



**TEST REPORT CONCERNING THE COMPLIANCE OF AN  
RFID CARD READER, OPERATING ON 13.56 MHz.  
BRAND Nedap, MODEL Convexs MD80FG  
WITH 47 CFR PART 15 (10-1-09 EDITION) AND THE  
REQUIREMENTS OF INDUSTRY CANADA:  
RSS-GEN AND RSS-210 (ISSUE 8, DECEMBER 2010)**

**11022301.fcc01  
June 28, 2011**

FCC listed : 90828  
Industry Canada : 2932G-1  
VCCI Registered : R-1518, C-1598  
R&TTE, LVD, EMC Notified Body : 1856

**TÜV Rheinland EPS B.V.  
P.O. Box 15  
9822 ZG Niekerk (NL)  
Smidshornerweg 18  
9822 TL Niekerk (NL)**

Telephone: +31 594 505005  
Telefax: +31 594 504804

E-mail: [info@tuv-eps.com](mailto:info@tuv-eps.com)  
Web: [www.tuv-eps.com](http://www.tuv-eps.com)

## MEASUREMENT/TECHNICAL REPORT

**N.V. Nederlandsche Apparatenfabriek "Nedap"**

**Brand: Nedap**  
**Model: Convexs MD80FG**  
**FCC ID: CGDCONVEXSM**  
**IC: 1444A-CONVEXSM**

This report concerns:	Original grant/certification	<del>Class 2 Permissive Change</del>	<del>Verification</del>
Equipment type:	RFID Card Reader		
Report prepared by:	Name	: Richard van der Meer	
	Company name	: TÜV Rheinland EPS B.V.	
	Address	: Smidshornerweg 18	
	Postal code/city	: 9822 TL Niekerk	
	Mailing address	: P.O. Box 15	
	Postal code/city	: 9822 ZG Niekerk	
	Country	: The Netherlands	
	Telephone number	: + 31 594 505 005	
	Telefax number	: + 31 594 504 804	
	E-mail	: info@tuv-eps.com	

The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (10-1-09 Edition), RSS-GEN AND RSS-210 and the measurement procedures of ANSI C63.4-2009. TÜV Rheinland EPS B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission profile of the Equipment Under Test (EUT) on the date of the test as noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.

Date: June 28, 2011]

Signature:



O.H. Hoekstra  
Senior Engineer Telecom TÜV Rheinland EPS B.V.

## Summary

The device under test does:

- fulfill the general approval requirements as identified in this test report
- not fulfill the general approval requirements as identified in this test report

## Description of test item

Test item (EUT) : RFID Card Reader  
Manufacturer : N.V. Nederlandsche Apparatenfabriek "Nedap"  
Brand : Nedap  
Model(s) : Convexs MD80FG  
Serial number(s) : B404 B3A4B  
FCC ID : CGDCONVEXSM  
IC : 1444A-CONVEXSM  
Receipt date : April 04, 2011



## Applicant information

Applicant's representative : Mr. J. Hulshof  
Company : N.V. Nederlandsche Apparatenfabriek "Nedap"  
Address : Parallelweg 2  
Postal code : 7141 DC  
City : Groenlo  
Country : The Netherlands  
Telephone number : +31 544 471 162  
Telefax number : +31 544 466 475

## Test(s) performed

Location : Niekerk  
Test(s) started : April 21, 2011  
Test(s) completed : June 08, 2011  
Purpose of test(s) : Equipment Authorization (Original grant/certification)

Test specification(s) : 47 CFR Part 15 (10-1-09 Edition) and RSS-GEN AND RSS-210  
Compliance statement : The test has demonstrated that this unit complies with stipulated standards.

Test engineer(s) : R. van der Meer   
O.H. Hoekstra 

Report written by : R. van der Meer

Report date : June 28, 2011

This report shall not be reproduced, except in full, without the written permission of TÜV Rheinland EPS B.V.  
The test results relate only to the item(s) tested.

## Table of contents

1	General information.....	5
1.1	Product description.....	5
1.1.1	Introduction.....	5
1.2	Related submittal(s) and/or Grant(s).....	5
1.2.1	General.....	5
1.3	Tested system details.....	5
1.3.1	Description of input and output ports.....	7
1.4	Test Summary.....	7
1.5	Test methodology.....	8
1.6	Test facility.....	8
1.7	Test conditions.....	8
2	System test configuration.....	9
2.1	Justification.....	9
2.2	EUT mode of operation.....	9
2.3	Special accessories.....	9
2.4	Equipment modifications.....	9
2.5	Product Labeling.....	9
2.6	Block diagram of the EUT.....	9
2.7	Schematics of the EUT.....	9
2.8	Part list of the EUT.....	9
3	Radiated emission data.....	10
3.1	Radiated field strength measurements (30 MHz – 1 GHz, E-field).....	10
3.1.1	Test equipment used (for reference see test equipment listing).....	10
3.2	Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).....	11
3.2.1	Test equipment used (for reference see test equipment listing).....	11
4	Conducted emission data.....	12
4.1	Conducted emission data of the EUT (full configuration).....	12
4.1.1	Test equipment used (for reference see test equipment listing).....	12
5	Carrier stability under special conditions.....	13
5.1	Frequency stability (on 13.56 MHz) in accordance with 47 CFR Part 15, section 15.225 (e) & RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6:.....	13
5.1.1	At 85% and 115% of rated voltage supply level.....	13
5.2	Bandwidth of the emission on 13.56 MHz in accordance with RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6.....	13
5.2.1	Test equipment used (for reference see test equipment listing).....	14
6	Plots of measurement data.....	15
6.1	Bandwidth of the emission.....	15
6.2	Plots of the Conducted emissions.....	16
7	List of utilized test equipment.....	18

## 1 General information.

### 1.1 Product description.

#### 1.1.1 Introduction.

The RFID Card Reader, brand Nedap model Convexs MD80FG, hereafter referred to as EUT is an RFID card reader intended for access control. It is capable of reading 13.56 MHz inductive tags.

The content of this report and measurement results have not been changed other than the way of presenting the data.

### 1.2 Related submittal(s) and/or Grant(s).

#### 1.2.1 General.

This test report supports the original grant/certification in equipment authorization files under registration number.  
**FCC ID: CGDCONVEXSM and IC: 1444A-CONVEXSM.**

### 1.3 Tested system details.

Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	RFID Cardreader
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand	:	Nedap
Model	:	Convexs MD80FG
Serial number	:	B404 B3A4B
Voltage input rating	:	12 - 24 VDC
Voltage output rating	:	n.a.
Current input rating	:	0.1 A
Antenna	:	Internal
Remarks	:	n.a.

Aux: 1	:	USB converter (USB/RS485)
Manufacturer	:	---
Brand	:	EasySync
Model/partnumber	:	USB-COMi-SI-M
Serial #/ID	:	---
Voltage input rating	:	---

Aux: 2	:	USB hub
Manufacturer	:	EMINENT
Brand	:	EMINENT
Model/partnumber	:	EM1036
Serial #/ID	:	---
Voltage input rating	:	---

Aux: 3	:	Power supply
Manufacturer	:	AN-MANN
Brand	:	AN-MANN
Model/partnumber	:	81940-12/93
Serial #/ID	:	---
Voltage input rating	:	100-230 Vac

Aux: 4 : Laptop  
Manufacturer : Toshiba  
Brand : Toshiba  
Model/partnumber : Satellite Pro 4300  
Serial #/ID : ---  
Voltage input rating : 100-230 Vac

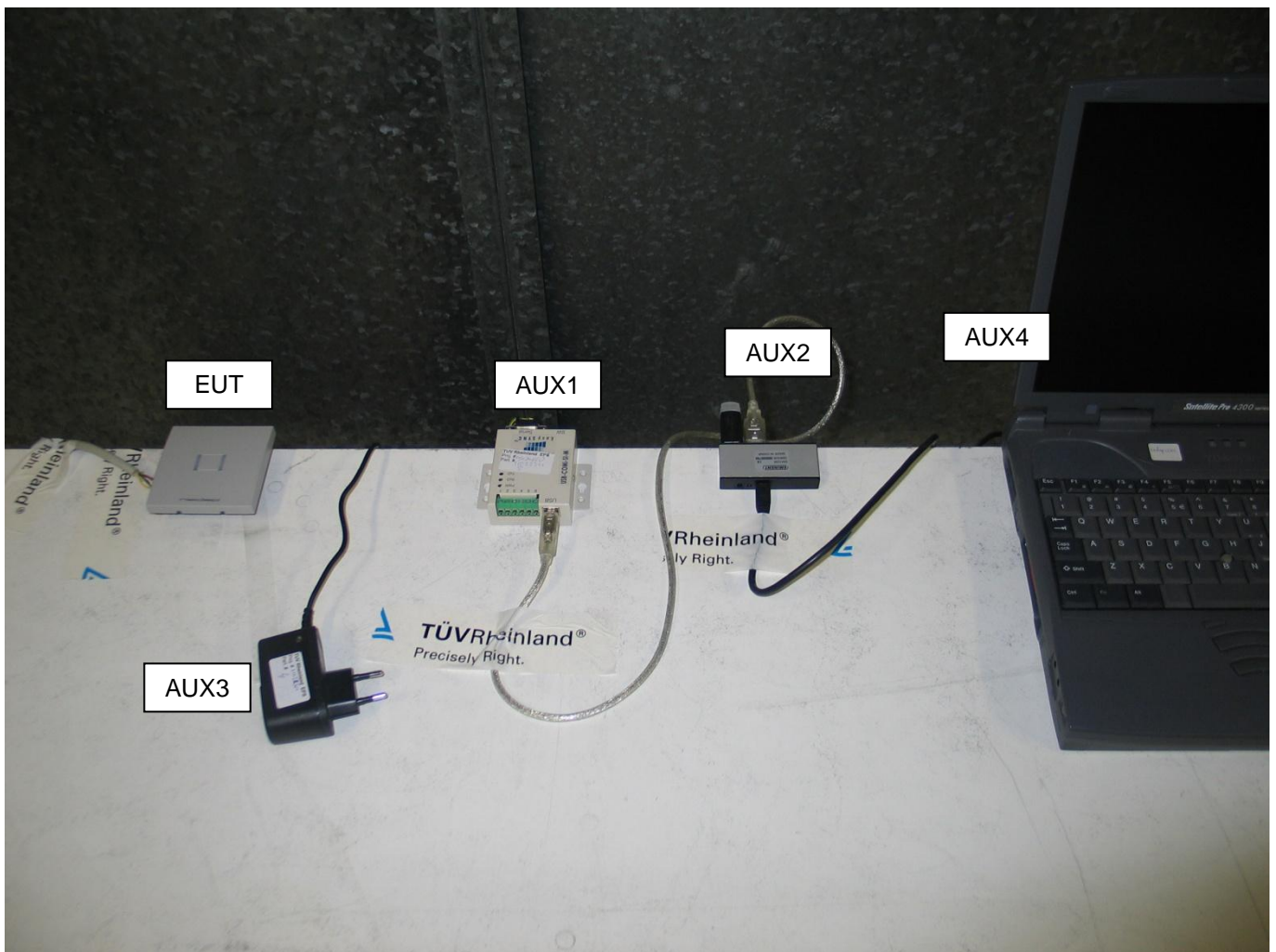


Photo 1: System overview

### 1.3.1 Description of input and output ports.

Number	Terminal	From	To	Length
1	AC Power	Mains	Aux 3	0 m
2	DC power	Aux 3	EUT	>> 3 m, shielded
3	Controller I/O	EUT	Aux 1	>> 3 m, shielded
4	USB	Aux 2	Aux 4	< 3 m, shielded

### 1.4 Test Summary

The EUT was tested in accordance with the specifications given in Table 1 below.

Test Standard		Description	Pass / Fail
47 CFR Part 15.225 (10-1-09 Edition)	RSS-210 Issue 8, December 2010		
15.207(a)	RSS-Gen(7.2.4)	Conducted emissions	Pass
15.225(a)	RSS-210(A2.6(a))	Emissions in the band 13.533-13.567 MHz	Pass
15.225(d), 15.209	RSS-210(A2.6)	Emissions outside the band 13.110-14.010 MHz	Pass
15.225(e)	RSS-210(A2.6)	Frequency stability	Pass
15.215(c)	RSS-Gen(4.6.1)	Occupied bandwidth	Pass

Table 1: Test specifications

Testmethods: ANSI C63:2009 and RSS-Gen Issue 3, December 2010

## 1.5 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (10-1-09 Edition), sections 15.31, 15.35, 15.205, 15.209, 15.209 and 15.225 and RSS-GEN AND RSS-210 (ISSUE 8, DECEMBER 2010).

The test methods, which have been used, are based on ANSI C63.4: 2009.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters.

Radiated emission tests below 30 MHz were performed at a measurement distance of 3 meters.

To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the appropriate extrapolation factor is used.

The receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antenna factors are programmed in the test receiver. The receiver automatically calculates the appropriate correction factor for the utilized antenna and also the appropriate antenna factor for the cable loss. The total correction is automatically added to the measured value.

## 1.6 Test facility.

The Federal Communications Commission and Industry Canada has reviewed the technical characteristics of the test facilities at TÜV Rheinland EPS B.V., located in Niekerk, 9822 TL Smidshornerweg 18, The Netherlands, and has found these test facilities to be in compliance with the requirements of 47 CFR Part 15, section 2.948(10-1-06 edition).

The description of the test facilities has been filed at the Office of the Federal Communications Commission under registration number 90828. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

The description of the test facilities has been filed to Industry Canada under registration number 2932G-1. The facility has been added to the list of laboratories performing these test services for the public on a fee basis.

## 1.7 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: 120VAC/60Hz to the AC/DC Power Supply
Air pressure	: 950 – 1050 hPa

When is was impracticable to carry out the tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests are stated separately.



## 2 System test configuration.

### 2.1 Justification.

The system was configured for testing in a typical situation as a customer would normally use it. The test sample was configured by the applicant to enable continuous transmit. Only for Conducted Emission test the test unit was modified to add a resistive termination in lieu of the antenna as per KDB 174176.

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.4: 2009.

### 2.2 EUT mode of operation.

The EUT has been tested in active mode, i.e. the EUT is ready to detect a card. To assess the behavior of the EUT while reading the card, the EUT is tested with a card presented such that it continuously reads the card. The intentional radiator tests have been performed with a complete functioning EUT.

### 2.3 Special accessories.

No special accessories are used and/or needed to achieve compliance.

### 2.4 Equipment modifications.

No modifications have been made to the equipment.

### 2.5 Product Labeling

The product labeling information is available in the technical documentation package.

### 2.6 Block diagram of the EUT.

The block diagram is available in the technical documentation package.

### 2.7 Schematics of the EUT.

The schematics are available in the technical documentation package.

### 2.8 Part list of the EUT.

The part list is available in the technical documentation package.

### 3 Radiated emission data.

#### 3.1 Radiated field strength measurements (30 MHz – 1 GHz, E-field)

Frequency (MHz)	Measurement results @3m Vertical (dBµV)	Measurement results @3m Horizontal (dBµV)	Correction factor (dB)	Results after correction Vertical (dBµV/m)	Results after correction Horizontal (dBµV/m)	Limits @3m (dBµV/m)	Pass/Fail
59.3	15.9	7.8	6.9	22.8	14.7	40.0	Pass
64.2	19.2	9.9	7.0	26.2	16.9	40.0	Pass
68.6	24.1	15.5	7.4	31.5	22.9	40.0	Pass
112.1	15.8	8.1	13.5	29.3	21.6	43.5	Pass
176.3	21.4	18.3	12.2	33.6	30.5	43.5	Pass
203.4	17.5	10.1	12.3	29.8	22.4	43.5	Pass

Table 2 Radiated emissions of the EUT

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15 section 15.205, 15.209 and 15.225 and RSS-210 and RSS-Gen, section 2.2 and 2.6 are depicted in Table 2.

**Notes:**

1. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
2. Measurement uncertainty is  $\pm 5.0$ dB.
3. The EUT was varied in three positions, the measuring antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
4. The EUT was tested in both normal mode (i.e. without a label in its proximity) and in activated mode (i.e. with a label in its proximity). Worst case noted.
5. A Quasi-peak detector was used with a bandwidth of 120 kHz.

#### 3.1.1 Test equipment used (for reference see test equipment listing).

99699	99547	99071	99070	15633	99174	12476
99606	99580	99608	99107	12477		

Test engineer

Signature :



Name : O.H. Hoekstra

Date : May 30, 2011

### 3.2 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

Frequency (MHz)	Measurement results	Detector	Antenna factor	Cable loss	Extrapolation factor	Measurement results (calculated)	Limits	Pass/Fail
	dBµV @3m							
13.56 (fundamental)	45.9	Qp	19.7	1	40	26.6	84.0	Pass
27.12	< 0.0	Qp	19.7	1	40	<-19.3	29.5	Pass

Table 3 Radiated emissions of the EUT, in the frequency range 0.009 – 30 MHz

The results of the radiated emission tests in the frequency range 0.009 – 30 MHz, carried out in accordance with 47 CFR Part 15 section 15.209, 15.225 and RSS-210 and RSS-Gen are depicted in Table 3.

**Notes:**

1. Calculated measurement results are obtained by using the 40dB/decade factor (antenna factor and cable loss is included). i.e at 13.56 MHz: 45.9 dBµV + 19.7 dB + 1dB - 40dB= 26.6 dBµV/m.
2. A resolution bandwidth of 9 kHz was used during testing.
3. Field strength values of radiated emissions at frequencies not listed in Table 3 are more than 20 dB below the applicable limit.
4. The loop antenna was varied in horizontal and vertical orientations and also around it's axis. The reported value is the worst case found at the reported frequency.
5. The EUT was tested in horizontal and vertical orientations. Worst case values noted.
6. Measurement uncertainty is ±5.0dB.

#### 3.2.1 Test equipment used (for reference see test equipment listing).

99699	99547	99071	99070	99608	15453	99580
-------	-------	-------	-------	-------	-------	-------

Test engineer

Signature :



Name : O.H. Hoekstra

Date : May 30, 2011

## 4 Conducted emission data.

### 4.1 Conducted emission data of the EUT (full configuration).

Frequency (MHz)	Measurement results dB(μV) Neutral		Measurement results dB(μV) Line 1		Limits dB(μV)		Pass/Fail
	QP	AV	QP	AV	QP	AV	
0.154	<30	<20	38.3	27.3	66.0	56.0	Pass
0.166	38.3	27.6	38.5	26.9	65.0	55.0	Pass
0.186	35.8	25.8	36.3	24.6	64.0	54.0	Pass
0.694	36.5	26.7	29.4	24.5	56.0	46.0	Pass
0.718	44.6	34.4	36.9	31.5	56.0	46.0	Pass
0.774	34.0	24.6	28.3	20.0	56.0	46.0	Pass
0.890	34.0	25.5	29.3	21.3	56.0	46.0	Pass
3.862	33.8	27.3	31.5	21.6	56.0	46.0	Pass
13.562	53.1	49.7	50.9	44.7	60.0	50.0	Pass

Table 4 Conducted emission measurements

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15 section 15.207 & RSS-Gen, section 7.2.4, at the 120 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in Table 4.


#### Notes:

1. The test unit was modified to add a resistive termination in lieu of the antenna as per KDB 174176.
2. The test data shown above is of the worst case EUT. Maximum values recorded.
3. The values of conducted emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
4. Measurement uncertainty is  $\pm 3.5$ dB
5. Plots of the conducted emissions are given on pages 16 and 17.

#### 4.1.1 Test equipment used (for reference see test equipment listing).

99699	12512	99161	99548	99615		
-------	-------	-------	-------	-------	--	--

#### Test engineer

Signature : 

Name : R. van der Meer

Date : June 06, 2011

## 5 Carrier stability under special conditions.

### 5.1 Frequency stability (on 13.56 MHz) in accordance with 47 CFR Part 15, section 15.225 (e) & RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6:

- 1) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 °C to +50 °C at normal supply voltage (see Table 5).

Stability under special conditions	Supply Voltage	Measured frequency (MHz)	Frequency deviation (limit $\pm 0.01\%$ ) (%)	PASS/FAIL
Temperature (°C)	(Vac)			
20.0	120	13.560332 (reference)	N.A.	N.A.
-20.0	120	13.560461	< 0.01	PASS
50.0	120	13.560308	< 0.01	PASS

Table 5: The frequency tolerance of the carrier signal

#### 5.1.1 At 85% and 115% of rated voltage supply level

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency at 85% and at 115% of the rated power supply voltage at 20 °C environmental temperature. The results are stated in Table 6.

Stability under special conditions	Measured frequency (MHz)	Frequency deviation (limit $\pm 0.01\%$ ) (%)	PASS/FAIL
% variation U			
100.0	13.560332 (reference)	N.A.	N.A.
85.0	13.560332	< 0.01	PASS
115.0	13.560332	< 0.01	PASS

Table 6: The frequency tolerance of the carrier signal

### 5.2 Bandwidth of the emission on 13.56 MHz in accordance with RSS-Gen section 4.7 and 7.2.4 and RSS-210 section A2.6.

Limit: 20 dB of the bandwidth of the emission shall be within the specified frequency band.  
 Bandwidth of the emission is determined at the points 20 dB down from the modulated carrier.  
 Specified frequency band: 13553 kHz - 13567 kHz.

Temperature (°C)	Minimum frequency (kHz)	Maximum frequency (kHz)
+20.0	13560.370	13560.404
-20.0	13560.499	13560.530
+50.0	13560.360	13560.389
Bandwidth	13560.360	13560.530

Table 6: Bandwidth of the emission

The measured minimum frequency and maximum frequency are well within the specified frequency bandwidth.

**5.2.1 Test equipment used (for reference see test equipment listing).**

99318	99413	12640	99613	99733		
-------	-------	-------	-------	-------	--	--

Test engineer

Signature



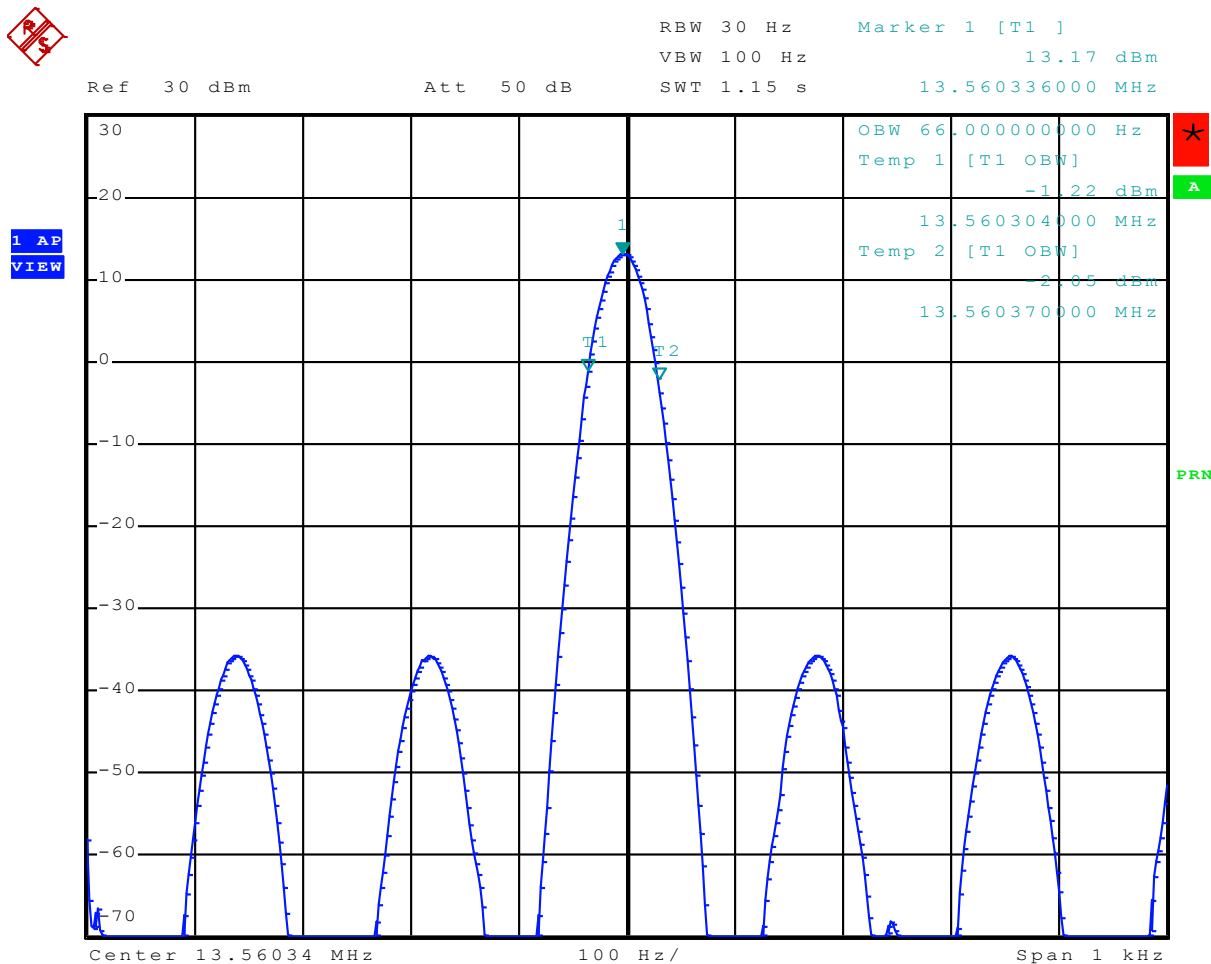
:

Name : O.H. Hoekstra

Date : April 21, 2011

## 6 Plots of measurement data

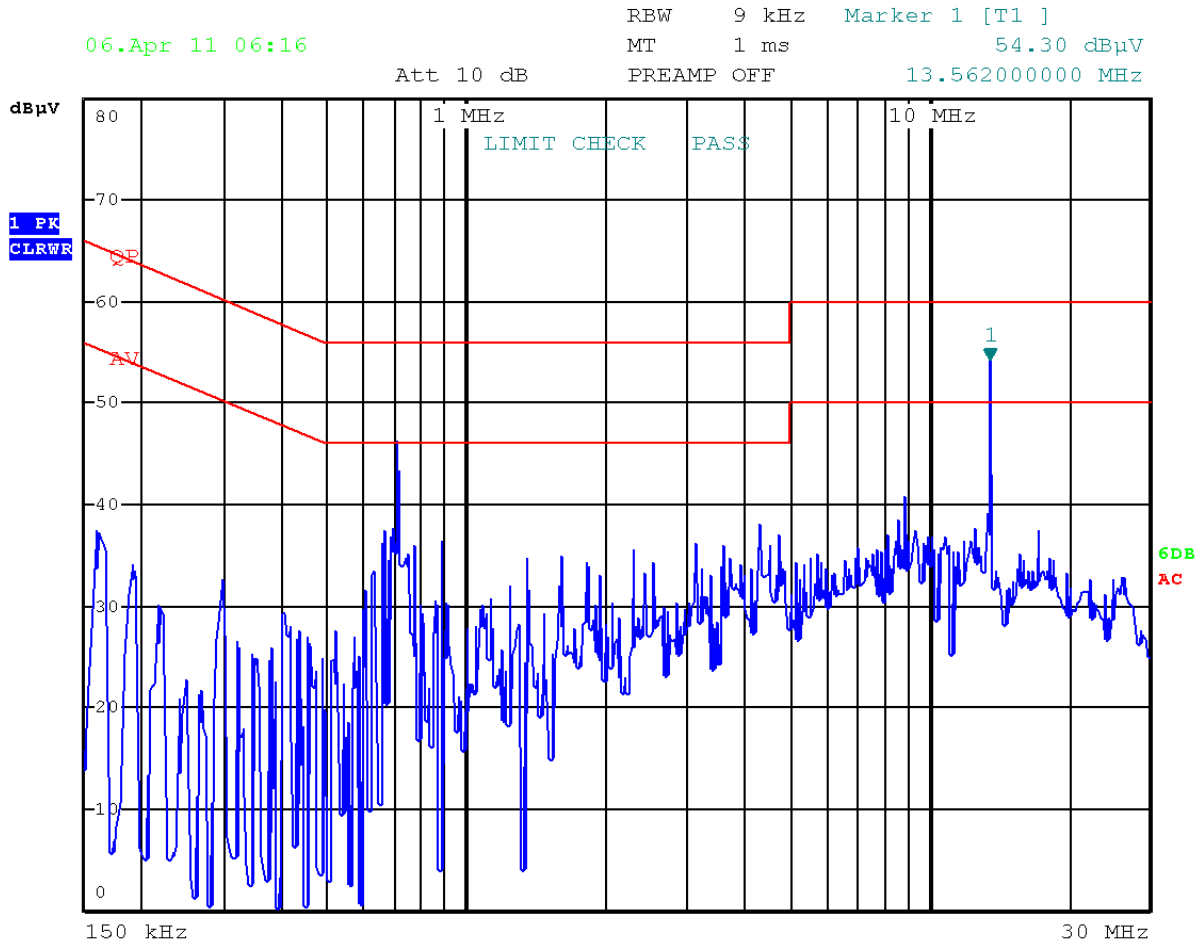
### 6.1 Bandwidth of the emission



Date: 21.APR.2011 14:02:25

Plot1: Bandwidth of the emission at 13.56 MHz (Fundamental Carrier),  
for IC the measured Occupied Bandwidth is 66 Hz. Measured with a spectrum analyzer.

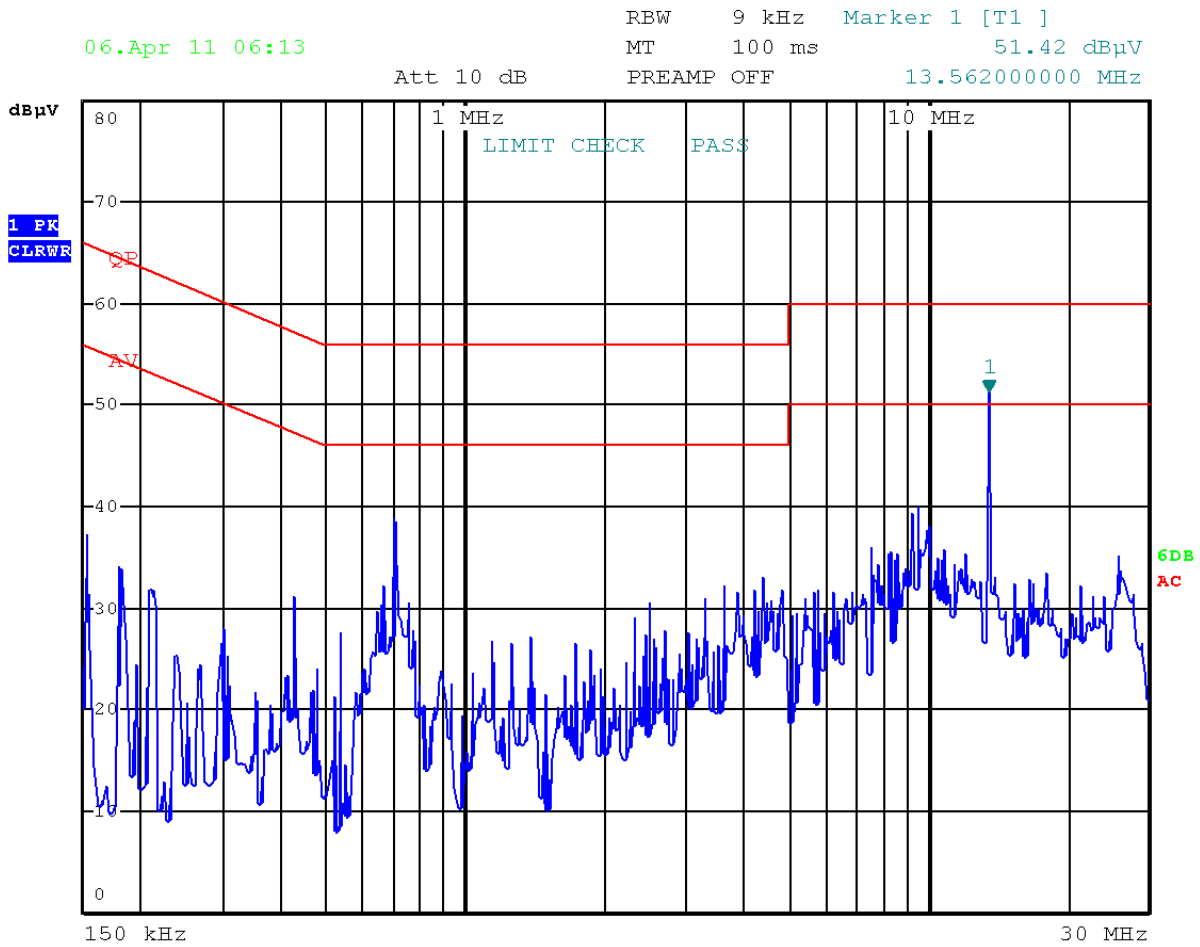
## 6.2 Plots of the Conducted emissions



Date: 6.APR.2011 06:16:14

Plot 2: Conducted emissions of the EUT on L1





Date: 6.APR.2011 06:13:15

Plot 3: Conducted emissions of the EUT on L2

## 7 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12512	LISN FCC 50 uH / 50 ohm	Emco	3725/2	01/2010	01/2012
12476	Antenna mast	EMCO	TR3	NA	NA
12477	Antenna mast 1-4 mtr	Poelstra	NA	NA	NA
15453	Active loopant. 60 cm	Chase	HLA6120	05/2010	05/2011
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2011	02/2012
12640	Temperature chamber	Heraeus	VEM03/500	NA	NA
99070	Coax 15m RG213 OATS	NMi Certin B.V.	CABLE 15M OATS	11/2010	11/2011
99071	Coax OATS ground	NMi Certin B.V.	CABLE OATS	11/2010	11/2011
99107	Controller OATS	Heinrich Deisel	4630-100	NA	NA
99161	Variac 250V 6A	RFT	LTS006	NA	NA
99174	Turntable control	Bruel & Kjaer	5949/WH3014	NA	NA
99318	Digital multimeter	HP	34401A	10/2010	10/2011
99413	Temperatuur-Hygrometer	Tempcontrol	P570	01/2011	01/2012
99547	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2010	10/2011
99548	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2010	10/2011
99580	OATS	Comtest	FCC listed: 90828	08/2008	08/2011
99606	Test Setup Emission	EMCS	RFS06S	10/2010	10/2011
99608	Controller (OATS)	EMCS	DOC202	NA	NA
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99613	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2010	10/2011
99615	Laptop	IBM	Lenovo 9456-HTG	NA	NA
99623	Power Supply	EA	PS 2016-050	12/2010	12/2011
99699	Measuring receiver	R&S	ESCI	12/2009	12/2010
99683	Loop antenna, 6cm	--	7405-901	09/2010	09/2011
99733	Spectrum Analyzer	R&S	FSV30	05/2010	05/2011

NA= Not Applicable