FCC Test Report

Product Name: GSM Mobile Phone

Model Number: HUAWEI G2100

Report No: SYBHZ(R)E021042010EB-1
FCC ID: QISG2100

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REPORT ON	FCC Test of Huawei GSM Mobile Phone
	M/N: HUAWEI G2100
	Report No: SYBHZ(R)E021042010EB-1
	FCC ID: QISG2100
REGULATION	FCC CFR47 Part 2: Subpart J;
	FCC CFR47 Part 22: Subpart H;
CONCLUSION	PASS

General Manager	2010.04.27	张兴海	
	Date	Name	signature
Test Lab Engineer	2010.04.22	胡 俊	
	Date	Name	signature

Contents

1 Summary

The table below summarizes the measurements and results for the Huawei GSM Mobile Phone HUAWEI G2100. 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	PASS

2 Product Description

2.1 Production Information

2.1.1 General Description

Huawei GSM Mobile Phone HUAWEI G2100 is subscriber equipment in the GSM system. The frequency band is GSM 850. The Mobile Phone implements such functions as RF signal receiving Transmitting, GSM protocol processing, voice service etc.

2.1.2 Support function and Service

The Mobile Phone HUAWEI G2100 support the function and service as follows:

Table 2 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
Voice	Modulation: GMSK	TM1*	GSM

Note: * The specified GSM test conditions & settings are defined in 3GPP TS51.010 V6.1.0

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

April.20.2010 ～ April.22.2010

3.2 General Set up Description

Huawei GSM Mobile Phone HUAWEI G2100 is subscriber equipment in the GSM system. The frequency band is GSM 850.

TM1: GSM Mode with GMSK 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

Channel spacing:	200 kHz
Channel raster	200 kHz

4.1.3 Type of Emission

Table 6 Type of Emission

Emission Designation:	300kGXW

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:	~120V
AC voltage range	~100V-~240V
AC current maximal:	400mA

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 RF module DC Voltages and Currents

Voltage:	⎓ +3.7 VDC
Current:	120mA 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

GSM Mobile Phone		
HUAWEI G2100		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
-Main board	020UGM4C03000054	HG1G2100M VER.B RF
-LCD	200901102399	TM128128H1KFWGWC
-Battery	FMTA205XB3933424	HB5E1

4.2.2 Adapter Technical Data

AC/DC Adapter Model:	HS-050040U2
Manufacturer:	Huawei Technologies Co., Ltd.
Rated Voltage	~ 120V, 60Hz
Input Voltage:	~ 100-240V 50/60Hz
Output Voltage;	⎓ 5.0V
Rated Power:	2W
S/N:	BYA951944719

4.2.3 Battery Technical Data

Battery Model:	HB5E1
Rated capacity:	700mAh
Nominal Voltage:	⎓ +3.7V
Charging Voltage:	⎓ +4.2V

4.2.4 FCC Identification

Grantee Code: **QIS**
Product Code: **G2100**
FCC Identification: **QISG2100**

5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (yyyy.MM.dd)
Receiver	R&S	ESIB 26	100318	2011.04.20
Loop Antenna	Schwarzbeck	FMZB1516	1516115	2011.03.10
BiLog Antenna	Schaffner	CBL 6112B	2747	2010.09.21
Horn Antenna	ETS-Lindgren	3117	00062553	2010.09.21
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	2010.10.11
Signal Generator	R&S	SMT06	830264/009	2010.05.11
Signal Generator	R&S	SMR 40	100325	2010.05.11
Signal Generator	R&S	SMU200A	103235	2011.04.10
Power Supply	Agilent	66319	MY43003185	2010.08.06
Climate Chamber	WEISS	ACS-1	3604040034	2010.06.05
Universal Radio Communication Tester	R&S	CMU200	114634	2010.12.24
Directional coupler	Shanghai HUAXIANG	DDTO-4-20	3907122688	2010.11.23
Spectrum Analyzer	Agilent	PSA E4440A	MY46187665	2010.08.31

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:	25℃
Relative humidity:	55%
Test Configurations:	TM1 at frequency B, M, 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
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.1.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of a mobile Phone transmitter exceed 7 W. And calculate longitude ERP by following formula：ERP(dBm)= 10*log ($ERP_{in\ mwatts}$).
EIRP (dBm)=ERP(dBm)+2.15dB.

Table 14 Limits

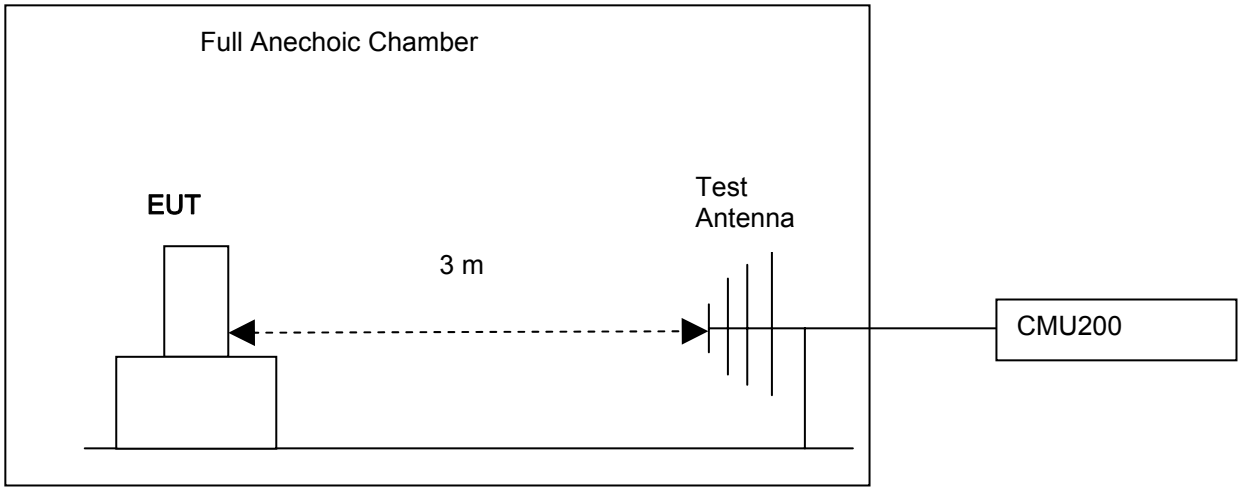
Maximum Output Power (Watts)	< 7 Watts
Maximum Output Power (dBm)	< 38.5 dBm

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 Phone to the wireless communication tester CMU200 via the air interface. The band class is set as GSM 850.
(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

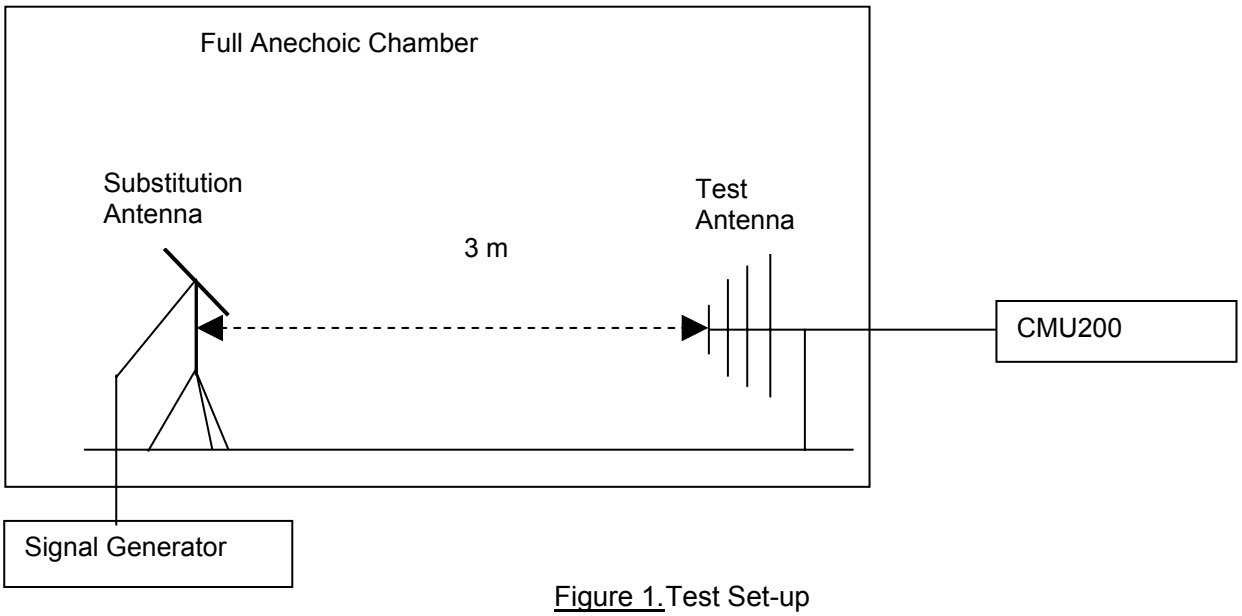


Figure 1.Test Set-up

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

Table 15 Measurement Results

TEST CONDITIONS		RF Output Power					
		Channel128(B) 824.2MHz		Channel 192(M) 837MHz		Channel251(T) 848.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	Tnom (25 °C) Vnom (3.7 V)	29.15	38.5	29.21	38.5	29.17	38.5

6.1.4.2 Substitution Results

Table 16 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBd]	Cable Loss [dB]	Substitution Level (ERP) [dBm]	Limit [dBm]	Result
TM1	824.2	29.15	Dipole Ant.	32.68	-2.95	0.6	29.13	38.5	Pass
TM1	837	29.21	Dipole Ant.	32.85	-3.06	0.6	29.19	38.5	Pass
TM1	848.8	29.17	Dipole Ant.	32.85	-3.11	0.6	29.14	38.5	Pass

Note:

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

ERP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBd]

NOTE: SGP- Signal Generator Level

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

c, RBW=10kHz, VBW=30kHz, and integrated by the instrument to 200kHz for TM1.

6.1.5 Conclusion

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

6.2 Conducted output power

6.2.1 Test Conditions

Table 17 Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	25℃
Relative humidity:	55%
Test Configurations:	TM1 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 18 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.2.2.3 Limits

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

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

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

Table 19 Limits

Maximum Output Power (Watts)	< 7 Watts=(38.5 dBm)
Antenna Gain(dBi):	-1Bi
Antenna Gain(dBd):	-3.15dBd
Maximum Conducted Output Power (dBm)	< 41.65dBm

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 GSM 850.
(b)Test the Conducted maximum output power by the CMU200.

Test setup

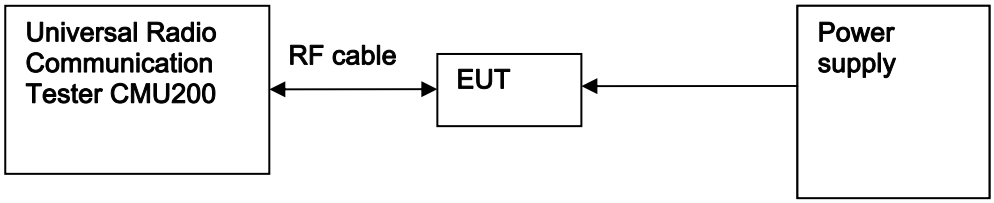


Figure 2.Test Set-up

6.2.4 Measurement Results

Table 20 Measurement Results

TEST CONDITIONS		RF Output Power					
		Channel128(B) 824.2MHz		Channel192 (M) 837MHz		Channel251(T) 848.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	Tnom (25 °C) Vnom (3.7 V)	32. 33	41.65	32.39	41.65	32.37	41.65

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:	55 %
Test Configurations:	TM1 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
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

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 Phone to Wireless Communication Test Set R&S CMU200 via the antenna connector. The band class is set as GSM 850; the Mobile Phone's output is matched with 50 Ω loads, test method was according to 3GPP TS 51.010 .The Phase Error and Frequency Error of the Mobile Phone was tested.

Test setup

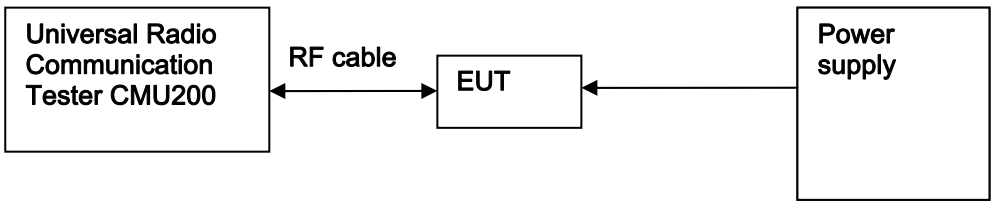


Figure 3.Test Set-up

6.3.4 Measurement Results

Table 24 Measurement Results

		Modulation Characteristic
TEST CONDITIONS		Channel192(M) 837MHz
		Measured
T_{nom} (25 °C)	V_{nom} (3.7V)	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:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1 at frequency B, M, 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
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

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

The EUT was connected to the wireless communication test set CMU200 and the Spectrum Analyzer E4440A via the divider. The band class is set as GSM 850; The EUT was controlled to transmit Maximum power. Measure and record the Occupied Bandwidth of the the EUT by the Spectrum Analyzer E4440A

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): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz

Test Set-up

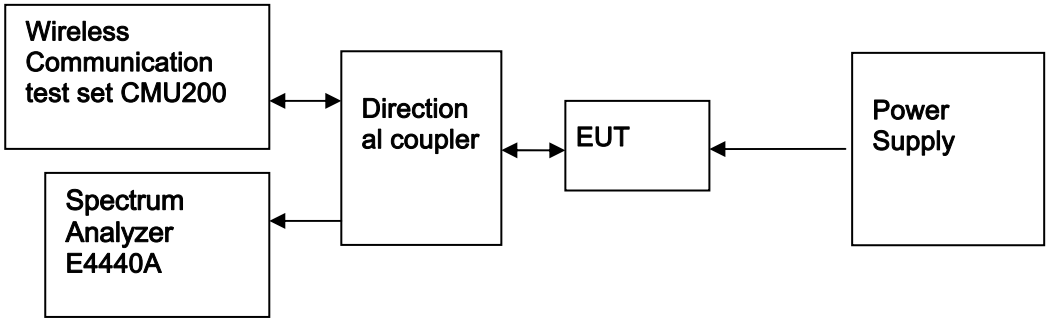


Figure 4.Test Set-up

6.4.4 Measurement Results

Table 28 Measurement Results

TEST CONDITIONS		Occupied Bandwidth		
		Channel128 (B) 824.2MHz	Channel192 (M) 837MHz	Channel251 (T) 848.8MHz
		Measured (kHz)	Measured (kHz)	Measured (kHz)
T_{nom} (25 °C) V_{nom} (3.7V)	99%	244.22	246.92	242.71
	-26dB	319.13	314.10	319.79

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:	55 %
Test Configurations:	TM1 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
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

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 in Watt).

Table 31 Limits

Rated Power:	33 dBm
Required attenuation:	43+10log (2) = 46 , 33 dBm - 46 dB
Absolute level	- 13 dBm

6.5.3 Test Method and Setup

The EUT was connected to the wireless communication test set CMU200 and the Spectrum Analyzer E4440A via the divider, the band class is set as GSM 850. The EUT was controlled to transmit Maximum power. Measure and record Band edge compliance of The EUT by the E4440A.

Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)
Video bandwidth (VBW): 10 kHz

Test Set-up

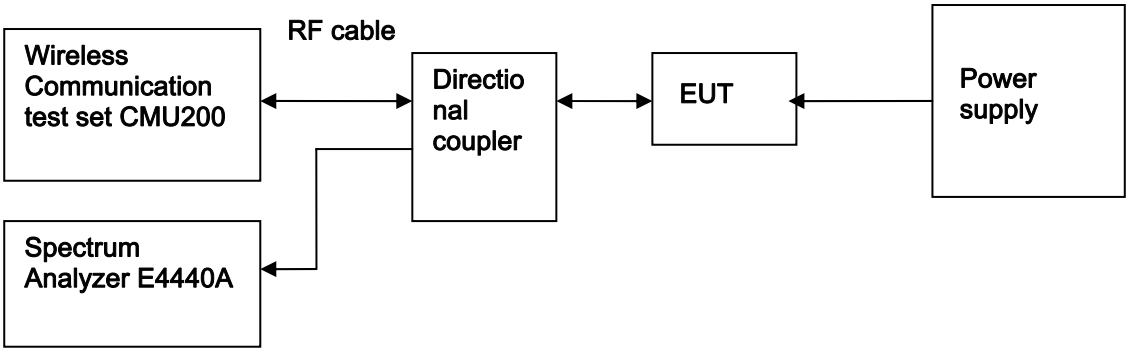


Figure 5. Test Set-up

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	Spurious Level measured [dBm]	FCC limit	Result
Cellular	T_{nom} (25 °C), V_{nom} (3.7V)					
	824.2	128	TM1	<-13(See appendix C)	- 13 dBm	Pass
	848.8	251	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 33 Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	TM1 at frequency B, M, 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
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

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 in Watt).

Table 35 Limits

Rated Power:	33dBm
Required attenuation:	43+10log (2) = 46 , 33 dBm - 46 dB
Absolute level	- 13 dBm

6.6.3 Test Method and Setup

The EUT was connected to the wireless communication test set CMU200 and the Spectrum Analyzer E4440A via the divider, the band class is set as GSM 850. The EUT was controlled to transmit Maximum power. Measure and record the Conducted Spurious Emission of the the EUT by the Spectrum Analyzer E4440A.

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

Measurement bandwidth (RBW) for 30 MHz up to 1 GHz: 100 kHz;
Measurement bandwidth (RBW) for 1 GHz up to 6 GHz: 1 MHz;
Measurement bandwidth (RBW) for 6 GHz up to 12.75 GHz: 1 MHz;

Test Set-up

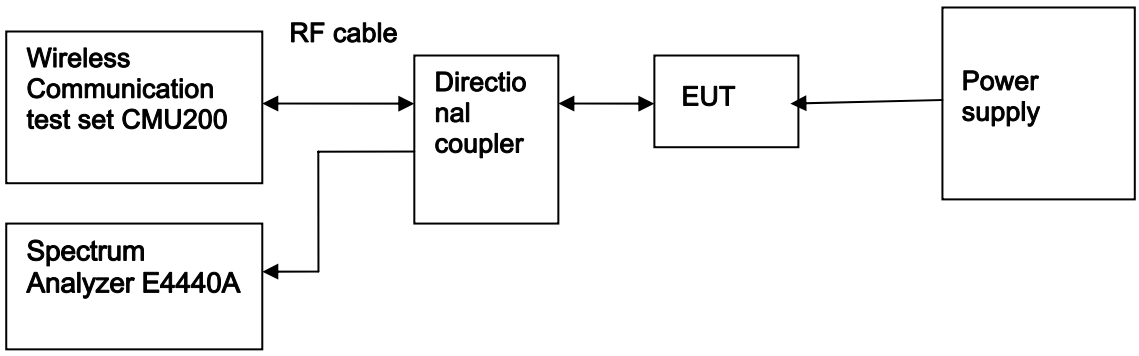


Figure 6. Test Set-up

6.6.4 Measurement Results at Conducted Spurious Emission

Table 36 Measurement Results

Channel Number	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 128(B)	9 kHz~12.75GHz	32.33	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 192(M)	9 kHz~12.75GHz	32.39	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 251(T)	9 kHz~12.75GHz	32.37	<- 13 dBm (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 37 Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	TM1 at frequency M

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 22.355

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
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.7.2.3 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.

6.7.3 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^{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.
(b) 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.

(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 3.5V and 4.2V，so here the EUT is tested in the 3.5V and 4.2V.

Test Set up

Connect the Mobile Phone 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 Ω loads.

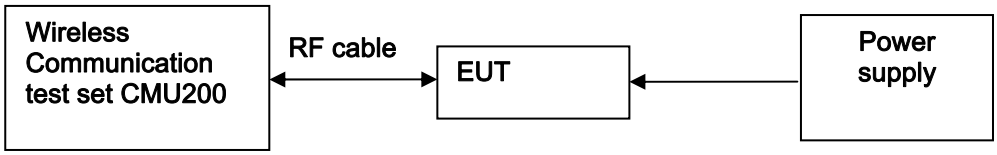


Figure 7. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

- TM1, 3.7V DC Channel No.192(837.0MHz)

Table 39 Measurement Results vs. Variation of Temperature

Temperature	Conducted Rated Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	32.5	837.0	-15	Pass
-20 °C	32.5	837.0	20	Pass
-10 °C	32.5	837.0	13	Pass
0 °C	32.5	837.0	-12	Pass
+10 °C	32.5	837.0	15	Pass
+20 °C	32.5	837.0	-11	Pass
+30 °C	32.5	837.0	15	Pass
+40 °C	32.5	837.0	-14	Pass
+50 °C	32.5	837.0	9	Pass

6.7.4.2 Measurement Results vs. Variation of Voltage

TM1, 25 °C, Channel No. 192(837MHz)

Table 40 Measurement Results vs. Variation of Voltage—TM1

Voltage	Conducted Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.5	32.5	837	-21	Pass
3.7	32.5	837	16	Pass
4.2	32.5	837	-14	Pass

6.7.5 Conclusion

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

6.8 Radiated Spurious Emissions

6.8.1 Test Conditions

Table 41 Test Conditions

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

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 22.917

6.8.2.2 Supporting Standards

Table 42 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Phone (MS) conformance specification;

6.8.2.3 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 43 Limits

Rated Power:	33 dBm
Required attenuation:	43+10log (2) = 46 , 33dBm – 46 dB
Absolute level	- 13 dBm

6.8.3 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 an 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 ESIB 26 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 ESIB 26 Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

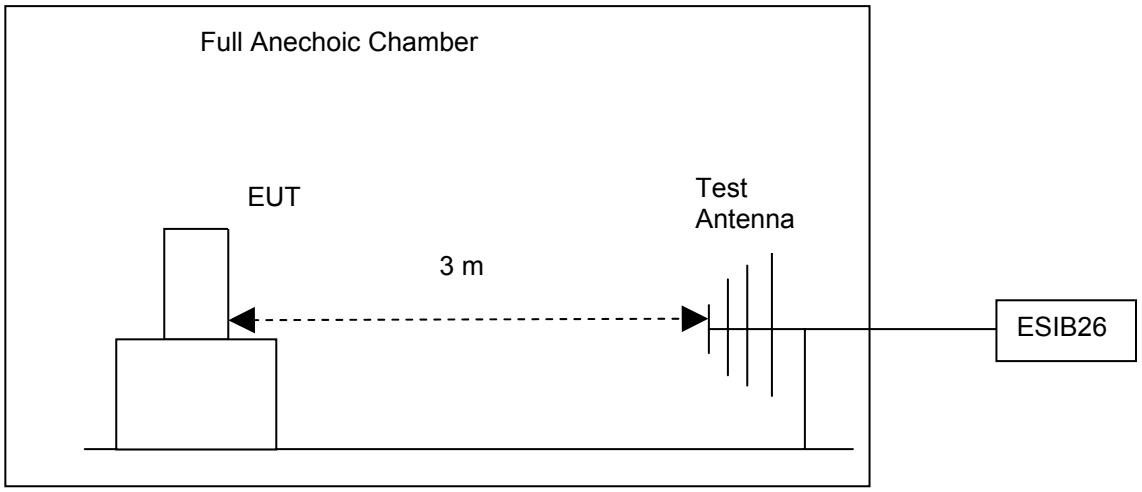
According to part 22.917, the defined measurement bandwidth as following:

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 18GHz: 1MHz;

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum ERP

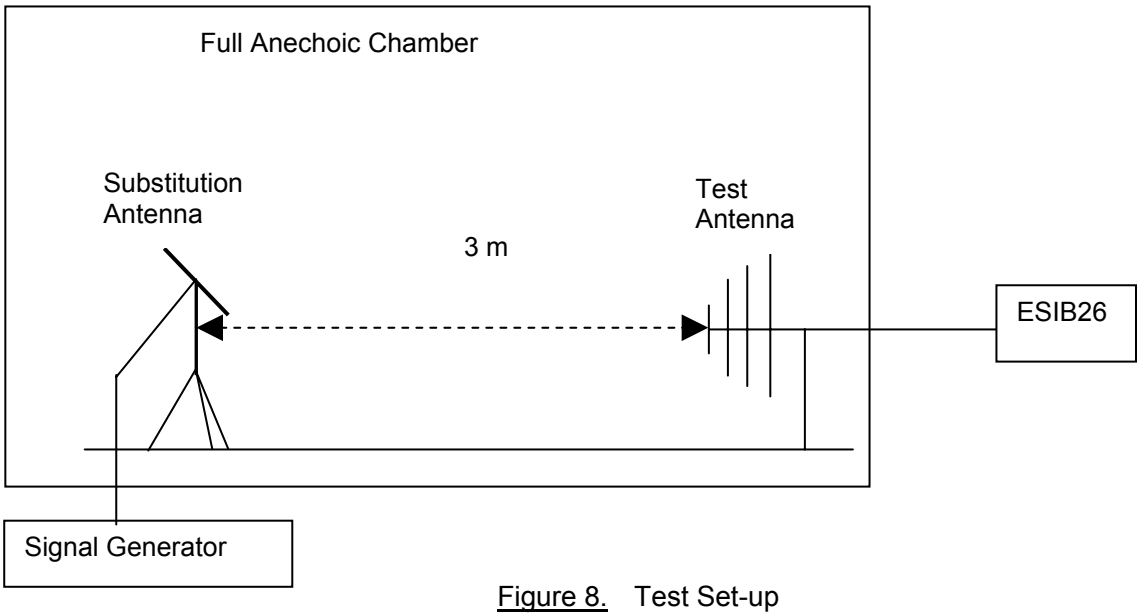


Figure 8. Test Set-up

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

6.8.4 Measurement Results

6.8.4.1 Pre-test Measurement Results

Table 44 Measurement Results

Channel Number	Test Range (Frequency)	Rated Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
192	9 kHz ~18 GHz	33	<- 13 dBm (See appendix E)	- 13 dBm	Pass

6.8.4.2 Substitution Results

No peak found in pre- test. All frequency points' margin are bigger than 20dB, so the substitution method isn't used.

Calculation Sample:

Table 45 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

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

6.8.5 Conclusion

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

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 46 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Radiated Power of Transmitter	ERP(dBm)	U=2.2dB; 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
Conducted Output Power	Power(dBm)	U=0.39dB; k=2
Radiated Spurious Emissions	ERP(dBm)	U＝2.2dB；k＝2

8 Appendixes

Appendix A	Measurement Results Modulation Characteristics	1 pages
Appendix B	Measurement Results Occupied Bandwidth	3 pages
Appendix C	Measurement Results Band Edges	2 pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	15 pages
Appendix E	Measurement Results Radiated Spurious Emissions	3 pages