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FCC RF Test Report

Test Report Number	WAP-22021511-LC-FCC IC-WLAN2.4G
FCC ID	KMH-14H317-NA1
IC	1422A-14H317NA1
Applicant	Ford Motor Company
Applicant Address	Building 5, 20300 Rotunda Dr., Dearborn, Michigan, United States 48124
Product Name	Vehicle Telematics Control Unit
Model Name	FNV3-B6-NA
Model Number	U5T-14H317-D
Date of Receipt	04/05/2022
Date of Test	05/17/2022 – 06/01/2022
Report Issue Date	06/03/2022
Test Standards	47 CFR Part 15.247 RSS 247 Issue2, February 2017
Test Result	**PASS**

Issued by:

Vista Compliance Laboratories
1261 Puerta Del Sol, San Clemente, CA 92673 USA
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Devin Tai (Test Engineer)

David Zhang (Technical Manager)

REVISION HISTORY

Report Number	Version	Description	Issued Date
WAP-22021511-LC-FCC IC-WLAN2.4G	01	Initial report	06/03/2022

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1 Test Summary

Test Item	Test Requirement	Test Method	Result
Antenna Requirement	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10 (2013)	Pass
DTS (6 dB) Channel Bandwidth	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10 (2013)	Pass
Occupied Bandwidth	RSS-Gen Issue 5, Mar 2019	RSS-Gen Issue 5, Feb 2021	Pass
Conducted Maximum Output Power	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10 (2013)	Pass
Power Spectral Density	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10 (2013)	Pass
Conducted Band-Edge & Unwanted Emissions	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10 (2013)	Pass
Radiated Emissions & Unwanted Emissions into Restricted Frequency Bands	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10 (2013)	Pass
AC Power Line Conducted Emissions	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017	ANSI C63.10 (2013)	N/A

Note: EUT is powered by Vehicle mains. It does not connect to public AC mains. This item is not applicable.

2 General Information

2.1 Applicant

Applicant	Ford Motor Company
Applicant address	Building 5, 20300 Rotunda Dr., Dearborn, Michigan, United States 48124
Manufacturer	Ford Motor Company
Manufacturer Address	Building 5, 20300 Rotunda Dr., Dearborn, Michigan, United States 48124

2.2 Product information

Product Name	Vehicle Telematics Control Unit
Mode Name	FNV3-B6-NA
Model Number	U5T-14H317-D
Family Model Number	N/A
Serial Number	ANHGG22022104741, ANHGG22027104975 (Conducted), ANHGG22022104737, ANHGG21328102795 (Radiated)
Frequency Band	BT BDR/EDR: 2402-2480MHz BLE: 2402-2480MHz 802.11b/g/n-20MHz: 2412-2462MHz 802.11n-40MHz: 2422-2452MHz 802.11a/n-20MHz: 5500-5580MHz, 5660-5720, 5725-5825MHz 802.11n-40MHz: 5510-5550MHz, 5630-5710, 5755-5795MHz 802.11ac: 5530, 5690MHz, 5775MHz WCDMA Band 2: UL: 1850- 1910MHz; DL: 1930-1990MHz WCDMA Band 4: UL: 1710- 1755MHz. DL: 2110-2155MHz WCDMA Band 5: UL: 824- 849MHz; DL: 869-894MHz LTE Band 2: UL: 1850-1910MHz; DL: 1930-1990MHz LTE Band 4: UL:1710-1755MHz; DL: 2110-2155MHz LTE Band 5: UL:824-849MHz; DL: 869-894MHz LTE Band 7: UL:2500-2570MHz; DL: 2620-2690MHz LTE Band 12: UL:699-716MHz; DL: 729-746MHz LTE Band 13: UL:777-787MHz; DL:746-756MHz LTE Band 17: UL: 704-716MHz; DL: 734-746MHz LTE Band 29: DL: 717-728MHz (UE Receive Only) LTE Band 38: UL: 2570-2620MHz; DL: 2570-2620MHz LTE Band 66: UL:1710-1780MHz; DL: 2110-2200MHz LTE Band 71: UL: 663-698MHz; DL: 617-652MHz 5G NR n2: UL: 1850-1910MHz; DL: 1930-1990MHz 5G NR n5: UL:824-849MHz; DL: 869-894MHz 5G NR n7: UL:2500-2570MHz; DL: 2620-2690MHz 5G NR n41: UL:2496-2690MHz; DL: 2496-2690MHz 5G NR n66: UL:1710-1780MHz; DL: 2110-2200MHz 5G NR n71: UL:663-698MHz; DL: 617-652MHz 5G NR n77-L: UL:3450-3550MHz; DL: 3450-3550MHz 5G NR n77-H: UL:3700-3980MHz; DL: 3700-3980MHz 5G NR n78-L: UL:3450-3550MHz; DL: 3450-3550MHz

	5G NR n78-H: UL: 3700-3800MHz; DL: 3700-3800MHz
Type of modulation	BT BDR/EDR: GFSK, π/4DQPSK, 8DPSK BLE: GFSK 802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g: OFDM-CCK (BPSK, QPSK, 16QAM, 64QAM) 802.11a/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM) WCDMA: QPSK LTE: QPSK, 16QAM, 64QAM, 256QAM 5G NR: Pi/2-BPSK, QPSK, 16QAM, 64QAM, 256QAM
Equipment Class/ Category	DSS, DTS, UNII, PCB
Maximum output power	See test result
Antenna Information	**2 x Internal BT/WLAN PCB trace antenna** Peak Gain: - 3.7 dBi @2.4GHz WiFi/Bluetooth, 6.4 dBi @5GHz WiFi **Cellular External antennas:** Peak Gain: 6 dBi @ 617 - 960 MHz 8 dBi @ 1710-2200MHz 8.5 dBi @ 2300-2700MHz 9.5 dBi @ 3300-4200MHz 11.0 dBi @ 4400-5000MHz *Antenna connector type: quad mini-Fakra connector* Modem 6 TCU will support 4 vehicle cellular antenna ports. The antenna port mapping is at below table,

Antenna	LB	MB	HB	N77/78/79	N41
Antenna1	DRX	TX+PRX	TX+PRX	TX+PRX	TX+PRX
Antenna2	TX+PRX	DRX	DRX	DRX	DRX
Antenna3	-	MIMO	MIMO	MIMO	MIMO
Antenna4	-	MIMO	MIMO	MIMO	MIMO

Note:

1. Antenna 1 and 3 go to the left-side rooftop external antenna (cellular antennas) and antenna 2 and 4 go to the right-side rooftop external antenna (cellular antennas). The cable length between left left-side and right-side rooftop external antenna are more than 20 cm.
2. Antenna 3 and 4 are for 4G-5G MIMO diversity only, no TX.
3. The antenna gain is declared by the manufacturer. Not all antennas support TX. The declared peak gain may have overestimated the TX gain of the single cellular antenna. For ERP/EIRP, radiated power will be measured in case when the calculated ERP/EIRP with declared antenna gain and measured conducted power is high.
4. For Bluetooth/WLAN, EUT has an option to use an external antenna with 10 dBi peak gain in 2.4GHz and 11 dBi gain in 5GHz. This antenna has not been evaluated in current report. However, the conservative 10 dBi gain (2.4GHz) and 11 dBi gain (5GH) are used for power related evaluation in current report.

Clock Frequencies	N/A

Port/Connectors	CAN bus
Input Power	Vehicle Battery powered: 12VDC
Power Adapter Manu/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Simultaneous Transmission	BT/BLE, WLAN and cellular radio can transmit simultaneously
Additional Info	N/A

2.3 Test standard and method

Test standard	47 CFR Part 15.247 RSS-247 Issue 2, Feb 2017
Test method	ANSI C63.10-2013 558074 D01 15.247 Meas Guidance v05r02

3 Test Site Information

Lab performing tests	Vista Laboratories, Inc.
Lab Address	1261 Puerta Del Sol, San Clemente, CA 92673 USA
Phone Number	+1 (949) 393-1123
Website	www.vista-compliance.com

Test Condition	Temperature	Humidity	Atmospheric Pressure
RF Testing	23.5°C	61.3%	1002 mbar
Radiated Emission Testing	23.5°C	61.3%	1002 mbar

4 Modification of EUT / Deviations from Standards

The EUT is an engineering test sample loaded with RF testing firmware specifically designed to support the RF TX/RX measurement in different aspects.

5 Test Configuration and Operation

5.1 EUT Test Configuration

EUT is powered by external DC power supply for testing purpose. EUT's RF antenna port is connected to spectrum analyzer through RF test cable for measurement. The test software is used to set EUT to different transmission mode in terms of radio mode (WLAN, BLE), test channel, data rate, etc. For Cellular radio, it's controlled by communication tester to change to different mode.

The following software was used for testing and to monitor EUT performance

Software	Description
EMISoft Vasona	EMC/RF Spurious emission test software used during testing
QRCT	Set the module work at different mode, channel, bandwidth, etc.

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #
AC/DC Adapter	MEAN WELL	GST60A12-P1J	EB74Q81066

6 Uncertainty of Measurement

Test item	Measurement Uncertainty (dB)
RF Output Power (Conducted)	±1.2 dB
Power Spectral Density	±0.9 dB
Unwanted Emission (conducted)	±2.6 dB
Occupied Channel Bandwidth	±5 %
Radiated Emission (9KHz-30MHz)	±3.5 dB
Radiated Emission (30MHz-1GHz)	±4.6 dB
Radiated Emission (1-18GHz)	±4.9 dB
Radiated Emission (18-40GHz)	±3.5 dB

7 Test Results

7.1 Antenna Requirement

7.1.1 Requirement

Per § 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. 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.

7.1.2 Result

Analysis:

EUT has internal and optional external antennas.

- For Internal antennas, they're PCB trace antennas. No standard RF connector or coupling is used.
- For External antennas, they're connected using non-standard coupling port. No standard RF connector or coupling is used.

Conclusion:

- EUT complies with antenna requirement in § 15.203.

7.2 DTS (6 dB) Bandwidth

7.2.1 Requirement

§ 15.247 (a)(2), RSS-247 §5.2

Systems using digital modulation techniques may operate in the 902-928MHz, 2400-2483.5MHz, and 5725-5850MHz bands. The minimum 6 dB bandwidth shall be at least 500 KHz.

7.2.2 Test Setup

7.2.3 Test Procedure

According to section 8.2, option 2, in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.8 of ANSI C63.10-2013:

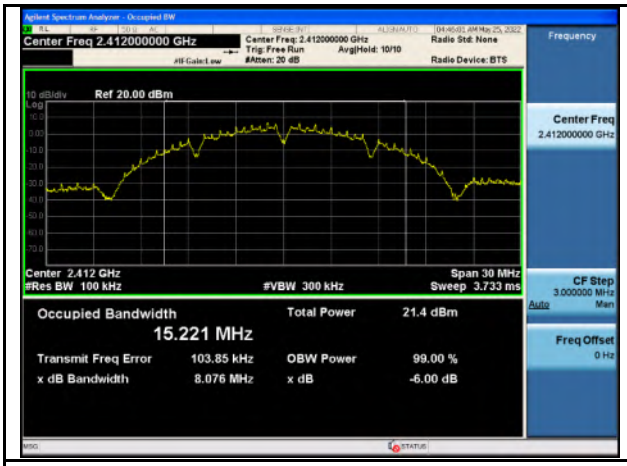
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

1. Set RBW = 100 kHz.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. Use automatic bandwidth measurement capability on instrument to obtain BW result.

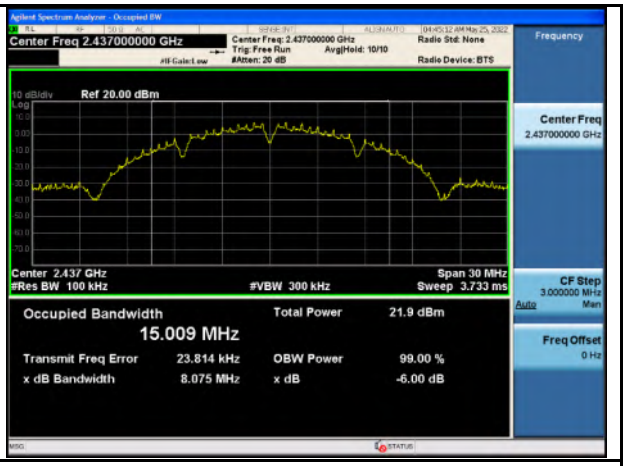
7.2.4 Test Result

Mode	Data rate	Frequency (MHz)	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Result
802.11b	1Mbps	2412	8.076	0.5	Pass
		2437	8.075	0.5	Pass
		2462	8.084	0.5	Pass
802.11g	6Mbps	2412	15.068	0.5	Pass
		2437	15.065	0.5	Pass
		2462	15.069	0.5	Pass
802.11n20	MCS0	2412	15.079	0.5	Pass
		2437	15.063	0.5	Pass
		2462	15.076	0.5	Pass
802.11n40	MCS0	2422	33.813	0.5	Pass
		2437	32.545	0.5	Pass
		2452	28.822	0.5	Pass

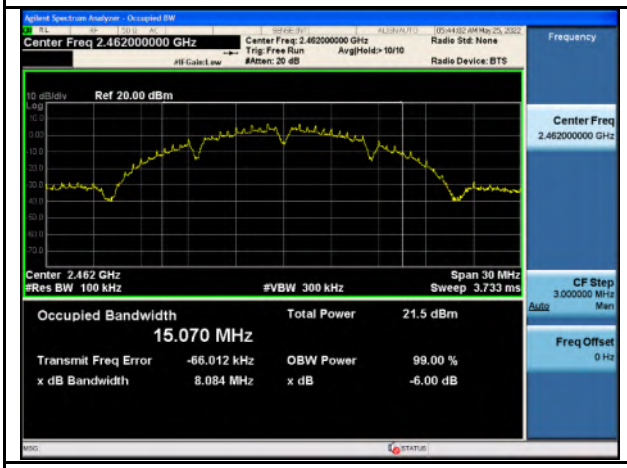
7.2.5 Test Plots



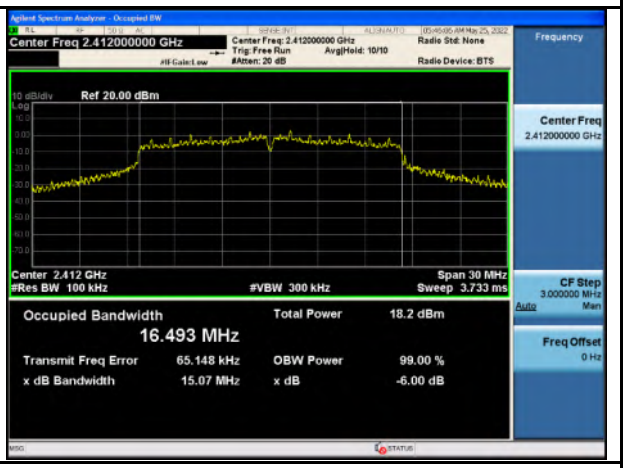
DTS BW_802.11b_Low CH



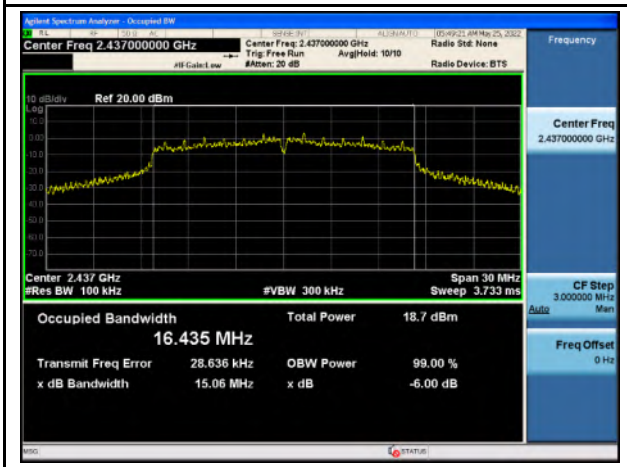
DTS BW_802.11b_Mid CH



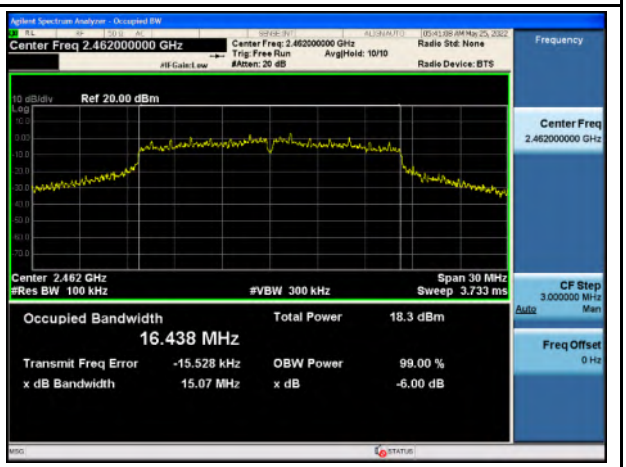
DTS BW_802.11b_High CH



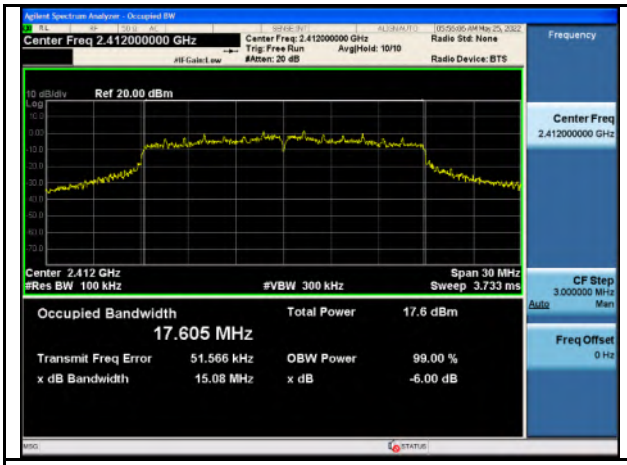
DTS BW_802.11g_Low CH



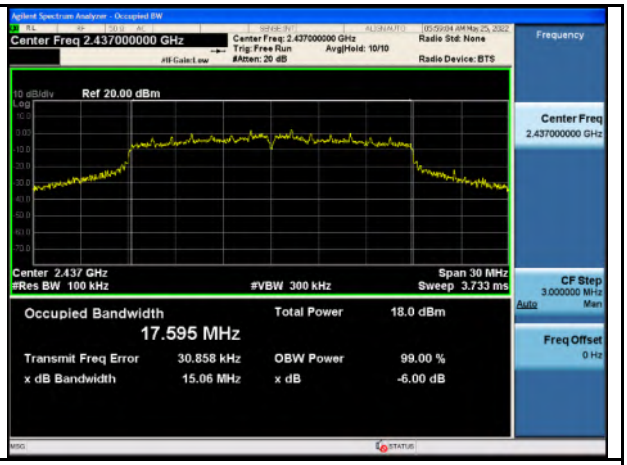
DTS BW_802.11g_Mid CH



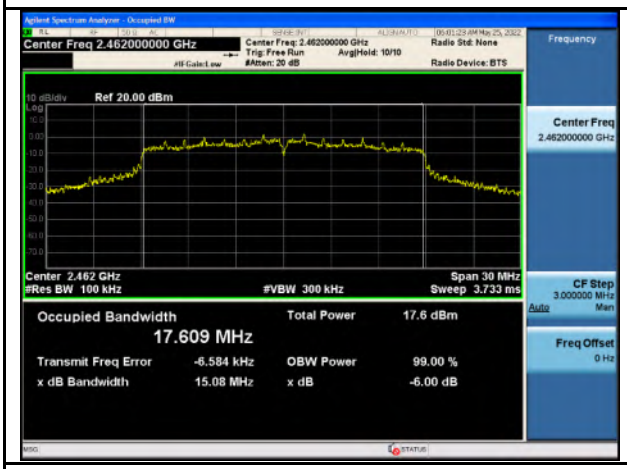
DTS BW_802.11g_High CH



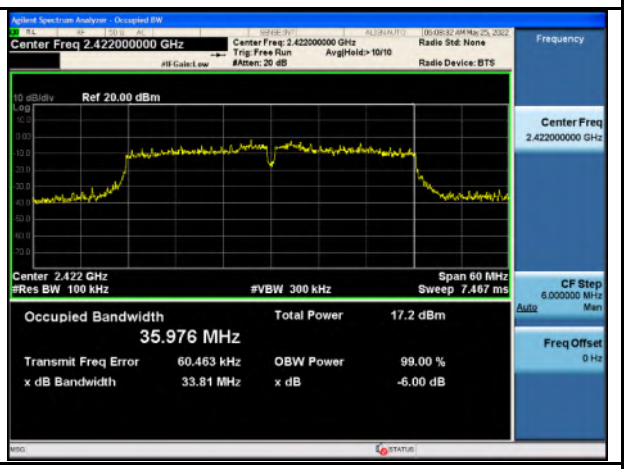
DTS BW_802.11n20_Low CH



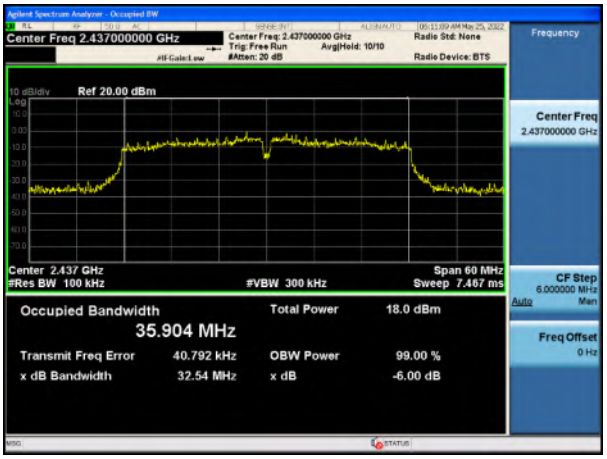
DTS BW_802.11 n20_Mid CH



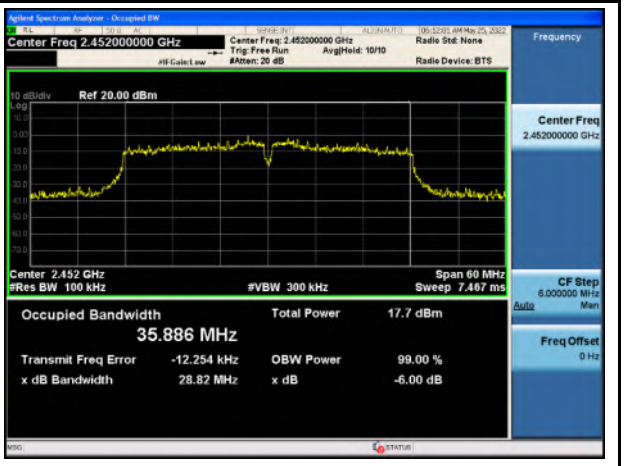
DTS BW_802.11 n20_High CH



DTS BW_802.11 n40_Low CH



DTS BW_802.11n40_Mid CH



DTS BW_802.11n40_High CH

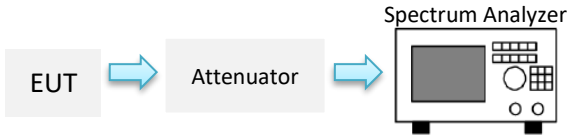
7.3 Occupied Bandwidth (99%)

7.3.1 Requirement

RSS-Gen §6.7

The occupied bandwidth or the "99% emission bandwidth" is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

7.3.2 Test Setup



7.3.3 Test Procedure

According to section RSS-Gen §6.7

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

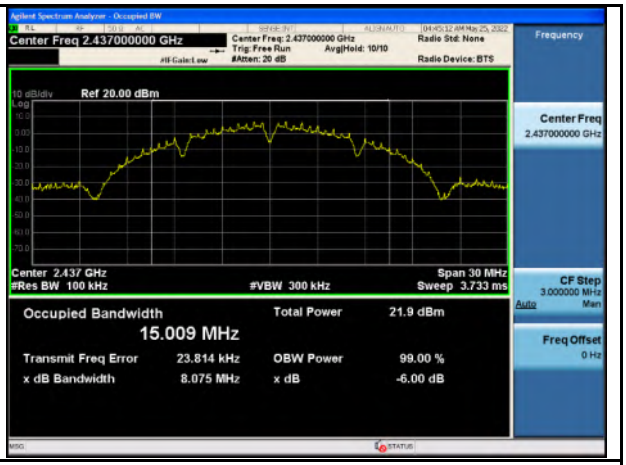
1. Set RBW = 1% to 5% of the actual occupied BW.
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Span = large enough to capture all products of the modulation process
7. Allow the trace to stabilize.
8. Use automatic bandwidth measurement capability on instrument to obtain BW result.

7.3.4 Test Result

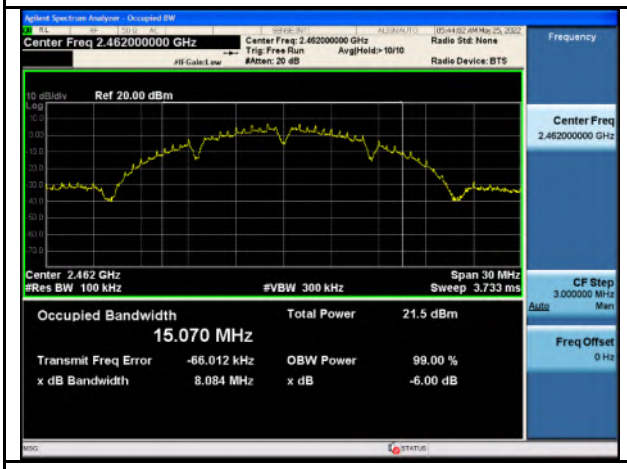
Mode	Data rate	Frequency (MHz)	Measured 99% OBW (MHz)	Limit (MHz)	Result
802.11b	1Mbps	2412	15.221	N/A	N/A
		2437	15.009	N/A	N/A
		2462	15.070	N/A	N/A
802.11g	6Mbps	2412	16.493	N/A	N/A
		2437	16.435	N/A	N/A
		2462	16.438	N/A	N/A
802.11n20	MCS0	2412	17.605	N/A	N/A
		2437	17.595	N/A	N/A
		2462	17.609	N/A	N/A
802.11n40	MCS0	2422	35.976	N/A	N/A
		2437	35.904	N/A	N/A
		2452	35.886	N/A	N/A

7.3.5 Test Plots

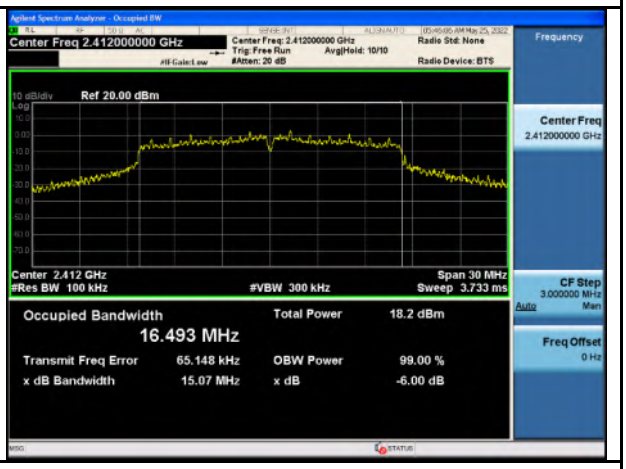
99%_802.11b_Low CH



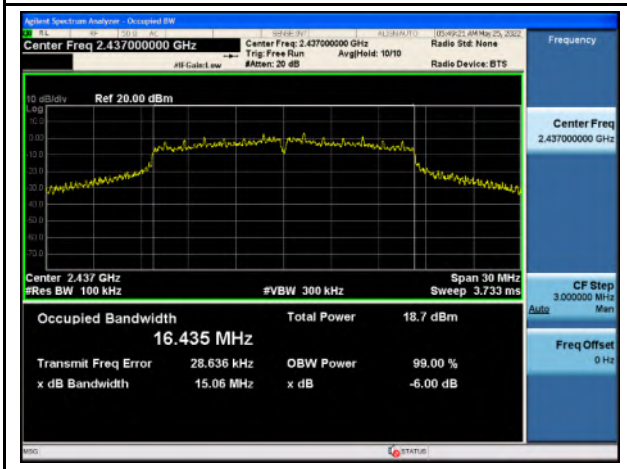
99%_802.11b_Mid CH



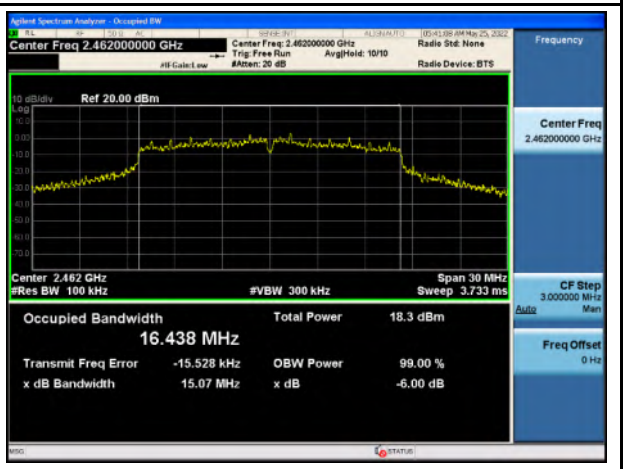
99%_802.11b_High CH



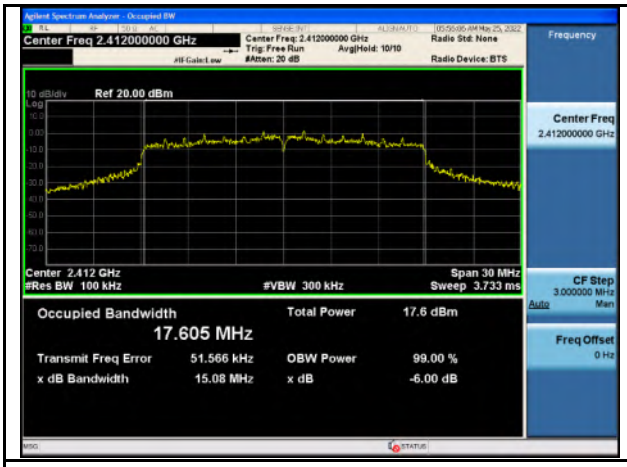
99%_802.11g_Low CH



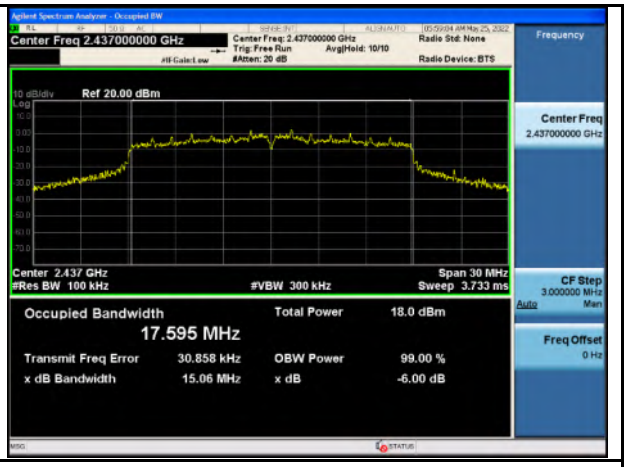
99%_802.11g_Mid CH



99%_802.11g_High CH



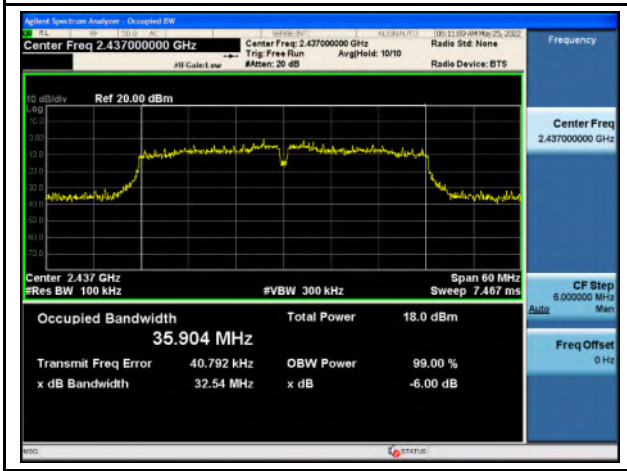
99%_802.11n20_Low CH



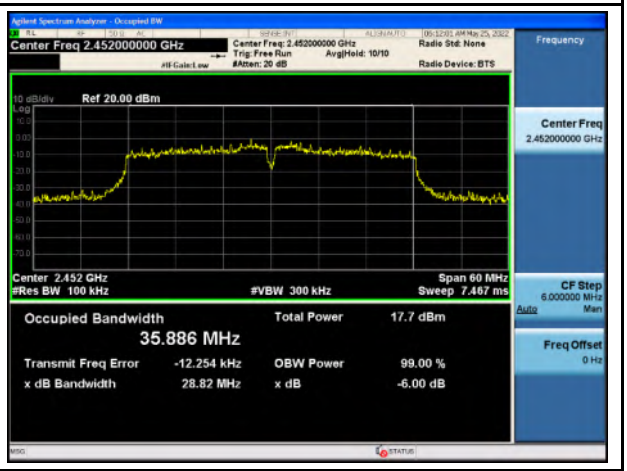
99%_802.11n20_Mid CH

99%_802.11n20_High CH

99%_802.11n40_Low CH



99%_802.11n40_Mid CH



99%_802.11n40_High CH

7.4 Maximum Output Power

7.4.1 Requirement

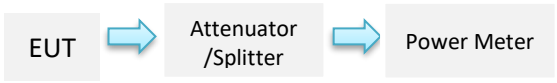
§ 15.247 (b)(3), RSS-247 §5.4

or systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: the maximum output power is 1 Watt.

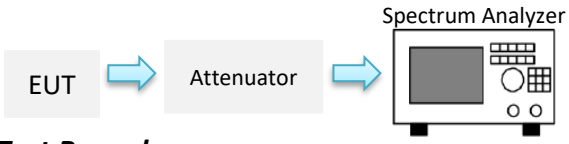
If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4.2 Test Setup

Power Meter



Spectrum Analyzer



7.4.3 Test Procedure

Method 1: Power Meter

Power measurement is according to clause 11.9.1.3 of ANSI C63.10-2013 PKPM1 Peak power meter method or clause 11.9.2.3 AVGPM method.

Method 2: Spectrum Analyzer

1. Set span to at least 1.5 times the OBW.
2. Set RBW = 1-5% of the OBW, not to exceed 1 MHz
3. Set VBW ⩾ 3 x RBW.
4. Number of points in sweep ⩾ 2 × span / RBW
5. Sweep time = auto.
6. Detector = RMS (i.e., power averaging), or sample detector mode.
7. If transmit duty cycle < 98 %, use a sweep trigger with the level set to enable triggering only on full power pulses. If the EUT transmits continuously (i.e., with no off intervals) or at duty cycle ⩾ 98 %, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run”.
8. Trace average at least 100 traces in power averaging (i.e., RMS) mode.

7.4.4 Test Result

Mode	Data rate	Frequency (MHz)	Measured Output Power (dBm)		Highest / Total power (dBm)	Max Output Power (dBm)	Result
			Chain 1	Chain 2			
802.11b	1Mbps	2412	15.047	13.670	15.047	26	Pass
		2437	15.535	12.609	15.535	26	Pass
		2462	15.073	13.819	15.073	26	Pass
802.11g	6Mbps	2412	11.431	10.693	11.431	26	Pass
		2437	11.828	10.200	11.828	26	Pass
		2462	11.526	10.203	11.526	26	Pass
802.11n20	MCS0	2412	10.408	9.772	13.112	26	Pass
		2437	10.856	9.305	13.159	26	Pass
		2462	10.525	9.182	12.916	26	Pass
802.11n40	MCS0	2422	8.359	7.434	10.931	26	Pass
		2437	9.082	8.447	11.786	26	Pass
		2452	8.835	8.038	11.465	26	Pass

Note:

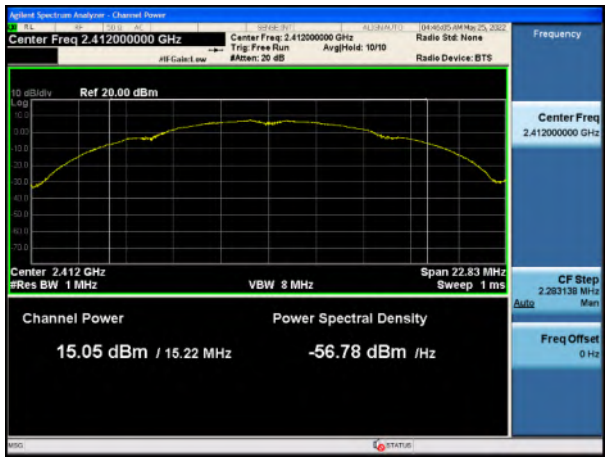
1) For 802.11b/g, the highest output power is recorded.

2) For 2.4GHz 802.11n mode, with internal antennas, it's under 2x2 MIMO mode, the output power is combined together to compare to limit. Directional gain is calculated per KDB 662911 D01. For 2.4GHz WiFi, directional gain = 6.7 dBi. The output power limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

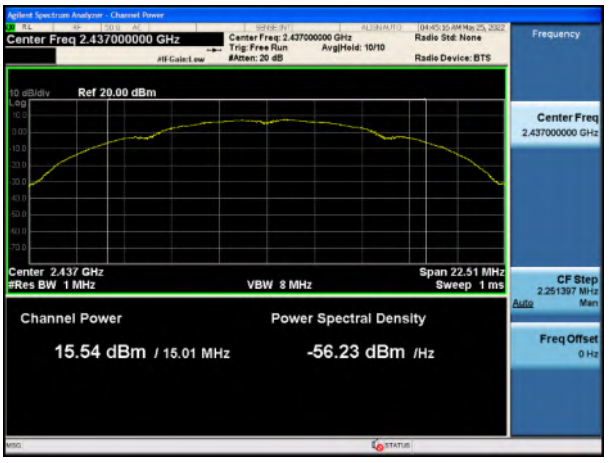
3) The actual power and PSD limit will be reduced by the amount that it exceeds 6 dBi based on a conservative 10 dBi peak gain (optional external antenna that is to be evaluated)

7.4.5 Test Plots

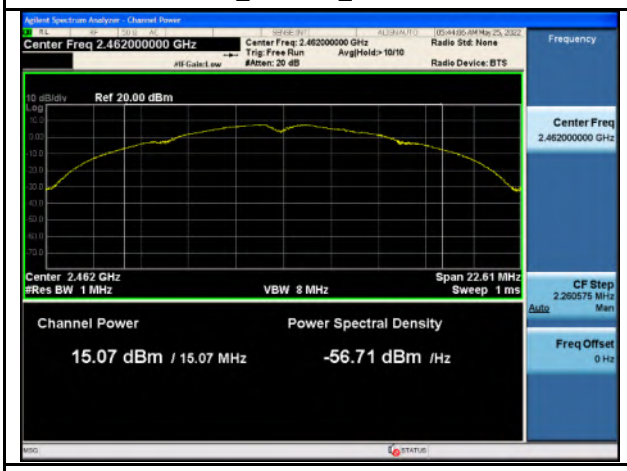
Chain 1



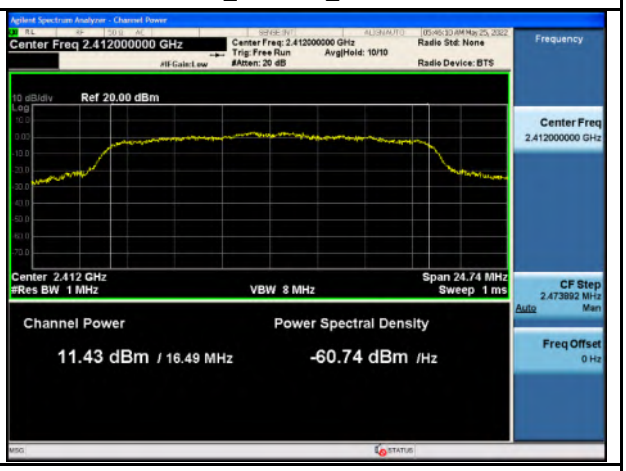
OP_802.11b_Low CH



OP_802.11b_Mid CH

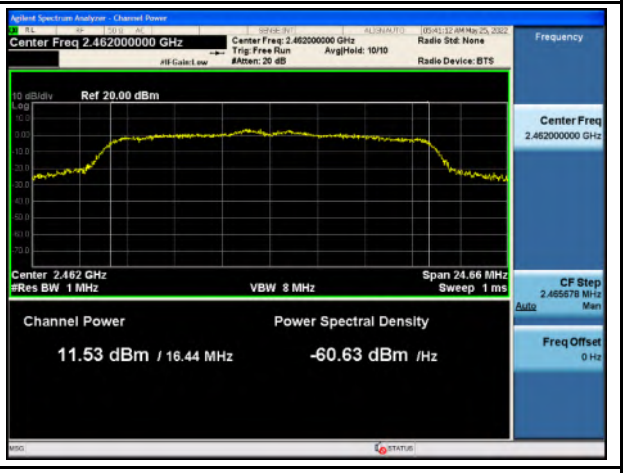


OP_802.11b_High CH

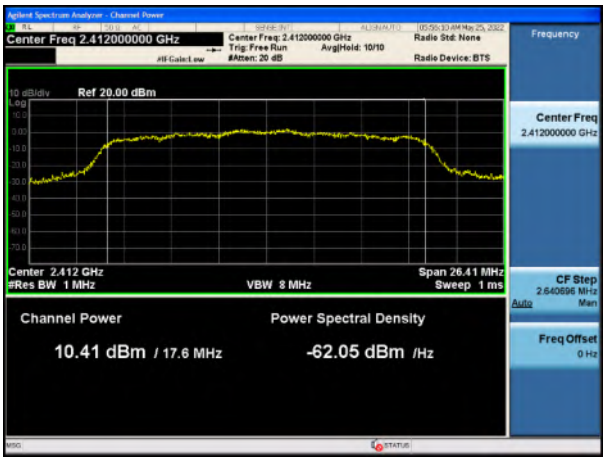


OP_802.11g_Low CH

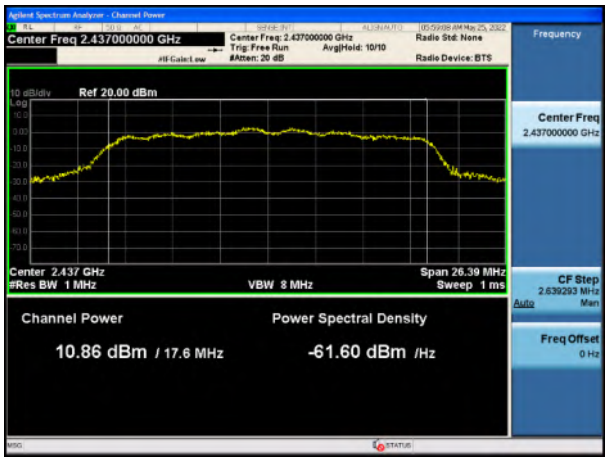
OP_802.11g_Mid CH



OP_802.11g_High CH

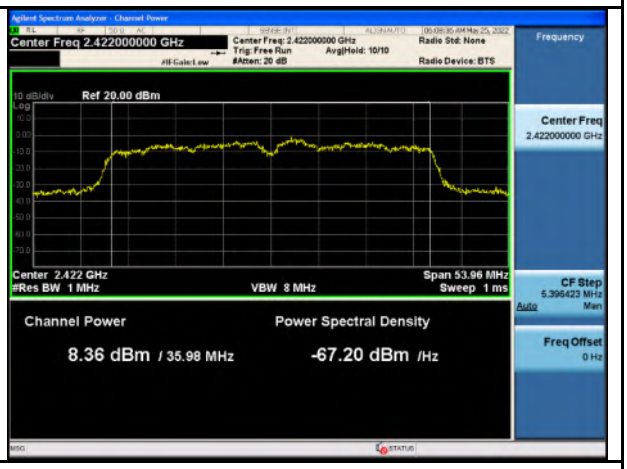


OP_802.11n_Low CH



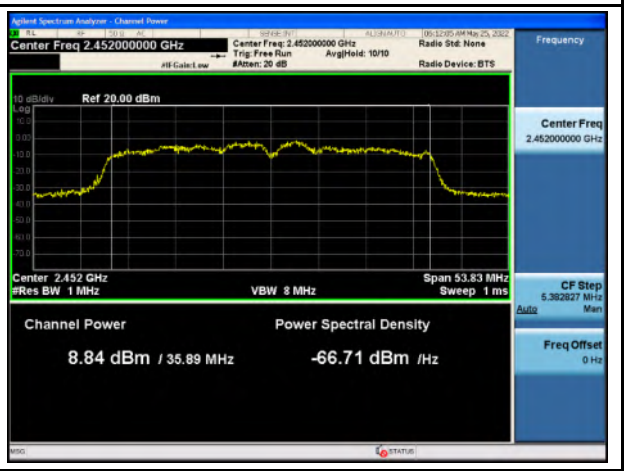
OP_802.11n_Mid CH

OP_802.11n_High CH



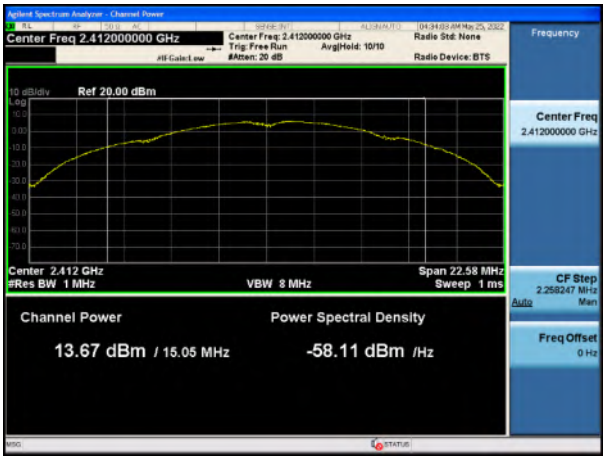
OP_802.11n40_Low CH

OP_802.11n40_Mid CH

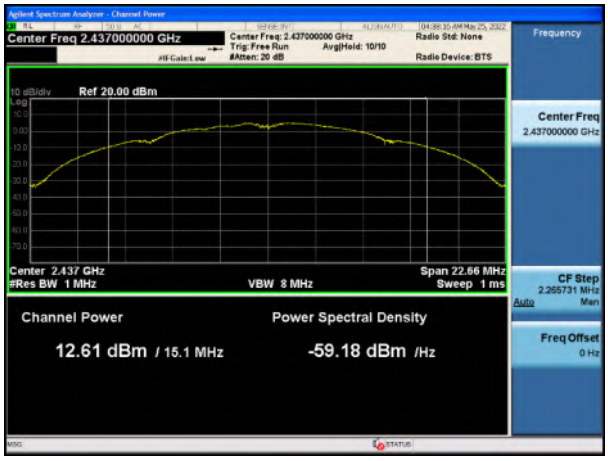


OP_802.11n40_High CH

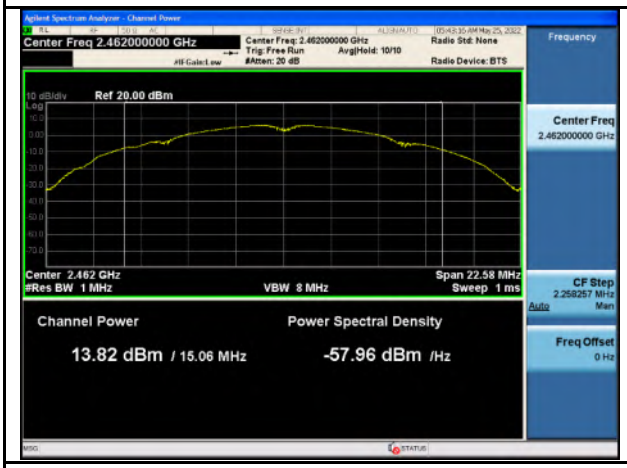
Chain 2



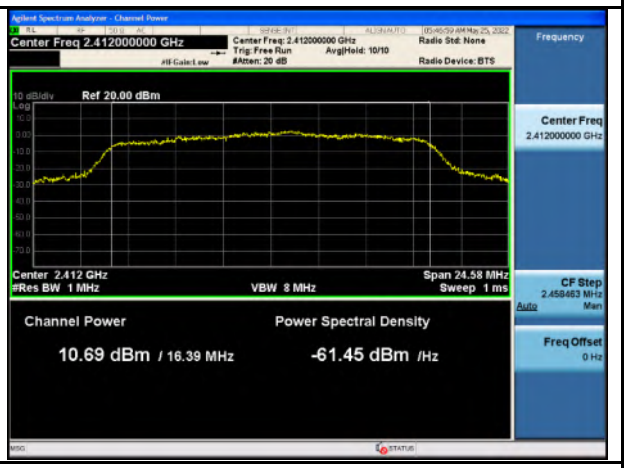
OP_802.11b_Low CH



OP_802.11b_Mid CH

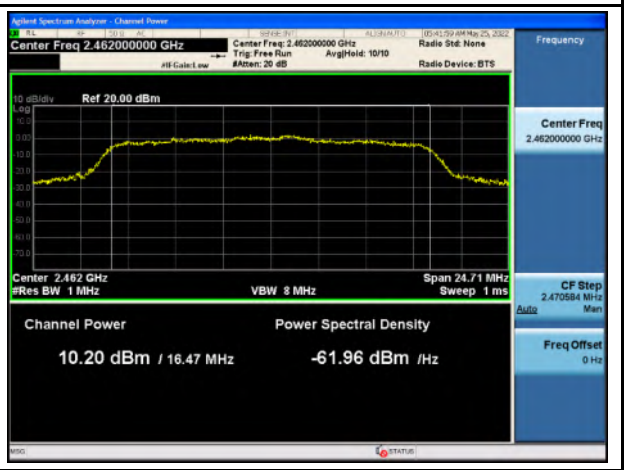


OP_802.11b_High CH

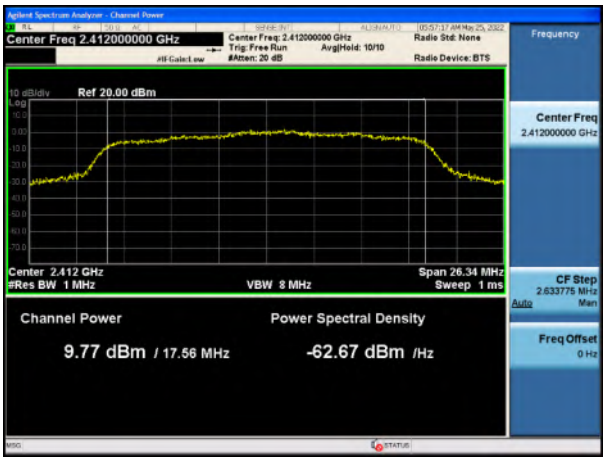


OP_802.11g_Low CH

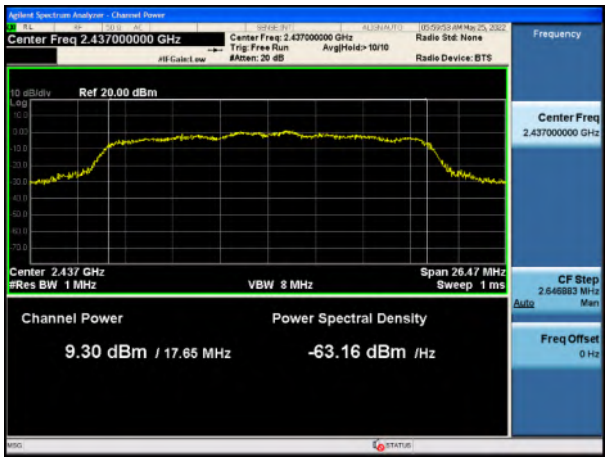
OP_802.11g_Mid CH



OP_802.11g_High CH

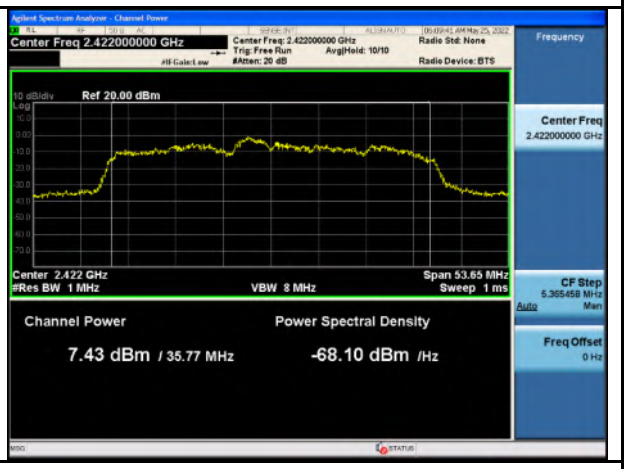


OP_802.11n_Low CH



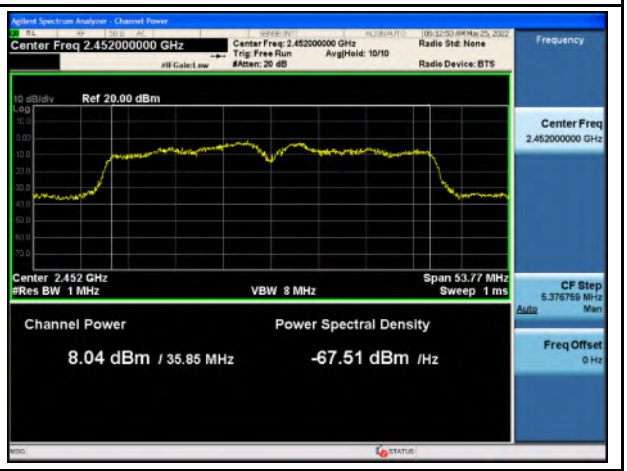
OP_802.11n_Mid CH

OP_802.11n_High CH



OP_802.11n40_Low CH

OP_802.11n40_Mid CH



OP_802.11n40_High CH

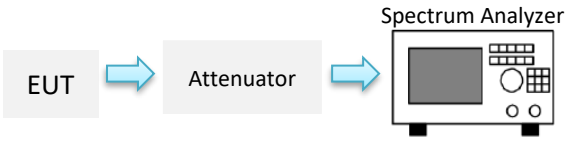
7.5 Power Spectral Density

7.5.1 Requirement

§ 15.247 (e), RSS-247 §5.2

For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power is used to determine the power spectral density.

7.5.2 Test Setup



7.5.3 Test Procedure

According to section 8.4 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.10.2 PKPSD of ANSI C63.10-2013:

1. Set analyser centre frequency to DTS channel centre frequency.
2. Set the span to 1.5 X DTS bandwidth.
3. Set the RBW to: 3 kHz ≤ 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.
9. Use the peak marker function to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

7.5.4 Test Result

Mode	Data rate	Frequency (MHz)	Measured PSD (dBm/3KHz)		Highest / Total PSD (dBm)	Max PSD Limit (dBm/3KHz)	Result
			Chain 1	Chain 2			
802.11b	1Mbps	2412	-7.958	-8.130	-7.958	4	Pass
		2437	-8.097	-6.317	-6.317	4	Pass
		2462	-7.552	-9.464	-7.552	4	Pass
802.11g	6Mbps	2412	-12.274	-13.219	-12.274	4	Pass
		2437	-10.798	-12.135	-10.798	4	Pass
		2462	-11.895	-13.488	-11.895	4	Pass
802.11n20	MCS0	2412	-12.761	-12.656	-9.698	4	Pass
		2437	-11.952	-14.015	-9.852	4	Pass
		2462	-11.953	-14.882	-10.165	4	Pass
802.11n40	MCS0	2422	-16.061	-14.407	-12.145	4	Pass
		2437	-14.135	-14.814	-11.451	4	Pass
		2452	-13.230	-12.661	-9.926	4	Pass

Note:

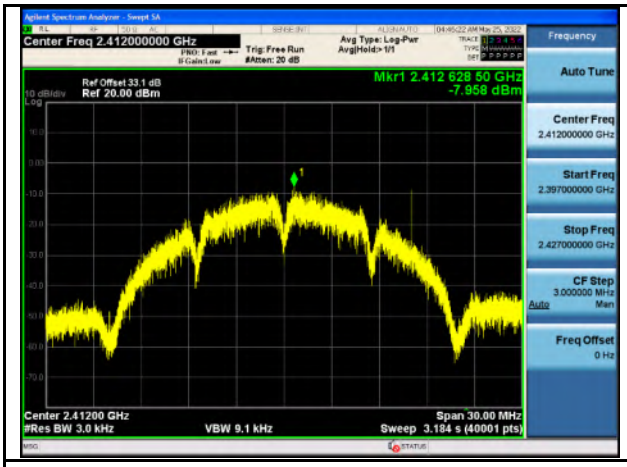
1) For 802.11b/g, the highest output power is recorded.

2) For 2.4GHz 802.11n mode, with internal antennas, it's under 2x2 MIMO mode, the output power is combined together to compare to limit. Directional gain is calculated per KDB 662911 D01. For 2.4GHz WiFi, directional gain = 6.7 dBi. The output power limit is reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3) The actual power and PSD limit will be reduced by the amount that it exceeds 6 dBi based on a conservative 10 dBi peak gain (optional external antenna that is to be evaluated)

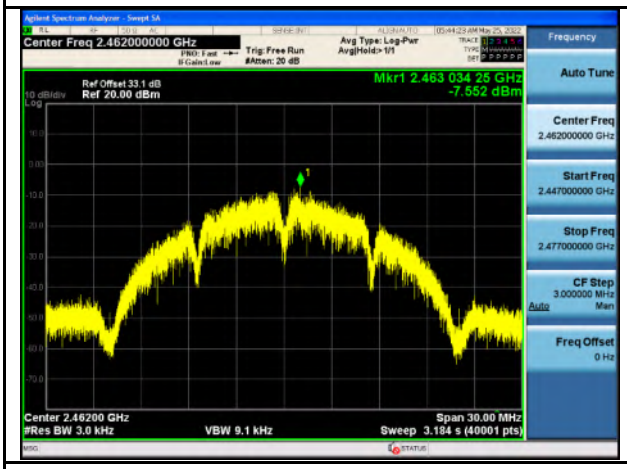
7.5.5 Test Plots

Chain 1

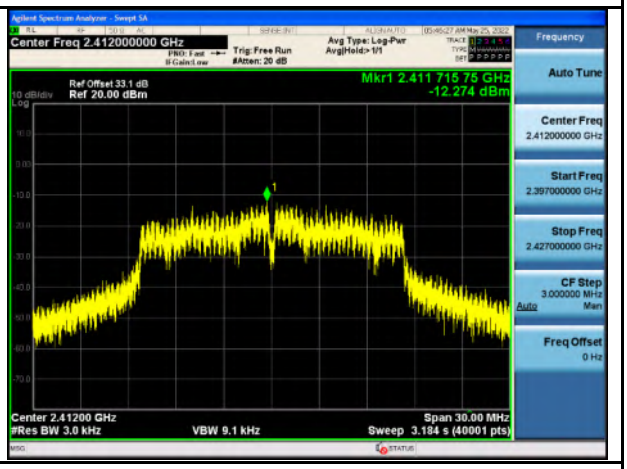


PSD-802.11b-Low CH

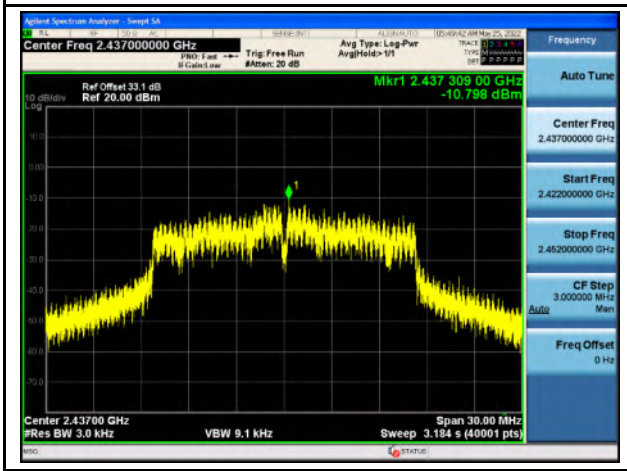
PSD-802.11b-Mid CH



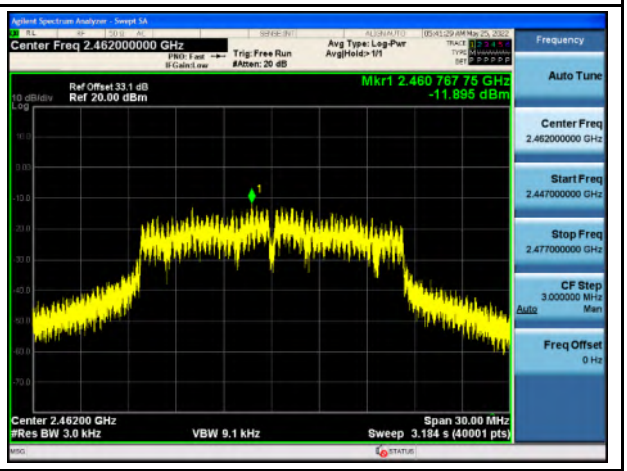
PSD-802.11b-High CH



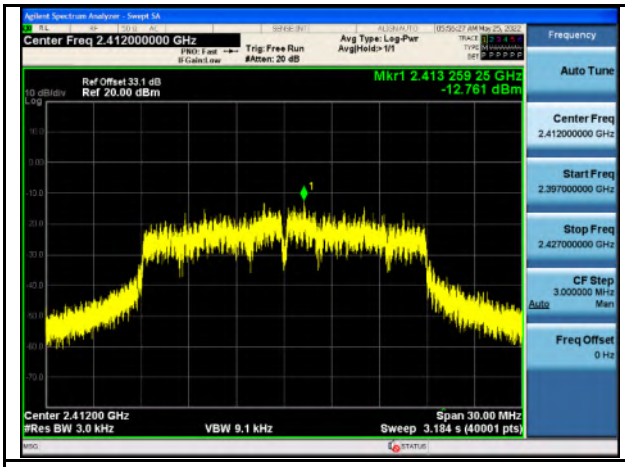
PSD-802.11g-Low CH



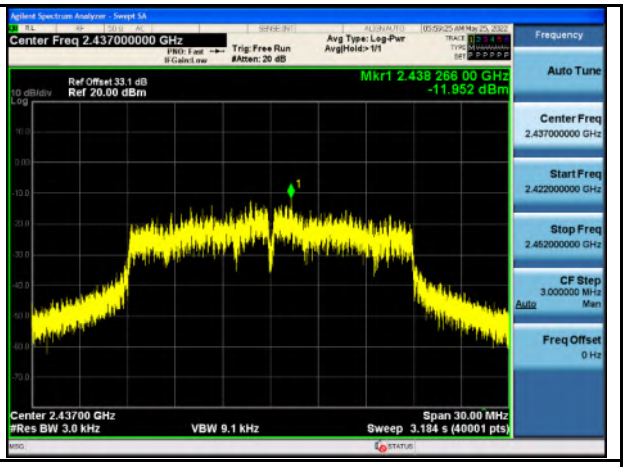
PSD-802.11g-Mid CH



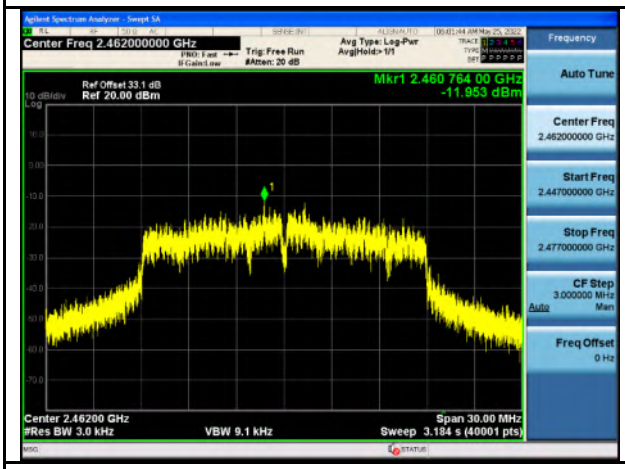
PSD-802.11g-High CH



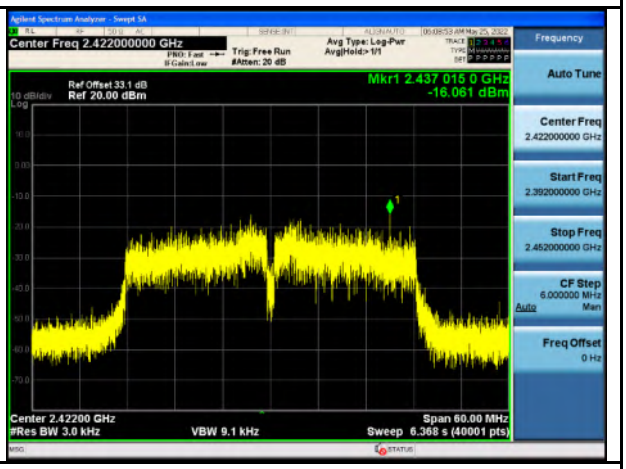
PSD-802.11n20-Low CH



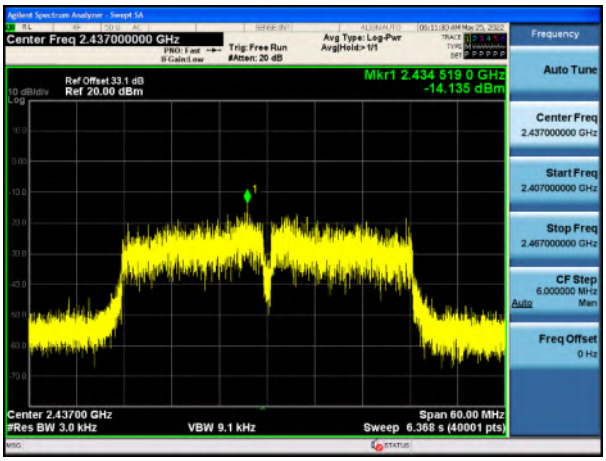
PSD-802.11n20-Mid CH



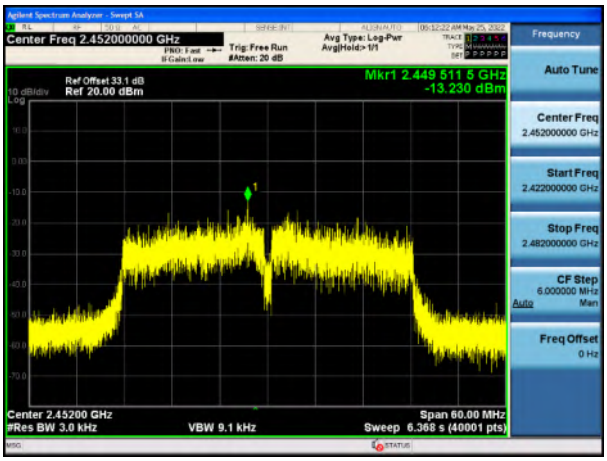
PSD-802.11n20-High CH



PSD-802.11n40-Low CH

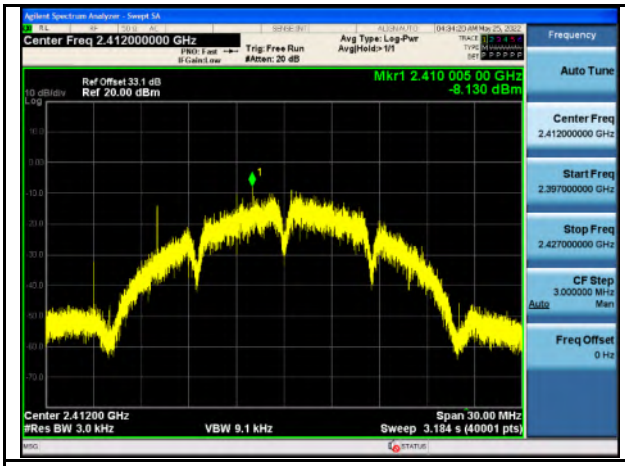


PSD-802.11n40-Mid CH



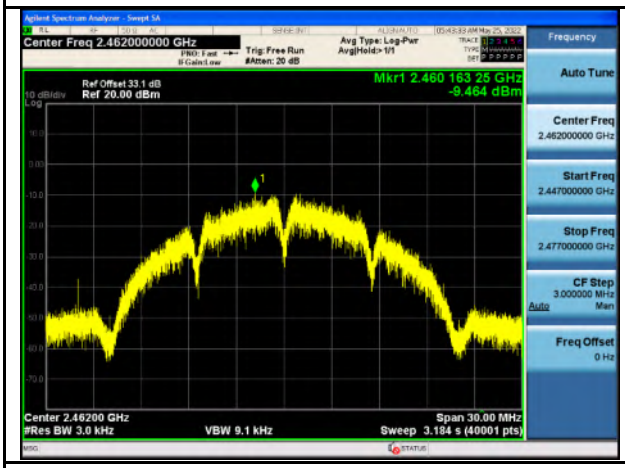
PSD-802.11n40-High CH

Chain 2

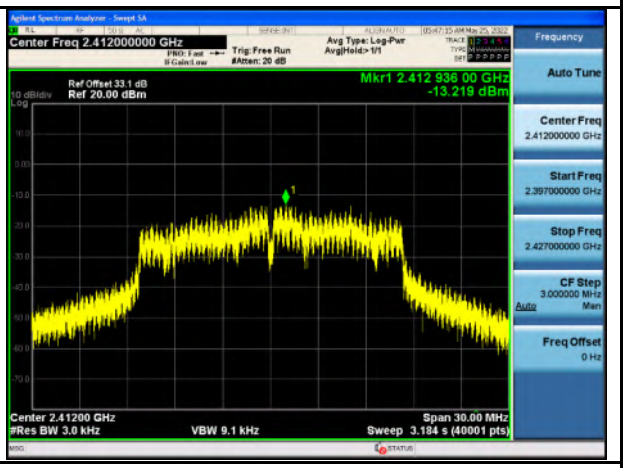


PSD-802.11b-Low CH

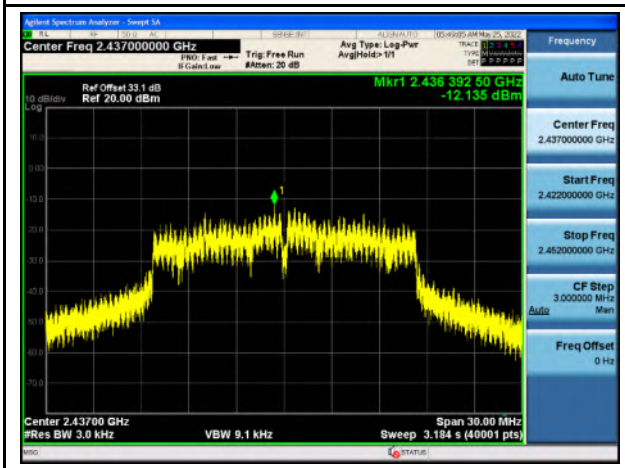
PSD-802.11b-Mid CH



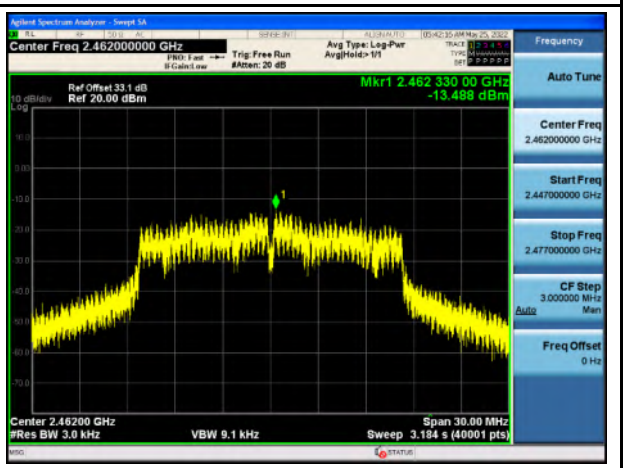
PSD-802.11b-High CH



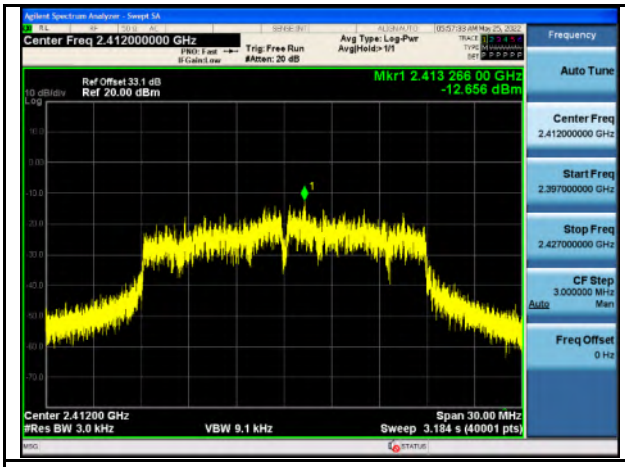
PSD-802.11g-Low CH



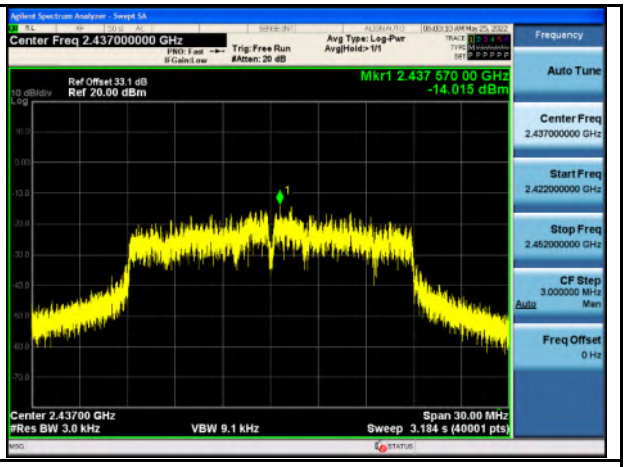
PSD-802.11g-Mid CH



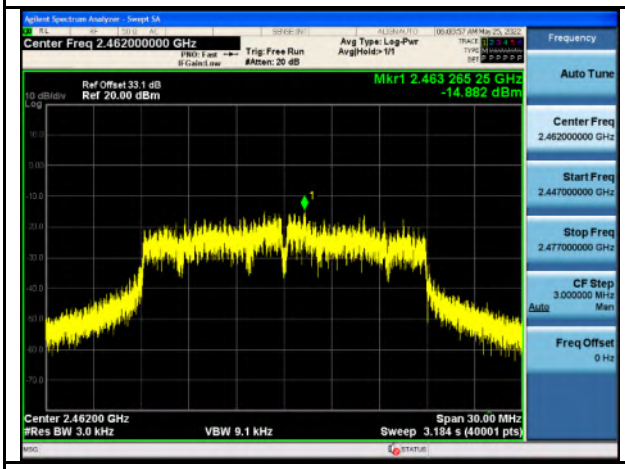
PSD-802.11g-High CH



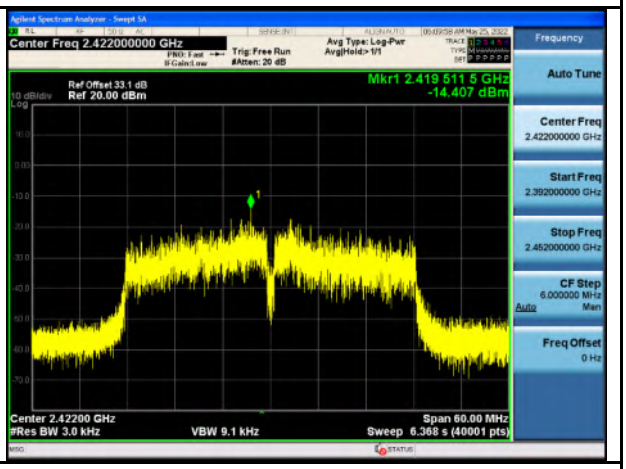
PSD-802.11n20-Low CH



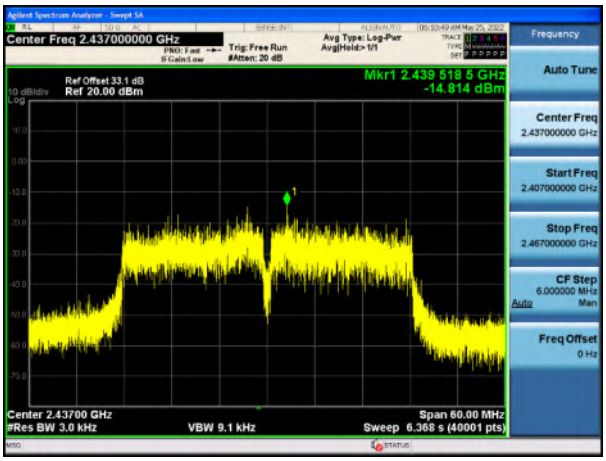
PSD-802.11n20-Mid CH



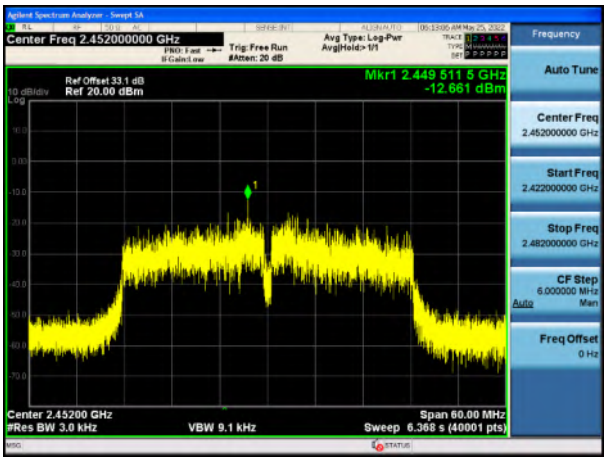
PSD-802.11n20-High CH



PSD-802.11n40-Low CH



PSD-802.11n40-Mid CH



PSD-802.11n40-High CH

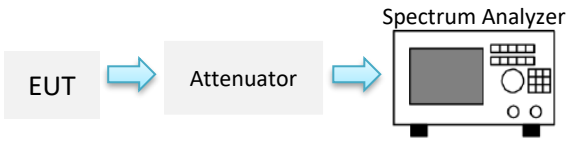
7.6 Conducted Band-Edge & Unwanted Emissions

7.6.1 Requirement

§ 15.247 (d), RSS-247 §5.5

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.

7.6.2 Test Setup



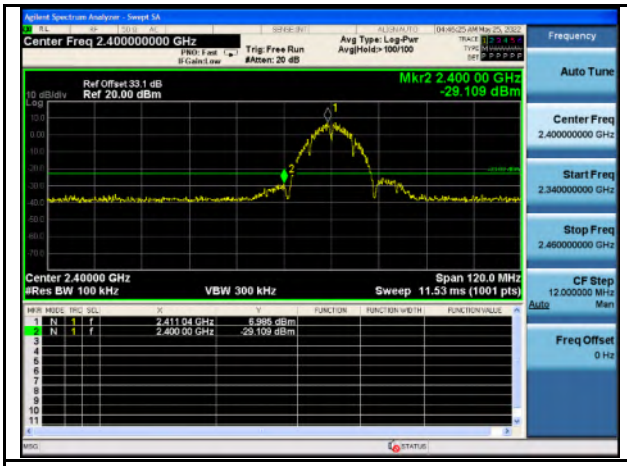
7.6.3 Test Procedure

According to ANSI C63.10-2013 clause 11.13

1. The RF output of EUT was connected to the spectrum analyser by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW=100 KHZ, VBW=300 KHZ, Peak Detector. Unwanted Emissions measured in any 100 khz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 db relative to the maximum in-band peak PSD level in 100 KHZ when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 db instead of 20 db per 15.247(d).
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete and record the results in the test report.

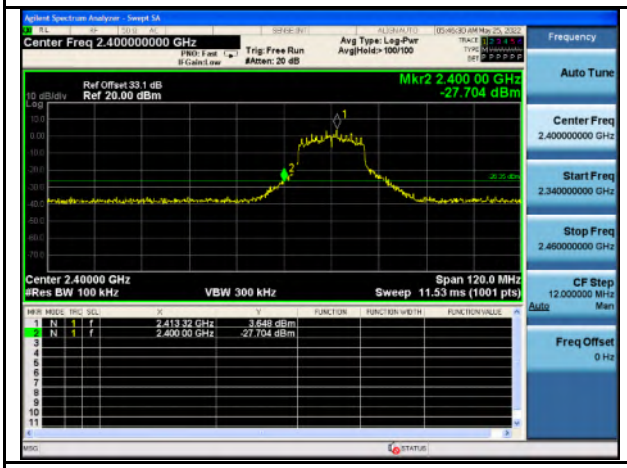
7.6.4 Test Result

Conducted Band edge

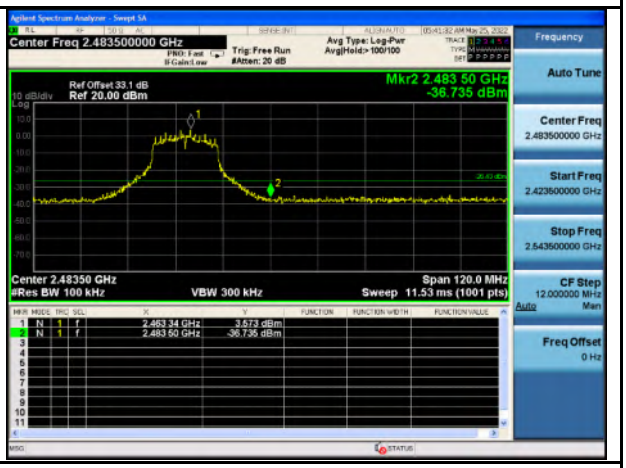


Band Edge-802.11b -Low CH

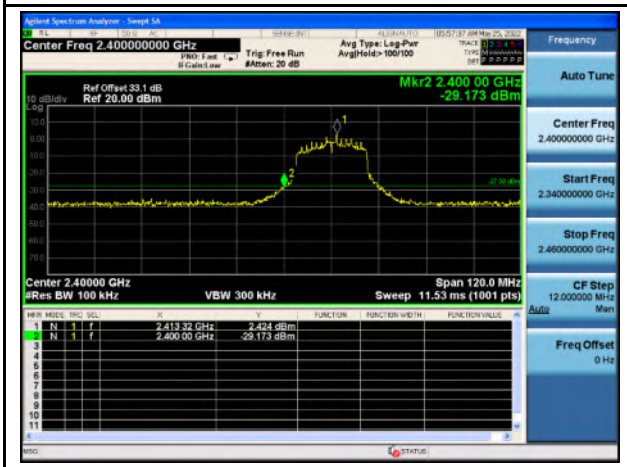
Band Edge-802.11b -High CH



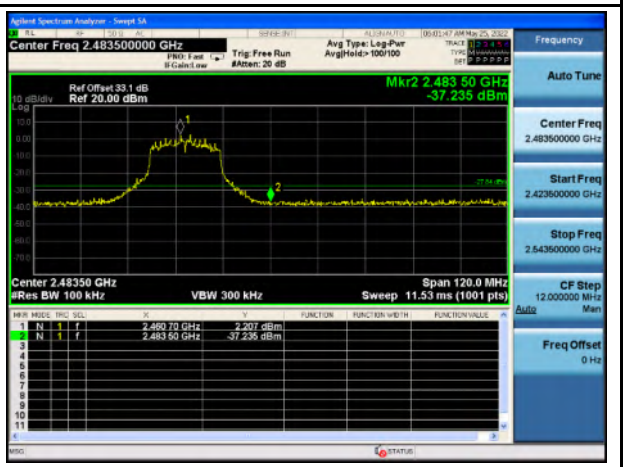
Band Edge-802.11g -Low CH



Band Edge-802.11g -High CH



Band Edge-802.11n20 -Low CH



Band Edge-802.11n20 -High CH

	
Band Edge-802.11n40 -Low CH	**Band Edge-802.11n40 -High CH**

7.7 Radiated Band-Edge & Spurious Emissions into Restricted Frequency Bands

7.7.1 Requirement

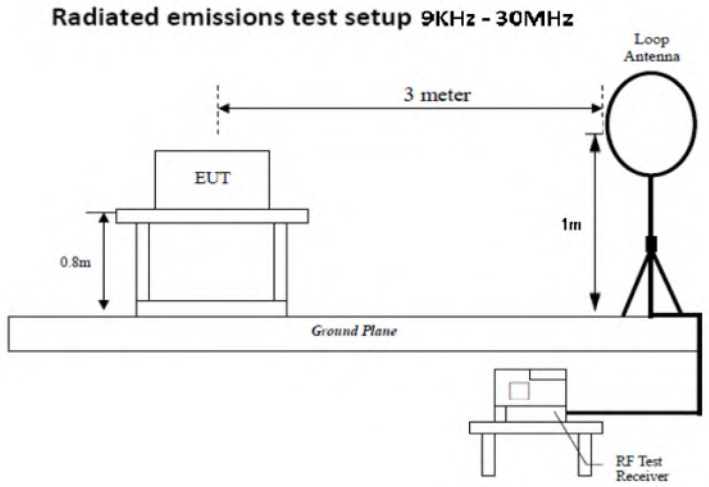
§ 15.247 (d), RSS-247 §5.5

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, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

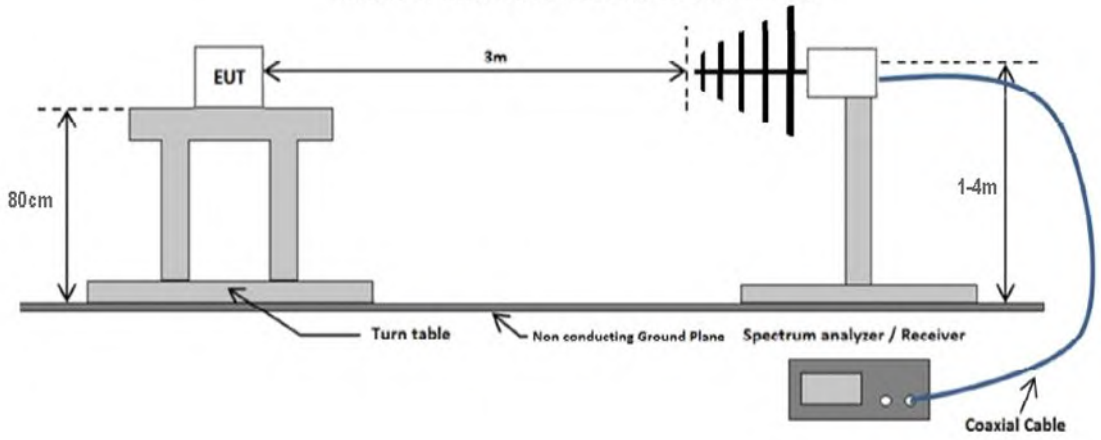
Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

Frequency Range (MHZ)	Field Strength (μV/m)
0.009~0.490	2400/F(KHz)
0.490~1.705	24000/F(KHz)
1.705~30.0	30
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

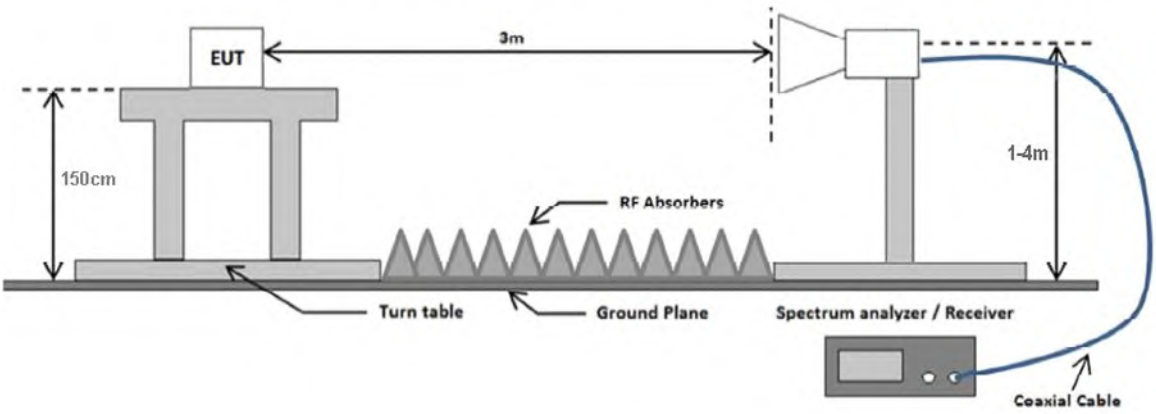
7.7.2 Test Setup



Radiated emissions test setup 30 MHz - 1 GHz



Radiated emissions test setup above 1 GHz



7.7.3 Test Procedure

According to section 8.6 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.12.2.7 Radiated spurious emission measurements in ANSI C63.10-2013 as well as the procedures for maximizing and measuring radiated emissions that are described in ANSI C63.10 was followed. Boresight antenna mast was used during the scanning to point to EUT to maximize the emission. The process will be repeated in 3 EUT orientations.

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterization. Maximization of the emissions, was carried out by rotating the EUT, changing the antenna polarization, and adjusting the antenna height in the following manner:
   a. Vertical or horizontal polarization (whichever gave the higher emission level over a full rotation of the EUT) was chosen.
   b. The EUT was then rotated to the direction that gave the maximum emission.
   c. Finally, the antenna height was adjusted to the height that gave the maximum emission.
3. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 200 Hz for frequency below 150KHz.
4. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 10 kHz for frequency between 150KHz – 30MHz.
5. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-Peak detection at frequency between 30MHz - 1GHz.
6. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz with Peak detection for Peak and average measurement at frequency above 1GHz.
7. Steps 2 and 3 were repeated for the next frequency point, until all selected frequency points were measured.

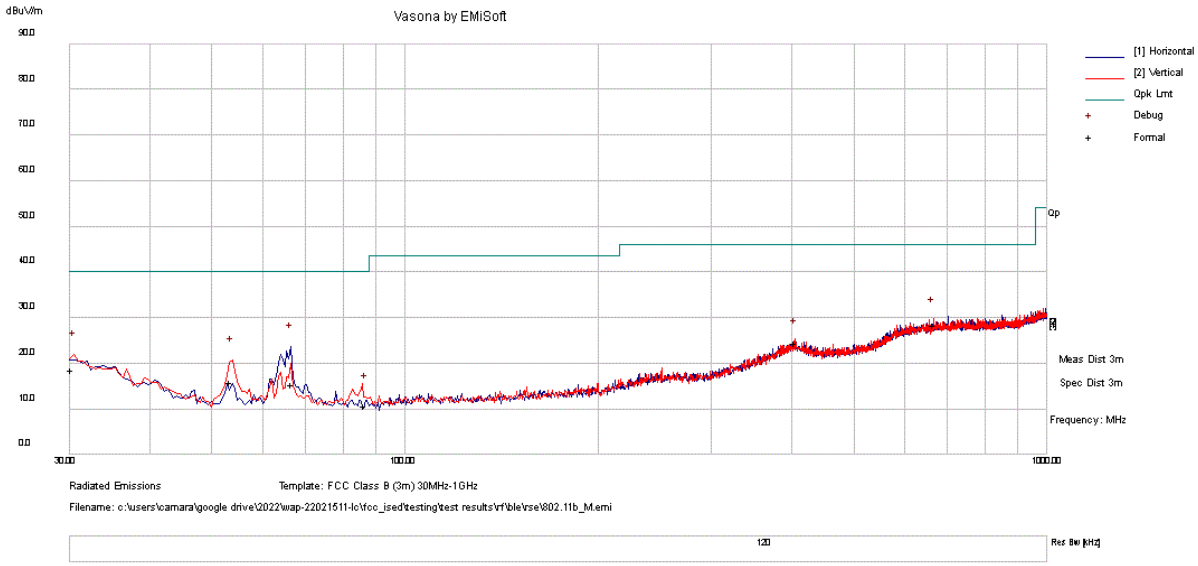
7.7.4 Test Result

Radiated Emission between 9KHz – 30MHz test result

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

RADIATED EMISSIONS BELOW 1 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11b Mode
Frequency Range:	30 MHz - 1 GHz	Test Date:	05/19/2022
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid channel	Test Result:	Pass



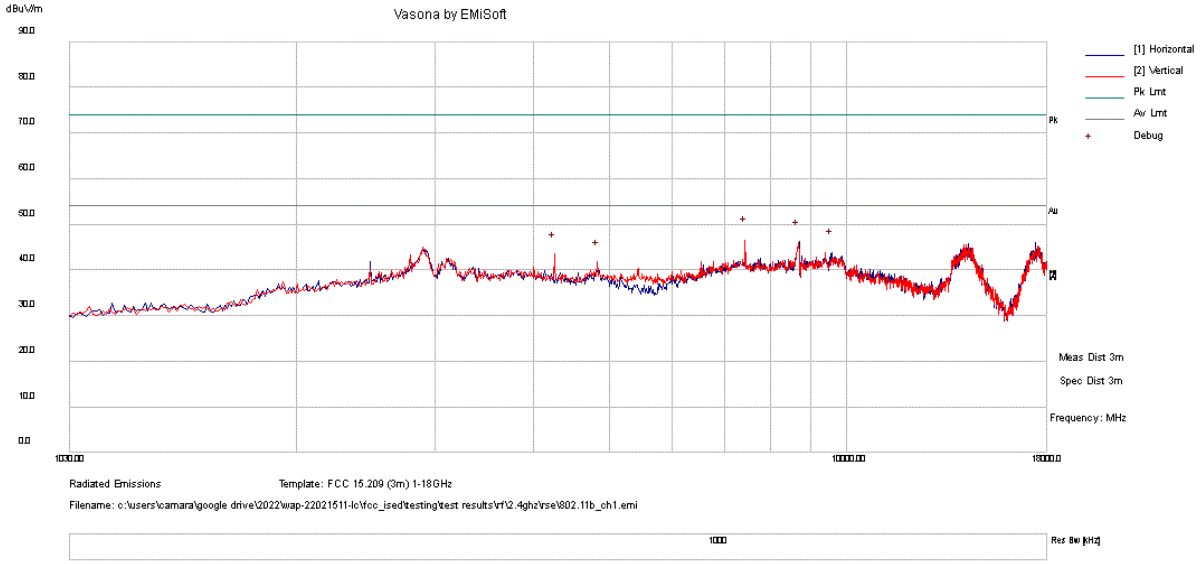
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	66.625	32.8	3.1	-20.3	15.6	Quasi Max	H	101	134	40	-24.4	Pass
2	665.577	26.4	7.3	-5.2	28.4	Quasi Max	V	328	332	46	-17.6	Pass
3	30.328	28.2	2.2	-11.7	18.7	Quasi Max	V	127	131	40	-21.3	Pass
4	53.555	34.1	2.9	-20.9	16	Quasi Max	V	112	59	40	-24	Pass
5	405.037	26.2	6.4	-8	24.5	Quasi Max	V	305	290	46	-21.5	Pass
6	86.598	27.6	3.4	-20.2	10.8	Quasi Max	V	400	309	40	-29.2	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11b Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



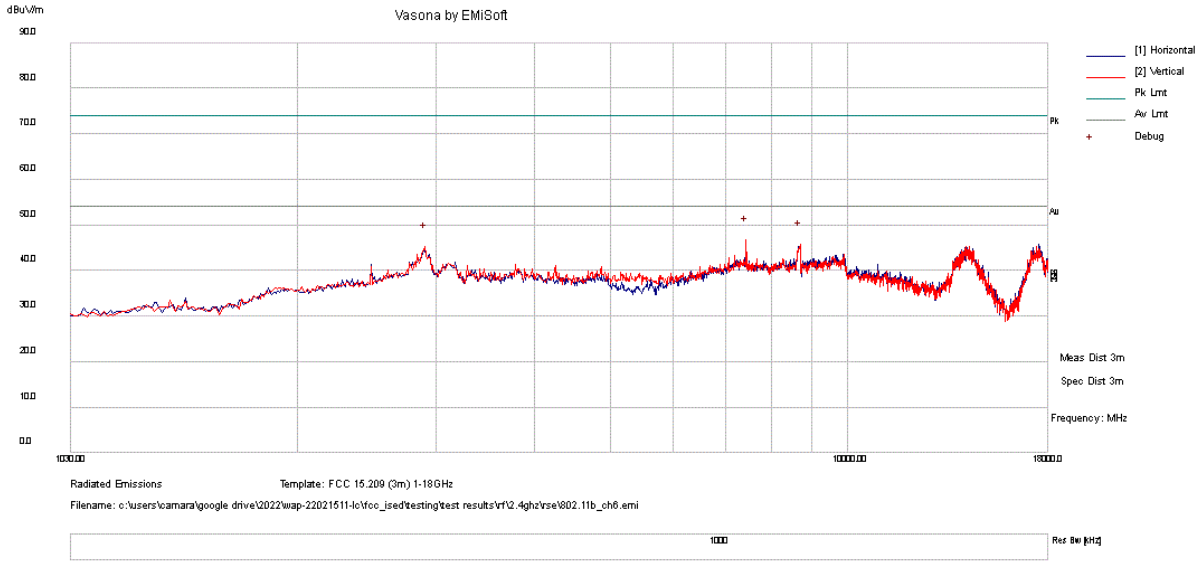
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7436.175	40.1	11.9	-5.6	46.5	Peak Max	V	100	0	54	-7.5	Pass
2	9578.638	34.9	14	-5.2	43.7	Peak Max	H	200	0	54	-10.3	Pass
3	4254.994	32.6	8.3	2.4	43.2	Peak Max	V	101	0	54	-10.8	Pass
4	8689.422	34.1	17.5	-5.7	45.8	Peak Max	V	101	0	54	-8.2	Pass
5	4828.412	37.1	9.1	-4.8	41.5	Peak Max	V	101	0	54	-12.5	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11b Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



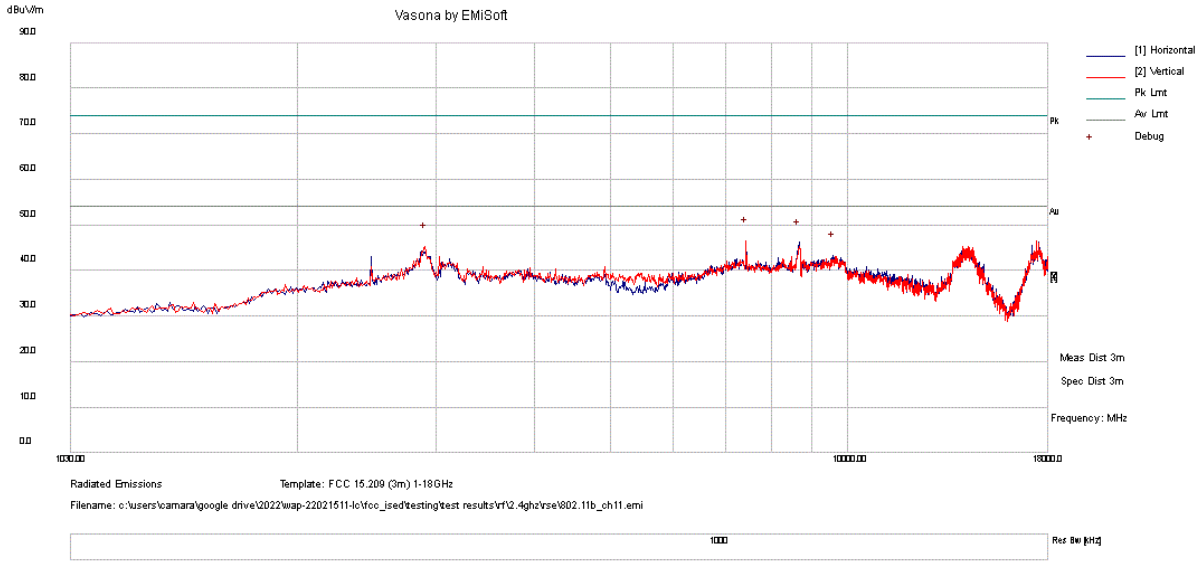
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7436.175	40.4	11.9	-5.6	46.8	Peak Max	V	100	0	54	-7.2	Pass
2	8708.925	33.9	17.6	-5.7	45.7	Peak Max	V	200	0	54	-8.3	Pass
3	2907.306	20.7	20.8	3.9	45.3	Peak Max	V	200	0	54	-8.7	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11b Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



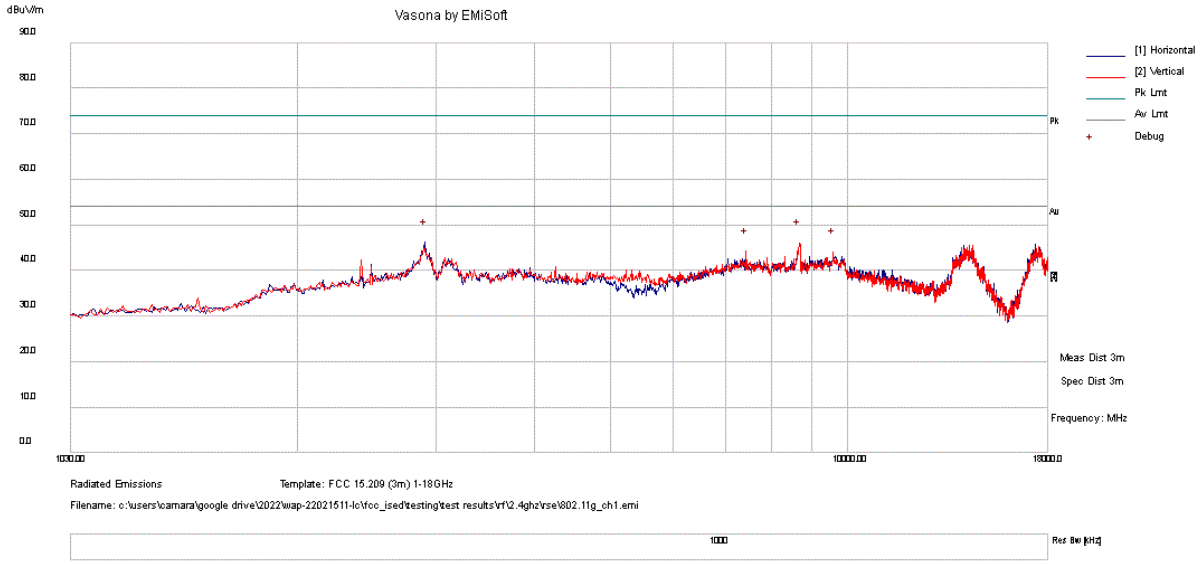
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7436.175	40.2	11.9	-5.6	46.6	Peak Max	V	200	0	54	-7.4	Pass
2	8687.713	34.5	17.4	-5.7	46.2	Peak Max	H	200	0	54	-7.8	Pass
3	2907.306	20.7	20.8	3.9	45.4	Peak Max	V	100	0	54	-8.6	Pass
4	9599.85	34.4	14.1	-5.2	43.3	Peak Max	H	100	0	54	-10.7	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11g Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



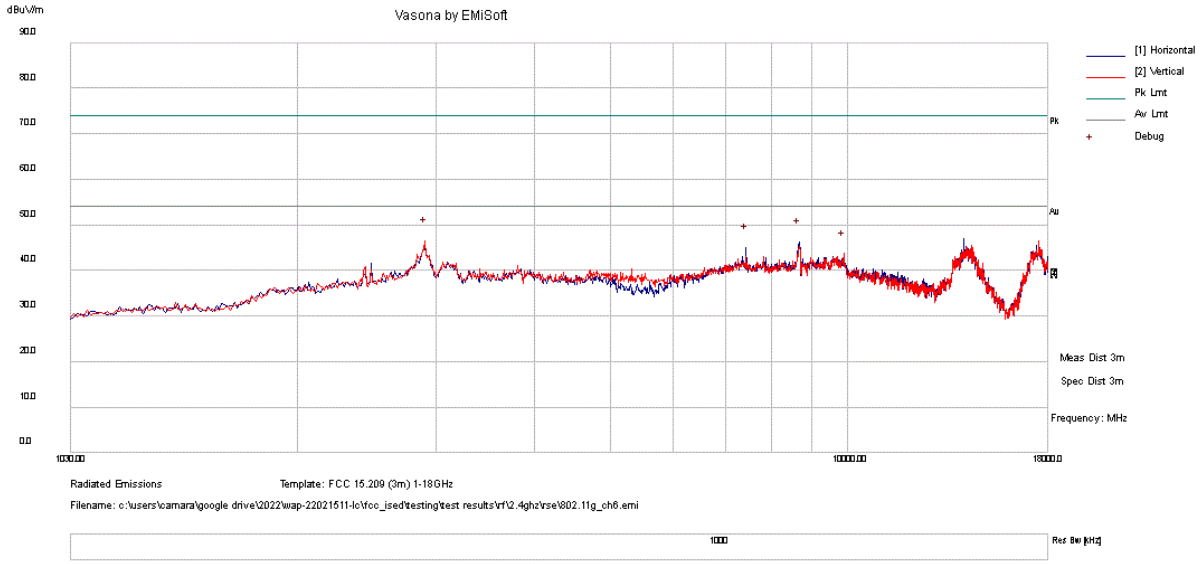
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	2907.306	21.5	20.8	3.9	46.1	Peak Max	H	200	0	54	-7.9	Pass
2	8687.713	34.4	17.4	-5.7	46.1	Peak Max	V	200	0	54	-7.9	Pass
3	9599.85	35.1	14.1	-5.2	44	Peak Max	V	100	0	54	-10	Pass
4	7436.43	37.9	11.9	-5.6	44.2	Peak Max	V	101	360	54	-9.8	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11g Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



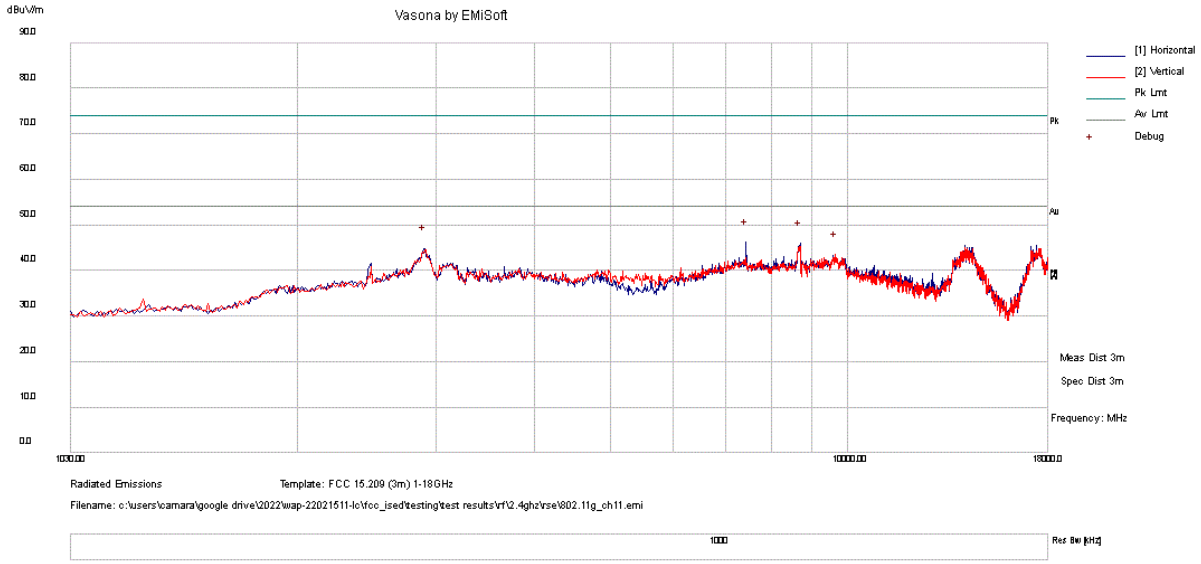
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	2907.306	21.9	20.8	3.9	46.5	Peak Max	V	200	0	54	-7.5	Pass
2	8687.713	34.6	17.4	-5.7	46.3	Peak Max	H	100	0	54	-7.7	Pass
3	9896.825	34.3	14.6	-5.2	43.7	Peak Max	V	200	0	54	-10.4	Pass
4	7436.208	38.7	11.9	-5.6	45	Peak Max	H	101	360	54	-9	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11g Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



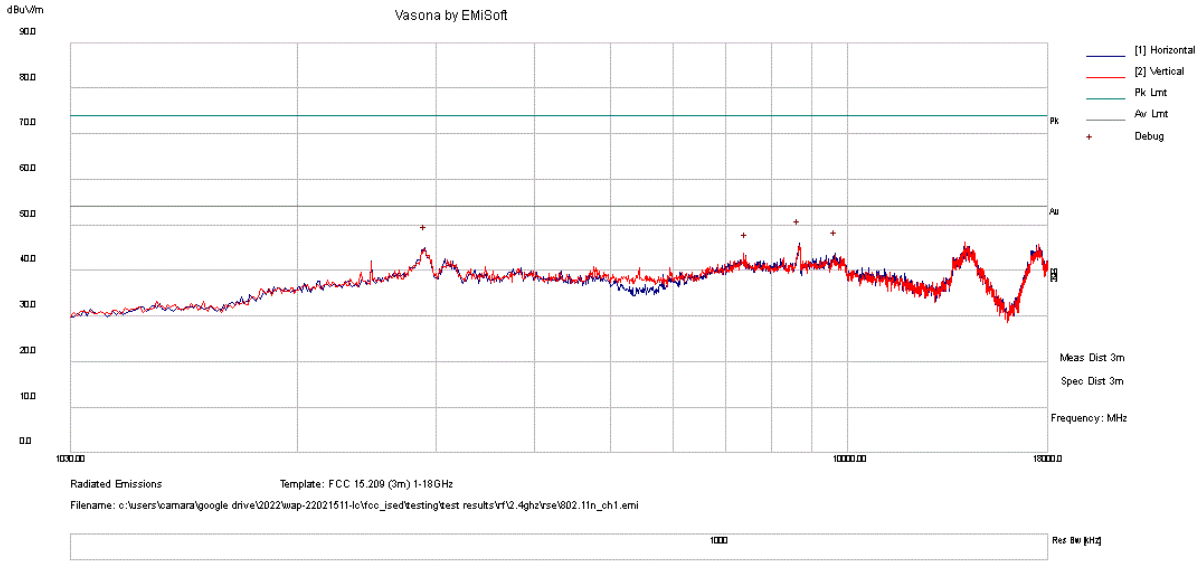
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7436.175	39.8	11.9	-5.6	46.1	Peak Max	H	100	0	54	-7.9	Pass
2	8708.925	34.1	17.6	-5.7	45.9	Peak Max	H	100	0	54	-8.1	Pass
3	2896.7	19.1	21.9	3.8	44.8	Peak Max	H	100	0	54	-9.2	Pass
4	9663.488	34.2	14.5	-5.2	43.5	Peak Max	V	100	0	54	-10.5	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11n20 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



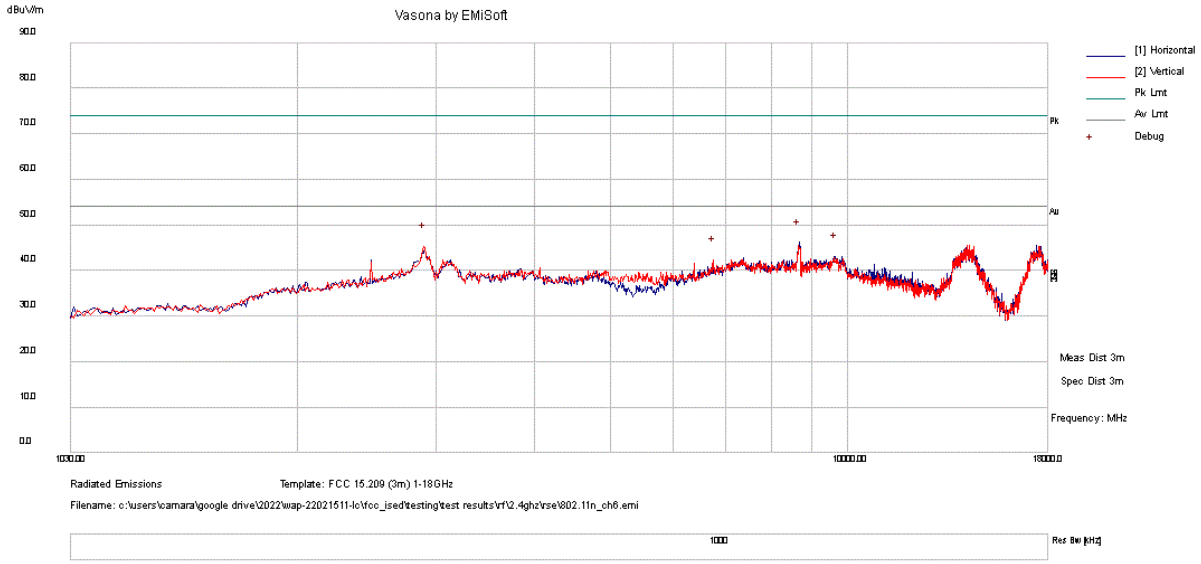
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8687.713	34.4	17.4	-5.7	46.1	Peak Max	H	200	0	54	-7.9	Pass
2	2907.306	20.3	20.8	3.9	44.9	Peak Max	H	100	0	54	-9.1	Pass
3	9663.488	34.4	14.5	-5.2	43.7	Peak Max	H	200	0	54	-10.3	Pass
4	7436.449	36.8	11.9	-5.6	43.1	Peak Max	V	101	360	54	-10.9	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11n20 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



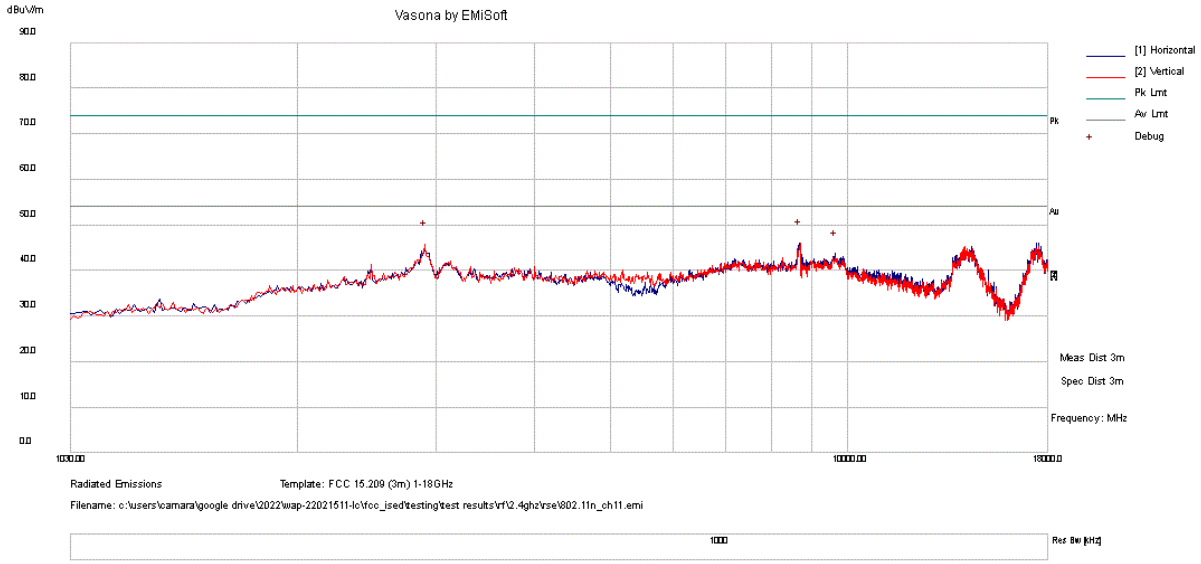
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8687.713	34.5	17.4	-5.7	46.2	Peak Max	H	100	0	54	-7.8	Pass
2	2896.7	19.5	21.9	3.8	45.2	Peak Max	V	200	0	54	-8.8	Pass
3	9663.488	33.8	14.5	-5.2	43.1	Peak Max	H	100	0	54	-10.9	Pass
4	6757.292	38.1	11.2	-7	42.3	Peak Max	V	101	360	54	-11.7	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11n20 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



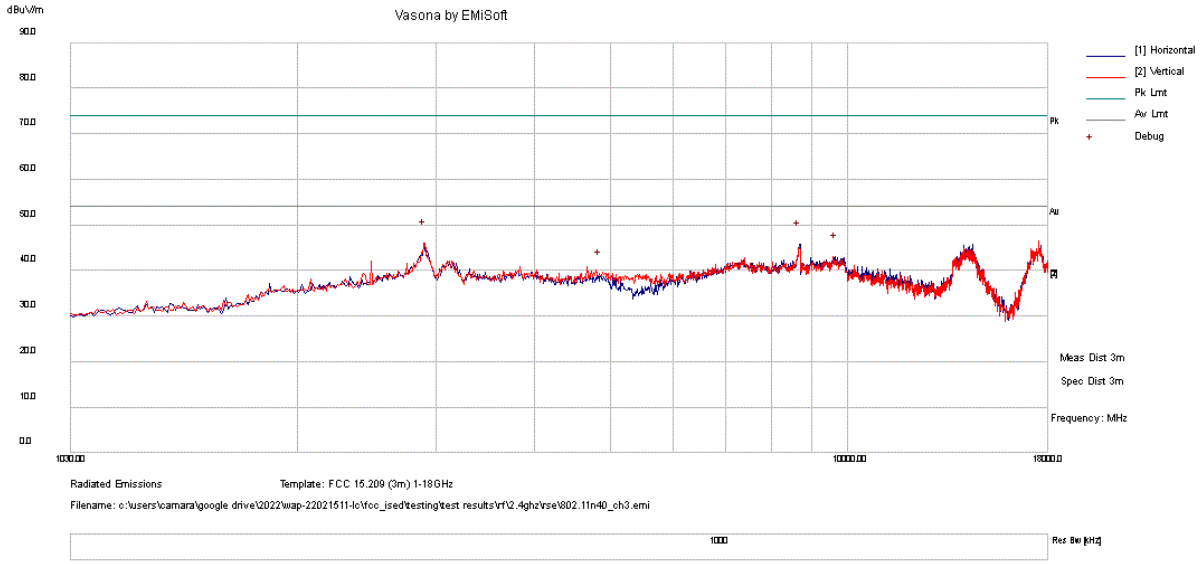
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8708.925	34.2	17.6	-5.7	46	Peak Max	V	200	0	54	-8	Pass
2	2907.306	21.1	20.8	3.9	45.7	Peak Max	V	200	0	54	-8.3	Pass
3	9652.881	34.5	14.4	-5.2	43.7	Peak Max	H	200	0	54	-10.3	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11n40 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



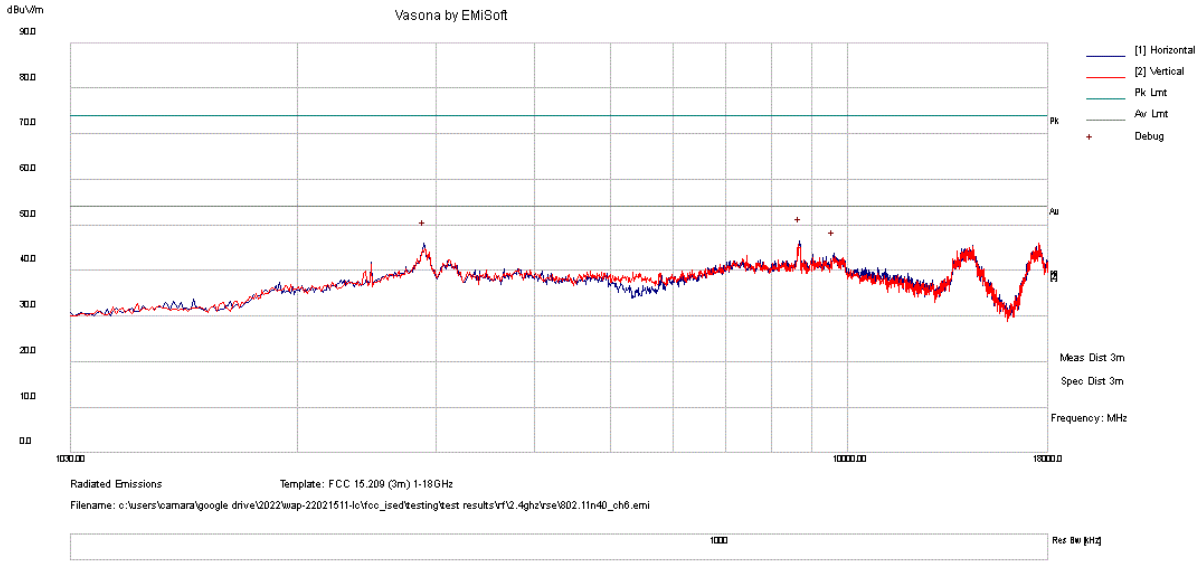
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	2896.7	20.3	21.9	3.8	46	Peak Max	H	100	0	54	-8	Pass
2	8687.713	34	17.4	-5.7	45.7	Peak Max	H	200	0	54	-8.3	Pass
3	9652.881	33.9	14.4	-5.2	43.1	Peak Max	H	200	0	54	-10.9	Pass
4	4844.561	35.2	9.1	-5	39.3	Peak Max	V	101	360	54	-14.7	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11n40 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



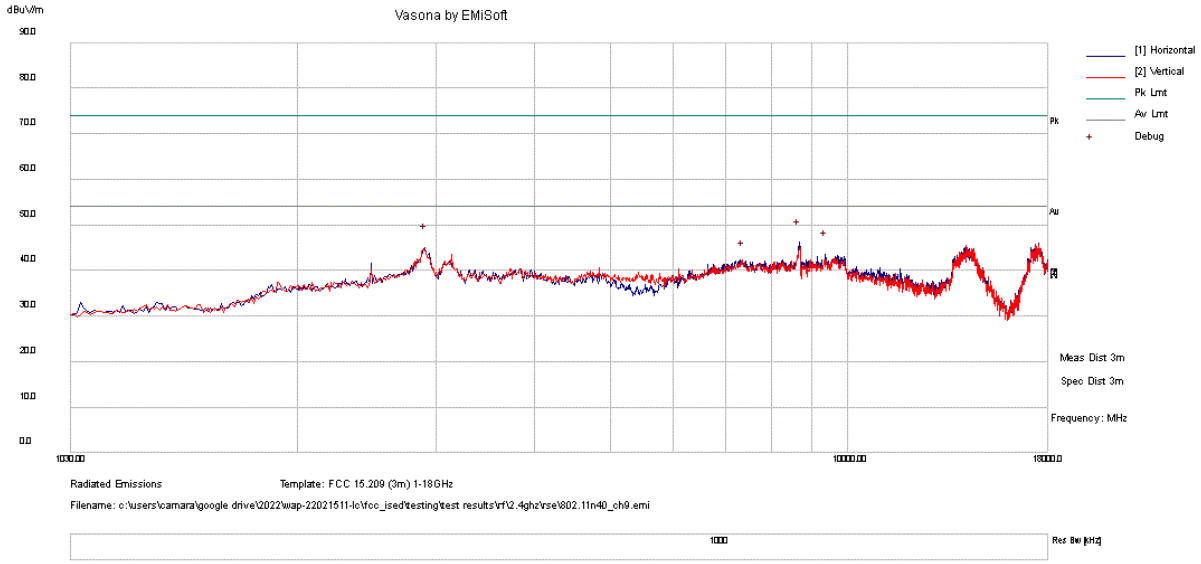
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8698.319	34.3	17.9	-5.7	46.5	Peak Max	H	100	0	54	-7.5	Pass
2	2896.7	20.2	21.9	3.8	45.9	Peak Max	H	200	0	54	-8.1	Pass
3	9610.456	34.7	14.1	-5.2	43.7	Peak Max	H	200	0	54	-10.3	Pass

Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

RADIATED EMISSIONS 1 - 18 GHZ

Test Standard:	FCC15.247, 15.209, RSS 247	Mode:	802.11n40 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	05/19/2022-05/25/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8687.713	34.4	17.4	-5.7	46.1	Peak Max	H	100	0	54	-7.9	Pass
2	2907.306	20.4	20.8	3.9	45.1	Peak Max	H	100	0	54	-8.9	Pass
3	9387.725	34.2	14.6	-5.2	43.6	Peak Max	H	200	0	54	-10.4	Pass
4	7362.266	35	11.9	-5.5	41.5	Peak Max	V	101	360	54	-12.5	Pass

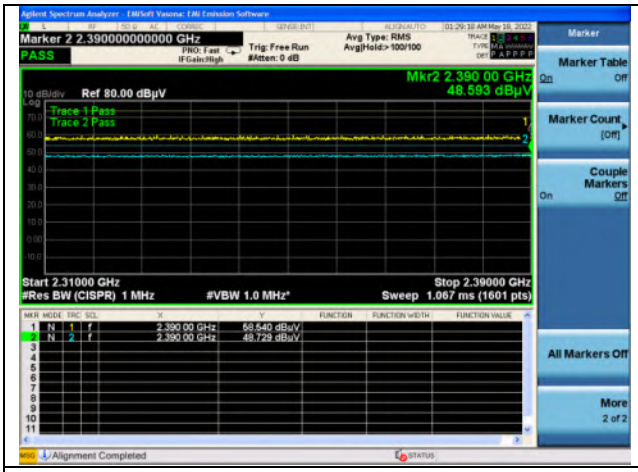
Remarks:

1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)
4. Final average measurement is not necessary since peak level is below average limit

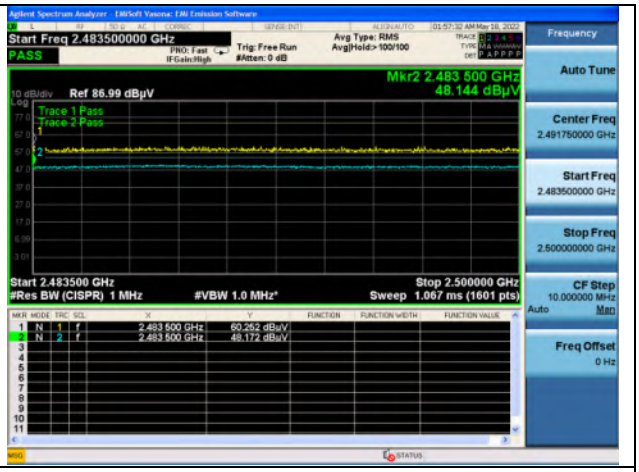
Radiated Emission between 18GHz – 40GHz test result

Note: no substantial emission is found other than the noise floor. Different modes have been verified.

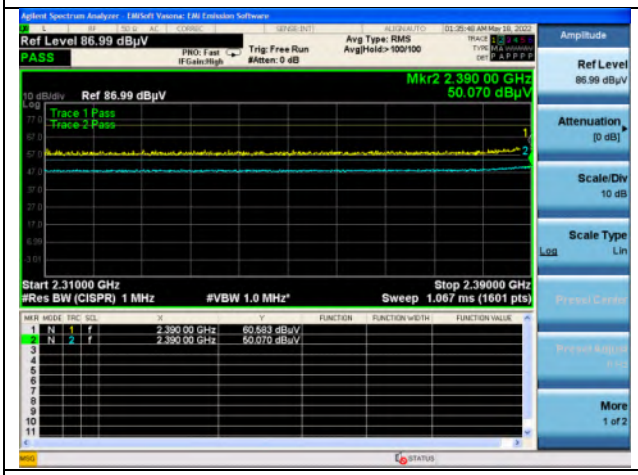
Restricted Band Measurement Result



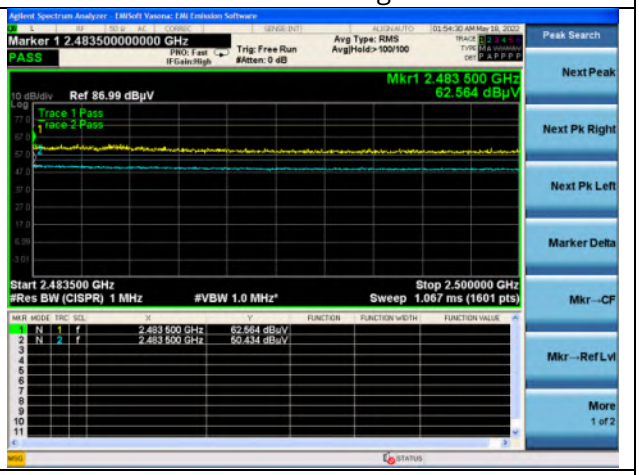
RB– 802.11b - Low CH



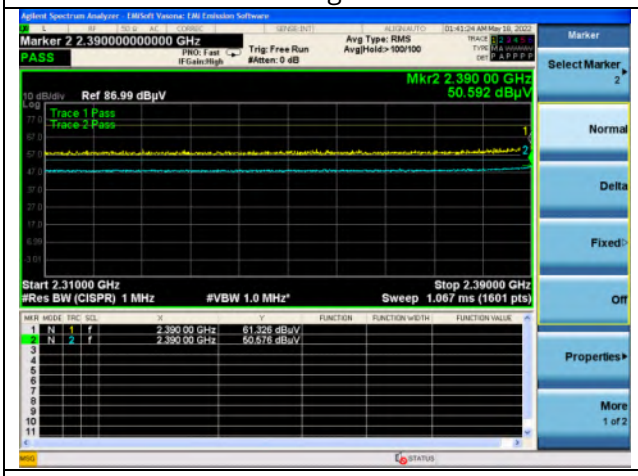
RB– 802.11b - High CH



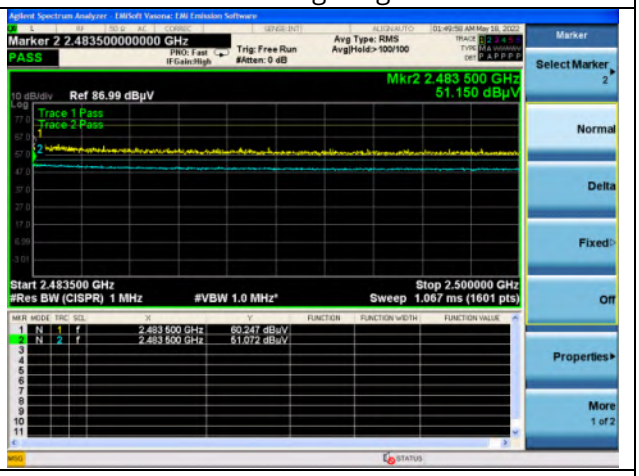
RB– 802.11g - Low CH



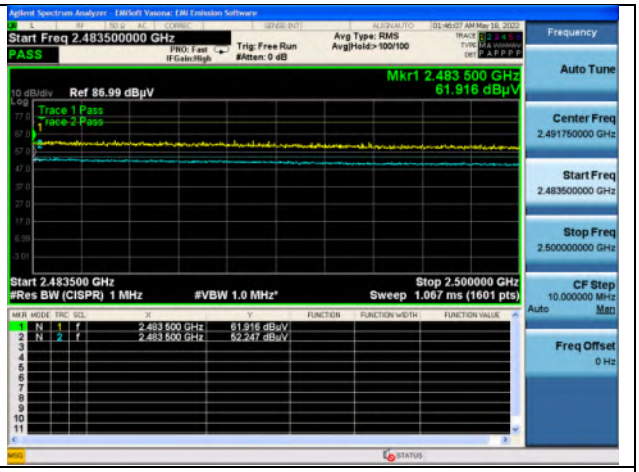
RB– 802.11g - High CH



RB– 802.11n20 - Low CH



RB– 802.11n20 - High CH

	
RB– 802.11n40 - Low CH	RB– 802.11n40 - High CH

8 EUT and Test Setup Photos

See FCC exhibits

9 Test Instrument List

Equipment	Manufacturer	Model	Instrument Number	Cal. Date	Cal. Due
Semi-Anechoic Chamber	ETS-Lindgren	10M	VL001	10/18/2021	10/18/2022
Shielding Control Room	ETS-Lindgren	Series 81	VL006	N/A	N/A
Spectrum Analyzer	Keysight	N9020A	MY50110074	06/17/2021	06/17/2022
EMC Test Receiver	R&S	ESL6	100230	06/14/2021	06/14/2022
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2021	11/15/2022
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	05/14/2022	05/14/2023
Horn Antenna (18-40GHz)	Com-Power	AH-840	101109	06/24/2021	06/24/2022
Preamplifier	RF Bay, Inc.	LPA-10-20	11180621	07/16/2021	07/16/2022
True RMS Multi-meter	UNI-T	UT181A	C173014829	05/05/2022	05/05/2023
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	05/05/2022	05/05/2023
RF Attenuator	Pasternack	PE7005-3	VL061	07/16/2021	07/16/2022
Preamplifier 100KHz - 40GHz	Aeroflex	33711-392-77150-11	064	07/16/2021	07/16/2022
EM Center Control	ETS-Lindgren	7006-001	160136	N/A	N/A
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A	N/A
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A	N/A
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	05/16/2022	05/16/2023
RE test cable (below 6GHz)	Vista	RE-6GHz-01	RE-6GHz-01	07/16/2021	07/16/2022
RE test cable (1-18GHz)	PhaseTrack	II-240	RE-18GHz-01	07/16/2021	07/16/2022
RE test cable (>18GHz)	Sucoflex	104	344903/4	07/16/2021	07/16/2022
Pulse limiter	Com-Power	LIT-930A	531727	07/16/2021	07/16/2022
CE test cable #1	FIRST RF	FRF-C-1002-001	CE-6GHz-01	07/16/2021	07/16/2022
CE test cable#2	FIRST RF	FRF-C-1002-001	CE-6GHz-02	07/16/2021	07/16/2022
Vector Signal Generator	Keysight	N5182A	US47080548	06/17/2021	06/17/2022
USB RF Power Sensor	ETS-Lindgren	7002-006	SN 00151268	05/15/2022	05/15/2023
RF Power Amplifier (80-1000MHz)	Ophir	5226FE	1013/1815	N/A	N/A
RF Power Amplifier (700-6000MHz)	Ophir	5293FE	1063/1815	N/A	N/A
Horn Antenna (1-18GHz)	FT-RF	HA-07M18G-NF	180010HA	N/A	N/A
Wideband Communication	R&S	CMW500	147508	05/10/2022	05/10/2023
Radio Communication Tester	Anritsu	MT8000a	6262261939	02/23/2022	02/23/2023
Temperature/Humidity Chamber	Thermotron	SM-8-8200	40991	09/08/2021	09/08/2022

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