

TEST REPORT No. I17Z60545-EMC01

for

TCL Communication Ltd.

LTE / UMTS / GSM mobile phone

Model Name: 5049G/5149G

FCC ID: 2ACCJH075

with

Hardware Version: PIO

Software Version: v7L1H

Issued Date: 2017-05-08

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.

Test Laboratory:

FCC 2.948 Listed: No. 525429

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I17Z60545-EMC01	Rev.0	1st edition	2017-05-08



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1. Test Laboratory

1.1. Testing Location

CTTL(Huayuan North Road)

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

China100191

1.2. <u>Testing Environment</u>

Normal Temperature: $15-35^{\circ}$ C Relative Humidity: 20-75%

1.3. Project data

Testing Start Date: 2016-12-05 Testing End Date: 2017-05-04

1.4. Signature

Zhang Hui

(Prepared this test report)

Qu Pengfei

(Reviewed this test report)

Liu Baodian

Deputy Director of the laboratory

(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: TCL Communication Ltd.

Address /Post: 17 Huifeng 3th Road, ZhongKai Hi-tech Development District,

Huizhou, Guangdong 516006 P.R.China

Contact Person: Gong Zhizhou

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2.2. Manufacturer Information

Company Name: TCL Communication Ltd.

Address /Post: 17 Huifeng 3th Road, ZhongKai Hi-tech Development District,

Huizhou, Guangdong 516006 P.R.China

Contact Person: Gong Zhizhou

Contact Email zhizhou.gong@tcl.com
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3. Equipment Under Test (EUT) and Ancillary Equipment (AE)

3.1. About EUT

Description LTE / UMTS / GSM mobile phone

 Model Name
 5049G/5149G

 FCC ID
 2ACCJH075

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

EUT1 014917000003854 PIO v7L1H

3.3. Internal Identification of AE used during the test

AE ID*	Description	SN	Remarks
AE1	Battery	/	16TCT-BA-1280
AE2	Battery	/	16TCT-BA-1269
AE8	USB Cable	/	15TCT-DC-0208
AE10	USB Cable	/	16TCT-DC-0459
AE23	Travel charger	/	17TCT-CH-0251
AE24	Travel charger	/	17TCT-CH-0279

AE1

Model CAC2900001C1

Manufacturer BYD
Capacitance 2900mAh
Nominal voltage 3.85V

AE2

Model CAC2900003CC Manufacturer HYPERPOWER

Capacitance 2900mAh Nominal voltage 3.85V

AE8

Model CDA3122005C2
Manufacturer SHENHUA

Length of cable /

AE10

Model CDA3122005C8

Manufacturer PUAN Length of cable /

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



AE23

Model CBA0058AGAC2

Manufacturer TEN PAO

Length of cable /

AE24

Model CBA0058AGAC4

Manufacturer Aohai 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.7	EUT1 + AE1 + AE8	USB mode
Set.8	EUT1 + AE1 + AE10	USB mode
Set.9	EUT1 + AE1 + AE8 + AE23	Charging mode
Set.10	EUT1 + AE1 + AE8 + AE24	Charging mode

Note:

The LTE / UMTS / GSM mobile phone 5049G/5149G manufactured by TCL Communication Ltd. is a variant model based on 5044O for conformance test.

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	2015
ANSI C63.4	Methods of Measurement of Radio-Noise	2014
	Emissions from Low - Voltage Electrical and	
	Electronic Equipment in the Range of 9 kHz to 40	
	GHz	

Note: The test methods used have no deviation with standards above.

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



5. LABORATORY ENVIRONMENT

Semi-anechoic chamber SAC-2 (10.0 m x 6.7 m x 6.15 m) 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, 3 m distance
Site voltage standing-wave ratio (SVSWR)	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:		
Р		Pass
Verdict Column	NA	Not applicable
	F	Fail
Location Column 1		The test is performed in test location 1 which are described in section 1.1 of this report

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



7. Test Equipments Utilized

NO.	Description	TYPE	SERIES NUMBER	MANUFACTURE	CAL DUE DATE	CALIBRATION INTERVAL
1	Test Receiver	ESCI	100344	R&S	2018-02-15	1 year
2	Test Receiver	ESU26	100235	R&S	2018-03-01	1 year
3	Universal Radio Communication Tester	CMW500	116588	R&S	2017-12-01	1 year
4	Universal Radio Communication Tester	CMW500	143008	R&S	2017-12-01	1 year
5	LISN	ENV216	101200	R&S	2017-07-10	1 year
6	EMI Antenna	VULB 9163	9163-301	Schwarzbeck	2017-12-16	3 years
7	EMI Antenna	3115	6914	ETS-Lindgren	2017-12-15	3 years

Test Software Utilized

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 (§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	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/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:

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

Where

GA: Antenna factor of receive antenna

GPL: Path Loss

P_{Mea}: Measurement result on receiver. Measurement uncertainty (worst case):

30MHz-1GHz: U = 4.86 dB, k=2, 1GHz-18GHz: U = 5.26 dB, k=2

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Measurement results for Set.7

USB Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dBµV)	Polarity
17947.300	44.4	-17.7	45.6	16.500	Н
17938.233	44.4	-17.7	45.6	16.500	Н
17950.133	44.3	-17.7	45.6	16.400	V
17954.100	44.2	-17.7	45.6	16.300	Н
17865.700	44.2	-18.5	45.6	17.100	Н
17933.133	44.2	-17.7	45.6	16.300	Н

USB Mode/Peak detector

Frequency(MHz)	Result(dB _μ V/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dBµV)	Polarity
17958.633	56.8	-17.7	45.6	28.900	Н
17911.600	56.3	-18.5	45.6	29.200	Н
17759.733	55.7	-18.5	45.6	28.600	V
17903.100	55.5	-18.5	45.6	28.400	Н
17908.200	55.4	-18.5	45.6	28.300	Н
17945.033	55.4	-17.7	45.6	27.500	Н

Measurement results for Set.8:

USB Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G _{PL} (dB)	G _A (dB/m)	$P_{Mea}(dB\mu V)$	Polarity
17953.533	44.2	-17.7	45.6	16.300	Н
17934.267	44.2	-17.7	45.6	16.300	Н
17960.333	44.2	-17.7	45.6	16.300	V
17942.767	44.1	-17.7	45.6	16.200	Н
17946.733	44.1	-17.7	45.6	16.200	Н
17952.967	44.1	-17.7	45.6	16.200	Н



USB Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dBµV)	Polarity
17912.167	56.0	-18.5	45.6	28.900	Н
17925.767	55.8	-17.7	45.6	27.900	Н
17871.367	55.6	-18.5	45.6	28.500	V
17984.700	55.6	-17.7	45.6	27.700	Н
17956.367	55.6	-17.7	45.6	27.700	Н
17963.733	55.5	-17.7	45.6	27.600	Н

Measurement results for Set.9:

Charging Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G _{PL} (dB)	G _A (dB/m)	$P_{Mea}(dB\mu V)$	Polarity
17988.667	44.2	-17.7	45.6	16.300	Н
17943.900	44.1	-17.7	45.6	16.200	Н
17905.933	44.1	-18.5	45.6	17.000	V
17946.733	44.0	-17.7	45.6	16.100	Н
17924.633	44.0	-17.7	45.6	16.100	Н
17932.000	44.0	-17.7	45.6	16.100	Н

Charging Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G _{PL} (dB)	G _A (dB/m)	Р _{меа} (dBµV)	Polarity
17957.500	55.7	-17.7	45.6	27.800	Н
17801.667	55.5	-18.5	45.6	28.400	Н
17950.700	55.3	-17.7	45.6	27.400	V
17937.667	55.3	-17.7	45.6	27.400	Н
17962.033	55.2	-17.7	45.6	27.300	Н
17873.633	55.1	-18.5	45.6	28.000	Н

Measurement results for Set.10:

Charging Mode/Average detector

Frequency(MHz)	Result(dBμV/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dBµV)	Polarity
17642.250	47.9	-13.0	41.1	19.892	V
17577.000	47.9	-13.6	41.1	20.385	Н
17623.500	47.9	-13.1	41.1	19.880	V
17639.250	47.9	-13.0	41.1	19.784	Н
17285.250	47.8	-13.9	41.2	20.544	V
17637.000	47.8	-13.0	41.1	19.734	Н

Charging Mode/Peak detector

Frequency(MHz)	Result(dBμV/m)	G _{PL} (dB)	G _A (dB/m)	P _{Mea} (dBµV)	Polarity
17629.500	59.7	-13.0	41.1	31.601	Н
17943.750	59.5	-13.6	40.8	32.280	Н



17588.250	59.5	-13.5	41.1	31.822	V
17577.000	59.4	-13.6	41.1	31.843	V
17229.750	59.3	-14.3	41.2	32.414	Н
17513.250	59.2	-14.3	41.2	32.338	V

Sample calculation: Average detector , 17642.250MHz

Result = $P_{Mea} + A_{Rpl} = P_{Mea}(19.892 \text{ dBuV}) + G_A (41.1 \text{dB/m}) + G_{PL} (-13.0 \text{dB}) = 47.9 \text{dBuV/m}$



USB Mode, Set.7

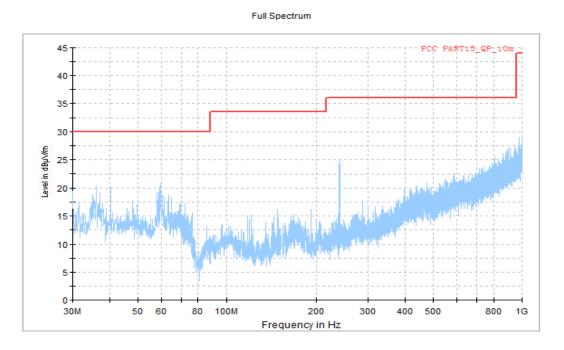


Fig.1 Radiated Emission from 30MHz to 1GHz

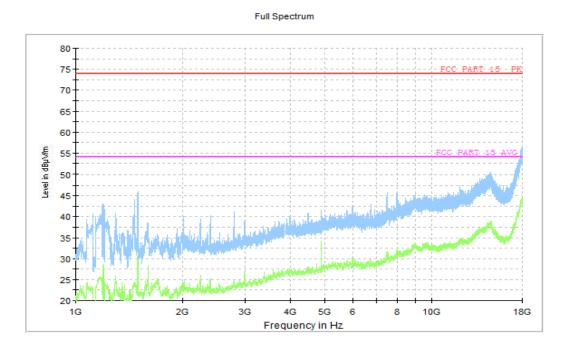


Fig.2 Radiated Emission from 1GHz to 18GHz



USB Mode, Set.8

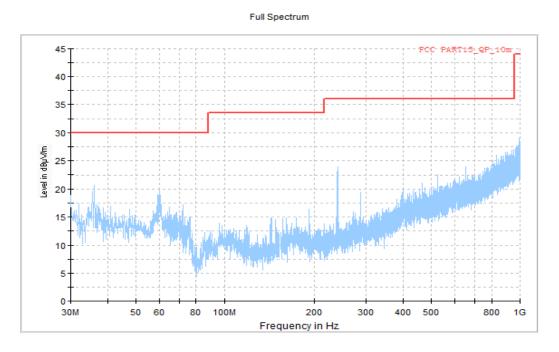


Fig.3 Radiated Emission from 30MHz to 1GHz

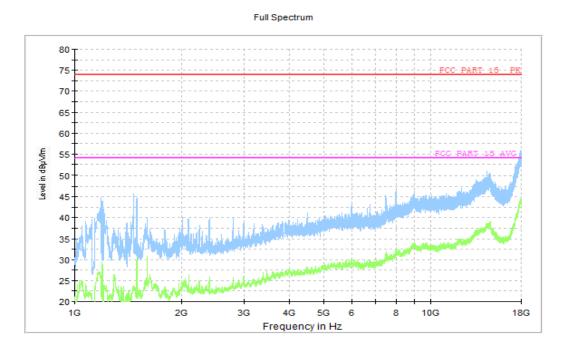


Fig.4 Radiated Emission from 1GHz to 18GHz



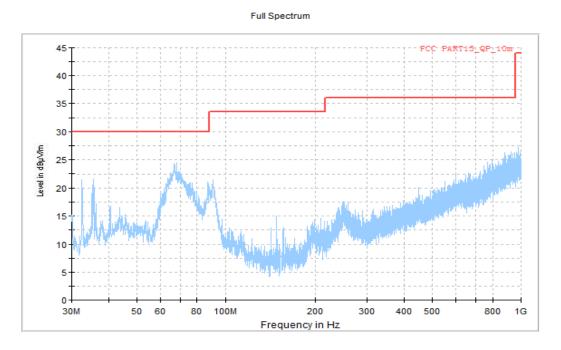


Fig.5 Radiated Emission from 30MHz to 1GHz

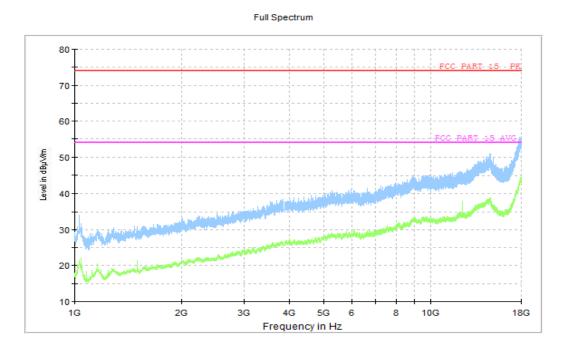


Fig.6 Radiated Emission from 1GHz to 18GHz



15B RE 30MHz-1GHz

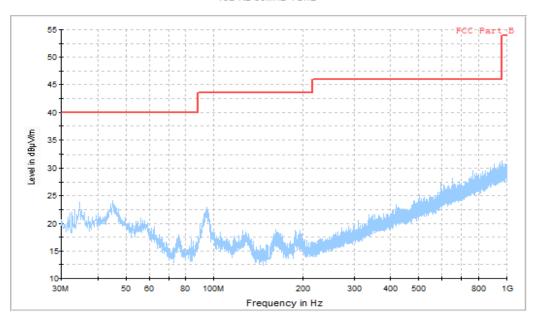


Fig.7 Radiated Emission from 30MHz to 1GHz

15B RE - 1GHz-3GHz

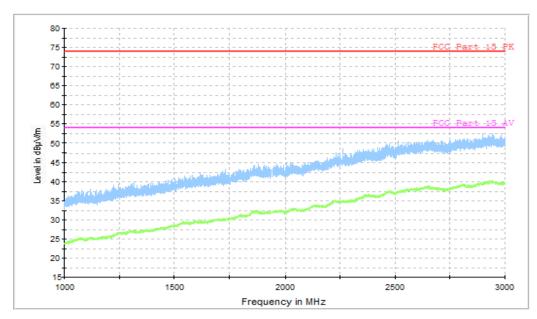


Fig.8 Radiated Emission from 1GHz to 3GHz





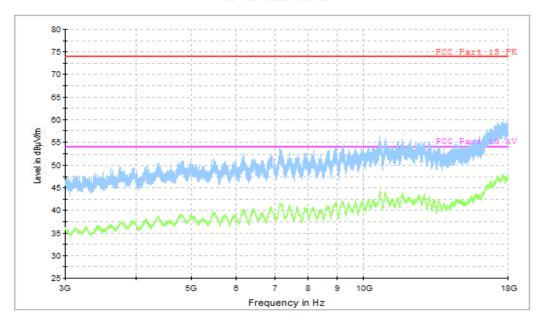


Fig.9 Radiated Emission from 3GHz to 18GHz



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 - 2014, 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.

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*= 3.38 dB, *k*=2.

Charging Mode, Set.7

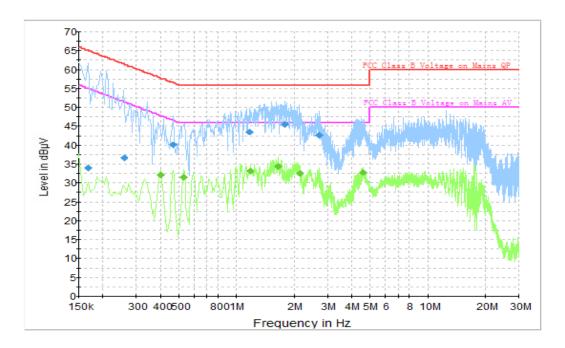


Fig.10 Conducted Emission

Final Result 1

Frequency	QuasiPeak	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.168000	34.1	2000.0	9.000	On	L1	19.9	31.0	65.1
0.258000	36.6	2000.0	9.000	On	N	19.8	24.9	61.5
0.465000	40.1	2000.0	9.000	On	L1	19.9	16.5	56.6
1.162500	43.6	2000.0	9.000	On	L1	19.7	12.4	56.0
1.792500	45.6	2000.0	9.000	On	L1	19.7	10.4	56.0
2.724000	42.8	2000.0	9.000	On	L1	19.2	13.2	56.0

Final Result 2

Frequency	Average	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.402000	32.1	2000.0	9.000	On	L1	19.9	15.7	47.8
0.528000	31.6	2000.0	9.000	On	N	19.9	14.4	46.0
1.180500	33.2	2000.0	9.000	On	N	19.7	12.8	46.0
1.657500	34.4	2000.0	9.000	On	L1	19.7	11.6	46.0
2.139000	32.5	2000.0	9.000	On	N	19.5	13.5	46.0
4.591500	32.8	2000.0	9.000	On	L1	19.6	13.2	46.0



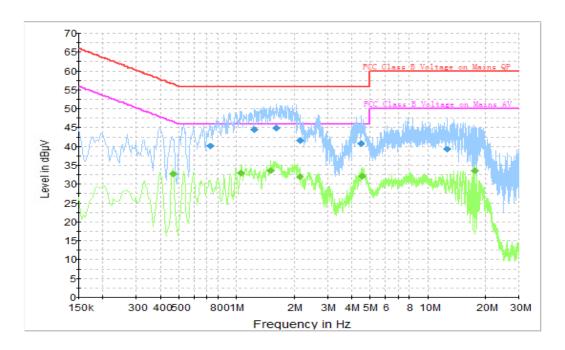


Fig.11 Conducted Emission

Final Result 1

- 111ai 1100t								
Frequency	QuasiPeak	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.730500	40.1	2000.0	9.000	On	N	19.8	15.9	56.0
1.248000	44.6	2000.0	9.000	On	L1	19.7	11.4	56.0
1.617000	44.9	2000.0	9.000	On	N	19.7	11.1	56.0
2.161500	41.7	2000.0	9.000	On	N	19.4	14.3	56.0
4.452000	40.8	2000.0	9.000	On	N	19.6	15.2	56.0
12.642000	39.3	2000.0	9.000	On	N	19.7	20.7	60.0

Final Result 2

Frequency	Average	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.465000	32.8	2000.0	9.000	On	N	19.9	13.8	46.6
1.059000	33.1	2000.0	9.000	On	L1	19.7	12.9	46.0
1.509000	33.7	2000.0	9.000	On	N	19.7	12.3	46.0
2.139000	32.1	2000.0	9.000	On	L1	19.5	13.9	46.0
4.542000	32.1	2000.0	9.000	On	N	19.6	13.9	46.0
17.574000	33.7	2000.0	9.000	On	L1	19.9	16.3	50.0



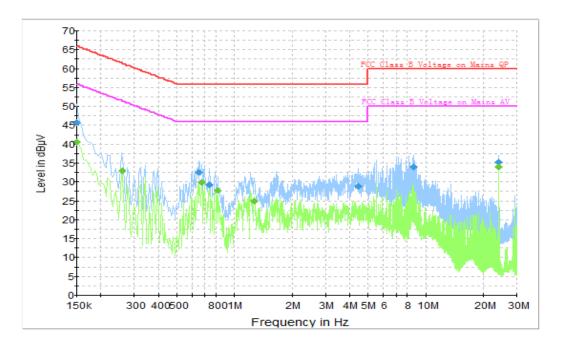


Fig.12 Conducted Emission

Final Result 1

Frequency	QuasiPeak	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.150000	45.8	2000.0	9.000	On	N	20.2	20.2	66.0
0.654000	32.5	2000.0	9.000	On	N	19.8	23.5	56.0
0.739500	29.2	2000.0	9.000	On	L1	19.8	26.8	56.0
4.443000	28.8	2000.0	9.000	On	N	19.6	27.2	56.0
8.646000	34.0	2000.0	9.000	On	N	19.7	26.0	60.0
24.054000	35.3	2000.0	9.000	On	L1	20.1	24.7	60.0

Final Result 2

Frequency	Average	Meas. Time	Bandwidth	Filter	Line	Corr.	Margin	Limit
(MHz)	(dBµV)	(ms)	(kHz)			(dB)	(dB)	(dBµV)
0.150000	40.6	2000.0	9.000	On	N	20.2	15.4	56.0
0.258000	33.1	2000.0	9.000	On	N	19.8	18.4	51.5
0.672000	29.9	2000.0	9.000	On	N	19.8	16.1	46.0
0.811500	27.7	2000.0	9.000	On	N	19.8	18.3	46.0
1.270500	24.9	2000.0	9.000	On	L1	19.7	21.1	46.0
24.054000	34.0	2000.0	9.000	On	L1	20.1	16.0	50.0



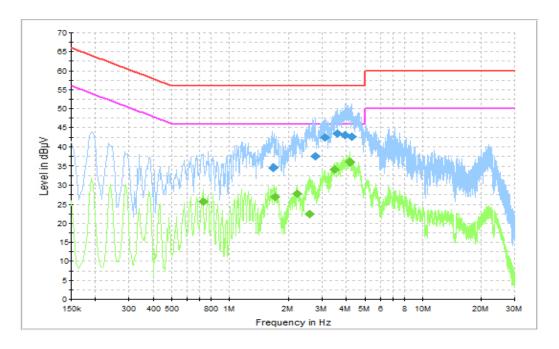


Fig.13 Conducted Emission

Final Result 1

Frequency	QuasiPeak	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
1.666500	34.5	GND	N	10.4	21.5	56.0
2.769000	37.4	GND	N	10.5	18.6	56.0
3.097500	42.3	GND	L1	10.4	13.7	56.0
3.588000	43.4	GND	L1	10.4	12.6	56.0
3.943500	43.1	GND	N	10.5	12.9	56.0
4.276500	42.7	GND	N	10.5	13.3	56.0

Final Result 2

Frequency	Average	PE	Line	Corr.	Margin	Limit
(MHz)	(dBµV)			(dB)	(dB)	(dBµV)
0.726000	25.8	GND	L1	10.3	20.2	46.0
1.698000	26.9	GND	L1	10.3	19.1	46.0
2.229000	27.8	GND	L1	10.4	18.2	46.0
2.571000	22.5	GND	L1	10.4	23.5	46.0
3.489000	34.2	GND	L1	10.4	11.8	46.0
4.164000	36.0	GND	L1	10.5	10.0	46.0

END OF REPORT