



Report No: SYBH(R) 36052006EB
FCC ID: QISE220

**FCC TEST REPORT OF
HUAWEI HSDPA USB MODEM
M/N: E220**

Jun. 15, 2006

Reliability Laboratory of Huawei Technologies Co., Ltd.

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REPORT ON FCC Test of HUAWEI HSDPA USB MODEM

M/N: E220

Report No: SYBH(R) 36052006EB

REGULATION **FCC CFR47 Part 2: Subpart J;**
FCC CFR47 Part 24: Subpart E;
FCC CFR47 Part 15: Subpart B;

CONCLUSION There are 8 items need to be tested, 8 items have been tested. The sample of the model completely meets the requirements

Final Judgement: Pass

General Manager

2006.06.15
Date

Tang Shuanli
Name

signature

A red circular stamp with Chinese characters. The outer ring contains the characters "华为技术有限公司" (Huawei Technologies Co., Ltd.). The inner part contains the characters "可靠性实验室" (Reliability Laboratory).

**Technical Responsibility
For Area of Testing**

2006.06.13
Date

Zhang Xinghai
Name

signature

Handwritten signature of Zhang Xinghai in black ink.

Test Lab Engineer

2006.06.12
Date

Zhu Yongsheng
Name

signature

Handwritten signature of Zhu Yongsheng in black ink.

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1 Summary

The table below summarizes the measurements and results for the HSDPA USB MODEM. 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
2.1047		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
-	15.109	Radiated Emission of Enclosure in Idle Mode	PASS

2 Product Description

2.1 Production Information

2.1.1 General Description

Huawei GSM HSDPA USB MODEM is subscriber equipment in the GSM system. The frequency band is PCS. The HSDPA USB MODEM implements such functions as RF signal receiving / Transmitting, GSM/GPRS/EDGE protocol processing and data service etc. Externally it provides USB interface (to connect to the notebook etc.), USIM card interface. The HSDPA USB MODEM uses Qualcomm MSM6280 chipset and Zero-IF technologies.

2.1.2 Support function and Service

The USB MODEM support the function and service as follows:

Table 2 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
data	Modulation: GMSK	GPRS Mode	
data	Modulation: 8PSK	EDGE Mode	

Note: * The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V6.1.0 clause 40 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V6.1.0 clause 50.

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 applicaiton!				

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  and registration granted under the registration number **97456** on March 11. 2003. The test site has been accredited by



and the accredited number is **2714.01** in Jan of 2004.

3.1 Testing Period

The test have been performed during the period of

Jun 02, 2006 to Jun. 08, 2006

3.2 General Set up Description

Huawei HSDPA USB MODEM can support GPRS/EDGE mode and PCS Band. During this measurement, the HSDPA USB MODEM just works in GPRS/EDGE mode and PCS Band.

GPRS Mode: GMSK Modulation

EDGE Mode: 8PSK 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:	200K Hz
Channel separation:	200K Hz

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

DC voltage nominal:	 +5V; Supplied by USB port of notebook
DC voltage range	 +4.75-5.25V
DC current maximal:	500mA

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:	 +2.85V
Current:	150mA 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

1900MHz HSDPA USB MODEM		
E220		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
-MAINBOARD	E01AB10652700136	CD33TCPU

4.2.2 Adapter Technical Data

No Applicable.

4.2.3 Battery Technical Data

No Applicable.

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: E220
FCC Identification: QISE220

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	12.24.2006
3m Full Anechoic Chamber	S+M	N/A	N/A	12.05.2006
Signal Analyzer	R&S	FSQ 26	100266	05.18.2007
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	05.30.2007
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	05.30.2007
Receiver	R&S	ESIB 26	100318	08.17.2006
Receiver	R&S	ESCS30	830245/018	05.30.2007
Pre-Amplifier	Agilent	8447D	2944A10146	05.30.2007
Pre-Amplifier	Agilent	83017A	3950M00246	01.03.2007
Loop Antenna	Schwarzbeck	FMZB1516	1516115	01.08.2007
BiLog Antenna	Schaffner	CBL 6112B	2747	08.30.2006
BiLog Antenna	Schaffner	CBL 6112B	2536	08.30.2006
Horn Antenna	R&S	HF906 4044.4507.02	359287/005	12.05.2006
Horn Antenna	R&S	HF906 4044.4507.02	359287/006	12.05.2006
Horn Antenna	ETS-Lindgren	3116	00031541	01.15.2007
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	08.28.2006
Signal Generator	R&S	SMT06	830264/009	05.29.2007
Signal Generator	R&S	SMR 40	100325	12.09.2006
Artificial Mains Network	Schwarzbeck	NNLK8121	8121416	05.29.2007
Power Supply	Keithley	2306	1045337	04.20.2007
Climate Chamber	WEISS	ACS-1	3604040034	04.24.2007
Universal Radio Communication Tester	R&S	CMU200	108035	07.04.2006
Wireless communication test set	Agilent	8960	GB43461081	01.24.2007

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:	25°C
Relative humidity:	55%
Test Configurations:	GPRS Mode and EDGE Mode 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 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 Station (MS) conformance specification;

6.1.2.3 Limits

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

Table 14 Limits

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

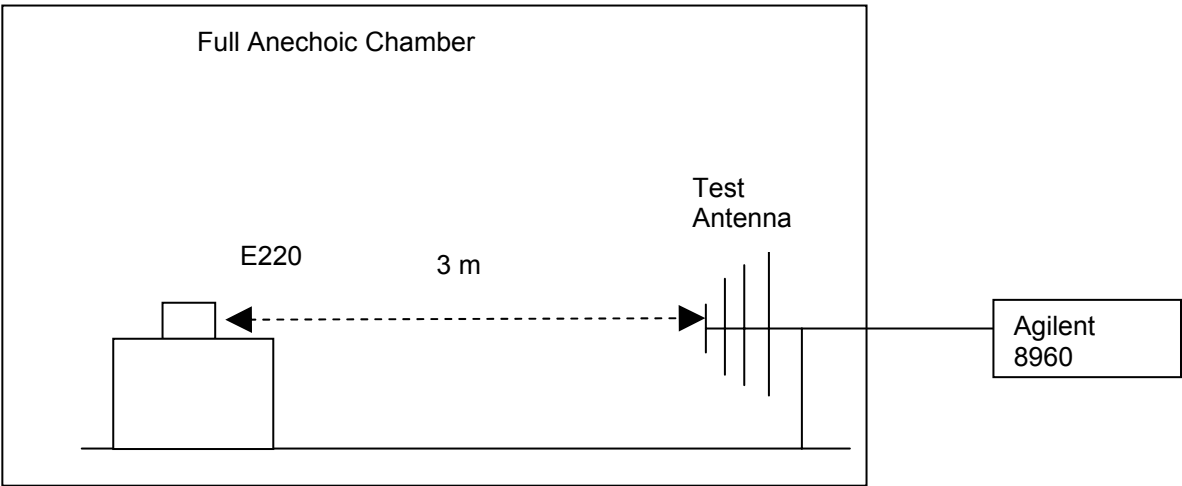
6.1.3 Test Method and Setup

- 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 HSDPA USB MODEM to the wireless communication tester Agilent 8960 via the air interface. The band is set as PCS.
- Test the Radiated maximum output power by the Agilent 8960 received from test antenna.
- 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

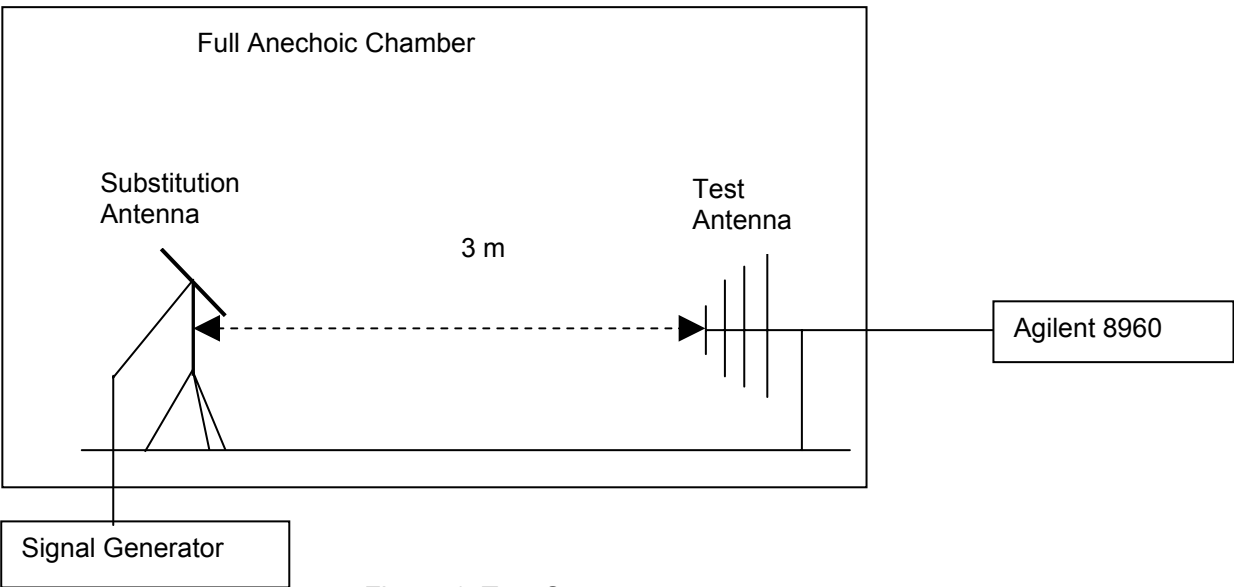


Figure 1. Test Set-up

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(EIRP)

TEST CONDITIONS	RF Output Power		
	Channel512(B)	Channel661(M)	Channel810(T)

		1850.2MHz		1880.0MHz		1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
GPRS Mode	T _{nom} (25 °C)	28.81	33.0	29.06	33.0	28.93	33.0
	V _{nom} (5 V)						
EDGE Mode	T _{nom} (25 °C)	25.13	33.0	24.63	33.0	25.27	33.0
	V _{nom} (5 V)						

6.1.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix A with 7 pages.

6.2 Modulation Characteristics

6.2.1 Test Conditions

Table 16 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	47 %
Test Configurations:	GPRS Mode and EDGE Mode at frequency M

6.2.2 Test Specifications and Limits

6.2.2.1 Specification

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

6.2.2.2 Supporting Standards

Table 17 Supporting Standards:

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

6.2.2.3 Limits

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

Table 18 Limits

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

6.2.3 Test Method and Setup

Connect the HSDPA USB MODEM to Universal Radio Communication Tester CMU200 via the antenna connector. The frequency band is set as PCS; the HSDPA USB Modem's output is matched with 50 Ω load, test method was according to 3GPP TS 51.010. The waveform quality and constellation of the HSDPA USB MODEM was tested.

Test setup

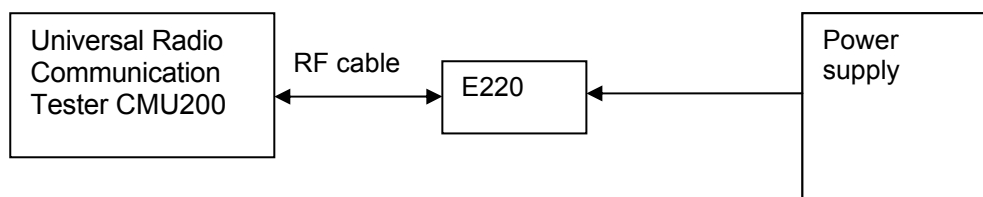


Figure 2. Test Set-up

6.2.4 Measurement Results

Table 19 Measurement Results

TEST CONDITIONS		Modulation Characteristic	
		Channel661(M) 1880.0MHz	
		Measured	
		GPRS Mode	EDGE Mode
T _{nom} (25 °C)	V _{nom} (5V)	Refer to Appendix B	Refer to Appendix B

6.2.5 Conclusion

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

For the measurement results refer to appendix B with 3 pages.

6.3 Occupied Bandwidth

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:	GPRS Mode and EDGE Mode at frequency B、M、T

6.3.2 Test Specifications and Limits

6.3.2.1 Specification

CFR 47 (FCC) part 2.1049 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
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile Station (MS) conformance specification;

6.3.2.3 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 22 Limits

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

6.3.3 Test Method and Setup

HSDPA USB MODEM was connected to the wireless signal analyzer R&S FSQ26 via the one RF connector. The band class is set as PCS; HSDPA USB MODEM was controlled to transmit maximum power. Measure and record the occupied bandwidth of the HSDPA USB MODEM by the R&S FSQ26.

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

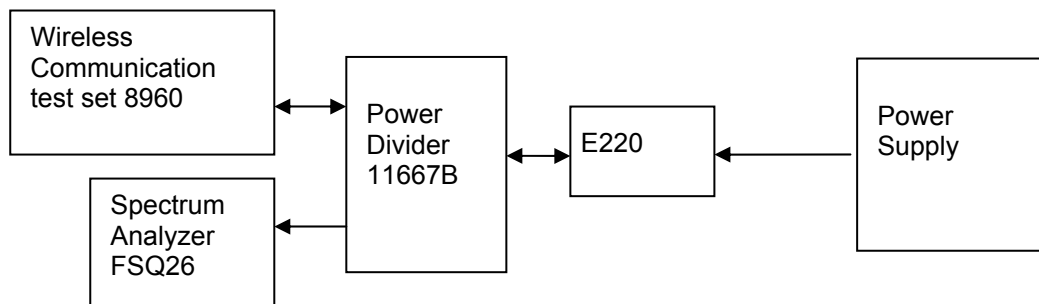


Figure 3. Test Set-up

6.3.4 Measurement Results

Table 23 Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
		Channel512 (B) 1850.2MHz		Channel661 (M) 1880.0Mhz		Channel810 (T) 1909.8MHz	
		Measured (KHz)		Measured (KHz)		Measured (KHz)	
		GPRS Mode	EDGE Mode	GPRS Mode	EDGE Mode	GPRS Mode	EDGE Mode
T_{nom} (25 °C) V_{nom} (5V)	99%	274.0	275.6	285.3	283.7	283.7	283.7
T_{nom} (25 °C) V_{nom} (5V)	26dBc	314.1	312.5	323.7	315.7	317.3	314.1

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix C with 13 pages.

6.4 Band Edges Compliance

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:	GPRS Mode and EDGE Mode at frequency B、T

6.4.2 Test Specifications and Limits

6.4.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

6.4.2.2 Supporting Standards

Table 25 Supporting Standards:

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

6.4.2.3 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 26 Limits for GPRS

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

Table 27 Limits for EDGE

Rated Power:	26 dBm
Required attenuation:	$43 + 10 \log(0.4) = 39$, 26 dBm - 39 dB
Absolute level	- 13 dBm

6.4.3 Test Method and Setup

HSDPA USB MODEM was connected to the wireless signal analyzer R&S FSQ26 via the one RF connector, the band class is set as PCS. HSDPA USB MODEM was controlled to transmit maximum power. Measure and record band edges compliance of the HSDPA USB MODEM by the R&S FSQ26.

In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least 1% of the emission bandwidth of the fundamental emission of the transmitter may be employed According to FCC part24.238.The FCC rules define the fundamental emission as -26dBc bandwidth. The limit is -13dBm.

Test Set-up

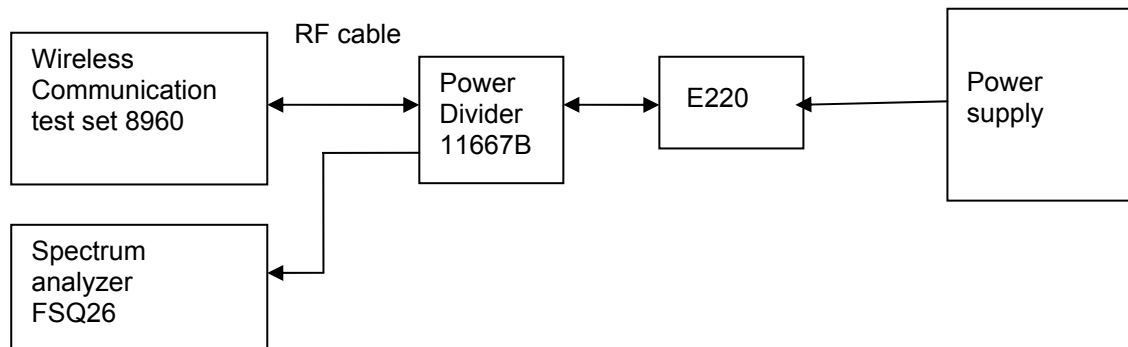


Figure 4. Test Set-up

6.4.4 Measurement Results

Table 28 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	$T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (5\text{V})$					
	1850.2	512	GPRS Mode	<-13(See appendix D)	- 13 dBm	Pass
	1909.8	810	GPRS Mode	<-13(See appendix D)	- 13 dBm	Pass

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
PCS	$T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (5\text{V})$					
	1850.2	512	EDGE Mode	<-13(See appendix D)	- 13 dBm	Pass
	1909.8	810	EDGE Mode	<-13(See appendix D)	- 13 dBm	Pass

6.4.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix D with 5 pages.

6.5 Spurious Emission at Antenna Terminal

6.5.1 Test Conditions

Table 29 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	50 %
Test Configurations:	GPRS Mode and EDGE Mode at frequency B、M、T

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	Recommended GSM/EDGE 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 $43 + 10 \log_{10} P$. (Whereas P is the rated power of the EUT).

Table 31 Limits for GPRS Mode

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

Table 32 Limits for EDGE Mode

Rated Power:	26 dBm
Required attenuation:	$43 + 10 \log(0.4) = 39$, 26 dBm - 39 dB
Absolute level	- 13 dBm

6.5.3 Test Method and Setup

HSDPA USB MODEM was connected to the wireless signal analyzer R&S FSQ26 via the one RF connector, the band class is set as PCS. HSDPA USB MODEM was controlled to transmit maximum power.

Measure and record the Conducted Spurious Emission of the HSDPA USB MODEM by the R&S FSQ26.

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

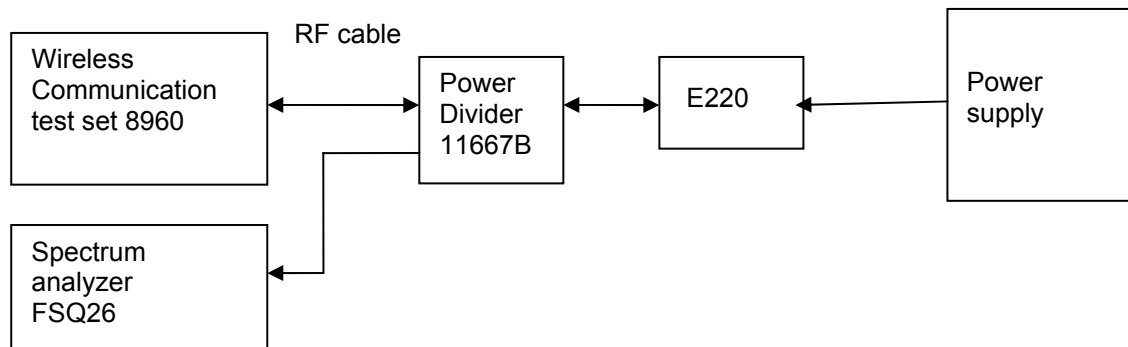


Figure 5. Test Set-up

6.5.4 Measurement Results

Table 33 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 512(B)	GPRS Mode	9 kHz ~20GHz	30	<- 13 dBm (See appendix E)	- 13 dBm	Pass
	EDGE Mode	9 kHz ~20GHz	26	<- 13 dBm (See appendix E)	- 13 dBm	Pass
Channel 661(M)	GPRS Mode	9 kHz ~20GHz	30	<- 13 dBm (See appendix E)	- 13 dBm	Pass
	EDGE Mode	9 kHz ~20GHz	26	<- 13 dBm (See appendix E)	- 13 dBm	Pass
Channel 810(T)	GPRS Mode	9 kHz ~20GHz	30	<- 13 dBm (See appendix E)	- 13 dBm	Pass
	EDGE Mode	9 kHz ~20GHz	26	<- 13 dBm (See appendix E)	- 13 dBm	Pass

6.5.5 Conclusion

The equipment **PASSED** the requirement of this clause.
 For the measurement results refer to appendix E with 19 pages.

6.6 Radiated Spurious Emission

6.6.1 Test Conditions

Table 34 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	53 %
Test Configurations:	GPRS Mode and EDGE Mode at frequency M

6.6.2 Test Specifications and Limits

6.6.2.1 Specification

CFR 47 (FCC) part 2.1053 and part 24.238

6.6.2.2 Supporting Standards

Table 35 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 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 36 Limits for GPRS Mode

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

Table 37 Limits for EDGE Mode

Rated Power:	26 dBm
Required attenuation:	$43 + 10 \log(0.4) = 39$, 26 dBm - 39 dB
Absolute level	- 13 dBm

6.6.3 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 HSDPA USB MODEM is equipment with non-integral antenna. And it should test according to part (b) of above section.

BTS simulator is connected to a communication antenna, by which communicate with the HSDPA USB MODEM inside the test site. The BTS simulator controls the HSDPA USB MODEM 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 HSDPA USB MODEM 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 HSDPA USB MODEM 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.

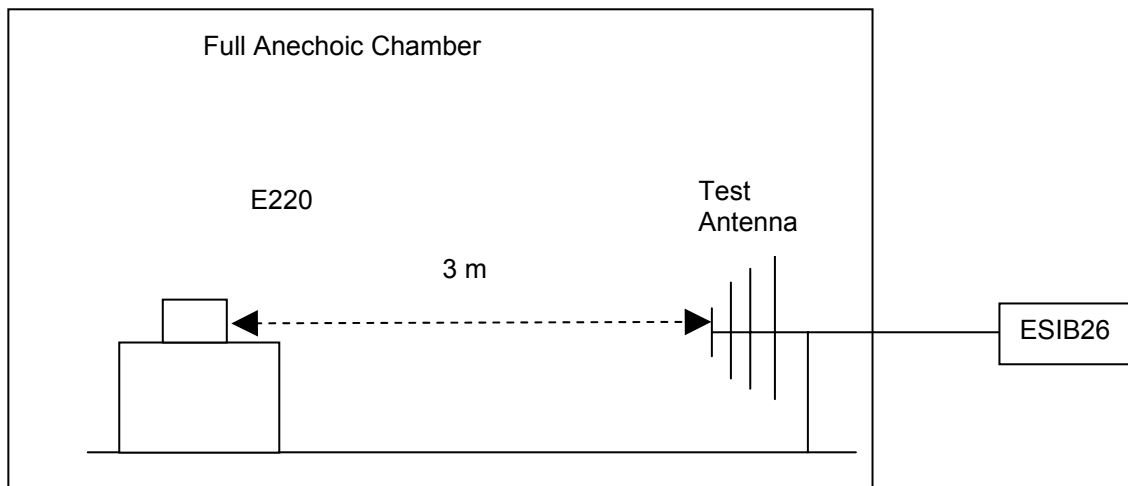
Measurement bandwidth (RBW) for 9 kHz up to 1GHz: 1 MHz;

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

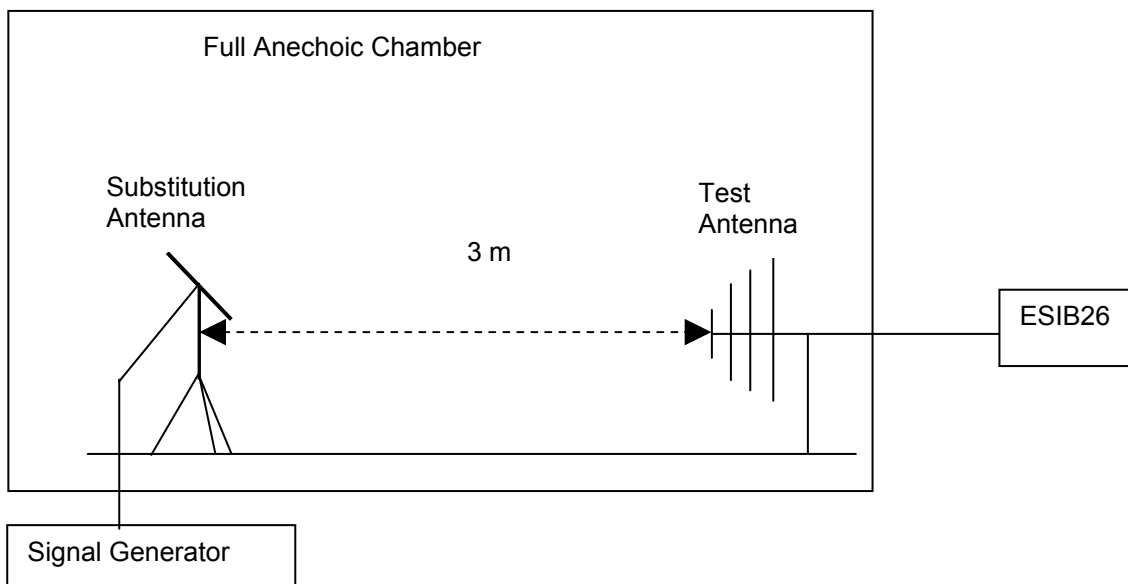


Figure 6. Test Set-up

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

6.6.4 Measurement Results

6.6.4.1 Pre-test Measurement Results

Table 38 Measurement Results

Channel Number	Mode	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
661	GPRS	9 kHz ~20GHz	30	<- 13 dBm (See appendix F)	- 13 dBm	Pass
661	EDGE	9 kHz ~20GHz	26	<- 13 dBm (See appendix F)	- 13 dBm	Pass

6.6.4.2 Substitution Results

No peak found in pre- test.

Calculation Sample:

Table 39 Substitution Results

Freq. [MHz]	Measur ement Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result
3923. 33	-38.12	Horn Ant.	7.85	2.20	-41.24	-35.59	-13	Pass

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

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

NOTE: SGP- Signal Generator Level

6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix F with 17 pages.

6.7 Frequency Stability

6.7.1 Test Conditions

Table 40 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	GPRS Mode and EDGE Mode at frequency M

6.7.2 Test Specifications and Limits

6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 24.235

6.7.2.2 Supporting Standards

Table 41 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

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

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

(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 HSDPA USB MODEM to the Wireless Communication test set 8960 via the connector. Then measure the frequency error by the Wireless Communication test set 8960. The HSDPA USB Modem's output is matched with a 50 Ω load.

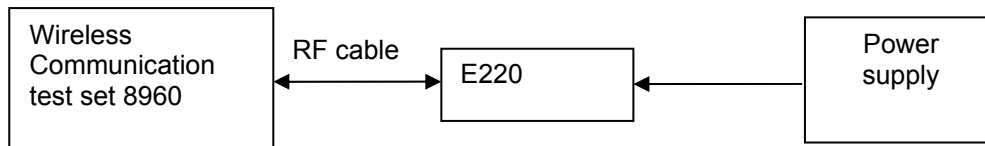


Figure 7. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

● GPRS Mode, 5V DC Channel No.661(1880.0MHz)

Table 42 Measurement Results vs. Variation of Temperature—GPRS Mode

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-10 °C	30	1880.0	-12.12	Pass
0 °C	30	1880.0	5.46	Pass
+10 °C	30	1880.0	2.85	Pass
+20 °C	30	1880.0	-12.20	Pass
+30 °C	30	1880.0	6.07	Pass
+40 °C	30	1880.0	-3.80	Pass
+50 °C	30	1880.0	-15.11	Pass

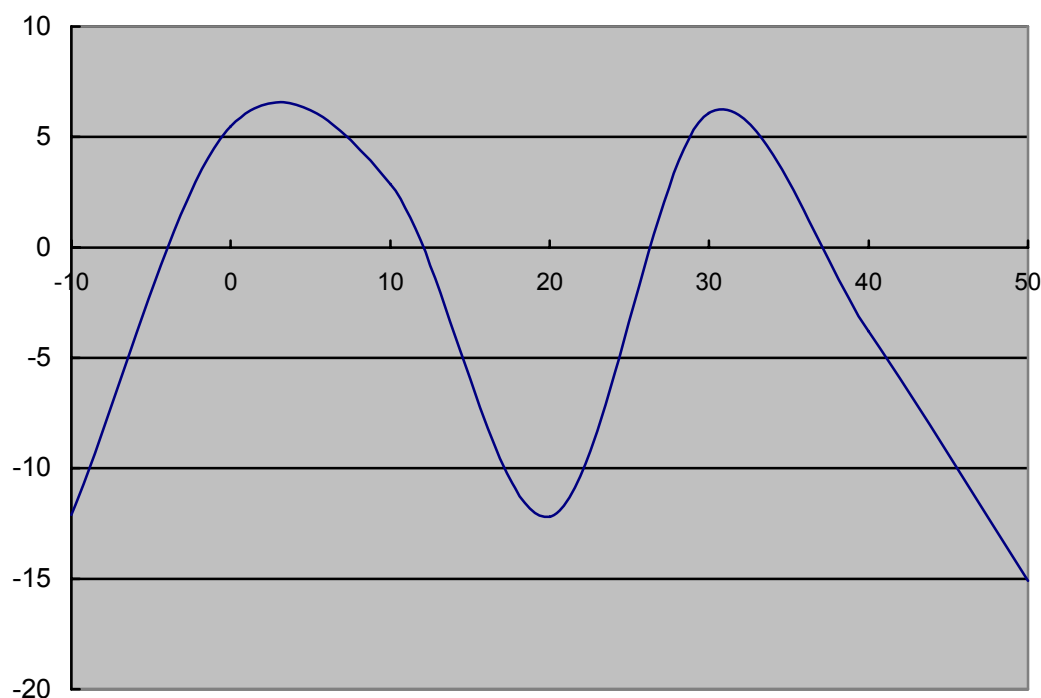


Figure 8. GPRS Mode Test Graph

- **EDGE Mode, 5V DC Channel No.661(1880.0MHz)**

Table 43 Measurement Results vs. Variation of Temperature—EDGE Mode

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-10 °C	26	1880.0	10.35	Pass
0 °C	26	1880.0	8.79	Pass
+10 °C	26	1880.0	9.01	Pass
+20 °C	26	1880.0	-2.46	Pass
+30 °C	26	1880.0	3.44	Pass
+40 °C	26	1880.0	-10.88	Pass
+50 °C	26	1880.0	13.53	Pass

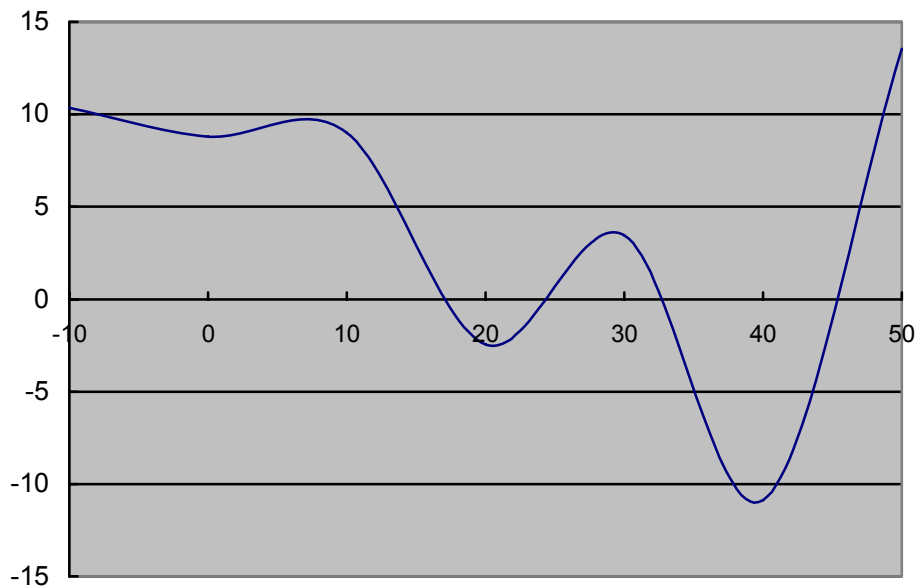


Figure 9. EDGE Mode Test Graph

6.7.4.2 Measurement Results vs. Variation of Voltage

- GPRS Mode, 25 °C ,Channel No. 661(1880.0MHz)

Table 44 Measurement Results vs. Variation of Voltage—GPRS Mode

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.75	30	1880.0	-22.11	Pass
5	30	1880.0	-6.79	Pass
5.25	30	1880.0	-0.32	Pass

- EDGE Mode, 25 °C ,Channel No. 661(1880.0MHz)

Table 45 Measurement Results vs. Variation of Voltage—EDGE Mode

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
4.75	26	1880.0	15.11	Pass
5	26	1880.0	9.82	Pass
5.25	26	1880.0	3.33	Pass

6.7.5 Conclusion

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

7 EMC Test

7.1 Radiated Emission of Enclosure in Idle Mode

7.1.1 Test Conditions

Table 46 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	GPRS Mode at frequency M

7.1.2 Test Specifications and Limits

7.1.2.1 Specification

CFR 47 (FCC) part 15.109

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
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7.1.2.3 Limits

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

Table 48 Limits

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

7.1.3 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 E220 was communicated with the BTS simulator through Air interface. The E220 operated on the typical channel and the E220 worked in idle mode, transmitter was not work in this test.

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

Test set up

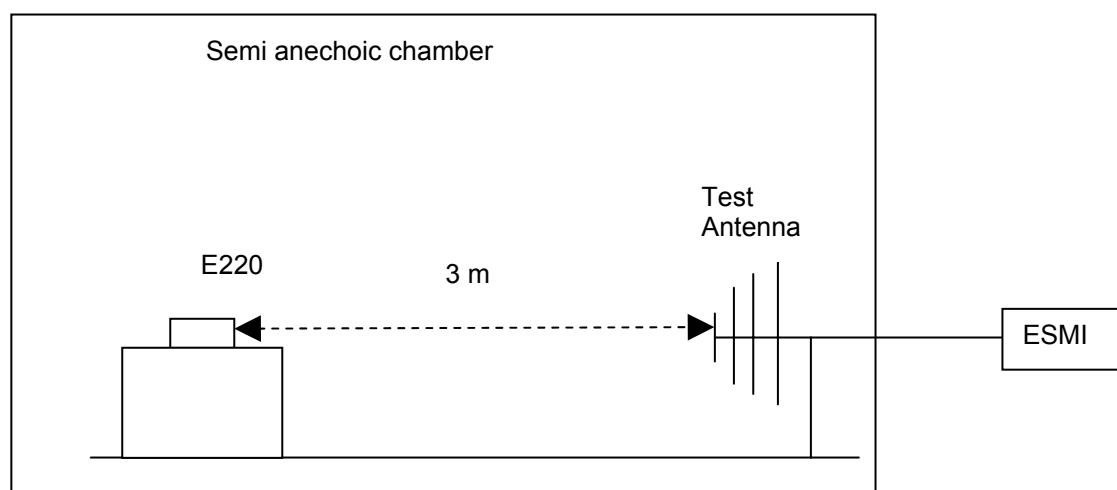


Figure 10. Test set up

7.1.4 Measurement Results

Table 49 MEASUREMENT RESULT: QP DECTER

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
59.980000	27.90	-17.1	40.0	12.1	109.0	0.00	VERTICAL
113.700000	26.20	-10.2	43.5	17.3	262.0	0.00	HORIZONTAL
173.400000	27.00	-12.1	43.5	16.5	161.0	0.00	HORIZONTAL
249.960000	31.00	-8.2	46.0	15.0	161.0	260.00	VERTICAL
466.320000	34.50	-3.6	46.0	11.5	100.0	0.00	VERTICAL
598.140000	36.10	-1.7	46.0	9.9	100.0	0.00	VERTICAL

7.1.5 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 50 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
Radiated Emission of enclosure at ideal mode	Field strength (dBμV/m)	U=5dB; k=2

9 Appendixes

Appendix A	Measurement Results Effective Radiated Power of Transmitter	7 pages
Appendix B	Measurement Results Modulation Characteristics	3 pages
Appendix C	Measurement Results Occupied Bandwidth	13 pages
Appendix D	Measurement Results Band Edges	5 pages
Appendix E	Measurement Results Spurious Emission at Antenna Terminal	19 pages
Appendix F	Measurement Results Radiated Spurious Emission	17 pages
Appendix G	Measurement Results Radiated Emission of Enclosure at Ideal Mode	2 pages
Appendix H	Photos of Test Setup	4 pages
Appendix I	Measurement Results Maximum Conducted Output Power	20 pages