



TEST REPORT

No.I16N00359-EMC02

for

OnePlus Technology(Shenzhen) Co., Ltd.

Mobile Phone

Model Name: ONEPLUS A3000

FCC ID: 2ABZ2-A3000

with

Hardware Version: 16

Software Version: Qxygen OS 3.1.0

Issued Date: 2016-05-09

Test Laboratory:

FCC 2.948 Listed: No.342690

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:

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REPORT HISTORY

Report Number	Revision	Description	Issue Date
I16N00359-EMC02	Rev.0	1st edition	2016-05-09

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1. Test Laboratory

1.1. Testing Location

Address: TCL International E city No. 1001 Zhongshanyuan Road, Nanshan District, Shenzhen, Guangdong, China
Postal Code: 518048
Telephone: +86(755)33322000
Fax: +86(755)33322001

1.2. Testing Environment

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

1.3. Project data

Testing Start Date: 2016-04-06
Testing End Date: 2016-04-25

1.4. Signature



Liang Yong

(Prepared this test report)



Zhang Yunzhuan

(Reviewed this test report)



Cao Junfei

Director of the laboratory

(Approved this test report)



2. Client Information

2.1. Applicant Information

Company Name: OnePlus Technology(Shenzhen) Co., Ltd.
Address: 18/F, Tower C, Tai Ran Building, No.8 Tai Ran Road, Shenzhen, China

2.2. Manufacturer Information

Company Name: OnePlus Technology(Shenzhen) Co., Ltd.
Address: 18/F, Tower C, Tai Ran Building, No.8 Tai Ran Road, Shenzhen, China

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

3.1. About EUT

Description	Mobile Phone
Model Name	ONEPLUS A3000
FCC ID	2ABZ2-A3000

Remark: The above EUT's information is declared by manufacturer. Please refer to the specifications or user's manual for more detailed information.

3.2. Internal Identification of EUT used during the test

EUT ID* SN or IMEI

EUT 8660046030181046

*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
AE1	Battery	/
AE2	Travel charger	/
AE3	USB cable	/

AE1

Model	BLP613
Manufacturer	Leung's Communication & Electric Products(Guangzhou) LTD
Capacitance	3000mAh
Nominal voltage	3.8V

AE2-1

Model	HK0504
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
SN	HC1608500001

AE2-2

Model	DC0504A5
Manufacturer	SHENZHEN HUNTKEY ELECTRIC CO., LTD
SN	/

AE3

Model	/
Manufacturer	/
Length of cable	102cm

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

3.4. General Description

Equipment Under Test (EUT) is a model of Mobile Phone with integrated antenna. It supports GSM 850/1900;UMTS FDD Band II(W1900)/IV(W1700)/Band V(W850); CDMA Band 0;LTE Band 2/4/5/7/12/17/30/41

It has FM, Camera, MP3, USB, WiFi, Bluetooth, GPS;

Samples undergoing test were selected by the Client.

3.5. EUT set-ups

EUT set-up No.	Combination of EUT and AE	Remarks
Set.1	EUT+ AE1	ERP/EIRP/RSE tests

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 22	PUBLIC MOBILE SERVICES	10-1-2015 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:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
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 °C, Max. = 30 °C
Relative humidity	Min. =35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-10000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω

Fully-anechoic chamber did not exceed following limits along the EMC testing:

Temperature	Min. = 15 °C, Max. = 30 °C
Relative humidity	Min. = 35 %, Max. = 60 %
Shielding effectiveness	0.014MHz-1MHz,>60dB; 1MHz-18000MHz,>90dB
Electrical insulation	> 2MΩ
Ground system resistance	< 4 Ω
Voltage Standing Wave Ratio (VSWR)	≤ 6 dB, from 1 to 18 GHz, 3 m distance
Uniformity of field strength	Between 0 and 6 dB, from 80 to 3000 MHz

6. SUMMARY OF TEST RESULTS

6.1. Summary of test results

Abbreviations used in this clause:		
Verdict Column	P	Pass
	F	Fail
	NA	Not applicable
	NM	Not measured

CDMA800

Items	Test Name	Clause in FCC rules	Section in this report	Verdict
1	Output Power	22.913(a.2)	5.4	P
2	Emission Limit	22.917(a), 2.1051	5.5	P

7. Test Equipments Utilized

NO.	NAME	TYPE	PRODUCER	SERIES NUMBER	CAL. DUE DATE	CAL. INTERVAL
1.	Test Receiver	ESCI	R&S	100702	2016-05-30	1 Years
2.	BiLog Antenna	VULB9163	Schwarzbeck	9163 329	2017-01-20	3Years
3.	Horn Antenna	3117	ETS-Lindgren	00066585	2019-03-05	3 Years
5.	Fully Anechoic Chamber	FACT5-2.0	ETS-Lindgren	4166	2018-05-13	3Year
6.	Spectrum Analyzer	FSP40	R&S	100378	2016-12-18	1 Year
7.	Universal Radio Communication Tester	CMU200	R&S	114540	2016-12-24	1 Year

ANNEX A: MEASUREMENT RESULTS

A.1 OUTPUT POWER

Reference

FCC: CFR Part 22.913

A.1.1 Summary

During the process of testing, the EUT was controlled via Agilent Universal Radio Communication Tester (FACT5-2.0) to ensure max power transmission and proper modulation.

This result contains peak output power and ERP/EIRP measurements for the EUT.

In all cases, output power is within the specified limits.

A.1.2 Radiated

A.1.2.1 Description

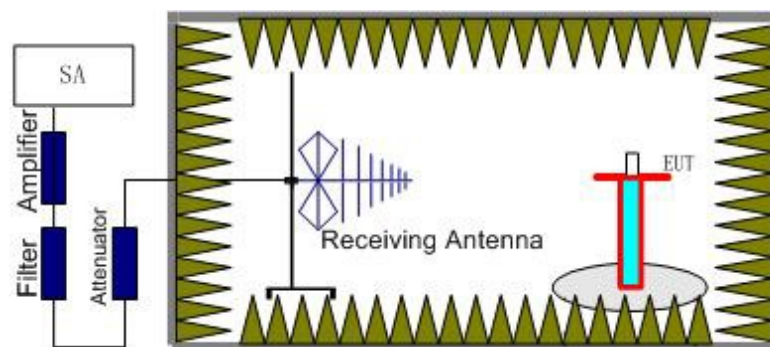
This is the test for the maximum radiated power from the EUT.

Rule Part 22.913(a)(2) specifies "The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts."

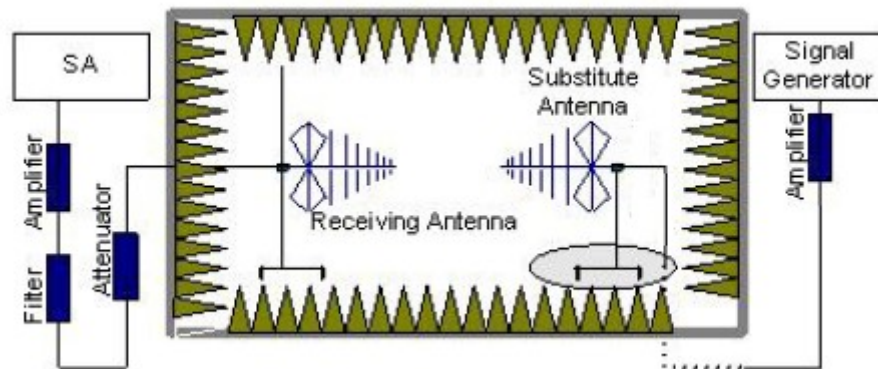
A.1.2.2 Method of Measurement

The measurements procedures in TIA-603C-2004 are used.

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, a substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. An amplifier should be connected to the Signal Source output port. And the cable should be connected between the amplifier and the substitution antenna.
The cable loss (P_{Cl}), the substitution antenna Gain (G_a) and the amplifier Gain (P_{Ag}) should be recorded after test.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} - P_{Ag} - P_{Cl} - G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (Unit dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15$.

For test layout photo, please refer to Pic.1 in Annex B.

Note: the result contains vertical part and Horizontal part

CDMA800- ERP

Limits

Band	Peak ERP (dBm)
CDMA800(BC0)	$\leq 38.45\text{dBm}$ (7W)

Measurement result

1x RTT

Frequency (MHz)	P_{Mea} (dBm)	P_{Cl} (dB)+ P_{Ag} (dB)	G_a (dBi)	Peak ERP(dBm)	Polarization
824.70	-18.80	-33.60	-7.83	20.48	Horizontal
836.52	-19.25	-33.50	-7.88	19.98	Horizontal
848.31	-20.72	-33.50	-7.64	18.27	Horizontal

Sample calculation: 824.70MHz

$$\begin{aligned} \text{Peak ERP (dBm)} &= P_{Mea}(-18.80\text{dBm}) - G_a (-7.83\text{dBi}) - (P_{Ag} + P_{Cl}) (-33.6\text{dB}) - 2.15\text{dBm} \\ &= 20.48 \text{ dBm} \end{aligned}$$

Ev-Do

Frequency (MHz)	P _{Mea} (dBm)	P _{cl} (dB)+P _{Ag} (dB)	G _a (dBi)	Peak ERP(dBm)	Polarization
824.70	-18.96	-33.60	-7.83	20.32	Horizontal
836.52	-19.40	-33.50	-7.88	19.83	Horizontal
848.31	-20.55	-33.50	-7.64	18.44	Horizontal

Sample calculation: 824.70MHz

$$\text{Peak ERP (dBm)} = P_{\text{Mea}}(-18.96\text{dBm}) - G_a(-7.83\text{dBi}) - (P_{\text{Ag}} + P_{\text{cl}})(-33.6\text{dB}) - 2.15\text{dBm}$$

$$= 20.32 \text{ dBm}$$

ANALYZER SETTINGS: RBW = VBW = 5MHz

Note: Expanded measurement uncertainty for CDMA800 (BC0) is : below 3GHz: 3.14dB (k=2);
Above 3GHz: 4.86 dB (k=2)

A.2 EMISSION LIMIT

Reference

FCC: CFR 2.1051, Part 22.917(a),

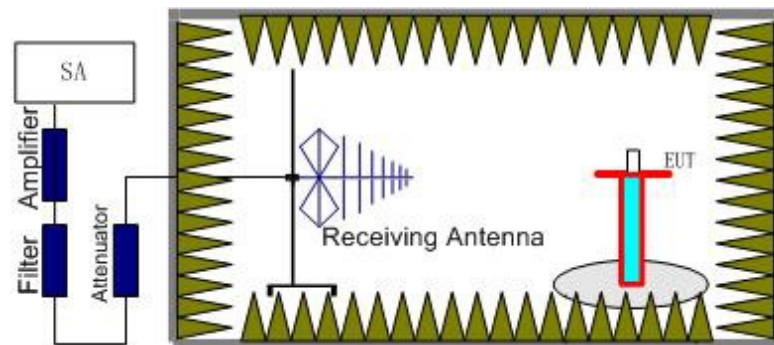
A.2.1 Measurement Method

The measurements procedures in TIA-603C-2004 are used. This measurement is carried out in fully-anechoic chamber 3.

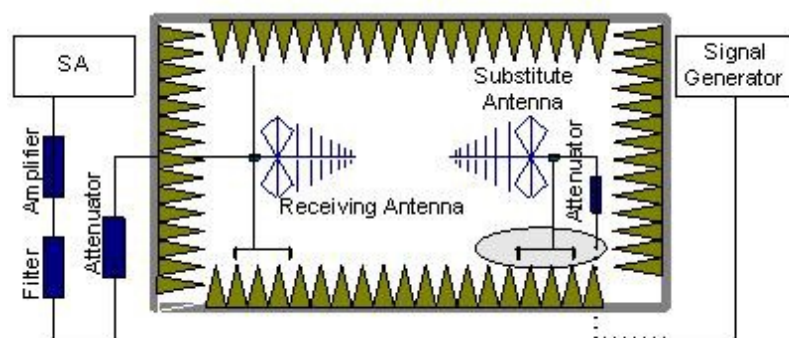
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in Part 22.917(a). The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of CDMA800 .

The procedure of radiated spurious emissions is as follows:

1. EUT was placed on a 1.5 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.5m. The test setup refers to figure below. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all non-harmonic and harmonics of the transmit frequency through the 10th harmonic were measured with peak detector.



2. The EUT is then put into continuously transmitting mode at its maximum power level during the test. And the maximum value of the receiver should be recorded as (Pr).
3. The EUT shall be replaced by a substitution antenna. The test setup refers to figure below.



In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P_{Mea}) is applied to the input of the substitution antenna. Adjust the level of the signal generator output until the value of the receiver reaches the previously recorded (P_r). The power of signal source (P_{Mea}) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

4. The Path loss (P_{pl}) between the Signal Source with the Substitution Antenna and the Substitution Antenna Gain (G_a) should be recorded after test.

An amplifier should be connected in for the test.

The Path loss (P_{pl}) is the summation of the cable loss and the gain of the amplifier.

The measurement results are obtained as described below:

$$\text{Power (EIRP)} = P_{Mea} + P_{pl} + G_a$$

5. This value is EIRP since the measurement is calibrated using an antenna of known gain (unit: dBi) and known input power.
6. ERP can be calculated from EIRP by subtracting the gain of the dipole, $ERP = EIRP - 2.15\text{dB}$.

Note: the result contains vertical part and Horizontal part

A.2.2 Measurement Limit

Part 22.917(a) specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least $43 + 10 \log(P)$ dB, translates in the relevant power range (1 to 0.001 W) to

-13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper, middle, and lower carrier frequencies of the CDMA BC0 (836.52MHz, 848.31MHz and 824.7MHz). It was decided that measurements at these three carrier frequencies would be sufficient to demonstrate compliance with emissions limits because it was seen that all the significant spurs occur well outside the band and no radiation was seen from a carrier in one block of the CDMA BC0 into any of the other blocks. The equipment must still, however, meet emissions requirements with the carrier at all frequencies over which it is capable of operating and it is the manufacturer's responsibility to verify this.

The worst case
CDMA BC0, Channel 384/836.52MHz

Frequency (MHz)	PMea (dBm)	Ppl (dB)	Ga (dBi)	Peak ERP	Limit (dBm)	Polarity
7524	-56.07	1.80	-12.9	-47.12	-13.00	Vertical
8244	-56.21	1.80	-12.9	-47.26	-13.00	Vertical
9108.5	-55.97	2.00	-12.9	-47.22	-13.00	Vertical
9211	-56.13	2.00	-13.1	-47.18	-13.00	Horizontal
9340.5	-56.68	2.10	-13.46	-47.47	-13.00	Vertical
9762	-56.47	2.20	-13.79	-47.03	-13.00	Horizontal

CDMA BC0, Channel 777/848.31MHz

Frequency (MHz)	PMea (dBm)	Ppl (dB)	Ga (dBi)	Peak ERP	Limit (dBm)	Polarity
8195.5	-56.34	1.80	-12.9	-47.39	-13.00	Vertical
8561.5	-56.36	2.00	-12.9	-47.61	-13.00	Horizontal
8656	-56.35	2.00	-13.1	-47.40	-13.00	Vertical
9168	-56.54	2.00	-13.1	-47.59	-13.00	Vertical
9203.5	-56.52	2.00	-13.46	-47.21	-13.00	Vertical
9984.5	-56.21	2.20	-13.46	-47.10	-13.00	Horizontal

CDMA BC0, Channel 1013/824.7MHz

Frequency (MHz)	PMea (dBm)	Ppl (dB)	Ga (dBi)	Peak ERP (dBm)	Limit (dBm)	Polarity
8238	-56.14	1.80	-12.56	-47.53	-13.00	Vertical
8536	-55.75	2.00	-12.56	-47.34	-13.00	Vertical
8600.5	-55.64	2.00	-12.9	-46.89	-13.00	Vertical
9161.5	-55.96	2.00	-12.9	-47.21	-13.00	Horizontal
9212	-56.46	2.00	-13.46	-47.15	-13.00	Horizontal
9393.5	-56.86	2.10	-13.79	-47.32	-13.00	Horizontal

Note: Expanded measurement uncertainty for CDMA800 (BC0) is : below 3GHz: 3.14dB (k=2);
Above 3GHz: 4.86 dB (k=2)

ANNEX B: TEST LAYOUT

Pic.1 Radiated spurious emission(below 3GHz)



Pic.1 Radiated spurious emission(Above 3GHz)

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