



**TEST REPORT CONCERNING THE COMPLIANCE  
OF A SMARTTRANS READER, OPERATING ON  
13.56 MHZ, BRAND INTEGRATED ENGINEERING,  
MODEL SMARTID/LEGIC/8PIN, WITH 47 CFR PART  
15 (AUGUST 14, 2006).**

(MODIFIED REPORT NR: 06080103\_mod1.fcc)

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

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Test specification(s): 47 CFR Part 15 (2006-02-01)  
Description of EUT: Smarttrans reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smartid/Legic/8pin  
FCC ID: P4E-SMARTPIN-5

## MEASUREMENT/TECHNICAL REPORT

**Integrated Engineering B.V.**

**Model : Smartid/Legic/8pin**

**FCC ID: P4E- SMARTPIN-5**

February 20, 2007  
(replaces version 06080103.fcc of February 2, 2007)

This report concerns:	Original grant/certification	<del>Class 2 change</del>	<del>Verification</del>
Equipment type:	Smarttrans reader		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	<del>Yes</del>	<del>No</del>	n.a.
Report prepared by:	Name	: Ties E.T. Koning	
	Company name	: TNO Electronic Products & Services (EPS) B.V.	
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The data taken for this test and report herein was done in accordance with 47 CFR Part 15 (August 14, 2006) 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.

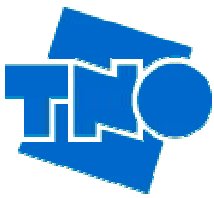
Date: February 20, 2007

Signature:



H.J. Pieters

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



Test specification(s): 47 CFR Part 15 (2006-02-01)  
Description of EUT: Smarttrans reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smartid/Legic/8pin  
FCC ID: P4E-SMARTPIN-5

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### **Description of test item**

Test item : 13.56 MHz Inductive Proximity Card Reader  
Manufacturer : Integrated Engineering B.V.  
Brand : Integrated Engineering  
Model : Smartid/Legic/8pin  
Serial number(s) : n.a.  
Revision : n.a.  
Receipt date : August 1, 2006

### **Applicant information**

Applicant's representative : Ir. R. Holslag  
Company : Integrated Engineering B.V.  
Address : Paasheuvelweg 20  
Postal code : 1105 BJ  
City : Amsterdam  
PO-box : -  
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City : -  
Country : The Netherlands  
Telephone number : +31 (0) 20 46 20 755  
Telefax number : +31 (0) 20 46 20 756

### **Test(s) performed**

Location : Niekerk  
Test(s) started : August 25, 2006  
Test(s) completed : November 28, 2006  
Purpose of test(s) : Equipment Authorisation (Original grant/certification)

Test specification(s) : 47 CFR Part 15 (August 14, 2006)

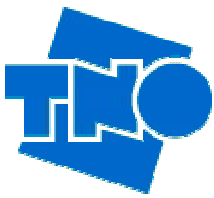
Test engineers : J. Schuurmans, B.Sc.E.E.  
i.o.

Report written by : Ties F.T. Koning

Report date : February 20, 2007 (replaces version 06080103.fcc of February 2, 2007)

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.

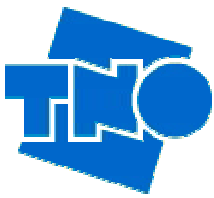


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## 1 General information.

### 1.1 Product description.

#### 1.1.1 Introduction.

The EUT is an inductive proximity card reader intended to be used in access control systems, parking systems and other applications using RF ID readers. It is capable of reading 13.56 MHz inductive tags.

This report is an amended report in which clauses 3.3 has been modified in such a way that measurement results have been related to requirements and a verdict could be established. The content of this report and measurement results have not been changed other than the way of presenting the data.

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

#### 1.2.1 General.

This test report supports the original grant/certification in equipment authorization files under FCC ID P4E-SMARTPIN-5.

#### 1.2.2 FCC ID P4E-SMARTPIN-5.

This report supports the results of the 13.56 MHz Inductive Card Reader (FCC ID P4E-SMARTPIN-5).

### 1.3 Tested system details.

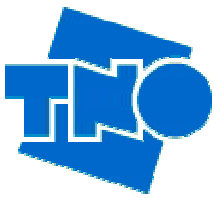
Details and an overview of the system and all of its components, as it has been tested, may be found below.

EUT	:	13.56 MHz Inductive Card Reader
Manufacturer	:	Integrated Engineering
Brand	:	Integrated Engineering
Model	:	Smartid/Legic/8pin
Serial number	:	n.a.
Voltage input rating	:	+4 - +12 VDC and 100-240 VAC *)
Current input rating	:	700 mAmps
Remarks	:	-

\*) Applying an AC adaptor

Auxiliary equipment 1	:	AC/DC power adapter
Manufacturer	:	Integrated Engineering.
Brand	:	Integrated Engineering
Model	:	FW7238/05
Serial number	:	n.a.
Voltage input rating	:	100-240 VAC, 50-60 Hz
Current input rating	:	160 mAmps max.
Voltage output rating	:	+5 VDC
Current output rating	:	1.3 Amps
Remarks	:	-

Auxiliary equipment 2	:	Laptop
Manufacturer	:	Dell Computer Corporation
Brand	:	Dell
Model	:	C600
Serial number	:	TW-0791UH-12800-155-4387
Voltage input rating	:	100-240 VAC, 50-60 Hz
Current input rating	:	3.5 Amps max.
Remarks	:	used on IO port.



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### 1.3.1 Description of input and output ports.

Number	Ports	From	To	Shielding	Remarks
1	AC mains	AC mains	AE1	<del>yes</del> / no	None
2	DC power input port	AE1	EUT	<del>yes</del> / no	None
3	Serial port	EUT	AE2	yes <del>no</del>	None

AE = Auxiliary equipment

### 1.4 Test methodology.

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

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 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>.

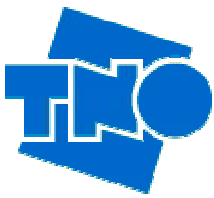
### 1.6 Product labeling.

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).



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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).

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. To assess the behavior of the EUT while reading the card, the EUT is tested with a card presented such that it continuously reads the card, and continuously sends data to the serial port of the EUT, connected to AE2.

The intentional radiator tests (47 CFR Part 15 sections, 15.207, 15.209 and 15.225) have been performed with a complete functioning EUT and interconnections.

### **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.**

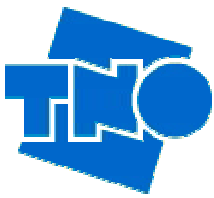
The block diagram is available in the technical documentation package, which will be submitted to the Commission.

### **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.



### 3 Radiated emission data.

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

Frequency (MHz)	Measurement results dB(μV)/m @ 3 metres Quasi-peak		Limits dB(μV)/m @ 3 metres Quasi-peak	Result
	Vertical	Horizontal		
54.2	30.7	<<	40.0	PASS
158.6	23.0	<<	43.5	PASS
250.0	21.6	<<	46.0	PASS
300.0	22.8	<<	46.0	PASS
311.8	25.6	<<	46.0	PASS
325.5	15.0	<<	46.0	PASS
339.0	24.6	23.7	46.0	PASS
366.1	27.0	<<	46.0	PASS
380.0	31.3	<<	46.0	PASS
379.7	26.0	26.4	46.0	PASS
447.5	31.9	28.9	46.0	PASS
480.0	<<	31.0	46.0	PASS
501.8	<<	30.5	46.0	PASS
515.3	38.2	28.9	46.0	PASS
610.2	<<	32.7	54.0	PASS
611.0-1000.0	<25.0	< 25.0	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, with the EUT tested in active mode and while detecting a card 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.
2. “<<” means that measurement values are much lower than the value determined for the other polarization.

Test engineer

signature

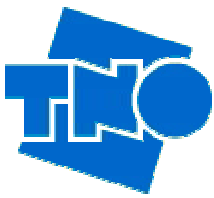
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: Ties E.T. Koning

Date

: February 2, 2007



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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		Antenna factor dB	Cable loss dB	Measurement results dB( $\mu$ V)/m for 30 m (calculated)	Limits Part 15.209 & Part 15.225 dB( $\mu$ V)/m
	3 meters	10 meters				
0.009 - 0.490	<10.0	n.i.	20.5	1	n.i	48.5 – 13.8 (300 m)
0.490 - 1.705	<10.0	n.i.	19.5	1	n.i	33.8 - 22.9 (30 m)
1.705 – 30.0	< 10.0	n.i.	19.5	1	n.i	29.5 (30 m)
13.561	31.1	1.0	19.6	1	-11.0	84.0 (30m)

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, 15.209 and 15.225 with the EUT operating in continuous transmit mode on 13.562 MHz, are depicted in table 2.

- Notes:**
- A 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.i. 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.

The EUT was tested in both normal mode (i.e. without a label in its proximity) and in activated mode (i.e. with a label in its proximity).

Test engineer

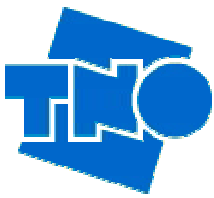
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### 3.3 Carrier stability under special conditions.

#### Frequency stability in accordance with 47 CFR Part 15, sections 15.225 (e):

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  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 (%)	PASS/FAIL
21.0	13560.668 ( <i>reference</i> )	N.A.	N.A.
-20	13560.686	$< 0.01$	PASS
+50	13560.548	$< 0.01$	PASS

Table 3

The frequency tolerance of the carrier signal shall be maintained within  $\pm 0.01\%$  of the operating frequency over an input voltage variation of  $\pm 15\%$  of the normal supply voltage at 20 degrees C (see table 4).

Stability under special conditions % variation U	Measured frequency (kHz)	Frequency deviation limit (%)	PASS/FAIL
100.0	13560.668 ( <i>reference</i> )	N.A.	N.A.
85.0	13560.668	$< 0.01$	PASS
115.0	13560.668	$< 0.01$	PASS

Table 4

#### Amplitude stability in accordance with 47 CFR Part 15, sections 15.31 (e).

EUT amplitude stability measured at 3 different power supply voltages determined at 21 degrees C (see table 5).

Stability under special conditions % variation U	Measured output (dBm)	Amplitude deviation (dBm)	PASS/FAIL
100.0	4.25 ( <i>reference</i> )	N.A.	PASS
85.0	4.25	none	PASS
115.0	4.25	none	PASS

Table 5

Test engineer

Signature

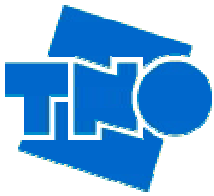
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Name

: O.H. Hoekstra

Date

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## 4 Conducted emission data.

### 4.1 Conducted emission data of the EUT.

Frequency (MHz)	Measurement results dB(μV) Neutral		Measurement results dB(μV) Line 1		Limits dB(μV)		Result
	QP	AV	QP	AV	QP	AV	
0.166	38.0	13.5	40.0	< 10.0	66.0	56.0	PASS
0.17-0.50	< 35.0	< 10.0	< 35.0	< 10.0	63.6	53.6	PASS
0.50-5.0	< 35.0	< 10.0	< 35.0	< 10.0	58.5	48.5	PASS
5.0-13.5	< 35.0	< 10.0	< 35.0	< 10.0	56.0	46.0	PASS
13.56	60.0	8.8	60.0	< 10.0	60.0	50.0	PASS
13.6-30.0	< 35.0	< 10.0	< 35.0	< 10.0	60.0	50.0	PASS

Table 6

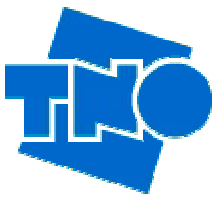
Conducted emission measurements. The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.207, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT, are depicted in table 5. The EUT was tested in both active mode, and while detecting a card. Maximum values recorded.

Test engineer

Signature

Name : Ties E.T. Koning

Date : February 2, 2007

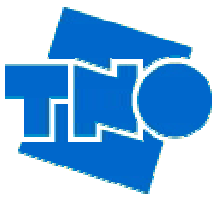


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## 5 List of utilized test equipment.

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 13.562 MHz:

$$H_{3m} = 51.7 \text{ dB}\mu\text{V/m} = 384.59 \mu\text{V/m}$$

$$H_{10m} = 20.6 \text{ dB}\mu\text{V/m} = 10.72 \mu\text{V/m}$$

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

$$n = \log(10.72/384.59) / \log(3/10)$$

$$n = 3.1$$

#### Calculated field strength at 13.562 MHz (10m --> 30m):

$$H_{30m} = H_{d2}, H_{10m} = H_{d1}$$

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

$$H_{30} = 0.36 \mu\text{V/m} = -11.0 \text{ dB}\mu\text{V/m}$$