RF Test Report

For

Applicant name:	**Shenzhen Kenuo Digital Technology Co., Ltd.**
Address:	7th Floor, Block A, Huizhi R&D Center, Xixiang Street, Baoan District, Shenzhen, Guangdong Province, China
EUT name:	Soundbar
Brand name:	FANSBE
Model number:	KB-S728C-6
Series model number:	Refer to section 2
FCC ID:	2AW3EKB-S728C-6

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:	BTF251125R00101
Test standards:	47 CFR Part 15.247
Test conclusion:	Pass
Date of sample receipt:	2025-11-25
Test date:	2025-11-25 to 2025-12-01
Date of issue:	2025-12-05

Prepared by: Chris Liu

Chris Liu / Project engineer

Approved by: Ryan.Cai / EMC Manager

BTF Testing Lab (Shenzhen) Co., Ltd.

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2025-12-05	Original

Note:
Once the revision has been made, then previous versions reports are invalid.

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1 Introduction

1.1 Laboratory Location

Test location:	BTF Testing Lab (Shenzhen) Co., Ltd.
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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.

1.3 Announcement

(1) The test report reference to the report template version v0.
(2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
(3) The test report is invalid if there is any evidence and/or falsification.
(4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.
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(6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.
(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:	Shenzhen Kenuo Digital Technology Co., Ltd.
Address:	7th Floor, Block A, Huizhi R&D Center, Xixiang Street, Baoan District, Shenzhen, Guangdong Province, China

2.2 Manufacturer Information

Company name:	Dongguan Kenuo Electronic Co., Ltd.
Address:	2/F, No. 21, Tangling Rd., Datangdi, Dalingshan Town, Dongguan, Guangdong, China

2.3 Factory Information

Company name:	Dongguan Kenuo Electronic Co., Ltd.
Address:	2/F, No. 21, Tangling Rd., Datangdi, Dalingshan Town, Dongguan, Guangdong, China

2.4 General Description of Equipment under Test (EUT)

EUT name:	Soundbar
Under test model name:	KB-S728C-6
Series model name:	LASB-2800BLK
Description of model name differentiation:	Only the model name is different, everything else is the same
Hardware version:	KB-S728C-6 V:01
Software version:	LK-S801C-(6956C8)
Ratings:	Input: DC 5V 2A Battery DC 3.7V 2400mAh 8.88Wh

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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
Max. E.I.R.P Power:	5.54dBm
Antenna type:	Internal Antenna
Antenna gain:	-0.58dBi

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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

3.2 Uncertainty of Test

Measurement	Value
Conducted Emission for LISN (150kHz ~ 30MHz)	±2.45 dB
RF output power, conducted	±1.5 dB
Occupied Channel Bandwidth	±5 %
Time	±5 %
Unwanted Emissions, conducted	±3.0 dB
Radiated Emission(1GHz~18GHz)	±4.82 dB
Radiated Emission(30MHZ~1000MHZ)	±4.80 dB
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
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	2025-08-23	2026-08-22
Coaxial Switcher	Schwarzbeck	CX210	CX210	/	/
Pulse Limiter	Schwarzbeck	VTSD 9561-F	00953	/	/
LISN-Cable	REBES Talent	LISN9K30M	21101580	2025-08-23	2026-08-22

Maximum Conducted Output Power Channel Separation Number of Hopping Frequencies Dwell Time Emissions in non-restricted frequency bands					
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	/	2025-10-17	2026-10-16
RF Sensor Unit	Techy	TR1029-2	/	2025-10-17	2026-10-16
RF shielding box	Yinuoxin Electronics	50*50*50 cm	/	2025-05-26	2026-05-25

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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
Log periodic antenna	Schwarzbeck	VULB 9168	01328	2025-10-18	2026-10-17
Preamplifier (30MHz ~ 1GHz)	Schwarzbeck	BBV9744	00246	2025-05-26	2026-05-25
BELOW-Cable	REBES Talent	9K1G	21101576	2025-08-23	2026-08-22
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	2025-05-26	2026-05-25
ABOVE-Cable	REBES Talent	1~18G	21101558	2025-08-23	2026-08-22
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	2025-08-23	2026-08-22
ABOVE-Cable1	REBES Talent	18~40G	21101687	2025-08-23	2026-08-22

4.2 Test Auxiliary Equipment

The EUT has been tested as an independent unit.

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)

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	2441	2480

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4.5 Test software

Test software:	Version:	Power Class:
FCC_assist_1.0.3.a.exe	V1.0.3	8

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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.
Operating Environment:	
Temperature:	24.2 °C
Humidity:	47.7 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

5.1.1 Conclusion

The Bluetooth antenna is an Internal antenna which permanently attached, and the best case gain of the antenna is -0.58dBi. See product internal photos for details.

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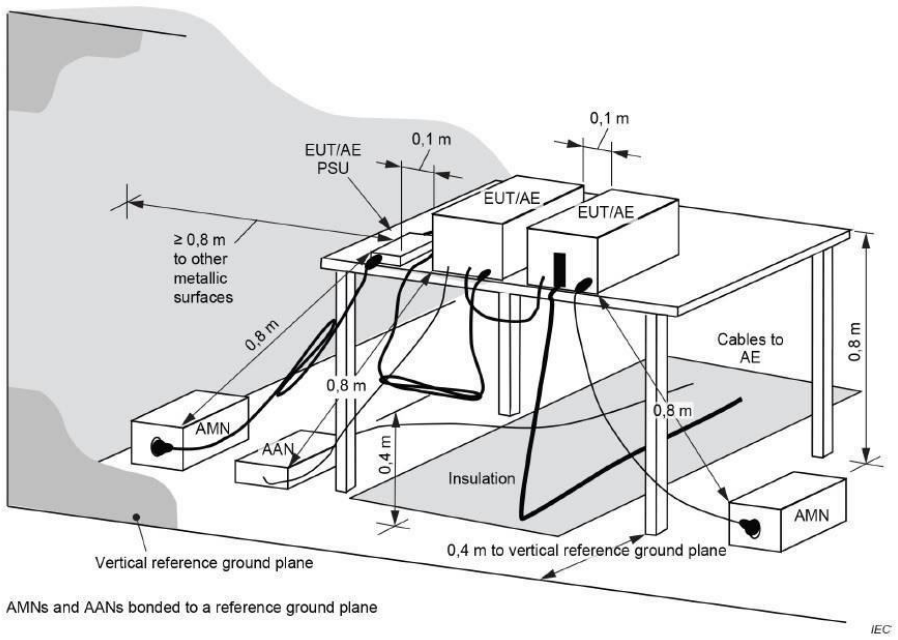
6 Radio Spectrum Matter Test Results (RF)

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 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 section 6.2, standard test method for ac power-line conducted emissions from unlicensed wireless devices
Test Setup:	

Operating Environment:	
Temperature:	24.5 °C
Humidity:	52.1 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

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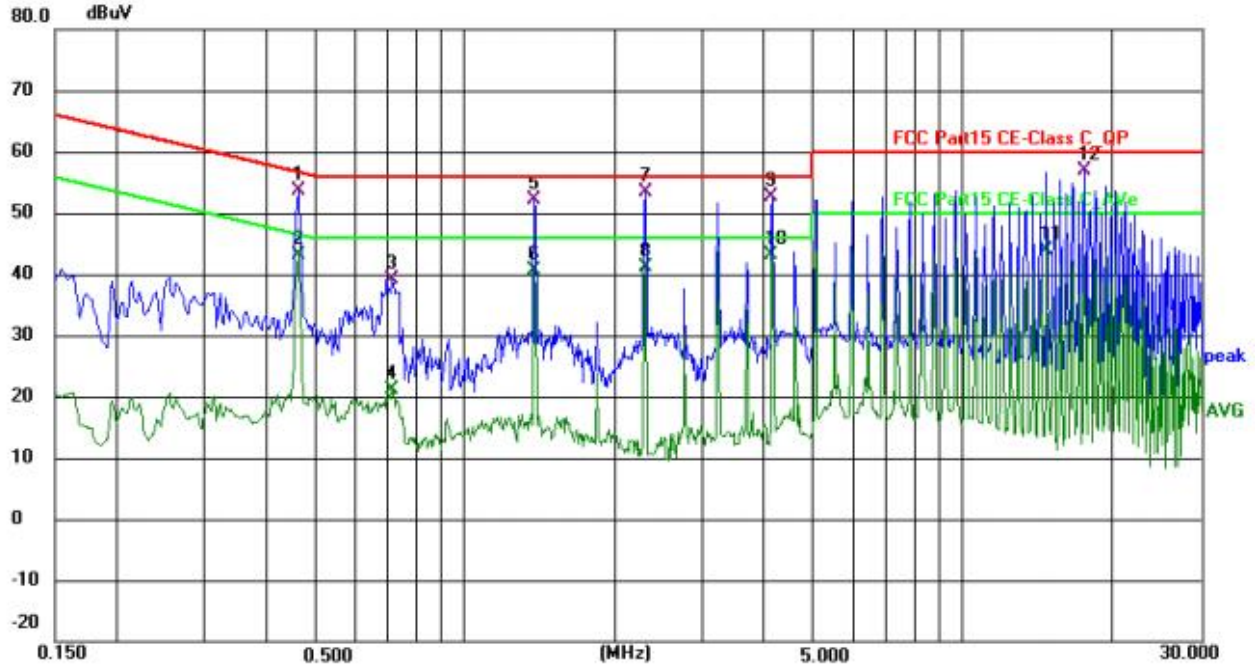
6.1.1 Test Data

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

TM1 / Line: Line / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor ()	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4605	43.88	9.65	53.53	56.68	-3.15	QP	P	
2	0.4605	33.36	9.65	43.01	46.68	-3.67	AVG	P	
3	0.7125	29.71	9.48	39.19	56.00	-16.81	QP	P	
4	0.7125	11.54	9.48	21.02	46.00	-24.98	AVG	P	
5	1.3785	41.83	10.21	52.04	56.00	-3.96	QP	P	
6	1.3785	30.36	10.21	40.57	46.00	-5.43	AVG	P	
7 *	2.3010	43.25	10.24	53.49	56.00	-2.51	QP	P	
8	2.3010	30.86	10.24	41.10	46.00	-4.90	AVG	P	
9	4.1369	42.25	10.26	52.51	56.00	-3.49	QP	P	
10	4.1369	32.78	10.26	43.04	46.00	-2.96	AVG	P	
11	14.7255	33.04	10.74	43.78	50.00	-6.22	AVG	P	
12	17.4973	45.83	10.97	56.80	60.00	-3.20	QP	P	

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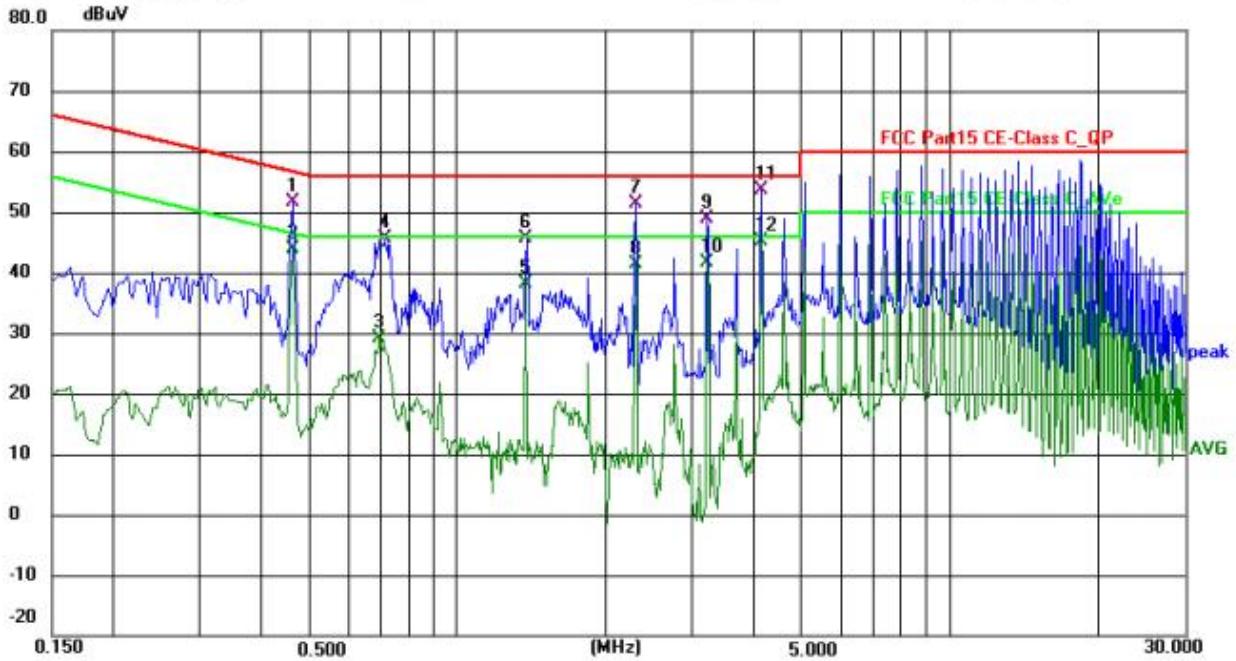
TM1 / Line: Neutral / Band: 2400-2483.5 MHz / BW: 1 / CH: M



No.	Frequency (MHz)	Reading (dBuV)	Factor ()	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F	Remark
1	0.4605	42.02	9.68	51.70	56.68	-4.98	QP	P	
2	0.4605	34.21	9.68	43.89	46.68	-2.79	AVG	P	
3	0.6945	19.68	9.46	29.14	46.00	-16.86	AVG	P	
4	0.7125	36.09	9.44	45.53	56.00	-10.47	QP	P	
5	1.3785	28.01	10.19	38.20	46.00	-7.80	AVG	P	
6	1.3829	35.36	10.19	45.55	56.00	-10.45	QP	P	
7	2.3010	41.16	10.22	51.38	56.00	-4.62	QP	P	
8	2.3010	31.13	10.22	41.35	46.00	-4.65	AVG	P	
9	3.2235	38.73	10.26	48.99	56.00	-7.01	QP	P	
10	3.2235	31.36	10.26	41.62	46.00	-4.38	AVG	P	
11	4.1460	43.35	10.29	53.64	56.00	-2.36	QP	P	
12 *	4.1460	34.80	10.29	45.09	46.00	-0.91	AVG	P	

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

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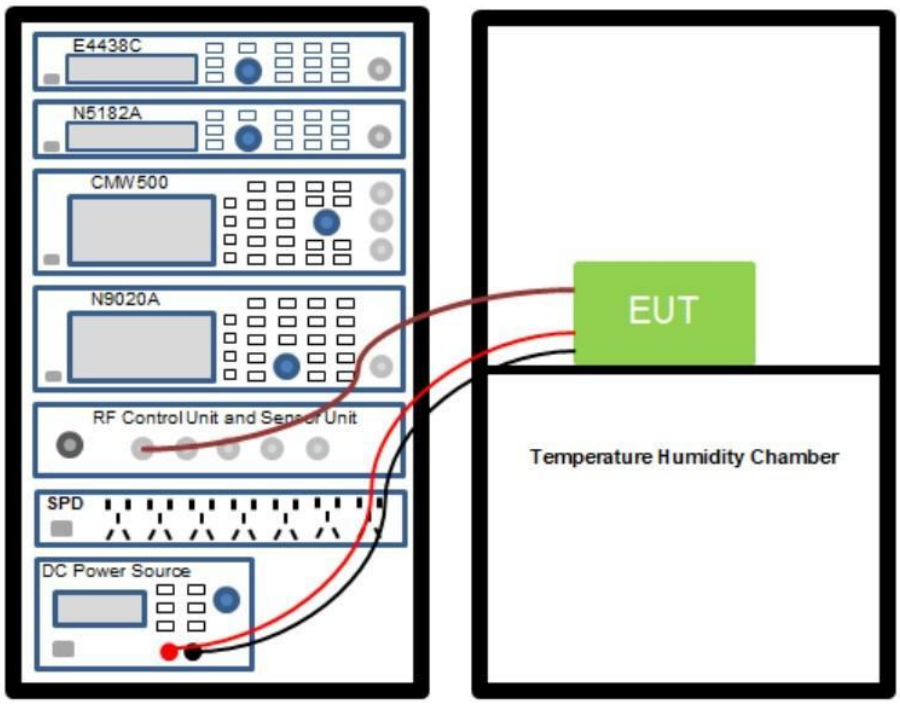
6.2 Maximum Conducted Output Power

Test Requirement:	47 CFR 15.247(b)(1)
Test Method:	ANSI C63.10-2020, 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.
Procedure:	This is an RF-conducted test to evaluate maximum peak output power. Use a direct connection between the antenna port of the unlicensed wireless device and the spectrum analyzer, through suitable attenuation. Frequency hopping shall be disabled for this test. Use the following spectrum analyzer settings: a) Span: Approximately five times the 20 dB bandwidth, centered on a hopping channel. b) RBW > 20 dB bandwidth of the emission being measured. c) VBW ≥ RBW. d) Sweep: No faster than coupled (auto) time. e) Detector function: Peak. f) Trace: Max-hold. g) Allow trace to stabilize. h) Use the marker-to-peak function to set the marker to the peak of the emission. i) The indicated level is the peak output power, after any corrections for external attenuators and cables. j) A spectral plot of the test results and setup description shall be included in the test report. NOTE—A peak responding power meter may be used, where the power meter and sensor system video bandwidth is greater than the occupied bandwidth of the unlicensed wireless device, rather than a spectrum analyzer.
Test Setup:	

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Operating Environment:	
Temperature:	22.1 °C
Humidity:	48 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

6.2.1 Test Data

Please Refer to Appendix - BT for Details.

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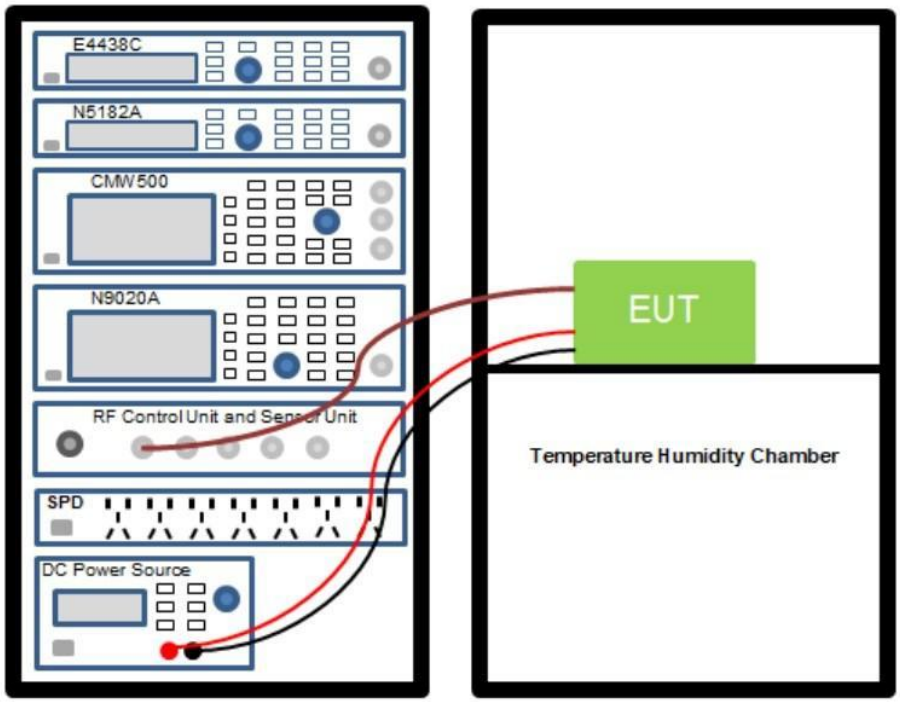
6.3 Channel Separation

Test Requirement:	47 CFR 15.247(a)(1)
Test Method:	ANSI C63.10-2020, 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:	25.2 °C

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Humidity:	54.4 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

6.3.1 Test Data

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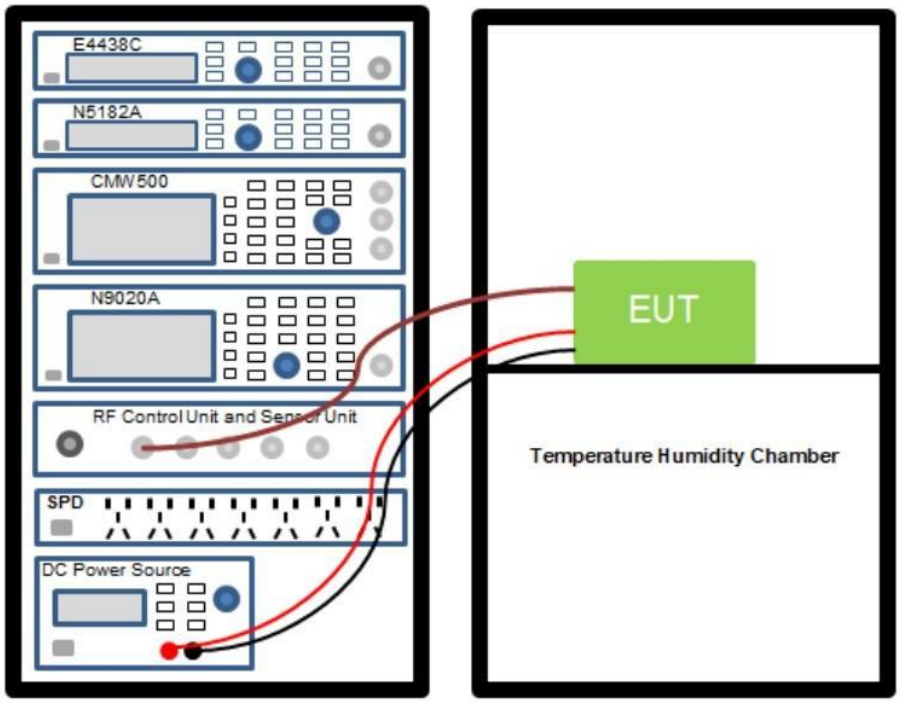
6.4 Number of Hopping Frequencies

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Method:	ANSI C63.10-2020, 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:	

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Temperature:	22.4 °C
Humidity:	48 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

6.4.1 Test Data

Please Refer to Appendix - BT for Details.

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6.5 Dwell Time

Test Requirement:	47 CFR 15.247(a)(1)(iii)
Test Method:	ANSI C63.10-2020, 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

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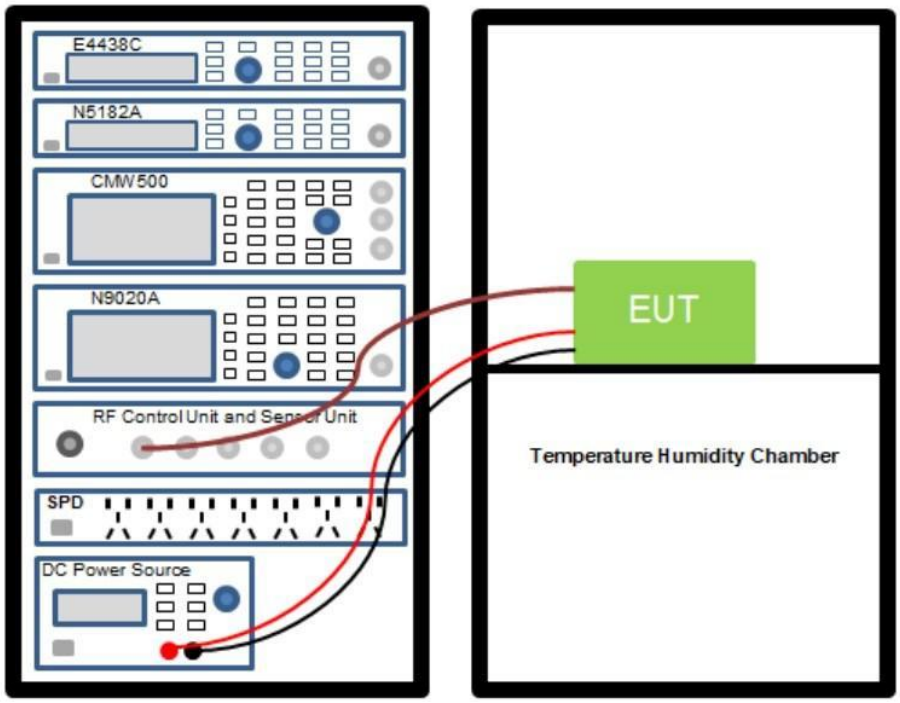
	across the sweep time. The average number of hops on the same channel within the regulatory observation period is calculated from the number of hops on the channel divided by the spectrum analyzer sweep time multiplied by the regulatory observation period. For example, if three hops are counted with 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:	24 °C
Humidity:	48 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

6.5.1 Test Data

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6.6 Emissions in non-restricted frequency bands

Test Requirement:	47 CFR 15.247(d)
Test Method:	ANSI C63.10-2020 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.
Procedure:	7.8.7.1 General considerations To demonstrate compliance with the relative out-of-band emissions requirements conducted spurious emissions shall be measured for the transmit frequencies, per 5.5 and 5.6, and at the maximum transmit powers. Frequency hopping shall be disabled for this test with the exception of measurements at the allocated band-edges which shall be repeated with hopping enabled. Connect the primary antenna port through an attenuator to the spectrum analyzer input; in the results, account for all losses between the unlicensed wireless device output and the spectrum analyzer. The frequency range of testing shall span 30 MHz to 10 times the operating frequency and this may be done in a single sweep or, to aid resolution, across a number of sweeps. The resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector. The limit is based on the highest in-band level across all channels measured using the same instrument settings (resolution bandwidth of 100 kHz, video bandwidth of 300 kHz, and a coupled sweep time with a peak detector). To help clearly demonstrate compliance a display line may be set at the required offset (typically 20 dB) below the highest in-band level. Where the highest in-band level is not clearly identified in the out-of-band measurements a separate spectral plot showing the in-band level shall be provided. When conducted measurements cannot be made (for example a device with integrated, non-removable antenna) radiated measurements shall be used. The reference level for determining the limit shall be established by maximizing the field strength from the highest power channel and measuring using the resolution and video bandwidth settings and peak detector as described above. The field strength limit for spurious emissions outside of restricted-bands shall then be set at the required offset (typically 20 dB) below the highest in-band level. Radiated measurements will follow the standards measurement procedures described in Clause 6 with the exception that the resolution bandwidth shall be 100 kHz, video bandwidth 300 kHz, and a coupled sweep time with a peak detector. Note that use of wider measurement bandwidths are acceptable for measuring the spurious emissions provided that the peak detector is used and that the measured value of spurious emissions are compared to the highest in-band level measured with the 100 kHz / 300 kHz bandwidth settings to determine compliance. 7.8.7.2 Band-edges Compliance with a relative limit at the band-edges (e.g., −20 dBc) shall be made on the lowest and on the highest channels with frequency hopping disabled and

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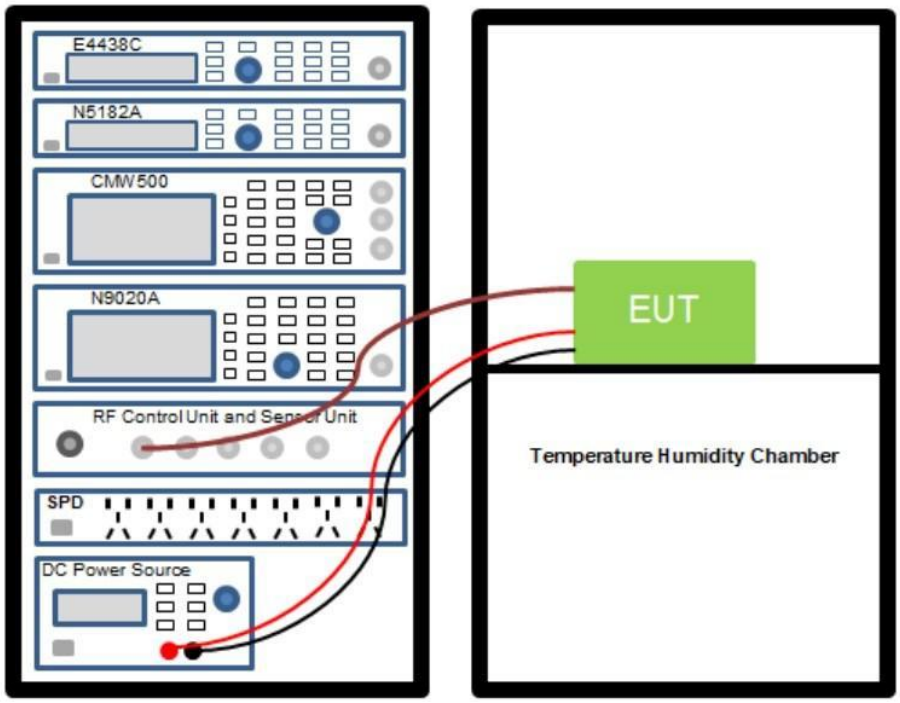
	repeated with frequency hopping enabled. For the latter test the hopping sequence shall include the lowest and highest channels. For measurements with the hopping disabled the analyzer screen shall clearly show compliance with the requirement within 10 MHz of the allocated band-edge. For measurements with the hopping enabled the analyzer screen shall clearly show compliance with the requirement within 10 MHz of both of the allocated band-edges. This could require separate spectral plots for each band-edge.
Test Setup:	
Operating Environment:	
Temperature:	23 °C
Humidity:	45.2 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

6.6.1 Test Data

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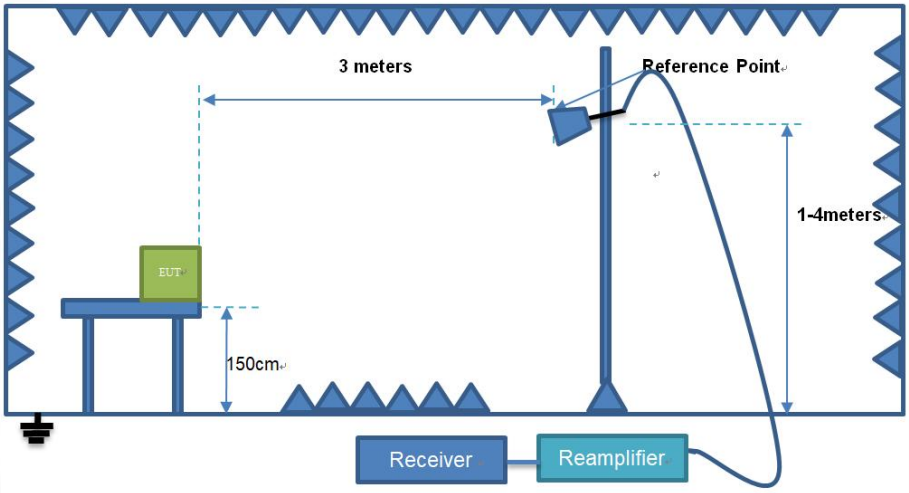
6.7 Band edge emissions (Radiated)

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 section 6.10 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 section 6.10.5.2
Test Setup:	

Operating Environment:	
Temperature:	24.7 °C
Humidity:	49.7 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

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6.7.1 Test Data

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

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	50.54	3.85	54.39	74.00	-19.61	Peak	Pass
2310.00	40.60	3.85	44.45	54.00	-9.55	AVG	Pass
2390.00	51.59	3.91	55.50	74.00	-18.50	Peak	Pass
2390.00	40.72	3.91	44.63	54.00	-9.37	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	51.72	3.85	55.57	74.00	-18.43	Peak	Pass
2310.00	42.09	3.85	45.94	54.00	-8.06	AVG	Pass
2390.00	51.90	3.91	55.81	74.00	-18.19	Peak	Pass
2390.00	41.92	3.91	45.83	54.00	-8.17	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	51.65	3.99	55.63	74.00	-18.37	Peak	Pass
2483.50	41.84	3.99	45.83	54.00	-8.17	AVG	Pass
2500.00	51.71	4.00	55.71	74.00	-18.29	Peak	Pass
2500.00	41.47	4.00	45.47	54.00	-8.53	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	50.79	3.99	54.78	74.00	-19.22	Peak	Pass
2483.50	40.53	3.99	44.51	54.00	-9.49	AVG	Pass
2500.00	51.30	4.00	55.30	74.00	-18.70	Peak	Pass
2500.00	40.91	4.00	44.91	54.00	-9.09	AVG	Pass

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

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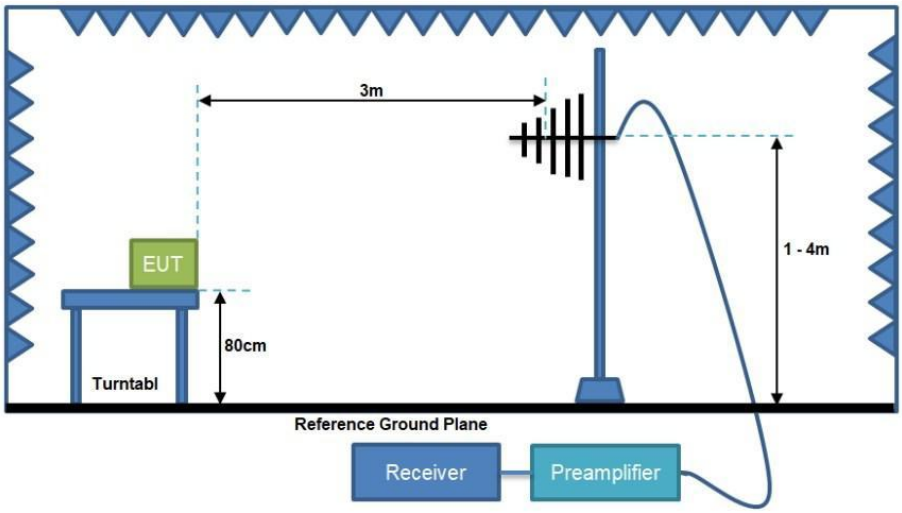
6.8 Emissions in frequency bands (below 1GHz)

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 section 6.6.4 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 section 6.6.4
Test Setup:	

Operating Environment:	
Temperature:	24 °C
Humidity:	50.3 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

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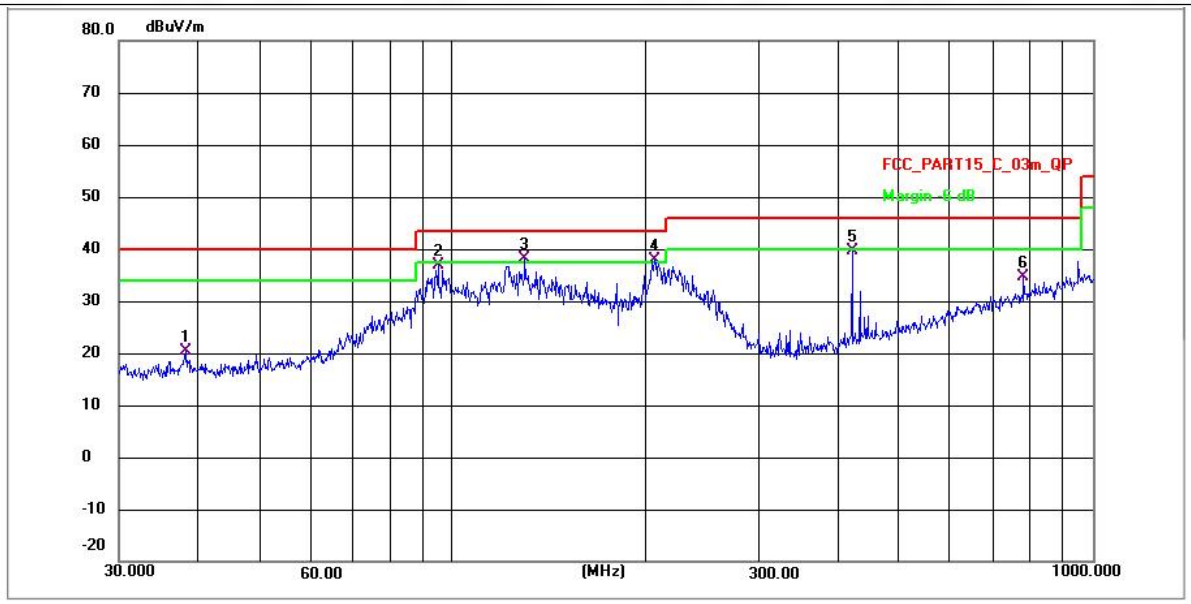
6.8.1 Test Data

TM1 / Polarization: Horizontal / Band: 2400-2483.5 MHz / BW: 1 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	38.2120	30.40	-10.08	20.32	40.00	-19.68	QP	P
2	94.7601	64.90	-27.98	36.92	43.50	-6.58	QP	P
3 *	129.9226	65.56	-27.55	38.01	43.50	-5.49	QP	P
4 !	206.3976	64.53	-26.70	37.83	43.50	-5.67	QP	P
5	420.5803	64.29	-24.74	39.55	46.00	-6.45	QP	P
6	780.9749	56.45	-21.84	34.61	46.00	-11.39	QP	P

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

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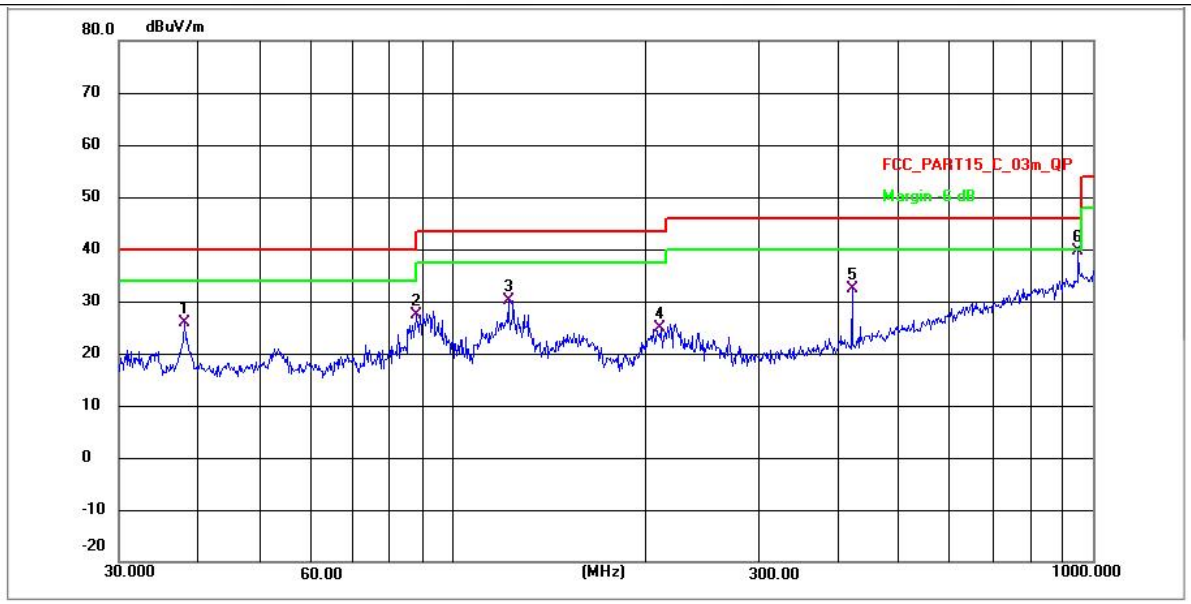
TM1 / Polarization: Vertical / Band: 2400-2483.5 MHz / BW: 1 / CH: L



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	P/F
1	38.0783	35.97	-10.08	25.89	40.00	-14.11	QP	P
2	87.8787	55.58	-28.08	27.50	40.00	-12.50	QP	P
3	121.9755	57.70	-27.65	30.05	43.50	-13.45	QP	P
4	211.1559	51.42	-26.65	24.77	43.50	-18.73	QP	P
5	420.5803	57.13	-24.74	32.39	46.00	-13.61	QP	P
6 *	948.7610	60.25	-20.60	39.65	46.00	-6.35	QP	P

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

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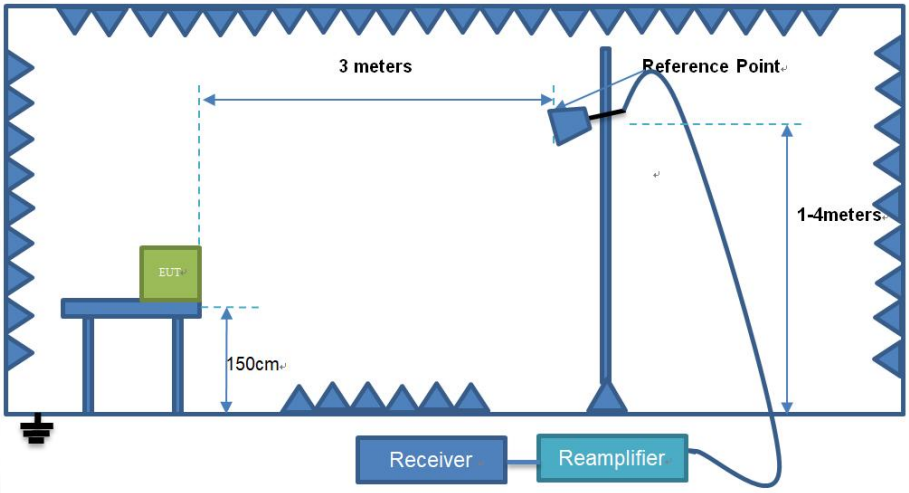
6.9 Emissions in frequency bands (above 1GHz)

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 section 6.6.4 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 section 6.6.4
Test Setup:	

Operating Environment:	
Temperature:	25.6 °C
Humidity:	49.9 %
Atmospheric Pressure:	1010 mbar
Test voltage:	AC 129V 69Hz

6.9.1 Test Data

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

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	78.17	-48.89	29.28	74.00	-44.72	Peak	Pass
4804.00	67.56	-48.89	18.67	54.00	-35.33	AVG	Pass
7206.00	75.67	-47.02	28.65	74.00	-45.35	Peak	Pass
7206.00	65.37	-47.02	18.35	54.00	-35.65	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	79.46	-48.89	30.58	74.00	-43.42	Peak	Pass
4804.00	68.98	-48.89	20.09	54.00	-33.91	AVG	Pass
7206.00	76.61	-47.02	29.59	74.00	-44.41	Peak	Pass
7206.00	66.14	-47.02	19.12	54.00	-34.88	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	79.36	-48.84	30.52	74.00	-43.48	Peak	Pass
4882.00	68.64	-48.84	19.81	54.00	-34.19	AVG	Pass
7323.00	76.26	-46.88	29.38	74.00	-44.62	Peak	Pass
7323.00	66.57	-46.88	19.69	54.00	-34.31	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	79.50	-48.84	30.66	74.00	-43.34	Peak	Pass
4882.00	69.62	-48.84	20.78	54.00	-33.22	AVG	Pass
7323.00	75.21	-46.88	28.33	74.00	-45.67	Peak	Pass
7323.00	65.05	-46.88	18.16	54.00	-35.84	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	79.39	-48.79	30.61	74.00	-43.39	Peak	Pass
4960.00	69.41	-48.79	20.62	54.00	-33.38	AVG	Pass
7440.00	75.68	-46.74	28.93	74.00	-45.07	Peak	Pass
7440.00	65.37	-46.74	18.63	54.00	-35.37	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	80.08	-48.79	31.29	74.00	-42.71	Peak	Pass
4960.00	69.45	-48.79	20.66	54.00	-33.34	AVG	Pass
7440.00	76.63	-46.74	29.88	74.00	-44.12	Peak	Pass
7440.00	66.50	-46.74	19.76	54.00	-34.24	AVG	Pass

Note:Margin=Level-Limit=Reading+factor-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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-- END OF REPORT --

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