





TEST REPORT

No. 23T04Z70647-11

for

Samsung Electronics Co., Ltd.

Notebook PC

MODEL NAME:

NP750XGL,NP750XGP,NP751XGL,NP751XGP,NP754XGL,NP754XGP

With

FCC ID: ZCANP750XGL

Hardware Version: REV1.0

Software Version: Windows 11

Issued Date: 2024-01-08

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 CTTL.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
23T04Z70647-11	Rev.0	1 st edition	2024-01-08

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





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1. Test Laboratory

1.1. Introduction & Accreditation

Telecommunication Technology Labs, CAICT is an ISO/IEC 17025:2017 accredited test laboratory under American Association for Laboratory Accreditation (A2LA) with lab code 7049.01, and is also an FCC accredited test laboratory (CN1349), and ISED accredited test laboratory (CAB identifier:CN0066). The detail accreditation scope can be found on A2LA website.

1.2. Testing Location

CTTL (Huayuan North Road)

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

China

1.3. <u>Testing Environment</u>

Normal Temperature: 15-35°C Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2023-12-15 Testing End Date: 2024-01-04

1.5. Signature

J.C 1

Zhang Ying

(Prepared this test report)

An Hui

(Reviewed this test report)

Zhang Xia

Deputy Director of the laboratory (Approved this test report)





2. Client Information

2.1. Applicant Information

Company Name: Samsung Electronics Co., Ltd.

Address / Post: 19 Chapin Rd., Building D Pine Brook, NJ 07058

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Email: j1.chun@samsung.com

Telephone: +1-201-937-4203

2.2. Manufacturer Information

Address /Post:

Company Name: Samsung Electronics Co., Ltd.

Samsung R5, Maetan dong 129, Samsung ro Youngtong gu, Suwon

city 443 742, Korea

Contact Minji Son

Email: minji28.son@samsung.com

Telephone: +82-10-3130-2080





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

3.1. About EUT

Description Notebook PC

Model name NP750XGL,NP750XGP,NP751XGL,NP751XGP,NP754XGL,NP754XGP

FCC ID ZCANP750XGL

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

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version	Date of receipt
UT16a	HQ8899YW90001RJ	REV1.0	Windows 11	2023-12-15
UT23a	HQ8899YW900061J	REV1.0	Windows 11	2023-12-15

^{*}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	Model	Manufacturer	Note
AE15	Travel adapter	EP-TA865	DONGYANG	65W US
AE6	Battery	AA-PBSN4AT	SAMSUNG SDI CO.,	/
			LTD. (SDI)	
AE7	Headset	/	/	/
AE8	HDMI Cable	/	/	/
AE9	Type-C to DP	/	/	/
	Cable			
AE10/AE11	Display	/	/	/
AE12/AE13	USB Disk	/	/	/
AE14	SD card	/	/	/

Note: The USB cables are shielded.

3.4. General Description

Equipment under Test (EUT) is a model of Notebook PC with integrated antenna.

It consists of normal options: lithium battery and charger.

Samples undergoing test were selected by the client.

The differences in the model names are only for different marketing purposes.

Manual and specifications of the EUT were provided to fulfil the test.

For more EUT information please refers to the manufacturer's specifications or user's manual.





Interface connection



Mode	Port1	Port2	Port3	Port4	Port5	Port6	Port7	Port8
Mode A	AC mains 230V/50Hz	PC(RJ45 cable)	Display(H DMI Cable)	USB Disk	Display(Typ e-C to DP Cable)	USB Disk	Headset	SD Card
Mode B	Display(Type- C to DP Cable)	PC(RJ45 cable)	Display(H DMI Cable)	USB Disk	AC mains 230V/50Hz	USB Disk	Headset	SD Card
Mode C	AC mains 230V/50Hz	PC(RJ45 cable)	Display(H DMI Cable)	USB Disk	Display(Typ e-C to DP Cable)	USB Disk	Headset	SD Card
Mode E	Display(Type- C to DP Cable)	PC(RJ45 cable)	Display(H DMI Cable)	USB Disk	AC mains 230V/50Hz	USB Disk	Headset	SD Card
Mode F	AC mains 230V/50Hz	PC(RJ45 cable)	Display(H DMI Cable)	USB Disk	Display(Typ e-C to DP Cable)	USB Disk	Headset	SD Card
Mode G	Display(Type- C to DP Cable)	PC(RJ45 cable)	Display(H DMI Cable)	USB Disk	AC mains 230V/50Hz	USB Disk	Headset	SD Card
Mode I	AC mains 230V/50Hz	PC(RJ45 cable)	Display(H DMI Cable)	USB Disk	Display(Typ e-C to DP Cable)	USB Disk	Headset	SD Card





3.5. Key component list

No.	Item	Vendor	Vendor model	Specification
1	MB	HUAQIN	TITAN4	1
o ODU	Intel	i7 RPL-R (Intel CORE 7 150U)	1.8G/10C	
2 CPU		Intel	i5 RPL-R (Intel CORE 5 120U)	1.4G/10C
3	GPU	Nvdia	GN20-S5L-A1	1
4	Vram	Samsung	K4ZAF325BC-SC16	GDDR6 4GB
5	Memory	Samsung	K4UCE3Q4AB-MGCL	LPDDR4x 32GB
		Samsung	K4UBE3D4AB-MGCL	LPDDR4x 16GB
6 SSD		SSSTC	CL4-8D512	512G GEN4 DRAMLESS
		SSSTC	CL4-8D1024	1TB GEN4 DRAMLESS
7	WLAN	Intel	AX201D2W	802.11 ac ax 2x2
8	Adapter	DONGYANG	EP-TA865	I/P: 100-240V~, 50-60Hz,1.7A DC-output: DC (PDO) 5V/3A or 9V/3A or 15V/3A or 20V/3.25A DC (PPS) 5-20V/3.25A
9	LCD	KD	KD156N20-30NI-A005	15.6" FHD IPS
3	LOD	CSOT	2061156OP8045001-52E	15.6" FHD IPS
10	Camera	KingCome	KPNB820	1
10	Callicia	Shine Optics	DK123C	1
11	Battery	Samsung	AA-PBSN4AT	Rated Voltage:15.4V, Rated capacity: 54Wh

3.6. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.36	UT16a+AE15+AE6+AE7+AE8+AE9+AE10+AE11	UT16a+ADAPTER
	+AE12+AE13+AE14	AE15
Set.37	UT23a+AE15+AE6+AE7+AE8+AE9+AE10+AE11	UT23a+ADAPTER
	+AE12+AE13+AE14	AE15

Note:

- 1. All of the above set-ups and test modes were tested, and only the worst results are shown in this report.
- 2. The EUT exercise program was tested using the Burn-in test program for windows.





4. Reference Documents

4.1. <u>Documents supplied by applicant</u>

EUT parameters 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.

Reference	Title	Version
FCC 47 CFR	Radio frequency devices - Unintentional Radiators	2023
Part 15, Subpart B		
ANSI C63.4	American National Standard for Methods of	2014
	Measurement of Radio-Noise Emissions from	
	Low-Voltage Electrical and Electronic Equipment in	
	the Range of 9 kHz to 40 GHz	

Note: The test methods have no deviation with standards.





5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C		
Relative humidity	Min. = 15 %, Max. = 75 %		
Chialding offertiveness	0.014MHz - 1MHz, >60dB;		
Shielding effectiveness	1MHz - 1000MHz, >90dB.		
Electrical insulation	> 2 MΩ		
Ground system resistance	< 4 Ω		
Normalised site attenuation (NSA)	< ± 4 dB, 3m distance, from 30 to 1000 MHz		
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz		
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, >60dB;
	1MHz-1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4 Ω





6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
	Р	Pass
Verdict Column	NA	Not applicable
	F	Fail
	BR	Re-use test data from basic model report.

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





7. Test Equipments Utilized

Test Equipment

NO	Description	TVDE	SERIES	MANUFACTURE	CAL DUE	CALIBRATION
NO.	Description	TYPE	NUMBER MANOTACTOR	WANUFACTURE	DATE	INTERVAL
1	LISN	ENV216	101200	Rohde & Schwarz	2024-06-04	1 year
2	Test Receiver	ESCI 3	100344	Rohde & Schwarz	2024-02-20	1 year
3	Test Receiver	ESW44	103023	Rohde & Schwarz	2024-06-08	1 year
4	Test Receiver	ESW44	103015	Rohde & Schwarz	2024-01-11	1 year
5	EMI Antenna	VULB9163	01222	Schwarzbeck	2024-01-28	1 year
6	EMI Antenna	3115	6914	ETS-Lindgren	2024-05-07	1 year

Test Software

Test Item	Test Software and Version	Software Vendor		
Conducted emission	EMC32 V8.53.0	R&S		
Radiated emission	EMC32 V11.50.00	R&S		

8. Measurement Uncertainty

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

Location 1: CTTL(huayuan North Road)

Test item	Frequency ranges	Measurement uncertainty
	30MHz-1GHz	4.72dB(<i>k</i> =2)
Radiated Emission	1GHz-18GHz	4.84dB(k=2)
	18GHz-40GHz	5.12dB(k=2)
Conducted Emission	150kHz-30MHz	3.08dB(k=2)





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 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 and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions. 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.

For the test setup photographs please see the test setup photos document.

A.1.2 EUT Operating Mode

The EUT exercise program was tested using the Burn-in test program for windows.

The system was configured for testing in a typical mode that a customer would normal use.

Cables were attached to each of the available I/O ports. Where applicable, peripherals were attached to the I/O cables. All the external I/O ports were exercised.

LABTM software is used to let the EUT to continuously copy data to external (Hard Disk & SD card) storage media, read and erase the data after copy action was finished. During the test, the a pattern of "H" characters was written to display on the LCD panel; the camera was in video mode; the music was repetitively played through the headset; the WIFI and BT function was on and worked in receiver mode.

A.1.3 Measurement Limit

Frequency range	Field strength limit (μV/m)						
(MHz)	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.

Limit (10m) = limit (3m) + 20(log (3/10))





A.1.4 Test Condition

Voltage (V)	Frequency (Hz)
120	60

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:

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

Where

GA: Antenna factor of receive antenna

G_{PL}: Path Loss

 P_{Mea} : Measurement result on receiver.





Set.36, Mode B, Charging + ping + USB transfer + HDMI display + DP display + SD Card transfer + Camera + MP4

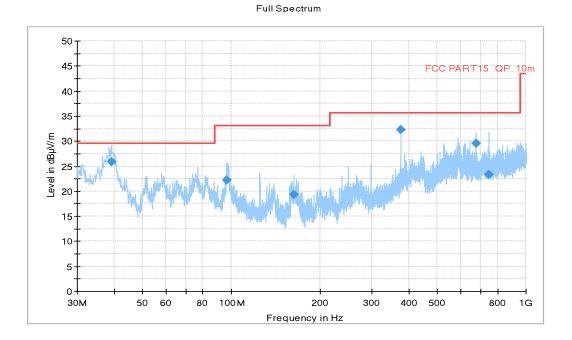


Figure A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency	QuasiPeak	Limit	Margin	Bandwidth	Height	Polarization	Azimuth
(MHz)	$(dB\mu V/m)$	(dBµV/m)	(dB)	(kHz)	(cm)		(deg)
39.21500	25.83	29.54	3.71	120.000	183.0	V	135.0
96.25100	22.27	33.06	10.79	120.000	125.0	V	226.0
162.8900	19.39	33.06	13.67	120.000	100.0	V	-25.0
375.0290	32.28	35.56	3.28	120.000	100.0	V	155.0
675.0500	29.48	35.56	6.08	120.000	183.0	Н	64.0
748.9640	23.28	35.56	12.28	120.000	175.0	Н	264.0





Full Spectrum

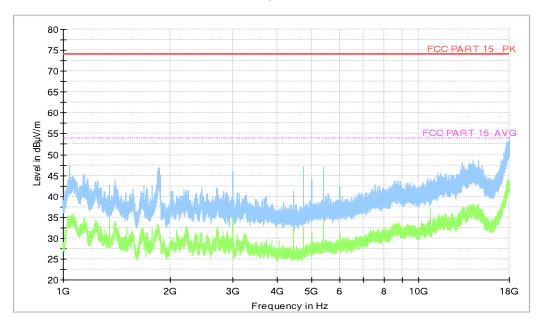


Figure A.2 Radiated Emission from 1GHz to 18GHz

Average detector result

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Limit (dBµV/m)	Margin (dB)	Antenna Pol. (H/V)
1349.860	37.8	-39.9	24.5	53.2	54.0	16.2	V
2995.460	34.7	-39.5	30.0	44.3	54.0	19.3	V
4454.740	34.8	-39.1	32.4	41.5	54.0	19.2	Н
4751.560	32.6	-39.2	32.9	38.9	54.0	21.4	Н
5400.960	43.9	-38.4	34.0	48.3	54.0	10.1	V
5995.620	31.4	-38.4	34.4	35.4	54.0	22.6	Н

Peak detector result

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Limit (dBµV/m)	Margin (dB)	Antenna Pol. (H/V)
1040.800	47.5	-39.9	23.5	63.9	74.0	26.5	Н
1859.860	46.9	-39.8	26.5	60.2	74.0	27.1	V
2997.160	46.1	-39.5	30.0	55.7	74.0	27.9	Н
4751.560	46.4	-39.2	32.9	52.7	74.0	27.6	Н
4993.300	43.6	-38.8	33.3	49.1	74.0	30.4	V
5400.620	47.0	-38.4	34.0	51.4	74.0	27.0	V





Set.37, Mode A, Charging + ping + USB transfer + HDMI display + DP display + SD Card transfer + Camera + MP4

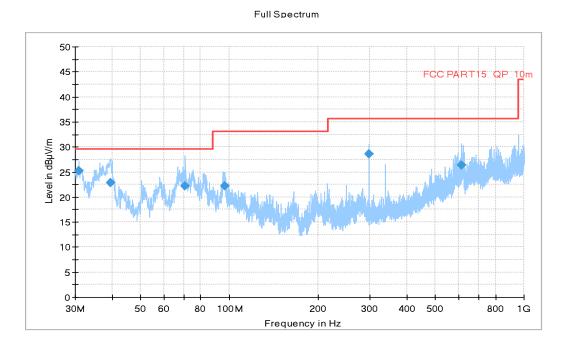


Figure A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

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Frequency	QuasiPeak	Limit	Margin	Bandwidth	Height	Polarization	Azimuth
(MHz)	$(dB\mu V/m)$	$(dB\mu V/m)$	(dB)	(kHz)	(cm)		(deg)
30.87300	25.17	29.54	4.37	120.000	100.0	V	65.0
39.40900	22.78	29.54	6.76	120.000	183.0	V	315.0
70.93400	22.27	29.54	7.27	120.000	183.0	V	211.0
96.63900	22.17	33.06	10.89	120.000	108.0	V	212.0
297.0410	28.62	35.56	6.94	120.000	100.0	V	283.0
614.1340	26.34	35.56	9.22	120.000	183.0	V	-25.0





Full Spectrum

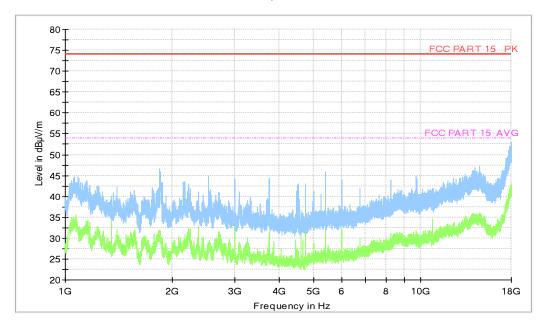


Figure A.4 Radiated Emission from 1GHz to 18GHz

Average detector result

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Limit (dBµV/m)	Margin (dB)	Antenna Pol. (H/V)
1349.860	35.8	-39.9	24.5	51.2	54.0	18.2	V
2375.640	32.8	-39.7	28.0	44.5	54.0	21.2	Н
2998.180	33.4	-39.5	30.0	43.0	54.0	20.6	V
4751.900	33.9	-39.2	32.9	40.2	54.0	20.1	V
5400.620	41.8	-38.4	34.0	46.2	54.0	12.2	V
5989.160	32.2	-38.4	34.4	36.2	54.0	21.8	Н

Peak detector result

Frequency (MHz)	Measurement Result (dBµV/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dBµV)	Limit (dBµV/m)	Margin (dB)	Antenna Pol. (H/V)
1842.860	46.7	-39.8	26.4	60.1	74.0	27.3	V
2535.100	45.0	-39.7	28.4	56.3	74.0	29.0	V
2996.140	44.2	-39.5	30.0	53.8	74.0	29.8	V
3748.900	44.4	-39.2	31.6	51.9	74.0	29.6	V
5400.620	45.8	-38.4	34.0	50.2	74.0	28.2	Н
5998.000	44.0	-38.4	34.4	48.0	74.0	30.0	Н





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.

For the test setup photographs please see the test setup photos document.

A.2.2 EUT Operating Mode

The EUT exercise program was tested using the Burn-in test program for windows.

The system was configured for testing in a typical mode that a customer would normal use.

Cables were attached to each of the available I/O ports. Where applicable, peripherals were attached to the I/O cables. All the external I/O ports were exercised.

LABTM software is used to let the EUT to continuously copy data to external (Hard Disk & SD card) storage media, read and erase the data after copy action was finished. During the test, the a pattern of "H" characters was written to display on the LCD panel; the camera was in video mode; the music was repetitively played through the headset; the WIFI and BT function was on and worked in receiver mode.

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.2.4 Test Condition in charging mode

Voltage (V)	Frequency (Hz)
120	60

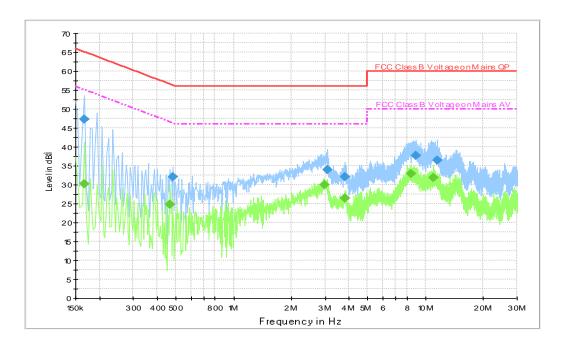
RBW/IF bandwidth	Sweep Time(s)
9kHz	1





A.2.5 Measurement Results

Set.36, Mode B, Charging + ping + USB transfer + HDMI display + DP display + SD Card transfer + Camera + MP4



Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Figure A.11 Conducted Emission

Final Result 1

i iiiai itooait i					
Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	47.4	N	19.7	17.8	65.2
0.482000	32.1	N	19.7	24.2	56.3
3.094000	34.0	L1	19.6	22.0	56.0
3.782000	32.0	N	19.6	24.0	56.0
8.934000	37.7	L1	19.7	22.3	60.0
11.490000	36.4	L1	19.7	23.6	60.0

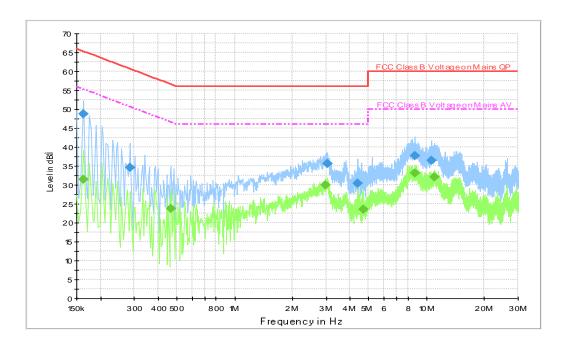
Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.166000	30.2	N	19.7	25.0	55.2
0.466000	24.8	N	19.7	21.7	46.6
2.962000	29.9	L1	19.6	16.1	46.0
3.782000	26.4	N	19.6	19.6	46.0
8.362000	33.0	L1	19.7	17.0	50.0
11.030000	31.9	L1	19.7	18.1	50.0





Set.37, Mode B, Charging + ping + USB transfer + HDMI display + DP display + SD Card transfer + Camera + MP4



Note: The graphic result above is the maximum of the measurements for both phase line and neutral line.

Figure A.12 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.162000	48.7	N	19.7	16.7	65.4
0.286000	34.6	L1	19.7	26.0	60.6
3.030000	35.7	L1	19.6	20.3	56.0
4.390000	30.5	N	19.6	25.5	56.0
8.714000	37.6	L1	19.7	22.4	60.0
10.578000	36.5	L1	19.7	23.5	60.0

Final Result 2

Frequency (MHz)	CAverage (dBµV)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.162000	31.5	N	19.7	23.9	55.4
0.466000	23.8	N	19.7	22.7	46.6
2.970000	29.9	L1	19.6	16.1	46.0
4.694000	23.5	N	19.6	22.5	46.0
8.714000	33.0	L1	19.7	17.0	50.0
10.946000	32.0	L1	19.7	18.0	50.0





ANNEX B: Persons involved in this testing

Test Item	Tester	
Radiated Emission	Ding Zai & Zhang Tianli & Li Pengfei & Yan Hanchen	
Conducted Emission	Li Pengfei	

END OF REPORT