



# EMC TEST REPORT

No. I16Z42015-EMC03

for

**TCL Communication Ltd.**

**HSUPA/HSDPA/UMTS Quad Band/GSM Quad Band/LTE Tri**

**Band/CDMA EVDO Tri Band mobile phone**

**Model Name: 4044T**

**FCC ID: 2ACCJN010**

with

**Hardware Version: 03**

**Software Version: A4J**

**Issued Date: 2016-11-16**

**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 Beijing.

**Test Laboratory:**

**FCC 2.948 Listed: No. 525429**

**IC O.A.T.S listed: No. 12389A-1**

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## **REPORT HISTORY**

Report Number	Revision	Description	Issue Date
I16Z42015-EMC03	Rev.0	1st edition	2016-11-16

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## **1. Test Laboratory**

### **1.1. Testing Location**

#### **Location 2: CTTL(Shouxiang)**

Address: No. 51 Shouxiang Science Building, Xueyuan Road,  
Haidian District, Beijing, P. R. China 100191

### **1.2. Testing Environment**

Normal Temperature: 15-35℃  
Relative Humidity: 20-75%  
Air pressure 980 - 1040 hPa

The climatic requirements above are general exclude the special requirements for dedicated test environments listed in section 5 and some specific test cases in other parts of this report.

### **1.3. Project data**

Testing Start Date: 2016-11-05  
Testing End Date: 2016-11-05

### **1.4. Signature**



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**Zhang Hui**  
**(Prepared this test report)**



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**Qu Pengfei**  
**(Reviewed this test report)**



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**Liu Baodian**  
**(Approved this test report)**

## **2. Client Information**

### **2.1. Applicant Information**

Company Name: TCL Communication Ltd.  
Address /Post: 5F, C building, No. 232, Liang Jing Road, ZhangJiang High-Tech  
Park, Pudong Area, Shanghai, P.R. China. 201203  
City: Shanghai  
Postal Code: 201203  
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Contact Person: Zhizhou Gong  
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### **2.2. Manufacturer Information**

Company Name: TCL Communication Ltd.  
Address /Post: 5F, C building, No. 232, Liang Jing Road, ZhangJiang High-Tech  
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City: Shanghai  
Postal Code: 201203  
Country: China  
Telephone: +86 21 51798260  
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### **3. Equipment Under Test (EUT) and Ancillary Equipment (AE)**

#### **3.1. About EUT**

Description	HSUPA/HSDPA/UMTS Quad Band/GSM Quad Band/LTE Tri Band/CDMA EVDO Tri Band mobile phone
Model Name	4044T
FCC ID	2ACCJN010
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 Telecommunication Metrology Center of MIIT of People's Republic of China.

#### **3.2. Internal Identification of EUT used during the test**

EUT ID*	IMEI	HW Version	SW Version
EUT1	359571070103970	03	A4J

\*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	Revision
AE1	Battery	/	16TCT-BA-1076
AE2	Battery	/	16TCT-BA-1077

AE1, AE2

Model name	Tli013C1
Manufacturer	BYD
Minimum Capacitance	1350mAh
Nominal Voltage	3.7 V

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

### **3.4. General Description**

The Equipment Under Test (EUT) is a model of HSUPA/HSDPA/UMTS Quad Band/GSM Quad Band/LTE Tri Band/CDMA EVDO Tri Band mobile phone with integrated antenna and embedded battery.

The EUT supports GSM 900/1800/850/1900;UMTS FDD Band I(W2100)/Band II(W1900)/IV(W1700)/Band V(W850); CDMA Band 0/1/10;LTE B25/26/41, supports 1X RTT/ EvDo/rev0/rev.A.

It has FM,Camera,MP3,USB,HAC,TTY,SMS,Data Service, MEID,Mobile IP,MMS,DM,SUPL1.0+2.0;Browsing;WiFi 802.11 b/g/n; BT 4.1 LE EDR;GPS;AGPS functions.

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

Samples undergoing test were selected by the client.

### **3.5. EUT set-ups**

<b>EUT Set-up No.</b>	<b>Combination of EUT and AE</b>	<b>Remarks</b>
Set.1	EUT1 +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 90	PRIVATE LAND MOBILE RADIO SERVICES	10-1-15 Edition
ANSI/TIA-603-D	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards	2010
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
KDB 971168 D01	Measurement Guidance for Certification of Licensed Digital Transmitters	v02r02



## 5. LABORATORY ENVIRONMENT

**Fully-anechoic chamber FAC-3** (9 meters×6.5 meters×4 meters) 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
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 4000 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
Location Column	1/2/3/4	The test is performed in test location 1, 2, 3 or 4 which are described in section 1.1 of this report

#### CDMA800 BC10

Items	Test Name	Clause in FCC rules	Section in this report	Verdict	Test Location
1	Output Power	90.635(b)	5.4	A.1	2
2	Emission Limit	90.210, 90.691	5.5	A.2	2

## **6.2. Statements**

The test cases listed in section 6.1 of this report for the EUT specified in section 3 were performed by TMC according to the standards or reference documents in section 4.1

The EUT met all applicable requirements of the standards or reference documents in section 4.1.

This report only deals with the CDMA functions among the features described in section 3.

## 7. Test Equipments Utilized

NO.	NAME	TYPE	SERIES NUMBER	PRODUCER	CAL. DUE DATE	CAL. INTERVAL
1.	EMI Antenna	VULB 9163	9163-235	Schwarzbeck	2017-10-29	3 Years
2.	EMI Antenna	3117	00119024	ETS-Lindgren	2017-01-20	3 Years
3.	EMI Antenna	9117	167	Schwarzbeck	2019-04-13	3 Years
4.	EMI Antenna	3117	00058888	ETS-Lindgren	2017-04-20	3 Years
5.	Signal Generator	N5183A	MY49060052	Agilent	2017-03-07	1 Year
6.	Power Amplifier	5S1G4	0341863	AR	/	1 Year
7.	Universal Radio Communication Tester	CMW500	143008	R&S	2017-12-01	1 Year
8.	Spectrum Analyzer	E4440A	MY48250642	Agilent	2017-03-03	1 Year

## **ANNEX A: MEASUREMENT RESULTS**

### **A.1 OUTPUT POWER**

#### **Reference**

FCC: CFR Part 90.635, and 2.1053

#### **A.1.1 Summary**

During the process of testing, the EUT was controlled via Agilent Universal Radio Communication Tester (E5515C) 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**

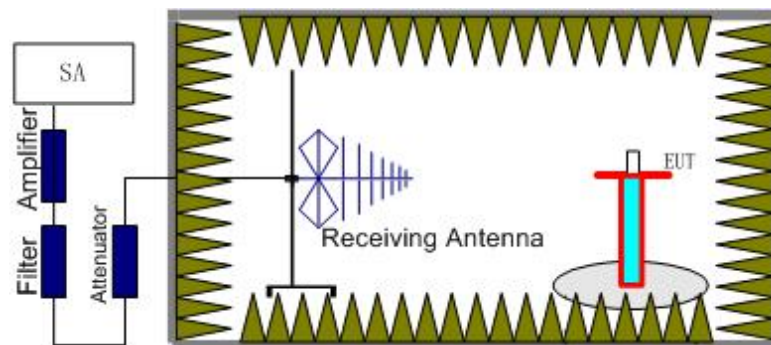
This is the test for the maximum radiated power from the EUT.

Rule Part 90.635(b) specifies "The maximum output power of the transmitter for mobile stations is 100 watts (20 dBw)."

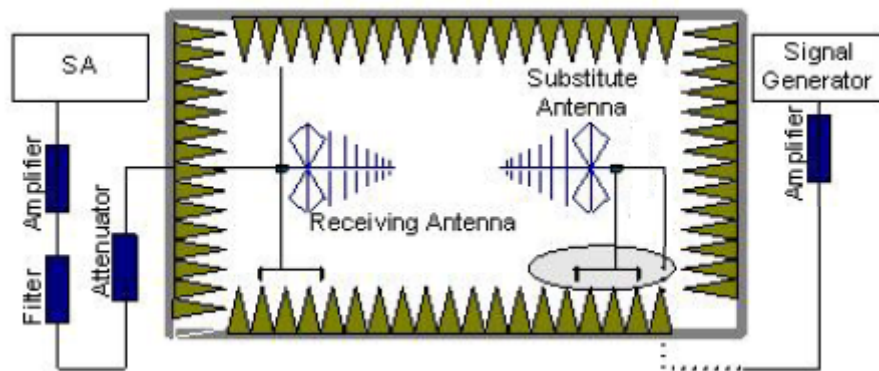
##### **A.1.2.2 Method of Measurement**

The measurements procedures in TIA-603-D-2010 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:  
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.

### CDMA800(BC10)- ERP

#### Limits

Band	Peak ERP (dBm)
CDMA800(BC10)	≤50dBm (100W)

#### Measurement result

##### 1x RTT

Frequency (MHz)	$P_{Mea}$ (dBm)	$P_{cl}$ (dB)	$P_{Ag}$ (dB)	$G_a$ (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
817.90	-20.60	2.18	-45.87	-1.03	2.15	21.97	Horizontal
823.10	-18.62	2.24	-45.80	-0.10	2.15	22.89	Horizontal

Sample calculation: 823.10MHz

$$\begin{aligned} \text{Peak ERP (dBm)} &= P_{Mea}(-18.62\text{dBm}) - G_a(-0.10\text{dBi}) - P_{Ag}(-45.80\text{dB}) - P_{cl}(2.24\text{dB}) - 2.15 \\ &= 22.89 \text{ dBm} \end{aligned}$$

**Ev-Do**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	P <sub>Ag</sub> (dB)	G <sub>a</sub> (dBi)	Correction (dB)	Peak ERP(dBm)	Polarization
817.90	-20.63	2.18	-45.87	-1.03	2.15	21.94	Horizontal
823.10	-18.54	2.24	-45.80	-0.10	2.15	22.97	Horizontal

Sample calculation: 823.10MHz

$$\begin{aligned}\text{Peak ERP (dBm)} &= P_{\text{Mea}}(-18.54\text{dBm}) - G_a(-0.10\text{dBi}) - P_{\text{Ag}}(-45.80\text{dB}) - P_{\text{cl}}(2.24\text{dB}) - 2.15 \\ &= 22.97 \text{ dBm}\end{aligned}$$

**ANALYZER SETTINGS: RBW = VBW = 5MHz**Note: Expanded measurement uncertainty for CDMA800 (BC10) is  $U = 0.96 \text{ dB}$ ,  $k=2$ .

## A.2 EMISSION LIMIT

### Reference

FCC: 47 CFR 90.210 and 90.691

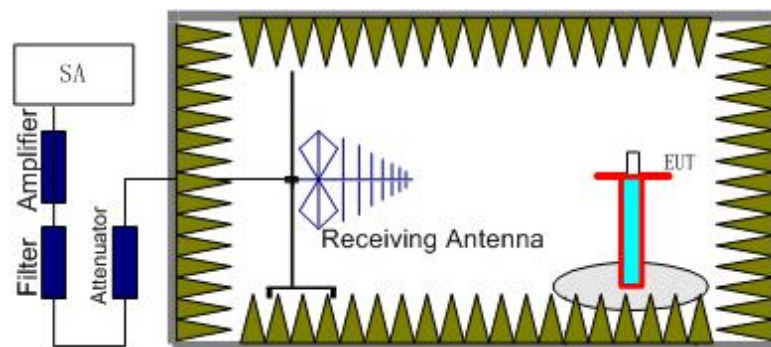
### A.2.1 Measurement Method

The measurements procedures in TIA-603-D-2010 are used. This measurement is carried out in fully-anechoic chamber 3.

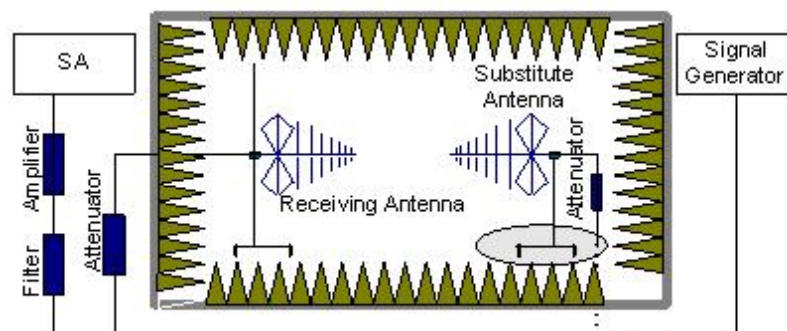
The spectrum was scanned from 30 MHz to the 10th harmonic of the highest frequency generated within the equipment, which is the transmitted carrier that can be as high as 1910 MHz. The resolution bandwidth is set 1MHz as outlined in CFR Part 90.691. The spectrum was scanned with the mobile station transmitting at carrier frequencies that pertain to low, mid and high channels of CDMA800 BC10.

### 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, 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. 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,  $ERP = EIRP - 2.15\text{dB}$ .

#### A.2.2 Measurement Limit

CFR Part 90.210 For transmitters that are not equipped with an audio low-pass filter, the power of any emission must be attenuated below the unmodulated carrier power ( $P$ ) as follows:

(1) On any frequency removed from the center of the authorized bandwidth by a displacement frequency ( $f_d$  in kHz) of more than 10 kHz, but no more than 250 percent of the authorized bandwidth: At least  $116 \log(f_d/6.1)$  dB, or  $50 + 10 \log(P)$  dB, or 70 dB, whichever is the lesser attenuation;

(2) On any frequency removed from the center of the authorized bandwidth by more than 250 percent of the authorized bandwidth: At least  $43 + 10 \log(P)$  dB.

The specification that emissions shall be attenuated below the transmitter power ( $P$ ) by at least  $50 + 10 \log(P)$  dB, translates in the relevant power range (1 to 0.001 W) to -20 dBm.

#### A.2.3 Measurement Results

Radiated emissions measurements were made only at the upper and lower carrier frequencies of the CDMA BC10 (817.9MHz and 823.1MHz). 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, CDMA BC1 or CDMA BC10 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 BC10, Channel 475/817.9MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1635.06	-46.85	3.82	-5.26	2.15	-47.56	-20	H
2431.61	-65.11	4.73	-5.89	2.15	-66.1	-20	V
3239.91	-61.29	5.48	-7.58	2.15	-61.34	-20	V
4016.75	-59.78	6.13	-8.92	2.15	-59.14	-20	V
5053.75	-59.78	6.78	-9.98	2.15	-58.73	-20	H
5833.88	-59.93	7.33	-10.53	2.15	-58.88	-20	V

**CDMA BC10, Channel 684/823.1MHz**

Frequency (MHz)	P <sub>Mea</sub> (dBm)	Path Loss(dB)	Antenna Gain(dBi)	Correction (dB)	Peak ERP(dBm)	Limit (dBm)	Polarization
1646.99	-51.05	3.91	-5.24	2.15	-51.87	-20	H
2455.09	-63.94	4.73	-5.97	2.15	-64.85	-20	V
3272.42	-61.56	5.48	-7.65	2.15	-61.54	-20	H
4082.94	-60.85	6.16	-8.98	2.15	-60.18	-20	H
4847.83	-59.74	6.63	-9.75	2.15	-58.77	-20	H
5602.12	-59.98	7.17	-10.58	2.15	-58.72	-20	V

Note: Expanded measurement uncertainty for this test item is  $U = 4.2$  dB,  $k = 2$ .

## **ANNEX B: TEST LAYOUT**



**Pic.1 Radiated spurious emission**

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