

Test Report TL-ES-07-35

Prionics / Ktimel OTP Validation

Validation of Ktimel S.A. HiTag S Transponder Configuration
For Electronic Identification of Livestock

J.W.Bishop, A.Lebiedowski, P.Viaud

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05 October 2007

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Part 1 - Report

1. Description of Prionics boluses customised by Ktimel S.A.

This report documents the results of tests conducted on Prionics PR020, PR052, and PR073 boluses to verify correct one-time programming of the incorporated HiTag S transponders by Ktimel S.A.

1.1 Identification of Test Samples

This report documents test results obtained with a batch of 15 FDX-B ceramic boluses received on 03 August 2007. These test samples are maintained at the test laboratory for reference purposes. Identification codes and physical dimensions of these samples are given in Part 2: Electronic Identifier Physical Characteristics.

No information identifying production lot is provided by the customer. The recorded physical characteristics of the samples are summarised in Table 1.

Identifier	Mass [gr]	Length [mm]	Diameter [mm]
PR020	20.55 ± 0.14	55.07 ± 0.26	12.01 ± 0.04
PR052	52.42 ± 0.65	66.22 ± 0.14	17.15 ± 0.11
PR073	70.99 ± 0.69	65 ± 0.26	20.26 ± 0.06

Table 1: Prionics / Ktimel bolus samples - recorded physical characteristics

2. Test Plan

All samples are subjected to the test sequence depicted in Table 2.

Test	Description	Outcome	Page
1	Electronic Identifier Physical Characteristics	Pass	7
2	Transponder resonance frequency measurement	Pass	8
3	Transponder modulation sideband measurements	Pass	9
4	Transponder return signal demodulation	Pass	10
5	OTP verification	Pass	11

Table 2: Test sequence applied to the Prionics / Ktimel bolus samples

2.1 Pass Criteria

- each identifier shall be integral and free of visual signs of permanent deformation;
- the identification code of each transponder shall be integral;
- each transponder shall conform with the JRC HiTag S configuration profile (see Table 3).

The JRC HiTag S configuration profile is derived from the Philips Semiconductors HiTag S Product Specification 079231 Rev.3.1 2006 July 18 (available at http://www.nxp.com/acrobat_download/other/identification/ht079231.pdf).

3. Test Results

3.1 Physical Characteristics

Functionality, weights, dimensions, and condition of all 15 test samples are verified; all test samples are accepted for testing. Identification codes were readable using ISO-compliant readers.

3.2 Resonance Frequency Measurements

Resonance frequencies of all transponders fell in the range of 134.2kHz \pm 3kHz according to ICAR conformance test requirements.

3.3 Return Signal - Modulation Sidebands

Transponder return signal sideband frequencies fell in the ranges (left sideband 129kHz - 133.2kHz; right sideband of 135.2kHz - 139.4kHz) defined for ICAR conformance test requirements.

3.4 Return Signal Demodulation

Identification codes recovered by demodulation of the transponder return signal contained the ISO 3166 country code for Greece (0300) and user information field value (4 as defined in Council Regulation 21/2004) appropriate for sheep and goats.

The test samples are, to all effects, useable in official animal identification schemes. In future OTP verification tasks, the reserved for testing value of 0999 shall be mandated.

3.5 OTP Verification

Data stored in each transponder are compared to the JRC Ispra configuration profile for HiTag S transponders depicted in Table 3.

Configuration information written to the configuration control registers (Page 1) of the HiTag S chips assure the locking of the animal identification code (contained in Pages 4 - 7), and configure the chip operating mode for compatibility with the ISO 11785 standard.

Certain data fields in Pages 1 - 3 were found to be either one-time programmable, or read-write.

Modification of these data fields does not enable modification of the animal identification data stored in Pages 4 - 7, or enable changes to the operating mode of the HiTag S chips.

4. Conclusions

The customisation procedure implemented by Ktimel is appropriate for the supply of identifiers containing HiTag S chips to official identification schemes implementing Council Regulation 21/2004.

Page No.	Byte No. & Name	Bit No. & Name	Value for Official EID Systems	Remarks
0	0..3: UID	0..31: UID	No stipulation	Unique IDentification 32-bit value programmed during chip manufacturing
1	3: PWDH	0..8	No stipulation	Not used for official EID systems.
	2: CON 2	7: LCK 7	1: Page 4-5 RO	Memory Lock bits NB: Pages are one-time programmable only if LCON = 1. Required for official EID systems.
		6: LCK 6	1: Page 6-7 RO	
		0..5: LCK 0-5	No stipulation	Pages beyond 4-7 not used for official EID systems.
	1: CON 1	7: AUT	0: Plain mode	AUThentication mode Plain mode appropriate for official EID systems.
		6: TTFC	1: Biphase	Transponder Talks First (TTF) Coding. Biphase required for ISO 11785 compliance.
		5: TTFDR 1 4: TTFDR 0	00: 4kBit	TTF Data Rate 4kBit required for ISO 11785 compliance
		3: TTFM 1 2: TTFM 0	10: Pages 4-7	TTF Mode Transmit pages 4-7 to the reader. Required for ISO 11785 compliance.
		1: LCON	1	Lock CONfiguration Set CON 1 RO / CON 2 OTP. Required for official EID systems.
		0: LKP	No stipulation	Lock Key and Password Set access to PWDH, Pages 2 and 3. Not used for official EID systems.
0: CON 0		1: MEMT1 0: MEMT0	01 - 256-bit 10 - 2048-bit	MEMory Type At least 256 bit required for official EID systems.
2-3	0..3	0..31	No stipulation	User data Not used for official EID systems.
4-7	0..3	0..31	EID Number	User data Electronic identification code used for official EID systems.

Table 3: JRC Ispra HiTag S configuration profile for official identification schemes.
See Philips Semiconductors HiTag S Product Specification 079231 Rev.3.1 2006 July 18
(available at http://www.nxp.com/acrobat_download/other/identification/ht079231.pdf).

Part 2 - Laboratory Record Sheets



Tempest Laboratory



TL-ES-07-35	Test 4 - Return Signal Demodulation	Code Date Rev.	E503B6 04/2007 b
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<i>Start Date</i> 2007-10-04	<i>Technician</i> J. Bishop / P. Viaud	<i>EUT Description</i> Prionics boluses customised by Ktimel S.A.
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Test Definition

ISO 11784 / 11785 conformance: Transponder return signal demodulation

<i>Test Execution</i>		<i>ZEM1: T = 15-35°C; RH = 25-75%; Pa = 860-1060 hPa</i>	
<i>Observed ambient</i>	26.4 °C	50 %r.h.	995 hPa
<i>Digitiser</i>	MM050	<i>Antenna</i>	MI179
<i>Start time</i>	2007-10-04 10:20:00	<i>Software</i>	TARS-LeCroy9350 + FDX.m
		<i>End time</i>	2007-10-04 10:50:00

Lab ID	<i>ISO 11785 FDX-B and bit ranges according to ISO 11784 Amendment 2</i>										
	Hdr.	1	2-4	5-9	10-14	15	16	17-26	27-64	CRC	Trailer
	[Hex]	A	Retag	UIF	RFU	ST	MD	Cntry.	National ID Code	[Hex]	[Hex]
1	001	1	0	4	0	0	0	0300	013009992001	6ABD	000000
2	001	1	0	4	0	0	0	0300	013009992002	61EC	000000
3	001	1	0	4	0	0	0	0300	013009992003	9C6D	000000
4	001	1	0	4	0	0	0	0300	013009992004	EC54	000000
5	001	1	0	4	0	0	0	0300	013009992005	11D5	000000
6	001	1	0	4	0	0	0	0300	013009995201	466B	000000
7	001	1	0	4	0	0	0	0300	013009995202	4D3A	000000
8	001	1	0	4	0	0	0	0300	013009995203	B0BB	000000
9	001	1	0	4	0	0	0	0300	013009995204	C082	000000
10	001	1	0	4	0	0	0	0300	013009995205	3D03	000000
11	001	1	0	4	0	0	0	0300	013009997301	1BCF	000000
12	001	1	0	4	0	0	0	0300	013009997302	109E	000000
13	001	1	0	4	0	0	0	0300	013009997303	ED1F	000000
14	001	1	0	4	0	0	0	0300	013009997304	A092	000000
15	001	1	0	4	0	0	0	0300	013009997305	5D13	000000

Note: Lab ID 1-5: PR020 / 6-10: PR052 / 11-15: PR073

<i>Completion date:</i> 2007-10-04	<i>Technician's visa:</i>
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Tempest Laboratory



TL-ES-07-35	Test 5 - OTP Verification	Code Date Rev.	E504B6 09/2007 a
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<i>Start Date</i> 2007-10-04	<i>Technician</i> J.Bishop / P.Viaud	<i>EUT Description</i> Prionics boluses customised by Ktimel S.A.
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Test Definition

Tempest Lab: OTP verification

Test Execution *ZEM1: T = 15-35°C; RH = 25-75%; Pa = 860-1060 hPa*

Observed ambient 26.6 °C 49 %r.h. 995 hPa *Accepted*

OTP Reader Frosch Electronics *Silicon* HiTag S *Software* Intuilink / Excel

Start time 2007-10-04 10:50:00 *End time* 2007-10-04 10:55:00

Lab ID	<i>Memory Page Contents [Hexadecimal]</i>								OTP
	Page 0 <i>Unique ID</i>	Page 1 <i>Config.</i>	Page 2 <i>User Data</i>	Page 3 <i>User Data</i>	Page 4 <i>Data</i>	Page 5 <i>Data</i>	Page 6 <i>Data</i>	Page 7 <i>Data</i>	
1	72407C9F	00C04AC9	4E4F5448	524B494D	D9593000	D2818377	5B6D5080	010204D8	Pg4-7 OTP
2	7240820E	00C04AC9	4E4F5448	524B494D	D9592800	D2818377	3E6C5080	010204C8	Pg4-7 OTP
3	72407868	00C04AC9	4E4F5448	524B494D	D9593800	D2818377	96735080	010204D8	Pg4-7 OTP
4	724074C9	00C04AC9	4E4F5448	524B494D	D9592400	D2818377	957D5080	01020448	Pg4-7 OTP
5	724089AD	00C04AC9	4E4F5448	524B494D	D9593400	D2818377	3D625080	01020458	Pg4-7 OTP
6	724079DD	00C04AC9	4E4F5448	524B494D	397A3000	D2818377	D6685080	010204B8	Pg4-7 OTP
7	72408215	00C04AC9	4E4F5448	524B494D	397A2800	D2818377	B3695080	010204A8	Pg4-7 OTP
8	72407F7E	00C04AC9	4E4F5448	524B494D	397A3800	D2818377	1B765080	010204B8	Pg4-7 OTP
9	724082E6	00C04AC9	4E4F5448	524B494D	397A2400	D2818377	18785080	01020428	Pg4-7 OTP
10	724089A7	00C04AC9	4E4F5448	524B494D	397A3400	D2818377	B0675080	01020438	Pg4-7 OTP
11	7240761D	00C04AC9	4E4F5448	524B494D	39FB3500	D2818377	7C635080	010204F8	Pg4-7 OTP
12	724076F4	00C04AC9	4E4F5448	524B494D	39FB2D00	D2818377	19625080	010204E8	Pg4-7 OTP
13	72407204	00C04AC9	4E4F5448	524B494D	39FB3D00	D2818377	B17D5080	010204F8	Pg4-7 OTP
14	72407C04	00C04AC9	4E4F5448	524B494D	39FB2300	D2818377	19745080	01020428	Pg4-7 OTP
15	72407300	00C04AC9	4E4F5448	524B494D	39FB3300	D2818377	B16B5080	01020438	Pg4-7 OTP

Note: Lab ID 1-5: PR020 / 6-10: PR052 / 11-15: PR073

Remarks

HiTag S: see Philips Semiconductors HiTag S Product Specification 079231 Rev.3.1 2006 July 18

<i>Completion date:</i> 2007-10-04	<i>Technician's visa:</i>
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Tempest Laboratory



Test 5 - OTP Verification

Code	E504B6
Date	09/2007
Rev.	a

<i>Start Date</i> 2007-10-04	<i>Technician</i> J.Bishop / P.Viaud	<i>EUT Description</i> Prionics boluses customised by Ktimel S.A.
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Test Definition

Tempest Lab: OTP verification

Test Execution

ZEM1: T = 15-35°C; RH = 25-75%; Pa = 860-1060 hPa

Observed ambient 26.6 °C 49 %r.h. 995 hPa *Accepted*

OTP Reader Frosch Electronics *Silicon* HiTag S *Software* Intuilink / Excel

Start time 2007-10-04 10:50:00 *End time* 2007-10-04 10:55:00

Lab ID	Configuration Data (Page 1) Analysis								ISO
	CON2 [Bin]	CON1 LKP [Bin]	CON1 LCON	CON1 TTFM	CON1 TTFDR	CON1 TTFC	CON1 AUT	CON0 Memory	11785 FDX-B
1	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
2	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
3	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
4	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
5	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
6	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
7	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
8	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
9	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
10	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
11	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
12	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
13	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
14	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK
15	11000000	0	CON1:RO / CON2:OTP	4-7 TX	4kBit	Biphase	Plain	256 bit	OK

Note: Lab ID 1-5: PR020 / 6-10: PR052 / 11-15: PR073

Remarks

HiTag S: see Philips Semiconductors HiTag S Product Specification 079231 Rev.3.1 2006 July 18

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Abstract

Validation of the “one-time programming” of electronic identifiers containing HiTag S passive RFID transponders by Ktimel S.A. The objective of the validation tests is to demonstrate conformity of the identifiers with the ISO 11785 standard, and with requirements for electronic identification code integrity appropriate for official livestock identification schemes implementing Council Regulation 21/2004.

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