



# FCC RF Test Report

**Product Name: cdma2000 Digital Mobile Phone**

**Model Number: HUAWEI M865/M865**

**Report No: SYBH(Z-RF)012042011-2001**

**FCC ID: QISM865**

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

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## Notice

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## Notice 2

Table 1 Modification Information

Modification Information	1	
	2	
	3	<i>Not Applicable!</i>
	4	
	5	
	6	
	7	



<b>REGULATION</b>	FCC CFR47 Part 2: Subpart J;
	FCC CFR47 Part 22 : Subpart H;
<b>START OF TEST</b>	Apr.07, 2011
<b>END OF TEST</b>	Apr.18, 2011
<b>Final Judgement:</b>	Pass

Approved By 2011-05-03 Chen Xiaohong *Chen Xiaohong*  
 Date Name Signature

Reviewed By 2011-05-03 Xu Guangyi *Xuguangyi*  
 Date Name Signature

Operator 2011-05-03 Wu Hua *Wu Hua*  
 Date Name Signature



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# 1 Summary

The table below summarizes the measurements and results for the EUT. Detailed results and descriptions are shown in the following pages.

Table 2 Summary of results

<b>FCC Measurement Specification</b>	<b>FCC Limits Part(s)</b>	<b>Description</b>	<b>Result</b>
2.1046	22.913	Effective Radiated Power of Transmitter	PASS
2.1046	22.913	Conducted Power of Transmitter	PASS
2.1047		Modulation Characteristics	PASS
2.1049		Occupied Bandwidth	PASS
2.1051	22.917	Band Edges Compliance	PASS
2.1051	22.917	Spurious Emission at Antenna Terminals	PASS
2.1053	22.917	Radiated Spurious Emissions	PASS
2.1055	22.355	Frequency Stability	PASS

Note: The Radiated Spurious Emissions' test results are shown in the EMC report.



## 2 Product Description

### 2.1 Production Information

#### 2.1.1 General Description

cdma2000 Digital Mobile Phone—HUAWEI M865/M865 is subscriber equipment in the CDMA/EVDO system. The frequency band is US Cellular and N.American PCS and AWS, Their band test data included in this report. The Mobile Phone implements such functions as RF signal receiving/transmitting, CDMA2000 1x and 1xEV-DO protocol processing, voice, MMS service, GPS, AGPS and WIFI etc. Externally it provides micro SD card interface, earphone port (to provide voice service).

#### 2.1.2 Support function and Service

The EUT support the function and service as follows:

Table 3 Service and Test mode List

Service Name	Characteristic	Corresponding Test Mode	Note (Corresponding coding and transmission rates)
data and SMS	Modulation: QPSK	TM1	
data and SMS	Modulation: HPSK	TM3	
Data(EV-DO)	Default Access Channel MAC	Subtype 0	Modulation: HPSK
data(EV-DO)	Enhanced Access Channel MAC	Subtype 2	The R-Data packet size determines the modulation format, R-Data Packet Size: 128, 256, 512, 768 or 1024 Modulation: BPSK R-Data Packet Size: 1536 , 2048, 3072, 4096, 6144 or 8192 Modulation: QPSK R-Data Packet Size: 12288 Modulation: 8-PSK

Note: \* The test conditions and settings are defined in ANSI/TIA-98-E section 1.3, 3GPP2 c.s0033-0-v2.0 and 3GPP2 C.S0033-A-v1.0.



## 2.2 Modification Information

For original equipment, following table is not application.

Table 4 Modification Information

Model Number	Board/Module	Original Version	New Version	Modify Information
Not applicable!				



### 3 Test Site Description

The test site of:

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

#### 3.1 Testing Period

The test have been performed during the period of

Apr.07, 2011 to Apr.18, 2011

#### 3.2 General Set up Description

The EUT can Support Cellular Band, and Support the CDMA2000 1x standard and the CDMA2000 1xEV-DO Rev. A standard. During this measurement,EUT works in CDMA / EV-DO mode and Cellular Band.

##### CDMA MODE:

**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
$\frac{Pilot Ec}{I_{or}}$	dB	-7
$\frac{Traffic Ec}{I_{or}}$	dB	-7.4

##### EVDO MODE:

Current Physical Layer Subtype:

**Subtype 0\*** indicates that the protocol subtype assigned to the Access Channel MAC protocol is Default Access Channel MAC and its Subtype ID number is 0x0000.

**Subtype 2\*** indicates that the protocol subtype assigned to the Access Channel MAC protocol is Enhanced Access Channel MAC and its Subtype ID number is 0x0002

Note: \*The test settings are defined in 3GPP2 C.S0033



## 4 Product Description

### 4.1 Technical Characteristics

#### 4.1.1 Frequency Range

Table 5 Frequency Range

Uplink band:	824 to 849 MHz
Downlink band:	869 to 894 MHz

#### 4.1.2 Channel Spacing / Separation

Table 6 Channel Spacing / Separation

Channel spacing:	30 KHz
Channel separation:	1.23 MHz

#### 4.1.3 Type of Emission

Table 7 Type of Emission

Emission Designation:	<b>1M25F9W</b>
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According to CFR 47 (FCC) part 2, subpart C, section 2.201 and 2.202

#### 4.1.4 Environmental Requirements

Table 8 Environmental Requirements

Minimum temperature:	- 10 °C
Maximum temperature:	+ 35 °C
Relative Humidity:	5%~95%RH

#### 4.1.5 Power Source

Table 9 Power Source

Charger voltage range:	~100-240 V, 50/60Hz
Charger current maximal:	0.2 A Max
Battery Rated capacity:	2200mAh
Battery Nominal Voltage:	== 3.7V

#### 4.1.6 Tune-up Procedure

According to CFR (FCC) part 2, subpart 2, section 2.1033 (9)

Please reference the document Tune-up Procedure in TCF.

#### 4.1.7 Applied DC Voltages and Currents

According to CFR (FCC) part 2, subpart 2, section 2.1033 (8)

The voltage and current in the final RF stage is:

Table 10 Applied DC Voltages and Currents

Voltage:	== +4.2V
Current:	500mA According to CFR (FCC) part 2, subpart 2, section 2.1033(c) (8)



## 4.2 EUT Identification List

### 4.2.1 Board Information

Table 11 Board Information

cdma2000 Digital Mobile Phone		
HUAWEI M865/M865		
Board and Module		
Description	Hardware Version	Software Version
Main board of Mobile Phone	HC1M865M	M865V100R001C126B811

### 4.2.2 Adapter Technical Data

Table 12 Adapter Technical Data

AC/DCAdapter Model	HW-050100U1W
Manufacturer	Huawei Technologies Co., Ltd.
Input Voltage	~100-240V 50/60Hz 0.2A
Output Voltage	5V  1A
Rated Power	5W
S/N	HKAA50924648

### 4.2.3 Battery Technical Data

Table 13 Battery Technical Data

Name	Qty.	Manufacture	Serials number	Description
Rechargeable Li-ion	1	Huawei Technologies Co., Ltd.	WHCB304HI1030 831	Battery Model: HB5K1H Rated capacity: 1400mAh Nominal Voltage:  +3.7V Charging Voltage:  +4.2V

### 4.2.4 FCC Identification

**Grantee Code:** QIS  
**Product Code:** M865  
**FCC Identification:** QISM865



## 5 Main Test Instruments

Table 14 Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Power supply	KEITHLEY	2303	1288003	Sep.27,2011
Universal Radio Communication Tester	R&S	CMU200	105822	Oct.24.2011
Wireless Communication Test set	Agilent	N4010A	MY49081592	Dec.14.2011
Universal Radio Communication Tester	Agilent	E5515C	MY50260239	Aug.04,2011
Spectrum Analyzer	Agilent	E4440A	MY49420179	April.24,2011
Signal Analyzer	R&S	FSQ31	200021	Sep.27,2011
Temperature Chamber	WEISS	WKL64	24600294	Jan.03,2012
Signal generator	Agilent	E8257D	MY49281095	Jul.9.2011
Vector Signal Generator	R&S	SMU200A	104162	Sep.07,2011
Test receiver	R&S	ESIB26	100318	May.04.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	919/1009	Dec.13.2011
Tunable Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	Dec.13.2011
Horn Antenna	R & S	HF906	359287/005	May.07, 2011
Horn Antenna	R & S	HF906	359287/006	April.27, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2536	Sep.21, 2011
Broadband Antenna	SCHAFFNER	CBL 6112B	2941	Jun.11, 2011
Horn Antenna	ETS-LINDGREN	3160	60008	Sep.20.2011
Horn Antenna	ETS-LINDGREN	3160	60006	Oct.27.2011

## 6 Transmitter Measurements

### 6.1 Effective Radiated Power of Transmitter (ERP)

#### 6.1.1 Test Conditions

Table 15 Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	CDMA TM1 and TM3 at frequency B,M,T EVDO Mode Subtype 0 and Subtype 2 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 22.913

##### 6.1.2.2 Supporting Standards

Table 16 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

##### 6.1.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of EUT transmitter exceed 7 W. The calculated longitude ERP by following formula:  $ERP(dBm) = 10 \cdot \log(ERP_{in\ mWatts})$ .

Table 17 Limits

Maximum Output Power (Watts)	< 7 Watts
Maximum Output Power (dBm)	< 38.5 dBm

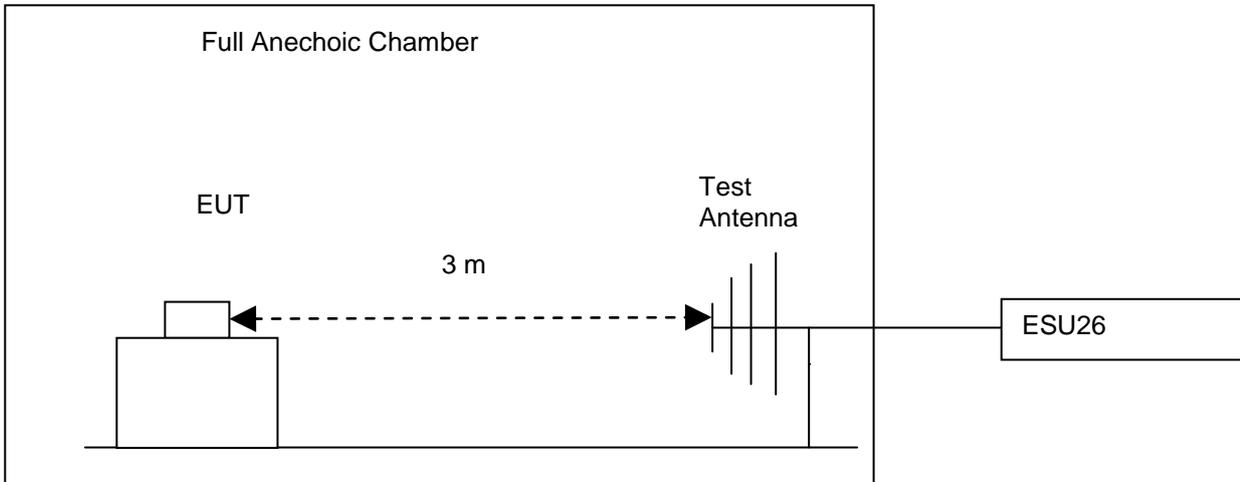
#### 6.1.3 Test Method and Setup

- (a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, ERP shall be measured when the transmitter is adjusted in accordance with the tune-up procedure to give the values of current and voltage on the circuit elements specified in 2.1033(c)(8). Connect the EUT to the wireless communication tester CMU200 the air interface. The band class is set as US Cellular.
- (b) Test the Radiated maximum output power by the CMU200 received from test antenna.
- (c) Use substitution method to verify the maximum output power. The EUT is substituted by a dipole antenna. The dipole is connected to a signal generator. And then adjust the output level of the signal generator to get the same received power recorded in step (b) on CMU200, and record the

power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

### Test setup

#### Step 1: Pre-test



#### Step 2: Substitution method to verify the maximum ERP

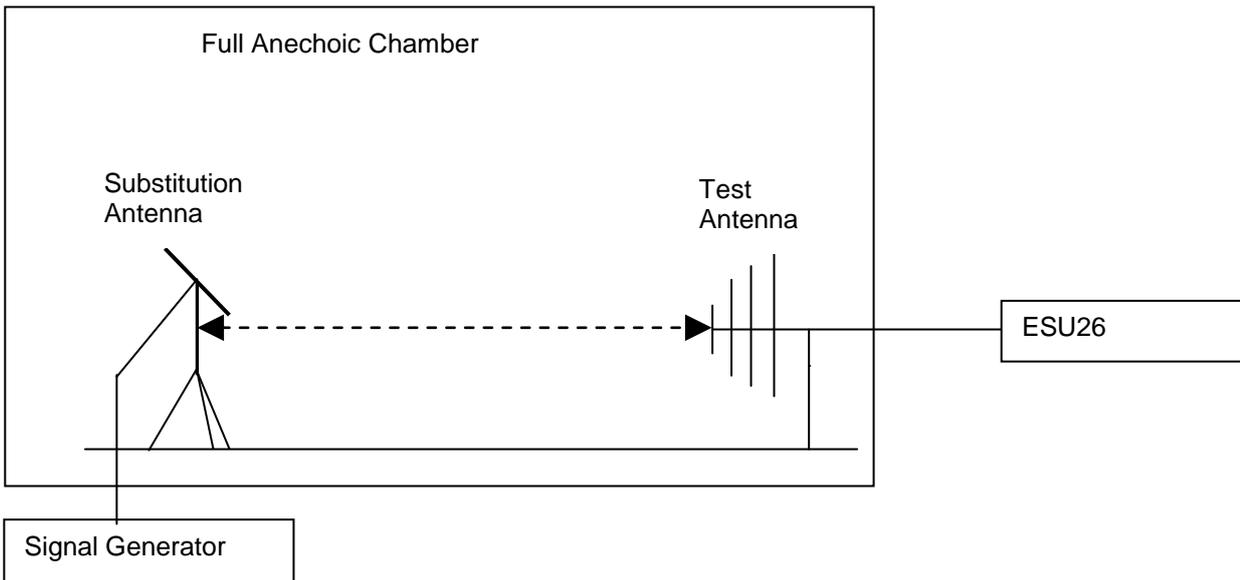


Figure 1. Test Set-up

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

## 6.1.4 Measurement Results

Table 18 Measurement Results

TEST CONDITIONS		RF Output Power(ERP)					
		Channel1013(B) 824.7 MHz		Channel 283(M) 833.49Mhz		Channel777(T) 848.31 MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	22.17	38.5	22.19	38.5	22.18	38.5
TM3	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	22.19	38.5	22.23	38.5	22.27	38.5
Subtype 0	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	22.04	38.5	21.93	38.5	22.01	38.5
Subtype 2	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	21.91	38.5	21.98	38.5	21.96	38.5

### 6.1.4.1 Substitution Results

Table 19 Substitution Results

Test Mode	Freq. [MHz]	Meas. Level [dBm]	Substitution Antenna Type	SGP [dBm]	Substitution Gain [dBd]	Cable Loss [dB]	Substitution Level (ERP) [dBm]	Limit [dBm]	Result
TM1	824.7	22.17	Dipole Ant.	25.66	-2.95	0.6	22.11	38.5	Pass
TM1	833.49	22.19	Dipole Ant.	25.91	-3.02	0.6	22.29	38.5	Pass
TM1	848.31	22.18	Dipole Ant.	25.86	-3.11	0.6	22.15	38.5	Pass
TM3	824.7	22.19	Dipole Ant.	25.68	-2.95	0.6	22.13	38.5	Pass
TM3	833.49	22.23	Dipole Ant.	25.95	-3.02	0.6	22.33	38.5	Pass
TM3	848.31	22.27	Dipole Ant.	25.93	-3.11	0.6	22.22	38.5	Pass
Subtype	824.7	22.04	Dipole Ant.	25.69	-2.95	0.6	22.14	38.5	Pass
Subtype	833.49	21.93	Dipole Ant.	25.45	-3.02	0.6	21.83	38.5	Pass
Subtype	848.31	22.01	Dipole Ant.	25.79	-3.11	0.6	22.08	38.5	Pass
Subtype	824.7	21.91	Dipole Ant.	25.52	-2.95	0.6	21.97	38.5	Pass
Subtype	833.49	21.98	Dipole Ant.	25.53	-3.02	0.6	21.91	38.5	Pass
Subtype	848.31	21.96	Dipole Ant.	25.63	-3.11	0.6	21.92	38.5	Pass

Note: a, For get the ERP (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

b, A CDMA EVDO signal with bandwidth of 1.23MHz is created by the vector generator R&S SMU200A.

c, RBW=10kHz, VBW=300kHz, and integrated by the instrument to 1.23MHz.

### 6.1.5 Conclusion

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



## 6.2 Conducted output power

### 6.2.1 Test Conditions

Table 20 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55%
Test Configurations:	CDMA TM1 and TM3 at frequency B,M ,T EVDO Subtype 0 and Subtype 2 at frequency B,M ,T

### 6.2.2 Test Specifications and Limits

#### 6.2.2.1 Specification

CFR 47 (FCC) part 2.1046 and part 22.913

#### 6.2.2.2 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

#### 6.2.2.3 Limits

Compliance with part 22.913, in no any case may the peak power of a mobile station transmitter exceed 7 W. The calculated longitude ERP by following formula:

$$ERP(dBm) = 10 * \log (ERP_{in\ mwatts}).$$

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

$$P_{cod.}(dBm) = ERP(dBm) - Gain(dBd).$$

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

Table 22 Limits

Maximum Output Power (Watts)	< 7 Watts
Antenna Gain(dBi):	-0.15
Antenna Gain(dBd):	-2.30
Maximum Conducted Output Power (dBm)	< 40.30dBm

### 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 Station 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

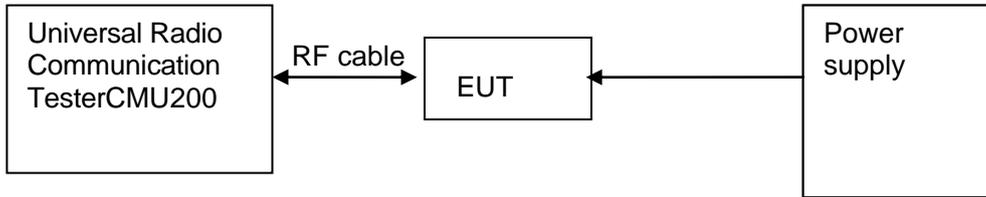


Figure 2. Test Set-up

### 6.2.4 Measurement Results

Table 23 Measurement Results

TEST CONDITIONS		RF Output Power(ERP)					
		Channel 1013(B) 824.7MHz		Channel 283(M) 833.49Mhz		Channel 777(T) 848.31MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
TM1	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	24.47	40.30	24.49	40.30	24.48	40.30
TM3	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	24.49	40.30	24.53	40.30	24.57	40.30
Subtype 0	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	24.34	40.30	24.23	40.30	24.31	40.30
Subtype 2	T <sub>nom</sub> (25 °C) V <sub>nom</sub> (3.7V)	24.21	40.30	24.28	40.30	24.26	40.30

### 6.2.5 Conclusion

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

## 6.3 Modulation Characteristics

### 6.3.1 Test Conditions

Table 24 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	47 %
Test Configurations:	CDMA mode TM1 and TM3 at frequency M EVDO mode Subtype 0 and Subtype 2 at frequency M

### 6.3.2 Test Specifications and Limits

#### 6.3.2.1 Specification

CFR 47 (FCC) part 2.1047 and part 22 subpart H.

#### 6.3.2.2 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.

#### 6.3.2.3 Limits

No specific modulation characteristics requirement limits in part 2.1047 and part 22 subpart H.

Table 26 Limits

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

### 6.3.3 Test Method and Setup

Connect the EUT Wireless Module to Universal Radio Communication Tester CMU200 via the antenna connector. The band class is set as US Cellular; the EUT output is matched with 50 Ω loads, test method was according to ANSI/TIA-98-E. The waveform quality and constellation of the EUT Wireless Module were tested.

#### Test setup

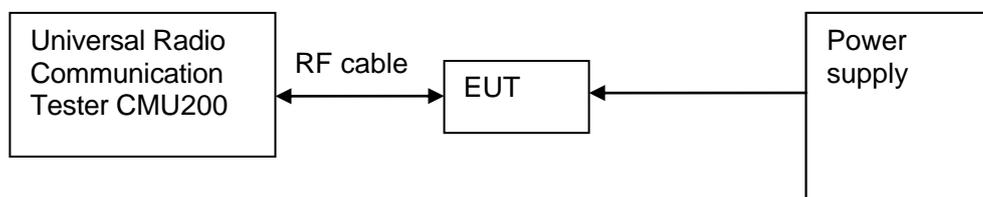


Figure 3. Test Set-up

### 6.3.4 Measurement Results

Table 27 Measurement Results

TEST CONDITIONS		Modulation Characteristic	
		Channel 283(M) 833.49MHz	
		Measured	
		CDMA Mode TM1 & TM3	EVDO Mode Subtype 0 & Subtype 2
$T_{nom}$ (25 °C)	$V_{nom}$ (3.7V)	Refer to Appendix A	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 28 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %
Test Configurations:	CDMA TM1 and TM3 at frequency B,M ,T EVDO Mode Subtype 0 and Subtype 2 at frequency B,M ,T

### 6.4.2 Test Specifications and Limits

#### 6.4.2.1 Specification

CFR 47 (FCC) part 2.1049 and part 22 subpart H.

#### 6.4.2.2 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

#### 6.4.2.3 Limits

No specific occupied bandwidth requirement in part 22 subpart H, 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 30 Limits

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

### 6.4.3 Test Method and Setup

The EUT was connected to the wireless signal analyzer FSQ31 via the one RF connector. The band class is set as US Cellular; EUT was controlled to transmit maximum power. Measure and record the occupied bandwidth of the EUT by the FSQ31.

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 part 2.1049 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**

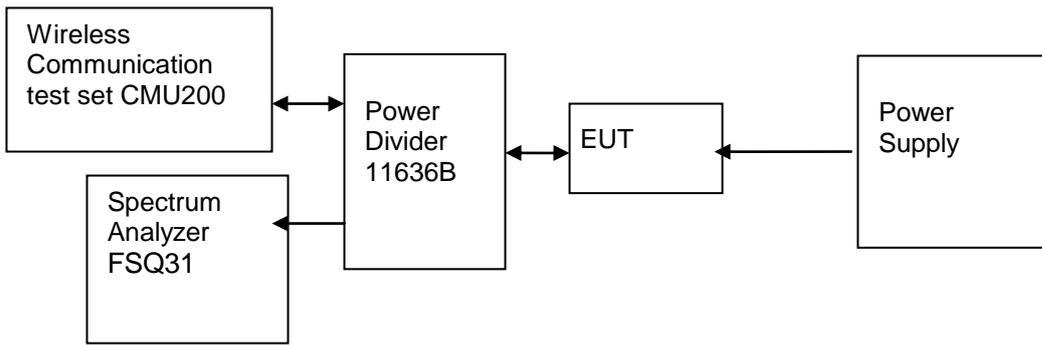


Figure 4. Test Set-up

**6.4.4 Measurement Results**

Table 31 Measurement Results

TEST CONDITIONS		Occupied Bandwidth											
		Channel 1013(B) 824.70MHz				Channel 283(M) 833.49Mhz				Channel 777(T) 848.31MHz			
		Measured (MHz)				Measured (MHz)				Measured (MHz)			
		CDMA		EVDO		CDMA		EVDO		CDMA		EVDO	
		TM1	TM3	Subtype 0	Subtype 2	TM1	TM3	Subtype 0	Subtype 2	TM1	TM3	Subtype 0	Subtype 2
Tnom (25 °C)	Vnom (3.7V)	1.28	1.28	1.29	1.28	1.29	1.28	1.28	1.29	1.29	1.28	1.28	1.28



## 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 32 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	CDMA TM1 and TM3 at frequency B,T EVDO Mode Subtype 0 and Subtype 2 at frequency B,T

### 6.5.2 Test Specifications and Limits

#### 6.5.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 22.917

#### 6.5.2.2 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

#### 6.5.2.3 Limits

Compliance with 22.917, all spurious emission must be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$ . (Whereas P is the rated power of the EUT in Watt).

Table 34 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

The EUT was connected to the wireless signal analyzer FSQ31 via the one RF connector, the band class is set as US Cellular. EUT was controlled to transmit maximum power. Measure and record Band edge compliance of the EUT by the FSQ31.

Measurement bandwidth (RBW): 13 kHz (Resolution bandwidth)

Video bandwidth (VBW): 130 kHz

### Test Set-up

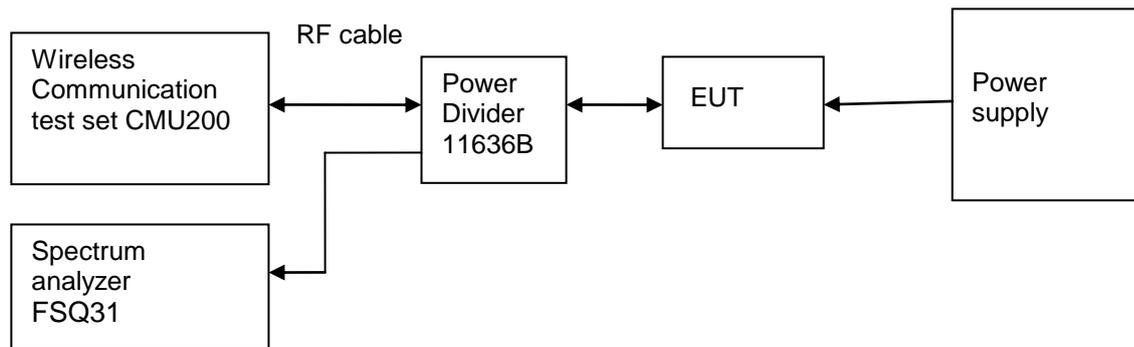


Figure 5. Test Set-up

### 6.5.4 Measurement Results

Table 35 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
US Cellular	$T_{nom}$ (25 °C), $V_{nom}$ (3.7V)						
	824.70	1013 (B)	TM1 & TM3	24	<-13(See appendix C)	- 13 dBm	Pass
	848.31	777 (T)	TM1 & TM3	24	<-13(See appendix C)	- 13 dBm	Pass
US Cellular	$T_{nom}$ (25 °C), $V_{nom}$ (3.7V)						
	824.70	1013 (B)	Subtype 0 & Subtype 2	24	<-13(See appendix C)	- 13 dBm	Pass
	848.31	777 (T)	Subtype 0 & Subtype 2	24	<-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 36 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25°C
Relative humidity:	55 %
Test Configurations:	CDMA TM1 and TM3 at frequency B,M,T EVDO Mode Subtype 0 and Subtype 2 at frequency B,M,T

### 6.6.2 Test Specifications and Limits

#### 6.6.2.1 Specification

CFR 47 (FCC) part 2.1051 and part 22.917

#### 6.6.2.2 Supporting Standards

Table 37 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.

#### 6.6.2.3 Limits

Compliance with part 22.917, all spurious emission must be attenuated below the transmitter power by at least  $43 + 10 \log_{10} P$ . (Whereas P is the rated power of the EUT in Watt).

Table 38 Limits

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

### 6.6.3 Test Method and Setup

EUT was connected to the wireless signal analyzer FSQ31 via the one RF connector, the band class is set as US Cellular. EUT was controlled to transmit maximum power.

Measure and record the Conducted Spurious Emission of the EUT by the FSQ31.

According to part 22.917, the defined measurement bandwidth as following:

22.917(b) Measurement procedure: Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater.

Measurement bandwidth (RBW) for 9 kHz up to 150 kHz: 1 kHz;  
 Measurement bandwidth (RBW) for 150 kHz up to 30 MHz: 10 kHz;  
 Measurement bandwidth (RBW) for 30 MHz up to 1 GHz: 100 kHz;  
 Measurement bandwidth (RBW) for 1GHz up to 12.75GHz: 1MHz;

### Test Set-up

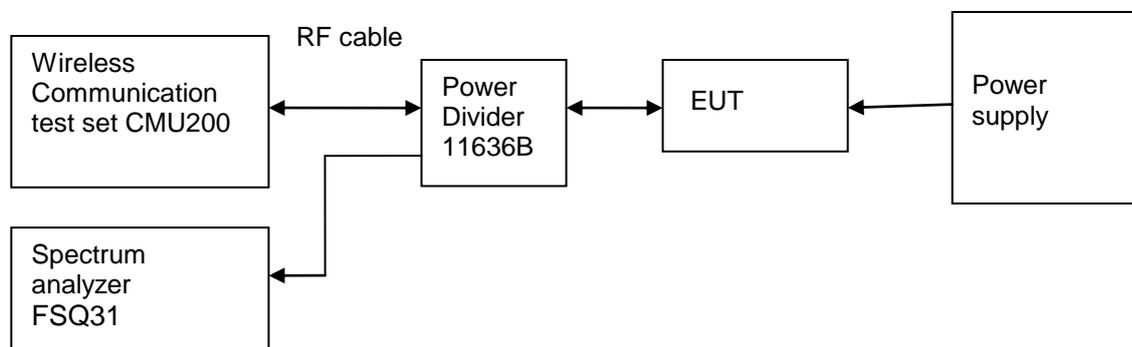


Figure 6. Test Set-up

### 6.6.4 Measurement Results

Table 39 Measurement Results

Channel Number	Test Mode	Test Range (Frequency)	Output Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel 1013(B)	TM1	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM3	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	Subtype 0	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	Subtype 2	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 384 (M)	TM1	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	TM3	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	Subtype 0	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	Subtype 2	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
Channel 777 (T)	TM1	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass



	TM3	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	Subtype 0	9 kHz ~12.75GHz	24	<- 13 dBm (See appendix D)	- 13 dBm	Pass
	Subtype 2	9 kHz ~12.75GHz	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 40 Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 25 °C
Test Configurations:	CDMA TM1 and TM3 at frequency M EVDO Mode Subtype 0 and Subtype 2 at frequency M

### 6.7.2 Test Specifications and Limits

#### 6.7.2.1 Specification

CFR 47 (FCC) part 2.1055 and part 22.355

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

#### 6.7.2.3 Limits

According to part 22.355, from 821MHz to 896MHz, for mobile device, the carrier frequency of each transmitter in the Public Mobile Services must be maintained within the tolerances 2.5ppm.

### 6.7.3 Test Method and Setup

The frequency stability shall be measured with variation of ambient temperature as follows:

- (1) From  $-30^{\circ}$  to  $+50^{\circ}$  centigrade for all equipment except that specified in subparagraphs (2) and (3) of paragraph 2.1055

(a) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than  $10^{\circ}$  centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to frequency measurement. The short-term transient effects on the frequency of the transmitter due to keying (except for broadcast transmitters) and any heating element cycling normally occurring at each ambient temperature level also shall be shown. Only the portion or portions of the transmitter containing the frequency determining and stabilizing circuitry need be subjected to the temperature variation test.

(b) The frequency stability shall be measured with variation of primary supply voltage as follows:

- (1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
- (2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point, which shall be specified by the manufacturer.
- (3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of

transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

(c) When deemed necessary, the Commission may require tests of frequency stability under conditions in addition to those specifically set out in paragraphs (a), (b), (c) of this section. (For example, measurements showing the effect of proximity to large metal objects, or of various types of antennas, may be required for portable equipment.)

The EUT can only work in such extreme voltage 3.6V and 4.2V, so here the EUT is tested in the 3.6V and 4.2V.

## Test Set up

Connect the EUT to the Wireless Communication test set CMU200 via the connector. Then measure the frequency error by the Wireless Communication test set CMU200. The EUT's output is matched with a 50 Ω loads.

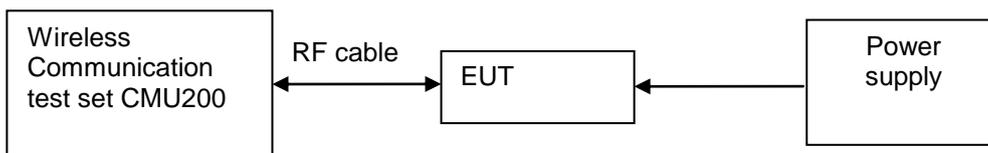


Figure 7. Test Set up

## 6.7.4 Measurement Results

### 6.7.4.1 Measurement Results vs. Variation of Temperature

- TM1, 5.0V DC Channel No.283(833.49MHz)

Table 42 Measurement Results vs. Variation of Temperature—TM1

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	24	833.49	-12	Pass
-20 °C	24	833.49	-8	Pass
-10 °C	24	833.49	12	Pass
0 °C	24	833.49	9	Pass
+10 °C	24	833.49	-15	Pass
+20 °C	24	833.49	16	Pass
+30 °C	24	833.49	-5	Pass
+40 °C	24	833.49	-11	Pass
+50 °C	24	833.49	4	Pass

- **TM3, 5.0V DC Channel No.283(833.49MHz)**

Table 43 Measurement Results vs. Variation of Temperature—TM3

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	24	833.49	-2	Pass
-20 °C	24	833.49	13	Pass
-10 °C	24	833.49	11	Pass
0 °C	24	833.49	-8	Pass
+10 °C	24	833.49	-4	Pass
+20 °C	24	833.49	16	Pass
+30 °C	24	833.49	14	Pass
+40 °C	24	833.49	4	Pass
+50 °C	24	833.49	-6	Pass

- **Subtype 0, 5.0V DC Channel No.283(833.49MHz)**

Table 44 Measurement Results vs. Variation of Temperature—EVDO

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	24	833.49	14	Pass
-20 °C	24	833.49	12	Pass
-10 °C	24	833.49	-5	Pass
0 °C	24	833.49	-11	Pass
+10 °C	24	833.49	15	Pass
+20 °C	24	833.49	7	Pass
+30 °C	24	833.49	9	Pass
+40 °C	24	833.49	-8	Pass
+50 °C	24	833.49	-4	Pass

- **Subtype 2, 5.0V DC Channel No.283 (833.49MHz)**

Table 45 Measurement Results vs. Variation of Temperature—EVDO

Temperature	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
-30 °C	24	833.49	13	Pass
-20 °C	24	833.49	17	Pass

-10 °C	24	833.49	21	Pass
0 °C	24	833.49	-11	Pass
+10 °C	24	833.49	-8	Pass
+20 °C	24	833.49	5	Pass
+30 °C	24	833.49	11	Pass
+40 °C	24	833.49	4	Pass
+50 °C	24	833.49	-12	Pass

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

- TM1, 25 °C ,Channel No. **283(833.49MHz)**

Table 46 Measurement Results vs. Variation of Voltage—TM1

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25	24	833.49	17	Pass
5.0	24	833.49	-11	Pass
4.75	24	833.49	-4	Pass

- TM3, 25 °C ,Channel No. **283(833.49MHz)**

Table 47 Measurement Results vs. Variation of Voltage—TM3

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25	24	833.49	-11	Pass
5.0	24	833.49	18	Pass
4.75	24	833.49	-3	Pass

- Subtype 0 , 25 °C ,Channel No. **283(833.49MHz)**

Table 48 Measurement Results vs. Variation of Voltage—EVDO

Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25	24	833.49	11	Pass
5.0	24	833.49	-13	Pass
4.75	24	833.49	11	Pass

- Subtype 2 , 25 °C ,Channel No. **283(833.49MHz)**

Table 49 Measurement Results vs. Variation of Voltage—EVDO



Voltage	Power (dBm)	Nominal Frequency (MHz)	Measured Frequency Error(Hz)	Result
5.25	24	833.49	11	Pass
5.0	24	833.49	-15	Pass
4.75	24	833.49	-13	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 50 System Measurement Uncertainty

Items		Extended Uncertainty
Effective Radiated Power of Transmitter	ERP(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=2.2dB; k=2
Conducted Output Power	Power(dBm)	U=0.39dB; k=2



## 8 Appendixes

Appendix A	Measurement Results Modulation Characteristics	7 pages
Appendix B	Measurement Results Occupied Bandwidth	13 pages
Appendix C	Measurement Results Band Edges	13 pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	73 pages

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