TEST REPORT

Report No.:	8228EU010101W3
Applicant:	Shenzhen Okexin Technology Co., Ltd.
Address:	Block E, Gold Rush building, Tai Long Street, Longhua District, 318 Shenzhen, Guangdong Province, China
Product Name:	Projector
Model No.:	L02 (refer to clause 2.4)
Trademark:	N/A
FCC ID:	2BFMQ-L02
Test Standard(s):	47 CFR Part 15 Subpart E
Date of Receipt:	Apr. 01, 2024
Test Date:	Apr. 01, 2024 – May 15, 2024
Date of Issue:	May 29, 2024

ISSUED BY:

SHENZHEN EU TESTING LABORATORY LIMITED

SHENZHEN EU TESTING LABORATORY LIMITED APPROVED

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2 General Information

2.1 Applicant Information

Applicant	Shenzhen Okexin Technology Co., Ltd.
Address	Block E, Gold Rush building, Tai Long Street, Longhua District, 318 Shenzhen, Guangdong Province, China

2.2 Manufacturer Information

Manufacturer	Shenzhen Okexin Technology Co., Ltd.
Address	Block E, Gold Rush building, Tai Long Street, Longhua District, 318 Shenzhen, Guangdong Province, China

2.3 Factory Information

Factory	Shenzhen Okexin Technology Co., Ltd.
Address	Block E, Gold Rush building, Tai Long Street, Longhua District, 318 Shenzhen, Guangdong Province, China

2.4 General Description of E.U.T.

Product Name	Projector
Model No. Under Test	L02
List Model No.	AY3, AY5, J02Pro, J03, L03Pro, L62, S01, S02Pro, S61
Description of Model differentiation	All models are same with electrical parameters and internal circuit structure, but only differ in the appearance color, location of key PCB board and model name. (this information provided by the customer)
Rating(s)	Adapter 1: Input: 21V⎓2.28A (Adapter Input: 100-240V~, 50/60Hz, 1.0A(Max); Output: 21V⎓2.28A, 48W) Adapter 2: Input: 22V⎓2.18A (Adapter Input: 100-240V~, 50/60Hz, 1.5A; Output: 22V⎓2.18A)
Adapter 1	Model No.: MX48CC-210228US Input: 100-240V~, 50/60Hz, 1.0A(Max) Output: 21V⎓2.28A, 48W Manufacturer: Dong Guan Ming Xu Electronic Co., Ltd.
Adapter 2	Model No.: SAN-2202180US Input: 100-240V~, 50/60Hz, 1.5A Output: 22V⎓2.18A Manufacturer: Shenzhen ShiAn Power Technology Co., Ltd.
Product Type	☒ Mobile ☐ Portable ☐ Fix Location
Test Sample No.	-1/1(Normal Sample)
Hardware Version	PJ31V201-C6B
Software Version	PJ31V200-240312
Remark	For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

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2.5 Technical Information of E.U.T.

Network and Wireless Connectivity	Bluetooth (BDR+EDR) WiFi 2.4G: 802.11b, 802.11g, 802.11n(HT20/40) WiFi 5G: 802.11a, 802.11n(HT20/40), 802.11ac(VHT20/40) U-NII-1

The requirement for the following technical information of the EUT was tested in this report:

Technology	**WiFi 5G**			
Operation Mode	☒ a	☒ n(HT20)	☒ n(HT40)	☒ ac(VHT20)
	☒ ac(VHT40)	☐ ac(VHT80)	☐ ac(VHT160)	☐ ax(HEW20)
	☐ ax(HEW40)	☐ ax(HEW80)	☐ ax(HEW160)	
Operating Frequency	5150 MHz to 5250 MHz			
Modulation Technology	OFDM			
Function	☒ Client device	☐ Master device		
Modulation Type	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) 802.11ac: OFDM (64QAM, 16QAM, QPSK, BPSK, 256QAM)			
Transfer Rate (Mbps) (Single RF path)	802.11a: 54/ 48/ 36/ 24/ 18/ 12/ 9/ 6 Mbps 802.11n: up to 150 Mbps 802.11ac: up to VHT-MCS9			
Antenna System (eg., MIMO, Smart Antenna)	N/A			
Categorization as Correlated or Completely Uncorrelated	N/A			
Antenna Type	FPC Antenna			
Antenna Gain	5150 MHz to 5250 MHz: 2.33 dBi			

All channels were listed on the following table:

20 MHz Bandwidth		40 MHz Bandwidth		80 MHz Bandwidth	
Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)	Channel Number	Frequency (MHz)
36	**5180**	**38**	**5190**	42	5210
40	**5200**	**46**	**5230**	/	/
44	5220	/	/	/	/
48	**5240**	/	/	/	/

The Lowest frequency, the middle frequency and the highest frequency of channel were selected to perform the test, and the selected channels see below:

✧ **For 802.11a/n(HT20)/ac(VHT20)**

U-NII-1 (5150 - 5250 MHz)		
Channel Number	Channel	Frequency (MHz)
36	Low	5180
40	Mid	5200
48	High	5240

✧ **For 802.11n(HT40)**

U-NII-1 (5150 - 5250 MHz)		
Channel Number	Channel	Frequency (MHz)
38	Low	5190
46	High	5230

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

Test Items	Mode	Data Rate	Modulation Type	U-NII-1
				Channel
RF Output Power	11a	6	BPSK	48/40/36
	11n(20 MHz)	6.5		48/40/36
	11n(40 MHz)	13.5		46/38
Emission Bandwidth & 99% Occupied Bandwidth	11a	6	BPSK	48/40/36
	11n(20 MHz)	6.5		48/40/36
	11n(40 MHz)	13.5		46/38
Power Spectral Density	11a	6	BPSK	48/40/36
	11n(20 MHz)	6.5		48/40/36
	11n(40 MHz)	13.5		46/38
Band Edge (Restricted- band)	11a	6	BPSK	48/40/36
	11n(20 MHz)	6.5		48/40/36
	11n(40 MHz)	13.5		46/38
Undesirable Emissions	11a	6	BPSK	48/40/36
	11n(20 MHz)	6.5		48/40/36
	11n(40 MHz)	13.5		46/38

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3 Test Summary

3.1 Test Standard

The tests were performed according to following standards:

No.	Identity	Document Title
1	47 CFR Part 15 Subpart E	Unlicensed National Information Infrastructure Devices
2	ANSI C63.10-2020	American National Standard for Testing Unlicensed Wireless Devices
3	KDB Publication 789033 D02v02r01	Guidelines for Compliance Testing of Unlicensed National Information Infrastructure (U-NII) Devices Part 15, Subpart E
4	KDB Publication 662911 D01v02r01	Emissions Testing of Transmitters with Multiple Outputs in the Same Band (e.g., MIMO, Smart Antenna, etc)

Remark:
Maintenance of compliance is the responsibility of the manufacturer. Any modification of the product maybe which result in lowering the emission/immunity should be checked to ensure compliance has been maintained.

3.2 Test Verdict

No.	Description	FCC Part No.	Verdict	Remark
1	Antenna Requirement	15.203	Pass	--
2	Conducted Emission at AC Power Line	15.207 15.407(b)(9)	Pass	--
3	Emission Bandwidth and Occupied Bandwidth	U-NII 1: No limits, only for report use. U-NII 3: 15.407(e)	Pass	--
4	Maximum Conducted Output Power	15.407(a)(1)(i) 15.407(a)(1)(ii) 15.407(a)(1)(iii) 15.407(a)(1)(iv) 15.407(a)(3)(i)	Pass	--
5	Power Spectral Density	15.407(a)(1)(i) 15.407(a)(1)(ii) 15.407(a)(1)(iii) 15.407(a)(1)(iv) 15.407(a)(3)(i)	Pass	--
6	Band Edge emissions (Radiated)	15.407(b)(1) 15.407(b)(4) 15.407(b)(10)	Pass	--
7	Undesirable Emissions	15.407(b)(1) 15.407(b)(4) 15.407(b)(9) 15.407(b)(10)	Pass	--
8	Frequency Stability	15.407(g)	Pass	--

3.3 Test Laboratory

Test Laboratory	Shenzhen EU Testing Laboratory Limited
Address	101, Building B1, Fuqiao Fourth Area, Qiaotou Community, Fuhai Subdistrict, Baoan District, Shenzhen, Guangdong, China
Designation Number	CN1368
Test Firm Registration Number	952583

4 Test Configuration

4.1 Test Environment

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

Relative Humidity	30% to 60%	
Atmospheric Pressure	86 kPa to 106 kPa	
Temperature	NT (Normal Temperature)	+15℃ to +35℃
Working Voltage of the EUT	NV (Normal Voltage)	AC 120V/60Hz for adapter

4.2 Test Equipment

Conducted Emission at AC power line					
Equipment	**Manufacturer**	**Model No**	**Serial No**	**Cal. Date**	**Cal. Due Date**
L.I.S.N. Artificial Mains Network	Rohde & Schwarz	ENV216	EE-004	2024/01/09	2025/01/08
EMI Test Receiver	Rohde & Schwarz	ESCI	EE-005	2024/01/09	2025/01/08
Test Software	Ferrari Technology	EZ-EMC	EE-014	N.C.R	N.C.R

Radiated Emission and RF Test					
Equipment	**Manufacturer**	**Model No**	**Serial No**	**Cal Date**	**Cal Due Date**
EMI Test Receiver	ROHDE & SCHWARZ	ESPI	EE-006	2024/01/09	2025/01/08
Bilog Broadband Antenna	SCHWARZBECK	VULB 9163	EE-007	2023/01/14	2026/01/13
Double Ridged Horn Antenna	A-INFOMW	LB-10180-NF	EE-008	2023/01/12	2026/01/11
Pre-amplifier	Agilent	8447D	EE-009	2024/01/09	2025/01/08
Pre-amplifier	Agilent	8449B	EE-010	2024/01/09	2025/01/08
MXA Signal Analyzer	Agilent	N9020A	EE-011	2024/01/09	2025/01/08
MXG RF Vector Signal Generator	Agilent	N5182A	EE-012	2024/01/09	2025/01/08
Test Software	Farad	EZ-EMC	EE-015	N.C.R	N.C.R
MIMO Power Measurement Module	TSTPASS	TSPS 2023R	EE-016	2024/05/16	2025/05/15
RF Test Software	TSTPASS	TS32893 V2.0	EE-017	N.C.R	N.C.R
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	EE-402	2024/02/15	2025/02/14
Loop Antenna	TESEQ	HLA6121	EE-403	2024/02/15	2025/02/14
Spectrum Analyzer	ROHDE & SCHWARZ	FSP40	EE-404	2024/05/15	2025/05/14
MXG RF Analog Signal Generator	Agilent	N5181A	EE-406	2024/02/15	2025/02/14
DRG Horn Antenna (up to 40GHz)	SCHWARZBECK	BBHA 9170	EE-410	2024/06/06	2025/06/05
Pre-amplifier	SKET	LNPA-1840-50	EE-411	2024/06/06	2025/06/05
Constant Temperature Humidity Chamber	Guangxin	GXP-401	ES-002	2023/07/31	2024/07/30

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4.3 Description of Support Unit

No.	Title	Manufacturer	Model No.	Serial No.
1	Adapter	refer to clause 2.4	refer to clause 2.4	--

4.4 Test Mode

No.	Test Modes	Description
TM1	802.11a mode	Keep the EUT in 802.11a transmitting mode.
TM2	802.11n(HT20) mode	Keep the EUT in 802.11n(HT20) transmitting mode.
TM3	802.11n(HT40) mode	Keep the EUT in 802.11n(HT40) transmitting mode.
TM4	802.11ac(VHT20) mode	Keep the EUT in 802.11ac(VHT20) transmitting mode.
TM5	802.11ac(VHT40) mode	Keep the EUT in 802.11ac(VHT40) transmitting mode.

4.5 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2.
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test Item	Measurement Uncertainty
Conducted Emission	2.64 dB
Occupied Channel Bandwidth	2.8 %
RF output power, conducted	0.68 dB
Power Spectral Density, conducted	1.37 dB
Unwanted Emissions, conducted	1.84 dB
Radiated Emission (30MHz- 1GHz)	Ur = 2.70 dB (Horizontal)
	Ur = 2.70 dB (Vertical)
Radiated Emission (1GHz- 18GHz)	Ur = 3.50 dB (Horizontal)
	Ur = 3.50 dB (Vertical)
Radiated Emission (18GHz- 40GHz)	Ur = 5.15 dB (Horizontal)
	Ur = 5.24 dB (Vertical)
Temperature	0.8°C
Humidity	4%

4.6 Deviation from Standards

None.

4.7 Abnormalities from Standard Condition

None.

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5 Test Items

5.1 Antenna requirement

5.1.1 Test Requirement

Test Requirement	According to FCC §15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of § 15.211, § 15.213, § 15.217, § 15.219, or § 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with § 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded. If directional gain of transmitting antennas is greater than 6 dBi, the power shall be reduced by the same level in dB comparing to gain minus 6 dBi. For the fixed point-to-point operation, the power shall be reduced by one dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the FCC rule.

5.1.2 Antenna Anti-Replacement Construction

The Antenna Anti-Replacement as following method:

Protected Method	Description
The antenna is embedded in the product.	An embedded-in antenna design is used.

Reference Documents	Item
Photo	Please refer to the EUT Photo documents.

5.1.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

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5.2 Conducted Emission at AC Power Line

5.2.1 Test Requirement

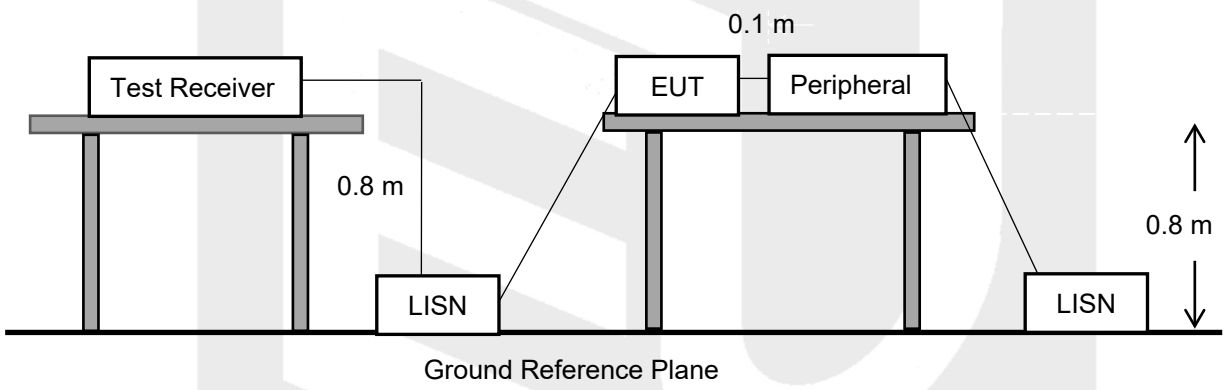
Test Requirement	Except as shown in paragraphs (b)and (c)of this section, for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μH/50 ohms line impedance stabilization network (LISN).
Test Limit	

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

*Decreases with the logarithm of the frequency.

Test Method	ANSI C63.10-2020 section 6.2

5.2.2 Test Setup Diagram



5.2.3 Test Procedure

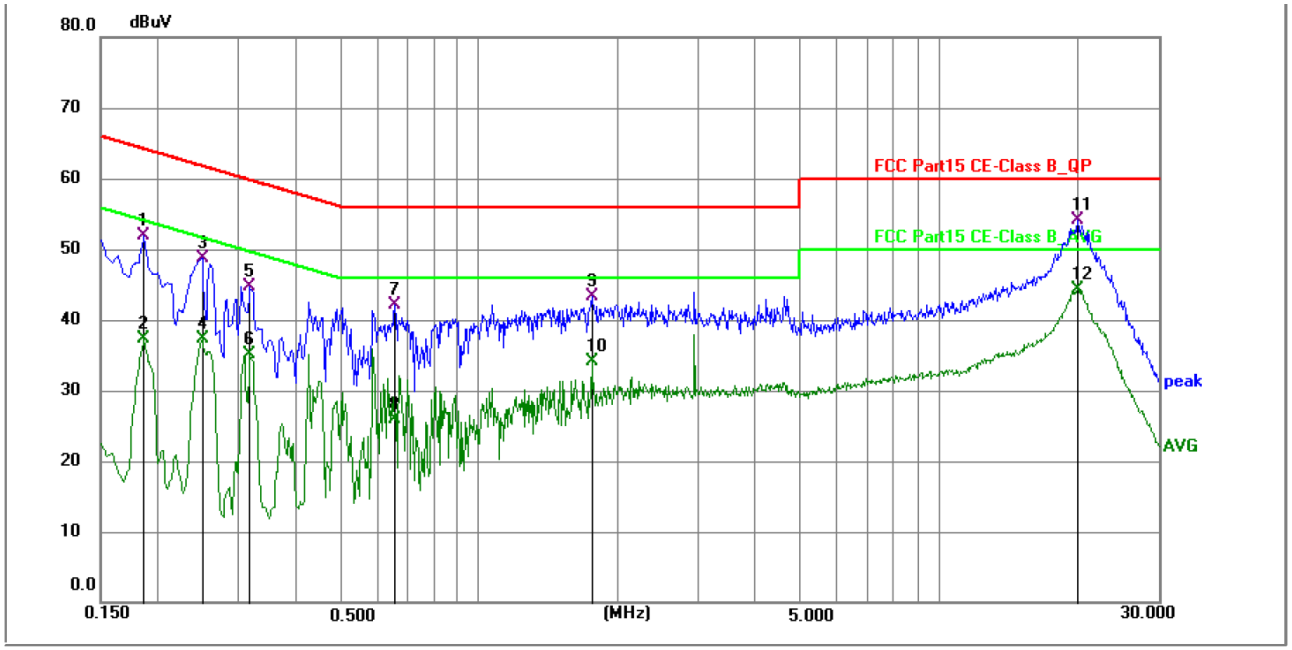
The EUT is put on the plane 0.8 m high above the ground by insulating support and connected to the AC mains through Line Impedance Stability Network (L.I.S.N). This provided a 50ohm coupling impedance for the tested equipment. Both sides of AC line are investigated to find out the maximum conducted emission according to the test standard regulations during conducted emission measurement.
The bandwidth of the field strength meter (R&S Test Receiver ESCI) is set at 9kHz in 150kHz~30MHz.
The maximum conducted interference is searched using Peak (PK), if the emission levels more than the AV and QP limits, and that have narrow margins from the AV and QP limits will be re-measured with AV and QP detectors. Tests for both L phase and N phase lines of the power mains connected to the EUT are performed. Refer to recorded points and plots below.
Devices subject to Part 15 must be tested for all available U.S. voltages and frequencies (such as a nominal 120 VAC, 50/60 Hz and 240 VAC, 50/60 Hz) for which the device is capable of operation. A device rated for 50/60 Hz operation need not be tested at both frequencies provided the radiated and line conducted emissions are the same at both frequencies.

5.2.4 Test Data

PASS.
All modes have been tested and pass, only the worst case data was showed in the report, please to see the following pages.

Conducted Emission Test Data

Test Site:	Shielded Room #1
Test Mode:	TM1/ CH Middle
Comments:	Live Line
Model No.:	Adapter 1



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1860	41.91	9.91	51.82	64.21	-12.39	QP	P	
2	0.1860	27.34	9.91	37.25	54.21	-16.96	AVG	P	
3	0.2490	38.82	9.92	48.74	61.79	-13.05	QP	P	
4	0.2490	27.32	9.92	37.24	51.79	-14.55	AVG	P	
5	0.3165	34.73	9.94	44.67	59.80	-15.13	QP	P	
6	0.3165	25.14	9.94	35.08	49.80	-14.72	AVG	P	
7	0.6540	32.15	9.99	42.14	56.00	-13.86	QP	P	
8	0.6540	15.87	9.99	25.86	46.00	-20.14	AVG	P	
9	1.7610	33.36	9.99	43.35	56.00	-12.65	QP	P	
10	1.7610	24.11	9.99	34.10	46.00	-11.90	AVG	P	
11	19.9590	43.96	10.12	54.08	60.00	-5.92	QP	P	
12 *	19.9590	34.25	10.12	44.37	50.00	-5.63	AVG	P	

Note: Level = Reading + Factor Margin = Level - Limit

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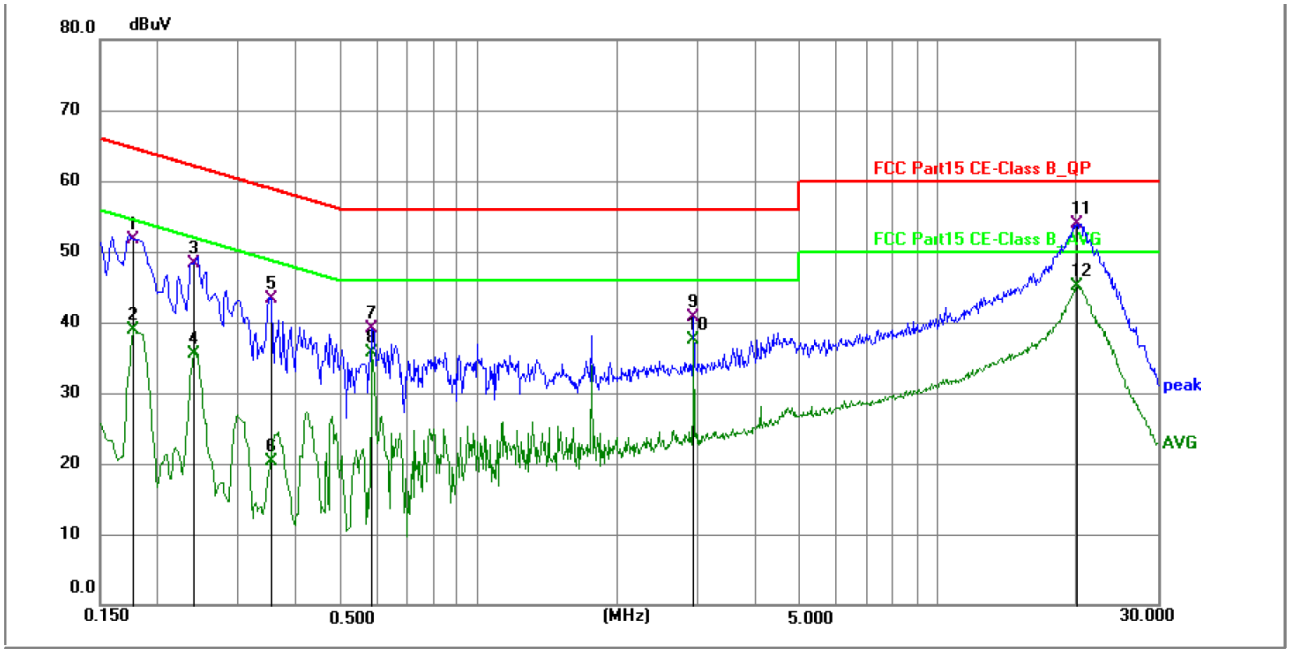
Conducted Emission Test Data

Test Site:	Shielded Room #1
Test Mode:	TM1/ CH Middle
Comments:	Neutral Line
Model No.:	Adapter 1



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1768	41.83	9.93	51.76	64.63	-12.87	QP	P	
2	0.1768	28.91	9.93	38.84	54.63	-15.79	AVG	P	
3	0.2391	38.37	9.95	48.32	62.13	-13.81	QP	P	
4	0.2391	25.47	9.95	35.42	52.13	-16.71	AVG	P	
5	0.3525	33.38	9.97	43.35	58.90	-15.55	QP	P	
6	0.3525	10.42	9.97	20.39	48.90	-28.51	AVG	P	
7	0.5865	29.16	10.00	39.16	56.00	-16.84	QP	P	
8	0.5865	25.77	10.00	35.77	46.00	-10.23	AVG	P	
9	2.9355	30.78	10.01	40.79	56.00	-15.21	QP	P	
10	2.9355	27.52	10.01	37.53	46.00	-8.47	AVG	P	
11	20.0355	43.86	10.13	53.99	60.00	-6.01	QP	P	
12 *	20.0355	35.07	10.13	45.20	50.00	-4.80	AVG	P	

Note: Level = Reading + Factor Margin = Level - Limit

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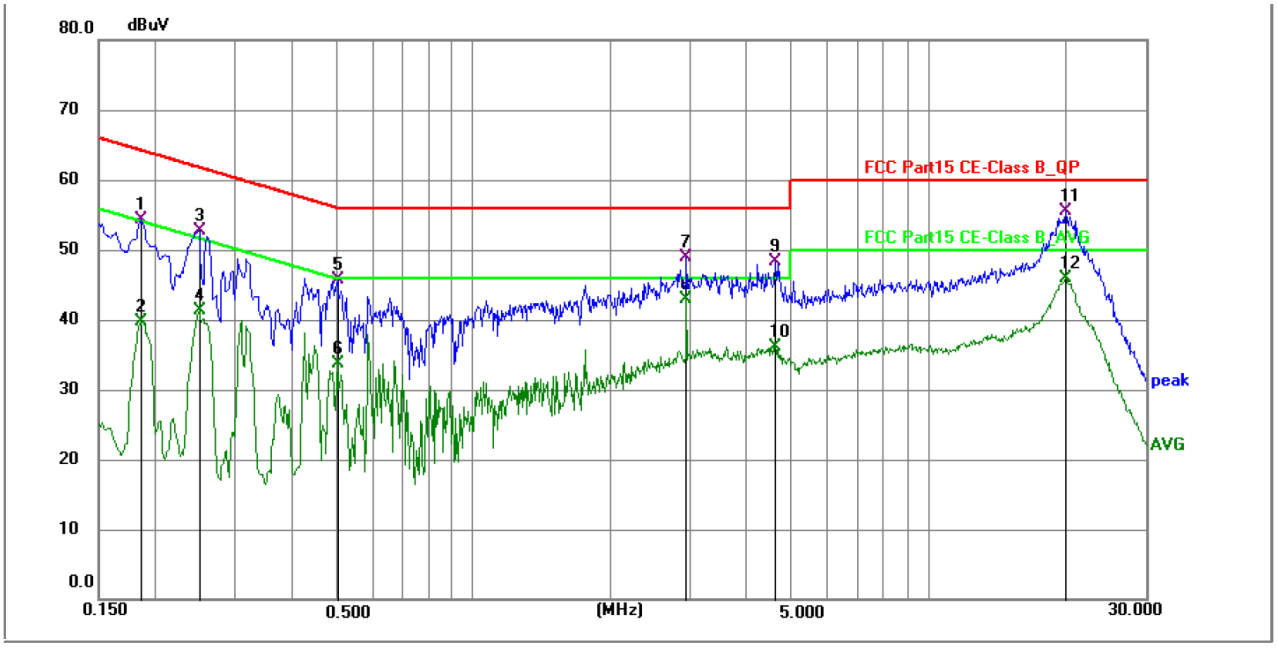
Conducted Emission Test Data

Test Site:	Shielded Room #1
Test Mode:	TM1/ CH Middle
Comments:	Live Line
Model No.:	Adapter 2



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1860	44.41	9.91	54.32	64.21	-9.89	QP	P	
2	0.1860	29.84	9.91	39.75	54.21	-14.46	AVG	P	
3	0.2490	42.82	9.92	52.74	61.79	-9.05	QP	P	
4	0.2490	31.32	9.92	41.24	51.79	-10.55	AVG	P	
5	0.5010	35.65	9.97	45.62	56.00	-10.38	QP	P	
6	0.5010	23.64	9.97	33.61	46.00	-12.39	AVG	P	
7	2.9355	38.93	10.02	48.95	56.00	-7.05	QP	P	
8 *	2.9355	32.80	10.02	42.82	46.00	-3.18	AVG	P	
9	4.6005	38.39	10.00	48.39	56.00	-7.61	QP	P	
10	4.6005	26.14	10.00	36.14	46.00	-9.86	AVG	P	
11	19.9590	45.46	10.12	55.58	60.00	-4.42	QP	P	
12	19.9590	35.75	10.12	45.87	50.00	-4.13	AVG	P	

Note: Level = Reading + Factor Margin = Level - Limit

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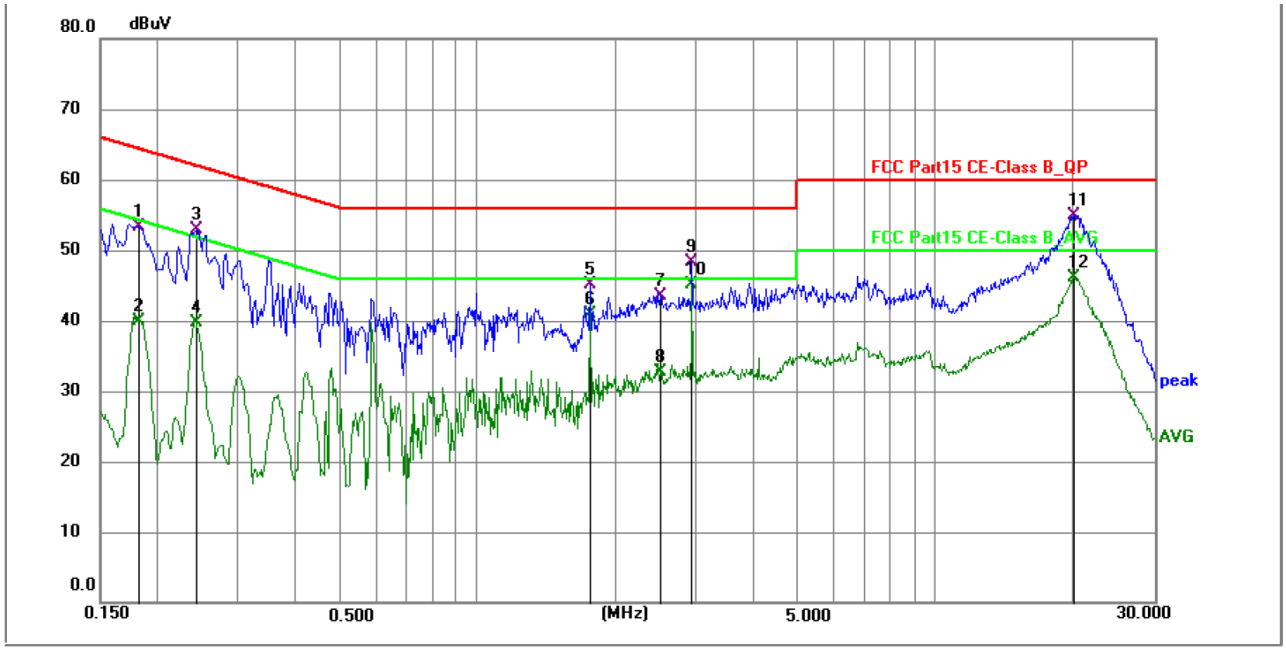
Conducted Emission Test Data

Test Site:	Shielded Room #1
Test Mode:	TM1/ CH Middle
Comments:	Neutral Line
Model No.:	Adapter 2



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1814	43.33	9.94	53.27	64.42	-11.15	QP	P	
2	0.1814	30.01	9.94	39.95	54.42	-14.47	AVG	P	
3	0.2430	42.99	9.95	52.94	61.99	-9.05	QP	P	
4	0.2430	29.70	9.95	39.65	51.99	-12.34	AVG	P	
5	1.7610	35.04	10.04	45.08	56.00	-10.92	QP	P	
6	1.7610	30.89	10.04	40.93	46.00	-5.07	AVG	P	
7	2.5034	33.41	10.02	43.43	56.00	-12.57	QP	P	
8	2.5034	22.70	10.02	32.72	46.00	-13.28	AVG	P	
9	2.9355	38.28	10.01	48.29	56.00	-7.71	QP	P	
10 *	2.9355	35.02	10.01	45.03	46.00	-0.97	AVG	P	
11	20.0353	44.86	10.13	54.99	60.00	-5.01	QP	P	
12	20.0353	36.07	10.13	46.20	50.00	-3.80	AVG	P	

Note: Level = Reading + Factor Margin = Level - Limit

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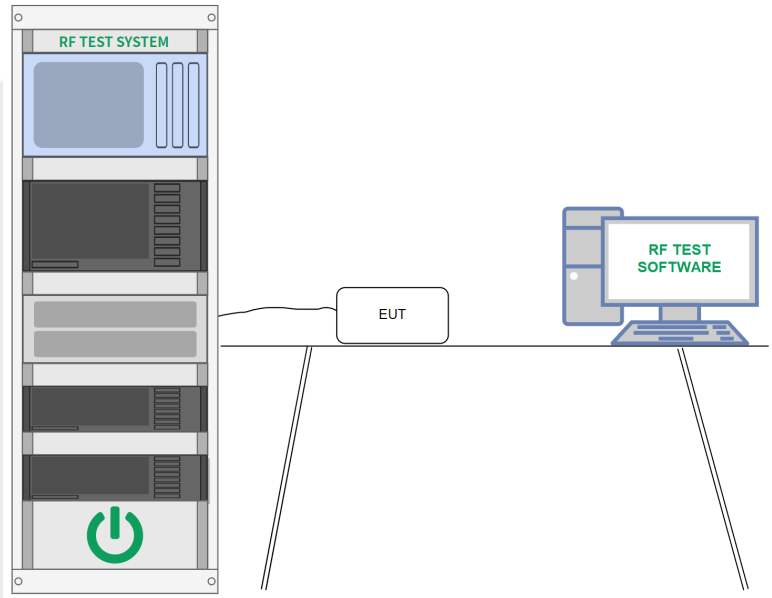
5.3 Emission Bandwidth and Occupied Bandwidth

5.3.1 Test Requirement

Test Requirement	U-NII 1, U-NII 2A, U-NII 2C: No limits, only for report use. U-NII 3, U-NII 4: Within the 5.725-5.850 GHz and 5.850-5.895 GHz bands, the minimum 6 dB bandwidth of U-NII devices shall be at least 500 kHz.
Test Method	ANSI C63.10-2020 section 12.5

5.3.2 Test Setup Diagram



5.3.3 Test Procedure

Emission bandwidth:
a) Set RBW = shall be in the range of 1% to 5% of the emission bandwidth.
b) Set the VBW > RBW.
c) Detector = peak.
d) Trace mode = max hold.
e) Measure the maximum width of the emission that is 26 dB down from the peak of the emission. Compare this with the RBW setting of the instrument. Readjust RBW and repeat measurement as needed until the RBW/EBW ratio is in the range of 1% to 5%.

Occupied bandwidth:
a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement.
c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2.
d) Step a) through step c) might require iteration to adjust within the specified range.
e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used.
f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
g)If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.
h)The occupied bandwidth shall be reported by providing plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled.
Tabular data may be reported in addition to the plot(s).

6 dB emission bandwidth:
a) Set RBW = 100 kHz.
b) Set the video bandwidth (VBW) ≥ 3 >= RBW.
c) Detector = Peak.
d) Trace mode = max hold.
e) Sweep = auto couple.
f) Allow the trace to stabilize.
Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

5.3.4 Test Data

PASS.
Please refer to Annex F for details.

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5.4 Maximum Conducted Output Power

5.4.1 Test Requirement

Test Requirement	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. The maximum e.i.r.p. at any elevation angle above 30 degrees as measured from the horizon must not exceed 125 mW (21 dBm). For an indoor access point operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum conducted output power. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum conducted output power is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations. For client devices in the 5.15-5.25 GHz band, the maximum conducted output power over the frequency band of operation shall not exceed 250 mW provided the maximum antenna gain does not exceed 6 dBi. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum conducted output power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Test Method	ANSI C63.10-2020, section 12.4

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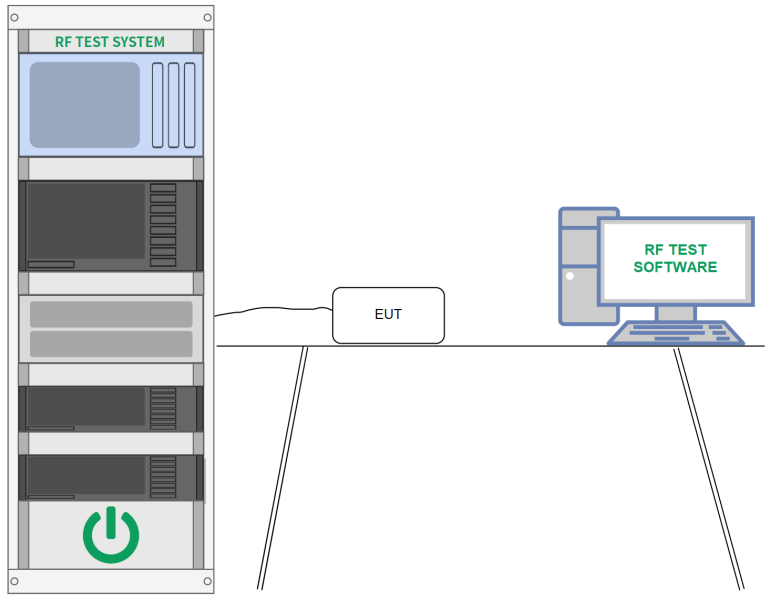
5.4.2 Test Setup Diagram



5.4.3 Test Procedure

Method SA-1
a) Set span to encompass the entire 26 dB EBW or 99% OBW of the signal.
b) Set RBW = 1 MHz.
c) Set VBW >= 3 MHz.
d) Number of points in sweep >= [2 × span / RBW]. (This gives bin-to-bin spacing <= RBW / 2, so that narrowband signals are not lost between frequency bins.)
e) Sweep time = auto.
f) Detector = RMS (i.e., power averaging), if available. Otherwise, use sample detector mode.
g) If transmit duty cycle < 98%, use a video trigger with the trigger level set to enable triggering only on full power pulses. The transmitter shall operate at maximum power control level for the entire duration of every sweep. If the EUT transmits continuously (i.e., with no OFF intervals) or at duty cycle >= 98%, and if each transmission is entirely at the maximum power control level, then the trigger shall be set to “free run.”
h) Trace average at least 100 traces in power averaging (rms) mode.
i) Compute power by integrating the spectrum across the 26 dB EBW or 99% OBW of the signal using the instrument’s band power measurement function, with band limits set equal to the EBW or OBW band edges. If the instrument does not have a band power function, then sum the spectrum levels (in power units) at 1 MHz intervals extending across the 26 dB EBW or 99% OBW of the spectrum.

5.4.4 Test Data

PASS.

Please refer to Annex F for details.

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5.5 Power Spectral Density

5.5.1 Test Requirement

Test Requirement	For an outdoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For an indoor access point operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For fixed point-to-point access points operating in the band 5.15-5.25 GHz, the maximum power spectral density shall not exceed 17 dBm in any 1 megahertz band. Fixed point-to-point U-NII devices may employ antennas with directional gain up to 23 dBi without any corresponding reduction in the maximum power spectral density. For fixed point-to-point transmitters that employ a directional antenna gain greater than 23 dBi, a 1 dB reduction in maximum power spectral density is required for each 1 dB of antenna gain in excess of 23 dBi. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations. For client devices in the 5.15-5.25 GHz band, the maximum power spectral density shall not exceed 11 dBm in any 1 megahertz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. For the band 5.725-5.850 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band. If transmitting antennas of directional gain greater than 6 dBi are used, the maximum power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi. However, fixed point-to-point U-NII devices operating in this band may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power. Fixed, point-to-point operations exclude the use of point-to-multipoint systems, omnidirectional applications, and multiple collocated transmitters transmitting the same information. The operator of the U-NII device, or if the equipment is professionally installed, the installer, is responsible for ensuring that systems employing high gain directional antennas are used exclusively for fixed, point-to-point operations.
Test Method	ANSI C63.10-2020, section 12.6

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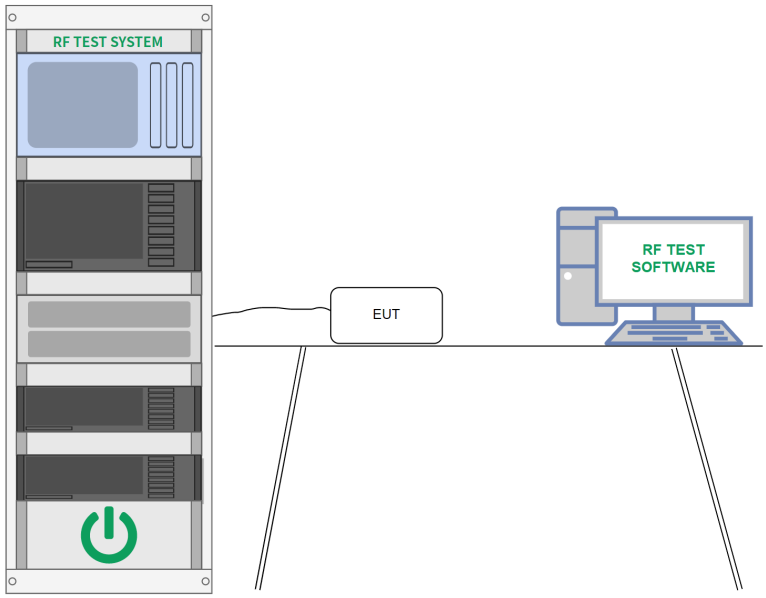
5.5.2 Test Setup Diagram



5.5.3 Test Procedure

a) Create an average power spectrum for the EUT operating mode being tested by following the instructions in 12.3.2 for measuring maximum conducted output power using a spectrum analyzer or EMI receiver; that is, select the appropriate test method (SA-1, SA-2, SA-3, or their respective alternatives) and apply it up to, but not including, the step labeled, “Compute power….” (This procedure is required even if the maximum conducted output power measurement was performed using the power meter method PM.)
b) Use the peak search function on the instrument to find the peak of the spectrum.
c) Make the following adjustments to the peak value of the spectrum, if applicable:
1) If method SA-2 or SA-2A was used, then add [10 log (1 / D)], where D is the duty cycle, to the peak of the spectrum.
2) If method SA-3A was used and the linear mode was used in step h) of 12.3.2.7, add 1 dB to the final result to compensate for the difference between linear averaging and power averaging.
d) The result is the PPSD.
e) The procedure in item a) through item c) requires the use of 1 MHz resolution bandwidth to satisfy the 1 MHz measurement bandwidth specified by some regulatory authorities. This requirement also permits use of resolution bandwidths less than 1 MHz “provided that the measured power is integrated to show the total power over the measurement bandwidth” (i.e., 1 MHz). If measurements are performed using a reduced resolution bandwidth and integrated over 1 MHz bandwidth, the following adjustments to the procedures apply:
1) Set RBW >= 1 / T, where T is defined in 12.2 a).
2) Set VBW >= [3 × RBW].
Care shall be taken such that the measurements are performed during a period of continuous transmission or are corrected upward for duty cycle.

5.5.4 Test Data

PASS.

Please refer to Annex F for details.

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5.6 Band edge Emissions (Restricted frequency bands)

5.6.1 Test Requirement

Test Requirement

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating solely in the 5.725-5.850 GHz band:
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.

If radiated measurements are performed, field strength is then converted to EIRP as follows, Where:
E is the field strength in V/m;
d is the measurement distance in meters.
EIRP is the equivalent isotopically radiated power in watts.ii) Working in dB units, the above equation is equivalent to.EIRP [dBm] = E [dBuV/m] + 20 log (d [meters]) - 104.77
Or, if d is 3 meters:
EIRP [dBm] = E [dBuV/m] - 95.23

Operating Band	Frequency	EIRP Limit	Value
5150-5250MHz	Above 1GHz	-27dBm/MHz(68.23dBuV/m)@3m	Peak
5250-5350MHz	Above 1GHz	-27dBm/MHz(68.23dBuV/m)@3m	Peak
5470-5725MHz	Above 1GHz	-27dBm/MHz(68.23dBuV/m)@3m	Peak
5725-5850 MHz	1GHz-5.65GHz	-27 dBm/MHz(68.23dBuV/m)@3m	Peak
	5.65GHz-5.7GHz	-27dBm/MHz to 10dBm/MHz* (68.23dBuV/m to 105.23dBuV/m) *	Peak
	5.7GHz-5.72GHz	10dBm/MHz to 15.6dBm/MHz* (105.6dBuV/m to 110.83dBuV/m) *	Peak
	5.72GHz-5.725GHz	15.6dBm/MHz to 27dBm/MHz* (110.8dBuV/m to 122.23dBuV/m) *	Peak
	5.85GHz-5.855GHz	27dBm/MHz to 15.6dBm/MHz* (122.2dBuV/m to110.83dBuV/m)*	Peak
	5.855GHz-5.875GHz	15.6dBm/MHz to 10dBm/MHz* (110.8dBuV/m to 105.63dBuV/m*	Peak
	5.875GHz-5.925GHz	10dBm/MHz to -27dBm/MHz* (105.6dBuV/m to 68.23dBuV/m) *	Peak
	Above 5.925GHz	-27 dBm/MHz(68.2dBuV/m)@3m	Peak

Test Method

ANSI C63.10-2020, section 12.7.4, section 12.7.5, section 12.7.6;

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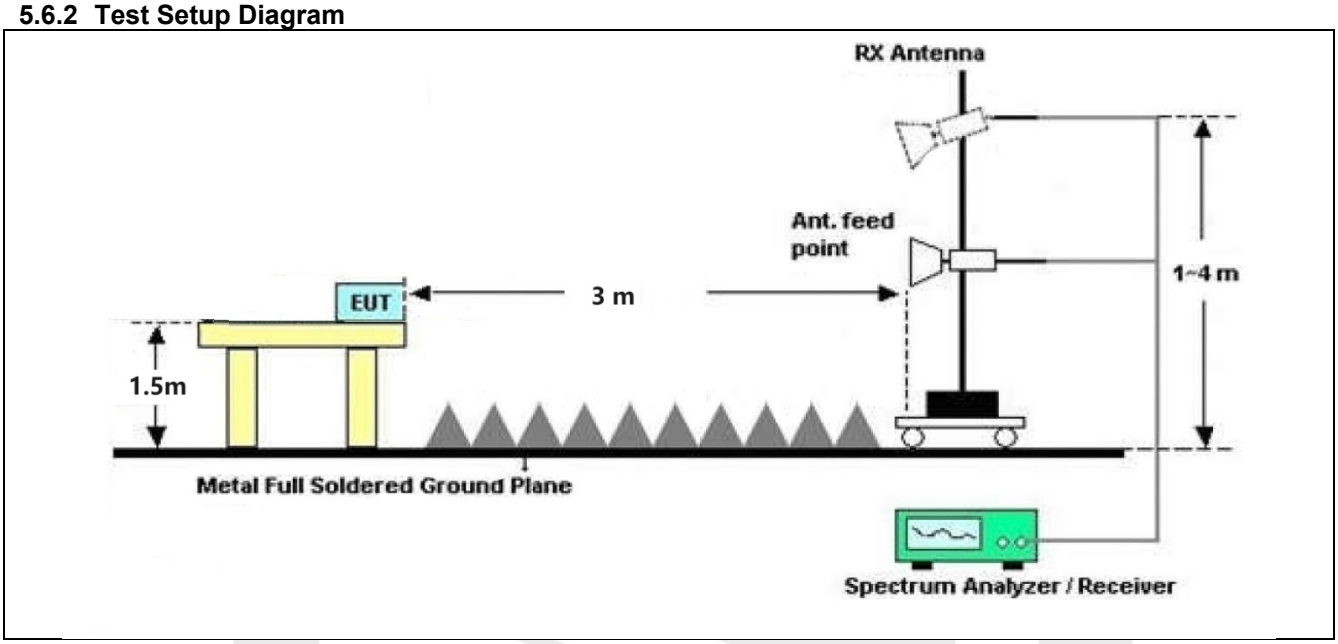
5.6.2 Test Setup Diagram



5.6.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power. Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.
The power of the EUT transmitting frequency should be ignored.
All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
RBW = 1 MHz for f ≥ 1 GHz
VBW ≥ RBW
Sweep = auto
Detector function = peak
Trace = max hold.

According the ANSI C63.10-2020, where limits are specified for both average and peak (or quasi-peak) detector functions, if the peak (or quasi-peak) measured value complies with the average limit, it is unnecessary to perform an average measurement.

5.6.4 Test Data

PASS.

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Band Edge Emissions Test Data:
U-NII-1:

Test Mode: 802.11a					CH Low: 5180 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	47.90	5.79	53.69	68.23	-14.55	PK	PASS
H	5350.00	46.82	6.45	53.27	68.23	-14.96	PK	PASS
V	5150.00	47.08	5.79	52.87	68.23	-15.36	PK	PASS
V	5350.00	45.50	6.45	51.95	68.23	-16.28	PK	PASS
H	5150.00	35.81	5.79	41.60	54.00	-12.41	AV	PASS
H	5350.00	31.07	6.45	37.52	54.00	-16.48	AV	PASS
V	5150.00	34.53	5.79	40.32	54.00	-13.68	AV	PASS
V	5350.00	33.43	6.45	39.88	54.00	-14.13	AV	PASS

Test Mode: 802.11a					CH High: 5240 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	47.26	5.79	53.05	68.23	-15.19	PK	PASS
H	5350.00	46.74	6.45	53.19	68.23	-15.05	PK	PASS
V	5150.00	49.45	5.79	55.24	68.23	-12.99	PK	PASS
V	5350.00	46.37	6.45	52.82	68.23	-15.41	PK	PASS
H	5150.00	34.06	5.79	39.85	54.00	-14.15	AV	PASS
H	5350.00	32.03	6.45	38.48	54.00	-15.53	AV	PASS
V	5150.00	35.73	5.79	41.52	54.00	-12.49	AV	PASS
V	5350.00	32.98	6.45	39.43	54.00	-14.58	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

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Band Edge Emissions Test Data:
U-NII-1:

Test Mode: 802.11n(HT20)					CH Low: 5180 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	49.90	5.79	55.69	68.23	-12.54	PK	PASS
H	5350.00	46.19	6.45	52.64	68.23	-15.59	PK	PASS
V	5150.00	49.48	5.79	55.27	68.23	-12.96	PK	PASS
V	5350.00	46.91	6.45	53.36	68.23	-14.87	PK	PASS
H	5150.00	35.06	5.79	40.85	54.00	-13.15	AV	PASS
H	5350.00	33.60	6.45	40.05	54.00	-13.95	AV	PASS
V	5150.00	36.65	5.79	42.44	54.00	-11.57	AV	PASS
V	5350.00	33.06	6.45	39.51	54.00	-14.49	AV	PASS

Test Mode: 802.11n(HT20)					CH High: 5240 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	48.44	5.79	54.23	68.23	-14.00	PK	PASS
H	5350.00	45.16	6.45	51.61	68.23	-16.62	PK	PASS
V	5150.00	48.02	5.79	53.81	68.23	-14.43	PK	PASS
V	5350.00	44.75	6.45	51.20	68.23	-17.03	PK	PASS
H	5150.00	34.26	5.79	40.05	54.00	-13.96	AV	PASS
H	5350.00	31.58	6.45	38.03	54.00	-15.98	AV	PASS
V	5150.00	34.59	5.79	40.38	54.00	-13.63	AV	PASS
V	5350.00	32.84	6.45	39.29	54.00	-14.71	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

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Band Edge Emissions Test Data:
U-NII-1:

Test Mode: 802.11n(HT40)					CH Low: 5190 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	48.71	5.79	54.50	68.23	-13.74	PK	PASS
H	5350.00	45.13	6.45	51.58	68.23	-16.66	PK	PASS
V	5150.00	48.86	5.79	54.65	68.23	-13.59	PK	PASS
V	5350.00	44.09	6.45	50.54	68.23	-17.70	PK	PASS
H	5150.00	34.20	5.79	39.99	54.00	-14.01	AV	PASS
H	5350.00	32.13	6.45	38.58	54.00	-15.43	AV	PASS
V	5150.00	34.92	5.79	40.71	54.00	-13.29	AV	PASS
V	5350.00	33.99	6.45	40.44	54.00	-13.57	AV	PASS

Test Mode: 802.11n(HT40)					CH High: 5190 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	47.85	5.79	53.64	68.23	-14.60	PK	PASS
H	5350.00	46.66	6.45	53.11	68.23	-15.13	PK	PASS
V	5150.00	47.14	5.79	52.93	68.23	-15.30	PK	PASS
V	5350.00	45.18	6.45	51.63	68.23	-16.60	PK	PASS
H	5150.00	36.92	5.79	42.71	54.00	-11.29	AV	PASS
H	5350.00	31.47	6.45	37.92	54.00	-16.09	AV	PASS
V	5150.00	35.71	5.79	41.50	54.00	-12.51	AV	PASS
V	5350.00	32.19	6.45	38.64	54.00	-15.37	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

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Band Edge Emissions Test Data:
U-NII-1:

Test Mode: 802.11ac(VHT20)					CH Low: 5180 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	48.38	5.79	54.17	68.23	-14.07	PK	PASS
H	5350.00	45.98	6.45	52.43	68.23	-15.80	PK	PASS
V	5150.00	47.65	5.79	53.44	68.23	-14.79	PK	PASS
V	5350.00	46.87	6.45	53.32	68.23	-14.91	PK	PASS
H	5150.00	36.15	5.79	41.94	54.00	-12.07	AV	PASS
H	5350.00	32.91	6.45	39.36	54.00	-14.65	AV	PASS
V	5150.00	36.36	5.79	42.15	54.00	-11.86	AV	PASS
V	5350.00	31.49	6.45	37.94	54.00	-16.06	AV	PASS

Test Mode: 802.11ac(VHT20)					CH High: 5240 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	47.58	5.79	53.37	68.23	-14.87	PK	PASS
H	5350.00	45.06	6.45	51.51	68.23	-16.73	PK	PASS
V	5150.00	47.94	5.79	53.73	68.23	-14.50	PK	PASS
V	5350.00	46.48	6.45	52.93	68.23	-15.30	PK	PASS
H	5150.00	35.88	5.79	41.67	54.00	-12.34	AV	PASS
H	5350.00	31.92	6.45	38.37	54.00	-15.64	AV	PASS
V	5150.00	34.50	5.79	40.29	54.00	-13.71	AV	PASS
V	5350.00	31.09	6.45	37.54	54.00	-16.47	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

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Band Edge Emissions Test Data:
U-NII-1:

Test Mode: 802.11 ac(VHT40)					CH Low: 5190 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	47.02	5.79	52.81	68.23	-15.42	PK	PASS
H	5350.00	46.79	6.45	53.24	68.23	-14.99	PK	PASS
V	5150.00	49.39	5.79	55.18	68.23	-13.05	PK	PASS
V	5350.00	46.16	6.45	52.61	68.23	-15.62	PK	PASS
H	5150.00	34.67	5.79	40.46	54.00	-13.54	AV	PASS
H	5350.00	33.00	6.45	39.45	54.00	-14.55	AV	PASS
V	5150.00	35.76	5.79	41.55	54.00	-12.45	AV	PASS
V	5350.00	32.72	6.45	39.17	54.00	-14.84	AV	PASS

Test Mode: 802.11 ac(VHT40)					CH High: 5190 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
H	5150.00	47.11	5.79	52.90	68.23	-15.34	PK	PASS
H	5350.00	46.00	6.45	52.45	68.23	-15.78	PK	PASS
V	5150.00	47.47	5.79	53.26	68.23	-14.97	PK	PASS
V	5350.00	46.66	6.45	53.11	68.23	-15.12	PK	PASS
H	5150.00	34.97	5.79	40.76	54.00	-13.25	AV	PASS
H	5350.00	31.98	6.45	38.43	54.00	-15.58	AV	PASS
V	5150.00	35.82	5.79	41.61	54.00	-12.40	AV	PASS
V	5350.00	33.14	6.45	39.59	54.00	-14.41	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.

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5.7 Undesirable Emissions

5.7.1 Test Requirement

Test Requirement

For transmitters operating in the 5.15-5.25 GHz band: All emissions outside of the 5.15-5.35 GHz band shall not exceed an e.i.r.p. of −27 dBm/MHz.
For transmitters operating solely in the 5.725-5.850 GHz band:
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.

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
[1]0.495-0.505	16.69475-16.69525	608-614	5.35-5.46
2.1735-2.1905	16.80425-16.80475	960-1240	7.25-7.75
4.125-4.128	25.5-25.67	1300-1427	8.025-8.5
4.17725-4.17775	37.5-38.25	1435-1626.5	9.0-9.2
4.20725-4.20775	73-74.6	1645.5-1646.5	9.3-9.5
6.215-6.218	74.8-75.2	1660-1710	10.6-12.7
6.26775-6.26825	108-121.94	1718.8-1722.2	13.25-13.4
6.31175-6.31225	123-138	2200-2300	14.47-14.5
8.291-8.294	149.9-150.05	2310-2390	15.35-16.2
8.362-8.366	156.52475-156.52525	2483.5-2500	17.7-21.4
8.37625-8.38675	156.7-156.9	2690-2900	22.01-23.12
8.41425-8.41475	162.0125-167.17	3260-3267	23.6-24.0
12.29-12.293	167.72-173.2	3332-3339	31.2-31.8
12.51975-12.52025	240-285	3345.8-3358	36.43-36.5
12.57675-12.57725	322-335.4	3600-4400	([2])
13.36-13.41			

[1]Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz.
[2]Above 38.6

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35apply to these measurements.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490	2400/F(kHz)	300
0.490-1.705	24000/F(kHz)	30
1.705-30.0	30	30
30-88	100 **	3
88-216	150 **	3
216-960	200 **	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional

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	radiators operating under this section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., §§ 15.231 and 15.241. Note: 1) Field Strength (dBμV/m) = 20*log[Field Strength (μV/m)]. 2) In the emission tables above, the tighter limit applies at the band edges. 3) For above 1000 MHz, the emission limit in this paragraph is based on measurement instrumentation employing an average detector, measurement using instrumentation with a peak detector function, corresponding to 20dB above the maximum permitted average limit. 4) For above 1000 MHz, limit field strength of harmonics: 54dBuV/m@3m (AV) and 74dBuV/m@3m (PK).
Test Method	ANSI C63.10-2020, section 12.7.4, section 12.7.5, section 12.7.6;

5.7.2 Test Setup Diagram

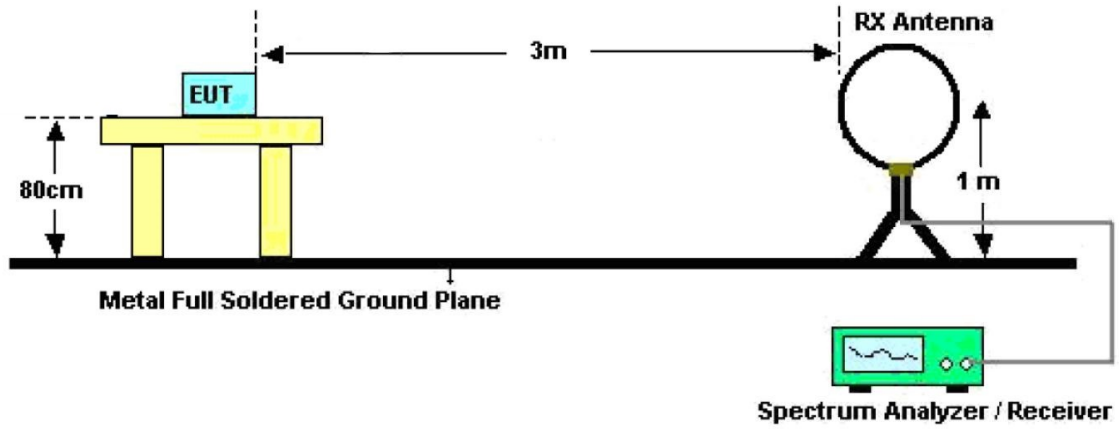

Figure 1. Below 30MHz

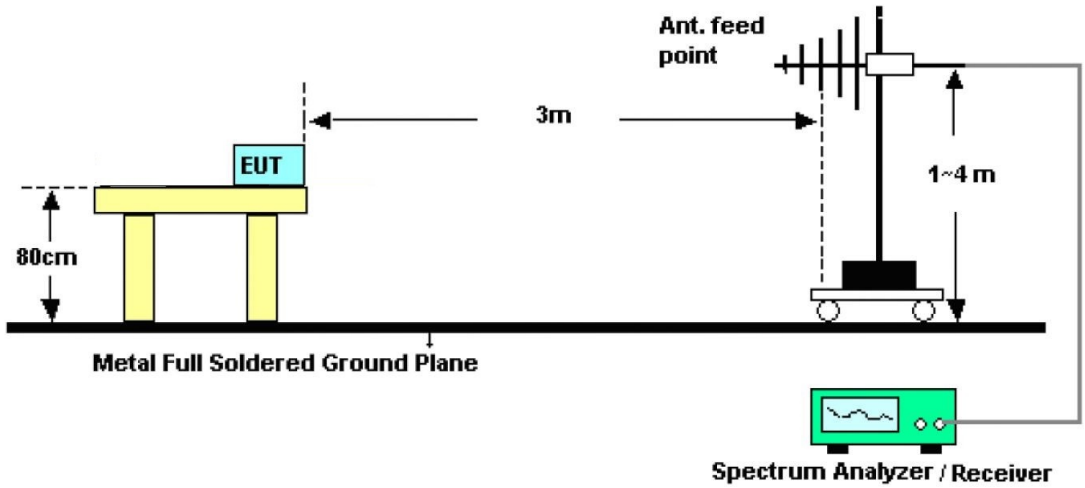

Figure 2. 30MHz to 1GHz

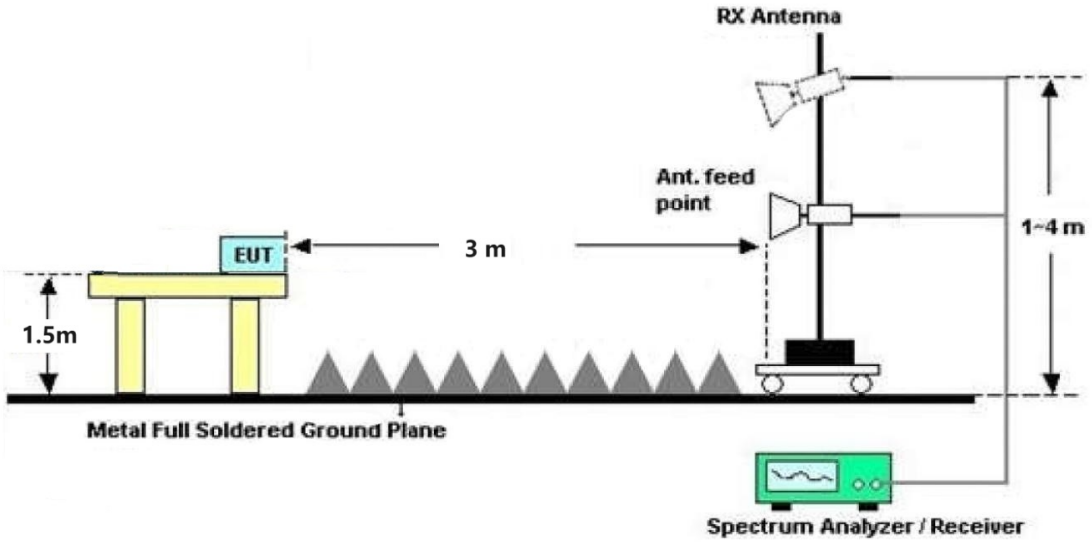

Figure 3. Above 1 GHz

5.7.3 Test Procedure

The measurement frequency range is from 9 kHz to the 10th harmonic of the fundamental frequency. The Turn Table is actuated to turn from 0° to 360°, and both horizontal and vertical polarizations of the Test Antenna are used to find the maximum radiated power.
Mid channels on all channel bandwidth verified. Only the worst RB size/offset presented.
The power of the EUT transmitting frequency should be ignored.
All Spurious Emission tests were performed in X, Y, Z axis direction. And only the worst axis test condition was recorded in this test report.
Use the following spectrum analyzer settings:
Span = wide enough to fully capture the emission being measured
For 9kHz to 150kHz, Set the spectrum analyzer as:
RBW = 200Hz, VBW =1kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 150kHz to 30MHz, Set the spectrum analyzer as:
RBW = 9KHz, VBW =30kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For 30MHz to 1000MHz, Set the spectrum analyzer as:
RBW = 100kHz, VBW =300kHz, Detector= Quasi-Peak, Trace mode= Max hold, Sweep- auto couple.

For above 1GHz,Set the spectrum analyzer as:
RBW =1MHz, VBW =1MHz, Detector= Peak, Trace mode= Max hold, Sweep- auto couple.
RBW =1MHz, VBW =10Hz, Detector= Average, Trace mode= Max hold, Sweep- auto couple.

For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicable limit, the peak emission level will be reported, Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported.

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5.7.4 Test Data

PASS.
Please to see the following pages.

The test results of 9kHz-30MHz was attenuated more than 20dB below the permissible limits, so the results don't record in the report.

For test of 30MHz-1GHz, during the test, pre-scan all modes, and found the U-NII-1 / 802.11n(HT20) Middle Middle is worse case, the report only record this mode.

For test of 1GHz-18GHz, during the test, pre-scan all modes, and found the U-NII-1 / 802.11n(HT20) is worse case, the report only record this mode.

The disturbance above 18GHz were very low and the harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

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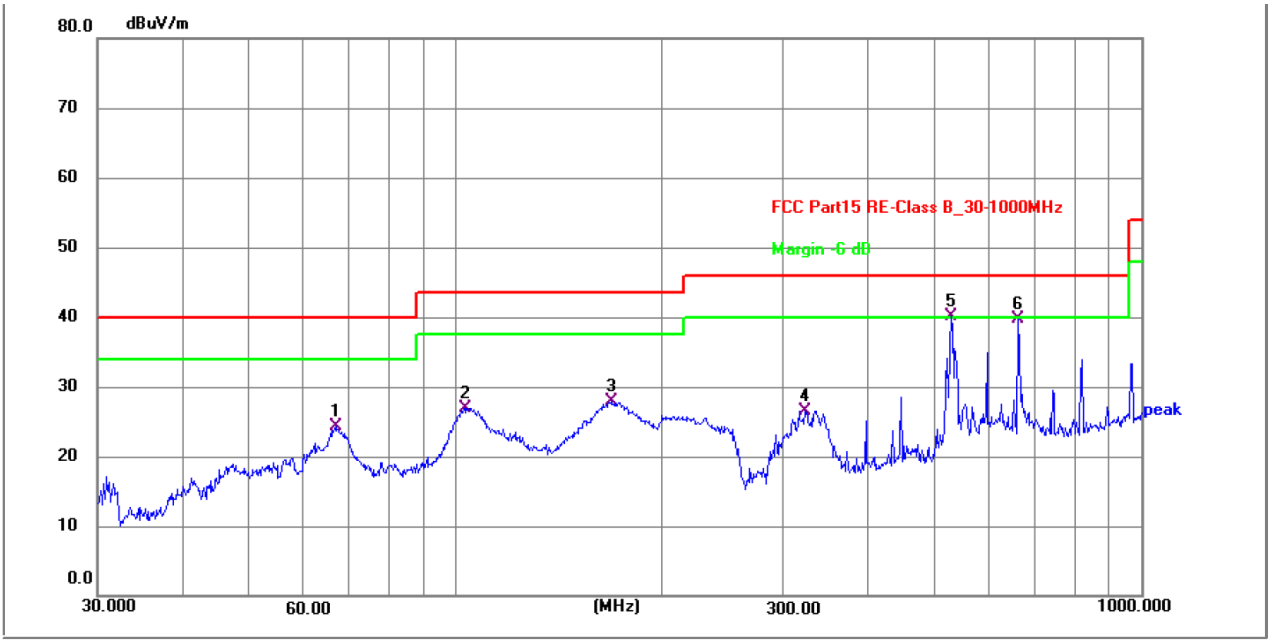
Radiated Emission Test Data (30-1000MHz)

Test Site:	**966 Chamber #1**	**Polarization:**	**Horizontal**
Distance:	**3m**	**Test Mode:**	**TM2/ CH Middle**
Model No.:	**Adapter 1**		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	66.7325	41.13	-16.74	24.39	40.00	-15.61	QP	P	
2	103.0800	42.50	-15.53	26.97	43.50	-16.53	QP	P	
3	168.4137	45.09	-17.10	27.99	43.50	-15.51	QP	P	
4	323.3204	38.08	-11.51	26.57	46.00	-19.43	QP	P	
5 *	528.2458	48.26	-8.16	40.10	46.00	-5.90	QP	P	
6	661.1505	45.38	-5.68	39.70	46.00	-6.30	QP	P	

Note: Level = Reading + Factor **Margin = Level - Limit**

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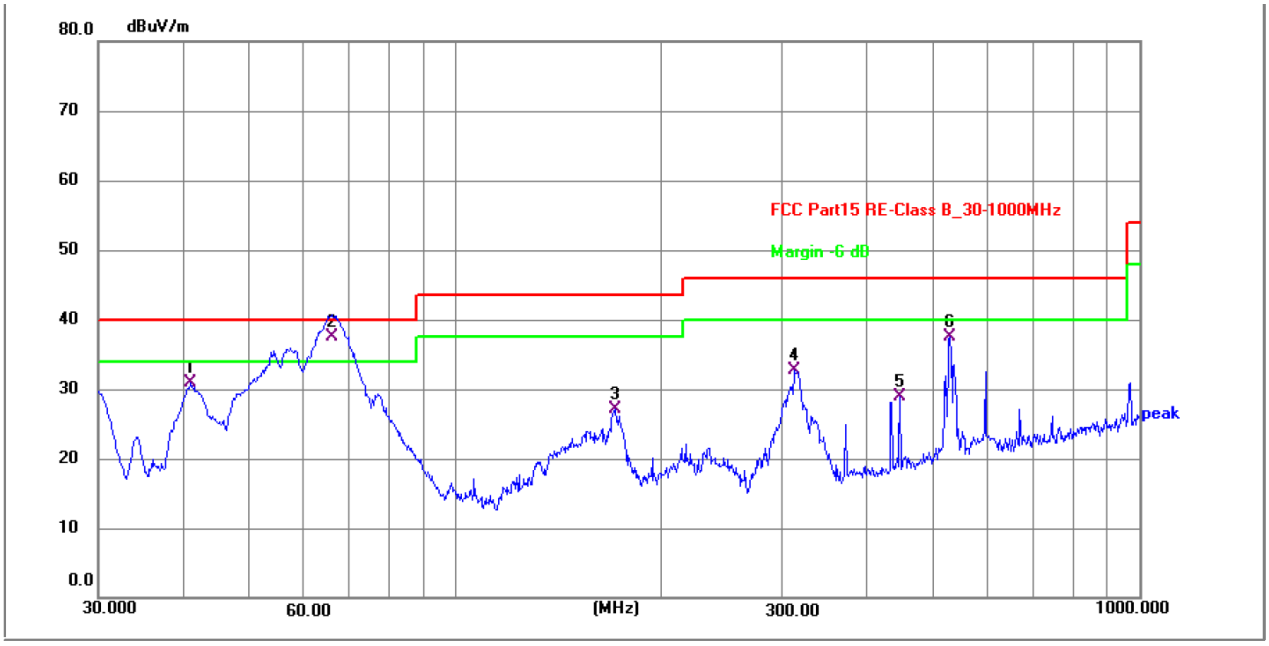
Radiated Emission Test Data (30-1000MHz)

Test Site:	**966 Chamber #1**	**Polarization:**	**Vertical**
Distance:	**3m**	**Test Mode:**	**TM2/ CH Middle**
Model No.:	**Adapter 1**		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	40.9880	45.91	-14.98	30.93	40.00	-9.07	QP	P	
2 *	66.0342	54.08	-16.48	37.60	40.00	-2.40	QP	P	
3	170.7926	44.03	-16.93	27.10	43.50	-16.40	QP	P	
4	313.2760	44.40	-11.68	32.72	46.00	-13.28	QP	P	
5	446.4140	38.42	-9.44	28.98	46.00	-17.02	QP	P	
6	528.2458	45.58	-8.06	37.52	46.00	-8.48	QP	P	

Note: Level = Reading + Factor **Margin = Level - Limit**

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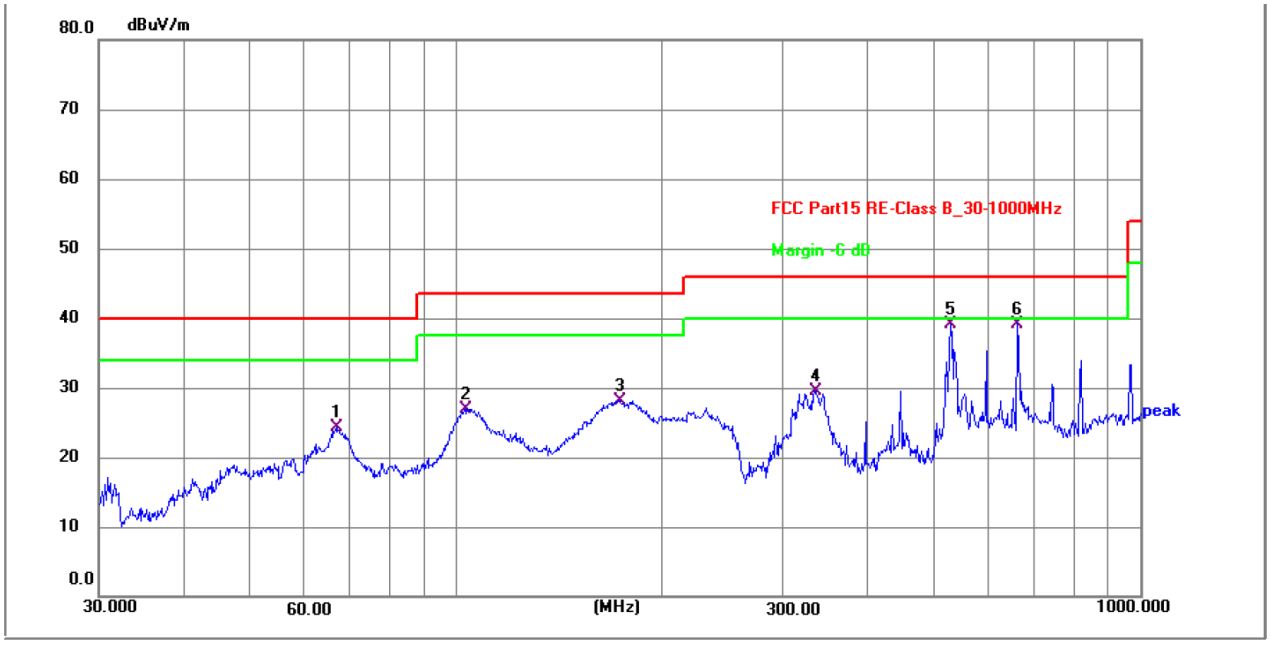
Radiated Emission Test Data (30-1000MHz)

Test Site:	**966 Chamber #1**	**Polarization:**	**Horizontal**
Distance:	**3m**	**Test Mode:**	**TM1/ CH Middle**
Model No.:	**Adapter 2**		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1	66.7325	41.13	-16.74	24.39	40.00	-15.61	QP	P	
2	103.0800	42.50	-15.53	26.97	43.50	-16.53	QP	P	
3	173.8135	44.88	-16.71	28.17	43.50	-15.33	QP	P	
4	334.8586	40.75	-11.28	29.47	46.00	-16.53	QP	P	
5	528.2458	47.26	-8.16	39.10	46.00	-6.90	QP	P	
6 *	661.1503	44.88	-5.68	39.20	46.00	-6.80	QP	P	

Note: Level = Reading + Factor **Margin = Level - Limit**

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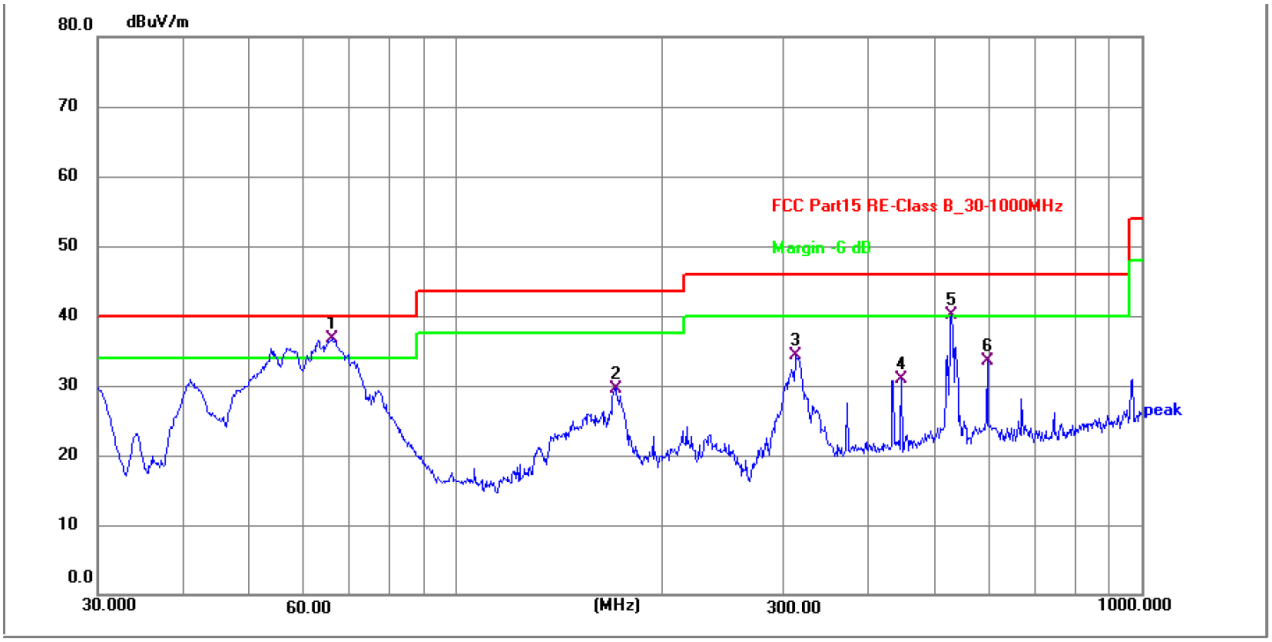
Radiated Emission Test Data (30-1000MHz)

Test Site:	**966 Chamber #1**	**Polarization:**	**Vertical**
Distance:	**3m**	**Test Mode:**	**TM1/ CH Middle**
Model No.:	**Adapter 2**		



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F	Remark
1 *	66.0340	53.11	-16.48	36.63	40.00	-3.37	QP	P	
2	170.7923	46.53	-16.93	29.60	43.50	-13.90	QP	P	
3	313.2760	45.90	-11.68	34.22	46.00	-11.78	QP	P	
4	446.4140	40.42	-9.44	30.98	46.00	-15.02	QP	P	
5 !	528.2458	48.08	-8.06	40.02	46.00	-5.98	QP	P	
6	595.1326	40.04	-6.53	33.51	46.00	-12.49	QP	P	

Note: Level = Reading + Factor **Margin = Level - Limit**

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Radiated Spurious Emission (1GHz-18GHz)
U-NII-1:

Test Mode: 802.11n(HT20)					CH Low: 5180 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	3208.11	45.09	-0.84	44.25	68.23	-23.98	PK	PASS
V	7517.98	41.37	9.85	51.22	68.23	-17.01	PK	PASS
V	9501.21	35.34	13.14	48.48	68.23	-19.75	PK	PASS
V	10361.50	42.90	13.79	56.69	68.23	-11.54	PK	PASS
V	14017.16	36.43	17.35	53.78	68.23	-14.45	PK	PASS
V	15541.25	*	*	*	68.23	*	PK	PASS
H	3200.00	47.70	-0.87	46.83	68.23	-21.40	PK	PASS
H	7501.25	42.86	9.83	52.69	68.23	-15.54	PK	PASS
H	9501.00	36.14	13.14	49.28	68.23	-18.95	PK	PASS
H	10360.25	43.10	13.79	56.89	68.23	-11.34	PK	PASS
H	14001.64	35.42	17.33	52.75	68.23	-15.48	PK	PASS
H	15541.25	*	*	*	68.23	*	PK	PASS
V	3208.11	32.00	-0.84	31.16	54.00	-22.84	AV	PASS
V	7517.98	29.16	9.85	39.01	54.00	-14.99	AV	PASS
V	9501.21	23.25	13.14	36.39	54.00	-17.61	AV	PASS
V	10361.50	32.73	13.79	46.52	54.00	-7.48	AV	PASS
V	14017.16	24.05	17.35	41.41	54.00	-12.59	AV	PASS
V	15541.25	*	*	*	54.00	*	AV	PASS
H	3200.00	33.64	-0.87	32.77	54.00	-21.23	AV	PASS
H	7501.25	30.09	9.83	39.92	54.00	-14.08	AV	PASS
H	9501.00	24.66	13.14	37.80	54.00	-16.20	AV	PASS
H	10360.25	31.67	13.79	45.46	54.00	-8.54	AV	PASS
H	14001.64	23.11	17.33	40.45	54.00	-13.55	AV	PASS
H	15541.25	*	*	*	54.00	*	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
2. “*” means the test results were attenuated more than 20dB below the permissible limits, so the results don't record in the report.

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Radiated Spurious Emission (1GHz-18GHz)
U-NII-1:

Test Mode: 802.11n(HT20)					CH Middle: 5200 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	3401.47	47.16	-0.13	47.03	68.23	-21.20	PK	PASS
V	8006.43	40.14	10.34	50.48	68.23	-17.75	PK	PASS
V	9714.94	37.55	13.20	50.75	68.23	-17.48	PK	PASS
V	10400.25	43.93	13.91	57.84	68.23	-10.39	PK	PASS
V	14317.43	37.97	17.46	55.43	68.23	-12.80	PK	PASS
V	15601.50	*	*	*	68.23	*	PK	PASS
H	3408.30	46.21	-0.11	46.10	68.23	-22.13	PK	PASS
H	8014.72	40.93	10.36	51.28	68.23	-16.95	PK	PASS
H	9711.37	37.12	13.20	50.32	68.23	-17.91	PK	PASS
H	10400.00	42.09	13.91	56.00	68.23	-12.23	PK	PASS
H	14302.15	35.14	17.43	52.57	68.23	-15.66	PK	PASS
H	15602.50	*	*	*	68.23	*	PK	PASS
V	3401.47	34.52	-0.13	34.39	54.00	-19.61	AV	PASS
V	8006.43	30.27	10.34	40.61	54.00	-13.39	AV	PASS
V	9714.94	23.07	13.20	36.28	54.00	-17.72	AV	PASS
V	10400.25	31.12	13.91	45.03	54.00	-8.97	AV	PASS
V	14317.43	23.81	17.46	41.27	54.00	-12.73	AV	PASS
V	15601.50	*	*	*	54.00	*	AV	PASS
H	3408.30	32.24	-0.11	32.13	54.00	-21.87	AV	PASS
H	8014.72	30.38	10.36	40.74	54.00	-13.26	AV	PASS
H	9711.37	22.37	13.20	35.57	54.00	-18.43	AV	PASS
H	10400.00	32.64	13.91	46.55	54.00	-7.45	AV	PASS
H	14302.15	23.86	17.43	41.29	54.00	-12.71	AV	PASS
H	15602.50	*	*	*	54.00	*	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
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Radiated Spurious Emission (1GHz-18GHz)
U-NII-1:

Test Mode: 802.11n(HT20)					CH High: 5240 MHz			
Pol.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Emission level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector Type	Result
V	3715.66	47.13	1.10	48.23	68.23	-20.00	PK	PASS
V	8200.27	40.96	10.85	51.81	68.23	-16.42	PK	PASS
V	9808.24	35.36	13.23	48.59	68.23	-19.64	PK	PASS
V	10480.00	44.00	13.96	57.96	68.23	-10.27	PK	PASS
V	14702.06	37.31	17.56	54.87	68.23	-13.36	PK	PASS
V	15720.75	*	*	*	68.23	*	PK	PASS
H	3717.31	45.56	1.11	46.66	68.23	-21.57	PK	PASS
H	8207.67	41.08	10.87	51.95	68.23	-16.28	PK	PASS
H	9801.77	36.26	13.23	49.49	68.23	-18.74	PK	PASS
H	10482.25	44.18	13.96	58.14	68.23	-10.09	PK	PASS
H	14708.60	35.65	17.58	53.23	68.23	-15.00	PK	PASS
H	15722.25	*	*	*	68.23	*	PK	PASS
V	3715.66	34.76	1.10	35.87	54.00	-18.13	AV	PASS
V	8200.27	29.57	10.85	40.42	54.00	-13.58	AV	PASS
V	9808.24	23.25	13.23	36.48	54.00	-17.52	AV	PASS
V	10480.00	30.23	13.96	44.19	54.00	-9.81	AV	PASS
V	14702.06	22.75	17.56	40.31	54.00	-13.69	AV	PASS
V	15720.75	*	*	*	54.00	*	AV	PASS
H	3717.31	32.37	1.11	33.48	54.00	-20.52	AV	PASS
H	8207.67	29.68	10.87	40.55	54.00	-13.45	AV	PASS
H	9801.77	22.21	13.23	35.44	54.00	-18.56	AV	PASS
H	10482.25	30.43	13.96	44.39	54.00	-9.61	AV	PASS
H	14708.60	23.66	17.58	41.24	54.00	-12.76	AV	PASS
H	15722.25	*	*	*	54.00	*	AV	PASS

Remark:
1. Emission Level = Reading + Factor, Margin= Emission Level – Limit.
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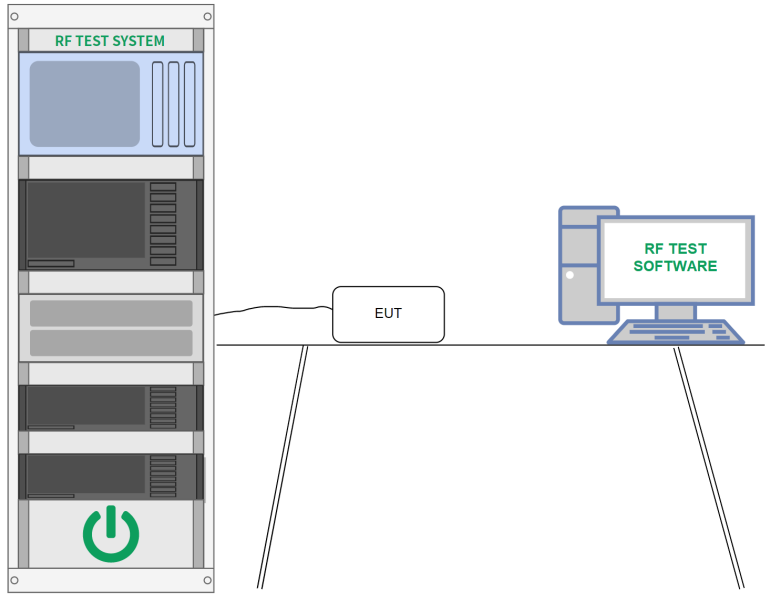
5.8 Frequency Stability

5.8.1 Test Requirement

Test Requirement	Manufacturers of U-NII devices are responsible for ensuring frequency stability such that an emission is maintained within the band of operation under all conditions of normal operation as specified in the user's manual.

5.8.2 Test Setup Diagram



5.8.3 Test Procedure

✧ **Frequency stability with respect to ambient temperature**

a) Supply the EUT with a nominal ac voltage or install a new or fully charged battery in the EUT. If possible, a dummy load shall be connected to the EUT because an antenna near the metallic walls of an environmental test chamber could affect the output frequency of the EUT. If the EUT is equipped with a permanently attached, adjustable-length antenna, then the EUT shall be placed in the center of the chamber with the antenna adjusted to the shortest length possible. Turn ON the EUT and tune it to one of the number of frequencies.

b) Couple the unlicensed wireless device output to the measuring instrument by connecting an antenna to the measuring instrument with a suitable length of coaxial cable and placing the measuring antenna near the EUT (e.g., 15 cm away), or by connecting a dummy load to the measuring instrument through an attenuator if necessary.

NOTE-An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.

c) Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).

d) Turn the EUT OFF and place it inside the environmental temperature chamber. For devices that have oscillator heaters energize only the heater circuit.

e) Set the temperature control on the chamber to the highest specified in the regulatory requirements for the type of device and allow the oscillator heater and the chamber temperature to stabilize.

f) While maintaining a constant temperature inside the environmental chamber, turn the EUT ON and record the operating frequency at startup, and at 2 min, 5 min, and 10 min after the EUT is energized. Four measurements in total are made.

g) Measure the frequency at each of frequencies.

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h) Switch OFF the EUT but do not switch OFF the oscillator heater.
i) Lower the chamber temperature by not more than 10 ℃, and allow the temperature inside the chamber to stabilize.
j) Repeat step f through step i) down to the lowest specified temperature.

✧ **Frequency stability when varying supply voltage**
Unless otherwise specified, these tests shall be made at ambient room temperature (+15 °C to +25 °C).
a) An antenna shall be connected to the antenna output terminals of the EUT if possible. If the EUT is equipped with or uses an adjustable-length antenna, then it shall be fully extended.
Supply the EUT with nominal voltage or install a new or fully charged battery in the EUT. Turn ON the EUT and couple its output to a frequency counter or other frequency measuring instrument.
NOTE An instrument that has an adequate level of accuracy as specified by the procuring or regulatory agency is the recommended measuring instrument.
b) Tune the EUT to one of the number of frequencies. Adjust the location of the measurement antenna and the controls on the measurement instrument to obtain a suitable signal level (i.e., a level that will not overload the measurement instrument but is strong enough to allow measurement of the operating or fundamental frequency of the EUT).
c) Measure the frequency at each of the frequencies.
d) Repeat the above procedure at 85% and 115% of the nominal supply voltage.

5.8.4 Test Data

PASS.
Please refer to Annex F for details.

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ANNEX A TEST SETUP PHOTOS

Please refer to the document “8228EU010101W-AA.PDF”

ANNEX B EXTERNAL PHOTOS

Please refer to the document “8228EU010101W-AB.PDF”

ANNEX C INTERNAL PHOTOS

Please refer to the document “8228EU010101W-AC.PDF”

ANNEX D TEST DATA

Please refer to the document “8228EU010101W-AF.PDF”

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