

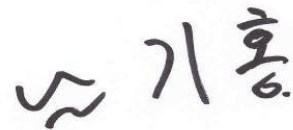
RADIO PERFORMANCE TEST REPORT

Test Report No. : OT-22N-RWD-057
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-MIB3OI01
Model Name : MIB3 OI
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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CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE	7
2. TEST SUMMARY.....	8
2.1 TEST ITEMS AND RESULTS	8
2.2 ADDITIONS, DEVIATIONS, EXCLUSIONS FROM STANDARDS.....	8
2.3 RELATED SUBMITTAL(S) / GRANT(S)	8
2.4 PURPOSE OF THE TEST	8
2.5 TEST METHODOLOGY.....	8
2.6 TEST FACILITY.....	8
3. GENERAL INFORMATION.....	9
3.1 PRODUCT DESCRIPTION.....	9
3.2 ALTERNATIVE TYPE(S)/MODEL(S); ALSO COVERED BY THIS TEST REPORT.....	11
4. EUT MODIFICATIONS.....	11
5. SYSTEM TEST CONFIGURATION	12
5.1 JUSTIFICATION.....	12
5.2 PERIPHERAL EQUIPMENT	12
5.3 MODE OF OPERATION DURING THE TEST	13
5.4 CONFIGURATION OF TEST SYSTEM.....	17
5.5 ANTENNA REQUIREMENT	17
6. PRELIMINARY TEST	17
6.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....	17
6.2 GENERAL RADIATED EMISSIONS TESTS	17
7. 99 % OCCUPIED BANDWIDTH & MIMIMUM 26 DB BANDWIDTH	18
7.1 OPERATING ENVIRONMENT	18
7.2 TEST SET-UP	18
7.3 TEST DATE	18
7.4 TEST DATA FOR 802.11A RLAN MODE.....	19
7.4.1 Test data for Antenna 0	19
7.4.2 Test data for Antenna 1	20
7.5 TEST DATA FOR 802.11N_HT20 RLAN MODE.....	21
7.5.1 Test data for Antenna 0	21
7.5.2 Test data for Antenna 1	22
7.6 TEST DATA FOR 802.11N_HT40 RLAN MODE.....	23
7.6.1 Test data for Antenna 0	23
7.6.2 Test data for Antenna 1	24

7.7 TEST DATA FOR 802.11AC_VHT80 RLAN MODE.....	25
7.7.1 Test data for Antenna 0	25
7.7.2 Test data for Antenna 1	25
8. 6 DB BANDWIDTH	26
8.1 OPERATING ENVIRONMENT	26
8.2 TEST SET-UP	26
8.3 TEST DATE	26
8.4 TEST DATA FOR 802.11A RLAN MODE.....	27
8.4.1 Test data for Antenna 0	27
8.4.2 Test data for Antenna 1	27
8.5 TEST DATA FOR 802.11N_HT20 RLAN MODE.....	28
8.5.1 Test data for Antenna 0	28
8.5.2 Test data for Antenna 1	28
8.6 TEST DATA FOR 802.11N_HT40 RLAN MODE.....	29
8.6.1 Test data for Antenna 0	29
8.6.2 Test data for Antenna 1	29
8.7 TEST DATA FOR 802.11AC_VHT80 RLAN MODE.....	29
8.7.1 Test data for Antenna 0	29
8.7.2 Test data for Antenna 1	29
9. MAXIMUM CONDUCTED(AVERAGE) OUTPUT POWER	30
9.1 OPERATING ENVIRONMENT	30
9.2 TEST SET-UP	30
9.3 TEST DATE	30
9.4 TEST DATA FOR 802.11A RLAN MODE.....	31
9.4.1 Test data for Antenna 0	31
9.4.2 Test data for Antenna 1	31
9.4.3 Test data for Multiple Transmit	32
9.5 TEST DATA FOR 802.11N_HT20 RLAN MODE.....	33
9.5.1 Test data for Antenna 0	33
9.5.2 Test data for Antenna 1	33
9.5.3 Test data for Multiple Transmit	34
9.6 TEST DATA FOR 802.11N_HT40 RLAN MODE.....	35
9.6.1 Test data for Antenna 0	35
9.6.2 Test data for Antenna 1	35
9.6.3 Test data for Multiple Transmit	35
9.7 TEST DATA FOR 802.11AC_HT80 RLAN MODE.....	36
9.7.1 Test data for Antenna 0	36

9.7.2 Test data for Antenna 136

9.7.3 Test data for Multiple Transmit36

10. PEAK POWER SPECTRUL DENSITY37

10.1 OPERATING ENVIRONMENT37

10.2 TEST SET-UP37

10.3 TEST DATE37

10.4 TEST DATA FOR 802.11A RLAN MODE.....38

10.4.1 Test data for Antenna 038

10.4.2 Test data for Antenna 138

10.4.3 Test data for Multiple Transmit39

10.5 TEST DATA FOR 802.11N_HT20 RLAN MODE.....40

10.5.1 Test data for Antenna 040

10.5.2 Test data for Antenna 140

10.5.3 Test data for Multiple Transmit41

10.6 TEST DATA FOR 802.11N_HT40 RLAN MODE.....42

10.6.1 Test data for Antenna 042

10.6.2 Test data for Antenna 142

10.7 TEST DATA FOR 802.11AC_HT80 RLAN MODE.....44

10.7.1 Test data for Antenna 044

10.7.2 Test data for Antenna 144

10.7.3 Test data for Multiple Transmit44

11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION.....45

11.1 OPERATING ENVIRONMENT45

11.2 TEST SET-UP45

11.3 TEST DATE45

11.4 TEST DATA FOR U-NII-146

11.5 TEST DATA FOR U-NII-347

12. FREQUENCY STABILITY WITH VOLTAGE VARIATION.....48

12.1 OPERATING ENVIRONMENT48

12.2 TEST SET-UP48

12.3 TEST DATE48

12.4 TEST DATA FOR U-NII-149

12.5 TEST DATA FOR U-NII-349

13. RADIATED SPURIOUS EMISSIONS50

13.1 OPERATING ENVIRONMENT50

13.2 TEST SET-UP FOR CONDUCTED MEASUREMENT50

13.3 TEST DATE51

13.4 TEST DATA FOR BELOW 30 MHz	52
13.5 TEST DATA FOR 30 MHz ~ 1 000 MHz	53
<i>13.5.1 Test data for WLAN 5 GHz</i>	53
<i>13.5.2 Test data for Intermodulation Mode(Bluetooth + WLAN 5 GHz)</i>	54
13.6 Test data for Above 1 GHz	55
<i>13.6.1 Test data for Frequency UNII I</i>	55
<i>13.6.4 Test data for Frequency UNII 3</i>	59
14. RADIATED RESTRICTED BAND EDGE MEASUREMENTS	63
14.1 OPERATING ENVIRONMENT	63
14.2 TEST SET-UP FOR CONDUCTED MEASUREMENT	63
14.3 TEST DATE	63
14.4 TEST DATA FOR FREQUENCY UNII I	64
<i>14.4.1 Test data for 802.11a RLAN Mode</i>	64
<i>14.4.2 Test data for 802.11n_HT20 RLAN Mode</i>	65
<i>14.4.3 Test data for 802.11n_HT40 RLAN Mode</i>	66
<i>14.4.4 Test data for 802.11ac_VHT80 RLAN Mode</i>	67
14.7 TEST DATA FOR FREQUENCY U-NII-3	68
<i>14.7.1 Test data for 802.11a RLAN Mode</i>	68
<i>14.7.2 Test data for 802.11n_HT20 RLAN Mode</i>	70
<i>14.7.3 Test data for 802.11n_HT40 RLAN Mode</i>	72
<i>14.7.4 Test data for 802.11ac_VHT80 RLAN Mode</i>	74
<i>14.7.5 U-NII-3 Emission Limits</i>	75
15. LIST OF TEST EQUIPMENT	76

※ 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-057	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-MIB3OI01
 Model Name : MIB3 OI
 Brand Name : Volkswagen, Seat
 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)	Peak 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 (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	2.16 dBm	
		2 Mbps	0.93 dBm	
		3 Mbps	1.07 dBm	
	WLAN 2.4 GHz	10.49 dBm(802.11b) 10.88 dBm(802.11g) 11.11 dBm(802.11n_HT20)		
	WLAN 5 150 MHz ~ 5 250 MHz Band	Antenna 0	9.39 dBm(802.11a) 8.37 dBm(802.11n_HT20) 8.24 dBm(802.11n_HT40) 8.21 dBm(802.11ac_VHT80)	
		Antenna 1	8.46 dBm(802.11a) 8.45 dBm(802.11n_HT20) 8.29 dBm(802.11n_HT40) 8.24 dBm(802.11ac_VHT80)	
		Multiple Antenna	11.96 dBm(802.11a) 11.42 dBm(802.11n_HT20) 11.28 dBm(802.11n_HT40) 11.24 dBm(802.11ac_VHT80)	
	WLAN 5 725 MHz ~ 5 850 MHz Band	Antenna 0	13.70 dBm(802.11a) 13.72 dBm(802.11n_HT20) 13.86 dBm(802.11n_HT40) 13.98 dBm(802.11ac_VHT80)	
		Antenna 1	12.68 dBm(802.11a) 12.71 dBm(802.11n_HT20) 12.62 dBm(802.11n_HT40) 12.67 dBm(802.11ac_VHT80)	
		Multiple Antenna	16.22 dBm(802.11a) 16.25 dBm(802.11n_HT20) 16.29 dBm(802.11n_HT40) 16.38 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)		55.466 67 MHz, 40 MHz, 32 MHz, 28.63636 MHz, 25 MHz, 26 MHz, 20 MHz. 19.2 MHz		
RATED SUPPLY VOLTAGE		DC 12.0 V		

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	N/A	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	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	0.368	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

- 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	0.160	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) (5 775 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	0.132	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

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

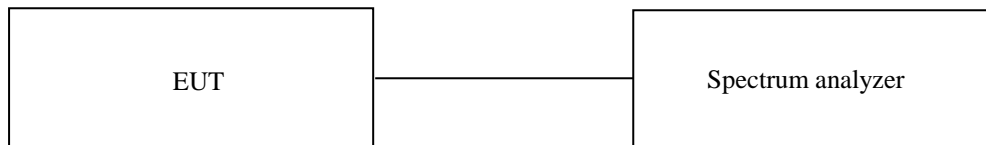
7.1 Operating environment

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	16.38
	High	5 825.00	16.48

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	19.53
	Middle	5 785.00	19.63
	High	5 825.00	19.38

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	16.38
	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	16.48
	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	19.93

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	17.58

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	19.98
	Middle	5 785.00	19.88
	High	5 825.00	19.88

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	17.63
	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	19.78
	Middle	5 785.00	19.78
	High	5 825.00	19.93

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	36.26
	High	5 230.00	36.16
5 725 ~ 5 850	Low	5 755.00	36.16
	High	5 795.00	36.36

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	40.56

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	36.16
5 725 ~ 5 850	Low	5 755.00	36.26
	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	39.96
	High	5 795.00	39.76

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	76.12
5 725 ~ 5 850	Middle	5 775.00	76.32

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	81.72

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	76.12
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	81.32

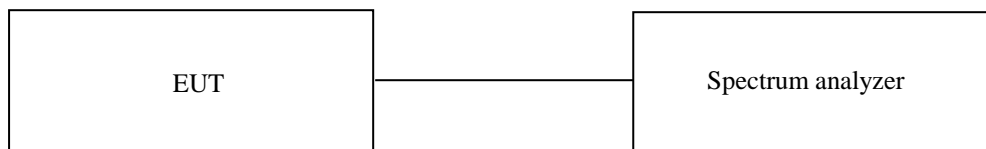
8. 6 dB BANDWIDTH

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	16.33	0.50	15.83
	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	16.38	0.50	15.88
	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	16.93	0.50	16.43
	Middle	5 785.00	16.88	0.50	16.38
	High	5 825.00	16.93	0.50	16.43

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	17.33	0.50	16.83
	Middle	5 785.00	17.53	0.50	17.03
	High	5 825.00	17.53	0.50	17.03

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	35.66	0.50	35.16

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	35.56	0.50	35.06
	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	76.32	0.50	75.82

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

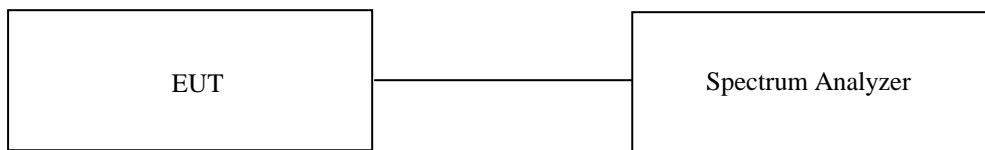
9.1 Operating environment

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	8.79	0.05	8.84	23.98	15.14
	Middle	5 220.00	9.03	0.05	9.08	23.98	14.90
	High	5 240.00	9.34	0.05	9.39	23.98	14.59
5 725 ~ 5 850	Low	5 745.00	13.64	0.05	13.69	30.00	16.31
	Middle	5 785.00	13.65	0.05	13.70	30.00	16.30
	High	5 825.00	13.64	0.05	13.69	30.00	16.31

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	7.75	0.05	7.80	23.98	16.18
	Middle	5 220.00	7.98	0.05	8.03	23.98	15.95
	High	5 240.00	8.41	0.05	8.46	23.98	15.52
5 725 ~ 5 850	Low	5 745.00	12.43	0.05	12.48	28.70	16.22
	Middle	5 785.00	12.33	0.05	12.38	28.70	16.32
	High	5 825.00	12.63	0.05	12.68	28.70	16.02

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	11.36	23.01	11.65
	Middle	5 220.00	11.60	23.01	11.41
	High	5 240.00	11.96	23.01	11.05
5 725 ~ 5 850	Low	5 745.00	16.14	27.51	11.37
	Middle	5 785.00	16.10	27.51	11.41
	High	5 825.00	16.22	27.51	11.29

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	7.84	0.05	7.89	23.98	16.09
	Middle	5 220.00	8.01	0.05	8.06	23.98	15.92
	High	5 240.00	8.32	0.05	8.37	23.98	15.61
5 725 ~ 5 850	Low	5 745.00	13.67	0.05	13.72	30.00	16.28
	Middle	5 785.00	13.62	0.05	13.67	30.00	16.33
	High	5 825.00	13.66	0.05	13.71	30.00	16.29

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	7.75	0.05	7.80	23.98	16.18
	Middle	5 220.00	7.96	0.05	8.01	23.98	15.97
	High	5 240.00	8.40	0.05	8.45	23.98	15.53
5 725 ~ 5 850	Low	5 745.00	12.46	0.05	12.51	28.70	16.19
	Middle	5 785.00	12.34	0.05	12.39	28.70	16.31
	High	5 825.00	12.66	0.05	12.71	28.70	15.99

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	10.86	23.01	12.15
	Middle	5 220.00	11.05	23.01	11.96
	High	5 240.00	11.42	23.01	11.59
5 725 ~ 5 850	Low	5 745.00	16.17	27.51	11.34
	Middle	5 785.00	16.09	27.51	11.42
	High	5 825.00	16.25	27.51	11.26

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	7.78	0.10	7.88	23.98	16.10
	High	5 230.00	8.14	0.10	8.24	23.98	15.74
5 725 ~ 5 850	Low	5 755.00	13.76	0.10	13.86	30.00	16.14
	High	5 795.00	13.53	0.10	13.63	30.00	16.37

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	7.69	0.10	7.79	23.98	16.19
	High	5 230.00	8.19	0.10	8.29	23.98	15.69
5 725 ~ 5 850	Low	5 755.00	12.52	0.10	12.62	28.70	16.08
	High	5 795.00	12.26	0.10	12.36	28.70	16.34

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	10.85	23.01	12.16
	High	5 230.00	11.28	23.01	11.73
5 725 ~ 5 850	Low	5 755.00	16.29	27.51	11.22
	High	5 795.00	16.05	27.51	11.46

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	7.86	0.35	8.21	23.98	15.77
5 725 ~ 5 850	Middle	5 775.00	13.63	0.35	13.98	30.00	16.02

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	7.89	0.35	8.24	23.98	15.74
5 725 ~ 5 850	Middle	5 775.00	12.32	0.35	12.67	28.70	16.03

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	11.24	23.01	11.77
5 725 ~ 5 850	Middle	5 775.00	16.38	27.51	11.13

Remark 1: Margin = Limit – Total Value

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

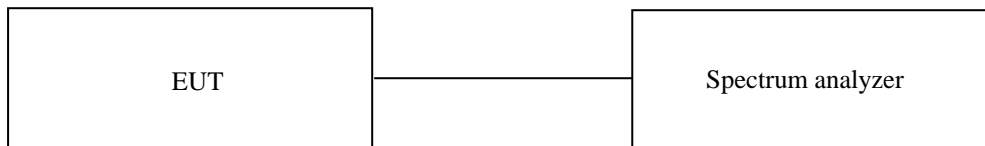
10. PEAK POWER SPECTRUL DENSITY

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	-2.27	0.05	-2.22	11.00	13.22
	Middle	5 220.00	-1.73	0.05	-1.68	11.00	12.68
	High	5 240.00	-1.38	0.05	-1.33	11.00	12.33
5 725 ~ 5 850	Low	5 745.00	-0.29	0.05	-0.24	30.00	30.24
	Middle	5 785.00	-0.11	0.05	-0.06	30.00	30.06
	High	5 825.00	-0.13	0.05	-0.08	30.00	30.08

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	-3.25	0.05	-3.20	11.00	14.20
	Middle	5 220.00	-3.06	0.05	-3.01	11.00	14.01
	High	5 240.00	-2.32	0.05	-2.27	11.00	13.27
5 725 ~ 5 850	Low	5 745.00	-1.61	0.05	-1.56	28.70	30.26
	Middle	5 785.00	-1.75	0.05	-1.70	28.70	30.40
	High	5 825.00	-1.16	0.05	-1.11	28.70	29.81

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	0.33	10.03	9.70
	Middle	5 220.00	0.72	10.03	9.31
	High	5 240.00	1.24	10.03	8.79
5 725 ~ 5 850	Low	5 745.00	2.16	27.51	25.35
	Middle	5 785.00	2.21	27.51	25.30
	High	5 825.00	2.45	27.51	25.06

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	-3.44	0.05	-3.39	11.00	14.39
	Middle	5 220.00	-3.20	0.05	-3.15	11.00	14.15
	High	5 240.00	-2.95	0.05	-2.90	11.00	13.90
5 725 ~ 5 850	Low	5 745.00	-0.32	0.05	-0.27	30.00	30.27
	Middle	5 785.00	-0.49	0.05	-0.44	30.00	30.44
	High	5 825.00	-0.57	0.05	-0.52	30.00	30.52

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	-3.26	0.05	-3.21	11.00	14.21
	Middle	5 220.00	-3.27	0.05	-3.22	11.00	14.22
	High	5 240.00	-2.65	0.05	-2.60	11.00	13.60
5 725 ~ 5 850	Low	5 745.00	-1.49	0.05	-1.44	28.70	30.14
	Middle	5 785.00	-1.83	0.05	-1.78	28.70	30.48
	High	5 825.00	-1.60	0.05	-1.55	28.70	30.25

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	-0.29	10.03	10.32
	Middle	5 220.00	-0.17	10.03	10.20
	High	5 240.00	0.26	10.03	9.77
5 725 ~ 5 850	Low	5 745.00	2.19	27.51	25.32
	Middle	5 785.00	1.95	27.51	25.56
	High	5 825.00	2.01	27.51	25.50

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	-6.19	0.10	-6.09	11.00	17.09
	High	5 230.00	-5.94	0.10	-5.84	11.00	16.84
5 725 ~ 5 850	Low	5 755.00	-3.17	0.10	-3.07	30.00	33.07
	High	5 795.00	-3.46	0.10	-3.36	30.00	33.36

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	-6.47	0.10	-6.37	11.00	17.37
	High	5 230.00	-5.74	0.10	-5.64	11.00	16.64
5 725 ~ 5 850	Low	5 755.00	-4.46	0.10	-4.36	28.70	33.06
	High	5 795.00	-5.00	0.10	-4.90	28.70	33.60

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	-3.22	10.03	13.25
	High	5 230.00	-2.73	10.03	12.76
5 725 ~ 5 850	Low	5 755.00	-0.66	27.51	28.17
	High	5 795.00	-1.05	27.51	28.56

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	-9.41	0.35	-9.06	11.00	20.06
5 725 ~ 5 850	Low	5 775.00	-7.00	0.35	-6.65	30.00	36.65

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	-9.66	0.35	-9.31	11.00	20.31
5 725 ~ 5 850	Low	5 775.00	-8.06	0.35	-7.71	28.70	36.41

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	-6.17	10.03	16.20
5 725 ~ 5 850	Middle	5 775.00	-4.14	27.51	31.65

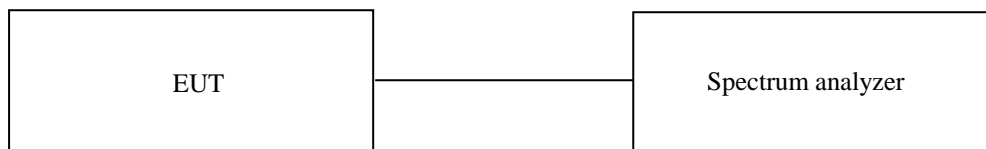
11. FREQUENCY STABILITY WITH TEMPERATURE VARIATION

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	5 180 012 115	12 115
-10		5 180 010 126	10 126
0		5 180 009 502	9 502
10		5 180 008 113	8 113
20		5 180 007 183	7 183
30		5 180 006 098	6 098
40		5 180 005 539	5 539
50		5 180 004 509	4 509
-20		5 220 000 000	5 220 011 198
-10	5 220 009 281		9 281
0	5 220 008 528		8 528
10	5 220 007 244		7 244
20	5 220 006 247		6 247
30	5 220 005 260		5 260
40	5 220 004 653		4 653
50	5 220 003 593		3 593
-20	5 240 000 000		5 240 012 955
-10		5 240 010 942	10 942
0		5 240 010 344	10 344
10		5 240 008 993	8 993
20		5 240 008 048	8 048
30		5 240 007 042	7 042
40		5 240 006 429	6 429
50		5 240 005 360	5 360

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	5 745 012 655	12 655
-10		5 745 010 673	10 673
0		5 745 009 982	9 982
10		5 745 008 745	8 745
20		5 745 007 716	7 716
30		5 745 006 729	6 729
40		5 745 006 127	6 127
50		5 745 005 135	5 135
-20		5 785 000 000	5 785 012 335
-10	5 785 010 408		10 408
0	5 785 009 795		9 795
10	5 785 008 358		8 358
20	5 785 007 373		7 373
30	5 785 006 316		6 316
40	5 785 005 806		5 806
50	5 785 004 793		4 793
-20	5 825 000 000		5 825 011 535
-10		5 825 009 567	9 567
0		5 825 008 978	8 978
10		5 825 007 632	7 632
20		5 825 006 586	6 586
30		5 825 005 605	5 605
40		5 825 004 942	4 942
50		5 825 003 944	3 944

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)

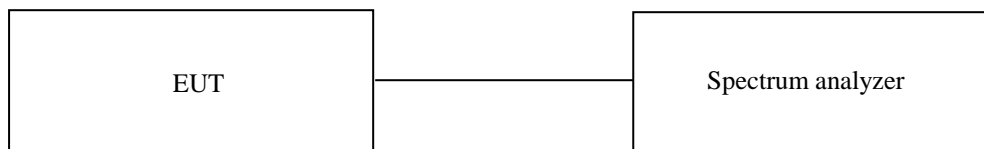
12. FREQUENCY STABILITY WITH VOLTAGE VARIATION

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	5 180 007 183	7 183
10.20		5 180 007 353	7 353
13.80		5 180 007 103	7 103
12.00	5 220 000 000	5 220 006 247	6 247
10.20		5 220 006 057	6 057
13.80		5 220 006 140	6 140
12.00	5 240 000 000	5 240 008 048	8 048
10.20		5 240 007 943	7 943
13.80		5 240 008 018	8 018

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	5 745 007 716	7 716
10.20		5 745 007 870	7 870
13.80		5 745 007 890	7 890
12.00	5 785 000 000	5 785 007 373	7 373
10.20		5 785 007 322	7 322
13.80		5 785 007 452	7 452
12.00	5 825 000 000	5 825 006 586	6 586
10.20		5 825 006 841	6 841
13.80		5 825 006 461	6 461

13. RADIATED SPURIOUS EMISSIONS

13.1 Operating environment

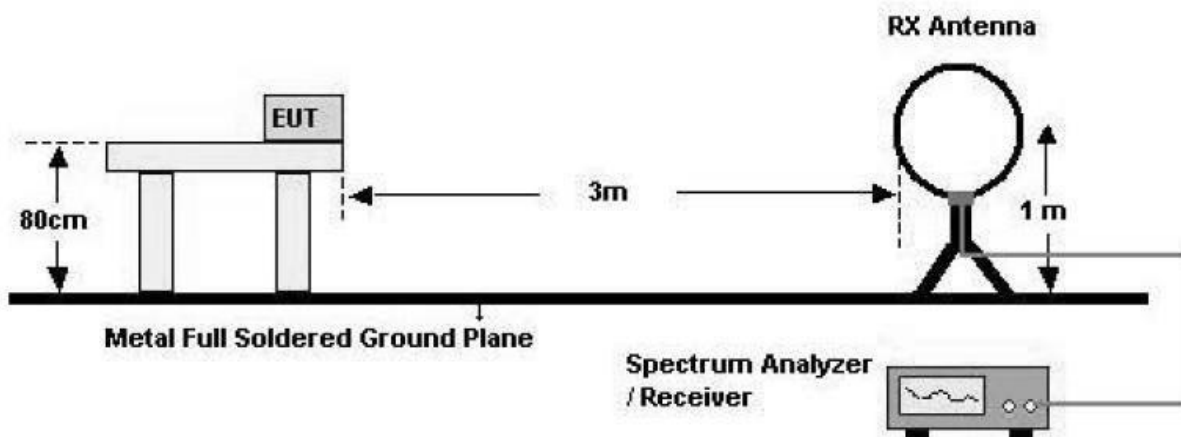
Temperature : 23 °C
 Relative humidity : 48 % R.H.

13.2 Test set-up for conducted measurement

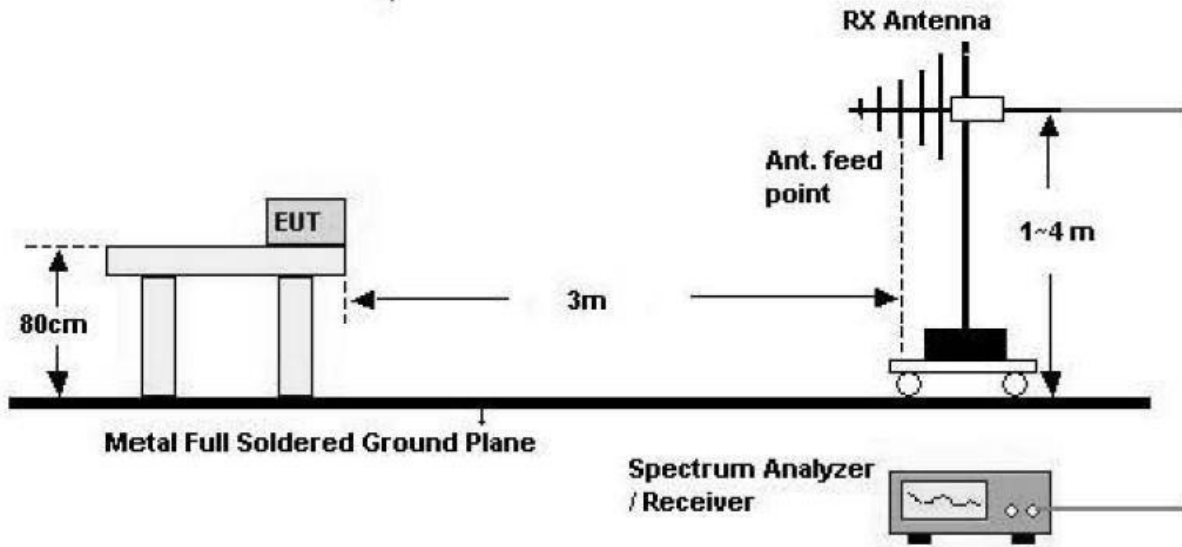
The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the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

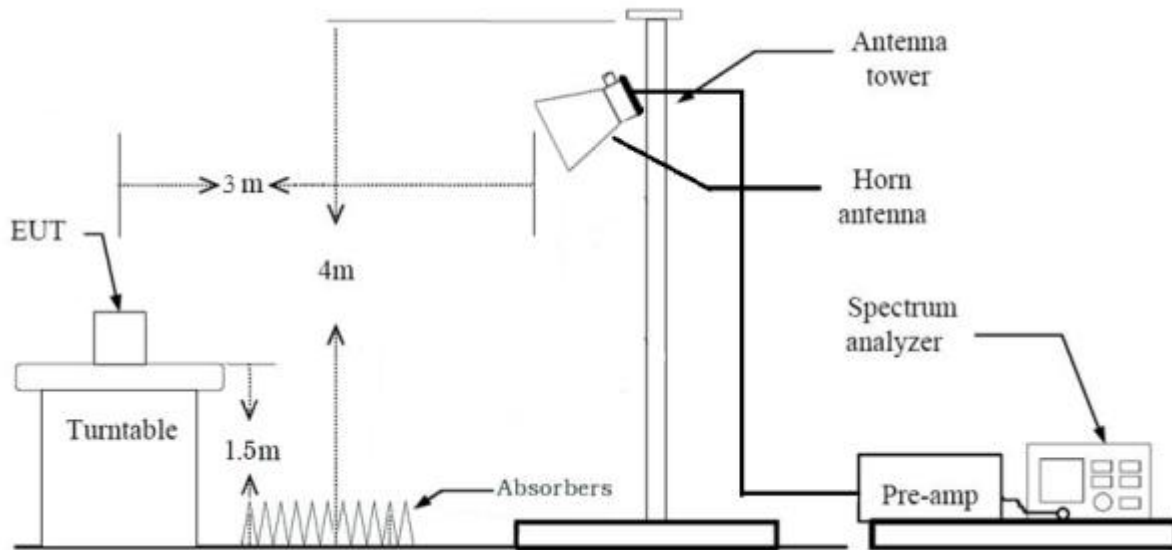
1. Below 30 MHz



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

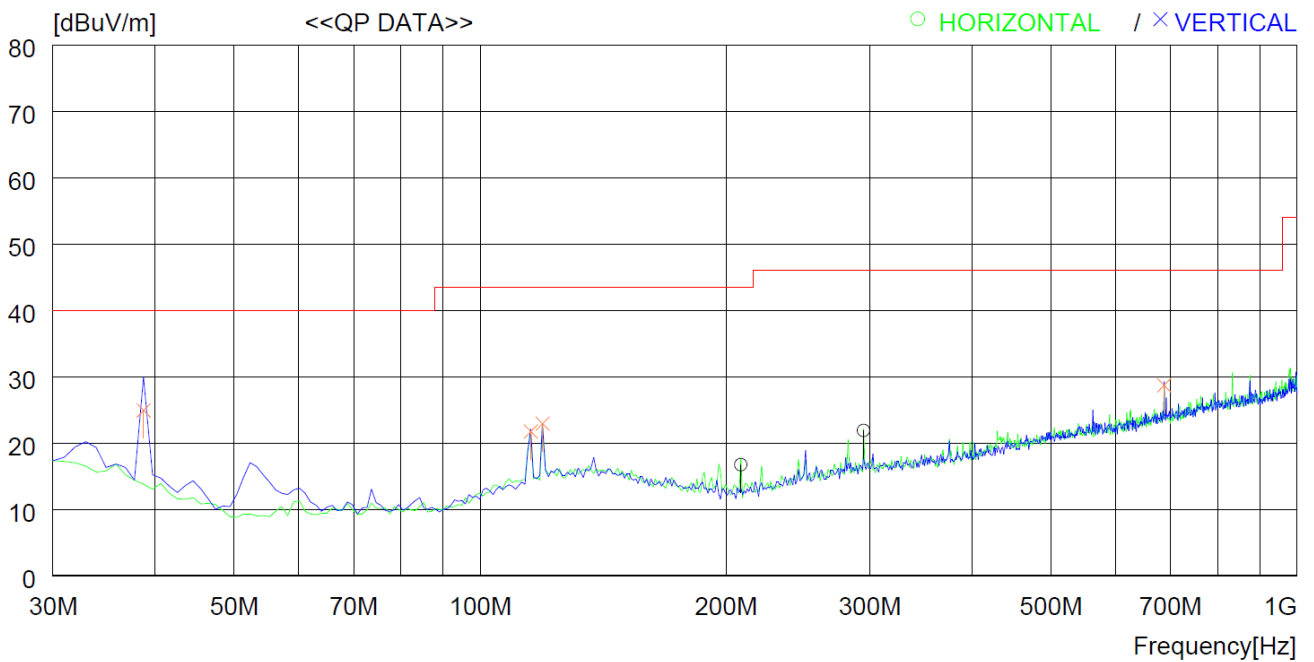
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.247

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	208.480	31.2	15.8	1.8	32.1	16.7	43.5	26.8	200	359
2	294.810	32.9	19.0	2.2	32.2	21.9	46.0	24.1	100	0
----- Vertical -----										
3	38.730	38.5	17.6	0.8	32.0	24.9	40.0	15.1	400	0
4	115.360	34.6	17.8	1.4	32.1	21.7	43.5	21.8	200	0
5	119.240	35.1	18.5	1.4	32.1	22.9	43.5	20.6	400	0
6	687.655	32.5	25.2	3.4	32.4	28.7	46.0	17.3	100	359

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

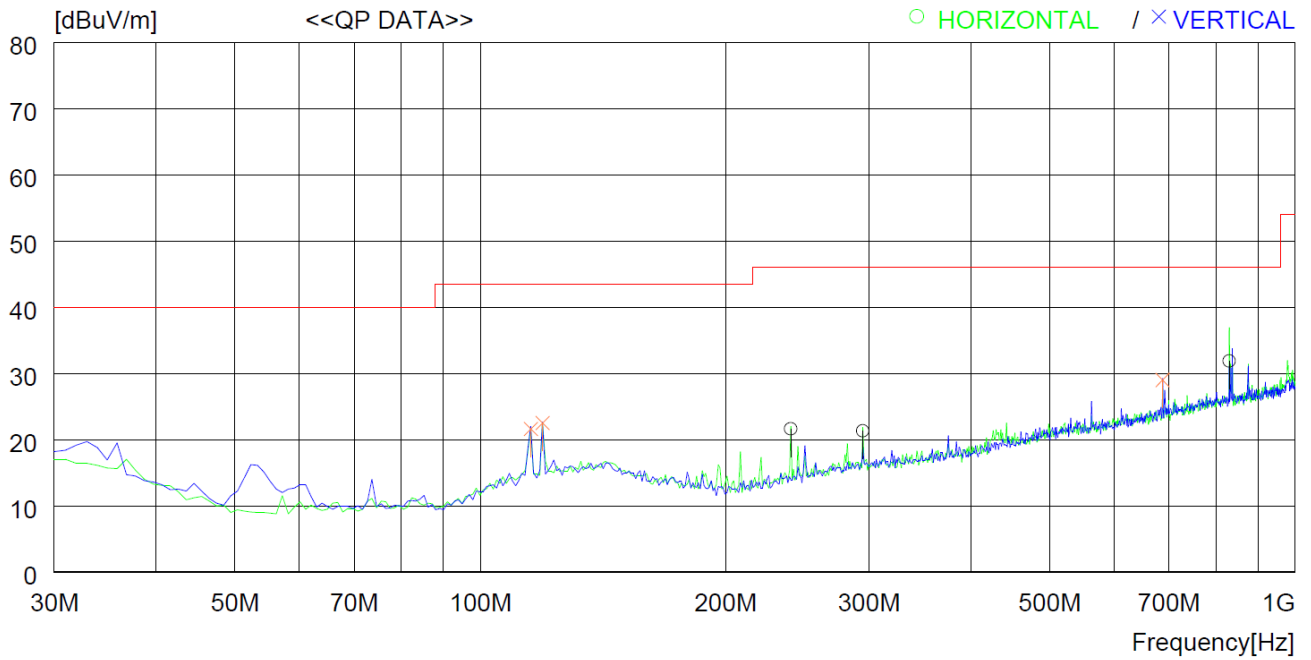
Humidity Level : 48 % R.H. Temperature: 23 °C

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	240.490	34.5	17.2	2.0	32.1	21.6	46.0	24.4	100	0
2	294.810	32.3	19.0	2.2	32.2	21.3	46.0	24.7	100	0
3	830.241	33.1	27.2	3.8	32.2	31.9	46.0	14.1	200	203
----- Vertical -----										
4	115.360	34.5	17.8	1.4	32.1	21.6	43.5	21.9	200	70
5	119.240	34.7	18.5	1.4	32.1	22.5	43.5	21.0	400	276
6	687.655	32.8	25.2	3.4	32.4	29.0	46.0	17.0	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	49.63	Peak	H	39.32	16.23	45.33	-	59.85	68.20	8.35
10 360.000	49.94	Peak	V	39.32	16.23	45.33	-	60.16	68.20	8.04
10 440.000	50.52	Peak	H	39.40	16.23	45.31	-	60.84	68.20	7.36
10 440.000	50.31	Peak	V	39.40	16.23	45.31	-	60.63	68.20	7.57
10 480.000	49.95	Peak	H	39.46	16.35	45.30	-	60.46	68.20	7.74
10 480.000	50.03	Peak	V	39.46	16.35	45.30	-	60.54	68.20	7.66

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	49.57	Peak	H	39.32	16.23	45.33	-	59.79	68.20	8.41
10 360.000	49.57	Peak	V	39.32	16.23	45.33	-	59.79	68.20	8.41
10 440.000	50.34	Peak	H	39.40	16.23	45.31	-	60.66	68.20	7.54
10 440.000	49.89	Peak	V	39.40	16.23	45.31	-	60.21	68.20	7.99
10 480.000	49.83	Peak	H	39.46	16.35	45.30	-	60.34	68.20	7.86
10 480.000	49.88	Peak	V	39.46	16.35	45.30	-	60.39	68.20	7.81

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	50.03	Peak	H	39.38	16.23	45.32	-	60.32	68.20	7.88
10 380.000	49.59	Peak	V	39.38	16.23	45.32	-	59.88	68.20	8.32
10 460.000	49.95	Peak	H	39.45	16.35	45.30	-	60.45	68.20	7.75
10 460.000	50.25	Peak	V	39.45	16.35	45.30	-	60.75	68.20	7.45

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	49.95	Peak	H	39.40	16.23	45.32	-	60.26	68.20	7.94
10 420.000	50.48	Peak	V	39.40	16.23	45.32	-	60.79	68.20	7.41

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	49.02	Peak	H	39.48	16.17	45.30	-	59.37	74.00	14.63
11 490.000	36.79	Average	H	39.48	16.17	45.30	0.05	47.19	54.00	6.81
11 490.000	49.25	Peak	V	39.48	16.17	45.30	-	59.60	74.00	14.40
11 490.000	36.82	Average	V	39.48	16.17	45.30	0.05	47.22	54.00	6.78
11 570.000	50.26	Peak	H	39.65	16.45	45.30	-	61.06	74.00	12.94
11 570.000	37.76	Average	H	39.65	16.45	45.30	0.05	48.61	54.00	5.39
11 570.000	50.15	Peak	V	39.65	16.45	45.30	-	60.95	74.00	13.05
11 570.000	37.87	Average	V	39.65	16.45	45.30	0.05	48.72	54.00	5.28
11 650.000	51.00	Peak	H	39.89	16.45	45.30	-	62.04	74.00	11.96
11 650.000	38.31	Average	H	39.89	16.45	45.30	0.05	49.40	54.00	4.60
11 650.000	51.02	Peak	V	39.89	16.45	45.30	-	62.06	74.00	11.94
11 650.000	38.36	Average	V	39.89	16.45	45.30	0.05	49.45	54.00	4.55

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	48.81	Peak	H	39.48	16.17	45.30	-	59.16	74.00	14.84
11 490.000	36.69	Average	H	39.48	16.17	45.30	0.05	47.09	54.00	6.91
11 490.000	49.36	Peak	V	39.48	16.17	45.30	-	59.71	74.00	14.29
11 490.000	36.64	Average	V	39.48	16.17	45.30	0.05	47.04	54.00	6.96
11 570.000	49.88	Peak	H	39.65	16.45	45.30	-	60.68	74.00	13.32
11 570.000	37.63	Average	H	39.65	16.45	45.30	0.05	48.48	54.00	5.52
11 570.000	50.38	Peak	V	39.65	16.45	45.30	-	61.18	74.00	12.82
11 570.000	37.68	Average	V	39.65	16.45	45.30	0.05	48.53	54.00	5.47
11 650.000	50.63	Peak	H	39.89	16.45	45.30	-	61.67	74.00	12.33
11 650.000	38.13	Average	H	39.89	16.45	45.30	0.05	49.22	54.00	4.78
11 650.000	50.90	Peak	V	39.89	16.45	45.30	-	61.94	74.00	12.06
11 650.000	38.15	Average	V	39.89	16.45	45.30	0.05	49.24	54.00	4.76

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	50.00	Peak	H	39.53	16.17	45.30	-	60.40	74.00	13.60
11 510.000	37.63	Average	H	39.53	16.17	45.30	0.10	48.13	54.00	5.87
11 510.000	49.83	Peak	V	39.53	16.17	45.30	-	60.23	74.00	13.77
11 510.000	37.40	Average	V	39.53	16.17	45.30	0.10	47.90	54.00	6.10
11 590.000	49.83	Peak	H	39.69	16.45	45.30	-	60.67	74.00	13.33
11 590.000	37.85	Average	H	39.69	16.45	45.30	0.10	48.79	54.00	5.21
11 590.000	50.34	Peak	V	39.69	16.45	45.30	-	61.18	74.00	12.82
11 590.000	37.81	Average	V	39.69	16.45	45.30	0.10	48.75	54.00	5.25

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	49.79	Peak	H	39.62	16.45	45.30	-	60.56	74.00	13.44
11 550.000	37.48	Average	H	39.62	16.45	45.30	0.35	48.60	54.00	5.40
11 550.000	50.03	Peak	V	39.62	16.45	45.30	-	60.80	74.00	13.20
11 550.000	37.70	Average	V	39.62	16.45	45.30	0.35	48.82	54.00	5.18

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

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

14. RADIATED RESTRICTED BAND EDGE MEASUREMENTS

14.1 Operating environment

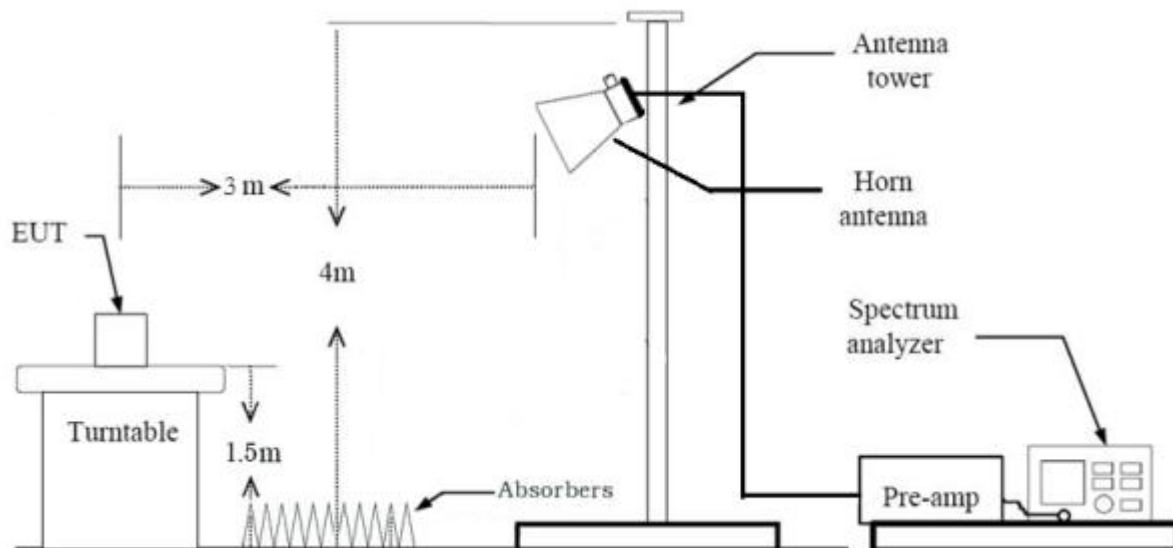
Temperature : 23 °C
 Relative humidity : 48 % R.H.

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 (dBuV/m)	Limits (dBuV/m)	Margin (dB)
Multiple Transmit											
4 591.37	50.44	Peak	H	32.98	10.80	44.62	5.83	-	55.43	74.00	18.57
5 120.56	38.97	Average	H	34.24	11.16	44.72	5.80	0.05	45.50	54.00	8.50
4 782.26	49.85	Peak	V	33.50	10.83	44.66	5.80	-	55.32	74.00	18.68
4 592.73	38.32	Average	V	32.99	10.80	44.62	5.83	0.05	43.37	54.00	10.63

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											
4 675.60	49.77	Peak	H	33.30	10.73	44.64	5.83	-	54.99	74.00	19.01
5 113.77	38.43	Average	H	34.23	11.16	44.72	5.80	0.05	44.95	54.00	9.05
4 967.71	49.88	Peak	V	33.64	10.92	44.69	5.80	-	55.55	74.00	18.45
5 041.08	38.29	Average	V	33.95	11.18	44.71	5.80	0.05	44.56	54.00	9.44

Tabulated test data for Restricted Band

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

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

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											
5 149.68	54.52	Peak	H	34.30	11.11	44.73	5.80	-	61.00	74.00	13.00
5 148.99	40.14	Average	H	34.30	11.11	44.73	5.80	0.10	46.72	54.00	7.28
5 148.99	53.34	Peak	V	34.30	11.11	44.73	5.80	-	59.82	74.00	14.18
5 129.00	38.52	Average	V	34.26	11.11	44.73	5.80	0.10	45.06	54.00	8.94

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											
5 143.68	56.73	Peak	H	34.29	11.11	44.73	5.80		63.20	74.00	10.80
5 144.39	44.89	Average	H	34.29	11.11	44.73	5.80	0.35	51.71	54.00	2.29
5 145.81	50.28	Peak	V	34.29	11.11	44.73	5.80		56.75	74.00	17.25
5 145.81	39.47	Average	V	34.29	11.11	44.73	5.80	0.35	46.29	54.00	7.71

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											
5 699.77	56.25	Peak	H	34.10	11.72	44.64	5.83	-	63.26	105.03	41.77
5 719.09	65.83	Peak	H	34.18	11.72	44.62	5.83	-	72.94	110.55	37.61
5 724.92	70.93	Peak	H	34.20	11.72	44.62	5.83	-	78.06	122.02	43.96
5 851.24	55.37	Peak	H	34.60	11.84	44.52	5.84	-	63.13	119.37	56.24
5 873.95	55.39	Peak	H	34.70	11.84	44.50	5.84	-	63.27	105.49	42.22
5 923.33	55.57	Peak	H	34.89	11.90	44.46	5.84	-	63.74	69.44	5.70
5 698.78	56.66	Peak	V	34.10	11.72	44.64	5.83	-	63.67	104.30	40.63
5 719.99	66.34	Peak	V	34.18	11.72	44.62	5.83	-	73.45	110.80	37.35
5 722.18	71.51	Peak	V	34.19	11.72	44.62	5.83	-	78.63	115.77	37.14
5 854.46	55.64	Peak	V	34.62	11.84	44.52	5.84	-	63.42	112.03	48.61
5 870.53	55.63	Peak	V	34.68	11.84	44.50	5.84	-	63.49	106.45	42.96
5 882.62	55.65	Peak	V	34.73	11.90	44.49	5.84	-	63.63	99.56	35.93

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											
5 681.99	55.20	Peak	H	34.10	11.72	44.65	5.83	-	62.20	91.87	29.67
5 707.84	55.95	Peak	H	34.13	11.72	44.63	5.83	-	63.00	107.40	44.40
5 721.32	54.89	Peak	H	34.19	11.72	44.62	5.83	-	62.01	113.81	51.80
5 851.07	65.94	Peak	H	34.60	11.84	44.52	5.84	-	73.70	119.76	46.06
5 856.51	60.90	Peak	H	34.63	11.84	44.51	5.84	-	68.70	110.38	41.68
5 876.12	56.15	Peak	H	34.70	11.90	44.50	5.84	-	64.09	104.37	40.28
5 675.60	55.53	Peak	V	34.10	11.72	44.66	5.83	-	62.52	87.14	24.62
5 715.10	55.15	Peak	V	34.16	11.72	44.63	5.83	-	62.23	109.43	47.20
5 720.07	55.54	Peak	V	34.18	11.72	44.62	5.83	-	62.65	110.96	48.31
5 850.70	64.76	Peak	V	34.60	11.84	44.52	5.84	-	72.52	120.60	48.08
5 855.75	60.68	Peak	V	34.62	11.84	44.52	5.84	-	68.46	110.59	42.13
5 897.40	56.53	Peak	V	34.79	11.90	44.48	5.84	-	64.58	88.62	24.04

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											
5 690.98	57.88	Peak	H	34.10	11.72	44.65	5.83	-	64.88	98.53	33.65
5 719.39	68.77	Peak	H	34.18	11.72	44.62	5.83	-	75.88	110.63	34.75
5 722.15	72.48	Peak	H	34.19	11.72	44.62	5.83	-	79.60	115.70	36.10
5 852.11	57.23	Peak	H	34.61	11.84	44.52	5.84	-	65.00	117.39	52.39
5 865.26	55.77	Peak	H	34.66	11.84	44.51	5.84	-	63.60	107.93	44.33
5 916.93	55.77	Peak	H	34.87	11.90	44.47	5.84	-	63.91	74.17	10.26
5 693.38	58.51	Peak	V	34.10	11.72	44.65	5.83	-	65.51	100.30	34.79
5 716.59	68.43	Peak	V	34.17	11.72	44.63	5.83	-	75.52	109.85	34.33
5 722.67	72.04	Peak	V	34.19	11.72	44.62	5.83	-	79.16	116.89	37.73
5 851.66	55.68	Peak	V	34.61	11.84	44.52	5.84	-	63.45	118.42	54.97
5 868.86	55.53	Peak	V	34.68	11.84	44.50	5.84	-	63.39	106.92	43.53
5 875.02	56.46	Peak	V	34.70	11.90	44.50	5.84	-	64.40	105.19	40.79

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											
5 680.99	55.31	Peak	H	34.10	11.72	44.66	5.83	-	62.30	91.13	28.83
5 701.53	55.05	Peak	H	34.11	11.72	44.64	5.83	-	62.07	105.63	43.56
5 722.03	55.42	Peak	H	34.19	11.72	44.62	5.83	-	62.54	115.43	52.89
5 851.85	69.21	Peak	H	34.61	11.84	44.52	5.84	-	76.98	117.98	41.00
5 855.67	66.55	Peak	H	34.62	11.84	44.52	5.84	-	74.33	110.61	36.28
5 876.02	57.19	Peak	H	34.70	11.90	44.50	5.84	-	65.13	104.45	39.32
5 698.33	55.22	Peak	V	34.10	11.72	44.64	5.83	-	62.23	103.96	41.73
5 707.60	55.42	Peak	V	34.13	11.72	44.63	5.83	-	62.47	107.33	44.86
5 721.33	55.41	Peak	V	34.19	11.72	44.62	5.83	-	62.53	113.83	51.30
5 852.12	67.72	Peak	V	34.61	11.84	44.52	5.84	-	75.49	117.37	41.88
5 856.41	63.86	Peak	V	34.63	11.84	44.51	5.84	-	71.66	110.41	38.75
5 885.51	56.02	Peak	V	34.74	11.90	44.49	5.84	-	64.01	97.42	33.41

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											
5 699.88	65.60	Peak	H	34.10	11.72	44.64	5.83	-	72.61	105.11	32.50
5 719.85	71.29	Peak	H	34.18	11.72	44.62	5.83	-	78.40	110.76	32.36
5 722.99	73.46	Peak	H	34.19	11.72	44.62	5.83	-	80.58	117.62	37.04
5 850.67	55.95	Peak	H	34.60	11.84	44.52	5.84	-	63.71	120.67	56.96
5 862.18	55.79	Peak	H	34.65	11.84	44.51	5.84	-	63.61	108.79	45.18
5 911.74	55.39	Peak	H	34.85	11.90	44.47	5.84	-	63.51	78.01	14.50
5 699.92	65.73	Peak	V	34.10	11.72	44.64	5.83	-	72.74	105.14	32.40
5 718.47	71.16	Peak	V	34.17	11.72	44.63	5.83	-	78.25	110.37	32.12
5 723.63	72.48	Peak	V	34.19	11.72	44.62	5.83	-	79.60	119.08	39.48
5 851.12	55.57	Peak	V	34.60	11.84	44.52	5.84	-	63.33	119.65	56.32
5 861.88	55.35	Peak	V	34.65	11.84	44.51	5.84	-	63.17	108.87	45.70
5 905.59	56.09	Peak	V	34.82	11.90	44.48	5.84	-	64.17	82.56	18.39

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											
5 699.48	57.05	Peak	H	34.10	11.72	44.64	5.83	-	64.06	104.82	40.76
5 717.89	58.61	Peak	H	34.17	11.72	44.63	5.83	-	65.70	110.21	44.51
5 723.16	60.44	Peak	H	34.19	11.72	44.62	5.83	-	67.56	118.00	50.44
5 852.54	61.26	Peak	H	34.61	11.84	44.52	5.84	-	69.03	116.41	47.38
5 867.18	58.74	Peak	H	34.67	11.84	44.51	5.84	-	66.58	107.39	40.81
5 875.77	56.36	Peak	H	34.70	11.90	44.50	5.84	-	64.30	104.63	40.33
5 699.13	56.18	Peak	V	34.10	11.72	44.64	5.83	-	63.19	104.56	41.37
5 710.86	59.09	Peak	V	34.14	11.72	44.63	5.83	-	66.15	108.24	42.09
5 723.42	60.17	Peak	V	34.19	11.72	44.62	5.83	-	67.29	118.60	51.31
5 852.96	60.81	Peak	V	34.61	11.84	44.52	5.84	-	68.58	115.45	46.87
5 858.35	58.05	Peak	V	34.63	11.84	44.51	5.84	-	65.85	109.86	44.01
5 875.77	56.56	Peak	V	34.70	11.90	44.50	5.84	-	64.50	104.63	40.13

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											
5 681.84	67.38	Peak	H	34.10	11.72	44.65	5.83	-	74.38	91.76	17.38
5 701.35	70.57	Peak	H	34.11	11.72	44.64	5.83	-	77.59	105.58	27.99
5 724.46	71.24	Peak	H	34.20	11.72	44.62	5.83	-	78.37	120.97	42.60
5 852.87	65.73	Peak	H	34.61	11.84	44.52	5.84	-	73.50	115.66	42.16
5 868.56	67.01	Peak	H	34.67	11.84	44.51	5.84	-	74.85	107.00	32.15
5 877.02	60.36	Peak	H	34.71	11.90	44.50	5.84	-	68.31	103.71	35.40
5 697.53	66.59	Peak	V	34.10	11.72	44.64	5.83	-	73.60	103.37	29.77
5 712.94	70.12	Peak	V	34.15	11.72	44.63	5.83	-	77.19	108.82	31.63
5 724.33	70.02	Peak	V	34.20	11.72	44.62	5.83	-	77.15	120.67	43.52
5 851.26	64.38	Peak	V	34.61	11.84	44.52	5.84	-	72.15	119.33	47.18
5 868.34	65.83	Peak	V	34.67	11.84	44.51	5.84	-	73.67	107.06	33.39
5 875.67	59.72	Peak	V	34.70	11.90	44.50	5.84	-	67.66	104.70	37.04

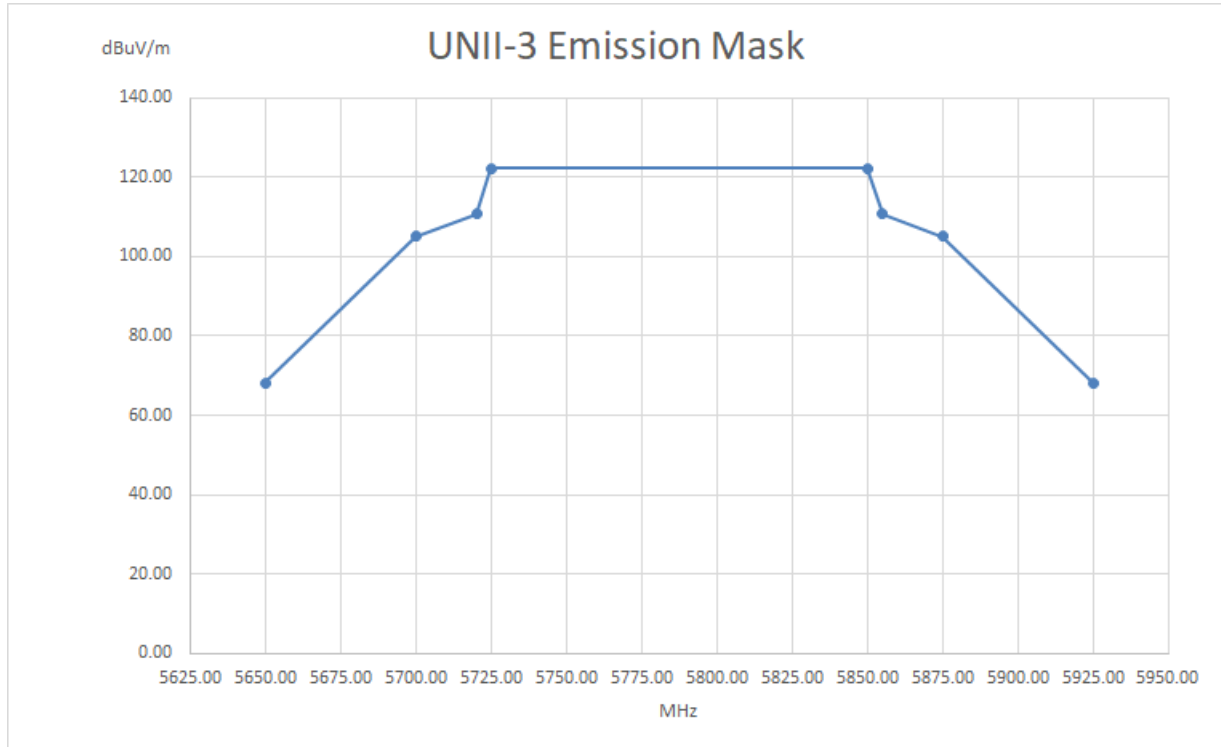
Tabulated test data for Restricted Band

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

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

14.7.5 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.