TEST REPORT

No.I20N00568-EMC

for

TCL Communication Ltd.

Whole Home WiFi Mesh System

Model Name：MS1G

With

Hardware Version: 2.0

Software Version: MS1G_00_01_00_01

FCC ID: 2ACCJB123

Issued Date:2020-06-30

Designation Number: CN1210

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 SAICT.

Test Laboratory:

SAICT, Shenzhen Academy of Information and Communications Technology

Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, P. R. China 518026.

Tel:+86(0)755-33322000, Fax:+86(0)755-33322001

Email: yewu@caict.ac.cn. www.saict.ac.cn

REPORT HISTORY

Report Number	Revision	Description	Issue Date
I20N00568-EMC	Rev.0	1st edition	2020-06-30

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

CONTENTS

1. Summary of Test Report

1.1. Test Items

Description	Whole Home WiFi Mesh System
Model Name	MS1G
Applicant's name	TCL Communication Ltd.
Manufacturer's Name	TCL Communication Ltd.

1.2. Test Standards

FCC Part 15, Subpart B 10-1-2019 Edition; ANSI C63.4 2014.

1.3. Test Result

Total test 2 items, pass 2 items. Please refer to "6.2 Test Results".

1.4. Testing Location

Address: Building G, Shenzhen International Innovation Center, No.1006 Shennan Road, Futian District, Shenzhen, Guangdong, China

1.5. Project data

Testing Start Date: 2020-03-16 Testing End Date: 2020-05-25

1.6. Signature

Liang Yong
(Prepared this test report)

Zhang Yunzhuan
(Reviewed this test report)

Cao Junfei
(Approved this test report)

2. ClientInformation

2.1. Applicant Information

Company Name:	TCL Communication Ltd.
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact:	Gong Zhizhou
E-mail	zhizhou.gong@tcl.com
Tel:	0086-755-36611722

2.2. Manufacturer Information

Company Name:	TCL Communication Ltd.
Address:	5/F, Building 22E, 22 Science Park East Avenue, Hong Kong Science Park, Shatin, NT, Hong Kong
Contact:	Gong Zhizhou
E-mail	zhizhou.gong@tcl.com
Tel:	0086-755-36611722

3. Equipment UnderTest (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description	Whole Home WiFi Mesh System
Model Name	MS1G
FCC ID	2ACCJB123
Condition of EUT as received	No obvious damage in appearance

Note: Photographs of EUT are shown in ANNEX A of this test report. Components list, please refer to documents of the manufacturer; it is also included in the original test record of Shenzhen Academy of Information and Communications Technology.

3.2. Internal Identification of EUT

EUT ID*	SN or IMEI	HW Version	SW Version	Receive Date
UT01aa	E82520100103000332	2.0	MS1G_00_01_00_01	2020-04-17

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

3.3. Internal Identification of AE

AE ID*	Description
AE1	Charger

AE1-1

Model	S012CDU1200100
Manufacturer	Ten Pao Industrial Co., Ltd

AE1-2

Model	BN073-A12012U
Manufacturer	SHENZHEN HEWEISHUN NETWORK TECHNOLOGY CO.,LTD

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

3.4. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	UT01aa+AE1-1+PC	
Set.2	UT01aa+AE1-2+PC	

3.5. General Description

The Equipment Under Test (EUT) is a model of Whole Home WiFi Mesh System with internal antenna.

It has Wi-Fi functions.

It consists of normal options: Charger.

Manual and specifications of the EUT were provided to fulfill the test.

Samples (EUT+AE) undergoing test were selected by the Client. Relevant information is provided by the Client.

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	10-1-2019 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	2014

5. LABORATORY ENVIRONMENT

Semi-anechoic chamber did not exceed following limits along the EMC testing:
9.10m×6.10m×5.60m (L×W×H)

Temperature	Min. = 15 ℃, Max. = 35℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	>2MΩ
Ground system resistance	<4Ω
Normalised site attenuation (NSA)	<±4 dB, 3 m distance, from 30 to 1000 MHz

Shield room did not exceed following limits along the EMC testing:

Temperature	Min. = 15 ℃, Max. = 30 ℃
Relative humidity	Min. =20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-10000MHz,>90dB
Electrical insulation	>2MΩ
Ground system resistance	<4Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing:
9.10m×6.10m×5.60m (L×W×H)

Temperature	Min. = 15 ℃, Max. = 35℃
Relative humidity	Min. = 20 %, Max. = 75 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	>2MΩ
Ground system resistance	<4Ω
Voltage Standing Wave Ratio（VSWR）	≤ 6 dB, from 1 to 18GHz，3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 6000 MHz

6. SUMMARY OF TEST RESULTS

6.1. Testing Environment

Normal Temperature: 15~35℃
Relative Humidity: 20~75%
Atmospheric pressure 86~106kPa

6.2. Summary of Measurement Results

Abbreviations used in this clause:	
P	Pass
NA	Not applicable
F	Fail

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Radiated Emission	15.109(a)	A.1	P
2	Conducted Emission	15.107(a)	B.2	P

6.3. Statement

6.3.1 Statements of conformity

This report takes measured values as criterion of test conclusion. The test conclusion meets the limit requirements.

7. Measurement uncertainty

Test item	Frequency ranges	Measurement uncertaint
Radiated Emission	30MHz-1GHz	4.90dB(k=2)
	1GHz-18GHz	4.60dB(k=2)
	18GHz-40GHz	4.10dB(k=2)
Conducted Emission	150kHz-30MHz	3.00dB(k=2)

8. Test Facilities Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CALDUE DATE	CAL PERIOD
1.	Test Receiver	ESR7	101676	R&S	2020.11.27	1 year
2.	Test Receiver	ESCI	100701	R&S	2020.08.10	1 year
3.	Spectrum Analyzer	FSV40	101192	R&S	2021.01.14	1 year
4.	BiLog Antenna	3142E	00224831	ETS-Lindgren	2021.05.17	3 years
5.	LISN	ENV216	102067	R&S	2020.07.17	1 year
6.	Horn Antenna	3117	00066577	ETS-Lindgren	2022.04.02	3 years
7.	Chamber	FACT3-2.0	1285	ETS-Lindgren	2021.07.19	2 years
8.	Software	EMC32	V10.01.00	R&S	/	/
9.	PC	ThinkPad T480	PF-13LW0C	Lenovo	/	/
10.	Printer	P1008	VNF6C12491	HP	/	/
11.	Mouse	MOEUUOA	44NY517	Lenovo	/	/
12.	Filter	HPF_3G18G-SMA	/	SKET	/	/
13.	Filter	HPF_6.3G21G-SMA	/	SKET	/	/

ANNEX A: MEASUREMENT RESULTS

A.1 Radiated Emission (§15.109(a))

Reference

FCC: CFR Part 15.109(a)

A.1.1 Method of measurement

The field strength of radiated emissions from the unintentional radiator (Data transfer mode of EUT and charging mode of EUT) at a distance 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 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:

Data Transfer Mode: The model of the PC is Lenovo ThinkPad T480, and the serial number of the PC is PF-13LW0C. The CMD.exe is used to let the PC keep on ping EUT's IP address, pinging EUT's IP address was until test finished. The EUT operate at normal working. This Mode is worst case.

A.1.3 Measurement Limit

Limit from CFR Part 15.109(a)

Frequency range (MHz)	Field strength limit (μV/m)		
	Quasi-peak	Average	Peak
30-88	100		
88-216	150		
216-960	200		
960-1000	500		
>1000		500	5000

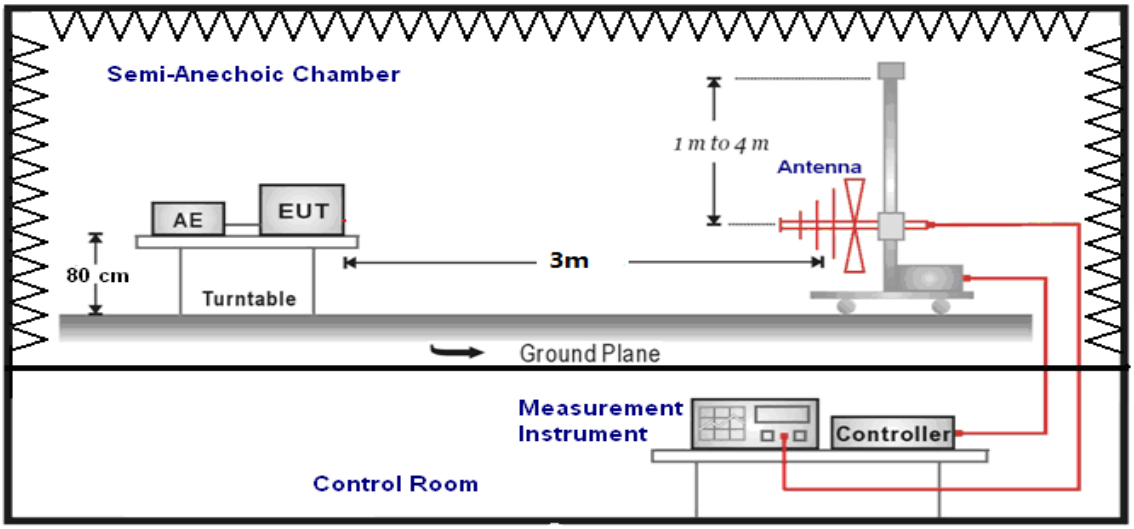
*Note: The original limit is defined at 10m test distance. This limit is calculated according to CISPR requirements.

A.1.4 Test Condition

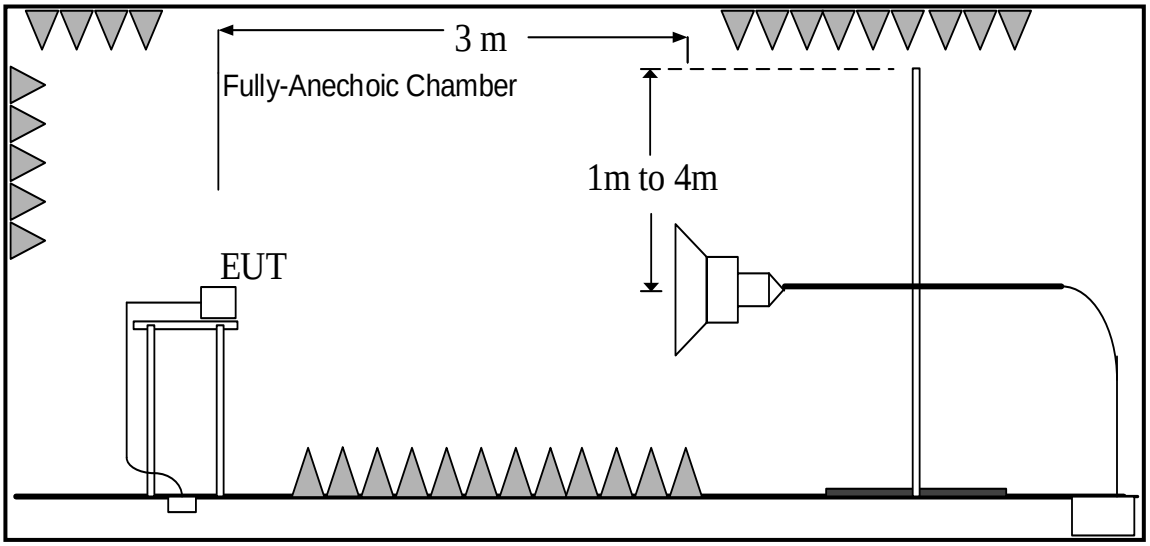
Frequency of emission (MHz)	RBW/VBW	Sweep Time(s)
30-1000	120kHz (IF bandwidth)	5
Above 1000	1MHz/3MHz	15

A.1.5 Test set-up:

30MHz-1GHz



1GHz-30GHz



A.1.6 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

G_A: Antenna factor of receive antenna

G_{PL}:PathLoss

P_{Mea}: Measurement result on receiver.

Result:Quasi-Peak(dBμV/m) /Average(dBμV/m)/Peak(dBμV/m)

Note: the result contains vertical part and Horizontal part

Data Transfer Mode

Frequency range (MHz)	Quasi-Peak Limit (dBμV/m)	Result (dBμV/m) Set.1	Conclusion
30-88	40	See Figure A.1	P
88-216	44		
216-960	46		
960-1000	54		

Frequency range (MHz)	Average Limit (dBμV/m)	Peak Limit (dBμV/m)	Result (dBμV/m) Set.1	Conclusion
1000 to 3000	54	74	See Figure A.2	P
3000 to 18000			See Figure A.3	
18000 to 26500			See Figure A.4	
26500 to 40000			See Figure A.5	

Data Transfer Mode

Frequency range (MHz)	Quasi-Peak Limit (dBμV/m)	Result (dBμV/m) Set.2	Conclusion
30-88	40	See Figure A.6	P
88-216	44		
216-960	46		
960-1000	54		

Frequency range (MHz)	Average Limit (dBμV/m)	Peak Limit (dBμV/m)	Result (dBμV/m) Set.2	Conclusion
1000 to 3000	54	74	See Figure A.7	P
3000 to 18000			See Figure A.8	
18000 to 26500			See Figure A.9	
26500 to 40000			See Figure A.10	

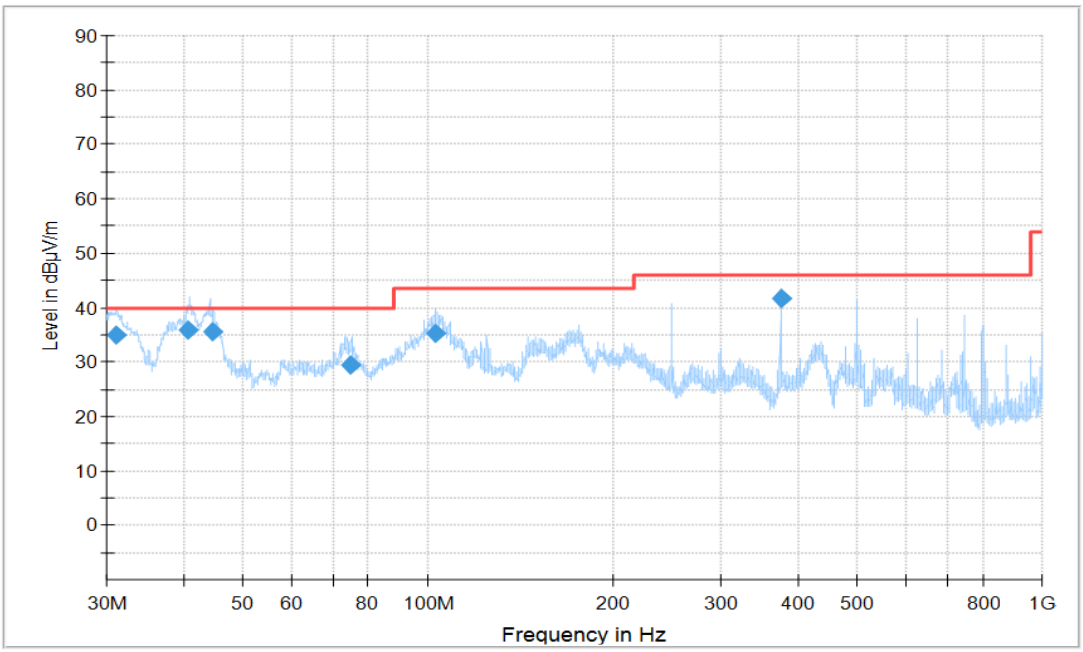


Figure A.1 Radiated Emission (Set.1, Data Transfer Mode , 30MHz to 1GHz)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	ARpl (dB/m)	P_{Mea} (dBµV)
31.191667	34.91	40	5.09	V	-25.4	60.31
40.825556	35.83	40	4.17	V	-29.7	65.53
44.639444	35.47	40	4.53	V	-32.4	67.87
74.898889	29.34	40	10.66	V	-33.8	63.14
103.265556	35.15	43.5	8.35	V	-32.4	67.55
374.976667	41.69	46	4.31	V	-26.7	68.39

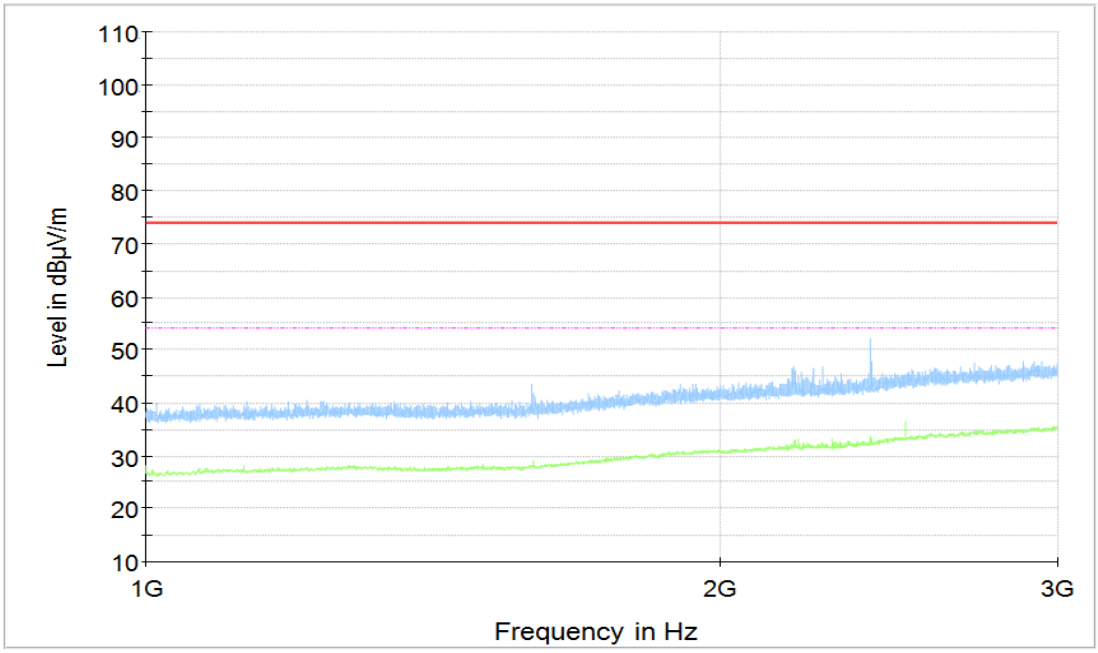


Figure A.2 Radiated Emission (Set.1, Data Transfer Mode , 1GHz to 3GHz)

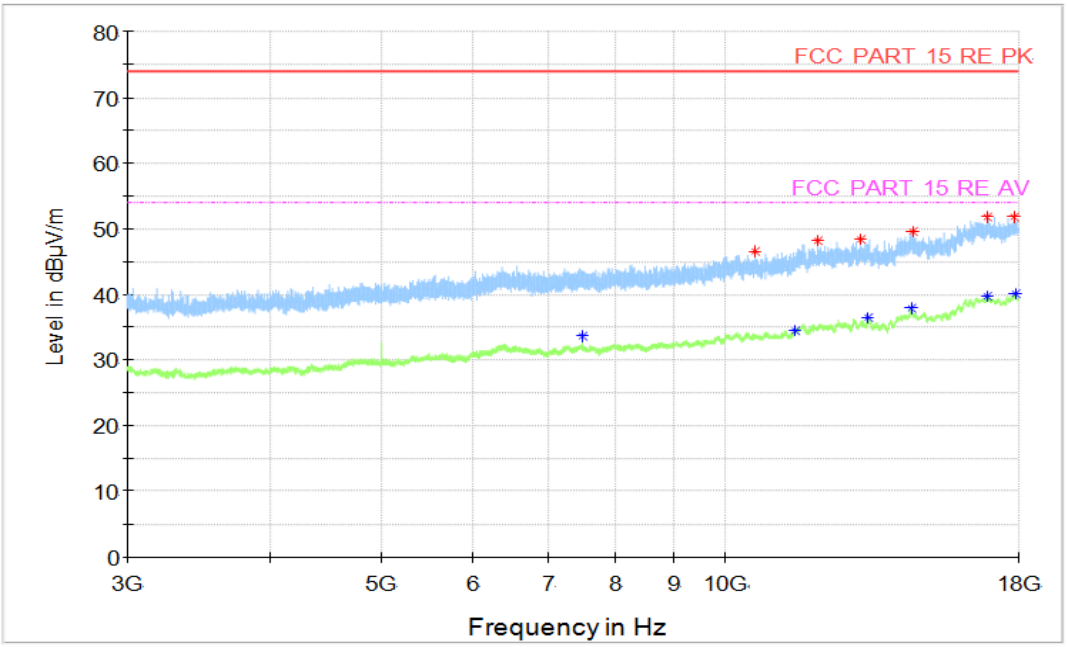


Figure A.3 Radiated Emission (Set.1, Data Transfer Mode , 3GHz to 18GHz)

Final_Results_PK

Frequency(MHz)	Peak (dBµV/m)	Limit (dBµV/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dBµV)
10607	46.53	74	27.47	H	4.9	41.63
12022.5	48.2	74	25.8	V	7.2	41
13120.5	48.41	74	25.59	V	8.5	39.91
14558	49.63	74	24.37	V	11.4	38.23
16906	51.72	74	22.28	H	15.1	36.62
17836.5	51.85	74	22.15	H	16.3	35.55

Final_Results_AVG

Frequency(MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dBµV)
7500	33.6	54	20.4	V	2.1	31.5
11481	34.54	54	19.46	V	5.9	28.64
13310	36.47	54	17.53	H	9	27.47
14504	37.86	54	16.14	H	11.5	26.36
16891.5	39.71	54	14.29	H	15.1	24.61
17877.5	40.19	54	13.81	V	16.3	23.89

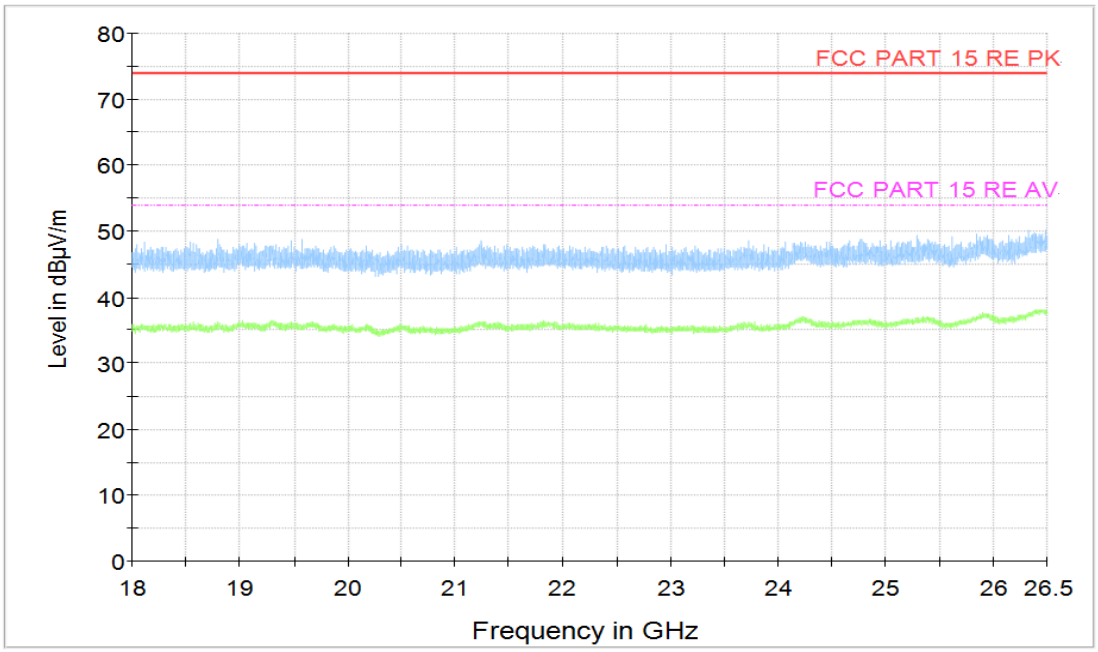


Figure A.4 Radiated Emission (Set.1, Data Transfer Mode , 18GHz to 26.5GHz)

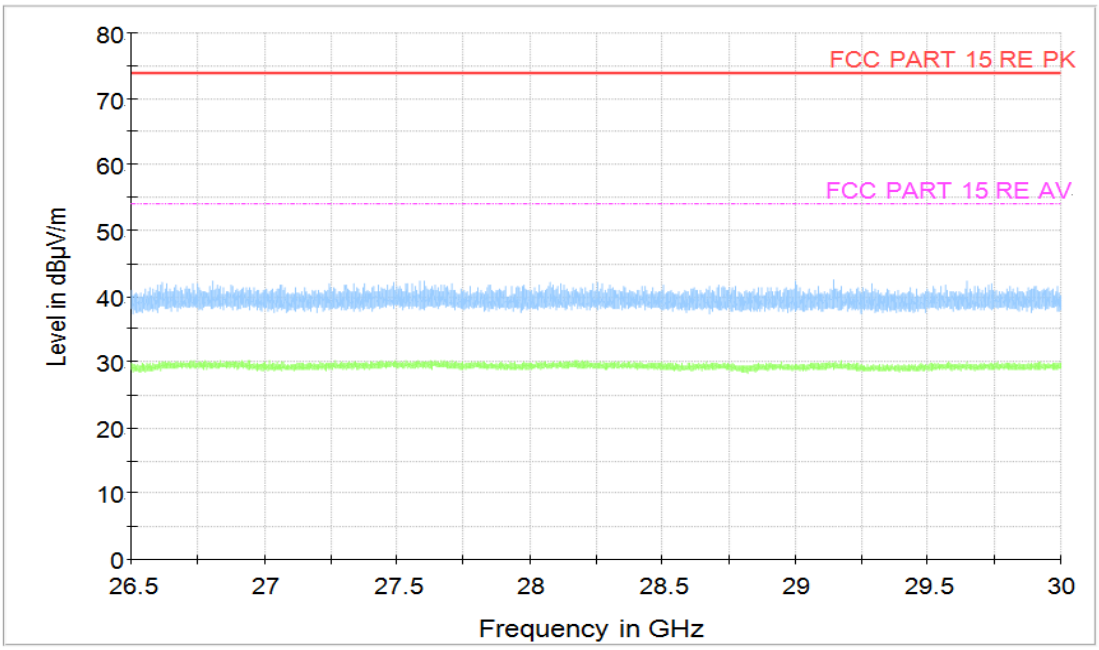


Figure A.5 Radiated Emission (Set.1, Data Transfer Mode , 26.5GHz to 30GHz)

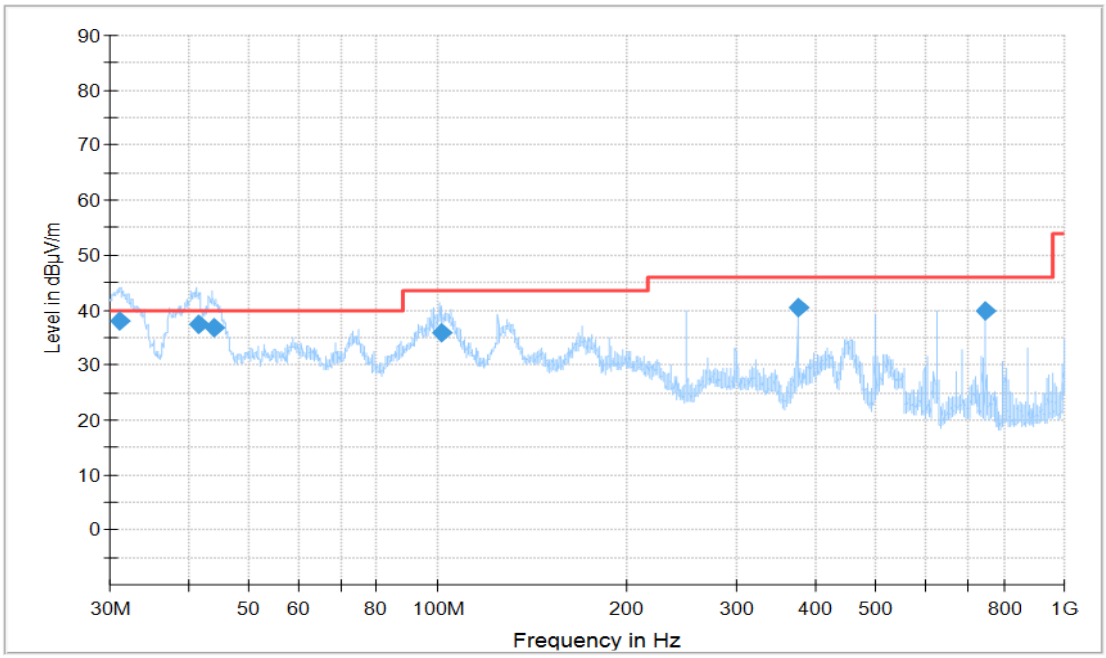


Figure A.6 Radiated Emission (Set.2, Data Transfer Mode , 30MHz to 1GHz)

Final_Result

Frequency (MHz)	QuasiPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	ARpl (dB/m)	P_{Mea} (dBµV)
30.977778	38.05	40	1.95	V	-25.2	63.25
41.458333	37.38	40	2.62	V	-30.1	67.48
43.867778	36.81	40	3.19	V	-31.9	68.71
101.407222	35.83	43.5	7.67	V	-32.4	68.23
375.016667	40.35	46	5.65	V	-26.7	67.05
749.989444	39.85	46	6.15	H	-19.5	59.35

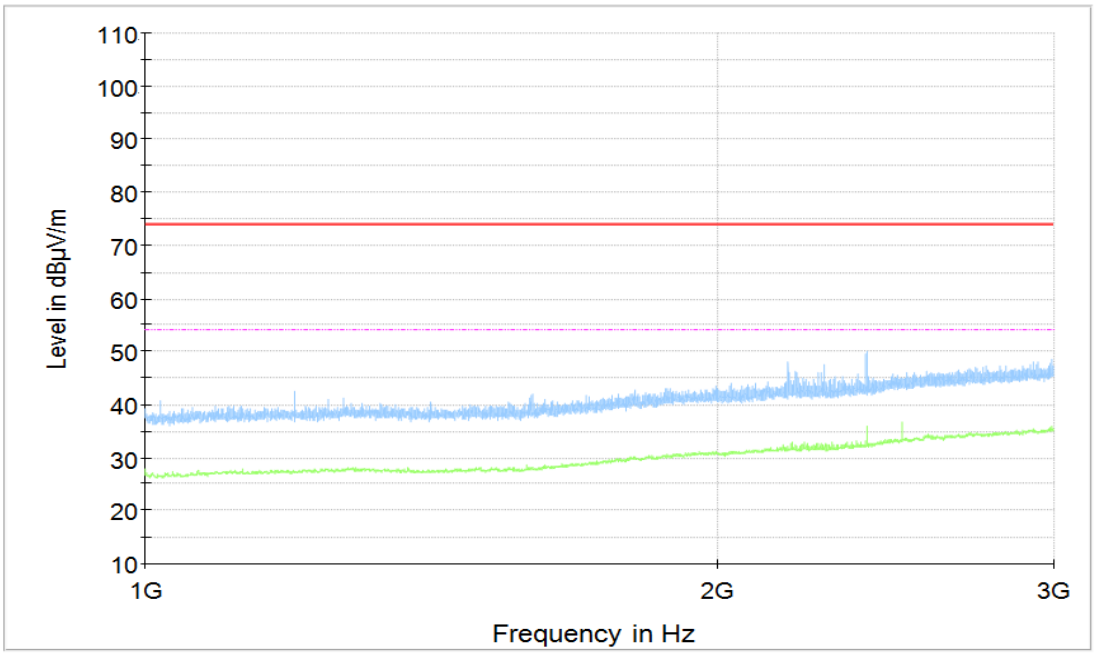


Figure A.7 Radiated Emission (Set.2, Data Transfer Mode , 1GHz to 3GHz)

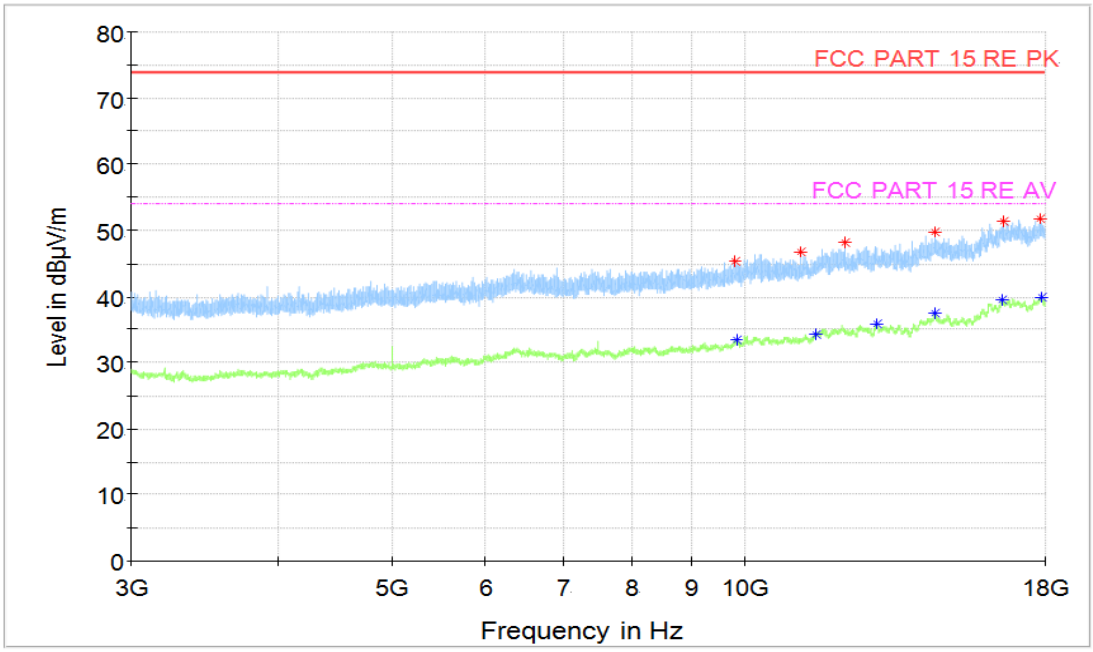


Figure A.8 Radiated Emission (Set.2, Data Transfer Mode , 3GHz to 18GHz)

Final_Results_PK

Frequency(MHz)	Peak (dBµV/m)	Limit (dBµV/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dBµV)
9813	45.29	74	28.71	V	4.3	40.99
11154	46.82	74	27.18	H	5.1	41.72
12165.5	48.15	74	25.85	H	7.2	40.95
14497.5	49.71	74	24.29	V	11.4	38.31
16594.5	51.42	74	22.58	V	14.8	36.62
17835	51.83	74	22.17	H	16.3	35.53

Final_Results_AVG

Frequency(MHz)	Average (dBµV/m)	Limit (dBµV/m)	Margin(dB)	Polarity	ARpl (dB/m)	P_{Mea} (dBµV)
9828	33.46	54	20.54	H	4.4	29.06
11482	34.34	54	19.66	H	5.9	28.44
12963	35.86	54	18.14	H	8.5	27.36
14501.5	37.53	54	16.47	H	11.5	26.03
16561.5	39.53	54	14.47	H	14.7	24.83
17879.5	39.86	54	14.14	H	16.2	23.66

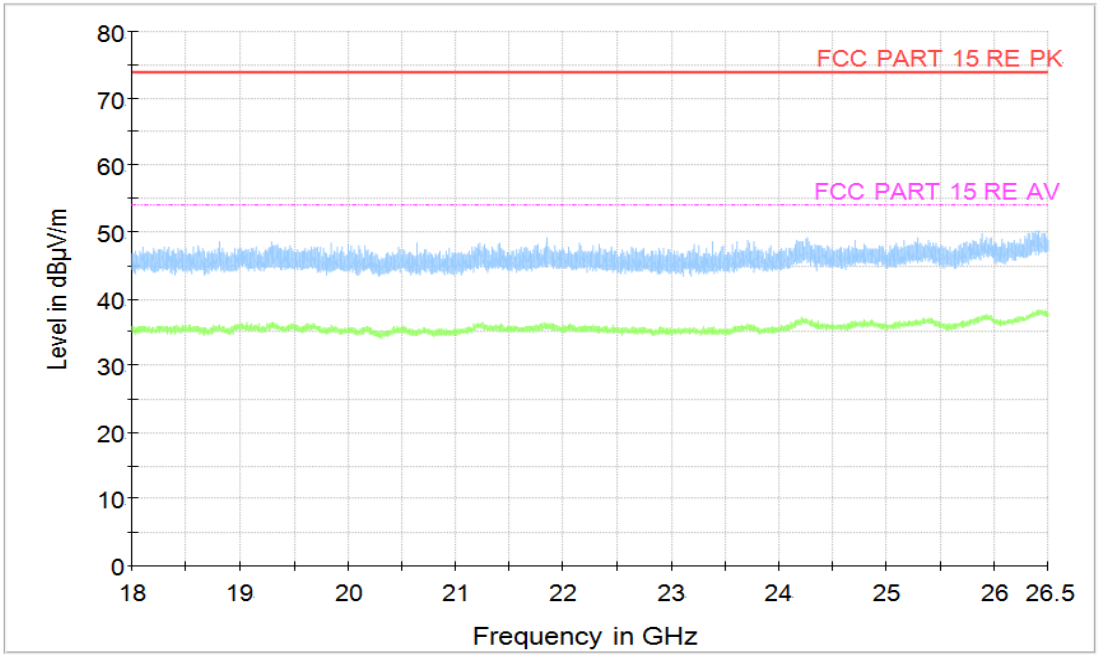


Figure A.9 Radiated Emission (Set.2, Data Transfer Mode , 18GHz to 26.5GHz)

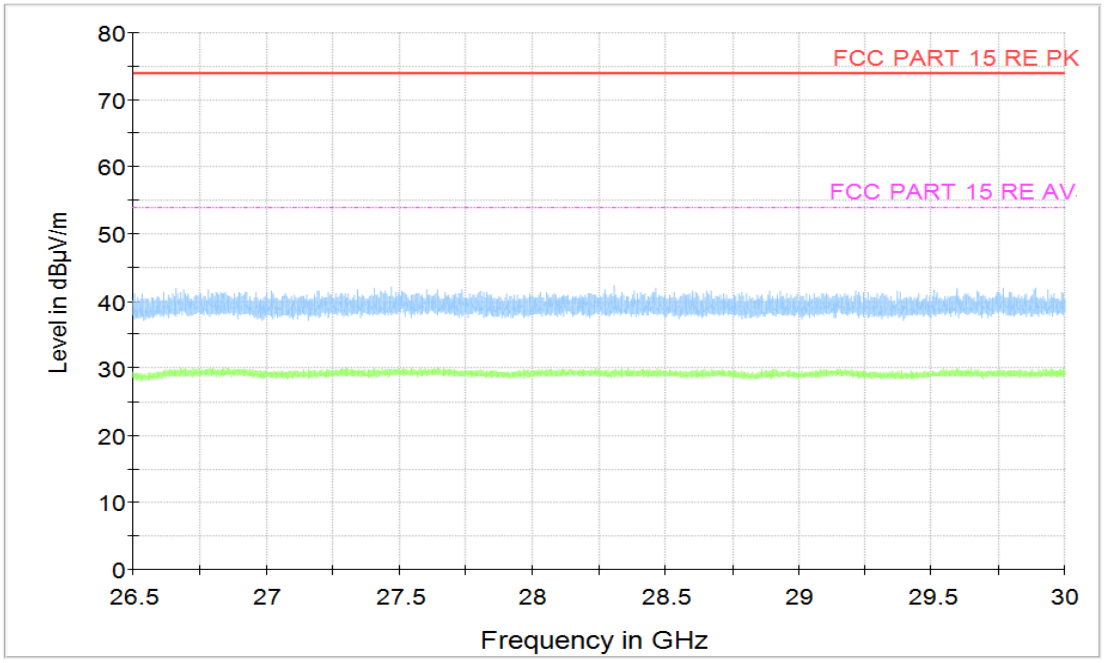


Figure A.10 Radiated Emission (Set.2, Data Transfer Mode , 26.5GHz to 30GHz)

B.2 Conducted Emission (§15.107(a))

Reference

FCC: CFR Part 15.107(a)

B.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 150kHz to 30MHz shall not exceed the limits. Tested in accordance with the procedures of ANSI C63.4 -2014, section 7.3.

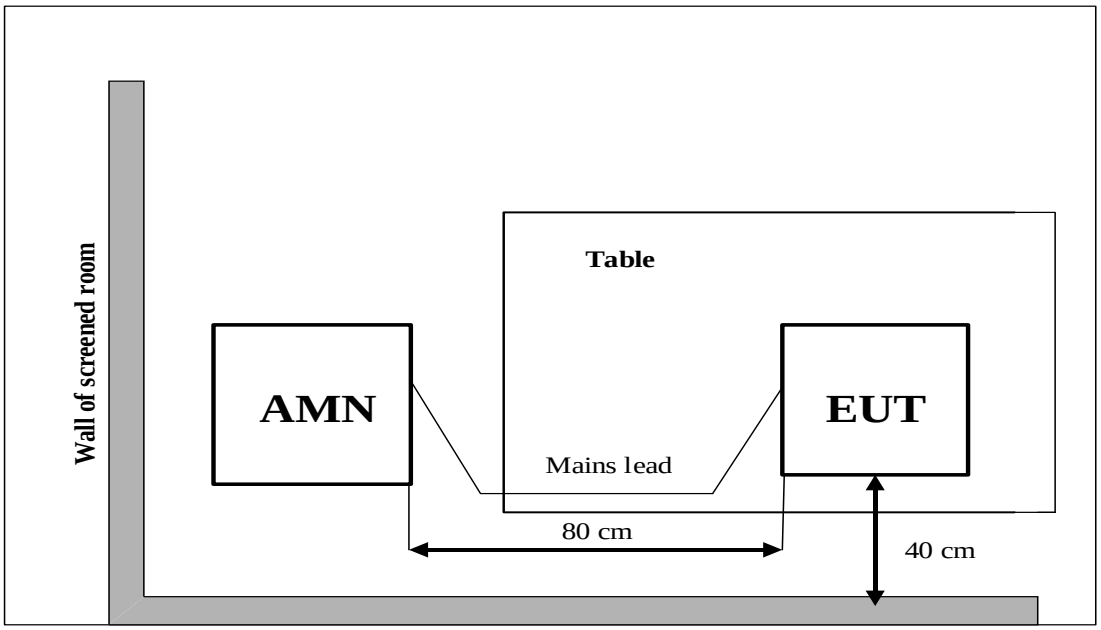
B.2.2 EUT Operating Mode:

Data Transfer Mode: The model of the PC is Lenovo ThinkPad T480, and the serial number of the PC is PF-13LW0C. The CMD.exe is used to let the PC keep on ping EUT's IP address, pinging EUT's IP address was until test finished. The EUT operate at normal working. This Mode is worst case.

B.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		

B.2.4Test set-up:



B.2.5 Test Condition in charging mode

Voltage（V）	Frequency（Hz）
120	60
240	60

RBW	Sweep Time(s)
9kHz	1

B.2.6 Measurement Results

QuasiPeak(dBμV) /Average(dBμV) =PMea+Corr

Where

Corr: PathLoss + Voltage Division Factor

PMea: Measurement result on receiver.

Data Transfer Mode

AC Input Port/ Voltage: 120V/60Hz

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV) Set.1	Conclusion
0.15 to 0.5	66 to 56	56 to 46	See Figure B.1	P
0.5 to 5	56	46		
5 to 30	60	50		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Data Transfer Mode

AC Input Port/ Voltage: 120V/60Hz

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV) Set.2	Conclusion
0.15 to 0.5	66 to 56	56 to 46	See Figure B.2	P
0.5 to 5	56	46		
5 to 30	60	50		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Data Transfer Mode

AC Input Port/ Voltage: 240V/60Hz

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV)	Conclusion
			Set.1	
0.15 to 0.5	66 to 56	56 to 46	See Figure B.3	P
0.5 to 5	56	46		
5 to 30	60	50		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

Data Transfer Mode

AC Input Port/ Voltage: 240V/60Hz

Frequency range (MHz)	Quasi-peak Limit (dBμV)	Average Limit (dBμV)	Result (dBμV)	Conclusion
			Set.2	
0.15 to 0.5	66 to 56	56 to 46	See Figure B.4	P
0.5 to 5	56	46		
5 to 30	60	50		
NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.5 MHz.				

AC Input Port/ Voltage: 120V/60Hz

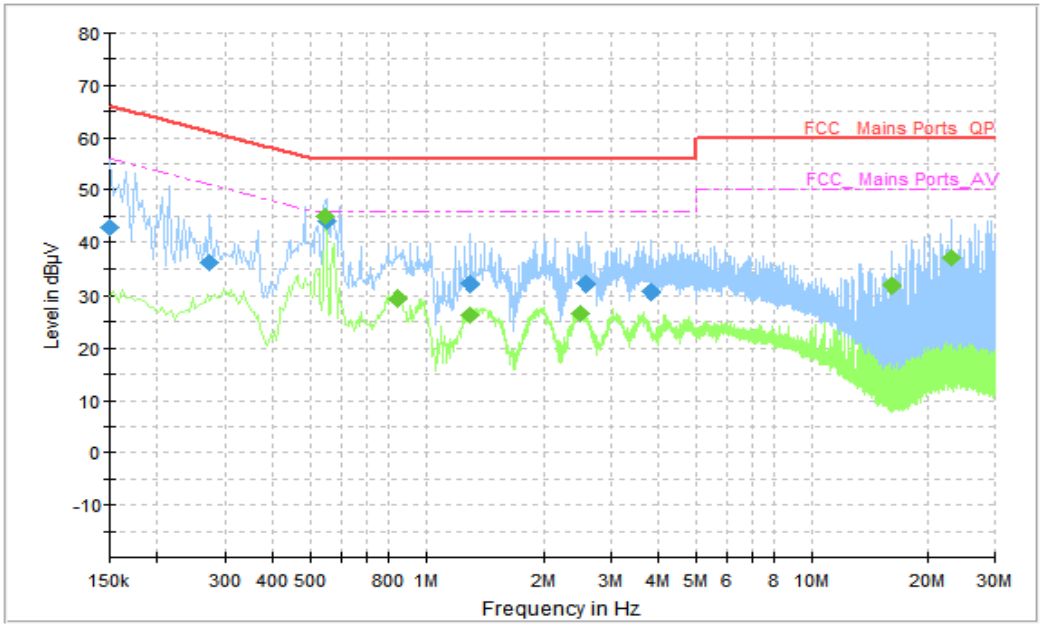


Figure B.1 Conducted Emission(Set.1, Data Transfer Mode)

Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.15	42.83	66	23.17	N	9.6	33.23
0.274	36	61	25	N	9.6	26.4
0.554	43.88	56	12.12	N	9.7	34.18
1.306	32.29	56	23.71	N	9.7	22.59
2.574	32.13	56	23.87	N	9.7	22.43
3.83	30.56	56	25.44	N	9.7	20.86

Final_Result_AVG

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.546	44.96	46	1.04	N	9.7	35.26
0.846	29.32	46	16.68	N	9.7	19.62
1.306	26.48	46	19.52	N	9.7	16.78
2.498	26.65	46	19.35	N	9.7	16.95
16.226	31.9	50	18.1	N	10.1	21.8
23.13	37	50	13	N	10.3	26.7

AC Input Port/ Voltage: 120V/60Hz

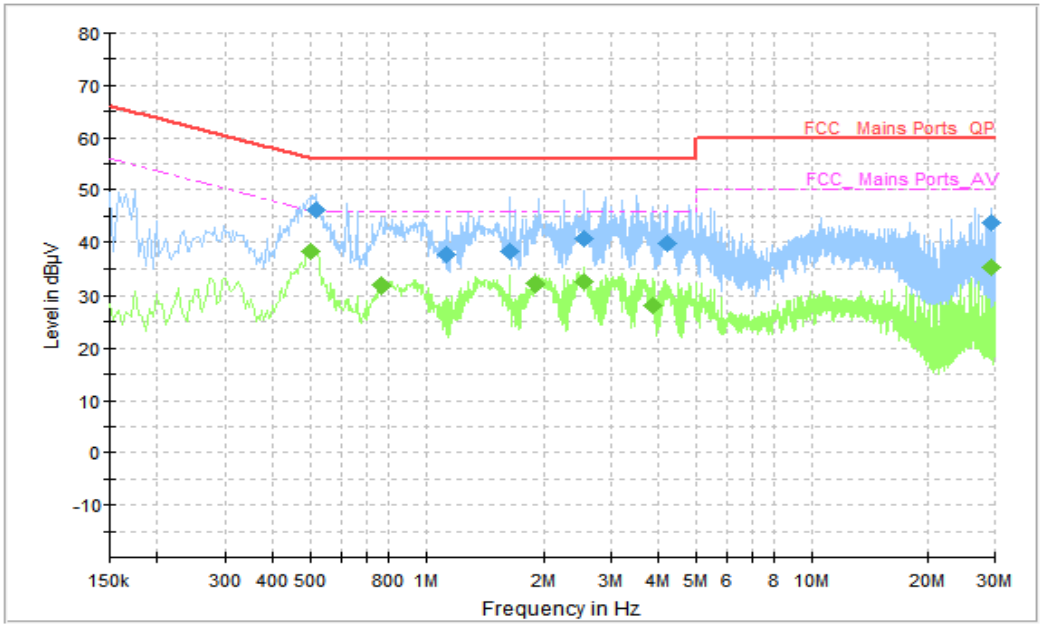


Figure B.2 Conducted Emission(Set.2, Data Transfer Mode)

Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.518	46.08	56	9.92	N	9.7	36.38
1.134	37.7	56	18.3	N	9.7	28
1.642	38.12	56	17.88	N	9.7	28.42
2.558	40.78	56	15.22	N	9.7	31.08
4.198	39.61	56	16.39	N	9.7	29.91
29.234	43.77	60	16.23	N	10	33.77

Final_Result_AVG

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.498	38.24	46.03	7.8	L1	9.7	28.54
0.762	31.75	46	14.25	N	9.7	22.05
1.91	32.12	46	13.88	N	9.7	22.42
2.558	32.53	46	13.47	N	9.7	22.83
3.854	28.02	46	17.98	N	9.7	18.32
29.234	35.15	50	14.85	N	10	25.15

AC Input Port/ Voltage: 240V/60Hz

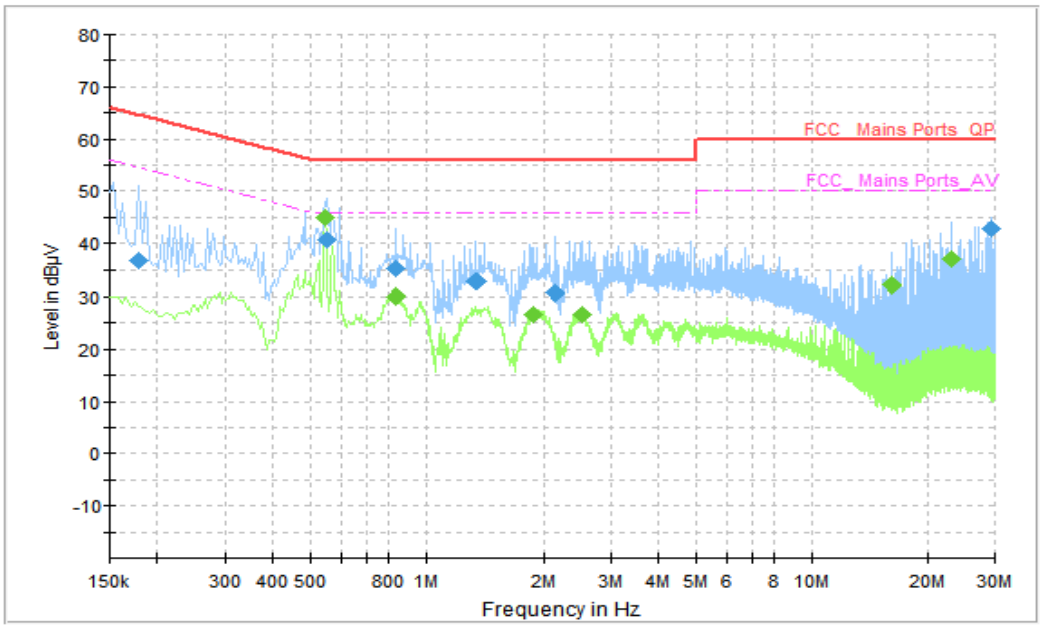


Figure B.3 Conducted Emission(Set.1, Data Transfer Mode)

Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.178	36.66	64.58	27.92	N	9.6	27.06
0.554	40.63	56	15.37	N	9.7	30.93
0.834	35.17	56	20.83	N	9.7	25.47
1.346	32.72	56	23.28	N	9.7	23.02
2.154	30.63	56	25.37	N	9.7	20.93
29.234	42.81	60	17.19	L1	10	32.81

Final_Result_AVG

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	PMea (dBµV)
0.546	44.74	46	1.26	N	9.7	35.04
0.834	29.86	46	16.14	N	9.7	20.16
1.89	26.67	46	19.33	N	9.7	16.97
2.526	26.56	46	19.44	N	9.7	16.86
16.226	32.04	50	17.96	N	10.1	21.94
23.13	37.06	50	12.94	N	10.3	26.76

AC Input Port/ Voltage: 240V/60Hz

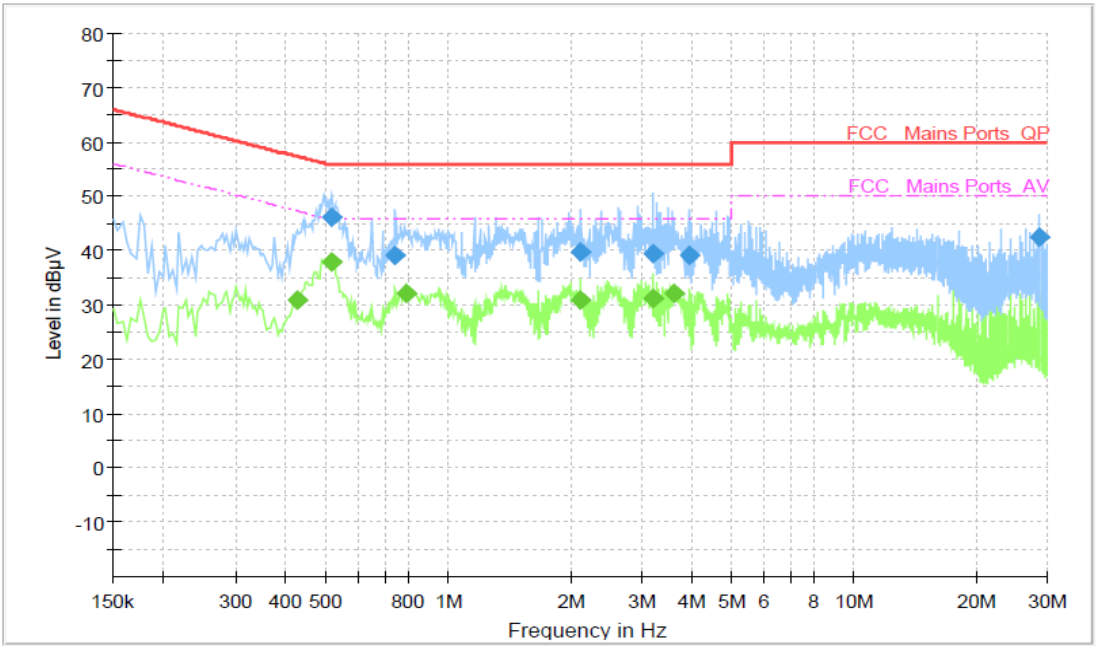


Figure B.4 Conducted Emission(Set.2, Data Transfer Mode)

Final_Result_QPK

Frequency (MHz)	QuasiPeak (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.518	46.2	56	9.8	N	9.7	36.5
0.742	39.14	56	16.86	N	9.7	29.44
2.118	39.65	56	16.35	N	9.7	29.95
3.206	39.58	56	16.42	N	9.7	29.88
3.918	39.29	56	16.71	N	9.7	29.59
28.686	42.64	60	17.36	N	10.1	32.54

Final_Result_AVG

Frequency (MHz)	Average (dBµV)	Limit (dBµV)	Margin (dB)	Line	Corr. (dB)	P_{Mea} (dBµV)
0.426	30.78	47.33	16.55	N	9.7	21.08
0.518	37.88	46	8.12	L1	9.7	28.18
0.794	32.02	46	13.98	N	9.7	22.32
2.118	30.8	46	15.2	N	9.7	21.1
3.206	31.33	46	14.67	N	9.7	21.63
3.614	32.12	46	13.88	N	9.7	22.42

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