

TEST REPORT

On behalf of

Spoke Custom Products LLC

Product Name: Fast Wireless Charger

Model No.: HD01

FCC ID: 2BNNLHD01

Prepared For: Spoke Custom Products LLC
4350 Peachtree Industrial Blvd Suite 900
Norcross GA 30071 United States

Prepared By: Audix Technology (Shanghai) Co., Ltd.
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Report No. : ACI-F25009
Date of Test : 2025.01.10-20
Date of Report : 2025.01.25

The statement is based on a single evaluation of one sample of the above-mentioned products. It does not imply an assessment of the whole production and does not permit the use of the test lab logo. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S. Government.

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TEST REPORT

Applicant : Spoke Custom Products LLC
EUT Description : Fast Wireless Charger
(A) Model No. : Refer to Sec.2.1
(B) Power Supply : AC 120V/60Hz
(C) Test Voltage : AC 120V/60Hz

Test Procedure Used:

*FCC RULES AND REGULATIONS PART 15 SUBPART C
AND ANSI C63.10-2013*

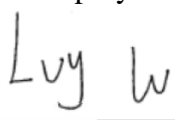
The device described above is tested by Audix Technology (Shanghai) Co., Ltd. to determine the maximum emission levels emanating from the device. The maximum emission levels are compared to the FCC Part 15 Subpart C limits.

The test results are contained in this test report and Audix Technology (Shanghai) Co., Ltd. is assumed full responsibility for the accuracy and completeness of these measurements. This report also shows that the EUT (M/N: Refer to Sec2.1), which was tested is technically compliance with the FCC limits.


This report applies to above tested Sample only. This report shall not be reproduced in part without written approval of Audix Technology (Shanghai) Co., Ltd.

Date of Test : 2025.01.10-20 Date of Report : 2025.01.25

Producer : 
JAREY LU / Deputy Assistant Manager

Review : 
LVV LV / Deputy Assistant Manager

 For and on behalf of
Audix Technology (Shanghai) Co., Ltd.

.....
Authorized Signature(s) 
KAMP CHEN / Manager

1 SUMMARY OF STANDARDS AND RESULTS

1.1 Description of Standards and Results

The result is determined according to the decision rules of customer selection in the ASC-403 application service form.

1. According to IEC GUIDE 115 Procedure 2 and ILAC-G8, the uncertainties value is not used in determining the PASS/FAIL results.

2. If the required specification or standard already contains the decision rules, it will be carried out in accordance with the regulations or standard documents or the requirements of the competent units. If the required specification or standard does not contain a decision rule, the same paragraph 1.

3. If your company has a required decision rule, it will be implemented in accordance with the requirements and ISO/IEC Guide 98-4 specifications.

The EUT have been tested according to the applicable standards as referenced below:

Description / Test Item	Test Standard	Results	Meets Limit
EMISSION			
Conducted Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.207
Radiated Emission	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.209(a) 15.205(a)(c)
20 dB Bandwidth Measurement	FCC RULES AND REGULATIONS PART 2 SUBPART J AND ANSI C63.10:2013	Pass	15.215(c)
Antenna Requirement	FCC RULES AND REGULATIONS PART 15 SUBPART C AND ANSI C63.10:2013	Pass	15.203
N/A is an abbreviation for Not Applicable.			

2 GENERAL INFORMATION

2.1 Description of Equipment Under Test

Description : Fast Wireless Charger

Type of EUT : ☒ Production ☐ Pre-product ☐ Pro-type

Model Number : HD01

Test Model : HD01

Power Rating : Input voltage/current: 5V/2.0A, 9V/1.8A
Output Power: 5W/7.5W/10W

Technology : Wireless Power Charging

Frequency Range: 111-148 kHz

Modulation : ASK

Antenna Info. : Antenna Type: Loop Coil Antenna

Applicant : Spoke Custom Products LLC
4350 Peachtree Industrial Blvd Suite 900
Norcross GA 3007 United States

Manufacturer : Same as Applicant.

Factory : Same as Manufacturer.

2.2 EUT Specifications Assessed in Current Report

Mode	Modulation
WPC	ASK

2.3 Test Information

The EUT was operated under the following conditions.

Mode	Conditions	Output Power	Battery status	Remark
1	Adapter + EUT + iPhone X	10W	5%	Recorded
2	Adapter + EUT + iPhone X	10W	50%	Pre-tested
3	Adapter + EUT + iPhone X	10W	95%	Pre-tested
4	Adapter + EUT + iPhone SE	5W	5%	Recorded
5	Adapter + EUT + iPhone SE	5W	50%	Pre-tested
6	Adapter + EUT + iPhone SE	5W	95%	Pre-tested
All the modes were pre-tested, the worst case mode (1, 4) recorded in the current report.				

2.4 Sample Description

Test Item	Model Number	Sample Number	Channel (kHz)	Date of receipted
All test	HD01	E20250109011-01/01	111-148	2025.01.09

2.5 Supported equipment

Product Name : AC-DC adapter
 Brand : XIAOMI
 Mode Number : MDY-08-ES
 Input : 100-240VAC, 50/60Hz, 0.5A
 Output : DC5V/3A, DC9V/2A, DC12V/1.5A

Product Name : Mobile Phone
 Mode Number : iPhone X

Product Name : Mobile Phone
 Mode Number : iPhone SE

2.6 Description of Test Facility

Name of Firm : Audix Technology (Shanghai) Co., Ltd.

Site Location : 3F, Building 34, No. 680 Guiping Rd.,
Caohejing, Hi-Tech Park,
Shanghai 200233, China

Accredited by NVLAP, Lab Code : 200371-0

FCC Designation Number : CN5027

Test Firm Registration Number : 954668

3 CONDUCTED EMISSION TEST

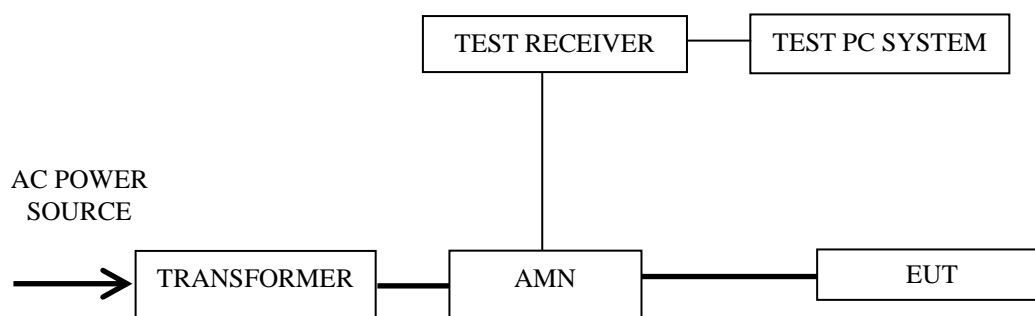
3.1 Test Equipment

The following test equipments are used during the conducted emission test in a shielded room:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Test Receiver	R&S	ESCI	101302	2024.02.22	1 Year
2.	Artificial Mains Network (AMN)	R&S	ESH2-Z5	843890/011	2024.02.22	1 Year
3.	Fixed Attenuator	SHYL	TTS-1	001	2024.02.22	1 Year
4.	50Ω Coaxial Switch	Anritsu	MP59B	6200655085	2024.02.22	1 Year
5.	Coaxial Cable	Audix	CE Cable	CE-SH1-001	2024.02.22	1 Year
6.	Software	Audix	e3	e3.v9.210616	--	--

3.2 Block Diagram of Test Setup

3.2.1 Conducted Disturbance Test Setup



— : Signal Line

— : Power Line

3.3 Conducted Emission Limits (§15.207)

Frequency Range (MHz)	Limits dB(μV)	
	Quasi-peak	Average
0.15 ~ 0.5	66~56	56~46
0.5 ~ 5	56	46
5 ~ 30	60	50
NOTE 1 – The lower limit shall apply at the transition frequencies. NOTE 2 – The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz~0.50 MHz		

3.4 Test Configuration

The EUT (listed in Sec.2.1) was installed as shown on Sec.3.2 to meet FCC requirement and operating in a manner which tends to maximize its emission level in a normal application.

3.5 Operating Condition of EUT

3.5.1 Setup the EUT as shown in Sec. 3.2.

3.5.2 Turn on the power of all equipment.

3.5.3 Turn the EUT on the test mode, and then test.

3.6 Test Procedures

The EUT was placed upon a non-metallic table, which is 0.8 m above the horizontal conducting ground plane and 0.4 m from a vertical reference plane. The EUT was connected to the power mains through an Artificial Mains Network (AMN) to provide a 50 Ω coupling impedance for the measuring equipment. Both sides of AC line (Line & Neutral) were checked to find out the maximum conducted emission according to FCC Part 15 Subpart C and ANSI C63.10: 2013 requirements during conducted disturbance test.

The I.F. bandwidth of Test Receiver ESCI was set at 9 kHz.

The frequency range from 150 kHz to 30 MHz was checked.

Test with a dummy load in lieu of the antenna to determine compliance with Section 15.207 limits within the transmitter's fundamental emission band. (According to KDB 174176 D01 Line Conducted FAQ)

The test modes were done on conducted disturbance test and all the test results are listed in Sec. 3.7

3.7 Test Results

< **PASS** >

The frequency and amplitude of the highest conducted emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Worst case emission:

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Charging	Mode 1	--	127 kHz	P11-12
2.	Charging	Mode 4	--	127 kHz	P13-14

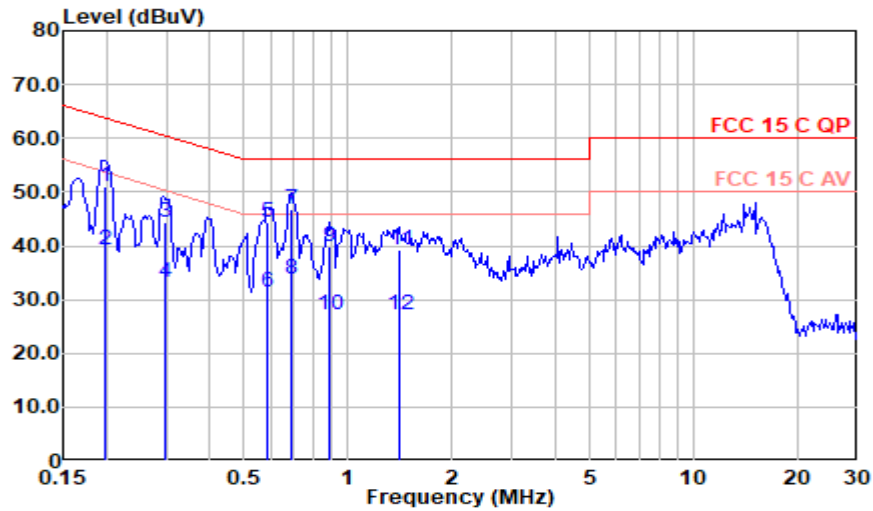
NOTE 1 – Emission Level = Read Level + AMN Factor + Aux Factor + Cable Loss
Margin = Limits - Emission Level

NOTE 2 – “QP” means “Quasi-Peak” values

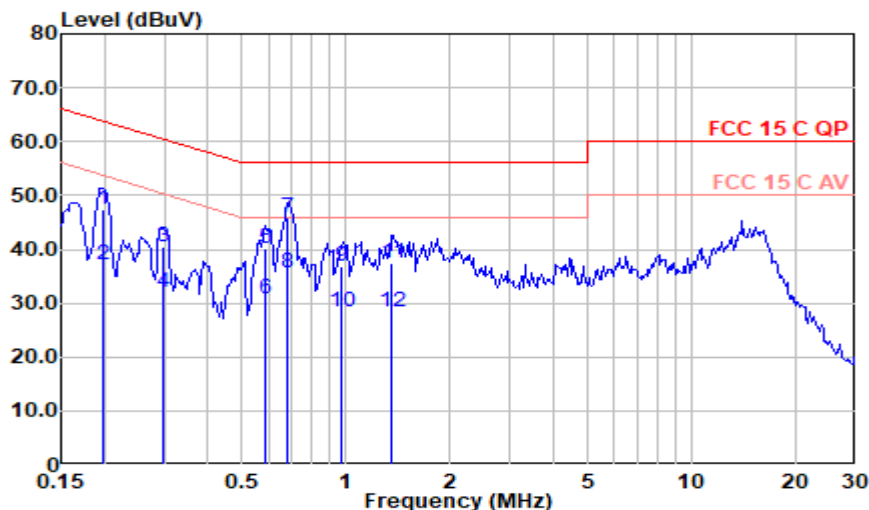
NOTE 3 – The emission levels which not reported are too low against the official limit.

Worst case emission

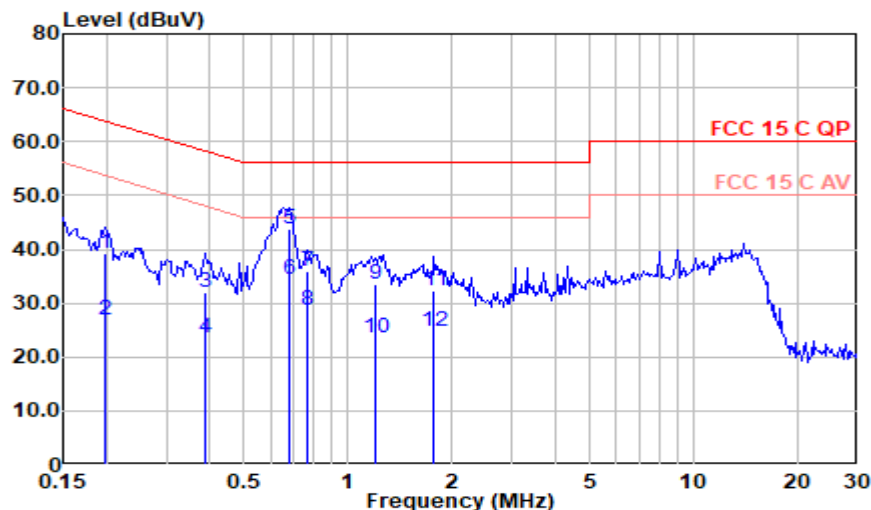
Test Date:	2025.01.13	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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Mode: Mode 1**Polarization at Line**

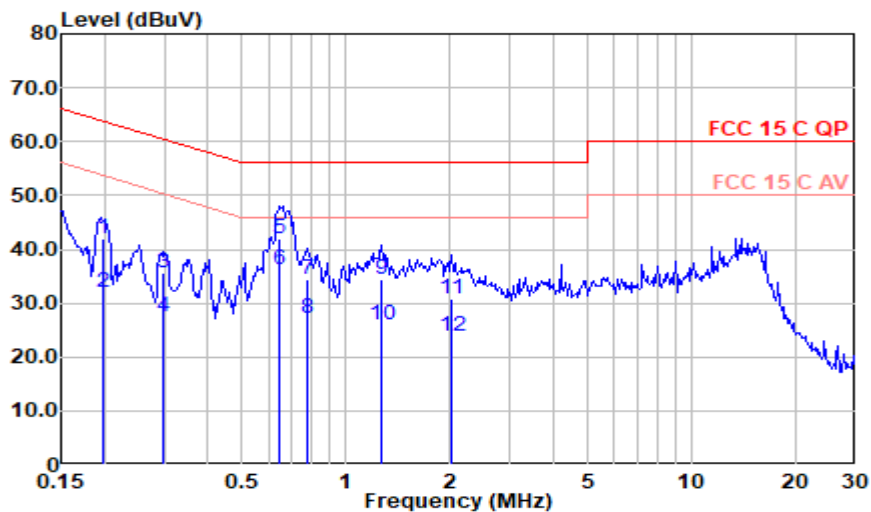
Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.198	41.24	0.10	9.49	0.10	50.93	63.69	12.76	QP
0.198	29.59	0.10	9.49	0.10	39.28	53.69	14.41	Average
0.298	34.61	0.10	9.49	0.10	44.30	60.30	16.01	QP
0.298	23.50	0.10	9.49	0.10	33.19	50.30	17.11	Average
0.586	34.70	0.20	9.49	0.12	44.51	56.00	11.49	QP
0.586	21.57	0.20	9.49	0.12	31.38	46.00	14.62	Average
0.686	36.90	0.20	9.49	0.12	46.71	56.00	9.29	QP
0.686	24.05	0.20	9.49	0.12	33.86	46.00	12.14	Average
0.889	29.88	0.20	9.49	0.13	39.71	56.00	16.29	QP
0.889	17.21	0.20	9.49	0.13	27.03	46.00	18.97	Average
1.418	29.32	0.20	9.49	0.14	39.15	56.00	16.85	QP
1.418	17.23	0.20	9.49	0.14	27.06	46.00	18.94	Average

Mode: Mode 1**Polarization at Neutral**

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.198	37.78	0.10	9.49	0.10	47.47	63.69	16.22	QP
0.198	27.36	0.10	9.49	0.10	37.05	53.69	16.64	Average
0.298	30.71	0.10	9.49	0.10	40.40	60.30	19.91	QP
0.298	22.19	0.10	9.49	0.10	31.88	50.30	18.42	Average
0.586	30.55	0.10	9.49	0.12	40.26	56.00	15.74	QP
0.586	20.98	0.10	9.49	0.12	30.69	46.00	15.31	Average
0.680	36.14	0.10	9.49	0.12	45.85	56.00	10.15	QP
0.680	25.95	0.10	9.49	0.12	35.66	46.00	10.34	Average
0.972	26.88	0.17	9.49	0.14	36.68	56.00	19.32	QP
0.972	18.53	0.17	9.49	0.14	28.33	46.00	17.67	Average
1.363	27.69	0.20	9.49	0.14	37.52	56.00	18.48	QP
1.363	18.52	0.20	9.49	0.14	28.35	46.00	17.65	Average

Mode: Mode 4**Polarization at Line**

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.198	29.66	0.10	9.49	0.10	39.35	63.69	24.34	QP
0.198	17.09	0.10	9.49	0.10	26.78	53.69	26.90	Average
0.386	22.23	0.10	9.49	0.10	31.92	58.16	26.23	QP
0.386	13.71	0.10	9.49	0.10	23.40	48.16	24.75	Average
0.680	34.01	0.20	9.49	0.12	43.83	56.00	12.17	QP
0.680	24.74	0.20	9.49	0.12	34.55	46.00	11.45	Average
0.766	26.17	0.20	9.49	0.13	35.98	56.00	20.02	QP
0.766	18.75	0.20	9.49	0.13	28.56	46.00	17.44	Average
1.210	23.82	0.20	9.49	0.14	33.65	56.00	22.35	QP
1.210	13.78	0.20	9.49	0.14	23.61	46.00	22.39	Average
1.783	22.43	0.20	9.49	0.14	32.26	56.00	23.74	QP
1.783	14.78	0.20	9.49	0.14	24.61	46.00	21.39	Average

Mode: Mode 4**Polarization at Neutral**

Frequency (MHz)	Meter Reading dB (μV)	AMN Factor (dB)	Aux Factor (dB)	Cable Loss (dB)	Emission Level dB (μV)	Limits dB (μV)	Margin (dB)	Remark
0.198	32.38	0.10	9.49	0.10	42.07	63.69	21.62	QP
0.198	22.43	0.10	9.49	0.10	32.12	53.69	21.57	Average
0.295	26.00	0.10	9.49	0.10	35.69	60.39	24.70	QP
0.295	17.78	0.10	9.49	0.10	27.47	50.39	22.91	Average
0.647	32.22	0.10	9.49	0.12	41.93	56.00	14.07	QP
0.647	26.58	0.10	9.49	0.12	36.30	46.00	9.70	Average
0.773	24.84	0.10	9.49	0.13	34.56	56.00	21.44	QP
0.773	17.39	0.10	9.49	0.13	27.11	46.00	18.89	Average
1.271	24.61	0.20	9.49	0.14	34.44	56.00	21.56	QP
1.271	16.20	0.20	9.49	0.14	26.03	46.00	19.97	Average
2.029	20.96	0.20	9.49	0.14	30.79	56.00	25.21	QP
2.029	13.91	0.20	9.49	0.14	23.74	46.00	22.26	Average

4 RADIATED EMISSION TEST

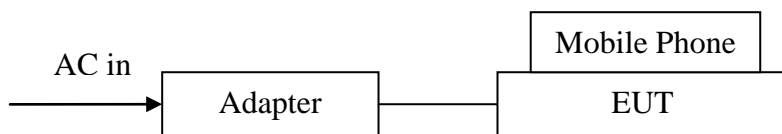
4.1 Test Equipment

The following test equipment are used during the radiated emission test in a semi-anechoic chamber:

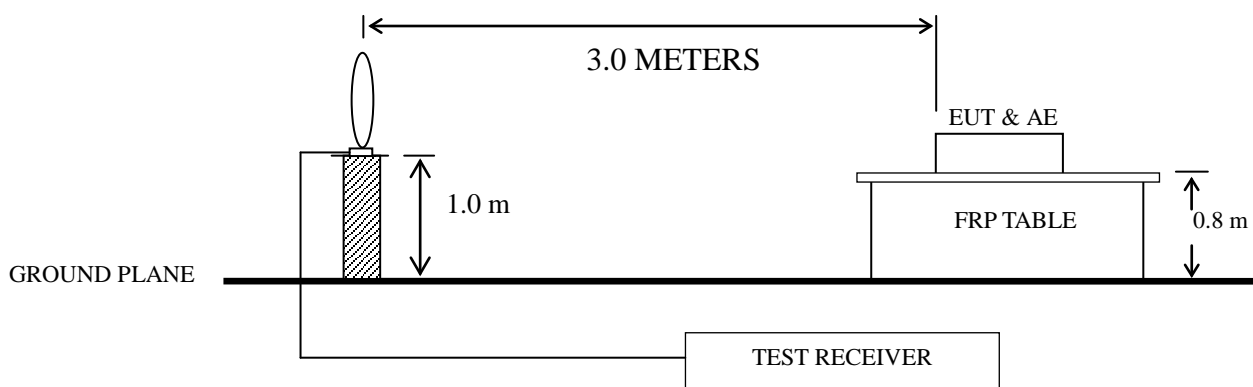
Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Preamplifier	Agilent	8447D	2944A10548	2024.02.22	1 Year
2.	Test Receiver	R&S	ESCI	101303	2024.02.22	1 Year
3.	Bilog Antenna+6dB Attenuator	Schwarzbeck	VULB 9168+EMCI-N-6-06	708+AT-N0638	2024.02.07	1 Year
4.	Loop Antenna	Schaffner	HLA6120	1193	2024.07.10	1 Year
5.	Coaxial Switch	Anritsu	MP59B	6200655086	2024.02.22	1 Year
6.	Coaxial Cable	SCHAFFNER	RG 212U-MIL C 17+N1K50-E W0630-N1K50-15m-1	RE-10m-001/ RE-15m-002	2024.02.22	1 Year
7.	Software	Audix	e3	v9.210616	--	--

4.2 Block Diagram of Test Setup

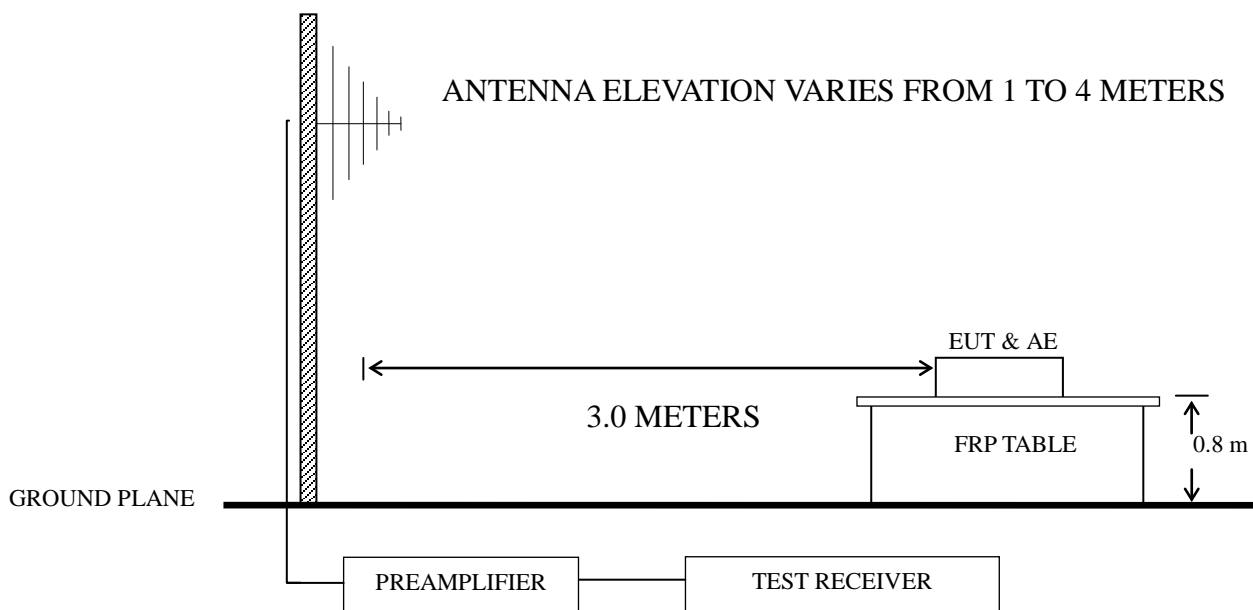
4.2.1 EUT & Peripherals



4.2.2 9kHz to 30MHz



4.2.3 30MHz to 1GHz



4.3 Radiated Emission Limit (§15.205&15.209)

§15.205(a):

Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

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			

§15.209(a):

Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Distance (m)	Field strength limits (μV/m)	
		(μV/m)	dB(μV/m)
0.009 ~ 0.490	300	2400/F(kHz)	20log(2400/F(kHz))
0.490 ~ 1.705	30	24000/F(kHz)	20log(24000/F(kHz))
1.705 ~ 30	30	30	29.5
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
Above 960	3	500	54.0
NOTE 1 - Emission Level dB (μV/m) = 20 log Emission Level (μV/m)			
NOTE 2 - The tighter limit applies at the band edges.			
NOTE 3 - Distance refers to the distance in meters between the measuring instrument antenna and the closed point of any part of the device or system.			
NOTE 4 - The limits shown are based on Quasi-peak value detector except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. The limits in these three bands are based on average detector.			

According to the ANSI C63.10, section 6.4: For Radiated Emissions from unlicensed wireless devices below 30MHz. When performing measurements at a closer distance than specified, the results shall be extrapolated to the specified distance by using one of the methods described in 6.4.4 or 6.4.5.

In the report, The EUT was measured at 3 meter, the limit should be extrapolated. According to the Section 6.4.4 of ANSI C63.10, the extrapolation factor was based on to the relationship of $d_{\text{near field}}$, d_{measure} and d_{limit} .

The finally selection of Extrapolated Equations were showed as below:

Frequency Range (MHz)	Measurement distance d_{measure} (m)	Reference limit distance d_{limit} (m)	Equation applied
0.009 to 0.159	3	300	Equation (4)
0.159 to 0.49	3	300	Equation (2)
0.49 to 1.075	3	30	Equation (4)
1.075 to 1.59	3	30	Equation (4)
1.59 to 15.9	3	30	Equation (2)
15.9 to 30	3	30	Equation (3)

where

the $d_{\text{near field}}$ is the near field distance that determined as Equation (1):

$$d_{\text{near field}} = 47.77 / f_{\text{MHz}} \quad (1)$$

the d_{measure} is the measurement distance

the d_{limit} is the reference limit distance

The Equation (2) (3) (4) as below:

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left(\frac{d_{\text{near field}}}{d_{\text{measure}}} \right) - 20 \log \left(\frac{d_{\text{limit}}}{d_{\text{near field}}} \right) \quad (2)$$

$$FS_{\text{limit}} = FS_{\text{max}} - 20 \log \left(\frac{d_{\text{limit}}}{d_{\text{measure}}} \right) \quad (3)$$

$$FS_{\text{limit}} = FS_{\text{max}} - 40 \log \left(\frac{d_{\text{limit}}}{d_{\text{measure}}} \right) \quad (4)$$

Finally, the limit at 3 meter (9k to 30MHz) can extrapolated as below:

Frequency (MHz)	Reference limit Distance (m)	Measurement distance (m)	Field strength limits dB(μV/m) at 3m measurement distance
0.009 ~ 0.159	300	3	$20 \log(2400/F(\text{kHz})) + 80$
0.159 ~ 0.49	30	3	$20 \log(24000/F(\text{kHz})) + 20 \log[(300*47770)/(3*3*F(\text{kHz}))]$
0.49 ~ 1.075	30	3	$20 \log(24000/F(\text{kHz})) + 40$
1.075 ~ 1.59	30	3	69.54
1.59 ~ 15.9	30	3	29.54 + $20 \log[(30*47770)/(3*3*F(\text{kHz}))]$
15.9 ~ 30	30	3	59.54

4.4 Test Configuration

The EUT (listed in Sec.2.1) and the simulators (listed in Sec.2.2) were installed as shown on Sec.4.2 to meet FCC requirements and operating in a manner that tends to maximize its emission level in a normal application.

4.5 Operating Condition of EUT

4.5.1 Setup the EUT as shown in Sec. 4.2.

4.5.2 Turn EUT on, then test.

4.5.3 Repeat step 4.5.1 and 4.5.2, until the test of all modes finished.

4.6 Test Procedures

Radiated emission test applies to harmonics/spurs that fall in the restricted bands listed in Section 15.205. The maximum permitted average field strength is listed in Section 15.209. A pre-amp is necessary for this measurement. For measurement above 1 GHz, set RBW = 1MHz, VBW = 10 Hz, Sweep: Auto. If the emission is pulsed, modify the unit for continuous operation; use the settings shown above, then correct the reading by subtracting the peak-average correction factor, derived from the appropriate duty cycle calculation.

The EUT was placed on a turntable. Below 1 GHz, the table height is 80 cm above the reference ground plane. Above 1 GHz, the table height is 1.5 m. The turntable rotated 360 degrees to determine the position of the maximum emission level. The EUT was set 3 meters away from the receiving antenna, which was mounted on an antenna tower. The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level. Broadband antenna (Calibrated Bilog Antenna) or Horn antenna was used as receiving antenna. Both horizontal and vertical polarizations of the antenna were set on measurement. In order to find the maximum emission, all of the interference cables were manipulated according to ANSI C63.10: 2013 requirements during radiated emission test.

The bandwidth of Test Receiver R&S ESCI was set at 120 kHz from 30MHz to 1000MHz.

The bandwidth of Agilent N9010A was set at 1MHz for above 1GHz.

The frequency range from 30 MHz to 40 GHz (Up to 10th harmonics from fundamental frequency) was checked.

All the test results are listed in Sec.4.7.

4.7 Test Results

<PASS>

The frequency and amplitude of the highest radiated emission relative the limit is reported. All the emissions not reported below are too low against the FCC limit.

Frequency range: 9 kHz to 30 MHz

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Charging	Mode 1	--	127 kHz	P21-22
2.	Charging	Mode 4	--	127 kHz	P23-24

Frequency range: 30 MHz to 1GHz

No.	Operation	Mode	Channel	Frequency	Data Page
1.	Charging	Mode 1	--	127 kHz	P25-26
2.	Charging	Mode 4	--	127 kHz	P27-28

NOTE 1 – For 9 kHz to 30 MHz:

Emission Level = Read Level + Antenna Factor + Cable Loss

Margin = Limits - Emission Level.

For 30 MHz to 1 GHz:

Emission Level = Read Level + Antenna Factor + Cable Loss - Preamp Factor

Margin = Limits - Emission Level.

NOTE 2 – “QP” means “Quasi-Peak” values.

NOTE 3 – For the degree of table, 0° was the table front facing the antenna.

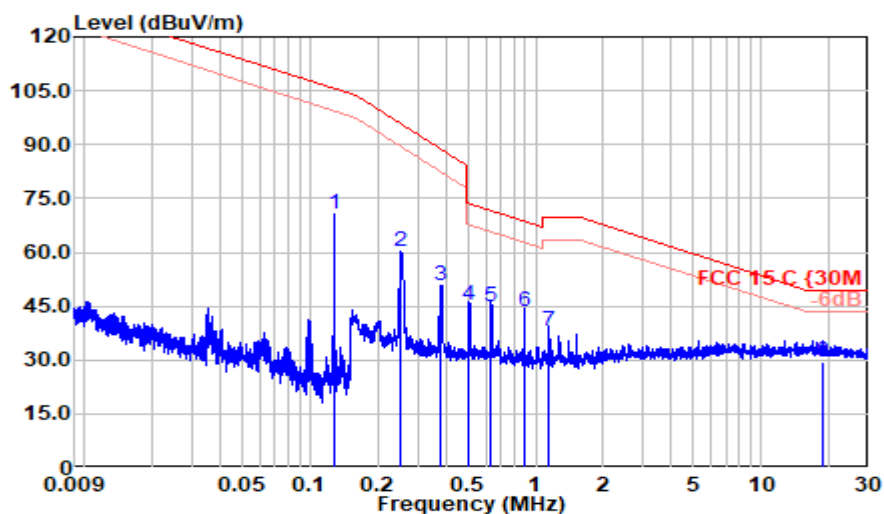
Degree is calculated from 0° clockwise facing the antenna.

NOTE 4 – The emission levels which not reported are too low against the official limit.

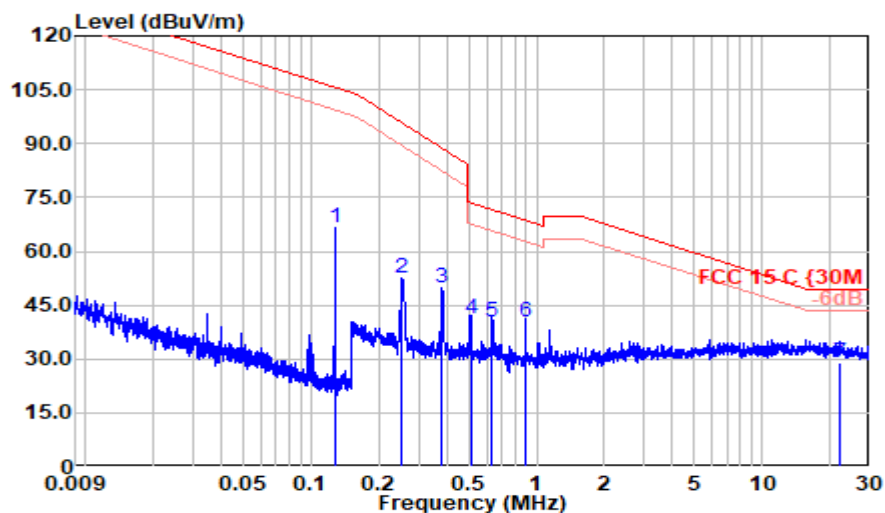
NOTE 6 – All reading are Quasi-Peak values except for the frequency bands 9–90 kHz, 110–490 kHz and above 1000 MHz. The Peak and Average values are reading in these three frequency bands. And for these three frequency bands, if the peak measured value complies with the average limit, it is unnecessary to perform an average measurement.

Radiated emission (9 kHz to 30 MHz)

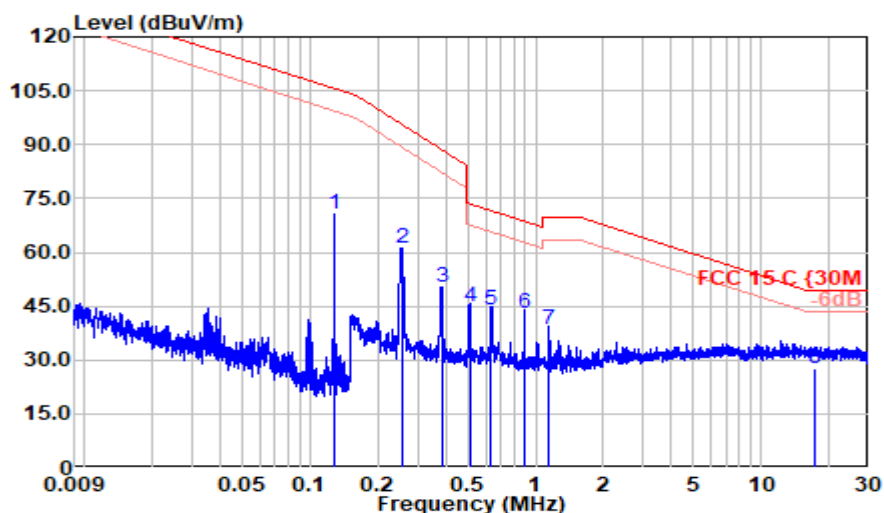
Test Date:	2025.01.14	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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Mode: Mode 1**Loop Antenna Polarization at 0 degree**

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
0.127	50.42	20.10	0.20	0.00	70.72	105.49	34.77	Peak
0.254	40.11	19.99	0.20	0.00	60.31	95.44	35.13	Peak
0.382	30.68	19.90	0.21	0.00	50.79	88.36	37.57	Peak
0.507	24.85	20.10	0.21	0.00	45.16	73.50	28.34	QP
0.637	24.73	20.10	0.22	0.00	45.05	71.52	26.47	QP
0.892	22.92	20.17	0.23	0.00	43.32	68.59	25.28	QP
1.144	17.82	20.20	0.23	0.00	38.26	69.54	31.28	QP
18.665	8.66	20.20	0.53	0.00	29.40	49.54	20.14	QP

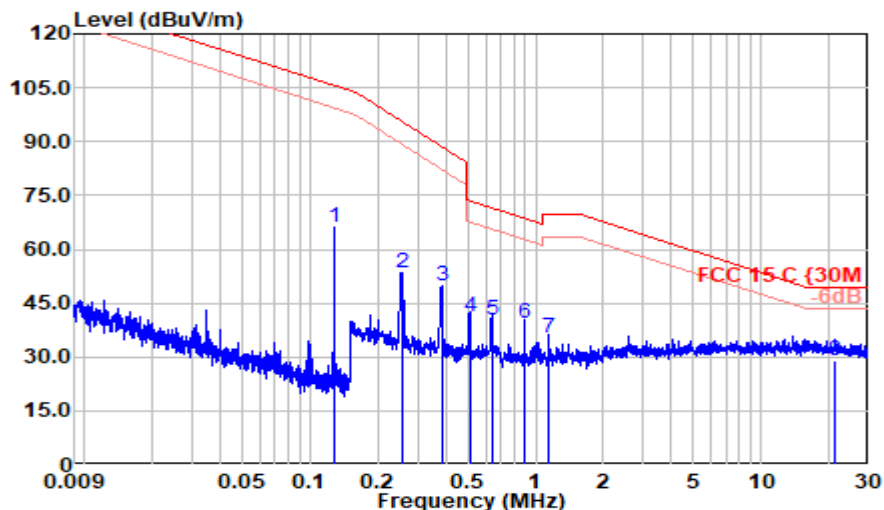
Mode: Mode 1**Loop Antenna Polarization at 90 degree**

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
0.128	46.44	20.10	0.20	0.00	66.74	105.48	38.74	Peak
0.253	32.21	19.99	0.20	0.00	52.41	95.53	43.12	Peak
0.381	29.80	19.90	0.21	0.00	49.90	88.40	38.50	Peak
0.510	20.90	20.10	0.21	0.00	41.21	73.45	32.24	QP
0.636	20.16	20.10	0.22	0.00	40.47	71.54	31.07	QP
0.892	19.73	20.17	0.23	0.00	40.12	68.59	28.47	QP
21.953	8.00	20.20	0.57	0.00	28.77	49.54	20.77	QP

Mode: Mode 4

Loop Antenna Polarization at 0 degree

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
0.127	50.50	20.10	0.20	0.00	70.80	105.49	34.69	Peak
0.255	41.07	19.99	0.20	0.00	61.27	95.39	34.12	Peak
0.383	30.31	19.90	0.21	0.00	50.42	88.31	37.89	Peak
0.511	24.46	20.10	0.21	0.00	44.77	73.43	28.66	QP
0.637	23.69	20.10	0.22	0.00	44.01	71.52	27.51	QP
0.892	22.43	20.17	0.23	0.00	42.82	68.59	25.77	QP
1.147	18.18	20.20	0.23	0.00	38.61	69.54	30.93	QP
17.211	6.96	20.20	0.52	0.00	27.68	49.54	21.86	QP

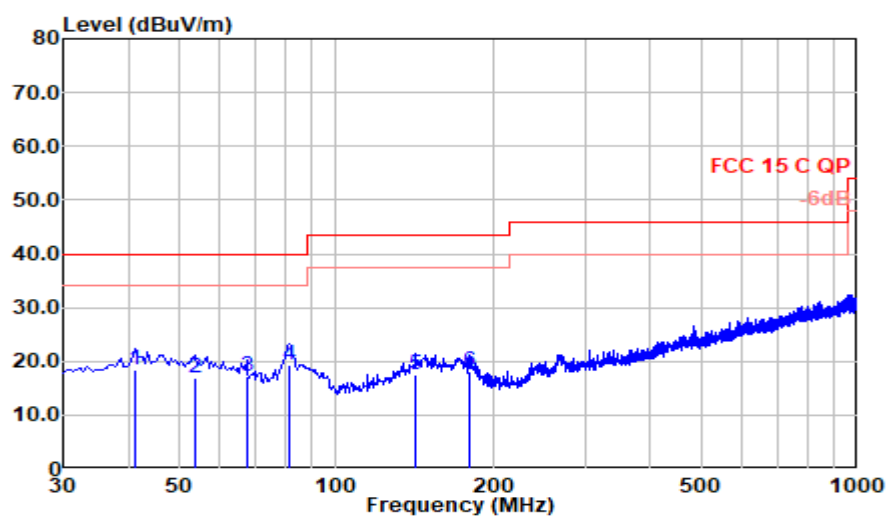
Mode: Mode 4

Loop Antenna Polarization at 90 degree

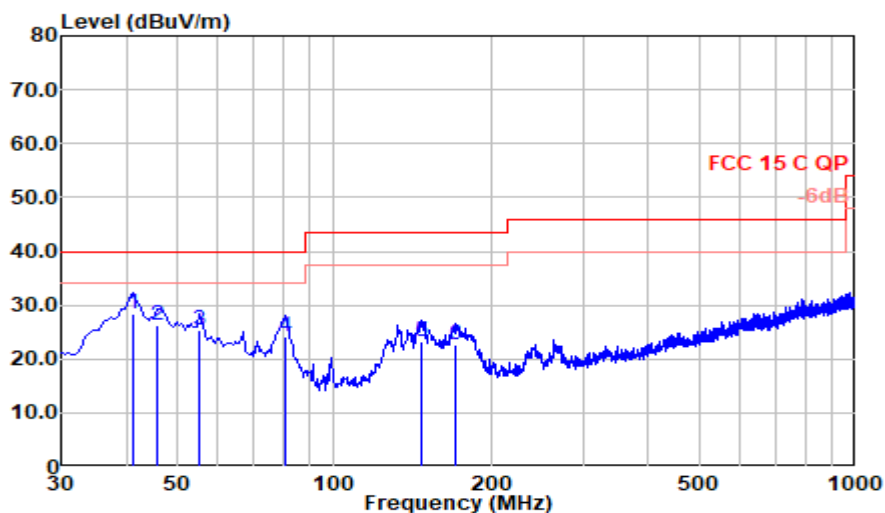
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
0.128	45.72	20.10	0.20	0.00	66.02	105.48	39.46	Peak
0.255	33.24	19.99	0.20	0.00	53.43	95.39	41.96	Peak
0.384	29.49	19.90	0.21	0.00	49.60	88.26	38.67	Peak
0.510	21.09	20.10	0.21	0.00	41.40	73.45	32.05	QP
0.639	20.18	20.10	0.22	0.00	40.50	71.49	31.00	QP
0.892	18.98	20.17	0.23	0.00	39.37	68.59	29.22	QP
1.147	14.84	20.20	0.23	0.00	35.28	69.54	34.26	QP
21.123	8.09	20.20	0.56	0.00	28.86	49.54	20.68	QP

Radiated Emission (30 MHz to 1 GHz)

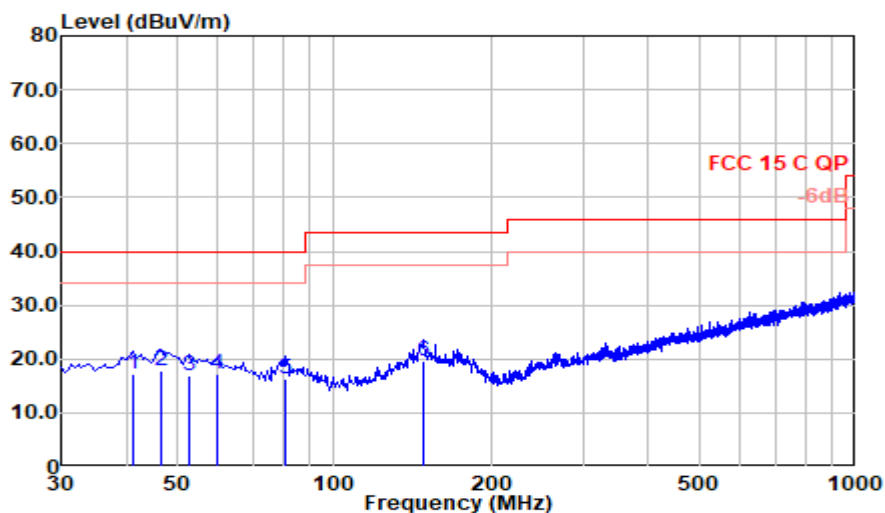
Test Date:	2025.01.10	Temp./Hum.:	22°C/51%RH	Test By:	Jarey
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Mode: Mode 1**Polarization at Horizontal**

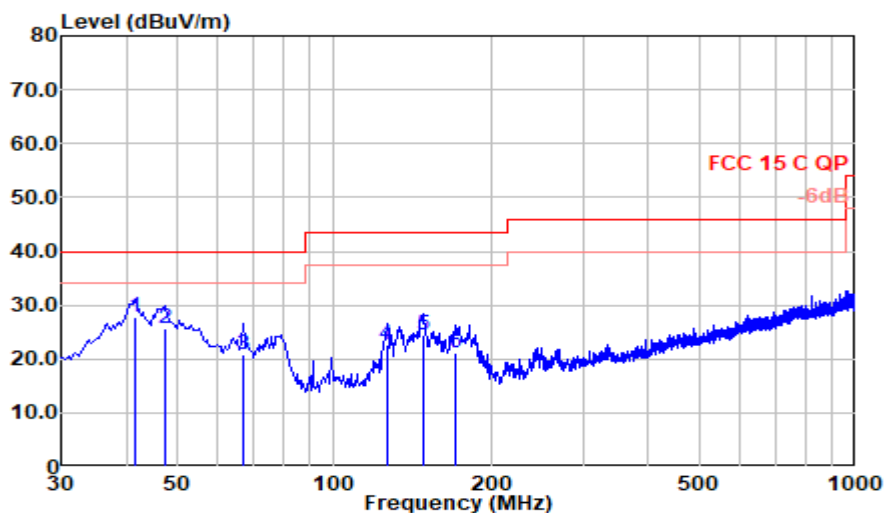
Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
41.155	27.87	19.12	0.76	29.40	18.35	40.00	21.65	QP
53.765	26.13	19.42	0.86	29.40	17.01	40.00	22.99	QP
67.345	27.62	17.93	0.94	29.40	17.10	40.00	22.90	QP
81.410	33.12	14.58	1.04	29.39	19.35	40.00	20.65	QP
142.035	26.43	18.80	1.39	29.20	17.42	43.50	26.08	QP
180.350	28.22	17.46	1.56	29.10	18.15	43.50	25.35	QP

Mode: Mode 1**Polarization at Vertical**

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
41.155	37.81	19.12	0.76	29.40	28.29	40.00	11.71	QP
46.005	35.48	19.40	0.80	29.40	26.28	40.00	13.72	QP
55.220	34.62	19.40	0.87	29.40	25.49	40.00	14.51	QP
80.925	37.77	14.71	1.04	29.39	24.12	40.00	15.88	QP
146.885	31.95	19.09	1.41	29.20	23.25	43.50	20.25	QP
171.135	31.54	18.59	1.52	29.13	22.51	43.50	20.99	QP

Mode: Mode 4**Polarization at Horizontal**

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
41.155	26.85	19.12	0.76	29.40	17.32	40.00	22.68	QP
46.490	26.98	19.50	0.80	29.40	17.88	40.00	22.12	QP
52.795	25.81	19.50	0.85	29.40	16.76	40.00	23.24	QP
59.585	26.77	19.04	0.90	29.40	17.31	40.00	22.69	QP
80.440	29.95	14.81	1.03	29.40	16.40	40.00	23.60	QP
148.340	28.19	19.13	1.42	29.20	19.54	43.50	23.96	QP

Mode: Mode 4

Polarization at Vertical

Frequency (MHz)	Meter Reading dB (μV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamplifier Factor (dB)	Emission Level dB (μV/m)	Limits dB (μV/m)	Margin (dB)	Remark
41.640	37.12	19.16	0.76	29.40	27.65	40.00	12.35	QP
47.460	34.79	19.55	0.81	29.40	25.75	40.00	14.25	QP
66.860	31.12	18.03	0.94	29.40	20.69	40.00	19.31	QP
126.030	33.49	17.00	1.32	29.20	22.61	43.50	20.89	QP
148.340	32.99	19.13	1.42	29.20	24.34	43.50	19.16	QP
171.135	30.30	18.59	1.52	29.13	21.27	43.50	22.23	QP

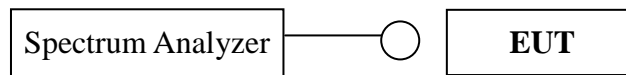
5 20 dB BANDWIDTH MEASUREMENT

5.1 Test Equipment

The following test equipment was used during the Emission Bandwidth measurement:

Item	Type	Manufacturer	Model No.	Serial No.	Cal. Date	Cal. Interval
1.	Spectrum Analyzer	Agilent	N9010A	MY52221182	2024.08.09	1 Year

5.2 Block Diagram of Test Setup



5.3 Specification Limits (§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. In the case of intentional radiators operating under the provisions of subpart E, the emission bandwidth may span across multiple contiguous frequency bands identified in that subpart. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of-band operation.

5.4 Operating Condition of EUT

The software as section 2.3 was used to enable the EUT to change the test mode one by one.

5.5 Test Procedure

The transmitter output was connected to the spectrum analyzer. The bandwidth of the fundamental frequency was measure by spectrum analyzer with settings: RBW = 1% to 5% of the 20 dB Bandwidth, VBW approximately three times of RBW. Set detection mode to peak and trace mode to max hold. Set the “x dB” function to “-20 dB” on Spectrum Analyzer to measure 20 dB Bandwidth, record it.

The 20 dB bandwidth is defined as the total spectrum the power of which is lower than peak power minus 20 dB .

The test procedure is defined in ANSI C63.10-2013 (the 6.9.2 Measurement Procedure “ Occupied bandwidth—relative measurement procedure” was used).

5.6 Test Results

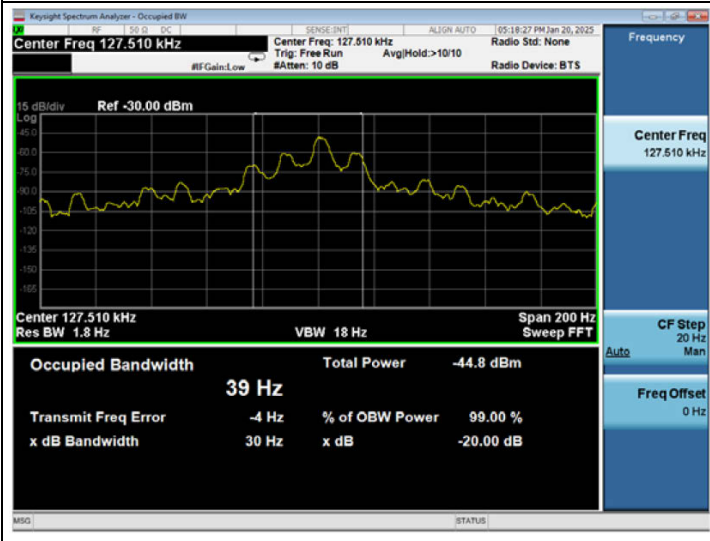
PASSED.

All the test results are attached in next pages.

(Test Date: 2025.01.20 Temperature: 23°C Humidity: 51 %)

Mode	Channel	Frequency (kHz)	20dB Bandwidth (Hz)
WPC	--	127.51	30

WPC



6 ANTENNA REQUIREMENT

6.1 Specification Limits (§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.

6.2 Result

According to KDB 353028 D1, the following describes the three ways that can be used to demonstrate compliance to Section 15.203:

- a) Antenna permanently attached.
- b) Unique (non-standard) antenna connector.
- c) Professional installation.

For this product, the antenna is: an inductive loop coil Antenna, which:

- ☒ Antenna permanently attached
- ☐ Unique (non-standard) antenna connector
- ☐ Professional installation
- ☐ not meet any of ways list above

that

- ☒ compliant
- ☐ not compliant

with the requirement of Section 15.203.

7 DEVIATION TO TEST SPECIFICATIONS

None.

8 MEASUREMENT UNCERTAINTY LIST

The measurement uncertainty was estimated for test on the EUT according to CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage of K=2.

The uncertainties value is not used in determining the PASS/FAIL results.

Test Items/Facilities	Frequency/Equipment/Unit	Uncertainty
Conducted Emission No.1 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Conducted Emission No.3 Shielded Room	9kHz~150kHz	±3.1 dB
	150kHz~30MHz	±2.6 dB
Radiated Emission	30MHz~200MHz, Horizontal	±3.8 dB
	30MHz~200MHz, Vertical	±4.1 dB
	200MHz~1000MHz, Horizontal	±3.6 dB
	200MHz~1000MHz, Vertical	±5.1 dB
	1GHz~6GHz	±5.3 dB
	6GHz~18GHz	±5.3 dB
	18GHz~40GHz	±3.5 dB
Output Power Test	50MHz~18GHz	0.77 dB
Power Density Test	9kHz~6GHz	1.08 dB
RF Frequency Test	9kHz~40GHz	6×10^{-4}
Bandwidth Test	9kHz~6GHz	1.5×10^{-3}
RF Radiated Power Test	30MHz~1000MHz	3.06 dB
Conducted Output Power Test	50MHz~18GHz	0.83 dB
AC Voltage(<10kHz) Test	120V~230V	0.04 %
DC Power Test	0V~30V	0.4 %
Temperature	-40°C~+100°C	0.52 °C
Humidity	30%~95%	2.6 %