



TEST REPORT

No. I20Z70084-EMC02

for

Samsung Electronics. Co., Ltd.

Mobile phone

Model Name: SM-M015G/DS

FCC ID: ZCASMM015G

with

Hardware Version: REV1.0

Software Version: M015G.001

Issued Date: 2020-4-28

Note:

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Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20Z70084-EMC02	Rev.0	1 st edition	2020-04-23
I20Z70084-EMC02	Rev.1	1 st edition	2020-04-28

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	7
4. REFERENCE DOCUMENTS.....	8
4.1. REFERENCE DOCUMENTS FOR TESTING.....	8
5. LABORATORY ENVIRONMENT.....	9
6. SUMMARY OF TEST RESULTS.....	10
7. TEST EQUIPMENTS UTILIZED.....	11
ANNEX A: MEASUREMENT RESULTS	12
ANNEX B: PERSONS INVOLVED IN THIS TESTING	25

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 (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: 2020-04-20
Testing End Date: 2020-04-23

1.5. Signature



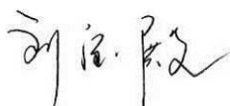
Li Yan

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

2.2. Manufacturer Information

Company Name: Samsung Electronics. Co., Ltd.
R5, A Tower 22 Floor A-1,(Maetan dong)
Address /Post: 129,Samsung-ro,Yeongtong-gu, Suwon-Si, Gyeonggi-do 16677,
Korea
Contact: JP KIM
Email: jp426.kim@samsung.com
Telephone: +82-10-4376-0326

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

3.1. About EUT

Description	Mobile phone
Model Name	SM-M015G/DS
FCC ID	ZCASMM015G
Extreme vol. Limits	3.6VDC to 4.2VDC (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
EUT3	355257110019889/ 355258110019887	REV1.0	M015G.001

*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	/	/
AE3	Charger	/	/
AE4	Charger	/	/
AE5	USB Cable	/	/
AE6	Headset	/	/

AE1

Model	HQ-61N
Manufacturer	Ningde Amperex Technology Limited
Capacitance	3900mAh/4000mAh
Nominal voltage	3.86 V

AE3

Model	ETA0U83EWE
Manufacturer	Samsung Electronics Co., Ltd
Length of cable	/

AE4

Model	ETA0U83JWS
Manufacturer	Samsung Electronics Co., Ltd
Length of cable	/

AE5

Model	ECB-DU68WE
Manufacturer	SHENGHUA
Length of cable	95cm



AE6

Model	EHS61ASFWE
Manufacturer	/
Length of cable	/

Note: The USB cables are shielded.

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT3+ AE1 + AE4+AE5	License RX band mode

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	2019
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 effectiveness	0.014MHz - 1MHz, >60dB; 1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 MΩ
Ground system resistance	< 4Ω
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
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

6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
Verdict Column	P	Pass
	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	P	CTTL(huayuan North Road)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESU26	100235	R&S	2021-03-05	1 Year
3	Universal Radio Communication Tester	CMW500	150344	R&S	2020-12-27	1 year
4	EMI Antenna	VULB9163	9163-1222	Schwarzbeck	2020-09-17	1 year
5	EMI Antenna	3117	0016725	ETS-Lindgren	2020-05-15	1 year

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01.00	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 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

TEST MODE: WCDMA BAND 5, LTE BAND 5.

The MS is operating in the charging mode and transmitter receiver mode.

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 (worst case): 30MHz-1GHz: 5.40dB, 1GHz-18GHz: 4.32dB, $k=2$.

WCDMA Band 5:

LOW CHANNEL (871.4MHz)

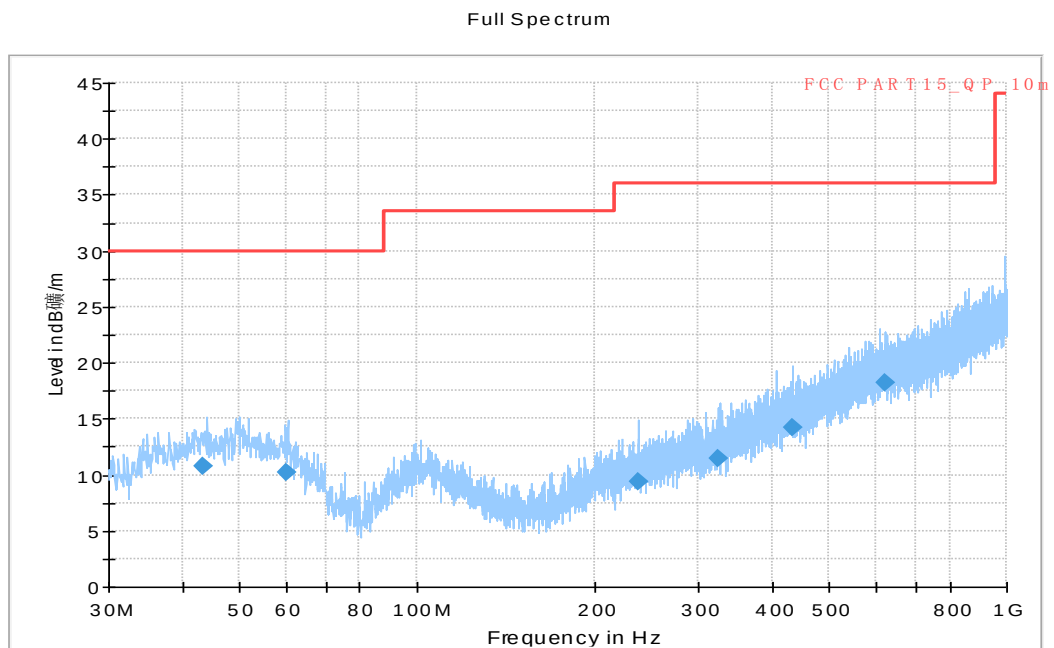


Figure A.1 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
43.465000	10.76	30.00	19.24	1000.0	120.000	112.0	V	85.0
59.881000	10.16	30.00	19.84	1000.0	120.000	175.0	V	201.0
237.774000	9.38	36.00	26.64	1000.0	120.000	190.0	V	30.0
325.236000	11.51	36.00	24.51	1000.0	120.000	103.0	V	99.0
434.813000	14.26	36.00	21.76	1000.0	120.000	180.0	V	74.0
620.781000	18.26	36.00	17.76	1000.0	120.000	109.0	V	60.0

Full Spectrum

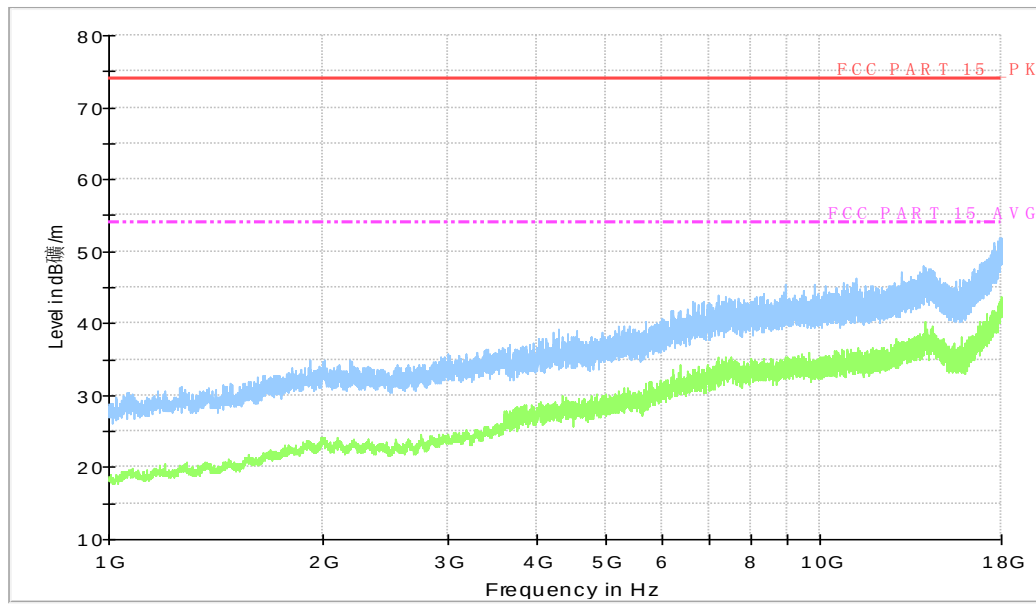


Figure A.2 Radiated Emission from 1GHz to 18GHz

MID CHANNEL (881.6MHz)

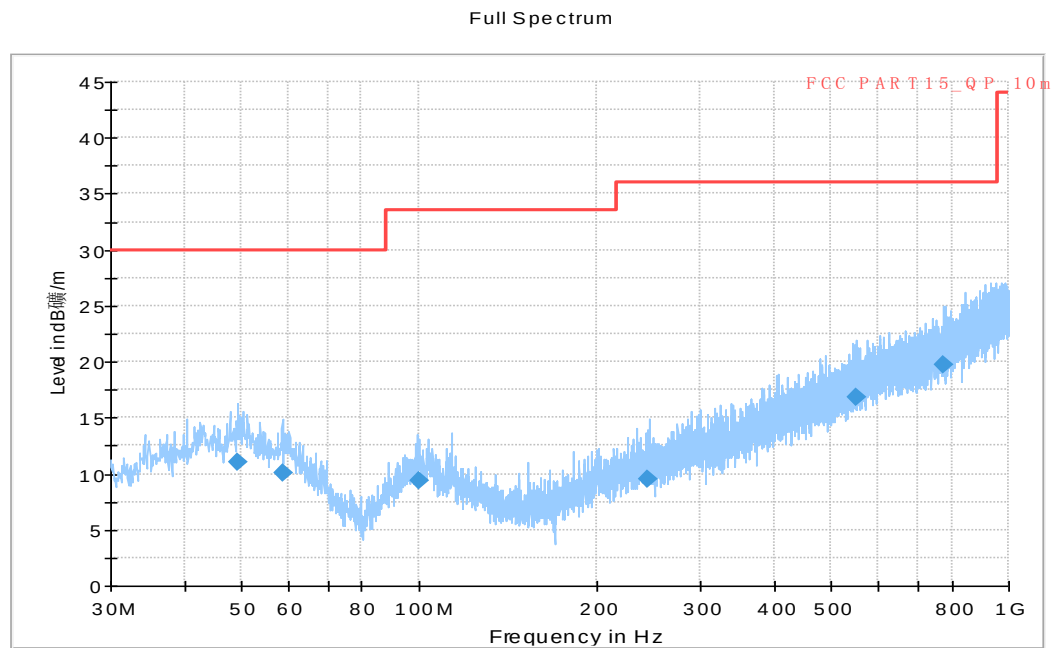


Figure A.3 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
49.326000	11.08	30.00	18.92	1000.0	120.000	104.0	V	200.0
58.615000	10.06	30.00	19.94	1000.0	120.000	189.0	V	18.0
99.997000	9.38	33.50	24.14	1000.0	120.000	175.0	V	106.0
244.957000	9.58	36.00	26.44	1000.0	120.000	117.0	V	98.0
551.384000	16.84	36.00	19.18	1000.0	120.000	116.0	V	60.0
776.147000	19.70	36.00	16.32	1000.0	120.000	179.0	V	14.0

Full Spectrum

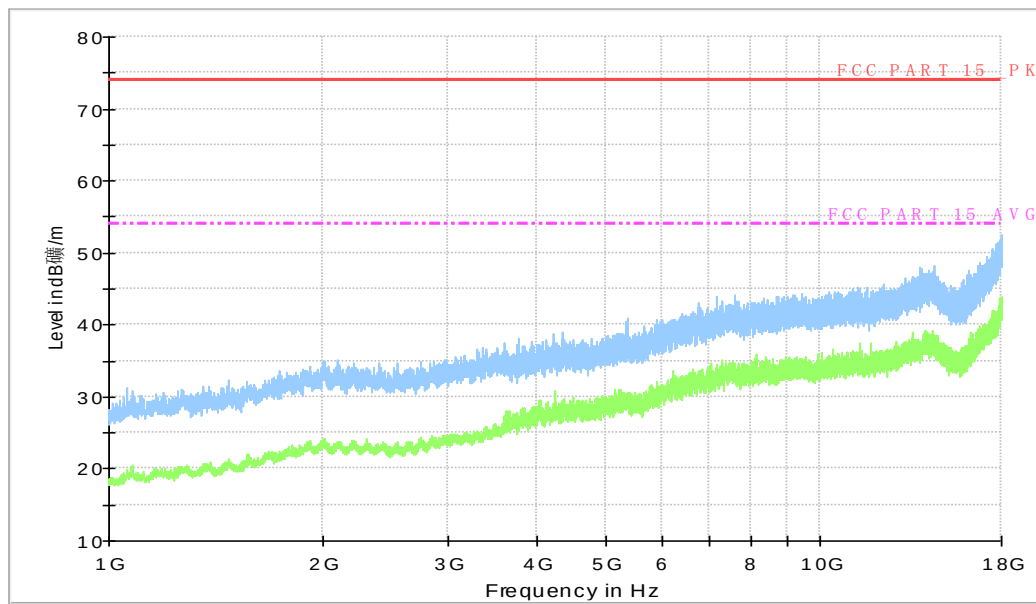


Figure A.4 Radiated Emission from 1GHz to 18GHz

HIGH CHANNEL (891.6MHz)

Full Spectrum

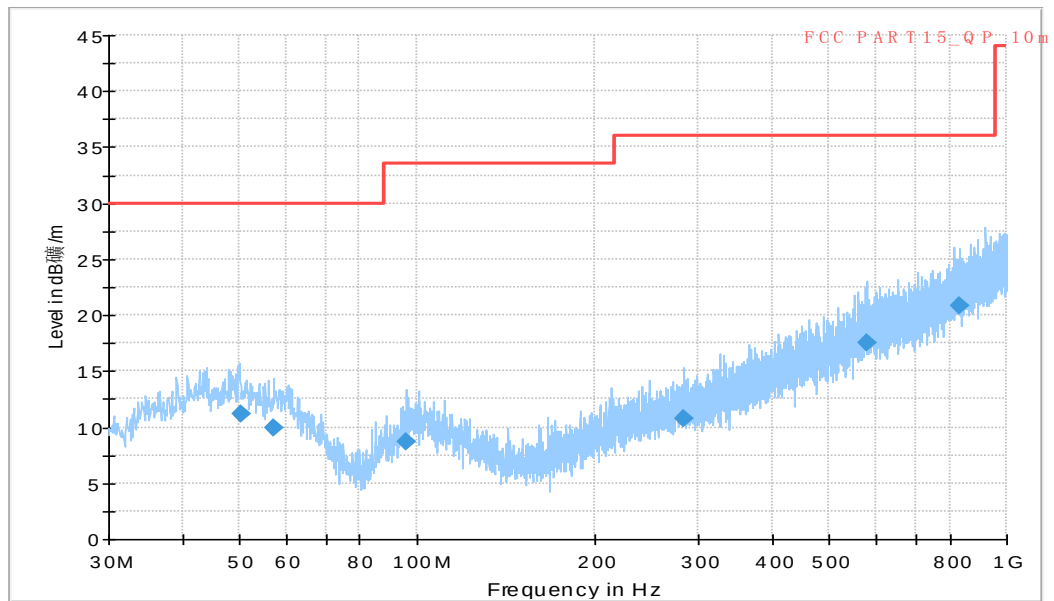


Figure A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
50.402000	11.24	30.00	18.76	1000.0	120.000	104.0	V	99.0
57.257000	9.87	30.00	20.13	1000.0	120.000	208.0	V	75.0
96.177000	8.68	33.50	24.84	1000.0	120.000	103.0	V	210.0
283.346000	10.76	36.00	25.26	1000.0	120.000	178.0	V	94.0
581.228000	17.53	36.00	18.49	1000.0	120.000	103.0	V	30.0
832.338000	20.80	36.00	15.22	1000.0	120.000	125.0	V	-8.0

Full Spectrum

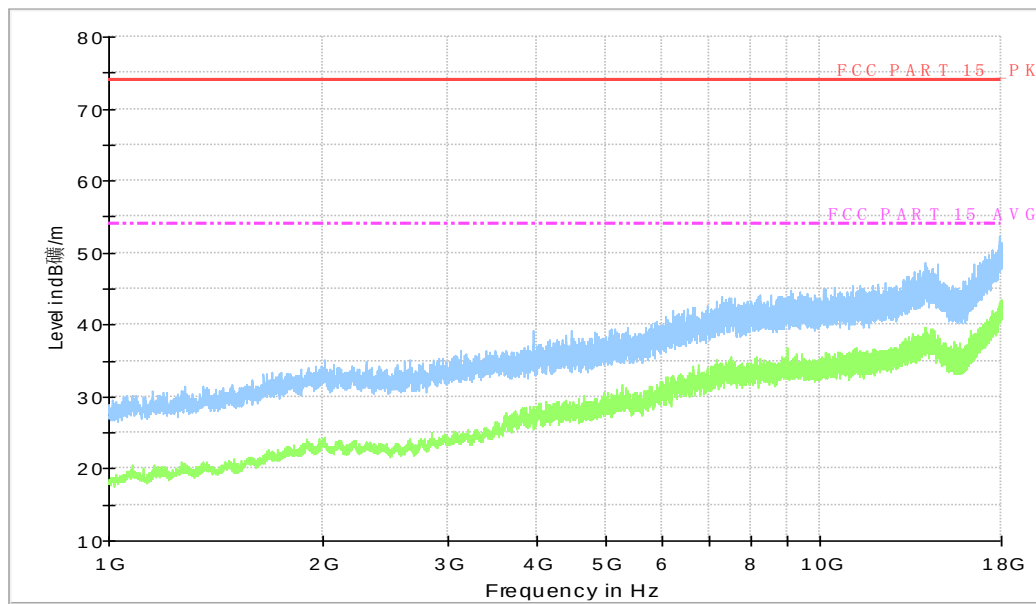


Figure A.6 Radiated Emission from 1GHz to 18GHz

LTE Band 5:

LOW CHANNEL (869.7MHz)

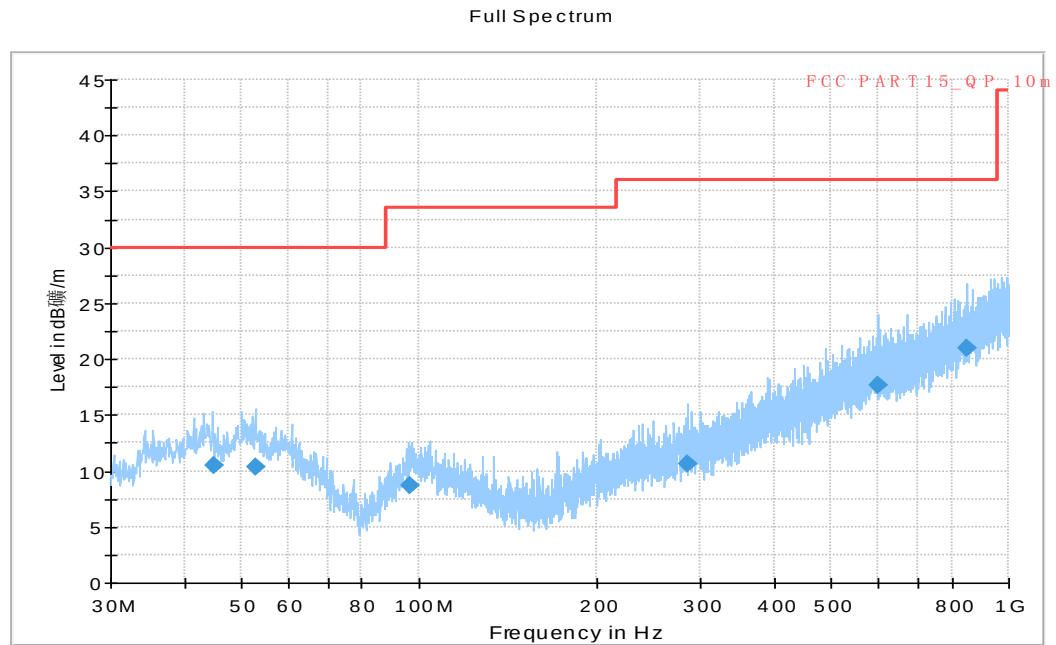


Figure A.7 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
45.030000	10.46	30.00	19.54	1000.0	120.000	179.0	V	11.0
52.818000	10.33	30.00	19.67	1000.0	120.000	108.0	V	210.0
96.547000	8.68	33.50	24.84	1000.0	120.000	179.0	V	96.0
286.103000	10.58	36.00	25.44	1000.0	120.000	125.0	V	114.0
599.847000	17.71	36.00	18.31	1000.0	120.000	201.0	V	173.0
850.962000	20.98	36.00	15.04	1000.0	120.000	225.0	V	210.0

Full Spectrum

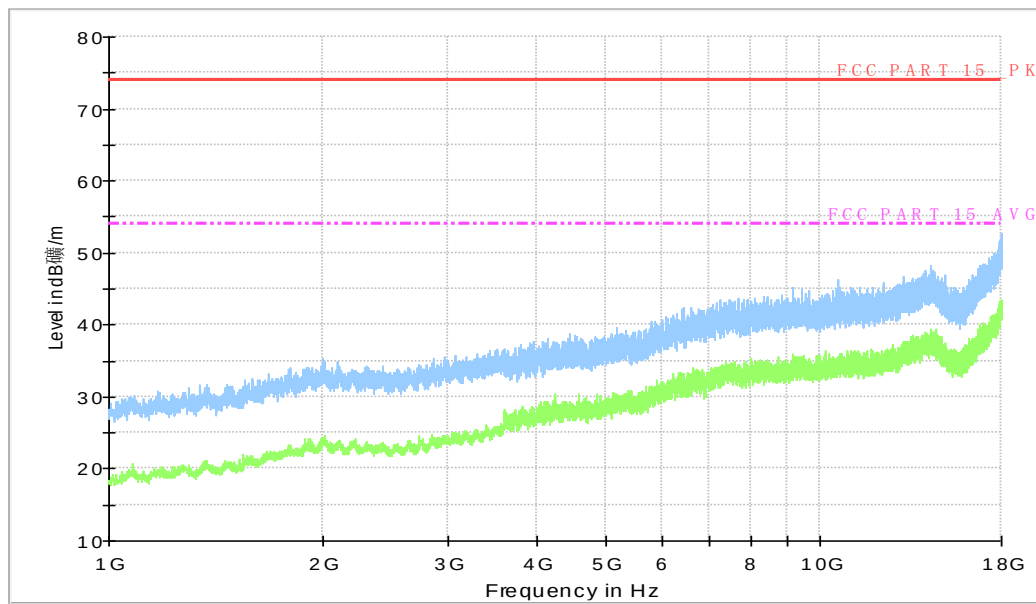


Figure A.8 Radiated Emission from 1GHz to 18GHz

MID CHANNEL (881.5MHz)

Full Spectrum

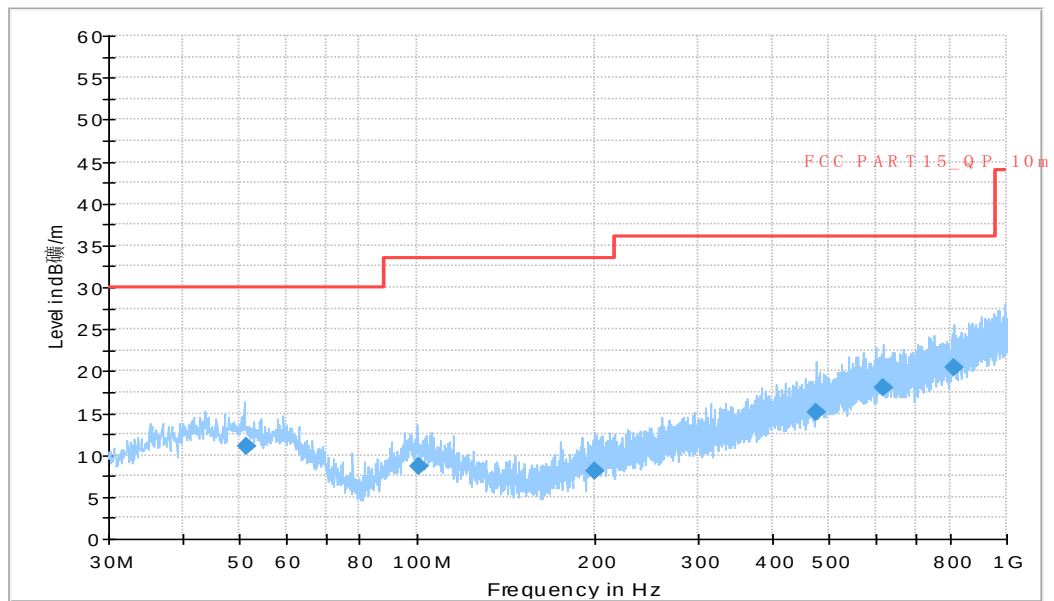


Figure A.9 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
51.395000	11.03	30.00	18.97	1000.0	120.000	106.0	V	74.0
100.708000	8.57	33.50	24.95	1000.0	120.000	111.0	V	158.0
199.990000	8.11	33.50	25.41	1000.0	120.000	110.0	V	120.0
475.304000	15.15	36.00	20.87	1000.0	120.000	103.0	V	-30.0
616.656000	18.03	36.00	17.99	1000.0	120.000	125.0	V	74.0
815.839000	20.42	36.00	15.60	1000.0	120.000	213.0	V	115.0

Full Spectrum

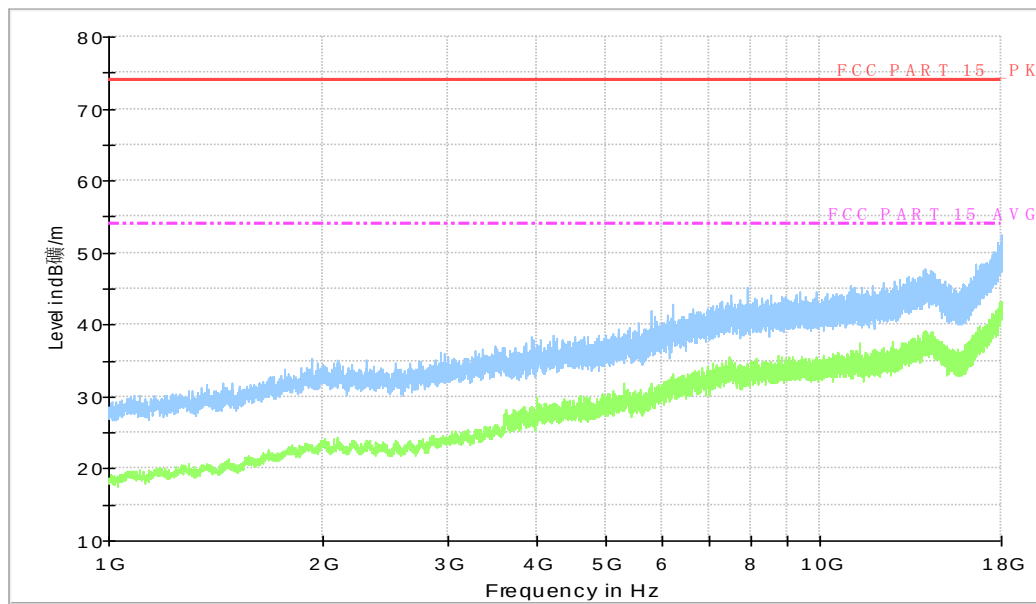


Figure A.10 Radiated Emission from 1GHz to 18GHz

HIGH CHANNEL (893.3MHz)

Full Spectrum

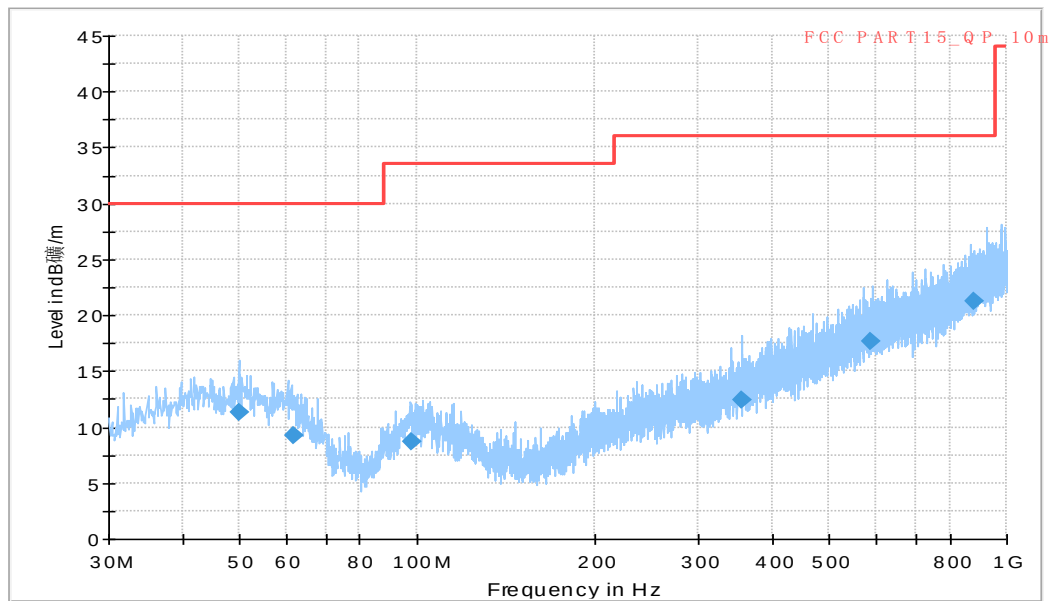


Figure A.11 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
49.968000	11.27	30.00	18.73	1000.0	120.000	125.0	V	4.0
61.654000	9.23	30.00	20.77	1000.0	120.000	125.0	V	60.0
97.872000	8.75	33.50	24.77	1000.0	120.000	182.0	V	30.0
355.902000	12.46	36.00	23.56	1000.0	120.000	125.0	V	150.0
586.115000	17.67	36.00	18.35	1000.0	120.000	104.0	V	120.0
878.699000	21.32	36.00	14.70	1000.0	120.000	225.0	V	21.0

Full Spectrum

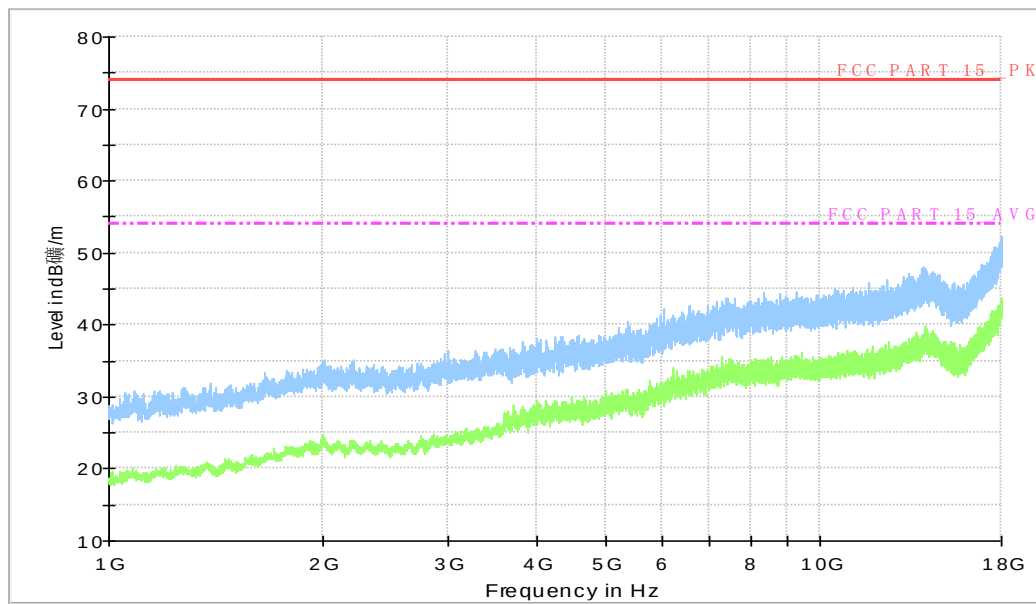


Figure A.12 Radiated Emission from 1GHz to 18GHz

ANNEX B: Persons involved in this testing

Test Item	Tester
Radiated Emission	Yan Hanchen Wang Huan

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