



FCC 15B TEST REPORT

No. I21Z61036-EMC01

for

TCL Communication Ltd

Vodafone Gigacube

Model Name: HH500V

FCC ID: 2ACCJB157

with

Hardware Version: HH500_MB_C

Software Version: HH500V_VDF_V2.0.0B01

Issued Date: 2021-08-11

Note:

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Test Laboratory:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I21Z61036-EMC01	Rev.0	1 st edition	2021-07-23
I21Z61036-EMC01	Rev.1	Delete WCDMA test results	2021-08-11

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

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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2005 accredited test laboratory under NATIONAL VOLUNTARY LABORATORY ACCREDITATION PROGRAM (NVLAP) with lab code 600118-0, and is also an FCC accredited test laboratory (CN5017), and ISED accredited test laboratory (ISED#: 24849). The detail accreditation scope can be found on NVLAP website.

1.2. Testing Location

Location 1: CTTL(huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,
P. R. China 100191

1.3. Testing Environment

Normal Temperature: 15-35℃
Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2021-06-15
Testing End Date: 2021-07-23

1.5. Signature



Zhang Ying
(Prepared this test report)



An Hui
(Reviewed this test report)



Zhang Xia
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
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Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
Contact Gong Zhizhou
E-mail zhizhou.gong@tcl.com
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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address /Post: 5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science
Park, Shatin, NT, Hong Kong
City: Hong Kong
Postal Code: /
Country: China
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Telephone: 0086-755-36611722
Fax: /

3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Vodafone Gigacube
Model Name	HH500V
FCC ID	2ACCJB157

This device contains the receivers which tune and operate between 30MHz-960MHz in the following bands:

LTE bands 5.

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT7	350364240200093	HH500_MB_C	HH500V_VDF_V2.0.0B01

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

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	Travel charger	/	/
AE2	PC	/	/
AE3	Telephone	/	/
AE1	Travel charger	/	/

AE1

Model	CYSE36-120300E
Manufacturer	Jiangsu Chenyang Electron Co.,Ltd
Length of cable	/

AE2

Model	/
Manufacturer	/

AE3

Model	/
Manufacturer	/

AE4

Model	CYSE36-120300UK
Manufacturer	Jiangsu Chenyang Electron Co.,Ltd
Length of cable	/

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



3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.7-1	EUT7+ AE1	Charger
Set.7-2	EUT7+ AE1+AE2+AE3	Charger+WLAN+TELEPHONE

4. Reference Documents

4.1. Documents supplied by applicant

EUT parameters, referring to chapter 3 for detailed information, are supplied by the client or manufacturer, which is the basis of testing.

4.2. Reference Documents for testing

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

	Title	Version
Reference		
FCC Part 15, Subpart B	Radio frequency devices - Unintentional Radiators	10-1-20 Edition
ANSI C63.4	American National Standard for Methods of Measurement of Radio- Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2014

Note: The test methods have no deviation with standards.

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (23 meters×17meters×10meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 10 m distance
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 6GHz
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 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, >60dB; 1MHz—1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	NA	Not applicable
	F	Fail
Location Column	1/2/4	The test is performed in test location 1/2/4 which is described in section 1.1 of this report

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

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI 3	100344	Rohde & Schwarz	2022-02-23	1 year
2	LISN	R&S	825562/028	Rohde & Schwarz	2021-10-15	1 year
3	EMI Antenna	VULB 9163	9163-483	Schwarzbeck	2021-08-27	1 year
4	EMI Antenna	3115	6914	ETS-Lindgren	2022-02-03	1 year
5	Test Receiver	ESU26	100235	Rohde & Schwarz	2022-02-23	1 year
6	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
7	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
8	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
9	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01.0	R&S
Conducted Emission	EMC32 V8.52.0	R&S

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission

Reference

FCC: CFR Part 15.109(a).

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (charging mode and FM mode of MS) at distances of 10 meters (for 30MHz-1GHz) and 3 meters (for above 1GHz) 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. The measurement antenna was placed at a distance of 3/10 meters from the EUT. 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:

The MS is operating in the charging mode, WLAN transfer mode and telephone mode. During the test MS is connected to a charger.

The EUT was tested while operating in licensed band Rx mode. All licensed band receivers that tune in the range of 30MHz-960MHz, as listed in Section 3.1, are investigated. Only the worst case emissions are reported.

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

Frequency range (MHz)	Field strength limit ($\mu\text{V}/\text{m}$)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting.

$$\text{Limit}(10\text{m}) = \text{limit}(3\text{m}) + 20(\log(3/10))$$

A.1.4 Test Condition

Frequency range (MHz)	RBW/VBW	Sweep Time (s)	Detector
30-1000	120kHz (IF Bandwidth)	5	Peak/Quasi-peak
Above 1000	1MHz/3MHz	15	Peak, Average

A.1.5 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:

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

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): 30MHz-1GHz: 5.16dB, 1GHz-18GHz: 5.44dB, $k=2$.

Measurement results for Set.7-1:

LTE band 5 idle QP detector

Frequency (MHz)	QP (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
52.601000	13.83	29.50	15.71	104.0	H	81.0
58.324000	12.73	29.50	16.81	117.0	H	190.0
59.973000	15.51	29.50	14.03	225.0	H	-17.0
128.843000	12.88	33.10	20.18	106.0	H	151.0
221.284000	13.27	35.60	22.29	185.0	H	-16.0
240.393000	13.98	35.60	21.58	104.0	H	-1.0

LTE band 5 idle PK detector

Frequency (MHz)	Result(d B μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Polarity
17899.700	55.8	-29.5	46.0	39.4	74.0	18.2	H
17995.467	55.7	-29.1	46.7	38.1	74.0	18.3	H
17956.933	55.6	-28.9	46.7	37.9	74.0	18.4	H
17980.733	55.5	-29.1	46.7	37.9	74.0	18.5	H
17924.067	55.5	-29.4	46.7	38.2	74.0	18.5	V
17973.367	55.4	-29.1	46.7	37.8	74.0	18.6	H

LTE band 5 idle AV detector

Frequency (MHz)	Result(d B μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Polarity
10360.200	49.7	-36.2	38.2	47.7	54.0	4.3	H
17985.267	47.2	-29.1	46.7	29.6	54.0	6.8	H
5760.000	47.2	-38.4	34.3	51.3	54.0	6.8	H
17962.033	47.1	-29.1	46.7	29.5	54.0	6.9	H
5988.367	47.0	-38.4	34.4	51.0	54.0	7.0	V
17935.400	46.6	-29.4	46.7	29.3	54.0	7.4	H

Measurement results for Set.7-2:
WLAN and Telephone, QP detector

Frequency (MHz)	QP (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
38.633000	15.32	29.50	14.22	235.0	V	108.0
67.248000	16.83	29.50	12.71	203.0	V	193.0
87.424000	18.69	29.50	10.85	125.0	V	160.0
144.557000	13.99	33.10	19.07	103.0	V	172.0
219.344000	14.47	35.60	21.09	116.0	V	210.0
292.482000	11.80	35.60	23.76	116.0	V	186.0

WLAN and Telephone, PK detector

Frequency (MHz)	Result(d B μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Polarity
17981.300	55.2	-29.1	46.7	37.6	74.0	18.8	V
17976.767	55.2	-29.1	46.7	37.6	74.0	18.8	H
17960.900	54.9	-29.1	46.7	37.3	74.0	19.1	V
17858.900	54.8	-29.3	46.0	38.2	74.0	19.2	V
17964.300	54.7	-29.1	46.7	37.1	74.0	19.3	V
17883.833	54.5	-29.5	46.0	38.1	74.0	19.5	H

WLAN and Telephone, AV detector

Frequency (MHz)	Result(d B μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Polarity
17981.300	47.2	-29.1	46.7	29.6	54.0	6.8	H
17908.200	47.2	-29.3	46.0	30.6	54.0	6.8	H
17998.300	46.8	-29.1	46.7	29.2	54.0	7.2	H
17955.800	46.8	-28.9	46.7	29.1	54.0	7.2	H
17993.200	46.8	-29.1	46.7	29.2	54.0	7.2	V
17985.833	46.6	-29.1	46.7	29.0	54.0	7.4	V

Sample calculation: AV detector, 17981.300MHz

Result =P_{Mea} (29.6 dB μ V)+ G_A (46.7dB/m)+ G_{PL}(-29.1dB) =47.2dB μ V/m

LTE band 5 idle, Set.7-1

Full Spectrum

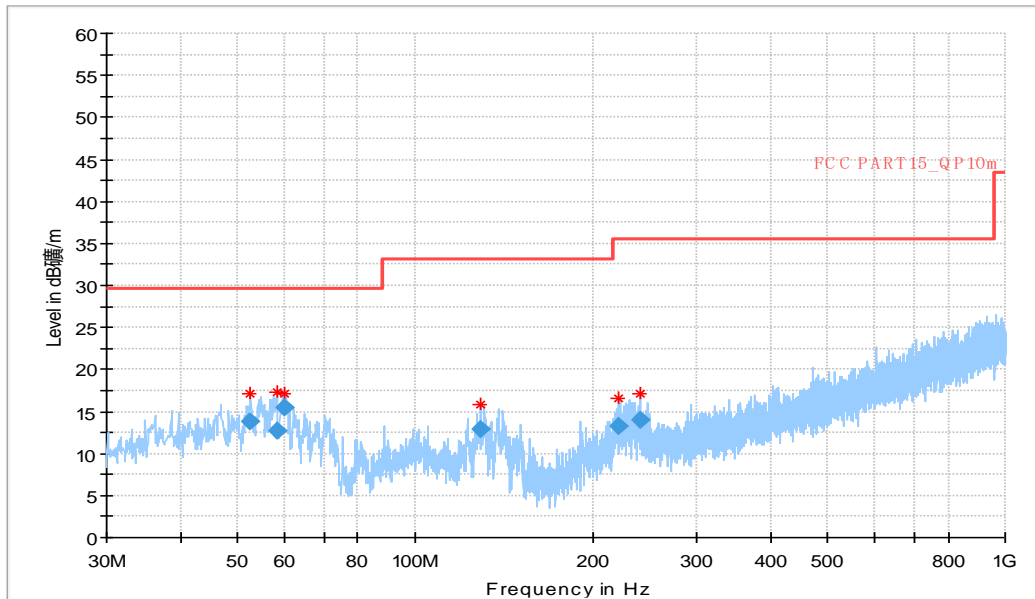


Figure A.1 Radiated Emission from 30MHz to 1GHz

Full Spectrum

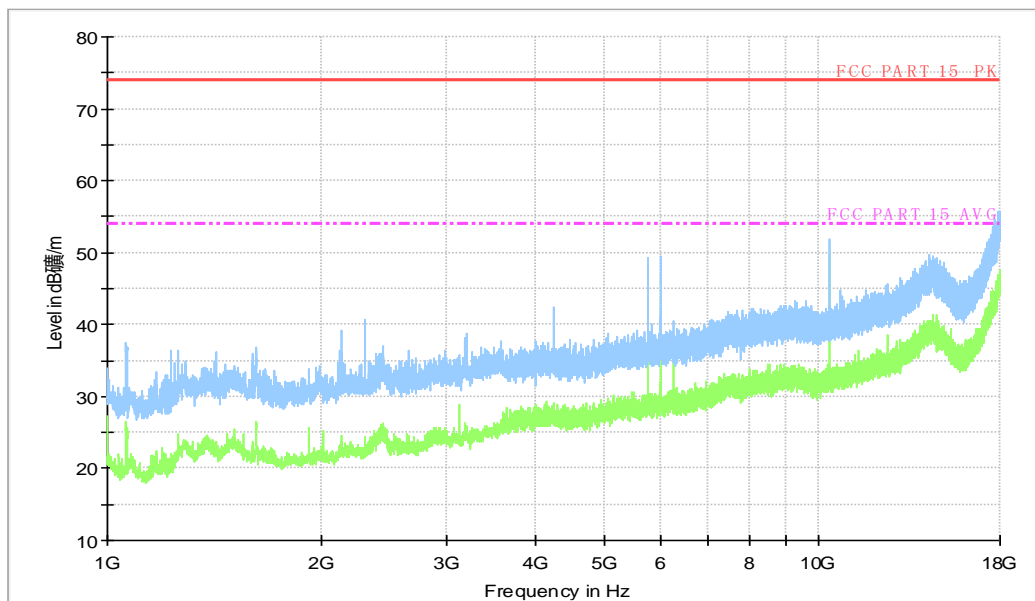


Figure A.2 Radiated Emission from 1GHz to 18GHz

WLAN and telephone, Set.7-2

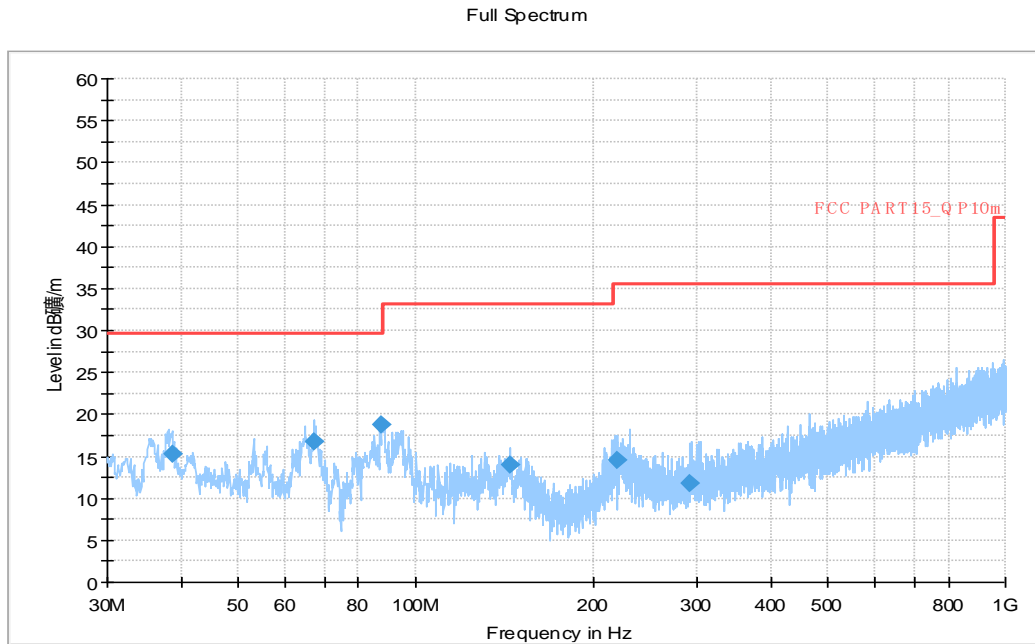


Figure A.3 Radiated Emission from 30MHz to 1GHz

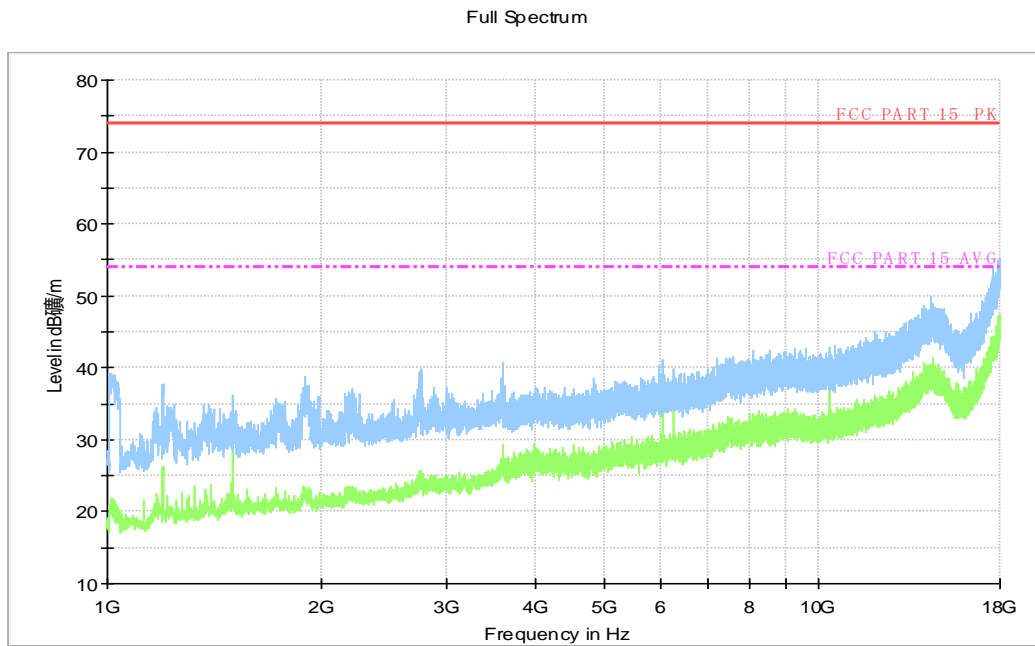


Figure A.4 Radiated Emission from 1GHz to 18GHz

A.2 Conducted Emission

Reference

FCC: CFR 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 150 kHz to 30 MHz 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

The MS is operating in the charging mode, WLAN transfer mode and telephone mode. During the test MS is connected to a charger.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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.2.4 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1

A.2.5 Measurement Results

Measurement uncertainty: $U=3.08\text{dB}$, $k=2$.

LTE band 5 idle, Set.7-1

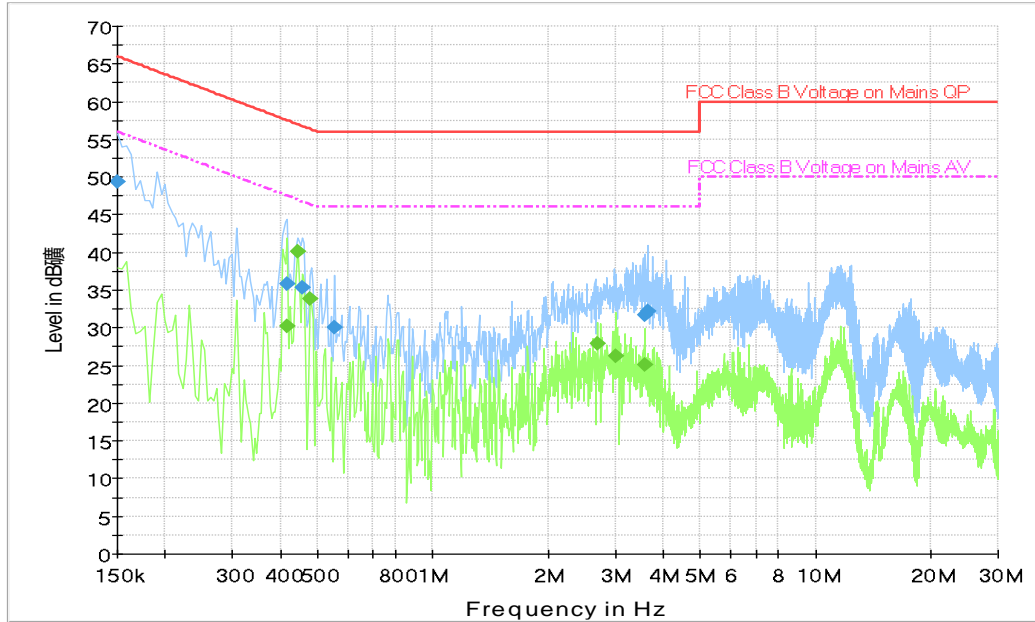


Figure A.5 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	49.3	N	10.0	16.7	66.0
0.415500	35.8	L1	9.9	21.7	57.5
0.456000	35.3	N	10.0	21.5	56.8
0.555000	30.0	N	10.0	26.0	56.0
3.597000	31.6	L1	10.1	24.4	56.0
3.637500	32.2	L1	10.1	23.8	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.415500	30.1	L1	9.9	17.4	47.5
0.442500	40.1	N	10.0	6.9	47.0
0.478500	33.9	L1	10.0	12.5	46.4
2.697000	27.9	L1	10.0	18.1	46.0
3.021000	26.2	N	10.1	19.8	46.0
3.583500	25.1	N	10.1	20.9	46.0

WLAN and Telephone, Set.7-2

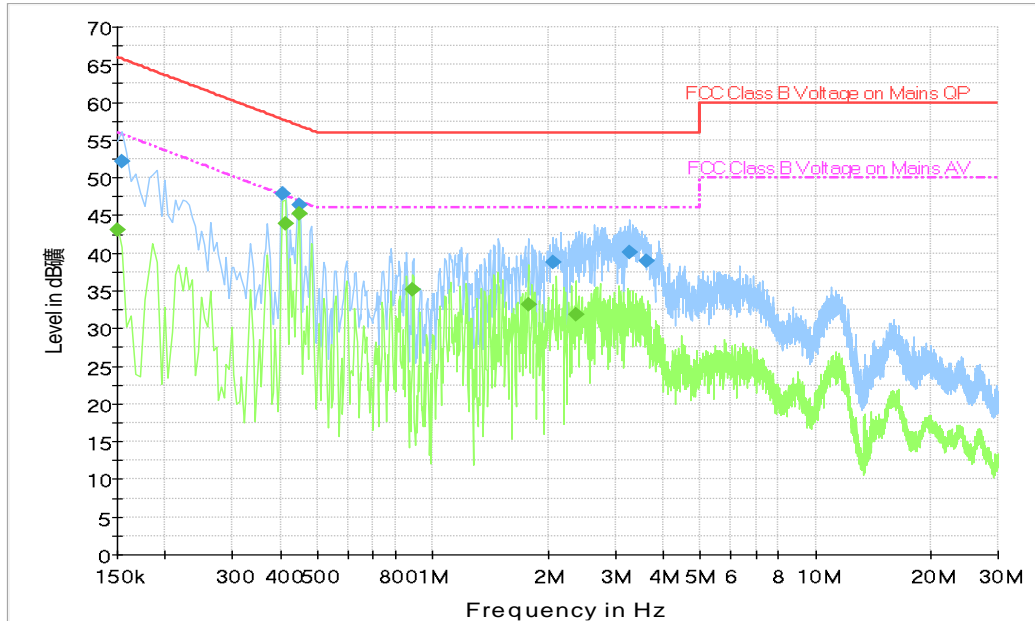


Figure A.6 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.154500	52.1	N	19.8	13.6	65.8
0.406500	47.9	N	19.9	9.9	57.7
0.447000	46.4	L1	19.9	10.5	56.9
2.062500	38.9	L1	19.5	17.1	56.0
3.273000	40.1	L1	19.5	15.9	56.0
3.606000	38.9	L1	19.5	17.1	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.150000	43.0	L1	20.2	13.0	56.0
0.411000	43.9	N	19.9	3.7	47.6
0.447000	45.2	N	19.9	1.7	46.9
0.888000	35.2	L1	19.6	10.8	46.0
1.774500	33.2	L1	19.5	12.8	46.0
2.368500	31.9	L1	19.5	14.1	46.0



ANNEX B: Persons involved in this testing

Test Item	Tester
Conducted Continuous Emission	Wang Huan
Radiated Continuous Emission	Wang Huan, Ding Zai, Zhang Tianli

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