



Testing and certification of, consultancy and  
research concerning, electronic and electric  
appliances, systems, installations and  
telecommunication systems

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**TEST REPORT CONCERNING THE COMPLIANCE OF  
AN INDUCTIVE PROXIMITY CARD READER,  
BRAND INTEGRATED ENGINEERING, TYPE  
PX007Z/MF/PAC, WITH 47 CFR PART 15 (2001-5-24).**

FCC listed : 90828  
Industry Canada : IC3501

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Test specification(s): 47 CFR Part 15 (2001-5-24)  
Description of EUT: Inductive proximity card reader  
Manufacturer: Integrated Engineering B.V.  
Brand mark: Integrated Engineering  
Type: PX007Z/MF/PAC  
FCC ID: P4EMPPROX-02

## MEASUREMENT/TECHNICAL REPORT

**INTEGRATED ENGINEERING B.V.**

**Model : PX007Z/MF/PAC**

**FCC ID: P4EMPPROX-02**

December 20, 2001

|   |  |                       |                     |
|---|--|-----------------------|---------------------|
| This report concerns:                                 | Original grant/certification   | <u>Class 2 change</u> | <u>Verification</u> |
| Equipment type:                                       | Inductive proximity card reader operating on 13.56 MHz   |                       |                     |
| Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ? | <u>Yes</u>   | <u>No</u>             | n.a.                |
| Report prepared by:                                   | Name : P.A.J.M. Robben, B.Sc.E.E.<br>Company name : TNO Electronic Products & Services (EPS) B.V.<br>Address : Smidshornerweg 18<br>Postal code/city : 9822 ZG Niekerk<br>Mailing address : P.O. Box 15<br>Postal code/city : 9822 TL Niekerk<br>Country : The Netherlands<br>Telephone number : + 31 594 505 005<br>Telefax number : + 31 594 504 804<br>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 C63.4-1992. TNO Certification EPS 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: December 20, 2001

Signature:

O.H. Hoekstra  
TNO Electronic Products & Services (EPS) B.V.



Test specification(s): 47 CFR Part 15 (2001-5-24)  
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Brand mark: Integrated Engineering  
Type: PX007Z/MF/PAC  
FCC ID: P4EMPPROX-02

### Description of test item

Test item : Inductive proximity card reader operating on 13.56 MHz  
Manufacturer : Integrated Engineering B.V.  
Brand : Integrated Engineering  
Type : PX007Z/MF/PAC  
Serial number : 010821  
Revision : n.a.  
Receipt number : 1  
Receipt date : August 22, 2001

### Applicant information

Applicant's representative : Mr. R. Holslag  
Company : Integrated Engineering B.V.  
Address : Paasheuvelweg 20  
Postal code : 1105 BJ  
City : Amsterdam  
PO-box : n.a.  
Postal code : n.a.  
City : n.a.  
Country : The Netherlands  
Telephone number : +31 20 462 0700  
Telefax number : +31 20 462 0758  
Order number : n.a.

### Test(s) performed

Location : Niekerk  
Test(s) started : September 6, 2001  
Test(s) completed : September 19, 2001  
Purpose of test(s) : Compliance with standard  
Test specification(s) : 47 CFR Part 15 (2001-5-24)

Test engineer : T.E.T. Koning 

Project leader : P. de Beer 

Report written by : P.A.J.M. Robben, B.Sc.E.E. 

Report approved by : O.H. Hoekstra 

Report date : December 20, 2001

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.



Test specification(s): **47 CFR Part 15 (2001-5-24)**  
Description of EUT: **Inductive proximity card reader**  
Manufacturer: **Integrated Engineering B.V.**  
Brand mark: **Integrated Engineering**  
Type: **PX007Z/MF/PAC**  
FCC ID: **P4EMPPROX-02**

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## 1 General information.

### 1.1 Product description.

#### 1.1.1 Introduction.

The inductive proximity card reader, brand Integrated Engineering, type PX007Z/MF/PAC, is designed to function as a security measure in order to prevent unauthorized access to buildings (or parts of buildings). A person who wants to enter a secure building, or a secure area in the building, must have a key card in which a valid access code is stored. When the key card is in close proximity of the card reader the code will be transmitted and validated by a computer system which is connected to the reader itself. Access will be granted to the secure area if it is determined that a valid code has been transmitted.

#### 1.1.2 Choice of operating frequency.

The operating frequency of the inductive proximity card reader, brand Integrated Engineering, type PX007Z/MF/PAC, is 13.56 MHz (continuous carrier).

#### 1.1.3 Operating principles.

The inductive proximity card reader is a DC powered system with an integral antenna. The inductive proximity card reader generates a RF-field at a frequency of 13.56 MHz (continuous carrier) which activates the electronics in the key card. The activated key card then sends an identification code to the inductive proximity card reader by modulating the RF-field. The modulation of the 13.56 MHz RF-field can be detected and then the code is demodulated by the inductive proximity card reader. The code is then transmitted by a wired connection to the computer system for validation.

### 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 in table 1 below. FCC ID's are stated in this overview where applicable. The EUT is listed in the first row of table 1.

| Description  | Manufacturer                | Type number   | Serial number | FCC ID       | Cable descriptions  |
|--|-----------------------------|---------------|---------------|--------------|---|
| Inductive cardreader   | Integrated Engineering B.V. | PX007Z/MF/PAC | 0100821       | P4EMPPROX-02 | Shielded data/DC power cable.   |
| AC/DC power adapter<br>120 VAC/60 Hz/15W to<br>+9 VDC/1 Amps | Sceptre                     | PD9010APL05   | n.a.          | n.a. (DoC)   | Shielded DC power cable to EUT.<br>Unshielded power cord to AC mains. |

Table 1 - Tested system details overview.



Test specification(s): **47 CFR Part 15 (2001-5-24)**  
Description of EUT: **Inductive proximity card reader**  
Manufacturer: **Integrated Engineering B.V.**  
Brand mark: **Integrated Engineering**  
Type: **PX007Z/MF/PAC**  
FCC ID: **P4EMPPROX-02**

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## 1.4 Test methodology.

The test methodology used is based on the requirements of 47 CFR Part 15, issue of May 24, 2001, sections 15.207, 15.209 and 15.225.

The test methods, which have been used, are based on ANSI C63.4: 1992.

Radiated emission tests above 30 MHz were performed at a measurement distance of 3 meters. Below 30 MHz the radiated emission tests were carried out at measurement distances of 3 and 10 meters. The test results regarding the radiated emission tests on frequencies below 30 MHz have been extrapolated in order to determine the field strength of the measured values at measurement distances of 30 and 300 meters (as required by 47 CFR Part 15).

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 Certification EPS, 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, with reference 31040/SIT.

The description of the test facilities has been filed at the Office of the Federal Communications Commission. The facility has been added to the list of those 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.

The FCC ID of the EUT must be placed on a label, which is 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)(2), 47 CFR Part 15.19 (b)(4), 47 CFR Part 2.925 and 47 CFR Part 2.926.



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## 2 System test configuration.

### 2.1 Justification.

The system was configured for testing in a typical fashion (as a customer would normally use it). During all tests the EUT was set up to function in accordance with the manufacturer's instructions.

The justification and manipulation of cables and equipment in order to simulate a worst-case behaviour of the test setup has been carried out as prescribed in ANSI C63.4: 1992.

### 2.2 EUT mode of operation.

Radiated and conducted emission measurements were carried out when the system was active and was generating a continuous transmitting signal.

### 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 Configuration of the tested system.

|                         |   |                                     |
|-------------------------|---|-------------------------------------|
| Unit title              | : | Inductive proximity card reader     |
| Model number            | : | PX007Z/MF/PAC                       |
| Part number             | : | n.a.                                |
| FCC ID                  | : | P4EMPPROX-02                        |
| Frequency range         | : | 13.56 MHz (continuous carrier)      |
| Description/details     | : | see section 1.1 of this test report |
| Power supply            | : | 4.75 - 12.25 Volts DC               |
| Clock Oscillator(s)     | : | 7.3728 MHz, 13.56 MHz               |
| Cabinet & Screening     | : | Plastic                             |
| Interface Cable(s)      | : | Shielded data/DC power cable        |
| Method of screening     | : | Not applicable                      |
| Method of grounding     | : | Not applicable                      |
| Operating configuration | : | see section 1.3 of this test report |



Test specification(s): **47 CFR Part 15 (2001-5-24)**  
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## **2.6 Block diagram of the EUT.**

The block diagram is available in the technical documentation package as an addendum to this test report.

## **2.7 Schematics of the EUT.**

The schematics are available in the technical documentation package as an addendum to this test report.

## **2.8 Partlist of the EUT.**

The partlist is available in the technical documentation package as an addendum to this test report.



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### 3 Radiated emission data.

#### 3.1 Radiated field strength measurements (frequency range of 30-1000 MHz, E-field).

| Frequency<br>(MHz) | Measurement results<br>dB( $\mu$ V)/m @ 3 metres<br>Quasi-peak |            | Limits<br>dB( $\mu$ V)/m @ 3 metres<br>Quasi-peak | Margin<br>(dB)<br>Quasi-peak |            | Result |
|--------------------|--|------------|---|------------------------------|------------|--------|
|                    | Vertical   | Horizontal |   | Vertical                     | Horizontal |        |
| 30.0 - 88.0        | <10.0  | <10.0      | 40.0  | >-30.0                       | >-30.0     | PASS   |
| 88.0 - 216.0       | <15.0  | <15.0      | 43.5  | >-28.5                       | >-28.5     | PASS   |
| 216.0 - 960.0      | <20.0  | <20.0      | 46.0  | >-26.0                       | >-26.0     | PASS   |
| 960.0 - 1000.0     | <25.0  | <25.0      | 54.0  | >-29.0                       | >-29.0     | PASS   |

Table 2

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.209 and 15.225 (a), with the EUT operating in continuous transmit mode on 13.56 MHz, are depicted in table 2.

Note: - Field strength values of radiated emissions at frequencies not listed in table 2 are more than 20 dB below the applicable limit.

Test engineer

Signature

Name : T.E.T. Koning

Date : December 20, 2001



Test specification(s): 47 CFR Part 15 (2001-5-24)  
Description of EUT: Inductive proximity card reader  
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### 3.2 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

| Frequency (MHz) | Measurement results dB $\mu$ V Quasi-peak |    | Antenna factor | Cable loss | Measurement results dB( $\mu$ V)/m Quasi-peak (calculated) | Limits Part 15.209 dB( $\mu$ V)/m (calculated) |
|-----------------|---|----|----------------|------------|--|--|
|                 | 10 meters                                 | dB |                |            |  |  |
| 0.009 - 0.490   | <10.0                                     | 19 | 1              | <10.0      | 48.5 - 13.8 (300 m)  |  |
| 0.490 - 1.705   | <10.0                                     | 19 | 1              | <10.0      | 33.8 - 22.9 (30 m)   |  |
| 1.705 - 13.553  | <10.0                                     | 19 | 1              | <10.0      | 29.5 (30 m)  |  |
| 13.563          | 32.5                                      | 19 | 1              | <25.0      | 80.0 (30 m)  |  |
| 13.567 - 30.00  | <10.0                                     | 19 | 1              | <10.0      | 29.5 (30 m)  |  |

Table 3

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, sections 15.209, 15.225 (a) and 15.225 (b), with the EUT operating in continuous transmit mode on 13.56 MHz, are depicted in table 3.

Notes:

- Frequency range: 9-90 kHz Average detector used during measurements  
110-490 kHz Average detector used during measurements
- The radiated field strengths were measured at a distance of 10 meters.  
Measured field strengths at a distance of 10 meters were already below the limit of 30/300 meters
- Field strength values of radiated emissions at frequencies not listed in table 3 are more than 20 dB below the applicable limit.

#### Test engineer

Signature

Name : T.E.T. Koning

Date : December 20, 2001



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## 4 Conducted emission data.

| Frequency<br>(MHz) | Measurement results<br>dB(µV)<br>Line 1 |      | Measurement results<br>dB(µV)<br>Line 2 |       | Limits<br>dB(µV) | Margin<br>(dB)<br>Line 1 | Margin<br>(dB)<br>Line 2 | Result |
|--------------------|---|------|---|-------|------------------|--------------------------|--------------------------|--------|
|                    | QP                                      | QP   | QP                                      | QP    |                  |                          |                          |        |
| 18.100             | 27.2                                    | 14.2 | 48.0                                    | -20.8 | -27.0            | PASS                     |                          |        |
| 19.600             | 28.2                                    | 18.1 | 48.0                                    | -19.8 | -17.2            | PASS                     |                          |        |
| 25.500             | 24.4                                    | 21.9 | 48.0                                    | -23.6 | -22.2            | PASS                     |                          |        |
| 25.900             | 27.1                                    | 23.5 | 48.0                                    | -20.9 | -24.5            | PASS                     |                          |        |

Table 4

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 adapter connected to the EUT and with the EUT operating in continuous transmit mode on 13.56 MHz, are depicted in table 4.

**Note:** During the measurement it was taken into account that the main operating frequency of 13.56 MHz of the EUT could be present on the 110 Volts AC mains connection terminals. The possible occurrence of this frequency of 13.56 MHz and its harmonics, throughout the range of 13.56 MHz to 30 MHz, was checked during the measurement. The conducted emissions on frequencies which are not listed in table 4 were found to be below 20 dB(µV) on both line 1 and line 2.

### Test engineer

Signature :

Name : T.E.T. Koning

Date : December 20, 2001



Test specification(s): **47 CFR Part 15 (2001-5-24)**  
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FCC ID: **P4EMPPROX-02**

## 5 Frequency tolerance of the carrier signal.

| Temperature variation<br>(°C) | Measurement results<br>(MHz) | Limits<br>(MHz)   |
|-------------------------------|------------------------------|-------------------|
| -20 to +50                    | 13.5612 - 13.5633            | 13.5608 - 13.5635 |

Table 5

The results of the measurements regarding the frequency tolerance of the carrier signal, carried out in accordance with 47 CFR Part 15, section 15.225 (c), with the EUT operating in continuous transmit mode on 13.56 MHz, are depicted in table 5. The measurements were carried out with the AC mains input voltage of the AC/DC adapter set to 110 Volts AC, which was determined to be the nominal value, while the ambient temperature was varied between -20 and +50 °C.

The nominal frequency was determined to be 13.5622 MHz. The limits in table 5 were determined by taking the maximum allowable tolerance of  $\pm 0.01\%$  into account, with respect to the nominal frequency, as set forth in 47 CFR Part 15, section 15.225 (c).

| Input voltage variation<br>(%) | Measurement results<br>(MHz) | Limits<br>(MHz)   |
|--------------------------------|------------------------------|-------------------|
| 85 - 115                       | 13.5617 - 13.5628            | 13.5608 - 13.5635 |

Table 6

The results of the measurements regarding the frequency tolerance of the carrier signal, carried out in accordance with 47 CFR Part 15, section 15.225 (c), with the EUT operating in continuous transmit mode on 13.56 MHz, are depicted in table 6. The measurements were carried out at a nominal ambient temperature of +20 °C, while the AC mains input voltage of the AC/DC adapter was varied between 85% to 115% of the nominal AC mains input voltage of 110 Volts AC.

The nominal frequency was determined to be 13.5622 MHz. The limits in table 6 were determined by taking the maximum allowable tolerance of  $\pm 0.01\%$  into account, with respect to the nominal frequency, as set forth in 47 CFR Part 15, section 15.225 (c).

Test engineer

Signature

Name : T.E.T. Koning

Date : December 20, 2001



Test specification(s): 47 CFR Part 15 (2001-5-24)  
Description of EUT: Inductive proximity card reader  
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## 6 List of utilized test equipment.

| Inventory number | Description                    | Brand             | Type                 |
|------------------|--------------------------------|-------------------|----------------------|
| 12471            | Biconical antenna 20MHz-200MHz | EATON             | 94455-1              |
| 12473            | Log-per antenna 200-1000MHz    | EATON             | 96005                |
| 12476            | Antenna mast                   | EMCO              | TR3                  |
| 12477            | Antenna mast 1-4 mtr           | Poelstra          | --                   |
| 12482            | Loop antenna                   | EMCO              | 6507                 |
| 12483            | Guidehorn                      | EMCO              | 3115                 |
| 12484            | Guidehorn                      | EMCO              | 3115                 |
| 12488            | Guidehorn 18 - 26.5 GHz        | EMCO              | RA42-K-F-4B-C        |
| 12533            | Signalgenerator                | MARCONI           | 2032                 |
| 12559            | Digital storage oscilloscope   | Le Croy           | 9310M                |
| 12561            | DC Power Supply 20A/70V        | DELTA             | SM7020D              |
| 12567            | Plotter                        | HP                | 7440A                |
| 12605            | calibrated dipole 28MHz-1GHz   | Emco              | 3121c                |
| 12608            | HF milliwattmeter              | Hewlett Packard   | HP435a               |
| 12609            | Power sensor 10MHz-18GHz       | Hewlett Packard   | HP8481A              |
| 12636            | Polyester chamber              | Polyforce         | --                   |
| 12640            | Temperature chamber            | Heraeus           | VEM03/500            |
| 13664            | Spectrum analyzer              | HP                | HP8593E              |
| 13078            | Preamplifier 0.1 GHz - 12 GHz  | Miteq             | AMF-3D-001120-35-14p |
| 13452            | Digital multi meter            | HP                | 34401A               |
| 13526            | Signalgenerator 20 GHz         | Hewlett & Packard | 83620A               |
| 13594            | Preamplifier 10 GHz - 25 GHz   | Miteq             | AMF-6D-100250-10p    |
| 13886            | Open Area testsite             | Comtest           | --                   |
| 14051            | Anechoic room                  | Comtest           | --                   |
| 14450            | 2.4 GHz bandrejectfilter       | BSC               | XN-1783              |
| 15633            | Biconilog Testantenna          | Chase             | CBL 6111B            |
| 15667            | Measuring receiver             | R&S               | ESCS 30              |
| 99045            | DC Power Supply 3A/30V         | DELTA             | E030/3               |
| 99055            | Non-conducting support         | NMi               | --                   |
| 99061            | Non-conducting support 150cm   | NMi               | --                   |
| 99068            | Detector N-F/BNC-F             | Radiall           | R451576000           |
| 99069            | Cable 5m RG214                 | NMi               | --                   |
| 99071            | Cable 10m RG214                | NMi               | --                   |
| 99076            | Bandpassfilter 4 - 10 GHz      | Reactel           | 7AS-7G-6G-511        |
| 99077            | Regulating trafo               | RFT               | LTS006               |
| 99112            | Tripod                         | Chase             | --                   |
| 99136            | Bandpassfilter 10 - 26.5 GHz   | Reactel           | 9HS-10G/26.5G-S11    |