



EMC TEST REPORT

Applicant TP-LINK TECHNOLOGIES CO., LTD.
FCC ID TE7C5LV1
Brand TP-LINK
Product C5L FDD-LTE Smartphone
Model TP601C
Report No. RXA1511-0187EMC01R1
Issue Date December 21, 2015

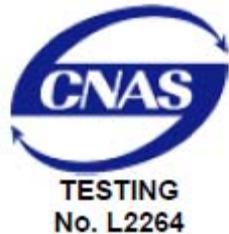
TA Technology (Shanghai) Co., Ltd. tested the above equipment in accordance with the requirements in **FCC Code CFR47 Part15B (2014)/ ANSI C63.4 (2014)**. The test results show that the equipment tested is capable of demonstrating compliance with the requirements as documented in this report.

Wei Liu

Reviewed by: Wei Liu

Guangchang Fan

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Summary of measurement results

Number	Test Case	Clause in FCC Rules	Conclusion
1	Radiated Emission	15.109, ANSI C63.4-2014	PASS
2	Conducted Emission	15.107, ANSI C63.4-2014	PASS



1 Test Laboratory

1.1 Notes of the Test Report

This report shall not be reproduced in full or partial, without the written approval of TA technology (shanghai) co., Ltd).The results documented in this report apply only to the tested sample, under the conditions and modes of operation as described herein .Measurement Uncertainties were not taken into account and are published for informational purposes only. This report is written to support regulatory compliance of the applicable standards stated above. This report must not be used by the client to claim product certification, approval, or endorsement by CNAS or any government agencies.

1.2 Test facility

CNAS (accreditation number: L2264)

TA Technology (Shanghai) Co., Ltd. has obtained the accreditation of China National Accreditation Service for Conformity Assessment (CNAS).

FCC (recognition number is 428261)

TA Technology (Shanghai) Co., Ltd. has been listed on the US Federal Communications Commission list of test facilities recognized to perform electromagnetic emissions measurements.

IC (recognition number is 8510A)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Canada to perform electromagnetic emission measurement.

VCCI (recognition number is C-4595, T-2154, R-4113, G-766)

TA Technology (Shanghai) Co., Ltd. has been listed by industry Japan to perform electromagnetic emission measurement.

A2LA (Certificate Number: 3857.01)

TA Technology (Shanghai) Co., Ltd. has been listed by American Association for Laboratory Accreditation to perform electromagnetic emission measurement.



1.3 Testing Location

Company: TA Technology (Shanghai) Co., Ltd.
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City: Shanghai
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Website: <http://www.ta-shanghai.com>
E-mail: xukai@ta-shanghai.com



2 General Description of Equipment under Test

2.1 Client Information

Applicant	TP-LINK TECHNOLOGIES CO., LTD.
Applicant address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China
Manufacturer	TP-LINK TECHNOLOGIES CO., LTD.
Manufacturer address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

2.2 General information

EUT Description	
Device Type:	Portable Device
Product Name:	C5L FDD-LTE Smartphone
Model Number:	TP601C
HW Version:	P1
SW Version:	H10S100D03B20151015R1003
IMEI:	SIM 1: 868788020000775 SIM 2: 868788020001781
Antenna Type:	Internal Antenna
Used Host Product:	Lenovo X61(SN : L3-D1224)
Test Mode:	Transfer Data Mode
EUT Accessory	
Adapter	Manufacturer: TP-LINK Model: N050100-2B3 Input power: 100-240V AC 50/60Hz 0.3A Output power: 5V DC 1A
Battery	Manufacturer: BYD Model: NBL-45A2000 Power Rating: DC 3.8V, 2000mAh, Li-ion
USB Cable	100cm Cable, Shielded, Manufacturer: TP-LINK
Remark: The information of the EUT is declared by the manufacturer. Please refer to the specifications or user manual for details.	



2.3 Applied Standards

According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

Test standards

FCC Code CFR47 Part15B (2014)

ANSI C63.4 (2014)



3 Test Case Results

3.1 Radiated Emission

Ambient condition

Temperature	Relative humidity	Pressure
24°C~26°C	45%~50%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The distance between EUT and receive antenna should be 3 meters. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Sweep the whole frequency band through the range from 30MHz to the 5th harmonic of the carrier. During the test, the height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees for detecting the maximum of radiated signal level.

The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing. During the test, the EUT is worked at maximum output power.

Set the spectrum analyzer in the following:

Below 1GHz:

RBW=1 MHz / VBW=3MHz / Sweep=AUTO

Above 1GHz:

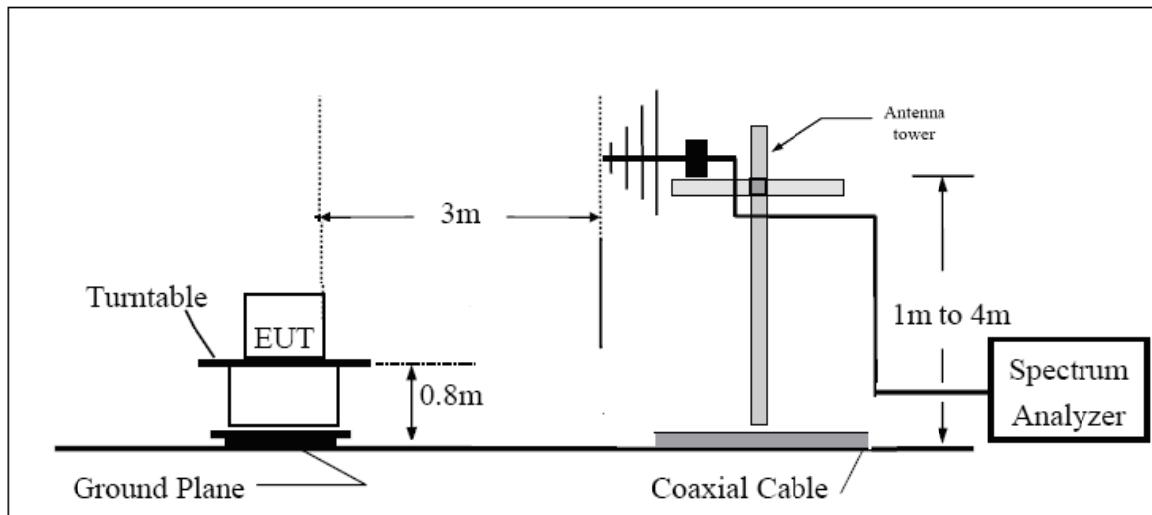
(a) PEAK: RBW=1MHz VBW=3MHz/ Sweep=AUTO

(b) AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

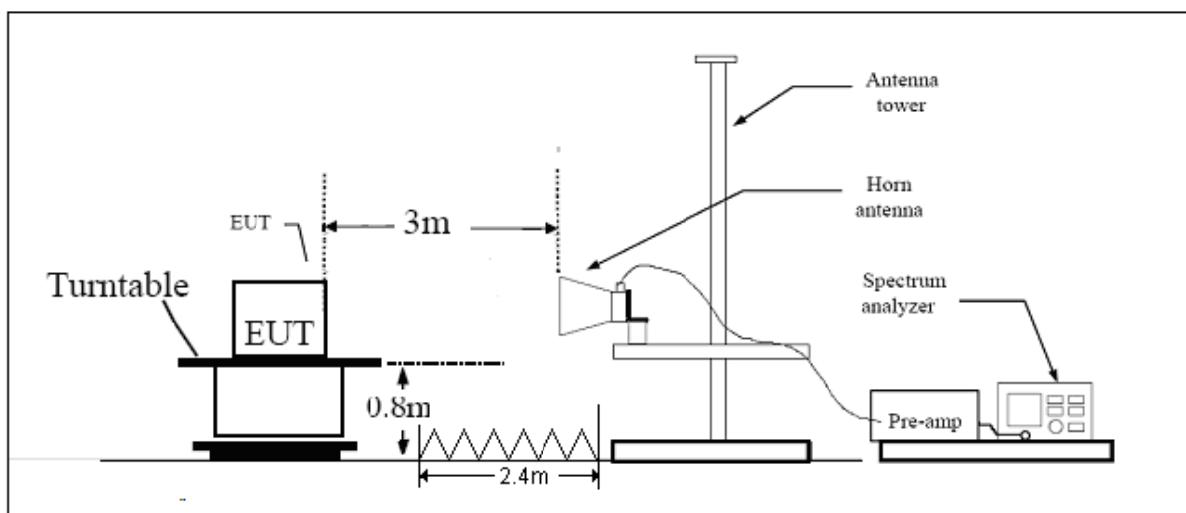
During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup

Below 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

**Limits**

Frequency (MHz)	Field Strength (dB μ V/m)	Detector
30 -88	40.0	Quasi-peak
88-216	43.5	Quasi-peak
216 – 960	46.0	Quasi-peak
960-1000	54.0	Quasi-peak
1000-5 th harmonic of the highest frequency or 40GHz,which is lower	54 74	Average Peak

Measurement Uncertainty

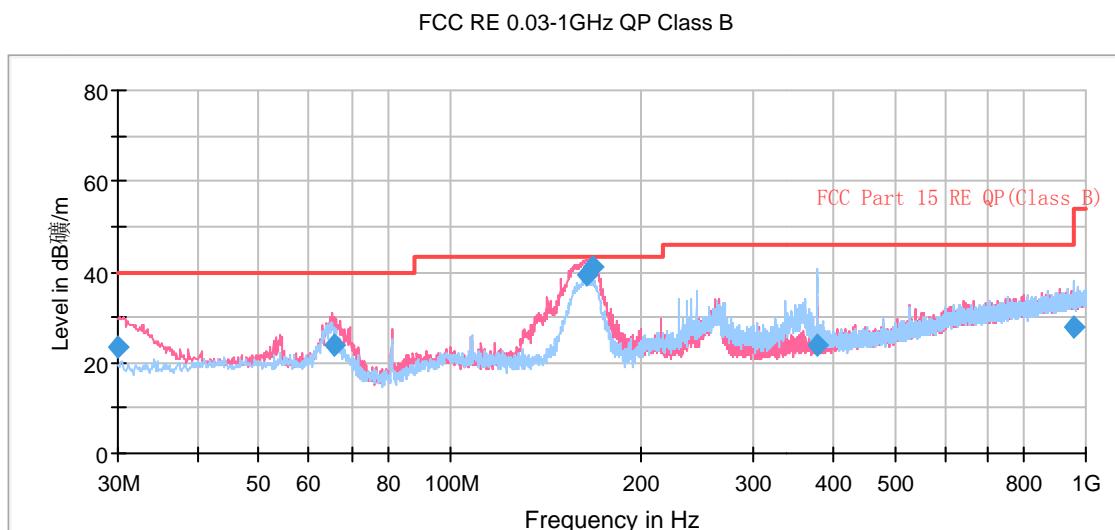
The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 3.92$ dB.

Test Results

The messy code (dB_礦/m) including in the following plots mean dB_{uv}/m.

The following graphs display the maximum values of horizontal and vertical by software.

For above 1GHz, Blue trace uses the peak detection, Green trace uses the average detection.



Radiated Emission from 30MHz to 1GHz

Frequency (MHz)	Quasi-Peak (dB _{uv} /m)	Reading value (dB _{uv} /m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dB _{uv} /m)
30.006250	23.2	35.1	100.0	V	0.0	11.9	16.8	40.0
65.603750	23.8	34.1	100.0	V	91.0	10.3	16.2	40.0
163.703750	39.5	49.4	100.0	V	247.0	9.9	4.0	43.5
167.982500	41.0	51.2	100.0	V	294.0	10.2	2.5	43.5
377.583750	23.8	41.2	100.0	H	259.0	17.4	22.2	46.0
954.413750	28.0	54.1	100.0	H	151.0	26.1	18.0	46.0

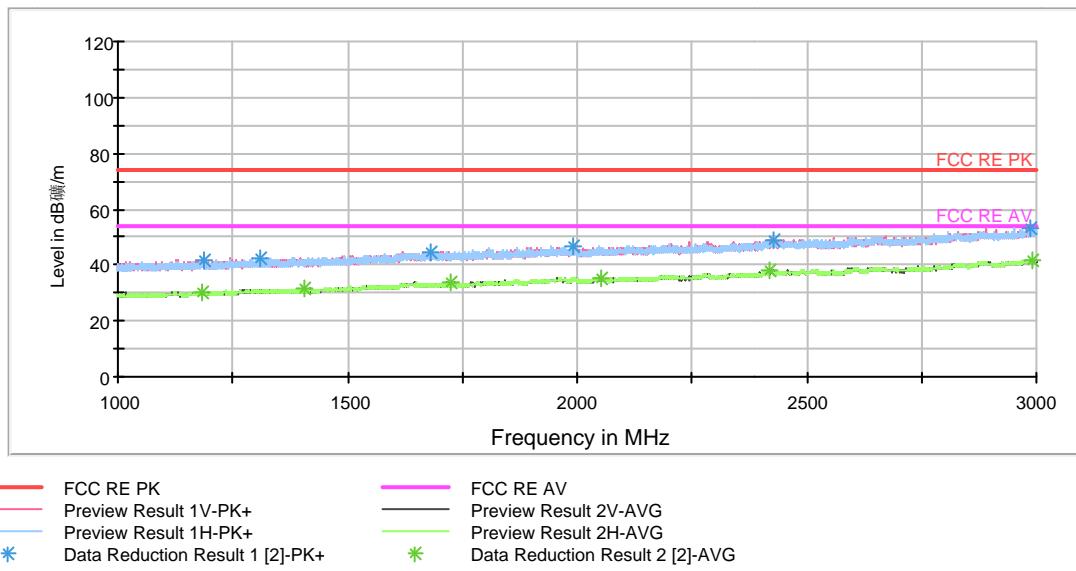
Remark: 1. Quasi-Peak = Reading value + Correction factor

2. Correction Factor = Antenna factor+ Insertion loss(cable loss+amplifier gain)

3. Margin = Limit – Quasi-Peak



RE 1G-3GHz PK+AV



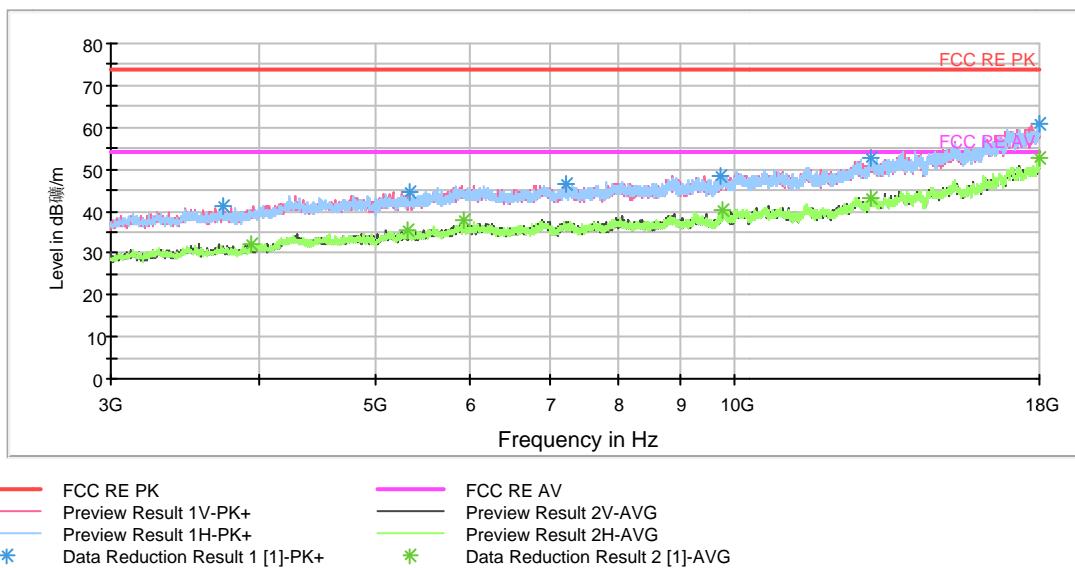
Radiated Emission from 1GHz to 3GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1182.500000	40.9	48.9	100.0	V	161.0	-8.0	33.1	74
1408.000000	41.0	48.1	100.0	V	328.0	-7.1	33.0	74
1725.500000	42.7	47.8	100.0	V	237.0	-5.1	31.3	74
2054.000000	44.5	47.7	100.0	V	328.0	-3.2	29.5	74
2421.000000	47.8	48.4	100.0	V	335.0	-0.6	26.2	74
2991.000000	51.7	53.9	100.0	H	160.0	2.2	22.3	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
1182.500000	30.3	38.3	100.0	V	161.0	-8.0	23.7	54
1408.000000	31.5	38.6	100.0	V	328.0	-7.1	22.5	54
1725.500000	33.7	38.8	100.0	V	237.0	-5.1	20.3	54
2054.000000	35.3	38.5	100.0	V	328.0	-3.2	18.7	54
2421.000000	38.1	38.7	100.0	V	335.0	-0.6	15.9	54
2991.000000	41.8	44.0	100.0	H	160.0	2.2	12.2	54



RE 3-18GHz PK+AV



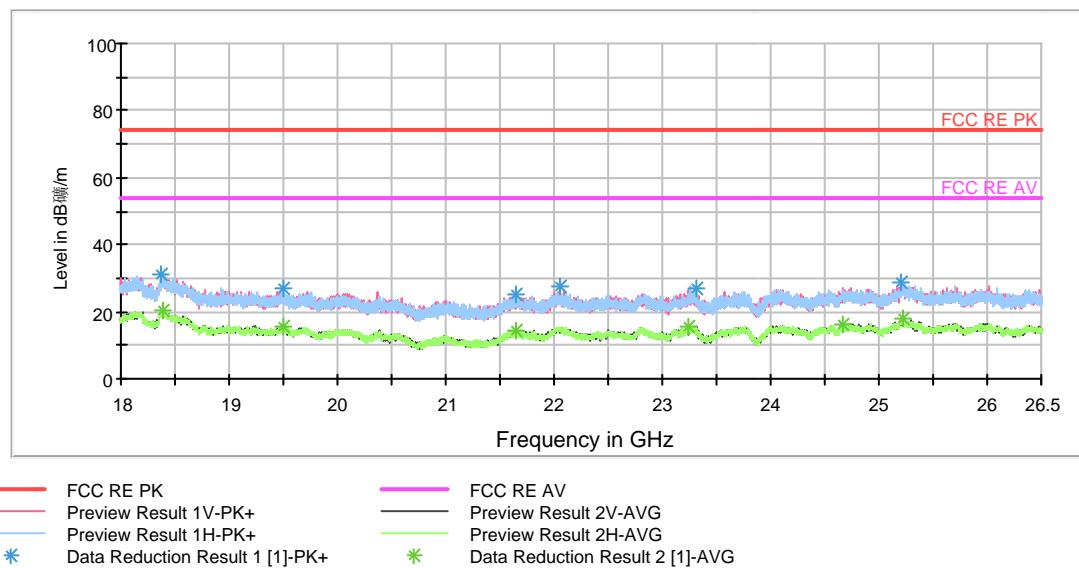
Radiated Emission from 3GHz to 18GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
3926.250000	38.7	38.7	100.0	H	87.0	0.0	35.3	74
5328.750000	42.4	46.2	100.0	H	234.0	3.8	31.6	74
5932.500000	44.7	50.8	100.0	H	19.0	6.1	29.3	74
9776.250000	47.4	59.4	100.0	H	177.0	12.0	26.6	74
13010.625000	50.4	66.6	100.0	V	120.0	16.2	23.6	74
17988.750000	59.1	84.4	100.0	H	0.0	25.3	14.9	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Height (cm)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
3926.250000	32.0	32.0	100.0	H	87.0	0.0	22.0	54
5328.750000	35.6	39.4	100.0	H	234.0	3.8	18.4	54
5932.500000	37.9	44.0	100.0	H	19.0	6.1	16.1	54
9776.250000	40.3	52.3	100.0	H	177.0	12.0	13.7	54
13010.625000	43.2	59.4	100.0	V	120.0	16.2	10.8	54
17988.750000	52.6	77.9	100.0	H	0.0	25.3	1.4	54



RE 18-26.5GHz PK+AV



Radiated Emission from 18GHz to 26.5GHz

Frequency (MHz)	Peak (dBuV/m)	Reading value (dBuV/m)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
18395.250000	29.4	34.3	V	0.0	-4.9	44.6	74
19491.750000	25.2	32.8	V	0.0	-7.6	48.8	74
21651.812500	25.1	34.3	H	0.0	-9.2	48.9	74
23248.750000	26.1	33.6	V	0.0	-7.5	47.9	74
24664.000000	24.1	31.2	H	0.0	-7.1	49.9	74
25222.875000	27.2	33.1	H	0.0	-5.9	46.8	74

Frequency (MHz)	Average (dBuV/m)	Reading value (dBuV/m)	Polarization	Azimuth (deg)	Correct Factor (dB)	Margin (dB)	Limit (dBuV/m)
18395.250000	20.5	25.4	V	0.0	-4.9	33.5	54
19491.750000	15.8	23.4	V	0.0	-7.6	38.2	54
21651.812500	14.3	23.5	H	0.0	-9.2	39.7	54
23248.750000	15.5	23.0	V	0.0	-7.5	38.5	54
24664.000000	16.4	23.5	H	0.0	-7.1	37.6	54
25222.875000	17.9	23.8	H	0.0	-5.9	36.1	54

3.2 Conducted Emission

Ambient condition

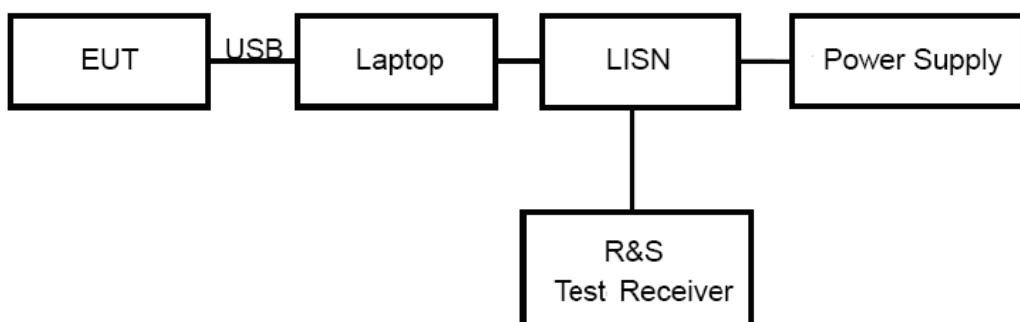
Temperature	Relative humidity	Pressure
24°C ~26°C	50%~55%	102.5kPa

Methods of Measurement

The EUT is placed on a non-metallic table of 80cm height above the horizontal metal reference ground plane. During the test, the EUT was operating in its typical mode. The test method is according to ANSI C63.4-2014. Connect the AC power line of the EUT to the L.I.S.N. Use EMI receiver to detect the average and Quasi-peak value. RBW is set to 9 kHz, VBW is set to 30kHz. The measurement result should include both L line and N line.

During the test, EUT is connected to a laptop via a USB cable in the case of Transfer Data mode. The EUT is used as the peripheral equipment of the PC. The data is transferred from EUT to PC; PC is connected to server via a long LAN cable.

Test Setup



Note: Power Supply is AC Power source and it is used to change the voltage 120V/60Hz.

Limits

Frequency (MHz)	Conducted Limits(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

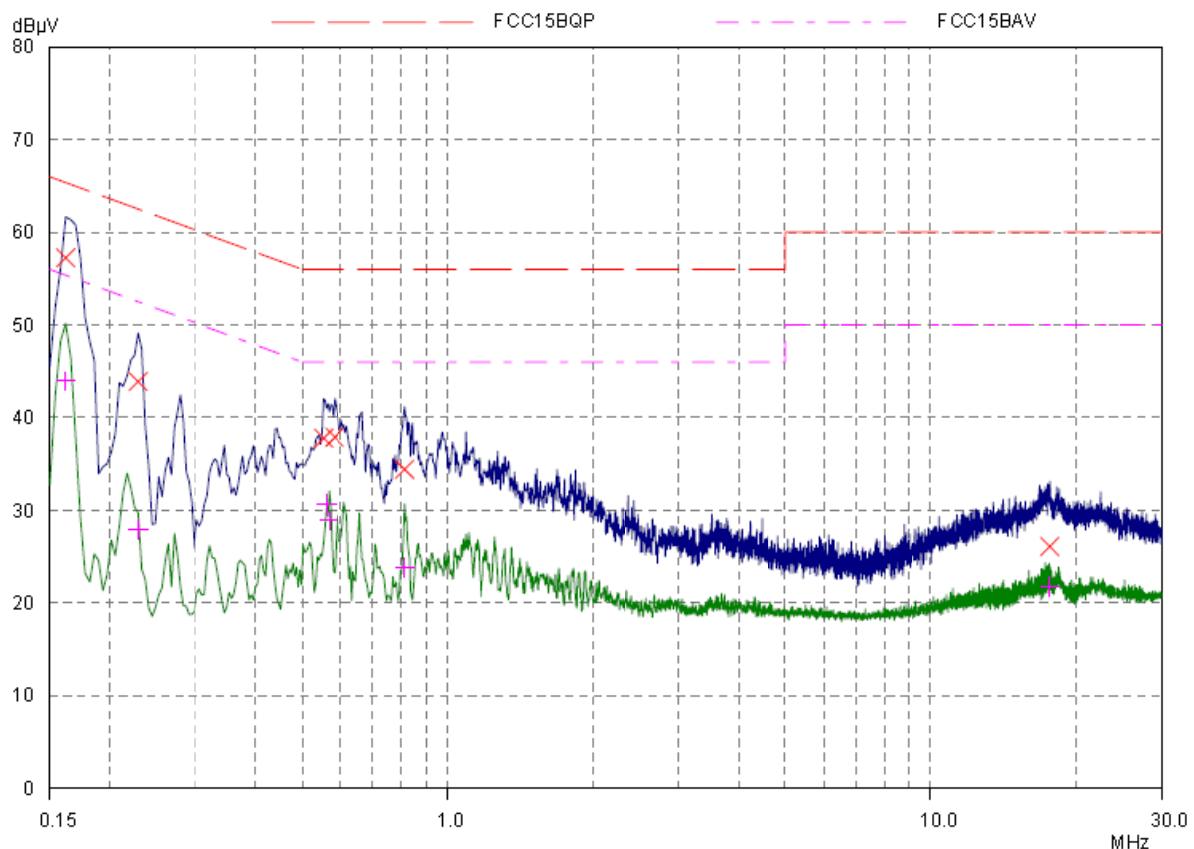
^{*}: Decreases with the logarithm of the frequency.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 1.96$. $U = 2.69$ dB.

Test Results

Following plots, Blue trace uses the peak detection; Green trace uses the average detection.



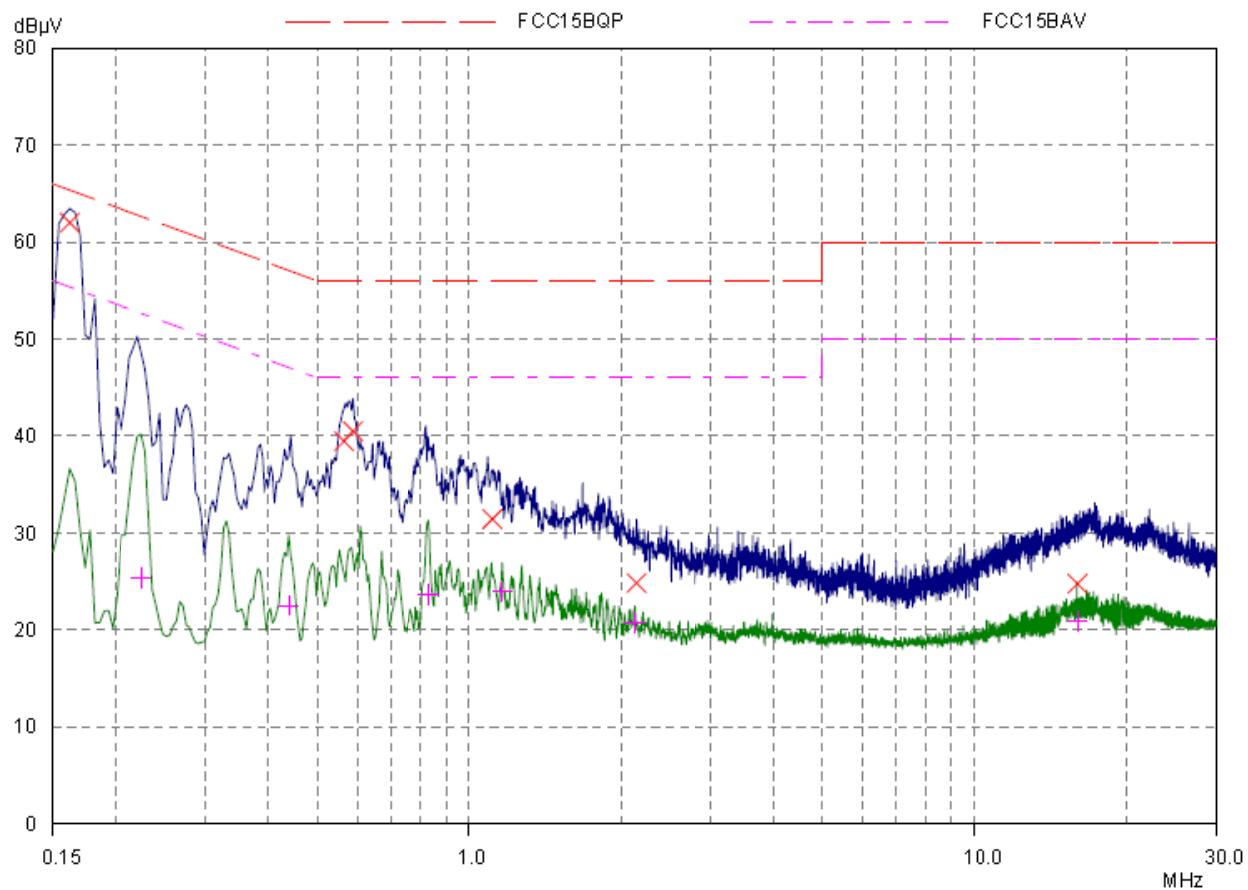
Final Measurement Results

Frequency MHz	QP Level dB μ V	QP Limit dB μ V	QP Delta dB	Phase	PE
0.16171	57.26	65.38	8.12	L1	gnd
0.22812	43.90	62.52	18.62	L1	gnd
0.56234	37.78	56.00	18.22	L1	gnd
0.58359	37.90	56.00	18.10	L1	gnd
0.81406	34.42	56.00	21.58	L1	gnd
17.64218	26.09	60.00	33.91	L1	gnd

Frequency MHz	AV Level dB μ V	AV Limit dB μ V	AV Delta dB	Phase	PE
0.16171	43.98	55.38	11.40	L1	gnd
0.22812	27.92	52.52	24.60	L1	gnd
0.56015	30.71	46.00	15.29	L1	gnd
0.56796	28.89	46.00	17.11	L1	gnd
0.81406	23.87	46.00	22.13	L1	gnd
17.64218	21.75	50.00	28.25	L1	gnd

L line

Conducted Emission from 150 KHz to 30 MHz



Final Measurement Results

Frequency MHz	QP Level dB μ V	QP Limit dB μ V	QP Delta dB	Phase	PE
0.16171	62.00	65.38	3.38	N	gnd
0.56406	39.46	56.00	16.54	N	gnd
0.5875	40.50	56.00	15.50	N	gnd
1.11093	31.42	56.00	24.58	N	gnd
2.13828	24.84	56.00	31.16	N	gnd
16.01718	24.77	60.00	35.23	N	gnd
Frequency MHz	AV Level dB μ V	AV Limit dB μ V	AV Delta dB	Phase	PE
0.22421	25.36	52.66	27.30	N	gnd
0.43906	22.52	47.08	24.56	N	gnd
0.82968	23.69	46.00	22.31	N	gnd
1.16171	23.95	46.00	22.05	N	gnd
2.12265	20.74	46.00	25.26	N	gnd
16.01718	20.93	50.00	29.07	N	gnd

N line
Conducted Emission from 150 KHz to 30 MHz



4 Main Test Equipment

Name	Type	Manufacturer	Serial Number	Last Cal.	Cal. Due Date
EMI Test Receiver	ESCI	R&S	100948	2015-05-22	2016-05-21
Trilog Antenna	VULB 9163	SCHWARZBECK	9163-201	2014-12-06	2017-12-05
Signal Analyzer	FSV30	R&S	100815	2014-12-18	2015-12-17
Horn Antenna	HF907	R&S	100126	2014-12-06	2017-12-05
Horn Antenna	3160-09	ETS-Lindgren	00102643	2015-01-30	2018-01-29
EMI Test Receiver	ESCS30	R&S	100138	2014-12-18	2015-12-17
LISN	ENV216	R&S	101171	2013-12-18	2016-12-17

ANNEX A: The EUT Appearance and Test Configuration

A.1 EUT Appearance

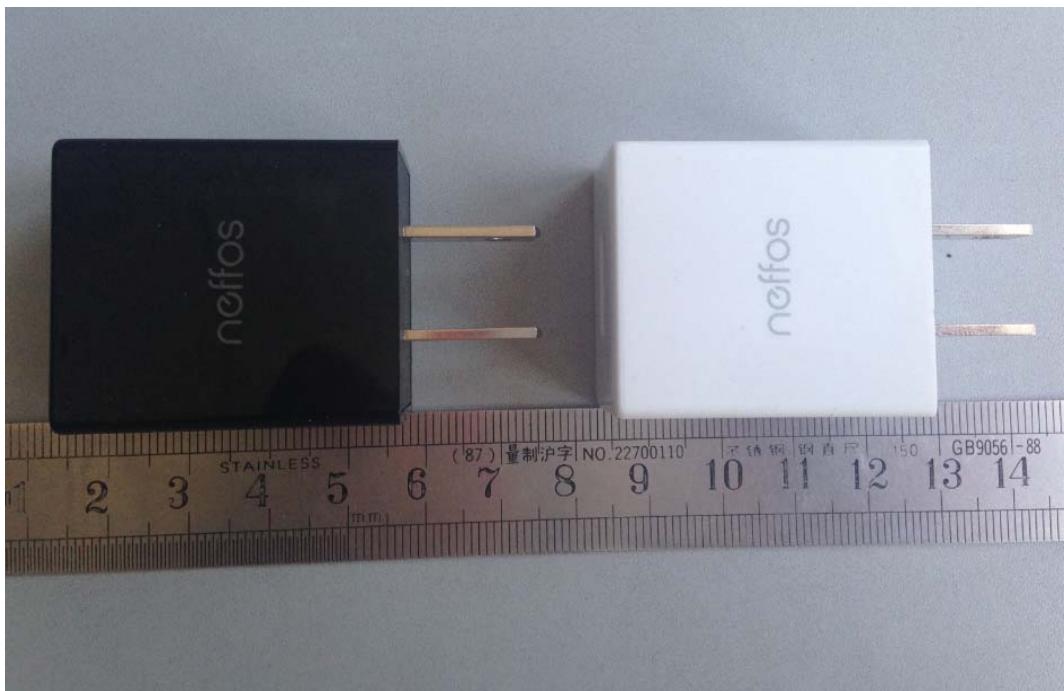


Front Side



Back Side

a: EUT

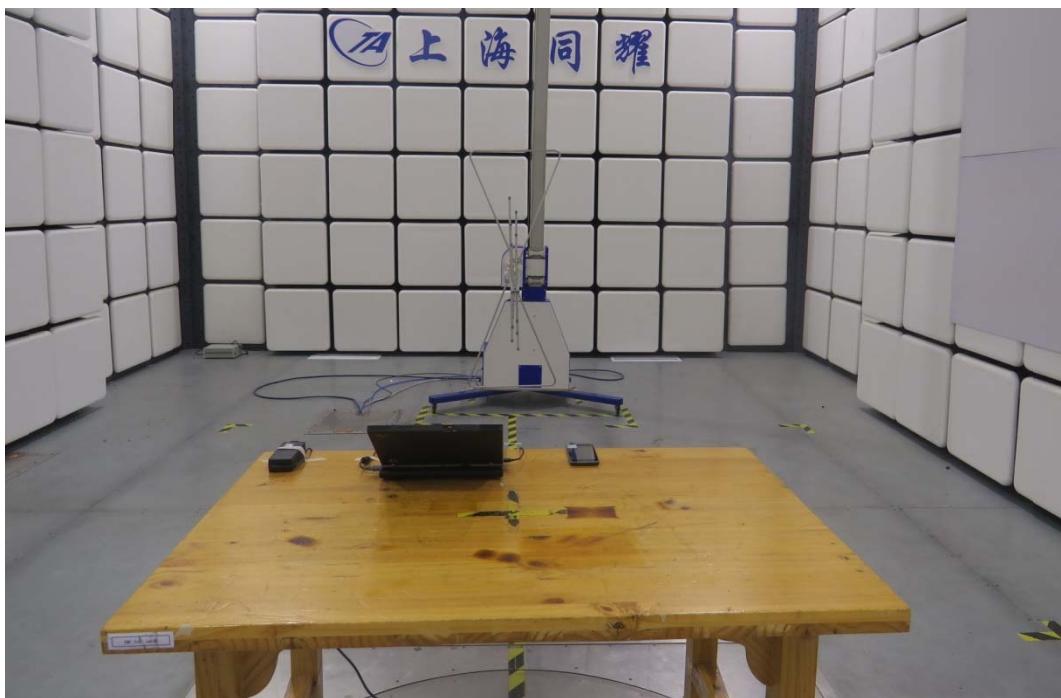


Note: The only difference of the two chargers is the color

b: Adapter

Picture 1 EUT

A.2 Test Setup



a: Below 1GHz



b: Above 1GHz

Picture 2 Radiated Emission Test Setup



Picture 3 Conducted Emission Test Setup