





# TEST REPORT No. I21Z70659-EMC07

for

Samsung Electronics Co., Ltd.

### **Notebook PC**

### NP750XEE

with

### FCC ID: ZCANP750XEE

### Hardware Version: REV1.0

### Software Version: Windows11

### Issued Date: 2022-01-28

#### Note:

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The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

#### Test Laboratory:

#### **CTTL-Telecommunication Technology Labs, CAICT**

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# **REPORT HISTORY**

Report Number	Revision	Description	Issue Date
I21Z70659-EMC07	Rev.0	1 <sup>st</sup> edition	2022-01-28

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





# **CONTENTS**

1.	TEST LABORATORY	4
1.1.	INTRODUCTION & ACCREDITATION	4
1.2.	TESTING LOCATION	4
1.3.	TESTING ENVIRONMENT	4
1.4.	PROJECT DATA	4
1.5.	SIGNATURE	4
2.	CLIENT INFORMATION	5
2.1.	APPLICANT INFORMATION	5
2.2.	MANUFACTURER INFORMATION	5
3.	EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	6
3.1.	ABOUT EUT	6
3.2.	INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST	6
3.3.	INTERNAL IDENTIFICATION OF AE USED DURING THE TEST	6
3.4.	EUT SET-UPS	8
4.	REFERENCE DOCUMENTS	9
4.1.	REFERENCE DOCUMENTS FOR TESTING	9
5.	LABORATORY ENVIRONMENT 1	0
6.	SUMMARY OF TEST RESULTS 1	11
7.	TEST EQUIPMENTS UTILIZED 1	2
	NEX A: MEASUREMENT RESULTS 1	3
	NEX B: PERSONS INVOLVED IN THIS TESTING	21





### 1. Test Laboratory

#### 1.1. Introduction & Accreditation

**Telecommunication Technology Labs, CAICT** is an ISO/IEC 17025:2017 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

#### CTTL (Huayuan North Road)

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

#### 1.3. Testing Environment

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

#### 1.4. Project data

Testing Start Date:	2021-12-10
Testing End Date:	2022-01-28

#### 1.5. Signature

Li Yan (Prepared this test report)

张颖

Zhang Ying (Reviewed this test report)

张晨

Zhang Xia Deputy Director of the laboratory (Approved this test report)





# 2. <u>Client Information</u>

# 2.1. Applicant Information

Company Name:	Samsung Electronics Co., Ltd.
Address:	19 Chapin Rd., Building D Pine Brook, NJ 07058
City:	/
Postal Code:	/
Country:	/
Contact:	Jenni Chun
Email:	j1.chun@samsung.com
Telephone:	+1-201-937-4203

### 2.2. Manufacturer Information

Company Name:	Samsung Electronics. Co., Ltd.
Address:	Samsung R5, Maetan dong 129, Samsung ro Youngtong gu, Suwon city 443 742, Korea
City:	/
Postal Code:	/
Country:	/
Contact:	Sunghoon Cho
Email:	ggobi.cho@samsung.com
Telephone:	+82-10-2722-4159





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

### 3.1. About EUT

Description	Notebook PC
Model name	NP750XEE
FCC ID	ZCANP750XEE

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*	IMEI/SN	<b>HW Version</b>	SW Version
EUT1	2170659UT15a	REV1.0	Windows 11
EUT3	2170659UT24a	REV1.0	Windows 11
EUT3	2170659UT17a	REV1.0	Windows 11
EUT4	2170659UT18a	REV1.0	Windows 11

\*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	Adapter	/	/		
AE2	HDMI Cable	/	/		
AE3	Display	/	/		
AE4	Mouse	/	USB		
AE5	Mobile HD	/	USB		
AE6	Mobile HD	/	Type-C		
AE7	SD card	/	/		
AE8	Headset	/	/		
AE9	Battery	/	/		
AE10	Data Cable	/	/		
AE1					
Model		EP-TA865			
Manufacturer		DONGYANG E&P Inc	DONGYANG E&P Inc		
Length of ca	able	/			
AE9					
Model		AA-PBSN4AT			
Manufacturer		SAMSUNG SDI CO., LTD. ( SDI )			
Capacitance		/			
Nominal voltage		/			
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.

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

Samples undergoing test were selected by the client.

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

#### 3.5. Key component list

Item	Spec.	Vendor	Vendor Model
CPU	Intel Alder Lake-U 28W(I7)	INTEL	INTEL(R) CORE(TM) PROCESSOR I7-1260P
CPU	Intel Alder Lake-U 28W(I5)	INTEL	INTEL(R) CORE(TM) PROCESSOR I5-1240P
WLAN	AX201.D2WG.SNVW	INTEL	AX201D2W
Marran	LPDDR4X 8GB	Samsung Electronics Co.,Ltd. (SAMSUNG)	K4U6E3S4AA-MGCR
Memory	LPDDR4X 16GB	Samsung Electronics Co.,Ltd. ( SAMSUNG)	K4UBE3D4AA-MGCR
		Samsung Electronics Co.,Ltd. ( SAMSUNG)	MZVLQ256HBJD-00BKN
	256G M.2 2280 PCIe(NVMe)	SOLID STATES STORAGE TECHNOLOGY CORPORATION (SSSTC)	CL1-8D256
SSD	D 512G M.2 2280 PCIe(NVMe) 1T M.2 2280 PCIe(NVMe)	Samsung Electronics Co.,Ltd. (SAMSUNG)	MZVLQ512HBLU-00BKN
330		SOLID STATES STORAGE TECHNOLOGY CORPORATION (SSSTC)	CL1-8D512
		Samsung Electronics Co.,Ltd. ( SAMSUNG)	MZVLQ1T0HBLB-00BKN
		Western Digital (WD)	SDBPNPZ-1T00
VRAM	GDDR6 2GB	Samsung Electronics Co.,Ltd. ( SAMSUNG)	K4Z80325BC-HC14
	15.6" FHD IPS(Old IC)	BOE	LM156LF5L03
LCD	15.6" FHD IPS(New IC)	BOE	NE156FHM-NS0
Antorra	1	INNOWAVE	/
Antenna	1	SPEED	/

Note: EUT1, EUT2, EUT3 and EUT4 correspond to the configurations of different key components.

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# 3.6. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+AE1 +AE2+AE3+AE4+AE5+AE6+AE7+AE8+AE9+AE10	EUT1+ Adapter1
Set.2	EUT2+AE1 +AE2+AE3+AE4+AE5+AE6+AE7+AE8+AE9+AE10	EUT2+ Adapter1
Set.3	EUT3+AE1 +AE2+AE3+AE4+AE5+AE6+AE7+AE8+AE9+AE10	EUT3+ Adapter1
Set.4	EUT4+AE1 +AE2+AE3+AE4+AE5+AE6+AE7+AE8+AE9+AE10	EUT4+ Adapter1

Note:

All of the above set-ups and test modes were tested, and only the worst results are shown in this report.





# 4. <u>Reference Documents</u>

#### 4.1. Documents supplied by applicant

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.

<b>Reference</b> FCC 47 CFR Part 15, Subpart B	<b>Title</b> Radio frequency devices - Unintentional Radiators	Version 2021
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 × 17 meters × 10 meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 35 °C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding offectiveness	0.014MHz - 1MHz, >60dB;
Shielding effectiveness	1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	<4 Ω
Normalised site attenuation (NSA)	< $\pm$ 4 dB, 3m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S <sub>VSWR</sub> )	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
Vardiat Caluma	NA	Not applicable
Verdict Column	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	Ρ	CTTL(Huayuan North Road)





# 7. Test Equipments Utilized

			SERIES		CAL DUE	CALIBRATI
NO.	Description	TYPE	NUMBER	MANUFACTURE	DATE	ON
			NUMBER			INTERVAL
1	Test Receiver	ESCI	100344	R&S	2022-02-23	1 year
2	LISN	ENV216	101200	R&S	2022-05-30	1 year
3	Test Receiver	ESW44	103023	R&S	2022-10-28	1 year
4	Analytical	FSW67	103290	R&S	2022-01-20	1 yoor
4	Spectrometer	F3007	103290	Rao	2022-01-20	1 year
5	Test Receiver	ESU 26	100235	R&S	2022-02-23	1 year
6	EMI Antenna	VULB 9163	9163-01223	Schwarzbeck	2022-03-22	1 year
7	EMI Antenna	3115	00167250	ETS-Lindgren	2022-07-01	1 year

Note: the Analytical Spectrometer which series number is 103290 was before Cal Due Date when used.





# 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.

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		

#### A.1.3 Measurement Limit

Note: the above limit is for 3 meters test distance. 10 meters' limit is got by converting. Limit  $(10m) = \text{limit} (3m) + 20(\log (3/10))$ 





#### 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

G<sub>A</sub>: Antenna factor of receive antenna

G<sub>PL</sub>: Path Loss

P<sub>Mea</sub>: Measurement result on receiver.

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

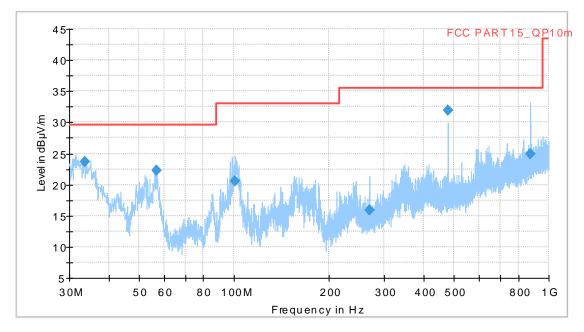
Note: all the set-up lists in section 3.6 were tested and only the worst test data of worst set-up showed in this section.







Full Spectrum



Preview Result 1-PK+ [Preview Result 1.Result:1]
Critical\_Freqs PK+ [Critical\_Freqs.Result:4]
FCC PART15\_QP10m [..\]
Final\_Result QPK [Final\_Result.Result:4]

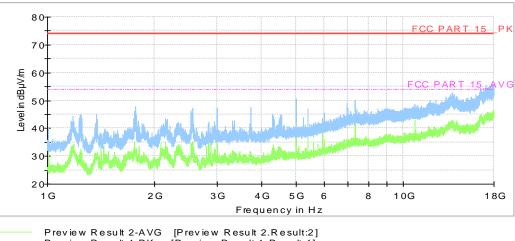


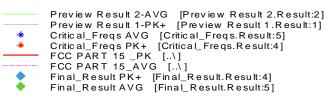
Frequency	QuasiPeak	Limit	Margin	Meas.	Bandwidth	Height	Polarization	Azimuth
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	Time	(kHz)	(cm)		(deg)
				(ms)				
33.49200	23.68	29.54	5.86	2000.0	120.000	95.0	V	120.0
56.86900	22.30	29.54	7.24	2000.0	120.000	402.0	Н	151.0
101.0040	20.62	33.06	12.44	2000.0	120.000	183.0	V	280.0
269.4930	15.96	35.56	19.60	2000.0	120.000	125.0	V	210.0
479.9830	31.90	35.56	3.66	2000.0	120.000	95.0	V	-9.0
874.0940	24.99	35.56	10.57	2000.0	120.000	402.0	V	120.0





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)
1762.167	35.0	-39.8	26.1	48.781	54.0	19.0	Н
2836.567	38.1	-39.6	29.4	48.299	54.0	15.9	Н
2995.233	38.6	-39.5	30.0	48.151	54.0	15.4	V
4998.967	38.7	-38.8	33.3	44.166	54.0	15.3	V
5400.733	39.9	-38.4	34.0	44.306	54.0	14.1	V
7334.767	42.9	-36.9	36.5	43.224	54.0	11.1	V

#### 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)
1371.167	45.0	-39.9	24.5	60.369	74.0	29.000	V
1772.933	47.9	-39.8	26.1	61.605	74.0	26.100	Н
2563.433	47.3	-39.7	28.5	58.549	74.0	26.700	V
3733.600	47.7	-39.2	31.6	55.269	74.0	26.300	V
4996.700	49.9	-38.8	33.3	55.366	74.0	24.100	Н
7334.767	50.2	-36.9	36.5	50.524	74.0	23.800	V





#### 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



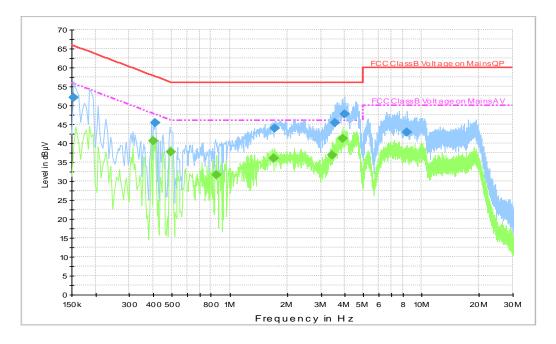


#### A.2.5 Measurement Results

Measurement uncertainty: U= 3.08 dB, k=2.

Note: all the set-up lists in section 3.6 were tested and only the worst test data of worst set-up showed in this section.

#### Set.1



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

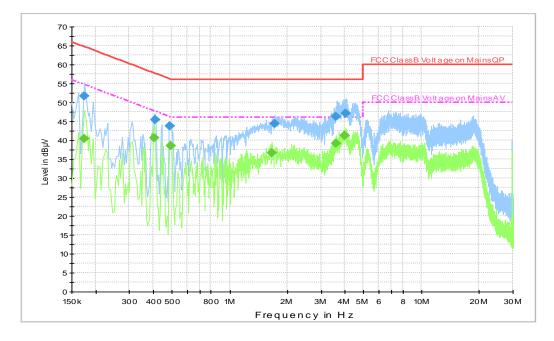
FINAL RE											
Frequency	QuasiPeak	Meas. Time	Bandwidth	Filter	Line	C	orr.	Mar	gin	Lin	nit
(MHz)	(dBµV)	(ms)	(kHz)			(	dB)	(d	B)	(dB	μV)
0.154000	52.1	2000.0	9.000	On	N	1	9.8	13.	7	65.	8
0.410000	45.3	2000.0	9.000	On	L1	1	9.9	12.	3	57.	6
1.726000	43.9	2000.0	9.000	On	Ν	1	9.7	12.	1	56.	0
3.554000	45.3	2000.0	9.000	On	Ν	1	9.7	10.	7	56.	0
3.974000	47.7	2000.0	9.000	On	Ν	1	9.7	8.3		56.	0
8.454000	42.8	2000.0	9.000	On	Ν	1	9.8	17.	2	60.	0
Final Re	esult 2										
Frequency	Average	Meas. Time	Bandwidth	Filter	Li	ne	Co	orr.	Ма	rgin	Limit
(MHz)	(dBµV)	(ms)	(kHz)				(d	B)	(d	B)	(dBµ∖
0.402000	40.5	2000.0	9.000	On	L	l	19.	9	7.3	;	47.8
0.494000	37.8	2000.0	9.000	On	N		20.	0	8.3	;	46.1
0.858000	31.6	2000.0	9.000	On	Ν		19.	8	14	.4	46.0
1.694000	36.0	2000.0	9.000	On	N		19.	7	10	.0	46.0
3.438000	37.0	2000.0	9.000	On	Ν		19.	7	9.0	)	46.0
3.902000	41.3	2000.0	9.000	On	Ν		19.	7	4.7	,	46.0

Figure A.3 Conducted Emission





#### Set.2



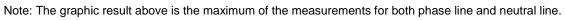


Figure A.4 Conducted Emission

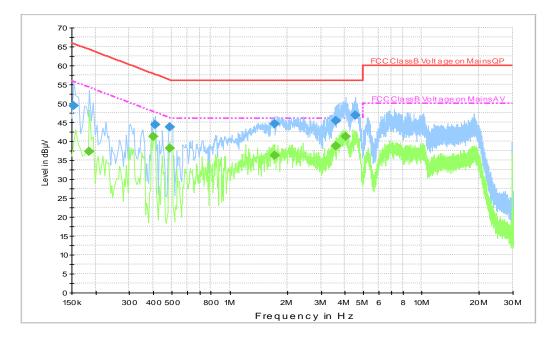
Final Re	esult 1		•					
Frequency	QuasiPeak	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.174000	51.6	2000.0	9.000	On	L1	20.0	13.2	64.8
0.410000	45.4	2000.0	9.000	On	Ν	19.9	12.3	57.6
0.486000	43.8	2000.0	9.000	On	L1	19.9	12.4	56.2
1.714000	44.4	2000.0	9.000	On	Ν	19.7	11.6	56.0
3.598000	46.2	2000.0	9.000	On	Ν	19.7	9.9	56.0
4.014000	47.2	2000.0	9.000	On	Ν	19.7	8.8	56.0
Elmal D								

Frequency	Average	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.174000	40.4	2000.0	9.000	On	L1	20.0	14.4	54.8
0.406000	40.6	2000.0	9.000	On	L1	19.9	7.1	47.7
0.494000	38.6	2000.0	9.000	On	L1	19.9	7.5	46.1
1.666000	36.8	2000.0	9.000	On	Ν	19.8	9.2	46.0
3.598000	39.3	2000.0	9.000	On	Ν	19.7	6.7	46.0
3.998000	41.2	2000.0	9.000	On	Ν	19.7	4.8	46.0





#### Set.3



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

Figure A.5 Conducted Emission

Final Re	esult 1							
Frequency	QuasiPeak	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.154000	49.4	2000.0	9.000	On	Ν	19.8	16.4	65.8
0.410000	44.3	2000.0	9.000	On	L1	19.9	13.3	57.6
0.486000	43.8	2000.0	9.000	On	L1	19.9	12.4	56.2
1.718000	44.6	2000.0	9.000	On	Ν	19.7	11.4	56.0
3.570000	45.4	2000.0	9.000	On	Ν	19.7	10.6	56.0
4.514000	47.0	2000.0	9.000	On	Ν	19.7	9.0	56.0
Elmal D	I <mark>. 0</mark>							

Frequency	Average	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.186000	37.3	2000.0	9.000	On	N	19.7	16.9	54.2
0.402000	41.4	2000.0	9.000	On	L1	19.9	6.5	47.8
0.490000	38.2	2000.0	9.000	On	L1	19.9	8.0	46.2
1.714000	36.2	2000.0	9.000	On	L1	19.5	9.8	46.0
3.570000	38.8	2000.0	9.000	On	N	19.7	7.2	46.0
4.034000	41.3	2000.0	9.000	On	N	19.7	4.8	46.0





# **ANNEX B: Persons involved in this testing**

Test Item	Tester
Radiated Emission	DING Zai, ZHANG Tianli, LI Pengfei
Conducted Emission	ZHANG Tianli

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