



FCC SDoC TEST REPORT

Purism SPC

mobile phone

Test Model: Librem 5

Prepared for : Purism SPC
Address : One Market Street, 36th Floor, San Francisco, CA
94105, USA

Prepared by : Shenzhen LCS Compliance Testing Laboratory Ltd.
Address : Room 101, 201, Building A and Room 301, Building C,
Juji Industrial Park, Yabianxueziwei, Shajing Street,
Bao'an District, Shenzhen, Guangdong, China

Tel : (+86)755-82591330
Fax : (+86)755-82591332
Web : www.LCS-cert.com
Mail : webmaster@LCS-cert.com

Date of receipt of test sample : June 30, 2021
Number of tested samples : 1
Serial number : Prototype
Date of Test : June 30, 2021 ~ July 02, 2021
Date of Report : July 05, 2021





FCC SDoC TEST REPORT

FCC 47 CFR Part 15 Subpart B, Class B(SDoC), ANSI C63.4 -2014

Report Reference No. : **LCS210421040AE**

Date Of Issue : July 05, 2021

Testing Laboratory Name : **Shenzhen LCS Compliance Testing Laboratory Ltd.**

Address : Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Testing Location/ Procedure... : Full application of Harmonised standards ☒
 Partial application of Harmonised standards ☐
 Other standard testing method ☐

Applicant's Name..... : **Purism SPC**

Address : One Market Street, 36th Floor, San Francisco, CA 94105, USA

Test Specification

Standard : FCC 47 CFR Part 15 Subpart B, Class B(SDoC), ANSI C63.4 -2014

Test Report Form No...... : LCSEMC-1.0

TRF Originator..... : Shenzhen LCS Compliance Testing Laboratory Ltd.

Master TRF..... : Dated 2011-03

SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. All rights reserved.

This publication may be reproduced in whole or in part for non-commercial purposes as long as the SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. is acknowledged as copyright owner and source of the material. SHENZHEN LCS COMPLIANCE TESTING LABORATORY LTD. takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context.

Test Item Description..... : **mobile phone**

Test Model : Librem 5

Trade Mark : Purism

For AC Adapter: Input: 100-240V~, 50/60Hz, 0.6A

Ratings : Output: 5V=3A, 9V=2A, 12V=1.5A 18W Max

DC 3.8V by Rechargeable Li-ion Battery(4500mAh)

Result : **Positive**

Compiled by:

Emma Wang

Supervised by:

Baron Wen

Approved by:



Emma Wang/ File
administrators

Baron Wen/Technique principal

Gavin Liang/ Manager

**FCC -- TEST REPORT****Test Report No. : LCS210421040AE**July 05, 2021

Date of issue

Test Model : Librem 5

EUT..... : mobile phone

Applicant..... : Purism SPCAddress..... : One Market Street, 36th Floor, San Francisco, CA
94105, USA

Telephone..... : /

Fax..... : /

Manufacturer..... : Purism SPCAddress..... : One Market Street, 36th Floor, San Francisco, CA
94105, USA

Telephone..... : /

Fax..... : /

Factory..... : Purism SPCAddress..... : One Market Street, 36th Floor, San Francisco, CA
94105, USA

Telephone..... : /

Fax..... : /

Test Result according to the standards on page 6: **Positive**

The test report merely corresponds to the test sample.

It is not permitted to copy extracts of these test result without the written permission of the test laboratory.



Revision History

Revision	Issue Date	Revisions	Revised By
000	July 05, 2021	Initial Issue	Gavin Liang



TABLE OF CONTENTS

Test Report Description	Page
1. SUMMARY OF STANDARDS AND RESULTS	6
1.1. Description of Standards and Results	6
2. GENERAL INFORMATION	7
2.1. Description of Device (EUT)	7
2.2. Support equipment List	7
2.3. Description of Test Facility	7
2.4. Statement of the Measurement Uncertainty	7
2.5. Measurement Uncertainty	8
3. TEST RESULTS	9
3.1. POWER LINE CONDUCTED EMISSION MEASUREMENT	9
3.2. Radiated emission Measurement	13
4. PHOTOGRAPH	20
5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT	22



1. SUMMARY OF STANDARDS AND RESULTS

1.1. Description of Standards and Results

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

EMISSION			
Description of Test Item	Standard	Limits	Results
Conducted disturbance at mains terminals	FCC 47 CFR Part 15 Subpart B, Class B(SDoC), ANSI C63.4 -2014	Class B	PASS
Radiated disturbance	FCC 47 CFR Part 15 Subpart B, Class B(SDoC), ANSI C63.4 -2014	Class B	PASS
N/A is an abbreviation for Not Applicable.			

Test mode:		
Mode 1	Charging mode	Record
Mode 2	BT mode	Pre-scan
Mode 3	Playing Music Mode	Pre-scan
Mode 4	Idle Mode	Pre-scan
Mode 5	Camera Mode	Pre-scan
***Note: All test modes were tested, but we only recorded the worst case in this report.		



2. GENERAL INFORMATION

2.1. Description of Device (EUT)

EUT : mobile phone

Trade Mark : Purism

Test Model : Librem 5

Power Supply : For AC Adapter: Input: 100-240V~, 50/60Hz, 0.6A
Output: 5V=3A, 9V=2A, 12V=1.5A 18W Max
DC 3.8V by Rechargeable Li-ion Battery(4500mAh)

2.2. Support equipment List

Name	Manufacturers	M/N	S/N
International Holdings	Adapter	PD-014	--

2.3. Description of Test Facility

Site Description
EMC Lab. : NVLAP Accreditation Code is 600167-0.
FCC Designation Number is CN5024.
CAB identifier is CN0071.
CNAS Registration Number is L4595.

2.4. Statement of the Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 – 4 “Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements” and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.



2.5. Measurement Uncertainty

Test	Parameters	Expanded Uncertainty (Ulab)	Expanded Uncertainty (Ucisp)
Conducted Emission	Level accuracy (9kHz to 150kHz) (150kHz to 30MHz)	± 2.63 dB ± 2.35 dB	± 3.8 dB ± 3.4 dB
Radiated Emission	Level accuracy (9kHz to 30MHz)	± 3.68 dB	N/A
Radiated Emission	Level accuracy (30MHz to 1000MHz)	± 3.48 dB	± 5.3 dB
Radiated Emission	Level accuracy (above 1000MHz)	± 3.90 dB	± 5.2 dB

(1) Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus.

(2) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor of $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%.

3. TEST RESULTS

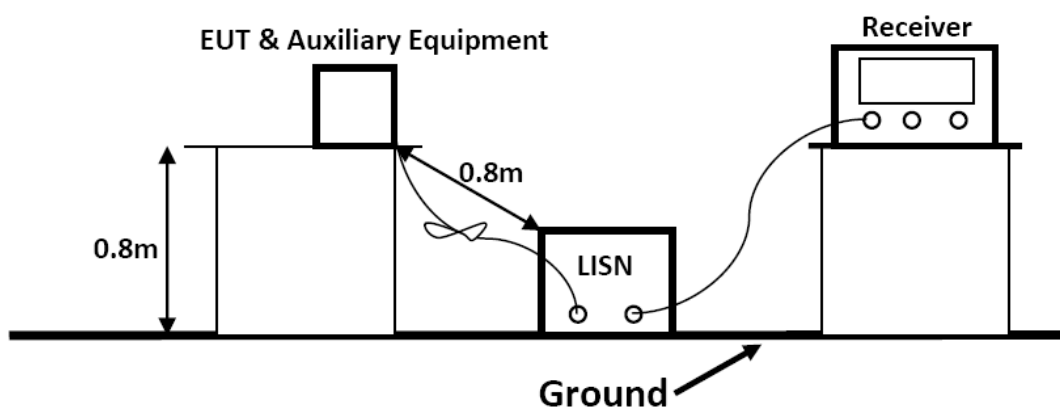
3.1. POWER LINE CONDUCTED EMISSION MEASUREMENT

3.1.1. Test Equipment

The following test equipments are used during the power line conducted measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	EZ	EZ-EMC	/	N/A	N/A
2	EMI Test Receiver	R&S	ESPI	101840	2021-06-21	2022-06-20
3	Artificial Mains	R&S	ENV216	101288	2021-06-21	2022-06-20
4	10dB Attenuator	SCHWARZBEC K	MTS-IMP-136	261115-001-0032	2021-06-21	2022-06-20

3.1.2. Block Diagram of Test Setup



3.1.3. Test Standard

Power Line Conducted Emission Limits (Class B)

Frequency (MHz)			Limit (dB μ V)	
			Quasi-peak Level	Average Level
0.15	~	0.50	66.0 ~ 56.0 *	56.0 ~ 46.0 *
0.50	~	5.00	56.0	46.0
5.00	~	30.00	60.0	50.0

NOTE1-The lower limit shall apply at the transition frequencies.

NOTE2-The limit decreases linearly with the logarithm of the frequency in the range 0.15MHz to 0.50MHz.

3.1.4. EUT Configuration on Test

The following equipments are installed on Power Line Conducted Emission Measurement to meet the commission requirement and operating regulations in a manner, which tends to maximize its emission characteristics in a normal application.



3.1.5. Operating Condition of EUT

3.1.5.1. Setup the EUT as shown on Section 3.1.2

3.1.5.2. Turn on the power of all equipments.

3.1.5.3. Let the EUT work in measuring Mode 1 and measure it.

3.1.6. Test Procedure

The EUT system is connected to the power mains through a line impedance stabilization network (L.I.S.N.). This provides 50ohm coupling impedance for the EUT system. Please refer the block diagram of the test setup and photographs. Both sides of AC line are checked to find out the maximum conducted emission. In order to find the maximum emission levels, the relative positions of equipment and all of the interface cables shall be changed according to FCC/ANSI C63.4-2014 on Conducted Emission Measurement.

The bandwidth of the test receiver is set at 9kHz.

The frequency range from 150kHz to 30MHz is investigated

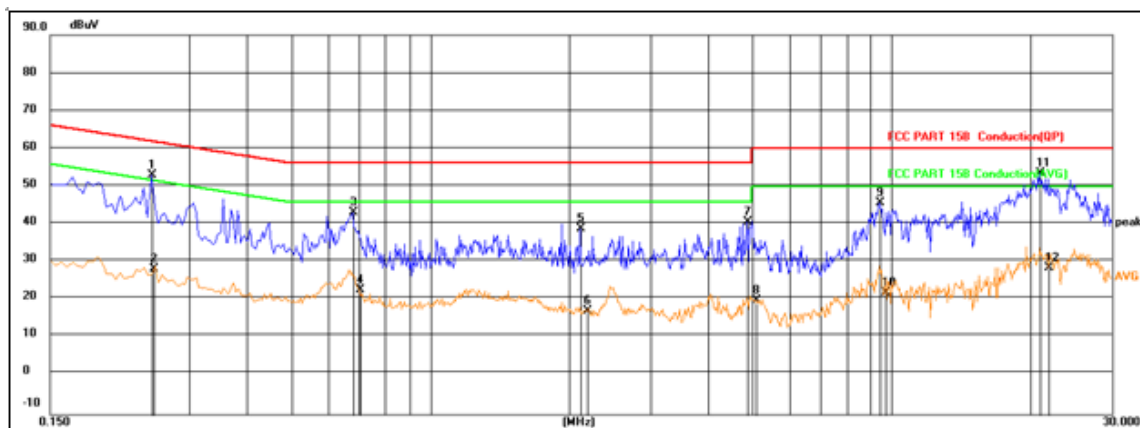
3.1.7. Test Results

PASS.

The test result please refer to the next page.



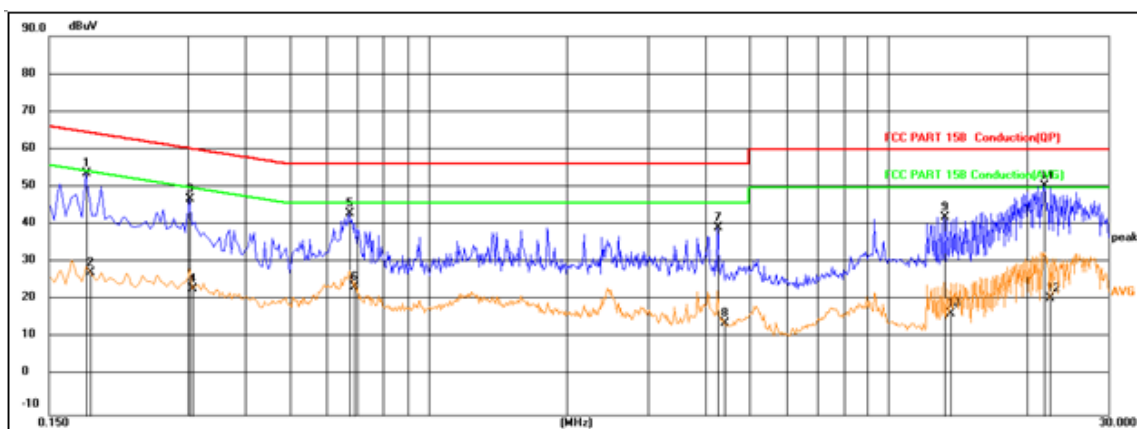
Test Model	Librem 5	Test Mode	Mode 1
Environmental Conditions	23.3°C, 53.7% RH	Test Engineer	Daiwei Dai
Pol	Line	Test Voltage	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.2490	33.87	19.23	53.10	61.79	-8.69	QP
2	0.2521	9.30	19.23	28.53	51.69	-23.16	AVG
3	0.6809	24.11	19.26	43.37	56.00	-12.63	QP
4	0.7035	3.59	19.28	22.87	46.00	-23.13	AVG
5	2.1165	19.65	19.41	39.06	56.00	-16.94	QP
6	2.1885	-2.03	19.43	17.40	46.00	-28.60	AVG
7	4.8570	21.33	19.49	40.82	56.00	-15.18	QP
8	5.0729	0.63	19.49	20.12	50.00	-29.88	AVG
9	9.4290	26.13	19.68	45.81	60.00	-14.19	QP
10	9.7035	2.38	19.68	22.06	50.00	-27.94	AVG
11	20.9265	33.39	20.30	53.69	60.00	-6.31	QP
12	21.8985	8.48	20.28	28.76	50.00	-21.24	AVG



Test Model	Librem 5	Test Mode	Mode 1
Environmental Conditions	23.3°C, 53.7% RH	Test Engineer	Daiwei Dai
Pol	Neutral	Test Voltage	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Correct (dB)	Result (dBuV)	Limit (dBuV)	Margin (dB)	Remark
1	0.1815	34.63	19.17	53.80	64.42	-10.62	QP
2	0.1844	8.57	19.17	27.74	54.29	-26.55	AVG
3	0.3030	27.82	19.27	47.09	60.16	-13.07	QP
4	0.3075	4.15	19.28	23.43	50.04	-26.61	AVG
5	0.6720	24.10	19.25	43.35	56.00	-12.65	QP
6	0.6900	4.70	19.26	23.96	46.00	-22.04	AVG
7	4.2675	19.94	19.47	39.41	56.00	-16.59	QP
8	4.3935	-5.10	19.47	14.37	46.00	-31.63	AVG
9	13.2270	22.27	19.98	42.25	60.00	-17.75	QP
10	13.5510	-3.20	20.00	16.80	50.00	-33.20	AVG
11	21.8265	30.60	20.08	50.68	60.00	-9.32	QP
12	22.3035	0.86	20.08	20.94	50.00	-29.06	AVG

Note: Pre-Scan all mode, Thus record worse case mode result in this report.

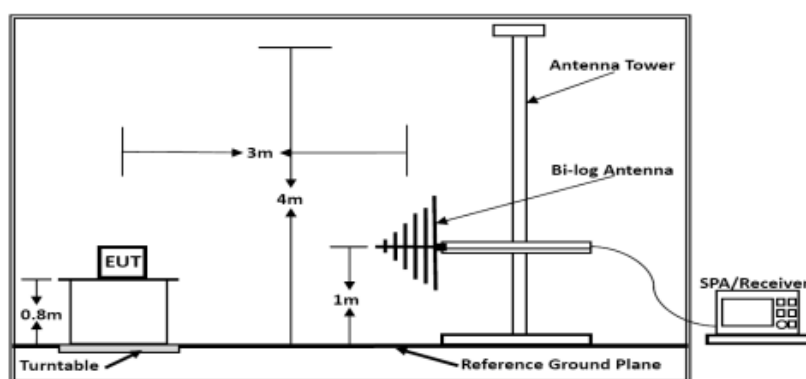
3.2. Radiated emission Measurement

3.2.1. Test Equipment

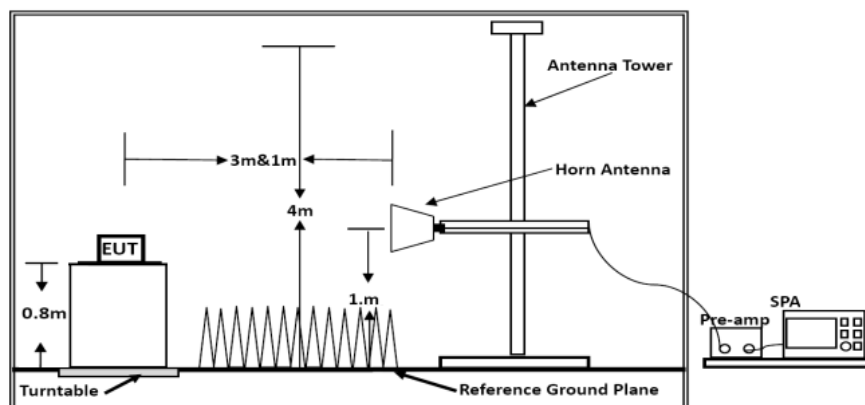
The following test equipments are used during the radiated emission measurement:

Item	Equipment	Manufacturer	Model No.	Serial No.	Cal Date	Due Date
1	EMI Test Software	E3	E3-EMC	/	N/A	N/A
2	By-log Antenna	SCHWARZBECK	VULB9163	9163-470	2018-07-26	2021-07-25
3	Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-1925	2018-07-02	2021-07-01
4	EMI Test Receiver	R&S	ESR 7	101181	2020-06-22	2021-06-21
5	Broadband Preamplifier	/	BP-01M18G	P190501	2020-06-22	2021-06-21

3.2.2. Block Diagram of Test Setup



Below 1GHz



Above 1GHz



3.2.3. Radiated Emission Limit (Class B)

Limits for Radiated Disturbance Below 1GHz

FREQUENCY MHz	DISTANCE Meters	FIELD STRENGTHS LIMIT	
		$\mu\text{V/m}$	$\text{dB}(\mu\text{V})/\text{m}$
30 ~ 88	3	100	40
88 ~ 216	3	150	43.5
216 ~ 960	3	200	46
960 ~ 1000	3	500	54
Remark: (1) Emission level $(\text{dB})\mu\text{V} = 20 \log$ Emission level $\mu\text{V/m}$ (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.			
Limits for Radiated Emission Above 1GHz			
Frequency (MHz)	Distance (Meters)	Peak Limit ($\text{dB}\mu\text{V/m}$)	Average Limit ($\text{dB}\mu\text{V/m}$)
Above 1000	3	74	54
***Note: The lower limit applies at the transition frequency.			

3.2.4. EUT Configuration on Measurement

The following equipment are installed on Radiated Emission Measurement to meet the commission requirements and operating regulations in a manner which tends to maximize its emission characteristics in normal application.

3.2.5. Operating Condition of EUT

3.2.5.1. Setup the EUT as shown in Section 3.2.2.

3.2.5.2. Let the EUT work in test Mode 1 and measure it.

3.2.6. Test Procedure

EUT and its simulators are placed on a turntable, which is 0.8 meter high above ground. The turntable can rotate 360 degrees to determine the position of the maximum emission level. EUT is set 3.0 meters away from the receiving antenna, which is mounted on an antenna tower. The antenna can be moved up and down between 1.0 meter and 4 meters to find out the maximum emission level. Broadband antenna (calibrated by-log antenna) is used as receiving antenna. Both horizontal and vertical polarization of the antenna is set on measurement. In order to find the maximum emission levels, all of the interface cables must be manipulated according to ANSI C63.4-2014 on radiated emission measurement.



3.2.7. Measuring Instruments and Setting

Please refer to equipment list in this report. The following table is the setting of spectrum analyzer and receiver

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/AVG
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/AVG
Start ~ Stop Frequency	30MHz~1000MHz / RB/VB 120kHz/1MHz for QP

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10 th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 1/B kHz for Average

The frequency range from 30MHz to 1000MHz and above 1000MHz is checked.

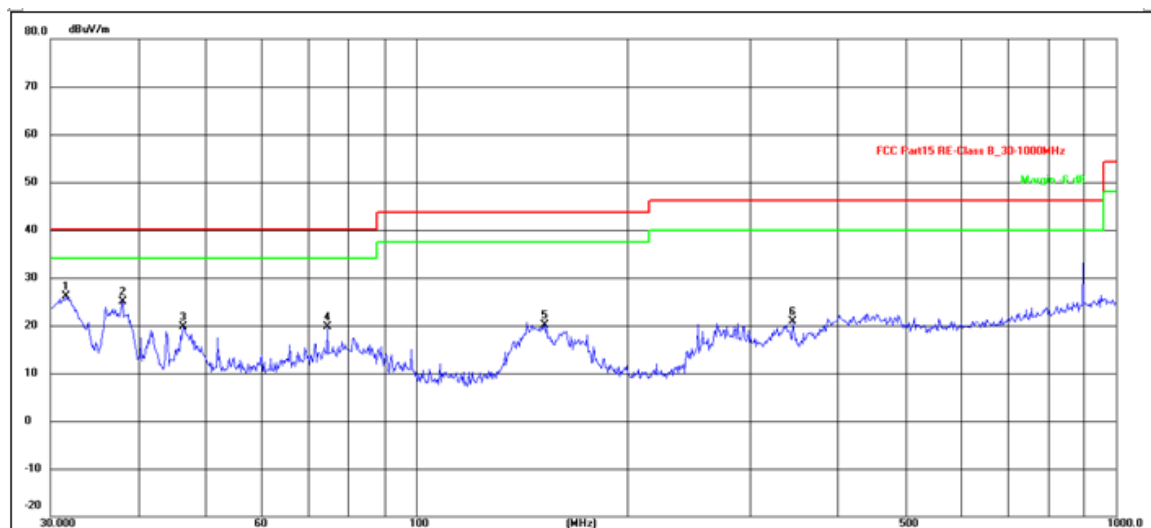
3.2.8. Radiated Emission Noise Measurement Result

PASS.

The scanning waveforms please refer to the next page.



Test Model	Librem 5	Test Mode	Mode 1
Environmental Conditions	24.6°C, 54.1% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Daiwei Dai	Test Voltage	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	31.6201	44.62	-18.43	26.19	40.00	-13.81	QP
2	38.0782	42.35	-17.26	25.09	40.00	-14.91	QP
3	46.5030	35.37	-15.68	19.69	40.00	-20.31	QP
4	74.6568	40.33	-20.56	19.77	40.00	-20.23	QP
5	152.6641	40.90	-20.73	20.17	43.50	-23.33	QP
6	345.5952	34.51	-13.60	20.91	46.00	-25.09	QP



Test Model	Librem 5	Test Mode	Mode 1
Environmental Conditions	24.6°C, 54.1% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Daiwei Dai	Test Voltage	AC 120V/60Hz



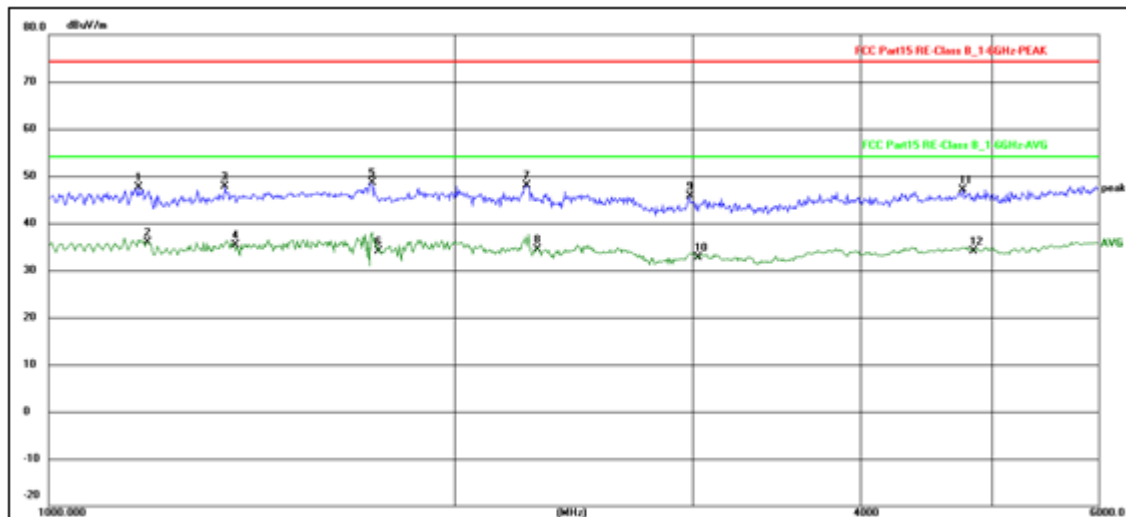
No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	32.1794	35.98	-18.39	17.59	40.00	-22.41	QP
2	47.4917	29.04	-15.68	13.36	40.00	-26.64	QP
3	155.3643	42.78	-20.62	22.16	43.50	-21.34	QP
4	260.1444	39.01	-15.70	23.31	46.00	-22.69	QP
5	327.8872	37.59	-14.07	23.52	46.00	-22.48	QP
6	429.5228	34.31	-11.57	22.74	46.00	-23.26	QP

Note: Pre-Scan all mode, Thus record worse case mode result in this report.

Remark: For above 1000MHz, Because the emission it too low to be reported.



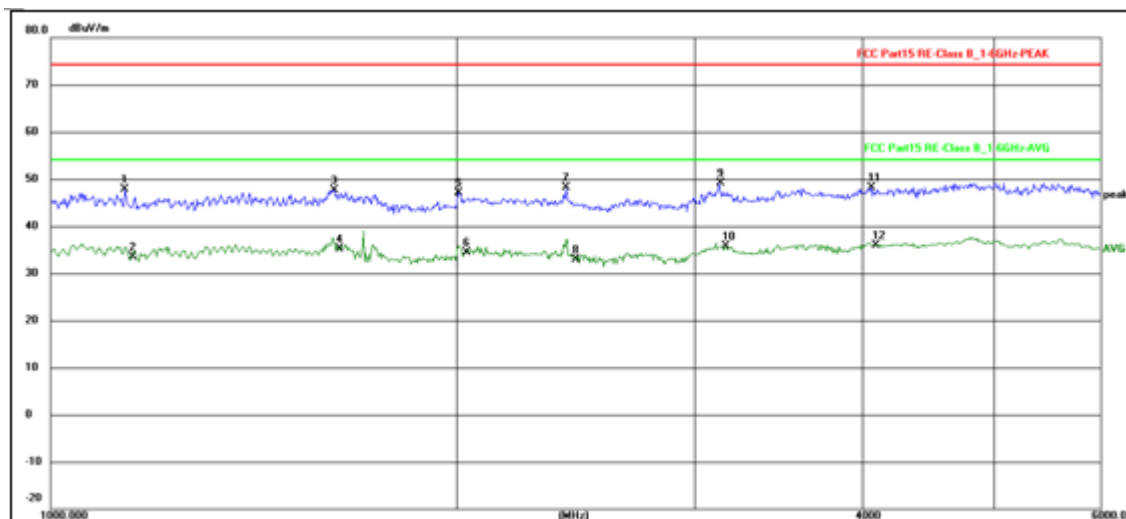
Test Model	Librem 5	Test Mode	Mode 1
Environmental Conditions	24.2°C, 54.3% RH	Detector Function	Quasi-peak
Pol	Vertical	Distance	3m
Test Engineer	Daiwei Dai	Test Voltage	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1166.597	62.65	-14.98	47.67	74.00	-26.33	peak
2	1183.440	50.95	-14.94	36.01	54.00	-17.99	AVG
3	1351.230	61.86	-14.12	47.74	74.00	-26.26	peak
4	1373.197	49.44	-14.09	35.35	54.00	-18.65	AVG
5	1733.375	62.58	-14.01	48.57	74.00	-25.43	peak
6	1755.252	48.09	-13.96	34.13	54.00	-19.87	AVG
7	2263.794	58.91	-10.91	48.00	74.00	-26.00	peak
8	2300.596	45.33	-10.89	34.44	54.00	-19.56	AVG
9	2983.131	55.54	-9.86	45.68	74.00	-28.32	peak
10	3026.199	42.41	-9.76	32.65	54.00	-21.35	AVG
11	4761.784	53.42	-6.37	47.05	74.00	-26.95	peak
12	4839.195	40.42	-6.33	34.09	54.00	-19.91	AVG



Test Model	Librem 5	Test Mode	Mode 1
Environmental Conditions	24.2°C, 54.3% RH	Detector Function	Quasi-peak
Pol	Horizontal	Distance	3m
Test Engineer	Daiwei Dai	Test Voltage	AC 120V/60Hz



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB/m)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1135.661	62.83	-15.04	47.79	74.00	-26.21	peak
2	1147.936	48.48	-15.01	33.47	54.00	-20.53	AVG
3	1619.283	61.87	-14.30	47.57	74.00	-26.43	peak
4	1633.855	49.43	-14.32	35.11	54.00	-18.89	AVG
5	2007.709	60.18	-13.03	47.15	74.00	-26.85	peak
6	2033.049	47.16	-12.71	34.45	54.00	-19.55	AVG
7	2410.306	59.47	-11.20	48.27	74.00	-25.73	peak
8	2445.105	44.04	-11.18	32.86	54.00	-21.14	AVG
9	3130.995	59.04	-9.90	49.14	74.00	-24.86	peak
10	3164.836	45.78	-9.94	35.84	54.00	-18.16	AVG
11	4059.890	55.96	-7.81	48.15	74.00	-25.85	peak
12	4089.092	43.67	-7.77	35.90	54.00	-18.10	AVG

Note: Pre-Scan all mode, Thus record worse case mode result in this report.

Remark: For above 1000MHz, Because the emission it too low to be reported.

4. PHOTOGRAPH

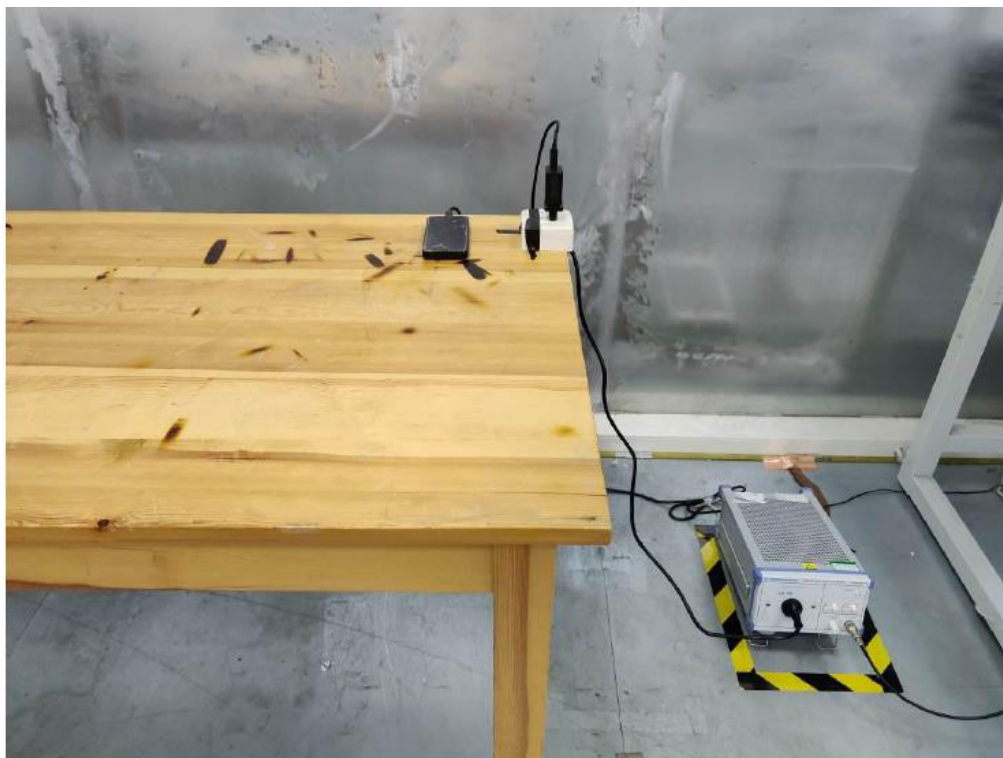


Photo of Power Line Conducted Measurement

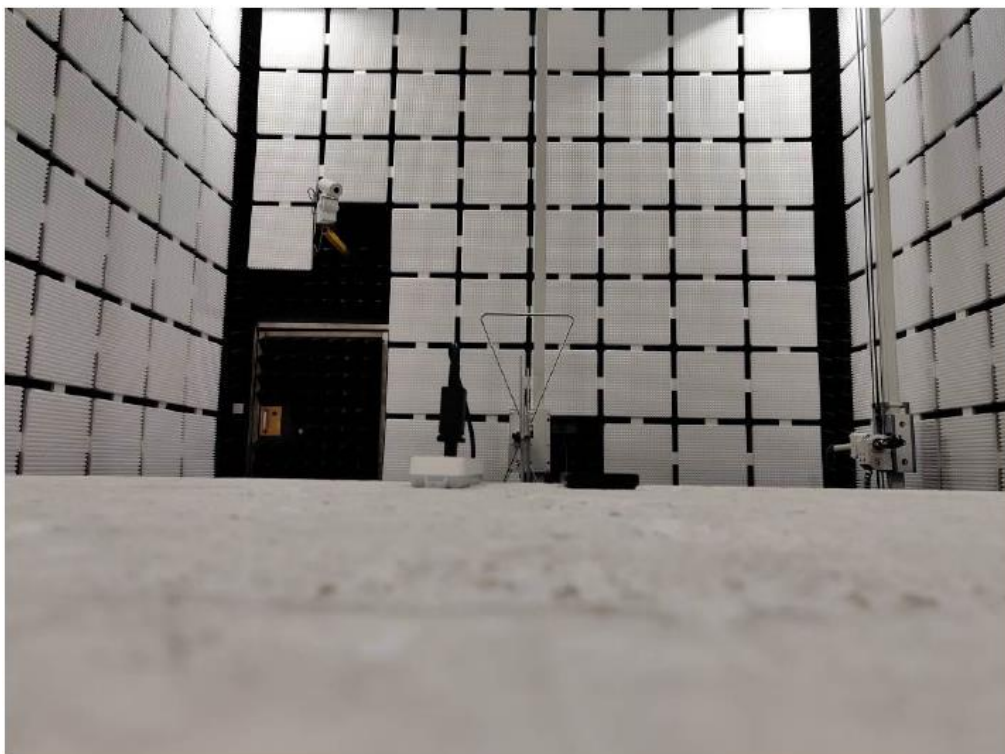


Photo of Radiated emission Measurement(Below 1GHz)



Photo of Radiated emission Measurement (Above 1GHz)

5. EXTERNAL AND INTERNAL PHOTOS OF THE EUT



Fig. 1

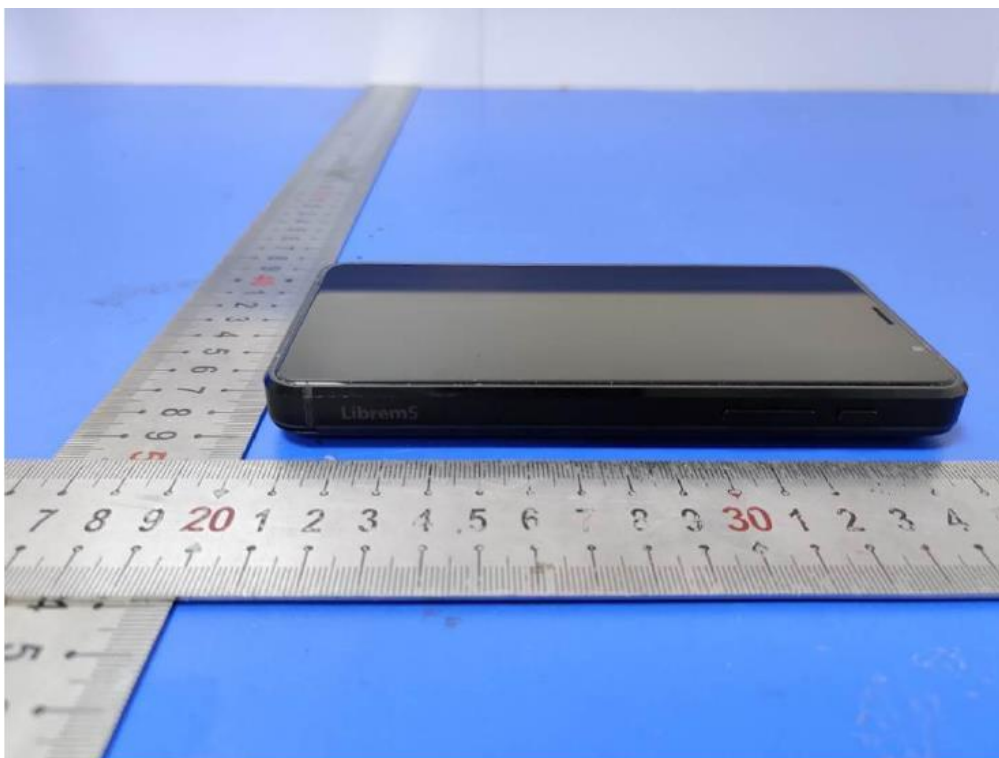


Fig. 2



Fig. 3



Fig. 4



Fig. 5



Fig. 6



Fig. 7



Fig. 8



Fig. 9



Fig. 10



Fig. 11



Fig. 12



Fig. 13



Fig. 14

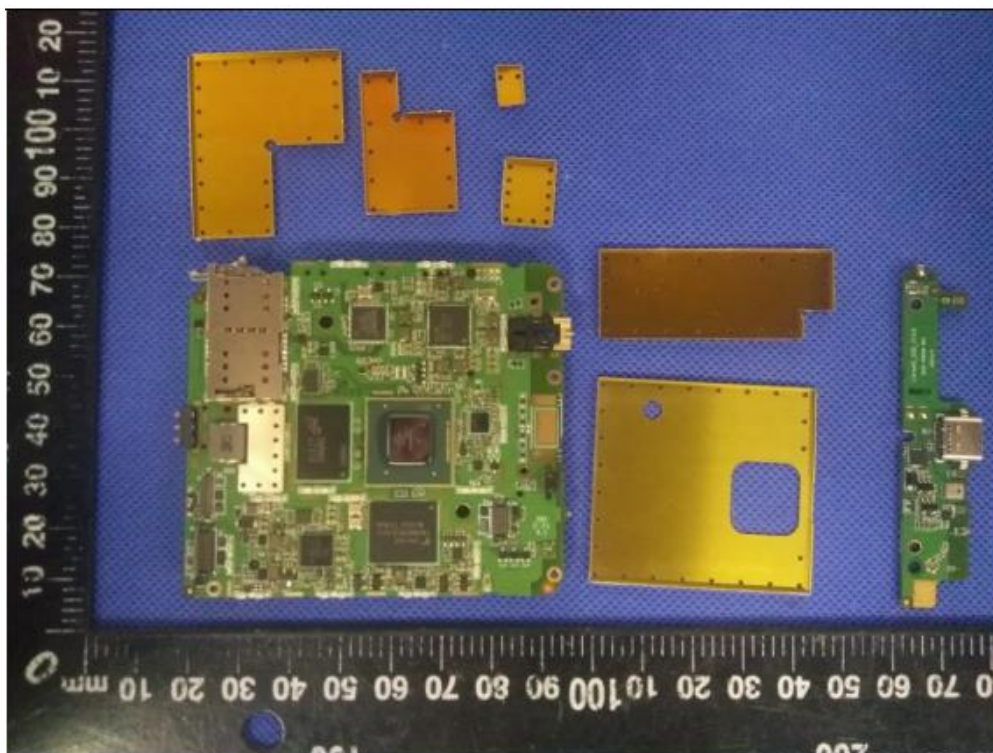


Fig. 15

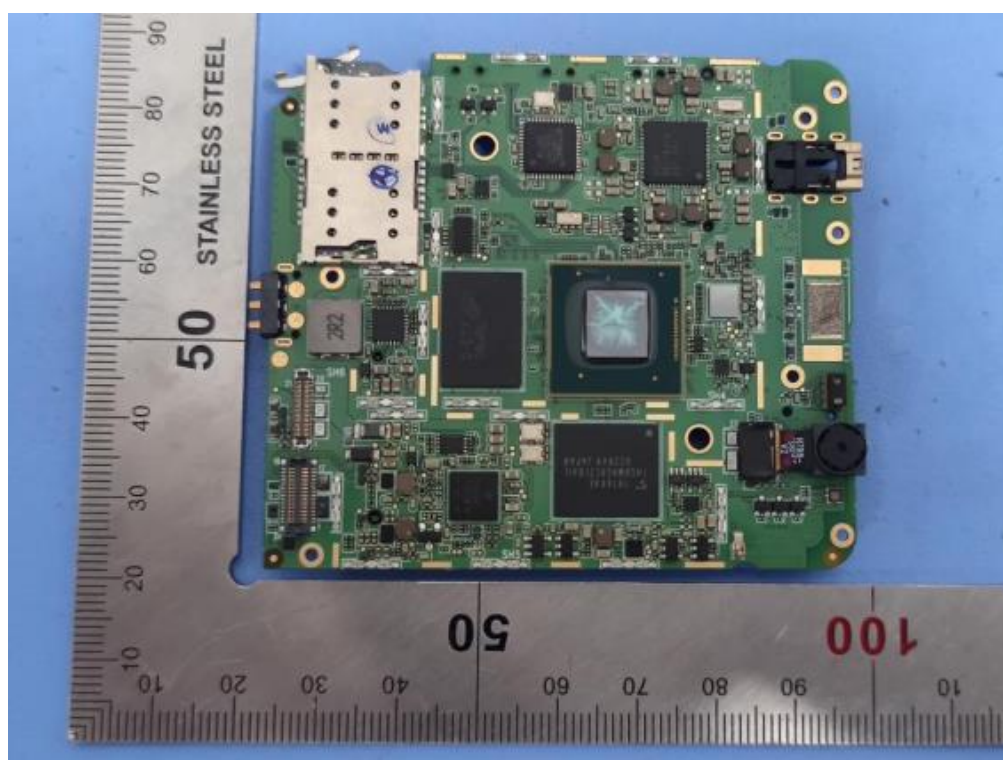


Fig. 16



Fig. 17

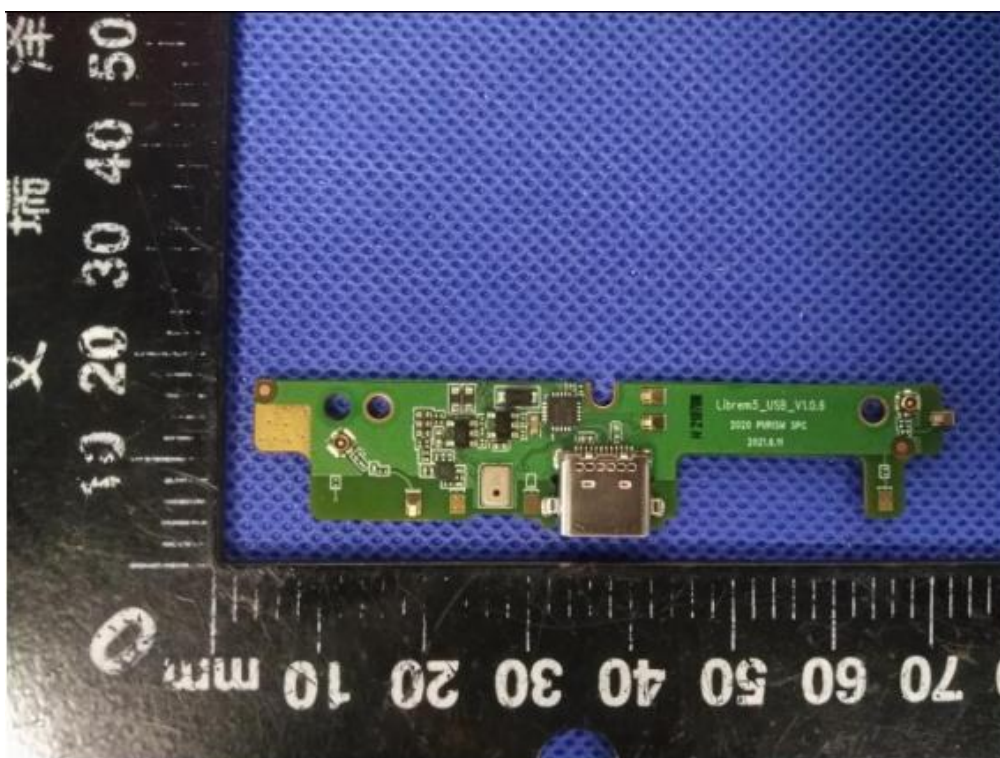


Fig. 18

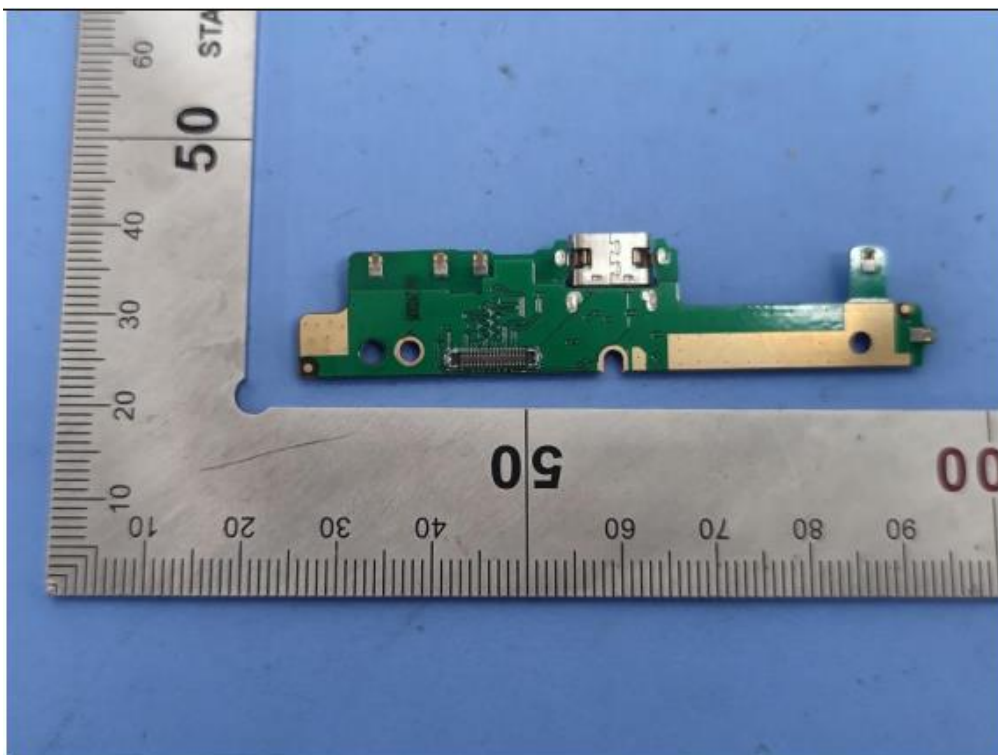


Fig. 19

-----THE END OF TEST REPORT-----