

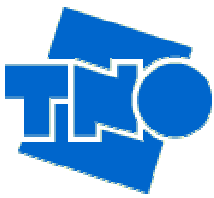
**TEST REPORT CONCERNING THE COMPLIANCE OF  
AN INDUCTIVE PROXIMITY CARD READER,  
BRAND NEDAP,  
MODEL SMARTCARD/TRANSITION-BOOSTER,  
WITH 47 CFR PART 15 (2006-08-14).**

FCC listed : 90828  
Industry Canada : IC3501  
VCCI registered : R-1518, C-1598

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Test specification(s): 47 CFR Part 15 (2006-08-14)  
Description of EUT: Inductive proximity card reader  
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"  
Brand mark: Nedap  
Model: Smartcard/Transition-Booster  
FCC ID: CGDBOOSTER2

## MEASUREMENT/TECHNICAL REPORT

**Nedap N.V.**

**Model : Smartcard/Transition-Booster**

**FCC ID: CGDBOOSTER2**

February 22, 2007

This report concerns:	Original grant/certification	<del>Class 2 change</del>	Verification
Equipment type:	Inductive proximity card reader		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	<b>Yes</b>	<del>No</del>	n.a.
Report prepared by:	Name	: A. van der Valk, B.Sc.E.E.	
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 and the measurement procedures of ANSI C63.4-2003. TNO Electronic Products & Services (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.

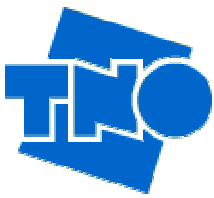
Date: February 22, 2007

Signature:

H.J. Pieters

Project Manager TNO Electronic Products & Services (EPS) B.V.





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### Description of test item

Test item : Inductive proximity card reader (13.56 MHz) and (120 - 125 kHz)  
Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"  
Brand : Nedap  
Model : Smartcard/Transition-Booster  
Serial number(s) : Not available  
Revision : Not available  
Receipt date : January 25, 2007

### Applicant information

Applicant's representative : Mr. J. Hulshof  
Company : N.V. Nederlandsche Apparatenfabriek "NEDAP"  
Address : Parallelweg 2  
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City : Groenlo  
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City : Groenlo  
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Telefax number : +31 (0) 544 463475

### Test(s) performed

Location : Niekerk  
Test(s) started : January 25, 2007  
Test(s) completed : February 21, 2007  
Purpose of test(s) : Equipment Authorisation (Certification).

Test specification(s) : 47 CFR Part 15 (2006-08-14)

Test engineers : A. van der Valk  
O.H. Hoekstra

Report written by : A. van der Valk

Report date : February 22, 2007

*[Handwritten signature: O.H. Hoekstra]*  
*[Handwritten signature: A. van der Valk]*

This report is in conformity with NEN-EN-ISO/IEC 17025: 2000.

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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 EUT is an inductive proximity card reader which is intended to supplement the detection of 13.56 MHz and/or 121 kHz inductive cards to the existing NEDAP TRANS IT reader system.

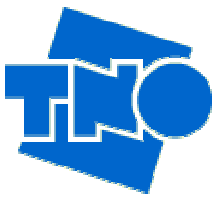
## 1.2 Related submittal(s) and/or Grant(s).

Not applicable.

## 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	:	Smartcard/Transition-Booster
Serial number	:	--
Voltage input rating	:	3 VDC (two AAA batteries in series)
Current input rating	:	--
Frequency	:	13.56 MHz and 120 - 125 kHz
Antenna	:	internal
Remarks	:	none



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### 1.3.1 Description of input and output ports.

The EUT is battery operated only and there are no actual input and output ports present.

## 1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (2006-08-14), sections 15.207, 15.225 and 15.209.

The test methods, which have been used, are based on ANSI C63.4: 2003.

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 and if necessary at 10 and 30 meters. To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the computation method in appendix 1 has been applied.

## 1.5 Test facility.

The Federal Communications Commission has reviewed the technical characteristics of the test facilities at TNO Electronic Products & Services (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 2, section 2.948.

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 list of all public test facilities is available on the Internet at <http://www.fcc.gov>.

## 1.6 Test conditions.

Normal test conditions:

Temperature (*)	: +15°C to +35°C
Relative humidity(*)	: 20 % to 75 %
Supply voltage	: not applicable, the equipment under test is battery operated (see clause 1.3)
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.



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## **2 System test configuration.**

### **2.1 Justification.**

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: 2003.

### **2.2 EUT mode of operation.**

The EUT has been tested in active mode, i.e. the EUT is ready to detect a card.

All test set ups have been documented in pictures in the documentation package which will be submitted to the Commission

### **2.3 Special accessories.**

No special accessories are used and/or needed to achieve compliance with the applicable sections of 47 CFR Part 15.

### **2.4 Equipment modifications.**

No modifications have been made to the equipment in order to achieve compliance with the appropriate sections of 47 CFR Part 15.

### **2.5 Block diagram of the EUT.**

The block diagram is available in the technical documentation package, which will be submitted to the Commission.

### **2.6 Schematics of the EUT.**

The schematics are available in the technical documentation package, which will be submitted to the Commission.

### **2.7 Part list of the EUT.**

The part list is available in the technical documentation package, which will be submitted to the Commission.



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### 3 Radiated emission data.

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

Frequency (MHz)	Measurement results dB( $\mu$ V)/m @ 3 metres Quasi-peak		Limits dB( $\mu$ V)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
30 - 300	n.i.	n.i.	40.0 – 46.0	-	-	PASS
300 - 1000	n.i.	n.i.	46.0 – 54.0	-	-	PASS

**Table 1: Radiated emissions of the EUT.**

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, section 15.209, are depicted in table 1.

#### Notes:

1. (AV) average detector
2. (QP) quasi peak detector
3. n.i. indicates that no field strength values related to the EUT could be measured for the listed frequency or for the listed frequency range.
4. << indicates that field strength values of radiated emissions are more than 20 dB below the applicable limit.
5. The reported field strength values are the worst case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.
6. Up to the 10 th harmonic of the transmit frequency or beyond because of the incorporation of a digital device was investigated, as per 47 CFR Part 15 section 15.33

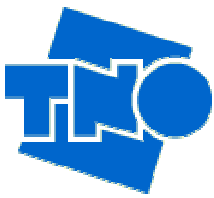
Test engineer

signature :

Name : A. van der Valk

Date : January 30, 2007





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

Frequency (kHz)	Measurement results dB $\mu$ V		Antenna factor dB	Cable loss dB	Calculated results dB( $\mu$ V)/m	Limits Part 15.209 & 15.225 dB( $\mu$ V)/m
	3 meters	10 meters				
9.00 – 119.0	n.i.	-	-	-	-	-
120.0	42.2 (AV)	n.i. (AV)	20.1	1	-16.7	25.1 (300 m)
240.0	n.i.	-	20.0	1	<<	19.0 (300 m)
360.0	n.i.	-	20.0	1	<<	16.5 (300 m)
360.0- 1705	n.i.	-	-	-	-	-
1.705 – 30.0 MHz	n.i.	-	-	-	-	-
9.00 – 13.0 MHz	n.i.	-	-	-	-	-
13.56 MHz	38.6	18.6	19.7	1	+19.3	84.0 (30m)
27.12 MHz	n.i.	-	-	-	-	-
27.12 MHz– 30.0 MHz	n.i.	-	-	-	-	-

**Table 2: Radiated emissions of the EUT.**

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205, 15.225 and 15.209, are depicted in table 2. Measurement results are readings from the measuring device in dB $\mu$ V. Using the appropriate antenna factor and cable losses, these readings are expressed directly into dB ( $\mu$ V)/m and are recalculated at distances as appropriate.

#### Notes:

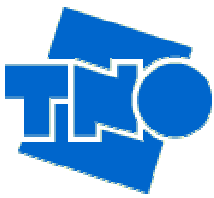
1. (AV) average detector
2. (QP) quasi peak detector
3. The computation method for calculation of the field strength at different distances can be found in Appendix 1. The extrapolation factor of 40 dB/decade was used (80 dB for 3 to 300 m).
4. Frequency range: 9-90 kHz and 110-490 kHz: Average detector (AV) used during measurements.
5. n.i. indicates that no field strength values related to the EUT could be measured for the listed frequency or for the listed frequency range.
6. << indicates that field strength values of radiated emissions are more than 20 dB below the applicable limit.
7. The reported field strength values are the worst-case values at the indicated frequency, obtained by rotation of the EUT and orientation of the antenna.
8. Peak levels of the emissions more than 40 dB below the applicable limits.

#### Test engineer

signature :

Name : A. van der Valk

Date : January 30, 2007



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## 4 Conducted emission data.

### 4.1 Conducted emission data of the EUT.

Not applicable, the EUT is battery operated only.

## 5 Carrier stability under special conditions.

### 5.1 Carrier stability with respect to the operating frequency of 13.56 MHz.

#### 5.1.1 Frequency stability (on 13.56 MHz) in accordance with 47 CFR Part 15, section 15.225 (e).

- 1) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage (see table 3).

Stability under special conditions Temperature (°C)	Measured frequency (kHz)	Frequency deviation (limit ±0.01%) (%)	PASS/FAIL
21.0	13561.820 (reference)	N.A.	N.A.
-20	13561.848	< 0.01	PASS
50	13561.764	< 0.01	PASS

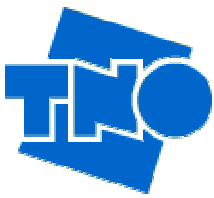
**Table 3: Frequency stability of the EUT.**

- 2) The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over an input voltage variation of +/- 15% of the normal supply voltage at 20 degrees C .

Not applicable, the EUT is battery operated only.  
Measurement data has been derived using new batteries.

#### 5.1.2 Amplitude stability (on 13.56 MHz) in accordance with 47 CFR Part 15, section 15.31 (e).

Not applicable, the EUT is battery operated only.  
Measurement data has been derived using new batteries.



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## 5.2 Carrier stability with respect to the operating frequency of 120 kHz.

### 5.2.1 Frequency stability (on 120 kHz) in accordance with 47 CFR Part 15.

No particular requirements other than in section 3 of this report.

From measurements performed as indicated below, the frequency stability will not cause non-compliant situations with respect to exclusion bands or emissions outside permissible bands (band edges)


Stability under special conditions Temperature (°C)	Measured frequency (kHz)	Frequency deviation Hz
20.0	120.450 (reference)	N.A.
-20.0	120.410	-40
50.0	120.480	30

### 5.2.2 Amplitude stability (on 120 kHz) in accordance with 47 CFR Part 15, section 15.31 (e).

Not applicable, the EUT is battery operated only.

Measurement data has been derived using new batteries.

#### Test engineer

Signature : 

Name : O.H. Hoekstra

Date : February 2, 2007



Test specification(s): 47 CFR Part 15 (2006-08-14)  
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## 6 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12476	Antenna mast	EMCO	TR3	-	-
12477	Antenna mast 1-4 mtr	Poelstra	--	-	-
12482	Loop antenna	EMCO	6507	04/2006	04/2007
12483	Guidehorn	EMCO	3115	03/2006	03/2007
12484	Guidehorn	EMCO	3115	03/2006	03/2007
12533	Signalgenerator	MARCONI	2032	03/2006	03/2007
12605	Calibrated dipole 28MHz-1GHz	EMCO	3121c	09/2002	09/2007
12640	Temperature chamber	Heraeus	VEM03/500	01/2007	01/2008
13664	Spectrum analyzer	HP	HP8593E	08/2006	08/2007
13886	Open Area testsite	Comtest	--	07/2005	07/2007
14051	Anechoic room	Comtest	--	-	-
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2006	02/2007
15667	Measuring receiver	R&S	ESCS 30	04/2006	04/2007
99596	Preamplifier 0.5 GHz - 18 GHz	Miteq	AMF-5D-005180-28-13p	07/2006	07/2007



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## Appendix 1

### Calculated measurements results radiated field strength, H-Field

The rules of Part 15 section 15.31 allow scaling of the measured values or limits when measurements are made at distances other than those specified. The extrapolation factor for frequencies below 30 MHz are 40 dB/decade which means that for a distance change of 10 to 1 (a decade), the limit, or measured value, may be recalculated by adding (moving closer) or subtracting (moving away) 40 dB, respectively.

It is also possible to make radiated-emission measurements at two different distances and extrapolate to a third distance. The calculation method described below, should then be followed.

#### **General Formula:**

$d_1$  = short distance

$d_2$  = long distance

So:  $(d_1/d_2)^n = H_{d2}/H_{d1}$

$n \log(d_1/d_2) = \log(H_{d2}/H_{d1})$

#### **Calculation of n:**

$n = \log(H_{d2}/H_{d1}) / \log(d_1/d_2)$

#### **Calculation of field strength at other distance (10m --> 300m):**

$H_{d2} = H_{d1} (d_1/d_2)^n$