

Prüfbericht - Nr.: 17000535 001		Seite 1 von 37 Page 1 of 37																					
<i>Test Report No.</i>																							
Auftraggeber: <i>Client:</i>	Huawei Technologies Co., Ltd. Kefa Rd. Science-Based Industrial Park Nanshan District Shenzhen 518057 P.R. China																						
Gegenstand der Prüfung: <i>Test item:</i>	CDMA Base Station																						
Bezeichnung: <i>Identification:</i>	cBTS3612-800	Serien-Nr.: <i>Serial No.</i>	Pre-production Model																				
Wareneingangs-Nr.: <i>Receipt No.:</i>	63004686	Eingangsdatum: <i>Date of receipt:</i>	01.07.2002																				
Prüfart: <i>Testing location:</i>	Huawei EMC Laboratory FCC registered test site number 97456 as of October 10. 2000.																						
Prüfgrundlage: <i>Test specification:</i>	FCC Part 22, subpart H, §22.901(d) FCC Part 2, subpart J, §2.1033 - §2.1057																						
Prüfresultat: <i>Test Result</i>	Der vorstehend beschriebene Prüfgegenstand wurde geprüft und entspricht oben genannter Prüfgrundlage. The a. m. test item passed .																						
geprüft / tested by: Yu Huichun	kontrolliert / reviewed by: Zhang Xinghai																						
<table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">_____</td> <td style="width: 25%; border: none;">Yu Huichun</td> <td style="width: 25%; border: none;">_____</td> <td style="width: 25%; border: none;">Zhang Xinghai</td> </tr> <tr> <td style="border: none;">Datum</td> <td style="border: none;">Name</td> <td style="border: none;">Datum</td> <td style="border: none;">Name</td> </tr> <tr> <td style="border: none;"><i>Date</i></td> <td style="border: none;"><i>Name</i></td> <td style="border: none;"><i>Date</i></td> <td style="border: none;"><i>Name</i></td> </tr> <tr> <td style="border: none;">Unterschrift</td> <td style="border: none;">Unterschrift</td> <td style="border: none;">Unterschrift</td> <td style="border: none;">Unterschrift</td> </tr> <tr> <td style="border: none;"><i>Signature</i></td> <td style="border: none;"><i>Signature</i></td> <td style="border: none;"><i>Signature</i></td> <td style="border: none;"><i>Signature</i></td> </tr> </table>				_____	Yu Huichun	_____	Zhang Xinghai	Datum	Name	Datum	Name	<i>Date</i>	<i>Name</i>	<i>Date</i>	<i>Name</i>	Unterschrift	Unterschrift	Unterschrift	Unterschrift	<i>Signature</i>	<i>Signature</i>	<i>Signature</i>	<i>Signature</i>
_____	Yu Huichun	_____	Zhang Xinghai																				
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Sonstiges / Other Aspects:																							
<p>Abkürzungen: OK, Pass = entspricht Prüfgrundlage Fail = entspricht nicht Prüfgrundlage N/A = nicht anwendbar</p> <p>Abbreviations: OK, Pass = passed Fail = failed N/A = not applicable</p>																							
<p>Dieser Prüfbericht bezieht sich nur auf den o.g. Prüfgegenstand und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens. This test report relates to the a. m. test item. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark on this or similar products.</p>																							
<small>Authorized format 16.12.1996, R.M.</small>																							

1. SUMMARY

Below table summarizes the measurements and results for the CDMA base station. Detailed results and descriptions are shown in the following pages.

FCC Measurement Specification	FCC Limits Part(s)	Description	Result
2.1046	22.913	RF Output Power	PASS
2.1047	22.901	Modulation Characteristics	PASS
2.1049	22.917	Occupied Bandwidth	PASS
2.1051	22.917(e)	Spurious Emission at Antenna Terminals	PASS
2.1053	22.917(e)	Field Strength of Spurious Emissions	PASS
2.1055	22.355	Frequency Stability	PASS

The base station is intended for use in the licensed domestic public cellular radio service and is designed to be placed and operated under the conditions of FCC rules part 22 subpart H, section 22.901 (d).

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3. PRODUCT DESCRIPTION

The cBTS3612-800 is located between the Base Station Controller (BSC) and Mobile Station (MS) in the CDMA2000 1X mobile communication system. Under the control of BSC, cBTS3612-800 serves as the wireless transceiving equipment of one cell or multiple logical sectors. By connecting to BSC via the Abis interface, it helps BSC with the radio resource management, radio parameter management and interface management. It also implements, via the Um interface, the radio transmission between BTS3612 and MS as well as related control functions. cBTS3612-800 is fully compatible with IS-95A/B, serving as medium-/large-capacity BTS. When fully configured, single cabinet accommodates up to 12 sector carriers. With 3 fully configured cabinets, it can support 36 sector carriers. It also enables smooth expansion and the configuration of one cabinet for 6 sectors.

4. TEST SITE DESCRIPTION

The test site of:

Huawei Technologies Co. Ltd.
P.O. Box 518057
Kefa Road, Science-based Industrial Park
Nanshan District, Shenzhen, China

The test site description has been submitted to FCC and registration granted under the registration number 97456 on October 10. 2000.

4.1. Testing Period

The test have been performed during the period of

July 1. 2002 to July 23. 2002

4.2. General Set up Description

The base station cBTS3612-800 is equipped with a total of 12 identical transceivers. Although only one transceiver has been tested, all other transceiver have been operated to produce most unfavourable conditions for the testing.

5. PRODUCT DESCRIPTION

5.1. Technical Characteristics

5.1.1. Frequency Range

Lower frequency:	869 MHz
Upper frequency:	894 MHz

5.1.2. Transmitter Power Rating

Minimum Power:	No level adjustment possible according to manufacturer statement
Maximum Power:	43 dBm +2/-4 dBm

5.1.3. Channel Spacing / Separation

Channel spacing:	Channel 1: 872.34 MHz, Channel 2: 874.80 MHz
Channel separation	Not specified

5.1.4. Type of Emission

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

5.1.5. Environmental Conditions for Base station

Minimum temperature:	- 30 °C
Maximum temperature:	+ 50 °C
Relative Humidity:	Max. 93% r.H

5.1.6. Power Source

DC nominal:	-48 VDC
DC voltage range	± 15%
DC current maximal:	Not specified

5.1.7. Tune-up Procedure

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

The CDMA base station does not need a tune up procedure according to statement of manufacturer.

5.1.8. 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:

Voltage: 27 VDC
Current: 1,5 A

5.2. EUT Identification List

Power Supply for type designation cBTS3612-800		
Equipment Designation / Description	Serial Number	Remarks
Power Supply NPSU No. 1	21022805362019000037 QC5M1BRFM	
Power Supply NPSU No. 2	21022805362019000067 QC5M1BRFM	
Power Supply NPSU No. 3	2102280536201A000007 QC5M1BRFM	
Power Supply NPSU No. 4	2102280536201A000006 QC5M1BRFM	
Power Supply NPSU No. 5	21022805362018000020 QC5M1BRFM	

Combiner / Divider for type designation cBTS3612-800		
Equipment Designation / Description	Serial Number	Remarks
Combining Duplex Unit CDU No. 1	0111023	CDU2C2K-F3&F5
Combining Duplex Unit CDU No. 2	0111018	CDU2C2K-F3&F5
Combining Duplex Unit CDU No. 3	0111017	CDU2C2K-F3&F5
Combining Duplex Unit CDU No. 4	0111024	CDU2C2K-F3&F5
Combining Duplex Unit CDU No. 5	0111029	CDU2C2K-F3&F5
Combining Duplex Unit CDU No. 6	0111021	CDU2C2K-F3&F5

Transceiver module (BTRM) for type designation cBTS3612-800		
Equipment Designation / Description	Serial Number	Remarks
Transceiver module BTRM No. 1	21023109831021000129 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 2	21023109831021000121	Transceiver Module

	QC5M1BRFM	
Transceiver module BTRM No. 3	21023109831021000126 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 4	21023109831021000131 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 5	21023109831021000034 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 6	21023109831021000125 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 7	21023109831021000123 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 8	21023109831021000133 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 9	21023109831021000132 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 10	21023109831021000002 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 11	21023109831021000134 QC5M1BRFM	Transceiver Module
Transceiver module BTRM No. 12	21023109831021000121 QC5M1BRFM	Transceiver Module

Transceiver Module for type designation cBTS3612-800

Equipment Designation / Description	Serial Number	Remarks
Transceiver Unit BRFM No. 1	2102311013101C000047 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 2	21023110131024000163 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 3	21023110131024000223 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 4	21023110131024000220 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 5	21023110131024000212 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 6	21023110131024000066 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 7	21023110131024000150 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA

		module and a fan module
Transceiver Unit BRFM No. 8	21023110131024000154 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 9	21023110131024000080 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 10	21023110131024000049 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 11	21023110131024000060 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module
Transceiver Unit BRFM No. 12	21023110131024000208 QC5M1BRFM	Each transceiver unit consist of BTRM module a BHPA module and a fan module

Controller for type designation cBTS3612-800

Equipment Designation / Description	Serial Number	Remarks
BTS Control Interface Module BCIM	0330291021000031 QC51BCIM0	
BTS Channel Processing Module BCPM No.1	0329931022000092 QC51BCPMA0	
BTS Channel Processing Module BCPM No.2	0329931022000012 QC51BCPMA0	
BTS Resource Distribution Module BRDM No.1	0330271021000014 QC51BRDM0	
BTS Resource Distribution Module BRDM No.2	0330271021000032 QC51BRDM0	
BTS Resource Distribution Module BRDM No.3	0330271021000026 QC51BRDM0	
BTS Control and Clock Module BCKM	0330281021000030 QC51BCKM0	
Fan Unit No.1	21023110121024000121 QC5M1BFAN	
Fan Unit No.2	21023110121024000078 QC5M1BFAN	
Receive LNA Distribution Unit RLDU No.1	01110052	RLDUC2K

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Receive LNA Distribution Unit RLDU No.2	01110048	RLDUC2K
Receive LNA Distribution Unit RLDU No.3	21270200661021000012 RLDU1.0	
Power distribution panel BCDS	2102120008910240000073	QC5E1BCDS

5.2.1. FCC Identification

Grantee Code: QIS
Product Code: cBTS3612-800

FCC Identification: QIScBTS3612-800

6. TRANSMITTER MEASUREMENTS

6.1. RF Output Power

6.1.1. Test Conditions

Preconditioning:	1 hour
Maximum Specified Transmitter Power:	43 dBm
Measured at:	Combiner Output No. 1
Ambient temperature:	23.5 °C
Relative humidity:	55 %
Power Supply:	-48 VDC
Date of Testing:	01.07.2002

6.1.2. Test Specifications and Limits

6.1.2.1. Specification

CFR 47 (FCC) part 2.1046 and part 22.913

Supporting Standards:

EIA/TIA-603-A: 1992 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)
EIA/TIA -95B-1999 Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)

6.1.2.2. Limits

Compliance with 22.913 requires that the effective radiated power must not exceed 500W.

Max. ERP	500 W
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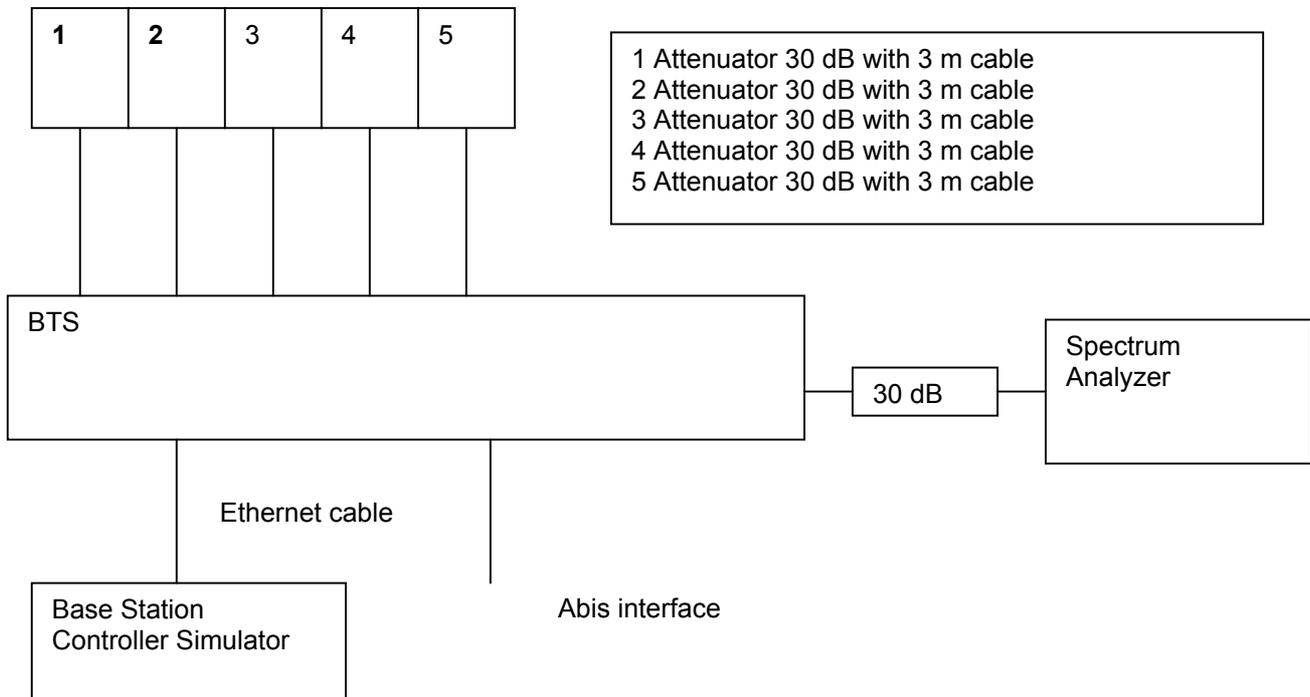
6.1.3. Test Method and Setup

(a) For transmitters other than single sideband, independent sideband and controlled carrier radiotelephone, power output shall be measured at the RF output terminals 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 2.983(d)(5). The electrical characteristics of the radio frequency load attached to the output terminals when this test is made shall be stated.

Test Set up

The CDMA BTS was set up via the BTS controller simulator and operated at maximal load. The Spectrum analyzer was set with the following settings.

Resolution bandwidth: 30 kHz
Video bandwidth: 300 kHz
Max. Hold function: active



6.1.4. Measurement Results

TEST CONDITIONS		RF Output Power					
		Channel 1 872.34 MHz				Channel 2 874.80 MHz	
		dBm		dBm		dBm	
		Measured	Limit	Measured	Limit	Measured	Limit
T_{nom} (23.5 °C)	V_{nom} (- 48 V)	42.52	57	N/A	N/A	42.3	57
Measurement uncertainty (dB)		Equipment			Requirement		
		± 0.4 dB			N/A		

6.1.4.1. Conclusion

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

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

6.1.4.2. Equipment List

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Spectrum Analyzer	Agilent	E4440A PSA series	US40420781	17.07.2002
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	15	18.09.2003
Cable	Diverse	RG58-U	n.a	Before test

6.2. Modulation Characteristics

6.2.1. Test Conditions

Preconditioning:	1 hour
Maximum Specified Transmitter Power	43 dBm
Measured at:	Combiner Output
Ambient temperature:	23.5 °C
Relative humidity:	55 %
Power Supply:	-48 VDC

6.2.2. Test Specifications and Limits

6.2.2.1. Specification

CFR 47 (FCC) part 2.1047 and part 22.917

Supporting Standards:

EIA/TIA-603-A: 1992 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)
 EIA/TIA -95B-1999 Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)

6.2.2.2. Limits

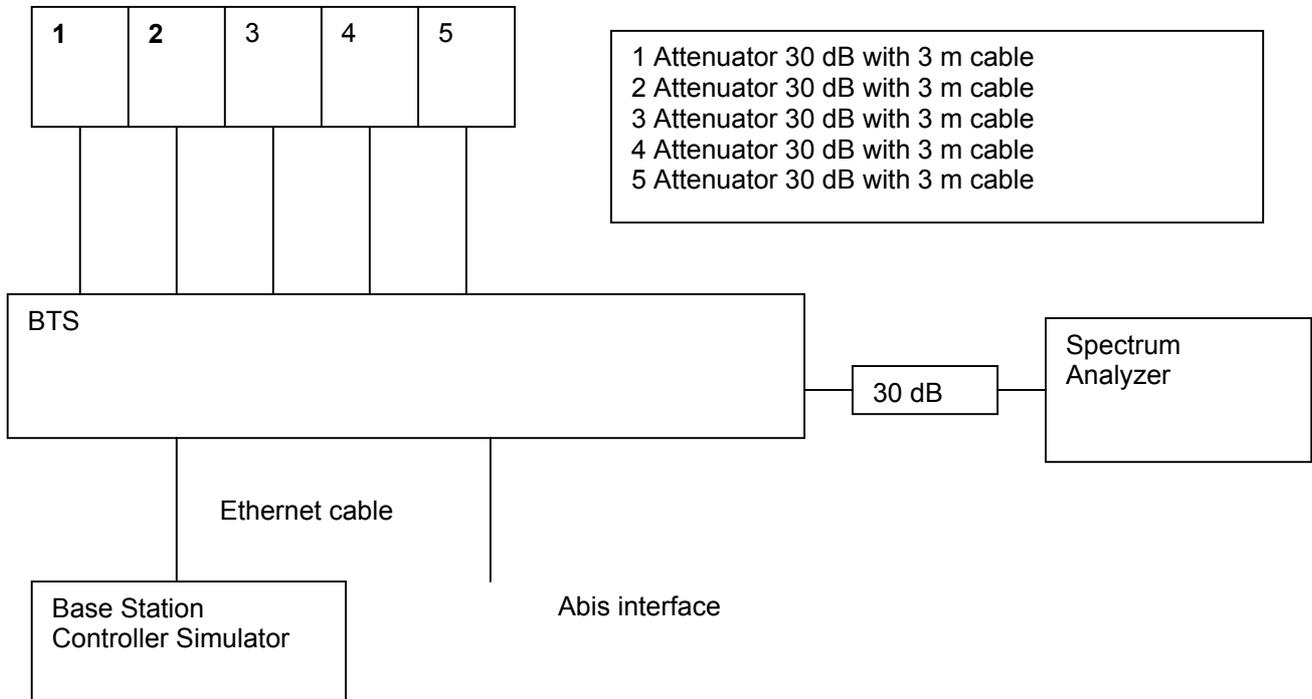
Compliance with 22.917 requires not a specific modulation characteristic since the EUT is applied for 22.901 (d).

Limits	Not applicable
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6.2.3. Test Method and Setup

The CDMA BTS was controlled via the BTS simulator. The antenna port was connected to a 30 dB load

Test Set-up



6.2.4. Measurement Results

TEST CONDITIONS		RF Output Power					
		Channel 1 872.34 MHz				Channel 2 874.80 MHz	
		Rho				Rho	
		Measured	Limit	Measured	Limit	Measured	Limit
T_{nom} (23.5 °C)	V_{nom} (- 48 V)	0.9957	N.A.	N/A	N/A	0.9957	N/A
Measurement uncertainty (dB)		Equipment			Requirement		
					N/A		

6.2.4.1. Conclusion

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

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

6.2.4.2. Equipment List

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Spectrum Analyzer	Agilent/HP	HP8935 E6380A	GB40421057	17.07.2002
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	15	18.09.2003
Cable	Diverse	RG58-U	n.a	Before test

6.3. Occupied Bandwidth

6.3.1. Test Conditions

Preconditioning:	1 hour
Nominal Output Power:	43 dBm
Measured at:	Combiner Output No. 1
Ambient temperature:	23.5 °C
Relative humidity:	55 %
Power Supply:	-48 VDC
Date of Testing:	01.07.2002

6.3.2. Test Specifications and Limits

6.3.2.1. Specification

CFR 47 (FCC) part 2.1049 and part 22.917

Supporting Standards:

EIA/TIA-603-A: 1992 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)
 EIA/TIA -95B-1999 Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)

6.3.2.2. Limits

Compliance with 22.917 requires not a specific occupied bandwidth since the EUT is applied for 22.901 (d) and possesses a digital modulation there is no specific requirement formulated in before mentioned rules the 99% rules applies.

Upper /lower frequency limits	0.5% of the mean power
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6.3.3. Test Method and Setup

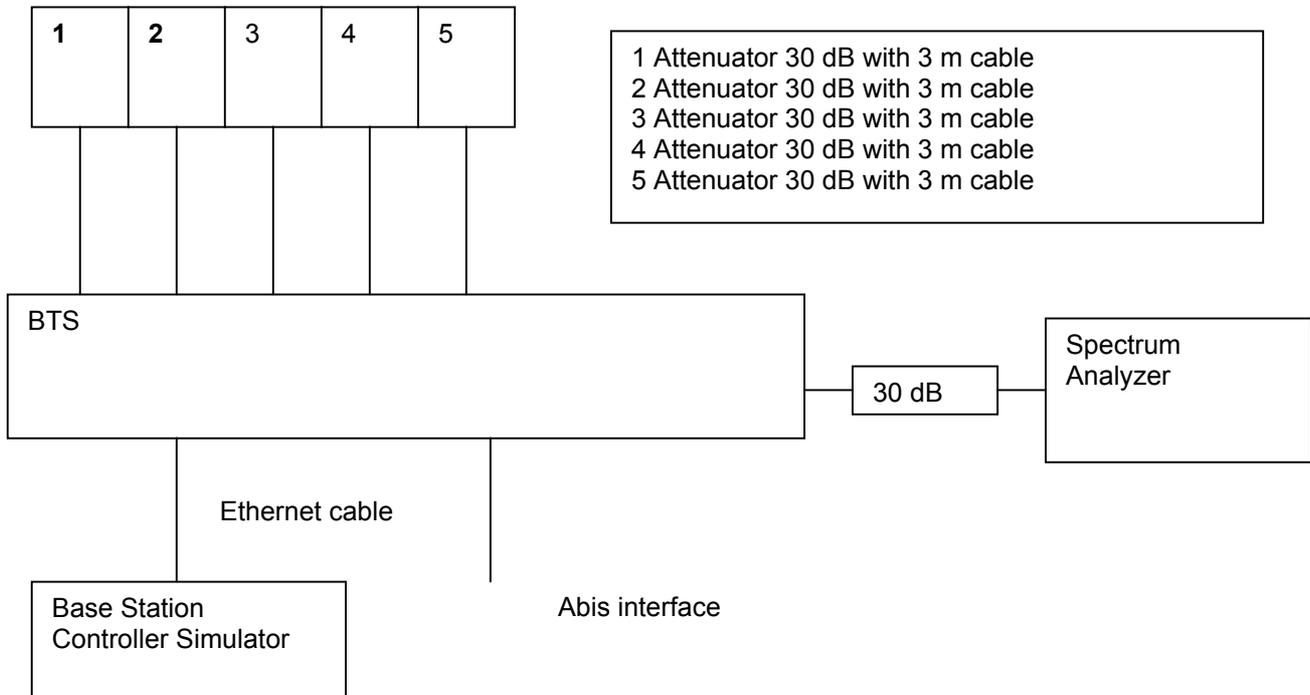
The OBW, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured under the following conditions as applicable:

(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): 20 kHz (Resolution bandwidth)
Video bandwidth (VBW): 200 kHz

Test Set-up



6.3.4. Measurement Results

TEST CONDITIONS		Occupied Bandwidth					
		Channel 1 872.34 MHz				Channel 2 874.80 MHz	
		Measured (MHz)	Limit	Measured (MHz)	Limit	Measured (MHz)	Limit
T _{nom} (23.5 °C)	V _{nom} (- 48 V)	1.2369	N/A	N/A	N/A	1.2350	N/A
Measurement uncertainty (dB)		Equipment			Requirement		
		0.2%					

6.3.4.1. Conclusion

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

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

6.3.4.2. Equipment List

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Spectrum analyzer	Agilent	E4440A PSA series	US40420781	17.07.2002
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	15	18.09.2003
Cable	Diverse	RG58-U	n.a	Before test

6.4. Spurious Emission at Antenna Terminal

6.4.1. Test Conditions

Preconditioning:	1 hour
Nominal Output Power:	43 dBm
Measured at:	Combiner Output
Ambient temperature:	23.5°C
Relative humidity:	55 %
Power Supply:	-48 VDC
Date of Testing:	18.07.2002

6.4.2. Test Specifications and Limits

6.4.2.1. Specification

CFR 47 (FCC) part 2.1051 and part 22.917

Supporting Standards:

- EIA/TIA-603-A: 1992 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)
EIA/TIA -95B-1999 Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)

6.4.2.2. Limits

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

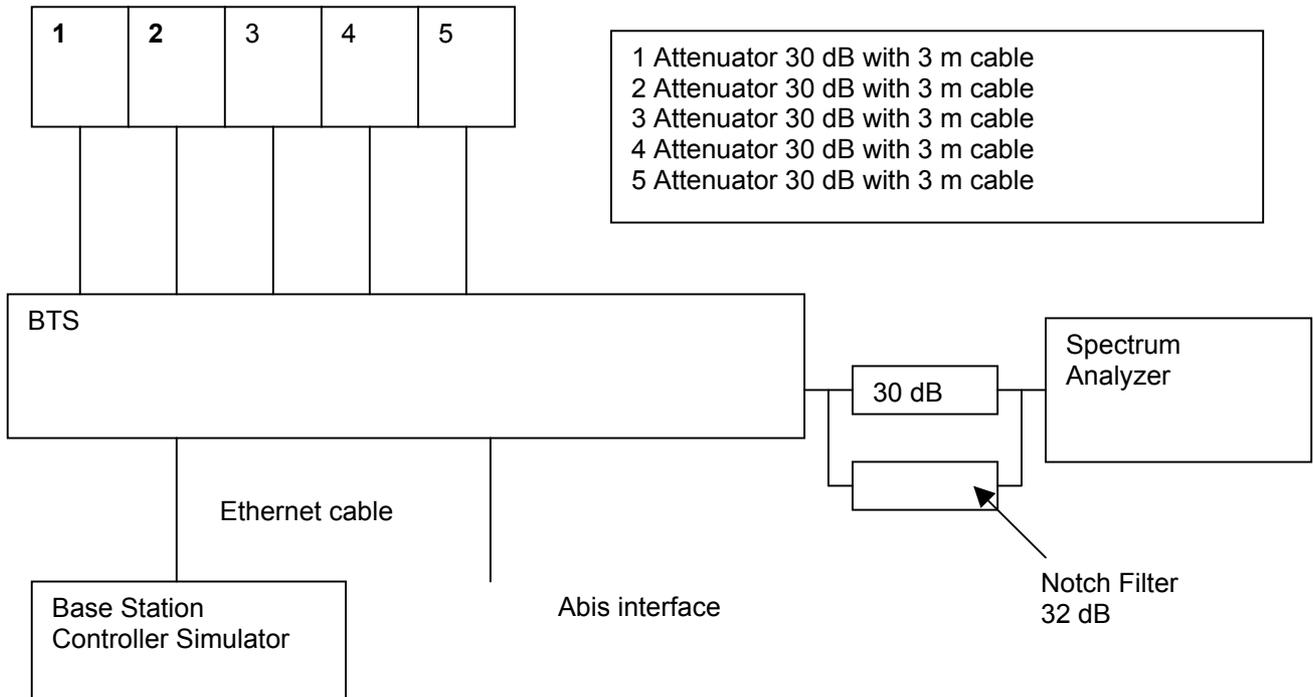
Rated Power:	43 dBm
Required attenuation:	$43 + 10 \log_{10} (20) = 56$, 43 dBm – 56 dB
Absolute level	- 13 dBm

6.4.3. Test Method and Setup

The BTSC simulator controls the CDMA base station. Every antenna port is connected to an artificial 50-Ohm load. The BTS operates two channels at a time.

Measurement bandwidth (RBW) for up to 1 MHz adjacent to carrier:	30 kHz
Measurement bandwidth (RBW) for 150 kHz up to 30 MHz:	30 kHz
Measurement bandwidth (RBW) for 30 MHz up to 1 GHz	100 kHz
Measurement bandwidth (RBW) for all others frequencies above 1 GHz	1 MHz

Test Set up



6.4.4. Measurement Results at Band Edges

Frequency of Band edge [MHz]	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
869	43	- 38.77	- 13 dBm	Pass
870.92	43	- 21.73	- 13 dBm	Pass
890	43	- 38.57	- 13 dBm	Pass
876.6	43	- 18.46	- 13 dBm	Pass

6.4.5. Measurement Results outside Band Edges

Frequency	Power [dBm]	Spurious Level measured [dBm]	FCC limit	Result
150 kHz	43	-83.13	- 13 dBm	Pass
15.08 MHz	43	- 89.97	- 13 dBm	Pass
49.4 MHz	43	- 84.38	- 13 dBm	Pass
1.180 GHz	43	- 73.67	- 13 dBm	Pass
2.620 GHz	43	- 55.56	- 13 dBm	Pass
7.045 GHz	43	- 69.57	- 13 dBm	Pass
8.770 GHz	43	- 70.47	- 13 dBm	Pass

6.4.5.1. Conclusion

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

For the measurement results refer to appendix D with 8 pages.

6.4.5.2. Equipment List

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Spectrum analyzer	Agilent	E4440A PSA series	US40420781	17.07.2002
Attenuator	Shanghai Huaxiang	DTS100	15	18.09.2003
Notch Filter	Wainwright	WRCF869/894- 859/904-85/14EE	1	19.03.2003
Cable	Huber&Suhner	RG58U	--	Before test

6.5. Field Strength of Spurious Radiation

6.5.1. Test Conditions

Preconditioning:	0.5 hour
Nominal Output Power:	43 dBm
Measured at:	Combiner Output
Ambient temperature:	22 °C
Relative humidity:	55 %
Power Supply:	-48 VDC
Date of testing:	18.07.2002

6.5.2. Test Specifications and Limits

6.5.2.1. Specification

CFR 47 (FCC) part 2.1053 and part 22.917 (e)

Supporting Standards:

EIA/TIA-603-A: 1992	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)
EIA/TIA -95B-1999	Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)

6.5.2.2. Limits

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

Rated Power:	43 dBm
Required attenuation:	$43 + 10 \log_{10} (20W) = 56 \text{ dB}$
Absolute level	$43 \text{ dBm} - 56 \text{ dB} = -13 \text{ dBm}$

6.5.3. Test Method and Setup

(a) Measurements was 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 2.989(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 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.

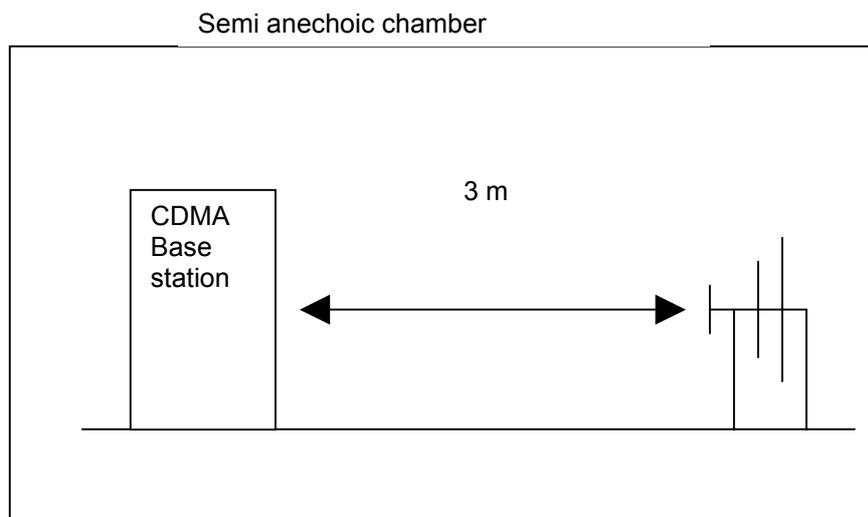
(b) Measurements specified in paragraph (a) of this section shall be made for the following equipment:

- (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.

The BTSC simulator controls the CDMA base station. Every antenna port is connected to an artificial 50-Ohm load. The BTS operates two channels at a time.

Measurement bandwidth: 30 MHz – 1000 MHz: 120 kHz
Measurement bandwidth: 1 GHz – 10 GHz: 1 MHz

Test set up



6.5.4. Measurement Results

Frequency in [MHz]	Spurious Emission measurement reading In [dBm]	Signal Generator Level [dBm]	Cable loss [dB]	Antenna gain [dBd]	Effective Power ERP [in dBm]	Power in [dBc]	Spurious Emission Limits [dBm]
1774.68 H	-41.25	- 40 dBm	3 dB	6.85	- 36.15	79.15	-13 dBm
1774.68 V	-41.86	-40 dBm	3 dB	6.85	- 36.15	79.15	-13 dBm

Measurement Uncertainty: +/- 6 dB

6.5.4.1. Conclusion

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

For the measurement results refer to appendix E with 28 pages.

6.5.4.2. Equipment List

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Spectrum analyser	R&S	FSIQ7 1119.5005.17	839594/034	13.07.2002
Test Receiver Display Unit	R&S	ESMI 804.8932.52	829214/011	13.07.2002
Test Receiver RF Unit	R&S	ESMI 1032.5640.53	829550/008	13.07.2002
BiLog Antenna	Schaffner	CBL 6111B	2536	13.07.2003
Pre-Amplifier	Agilent	83017A	3950M00246	16.10.2002
Horn Antenna	R&S	HF901 4044.4507.02	359287/005	17.07.2002
Attenuator	HP	8491A (3dB)	36239	Calibrated with setup
Horn Antenna	R&S	HF901 4044.4507.02	359287/006	13.07.2002
Notch Filter	Wainwright	WRCF869/894-859/904-85/14EE	1	19.03.2003
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	15	18.09.2003

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Attenuator	Shanghai Huaxiang	DTS100 (30dB)	30	18.09.2003
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	73	18.09.2003
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	27	18.09.2003
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	12	18.09.2003
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	18	18.09.2003

6.6. Frequency Stability

6.6.1. Test Conditions

Preconditioning:	1 hour
Nominal Output Power:	-43 dBm
Measured at:	Combiner Output
Ambient temperature:	See below
Relative humidity:	55 % at 20 °C
Power Supply:	-48 VDC
Date of Testing:	22.07.2002 – 23.07.2002

6.6.2. Test Specifications and Limits

CFR 47 (FCC) part 2.1055 and part 22.355

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-A: 1992	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)
EIA/TIA -95B-1999	Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)

6.6.3. 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

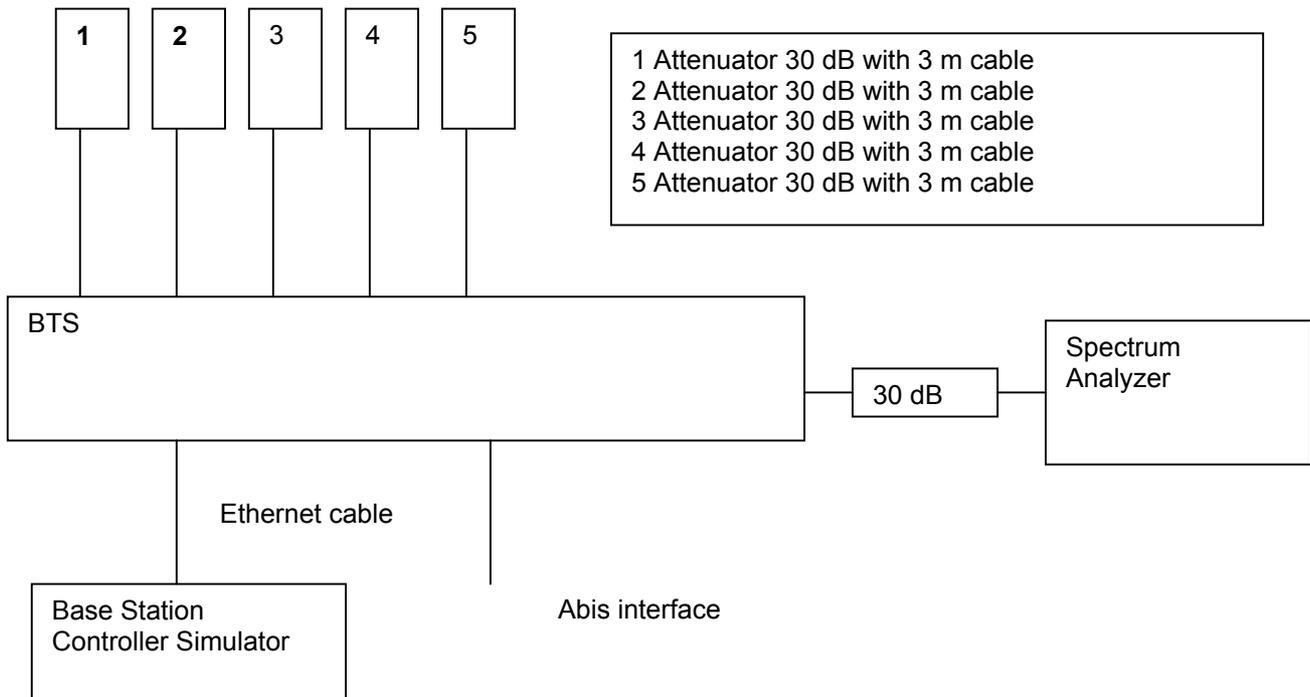
(b) Frequency measurements shall be made at the extremes of the specified temperature range and at intervals of not more than 10o centigrade through the range. A period of time sufficient to stabilize all of the components of the oscillator circuit at each temperature level shall be allowed prior to 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

Measurement Bandwidth: 30 kHz



6.6.4. Measurement Results vs. Variation of Temperature

Temperature	Power (dBm)	Nominal Frequency	Measured Frequency Error	Result
-30 °C	43	874.8 MHz	15.8 Hz	Pass
-20 °C	43	874.8 MHz	8.9 Hz	Pass
-10 °C	43	874.8 MHz	1.3 Hz	Pass
0 °C	43	874.8 MHz	- 9.1 Hz	Pass
+10 °C	43	874.8 MHz	4.7 Hz	Pass
+20 °C	43	874.8 MHz	- 1.2 Hz	Pass
+30 °C	43	874.8 MHz	- 1.2 Hz	Pass
+40 °C	43	874.8 MHz	14.7 Hz	Pass
+50 °C	43	874.8 MHz	19.6 Hz	Pass

6.6.5. Measurement Results vs. Variation of Voltage

Voltage	Power (dBm)	Nominal Frequency	Measured Frequency Error	Result
- 40.8 V	43	874.8 MHz	3.1 Hz	Pass
- 48 V	43	874.8 MHz	- 8.5 Hz	Pass
- 55.2 V	43	874.8 MHz	- 29.4 Hz	Pass

6.6.5.1. Conclusion

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

For the measurement results refer to appendix F with 8 pages.

6.6.5.2. Equipment List

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
Spectrum Analyzer	Agilent/HP	HP8935 E6380A	GB40421057	17.07.2002
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	15	18.09.2003
Cable	Diverse	RG58-U	n.a	Before test
Climatic Chamber	Weiss	SB2/1500/80	207036	10.11.2002

6.7. Conducted Emission at Power Supply Terminal Port

6.7.1. Test Conditions

Preconditioning:	0.5 hour
Nominal Output Power:	43 dBm
Measured at:	Combiner Output
Ambient temperature:	21 °C
Relative humidity:	55 %
Power Supply:	-48 VDC
Date of Testing:	18.07.2002

6.7.2. Test Specifications and Limits

6.7.2.1. Specification

CFR 47 (FCC) part 15.207

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-A: 1992	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)
EIA/TIA -95B-1999	Mobile Station-Base Station Compatibility Standard for Wideband Spread Spectrum Cellular Systems (ANSI/TIA/EIA-95-B-99)

6.7.2.2. Limits

Compliance with 15.207 requires that all spurious emission must be below the specified limits in clause 15.207.

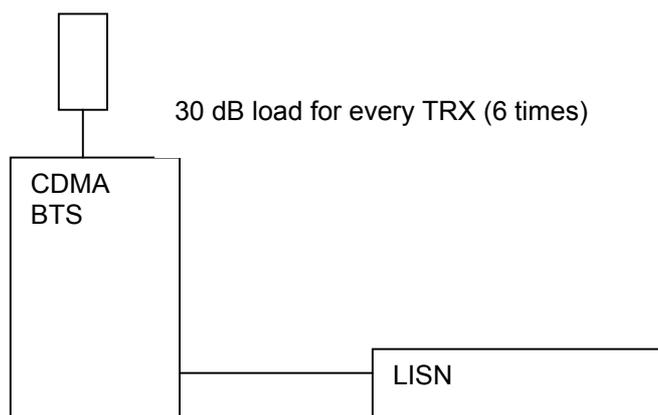
Frequency Range:	Limit
450 kHz – 30 MHz	250 μ V
450 kHz – 30 MHz	47.9 dB μ V

6.7.3. Test Method and Setup

The CDMA BTS was setup in the anechoic chamber and operated under nominal conditions.

Measurement Bandwidth: 450 kHz – 30 MHz: 10 kHz

Test set up



6.7.4. Measurement Results

Frequency in [MHz]	Measured Conducted Emission [dB μ V]	Conducted Emission Limits [dB μ V]	Remarks
0.508500	37.80	48	QP
0.594000	34.90	48	QP
0.679500	38.70	48	QP
0.850500	37.00	48	QP
1.021500	36.20	48	QP
0.513000	38.80	48	AV
0.598500	34.20	48	AV
0.679500	38.60	48	AV
0.850500	36.80	48	AV
1.021500	35.40	48	AV
1.192500	32.80	48	AV

6.7.4.1. Conclusion

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

For the measurement results refer to appendix G with 4 pages.

6.7.4.2. Equipment List

Equipment Description	Manufacturer	Model	Serial Number	Calibrated until
LISN	Schwarzbeck	NNLK 8121	8121146	14.07.2002
Test Receiver	R&S	ESMI-DU 1032.5510.53 ESMI-RF 1032.5640.53	829214/011 829550/008	17.07.2002
Attenuator	Shanghai Huaxiang	DTS100 (30dB)	15	18.09.2003
Cable	Diverse	RG58-U	n.a	Before test

7. APPENDIXES

Appendix A	Measurement Results RF Output Power	3 pages
Appendix B	Measurement Results Modulation Characteristics	3 pages
Appendix C	Measurement Results Occupied Bandwidth	3 pages
Appendix D	Measurement Results Spurious Emission at Antenna Terminal	8 pages
Appendix E	Measurement Results Field Strength of Spurious Radiation	28 pages
Appendix F	Measurement Results Frequency Stability versus Temperature and Voltage	8 pages
Appendix G	Measurement Results Conducted Emission at Power Port	4 pages