RF TEST REPORT

Test Equipment	:	WIRELESS CAR CHARGER
Model Name	:	LF_22 MININI_WIRELESS CAR CHARGER
FCC ID	:	2AQTSIPX-23CE-WCC01
Date of Receipt	:	2022-08-02
Test Duration	:	2022-09-05 ~ 2022-09-08
Date of Issue	:	2022-09-08

Applicant : IPX Corporation

5F, 98, Hannam-daero, Yongsan-gu, Seoul, Republic of Korea

Test Laboratory : Lab-T, Inc.

2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si
Gyeonggi-do 17036, Republic of Korea

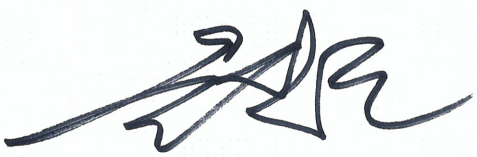
Test Specification	:	FCC Part 15 Subpart C
Test Result	:	Pass

The above equipment was tested by Lab-T Testing Laboratory for compliance with the requirements of FCC Rules and Regulations.
The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose.
This test report shall not be reproduced except in full, without the written approval of Lab-T, Inc

Tested by:

Engineer
Namhyoung Kwon

Reviewed by:



Technical Manager
SangHoon Yu

CONTENTS

1. Revision History

Test Report No.	Date	Description
TRRFCC22-0014	22-09-08	Initial issue

2. Information

2.1 Applicant Information

Applicant Name	IPX Corporation
Address	5F, 98, Hannam-daero, Yongsan-gu, Seoul, Republic of Korea
Telephone No.	+82-10-2761-7301
Person in Charge	Jehyuk Jang / Product Quality Management Manager
Manufacturer	Shenzhen Caibo Technology Co., Ltd.
Address	4th floor, Building 30,No.5 Area, Cuigang Industrial zone, Huaide, Fuyong Bao'an District, Shenzhen,China

2.2 Test Laboratory Information

Corporate Name	Lab-T, Inc.
Representative	Duke(Jongyoung) Kim
Address	2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Telephone	+82-31-322-6767
Fax	+82-31-322-6768
E-mail	info@lab-t.net
FCC Designation No.	KR0159
FCC Registration No.	133186
IC Registration No.	22000

2.3 Test Site

Test Site	used	Address
Building L	☒	2182-40 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Building T	☐	2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)
Building A	☒	2182-44 Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si, Gyeonggi-do 17036, Korea(Republic of)

3. Information About Test Equipment

3.1 Equipment Information

Equipment Type	WIRELESS CAR CHARGER
Equipment Model Name	LF_22 MININI_WIRELESS CAR CHARGER
Variant Model Name[Note 2]	BT21_TATA_22 MININI_WIRELESS CAR CHARGER BT21_CHIMMY_22 MININI_WIRELESS CAR CHARGER BT21_COOKY_22 MININI_WIRELESS CAR CHARGER BT21_RJ_22 MININI_WIRELESS CAR CHARGER BT21_SHOOKY_22 MININI_WIRELESS CAR CHARGER BT21_KOYA_22 MININI_WIRELESS CAR CHARGER BT21_MANG_22 MININI_WIRELESS CAR CHARGER
Frequency Range	110 kHz ~ 205 kHz
Modulation Type	ASK
Power Supply	AC 120 V/60 Hz(Using AC/DC Adapter)
Input Voltage	5 V/2 A, 9 V/2 A Max
S/W Version	-
H/W Version	XL1024+5004-X1S-V12

Note 1 : The above EUT information was declared by the manufacturer.
Note 2 : The difference between each model names are just the design(Color and Character).

3.2 Antenna Information

Type	Model No.	Gain	Note.
Loop Coil Antenna	-	-	-

3.3 Test Mode

Test Mode	Output Power
Mode 1	5 W Wireless Charging
Mode 2	7.5 W Wireless Charging
Mode 3	10 W Wireless Charging
Mode 4	15 W Wireless Charging

3.4 Tested Companion Device Information

Type	Manufacturer	Model	Note
AC/DC Adapter	Xiaomi Communications Co., Ltd.	MDY-12-EF	Input Votage: 100 V to 240 V, 50 Hz/60 Hz Output Votage: 5 V to 20 V, 6.2 A to 3.25 A (67 W Max)
Intelligent wireless charging full function test module	YBZ	-	-

4. Test Report

4.1 Summary

FCC Part 15C			
Reference	Parameter	Clause	Status
Transmitter Requirements			
15.203	Antenna Requirements	4.3.1	C
2.1049	20 dB Bandwidth	4.3.2	C
15.209(a)	Radiated Emission	4.3.3	C
15.207(a)	Conducted Emissions	4.3.4	C
NOTE 1 : C = Comply N/C = Not Comply N/T = Not Tested N/A = Not Applicable			

* The general test methods used to test this device is ANSI C63.10:2020

4.2 Measurement Uncertainty

Mesurement Items	Expanded Uncertainty	
Radiated Spurious Emissions (30 MHz under)	4.28 dB	(The confidence level is about 95 %, *k*=2)
Radiated Spurious Emissions (30 MHz ~ 1 GHz)	4.80 dB	(The confidence level is about 95 %, *k*=2)
Conducted emission	2.36 dB	(The confidence level is about 95 %, *k*=2)

4.3 Transmitter Requirements

4.3.1 Antenna Requirements

4.3.1.1 Regulation

According to §15.203, An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

4.3.1.2 Result

Comply (The antenna of this EUT is Inductive Loop Coil Antenna Type. Therefore the antenna is permanently attached. Please refer to the internal photo. Therefore this EUT Complies with the requirement of §15.203)

4.3.2 20 dB Bandwidth

4.3.2.1 Measurement Procedure

The 20 dB Bandwidth is measured with a spectrum anaylyzer connecterd via a receiving antenna placed near the EUT while the EUT is operating.

4.3.2.2 Result

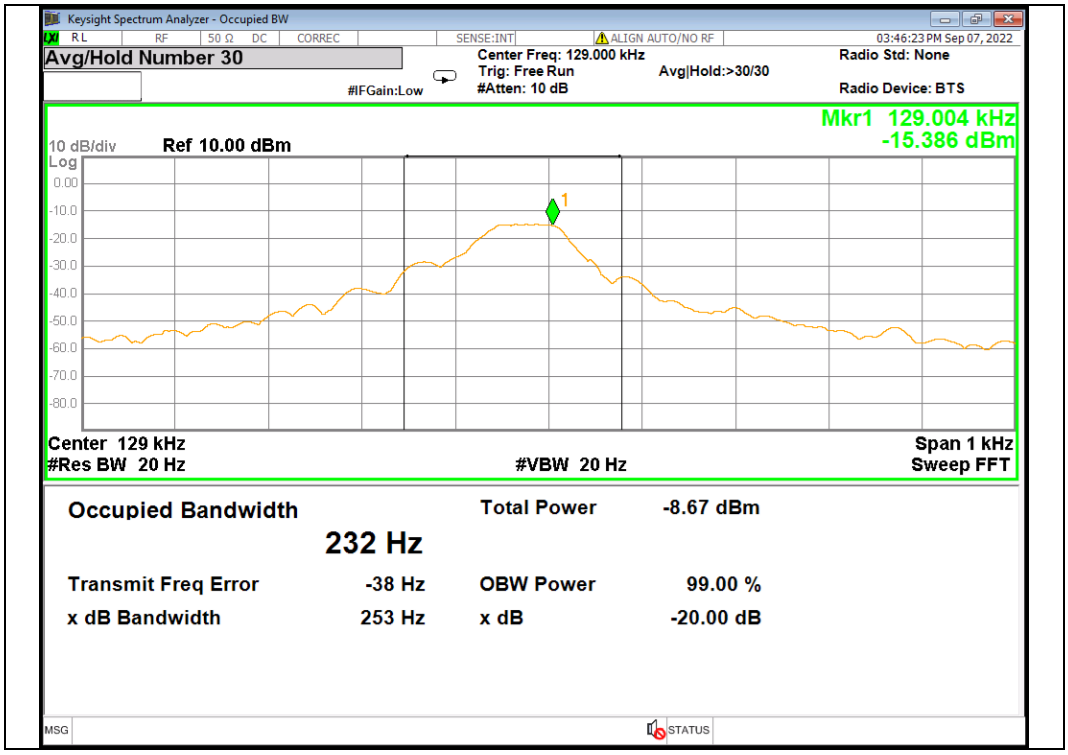
Comply (measurement data : refer to below)

4.3.2.3 Measurement Data

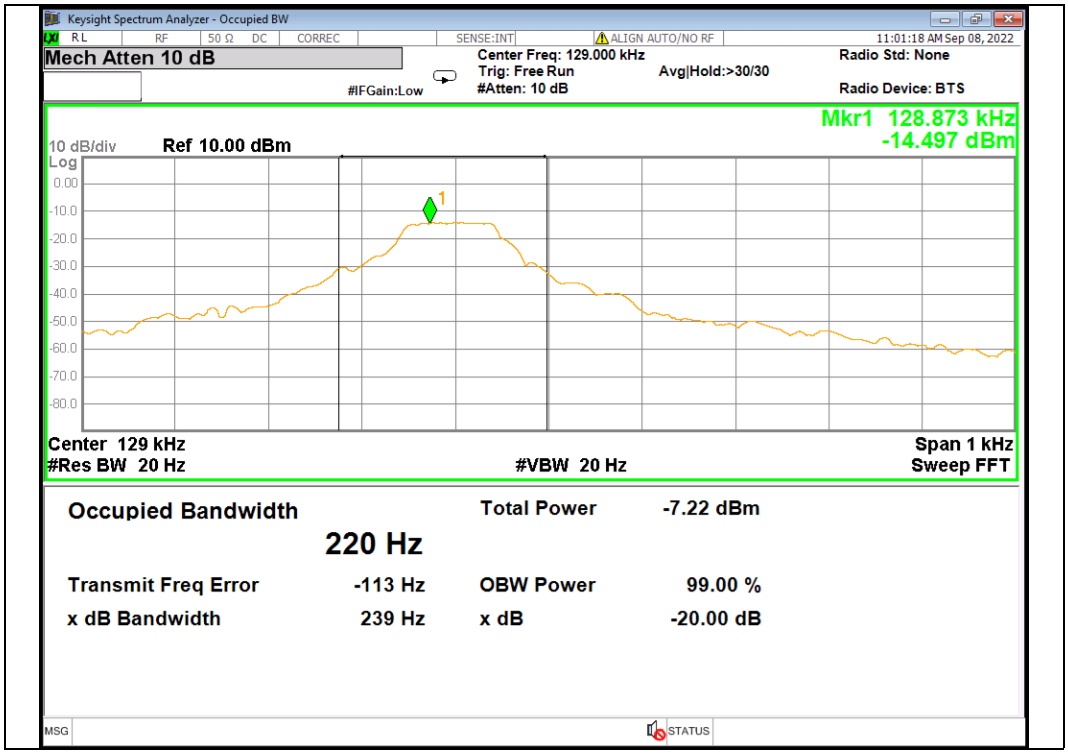
Test Mode	Tested Frequency(kHz)	Test Results(kHz)
Mode 1	129	0.253
Mode 2	129	0.239
Mode 3	129	0.232
Mode 4	129	0.247

4.3.2.4 Test Plot

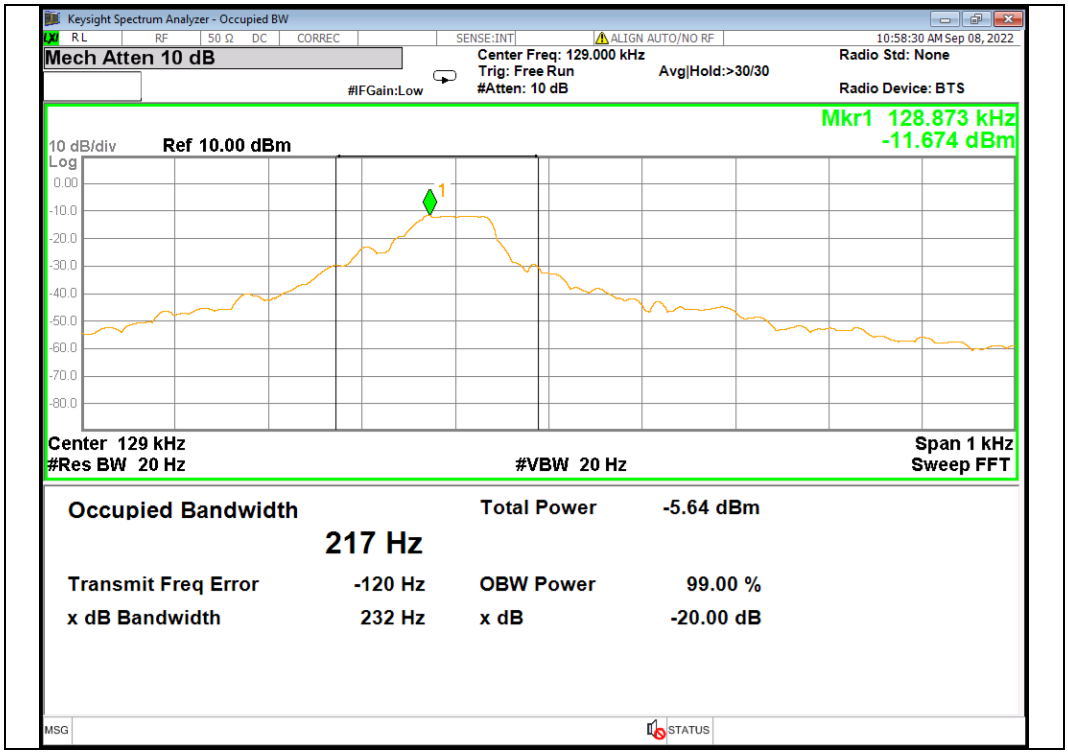
Test Mode : Mode 1



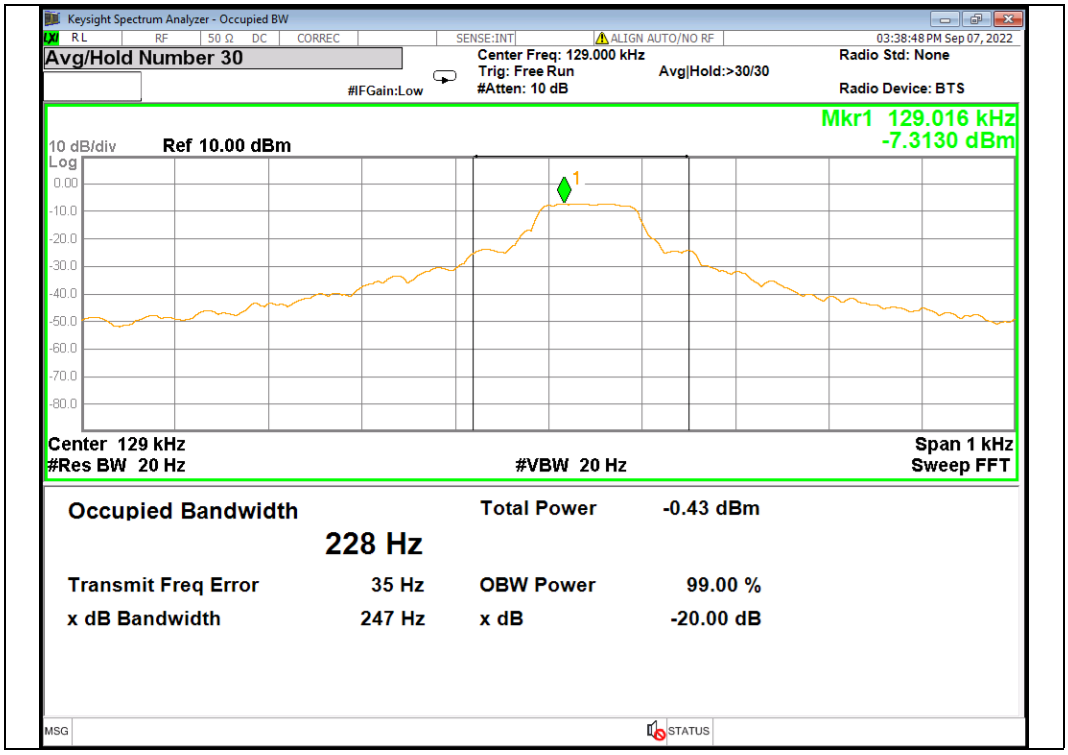
Test Mode : Mode 2



Test Mode : Mode 3



Test Mode : Mode 4



4.3.3 Radiated Emission

4.3.3.1 Regulation

According to §15.209(a) Except as provided elsewhere in this subpart, the emissions from an intentional radiator shall notexceed the field strength levels specified in the following table:

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009 - 0.490	2 400/F(kHz)	300
0.490 - 1.705	24 000/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 shallnot 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.

4.3.3.2 Measurement Procedure

1) The preliminary and final radiated measurements were performed to determine the frequency producing the maximum emissions in at a 10m anechoic chamber. The EUT was tested at a distance 3 meters.
2) The EUT was placed on the top of the 0.8-meter height table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360°
3) The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 9 kHz to 30 MHz using the loop antenna, and from 30 to 1 000 MHz using the TRILOG broadband antenna.
4) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.

Note 1 : The resolution bandwidth of test receiver/spectrum analyzer is 200 Hz for Quasi-peak detection (QP) at frequency below 150 kHz.
Note 2 : The resolution bandwidth of test receiver/spectrum analyzer is 9 kHz for Quasi-peak detection (QP) at frequency 150 kHz to 30 MHz
Note 3 : The resolution bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1 GHz.
Note 4 : The video bandwidth of test receiver/spectrum analyzer is three times as much as resolution bandwidth

4.3.3.3 Result

Comply (measurement data : refer to the next page)

4.3.3.4 Measurement Data

Test Mode : Mode 1_9 kHz ~ 30 MHz

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 300m (dBµV/m)	Limit at 300m (dBµV/m)	Margin (dB)
0.129	QP	F	H	80.2	11.8	0.2	92.2	12.2	25.4	13.2
0.129	QP	F	V	71.8	11.8	0.2	83.8	3.8	25.4	21.6

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 30m (dBµV/m)	Limit at 30m (dBµV/m)	Margin (dB)
0.899	QP	S	H	44.2	11.8	0.7	56.7	16.7	28.5	11.8
1.930	QP	S	H	44.7	11.8	0.6	57.1	17.1	29.5	12.4

Test Mode : Mode 2_9 kHz ~ 30 MHz

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 300m (dBµV/m)	Limit at 300m (dBµV/m)	Margin (dB)
0.129	QP	F	H	79.6	11.8	0.2	91.6	11.6	25.4	13.8
0.129	QP	F	V	72.2	11.8	0.2	84.2	4.2	25.4	21.2

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 300m (dBµV/m)	Limit at 30m (dBµV/m)	Margin (dB)
0.514	QP	S	H	47.0	11.7	0.4	59.1	19.1	33.4	14.3
1.027	QP	S	H	40.8	11.8	0.7	53.3	13.3	27.4	14.1
1.929	QP	S	H	43.5	11.8	0.6	55.9	15.9	29.5	13.6

Note 1 : "F" : Fundamental, "S" : Spurious
Note 2 : Result : Reading + Ant Factor + Cable Loss
Note 3 : According to §15.31 (f)(2);
Result at 30m (dBµV/m) = Result at 3m(dBµV/m)-40log(30/3) (dBµV/m)
Result at 300m (dBµV/m) = Result at 3m(dBµV/m)-40log(300/3) (dBµV/m)
Note 4 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.

Test Mode : Mode 3_9 kHz ~ 30 MHz

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 300m (dBµV/m)	Limit at 300m (dBµV/m)	Margin (dB)
0.129	QP	F	H	81.5	11.8	0.2	93.5	13.5	25.4	11.9
0.129	QP	F	V	75.2	11.8	0.2	87.2	7.2	25.4	18.2

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 30m (dBµV/m)	Limit at 30m (dBµV/m)	Margin (dB)
0.642	QP	S	H	49.5	11.7	0.5	61.7	21.7	31.5	9.8
0.900	QP	S	H	42.1	11.8	0.7	54.6	14.6	28.5	13.9
1.804	QP	S	H	45.3	11.8	0.6	57.7	17.7	29.5	11.8

Test Mode : Mode 4_9 kHz ~ 30 MHz

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 300m (dBµV/m)	Limit at 300m (dBµV/m)	Margin (dB)
0.129	QP	F	H	82.6	11.8	0.2	94.6	14.6	25.4	10.8
0.129	QP	F	V	74.7	11.8	0.2	86.7	6.7	25.4	18.7

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Cable Loss (dB)	Result at 3m (dBµV/m)	Result at 30m (dBµV/m)	Limit at 30m (dBµV/m)	Margin (dB)
0.641	QP	S	H	51.5	11.7	0.5	63.8	23.8	31.5	7.7
0.899	QP	S	H	44.5	11.8	0.7	57.0	17.0	28.5	11.5

Note 1 : "F" : Fundamental, "S" : Spurious
Note 2 : Result : Reading + Ant Factor + Cable Loss
Note 3 : According to §15.31 (f)(2);
Result at 30m (dBµV/m) = Result at 3m(dBµV/m)-40log(30/3) (dBµV/m)
Result at 300m (dBµV/m) = Result at 3m(dBµV/m)-40log(300/3) (dBµV/m)
Note 4 : The radiation measurements are performed in X, Y, Z axis positioning. And worst case mode is recorded in the report.

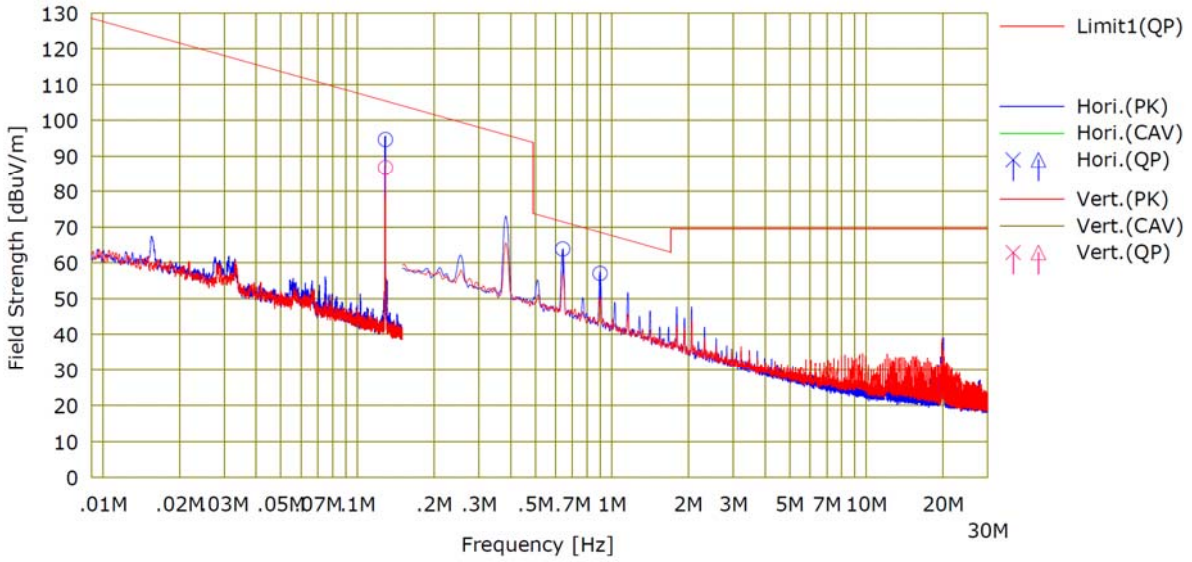
Test Mode : Mode 4(Worst Case)_30 MHz ~ 1 GHz

Frequency (MHz)	Detector	Note 1	Pol. (V/H)	Reading (dBµV)	Ant Factor (dB)	Loss (dB)	Result (dBµV/m)	Limit (dBµV/m)	Margin (dB)
58.535	QP	S	V	62.7	19.4	-45.4	36.7	40.0	3.3
74.330	QP	S	V	60.6	16.7	-45.2	32.1	40.0	7.9
136.691	QP	S	V	56.4	18.7	-43.9	31.2	43.5	12.3
137.190	QP	S	H	58.8	18.7	-43.9	33.6	43.5	9.9
191.990	QP	S	V	61.4	16.7	-43.0	35.1	43.5	8.4
191.995	QP	S	H	58.6	16.7	-43.0	32.3	43.5	11.2
323.919	QP	S	H	53.4	20.2	-42.0	31.6	46.0	14.4

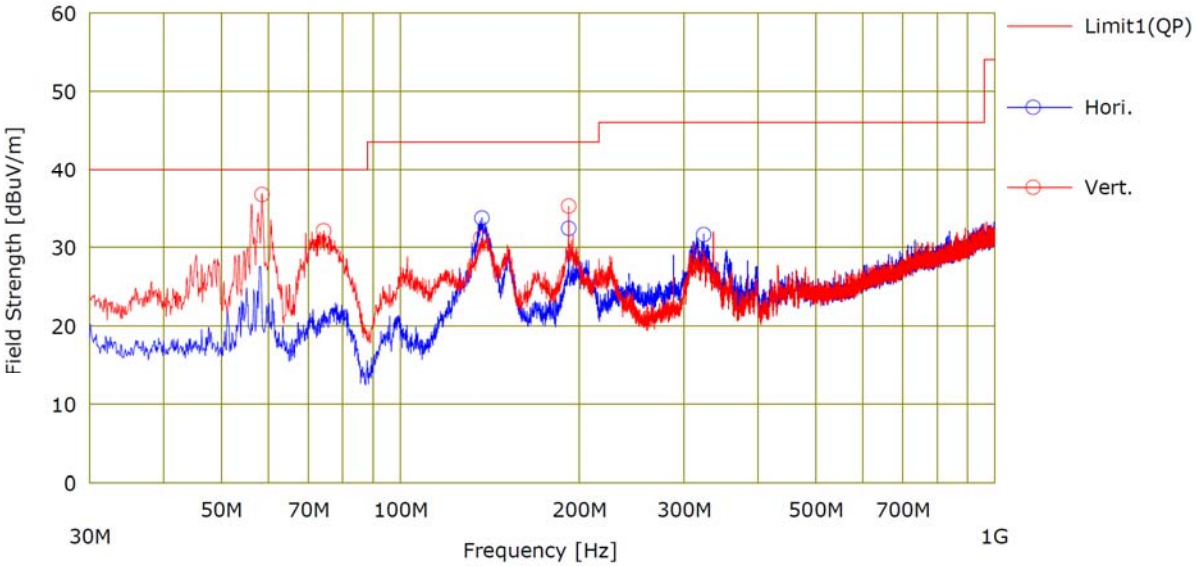
Note 1 : "F" : Fundamental, "S" : Spurious
Note 2 : Loss : Cable loss – Amp gain
Note 3 : Result : Reading + Ant Factor + Loss

4.3.3.5 Measurement Plot

Test Mode : 9 kHz ~ 30 MHz_Mode 4(Worst Case)



Test Mode : 30 MHz ~ 1 GHz_Mode 4(Worst Case)



4.3.4 Conducted Emission

4.3.4.1 Regulation

According to §15.207(a), 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 Ω line impedance stabilization network (LISN).
Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBμV)	
	Qausi-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.

According to §15.107(a), for unintentional device, except for Class A digital devices, line conducted emission limits are the same as the above table.

4.3.4.2 Measurement Procedure

1) The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 cm in which is located 40 cm away from the vertical wall and 1.5 m away from the side wall of the shielded room.

2) Each current-carrying conductor of the EUT power cord was individually connected through a 50 Ω/50 μH LISN, which is an input transducer to a Spectrum Analyzer or an EMI/Field Intensity Meter, to the input power source.

3) Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.

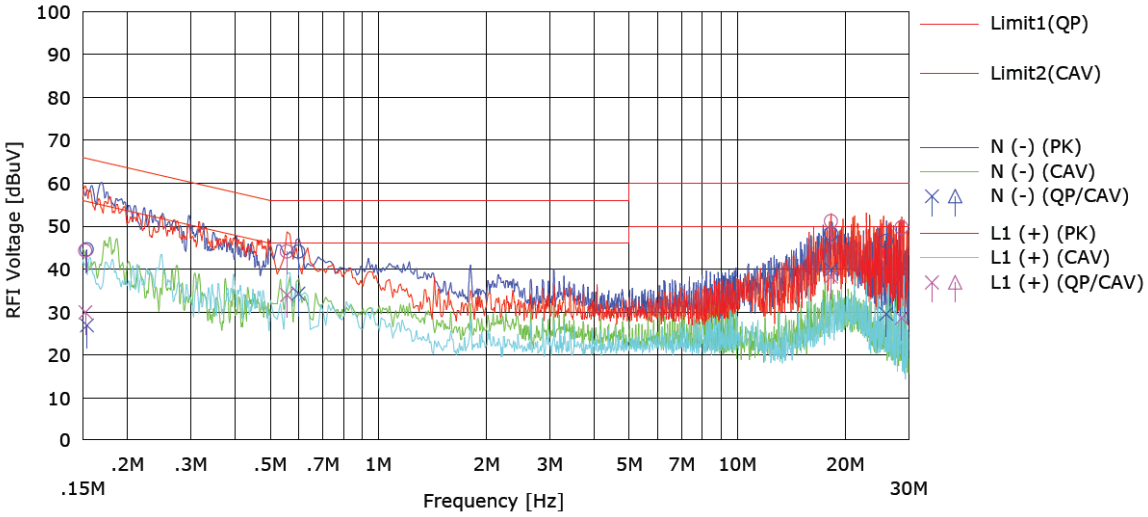
4) The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 MHz to 30 MHz.

5) The measurements were made with the detector set to PEAK amplitude within a bandwidth of 10 kHz or to QUASIPEAK and AVERAGE within a bandwidth of 9 kHz. The EUT was in transmitting mode during the measurements.

4.3.4.3 Result

Comply (measurement data : refer to below)

Test Mode : Mode 4(Worst Case)



NO	FREQ	READING QP	READING CAV	C.FACTOR	RESULT QP	RESULT CAV	LIMIT QP	LIMIT CAV	MARGIN QP	MARGIN CAV	PHASE
	[MHz]	[dBuV]	[dBuV]	[dB]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	[dBuV]	
1	0.15423	24.7	7.0	19.9	44.6	26.9	65.8	55.8	21.2	28.9	N (-)
2	0.59906	24.1	14.4	19.9	44.0	34.3	56.0	46.0	12.0	11.7	N (-)
3	18.27319	28.0	19.8	20.2	48.2	39.9	60.0	50.0	11.8	10.1	N (-)
4	25.97968	26.2	9.2	20.3	46.5	29.5	60.0	50.0	13.5	20.5	N (-)
5	0.15263	24.5	10.1	19.8	44.3	30.0	65.9	55.9	21.6	25.9	L1 (+)
6	0.55625	24.1	14.1	19.9	44.1	34.0	56.0	46.0	11.9	12.0	L1 (+)
7	18.25000	31.0	18.1	20.2	51.1	38.3	60.0	50.0	8.9	11.7	L1 (+)
8	28.70000	29.3	8.3	20.3	49.6	28.6	60.0	50.0	10.4	21.4	L1 (+)

APPENDIX I

TEST EQUIPMENT USED FOR TESTS

To facilitate inclusion on each page of the test equipment used for related tests, each item of test equipment.

Equipment	Manufacturer	Model	Serial No.	Cal. Date (yy.mm.dd)	Next Cal.Date (yy.mm.dd)
PXA Signal Analyzer	KEYSIGHT	N9030A	MY54410264	2022-01-10	2023-01-10
HUMIDITY/TEMP DATA RECORDER	LUTRON	MHB-382SD	79735	2022-04-16	2023-04-16
Digital MultiMeter	HP	34401A	US36025428	2022-01-10	2023-01-10
Signal Generator	ROHDE&SCHWARZ	SMB100A	178384	2021-10-13	2022-10-13
10 m Semi-Anechoic Chamber	에스와이코포레이션	-	-	-	-
EMI Test Receiver	R&S	ESW44	101839	2022-06-14	2023-06-14
Controller	Innco	C3000	–	–	–
Turn Table	-	–	–	–	–
Antenna Mast	Innco	MA4000-EP	–	–	–
Bi-Log Antenna	Schwarzbeck	VULB9168	00822	2021-03-31	2023-03-31
Attenuator	JFW	50FPE-006N	6 dB-1	2022-04-14	2023-04-14
Preamplifier	L2 MICROWAVE	BPA00T30W01-S	2003-0003	2022-06-14	2023-06-14
LOOP ANTENNA	ETS	6502	00150598	2022-06-02	2024-06-02
EMI TEST RECEIVER	Rohde & Schwarz	ESR7	101440	2021-09-10	2022-09-10
LISN	Rohde & Schwarz	ENV216	101883	2022-04-13	2023-04-13
Pulse Limiter	Schwarzbeck	VTSD 9561-F	00189	2022-04-13	2023-04-13