TEST REPORT CONCERNING THE COMPLIANCE OF A BIOMETRIC FINGERPRINT READER WITH 13.56 MHZ INDUCTIVE PROXIMITY CARD READER, OPERATING ON 13.56 MHZ, BRAND INTEGRATED ENGINEERING, MODEL SMARTTOUCH™ XTREME, WITH 47 CFR PART 15 (AUGUST 14, 2006).

FCC listed : 90828
Industry Canada : IC3501
R&TTE, LVD, EMC Notified Body : 1856

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MEASUREMENT/TECHNICAL REPORT

Integrated Engineering B.V.

Model : SmartTOUCH™ Xtreme

FCC ID: P4E-SMARTPIN-7

August 22, 2007

This report concerns:	Original grant/certification ~~Class 2 change~~ ~~Verification~~		
Equipment type:	Biometric Fingerprint Reader with 13.56 MHz Inductive Proximity Card Reader (DesFire PIV/Mifare) cards		
Deferred grant requested per 47 CFR 0.457(d)(1)(ii) ?	~~Yes~~	~~No~~	n.a.

Report prepared by:		
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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: August 22, 2007 Signature:

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

Description of test item

Test item	:	Biometric Fingerprint Reader with 13.56 MHz Inductive Proximity Card Reader
Manufacturer	:	Integrated Engineering B.V.
Brand	:	Integrated Engineering
Model	:	SmartTOUCH™ Xtreme
Serial number(s)	:	n.a.
Revision	:	n.a.
Receipt date	:	July 12, 2007

Applicant information

Applicant's representative	:	Ir. R. Holslag
Company	:	Integrated Engineering B.V.
Address	:	Paasheuvelweg 20
Postal code	:	1105 BJ
City	:	Amsterdam
PO-box	:	-
Postal code	:	-
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	:	July 17, 2007
Test(s) completed	:	August 17, 2007
Purpose of test(s)	:	Equipment Authorisation (Original grant/certification)
Test specification(s)	:	47 CFR Part 15 (August 14, 2006)
Test engineers	:	Ties E.T. Koning
Report written by	:	Ties E.T. Koning.
Report date	:	August 22, 2007

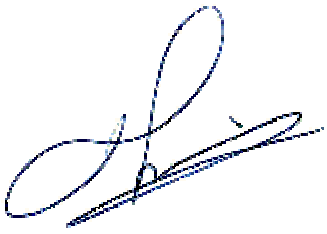


Table of contents

1 General information.

1.1 Product description.

1.1.1 Introduction.

The EUT is a Biometric Fingerprint Reader with 13.56 MHz 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.
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-7.

1.2.2 FCC ID P4E-SMARTPIN-8.

This report supports the results of the 13.56 MHz Inductive Card Reader (FCC ID P4E-SMARTPIN-8) inside the Biometric Fingerprint Reader.

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	:	Biometric Fingerprint Reader with 13.56 MHz Inductive Proximity Card Reader
Manufacturer	:	Integrated Engineering B.V.
Brand	:	Integrated Engineering
Model	:	SmartTOUCH™ Xtreme
Serial number	:	n.a.
Voltage input rating	:	+8 - +12 VDC (any DC power supply)
Current input rating	:	700 mAmps
Remark 1	:	All testing with +8 and +12 V DC and 110 V AC achieving maximum radiation
Remark 2	:	The EUT contains a SmartreaderII/8pin V01.01 with FCC ID P4E-SMARTPIN-8

1.3.1 Description of input and output ports.

Number	Ports	From	To	Shielding	Remarks
1	DC power input port	DC Power supply	EUT	~~yes~~ / no	**None**
2	Serial port	EUT	Laptop *)	yes / ~~no~~	**None**

*) during immunity testing

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).

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 (FCC 15-209: 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		PASS/FAIL
30.0-88.0	< 20.0	<<	40.0	PASS
except for:				
40.68	40.0	<<	40.0	PASS
54.20	19.0	<<	40.0	PASS
67.81	22.0	<<	40.0	PASS
81.37	17.0	<<	40.0	PASS
88.0-216.0	< 20.0	<<	43.5	PASS
except for:				
95.00	28.0	<<	43.5	PASS
176.30	26.0	<<	43.5	PASS
216.0-950.0	< 25.0	<<	46.0	PASS
except for:				
284.80	21.3	23.3	46.0	PASS
311.93	23.0	23.0	46.0	PASS
> 950.0	< 30.0	<<	54.0	PASS

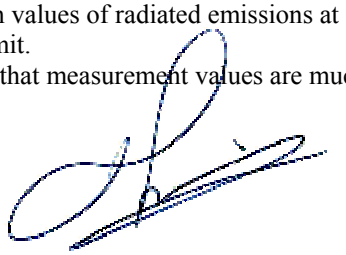
Table 1

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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Date : August 17, 2007

3.2 Radiated field strength measurements (frequency range of 0.009-30 MHz, H-field).

Frequency (MHz)	Measurement results dBµV/m		Antenna factor	Cable loss	Measurement results dB(µV)/m for 30 m (calculated)	Limits Part 15.209 & Part 15.225 dB(µV)/m
	3 meters	10 meters	dB	dB		
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)
13.562	38.6	20.6	19.6	1	23.2	24.0 (30m) (FCC 15.225-(a)

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: - An 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 2 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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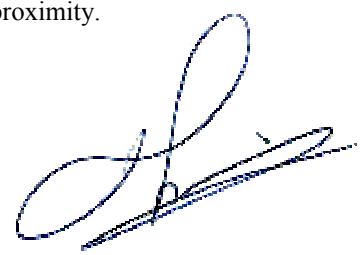

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3.3 Carrier stability under special conditions.

3.3.1 Frequency stability (on 13.56 MHz) in accordance with 47 CFR Part 15, section 15.225 (e) at –20 and +50 °C:

1) The frequency tolerance of the carrier signal shall be maintained within +/- 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 (MHz)	Frequency deviation (limit ±0.01%) (%)	PASS/FAIL
21.0	13.562(reference)	N.A.	N.A.
-20.0	13.562	< 0.01	PASS
50.0	13.562	< 0.01	PASS

Table 3.

3.3.2 Frequency stability in accordance with 47 CFR Part 15, sections 15.225 (e): Temperature = 20 °C

3.3.2.1 At 85% and 115% of rated voltage supply level

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency at 85% and at 115% of the rated power supply voltage at 20 °C environmental temperature. The results are stated in Table 4.

Stability under special conditions % variation U	Measured frequency (MHz)	Frequency deviation limit (%)	PASS/FAIL
100.0	13.562 *(reference)*	N.A.	N.A.
85.0	13.562	< 0.01	PASS
115.0	13.562	< 0.01	PASS

Table 4

Test engineer

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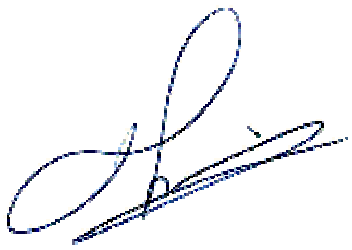


Amplitude stability in accordance with 47 CFR Part 15, sections 15.31 (e).

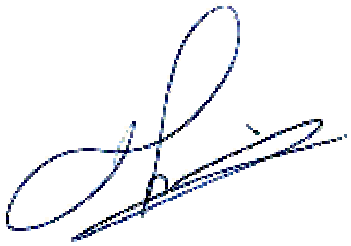
EUT amplitude stability measured at 3 different power supply voltages determined at 21 degrees C (see table 5).

Stability under special conditions % variation U	Amplitude deviation (dB)	PASS/FAIL
100.0	Reference	N.A.
85.0	0.0	PASS
115.0	0.0	PASS

Table 5

Test engineer

Signature :



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Date : August 17, 2007

4 Conducted emission data.

4.1 Conducted emission data of he EUT.

Frequency (MHz)	Measurement results dB(µV) positive		Measurement results dB(µV) negative		Limits dB(µV)		Result
	QP	AV	QP	AV	QP	AV	
0.15-0.5	< 40.0	< 30.0	< 40.0	< 30.0	66.0-56.0	56.0-46.0	PASS
except for:							
0.27	51.3	50.5			61.1	51.1	PASS
0.5-5.0	< 35.0	< 30.0	< 35.0	< 30.0	56.0	46.0	PASS
except for:							
0.54	42.3	42.5	42.0	42.0	56.0	46.0	PASS
0.805	30.0	30.6	30.0	30.5	56.0	46.0	PASS
1.075	39.0	39.3	38.0	38.2	56.0	46.0	PASS
5.0-30.0	< 35.0	< 30.0	< 35.0	< 30.0	60.0	50.0	PASS
except for:							
13.56	49.5	49.9	48.5	49.0	60.0	50.0	PASS
27.124	29.0	29.3	29.0	29.4	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 12 VDC max power connection terminals of the DC power supply via the LISN which was connected to the EUT, are depicted in table 6. The EUT was tested in both active mode, and while detecting a card. Maximum values recorded.

Test engineer

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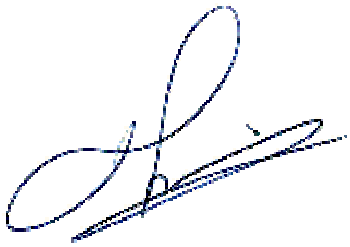

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Date : August 17, 2007

5 List of utilized test equipment.

Inventory number	Description	Brand	Model	Last cal.	Next cal.
12476	Antenna mast	EMCO	TR3	-	-
12477	Antenna mast 1-4 mtr	Poelstra	--	-	-
12482	Loop antenna	EMCO	6507	04/2007	04/2008
12483	Guidehorn	EMCO	3115	03/2007	03/2008
12484	Guidehorn	EMCO	3115	03/2007	03/2008
12533	Signalgenerator	MARCONI	2032	03/2007	03/2008
12605	Calibrated dipole 28MHz-1GHz	EMCO	3121c	09/2002	09/2007
12640	Temperature chamber	Heraeus	VEM03/500	01/2007	01/2008
13664	Spectrum analyzer	HP	HP8593E	08/2006	08/2007
13886	Open Area testsite	Comtest	--	09/2006	09/2009
14051	Anechoic room	Comtest	--	-	-
15633	Biconilog Testantenna	Chase	CBL 6111B	02/2007	02/2008
15667	Measuring receiver	R&S	ESCS 30	04/2007	04/2008
99596	Preamplifier 0.5 GHz - 18 GHz	Miteq	AMF-5D-005180-28-13p	07/2006	07/2008

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} = 59.2 dBµV/m = 912 µV/m

H_{10m} = 41.2 dBµV/m = 115 µV/m

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

$n = \log(115/912) / \log(3/10)$

$n = 1.72$

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

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

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

$H_{30} = 14.49$ µV/m = 23.2 dBµV/m