RF TEST REPORT

Report No.: 20240517G07667X-W2

Product Name: RCP-P1

Model No. : HSA-20NP-PB, HSA-20NP-PA

FCC ID: 2AHPN-HSA-20NP-PB

IC: 6434C-HSA20NPPB

Applicant: Harman International Industries Incorporated

Address: 30001, Cabot Drive, Novi, MI 48377, USA

Dates of Testing: 07/08/2024 - 07/23/2024

Issued by: CCIC Southern Testing Co., Ltd.

Lab Location: Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.

Tel: 86-755-26627338 **E-Mail:** manager@ccic-set.com

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Test Report

Product Name.....:	RCP-P1
Brand Name.....:	Ride Command Plus
Applicant.....:	Harman International Industries Incorporated
Applicant Address.....:	30001, Cabot Drive, Novi, MI 48377, USA
Manufacturer.....:	Harman International Industries Incorporated
Manufacturer Address .....:	30001, Cabot Drive, Novi, MI 48377, USA
Test Standards.....:	47 CFR Part 15 Subpart C 15.247 ANSI C63.10-2020 RSS-Gen Issue 5, Feb 2021 RSS-247 Issue 3, Ang 2023
Test Result .....:	Pass

Tested by .....:	Kim Li	2024.07.23
	Kim Li, Test Engineer	
Reviewed by .....:	Chris You	2024.07.23
	Chris You, Senior Engineer	
Approved by .....:	Yang Fan	2024.07.23
	Yang Fan, Manager	

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Change History		
Issue	Date	Reason for change
1.0	2024.07.23	First edition

1. General Information

1.1. EUT Description

EUT Name	RCP-P1
Hardware Version	V1.0
Software Version	N75NA_POPLS_R6.2.4
EUT supports Radios application	WLAN 2.4GHz 802.11b/g/n (HT20)
Frequency Range	802.11b/g/n-HT20: 2.412GHz - 2.462GHz
Channel Number	802.11b/g/n-20MHz: 11
Bit Rate of Transmitter	802.11b: 11/5.5/2/1 Mbps 802.11g: 54/48/36/24/18/12/9/6 Mbps 802.11n : up to 72.2Mbps
Modulation Type	DSSS (802.11b), OFDM (802.11g/n)
Test Control Software	ADB
RF setting Level	802.11b: 16 802.11g: 16 802.11n-HT20: 15
Antenna Type	Internal Antenna
Antenna Gain	2.0 dBi
Power supply	DC 9V-16V

Note 1: For a more detailed description, please refer to Specification or User's Manual supplied by the applicant and/or manufacturer.

Note 2: The EUT was programmed to be in continuously transmitting mode and the transmit duty cycle is not less than 98%.

Note 3: The information of antenna gain and cable loss is provided by the manufacturer and our lab is not responsible for the accuracy of the antenna gain and cable loss information.

Note 4: The RSS-247 testing standard has been updated, and this upgrade has no impact on the test results.

Note 5: This amend report refer to original SET2021-17306, Some PCB board materials have been replaced, and the parameters and functions of the replaced materials are the same as those of the original materials. Retest the Radiated Band Edge and Spurious Emission items, AC Power Line Conducted Emission items, Peak Conducted Output Power.

1.2. Test Standards and Results

The purpose of the report is to conduct testing according to the following FCC/IC certification standards:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart C	Radio Frequency Devices
2	KDB 558074 D01 15.247 Meas Guidance v05r02	Guidance for Compliance Measurement on Digital Transmission Systems, Frequency Hopping Spread Spectrum Systems, and Hybrid System Devices Operating under Section 15.247 of the FCC Rules
3	KDB 662911 D01 Multiple Transmitter Output v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
4	ANSI C63.10-2020	American National Standard for Testing Unlicensed Wireless Devices
5	RSS-Gen Issue 5, Feb 2021	General Requirements for Compliance of Radio Apparatus
6	RSS-247 Issue 3, Aug 2023	Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices

Test detailed items/section required by FCC/IC rules and results are as below:

No.	Section in CFR 47	IC Rules	Description	Result
1	15.247(b)(3)	RSS-247, 5.4(d)	Peak Conducted Output Power	PASS
2	15.207	RSS-GEN, 8.8	AC Power Line Conducted Emission	PASS
3	15.209 15.205 15.247(d)	RSS-GEN, 8.9 RSS-GEN, 8.10 RSS-247, 5.5	Radiated Band Edges and Spurious Emission	PASS

Note 1: The tests of Conducted Emission and Radiated Emission were performed according to the method of measurements prescribed in ANSI C63.10-2020.

Note 2: These RF tests were performed according to the method of measurements prescribed in KDB 558074 D01 15.247 Meas Guidance v05r02.

Preliminary tests were performed in different data rate to find the worst radiated emission. The data rate shown in the table below is the worst-case rate with respect to the specific test item. Investigation has been done on all the possible configurations for searching the worst cases. The following table is a list of the test modes shown in this test report.

For 20MHz bandwidth systems, use Channel 1~ Channel 11.

Channel No.	Frequency	Channel No.	Frequency	Channel No.	Frequency
1	2412MHz	5	2432MHz	9	2452MHz
2	2417MHz	6	2437MHz	10	2457MHz
3	2422MHz	7	2442MHz	11	2462MHz
4	2427MHz	8	2447MHz		
Note: Channel 1, 6 & 11 selected for 802.11b/g/n-HT20 as Lowest, Middle and Highest channel.					

Test Items	Mode	Data Rate	Channel
RF Conducted Output Power Power Spectral Density 6dB and 99% Occupied Bandwidth Conducted and Spurious Emission	11b/DSSS	1 Mbps	1/6/11
	11g/OFDM	6 Mbps	1/6/11
	11n(20MHz)/OFDM	MCS 0	1/6/11
Band Edge	11b/DSSS	1 Mbps	1/11
	11g/OFDM	6 Mbps	1/11
	11n(20MHz)/OFDM	MCS 0	1/11

1.3. Table for Supporting Units

No.	Equipment	Brand Name	Model Name	Manufacturer	Serial No.	Note
1	Notebook	DELL	PP11L	DELL	H5914A03	FCC DOC

1.4. EUT Operation Test Setup

For RF test items, an engineering test program was provided and enable to make EUT transmitting.

1.5. Facilities and Accreditations

1.5.1. Facilities

FCC-Registration No.: CN1283

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until Jun. 30th, 2025.

ISED Registration: 11185A

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A on Aug. 04, 2016, valid time is until Jun. 30th, 2025.

CAB number: CN0064

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

1.5.2. Test Environment Conditions

During the measurement, the environmental conditions were within the listed ranges:

Temperature (℃):	15℃ - 35℃
Relative Humidity (%):	30% -60%
Atmospheric Pressure (kPa):	86KPa-106KPa

2. Test Requirements

2.1. Maximum Conducted Output Power

2.1.1. Limit of Maximum Conducted Output Power

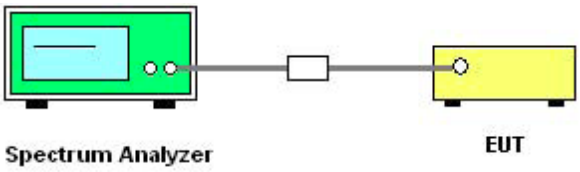
For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power. The maximum conducted output power is the total transmit power delivered to all antennas and antenna elements, averaged across all symbols in the signalling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or transmitting at a reduced power level. If multiple modes of operation are implemented, the maximum conducted output power is the highest total transmit power occurring in any mode.

2.1.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.1.3. Test Setup



2.1.4. Test Procedures

1. The testing follows Measurement Procedure 8.3 Method AVGSA of FCC KDB558074 D01 v05r02.

2. The RF output of EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.

3. Set to the maximum power setting and enable the EUT transmit continuously.

4. Set span to at least 1.5 times the OBW, set RBW = 1% to 5% of the OBW, not to exceed 1 MHz, set VBW ⩾ [3 × RBW].

5. Number of points in sweep ⩾ [2 × span / RBW], sweep time = auto, Detector = RMS.
6. Trace average at least 100 traces in power averaging (rms) mode.
7. Measure and record the results in the test report.

2.1.5. Test Result

Please refer to Appendix A for detail

2.2. Radiated Band Edge and Spurious Emission

2.2.1. Limit of Radiated Band Edges and Spurious Emission

In any 100 kHz bandwidth outside the intentional radiator frequency band, all harmonics/spurious must be at least 20 dB below the highest emission level within the authorized band. If the output power of this device was measured by spectrum analyzer, the attenuation under this paragraph shall be 30 dB instead of 20 dB. In addition, radiated emissions which fall in the restricted bands must also comply with the FCC section 15.209 limits as below.

Note: Wireless charger configuration was evaluated.

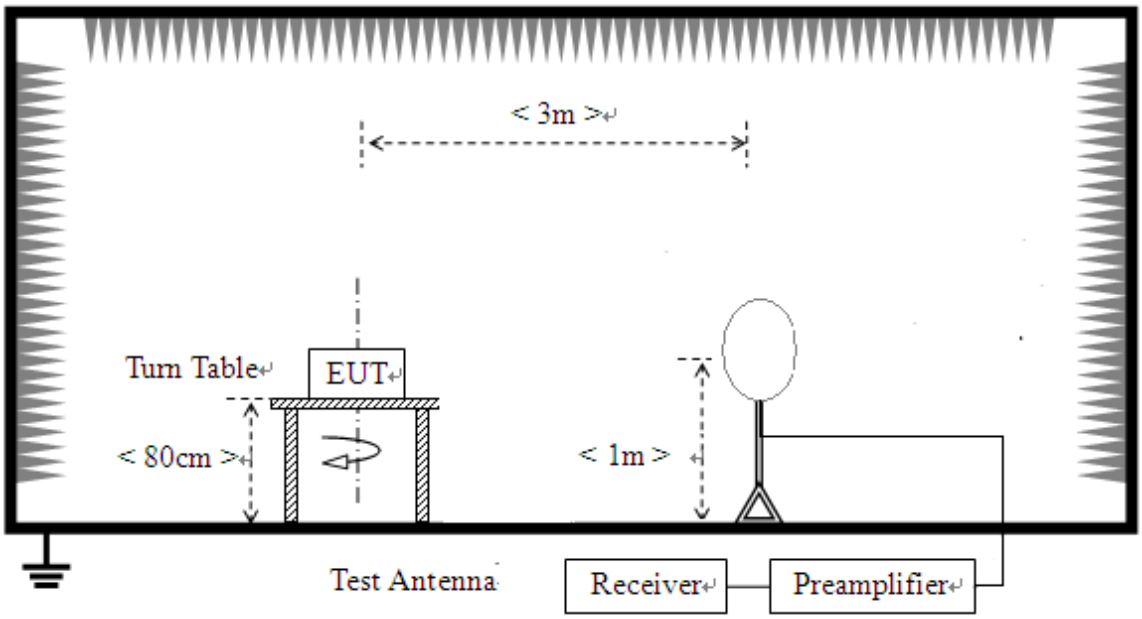
Frequency (MHz)	Field Strength (μV/m)	Measurement Distance (m)
0.009 - 0.490	2400/F(kHz)	300
0.490 - 1.705	24000/F(kHz)	30
1.705 - 30.0	30	30
30 - 88	100	3
88 - 216	150	3
216 - 960	200	3
Above 960	500	3

2.2.2. Measuring Instruments

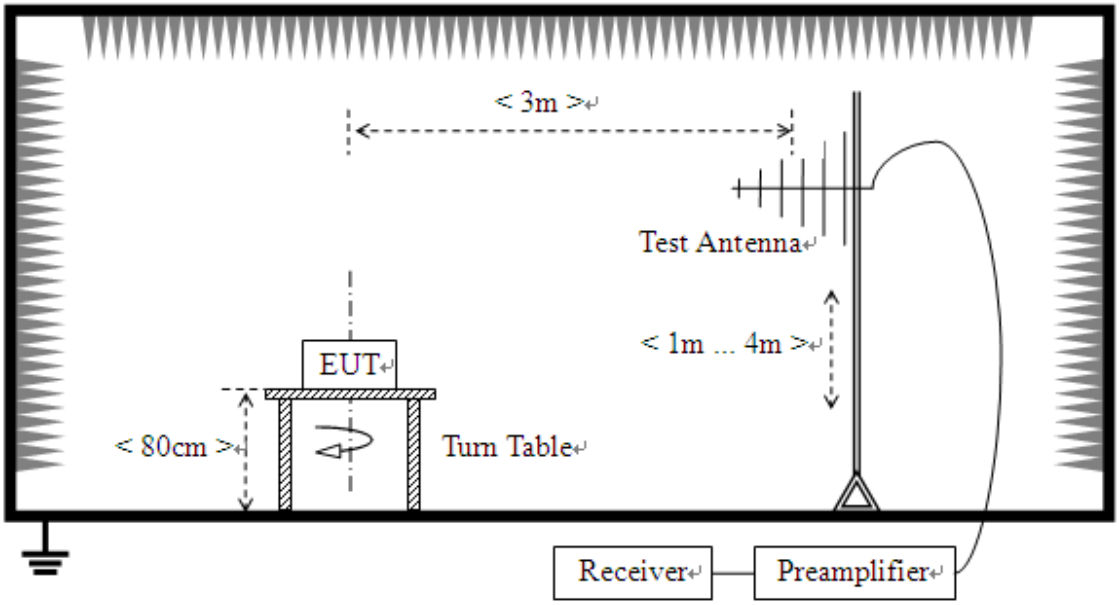
The measuring equipment is listed in the section 3 of this test report.

2.2.3. Test Setup

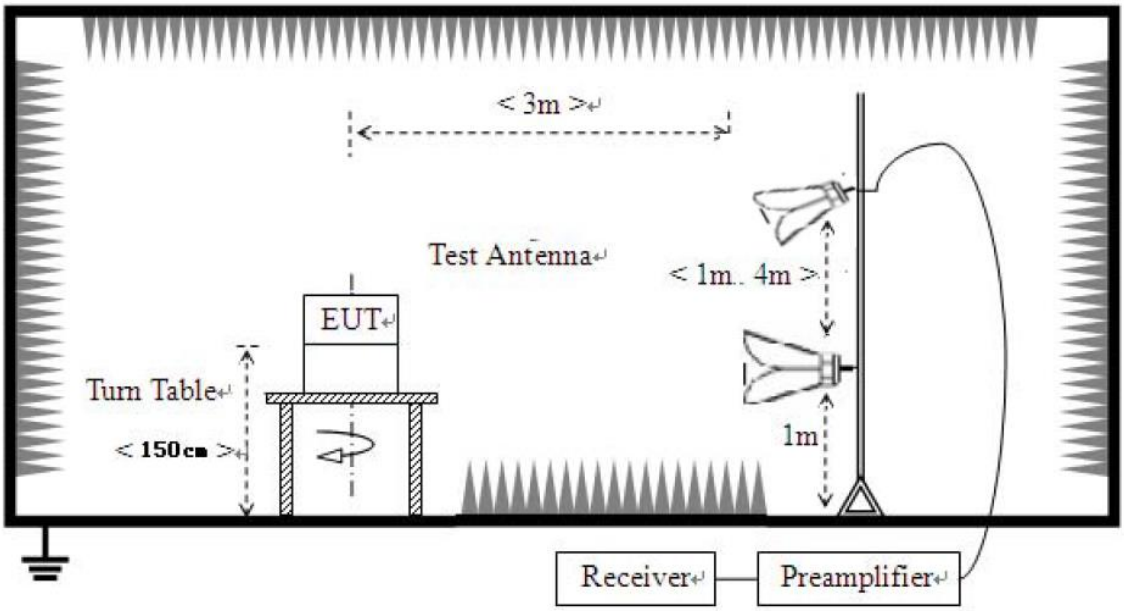
For radiated emissions from 9 KHz to 30 MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



2.2.4. Test Procedures

1. The EUT was placed on the top of a rotating table 0.8m for below 1GHz/1.5m for above 1GHz above the ground at a 3 meters semi-anechoic chamber. The table was rotated 360 degrees to determine the position of the highest radiation.
2. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.
3. Height of receiving antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
4. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.
5. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
6. If the emission level of the EUT in peak mode was lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported.
   Otherwise the emissions would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.
7. For the radiated emission test above 1GHz:
   Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120kHz for Quasi-peak detection at frequency below 1GHz.
2. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 3MHz for Peak detection at frequency above 1GHz.
3. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and the video bandwidth is≥ 1/T (Duty cycle < 98%) or 10Hz(Duty cycle > 98%) for Average detection (AV) at frequency above 1GHz.
4. All radiated emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.

2.2.5. Test Results of Radiated Band Edge and Spurious Emission

For 9 kHz to 30MHz, The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.

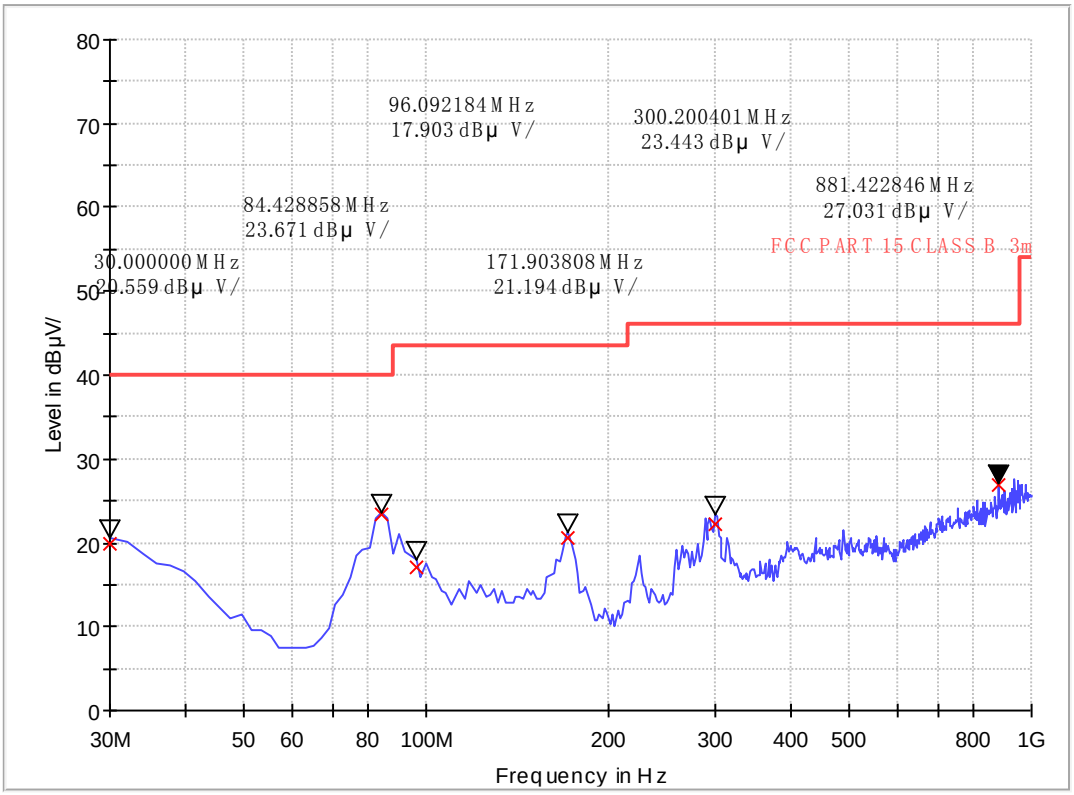
For 30MHz to 1GHz, All of the EUT Configure mode were tested and found 802.11b_2462MHz channel is the worst mode, the worst case is recorded in this report.

For 1GHz to 25GHz, Only worst-case data is reported.

For 30MHz to 1000 MHz

Test site:	3M anechoic chamber	Environment:	Temp: 23℃; Humi:48%;101kPa
Operator:	Huang Chaoming	Test Date:	2024.07.08
Test Mode:	WIFI – TX	Test Result:	Pass

EMI Sweep-3M(30-1G)



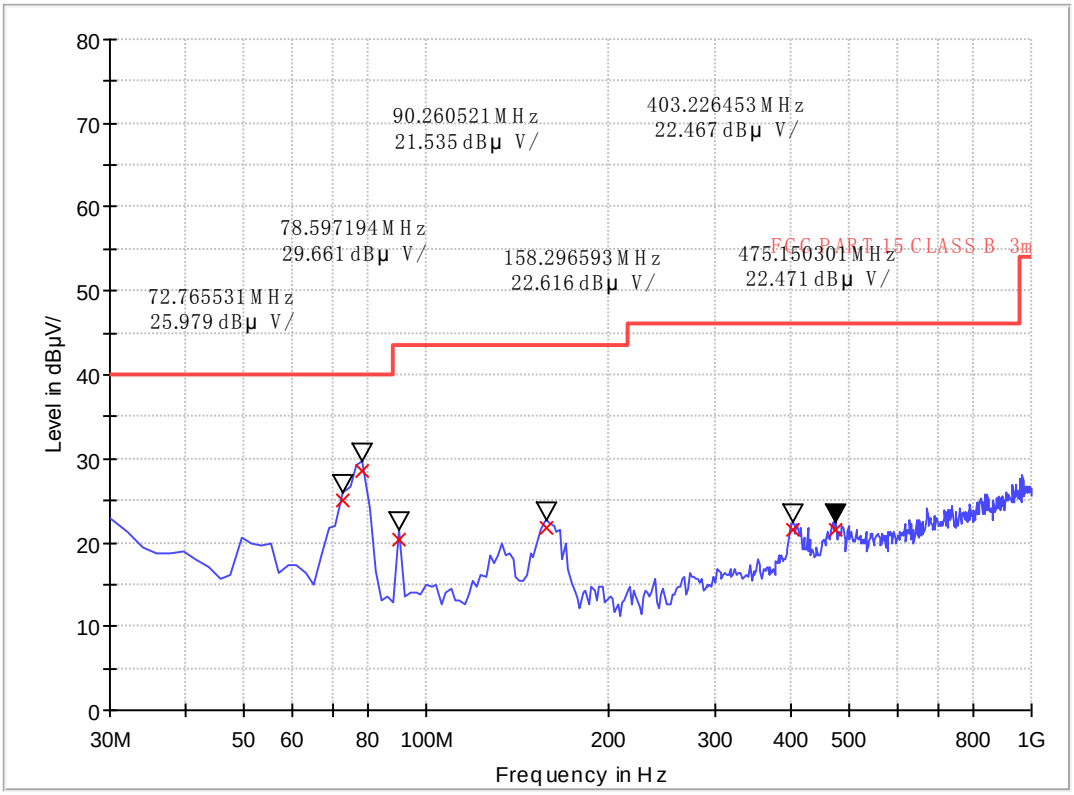
Frequency (MHz)	QuasiPeak (dBμV/m)	Bandwidth (kHz)	Height (cm)	Polarity	Corr. (dB/m)	Margin - QPK	Limit - QPK
30.000000	19.99	120.000	100.0	H	21.1	20.01	40.0
84.440000	23.29	120.000	100.0	H	10.4	16.71	40.0
96.080000	17.12	120.000	100.0	H	11.9	26.38	43.5
171.920000	20.57	120.000	100.0	H	12.5	22.93	43.5
300.200000	22.14	120.000	100.0	H	16.4	23.86	46.0
881.440000	26.81	120.000	100.0	H	24.2	19.19	46.0

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB).
3. Margin value = Limit value – Emission Level.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. Only the antenna height (from 1m to 4m) at maximum reading are recorded.

Test site:	3M anechoic chamber	Environment:	Temp: 23℃; Humi:48%;101kPa
Operator:	Huang Chaoming	Test Date:	2024.07.08
Test Mode:	WIFI - TX	Test Result:	Pass

EMI Sweep-3M(30-1G)



Frequency (MHz)	QuasiPeak (dB μV/m)	Bandwidth (kHz)	Height (cm)	Polarity	Corr. (dB/m)	Margin - QPK	Limit - QPK
72.760000	25.01	120.000	100.0	V	8.7	14.99	40.0
78.600000	28.44	120.000	100.0	V	9.4	11.56	40.0
90.280000	20.44	120.000	100.0	V	11.3	23.06	43.5
158.280000	21.72	120.000	100.0	V	13.4	21.78	43.5
403.240000	21.55	120.000	100.0	V	18.3	24.45	46.0
475.160000	21.46	120.000	100.0	V	19.8	24.54	46.0

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m).
2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB).
3. Margin value = Limit value – Emission Level.
4. The emission levels of other frequencies are very lower than the limit and not show in test report.
5. Only the antenna height (from 1m to 4m) at maximum reading are recorded.

For 1GHz to 25 GHz

2.4G Wi-Fi 802.11b_2412MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2390.00	53.44	74.00	-20.56	1.40	120	56.53	-3.09	Horizontal	Peak
2390.00	44.07	54.00	-9.93	1.40	120	47.16	-3.09	Horizontal	Average
4824.00	46.64	74.00	-27.36	1.40	120	45.47	1.17	Horizontal	Peak
4824.00	37.94	54.00	-16.06	1.40	120	36.77	1.17	Horizontal	Average
7236.00	50.66	74.00	-23.34	1.40	120	44.71	5.95	Horizontal	Peak
7236.00	42.03	54.00	-11.97	1.40	120	36.08	5.95	Horizontal	Average
2390.00	52.36	74.00	-21.64	1.60	190	55.45	-3.09	Vertical	Peak
2390.00	42.91	54.00	-11.09	1.60	190	46.00	-3.09	Vertical	Average
4824.00	46.21	74.00	-27.79	1.60	190	45.04	1.17	Vertical	Peak
4824.00	37.62	54.00	-16.38	1.60	190	36.45	1.17	Vertical	Average
7236.00	51.02	74.00	-22.98	1.60	190	45.07	5.95	Vertical	Peak
7236.00	42.02	54.00	-11.98	1.60	190	36.07	5.95	Vertical	Average
2.4G Wi-Fi 802.11b_2437MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
4874.00	45.88	74.00	-28.12	1.40	120	44.92	0.96	Horizontal	Peak
4874.00	38.48	54.00	-15.52	1.40	120	37.52	0.96	Horizontal	Average
7311.00	51.98	74.00	-22.02	1.40	120	46.44	5.54	Horizontal	Peak
7311.00	41.26	54.00	-12.74	1.40	120	35.72	5.54	Horizontal	Average
4874.00	46.67	74.00	-27.33	1.60	190	45.71	0.96	Vertical	Peak
4874.00	37.08	54.00	-16.92	1.60	190	36.12	0.96	Vertical	Average
7311.00	50.65	74.00	-23.35	1.60	190	45.11	5.54	Vertical	Peak
7311.00	41.69	54.00	-12.31	1.60	190	36.15	5.54	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.4G Wi-Fi 802.11b_2462MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2483.50	55.65	74.00	-18.35	1.40	120	60.40	-4.75	Horizontal	Peak
2483.50	45.13	54.00	-8.87	1.40	120	49.88	-4.75	Horizontal	Average
4924.00	45.34	74.00	-28.66	1.40	120	44.74	0.6	Horizontal	Peak
4924.00	37.34	54.00	-16.66	1.40	120	36.74	0.6	Horizontal	Average
7386.00	50.79	74.00	-23.21	1.40	120	44.86	5.93	Horizontal	Peak
7386.00	41.40	54.00	-12.60	1.40	120	35.47	5.93	Horizontal	Average
2483.50	53.64	74.00	-20.36	1.60	190	58.39	-4.75	Vertical	Peak
2483.50	44.94	54.00	-9.06	1.60	190	49.69	-4.75	Vertical	Average
4924.00	46.58	74.00	-27.42	1.60	190	45.98	0.6	Vertical	Peak
4924.00	37.17	54.00	-16.83	1.60	190	36.57	0.6	Vertical	Average
7386.00	50.49	74.00	-23.51	1.60	190	44.56	5.93	Vertical	Peak
7386.00	41.55	54.00	-12.45	1.60	190	35.62	5.93	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.4G Wi-Fi 802.11g_2412MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2390.00	53.30	74.00	-20.70	1.40	120	56.39	-3.09	Horizontal	Peak
2390.00	44.07	54.00	-9.93	1.40	120	47.16	-3.09	Horizontal	Average
4824.00	46.27	74.00	-27.73	1.40	120	45.10	1.17	Horizontal	Peak
4824.00	38.37	54.00	-15.63	1.40	120	37.20	1.17	Horizontal	Average
7236.00	50.75	74.00	-23.25	1.40	120	44.80	5.95	Horizontal	Peak
7236.00	42.17	54.00	-11.83	1.40	120	36.22	5.95	Horizontal	Average
2390.00	52.61	74.00	-21.39	1.60	190	55.70	-3.09	Vertical	Peak
2390.00	42.57	54.00	-11.43	1.60	190	45.66	-3.09	Vertical	Average
4824.00	46.12	74.00	-27.88	1.60	190	44.95	1.17	Vertical	Peak
4824.00	38.00	54.00	-16.00	1.60	190	36.83	1.17	Vertical	Average
7236.00	50.74	74.00	-23.26	1.60	190	44.79	5.95	Vertical	Peak
7236.00	41.95	54.00	-12.05	1.60	190	36.00	5.95	Vertical	Average
2.4G Wi-Fi 802.11g_2437MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
4874.00	45.97	74.00	-28.03	1.40	120	45.01	0.96	Horizontal	Peak
4874.00	38.68	54.00	-15.32	1.40	120	37.72	0.96	Horizontal	Average
7311.00	52.13	74.00	-21.87	1.40	120	46.59	5.54	Horizontal	Peak
7311.00	41.00	54.00	-13.00	1.40	120	35.46	5.54	Horizontal	Average
4874.00	47.16	74.00	-26.84	1.60	190	46.20	0.96	Vertical	Peak
4874.00	37.25	54.00	-16.75	1.60	190	36.29	0.96	Vertical	Average
7311.00	50.61	74.00	-23.39	1.60	190	45.07	5.54	Vertical	Peak
7311.00	42.03	54.00	-11.97	1.60	190	36.49	5.54	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.4G Wi-Fi 802.11g_2462MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2483.50	56.02	74.00	-17.98	1.40	120	60.77	-4.75	Horizontal	Peak
2483.50	44.99	54.00	-9.01	1.40	120	49.74	-4.75	Horizontal	Average
4924.00	45.29	74.00	-28.71	1.40	120	44.69	0.6	Horizontal	Peak
4924.00	36.87	54.00	-17.13	1.40	120	36.27	0.6	Horizontal	Average
7386.00	51.28	74.00	-22.72	1.40	120	45.35	5.93	Horizontal	Peak
7386.00	40.97	54.00	-13.03	1.40	120	35.04	5.93	Horizontal	Average
2483.50	53.93	74.00	-20.07	1.60	190	58.68	-4.75	Vertical	Peak
2483.50	45.04	54.00	-8.96	1.60	190	49.79	-4.75	Vertical	Average
4924.00	46.84	74.00	-27.16	1.60	190	46.24	0.6	Vertical	Peak
4924.00	37.62	54.00	-16.38	1.60	190	37.02	0.6	Vertical	Average
7386.00	50.09	74.00	-23.91	1.60	190	44.16	5.93	Vertical	Peak
7386.00	41.41	54.00	-12.59	1.60	190	35.48	5.93	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.4G Wi-Fi 802.11n-HT20_2412MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2390.00	52.98	74.00	-21.02	1.40	120	56.07	-3.09	Horizontal	Peak
2390.00	43.96	54.00	-10.04	1.40	120	47.05	-3.09	Horizontal	Average
4824.00	46.98	74.00	-27.02	1.40	120	45.81	1.17	Horizontal	Peak
4824.00	38.41	54.00	-15.59	1.40	120	37.24	1.17	Horizontal	Average
7236.00	50.96	74.00	-23.04	1.40	120	45.01	5.95	Horizontal	Peak
7236.00	42.18	54.00	-11.82	1.40	120	36.23	5.95	Horizontal	Average
2390.00	52.43	74.00	-21.57	1.60	190	55.52	-3.09	Vertical	Peak
2390.00	42.52	54.00	-11.48	1.60	190	45.61	-3.09	Vertical	Average
4824.00	46.25	74.00	-27.75	1.60	190	45.08	1.17	Vertical	Peak
4824.00	37.61	54.00	-16.39	1.60	190	36.44	1.17	Vertical	Average
7236.00	50.82	74.00	-23.18	1.60	190	44.87	5.95	Vertical	Peak
7236.00	41.90	54.00	-12.10	1.60	190	35.95	5.95	Vertical	Average
2.4G Wi-Fi 802.11n-HT20_2437MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
4874.00	46.22	74.00	-27.78	1.40	120	45.26	0.96	Horizontal	Peak
4874.00	39.12	54.00	-14.88	1.40	120	38.16	0.96	Horizontal	Average
7311.00	52.34	74.00	-21.66	1.40	120	46.80	5.54	Horizontal	Peak
7311.00	41.13	54.00	-12.87	1.40	120	35.59	5.54	Horizontal	Average
4874.00	46.99	74.00	-27.01	1.60	190	46.03	0.96	Vertical	Peak
4874.00	37.44	54.00	-16.56	1.60	190	36.48	0.96	Vertical	Average
7311.00	50.90	74.00	-23.10	1.60	190	45.36	5.54	Vertical	Peak
7311.00	41.53	54.00	-12.47	1.60	190	35.99	5.54	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.4G Wi-Fi 802.11n-HT20_2462MHz									
Frequency (MHz)	Emssion Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Antenna Height (m)	Table Angle (Degree)	Raw Value (dBuV/m)	Correction Factor (dB/m)	Polarity	Detector
2483.50	55.73	74.00	-18.27	1.40	120	60.48	-4.75	Horizontal	Peak
2483.50	45.57	54.00	-8.43	1.40	120	50.32	-4.75	Horizontal	Average
4924.00	45.20	74.00	-28.80	1.40	120	44.60	0.6	Horizontal	Peak
4924.00	37.46	54.00	-16.54	1.40	120	36.86	0.6	Horizontal	Average
7386.00	50.74	74.00	-23.26	1.40	120	44.81	5.93	Horizontal	Peak
7386.00	41.89	54.00	-12.11	1.40	120	35.96	5.93	Horizontal	Average
2483.50	54.05	74.00	-19.95	1.60	190	58.80	-4.75	Vertical	Peak
2483.50	45.34	54.00	-8.66	1.60	190	50.09	-4.75	Vertical	Average
4924.00	46.34	74.00	-27.66	1.60	190	45.74	0.6	Vertical	Peak
4924.00	37.64	54.00	-16.36	1.60	190	37.04	0.6	Vertical	Average
7386.00	50.89	74.00	-23.11	1.60	190	44.96	5.93	Vertical	Peak
7386.00	42.03	54.00	-11.97	1.60	190	36.10	5.93	Vertical	Average

Remark:

1. Emission Level(dBuV/m) = Raw Value(dBuV) + Correction Factor(dB/m)

2. Correction Factor(dB/m) = Antenna Factor(dB/m) + Cable Factor(dB) - Pre-Amplifier Factor(dB)

3. Margin value = Emission Level – Limit value

4.The emission levels of other frequencies are very lower than the limit and not show in test report.

2.3. AC Power Line Conducted Emission

2.3.1. Limit of AC Power Line Conducted Emission

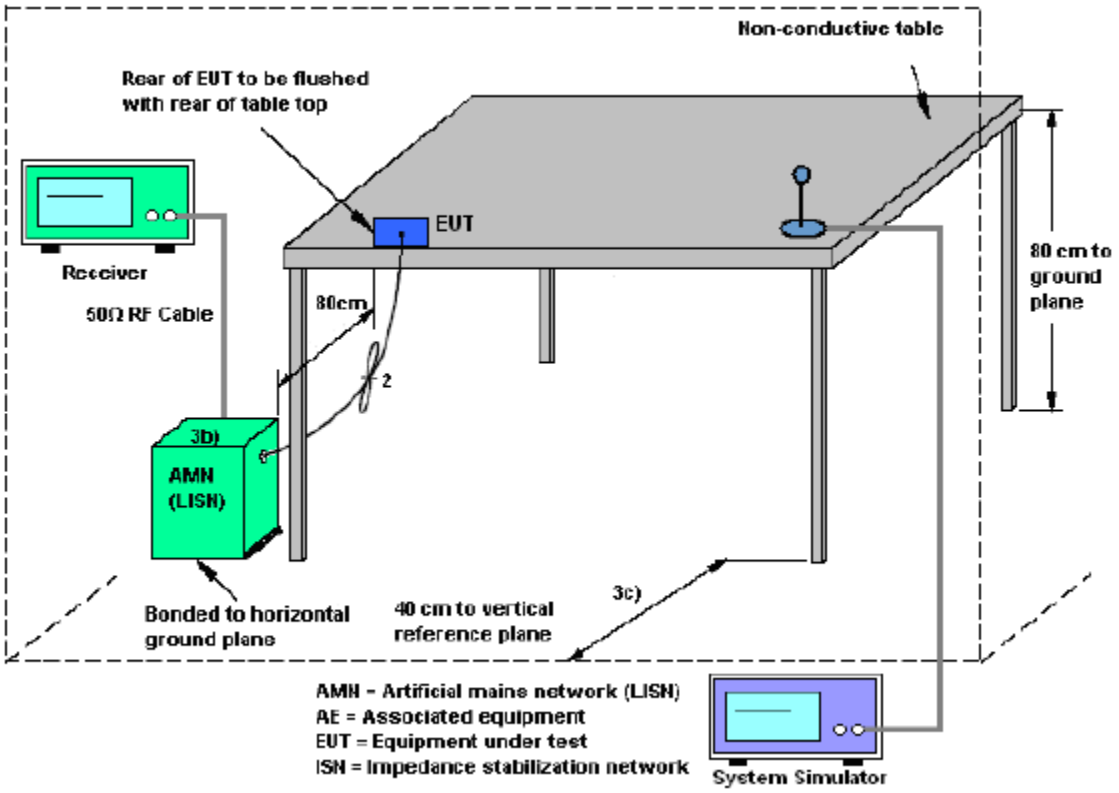
For equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency range (MHz)	Conducted Limit (dBμV)	
	Quai-peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.50 - 5	56	46
5 - 30	60	50

2.3.2. Measuring Instruments

The measuring equipment is listed in the section 3 of this test report.

2.3.3. Test Setup



2.3.4. Test Procedures

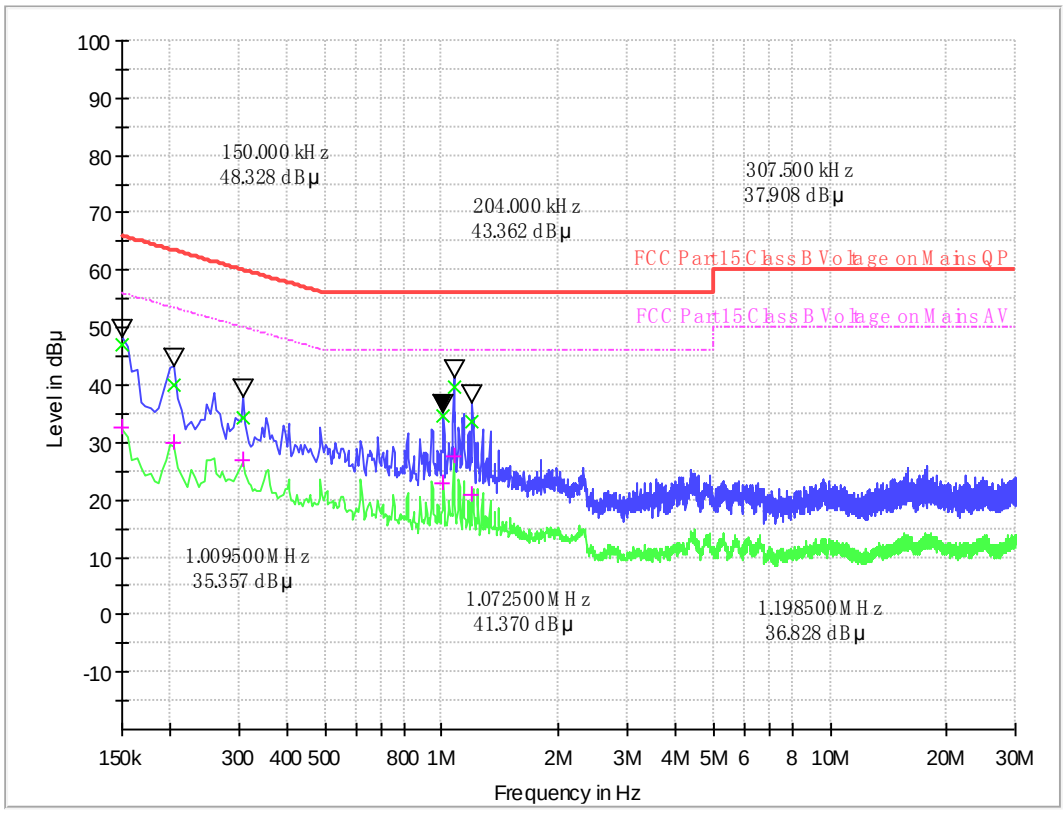
1. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
2. Connect EUT to the power mains through a line impedance stabilization network (LISN).
3. All the support units are connecting to the other LISN.
4. The LISN provides 50 ohm coupling impedance for the measuring instrument.
5. The FCC states that a 50 ohm, 50 micrometry LISN should be used.
6. Both sides of AC line were checked for maximum conducted interference.
7. The frequency range from 150 kHz to 30 MHz was searched.
8. Set the test-receiver system to Peak Detect Function and specified bandwidth (IF Bandwidth = 9kHz) with Maximum Hold Mode. Then measurement is also conducted by Average Detector and Quasi-Peak Detector Function respectively.

2.3.5. Test Results of Conducted Emission

Note 1: The EUT configuration of the emission tests is WLAN Link + Cable (Charging from Adapter)

Note 2: All of the EUT Configure mode were tested and found 802.11b 2437MHz channel is the worst mode, the worst case is recorded in this report.

Line Phase

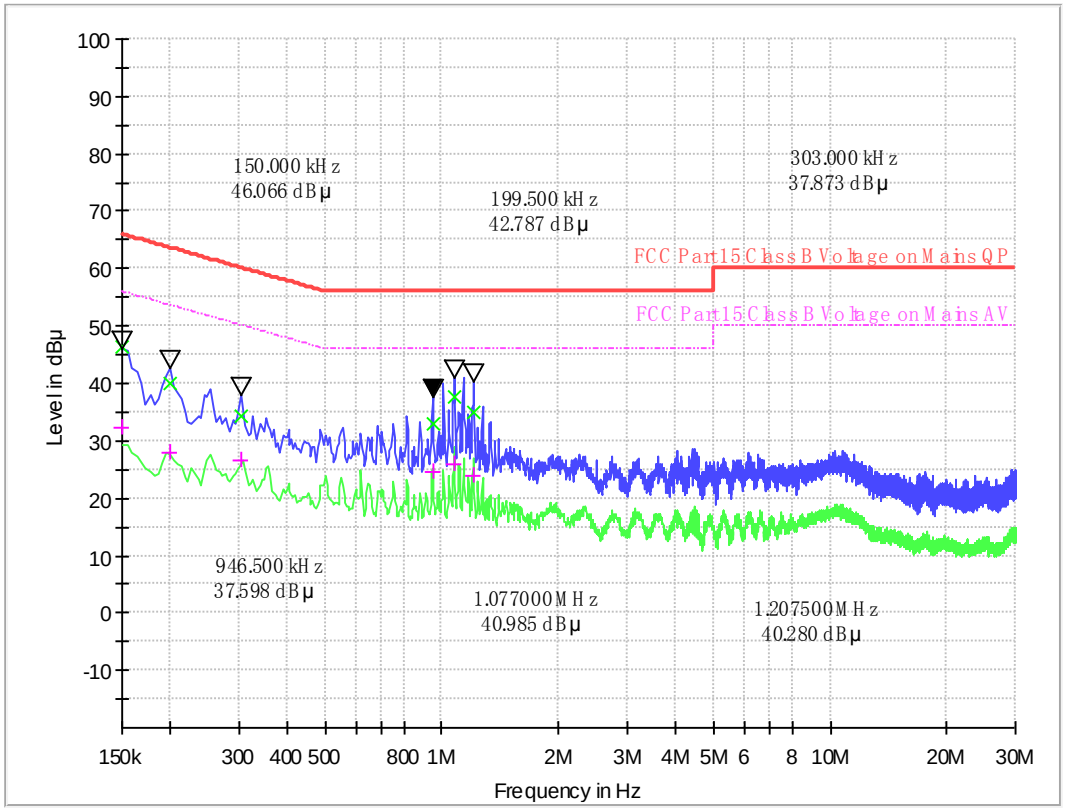


Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Corr.Factor (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dBµV)
0.150000	46.97	32.65	20.1	19.03	66.0	23.35	56.0
0.204000	40.13	29.97	19.8	23.32	63.4	23.48	53.4
0.307500	34.43	26.90	19.9	25.61	60.0	23.14	50.0
1.009500	34.51	22.87	19.8	21.49	56.0	23.13	46.0
1.072500	39.57	27.72	19.8	16.43	56.0	18.28	46.0
1.198500	33.55	20.84	19.8	22.45	56.0	25.16	46.0

Test Result : Pass

Note: Final Level = Receiver Read level + Correction factor.

Neutral Phase



Frequency (MHz)	QuasiPeak (dBµV)	Average (dBµV)	Corr.Factor (dB)	Margin - QPK	Limit - QPK	Margin - AV	Limit - AV (dBµV)
0.150000	46.38	32.16	20.0	19.62	66.0	23.84	56.0
0.199500	39.97	27.87	19.8	23.66	63.6	25.76	53.6
0.303000	34.44	26.65	19.8	25.72	60.2	23.51	50.2
0.946500	32.92	24.58	19.9	23.08	56.0	21.42	46.0
1.077000	37.79	25.78	19.9	18.21	56.0	20.22	46.0
1.207500	34.95	23.79	19.9	21.05	56.0	22.21	46.0

Test Result : Pass

Note: Final Level = Receiver Read level + Correction factor.

3. List of measuring equipment

Item	Test Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	5M Anechoic Chamber	Albatross	SAC-5MAC 12.8x6.8x6.4m	A0304210	2023.08.01	2026.07.31
2	EMI Test Receiver	ROHDE&SCHWARZ	ESW26	A180502935	2024.05.23	2025.05.22
3	Loop Antenna	Schwarz beck	HFH2-Z2	A0304220	2022.05.02	2025.05.01
4	Broadband antenna (30MHz~1GHz)	R&S	HL562	A0304224	2023.09.05	2026.09.04
5	EMI Horn Ant. (1-18G)	ETC	MCTD-1209	A150402241	2023.05.16	2026.05.15
6	Horn antenna (18GHz~26.5GHz)	AR	AT4510	A0804450	2023.06.01	2026.05.31
7	Amplifier 30M~1GHz	MILMEGA	80RF1000-10004	A140101634	2023.10.20	2024.10.19
8	Amplifier 1G~18GHz	MILMEGA	AS0104R-800/400	A160302517	2023.10.20	2024.10.19
9	Spectrum Analyzer	KEYSIGHT	N9030A	A160702554	2024.01.18	2025.01.17
10	Test Receiver	R&S	ESIB7	A0501375	2024.02.28	2025.02.27
11	Broadband Ant.	ETC	MCTD 2786	A150402240	2023.05.22	2026.05.21
12	3M Anechoic Chamber	Albatross	SAC-3MAC 9*6*6m	A0412375	2024.02.27	2027.02.26
13	Temperature chamber	ESPEC	SU-642	A150802409	2024.02.22	2025.02.21
14	Test Receiver	KEYSIGHT	N9038A	A141202036	2024.06.05	2025.06.04
15	LISN	ROHDE&SCHWARZ	ENV216	A140701847	2024.05.23	2025.05.22

4. Uncertainty of Evaluation

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2020. All the measurement uncertainty value were shown with a coverage K=2 to indicate 95% level of confidence . The measurement data show herein meets or exceeds the CISPR measurement uncertainty values specified in CISPR 16-4-2 and can be compared directly to specified limit to determine compliance.

Uncertainty of Conducted Emission Measurement (150KHz~30MHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	2.8dB

Uncertainty of Radiated Emission Measurement (30MHz~1GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	3.91dB

Uncertainty of Radiated Emission Measurement (1GHz~18GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	4.5dB

Uncertainty of Radiated Emission Measurement (18GHz~40GHz)

Measuring Uncertainty for a level of confidence of 95%(U=2Uc(y))	4.9dB

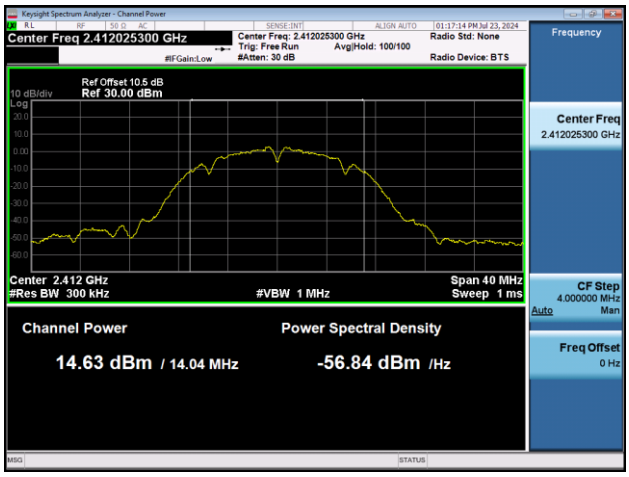
Appendix A

Maximum Conducted Output Power

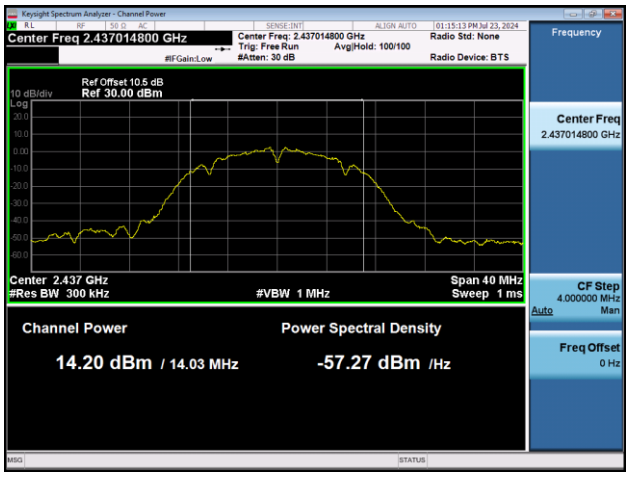
Test Result and Data

Test Mode	Antenna	Frequency [MHz]	Average Power [dBm]	DC Factor [dBm]	Result [dBm]	Limit [dBm]	Gain [dBi]	EIRP [dBm]	EIRP Limit [dBm]	Verdict
11B	Ant1	2412	14.63	0.05	14.68	≤30.00	2.0	16.68	≤36.00	PASS
11B	Ant1	2437	14.20	0.05	14.25	≤30.00	2.0	16.25	≤36.00	PASS
11B	Ant1	2462	14.43	0.05	14.48	≤30.00	2.0	16.48	≤36.00	PASS
11G	Ant1	2412	12.56	0.33	12.89	≤30.00	2.0	14.89	≤36.00	PASS
11G	Ant1	2437	12.28	0.33	12.61	≤30.00	2.0	14.61	≤36.00	PASS
11G	Ant1	2462	12.51	0.33	12.84	≤30.00	2.0	14.84	≤36.00	PASS
11N20SISO	Ant1	2412	11.20	0.32	11.52	≤30.00	2.0	13.52	≤36.00	PASS
11N20SISO	Ant1	2437	11.37	0.32	11.69	≤30.00	2.0	13.69	≤36.00	PASS
11N20SISO	Ant1	2462	11.52	0.32	11.84	≤30.00	2.0	13.84	≤36.00	PASS

Test Graphs

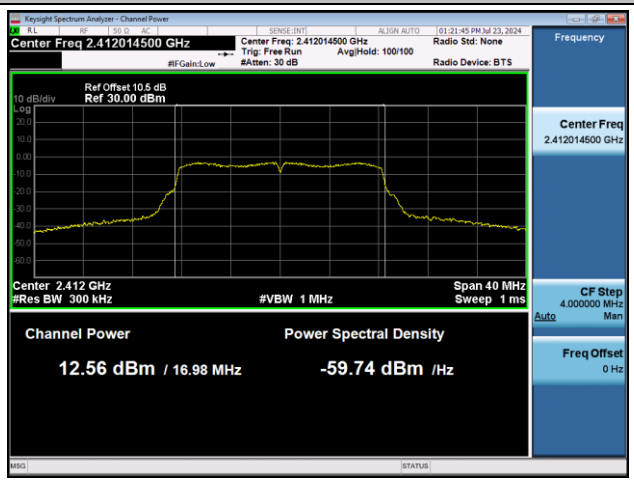


11B-Ant1-2412-PASS



11B-Ant1-2437-PASS

11B-Ant1-2462-PASS



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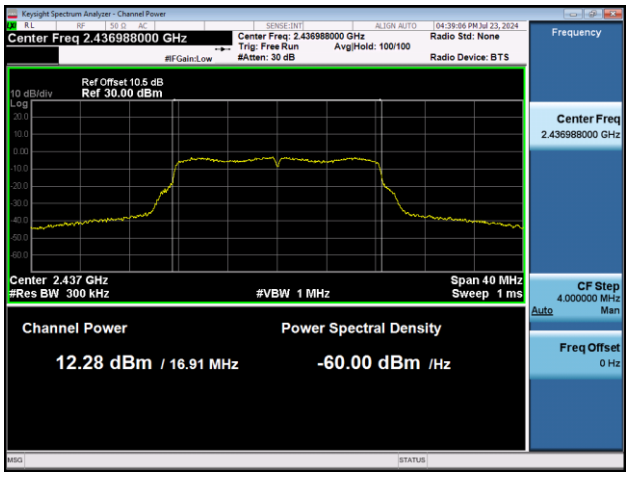

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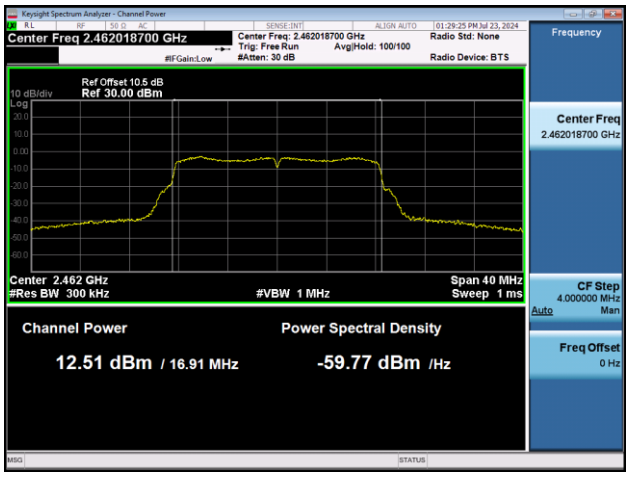

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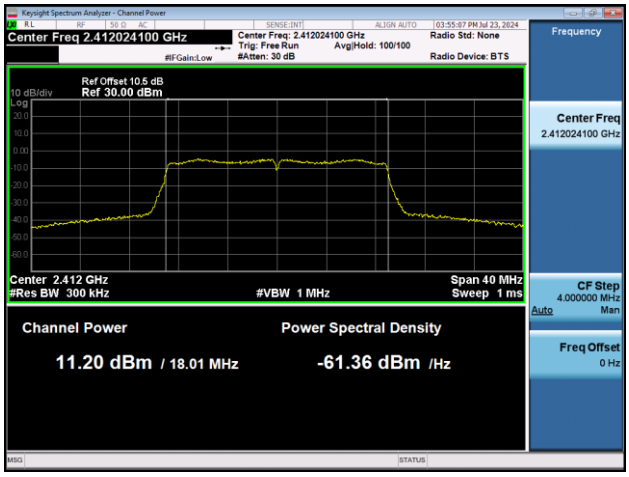

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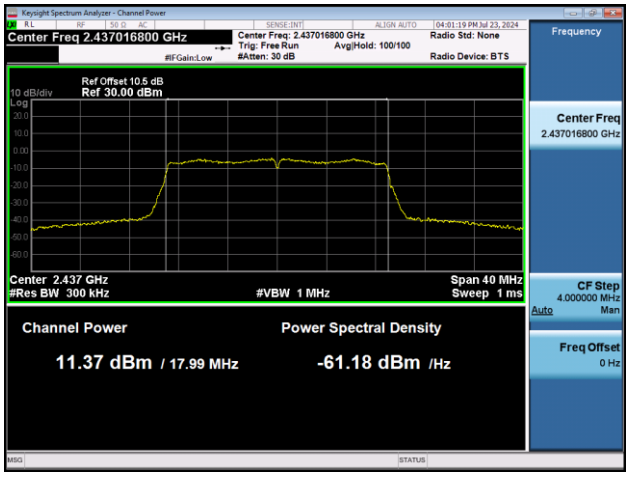

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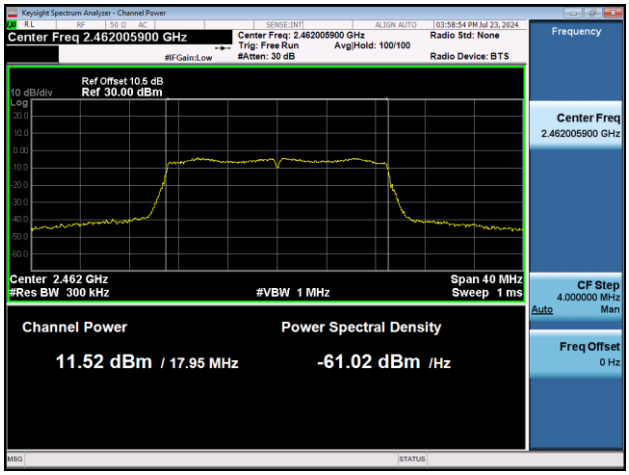

11N20SISO-Ant1-2462-PASS

END OF REPORT