



**TEST REPORT CONCERNING THE COMPLIANCE  
OF AN INDUCTIVE CARD READER  
OPERATING ON 13.56 MHZ,  
BRAND INTEGRATED ENGINEERING,  
MODEL SMARTREADER/8PIN WITH 47 CFR PART 15  
(2004-09-21).**

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

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Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

## MEASUREMENT/TECHNICAL REPORT

**Integrated Engineering B.V.**

**Model : Smartreader/8pin**

**FCC ID: P4E-SMARTPIN-1**

October 14, 2005

This report concerns:	Original grant/certification	<del>Class 2 change</del>	Verification
Equipment type:	Intelligent Substation		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	<del>Yes</del>	<del>No</del>	n.a.
Report prepared by:	Name	: J. Schuurmans, B.Sc.E.E.	
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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 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: November 1, 2005

Signature:

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



Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

### **Description of test item**

Test item : 13.56 MHz Inductive Card Reader  
Manufacturer : Integrated Engineering B.V.  
Brand : Integrated Engineering  
Model : Smartreader/8pin  
Serial number(s) : 182120007  
Revision : Not applicable  
Receipt date : September 2, 2005

### **Applicant information**

Applicant's representative : Ir. R. Holslag  
Company : Integrated Engineering  
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### **Test(s) performed**

Location : Niekkerk  
Test(s) started : September 2, 2005  
Test(s) completed : October 14, 2005  
Purpose of test(s) : Equipment Authorisation (Certification).

Test specification(s) : 47 CFR Part 15 (2004-09-21)

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

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

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

Report date : October 14, 2005

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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## **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.....	7
1.4	Test methodology.....	7
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.....	9
2.6	Schematics of the EUT.....	9
2.7	Part list of the EUT.....	9
3	Radiated emission data.....	10
3.1	Radiated field strength measurements (30 MHz – 1 GHz, H-field).....	10
3.2	Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).....	12
3.3	Radiated field strength measurements (30 MHz – 1 GHz, H-field) SmartTOUCH.....	13
3.4	Radiated field strength measurements (30 MHz – 1 GHz, H-field) SmartReader/lighted.....	15
4	Conducted emission data.....	17
4.1	Conducted emission data of the EUT.....	17
4.2	Conducted emission data of the SmartPIN/LIGHTED.....	18
4.3	Conducted emission data of the SmartTOUCH.....	19
5	Operation in the band 13.110 – 14010 MHz.....	20
5.1	Field strength near the carrier frequency.....	20
6	List of utilized test equipment.....	21



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## 1 General information.

### 1.1 Product description.

#### 1.1.1 Introduction.

The EUT is an inductive card reader intended to be used in access control systems, parking systems and other applications using RF ID readers. It possesses a connector to attach to peripheral and/or auxiliary devices. The peripheral devices are: 1 bioscrypt fingerprint reader, and 1 illuminated keypad.

### 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.

Test item 1	:	13.56 MHz Inductive Card Reader
Manufacturer	:	Integrated Engineering
Brand	:	Integrated Engineering
Model	:	SmartReader/8pin
Serial number	:	182120007
Voltage input rating	:	+5 - +12V VDC
Current input rating	:	700 mAmps
Remarks	:	-

Test Item 2	:	
Manufacturer	:	Integrated Engineering
Brand	:	Integrated Engineering
Model	:	SmartTOUCH
Serial number	:	n.a.
Voltage input rating	:	+8 - +12V VDC
Current input rating	:	700 mAmps
Remarks	:	See section 1.1

Test Item 3	:	
Manufacturer	:	Integrated Engineering
Brand	:	Integrated Engineering
Model	:	SmartReader/LightED
Serial number	:	n.a.
Voltage input rating	:	+5 - +12V VDC
Current input rating	:	700 mAmps
Remarks	:	See section 1.1



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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	:	5V VDC
Current output rating	:	1.3 Amps
Remarks	:	-
Auxiliary equipment 2	:	AC/DC power adapter
Manufacturer	:	Mean Well.
Brand	:	Mean Well
Model	:	AD-55A
Serial number	:	CA48235963
Voltage input rating	:	100-240 VAC, 50-60 Hz
Current input rating	:	1.6 Amps max.
Voltage output rating	:	13.8V VDC
Current output rating	:	3.5 Amps
Remarks	:	-
Auxiliary equipment 3	:	laptop
Manufacturer	:	Dell.
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 control 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	AE3	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 (2004-09-21), sections 15.207 and 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 fieldstrength 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: 1992.

### 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 behaviour 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 AE3.

The EUT is a PCB with keypad. Housing is always plastic and contains no metal parts. When the housing does contain metal parts. (see SmartTOUCH) the spurious emissions of the device are tested and reported in this test report.

The EUT can be integrated in the following products. The product contains only the EUT and a plastic housing. Refer to external photo's exhibit for explanatory pictures.

Model name	Model Number	specification	Tested
SMARTREADER/8PIN		PCB with Pinpad only (no housing)	YES
SMART TOUCH		Contains in addition to the EUT a bioscrypt™ finger print reader	YES
SMARTREADER / LIGHTED		Contains in addition to the EUT a carrier PCB with additional LED lighting	YES
CLASSIC		Contains only the EUT but without the keypad	No
SMARTID		Contains only the EUT but without the keypad	No
SMARTID PIN		Contains only the EUT	No
SMARTLOGIN		Contains only the EUT without the keypad	No

The intentional radiator tests (15.207, 15.209 and 15.225) have been performed with the EUT, which contains a keypad and interconnect (see internal pictures exhibit).

The SmartTouch and SmartPIN LightEd version have been tested in addition for their spurious emissions, (15.107 and 15.109), since they contain additional electronics/electric hardware. The CLASSIC, SMARTID, SMARTID PIN and SMARTLOGIN contain only the SMARTREADER/8PIN board, and are plastic housings. These models have not been tested, as the SMARTREADER/8PIN is already fully tested.

### 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.





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## **2.5 Block diagram of the EUT.**

The block diagram is available in the technical documentation package which is kept at the manufacturers facilities.

## **2.6 Schematics of the EUT.**

The schematics are available in the technical documentation package which is kept at the manufacturers facilities.

## **2.7 Part list of the EUT.**

The part list is available in the technical documentation package which is kept at the manufacturers facilities.



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### 3 Radiated emission data.

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

Frequency (MHz)	Measurement results dB(μV)/m @ 3 metres Quasi-peak		Limits dB(μV)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
30.00	26.7	19.4	40.0	-13.3	-20.6	PASS
40.68	29.9	24.0	40.0	-10.1	-16.0	PASS
50.00	24.0	13.4	40.0	-16.0	-26.6	PASS
54.25	34.1	30.3	40.0	-5.9	-9.7	PASS
60.00	18.6	13.6	40.0	-21.4	-26.4	PASS
63.37	6.9	6.9	40.0	-33.1	-33.1	PASS
67.81	36.5	30.4	40.0	-3.5	-9.6	PASS
70.00	14.6	13.5	40.0	-25.4	-26.5	PASS
80.00	18.4	16.2	40.0	-21.6	-23.8	PASS
81.30	9.4	9.4	40.0	-30.6	-30.6	PASS
90.00	21.3	20.9	43.5	-22.2	-22.6	PASS
100.00	27.4	24.1	43.5	-16.1	-19.4	PASS
108.49	30.3	30.3	43.5	-13.2	-13.2	PASS
110.00	19.9	18.1	43.5	-23.6	-25.4	PASS
120.00	24.3	26.4	43.5	-19.2	-17.1	PASS
122.06	23.8	20.3	43.5	-19.7	-23.2	PASS
130.00	14.1	26.3	43.5	-29.4	-17.2	PASS
135.62	29.0	25.5	43.5	-14.5	-18.0	PASS
160.00	24.1	26.8	43.5	-19.4	-16.7	PASS
162.74	15.6	14.5	43.5	-27.9	-29.0	PASS
170.00	28.8	23.4	43.5	-14.7	-20.1	PASS
180.00	28.2	25.6	46.0	-17.8	-20.4	PASS
216.99	14.0	17.3	46.0	-32.0	-28.7	PASS
230.55	12.6	16.5	43.5	-30.9	-27.0	PASS
210.00	27.3	14.0	46.0	-18.7	-32.0	PASS
220.00	22.0	17.2	46.0	-24.0	-28.8	PASS

**Table 1: Radiated Emission 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.

(continued on next page)



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**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

: September 8, 2005



Test specification(s): 47 CFR Part 15 (2004-09-21)  
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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  dB	Cable loss  dB	Measurement results dB( $\mu$ V)/m Quasi-peak (calculated)	Limits Part 15.209 & 225 dB( $\mu$ V)/m
	3 meters	10 meters			30 meters	
0.009 - 0.490	<10.0	n.a.	20.5	1	-	28.5 – 13.8 (300 m)
0.490 - 1.705	<10.0	n.a.	19.5	1	-	33.8 - 22.9 (30 m)
1.705 – 13.56	< 10.0	n.a.	19.5	1	-	29.5 (30 m)
13.110-13.410	<10	n.a.	19.5	1	-	40.5 (30 m)
13.410-13.553	<10	n.a.	19.5	1	-	50.5 (30 m)
13.553-13.567	43.0	22.0	19.5	1	23.4	84.0 (30m)
13.567-13.710	<10	n.a.	19.5	1	-	50.5 (30m)
13.710—14.010	<10	n.a.	19.5	1	-	40.5 (30m)
27.124	<10	n.a.	19.7	1	-	29.5 (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 and 15.209, with the EUT operating in continuous transmit mode on 13.56 kHz, are depicted in table 2.

- Notes:**
- A total work out of the calculated measurement result can be found in the Appendix 1.
  - 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 3 and 10 meters. Measured field strengths at a distance of 10 meters were already below the limit of 30/300 meters
  - 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.

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

Signature

Name : J. Schuurmans

Date : October 25 , 2004



Test specification(s): 47 CFR Part 15 (2004-09-21)  
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 Brand mark: Integrated Engineering  
 Model: Smart Touch  
 FCC ID: P4E-SMARTPIN-1

### 3.3 Radiated field strength measurements (30 MHz – 1 GHz, H-field) SmartTOUCH.

Frequency (MHz)	Measurement results dB(μV)/m @ 3 metres Quasi-peak		Limits dB(μV)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
40.69	22.7	14.0	40.0	-17.3	-26.0	PASS
54.25	26.3	15.2	40.0	-13.7	-24.8	PASS
67.81	25.3	27.3	40.0	-14.7	-12.7	PASS
81.37	9.4	18.8	40.0	-30.6	-21.2	PASS
108.50	26.3	21.3	43.5	-17.2	-22.2	PASS
122.06	34.3	15.0	43.5	-9.2	-28.5	PASS
135.62	23.6	16.0	43.5	-19.9	-27.5	PASS
162.74	20.3	27.2	43.5	-23.2	-16.3	PASS
189.87	27.9	31.2	43.5	-15.6	-12.3	PASS
192.07	29.8	29.8	43.5	-13.7	-13.7	PASS
193.22	30.2	29.9	43.5	-13.3	-13.6	PASS
194.37	31.0	29.6	43.5	-12.5	-13.9	PASS
195.52	31.0	29.2	43.5	-12.5	-14.3	PASS
196.68	32.3	29.3	43.5	-11.2	-14.2	PASS
197.83	32.7	29.4	43.5	-10.8	-14.1	PASS
198.98	32.8	29.3	43.5	-10.7	-14.2	PASS
200.14	32.7	28.9	43.5	-10.8	-14.6	PASS
201.29	32.1	28.9	43.5	-11.4	-14.6	PASS
202.44	33.1	29.0	43.5	-10.4	-14.5	PASS
203.60	32.9	29.2	43.5	-10.6	-14.3	PASS
204.75	32.8	36.4	43.5	-10.7	-7.1	PASS
205.90	32.4	27.4	43.5	-11.1	-16.1	PASS
207.05	32.1	27.1	43.5	-11.4	-16.4	PASS
208.21	31.1	26.8	43.5	-12.4	-16.7	PASS
209.36	29.8	26.5	43.5	-13.7	-17.0	PASS
210.00	19.6	29.2	43.5	-23.9	-14.3	PASS
210.51	28.4	25.9	43.5	-15.1	-17.6	PASS
211.67	22.5	25.3	43.5	-21.0	-18.2	PASS
212.82	21.4	24.4	43.5	-22.1	-19.1	PASS
215.13	28.1	12.8	43.5	-15.4	-30.7	PASS
216.99	26.9	12.9	46.0	-19.1	-33.1	PASS
220.00	20.6	33.3	46.0	-25.4	-12.7	PASS
222.04	41.4	26.0	46.0	-4.6	-20.0	PASS
223.20	41.6	26.0	46.0	-4.4	-20.0	PASS
224.35	41.9	26.0	46.0	-4.1	-20.0	PASS
225.50	41.7	26.0	46.0	-4.3	-20.0	PASS
226.66	41.3	26.3	46.0	-4.7	-19.7	PASS
227.81	39.6	23.6	46.0	-6.4	-22.4	PASS
228.96	39.1	21.7	46.0	-6.9	-24.3	PASS
230.11	33.9	21.6	46.0	-12.1	-24.4	PASS
250.00	19.9	16.5	46.0	-26.1	-29.5	PASS
298.36	33.8	35.0	46.0	-12.2	-11.0	PASS

Continued on next page



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Frequency (MHz)	Measurement results dB(μV)/m @ 3 metres Quasi-peak		Limits dB(μV)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
320.00	34.6	36.9	46.0	-11.4	-9.1	PASS
340.00	28.8	34.0	46.0	-17.2	-12.0	PASS
360.00	21.0	28.1	46.0	-25.0	-17.9	PASS
380.00	30.1	30.8	46.0	-15.9	-15.2	PASS

**Table 3 Radiated emissions SmartTOUCH**

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, section 15.109, with the EUT tested in active mode and while detecting a card are depicted in the table 3.

**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 : October 27, 2005



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 Manufacturer: Integrated Engineering  
 Brand mark: Integrated Engineering  
 Model: Smart Touch  
 FCC ID: P4E-SMARTPIN-1

### 3.4 Radiated field strength measurements (30 MHz – 1 GHz, H-field) SmartReader/lighted.

Frequency (MHz)	Measurement results dB(μV)/m @ 3 metres Quasi-peak		Limits dB(μV)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
40.69	29.6	29.6	40.0	-10.4	-10.4	PASS
54.25	33.0	18.3	40.0	-7.0	-21.7	PASS
67.81	34.2	21.1	40.0	-5.8	-18.9	PASS
81.37	36.2	24.5	40.0	-3.8	-15.5	PASS
108.50	35.0	28.2	43.5	-8.5	-15.3	PASS
122.06	24.7	26.9	43.5	-18.8	-16.6	PASS
135.62	14.1	24.0	43.5	-29.4	-19.5	PASS
149.18	16.8	27.8	43.5	-26.7	-15.7	PASS
160.00	18.1	28.2	43.5	-25.4	-15.3	PASS
170.00	14.6	24.3	43.5	-28.9	-19.2	PASS
176.31	18.1	32.5	43.5	-25.4	-11.0	PASS
180.00	18.6	37.1	43.5	-24.9	-6.4	PASS
190.00	19.2	24.4	43.5	-24.3	-19.1	PASS
200.00	22.6	26.5	43.5	-20.9	-17.0	PASS
210.00	25.5	32.9	43.5	-18.0	-10.6	PASS
218.02	23.4	30.7	46.0	-22.6	-15.3	PASS
219.13	24.4	30.9	46.0	-21.6	-15.1	PASS
220.00	29.6	39.8	46.0	-16.4	-6.2	PASS
220.25	25.0	30.6	46.0	-21.0	-15.4	PASS
221.36	25.9	30.1	46.0	-20.1	-15.9	PASS
222.47	25.3	30.3	46.0	-20.7	-15.7	PASS
223.58	25.7	30.5	46.0	-20.3	-15.5	PASS
224.69	26.1	30.3	46.0	-19.9	-15.7	PASS
225.81	26.2	30.0	46.0	-19.8	-16.0	PASS
226.92	26.3	30.2	46.0	-19.7	-15.8	PASS
228.03	26.3	30.3	46.0	-19.7	-15.7	PASS
229.14	26.5	30.5	46.0	-19.5	-15.5	PASS
230.00	32.7	38.5	46.0	-13.3	-7.5	PASS
230.25	27.7	37.9	46.0	-18.3	-8.1	PASS
231.37	26.3	29.0	46.0	-19.7	-17.0	PASS
232.48	26.0	28.7	46.0	-20.0	-17.3	PASS
233.59	26.0	28.7	46.0	-20.0	-17.3	PASS
234.70	25.7	28.4	46.0	-20.3	-17.6	PASS
235.81	25.2	28.0	46.0	-20.8	-18.0	PASS
236.93	24.6	27.4	46.0	-21.4	-18.6	PASS
238.04	23.6	26.6	46.0	-22.4	-19.4	PASS
240.00	31.1	37.5	46.0	-14.9	-8.5	PASS
250.00	27.3	35.3	46.0	-18.7	-10.7	PASS
260.00	30.0	37.8	46.0	-16.0	-8.2	PASS
270.00	29.3	37.9	46.0	-16.7	-8.1	PASS
280.00	29.9	40.6	46.0	-16.1	-5.4	PASS

Continued on next page



Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

Frequency (MHz)	Measurement results dB(μV)/m @ 3 metres Quasi-peak		Limits dB(μV)/m @ 3 metres Quasi-peak	Margin (dB) Quasi-peak		Result
	Vertical	Horizontal		Vertical	Horizontal	
290.00	24.0	38.1	46.0	-22.0	-7.9	PASS
300.00	27.9	36.4	46.0	-18.1	-9.6	PASS
310.00	19.5	32.5	46.0	-26.5	-13.5	PASS
320.00	25.5	32.8	46.0	-20.5	-13.2	PASS
339.05	22.2	29.2	46.0	-23.8	-16.8	PASS
340.00	22.2	29.4	46.0	-23.8	-16.6	PASS
360.00	27.5	30.4	46.0	-18.5	-15.6	PASS
380.00	26.5	26.1	46.0	-19.5	-19.9	PASS

**Table 4 Radiated emissions SmartPIN/LIGHTED**

The results of the radiated emission tests, carried out in accordance with 47 CFR Part 15, section 15.109, with the EUT tested in active mode and while detecting a card are depicted in the 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.

Test engineer

Signature

Name : J. Schuurmans

Date : October 27, 2005





Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

## 4 Conducted emission data.

### 4.1 Conducted emission data of the EUT.

Frequency (MHz)	Measurement results dB( $\mu$ V) Neutral		Measurement results dB( $\mu$ V) Line 1		Limits dB( $\mu$ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.17	36.7	21.7	35.5	14.6	65.1	55.1	-28.4	-33.4	-29.6	-40.5	PASS
0.20	35.1	25.0	33.7	17.7	63.7	53.7	-28.6	-28.7	-30.0	-36.0	PASS
0.22	27.9	11.7	24.7	9.5	62.8	52.8	-34.9	-41.1	-38.1	-43.3	PASS
0.33	28.6	19.5	26.0	15.4	59.5	49.5	-30.9	-30.0	-33.5	-34.1	PASS
0.53	30.1	23.6	23.8	16.6	56.0	46.0	-25.9	-22.4	-32.2	-29.4	PASS
0.65	30.4	21.5	24.1	14.9	56.0	46.0	-25.6	-24.5	-31.9	-31.1	PASS
0.76	24.8	12.5	19.1	10.4	56.0	46.0	-31.2	-33.5	-36.9	-35.6	PASS
1.26	28.9	22.5	22.3	15.1	56.0	46.0	-27.1	-23.5	-33.7	-30.9	PASS
13.56	53.3	30.9	47.8	47.7	60.0	50.0	-6.7	-19.1	-12.2	-2.3	PASS
27.12	50.7	28.2	46.5	27.4	60.0	50.0	-9.3	-21.8	-13.5	-22.6	PASS

**Table 5: 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.

#### Notes:

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

Test engineer

Signature : 

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

Date : October 25, 2005



Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

## 4.2 Conducted emission data of the SmartPIN/LIGHTED.

Frequency (MHz)	Measurement results dB( $\mu$ V) Neutral		Measurement results dB( $\mu$ V) Line 1		Limits dB( $\mu$ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.20	31.5	19.6	29.0	18.2	63.7	53.7	-32.2	-34.1	-34.7	-35.5	PASS
0.27	30.8	22.1	26.8	19.5	61.2	51.2	-30.4	-29.1	-34.4	-31.7	PASS
0.33	29.3	23.6	26.0	20.9	59.4	49.4	-30.1	-25.8	-33.4	-28.5	PASS
0.47	29.5	22.5	24.1	19.0	56.6	46.6	-27.1	-24.1	-32.5	-27.6	PASS
0.53	30.7	25.0	24.2	19.1	56.0	46.0	-25.3	-21.0	-31.8	-26.9	PASS
0.73	30.5	25.3	25.6	19.3	56.0	46.0	-25.5	-20.7	-30.4	-26.7	PASS
13.56	26.7	21.8	22.8	21.9	60.0	50.0	-33.3	-28.2	-37.2	-28.1	PASS
19.14	28.9	24.9	25.3	21.9	60.0	50.0	-31.1	-25.1	-34.7	-28.1	PASS
27.12	46.7	43.3	37.8	35.8	60.0	50.0	-13.3	-6.7	-22.2	-14.2	PASS

**Table 6: Conducted emission measurements SmartPIN/LIGHTED.**

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.107, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT including AE1, are depicted in table 6. The EUT was tested in both active mode, and while detecting a card.

### Notes:

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

### Test engineer

Signature : 

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

Date : September 27, 2005



Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

#### 4.3 Conducted emission data of the SmartTOUCH.

Frequency (MHz)	Measurement results dB( $\mu$ V) Neutral		Measurement results dB( $\mu$ V) Line 1		Limits dB( $\mu$ V)		Margin (dB) Neutral		Margin (dB) Line 1		Result
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV	
0.18	45.8	32.0	46.5	32.0	64.6	54.6	-18.8	-22.6	-18.1	-22.6	PASS
0.22	43.6	29.4	43.5	29.2	62.7	52.7	-19.1	-23.3	-19.2	-23.5	PASS
0.27	41.2	28.6	41.8	28.8	61.2	51.2	-20.0	-22.6	-19.4	-22.4	PASS
0.31	35.1	22.0	35.3	22.6	59.9	49.9	-24.8	-27.9	-24.6	-27.3	PASS
0.40	35.2	27.4	35.5	27.0	57.9	47.9	-22.7	-20.5	-22.4	-20.9	PASS
0.45	37.6	29.5	38.0	29.9	56.9	46.9	-19.3	-17.4	-18.9	-17.0	PASS
0.54	30.7	20.8	30.9	20.5	56.0	46.0	-25.3	-25.2	-25.1	-25.5	PASS
0.58	28.7	19.0	28.3	18.8	56.0	46.0	-27.3	-27.0	-27.7	-27.2	PASS
0.62	25.7	16.6	25.9	16.9	56.0	46.0	-30.3	-29.4	-30.1	-29.1	PASS
0.71	24.2	15.6	24.5	16.1	56.0	46.0	-31.8	-30.4	-31.5	-29.9	PASS
13.56	54.0	49.6	53.1	49.6	60.0	50.0	-6.0	-0.4	-6.9	-0.4	PASS
27.12	40.6	34.3	41.0	33.3	60.0	50.0	-19.4	-15.7	-19.0	-16.7	PASS

**Table 7: Conducted emission measurements SmartTOUCH.**

The results of the conducted emission tests, carried out in accordance with 47 CFR Part 15, section 15.107, at the 110 Volts AC mains connection terminals of the AC/DC power supply which was connected to the EUT including AE1, 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 $\mu$ V on both line 1 and line 2.

**Test engineer**

Signature : 

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

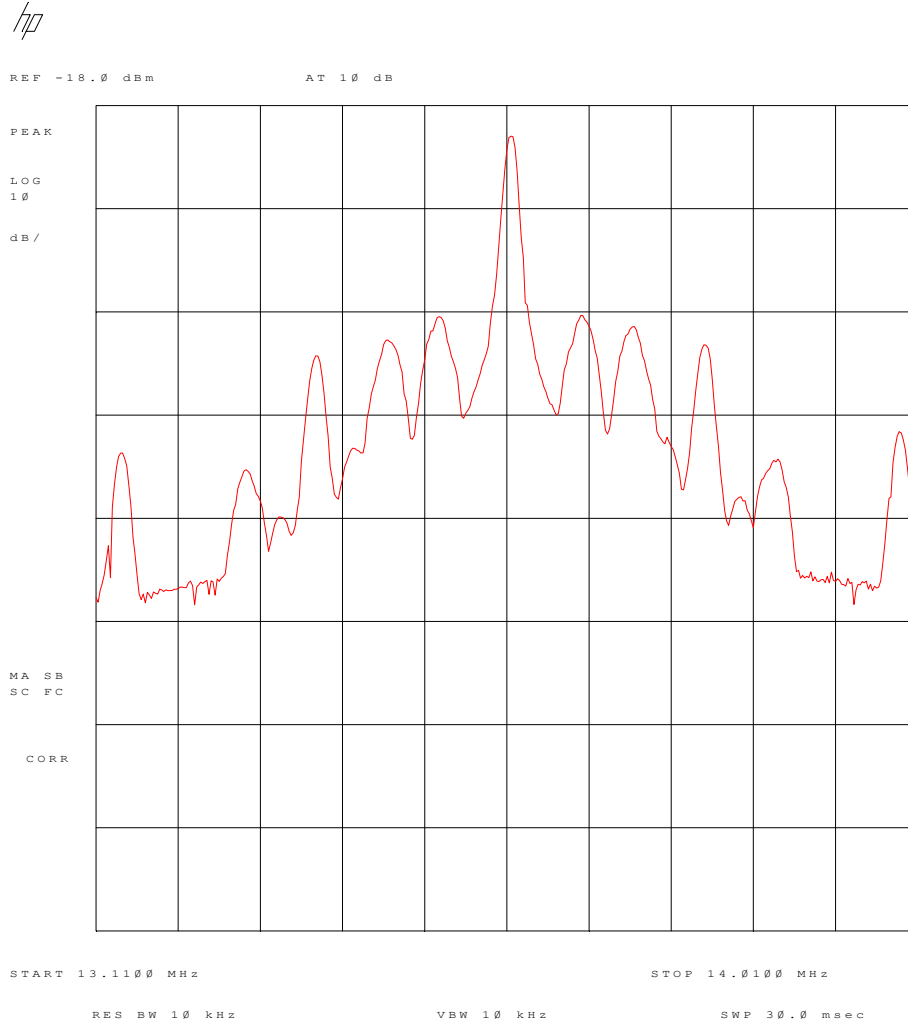
Date : October 27, 2005



Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

## 5 Operation in the band 13.110 – 14010 MHz.

### 5.1 Field strength near the carrier frequency



**Figure 1: Fieldstrength near the carrier frequency.**

#### Notes:

1. The peak level in figure 1 corresponds to the value at 30 m in Table 2.
2. The temperature dependence and AC mains voltage (85%-115%) dependence have been found to be less than +/- 0.01% of the operating frequency

#### Test engineer

Signature :

Name : J. Schuurmans, B.Sc.E.E.  
Date : September 29, 2005



Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

## 6 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	--



Test specification(s): 47 CFR Part 15 (2004-09-21)  
Description of EUT: 13.56 MHz Inductive Card Reader  
Manufacturer: Integrated Engineering  
Brand mark: Integrated Engineering  
Model: Smart Touch  
FCC ID: P4E-SMARTPIN-1

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## Appendix 1

### Calculated measurements results radiated field strength, H-Field

#### General Formula:

$d_1$  = short distance

$d_2$  = long distance

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

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

#### Measured field strength at 13.56 MHz:

$$H_{3m} = 63.5 \text{ dB}\mu\text{V/m} = 1496 \text{ }\mu\text{V/m}$$

$$H_{10m} = \text{dB}\mu\text{V/m} = 133.4 \text{ }\mu\text{V/m}$$

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

$$n = \log(133.4/1496) / \log(3/10)$$

$$n = 2.01$$

#### Calculated field strength at 13.56 MHz (10m --> 30m):

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

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

$$H_{30} = 14.8 \text{ }\mu\text{V/m} = 23.4 \text{ dB}\mu\text{V/m}$$