TEST REPORT

No.I23N00746-EMC

for

Guilin Zhishen Information Technology Co., Ltd.

CRANE 4

Model Name：CR122

With

Hardware Version: V1.0

Software Version: V1.75

FCC ID:2AIHFZYCR122

Issued Date: 2023-05-26

Designation Number: CN1210

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of SAICT.

Test Laboratory:

SAICT, Shenzhen Academy of Information and Communications Technology

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I23N00746-EMC	Rev.0	1st edition	2023-05-26

Note: the latest revision of the test report supersedes all previous version.

CONTENTS

1. SUMMARY OF TEST REPORT

1.1. Test Items

Description	CRANE 4
Model Name	CR122
Applicant's name	Guilin Zhishen Information Technology Co., Ltd.
Manufacturer's Name	Guilin Zhishen Information Technology Co., Ltd.

1.2. Test Standards

FCC Part 15, Subpart B (10-1-2021 Edition); ANSI C63.4-2014.

1.3. Test Result

Total test 2 items, pass 2 items. Please refer to "6.2 Test Results".

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, China

1.5. Project data

Testing Start Date: 2023-05-15 Testing End Date: 2023-05-20

1.6. Signature

Liu Xiangzhou
(Prepared this test report)

Liang Yong
(Reviewed this test report)

Cao Junfei
(Approved this test report)

2. CLIENT INFORMATION

2.1. Applicant Information

Company Name:	Guilin Zhishen Information Technology Co., Ltd.
Address:	09 Huangtong Road, Tieshan Industrial Zone, Qixing District, Guilin, Guangxi, China.
Contact	Zou Jian
Email	zouj@zhiyun-tech.com
Tel.	1306932837
Fax	/

2.2. Manufacturer Information

Company Name:	Guilin Zhishen Information Technology Co., Ltd.
Address:	09 Huangtong Road, Tieshan Industrial Zone, Qixing District, Guilin, Guangxi, China.
Contact	Zou Jian
Email	zouj@zhiyun-tech.com
Tel.	1306932837
Fax	/

3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)

3.1. About EUT

Description	CRANE 4
Model Name	CR122
FCC ID	2AIHFZYCR122
Condition of EUT as received	No obvious damage in appearance

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version	Receive Date
UT02aa	90004905E010027	V1.0	V1.75	2023-04-28

*EUT ID: is used to identify the test sample in the lab internally.

3.3. Internal Identification of AE

AE ID*	Description
AE1	Polymer Li-ion Battery
AE2	Charger
AE3	Power Cable
AE4	USB Cable
AE5	Camera

AE1

Model	ZY-CR122
Manufacturer	DongGuan Howell Energy Co., Ltd.
Capacity	2600mAh
Nominal Voltage	14.8V

AE2

Model	/
Manufacturer	/

AE3

Model	XL01077
Manufacturer	Guilin Zhishen Information Technology Co.,Ltd.

AE4-1

Model	LN-NBUC-A01
Manufacturer	Guilin Zhishen Information Technology Co.,Ltd.

AE4-2

Model	LN-UCUS-A03
Manufacturer	Guilin Zhishen Information Technology Co.,Ltd.

AE4-3

Model	LN-UCUC-A02

Manufacturer Guilin Zhishen Information Technology Co.,Ltd.

AE4-4

Model LN-MBUC-A02

Manufacturer Guilin Zhishen Information Technology Co.,Ltd.

AE5

Model /

Manufacturer /

* AE ID: is used to identify the test sample in the lab internally.

AE: Ancillary equipment

AE2/AE5: Just for test.

3.4. EUT Set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT+AE1+AE2+AE3+AE4-3+AE5	

3.5. General Description

The Equipment Under Test (EUT) is a model of CRANE 4 with internal antenna.
It has Bluetooth functions.
Since subscribers often use EUT during charging, EUT is to be tested in accordance with “Fixed use” besides in accordance with “Portable use”.
Manual and specifications of the EUT were provided to fulfill the test.
Samples (EUT+AE) undergoing test were selected by the Client. Relevant information is provided by the client.

4. REFERENCE DOCUMENTS

4.1. Reference Documents for Testing

The following documents listed in this section are referred for testing.

Reference	Title	Version
FCC Part 15, Subpart B	Radio frequency devices	(10-1-2021 Edition)
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

5. LABORATORY ENVIRONMENT

Anechoic chamber (FACT3-2.0) did not exceed following limits along the EMC testing:
9.10m×6.10m×5.60m (L×W×H)

Temperature	Min. = 15 ˚C, Max. = 35 ˚C
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4Ω
Normalised site attenuation (NSA)	< ±4 dB, 3 m distance, from 30 to 1000 MHz
Voltage Standing Wave Ratio （VSWR）	≤ 6 dB, from 1 to 18 GHz，3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

Shielded room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ˚C**,** Max. = 35 ˚C
Relative humidity	Min. =20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz> 60 dB; 1MHz-18000MHz>90 dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4Ω

6. SUMMARY OF TEST RESULTS

6.1. Testing Environment

Normal Temperature: 15~35℃
Relative Humidity: 20~75%
Atmospheric pressure 86~106kPa

6.2. Summary of Measurement Results

Abbreviations used in this clause:	
P	Pass
NA	Not applicable
F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Radiated Emission	15.109(a)/ Section 6.2	A.1	P
2	Conducted Emission	15.107(a)/ Section 6.1	A.2	P

Note: As FCC Part 15, Subpart B, conducted Emission is not required for equipment which is powered by DC source.

6.3. Statement

6.3.1 Statements of conformity

This report takes measured values as criterion of test conclusion. The test conclusion meets the limit requirements.

7. MEASUREMENT UNCERTAINTY

Test item	Frequency ranges	Measurement uncertainty
Radiated Emission	30MHz-1GHz	4.80dB(*k*=2)
	1GHz-18GHz	4.62dB(*k*=2)
	18GHz-40GHz	2.36dB(*k*=2)
Conducted Emission	150kHz-30MHz	2.68dB(*k*=2)

8. MEASURING APPARATUS UTILIZED

No.	Name	Model	Serial Number	Manufacturer	Calibration Due date	Calibration Period
1.	Test Receiver	ESR7	101676	R&S	2023.11.23	1 year
2.	Spectrum Analyzer	FSV40	101192	R&S	2024.01.11	1 year
3.	BiLog Antenna	3142E	0224831	ETS-Lindgren	2024.05.27	3 years
4.	Horn Antenna	3117	00066577	ETS-Lindgren	2025.04.17	3 years
5.	Anechoic chamber	FACT3-2.0	1285	ETS-Lindgren	2023.05.29	2 years
6.	Test Receiver	ESCI	100702	R&S	2024.01.11	1 year
7.	LISN	ENV216	102067	R&S	2023.09.06	1 year
8.	Software	EMC32	V10.50.40	R&S	/	/
9.	Horn Antenna	QSH-SL-18-26-S-20	17013	Q-par	2026.01.30	3 years
10.	Horn Antenna	QSH-SL-8-26-40-K-20	17014	Q-par	2026.01.30	3 years

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§15.109(a))

Reference

FCC: Part 15.109(a)

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator at a distance of 3 meters or 1 meter is tested. Tested in accordance with the procedures of ANSI C63.4 -2014, section 8.3. The EUT was placed on a non-conductive table. Below 18GHz the measurement antenna was placed at a distance of 3 meters from the EUT. Above 18GHz the measurement antenna was placed at a distance of 1 meters from the EUT. (According to Part 15.31(f)(1), 1m limit is calculated by extrapolation factor of 20 dB/decade) During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations.

A.1.2 EUT Operating Mode:

Normal Working: EUT is powered on, plugged into the USB cable and Audio cable establish a connection with camera，and plugged into the power supply to start charging.

All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions.

A.1.3 Measurement Limit

Limit from Part 15.109(a)

Frequency range (MHz)	Field strength limit (μV/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

*Note: The original limit is defined at 10m test distance. This limit is calculated according to CISPR requirements.

A.1.4 Test Condition

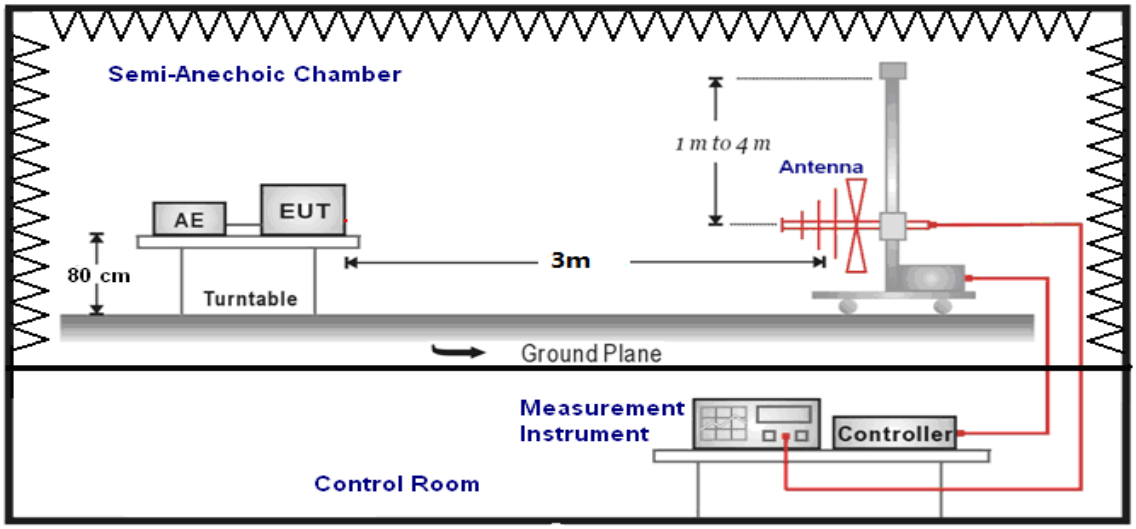
Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz (IF bandwidth)	5
Above 1000	1MHz/3MHz	15

A.1.5 Test power supply

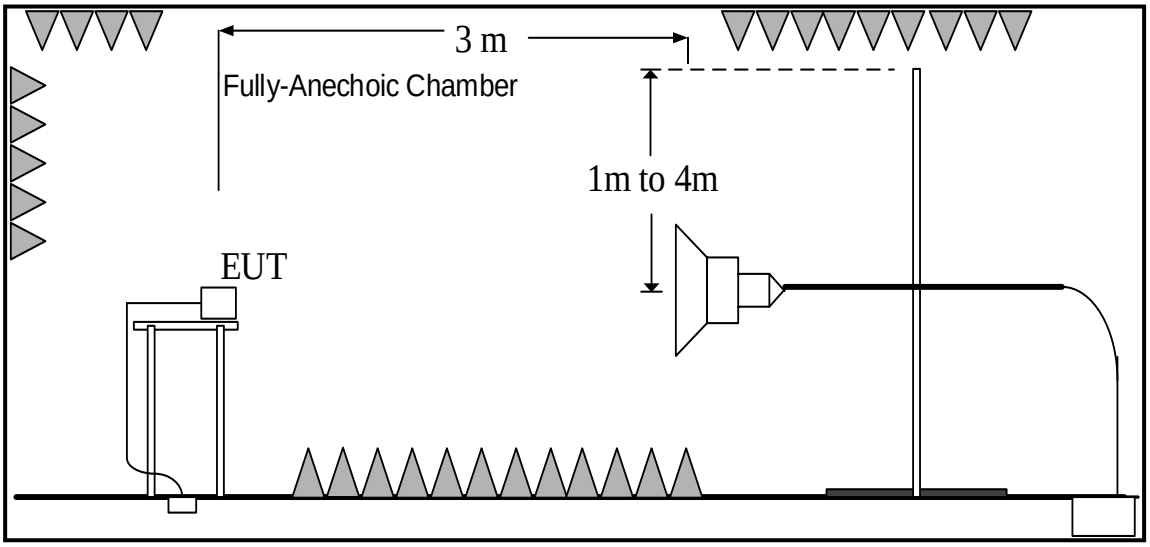
Power	Voltage（V）
DC	13.6

A.1.6 Test set-up:

30MHz-1GHz



1GHz-40GHz



A.1.7 Measurement Results

A "reference path loss" is established and the A_{Rpl} is the attenuation of “reference path loss”. It includes the antenna factor of receive antenna and the path loss.

The measurement results are obtained as described below:

Result=P_{Mea}+A_{Rpl} = P_{Mea} +G_A+G_{PL}

Where

G_A: Antenna factor of receive antenna

G_{PL}:PathLoss

P_{Mea}: Measurement result on receiver.

Result:Quasi-Peak(dBμV/m) /Average(dBμV/m)/Peak(dBμV/m)

Note: the result contains vertical part and Horizontal part

Normal Working

Frequency range (MHz)	Quasi-Peak Limit (dBμV/m)	Result (dBμV/m) UT02aa/Set.1	Conclusion
30-88	40.00	See Figure A.1.1.	P
88-216	43.52		
216-960	46.02		
960-1000	54.00		

Frequency range (MHz)	Average Limit (dBμV/m)	Peak Limit (dBμV/m)	Result (dBμV/m) UT02aa/Set.1	Conclusion
1000 to 18000	54.00	74.00	See Figure A.1.2.	P
18000 to 26500	63.54	83.54	See Figure A.1.3.	

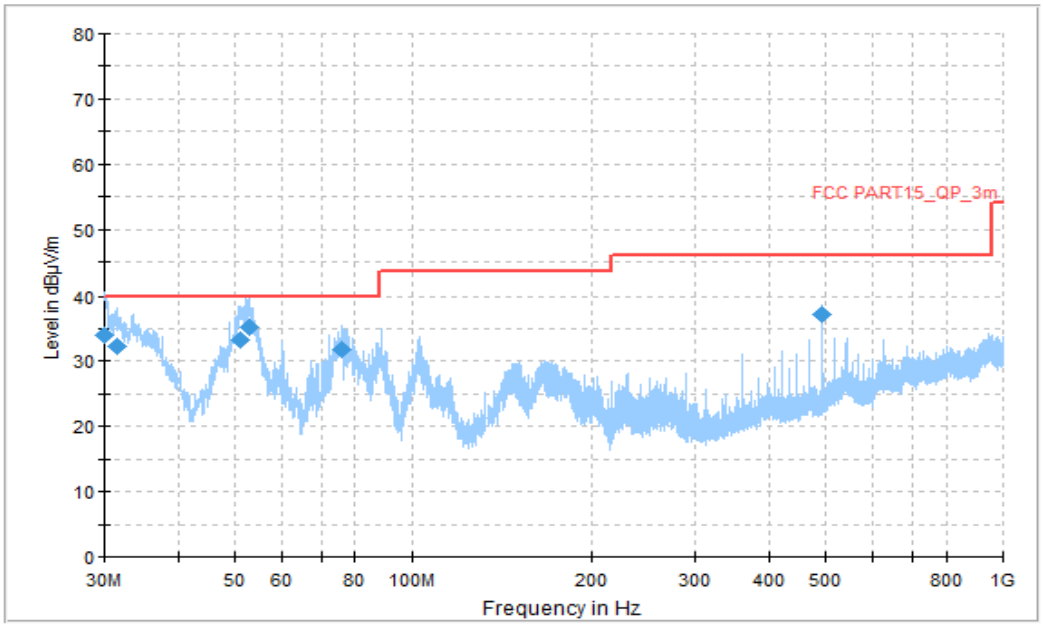


Figure A.1.1. Radiated Emission (Normal Working, 30MHz to 1GHz)

Final_Results

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	ARpl (dB/m)	P_{Mea} (dBµV)
30.000000	34.00	40.00	6.00	V	-11	45.00
31.616667	32.26	40.00	7.74	V	-12	44.26
51.178333	33.18	40.00	6.82	V	-21	54.18
52.687222	35.12	40.00	4.88	V	-21	56.12
75.859444	31.70	40.00	8.30	V	-20	51.7
493.767778	37.16	46.02	8.86	V	-6	43.16

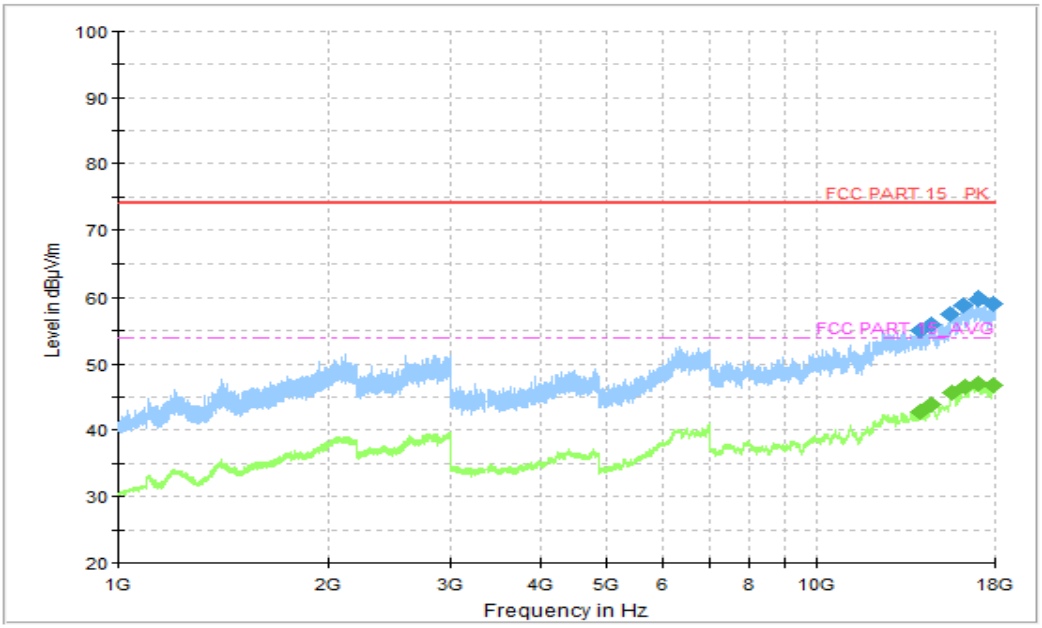


Figure A.1.2. Radiated Emission (Normal Working, 1GHz to 18GHz)

Final_Results_PK

Frequency(MHz)	Peak (dBµV/m)	Limit (dBµV/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dBµV)
14002.250000	55.11	74.00	18.89	H	17	38.11
14538.500000	56.05	74.00	17.95	H	18	38.05
15539.500000	57.46	74.00	16.54	H	19	38.46
16163.750000	58.88	74.00	15.12	H	21	37.88
17001.750000	59.82	74.00	14.19	H	23	36.82
17852.500000	59.18	74.00	14.82	H	23	36.18

Final_Results_AVG

Frequency(MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dBµV)
14017.000000	42.86	54.00	11.14	H	17	25.86
14565.500000	43.90	54.00	10.10	V	18	25.9
15576.000000	45.75	54.00	8.25	H	20	25.75
16259.500000	46.51	54.00	7.49	H	21	25.51
17002.250000	47.06	54.00	6.94	H	23	24.06
17892.000000	46.88	54.00	7.12	H	24	22.88

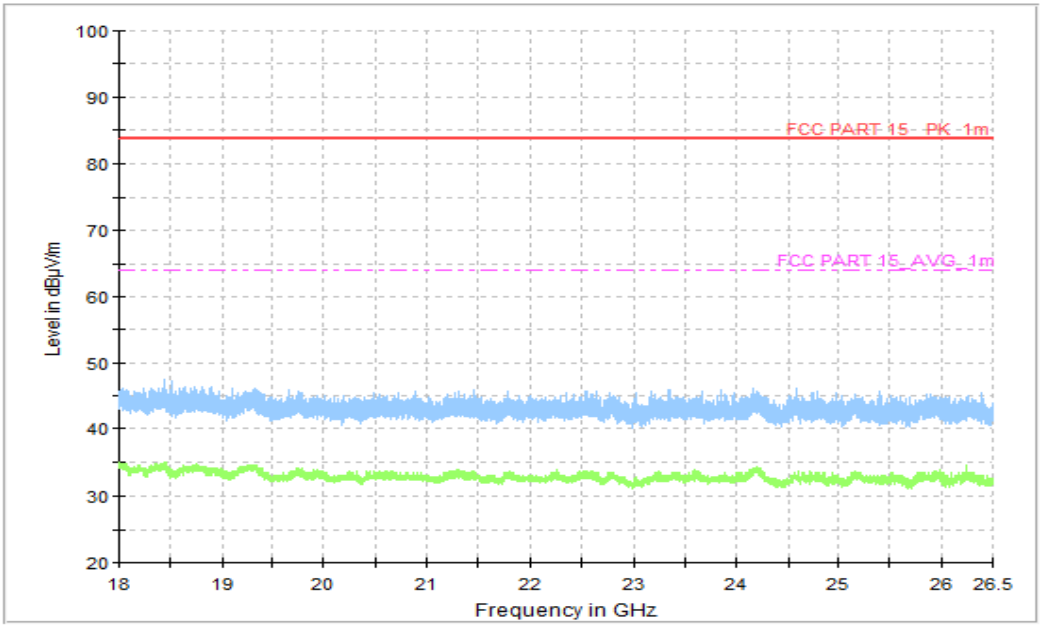


Figure A.1.3. Radiated Emission (Normal Working, 18GHz to 26.5GHz)

A.2 Conducted Emission (§15.107(a))

Reference

FCC: Part 15.107(a)

A.2.1 Method of measurement

For equipment 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 150kHz to 30MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 -2014, section 7.3.

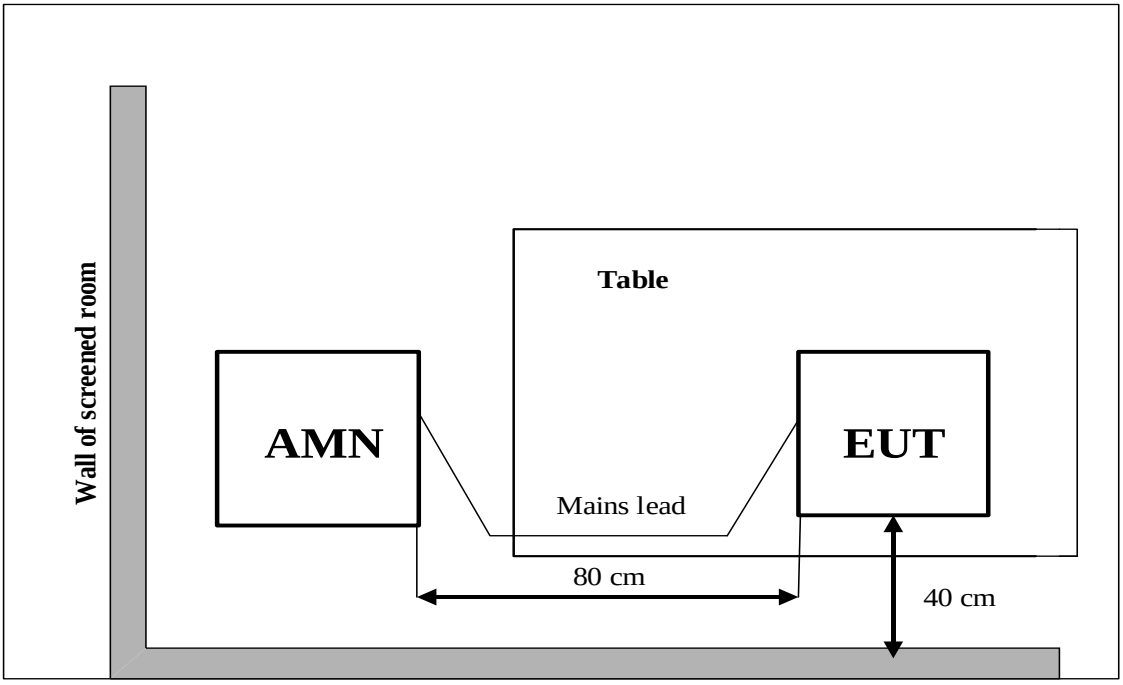
A.2.2 EUT Operating Mode:

Normal Working: EUT is powered on, plugged into the USB cable and Audio cable establish a connection with camera， and plugged into the power supply to start charging.

A.2.3 Measurement 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		

A.2.4Test set-up:



A.2.5 Test Condition in charging mode

Voltage（V）	Frequency（Hz）
120	60
240	60

RBW	Sweep Time(s)
9kHz	1

A.2.6 Measurement Results

QuasiPeak(dBμV) /Average(dBμV) =PMea+Corr

Where

Corr: PathLoss + Voltage Division Factor

PMea: Measurement result on receiver.

Normal Working

AC Input Port/ Voltage: 120V/60Hz

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV) UT02aa/Set.1	Conclusion
0.15 to 0.5	66 to 56	56 to 46	See Figure A.2.1.	P
0.5 to 5	56	46		
5 to 30	60	50		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Normal Working

AC Input Port/ Voltage: 240V/60Hz

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV) UT02aa/Set.1	Conclusion
0.15 to 0.5	66 to 56	56 to 46	See Figure A.2.2.	P
0.5 to 5	56	46		
5 to 30	60	50		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

AC Input Port/ Voltage: 120V/60Hz

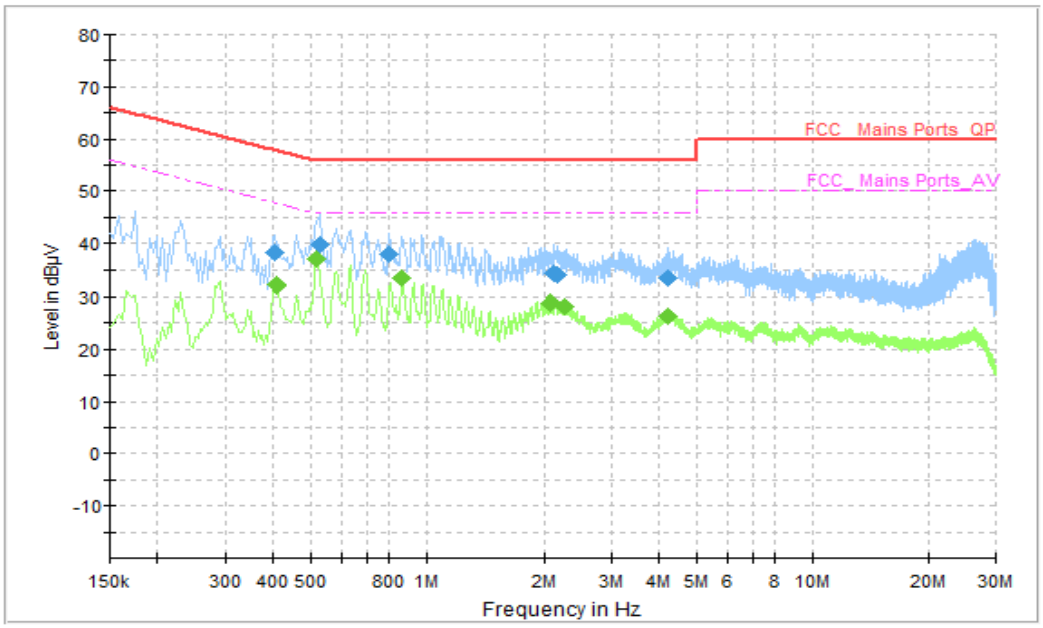


Figure A.2.1. Conducted Emission(Normal Working)

Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.402000	38.17	57.81	19.64	L1	10	28.17
0.530000	39.61	56.00	16.39	L1	10	29.61
0.798000	37.96	56.00	18.04	L1	10	27.96
2.114000	34.28	56.00	21.72	L1	10	24.28
2.166000	33.98	56.00	22.02	L1	10	23.98
4.226000	33.32	56.00	22.68	L1	10	23.32

Final_Result_AVG

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.406000	32.24	47.73	15.49	L1	10	22.24
0.518000	37.00	46.00	9.00	L1	10	27
0.866000	33.49	46.00	12.51	L1	10	23.49
2.086000	28.90	46.00	17.10	L1	10	18.90
2.258000	28.07	46.00	17.93	L1	10	18.07
4.218000	26.28	46.00	19.72	L1	10	16.28

AC Input Port/ Voltage: 240V/60Hz

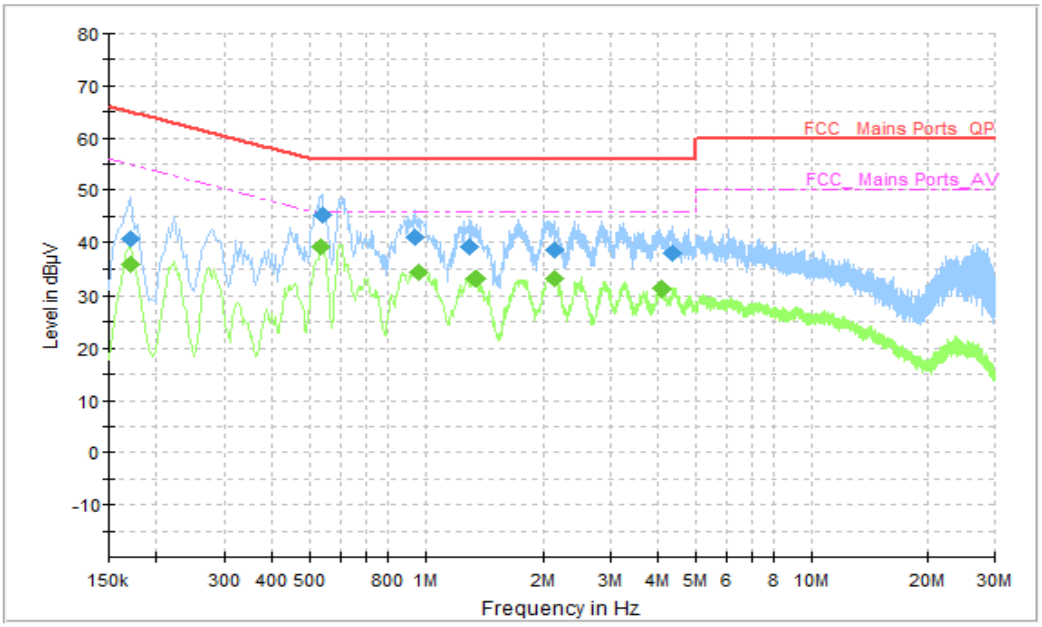


Figure A.2.2. Conducted Emission(Normal Working)

Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.170000	40.79	64.96	24.17	L1	10	30.79
0.538000	45.18	56.00	10.82	L1	10	35.18
0.938000	40.97	56.00	15.03	L1	10	30.97
1.298000	39.12	56.00	16.88	L1	10	29.12
2.146000	38.67	56.00	17.33	L1	10	28.67
4.326000	37.84	56.00	18.16	L1	10	27.84

Final_Result_AVG

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.170000	35.92	54.96	19.04	L1	10	25.92
0.534000	39.11	46.00	6.89	L1	10	29.11
0.958000	34.42	46.00	11.58	L1	10	24.42
1.350000	32.96	46.00	13.04	L1	10	22.96
2.134000	33.12	46.00	12.88	L1	10	23.12
4.050000	31.29	46.00	14.71	L1	10	21.29

*****END OF REPORT****