



**TEST REPORT CONCERNING THE COMPLIANCE
OF AN INDUCTIVE PROXIMITY TAG READER
OPERATING ON 134 KHZ,
BRAND NEDAP,
MODEL TF-4 WITH 47 CFR PART 15
(2006-02-01).**

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

TNO Electronic Products & Services (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@eps.tno.nl



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

MEASUREMENT/TECHNICAL REPORT

Nedap N.V.

Model : TF-4

FCC ID: CGD-TF4

April 14, 2006

This report concerns:	Original grant/certification	Class 2 change	Verification
Equipment type:	Inductive proximity card reader		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	Yes	No	n.a.
Report prepared by:	Name	: J. Schuurmans, B.Sc.E.E.	
	Company name	: TNO Electronic Products & Services (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@eps.tno.nl	

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: April 14, 2006

Signature:

P.A.J.M. Robben, B.Sc.E.E.
TNO Electronic Products & Services (EPS) B.V.



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

Description of test item

Test item : 134 kHz Inductive Tag Reader
Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand : Nedap
Model : TF-4
Serial number(s) : --
Revision : --
Receipt date : --

Applicant information

Applicant's representative : Mr. J.A.M. Hulshof
Company : N.V. Nederlandsche Apparatenfabriek "NEDAP"
Address : Parallelweg 2
Postal code : 7141 DC
City : Groenlo
PO-box : 6
Postal code : 7140 AA
City : Groenlo
Country : The Netherlands
Telephone number : +31 (0) 544 471111
Telefax number : +31 (0) 544 463475

Test(s) performed

Location : Niekerk
Test(s) started : March 23, 2006
Test(s) completed : March 31, 2006
Purpose of test(s) : Equipment Authorisation (Certification).

Test specification(s) : 47 CFR Part 15 (2006-02-01)

Test engineers : J. Schuurmans, B.Sc.E.E.

Report written by : J. Schuurmans, B.Sc.E.E.

Report date : April 14, 2006

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

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



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

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
1.3	Tested system details.....	5
1.3.1	Description of input and output ports.....	6
1.4	Test methodology.....	6
1.5	Test facility.....	7
1.6	Product labeling.....	7
2	System test configuration.....	8
2.1	Justification.....	8
2.2	EUT mode of operation.....	8
2.3	Special accessories.....	8
2.4	Equipment modifications.....	8
2.5	Block diagram of the EUT.....	8
2.6	Schematics of the EUT.....	8
2.7	Part list of the EUT.....	8
3	Radiated emission data.....	9
3.1	Radiated field strength measurements (30 MHz – 1 GHz, E-field).....	9
3.2	Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).....	11
4	Conducted emission data.....	15
4.1	Conducted emission data of he EUT (full configuration).....	15
4.2	Conducted emission data of he EUT with AE5.....	16
4.3	Conducted emission data of he EUT with AE4.....	17
4.4	Conducted emission data of he EUT with AE3.....	18
5	List of utilized test equipment.....	19



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is an inductive tag reader intended to be used as cattle identification and motor control for feeding purposes.

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	:	134 kHz Inductive Tag Reader
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	Nedap
Model	:	TF-4
Serial number	:	--
Voltage input rating	:	27 VDC
Current input rating	:	3 A
Remarks	:	-
Auxiliary equipment 1	:	AC/DC power adapter
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP".
Brand	:	Nedap
Model	:	9839208
Serial number	:	U309 B 0001
Voltage input rating	:	100-120 VAC, 50-60 Hz
Current input rating	:	3A
Voltage output rating	:	+27 VDC
Current output rating	:	6 Amps
Remarks	:	UL listed, file no. E135130
Auxiliary equipment 2	:	Motor with gear
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	Nedap
Model	:	VC4 single/twin
Serial number	:	M525 A0647
Remarks	:	no remarks.
Auxiliary equipment 3	:	External antenna
Manufacturer	:	N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand	:	Nedap
Model	:	small
Serial number	:	--
Remarks	:	no remarks.



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

Auxiliary equipment 4 : External antenna
 Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand : Nedap
 Model : medium
 Serial number : --
 Remarks : no remarks.

Auxiliary equipment 5 : External antenna
 Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand : Nedap
 Model : large
 Serial number : --
 Remarks : no remarks.

Auxiliary equipment 6 : SF-4
 Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand : Nedap
 Model : SF-4
 FCC ID : CGD-SF4
 Serial number : --
 Remarks : FCC certification pending.

Auxiliary equipment 7 : Lactivator
 Manufacturer : N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand : Nedap
 serial : 00105531
 FCC ID : CGD-SF4
 Serial number : --
 Remarks: : This is a responder. The information send back to the reader upon triggering by the 134 kHz field can be altered by means of an internal sensor.

1.3.1 Description of input and output ports.

Number	Ports	From	To	Shielding	Remarks
1	AC mains	AC mains	AE1	yes / no	None
2	DC power input port	AE1	EUT	yes / no	None
3	Motor control ports	EUT	AE2	yes / no	None
4	External antenna port	EUT	AE3	yes / no	None
5	Synchronisation port	EUT	AE4	Yes / no	None

AE = Auxiliary equipment

1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15 (2002-02-01), sections 15.207 and 15.209.

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



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

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 10 meters. To calculate the field strength level from these results to the appropriate distance at which the limit is specified, the calculation in appendix 1 has been applied.

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.

1.5 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 15, section 2.948, per October 23, 2000.

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 Product labeling.

In accordance with 47 CFR Part 15.19 (a)(3) the following text shall be placed on a label, which is attached to the EUT:

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

A label, in accordance with 47 CFR Part 15.19 (b)(1)(i), shall be attached to the EUT.

For further details about the labeling requirements (size, legibility, etc.) as set by the Federal Communications Commission see 47 CFR Part 15.19 (a)(3), ~~47 CFR Part 15.19 (b)(1), 47 CFR Part 15.19 (b)(2) and 47 CFR Part 15.19 (b)(4).~~



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

2 System test configuration.

2.1 Justification.

The system was configured for testing in a typical fashion (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: 2003.

2.2 EUT mode of operation.

The EUT has been tested in active mode, i.e. the EUT is ready to detect a tag. The EUT was set to maximum power output, and the antenna tuning was executed as described in the manual. When 1 antenna was used, and field strength measurements were done, the EUT was set to continuous transmit. If more than 1 antenna was connected, the EUT continually switched between the antennas.

The EUT has been tested with 3 types of antennas separately (AE3, AE4 and AE5). Field strength measurements were done on these configurations. Measurement for conducted emissions were also done on each of these configurations. Spurious emissions were tested on the EUT combined with the largest antenna

In addition a full set up has been measured, with a EUT and AE1, AE2, AE3, AE4 and AE6.

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 appropriate 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.



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

3 Radiated emission data.

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

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres Quasi-peak		Limits dB(μ V)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
36.64	28.6	19.0	40.0	-11.4	-21.0	PASS
36.90	28.3	16.0	40.0	-11.7	-24.0	PASS
38.00	26.0	15.5	40.0	-14.0	-24.5	PASS
42.00	23.1	13.5	40.0	-16.9	-26.5	PASS
50.00	23.5	16.5	40.0	-16.5	-23.5	PASS
50.86	22.9	11.6	40.0	-17.1	-28.4	PASS
52.00	21.2	8.9	40.0	-18.8	-31.1	PASS
58.00	25.2	9.7	40.0	-14.8	-30.3	PASS
62.00	27.9	8.9	40.0	-12.1	-31.1	PASS
65.49	25.0	14.1	40.0	-15.0	-25.9	PASS
68.71	26.4	17.4	40.0	-13.6	-22.6	PASS
69.24	27.4	19.7	40.0	-12.6	-20.3	PASS
69.52	31.3	20.6	40.0	-8.7	-19.4	PASS
69.78	26.9	18.8	40.0	-13.1	-21.2	PASS
71.12	25.0	15.2	40.0	-15.0	-24.8	PASS
76.00	33.0	24.4	40.0	-7.0	-15.6	PASS
78.00	31.9	20.7	40.0	-8.1	-19.3	PASS
80.00	29.6	23.2	40.0	-10.4	-16.8	PASS
83.75	31.3	25.2	43.5	-12.2	-18.3	PASS
123.45	26.6	21.4	43.5	-16.9	-22.1	PASS
125.06	24.5	20.2	43.5	-19.0	-23.3	PASS
126.28	27.8	23.6	43.5	-15.7	-19.9	PASS
131.92	19.6	24.1	43.5	-23.9	-19.4	PASS

Table 1: Radiated emissions of the EUT with AE5.

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. Field strength values of radiated emissions at frequencies not listed in the table above are more than 20 dB below the applicable limit.

Test engineer

signature : 

Name : J. Schuurmans
Date : March 30, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
 Description of EUT: Inductive proximity tag reader
 Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand mark: Nedap
 Model: TF-4
 FCC ID: CGD-TF4

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres Quasi-peak		Limits dB(μ V)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
32.21	33.3	28.3	40.0	-6.7	-11.7	PASS
42.00	27.0	13.5	40.0	-13.0	-26.5	PASS
50.00	20.7	9.4	40.0	-19.3	-30.6	PASS
50.86	23.6	9.1	40.0	-16.4	-30.9	PASS
46.00	25.5	11.4	40.0	-14.5	-28.6	PASS
52.00	22.0	8.9	40.0	-18.0	-31.1	PASS
62.00	21.9	22.0	40.0	-18.1	-18.0	PASS
65.49	21.6	11.8	40.0	-18.4	-28.2	PASS
70.00	23.2	12.0	40.0	-16.8	-28.0	PASS
76.00	25.0	18.7	40.0	-15.0	-21.3	PASS
78.00	25.5	18.6	40.0	-14.5	-21.4	PASS
77.83	22.9	20.6	40.0	-17.1	-19.4	PASS
79.44	29.4	22.7	40.0	-10.6	-17.3	PASS
83.74	24.6	19.8	40.0	-15.4	-20.2	PASS
112.06	30.0	24.1	43.5	-13.5	-19.4	PASS
126.01	27.9	27.4	43.5	-15.6	-16.1	PASS
127.89	29.4	30.5	43.5	-14.1	-13.0	PASS

Table 2: Radiated emissions of the EUT with AE1, AE2, AE3, AE4 and AE6 (maximum configuration).

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

Test engineer

signature :

Name : J. Schuurmans

Date : March 30, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
 Description of EUT: Inductive proximity tag reader
 Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
 Brand mark: Nedap
 Model: TF-4
 FCC ID: CGD-TF4

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

Frequency (MHz)	Measurement results dB μ V Quasi-peak		Antenna factor dB	Cable loss dB	Measurement results dB(μ V)/m Quasi-peak (calculated)	Limits Part 15.209 dB(μ V)/m
	3 meters	10 meters				
0.0302	83.0	56.7	20.4	1	3.8	38.0 (300m)
0.0610	61.2	18.4	20.4	1	<<	32.0 (300m)
0.09134	30.5	<<	20.4	1	<<	28.5 (300m)
0.134	76.5	49.6	20.3	1	-12.4	25.1(300 m)
0.268	< 10.0	n.a.	20.5	1	<<	19.6 (300 m)
0.402	< 10.0	n.a.	20.0	1	<<	15.5 (300 m)
0.490 - 1.705	<10.0	n.a.	19.5	1	<<	33.8 - 22.9 (30 m)
1.705 – 30.0	< 10.0	n.a.	19.5	1	<<	29.5 (30 m)

Table 3: Radiated emissions of the EUT with AE3.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205 and 15.209, are depicted in table 3.

- Notes:**
- An example of a calculated measurement result can be found in Appendix 1.
 - Frequency range: 9-90 kHz Average detector used during measurements
110-490 kHz Average detector used during measurements
 - n.a. indicates that no field strength values could be measured on the listed frequencies or in the listed frequency range
 - Field strength values of radiated emissions at frequencies not listed in table 3 are more than 20 dB below the applicable limit

The EUT was varied in three positions, the loop antenna was varied in two orientations. The reported value is the worst case found at the reported frequency.

Up to the 10 th harmonic of the transmit frequency was investigated, as per 47 CFR Part 15 section 15.33

Test engineer

Signature

Name : J. Schuurmans

Date : March 23, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

Frequency (MHz)	Measurement results dB(μ V)/m @ 3 metres Quasi-peak		Limits dB(μ V)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
47.25	15.5	10.9	40.0	-24.5	-29.1	PASS
52.31	16.4	8.9	40.0	-23.6	-31.1	PASS
59.78	17.1	6.7	40.0	-22.9	-33.3	PASS
64.00	17.5	7.0	40.0	-22.5	-33.0	PASS
68.00	15.0	10.8	40.0	-25.0	-29.2	PASS
44.00	17.9	12.5	40.0	-22.1	-27.5	PASS
72.00	24.9	16.0	40.0	-15.1	-24.0	PASS
76.00	15.7	14.4	40.0	-24.3	-25.6	PASS

Table 4: Radiated emissions of the EUT with AE7.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, section 15.209, are depicted in table 4

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. AE 6 is a responder. Upon triggering by the 134 kHz field, it opens and closes its antenna coil in an encoded way. The message can be detected by the EUT.

Test engineer

signature

Name

: J. Schuurmans

Date

: May 15, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

Frequency (MHz)	Measurement results dB μ V Quasi-peak		Antenna factor dB	Cable loss dB	Measurement results dB(μ V)/m Quasi-peak (calculated)	Limits Part 15.209 dB(μ V)/m
	3 meters	10 meters				
0.0302	83.0	56.7	20.4	1	3.8	38.0 (300m)
0.0610	61.2	18.4	20.4	1	<<	32.0 (300m)
0.09134	30.5	<<	20.4	1	<<	28.5 (300m)
0.134	90.0	61.6	20.3	1	2.77	25.1(300 m)
0.268	< 10.0	<<	20.5	1	<<	19.6 (300 m)
0.402	< 10.0	<<	20.0	1	<<	15.5 (300 m)
0.490 - 1.705	<10.0	<<	19.5	1	<<	33.8 - 22.9 (30 m)
1.705 – 30.0	< 10.0	<<	19.5	1	<<	29.5 (30 m)

Table 4: Radiated emissions of the EUT with AE4.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205 and 15.209, are depicted in table 4.

- Notes:**
- An example of a calculated measurement result can be found in Appendix 1.
 - Frequency range: 9-90 kHz Average detector used during measurements
110-490 kHz Average detector used during measurements
 - n.a. indicates that no field strength values could be measured on the listed frequencies or in the listed frequency range
 - Field strength values of radiated emissions at frequencies not listed in table 4 are more than 20 dB below the applicable limit

The EUT was varied in three positions, the loop antenna was varied in two orientations. The reported value is the worst case found at the reported frequency.

Up to the 10 th harmonic of the transmit frequency was investigated, as per 47 CFR Part 15 section 15.33

Test engineer

Signature

Name : J. Schuurmans

Date : March 23, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

Frequency (MHz)	Measurement results dB μ V Quasi-peak		Antenna factor dB	Cable loss dB	Measurement results dB(μ V)/m Quasi-peak (calculated)	Limits Part 15.209 dB(μ V)/m
	3 meters	10 meters				
0.0302	83.0	56.7	20.4	1	3.8	38.0 (300m)
0.0610	61.2	18.4	20.4	1	<<	32.0 (300m)
0.09134	30.5	<<	20.4	1	<<	28.5 (300m)
0.134	95.4	66.4	20.3	1	5.88	25.1(300 m)
0.268	56.1	<<	20.2	1	<<	19.6 (300 m)
0.402	60.2	<<	20.1	1	<<	15.5 (300 m)
0.490 - 1.705	<10.0	<<	19.5	1	<<	33.8 - 22.9 (30 m)
1.705 – 30.0	< 10.0	<<	19.5	1	<<	29.5 (30 m)

Table 5: Radiated emissions of the EUT with AE5.

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.205 and 15.209 are depicted in table 5.

- Notes:**
- An example of a calculated measurement result can be found in Appendix 1.
 - Frequency range: 9-90 kHz Average detector used during measurements
110-490 kHz Average detector used during measurements
 - "<<" indicates that no field strength values could be measured on the listed frequencies or in the listed frequency range
 - Field strength values of radiated emissions at frequencies not listed in table 5 are more than 20 dB below the applicable limit

The EUT was varied in three positions, the loop antenna was varied in two orientations. The reported value is the worst case found at the reported frequency.

Up to the 10 th harmonic of the transmit frequency was investigated, as per 47 CFR Part 15 section 15.33

Test engineer

Signature

Name : J. Schuurmans

Date : Macrh 23, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

4 Conducted emission data.

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

Frequency (MHz)	Measurement results dB(μ V) Neutral		Measurement results dB(μ V) Line 1		Limits dB(μ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.25	17.7	14.6	14.8	9.6	61.8	51.8	-44.1	-37.2	-47.0	-42.2	PASS
0.38	27.0	26.6	22.1	20.4	58.4	48.4	-31.4	-21.8	-36.3	-28.0	PASS
0.63	26.0	24.6	24.2	23.3	56.0	46.0	-30.0	-21.4	-31.8	-22.7	PASS
0.88	25.1	24.6	24.2	23.5	56.0	46.0	-30.9	-21.4	-31.8	-22.5	PASS
1.13	32.0	30.8	32.1	31.9	56.0	46.0	-24.0	-15.2	-23.9	-14.1	PASS
2.28	34.4	33.9	32.3	31.0	56.0	46.0	-21.6	-12.1	-23.7	-15.0	PASS
3.42	35.0	34.5	32.3	31.0	56.0	46.0	-21.0	-11.5	-23.7	-15.0	PASS
6.69	33.3	30.1	31.9	28.1	60.0	50.0	-26.7	-19.9	-28.1	-21.9	PASS

Table 6: Conducted emission measurements of the EUT with AE1, AE2, AE3, AE4 and AE6 (maximum configuration).

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in table 6.

Notes:

1. The conducted emissions on frequencies which are not listed in the table above were found to be below 25 dB μ V on both line 1 and line 2.

Test engineer

Signature : 

Name : J. Schuurmans, B.Sc.E.E.

Date : March 30, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

4.2 Conducted emission data of the EUT with AE5.

Frequency (MHz)	Measurement results dB(μ V) Neutral		Measurement results dB(μ V) Line 1		Limits dB(μ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.15	44.5	43.4	46.4	45.0	66.0	56.0	-21.5	-12.6	-19.6	-11.0	PASS
0.18	43.9	43.5	43.8	43.0	64.7	54.7	-20.8	-11.2	-20.9	-11.7	PASS
0.26	35.5	35.1	36.7	36.4	61.3	51.3	-25.8	-16.2	-24.6	-14.9	PASS
10.00	35.5	35.7	36.8	35.0	60.0	50.0	-24.5	-14.3	-23.2	-15.0	PASS
12.00	36.8	36.6	37.4	37.1	60.0	50.0	-23.2	-13.4	-22.6	-12.9	PASS
16.00	30.4	28.5	28.9	28.7	60.0	50.0	-29.6	-21.5	-31.1	-21.3	PASS
18.00	25.1	23.8	25.0	23.7	60.0	50.0	-34.9	-26.2	-35.0	-26.3	PASS

Table 7: Conducted emission measurements of the EUT with AE5.

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in table 7.

Notes:

1. The conducted emissions on frequencies which are not listed in the table above were found to be below 25 dB μ V on both line 1 and line 2.

Test engineer

Signature : 

Name : J. Schuurmans, B.Sc.E.E.

Date : March 30, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

4.3 Conducted emission data of the EUT with AE4.

Frequency (MHz)	Measurement results dB(μ V) Neutral		Measurement results dB(μ V) Line 1		Limits dB(μ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.15	43.2	41.4	45.3	43.9	66.0	56.0	-22.8	-14.6	-20.7	-12.1	PASS
0.18	41.3	40.0	43.3	42.7	64.7	54.7	-23.4	-14.7	-21.4	-12.0	PASS
0.26	33.4	32.8	34.9	34.8	61.3	51.3	-27.9	-18.5	-26.4	-16.5	PASS
8.00	28.9	29.0	30.9	29.5	60.0	50.0	-31.1	-21.0	-29.1	-20.5	PASS
10.00	31.1	29.7	31.1	29.7	60.0	50.0	-28.9	-20.3	-28.9	-20.3	PASS
12.00	33.4	33.0	33.3	33.0	60.0	50.0	-26.6	-17.0	-26.7	-17.0	PASS
16.00	27.8	27.7	27.9	27.6	60.0	50.0	-32.2	-22.3	-32.1	-22.4	PASS
18.00	26.7	25.6	26.0	24.8	60.0	50.0	-33.3	-24.4	-34.0	-25.2	PASS

Table 8: Conducted emission measurements of the EUT with AE4.

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in table 8.

Notes:

1. The conducted emissions on frequencies which are not listed in the table above were found to be below 25 dB μ V on both line 1 and line 2.

Test engineer

Signature :

Name :

J. Schuurmans, B.Sc.E.E.

Date :

March 30, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

4.4 Conducted emission data of the EUT with AE3.

Frequency (MHz)	Measurement results dB(μ V) Neutral		Measurement results dB(μ V) Line 1		Limits dB(μ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.15	47.6	46.0	45.1	43.7	66.0	56.0	-18.4	-10.0	-20.9	-12.3	PASS
0.18	41.3	40.0	43.0	42.4	64.7	54.7	-23.4	-14.7	-21.7	-12.3	PASS
0.26	33.6	33.4	34.7	34.6	61.3	51.3	-27.7	-17.9	-26.6	-16.7	PASS
8.00	32.0	30.3	32.3	31.1	60.0	50.0	-28.0	-19.7	-27.7	-18.9	PASS
10.00	31.2	29.7	31.6	29.7	60.0	50.0	-28.8	-20.3	-28.4	-20.3	PASS
12.00	35.9	36.2	35.9	36.0	60.0	50.0	-24.1	-13.8	-24.1	-14.0	PASS
16.00	30.5	28.7	30.3	28.4	60.0	50.0	-29.5	-21.3	-29.7	-21.6	PASS
18.00	27.7	25.7	27.0	25.0	60.0	50.0	-32.3	-24.3	-33.0	-25.0	PASS

Table 9: Conducted emission measurements of the EUT with AE3.

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in table 9.

Notes:

1. The conducted emissions on frequencies which are not listed in the table above were found to be below 25 dB μ V on both line 1 and line 2.

Test engineer

Signature : 

Name : J. Schuurmans, B.Sc.E.E.

Date : March 30, 2006



Test specification(s): 47 CFR Part 15 (2006-02-01)
Description of EUT: Inductive proximity tag reader
Manufacturer: N.V. Nederlandsche Apparatenfabriek "NEDAP"
Brand mark: Nedap
Model: TF-4
FCC ID: CGD-TF4

5 List of utilized test equipment.

Inventory number	Description	Brand	Model
12476	Antenna mast	EMCO	TR3
12477	Antenna mast 1-4 mtr	Poelstra	--
12491	Measuring receiver	R&S	ESH3
12493	Spectrum monitor ESH3	R&S	EZM
12512	LISN FCC	Emco	3725/2
12605	calibrated dipole 28MHz-1GHz	Emco	3121c
12636	Polyester chamber	Polyforce	--
13313	Pulse limiter	R&S	ESH3-Z2
13886	Open Area testsite	Comtest	--
14051	Anechoic room	Comtest	--
15633	Biconilog Testantenna	Chase	CBL 6111B
15667	Measuring receiver	R&S	ESCS 30
99055	Non-conducting support	NMi	--
99061	Non-conducting support 150cm	NMi	--
99077	Regulating trafo	RFT	LTS006
99112	Tripod	Chase	--



Appendix 1

Calculated measurements results radiated field strength, H-Field

General Formula:

d_1 = short distance

d_2 = long distance

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

Measured field strength at 125 kHz:

$$H_{3m} = 116.7 \text{ dB}\mu\text{V/m} = 634.8 \text{ mV/m}$$

$$H_{10m} = 87.7 \text{ dB}\mu\text{V/m} = 24.3 \text{ mV/m}$$

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

$$n = \log(24.3/634.8) / \log(3/10)$$

$$n = 2.77$$

Calculated field strength at 125 kHz (10m --> 300m):

$$H_{300m} = H_{d2}, H_{10m} = H_{d1}$$

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

$$H_{300m} = 1.94 \mu\text{V/m} = 5.78 \text{ dB}\mu\text{V/m}$$