



TEST REPORT

No. I19Z61825-EMC01

for

TCL Communication Ltd.

LTE/UMTS/GSM mobile phone

Model Name: A507DL

FCC ID: 2ACCJH111

with

Hardware Version: PIO

Software Version: vD41

Issued Date: 2019-11-01

Note:

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Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I19Z61825-EMC01	Rev.0	1 st edition	2019-11-01

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 (CN0066). The detail accreditation scope can be found on NVLAP website.

2. Test Laboratory

2.1. Testing Location

CTTL(huayuan North Road)

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

2.2. Testing Environment

Normal Temperature: 15-25°C
Relative Humidity: 20-75%

2.3. Project data

Testing Start Date: 2019-10-11
Testing End Date: 2019-11-01

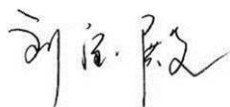
2.4. Signature



An Hui
(Prepared this test report)



Zhang Ying
(Reviewed this test report)



Liu Baodian
Deputy Director of the laboratory
(Approved this test report)

3. Client Information

3.1. Applicant 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
Telephone: 0086-755-36611722
Fax: /

3.2. 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
Telephone: 0086-755-36611722
Fax: /

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

4.1. About EUT

Description	LTE/UMTS/GSM mobile phone
Model Name	A507DL
FCC ID	2ACCJH111
Frequency Band	ISM 2400MHz~2483.5MHz
Type of Modulation	GFSK/ $\pi/4$ DQPSK/8DPSK
Number of Channels	79
Power Supply	3.8V DC by Battery

4.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT1	015591000213240	PIO	vD41

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

4.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	battery	/	/
AE2	Travel charger	/	/
AE3	USB Cable	/	/

AE1

Model	CAC2900019C1
Manufacturer	BYD
Capacitance	3000mAh
Nominal voltage	/

AE2

Model	CBA0059AGAC5
Manufacturer	PUAN
Length of cable	/

AE3

Model	CDA0000024C8
Manufacturer	PUAN
Length of cable	\

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

Note: The USB cables are shielded.

4.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1 + AE2 + AE3	Charger +FM
Set.2	EUT1+ AE3	USB mode

5. Reference Documents

5.1. 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.

6. 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

Semi-anechoic chamber SAC-2 (10 meters×6.7meters×6.1meters) 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, 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 °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

7. 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(huayuan North Road)
2	Conducted Emission	15.107(a)	B.2	P	CTTL(huayuan North Road)

8. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CALIBRATION INTERVAL	CAL DUE DATE
1	Test Receiver	ESU26	100376	Rohde & Schwarz	1 year	2019-11-27
2	BiLog Antenna	VULB9163	514	Schwarzbeck	1 years	2020-02-03
3	Dual-Ridge Waveguide Horn Antenna	3117	00139065	ETS-Lindgren	1 years	2019-11-05
4	Dual-Ridge Waveguide Horn Antenna	3116	2663	ETS-Lindgren	1 years	2020-05-31
5	Vector Signal Analyzer	FSV	101047	Rohde & Schwarz	1 year	2020-05-16
6	LISN	ENV216	101459	Rohde & Schwarz	1 year	2020-04-10
7	Test Receiver	ESCI	100766	Rohde & Schwarz	1 year	2020-03-20
8	Signal Power	SMBV100A	260613	R&S	2019-12-27	1 year
9	PC	扬天 M4000e-17	M706GWXD	LENOVO	N/A	N/A
10	Printer	HP LasterJet 1160	33740	HP	N/A	N/A
11	Display	LS2224A	U55WVZ293	LENOVO	N/A	N/A

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 M4000E-17, and the serial number of the PC is M706GWXD. 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:

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

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): $U = 6.89 \text{ dB}$, $k=2$.

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)
17974.500	39.1	-25.9	41.3	23.669	54.0	14.9	V
17982.000	39.1	-25.8	41.3	23.625	54.0	14.9	V
17978.000	39.1	-25.9	41.3	23.632	54.0	14.9	V
17987.500	39.0	-25.8	41.3	23.566	54.0	15.0	V
17988.500	39.0	-25.8	41.3	23.482	54.0	15.0	V
17972.000	38.9	-25.9	41.3	23.513	54.0	15.1	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)
17916.500	51.8	-26.1	41.3	36.59	74.0	22.2	V
17974.000	51.6	-25.9	41.3	36.18	74.0	22.4	V
17966.000	51.3	-25.9	41.3	35.94	74.0	22.7	V
17118.000	51.3	-26.0	41.6	35.72	74.0	22.7	H
17985.000	51.3	-25.8	41.3	35.83	74.0	22.7	H
17755.000	51.3	-26.5	41.3	36.57	74.0	22.7	V

Measurement results for Set.2:

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)
17992.000	39.1	-25.8	41.3	23.68	54.0	14.9	V
17980.000	39.1	-25.8	41.3	23.66	54.0	14.9	V
17997.000	39.1	-25.9	41.3	23.62	54.0	14.9	H
17976.500	39.0	-25.9	41.3	23.61	54.0	15.0	V
17979.500	39.0	-25.8	41.3	23.58	54.0	15.0	V
17986.500	39.0	-25.8	41.3	23.53	54.0	15.0	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)
3585.500	60.0	-35.2	33.2	61.97	74.0	14.0	H
3589.500	57.2	-35.2	33.2	59.19	74.0	16.8	H
3589.000	55.6	-35.2	33.2	57.63	74.0	18.4	H
3586.000	55.2	-35.2	33.2	57.21	74.0	18.8	H
3583.000	52.0	-35.2	33.2	54.03	74.0	22.0	H
17520.500	52.0	-26.4	41.2	37.14	74.0	22.0	V

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

Charging Mode, Set.1

15B RE 30MHz-1GHz

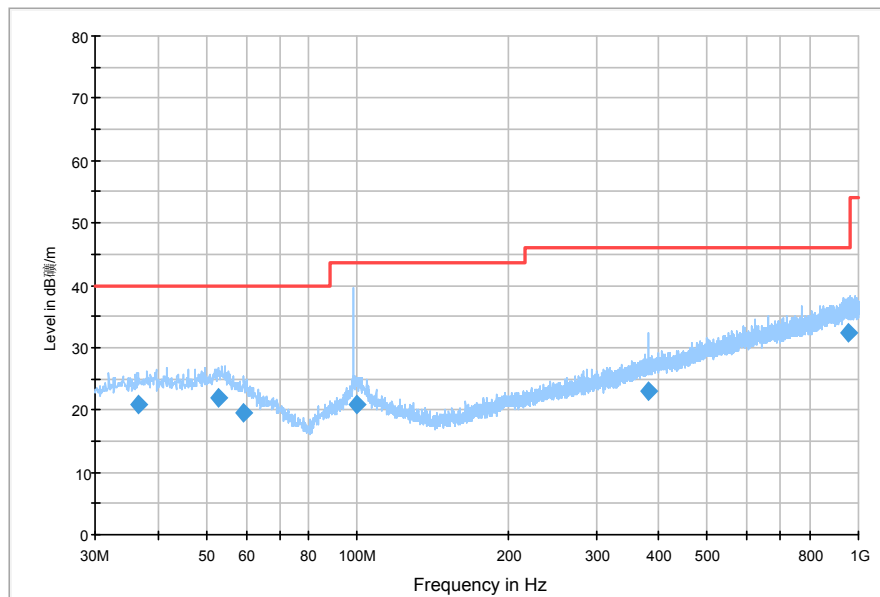


Fig A.1 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
36.499000	20.9	100.0	V	155.0	0.1	19.1	40.0
52.795000	21.9	110.0	V	138.0	0.7	18.1	40.0
59.391000	19.6	125.0	H	225.0	0.1	20.4	40.0
99.452000	20.8	100.0	V	232.0	-1.0	22.7	43.5
379.782000	22.9	125.0	V	135.0	4.5	23.1	46.0
954.604000	32.2	125.0	H	235.0	13.2	13.8	46.0

15B RE - 1GHz-3GHz

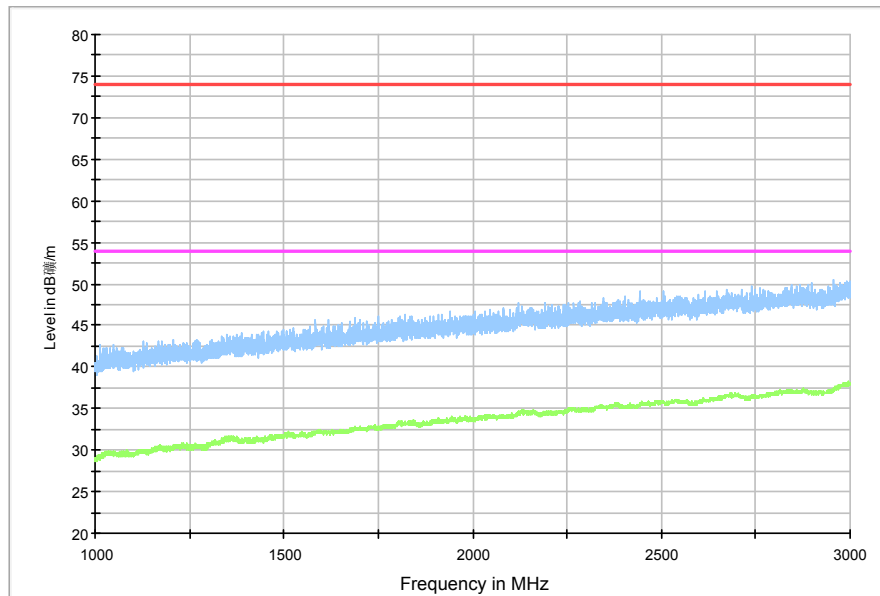


Fig A.2 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

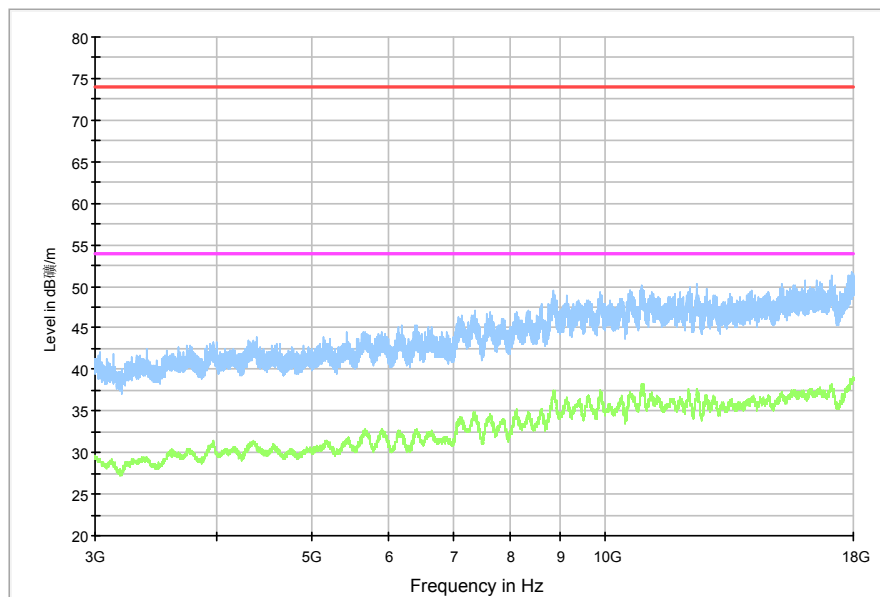


Fig A.3 Radiated Emission from 3GHz to 18GHz

USB Mode, Set.2

15B RE 30MHz-1GHz

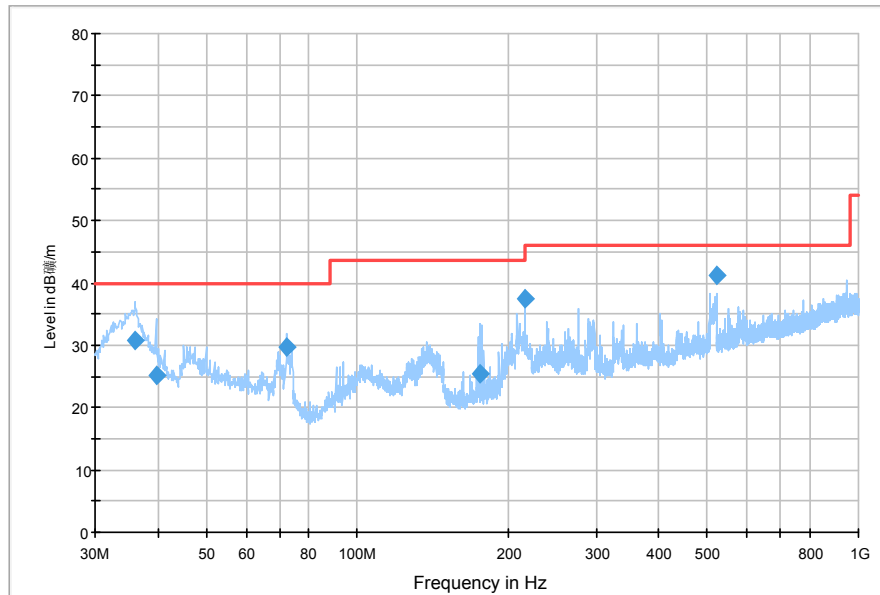


Fig A.4 Radiated Emission from 30MHz to 1GHz

Final_Result

Frequency (MHz)	QuasiPeak (dBμV/m)	Height (cm)	Polarization	Azimuth (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
36.014000	30.7	110.0	V	228.0	0.0	9.3	40.0
39.700000	25.1	125.0	V	0.0	0.5	14.9	40.0
72.292000	29.6	110.0	V	270.0	-4.7	10.4	40.0
176.082000	25.5	100.0	H	259.0	-3.0	18.0	43.5
215.949000	37.5	119.0	H	239.0	-1.0	6.0	43.5
520.141000	41.1	125.0	V	-21.0	7.5	4.9	46.0

15B RE - 1GHz-3GHz

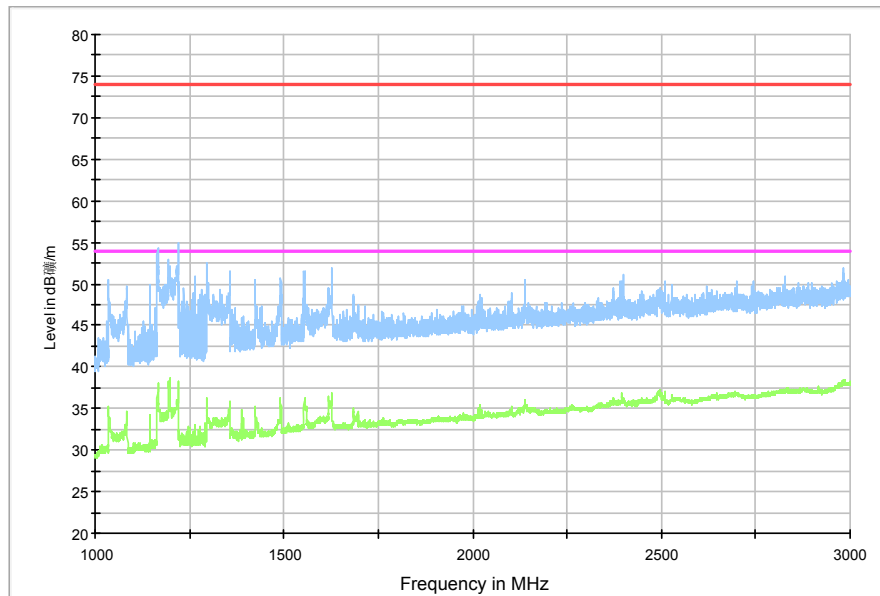


Fig A.5 Radiated Emission from 1GHz to 3GHz

15b RE - 3GHz-18GHz

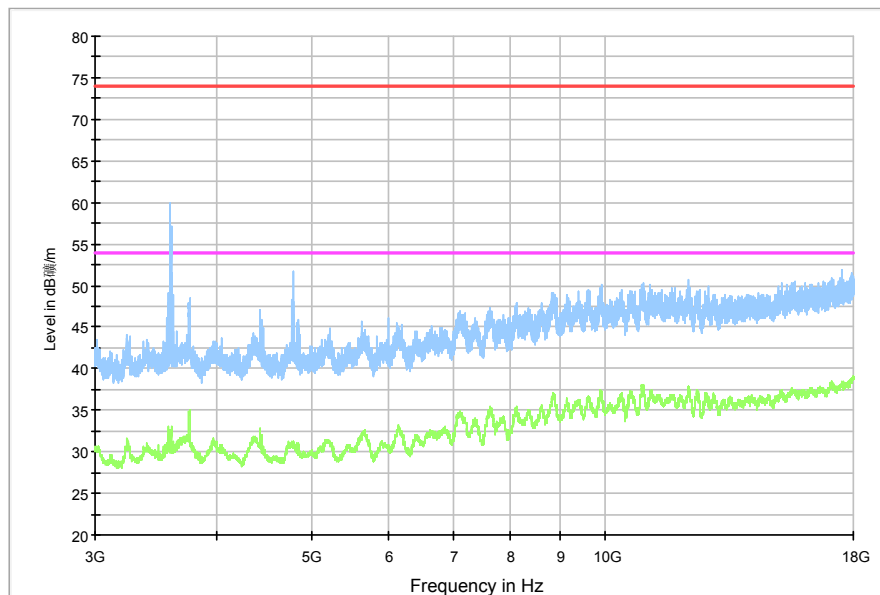


Fig A.6 Radiated Emission from 3GHz to 18GHz

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 M4000E-17, and the serial number of the PC is M706GWXD. 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: $U = 3.10 \text{ dB}$, $k=2$.

Charging Mode, Set.1

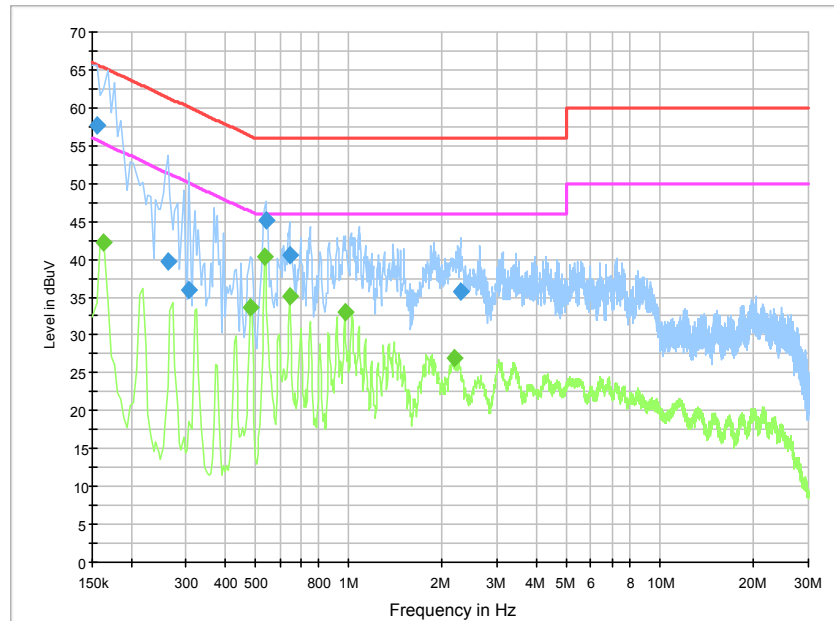


Fig A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.154500	57.7	10000.0	9.000	On	N	28.0	8.1	65.8
0.262500	39.8	10000.0	9.000	On	L1	19.9	21.6	61.4
0.307500	36.0	10000.0	9.000	On	L1	20.0	24.0	60.0
0.541500	45.1	10000.0	9.000	On	L1	20.0	10.9	56.0
0.645000	40.5	10000.0	9.000	On	L1	19.9	15.5	56.0
2.283000	35.7	10000.0	9.000	On	N	19.8	20.3	56.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.163500	42.2	10000.0	9.000	On	L1	26.3	13.1	55.3
0.483000	33.6	10000.0	9.000	On	L1	20.0	12.7	46.3
0.537000	40.2	10000.0	9.000	On	L1	20.0	5.8	46.0
0.645000	35.0	10000.0	9.000	On	L1	19.9	11.0	46.0
0.969000	33.0	10000.0	9.000	On	L1	19.9	13.0	46.0
2.175000	26.9	10000.0	9.000	On	L1	19.8	19.1	46.0

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

USB Mode, Set.2

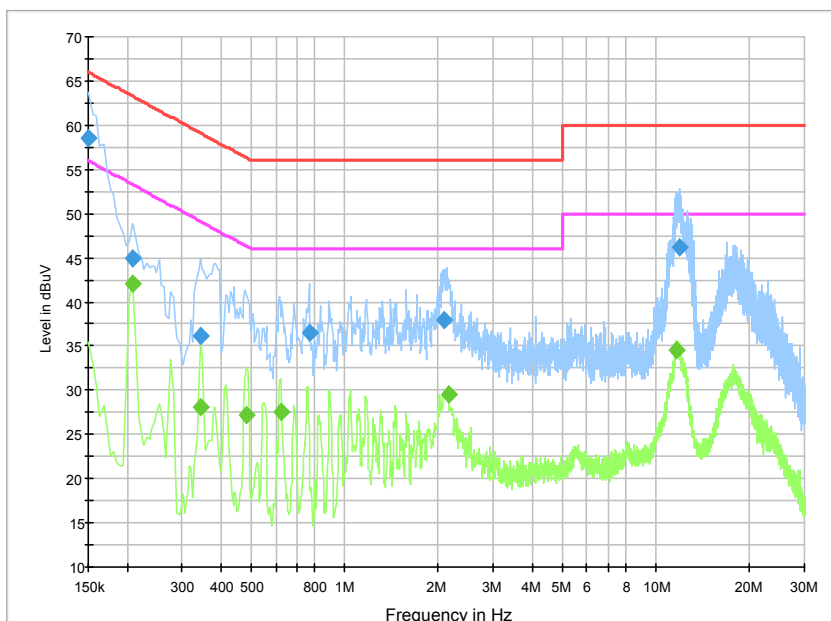


Fig A.8 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.150000	58.5	10000.0	9.000	On	L1	28.9	7.5	66.0
0.208500	44.8	10000.0	9.000	On	N	19.9	18.4	63.3
0.343500	36.1	10000.0	9.000	On	N	20.0	23.0	59.1
0.771000	36.5	10000.0	9.000	On	N	19.9	19.5	56.0
2.089500	37.9	10000.0	9.000	On	N	19.8	18.1	56.0
11.854500	46.2	10000.0	9.000	On	N	19.9	13.8	60.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.208500	42.0	10000.0	9.000	On	N	19.9	11.2	53.3
0.343500	28.0	10000.0	9.000	On	N	20.0	21.1	49.1
0.483000	27.1	10000.0	9.000	On	N	20.0	19.1	46.3
0.622500	27.5	10000.0	9.000	On	N	20.0	18.5	46.0
2.161500	29.5	10000.0	9.000	On	N	19.8	16.5	46.0
11.670000	34.6	10000.0	9.000	On	N	20.0	15.4	50.0

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

ANNEX B: PERSONS INVOLVED IN THIS TESTING

Test Item	Test Software and Version	Software Vendor	Test operator
Conducted Emission	EMC32 V8.5.1	R&S	Yang Fei
Radiated Emission	EMC32 V8.5.1	R&S	Zhao Wen Hui

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