



Report No: SYBH(R) 02012007EB
FCC ID: QISQCMM-1900

**FCC TEST REPORT OF
Outdoor-BTS Radio
Module(1900MHz) of Huawei
CDMA2000 Base Station**

Jan. 16, 2007

Reliability Laboratory of Huawei Technologies Co., Ltd.

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REPORT ON FCC Test of **Outdoor-BTS Radio Module(1900MHz) of Huawei CDMA2000 Base Station**

Report No: SYBH(R) 02012007EB

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

CONCLUSION There are 9 items need to be tested, 9 items have been tested. The sample of the model completely meets the requirements

Final Judgement: Pass

General Manager

2007.01.28

Date

Guo Xiaoqi

Name

signature



**Technical Responsibility
For Area of Testing**

2007.01.27

Date

Zhang Xinghai

Name

signature

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Test Lab Engineer

2007.01.26

Date

Wangwenjin

Name

signature

Handwritten signature of Wangwenjin in black ink.

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1 Summary

The table below summarizes the measurements and results for the Huawei Outdoor-BTS Radio Module(1900MHz). Detailed results and descriptions are shown in the following pages.

table 1. Summary of results

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
2.1046	24.232	Maximum Channel Power	PASS
2.1047		Modulation Characteristics	PASS
2.1049		Occupied Bandwidth	PASS
2.1051	24.238	Band Edges Compliance	PASS
2.1051	24.238	Spurious Emission at antenna terminal	PASS
2.1053	24.238	Radiated Spurious Emission	PASS
2.1055	24.235	Frequency Stability	PASS
-	15.109	Radiated Emission of Enclosure in Idle Mode	PASS

2 Product Description

2.1 Production Information

2.1.1 General Description

The Outdoor-BTS Radio Module(1900MHz) is mainly composed of Outdoor Multi-carrier Transceiver Module 1900MHz (OMTR-1900) and Outdoor Multi-carrier Power Amplifier Module 1900MHz(OMPA-1900) . The OMTR-1900 and OMPA-1900 can support 1900MHz frequency band. In general, the Outdoor-BTS Radio Module(1900MHz) is connected to baseband processing module through a pair of fibres, and serves one cell or several logical sectors.

The Outdoor-BTS Radio Module(1900MHz) implements radio transmission over the Um interface, as well as the related control functions.

The Outdoor-BTS Radio Module(1900MHz) has the following features:

- Compact size
- Easy installation
- Flexible coverage

It is ideal for the areas with medium or high traffic density.

It can operate in the following modes:

- CDAM2000 1X mode
- CDAM2000 1 X EV-DO mode
- CDMA2000 1X/1X EV-DO hybrid mode

2.1.2 Main Equipment Technical Data

Input Rated Voltage:	 +24V
Rated Power:	500 W
Dimensions:	150mm(W)X500(L)X500mm(H)
Weight:	40kg
Transmitt Frequency:	1930MHz ~1990MHz
Receive Frequency:	1850MHz ~1910MHz

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 April 20, 2006. The test site has been accredited by



and the accredited number is **2174.01** in Jan of 2006.

3.1 Testing Period

The test have been performed during the period of

Jan. 05, 2007 to Jan. 14, 2007

4 Product Description

4.1 Technical Characteristics

4.1.1 Frequency Range

Uplink band:	1850 to 1910 MHz
Downlink band:	1930 to 1990 MHz

4.1.2 Channel Spacing / Separation

Channel spacing:	50 kHz
Channel separation:	1.25 MHz

4.1.3 Type of Emission

table 2. 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 3. Environmental Requirements

Minimum temperature:	- 40 °C
Maximum temperature:	+ 70 °C
Relative Humidity:	5%-95%RH

4.1.5 Power Source

table 4. Power Source

DC voltage nominal:	 +24V
DC voltage range	+20.4V ~ +27.6V
DC current maximal:	25A

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.

4.2 EUT Identification List

4.2.1 Board Information

table 5. Board Information

Model Name	Qty.	Hardware Version	Serial	Description
1900M OMTR	1	VER.0	2102314259106A000003 2102314259106A000004 2102314259106A000005	Multi-carrier Transceiver Module
1900M OMPA	1	VER.0	2102314392106B000008 2102314392106B000009 2102314392106B000010	Multi-carrier Power Amplifier Module

4.2.2 Adapter Technical Data

Not Applicable for BTS.

4.2.3 Battery Technical Data

Not Applicable for BTS.

4.2.4 FCC Identification

Grantee Code: QIS
Product Code: QCMM-1900
FCC Identification: QISQCMM-1900

5 Main Test Instruments

table 6. Main Test Equipments

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until (MM.DD.YYYY)
3m Semi Anechoic Chamber	S+M	N/A	N/A	12.24.2006
3m Full Anechoic Chamber	S+M	N/A	N/A	12.05.2006
Signal Analyzer	R&S	FSQ 40	100266	08.30.2007
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	05.30.2007
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	05.30.2007
Receiver	R&S	ESCS30	830245/018	05.30.2007
Pre-Amplifier	Agilent	8447D	2944A10146	05.30.2007
Pre-Amplifier	Agilent	83017A	3950M00246	01.03.2007
Loop Antenna	Schwarzbeck	FMZB1516	1516115	01.08.2007
BiLog Antenna	Schaffner	CBL 6112B	2747	08.30.2007
BiLog Antenna	Schaffner	CBL 6112B	2536	08.30.2007
Horn Antenna	R&S	HF906 4044.4507.02	359287/005	12.05.2006
Horn Antenna	R&S	HF906 4044.4507.02	359287/006	12.05.2006
Horn Antenna	ETS-Lindgren	3116	00031541	01.15.2007
Dipole	Schwarzbeck	D69250-UHAP/D69250-VHAP	979/917	08.28.2007
Signal Generator	R&S	SMR 40	100325	06.25.2007
Artificial Mains Network	Schwarzbeck	NNLK8121	8121416	05.29.2007
Power Supply	KIKUSUI	PAD110-32LA	EM004681	11.13.2007
Climate Chamber	WEISS	WK1-1	3604040034	04.24.2007

6 Transmitter Measurements

6.1 Maximum Channel Power

6.1.1 Test Conditions

table 7. Test Conditions

Preconditioning:	1 hour
Measured at:	Antenna connector
Ambient temperature:	23.5°C
Relative humidity:	55%

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 8. Supporting Standards:

EIA/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
EIA/TIA-102-CAAA:1999	Digital C4FM/CQPSK Transceiver Measurement Methods (ANSI/TIA/EIA-102.CAAA-1999)
3GPP2 C.S0010-B	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations. Release B

6.1.2.3 Limits

Compliance with part 24.232, in no any case may the peak power of a base station transmitter exceeds 100 watts. $W \text{ (dBm)} = 10 \cdot \log (W \text{ watts})$.

table 9. Limits

Maximum Output Power (Watts)	< 1640 Watts
Maximum Output Power (dBm)	< 62 dBm

6.1.3 Test Method and Setup

OUTDOOR-BTS RADIO MODULE(1900MHz) was connected to the wireless signal analyzer R&S FSQ40 via the one RF connector. Other RF connectors were connected to match load. The band class is set Band Class 1(1900MHz). OUTDOOR-BTS RADIO MODULE(1900MHz) was controlled to transmit Maximum power by console computer. Measure and record the Maximum Channel Power of the OUTDOOR-BTS RADIO MODULE(1900MHz) by the R&S FSQ40.

Peak transmit power must be measured over any interval of continuous transmission using instrumentation calibrated in terms of an RMS equivalent voltage. The measurement results shall be properly adjusted for any instrument limitations, such as detector response times, limited resolution bandwidth capability when compared to the emission bandwidth, sensitivity, etc., so as to obtain a true peak measurement for the emission in question over the full bandwidth of the channel.

Test setup

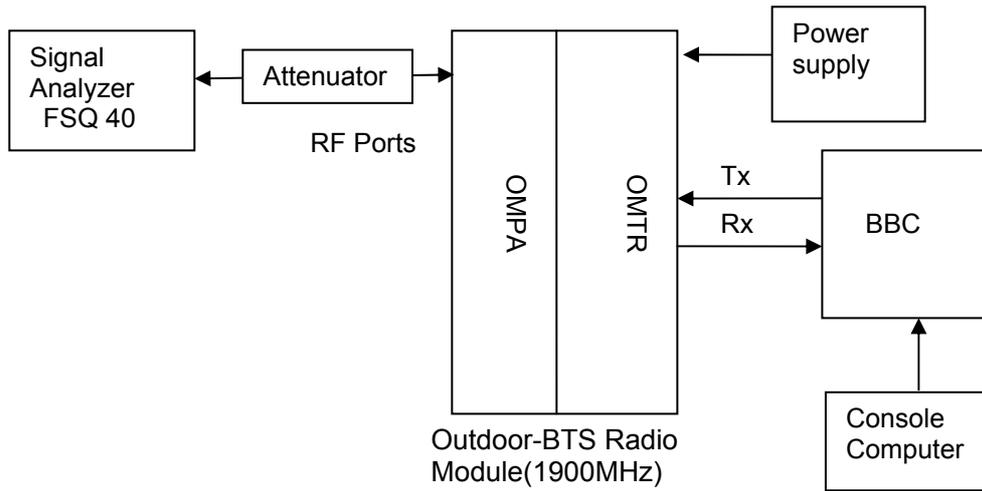


Figure 1. TEST SETUP

6.1.4 Measurement Results

The system is operated as 'Per-Channel Power' type.

For CDMA2000 1X system, set the base station to transmit a signal modulated with a combination of Pilot, Sync, Paging, and 6 traffic channels. For CDMA2000 1X EV-DO system, Configure the MAC channel with 14 MAC indices, i.e. the RA channel and 13 RPC channels.

CDMA2000 1X

A. Single Carrier:

table 10.Measurement Results for single carrier

TEST CONDITIONS		Maximum Output Power					
		Channel25		Channel600		Channel1175	
		1931.25MHz		1960.00MHz		1988.75MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
T_{nom} (25 °C)	V_{nom} (+24V)	43.34	< 62	43.19	< 62	43.27	< 62

B. Two Carriers:

table 11. Measurement Results for two carriers

TEST CONDITIONS		Maximum Output Power					
		Channel25 & 50		Channel600 & 625		Channel1150 & 1175	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
T_{nom} (25 °C)	V_{nom} (+24V)						
Carrier 1							
		43.23	< 62	43.30	< 62	43.10	< 62
Carrier 2							
		43.30	< 62	43.26	< 62	43.09	< 62
Total							
		46.27	< 62	46.29	< 62	46.10	< 62

C. Three Carriers:

table 12. Measurement Results for three carriers

TEST CONDITIONS		Maximum Output Power					
		Channel25 & 50 & 75		Channel575&600 & 625		Channel1125&1150& 1175	
		dBm		dBm		dBm	
T _{nom} (25 °C)	V _{nom} (+24V)	Measured	Limit	Measured	Limit	Measured	Limit
Carrier 1							
		43.30	< 62	42.93	< 62	42.89	< 62
Carrier 2							
		43.30	< 62	42.95	< 62	42.75	< 62
Carrier 3							
		43.32	< 62	42.89	< 62	42.74	< 62
Total							
		48.18	< 62	47.84	< 62	47.78	< 62

CDMA2000 1X EV-DO

table 13. Measurement Results for EV-DO

TEST CONDITIONS		Maximum Output Power					
		Channel25 1931.25MHz		Channel600 1960.00MHz		Channel1175 1988.75MHz	
		dBm		dBm		dBm	
T _{nom} (25 °C)	V _{nom} (+24V)	Measured	Limit	Measured	Limit	Measured	Limit
		42.77	< 62	42.25	< 62	42.77	< 62

6.1.5 Conclusion

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

6.2 Modulation Characteristics

6.2.1 Test Conditions

table 14. Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	49 %

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 15. Supporting Standards:

EIA/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
EIA/TIA-102-CAAA:1999	Digital C4FM/CQPSK Transceiver Measurement Methods (ANSI/TIA/EIA-102.CAAA-1999)
3GPP2 C.S0010-B	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations. Release B

6.2.2.3 Limits

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

table 16. Limits

Limits	Rho > 0.89
--------	------------

6.2.3 Test Method and Setup

OUTDOOR-BTS RADIO MODULE(1900MHz) was connected to the wireless signal analyzer R&S FSQ40 via the one RF connector. Other RF connectors were connected to match load. The band class is set Band Class 1(1900MHz). OUTDOOR-BTS RADIO MODULE(1900MHz) was controlled to transmit Maximum power by console computer. Measure and record the Code Domain Power and the constellation of the OUTDOOR-BTS RADIO MODULE(1900MHz) by the R&S FSQ40.

Test setup

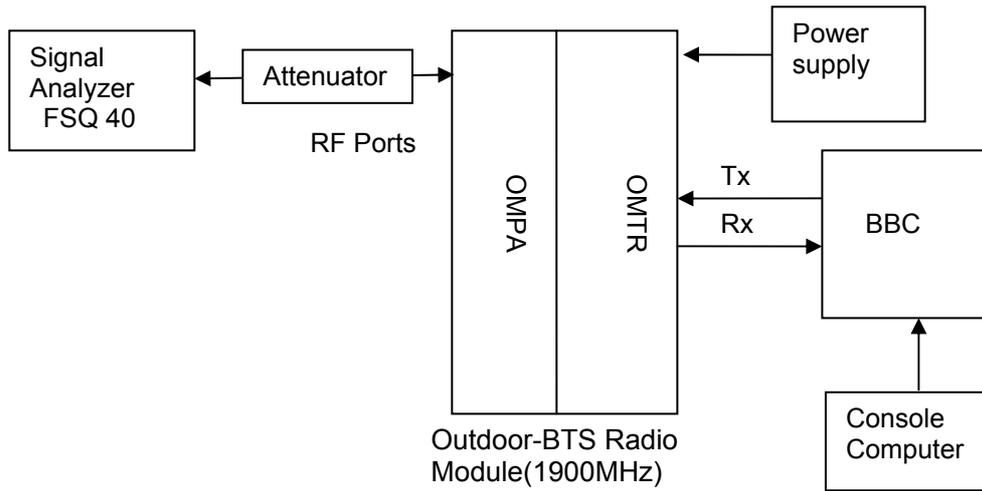


Figure 2. TEST SETUP

6.2.4 Measurement Results

For the CDMA2000 1X, the measurement was made based on two Radio Configurations: RC1 and RC3. The modulation mode of RC1 is BPSK, and the modulation mode of RC3 is QPSK. For the CDMA2000 1X EV-DO, the modulation mode is 16-QAM.

table 17. Measurement Results for CDMA2000 1X

TEST CONDITIONS		Rho(RC1/1)		
		Channel600		
		1960MHz		
		N/A		
		Type	Measured	Limit
T_{nom} (25 °C)	V_{nom} (+24V)	BPSK	0.97646	0.89

TEST CONDITIONS		Rho(RC3/3)		
		Channel600		
		1960MHz		
		N/A		
		Type	Measured	Limit
T_{nom} (25 °C)	V_{nom} (+24V)	QPSK	0.98745	0.89

table 18. Measurement Results for CDMA2000 1X EV-DO

TEST CONDITIONS		Rho(RC3/3)		
		Channel600		
		1960MHz		
		N/A		
		Type	Measured	Limit
T_{nom} (25 °C)	V_{nom} (+24V)	16-QAM	0.99335	0.89

6.2.5 Conclusion

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

For the measurement results refer to appendix A with 6 pages.

6.3 Occupied Bandwidth

6.3.1 Test Conditions

table 19. Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	25 °C
Relative humidity:	55 %

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 20. Supporting Standards:

EIA/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
EIA/TIA-102-CAAA:1999	Digital C4FM/CQPSK Transceiver Measurement Methods (ANSI/TIA/EIA-102.CAAA-1999)
3GPP2 C.S0010-B	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations. Release B

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 21. Limits

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

6.3.3 Test Method and Setup

OUTDOOR-BTS RADIO MODULE(1900MHz) was connected to the wireless signal analyzer R&S FSQ40 via the one RF connector. Other RF connectors were connected to match load. The band class is set Band Class 1(1900MHz). OUTDOOR-BTS RADIO MODULE(1900MHz) was controlled to transmit Maximum power by console computer. Measure and record the Occupied Bandwidth of the OUTDOOR-BTS RADIO MODULE(1900MHz) by the R&S FSQ40.

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
 Video bandwidth (VBW): 100 kHz

Test Set-up

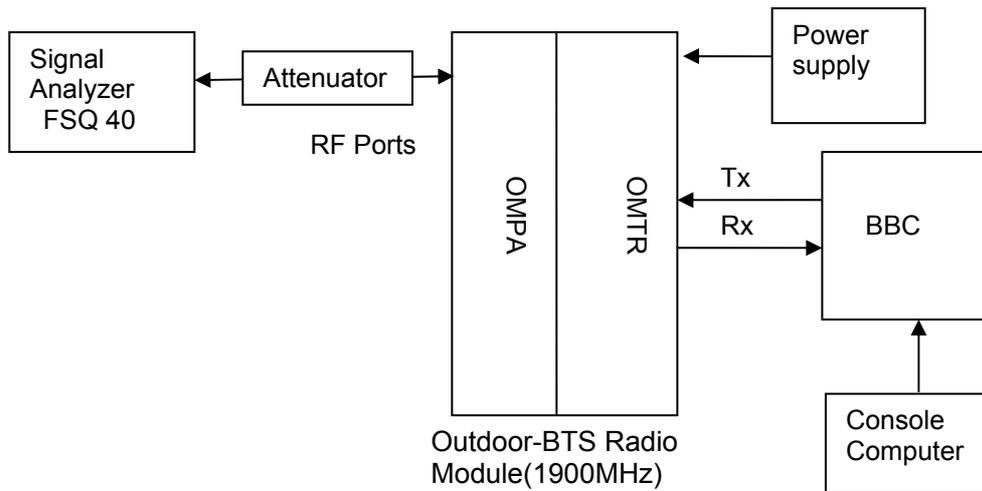


Figure 3. TEST SETUP

6.3.4 Measurement Results

table 22. Measurement Results for CDMA2000 1X

TEST CONDITIONS		Occupied Bandwidth	
		Measured (MHz)	Limit (MHz)
		Channel600 1960MHz	
T_{nom} (25 °C)	V_{nom} (+24V)	1.2788	1.48

table 23. Measurement Results for CDMA2000 1X EV-DO

TEST CONDITIONS		Occupied Bandwidth	
		Measured (MHz)	Limit (MHz)
		Channel600 1960MHz	
T_{nom} (25 °C)	V_{nom} (+24V)	1.2788	1.48

6.3.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix B with 3 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:	23.5°C
Relative humidity:	55 %

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:

EIA/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
EIA/TIA-102-CAAA:1999	Digital C4FM/CQPSK Transceiver Measurement Methods (ANSI/TIA/EIA-102.CAAA-1999)
3GPP2 C.S0010-B	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations. Release B

6.4.2.3 Limits

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

table 26. Limits

Rated Power:	43 dBm
Required attenuation:	$43 + 10 \log(20) = 56$, 43 dBm – 56 dB
Absolute level	- 13 dBm

6.4.3 Test Method and Setup

OUTDOOR-BTS RADIO MODULE(1900MHz) was connected to the wireless signal analyzer R&S FSQ40 via the one RF connector. Other RF connectors were connected to match load. The band class is set Band Class 0(800MHz) or Band Class 1(1900MHz). OUTDOOR-BTS RADIO MODULE(1900MHz) was controlled to transmit Maximum power by console computer. Measure and record the Occupied Bandwidth of the OUTDOOR-BTS RADIO MODULE(1900MHz) by the R&S FSQ40.

RBW of 20kHz(more than 1% of 1.25MHz) was used up to 1MHz away from the band edge .So the FCC rules specify that RBW of 1MHz for measurements of emissions >1MHz away from the band edges for Band Class 1(1900MHz).

Test Set-up

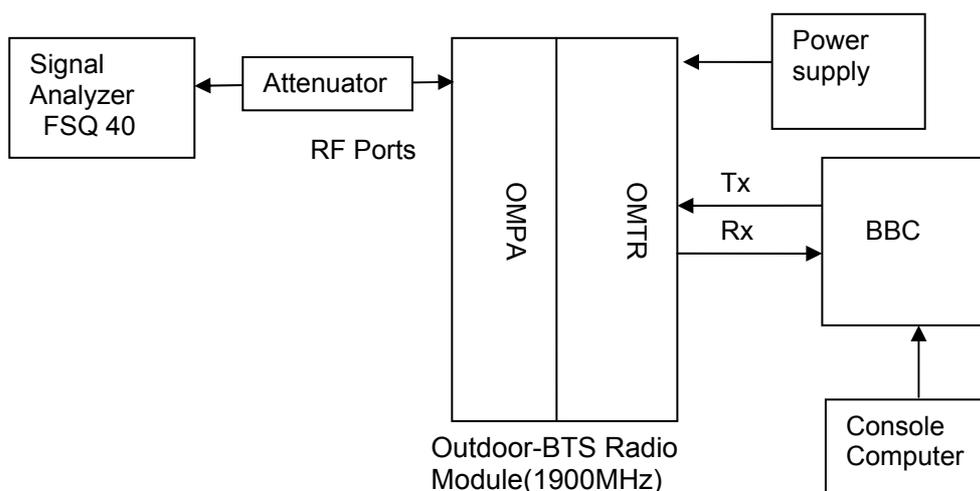


Figure 4. Test Set-up

6.4.4 Measurement Results

CDMA2000 1X:

A. Single Carrier

table 27. Measurement Results for single carrier

Channel Number	Frequency of Band edge [MHz]	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
25	1930	43	<-13(See appendix C)	- 13 dBm	Pass
1175	1990	43	<-13(See appendix C)	- 13 dBm	Pass

B. Multiple Carrier

table 28. Measurement Results for multiple carrier

Channel Number	Frequency of Band edge [MHz]	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
25/50/75	1930	43	<-13(See appendix C)	- 13 dBm	Pass
1125/1150/1175	1990	43	<-13(See appendix C)	- 13 dBm	Pass

CDMA2000 1X EV-DO:

table 29. Measurement Results for EV-DO

Channel Number	Frequency of Band edge [MHz]	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
25	1930	43	<-13(See appendix C)	- 13 dBm	Pass
1175	1990	43	<-13(See appendix C)	- 13 dBm	Pass

6.4.5 Conclusion

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

6.5 Spurious Emission at Antenna Terminal

6.5.1 Test Conditions

table 30. Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	20°C
Relative humidity:	50 %

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 31. Supporting Standards:

EIA/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
EIA/TIA-102-CAAA:1999	Digital C4FM/CQPSK Transceiver Measurement Methods (ANSI/TIA/EIA-102.CAAA-1999)
3GPP2 C.S0010-B	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations. Release B

6.5.2.3 Limits

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

table 32. Limits

Rated Power:	43dBm
Required attenuation:	$43 + 10 \log(20) = 53$, 43 dBm – 56 dB
Absolute level	- 13 dBm

6.5.3 Test Method and Setup

OUTDOOR-BTS RADIO MODULE(1900MHz) was connected to the wireless signal analyzer R&S FSQ40 via the one RF connector. Other RF connectors were connected to match load. The band class is set Band Class 1(1900MHz). OUTDOOR-BTS RADIO MODULE(1900MHz) was controlled to transmit Maximum power by console computer. Measure and record the Occupied Bandwidth of the OUTDOOR-BTS RADIO MODULE(1900MHz) by the R&S FSQ40.

According to 47CFR part 24.238, this defined the measurement bandwidth of as following:
 Measurement bandwidth (RBW) for 9 kHz up to 3GHz: 1MHz;
 Measurement bandwidth (RBW) for 3GHz up to 20GHz: 1MHz;

Test Set-up

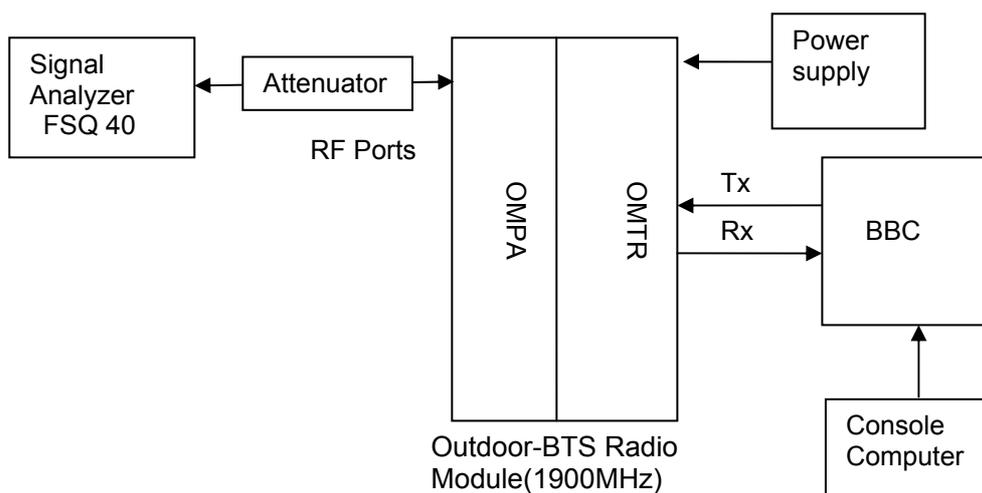


Figure 5. Test Set-up

6.5.4 Measurement Results

CDMA2000 1X:

A. Single Carrier

table 33. Measurement Results for single carrier

Channel Number	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
25	9 kHz ~20GHz	43	<- 13 dBm (See appendix D)	- 13 dBm/1MHz	Pass
1175	9 kHz ~20GHz	43	<- 13 dBm (See appendix D)	- 13 dBm/1MHz	Pass

B. Multiple Carrier

table 34. Measurement Results for multiple carriers

Channel Number	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
25/50/75	9 kHz ~20GHz	43	<- 13 dBm (See appendix D)	- 13 dBm/1MHz	Pass
1125/1150/1175	9 kHz ~20GHz	43	<- 13 dBm (See appendix D)	- 13 dBm/1MHz	Pass

CDMA2000 1X EV-DO:

table 35. Measurement Results for EV-DO

Channel Number	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
25	9 kHz ~20GHz	43	<- 13 dBm (See appendix D)	- 13 dBm/1MHz	Pass
1175	9 kHz ~20GHz	43	<- 13 dBm (See appendix D)	- 13 dBm/1MHz	Pass

6.5.5 Conclusion

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

6.6 Radiated Spurious Emission

6.6.1 Test Conditions

table 36. Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	22 °C
Relative humidity:	53 %

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 37. Supporting Standards:

EIA/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
EIA/TIA-102-CAAA:1999	Digital C4FM/CQPSK Transceiver Measurement Methods (ANSI/TIA/EIA-102.CAAA-1999)
3GPP2 C.S0010-B	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations. Release B

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 38. Limits

Rated Power:	43dBm
Required attenuation:	$43 + 10 \log(20) = 56$, 43 dBm – 56 dB
Absolute level	- 13 dBm

6.6.3 Test Method and Setup

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

rated power output of the transmitter, assuming all emissions are radiated from half-wave dipole antennas.

(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:

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

Huawei CDMA2000 BTS3606AE is equipment with non-integral antenna. And it should test according to part (b) of above section.

HUAWEI CDMA2000 BTS3606AE is equipment with non-integral antenna. And it should test according to part (b) of above section.

BTS is connected to match loads. The console computer controls the CDMA2000 BTS3606AE to transmitter the maximum power which defined in specification of product. The Base Station 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). HUAWEI CDMA2000 BTS3606AE was connected to ancillary in order to simulate normal operating conditions with reference to the guidance given in the standard for this type of equipment.
- (b) Test the radiated maximum output power by the R&S test receiver ESML 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 ESML, and record the power level of Signal Generator. Of course, the cable loss at the test frequency should be compensated.

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

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

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

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

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

Test setup

Step 1: Pre-test

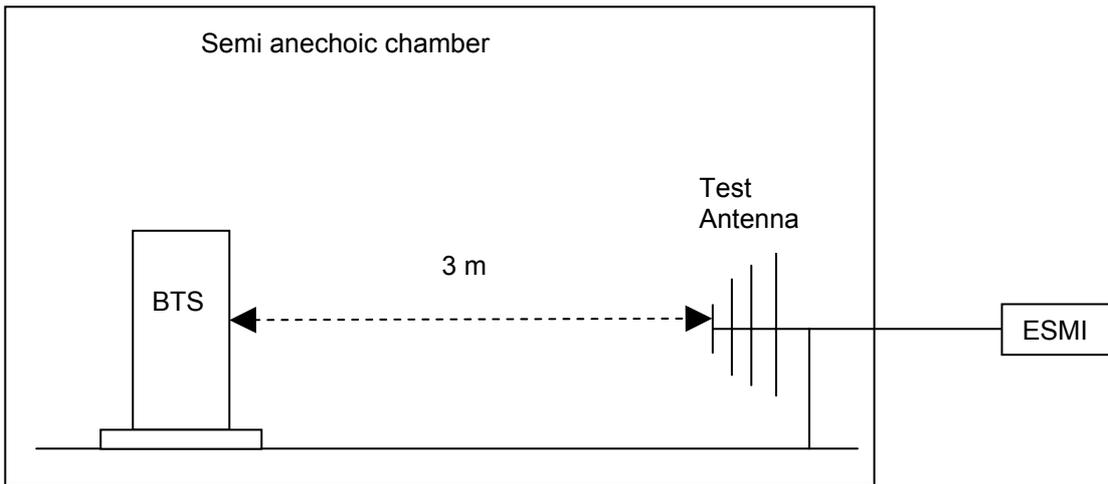


Figure 6. Test Set-up

Step 2: Substitution method to verify the maximum ERP

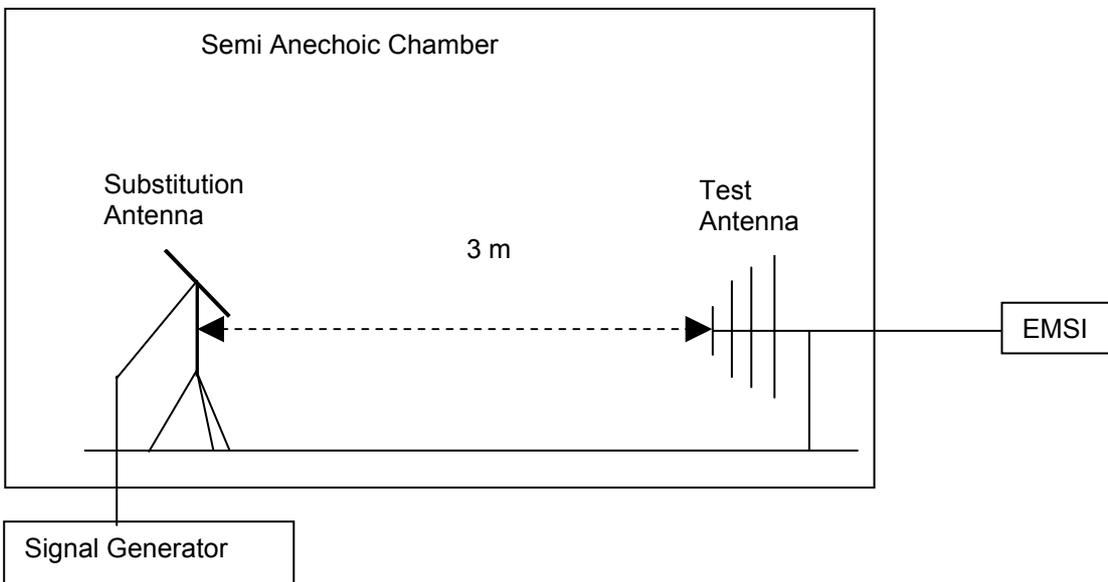


Figure 7. Test Set-up

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

6.6.4 Measurement Results of BTS3606AE

6.6.4.1 Pre-test Measurement Results

table 39. Measurement Result for Band Class 1

Channel Number	Test Range (Frequency)	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
Channel600 1960MHz	9 kHz ~20GHz	43	<- 13 dBm (See appendix E)	- 13 dBm	Pass

6.6.4.2 Substitution Results

No peak found in pre- test.

Calculation Samples

table 40. Substitution Results for Band Class 1(1900MHz)

Freq. [MHz]	Measurement Value [dBm]	Substitution Antenna Type	Gain [dBd]	Cable Loss [dB]	Signal Generator Level [dBm]	Substitution Level [dBm]	FCC limit [dBm]	Result
3964.44	-28.77	Horn Ant.	5.7	2.20	-33.24	-29.74	-13	Pass

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

$$ERP [dBm] = SGP [dBm] - Cable Loss [dB] + Gain [dBd]$$

NOTE: SGP- Signal Generator Level

6.6.5 Conclusion

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

6.7 Frequency Stability

6.7.1 Test Conditions

table 41. Test Conditions

Preconditioning:	0.5 hour
Measured at:	Antenna connector
Ambient temperature:	See below
Relative humidity:	55 % at 20 °C

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 42. Supporting Standards:

ANSI C63.4-1992	Methods of Measurement of Radio-Noise Emissions from Low Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz
EIA/TIA-603-C: 2004	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards
3GPP2 C.S0010-B	Recommended Minimum Performance Standards for cdma2000 Spread Spectrum Base Stations. Release B

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 $+50^{\circ}$ 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 OUTDOOR-BTS RADIO MODULE(1900MHz) to the Wireless Signal Analyzer R&S FSQ40 via the antenna connector. Then measure the frequency error by the R&S FSQ40. The Other antenna output ports were matched with 50 Ω match loads.

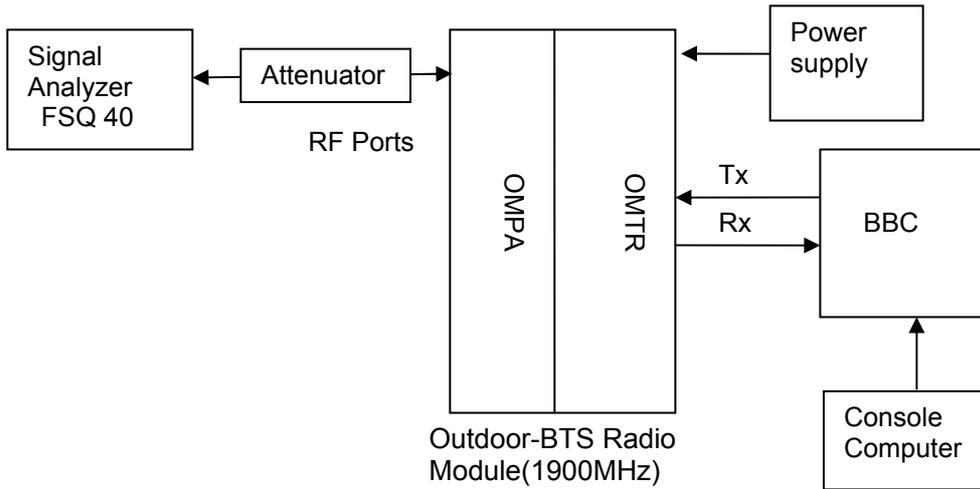


Figure 8. Test Set up

6.7.4 Measurement Results

6.7.4.1 Measurement Results vs. Variation of Temperature

CDMA2000 1X:

- TRX1: Channel No.600(1960MHz)

RC1:

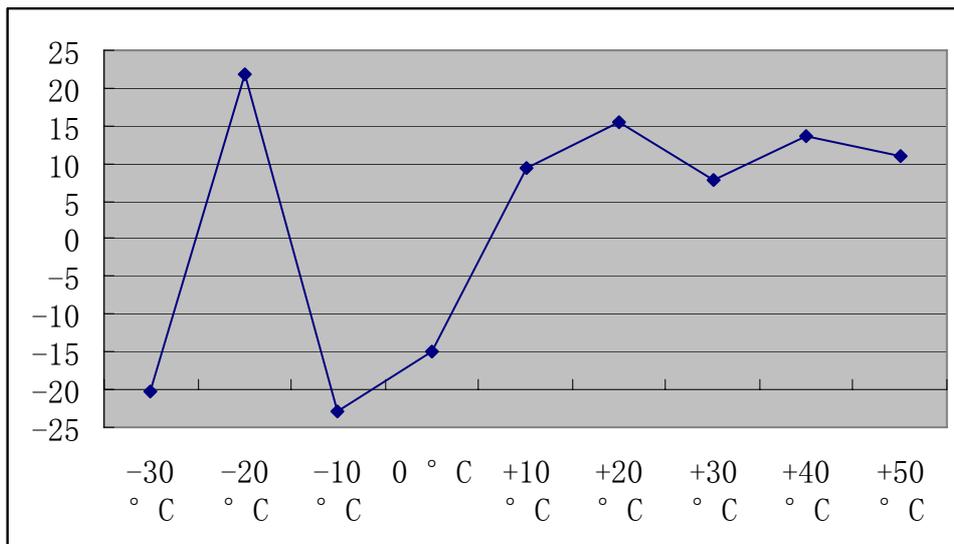


Figure 9. Measurement Results for RC1

RC3:

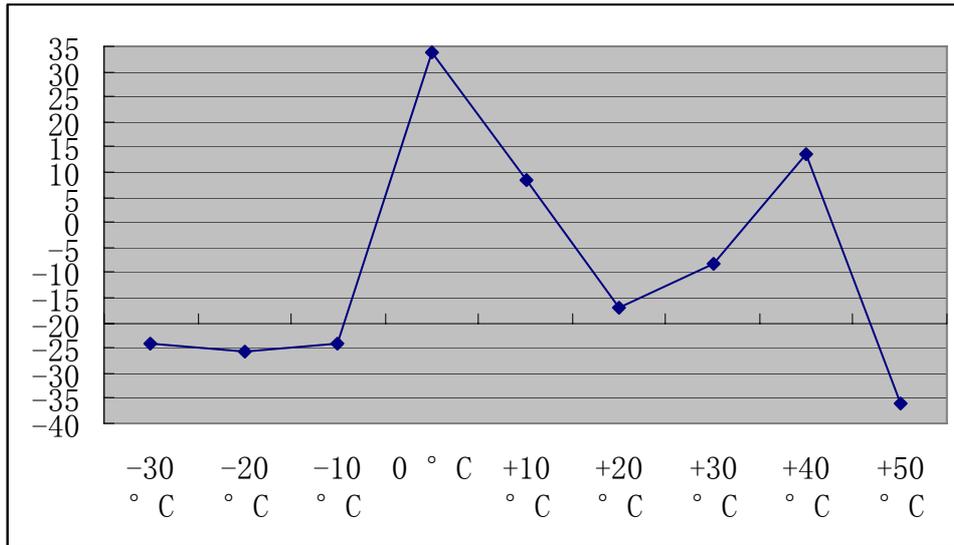


Figure 10. Measurement Results for RC3

CDMA2000 1X EV-DO:

- TRX1: Channel No.600(1960MHz)

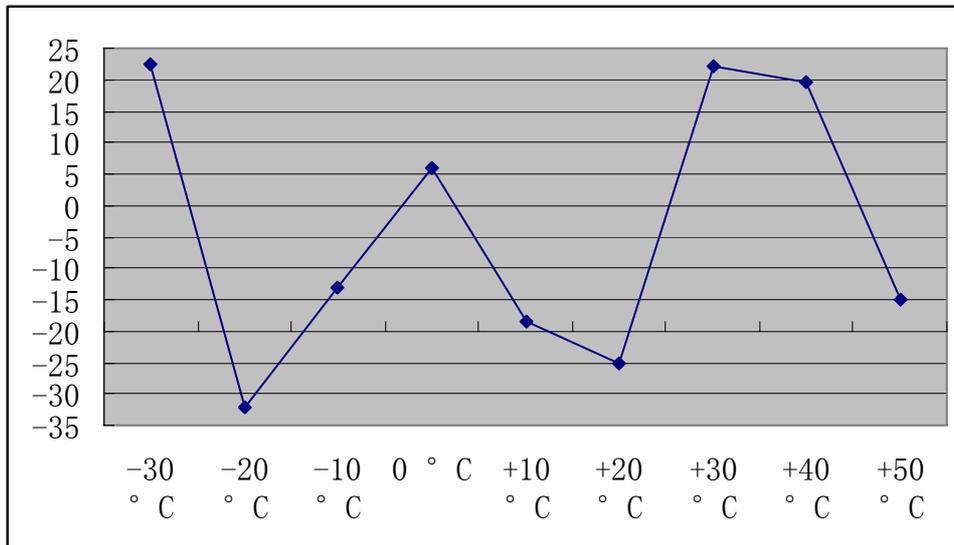


Figure 11. Measurement Results for EV-DO

6.7.4.2 Measurement Results vs. Variation of Voltage

CDMA2000 1X:

- TRX1: Channel No.600(1960MHz)

RC1:

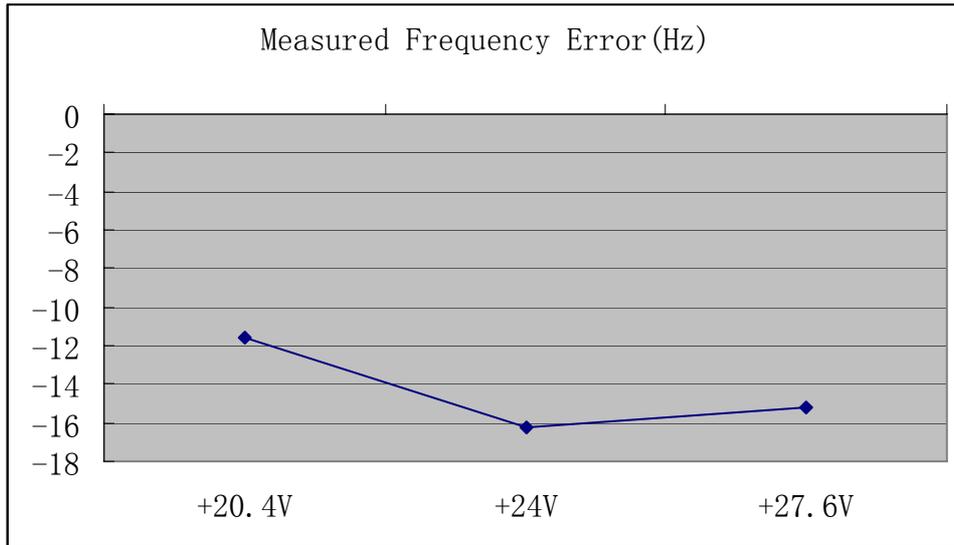


Figure 12. Measurement Results for RC1

RC3:

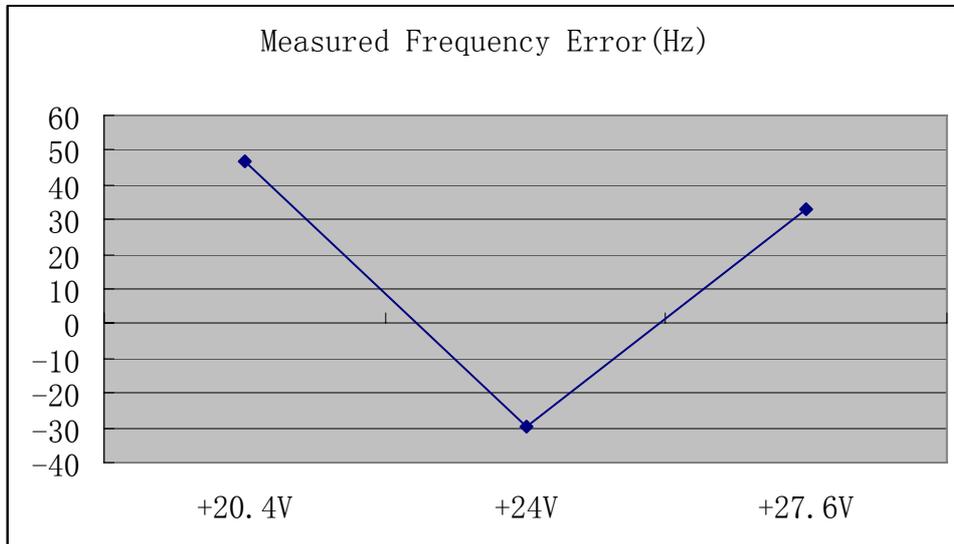


Figure 13. Measurement Results for RC3

CDMA2000 1X EV-DO:

- TRX1: Channel No.600(1960MHz)

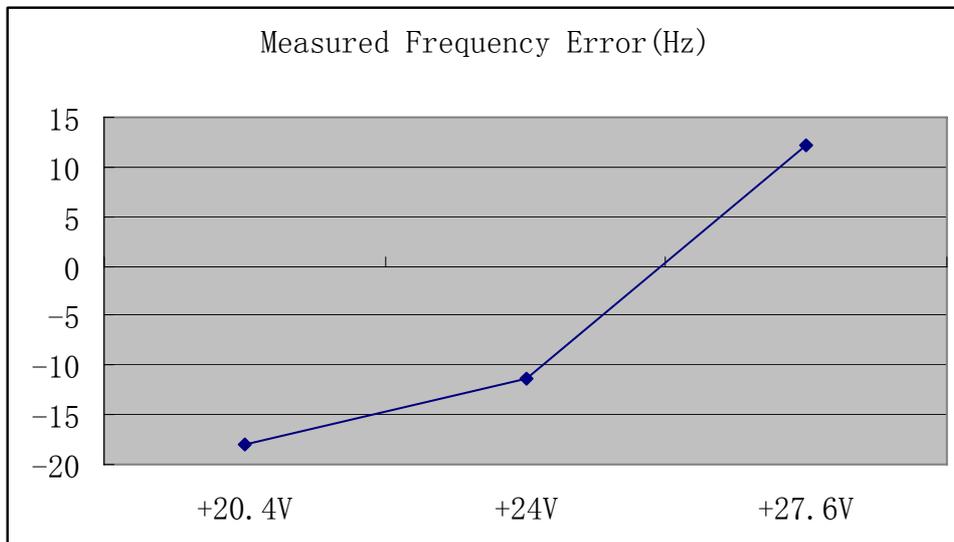


Figure 14. Measurement Results for EV-DO

6.7.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix F with 37 pages.

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:	55 %

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 part15.107, conducted emission must meet the requirement of following table.

table 45. Limits

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	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 floor-top EUT was placed upon a non-metallic table 0.1 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 CDMA2000 BTS3606AE was connected to ancillary in order to simulate normal operating conditions with reference to the guidance given in the standard for this type of equipment.

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

Test Set-up

The CDMA2000 BTS3606AE was setup in the screened chamber and operated under nominal conditions.

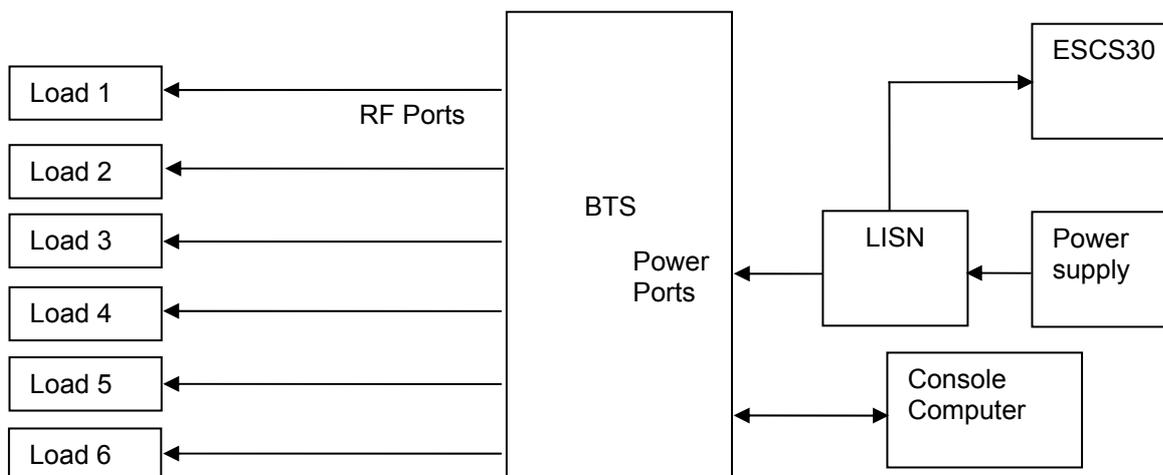


Figure 15. Test Set-up

7.1.4 Measurement Results of BTS3606AE

table 46. MEASUREMENT RESULT:QP DETECTOR

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.150000	35.70	11.0	66	30.3	L3	GND
0.361500	28.30	10.2	59	30.4	N	GND
1.356000	38.20	10.0	56	17.8	N	GND
2.593500	32.70	10.1	56	23.3	N	GND
9.843000	41.90	11.0	60	18.1	L3	GND
20.229000	37.30	13.2	60	22.7	N	GND

table 47. MEASUREMENT RESULT:AV DETECTOR

Frequency (MHz)	Level (dBμV)	Transd (dB)	Limit (dBμV)	Margin (dB)	Line	PE
0.150000	27.20	11.0	56	28.8	L3	GND
0.366000	24.30	10.2	49	24.3	N	GND
1.365000	27.70	10.0	46	18.3	N	GND
4.321500	30.30	10.1	46	15.7	L3	GND
9.217500	41.30	10.7	50	8.7	N	GND
20.535000	30.40	13.4	50	19.6	L3	GND

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 Idle Mode

7.2.1 Test Conditions

table 48. Test Conditions

Preconditioning:	0.5 hour
Measured at:	enclosure
Ambient temperature:	25 °C
Relative humidity:	51 %

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 part 15.109. The limit showed in following table.

table 50. Limits

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

7.2.3 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 EN 55022/CISPR 22. 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.

The test performed at worst emission state.

For convenience, the OUTDOOR-BTS RADIO MODULE(1900MHz) under test were installed in Radio Frequency Cabinet (RFC) and all RF ports of CDMA2000 BTS3606AE were terminated with match load. And the OUTDOOR-BTS RADIO MODULE(1900MHz) was operated on the typical channel. The transceivers of OUTDOOR-BTS RADIO MODULE(1900MHz) were worked in idle mode.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 k Hz
 Measurement bandwidth: 1GHz – 12.75 GHz: 1 MHz

Test set up

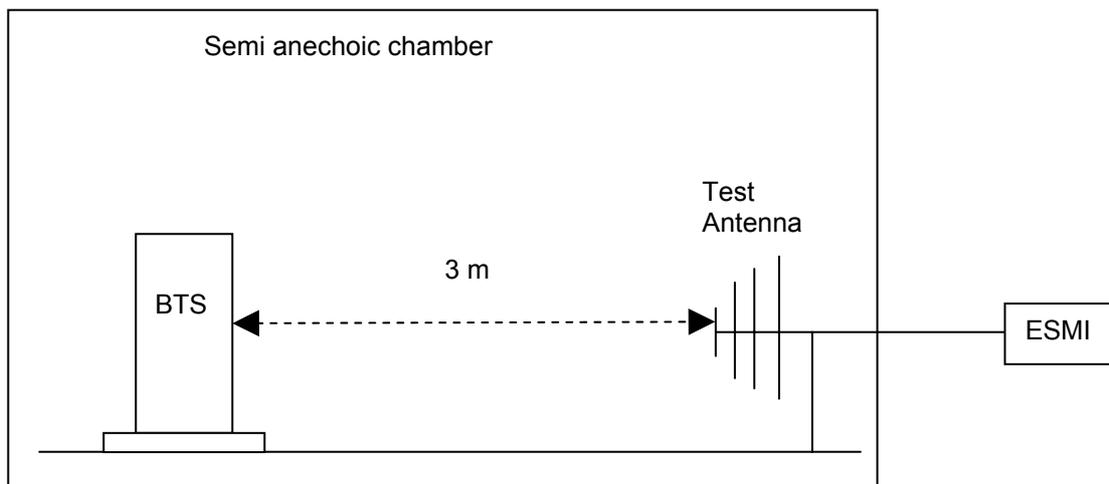


Figure 16. Test set up

7.2.4 Measurement Results

30MHz~1GHz:

table 51. MEASUREMENT RESULT: QP DETECTOR

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
34.800000	32.60	-6.5	40.0	7.4	100.0	258.00	VERTICAL
122.880000	33.60	-9.6	40.0	6.4	141.0	0.00	HORIZONTAL
150.300000	29.00	-10.9	40.0	11.0	113.0	357.00	VERTICAL
200.400000	28.20	-11.8	40.0	11.8	108.0	67.00	HORIZONTAL
240.600000	30.60	-9.3	47.0	16.4	155.0	0.00	VERTICAL
737.880000	38.90	0.0	47.0	8.1	100.0	90.00	VERTICAL

1GHz~12.75GHz:

table 52. MEASUREMENT RESULT: QP DETECTOR

Frequency (MHz)	Level (dBμV/m)	Transd (dB)	Limit (dBμV/m)	Margin (dB)	Height (cm)	Azimuth (deg)	Polarisation
2500.000000	34.70	2.1	53.9	19.2	100.0	342.00	VERTICAL

7.2.5 Conclusion

The equipment **PASSED** the requirement of this clause.
For the measurement results refer to appendix H with 3 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 53. System Measurement Uncertainty

Items		Extended Uncertainty
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)(30MHz~1G)	U=4.6dB; k=2
	ERP (dBm) (>1G)	U=3dB; k=2
Conducted Output Power	Power(dBm)	U=0.39dB; k=2
Conducted Emission at Power Port	Disturbance Voltage (dB μ V)	U=3.3dB; k=2
Radiated Emission of enclosure at ideal mode	Field strength (dB μ V/m)	U=4.6dB; k=2

9 Appendices

Appendix A	Modulation Characteristic Measurement	6 pages
Appendix B	Occupied Bandwidth Measurement	3 pages
Appendix C	Band Edge Measurement	13 pages
Appendix D	Spurious Emission at Antenna Terminal	13 pages
Appendix E	Field Strength of Spurious Radiation	5 pages
Appendix F	Frequency Stability Measurements	37 pages
Appendix G	Conducted Emission at Power Port	2 pages
Appendix H	Radiated Emission of Enclosure in Idle Mode	3 pages
Appendix I	Photos of Test Setup	4 pages