



# InterLab®

## Final Report on

### BX4 FCC ID: Y6MNCOM7

**Report Reference:** MDE\_REDox\_1202\_FCCf  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

**Date:** October 11, 2012

#### Test Laboratory:

7Layers 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.

7Layers AG  
Borsigstrasse 11  
40880 Ratingen, Germany  
Phone: +49 (0) 2102 749 0  
Fax: +49 (0) 2102 749 350  
[www.7Layers.com](http://www.7Layers.com)

Aufsichtsratsvorsitzender •  
Chairman of the Supervisory Board:  
Ralf Mertens  
Vorstand • Board:  
Dr. H.-J. Meckelburg



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



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

## 1 Administrative Data

### 1.1 Project Data

*Project Responsible:* Patrick Lomax  
*Date Of Test Report:* 2012/10/11  
*Date of first test:* 2012/08/09  
*Date of last test:* 2012/09/14

### 1.2 Applicant Data

*Company Name:* Nolangroup s.p.a.  
*Street:* via Terzi di S.Agata 2  
*City:* 24030 Brembate di sopra  
*Country:* Italy  
*Contact Person:* Mr. Claudio Corollo  
*Phone:* +39 035 602 285  
*Fax:* +39 035 602 261  
*E-Mail:* c.corollo@nolan.it

### 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	DAkkS-Registration no. D-PL-12140-01-01
Lab 2	Radiated Emissions	Mr. Robert Machulec Mr. Andreas Petz	DAkkS-Registration no. D-PL-12140-01-01

### 1.4 Signature of the Testing Responsible

Patrick Lomax

responsible for tests performed in: Lab 1, Lab 2



Reference: MDE\_REDox\_1202\_FCCf

According to:

FCC 47 CFR Ch.1 Part 15 Subpart B

### 1.5 Signature of the Accreditation Responsible

*7 layers*  
7 layers AG, Borsigstr. 11  
D-40390 Ratingen, Germany  
Phone +49 (0)2102 74910

*H. Müller [M. Müller]*

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: BX4**

**Manufacturer:**

Company Name:

Please see applicant data

Contact Person:

-

**Ancillary Equipment: ACDC Adaptor (AK00G-0500040VU)**

**Parameter List:**

Parameter name

Value

**Parameter for Scope FCC\_v2:**

AC Power Supply

120 (V)



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

## 2.2 Detailed Description of OUT Samples

### Sample : CA01

<i>OUT Identifier</i>	BX4
<i>Sample Description</i>	NCOM BX4
<i>Serial No.</i>	#1
<i>HW Status</i>	1.00
<i>SW Status</i>	3.12

#### **Parameter List:**

Parameter Description	Value
<b>Parameter for Scope FCC_v2</b>	
Antenna Gain	0 (dBi)
Frequency_high	2480 (MHz)
Frequency_low	2402 (MHz)
Frequency_mid	2441 (MHz)

### Sample : ACDC01

<i>OUT Identifier</i>	ACDC Adaptor (AK00G-0500040VU)
<i>Sample Description</i>	AK00G-0500040VU
<i>Serial No.</i>	#1

## 2.3 OUT Features

### Features for OUT: BX4

Designation	Description	Allowed Values	Supported Value(s)
<b>Features for scope: FCC_v2</b>			
AC	The OUT is powered by or connected to AC Mains		
BT	EUT supports Bluetooth data rate of 1 Mbps with GFSK modulation in the band 2400 MHz - 2483.5 MHz		
EDR2	EUT supports Bluetooth using data rate of 2 Mbps with PI/4 DQPSK modulation in the band 2400 MHz - 2483.5 MHz		
EDR3	EUT supports Bluetooth using data rate of 3 Mbps with 8DPSK modulation in the band 2400 MHz - 2483.5 MHz		
Iant	Integral Antenna: permanent fixed antenna, which may be built-in, designed as an indispensable part of the equipment		
TantC	temporary antenna connector, which may be only built-in for testing, designed as an example part of the equipment		



Reference: MDE\_REDUX\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

## 2.4 Auxiliary Equipment

AE No.	Type Designation	Serial No.	HW Status	SW Status	Description
AE 01					USB Cable
AE 06	Cherry RS 6000 USB ON	G 0000273 2P28			Keyboard 1
AE 02	LG L1740BQ	509WANF1W607			TFT 1
AE 05	Logitech M-BB48	LZC90505478			Mouse
AE 04	Toshiba PA3378E-3AC3				AC Adapter 1
AE 03	Toshiba TECRA M9	TECRA M9		87060248H	Laptop 1

## 2.5 Operating Mode(s)

Ref.-No.	Description
01	Windows computer using a Redox program to continuously transmit data via USB.

## 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
<b>ACDC_CA01 (BX4)</b>				
Sample:	ACDC01	AK00G-0500040VU		
Sample:	CA01	NCOM BX4		
<b>PC_CA01 (BX4)</b>				
Sample:	CA01	NCOM BX4	AE 01	USB Cable
			AE 06	Keyboard 1
			AE 02	TFT 1
			AE 05	Mouse
			AE 04	AC Adapter 1
			AE 03	Laptop 1



Reference: MDE\_REDox\_1202\_FCCf  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

### 3 Results

#### 3.1 General

<b>Documentation of tested devices:</b>	Available at the test laboratory.
<b>Interpretation of the test results:</b>	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:** The laboratory environmental conditions are recorded and available in the Interlab system for each performed test.

#### 3.2 List of the Applicable Body

(Body for Scope: FCC\_v2)

<i>Designation</i>	<i>Description</i>
FCC47CFRChIPART15bRADIO FREQUENCY DEVICES	Part 15, Subpart B - Unintentional Radiators

#### 3.3 List of Test Specification

<i>Test Specification:</i>	<b>FCC part 2 and 15</b>
<i>Version</i>	10-1-11 Edition
<i>Title:</i>	PART 2 - GENERAL RULES AND REGULATIONS PART 15 - RADIO FREQUENCY DEVICES



Reference: MDE\_REDox\_1202\_FCCf  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

### 3.4 Summary

<i>Test Case Identifier / Name</i>	<i>Result</i>	<i>Date of Test</i>	<i>Lab Ref.</i>	<i>Setup</i>
<b>15b.1 Conducted Emissions (AC Power Line) §15.107</b>				
15b.1; Mode = transmit	Passed operating mode: 01	2012/09/14	Lab 1	PC_CA01
	Passed	2012/08/09	Lab 1	ACDC_CA01
<b>15b.2 Spurious Radiated Emissions §15.109</b>				
15b.2; Mode = transmit	Passed operating mode: 01	2012/09/14	Lab 2	PC_CA01
	Passed	2012/08/09	Lab 2	ACDC_CA01



---

Reference: MDE\_REDox\_1202\_FCCf  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

### 3.5 Detailed Results

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

**Test1: 15b.1; Mode = transmit**

<i>Result:</i>	Passed
<i>Setup No.:</i>	ACDC_CA01
<i>Date of Test:</i>	2012/08/09 7:15
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15



Reference: MDE\_REDox\_1202\_FCCf  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

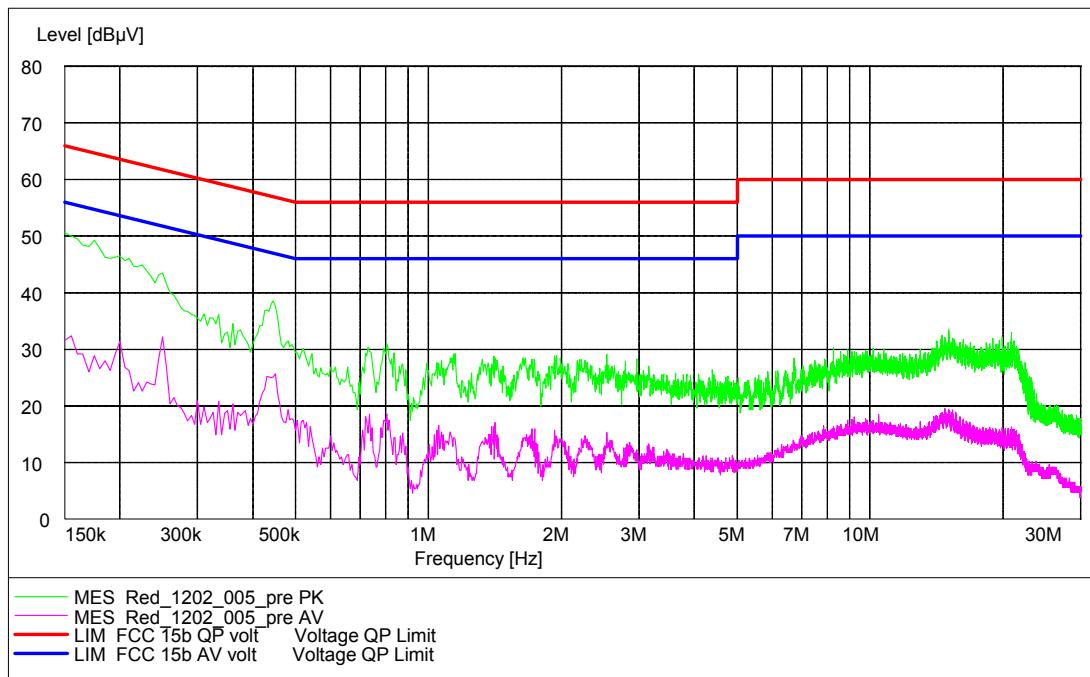
**Detailed Results:**

**AC MAINS CONDUCTED**

EUT: (UH050ca01)  
Manufacturer: Redox  
Operating Condition: charging via ACDC(USB) charger  
Test Site: 7 layers Ratingen  
Operator: Giz  
Test Specification: ANSI C63.4; FCC 15.107 / 15.207  
Comment:  
Start of Test: 10.08.2012 / 10:53:44

**SCAN TABLE: "FCC Voltage"**

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



**Test2: 15b.1; Mode = transmit**

*Result:* Passed  
*Setup No.:* PC\_CA01  
*Date of Test:* 2012/09/14 8:53  
*Body:* FCC47CFRChIPART15bRADIO FREQUENCY DEVICES  
*Test Specification:* FCC part 2 and 15



Reference: MDE\_REDox\_1202\_FCCf  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

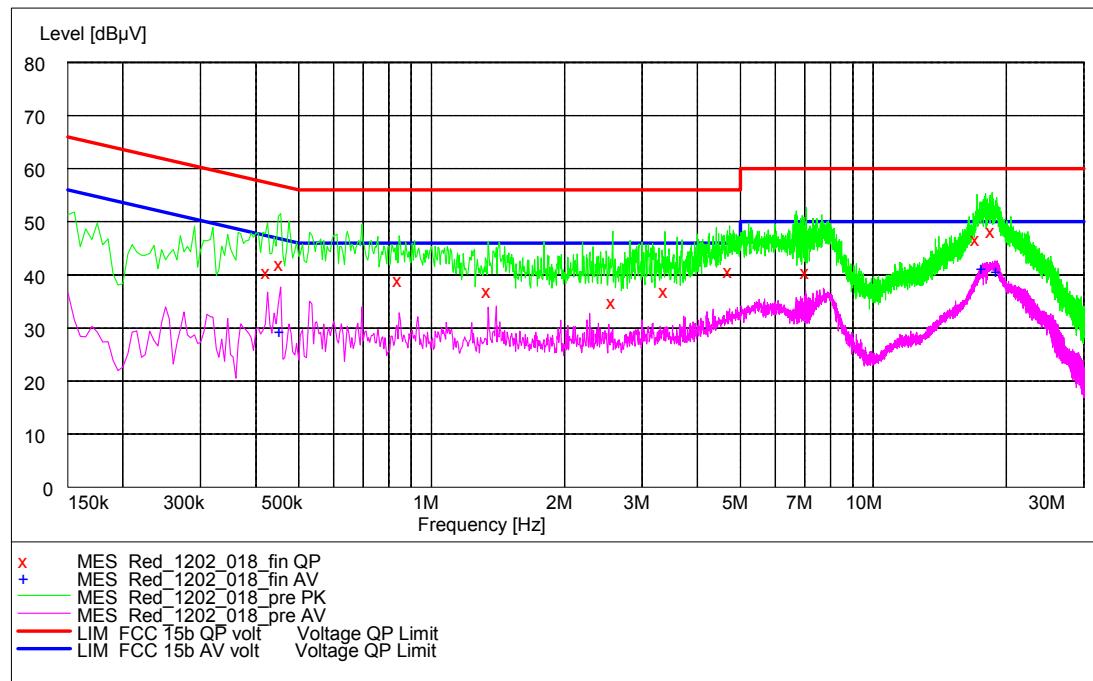
#### Detailed Results:

##### AC MAINS CONDUCTED

EUT: (UH050ca01)  
Manufacturer: Redox  
Operating Condition: USB Traffic  
Test Site: 7 layers Ratingen  
Operator: Giz  
Test Specification: ANSI C63.4; FCC 15.107 / 15.207  
Comment:  
Start of Test: 06.09.2012 / 12:59:05

##### SCAN TABLE: "FCC Voltage"

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



##### MEASUREMENT RESULT: "Red\_1202\_018\_fin QP"

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.425000	40.90	10.1	57	16.4	N	FLO
0.455000	42.30	10.1	57	14.5	N	FLO
0.845000	39.30	10.1	56	16.7	L1	GND
1.345000	37.20	10.1	56	18.8	L1	FLO
2.570000	35.20	10.2	56	20.8	L1	GND
3.380000	37.30	10.3	56	18.7	L1	GND
4.725000	41.00	10.4	56	15.0	L1	FLO
7.060000	40.90	10.5	60	19.1	L1	FLO
17.165000	47.10	10.9	60	12.9	N	FLO
18.580000	48.60	10.9	60	11.4	L1	FLO

##### MEASUREMENT RESULT: "Red\_1202\_018\_fin AV"

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.455000	29.60	10.1	47	17.2	N	GND
17.655000	41.30	10.9	50	8.7	L1	FLO
19.070000	40.80	10.9	50	9.2	L1	FLO



Reference: MDE\_REDOX\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

### **3.5.2      15b.2 Spurious Radiated Emissions §15.109**

**Test1: 15b.2; Mode = transmit**

<i>Result:</i>	Passed
<i>Setup No.:</i>	ACDC_CAO1
<i>Date of Test:</i>	2012/08/09 7:15
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15



Reference: MDE\_REDox\_1202\_FCCf  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

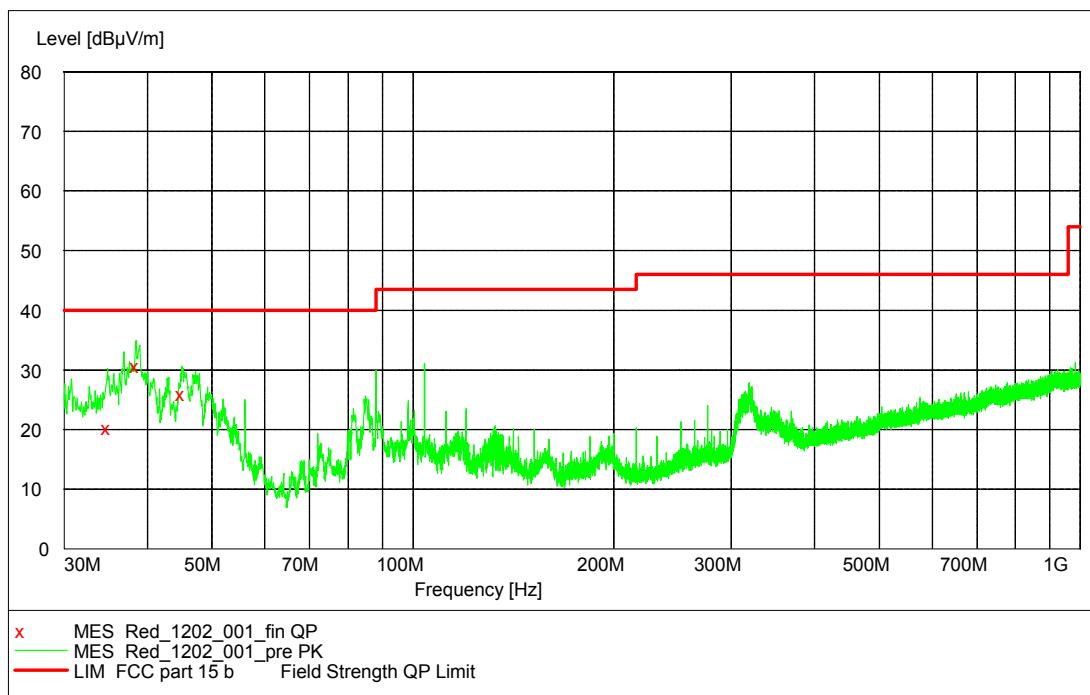
**Detailed Results:**

**EMI RADIATED TEST**

EUT: NCOM-X4 (UH050ca01)  
Manufacturer:  
Operating Condition: charging via ACDC(USB) charger  
Test Site: 7 layers, Ratingen  
Operator: Gal  
Test Specification: FCC part 15 b  
Comment: Horizontal EUT position  
Start of Test: 09.08.2012 / 23:26:29

**SCAN TABLE: "FCC part 15 b"**

Short Description:	FCC part 15 b					
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	MaxPeak	1.0 ms	120 kHz	HL562



**MEASUREMENT RESULT: "Red\_1202\_001\_fin QP"**

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
34.860000	20.30	17.9	40.0	19.7	375.0	329.00	VERTICAL
38.460000	30.80	15.8	40.0	9.2	125.0	318.00	VERTICAL
45.060000	26.00	12.0	40.0	14.0	114.0	158.00	VERTICAL

**Test2: 15b.2; Mode = transmit**

**Result:** Passed  
**Setup No.:** PC\_Ca01  
**Date of Test:** 2012/09/14 8:55  
**Body:** FCC47CFRChIPART15bRADIO FREQUENCY DEVICES  
**Test Specification:** FCC part 2 and 15

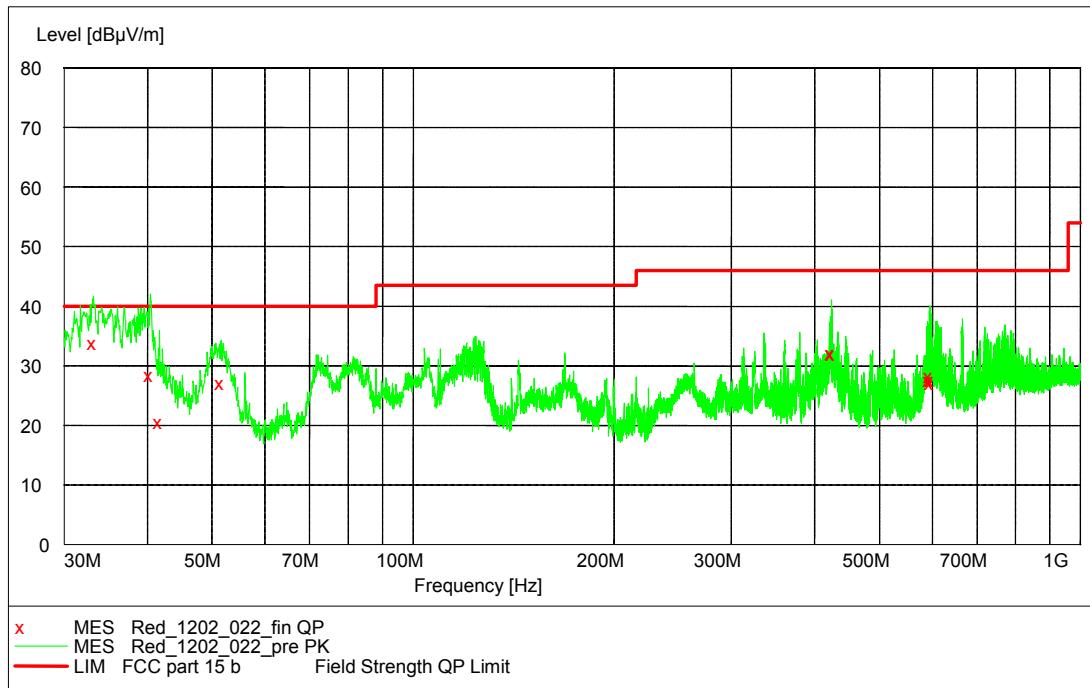
**Detailed Results:**

**EMI RADIATED TEST**

EUT: (UH050ca01)  
 Manufacturer:  
 Operating Condition: USB traffic  
 Test Site: 7 layers, Ratingen  
 Operator: Gal  
 Test Specification: FCC part 15 b  
 Comment: Horizontal EUT position  
 Start of Test: 13.09.2012 / 23:33:22

**SCAN TABLE: "FCC part 15 b"**

Short Description:		FCC part 15 b				
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
30.0 MHz	1.0 GHz	60.0 kHz	MaxPeak	1.0 ms	120 kHz	HL562



**MEASUREMENT RESULT: "Red\_1202\_022\_fin\_QP"**

Frequency MHz	Level dB $\mu$ V/m	Transd dB	Limit dB $\mu$ V/m	Margin dB	Height cm	Azimuth deg	Polarisation
33.240000	33.90	18.7	40.0	6.1	182.0	112.00	VERTICAL
40.380000	28.50	14.7	40.0	11.5	225.0	112.00	VERTICAL
41.700000	20.60	14.0	40.0	19.4	307.0	247.00	HORIZONTAL
51.600000	27.20	7.7	40.0	12.8	103.0	338.00	VERTICAL
423.960000	32.20	16.2	46.0	13.8	118.0	157.00	HORIZONTAL
424.740000	32.00	16.2	46.0	14.0	125.0	157.00	HORIZONTAL
594.240000	27.60	19.8	46.0	18.4	183.0	0.00	HORIZONTAL
595.320000	28.30	19.8	46.0	17.7	125.0	157.00	VERTICAL
597.240000	27.20	19.8	46.0	18.8	105.0	0.00	VERTICAL
597.780000	27.70	19.8	46.0	18.3	101.0	234.00	HORIZONTAL



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

## 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:	10.58x6.38x6.00 m <sup>3</sup>

#### 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 <sup>3</sup>	none	Frankonia
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	FCC listing 96716 3m Part15/18		2011/01/11    2014/01/10
	IC listing 3699A-1 3m		2011/02/07    2014/02/06
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 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
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Path Calibration		2011/11/11    2012/11/10
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
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	DKD calibration		2011/01/20    2013/01/19



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

### 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	620/37	HD GmbH	
Biconical dipole	VUBA 9117 <i>Calibration Details</i>	9117-108	Schwarzbeck	
	Standard Calibration		Last Execution	Next Exec.
	Standard Calibration		2008/10/27	2013/10/26
			2012/01/18	2015/01/17
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P <i>Calibration Details</i>	849785	Miteq	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4 <i>Calibration Details</i>	-	Miteq	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P <i>Calibration Details</i>	896037	Miteq	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
Cable "ESI to EMI Antenna"	EcoFlex10 <i>Calibration Details</i>	W18.01- 2+W38.01-2	Kabel Kusch	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
Cable "ESI to Horn Antenna"	UFB311A+UFB293C <i>Calibration Details</i>	W18.02- 2+W38.02-2	Rosenberger Micro-Coax	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
	Path Calibration		2012/05/24	2012/11/23
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		Last Execution	Next Exec.
	Standard Calibration		2012/05/18	2015/05/17
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG	
	<i>Calibration Details</i>		Last Execution	Next Exec.
	Standard Calibration		2012/06/26	2015/06/25
High Pass Filter	4HC1600/12750-1.5-KK <i>Calibration Details</i>	9942011	Trilithic	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
High Pass Filter	5HC2700/12750-1.5-KK <i>Calibration Details</i>	9942012	Trilithic	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
High Pass Filter	5HC3500/12750-1.2-KK <i>Calibration Details</i>	200035008	Trilithic	
	Path Calibration		Last Execution	Next Exec.
			2012/05/24	2012/11/23
High Pass Filter	WHKX 7.0/18G-8SS <i>Calibration Details</i>	09	Wainwright	
			Last Execution	Next Exec.



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

#### Single Devices for Auxiliary Equipment for Radiated emissions (continued)

Single Device Name	Type	Serial Number	Manufacturer
	Path Calibration		2012/05/24 2012/11/23
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG
Calibration Details		Last Execution	Next Exec.
	Standard calibration	2011/10/27	2014/10/26
Pyramidal Horn Antenna 26,5 GHz	3160-09	00083069	EMCO Elektronik GmbH
Pyramidal Horn Antenna 40 GHz	3160-10	00086675	EMCO Elektronik GmbH
Tilt device Maturo (Rohacell)	Antrieb TD1.5-10kg	TD1.5-10kg/024/3790709	Maturo 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
Broadband Power Divider N (Aux)	1506A / 93459	LM390	Weinschel Associates
Broadband Power Divider SMA	WA1515	A855	Weinschel Associates
Digital Multimeter 03 (Multimeter)	Fluke 177	86670383	Fluke Europe B.V.
Calibration Details		Last Execution	Next Exec.
	Customized calibration	2011/10/19	2013/10/18
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
Vector Signal Generator	SMIQ 03B	832492/061	Rohde & Schwarz GmbH & Co.KG



Reference: MDE\_REDUX\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

### 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		2011/11/24    2014/11/23
CMW500	CMW500	107500	Rohde & Schwarz GmbH & Co.KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Initial factory calibration		2012/01/26    2014/01/25
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	Firmware: V.2.01.25		2012/07/03
	3G : KC42x 11.48.02, 12.16.00		
	LTE: KC501 1.7.0 up to 2.0.0		
	KC503 1.7.2 up to 2.0.0		
	KC506 1.9.8 up to 2.0.0		
	KC507 1.7.0		
	KC508 1.8.5 up to 2.0.0		
	KC551 1.4.9 up to 2.0.0		
	KC553 1.7.0 up to 2.0.0		
	KC556 2.0.0		
	KC571 1.8.5 up to 2.0.0		
	KC572 1.8.5 up to 2.0.0		
	---		
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		2011/05/26    2013/05/25
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	Hardware:		2007/07/16
	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		
	---		
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		2011/12/07    2014/12/06
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	HW options:		2007/01/02
	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		
	---		
	SW:		2008/11/03
	K62, K69		



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

#### 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
Power Meter	NRVD	828110/016	Rohde & Schwarz GmbH & Co.KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2012/05/22    2013/05/21
Sensor Head A	NRV-Z1	827753/005	Rohde & Schwarz GmbH & Co.KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	Standard calibration		2012/05/21    2013/05/20
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		2011/05/12    2014/05/11
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		2011/12/05    2013/12/04
	<i>HW/SW Status</i>		<i>Date of Start</i> <i>Date of End</i>
	Firmware-Update 4.34.4 from 3.45 during calibration		2009/12/03

#### Test Equipment Shielded Room 02

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



---

Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

**5        Annex**

**5.1      Additional Information for Report**



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

#### Test Description

---

---

---

#### Conducted emissions (AC power line)

---

Standard      FCC Part 15 Subpart B

The test was performed according to: ANSI C 63.4, 2009

#### Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2009.

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) which meets the requirements of ANSI C63.4-2009, Annex B, in the frequency range of the measurements. 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 (dB $\mu$ V)	AV Limit (dB $\mu$ V)
0.15 – 0.5	66 to 56	56 to 46
0.5 – 5	56	46
5 – 30	60	50



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

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

Frequency Range (MHz)	QP Limit (dB $\mu$ V)	AV Limit (dB $\mu$ V)
0.15 - 0.5	79	66
0.5 - 30	73	60

Used conversion factor: Limit (dB $\mu$ V) = 20 log (Limit ( $\mu$ V)/1 $\mu$ V).

NOTES:

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.

The chosen operating mode is selected as representative mode to generate "worst-case" conditions, i.e. high power consumption.

---

Spurious radiated emissions

---

Standard FCC Part 15, Subpart B

The test was performed according to: ANSI C 63.4, 2009

Test Description

Measurement below 1 GHz:

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2009.

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 influence of the EUT support table that is used between 30-1000 MHz was evaluated.

The test was performed at the distance of 3 m between the EUT and the receiving antenna. The measurement procedure is implemented into the EMI test software ES-K1 from R&S. The radiated emissions measurements were made in a typical installation configuration. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is performed at 2 axes. A pre-check is also performed while the EUT is powered from both AC and DC (battery) power in order to find the worst-case operating condition.

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  $\mu$ s
- 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



Reference: MDE\_RED0X\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

- 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: -0.25 m to +0.25 m 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 (dB $\mu$ V/m)

Frequency Range (MHz)	Class B Limit (dB $\mu$ V/m)
30 – 88	40.0
88 – 216	43.5
216 – 960	46.0
above 960	54.0

Frequency Range (MHz)	Class A Limit (dB $\mu$ V/m) / @ 3m !
30 – 88	49.5
88 – 216	54.0
216 – 960	56.9
above 960	60.0

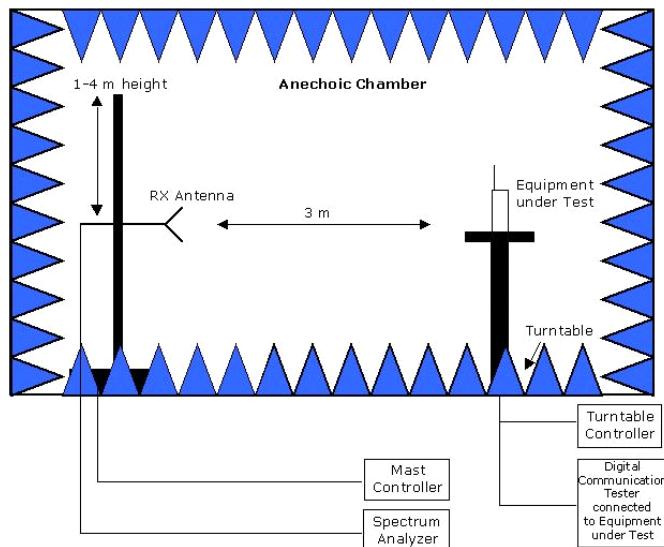
#### §15.35(b)

..., 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....

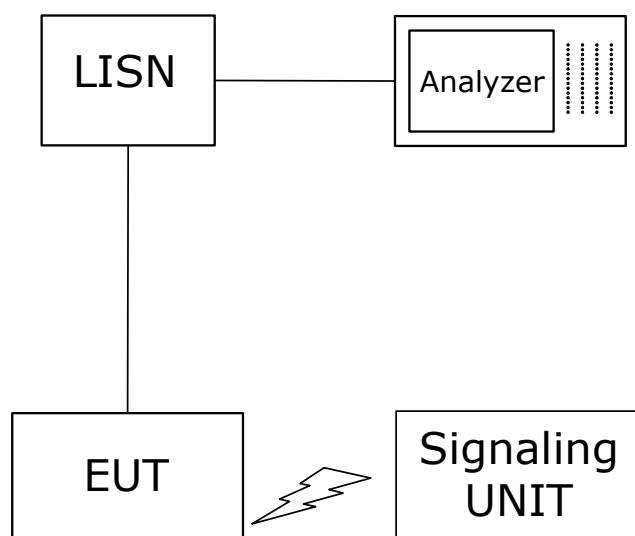
Used conversion factor: Limit (dB $\mu$ V/m) = 20 log (Limit ( $\mu$ V/m)/1 $\mu$ V/m)

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



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



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



Reference: MDE\_REDox\_1202\_FCCF  
According to:  
FCC 47 CFR Ch.1 Part 15 Subpart B

## 6 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	4
2.3 OUT Features	4
2.4 Auxiliary Equipment	5
2.5 Operating Mode(s)	5
2.6 Setups used for Testing	5
3 Results	6
3.1 General	6
3.2 List of the Applicable Body	6
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	11
4 Test Equipment Details	14
4.1 List of Used Test Equipment	14
5 Annex	19
5.1 Additional Information for Report	19
6 Index	24