Report No: SYBH(R) 45012007EB-1
FCC ID: QISU120

FCC TEST REPORT OF Huawei WCDMA/GPRS/GSM Mobile Phone

M/N: U120

Feb. 28, 2007

Reliability Laboratory of Huawei Technologies Co., Ltd.

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2.	The laboratory has obtained the accreditation of THE AMERICAN ASSOCIATION FOR LABORATORY ACCREDITATION (A2LA), and Accreditation Council Certificate Number: 2174.01.
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REPORT ON	FCC Test of **Huawei WCDMA/GPRS/GSM Mobile Phone** M/N: U120 Report No: SYBH(R) 45012007EB-1
REGULATION	**FCC CFR47 Part 2: Subpart J;** **FCC CFR47 Part 24: Subpart E;** **FCC CFR47 Part 15: Subpart B;**
CONCLUSION	There are 9 items need to be tested, 9 items have been tested. The sample of the model completely meets the requirements **Final Judgement: Pass**

General Manager	**2007.02.12**	**Tang Shuanli**	Tang Shuanli
	Date	Name	signature
Technical Responsibility For Area of Testing	**2007.02.09**	**Zhang Xinghai**	Zhang Xinghai
	Date	Name	signature
Test Lab Engineer	**2007.02.08**	**Deng Jiang**	Deng Jiang
	Date	Name	signature

Contents

1 Summary

The table below summarizes the measurements and results for the Huawei WCDMA /GPRS/GSM Mobile Phone. 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
2.1051	24.238	Spurious Emission at Antenna Terminal	PASS
2.1053	24.238	Radiated Spurious Emission	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 WCDMA/GPRS/GSM Mobile Phone is subscriber equipment in the WCDMA/GSM system. The frequency band is WCDMA/GSM/DCS/PCS. The Mobile Phone implements such functions as RF signal receiving / Transmitting, WCDMA protocol processing, voice, video and MMS service etc. Externally it provides micro SD card interface, earphone port(to provide voice service), 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.

2.1.2 Support function and Service

The Mobile Phone 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	Mobile Phone was controlled to transmit maximum power

2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information

Not applicable!

3 Test Site Description

The test site of:

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

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

3.1 Testing Period

The test have been performed during the period of

Jan. 03, 2007 to Jan. 15, 2007

3.2 General Set up Description

Huawei WCDMA/GPRS/GSM Mobile Phone is subscriber equipment in the WCDMA/GSM system. The frequency band is WCDMA/GSM/DCS/PCS. The Mobile Phone implements such functions as RF signal receiving / Transmitting, WCDMA protocol processing, voice, video and MMS service etc. Externally it provides micro SD card interface, earphone port (to provide voice service), and USIM card interface.

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:	200KHz

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

4.1.6 Tune-up Procedure

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

WCDMA/GPRS/GSM Mobile Phone		
U120		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
-Main board	U120M-10	HD1U120M Ver.B
-Battery	BYD6B0901147	U120

4.2.2 Adapter Technical Data

AC/DCAdapter Model:	TPCA-053065VY
Manufacturer:	TECH-POWER INTERNATIONAL CO.,LTD/Shenzhen
Input Voltage:	~100-240V ;50/60Hz
Output Voltage:	⎓ +5.3V
Rated Power:	4W

4.2.3 Battery Technical Data

Type:	Rechargeable Li-ion
Manufacturer:	BYD Electronics Co.,Ltd.
Battery Model:	HBC80S
Rated capacity:	800mAH
Nominal Voltage:	⎓ +3.7V
Charging Voltage:	⎓ +4.2V

4.2.4 FCC Identification

Grantee Code: **QIS**
Product Code: **U120**
FCC Identification: **QISU120**

5 Main Test Instruments

Table 11 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
3m Semi Anechoic Chamber	S+M	N/A	N/A	Dec.24.2007
3m Full Anechoic Chamber	S+M	N/A	N/A	Dec.05.2007
Signal Analyzer	R&S	FSQ 26	100266	May.18.2007
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	May.30.2007
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	May.30.2007
Receiver	R&S	ESIB 26	100318	Aug.17.2007
Receiver	R&S	ESCS30	830245/018	May.30.2007
Pre-Amplifier	Agilent	8447D	2944A10146	May.30.2007
Pre-Amplifier	Agilent	83017A	3950M00246	Aug.03.2007
Loop Antenna	Schwarzbeck	FMZB1516	1516115	May.08.2007
BiLog Antenna	Schaffner	CBL 6112B	2747	Aug.30.2007
BiLog Antenna	Schaffner	CBL 6112B	2536	Aug.30.2007
Horn Antenna	R&S	HF906 4044.4507.02	359287/005	Dec.05.2007
Horn Antenna	R&S	HF906 4044.4507.02	359287/006	Dec.05.2007
Horn Antenna	ETS-Lindgren	3116	00031541	Aug.15.2007
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Aug.28.2007
Signal Generator	R&S	SMT06	830264/009	May.29.2007
Signal Generator	R&S	SMR 40	100325	Dec.09.2007
Artificial Mains Network	Schwarzbeck	NNLK8121	8121416	May.29.2007
Power Supply	Keithley	2306	1045337	Apr.20.2007
Climate Chamber	WEISS	ACS-1	3604040034	Apr.24.2007
Universal Radio Communication Tester	R&S	CMU200	108522	Aug.16.2007
Wireless Communications test set	Agilent	8960	3604061855	Aug.06.2007
Spectrum Analyzer	Agilent	E4445A	3602041773	Oct.31.2007
Spectrum Analyzer	R&S	FSU26	N/A	Sep.26.2007

6 Transmitter Measurements

6.1 Effective Radiated Power of Transmitter (EIRP)

6.1.1 Test Conditions

Table 12 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	23.5℃
Relative humidity:	55%
Test Configurations:	TM1 at high, middle ,low channel

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

6.1.2.3 Limits

Compliance with part 24.232, mobile/portable stations are limited to 2 watts EIRP peak power.
W(dBm)= 10*log (W_{watts}).

Table 14 Limits

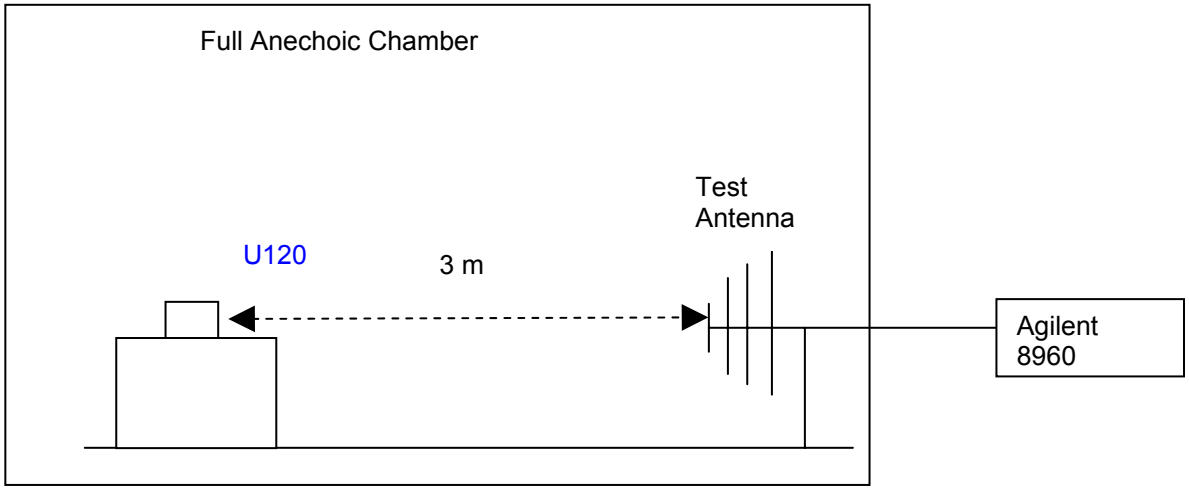
Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

6.1.3 Test Method and Setup

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, 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 Agilent 8960 via the air interface. The band class is set as PCS.
(b) Test the Radiated maximum output power by the Agilent 8960 received from test antenna.
(c) Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on Agilent 8960, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum EIRP

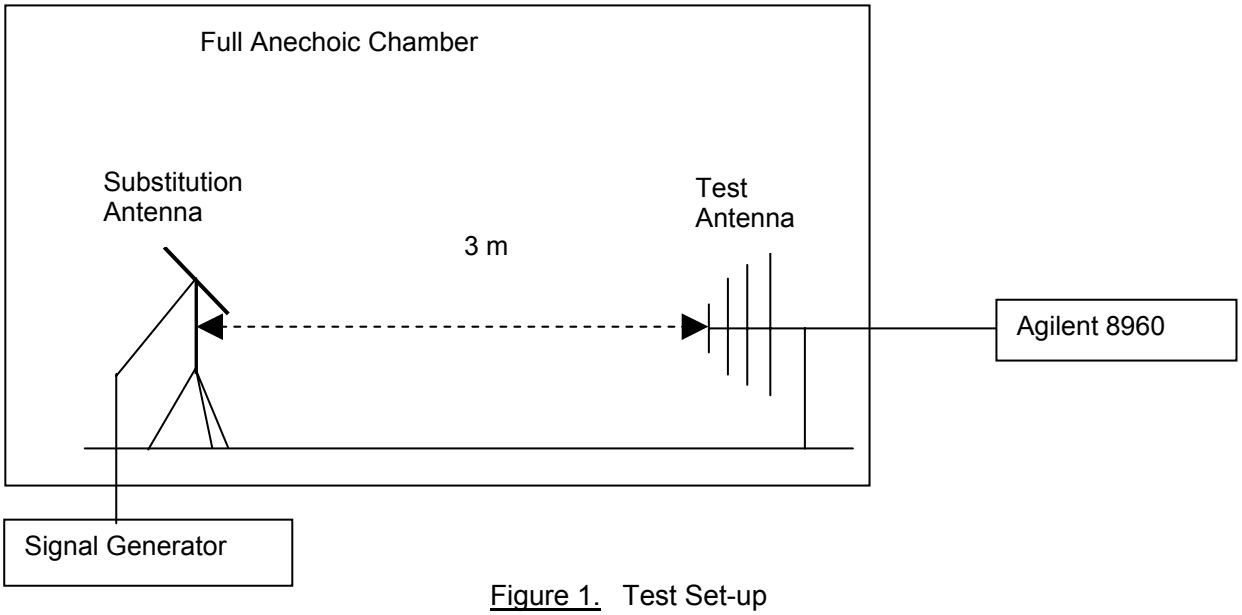


Figure 1. Test Set-up

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 EIRP and ERP.
ERP (dBm) =EIRP (dBm) – 2.15 (ITU-R Recommendation SM.329-10).

6.1.4 Measurement Results

Table 15 Measurement Results

TEST CONDITIONS		RF Output Power					
		Channel 512 1850.2MHz		Channel 661 1880.0MHz		Channel 810 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T_{nom} (25 °C)	32.03	33.0	32.01	33.0	32.02	33.0

	V_{nom} (3.7 V)						

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:	enclosure
Ambient temperature:	23.5℃
Relative humidity:	55%
Test Configurations:	TM1 at high, middle ,low channel

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

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

6.2.2.3 Limits

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

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

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 18 Limits

Maximum Output Power (Watts)	< 2 Watts=33 dBm
Antenna Gain(dBi):	2.5dBi
Maximum Conducted Output Power (dBm)	< 30.5dBm

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 Agilent 8960 via the antenna connector. The band class is set as US Cellular.
(b)Test the Conducted maximum output power by the Agilent 8960.

Test setup

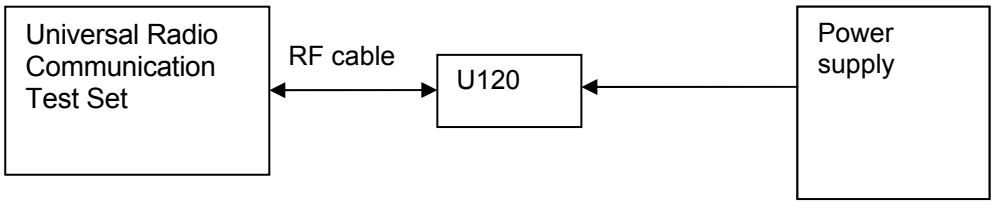


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 19 Measurement Results

TEST CONDITIONS		RF Output Power					
		Channel 512 1850.2MHz		Channel 661 1880MHz		Channel 810 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T_{nom} (25 °C) V_{nom} (3.7 V)	30.0	30.5	29.6	30.5	29.5	30.5

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:	55 %
Test Configurations:	TM1 at High, Middle, Low Channel

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 21 Supporting Standards:

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

6.3.2.3 Limits

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

Table 22 Limits

Limits	Not applicable

6.3.3 Test Method and Setup

Connect the Mobile Phone to Wireless Communication Test Set Agilent 8960 via the antenna connector. The band class is set as PCS; the Mobile Phone's output is matched with 50 Ω loads, test method was according to ANSI/TIA-98-E. The waveform quality and constellation of the Mobile Phone was tested.

Test setup

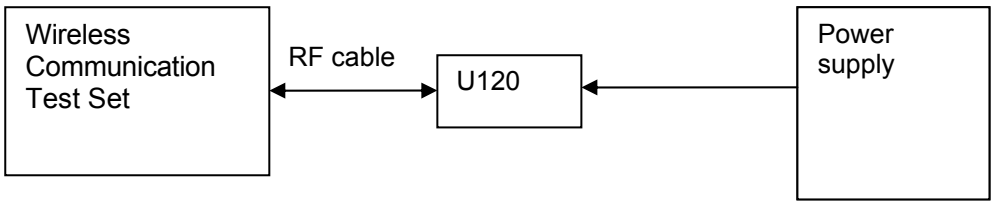


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 23 Measurement Results

TEST CONDITIONS		Phase Error		
		Channel 512 1850.2MHz	Channel 661 1880.0MHz	Channel 810 1909.8MHz
		Measured (Degree)	Measured (Degree)	Measured (Degree)
T_{nom} (25 °C)	V_{nom} (3.7V)	0.98	1.07	1.45
Refer to Appendix A				

6.3.5 Conclusion

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

For the measurement results refer to appendix A with 4 pages.

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 High, Middle, Low Channel

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 25 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

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 26 Limits

Upper /lower frequency limits	0.5% of the mean power

6.4.3 Test Method and Setup

Mobile Phone was connected to the Spectrum Analyzer E4445A via the one RF connector. The band class is set as PCS; Mobile Phone was controlled to transmit maximum power. Measure and record the occupied bandwidth of the Mobile Phone by the E4445A.

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

Refer to 47CFR part2.1049 section (g)&(h).
(g) Transmitter in which the modulating base band comprises not more than three independent channels - when modulated by the full complement of signals for which the transmitter is rated. The level of modulation for each channel should be set to that prescribed in rule parts applicable to the services for which the transmitter is intended. If specific modulation levels are not set forth in the rules, the tests should provide the manufacturer's maximum rated condition.
(h) Transmitters employing digital modulation techniques - when modulated by an input signal such that its amplitude and symbol rate represent the maximum rated conditions under which the equipment will

be operated. The signal shall be applied through any filter networks, pseudorandom generators or other devices required in normal service. Additionally, the occupied bandwidth shall be shown for operation with any devices used for modifying the spectrum when such devices are optional at discretion of the user.

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

Test Set-up

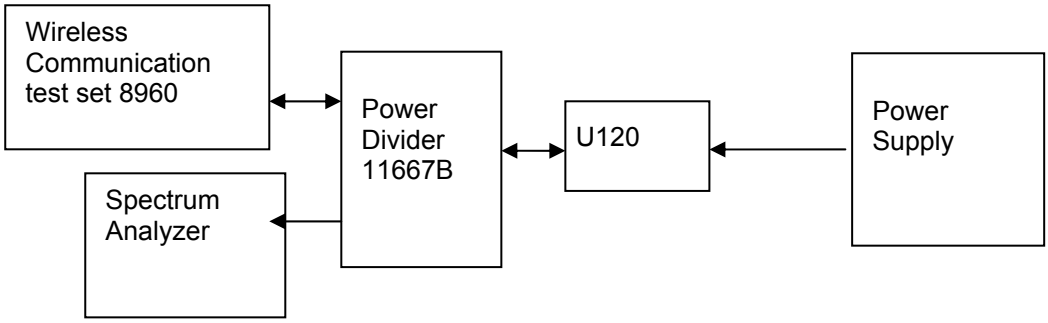


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 27 Measurement Results

TEST CONDITIONS		Occupied Bandwidth		
		Channel 512 1850.2MHz	Channel 661 1880.0Mhz	Channel 810 1909.8MHz
		Measured (kHz)	Measured (kHz)	Measured (kHz)
T_{nom} (25 °C)	99%	243.9693	243.7312	243.8327
V_{nom} (3.7V)	26dB	310.771	309.139	314.956
Refer to Appendix B				

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B with 4 pages.

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 High, Low Channel

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 29 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

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. (Whereas P is the rated power of the EUT).

Table 30 Limits

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

6.5.3 Test Method and Setup

Mobile Phone was connected to the Spectrum Analyzer E4445A via the one RF connector, the band class is set as PCS. Mobile Phone was controlled to transmit maximum power. Measure and record band edges compliance of the Spectrum Analyzer E4445A.

RBW of 20 kHz (1% of 2MHz) was used up to 5MHz away from the band edge. So the FCC rules specify that RBW of 1MHz for measurements of emissions >1MHz away from the band edges ,the limit was adjusted with -13dBm to -30dBm to compensate for the reduced measurement bandwidth.

Test Set-up

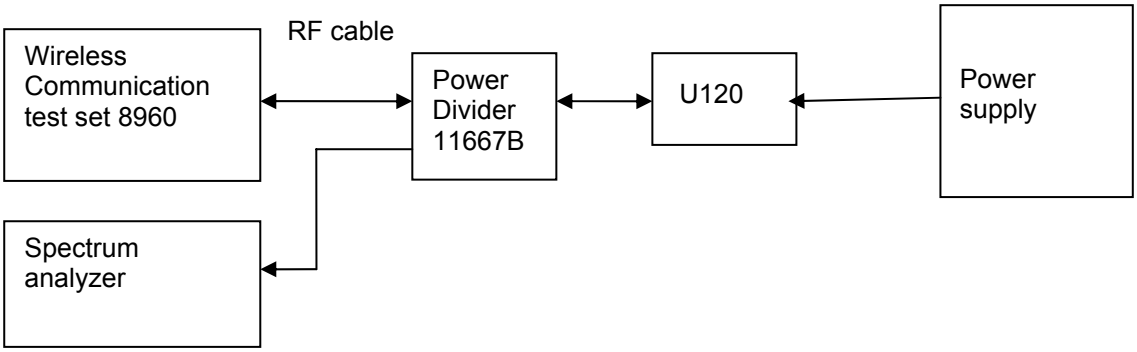


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 31 Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Carrier Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
US PCS	T_{nom} (25 °C), V_{nom} (3.7V)						
	1850	512	TM1	29.53	<-13(See appendix C)	- 13 dBm	Pass
	1910	810	TM1	29.52	<-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 with 3 pages.

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:	55 %
Test Configurations:	TM1 at High, Middle, Low Channel

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 33 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

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).

Table 34 Limits

Rated Power(EIRP):	32.03dBm
Required attenuation:	43+10log (1) = 43 , 30 dBm –43dB
Absolute level	- 13 dBm

6.6.3 Test Method and Setup

Mobile Phone was connected to the Spectrum Analyzer E4445A and R&S FSU26 via the one RF connector, the band class is set as PCS. Mobile Phone was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the Mobile Phone by the E4445A and R&S FSU26.

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 1 MHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 3GHz: 1 MHz;
Measurement bandwidth (RBW) for 3GHz up to 12.5GHz: 1MHz;
Measurement bandwidth (RBW) for 12.5GHz up to 20GHz: 1MHz;

Test Set-up

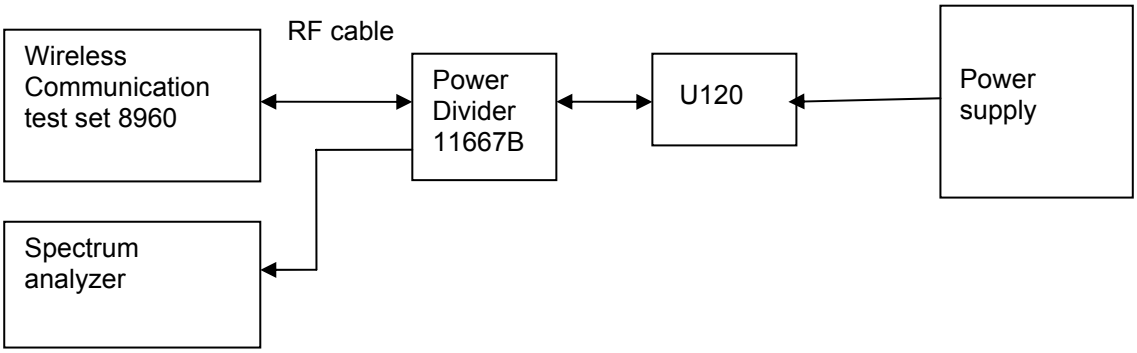


Figure 6. Test Set-up

6.6.4 Measurement Results

Table 35 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Carrier Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 512(L)	TM1	9 kHz ~20GHz	30.39	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 661(M)	TM1	9 kHz ~20GHz	30.27	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 810(H)	TM1	9 kHz ~20GHz	30.25	<- 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 with 4 pages.

6.7 Radiated Spurious Emission

6.7.1 Test Conditions

Table 36 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	53 %
Test Configurations:	TM1 at middle channel

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 37 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

6.7.2.3 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).

Table 38 Limits

Rated Power:	32.03dBm (1W)
Required attenuation:	43 +10 $\log_{10}$ (1W) = 43 dB
Absolute level	30dBm – 43 dB= - 13 dBm

6.7.3 Test Method and Setup

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

(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:
(1) Those in which the spurious emission are required to be 60 dB or more below the mean power of the transmitter.
(2) All equipment operating on frequencies higher than 25 MHz
(3) All equipment where the antenna is an integral part of, and attached directly to the transmitter.
(4) Other types of equipment as required, when deemed necessary by the Commission.

Huawei Mobile Phone is equipment with integral antenna. And it should be tested according to part (b) of above section.

BTS simulator is connected to a communication antenna, by which communicate with the Mobile Phone inside the test site. The BTS simulator controls the Mobile Phone 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 Mobile Phone operates on a typical channel.

The test procedure:

(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 BTS simulator via the air interface. The band class is set as PCS.
(b) Test the Radiated maximum output power by the Rohde and Schwarz ESMI Test Receiver from test antenna.
(c) Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on ESMI Test Receiver, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

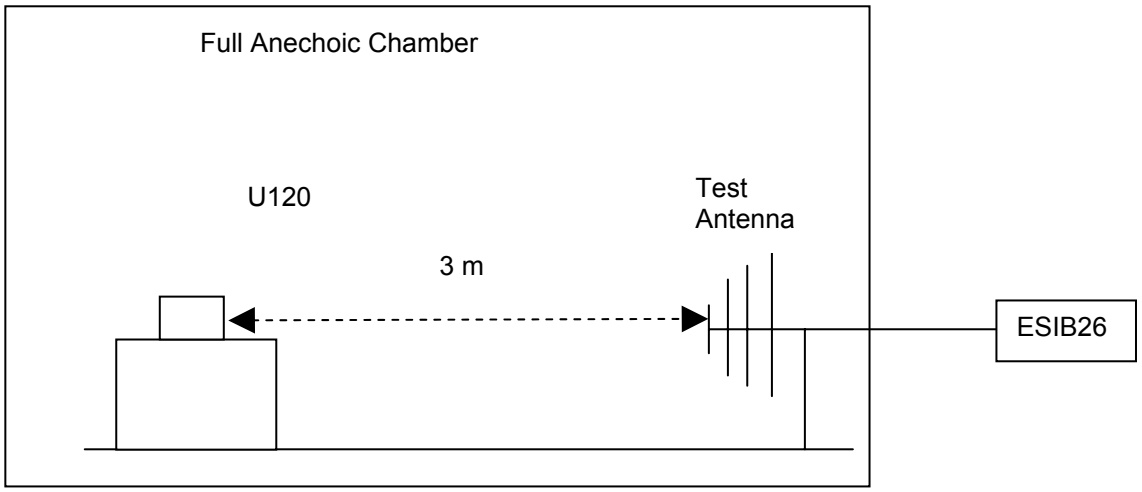
According to part 24.238, the defined measurement bandwidth as following:

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

Measurement bandwidth (RBW) for 9 kHz up to 1GHz: 1 MHz;
Measurement bandwidth (RBW) for 1GHz up to 12.75GHz: 1MHz;
Measurement bandwidth (RBW) for 12.75GHz up to 20GHz: 1MHz;

Test setup

Step 1: Pre-test



Step 2: Substitution method to verify the maximum ERP

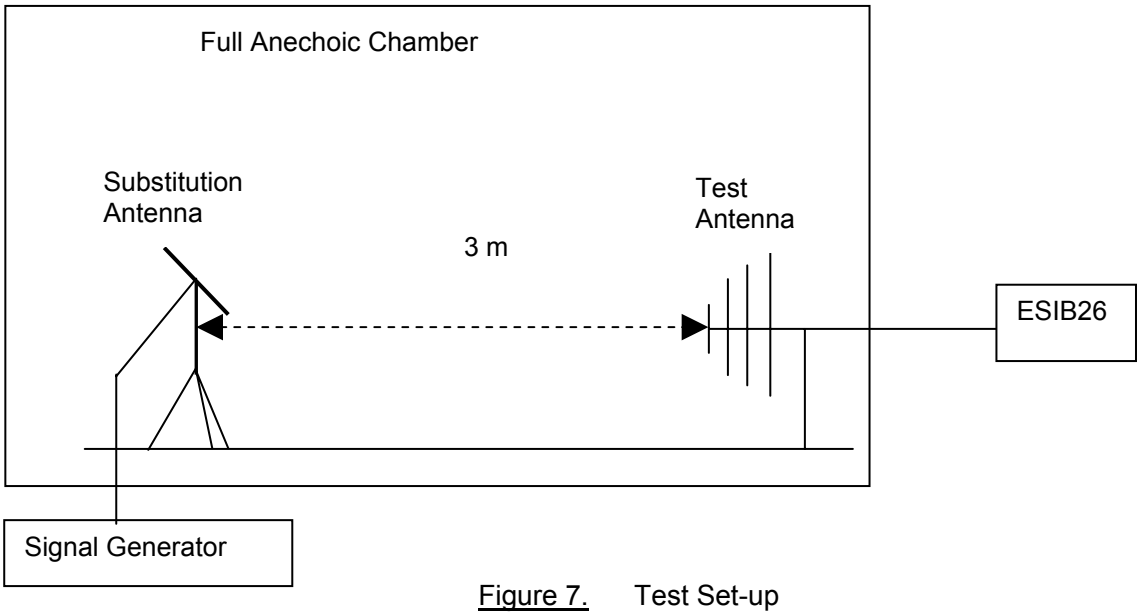


Figure 7. Test Set-up

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 39 Measurement Results

Channel Number	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
661	9 kHz ~20GHz	29.97	<- 13 dBm (See appendix E)	- 13 dBm	Pass

6.7.4.2 Substitution Results

No peak found in pre- test.

Calculation Sample:

Table 40 Substitution Results

Freq. [MHz]	Measurement Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result
3923.33	-35.27	Horn Ant.	7.85	2.20	-41.24	-35.59	-13	Pass

Note: The table use a sample frequency point because there is at least 20dB between the test result and the limit line, so this test we didn't use the substitution method. The following formula should take to calculate it.

ERP [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 with 9 pages.

6.8 Frequency Stability

6.8.1 Test Conditions

Table 41 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	TM1 at High ,Middle, Low Channel

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 42 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards

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

(b) 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.

(d) The frequency stability shall be measured with variation of primary supply voltage as follows:
(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.
(3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.
(e) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) and (d) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas,

may be required for portable equipment.)

Test Set up

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

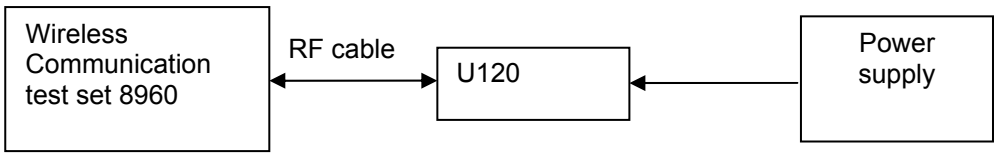


Figure 8. Test Set up

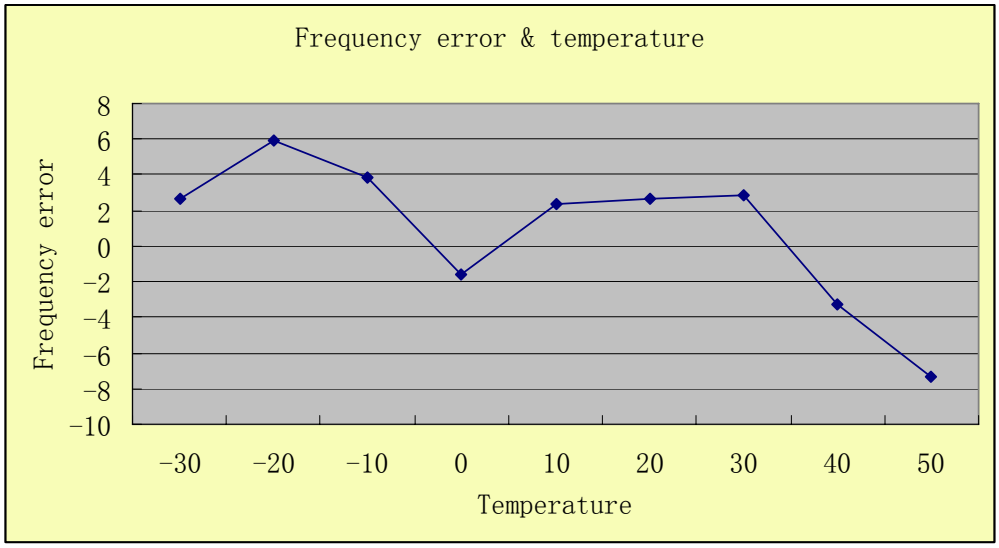
6.8.4 Measurement Results

6.8.4.1 Measurement Results vs. Variation of Temperature

- 3.7V DC Channel 512**(1850.2MHz)**

Table 43 Measurement Results vs. Variation of Temperature

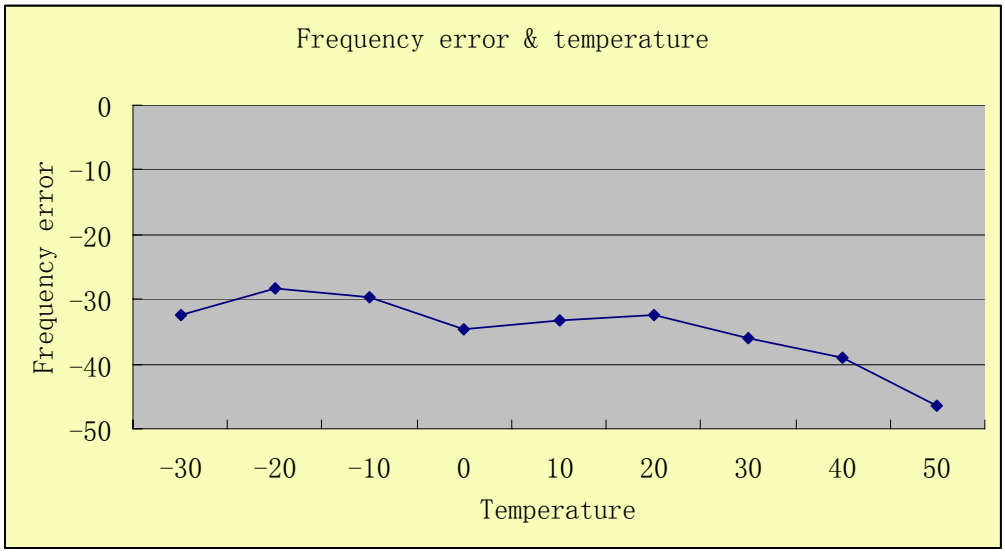
Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	29.53	1850.2	2.66	Pass
-20 °C	29.53	1850.2	5.94	Pass
-10 °C	29.53	1850.2	3.82	Pass
0 °C	29.53	1850.2	-1.58	Pass
+10 °C	29.53	1850.2	2.37	Pass
+20 °C	29.53	1850.2	2.66	Pass
+30 °C	29.53	1850.2	2.87	Pass
+40 °C	29.53	1850.2	-3.28	Pass
+50 °C	29.53	1850.2	-7.37	Pass



- 3.7V DC Channel 661**(1880.0MHz)**

Table 44 Measurement Results vs. Variation of Temperature

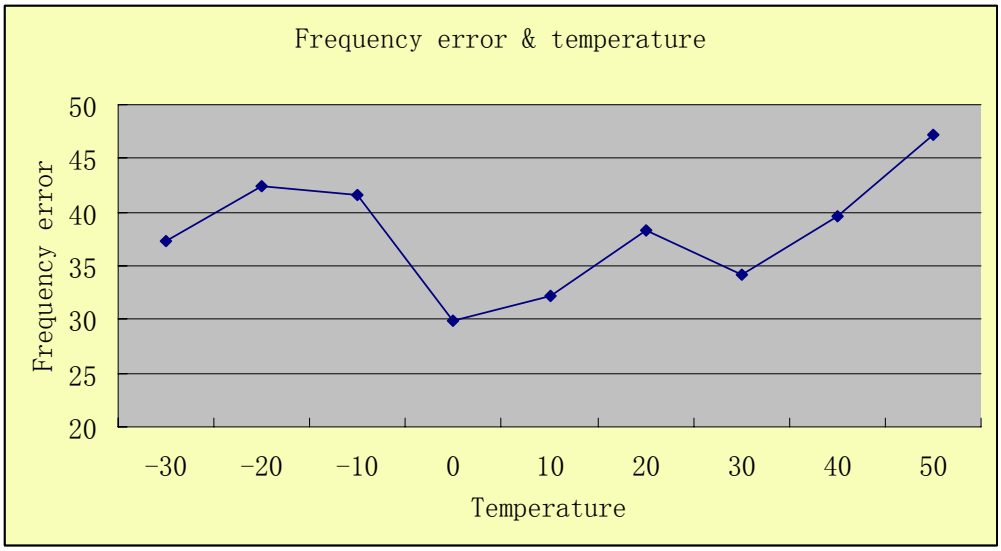
Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	29.51	1880.0	-32.45	Pass
-20 °C	29.51	1880.0	-28.34	Pass
-10 °C	29.51	1880.0	-29.54	Pass
0 °C	29.51	1880.0	-34.55	Pass
+10 °C	29.51	1880.0	-33.28	Pass
+20 °C	29.51	1880.0	-32.51	Pass
+30 °C	29.51	1880.0	-35.86	Pass
+40 °C	29.51	1880.0	-38.92	Pass
+50 °C	29.51	1880.0	-46.38	Pass



- 3.7V DC Channel 810(1909.8MHz)

Table 45 Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	29.52	1909.8	37.32	Pass
-20 °C	29.52	1909.8	42.47	Pass
-10 °C	29.52	1909.8	41.56	Pass
0 °C	29.52	1909.8	29.84	Pass
+10 °C	29.52	1909.8	32.14	Pass
+20 °C	29.52	1909.8	38.25	Pass
+30 °C	29.52	1909.8	34.15	Pass
+40 °C	29.52	1909.8	39.54	Pass
+50 °C	29.52	1909.8	47.21	Pass



6.8.4.2 Measurement Results vs. Variation of Voltage

- 25 °C ,Channel 512 **(1850.2MHz)**

Table 46 Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.6	29.53	1850.2	2.54	Pass
3.7	29.53	1850.2	7.51	Pass
4.2	29.53	1850.2	-0.54	Pass

- 25 °C ,Channel 661 **(1880.0MHz)**

Table 47 Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.6	29.51	1880.0	39.04	Pass
3.7	29.51	1880.0	29.91	Pass
4.2	29.51	1880.0	32.03	Pass

- 25℃,Channel810(1909.8MHz)

Table 48 Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.6	29.52	1880.0	34.28	Pass
3.7	29.52	1880.0	38.21	Pass
4.2	29.52	1880.0	39.28	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 49 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Power port
Ambient temperature:	23.5°C
Relative humidity:	55 %
Test Configurations:	TM1 at frequency M

7.1.2 Test Specifications and Limits

7.1.2.1 Specification

CFR 47 (FCC) part 15.107

7.1.2.2 Supporting Standards

Table 50 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 51 Limits

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

Note: * Decreases with the logarithm of the frequency.

7.1.3 Test Method and Setup

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

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

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

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

Test Set-up

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

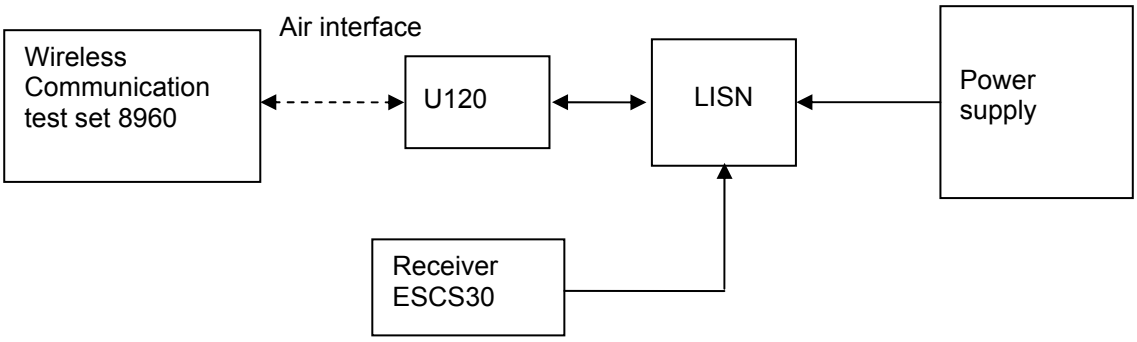


Figure 9. Test Set-up

7.1.4 Measurement Results

Table 52 MEASUREMENT RESULT:QP DECTER

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.217500	44.90	10.4	63	18.0	N	FLO
0.474000	40.40	10.0	56	16.0	N	FLO
1.261500	40.30	9.9	56	15.7	N	FLO
2.760000	38.30	10.1	56	17.7	N	FLO
5.590500	33.90	10.2	60	26.1	N	FLO
22.366500	33.20	15.0	60	26.8	L3	FLO

Table 53 MEASUREMENT RESULT:AV DECTER

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.352500	29.70	10.2	49	19.2	N	FLO
0.433500	24.50	10.0	47	22.7	N	FLO
0.865500	26.10	9.9	46	19.9	N	FLO
2.899500	22.10	10.0	46	23.9	N	FLO
5.653500	21.00	10.2	50	29.0	N	FLO
25.201500	22.40	14.7	50	27.6	L3	FLO

7.1.5 Conclusion

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

7.2 Radiated Emission of Enclosure in Ideal Mode

7.2.1 Test Conditions

Table 54 Test Conditions

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

7.2.2 Test Specifications and Limits

7.2.2.1 Specification

CFR 47 (FCC) part 15.109

7.2.2.2 Supporting Standards

Table 55 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 56 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 Phone was communicated with the BTS simulator through Air interface. The Mobile Phone operated on the typical channel and the Mobile Phone worked in idle mode, transmitter was not work in this test.

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

Test set up

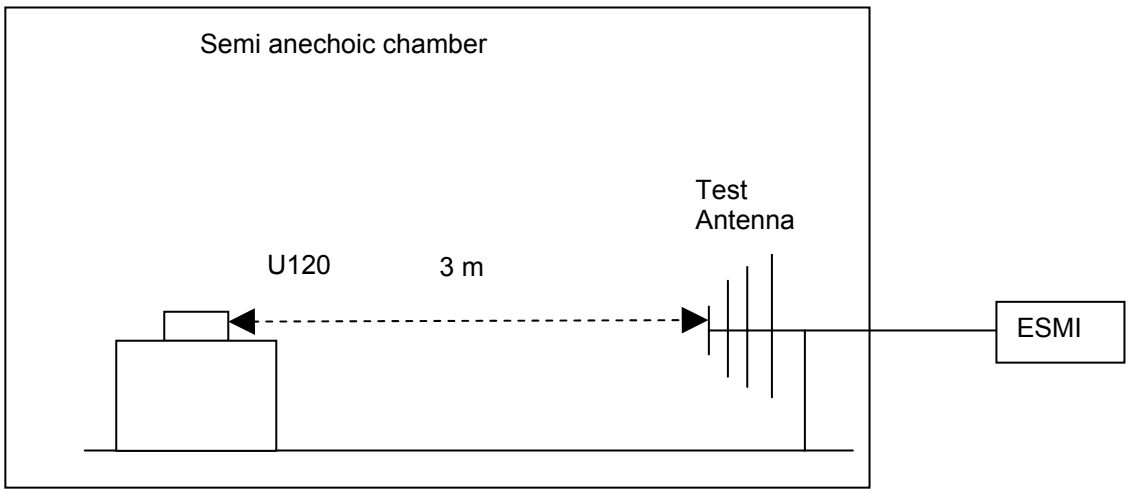


Figure 10. Test set up

7.2.4 Measurement Results

Table 57 MEASUREMENT RESULT: QP DECTER

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
42.780000	25.00	-11.1	40.0	15.0	106.0	89.00	VERTICAL
92.580000	23.20	-12.2	43.5	20.3	204.0	225.00	HORIZONTAL
105.960000	25.50	-10.1	43.5	18	400.0	358.00	HORIZONTAL
215.820000	31.70	-11.5	43.5	11.8	127.0	105.00	HORIZONTAL
543.780000	20.70	-1.9	46.0	25.3	219.0	0.00	VERTICAL
909.120000	24.30	1.3	46.0	21.7	176.0	30.00	VERTICAL

7.2.5 Conclusion

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

8 System Measurement Uncertainty

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

Table 58 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
Field Strength of Spurious Radiation	ERP(dBm)	U=3dB; k=2
Conducted Output Power	Power(dBm)	U=0.39dB; k=2
Conducted Emission at Power Port	Disturbance Voltage （dBμV）	U=4dB; k=2
Radiated Emission of enclosure at ideal mode	Field strength （dBμV/m）	U=5dB; k=2

9 Appendixes

Appendix A	Measurement Results Modulation Characteristics	4 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	4 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 Ideal Mode	2 pages
Appendix H	Photos of Test Setup	4 pages