RF Test Report

For

Applicant name:	**Migear International Group LLC**
Address:	21 West 38th Street, 14th Floor. New York, NY 10018, United States
EUT name:	OUTDOOR LIGHT SPEAKER
Brand name:	Coleman
Model number:	CLDL300
Series model number:	Refer to section 2
FCC ID:	2AIDL-CLDL300

Issued By

Company name:	**BTF Testing Lab (Shenzhen) Co., Ltd.**
Address:	Plant 101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, Guangdong, China
Report number:	BTF260922R01301
Test standards:	47 CFR Part 15.247
Test conclusion:	Pass
Date of sample receipt:	2026-09-22
Test date:	2026-09-22 to 2026-09-24
Date of issue:	2026-09-24
Test by:	Leon Huang / Tester
Prepared by:	Sean He / Project engineer
Approved by:	Ryan CJ / EMC Manager

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2026-09-24	Original

Note:
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1 Introduction

1.1 Laboratory Location

Test location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	Plant 101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, Guangdong, China
Phone number:	+86-0755-23146130
Fax number:	+86-0755-23146130

1.2 Laboratory Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **FCC - Designation No.: CN1409**
  BTF Testing Lab (Shenzhen) Co., Ltd. has been accredited as a testing laboratory by FCC (Federal Communications Commission). The test firm Registration No. is 695374.
- **CNAS - Registration No.: CNAS L17568**
  BTF Testing Lab (Shenzhen) Co., Ltd. is accredited to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L17568.
- **A2LA - Registration No.: 6660.01**
  BTF Testing Lab (Shenzhen) Co., Ltd. is accredited in accordance with the recognized International Standard ISO/IEC 17025:2017 General requirements for the competence of testing and calibration laboratories.
- **ISED – CAB identifier.: CN0135**
  The 3m Semi-anechoic chamber of BTF Testing Lab (Shenzhen) Co., Ltd. has been Registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 27844.

1.3 Announcement

(1) The test report reference to the report template version v0.
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(7) All entrusted information in this report is provided by the client and has been confirmed through consultation with the client; The testing items for this report have been discussed and confirmed with the client, and our company is only responsible for the content reflected in the report.

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2 Product Information

2.1 Application Information

Company name:	Migear International Group LLC
Address:	21 West 38th Street, 14th Floor. New York, NY 10018, United States

2.2 Manufacturer Information

Company name:	Loud Global (Shenzhen) Import & Export Co., Ltd
Address:	Room 1705, Building A, United Plaza, No.5022 Binhe Avenue,Fushan Community, Futian Street, Futian District, Shenzhen

2.3 Factory Information

Company name:	NINGBO WISEASIA CO.,LTD
Address:	2F,Unit 7, No.688 Jinda Road, Yinzhou, Ningbo, China. Post Code 315040

2.4 General Description of Equipment under Test (EUT)

EUT name:	OUTDOOR LIGHT SPEAKER
Under test model name:	CLDL300
Series model name:	CLDL300W, CLDL300K
Description of model name differentiation:	The model names and color are different.
Ratings:	Input: DC 3.7V from Battery or DC 5V from adapter

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2.5 Technical Information

Operation Frequency:	2402MHz to 2480MHz
Channel numbers:	79
Channel separation:	1MHz
Modulation technology:	GFSK, π/4 DQPSK, 8DPSK
Maximum Conducted Power:	-6.56dBm
Antenna type:	PCB Antenna
Antenna gain:	1.48dBi

Channel List:

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2422	40	2442	60	2462
1	2403	21	2423	41	2443	61	2463
2	2404	22	2424	42	2444	62	2464
3	2405	23	2425	43	2445	63	2465
4	2406	24	2426	44	2446	64	2466
5	2407	25	2427	45	2447	65	2467
6	2408	26	2428	46	2448	66	2468
7	2409	27	2429	47	2449	67	2469
8	2410	28	2430	48	2450	68	2470
9	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	/	/

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3 Summary of Test Results

3.1 Test Standards

The tests were performed according to following standards:
47 CFR Part 15.247: Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz
KDB 558074 D01 15.247 Meas Guidance v05r02: Guidance for Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operating Under Section 15.247 of The FCC Rules.

3.2 Uncertainty of Test

Measurement	Value
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.45 dB
Occupied Channel Bandwidth	±173.1Hz
RF output power, conducted	±0.66 dB
Time	±5 %
Unwanted Emissions, conducted	±2.32 dB
Radiated Emission(1GHz~18GHz)	±4.80 dB
Radiated Emission(9kHz~30MHz)	±2.20 dB
Radiated Emission(30MHz~1GHz)	±4.94 dB
Radiated Emission (18GHz ~ 40GHz)	±5.08dB
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.	

3.3 Summary of Test Result

Item	Standard	Requirement	Result
Antenna requirement	47 CFR Part 15.247	47 CFR 15.203	Pass
Conducted Emission at AC power line	47 CFR Part 15.247	47 CFR 15.207(a)	Pass
20dB Bandwidth	47 CFR Part 15.247	47 CFR 15.247(a)(1)	Pass
Maximum Conducted Output Power	47 CFR Part 15.247	47 CFR 15.247(b)(1)	Pass
Channel Separation	47 CFR Part 15.247	47 CFR 15.247(a)(1)	Pass
Number of Hopping Frequencies	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Dwell Time	47 CFR Part 15.247	47 CFR 15.247(a)(1)(iii)	Pass
Emissions in non-restricted frequency bands	47 CFR Part 15.247	47 CFR 15.247(d)	Pass
Band edge emissions (Radiated)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (below 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Emissions in frequency bands (above 1GHz)	47 CFR Part 15.247	47 CFR 15.247(d), 15.209, 15.205	Pass
Remark: *1. Pass: Meet the requirements.* *2. N/A: not applicable.*			

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3.4 Additions to, deviations, or exclusions from the method

None

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4 Test Configuration

4.1 Test Equipment List

Conducted Emission at AC power line					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Test Software	Frad	EZ_EMC	Version: EMC-CON 3A1.1+	/	/
EMI Receiver	Rohde & Schwarz	ESCI3	101422	2025-10-17	2026-10-16
V-LISN	Schwarzbeck	NSLK 8127	01073	2026-08-17	2027-08-16
Coaxial Switcher	Schwarzbeck	CX210	CX210	/	/
Pulse Limiter	Schwarzbeck	VTSD 9561-F	00953	/	/
LISN-Cable	REBES Talent	LISN9K30M	21101580	2026-08-17	2027-08-16
ISN	SCHWARZBECK	NTFM 8158	00631	2026-08-17	2027-08-16
LV DC LISN	MTRAC	PWL-5-200	2673	2026-08-17	2027-08-16
LV DC LISN	MTRAC	PWL-5-200	2674	2026-08-17	2027-08-16

Dwell Time Emissions in non-restricted frequency bands 20dB Bandwidth Maximum Conducted Output Power Channel Separation Number of Hopping Frequencies					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Test Software	TST Pass	/	Version: 2.0	/	/
Cell Site Test Set	HP	8921A	US35010158	2025-10-17	2026-10-16
Spectrum Analyzer	Keysight	N9020A	MY50410020	2025-10-17	2026-10-16
ESG Vector Signal Generator	Agilent	E4438C	MY45094854	2025-10-17	2026-10-16
MXG Vector Signal Generator	Agilent	N5182A	MY46240163	2025-10-17	2026-10-16
Wideband Radio Communication Tester	Rohde&Schwarz	CMW500	161997	2025-10-17	2026-10-16
Programmable Constant Temperature And Humidity Test Chamber	ZZCKONG	ZZ-K02A	20210928007	2025-10-17	2026-10-16
DC Power Supply	Tongmen	etm-6050c	20211026123	2025-10-17	2026-10-16
RF Control Unit	Techy	TR1029-1	10291	2025-10-17	2026-10-16
RF Sensor Unit	Techy	TR1029-2	10292	2025-10-17	2026-10-16
RF shielding box	Yinuoxin Electronics	50*50*50 cm	050505M	2025-10-21	2026-10-20

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Band edge emissions (Radiated) Emissions in frequency bands (below 1GHz) Emissions in frequency bands (above 1GHz)					
Test Equipment	Manufacturer	Model	Serial No.	Cal. Date	Cal. Due
Test Software	Frad	EZ_EMC	Version: FA-03A2 RE+	/	/
EMI Receiver	Rohde & Schwarz	ESCI7	101032	2025-10-17	2026-10-16
Signal Analyzer	Rohde & Schwarz	FSQ40	100010	2025-10-17	2026-10-16
Active Loop Antenna	TONSCEND	LOP32-30	806LOP000507261003	2026/8/18	2027/8/17
Preamplifier (9kHz ~ 6GHz)	Schwarzbeck	BBV9744	00246	2026-05-10	2027-05-09
BELOW-Cable	REBES Talent	9K1G	21101576	2026-08-17	2027-08-16
Horn Antenna	Schwarzbeck	BBHA9120D	2597	2025-10-18	2026-10-17
Preamplifier (1GHz ~ 18GHz)	Schwarzbeck	BBV9718D	00008	2025-10-18	2026-10-17
Preamplifier	TSTPASS	LNA10180G45	TS2215007	2026-05-10	2027-05-09
ABOVE-Cable	REBES Talent	1~18G	21101558	2026-08-17	2027-08-16
Horn Antenna	SCHWARZBECK	BBHA9170	1157	2025-10-18	2026-10-17
Low Noise Pre-amplifier	Sket	LNPA_1840G-50	SK2022032902	2025-10-17	2026-10-16
ABOVE-Cable2	REBES Talent	18~40G	21101686	2026-08-18	2027-08-17
ABOVE-Cable1	REBES Talent	18~40G	21101687	2026-08-18	2027-08-17
Filter	COM-MW	ZBSF6-M2400-2483.5-2990	08226825	2025-10-18	2026-10-17
Active Loop Antenna	TONSCEND	LOP32-30	806LOP000507261003	2026-08-18	2027-08-17
ABOVE Cable1-40G	REBES Talent	AA210B0009M3030Z	BUAO1E9090	2026-08-18	2027-08-17

4.2 Test Auxiliary Equipment

No.	Description	Manufacturer	Model	Serial Number	Certification
1	Adapter	Huawei	HW-059200CHQ	/	/

4.3 Test Modes

No.	Test Modes
TM1	TX-GFSK (Non-Hopping)
TM2	TX-Pi/4DQPSK (Non-Hopping)
TM3	TX-8DPSK (Non-Hopping)
TM4	TX-GFSK (Hopping)
TM5	TX-Pi/4DQPSK (Hopping)
TM6	TX-8DPSK (Hopping)

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4.4 Test Channel of EUT

Operation Band: 2400-2483.5 MHz

Bandwidth (MHz)	Lowest Channel (LCH) (MHz)	Middle Channel (MCH) (MHz)	Highest Channel (HCH) (MHz)
1	2402	2440	2480

4.5 Test software

Test software:	Version:	Power Class:
FCC_assist1.0.4	1.0.4	10

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5 Evaluation Results (Evaluation)

5.1 Antenna requirement

Test Requirement:	Refer to 47 CFR Part 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.
Test Method:	---
Operating Environment:	
Temperature:	23.9 °C
Humidity:	47.6 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

5.1.1 Conclusion

The Bluetooth antenna is an PCB Antenna which permanently attached, and the best case gain of the antenna is 1.48dBi. See product internal photos for details.

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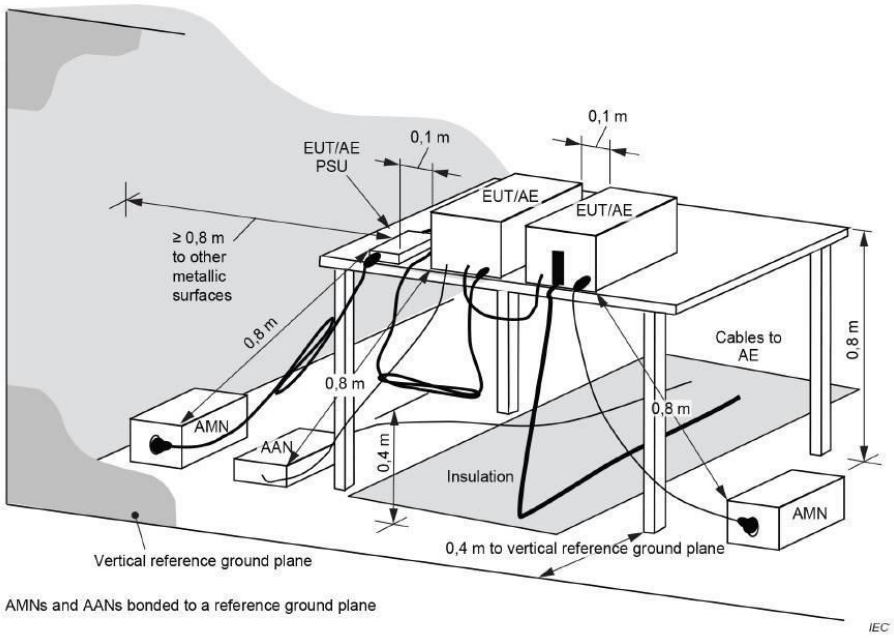
6 Radio Spectrum Matter Test Results (RF)

6.1 Conducted Emission at AC power line

Test Requirement:	Refer to 47 CFR 15.207(a), 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 Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.2
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.
Procedure:	Refer to ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices
Test Setup:	
Operating Environment:	
Temperature:	23.5 °C
Humidity:	48.6 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

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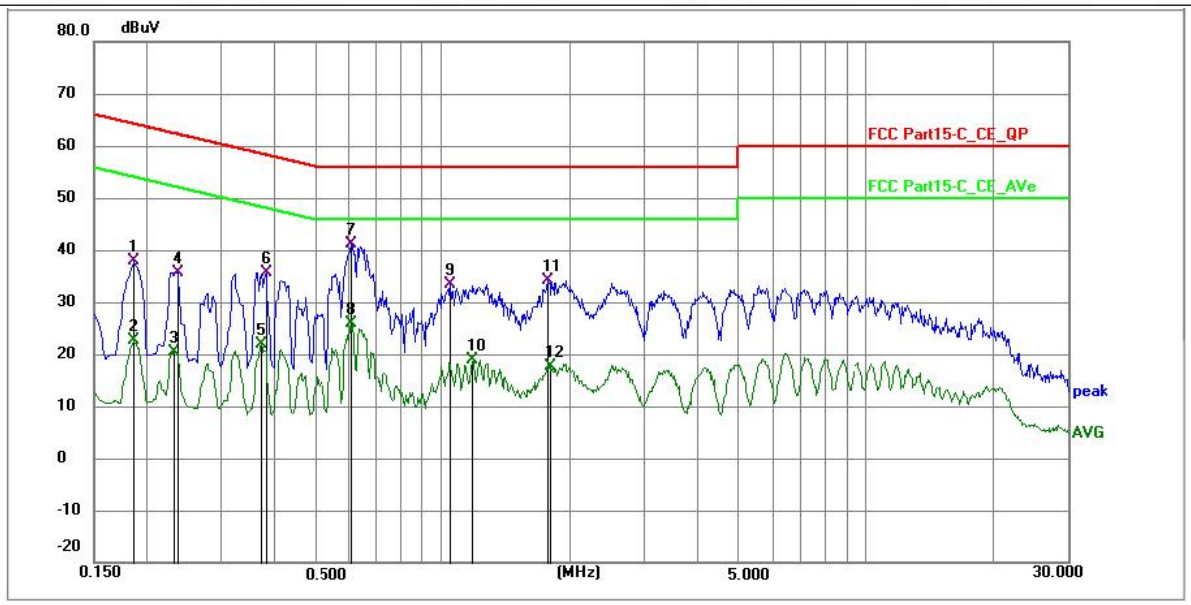
6.1.1 Test Data

Remark: The report only reflects the test data of worst mode.

TM3 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1860	27.86	9.96	37.82	64.21	-26.39	QP	P	
2	0.1860	12.62	9.96	22.58	54.21	-31.63	AVG	P	
3	0.2310	10.44	9.96	20.40	52.41	-32.01	AVG	P	
4	0.2354	25.66	9.96	35.62	62.26	-26.64	QP	P	
5	0.3704	12.03	9.97	22.00	48.49	-26.49	AVG	P	
6	0.3795	25.57	9.97	35.54	58.29	-22.75	QP	P	
7 *	0.6090	31.04	9.98	41.02	56.00	-14.98	QP	P	
8	0.6134	15.83	9.98	25.81	46.00	-20.19	AVG	P	
9	1.0455	23.32	10.02	33.34	56.00	-22.66	QP	P	
10	1.1849	8.81	10.02	18.83	46.00	-27.17	AVG	P	
11	1.7790	23.95	10.06	34.01	56.00	-21.99	QP	P	
12	1.8015	7.53	10.06	17.59	46.00	-28.41	AVG	P	

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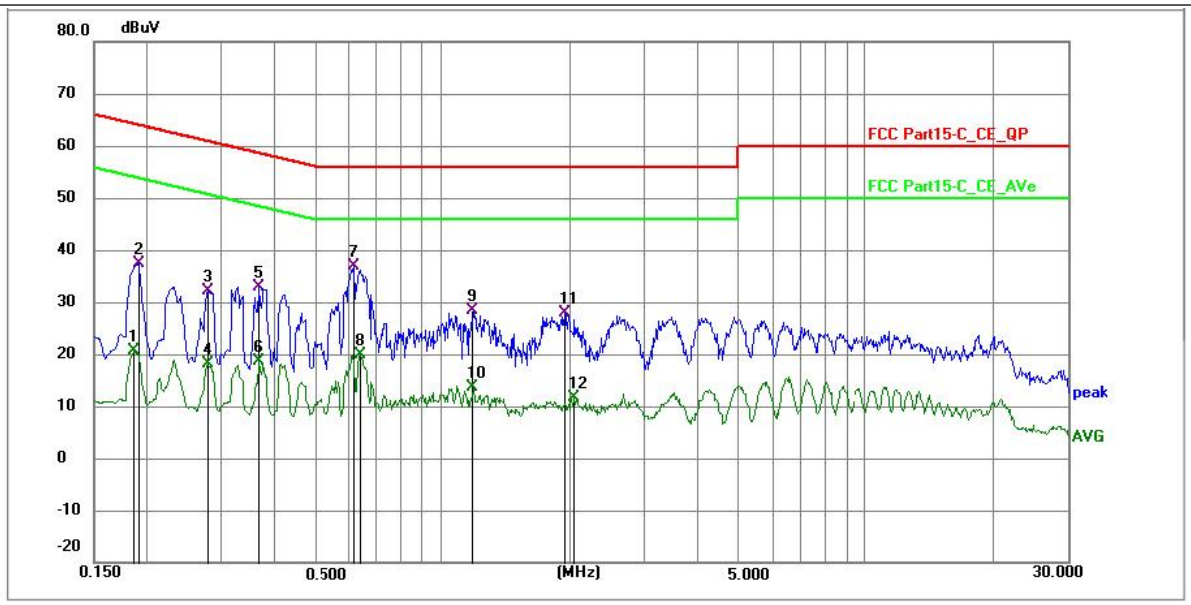
TM3 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.1860	10.74	9.97	20.71	54.21	-33.50	AVG	P	
2	0.1905	27.38	9.97	37.35	64.01	-26.66	QP	P	
3	0.2760	22.16	9.98	32.14	60.94	-28.80	QP	P	
4	0.2760	8.09	9.98	18.07	50.94	-32.87	AVG	P	
5	0.3660	22.98	9.99	32.97	58.59	-25.62	QP	P	
6	0.3660	8.58	9.99	18.57	48.59	-30.02	AVG	P	
7 *	0.6180	26.96	10.00	36.96	56.00	-19.04	QP	P	
8	0.6405	9.95	10.00	19.95	46.00	-26.05	AVG	P	
9	1.1849	18.31	10.03	28.34	56.00	-27.66	QP	P	
10	1.1849	3.50	10.03	13.53	46.00	-32.47	AVG	P	
11	1.9455	17.93	10.04	27.97	56.00	-28.03	QP	P	
12	2.0490	1.60	10.05	11.65	46.00	-34.35	AVG	P	

Note:Margin=Level-Limit=Reading+factor-Limit=Reading+LISN+Cable loss-Limit

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6.2 20dB Bandwidth

Test Requirement:	47 CFR 15.247(a)(1)
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 7.8.6, For occupied bandwidth measurements, use the procedure in 6.9.2. Frequency hopping shall be disabled for this test. KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.215(c), intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.
Procedure:	A dBc bandwidth is measured as the width of the spectral envelope of the modulated signal, at an amplitude level reduced from a reference value by a specified ratio (or in decibels, a specified number of dB down from the reference value). Typical ratios, expressed in dB, are −6 dB, −20 dB, and −26 dB, corresponding to 6 dB BW, 20 dB BW, and 26 dB BW, respectively. In this subclause, the ratio is designated by "−xx dB." The reference value is either the level of the unmodulated carrier or the highest level of the spectral envelope of the modulated signal, as stated by the applicable requirement. Some requirements might specify a specific maximum or minimum value for the "−xx dB" bandwidth; other requirements might specify that the "−xx dB" bandwidth be entirely contained within the authorized or designated frequency band.51 a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the EMI receiver or spectrum analyzer shall be between two times and five 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 video bandwidth (VBW) shall be at least three times 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 4.1.6.2. d) Steps a) through c) might require iteration to adjust within the specified tolerances. e) The dynamic range of the instrument at the selected RBW shall be more than 10 dB below the target "−xx dB down" requirement; that is, if the requirement calls for measuring the −20 dB OBW, the instrument noise floor at the selected RBW shall be at least 30 dB below the reference value. f) Set detection mode to peak and trace mode to max-hold. g) Determine the reference value: Set the EUT to transmit an unmodulated carrier or modulated signal, as applicable. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value). h) Determine the "−xx dB down amplitude" using [(reference value) - xx]. Alternatively, this calculation may be made by using the marker-delta function of the instrument. i) If the reference value is determined by an unmodulated carrier, then turn the EUT modulation ON, and either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise, the trace from step g) shall be used for step j). j) Place two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the "−xx dB down amplitude" determined in step h). If a marker is below this "−xx dB down amplitude" value, then it shall be as close as possible to this value. The dBc bandwidth is the frequency difference between the two markers. Alternatively, set a marker at the lowest frequency of the envelope of the spectral

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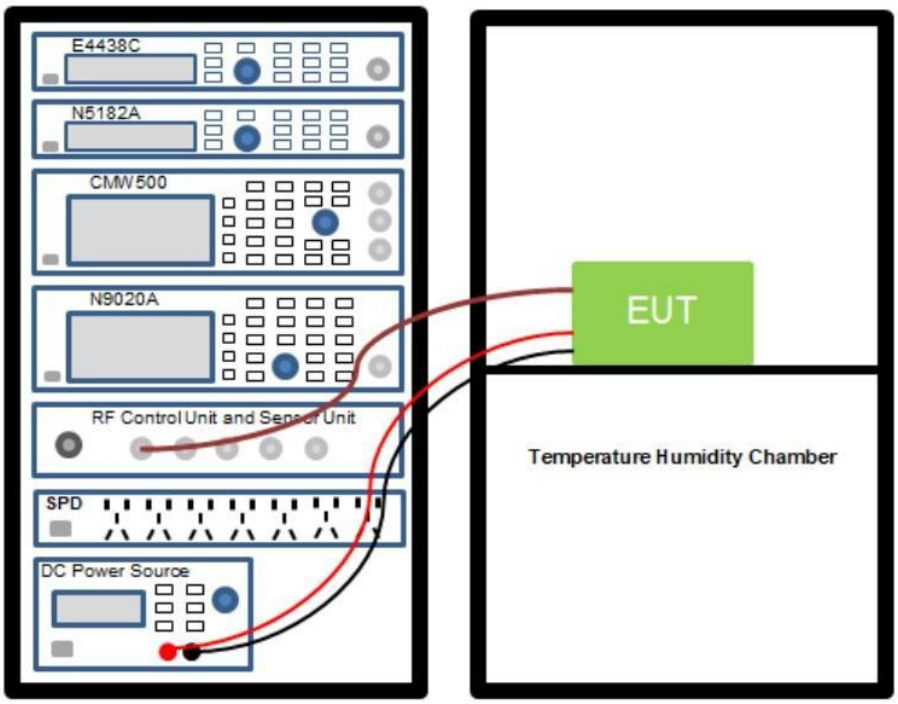
	display, such that the marker is at or slightly below the "−xx dB down amplitude" determined in step h). Reset the marker-delta function and move the marker to the other side of the emission until the delta marker amplitude is at the same level as the reference marker amplitude. The marker-delta frequency reading at this point is the specified emission bandwidth. k) The dBc bandwidth shall be reported by providing spectral 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).
Test Setup:	
Operating Environment:	
Temperature:	25.6 °C
Humidity:	46.6 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

6.2.1 Test Data

Please Refer to Appendix for Details.

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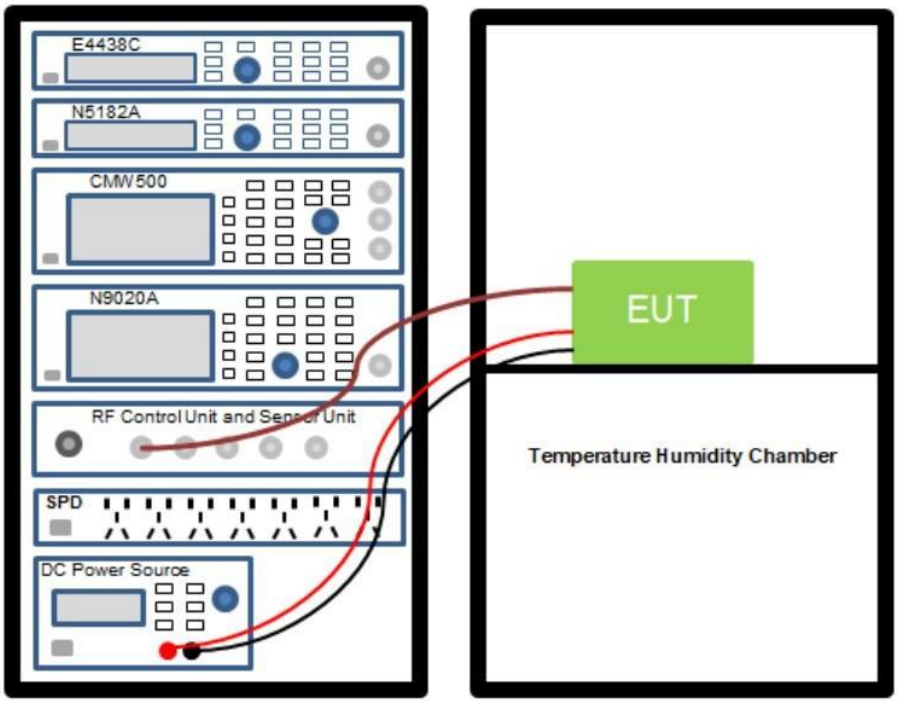
6.3 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(1)
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 7.8.5 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(b)(1), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.
Test Setup:	
Operating Environment:	
Temperature:	25.7 °C
Humidity:	50.1 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

6.3.1 Test Data

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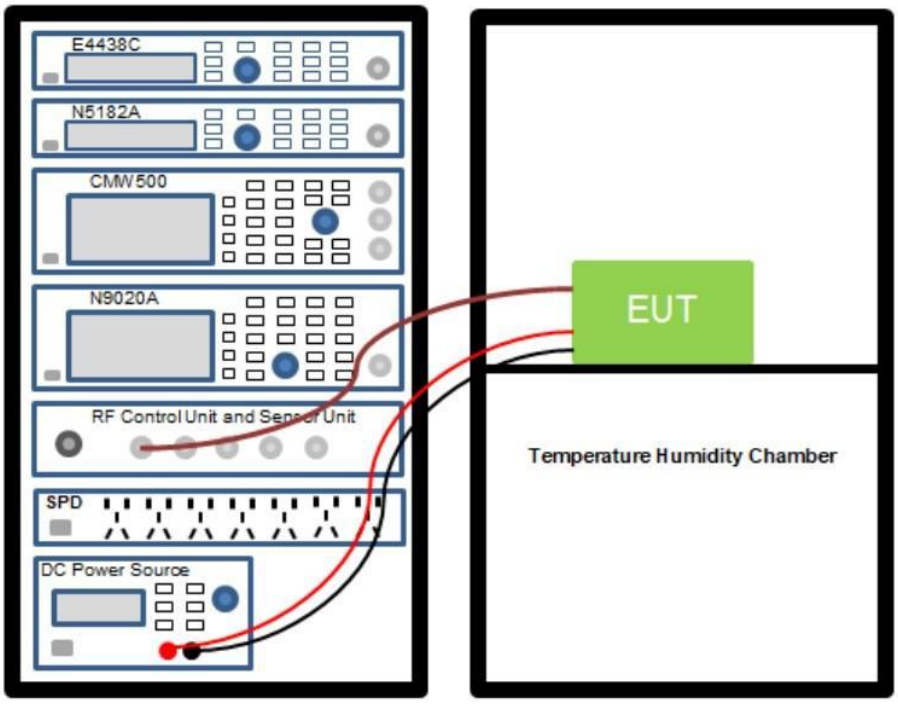
6.4 Channel Separation

Test Requirement:	47 CFR 15.247(a)(1)
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 7.8.2 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: Wide enough to capture the peaks of two adjacent channels. b) RBW: Start with the RBW set to approximately 30% of the channel spacing; adjust as necessary to best identify the center of each individual channel. c) Video (or average) bandwidth (VBW) ≥ RBW. d) Sweep: No faster than coupled (auto) time. e) Detector function: Peak. f) Trace: Max-hold. g) Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. Compliance of an EUT with the appropriate regulatory limit shall be determined. A spectral plot of the data shall be included in the test report.
Test Setup:	
Operating Environment:	
Temperature:	23.7 °C
Humidity:	54.1 %

Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

6.4.1 Test Data

Please Refer to Appendix for Details.

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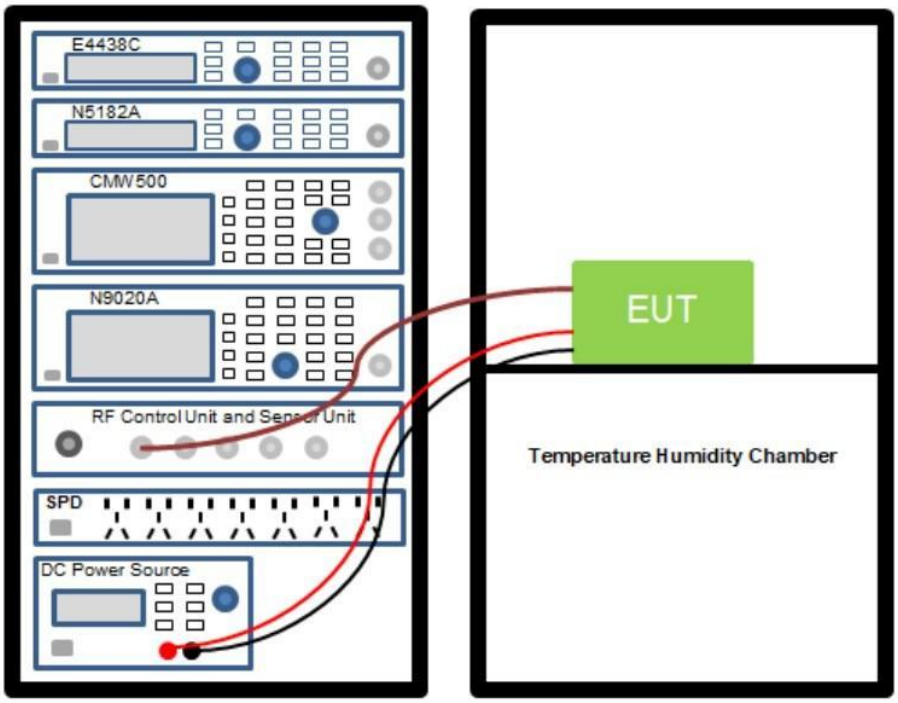
6.5 Number of Hopping Frequencies

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 7.8.3 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Fequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Procedure:	The EUT shall have its hopping function enabled. Use the following spectrum analyzer settings: a) Span: The frequency band of operation. Depending on the number of channels the device supports, it could be necessary to divide the frequency range of operation across multiple spans, to allow the individual channels to be clearly seen. b) RBW: To identify clearly the individual channels, set the RBW to less than 30% of the channel spacing or the 20 dB bandwidth, whichever is smaller. c) VBW ≥ RBW. d) Sweep: No faster than coupled (auto) time. e) Detector function: Peak. f) Trace: Max-hold. g) Allow the trace to stabilize. It might prove necessary to break the span up into subranges to show clearly all of the hopping frequencies. Compliance of an EUT with the appropriate regulatory limit shall be determined for the number of hopping channels. A spectral plot of the data shall be included in the test report.
Test Setup:	
Operating Environment:	
Temperature:	24.8 °C

Humidity:	54.7 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

6.5.1 Test Data

Please Refer to Appendix for Details.

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6.6 Dwell Time

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024, section 7.8.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(a)(1)(iii), Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.
Procedure:	The dwell time per hop on a channel is the time from the start of the first transmission to the end of the last transmission for that hop. If the device has a single transmission per hop then the dwell time is the duration of that transmission. If the device has a multiple transmissions per hop then the dwell time is measured from the start of the first transmission to the end of the last transmission. The time of occupancy is the total time that the device dwells on a channel over an observation period specified in the regulatory requirement. To determine the time of occupancy the spectrum analyzer will be configured to measure both the dwell time per hop and the number of times the device transmits on a specific channel in a given period. The EUT shall have its hopping function enabled. Compliance with the requirements shall be made with the minimum and with the maximum number of channels enabled. If the dwell time per channel does not vary with the number of channels than compliance with the requirements may be based on the minimum number of channels. If the device supports different dwell times per channel (example Bluetooth devices can dwell on a channel for 1, 3 or 5 time slots) then measurements can be limited to the longest dwell time with the minimum number of channels. Use the following spectrum analyzer settings to determine the dwell time per hop: a) Span: Zero span, centered on a hopping channel. b) RBW shall be ≤ channel spacing and where possible RBW should be set >> 1 / T, where T is the expected transmission time per hop. c) Sweep time: Set so that the start of the first transmission and end of the last transmission for the hop are clearly captured. Setting the sweep time to be slightly longer than the hopping period per channel (hopping period = 1/hopping rate) should achieve this. d) Use a video trigger, where possible with a trigger delay, so that the start of the transmission is clearly observed. The trigger level might need adjustment to reduce the chance of triggering when the system hops on an adjacent channel. e) Detector function: Peak. f) Trace: Clear-write, single sweep. g) Place markers at the start of the first transmission on the channel and at the end of the last transmission. The dwell time per hop is the time between these two markers. To determine the number of hops on a channel in the regulatory observation period repeat the measurement using a longer sweep time. When the device uses a single hopping sequence the period of measurement should be sufficient to capture at least 2 hops. When the device uses a dynamic hopping sequence, or the sequence varies, the period of measurement may need to capture multiple hops to better determine the average time of occupancy. Count the number of hops on the channel across the sweep time.

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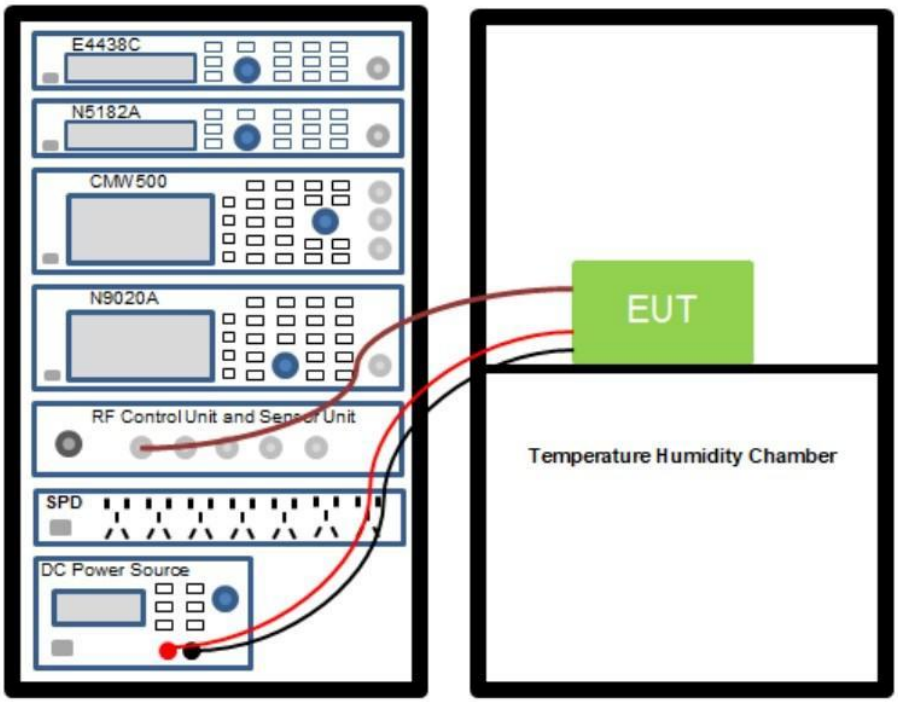
	The average number of hops on the same channel within the regulatory observation period is calculated from the number of hops on the channel divided by the spectrum analyzer sweep time multiplied by the regulatory observation period. For example, if three hops are counted with an analyzer sweep time of 500 ms and the regulatory observation period is 10 s, then the number of hops in that ten seconds is 3 / 0.5 × 10, or 60 hops. The average time of occupancy is calculated by multiplying the dwell time per hop by the number of hops in the observation period.
Test Setup:	
Operating Environment:	
Temperature:	23.7 °C
Humidity:	48 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

6.6.1 Test Data

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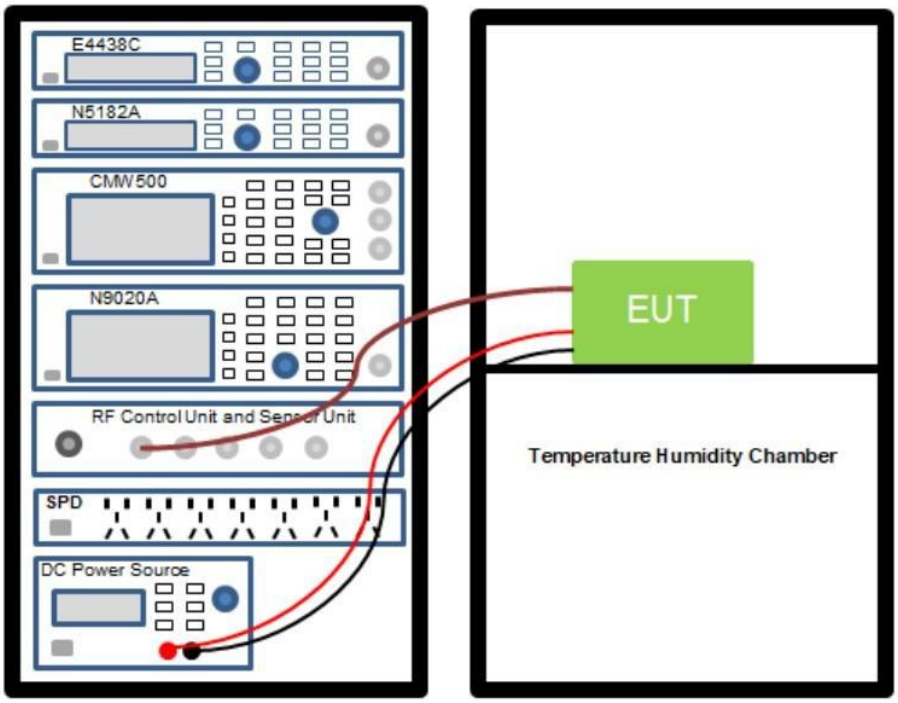
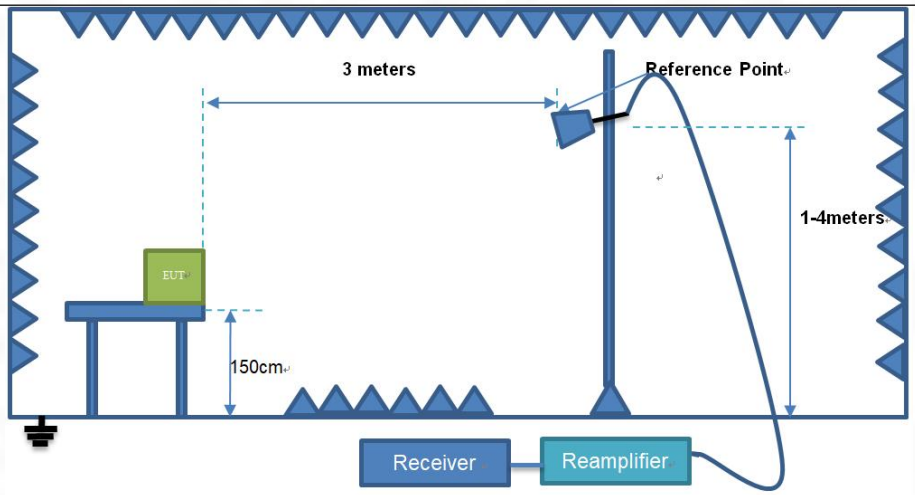
6.7 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d)
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 7.8.7 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	Refer to 47 CFR 15.247(d), In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in § 15.209(a) is not required.
Test Setup:	
Operating Environment:	
Temperature:	25.6 °C
Humidity:	49.8 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

6.7.1 Test Data

Please Refer to Appendix for Details.

6.8 Band edge emissions (Radiated)

<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.10
KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Test Limit:</td><td><table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional 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.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.10.5.2</td></tr>
<tr><td>Test Setup:</td><td> 
</td></tr>
<tr><td colspan="2">Operating Environment:</td></tr>
<tr><td>Temperature:</td><td>25.1 °C</td></tr>
<tr><td>Humidity:</td><td>47 %</td></tr>
<tr><td>Atmospheric Pressure:</td><td>1010 mbar</td></tr>
<tr><td>Test voltage:</td><td>DC 5V from Adapter with AC 120V/60Hz</td></tr>
</table>

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6.8.1 Test Data

Remark: The report only reflects the test data of worst mode.

TM3

Test Channel: Lowest channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
2310.00	51.74	3.85	55.60	74.00	-18.40	peak	Pass
2310.00	41.61	3.85	45.46	54.00	-8.54	AVG	Pass
2390.00	51.85	3.91	55.76	74.00	-18.24	peak	Pass
2390.00	41.58	3.91	45.49	54.00	-8.51	AVG	Pass
Test Channel: Lowest channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
2310.00	51.30	3.85	55.15	74.00	-18.85	peak	Pass
2310.00	41.64	3.85	45.49	54.00	-8.51	AVG	Pass
2390.00	51.05	3.91	54.96	74.00	-19.04	peak	Pass
2390.00	40.94	3.91	44.86	54.00	-9.14	AVG	Pass
Test Channel: Highest channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
2483.50	51.75	3.99	55.73	74.00	-18.27	peak	Pass
2483.50	41.08	3.99	45.06	54.00	-8.94	AVG	Pass
2500.00	52.84	4.00	56.84	74.00	-17.16	peak	Pass
2500.00	42.02	4.00	46.02	54.00	-7.98	AVG	Pass
Test Channel: Highest channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
2483.50	51.78	3.99	55.77	74.00	-18.23	peak	Pass
2483.50	40.98	3.99	44.97	54.00	-9.03	AVG	Pass
2500.00	51.51	4.00	55.51	74.00	-18.49	peak	Pass
2500.00	40.58	4.00	44.58	54.00	-9.42	AVG	Pass

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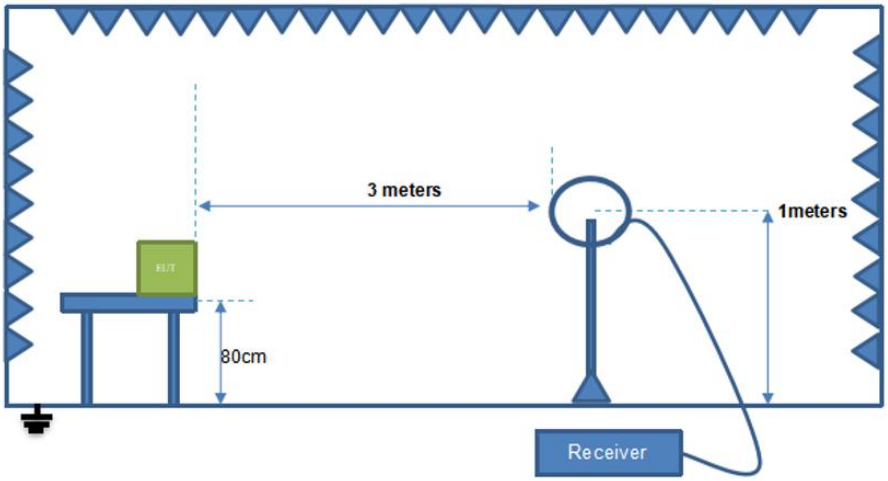
6.9 Emissions in frequency bands (below 1GHz)

<table>
<tr><td>Test Requirement:</td><td>Refer to 47 CFR 15.247(d), In addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).</td></tr>
<tr><td>Test Method:</td><td>ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.5.4
KDB 558074 D01 15.247 Meas Guidance v05r02</td></tr>
<tr><td>Test Limit:</td><td>
<table>
<tr><td>Frequency (MHz)</td><td>Field strength (microvolts/meter)</td><td>Measurement distance (meters)</td></tr>
<tr><td>0.009-0.490</td><td>2400/F(kHz)</td><td>300</td></tr>
<tr><td>0.490-1.705</td><td>24000/F(kHz)</td><td>30</td></tr>
<tr><td>1.705-30.0</td><td>30</td><td>30</td></tr>
<tr><td>30-88</td><td>100 **</td><td>3</td></tr>
<tr><td>88-216</td><td>150 **</td><td>3</td></tr>
<tr><td>216-960</td><td>200 **</td><td>3</td></tr>
<tr><td>Above 960</td><td>500</td><td>3</td></tr>
</table>
** Except as provided in paragraph (g), fundamental emissions from intentional 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.
In the emission table above, the tighter limit applies at the band edges.
The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
</td></tr>
<tr><td>Procedure:</td><td>ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.5.4</td></tr>
<tr><td>Test Setup:</td><td> 
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</table>

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	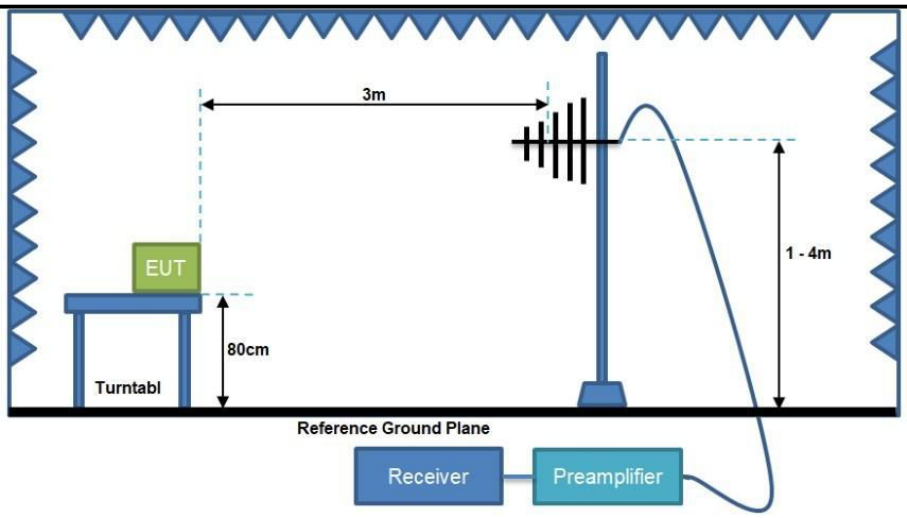
Operating Environment:	
Temperature:	23.1 °C
Humidity:	49.1 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

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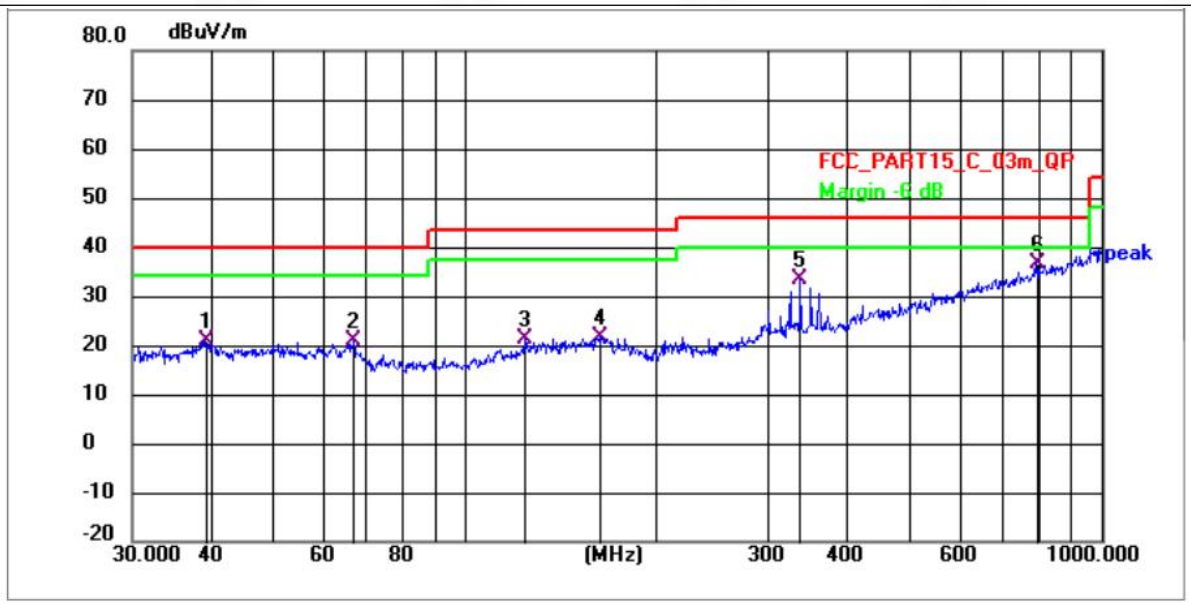
6.9.1 Test Data

Remark: The report only reflects the test data of worst mode (TM3)

(9KHz-30 MHz)
The amplitude of spurious emissions which are attenuated by more than 20dB below the permissible value has no need to be reported.
Distance extrapolation factor =40 log (specific distance/test distance)(dB);
Limit line = specific limits (dBuv) + distance extrapolation factor.

TM3 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	39.0245	30.26	-9.51	20.75	40.00	-19.25	QP	Pass
2	66.7325	31.81	-11.01	20.80	40.00	-19.20	QP	Pass
3	124.5690	30.03	-8.94	21.09	43.50	-22.41	QP	Pass
4	163.4681	28.91	-7.31	21.60	43.50	-21.90	QP	Pass
5	336.0352	38.84	-5.39	33.45	46.00	-12.55	QP	Pass
6 *	790.6188	30.03	6.50	36.53	46.00	-9.47	QP	Pass

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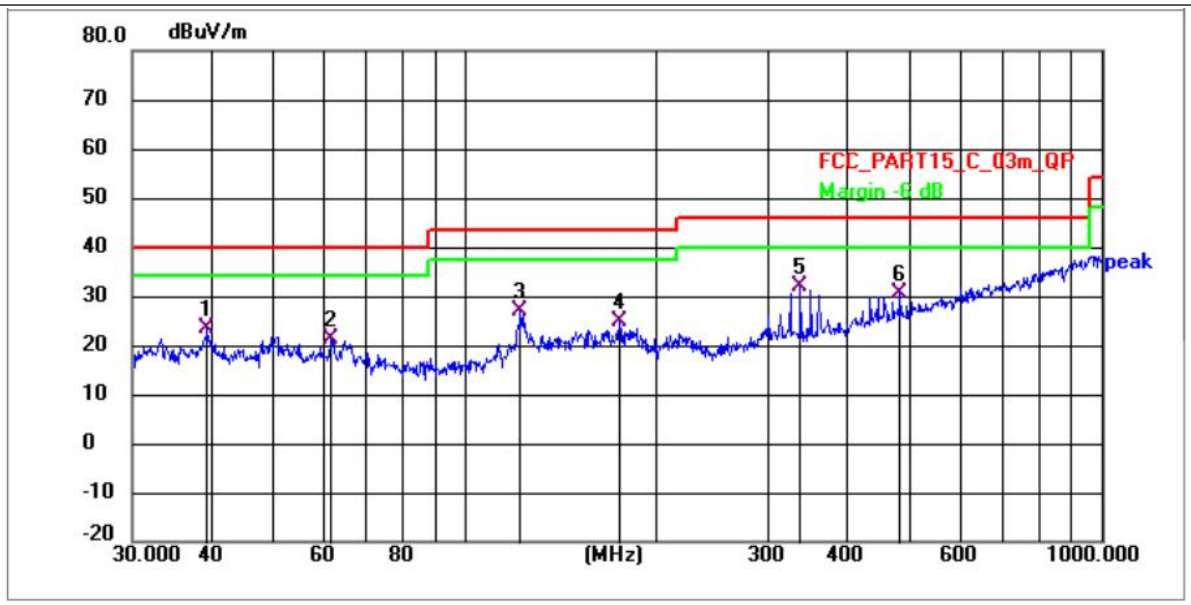
TM3 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	39.2303	32.81	-9.30	23.51	40.00	-16.49	QP	Pass
2	61.5618	31.86	-10.70	21.16	40.00	-18.84	QP	Pass
3	121.9755	35.72	-8.89	26.83	43.50	-16.67	QP	Pass
4	174.1184	33.55	-8.70	24.85	43.50	-18.65	QP	Pass
5 *	336.0352	37.25	-5.39	31.86	46.00	-14.14	QP	Pass
6	480.5276	31.64	-1.07	30.57	46.00	-15.43	QP	Pass

Note:Margin=Level-Limit=Reading+factor-Limit=Reading+Antenna factor+ cable loss -amplifier gain-Limit

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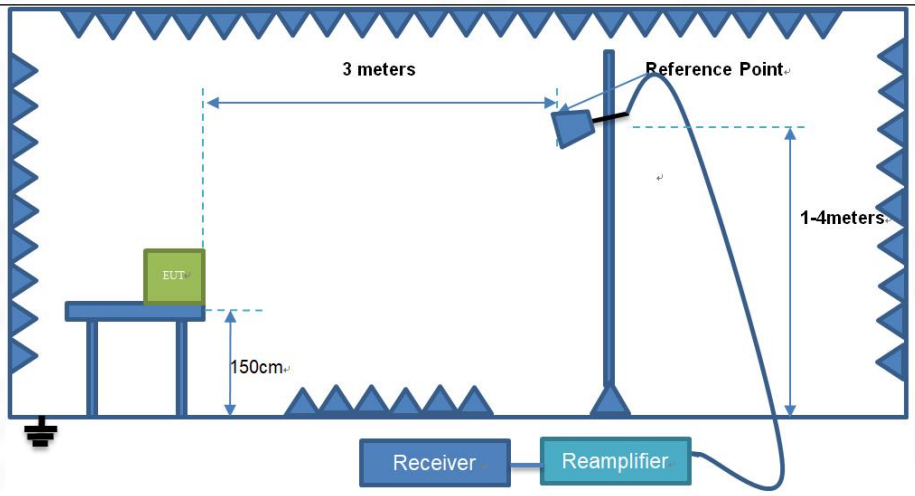
6.10 Emissions in frequency bands (above 1GHz)

Test Requirement:	Refer to 47 CFR 15.247(d), in addition, radiated emissions which fall in the restricted bands, as defined in § 15.205(a), must also comply with the radiated emission limits specified in § 15.209(a)(see § 15.205(c)).
Test Method:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.5.4 KDB 558074 D01 15.247 Meas Guidance v05r02
Test Limit:	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 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. In the emission table above, the tighter limit applies at the band edges. The emission limits shown in the above table are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.
Procedure:	ANSI C63.10-2020 + Cor. 1-2023+C63.10a-2024 + Errata to C63.10a-2024 section 6.5.4
Test Setup:	
Operating Environment:	
Temperature:	23.7 °C
Humidity:	53.4 %
Atmospheric Pressure:	1010 mbar
Test voltage:	DC 5V from Adapter with AC 120V/60Hz

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6.10.1 Test Data

Remark: The report only reflects the test data of worst mode.

TM3

Test Channel: Lowest channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
4804.00	78.18	-48.89	29.29	74.00	-44.71	peak	Pass
4804.00	67.87	-48.89	18.99	54.00	-35.01	AVG	Pass
7206.00	86.95	-47.02	39.93	74.00	-34.07	peak	Pass
7206.00	76.51	-47.02	29.49	54.00	-24.51	AVG	Pass
Test Channel: Lowest channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
4804.00	78.91	-48.89	30.03	74.00	-43.97	peak	Pass
4804.00	68.62	-48.89	19.74	54.00	-34.26	AVG	Pass
7206.00	86.21	-47.02	39.19	74.00	-34.81	peak	Pass
7206.00	75.78	-47.02	28.76	54.00	-25.24	AVG	Pass
Test Channel: Middle channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
4882.00	78.65	-48.84	29.81	74.00	-44.19	peak	Pass
4882.00	68.44	-48.84	19.60	54.00	-34.40	AVG	Pass
7323.00	85.31	-46.88	38.43	74.00	-35.57	peak	Pass
7323.00	75.53	-46.88	28.65	54.00	-25.35	AVG	Pass
Test Channel: Middle channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
4882.00	78.89	-48.84	30.06	74.00	-43.94	peak	Pass
4882.00	69.28	-48.84	20.45	54.00	-33.55	AVG	Pass
7323.00	86.47	-46.88	39.59	74.00	-34.41	peak	Pass
7323.00	76.41	-46.88	29.53	54.00	-24.47	AVG	Pass

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Test Channel: Highest channel, Test Polarization: Vertical							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
4960.00	79.80	-48.79	31.02	74.00	-42.98	peak	Pass
4960.00	69.10	-48.79	20.32	54.00	-33.68	AVG	Pass
7440.00	86.41	-47.02	39.38	74.00	-34.62	peak	Pass
7440.00	76.11	-47.02	29.09	54.00	-24.91	AVG	Pass
Test Channel: Highest channel, Test Polarization: Horizontal							
Frequency (MHz)	Reading (dBμV)	Factor (dB)	Level (dBμV/m)	Limit (dBμV/m)	Marging (dB)	Detector	Result
4960.00	79.92	-48.79	31.14	74.00	-42.86	peak	Pass
4960.00	69.58	-48.79	20.80	54.00	-33.20	AVG	Pass
7440.00	85.09	-47.02	38.07	74.00	-35.93	peak	Pass
7440.00	75.34	-47.02	28.32	54.00	-25.68	AVG	Pass

Note:Margin=Level-Limit=Reading+factor-Limit=Reading+Antenna factor+ cable loss -amplifier gain-Limit

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7 Test Setup Photos

Please refer to Appendix I Test Setup Photos.

8 EUT Constructional Details (EUT Photos)

Please refer to Appendix II External Photos and Appendix III Internal Photos.

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