



TEST REPORT

No. I18Z62245-EMC01

for

TCL Communication Ltd.

HSUPA/HSDPA/UMTS Tri Band/GSM Bi Band/LTE Quad Bands

mobile phone

Model Name: 4051S

FCC ID: 2ACCJN030

With

Hardware Version: 02

Software Version: XV21

Issued Date: 2019-02-22



Note:

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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

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
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1. Test Laboratory

1.1. Testing Location

Location1: CTTL(huayuan North Road)

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

1.2. Testing Environment

Normal Temperature: 15-35°C

Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2017-12-06

Testing End Date: 2017-12-21

1.4. Signature



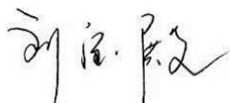
Li Yan

(Prepared this test report)



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Deputy Director of the laboratory

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2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.
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Nanshan District, Shenzhen, Guangdong, P.R. China 518052
City: /
Postal Code: 518052
Country: P. R. China
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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.
Address /Post: 7/F, Block F4, TCL International E City, Zhong Shan Yuan Road,
Nanshan District, Shenzhen, Guangdong, P.R. China 518052
City: /
Postal Code: 518052
Country: P. R. China
Contact Person: Gong Zhizhou
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Telephone: 0086-755-36611722
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	HSUPA/HSDPA/UMTS Tri Band/GSM Bi Band/LTE Quad Bands mobile phone
Model Name	4051S
FCC ID	2ACCJN030
Extreme vol. Limits	3.5VDC to 4.2VDC (nominal: 3.7VDC)

Note: Components list, please refer to documents of the manufacturer; it is also included in the original test record of CTTL, Telecommunication Technology Labs, Academy of Telecommunication Research, MIIT.

3.2. Internal Identification of EUT used during the test

EUT ID*	SN or IMEI	HW Version	SW Version
EUT3	/	/	/

*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	/	/
AE2	Charger	/	/
AE3	USB cable	/	/

AE1

Model	TLi013C1
Manufacturer	BYD
Capacitance	1350 mAh
Nominal voltage	3.7V

AE2

Model	PA-5V550mA-005
Manufacturer	PUAN
Length of cable	/

AE3

Model	/
Manufacturer	/
Length of cable	/

*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	EUT3+ AE1+ AE2	Charger
Set.2	EUT3+ AE1+ AE3	USB mode

Note: 4051S manufactured by TCL Communication Ltd. is a variant model based on A405DL for conformance test, According to the declaration of changes provided by the applicant and FCC KDB publication 484596 D01; all results are cited from the initial model. The report number for initial model is I17Z62134-EMC01.

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	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.

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

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
	BR	Re-use test data from basic model report.
	F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Radiated Emission	15.109(a)	B.1	BR	CTTL(huayuan North Road)
2	Conducted Emission	15.107(a)	B.2	BR	CTTL(huayuan North Road)

7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESU26	100235	R&S	2018-03-01	1 year
2	Test Receiver	ESCI 7	100344	R&S	2018-03-15	1 year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2018-11-26	1 year
4	Universal Radio Communication Tester	CMW500	150344	R&S	2018-11-30	1 year
5	LISN	ENV216	101200	R&S	2018-08-03	1 year
6	EMI Antenna	VULB9163	9163-302	Schwarzbeck	2020-03-27	3 years
7	EMI Antenna	3115	00167250	ETS-Lindgren	2020-05-21	3 years
8	PC	OPTIPLEX 380	2X1YV2X	DELL	N/A	N/A
9	Printer	P1606dn	VNC3L52122	HP	N/A	N/A
10	Keyboard	L100	CN0RH6596589 07ATOI40	DELL	N/A	N/A
11	Mouse	M-UAE119	LZ935220ZRC	Lenovo	N/A	N/A

Test Item	Test Software and Version	Software Vendor
Radiated Continuous Emission	EMC32 V9.01	R&S
Conducted Emission	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 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 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.

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/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): 30MHz-1GHz: 4.86dB, 1GHz-18GHz: 5.26dB, $k=2$.

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
17877.600	39.0	-18.5	45.6	11.900	H
17764.267	38.8	-18.5	45.6	11.700	H
17856.633	38.6	-18.5	45.6	11.500	V
17881.000	38.6	-18.5	45.6	11.500	H
17875.333	38.6	-18.5	45.6	11.500	H
17886.667	38.6	-18.5	45.6	11.500	H

Charging Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G_{PL} (dB)	G_A (dB/m)	P_{Mea} (dB μ V)	Polarity
17381.767	51.4	-19.5	41.5	29.400	H
17456.567	50.8	-19.2	41.5	28.500	H
17415.767	50.5	-19.2	41.5	28.200	V
17901.400	50.4	-18.5	45.6	23.300	H
17354.000	50.4	-19.5	41.5	28.400	H
17401.033	50.2	-19.2	41.5	27.900	H

Sample calculation: Peak detector, 17764.267MHz

$$\text{Result} = P_{\text{Mea}} (11.7\text{dB}\mu\text{V}) + G_A (45.6\text{dB/m}) + G_{\text{PL}}(-18.5 \text{ dB}) = 38.8\text{dB}\mu\text{V/m}$$

Measurement results for Set.2:

USB Mode/Average detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17790.900	39.1	-18.5	45.6	12.000	H
17896.300	38.8	-18.5	45.6	11.700	H
17901.967	38.8	-18.5	45.6	11.700	V
17879.867	38.7	-18.5	45.6	11.600	H
17861.167	38.7	-18.5	45.6	11.600	H
17454.867	38.7	-19.2	41.5	16.400	H

USB Mode/Peak detector

Frequency(MHz)	Result(dB μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dB μ V)	Polarity
17456.000	51.2	-19.2	41.5	28.900	H
17886.667	50.5	-18.5	45.6	23.400	H
17782.967	50.5	-18.5	45.6	23.400	V
17418.033	50.3	-19.2	41.5	28.000	H
7498.533	50.3	-28.9	36.3	42.900	H
17874.767	50.2	-18.5	45.6	23.100	H

Sample calculation: Peak detector, 17886.667MHz

Result =P_{Mea} (23.4dB μ V)+ G_A (45.6dB/m)+ G_{PL}(-18.5 dB) =50.5dB μ V/m

Charging Mode, Set.1

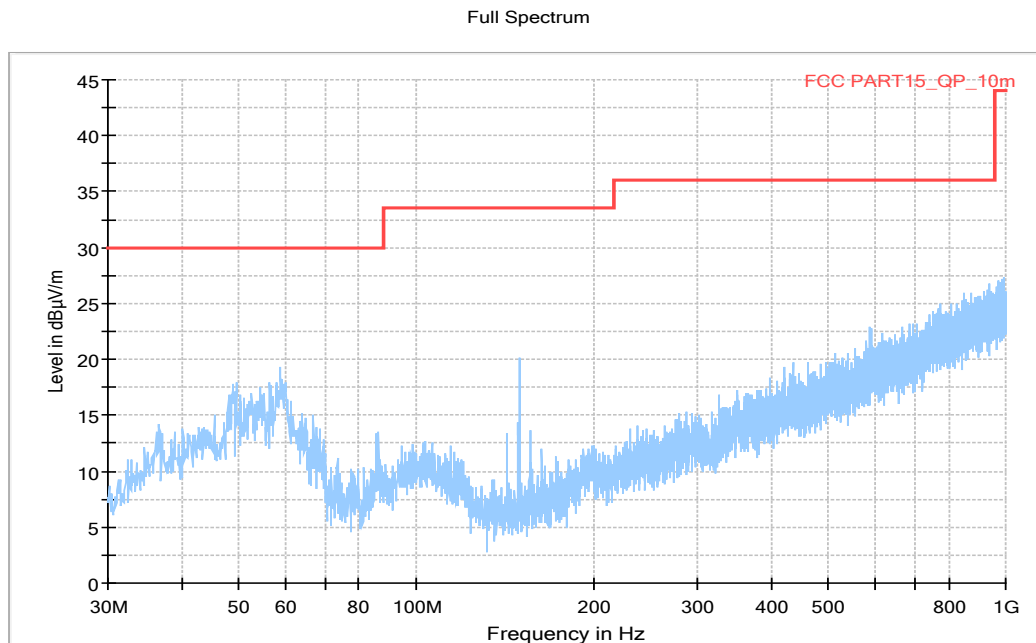


Figure A.1 Radiated Emission from 30MHz to 1GHz

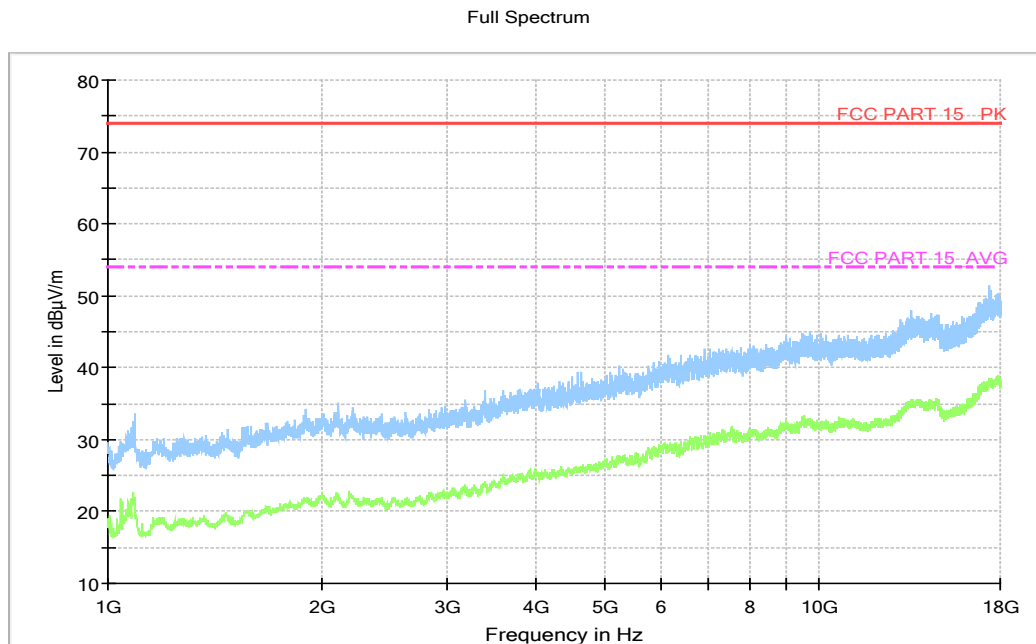


Figure A.2 Radiated Emission from 1GHz to 18GHz

USB Mode, Set.2

Full Spectrum

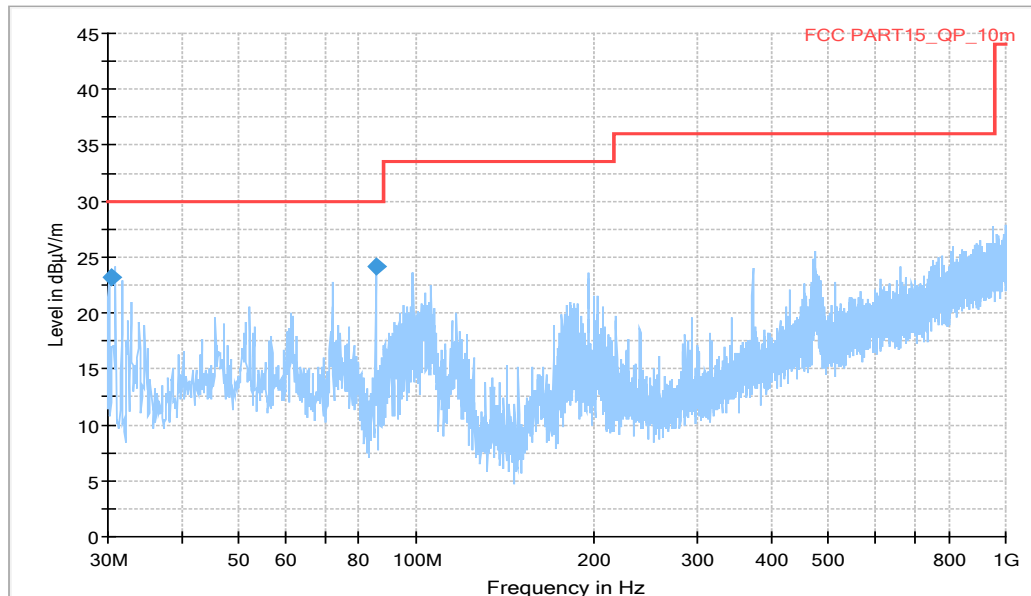


Figure A.4 Radiated Emission from 30MHz to 1GHz

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time	Bandwidth (kHz)	Height (cm)	Pol
30.393000	23.17	30.00	6.83	1000.0	120.000	325.0	V
85.484000	24.12	30.00	5.88	1000.0	120.000	182.0	V

Full Spectrum

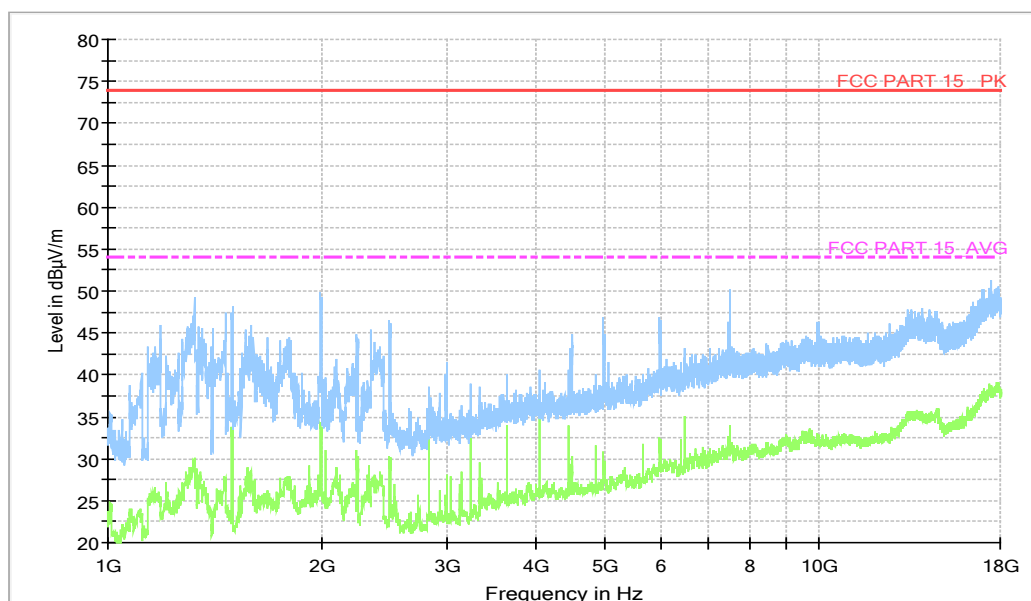


Figure A.5 Radiated Emission from 1GHz to 18GHz

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 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.

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: $U = 2.9 \text{ dB}$, $k=2$.

Charging Mode, Set.1

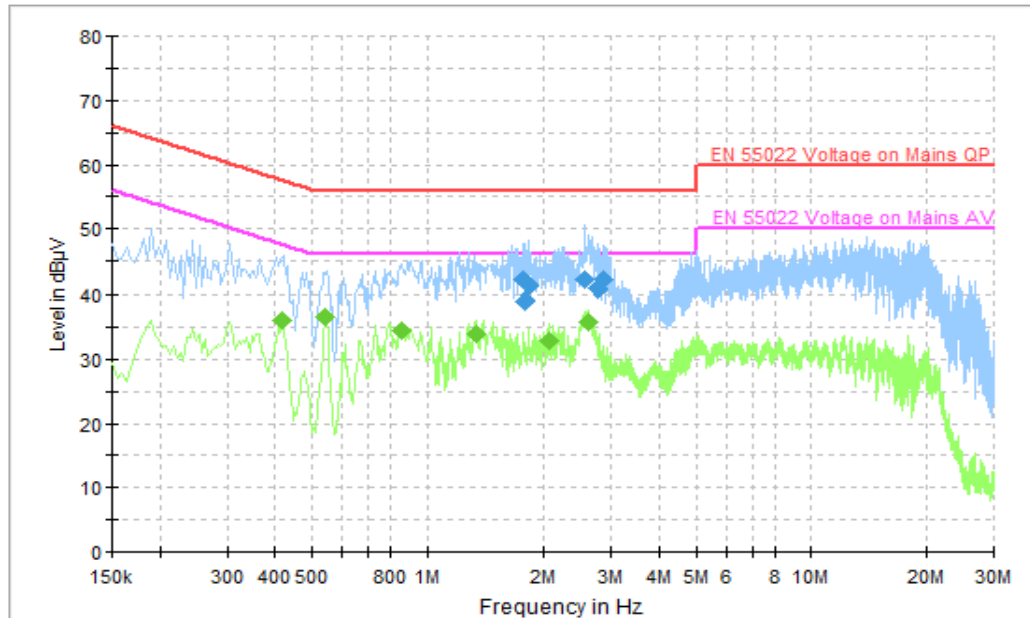


Figure A.7 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.761000	42.2	2000.0	9.000	L1	10.2	13.8	56.0
1.788000	38.9	2000.0	9.000	L1	10.2	17.1	56.0
1.824000	41.4	2000.0	9.000	L1	10.2	14.6	56.0
2.562000	42.2	2000.0	9.000	L1	10.2	13.8	56.0
2.773500	40.9	2000.0	9.000	L1	10.2	15.1	56.0
2.845500	42.2	2000.0	9.000	L1	10.3	13.8	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.415500	35.9	2000.0	9.000	L1	10.2	11.6	47.5
0.541500	36.6	2000.0	9.000	L1	10.2	9.4	46.0
0.861000	34.5	2000.0	9.000	L1	10.2	11.5	46.0
1.342500	33.8	2000.0	9.000	L1	10.2	12.2	46.0
2.062500	32.7	2000.0	9.000	L1	10.2	13.3	46.0
2.598000	35.9	2000.0	9.000	L1	10.2	10.1	46.0

USB Mode, Set.2

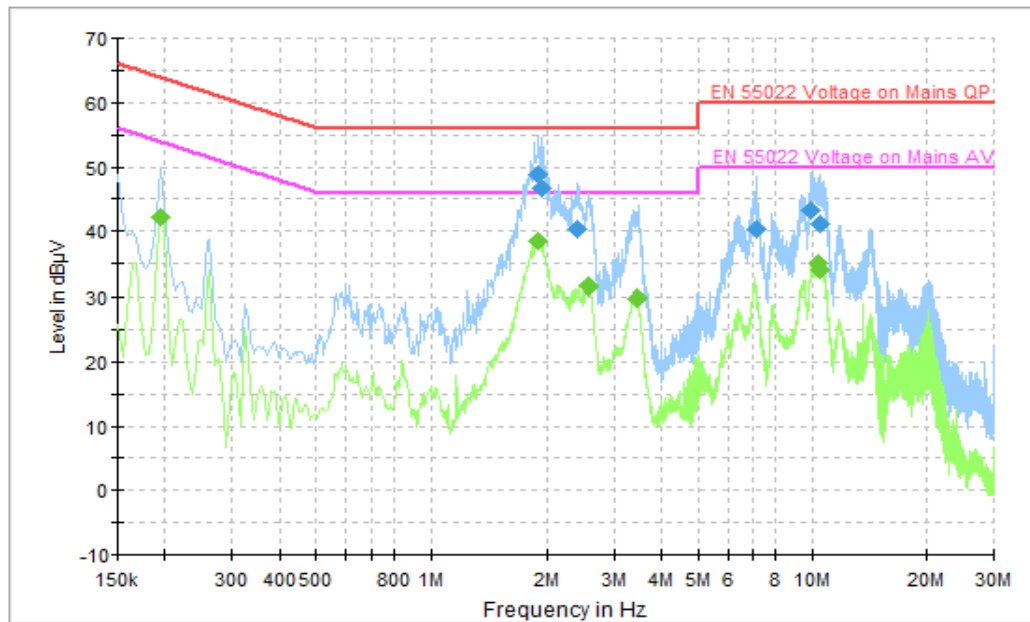


Figure A.8 Conducted Emission

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
1.761000	42.2	2000.0	9.000	L1	10.2	13.8	56.0
1.788000	38.9	2000.0	9.000	L1	10.2	17.1	56.0
1.824000	41.4	2000.0	9.000	L1	10.2	14.6	56.0
2.562000	42.2	2000.0	9.000	L1	10.2	13.8	56.0
2.773500	40.9	2000.0	9.000	L1	10.2	15.1	56.0
2.845500	42.2	2000.0	9.000	L1	10.3	13.8	56.0

Final Result 2

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.415500	35.9	2000.0	9.000	L1	10.2	11.6	47.5
0.541500	36.6	2000.0	9.000	L1	10.2	9.4	46.0
0.861000	34.5	2000.0	9.000	L1	10.2	11.5	46.0
1.342500	33.8	2000.0	9.000	L1	10.2	12.2	46.0
2.062500	32.7	2000.0	9.000	L1	10.2	13.3	46.0
2.598000	35.9	2000.0	9.000	L1	10.2	10.1	46.0

END OF REPORT