



**TEST REPORT CONCERNING THE COMPLIANCE OF AN
INDUCTIVE PROXIMITY CARD READER, OPERATING ON
13.56 MHz
BRAND Nedap, MODEL PROX1356
WITH 47 CFR PART 15 (10-1-09 EDITION) AND THE
REQUIREMENTS OF INDUSTRY CANADA:
RSS-GEN AND RSS-210 (ISSUE 8, DECEMBER 2010)**

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May 12, 2011**

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

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MEASUREMENT/TECHNICAL REPORT

N.V. Nederlandsche Apparatenfabriek "Nedap"

Brand: Nedap
Model: PROX1356
FCC ID: CGDPROX1356
IC: 1444A-PROX1356

May 12, 2011

This report concerns:	Original grant/certification	Class 2 Permissive Change	Verification
Equipment type:	Inductive Proximity Card Reader		
Report prepared by:	Name	: Richard van der Meer	
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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: May 12, 2011

Signature:



O. 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) : Inductive Proximity Card Reader
Manufacturer : N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand : Nedap
Model(s) : PROX1356
Serial number(s) : --
FCC ID : CGDPROX1356
IC : 1444A-PROX1356
Receipt date : September 28, 2010


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 : September 28 , 2010
Test(s) completed : May 12, 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 

Report written by : R. van der Meer 

Report date : May 12, 2011

This report is in conformity with NEN-EN-ISO/IEC 17025: 2005
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.

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1 General information.

1.1 Product description.

1.1.1 Introduction.

The brand Nedap model PROX1356, hereafter referred to as EUT is an inductive proximity card reader intended to be used in library systems. The EUT can be positioned under a desk/table (tableunder model). The EUT can be connected to existing hardware (PC) and/or Library Management Systems. 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: CGDPROX1356 and IC: 1444A-PROX1356.

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	:	Inductive Proximity Card Reader
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "Nedap"
Brand	:	Nedap
Model	:	PROX1356
Serial number	:	--
Voltage input rating	:	9 Vdc
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	Integral
Operating frequency	:	13.56 MHz
Remarks	:	n.a.

AUX1	:	Laptop PC including power supply adapter
Manufacturer	:	Lenovo
Brand	:	Lenovo
Model	:	Thinkpad R60
Serial number	:	L3-BF847 07/02
Voltage input rating	:	20Vdc
Voltage output rating	:	--
Current input rating	:	3.25 A
Remarks	:	Required to read data from EUT

AUX2 : Power supply
Brand : Power-win Technology Corp.
Model : PW-012A2-1Y09C1
Serial number : --
Voltage input rating : 100 – 240V 50-60Hz
Voltage output rating : 9Vdc
Current input rating : 1A
Remarks : n.a.



Photo 1: EUT

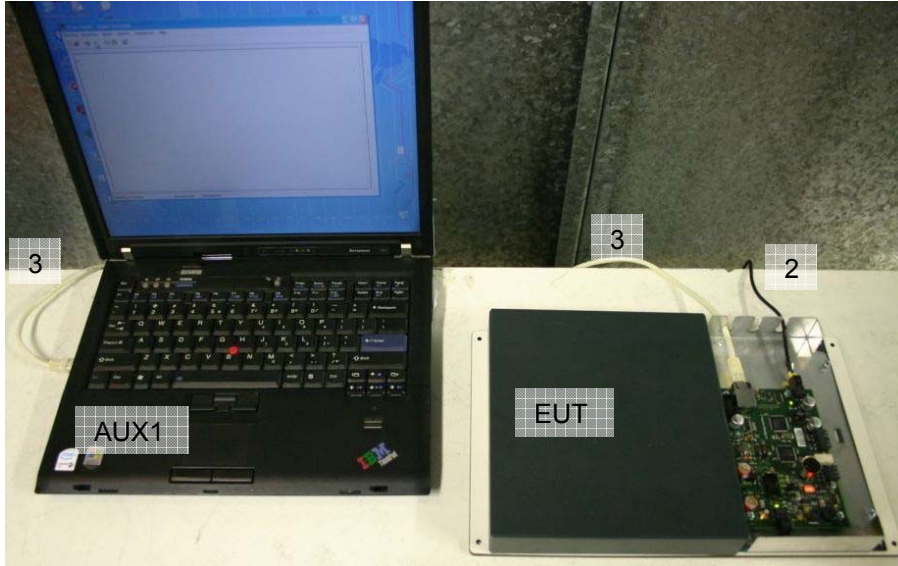


Photo 2: EUT in typical testsetup (LAN connection shown, AUX2 not shown)

1.3.1 Description of input and output ports.

Number	Ports	From	To	Shielding	Remarks
1	AC mains	AC mains	AUX2	yes / no	None
2	DC power	AUX2	EUT	yes / no	None
3	Serial port (usb or LAN)	EUT	AUX1	yes / no	None

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 13.553-13.567 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 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, and continuously sends data to the serial port of the EUT.

The intentional radiator tests (47 CFR Part 15 sections, 15.207, 15.209 and 15.225) have been performed with a complete functioning EUT and interconnections.

2.3 Special accessories.

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

2.4 Equipment modifications.

Only for the Conducted Emissions testing (section 4) test, the test unit was modified to add a resistive termination in lieu of the antenna as per FCC KDB 174.176. Pictures are available to show the modifications. For all other tests 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
40.68	24.1	10.2	14.0	38.1	24.2	40	Pass
54.24	21.3	14.5	8.3	29.6	22.8	40	Pass
67.80	15.7	5.8	7.3	23.0	13.1	40	Pass
81.36	14.6	0.9	9.4	24.0	10.3	40	Pass
108.48	10.8	3.0	13.1	23.9	16.1	43.5	Pass
122.04	14.5	10.2	13.8	28.3	24.0	43.5	Pass
135.60	9.2	7.9	14.1	23.3	22.0	43.5	Pass
271.20	1.1	4.4	16.9	18.0	21.3	46	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 ± 5.0 dB.
3. The EUT was varied in three positions, 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
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	99069	99174	12483
99733	99606	99580	99608	99742	99107	12476
12477	15633	99161				

Test engineer

Signature : 

Name : Richard van der Meer

Date : April 21, 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
	dB μ V @3m							
1.175	7.7	Av	19.7	1	40	-11.6	20.4	Pass
2.034	7.0	Qp	19.7	1	40	-12.3	29.5	Pass
3.609	6.7	Qp	19.5	1	40	-12.8	29.5	Pass
10.000	21.8	Qp	19.6	1	40	2.4	29.5	Pass
13.561	65.9	Qp	19.7	1	40	46.6	84.0	Pass
15.0	7.7	Qp	19.7	1	40	-11.6	29.5	Pass
16.2	8.4	Qp	19.7	1	40	-10.9	29.5	Pass
27.122	3.0	Qp	19.7	1	40	-16.3	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 13.561 MHz: 65.9 dB μ V + 19.7 dB + 1dB - 40dB= 46.6 dB μ V/m.
2. A resolution bandwidth of 9kHz 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 ± 5.0 dB

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

99699	99547	99071	99070	99608	15453	99161
99580						

Test engineer

Signature : 

Name : R. van der Meer

Date : April 06, 2011

4 Conducted emission data.

4.1 Conducted emission data of the EUT.

Frequency (MHz)	Measurement results dB μ V Neutral		Measurement results dB μ V Line 1		Limits dB μ V		Pass/Fail
	QP	AV	QP	AV	QP	AV	
0.150	51.4	43.2	47.6	41.2	66.0	56.0	PASS
0.295	46.1	43.2	43.7	41.2	60.2	50.2	PASS
0.445	38.8	34.2	37.5	33.6	56.9	46.9	PASS
0.590	37.0	34.1	39.4	36.7	56.0	46.0	PASS
0.740	41.6	38.0	42.1	38.8	56.0	46.0	PASS
0.895	43.6	39.2	41.9	37.8	56.0	46.0	PASS
1.035	40.6	34.9	35.4	29.9	56.0	46.0	PASS
1.170	38.2	32.3	36.5	30.4	56.0	46.0	PASS
1.330	42.5	37.1	40.0	33.9	56.0	46.0	PASS
1.480	41.1	35.0	38.7	32.6	56.0	46.0	PASS
1.935	38.6	31.8	41.3	34.5	56.0	46.0	PASS
2.080	40.6	33.0	41.1	33.8	56.0	46.0	PASS
2.340	35.6	32.3	37.4	31.1	56.0	46.0	PASS
13.560	46.0	44.4	44.2	42.5	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 values of conducted emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
3. Measurement uncertainty is ± 3.5 dB
4. Tested with UTP connection and with USB connection. Maximum values recorded. Plots of the emissions (L1) can be found in section 6.2.

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

15667	12512	99161	99548	13313		
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Test engineer

Signature : 

Name : R. van der Meer

Date : April 14, 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)	(Vdc)			
20.0	+9	13.561500 (reference)	N.A.	N.A.
-20.0	+9	13.561680	< 0.01	PASS
50.0	+9	13.561474	< 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 (+9Vdc) 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 (+9 Vdc)	13.561500 (reference)	N.A.	N.A.
85.0 (+7.65 Vdc)	13.561500	< 0.01	PASS
115.0 (+10.35 Vdc)	13.561562	< 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	13.56130	13.56184
-20.0	13.56149	13.56203
+50.0	13.56128	13.56185
Bandwidth	13.56128	13.56203

Table 7 Bandwidth of the emission

The measured minimum frequency of 13.56128 kHz and maximum frequency of 13.56203 kHz are well within the specified frequency bandwidth.

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

99318	99092	12640	99613	99538	99413	
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Test engineer

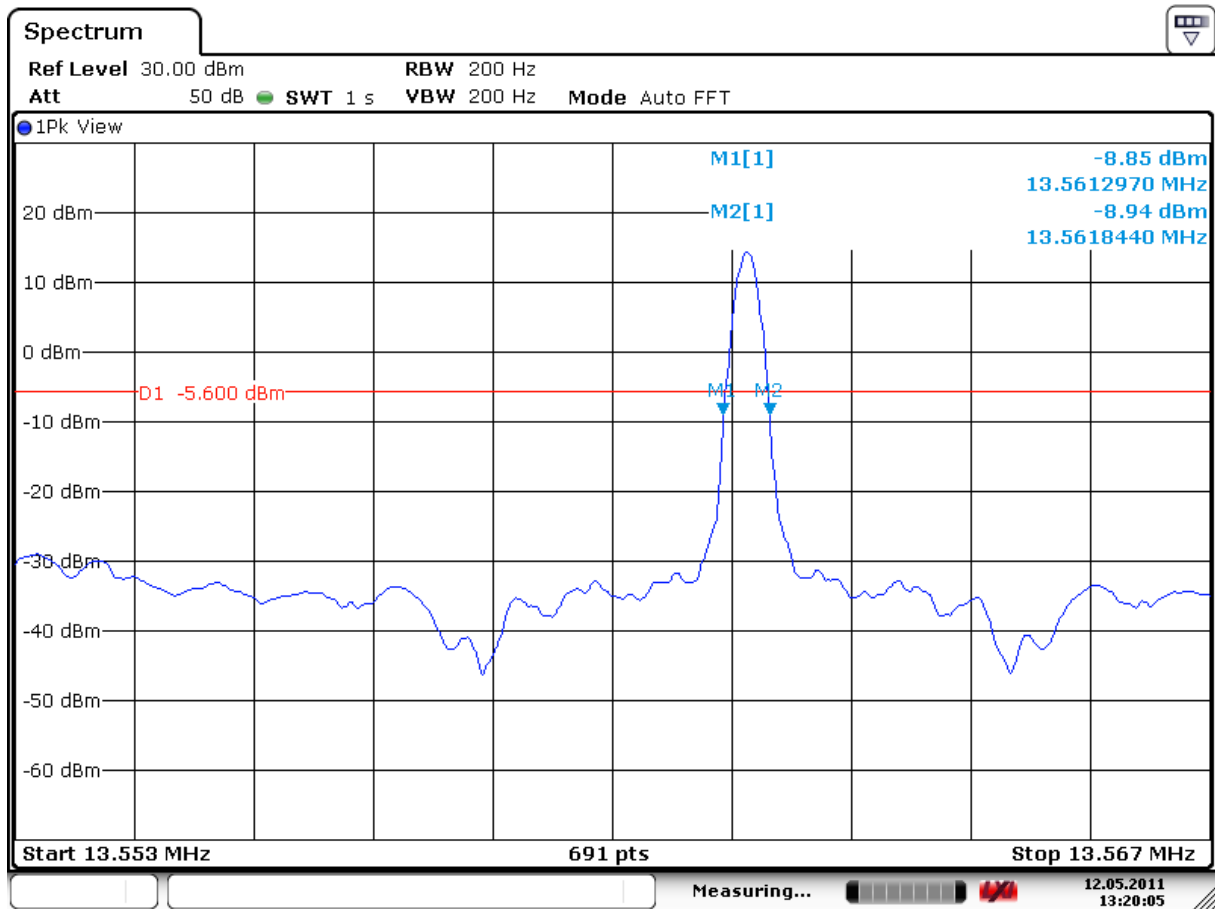
Signature : 

Name : R. van der Meer

Date : May 12, 2011

6 Plots of measurement data

6.1 Bandwidth of the emission



Date: 12.MAY.2011 13:20:05

Plot1: Bandwidth of the emission at 13.56 MHz (Fundamental Carrier),
 for IC the measured Occupied Bandwidth is 547 Hz. Measured on a spectrum analyzer.

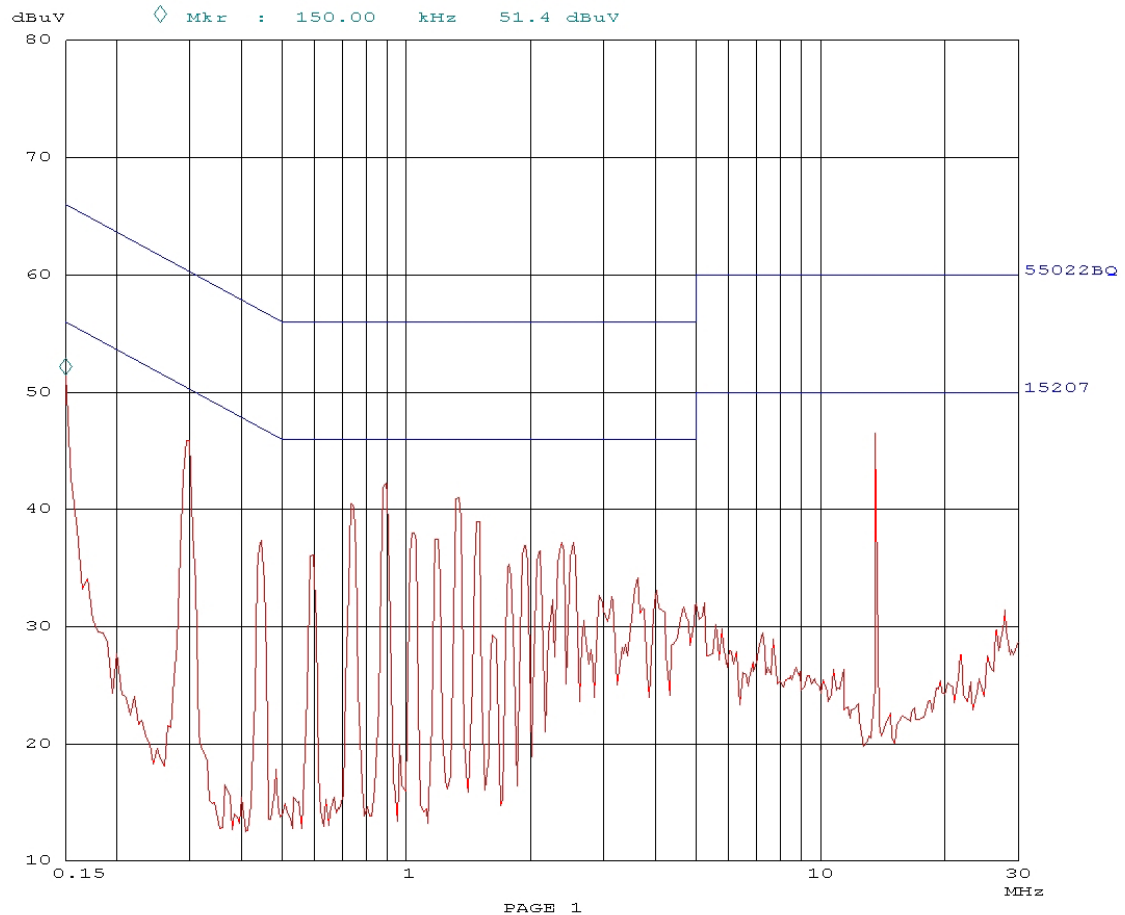
6.2 Conducted emissions

14. Apr 11 14:23

```

Scan Settings (1 Range)
|----- Frequencies -----|----- Receiver Settings -----|
  Start      Stop      Step      IF BW  Detector  M-Time  Atten  Preamp
  150k       30M         5k        9k     PK        20ms   AUTO  LN   OFF

Final Measurement: x QP
                   Meas Time: 1 ms
                   Subranges: 25
                   Acc Margin: 6dB
  
```



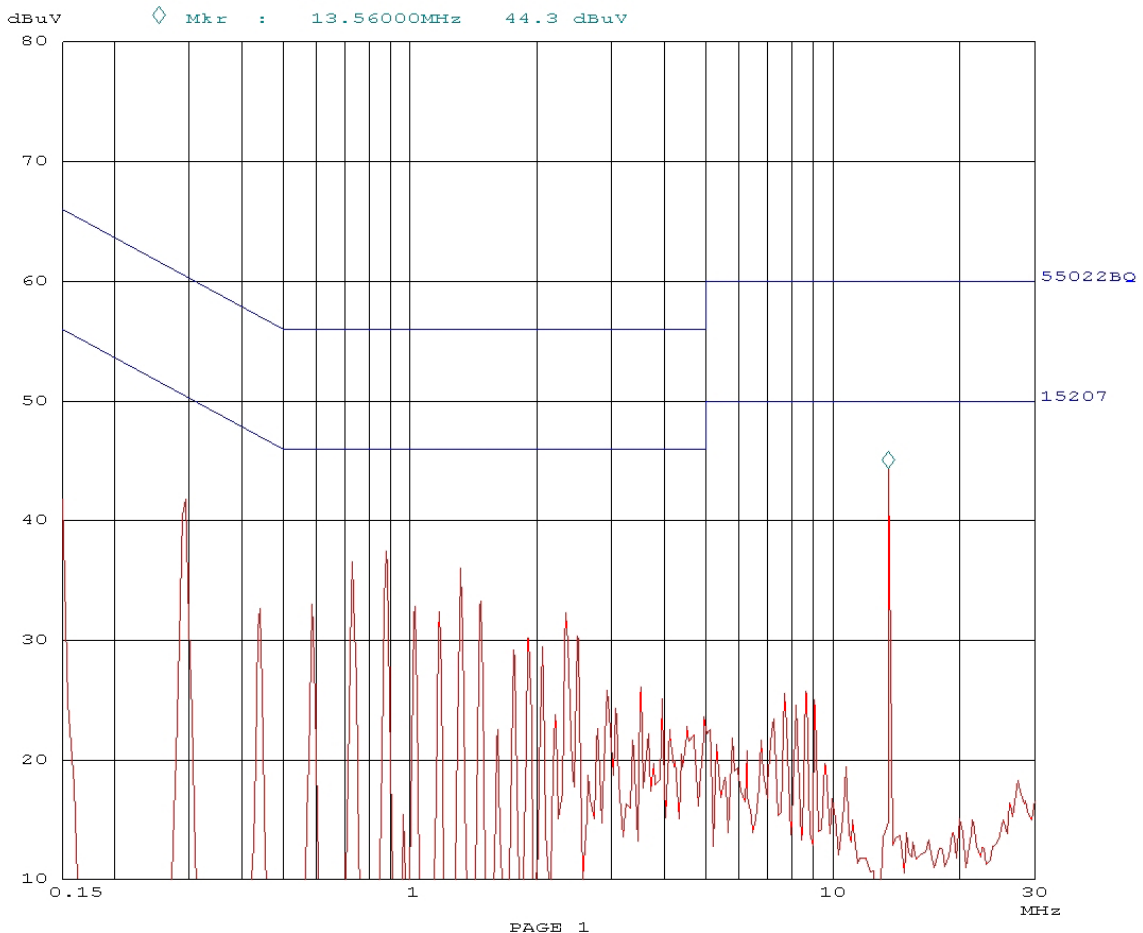
Plot 2: Conducted emissions of the EUT, Peak detector values on L1 with UTP connection

14. Apr 11 14:40

```

Scan Settings (1 Range)
|----- Frequencies -----|----- Receiver Settings -----|
  Start      Stop      Step      IF BW  Detector  M-Time  Atten  Preamp
  150k       30M         5k        9k     AV        20ms   AUTO  LN   OFF

Final Measurement: * AV
                   Meas Time: 1 ms
                   Subranges: 25
                   Acc Margin: 6dB
  
```



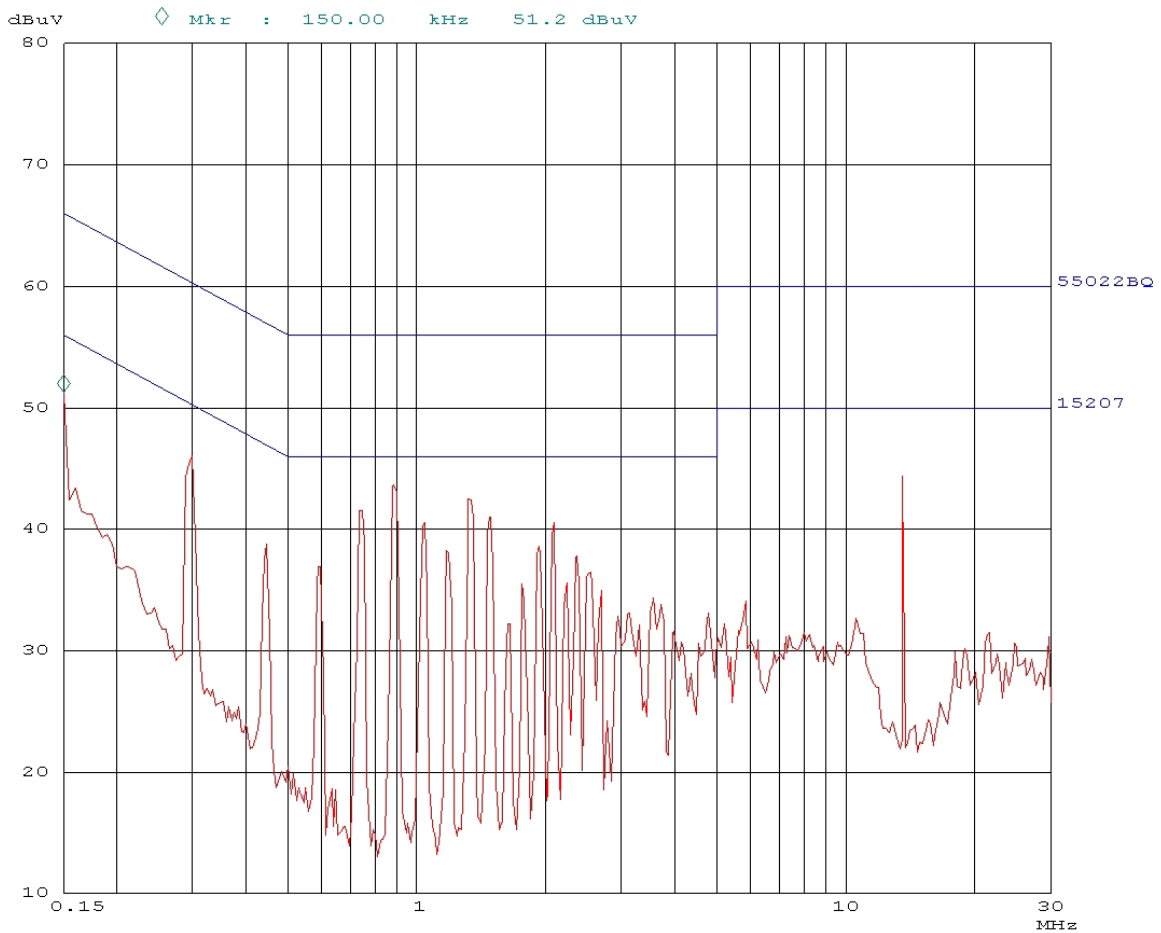
Plot 3: Conducted emissions of the EUT, Average detector values on L1 with UTP connection

14. Apr 11 16:01

```

Scan Settings (1 Range)
|----- Frequencies -----|----- Receiver Settings -----|
  Start      Stop      Step      IF BW  Detector  M-Time  Atten  Preamp
  150k       30M       5k       9k     PK        20ms   AUTO  LN   OFF

Final Measurement: x QP
                   Meas Time: 1 ms
                   Subranges: 25
                   Acc Margin: 6dB
  
```



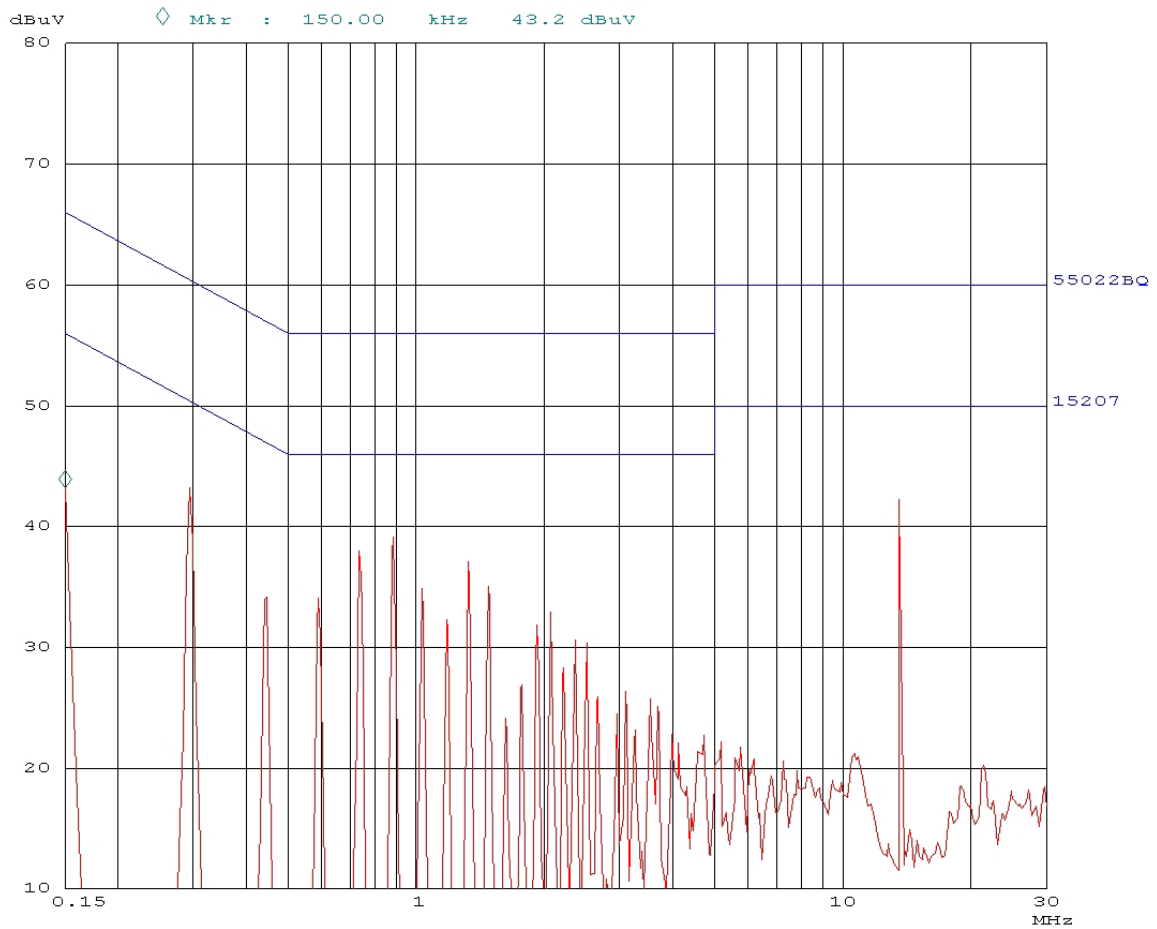
Plot 4: Conducted emissions of the EUT, Peak detector values on L1 with USB connection

14. Apr 11 15:49

```

Scan Settings (1 Range)
|----- Frequencies -----|----- Receiver Settings -----|
  Start      Stop      Step      IF BW  Detector  M-Time  Atten  Preamp
  150k       30M       5k       9k     AV        20ms   AUTO  LN   OFF

Final Measurement: x AV
                   Meas Time: 1 ms
                   Subranges: 25
                   Acc Margin: 6dB
  
```



Plot 5: Conducted emissions of the EUT, Average detector values on L1 with USB connection

7 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12476	Antenna mast	EMCO	TR3	NA	NA
12477	Antenna mast 1-4 mtr	Poelstra	NA	NA	NA
12512	LISN	EMCO	3625/2	01/2011	01/2012
13313	Pulse Limiter	R&S	ESH3-Z2	02/2011	02/2012
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
15667	Measuring receiver	R&S	ESCS30	06/201	06/2011
99069	Coax 5m RG213 OATS	NMi Certin B.V.	CABLE 5M OATS	11/2010	11/2011
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
99092	RF Cable	--	Cable A	NA	NA
99161	Variac 120Vac	RFT	LTS001	NA	NA
99107	Controller OATS	Heinrich Deisel	4630-100	NA	NA
99318	Digital multimeter	HP	34401A	10/2010	10/2011
99538	Spectrum analyzer	R&S	FSP40	05/2010	05/2011
99547	Temperature-Humiditymeter	Europe supplies	WS-7082	10/2010	10/2011
99580	OATS	Comtest	FCC listed: 90828	08/2008	08/2011
99161	Variac 250V 6A	RFT	LTS006	NA	NA
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
99623	Power Supply	EA	PS 2016-050	12/2010	12/2011
99651	Variac	NA	Vast Activa: 08-9510	NA	NA
99699	Measuring receiver	R&S	ESCI	12/2010	12/2011
99683	Loop antenna, 6cm	--	7405-901	09/2010	09/2011
99733	Spectrum Analyzer	R&S	FSV30	05/2010	05/2011

NA= Not Applicable