



TEST REPORT

No. I14Z47434-EMC01

for

TCT Mobile Limited

GSM dual-band mobile phone

Model Name: 4020A

FCC ID: RAD517

with

Hardware Version: 02

Software Version: v112

Issued Date: Aug. 8th, 2014

Note:

The test results in this test report relate only to the devices specified in this report. This report shall not be reproduced except in full without the written approval of TMC Beijing.

Test Laboratory:

FCC 2.948 Listed: No.733176

IC O.A.T.S listed: No.6629B-1

TMC Beijing, Telecommunication Metrology Center of Ministry of Industry and Information Technology

No. 52, Huayuan Bei Road, Haidian District, Beijing, P. R. China 100191

Tel: +86(0)10-62304633-2561, Fax: +86(0)10-62304633-2504 Email:welcome@emcite.com. www.emcite.com

CONTENTS

1. TEST LABORATORY	3
1.1. TESTING LOCATION	3
1.2. TESTING ENVIRONMENT	3
1.3. PROJECT DATA	3
1.4. SIGNATURE.....	3
2. CLIENT INFORMATION	4
2.1. APPLICANT INFORMATION.....	4
2.2. MANUFACTURER INFORMATION.....	4
3. EQUIPMENT UNDER TEST (EUT) AND ANCILLARY EQUIPMENT (AE)	5
3.1. ABOUT EUT.....	5
3.2. INTERNAL IDENTIFICATION OF EUT USED DURING THE TEST	5
3.3. INTERNAL IDENTIFICATION OF AE USED DURING THE TEST.....	5
3.4. EUT SET-UPS	6
4. REFERENCE DOCUMENTS.....	7
4.1. REFERENCE DOCUMENTS FOR TESTING.....	7
5. LABORATORY ENVIRONMENT.....	8
6. SUMMARY OF TEST RESULTS.....	9
7. TEST EQUIPMENTS UTILIZED.....	10
ANNEX A: MEASUREMENT RESULTS	11

1. Test Laboratory

1.1. Testing Location

Location A

Company Name: TMC Beijing, Telecommunication Metrology Center of MIIT
Address: No 52, Huayuan Bei Road, Haidian District, Beijing, P.R. China
Postal Code: 100191

1.2. Testing Environment

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

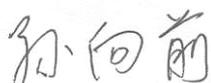
1.3. Project data

Testing Start Date: Aug.4th, 2014
Testing End Date: Aug.8th, 2014

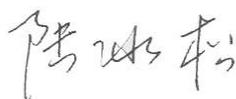
1.4. Signature



Qu Pengfei
(Prepared this test report)



Sun Xiangqian
(Reviewed this test report)



Lu Bingsong
Deputy Director of the laboratory
(Approved this test report)

2. Client Information

2.1. Applicant Information

Company Name: TCT Mobile Limited
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Pudong Area Shanghai, P.R. China.
City: Shanghai
Postal Code: 201203
Country: China
Contact Person: Gong Zhizhou
Contact Email: zhizhou.gong@jrdcom.com
Telephone: 0086-21-51798260
Fax: 0086-21-61460602

2.2. Manufacturer Information

Company Name: TCT Mobile Limited
Address /Post: 5F, C building, No. 232, Liang Jing Road ZhangJiang High-Tech Park,
Pudong Area Shanghai, P.R. China.
City: Shanghai
Postal Code: 201203
Country: China
Telephone: 0086-21-51798260
Fax: 0086-21-61460602

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

3.1. About EUT

Description	GSM dual-band mobile phone
Model Name	4020A
FCC ID	RAD517
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 Telecommunication Metrology Center of MIIT of People's Republic of China.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT3	014167000000043	02	v112

*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	/	1447204BA003
AE2	Battery	/	1447204BA001
AE3	Battery	/	1447204BA010
AE4	Battery	/	1447204BA009
AE5	Battery	/	1447204BA013
AE6	Travel charger	/	1447434CH015
AE7	Travel charger	/	1447434CH010
AE8	Travel charger	/	1447434CH025
AE9	Travel charger	/	1447434CH016
AE10	USB cable	/	1447434DC001
AE11	USB cable	/	1447434DC004
AE12	USB cable	/	1447434DC007
AE13	USB cable	/	1447434DC006

AE1, AE2, AE3, AE4, AE5

Model	CAB31L0000C1
Manufacturer	BYD
Capacitance	1000mAh
Nominal voltage	3.7V

AE6, AE7

Model	CBA3002AG0C1
Manufacturer	Yingju
Length of cable	/

AE8, AE9

Model	CBA3002AG0C3
Manufacturer	BYD
Length of cable	/

AE10, AE11

Model	CDA3122002C1
Manufacturer	JUWEI
Length of cable	101cm

AE12, AE13

Model	CDA3122002C2
Manufacturer	Shenhua
Length of cable	101cm

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

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT1+ AE1 + AE6 + AE10/AE12	Charger
Set.2	EUT1+ AE1 + AE8 + AE10/AE12	Charger
Set.3	EUT1+ AE1 + AE10/AE12	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	10-1-13 Edition
ANSI C63.4	Methods of Measurement of Radio-Noise Emissions from Low - Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz	2009

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 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

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
Location Column	A/B/C/D	The test is performed in test location A, B, C or D which are described in section 1.1 of this report

Clause	List	Clause in FCC rules	Verdict	Location
1	Radiated Emission	15.109(a)	P	A
2	Conducted Emission	15.107(a)	P	A

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI	100344	R&S	2015-03-03	1 year
2	Test Receiver	ESCI 7	100948	R&S	2015-07-16	1 year
3	Universal Radio Communication Tester	CMU200	109914	R&S	2015-04-13	1 year
4	Test Receiver	FSV	101047	R&S	2015-06-27	1 year
5	LISN	ESH2-Z5	829991/012	R&S	2015-04-14	1 year
6	EMI Antenna	VULB 9163	9163-234	Schwarzbeck	2016-09-16	3 years
7	EMI Antenna	3115	6914	ETS-Lindgren	2014-12-15	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Monitor	E178FPc	CN-OWR979-64180 -7AJ-D2MS	DELL	N/A	N/A
10	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
11	Keyboard	L100	CN0RH659658907 ATOI40	DELL	N/A	N/A
12	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§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 - 2009, 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.

A.1.3 Measurement Limit

Frequency range (MHz)	Field strength limit ($\mu\text{V}/\text{m}$)		
	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:

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

Where

G_A : Antenna factor of receive antenna

G_{PL} : Path Loss

P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): $U = 4.3 \text{ dB}$, $k=2$.

Measurement results for Set.1:

Charging Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
9987.625	35.6	-24.2	38.0	21.800	HORIZONTAL
9996.625	35.6	-24.2	38.0	21.800	VERTICAL
9969.625	35.6	-24.2	38.0	21.800	VERTICAL
9997.750	35.6	-24.2	38.0	21.800	VERTICAL
9983.125	35.6	-24.2	38.0	21.800	VERTICAL
9989.875	35.6	-24.2	38.0	21.800	VERTICAL

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
9791.875	48.2	-24.8	38.0	35.000	HORIZONTAL
8293.375	47.8	-27.5	37.7	37.600	VERTICAL
9401.500	47.4	-25.6	38.4	34.600	VERTICAL
9845.875	47.4	-24.8	38.0	34.200	VERTICAL
9991.000	47.2	-24.2	38.0	33.400	HORIZONTAL
8159.500	47.1	-27.5	37.7	36.900	VERTICAL

Measurement result for Set.2:

Charging Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
9996.625	35.8	-24.2	38.0	22.000	HORIZONTAL
9988.750	35.7	-24.2	38.0	21.900	VERTICAL
9995.500	35.7	-24.2	38.0	21.900	VERTICAL
9994.375	35.7	-24.2	38.0	21.900	VERTICAL
9969.625	35.7	-24.2	38.0	21.900	HORIZONTAL
9955.000	35.6	-24.9	38.0	22.500	VERTICAL

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
9985.375	47.6	-24.2	38.0	33.800	VERTICAL
9705.250	47.3	-24.5	38.0	33.800	VERTICAL
9980.875	47.2	-24.2	38.0	33.400	VERTICAL
8295.625	47.2	-27.5	37.7	37.000	VERTICAL
9993.250	47.2	-24.2	38.0	33.400	VERTICAL
10000.000	47.2	-24.2	38.5	32.900	HORIZONTAL

Measurement result for Set.3:

USB Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{mea} (dB μ V)	Polarity
9988.750	35.7	-24.2	38.0	21.900	VERTICAL
9993.250	35.7	-24.2	38.0	21.900	VERTICAL
9997.750	35.7	-24.2	38.0	21.900	VERTICAL
9976.375	35.6	-24.2	38.0	21.800	VERTICAL
9969.625	35.6	-24.2	38.0	21.800	VERTICAL
9966.250	35.6	-24.2	38.0	21.800	HORIZONTAL

USB Mode/ Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{mea} (dB μ V)	Polarity
1497.250	49.7	-40.3	24.1	65.900	VERTICAL
1498.375	49.3	-40.3	24.1	65.500	VERTICAL
1499.500	49.1	-40.3	24.1	65.300	VERTICAL
1496.125	48.4	-40.3	24.1	64.600	HORIZONTAL
1495.000	48.1	-40.3	24.1	64.300	VERTICAL
6740.875	48.0	-31.6	35.3	44.300	HORIZONTAL

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

Charging Mode, Set.1

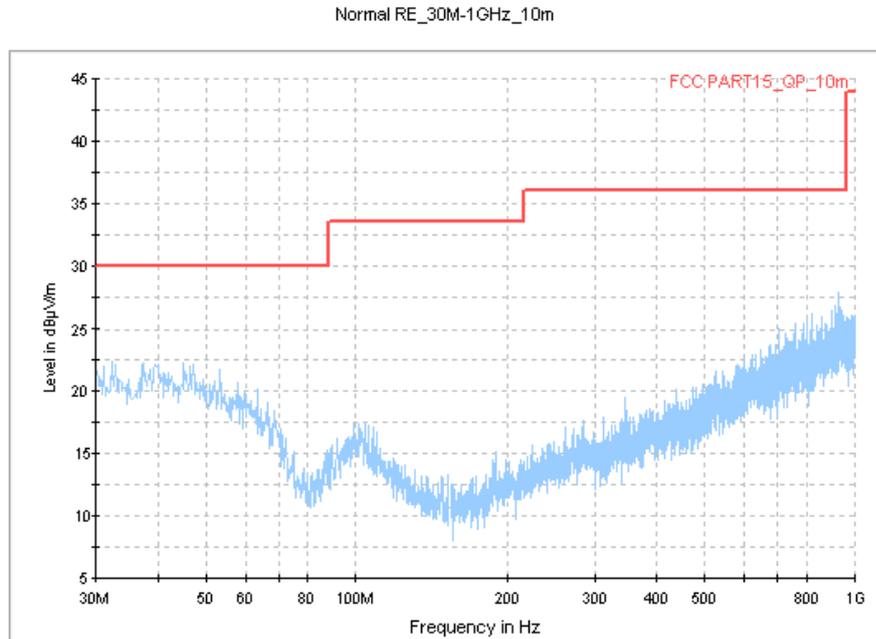


Figure A.1 Radiated Emission from 30MHz to 1GHz

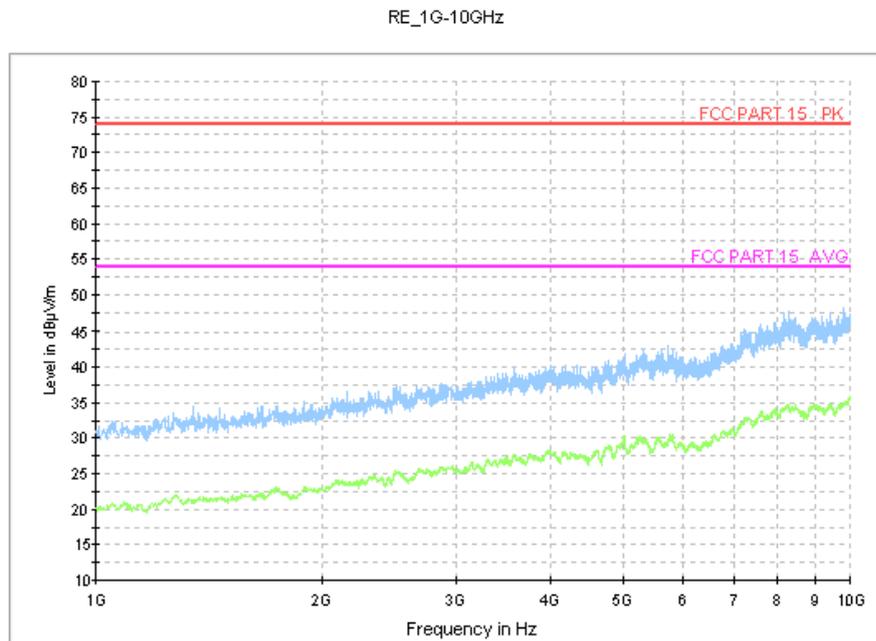


Figure A.2 Radiated Emission from 1GHz to 6GHz

Charging Mode, Set.2

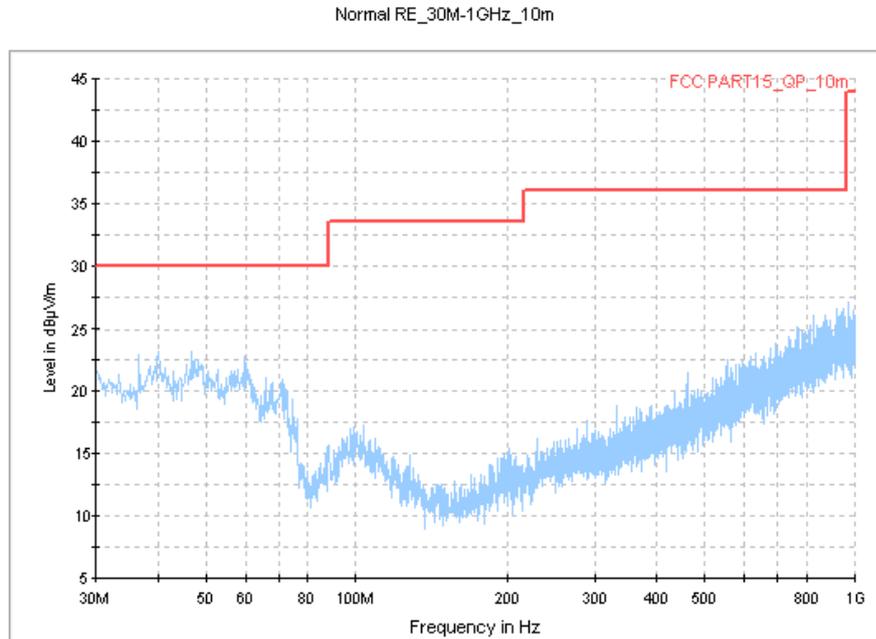


Figure A.3 Radiated Emission from 30MHz to 1GHz

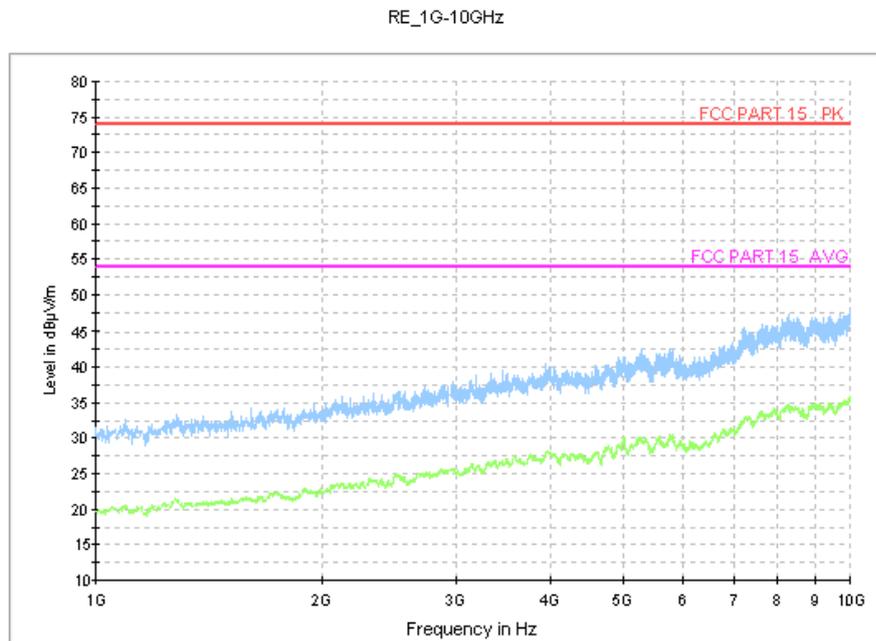


Figure A.4 Radiated Emission from 1GHz to 6GHz

USB Mode, Set.3

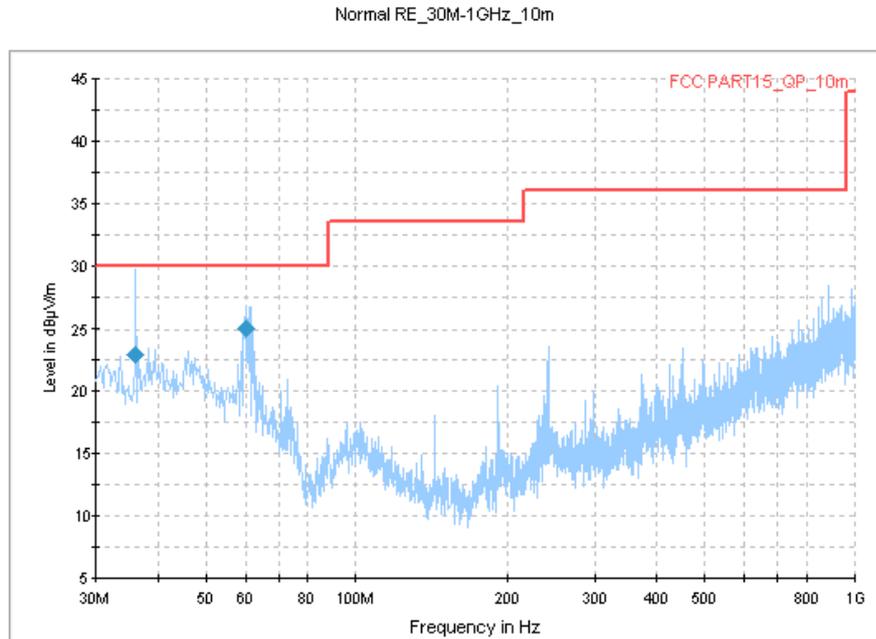


Figure A.5 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency MHz	QuasiPeak dB µV/m	Limit dB µV/m	Margin dB	Azimuth Deg	Polarization H/V
36.062500	23.0	30.0	7.0	85.0	V
60.372500	25.0	30.0	5.0	151.0	V

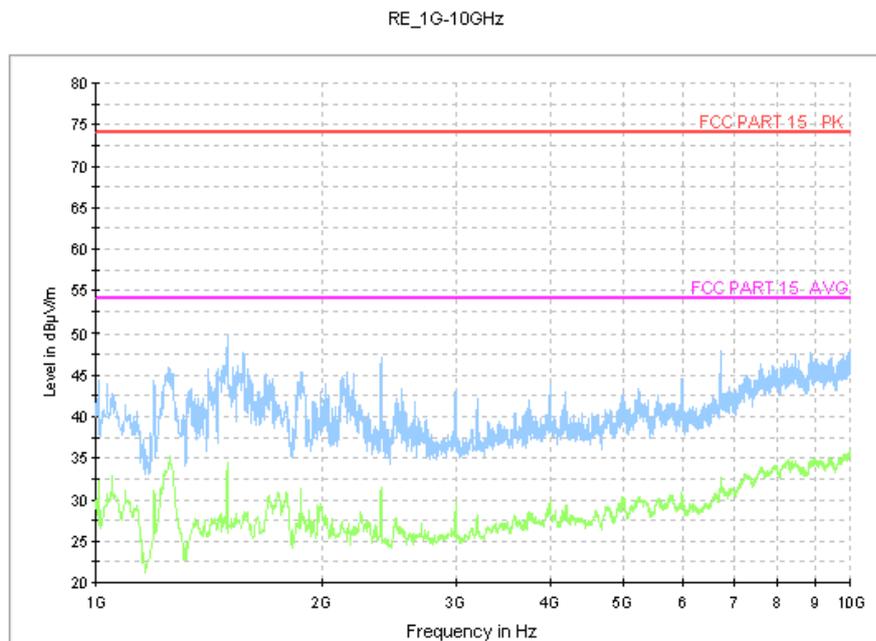


Figure A.6 Radiated Emission from 1GHz to 6GHz

A.2 Conducted Emission (§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 - 2009, section 7.2.

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.

A.2.3 Measurement Limit

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	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

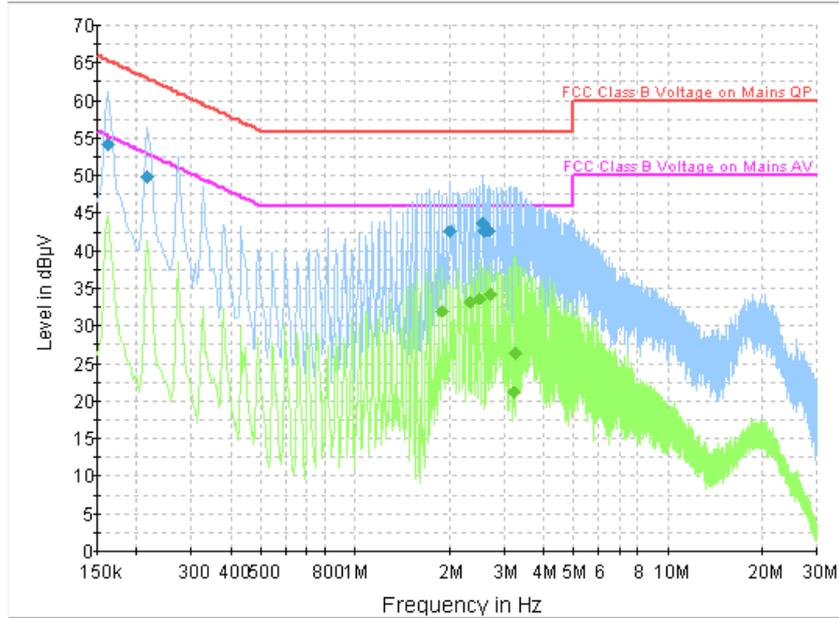


Figure A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dB µV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.163500	54.1	GND	L1	9.8	11.2	65.3
0.217500	49.8	GND	L1	9.8	13.1	62.9
2.008500	42.6	GND	L1	9.7	13.4	56.0
2.548500	43.8	GND	L1	9.7	12.2	56.0
2.607000	42.7	GND	L1	9.7	13.3	56.0
2.661000	42.8	GND	L1	9.7	13.2	56.0

Final Result 2

Frequency (MHz)	CAverage (dB µV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
1.900500	32.0	GND	L1	9.7	14.0	46.0
2.332500	33.2	GND	L1	9.7	12.8	46.0
2.494500	33.7	GND	L1	9.7	12.3	46.0
2.710500	34.1	GND	L1	9.7	11.9	46.0
3.210000	21.2	GND	L1	9.7	24.8	46.0
3.259500	26.5	GND	L1	9.7	19.5	46.0

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

Charging Mode, Set.2

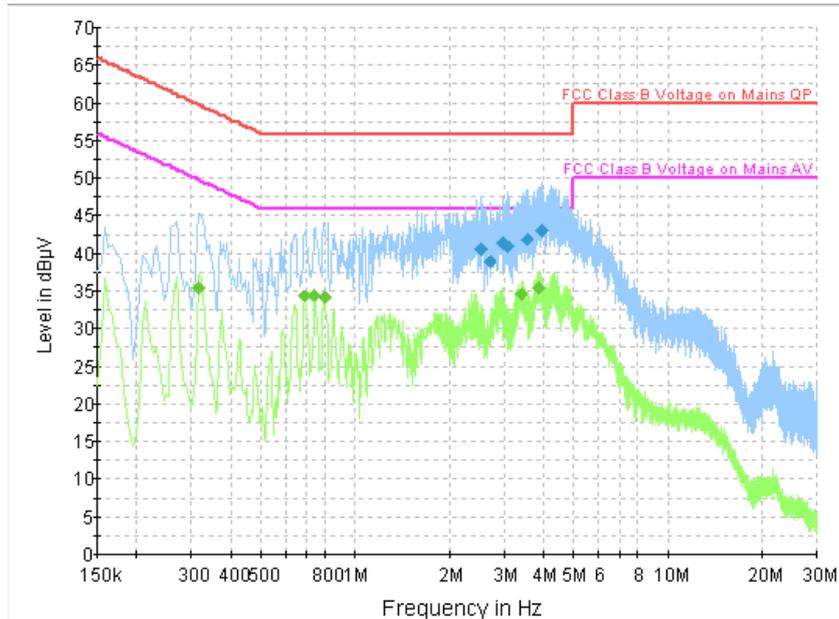


Figure A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dB µV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
2.530500	40.6	GND	L1	9.7	15.4	56.0
2.692500	38.9	GND	N	9.7	17.1	56.0
2.980500	41.5	GND	L1	9.7	14.5	56.0
3.052500	40.9	GND	L1	9.7	15.1	56.0
3.552000	42.0	GND	L1	9.7	14.0	56.0
3.961500	43.1	GND	L1	9.7	12.9	56.0

Final Result 2

Frequency (MHz)	CAverage (dB µV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.316500	35.5	GND	L1	9.8	14.3	49.8
0.690000	34.3	GND	L1	9.8	11.7	46.0
0.739500	34.6	GND	L1	9.8	11.4	46.0
0.798000	34.2	GND	L1	9.8	11.8	46.0
3.390000	34.6	GND	L1	9.7	11.4	46.0
3.871500	35.5	GND	L1	9.7	10.5	46.0

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

USB Mode, Set.3

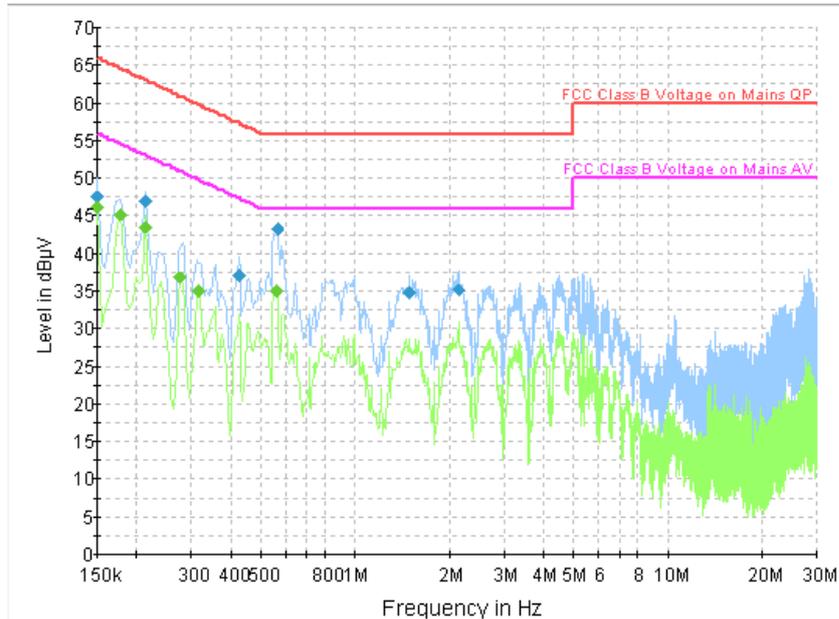


Figure A.9 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dB µV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.150000	47.5	GND	L1	9.8	18.5	66.0
0.213000	47.0	GND	L1	9.8	16.1	63.1
0.424500	37.1	GND	L1	9.8	20.3	57.4
0.564000	43.3	GND	N	9.8	12.7	56.0
1.491000	34.9	GND	L1	9.7	21.1	56.0
2.134500	35.1	GND	L1	9.7	20.9	56.0

Final Result 2

Frequency (MHz)	CAverage (dB µV)	PE	Line	Corr. (dB)	Margin (dB)	Limit (dB µV)
0.150000	46.3	GND	L1	9.8	9.7	56.0
0.177000	45.3	GND	L1	9.8	9.3	54.6
0.213000	43.7	GND	L1	9.8	9.4	53.1
0.276000	36.8	GND	L1	9.8	14.2	50.9
0.316500	35.0	GND	L1	9.8	14.8	49.8
0.559500	35.0	GND	N	9.8	11.0	46.0

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

END OF REPORT