
Report No: SYBH(R)66032007
FCC ID: QISC2800

# FCC TEST REPORT OF
# Huawei CDMA Mobile Station

**M/N: C2800**

**Mar. 23,2007**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

# Notice

| | |
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| 1. | The laboratory has obtained the accreditation of China National Accreditation Committee for Laboratories (CNAL), and accreditation number: L0310. |
| 2. | The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01. |
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**REPORT ON** FCC Test of Huawei CDMA Mobile Station

M/N: C2800

Report No: SYBH(R)66032007

**REGULATION** **FCC CFR47 Part 2: Subpart J;**

**FCC CFR47 Part 22: Subpart H;**

**FCC CFR47 Part 15: Subpart B;**

**CONCLUSION** There are 9 items need to be tested, 9 items have been tested. The sample of the model completely meets the requirements

**Final Judgement: Pass**

| | | | |
|---|---|---|---|
| **General Manager** | **2007.03.28** | **Guo Xiaoqi** | |
| | Date | Name | signature |
| **Technical Responsibility For Area of Testing** | **2007.03.28** | **Zhang Xinghai** | |
| | Date | Name | signature |
| **Test Lab Engineer** | **2007.03.28** | **HuJun** | |
| | Date | Name | signature |

# Contents

# 1 Summary

The table below summarizes the measurements and results for the Huawei CDMA Mobile Station C2800. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

| FCC Measurement Specification | FCC Limits Part(s) | Description | Result |
|---|---|---|---|
| 2.1046 | 22.913 | Effective Radiated Power of Transmitter | PASS |
| 2.1046 | 22.913 | Conducted Power of Transmitter | PASS |
| 2.1047 | | Modulation Characteristics | PASS |
| 2.1049 | | Occupied Bandwidth | PASS |
| 2.1051 | 22.917 | Band Edges Compliance | PASS |
| 2.1051 | 22.917 | Spurious Emission at Antenna Terminals | PASS |
| 2.1053 | 22.917 | Radiated Spurious Emissions | PASS |
| 2.1055 | 22.355 | Frequency Stability | PASS |
| - | 15.107 | Conducted Emission at Power Port | PASS |
| - | 15.109 | Radiated Emission of Enclosure in Idle Mode | PASS |

# 2 Product Description

## 2.1 Production Information

### 2.1.1 General Description

Huawei CDMA Mobile Phone C2800 is subscriber equipment in the CDMA system. The frequency band is US Cellular. The Mobile Phone implements such functions as RF signal receiving / Transmitting, CDMA protocol processing, voice and SMS service etc. The Mobile Phone uses QSC6010 single chipset and Zero-IF technologies. The FM function is integrated; the signal can be received through the ear line, only receiver included in FM function, no transmission.

### 2.1.2 Support function and Service

The Mobile Station C2800 support the function and service as follows:

Table 2 Service and Test mode List

| Service Name | Characteristic | Corresponding Test Mode | Note |
|---|---|---|---|
| voice and SMS | Modulation: QPSK | TM1* | |
| voice and SMS | Modulation: HPSK | TM3* | |

Note: * Refer to ANSI/TIA-98-E section 1.3 for the information of TM (Test Mode).

## 2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

| Model Number | Board/Module | Original Version | New Version | Modify Information |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Not applicable!

# 3 Test Site Description

The test site of:

***Huawei Technologies Co. Ltd.***
***P.O. Box 518129***
***Huawei base, bantian,***
***Longgang District, Shenzhen, China***

The test site description has been submitted to FCC and registration granted under the registration number **97456** on March 11. 2003. The test site has been accredited by and the accredited number is **2174.01** in Jan of 2004.

## 3.1 Testing Period

The test have been performed during the period of

Mar. 20, 2007 to Mar. 23, 2007

## 3.2 General Set up Description

Huawei CDMA Mobile Station C2800 can only support CDMA mode and US Cellular Band. During this measurement, the Mobile Station just works in CDMA mode and US Cellular Band.

**TM1:** Forward Traffic Channel Radio Configuration 1, Reverse Traffic Channel Radio Configuration 1
**TM3:** Forward Traffic Channel Radio Configuration 3, Reverse Traffic Channel Radio Configuration 3

| Parameter | Units | Value |
|---|---|---|
| $\hat{I}or$ | dBm/1.23 MHz | -104 |
| $\frac{\text{Pilot Ec}}{I_{or}}$ | dB | -7 |
| $\frac{\text{Traffic Ec}}{I_{or}}$ | dB | -7.4 |

# 4 Product Description

## 4.1 Technical Characteristics

### 4.1.1 Frequency Range

Table 4 Frequency Range

| | |
|---|---|
| Uplink band: | 824 to 849 MHz |
| Downlink band: | 869 to 894 MHz |

### 4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

| | |
|---|---|
| Channel spacing: | 30 KHz |
| Channel separation: | 1.23 MHz |

### 4.1.3 Type of Emission

Table 6 Type of Emission

| | |
|---|---|
| Emission Designation: | **1M25F9W** |

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

### 4.1.4 Environmental Requirements

Table 7 Environmental Requirements

| | |
|---|---|
| Minimum temperature: | - 10 °C |
| Maximum temperature: | + 55 °C |
| Relative Humidity: | 5% ~ 95%RH |

### 4.1.5 Power Source

Table 8 Power Source

| | |
|---|---|
| AC voltage nominal: | ~ 220V |
| AC voltage range | 100V ~ 240V |
| AC current maximal: | 650mA |

### 4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033 (9)

Please reference the document Tune-up Procedure in TCF.

### 4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033 (8)
The voltage and current in the final RF stage is:

Table 9 Applied DC Voltages and Currents

| | |
|---|---|
| Voltage: | ⎓ 2.85VDC |
| Current: | 150mA According to CFR (FCC) part 2, subpart 2, section 2.1033 (8) |

## 4.2 EUT Identification List

### 4.2.1 Board Information

Table 10 Board Information

| 800MHz CDMA Mobile Station | | |
|---|---|---|
| C2800 | | |
| Board and Module | | |
| Equipment Designation / Description | Serial Number | Remarks |
| -Main board | 020CHD7P73001227 | HC1C2800M |
| -LCD | 1701036801011Y | WD—X1212ZN - 6CLWa |
| -Battery | BYD6B0117704 | HBC85S |

### 4.2.2 Adapter Technical Data

Input Voltage: ~100-240V; 50/60Hz
Output Voltage: ⎓ 5.3V
Rated Power: 3.5W

### 4.2.3 Battery Technical Data

Battery Model: HBC85S
Rated capacity: 850mAH
Nominal Voltage: ⎓ 3.7V
Charging Voltage: ⎓ 4.2V

### 4.2.4 FCC Identification

**Grantee Code: QIS**
**Product Code: C2800**
**FCC Identification: QISC2800**

# 5 Main Test Instruments

Table 11 Main Test Equipments

| Equipment Description | Manufacturer | Model | Serial Number | Calibrated until (MM.DD.YYYY) |
|---|---|---|---|---|
| 3m Semi Anechoic Chamber | S+M | N/A | N/A | 12.24.2007 |
| 3m Full Anechoic Chamber | S+M | N/A | N/A | 12.05.2007 |
| Signal Analyzer | R&S | FSQ 26 | 100266 | 05.18.2007 |
| Test Receiver Display Unit | R&S | ESMI 804.8932.52 | 829214/011 | 05.30.2007 |
| Test Receiver RF Unit | R&S | ESMI 1032.5640.53 | 829550/008 | 05.30.2007 |
| Receiver | R&S | ESIB 26 | 100318 | 08.17.2007 |
| Receiver | R&S | ESCS30 | 830245/018 | 05.30.2007 |
| Pre-Amplifier | Agilent | 8447D | 2944A10146 | 05.30.2007 |
| Pre-Amplifier | Agilent | 83017A | 3950M00246 | 04.03.2007 |
| Loop Antenna | Schwarzbeck | FMZB1516 | 1516115 | 04.08.2007 |
| BiLog Antenna | Schaffner | CBL 6112B | 2747 | 08.30.2007 |
| BiLog Antenna | Schaffner | CBL 6112B | 2536 | 08.30.2007 |
| Horn Antenna | R&S | HF906 4044.4507.02 | 359287/005 | 12.05.2007 |
| Horn Antenna | R&S | HF906 4044.4507.02 | 359287/006 | 12.05.2007 |
| Horn Antenna | ETS-Lindgren | 3117 | 00062533 | 04.14.2007 |
| Horn Antenna | ETS-Lindgren | 3117 | 00062549 | 04.14.2007 |
| Horn Antenna | ETS-Lindgren | 3116 | 00031541 | 04.15.2007 |
| Dipole | Schwarzbeck | D69250-UHAP/D69250-VHAP | 979/917 | 08.28.2007 |
| Signal Generator | R&S | SMT06 | 830264/009 | 05.29.2007 |
| Signal Generator | R&S | SMR 40 | 100325 | 12.09.2007 |
| Artificial Mains Network | Schwarzbeck | NNLK8121 | 8121416 | 05.29.2007 |
| Power Supply | Keithley | 2306 | 1045337 | 04.20.2007 |
| Climate Chamber | WEISS | ACS-1 | 3604040034 | 04.24.2007 |
| Universal Radio Communication Tester | R&S | CMU200 | 108035 | 07.04.2007 |
| Wireless communication test set | Agilent | 8960 | GB43461081 | 03.13.2008 |
| Spectrum Analyzer | Agilent | PSA E4445A | MY42510100 | 03.13.2008 |

# 6 Transmitter Measurements

## 6.1 Effective Radiated Power of Transmitter (ERP)

### 6.1.1 Test Conditions

Table 12 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | enclosure |
| Ambient temperature: | 24℃ |
| Relative humidity: | 54% |
| Test Configurations: | TM1 and TM3 at frequency B、T |

### 6.1.2 Test Specifications and Limits

#### 6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 22.913

#### 6.1.2.2 Supporting Standards

Table 13 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations |

#### 6.1.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of a mobile station transmitter exceed 7 W. And calculate longitude ERP by following formula：ERP(dBm)= 10*log ($ERP_{\text{in watts}}$).

Table 14 Limits

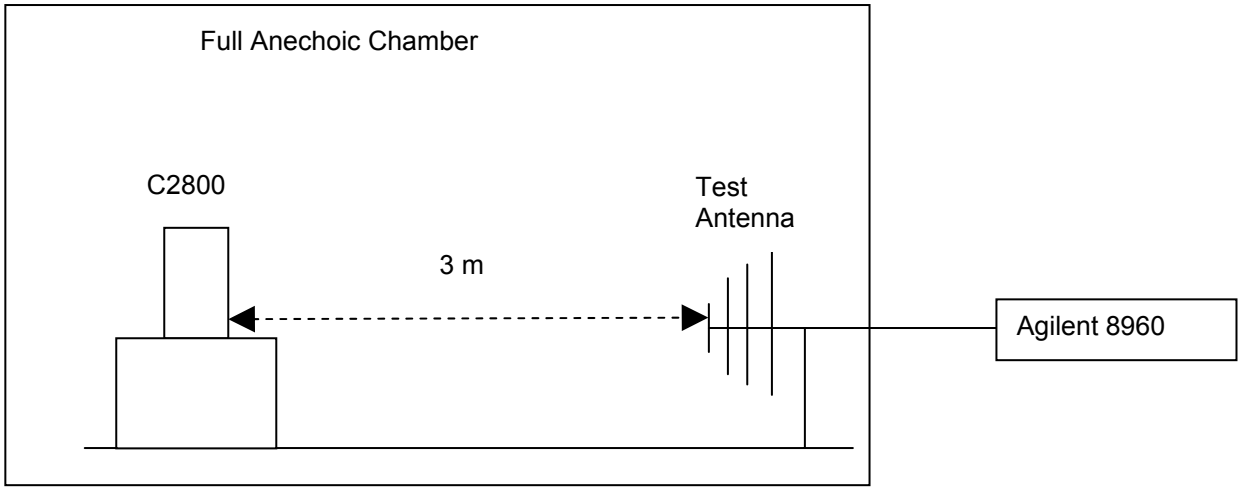
| | |
|---|---|
| Maximum Output Power (Watts) | < 7 Watts |
| Maximum Output Power (dBm) | < 38.5 dBm |

### 6.1.3 Test Method and Setup

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, E.R.P. shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Mobile Station to the wireless communication tester Agilent 8960 via the air interface. The band class is set as US Cellular.
(b) Test the Radiated maximum output power by the Agilent 8960 received from test antenna.
(c) Use substitution method to verify the Maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on Agilent 8960, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

## Test setup

### Step 1: Pre-test




### Step 2: Substitution method to verify the maximum ERP

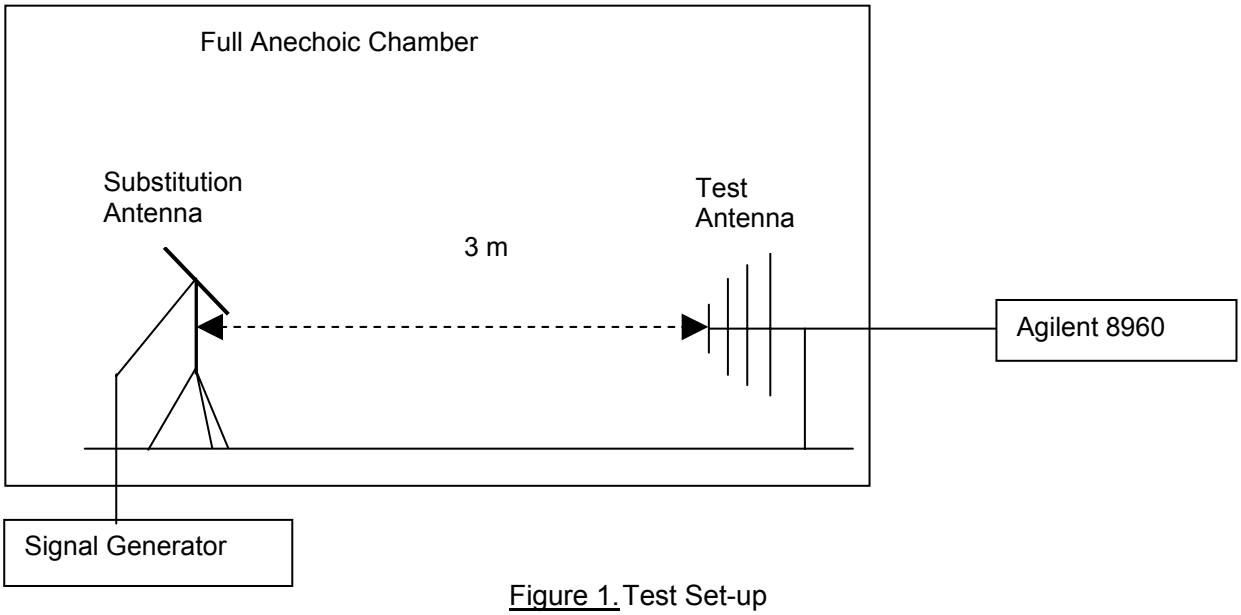



Figure 1. Test Set-up

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

### 6.1.4 Measurement Results

Table 15 Measurement Results

| TEST CONDITIONS | RF Output Power | | |
|---|---|---|---|
| | Channel1013(B) 824.7MHz | Channel777(T) 848.31MHz | |
| | dBm | dBm | |

| | | Measured | Limit | Measured | Limit | | |
|---|---|---|---|---|---|---|---|
| TM1 | $T_{nom}$ (24 °C)<br>$V_{nom}$ (3.7 V) | 21.07 | 38.5 | 20.87 | 38.5 | | |
| TM3 | $T_{nom}$ (24 °C)<br>$V_{nom}$ (3.7 V) | 20.97 | 38.5 | 20.67 | 38.5 | | |
| | | | | | | | |

### 6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.

## 6.2 Conducted output power

### 6.2.1 Test Conditions

Table 16 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 23℃ |
| Relative humidity: | 55% |
| Test Configurations: | TM1 and TM3 at frequency B、M、T |

### 6.2.2 Test Specifications and Limits

#### 6.2.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 22.913

#### 6.2.2.2 Supporting Standards

Table 17 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C:2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations |

#### 6.2.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of a mobile station transmitter exceed 7 W. The calculated longitude ERP by following formula:

ERP(dBm)= 10*log ($ERP_{in\ watts}$).

And for conducted power, we can use Antenna Gain to calculate the limit. So the conducted power:

$P_{cod}$.(dBm)=ERP(dBm)- Gain(dBd).
and Gain (dBd)= Gain(dBi)- 2.15dB
Maximum Conducted Output Power (dBm)= Maximum Output Power (Watts)- Antenna Gain(dBi)

Table 18

Table 19 Limits

| | |
|---|---|
| Maximum Output Power (Watts): | < 7 Watts=38.5 dBm |
| Antenna Gain(dBi): | -1 dBi |
| Maximum Conducted Output Power (dBm): | < 39.5dBm |

### 6.2.3 Test Method and Setup

(a)For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, Conducted maximum power shall be measured when the transmitter is adjusted in

accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Mobile Station to the wireless communication tester Agilent 8960 via the antenna connector. The band class is set as US Cellular.
(b)Test the Conducted maximum output power by the Agilent 8960.

## Test setup

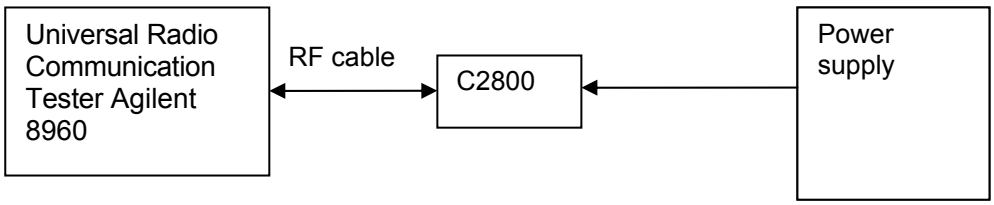



Figure 2. Test Set-up

### 6.2.4 Measurement Results

Table 20 Measurement Results

| TEST CONDITIONS | | RF Output Power | | | | | |
|---|---|---|---|---|---|---|---|
| | | Channel 1013(B) 824.7MHz | | Channel 283(M) 833.49MHz | | Channel 777(T) 848.31MHz | |
| | | dBm | | dBm | | dBm | |
| | | Measured | Limit | Measured | Limit | Measured | Limit |
| TM1 | $T_{nom}$ (23 °C) $V_{nom}$ (3.7 V) | 24.15 | 39.5 | 24.32 | 39.5 | 23.90 | 39.5 |
| TM3 | $T_{nom}$ (23 °C) $V_{nom}$ (3.7 V) | 24.20 | 39.5 | 24.25 | 39.5 | 24.05 | 39.5 |
| | | | | | | | |

### 6.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.

## 6.3 Modulation Characteristics

### 6.3.1 Test Conditions

Table 21 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25 °C |
| Relative humidity: | 53 % |
| Test Configurations: | TM1 and TM3 at frequency M |

### 6.3.2 Test Specifications and Limits

#### 6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 22 subpart H.

#### 6.3.2.2 Supporting Standards

Table 22 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations. |

#### 6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 22 subpart H.

Table 23 Limits

| | |
|---|---|
| Limits | Not applicable |

### 6.3.3 Test Method and Setup

Connect the Mobile Station to the Universal Radio Communication Tester CMU200 via the antenna connector. The band class is set as US Cellular; the Mobile Station's output is matched with 50 Ω loads. Test method was according to ANSI/TIA-98-E. The waveform quality and constellation of the Mobile Station was tested.

**Test setup**

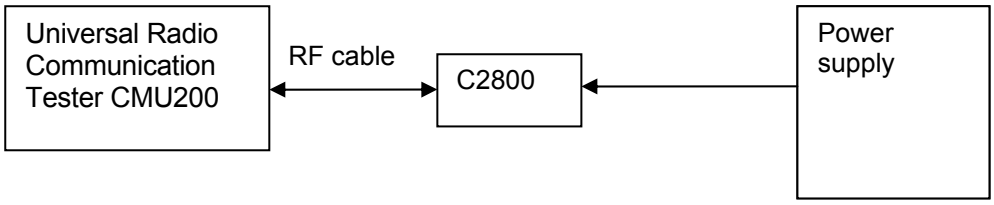



Figure 3. Test Set-up

### 6.3.4 Measurement Results

Table 24 Measurement Results

| TEST CONDITIONS | | Modulation Characteristic | |
|---|---|---|---|
| | | Channel283(M)<br>833.49MHz | |
| | | Measured | |
| | | TM1 | TM3 |
| $T_{nom}$ (25 °C) | $V_{nom}$ (3.7V) | Refer to Appendix A | Refer to Appendix A |
| | | | |

### 6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.

For the measurement results refer to appendix A.

## 6.4 Occupied Bandwidth

### 6.4.1 Test Conditions

Table 25 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | RF connector |
| Ambient temperature: | 24 °C |
| Relative humidity: | 57 % |
| Test Configurations: | TM1 and TM3 at frequency B、T |

### 6.4.2 Test Specifications and Limits

#### 6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 22 subpart H.

#### 6.4.2.2 Supporting Standards

Table 26 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations. |

#### 6.4.2.3 Limits

No specific occupied bandwidth requirement in part 22 subpart H, but the occupied bandwidth was defined in part 2.1049: the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Table 27 Limits

| | |
|---|---|
| Upper /lower frequency limits | 0.5% of the mean power |

### 6.4.3 Test Method and Setup

Mobile Station was connected to the wireless communication test set Agilent 8960 and the Signal Analyzer FSQ 26 via the divider. The band class is set as US Cellular; Mobile Station was controlled to transmit Maximum power. Measure and record the Occupied Bandwidth of the Mobile Station by the Spectrum Analyzer E4445A

The OBW, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

Refer to 47CFR part2.1049 section (g)&(h).
(g) Transmitter in which the modulating base band comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the

services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.
(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will be operated. The signal shall be applied through any filter networks, pseudorandom generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

Measurement bandwidth (RBW): 30 kHz (Resolution bandwidth)
Video bandwidth (VBW): 300 kHz

## Test Set-up

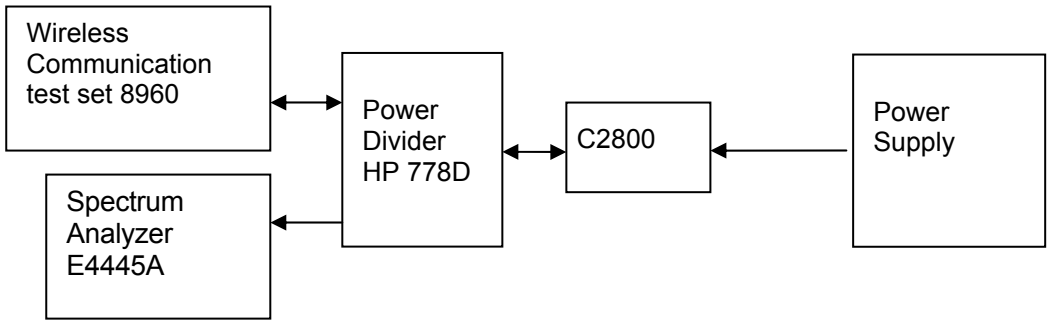



Figure 4. Test Set-up

### 6.4.4 Measurement Results

Table 28 Measurement Results

| TEST CONDITIONS | | Occupied Bandwidth | | | | | |
|---|---|---|---|---|---|---|---|
| | | Channel1013 (B) 824.7MHz | | | | Channel777(T) 848.31MHz | |
| | | Measured (MHz) | | | | Measured (MHz) | |
| | | TM1 | TM3 | | | TM1 | TM3 |
| $T_{nom}$ (24 °C) | $V_{nom}$ (3.7V) | 1.2791 | 1.2732 | | | 1.2790 | 1.2761 |

### 6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B.

## 6.5 Band Edges Compliance

### 6.5.1 Test Conditions

Table 29 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 25°C |
| Relative humidity: | 50 % |
| Test Configurations: | TM1 and TM3 at frequency B、T |

### 6.5.2 Test Specifications and Limits

#### 6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 22.917

#### 6.5.2.2 Supporting Standards

Table 30 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations. |

#### 6.5.2.3 Limits

Compliance with 22.917, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P. (Whereas P is the rated power of the EUT).

Table 31 Limits

| | |
|---|---|
| Rated Power: | 23 dBm |
| Required attenuation: | 43+10log (0.199) = 36 , 23dBm – 36 dB |
| Absolute level | - 13 dBm |

### 6.5.3 Test Method and Setup

Mobile Station was connected to the wireless communication test set Agilent 8960 and the Spectrum Analyzer E4445A via the divider, the band class is set as US Cellular. Mobile Station was controlled to transmit Maximum power. Measure and record Band edge compliance of the Mobile Station by the E4445A.

RBW of 15 kHz (1% of 1.5MHz) was used up to 5MHz away from the band edge. So the FCC rules specify that RBW of 100kHz for measurements of emissions >1MHz away from the band edges ,the limit was adjusted with -13dBm to -20dBm to compensate for the reduced measurement bandwidth.

**Test Set-up**

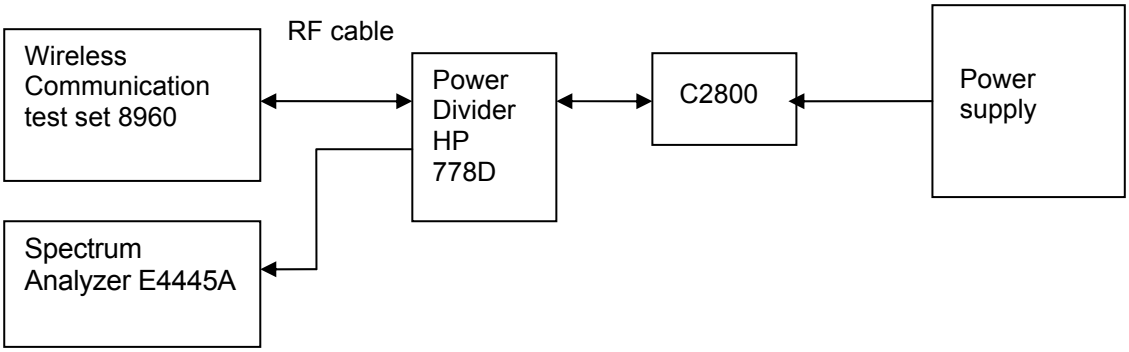



Figure 5. Test Set-up

### 6.5.4 Measurement Results at Band Edges

Table 32 Measurement Results outside Band Edges-- Single Carrier

| Band | Frequency of Band edges [MHz] | Channel Number | Test Mode | Conducted Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|---|---|---|---|---|---|---|---|
| US Cellular | $T_{nom}$ (25 °C), $V_{nom}$ (3.7V) | | | | | | |
| | 824 | 1013 (B) | TM1 & TM3 | 24.0 | <-13(See appendix C) | - 13 dBm | Pass |
| | 849 | 777 (T) | TM1 & TM3 | 23.9 | <-13(See appendix C) | - 13 dBm | Pass |

### 6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix C.

## 6.6 Spurious Emission at Antenna Terminal

### 6.6.1 Test Conditions

Table 33 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | 24°C |
| Relative humidity: | 52 % |
| Test Configurations: | TM1 and TM3 at frequency B、T |

### 6.6.2 Test Specifications and Limits

#### 6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 22.917

#### 6.6.2.2 Supporting Standards

Table 34 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations. Release C |

#### 6.6.2.3 Limits

Compliance with part 22.917, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P. (Whereas P is the rated power of the EUT).

Table 35 Limits

| | |
|---|---|
| Rated Power: | 23 dBm |
| Required attenuation: | 43+10log (0.199) = 36 , 23 dBm – 36 dB |
| Absolute level | - 13 dBm |

### 6.6.3 Test Method and Setup

Mobile Station was connected to the wireless communication test set Agilent 8960 and the Signal Analyzer FSQ 26 via the divider, the band class is set as US Cellular. Mobile Station was controlled to transmit Maximum power. Measure and record the Conducted Spurious Emission of the Mobile Station by the Signal Analyzer FSQ 26.

According to part 22.917, the defined measurement bandwidth as following:

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 1 GHz: 100 kHz;
Measurement bandwidth (RBW) for 1GHz up to 12.75GHz: 1MHz;

## Test Set-up

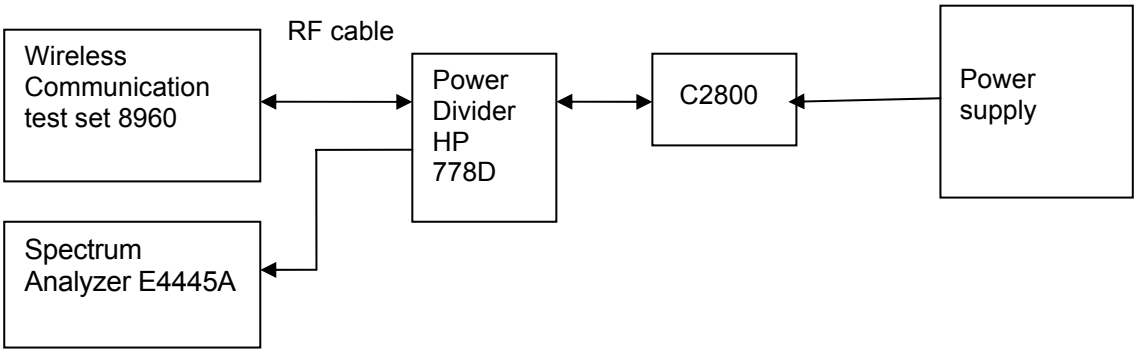



Figure 6. Test Set-up

### 6.6.4 Measurement Results at Conducted Spurious Emission

Table 36 Measurement Results

| Channel Number | Test Mode | Test Range (Frequency) | Conducted Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|---|---|---|---|---|---|---|
| Channel 1013(B) | TM1 | 9 kHz ~12.75GHz | 24.0 | <- 13 dBm (See appendix E) | - 13 dBm | Pass |
| | TM3 | 9 kHz ~12.75GHz | 24.0 | <- 13 dBm (See appendix E) | - 13 dBm | Pass |
| Channel 777(T) | TM1 | 9 kHz ~12.75GHz | 24.0 | <- 13 dBm (See appendix E) | - 13 dBm | Pass |
| | TM3 | 9 kHz ~12.75GHz | 24.0 | <- 13 dBm (See appendix E) | - 13 dBm | Pass |

### 6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix D.

## 6.7 Radiated Spurious Radiation

### 6.7.1 Test Conditions

Table 37 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | enclosure |
| Ambient temperature: | 22 °C |
| Relative humidity: | 53 % |
| Test Configurations: | TM1 at frequency M |

### 6.7.2 Test Specifications and Limits

#### 6.7.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 22.917

#### 6.7.2.2 Supporting Standards

Table 38 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| ANSI/TIA-98-E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations. |

#### 6.7.2.3 Limits

Compliance with 22.917, all spurious emission must be attenuated below the transmitter power by at least 43 +10 $\log_{10}$ P. (Whereas P is the rated power of the EUT).

Table 39 Limits

| | |
|---|---|
| Rated Power: | 23 dBm (0.199W) |
| Required attenuation: | 43 +10 $\log_{10}$ (0.199W) = 36 dB |
| Absolute level | 23 dBm – 36 dB= - 13 dBm |

### 6.7.3 Test Method and Setup

(a) Measurements were made to detect spurious emissions radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data were supplied showing the magnitude of each harmonic and other spurious emission. For this test, single sideband, independent sideband, and controlled carrier transmitters shall be modulated under the conditions specified in paragraph 2.1049(c) as appropriate. For equipment operating on frequencies below 890 MHz, an Open Field Test is normally required with the measuring instrument antenna located in the far field at all test frequencies. In the event it is either impractical or impossible to make open field measurements (e.g. a broadcast transmitter installed in a building) measurement will be accepted of the equipment as installed. Such measurements must be accompanied by a description of the site where the measurements were made showing the location of

any possible source of reflections, which might distort the field strength measurements. Information submitted shall include the relative radiated power of each spurious emission with the reference to the rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.
(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:
(1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the Commission.

Huawei Mobile Station is equipment with non-integral antenna. And it should test according to part (b) of above section.

BTS simulator is connected to a communication antenna, by which communicates with the Handset inside the test site. The BTS simulator controls the Handset to transmit at maximum power which defined in specification of product when in traffic mode, field strength of spurious emission in idle mode were also tested. The Handset operates on a typical channel.

## The test procedure:

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, E.R.P. shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the Mobile Station to the BTS simulator via the air interface. The band class is set as US Cellular.
(b) Test the Radiated maximum output power by the Rohde and Schwarz ESMI Test Receiver from test antenna.
(c) Use substitution method to verify the Maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on ESMI Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

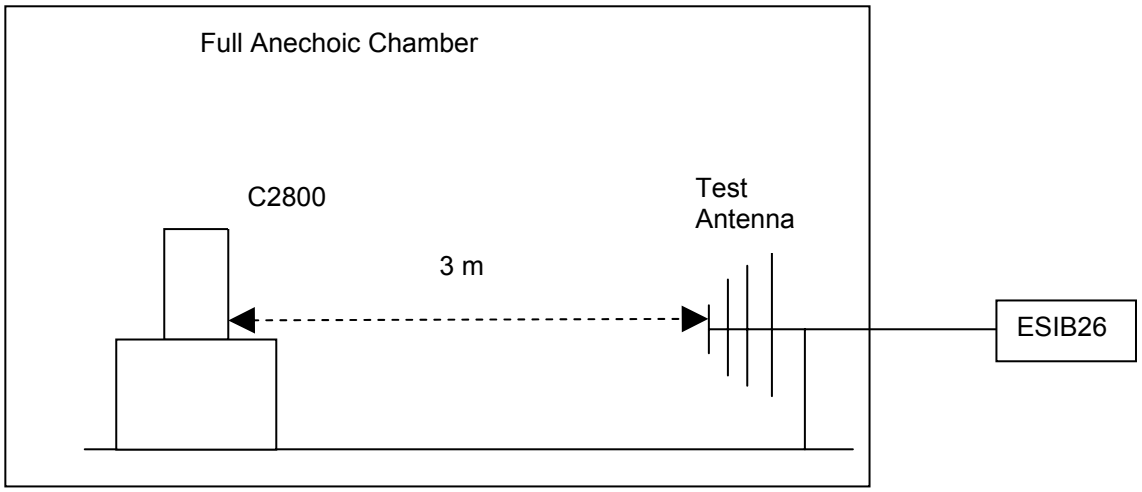
According to part 22.917, the defined measurement bandwidth as following:

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 1 GHz: 100 kHz;
Measurement bandwidth (RBW) for 1GHz up to 12.75GHz: 1MHz;

## Test setup

### Step 1: Pre-test




**Step 2: Substitution method to verify the maximum ERP**

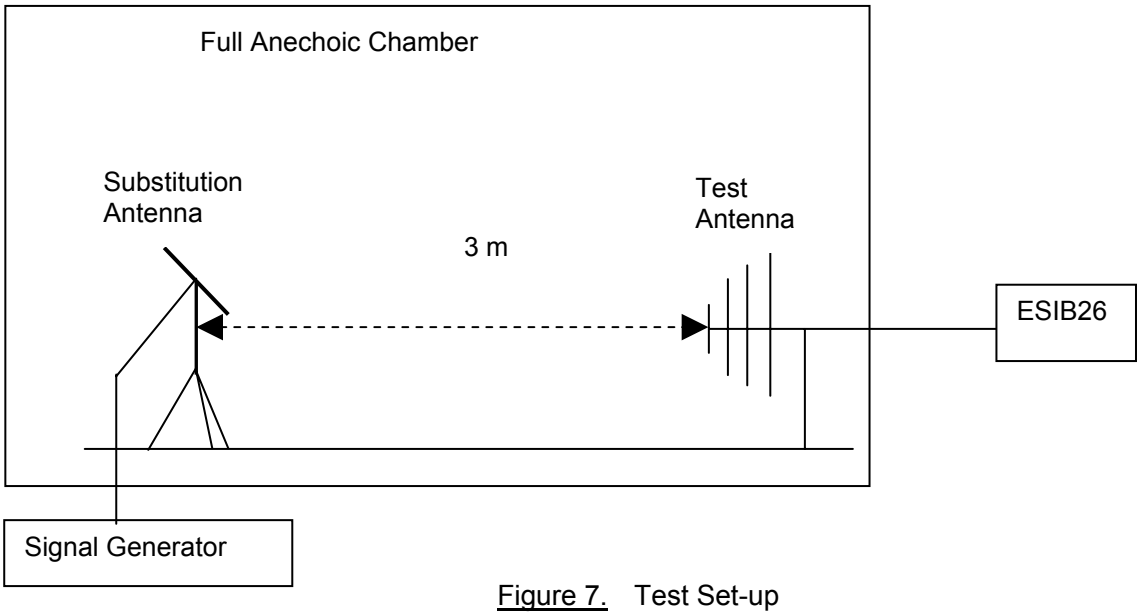



Figure 7. Test Set-up

NOTE: Effective radiated power (ERP) refers to the radiation power output of the EUT, assuming all emissions are radiated from half-wave dipole antennas.

### 6.7.4 Measurement Results

#### 6.7.4.1 Pre-test Measurement Results

Table 40 Measurement Results

| Channel Number | Test Range (Frequency) | Rated Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|---|---|---|---|---|---|
| 283 | 9 kHz ~12.75GHz | 23 | <- 13 dBm (See appendix F) | - 13 dBm | Pass |

#### 6.7.4.2 Substitution Results

No peak found in pre- test.

Calculation Sample:

Table 41 Substitution Results

| Freq. [MHz] | Measurement Value [dBm] | Substitution Antenna Type | Gain [dBd] | Cable Loss [dB] | Signal Generator Level [dBm] | Substitution Level [dBm] | FCC limit [dBm] | Result |
|---|---|---|---|---|---|---|---|---|
| 3923.33 | -38.12 | Horn Ant. | 7.85 | 2.20 | -41.24 | -35.59 | -13 | Pass |

Note: For get the E.R.P. (Efficient Radiated Power) in substitution method, the following formula should take to calculate it,

E.R.P. [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBd]

NOTE: SGP- Signal Generator Level

The upper table is just a sample, because the test result's margin is very big, so we didn't use substitution method

### 6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix F with 7 pages.

## 6.8 Frequency Stability

### 6.8.1 Test Conditions

Table 42 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | Antenna connector |
| Ambient temperature: | See below |
| Relative humidity: | 54% at 25°C |
| Test Configurations: | TM1 and TM3 at frequency M |

### 6.8.2 Test Specifications and Limits

#### 6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 22.355

#### 6.8.2.2 Supporting Standards

Table 43 Supporting Standards:

| | |
|---|---|
| ANSI/TIA-603-C: 2004 | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards |
| EIA/TIA-98E: 2003 | Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations. |

#### 6.8.2.3 Limits

According to part 22.355, from 821MHz to 869MHz, for mobile device, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm.

### 6.8.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:
(1) From –30 ° to +50 ° centigrade for all equipment except that specified in subparagraphs
(2) and (3) of paragraph 2.1055

(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than $10^{o}$ centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

## Test Set up

Connect the Mobile Station to the Wireless Communication test set 8960 via the connector. Then measure the frequency error by the Wireless Communication test set 8960. The Mobile Station's output is matched with a 50 Ω load.

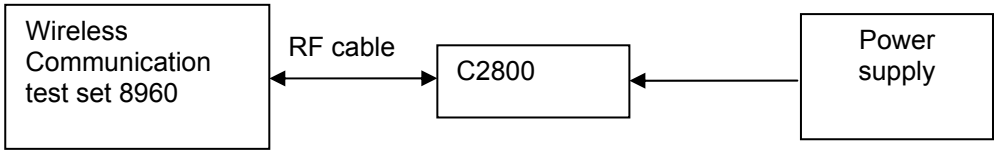



Figure 8. Test Set up

### 6.8.4 Measurement Results

#### 6.8.4.1 Measurement Results vs. Variation of Temperature

- TM1, 3.7V DC Channel No.**283(833.49MHz)**

Table 44 Measurement Results vs. Variation of Temperature—TM1

| Temperature | Conducted Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---|---|---|---|---|
| -30 °C | 24.1 | 833.49 | -20.00 | Pass |
| -20 °C | 24.1 | 833.49 | -25.00 | Pass |
| -10 °C | 24.1 | 833.49 | -27.00 | Pass |
| 0 °C | 24.1 | 833.49 | -24.00 | Pass |
| +10 °C | 24.1 | 833.49 | -30.00 | Pass |
| +20 °C | 24.1 | 833.49 | -31.00 | Pass |
| +30 °C | 24.1 | 833.49 | -31.00 | Pass |
| +40 °C | 24.1 | 833.49 | -28.00 | Pass |
| +50 °C | 24.1 | 833.49 | -29.00 | Pass |

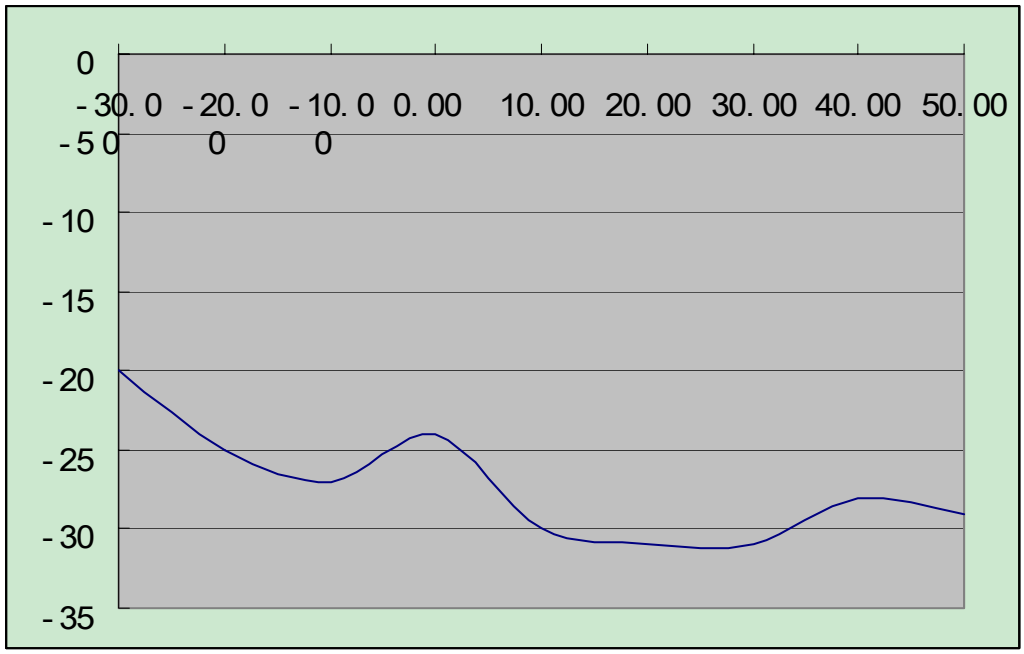



Figure 9. TM1 Test Graph

- TM3, 3.7V DC Channel No.**283(833.49MHz)**

Table 45 Measurement Results vs. Variation of Temperature—TM3

| Temperature | Conducted Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---|---|---|---|---|
| -30 °C | 24.1 | 833.49 | -16.00 | Pass |
| -20 °C | 24.1 | 833.49 | -15.00 | Pass |
| -10 °C | 24.1 | 833.49 | -15.00 | Pass |
| 0 °C | 24.1 | 833.49 | -11.00 | Pass |
| +10 °C | 24.1 | 833.49 | -12.00 | Pass |
| +20 °C | 24.1 | 833.49 | -14.00 | Pass |
| +30 °C | 24.1 | 833.49 | -15.00 | Pass |
| +40 °C | 24.1 | 833.49 | -13.00 | Pass |
| +50 °C | 24.1 | 833.49 | -15.00 | Pass |

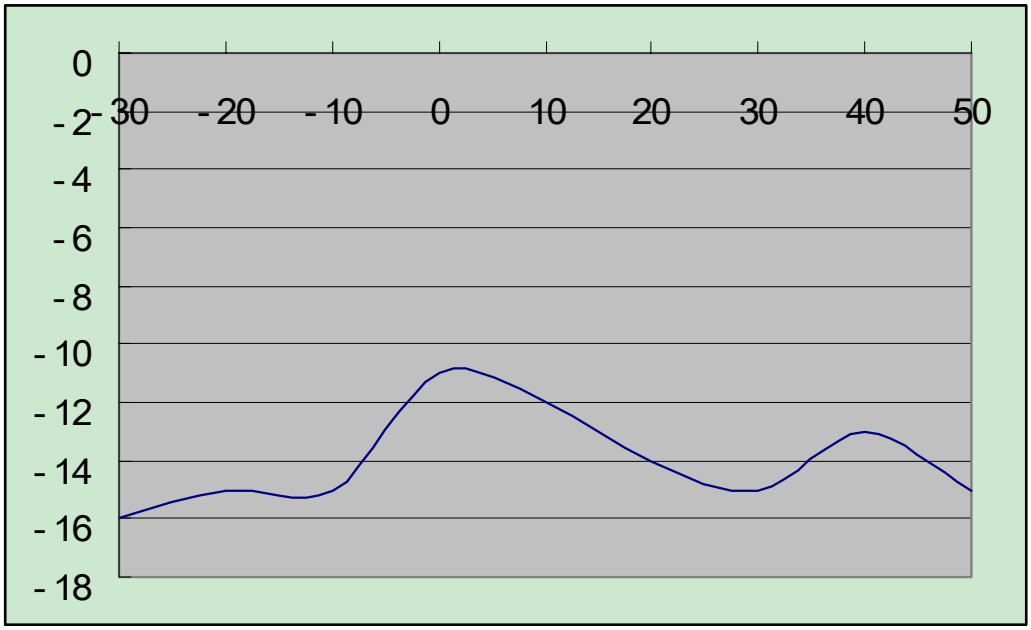



Figure 10. TM3 Test Graph

### 6.8.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 283(833.49MHz)**

Table 46 Measurement Results vs. Variation of Voltage—TM1

| Voltage | Conducted Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---|---|---|---|---|
| 3.5 | 24.1 | 833.49 | -22.00 | Pass |
| 3.7 | 24.1 | 833.49 | -19.00 | Pass |
| 4.2 | 24.1 | 833.49 | -21.00 | Pass |

- **TM3, 25 °C ,Channel No. 283(833.49MHz)**

Table 47 Measurement Results vs. Variation of Voltage—TM3

| Voltage | Conducted Power (dBm) | Nominal Frequency (MHz) | Measured Frequency Error(Hz) | Result |
|---|---|---|---|---|
| 3.5 | 24.1 | 833.49 | -12.00 | Pass |
| 3.7 | 24.1 | 833.49 | -13.00 | Pass |
| 4.2 | 24.1 | 833.49 | -15.00 | Pass |

### 6.8.5 Conclusion

The equipment **PASSED** the requirement of this clause.

# 7 EMC Test

## 7.1 Conducted Emission at Power Port

### 7.1.1 Test Conditions

Table 48 Test Conditions

| | |
|---|---|
| Preconditioning: | 1 hour |
| Measured at: | Power port |
| Ambient temperature: | 23.5°C |
| Relative humidity: | 55 % |
| Test Configurations: | TM1 at frequency M |

### 7.1.2 Test Specifications and Limits

#### 7.1.2.1 Specification

CFR 47 (FCC) part 15.107

#### 7.1.2.2 Supporting Standards

Table 49 Supporting Standards:

| | |
|---|---|
| ANSI C63.4: 2003 | Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |

#### 7.1.2.3 Limits

Compliance with part15.107, conducted emission must meet the requirement of following table.

Table 50 Limits

| Frequency of Emission (MHz) | Conducted Limit (dBμ V) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15-0.5 | 66 to 56 * | 56 to 46 * |
| 0.5-5 | 56 | 46 |
| 5-30 | 60 | 50 |

Note: * Decreases with the logarithm of the frequency.

### 7.1.3 Test Method and Setup

The Table-top EUT was placed upon a non-metallic table 0.8 m above the horizontal metal reference ground plane. EUT was connected to LISN and LISN was connected to reference Ground Plane. EUT was 80cm from LISN. The set-up and test methods were according to ANSI C63.4: 2003.

Conducted Disturbance at AC Port measurements were undertaken on the L and N Lines. The emissions were measured using a Quasi-Peak Detector and Average Detector.

Huawei Mobile Station was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Station to transmitter the maximum power which defined in specification of product. The Mobile Station operated on the typical channel.

Measurement bandwidth (RBW) for 150kz to 30 MHz: 9 kHz;

## Test Set-up

The Mobile Station was setup in the screened chamber and operated under nominal conditions.

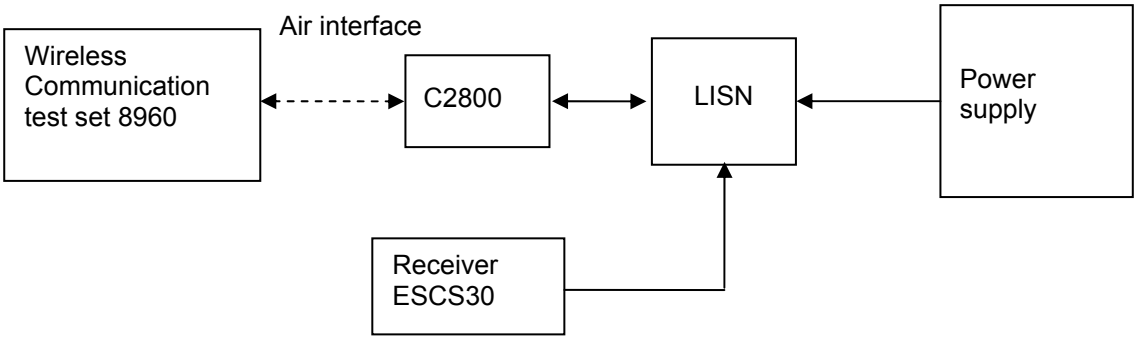



Figure 11. Test Set-up

### 7.1.4 Measurement Results

Table 51 MEASUREMENT RESULT:QP DECTER

| Frequency ( MHz ) | Level ( dBμV ) | Transd ( dB ) | Limit ( dBμV ) | Margin ( dB ) | Line | PE |
|---|---|---|---|---|---|---|
| 0.307500 | 31.00 | 10.2 | 50 | 19.0 | L3 | FLO |
| 0.717000 | 31.00 | 9.9 | 46 | 15.0 | L3 | FLO |
| 1.671000 | 29.10 | 9.9 | 46 | 16.9 | L3 | FLO |
| 2.566500 | 30.90 | 10.1 | 46 | 15.1 | L3 | FLO |
| 5.136000 | 26.00 | 10.1 | 50 | 24.0 | L3 | FLO |
| 23.392500 | 24.70 | 15.4 | 50 | 25.3 | L3 | FLO |

Table 52 MEASUREMENT RESULT:AV DECTER

| Frequency ( MHz ) | Level ( dBμV ) | Transd ( dB ) | Limit ( dBμV ) | Margin ( dB ) | Line | PE |
|---|---|---|---|---|---|---|
| 0.366000 | 45.60 | 10.2 | 59 | 13.4 | L3 | FLO |
| 0.456000 | 48.40 | 10.0 | 57 | 8.4 | L3 | FLO |
| 0.717000 | 47.10 | 9.9 | 56 | 8.9 | L3 | FLO |
| 1.608000 | 43.10 | 9.9 | 56 | 12.9 | L3 | FLO |
| 5.145000 | 39.60 | 10.1 | 60 | 20.4 | L3 | FLO |
| 9.834000 | 37.20 | 11.0 | 60 | 22.8 | L3 | FLO |

### 7.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix G with 2 pages.

## 7.2 Radiated Emission of Enclosure in ideal mode

### 7.2.1 Test Conditions

Table 53 Test Conditions

| | |
|---|---|
| Preconditioning: | 0.5 hour |
| Measured at: | enclosure |
| Ambient temperature: | 25 °C |
| Relative humidity: | 45 % |
| Test Configurations: | TM1 at frequency M |

### 7.2.2 Test Specifications and Limits

#### 7.2.2.1 Specification

CFR 47 (FCC) part 15.109

#### 7.2.2.2 Supporting Standards

Table 54 Supporting Standards:

| | |
|---|---|
| ANSI C63.4: 2003 | Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz |

#### 7.2.2.3 Limits

The Radiated Emission of enclosure of EUT should compliance with the requirement of part 15.109. The limit showed in following table.

Table 55 Limits

| Frequency of Emission (MHz) | Radiated Limit | |
|---|---|---|
| | Unit(μ v/m) | Unit(dBμ V/m) |
| 30-88 | 100 | 40 |
| 88-216 | 150 | 43.5 |
| 216-960 | 200 | 46 |
| 960-1000 | 500 | 54 |

### 7.2.3 Test Method and Setup

The test site semi-anechoic chamber has met the requirement of NSA tolerance 4dB according to the standards: ANSI C63.4 (2003). The test distance was 3m.The EUT was set-up on insulator 80cm above the Ground Plane. The set-up and test methods were according to ANSI C63.4.The Radiated Disturbance measurements were made using a Rohde and Schwarz ESMI Test Receiver and control software ES-K1.
A preliminary scan and a final scan of the emissions were made from 30 MHz to 1GHz by using test

script of software; the emissions were measured using a Quasi-Peak Detector. The maximal emission value was acquired by adjusting the antenna height, polarisation and turntable azimuth in accordance with the software setup. Normally, the height range of antenna was 1m to 4m, the azimuth range of turntable was 0°to 360°, The receive antenna has two polarizations V and H.

Huawei Mobile Station was communicated with the BTS simulator through Air interface. The Mobile Station operated on the typical channel and the Mobile Station worked in idle mode, transmitter was not work in this test.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz

## Test set up

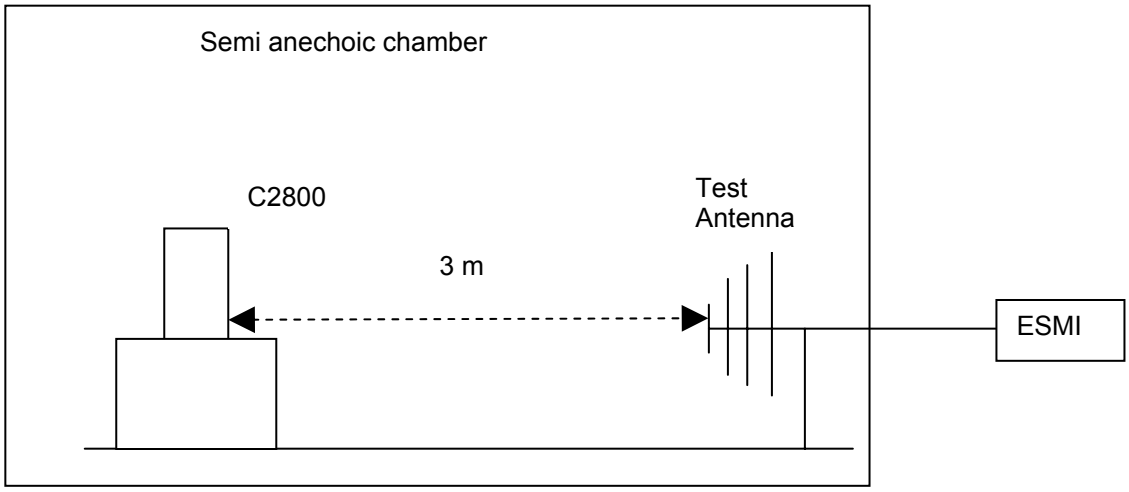



Figure 12. Test set up

### 7.2.4 Measurement Results

Table 56 MEASUREMENT RESULT: QP DECTER

| Frequency ( MHz ) | Level ( dBμV/m ) | Transd ( dB ) | Limit ( dBμV/m ) | Margin ( dB ) | Height ( cm ) | Azimuth ( deg ) | Polarisation |
|---|---|---|---|---|---|---|---|
| 38.760000 | 28.80 | -9.0 | 40.0 | 11.2 | 102.0 | 348.00 | VERTICAL |
| 51.720000 | 26.70 | -14.6 | 40.0 | 13.3 | 103.0 | 136.00 | VERTICAL |
| 142.080000 | 26.60 | -10.6 | 43.5 | 16.9 | 273.0 | 38.00 | HORIZONTAL |
| 226.440000 | 32.40 | -10.7 | 46.0 | 13.6 | 133.0 | 169.00 | HORIZONTAL |
| 267.240000 | 23.90 | -7.5 | 46.0 | 22.1 | 114.0 | 134.00 | HORIZONTAL |
| 610.260000 | 22.40 | -1.5 | 46.0 | 23.6 | 103.0 | 19.00 | HORIZONTAL |

### 7.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix H with 2 pages.

# 8 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 as following:

Table 57 System Measurement Uncertainty

| Items | | Extended Uncertainty |
|---|---|---|
| Effective Radiated Power of Transmitter | ERP(dBm) | U=3dB; k=2 |
| Band Width | Magnitude (%) | U = 0.2%; k=2 |
| Band Edge Compliance | Disturbance Power ( dBm ) | U = 2.0dB; k=2 |
| Conducted Spurious Emission at Antenna Terminal | Disturbance Power ( dBm ) | U = 2.0dB; k=2 |
| Frequency Stability | Frequency Accuracy(ppm) | U = 0.21ppm; k=2 |
| Field Strength of Spurious Radiation | ERP(dBm) | U=2.22dB; k=2 |
| Conducted Output Power | Power(dBm) | U=0.39dB; k=2 |
| Conducted Emission at Power Port | Disturbance Voltage ( dBμV ) | U=4dB; k=2 |
| Radiated Emission of enclosure at ideal mode | Field strength ( dBμV/m ) | U=5dB; k=2 |

# 9 Appendixes

| | | |
|---|---|---|
| Appendix A | Measurement Results Modulation Characteristics | 3 pages |
| Appendix B | Measurement Results Occupied Bandwidth | 5 pages |
| Appendix C | Measurement Results Band Edges | 5 pages |
| Appendix D | Measurement Results Spurious Emission at Antenna Terminal | 13pages |
| Appendix E | Measurement Results Radiated Spurious Emission | 4 pages |
| Appendix F | Measurement Results Conducted Emission at Power Port | 2 pages |
| Appendix G | Measurement Results Radiated Emission of Enclosure at Ideal Mode | 2 pages |
| Appendix H | Photos of Test Setup | 3 pages |