

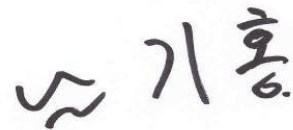
RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-22N-RWD-065
Reception No. : 2209002852
Applicant : LG Electronics USA
Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States
Manufacturer : LG Electronics Inc.
Address : 222 LG-ro, Jinwi-Myeon, Pyeongtaek -Si, Gyeonggi-Do, 451-713, Korea
Type of Equipment : Car Navigation
FCC ID. : BEJ-MIB3OIVR-E01
Model Name : MIB3 OI VR-E
Multiple Model Name : N/A
Serial number : N/A
Total page of Report : 76 pages (including this page)
Date of Incoming : October 13, 2022
Date of issue : November 21, 2022

SUMMARY

The equipment complies with the regulation; *FCC PART 15 SUBPART E Section 15.407*
 This test report only contains the result of a single test of the sample supplied for the examination.
 It is not a generally valid assessment of the features of the respective products of the mass-production.
 This report is not correlated with the "KS Q ISO/IEC 17025 and KOLAS accreditation" of Korean Laboratory Accreditation Scheme.





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※ Please refer to the Annex section for All test plots

Revision History

Rev. No.	Issue Report No.	Issued Date	Revisions	Section Affected
0	OT-22N-RWD-065	November 21, 2022	Initial Release	All

1. VERIFICATION OF COMPLIANCE

Applicant : LG Electronics USA
 Address : 111 Sylvan Avenue, North Building, Englewood Cliffs, New Jersey, 07632, United States
 Contact Person : Sung Soo, Kim / Director, Regulatory and Environmental Affairs
 Telephone No. : +201-266-2215
 FCC ID : BEJ-MIB3OIVR-E01
 Model Name : MIB3 OI VR-E
 Brand Name : LG, VOLKSWAGEN, SEAT, SKODA, FORD
 Serial Number : N/A
 Date : November 21, 2022

EQUIPMENT CLASS	Unlicensed National Information infrastructure(UNII)
E.U.T. DESCRIPTION	Car Navigation
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 SUBPART E Section 15.407 789033 D02 General UNII Test Procedures New Rules v02r01
Modifications on the Equipment to Achieve Compliance	None
Final Test was Conducted On	3 m, Semi Anechoic Chamber

-. The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.407(a)	26 dB Bandwidth	PASS
15.407(a)	Maximum Conducted Output Power	Met the Limit / PASS
15.407(a)	Power Spectral Density	Met the Limit / PASS
15.407(e)	6 dB Bandwidth	Met the Limit / PASS
15.407(g)	Frequency Stability	Met the Limit / PASS
15.407(b)	Undesirable Emissions	Met the Limit / PASS
15.205, 15.407(b)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Met the Limit / PASS
15.207	Conducted Limits	N/A (See Note)

Note: This test is not performed because the EUT is operated by only using DC Power.

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART E Section 15.407

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10: 2013. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea.

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-20122/ C-14617/ G-10666/ T-11842

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-3

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. GENERAL INFORMATION

3.1 Product Description

The LG Electronics USA, Model MIB3 OI VR-E (referred to as the EUT in this report) is a Car Navigation. The product specification described herein was obtained from product data sheet or user’s manual.

DEVICE TYPE	Car Navigation	
OPERATING FREQUENCY	Bluetooth	2 402 MHz ~ 2 480 MHz
	WLAN 2.4 GHz	2 412 MHz ~ 2 462 MHz (802.11b/g/n(HT20))
	WLAN 5 150 MHz ~ 5 250 MHz Band	5 180 MHz ~ 5 240 MHz (802.11a/n(HT20))
		5 190 MHz ~ 5 230 MHz (802.11n(HT40))
		5 210 MHz (802.11ac(VHT80))
	WLAN 5 725 MHz ~ 5 850 MHz Band	5 745 MHz ~ 5 825 MHz (802.11a/n(HT20))
		5 755 MHz ~ 5 795 MHz (802.11n(HT40))
		5 775 MHz (802.11ac(VHT80))
MODULATION TYPE	Bluetooth	GFSK for 1Mbps, $\pi/4$ -DQPSK for 2Mbps, 8-DPSK for 3Mbps
	WLAN 2.4 GHz	802.11b: DSSS Modulation (DBPSK/DQPSK/CCK)
		802.11g/n(HT20): OFDM Modulation (BPSK/QPSK/16QAM/64QAM)
WLAN 5 GHz	802.11a/n(HT20)/n(HT40)/ac(VHT80): OFDM Modulation(BPSK/QPSK/16QAM/64QAM)	

RF OUTPUT POWER	Bluetooth	1 Mbps	2.46 dBm	
		2 Mbps	1.66 dBm	
		3 Mbps	1.89 dBm	
	WLAN 2.4 GHz	9.13 dBm(802.11b) 9.30 dBm(802.11g) 9.52 dBm(802.11n_HT20)		
	WLAN 5 150 MHz ~ 5 250 MHz Band	Antenna 0	9.05 dBm(802.11a) 9.07 dBm(802.11n_HT20) 9.05 dBm(802.11n_HT40) 9.20 dBm(802.11ac_VHT80)	
		Antenna 1	9.10 dBm(802.11a) 9.10 dBm(802.11n_HT20) 8.93 dBm(802.11n_HT40) 8.84 dBm(802.11ac_VHT80)	
		Multiple Antenna	12.09 dBm(802.11a) 12.10 dBm(802.11n_HT20) 12.00 dBm(802.11n_HT40) 12.03 dBm(802.11ac_VHT80)	
	WLAN 5 725 MHz ~ 5 850 MHz Band	Antenna 0	12.80 dBm(802.11a) 12.82 dBm(802.11n_HT20) 12.82 dBm(802.11n_HT40) 12.42 dBm(802.11ac_VHT80)	
		Antenna 1	11.52 dBm(802.11a) 11.56 dBm(802.11n_HT20) 11.68 dBm(802.11n_HT40) 11.31 dBm(802.11ac_VHT80)	
		Multiple Antenna	15.22 dBm(802.11a) 15.25 dBm(802.11n_HT20) 15.30 dBm(802.11n_HT40) 15.26 dBm(802.11ac_VHT80)	

ANTENNA TYPE	Bluetooth	PCB Antenna	
	WLAN 2.4 GHz	Chip Antenna	
	WLAN 5 GHz	Antenna 0	Chip Antenna
		Antenna 1	PCB Antenna
ANTENNA GAIN	Bluetooth	1.39 dBi	
	WLAN 2.4 GHz	4.64 dBi	
	5 150 MHz ~ 5 250 MHz Band	Antenna 0	3.19 dBi
		Antenna 1	4.62 dBi
		Multiple Antenna	6.97 dBi
	5 725 MHz ~ 5 850 MHz Band	Antenna 0	2.29 dBi
		Antenna 1	7.30 dBi
		Multiple Antenna	8.49 dBi
List of each Osc. or crystal Freq.(Freq. >= 1 MHz)		19.2 MHz, 20 MHz, 25 MHz, 26 MHz, 40 MHz, 55.466 67 MHz	

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	LG Electronics Inc.	N/A	N/A

5.2 Peripheral equipment

Defined as equipment needed for correct operation of the EUT, but not considered as tested:

Model	Manufacturer	Description	Connected to
MIB3 OI VR-E	LG Electronics Inc.	Car Navigation (EUT)	-
GP-4303D	LG Precision Co.,Ltd	DC Power Supply	EUT
TC-3000C	TESCOM	BLUETOOTH TESTER	EUT

5.3 Mode of operation during the test

- Duty Cycle (Antenna 0)

Band	TEST Mode	Data Rate	On Time (ms)	Total Time (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
UNII 1	802.11 a (5 220 MHz)	6	1.432	1.447	98.96	0.05
		9	0.960	0.975	98.46	0.07
		12	0.728	0.743	97.98	0.09
		18	0.492	0.507	97.04	0.13
		24	0.376	0.391	96.16	0.17
		36	0.256	0.271	94.46	0.25
		48	0.200	0.215	93.02	0.31
		54	0.180	0.195	92.31	0.35
	802.11 n(HT20) (5 220 MHz)	MCS0	1.340	1.355	98.89	0.05
		MCS1	0.688	0.703	97.87	0.09
		MCS2	0.472	0.487	96.92	0.14
		MCS3	0.364	0.379	96.04	0.18
		MCS4	0.256	0.271	94.46	0.25
		MCS5	0.200	0.215	93.02	0.31
		MCS6	0.184	0.199	92.46	0.34
		MCS7	0.168	0.183	91.80	0.37
	802.11 n(HT40) (5 230 MHz)	MCS0	0.664	0.680	97.65	0.10
		MCS1	0.352	0.367	95.91	0.18
		MCS2	0.248	0.264	93.94	0.27
		MCS3	0.196	0.212	92.45	0.34
		MCS4	0.144	0.160	90.00	0.46
		MCS5	0.116	0.132	87.88	0.56
		MCS6	0.108	0.124	87.10	0.60
		MCS7	0.100	0.116	86.21	0.64
	802.11 ac(VHT80) (5 210 MHz)	MCS0	0.192	0.208	92.31	0.35
		MCS1	0.120	0.136	88.24	0.54
		MCS2	0.100	0.116	86.21	0.64
		MCS3	0.084	0.100	84.00	0.76
		MCS4	0.072	0.088	81.82	0.87
		MCS5	0.064	0.080	80.00	0.97
		MCS6	0.064	0.080	80.00	0.97
		MCS7	0.060	0.076	78.95	1.03
		MCS8	0.060	0.076	78.95	1.03
		MCS9	0.056	0.072	77.78	1.09

- Duty Cycle (Antenna 1)

Band	TEST Mode	Data Rate	On Time (ms)	Total Time (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
UNII 1	802.11 a (5 220 MHz)	6	1.432	1.447	98.96	0.05
		9	0.960	0.975	98.46	0.07
		12	0.728	0.743	97.98	0.09
		18	0.492	0.507	97.04	0.13
		24	0.376	0.391	96.16	0.17
		36	0.256	0.271	94.46	0.25
		48	0.200	0.215	93.02	0.31
		54	0.180	0.195	92.31	0.35
	802.11 n(HT20) (5 220 MHz)	MCS0	1.340	1.355	98.89	0.05
		MCS1	0.688	0.703	97.87	0.09
		MCS2	0.472	0.487	96.92	0.14
		MCS3	0.364	0.379	96.04	0.18
		MCS4	0.256	0.271	94.46	0.25
		MCS5	0.200	0.215	93.02	0.31
		MCS6	0.184	0.199	92.46	0.34
		MCS7	0.168	0.183	91.80	0.37
	802.11 n(HT40) (5 230 MHz)	MCS0	0.664	0.680	97.65	0.10
		MCS1	0.352	0.368	95.65	0.19
		MCS2	0.248	0.264	93.94	0.27
		MCS3	0.196	0.212	92.45	0.34
		MCS4	0.144	0.160	90.00	0.46
		MCS5	0.116	0.132	87.88	0.56
		MCS6	0.108	0.124	87.10	0.60
		MCS7	0.100	0.116	86.21	0.64
	802.11 ac(VHT80) (5 210 MHz)	MCS0	0.192	0.208	92.31	0.35
		MCS1	0.120	0.136	88.24	0.54
		MCS2	0.100	0.116	86.21	0.64
		MCS3	0.084	0.100	84.00	0.76
		MCS4	0.072	0.088	81.82	0.87
		MCS5	0.064	0.080	80.00	0.97
		MCS6	0.064	0.080	80.00	0.97
		MCS7	0.060	0.076	78.95	1.03
		MCS8	0.060	0.076	78.95	1.03
		MCS9	0.056	0.072	77.78	1.09

Note – Duty Cycle : (Tx On Time / (Tx On Time + Tx Off Time)) * 100

Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

-. Duty Cycle (Antenna 0)

Band	TEST Mode	Data Rate	On Time (ms)	Total Time (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
UNII 3	802.11 a (5 785 MHz)	6	1.432	1.447	98.96	0.05
		9	0.960	0.975	98.46	0.07
		12	0.728	0.743	97.98	0.09
		18	0.492	0.507	97.04	0.13
		24	0.376	0.391	96.16	0.17
		36	0.256	0.271	94.46	0.25
		48	0.200	0.215	93.02	0.31
		54	0.180	0.195	92.31	0.35
	802.11 n(HT20) (5 785 MHz)	MCS0	1.340	1.355	98.89	0.05
		MCS1	0.688	0.703	97.87	0.09
		MCS2	0.472	0.487	96.92	0.14
		MCS3	0.364	0.379	96.04	0.18
		MCS4	0.256	0.271	94.46	0.25
		MCS5	0.200	0.215	93.02	0.31
		MCS6	0.184	0.199	92.46	0.34
		MCS7	0.168	0.183	91.80	0.37
	802.11 n(HT40) (5 795 MHz)	MCS0	0.664	0.680	97.65	0.10
		MCS1	0.352	0.368	95.65	0.19
		MCS2	0.248	0.264	93.94	0.27
		MCS3	0.196	0.212	92.45	0.34
		MCS4	0.144	0.159	90.57	0.43
		MCS5	0.116	0.132	87.88	0.56
		MCS6	0.108	0.124	87.10	0.60
		MCS7	0.100	0.116	86.21	0.64
	802.11 ac(VHT80) (5 775 MHz)	MCS0	0.192	0.208	92.31	0.35
		MCS1	0.120	0.136	88.24	0.54
		MCS2	0.100	0.116	86.21	0.64
		MCS3	0.084	0.100	84.00	0.76
		MCS4	0.072	0.088	81.82	0.87
		MCS5	0.064	0.080	80.00	0.97
		MCS6	0.064	0.080	80.00	0.97
		MCS7	0.060	0.076	78.95	1.03
		MCS8	0.060	0.076	78.95	1.03
		MCS9	0.056	0.072	77.78	1.09

- Duty Cycle (Antenna 1)

Band	TEST Mode	Data Rate	On Time (ms)	Total Time (ms)	Duty Cycle (%)	Duty Cycle Factor (dB)
UNII 3	802.11 a (5 785 MHz)	6	1.432	1.447	98.96	0.05
		9	0.960	0.975	98.46	0.07
		12	0.728	0.743	97.98	0.09
		18	0.492	0.507	97.04	0.13
		24	0.376	0.391	96.16	0.17
		36	0.256	0.271	94.46	0.25
		48	0.200	0.215	93.02	0.31
		54	0.180	0.195	92.31	0.35
	802.11 n(HT20) (5 785 MHz)	MCS0	1.340	1.355	98.89	0.05
		MCS1	0.688	0.703	97.87	0.09
		MCS2	0.472	0.487	96.92	0.14
		MCS3	0.364	0.379	96.04	0.18
		MCS4	0.256	0.271	94.46	0.25
		MCS5	0.200	0.215	93.02	0.31
		MCS6	0.184	0.199	92.46	0.34
		MCS7	0.168	0.183	91.80	0.37
	802.11 n(HT40) (5 795 MHz)	MCS0	0.664	0.680	97.65	0.10
		MCS1	0.352	0.368	95.65	0.19
		MCS2	0.248	0.264	93.94	0.27
		MCS3	0.196	0.212	92.45	0.34
		MCS4	0.144	0.160	90.00	0.46
		MCS5	0.116	0.131	88.55	0.53
		MCS6	0.108	0.123	87.80	0.56
		MCS7	0.100	0.116	86.21	0.64
	802.11 ac(VHT80) (5 775 MHz)	MCS0	0.192	0.208	92.31	0.35
		MCS1	0.120	0.136	88.24	0.54
		MCS2	0.100	0.116	86.21	0.64
		MCS3	0.084	0.100	84.00	0.76
		MCS4	0.072	0.088	81.82	0.87
		MCS5	0.064	0.080	80.00	0.97
		MCS6	0.064	0.080	80.00	0.97
		MCS7	0.060	0.076	78.95	1.03
		MCS8	0.060	0.076	78.95	1.03
		MCS9	0.056	0.072	77.78	1.09

Note – Duty Cycle : (Tx On Time / (Tx On Time + Tx Off Time)) * 100

Correction Factor : 10 * Log(1 / (Duty Cycle / 100))

5.4 Configuration of Test System

Line Conducted Test: It is not need to test this requirement, because the EUT shall be operated by only using DC Power.

Radiated Emission Test: Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 meter Semi Anechoic Chamber.

The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.

5.5 Antenna Requirement

For intentional device, according to section 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.

Antenna Construction:

The antenna of the EUT is a PCB Antenna and Chip Antenna on the main board in the EUT, so no consideration of replacement by the user.

6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
It is not need to test this requirement, because the power of the EUT is supplied by DC Power.	

6.2 General Radiated Emissions Tests

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worse operating condition (Please check one only)
Transmitting Mode	X

7. 99 % OCCUPIED BANDWIDTH & MIMIMUM 26 dB BANDWIDTH

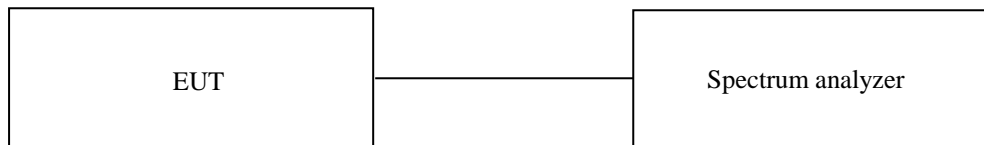
7.1 Operating environment

Temperature : 23 °C
 Relative humidity : 48 % R.H.

7.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 1%-5% OBW for 99% bandwidth, and peak detection was used. The 99 % bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5 % of the total mean power of the given emission.

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to approximately 1% of the emission bandwidth, and peak detection was used. The 26 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 26 dB.



7.3 Test Date

October 17, 2022 ~ October 31, 2022

7.4 Test data for 802.11a RLAN Mode

7.4.1 Test data for Antenna 0

7.4.1.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	16.43
	Middle	5 220.00	16.43
	High	5 240.00	16.43
5 725 ~ 5 850	Low	5 745.00	16.43
	Middle	5 785.00	16.43
	High	5 825.00	16.43

7.4.1.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	19.63
	Middle	5 220.00	19.53
	High	5 240.00	19.43
5 725 ~ 5 850	Low	5 745.00	19.63
	Middle	5 785.00	19.53
	High	5 825.00	19.63

7.4.2 Test data for Antenna 1

7.4.2.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	16.43
	Middle	5 220.00	16.48
	High	5 240.00	16.43
5 725 ~ 5 850	Low	5 745.00	16.38
	Middle	5 785.00	16.43
	High	5 825.00	16.43

7.4.2.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	19.53
	Middle	5 220.00	19.43
	High	5 240.00	19.48
5 725 ~ 5 850	Low	5 745.00	19.38
	Middle	5 785.00	19.53
	High	5 825.00	19.63

7.5 Test data for 802.11n_HT20 RLAN Mode

7.5.1 Test data for Antenna 0

7.5.1.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	17.58
	Middle	5 220.00	17.58
	High	5 240.00	17.58
5 725 ~ 5 850	Low	5 745.00	17.58
	Middle	5 785.00	17.53
	High	5 825.00	17.63

7.5.1.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	19.83
	Middle	5 220.00	19.83
	High	5 240.00	19.88
5 725 ~ 5 850	Low	5 745.00	19.83
	Middle	5 785.00	20.03
	High	5 825.00	19.83

7.5.2 Test data for Antenna 1

7.5.2.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	17.58
	Middle	5 220.00	17.58
	High	5 240.00	17.58
5 725 ~ 5 850	Low	5 745.00	17.58
	Middle	5 785.00	17.63
	High	5 825.00	17.63

7.5.2.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 180.00	20.08
	Middle	5 220.00	19.83
	High	5 240.00	19.88
5 725 ~ 5 850	Low	5 745.00	19.93
	Middle	5 785.00	19.78
	High	5 825.00	19.98

7.6 Test data for 802.11n_HT40 RLAN Mode

7.6.1 Test data for Antenna 0

7.6.1.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190.00	36.16
	High	5 230.00	36.26
5 725 ~ 5 850	Low	5 755.00	36.26
	High	5 795.00	36.16

7.6.1.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190.00	40.36
	High	5 230.00	40.76
5 725 ~ 5 850	Low	5 755.00	40.46
	High	5 795.00	40.36

7.6.2 Test data for Antenna 1

7.6.2.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190.00	36.16
	High	5 230.00	36.06
5 725 ~ 5 850	Low	5 755.00	36.16
	High	5 795.00	36.26

7.6.2.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Low	5 190.00	40.06
	High	5 230.00	39.76
5 725 ~ 5 850	Low	5 755.00	40.36
	High	5 795.00	39.96

7.7 Test data for 802.11ac_VHT80 RLAN Mode

7.7.1 Test data for Antenna 0

7.7.1.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Middle	5 210.00	76.32
5 725 ~ 5 850	Middle	5 775.00	76.72

7.7.1.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Middle	5 210.00	81.92
5 725 ~ 5 850	Middle	5 775.00	81.92

7.7.2 Test data for Antenna 1

7.7.2.1 99 % OCCUPIED BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	99 % Bandwidth (MHz)
5 150 ~ 5 250	Middle	5 210.00	76.32
5 725 ~ 5 850	Middle	5 775.00	75.92

7.7.2.2 MINIMUM 26 dB BANDWIDTH

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	26 dB Bandwidth (MHz)
5 150 ~ 5 250	Middle	5 210.00	81.72
5 725 ~ 5 850	Middle	5 775.00	81.72

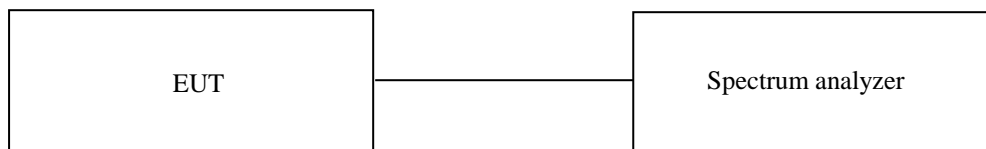
8. 6 dB BANDWIDTH

8.1 Operating environment

Temperature : 23 °C
 Relative humidity : 48 % R.H.

8.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz, and peak detection was used. The 6 dB bandwidth is defined as the total spectrum over which the power is higher than the peak power minus 6 dB.



8.3 Test Date

October 17, 2022 ~ October 31, 2022

8.4 Test data for 802.11a RLAN Mode

8.4.1 Test data for Antenna 0

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Low	5 745.00	16.38	0.50	15.88
	Middle	5 785.00	16.33	0.50	15.83
	High	5 825.00	16.33	0.50	15.83

8.4.2 Test data for Antenna 1

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Low	5 745.00	16.38	0.50	15.88
	Middle	5 785.00	16.33	0.50	15.83
	High	5 825.00	16.38	0.50	15.88

8.5 Test data for 802.11n_HT20 RLAN Mode

8.5.1 Test data for Antenna 0

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Low	5 745.00	17.03	0.50	16.53
	Middle	5 785.00	17.03	0.50	16.53
	High	5 825.00	16.78	0.50	16.28

8.5.2 Test data for Antenna 1

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Low	5 745.00	17.28	0.50	16.78
	Middle	5 785.00	17.53	0.50	17.03
	High	5 825.00	17.58	0.50	17.08

8.6 Test data for 802.11n_HT40 RLAN Mode

8.6.1 Test data for Antenna 0

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Low	5 755.00	35.66	0.50	35.16
	High	5 795.00	35.56	0.50	35.06

8.6.2 Test data for Antenna 1

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Low	5 755.00	35.86	0.50	35.36
	High	5 795.00	35.56	0.50	35.06

Remark: See next page for measurement data.

8.7 Test data for 802.11ac_VHT80 RLAN Mode

8.7.1 Test data for Antenna 0

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Middle	5 775.00	76.12	0.50	75.62

Remark: See next page for measurement data.

8.7.2 Test data for Antenna 1

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	6 dB Bandwidth (MHz)	LIMIT (MHz)	Margin (MHz)
5 725 ~ 5 850	Middle	5 775.00	76.32	0.50	75.82

Remark: See next page for measurement data.

9. MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER

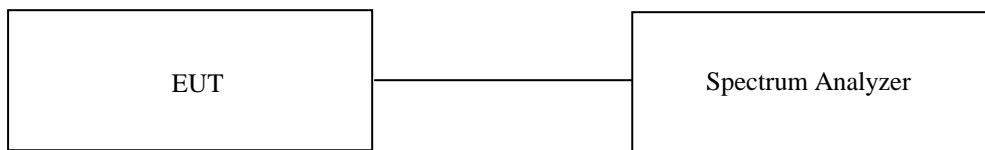
9.1 Operating environment

Temperature : 23 °C
Relative humidity : 48 % R.H.

9.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer.

The resolution bandwidth is set to 1 MHz, the video bandwidth is set to 3 times the resolution bandwidth.



9.3 Test Date

October 17, 2022 ~ October 31, 2022

9.4 Test data for 802.11a RLAN Mode

9.4.1 Test data for Antenna 0

-. Test Result : Pass

-. Duty Cycle : 98.96 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	8.72	0.05	8.77	23.98	15.21
	Middle	5 220.00	8.79	0.05	8.84	23.98	15.14
	High	5 240.00	9.00	0.05	9.05	23.98	14.93
5 725 ~ 5 850	Low	5 745.00	12.75	0.05	12.80	30.00	17.20
	Middle	5 785.00	12.22	0.05	12.27	30.00	17.73
	High	5 825.00	12.12	0.05	12.17	30.00	17.83

Remark : Margin = Limit –Total Value (=Measured Value +Duty Factor)

9.4.2 Test data for Antenna 1

-. Test Result : Pass

-. Duty Cycle : 98.96 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	8.08	0.05	8.13	23.98	15.85
	Middle	5 220.00	8.58	0.05	8.63	23.98	15.35
	High	5 240.00	9.05	0.05	9.10	23.98	14.88
5 725 ~ 5 850	Low	5 745.00	11.47	0.05	11.52	28.70	17.18
	Middle	5 785.00	11.21	0.05	11.26	28.70	17.44
	High	5 825.00	11.06	0.05	11.11	28.70	17.59

Remark : Margin = Limit –Total Value (=Measured Value +Duty Factor)

9.4.3 Test data for Multiple Transmit

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	11.47	23.01	11.54
	Middle	5 220.00	11.75	23.01	11.26
	High	5 240.00	12.09	23.01	10.92
5 725 ~ 5 850	Low	5 745.00	15.22	27.51	12.29
	Middle	5 785.00	14.80	27.51	12.71
	High	5 825.00	14.68	27.51	12.83

Remark 1: Margin = Limit – Total Value

Remark 2: Calculated Output Power= $10\log(10^{(\text{Antenna0 Output Power}/10)} + 10^{(\text{Antenna1 Output Power}/10)})$

9.5 Test data for 802.11n_HT20 RLAN Mode

9.5.1 Test data for Antenna 0

-. Test Result : Pass

-. Duty Cycle : 98.89 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	8.73	0.05	8.78	23.98	15.20
	Middle	5 220.00	8.78	0.05	8.83	23.98	15.15
	High	5 240.00	9.02	0.05	9.07	23.98	14.91
5 725 ~ 5 850	Low	5 745.00	12.77	0.05	12.82	30.00	17.18
	Middle	5 785.00	12.24	0.05	12.29	30.00	17.71
	High	5 825.00	12.14	0.05	12.19	30.00	17.81

Remark : Margin = Limit –Total Value (=Measured Value +Duty Factor)

9.5.2 Test data for Antenna 1

-. Test Result : Pass

-. Duty Cycle : 98.89 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	8.13	0.05	8.18	23.98	15.80
	Middle	5 220.00	8.57	0.05	8.62	23.98	15.36
	High	5 240.00	9.05	0.05	9.10	23.98	14.88
5 725 ~ 5 850	Low	5 745.00	11.51	0.05	11.56	28.70	17.14
	Middle	5 785.00	11.23	0.05	11.28	28.70	17.42
	High	5 825.00	11.07	0.05	11.12	28.70	17.58

Remark : Margin = Limit –Total Value (=Measured Value +Duty Factor)

9.5.3 Test data for Multiple Transmit

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	11.50	23.01	11.51
	Middle	5 220.00	11.74	23.01	11.27
	High	5 240.00	12.10	23.01	10.91
5 725 ~ 5 850	Low	5 745.00	15.25	27.51	12.26
	Middle	5 785.00	14.82	27.51	12.69
	High	5 825.00	14.70	27.51	12.81

Remark 1: Margin = Limit – Total Value

Remark 2: Calculated Output Power= $10\log(10^{(\text{Antenna0 Output Power}/10)} + 10^{(\text{Antenna1 Output Power}/10)})$

9.6 Test data for 802.11n_HT40 RLAN Mode

9.6.1 Test data for Antenna 0

-. Test Result : Pass
 -. Duty Cycle : 97.65 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 190.00	8.78	0.10	8.88	23.98	15.10
	High	5 230.00	8.95	0.10	9.05	23.98	14.93
5 725 ~ 5 850	Low	5 755.00	12.72	0.10	12.82	30.00	17.18
	High	5 795.00	12.08	0.10	12.18	30.00	17.82

Remark : Margin = Limit – Total Value (=Measured Value +Duty Factor)

9.6.2 Test data for Antenna 1

-. Test Result : Pass
 -. Duty Cycle : 97.65 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 190.00	8.14	0.10	8.24	23.98	15.74
	High	5 230.00	8.83	0.10	8.93	23.98	15.05
5 725 ~ 5 850	Low	5 755.00	11.58	0.10	11.68	28.70	17.02
	High	5 795.00	11.00	0.10	11.10	28.70	17.60

Remark : Margin = Limit – Total Value (=Measured Value +Duty Factor)

9.6.3 Test data for Multiple Transmit

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Low	5 190.00	11.58	23.01	11.43
	High	5 230.00	12.00	23.01	11.01
5 725 ~ 5 850	Low	5 755.00	15.30	27.51	12.21
	High	5 795.00	14.68	27.51	12.83

Remark 1: Margin = Limit – Total Value

Remark 2: Calculated Output Power= 10log (10^(Antenna0 Output Power/10) + 10^(Antenna1 Output Power/10))

9.7 Test data for 802.11ac_HT80 RLAN Mode

9.7.1 Test data for Antenna 0

-. Test Result : Pass

-. Duty Cycle : 92.31 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Middle	5 210.00	8.85	0.35	9.20	23.98	14.78
5 725 ~ 5 850	Middle	5 775.00	12.42	0.35	12.77	30.00	17.23

Remark : Margin = Limit – Total Value (=Measured Value +Duty Factor)

9.7.2 Test data for Antenna 1

-. Test Result : Pass

-. Duty Cycle : 92.31 %

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Total Value (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Middle	5 210.00	8.49	0.35	8.84	23.98	15.14
5 725 ~ 5 850	Middle	5 775.00	11.31	0.35	11.66	28.70	17.04

Remark : Margin = Limit – Total Value (=Measured Value +Duty Factor)

9.7.3 Test data for Multiple Transmit

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm)	MARGIN (dB)
5 150 ~ 5 250	Middle	5 210.00	12.03	23.01	10.98
5 725 ~ 5 850	Middle	5 775.00	15.26	27.51	12.25

Remark 1: Margin = Limit – Total Value

Remark 2: Calculated Output Power= $10\log (10^{(\text{Antenna0 Output Power}/10)} + 10^{(\text{Antenna1 Output Power}/10)})$

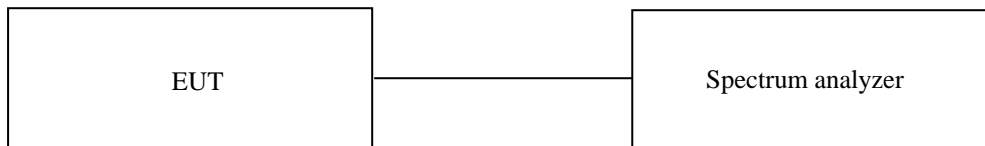
10. POWER SPECTRUL DENSITY

10.1 Operating environment

Temperature : 23 °C
 Relative humidity : 48 % R.H.

10.2 Test set-up

The antenna output of the EUT was connected to the spectrum analyzer. The resolution bandwidth is set to 1 MHz(UNII 1) and 500 kHz(UNII 3), the video bandwidth is set to 3 times the resolution bandwidth. The maximum level for the EUT in 1 MHz bandwidth was measured with above condition



10.3 Test Date

October 17, 2022 ~ October 31, 2022

10.4 Test data for 802.11a RLAN Mode

10.4.1 Test data for Antenna 0

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result value (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	-2.36	0.05	-2.31	11.00	13.31
	Middle	5 220.00	-2.34	0.05	-2.29	11.00	13.29
	High	5 240.00	-1.69	0.05	-1.64	11.00	12.64
5 725 ~ 5 850	Low	5 745.00	-0.90	0.05	-0.85	30.00	30.85
	Middle	5 785.00	-1.63	0.05	-1.58	30.00	31.58
	High	5 825.00	-1.59	0.05	-1.54	30.00	31.54

Remark.1: Peak Power Spectrul Density = Measured Value + Duty Cycle Factor

10.4.2 Test data for Antenna 1

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result value' (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	-2.29	0.05	-2.24	11.00	13.24
	Middle	5 220.00	-2.09	0.05	-2.04	11.00	13.04
	High	5 240.00	-1.72	0.05	-1.67	11.00	12.67
5 725 ~ 5 850	Low	5 745.00	-2.56	0.05	-2.51	28.70	31.21
	Middle	5 785.00	-2.62	0.05	-2.57	28.70	31.27
	High	5 825.00	-2.67	0.05	-2.62	28.70	31.32

Remark.1: Peak Power Spectrul Density = Measured Value + Duty Cycle Factor

10.4.3 Test data for Multiple Transmit

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	0.74	10.03	9.29
	Middle	5 220.00	0.85	10.03	9.18
	High	5 240.00	1.36	10.03	8.67
5 725 ~ 5 850	Low	5 745.00	1.41	27.51	26.10
	Middle	5 785.00	0.96	27.51	26.55
	High	5 825.00	0.96	27.51	26.55

10.5 Test data for 802.11n_HT20 RLAN Mode

10.5.1 Test data for Antenna 0

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result value' (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	-2.50	0.05	-2.45	11.00	13.45
	Middle	5 220.00	-2.45	0.05	-2.40	11.00	13.40
	High	5 240.00	-2.15	0.05	-2.10	11.00	13.10
5 725 ~ 5 850	Low	5 745.00	-1.44	0.05	-1.39	30.00	31.39
	Middle	5 785.00	-1.78	0.05	-1.73	30.00	31.73
	High	5 825.00	-1.76	0.05	-1.71	30.00	31.71

Remark.1: Peak Power Spectrul Density = Measured Value + Duty Cycle Factor

10.5.2 Test data for Antenna 1

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result value' (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	-2.84	0.05	-2.79	11.00	13.79
	Middle	5 220.00	-2.40	0.05	-2.35	11.00	13.35
	High	5 240.00	-1.68	0.05	-1.63	11.00	12.63
5 725 ~ 5 850	Low	5 745.00	-2.60	0.05	-2.55	28.70	31.25
	Middle	5 785.00	-3.06	0.05	-3.01	28.70	31.71
	High	5 825.00	-2.87	0.05	-2.82	28.70	31.52

Remark.1: Peak Power Spectrul Density = Measured Value + Duty Cycle Factor

10.5.3 Test data for Multiple Transmit

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 180.00	0.39	10.03	9.64
	Middle	5 220.00	0.64	10.03	9.39
	High	5 240.00	1.15	10.03	8.88
5 725 ~ 5 850	Low	5 745.00	1.08	27.51	26.43
	Middle	5 785.00	0.69	27.51	26.82
	High	5 825.00	0.78	27.51	26.73

10.6 Test data for 802.11n_HT40 RLAN Mode

10.6.1 Test data for Antenna 0

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result Value (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 190.00	-5.51	0.10	-5.41	11.00	16.41
	High	5 230.00	-5.32	0.10	-5.22	11.00	16.22
5 725 ~ 5 850	Low	5 755.00	-4.21	0.10	-4.11	30.00	34.11
	High	5 795.00	-4.96	0.10	-4.86	30.00	34.86

Remark.1: Peak Power Spectrual Density = Measured Value + Duty Cycle Factor

10.6.2 Test data for Antenna 1

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result VALUE (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 190.00	-6.09	0.10	-5.99	11.00	16.99
	High	5 230.00	-5.06	0.10	-4.96	11.00	15.96
5 725 ~ 5 850	Low	5 755.00	-5.57	0.10	-5.47	28.70	34.17
	High	5 795.00	-5.70	0.10	-5.60	28.70	34.30

Remark.1: Peak Power Spectrual Density = Measured Value + Duty Cycle Factor

10.6.3 Test data for Multiple Transmit

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 190.00	-2.68	10.03	12.71
	High	5 230.00	-2.08	10.03	12.11
5 725 ~ 5 850	Low	5 755.00	-1.73	27.51	29.24
	High	5 795.00	-2.20	27.51	29.71

10.7 Test data for 802.11ac_HT80 RLAN Mode

10.7.1 Test data for Antenna 0

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result VALUE (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 210.00	-8.67	0.35	-8.32	11.00	19.32
5 725 ~ 5 850	Low	5 775.00	-7.99	0.35	-7.64	30.00	37.64

Remark.1: Peak Power Spectrul Density = Measured Value + Duty Cycle Factor

10.7.2 Test data for Antenna 1

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	MEASURED VALUE (dBm)	Duty Factor (dB)	Result VALUE (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Low	5 210.00	-8.67	0.35	-8.32	11.00	19.32
5 725 ~ 5 850	Low	5 775.00	-8.81	0.35	-8.46	28.70	37.16

Remark.1: Peak Power Spectrul Density = Measured Value + Duty Cycle Factor

10.7.3 Test data for Multiple Transmit

-. Operating condition : Highest Output Power Transmitting Mode

-. Test Result : Pass

FREQUENCY RANGE (MHz)	CHANNEL	FREQUENCY (MHz)	ANT0 + ANT1 TOTAL VALUE (dBm)	LIMIT (dBm / MHz)	MARGIN (dB)
5 150 ~ 5 250	Middle	5 210.00	-5.31	10.03	15.34
5 725 ~ 5 850	Middle	5 775.00	-5.02	27.51	32.53

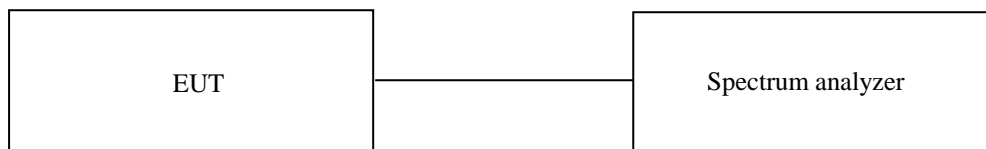
11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

11.1 Operating environment

Temperature : 23 °C
 Relative humidity : 48 % R.H.

11.2 Test set-up

Turn EUT off and set chamber temperature to -20 °C and then allow sufficient time (approximately 20 min to 30 min after chamber reach the assigned temperature) for EUT to stabilize. Turn on the EUT and measure the EUT operating frequency and then turn off the EUT after the measurement. The temperature in the chamber was raised 10 °C step from -20 °C to +80 °C. Repeat above method for frequency measurements every 10 °C step and then record all measured frequencies on each temperature step.



11.3 Test Date

October 17, 2022 ~ October 31, 2022

11.4 Test Data for U-NII-1

-. Result : Pass

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Frequency Error (Hz)
-20	5 180 000 000	5 180 012 334	12 334
-10		5 180 010 411	10 411
0		5 180 009 802	9 802
10		5 180 008 397	8 397
20		5 180 007 361	7 361
30		5 180 006 419	6 419
40		5 180 005 833	5 833
50		5 180 004 751	4 751
-20		5 220 000 000	5 220 011 955
-10	5 220 010 054		10 054
0	5 220 009 403		9 403
10	5 220 008 029		8 029
20	5 220 006 929		6 929
30	5 220 005 988		5 988
40	5 220 005 416		5 416
50	5 220 004 421		4 421
-20	5 240 000 000		5 240 011 860
-10		5 240 009 866	9 866
0		5 240 009 188	9 188
10		5 240 007 953	7 953
20		5 240 006 955	6 955
30		5 240 005 861	5 861
40		5 240 005 328	5 328
50		5 240 004 306	4 306

Note : While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.(ANSI C63.10-2013)

11.5 Test Data for U-NII-3

-. Result : Pass

Temperature (°C)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Frequency Error (Hz)
-20	5 745 000 000	5 745 012 360	12 360
-10		5 745 010 351	10 351
0		5 745 009 853	9 853
10		5 745 008 343	8 343
20		5 745 007 339	7 339
30		5 745 006 435	6 435
40		5 745 005 797	5 797
50		5 745 004 748	4 748
-20		5 785 000 000	5 785 012 570
-10	5 785 010 565		10 565
0	5 785 009 937		9 937
10	5 785 008 614		8 614
20	5 785 007 649		7 649
30	5 785 006 660		6 660
40	5 785 005 985		5 985
50	5 785 004 955		4 955
-20	5 825 000 000		5 825 011 985
-10		5 825 010 012	10 012
0		5 825 009 307	9 307
10		5 825 008 085	8 085
20		5 825 007 071	7 071
30		5 825 005 998	5 998
40		5 825 005 367	5 367
50		5 825 004 457	4 457

Note : While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 minutes, 5 minutes, and 10 minutes after the EUT is energized. Four measurements in total are made.(ANSI C63.10-2013)

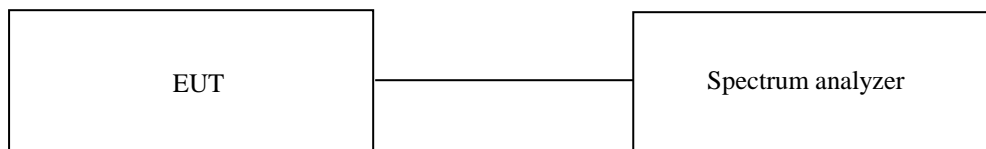
12. FREQUENCY STABILITY WITH VOLTAGE VARIATION

12.1 Operating environment

Temperature : 23 °C
 Relative humidity : 48 % R.H.

12.2 Test set-up

An external DC power supply was connected to the input of the EUT. The voltage of EUT set to 115.0 % of the nominal value and then was reduced to 85.0 % of nominal voltage. The output frequency was recorded at each step.



12.3 Test Date

October 17, 2022 ~ October 31, 2022

12.4 Test Data for U-NII-1

-. Result : Pass

Voltage (VDC)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Frequency Error (Hz)
12.00	5 180 000 000	5 180 007 361	7 361
10.20		5 180 007 081	7 081
13.80		5 180 007 543	7 543
12.00	5 220 000 000	5 220 006 929	6 929
10.20		5 220 007 219	7 219
13.80		5 220 006 829	6 829
12.00	5 240 000 000	5 240 006 955	6 955
10.20		5 240 007 855	7 855
13.80		5 240 006 750	6 750

12.5 Test Data for U-NII-3

-. Result : Pass

Voltage (VDC)	Carrier Freq. (Hz)	Measured Freq. (Hz)	Frequency Error (Hz)
12.00	5 745 000 000	5 745 007 339	7 339
10.20		5 745 006 850	6 850
13.80		5 745 007 153	7 153
12.00	5 785 000 000	5 785 007 649	7 649
10.20		5 785 007 355	7 355
13.80		5 785 007 851	7 851
12.00	5 825 000 000	5 825 007 071	7 071
10.20		5 825 006 955	6 955
13.80		5 825 007 352	7 352

13. RADIATED SPURIOUS EMISSIONS

13.1 Operating environment

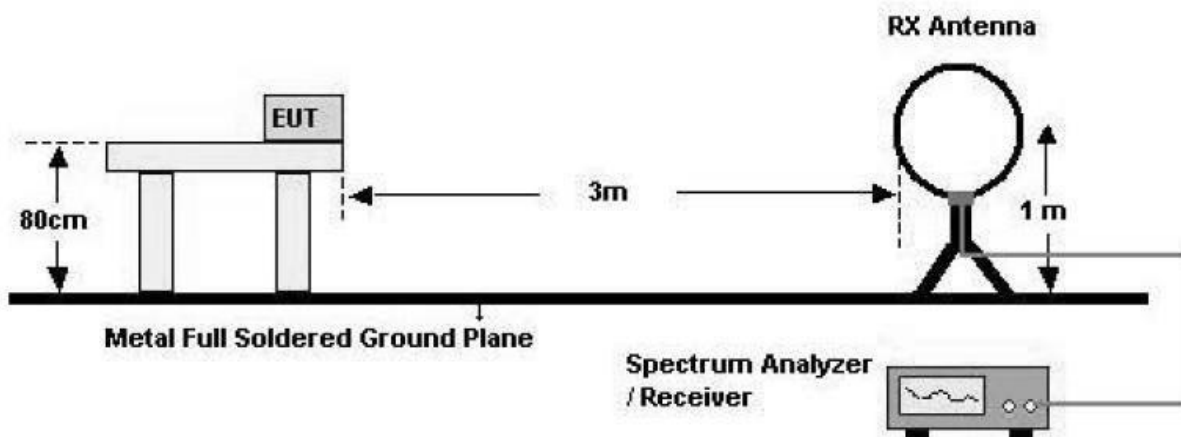
Temperature : 23 °C
 Relative humidity : 48 % R.H.

13.2 Test set-up for conducted measurement

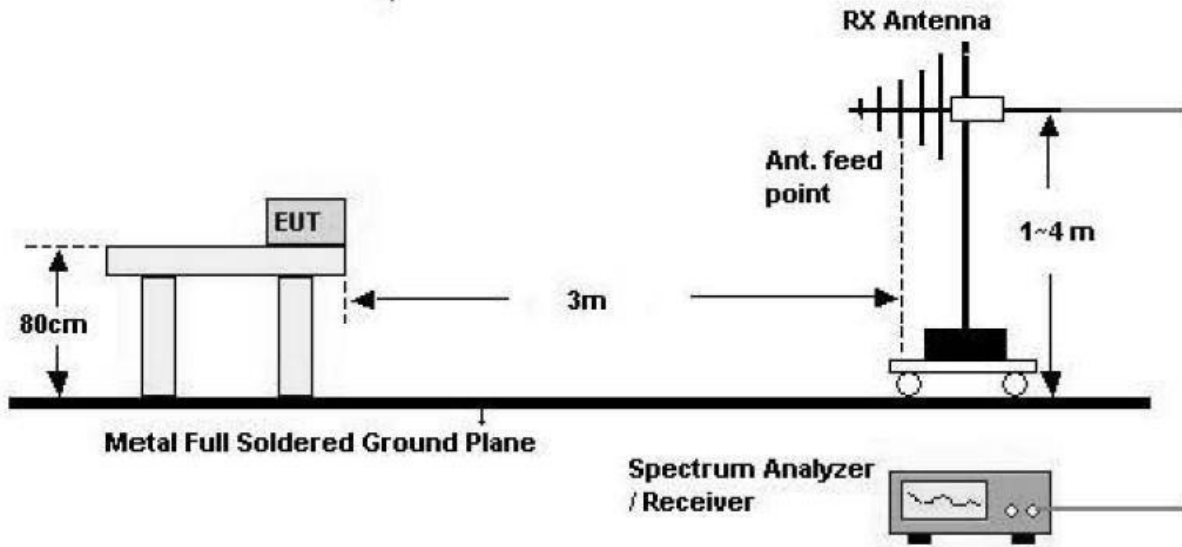
The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 MHz to 40 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

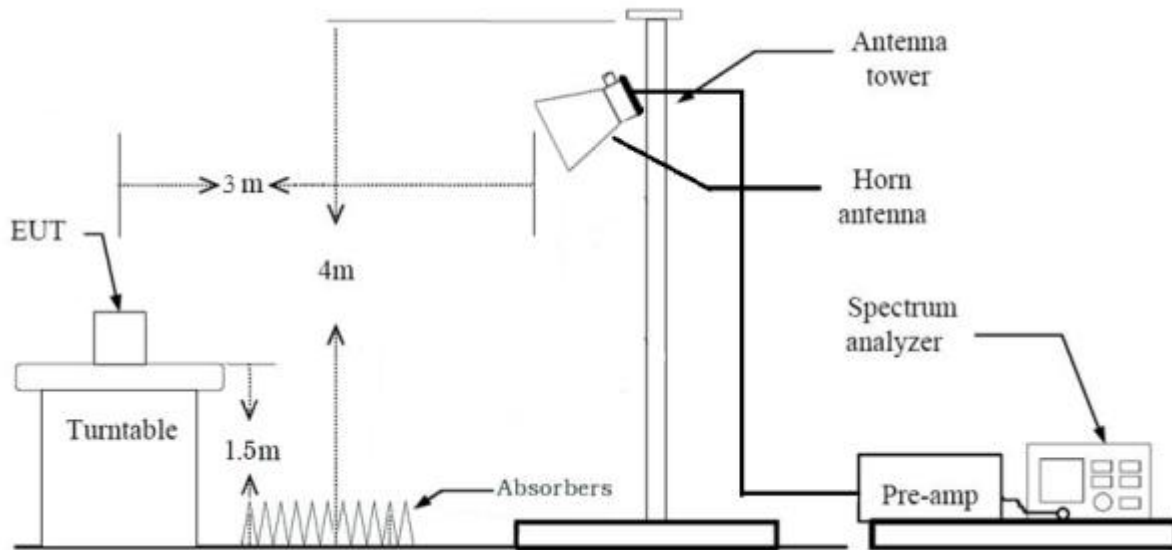
1. Below 30 MHz



2. 30 MHz - 1 GHz



3. Above 1 GHz



13.3 Test Date

October 17, 2022 ~ October 31, 2022

13.4 Test data for Below 30 MHz

- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 3 m
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Emission from the EUT more than 20 dB below the limit in each frequency range.									

13.5 Test data for 30 MHz ~ 1 000 MHz

13.5.1 Test data for WLAN 5 GHz

Humidity Level : 48 % R.H. Temperature: 23 °C

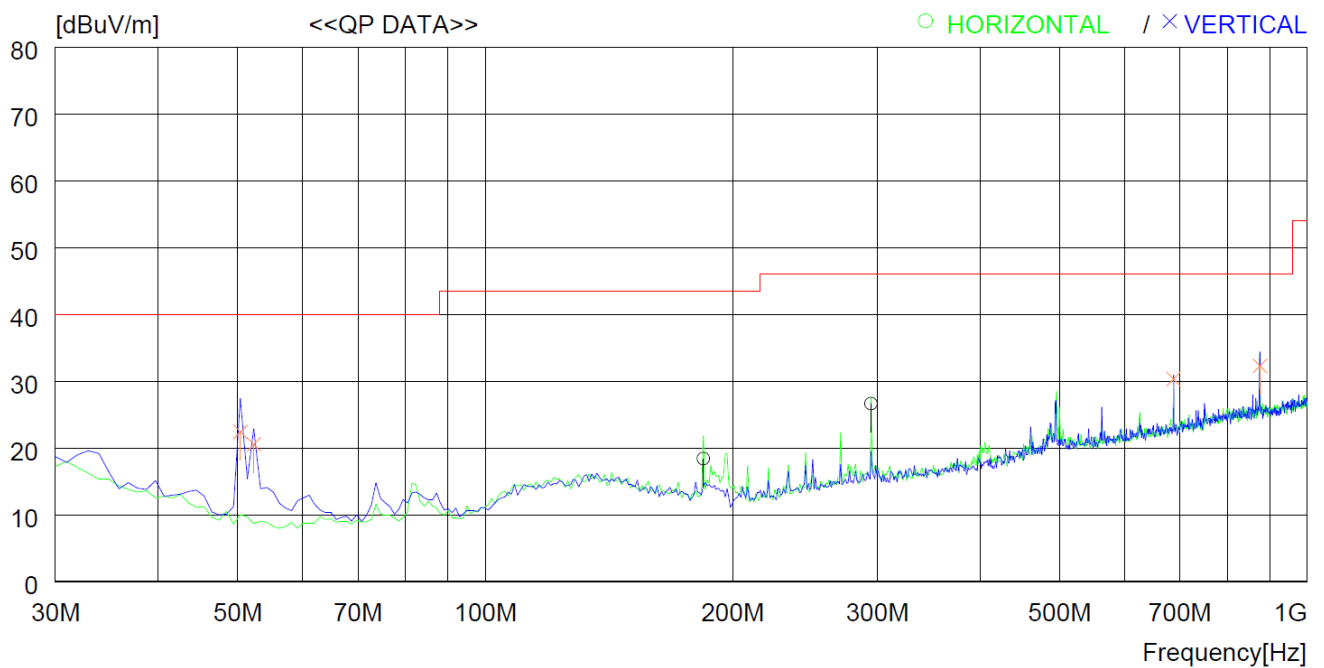
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Car Navigation

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)

-. Antenna 0, Antenna 1 and Multiple transmit tested, but the worst data were recorded.



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	184.230	32.5	16.3	1.7	32.1	18.4	43.5	25.1	200	129
2	294.810	37.6	19.0	2.2	32.2	26.6	46.0	19.4	100	359
----- Vertical -----										
3	50.370	40.6	12.9	0.9	32.0	22.4	40.0	17.6	100	0
4	52.310	38.9	12.7	0.9	32.0	20.5	40.0	19.5	300	0
5	687.655	34.1	25.2	3.4	32.4	30.3	46.0	15.7	100	34
6	875.830	33.1	27.4	3.9	32.1	32.3	46.0	13.7	100	234

13.5.2 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz)

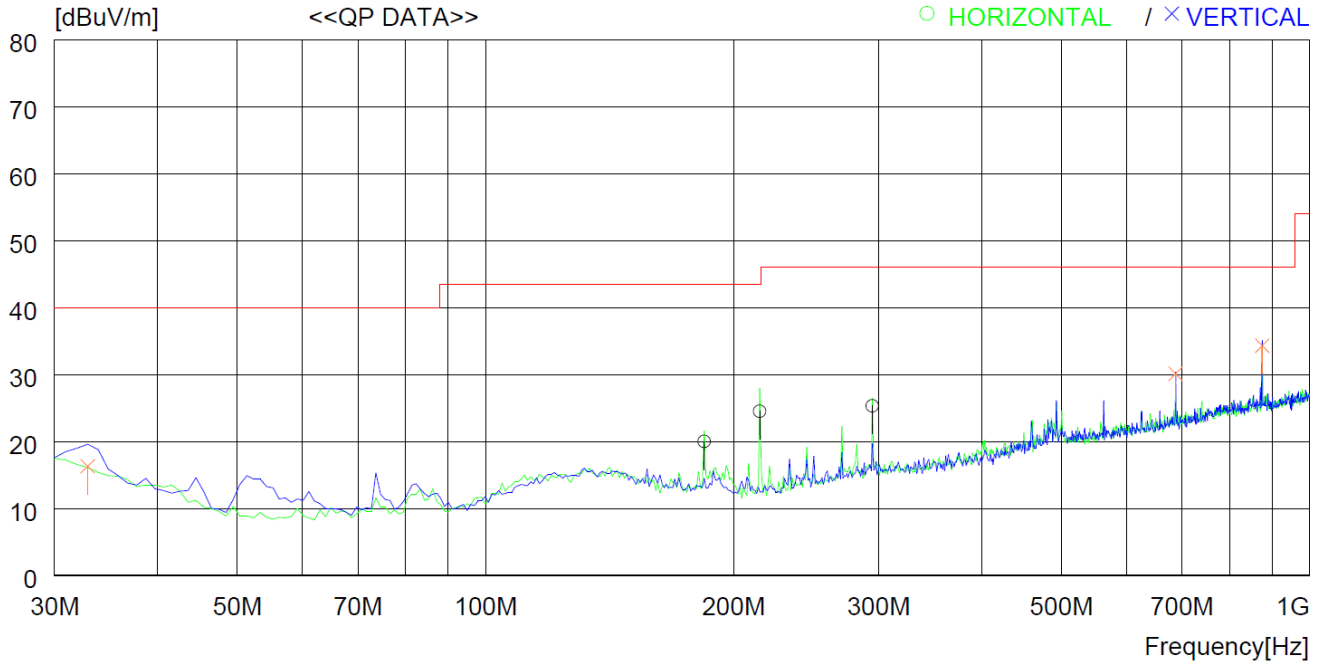
Humidity Level : 48 % R.H. Temperature: 23 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

Result : PASSED

EUT : Car Navigation

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	184.230	34.1	16.3	1.7	32.1	20.0	43.5	23.5	200	359
2	215.270	38.6	16.1	1.9	32.1	24.5	43.5	19.0	100	0
3	294.810	36.3	19.0	2.2	32.2	25.3	46.0	20.7	100	126
----- Vertical -----										
4	32.910	27.5	20.2	0.7	32.1	16.3	40.0	23.7	100	350
5	687.655	33.9	25.2	3.4	32.4	30.1	46.0	15.9	100	2
6	875.830	35.1	27.4	3.9	32.1	34.3	46.0	11.7	100	359

13.6 Test data for Above 1 GHz

13.6.1 Test data for Frequency UNII I

13.6.1.1 Test data for 802.11a RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 98.96 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
10 360.000	50.36	Peak	H	39.32	16.23	45.33	-	60.58	68.20	7.62
10 360.000	49.94	Peak	V	39.32	16.23	45.33	-	60.16	68.20	8.04
10 440.000	50.27	Peak	H	39.40	16.23	45.31	-	60.59	68.20	7.61
10 440.000	50.11	Peak	V	39.40	16.23	45.31	-	60.43	68.20	7.77
10 480.000	50.82	Peak	H	39.46	16.35	45.30	-	61.33	68.20	6.87
10 480.000	50.56	Peak	V	39.46	16.35	45.30	-	61.07	68.20	7.13

Remark - "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

13.6.1.2 Test data for 802.11n_HT20 RLAN Mode

13.6.1.2.1 Test data for Multiple Transmit

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 98.89 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
10 360.000	49.98	Peak	H	39.32	16.23	45.33	-	60.20	68.20	8.00
10 360.000	50.28	Peak	V	39.32	16.23	45.33	-	60.50	68.20	7.70
10 440.000	51.00	Peak	H	39.40	16.23	45.31	-	61.32	68.20	6.88
10 440.000	50.28	Peak	V	39.40	16.23	45.31	-	60.60	68.20	7.60
10 480.000	51.14	Peak	H	39.46	16.35	45.30	-	61.65	68.20	6.55
10 480.000	51.43	Peak	V	39.46	16.35	45.30	-	61.94	68.20	6.26

Remark - "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

13.6.1.3 Test data for 802.11n_HT40 RLAN Mode

13.6.1.3.1 Test data for Multiple Transmit

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 97.65 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
10 380.000	50.30	Peak	H	39.38	16.23	45.32	-	60.59	68.20	7.61
10 380.000	50.67	Peak	V	39.38	16.23	45.32	-	60.96	68.20	7.24
10 460.000	50.47	Peak	H	39.45	16.35	45.30	-	60.97	68.20	7.23
10 460.000	50.45	Peak	V	39.45	16.35	45.30	-	60.95	68.20	7.25

Remark - “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

13.6.1.4 Test data for 802.11ac_HT80 RLAN Mode

13.6.1.4.1 Test data for Multiple Transmit

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 92.31 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
10 420.000	50.60	Peak	H	39.40	16.23	45.32	-	60.91	68.20	7.29
10 420.000	50.13	Peak	V	39.40	16.23	45.32	-	60.44	68.20	7.76

Remark - "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

13.6.4 Test data for Frequency UNII 3

13.6.4.1 Test data for 802.11a RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 98.96 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
11 490.000	49.65	Peak	H	39.48	16.17	45.30	-	60.00	74.00	14.00
11 490.000	37.15	Average	H	39.48	16.17	45.30	0.05	47.55	54.00	6.45
11 490.000	49.37	Peak	V	39.48	16.17	45.30	-	59.72	74.00	14.28
11 490.000	36.83	Average	V	39.48	16.17	45.30	0.05	47.23	54.00	6.77
11 570.000	50.50	Peak	H	39.65	16.45	45.30	-	61.30	74.00	12.70
11 570.000	38.04	Average	H	39.65	16.45	45.30	0.05	48.89	54.00	5.11
11 570.000	49.93	Peak	V	39.65	16.45	45.30	-	60.73	74.00	13.27
11 570.000	37.81	Average	V	39.65	16.45	45.30	0.05	48.66	54.00	5.34
11 650.000	50.87	Peak	H	39.89	16.45	45.30	-	61.91	74.00	12.09
11 650.000	38.31	Average	H	39.89	16.45	45.30	0.05	49.40	54.00	4.60
11 650.000	50.17	Peak	V	39.89	16.45	45.30	-	61.21	74.00	12.79
11 650.000	38.22	Average	V	39.89	16.45	45.30	0.05	49.31	54.00	4.69

Remark - "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

13.6.4.2 Test data for 802.11n_HT20 RLAN Mode

13.6.4.2.1 Test data for Test data for Multiple Transmit

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 98.89 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
11 490.000	49.37	Peak	H	39.48	16.17	45.30	-	59.72	74.00	14.28
11 490.000	36.82	Average	H	39.48	16.17	45.30	0.05	47.22	54.00	6.78
11 490.000	49.05	Peak	V	39.48	16.17	45.30	-	59.40	74.00	14.60
11 490.000	36.76	Average	V	39.48	16.17	45.30	0.05	47.16	54.00	6.84
11 570.000	49.91	Peak	H	39.65	16.45	45.30	-	60.71	74.00	13.29
11 570.000	37.72	Average	H	39.65	16.45	45.30	0.05	48.57	54.00	5.43
11 570.000	50.02	Peak	V	39.65	16.45	45.30	-	60.82	74.00	13.18
11 570.000	37.57	Average	V	39.65	16.45	45.30	0.05	48.42	54.00	5.58
11 650.000	50.86	Peak	H	39.89	16.45	45.30	-	61.90	74.00	12.10
11 650.000	37.89	Average	H	39.89	16.45	45.30	0.05	48.98	54.00	5.02
11 650.000	49.82	Peak	V	39.89	16.45	45.30	-	60.86	74.00	13.14
11 650.000	37.84	Average	V	39.89	16.45	45.30	0.05	48.93	54.00	5.07

Remark - “H”: Horizontal, “V”: Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

13.6.4.3 Test data for 802.11n_HT40 RLAN Mode

13.6.4.3.1 Test data for Multiple Transmit

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 97.65 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
11 510.000	49.73	Peak	H	39.53	16.17	45.30	-	60.13	74.00	13.87
11 510.000	37.74	Average	H	39.53	16.17	45.30	0.10	48.24	54.00	5.76
11 510.000	50.17	Peak	V	39.53	16.17	45.30	-	60.57	74.00	13.43
11 510.000	37.64	Average	V	39.53	16.17	45.30	0.10	48.14	54.00	5.86
11 590.000	50.27	Peak	H	39.69	16.45	45.30	-	61.11	74.00	12.89
11 590.000	37.62	Average	H	39.69	16.45	45.30	0.10	48.56	54.00	5.44
11 590.000	49.86	Peak	V	39.69	16.45	45.30	-	60.70	74.00	13.30
11 590.000	37.56	Average	V	39.69	16.45	45.30	0.10	48.50	54.00	5.50

Remark - "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

13.6.4.4 Test data for 802.11ac_VHT80 RLAN Mode

13.6.4.4.1 Test data for Multiple Transmit

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode for the emissions fall in restricted band,
1 MHz and RMS Detector for Average Mode for the emissions fall in restricted band
100 kHz for Peak Mode for the emissions outside restricted band
- Video bandwidth : 3 MHz for Peak and Average Mode
- Frequency range : 1 GHz ~ 40 GHz
- Measurement distance : 3 m
- Duty Cycle : 92.31 %
- Operating mode : Transmitting mode

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit										
11 550.000	49.61	Peak	H	39.62	16.45	45.30	-	60.38	74.00	13.62
11 550.000	37.55	Average	H	39.62	16.45	45.30	0.35	48.67	54.00	5.33
11 550.000	49.52	Peak	V	39.62	16.45	45.30	-	60.29	74.00	13.71
11 550.000	37.62	Average	V	39.62	16.45	45.30	0.35	48.74	54.00	5.26

Remark - "H": Horizontal, "V": Vertical

Margin (dB) = Limits (dBμV/m) - Emission Level (dBμV/m)

14. RADIATED RESTRICTED BAND EDGE MEASUREMENTS

14.1 Operating environment

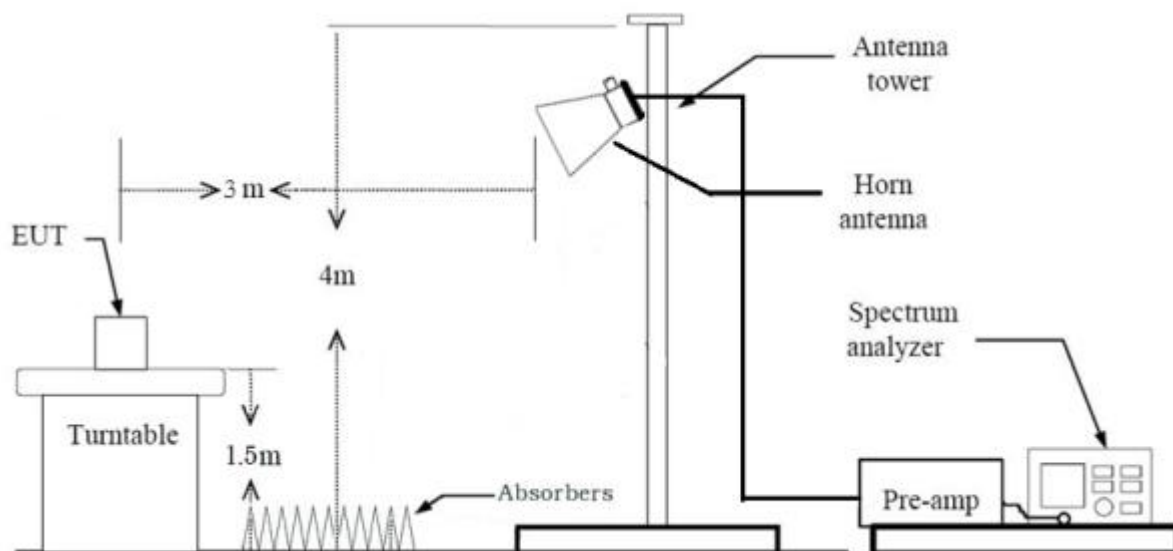
Temperature : 23 °C
 Relative humidity : 48 % R.H.

14.2 Test set-up for conducted measurement

The radiated emissions measurements were performed on the 3 m, open-field test site. The EUT was placed on a non-conductive turntable above the ground plane.

The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 m in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

1. Above 1 GHz



14.3 Test Date

October 17, 2022 ~ October 31, 2022

14.4 Test data for Frequency UNII I

14.4.1 Test data for 802.11a RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 98.96 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit											
4636.88	50.57	Peak	H	33.15	10.80	44.63	5.83	-	55.72	74.00	18.28
5142.30	39.82	Average	H	34.28	11.11	44.73	5.80	0.05	46.33	54.00	7.67
4686.47	50.74	Peak	V	33.35	10.73	44.64	5.83	-	56.01	74.00	17.99
5120.56	38.84	Average	V	34.24	11.16	44.72	5.80	0.05	45.37	54.00	8.63

Tabulated test data for Restricted Band

Remark - “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$

14.4.2 Test data for 802.11n_HT20 RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 98.89 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit											
4609.03	51.12	Peak	H	33.04	10.80	44.62	5.83	-	56.17	74.00	17.83
5147.05	39.63	Average	H	34.29	11.11	44.73	5.80	0.05	46.15	54.00	7.85
4571.67	50.62	Peak	V	32.94	10.80	44.61	5.83	-	55.58	74.00	18.42
5094.75	39.00	Average	V	34.18	11.16	44.72	5.80	0.05	45.47	54.00	8.53

Tabulated test data for Restricted Band

Remark - “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$

14.4.3 Test data for 802.11n_HT40 RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 97.65 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit											
5148.30	56.41	Peak	H	34.30	11.11	44.73	5.80	-	62.89	74.00	11.11
5149.68	40.91	Average	H	34.30	11.11	44.73	5.80	0.10	47.49	54.00	6.51
5148.99	55.01	Peak	V	34.30	11.11	44.73	5.80	-	61.49	74.00	12.51
5148.99	39.62	Average	V	34.30	11.11	44.73	5.80	0.10	46.20	54.00	7.80

Tabulated test data for Restricted Band

Remark - “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$

14.4.4 Test data for 802.11ac_VHT80 RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 92.31 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit											
5149.36	57.28	Peak	H	34.30	11.11	44.73	5.80	-	63.76	74.00	10.24
5147.23	44.15	Average	H	34.29	11.11	44.73	5.80	0.35	50.97	54.00	3.03
5144.39	52.63	Peak	V	34.29	11.11	44.73	5.80	-	59.10	74.00	14.90
5143.68	40.66	Average	V	34.29	11.11	44.73	5.80	0.35	47.48	54.00	6.52

Tabulated test data for Restricted Band

Remark - “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$

14.7 Test data for Frequency U-NII-3

14.7.1 Test data for 802.11a RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 98.96 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Multiple Transmit											
5690.23	57.00	Peak	H	34.10	11.72	44.65	5.83	-	64.00	97.97	33.97
5719.89	68.43	Peak	H	34.18	11.72	44.62	5.83	-	75.54	110.77	35.23
5724.73	72.17	Peak	H	34.20	11.72	44.62	5.83	-	79.30	121.58	42.28
5853.83	55.38	Peak	H	34.62	11.84	44.52	5.84	-	63.16	113.47	50.31
5862.12	55.10	Peak	H	34.65	11.84	44.51	5.84	-	62.92	108.81	45.89
5894.91	55.10	Peak	H	34.78	11.90	44.48	5.84	-	63.14	90.47	27.33
5697.13	56.96	Peak	V	34.10	11.72	44.64	5.83	-	63.97	103.08	39.11
5719.37	65.52	Peak	V	34.18	11.72	44.62	5.83	-	72.63	110.62	37.99
5723.58	72.04	Peak	V	34.19	11.72	44.62	5.83	-	79.16	118.96	39.80
5854.76	55.22	Peak	V	34.62	11.84	44.52	5.84	-	63.00	111.35	48.35
5874.15	55.44	Peak	V	34.70	11.84	44.50	5.84	-	63.32	105.44	42.12
5916.83	55.75	Peak	V	34.87	11.90	44.47	5.84	-	63.89	74.25	10.36

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Multiple Transmit											
5665.71	54.58	Peak	H	34.10	11.70	44.67	5.83	-	61.54	79.83	18.29
5707.66	55.17	Peak	H	34.13	11.72	44.63	5.83	-	62.22	107.34	45.12
5721.48	54.55	Peak	H	34.19	11.72	44.62	5.83	-	61.67	114.17	52.50
5850.11	66.38	Peak	H	34.60	11.84	44.52	5.84	-	74.14	121.95	47.81
5857.27	62.11	Peak	H	34.63	11.84	44.51	5.84	-	69.91	110.16	40.25
5875.87	55.68	Peak	H	34.70	11.90	44.50	5.84	-	63.62	104.56	40.94
5686.29	54.61	Peak	V	34.10	11.72	44.65	5.83	-	61.61	95.05	33.44
5716.09	54.59	Peak	V	34.16	11.72	44.63	5.83	-	61.67	109.71	48.04
5723.50	54.89	Peak	V	34.19	11.72	44.62	5.83	-	62.01	118.78	56.77
5850.03	67.59	Peak	V	34.60	11.84	44.52	5.84	-	75.35	122.13	46.78
5855.61	62.50	Peak	V	34.62	11.84	44.52	5.84	-	70.28	110.63	40.35
5910.14	56.46	Peak	V	34.84	11.90	44.47	5.84	-	64.57	79.20	14.63

Tabulated test data for Restricted Band

Remark - "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$

14.7.2 Test data for 802.11n_HT20 RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 98.89 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Multiple Transmit											
5698.28	57.89	Peak	H	34.10	11.72	44.64	5.83	-	64.90	103.93	39.03
5718.39	69.93	Peak	H	34.17	11.72	44.63	5.83	-	77.02	110.35	33.33
5722.08	73.53	Peak	H	34.19	11.72	44.62	5.83	-	80.65	115.54	34.89
5851.66	54.87	Peak	H	34.61	11.84	44.52	5.84	-	62.64	118.42	55.78
5865.26	54.91	Peak	H	34.66	11.84	44.51	5.84	-	62.74	107.93	45.19
5924.88	55.47	Peak	H	34.90	11.90	44.46	5.84	-	63.65	68.29	4.64
5697.98	57.73	Peak	V	34.10	11.72	44.64	5.83	-	64.74	103.71	38.97
5719.01	69.93	Peak	V	34.18	11.72	44.62	5.83	-	77.04	110.52	33.48
5722.42	72.28	Peak	V	34.19	11.72	44.62	5.83	-	79.40	116.32	36.92
5851.95	54.66	Peak	V	34.61	11.84	44.52	5.84	-	62.43	117.75	55.32
5861.44	54.82	Peak	V	34.65	11.84	44.51	5.84	-	62.64	109.00	46.36
5876.87	55.65	Peak	V	34.71	11.90	44.50	5.84	-	63.60	103.82	40.22

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Multiple Transmit											
5668.86	54.25	Peak	H	34.10	11.70	44.66	5.83	-	61.22	82.16	20.94
5716.49	55.10	Peak	H	34.17	11.72	44.63	5.83	-	62.19	109.82	47.63
5724.54	55.86	Peak	H	34.20	11.72	44.62	5.83	-	62.99	121.15	58.16
5852.30	68.37	Peak	H	34.61	11.84	44.52	5.84	-	76.14	116.96	40.82
5855.61	64.57	Peak	H	34.62	11.84	44.52	5.84	-	72.35	110.63	38.28
5875.42	58.57	Peak	H	34.70	11.90	44.50	5.84	-	66.51	104.89	38.38
5677.15	54.51	Peak	V	34.10	11.72	44.66	5.83	-	61.50	88.29	26.79
5706.68	54.68	Peak	V	34.13	11.72	44.63	5.83	-	61.73	107.07	45.34
5721.30	54.32	Peak	V	34.19	11.72	44.62	5.83	-	61.44	113.76	52.32
5850.23	66.99	Peak	V	34.60	11.84	44.52	5.84	-	74.75	121.68	46.93
5855.83	64.31	Peak	V	34.62	11.84	44.52	5.84	-	72.09	110.57	38.48
5875.08	57.69	Peak	V	34.70	11.90	44.50	5.84	-	65.63	105.14	39.51

Tabulated test data for Restricted Band

Remark - "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$

14.7.3 Test data for 802.11n_HT40 RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 97.65 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Multiple Transmit											
5699.58	65.36	Peak	H	34.10	11.72	44.64	5.83	-	72.37	104.89	32.52
5719.97	72.66	Peak	H	34.18	11.72	44.62	5.83	-	79.77	110.79	31.02
5722.70	74.07	Peak	H	34.19	11.72	44.62	5.83	-	81.19	116.96	35.77
5850.77	54.83	Peak	H	34.60	11.84	44.52	5.84	-	62.59	120.44	57.85
5867.22	56.28	Peak	H	34.67	11.84	44.51	5.84	-	64.12	107.38	43.26
5912.74	55.24	Peak	H	34.85	11.90	44.47	5.84	-	63.36	77.27	13.91
5699.98	65.12	Peak	V	34.10	11.72	44.64	5.83	-	72.13	105.19	33.06
5711.90	72.95	Peak	V	34.15	11.72	44.63	5.83	-	80.02	108.53	28.51
5721.35	73.92	Peak	V	34.19	11.72	44.62	5.83	-	81.04	113.88	32.84
5854.55	55.04	Peak	V	34.62	11.84	44.52	5.84	-	62.82	111.83	49.01
5867.22	54.99	Peak	V	34.67	11.84	44.51	5.84	-	62.83	107.38	44.55
5882.77	54.93	Peak	V	34.73	11.90	44.49	5.84	-	62.91	99.45	36.54

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBμV/m)	Limits (dBμV/m)	Margin (dB)
Multiple Transmit											
5699.83	57.50	Peak	H	34.10	11.72	44.64	5.83	-	64.51	105.07	40.56
5710.98	61.81	Peak	H	34.14	11.72	44.63	5.83	-	68.87	108.27	39.40
5722.83	63.41	Peak	H	34.19	11.72	44.62	5.83	-	70.53	117.25	46.72
5852.37	61.40	Peak	H	34.61	11.84	44.52	5.84	-	69.17	116.80	47.63
5866.42	60.43	Peak	H	34.67	11.84	44.51	5.84	-	68.27	107.60	39.33
5875.27	57.64	Peak	H	34.70	11.90	44.50	5.84	-	65.58	105.00	39.42
5699.23	55.45	Peak	V	34.10	11.72	44.64	5.83	-	62.46	104.63	42.17
5710.86	59.84	Peak	V	34.14	11.72	44.63	5.83	-	66.90	108.24	41.34
5722.64	63.30	Peak	V	34.19	11.72	44.62	5.83	-	70.42	116.82	46.40
5852.77	59.97	Peak	V	34.61	11.84	44.52	5.84	-	67.74	115.88	48.14
5858.93	58.65	Peak	V	34.64	11.84	44.51	5.84	-	66.46	109.70	43.24
5887.51	55.43	Peak	V	34.75	11.90	44.49	5.84	-	63.43	95.94	32.51

Tabulated test data for Restricted Band

Remark - "H": Horizontal, "V": Vertical

$$\text{Margin (dB)} = \text{Limits (dB}\mu\text{V/m)} - \text{Emission Level (dB}\mu\text{V/m)}$$

14.7.4 Test data for 802.11ac_VHT80 RLAN Mode

- Resolution bandwidth : 1 MHz and Peak Detector for Peak Mode
1 MHz and RMS Detector for Average Mode
- Video bandwidth : 3 MHz for Peak and Average Mode
- Measurement distance : 3 m
- Duty Cycle : 92.31 %
- Result : Pass

Frequency (MHz)	Reading (dBμV)	Detector Mode	Ant. Pol. (H/V)	Ant. Factor (dB/m)	Cable Loss (dB)	AMP Gain (dB)	ATT (dB)	Duty (dB)	Total (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Multiple Transmit											
5690.63	64.21	Peak	H	34.10	11.72	44.65	5.83	-	71.21	98.27	27.06
5714.96	67.99	Peak	H	34.16	11.72	44.63	5.83	-	75.07	109.39	34.32
5724.33	67.43	Peak	H	34.20	11.72	44.62	5.83	-	74.56	120.67	46.11
5850.06	63.43	Peak	H	34.60	11.84	44.52	5.84	-	71.19	122.06	50.87
5869.84	63.34	Peak	H	34.68	11.84	44.50	5.84	-	71.20	106.64	35.44
5880.27	57.33	Peak	H	34.72	11.90	44.50	5.84	-	65.29	101.30	36.01
5689.79	69.04	Peak	V	34.10	11.72	44.65	5.83	-	76.04	97.64	21.60
5709.72	70.04	Peak	V	34.14	11.72	44.63	5.83	-	77.10	107.92	30.82
5724.75	70.81	Peak	V	34.20	11.72	44.62	5.83	-	77.94	121.63	43.69
5850.19	66.48	Peak	V	34.60	11.84	44.52	5.84	-	74.24	121.77	47.53
5859.25	66.00	Peak	V	34.64	11.84	44.51	5.84	-	73.81	109.61	35.80
5876.02	59.62	Peak	V	34.70	11.90	44.50	5.84	-	67.56	104.45	36.89

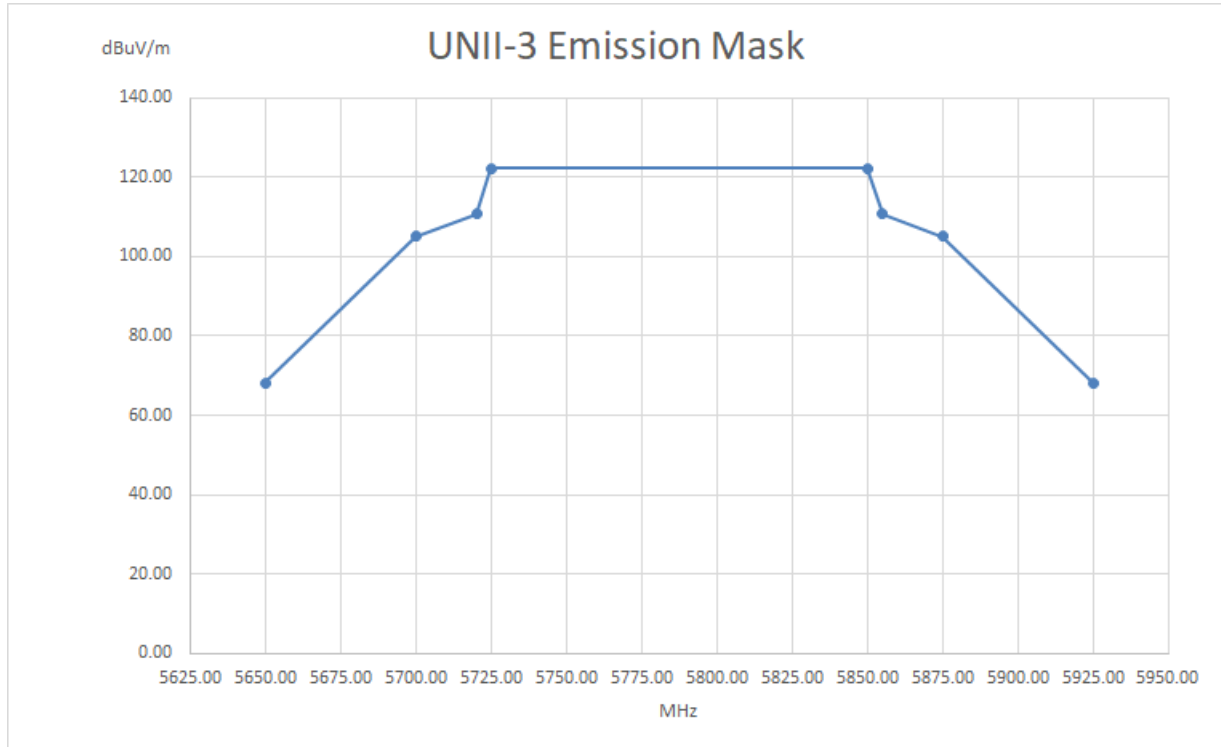
Tabulated test data for Restricted Band

Remark - “H”: Horizontal, “V”: Vertical

$$\text{Margin (dB)} = \text{Limits (dBμV/m)} - \text{Emission Level (dBμV/m)}$$

14.7.5 U-NII-3 Emission Limits

14.7.5.1 Emission Mask Plots



Remark.

- . Title 47 → Part 15 → Subpart E—UNLICENSED NATIONAL INFORMATION INFRASTRUCTURE DEVICES

§ 15.407 General technical requirements.

(4) For transmitters operating in the 5.725-5.85 GHz band:

- (i) All emissions shall be limited to a level of -27 dBm/MHz at 75 MHz or more above or below the band edge increasing linearly to 10 dBm/MHz at 25 MHz above or below the band edge, and from 25 MHz above or below the band edge increasing linearly to a level of 15.6 dBm/MHz at 5 MHz above or below the band edge, and from 5 MHz above or below the band edge increasing linearly to a level of 27 dBm/MHz at the band edge.

15. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal.(Interval)
FSVA40	Rohde & Schwarz	Signal Analyzer	101586	Apr. 21, 2022 (1Y)
ESU	Rohde & Schwarz	EMI Test Receiver	100261	Mar. 07, 2022 (1Y)
310N	Sonoma Instrument	Pre-Amplifier	392756	Oct. 13, 2022 (1Y)
SCU18	Rohde & Schwarz	Signal Conditioning unit	102266	Jul. 12, 2022 (1Y)
SCU40A	Rohde & Schwarz	Signal Conditioning unit	100436	Jan. 18, 2022 (1Y)
GP-4303D	LG Precision Co.,Ltd	DC POWER SUPPLY	5071069	Jan. 03, 2022 (1Y)
WT-A5851-R12	Microwave	Cavity Band Rejection Filter	WT22040502-2	Jun. 21, 2022 (1Y)
WT-A1856-R12	Microwave	Cavity Band Rejection Filter	WT22040502-4	Jun. 21, 2022 (1Y)
PSL-2KP	ESPEC	Environmental Test Chamber	14009407	Jan. 18, 2022 (1Y)
DT2000-2t	Innco System	Turn Table	N/A	N/A
MA-4640-XPET	Innco System	Antenna Master	MA4640/652/43100318/P	N/A
CO3000	Innco System	Controller	1026/40960617/P	N/A
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar. 24, 2022 (2Y)
HLP-2008	TDK	Hybrid Antenna	131316	Mar. 07, 2022 (2Y)
BBHA9120D	Schwarzbeck	Horn Antenna	9120D-1349	Jul. 08, 2022 (1Y)
BBHA9170	Schwarzbeck	Horn Antenna	BBHA9170179	Jan. 21, 2022 (1Y)

All test equipment used is calibrated on a regular basis.