InterLab®

FCC Measurement/Technical Report on

GSM/UMTS PCMCIA Card

GlobeTrotter Express HSUPA E
GE0301

Report Reference: MDE_Opti_0702_FCCe1

Test Laboratory:

7 layers AG
Borsigstrasse 11
40880 Ratingen
Germany
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Deutscher Akkreditierungs Rat
DAR
DAT-P-192/99-01

CTIA Authorized Test Lab
LAB CODE 20011121-00

Table of Contents

0 Summary

0.1 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 19 and Parts 20 to 69 (10-1-06 Edition). The following subparts are applicable to the results in this test report.

Part 2
Subpart J - Equipment Authorization Procedures, Certification

§ 2.1046 Measurement required: RF power output

§ 2.1049 Measurement required: Occupied bandwidth

§ 2.1051 Measurement required: Spurious emissions at antenna terminals

§ 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

Subpart H – Cellular Radiotelephone Service

§ 22.913 Effective radiated power limits

§ 22.917 Emission limitations for cellular equipment

Summary Test

The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.

0.2 Measurement Summary

RF Power Output			
The measurement was performed according to FCC §2.1046			10-1-06
OP-Mode	**Setup**	**Port**	**Final Result**
op-mode 1	Setup_a04	antenna connector	passed
op-mode 2	Setup_a04	antenna connector	passed
op-mode 3	Setup_a04	antenna connector	passed
op-mode 4	Setup_a04	antenna connector	passed
op-mode 5	Setup_a04	antenna connector	passed
op-mode 6	Setup_a04	antenna connector	passed

Frequency stability			
The measurement was performed according to FCC §2.1055			10-1-06
OP-Mode	**Setup**	**Port**	**Final Result**
			N/P

Spurious emissions at antenna terminals			
The measurement was performed according to FCC §2.1051			10-1-06
OP-Mode	**Setup**	**Port**	**Final Result**
			N/P

Field strength of spurious radiation			
The measurement was performed according to FCC §2.1053			10-1-06
OP-Mode	**Setup**	**Port**	**Final Result**
			N/P

Emission and Occupied Bandwidth			
The measurement was performed according to FCC §2.1049			10-1-06
OP-Mode	**Setup**	**Port**	**Final Result**
			N/P

Band edge compliance			
The measurement was performed according to FCC §2.1053			10-1-06
OP-Mode	**Setup**	**Port**	**Final Result**
op-mode 1	Setup_a04	antenna connector	passed
op-mode 3	Setup_a04	antenna connector	passed
op-mode 4	Setup_a04	antenna connector	passed
op-mode 6	Setup_a04	antenna connector	passed

N/P: not performed

The test cases were selected on customers demand to demonstrate compliance of the HSUPA operating mode.

This test report replaces the 7 layers test report reference "MDE_Opti_0702_FCCe", dated 2007-04-19.

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

Responsible for Accreditation Scope: _____ Responsible for Test Report: _____

1 Administrative Data

1.1 Testing Laboratory

Company Name:	7 Layers AG
Address	Borsigstr. 11 40880 Ratingen Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716 .

The test facility is also accredited by the following accreditation organisation:

- Deutscher Akkreditierungs Rat	DAR-Registration no. DAT-P-192/99-01
Responsible for Accreditation Scope:	Dipl.-Ing. Bernhard Retka Dipl.-Ing. Robert Machulec Dipl.-Ing. Thomas Hoell
Report Template Version:	2006-12-18

1.2 Project Data

Responsible for testing and report:	Dipl.-Ing. Robert Machulec
Receipt of EUT:	See chapter 2.2
Date of Test(s):	2007-04-19
Date of Report:	2007-07-19

1.3 Applicant Data

Company Name:	Option NV
Address:	Gaston Geenslaan 14 3001 Leuven Belgium
Contact Person:	Mr. Lodeweyckx

1.4 Manufacturer Data

Company Name:	please see applicant data
Address:	
Contact Person:	

2 Testobject Data

2.1 General EUT Description

Equipment under Test:	GSM/UMTS PCMCIA Card
Type Designation:	GlobeTrotter Express HSUPA E, GE0301
Kind of Device:	GSM 850/900/1800/1900 + UTRA FDD I/II/V
(optional)	including HSDPA + HSUPA
Voltage Type:	DC
Nominal Voltage:	3.5 V
Maximum Voltage:	3.5 V
Minimum Voltage:	3.15 V

General product description:

The Equipment under Test (EUT) is a data card that supports GSM/EDGE 850/900/1800/1900 and FDD I, II and V with HSDPA and HSUPA.
The manufacturer declared that nominal voltage is equal to high voltage.

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).

The EUT provides the following ports:

Ports
antenna connector
enclosure

The main components of the EUT are listed and described in Chapter 2.2

2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status	Date of Receipt
EUT D (Code: 37230J09)	GlobeTrotter Express HSUPA E	GE0301	EE4473100N	4.0	2.2.2	2007-04-19

Remark: EUT is equipped with an integral antenna (gain= -2.11 dBD = 0.03 dBi –2.14) and a permanent antenna connector

NOTE: The short description is used to simplify the identification of the EUT in this test report.

2.3 Ancillary Equipment

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

Short Description	Equipment under Test	Type Designation	HW Status	SW Status	Serial no.	FCC ID
AE1	Test Cradle	BONZAI V2.0	–	–	–	–

2.4 EUT Setups

This chapter describes the combination of EUT's and ancillary equipment used for testing.

Setup No.	Combination of EUTs	Description
setup_a04	EUT D + AE1	setup for conducted tests

2.5 Operating Modes

This chapter describes the operating modes of the EUT's used for testing.

Op. Mode	Description of Operating Modes	Remarks
	FDD V data call	
op-mode 1	Call established on Traffic Channel (TCH) 4132, Carrier Frequency 826.4 MHz	4132 is the lowest channel FDD V data call
op-mode 2	Call established on Traffic Channel (TCH) 4183, Carrier Frequency 836.6 MHz	4183 is a mid channel FDD V data call
op-mode 3	Call established on Traffic Channel (TCH) 4233, Carrier Frequency 846.6 MHz	4233 is the highest channel FDD V data call
	FDD V data call HSUPA	
op-mode 4	Call established on Traffic Channel (TCH) 4132, Carrier Frequency 826.4 MHz	4132 is the lowest channel FDD V data call HSUPA
op-mode 5	Call established on Traffic Channel (TCH) 4183, Carrier Frequency 836.6 MHz	4183 is a mid channel FDD V data call HSUPA
op-mode 6	Call established on Traffic Channel (TCH) 4233, Carrier Frequency 846.6 MHz	4233 is the highest channel FDD V data call HSUPA

3 Test Results

3.1 RF Power Output

Standard FCC Part 22, 10-1-06
Subpart H

The test was performed according to: FCC §2.1046, 10-1-06

3.1.1 Test Description

1) The EUT was coupled to the R&S Spectrum Analyser and the R&S CMU200 Digital Communication Tester through a Power Divider. Refer to chapter "Setup Drawings".

2) The total insertion losses for RF Path 1 and RF Path 2 were measured. The values were used to correct the readings from the R&S Spectrum Analyser and the R&S CMU200 Digital Communication Tester.

3) A call was established on a Traffic Channel (TCH) between the EUT and the base station simulator (R&S CMU200 Digital Communication Tester).
Important Settings:
- Discontinuous Transmission: OFF
- Modulation Signal: PSR16-1 (Pseudo Random Sequence)
- Output Power: Varied during measurements
- Channel (Frequency): Varied during measurements

4) The transmitted power of the EUT was recorded for all possible power control level by using an internal measurement function of the CMU200.

5) During this test the Spectrum Analyser was only used to check if the results are comprehensible.

3.1.2 Test Requirements / Limits

§2.1046 Measurements Required: RF Power Output

(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 § 2.1033(c)(8). The electrical characteristics of the output terminals when this test is made shall be stated.

§22.913 Effective radiated power limits

(a) Maximum ERP. ... The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 Watts.

3.1.3 Test Protocol

Temperature: 25 °C
Air Pressure: 1020 hPa
Humidity: 33 %

Op. Mode	Setup	Port
op-mode 1	setup_a04	antenna connector

Power Class	Output power Nominal (dBm)	Output power Measured (dBm)	Difference dB
3	24	25.87	1.87

Remark: The ERP including antenna gain (-2.11 dBD = 0.03 dBi –2.14) is 23.76 dBm.

Op. Mode	Setup	Port
op-mode 2	setup_a04	antenna connector

Power Class	Output power Nominal (dBm)	Output power Measured (dBm)	Difference dB
3	24	25.84	1.84

Remark: The ERP including antenna gain (-2.11 dBD = 0.03 dBi –2.14) is 23.73 dBm.

Op. Mode	Setup	Port
op-mode 3	setup_a04	antenna connector

Power Class	Output power Nominal (dBm)	Output power Measured (dBm)	Difference dB
3	24	25.84	1.84

Remark: The ERP including antenna gain (-2.11 dBD = 0.03 dBi –2.14) is 23.73 dBm.

Op. Mode	Setup	Port
op-mode 4	setup_a04	antenna connector

Power Class	Output power Nominal (dBm)	Output power Measured (dBm)	Difference dB
3	24	26.09	2.09

Remark: The ERP including antenna gain (-2.11 dBD = 0.03 dBi –2.14) is 23.98 dBm.

Op. Mode	Setup	Port
op-mode 5	setup_a04	antenna connector

Power Class	Output power Nominal (dBm)	Output power Measured (dBm)	Difference dB
3	24	26.36	2.36

Remark: The ERP including antenna gain (-2.11 dBD = 0.03 dBi –2.14) is 24.25 dBm.

Op. Mode	Setup	Port
op-mode 6	setup_a04	antenna connector

Power Class	Output power Nominal (dBm)	Output power Measured (dBm)	Difference dB
3	24	25.60	1.60

Remark: The ERP including antenna gain (-2.11 dBD = 0.03 dBi –2.14) is 23.49 dBm.

3.1.4 Test result: RF Power Output

FCC Part 22, Subpart H	Op. Mode	Result
	op-mode 1	passed
	op-mode 2	passed
	op-mode 3	passed
	op-mode 4	passed
	op-mode 5	passed
	op-mode 6	passed

3.2 Band edge compliance

Standard FCC Part 22, 10-1-06
Subpart H

The test was performed according to: FCC §22.913, 10-1-06

3.2.1 Test Description

1) The EUT was coupled to the R&S CMU200 Digital Communications Tester via a 10 dB attenuator and a 6 dB coupler.
2) For the measurement the EUT is connected to the Spectrum Analyser via 30 dB attenuator and 6 dB coupler.
3) The spectrum analyser is set to a RBW/VBW of 3 kHz/3 kHz.

3.2.2 Test Requirements / Limits

§ 22.913 Effective radiated power limits

3.2.3 Test Protocol

Temperature: 25 °C
Air Pressure: 1020 hPa
Humidity: 33 %

Op. Mode	Setup	Port
op-mode 1	setup_a04	Antenna connector

Frequency MHz	Measured value dBm	Limit dBm
824	-16.16	-13

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 3	Setup_a04	Antenna connector

Frequency MHz	Measured value dBm	Limit dBm
849	-18.65	-13

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 4	Setup_a04	Antenna connector

Frequency MHz	Measured value dBm	Limit dBm
824	-16.47	-13

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 6	Setup_a04	Antenna connector

Frequency MHz	Measured value dBm	Limit dBm
849	-17.64	-13

Remark: Please see annex for the measurement plot.

3.2.4 Test result: Band edge compliance

FCC Part 22, Subpart H	Op. Mode	Result
	op-mode 1	passed
	op-mode 3	passed
	op-mode 4	passed
	op-mode 6	passed
	op-mode 7	passed
	op-mode 9	passed

4 Test Equipment

EUT Digital Signalling System

Equipment	Type	Serial No.	Manufacturer
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz
Signalling Unit for Bluetooth Spurious Emissions	PTW60	100004	Rohde & Schwarz
Universal Radio Communication Tester	CMU 200	102366	Rohde & Schwarz
3G Protocol test system	ANITE SAT (A) UE	Anite Baseband Processor ABP #4 0173 Anite Baseband Processor ABP #5 0175 Anite Baseband Processor ABP #6 0174 Anite Horizontal Combiner 0127 Agilent 8960 Series 10 digial radio test set GB44050547 Agilent 8960 Series 10 digial radio test set GB44050938 Agilent 8960 Series 10 digial radio test set GB44050939 Agilent 8960 Series 10 digial radio test set GB44050944 Agilent 8960 Series 10 digial radio test set GB44050964 Agilent 8960 Series 10 digial radio test set GB44050982	ANITE Telecoms Ltd

EMI Test System

Equipment	Type	Serial No.	Manufacturer
Comparison Noise Emitter	CNE III	99/016	York
EMI Analyzer	ESI 26	830482/004	Rohde & Schwarz
Signal Generator	SMR 20	846834/008	Rohde & Schwarz

EMI Radiated Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer
Antenna mast 4m	MA 240	240/492	HD GmbH H. Deisel
Biconical dipole	VUBA 9117	9117108	Schwarzbeck
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32	849785	Miteq
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35	896037	Miteq
Broadband Amplifier 45MHz-27GHz	JS4-00102600-42	619368	Miteq
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2 + W38.01-2	Kabel Kusch
Cable "ESI to Horn Antenna"	UFB311A + UFB293C	W18.02-2 + W38.02-2	Rosenberger-Microcoax
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic
KUEP pre amplifier	Kuep 00304000	001	7layers
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz
Pyramidal Horn Antenna 26.5 GHz	Model 3160-09	9910-1184	EMCO

EMI Conducted Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber+Suhner
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz

Auxiliary Test Equipment

Equipment	Type	Serial No.	Manufacturer
Broadband Resist. Power Divider N	1506A / 93459	LM390	Weinschel
Broadband Resist. Power Divider SMA	1515 / 93459	LN673	Weinschel
Digital Multimeter 01	Voltcraft M-3860M	IJ096055	Conrad
Digital Multimeter 02	Voltcraft M-3860M	IJ095955	Conrad
Digital Oscilloscope	TDS 784C	B021311	Tektronix
Fibre optic link Satellite	FO RS232 Link	181-018	Pontis
Fibre optic link Transceiver	FO RS232 Link	182-018	Pontis
I/Q Modulation Generator	AMIQ-B1	832085/018	Rohde & Schwarz
Notch Filter ultra stable	WRCA800/960-6E	24	Wainwright
Spectrum Analyzer 9 kHz to 3 GHz	FSP3	838164/004	Rohde & Schwarz
Temperature Chamber	VT 4002	58566002150010	Vötsch
Temperature Chamber	KWP 120/70	59226012190010	Weiss
ThermoHygro Datalogger 03	Opus10 THI (8152.00)	7482	Lufft Mess- und Regeltechnik GmbH

Anechoic Chamber

Equipment	Type	Serial No.	Manufacturer
Air Compressor (pneumatic)			Atlas Copco
Controller	CO 2000	CO2000/328/12470406 /L	Innco innovative constructions GmbH
EMC Camera	CE-CAM/1		CE-SYS
EMC Camera for observation of EUT	CCD-400E	0005033	Mitsubishi
Filter ISDN	B84312-C110-E1		Siemens&Matsushita
Filter telephone systems / modem	B84312-C40-B1		Siemens&Matsushita
Filter Universal 1A	B84312-C30-H3		Siemens&Matsushita
Fully/Semi AE Chamber	10.58x6.38x6		Frankonia
Turntable	DS 420S	420/573/99	HD GmbH, H. Deisel
Valve Control Unit (pneum.)	VE 615P	615/348/99	HD GmbH, H. Deisel

7 layers Bluetooth™ Full RF Test Solution

Bluetooth RF Conformance Test System TS8960

Equipment	Type	Serial No.	Manufacturer
10 MHz Reference	MFS	5489/001	Efratom
Power Meter 832025/059	NRVD	832025/059	Rohde & Schwarz
Power Sensor A 832279/013	NRV-Z1	832279/013	Rohde & Schwarz
Power Sensor B 832279/015	NRV-Z1	832279/015	Rohde & Schwarz
Power Supply	E3632A	MY40003776	Agilent
Power Supply	PS-2403D	-	Conrad
RF Step Attenuator 833695/001	RSP	833695/001	Rohde & Schwarz
Rubidium Frequency Normal	MFS	002	Efratom
Signal Analyzer FSIQ26 832695/007	FSIQ26	832695/007	Rohde & Schwarz
Signal Generator 833680/003	SMP 03	833680/003	Rohde & Schwarz
Signal Generator A 834344/002	SMIQ03B	834344/002	Rohde & Schwarz
Signal Generator B 832870/017	SMIQ03B	832870/017	Rohde & Schwarz
Signal Switching and Conditioning Unit	SSCU	338826/005	Rohde & Schwarz
Signalling Unit PTW60 838312/014	PTW60 for TS8960	838312/014	Rohde & Schwarz
System Controller 829323/008	PSM12	829323/008	Rohde & Schwarz

5 Photo Report

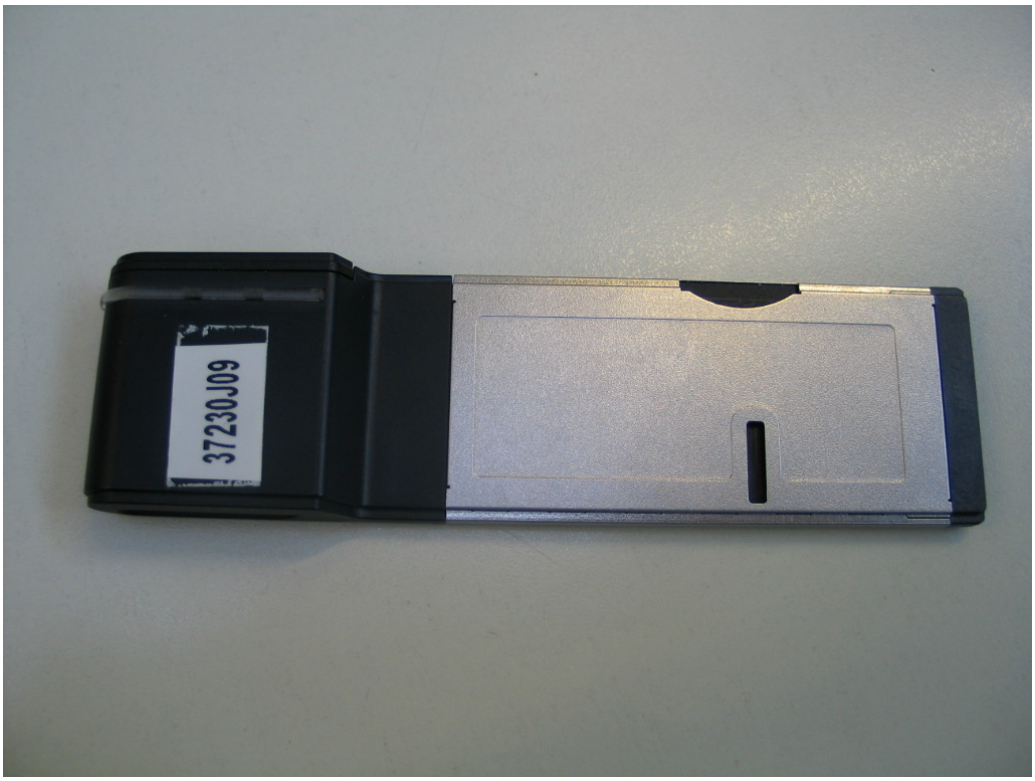


Photo 1: EUT (top side)

Photo 2: EUT (bottom side)

Photo 3: EUT (view to antenna connector)

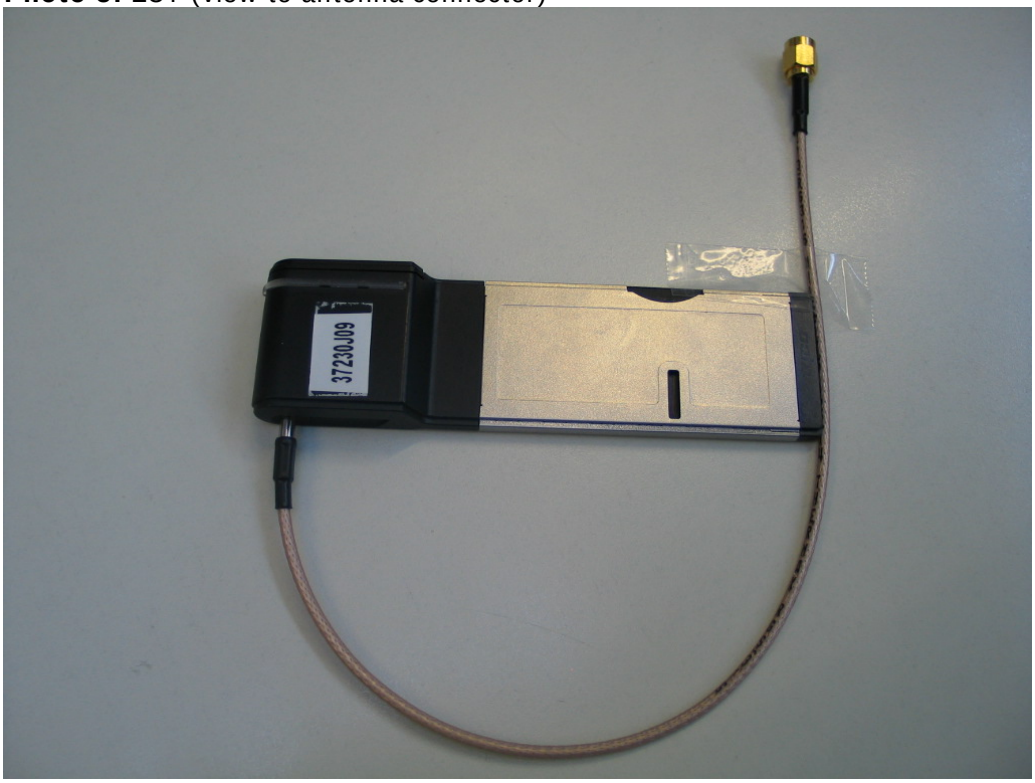
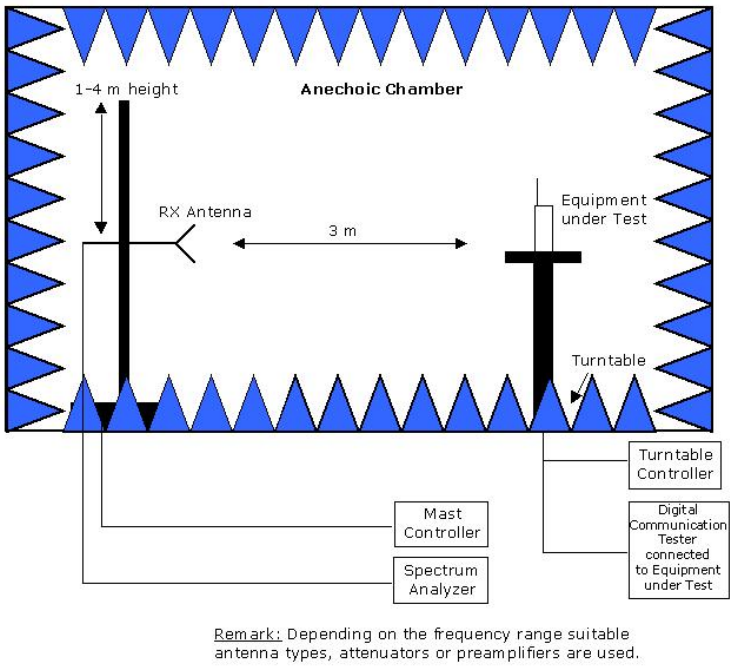
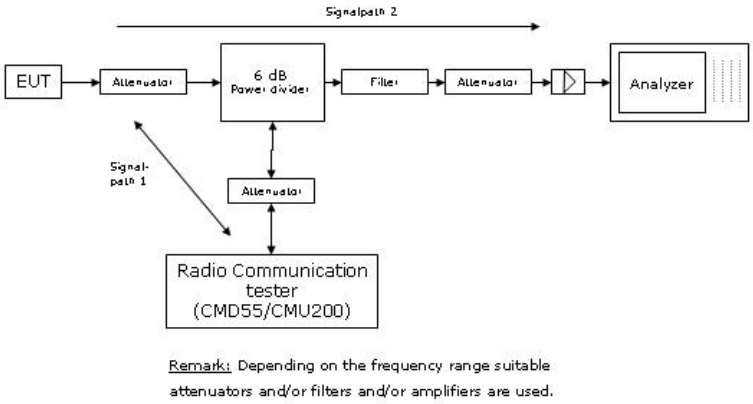


Photo 4: EUT (cable used for testing connected)

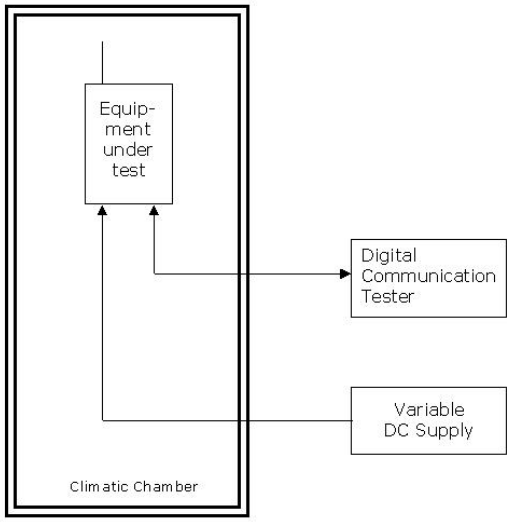
6 Setup Drawings



Drawing 1: Principle setup for radiated measurements.



Drawing 2: Principle setup for conducted measurements under nominal conditions



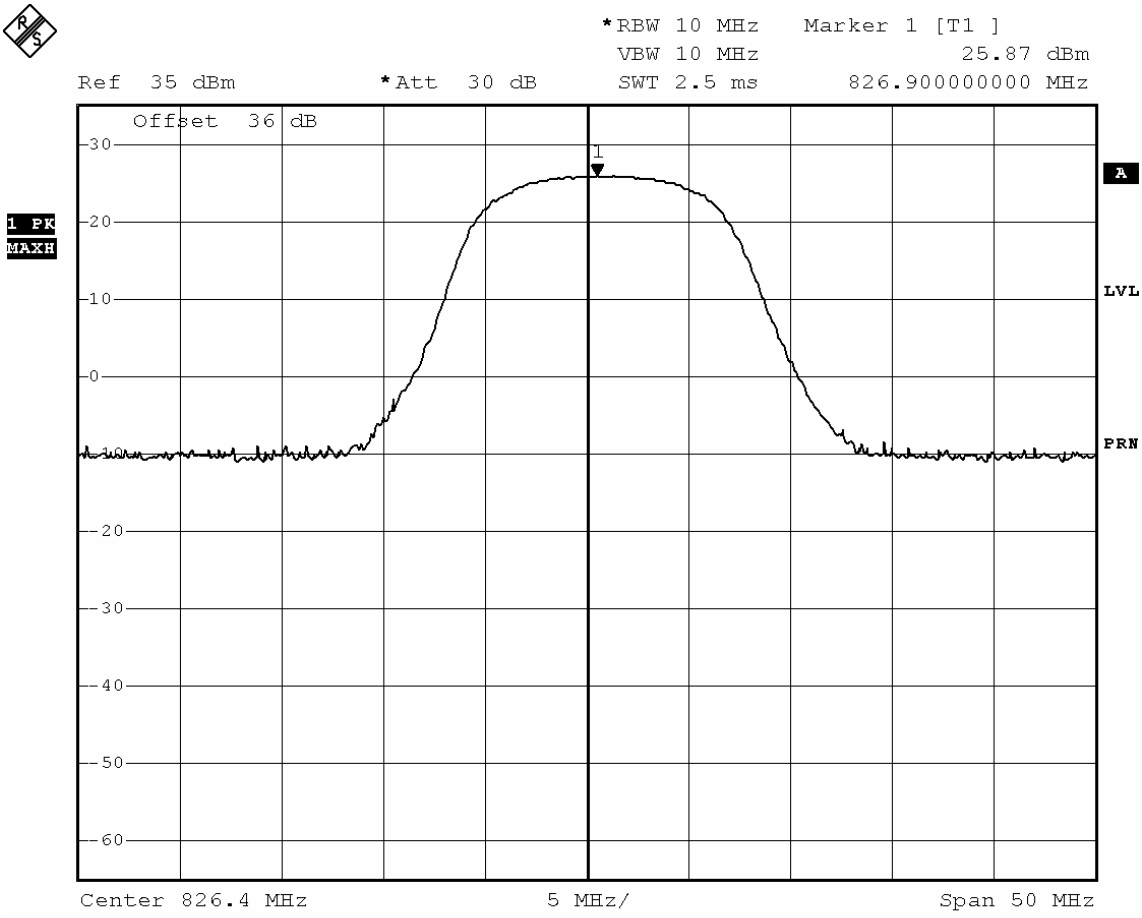
Drawing 3: Principle setup for tests under extreme test conditions

7 Annex

Measurement plots RF Power Output

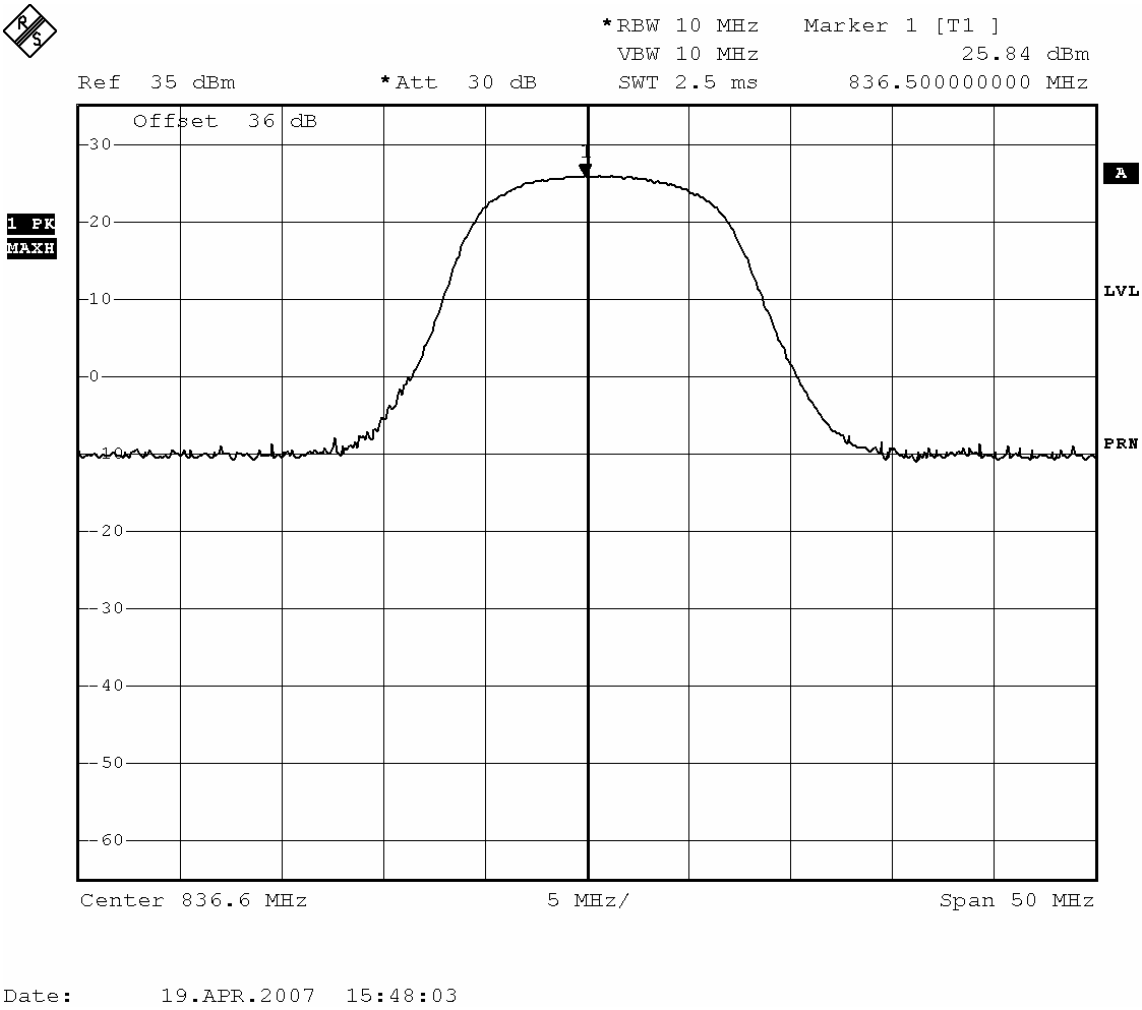
Op. Mode

op-mode 1



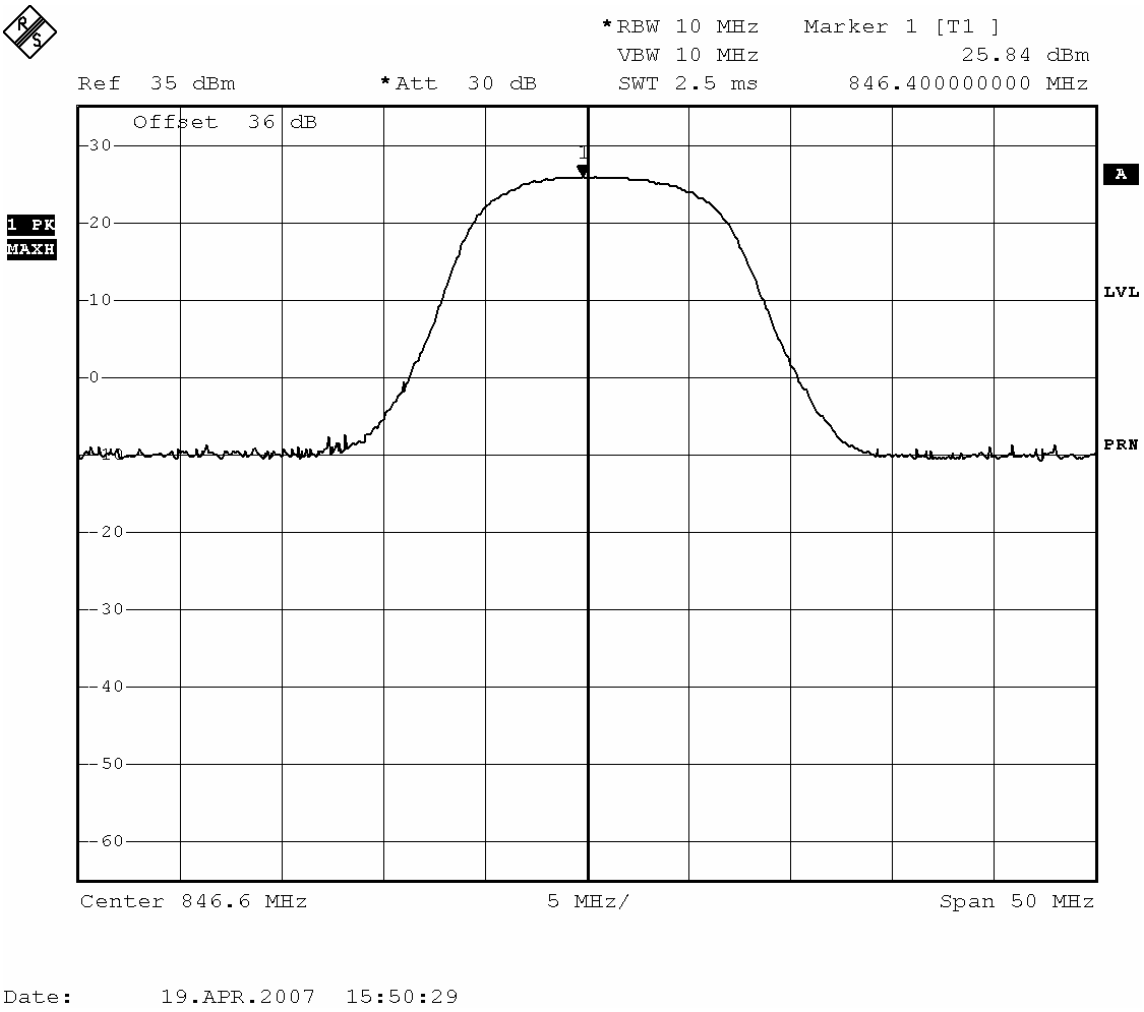
Op. Mode

op-mode 2



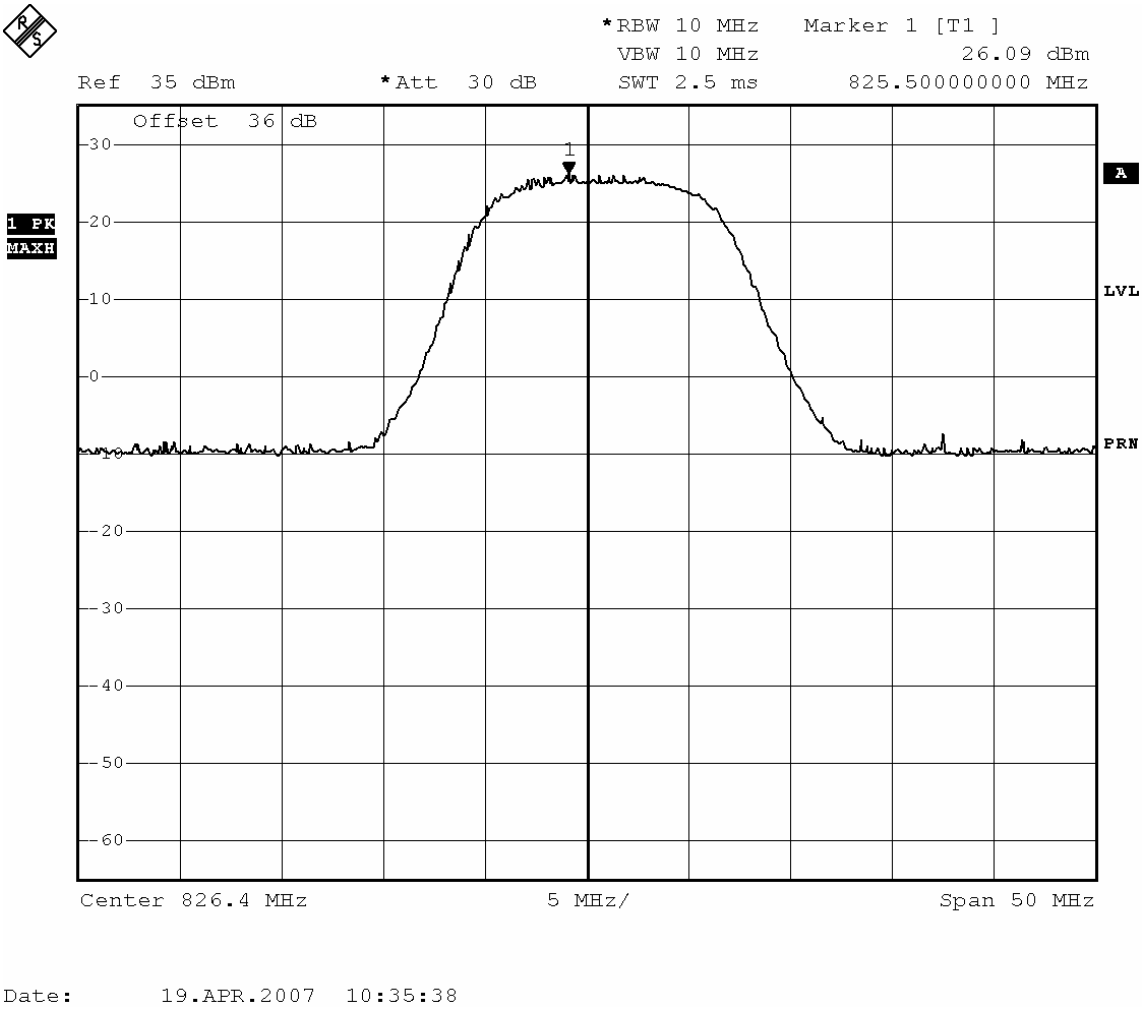
Op. Mode

op-mode 3



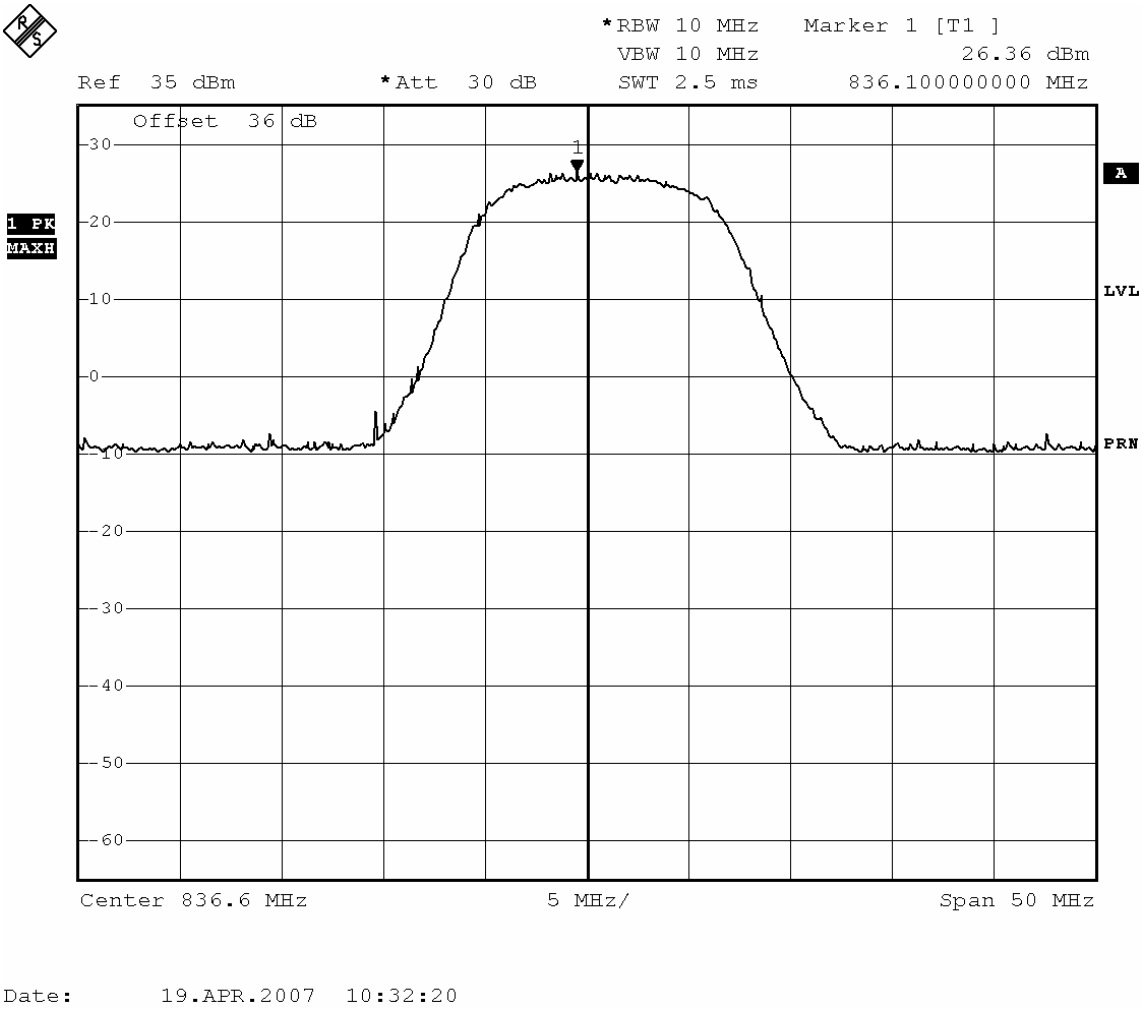
Op. Mode

op-mode 4



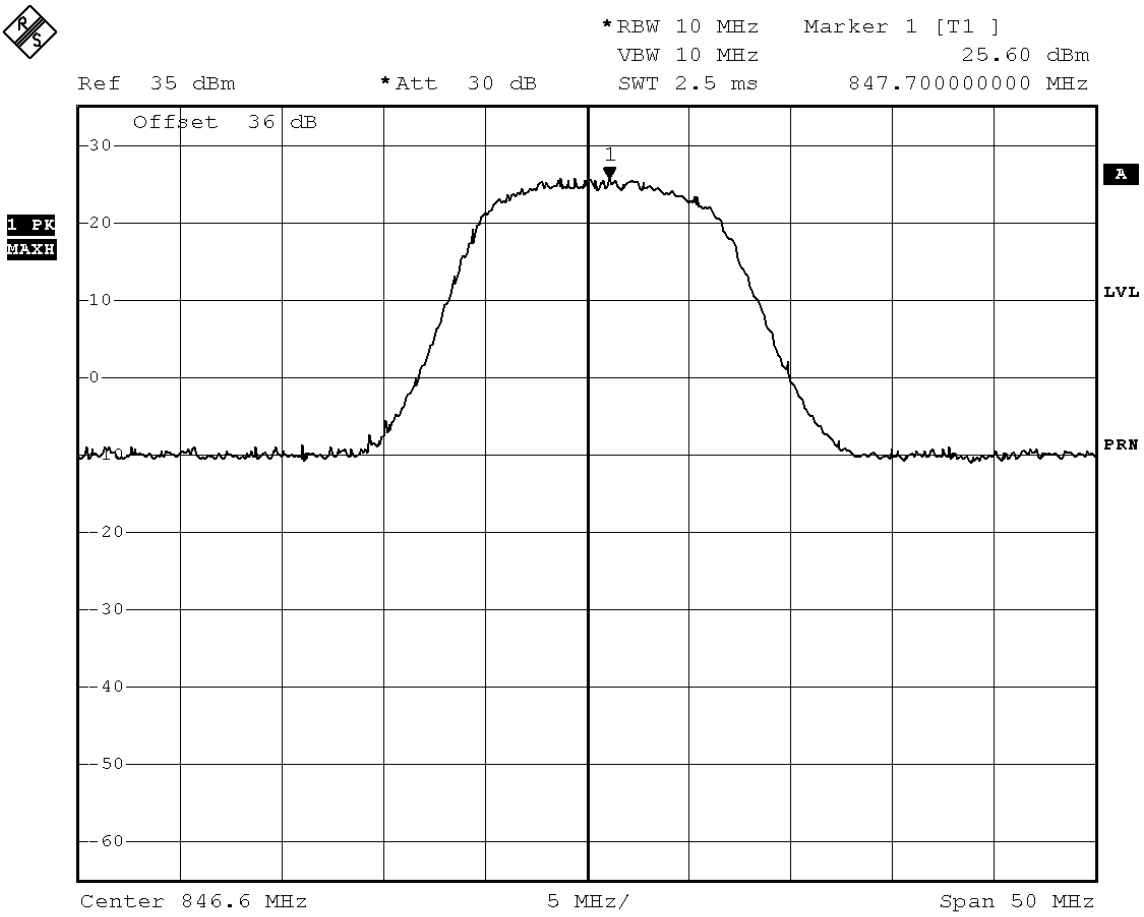
Op. Mode

op-mode 5



Op. Mode

op-mode 6



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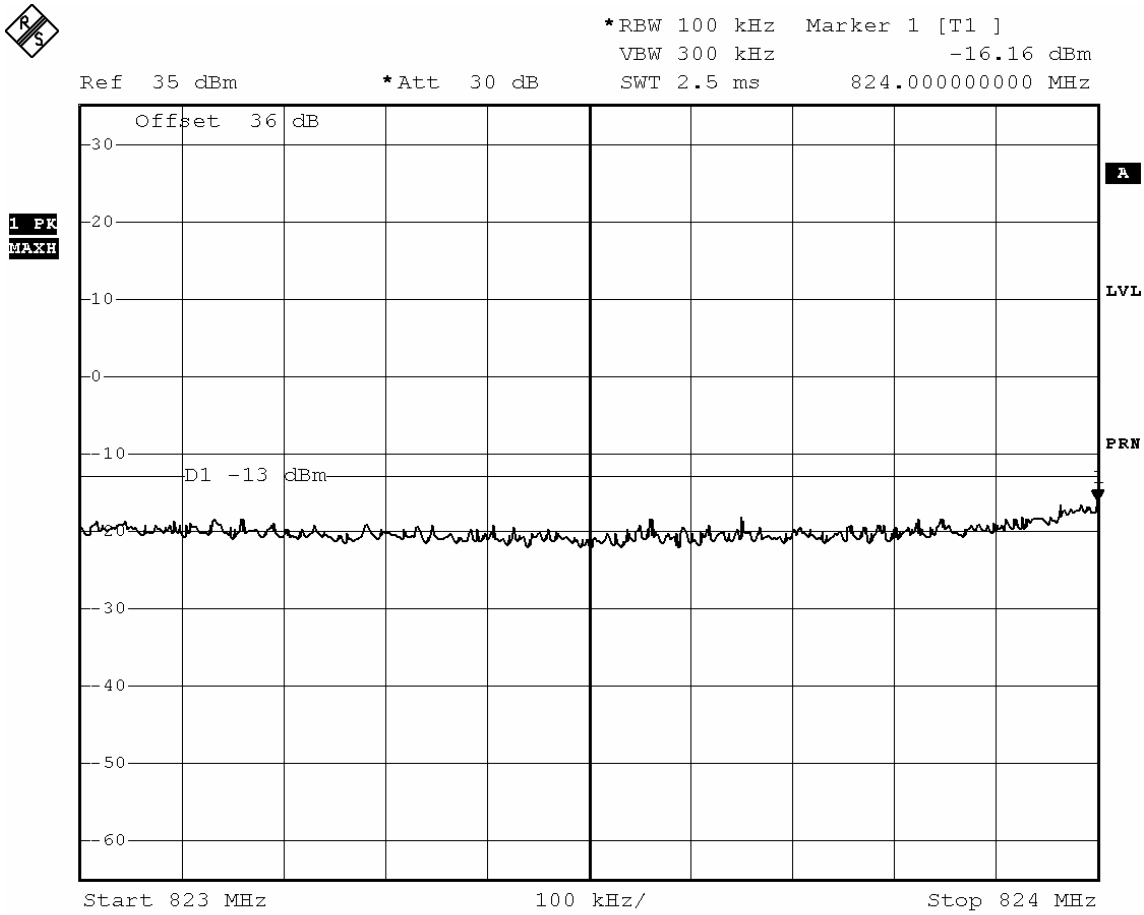
Measurement plots Band edge compliance

Op. Mode

op-mode 1



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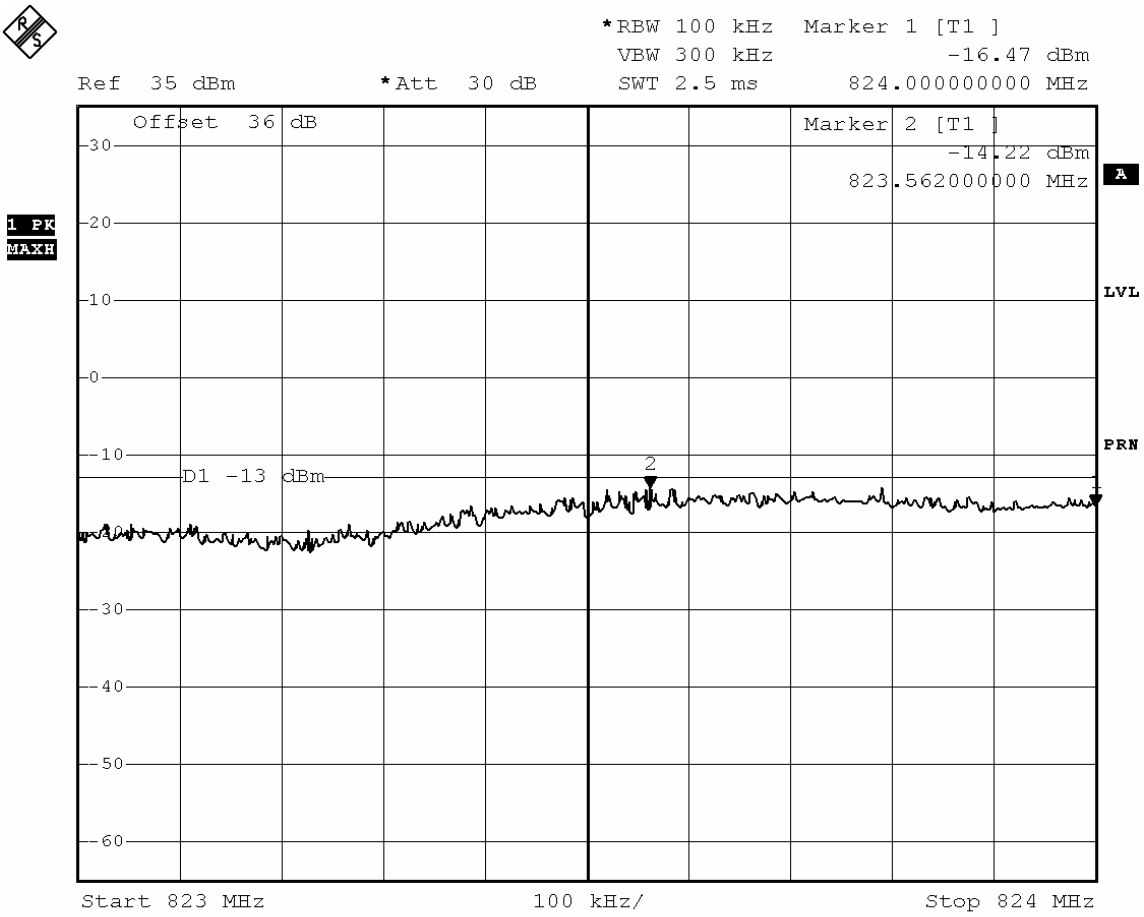
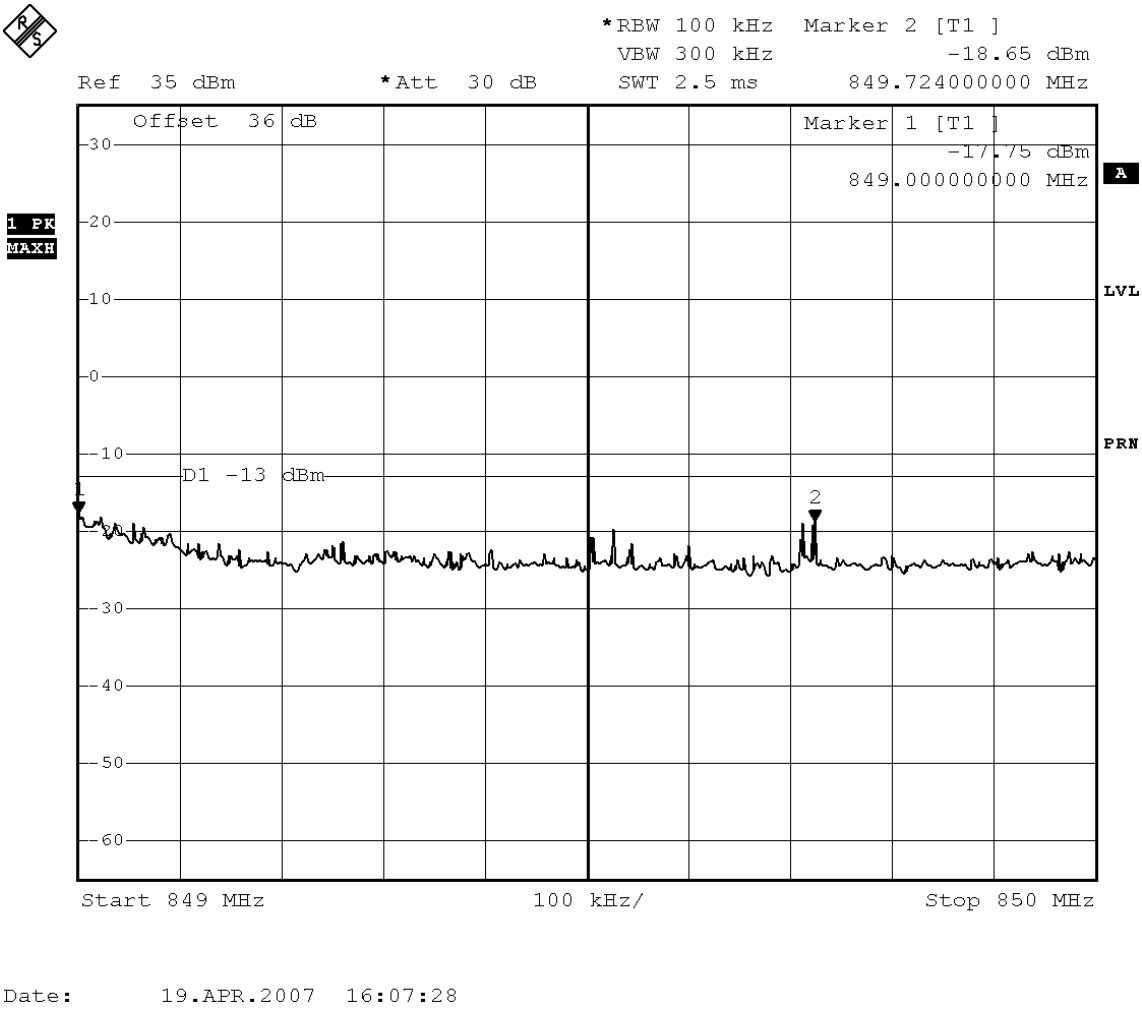
Op. Mode

op-mode 4



Op. Mode

op-mode 3



Op. Mode

op-mode 6