



# InterLab<sup>®</sup>

## Final Report on

### BlackBerry HS-700 Bluetooth Headset

**Report Reference:** MDE\_GNNET\_1002\_FCCb

FCC Part 15b

**Date:** March 05, 2010

**Test Laboratory:**

7 layers AG  
Borsigstr. 11  
40880 Ratingen  
Germany

**Note:**

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

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Aufsichtsratsvorsitzender •  
Chairman of the Supervisory Board:  
Markus Becker  
Vorstand • Board:  
Dr. Hermann Buitkamp  
Wilfried Klassmann



DGA-PL-192/99-02

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:* Carsten Steinröder  
*Date Of Test Report:* 2010/03/05  
*Date of first test:* 2010/02/26  
*Date of last test:* 2010/03/01

### 1.2 Applicant Data

GN Netcom A/S Lautrupbjerg 7 2750 Ballerup Denmark	on behalf of	<b>Research In Motion Ltd.</b> 295 Phillip Street Waterloo, Ontario Canada N2L 3W8
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**Contact Person:**  
 Mr. Tom Ringtved  
 Tel. +45 45 75 91 86  
[tringtved@gm.com](mailto:tringtved@gm.com)

### 1.3 Test Laboratory Data

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

#### 7 layers DE

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*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**



Carsten Steinröder  
responsible for tests performed in: Lab 1, Lab 2



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

**1.5 Signature of the Accreditation Responsible**



Accreditation scope responsible person  
responsible for Lab 1, Lab 2

## 2 Test Object Data

### 2.1 General OUT Description

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

**OUT:** BlackBerry HS-700 Bluetooth Headset

*Product Category:* Mobile Phone Accessory

**Manufacturer:**

*Company Name:* GN Netcom A/S  
*Street:* Lautrupbjerg 7  
*City:* DK-2750 Ballerup  
*Country:* Danmark

*Contact Person:* Mr. Tom Ringtved  
*Phone:* +45 45 75 91 86  
*Fax:* +45 45 75 88 89  
*E-Mail:* tringtved@gn.com

**Parameter List:**

<i>Parameter name</i>	<i>Value</i>
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**Parameter for Scope FCC\_v2:**

AC Power Supply	120 (V)
Antenna Gain	1.0 (dBi)
DC Power Supply (via USB)	5 (V)
highest channel	2480 (MHz)
lowest channel	2402 (MHz)
mid channel	2441 (MHz)

**OUT: USB cable**

**Ancillary Equipment: AC/DC Charger**

**Manufacturer:**

*Company Name:* Research In Motion Ltd.  
*Street:* 295 Phillip Street  
*City:* Waterloo, Ontario N2L 3W8  
*Country:* Canada

*Contact Person:* -

## 2.2 Detailed Description of OUT Samples

### **Sample : 02**

<i>OUT Identifier</i>	USB cable
<i>Sample Description</i>	USB cable
<i>Serial No.</i>	-
<i>HW Status</i>	-
<i>SW Status</i>	-
<i>Date of Receipt</i>	2010/02/22

### **Sample : f01**

<i>OUT Identifier</i>	BlackBerry HS-700 Bluetooth Headset		
<i>Sample Description</i>	radiated sample		
<i>Serial No.</i>	00237874011F		
<i>HW Status</i>	27-01275-D		
<i>SW Status</i>	1.11.0		
<i>Date of Receipt</i>	2010/02/22		
<i>Low Voltage</i>	3.2 V	<i>Low Temp.</i>	-10 °C
<i>High Voltage</i>	4.2 V	<i>High Temp.</i>	+60 °C
<i>Nominal Voltage</i>	3.7 V	<i>Normal Temp.</i>	+20 °C

### **Parameter List:**

<i>Parameter Description</i>	<i>Value</i>
<b>Parameter for Scope FCC_v2</b>	
Antenna Gain	1.0 (dBi)
Frequency_high	2480 (MHz)
Frequency_low	2402 (MHz)
Frequency_mid	2441 (MHz)

### **Sample : 01**

<i>OUT Identifier</i>	AC/DC Charger
<i>Sample Description</i>	AC/DC RIM part No.HDW24481001
<i>Serial No.</i>	00B7
<i>HW Status</i>	Model: RIM-C-0004ADUUS-00
<i>SW Status</i>	-
<i>Date of Receipt</i>	2010/02/22

### 2.3 OUT Features

**Features for OUT:** BlackBerry HS-700 Bluetooth Headset

<i>Designation</i>	<i>Description</i>	<i>Allowed Values</i>	<i>Supported Value(s)</i>
<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		
DC	The OUT is powered by or connected to DC Mains		
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		

### 2.4 Auxiliary Equipment

<i>AE No.</i>	<i>Type Designation</i>	<i>Serial No.</i>	<i>HW Status</i>	<i>SW Status</i>	<i>Description</i>
AE 5	Cherry RS 6000	G 0000273 2P28			Keyboard
AE 1	Flatron L1740BQ	509WANF1W607			TFT Display
AE 4	Logitech M-BB48	LZC90505478			Optical Mouse
AE 3	Toshiba PA3378E-3AC3	G71C0006R310			AC-Adapter
AE 2	Toshiba TECRA M9	87060248H			Notebook

## 2.5 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.

<i>Setup No.</i>	<i>List of OUT samples</i>	<i>List of auxiliary equipment</i>	
<i>Sample No.</i>	<i>Sample Description</i>	<i>AE No.</i>	<i>AE Description</i>
<b>F01_AC</b>			
Sample: 01	AC/DC RIM part No.HDW24481001		
Sample: 02	USB cable		
Sample: f01	radiated sample		
<b>F01_PC</b>			
Sample: 02	USB cable	AE 5	Keyboard
Sample: f01	radiated sample	AE 1	TFT Display
		AE 4	Optical Mouse
		AE 3	AC-Adapter
		AE 2	Notebook

## 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:**

The OUT is automatically switched off during charging. Charging is possible via USB or dedicated AC/DC adapter.

### 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

*Test Specification:* **FCC part 2 and 15**  
*Date / Version* 2009/03/26 Version: 10-1-08 Edition  
*Title:* PART 2 - GENERAL RULES AND REGULATIONS  
PART 15 - RADIO FREQUENCY DEVICES

<i>Applicable Errata</i>	<i>Activate Date</i>	<i>Comment</i>
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

<i>Test Case Identifier / Name Test (condition)</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 = charging	Passed	2010/02/26	Lab 1	F01_PC
	Passed	2010/02/26	Lab 1	F01_AC
<b>15b.2 Spurious Radiated Emissions §15.109</b>				
15b.2; Mode = charging	Passed	2010/03/01	Lab 2	F01_PC
	Passed	2010/03/01	Lab 2	F01_AC



### **3.5 Detailed Results**

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

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

<i>Result:</i>	Passed
<i>Setup No.:</i>	F01_AC
<i>Date of Test:</i>	2010/02/26 11:11
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15

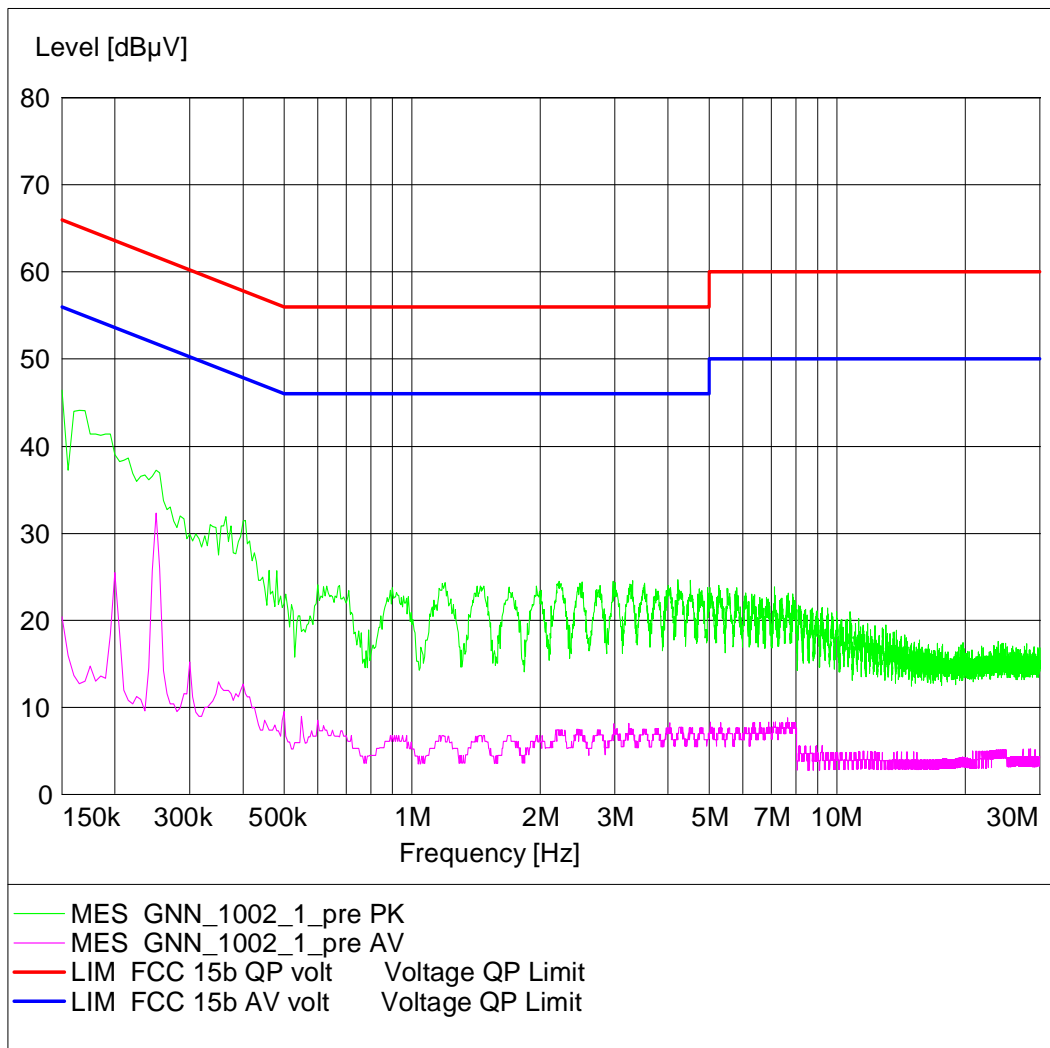
**Detailed Results:**

**AC MAINS CONDUCTED**

EUT: Cj080f01  
 Manufacturer: GNNET  
 Operating Condition: charging 120 AC  
 Test Site: 7 layers Ratingen  
 Operator: mac  
 Test Specification: ANSI C63.4; FCC 15.107 / 15.207  
 Comment:  
 Start of Test: 26.02.2010 / 10:33:03

**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 = charging**

<i>Result:</i>	Passed
<i>Setup No.:</i>	F01_PC
<i>Date of Test:</i>	2010/02/26 11:13
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15

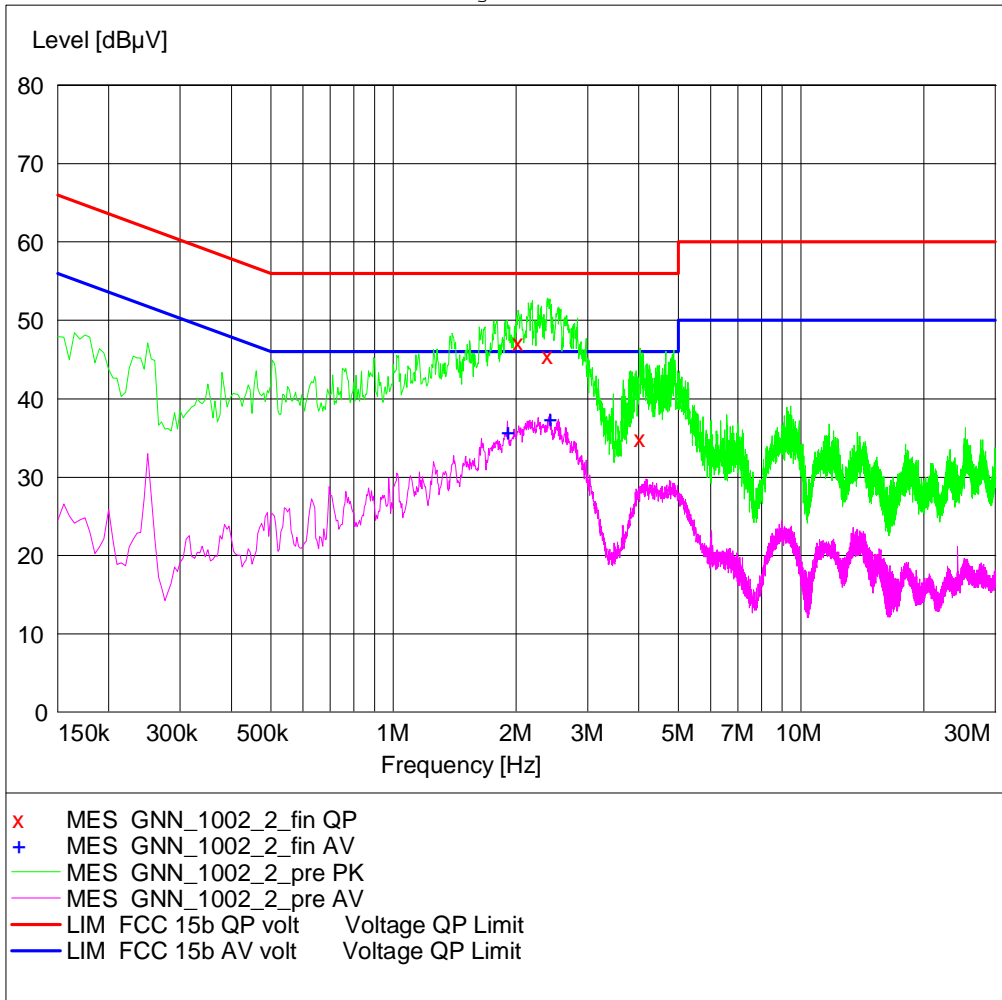
**Detailed Results:**

**AC MAINS CONDUCTED**

EUT: Cj080f01  
 Manufacturer: GNNET  
 Operating Condition: charging USB  
 Test Site: 7 layers Ratingen  
 Operator: mac  
 Test Specification: ANSI C63.4; FCC 15.107 / 15.207  
 Comment:  
 Start of Test: 26.02.2010 / 10:55:07

**SCAN TABLE: "FCC Voltage"**

Start	Stop	Step	Detector	Meas. Time	IF Bandw.	Transducer
150.0 kHz	30.0 MHz	5.0 kHz	MaxPeak Average	20.0 ms	9 kHz	ESH3-Z5



**MEASUREMENT RESULT: "GNN\_1002\_2\_fin QP"**

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
2.025000	47.20	10.1	56	8.8	N	GND
2.385000	45.50	10.1	56	10.5	L1	GND
4.035000	35.00	10.3	56	21.0	N	FLO

**MEASUREMENT RESULT: "GNN\_1002\_2\_fin AV"**

26.02.2010 11:01

Frequency	Level	Transd	Limit	Margin	Line	PE
MHz	dBµV	dB	dBµV	dB		
1.905000	35.80	10.1	46	10.2	N	GND
2.420000	37.50	10.2	46	8.5	N	GND



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

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

<i>Result:</i>	Passed
<i>Setup No.:</i>	F01_AC
<i>Date of Test:</i>	2010/03/01 11:56
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15

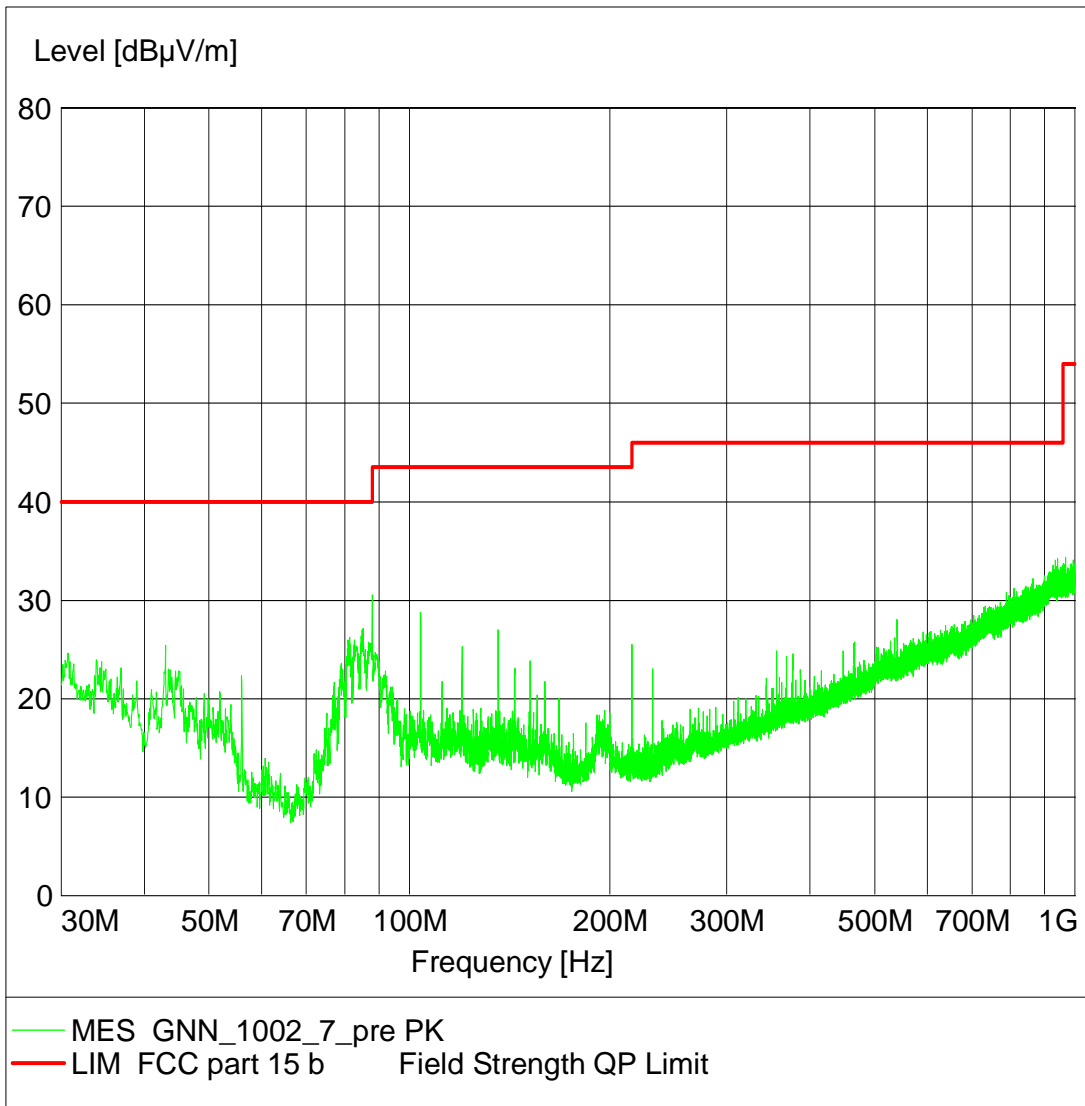
**Detailed Results:**

**EMI RADIATED TEST**

EUT: CJ080f01  
 Manufacturer: GNNET  
 Operating Condition: charging AC=120V  
 Test Site: 7 layers, Ratingen  
 Operator: mac  
 Test Specification: FCC part 15 b  
 Comment: Horizontal EUT position  
 Start of Test: 01.03.2010 / 11:26:56

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

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





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

<i>Result:</i>	Passed
<i>Setup No.:</i>	F01_PC
<i>Date of Test:</i>	2010/03/01 11:59
<i>Body:</i>	FCC47CFRChIPART15bRADIO FREQUENCY DEVICES
<i>Test Specification:</i>	FCC part 2 and 15



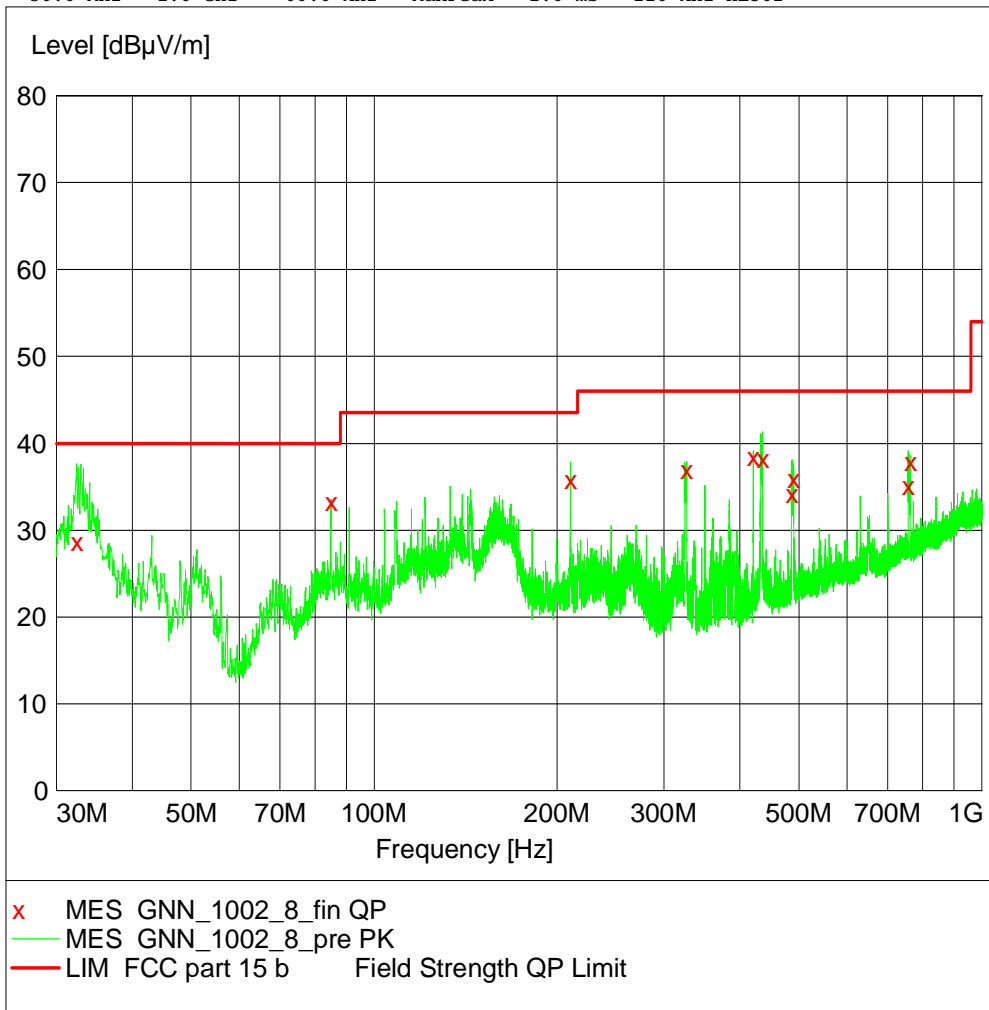
**Detailed Results:**

**EMI RADIATED TEST**

EUT: CJ080f01  
 Manufacturer: GNNET  
 Operating Condition: charging USB  
 Test Site: 7 layers, Ratingen  
 Operator: mac  
 Test Specification: FCC part 15 b  
 Comment: Horizontal EUT position  
 Start of Test: 01.03.2010 / 11:52:29

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

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



**MEASUREMENT RESULT: "GNN\_1002\_8\_fin QP"**

Frequency MHz	Level dBuV/m	Transd dB	Limit dBuV/m	Margin dB	Height cm	Azimuth deg	Polarisation
32.400000	28.70	19.4	40.0	11.3	100.0	67.00	VERTICAL
84.900000	33.30	10.0	40.0	6.7	119.0	157.00	VERTICAL
210.360000	35.80	10.0	43.5	7.7	102.0	23.00	HORIZONTAL
326.640000	36.90	14.8	46.0	9.1	112.0	45.00	VERTICAL
420.780000	38.50	17.5	46.0	7.5	113.0	19.00	VERTICAL
435.660000	38.20	17.9	46.0	7.8	102.0	359.00	VERTICAL
487.020000	34.20	19.3	46.0	11.8	118.0	67.00	VERTICAL
490.080000	35.90	19.3	46.0	10.1	125.0	157.00	VERTICAL
756.900000	35.10	24.6	46.0	10.9	175.0	202.00	VERTICAL
762.000000	37.90	24.6	46.0	8.1	175.0	226.00	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

<b>Lab ID:</b>	<b>Lab 2</b>		
<b>Manufacturer:</b>	Frankonia		
<b>Description:</b>	Anechoic Chamber for radiated testing		
<b>Type:</b>	10.58x6.38x6		
	<i>Calibration Details</i>	<i>Last Execution</i>	<i>Next Exec.</i>
	IC renewal	2009/01/21	2011/01/20
	FCC renewal	2009/01/07	2011/01/06

#### Single Devices for Anechoic Chamber

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Air compressor	none	-	Atlas Copco
Anechoic Chamber	10.58 x 6.38 x 6	none	Frankonia
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	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	CO2000/328/124 70406/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

<b>Lab ID:</b>	<b>Lab 1</b>
<b>Manufacturer:</b>	Rohde & Schwarz GmbH & Co.KG
<b>Description:</b>	EMI Conducted Auxiliary Equipment

#### Single Devices for Auxiliary Equipment for Conducted emissions

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
Cable "LISN to ESI"	RG214	W18.03+W48.03	Huber&Suhner
Coupling-Decoupling- Network	CDN ENY41	100002	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	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
	<i>Calibration Details</i>		<i>Last Execution</i> <i>Next Exec.</i>
	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
	<i>Calibration Details</i>		
	Standard Calibration		2008/10/27 2013/10/26
Broadband Amplifier 18MHz-26GHz	JS4-18002600-32-5P	849785	Miteq
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
Broadband Amplifier 1GHz-4GHz	AFS4-01000400-1Q-10P-4	-	Miteq
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
Broadband Amplifier 30MHz-18GHz	JS4-00101800-35-5P	896037	Miteq
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
Cable "ESI to EMI Antenna"	EcoFlex10	W18.01- 2+W38.01-2	Kabel Kusch
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
Cable "ESI to Horn Antenna"	UFB311A+UFB293C	W18.02- 2+W38.02-2	Rosenberger Micro-Coax
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
Double-ridged horn	HF 906	357357/001	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		
	Standard Calibration		2009/04/16 2012/04/15
Double-ridged horn	HF 906	357357/002	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		
	Standard Calibration		2009/04/28 2012/04/27
Dreheinheit	DE 325		HD GmbH
High Pass Filter	4HC1600/12750-1.5-KK	9942011	Trilithic
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
High Pass Filter	5HC2700/12750-1.5-KK	9942012	Trilithic
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
High Pass Filter	5HC3500/12750-1.2-KK	200035008	Trilithic
	<i>Calibration Details</i>		
	Path Calibration		2009/11/16 2010/05/15
Log.-per. Antenna	HL 562 Ultralog	830547/003	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		

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

<i>Single Device Name</i>	<i>Type</i>	<i>Serial Number</i>	<i>Manufacturer</i>
	Standard Calibration		2009/05/27 2012/05/26
Loop Antenna	HFH2-Z2	829324/006	Rohde & Schwarz GmbH & Co. KG
	<i>Calibration Details</i>		<i>Last Execution Next Exec.</i>
	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**

<b>Lab ID:</b>	<b>Lab 2</b>
<i>Manufacturer:</i>	see single devices
<i>Description:</i>	Single Devices for various Test Equipment
<i>Type:</i>	various
<i>Serial Number:</i>	none

**Single Devices for Auxiliary Test Equipment**

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



**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
			<i>Calibration Details</i>
			<i>Last Execution</i> <i>Next Exec.</i>
			Standard Calibration
			2007/12/05   2010/12/04
Spectrum Analyzer	ESIB 26	830482/004	Rohde & Schwarz GmbH & Co. KG
			<i>Calibration Details</i>
			<i>Last Execution</i> <i>Next Exec.</i>
			Standard Calibration
			2009/12/03   2011/12/02

**Test Equipment 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**

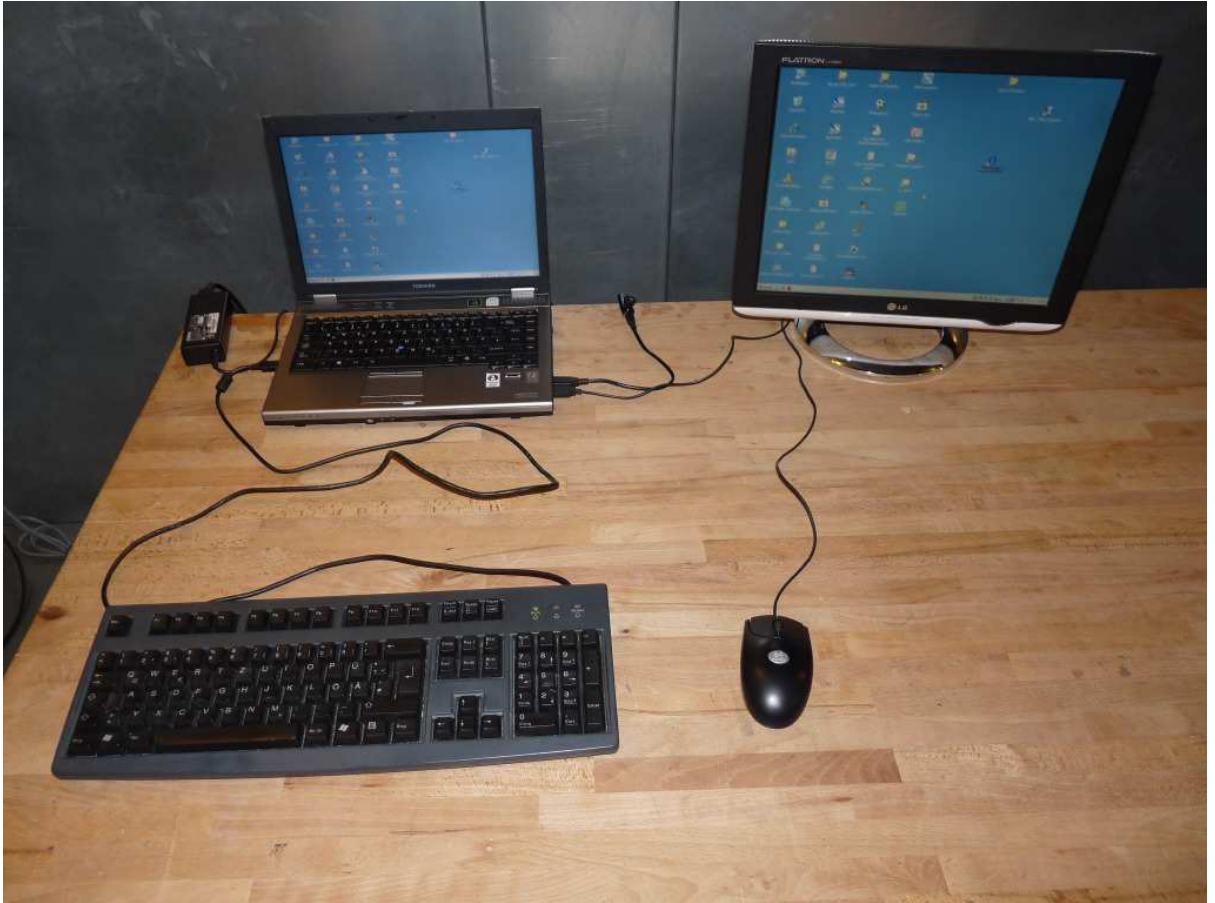
Laboratory	Date	Temperature	Humidity	Air Pressure
Lab 1	2010/02/26	23 °C	32 %	982 hPa
Lab 2	2010/03/01	23 °C	32 %	1005 hPa

## 5 Annex

### 5.1 Additional Information for Test Plan

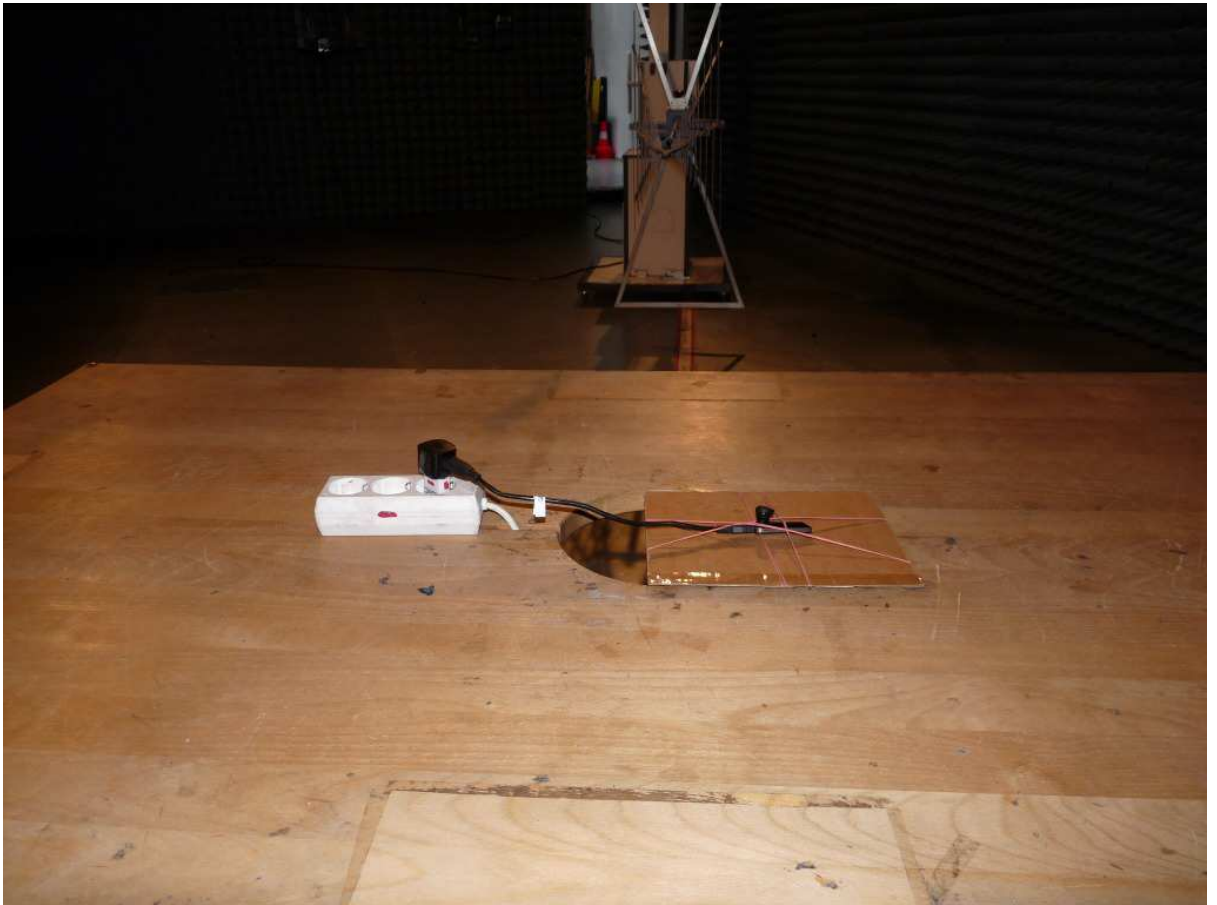


setup for the test conducted emissions. EUT powered by AC



setup for the test conducted emissions. EUT powered by USB





setup for the test radiated emissions. EUT powered by AC



setup for the test radiated emissions. EUT powered by USB

**5.2 Additional Information for Report**



Photo OUT: back view



Photo OUT: front view



Photo OUT: left view



Photo OUT: right view



Photo OUT: USB-port



Photo AC/DC Charger





Photo AC/DC Charger (USB connector visible)



AC/DC Charger with USB cable

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**Test Description**

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**Conducted emissions (AC power line)**

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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 50 $\mu$ H || 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 (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

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

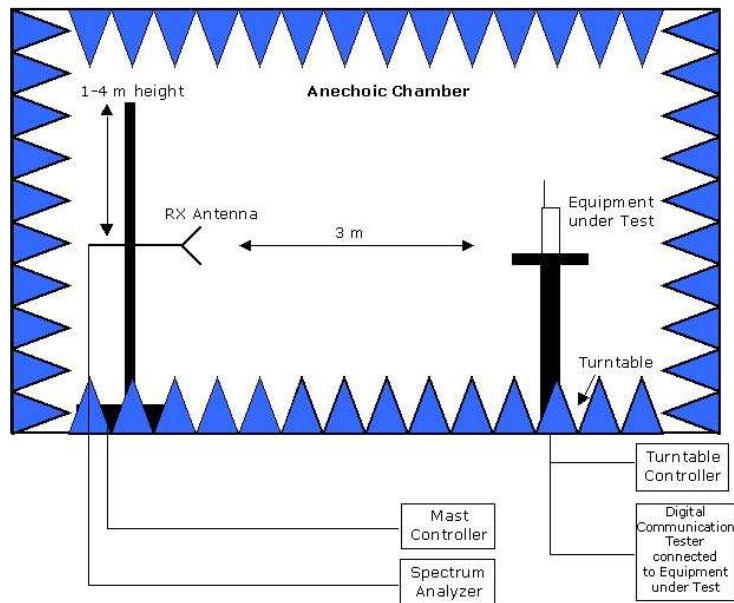
**§15.35(b)**

..., 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.



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