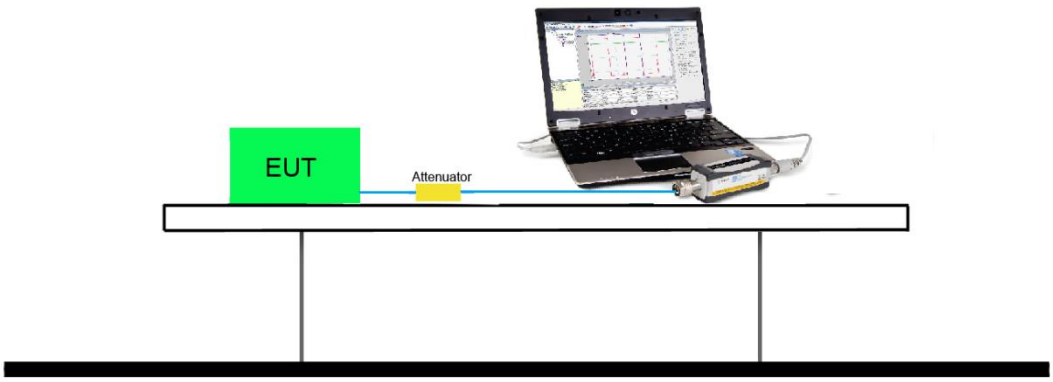
ANSI C63.10 - 2013 - Section 11.9.2.3.2

7.3.3. Test Setting

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

7.3.4. Test Setup



7.3.5. Test Result of Output Power

Model	Rate	Ch.	Freq. (MHz)	Ant 0 Average (dBm)	Ant 1 Average (dBm)	Total Average (dBm)	Power Limit (dBm)
802.11b	1M	1	2412	16.21	16.78	N/A	30.00
	1M	6	2437	16.34	16.73	N/A	30.00
	1M	11	2462	17.09	16.63	N/A	30.00
802.11g	6M	1	2412	14.65	13.47	N/A	30.00
	6M	6	2437	14.31	13.22	N/A	30.00
	6M	11	2462	14.39	12.92	N/A	30.00
802.11n-HT20	MCS0	1	2412	13.64	12.45	16.10	30.00
	MCS0	6	2437	13.37	12.31	15.88	30.00
	MCS0	11	2462	13.81	12.25	16.11	30.00
802.11n-HT40	MCS0	3	2422	13.68	12.82	16.28	30.00
	MCS0	6	2437	13.71	12.45	16.14	30.00
	MCS0	9	2452	13.81	12.96	16.42	30.00

Note: The Total Power (dBm) = $10*\log\{10^{(\text{Ant 0 Power }/10)} + 10^{(\text{Ant 1 Power }/10)}\}$.

7.4. Power Spectral Density Measurement

7.4.1. Test Limit

The maximum permissible power spectral density is 8dBm in any 3 kHz band.

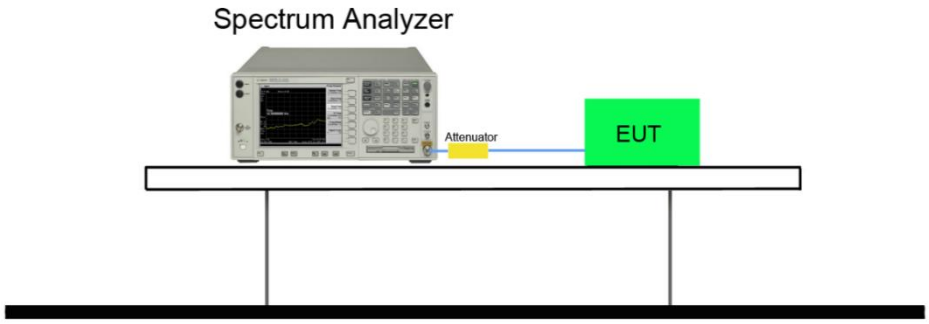
7.4.2. Test Procedure Used

ANSI C63.10 - 2013 - Section 11.10.5

7.4.3. Test Setting

1. Measure the duty cycle (x) of the transmitter output signal.
2. Set instrument center frequency to DTS channel center frequency.
3. Set span to at least 1.5 times the OBW.
4. RBW = 10 kHz.
5. VBW = 30 kHz.
6. Detector = RMS.
7. Ensure that the number of measurement points in the sweep ≥ 2 x span/RBW.
8. Sweep time = auto couple.
9. Don’t use sweep triggering. Allow sweep to “free run”.
10. Employ trace averaging (RMS) mode over a minimum of 100 traces.
11. Use the peak marker function to determine the maximum amplitude level.
12. Add 10 log (1/x), where x is the duty cycle measured in step (a, to the measured PSD to compute the average PSD during the actual transmission time. If measured value exceeds requirement specified by regulatory agency, then reduce RBW (but no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span to meet the minimum measurement point requirement as the RBW is reduced).

7.4.4. Test Setup

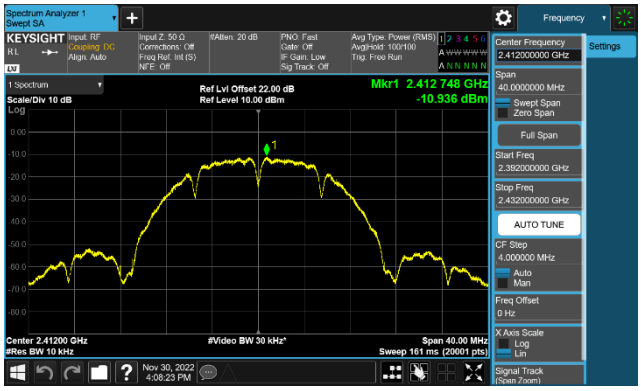
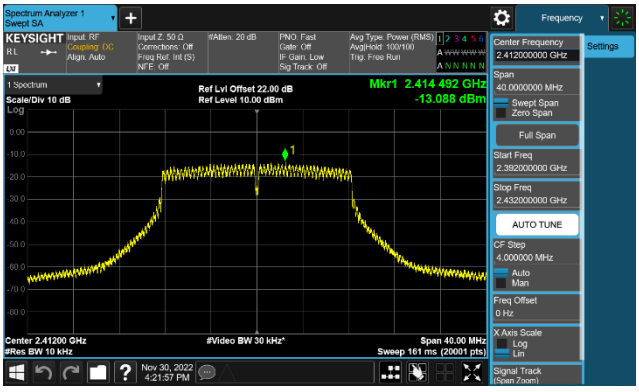
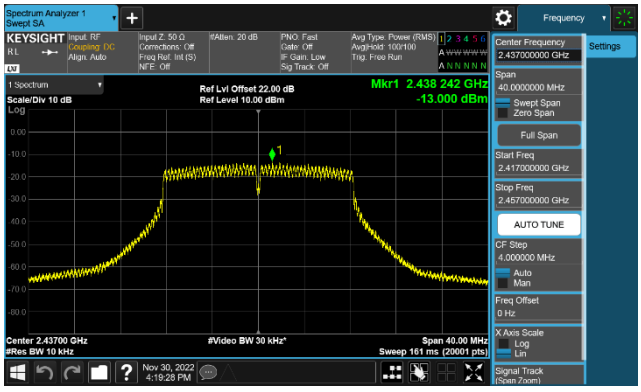
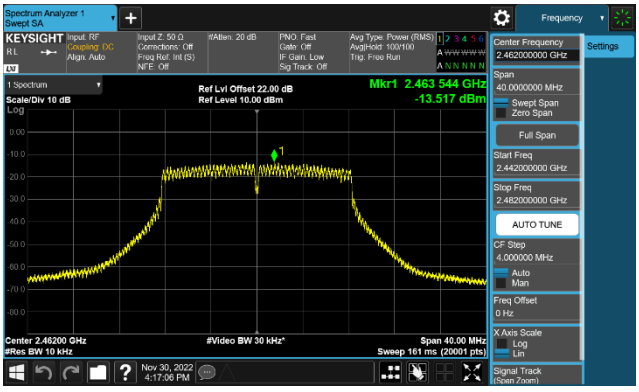


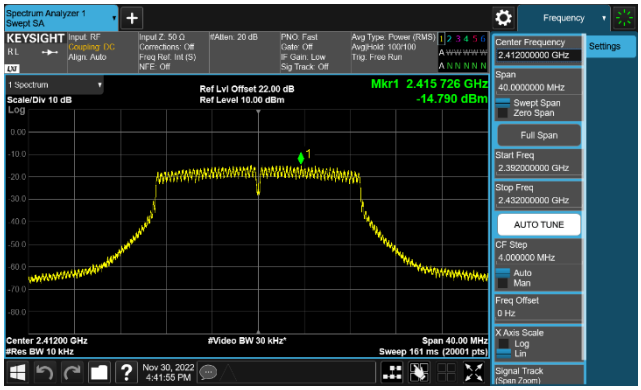
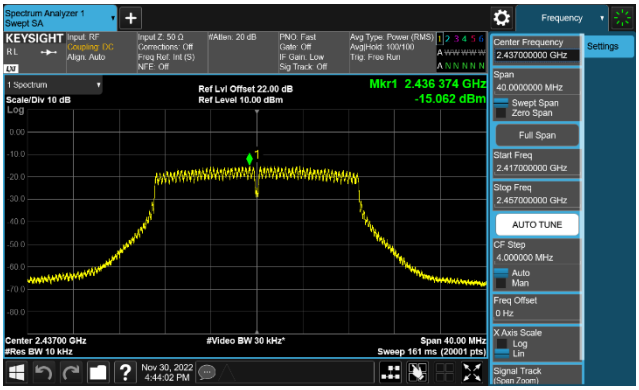
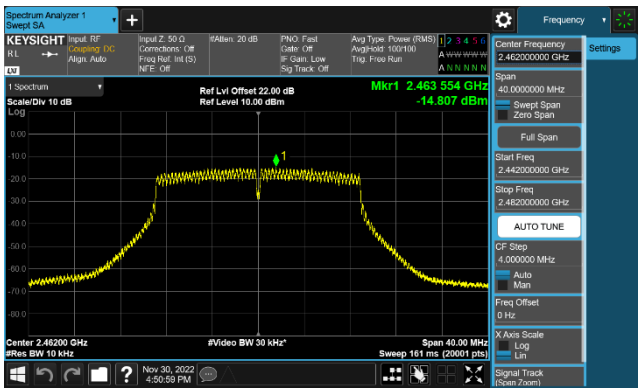
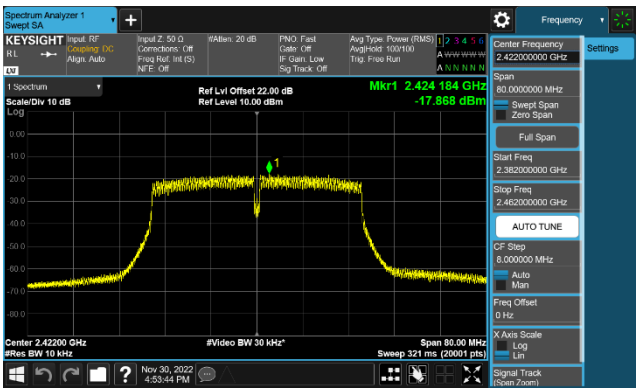
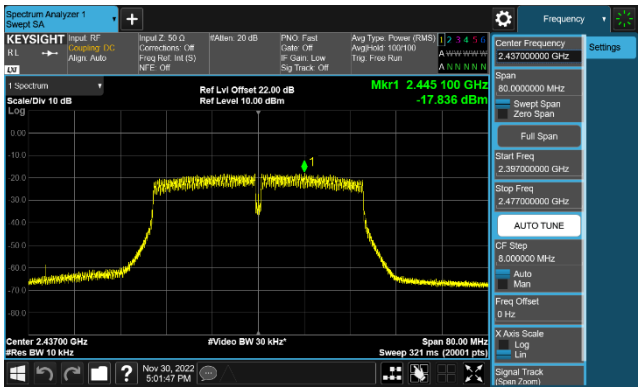
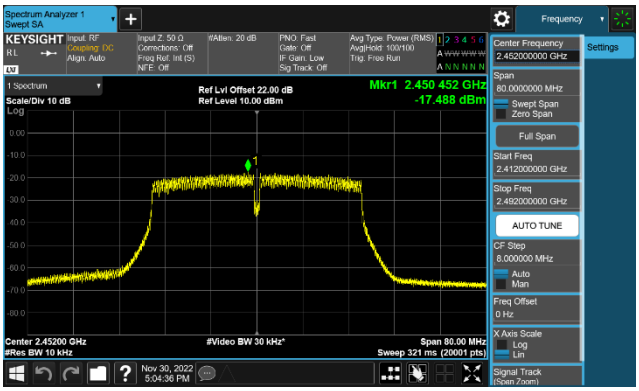
7.4.5. Test Result

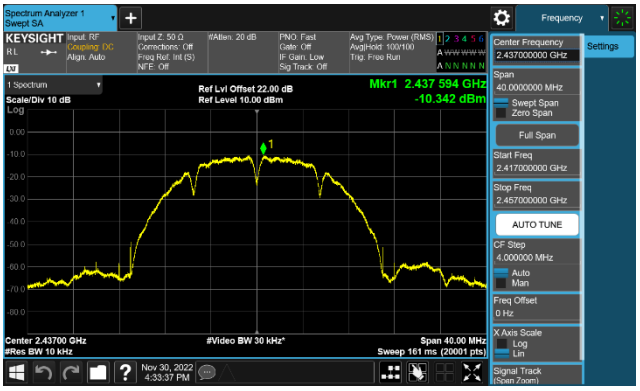
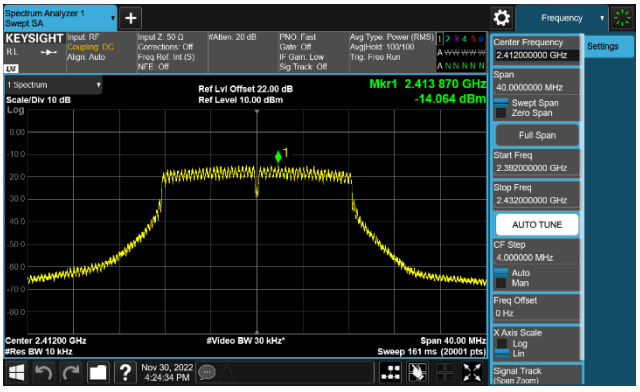
Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ 10kHz)	Ant 1 PSD (dBm/ 10kHz)	Duty Cycle (%)	Ant 0 PSD (dBm/ 10kHz)	Ant 1 PSD (dBm/ 10kHz)	Limit (dBm/ 3kHz)	Result
802.11b	1Mbps	01	2412	-10.936	-9.795	96.03%	-10.760	-9.619	≤ 8.00	Pass
802.11b	1Mbps	06	2437	-10.233	-10.342	96.03%	-10.057	-10.166	≤ 8.00	Pass
802.11b	1Mbps	11	2462	-9.932	-10.618	96.03%	-9.756	-10.442	≤ 8.00	Pass
802.11g	6Mbps	01	2412	-13.088	-14.064	90.88%	-12.673	-13.649	≤ 8.00	Pass
802.11g	6Mbps	06	2437	-13.000	-14.386	90.88%	-12.585	-13.971	≤ 8.00	Pass
802.11g	6Mbps	11	2462	-13.517	-14.255	90.88%	-13.102	-13.840	≤ 8.00	Pass

Test Mode	Data Rate/ MCS	Channel No.	Freq. (MHz)	Ant 0 PSD (dBm/ 10kHz)	Ant 1 PSD (dBm/ 10kHz)	Duty Cycle (%)	Total PSD (dBm/ 10kHz)	Limit (dBm/ 3kHz)	Result
802.11n-HT20	MCS0	01	2412	-14.790	-15.723	95.28%	-12.011	≤ 8.00	Pass
802.11n-HT20	MCS0	06	2437	-15.062	-15.367	95.28%	-11.992	≤ 8.00	Pass
802.11n-HT20	MCS0	11	2462	-14.807	-15.978	95.28%	-12.133	≤ 8.00	Pass
802.11n-HT40	MCS0	03	2422	-17.868	-18.782	90.75%	-14.869	≤ 8.00	Pass
802.11n-HT40	MCS0	06	2437	-17.836	-18.787	90.75%	-14.854	≤ 8.00	Pass
802.11n-HT40	MCS0	09	2452	-17.488	-18.385	90.75%	-14.482	≤ 8.00	Pass

Note 1: When EUT duty cycle ≤ 98%, Total AVGPSD = 10*log $\{10^{(\text{Ant 0 AVGPSD}/10)} + 10^{(\text{Ant 1 AVGPSD}/10)}\}$ + 10*log (1/Duty Cycle).

802.11 b CH01 (2412MHz) Ant 0	802.11 b CH06 (2437MHz) Ant 0
	
802.11 b CH11 (2462MHz) Ant 0	**802.11 g CH01 (2412MHz) Ant 0**
	
802.11 g CH06 (2437MHz) Ant 0	**802.11 g CH11 (2462MHz) Ant 0**
	

802.11 n-20M CH01 (2412MHz) Ant 0	802.11 n-20M CH06 (2437MHz) Ant 0
	
802.11 n-20M CH11 (2462MHz) Ant 0	**802.11 n-40M CH03 (2422MHz) Ant 0**
	
802.11 n-40M CH 06 (2437MHz) Ant 0	**802.11 n-40M CH 09 (2452MHz) Ant 0**
	

802.11 b CH01 (2412MHz) Ant 1	802.11 b CH06 (2437MHz) Ant 1
	
802.11 b CH11 (2462MHz) Ant 1	**802.11 g CH01 (2412MHz) Ant 1**
	
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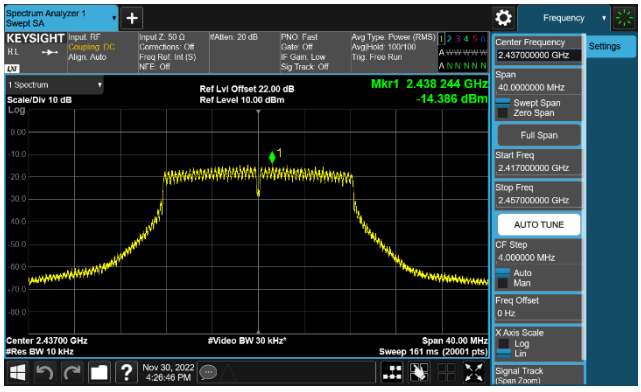
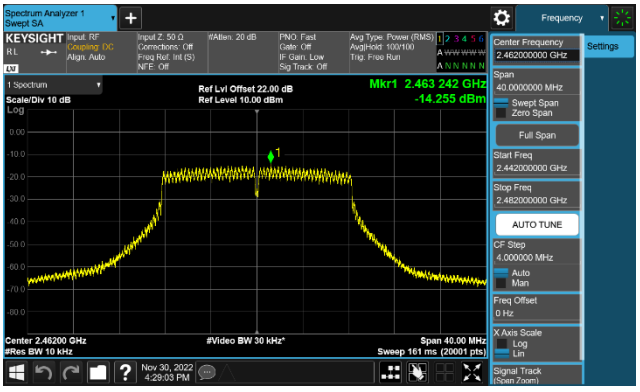
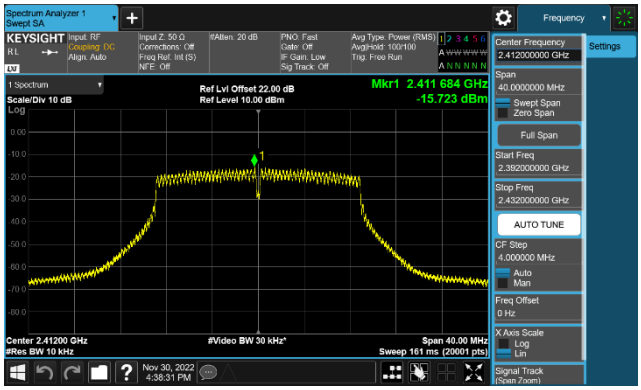
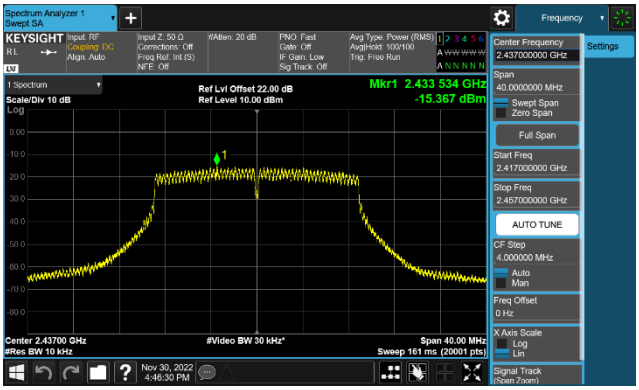
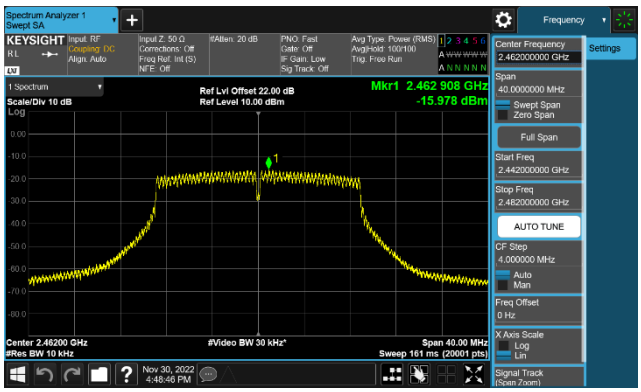
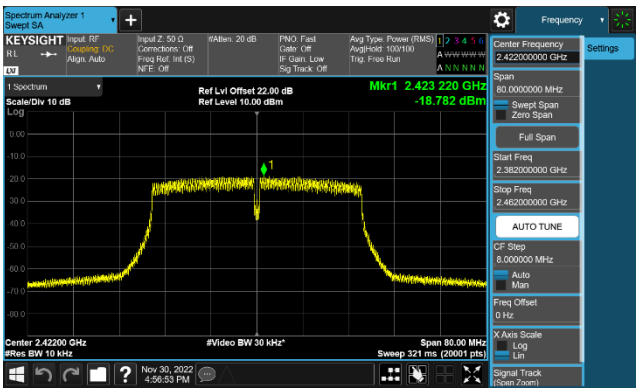
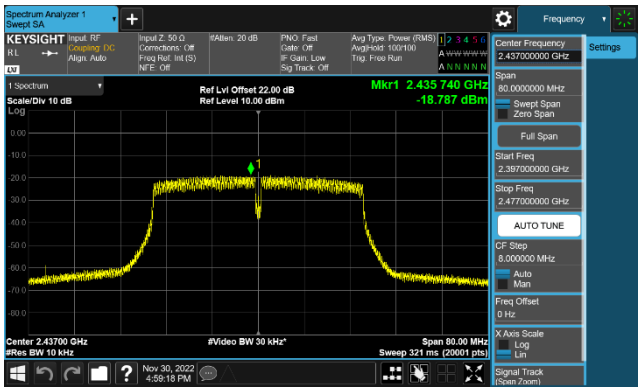
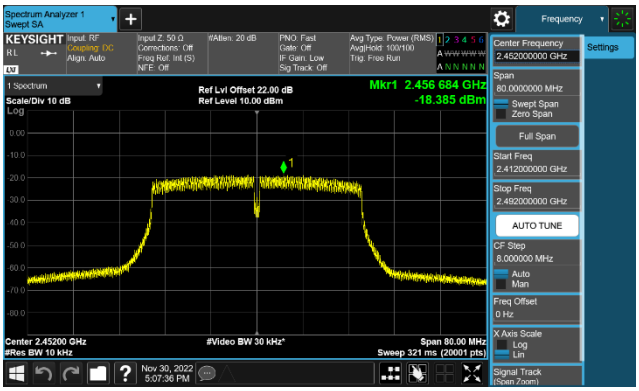
	

802.11 n-20M CH01 (2412MHz) Ant 1	802.11 n-20M CH06 (2437MHz) Ant 1
	
802.11 n-20M CH11 (2462MHz) Ant 1	**802.11 n-40M CH03 (2422MHz) Ant 1**
	
802.11 n-40M CH 06 (2437MHz) Ant 1	**802.11 n-40M CH 09 (2452MHz) Ant 1**
	

7.5. Out-of-Band Spurious Emissions Measurement

7.5.1. Test Limit

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on RF conducted measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

7.5.2. Test Procedure Used

ANSI C63.10-2013 - Section 11.11

7.5.3. Test Settitng

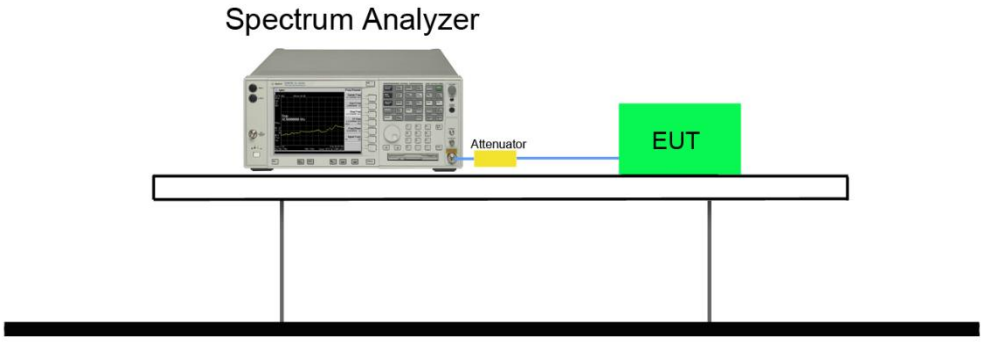
Reference level measurement

1. Set instrument center frequency to DTS channel center frequency
2. Set the span to ≥ 1.5 times the DTS bandwidth
3. Set the RBW = 100 kHz
4. Set the VBW ≥ 3 x RBW
5. Detector = peak
6. Sweep time = auto couple
7. Trace mode = max hold
8. Allow trace to fully stabilize

Emission level measurement

1. Set the center frequency and span to encompass frequency range to be measured
2. RBW = 100kHz
3. VBW = 300kHz
4. Detector = Peak
5. Trace mode = max hold
6. Sweep time = auto couple
7. The trace was allowed to stabilize

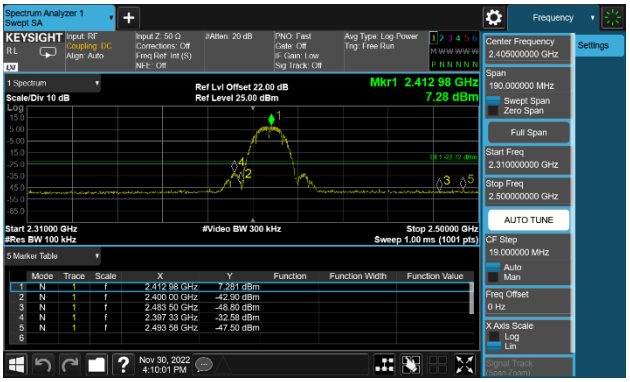
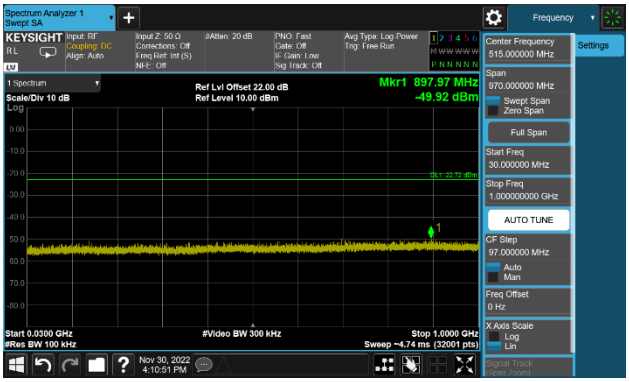
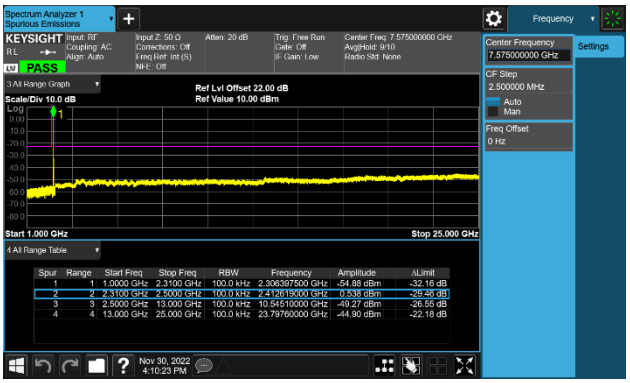
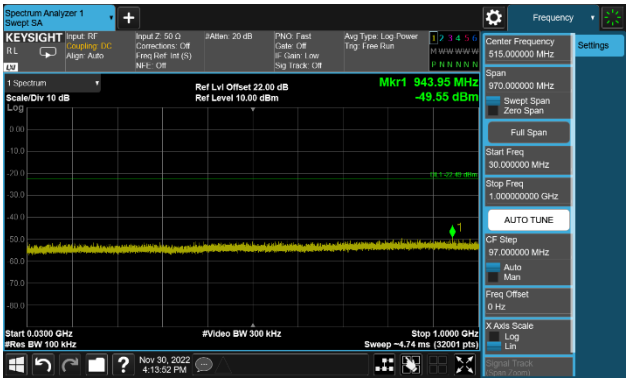
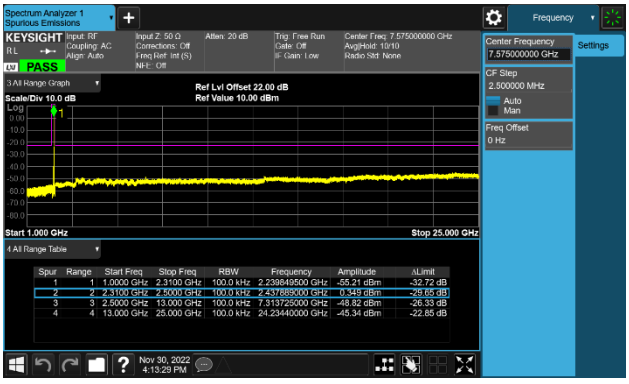
7.5.4. Test Setup

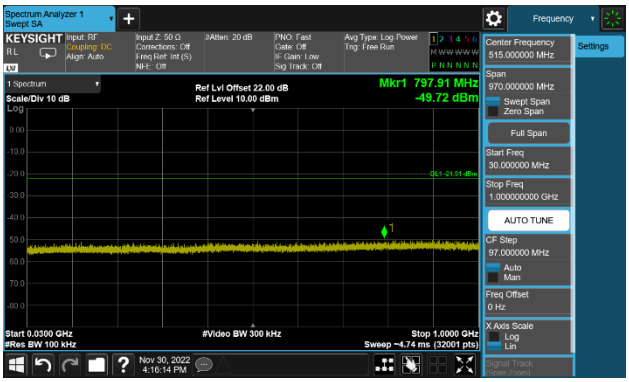
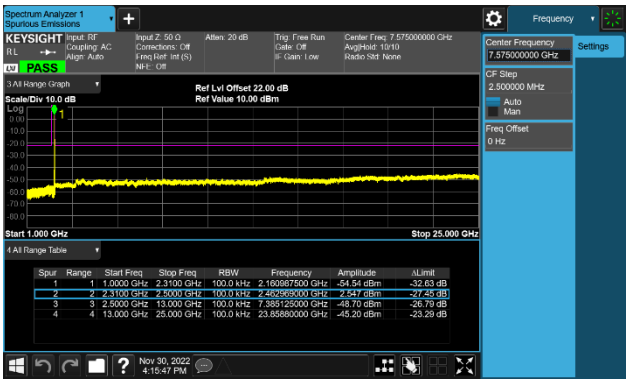
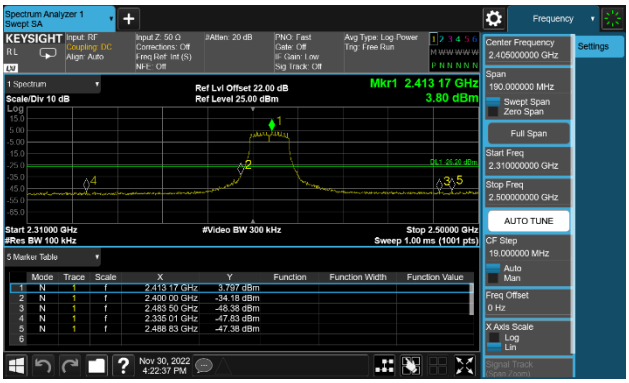
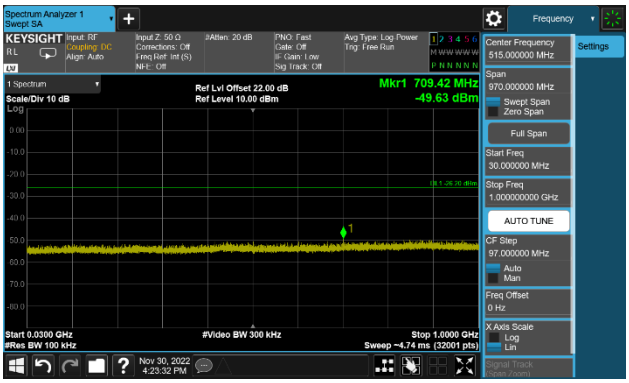
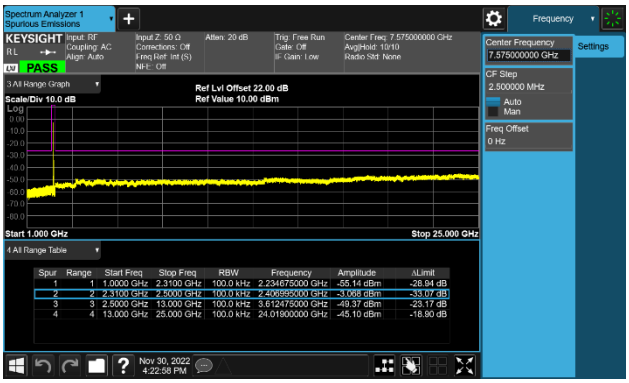


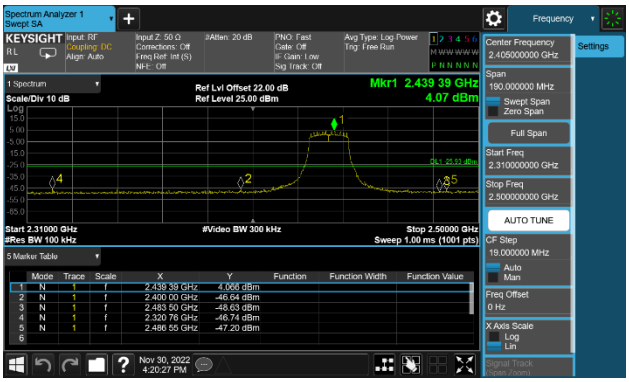
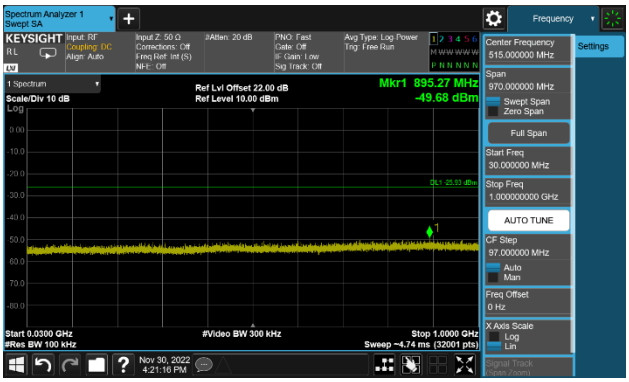
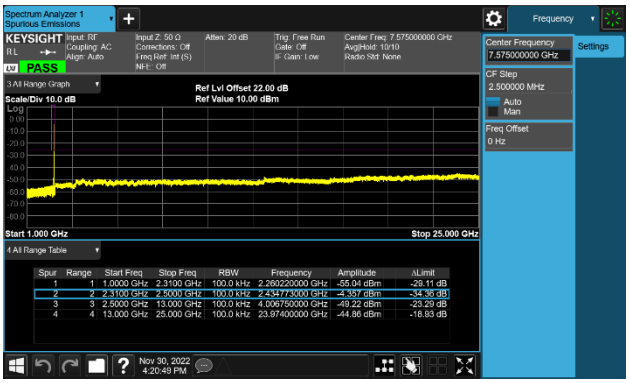
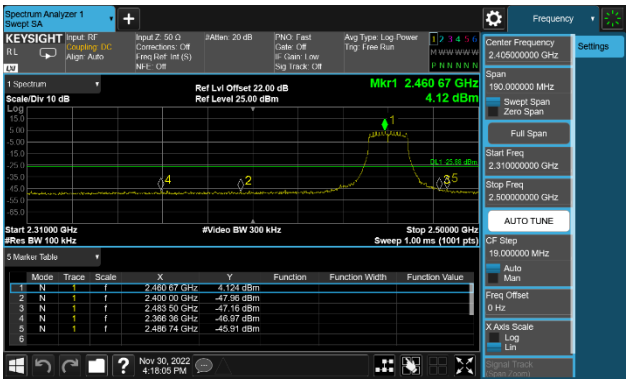
7.5.5. Test Result

Test Mode	Channel No.	Frequency (MHz)	Limit	Result
Ant 0				
802.11b	01	2412	30dBc	Pass
802.11b	06	2437	30dBc	Pass
802.11b	11	2462	30dBc	Pass
802.11g	01	2412	30dBc	Pass
802.11g	06	2437	30dBc	Pass
802.11g	11	2462	30dBc	Pass
802.11n-20M	01	2412	30dBc	Pass
802.11n-20M	06	2437	30dBc	Pass
802.11n-20M	11	2462	30dBc	Pass
802.11n-40M	03	2422	30dBc	Pass
802.11n-40M	06	2437	30dBc	Pass
802.11n-40M	09	2452	30dBc	Pass

Test Mode	Channel No.	Frequency (MHz)	Limit	Result
Ant 1				
802.11b	01	2412	30dBc	Pass
802.11b	06	2437	30dBc	Pass
802.11b	11	2462	30dBc	Pass
802.11g	01	2412	30dBc	Pass
802.11g	06	2437	30dBc	Pass
802.11g	11	2462	30dBc	Pass
802.11n-20M	01	2412	30dBc	Pass
802.11n-20M	06	2437	30dBc	Pass
802.11n-20M	11	2462	30dBc	Pass
802.11n-40M	03	2422	30dBc	Pass
802.11n-40M	06	2437	30dBc	Pass
802.11n-40M	09	2452	30dBc	Pass

802.11 b CH01 (2412MHz) Ant 0	802.11 b CH01 (2412MHz) Ant 0
	
802.11 b CH01 (2412MHz) Ant 0	**802.11 b CH06 (2437MHz) Ant 0**
	
802.11 b CH06 (2437MHz) Ant 0	**802.11 b CH06 (2437MHz) Ant 0**
	

802.11 b CH11 (2462MHz) Ant 0	802.11 b CH11 (2462MHz) Ant 0
	
802.11 b CH11 (2462MHz) Ant 0	**802.11 g CH01 (2412MHz) Ant 0**
	
802.11 g CH01 (2412MHz) Ant 0	**802.11 g CH01 (2412MHz) Ant 0**
	

802.11 g CH06 (2437MHz) Ant 0	802.11 g CH06 (2437MHz) Ant 0
	
802.11 g CH06 (2437MHz) Ant 0	**802.11 g CH11 (2462MHz) Ant 0**
	
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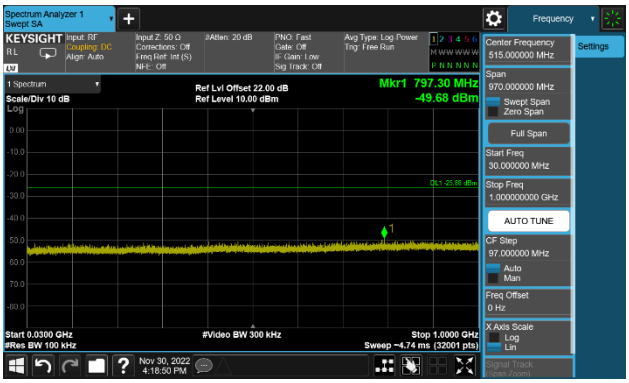
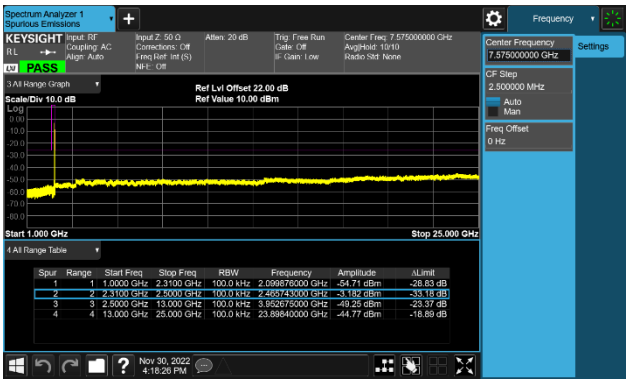
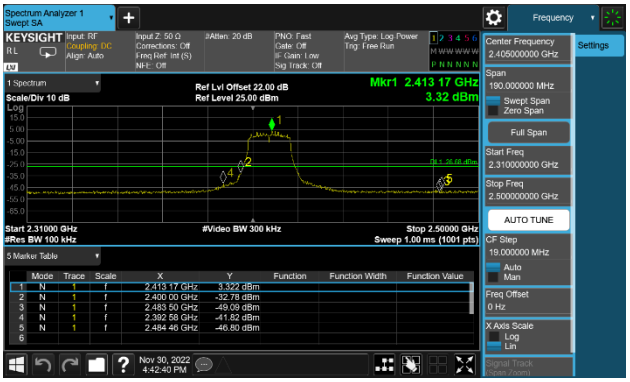
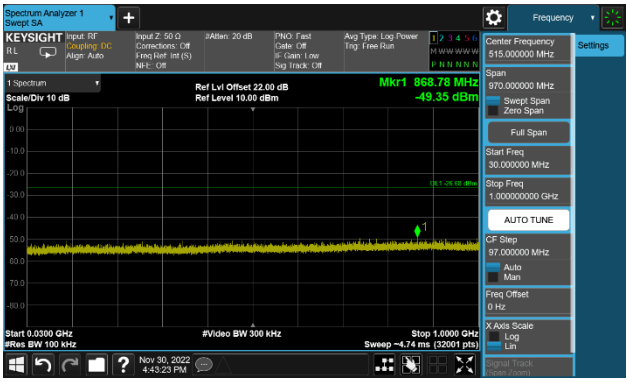
	

802.11 n20 CH01 (2412MHz) Ant 0	802.11 n20 CH01 (2412MHz) Ant 0
	
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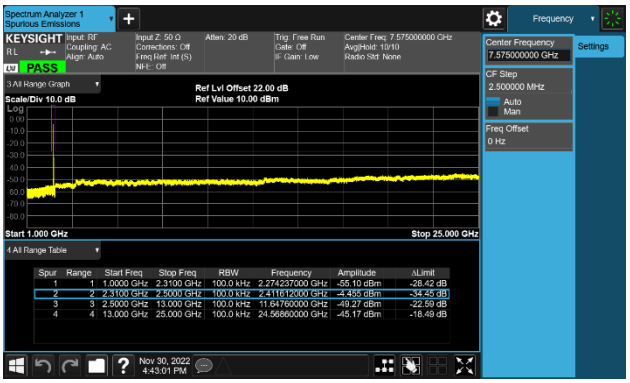	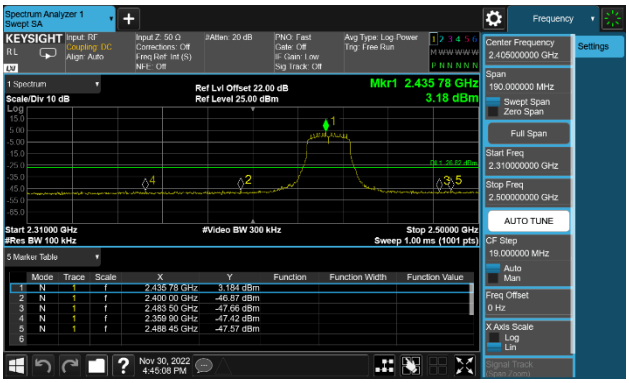
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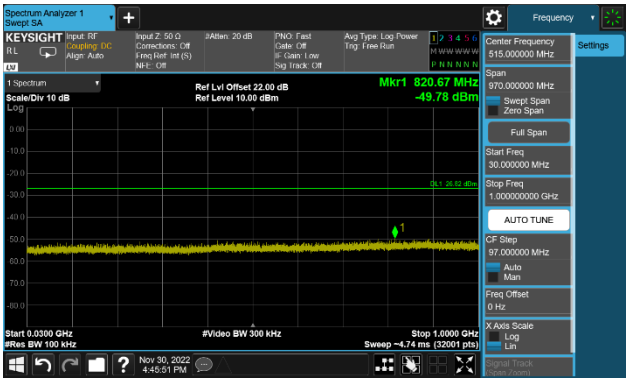
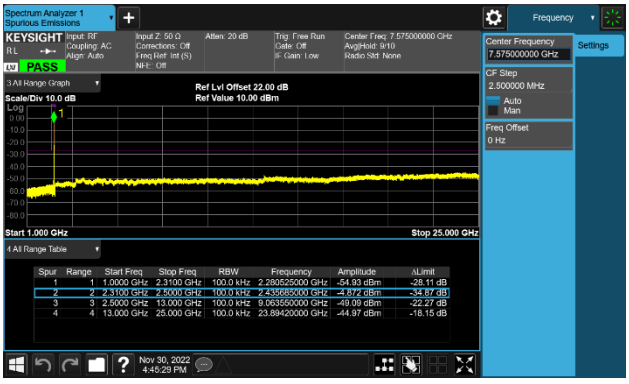
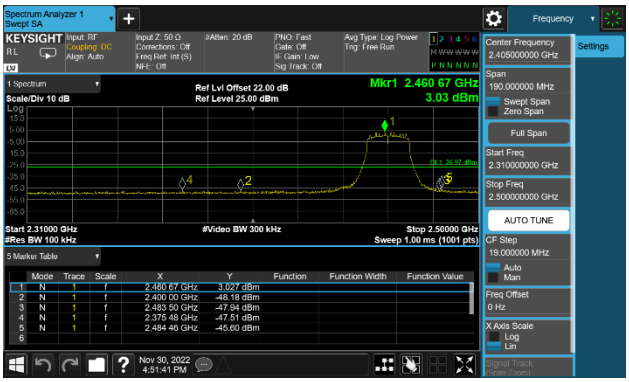
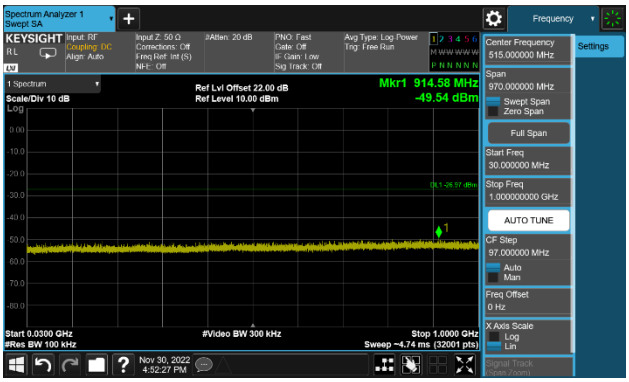
	

802.11 n20 CH11 (2462MHz) Ant 0	802.11 n20 CH11 (2462MHz) Ant 0
	
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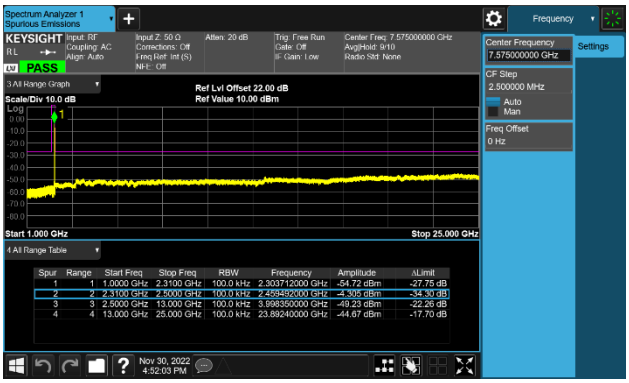	
802.11 n40 CH03 (2422MHz) Ant 0	**802.11 n40 CH03 (2422MHz) Ant 0**