



Report No: SYBH (R) 44082005EB  
FCC ID: QISETS2551

**FCC TEST REPORT OF  
Huawei CDMA Fixed Wireless Terminal  
M/N:ETS2551**

**Mar. 08, 2006**

**Reliability Laboratory of Huawei Technologies Co., Ltd.**

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**REPORT ON**

FCC Test of Huawei CDMA Fixed Wireless Terminal

M/N: ETS2551

Report No: SYBH (R) 44082005EB

**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**

2006.03.08

Date

Tang Shuanli

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signature



**Technical Responsibility  
For Area of Testing**

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Zhang Xinghai

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## 1 Summary

The table below summarizes the measurements and results for the Huawei CDMA Fixed Wireless Terminal. Detailed results and descriptions are shown in the following pages.

Table 1 Summary of results

<b>FCC Measurement Specification</b>	<b>FCC Limits Part(s)</b>	<b>Description</b>	<b>Result</b>
2.1046	24.232	Effective Radiated Power of Transmitter	PASS
2.1047		Modulation Characteristics	PASS
2.1049		Occupied Bandwidth	PASS
2.1051		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 CDMA Fixed Wireless Terminal is subscriber equipment in the CDMA system. The frequency band is US PCS. The Fixed Wireless Terminal implements such functions as RF signal receiving / transmitting, CDMA protocol processing, and voice service etc. The Fixed Wireless Terminal uses MSM6025 chipset and Zero-IF technologies.

#### 2.1.2 Support function and Service

The Fixed Wireless Terminal support the function and service as follows:

Table 2 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note
voice	Modulation: QPSK	TM1*	
voice	Modulation: HPSK	TM3*	

Note: \* Refer to ANSI/TIA-98-E section 1.3 for the information of TM (Test Mode).

### 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 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 **2714.01** in Jan of 2004.

#### 3.1 Testing Period

The test have been performed during the period of

Feb.24, 2006 to Mar. 03, 2006

#### 3.2 General Set up Description

Huawei CDMA Fixed Wireless Terminal can only support CDMA mode and US PCS Band. During this measurement, the Fixed Wireless Terminal just works in CDMA mode and US PCS Band.

**TM1:** Forward Traffic Channel Radio Configuration 1, Reverse Traffic Channel Radio Configuration 1

**TM3:** Forward Traffic Channel Radio Configuration 3, Reverse Traffic Channel Radio Configuration 3

Parameter	Units	Value
$\hat{I}_{or}$	dBm/1.23 MHz	-104
$\frac{\text{Pilot } E_c}{I_{or}}$	dB	-7
$\frac{\text{Traffic } E_c}{I_{or}}$	dB	-7.4

## 4 Product Description

### 4.1 Technical Characteristics

#### 4.1.1 Frequency Range

Table 4 Frequency Range

Uplink band:	1850 to1910 MHz
Downlink band:	1930 to 1990 MHz

#### 4.1.2 Channel Spacing / Separation

Table 5 Channel Spacing / Separation

Channel spacing:	50 KHz
Channel separation:	1.25 MHz

#### 4.1.3 Type of Emission

Table 6 Type of Emission

Emission Designation:	1M25F9W
-----------------------	---------

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:	~100-220V
AC voltage range	~90V-264V
AC current maximal:	300mA

#### 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 CDMA Fixed Wireless Terminal		
ETS2551		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
-Main board	0399518BC001063	WL23TCPU
-Connect board	0287047N53008083	WL21PIPU
-Battery	BYD5C0500612	HBC86P1

### 4.2.2 Adapter Technical Data

AC/DCAdapter Model: UE15-120125SPA4  
 Manufacturer: UE Fuhua Electronic Co., Ltd.  
 Input Voltage: ~100-220V; ~50/60Hz  
 Output Voltage:  + 12V  
 Rated Power: 9.6W

### 4.2.3 Battery Technical Data

Type: Rechargeable NI-MH Battery  
 Manufacturer: BYD COMPANY LIMITED  
 Battery Model: H-AA1500B×3  
 Rated capacity: 1500mAH  
 Nominal Voltage:  + 3.8V  
 Charging Voltage:  + 4.4V

### 4.2.4 FCC Identification

Grantee Code: QIS  
 Product Code: ETS2551  
 FCC Identification: QISETS2551

## 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	FSU 26	200002	04.21.2006
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	05.30.2006
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	05.30.2006
Receiver	R&S	ESIB 26	100318	08.17.2006
Receiver	R&S	ESCS30	830245/018	05.30.2006
Pre-Amplifier	Agilent	8447D	2944A10146	05.30.2006
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
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	08.28.2006
Signal Generator	R&S	SMT06	830264/009	05.29.2006
Signal Generator	R&S	SMR 40	100325	12.09.2006
Artificial Mains Network	Schwarzbeck	NNLK8121	8121416	05.29.2006
Power Supply	Keithley	2306	1045337	04.20.2006
Climate Chamber	WEISS	ACS-1	3604040034	04.24.2006
Universal Radio Communication Tester	R&S	CMU200	108522	08.16.2006
Wireless communications test set	Agilent	8960	GB43042699	04.15.2006
Power splitter	Agilent	11667B	N/A	Before test

## 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:	24.5°C
Relative humidity:	50%
Test Configurations:	TM1 and TM3 at channel No.25、600、1175

#### 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
ANSI/TIA-98-E: 2003	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations

##### 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

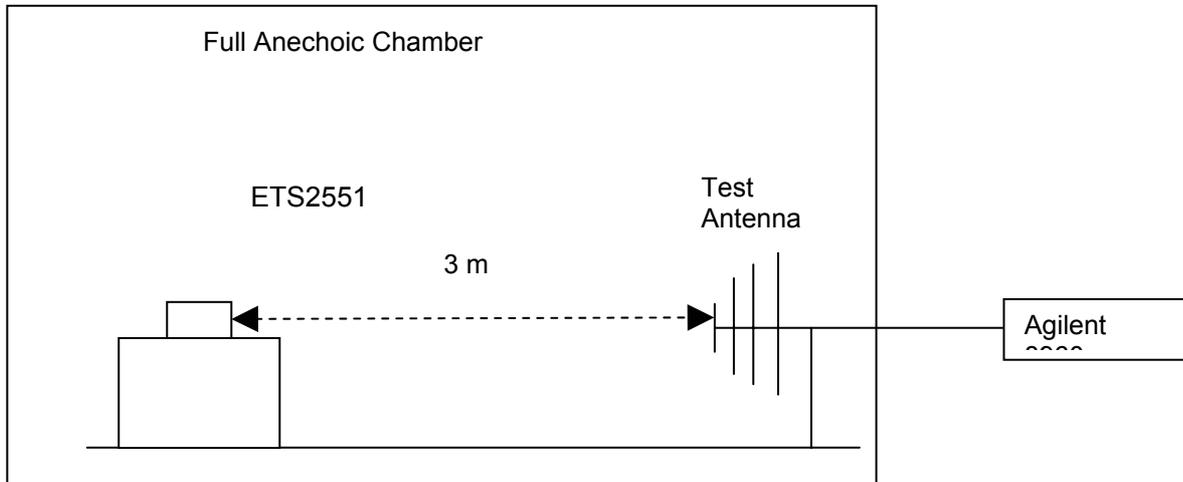
Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

#### 6.1.3 Test Method and Setup

- (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 Fixed Wireless Terminal to the wireless communication tester Agilent 8960 via the air interface. The band class is set as US 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**

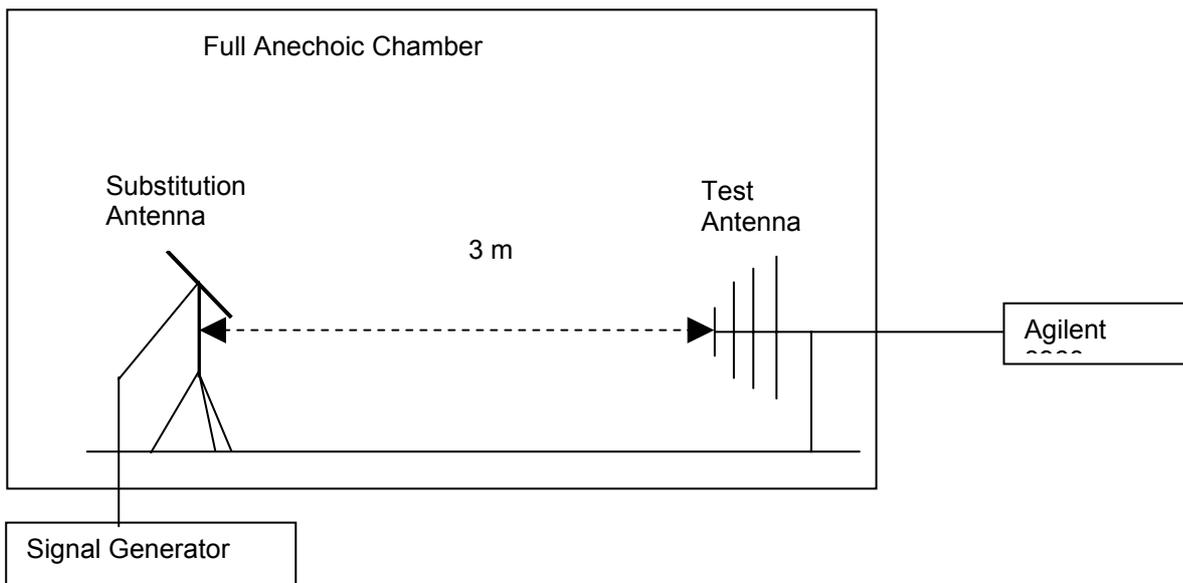


Figure 1. Test Set-up

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		
	Channel25(B) 1851.25MHz	Channel600(M) 1880MHz	Channel1175(T) 1908.75MHz
	dBm	dBm	dBm

		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T <sub>nom</sub> (24.5°C)	23.63	33	24.41	33	24.59	33
	V <sub>nom</sub> (3.8 V)						
TM3	T <sub>nom</sub> (24.5 °C)	23.81	33	24.33	33	24.60	33
	V <sub>nom</sub> (3.8 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:	23 °C
Relative humidity:	51 %
Test Configurations:	TM1 and TM3 at channel No.600

### 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
ANSI/TIA-98-E: 2003	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations.

#### 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 Fixed Wireless Terminal to Universal Radio Communication Tester CMU200 via the antenna connector. The band class is set as US PCS; the Fixed Wireless Terminal's output is matched with 50 Ω load, test method was according to ANSI/TIA-98-E. The waveform quality and constellation of the Fixed Wireless Terminal was tested.

#### Test setup

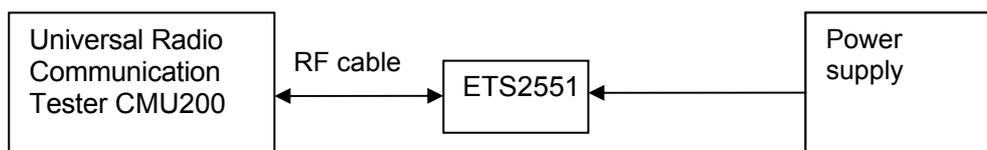


Figure 2. Test Set-up

**6.2.4 Measurement Results**

Table 19 Measurement Results

TEST CONDITIONS		Modulation Characteristic	
		Channel 600(M) 1880MHz	
		Measured	
		TM1	TM3
T <sub>nom</sub> (23 °C)	V <sub>nom</sub> (3.8V)	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:	RF connector
Ambient temperature:	25 °C
Relative humidity:	53 %
Test Configurations:	TM1 and TM3 at channel No.25、600、1175

#### 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
ANSI/TIA-98-E: 2003	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations.

##### 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

Fixed Wireless Terminal was connected to the wireless signal analyzer R&S FSU26 via the one RF connector. The band class is set as US PCS; Fixed Wireless Terminal was controlled to transmit Maximum power. Measure and record the Occupied Bandwidth of the ETS2551 by the R&S FSU26.

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): 30 kHz (Resolution bandwidth)  
 Video bandwidth (VBW): 300 kHz

**Test Set-up**

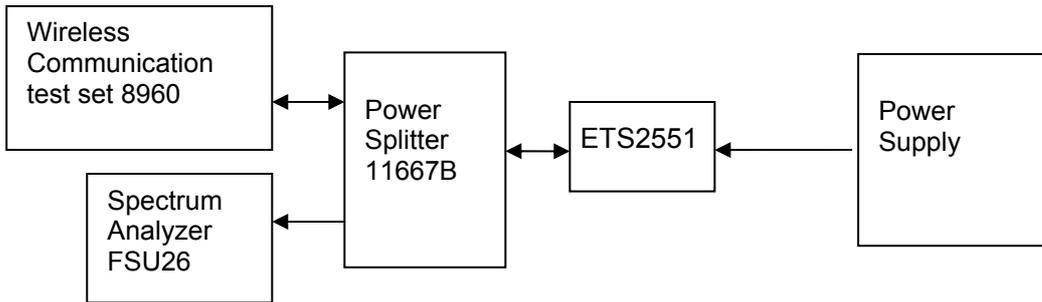


Figure 3. Test Set-up

**6.3.4 Measurement Results**

Table 23 Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
		Channel25 (B) 1851.25MHz		Channel600 (M) 1880MHz		Channel777(T) 1908.75MHz	
		Measured (MHz)		Measured (MHz)		Measured (MHz)	
		TM1	TM3	TM1	TM3	TM1	TM3
T <sub>nom</sub> (25 °C)	V <sub>nom</sub> (3.8V)	1.3053	1.2981	1.2981	1.2981	1.3053	1.3053

**6.3.5 Conclusion**

The equipment **PASSED** the requirement of this clause.  
 For the measurement results refer to appendix C with 7 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:	24°C
Relative humidity:	52 %
Test Configurations:	TM1 and TM3 at channel No.25、 1175

### 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
ANSI/TIA-98-E: 2003	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations.

#### 6.4.2.3 Limits

Compliance with 24.238 requires that 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

Rated Power:	24 dBm
Required attenuation:	$43 + 10 \log(0.25) = 37$ , 24 dBm – 37 dB
Absolute level	- 13 dBm

### 6.4.3 Test Method and Setup

Fixed Wireless Terminal was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as US PCS. Fixed Wireless Terminal was controlled to transmit Maximum power. Measure and record Band edge compliance of the Fixed Wireless Terminal by the R&S FSU26.

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

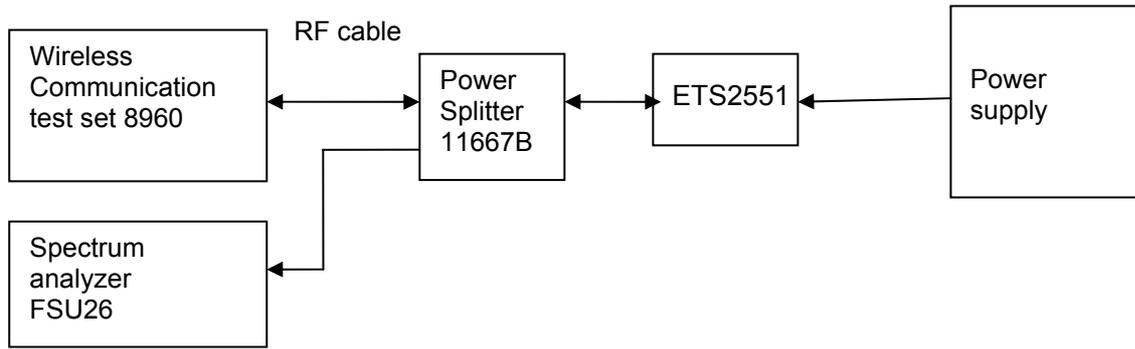


Figure 4. Test Set-up

### 6.4.4 Measurement Results

Table 27 Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
$T_{nom}$ (24 °C), $V_{nom}$ (3.8V)							
US PCS	1850	25 (B)	TM1 & TM3	24	<-13(See appendix D)	- 13 dBm	Pass
	1910	1175 (T)	TM1 & TM3	24	<-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 28 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	23.5°C
Relative humidity:	52 %
Test Configurations:	TM1 and TM3 at channel No.25、 600、 1175

### 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
ANSI/TIA-98-E: 2003	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Mobile Stations.

#### 6.5.2.3 Limits

Compliance with 24.238 requires that 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:	24 dBm
Required attenuation:	$43 + 10 \log(0.25) = 37$ , 24 dBm – 37 dB
Absolute level	- 13 dBm

### 6.5.3 Test Method and Setup

Fixed Wireless Terminal was connected to the wireless signal analyzer R&S FSU26 via the one RF connector, the band class is set as US PCS. Fixed Wireless Terminal was controlled to transmit Maximum power.

Measure and record the Conducted Spurious Emission of the ETS2551 by the R&S FSU26.

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

**(b) 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**

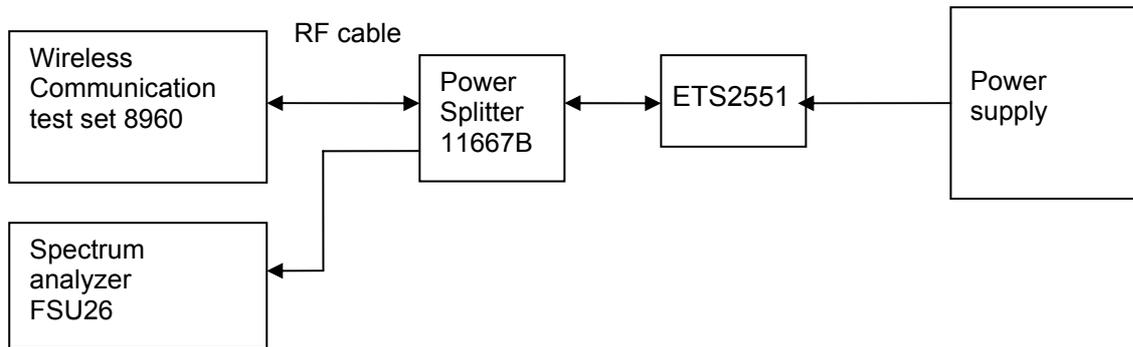


Figure 5. Test Set-up

**6.5.4 Measurement Results**

Table 31 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel No.25(B)	TM1	9 kHz ~20GHz	24	<- 13 dBm (See appendix E)	- 13 dBm	Pass
	TM3	9 kHz ~20GHz	24	<- 13 dBm (See appendix E)	- 13 dBm	Pass
Channel No.600(M)	TM1	9 kHz ~20GHz	24	<- 13 dBm (See appendix E)	- 13 dBm	Pass
	TM3	9 kHz ~20GHz	24	<- 13 dBm (See appendix E)	- 13 dBm	Pass
Channel No.1175(T)	TM1	9 kHz ~20GHz	24	<- 13 dBm (See appendix E)	- 13 dBm	Pass
	TM3	9 kHz ~20GHz	24	<- 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 13 pages.

## 6.6 Radiated Spurious Emission

### 6.6.1 Test Conditions

Table 32 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	24.5 °C
Relative humidity:	52 %
Test Configurations:	TM1 at channel No.600

### 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 33 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.

#### 6.6.2.3 Limits

Compliance with 24.238 requires that 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:	24 dBm (0.25W)
Required attenuation:	$43 + 10 \log_{10} (0.25W) = 37 \text{ dB}$
Absolute level	$24 \text{ dBm} - 37 \text{ dB} = - 13 \text{ dBm}$

### 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 Fixed Wireless Terminal 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 Fixed Wireless Terminal inside the test site. The BTS simulator controls the Fixed Wireless Terminal 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 Fixed Wireless Terminal 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 Fixed Wireless Terminal to the BTS simulator via the air interface. The band class is set as US 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.

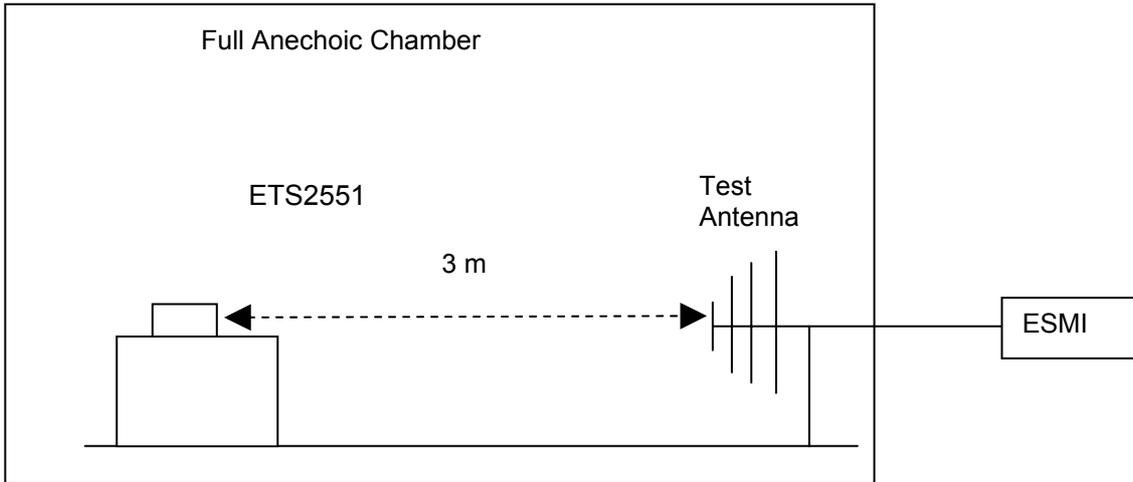
According to part 24.238, the defined measurement bandwidth as following:

24.238(b): 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**

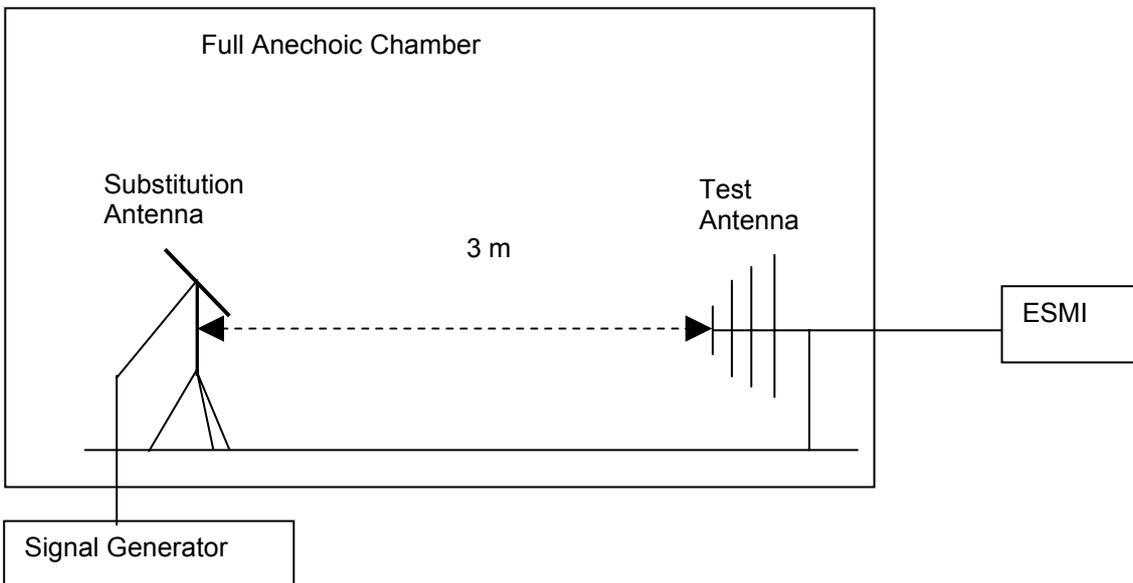


Figure 6. Test Set-up

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 35 Measurement Results

Channel Number	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
600	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix F)	- 13 dBm	Pass

**6.6.4.2 Substitution Results**

There was one peak found in pre- test.

Table 36 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
3760.00	-30.82	Horn Ant.	8.5	2.35	-37.36	-31.21	-13	Pass

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

$$E.R.P. [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd]$$

NoTE: SGP- Signal Generator Level

### 6.6.5 Conclusion

The equipment **PASSED** the requirement of this clause.  
For the measurement results refer to appendix F with 9 pages.

**6.7 Frequency Stability**

**6.7.1 Test Conditions**

Table 37 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	TM1 and TM3 at channel No.600

**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 38 Supporting Standards:

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

**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 ETS2551 to the Wireless Communication test set 8960 via the antenna connector. Then measure the frequency error by the Wireless Communication test set 8960. The Fixed Wireless Terminal’s output is matched with a 50 Ω load.

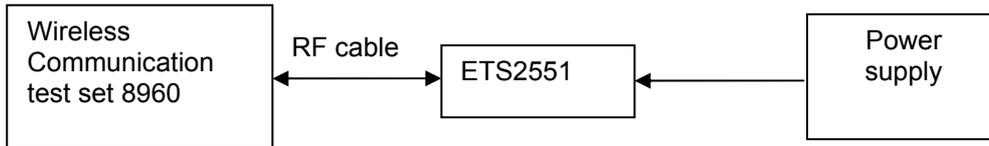


Figure 7. Test Set up

**6.7.4 Measurement Results**

**6.7.4.1 Measurement Results vs. Variation of Temperature**

- TM1, 3.8V DC Channel No.600(1880MHz)

Table 39 Measurement Results vs. Variation of Temperature – TM1

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	24	1880	5.6	Pass
-20 °C	24	1880	4.8	Pass
-10 °C	24	1880	-7.2	Pass
0 °C	24	1880	4.6	Pass
+10 °C	24	1880	-6.2	Pass
+20 °C	24	1880	-6.2	Pass
+30 °C	24	1880	3.6	Pass
+40 °C	24	1880	4.8	Pass
+50 °C	24	1880	-8.2	Pass

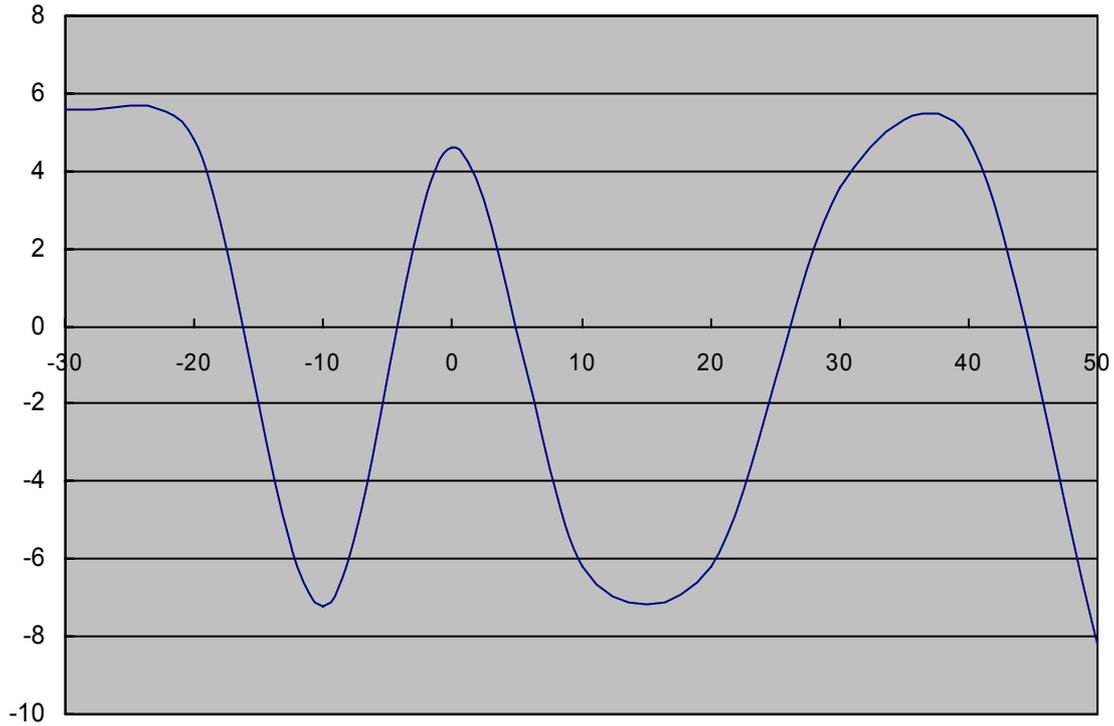


Figure 8. TM1 Test Graph

- **TM3, 3.8V DC Channel No.600(1880MHz)**

Table 40 Measurement Results vs. Variation of Temperature—TM3

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	24	1880	-5.6	Pass
-20 °C	24	1880	-4.2	Pass
-10 °C	24	1880	-5.2	Pass
0 °C	24	1880	5.2	Pass
+10 °C	24	1880	-8.2	Pass
+20 °C	24	1880	-6.4	Pass
+30 °C	24	1880	3.8	Pass
+40 °C	24	1880	9.8	Pass
+50 °C	24	1880	12.2	Pass

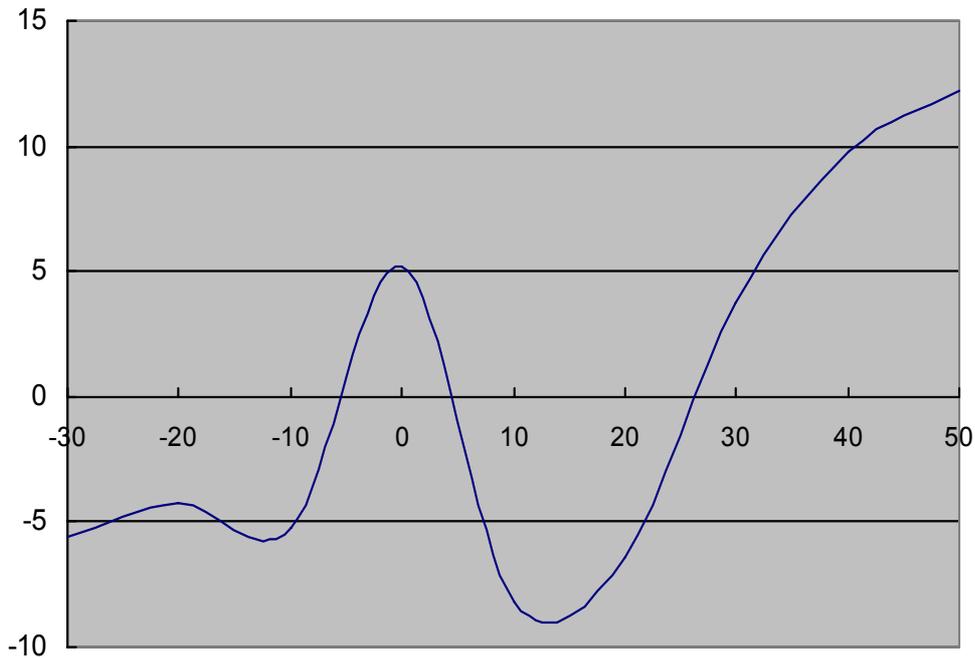


Figure 9. TM3 Test Graph

**6.7.4.2 Measurement Results vs. Variation of Voltage**

- TM1, 25 °C ,Channel No. **600(1880MHz)**

Table 41 Measurement Results vs. Variation of Voltage – TM1

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.3	24	1880	4.8	Pass
3.8	24	1880	-6.2	Pass
4.2	24	1880	-3.6	Pass

- TM3, 25 °C ,Channel No. **600(1880MHz)**

Table 42 Measurement Results vs. Variation of Voltage – TM3

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.3	24	1880	5.2	Pass
3.8	24	1880	6.6	Pass
4.2	24	1880	-4.2	Pass

**6.7.5 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 43 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Power port
Ambient temperature:	23.5°C
Relative humidity:	52 %
Test Configurations:	TM1 at channel No.600

#### 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 44 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

Compliance with CFR 47 part15.107 requires that conducted emission must meet the requirement of following table.

Table 45 Limits

Frequency of Emission (MHz)	Conducted Limit (dB $\mu$ 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 Fixed Wireless Terminal was communicated with the BTS simulator through Air interface, the BTS simulator controls the Fixed Wireless Terminal to transmitter the maximum power which defined in

specification of product. The Fixed Wireless Terminal operated on the typical channel.

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

**Test Set-up**

The Fixed Wireless Terminal was setup in the screened chamber and operated under nominal conditions.

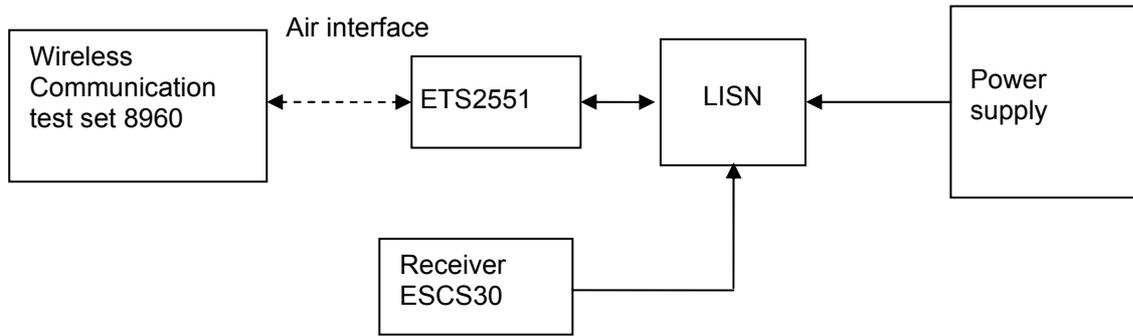


Figure 10. Test Set-up

**7.1.4 Measurement Results**

Table 46 MEASUREMENT RESULT:QP DECTER

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.312000	49.60	1.0	60	10.4	N	FLO
0.496500	50.30	0.7	56	5.7	L2	FLO
1.419000	49.00	0.6	56	7.0	L2	FLO
2.598000	44.30	0.6	56	11.7	L2	FLO
5.257500	40.10	0.6	60	19.9	L2	FLO
21.799500	28.70	3.0	60	31.3	L2	FLO

Table 47 MEASUREMENT RESULT:AV DECTER

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.496500	39.90	0.7	46	6.2	N	FLO
0.744000	33.20	0.7	46	12.8	L2	FLO
0.802500	30.90	0.7	46	15.1	N	FLO
0.865500	32.90	0.6	46	13.1	L2	FLO
0.928500	32.60	0.5	46	13.4	L2	FLO
2.602500	29.10	0.6	46	16.9	L2	FLO

**7.1.5 Conclusion**

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

## 7.2 Radiated Emission of Enclosure in Ideal mode

### 7.2.1 Test Conditions

Table 48 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	50%
Test Configurations:	TM1 at channel No.600

### 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 49 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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#### 7.2.2.3 Limits

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

Table 50 Limits

Frequency of Emission (MHz)	Radiated Limit	
	Unit( $\mu$ v/m)	Unit(dB $\mu$ 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 Fixed Wireless Terminal was communicated with the BTS simulator through Air interface. The Fixed Wireless Terminal operated on the typical channel and the Fixed Wireless Terminal worked in idle mode, transmitter was not work in this test.

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

**Test set up**

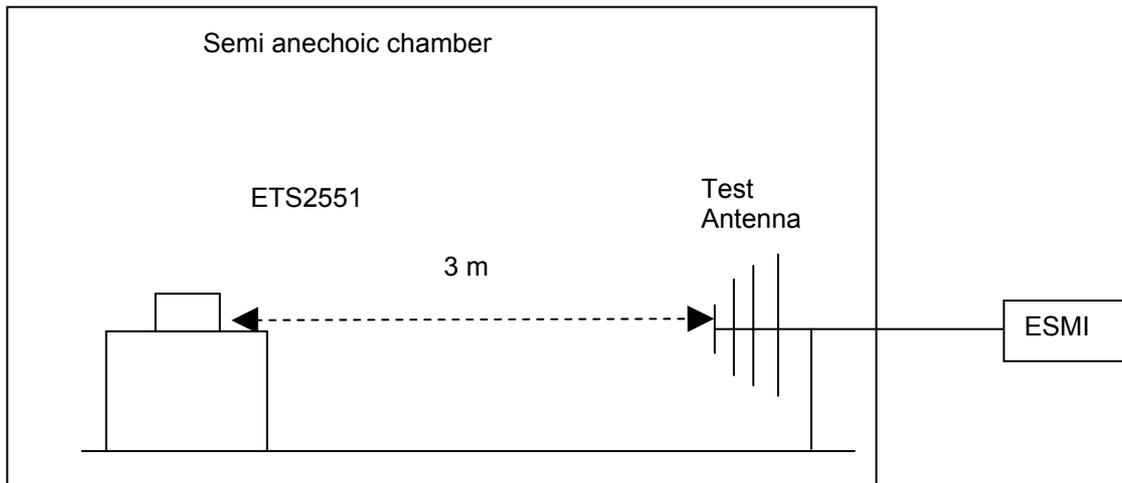


Figure 11. Test set up

**7.2.4 Measurement Results**

Table 51 MEASUREMENT RESULT: QP DECTER

Frequency (MHz)	Level (dBµV/m)	Transd (dB)	Limit (dBµV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
51.600000	30.30	-13.8	40.0	6.7	115.0	144.00	VERTICAL
61.800000	24.30	-9.8	40.0	15.7	100.0	20.00	VERTICAL
70.500000	26.50	-10.8	40.0	13.5	100.0	40.00	VERTICAL
240.600000	30.50	-11.7	47.0	16.5	105.0	30.00	VERTICAL
288.300000	32.40	-6.2	47.0	14.6	105.0	105.00	VERTICAL
384.770000	30.00	-5.1	47.0	17.0	100.0	10.00	VERTICAL

**7.2.5 Conclusion**

The equipment **PASSED** the requirement of this clause.  
For the measurement results refer to appendix H 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 52 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 Effective Radiated Power of Transmitter	7 pages
Appendix B	Measurement Results Modulation Characteristics	3 pages
Appendix D	Measurement Results Band Edges Compliance	9 pages
Appendix E	Measurement Results Spurious Emission at Antenna Terminal	19 pages
Appendix F	Measurement Results Radiated Spurious Emission	9 pages
Appendix G	Measurement Results Conducted Emission at Power Port	2 pages
Appendix H	Measurement Results Radiated Emission of Enclosure at Ideal Mode	2 pages
Appendix I	Photos of Test Setup	5 pages