



Report No: SYBH(R)181082007EB-2  
FCC ID: QISU5705

**FCC TEST REPORT OF  
HUAWEI  
WCDMA/GPRS/GSM/EDGE Mobile  
Phone With Bluetooth**

**M/N: U5705**

**Sep. 22, 2007**

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

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**REPORT ON**                      **FCC Test of HUAWEI WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth**

**M/N: U5705**

**Report No: SYBH(R) 181082007EB-2**

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

**CONCLUSION**                      There are 7 items need to be tested, 7 items have been tested. The sample of the model completely meets the requirements

**Final Judgement: Pass**

**General Manager**

2007.09.22  
Date

张兴海  
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**Technical Responsibility For Area of Testing**

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## 1 Summary

The table below summarizes the measurements and results for the HUAWEI WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth. 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>
<b>2.1046</b>	<b>24.232</b>	<b>Effective Radiated Power of Transmitter</b>	<b>PASS</b>
<b>2.1046</b>	<b>24.232</b>	<b>Conducted Power of Transmitter</b>	<b>PASS</b>
<b>2.1047</b>		<b>Modulation Characteristics</b>	<b>PASS</b>
<b>2.1049</b>		<b>Occupied Bandwidth</b>	<b>PASS</b>
<b>2.1051</b>	<b>24.238</b>	<b>Band Edges Compliance</b>	<b>PASS</b>
<b>2.1051</b>	<b>24.238</b>	<b>Spurious Emission at Antenna Terminal</b>	<b>PASS</b>
<b>2.1055</b>	<b>24.235</b>	<b>Frequency Stability</b>	<b>PASS</b>

## 2 Product Description

### 2.1 Production Information

#### 2.1.1 General Description

Huawei WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth 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 HUAWEI WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth 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	GPRS/GSM
Data	Modulation: 8PSK	TM2	EDGE
Data	Modulation: QPSK	TM3	WCDMA

Note: \* The specified GPRS test conditions & settings are defined in 3GPP TS51.010 V5.4.0 and the EDGE test conditions & settings are defined in 3GPP TS51.010 V5.4.0.

### 2.2 Modification Information

For original equipment, following table is not application.

Table 3 Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information
Not applicable				
Not applicable				
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  and registration granted under the registration number **97456** on Aug 20, 2006. The test site has been accredited by



and the accredited number is **2714.01** in Jan of 2006.

#### **3.1 Testing Period**

The test have been performed during the period of

**Sep. 09, 2007 – Sep. 22, 2007**

#### **3.2 General Set up Description**

Huawei WCDMA/GPRS/GSM/EDGE Mobile Phone With Bluetooth 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.

**TM1:** GPRS/GSM Mode with GMSK Modulation

**TM2:** EDGE Mode with 8PSK Modulation

**TM3:** WCDMA Mode with QPSK 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

	EDGE/GPRS/GSM	WCDMA
Channel spacing	200k Hz	200k Hz
Channel separation:	200k Hz	5M Hz

#### 4.1.3 Type of Emission

Table 6 Type of Emission

	EDGE/GPRS/GSM	WCDMA
Emission Designation:	300kGXW	5M0F9W

According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

#### 4.1.4 Environmental Requirements

Table 7 Environmental Requirements

Minimum temperature:	- 10 °C
Maximum temperature:	+ 55 °C
Relative Humidity:	5%-95%RH

#### 4.1.5 Power Source

Table 8 Power Source

AC voltage nominal:	~120V
AC voltage range	~100V-240V
AC current maximal:	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/EDGE Mobile Phone With Bluetooth		
U5705		
Board and Module		
Equipment Designation / Description	Serial Number	Remarks
MAINBOARD	U720H-12	HD1U720H VER.C

### 4.2.2 Adapter Technical Data

AC/DCAdapter Model: TPCA-050065UY  
 Manufacturer: TECH-POWER INTERNATIONAL CO.,LTD  
 Input Voltage: 100-240V ~50/60Hz  
 Output Voltage:  5.0V  
 Rated Power: 4W

### 4.2.3 Battery Technical Data

Type: Rechargeable Li-ion  
 Manufacturer: FMT Electronics Co.,Ltd.  
 Battery Model: HBU570  
 Rated capacity: 900mAh  
 Nominal Voltage:  +3.7V  
 Charging Voltage:  +4.2V

### 4.2.4 FCC Identification

Grantee Code: QIS  
 Product Code: U5705  
 FCC Identification: QISU5705

## 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	12.24.2007
3m Full Anechoic Chamber	S+M	N/A	N/A	12.05.2007
Signal Analyzer	R&S	FSQ 26	100266	07.18.2007
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	07.30.2007
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	07.30.2007
Receiver	R&S	ESIB 26	100318	08.17.2007
Receiver	R&S	ESCS30	830245/018	07.30.2007
Pre-Amplifier	Agilent	8447D	2944A10146	07.30.2007
Pre-Amplifier	Agilent	83017A	3950M00246	07.03.2007
Loop Antenna	Schwarzbeck	FMZB1516	1516115	08.08.2007
BiLog Antenna	Schaffner	CBL 6112B	2747	08.30.2007
BiLog Antenna	Schaffner	CBL 6112B	2536	08.30.2007
Horn Antenna	ETS-Lindgren	3160	00062553	09.14.2007
Horn Antenna	ETS-Lindgren	3117	006006	09.14.2007
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	09.14.2007
Signal Generator	R&S	SMT06	830264/009	07.15.2007
Signal Generator	R&S	SMR 40	100325	08.28.2007
Power Supply	Keithley	2306	1045337	12.09.2007
Climate Chamber	WEISS	ACS-1	3604040034	09.29.2007
Universal Radio Communication Tester	R&S	CMU200	108035	07.20.2007
Wireless communication test set	Agilent	8960	GB43461081	08.24.2007

## 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
Relative humidity:	55%
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、 Middle、 Top

#### 6.1.2 Test Specifications and Limits

##### 6.1.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 24.232

##### 6.1.2.2 Supporting Standards

Table 13 Supporting Standards:

ANSI/TIA-603-C:2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Digital cellular telecommunications system Mobile 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.  
 $W(\text{dBm}) = 10 \cdot \log(W_{\text{In mwatts}})$ .

Table 14 Limits

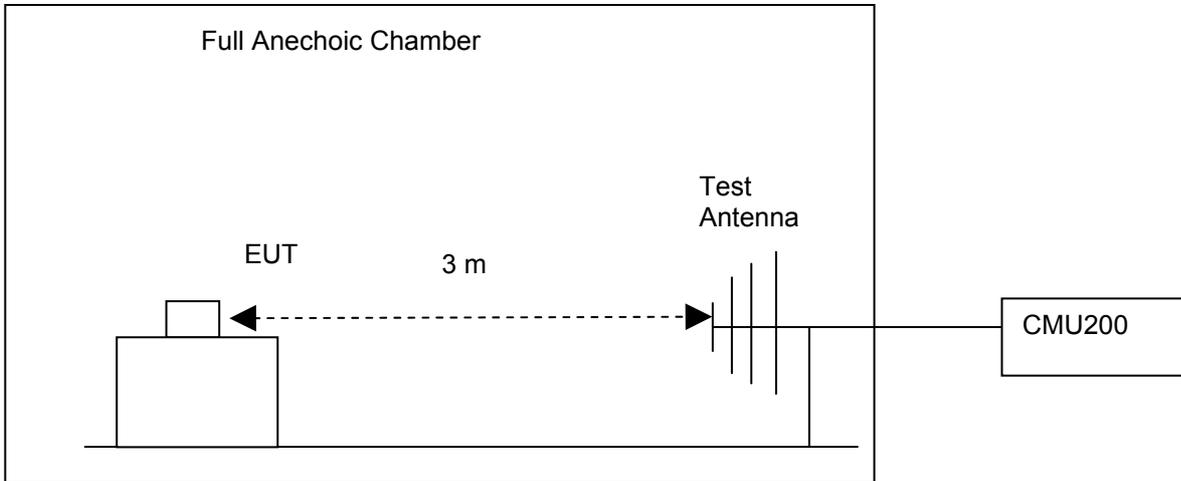
Maximum Output Power (Watts)	< 2 Watts
Maximum Output Power (dBm)	< 33 dBm

#### 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 Mobile Phone to the wireless communication tester CMU200 via the air interface. The band is set as PCS.
- Test the Radiated maximum output power by the CMU200 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**

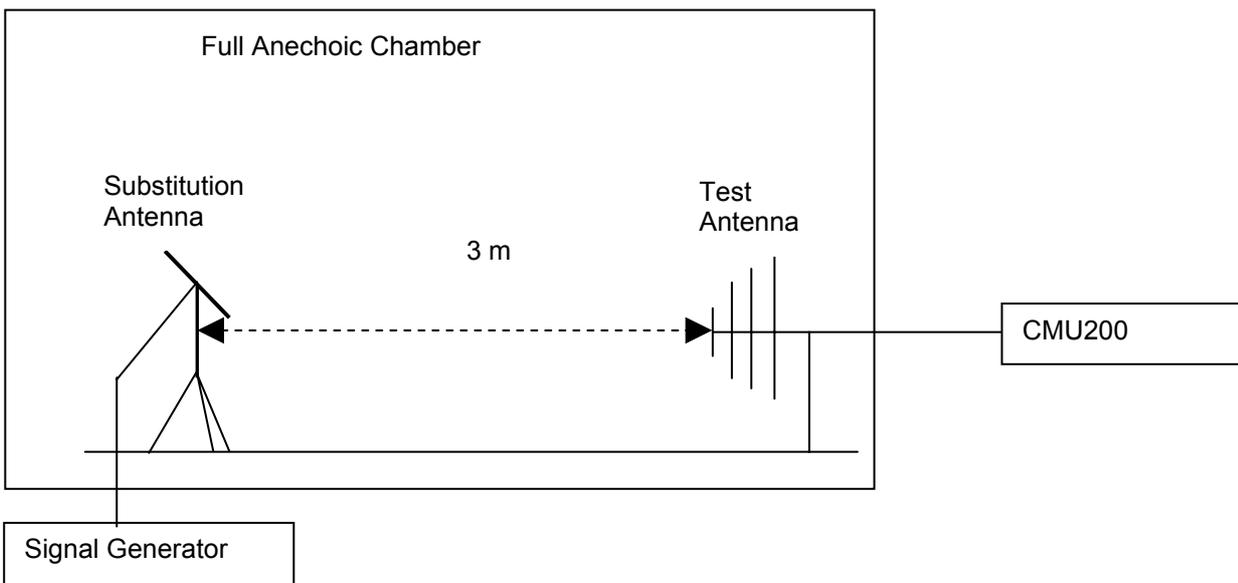


Figure 1. Test Set-up

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.

$EIRP (dBm) = ERP (dBm) + 2.15$  (ITU-R Recommendation SM.329-10).

## 6.1.4 Measurement Results

### 6.1.4.1 Pre-test Results

Table 15 Measurement Results

TEST CONDITIONS		RF Output Power (EIRP)					
		Channel512(B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	31.21	33	31.37	33	31.14	33
TM2	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	27.61	33	27.32	33	27.79	33
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM3	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	25.07	33	24.89	33	24.86	33

### 6.1.4.2 Substitution Results

Table 16 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBi]	Cable Loss [dB]	Substitution Level (ERP) [dBm]	Result
TM1	1850.2	31.21	Dipole Ant.	27.51	4.6	1.0	31.11	Pass
TM1	1880.0	31.37	Dipole Ant.	27.57	4.6	1.0	31.17	Pass
TM1	1909.8	31.14	Dipole Ant.	27.16	4.8	1.0	30.96	Pass
TM2	1850.2	27.61	Dipole Ant.	23.86	4.6	1.0	27.46	Pass
TM2	1880.0	27.32	Dipole Ant.	23.59	4.6	1.0	27.19	Pass
TM2	1909.8	27.79	Dipole Ant.	23.89	4.8	1.0	27.69	Pass
TM3	1852.4	25.07	Dipole Ant.	21.41	4.6	1.0	25.01	Pass
TM3	1880.0	24.89	Dipole Ant.	21.19	4.6	1.0	24.79	Pass
TM3	1907.6	24.86	Dipole Ant.	20.98	4.8	1.0	24.78	Pass

Note: a, For get the EIRP (Efficient Radiated Power) in substitution method, the following formula

should take to calculate it,

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

NOTE: SGP- Signal Generator Level

b, A wcdma signal with bandwidth of 5MHz are created by the vector generator R&S SMU200A.

c, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 200kHz for TM1 and TM2.

### 6.1.5 Conclusion

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

## 6.2 Conducted Power of Transmitter

### 6.2.1 Test Conditions

Table 17 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、 Middle、 Top

### 6.2.2 Test Specifications and Limits

#### 6.2.2.1 Specification

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

#### 6.2.2.2 Supporting Standards

Table 18 Supporting Standards:

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

#### 6.2.2.3 Limits

Compliance with part 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:

$$\text{EIRP(dBm)} = 10 * \log (\text{EIRP}_{\text{in mWts}}).$$

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

$$\text{P}_{\text{cod}}(\text{dBm}) = \text{EIRP}(\text{dBm}) - \text{Gain}(\text{dBi}).$$

and  $\text{Gain}(\text{dBi}) = \text{Gain}(\text{dBd}) + 2.15\text{dB}$

Table 19 Limits

Maximum Output Power (Watts)	< 2 Watts ( 33dBm )
Antenna Gain(dBi):	2.5
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 CMU200 via the antenna connector. The band class is set as US Cellular.  
 (b)Test the Conducted maximum output power by the CMU200.

**Test setup**

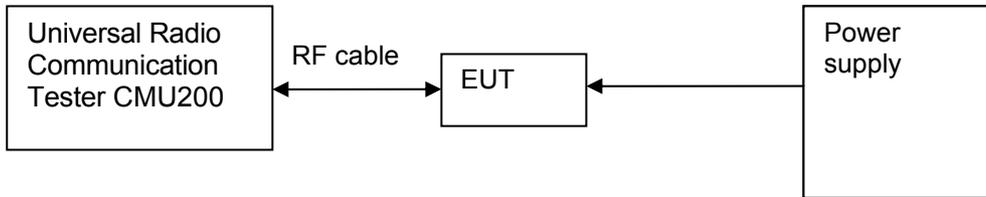


Figure 2. Test Set-up

**6.2.4 Measurement Results**

Table 20 Measurement Results

TEST CONDITIONS		RF Output Power(Conducted)					
		Channel512(B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810(T) 1909.8MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	28.75	30.5	28.87	30.5	28.62	30.5
TM2	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	25.15	30.5	24.85	30.5	25.36	30.5
TEST CONDITIONS		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538(T) 1907.6MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM3	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	22.55	30.5	22.42	30.5	22.37	30.5

**6.2.5 Conclusion**

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

### 6.3 Modulation Characteristics

#### 6.3.1 Test Conditions

Table 21 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	52 %
Test Configurations:	TM1/TM2/TM3 at frequency Middle

#### 6.3.2 Test Specifications and Limits

##### 6.3.2.1 Specification

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

##### 6.3.2.2 Supporting Standards

Table 22 Supporting Standards:

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

##### 6.3.2.3 Limits

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

Table 23 Limits

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

#### 6.3.3 Test Method and Setup

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

##### Test setup

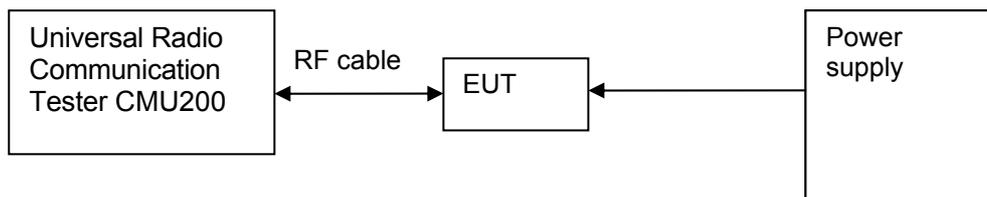


Figure 3. Test Set-up

### 6.3.4 Measurement Results

Table 24 Measurement Results

		Modulation Characteristic	
TEST CONDITIONS		Channel661(M) 1880MHz	
		Measured	
		TM1	TM2
T <sub>nom</sub> (25 °C)	V <sub>nom</sub> (3.7V)	Refer to Appendix A	Refer to Appendix A
		Modulation Characteristic	
TEST CONDITIONS		Channel9400(M) 1880MHz	
		Measured	
		TM3	
T <sub>nom</sub> (25 °C)	V <sub>nom</sub> (3.7V)	Refer to Appendix A	

### 6.3.5 Conclusion

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

For the measurement results refer to appendix A.

## 6.4 Occupied Bandwidth

### 6.4.1 Test Conditions

Table 25 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、 Middle、 Top

### 6.4.2 Test Specifications and Limits

#### 6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 24 subpart E

#### 6.4.2.2 Supporting Standards

Table 26 Supporting Standards:

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

#### 6.4.2.3 Limits

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

Table 27 Limits

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

### 6.4.3 Test Method and Setup

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

For TM1/TM2 following RBW and VBW are employed:  
 Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)  
 Video bandwidth (VBW): 10 kHz

For TM3 system following RBW and VBW are employed:  
 Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)  
 Video bandwidth (VBW): 500 kHz

**Test Set-up**

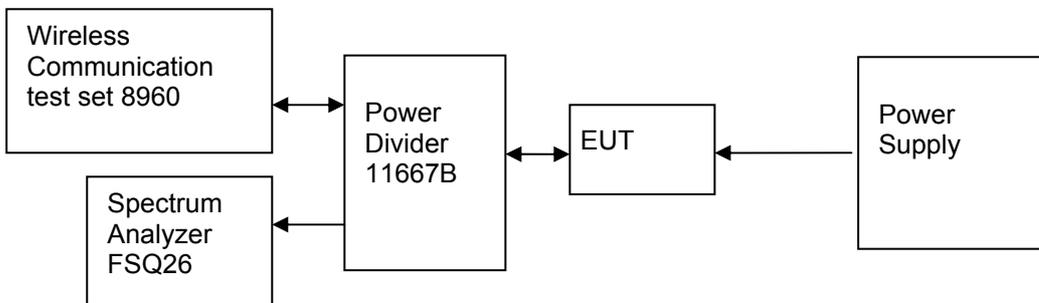


Figure 4. Test Set-up

**6.4.4 Measurement Results**

Table 28 Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
		Channel512 (B) 1850.2MHz		Channel661 (M) 1880MHz		Channel810 (T) 1909.8MHz	
		Measured (kHz)		Measured (kHz)		Measured (kHz)	
		TM1	TM2	TM1	TM2	TM1	TM2
T <sub>nom</sub> (25 °C)	99%	246.36	243.89	245.25	241.61	241.28	242.39
V <sub>nom</sub> (3.7V)							
TEST CONDITIONS		Occupied Bandwidth					
		Channel9262(B) 1852.4MHz		Channel9400(M) 1880MHz		Channel9538 (T) 1907.6MHz	
		Measured (MHz)		Measured (MHz)		Measured (KHz)	
		TM3		TM3		TM3	

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$T_{\text{nom}}$ (25 °C) $V_{\text{nom}}$ (3.7V)	99%	4.167	4.176	4.167
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### 6.4.5 Conclusion

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

## 6.5 Band Edges Compliance

### 6.5.1 Test Conditions

Table 29 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom、 Top

### 6.5.2 Test Specifications and Limits

#### 6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

#### 6.5.2.2 Supporting Standards

Table 30 Supporting Standards:

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

#### 6.5.2.3 Limits

Compliance with part 24.238, all spurious emission must be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P (W)$  . (Whereas P is the rated power of the EUT).

Table 31 Limits for GPRS

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	$43 + 10 \log (1) = 43$ , 30 dBm - 43 dB	$43 + 10 \log (0.4) = 39$ , 26 dBm - 39 dB	$43 + 10 \log (0.25) = 37$ , 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

### 6.5.3 Test Method and Setup

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

For TM1/TM2 following RBW and VBW are employed:  
 Measurement bandwidth (RBW): 3 kHz (Resolution bandwidth)  
 Video bandwidth (VBW): 10 kHz

For TM3 system following RBW and VBW are employed:  
 Measurement bandwidth (RBW): 50 kHz (Resolution bandwidth)  
 Video bandwidth (VBW): 200 kHz

**Test Set-up**

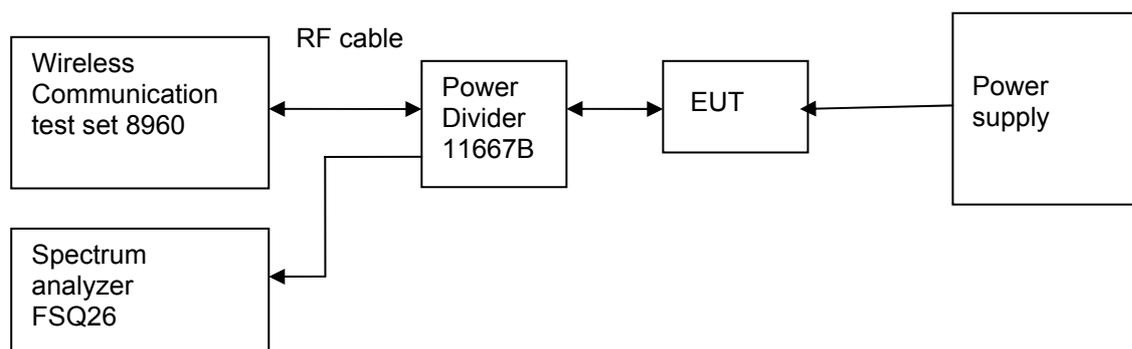


Figure 5. Test Set-up

**6.5.4 Measurement Results**

Table 32 Measurement Results outside Band Edges-- Single Carrier

Band	Frequency of Band edges [MHz]	Channel Number	Test Mode	Spurious Level measured [dBm]	FCC limit	Result
$T_{nom} (25\text{ }^{\circ}\text{C}), V_{nom} (3.7\text{V})$						
PCS	1850.2	512	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1909.8	810	TM1	<-13(See appendix C)	- 13 dBm	Pass
	1850.2	512	TM2	<-13(See appendix C)	- 13 dBm	Pass
	1909.8	810	TM2	<-13(See appendix C)	- 13 dBm	Pass
	1852.4	9262	TM3	<-13(See appendix C)	- 13 dBm	Pass
	1907.6	9538	TM3	<-13(See appendix C)	- 13 dBm	Pass

**6.5.5 Conclusion**

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

## 6.6 Spurious Emission at Antenna Terminal

### 6.6.1 Test Conditions

Table 33 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	50 %
Test Configurations:	TM1/TM2/TM3 at frequency Bottom, Top

### 6.6.2 Test Specifications and Limits

#### 6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 24.238

#### 6.6.2.2 Supporting Standards

Table 34 Supporting Standards:

ANSI/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP TS51.010 V6.1.0:2005	Recommended GSM/EDGE 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 35 Limits for GPRS Mode

	TM1	TM2	TM3
Rated Power:	30 dBm	26 dBm	24 dBm
Required attenuation:	$43 + 10 \log(1) = 43$ , 30 dBm - 43 dB	$43 + 10 \log(0.4) = 39$ , 26 dBm - 39 dB	$43 + 10 \log(0.25) = 37$ , 24 dBm - 37 dB
Absolute level	- 13 dBm	- 13 dBm	- 13 dBm

### 6.6.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer R&S FSQ26 via the one RF connector, the band class is set as PCS. The EUT was controlled to transmit maximum power. Measure and record the Conducted Spurious Emission of the EUT 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 150 kHz: 1 kHz;  
 Measurement bandwidth (RBW) for 150 kHz up to 30MHz: 10 kHz;  
 Measurement bandwidth (RBW) for 30 MHz up to 20GHz: 1MHz;

**Test Set-up**

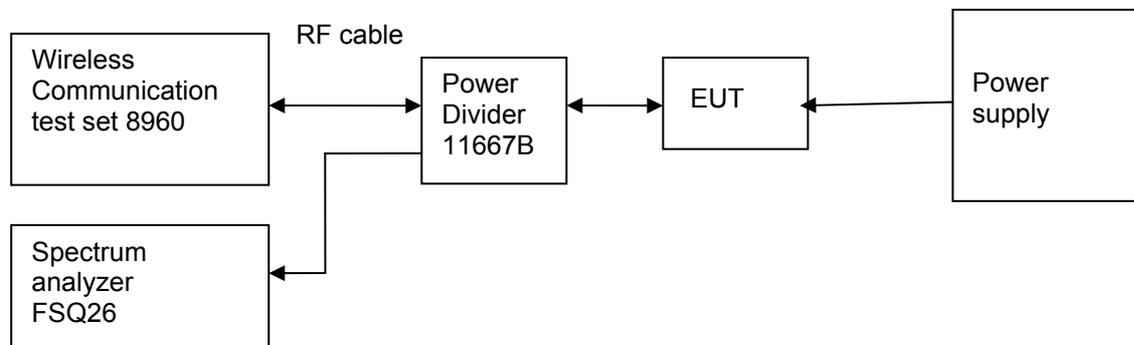


Figure 6. Test Set-up

**6.6.4 Measurement Results**

Table 36 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 512(B)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9262(B)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 810(T)	TM1	9 kHz~20GHz	30	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM2	9 kHz~20GHz	26	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 9538(T)	TM3	9 kHz~20GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass

**6.6.5 Conclusion**

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

## 6.7 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/TM2/TM3 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 38 Supporting Standards:

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

#### 6.7.2.3 Limits

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

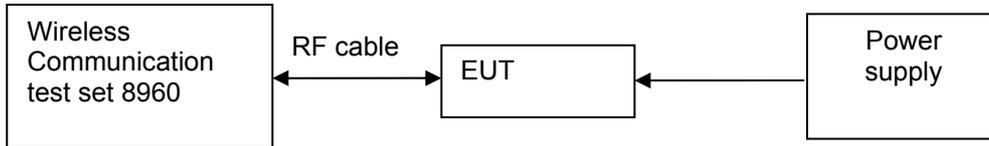


Figure 7. Test Set up

**6.7.4 Measurement Results**

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

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

Table 39 Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	30	1880.0	19.05	Pass
-20 °C	30	1880.0	15.34	Pass
-10 °C	30	1880.0	12.23	Pass
0 °C	30	1880.0	16.56	Pass
+10 °C	30	1880.0	24.32	Pass
+20 °C	30	1880.0	27.24	Pass
+30 °C	30	1880.0	-15.53	Pass
+40 °C	30	1880.0	21.78	Pass
+50 °C	30	1880.0	-16.35	Pass

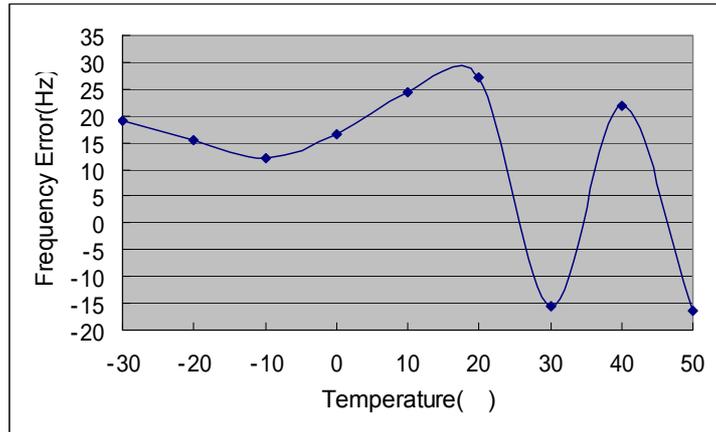


Figure 8. TM1 Test Graph

● **TM2, 3.7V DC Channel No.661(1880.0MHz)**

Table 40 Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	26	1880.0	14.30	Pass
-20 °C	26	1880.0	15.34	Pass
-10 °C	26	1880.0	21.45	Pass
0 °C	26	1880.0	24.48	Pass
+10 °C	26	1880.0	-11.70	Pass
+20 °C	26	1880.0	-21.34	Pass
+30 °C	26	1880.0	24.81	Pass
+40 °C	26	1880.0	21.06	Pass
+50 °C	26	1880.0	21.49	Pass

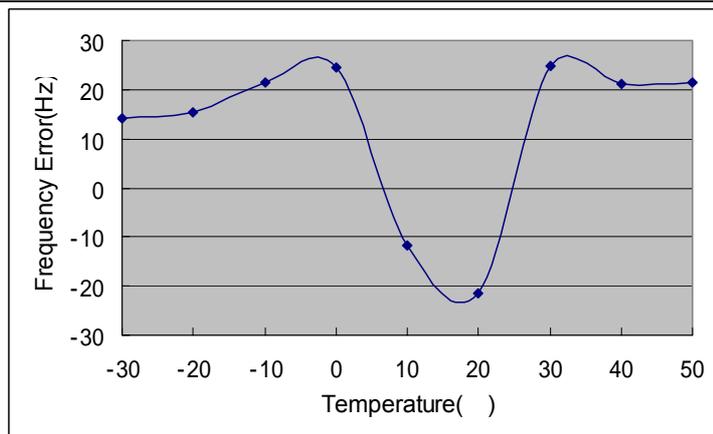


Figure 9. TM2 Test Graph

● **TM3, 3.7V DC Channel No.9400(1880.0MHz)**

Table 41 Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency	Measured Frequency	Result
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		(MHz)	Error(Hz)	
-30 °C	24	1880.0	28.44	Pass
-20 °C	24	1880.0	25.21	Pass
-10 °C	24	1880.0	19.75	Pass
0 °C	24	1880.0	12.14	Pass
+10 °C	24	1880.0	18.67	Pass
+20 °C	24	1880.0	16.52	Pass
+30 °C	24	1880.0	-21.24	Pass
+40 °C	24	1880.0	-24.71	Pass
+50 °C	24	1880.0	-13.54	Pass

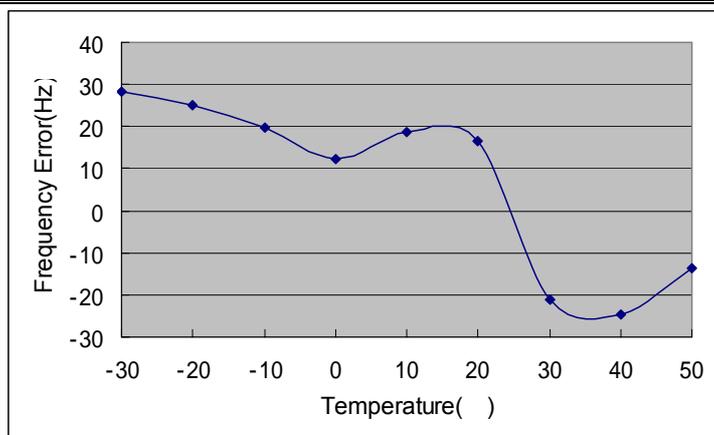


Figure 10. TM3 Test Graph

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

- **TM1, 25 °C ,Channel No. 661(1880.0MHz)**

Table 42 Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.6	30	1880.0	27.43	Pass
3.7	30	1880.0	23.21	Pass
4.2	30	1880.0	-8.86	Pass

- **TM2, 25 °C ,Channel No. 661(1880.0MHz)**

Table 43 Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.6	26	1880.0	-17.63	Pass
3.7	26	1880.0	14.82	Pass
4.2	26	1880.0	11.21	Pass

- **TM3, 25 °C ,Channel No. 9400(1880.0MHz)**

Table 44 Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
3.6	24	1880.0	21.64	Pass
3.7	24	1880.0	14.81	Pass
4.2	24	1880.0	15.95	Pass

### 6.7.5 Conclusion

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

## 7 System Measurement Uncertainty

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

Table 45 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Radiated Power of Transmitter	EIRP (dBm)	U=2.2dB; k=2
Band Width	Magnitude (%)	U = 0.2%; k=2
Band Edge Compliance	Disturbance Power ( dBm )	U = 2.0dB; k=2
Conducted Spurious Emission at Antenna Terminal	Disturbance Power ( dBm )	U = 2.0dB; k=2
Frequency Stability	Frequency Accuracy(ppm)	U = 0.21ppm; k=2

## 8 Appendices

Appendix A	Measurement Results Modulation Characteristics	4 pages
Appendix B	Measurement Results Occupied Bandwidth	10 pages
Appendix C	Measurement Results Band Edges Compliance	7 pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	37pages