

MEASUREMENT/TECHNICAL REPORT**DIALOC ID TECHNOLOGY B.V.****FCC ID: KX2SX002**

10 April 1998

This report concerns (check one):		☒ Original grant	☐ Class II change
Equipment type: intentional radiator			
Measurement procedure used:			
ANSI C63.4-1992			
Application for Certification prepared by:		Applicant for the device:	
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Country	: The Netherlands	Country	: The Netherlands

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2 GENERAL INFORMATION

2.1 Product Description

The product description will be send to the commission by Dialoc ID technology separately.

2.2 Photographs of the tested system

The photographs of the tested system will be send to the commission by Dialoc ID technology separately.

2.3 Test Methodology

Both conducted and radiated testing were performed according to the procedures as mentioned in section 15.207, section 209 and section 15.223 of 47CFR, Part 15 subpart C.

According to section 15.201 this type of device shall be classified as an intentional radiator and thus is subject to Certification. The measurements were performed in accordance with the test methodology of section 13 of ANSI C63.4-1992.

2.4 Test Facility

The open area test site and conducted measurement facility used to collect the radiated and conducted measurement data are located at the premises of KEMA Nederland B.V., Utrechtseweg 310, in Arnhem, The Netherlands. The FCC has per Public Notice declared this measurement facility had been reviewed and to be in compliance with the requirements of Section 2.948 of the FCC Rules. It was accepted by letter with accreditation number 31040/SIT; 1300F2, dated January 13 1998.

1 CONCLUSION

This report presents the results of FCC emission measurements on an anti-shoplifting system, manufactured by Dialog ID Technology, type SX with FCC Identification KX2 SX002.

Emission characteristics were determined according to 47CFR part 15, subpart C intentional radiators, section 15.207 (conducted limits), section 15.209 (general radiated emission limits) and section 15.223 (operation in the band 1.705-10MHz). The measurement methods are based on section 13 of ANSI C63-4:1992, 'Measurement of Intentional Radiators.

The requirements apply to equipment intended for use in a commercial environment.

The equipment under test (EUT) mentioned in this report does fulfil all the requirements as specified in the standards mentioned above.

The tests described in this report do not result in the right to use any approval mark as conferred by KEMA. As far as the tests were based on certain specifications, these are mentioned in the report.

4 SYSTEM TEST CONFIGURATION

4.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it).

The tested system is configured with one antenna. The antenna functions as a transmitting antenna and as a receiving antenna. The tested system is powered by means of a 120V_{ac}/24V_{dc} adapter.

The transmitter is operating at a transmitting frequency of 2,217 MHz. The carrier is pulse modulated with 60 Hz. The RF output power of the transmitter was calibrated by the manufacturer at the nominal working power (50% of the maximum power, 20V_{pp} antenna signal)

The SX system was configured as a floorstanding equipment during the measurements.

4.2 Configuration of Tested System

4.2.1 Equipment under test

Device	: anti-shoplifting system
Trade mark	: DIALOC
Type	: SX
Serial number	: 5901604
FCC ID	: KX2SX002
Power supply	: 120V _{ac} /24V _{dc} adapter
Enclosure	: plastic/metal
Interface cabling	: not applicable
Shield termination	: not applicable

4.2.2 Power supply

Device	: Power adapter
Trade mark	: POWER BOX
Type	: SW 6798
P dissipation	: 350 mA
Rating	: 120V _{ac} /24V _{dc} adapter
Power supply wire	: 2-wires unshielded cable

3 PRODUCT LABELING

The product labeling information will be send to the commission by Dialog ID technology separately.

5 CIRCUIT DIAGRAMS OF EQUIPMENT

The circuit diagrams will be send to the commission by Dialog ID technology separately.

4.2.3 Frequency range and X-tal information

transmitting f : 2,217 MHz
modulation : pulse
pulse duration : 58 μ s
pulse delay : 58 μ s
periods : 128
modulation f : 60 Hz

μ -controller : none16
frequency : 4,434 MHz



photo 3, measurement setup during H-field emission measurements at 3 meter



6 GENERAL INFORMATION

6.1 Client information

Manufacturer : Dialoc ID technology B.V.
Address : Galvanistraat 24
Postcode : 3846 AT
Place : Harderwijk
Country : The Netherlands

Applicant : Dialoc B.V.
Contact person : Mr. H. Batterink
Telephone : +31 0341 - 420940
Fax : +31 0341 - 425033
Address : Galvanistraat 24
Postal code : 3846 AT
Place : Harderwijk
Country : The Netherlands

6.2 Test data and place of measurement

Test location : KEMA Registered Quality Nederland B.V., The Netherlands
Address : Utrechtseweg 310
Postal code : 6812 AR
Place : Arnhem
Site ID : 31040/SIT
Country : The Netherlands
Date of tests : July and August 1996, April 1998
Test engineer : Mr. A.J. Werner
Mr. H.T. Jonker

8.3 Measured data (mains conducted disturbance voltage)

Standard : FCC part 15 Subpart B
 Port : 120V_{ac}/60Hz mains adapter
 Limits :

Frequency [MHz]	Limit Qp [dB(μV)]
0,45 - 30	48

Operation mode: sweep mode

Frequency [MHz]	Line/Neutral	Level Qp [dB(μV)]
2,22	L	46
4,44	L	22
9,9	N	21
20,41	N	28
22,17	N	38

Measurement uncertainty: ± 2 dB

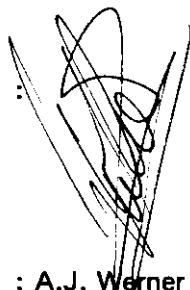
Note 1 : "Qp" are levels and limits referring to measurements with the quasi-peak detector.

Note 2 : The class A emission limits (section 15.107) are (also) allowed for any digital circuitry in the EUT which does not directly enable the transmitter.

Conclusion : Pass (margin 2 dB)

Test personnel:

Tester Signature :



Name

: A.J. Werner

8 CONDUCTED EMISSION DATA

8.1 Test procedure

In accordance with § 15.207 the conducted radio frequency disturbance voltages between each of the power lines (live, neutral) and the ground terminal were determined over the frequency range from 450 kHz to 30 MHz. The AC power line conducted emission measurements were performed at the line voltage of 120 V_{ac} and at the power frequency of 60 Hz. Measurements were performed at the AC powerport of the adapter.

The measurement shall show compliance of this (class B) intentional radiator with the conducted limit of 250 μ V (48 dB μ V).

The (floor standing) test set-up was in accordance with the requirements of ANSI C63.4-1992.

The initial step in collecting conducted data is a peak scan measurement over the frequency range of interest. Significant peaks are then marked, and these signals are then quasi-peaked. This procedure is implemented in the utilised test receiver by the incorporated EMI software. The test receiver used also meets the requirement as mentioned in § 15.35 "Measurement detector functions and bandwidths". The test receiver employs a CISPR quasi-peak detector function with a bandwidth of 9 - 10 kHz.

8.2 Test Instrumentation Used for Conducted Measurements

EMI Equipment	Type	Manufacturer	Serial no.	ORS No.	Cal interval
Spectrum analyzer	R3381A	Advantest		078274	yearly (08-98)
LISN (4 x 10 A)	NSLK 8127	Schwarzbeck	8127128	078088	yearly (05-98)
EMI test receiver	ESHS 10	Rohde & Schwarz	840048/008	077989	yearly (07-98)

Note : The Object Registration Number (ORS) is a unique number within the KEMA quality system, which identifies the equipment.

9.2 Field Strength Calculation

The final field strength is calculated by adding the Antenna Factor and Cable Factor to the reading on the test receiver. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CF - (G)$$

where:

FS = Field strength

RA = Receiver amplitude

AF = Antenna factor

CF = Cable attenuation factor

G = Pre-amplifier gain (used in frequency range 1 - 2 GHz)

Example of calculating the field strength level:

Assume the receiver reading of 26.0 dB μ V at a frequency of 113.6 MHz as obtained for the system with the bus-clock set at 66 MHz:

Measuring value, RA: 26.0 dB(μ V)

Antenna factor, AF: 13.0 (dB/m)

Cable factor, CF: 1.1 (dB)

Thus resulting in a

Field strength, FS: 40.1 dB(μ V/m)

The Correction Factor mentioned in the result tables of clause 9.4 comprises the Antenna factor AF and the Cable attenuation factor CF.

9.3 Test Instruments Used for Radiated Measurements

EMI Equipment	Type	Manufacturer	Serial no.	ORS No.	Cal interval
EMI Test receiver	ESV	Rohde & Schwarz	872148/016	067254	yearly (05-98)
EMI test receiver	ESVS 10	Rohde & Schwarz	827864/001	078088	yearly (09-98)
Biconical antenna	3110	EMCO	1078	078268	yearly (09-98)
Logger antenna	3146	EMCO	9111-3284	074850	yearly (09-98)

9.4 Radiated electromagnetic field strength results

Standard : FCC part 15 Subpart C
Limits : Measurement distance of 3 m

Frequency [MHz]	Limit Qp [μ V/m]	Limit Qp [dB(μ V/m)]
30 - 88	100	40
88 - 216	150	43,5
216 - 960	200	46
>960	500	54

Prescan results : No significant could be measured above 150 MHz

Final Results :

Frequency [MHz]	Measurement result	Correction factor [dB]	Polarisation [hor./vert.]	Level Qp [dB(μ V/m)]
62,1	18,0	10,0	V	28,0
66,1	18,0	10,0	V	28,0
146,3	4,0	16,5	V	20,5

Measurement uncertainty: ± 3 dB

No significant emission levels could be measured at all other frequencies.

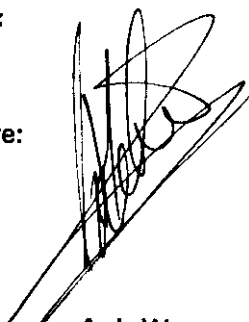
Note 1 : All readings are quasi-peak values using a quasi-peak bandwidth of 120 kHz

Note 2 : The class A emission limits (section 15.109) are (also) allowed for any digital circuitry in the EUT which does not directly enable the transmitter.

Conclusion : Pass (Margin is 12,0 dB).

Test personnel:

Tester Signature:



Name

Address

10 RADIATED EMISSION DATA (H-field <30 MHz)**10.1 Test Procedure**

In accordance with section 15.209 and section 15.223 the magnetic field strength levels of radiated emissions < 30 MHz from this intentional radiator at a distance of 3 and 10 meters were determined over the frequency range from 0,009 MHz up to 30 MHz. The measurement shall show compliance of this intentional radiator. The test set-up was in accordance with the requirements of section 13 of ANSI C63.4-1992.

Preliminary radiation measurements were performed in a compact anechoic room using the active loop antenna, in accordance with section 8.2.1 of ANSI C63-4, at a 3 meter test distance. First a bandwidth plot using the peak-detector was drawn of the fundamental and spurious frequency. See annex A for results.

The results of the preliminary measurements were used for the final measurements at the OATS. A conducting ground plane was present. Both the fundamental and the spurious emissions were measured.

In accordance with section 15.223, measurements in band 1.705 - 10 MHz were performed employing both the average- and the peak- detector. The peak limit is calculated by adding 20 dB the average limit (section 15.35(b) of 47CFR part 15).

The RF output power of the transmitter was calibrated by the manufacturer to the nominal working transmitting power (50% of the maximum power, 20V_{pp} antenna signal).

The data presented in clause 10.4 lists the significant emission frequencies and measured levels.

10.2 Field Strength Calculation

The field strength is calculated automatically by the EMI-receiver in combination with the active loop antenna by means of a hardware plug (20 dB linear over the range 1 - 30 MHz).

10.3 Test Instruments Used for H-field Radiated Measurements

EMI Equipment	Type	Manufacturer	Serial no.	ORS No.	Cal interval
EMI Test receiver	ESHS 10	Rhode & Schwarz	840048/008	077869	yearly (07-98)
EMI Test receiver	ESH2	Rohde & Schwarz	872318/018	067222	yearly (05-98)
Active loop antenna	HFH-Z2	Rohde & Schwarz	335471152	067219	yearly (08-98)

10.4 Radiated magnetic field strength

Standard : FCC part 15 Subpart C section 15.209 and 15.223

Limits : Distance of 30 m

frequency [MHz] ¹⁾	Limit [μ V/m] Quasi-peak	Limit [μ V/m] Average	Limit [μ V/m] Peak	Limit [dB(μ V/m)] Quasi-peak	Limit [dB(μ V/m)] Average	Limit [dB(μ V/m)] Peak
0,09 - 0,49	2400/f for 300m	-	-	calculation	-	-
0,49 - 1,705	24000/f for 30m	-	-	calculation	-	-
1,705-10,0	-	100	1000		40	60
10,0 -30,0	30	-	-	29,5	-	-

¹⁾ See section 15.221, 15.225 and section 15.227 for specific emission requirements within the bands 225-1705 kHz, 13.553-13.567 MHz and 26.96-27.28 MHz.

Limits : Distance of 10 m

In accordance with section 15.31 f(2) of 47CFR part 15 the square of an inverse linear distance extrapolation factor (40 dB/decade) was used to calculate the limit at 10 meter measuring distance.

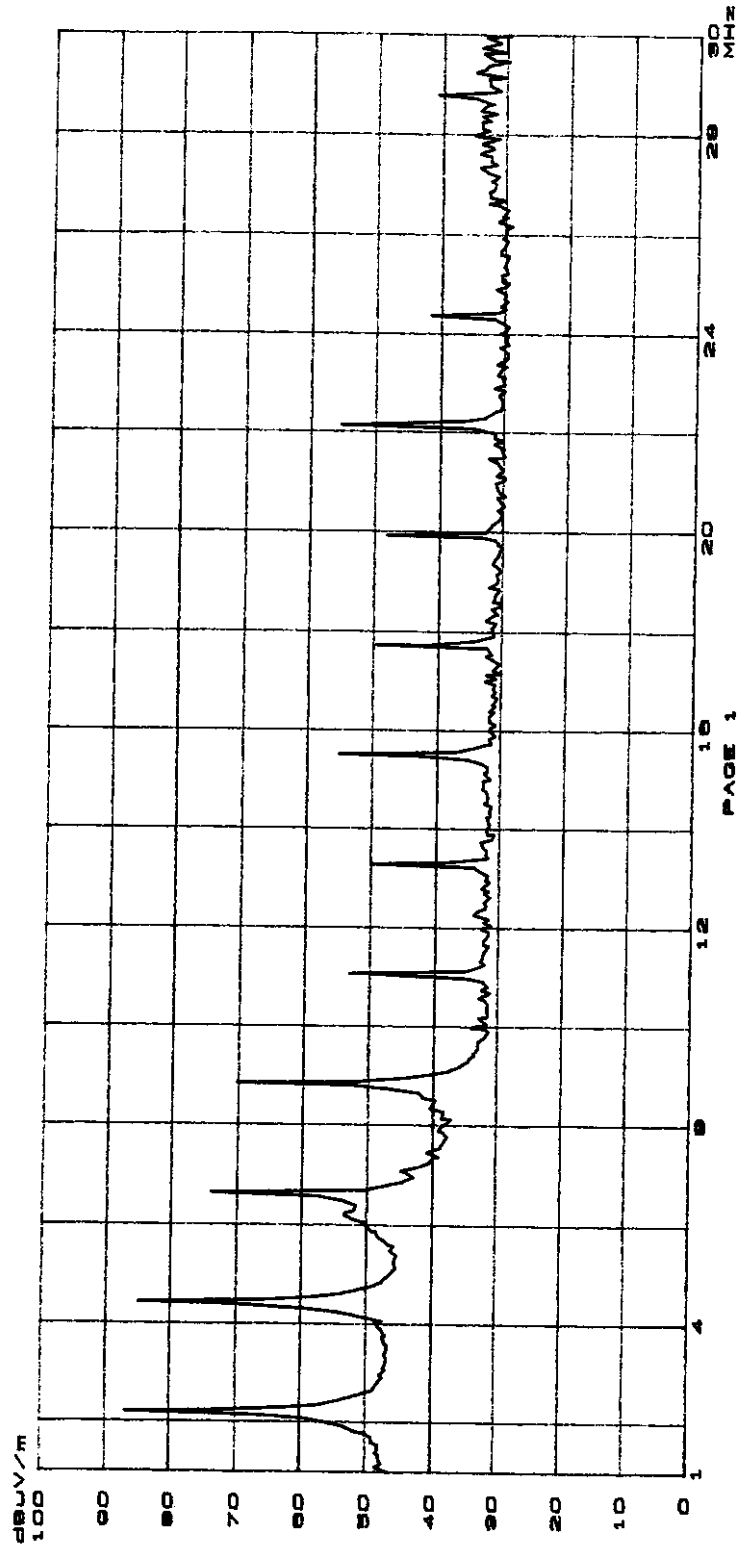
frequency [MHz]	Limit [dB(μ V/m)] Quasi-peak	Limit [dB(μ V/m)] Average	Limit [dB(μ V/m)] Peak
1,705-10,0	-	60	80
10,0 -30,0	49,5	-	-

6262400 DIALOC ID Technology
H-field pre-measurements 3 m

EUT: ANTI-SHOP LIFTING SYSTEM TYPE 9X
 Manuf: DIALOC
 Model: NOMINAL OPERATING POWER
 Oper Cond: H70
 Oper Ref: 4700R Part 13(2) ANSIC03-4
 Test Spec: Bandwidth plus fundamental + spurious
 Comment: 80Hz

Scan Settings (1 Range)
 Span: 300m
 Preset: 3.0k
 In: 10k
 Ref: 10k
 Detector: PK
 Receiver Settings
 Noise: 100dB AUTO LN
 Filter: 00000
 Mod: 00000
 Demod: 00000

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BANDWIDTH PLOTS

The next page shows the bandwidth plot of the operating SX-system.