FCC Test Report

Product Name: GSM Mobile Phone

Model Number: HUAWEI G2200

Report No: SYBH(R)E008122008EB-2
FCC ID: QISG2200

Reliability Laboratory of Huawei Technologies Co., Ltd.

Huawei Base, Bantian, Longgang District, Shenzhen 518129, P.R. China

Tel: +86 755 28780808 Fax: +86 755 89652518

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Huawei Technologies Co Ltd
Huawei Industrial Base,
Bantian Longgang
Shenzhen 518128, P.R China
Tel: +86 755 89651014
Fax: +86 755 89652518

REPORT ON FCC Test of HUAWEI GSM Mobile Phone

M/N: HUAWEI G2200

Report No: SYBH(R)E008122008EB-2

FCC ID: QISG2200

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

FCC CFR47 Part 24: Subpart E;

FCC CFR47 Part 15: Subpart B;

CONCLUSION **PASS**

General Manager	**2008.12.22**	张兴海	
	Date	Name	signature
Technical Responsibility For Area of Testing	**2008.12.20**	余 辉	
	Date	Name	signature
Test Lab Engineer	**2008.12.18**	胡 俊	
	Date	Name	signature

Contents

1 Summary

The table below summarizes the measurements and results for the HUAWEI GSM/GPRS Mobile Phone HUAWEI G2200. 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	24.232	Effective Radiated Power of Transmitter	PASS
2.1046	24.232	Conducted Power of Transmitter	PASS
2.1047	/	Modulation Characteristics	PASS
2.1049	/	Occupied Bandwidth	PASS
2.1051	24.238	Band Edges Compliance	PASS
2.1053	24.238	Radiated Spurious Emissions at Antenna Terminal	PASS
2.1053	24. 238	Radiated Spurious Emissions	PASS
2.1055	24.235	Frequency Stability	PASS
-	15.107	Conducted Emission at Power Port	PASS
-	15.109	Radiated Emission of Enclosure in Idle Mode	PASS

2 Product Description

2.1 Production Information

2.1.1 General Description

Huawei GSM Mobile Phone HUAWEI G2200 is subscriber equipment in the GSM system. The frequency band support GSM 850 and PCS. The Mobile Phone implements such functions as RF signal receiving /Transmitting, GSM protocol processing, voice etc.

2.1.2 Support function and Service

The Mobile Phone HUAWEI G2200 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

The test site description has been submitted to FCC and registration granted under the registration number **97456** on April 20.2006 . The test site has been accredited by A2LA and the accredited number is **2174.01** in July of 2008

3.1 Testing Period

The test have been performed during the period of

DEC. 15, 2008 –DEC.16, 2008

3.2 General Set up Description

Huawei GSM Mobile Phone HUAWEI G2200 is subscriber equipment in the GSM system. The tested band is PCS 1900 at this report.

TM1: GSM Mode with GMSK Modulation

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Table 4 Frequency Range

Uplink band:	1850 to 1910 MHz
Downlink band:	1930 to 1990 MHz

4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

Channel spacing	200 kHz
Channel separation:	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:	⎓ +3.7VDC
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

HUAWEI GSM Mobile Phone		
HUAWEI G2200		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
-Main board	020LRT4C8B000162	HG1G2200M VER.A
-LCD	4317L-081110-F-9-64	BYD4317M81118M
-Battery	GAG8918XC3833555	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：	HKA850703293

4.2.3 Battery Technical Data

Battery Model: HB5E1

Rated capacity: 800mAh

Nominal Voltage: ⎓ +3.7V

Charging Voltage: ⎓ +4.2V

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: G2200
FCC Identification: QISG2200

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	04.21.2009
Loop Antenna	Schwarzbeck	FMZB1516	1516115	03.10.2009
BiLog Antenna	Schaffner	CBL 6112B	2941	03.17.2009
Horn Antenna	ETS-Lindgren	3117	00062553	08.15.2009
Horn Antenna	ETS-Lindgren	3160	00031541	08.03.2009
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	10.11.2009
Receiver	R&S	ESMI	829179/008	04.21.2009
Receiver	R&S	ESCS30	830245/018	04.21.2009
Signal Generator	R&S	SMR 40	100325	05.11.2009
Signal Generator	R&S	SMU200A	101717	04.10.2009
Power Supply	Keithley	2306	1045337	05.11.2009
Universal Radio Communication Tester	R&S	CMU200	105822	10.10.2009
Climate Chamber	WEISS	ACS-1	3604040034	03.20.2009
Spectrum Analyzer	Agilent	PSA E4440A	MY46187664	02.26.2009

6 Transmitter Measurements

6.1 Effective Isotropic Radiated Power of Transmitter (EIRP)

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 Bottom、Middle、Top

6.1.2 Test Specifications and Limits

6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

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 Phone (MS) conformance specification;

6.1.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a mobile Phone transmitter exceed 2 W. And calculate longitude EIRP by following formula：EIRP(dBm)= 10*log ($EIRP_{in\ mwatts}$). EIRP(dBm)=ERP(dBm)+2.15dB.

Table 14 Limits

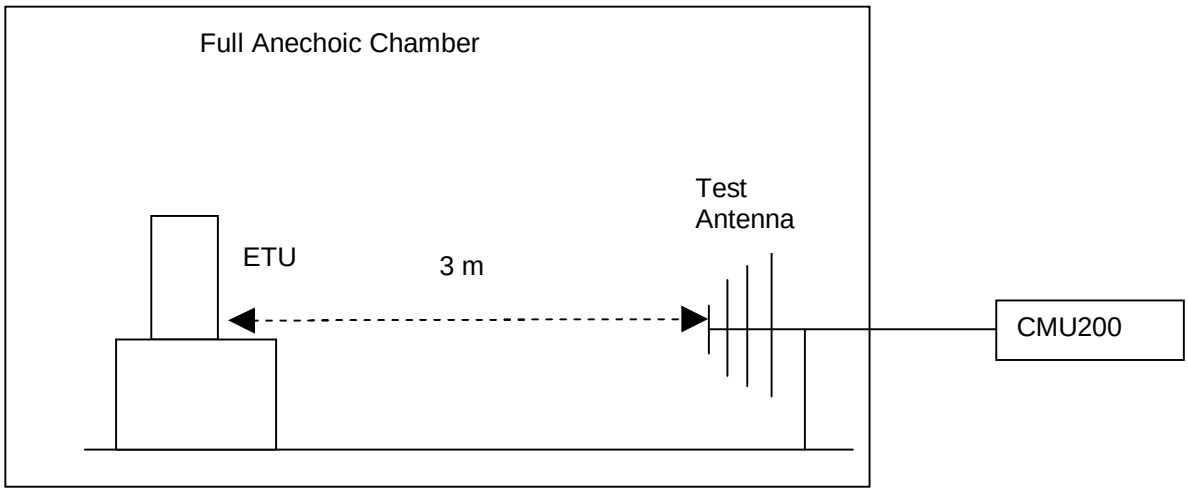
Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

6.1.3 Test Method and Setup

(a) 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 Mobile Phone to the wireless communication tester CMU200 via the air interface. The band is set as PCS band.
(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

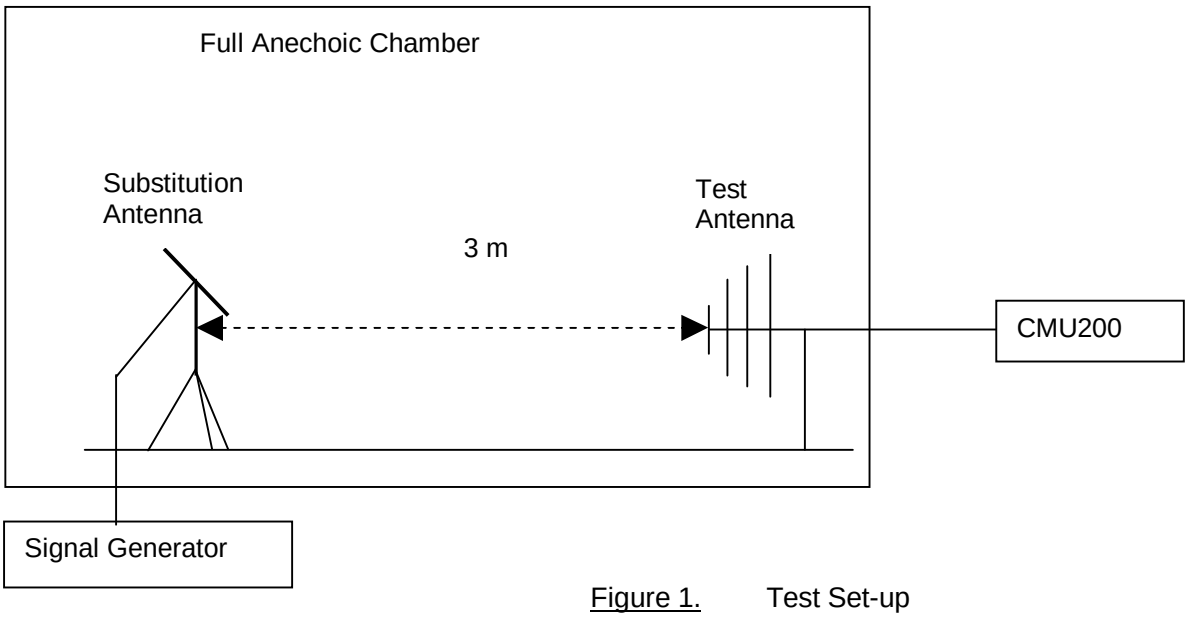


Figure 1. Test Set-up

NOTE: Effective Isotropic radiated power (EIRP) 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

		RF Output Power (EIRP)					
TEST CONDITIONS		Channel512(B) 1850.2MHz		Channel 661(M) 1880.00MHz		Channel 810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T_{nom} (25 °C) V_{nom} (3.7V)	30.24	33	30.22	33	30.21	33

6.1.4.2 Substitution Results

Table 16 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (EIRP) [dBm]	Limit [dBm]	Result
TM1	1850.2	30.24	Horn Ant.	26.04	5.18	1.0	30.22	33	Pass
TM1	1880.0	30.22	Horn Ant.	25.74	5.46	1.0	30.20	33	Pass
TM1	1909.8	30.21	Horn Ant.	25.41	5.77	1.0	30.18	33	Pass

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

EIRP [dBm] = SGP [dBm] – Cable Loss [dB] + Gain [dBi]

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=300kHz, and integrated by the instrument to 200kHz for TM1.

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:	1 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1 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 24.232

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 Phone (MS) conformance specification;

6.2.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a mobile Phone transmitter exceed 2 W. The calculated longitude EIRP by following formula:

EIRP(dBm)= 10*log ($EIRP_{in\ mwatts}$).

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

P_{cod}.(dBm)=EIRP(dBm)- Gain(dBi).
and Gain (dBi)= Gain(dBd)+ 2.15dB

Table 19 Limits

Maximum Output Power (Watts)	< 2 Watts=33 dBm
Antenna Gain(dBi):	1 dBi
Maximum Conducted Output Power (dBm)	< 32dBm

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

Test setup

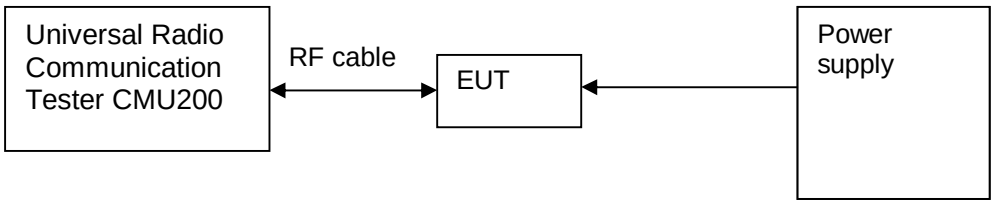


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 20 Measurement Results

		RF Output Power (Conducted)					
TEST CONDITIONS		Channel 512(B) 1850.2MHz		Channel 661(M) 1880.0MHz		Channel 810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T_{nom} (25 °C) V_{nom} (3.7V)	29.25	32	29.28	32	29.24	32

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 Middle

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 24 Subpart E

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 Phone (MS) conformance specification;

6.3.2.3 Limits

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

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 PCS band; 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

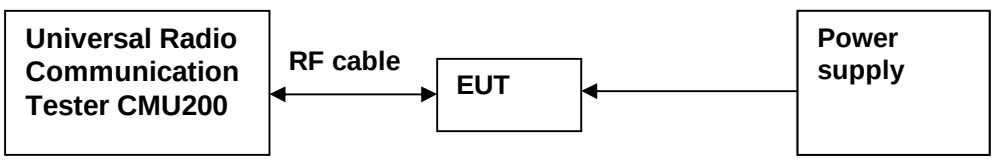


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 24 Measurement Results

		Modulation Characteristic
TEST CONDITIONS		Channel 661(M) 1880MHz
		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 Bottom、Middle、Top

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 24 Subpart E.

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 Phone (MS) conformance specification;

6.4.2.3 Limits

No specific occupied bandwidth requirement in part 24 Subpart E, but the occupied bandwidth was defined in part 2.1049: the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Table 27 Limits

Upper /lower frequency limits	0.5% of the mean power

6.4.3 Test Method and Setup

Mobile Phone was connected to the wireless communication test set CMU200 and the Spectrum Analyzer E4440A via the divider. The band class is set as PCS band; Mobile Phone was controlled to transmit maximum power. Measure and record the occupied bandwidth of the Mobile Phone by the Agilent 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

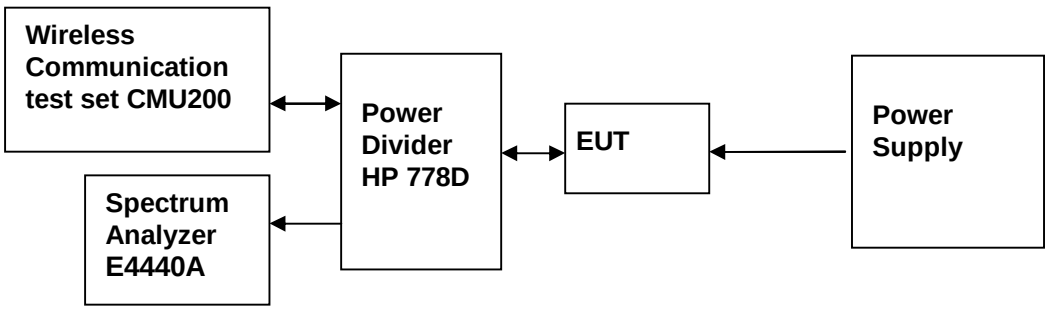


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 28 Measurement Results

TEST CONDITIONS		Occupied Bandwidth		
		Channel 512 (B) 1850.2MHz	Channel 661 (M) 1880MHz	Channel 810 (T) 1909.8MHz
		Measured (kHz)	Measured (kHz)	Measured (kHz)
T_{nom} (25 °C) V_{nom} (3.7V)	99%	243.68	245.68	241.71
	-26dB	316. 52	313.57	309.46

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 Bottom、Top

6.5.2 Test Specifications and Limits

6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

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 Phone (MS) conformance specification;

6.5.2.3 Limits

Compliance with part 24.238, 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 in Watt).

Table 31 Limits

Rated Power:	30 dBm
Required attenuation:	43+10log 1 = 43 , 30 dBm - 43 dB
Absolute level	- 13 dBm

6.5.3 Test Method and Setup

Mobile Phone was connected to the wireless communication test set CMU200 and the Spectrum Analyzer E4440A via the divider, the band class is set as PCS band. Mobile Phone was controlled to transmit maximum power. Measure and record band edges compliance of the Mobile Phone by the Agilent E4440A.

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

Test Set-up

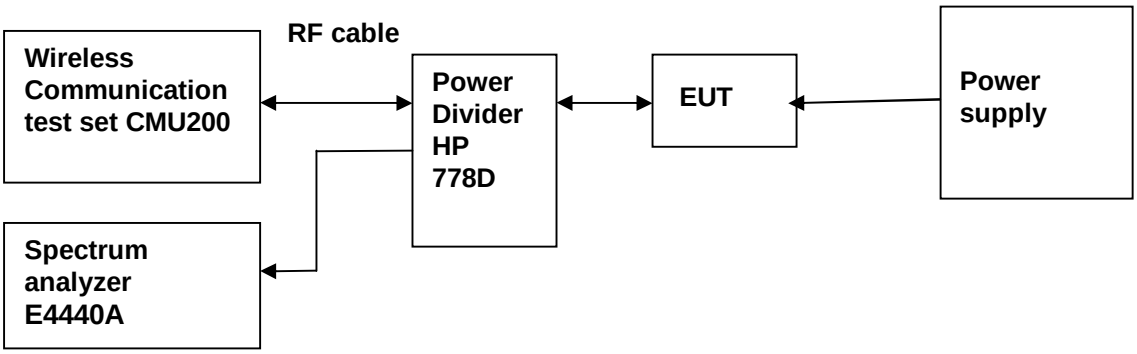


Figure 5. Test Set-up

6.5.4 Measurement Results

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
PCS	T_{nom} (25 °C), V_{nom} (3.7V)					
	1850.2	512	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1909.8	810	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 Bottom、Middle、Top

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

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 Phone (MS) conformance specification;

6.6.2.3 Limits

Compliance with part 24.238, 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:	30dBm
Required attenuation:	43+10log1 = 43 , 30 dBm - 43 dB
Absolute level	- 13 dBm

6.6.3 Test Method and Setup

Mobile Phone was connected to the wireless communication test set Agilent CMU200 and the Spectrum Analyzer E4440A via the divider, the band class is set as PCS band. Mobile Phone was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the Mobile Phone by the Spectrum Analyzer E4440A.

According to part 24.238, 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 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 3 GHz: 1MHz;
Measurement bandwidth (RBW) for 3 GHz up to 20 GHz: 1MHz;

Test Set-up

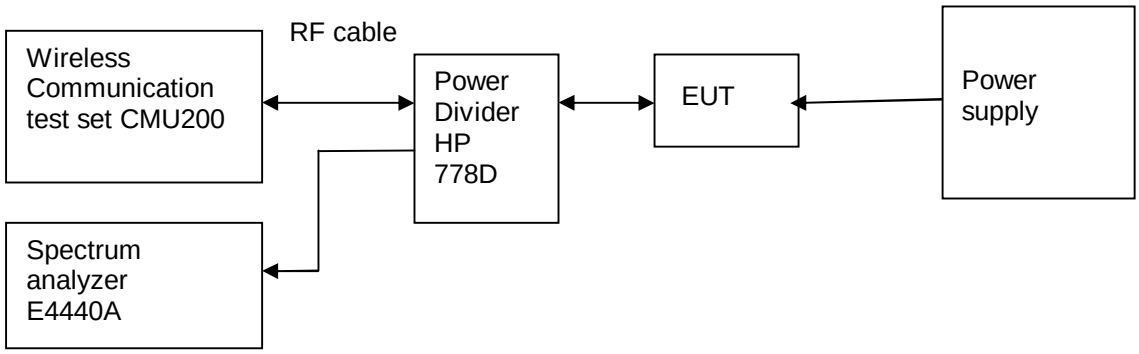


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 36 Measurement Results

Channel Number	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 512(B)	9 kHz~20GHz	29.25	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 661(M)	9 kHz~20GHz	29.28	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 810(T)	9 kHz~20GHz	29.24	<- 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 Radiated Spurious Radiation

6.7.1 Test Conditions

Table 37 Test Conditions

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

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 24.238

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 Phone (MS) conformance specification;

6.7.2.3 Limits

Compliance with 24.238, 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 39 Limits

Rated Power:	30 dBm
Required attenuation:	43+10log 1 = 43 , 30dBm – 43 dB
Absolute level	- 13 dBm

6.7.3 Test Method and Setup

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

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

Huawei Mobile Station is equipment with 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.

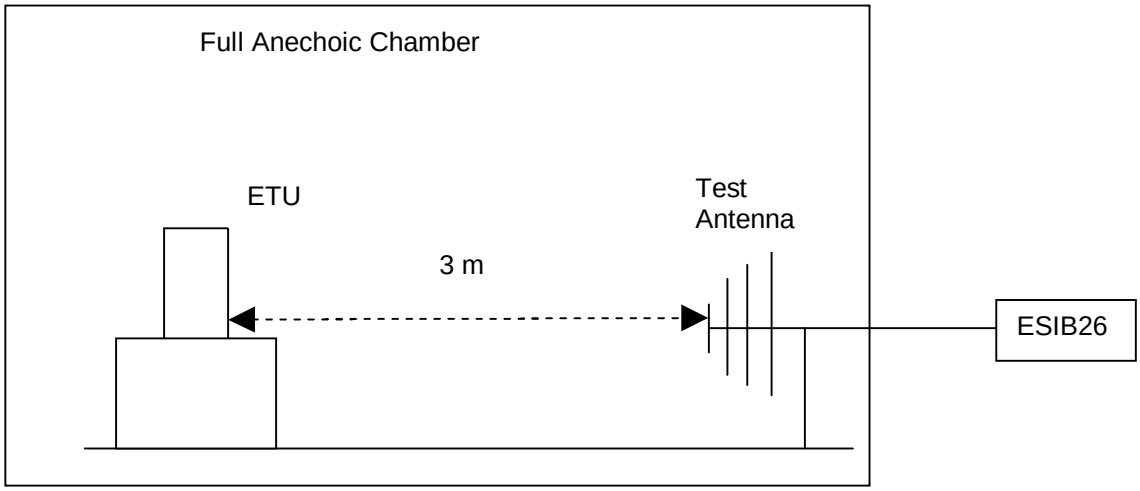
According to part 24.238, the defined measurement bandwidth as following:

24.238(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 26.5 GHz: 1MHz;

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum ERP

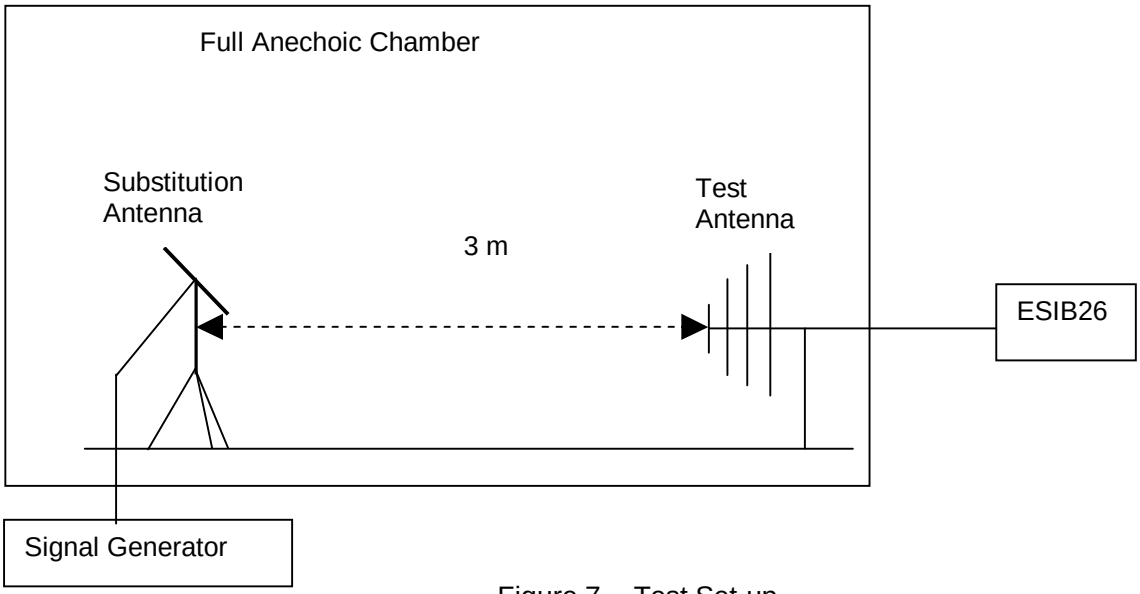


Figure 7. Test Set-up

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

6.7.4 Measurement Results

6.7.4.1 Pre-test Measurement Results

Table 40 Measurement Results

Channel Number	Test Range (Frequency)	Rated Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
661	9 kHz ~26.5 GHz	30	<- 13 dBm (See appendix E)	- 13 dBm	Pass

6.7.4.2 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 41 Substitution Results

Freq. [MHz]	Measurement Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result

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

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

NOTE: SGP- Signal Generator Level

6.7.5 Conclusion

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

6.8 Frequency Stability

6.8.1 Test Conditions

Table 42 Test Conditions

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

6.8.2 Test Specifications and Limits

6.8.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 24.235

6.8.2.2 Supporting Standards

Table 43 Supporting Standards:

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

6.8.2.3 Limits

No specific frequency stability requirement in part 2.1055 and part 24.235.

6.8.3 Test Method and Setup

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

(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 CMU200 via the connector. Then measure the frequency error by the Wireless Communication test CMU200. The Mobile Phone's output is matched with a 50 Ω load.

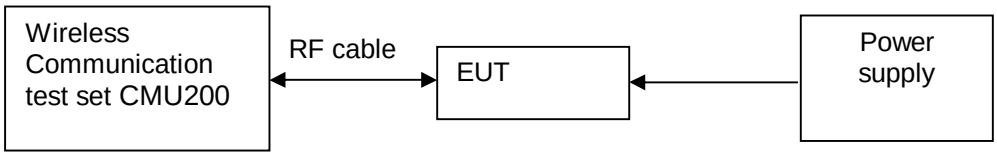


Figure 8. Test Set up

6.8.4 Measurement Results

6.8.4.1 Measurement Results vs. Variation of Temperature

l TM1, 3.7V DC Channel No.661(1880.0MHz)

Table 44 Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	29	1880	-10	Pass
-20 °C	29	1880	10	Pass
-10 °C	29	1880	-9	Pass
0 °C	29	1880	-20	Pass
+10 °C	29	1880	12	Pass
+20 °C	29	1880	19	Pass
+30 °C	29	1880	-21	Pass
+40 °C	29	1880	18	Pass
+50 °C	29	1880	-19	Pass

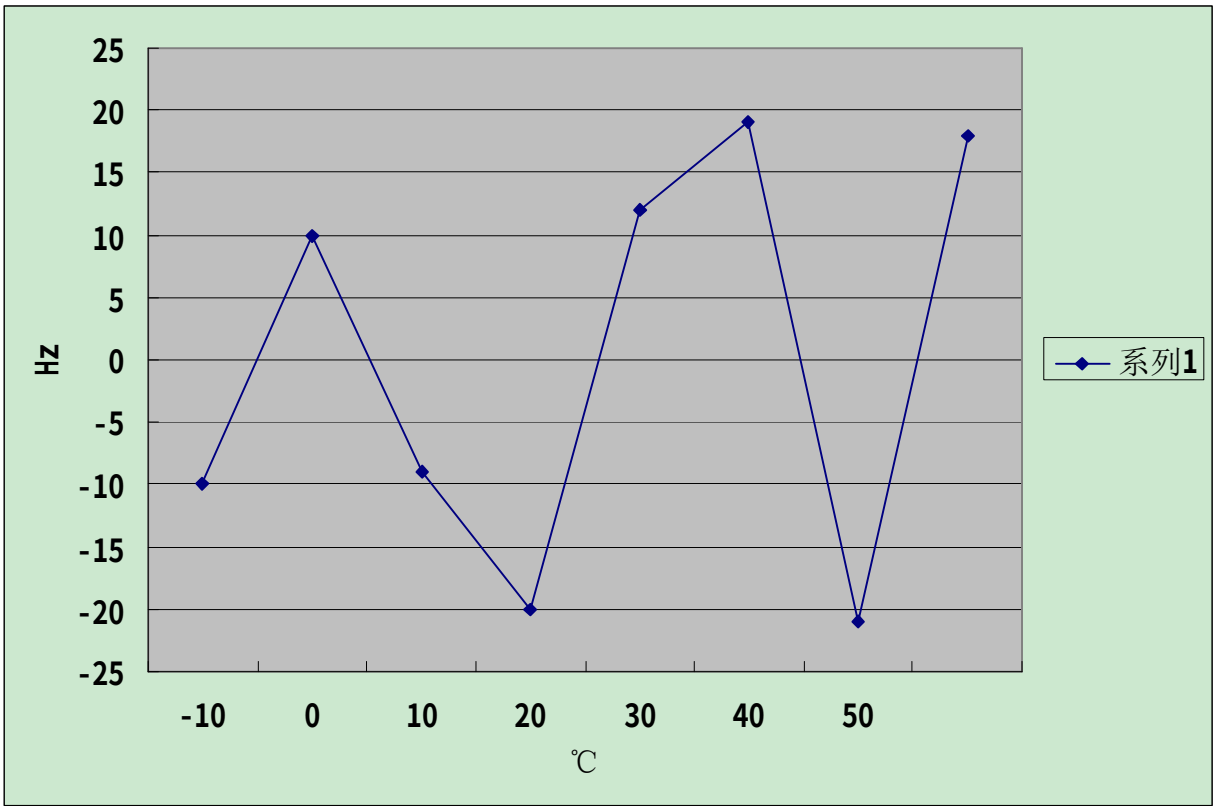


Figure 9. GSM Mode Test Graph

6.8.4.2 Measurement Results vs. Variation of Voltage

I PCS, TM1, 25 °C ,Channel No. 661(1880MHz)

Table 45 Measurement Results vs. Variation of Voltage—TM1

Voltage	Conducted Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.5	29	1880	-19	Pass
3.7	29	1880	15	Pass
4.2	29	1880	21	Pass

6.8.5 Conclusion

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

7 EMC Test

7.1 Conducted Emission at Power Port

7.1.1 Test Conditions

Table 46 Test Conditions

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

7.1.2 Test Specifications and Limits

7.1.2.1 Specification

CFR 47 (FCC) part 15.107

7.1.2.2 Supporting Standards

Table 47 Supporting Standards:

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

7.1.2.3 Limits

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

Table 48 Limits

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

Note: * Decreases with the logarithm of the frequency.

7.1.3 Test Method and Setup

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

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

Huawei Mobile Station was communicated with the BTS simulator through Air interface, the BTS simulator controls the Mobile Station to transmitter the maximum power which defined in specification

of product. The Mobile Station operated on the typical channel.

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

Test Set-up

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

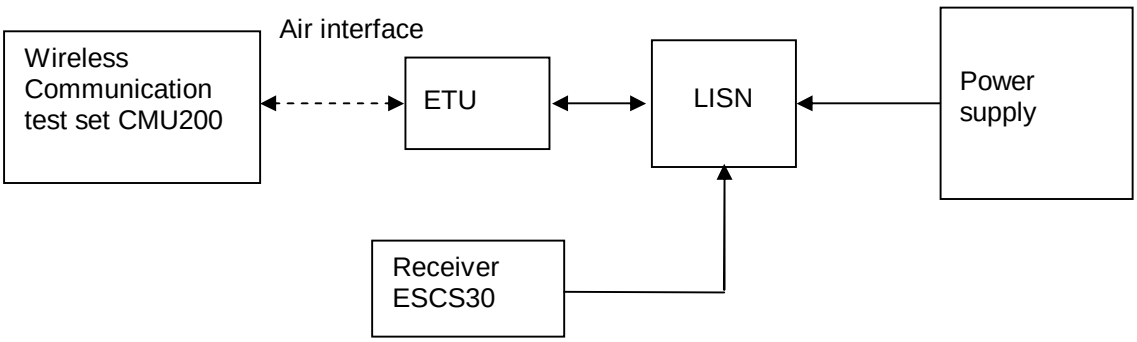


Figure 10. Test Set-up

7.1.4 Measurement Results

Table 49 MEASUREMENT RESULT:QP DECTER

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.343500	45.10	10.1	59	13.9	L3	FLO
0.442500	34.70	9.9	57	22.3	L3	FLO
0.879000	34.70	10.0	56	21.3	L3	FLO
4.929000	25.40	10.1	56	30.6	N	FLO
5.766000	34.10	10.1	60	25.9	L3	FLO
29.751000	29.40	10.5	60	30.6	L3	FLO

Table 50 MEASUREMENT RESULT:AV DECTER

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.348000	38.60	10.1	49	10.4	L3	FLO
0.433500	35.00	9.9	47	12.0	L3	FLO
2.017500	0.40	10.1	46	45.6	N	FLO
3.862500	0.70	10.1	46	45.3	N	FLO
5.757000	9.90	10.1	50	40.1	N	FLO
0.348000	38.60	10.1	49	10.4	L3	FLO

7.1.5 Conclusion

Two adapters are all tested in the EMC test, here the worse result are showed.
The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix F.

7.2 Radiated Emission of Enclosure in idle mode

7.2.1 Test Conditions

Table 51 Test Conditions

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

7.2.2 Test Specifications and Limits

7.2.2.1 Specification

CFR 47 (FCC) part 15.109

7.2.2.2 Supporting Standards

Table 52 Supporting Standards:

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

7.2.2.3 Limits

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

Table 53 Limits

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

7.2.3 Test Method and Setup

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

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

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

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

Test set up

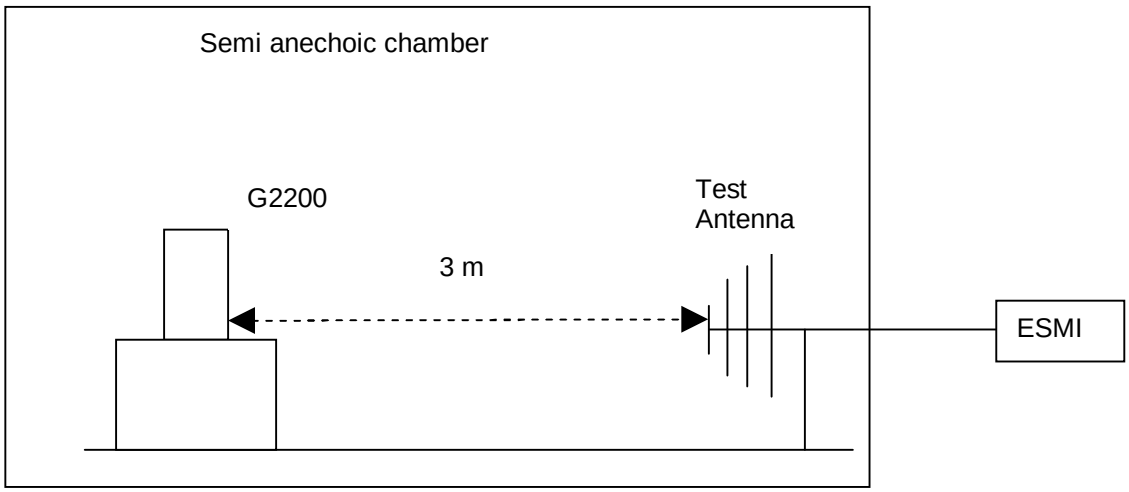


Figure 11. Test set up

7.2.4 Measurement Results

Table 54 MEASUREMENT RESULT: QP DECTER

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
38.040000	24.00	-10.5	40.0	16.0	100.0	71.00	VERTICAL
94.980000	14.80	-16.3	43.5	28.7	119.0	287.00	VERTICAL
143.400000	15.20	-14.6	43.5	28.3	198.0	272.00	HORIZONTAL
228.840000	18.70	-12.0	46.0	27.3	200.0	0.00	HORIZONTAL
543.840000	25.80	-3.9	46.0	20.2	111.0	12.00	VERTICAL
901.140000	30.80	1.4	46.0	15.2	200.0	100.00	HORIZONTAL

7.2.5 Conclusion

Two adapters are all tested in the EMC test, here the worse result are showed.
The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix G.

8 System Measurement Uncertainty

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

Table 55 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Isotropic Radiated Power of Transmitter	EIRP (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
Field Strength of Spurious Radiation	EIRP (dBm)	U=2.22dB; k=2
Conducted Output Power	Power(dBm)	U=0.39dB; k=2
Conducted Emission at Power Port	Disturbance Voltage （dBμV）	U=4dB; k=2
Radiated Emission of enclosure at idle mode	Field strength （dBμV/m）	U=5dB; k=2

9 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	13 pages
Appendix E	Measurement Results Radiated Spurious Emission	5 pages
Appendix F	Measurement Results Conducted Emission at Power Port	2 pages
Appendix G	Measurement Results Radiated Emission of Enclosure at Idle Mode	2 pages
Appendix H	Photos of Test Setup	5 pages