



# FCC&IC Test Report

**Product Name: HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone  
with Bluetooth**

**Model Number: HUAWEI U8150-A/U8150-A/Comet**

**Report No: SYBHZ(R)E002092010EB-4**

**FCC ID: QISU8150-A**

**IC:6369A-U8150A**

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**REPORT ON** **FCC&IC Test of HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth**

**M/N: HUAWEI U8150-A/U8150-A/Comet**

**Report No: SYBHZ(R)E002092010EB-4**

**FCC ID: QISU8150A**

**IC:6369A- U8150A**

**REGULATION** **FCC CFR47 Part 2: Subpart J;**  
**FCC CFR47 Part 27: Subpart C&L;**  
**RSS-Gen Issue 2**  
**RSS-139 Issue 2**

**CONCLUSION** **Pass**

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Date

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## 1 Summary

The table below summarizes the measurements and results for the EUT. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

| FCC Measurement Specification | FCC Limits Part(s) | Section in RSS-139 | Description                             | Result |
|-------------------------------|--------------------|--------------------|-----------------------------------------|--------|
| 2.1046                        | 27.50(d)(2)        | 6.4                | Effective Radiated Power of Transmitter | PASS   |
| 2.1046                        | 27.50(d)(2)        | 6.4                | Conducted Power of Transmitter          | PASS   |
| 2.1047                        | /                  | /                  | Modulation Characteristics              | PASS   |
| 2.1049                        | /                  | 6.5                | Occupied Bandwidth                      | PASS   |
| 2.1051                        | 27.53(g)           | 6.5                | Band Edges Compliance                   | PASS   |
| 2.1051                        | 27.53(g)           | 6.5                | Spurious Emission at Antenna Terminal   | PASS   |
| 2.1055                        | 27.54              | 6.3                | Frequency Stability                     | PASS   |



## 2 Product Description

### 2.1 Production Information

#### 2.1.1 General Description

HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth- HUAWEI U8150-A/U8150-A/Comet is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency bands of HUAWEI U8150-A/U8150-A/Comet are Band I and Band IV and Band VIII, only Band IV can be used in this report. The GSM/GPRS/EDGE frequency band includes GSM850 and GSM900 and DCS1800 and PCS1900. The Mobile Phone implements such functions as RF signal receiving/transmitting, HSDPA/UMTS and GSM/GPRS/EDGE protocol processing, voice, video, MMS service, GPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service) and USIM card interface. It also provides Bluetooth module to synchronize data between a PC and the phone, or to use the built-in modem of the phone to access the Internet with a PC, or to exchange data with other Bluetooth devices.

**Note: Only tests for AWS (WCDMA Band IV) band were included in this report for the requirement of FCC part 2 & 27.**

#### 2.1.2 Support function and Service

The HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth support the function and service as follows:

Table 2 Service and Test mode List

| Service Name | Characteristic   | Corresponding Test Mode | Note  |
|--------------|------------------|-------------------------|-------|
| Data         | Modulation: QPSK | TM1                     | WCDMA |
| Data         | Modulation: QPSK | TM2                     | HSDPA |

Note: \* The WCDMA test condition & settings are defined in 3GPP TS 34.121 V7.5.0.

## 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***

#### **3.1 Testing Period**

The test have been performed during the period of

**Sep.13, 2010 –Sep.14, 2010**

#### **3.2 General Set up Description**

**TM1:** WCDMA Mode with QPSK Modulation

**TM2:** HSDPA Mode with QPSK Modulation



## 4 Product Description

### 4.1 Technical Characteristics

#### 4.1.1 Frequency Range

Table 4 Frequency Range

| 1700M Band     |                  |
|----------------|------------------|
| Uplink band:   | 1710 to 1755 MHz |
| Downlink band: | 2110 to 2155 MHz |

#### 4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

|                  |             |
|------------------|-------------|
|                  | WCDMA/HSDPA |
| Channel Raster   | 200k Hz     |
| Channel spacing: | 5MHz        |

#### 4.1.3 Type of Emission

Table 6 Type of Emission

|                       |             |
|-----------------------|-------------|
|                       | WCDMA/HSDPA |
| Emission Designation: | 5M0F9W      |

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

Power Source

|                     |                    |
|---------------------|--------------------|
| AC voltage nominal: | ~ 120 V            |
| AC voltage range    | ~ 100 V to ~ 240 V |
| AC current maximal: | 650mA              |

#### 4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (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(c) (8).

The voltage and current in the final RF stage is:

Table 8 Applied RF Module DC Voltages and Currents

|          |                                                                       |
|----------|-----------------------------------------------------------------------|
| Voltage: | ≡ +2.8V                                                               |
| Current: | 100mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8) |



## 4.2 EUT Identification List

### 4.2.1 Board Information

Table 9 Board Information

|                                                      |                  |          |
|------------------------------------------------------|------------------|----------|
| HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth |                  |          |
| HUAWEI U8150-A/U8150-A/Comet                         |                  |          |
| Board and Module                                     |                  |          |
| Equipment Designation / Description                  | Serial Number    | Remarks  |
| MAINBOARD                                            | NG2AA11040900023 | HD1U815M |

### 4.2.2 Battery Technical Data

| Name                | Qty. | Manufacture                   | Serials number   | Description                                                                                                                                                                                                                                                                       |
|---------------------|------|-------------------------------|------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rechargeable Li-ion | 1    | Huawei Technologies Co., Ltd. | UNHA310VF1000924 | Battery Model: HB4J1H<br>Rated capacity: 1200mAh<br>Nominal Voltage:  +3.7V<br>Charging Voltage:  +4.2V |

### 4.2.3 FCC Identification

Grantee Code: QIS  
Product Code: U8150-A  
FCC Identification: QISU8150-A

### 4.2.4 IC Identification

Grantee Code: 6369A  
Product Code: U8150A  
IC Identification: 6369A-U8150A



## 5 Main Test Instruments

Table 10 Main Test Equipments

| Equipment Description                      | Manufacturer | Model                       | Serial Number      | Calibrated until<br>(MM.DD.YYYY) |
|--------------------------------------------|--------------|-----------------------------|--------------------|----------------------------------|
| Receiver                                   | R&S          | ESIB 26                     | 100318             | 04.21.2011                       |
| BiLog Antenna                              | Schaffner    | CBL 6112B                   | 2747               | 11.16.2010                       |
| Horn Antenna                               | ETS-Lindgren | 3117                        | 00062553           | 08.15.2011                       |
| Horn Antenna                               | ETS-Lindgren | 3160                        | 00060006           | 08.03.2011                       |
| Dipole                                     | Schwarzbeck  | D69250-<br>UHAP/D69250-VHAP | 979/917            | 10.11.2010                       |
| Signal Generator                           | R&S          | SMR 40                      | 100325             | 05.11.2011                       |
| Signal Generator                           | R&S          | SMU200A                     | 101717             | 04.10.2011                       |
| Power Supply                               | Keithley     | 2306                        | 1045337            | 05.11.2011                       |
| Climate Chamber                            | WEISS        | WK11-180/170                | 5822604947001<br>0 | 10.23.2010                       |
| Universal Radio<br>Communication<br>Tester | R&S          | CMU200                      | 112347             | 03.30.2011                       |
| Wireless<br>communication test set         | Agilent      | 8960                        | GB43461081         | 05.10.2011                       |
| Spectrum Analyzer                          | R&S          | FSU26                       | 200245             | 08.27.2011                       |



## 6 Transmitter Measurements

### 6.1 Effective Radiated Power of Transmitter (EIRP)

#### 6.1.1 Test Conditions

Table 11 Test Conditions

|                      |                                        |
|----------------------|----------------------------------------|
| Preconditioning:     | 0.5 hour                               |
| Measured at:         | enclosure                              |
| Ambient temperature: | 25°C                                   |
| Relative humidity:   | 55%                                    |
| Test Configurations: | TM1/TM2 at Channel Bottom, Middle, Top |

#### 6.1.2 Test Specifications and Limits

##### 6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and Part 27.50(d)2

##### 6.1.2.2 Supporting Standards

Table 12 Supporting Standards:

|                       |                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| ANSI/TIA-603-C:2004   | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards                                                        |
| 3GPP TS 34.121 V7.5.0 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

##### 6.1.2.3 Limits

Compliance with Part 27.232, mobile/portable stations are limited to 1 watts EIRP peak power.  
 $W(\text{dBm}) = 10 \cdot \log(W_{\text{in mW}})$ .

Table 13 Limits

|                              |           |
|------------------------------|-----------|
| Maximum Output Power (Watts) | < 1 Watts |
| Maximum Output Power (dBm)   | < 30 dBm  |

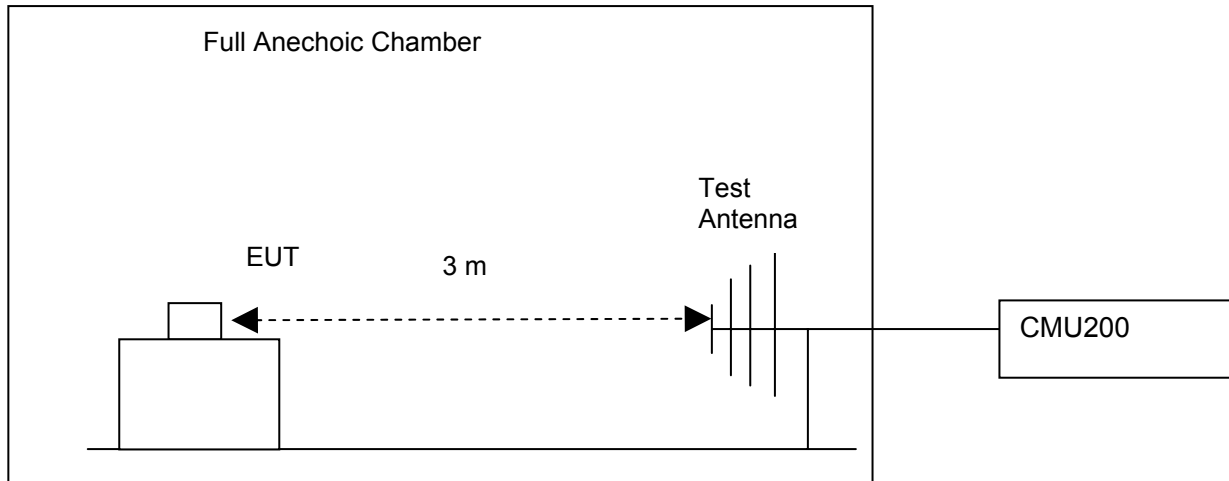
#### 6.1.3 Test Method and Setup

- For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, EIRP 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 EUT to the wireless communication tester CMU200 via the air interface. The band is set as AWS.
- Test the Radiated maximum output power by the CMU200 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 CMU200, 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 EIRP

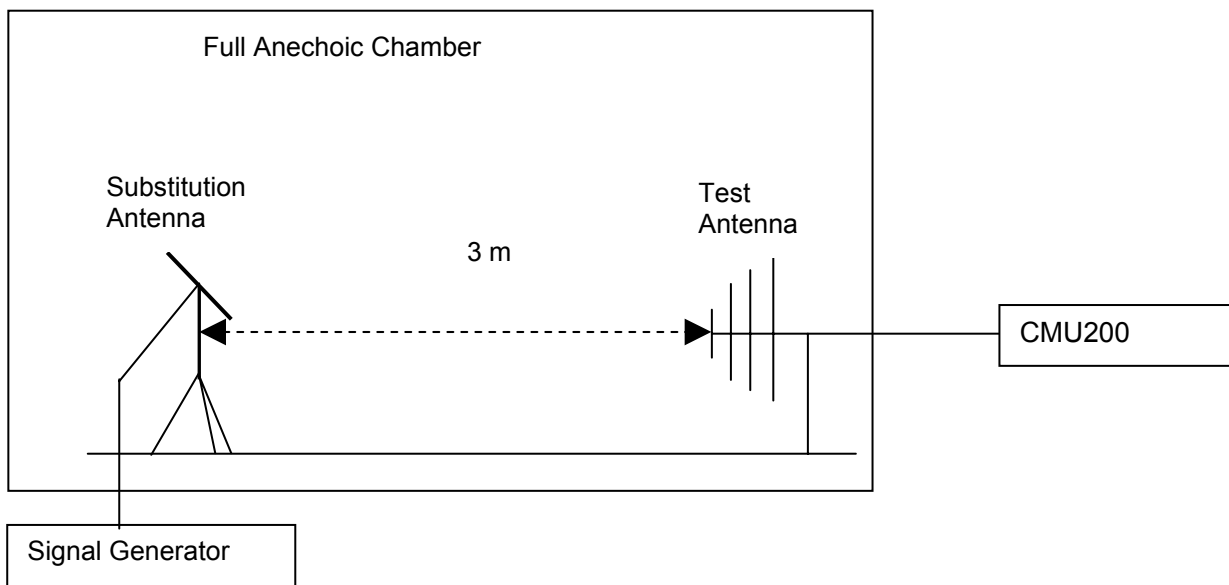


Figure 1. Test Set-up

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

There is a constant difference of 2.15 dB between ERP and EIRP.

$EIRP (dBm) = ERP (dBm) + 2.15$  (ITU-R Recommendation SM.329-10).

EIRP was measured using 1 host.



## 6.1.4 Measurement Results

### 6.1.4.1 Pre-test Results

For HSDPA test mode, there are 4 sub-test for different configuration. For the sub-test 1, The channel is Middle range.

| Sub-test | c     | d     | d (SF) | c/d   | HS (Note1, Note 2) | CM(dB) (Note 3) | MPR (dB) (Note 3) | Test result |
|----------|-------|-------|--------|-------|--------------------|-----------------|-------------------|-------------|
| 1        | 2/15  | 15/15 | 64     | 2/15  | 4/15               | 0               | 0                 | 23.85       |
| 2        | 12/15 | 15/15 | 64     | 12/15 | 24/15              | 1               | 0                 | 23.72       |
| 3        | 15/15 | 8/15  | 64     | 15/8  | 30/15              | 1.5             | 0.5               | 23.68       |
| 4        | 15/15 | 4/15  | 64     | 15/4  | 30/15              | 1.5             | 0.5               | 23.51       |

For the following test, the TM2 was used for HSDPA;

Table 14 Pre-test Measurement Results

|                 |                                                     | RF Output Power (EIRP)      |       |                             |       |                             |       |
|-----------------|-----------------------------------------------------|-----------------------------|-------|-----------------------------|-------|-----------------------------|-------|
| TEST CONDITIONS |                                                     | Channel1312(B)<br>1712.4MHz |       | Channel1412(M)<br>1732.4MHz |       | Channel1513(T)<br>1752.6MHz |       |
|                 |                                                     | dBm                         |       | dBm                         |       | dBm                         |       |
|                 |                                                     | Measured                    | Limit | Measured                    | Limit | Measured                    | Limit |
| TM1             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.3V) | 25.51                       | 30    | 25.64                       | 30    | 25.82                       | 30    |
| TM2             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.3V) | 25.49                       | 30    | 25.61                       | 30    | 25.80                       | 30    |

### 6.1.4.2 Substitution Results

Table 15 Substitution Results

| Test Mode | Freq. [MHz] | Meas. Level [dBm] | Substitution Antenna Type | SGP [dBm] | Substitution Gain [dBi] | Cable Loss [dB] | Substitution Level (EIRP) [dBm] | FCC limit [dBm] | Result |
|-----------|-------------|-------------------|---------------------------|-----------|-------------------------|-----------------|---------------------------------|-----------------|--------|
| TM1       | 1712.4      | 25.51             | Horn Ant.                 | 21.94     | 4.5                     | 1.0             | 25.44                           | 30              | Pass   |
| TM1       | 1732.4      | 25.64             | Horn Ant.                 | 22.08     | 4.5                     | 1.0             | 25.58                           | 30              | Pass   |
| TM1       | 1752.6      | 25.82             | Horn Ant.                 | 21.91     | 4.8                     | 1.0             | 25.71                           | 30              | Pass   |
| TM2       | 1712.4      | 25.49             | Horn Ant.                 | 21.86     | 4.5                     | 1.0             | 25.36                           | 30              | Pass   |
| TM2       | 1732.4      | 25.61             | Horn Ant.                 | 21.93     | 4.5                     | 1.0             | 25.43                           | 30              | Pass   |
| TM2       | 1752.6      | 25.80             | Horn Ant.                 | 21.89     | 4.8                     | 1.0             | 25.69                           | 30              | Pass   |

Note: a, For get the EIRP (Effective Isotropic Radiated Power) in substitution method, the following formula should take to calculate it,

$$\text{EIRP [dBm]} = \text{SGP [dBm]} - \text{Cable Loss [dB]} + \text{Gain [dBi]}$$



NOTE: SGP- Signal Generator Level

b, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 5M for TM1 and TM2.

### 6.1.5 Conclusion

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



## 6.2 Conducted Power of Transmitter

### 6.2.1 Test Conditions

Table 16 Test Conditions

|                      |                                        |
|----------------------|----------------------------------------|
| Preconditioning:     | 0.5 hour                               |
| Measured at:         | Antenna connector                      |
| Ambient temperature: | 25 °C                                  |
| Relative humidity:   | 52 %                                   |
| Test Configurations: | TM1/TM2 at Channel Bottom, Middle, Top |

### 6.2.2 Test Specifications and Limits

#### 6.2.2.1 Specification

CFR 47 (FCC) part 2.1047 and Part 27.50(d)(2)

#### 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                                                        |
| 3GPP TS 34.121 V7.5.0 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

#### 6.2.2.3 Limits

Compliance with Part 27.232, in no any case may the peak power of a mobile station transmitter exceed 2 W. The calculated longitude EIRP by following formula:

$$\text{EIRP(dBm)} = 10 \cdot \log(\text{EIRP}_{\text{mW}}).$$

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

$$\text{P}_{\text{cod}}(\text{dBm}) = \text{EIRP}(\text{dBm}) - \text{Gain}(\text{dBi}).$$

and  $\text{Gain}(\text{dBi}) = \text{Gain}(\text{dBd}) + 2.15\text{dB}$

Table 18 Limits

|                                      |                    |
|--------------------------------------|--------------------|
| Maximum Output Power (Watts)         | < 1 Watts (30 dBm) |
| Antenna Gain(dBi):                   | 1.9                |
| Maximum Conducted Output Power (dBm) | < 28.1             |

### 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 EUT to the wireless communication tester CMU200 via the antenna connector. The band class is set as AWS.

(b) Test the Conducted maximum output power by the CMU200.

#### Test setup

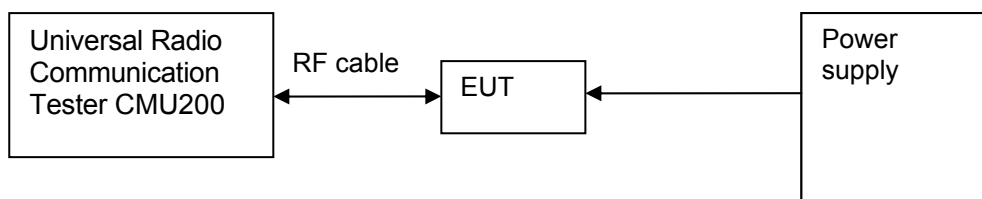


Figure 2. Test Set-up

### 6.2.4 Measurement Results

Table 19 Measurement Results

|                 |                                                     | RF Output Power(Conducted)  |       |                             |       |                             |       |
|-----------------|-----------------------------------------------------|-----------------------------|-------|-----------------------------|-------|-----------------------------|-------|
| TEST CONDITIONS |                                                     | Channel1312(B)<br>1712.4MHz |       | Channel1412(M)<br>1732.4MHz |       | Channel1513(T)<br>1752.6MHz |       |
|                 |                                                     | dBm                         |       | dBm                         |       | dBm                         |       |
|                 |                                                     | Measured                    | Limit | Measured                    | Limit | Measured                    | Limit |
| TM1             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.3V) | 23.61                       | 28.1  | 23.74                       | 28.1  | 23.92                       | 28.1  |
| TM2             | T <sub>nom</sub> (25 °C)<br>V <sub>nom</sub> (3.3V) | 23.59                       | 28.1  | 23.71                       | 28.1  | 23.90                       | 28.1  |

### 6.2.5 Conclusion

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

## 6.3 Modulation Characteristics

### 6.3.1 Test Conditions

Table 20 Test Conditions

|                      |                         |
|----------------------|-------------------------|
| Preconditioning:     | 0.5 hour                |
| Measured at:         | Antenna connector       |
| Ambient temperature: | 25 °C                   |
| Relative humidity:   | 52 %                    |
| Test Configurations: | TM1 at frequency Middle |

### 6.3.2 Test Specifications and Limits

#### 6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and Part 27 Subpart C&L

#### 6.3.2.2 Supporting Standards

Table 21 Supporting Standards:

|                       |                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004  | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards                                                        |
| 3GPP TS 34.121 V7.5.0 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

#### 6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 24 subpart E.

Table 22 Limits

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

### 6.3.3 Test Method and Setup

Connect the EUT to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as AWS; the EUT's output is matched with 50  $\Omega$  load, test method was according to 3GPP TS 34.121. The waveform quality and constellation of the EUT Module was tested.

#### Test setup

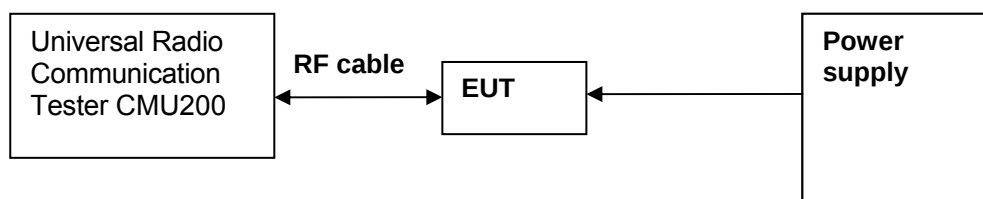


Figure 3. Test Set-up



### 6.3.4 Measurement Results

Table 23 Measurement Results

|                          |                         | Modulation Characteristic    |
|--------------------------|-------------------------|------------------------------|
| TEST CONDITIONS          |                         | Channel 1412(M)<br>1732.4MHz |
|                          |                         | Measured                     |
|                          |                         | TM1                          |
| T <sub>nom</sub> (25 °C) | V <sub>nom</sub> (3.3V) | 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 24 Test Conditions

|                      |                                      |
|----------------------|--------------------------------------|
| Preconditioning:     | 0.5 hour                             |
| Measured at:         | Antenna connector                    |
| Ambient temperature: | 25 °C                                |
| Relative humidity:   | 55 %                                 |
| Test Configurations: | TM1 at frequency Bottom, Middle, Top |

### 6.4.2 Test Specifications and Limits

#### 6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and Part 27

#### 6.4.2.2 Supporting Standards

Table 25 Supporting Standards:

|                       |                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004  | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards                                                        |
| 3GPP TS 34.121 V7.5.0 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

#### 6.4.2.3 Limits

No specific occupied bandwidth requirement in Part 27 Subpart C&L, 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 26 Limits

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

### 6.4.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSU26 via the one RF connector. The band class is set as AWS; The EUT was controlled to transmit maximum power. Measure and record the occupied bandwidth of the EUT HUAWEI U8150-A/U8150-A/Comet Module by the R&S FSU26.

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.

For TM1 following RBW and VBW are employed:

Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)

Video bandwidth (VBW): 500 kHz

### Test Set-up

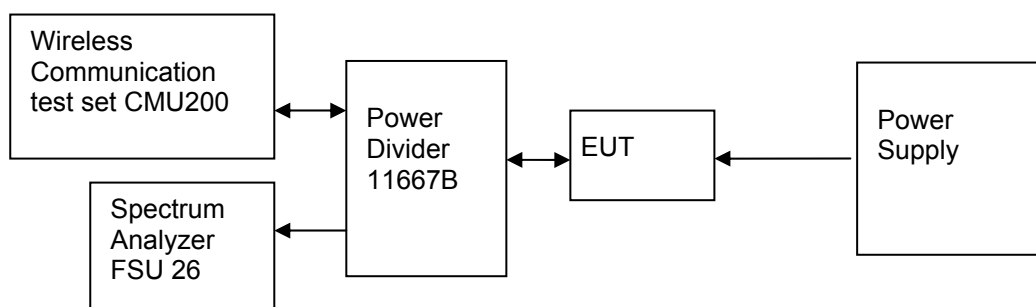


Figure 4. Test Set-up

### 6.4.4 Measurement Results

Table 27 Measurement Results

| TEST CONDITIONS             |     | Occupied Bandwidth          |                             |                             |
|-----------------------------|-----|-----------------------------|-----------------------------|-----------------------------|
| Center Frequency            |     | Channel1312(B)<br>1712.4MHz | Channel1412(M)<br>1732.4MHz | Channel1513(T)<br>1752.6MHz |
|                             |     | Measured<br>(MHz)           | Measured<br>(MHz)           | Measured<br>(MHz)           |
|                             |     | TM1                         | TM1                         | TM1                         |
| Tnom (25 °C)<br>Vnom (3.7V) | 99% | 4.18                        | 4.18                        | 4.18                        |

### 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 28 Test Conditions

|                      |                              |
|----------------------|------------------------------|
| Preconditioning:     | 0.5 hour                     |
| Measured at:         | Antenna connector            |
| Ambient temperature: | 25°C                         |
| Relative humidity:   | 55 %                         |
| Test Configurations: | TM1 at frequency Bottom, Top |

### 6.5.2 Test Specifications and Limits

#### 6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part 27.53

#### 6.5.2.2 Supporting Standards

Table 29 Supporting Standards:

|                       |                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004  | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards                                                        |
| 3GPP TS 34.121 V7.5.0 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

#### 6.5.2.3 Limits

Compliance with Part 27.50(d) (2), all spurious emission must be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$  (W). (Whereas P is the rated power of the EUT).

Table 30 Limits

|                       |                                            |
|-----------------------|--------------------------------------------|
|                       | TM3                                        |
| Rated Power:          | 24 dBm                                     |
| Required attenuation: | $43 + 10 \log(0.25) = 37$ , 24 dBm - 37 dB |
| Absolute level        | - 13 dBm                                   |

### 6.5.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as AWS. The EUT controlled to transmit maximum power. Measure and record band edges compliance of the EUT by the R&S FSU26.

For TM1 following RBW and VBW are employed:

Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)

Video bandwidth (VBW): 200 kHz

## Test Set-up

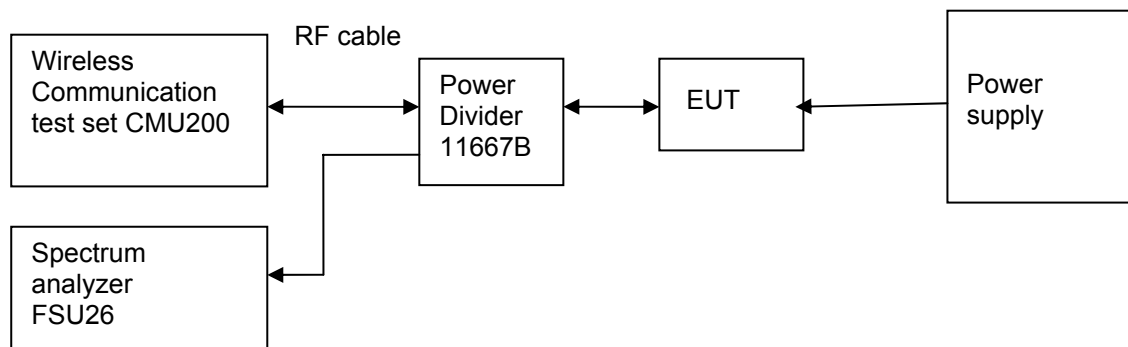


Figure 5. Test Set-up

## 6.5.4 Measurement Results

Table 31 Measurement Results outside Band Edges-- Single Carrier

| Band     | Frequency of Band edges [MHz]       | Channel Number | Test Mode | Spurious Level measured [dBm] | FCC limit | Result |
|----------|-------------------------------------|----------------|-----------|-------------------------------|-----------|--------|
| Cellular | $T_{nom}$ (25 °C), $V_{nom}$ (3.3V) |                |           |                               |           |        |
|          | 1712.4                              | 1312           | TM1       | <-13(See appendix C)          | - 13 dBm  | Pass   |
|          | 1752.6                              | 1513           | TM1       | <-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 32 Test Conditions

|                      |                                      |
|----------------------|--------------------------------------|
| Preconditioning:     | 0.5 hour                             |
| Measured at:         | Antenna connector                    |
| Ambient temperature: | 25°C                                 |
| Relative humidity:   | 50 %                                 |
| Test Configurations: | TM1 at frequency Bottom, Middle, Top |

### 6.6.2 Test Specifications and Limits

#### 6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and Part 27.53

#### 6.6.2.2 Supporting Standards

Table 33 Supporting Standards:

|                       |                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004  | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards                                                        |
| 3GPP TS 34.121 V7.5.0 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

#### 6.6.2.3 Limits

Compliance with Part 27.50(d)(2), 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 34 Limits

|                       |                                            |
|-----------------------|--------------------------------------------|
|                       | TM1                                        |
| Rated Power:          | 24 dBm                                     |
| Required attenuation: | $43 + 10 \log(0.25) = 37$ , 24 dBm - 37 dB |
| Absolute level        | - 13 dBm                                   |

### 6.6.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as AWS. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT by the R&S FSU26.

According to Part 27.50(d) (2), the defined measurement bandwidth as following:

24.238 (b) Measurement procedure: Compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;  
Measurement bandwidth (RBW) for 150 kHz up to 30MHz: 10 kHz;  
Measurement bandwidth (RBW) for 30 MHz up to 20GHz: 1MHz;

## Test Set-up

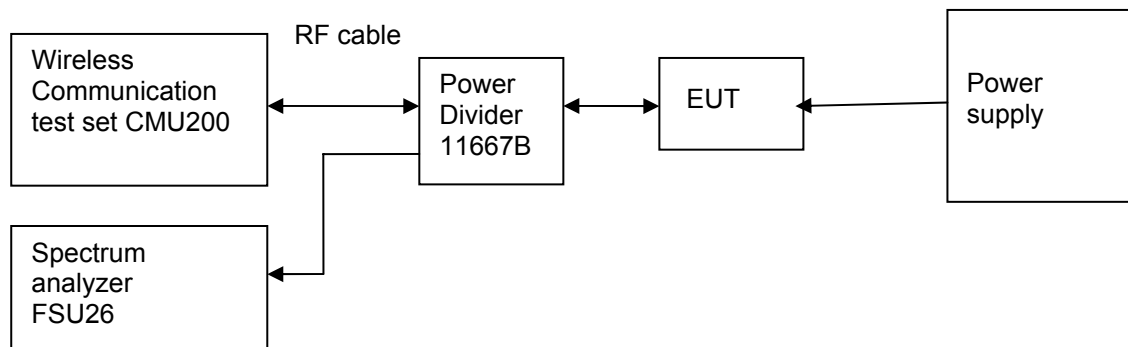


Figure 6. Test Set-up

## 6.6.4 Measurement Results

Table 35 Measurement Results

| Channel Number  | Test Mode | Test Range (Frequency) | Output Power [dBm] | Spurious Level measured [dBm] | FCC limit | Result |
|-----------------|-----------|------------------------|--------------------|-------------------------------|-----------|--------|
| Channel 1312(B) | TM1       | 9 kHz~20GHz            | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
| Channel 1412(M) | TM1       | 9 kHz~20GHz            | 24                 | <- 13 dBm<br>(See appendix D) | - 13 dBm  | Pass   |
| Channel 1513(T) | TM1       | 9 kHz~20GHz            | 24                 | <- 13 dBm<br>(See appendix D) | - 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 Frequency Stability

### 6.7.1 Test Conditions

Table 36 Test Conditions

|                      |                         |
|----------------------|-------------------------|
| Preconditioning:     | 0.5 hour                |
| Measured at:         | Antenna connector       |
| Ambient temperature: | See below               |
| Relative humidity:   | 55 % at 25 °C           |
| Test Configurations: | TM1 at frequency Middle |

### 6.7.2 Test Specifications and Limits

#### 6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and Part 27.54

#### 6.7.2.2 Supporting Standards

Table 37 Supporting Standards:

|                       |                                                                                                                                            |
|-----------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| ANSI/TIA-603-C: 2004  | Land Mobile FM or PM Communications Equipment Measurement and Performance Standards                                                        |
| 3GPP TS 34.121 V7.5.0 | Technical Specification Group Radio Access Network; User Equipment (UE) conformance specification; Radio transmission and reception (FDD); |

#### 6.7.2.3 Limits

No specific frequency stability requirement in part 2.1055 and Part 27.50(d)(2).

### 6.7.3 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

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10° 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.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 95 to 105 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.

(c) 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) 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.)

The EUT can only work in such extreme voltage 3.6V and 4.2V, so here the EUT is tested in the 3.6V and 4.2V.

## Test Set up

Connect the EUT to the Wireless Communication test set CMU200 via the connector. Then measure the frequency error by the Wireless Communication test set CMU200. The EUT's output is matched with a 50  $\Omega$  load.

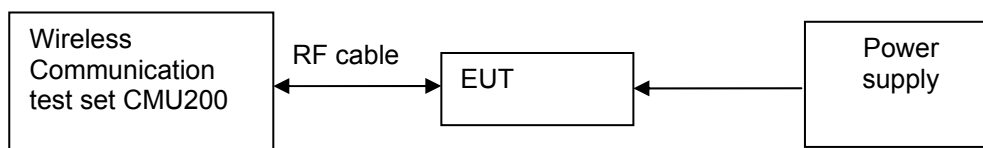


Figure 7. Test Set up

## 6.7.4 Measurement Results

### 6.7.4.1 Measurement Results vs. Variation of Temperature

- **TM1, 3.6V DC Channel No.4182(836.4MHz)**

Table 38 Measurement Results vs. Variation of Temperature—TM1

| Temperature | Nominal Frequency<br>(MHz) | Measured Frequency Error(Hz) | Result |
|-------------|----------------------------|------------------------------|--------|
| -30 °C      | 1732.4                     | -12                          | Pass   |
| -20 °C      | 1732.4                     | -2                           | Pass   |
| -10 °C      | 1732.4                     | 3                            | Pass   |
| 0 °C        | 1732.4                     | 9                            | Pass   |
| +10 °C      | 1732.4                     | 16                           | Pass   |
| +20 °C      | 1732.4                     | 4                            | Pass   |
| +30 °C      | 1732.4                     | -7                           | Pass   |
| +40 °C      | 1732.4                     | -11                          | Pass   |
| +50 °C      | 1732.4                     | 5                            | Pass   |



#### 6.7.4.2 Measurement Results vs. Variation of Voltage

- **TM1, 25 °C ,Channel No. 4182(836.4MHz)**

Table 39 Measurement Results vs. Variation of Voltage—TM1

| Voltage | Nominal Frequency<br>(MHz) | Measured<br>Frequency Error(Hz) | Result |
|---------|----------------------------|---------------------------------|--------|
| 4.2 V   | 1732.4                     | 5                               | Pass   |
| 3.7 V   | 1732.4                     | -14                             | Pass   |
| 3.6 V   | 1732.4                     | -8                              | Pass   |

#### 6.7.5 Conclusion

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



## 7 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 40 System Measurement Uncertainty

| Items                                           |                         | Extended Uncertainty |
|-------------------------------------------------|-------------------------|----------------------|
| Effective Radiated Power of Transmitter         | EIRP (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       |



## 8 Appendices

|            |                                                           |          |
|------------|-----------------------------------------------------------|----------|
| Appendix A | Measurement Results Modulation Characteristics            | 2 Pages  |
| Appendix B | Measurement Results Occupied Bandwidth                    | 4 Pages  |
| Appendix C | Measurement Results Band Edges                            | 3 Pages  |
| Appendix D | Measurement Results Spurious Emission at Antenna Terminal | 10 Pages |