TEST REPORT

No. I17Z62126-EMC01

for

TCL Communication Ltd.

LTE/UMTS/GSM mobile phone

Model Name: 5086A

FCC ID: 2ACCJH079

with

Hardware Version: PIO

Software Version: v8KT8

Issued Date: 2017-12-27

TESTING
NVLAP LAB CODE 600118-0

Note:

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Test Laboratory:

CTTL, Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z62126-EMC01	Rev.0	1st edition	2017-12-21
I17Z62126-EMC01	Rev.1	Update calibration due date for CMW500(143008) on page 11	2017-12-27

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1. Test Laboratory

1.1. Testing Location

CTTL (yizhuang)

Address: No.18A, Kangding Street, Beijing Economic-Technology Development Area, Beijing, P. R. China 100176

1.2. Testing Environment

Normal Temperature: 15-35℃

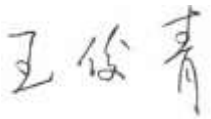
Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-12-10

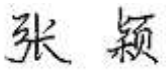
Testing End Date: 2017-12-20

1.4. Signature



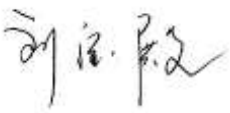
Wang Junqing

(Prepared this test report)



Zhang Ying

(Reviewed this test report)



Liu Baodian

Deputy Director of the laboratory

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address /Post:	5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park, Pudong Area Shanghai, P.R. China. 201203
Contact Person:	Gong Zhizhou
Contact Email	zhizhou.gong@tcl.com
Telephone:	0086-21-31363544
Fax:	0086-21-61460602

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

3.1. About EUT

Description	LTE/UMTS/GSM mobile phone
Model Name	5086A
FCC ID	2ACCJH079
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.8VDC)

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
EUT1	354245090200141	PIO	v8KT8

*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	Battery	/	/
AE2	Battery	/	/
AE3	Charger	/	/
AE4	Charger	/	/
AE14	USB Cable	/	/
AE15	USB Cable	/	/

AE1

Model	CAC2900007C1
Manufacturer	BYD
Capacitance	2900mAh
Nominal voltage	/

AE2

Model	CAC2900009C7
Manufacturer	VEKEN
Capacitance	2900mAh
Nominal voltage	/

AE3

Model	CBA0059AGAC4
Manufacturer	Aohai
Length of cable	/

AE4

Model	CBA0059AGAC2
Manufacturer	Tenpao
Length of cable	/

AE14

Model	CDA0000103CF
Manufacturer	LUXSHARE
Length of cable	95cm

AE15

Model	CDA0000103C1
Manufacturer	JUWEI
Length of cable	95cm

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

Note: The USB cables are shielded.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1/AE2+AE3+AE14/AE15	Charger
Set.2	EUT1+ AE1/AE2+AE4+AE14/AE15	Charger
Set.3	EUT1+ AE14/AE15	USB

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 - Unintentional Radiators	2016
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 ℃, Max. = 35 ℃
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

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 35 ℃
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, 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 3000 MHz

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

Temperature	Min. = 15 ℃, Max. = 35 ℃
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

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

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESU26	100235	R&S	2018-04-01	1 year
2	Test Receiver	ESCI 7	100344	R&S	2018-03-15	1 year
3	Universal Radio Communication Tester	CMW500	143008	R&S	2018-12-26	1 year
4	Universal Radio Communication Tester	CMW500	155415	R&S	2018-02-15	1 year
5	LISN	ENV216	101200	R&S	2018-08-03	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2020-06-19	3 years
7	EMI Antenna	3115	00167250	ETS-Lindgren	2020-05-21	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
10	Keyboard	L100	CN0RH659658907ATOI40	DELL	N/A	N/A
11	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01	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 (USB mode of MS and charging 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 USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

A.1.3 Measurement Limit

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

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/1MHz	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_A: Antenna factor of receive antenna

G_{PL}: Path Loss

P_{Mea}: Measurement result on receiver.

Measurement uncertainty (worst case): U = 4.3 dB, k=2.

Measurement results for Set.1:

Charging Mode/Average detector

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)
17636.250	38.8	-25.8	41.1	23.51	54.0	15.2	V
17612.250	38.7	-25.8	41.1	23.38	54.0	15.3	V
16932.750	38.6	-25.7	41.4	22.90	54.0	15.4	H
17577.000	38.6	-25.7	41.1	23.14	54.0	15.4	V
17621.250	38.6	-25.8	41.1	23.36	54.0	15.4	H
17943.000	38.6	-24.8	40.8	22.53	54.0	15.4	H

Charging Mode/Peak detector

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)
16866.750	51.2	-25.9	41.5	35.63	74.0	22.8	V
17008.500	50.7	-25.6	41.4	34.86	74.0	23.3	H
17570.250	50.6	-25.6	41.1	35.05	74.0	23.4	V
17621.250	50.5	-25.8	41.1	35.28	74.0	23.5	V
17534.250	50.5	-25.5	41.2	34.84	74.0	23.5	V
16944.750	50.5	-25.7	41.4	34.72	74.0	23.5	H

Measurement results for Set.2:

Charging Mode/Average detector

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)
17656.500	38.7	-25.5	41.1	23.15	54.0	15.3	V
17619.750	38.7	-25.8	41.1	23.40	54.0	15.3	H
16946.250	38.7	-25.7	41.4	22.90	54.0	15.3	V
17582.250	38.6	-25.7	41.1	23.20	54.0	15.4	H
17638.500	38.6	-25.8	41.1	23.34	54.0	15.4	V
17637.000	38.6	-25.8	41.1	23.33	54.0	15.4	H

Charging Mode/Peak detector

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)
15429.750	51.2	-26.4	40.0	37.62	74.0	22.8	V
17566.500	50.9	-25.6	41.1	35.41	74.0	23.1	V
17953.500	50.8	-24.9	40.8	34.92	74.0	23.2	V
17010.000	50.6	-25.6	41.4	34.79	74.0	23.4	H
17528.250	50.5	-25.5	41.2	34.79	74.0	23.5	H
17640.000	50.5	-25.8	41.1	35.18	74.0	23.5	V

Measurement results for Set.3:

USB Mode/Average detector

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)
17637.000	38.7	-25.8	41.1	23.40	54.0	15.3	V
17013.750	38.7	-25.6	41.4	22.85	54.0	15.3	H
17617.500	38.6	-25.8	41.1	23.35	54.0	15.4	H
17654.250	38.6	-25.5	41.1	23.05	54.0	15.4	V
17625.000	38.6	-25.9	41.1	23.33	54.0	15.4	V
17967.750	38.6	-25.1	40.8	22.85	54.0	15.4	V

USB Mode/ Peak detector

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)
16644.000	50.8	-26.0	41.3	35.49	74.0	23.2	H
16894.500	50.8	-25.8	41.4	35.20	74.0	23.2	H
16848.000	50.8	-26.0	41.5	35.31	74.0	23.2	V
17058.750	50.7	-25.5	41.4	34.92	74.0	23.3	V
17533.500	50.4	-25.5	41.2	34.76	74.0	23.6	H
17800.500	50.4	-23.1	41.0	32.54	74.0	23.6	V

Note: The measurement results of Set.1, Set.2 and Set.3 showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.1

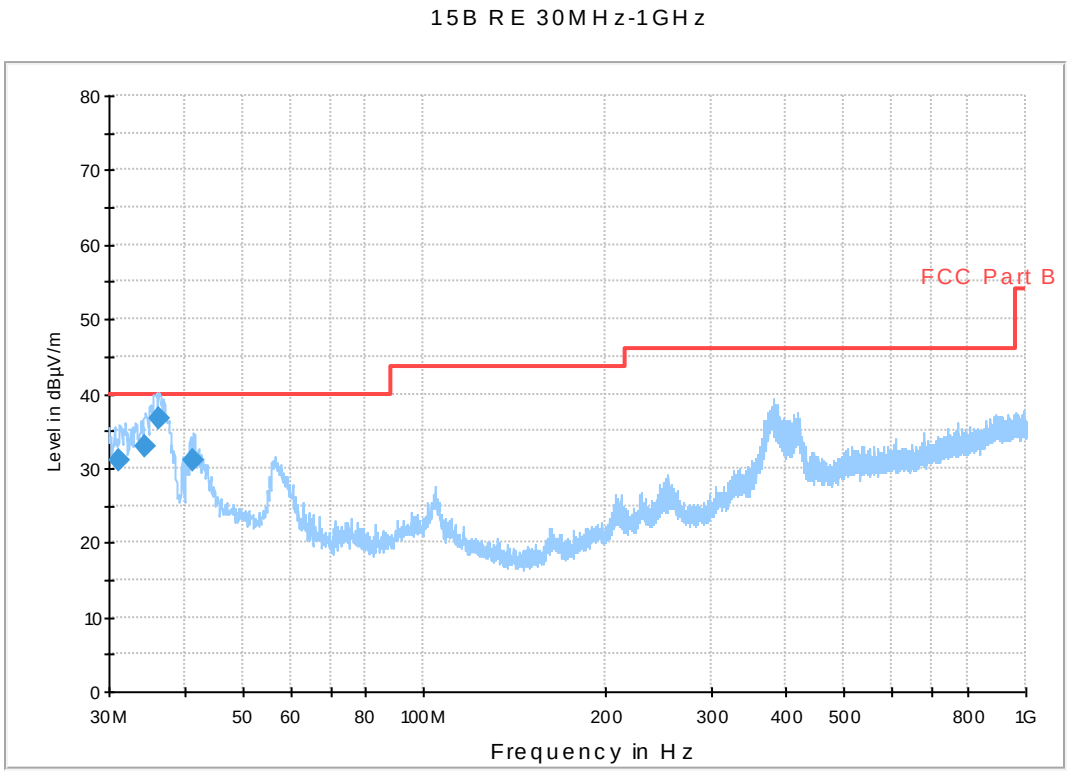


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
31.261000	31.0	100.0	V	121.0	-2.7	9.0	40.0	
34.462000	32.8	100.0	V	197.0	-2.0	7.2	40.0	
36.402000	36.6	100.0	V	236.0	-1.6	3.4	40.0	
41.446000	31.1	125.0	V	149.0	-0.9	8.9	40.0	

15B RE - 1GHz-3GHz

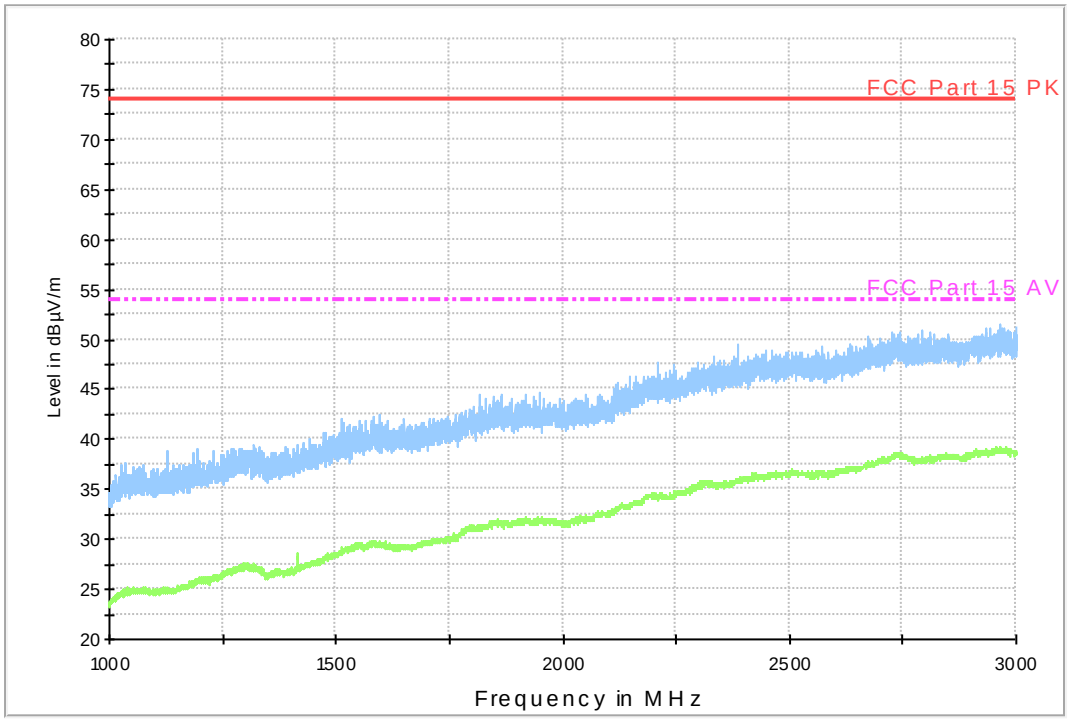


Fig A.2 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

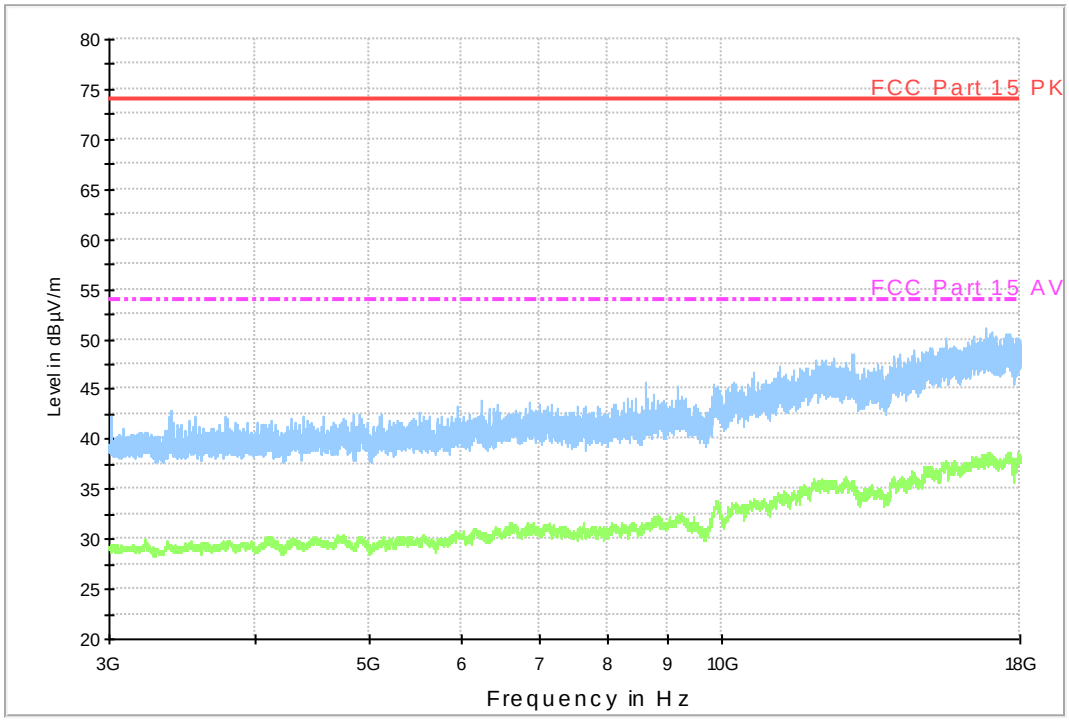


Fig A.3 Radiated Emission from 3GHz to 18GHz

Charging Mode, Set.2

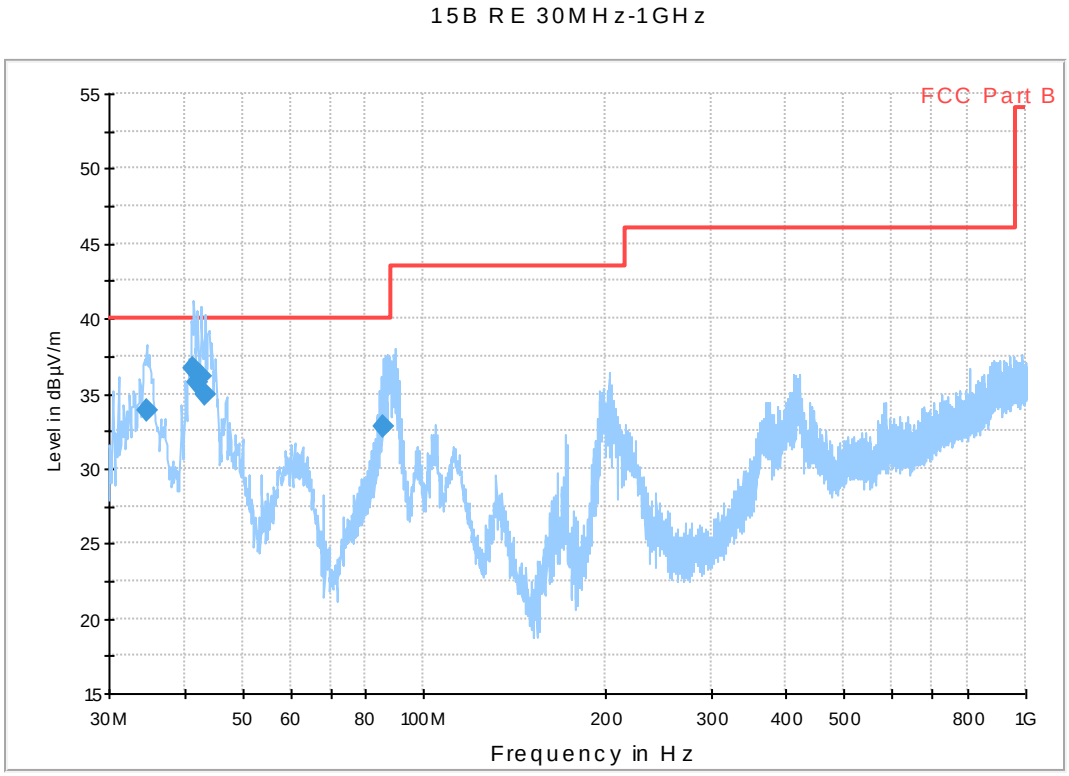


Fig A.4 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
34.656000	33.9	100.0	V	0.0	-2.0	6.1	40.0	
41.446000	36.7	100.0	V	145.0	-0.9	3.3	40.0	
42.125000	35.7	100.0	V	139.0	-0.8	4.3	40.0	
42.707000	36.2	100.0	V	307.0	-0.8	3.8	40.0	
43.386000	34.9	100.0	V	180.0	-0.8	5.1	40.0	
85.678000	32.8	114.0	V	304.0	-4.1	7.2	40.0	

15B RE - 1GHz-3GHz

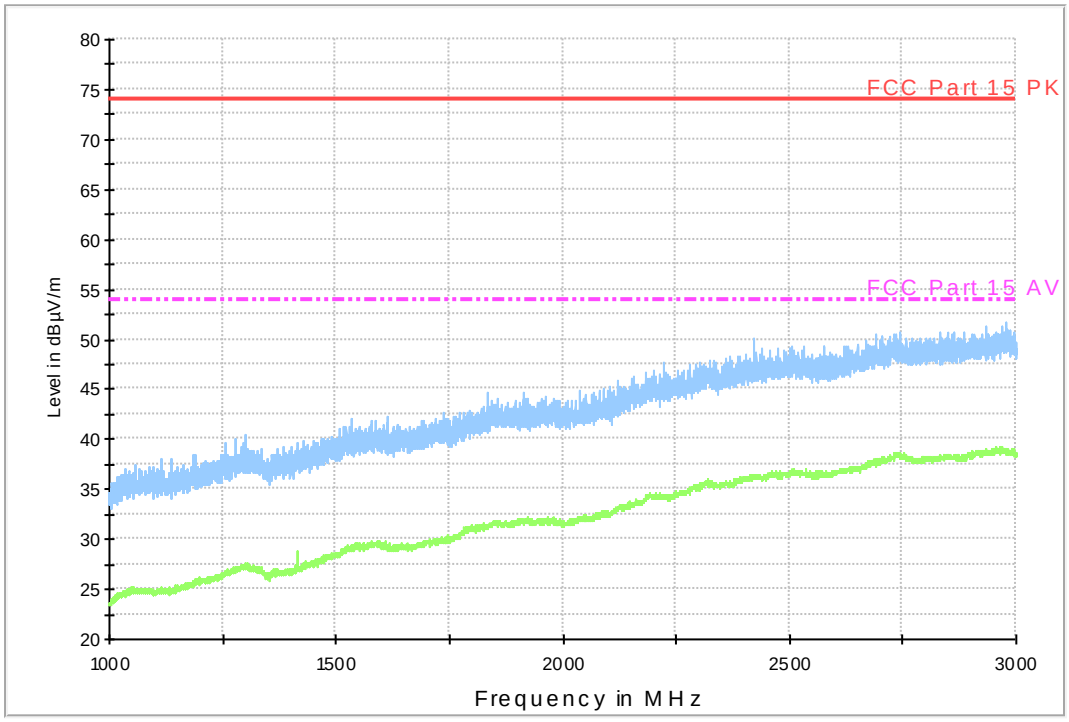


Fig A.5 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

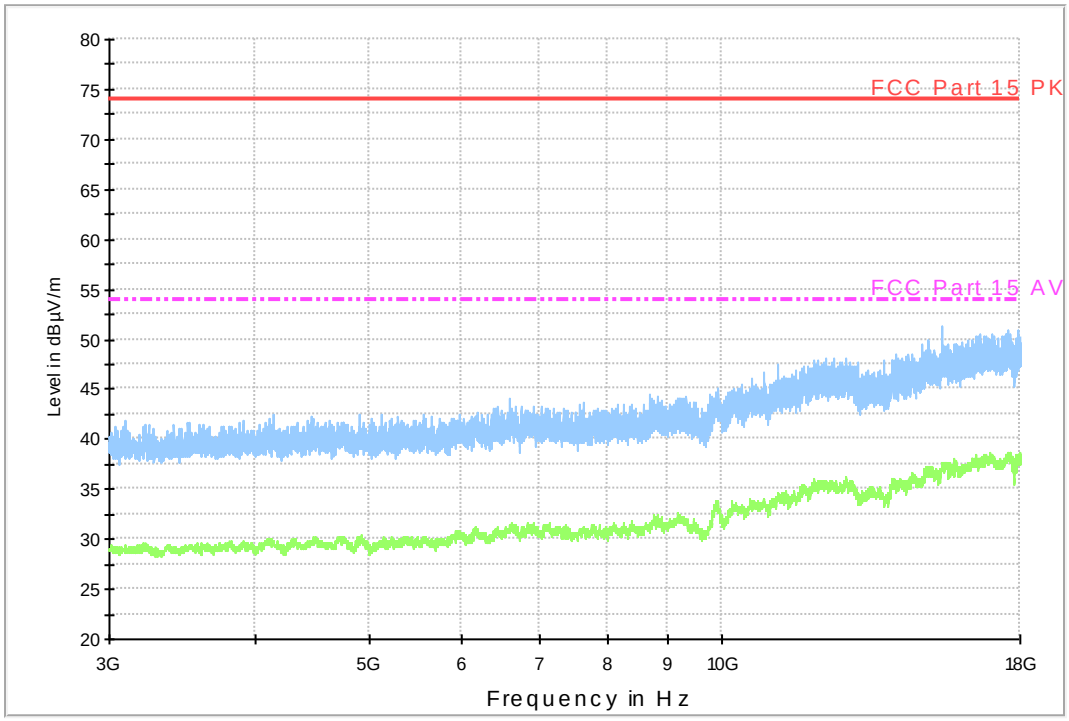


Fig A.6 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.3

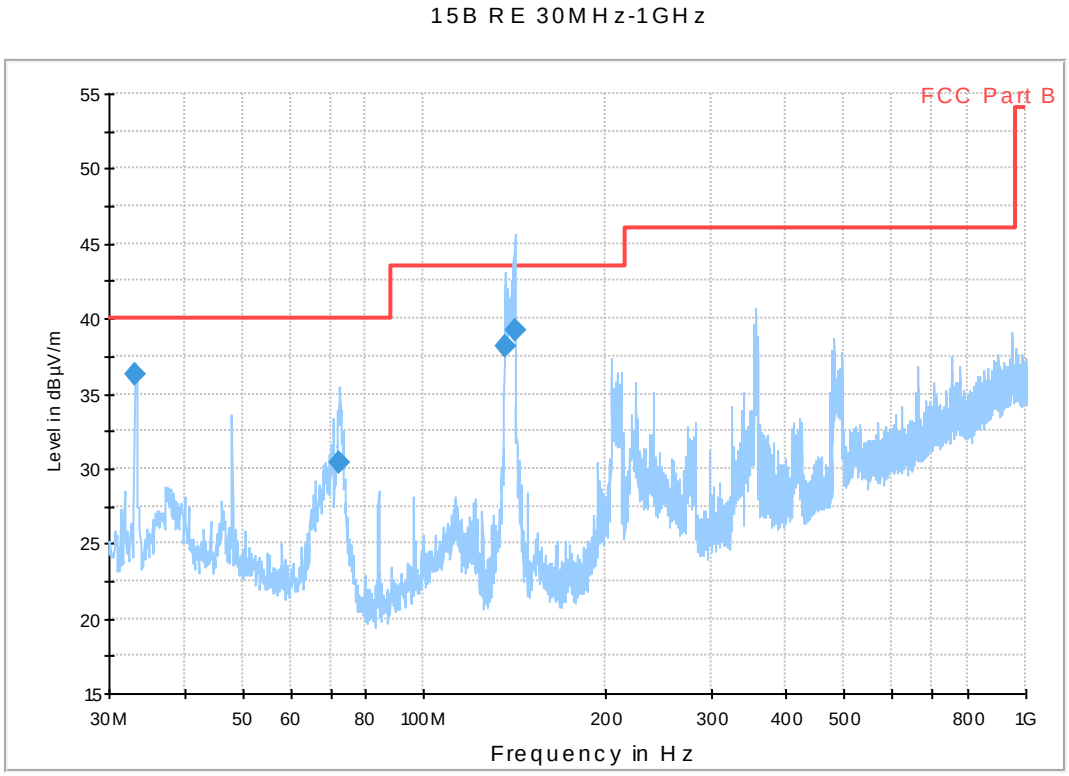


Fig A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBµV/m)	Comment
33.201000	36.3	100.0	V	214.0	-2.3	3.7	40.0	
72.583000	30.4	109.0	V	76.0	-4.8	9.6	40.0	
136.506000	38.2	109.0	V	-10.0	-5.5	5.3	43.5	
141.453000	39.2	114.0	V	11.0	-5.8	4.3	43.5	

15B RE - 1GHz-3GHz

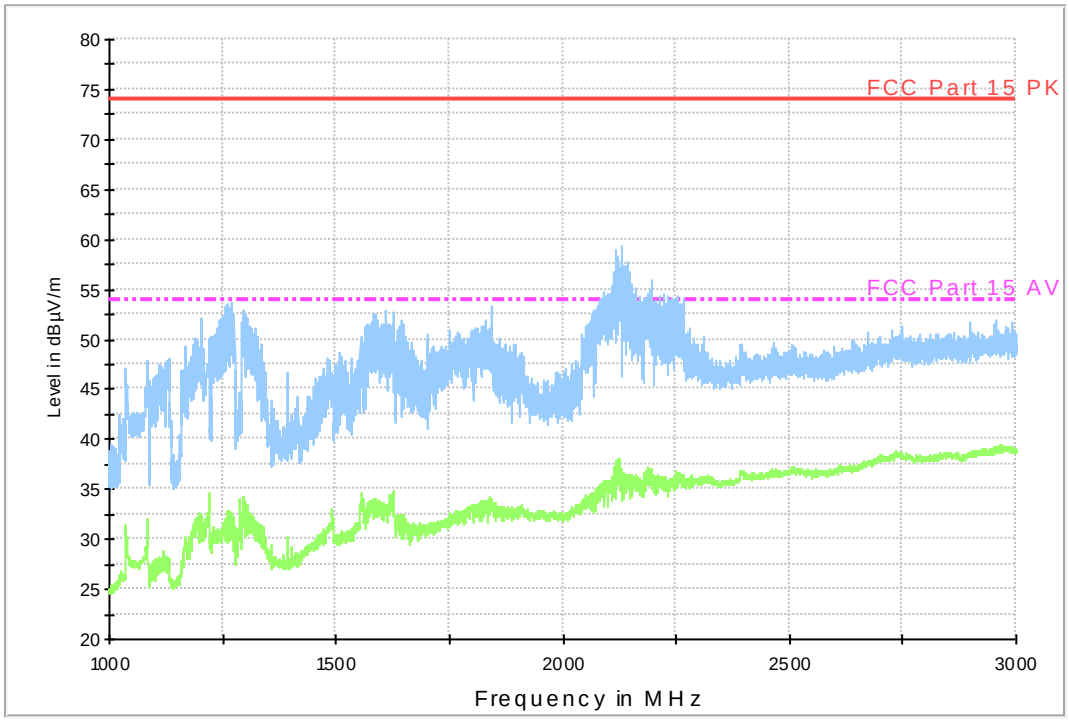


Fig A.8 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

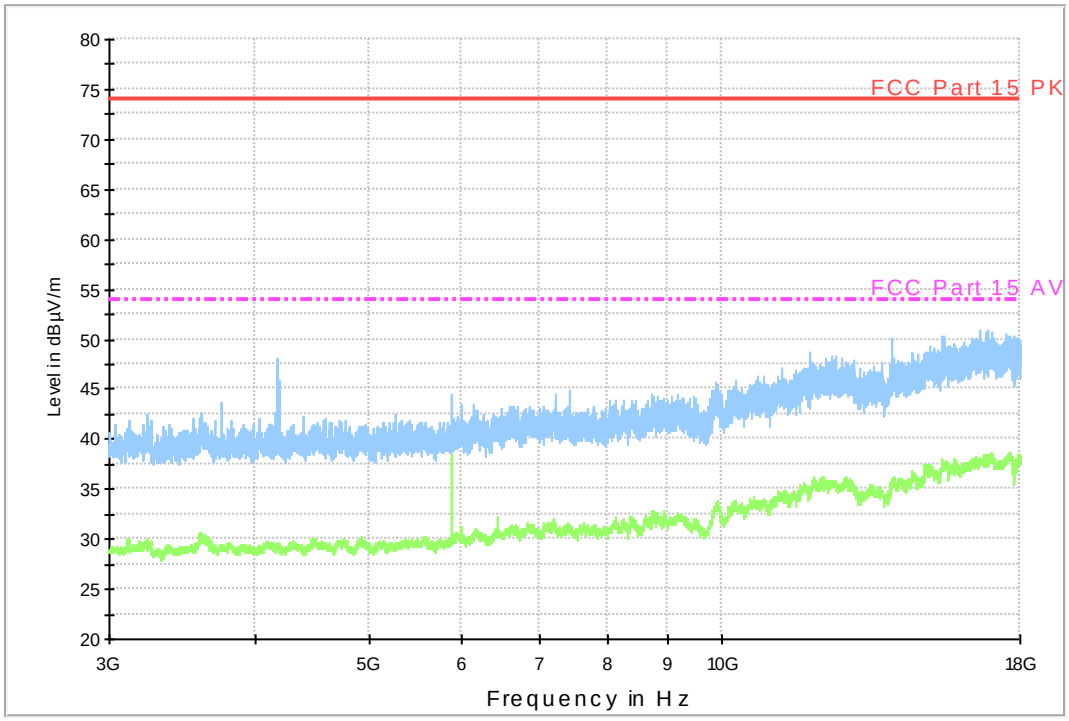


Fig A.9 Radiated Emission from 3GHz to 18GHz

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 USB mode and charging mode. During the test MS is connected to a PC via a USB cable in the case of USB mode and is connected to a charger in the case of charging mode. The model of the PC is DELL OPTIPLEX 380, and the serial number of the PC is 2X1YV2X. The software is used to let the PC keep on copying data to MS, reading and erasing the data after copy action was finished.

Note：I/O information：Printer – USB, Mouse – PS/2, Keyboard – USB.

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*= 2.9 dB, *k*=2.

Charging Mode, Set.1

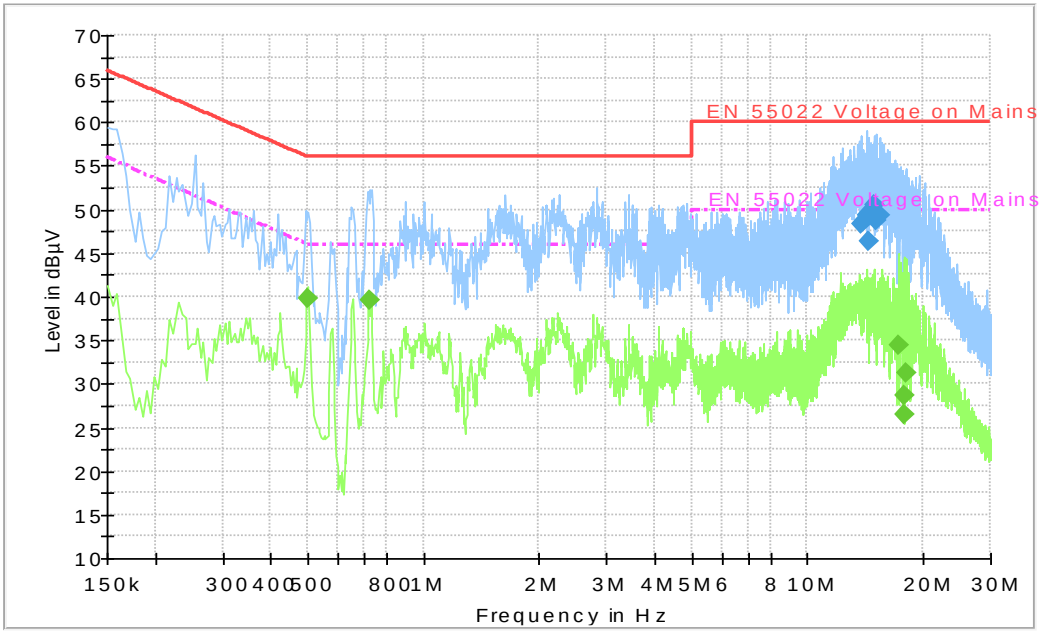


Fig A.10 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
13.866000	48.3	2000.0	9.000	L1	10.8	11.7	60.0
14.226000	49.3	2000.0	9.000	L1	10.8	10.7	60.0
14.370000	46.4	2000.0	9.000	L1	10.8	13.6	60.0
14.887500	50.5	2000.0	9.000	L1	10.9	9.5	60.0
15.153000	48.8	2000.0	9.000	L1	10.9	11.2	60.0
15.445500	49.3	2000.0	9.000	L1	10.9	10.7	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.501000	39.9	2000.0	9.000	L1	10.2	6.1	46.0
0.726000	39.5	2000.0	9.000	L1	10.2	6.5	46.0
17.380500	34.5	2000.0	9.000	L1	11.0	15.5	50.0
17.880000	26.5	2000.0	9.000	L1	11.1	23.5	50.0
17.961000	28.7	2000.0	9.000	L1	11.1	21.3	50.0
18.033000	31.2	2000.0	9.000	L1	11.1	18.8	50.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

Charging Mode, Set.2

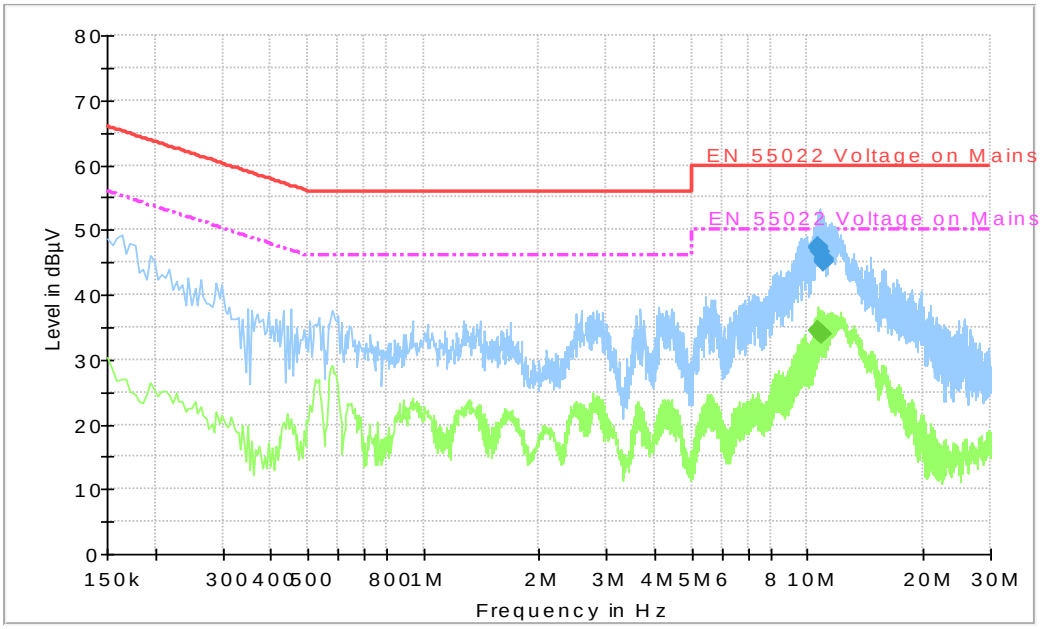


Fig A.11 Conducted Emission

Final Result 1

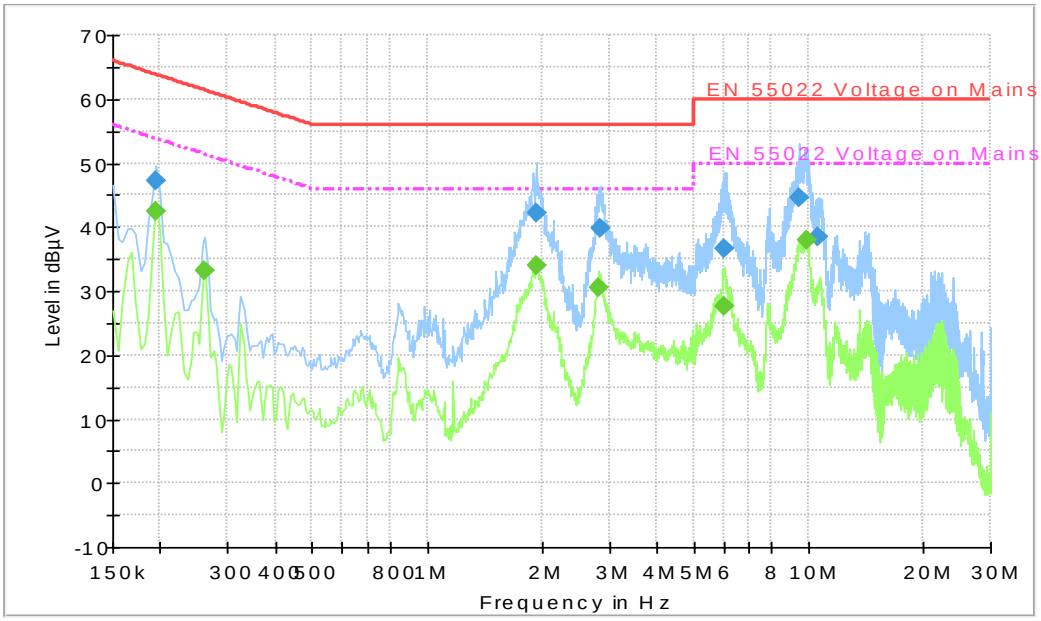
Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
10.626000	47.4	2000.0	9.000	L1	10.6	12.6	60.0
10.702500	47.2	2000.0	9.000	L1	10.6	12.8	60.0
10.833000	46.8	2000.0	9.000	L1	10.6	13.2	60.0
10.977000	45.6	2000.0	9.000	L1	10.6	14.4	60.0
11.004000	45.4	2000.0	9.000	L1	10.6	14.6	60.0
11.035500	45.0	2000.0	9.000	L1	10.6	15.0	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
10.657500	34.5	2000.0	9.000	L1	10.6	15.5	50.0
10.675500	34.5	2000.0	9.000	L1	10.6	15.5	50.0
10.702500	34.5	2000.0	9.000	L1	10.6	15.5	50.0
10.779000	34.3	2000.0	9.000	L1	10.6	15.7	50.0
10.806000	34.1	2000.0	9.000	L1	10.6	15.9	50.0
10.855500	34.0	2000.0	9.000	L1	10.6	16.0	50.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

USB Mode, Set.3



Final Result 1

Frequency (MHz)	QuasiPeak (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.195000	47.3	2000.0	9.000	N	10.2	16.6	63.8
1.927500	42.3	2000.0	9.000	N	10.3	13.7	56.0
2.832000	39.8	2000.0	9.000	N	10.3	16.2	56.0
6.004500	36.5	2000.0	9.000	L1	10.4	23.5	60.0
9.429000	44.6	2000.0	9.000	L1	10.5	15.4	60.0
10.603500	38.4	2000.0	9.000	L1	10.6	21.6	60.0

Final Result 2

Frequency (MHz)	Average (dBµV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)
0.195000	42.3	2000.0	9.000	N	10.2	11.5	53.8
0.262500	33.2	2000.0	9.000	L1	10.1	18.1	51.4
1.936500	33.9	2000.0	9.000	N	10.3	12.1	46.0
2.814000	30.6	2000.0	9.000	L1	10.3	15.4	46.0
6.027000	27.6	2000.0	9.000	L1	10.4	22.4	50.0
9.843000	37.8	2000.0	9.000	N	10.6	12.2	50.0

Note: The measurement results showed here are worst cases of the combinations of different batteries and USB cables.

ANNEX B: Accreditation Certificate

United States Department of Commerce
National Institute of Standards and Technology

NVLAP®

Certificate of Accreditation to ISO/IEC 17025:2005

NVLAP LAB CODE: 600118-0

Telecommunication Technology Labs, CAICT
Beijing
China

is accredited by the National Voluntary Laboratory Accreditation Program for specific services, listed on the Scope of Accreditation, for:

Electromagnetic Compatibility & Telecommunications

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (refer to joint ISO-ILAC-IAF Communique dated January 2009).

2016-09-29 through 2017-09-30
Effective Dates

For the National Voluntary Laboratory Accreditation Program

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