



InterLab®

Final Report on

aGate GSM 32 VoIP

Report Reference: MDE_Teles_1001_FCCa
 FCC Part 22/24 Co-Location
Date: November 19, 2010

Test Laboratory:

7 layers AG
Borsigstr. 11
40880 Ratingen
Germany



Note:

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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Reference: MDE_Teles_1001_FCCa

FCC Part 22/24 Co-Location

1 Administrative Data

1.1 Project Data

Project Responsible: Patrick Lomax
Date Of Test Report: 2010/11/19
Date of first test: 2010/10/04
Date of last test: 2010/10/05

1.2 Applicant Data

Company Name: Teles AG
Informationstechnologien
Street: Ernst-Reuter-Platz 8
City: 10587 Berlin
Country: Germany

Contact Person: Mr. Martin Herrscher
Function: Product Line Manager
Phone: +49 30 39928 1778
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E-Mail: m.herrscher@teles.de

1.3 Test Laboratory Data

The following list shows all places and laboratories involved for test result generation:

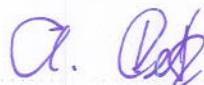
7 layers DE

Company Name : 7 layers AG
Street : Borsigstrasse 11
City : 40880 Ratingen
Country : Germany
Contact Person : Mr. Michael Albert
Phone : +49 2102 749 201
Fax : +49 2102 749 444
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Laboratory Details

<i>Lab ID</i>	<i>Identification</i>	<i>Responsible</i>	<i>Accreditation Info</i>
Lab 1	Radiated Emissions	Mr. Robert Machulec Mr. Andreas Petz	DAR-Registration no. DGA-PL-192/99-02
Lab 2	Radio Lab	Mr. Robert Machulec Mr. Andreas Petz	DAR-Registration no. DGA-PL-192/99-02

1.4 Signature of the Testing Responsible

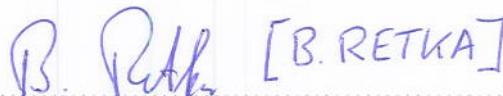


Andreas Petz

responsible for tests performed in: Lab 1, Lab 2

7 layers AG, Borsigstr. 11
40880 Ratingen, Germany
Phone +49 (0)2102 749 0

1.5 Signature of the Accreditation Responsible



Accreditation scope responsible person

responsible for Lab 1, Lab 2

2 Test Object Data

2.1 General OUT Description

The following section lists all OUTs (Object's Under Test) involved during testing.

OUT: aGate

Type / Model / Family:

aGate GSM 32 VoIP

Parameter List:

Parameter name	Value
AC Power Supply	120 (V)

2.2 Detailed Description of OUT Samples

Sample : A01

OUT Identifier	aGate
Sample Description	GSM Gateway, 2 antenna solution
Serial No.	TAG39010348325795
SW Status	15.02
Date of Receipt	2010/10/04
Nominal Voltage	120 V
	Normal Temp.
	20 °C

2.3 OUT Features

Features for OUT: aGate		Allowed Values	Supported Value(s)
Designation	Description		
Features for scope: FCC_v2			
AC	The OUT is powered by or connected to AC Mains		
Eant	removable antenna supplied and type tested with the radio equipment, designed as an indispensable part of the equipment		
GSM850	EUT supports GSM850 band 824MHz - 849MHz		
PantC	permanent fixed antenna connector, which may be built-in, designed as an indispensable part of the equipment		
PCS1900	EUT supports PCS1900 band 1850MHz - 1910MHz		

2.4 Auxiliary Equipment

AE No.	Type Designation	Serial No.	HW Status	SW Status	Description
AE 001	GSM Antenna	001			Antenna #1
AE 002	GSM Antenna	002			Antenna #2

2.5 Operating Mode(s)

Ref.-No.	Description
1	Call established on TCH190 (836,6MHz) Module1 and on TCH195 (837,6MHz) with Module 0. Modules are in colocation.
2	Call established on TCH661 (1880,0MHz) Module1 and on TCH666 (1881,0MHz) with Module0. Modules are in colocation.
3	Call established on TCH190 (836,6MHz) Module16 and on TCH661 (1880,0MHz) with Module0. Modules are in colocation

2.6 Setups used for Testing

For each setup a relation is given to determine if and which samples and auxiliary equipment is used. The left side list all OUT samples and the right side lists all auxiliary equipment for the given setup.

Setup No.	List of OUT samples		List of auxiliary equipment	
	Sample No.	Sample Description	AE No.	AE Description
A01 (1 Antenna setup)				
	Sample: A01	GSM Gateway, 2 antenna solution	AE 001	Antenna #1
A02 (2 Antenna setup)				
	Sample: A01	GSM Gateway, 2 antenna solution	AE 001	Antenna #1
			AE 002	Antenna #2

3 Results

3.1 General

Documentation of tested devices:

Available at the test laboratory.

Interpretation of the test results:

The results of the inspection are described on the following pages, where 'Conformity' or 'Passed' means that the certification criteria were verified and that the tested device is conform to the applied standard.

In cases where 'Declaration' is printed, the required documents are available in the manufacturers product documentation.

In cases where 'not applicable' is printed, the test case requirements are not relevant to the specific equipment implementation.

3.2 List of Test Specification

*Test Specification:***FCC part 2 and 22***Date / Version*

2009/03/26 Version: 10-1-09 Edition

Title:

PART 2 - GENERAL RULES AND REGULATIONS

PART 22 - PUBLIC MOBILE SERVICES

*Test Specification:***FCC part 2 and 24***Date / Version*

2009/03/26 Version: 10-1-09 Edition

Title:

PART 2 - GENERAL RULES AND REGULATIONS

PART 24 - PERSONAL COMMUNICATIONS SERVICES



3.3 Summary

<i>Test Case Identifier / Name</i>	<i>Test (condition)</i>	<i>Cat</i>	<i>Result</i>	<i>Date of Test</i>	<i>Lab</i>	<i>Ref.</i>	<i>Setup</i>
Test Specification: FCC part 2 and 22							
22.1 RF Power Output §2.1046, §22.913							
22.1; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz, Method = conducted		-	Passed	2010/10/05	Lab 2	A01	
			module 0/3				
		-	Passed	2010/10/05	Lab 2	A01	
		-	Passed	2010/10/05	Lab 2	A01	
			module 2/3				
		-	Passed	2010/10/05	Lab 2	A01	
			module 3/3				
22.4 Field strength of spurious radiation §2.1053, §22.917							
22.4; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz		-	Passed	2010/10/04	Lab 1	A02	
			operating mode: 1				
			The test was performed int the frequency range 800MHz - 5GHz				
Test Specification: FCC part 2 and 24							
24.1 RF Power Output §2.1046, §24.232							
24.1; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz, Method = conducted		-	Passed	2010/10/05	Lab 2	A01	
		-	Passed	2010/10/05	Lab 2	A01	
		-	Passed	2010/10/05	Lab 2	A01	
			module 1/3				
		-	Passed	2010/10/05	Lab 2	A01	
24.4 Field strength of spurious radiation §2.1053, §24.238							
24.4; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz		-	Passed	2010/10/04	Lab 1	A02	
			operating mode: 2				
			The test was performed int the frequency range 1.8GHz - 10GHz				
		-	Passed	2010/10/04	Lab 1	A02	
			operating mode: 3				
			The test was performed int the frequency range 30MHz - 20GHz				

3.4 Detailed Results

3.4.1 22.1 RF Power Output §2.1046, §22.913

Test1: 22.1; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz, Method = conducted

Result: Passed
 module 0/3

Setup No.: A01

Date of Test: 2010/10/05 10:31

Body: NO BODY

Test Specification: FCC part 2 and 22

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	32.18	passed
average	maxhold	300	31.85	passed
rms	maxhold	300	31.85	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than
8.41 dBi

Test2: 22.1; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz, Method = conducted

Result: Passed

Setup No.: A01

Date of Test: 2010/10/05 10:26

Body: NO BODY

Test Specification: FCC part 2 and 22

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	32.37	passed
average	maxhold	300	32.00	passed
rms	maxhold	300	32.00	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than
8.22 dBi

**Test1: 22.1; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz, Method = conducted**

Result: Passed
module 2/3

Setup No.: A01

Date of Test: 2010/10/05 10:20

Body: NO BODY

Test Specification: FCC part 2 and 22

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	32.02	passed
average	maxhold	300	31.69	passed
rms	maxhold	300	31.68	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than

8.57 dBi

Test2: 22.1; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz, Method = conducted

Result: Passed
module 3/3

Setup No.: A01

Date of Test: 2010/10/05 10:12

Body: NO BODY

Test Specification: FCC part 2 and 22

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	31.96	passed
average	maxhold	300	31.60	passed
rms	maxhold	300	31.62	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than

8.63 dBi

3.4.2 22.4 Field strength of spurious radiation §2.1053, §22.917

Test: 22.4; Frequency Band = 850, Mode = GSM, Channel = 190, Frequency = 836.6MHz

Result: Passed
The test was performed int the frequency range 800MHz - 5GHz

Setup No.: A02

Date of Test: 2010/10/04 15:27

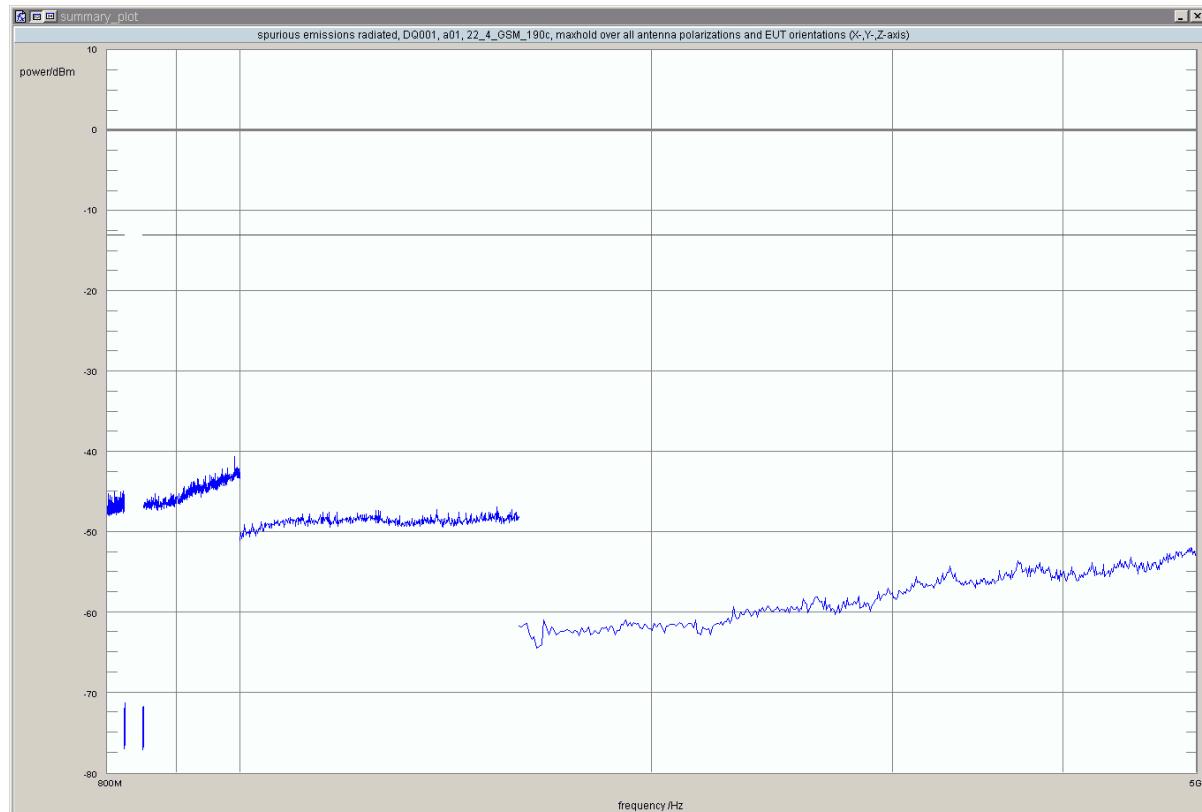
Body: FCC47CFRChIPART22PUBLIC MOBILE SERVICES

Test Specification: FCC part 2 and 22

Detailed Results:

detector	trace	resolution bandwidth /kHz	frequency /MHz	peak value /dBm	limit /dBm	margin to limit /dB	azimuth /°	antenna polarization	EUT orientation	verdict
peak	maxhold	1000	991.0	-40.60	-13.00	27.60	-90.0	horizontal	horizontal	passed

no further values have been found with a margin of less than 20 dB



Scan range based on worst case of parent device

3.4.3 24.1 RF Power Output §2.1046, §24.232

Test1: 24.1; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz, Method = conducted

Result: Passed
Setup No.: A01
Date of Test: 2010/10/05 11:07
Body: NO BODY
Test Specification: FCC part 2 and 24

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	28.15	passed
average	maxhold	300	27.79	passed
rms	maxhold	300	27.79	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than

4.85 dBi

Test2: 24.1; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz, Method = conducted

Result: Passed
Setup No.: A01
Date of Test: 2010/10/05 11:11
Body: NO BODY
Test Specification: FCC part 2 and 24

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	28.22	passed
average	maxhold	300	27.89	passed
rms	maxhold	300	27.91	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than

4.78 dBi

**Test1: 24.1; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz,
Method = conducted**

Result: Passed
module 1/3

Setup No.: A01

Date of Test: 2010/10/05 10:49

Body: NO BODY

Test Specification: FCC part 2 and 24

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	28.45	passed
average	maxhold	300	28.11	passed
rms	maxhold	300	28.11	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than

4.55 dBi

**Test2: 24.1; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz,
Method = conducted**

Result: Passed

Setup No.: A01

Date of Test: 2010/10/05 10:43

Body: NO BODY

Test Specification: FCC part 2 and 24

Detailed Results:

detector	trace	resolution bandwidth /kHz	conducted peak value /dBm	verdict
peak	maxhold	300	28.25	passed
average	maxhold	300	27.93	passed
rms	maxhold	300	27.93	passed

no external antenna gain is specified, the verdict is valid

for external antenna gains equal or less than

4.75 dBi

3.4.4 24.4 Field strength of spurious radiation §2.1053, §24.238

Test1: 24.4; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz

Result: Passed

The test was performed int the frequency range 1.8GHz - 10GHz

Setup No.: A02

Date of Test: 2010/10/04 15:29

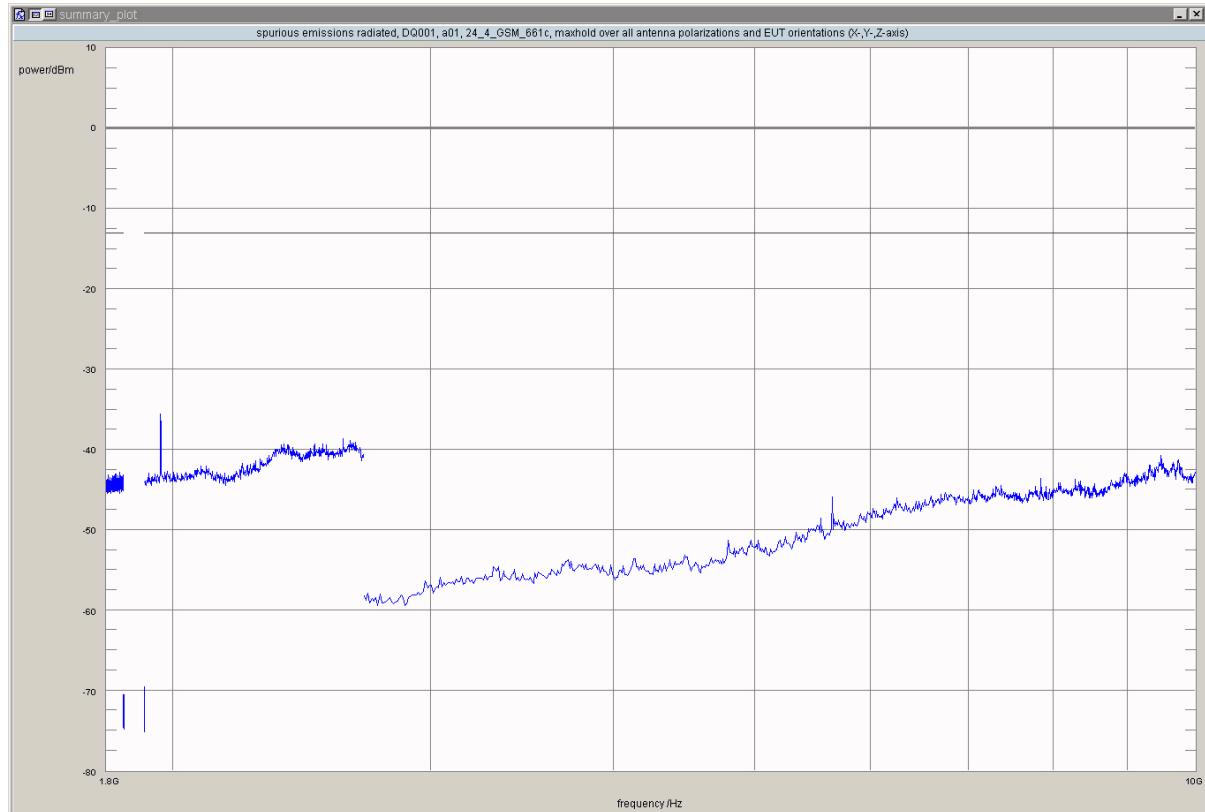
Body: FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES

Test Specification: FCC part 2 and 24

Detailed Results:

detector	trace	resolution bandwidth /kHz	frequency /MHz	peak value /dBm	limit /dBm	margin to limit /dB	azimuth /°	antenna polarization	EUT orientation	verdict
peak	maxhold	1000	1960.0	-35.58	-13.00	22.58	135.0	horizontal	horizontal	passed

no further values have been found with a margin of less than 20 dB



Scan range based on worst case of parent device

Test1: 24.4; Frequency Band = 1900, Mode = GSM, Channel = 661, Frequency = 1880.0MHz

Result:

Passed

The test was performed int the frequency range 30MHz - 20GHz

Setup No.:

A02

Date of Test:

2010/10/04 14:30

Body:

FCC47CFRChIPART24PERSONAL COMMUNICATIONS SERVICES

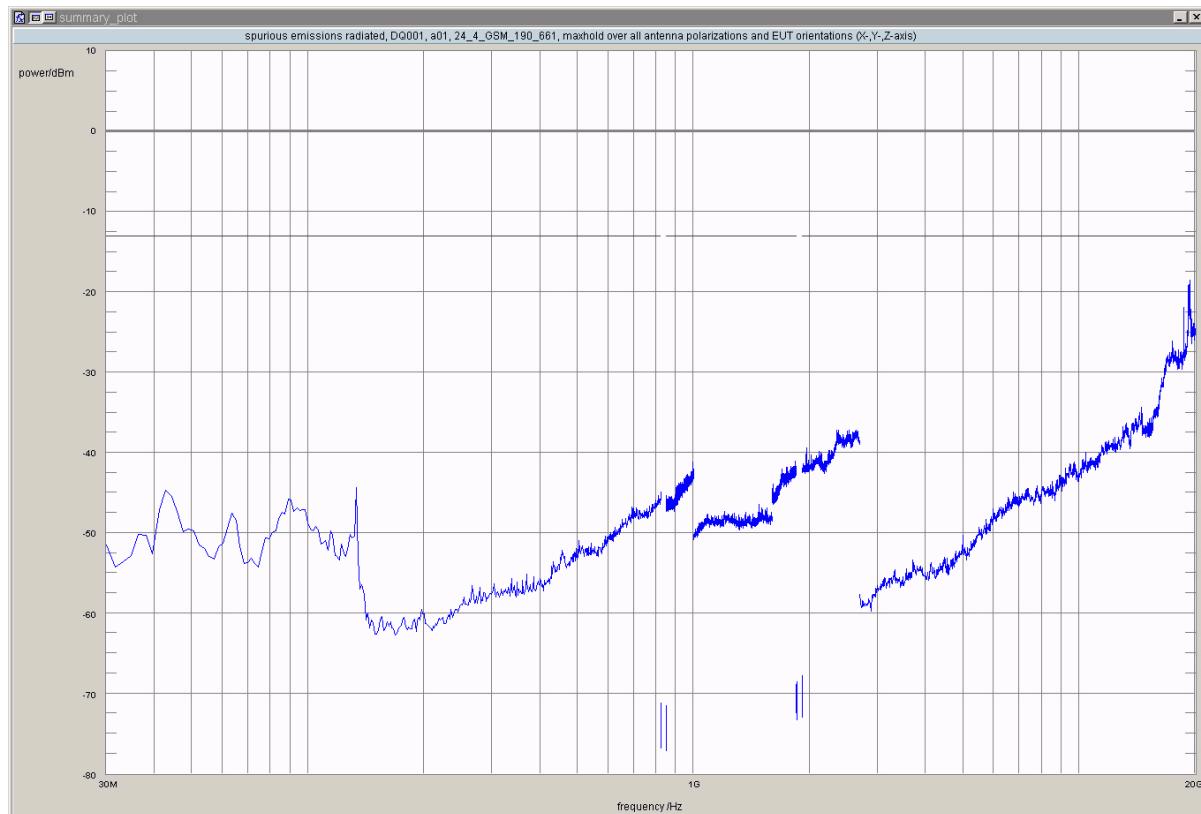
Test Specification:

FCC part 2 and 24

Detailed Results:

detector	trace	resolution bandwidth /kHz	frequency /MHz	peak value /dBm	limit /dBm	margin to limit /dB	azimuth /°	antenna polarization	EUT orientation	verdict
peak	maxhold	1000	18653.3	-21.92	-13.00	8.92	0.0	vertical	horizontal	passed
peak	maxhold	1000	19214.4	-19.18	-13.00	6.18	-90.0	vertical	horizontal	passed
peak	maxhold	1000	19312.6	-19.58	-13.00	6.58	135.0	vertical	horizontal	passed
peak	maxhold	1000	19326.7	-18.51	-13.00	5.51	45.0	horizontal	horizontal	passed

no further values have been found with a margin of less than 20 dB



4 Test Equipment Details

4.1 List of Used Test Equipment

The calibration, hardware and software states are shown for the testing period.

Test Equipment Anechoic Chamber

Lab ID:	Lab 1	Calibration Details	Last Execution	Next Exec.
Manufacturer:	Frankonia			
Description:	Anechoic Chamber for radiated testing			
Type:	10.58x6.38x6			
		IC renewal	2009/01/21	2011/01/20
		FCC renewal	2009/01/07	2011/01/06

Single Devices for Anechoic Chamber

Single Device Name	Type	Serial Number	Manufacturer
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6.00 m ³	none	Frankonia
	Calibration Details		Last Execution Next Exec.
	FCC listing 96716 3m Part15/18		2009/01/07 2011/01/06
	ANSI C64.3 NSA		2009/01/21 2011/01/20
Controller Maturo	MCU	961208	Maturo GmbH
EMC camera	CE-CAM/1	-	CE-SYS
EMC camera Nr.2	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter Universal 1A	BB4312-C30-H3	-	Siemens&Matsushita

Test Equipment Auxiliary Equipment for Radiated emissions

Lab ID: Lab 1
Description: Equipment for emission measurements
Serial Number: see single devices

Single Devices for Auxiliary Equipment for Radiated emissions

Single Device Name	Type	Serial Number	Manufacturer	
Antenna mast	AS 620 P		HD GmbH	
Biconical dipole	VUBA 9117 <i>Calibration Details</i>	9117108	Schwarzbeck <i>Last Execution</i>	<i>Next Exec.</i>
	Standard Calibration		2008/10/27	2013/10/26
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P <i>Calibration Details</i>	849785	Miteq <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4 <i>Calibration Details</i>	-	Miteq <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P <i>Calibration Details</i>	896037	Miteq <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
Cable "ESI to EMI Antenna"	EcoFlex10 <i>Calibration Details</i>	W18.01- 2+W38.01-2	Kabel Kusch <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
Cable "ESI to Horn Antenna"	UFB311A+UFB293C <i>Calibration Details</i>	W18.02- 2+W38.02-2	Rosenberger Micro-Coax <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
Double-ridged horn	HF 906 <i>Calibration Details</i>	357357/001	Rohde & Schwarz GmbH & Co. KG <i>Last Execution</i>	<i>Next Exec.</i>
	Standard Calibration		2009/04/16	2012/04/15
Double-ridged horn	HF 906 <i>Calibration Details</i>	357357/002	Rohde & Schwarz GmbH & Co. KG <i>Last Execution</i>	<i>Next Exec.</i>
	Standard Calibration		2009/04/28	2012/04/27
Dreheinheit	DE 325		HD GmbH	
High Pass Filter	4HC1600/12750-1.5-KK <i>Calibration Details</i>	9942011	Trilithic <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
High Pass Filter	5HC2700/12750-1.5-KK <i>Calibration Details</i>	9942012	Trilithic <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
High Pass Filter	5HC3500/12750-1.2-KK <i>Calibration Details</i>	200035008	Trilithic <i>Last Execution</i>	<i>Next Exec.</i>
	Path Calibration		2010/05/10	2010/11/09
Log.-per. Antenna	HL 562 Ultralog <i>Calibration Details</i>	830547/003	Rohde & Schwarz GmbH & Co. KG <i>Last Execution</i>	<i>Next Exec.</i>



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Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	Type	Serial Number	Manufacturer
	Standard Calibration		2009/05/27 2012/05/26
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	DKD calibration		2008/10/07 2011/10/06
Network Analyzer	E5071B	MY42200813	Agilent
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Clibration		2008/11/06 2010/11/06
	Standard Calibration		2009/11/11 2010/11/11
Pyramidal Horn Antenna 26,5 GHz	3160-09	00083069	EMCO Elektronik GmbH
Pyramidal Horn Antenna 40 GHz	3160-10	00086675	EMCO Elektronik GmbH

Test Equipment Auxiliary Test Equipment

Lab ID: Lab 1, Lab 2
Manufacturer: see single devices
Description: Single Devices for various Test Equipment
Type: various
Serial Number: none

Single Devices for Auxiliary Test Equipment

Single Device Name	Type	Serial Number	Manufacturer
AC Power Source	Chroma 6404	64040001304	Chroma ATE INC.
Broadband Power Divider N (Aux)	1506A / 93459	LM390	Weinschel Associates
Broadband Power Divider SMA	WA1515	A855	Weinschel Associates
Digital Multimeter 01 (Multimeter)	Voltcraft M-3860M	IJ096055	Conrad Electronics
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2009/10/07 2011/10/06
Digital Oscilloscope [SA2] (Aux)	TDS 784C	B021311	Tektronix GmbH
Fibre optic link Satellite (Aux)	FO RS232 Link	181-018	Pontis
Fibre optic link Transceiver (Aux)	FO RS232 Link	182-018	Pontis
Isolating Transformer	LTS 604	1888	Thalheimer Transformatorenwerke GmbH
Notch Filter Ultra Stable (Aux)	WRCA800/960-6EEK	24	Wainwright
Spectrum Analyser	FSP3	836722/011	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	DKD calibration		2008/10/06 2011/10/05
Vector Signal Generator	SMIQ B3	832492/061	

Test Equipment Digital Signalling Devices

Lab ID: **Lab 1, Lab 2**
Description: Signalling equipment for various wireless technologies.

Single Devices for Digital Signalling Devices

Single Device Name	Type	Serial Number	Manufacturer
Bluetooth Signalling Unit CBT	CBT	100589	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard Calibration		2008/08/14 2011/08/13
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2008/10/07 2010/10/06
Digital Radio Test Set	6103E	2359	Racal Instruments, Ltd.
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2009/02/16 2012/02/15
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	Hardware: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B56V14, B68 3v04, PCMCIA, U65V04		2007/07/16
	Software: K21 4v21, K22 4v21, K23 4v21, K24 4v21, K42 4v21, K43 4v21, K53 4v21, K56 4v22, K57 4v22, K58 4v22, K59 4v22, K61 4v22, K62 4v22, K63 4v22, K64 4v22, K65 4v22, K66 4v22, K67 4v22, K68 4v22, K69 4v22		
	Firmware: μP1 8v50 02.05.06		

Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2008/12/01 2011/11/30
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	HW options: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02		2007/01/02
	SW options: K21 4v11, K22 4v11, K23 4v11, K24 4v11, K27 4v10, K28 4v10, K42 4v11, K43 4v11, K53 4v10, K65 4v10, K66 4v10, K68 4v10,		
	Firmware: μP1 8v40 01.12.05		

	SW: K62, K69		2008/11/03
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2008/10/28 2011/10/27



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Test Equipment Emission measurement devices

Lab ID: **Lab 1**
Description: Equipment for emission measurements
Serial Number: see single devices

Single Devices for Emission measurement devices

Single Device Name	Type	Serial Number	Manufacturer
Personal Computer	Dell	30304832059	Dell
Signal Generator	SMR 20	846834/008	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard Calibration		2007/12/05 2010/12/04
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	Standard Calibration:		2007/12/05 2010/12/04
	The device is not used for absolute measurements. A power meter (calibration interval is one year) is used for measurements of absolute power values. Therefore the interval for the signal generator is set to three years according to manufacturer recommendation.		
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard Calibration		2009/12/03 2011/12/02

Test Equipment Radio Lab Test Equipment
Lab ID:
Lab 2

Description:

Radio Lab Test Equipment

Single Devices for Radio Lab Test Equipment

Single Device Name	Type	Serial Number	Manufacturer
Broadband Power Divider SMA	WA1515	A856	Weinschel Associates
Coax Attenuator 10dB SMA 2W	4T-10	F9401	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3702	Weinschel Associates
Coax Attenuator 10dB SMA 2W	56-10	W3711	Weinschel Associates
Coax Cable Huber&Suhner	Sucotest 2,0m		Rosenberger Micro-Coax
Coax Cable Rosenberger Micro Coax FA210A0010003030 SMA/SMA 1,0m	FA210A0010003030	54491-2	Rosenberger Micro-Coax
Power Sensor	NRV-Z1	836219/005	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard Calibration		2009/10/20 2011/10/19
Powermeter	NRVS	836333/064	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2009/10/15 2011/10/14
RF Step Attenuator RSP	RSP	833695/001	Rohde & Schwarz GmbH & Co.KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard Calibration		2008/06/18 2011/06/17
Rubidium Frequency Standard	Datum, Model: MFL	2689/001	Datum-Beverly
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2010/06/23 2011/06/22
Signal Generator	SMY02	829309/018	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	standard calibration		2008/10/07 2011/10/06
Signal Generator SMP	SMP02	836402/008	Rohde & Schwarz GmbH & Co. KG
Spectrum Analyser	FSIQ26	840061/005	Rohde & Schwarz GmbH & Co. KG
Temperature Chamber Vötsch 05	VT 4002	58566080550010	Vötsch
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Specific calibration		2010/03/16 2011/03/15
Vector Signal Generator	SMIQ 03B	837747/020	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard/DKD Calibration		2008/10/09 2011/10/08



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4.2 Laboratory Environmental Conditions

<i>Laboratory</i>	<i>Date</i>	<i>Temperature</i>	<i>Humidity</i>	<i>Air Pressure</i>
Lab 1	2010/10/04	26 °C	42 %	1014 hPa
Lab 2	2010/10/05	24 °C	45 %	1000 hPa

5 Annex

5.1 Additional Information for OUT Description

General product description:

The Equipment Under Test (EUT) is a GSM 850/900/1800/1900 gateway.

In GSM 850 mode the EUT operates in channel blocks A and B from 824,2 MHz (lowest channel = 128) to 848,8 MHz (highest channel = 251).

In PCS1900 mode the EUT operates in blocks A through F from 1850,2 MHz (lowest channel = 512) to 1909,8 MHz (highest channel = 810).

Specific product description for the EUT:

The Equipment Under Test (EUT) is a 19" case which can be mounted to e.g. a standard 19" rack. Radiated spurious emissions are performed for a fixed horizontal EUT mounting position.

The EUT incorporates a Mainboard which is supplied by the internal AC/DC converter of EUT. Up to 8 GSM Cards can be inserted which are controlled and powered via the Mainboard. On each GSM Card are mounted 4 GSM Modules. Each GSM Module (max. 32 pcs.) is equipped with a permanent short RF cable.

These GSM feeder lines are routed to a 4-to-1-combiner and via a RF cable to another 4-to-1-combiner so that at least max. 16 GSM Modules are using 1 external antenna, totally all 32 GSM Modules are using 2 external antennas.

Both antennas are arranged on a ground plane (for the tests: the top side cover of the housing) and have a distance to each other of approx. 0.2 m.

For the tests 1 or 2 antennas are selected as representative configuration.

The EUT is a variant of the one previously tested while the RF paths are changed and the combiners, which have already been in place, are now used in order to reduce the number of external antennas.

The EUT provides the following ports:

Ports

Enclosure

Antenna (external)

Antenna connector

AC Mains

LAN (2 connectors)

PRI (E1/T1, 2 connectors)

Photos are declared as confidential Please refer to report "MDE_Teles_1001_FCC_Photo".



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5.2 Additional Information for Report

Technical Report Summary

Type of Authorization :

Certification for a GSM cellular radiotelephone device

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 0 to 69. The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

§ 2.1053 Measurement required: Field strength of spurious radiation

§ 2.1055 Measurement required: Frequency stability

§ 2.1057 Frequency spectrum to be investigated

Part 22, Subpart C – Operational and Technical Requirements

§ 22.355 Frequency tolerance

Part 22, Subpart H – Cellular Radiotelephone Service

§ 22.913 Effective radiated power limits

§ 22.917 Emission limitations for cellular equipment

Part 24, Subpart E - Broadband PCS

§ 24.232 Power and antenna height limits

§ 24.235 Frequency stability

§ 24.236 Field strength limits

§ 24.238 Emission limitations for Broadband PCS equipment

additional documents

ANSI TIA-603-C-2004

Description of Methods of Measurements

Field strength of spurious radiation

Standard FCC Part 22, Subpart H and FCC Part 24, Subpart E

The test was performed according to: FCC §2.1053

Test Description

1) The EUT was placed inside an anechoic chamber. Refer to chapter "Setup Drawings". The EUT was coupled to a Digital Communication Tester which was located outside the chamber via a small signalling antenna.

2) A call was established on a Traffic Channel between the EUT and the Digital Communication Tester.

Important Settings:

- Output Power: Maximum

- Channel: please refer to the detailed results

3) A pre-calibration procedure is used so that the readings from the spectrum analyser are corrected and represent directly the equivalent radiated power (related to a lambda/2 dipole).

4) All spurious radiation measurements were made with spectrum analyser and the appropriate calibrated antennas for the frequency range of 30 MHz to 10 GHz (up to the 10th harmonic of the transmit frequency). The frequency range from 9 kHz to 30 MHz has been examined during the conducted spurious emission

measurements.

5) Important Analyser Settings

- [Resolution Bandwidth / Video Bandwidth]:

- a) [3 kHz / 10 kHz] in the Span of 1 MHz directly below and above the Band,
- b) [10 kHz / 30 kHz] in case the curve of the analyser IF-Filter leads to an exceeding of the limit, in this case a worst case correction factor of 20 dB (1 MHz -> 10 kHz) was used
- c) [1 MHz / 3 MHz] otherwise

- Sweep Time: depending on the transmitting signal, the span and the resolution bandwidth

- 6) The spurious emissions peaks were measured in both vertical and horizontal antenna polarization during the call is established on the lowest channel, mid channel and on the highest channel. To find the worst case peaks all orientations (X, Y, Z) of the EUT have been measured.

Test Requirements / Limits

§ 2.1053 Measurements required: Field strength of spurious radiation.

Measurements shall be made to detect spurious emissions that may be radiated directly from the cabinet, control circuits, power leads, or intermediate circuit elements under normal conditions of installation and operation. Curves or equivalent data shall be 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 (c) of Sec. 2.1049, 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) measurements 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 reference to the rated power output of the transmitter, assuming all emissions are radiated from halfwave dipole antennas.

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

- (2) All equipment operating on frequencies higher than 25 MHz.

§ 2.1057 Frequency spectrum to be investigated.

(a) In all of the measurements set forth in Secs. 2.1051 and 2.1053, the spectrum shall be investigated from the lowest radio frequency signal generated in the equipment, without going below 9 kHz, up to at least the frequency shown below:

(1) If the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

(b) Particular attention should be paid to harmonics and subharmonics of the carrier frequency as well as to those frequencies removed from the carrier by multiples of the oscillator frequency. Radiation at the frequencies of multiplier stages should also be checked.

(c) The amplitude of spurious emissions which are attenuated more than 20 dB below the permissible value need not be reported.

(d) Unless otherwise specified, measurements above 40 GHz shall be performed using a minimum resolution bandwidth of 1 MHz.

§ 22.917 Emission limitations for cellular equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

This is calculated to be -13 dBm (effective radiated power) which corresponds to 84.6 dB μ V/m (field strength) in a distance of 3 m.

(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. In the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 100 kHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].

(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

§ 24.238 Emission limitations for Broadband PCS equipment

(a) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB. This is calculated to be -13 dBm (effective radiated power) which corresponds to $84.6 \text{ dB}\mu\text{V/m}$ (field strength) in a distance of 3 m.

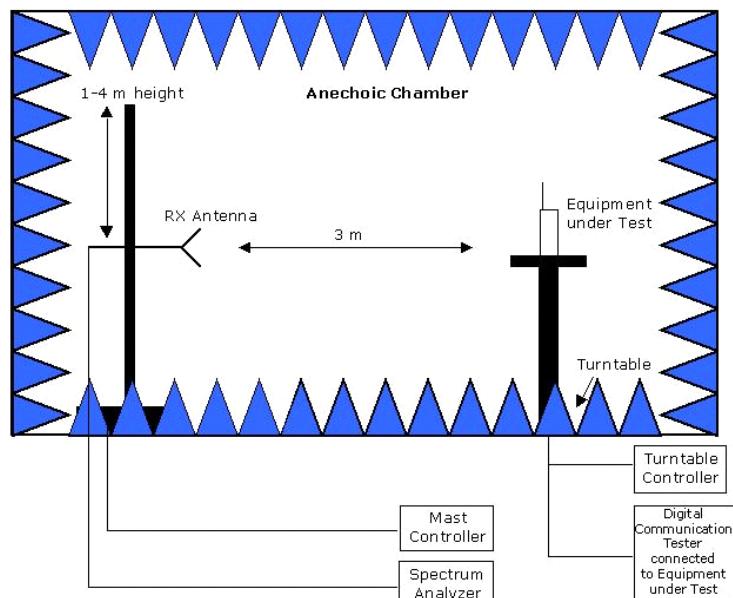
(b) Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

(c) Licensees in this service may establish an alternative out of band emission limit to be used at specified band edge(s) in specified geographical areas [...].

(d) If any emission from a transmitter operating in this service results in interference to users of another radio service, the FCC may require a greater attenuation of that emission than specified in this section.

For reporting only spurious emission levels reaching to the 20dB margin to limit were noted.

Setup Drawings



Remark: Depending on the frequency range suitable antenna types, attenuators or preamplifiers are used.

Principle set-up for radiated measurements

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