





TEST REPORT No. I22Z62035-EMC01

for

TCL Communication Ltd.

GSM/UMTS/LTE mobile phone

Model Name: T610K

FCC ID: 2ACCJB194

with

Hardware Version: 05

Software Version: 7GS8

Issued Date: 2022-12-26

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 CTTL.

The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the U.S.Government.

Test Laboratory:

CTTL-Telecommunication Technology Labs, CAICT

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

Tel:+86(0)10-62304633-2512, Fax:+86(0)10-62304633-2504

Email: cttl terminals@caict.ac.cn, website: www.caict.ac.cn





REPORT HISTORY

Report Number	Revision	Description	Issue Date
I22Z62035-EMC01	Rev.0	1 st edition	2022-12-26
I22Z62035-EMC01	Rev.1	2 nd edition	2023-01-09

Note: the latest revision of the test report supersedes all previous version.





CONTENTS

1.	TEST LABORATORY	4
1.1.	TESTING LOCATION	4
1.2.	TESTING ENVIRONMENT	4
1.3.	PROJECT DATA	4
1.4.	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	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
4 I A A	IEV A. MEACHDEMENT DECHITO	44





1. Test Laboratory

1.1. Testing Location

CTTL (huayuan North Road)

Address: No. 52, Huayuan North Road, Haidian District, Beijing,

P. R. China 100191

1.2. <u>Testing Environment</u>

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

1.3. Project data

Testing Start Date: 2022-12-04
Testing End Date: 2022-12-06

1.4. Signature

Wang Xue

(Prepared this test report)

秋

Zhang Ying

(Reviewed this test report)

Zhang Xia

(Approved this test report)





2. Client Information

2.1. 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

Contact: Annie Jiang

Email: nianxiang.jiang@tcl.com Telephone: +86 755 3661 1621

2.2. 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

Contact: Annie Jiang

Email: nianxiang.jiang@tcl.com Telephone: +86 755 3661 1621

Page 5 of 24





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

3.1. About EUT

Description GSM/UMTS/LTE mobile phone

Model Name T610K FCC ID: 2ACCJB194

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
LITO4-	354083950001576/	05	7GS8
UT21a	354083950001584	05	7630

^{*}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	Model	Manufacturer
AE1	Battery	TLp049C8	Dongguan Ganfeng Electronics Co., LTD
AE2	Charger1	YJC018R-EU	Dongguan YingJu Power Co., Ltd.
AE3	Charger2	YJC018R-UK	Dongguan YingJu Power Co., Ltd.
AE4	Charger3	QC13EU	PUAN
AE5	Charger4	QC13US	PUAN
AE6	Charger5	QC13UK	PUAN
AE7	Charger6	QC13AU	PUAN
AE8	USB Cable	JWUB1520-M01R	Huizhou Juwei Electronics Co., Ltd.
AE9	Headset	JWEP1247-M01R	Huizhou Juwei Electronics Co., Ltd.

^{*}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 + AE2 + AE3	Charger1+REAR Camera+GSM 850 idle	
Set.2	EUT1 + AE1 + AE4 + AE3	Charger3+MP4+WCDMA 850 idle	
Set.3	EUT1 + AE1 + AE8 + AE9	USB+front camera + LTE idle +FM	

Note:

Equipment Under Test (EUT) is a model of GSM/UMTS/LTE mobile phone with integrated antenna. It supports

GSM Band GSM 850/900/1800/1900

UMTS Band FDD Band I(W2100)/FDD Band II(W1900)/FDD Band V(W850)

LTE Band FDD 1/2/5/7/8/13/20/28, TDD 38/40/41.

It has MP3, Camera, USB memory, Bluetooth 5.1, Wi-Fi (802.11a/b/g/n/ac, 802.11n supports 20MHz and 40MHz bandwidth,802.11ac supports 20MHz, 40MHz and 80MHz bandwidth), GNSS





functions.

The device contains receivers which tune and operate between 30MHz-960MHz in the following bands: GSM 850, WCDMA850, LTE Band 5/13. All licensed band receivers that tune in the range of 30MHz-960MHz are investigated. Only the worst-case emissions are reported.

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	

Note: The test methods have no deviation with standards.





5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-1 (10 meters×6.7meters×6.1meters) did not exceed following limits along the EMC testing:

Temperature	Min. = 15 $^{\circ}$ C, Max. = 35 $^{\circ}$ C
Relative humidity	Min. = 15 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz, >60dB;
	1MHz - 1000MHz, >90dB.
Electrical insulation	> 2 M Ω
Ground system resistance	< 4 Ω
Normalised site attenuation (NSA)	< ±4 dB, 3m 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 6000 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 M Ω	
Ground system resistance	< 4 Ω	





6. SUMMARY OF TEST RESULTS

Abbreviations used in this clause:		
	Р	Pass
Verdict Column	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	Р	CTTL(huayuan North Road)
2	Conducted Emission	15.107(a)	B.2	Р	CTTL(huayuan North Road)





7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATI ON INTERVAL
1	Test Receiver	ESW44	103015	R&S	2023-01-23	1 year
2	Universal Radio Communication Tester	CMW500	163975	R&S	2023-01-10	1 year
3	EMI Antenna	VULB 9163	302	SCHWARZBECK	2022-12-28	1 year
4	EMI Antenna	3115	00146404	ETS-Lindgren	2023-02-23	1 year
5	LISN	ENV216	101200	R&S	2023-06-29	1 year
6	Test Receiver	ESCI 7	100344	R&S	2023-03-21	1 Year
7	Software	EMC32	/	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 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. 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.

All equipment is placed on the test table top and arranged in a typical configuration in accordance with ANSI C63.4-2014 and manipulated to obtain worst case emissions.

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

A THE MEDICAL COLORS AND A SECOND COLORS AND A					
Frequency range	Field strength limit (μV/m)				
(MHz)	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:

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

Where

GA: Antenna factor of receive antenna

G_{PL}: Path Loss

 P_{Mea} : Measurement result on receiver.

Measurement uncertainty (worst case): U = 5.54 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)
17565.140	42.20	-29.79	45.25	26.75	54.00	11.80	V
17906.840	41.80	-29.33	45.95	25.17	54.00	12.20	V
17546.100	41.80	-29.49	44.35	26.93	54.00	12.20	Н
17654.220	41.70	-29.60	45.25	26.05	54.00	12.30	V
17994.220	41.70	-29.06	46.66	24.10	54.00	12.30	Н
17960.560	41.60	-29.06	46.66	24.00	54.00	12.40	Н

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)
17545.080	54.20	-29.49	44.35	39.33	74.00	19.80	V
17902.760	52.60	-29.33	45.95	35.97	74.00	21.40	Н
17895.620	52.50	-29.53	45.95	36.08	74.00	21.50	V
17991.500	52.40	-29.06	46.66	34.80	74.00	21.60	V
17637.560	52.30	-29.40	45.25	36.45	74.00	21.70	V
17561.400	52.30	-29.79	45.25	36.85	74.00	21.70	V





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)
17993.540	41.90	-29.06	46.66	24.30	54.00	12.10	V
17920.440	41.80	-29.40	46.66	24.54	54.00	12.20	Н
17922.480	41.70	-29.40	46.66	24.44	54.00	12.30	Н
17992.520	41.70	-29.06	46.66	24.10	54.00	12.30	V
17953.080	41.60	-28.94	46.66	23.88	54.00	12.40	Н
17450.560	41.60	-29.87	44.35	27.12	54.00	12.40	Н

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)
17992.860	52.50	-29.06	46.66	34.90	74.00	21.50	V
17577.380	52.50	-29.79	45.25	37.05	74.00	21.50	Н
17467.220	52.50	-30.06	44.35	38.20	74.00	21.50	V
17905.140	52.40	-29.33	45.95	35.77	74.00	21.60	V
17545.760	52.30	-29.49	44.35	37.43	74.00	21.70	Н
17828.640	52.30	-29.68	45.95	36.02	74.00	21.70	Н





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)
17649.460	42.60	-29.60	45.25	26.95	54.00	11.40	Н
17991.840	42.50	-29.06	46.66	24.90	54.00	11.50	V
17996.600	42.50	-29.06	46.66	24.90	54.00	11.50	V
17632.800	42.40	-29.40	45.25	26.55	54.00	11.60	V
17983.680	42.30	-29.06	46.66	24.70	54.00	11.70	Н
17544.060	42.30	-29.49	44.35	27.43	54.00	11.70	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)
17478.780	53.70	-30.06	44.35	39.40	74.00	20.30	V
17801.440	53.10	-29.63	45.95	36.78	74.00	20.90	Н
17513.460	53.10	-29.26	44.35	38.00	74.00	20.90	Н
17969.400	52.90	-29.06	46.66	35.30	74.00	21.10	Н
3595.900	52.90	-39.31	31.15	61.06	74.00	21.10	Н
17254.380	52.80	-30.02	43.36	39.46	74.00	21.20	V





Measurement results for Set.1:

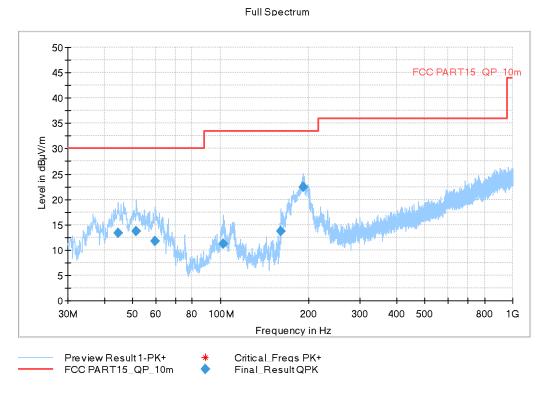


Fig A.1 Radiated Emission from 30MHz to 1GHz

Frequency	QuasiPeak	Limit	Margin	Bandwidth	Height	Pol	Azimuth	Corr.
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(kHz)	(cm)		(deg)	(dB/m)
44.647000	13.35	30.00	16.65	120.000	175.0	٧	45.0	-11.3
51.534000	13.70	30.00	16.30	120.000	100.0	٧	315.0	-10.8
59.779000	11.81	30.00	18.19	120.000	116.0	٧	264.0	-11.8
102.265000	11.16	33.52	22.36	120.000	100.0	٧	-45.0	-12.3
161.241000	13.72	33.52	19.80	120.000	100.0	٧	6.0	-14.9
191.602000	22.42	33.52	11.10	120.000	100.0	٧	84.0	-12.4





Full Spectrum

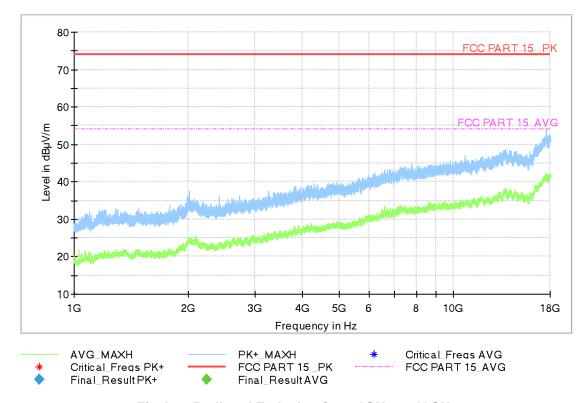


Fig A.2 Radiated Emission from 1GHz to 18GHz





Measurement results for Set.2:



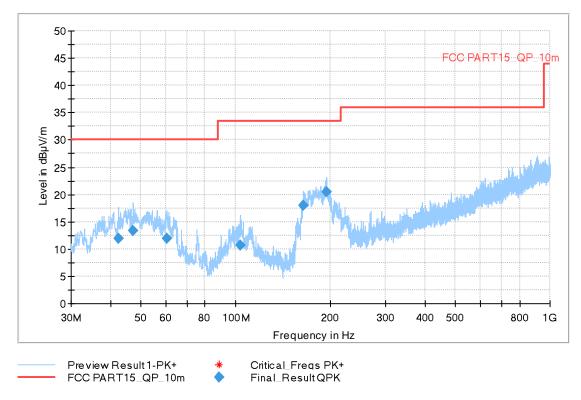


Fig A.3 Radiated Emission from 30MHz to 1GHz

Frequency	QuasiPeak	Limit	Margin	Bandwidth	Height	Pol	Azimuth	Corr.
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(kHz)	(cm)		(deg)	(dB/m)
42.416000	11.99	30.00	18.01	120.000	325.0	٧	45.0	-11.6
47.363000	13.40	30.00	16.60	120.000	125.0	٧	70.0	-10.9
60.652000	11.97	30.00	18.03	120.000	125.0	٧	279.0	-12.0
103.332000	10.65	33.52	22.87	120.000	302.0	٧	-32.0	-12.3
164.345000	17.90	33.52	15.62	120.000	100.0	٧	-6.0	-14.8
194.124000	20.51	33.52	13.01	120.000	100.0	٧	86.0	-12.0





Full Spectrum

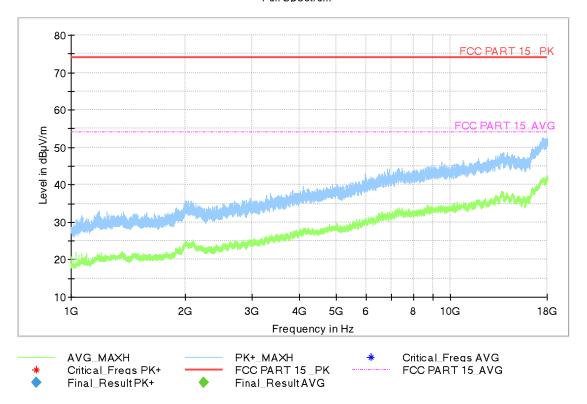


Fig A.4 Radiated Emission from 1GHz to 18GHz





Measurement results for Set.3:

Full Spectrum

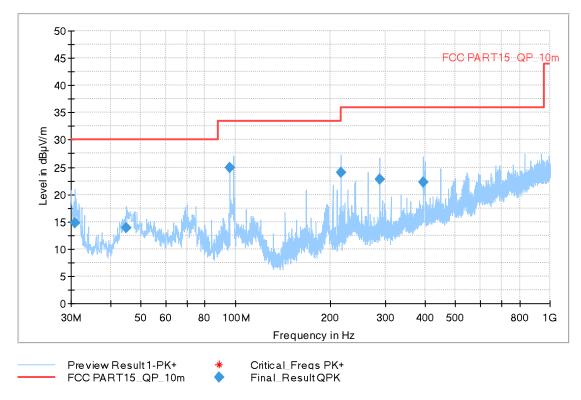


Fig A.5 Radiated Emission from 30MHz to 1GHz

Frequency	QuasiPeak	Limit	Margin	Bandwidth	Height	Pol	Azimuth	Corr.
(MHz)	(dBµV/m)	(dBµV/m)	(dB)	(kHz)	(cm)		(deg)	(dB/m)
30.970000	14.68	30.00	15.32	120.000	108.0	V	-31.0	-15.3
45.035000	13.90	30.00	16.10	120.000	108.0	٧	162.0	-11.1
95.960000	24.98	33.52	8.54	120.000	108.0	٧	292.0	-13.1
215.949000	24.04	33.52	9.48	120.000	225.0	Н	252.0	-11.9
287.923000	22.69	36.02	13.33	120.000	275.0	Н	73.0	-9.2
396.175000	22.30	36.02	13.72	120.000	225.0	н	-45.0	-5.7







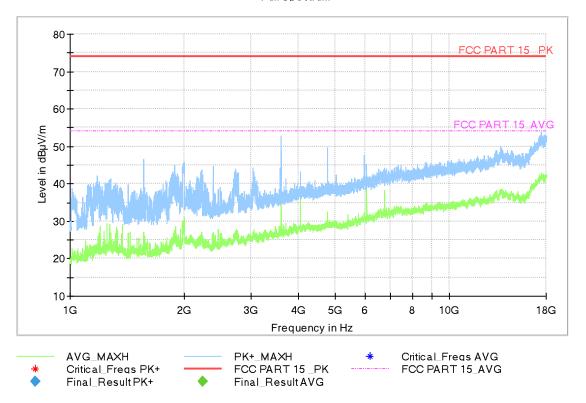


Fig A.6 Radiated Emission from 1GHz to 3GHz





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

	<u> </u>
Voltage (V)	Frequency (Hz)
120	60

RBW/IF bandwidth	Sweep Time(s)
9kHz	1





A.2.5 Measurement Results

Measurement uncertainty: *U*= 3.08 dB, *k*=2.

Charging Mode, Set.1:

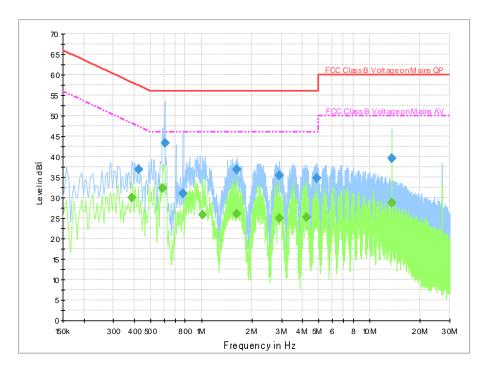


Fig A.7 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency	QuasiPeak	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBμV)	(kHz)			(dB)	(dB)	(dB _µ V)
0.422000	36.8	9.000	On	L1	19.7	20.6	57.4
0.606000	43.3	9.000	On	L1	19.7	12.7	56.0
0.774000	31.1	9.000	On	L1	19.7	24.9	56.0
1.630000	36.9	9.000	On	L1	19.6	19.1	56.0
2.922000	35.4	9.000	On	L1	19.6	20.6	56.0
4.870000	34.8	9.000	On	L1	19.6	21.2	56.0

Frequency	QuasiPeak	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBμV)	(kHz)			(dB)	(dB)	(dB _µ V)
0.386000	30.1	9.000	On	N	19.7	18.1	48.1
0.586000	32.4	9.000	On	L1	19.7	13.6	46.0
1.018000	25.9	9.000	On	L1	19.7	20.1	46.0
1.630000	26.0	9.000	On	L1	19.6	20.0	46.0
2.922000	25.1	9.000	On	L1	19.6	20.9	46.0
4.226000	25.3	9.000	On	L1	19.6	20.7	46.0





Charging Mode, Set.2:

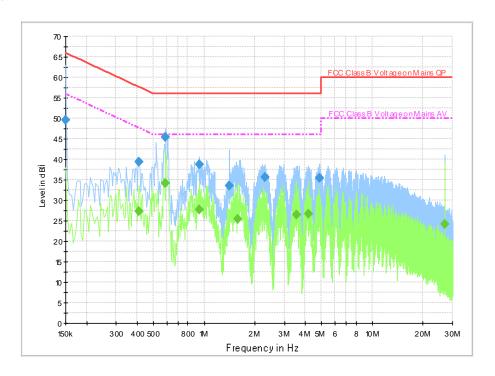


Fig A.8 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency	QuasiPeak	Bandwidth	Filter	Line	Corr.	Margin	Limit	
(MHz)	(dBμV)	(kHz)			(dB)	(dB)	(dBμV)	
0.150000	49.7	9.000	On	L1	20.0	16.3	66.0	
0.410000	39.4	9.000	On	L1	19.7	18.2	57.6	
0.590000	45.4	9.000	On	L1	19.7	10.6	56.0	
0.938000	38.7	9.000	On	L1	19.7	17.3	56.0	
1.410000	33.5	9.000	On	L1	19.7	22.5	56.0	
2.302000	35.6	9.000	On	L1	19.6	20.4	56.0	

Frequency	QuasiPeak	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBμV)	(kHz)			(dB)	(dB)	(dB _µ V)
0.410000	27.3	9.000	On	L1	19.7	20.3	47.6
0.590000	34.2	9.000	On	L1	19.7	11.8	46.0
0.938000	27.8	9.000	On	L1	19.7	18.2	46.0
1.586000	25.5	9.000	On	L1	19.6	20.5	46.0
3.526000	26.4	9.000	On	L1	19.6	19.6	46.0
4.190000	26.6	9.000	On	L1	19.6	19.4	46.0





USB Mode, Set.3:

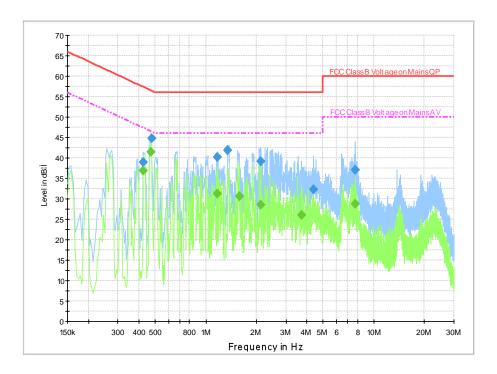


Fig A.9 Conducted Emission from 150kHz to 30MHz

Final Result 1

Frequency	QuasiPeak	Bandwidth	Filter	Line	Corr.	Margin	Limit	
(MHz)	(dBμV)	(kHz)			(dB)	(dB)	(dBμV)	
0.422000	39.0	9.000	On	N	19.7	18.5	57.4	
0.474000	44.8	9.000	On	N	19.7	11.7	56.4	
1.174000	40.3	9.000	On	L1	19.7	15.7	56.0	
1.350000	41.8	9.000	On	L1	19.6	14.2	56.0	
2.130000	39.2	9.000	On	L1	19.6	16.8	56.0	
4.398000	32.3	9.000	On	N	19.6	23.7	56.0	

Final Result 2

Frequency	QuasiPeak	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dB _µ V)	(kHz)			(dB)	(dB)	(dBμV)
0.426000	36.9	9.000	On	L1	19.7	10.5	47.3
0.470000	41.5	9.000	On	L1	19.7	5.0	46.5
1.174000	31.3	9.000	On	N	19.6	14.7	46.0
1.578000	30.6	9.000	On	L1	19.6	15.4	46.0
2.130000	28.5	9.000	On	L1	19.6	17.5	46.0
3.730000	26.0	9.000	On	N	19.6	20.0	46.0

END OF REPORT