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FCC RF Test Report

Test Report Number	GLS-21120342-LC-FCC IC-WLAN Rev_1.0
FCC ID	MG3-59007000006
IC	2575A-59007000006
Applicant	Universal Electronic Inc.
Applicant Address	201 East Sandpointe Ave., 7th Floor, Santa Ana, CA 92707
Product Name	UE61 Module
Model (s)	UE61S
Date of Receipt	05/25/2022
Date of Test	05/27/2022- 06/10/2022
Report Issue Date	06/10/2022
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
www.vista-compliance.com

Devin Tai (Test Engineer)

David Zhang (Technical Manager)

REVISION HISTORY

Report Number	Version	Description	Issued Date
GLS-21120342-LC-FCC IC-WLAN	01	Initial report	06/10/2022
GLS-21120342-LC-FCC IC-WLAN Rev_1.0	1.0	Update Applicant's address	10/28/2022

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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)	Pass

2 General Information

2.1 Applicant

Applicant	Universal Electronic Inc.
Applicant address	201 East Sandpointe Ave., 7th Floor, Santa Ana, CA 92707
Manufacturer	Universal Electronic Inc.
Manufacturer Address	201 East Sandpointe Ave., 7th Floor, Santa Ana, CA 92707

2.2 Product information

Product Name	UE61 Module
Product Description	UE61S
Model Number	N/A
Family Models	N/A
Serial Number	N/A
Frequency Band	BLE: 2402-2480MHz WLAN: 2412-2462MHz
Type of modulation	BLE: GFSK WLAN_2.4G: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM
Equipment Class	DTS
Antenna Information	PCB Antenna Antenna Gain: 1.5dBi ±0.5dB
Clock Frequencies	N/A
Input Power	DC 3.3V
Power Adapter Manufacturer/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
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	23.2°C	57.5%	996 mbar
Radiated Emission Testing	23.2°C	57.5%	996 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

The EUT is mounted onto a development board to support testing. EUT is set to different transmission mode in terms of radio mode bandwidth, power level, test channel, etc.

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
Realtek_DUT_Selection	Set the module work at wifi mode
UI_mptool	Set the module work at different mode, channel, bandwidth, etc.

Power setting as below

802.11b		**802.11g**	
Channel	Power Setting	Channel	Power Setting
1	102	1	92
6	104	6	92
11	102	11	92
802.11n20		**802.11n40**	
Channel	Power Setting	Channel	Power Setting
1	92	3	92
6	92	6	92
11	88	9	88

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #
DC Power supply	RIGOL	DP712	DP7B194900487
USB to TTL Serial Converter Adapter	Songhe	FT232RL	JESSE210825

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 a PCB trace antenna which is integrated to the main board. And the antenna gain is 1.5±0.5dBi.

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	10.05	0.5	Pass
		2437	10.02	0.5	Pass
		2462	10.04	0.5	Pass
802.11g	6Mbps	2412	16.51	0.5	Pass
		2437	16.50	0.5	Pass
		2462	16.49	0.5	Pass
802.11n20	MCS0	2412	17.67	0.5	Pass
		2437	17.63	0.5	Pass
		2462	17.67	0.5	Pass
802.11n40	MCS0	2422	36.35	0.5	Pass
		2437	36.35	0.5	Pass
		2452	36.35	0.5	Pass

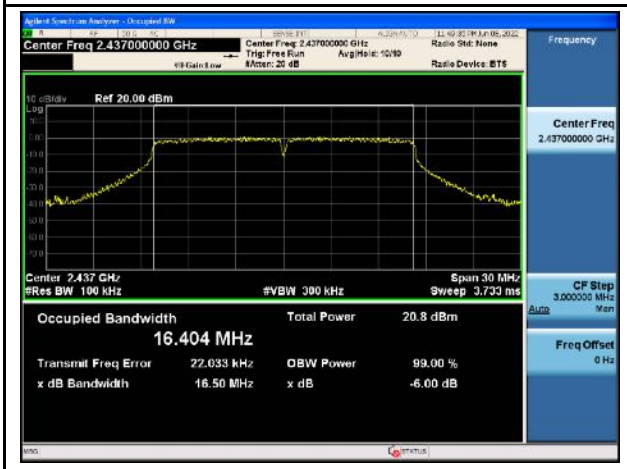
7.2.5 Test Plots

DTS BW_802.11b_Low CH

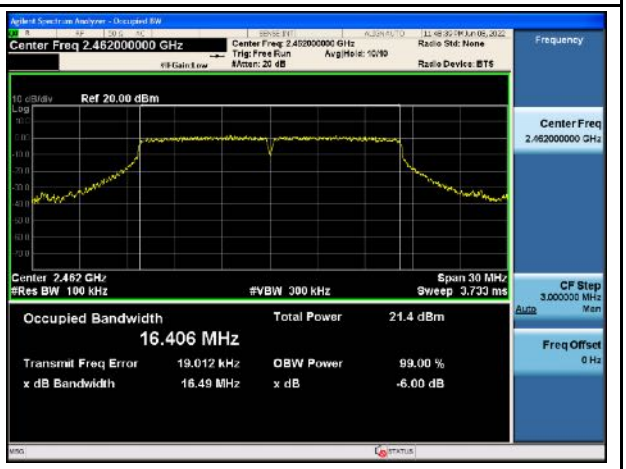
DTS BW_802.11b_Mid CH

DTS BW_802.11b_High CH

DTS BW_802.11g_Low CH

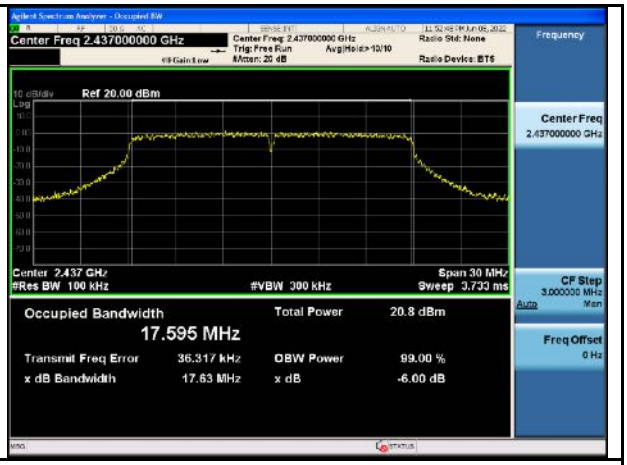


DTS BW_802.11g_Mid CH

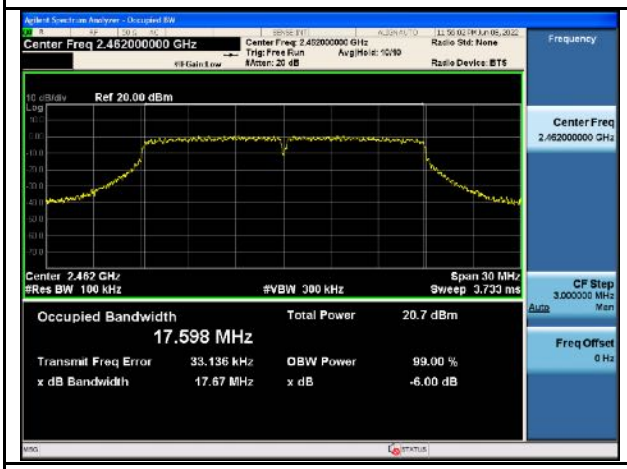


DTS BW_802.11g_High CH

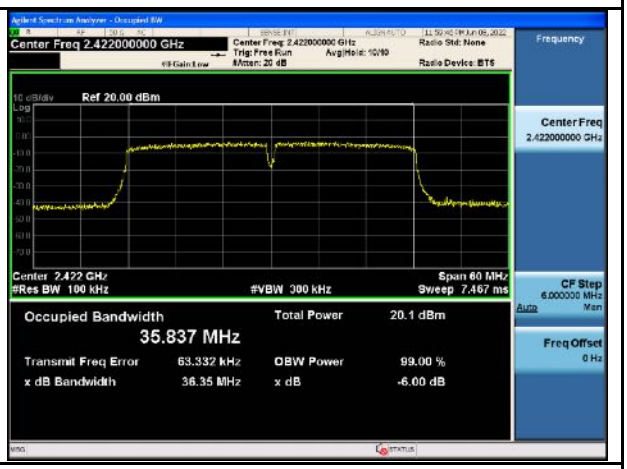
DTS BW_802.11n20_Low CH



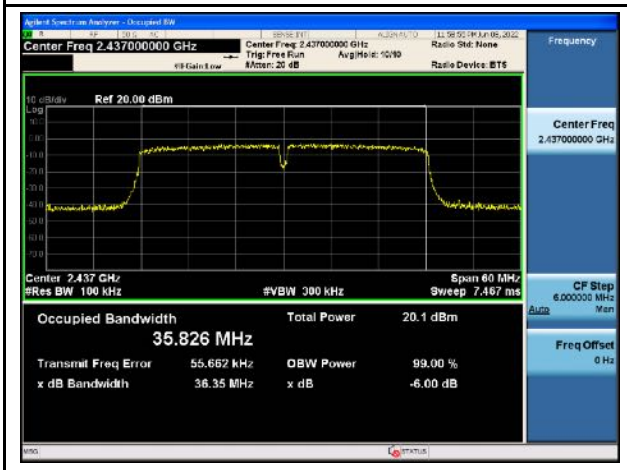
DTS BW_802.11 n20_Mid CH



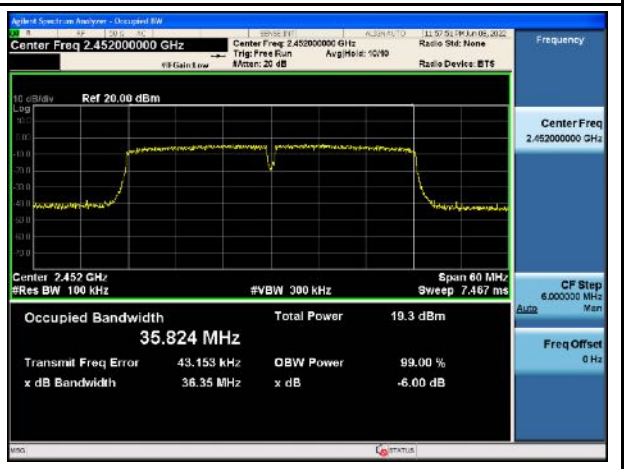
DTS BW_802.11 n20_High CH



DTS BW_802.11 n40_Low CH



DTS BW_802.11n40_Mid CH



DTS BW_802.11n40_High CH

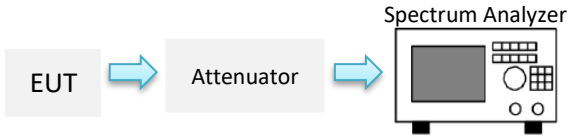
7.3 Occupied Bandwidth (99%)

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	14.679	N/A	N/A
		2437	14.661	N/A	N/A
		2462	14.655	N/A	N/A
802.11g	6Mbps	2412	16.731	N/A	N/A
		2437	16.736	N/A	N/A
		2462	16.730	N/A	N/A
802.11n20	MCS0	2412	17.755	N/A	N/A
		2437	17.752	N/A	N/A
		2462	17.763	N/A	N/A
802.11n40	MCS0	2422	35.810	N/A	N/A
		2437	35.802	N/A	N/A
		2452	35.798	N/A	N/A

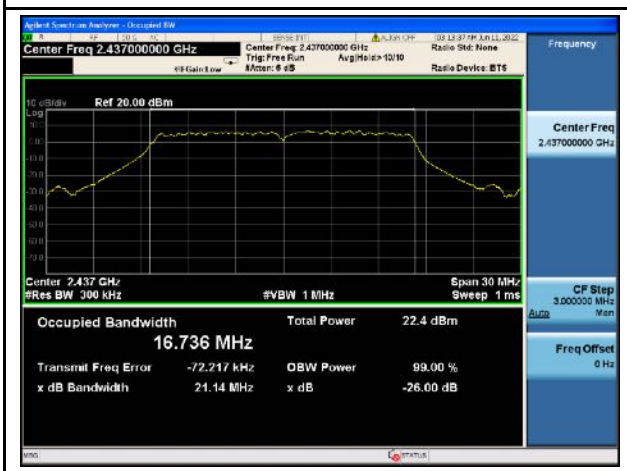
7.3.5 Test Plots

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

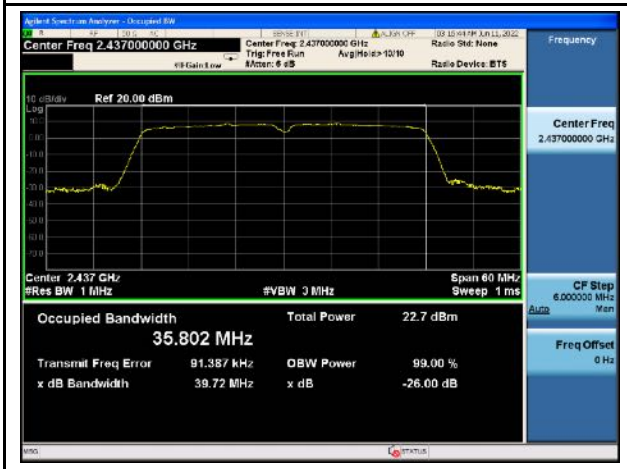
99%_802.11g_High CH

99%_802.11n20_Low CH

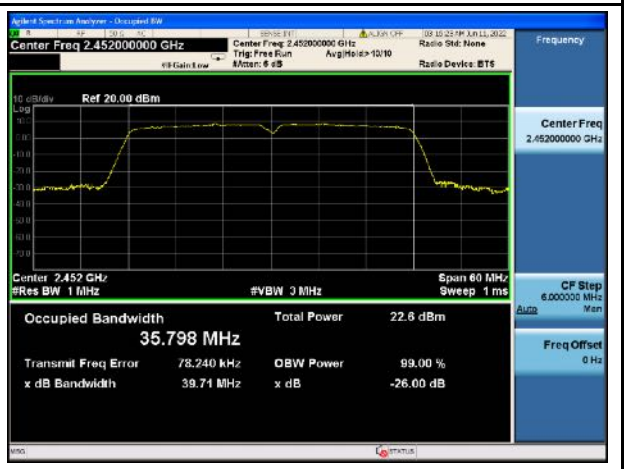
99%_802.11n20_Mid CH

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

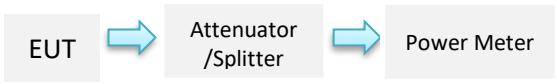
§ 15.247 (b)(3), RSS-247 §5.4

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.

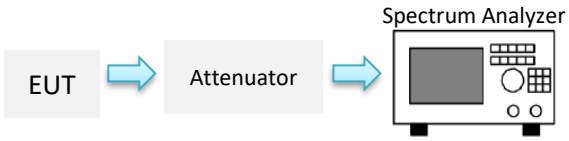
If transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

7.4.2 Test Setup

Power Meter



Spectrum Analyzer



7.4.3 Test Procedure

Method 1: Power Meter

Power measurement is according to clause 11.9.2.3 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

Average power meter measurement data

Mode	Data rate	Frequency (MHz)	Measured Output Power (dBm)	Max Output Power (dBm)	Result
802.11b	1Mbps	2412	17.45	30	Pass
		2437	18.46	30	Pass
		2462	18.19	30	Pass
802.11g	6Mbps	2412	15.53	30	Pass
		2437	15.59	30	Pass
		2462	16.25	30	Pass
802.11n20	MCS0	2412	15.56	30	Pass
		2437	15.63	30	Pass
		2462	15.50	30	Pass
802.11n40	MCS0	2422	15.51	30	Pass
		2437	15.53	30	Pass
		2452	14.70	30	Pass

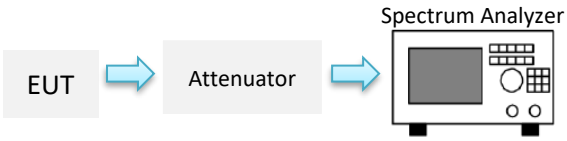
7.5 Power Spectral Density

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

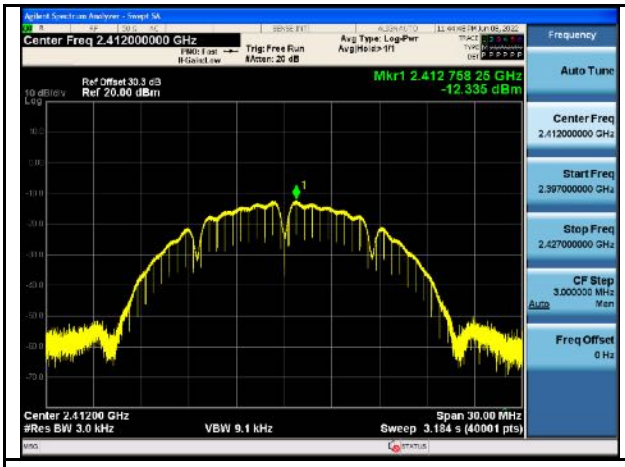
According to section 8.4 in KDB 558074 D01 DTS Meas Guidance v05r02 and subclause 11.10.2 PKPSD of ANSI C63.10-2013:

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

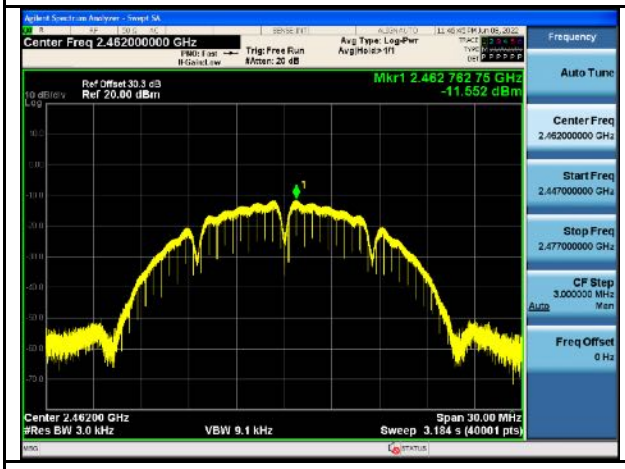
Mode	Data rate	Frequency (MHz)	Measured PSD (dBm/3KHz)	Max PSD Limit (dBm/3KHz)	Result
802.11b	1Mbps	2412	-12.335	8	Pass
		2437	-11.372	8	Pass
		2462	-11.552	8	Pass
802.11g	6Mbps	2412	-12.736	8	Pass
		2437	-12.937	8	Pass
		2462	-12.146	8	Pass
802.11n20	MCS0	2412	-12.583	8	Pass
		2437	-12.285	8	Pass
		2462	-12.499	8	Pass
802.11n40	MCS0	2422	-13.367	8	Pass
		2437	-12.790	8	Pass
		2452	-14.735	8	Pass

7.5.5 Test Plots

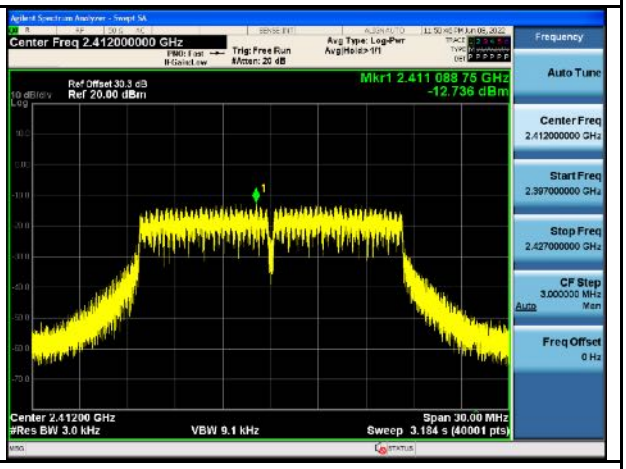


PSD-802.11b-Low CH

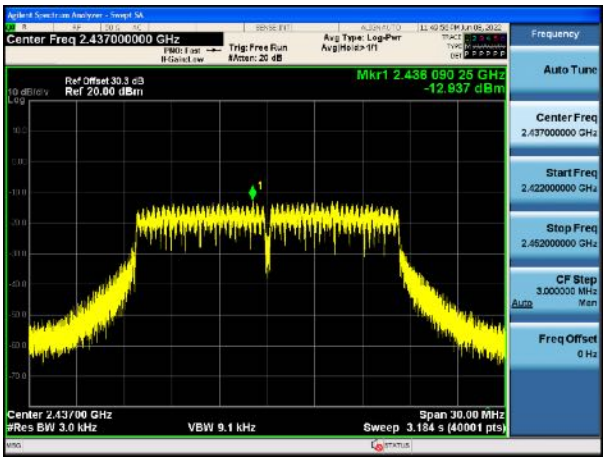
PSD-802.11b-Mid CH



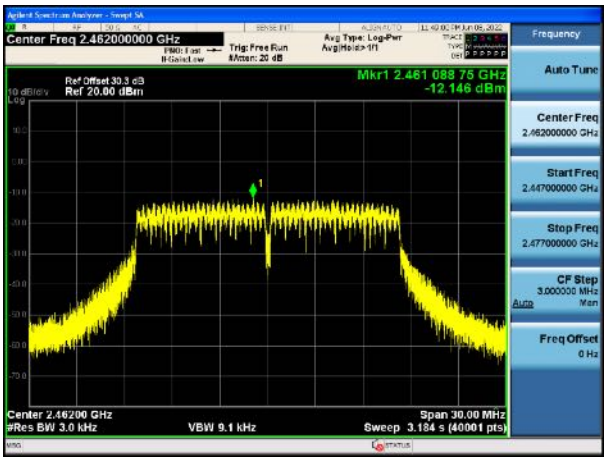
PSD-802.11b-High CH



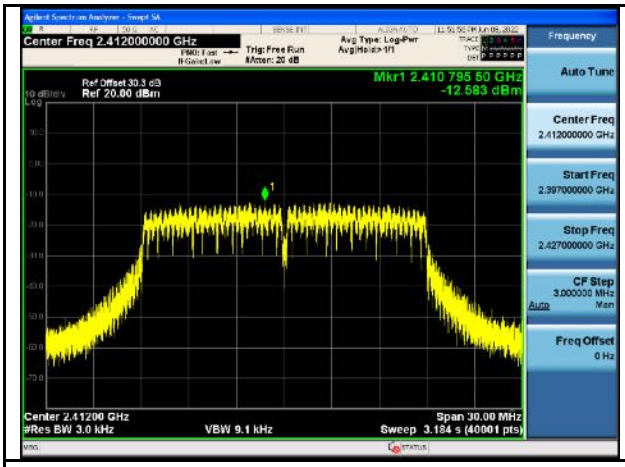
PSD-802.11g-Low CH



PSD-802.11g-Mid CH



PSD-802.11g-High CH



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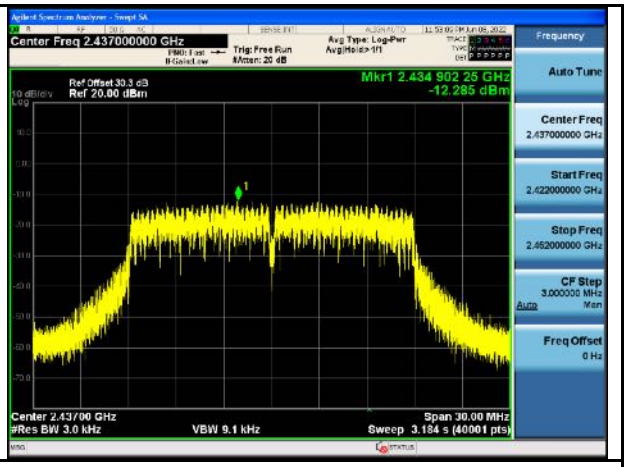
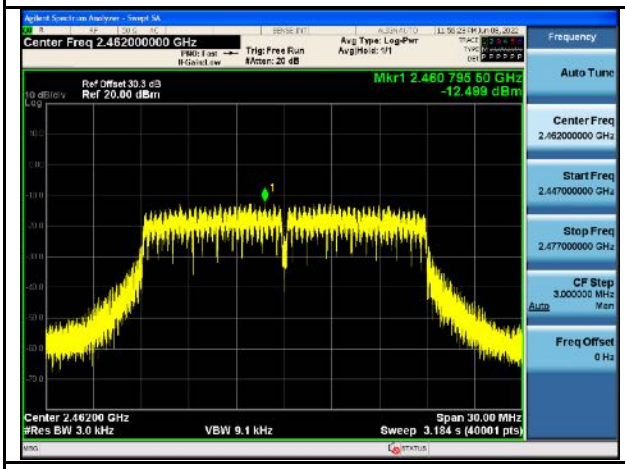
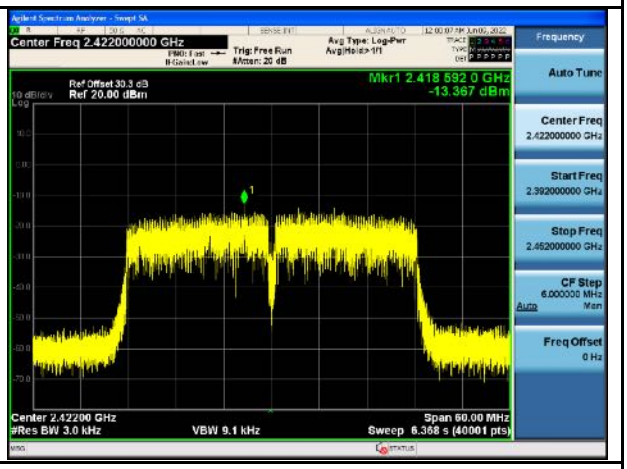


PSD-802.11n20-Mid CH



PSD-802.11n20-High CH



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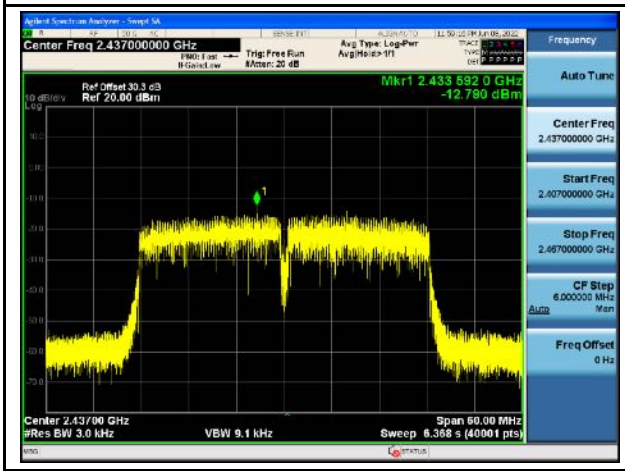
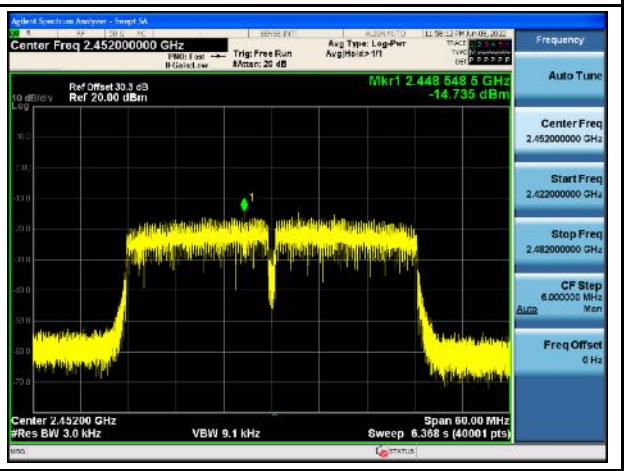


PSD-802.11n40-Mid CH



PSD-802.11n40-High CH

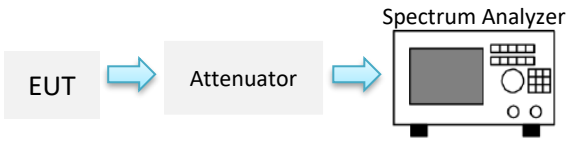
7.6 Conducted Band-Edge & Unwanted Emissions

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

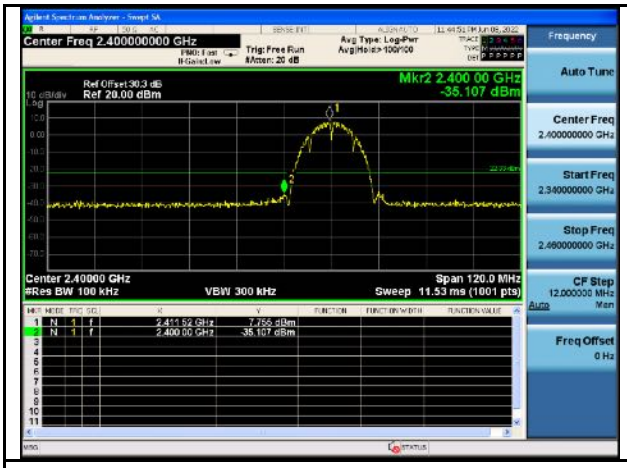
According to ANSI C63.10-2013 clause 11.13

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.

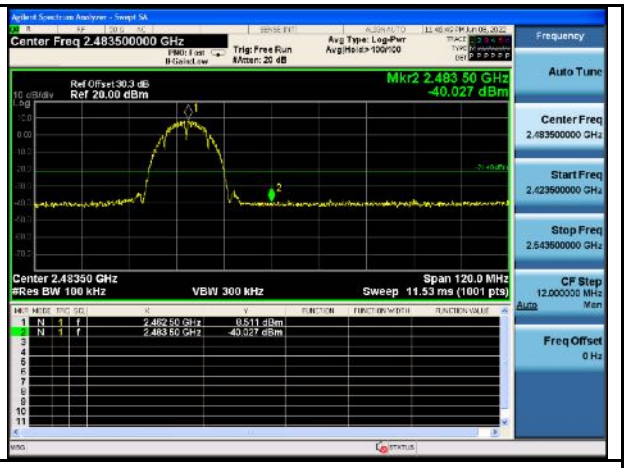
7.6.4 Test Result

Conducted Band edge

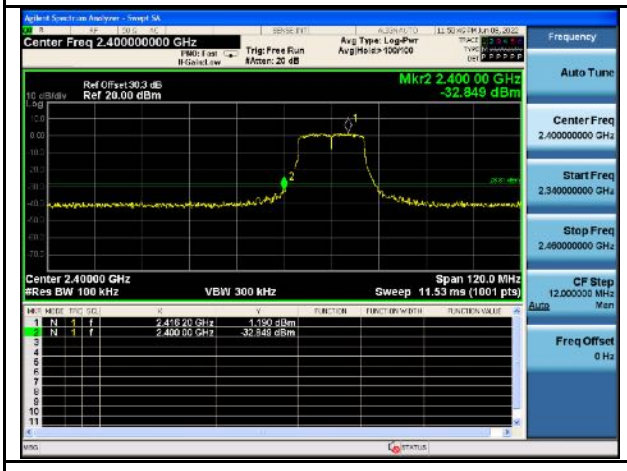
Mode	Data rate	Frequency (MHz)	Ref level (dBm)	Measured result (dBm)	Limit (dBm) Δ-30dBc	Result
802.11b	1Mbps	2412	7.755	-35.107	-22.245	Pass
		2462	8.511	-40.027	-21.489	Pass
802.11g	6Mbps	2412	1.190	-32.849	-28.81	Pass
		2462	2.101	-38.639	-27.899	Pass
802.11n(20M)	MCS0	2412	1.603	-32.091	-28.397	Pass
		2462	2.003	-39.381	-27.997	Pass
802.11n(40M)	MCS0	2422	-1.499	-39.689	-31.499	Pass
		2452	-2.081	-39.127	-32.081	Pass



Band Edge-802.11b -Low CH

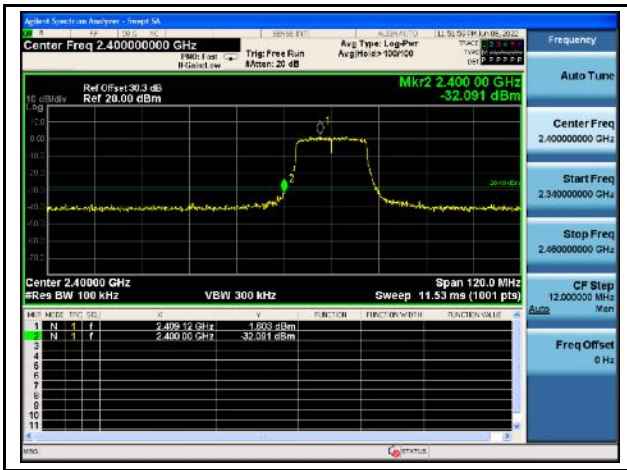


Band Edge-802.11b -High CH



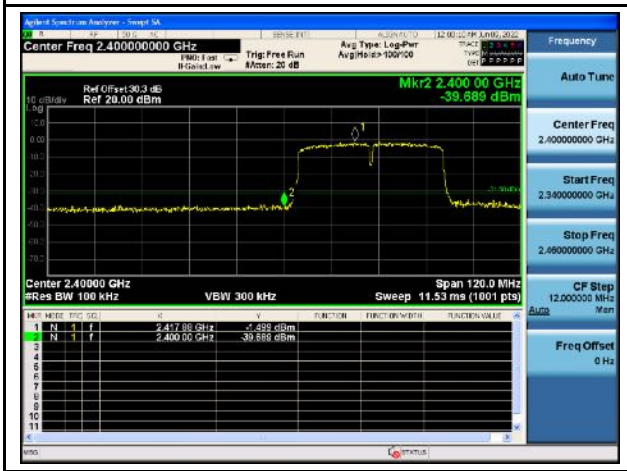
Band Edge-802.11g -Low CH

Band Edge-802.11g -High CH

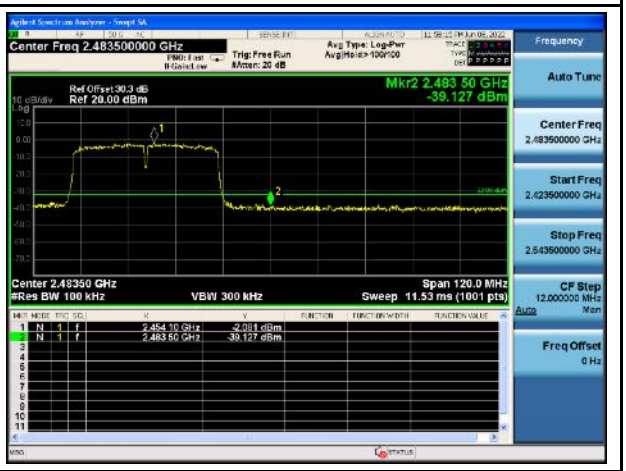


Band Edge-802.11n20 -Low CH

Band Edge-802.11n20 -High CH



Band Edge-802.11n40 -Low CH



Band Edge-802.11n40 -High CH

Conducted Spurious emission

Mode	Data rate	Test Frequency (MHz)	Ref level (dBm)	Emission Frequency (MHz)	Emission Level (dBm)	Limit (dBm) Δ-30dBc	Result
802.11b	1Mbps	2412	7.668	4834	-43.866	-22.332	Pass
		2437	8.701	4886	-44.542	-21.299	Pass
		2462	8.453	4912	-46.580	-21.547	Pass

CSE-802.11b-Low CH-REF

CSE-802.11b -Low CH

CSE-802.11b-Mid CH-REF

CSE-802.11b -Mid CH

CSE-802.11b-High CH-REF

CSE-802.11b -High CH

Mode	Data rate	Test Frequency (MHz)	Ref level (dBm)	Emission Frequency (MHz)	Emission Level (dBm)	Limit (dBm) Δ-30dBc	Result
802.11g	6Mbps	2412	1.420	16625	-46.397	-28.580	Pass
		2437	1.546	16365	-47.086	-28.454	Pass
		2462	1.732	16547	-46.308	-28.268	Pass

CSE-802.11g-Low CH-REF

CSE-802.11g -Low CH

CSE-802.11g-Mid CH-REF

CSE-802.11g -Mid CH

CSE-802.11g-High CH-REF

CSE-802.11g -High CH

Mode	Data rate	Test Frequency (MHz)	Ref level (dBm)	Emission Frequency (MHz)	Emission Level (dBm)	Limit (dBm) Δ-30dBc	Result
802.11n20	MCS0	2412	1.700	15690	-47.187	-28.300	Pass
		2437	1.996	16547	-45.884	-28.004	Pass
		2462	1.815	18832	-45.406	-28.185	Pass

CSE-802.11n20-Low CH-REF

CSE-802.11n20 -Low CH

CSE-802.11n20-Mid CH-REF

CSE-802.11n20 -Mid CH

CSE-802.11n20-High CH-REF

CSE-802.11n20 -High CH

Mode	Data rate	Test Frequency (MHz)	Ref level (dBm)	Emission Frequency (MHz)	Emission Level (dBm)	Limit (dBm) Δ-30dBc	Result
802.11n40	MCS0	2422	-1.454	16573	-45.629	-31.454	Pass
		2437	-1.270	16443	-46.534	-31.270	Pass
		2452	-1.298	14002	-48.959	-31.298	Pass

CSE-802.11n40-Low CH-REF

CSE-802.11n40 -Low CH

CSE-802.11n40-Mid CH-REF

CSE-802.11n40 -Mid CH

CSE-802.11n40-High CH-REF

CSE-802.11n40 -High CH

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

7.7.1 Requirement

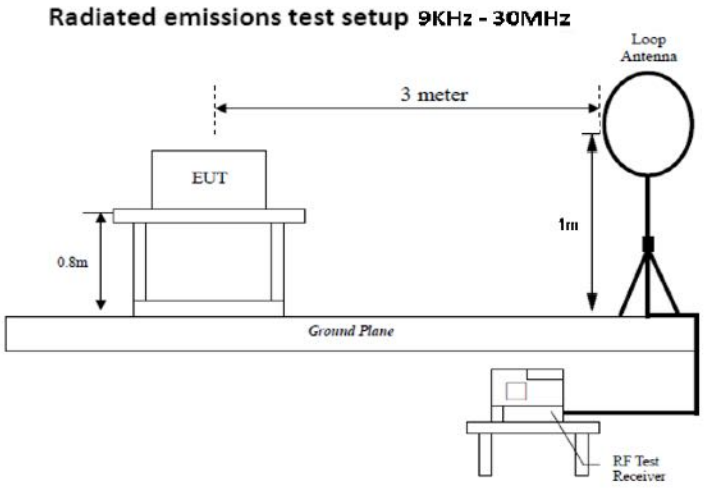
§ 15.247 (d), RSS-247 §5.5

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.

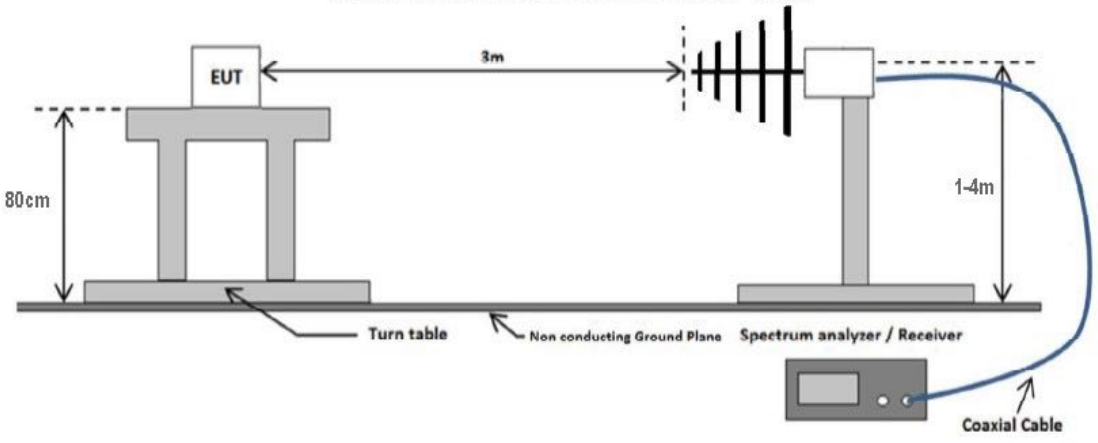
Attenuation below the general limits specified in §15.209(a) and RSS-Gen is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

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

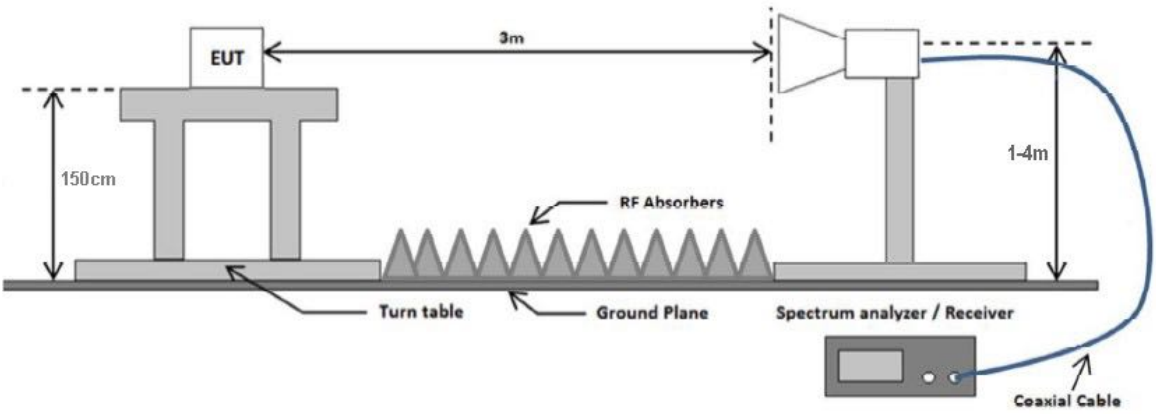
7.7.2 Test Setup



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.

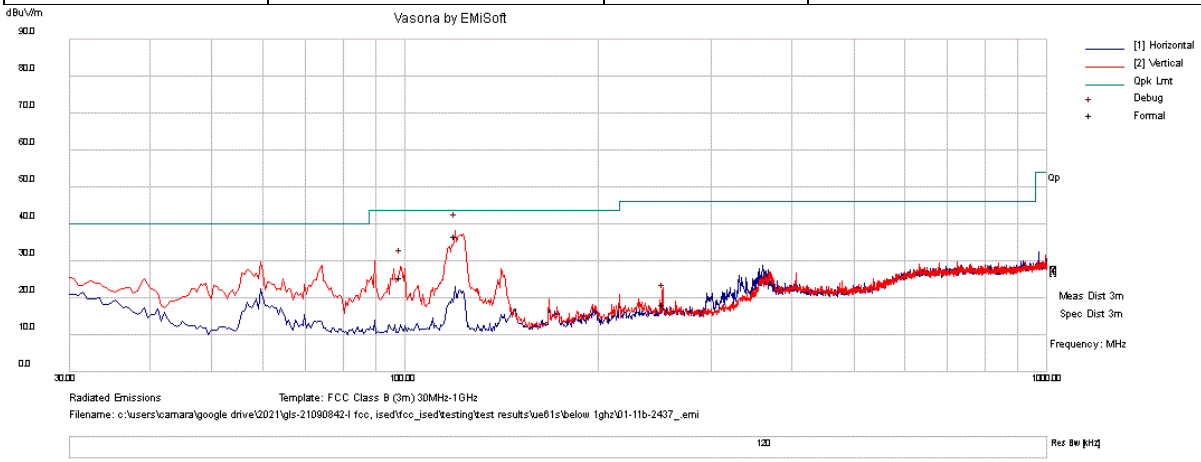
7.7.4 Test Result

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:	06/02/2022
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid channel	Test Result:	Pass



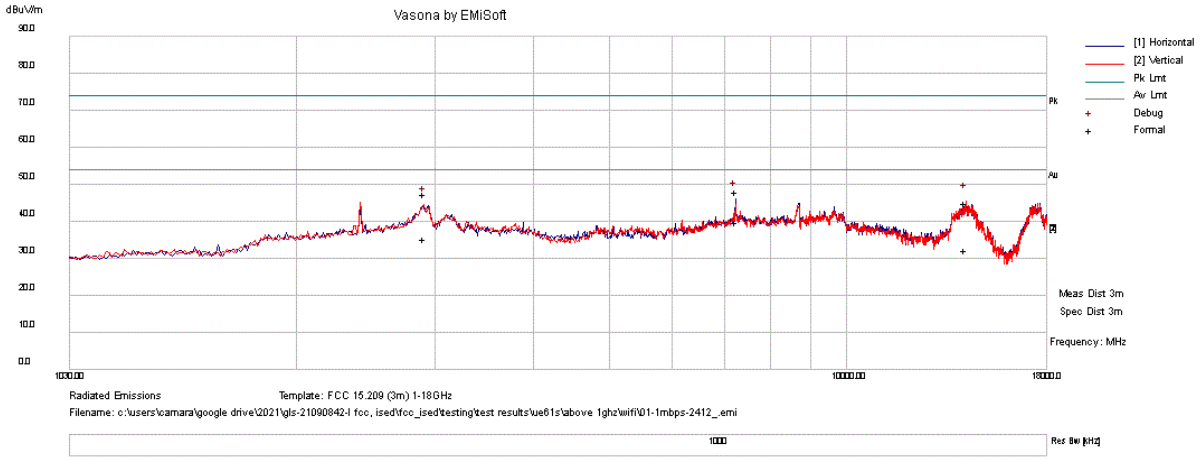
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	119.971	51.5	3.9	-18.5	36.9	Quasi Max	V	100	82	43.5	-6.6	Pass
2	98.503	41.3	3.5	-19.2	25.6	Quasi Max	V	124	144	43.5	-17.9	Pass
3	252.346	27.5	5.3	-14.6	18.2	Quasi Max	V	164	108	46	-27.8	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)

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:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



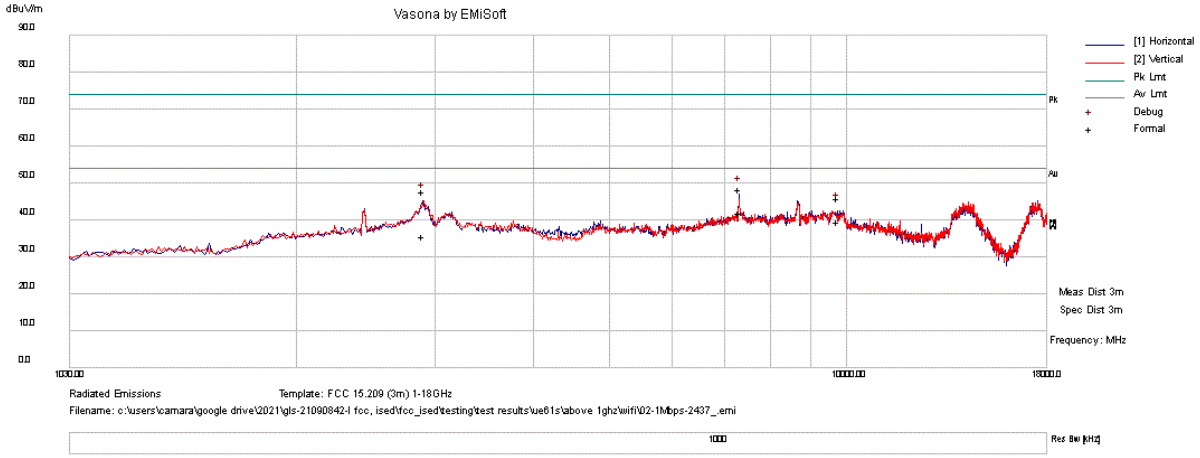
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7236.459	41.7	11.7	-5.5	48	Peak Max	H	197	354	74	-26	Pass
2	14190.661	27.7	16.4	1	45.1	Peak Max	V	341	360	74	-28.9	Pass
3	2908.984	23	20.5	3.9	47.4	Peak Max	V	168	321	74	-26.6	Pass
4	7236.459	33.5	11.7	-5.5	39.7	Average Max	H	197	354	54	-14.3	Pass
5	14190.661	14.8	16.4	1	32.2	Average Max	V	341	360	54	-21.8	Pass
6	2908.984	11	20.5	3.9	35.4	Average Max	V	168	321	54	-18.6	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:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



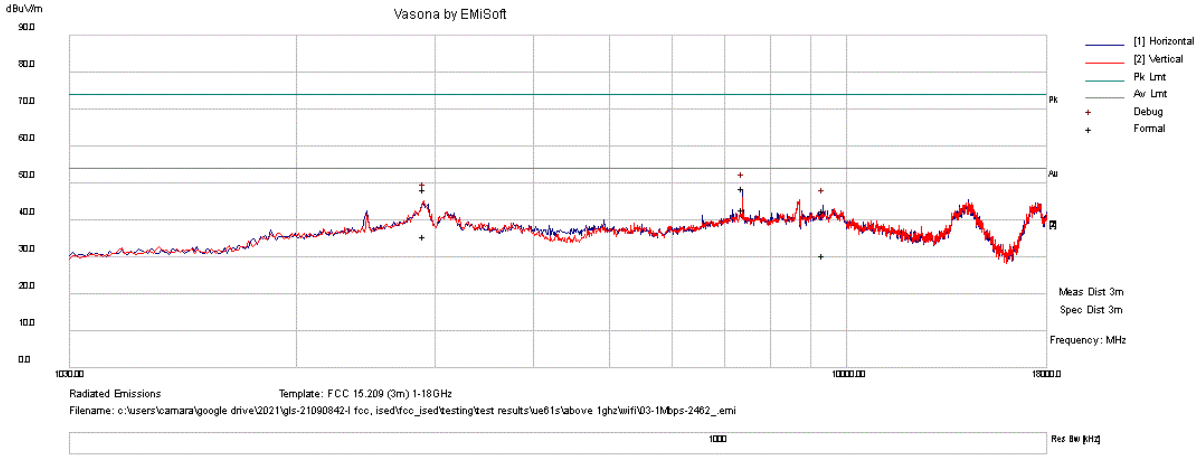
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7310.023	42	11.9	-5.5	48.4	Peak Max	H	173	40	74	-25.6	Pass
2	2896.833	22	21.9	3.8	47.7	Peak Max	H	391	22	74	-26.3	Pass
3	9748.158	36.6	14.4	-4.9	46	Peak Max	H	182	5	74	-28	Pass
4	7310.023	35.4	11.9	-5.5	41.8	Average Max	H	173	40	54	-12.2	Pass
5	2896.833	9.8	21.9	3.8	35.5	Average Max	H	391	22	54	-18.5	Pass
6	9748.158	30	14.4	-4.9	39.4	Average Max	H	182	5	54	-14.6	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:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



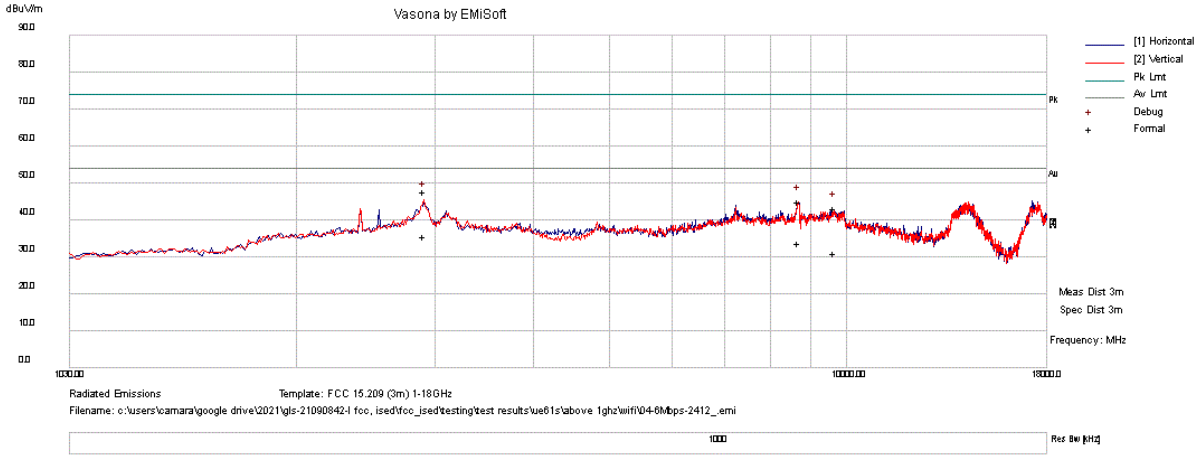
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7384.414	42.1	12	-5.5	48.6	Peak Max	H	200	360	74	-25.4	Pass
2	2907.061	23.6	20.8	3.9	48.2	Peak Max	V	129	172	74	-25.8	Pass
3	9355.169	33.6	14.3	-5.3	42.6	Peak Max	H	218	184	74	-31.4	Pass
4	7384.414	36.5	12	-5.5	42.9	Average Max	H	200	360	54	-11.1	Pass
5	2907.061	10.8	20.8	3.9	35.4	Average Max	V	129	172	54	-18.6	Pass
6	9355.169	21.5	14.3	-5.3	30.4	Average Max	H	218	184	54	-23.6	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:	802.11g Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



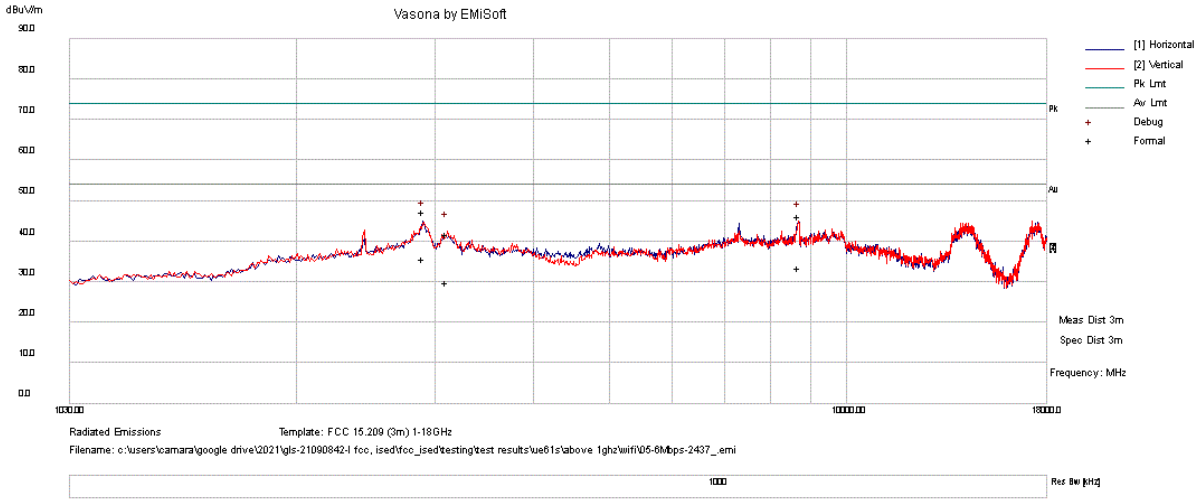
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	2907.239	23.1	20.8	3.9	47.8	Peak Max	V	136	128	74	-26.2	Pass
2	8699.359	32.9	17.9	-5.7	45.1	Peak Max	V	145	86	74	-28.9	Pass
3	9662.828	33.7	14.5	-5.2	43	Peak Max	V	108	94	74	-31	Pass
4	2907.239	10.8	20.8	3.9	35.5	Average Max	V	136	128	54	-18.5	Pass
5	8699.359	21.4	17.9	-5.7	33.6	Average Max	V	145	86	54	-20.4	Pass
6	9662.828	21.7	14.5	-5.2	31	Average Max	V	108	94	54	-23	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:	802.11g Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



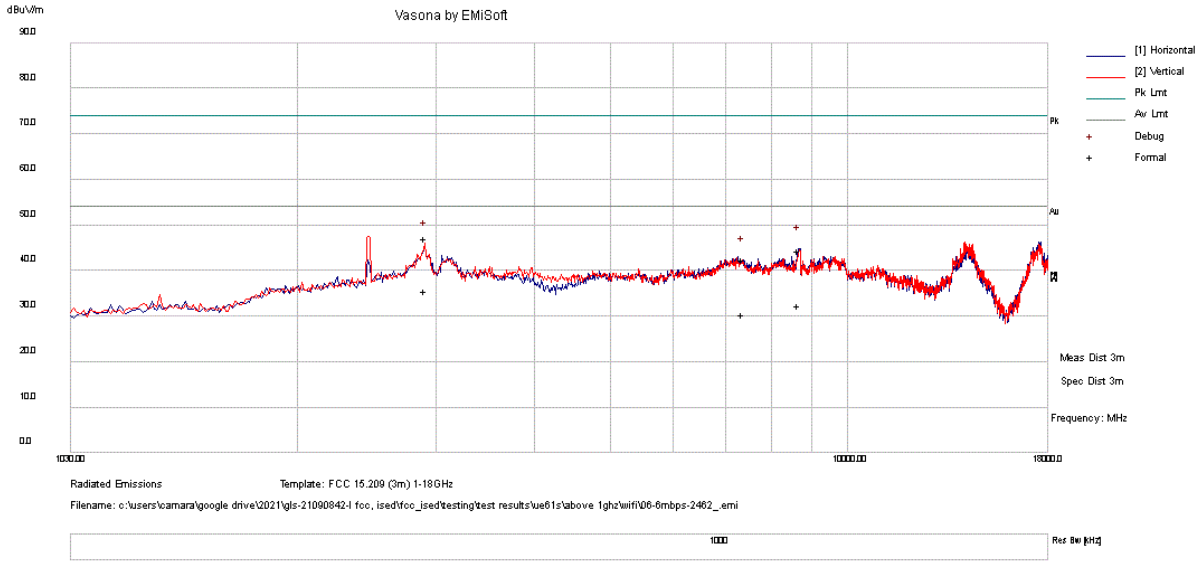
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	2898.228	21.6	21.9	3.8	47.3	Peak Max	H	162	180	74	-26.7	Pass
2	8698.439	33.9	17.9	-5.7	46.1	Peak Max	V	113	169	74	-27.9	Pass
3	3107.79	35.8	7.1	-1.1	41.7	Peak Max	V	355	20	74	-32.3	Pass
4	2898.228	10	21.9	3.8	35.7	Average Max	H	162	180	54	-18.3	Pass
5	8698.439	21.3	17.9	-5.7	33.5	Average Max	V	113	169	54	-20.5	Pass
6	3107.79	24	7.1	-1.1	29.9	Average Max	V	355	20	54	-24.1	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:	802.11g Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



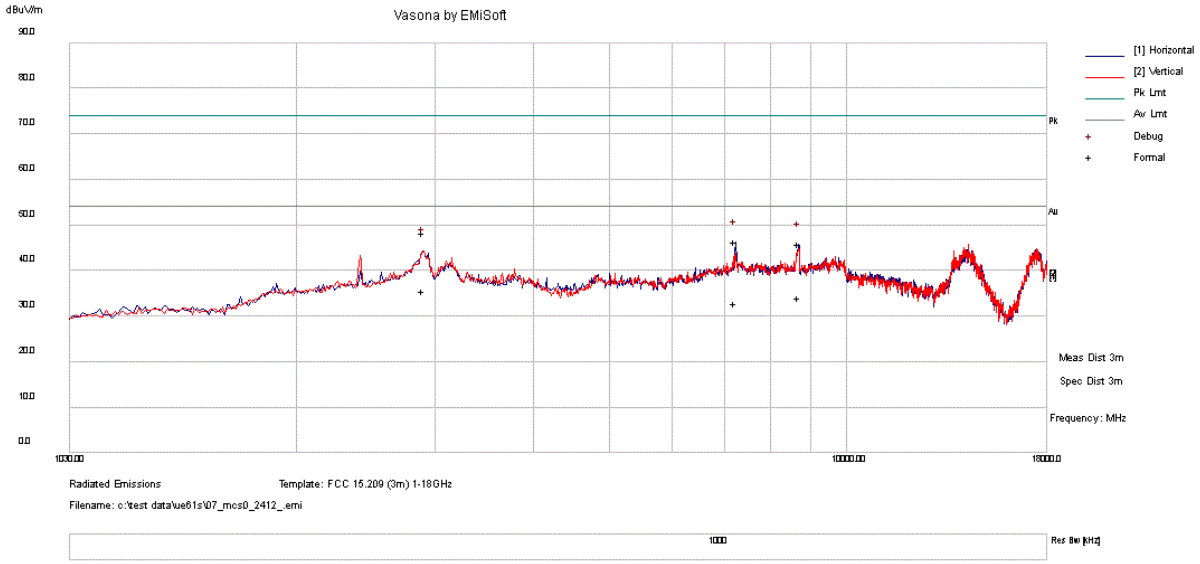
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	2909.186	22.8	20.5	3.9	47.1	Peak Max	V	239	328	74	-26.9	Pass
2	8666.365	33.8	16.4	-5.7	44.6	Peak Max	H	163	319	74	-29.4	Pass
3	7373.228	36	11.9	-5.5	42.5	Peak Max	V	176	277	74	-31.5	Pass
4	2909.186	11.1	20.5	3.9	35.5	Average Max	V	239	328	54	-18.5	Pass
5	8666.365	21.6	16.4	-5.7	32.3	Average Max	H	163	319	54	-21.7	Pass
6	7373.228	23.9	11.9	-5.5	30.4	Average Max	V	176	277	54	-23.6	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:	802.11n20 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



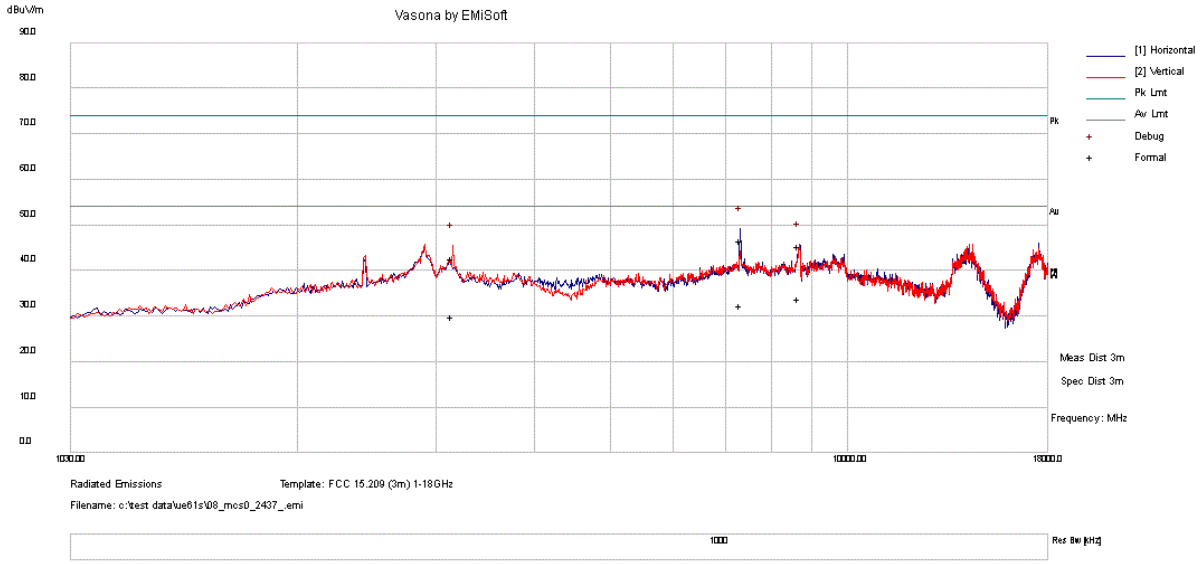
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7234.481	40.2	11.7	-5.5	46.4	Peak Max	H	174	23	74	-27.6	Pass
2	8699.719	33.7	17.9	-5.7	45.9	Peak Max	H	363	345	74	-28.1	Pass
3	2898.005	22.6	21.9	3.8	48.3	Peak Max	H	388	167	74	-25.7	Pass
4	7234.481	26.6	11.7	-5.5	32.8	Average Max	H	174	23	54	-21.2	Pass
5	8699.719	21.8	17.9	-5.7	34	Average Max	H	363	345	54	-20	Pass
6	2898.005	10	21.9	3.8	35.7	Average Max	H	388	167	54	-18.3	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)

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:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



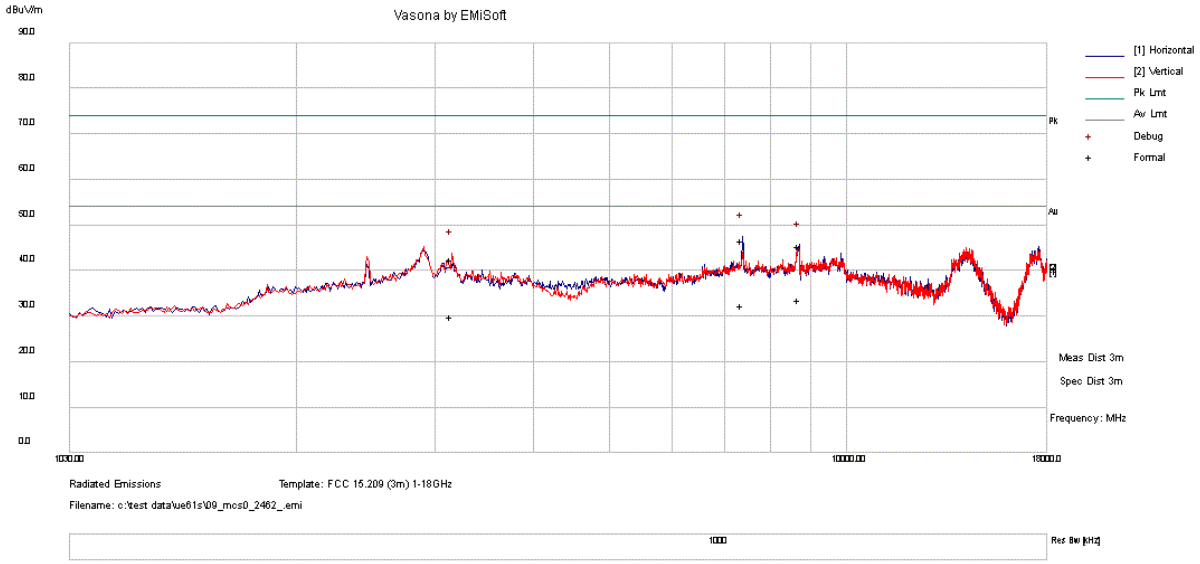
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7317.734	40.3	11.9	-5.5	46.7	Peak Max	H	136	19	74	-27.3	Pass
2	8686.983	33.7	17.4	-5.7	45.4	Peak Max	V	346	63	74	-28.6	Pass
3	3150.583	39.1	7.1	-3.4	42.8	Peak Max	V	100	296	74	-31.2	Pass
4	7317.734	26	11.9	-5.5	32.4	Average Max	H	136	19	54	-21.6	Pass
5	8686.983	22.1	17.4	-5.7	33.8	Average Max	V	346	63	54	-20.2	Pass
6	3150.583	26.3	7.1	-3.4	29.9	Average Max	V	100	296	54	-24.1	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:	802.11n20 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



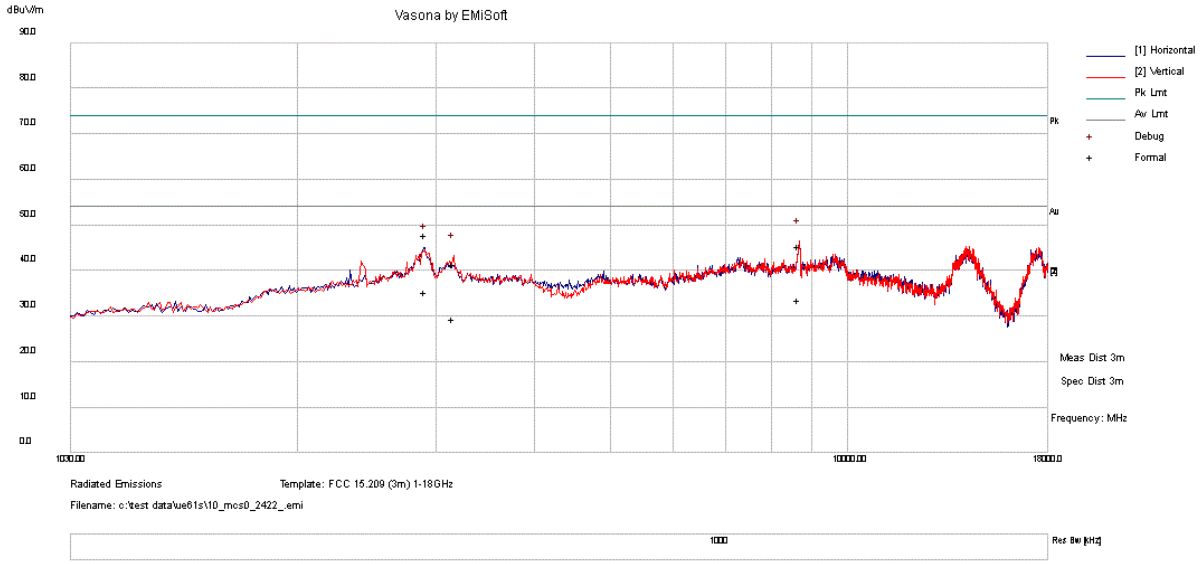
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7372.443	40.2	11.9	-5.5	46.7	Peak Max	H	118	40	74	-27.3	Pass
2	8707.798	33.6	17.6	-5.7	45.5	Peak Max	H	356	0	74	-28.5	Pass
3	3151.428	38.8	7.1	-3.4	42.4	Peak Max	V	289	203	74	-31.6	Pass
4	7372.443	26	11.9	-5.5	32.5	Average Max	H	118	40	54	-21.5	Pass
5	8707.798	21.7	17.6	-5.7	33.7	Average Max	H	356	0	54	-20.3	Pass
6	3151.428	26.2	7.1	-3.4	29.9	Average Max	V	289	203	54	-24.1	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:	802.11n40 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



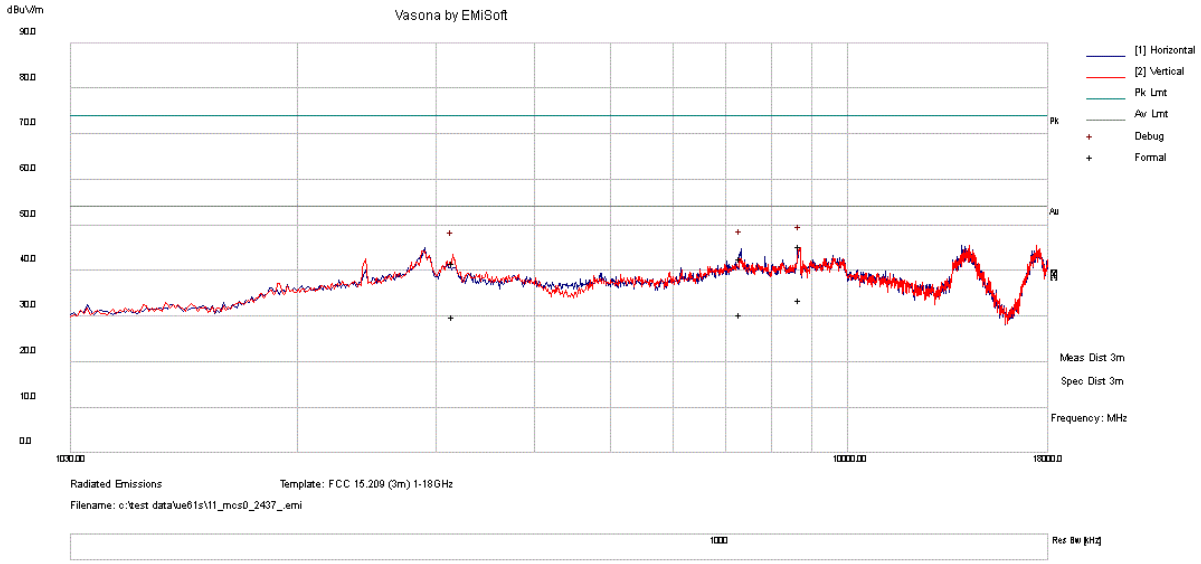
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8686.255	33.7	17.3	-5.7	45.4	Peak Max	V	142	115	74	-28.6	Pass
2	2907.326	23.2	20.8	3.9	47.8	Peak Max	H	190	220	74	-26.2	Pass
3	3161.611	38.5	7.1	-4	41.6	Peak Max	V	253	215	74	-32.4	Pass
4	8686.255	22.1	17.3	-5.7	33.7	Average Max	V	142	115	54	-20.3	Pass
5	2907.326	10.8	20.8	3.9	35.4	Average Max	H	190	220	54	-18.6	Pass
6	3161.611	26.5	7.1	-4	29.6	Average Max	V	253	215	54	-24.4	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:	802.11n40 Mode
Frequency Range:	1 GHz – 18 GHz	Test Date:	06/03/2022-06/06/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



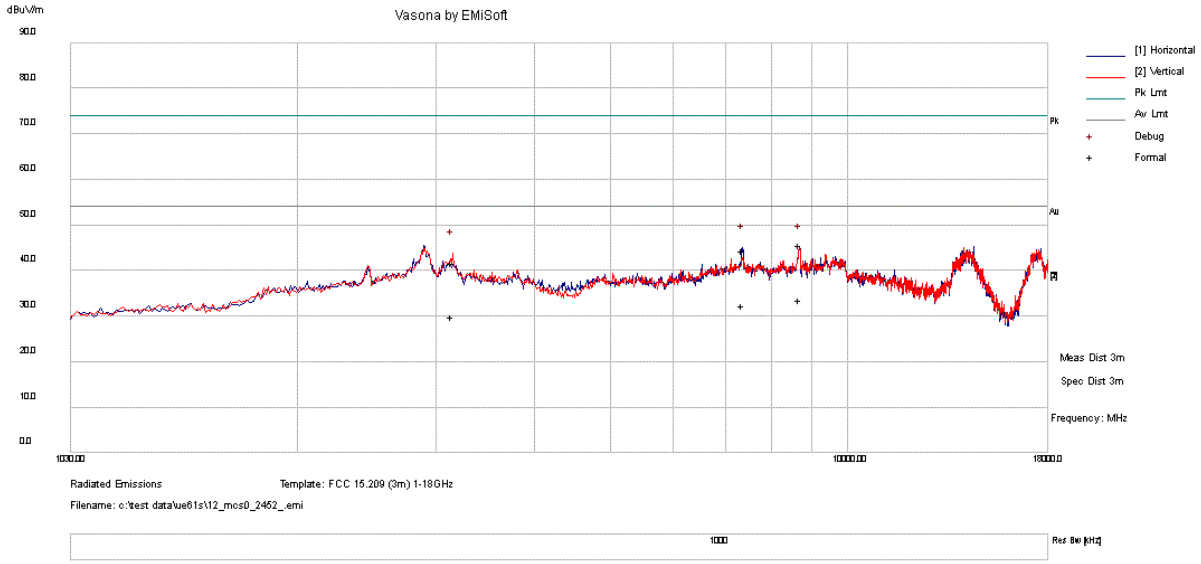
No.	Frequency MHz	Raw dBuV	Cable Loss	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	8706.938	33.4	17.6	-5.7	45.3	Peak Max	V	332	85	74	-28.7	Pass
2	7321.066	36.3	11.9	-5.5	42.8	Peak Max	V	319	81	74	-31.2	Pass
3	3152.925	38.2	7.1	-3.5	41.8	Peak Max	V	194	0	74	-32.2	Pass
4	8706.938	21.8	17.6	-5.7	33.7	Average Max	V	332	85	54	-20.3	Pass
5	7321.066	24	11.9	-5.5	30.4	Average Max	V	319	81	54	-23.6	Pass
6	3152.925	26.5	7.1	-3.5	30.1	Average Max	V	194	0	54	-23.9	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)

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:	06/03/2022-06/06/2022
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	7360.266	38.1	11.9	-5.5	44.5	Peak Max	H	135	355	74	-29.5	Pass
2	8698.011	33.4	17.9	-5.7	45.6	Peak Max	H	167	116	74	-28.4	Pass
3	3151.565	38.2	7.1	-3.5	41.8	Peak Max	V	342	23	74	-32.2	Pass
4	7360.266	26	11.9	-5.5	32.5	Average Max	H	135	355	54	-21.5	Pass
5	8698.011	21.5	17.9	-5.7	33.7	Average Max	H	167	116	54	-20.3	Pass
6	3151.565	26.3	7.1	-3.5	29.9	Average Max	V	342	23	54	-24.1	Pass

Remarks:

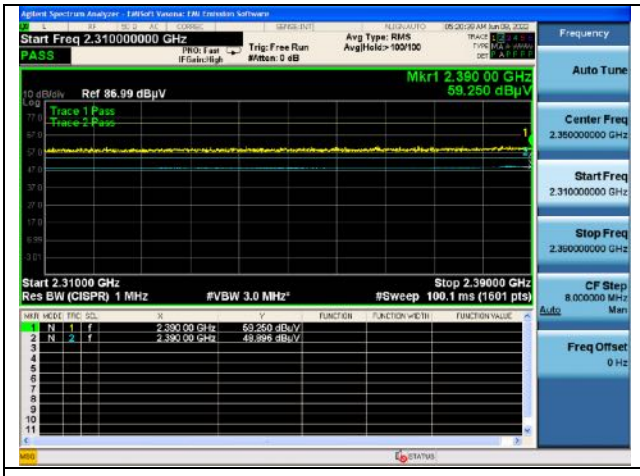
1. Level (dBuV) = Raw (dBuV) + Cable loss(dB) + AF (dB).
2. AF(dB/m) = Antenna Factor (dB) – Preamplifier Gain (dB)
3. Margin = Level (dBuV/m) - Limit value(dBuV/m)

Radiated Emission between 18GHz – 40GHz test result

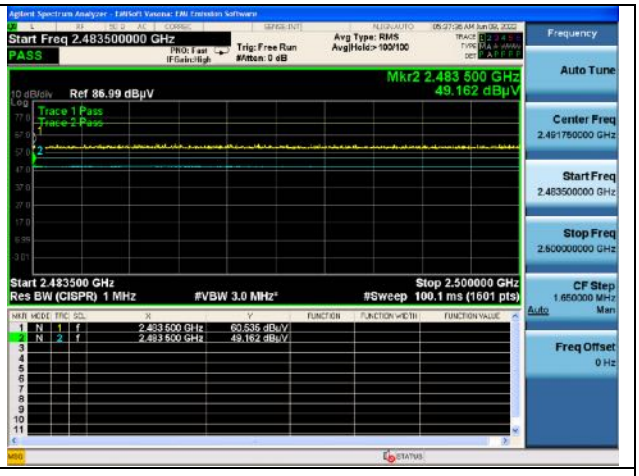
Note: no substantial emission is found other than the noise floor. Different modes have been verified.

Restricted Band Measurement Result

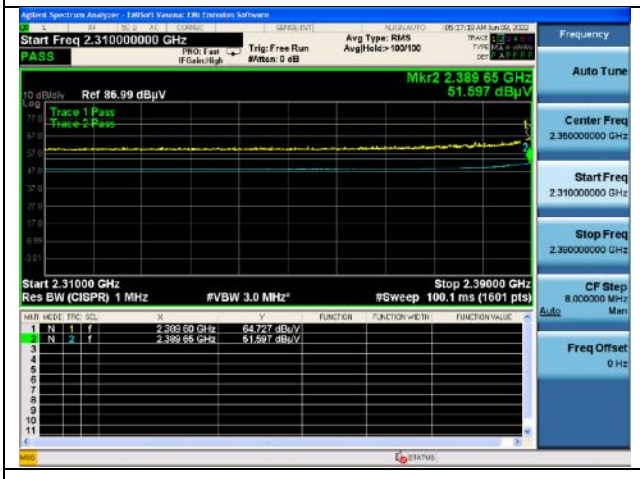
Mode	TX CH (MHz)	Frequency (MHz)	Emission Level (dBuV/m)	Detector Type	Limit (dBuV/m)	Margin (dB)	Result
802.11b	2412	2390	59.250	PK	74	-14.75	Pass
		2390	48.896	AV	54	-5.104	Pass
	2462	2483.5	60.535	PK	74	-13.465	Pass
		2483.5	49.162	AV	54	-4.838	Pass
802.11g	2412	2390	64.727	PK	74	-9.273	Pass
		2390	51.597	AV	54	-2.403	Pass
	2462	2483.5	65.596	PK	74	-8.404	Pass
		2483.5	51.227	AV	54	-2.773	Pass
802.11n	2412	2390	68.851	PK	74	-5.149	Pass
		2390	52.390	AV	54	-1.61	Pass
	2462	2483.5	64.478	PK	74	-9.522	Pass
		2483.5	50.384	AV	54	-3.616	Pass
802.11n40	2422	2390	66.945	PK	74	-7.055	Pass
		2390	51.913	AV	54	-2.087	Pass
	2452	2483.5	64.526	PK	74	-9.474	Pass
		2483.5	50.711	AV	54	-3.289	Pass



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

7.8 Conducted Emissions

7.8.1 Requirement

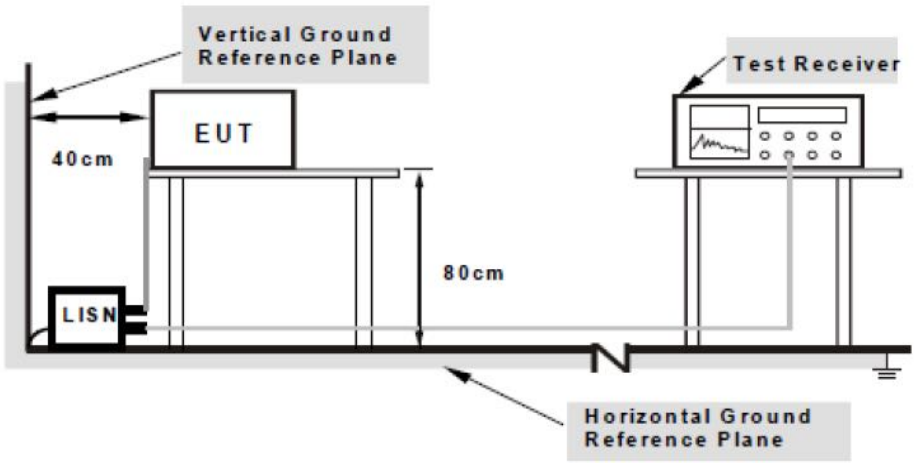
Per § 15.207 (a), RSS Gen 8.8

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Limits for Conducted Emissions at the Mains Ports

Section	Frequency ranges (MHz)	Limit (dBuV)	
		QP	Average
Class B devices	0.15 – 0.5	66 – 56	56 – 46
	0.5 – 5	56	46
	5 - 30	60	50
NOTE 1 The lower limit shall apply at the transition frequencies.			

7.8.2 Test setup



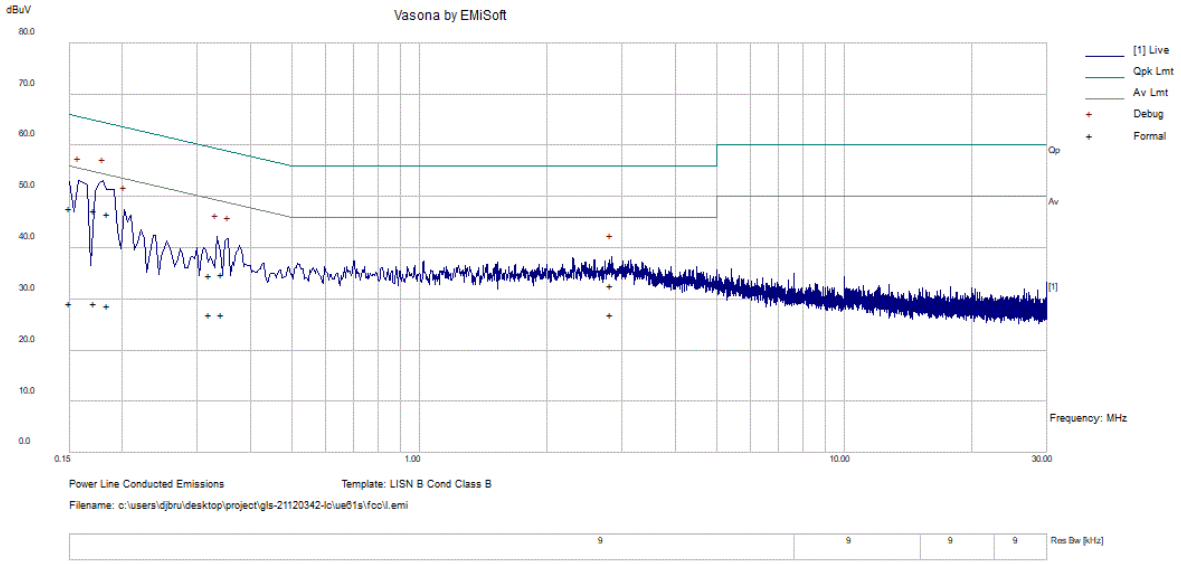
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

7.8.3 Test Procedure

1. The EUT and supporting equipment were set up in accordance with the requirements of the standard on top of a 1.5m x 1m x 0.8m high, non-metallic table.
2. The power supply for the EUT was fed through a 50Ω/50μH EUT LISN, connected to filtered mains.
3. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
4. All other supporting equipment was powered separately from another main supply.
5. The EUT was switched on and allowed to warm up to its normal operating condition.
6. A scan was made on the NEUTRAL line (for AC mains) or Earth line (for DC power) over the required frequency range using an EMI test receiver.
7. High peaks, relative to the limit line, were then selected.
8. The EMI test receiver was then tuned to the selected frequencies and the necessary measurements made with a receiver bandwidth setting of 10 kHz. For FCC tests, only Quasi-peak measurements were made; while for CISPR/EN tests, both Quasi-peak and Average measurements were made
9. All possible modes of operation were investigated. Only the worst case emissions were measured and reported. All other emissions were relatively insignificant.

7.8.4 Test Result

Test Standard:	Part 15.207 RSS Gen 8.8	Mode:	WLAN_802.11b_Mid CH
Frequency Range:	0.15-30MHz	Test Date:	06/10/2022
Antenna Type/Polarity:	N/A	Test Personnel:	Devin Tai
Remark:	Line 120VAC, 60Hz	Test Result:	Pass

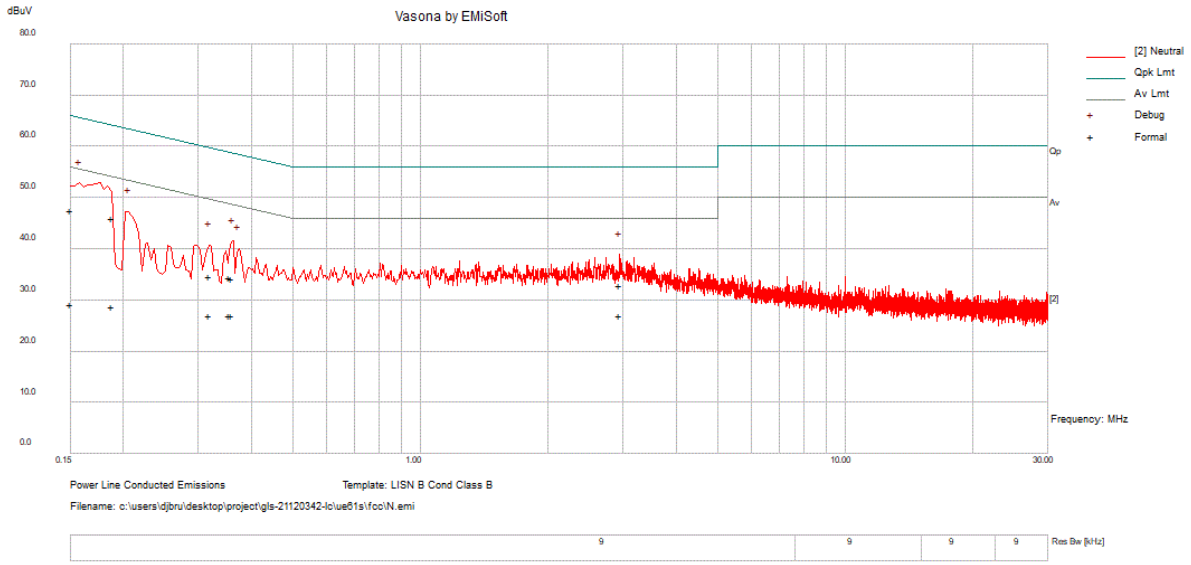


No.	Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Meas. Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
1	0.172	37.1	10.1	0.2	47.4	Quasi Peak	Live	64.9	-17.5	Pass
2	0.15	37.4	10.1	0.2	47.8	Quasi Peak	Live	66	-18.2	Pass
3	0.185	36.4	10.1	0.2	46.7	Quasi Peak	Live	64.3	-17.6	Pass
4	0.344	24.6	10.1	0.1	34.8	Quasi Peak	Live	59.1	-24.3	Pass
5	0.321	24.5	10.1	0.1	34.7	Quasi Peak	Live	59.7	-24.9	Pass
6	2.83	22.5	10.3	0.1	32.8	Quasi Peak	Live	56	-23.2	Pass
7	0.172	18.9	10.1	0.2	29.2	Average	Live	54.9	-25.7	Pass
8	0.15	19	10.1	0.2	29.3	Average	Live	56	-26.7	Pass
9	0.185	18.6	10.1	0.2	28.9	Average	Live	54.3	-25.4	Pass
10	0.344	16.8	10.1	0.1	27.1	Average	Live	49.1	-22.1	Pass
11	0.321	16.9	10.1	0.1	27.1	Average	Live	49.7	-22.6	Pass
12	2.83	16.7	10.3	0.1	27.1	Average	Live	46	-18.9	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Raw Value + Cable loss + Factors Value.

Test Standard:	Part 15.207 RSS Gen 8.8	Mode:	WLAN_802.11b_Mid CH
Frequency Range:	0.15-30MHz	Test Date:	06/10/2022
Antenna Type/Polarity:	N/A	Test Personnel:	Devin Tai
Remark:	Neutral 120VAC, 60Hz	Test Result:	Pass



No.	Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Meas. Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
1	0.15	37.2	10.1	0.2	47.5	Quasi Peak	Neutral	66	-18.5	Pass
2	0.188	35.7	10.1	0.2	46	Quasi Peak	Neutral	64.1	-18.1	Pass
3	2.949	22.7	10.3	0.1	33	Quasi Peak	Neutral	56	-23	Pass
4	0.356	24.2	10.1	0.1	34.4	Quasi Peak	Neutral	58.8	-24.4	Pass
5	0.359	24	10.1	0.1	34.3	Quasi Peak	Neutral	58.7	-24.5	Pass
6	0.318	24.4	10.1	0.1	34.6	Quasi Peak	Neutral	59.3	-24.7	Pass
7	0.15	19	10.1	0.2	29.3	Average	Neutral	56	-26.7	Pass
8	0.188	18.5	10.1	0.2	28.8	Average	Neutral	54.1	-25.3	Pass
9	2.949	16.7	10.3	0.1	27.1	Average	Neutral	46	-18.9	Pass
10	0.356	16.8	10.1	0.1	27	Average	Neutral	48.8	-21.8	Pass
11	0.359	16.8	10.1	0.1	27	Average	Neutral	48.7	-21.8	Pass
12	0.318	16.9	10.1	0.1	27.1	Average	Neutral	49.8	-22.7	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Margin value = Emission level - Limit value
3. Emission Level = Raw Value + Cable loss + Factors Value.

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	10/18/2020	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
LISN (9KHz – 30MHz)	EMCO	3816/2	9705-1066	05/04/2022	05/04/2023
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
Temp / Humidity / Pressure Meter	PCE Instruments	PCE-THB 40	R062028	05/15/2022	05/15/2023
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
Agilent Signal Generator	MXG N5182A	N5182A	US47080548	06/17/2021	06/17/2022
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL052	N/A	N/A
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL053	N/A	N/A
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL054	N/A	N/A
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL055	N/A	N/A

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