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Enclosure 3

Nederlands Meetinstituut

FCC ID: KX2 RF DSP 001

Testing, certification, consultancy and research in electronic and electric appliances, systems, installations and (radio) frequency technology.

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(March 3, 1993)

EMISSION MEASUREMENTS IN ACCORDANCE WITH FCC PART 15 AND ANSI C63.4-1992 ON A RF SYSTEM, BRAND DIALOC, TYPE 9000.

FCC report layout endorsed by the FCC by Public Notice of March 11, 1992.

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NMI Certin B.V. (33418)
NMi Test- en Adviescentrum (TAC) B.V. (28702)

MEASUREMENT/TECHNICAL REPORT

Dialoc ID Technology B.V.

FCC ID: KX2 RF DSP 001

January 19, 1999

This report concerns (check one):	Original grant ~~Class II permissive change~~		
Equipment type: RF System (shoplifting detection device)			
Deferred grant requested per 47 CFR 0.457(d)(1)(ii)?	~~yes~~	no	
	If yes defer until: not applicable		
Dialoc ID Technology B.V. agrees to notify the Commission by letter of the intended date of announcement of the product so that the grant can be issued on that date			
Transition Rules Request per 15.37	~~yes~~	no	
If no, assumed Part 15, Subpart B for unintentional radiators - the new 47 CFR (10-1-92 Edition) provision.			
Report prepared by:	Name	:	P.A.J.M. Robben, B.Sc.
	Company name	:	NMi Certin B.V.
	Address	:	Smidshornerweg 18
	Telephone number	:	+ 31 594 505005
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	Mailing address	:	P.O. Box 15
	City/Place/Postal cd.	:	9822 ZG NIEKERK
	Country	:	The Netherlands

The data taken for this test and report herein was done in accordance with FCC Part 15 and ANSI C63.4-1992 measurements. NMi Certin B.V.. location 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 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: January 19, 1999 Signature:

NMi Certin B.V.

J.S. Sikkema, B.Sc.
Department EMC, Telecommunications and Electrical Safety

Table of contents Page

1 General Information.

1.1 Product description.

1.1.1 Introduction.

The Dialoc RF System has been developed as a anti shop-lifting detection system. A miniature responder (called wafer) is attached to the products to be protected. These wafers are removed after paying. In the event of theft, they are still present and are detected when they enter the vicinity of the detection pillars consisting of a transmitter and a receiver pillar. The pillars form one or more passages and are located at the exit of the sales.

1.1.2 Choice of frequency.

The operating frequency of the Dialoc RF System is 7.24 - 9.02 MHz.

1.1.3 Operating principles.

The heart of the RF Ssytem is the wafer. The wafer contains a resonant circuit, consisting of an air cored loop and a capacitor. If the loop enters an alternating magnetic field, such as that of a primary transmitting loop, an electric voltage is generated in the windings. If the frequency of the alternating magnetic field corresponends to the resonant frequency of the wafer (determined by the self-inductance of the loop and the capacity of the capacitor), the voltage over the loop will cause an alternating current in the series connection of the coil and the capacitor. The current in the loop then generates its own, secondary, alternating magnetic field, which is 90 degrees phase shifted. This secondary field induces a voltage in the receiver antenna and is phase sensitive detected.

In this way energy is absorbed from the transmitting circuit by the wafer circuit. This energy is dissipated in the loss resistance, which should be connected in series with the loop and capacitor in the wafer.

1.2 Related Submittal(s)/grant(s).

Not applicable.

1.3 Test facility.

The FCC has per Public Notice declared that the measurement facilities located at the NMi Certin B.V. Testsite Niekerk, Smidshornerweg 18, The Netherlands, has been reviewed and found to be in compliance with the requirements of section 2.948 (previously section 15.38) of the FCC rules per August 4, 1994.

The description of the measuring facilities have been filed with reference 31040/SIT, 1300B3 at the FCC's Offices.

1.4 List of measurement equipment.

NMI number	Description	Marketing name	Type
01-8809	Antennamast 1-4 metres	Poelstra	-
01-8801	Biconical 20-200 MHz	EATON	94455-1
01-8808	Antennamast	EMCO	TR3
01-8803	Log-per 200-1000 MHz	EATON	96005
01-8901	Active loop antenna 30 cm.	EMCO	6507
02-8803	Meas. receiver 20-1000 MHz	R&S	ESVP
02-8803	Meas. receiver 0.01-30 MHz	R&S	ESH2
03-8801	Artificial mains network	R&S	ESH2-Z5
03-8804	Impulslimiter	R&S	ESH3-Z2
03-8810	LISN FCC	EMCO	3725/2
06-8802	Meas. cable 10 metres	-	-
08-8803	Regulating transformer	RFT	LSS020
09-8802	Controller opt. EZM	R&S	PCA-Z1
15-8801	OATS	WOLFF -	
16-8801	Shielded room	EUROSHIELD	6x4x2.5

1.5 Bandwidth and antenna factors

The utilized test equipment is stated in § 1.4. The bandwidth of the receivers are switching automatically to the right bandwidth in accordance with CISPR 16. This is implemented in the receiver. The antennafactors 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.

2 System test configuration.

2.1 Justification.

In accordance with § 11.2.4. of ANSI C63.4-1992 the placing and manipulation of the various connection cables has been carried out. In the drawing on page 9 the measuring set-up for the disturbance voltage measurements is given. In the drawing on page 10 the measuring set-up is given for the radiated field strength measurements.

2.2 EUT mode of operation.

During all measurements a wafer was placed between the antennas in order to generate a continuous detection signal.

2.3 Special accessories.

Not applicable.

2.4 Equipment modifications.

Not applicable.

2.5 Configuration of the tested system.

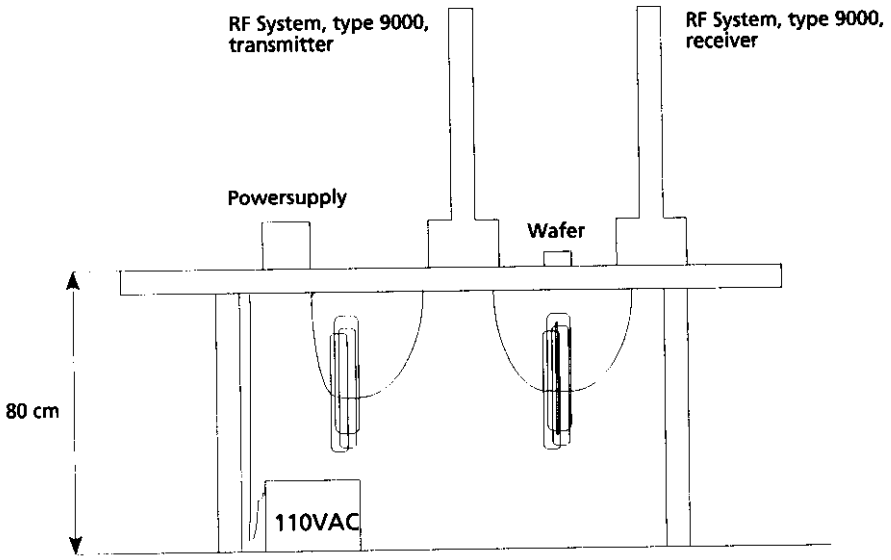
Unit title	:	RF System
Model number	:	type 9000
FCC ID number	:	KX2 RF DSP 001
Frequency range	:	7.24 - 9.02 MHz
Description/details	:	see § 1.1 of this report
Power Supply	:	power supply 120 V (see enclosure)
Cabinet & Screening	:	metal enclosure
Interface Cable(s)	:	unshielded cables
Method of screening	:	not applicable
Method of grounding	:	not applicable
Operating configuration	:	RF System, type 9000, with wafer for active mode

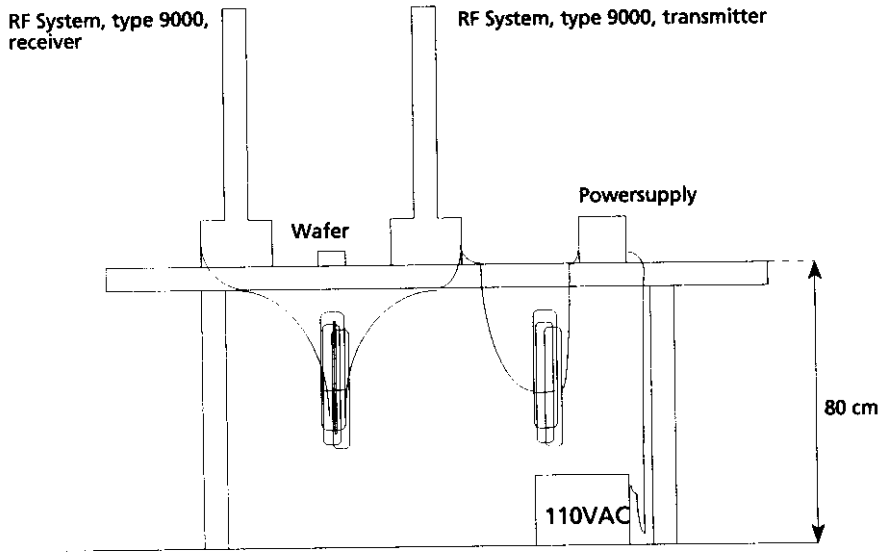
Applicant's representative	:	B. Appeldoorn
Company	:	Dialoc ID Technologies B.V.
Address	:	Galvanistraat 24
Postal code and city	:	3849 AT Harderwijk
Country	:	The Netherlands
Telephone number	:	+31 (0)341 420940
Telefax number	:	+31 (0)341 425033

3 Conducted and radiated measurement drawings.

On page 9 and 10 the drawings of the conducted and radiated measurements are given:

-	Page 9	Top drawing:	Radiated fieldstrength measurement: front
		Bottom drawing:	Radiated fieldstrength measurement: back
-	Page 10	Top drawing:	Disturbance voltage measurements: front
		Bottom drawing:	Disturbance voltage measurements: back


RF System, type 9000, transmitter
RF System, type 9000, receiver
Powersupply
Wafer
80 cm
110VAC


RF System, type 9000, receiver
RF System, type 9000, transmitter
Powersupply
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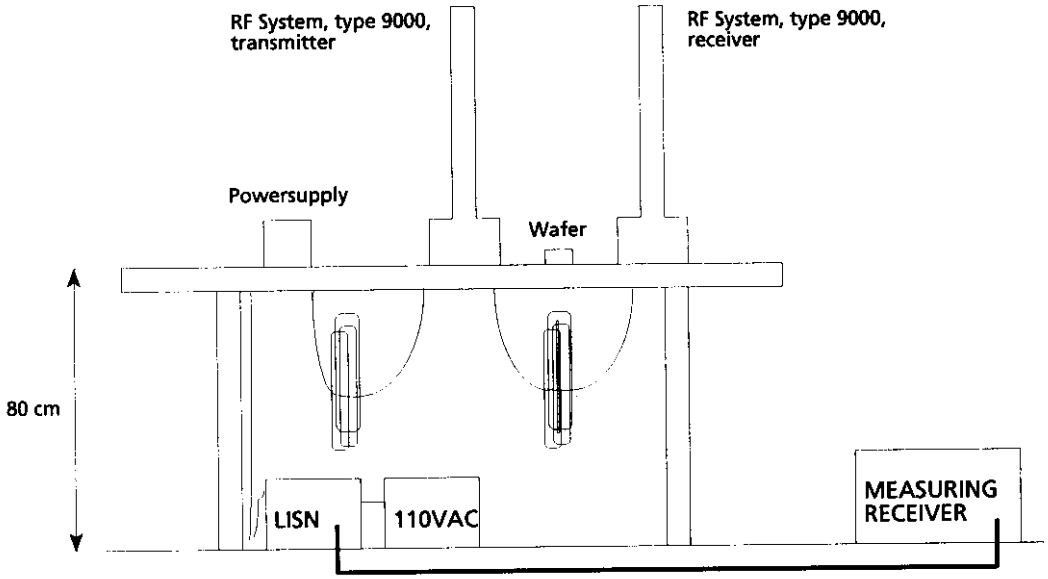
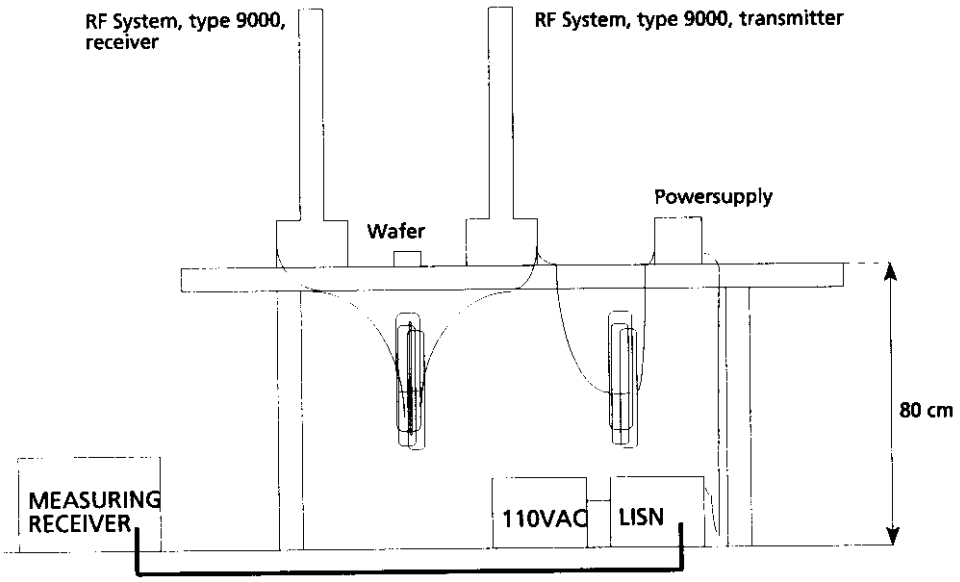
FCC ID: KX2 RF DSP 001





4 Conducted emission data.

4.1 Conducted emission data (the system was sweeping).

Frequency	Measured values (QP)		Limits
	Line	Neutral	
(MHz)	(dBµV)	(dBµV)	(dBµV)
0.450 - 30.000	< 35.0	< 35.0	48.0

QP = quasi-peak values
<< Measured levels more than 20 dB below limits
Levels of frequencies not stated in this table have been found below 30 dBµV

Table 1

Results of the disturbance voltage measurements, carried out in accordance with FCC Part 15, § 207 (Edition 10-1-1993), on the mains connection terminals of a RF System, brand Dialoc, type 9000.

Test engineer:

Tester signature : Date: January 19, 1999

Typed/Printed name : P.A.J.M. Robben, B.Sc.

4.2 Conducted emission data (sweep stopped).

Frequency	Measured values (QP)		Limits
	Line	Neutral	
(MHz)	(dBµV)	(dBµV)	(dBµV)
7.434 (a)	< 35.0	< 35.0	48.0
14.867 (b)	< 35.0	< 35.0	48.0
22.301 (c)	< 35.0	< 35.0	48.0
29.735 (d)	< 35.0	< 35.0	48.0
8.692 (e)	< 35.0	< 35.0	48.0
17.384 (f)	< 35.0	< 35.0	48.0
26.074 (g)	< 35.0	< 35.0	48.0

QP = quasi-peak values
<< Measured levels more than 20 dB below limits
Levels of frequencies not stated in this table have been found below 30 dBµV

Table 2

Results of the disturbance voltage measurements, carried out in accordance with FCC Part 15, § 207 and § 15.31c (Edition 10-1-1993), on the mains connection terminals of a RF System, brand Dialoc, type 9000. The sweeping of the RF System was stopped for the purpose of this measurement. The frequencies as stated in Table 2 are defined as follows:

a. Local signal (lower part)
b. Second harmonic (lower part)
c. Third harmonic (lower part)
d. Fourth harmonic (lower part)
e. Local signal (higher part)
f. Second harmonic (higher part)
g. Third harmonic (higher part)

Test engineer:

Tester signature : Date: January 19, 1999

Typed/Printed name : P.A.J.M. Robben, B.Sc.

5 Radiated emission data.

5.1 Radiated field strength measurements (frequency range of 30 MHz to 1000 MHz, E-Field)

Frequency	Measuring results (QP)		Limits FCC Part 15 § 209
	Vertical *)	Horizontal *)	
(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)
50.00	36.7	< 9.4	40.0
100.00	36.5	< 12.1	43.5
110.00	29.2	< 13.4	43.5
150.00	33.2	< 13.7	43.5
200.00	32.5	< 12.2	43.5
235.00	33.6	< 14.5	46.0
250.00	44.5	< 16.5	46.0
300.00	36.6	< 17.7	46.0
350.00	35.6	< 19.5	46.0
350.00 - 960.00	< 33.0	< 33.0	46.0
960.00 - 1000.0	< 33.0	< 33.0	54.0

QP = Quasi-peak
<< Measured levels more than 20 dB below limits
Measured levels on frequencies not stated in this report were more than 30 dB below the applicable limit.

Table 3

Results of the radiated electric field strength (E-field) measurements, carried out in accordance with FCC Part 15, § 209 (Edition 10-1-93) and ANSI C63.4-1992, on a RF System, brand Dialoc, type 9000. The system was sweeping during the measurements.

Test engineer:

Tester signature : Date: January 19, 1999

Typed/Printed name : P.A.J.M. Robben, B.Sc.

5.2 Radiated field strength measurements (frequency range of 9 kHz to 30 MHz, H-Field)

5.2.1 Radiated field strength measurements (H-field, the system was sweeping).

Frequency	Measuring results (QP)	Limits FCC Part 15 § 223 (30 m.)	Limits FCC Part 15 § 209
(MHz)	(dBµV/m)	(dBµV/m)	(dBµV/m)
0.009 - 0.490	<<	n.a.	2400/F (300 m.)
0.490 - 1.705	<<	n.a.	24000/F (30 m.)
1.705 - 8.200	<<	40.0	n.a.
8.200	28.9	40.0	n.a.
8.200 - 10.000	<<	40.0	n.a.
10.00 - 30.000	<<	n.a.	29.5

QP = Quasi-peak
<< Measured levels more than 20 dB below limits
Measured levels on frequencies not stated in this report were more than 30 dB below the applicable limits.

Table 4

Results of the radiated electric field strength (H-field) measurements, carried out in accordance with FCC Part 15, § 209, § 223 (Edition 10-1-93) and ANSI C63.4-1992, on a RF System, brand Dialoc, type 9000.

Note 1: **According to FCC Part 15, § 223, bandwidth shall be more than 10% of the frequency to apply the limits as given in Table 4. The bandwidth of the system is 7.24 MHz - 9.02 MHz.**

Note 2: **The EAS system sweeps from 7.24 MHz to 9.02 MHz. The sweep does not stop in bands as listed in FCC Part 15, § 15.205 (restricted bands of operation). The fundamental emission is outside the bands, as listed in FCC Part 15, § 15.205, for more than 99% of the time when the device is actively transmitting, without compensation for duty cycle.**

Test engineer:

Tester signature : Date: January 19, 1999

Typed/Printed name : P.A.J.M. Robben, B.Sc.

NMi Certin B.V.

5.2.2 Radiated emission measurements (H-field, sweep stopped).

Frequency	Measured values (QP)	Anntenna Factor	Cable Attn.	Measured Result	Limits FCC Part 15 § 223 (30 m.)	Limits FCC Part 15 § 209
(MHz)	(dBµV)	(dB)	(dB)	(dBµV/m)	(dBµV/m)	(dBµV/m)
7.24 (a)	17.2	17.0	1	35.2	40.0	n.a.
14.48 (b)	<<	17.0	1	< 18.0	n.a.	29.5
21.72 (c)	<<	17.0	1	< 18.0	n.a.	29.5
9.02 (d)	16.5	17.0	1	34.5	40.0	40.0
18.04 (e)	<<	17.0	1	< 18.0	n.a.	29.5
27.06 (f)	<<	17.0	1	< 18.0	n.a.	29.5

QP = Quasi-peak
<< Measured levels more than 20 dB below limits
Measured levels on frequencies not stated in this report have been measured more than 30 dB below the applicable limit.

Table 5

Results of the radiated electric field strength (H-field) measurements, carried out in accordance with FCC Part 15, § 209, § 223, § 15.31c (Edition 10-1-93) and ANSI C63.4-1992, on a RF System, brand Dialoc, type 9000. The sweeping of the RF System was stopped for the purpose of this measurement. The frequencies as stated in Table 5 are defined as follows:

a. Local signal (lower part)
b. Second harmonic (lower part)
c. Third harmonic (lower part)
d. Local signal (higher part)
e. Second harmonic (higher part)
f. Third harmonic (higher part)

Note: According to FCC Part 15, § 223, bandwidth shall be more than 10% of the frequency to apply the limits as given in Table 5. The bandwidth of the system is 7.24 MHz - 9.02 MHz.

Test equipment:

Tester signature : Date: January 19, 1999

Typed/Printed name : P.A.J.M. Robben, B.Sc.

APPENDIX A

Method of field strength calculations

General formula:

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

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

Measured field strength at 8.2 MHz:

H_{3m} = 88.9 dBμV/m = 27861.2 μV/m

H_{10m} = 57.5 dBμV/m = 749.9 μV/m

n = 3.0

Calculated field strength at 8.2 MHz (10m --> 30m):

H_{30m} = 27.8 μV/m = 28.9 dBμV/m

APPENDIX B

Plot of carrier bandwidth