



**TEST REPORT CONCERNING THE COMPLIANCE OF AN
INDUCTIVE PROXIMITY CARD READER,
OPERATING ON 120 kHz
BRAND Nedap, MODEL Prox Booster 2G,
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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June 13, 2012**

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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 37
9350 AA Leek (NL)
Eiberkamp 10
9351 VT Leek (NL)**

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

Internet: www.tuv-eps.com
E-mail: info@tuv-eps.com

MEASUREMENT/TECHNICAL REPORT

N.V. Nederlandsche Apparatenfabriek "Nedap"

Brand: Nedap
Model: Prox Booster 2G
FCC ID: CGDBOOSTER4
IC: 1444A-BOOSTER4

This report concerns:	Original grant/certification	Class 2 Permissive Change	Verification
Equipment type:	Inductive Proximity Card Reader		
Report prepared by:	Name	: O.H. Hoekstra	
	Company name	: TÜV Rheinland EPS B.V.	
	Address	: Eiberkamp 10	
	Postal code/city	: 9351 VT Leek	
	Mailing address	: P.O. Box 37	
	Postal code/city	: 9350 AA Leek	
	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 Leek, 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 13, 2012

Signature:



R. van der Meer
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) : Prox Booster 2G
Serial number(s) : --
FCC ID : CGDBOOSTER4
IC : 1444A-BOOSTER4
Receipt date : March 19, 2012


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 : Leek
Test(s) started : March 19, 2012
Test(s) completed : June 13, 2012
Purpose of test(s) : Equipment Authorization (Class 2 permissive change)

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) : O.H. Hoekstra 

Report written by : O.H. Hoekstra 

Report date : June 13, 2012

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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 Inductive Proximity Card Reader, brand Nedap, model Prox Booster 2G, hereafter referred to as EUT is an inductive proximity card reader intended to be used to access parking lots. It is capable of reading 120 kHz 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 Class 2 Permissive Change in equipment authorization files under registration number. **FCC ID: CGDBOOSTER4 and IC: 1444A-BOOSTER4.**

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	:	Prox Booster 2G
Serial number	:	--
Voltage input rating	:	3 Vdc Battery operated (2* AAA)
Voltage output rating	:	--
Current input rating	:	--
Antenna	:	Integral
Operating frequency	:	120 kHz
Remarks	:	n.a.



Photo 1a: EUT (front)



Photo 1b: EUT (back)

1.3.1 Description of input and output ports.

EUT has no specific input and output ports.

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		
15.209	RSS-210(A2.6)	Radiated emission limits, general requirements	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 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 at Eiberkamp 10, 9351 VT Leek, 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	: 3 Vdc Battery operated (2* AAA)
Air pressure	: 950 – 1050 hPa

When it 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.

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
53.8	15.5	14.4	6.6	22.1	21.0	40.0	Pass
79.7	13.4	14.4	7.4	20.8	21.8	40.0	Pass
148.3	6.0	6.8	11.3	17.3	18.1	43.5	Pass
334.5	9.1	6.2	15.6	24.7	21.8	46.0	Pass
435.6	8.4	7.8	18.9	27.3	26.7	46.0	Pass
648.8	7.5	6.2	22.6	30.1	28.8	46.0	Pass
823.5	6.4	5.0	25.7	32.1	30.7	46.0	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 RSS-210 and RSS-Gen, section 2.2 and 2.6 are depicted in Table 2.

Notes:

- Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.
- Measurement uncertainty is ± 5.0 dB.
- The EUT was varied in three positions, the measuring antenna was varied in horizontal and vertical orientations and also around its axis. The reported value is the worst case found at the reported frequency.
- 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.
- A Quasi-peak detector was used with a bandwidth of 120 kHz.

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

15633	99580	99609	99613	99699	99733	
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Test engineer

Signature :



Name : O.H. Hoekstra
 Date : March 21, 2012

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					dB		
0.1202 (fundamental)	49.9	Av	20.1	1	80	-10.0 @300m	26.0 @300m	Pass
0.1202 (fundamental)	50.1	Pk	20.1	1	80	-8.8 @300m	46.0 @300m	Pass
0.3606	21.9	Av	20.0	1	80	-37.1 @300m	16.5 @300m	Pass
0.3606	22.1	Pk	20.0	1	80	-36.9 @300m	36.5 @300m	Pass
1.336	14.7	Qp	19.7	1	40	-4.6	25.0	Pass
12.030	5.6	Qp	19.6	1	40	-13.8	30.0	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 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 120.2 kHz: 49.9 dBµV + 20.1 dB + 1dB - 80dB= -10.0 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).

15453	99413	99699				
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Test engineer

Signature :



Name : O.H. Hoekstra

Date : March 21, 2012

4 Conducted emission data.

4.1 Conducted emission data of the EUT.

Not applicable, EUT is battery powered only.

Test engineer

Signature

: 

Name : O.H. Hoekstra

Date : March 21, 2012

5 Plots of measurement data

5.1 Bandwidth of the emission



13.Jun 12 11:56

Ref 36.7 dBm

* Att 10 dB

* RBW 1 kHz

VBW 3 kHz

SWT 20 ms

Marker 1 [T1]

33.32 dBm

120.320000000 kHz

Offset 66.7 dB

OBW 3.000000000 kHz

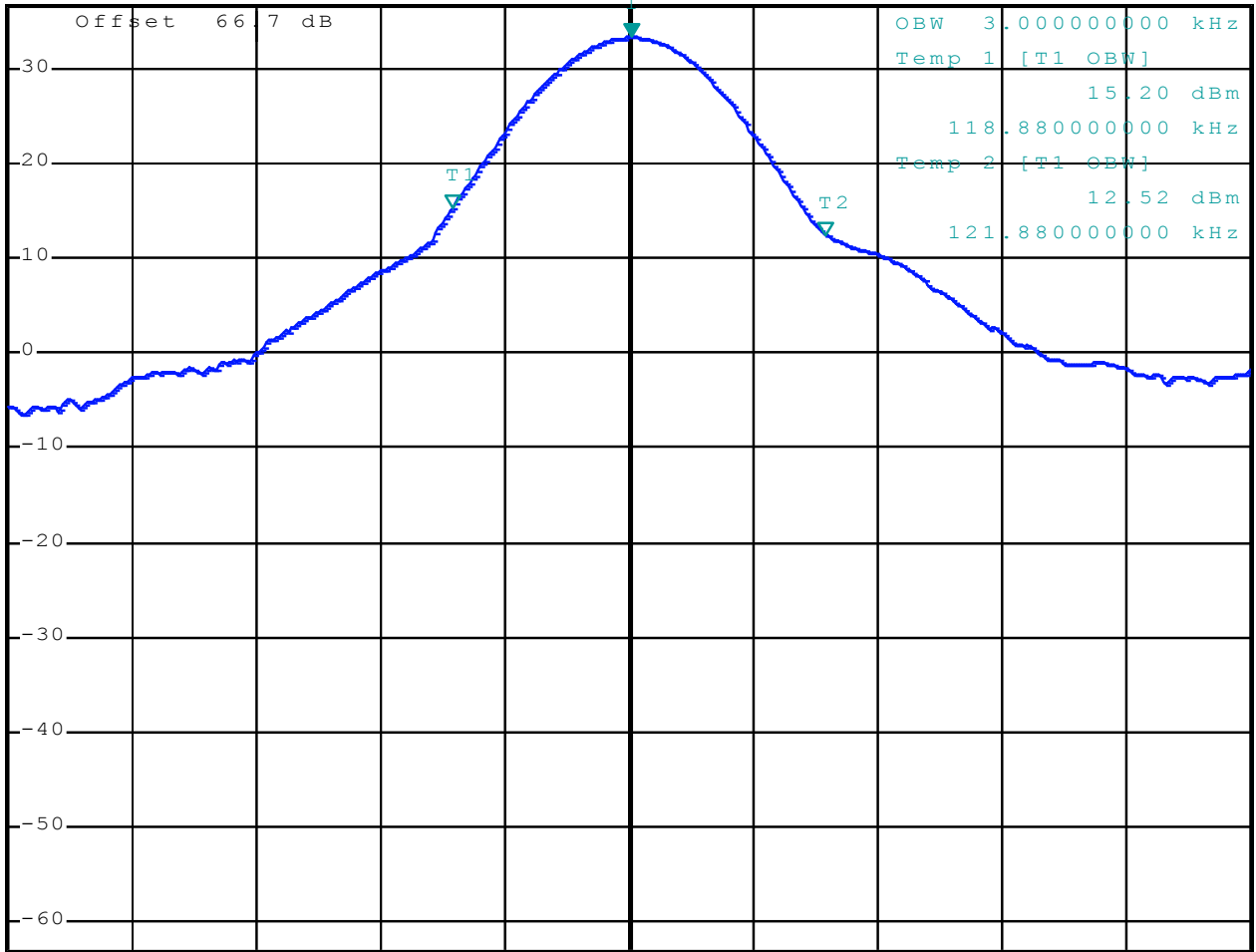
Temp 1 [T1 OBW] 15.20 dBm

118.880000000 kHz

Temp 2 [T1 OBW] 12.52 dBm

121.880000000 kHz

1 PK
VIEW



Center 120.3 kHz

1 kHz/

Span 10 kHz

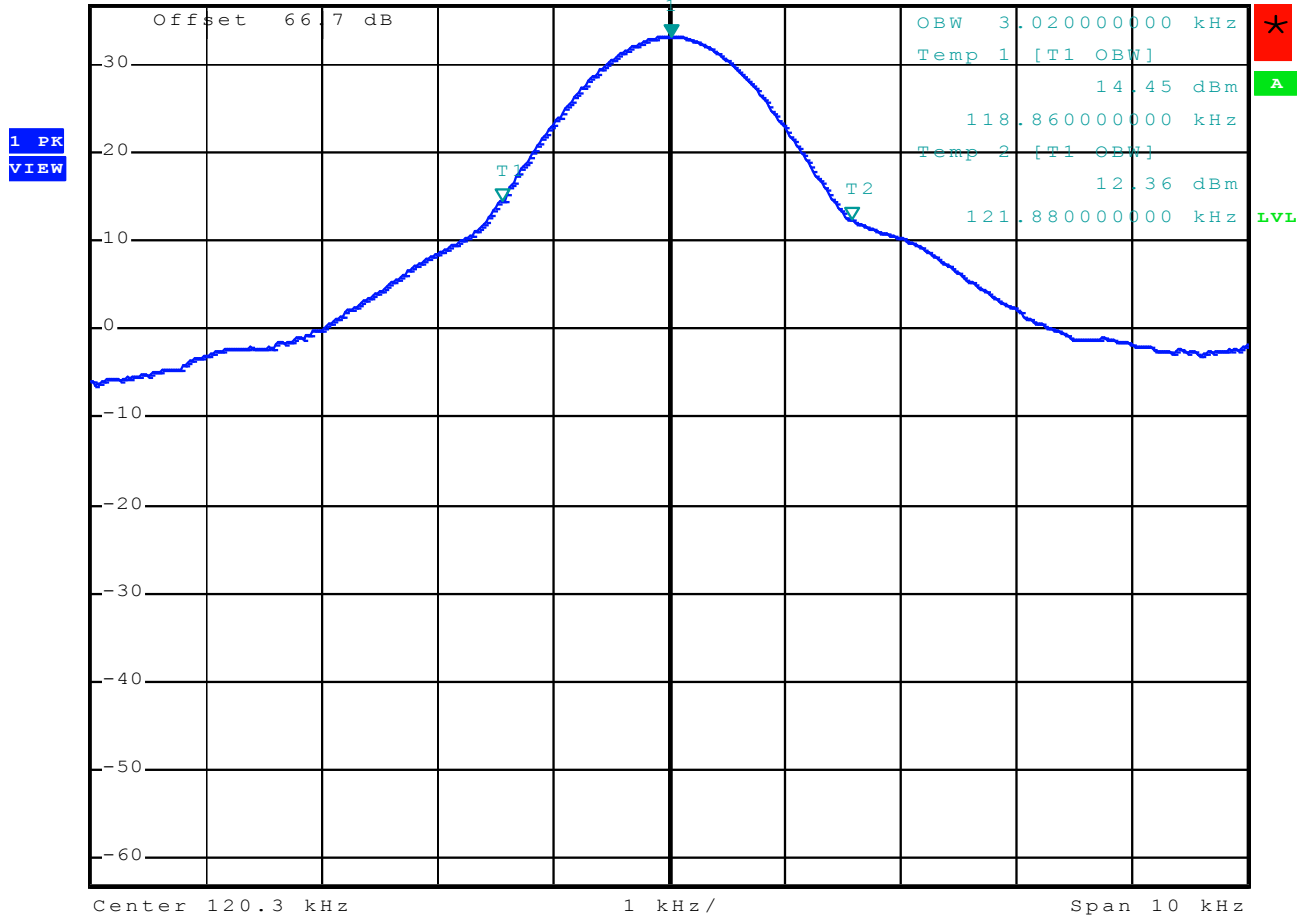
Date: 13.JUN.2012 11:56:39

Plot1

Emission Bandwidth (-20 dB down points) of the emission at 120 kHz (Fundamental Carrier), by using the spectrum analyzer (R&S FSP) function for -20 dB Occ BW.



13.Jun 12 11:59
Ref 36.7 dBm *Att 10 dB *RBW 1 kHz VBW 3 kHz Marker 1 [T1] 33.13 dBm
SWT 20 ms 120.320000000 kHz



Date: 13.JUN.2012 11:59:39

Plot2
Occupied Bandwidth (99% points) of the emission at 120 kHz (Fundamental Carrier),
by using the spectrum analyzer (R&S FSP) function for 99% Occ BW.

6 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
15453	Active loop antenna 60 cm	Chase	HLA6120	04-2011	04-2012
15633	Biconilog Test antenna	Chase	CBL 6111B	01-2012	01-2013
12640	Temperature chamber	Heraeus	VEM03/500	NA	NA
99318	Digital multimeter	HP	34401A	10-2011	10-2012
99413	Temperature-Hygrometer	Tempcontrol	P570	01-2012	01-2013
99538	Spectrum Analyzer	R&S	FSP	11-2011	11-2012
99580	Semi Anechoic Room	Siepel	FCC listed: 90828	12-2011	12-2014
99609	Antenna mast	EMCS	AP-4702C	NA	NA
99613	Temperature-Humiditymeter	Europe supplies	WS-7082	10-2011	10-2012
99623	Power Supply	EA	PS 2016-050	12-2011	12-2012
99699	Measuring receiver	R&S	ESCI	02-2012	02-2013
99733	Spectrum Analyzer	R&S	FSV30	06-2011	06-2012

NA= Not Applicable