



FCC Test Report

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

Model Number: HUAWEI U8110-5/U8110-5

**Report No: SYBHZ(R)E004092010EB-2
FCC ID: QISU8100-5**

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

M/N: HUAWEI U8110-5/U8110-5

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REGULATION **FCC CFR47 Part 2: Subpart J;**
FCC CFR47 Part 22: Subpart H;

CONCLUSION **PASS**

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	Date	Name	Signature

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1 Summary

The table below summarizes the measurements and results for the HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth. 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 Terminal	PASS
2.1055	22.355	Frequency Stability	PASS
2.1053	22.917	Radiated Spurious Emissions	(See Note)

Note: The Radiated Spurious Emissions' test results are shown in the EMC report.



2 Product Description

2.1 Production Information

2.1.1 General Description

HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth- HUAWEI U8110-5/U8110-5 is subscriber equipment in the WCDMA/GSM system. The HSDPA/UMTS frequency band is Band II and Band V, but only Band V band test data included in this report. The GSM/GPRS/EDGE frequency band includes GSM850 and DCS1800 and PCS1900, but only GSM850 band test data included in this report. 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 WCDMA Band V and GSM/GPRS/EDGE 850MHz (GSM) band was included in this report for the requirement of FCC part 2 & 22.

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
Voice and data	Modulation: GMSK	TM1	GPRS/GSM
Data	Modulation: 8PSK	TM2	EDGE
Data	Modulation: QPSK	TM3	WCDMA
Data	Modulation: QPSK	TM4	HSDPA

Note: * The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V5.4.0 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V5.4.0. The specified WCDMA test conditions & settings are defined in 3GPP TS 34.121 V7.3.0.

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				
Not applicable				
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. 25, 2010 –Sep. 26, 2010

3.2 General Set up Description

TM1: GPRS/GSM Mode with GMSK Modulation

TM2: EDGE Mode with 8PSK Modulation

TM3: WCDMA Mode with QPSK Modulation

TM4: HSDPA Mode with QPSK Modulation



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

	EDGE/GPRS/GSM	UMTS/HSDPA
Channel Raster	200kHz	200kHz
Channel Spacing:	200kHz	5MHz

4.1.3 Type of Emission

Table 6 Type of Emission

	GPRS/GSM	EDGE	UMTS/HSDPA
Emission Designation:	300KGXW	300KG7W	5M00F9W

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:	~ 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 9 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 10 Board Information

HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone with Bluetooth		
HUAWEI U8110-5/U8110-5		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
MAINBOARD	A97NAB1070603951	HD1U811M Ver.B

4.2.2 Battery Technical Data

Type:	Rechargeable Li-ion
Manufacturer:	Huawei Technologies Co., Ltd.
Battery Model:	HB5A2H
Rated capacity:	1150mAh
Nominal Voltage:	≡ +3.7V
Charging Voltage:	≡ +4.2V

4.2.3 FCC Identification

Grantee Code: QIS
Product Code: U8100-5
FCC Identification: QISU8100-5



5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (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- 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 0	10.23.2010
Universal Radio Communication Tester	R&S	CMU200	112347	03.30.2011
Wireless 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 (ERP)

6.1.1 Test Conditions

Table 12 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3/TM4 at frequency Bottom, Middle, Top

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
3GPP TS51.010 V5.4.0	Digital cellular telecommunications system; Mobile Station (MS) conformance specification;
3GPP TS 34.121 V7.3.0	Universal Mobile Telecommunications System (UMTS); User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

6.1.2.3 Limits

Compliance with part 22.913, mobile/portable stations are limited to 7 watts ERP peak power. The calculated longitude ERP by following formula: $ERP(dBm) = 10 \cdot \log(ERP_{in\ mwatts})$.

Table 14 Limits

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

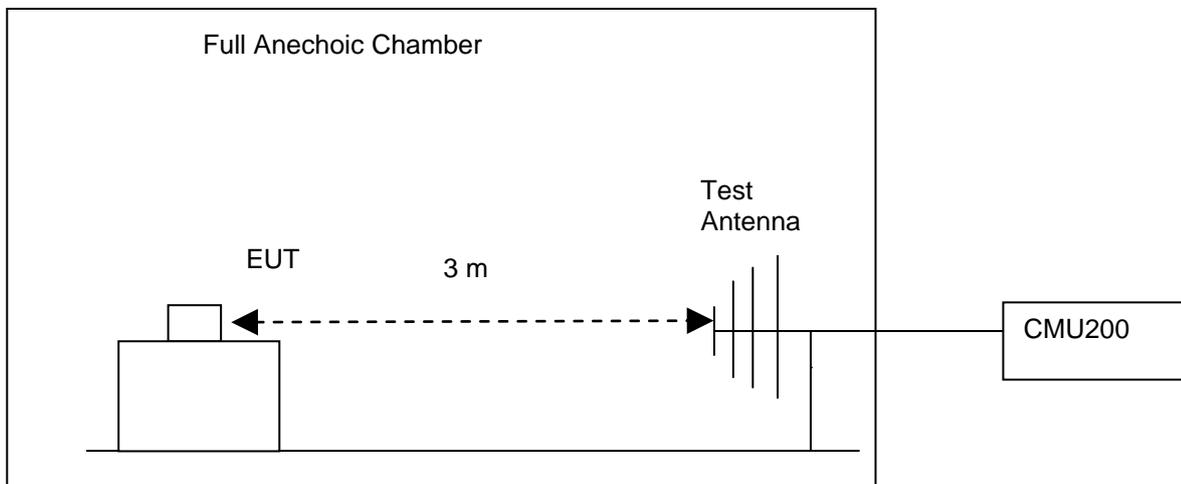
6.1.3 Test Method and Setup

- (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP 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 Phone to the wireless communication tester CMU200 via the air interface. The band class is set as GSM850M and WCDMA850M.
- (b) 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 ERP

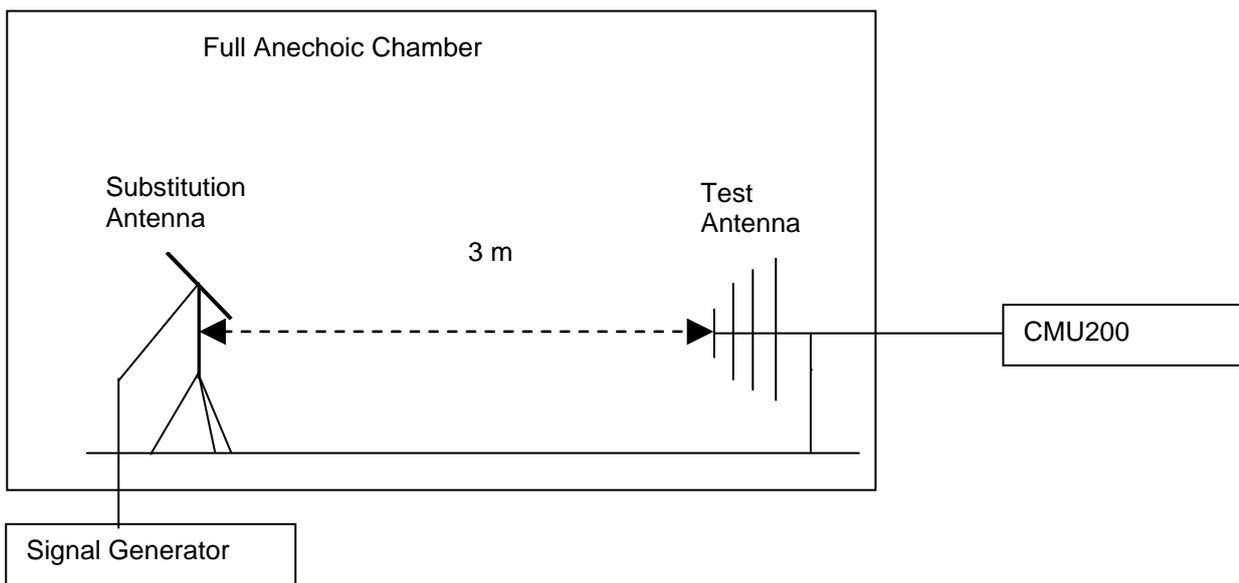


Figure 1. Test Set-up

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

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	0.0	22.61
2	12/15	15/15	64	12/15	24/15	1.0	0.0	22.47
3	15/15	8/15	64	15/8	30/15	1.5	0.5	21.31
4	15/15	4/15	64	15/4	30/15	1.5	0.5	20.74

For the following test, the TM4 was used for HSDPA.

Table 15 Measurement Results

TEST CONDITIONS		RF Output Power (ERP)					
		Channel128(B) 824.2MHz		Channel192 (M) 837MHz		Channel251(T) 848.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.7V)	30.73	38.5	30.52	38.5	30.21	38.5
TM2	T _{nom} (25 °C) V _{nom} (3.7V)	25.06	38.5	24.91	38.5	24.64	38.5
TEST CONDITIONS		Channel4132(B) 826.4MHz		Channel4182(M) 836.4MHz		Channel4233(T) 846.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM3	T _{nom} (25 °C) V _{nom} (3.7V)	20.82	38.5	20.58	38.5	20.54	38.5
TM4	T _{nom} (25 °C) V _{nom} (3.7V)	20.69	38.5	20.61	38.5	20.50	38.5

6.1.4.2 Substitution Results

Table 16 Substitution Results

Test	Freq.	Meas.	Substitution	SGP	Substitution	Cable	Substitution	Limit	Result
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Mode	[MHz]	Level [dBm]	Antenna Type	[dBm]	Gain [dBd]	Loss [dB]	Level (ERP) [dBm]	[dBm]	
TM1	824.2	30.73	Dipole Ant.	34.39	-2.95	0.6	30.84	38.5	Pass
TM1	837	30.52	Dipole Ant	34.38	-3.06	0.6	30.72	38.5	Pass
TM1	848.8	30.21	Dipole Ant	34.24	-3.11	0.6	30.53	38.5	Pass
TM2	824.2	25.06	Dipole Ant	28.92	-2.95	0.6	25.37	38.5	Pass
TM2	837	24.91	Dipole Ant.	28.72	-3.06	0.6	25.06	38.5	Pass
TM2	848.8	24.64	Dipole Ant	28.69	-3.11	0.6	24.98	38.5	Pass
TM3	826.4	20.82	Dipole Ant	24.61	-2.95	0.6	21.06	38.5	Pass
TM3	836.4	20.58	Dipole Ant	24.52	-3.06	0.6	20.86	38.5	Pass
TM3	846.6	20.54	Dipole Ant.	24.43	-3.11	0.6	20.72	38.5	Pass
TM4	826.4	20.69	Dipole Ant	24.46	-2.95	0.6	20.91	38.5	Pass
TM4	836.4	20.61	Dipole Ant	24.51	-3.06	0.6	20.85	38.5	Pass
TM4	846.6	20.50	Dipole Ant.	24.39	-3.11	0.6	20.68	38.5	Pass

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

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

NOTE: SGP- Signal Generator Level

b, A GSM signal with bandwidth of 200kHz & A WCDMA signal with bandwidth of 5MHz is created by the vector generator R&S SMU200A.

c, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 200kHz for TM1 and TM2, 5MHz for TM3 and TM4 and TM5.

6.1.5 Conclusion

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

6.2 Conducted Power of Transmitter

6.2.1 Test Conditions

Table 17 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3/TM4 at frequency Bottom, Middle, Top

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

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

6.2.2.2 Supporting Standards

Table 18 Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V5.4.0	Digital cellular telecommunications system; Mobile Station (MS) conformance specification;
3GPP TS 34.121 V7.3.0	Universal Mobile Telecommunications System (UMTS); User Equipment (UE) conformance specification; Radio transmission and reception (FDD);

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:

$$ERP(\text{dBm}) = 10 \cdot \log(ERP_{\text{in mwatts}})$$

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

$$P_{\text{cod}}(\text{dBm}) = ERP(\text{dBm}) - \text{Gain}(\text{dBd})$$

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

Table 19 Limits

Maximum Output Power (Watts)	< 7 Watts(38.5dBm)
Antenna Gain(dBi):	2.75
Antenna Gain(dBd):	-2
Maximum Conducted Output Power (dBm)	< 40.5dBm

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 Phone to the wireless communication tester CMU200 via the antenna connector. The band class is set as GSM850M and WCDMA850M.

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

Test setup

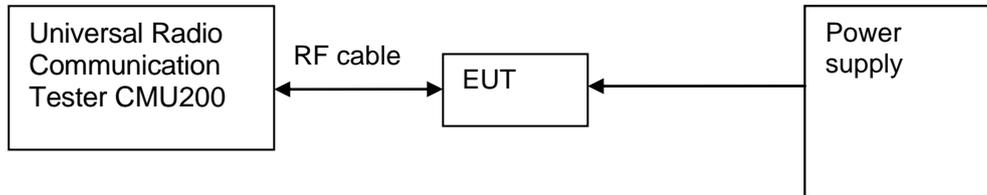


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 20 Measurement Results

TEST CONDITIONS		RF Output Power (Conducted)					
		Channel128(B) 824.2MHz		Channel192 (M) 837MHz		Channel251(T) 848.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T _{nom} (25 °C) V _{nom} (3.7V)	32.73	40.5	32.52	40.5	32.21	40.5
TM2	T _{nom} (25 °C) V _{nom} (3.7V)	27.06	40.5	26.91	40.5	26.64	40.5
TEST CONDITIONS		Channel4132(B) 826.4MHz		Channel4182(M) 836.4MHz		Channel4233(T) 846.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM3	T _{nom} (25 °C) V _{nom} (3.7V)	22.82	40.5	22.58	40.5	22.54	40.5
TM4	T _{nom} (25 °C) V _{nom} (3.7V)	22.69	40.5	22.61	40.5	22.50	40.5



6.2.5 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 21 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=2.2dB; k=2