

Inter Lab Final Report on GI0411

Report Reference: MDE_OPTI_0812_FCCa

Date: August 21, 2008

Test Laboratory:

DAT-P-192/99-01

Borsigstr. 11 40880 Ratingen Germany

7 layers AG

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.

7 layers AG Borsigstrasse 11 40880 Ratingen, Germany Phone: +49 (0) 2102 749 0 Fax: +49 (0) 2102 749 350 www.7Layers.com Aufsichtsratsvorsitzender •
Chairman of the Supervisory Board:
Markus Becker
Vorstand • Board:
Dr. Hans-Jürgen Meckelburg
René Schildknecht

Registergericht • registered in: Düsseldorf, HRB 44096 USt-IdNr • VAT No: DE 203159652 TAX No. 147/5869/0385



1 Administrative Data

1.1 Project Data

Project Responsible: Oliver Wagener
Date Of Test Report: 2008/08/21
Date of first test: 2008/08/14
Date of last test: 2008/08/14

1.2 Applicant Data

Company Name: Option NV

Street: Gaston Geenslaan 14

City: 3001 Leuven
Country: Belgium

Contact Person: Mr. Thomas Gulinck

Phone: +32 16 317 411 E-Mail: T.Gulinck@option.com

1.3 Test Laboratory Data

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

7 layers DE

7 layers AG Company Name : Street: Borsigstrasse 11 40880 Ratingen City: Germany Country: Mr. Michael Albert Contact Person: Phone: +49 2102 749 201 Fax: +49 2102 749 444 E Mail: michael.albert@7Layers.de

Laboratory Details

Lab ID	Identification	Responsible	Accreditation Info
Lab 1	Conducted Emissions	Mr. Robert Machulec Mr. Andreas Petz	DAR-Registration no. DAT-P-192/99-01
Lab 2	Radiated Emissions	Mr. Robert Machulec Mr. Andreas Petz	DAR-Registration no. DAT-P-192/99-01

1.4 Signature of the Testing Responsible

Michael Küppers

responsible for tests performed in: Lab 1, Lab 2



Signature of the Accreditation Responsible 1.5

Accreditation scope responsible person responsible for Lab 1, Lab 2

2 **Test Object Data**

General OUT Description

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

OUT: GI0411

Type / Model / Family:

GI0411

Product Category:

Computer Accessory

Manufacturer:

Company Name:

Option NV

Street:

Gaston Geenslaan 14

City:

3001 Leuven Belgium

Country: Company URL:

http://www.option.com

Contact Person:

Mr. Thomas Gulinck

Phone:

+32 16 311 694

E-Mail:

T.Gulinck@option.com

2.2 **Detailed Description of OUT Samples**

Sample: A01

OUT Identifier

GI0411

Sample Description

Radiated

Serial No.

004401441017718, PS2487N0

HW Status

2.0

SW Status

1.4.3

Date of Receipt

2008/08/07 4.5 V

Low Temp. 5.5 V

-30 °C 50 °C

Low Voltage High Voltage Nominal Voltage

5.5 V

High Temp.

21 °C



2.3 OUT Features

Features for OUT: GI0411

Designation	Description	Allowed Values	Supported Value(s)
Features for	scope: FCC_v2		
DC	EUT is powered by DC		
EDGE850	EUT supports EDGE in the band 824 MHz - 849 MHz		
EDGE1900	EUT supports EDGE in the band 1850 MHz - 1910 MHz		
FDD2	EUT supports UMTS FDD2 in the band 1850 MH - 1910 MHz	Z	
GSM850	EUT supports GSM850 band 824MHz - 849MHz		
HSDPA- FDD2	EUT supports UMTS FDD2 HSDPA in the band 1850 MHz - 1910 MHz		
HSUPA- FDD2	EUT supports UMTS FDD2 HSUPA in the band 1850 MHz - 1910 MHz		
lant	Integral Antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment		
PCS1900	EUT supports PCS1900 band 1850MHz - 1910MHz		
TantC	temporary antenna connector, which may be only built-in for testing, designed as an example part of the equipment	e	

2.4 Auxiliary Equipment

AE No.	Type Designation	Serial No.	HW Status	SW Status	Description
AE ACadap	ADP-80NB A				AC Adapter
AE Printer	EPSON Stylus C84 (B251A)	FBPT048906			Printer EPSON Stylus
AE TFT	LG Flatron L1740BQ	509WANF1W607			TFT display
AE Laptop	LifeBook (7L-OPTI- LAP-01)	YK5T053779			Fujitsu Siemens
AE Mouse	M-BB48	LZC90505478			Logitech
AE Keyboar	RS 6000	G 0000273 2P28			Keyboard CHERRY

2.5 Operating Mode(s)

RefNo.	Description
TCH190	Sample is transmitting on channel TCH190, GSM850
TCH661	Sample is transmitting on channel TCH661, GSM1900



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_FCC15b (set-up for FCC 15b tests with peripheral equipment)

Sample: A01 Radiated AE ACadap AC Adapter

AE Printer Printer EPSON Stylus

AE TFT TFT display

AE Laptop Fujitsu Siemens

AE Mouse Logitech

AE Keyboar Keyboard CHERRY

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 the Applicable Body

(Bodies for Scope: FCC_v2)

Designation Description

FCC47CFRChIPART15bRADIO FREQUENCY DEVICES

Subpart B - Unintentional Radiators



3.3 List of Test Specification

Test Specification: FCC part 2 and 15

Date / Version 2007/10/01 Version: 10-1-07 Edition

Title: PART 2 - GENERAL RULES AND REGULATIONS

PART 15 - RADIO FREQUENCY DEVICES



3.4 Summary

Test Case Identifier / Name			Lab	
Test (condition)	Result	Date of Test	Ref.	Setup
15b.1 Conducted Emissions (AC Power Line)	§15.107			
15b.1; Operating mode = transmit	Passed	2008/08/14	Lab 1	a01_FCC15b
	operating m	ode: TCH190		
15b.2 Spurious Radiated Emissions §15.109				
15b.2; Operating mode = transmit	Passed	2008/08/14	Lab 2	a01_FCC15b
	operating m	ode: TCH661		



3.5 **Detailed Results**

3.5.1 15b.1 Conducted Emissions (AC Power Line) §15.107

Test: 15b.1; Operating mode = transmit

Result:

a01_FCC15b Setup No.:

2008/08/14 17:34 Date of Test:

FCC47CFRChIPART15bRADIO FREQUENCY DEVICES Body:

Test Specification: FCC part 2 and 15

Test Equipment Environmental Conditions

27°C Temperature: 1014hPa Air Pressure: Rel. Humidity: 35%

Detailed Results:

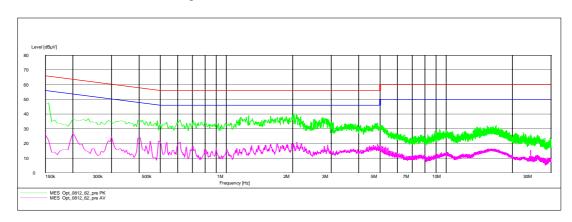
AC MAINS CONDUCTED

Pico racer (37450a01) BUT: Pico racer (37450a01)
Manufacturer: Option
Operating Condition: GSM 850 TCH 190
Test Site: 7 layers Ratingen
Operator: jend
Test Specification: FCC 15b
Comment:
Start of Test: 14.08.2008 / 14:17:57

SCAN TABLE: "FCC Voltage"

Short Description: Start Stop Step Short Description:
Start Stop Step Detector Meas. IF
Frequency Frequency Width Time Bandw.
150.0 kHz 30.0 MHz 5.0 kHz Average

MaxPeak 20.0 ms 9 kHz Transducer ESH3-Z5





3.5.2 15b.2 Spurious Radiated Emissions §15.109

Test: 15b.2; Operating mode = transmit

Result: Passed

Setup No.: a01_FCC15b

Date of Test: 2008/08/14 12:06

Body: FCC47CFRChIPART15bRADIO FREQUENCY DEVICES

Test Specification: FCC part 2 and 15

Test Equipment Environmental Conditions

Temperature:28°CAir Pressure:1007hPaRel. Humidity:45%



Detailed Results:

EMI RADIATED TEST

EUT: PicoRacer (37450a01)

Manufacturer: Option

Operating Condition: GSM1900 TCH661 Test Site: 7 layers, Ratingen

Operator: Doe

Test Specification: FCC part 15 b

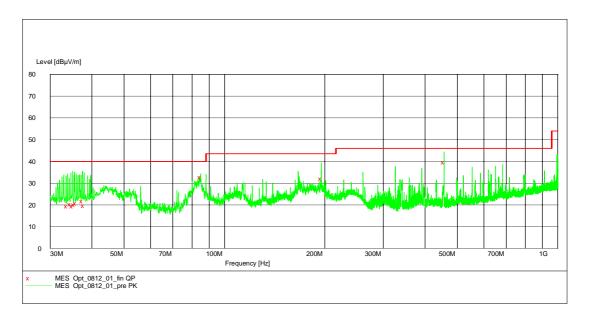
Horizontal EUT position 07.08.2008 / 20:42:02 Comment: Start of Test:

SCAN TABLE: "FCC part 15 b"

Short Description: FCC part 15 b

Start Stop Step Transducer

Step Detector Meas. IF Transc Width Time Bandw. 60.0 kHz MaxPeak 1.0 ms 120 kHz HL562 Frequency Frequency Width 30.0 MHz 1.0 GHz 60.0 k



MEASUREMENT RESULT: "Opt_0812_01_fin QP"

07.08.2008 Frequency	21:42 Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Height	Azimuth deg	Polarisation
MHZ	ασμν/ιιι	αв	ασμν/ιιι	ав	cm	aeg	
33.780000	19.40	18.2	40.0	20.6	100.0	169.00	VERTICAL
34.620000	20.40	17.9	40.0	19.6	100.0	244.00	VERTICAL
35.040000	19.50	17.5	40.0	20.5	117.0	243.00	VERTICAL
35.520000	20.10	17.2	40.0	19.9	105.0	290.00	VERTICAL
35.940000	20.70	16.9	40.0	19.3	101.0	247.00	VERTICAL
37.560000	21.80	16.0	40.0	18.2	101.0	255.00	VERTICAL
37.980000	19.80	15.7	40.0	20.2	124.0	209.00	VERTICAL
84.900000	32.80	9.4	40.0	7.2	125.0	157.00	VERTICAL
195.420000	32.20	8.1	43.5	11.3	100.0	158.00	VERTICAL
456.000000	39.70	16.5	46.0	6.3	129.0	182.00	VERTICAL



4 Annex

4.1 Additional Information for OUT Description



front view





back view

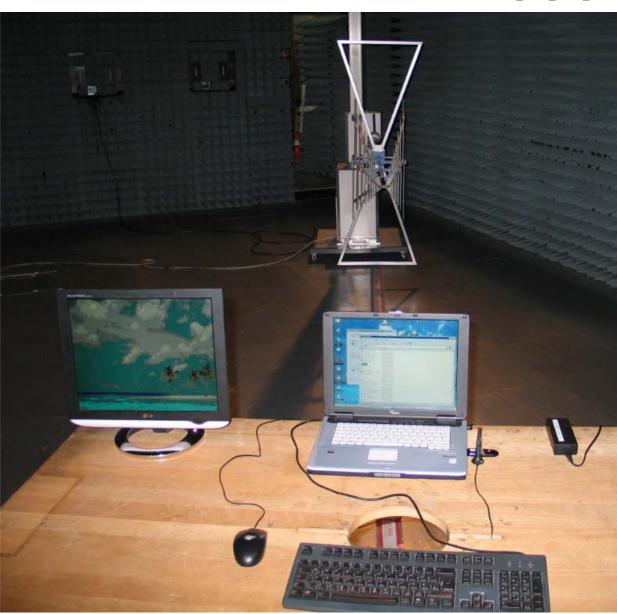


4.2 Additional Information for Report



set-up for conducted tests





set-up for radiated tests



Test Descript	tion
Conducted e	missions (AC power line)
Standard Subpart B	FCC Part 15, 10-1-07

The test was performed according to: ANSI C 63.4, 2003

Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003.

The Equipment Under Test (FUT) was setup in a shielded from to perform the conducted of

The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from 50µH || 50 Ohm Line Impedance Stabilization Network (LISN). The LISN's unused connections were terminated with 50 Ohm loads.

The measurement procedure consists of two steps. It is implemented into the EMI test software ES-K1 from R&S.

Step 1: Preliminary scan

Intention of this step is, to determine the conducted EMI-profile of the EUT.

EMI receiver settings:

- Detector: Peak Maxhold
- Frequency range: 150 kHz 30 MHz
- Frequency steps: 5 kHz
- IF-Bandwidth: 9 kHz
- Measuring time / Frequency step: 20 ms
- Measurement on phase + neutral lines of the power cords

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

Step 2: Final measurement

Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies identified in step 1.

EMI receiver settings:

- Detector: Quasi-Peak
- IF Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following combinations:

- 1) Neutral lead reference ground (PE grounded)
- 2) Phase lead reference ground (PE grounded)
- 3) Neutral lead reference ground (PE floating)

4) Phase lead - reference ground (PE floating)

The highest value is reported.

Test Requirements / Limits

FCC Part 15, Subpart B, §15.107

Frequency Range (MHz)	QP Limit (dBµV)	AV Limit (dBµV)
0.15 - 0.5	66 to 56	56 to 46
0.5 - 5	56	46
5 – 30	60	50

Used conversion factor: Limit (dB μ V) = 20 log (Limit (μ V)/1 μ V).

NOTE: a missing result table in the corresponding test report section means, that no final measurement was performed because no relevant frequencies (peaks) were found in the preliminary scan.



Spurious radiated emissions

Standard FCC Part 15, 10-1-07 Subpart B

The test was performed according to: ANSI C 63.4, 2003

Test Description

Measurement below 1 GHz:

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003.

The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The radiated emissions measurements were made in a typical installation configuration.

The measurement procedure is implemented into the EMI test software ES-K1 from R&S.

Step 1: Preliminary scan (test to identify the highest amplitudes relative to the limit)

Intention of this step is, to determine the radiated EMI-profile of the EUT.

Settings for step 1:

- Detector: Peak-Maxhold
- Frequency range: 30 1000 MHz
- Frequency steps: 60 kHzIF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 μs
- Turntable angle range: -180° to 180°
- Turntable step size: 90°
- Height variation range: 1 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

Step 2:

A further measurement will be performed on the frequencies determined in step 1. Intention of this step is, to find out the approximate turntable angle and antenna height for each frequency.

Settings for step 2:

- Detector: Peak Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 120 kHz - Measuring time: 100 ms
- Turntable angle range: -180° to 180°
- Turntable step size: 45°
- Height variation range: 1 4 m
- Height variation step size: 0.5 m
- Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5 m

Step 3: final measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will be slowly varied by $+/-22.5^{\circ}$ around this value. During this action the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position the antenna height is also slowly varied by +/-25 cm around the antenna height determined. During this action the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF Bandwidth: 120 kHz
- Measuring time: 100ms
- Turntable angle range: –22.5 $^{\circ}$ to + 22.5 $^{\circ}$ around the determined value
- Height variation range: -0.25m to +0.25m around the determined value



Step 4: Final measurement (with QP detector)

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:
- Detector: Quasi-Peak(< 1GHz)

Measured frequencies: in step 3 determined frequencies
 IF – Bandwidth: 120 kHz

IF – Bandwidth: 120 kHzMeasuring time: 1 sMeasurement above 1 GHz:

The following modifications apply to the measurement procedure for the frequency range above 1 GHz: The measurement distance was reduced to 1 m. The results were extrapolated by the extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements, inverse-linear-distance-squared for the power density measurements). Due to the fact that in this frequency range a double ridged wave guided horn antenna (up to 18 GHz) and a horn antenna (18–25 GHz) are used, the steps 2-4 as described before, are omitted. Step 1 was performed at one height of the receiving antenna only.

Detector: Peak, Average (simultaneously) RBW = VBW = 1 MHz; above 7 GHz 100 kHz

Test Requirements / Limits

FCC Part 15, Subpart B, §15.109, Radiated Emission Limits Frequency Range (MHz): Class B Limit ($dB\mu V/m$)

Frequency Range (MHz) Class B Limit (dBμV/m) 30 – 88 40.0 88 – 216 43.5

88 – 216 43.5 216 – 960 46.0 above 960 54.0

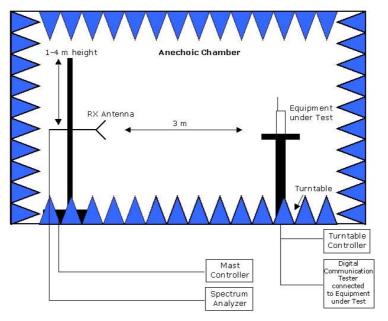
§15.35(b)

..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit.... Used conversion factor: Limit $(dB\mu V/m) = 20 \log (Limit (\mu V/m)/1\mu V/m)$

NOTE: a missing result table in the corresponding test report section means, that no final measurement was performed because no relevant frequencies (peaks) were found in the preliminary scan.



Setup Drawings



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

Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting ground plane.



Test Equipment

EUT Digital Signalling System

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Digital Radio	CMD 55	831050/020	Rohde & Schwarz	01.12.05	01.12.08
Communication Tester					
Signalling Unit for	PTW60	100004	Rohde & Schwarz	-	-
Bluetooth					
Universal Radio	CMU200	102366	Rohde & Schwarz	22.09.07	22.09.09
Communication Tester					

EMI Test System

Equipment	Туре	Serial No.	Manufacturer	Last Cal	Next cal
Comparison Noise Emitter	CNE III	99/016	York	-	-
EMI Analyzer	ESI 26	830482/004	Rohde & Schwarz	06.12.07	06.12.09
Signal Generator	SMR 20	846834/008	Rohde & Schwarz	05.12.07	05.12.09
AC Power Source	6404	64040000B04	Croma ATE INC.	01.06.08	N/A the parameters will be checked before testing
Spectrum Analyzer 9 kHz to 3 GHz	FSP3	838164/004	Rohde & Schwarz	25.11.05	25.11.08

EMI Radiated Auxiliary Equipment

Equipment	Туре	Serial No.	Manufacturer	Last Cal	Next cal
Antenna mast 4m	MA 240	240/492	HD GmbH H. Deisel	-	-
Biconical dipole	VUBA 9117	9117108	Schwarzbeck	02.07.03	02.10.08
Broadband Amplifier 18MHz-26GHz	JS4- 18002600 -32	849785	Miteq	06.02.08	06.10.08
Broadband Amplifier 30MHz-18GHz	JS4- 00101800 -35	896037	Miteq	06.02.08	06.10.08
Broadband Amplifier 45MHz-27GHz	JS4- 00102600 -42	619368	Miteq	06.02.08	06.10.08
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01-2 W38.01-2	Kabel Kusch	06.02.08	06.10.08
Cable "ESI to Horn Antenna"	UFB311A UFB293C	W18.02-2 W38.02-2	Rosenberger- Microcoax	06.02.08	06.10.08
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz	12.05.06	12.10.08
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz	20.01.04	N/A – spare antenna
High Pass Filter	5HC3500/ 12750- 1.2-KK	200035008	Trilithic	06.02.08	06.10.08
High Pass Filter	5HC2700/ 12750- 1.5-KK	9942012	Trilithic	06.02.08	06.10.08
High Pass Filter	4HC1600/ 12750- 1.5-KK	9942011	Trilithic	06.02.08	06.10.08
Logper. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz	17.05.06	17.05.09
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz	19.08.02	N/A – only used for pre-testing
Pyramidal Horn Antenna 26.5 GHz	Model 3160-09	9910-1184	EMCO	06.02.08	06.10.08



EMI Conducted Auxiliary Equipment

Equipment	Type	Serial No.	Manufacturer	Last Cal	Next cal
Cable "LISN to ESI"	RG214	W18.03+W48.	Huber+Suhner	06.02.08	06.10.08
		03			
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz	01.11.05	01.11.08
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz	-	-

Auxiliary Test Equipment – calibration not applicable; spare equipment

Equipment	Туре	Serial No.	Manufacturer	Last Cal	Next cal
Broadband Resist.	1506A /	LM390	Weinschel	-	-
Power Divider N	93459				
Broadband Resist.	1515 /	LN673	Weinschel	-	-
Power Divider SMA	93459				
Digital Multimeter 01	Voltcraft	IJ096055	Conrad	-	-
	M-3860M				
Digital Multimeter 02	Voltcraft	IJ095955	Conrad	-	-
	M-3860M				
Digital Oscilloscope	TDS 784C	B021311	Tektronix	-	-
Fibre optic link	FO RS232	181-018	Pontis	-	-
Satellite	Link				
Fibre optic link	FO RS232	182-018	Pontis	-	-
Transceiver	Link				
I/Q Modulation	AMIQ-B1	832085/018	Rohde & Schwarz	-	-
Generator					
Notch Filter ultra	WRCA800	24	Wainwright	-	-
stable	/960-6E				
Spectrum Analyzer 9	FSP3	838164/004	Rohde & Schwarz	-	-
kHz to 3 GHz					
Temperature Chamber	VT 4002	585660021500	Vötsch	-	-
		10			
Temperature Chamber	KWP	592260121900	Weiss	-	-
	120/70	10			
ThermoHygro	Opus10	7482	Lufft Mess- und	-	-
Datalogger 03	THI		Regeltechnik		
	(8152.00)		GmbH		

Anechoic Chamber – calibration not applicable

Equipment	Туре	Serial No.	Manufacturer	Last Cal	Next cal
Air Compressor (pneumatic)			Atlas Copco	-	-
Controller	CO 2000	CO2000/328/1 2470406/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	10.58x6.3 8x6		Frankonia	-	-
Turntable	DS 420S	420/573/99	HD GmbH, H.Deisel	-	-
Valve Control Unit (pneum.)	VE 615P	615/348/99	HD GmbH, H.Deisel	-	=



5 Index

1 Administrative Data	2
1.1 Project Data	2
1.2 Applicant Data	2
1.3 Test Laboratory Data	2
1.4 Signature of the Testing Responsible	2
1.5 Signature of the Accreditation Responsible	3
2 Test Object Data	3
2.1 General OUT Description	3
2.2 Detailed Description of OUT Samples	3
2.3 OUT Features	4
2.4 Auxiliary Equipment	4
2.5 Operating Mode(s)	4
2.6 Setups used for Testing	5
3 Results	5
3.1 General	5
3.2 List of the Applicable Body	5
3.3 List of Test Specification	6
3.4 Summary	7
3.5 Detailed Results	8
3.5.1 15b.1 Conducted Emissions (AC Power Line) §15.107	8
3.5.2 15b.2 Spurious Radiated Emissions §15.109	9
4 Annex	11
4.1 Additional Information for OUT Description	11
4.2 Additional Information for Report	13
5 Index	21