



# EMF TEST REPORT

No. I14N01065-EMF

For

**ZTE CORPORATION**

**LTE Wireless Data Terminal**

**ZM8620**

**FCC ID: SRQ-ZM8620**

With

**Hardware Version: ZM8620-1.0.0**

**Software Version: BD\_WELINK\_ZM8620V1.0.0B06**

**Issued Date: 2014-10-20**

**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 TMC Beijing.

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### Revision Version

| Report Number | Revision | Date       | Memo                            |
|---------------|----------|------------|---------------------------------|
| I14Z01065-SAR | 00       | 2014-10-20 | Initial creation of test report |

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## Test Laboratory

### 1.1 Testing Location

Company Name: TMC Shenzhen, Telecommunication Metrology Center of MIIT  
Address: No. 12building, Shangsha Innovation and Technology Park, Futian District, Shenzhen, P. R. China  
Postal Code: 518048  
Telephone: +86-755-33322000  
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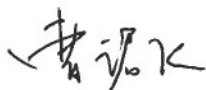
### 1.2 Testing Environment

Temperature: 18°C~25 °C,  
Relative humidity: 30%~ 70%  
Ground system resistance: < 0.5  $\Omega$   
Ambient noise & Reflection: < 0.012 W/kg

### 1.3 Project Data

Project Leader: Zhang Bojun  
Test Engineer: Cao Junfei  
Testing Start Date: 2014-10-20  
Testing End Date: 2014-10-20

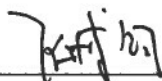
### 1.4 Signature



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Cao Junfei

(Prepared this test report)



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Zhang Bojun

(Reviewed this test report)



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Lu Minniu

Director of the laboratory

(Approved this test report)

## 2 Client Information

### 2.1 Applicant Information

|                |                                             |
|----------------|---------------------------------------------|
| Company Name:  | ZTE CORPORATION                             |
| Address /Post: | ZTE Plaza, Keji Road South, Shenzhen, China |
| City:          | Shenzhen                                    |
| Post Code:     | 518000                                      |
| Country:       | China                                       |
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| Telephone:     | +86 18616587757                             |
| Fax:           | +86 021 50801070                            |

### 2.2 Manufacturer Information

|                |                                             |
|----------------|---------------------------------------------|
| Company Name:  | ZTE CORPORATION                             |
| Address /Post: | ZTE Plaza, Keji Road South, Shenzhen, China |
| City:          | Shenzhen                                    |
| Post Code:     | 518000                                      |
| Country:       | China                                       |
| Contact:       | Min Zhang                                   |
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| Telephone:     | +86 18616587757                             |
| Fax:           | +86 021 50801070                            |

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

#### 3.1 About EUT

|                                       |                                                                   |
|---------------------------------------|-------------------------------------------------------------------|
| Description:                          | LTE Wireless Data Terminal                                        |
| Model name:                           | ZM8620                                                            |
| Marketing name:                       | ZM8620                                                            |
| Operating mode(s):                    | GSM850/1900,WCDMA 850/1700/1900,<br>LTE Band 1/2/4/5/7/8/12/17/38 |
| Tested Tx Frequency:                  | 824.2 – 848.8 MHz (GSM 850)                                       |
|                                       | 1850.2 – 1909.8 MHz (GSM 1900)                                    |
|                                       | 826.4 - 846.6 MHz (WCDMA 850)                                     |
|                                       | 1710 – 1755 MHz(WCDMA 1700)                                       |
|                                       | 1852.4 - 1908MHz (WCDMA 1900)                                     |
|                                       | 1850-1910/1930-1990 (LTE Band 2)                                  |
|                                       | 1710-1755/2110-2155 (LTE Band 4)                                  |
|                                       | 824-849/869-894 (LTE Band 5)                                      |
|                                       | 2500-2570/2620-2690 (LTE Band 7)                                  |
|                                       | 1850-1910/1930-1990 (LTE Band 12)                                 |
|                                       | 704-716/734-746 (LTE Band 17)                                     |
| GPRS class                            | 10                                                                |
| GPRS capability Class:                | A                                                                 |
| EGPRS Multislot Class:                | 12                                                                |
| Test device Production information:   | Production unit                                                   |
| Device type:                          | Portable device                                                   |
| Antenna type:                         | external antenna                                                  |
| Accessories/Body-worn configurations: | /                                                                 |
| Form factor:                          | 5.1cm × 3.0cm                                                     |

#### 3.2 Internal Identification of EUT

| EUT ID* | SN or IMEI | HW Version   | SW Version                |
|---------|------------|--------------|---------------------------|
| EUT1    | /          | ZM8620-1.0.0 | BD_WELINK_ZM8620V1.0.0B06 |

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

#### 3.3 Internal Identification of AE

| AE ID* | Description | Model | SN | Manufacturer |
|--------|-------------|-------|----|--------------|
| AE1    | /           | /     | /  | /            |

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

## 4 Reference Documents

### 4.1 Applicable Limit Regulations

**ANSI C95.1–1999:** IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

### 4.2 Applicable Measurement Standards

**FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v05r01:** Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

**FCC CFR 47 part1 1.1310:** Radiofrequency radiation exposure limits.

**FCC CFR 47 part2 2.1091:** Radiofrequency radiation exposure evaluation: mobile devices.

## 5 RF Exposure Limit

### Limits for General Population/Uncontrolled Exposure in §1.1310

| Frequency Range (MHz) | Electric Field Strength (E) (V/m) | Magnetic Field Strength (H) (A/m) | Power Density (S) (mW/cm <sup>2</sup> ) | Averaging Time  E  <sup>2</sup> ,  H  <sup>2</sup> or S (minutes) |
|-----------------------|-----------------------------------|-----------------------------------|-----------------------------------------|-------------------------------------------------------------------|
| 0.3-1.34              | 614                               | 1.63                              | <b>(100)*</b>                           | 30                                                                |
| 1.34-30               | 824/f                             | 2.19/f                            | <b>(180/f<sup>2</sup>)*</b>             | 30                                                                |
| 30-300                | 27.5                              | 0.073                             | <b>0.2</b>                              | 30                                                                |
| 300-1500              | --                                | --                                | <b>f/1500</b>                           | 30                                                                |
| 1500-100,000          | --                                | --                                | <b>1.0</b>                              | 30                                                                |

f = frequency in MHz    \*Plane-wave equivalent power density

## 6 Friis Formula

Friis transmission formula :  $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

where

**P<sub>d</sub>** = power density in **W/m<sup>2</sup>**

**P<sub>out</sub>** = output power to antenna in **W**

**G** = gain of antenna in linear scale

**π** = **3.1416**

**R** = distance between observation point and center of the radiator in **m**

**P<sub>d</sub>** is the limit of MPE. If we know the maximum Gain of the antenna and the total power input to the antenna, through the calculation, we will know the MPE value at distance 20cm.

## 7 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user. So, this device is classified as Mobile Device.

## 8 Test Results

### 8.1 The maximum antenna gain

The maximum antenna gain for external antenna is

GSM 850/1900: 3dBi

WCDMA 850/1700/1900: 3dBi

LTE Band 1/2/4/5/7/8/12/17/38: 3dBi

### 8.2 Output Power Into Antenna & RF Exposure value at distance 20cm

Conducted Output power calculation:

The conducted power calculation results for GSM

| mode       | timeslot | Duty cycle | Peak Output Power (dBm) | Average Output Power(dBm) |
|------------|----------|------------|-------------------------|---------------------------|
| GSM 850    | 1 slot   | 12.5%      | 32.87                   | 23.84                     |
| GPRS 850   | 1 slot   | 12.5%      | 32.87                   | 23.84                     |
| GPRS 850   | 2 slots  | 25%        | 31.86                   | 25.84                     |
| GPRS 850   | 3 slots  | 37.5%      | 29.94                   | 25.68                     |
| GPRS 850   | 4 slots  | 50%        | 28.90                   | 25.92                     |
| EGPRS 850  | 1 slot   | 12.5%      | 30.46                   | 21.43                     |
| EGPRS 850  | 2 slots  | 25%        | 29.45                   | 23.43                     |
| EGPRS 850  | 3 slots  | 37.5%      | 27.53                   | 25.68                     |
| EGPRS 850  | 4 slots  | 50%        | 26.52                   | 25.92                     |
| GSM 1900   | 1 slot   | 12.5%      | 29.53                   | 20.50                     |
| GPRS 1900  | 1 slot   | 12.5%      | 29.46                   | 20.43                     |
| GPRS 1900  | 2 slots  | 25%        | 28.50                   | 22.48                     |
| GPRS 1900  | 3 slots  | 37.5%      | 26.60                   | 22.34                     |
| GPRS 1900  | 4 slots  | 50%        | 25.80                   | 22.79                     |
| EGPRS 1900 | 1 slot   | 12.5%      | 28.91                   | 19.88                     |
| EGPRS 1900 | 2 slots  | 25%        | 27.95                   | 21.93                     |
| EGPRS 1900 | 3 slots  | 37.5%      | 26.60                   | 22.34                     |
| EGPRS 1900 | 4 slots  | 50%        | 25.80                   | 22.79                     |

To average the power, the division factor is as follows:

1TX-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB

3TX-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB

4TX-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

The conducted power measurement results for WCDMA

| Mode        | Average Output Power(dBm) |       |       |
|-------------|---------------------------|-------|-------|
|             | RMC                       | HSDPA | HSUPA |
| UMTS Band 2 | 23.56                     | 22.44 | 22.61 |
| UMTS Band 4 | 23.18                     | 21.87 | 22.77 |
| UMTS Band 5 | 23.59                     | 21.38 | 23.30 |

The conducted power measurement results for LTE

| Mode        | Band-width<br>(MHz) | Average Output Power(dBm) |       |
|-------------|---------------------|---------------------------|-------|
|             |                     | QPSK                      | 16QAM |
| LTE Band 2  | 1.4                 | 16.03                     | 17.58 |
|             | 3                   | 15.98                     | 17.51 |
|             | 5                   | 16.07                     | 17.74 |
|             | 10                  | 16.17                     | 17.74 |
|             | 15                  | 16.29                     | 17.63 |
|             | 20                  | 16.27                     | 16.55 |
| LTE Band 4  | 1.4                 | 18.80                     | 18.14 |
|             | 3                   | 18.84                     | 18.84 |
|             | 5                   | 18.71                     | 18.71 |
|             | 10                  | 19.74                     | 19.13 |
|             | 15                  | 19.80                     | 18.58 |
|             | 20                  | 19.76                     | 18.53 |
| LTE Band 5  | 1.4                 | 22.22                     | 21.25 |
|             | 3                   | 22.41                     | 21.13 |
|             | 5                   | 22.16                     | 21.03 |
|             | 10                  | 22.23                     | 20.91 |
| LTE Band 7  | 5                   | 16.65                     | 15.54 |
|             | 10                  | 17.04                     | 15.60 |
|             | 15                  | 16.63                     | 15.40 |
|             | 20                  | 16.63                     | 15.97 |
| LTE Band 12 | 1.4                 | 23.12                     | 22.13 |
|             | 3                   | 23.90                     | 22.88 |
|             | 5                   | 23.69                     | 22.86 |
|             | 10                  | 21.83                     | 21.22 |
| LTE Band 17 | 5                   | 19.86                     | 19.12 |
|             | 10                  | 18.95                     | 17.82 |

So the worst cases for each frequency band are:

| Frequency band | Average Output Power Including power tolerance (dBm) | Average Output Power Including power tolerance (mW) | Antenna gain (dBi) | Antenna gain (numeric) | Duty Cycle | Power Density (mW/cm <sup>2</sup> ) | Limit of Power Density (mW/cm <sup>2</sup> ) | PASS /FAIL |
|----------------|------------------------------------------------------|-----------------------------------------------------|--------------------|------------------------|------------|-------------------------------------|----------------------------------------------|------------|
| GSM 850        | 24.99                                                | 315.50                                              | 3                  | 2.00                   | 50%        | 0.126                               | 0.57                                         | PASS       |
| GSM 1900       | 21.99                                                | 158.13                                              | 3                  | 2.00                   | 50%        | 0.063                               | 1.00                                         | PASS       |
| WCDMA 850      | 24.00                                                | 251.19                                              | 3                  | 2.00                   | 100%       | 0.100                               | 0.57                                         | PASS       |
| WCDMA 1700     | 24.00                                                | 251.19                                              | 3                  | 2.00                   | 100%       | 0.100                               | 1.00                                         | PASS       |
| WCDMA 1900     | 24.00                                                | 251.19                                              | 3                  | 2.00                   | 100%       | 0.100                               | 1.00                                         | PASS       |
| LTE Band 2     | 17.00                                                | 50.12                                               | 3                  | 2.00                   | 100%       | 0.020                               | 1.00                                         | PASS       |
| LTE Band 4     | 20.00                                                | 100.00                                              | 3                  | 2.00                   | 100%       | 0.040                               | 1.00                                         | PASS       |
| LTE Band 5     | 23.00                                                | 199.53                                              | 3                  | 2.00                   | 100%       | 0.079                               | 0.57                                         | PASS       |
| LTE Band 7     | 17.00                                                | 50.12                                               | 3                  | 2.00                   | 100%       | 0.020                               | 1.00                                         | PASS       |
| LTE Band 12    | 24.00                                                | 251.19                                              | 3                  | 2.00                   | 100%       | 0.100                               | 0.47                                         | PASS       |
| LTE Band 17    | 20.00                                                | 100.00                                              | 3                  | 2.00                   | 100%       | 0.040                               | 0.47                                         | PASS       |

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