



TEST REPORT

No. I22Z61830-EMC01

for

HMD Global Oy

Smart Phone

Model Name: N155DL

FCC ID: 2AJOTTA-1550

with

Hardware Version: V1.0

Software Version: 02US_0_01B

Issued Date: 2022-12-26

Note:

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Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z61830-EMC01	Rev.0	1 st edition	2022-12-26

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.

1.2. Testing Location

CTTL (huayuan North Road)

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

CTTL (BDA)

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

1.3. Testing Environment

Normal Temperature: 15-35° C

Relative Humidity: 20-75%

1.4. Project data

Testing Start Date: 2022-11-29

Testing End Date: 2022-12-05

1.5. Signature



Zhang Ying

(Prepared this test report)



An Hui

(Reviewed this test report)



Shi Suolan

(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: HMD Global Oy
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2.2. Manufacturer Information

Company Name: HMD Global Oy
Address /Post: Bertel Jungin aukio 9, 02600 Espoo, Finland
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Email: reza.serafat@hmdglobal.com
Telephone: +491735287964

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

3.1. About EUT

Description	Smart Phone
Model Name	N155DL
FCC ID	2AJOTTA-1550
Extreme vol. Limits	3.6VDC to 4.4VDC (nominal: 3.85VDC)

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
UT24a	/	/	/
UT23a	/	/	/
UT27a	357245940009483	V1.0	02US_0_01B

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

UT24a is first source of TA-1515, and UT23a is second source of TA-1515.

UT26a is a variant model based on TA-1515.

3.3. Internal Identification of AE used during the test

AE ID*	Name	Model	Manufacturer
AE1	Battery	TN-BP4000N2	Guangdong Fenghua new energy co.,ltd.
AE2	Battery	TN-BP4000N2	Dongguan Ganfeng Electronics Co., Ltd
AE3	USB Cable	TN-TC2A1MFB	SAIBAO(JIANGXI) INDUSTRIAL CO.,LTD
AE4	Charger	AD-010U	Shenzhen Bajunda Electronic Co., Ltd

*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	UT24a + AE1/2 + AE3 + AE4	Charger
Set.2	UT24a + AE1/2 + AE3	USB
Set.3	UT24a + AE1/2 + AE3 + AE4 + Headset	FM
Set.4	UT23a + AE1/2 + AE3 + AE4	Charger
Set.5	UT23a + AE1/2 + AE3	USB
Set.6	UT23a + AE1/2 + AE3 + AE4 + Headset	FM
Set.7	UT27a + AE1/2 + AE3 + AE4	Charger

3.5. Test summary

First source

EUT set-up No.	Test mode	Test result
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		Radiated Emission	Conducted Emission
Set.1	Charger+REAR Camera+GSM 850 idle	Pass	Pass
Set.1	Charger+MP4+WCDMA 850 idle	Pass	/
Set.2	USB+front camera + LTE B5 idle	Pass	Pass
Set.2	USB+front camera + LTE B12 idle	Pass	/
Set.2	USB+front camera + LTE B13 idle	Pass	/
Set.2	USB+front camera + LTE B17 idle	Pass	/
Set.3	FM	Pass	Pass

Second source

EUT set-up No.	Test mode	Test result	
		Radiated Emission	Conducted Emission
Set.4	Charger+REAR Camera+GSM 850 idle	Pass	/
Set.5	USB+front camera + LTE B5 idle	Pass	/
Set.6	FM	Pass	/

Smart Phone N155DL manufactured by HMD Global Oy is a variant model based on TA-1515 for conformance test. According to the declaration of changes, adding the Emission tests as follows:

EUT set-up No.	Test mode	Test result	
		Radiated Emission	Conducted Emission
Set.7	Charger+front camera + LTE B5 idle	Pass	/

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	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×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 M
Ground system resistance	< 4
Normalised site attenuation (NSA)	< ± 4 dB, 3m/10m distance, from 30 to 1000 MHz
Site voltage standing-wave ratio (S_{VSWR})	Between 0 and 6 dB, from 1GHz to 18GHz

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

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 bei) CTTL (BDA)
2	Conducted Emission	15.107(a)	B.2	P	CTTL (Huayuan bei)

7. Test Equipments Utilized

The equipments for I22Z61849

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI	100344	R&S	2023-03-21	1 year
2	LISN	ENV216	101200	R&S	2023-06-29	1 Year
3	Test Receiver	ESW44	103015	Rohde & Schwarz	2023-01-23	1 year
4	BiLog Antenna	VULB9163	01223	Schwarzbeck	2023-07-25	1 Year
5	EMI Antenna	3115	00167250	ETS-Lindgren	2023-06-20	1 year
6	Universal Radio Communication Tester	CMW500	116588	R&S	2022-12-20	1 Year
7	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
8	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
9	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
10	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A
11	Test Receiver	ESU26	100376	R&S	2023-09-22	1 year
12	EMI Antenna	VULB 9163	01177	Schwarzbeck	2023-08-03	1 Year
13	EMI Antenna	3117	00119024	Schwarzbeck	2023-06-07	1 Year
14	Universal Radio Communication Tester	CMW500	159408	R&S	2023-03-02	1 Year
15	PC	E500-1042	2140770010640 901850	Tsinghua Tongfang	N/A	N/A
16	Printer	1160	33740	HP	N/A	N/A
17	Keyboard	/	/	/	N/A	N/A
18	Mouse	/	/	/	N/A	N/A

The equipments for I22Z61830

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
3	Test Receiver	ESW44	103015	Rohde & Schwarz	2023-01-23	1 year
4	BiLog Antenna	VULB9163	01223	Schwarzbeck	2023-07-25	1 Year
5	EMI Antenna	3115	00167250	ETS-Lindgren	2023-06-20	1 year
6	Universal Radio Communication Tester	CMW500	116588	R&S	2022-12-20	1 Year



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Test Item	Test Software and Version	Software Vendor
Conducted Emission	EMC32 V8.52.0	R&S
Radiated Emission ((Huayuan bei)	EMC32 V10.60.20	R&S
Radiated Emission (BDA)	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 3/10 meters 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 EUT was tested while operating in licensed band Rx mode with Camera/MP3. All licensed band receivers that tune in the range of 30MHz-960MHz, as listed in section 3.4, are investigated. Only the worst case emissions are reported.

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 ($\mu\text{V/m}$)		
	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/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:

Frequency range	Measurement uncertainty
30MHz-1GHz	5.18dB, k=2
1GHz-18GHz	5.54dB, k=2

Measurement results for Set.1, Charger + REAR Camera + GSM 850 idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
49.788000	12.43	30.00	17.57	108.0	V	251.0
54.056000	13.85	30.00	16.15	125.0	V	-20.0
75.008000	11.87	30.00	18.13	225.0	V	-45.0
188.595000	11.71	33.52	21.81	125.0	V	84.0
197.325000	11.28	33.52	22.24	175.0	V	59.0
253.779000	11.87	36.02	24.15	100.0	V	9.0

Charging Mode/Average detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
17994.220	42.2	-29.1	46.7	24.6	54.0	11.8	V
17999.320	41.9	-29.1	46.7	24.3	54.0	12.1	V
17995.920	41.7	-29.1	46.7	24.1	54.0	12.3	V
17543.380	41.7	-29.5	44.4	26.8	54.0	12.3	H
17989.120	41.6	-29.1	46.7	24.0	54.0	12.4	V
17983.340	41.6	-29.1	46.7	24.0	54.0	12.4	V

Charging Mode/Peak detector

Frequency (MHz)	Measurement Result (dB μ V/m)	Cable loss (dB)	Antenna Factor (dB/m)	Receiver Reading (dB μ V)	Limit (dB μ V/m)	Margin (dB)	Antenna Pol. (H/V)
17808.580	52.7	-29.6	46.0	36.4	74.0	21.3	V
17957.500	52.6	-28.9	46.7	34.9	74.0	21.4	V
17593.360	52.5	-29.7	45.2	36.9	74.0	21.5	H
17902.420	52.4	-29.3	46.0	35.8	74.0	21.6	V
17591.320	52.4	-29.7	45.2	36.8	74.0	21.6	H
17614.440	52.4	-29.5	45.2	36.7	74.0	21.6	V

Measurement results for Set.1, Charger + MP4 + WCDMA 850 idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
30.097000	18.69	30.00	11.31	125.0	V	225.0
95.960000	12.97	33.52	20.55	325.0	H	-32.0
239.908000	14.83	36.02	21.19	108.0	V	-31.0
399.958000	24.94	36.02	11.08	100.0	V	-5.0
594.637000	25.30	36.02	10.72	202.0	V	20.0
673.013000	28.65	36.02	7.37	175.0	V	8.0

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)
17998.640	42.0	-29.1	46.7	24.4	54.0	12.0	H
17996.600	41.9	-29.1	46.7	24.3	54.0	12.1	V
17999.320	41.9	-29.1	46.7	24.3	54.0	12.1	H
17524.680	41.8	-29.3	44.4	26.8	54.0	12.2	V
17969.740	41.7	-29.1	46.7	24.1	54.0	12.3	V
17992.520	41.7	-29.1	46.7	24.1	54.0	12.3	V

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)
17604.920	53.4	-29.5	45.2	37.7	74.0	20.6	H
17980.960	53.3	-29.1	46.7	35.7	74.0	20.7	H
17904.800	52.5	-29.3	46.0	35.9	74.0	21.5	V
17995.920	52.3	-29.1	46.7	34.7	74.0	21.7	V
17772.540	52.1	-29.6	46.0	35.8	74.0	21.9	V
17976.540	52.0	-29.1	46.7	34.4	74.0	22.0	H

Measurement results for Set.2, USB + Front camera+ LTE band 5 idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.067000	16.90	30.00	13.10	100.0	V	225.0
95.960000	24.41	33.52	9.11	302.0	H	-45.0
215.949000	26.10	33.52	7.42	125.0	V	85.0
288.117000	14.02	36.02	22.00	208.0	H	71.0
396.563000	18.25	36.02	17.77	175.0	H	281.0
673.207000	27.72	36.02	8.30	175.0	V	7.0

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)
17996.260	42.1	-29.1	46.7	24.5	54.0	11.9	V
17976.200	41.9	-29.1	46.7	24.3	54.0	12.1	V
17788.860	41.9	-29.9	46.0	25.8	54.0	12.1	H
17998.300	41.9	-29.1	46.7	24.3	54.0	12.1	H
17560.720	41.8	-29.8	44.4	27.2	54.0	12.2	V
17995.580	41.8	-29.1	46.7	24.2	54.0	12.2	V

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)
17990.480	52.9	-29.1	46.7	35.3	74.0	21.1	V
17977.560	52.8	-29.1	46.7	35.2	74.0	21.2	H
17986.400	52.4	-29.1	46.7	34.8	74.0	21.6	V
17386.980	52.2	-29.8	43.4	38.7	74.0	21.8	H
17991.160	52.2	-29.1	46.7	34.6	74.0	21.8	H
17921.800	52.2	-29.4	46.7	34.9	74.0	21.8	H

Measurement results for Set.2, USB + front camera + LTE B12 idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.552000	13.66	30.00	16.34	325.0	V	225.0
95.960000	25.51	33.52	8.01	325.0	H	-45.0
215.949000	25.62	33.52	7.90	110.0	V	84.0
263.964000	23.65	36.02	12.37	302.0	H	84.0
399.667000	23.70	36.02	12.32	100.0	V	8.0
592.988000	23.73	36.02	12.29	223.0	V	21.0

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)
17994.220	42.4	-29.1	46.7	24.8	54.0	11.6	V
17523.320	41.8	-29.3	44.4	26.8	54.0	12.2	V
17930.300	41.7	-29.4	46.7	24.4	54.0	12.3	V
17624.300	41.7	-29.4	45.2	25.9	54.0	12.3	H
17630.080	41.7	-29.4	45.2	25.9	54.0	12.3	V
17565.820	41.7	-29.8	45.2	26.2	54.0	12.3	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)
3583.660	57.1	-39.3	31.2	65.3	74.0	16.9	V
17978.240	52.8	-29.1	46.7	35.2	74.0	21.2	H
17999.320	52.7	-29.1	46.7	35.1	74.0	21.3	H
17995.920	52.6	-29.1	46.7	35.0	74.0	21.4	H
17989.800	52.3	-29.1	46.7	34.7	74.0	21.7	V
17978.580	52.3	-29.1	46.7	34.7	74.0	21.7	H

Measurement results for Set.2, USB + front camera + LTE B13 idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
31.067000	16.43	30.00	13.57	100.0	V	304.0
95.863000	16.02	33.52	17.50	283.0	H	-32.0
215.949000	23.52	33.52	10.00	175.0	V	76.0
350.003000	20.17	36.02	15.85	125.0	V	-5.0
400.055000	23.77	36.02	12.25	100.0	V	21.0
595.413000	24.61	36.02	11.41	183.0	V	36.0

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)
3597.600	43.4	-39.3	31.2	51.6	54.0	10.6	H
17992.860	42.3	-29.1	46.7	24.7	54.0	11.7	H
17980.620	42.1	-29.1	46.7	24.5	54.0	11.9	V
17941.860	42.0	-28.9	46.7	24.3	54.0	12.0	V
17998.640	42.0	-29.1	46.7	24.4	54.0	12.0	V
17588.260	41.8	-29.7	45.2	26.2	54.0	12.2	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)
3597.600	64.3	-39.3	31.2	72.5	74.0	9.7	H
3596.240	56.4	-39.3	31.2	64.6	74.0	17.6	H
11470.980	53.4	-34.7	38.8	49.3	74.0	20.6	V
18000.000	52.6	-29.2	47.0	34.8	74.0	21.4	V
17974.840	52.4	-29.1	46.7	34.8	74.0	21.6	V
17266.620	52.4	-29.7	43.4	38.8	74.0	21.6	V

Measurement results for Set.2, USB + front camera + LTE B17 idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
44.744000	12.65	30.00	17.35	323.0	V	225.0
95.960000	23.79	33.52	9.73	283.0	H	-45.0
167.934000	21.99	33.52	11.53	323.0	H	162.0
215.949000	25.80	33.52	7.72	100.0	V	71.0
399.667000	26.91	36.02	9.11	225.0	H	85.0
673.110000	27.35	36.02	8.67	175.0	V	7.0

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)
17996.600	42.1	-29.1	46.7	24.5	54.0	11.9	V
17616.480	41.9	-29.5	45.2	26.2	54.0	12.1	H
17981.640	41.9	-29.1	46.7	24.3	54.0	12.1	H
17997.960	41.9	-29.1	46.7	24.3	54.0	12.1	V
17577.380	41.7	-29.8	45.2	26.2	54.0	12.3	V
17998.300	41.7	-29.1	46.7	24.1	54.0	12.3	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)
3600.320	58.5	-39.3	31.2	66.6	74.0	15.5	H
3587.060	58.3	-39.3	31.2	66.5	74.0	15.7	H
17252.680	53.1	-30.0	43.4	39.8	74.0	20.9	H
17447.840	52.6	-29.9	44.4	38.1	74.0	21.4	V
17948.320	52.5	-28.9	46.7	34.8	74.0	21.5	H
17615.800	52.5	-29.5	45.2	36.8	74.0	21.5	V

Measurement results for Set.3, FM idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
43.580000	13.39	30.00	16.61	100.0	V	135.0
53.862000	10.92	30.00	19.08	125.0	V	45.0
75.299000	11.23	30.00	18.77	222.0	V	46.0
101.295000	8.74	33.52	24.78	100.0	V	225.0
180.641000	12.20	33.52	21.32	125.0	V	72.0
414.896000	12.08	36.02	23.94	100.0	H	239.0

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)
17995.240	41.9	-29.1	46.7	24.3	54.0	12.1	V
17793.620	41.9	-29.9	46.0	25.8	54.0	12.1	H
17936.420	41.9	-29.4	46.7	24.6	54.0	12.1	V
17892.560	41.8	-29.5	46.0	25.4	54.0	12.2	V
17931.660	41.8	-29.4	46.7	24.5	54.0	12.2	H
17997.960	41.7	-29.1	46.7	24.1	54.0	12.3	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)
17984.360	52.8	-29.1	46.7	35.2	74.0	21.2	V
17997.280	52.8	-29.1	46.7	35.2	74.0	21.2	H
17582.140	52.4	-29.7	45.2	36.8	74.0	21.6	V
17998.640	52.3	-29.1	46.7	34.7	74.0	21.7	H
17995.240	52.2	-29.1	46.7	34.6	74.0	21.8	V
17543.720	52.2	-29.5	44.4	37.3	74.0	21.8	V

Measurement results for Set.4, Charger + REAR Camera + GSM 850 idle, Second source:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
33.201000	21.6	40.0	18.4	125.0	V	0.0
37.760000	22.9	40.0	17.1	100.0	V	51.0
38.924000	24.5	40.0	15.5	100.0	V	64.0
48.721000	27.6	40.0	12.4	100.0	V	141.0
57.742000	23.9	40.0	16.1	100.0	V	-39.0
215.464000	19.0	43.5	24.5	100.0	V	-20.0

Measurement results for Set.5, Front camera+ LTE band 5 idle, Second source:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
30.582000	27.8	40.0	12.2	100.0	V	231.0
30.873000	31.1	40.0	8.9	100.0	V	70.0
59.973000	29.2	40.0	10.8	100.0	V	90.0
179.962000	31.6	43.5	11.9	113.0	V	295.0
405.487000	39.8	46.0	6.2	100.0	H	231.0
914.640000	36.6	46.0	9.4	100.0	V	12.0

Measurement results for Set.6, FM idle, Second source:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
35.044000	23.7	40.0	16.3	100.0	V	51.0
37.857000	27.9	40.0	12.1	100.0	V	115.0
42.222000	22.3	40.0	17.7	100.0	V	83.0
47.751000	26.0	40.0	14.0	100.0	V	13.0
208.480000	20.2	43.5	23.3	100.0	V	-45.0
917.841000	32.6	46.0	13.4	100.0	V	161.0

Measurement results for Set.7, Charger + Front camera+ LTE band 5 idle:
Charging Mode/QP detector

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Pol	Azimuth (deg)
46.490000	13.04	30.00	16.96	108.0	V	292.0
54.929000	15.44	30.00	14.56	125.0	V	292.0
105.854000	13.47	33.52	20.05	100.0	V	-14.0
114.487000	15.22	33.52	18.30	108.0	V	175.0
199.944000	13.55	33.52	19.97	125.0	V	73.0
208.480000	17.00	33.52	16.52	125.0	V	72.0

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)
17961.240	42.70	-29.06	46.66	25.10	54.00	11.30	V
17991.160	42.40	-29.06	46.66	24.80	54.00	11.60	H
17986.740	42.20	-29.06	46.66	24.60	54.00	11.80	V
17979.260	42.10	-29.06	46.66	24.50	54.00	11.90	V
17560.720	42.00	-29.79	44.35	27.44	54.00	12.00	V
17560.380	42.00	-29.79	44.35	27.44	54.00	12.00	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)
17581.120	52.9	-29.7	45.2	37.3	74.0	21.1	V
17990.140	52.8	-29.1	46.7	35.2	74.0	21.2	H
17986.740	52.8	-29.1	46.7	35.2	74.0	21.2	V
17620.560	52.7	-29.4	45.2	36.9	74.0	21.3	H
17994.900	52.7	-29.1	46.7	35.1	74.0	21.3	V
17372.360	52.6	-30.0	43.4	39.2	74.0	21.4	V

Measurement results for Set.1, Charger + REAR Camera + GSM 850 idle:

Full Spectrum

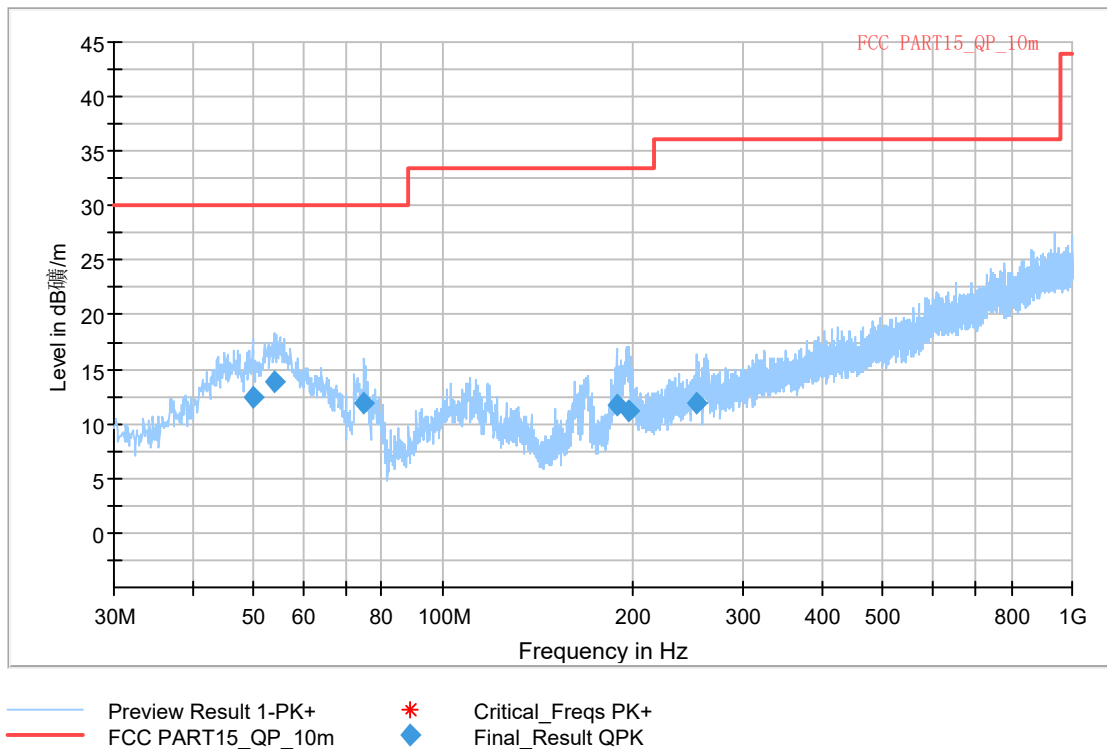


Fig A.1 Radiated Emission from 30MHz to 1GHz

Full Spectrum

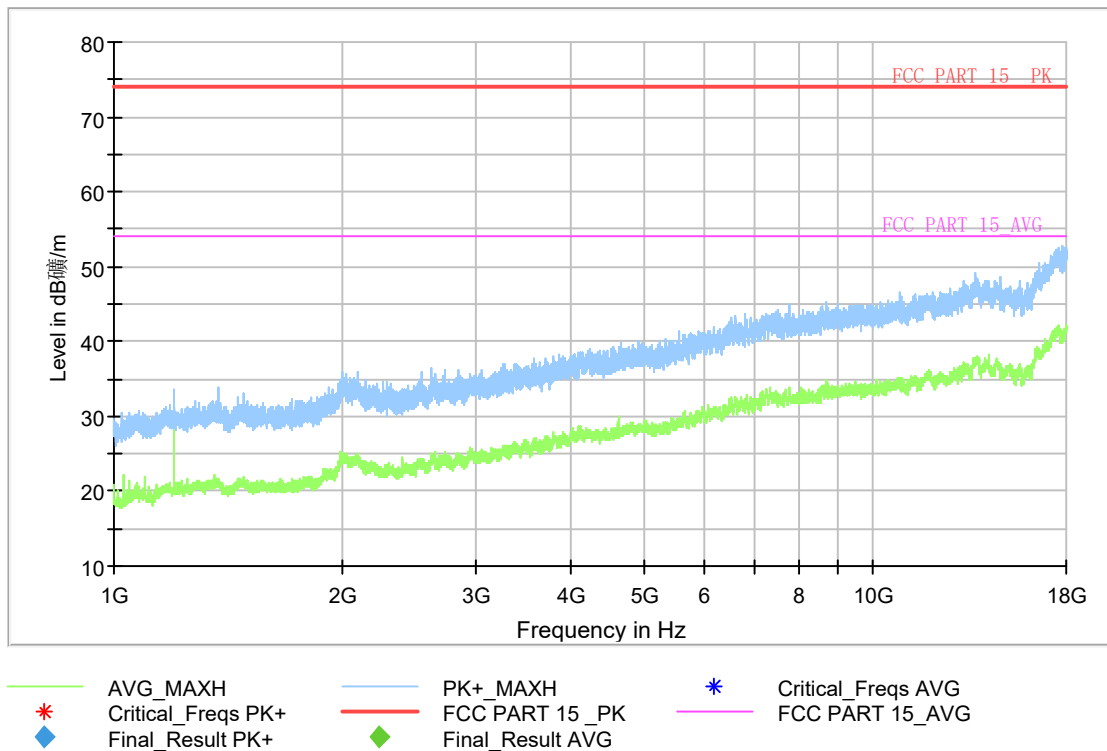


Fig A.2 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.1, Charger + MP4 + WCDMA 850 idle:

Full Spectrum

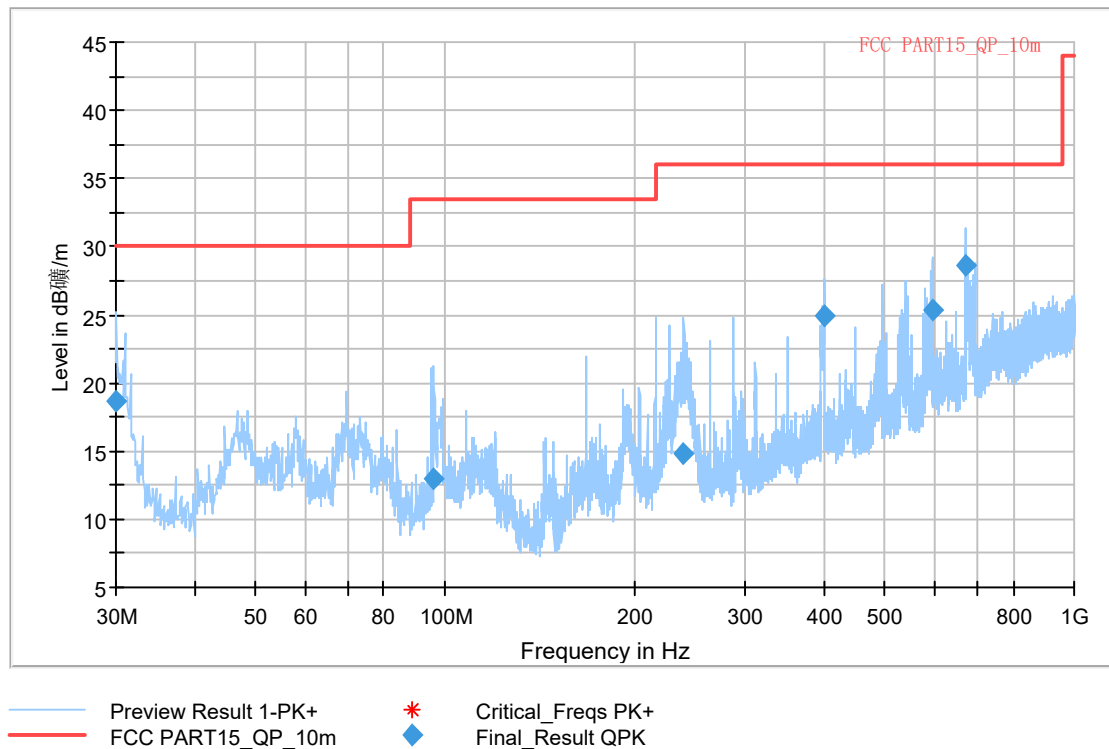


Fig A.3 Radiated Emission from 30MHz to 1GHz

Full Spectrum

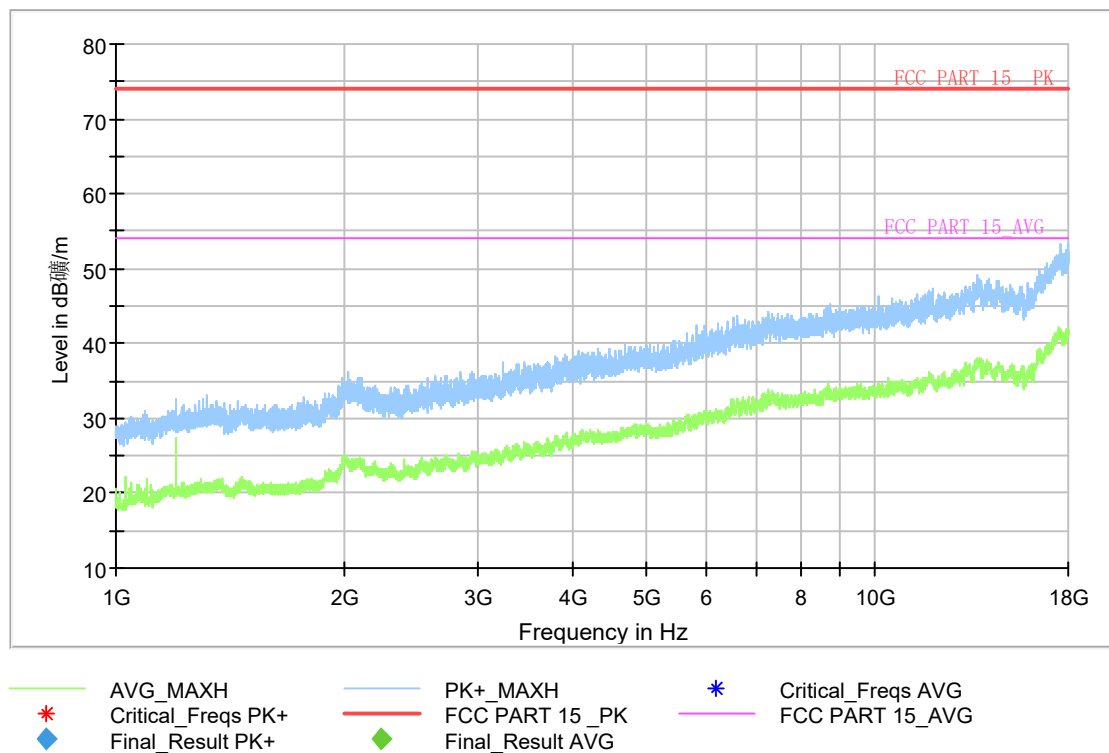


Fig A.4 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2, USB + Front camera+ LTE band 5 idle:

Full Spectrum

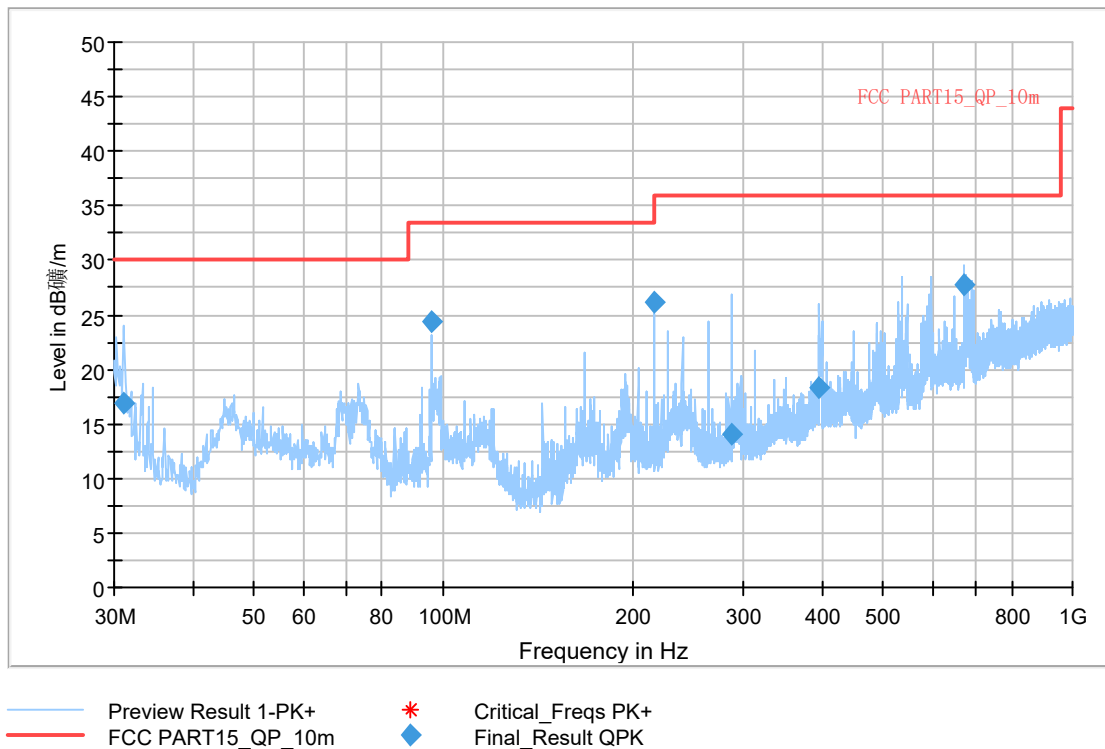


Fig A.5 Radiated Emission from 30MHz to 1GHz

Full Spectrum

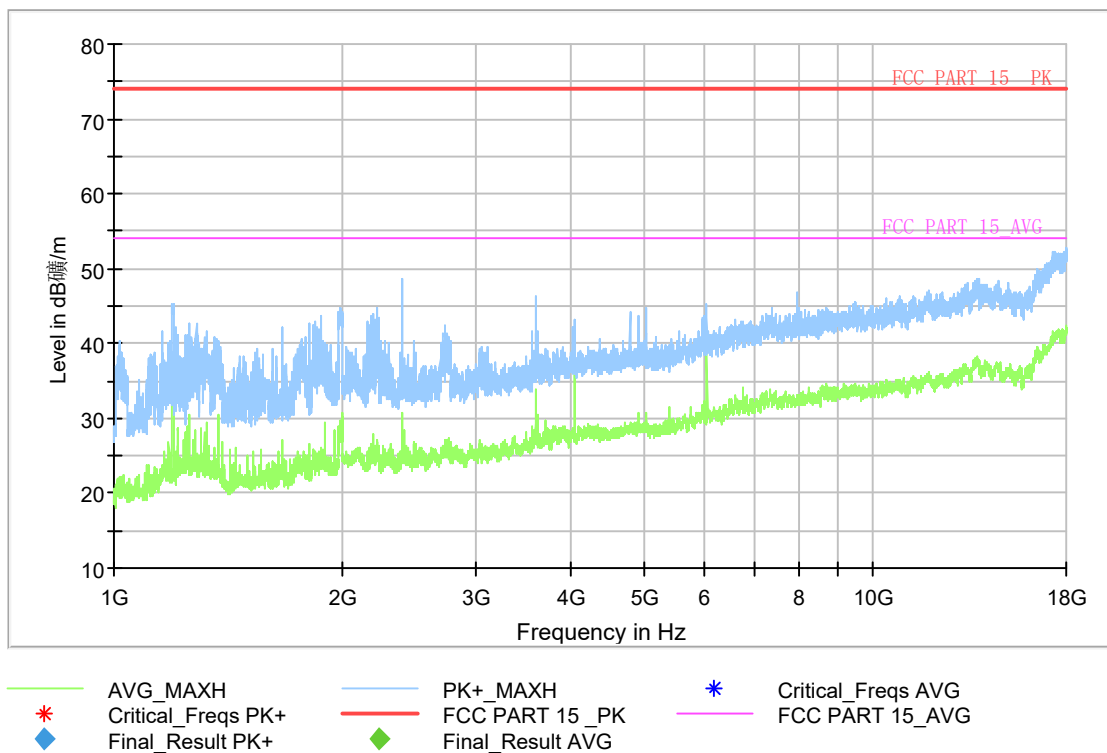


Fig A.6 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2, USB + front camera + LTE B12 idle:

Full Spectrum

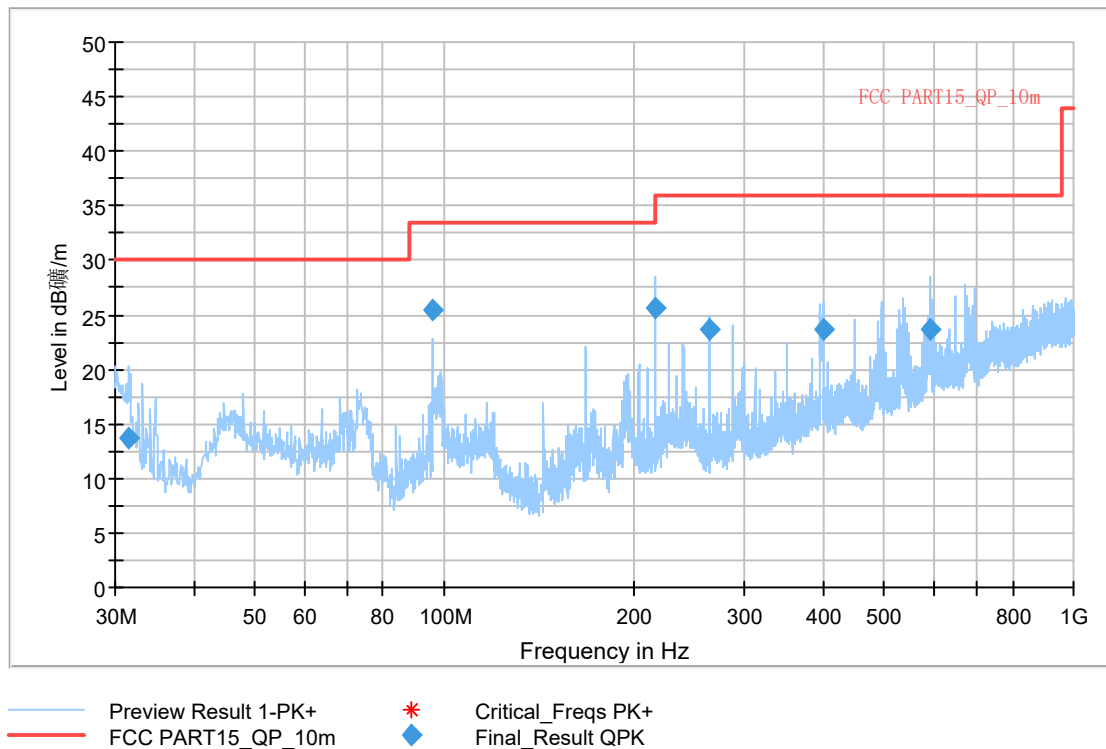


Fig A.7 Radiated Emission from 30MHz to 1GHz

Full Spectrum

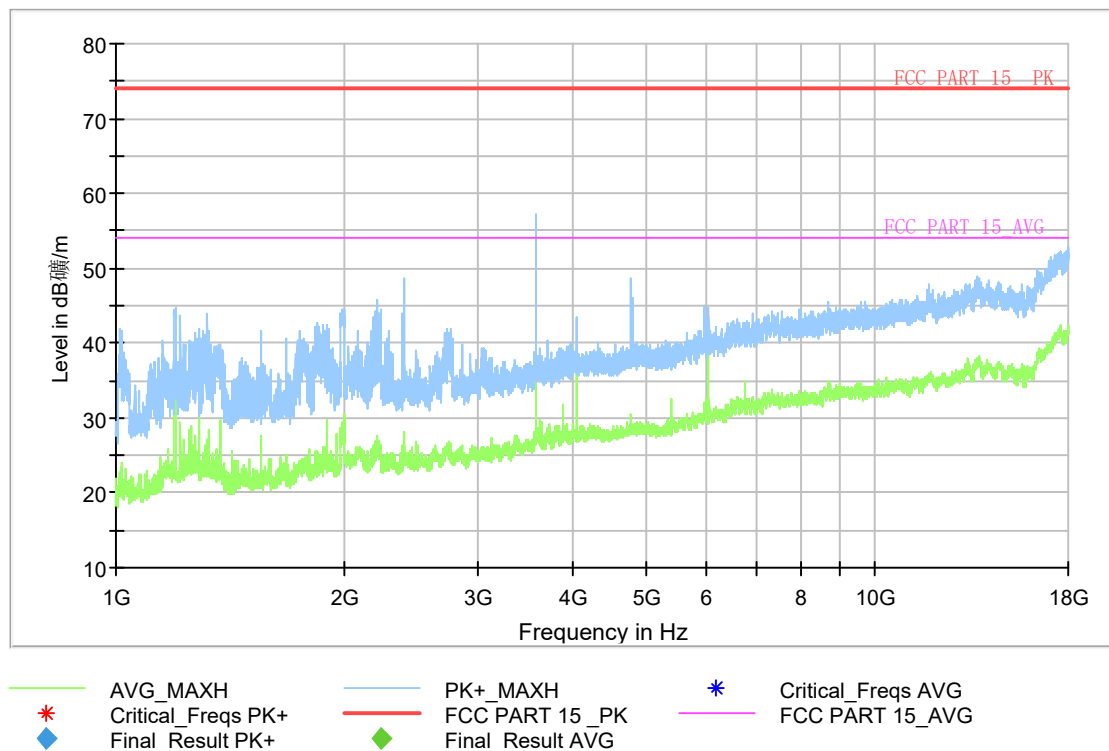


Fig A.8 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2, USB + front camera + LTE B13 idle:

Full Spectrum

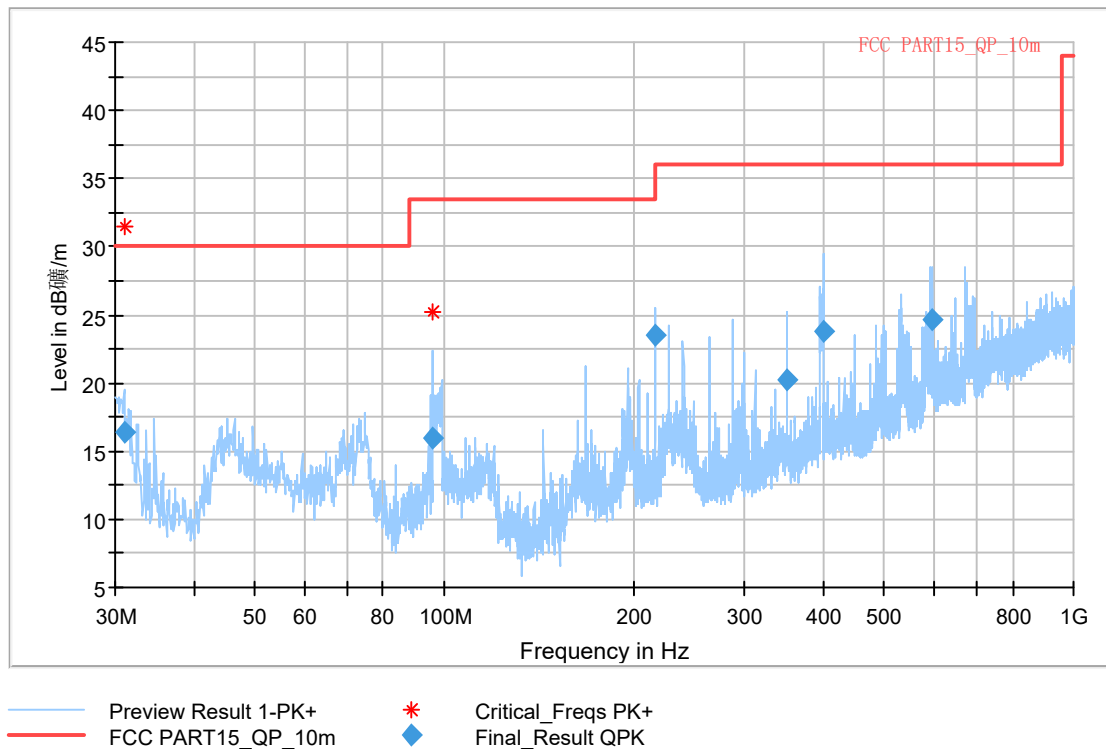


Fig A.9 Radiated Emission from 30MHz to 1GHz

Full Spectrum

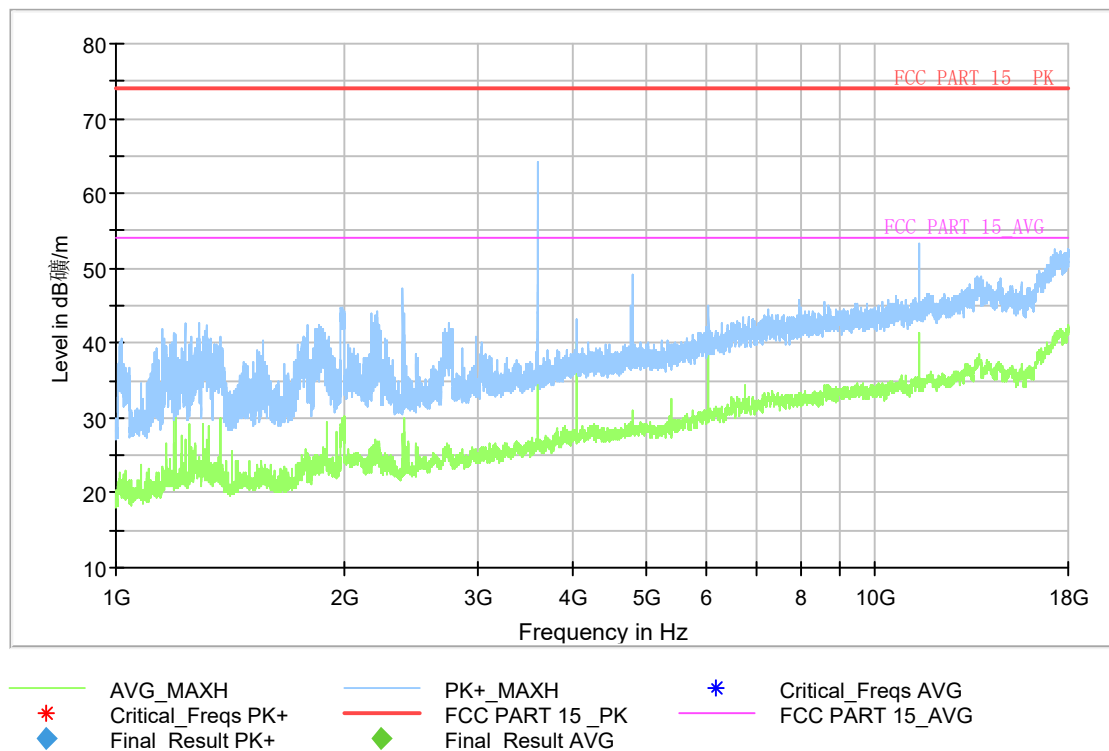


Fig A.10 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.2, USB + front camera + LTE B17 idle:

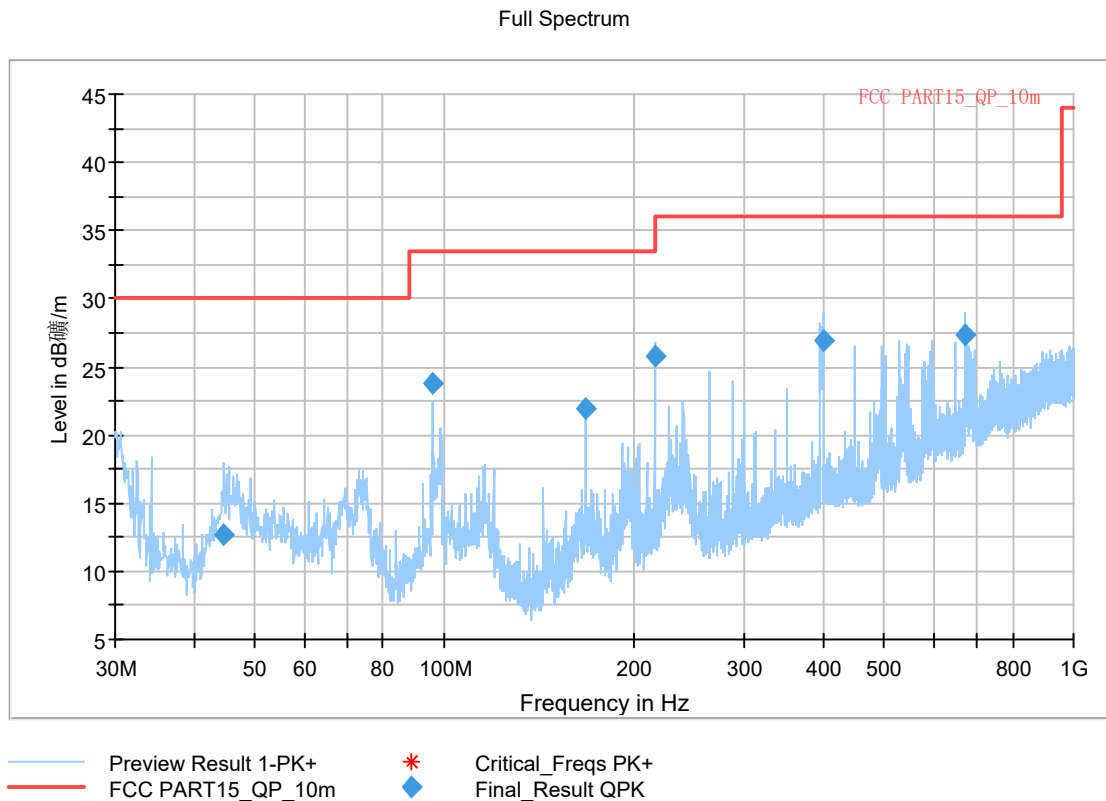


Fig A.11 Radiated Emission from 30MHz to 1GHz

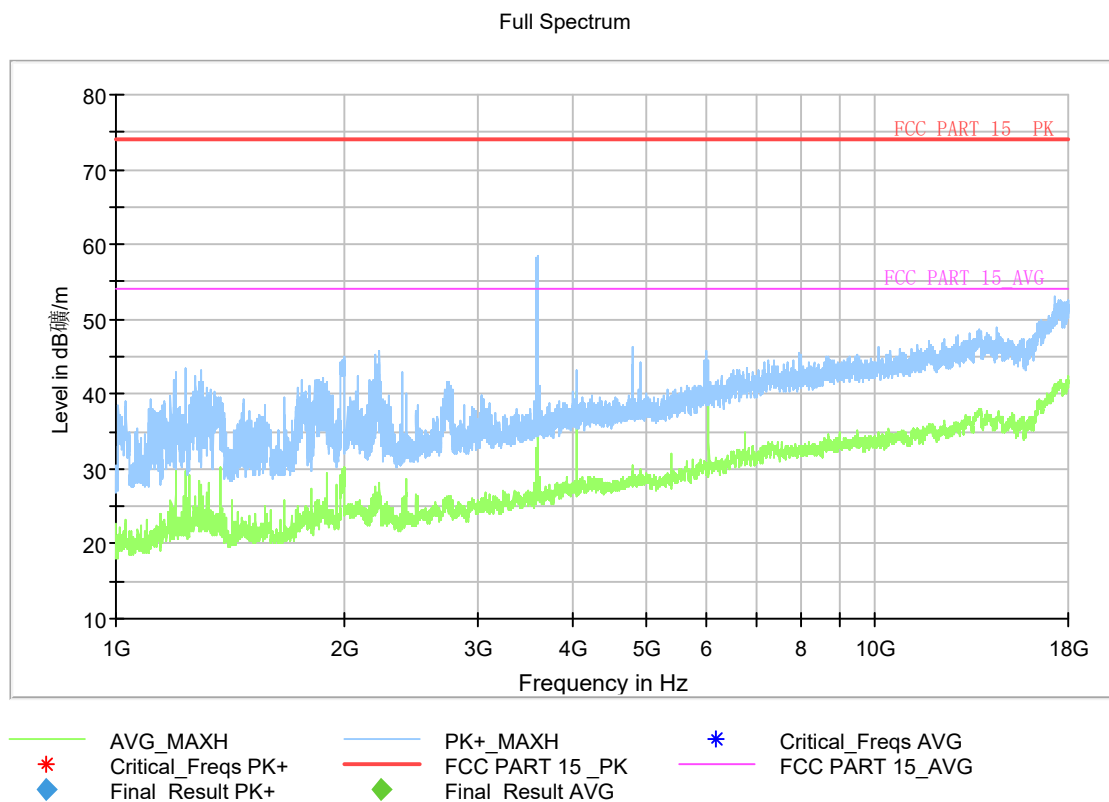


Fig A.12 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.3, FM idle:

Full Spectrum

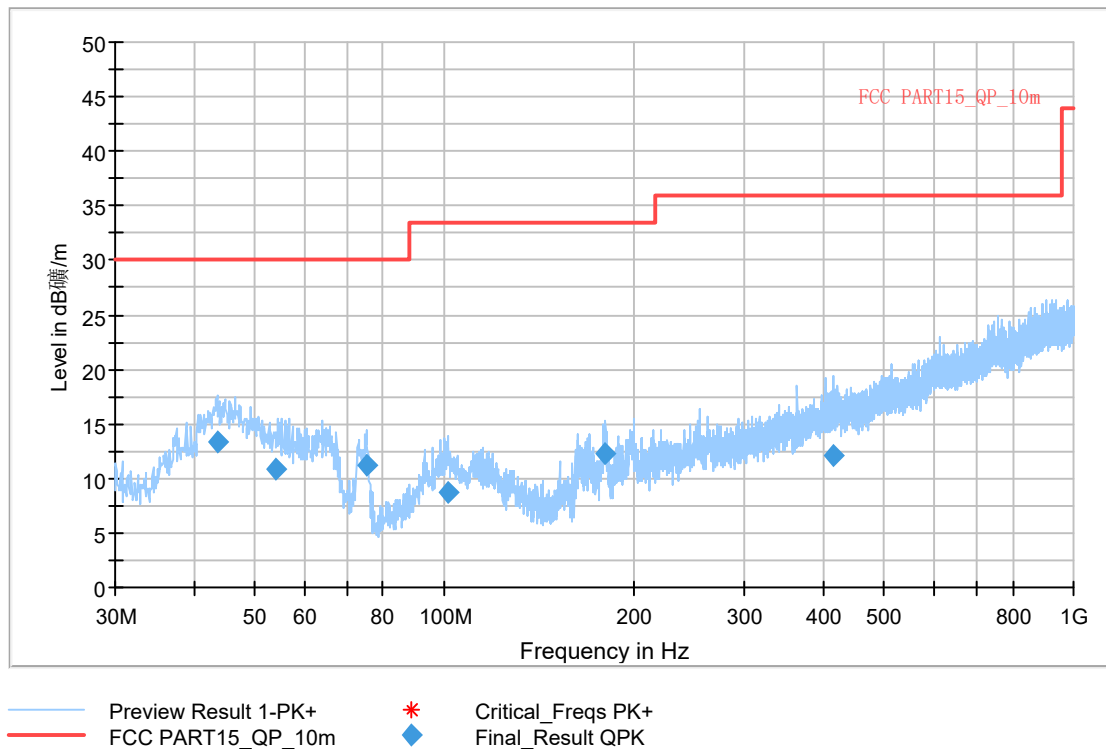


Fig A.13 Radiated Emission from 30MHz to 1GHz

Full Spectrum

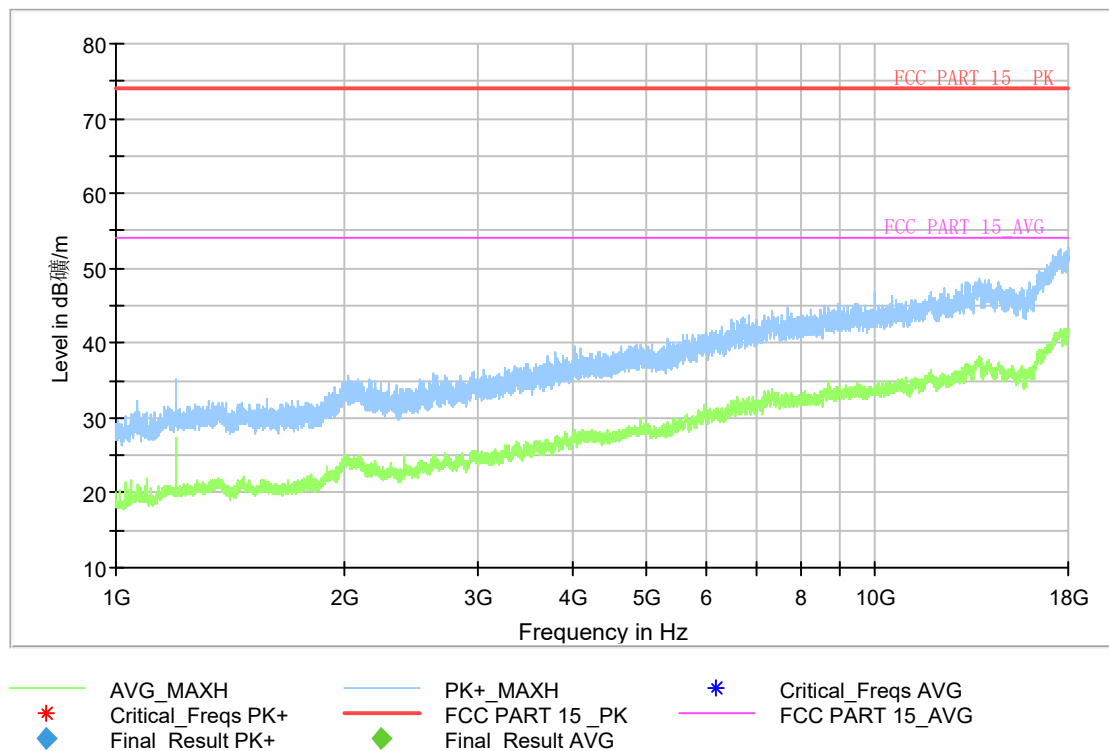


Fig A.14 Radiated Emission from 1GHz to 18GHz

Measurement results for Set.4, Charger + REAR Camera + GSM 850 idle, Second source:

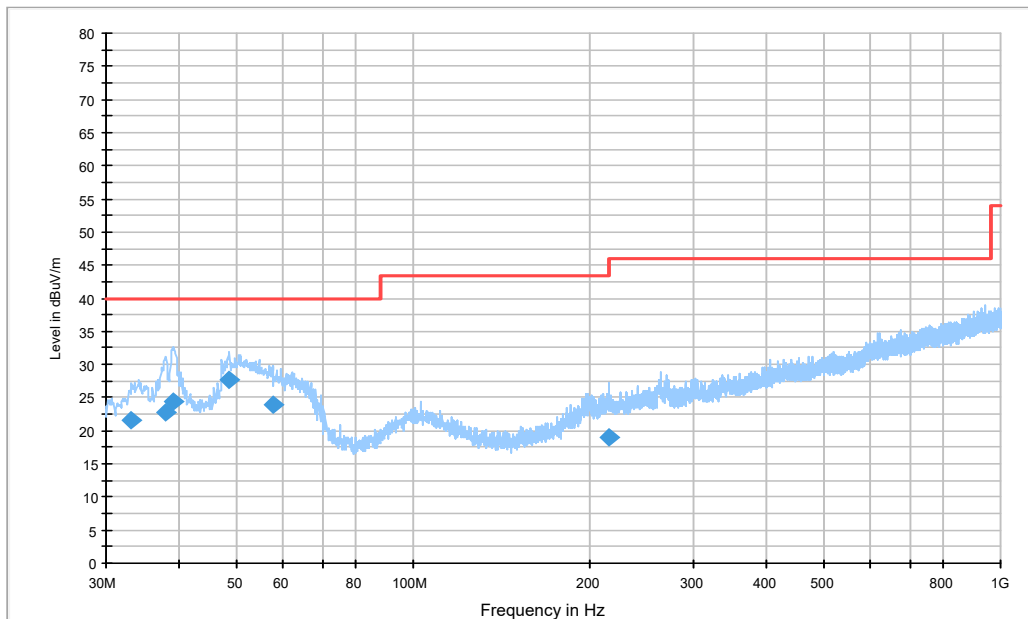


Fig A.15 Radiated Emission from 30MHz to 1GHz

Measurement results for Set.5, Front camera+ LTE band 5 idle, Second source:

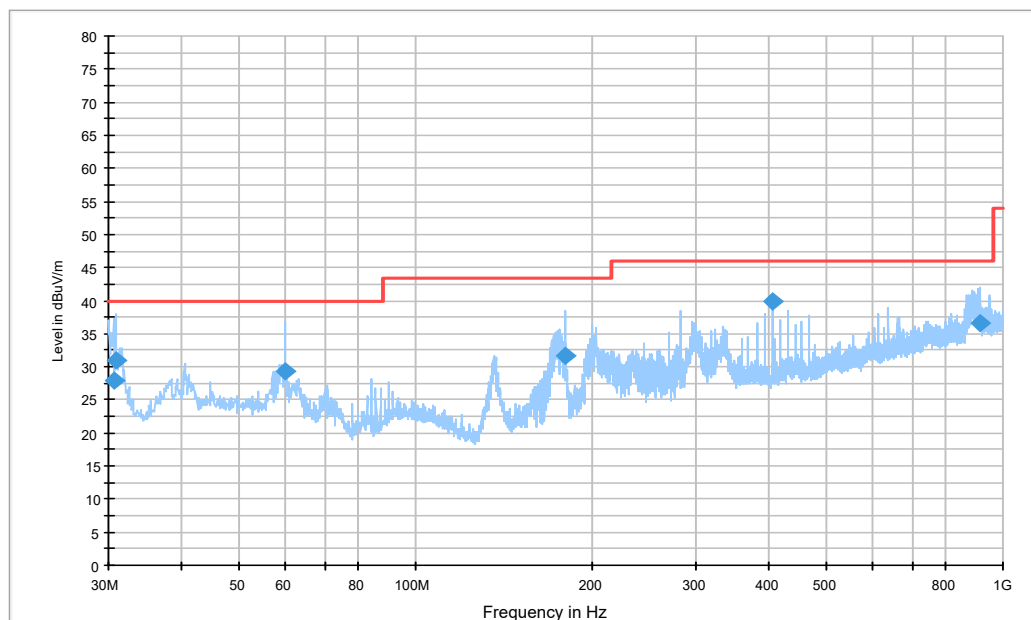


Fig A.16 Radiated Emission from 30MHz to 1GHz

Measurement results for Set.6, FM idle, Second source:

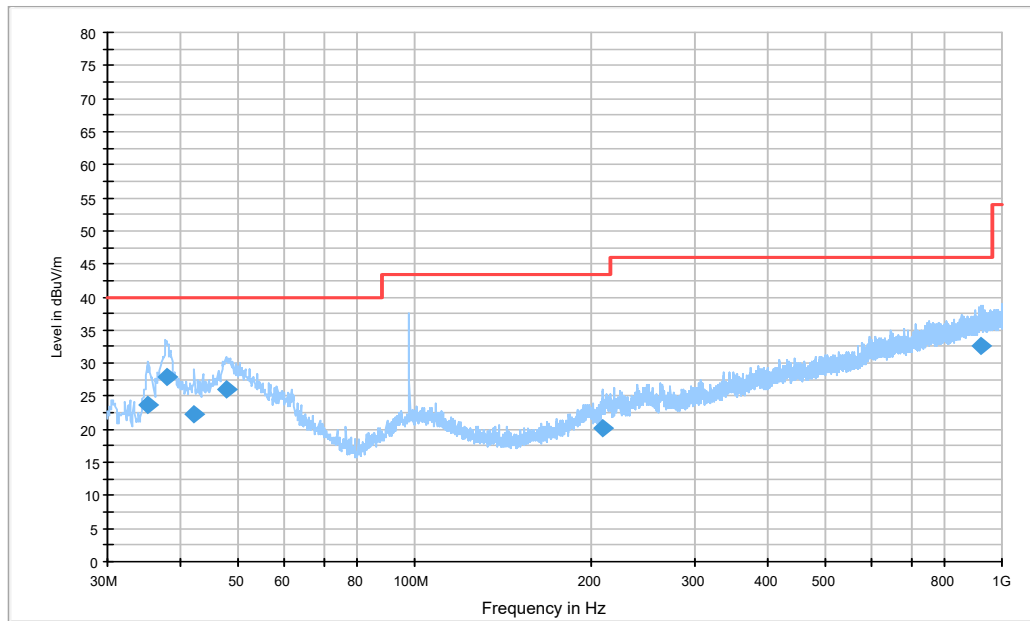


Fig A.17 Radiated Emission from 30MHz to 1GHz

Measurement results for Set.7, Charger + Front camera+ LTE band 5 idle:

Full Spectrum

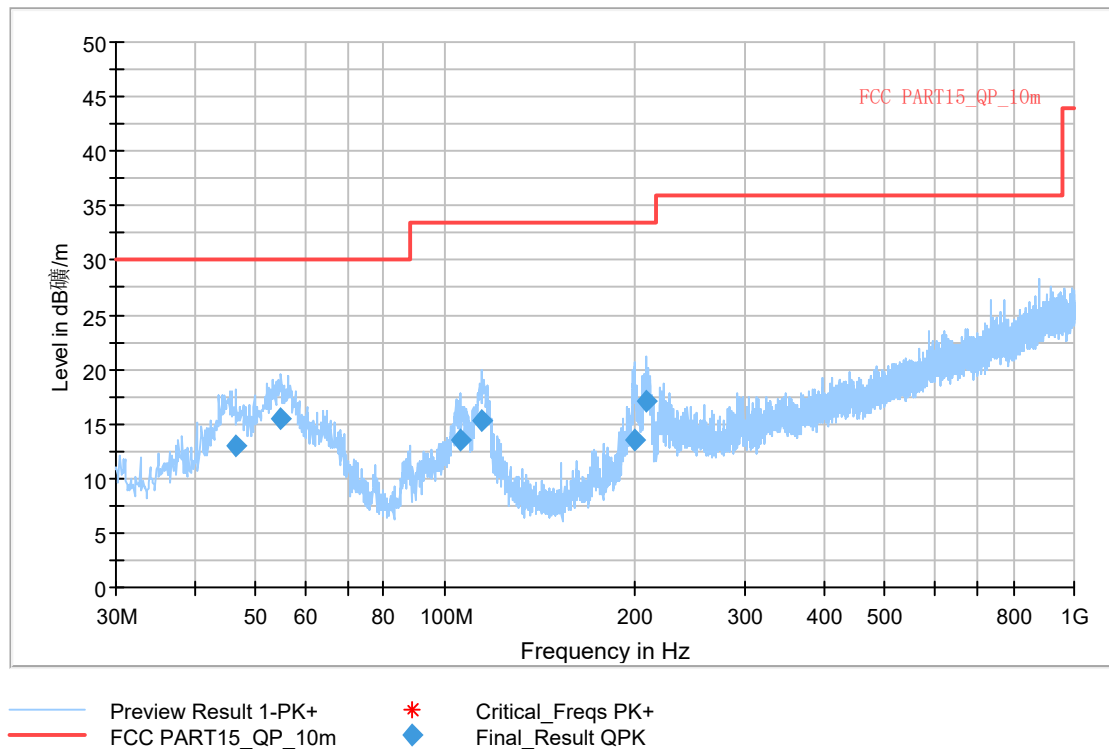


Fig A.18 Radiated Emission from 30MHz to 1GHz

Full Spectrum

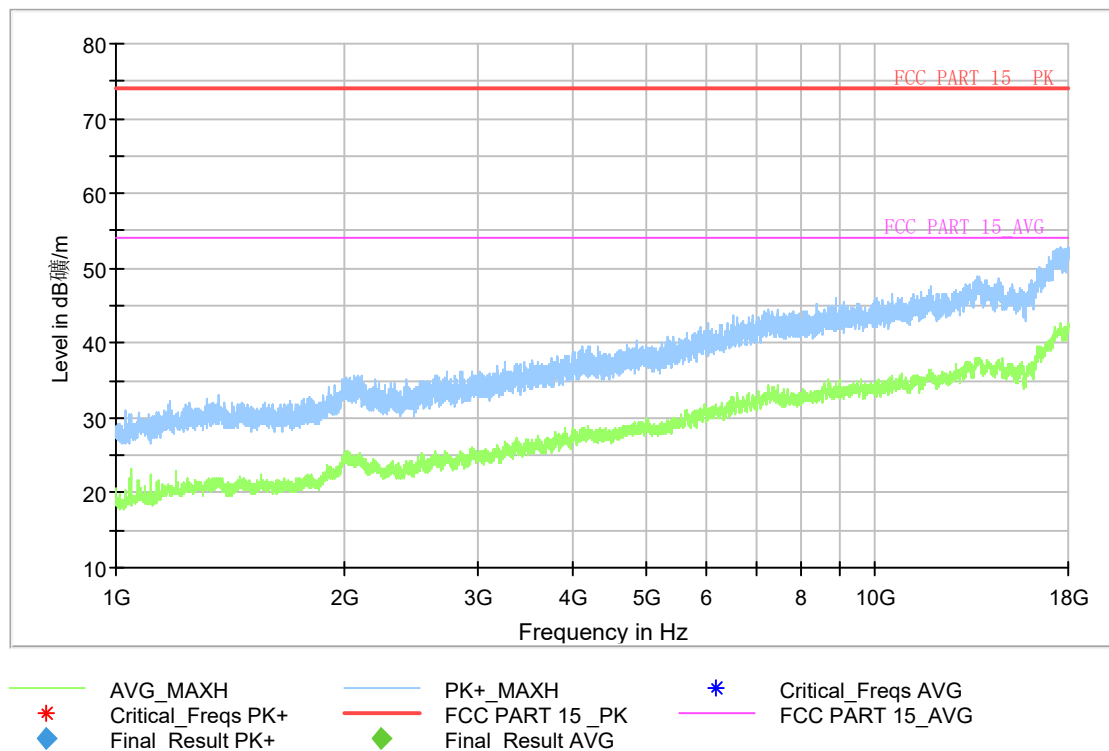


Fig A.19 Radiated Emission from 1GHz to 18GHz

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

Measurement results for Set.1, Charger + REAR Camera + GSM 850 idle:

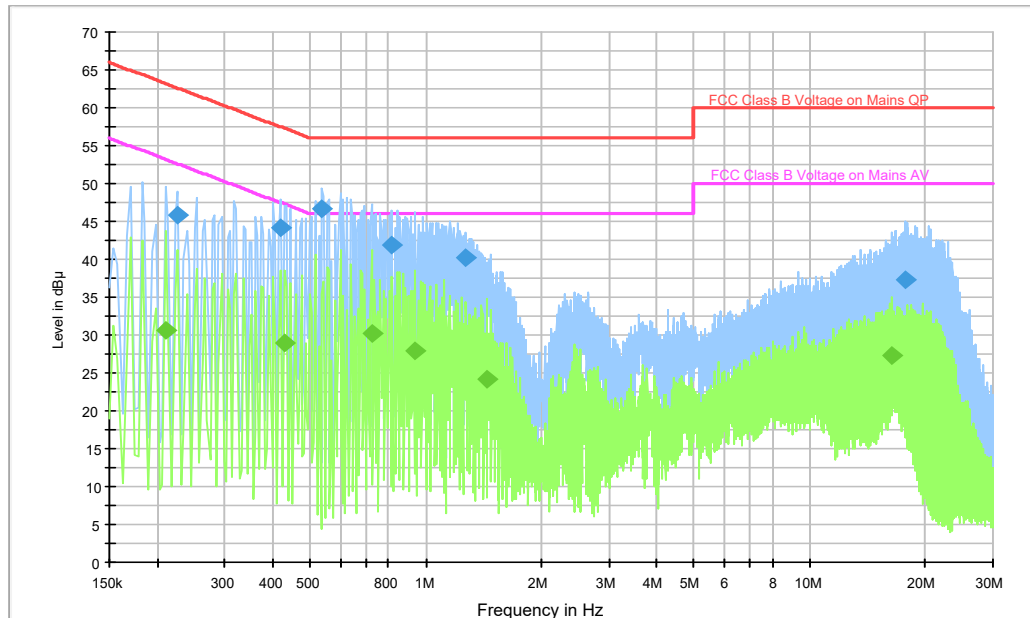


Fig A.20 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.226000	45.8	2000.0	9.000	On	N	19.7	16.8	62.6
0.418000	44.2	2000.0	9.000	On	N	19.7	13.3	57.5
0.538000	46.7	2000.0	9.000	On	L1	19.7	9.3	56.0
0.818000	41.8	2000.0	9.000	On	N	19.7	14.2	56.0
1.274000	40.3	2000.0	9.000	On	N	19.6	15.7	56.0
17.798000	37.4	2000.0	9.000	On	L1	19.7	22.6	60.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.210000	30.6	2000.0	9.000	On	L1	19.7	22.6	53.2
0.430000	28.9	2000.0	9.000	On	L1	19.7	18.3	47.3
0.722000	30.2	2000.0	9.000	On	N	19.7	15.8	46.0
0.942000	27.9	2000.0	9.000	On	N	19.6	18.1	46.0
1.442000	24.2	2000.0	9.000	On	N	19.6	21.8	46.0
16.290000	27.4	2000.0	9.000	On	L1	19.7	22.6	50.0

Measurement results for Set.2, USB + Front camera+ LTE band 5 idle:

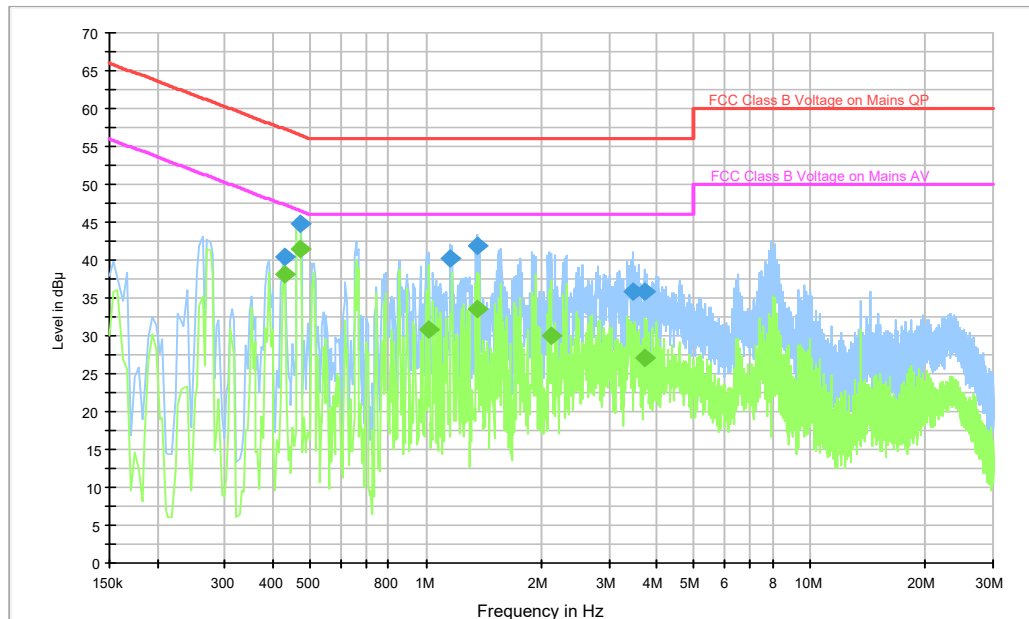


Fig A.21 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.430000	40.3	2000.0	9.000	On	L1	19.7	16.9	57.3
0.470000	44.7	2000.0	9.000	On	L1	19.7	11.8	56.5
1.162000	40.2	2000.0	9.000	On	L1	19.7	15.8	56.0
1.358000	41.8	2000.0	9.000	On	L1	19.6	14.2	56.0
3.458000	35.9	2000.0	9.000	On	N	19.6	20.1	56.0
3.710000	35.9	2000.0	9.000	On	N	19.6	20.1	56.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.430000	38.2	2000.0	9.000	On	L1	19.7	9.1	47.3
0.470000	41.5	2000.0	9.000	On	L1	19.7	5.0	46.5
1.022000	30.8	2000.0	9.000	On	L1	19.7	15.2	46.0
1.358000	33.5	2000.0	9.000	On	L1	19.6	12.5	46.0
2.122000	30.1	2000.0	9.000	On	N	19.6	15.9	46.0
3.714000	27.0	2000.0	9.000	On	N	19.6	19.0	46.0

Measurement results for Set.3, FM idle:

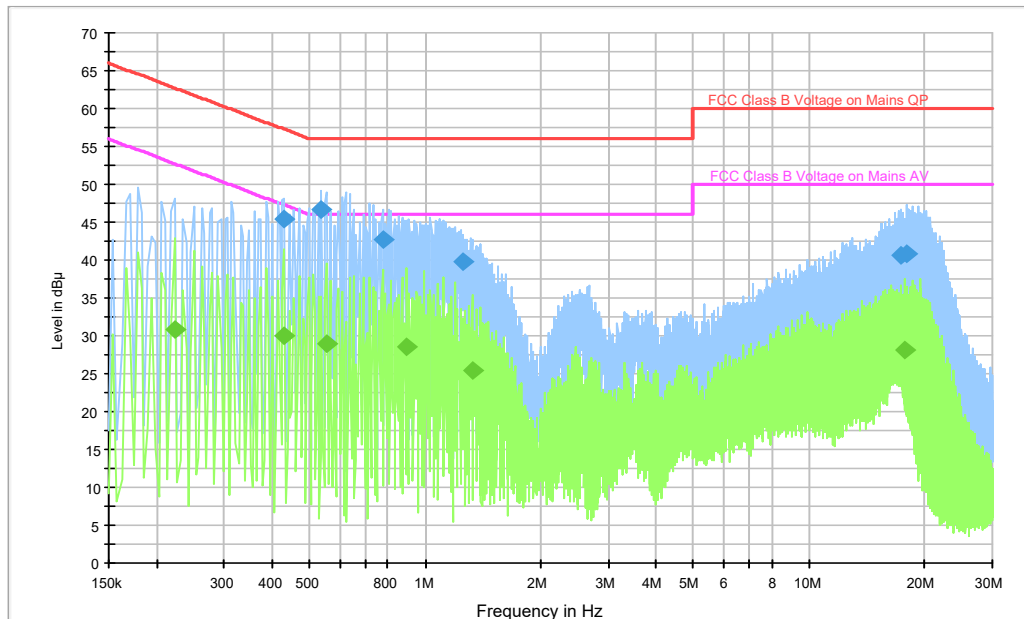


Fig A.22 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.430000	45.4	2000.0	9.000	On	N	19.7	11.8	57.3
0.538000	46.7	2000.0	9.000	On	L1	19.7	9.4	56.0
0.774000	42.7	2000.0	9.000	On	N	19.7	13.3	56.0
1.254000	39.8	2000.0	9.000	On	N	19.6	16.2	56.0
17.266000	40.6	2000.0	9.000	On	L1	19.7	19.4	60.0
18.018000	40.9	2000.0	9.000	On	L1	19.7	19.1	60.0

Final Result 2

Frequency (MHz)	Average (dBuV)	Meas. Time	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBuV)
0.222000	30.8	2000.0	9.000	On	N	19.7	21.9	52.7
0.430000	29.9	2000.0	9.000	On	N	19.7	17.3	47.3
0.554000	28.9	2000.0	9.000	On	N	19.7	17.1	46.0
0.898000	28.4	2000.0	9.000	On	N	19.6	17.6	46.0
1.326000	25.4	2000.0	9.000	On	N	19.6	20.6	46.0
17.746000	28.2	2000.0	9.000	On	L1	19.7	21.8	50.0

ANNEX B: PERSONS INVOLVED IN THIS TESTING

Test Item	Test operator
Conducted Emission	Zhang Tianli
Radiated Emission	Yan Hanchen & Ding Zai & Sun Tianyuan

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