
FCC Test Report

Report No.: AGC14614220701FE04

FCC ID : 2A4NL-F8

APPLICATION PURPOSE : Original Equipment

PRODUCT DESIGNATION : 3-IN-1 Magnetic wireless charger

BRAND NAME : N/A

MODEL NAME : F8, A8, X8, H8, U8

APPLICANT : Shenzhen Blue Craftsman Technology Co., Ltd.

DATE OF ISSUE : Jul 14, 2022

STANDARD(S) : FCC Part 15 Rules

TEST PROCEDURE(S)

REPORT VERSION : V1.0

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REPORT REVISE RECORD

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Jul. 14, 2022	Valid	Initial Release

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1. VERIFICATION OF CONFORMITY

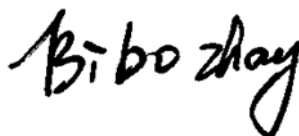
Applicant	Shenzhen Blue Craftsman Technology Co., Ltd.
Address	7th Floor, Building 5, Jianjin Bicycle Co., Ltd., south of Donghuan 2nd Road, Fukang Community, Longhua Street, Longhua District, Shenzhen, 518000, China
Manufacturer	Shenzhen Blue Craftsman Technology Co., Ltd.
Address	7th Floor, Building 5, Jianjin Bicycle Co., Ltd., south of Donghuan 2nd Road, Fukang Community, Longhua Street, Longhua District, Shenzhen, 518000, China
Factory	Shenzhen USV Technology Co., Ltd
Address	4F, Building B20, Hengfeng Industrial City, Hangchen, Bao'an District, Shenzhen City, Guangdong Province, China
Product Designation	3-IN-1 Magnetic wireless charger
Brand Name	N/A
Test Model	F8
Series Model	A8, X8, H8, U8
Difference description	All the series models are the same as the test model except for the model names and the color of appearance.
Date of test	Jul. 06, 2022 to Jul. 14, 2022
Deviation	No any deviation from the test method
Condition of Test Sample	Normal
Test Result	Pass
Report Template	AGCRT-US-BR/RF

We hereby certify that:

The above equipment was tested by Attestation of Global Compliance (Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with Section 15.207, 15.209, 15.203 of the FCC Part 15, Subpart C Rules.

The results of testing in this report apply to the product/system which was tested only.

Prepared By



Bibo Zhang
(Project Engineer) Jul. 14, 2022

Reviewed By



Calvin Liu
(Reviewer) Jul. 14, 2022

Approved By



Max Zhang
(Authorized Officer) Jul. 14, 2022

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2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

A major technical description of EUT is described as following

Operation Frequency	110.1-205kHz
Test Frequency	137.3KHz
Maximum field strength	74.12dBuV/m(PK)@3m
Modulation	ASK
Number of channels	1
Antenna Designation	Coil Antenna (Met 15.203 Antenna requirement)
Hardware Version	V2.1
Software Version	V2.1
Power Supply	DC 9V, 2A
Wireless charger	10W, 3W, 2.5W

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3. MEASUREMENT UNCERTAINTY

The uncertainty is calculated using the methods suggested in the “Guide to the Expression of Uncertainty in measurement” (GUM) published by CISPR and ANSI.

- Uncertainty of Conducted Emission, $U_c = \pm 3.2$ dB
- Uncertainty of Radiated Emission below 1GHz, $U_c = \pm 3.9$ dB
- Uncertainty of Radiated Emission above 1GHz, $U_c = \pm 4.8$ dB

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4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Full Load
2	Half Load
3	Null Load
Note: Wireless output: 10W, 3W, 2.5W (maximum wireless output 10W during charging)	

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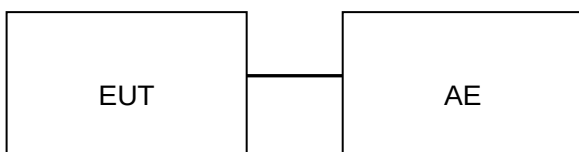
5. SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Radiated Emission Configure:



Conducted Emission Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	3-IN-1 Magnetic wireless charger	F8	2A4NL-F8	EUT
2	Huawei adapter	HW-200325CP0	Input:100-240V 50/60Hz,1.8A Output: 5V2A/9V2A/12V2A/15V3A/20V3.25A	AE
3	wireless charging load	N/A	Support 5W,7.5W,10W,15W	AE
4	Wireless headset	N/A	3W	AE
5	Wireless watch	N/A	2W	AE

5.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.209	Radiated Emission	Compliant
§15.215	20dB bandwidth	Compliant
§15.207	Conducted Emission	Compliant

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6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

TEST EQUIPMENT OF CONDUCTED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Mar. 28, 2022	Mar. 27, 2023
LISN	R&S	ESH2-Z5	100086	Jun. 08, 2022	Jun. 07, 2023
Test software	R&S	ES-K1(Ver.V1.71)	N/A	N/A	N/A

TEST EQUIPMENT OF RADIATED EMISSION TEST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESCI	10096	Mar. 28, 2022	Mar. 27, 2023
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Nov. 17, 2021	Nov. 16, 2022
Active loop antenna (9K-30MHz)	ZHINAN	ZN30900C	18051	Mar. 12, 2022	Mar. 21, 2024
ANTENNA	SCHWARZBECK	VULB9168	D69250	Jan. 08, 2020	Jan. 07, 2023
Test software	FARA	EZ_EMC (Ver.RA-03A)	N/A	N/A	N/A

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7. RADIATED EMISSION

7.1 TEST LIMIT

Standard FCC 15.209

Frequency (MHz)	Distance Meters	Field Strengths Limit	
		μ V/m	dB(μV)/m
0.009 ~ 0.490	300	2400/F(kHz)	---
0.490 ~ 1.705	30	24000/F(kHz)	---
1.705 ~ 30	30	30	---
30 ~ 88	3	100	40.0
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46.0
960 ~ 1000	3	500	54.0
Above 1000	3	Other:74.0 dB(μV)/m (Peak) 54.0 dB(μV)/m (Average)	
Remark: (1) Emission level dB μ V = 20 log Emission level μ V/m (2) The smaller limit shall apply at the cross point between two frequency bands. (3) Distance is the distance in meters between the measuring instrument, antenna and the closest point of any part of the device or system.			

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7.2. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 or 1.5 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Power on the EUT and all the supporting units. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
3. The height of the broadband receiving antenna was varied between one meter and four meters above ground to find the maximum emissions field strength of both horizontal and vertical polarization.
4. For each suspected emissions, the antenna tower was scan (from 1 M to 4 M) and then the turntable was rotated (from 0 degree to 360 degrees) to find the maximum reading.
5. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function with specified bandwidth under Maximum Hold Mode.
6. In case the emission is lower than 30MHz, loop antenna has to be used for measurement and the recorded data should be QP measured by receiver. High - Low scan is not required in this case.

The following table is the setting of spectrum analyzer and receiver.

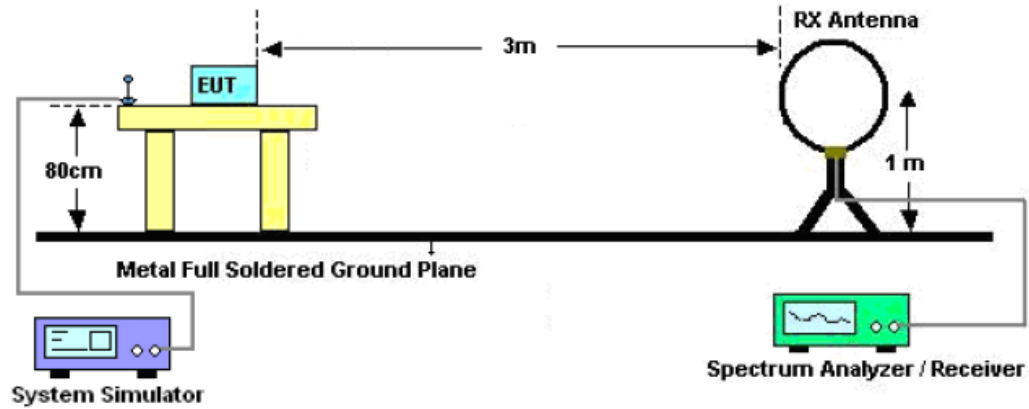
Spectrum Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

Receiver Parameter	Setting
Start ~Stop Frequency	9KHz~150KHz/RB 200Hz for QP
Start ~Stop Frequency	150KHz~30MHz/RB 9KHz for QP
Start ~Stop Frequency	30MHz~1000MHz/RB 120KHz for QP

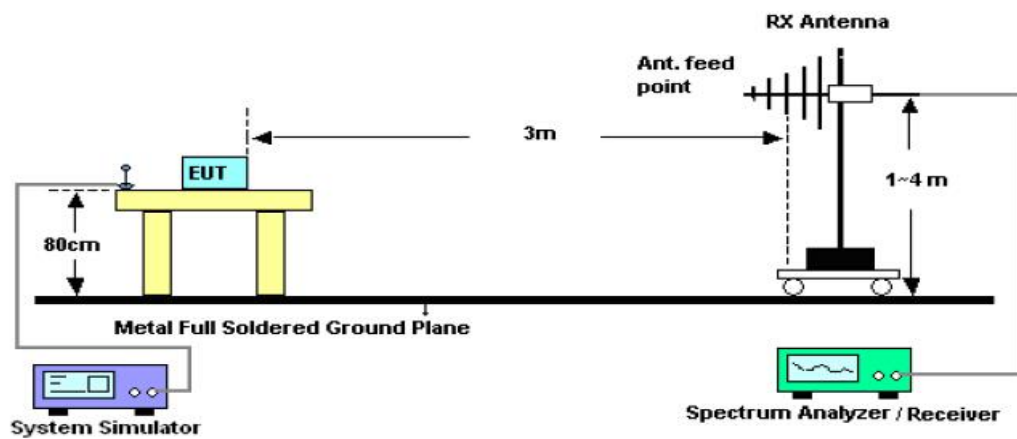
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7.3. TEST SETUP

Radiated Emission Test-Setup Frequency Below 30MHz



RADIATED EMISSION TEST SETUP 30MHz-1000MHz



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7.4. TEST RESULT

Frequency MHz	Polarization	Reading dB(uV) PK	Factor dB (1/m)	Level dB(uV/m) PK	Limit dB(uV/m) AV	Margin dB	Pass/Fail
0.1373	Face	52.59	21.53	74.12	104.85	-30.73	Pass
0.1373	Side	33.37	21.53	54.90	104.85	-49.95	Pass
0.1259	Face	26.45	21.56	48.01	105.60	-57.59	Pass
0.1259	Side	22.15	21.56	43.71	105.60	-61.89	Pass
0.1184	Face	18.46	21.48	39.94	106.14	-66.20	Pass
0.1184	Side	17.27	21.48	38.75	106.14	-67.39	Pass

RADIATED EMISSION BELOW 30MHZ

Note1: The amplitude of spurious emissions from 9kHz to 30MHz which are attenuated more than 20 dB below the permissible value need not be reported. The peak level of the emission is less than the average limit, so the average level shall be less than the limit without test.

Note 2: $\text{Level(dBuV/m)} = \text{Reading(dBuV)} + \text{Factor(dB/m)}$

$\text{Factor(dB/m)} = \text{Antenna Factor(dB/m)} + \text{Cable loss(dB)} + \text{Attenuation(dB) for Attenuator}$

$\text{Margin} = \text{Level} - \text{Limit}$

For 0.1373MHz

$\text{Limit(dBuV/m)} = 20\log(2400/F(\text{kHz})) + 40\log(300/3) = 104.85\text{dBuV/m.}$

For 0.1259MHz

$\text{Limit(dBuV/m)} = 20\log(2400/F(\text{kHz})) + 40\log(300/3) = 105.60\text{dBuV/m.}$

For 0.1184MHz

$\text{Limit(dBuV/m)} = 20\log(2400/F(\text{kHz})) + 40\log(300/3) = 106.14\text{dBuV/m.}$

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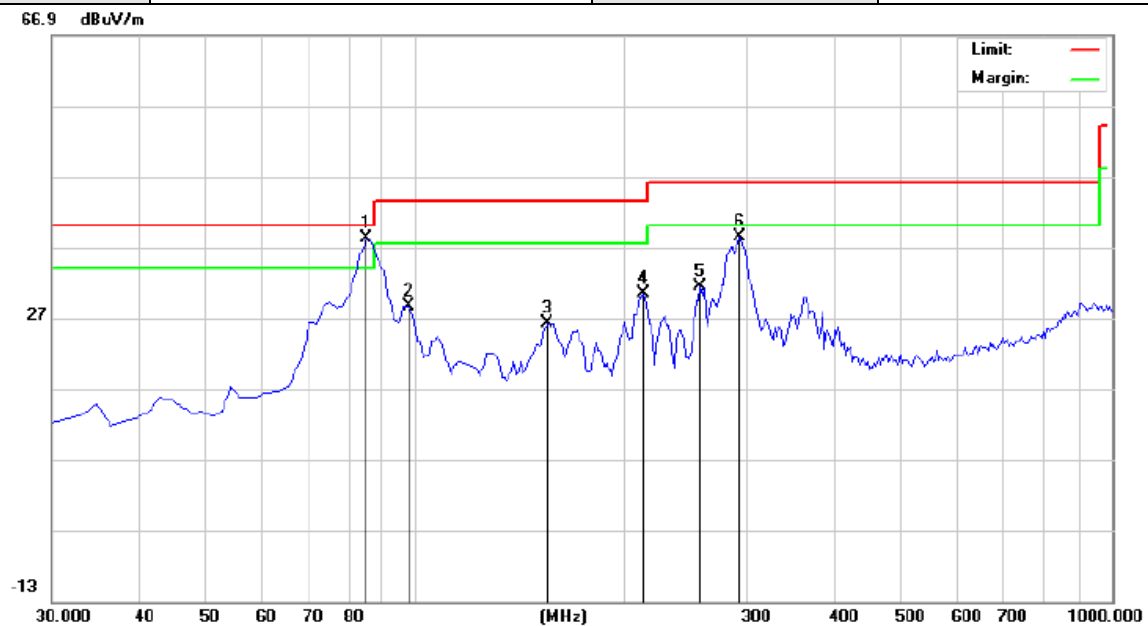
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RADIATED EMISSION 30MHz- 1GHz

EUT :	3-IN-1 Magnetic wireless charger	Model Name.	F8
Temperature :	25°C	Relative Humidity:	55%
Pressure :	1010 hPa	Test Voltage :	DC 5V
Test Mode :	Mode 1	Polarization :	Horizontal

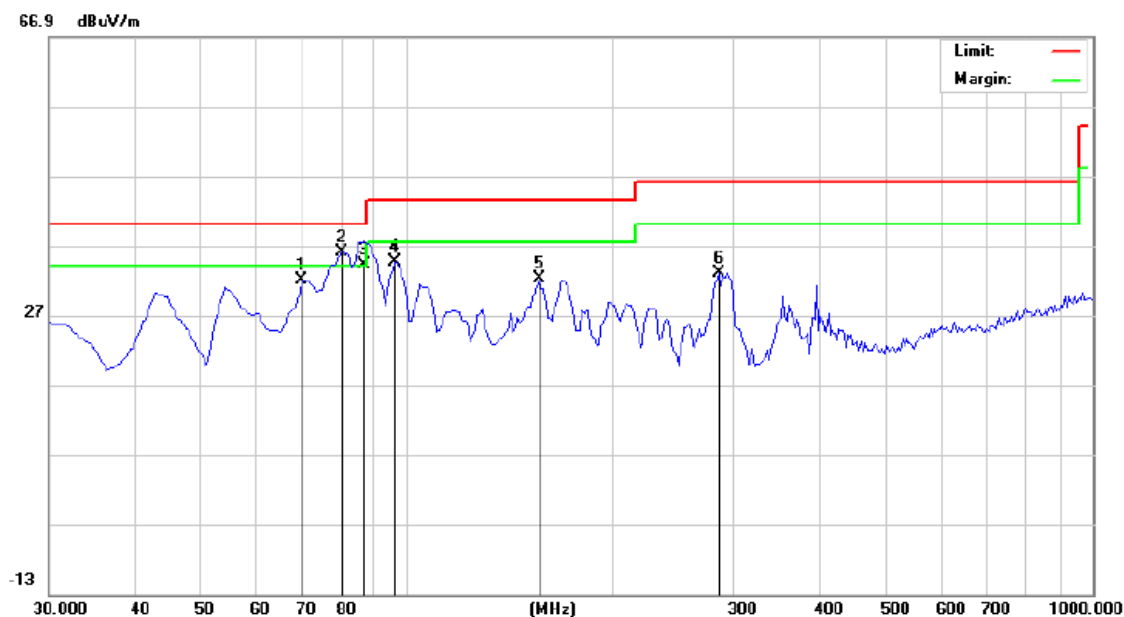


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	84.9666	24.28	13.95	38.23	40.00	-1.77	peak
2		97.9000	13.85	14.73	28.58	43.50	-14.92	peak
3		154.4832	9.58	16.59	26.17	43.50	-17.33	peak
4		212.6833	16.52	13.81	30.33	43.50	-13.17	peak
5		256.3333	15.10	16.37	31.47	46.00	-14.53	peak
6		291.9000	18.49	19.83	38.32	46.00	-7.68	peak

RESULT: PASS

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EUT :	3-IN-1 Magnetic wireless charger	Model Name.	F8
Temperature :	25°C	Relative Humidity:	55%
Pressure :	1010 hPa	Test Voltage :	DC 5V
Test Mode :	Mode 1	Polarization :	Vertical



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		70.4167	15.00	17.02	32.02	40.00	-7.98	peak
2	*	80.1166	21.11	14.94	36.05	40.00	-3.95	peak
3	!	86.5832	19.33	14.97	34.30	40.00	-5.70	QP
4		96.2832	20.81	13.74	34.55	43.50	-8.95	peak
5		156.0999	15.68	16.59	32.27	43.50	-11.23	peak
6		285.4332	13.26	19.81	33.07	46.00	-12.93	peak

RESULT: PASS

Note:

Factor=Antenna Factor + Cable loss, Over=Measurement-Limit.

The "Factor" value can be calculated automatically by software of measurement system.

All test modes had been tested. The mode 1 is the worst case and recorded in the report.

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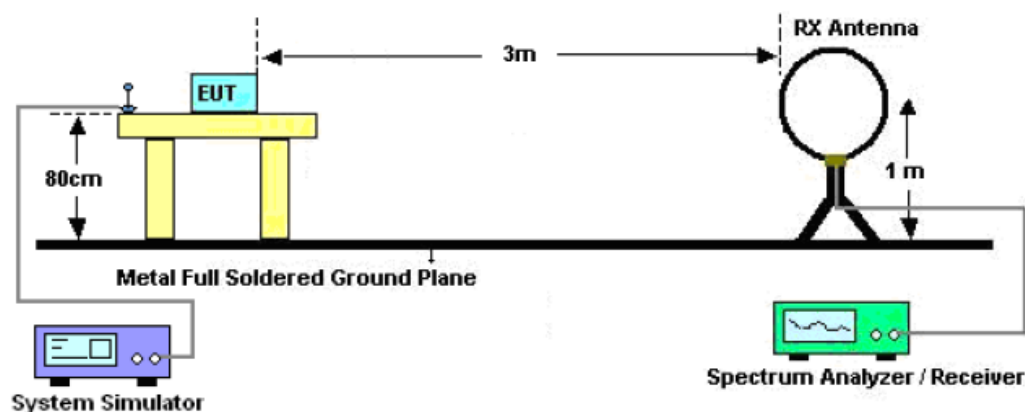
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8. 20DB BANDWIDTH

8.1. MEASUREMENT PROCEDURE

1. The EUT was placed on the top of the turntable 0.8 meter above ground. The phase center of the receiving antenna mounted on the top of a height-variable antenna tower was placed 3 meters far away from the turntable.
2. Set the EUT Work on operation frequency.
3. Set Span = approximately 2 to 5 times the 20 dB bandwidth, centered on a channel
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 approximately three times RBW; Sweep = auto; Detector function = peak
4. Set SPA Trace 1 Max hold, then View.

8.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



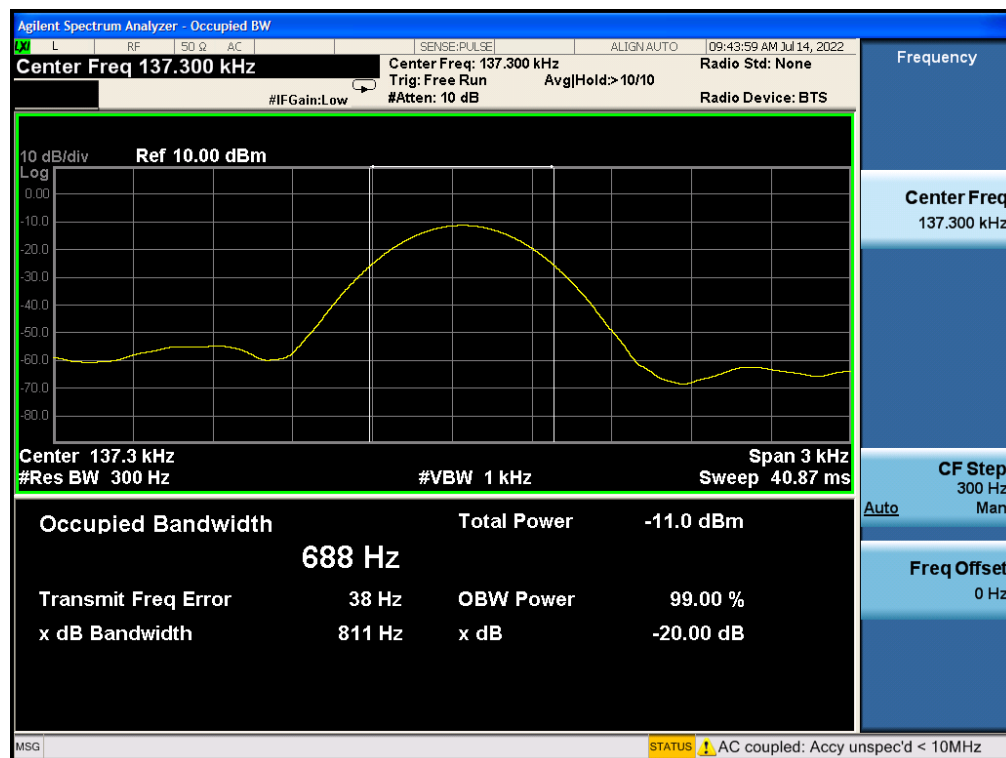
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8.3. MEASUREMENT RESULTS

TEST ITEM	20DB BANDWIDTH
TEST MODULATION	FSK

Test Data (KHz)		Criteria
Operate Channel	811	PASS

TEST PLOT OF BANDWIDTH



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9. FCC LINE CONDUCTED EMISSION TEST

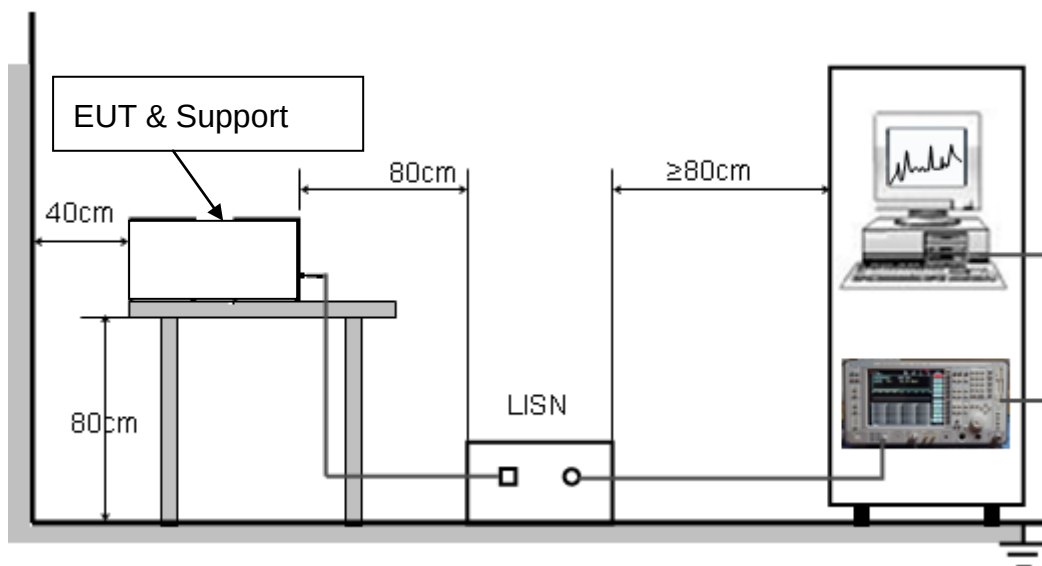
9.1. LIMITS OF LINE CONDUCTED EMISSION TEST

Frequency	Maximum RF Line Voltage	
	Q.P.(dBuV)	Average(dBuV)
150kHz~500kHz	66-56	56-46
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Note:

1. The lower limit shall apply at the transition frequency.
2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50MHz.

9.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST



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9.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. The equipment was set up as per the test configuration to simulate typical actual usage per the user's manual. When the EUT is a tabletop system, a wooden table with a height of 0.8 meters is used and is placed on the ground plane as per ANSI C63.10 (see Test Facility for the dimensions of the ground plane used). When the EUT is a floor-standing equipment, it is placed on the ground plane which has a 3-12 mm non-conductive covering to insulate the EUT from the ground plane.
2. Support equipment, if needed, was placed as per ANSI C63.10.
3. All I/O cables were positioned to simulate typical actual usage as per ANSI C63.10.
4. All support equipments received AC120V/60Hz power from a LISN, if any.
5. The EUT received charging voltage by adapter which received 120V/60Hz power by a LISN..
6. The test program was started. Emissions were measured on each current carrying line of the EUT using a spectrum Analyzer / Receiver connected to the LISN powering the EUT. The LISN has two monitoring points: Line 1 (Hot Side) and Line 2 (Neutral Side). Two scans were taken: one with Line 1 connected to Analyzer / Receiver and Line 2 connected to a 50 ohm load; the second scan had Line 1 connected to a 50 ohm load and Line 2 connected to the Analyzer / Receiver.
7. Analyzer / Receiver scanned from 150 kHz to 30MHz for emissions in each of the test modes.
8. During the above scans, the emissions were maximized by cable manipulation.
9. The test mode(s) were scanned during the preliminary test.

Then, the EUT configuration and cable configuration of the above highest emission level were recorded for reference of final testing.

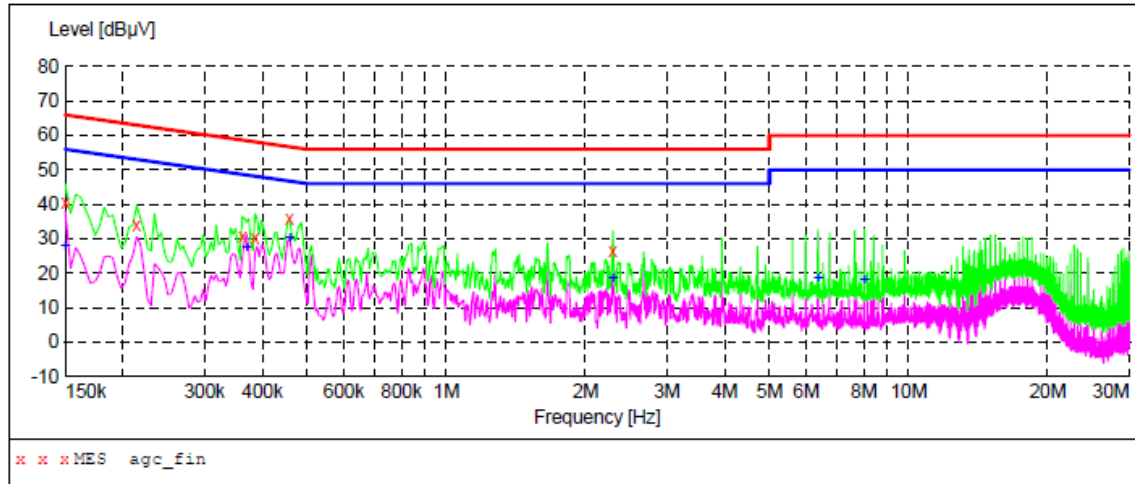
9.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST

1. EUT and support equipment was set up on the test bench as per step 2 of the preliminary test.
2. A scan was taken on both power lines, Line 1 and Line 2, recording at least the six highest emissions. Emission frequency and amplitude were recorded into a computer in which correction factors were used to calculate the emission level and compare reading to the applicable limit. If EUT emission level was less -2dB to the A.V. limit in Peak mode, then the emission signal was re-checked using Q.P and Average detector.
3. The test data of the worst case condition(s) was reported on the Summary Data page.

9.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST

Mode 1

LINE CONDUCTED EMISSION TEST-L



MEASUREMENT RESULT: "agc_fin"

2022/7/12 19:12

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.150000	40.40	6.9	66	25.6	QP	L1
0.214000	34.10	6.5	63	28.9	QP	L1
0.362000	30.40	5.8	59	28.3	QP	L1
0.386000	30.00	5.7	58	28.1	QP	L1
0.458000	35.60	5.5	57	21.1	QP	L1
2.294000	26.40	6.5	56	29.6	QP	L1

MEASUREMENT RESULT: "agc_fin2"

2022/7/12 19:12

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.150000	27.60	6.9	56	28.4	AV	L1
0.370000	27.20	5.8	49	21.3	AV	L1
0.458000	30.00	5.5	47	16.7	AV	L1
2.294000	18.60	6.5	46	27.4	AV	L1
6.370000	18.60	6.7	50	31.4	AV	L1
8.026000	18.20	6.8	50	31.8	AV	L1

RESULT: PASS

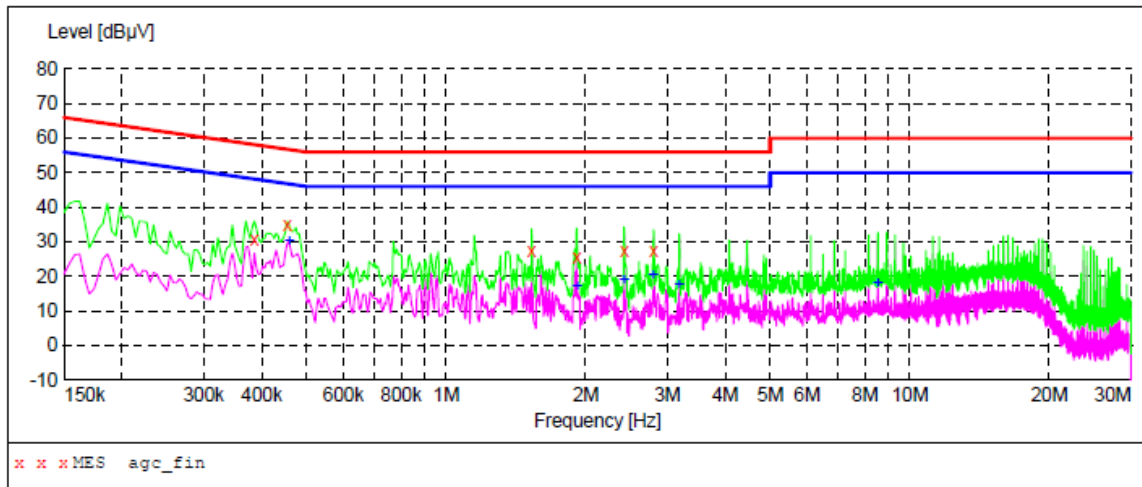
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LINE CONDUCTED EMISSION TEST-N



MEASUREMENT RESULT: "agc_fin"

2022/7/12 19:09

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.386000	30.50	5.7	58	27.6	QP	N
0.454000	34.70	5.5	57	22.1	QP	N
1.530000	27.40	6.1	56	28.6	QP	N
1.914000	25.40	6.4	56	30.6	QP	N
2.422000	27.40	6.5	56	28.6	QP	N
2.802000	27.30	6.5	56	28.7	QP	N

MEASUREMENT RESULT: "agc_fin2"

2022/7/12 19:09

Frequency MHz	Level dBμV	Transd dB	Limit dBμV	Margin dB	Detector	Line
0.458000	30.10	5.5	47	16.6	AV	N
1.914000	17.20	6.4	46	28.8	AV	N
2.422000	18.80	6.5	46	27.2	AV	N
2.802000	20.50	6.5	46	25.5	AV	N
3.186000	17.70	6.5	46	28.3	AV	N
8.538000	18.00	6.8	50	32.0	AV	N

RESULT: PASS

Note: All test modes had been tested. The mode 1 is the worst case and recorded in the report.

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APPENDIX A: PHOTOGRAPHS OF TEST SETUP

Refer to the Report No.: AGC14614220701AP01

APPENDIX B: PHOTOGRAPHS OF EUT

Refer to the Report No.: AGC14614220701AP02

----END OF REPORT----



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