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FCC RF Test Report

Test Report Number	HID-21050342-LC-FCC-IC-RF-WLAN2.4G
FCC ID	JQ6-SECONNECT
IC	2236B-SECONNECT
Applicant	HID Global Corporation
Applicant Address	611 Center Ridge Drive, Austin, TX, 78753, USA
Product Name	HID® iCLASS SE® Connectivity Module
Model (s)	BT/WIFIE
Date of Receipt	11/23/2021
Date of Test	11/29/2021- 04/14/2022
Report Issue Date	06/07/2022
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

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REVISION HISTORY

Report Number	Version	Description	Issued Date
HID-21050342-L-FCC-IC-RF-WLAN2.4G	01	Initial report	06/07/2022

TABLE OF CONTENTS

1 TEST SUMMARY 4

2 GENERAL INFORMATION 5

2.1 Applicant 5

2.2 Product information 5

2.3 Test standard and method 5

3 TEST SITE INFORMATION 6

4 MODIFICATION OF EUT / DEVIATIONS FROM STANDARDS 6

5 TEST CONFIGURATION AND OPERATION 6

5.1 EUT Test Configuration 6

5.2 Supporting Equipment 7

6 UNCERTAINTY OF MEASUREMENT 7

7 TEST RESULTS 8

7.1 Antenna Requirement 8

7.2 DTS (6 dB) Bandwidth 9

7.3 Occupied Bandwidth (99%) 13

7.4 Maximum Output Power 17

7.5 Power Spectral Density 19

7.6 Conducted Band-Edge & Unwanted Emissions 23

7.7 Radiated Spurious Emissions into Restricted Frequency Bands 29

7.8 Conducted Emissions 44

8 EUT AND TEST SETUP PHOTOS 48

9 TEST INSTRUMENT LIST 49

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)	Pass

2 General Information

2.1 Applicant

Applicant	HID Global Corporation
Applicant address	611 Center Ridge Drive, Austin, TX, 78753, USA
Manufacturer	HID Global Corporation
Manufacturer Address	611 Center Ridge Drive, Austin, TX, 78753, USA

2.2 Product information

Product Name	HID® iCLASS SE® Connectivity Module
Product Description	BLE & WIFI Module
Model Number	BT/WIFIE
Family Models	N/A
Serial Number	210119 0028
Frequency Band	BLE: 2402-2480MHz 2.4G: 2412-2462MHz 5G: U-NII-1: 5150-5250MHz U-NII-2A: 5250-5350MHz U-NII-2C: 5470-5725MHz U-NII-3: 5725-5850MHz
Type of modulation	BT_LE: GFSK 2.4G: CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 5G: 64QAM, 16QAM, QPSK, BPSK
Equipment Class	DTS
Antenna Information	Chip Antenna Antenna Gain: BLE:0.5dBi 2.4G: 1.0dBi 5G: 2.6dBi
Clock Frequencies	N/A
Input Power	DC 3.0V (EUT obtains power from the reader it works with)
Power Adapter Manufacturer/Model	N/A
Power Adapter SN	N/A
Hardware version	N/A
Software version	N/A
Additional Info	Test sample has u.FL connector for direct RF conducted measurement

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.

EUT test sample has u.FL connector for direct RF conducted measurement.
It also has a soldered 3.5mm TRS jack connector to connect to laptop with USB to UART cable for programming purpose, to set EUT into test mode.

5 Test Configuration and Operation

5.1 EUT Test Configuration

The EUT is mounted onto an iCLASS SE® Readers to support testing. EUT is set to different transmission modes in terms of radio mode bandwidth, power level, test channel, etc.

For Radiated Emission testing, a 12VDC battery is used as power source to minimize the ambient noise; for other testing, a 12VDC power supply provided by manufacturer is used as a power source representative for the reader that supplier power to EUT.

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
RadioToolGUI.exe	Set the module into different WLAN test mode, to change channel, modulation, power level, bandwidth, etc.

5.2 Supporting Equipment

Description	Manufacturer	Model #	Serial #	Remark
Laptop	Dell	Inspiron 15 3000 series	72YPMJ2	Provided by client
iCLASS SE® Readers	HID Global Corporation	RK40	N/A	Provided by client
DC Power supply	WERKER	WK12V1000	MRG05	Provided by client
USB to UART cable	FTDI Chip	TTL-232R-3V3-AJ	N/A	Provided by client

Description	Qty	Length (m)	Shielding (Y/N)	Core(s)	Remark
/	/	/	/	/	/

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 chip antenna which is soldered onto the main board. The antenna gain is 1.0 dBi for 2.4GHz band, 2.6dBi for 5GHz band. This meets the requirement of permanent attachment.

Conclusion:

- EUT complies with antenna requirement in § 15.203.

7.2 DTS (6 dB) Bandwidth

7.2.1 Requirement

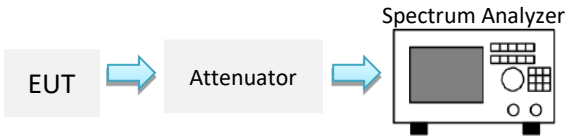
§ 15.247 (a)(2)

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.

RSS-247 §5.2

Systems using digital modulation techniques may operate in the 902-928MHz and 2400-2483.5MHz 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:

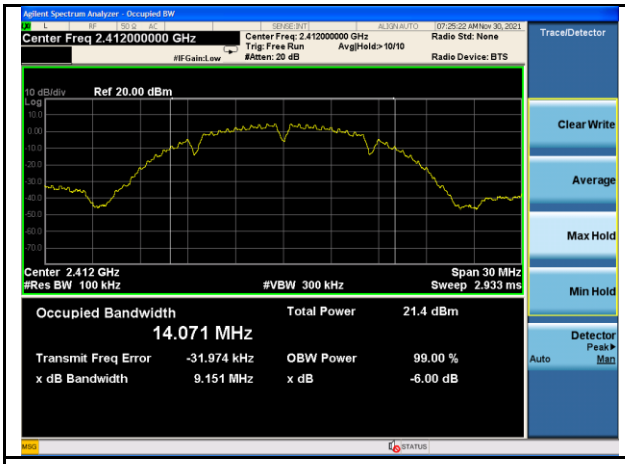
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this 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.

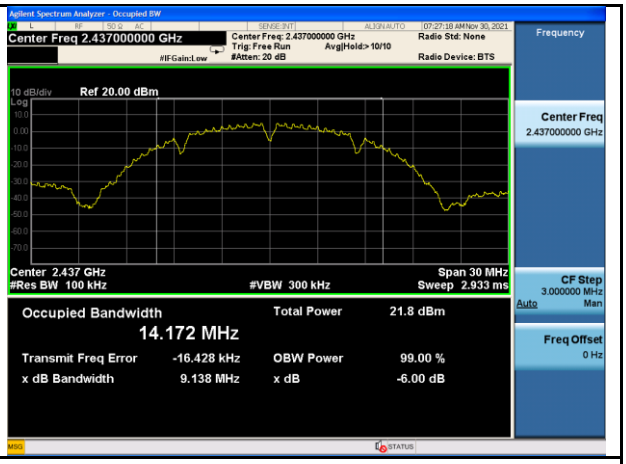
7.2.4 Test Result

Mode	Data rate	Frequency (MHz)	Measured Bandwidth (MHz)	Minimum Bandwidth (MHz)	Result
802.11b	1Mbps	2412	9.151	0.5	Pass
		2437	9.138	0.5	Pass
		2462	9.597	0.5	Pass
802.11g	6Mbps	2412	15.13	0.5	Pass
		2437	15.14	0.5	Pass
		2462	15.13	0.5	Pass
802.11n20	MCS0	2412	15.13	0.5	Pass
		2437	15.13	0.5	Pass
		2462	15.13	0.5	Pass

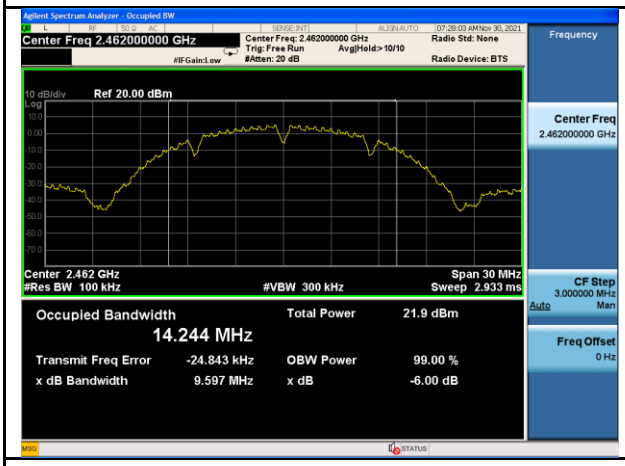
7.2.5 Test Plots



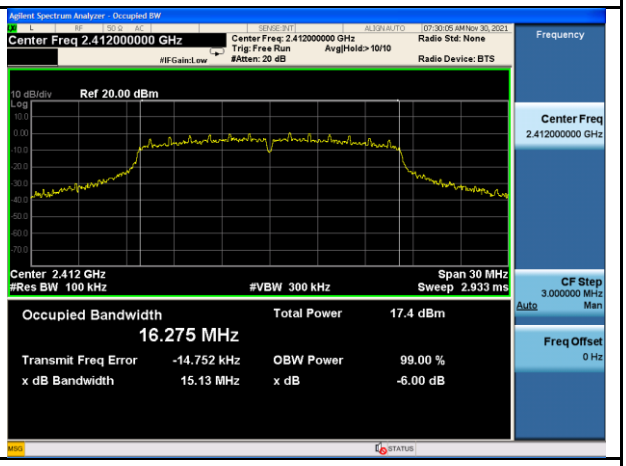
DTS BW_802.11b_Low CH



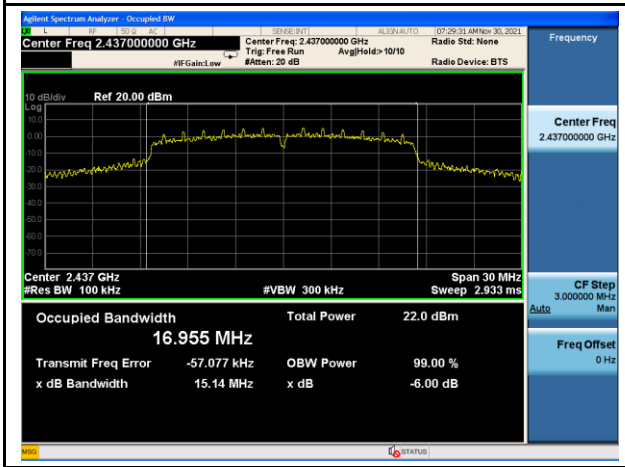
DTS BW_802.11b_Mid CH



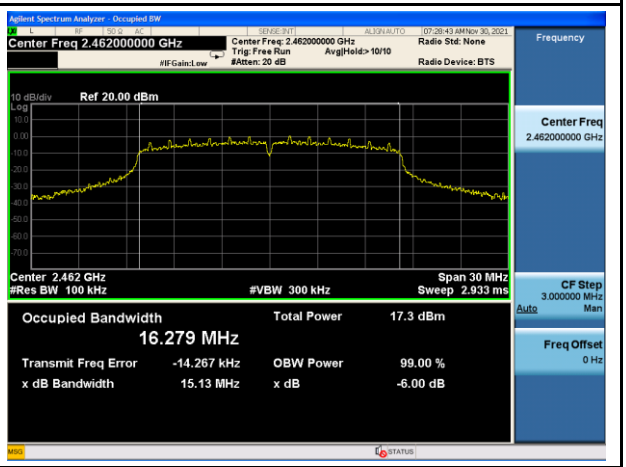
DTS BW_802.11b_High CH



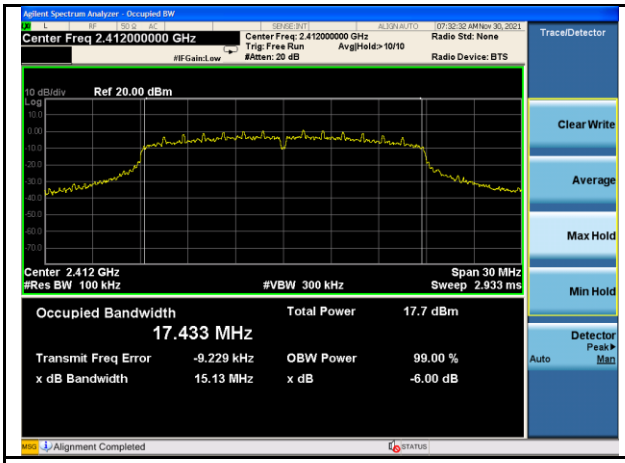
DTS BW_802.11g_Low CH



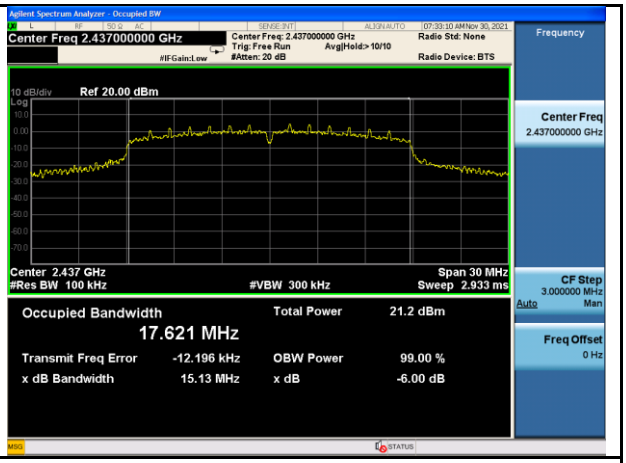
DTS BW_802.11g_Mid CH



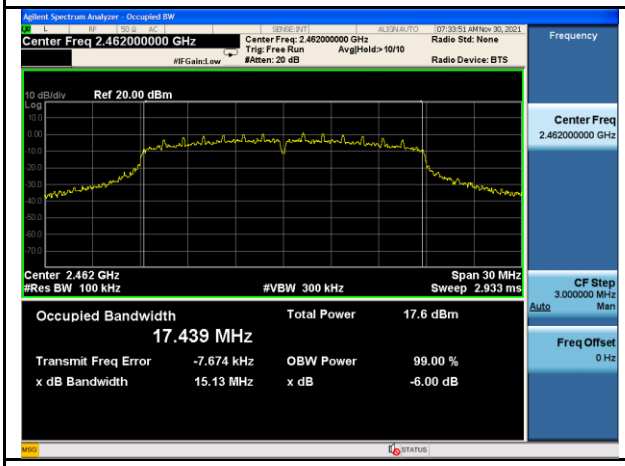
DTS BW_802.11g_High CH



DTS BW_802.11n20_Low CH



DTS BW_802.11 n20_Mid CH



DTS BW_802.11 n20_High CH

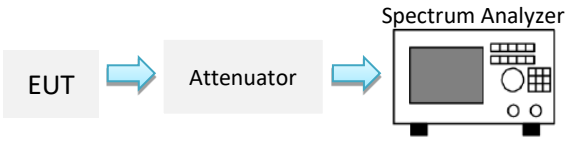
7.3 Occupied Bandwidth (99%)

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

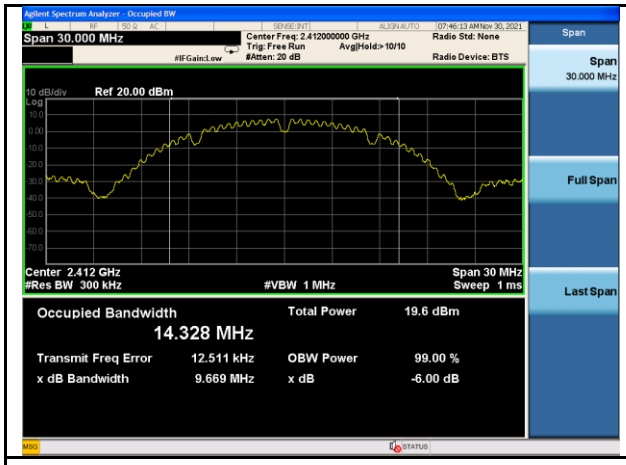
The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 × RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this 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.

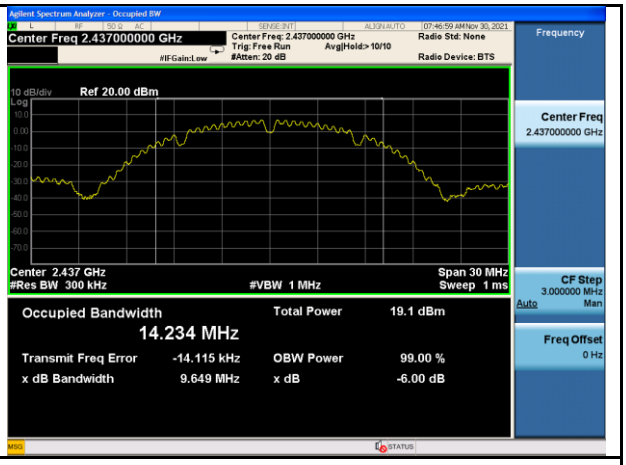
7.3.4 Test Result

Mode	Data rate	Frequency (MHz)	Measured 99% OBW (MHz)	Limit (MHz)	Result
802.11b	1Mbps	2412	14.328	N/A	N/A
		2437	14.234	N/A	N/A
		2462	14.294	N/A	N/A
802.11g	6Mbps	2412	16.566	N/A	N/A
		2437	17.860	N/A	N/A
		2462	16.585	N/A	N/A
802.11n20	MCS0	2412	17.588	N/A	N/A
		2437	18.023	N/A	N/A
		2462	17.628	N/A	N/A

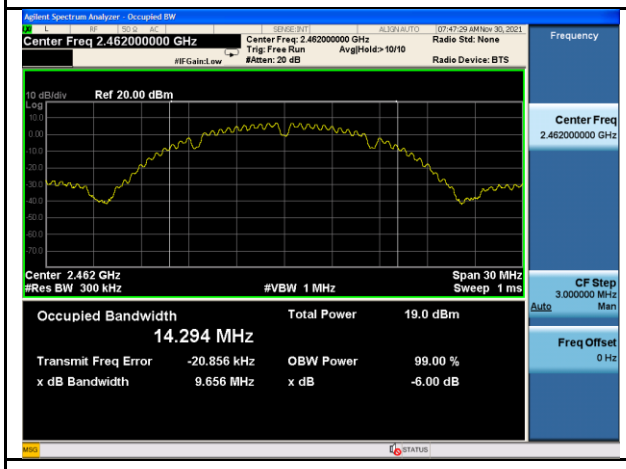
7.3.5 Test Plots



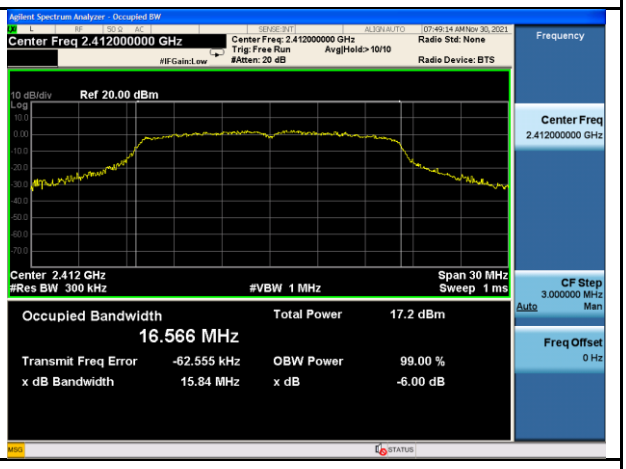
99%_802.11b_Low CH



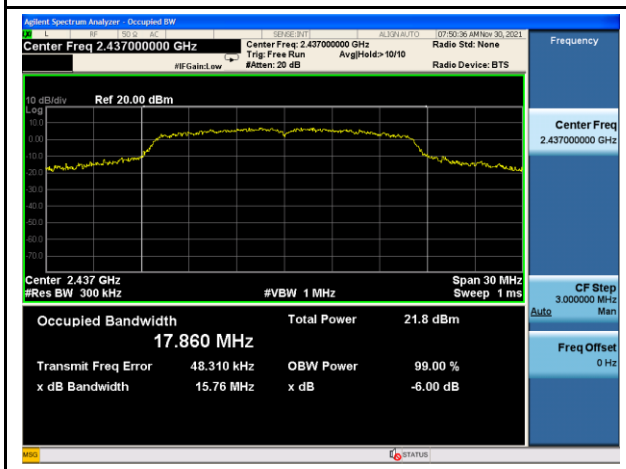
99%_802.11b_Mid CH



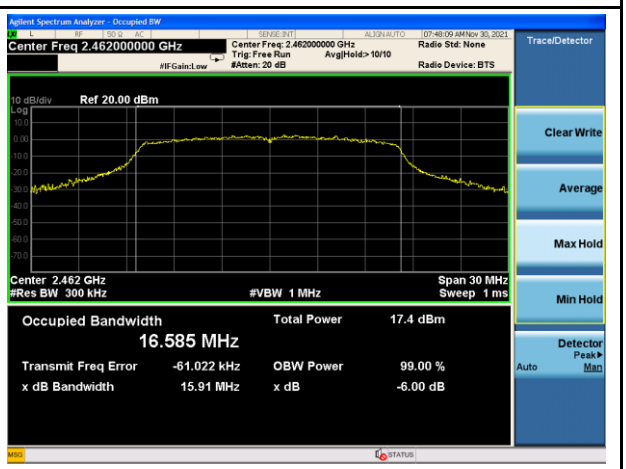
99%_802.11b_High CH



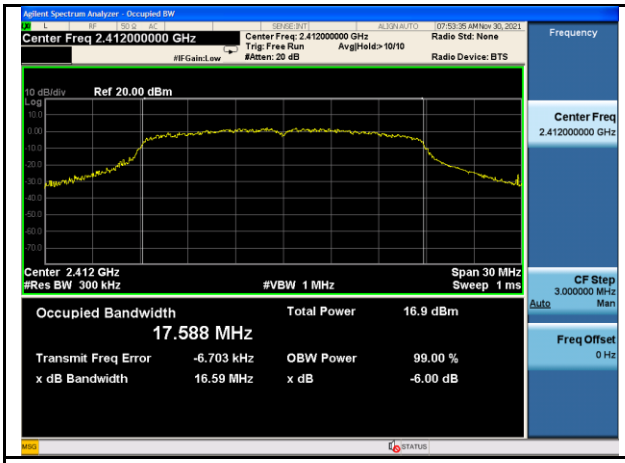
99%_802.11g_Low CH



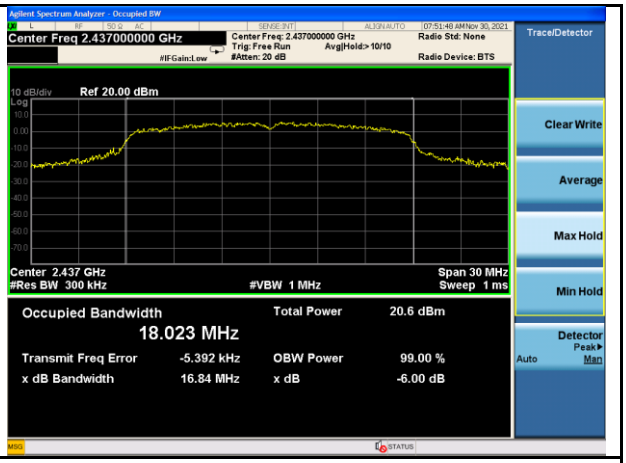
99%_802.11g_Mid CH



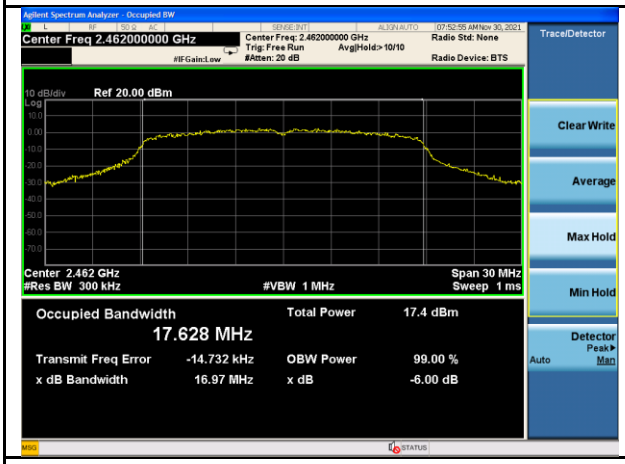
99%_802.11g_High CH



99%_802.11n20_Low CH



99%_802.11n20_Mid CH



99%_802.11n20_High CH

7.4 Maximum Output Power

7.4.1 Requirement

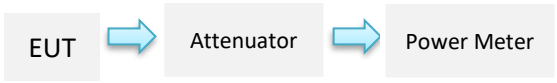
§ 15.247 (b)(3), RSS-247 §5.4

DTSs 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



7.4.3 Test Procedure

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.

7.4.4 Test Result

Mode	Data rate	Frequency (MHz)	Measured Peak Output Power (dBm)	Measured Average Output Power (dBm)	Max Output Power (dBm)	Result
802.11b	1Mbps	2412	17.29	14.01	30	Pass
		2437	17.71	14.15	30	Pass
		2462	17.53	14.37	30	Pass
802.11g	6Mbps	2412	17.15	9.57	30	Pass
		2437	22.39	13.66	30	Pass
		2462	18.06	9.80	30	Pass
802.11n20	MCS0	2412	17.89	9.45	30	Pass
		2437	21.37	13.12	30	Pass
		2462	17.99	9.59	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

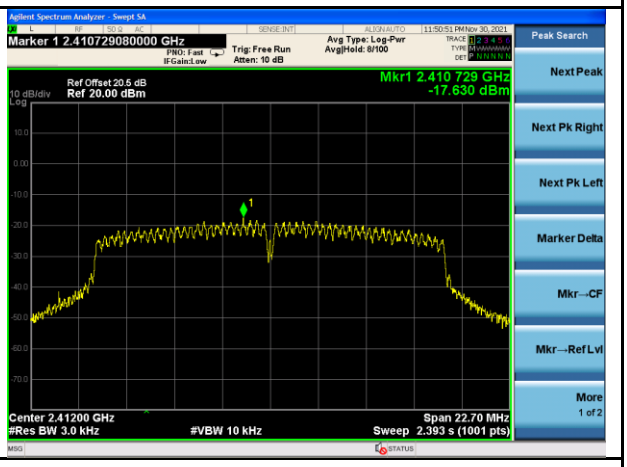
Mode	Data rate	Frequency (MHz)	Measured PSD (dBm/3KHz)	Max PSD (dBm/3KHz)	Result
802.11b	1Mbps	2412	-12.156	8	Pass
		2437	-12.270	8	Pass
		2462	12.549	8	Pass
802.11g	6Mbps	2412	-17.630	8	Pass
		2437	-13.060	8	Pass
		2462	-17.928	8	Pass
802.11n20	MCS0	2412	-17.737	8	Pass
		2437	-14.127	8	Pass
		2462	-16.780	8	Pass

7.5.5 Test Plots

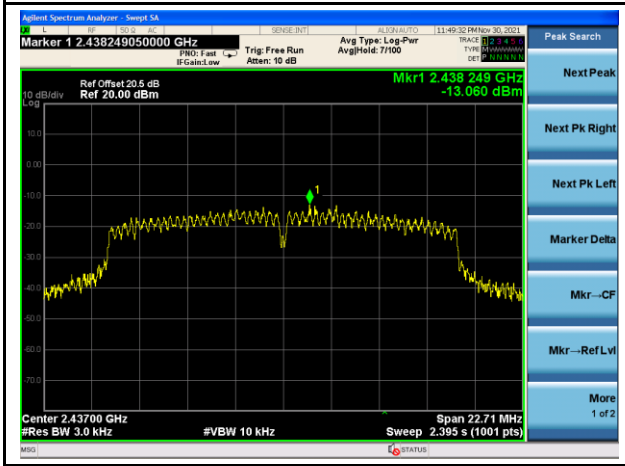
PSD-802.11b-Low CH

PSD-802.11b-Mid CH

PSD-802.11b-High CH

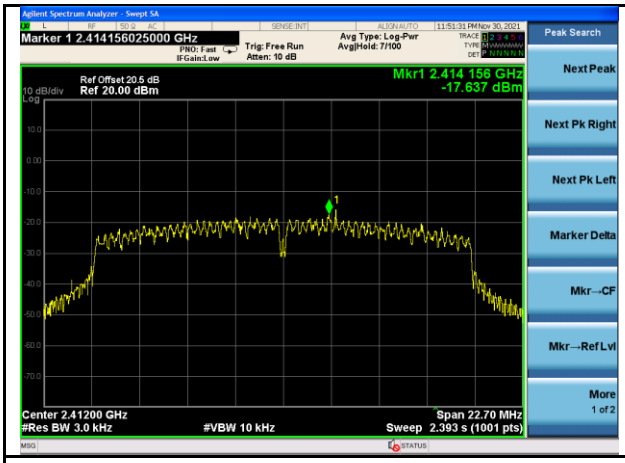


PSD-802.11g-Low CH

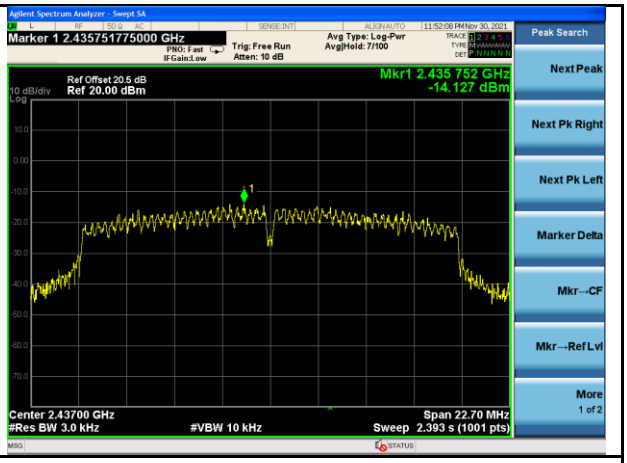


PSD-802.11g-Mid CH

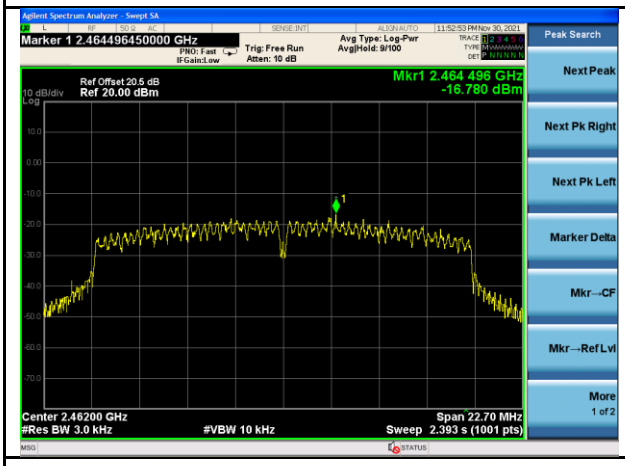
PSD-802.11b-High CH



PSD-802.11n20-Low CH



PSD-802.11n20-Mid CH



PSD-802.11n20-High CH

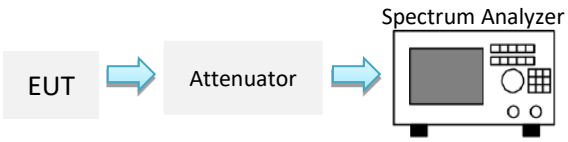
7.6 Conducted Band-Edge & Unwanted Emissions

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

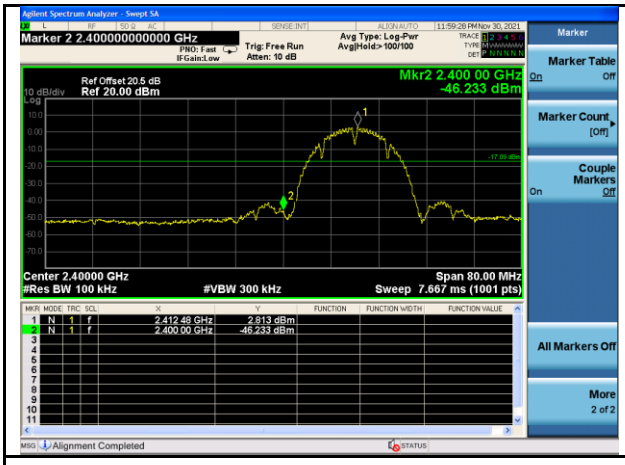
1. The RF output of EUT was connected to the spectrum analyser by RF cable and attenuator. The path loss was compensated to the results for each measurement.
2. Set to the maximum power setting and enable the EUT transmit continuously.
3. Set RBW=100 KHZ, VBW=300 KHZ, Peak Detector. Unwanted Emissions 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

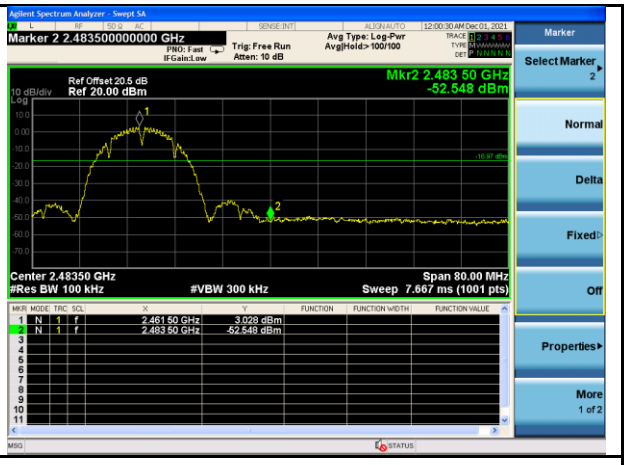
Conducted Band edge

Test Data

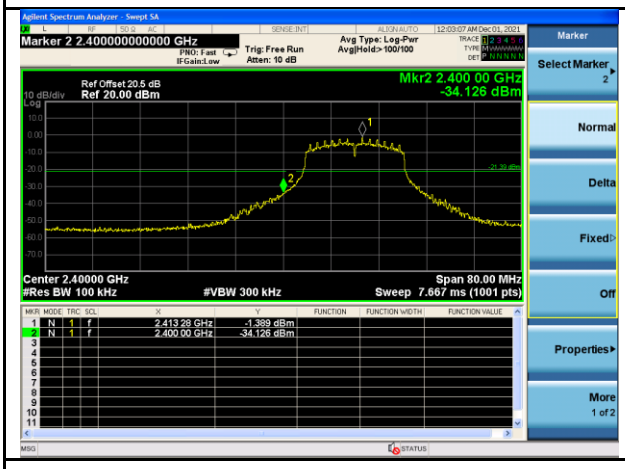
Mode	Data rate	Frequency (MHz)	Ref level (dBm)	Measured result (dBm)	Limit (dBm) Δ-20dBc	Result
802.11b	1Mbps	2412	2.813	-46.233	-17.187	Pass
		2462	3.028	-52.548	-16.972	Pass
802.11g	6Mbps	2412	-1.389	-34.126	-21.389	Pass
		2462	-1.441	-50.384	-21.441	Pass
802.11n(20M)	MCS0	2412	-1.333	-34.941	-21.333	Pass
		2462	-1.294	-51.218	-21.294	Pass



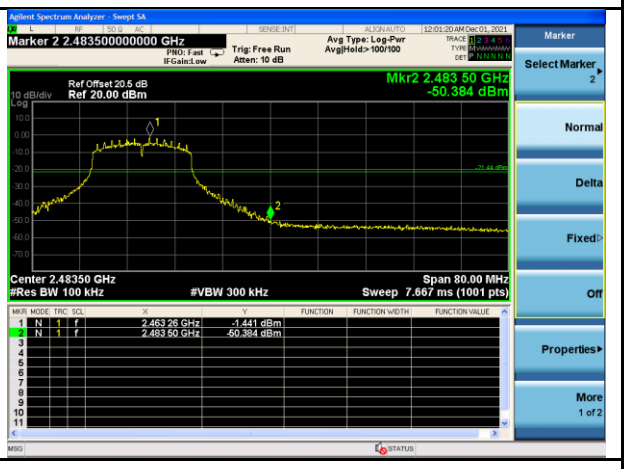
Band Edge-802.11b -Low CH



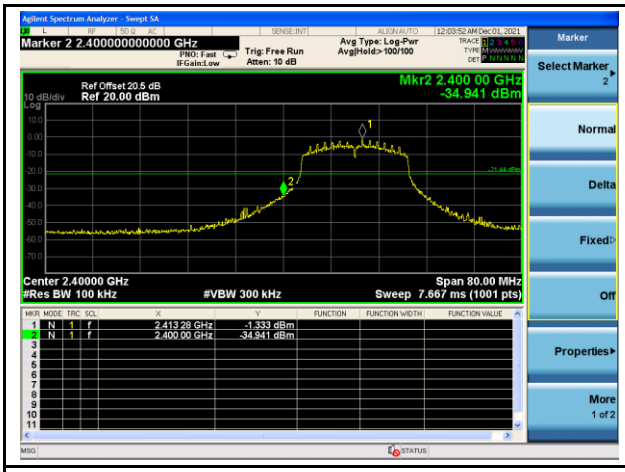
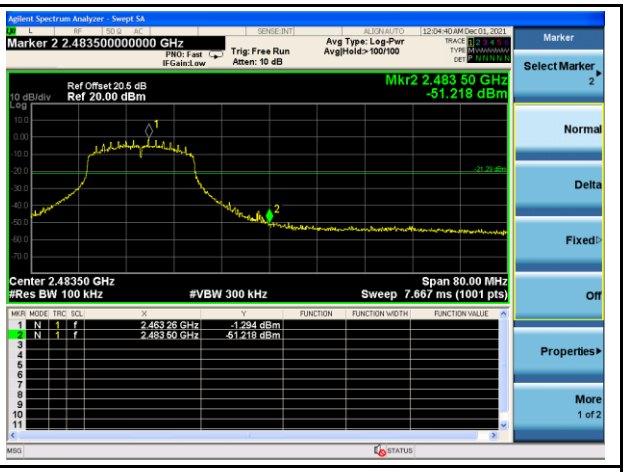
Band Edge-802.11b -High CH



Band Edge-802.11g -Low CH



Band Edge-802.11g -High CH

	
Band Edge-802.11n20 -Low CH	**Band Edge-802.11n20 -High CH**

Conducted Spurious emission

Mode	Data rate	Test Frequency (MHz)	Ref level (dBm)	Emission Frequency (MHz)	Emission Level (dBm)	Limit (dBm) Δ-20dBc	Result
802.11b	1Mbps	2412	4.702	16510	-52.132	-15.298	Pass
		2437	4.337	21904	-50.194	-15.663	Pass
		2462	4.212	24201	-49.739	-15.788	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-20dBc	Result
802.11g	6Mbps	2412	-1.090	5748	-55.532	-21.09	Pass
		2437	3.828	22228	-50.173	-16.172	Pass
		2462	-1.250	23667	-50.651	-21.25	Pass

CSE-802.11g-Low CH-REF

CSE-802.11g -Low CH

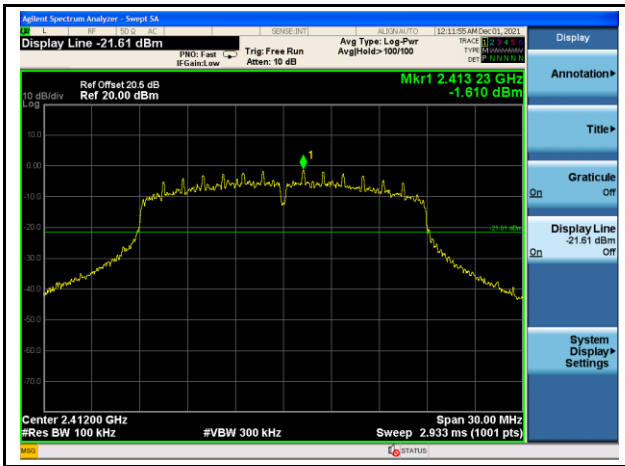
CSE-802.11g-Mid CH-REF

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-20dBc	Result
802.11n(20M)	MCS0	2412	-1.610	21354	-49.7	-21.61	Pass
		2437	2.483	23826	-49.505	-17.517	Pass
		2462	-1.036	16360	-51.9	-21.036	Pass

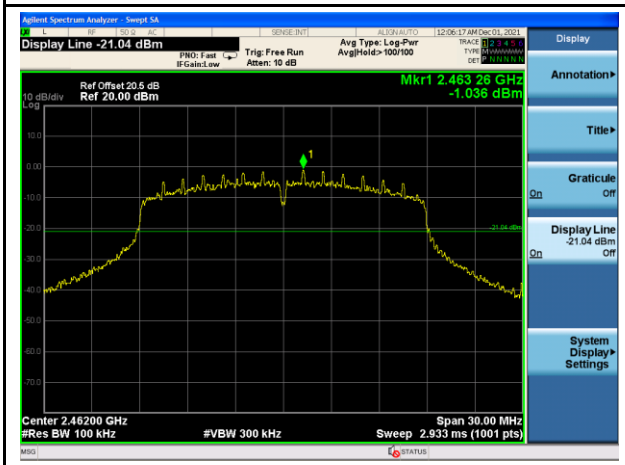


CSE-802.11n20-Low CH-REF

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

7.7 Radiated Spurious Emissions into Restricted Frequency Bands

7.7.1 Requirement

§ 15.247 (d), RSS-247 §5.5

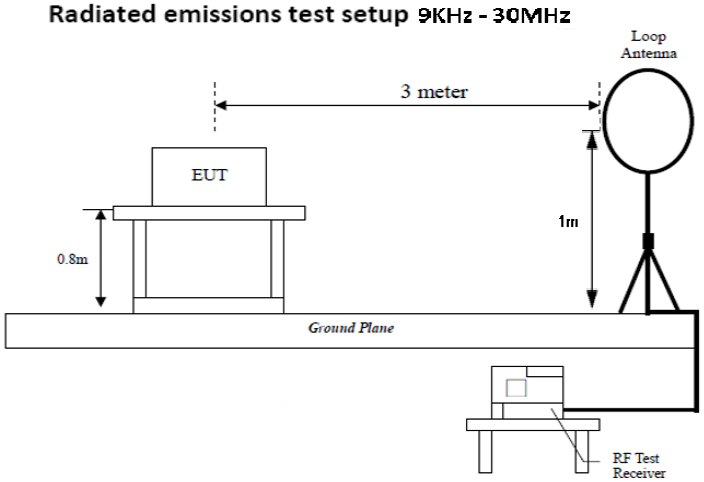
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the 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)).

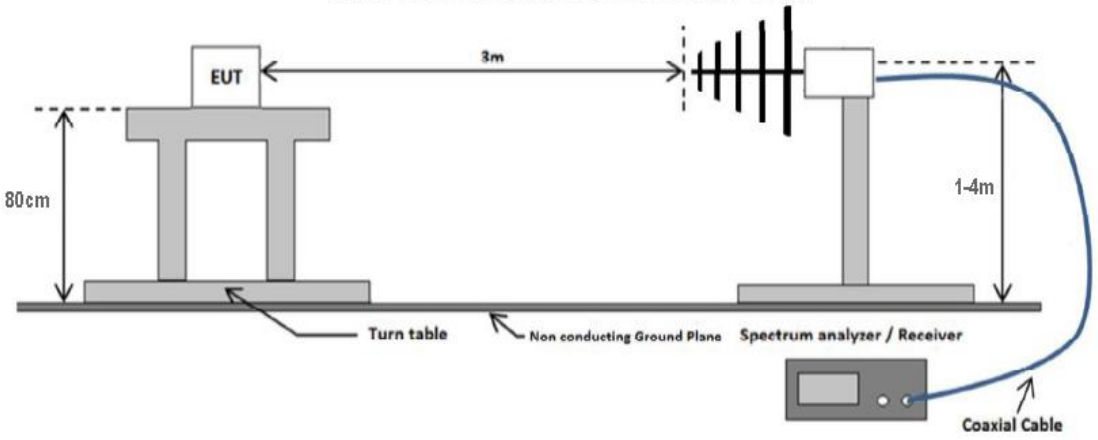
Frequency Range (MHZ)	Field Strength (μV/m)
0.009~0.490	2400/F(KHz)
0.490~1.705	24000/F(KHz)
1.705~30.0	30
30 – 88	100
88 – 216	150
216 960	200
Above 960	500

7.7.2 Test Setup

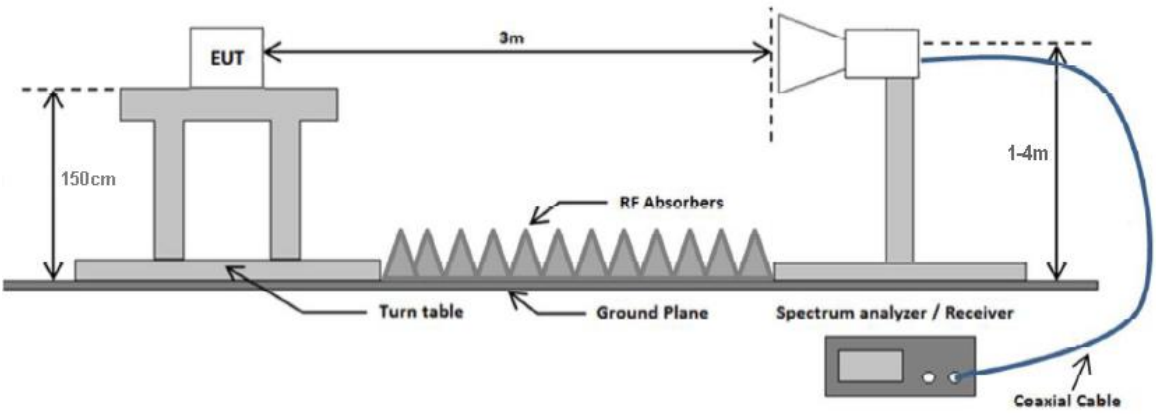
Radiated emissions test setup 9KHz - 30MHz



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 300 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.

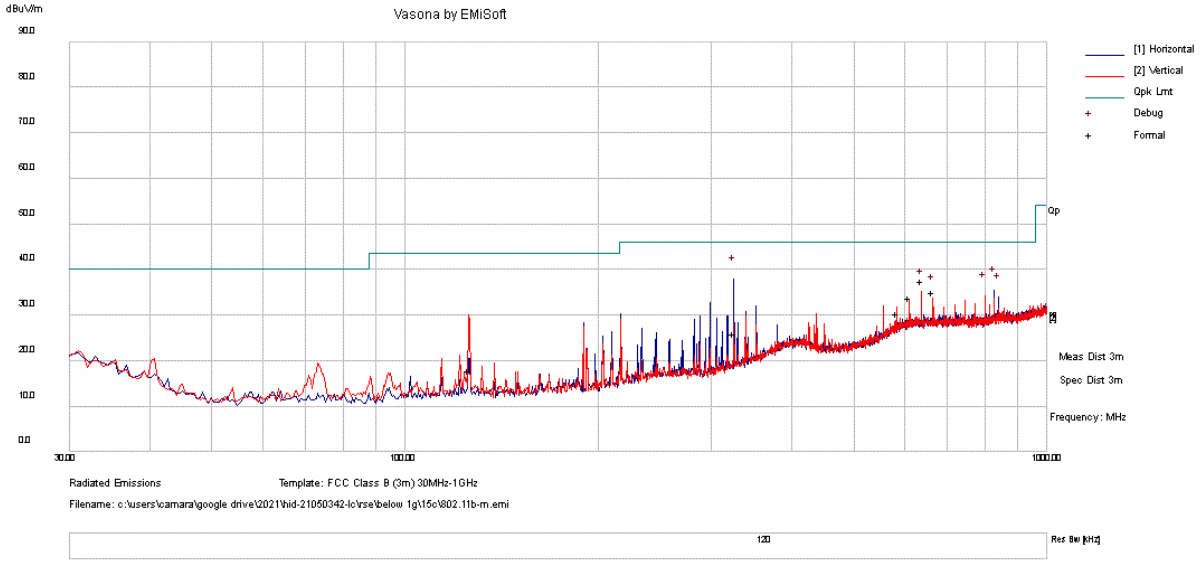
7.7.4 Test Result

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:	04/13/2022
Antenna Type/Polarity:	Bi-Log/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid channel	Test Result:	Pass



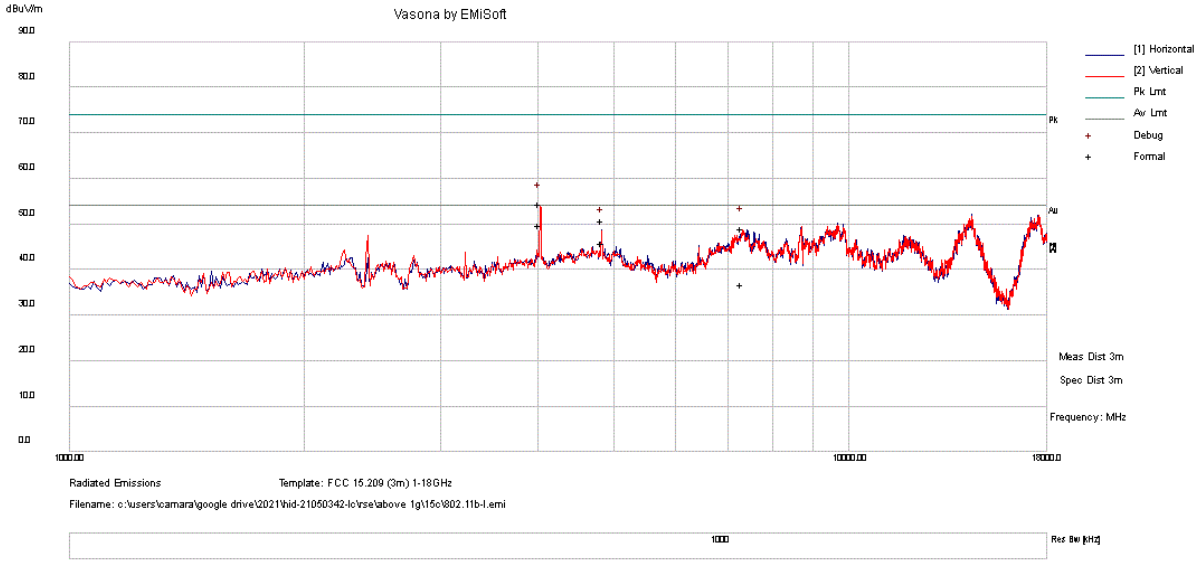
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	325.465	32.6	5.9	-12.5	26	QP Max	H	101	0	46	-20	Pass
2	637.37	35.5	7.2	-5.1	37.6	QP Max	V	150	342	46	-8.4	Pass
3	664.486	33	7.3	-5.2	35.1	QP Max	V	132	12	46	-10.9	Pass
4	583.137	29	7	-5.4	30.6	QP Max	V	146	141	46	-15.4	Pass
5	610.25	31.7	7.2	-5	33.9	QP Max	V	201	0	46	-12.1	Pass
6	125.783	32.4	3.9	-18.4	17.9	QP Max	V	100	266	43.5	-25.6	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



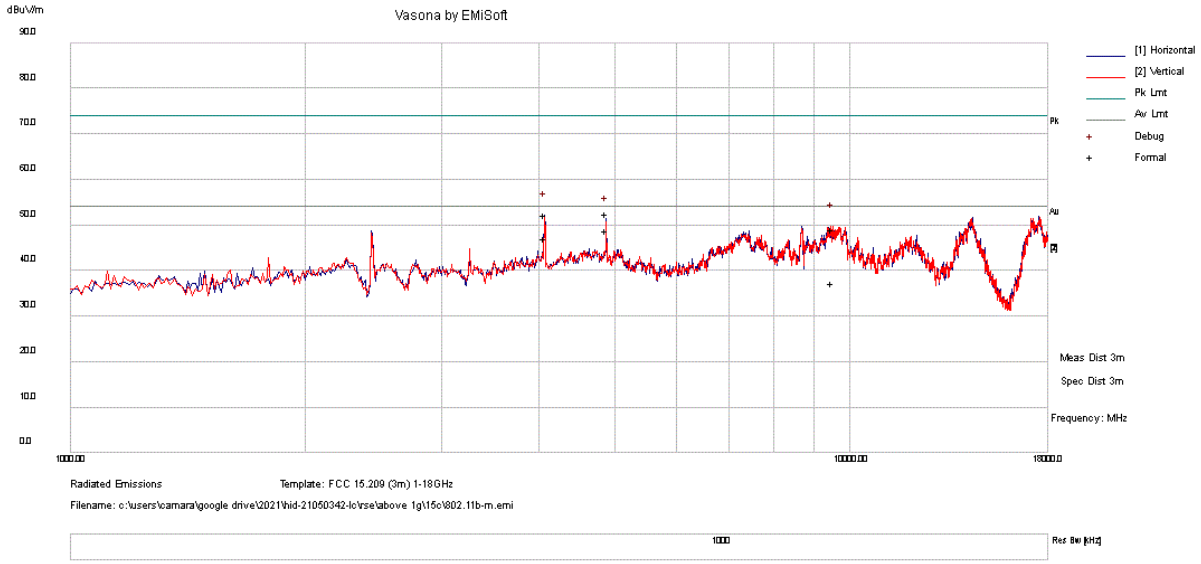
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	4018.535	44.9	8.1	1.6	54.5	Peak Max	V	181	303	74	-19.5	Pass
2	7310.298	32.2	11.9	5.1	49.2	Peak Max	V	166	73	74	-24.8	Pass
3	4823.871	39	9.1	2.7	50.8	Peak Max	V	127	180	74	-23.2	Pass
4	4018.535	40.1	8.1	1.6	49.8	Average Max	V	181	303	54	-4.2	Pass
5	7310.298	19.7	11.9	5.1	36.7	Average Max	V	166	73	54	-17.3	Pass
6	4823.871	34.2	9.1	2.7	46	Average Max	V	127	180	54	-8	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



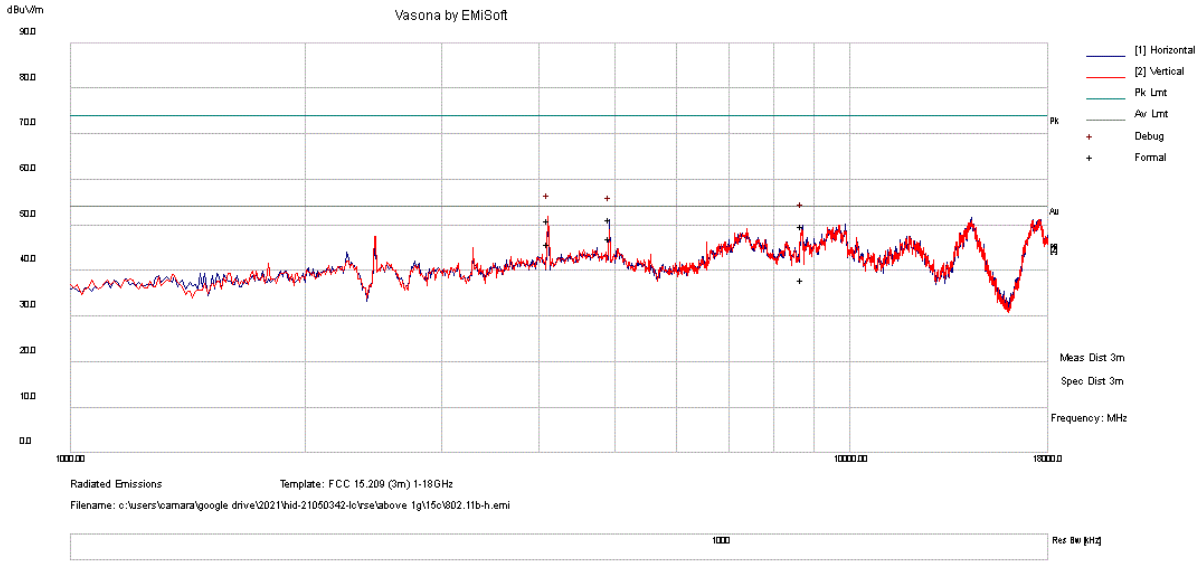
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	4060.675	43.1	8.1	1.1	52.3	Peak Max	H	202	128	74	-21.7	Pass
2	4874.095	40.4	9.1	3.2	52.7	Peak Max	H	159	127	74	-21.3	Pass
3	9520.838	27.8	13.9	7.4	49.1	Peak Max	V	108	218	74	-24.9	Pass
4	4060.675	37.9	8.1	1.1	47.1	Average Max	H	202	128	54	-6.9	Pass
5	4874.095	36.5	9.1	3.2	48.8	Average Max	H	159	127	54	-5.2	Pass
6	9520.838	16	13.9	7.4	37.3	Average Max	V	108	218	54	-16.7	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



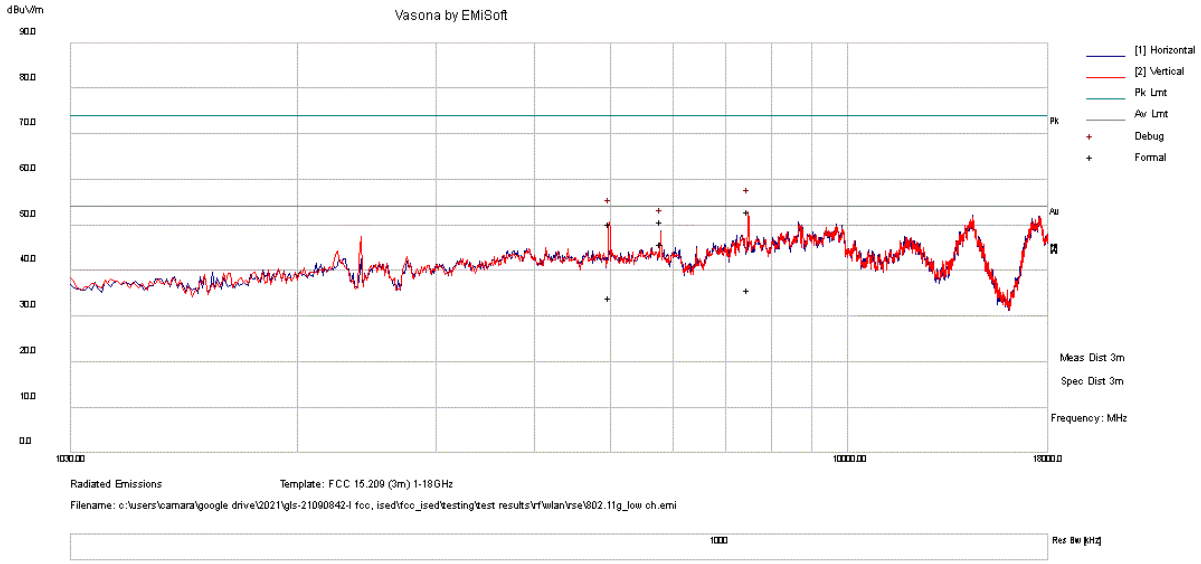
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	4102.693	42.3	8.1	0.7	51.1	Peak Max	V	161	290	74	-22.9	Pass
2	4924.075	39.1	9.1	3.1	51.3	Peak Max	H	115	79	74	-22.7	Pass
3	8702.875	27	17.8	5.1	49.9	Peak Max	H	332	144	74	-24.1	Pass
4	4102.693	37	8.1	0.7	45.8	Average Max	V	161	290	54	-8.2	Pass
5	4924.075	34.9	9.1	3.1	47.1	Average Max	H	115	79	54	-6.9	Pass
6	8702.875	15.2	17.8	5.1	38.1	Average Max	H	332	144	54	-15.9	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



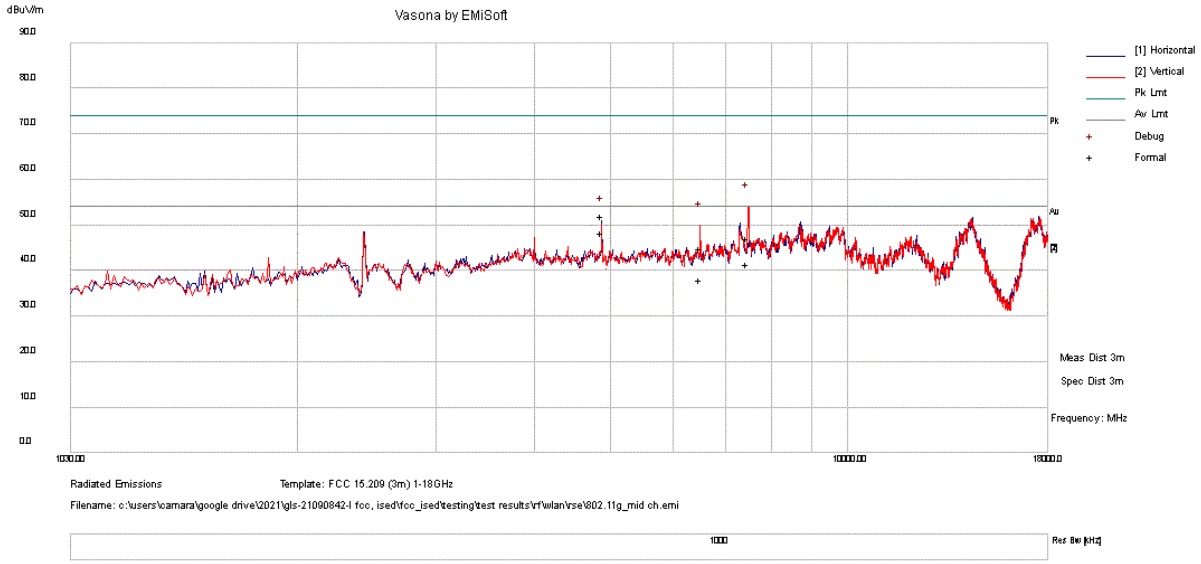
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7489.043	36.5	11.9	4.5	52.9	Peak Max	V	190	110	74	-21.1	Pass
2	4824.021	38.8	9.1	2.7	50.6	Peak Max	V	107	212	74	-23.4	Pass
3	6430.315	29.2	10.9	4.5	44.6	Peak Max	H	100	146	74	-29.4	Pass
4	7489.043	19.4	11.9	4.5	35.8	Average Max	V	190	110	54	-18.2	Pass
5	4824.021	34	9.1	2.7	45.8	Average Max	V	107	212	54	-8.2	Pass
6	6430.315	16.9	10.9	4.5	32.3	Average Max	H	100	146	54	-21.7	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



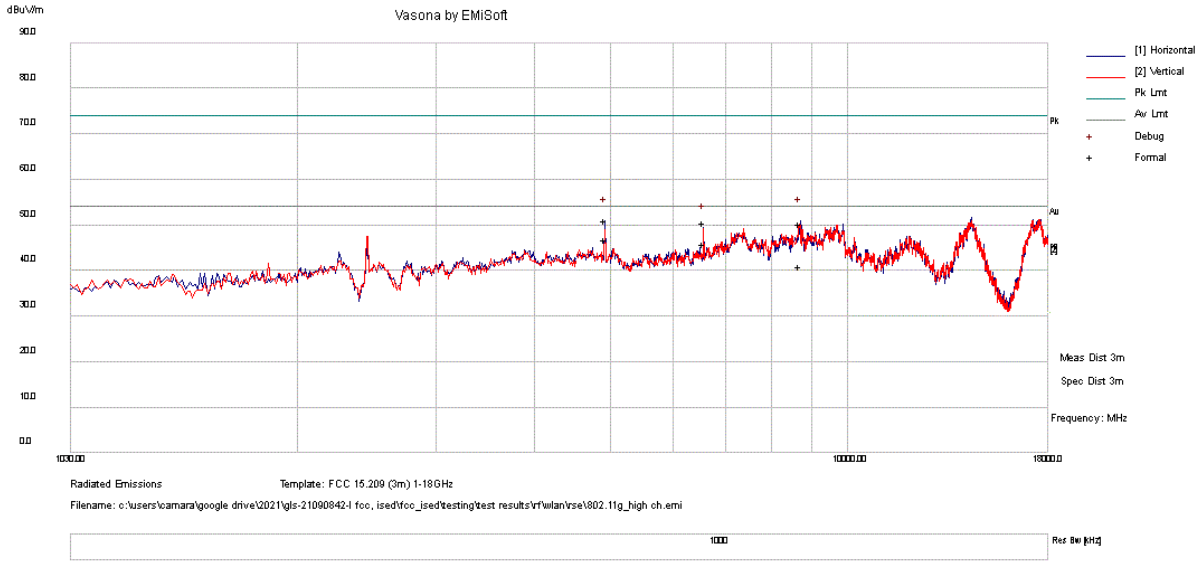
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	7467.121	30.5	11.9	4.8	47.2	Peak Max	V	193	310	74	-26.8	Pass
2	4874.088	38.2	9.1	3.2	50.5	Peak Max	H	138	238	74	-23.5	Pass
3	6501.293	29.2	10.9	4.8	44.9	Peak Max	V	368	179	74	-29.1	Pass
4	7467.121	23.8	11.9	4.8	40.5	Average Max	V	193	310	54	-13.5	Pass
5	4874.088	21.1	9.1	3.2	33.4	Average Max	H	138	238	54	-20.6	Pass
6	6501.293	22.6	10.9	4.8	38.3	Average Max	V	368	179	54	-15.7	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High Channel	Test Result:	Pass



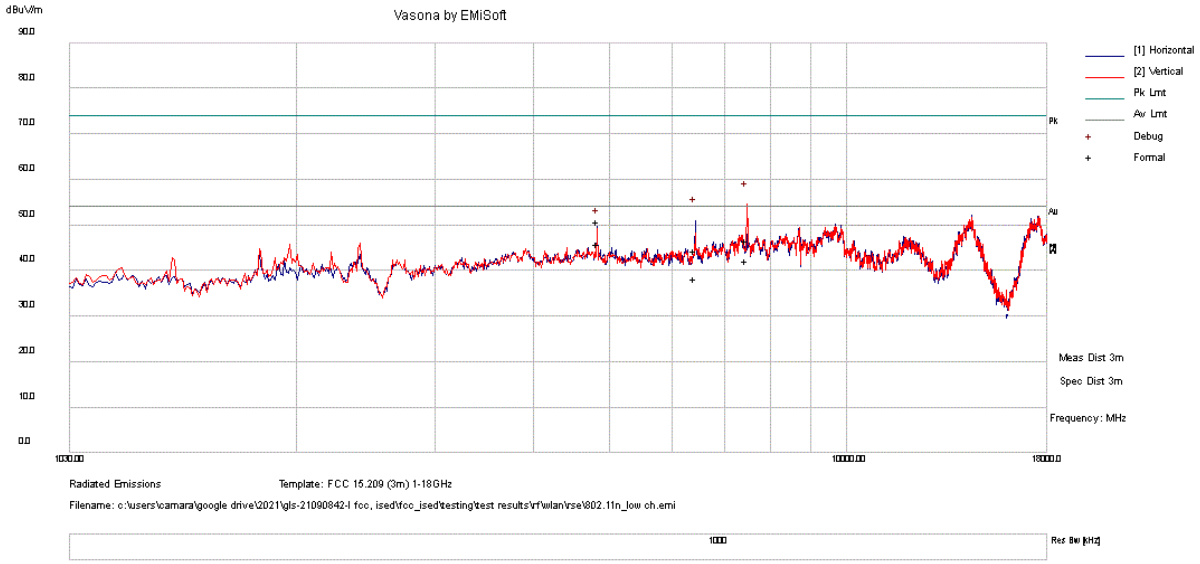
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	4924.075	38.9	9.1	3.1	51.1	Peak Max	V	350	230	74	-22.9	Pass
2	8708.668	27.5	17.6	5.1	50.2	Peak Max	H	156	0	74	-23.8	Pass
3	6565.173	35.3	11.1	4.3	50.7	Peak Max	H	180	228	74	-23.3	Pass
4	4924.075	34.7	9.1	3.1	46.9	Average Max	V	350	230	54	-7.1	Pass
5	8708.668	17.6	17.6	5.1	40.3	Average Max	H	156	0	54	-13.7	Pass
6	6565.173	30.5	11.1	4.3	45.9	Average Max	H	180	228	54	-8.1	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Low Channel	Test Result:	Pass



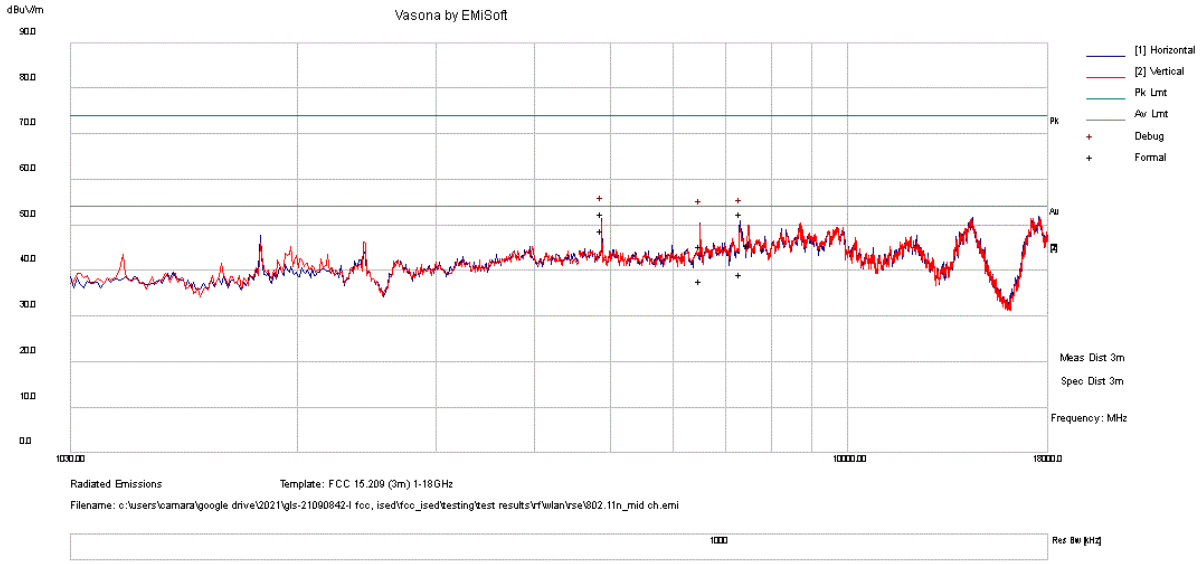
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	4823.851	38.6	9.1	2.7	50.4	Peak Max	H	168	326	74	-23.6	Pass
2	7466.494	29.8	11.9	4.8	46.5	Peak Max	V	354	36	74	-27.5	Pass
3	6426.581	29.1	10.9	4.5	44.5	Peak Max	H	155	330	74	-29.5	Pass
4	4823.851	33.9	9.1	2.7	45.7	Average Max	H	168	326	54	-8.3	Pass
5	7466.494	24.5	11.9	4.8	41.2	Average Max	V	354	36	54	-12.8	Pass
6	6426.581	23.1	10.9	4.5	38.5	Average Max	H	155	330	54	-15.5	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	Mid Channel	Test Result:	Pass



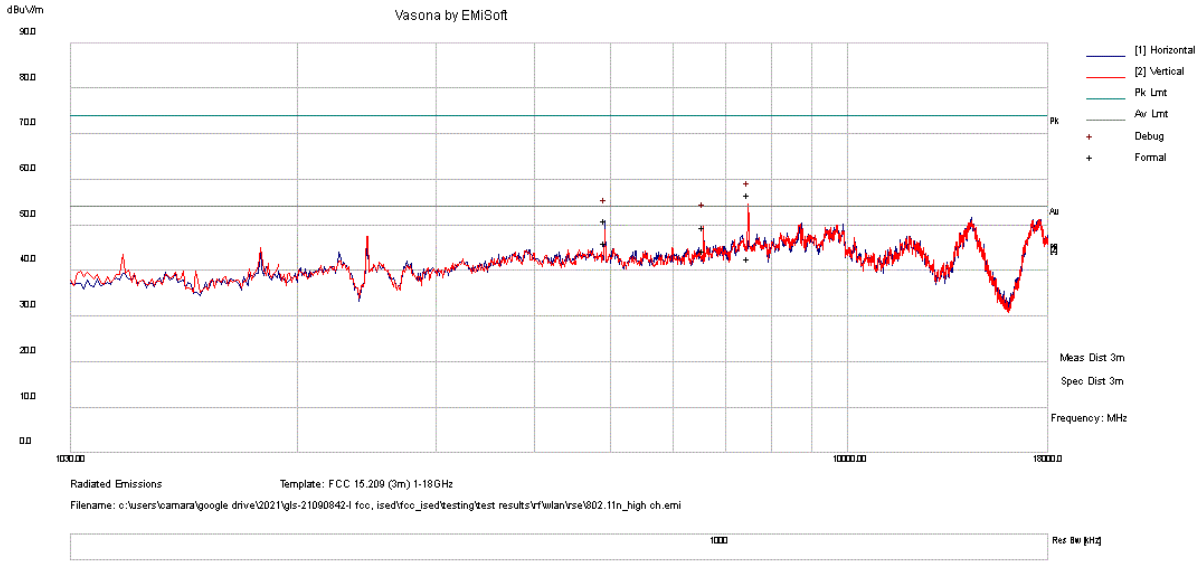
No.	Frequency MHz	Raw dBuV	Cable Loss dB	AF dB/m	Level dBuV/m	Measurement Type	Pol	Hgt cm	Azt Deg	Limit dBuV/m	Margin dB	Pass/Fail
1	4924.075	38.9	9.1	3.1	51.1	Peak Max	H	133	231	74	-22.9	Pass
2	7308.635	35.4	11.9	5.1	52.4	Peak Max	H	198	71	74	-21.6	Pass
3	6502.438	29.7	10.9	4.8	45.4	Peak Max	H	108	28	74	-28.6	Pass
4	4924.075	34.7	9.1	3.1	46.9	Average Max	H	133	231	54	-7.1	Pass
5	7308.635	22.2	11.9	5.1	39.2	Average Max	H	198	71	54	-14.8	Pass
6	6502.438	22.2	10.9	4.8	37.9	Average Max	H	108	28	54	-16.1	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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:	04/08/2022-04/11/2022
Antenna Type/Polarity:	Horn/Hor & Ver	Test Personnel:	Devin Tai
Remark:	High 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	7488.874	40.3	11.9	4.5	56.7	Peak Max	V	123	231	74	-17.3	Pass
2	4924.073	38.1	9.1	3.1	50.3	Peak Max	V	278	130	74	-23.7	Pass
3	6565.058	34.1	11.1	4.3	49.5	Peak Max	H	233	0	74	-24.5	Pass
4	7488.874	25.9	11.9	4.5	42.3	Average Max	V	123	231	54	-11.7	Pass
5	4924.073	31.7	9.1	3.1	43.9	Average Max	V	278	130	54	-10.1	Pass
6	6565.058	29.1	11.1	4.3	44.5	Average Max	H	233	0	54	-9.5	Pass

Remarks:

1. Level (dBuV/m) = Raw (dBuV) + Cable loss(dB) + AF (dB/m).
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

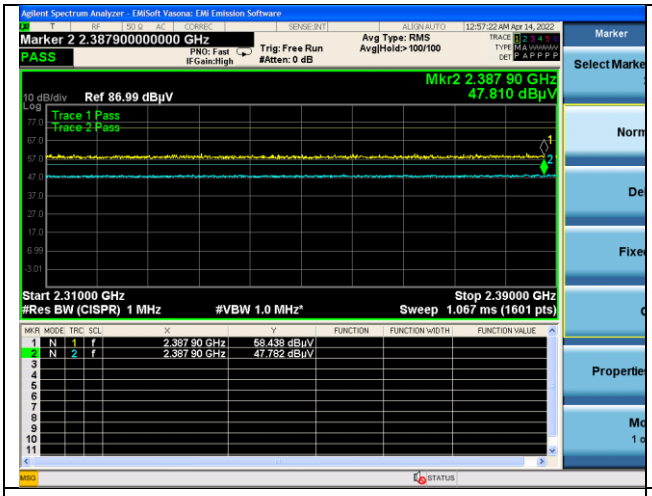
Note: no substantial emission is found other than the noise floor. Different modes have been verified.

Restricted Band Measurement Result

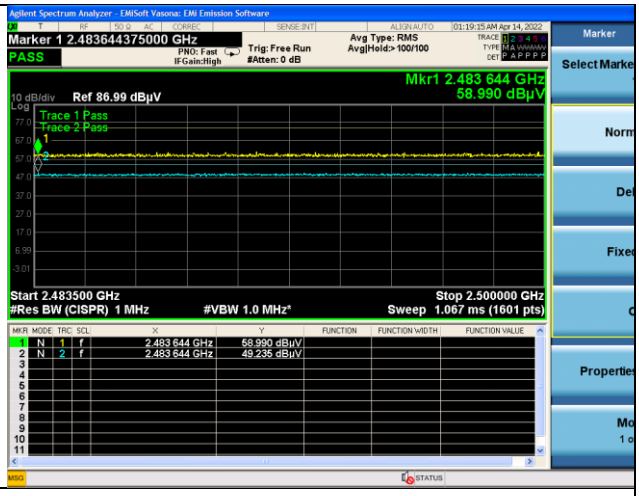
Test result:

Mode	Frequency MHz	Level (dBuV/m)	Measurement Type	Limit (dBuV/m)	Margin (dB)	Pass/Fail
802.11b	2387.90	58.438	Peak Max	74	-15.562	Pass
	2483.644	58.990	Peak Max	74	-15.01	Pass
	2387.90	47.782	Average Max	54	-6.218	Pass
	2483.644	49.235	Average Max	54	-4.765	Pass
802.11g	2389.60	59.092	Peak Max	74	-14.908	Pass
	2483.655	59.572	Peak Max	74	-14.428	Pass
	2389.60	47.916	Average Max	54	-6.084	Pass
	2483.655	48.769	Average Max	54	-5.231	Pass
802.11n	2388.85	58.415	Peak Max	74	-15.585	Pass
	2483.613	59.242	Peak Max	74	-14.758	Pass
	2388.85	48.062	Average Max	54	-5.938	Pass
	2483.613	48.213	Average Max	54	-5.787	Pass

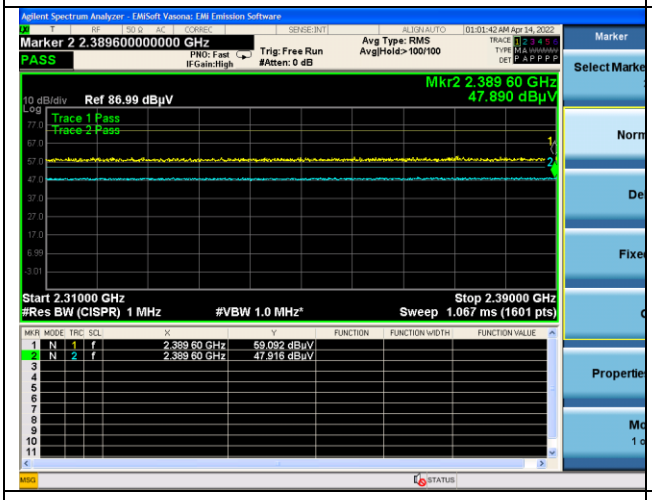
Test Plots



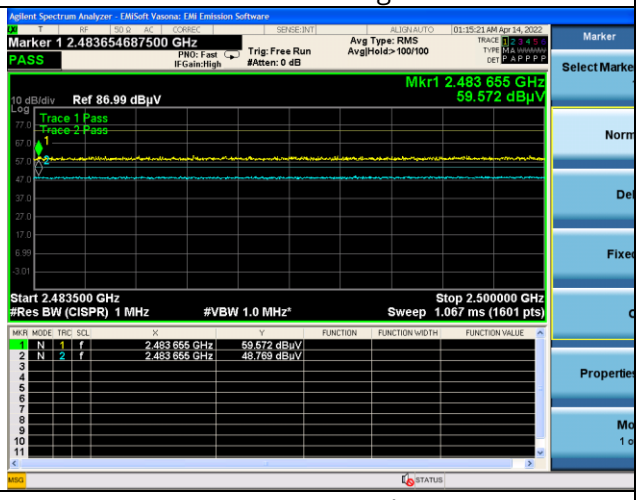
RB– 802.11b - Low CH



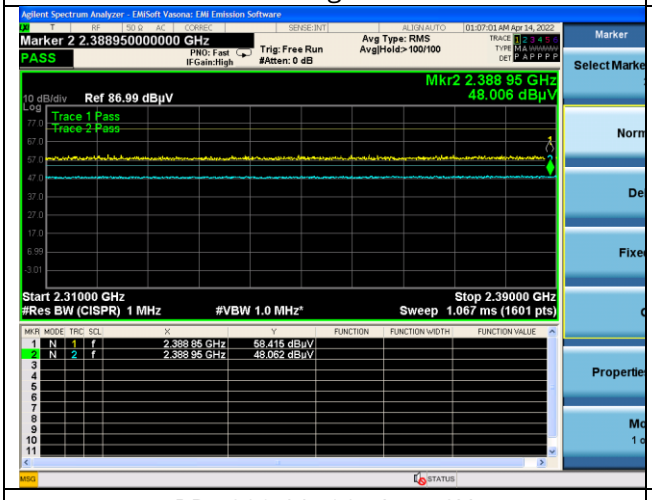
RB– 802.11b - High CH



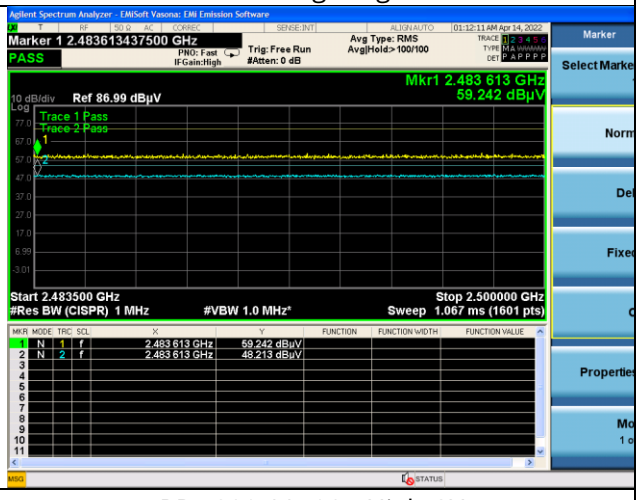
RB– 802.11g - Low CH



RB– 802.11g - High CH



RB– 802.11n20 - Low CH



RB– 802.11n20 - High CH

7.8 Conducted Emissions

7.8.1 Requirement

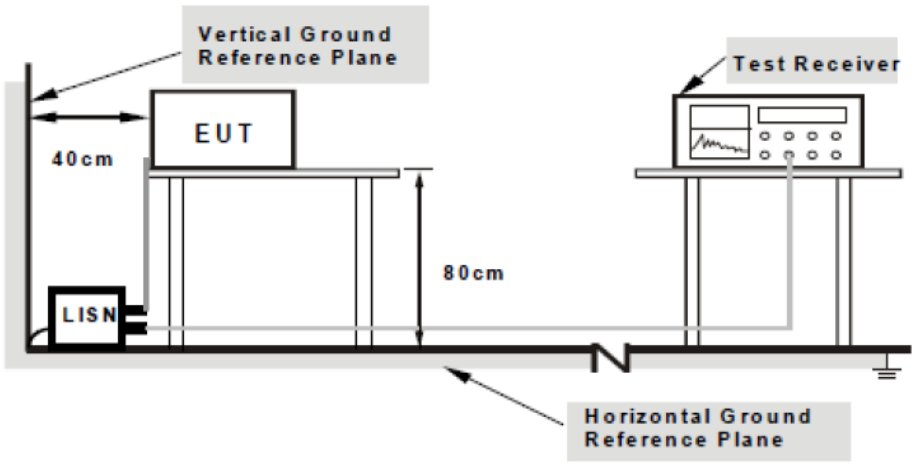
Per § 15.207 (a), RSS Gen 8.8

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



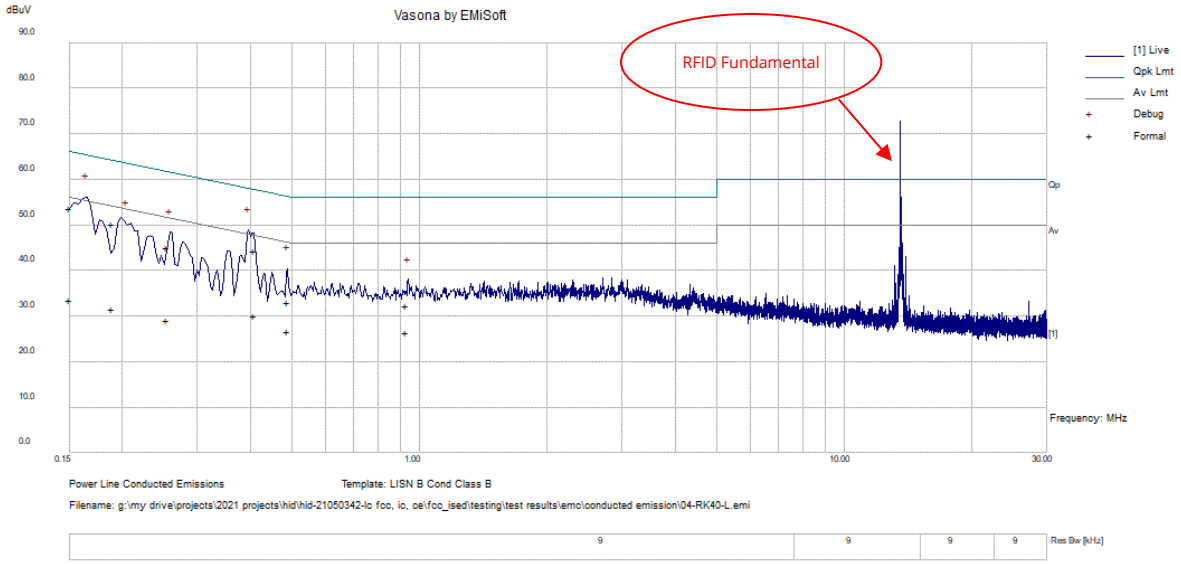
Note: 1.Support units were connected to second LISN.
2.Both of LISNs (AMN) are 80cm from EUT and at least 80cm from other units and other metal planes support units.

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. The LISN bonded to the reference ground plane used has a direct current (dc) resistance of less than 2.5 mΩ.
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 Live / 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:	TX Mode
Frequency Range:	0.15-30MHz	Test Date:	03/14/2022
Antenna Type/Polarity:	N/A	Test Personnel:	Devin Tai
Remark:	Line 120VAC, 60Hz	Test Result:	Pass

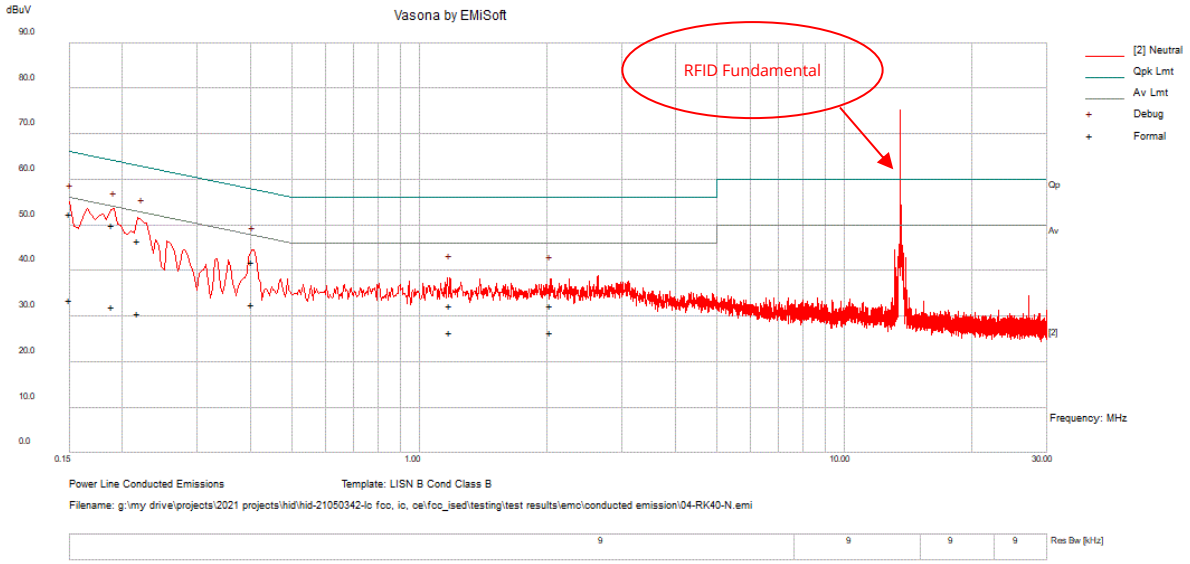


No.	Frequency (MHz)	Raw (dBuV)	Cable Loss (dB)	Factors (dB)	Level (dBuV)	Meas. Type	Line	Limit (dBuV)	Margin (dB)	Pass /Fail
1	0.409	34.3	10.1	0.1	44.5	Quasi Peak	Live	57.7	-13.2	Pass
2	0.15	43.5	10.1	0.2	53.8	Quasi Peak	Live	66	-12.2	Pass
3	0.254	35	10.1	0.2	45.3	Quasi Peak	Live	61.6	-16.3	Pass
4	0.19	40.1	10.1	0.2	50.4	Quasi Peak	Live	64	-13.6	Pass
5	0.489	23	10.1	0.1	33.2	Quasi Peak	Live	56.2	-23	Pass
6	0.933	22.2	10.1	0.1	32.4	Quasi Peak	Live	56	-23.6	Pass
7	0.409	20	10.1	0.1	30.2	Average	Live	47.7	-17.5	Pass
8	0.15	23.4	10.1	0.2	33.7	Average	Live	56	-22.3	Pass
9	0.254	19	10.1	0.2	29.3	Average	Live	51.6	-22.3	Pass
10	0.19	21.5	10.1	0.2	31.8	Average	Live	54	-22.2	Pass
11	0.489	16.5	10.1	0.1	26.7	Average	Live	46.2	-19.5	Pass
12	0.933	16.2	10.1	0.1	26.4	Average	Live	46	-19.6	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Factor = Inert loss of LISN
3. Margin value = Emission level - Limit value
4. Emission Level = Raw Value + Cable loss + Factors Value.
5. RFID fundamental signal comes from the integrated 13.56MHz RFID in the support equipment iCLASS SE® Readers that this module obtains power from.

Test Standard:	Part 15.207 RSS Gen 8.8	Mode:	TX Mode
Frequency Range:	0.15-30MHz	Test Date:	03/14/2022
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	0.189	39.9	10.1	0.2	50.2	Quasi Peak	Neutral	64.1	-13.9	Pass
2	0.15	42.2	10.1	0.2	52.5	Quasi Peak	Neutral	66	-13.5	Pass
3	0.218	36.3	10.1	0.2	46.6	Quasi Peak	Neutral	62.9	-16.3	Pass
4	0.403	31.9	10.1	0.1	42.1	Quasi Peak	Neutral	57.8	-15.7	Pass
5	1.182	22.2	10.2	0.1	32.5	Quasi Peak	Neutral	56	-23.5	Pass
6	2.03	22.1	10.2	0.1	32.4	Quasi Peak	Neutral	56	-23.6	Pass
7	0.189	22	10.1	0.2	32.3	Average	Neutral	54.1	-21.8	Pass
8	0.15	23.3	10.1	0.2	33.6	Average	Neutral	56	-22.4	Pass
9	0.218	20.4	10.1	0.2	30.7	Average	Neutral	52.9	-22.2	Pass
10	0.403	22.5	10.1	0.1	32.7	Average	Neutral	47.8	-15.1	Pass
11	1.182	16.3	10.2	0.1	26.6	Average	Neutral	46	-19.4	Pass
12	2.03	16.2	10.2	0.1	26.5	Average	Neutral	46	-19.5	Pass

REMARKS:

1. The emission levels of other frequencies were very low against the limit.
2. Factor = Inert loss of LISN
3. Margin value = Emission level - Limit value
4. Emission Level = Raw Value + Cable loss + Factors Value.
5. RFID fundamental signal comes from the integrated 13.56MHz RFID in the support equipment iCLASS SE® Readers that this module obtains power from.

8 EUT and Test Setup Photos

Refer to FCC/ISED 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/A1)	N/A1)
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	05/04/2021	05/04/2022
Bi-Log Antenna	ETS-Lindgren	3142E	217921	11/15/2021	11/15/2022
Horn Antenna (1-18GHz)	Electro-Metrics	EM-6961	6292	05/14/2021	05/14/2022
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	05/15/2021	05/15/2022
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/A1)	N/A1)
Turn Table	ETS-Lindgren	2181-3.03	VL002	N/A1)	N/A1)
Boresight Antenna Tower	ETS-Lindgren	2171B	VL003	N/A1)	N/A1)
Loop Antenna (9k-30MHz)	Com-Power	AL-130	121012	05/16/2021	05/16/2022
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	6/17/2021	6/17/2022
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL052	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL053	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL054	N/A1)	N/A1)
Power Splitter/Combiner	Mini-Circuits	ZFSC-2-9G+	VL055	N/A1)	N/A1)

Note:

1) This equipment is not for measurement purpose and only require functional verification. Calibration is not required.

---END---