InterLab®

Final Report on
LUCY H-200

Report Reference: MDE_UBLOX_0902_FCCd

acc. Title47 CFR chapter I part 15 subpart B

Date: April 29, 2010

Test Laboratory:

7 layers AG
Borsigstr. 11
40880 Ratingen
Germany

DGA-PL-192/99-02

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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1 Administrative Data

1.1 Project Data

Project Responsible:	Sven Lüngen
Date Of Test Report:	2010/04/29
Date of first test:	2010/04/15
Date of last test:	2010/04/15

1.2 Applicant Data

Company Name:	Neonseven S.p.A. a u-blox AG company
Street:	Via Stazione di Prosecco, 15
City:	34010 Sgonico (TS)
Contact Person:	Mr. Giulio Comar
Function:	Product Certification Manager
Phone:	+39 040 2529400
E-Mail:	giulio.comar@neonseven.com

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
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. DGA-PL-192/99-02
Lab 2	Radiated Emissions	Mr. Robert Machulec Mr. Andreas Petz	DAR-Registration no. DGA-PL-192/99-02

1.4 Signature of the Testing Responsible

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

Robert Machulec
responsible for tests performed in: Lab 1, Lab 2

1.5 Signature of the Accreditation Responsible

Accreditation scope responsible person
responsible for Lab 1, Lab 2

A. Petz

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40880 Ratingen, Germany
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2 Test Object Data

2.1 General OUT Description

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

OUT: Lucy-H200

Type / Model / Family:	LUCY H-200
Product Category:	Module
Manufacturer:	
Company Name:	U-BLOX AG
Street:	Zürcherstrasse 68
City:	8800 Thalwil
Country:	Switzerland
Contact Person:	Mr. Fabio Vesnaver
E-Mail:	fabio.vesnaver@neonseven.com

Ancillary Equipment: AC/DC adapter

Product Category:	Mobile Phone Accessory

Ancillary Equipment: USB cable

Product Category:	Mobile Phone Accessory

2.2 Detailed Description of OUT Samples

Sample : I02

OUT Identifier	Lucy-H200		
Sample Description	Sample 9		
Serial No.	SN104		
HW Status	HR118A00		
SW Status	SR.03.00.05		
Date of Receipt	2010/04/14		
Low Voltage	3.2 V	*Low Temp.*	-25 °C
High Voltage	4.2 V	*High Temp.*	+70 °C
Nominal Voltage	3.8 V	*Normal Temp.*	+22 °C

Sample : Adap01

OUT Identifier	USB cable
Sample Description	Simple USB adapter
Date of Receipt	2010/03/05

Sample : DC01

OUT Identifier	AC/DC adapter
Sample Description	AC/DC adapter 100-240 V50-60 Hz
Date of Receipt	2010/03/04
Low Voltage	100 V
High Voltage	240 V
Nominal Voltage	120 V

2.3 OUT Features

Features for OUT: AC/DC adapter

Designation	*Description*	*Allowed Values*	*Supported Value(s)*
Features for scope: FCC_v2			
AC	The OUT is powered by or connected to AC Mains		

Features for OUT: Lucy-H200

Designation	*Description*	*Allowed Values*	*Supported Value(s)*
Features for scope: FCC_v2			
DC	The OUT is powered by or connected to DC Mains		
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 MHz - 1910 MHz		
FDD5	EUT supports UMTS FDD5 in the band 824 MHz - 849 MHz		
GSM850	EUT supports GSM850 band 824MHz - 849MHz		
HSDPA-FDD2	EUT supports UMTS FDD2 HSDPA in the band 1850 MHz - 1910 MHz		
HSDPA-FDD5	EUT supports UMTS FDD5 HSDPA in the band 824 MHz - 849 MHz		
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 07					GSM/UMTS antenna
AE 08					Handset
AE 05	0055 AC TO DC Adaptor				Power Supply
AE 06	0055 AC TO DC Adaptor				Power Supply
AE 02	BS 221209	SN019	GP02_HW_CS_122000		Controlling board 2
AE 12	CHERRY RS 6000	G 0000273 2P28			Keyboard
AE 09	Fijitsu Limited ADP-80NB A	CP293661-01			AC/DC Adaptor Notebook
AE 04	IBM Lenovo R60 9461-54G	L3-AA471 06/10			Laptop
AE 10	LGE Flatron L1740BQ	509WANF1W607			TFT display
AE 11	Logitech M-BB48	LZC90505478			Mouse
AE 01	TS 141209	SN48	EN01_HW_CS 068C00		Controlling board 1
AE 03	TS 190309	SN48	END1_HW_CS_068C00		Controlling Board 3

2.5 Operating Mode(s)

Ref.-No.	*Description*
TCH190	Sample is transmitting on channel 190, GSM 850
TCH661	Sample is transmitting on channel 661, GSM 1900

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*
I02_FCC15b_ACDC	**(OUT connected to dedicated AC/DC adapter)**			
	Sample: DC01	AC/DC adapter 100-240 V50-60 Hz	AE 07	GSM/UMTS antenna
	Sample: I02	Sample 9	AE 08	Handset
			AE 05	Power Supply
			AE 06	Power Supply
			AE 02	Controlling board 2
			AE 09	AC/DC Adaptor Notebook
			AE 04	Laptop
			AE 01	Controlling board 1
			AE 03	Controlling Board 3
I02_FCC15b_peri	**(OUT in computer peripheral setup, powered by USB port)**			
	Sample: Adap01	Simple USB adapter	AE 07	GSM/UMTS antenna
	Sample: I02	Sample 9	AE 08	Handset
			AE 05	Power Supply
			AE 06	Power Supply
			AE 02	Controlling board 2
			AE 12	Keyboard
			AE 09	AC/DC Adaptor Notebook
			AE 04	Laptop
			AE 10	TFT display
			AE 11	Mouse
			AE 01	Controlling board 1
			AE 03	Controlling Board 3

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.
Note:	This test report replaces the report MDE_UBLOX_0902_FCCa.

3.2 List of the Applicable Body

(Body for Scope: FCC_v2)

Designation	*Description*
FCC47CFRChIPART15bRADIO FREQUENCY DEVICES	Part 15, Subpart B - Unintentional Radiators

3.3 List of Test Specification

Test Specification:	**FCC part 2 and 15**
Version	10-1-09 Edition
Title:	PART 2 - GENERAL RULES AND REGULATIONS PART 15 - RADIO FREQUENCY DEVICES

Applicable Errata	*Activate Date*	*Comment*
ANSI C63.4-2003	04/1/30	American National Standard for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and electronic Equipment in the Range of 9 kHz to 40 GHz
DA 00-705 considerd	00/3/1	Public Notice: Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

3.4 Summary

Test Case Identifier / Name *Test (condition)*	*Result*	*Date of Test*	*Lab Ref.*	*Setup*
15b.1 Conducted Emissions (AC Power Line) §15.107				
15b.1; Mode = transmit	Passed	2010/04/15	Lab 1	I02_FCC15b_ACDC
	operating mode: TCH190			
	Passed	2010/04/15	Lab 1	I02_FCC15b_peri
	operating mode: TCH190			
15b.2 Spurious Radiated Emissions §15.109				
15b.2; Mode = transmit	Passed	2010/04/15	Lab 2	I02_FCC15b_peri
	operating mode: TCH661			

3.5 Detailed Results

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

Test1: 15b.1; Mode = transmit

Result:	Passed
Setup No.:	I02_FCC15b_peri
Date of Test:	2010/04/15 11:25
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

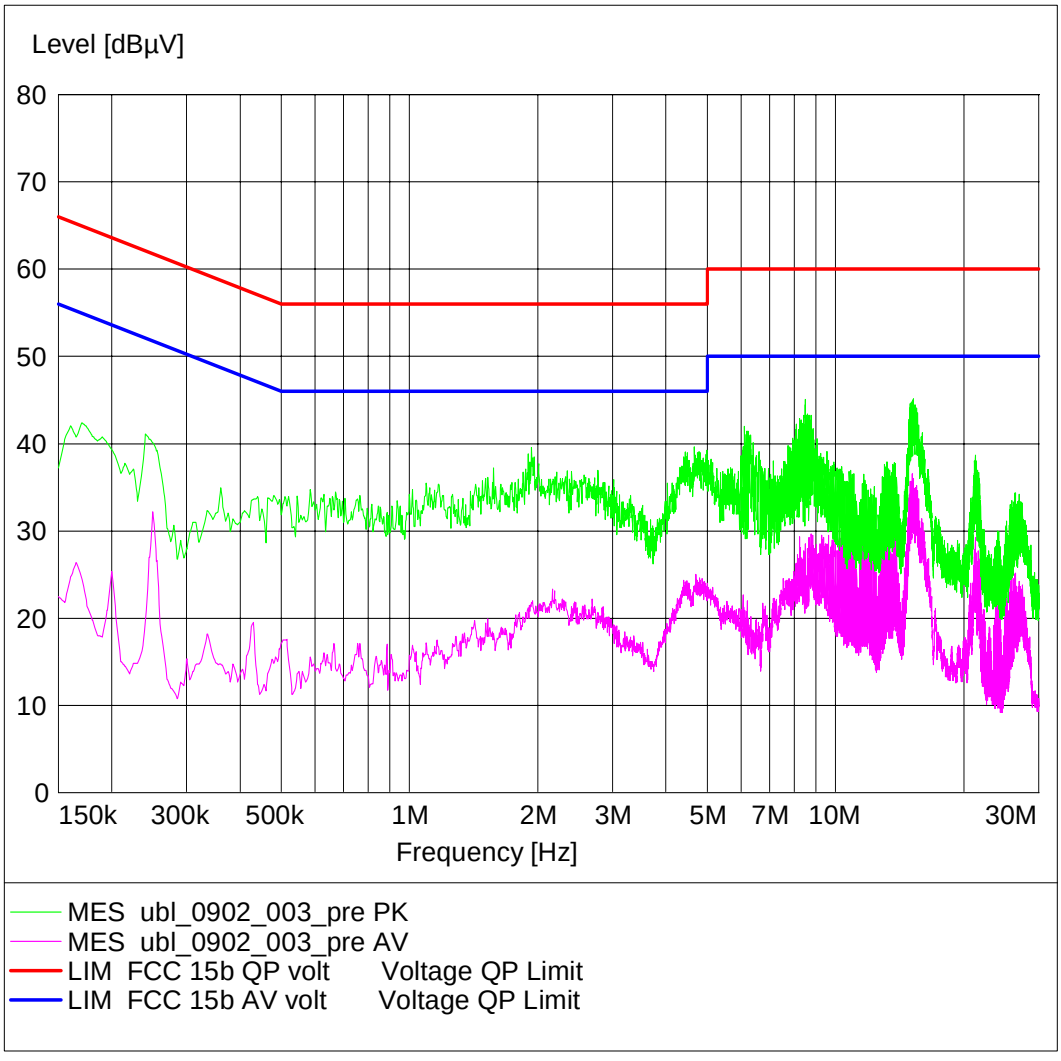
Detailed Results:

AC MAINS CONDUCTED

```
EUT:                  LUCY-H200 (EU000i02)
Manufacturer:         U-BLOX AG
Operating Condition:  GSM 850 TCH 190
Test Site:            7 layers Ratingen
Operator:             Gal
Test Specification:   ANSI C63.4; FCC 15.107 / 15.207
Comment:
Start of Test:        16.04.2010 / 00:20:27
```

SCAN TABLE: "FCC Voltage"

Short Description:			FCC Voltage			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak Average	20.0 ms	9 kHz	ESH3-Z5



Test1: 15b.1; Mode = transmit

Result:	Passed
Setup No.:	I02_FCC15b_ACDC
Date of Test:	2010/04/15 12:12
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

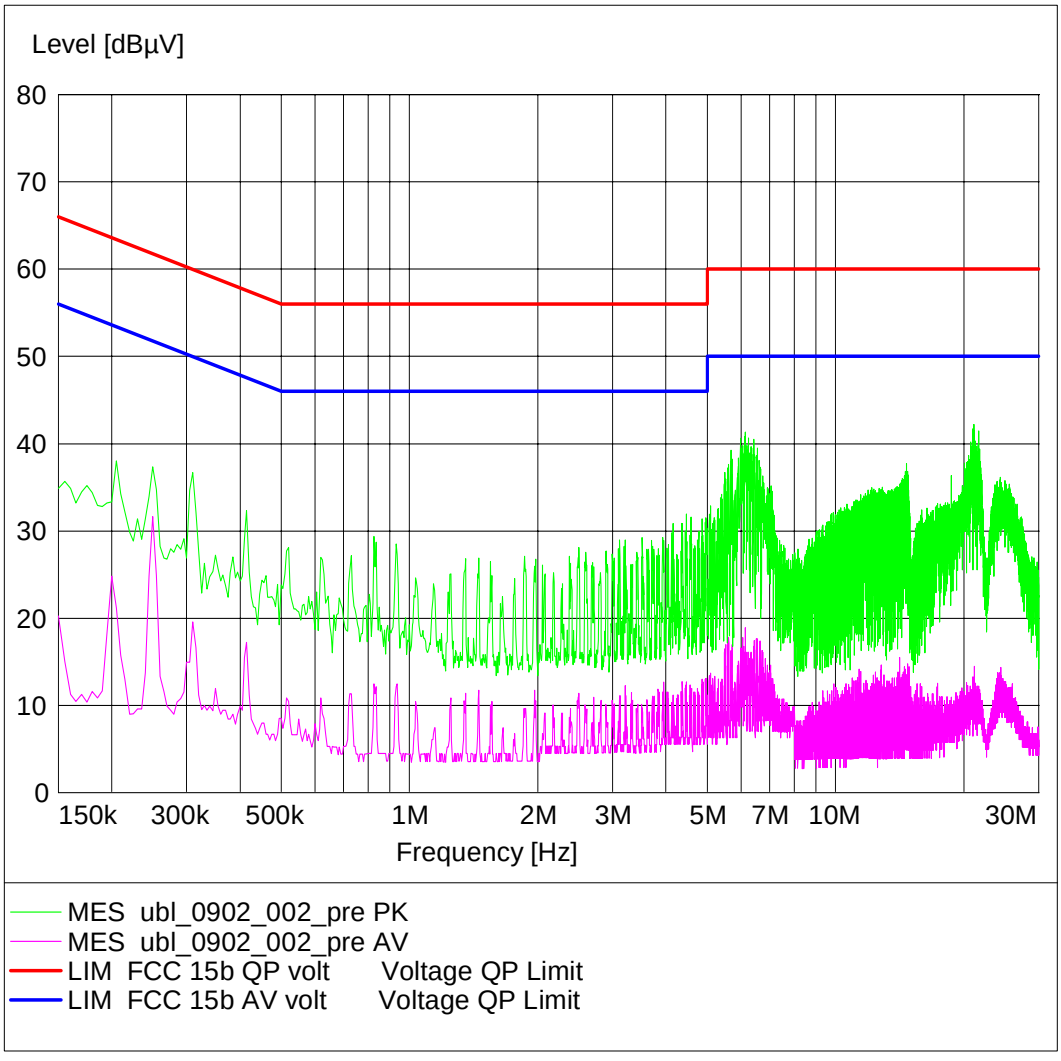
Detailed Results:

AC MAINS CONDUCTED

```
EUT:                  LUCY-H200 (EU000i02)
Manufacturer:         U-BLOX AG
Operating Condition:  GSM 850 TCH 190
Test Site:            7 layers Ratingen
Operator:             Gal
Test Specification:   ANSI C63.4; FCC 15.107 / 15.207
Comment:
Start of Test:        15.04.2010 / 23:40:01
```

SCAN TABLE: "FCC Voltage"

Short Description:			FCC Voltage			
Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak Average	20.0 ms	9 kHz	ESH3-Z5



3.5.2 15b.2 Spurious Radiated Emissions §15.109

Test: 15b.2; Mode = transmit

Result:	Passed
Setup No.:	I02_FCC15b_peri
Date of Test:	2010/04/15 11:26
Body:	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
Test Specification:	FCC part 2 and 15

Detailed Results:

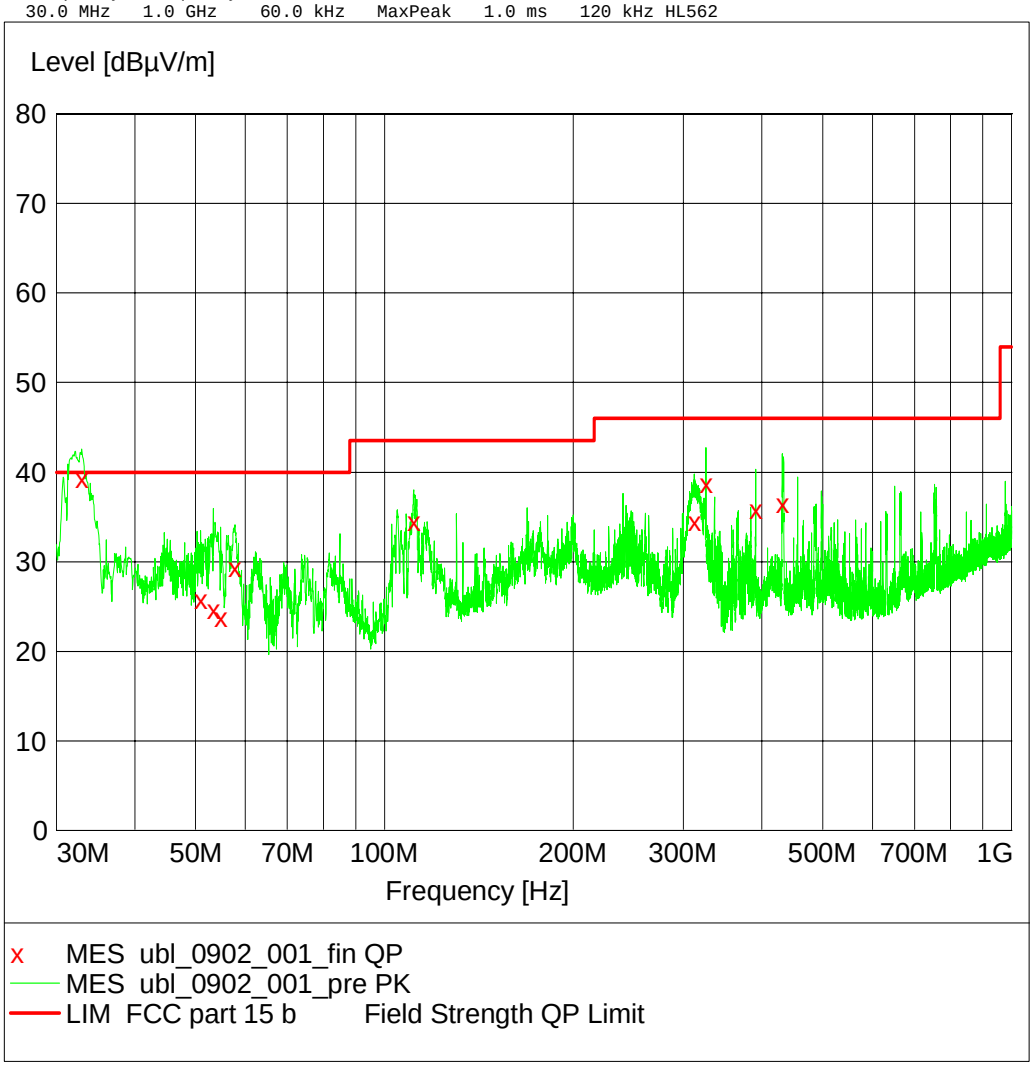
EMI RADIATED TEST

EUT: LUCY-H200 (EU000i02)
Manufacturer: U-BLOX AG
Operating Condition: GSM 1900 TCH 661
Test Site: 7 layers, Ratingen
Operator: Gal
Test Specification: FCC part 15 b
Comment: Horizontal EUT position
Start of Test: 15.04.2010 / 20:17:41

SCAN TABLE: "FCC part 15 b"

Short Description: FCC part 15 b

Start Frequency	Stop Frequency	Step Width	Detector	Meas. Time	IF Bandw.	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	MaxPeak	1.0 ms	120 kHz	HL562



MEASUREMENT RESULT: "ubl_0902_001_fin QP"

Frequency MHz	Level dBµV/m	Transd dB	Limit dBµV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.880000	39.30	19.1	40.0	0.7	103.0	16.00	VERTICAL
50.940000	25.80	8.4	40.0	14.2	100.0	248.00	VERTICAL
53.340000	24.70	6.8	40.0	15.3	125.0	292.00	VERTICAL
54.840000	23.80	5.9	40.0	16.2	131.0	357.00	VERTICAL
57.780000	29.40	4.9	40.0	10.6	248.0	184.00	VERTICAL
111.300000	34.50	11.5	43.5	9.0	297.0	184.00	HORIZONTAL
311.940000	34.50	14.3	46.0	11.5	114.0	291.00	HORIZONTAL
325.740000	38.70	14.8	46.0	7.3	175.0	157.00	VERTICAL
390.840000	35.90	16.7	46.0	10.1	125.0	157.00	VERTICAL
431.340000	36.50	17.8	46.0	9.5	125.0	157.00	VERTICAL

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 2**
Manufacturer:	Frankonia
Description:	Anechoic Chamber for radiated testing
Type:	10.58x6.38x6

Calibration Details	*Last Execution*	*Next Exec.*
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	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 Innco 2000	CO 2000	CO2000/328/1247 0406/L	Innco innovative constructions 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 Conducted emissions

Lab ID:	**Lab 1**
Manufacturer:	Rohde & Schwarz GmbH & Co.KG
Description:	EMI Conducted Auxiliary Equipment

Single Devices for Auxiliary Equipment for Conducted emissions

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber&Suhner
Coupling-Decoupling-Network	CDN ENY41	100002	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	Standard Calibration		2008/03/06 2011/03/05
Two-Line V-Network	ESH 3-Z5	828304/029	Rohde & Schwarz GmbH & Co. KG
Two-Line V-Network	ESH 3-Z5	829996/002	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	DKD calibration		2008/10/13 2011/10/12

Test Equipment Auxiliary Equipment for Radiated emissions

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

Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	*Type*	*Serial Number*	*Manufacturer*
	Calibration Details		*Last Execution* *Next Exec.*
	Standard Calibration		2009/05/27 2012/05/26
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	DKD calibration		2008/10/07 2011/10/06
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 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.
	Calibration Details		*Last Execution* *Next Exec.*
	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
	Calibration Details		*Last Execution* *Next Exec.*
	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
	Calibration Details		*Last Execution* *Next Exec.*
	Standard Calibration		2008/08/14 2011/08/13
Digital Radio Communication Tester	CMD 55	831050/020	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	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
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2009/02/16 2011/02/15
	HW/SW Status		*Date of Start* *Date of End*
	Hardware: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B56V14, B68 3v04, PCMCIA, U65V04 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 ---		2007/07/16
Universal Radio Communication Tester	CMU 200	837983/052	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2008/12/01 2011/11/30
	HW/SW Status		*Date of Start* *Date of End*
	HW options: B11, B21V14, B21-2, B41, B52V14, B52-2, B53-2, B54V14, B56V14, B68 3v04, B95, PCMCIA, U65V02 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 ---		2007/01/02
	SW: K62, K69		2008/11/03
Vector Signal Generator	SMU200A	100912	Rohde & Schwarz GmbH & Co. KG
	Calibration Details		*Last Execution* *Next Exec.*
	Standard calibration		2008/10/28 2011/10/27

Test Equipment Emission measurement devices

Lab ID:	**Lab 1, Lab 2**
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	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2007/12/05	2010/12/04
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG	
	Calibration Details		*Last Execution*	*Next Exec.*
	Standard Calibration		2009/12/03	2011/12/02

Test Equipment Shielded Room 02

Lab ID:	**Lab 1**
Manufacturer:	Frankonia
Description:	Shielded Room for conducted testing
Type:	12 qm
Serial Number:	none

4.2 Laboratory Environmental Conditions

Laboratory	*Date*	*Temperature*	*Humidity*	*Air Pressure*
Lab 1	2010/04/15	23 °C	35 %	1010 hPa
Lab 2	2010/04/15	23 °C	35 %	1010 hPa

5 Annex

5.1 Additional Information for OUT Setup

additional equipment used for the setup I02_FCC15b_peri

TFT display
Manufacturer: LG
Model: Flatron L1740BQ
SN: 509WANF1W607
FCC ID: BEJL17NU

Laptop
Manufacturer: Fujitsu Siemens
Product: LIFEBOK C1410
Model: C1410 WB2
SerialNo: YK5T053778
Laptop AC Adapter
Manufacturer: Delta Electronics Inc.
Model: ADP-80NB A

Mouse
Manufacturer: Logitech
Model: M-BB48
SerialNo: LZC90505478

Keyboard
Manufacturer: CHERRY
Model: RS 6000
SerialNo: G 0000273 2P28

5.2 Additional Information for Report

Test Description

Conducted emissions (AC power line)

Standard FCC Part 15
Subpart B

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 (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

If not stated within the measurement plot and/or test result, class B limits are applied.

FCC Part 15, Subpart B, §15.107, Class B Limit

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

FCC Part 15, Subpart B, §15.107, Class A Limit

Frequency Range (MHz)	QP Limit (dBµV)	AV Limit (dBµV)
0.15 - 0.5	79	66
0.5 - 30	73	60

Used conversion factor: Limit (dBµV) = 20 log (Limit (µV)/1µV).

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.

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Spurious radiated emissions

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Standard FCC Part 15, 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 kHz
- IF–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° 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° to + 22.5 ° 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
- Measuring time: 1 s

Measurement 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

If not stated within the measurement plot and/or test result, class B limits are applied.

FCC Part 15, Subpart B, §15.109, Radiated Emission Limits
Frequency Range (MHz): Class B Limit (dBµV/m)

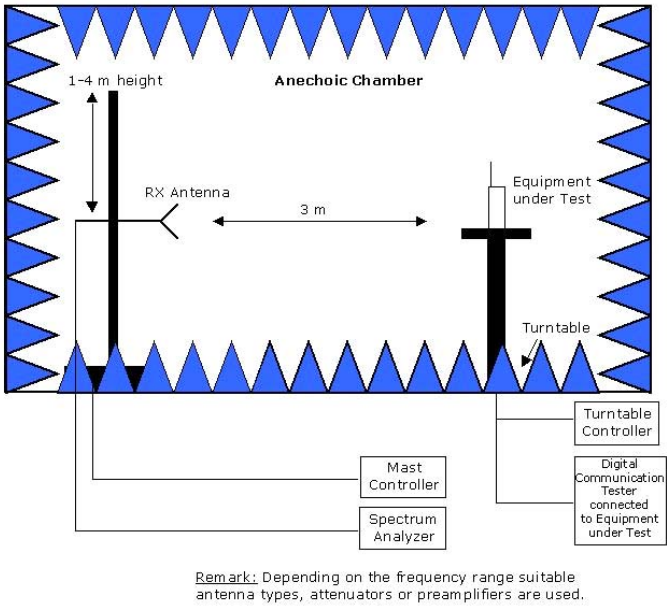
Frequency Range (MHz)	Class B Limit (dBµV/m)
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

Frequency Range (MHz)	Class A Limit (dBµV/m) / @ 3m !
30 - 88	49.5
88 - 216	54.0
216 - 960	56.9
above 960	60.0

§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 (dBµV/m) = 20 log (Limit (µV/m)/1µV/m)

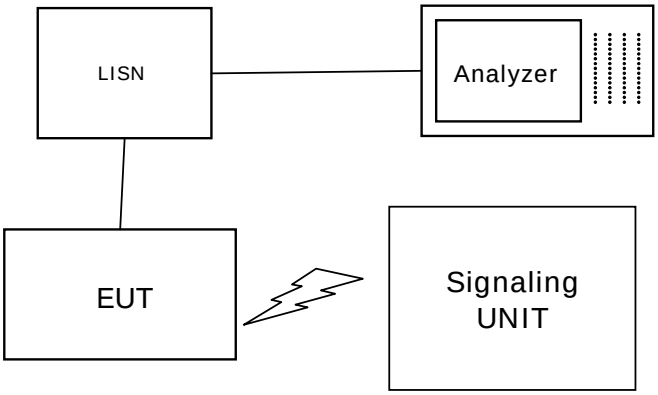
NOTE: a missing result table in the corresponding test report section means, that no final measurement was performed because no relevant frequencies (peaks) were found in the preliminary scan.

Setup Drawings



Remark: 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.



Setup in the shilded room for conducted measurements at AC mains port

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