# Summary report of e-MRTD InterFest Testing Session 4

Date: 3 February 2005

Venue: Paya Lebar Kovan Community Club, Room Hillside

Hougang Street 21

Coordinators:Mr Lin Yih, Digital Applied Research and Technology Pte Ltd

Mr Sunny Ho, NEC Asia Pacific

## Companies participated:

ACG (Asia Pacific) Pte Ltd	Mr Vernon Heng
Digital Applied Research and	Mr Derek Chan Hsien Wei
Technology Pte Ltd (Moderator)	Mr Joseph Ng Hon Keong
	Ms Loo Foong Ling
Gemplus	Mr Ng Poh Chang
Infineon Technologies Asia Pacific Pte	Mr Chung Wei-Ho
Ltd	
IRIS Corporation Berhad	Mr Chew Hoong Wei
	Mr Ryan Koo Boon Chong
Oberthur Card Systems Asia Pacific	Mr Samnoeuk Khim
Pte Ltd	
PCS Security	Mr David Goh
	Ms Wendy Soh
Philips Electronics (S) Pte Ltd	Ms Kam Bee Peng
SCM Microsystems	Mr Anthony Yeap
Sharp Electronics (S) Pte Ltd	Mr Vincent Kua Soon Huat

### Timeline of activities:

02 Dec 2004	First round of InterFest testing concluded.
10 Dec 2004	Release of standard test application version 1.0.
16 Dec 2004	Second round of InterFest testing concluded.
06 Jan 2005	Release of standard test application version 1.1.
20 Jan 2005	Third round of InterFest testing (BAC) concluded.
01 Feb 2005	Release of standard test application version 1.2.
03 Feb 2005	Fourth round of InterFest testing concluded.

l

### Test Objectives:

- 1. Basic Access Control (BAC) testing of cards/books with InterFest test application.
  - ❖ Read EF.COM, EF.DG1, EG.DG2 under Secure Messaging.

Special note: IRIS Corporation Berhad used their own application ("ICAO test program") for testing, as the current InterFest test application only supports PC/SC readers.

2. Investigative tests for issues identified from the four test sessions.

### **Equipment tested:**

#### Readers

- 1. ACG ISO14443 Contactless Reader
- 2. E Passport Reader 100U (IRIS Corp)
- 3. Sentinel Duo Passport Scanner (PCS Security)
- 4. SCR331/DI Rev 2.0 (SCM)

### Cards/Books/Inlays:

	Type A	Type B
BAC	1. IRIS book (Philips MTCOS)	Infineon Inlay     Gemplus (Lague Helga)     Sharp book
no BAC	Philips Eval OS card     Oberthur card (Cosmopolie LDS)	Gemplus book (Lane Rita)     Sharp book     IRIS book (ST Micro)

#### **Conduct of Tests:**

A moderator follows the card company representative as he goes through the various reader company stations. Tests were performed according to the steps in the checklist.

Although the InterFest does not compare performance, timings were taken for certain tests for investigative purposes.

The moderators were Mr Derek Chan Hsien Wei, Mr Joseph Ng Hon Keong, Ms Loo Foong Ling and Mr Sunny Ho.

At each reader station, the standard InterFest test application was used to test BAC.

Testing is considered successful when the MRZ and photo are successfully retrieved and displayed.

### **Key Findings:**

### 1. Testing of past issues

Please see attached tables for results of the testing.

## <u>Calculations and observations from readings:</u>

- a. Approximate average distance of book to reader before failure = 1.5 cm
- b. Average time taken to read DG1 and DG2 at different baud rates (silver data set with IRIS application, non PC/SC):

	DG1 (no BAC)	DG2 (no BAC)	DG1 (BAC)	DG2 (BAC)
106	0.29s	4.07s	0.38s	8.10s
212	0.28s	3.27s	0.35s	7.07s
424	0.27s	2.88s	0.34s	6.43s

- c. Cards are able to respond to both Le byte values of 0 and 28h, for mutual authentication.
- d. Average time taken to read DG1 and DG2 (all cards with silver data set using InterFest test application):

	DG1 (no BAC)	DG2 (no BAC)	DG1 (BAC)	DG2 (BAC)
Time (secs)	0.17	3.28	0.80	11.30

e. Average time to read DG1 and DG2 for *Infineon inlay* supporting both BAC and non-BAC (silver data set with InterFest test application):

	DG1 (no BAC)	DG2 (no BAC)	DG1 (BAC)	DG2 (BAC)
Time (secs)	0.81	10.97	1.91	19.43

DG1: BAC takes 2.36 times longer. DG2: BAC takes 1.77 times longer.

- f. The average timings in the report were based on a very small sample size, so may not be very accurate
- g. In order to be consistent, the timing from those books that were not using the silver data set were not used.
- h. The timings from the InterFest test application were calculated as such:
  - i) Time taken to read up to DG1 (time taken from Select AID, EF.COM to EF.DG1 displayed)
  - ii) Time taken to read up to DG2 (time taken from Select AID, EF.COM, EF.DG1 to EF.DG2 displayed)

# 2. MRZ Font

One book failed the test because the MRZ scanner could not successfully read its MRZ. It was found that the font used for the MRZ is not the standard OCR-B font.

# 3. Anti-collision

Anti-collision tests were performed using a combination of Type A and Type B cards, with IRIS reader and application.

Type A:

Cards/Books/Inlays	Test position	Findings
<ol> <li>Philip card (JCOP41)</li> <li>Oberthur card (Cosmopolie)</li> <li>IRIS book (Philips chip, MTCOS O/S)</li> </ol>		Application is able to detect all three cards/book.
	2 cards over book.	
1. Philip card (JCOP41) 2. Oberthur card (Cosmopolie) 3. IRIS book (Philips chip, MTCOS O/S) 4. IRIS book (JCOP41)	X	Application cannot detect the cards.  Possible distance factor.
4. Disilia agad (100D44)	2 cards over 2 books.	
<ol> <li>Philip card (JCOP41)</li> <li>Oberthur card (Cosmopolie)</li> <li>IRIS book (Philips chip, MTCOS O/S)</li> </ol>	X	Application cannot detect the cards.
	Book over 2 cards.	
1. Philip card (JCOP41) 2. IRIS book (Philips chip, MTCOS O/S)	No all average and	Application is able to detect both card and book.
4 DETENDED (100D44)	Book over card.	
<ol> <li>Philip card (JCOP41)</li> <li>Oberthur card (Cosmopolie)</li> <li>IRIS book (Philips chip, MTCOS O/S)</li> </ol>	Cards slotted in book.	Application is able to detect all three cards/book.

1. Philip card (JCOP41) 2. Oberthur card (Cosmopolie) 3. IRIS book (Philips chip, MTCOS O/S)	Flip over book slotted with cards.	Application is able to detect all three cards/book.
<ol> <li>Philip card (JCOP41)</li> <li>X 4</li> <li>Oberthur card (Cosmopolie)</li> </ol>	X 5 cards	Application cannot detect all the cards.

Type B:

Cards/Books/Inlays	Test position	Findings
1. Gemplus book (Infineon chip, GemBorder O/S) 2. IRIS book (ST Micro	X	Application cannot detect top book.
chip)	2 haaka	Possible distance or different chip issue.
1. Gemplus book (Infineon chip, GemBorder O/S) 2. Infineon Inlay (Eval O/S)	2 books.  √  Inlay over book.	Application is able to detect both book and inlay of same chip but different O/S.
1. Gemplus book (Infineon chip, GemBorder O/S) 2. Infineon Inlay (Eval O/S)		Application is able to detect both book and inlay of same chip but different O/S.
1. Infineon inlays (Eval O/S) x 2	Book over inlay.  2 inlays.	Application is able to detect both books of same chip and O/S.
1. Infineon inlay (Eval O/S) x 2 2. Gemplus book (Infineon chip, GemBorder O/S)	X	Application cannot detect all three inlays/book.
1. Infineon inlay (Eval O/S) x 2 2. Gemplus book (Infineon chip, GemBorder O/S)	2 inlays over book.  2 inlays slotted in book.	Application cannot detect all three inlays/book.
Type A and Type R.	· •	1

Type A and Type B:

It is noted that the application polls for Type A before Type B cards.

Cards/Books/Inlays	Test position	Findings
<ol> <li>Philips card (Type A, JCOP41)</li> <li>Sharp inlay (Type B)</li> </ol>	Philips card under Sharp	Application is able to detect both card and inlay.
1. Philips card (Type A, JCOP41) x 2 2. Sharp inlay (Type B)	Share inley between 2	Only both Philips cards (Type A) can be detected.
	Sharp inlay between 2 Philips cards.	
1. Philips card (Type A, JCOP41) x 2 2. Sharp inlay (Type B) 3. Infineon Inlay (Type B, Eval O/S)	X	Philips card (Type A) cannot be detected.
	Infineon inlay over Sharp inlay over Philips card.	
1. Philips card (Type A, JCOP41) x 2 2. Infineon inlay (Type B)	V VOI 1 Timps card.	Application is able to detect all inlay and cards.
	Infineon inlay over 2 Philips cards.	
1. Philips card (Type A, JCOP41) x 2 2. IRIS book (Type B, ST Micro chip)	IRIS book over Philips	Only Philips cards (Type A) can be detected.
	cards.	

## **Issues and observations**:

- a. Type B cards can generally only be detected up to two cards in the field.
  b. Readers may have problems detecting different chips within the same field.

- c. When both Type A and Type B cards are in the same field, Type A cards are usually detected over Type B.
- d. Relative size/thickness of books/cards in the same field may pose a problem to readers.

#### Other Matters:

Certificates of Participation will be issued to all companies involved in the InterFest.

There was a briefing on the Japan Passport Interoperability Testing from March 8 to 10 at Tsukubu, Tokyo, Japan. Companies can refer to http://www.epassporttest.org for details of registration.

Singapore will have a booth at the venue as a showcase for the InterFest sessions. All companies involved are invited to participate, or to send their equipment over for testing. Companies should register on their own and inform the Head of Delegation on the details of personnel going.

#### Conclusion

This session concludes the BAC testing. The investigative test results will be analysed and presented at the Japan Interoperability tests in March.

Prepared by:

Derek Chan Hsien Wei Engineer Digital Applied Research and Technology Pte Ltd

			PCS Security	
			(tested without	
	ACG	IRIS	BAC)	SCM
Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.  Read data.				
Read data.				
On reader	- I	<b>√</b>	<b>√</b>	√
1 cm	<b>→</b> √	<b>√</b>	1	<b>√</b>
2 cm	1 1	X	$\sqrt{}$	1
2 011			X (connect	<b>'</b>
3 cm	х	Х	ok)	Х
			X (connect	
4 cm	X	Х	ok)	Х
E om	x	х	X (connect ok)	х
5 cm Max distance before failure	2cm	1cm	2cm	2cm
inax distance before familie	2011	TCIII	ZGIII	ZCIII
Place book/card/inlay at optimal distance.				
Orientate at 0/45/90 degrees in both planes. Read data.				
Vertical plane				
45 degrees	٧	Х	√	√
90 degrees (perpendicular)	Х	Х	Х	Х
Horizontal plane				
45 degrees	√	√	√	√
90 degrees (perpendicular)	√	√	√	√
3. (For IRIS only) Place book/card/inlay at optimal distance.				
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.	n.a.		n.a.	n.a.
106				
DG1		0.35		
DG2		8.58		
212				
DG1		0.32		
DG2		7.58		
424				
DG1		0.31		
DG2		6.83		
847				
DG1		-		
DG2		-		
		<u> </u>	,	
4. Flip over book/card/inlay at optimal distance. Read data.	√	√	√	√
5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)				
Set test application Le byte value to 00/2011. Read data (DAC)				
0	-1	√	na	1
0 28h		\ √	n.a.	\ √
2011	<del>-   ^</del>	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	n.a.	- V
Place book/card/inlay at optimal distance.		<b> </b>		
Read EF.COM / EF.DG1 / EF.DG2. Record timing.				
,			(non BAC)	
Repeat with/without BAC (if supported)		1		
Repeat with/without BAC (if supported) Time taken to read and display up to DG1 (secs)	0.751	0.31	0.187	0.691
	0.751 10.395	0.31 7.16	0.187 2.344	0.691 9.123

1. Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.  Read data.  On reader  On reader  V V V X V V X V X V X X X X X X X X X		ACG	IRIS	PCS Security	SCM
Read data.    Control   Co	Place book/card/inlay on reader and 1 2 3 4 5 cm over reader	ACG	іпо	1 00 decurity	JUIVI
On reader         √         √         √         X         √         X         √         X         √         √         X         X         √         √         X					
On reader         √         √         √         X         √         X         √         X         √         √         X         X         √         √         X					
1 cm				X (only DG1	
2 cm	On reader			,	
3 cm	1 cm				
4 cm	2 cm	√	√		√
Som	3 cm	Х	Х		Х
Max distance before failure	4 cm	Х	Х		Х
2. Place book/card/inlay at optimal distance. Orientate at 0/45/90 degrees in both planes. Read data.  Vertical plane  45 degrees  XX √ X X  YX  90 degrees (perpendicular)  Horizontal plane  45 degrees  √ √ √ X X  X  X  X  Y  N  N  N  N  N  N  N  N  N  N  N  N	5 cm	Х	Х	Х	Х
Orientate at 0/45/90 degrees in both planes. Read data.  Vertical plane 45 degrees  X X X X X  AX  Horizontal plane 45 degrees  V X X X X X  Horizontal plane 45 degrees  V V V X V X V  AX V X X X X X X X X X X X X X X X X X X	Max distance before failure	2cm	2cm	-	2cm
Orientate at 0/45/90 degrees in both planes. Read data.  Vertical plane 45 degrees  X X X X X  AX  Horizontal plane 45 degrees  V X X X X X  Horizontal plane 45 degrees  V V V X V X V  AX V X X X X X X X X X X X X X X X X X X					
Vertical plane         X         √         X					
45 degrees (perpendicular)  W X X X X X X X X X X X X X X X X X X	Orientate at 0/45/90 degrees in both planes. Read data.				
45 degrees (perpendicular)  W X X X X X X X X X X X X X X X X X X	Montical plans				
90 degrees (perpendicular)  X X X X X X X X X X X X X X X X X X X			-1		
Horizontal plane  Horizontal plane  ## 45 degrees  ## 47					
45 degrees (perpendicular)  90 degrees (perpendicular)  3. (For IRIS only) Place book/card/inlay at optimal distance. Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  106  DG1 (no BAC)  DG2 (no BAC)  DG1 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG6 (no BAC)  DG7 (no BAC)  DG8 (no BAC)  DG9 (no BAC)	ao degrees (perpendicular)	<del>                                     </del>	_ ^	^	X
45 degrees (perpendicular)  90 degrees (perpendicular)  3. (For IRIS only) Place book/card/inlay at optimal distance. Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  106  DG1 (no BAC)  DG2 (no BAC)  DG1 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG6 (no BAC)  DG7 (no BAC)  DG8 (no BAC)  DG9 (no BAC)	Harizantal plana				
90 degrees (perpendicular)  3. (For IRIS only) Place book/card/inlay at optimal distance. Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  106 107 108 109 109 109 109 109 109 109 109 109 109		.1			-1
3. (For IRIS only) Place book/card/inlay at optimal distance.  Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  106  DG1 (no BAC)  107  24  212  DG1 (no BAC)  108  DG2 (no BAC)  109  109  109  109  109  109  109  10					
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  n.a.  n	ao degrees (perpendicular)	+ *	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		٧
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  n.a.  n	3 (For IRIS only) Place book/card/inlay at ontimal distance				
106   106   108   108   108   108   109		n a		n.a.	n a
DG1 (no BAC) DG2 (no BAC)  7.24  7.24  DG1 (no BAC) DG2 (no BAC)  0.88  DG2 (no BAC)  0.88  0.80  0.8				-	
DG2 (no BAC)  212  DG1 (no BAC)  DG2 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG6 (no BAC)  DG7 (no BAC)  DG8 (no BAC)  DG9 (no BA	106				
DG2 (no BAC)  212  DG1 (no BAC)  DG2 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG6 (no BAC)  DG7 (no BAC)  DG8 (no BAC)  DG9 (no BA			0.88		
212 DG1 (no BAC) DG2 (no BAC)  DG2 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  DG6 (no BAC)  DG7 (no BAC)  DG8 (no BAC)  DG8 (no BAC)  DG9 (no BAC)	` ,		-		
DG1 (no BAC) DG2 (no BAC)  DG2 (no BAC)  424  DG1 (no BAC) DG2 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC) DG5 (no BAC) DG5 (no BAC) DG5 (no BAC) DG6 (no BAC) DG7 (no BAC) DG8 (no BAC) DG9 (no BAC) DG9 (no BAC)  N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N0 (no BAC) N1 (no BAC) N2 (no BAC) N3 (no BAC) N4 (no BAC) N4 (no BAC) N5 (no BAC) N5 (no BAC) N5 (no BAC) N6 (no BAC) N7	, ,				
DG2 (no BAC)			0.88		
### DG1 (no BAC)  DG2 (no BAC)  DG3 (no BAC)  DG4 (BAC)  DG5 (BAC)  DG5 (BAC)  DG5 (BAC)  DG6 (BAC)  DG7 (BAC)  DG8 (BAC)  DG8 (BAC)  #### DG9 (no BAC)  #### A					
DG2 (no BAC)  DG1 (BAC)  DG2 (BAC)  847  DG1 (no BAC)  DG2 (no BAC)  DG2 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  4. Flip over book/card/inlay at optimal distance. Read data.  √ √ √ (only DG1 ok)  √ √ (ok) √ √ (ok)  √ √ (ok) √ √ (ok)  DG5 (test application Le byte value to 00/28h. Read data (BAC)  DG5 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG6 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte obook/card/inlay at optimal distance. Set test application Le byte obook/car					
DG2 (no BAC)  DG1 (BAC)  DG2 (BAC)  847  DG1 (no BAC)  DG2 (no BAC)  DG2 (no BAC)  DG3 (no BAC)  DG3 (no BAC)  DG4 (no BAC)  DG5 (no BAC)  DG5 (no BAC)  4. Flip over book/card/inlay at optimal distance. Read data.  √ √ √ (only DG1 ok)  √ √ (ok) √ √ (ok)  √ √ (ok) √ √ (ok)  DG5 (test application Le byte value to 00/28h. Read data (BAC)  DG5 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG6 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  DG7 (byte obook/card/inlay at optimal distance. Set test application Le byte obook/card/inlay at optimal distance. Set test application Le byte obook/car	DG1 (no BAC)		0.86		
DG1 (BAC)       1.17         DG2 (BAC)       12.73         847       0.86         DG1 (no BAC)       0.86         DG2 (no BAC)       5.68         4. Flip over book/card/inlay at optimal distance. Read data.       √       √       X (only DG1 ok)         5. Place book/card/inlay at optimal distance.       √       √       √       √         Set test application Le byte value to 00/28h. Read data (BAC)       √ <td< td=""><td></td><td></td><td>5.94</td><td></td><td></td></td<>			5.94		
DG2 (BAC)  847  DG1 (no BAC)  DG2 (no BAC)  5.68  4. Flip over book/card/inlay at optimal distance. Read data.  √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √			1.17		
B47			i e		
DG2 (no BAC)   5.68	847				
DG2 (no BAC)   5.68	DG1 (no BAC)		0.86		
4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0			5.68		
4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0	,				
5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0					
Set test application Le byte value to 00/28h. Read data (BAC)	Flip over book/card/inlay at optimal distance. Read data.	√ √	√	ok)	√
Set test application Le byte value to 00/28h. Read data (BAC)					
0					
28h       √       √       −       √         6. Place book/card/inlay at optimal distance.       Read EF.COM / EF.DG1 / EF.DG2. Record timing.       F.DG1 / EF.DG2. Record timing.       Time taken to read and display up to DG1 (secs) BAC       2.314       1.17       1.328       2.083         Time taken to read and display up to DG2 (secs) BAC       20.74       12.73       −       18.126         Time taken to read and display up to DG1 (secs) no BAC       0.906       0.972	oet test application Le byte value to 00/28n. Read data (BAC)				
28h       √       √       −       √         6. Place book/card/inlay at optimal distance.       Read EF.COM / EF.DG1 / EF.DG2. Record timing.       F.DG1 / EF.DG2. Record timing.       Time taken to read and display up to DG1 (secs) BAC       2.314       1.17       1.328       2.083         Time taken to read and display up to DG2 (secs) BAC       20.74       12.73       −       18.126         Time taken to read and display up to DG1 (secs) no BAC       0.906       0.972		اد	-1		-1
6. Place book/card/inlay at optimal distance. Read EF.COM / EF.DG1 / EF.DG2. Record timing. Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) BAC  Time taken to read and display up to DG2 (secs) BAC  Time taken to read and display up to DG1 (secs) no BAC  Description of the property of the prope					
Read EF.COM / EF.DG1 / EF.DG2. Record timing. Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) BAC  Time taken to read and display up to DG2 (secs) BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC	2011	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \	_	٧
Read EF.COM / EF.DG1 / EF.DG2. Record timing. Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) BAC  Time taken to read and display up to DG2 (secs) BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC	6. Place hook/card/inlay at optimal distance	-			
Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) BAC  Time taken to read and display up to DG2 (secs) BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC  Time taken to read and display up to DG1 (secs) no BAC					
Time taken to read and display up to DG1 (secs) BAC       2.314       1.17       1.328       2.083         Time taken to read and display up to DG2 (secs) BAC       20.74       12.73       -       18.126         Time taken to read and display up to DG1 (secs) no BAC       0.55       -       0.906       0.972	· · · · · · · · · · · · · · · · · · ·				
Time taken to read and display up to DG2 (secs) BAC 20.74 12.73 - 18.126 Time taken to read and display up to DG1 (secs) no BAC 0.55 - 0.906 0.972		2.314	1.17	1.328	2.083
Time taken to read and display up to DG1 (secs) no BAC 0.55 - 0.906 0.972		-		-	
				0.906	
	Time taken to read and display up to DG2 (secs) no BAC	11.847	-	-	10.085

	ACG	IRIS	PCS Security	SCM
Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.	ACG	IKIS	PCS Security	SCIVI
Read data.				
redu data.				
	.,	.1	.,	.1
On reader	<b>√</b>	√ ,	<b>√</b>	<b>√</b>
1 cm	√	√	√	√
	.,	V (	V (	J
2 cm	√ 	X (connect ok)	X (connect ok)	√
2 am	X (connect ok)		X (connect ok)	√
3 cm	X (connect	Х	A (Connect Ok)	X (connect
4 cm	ok)	x	X (connect ok)	ok)
+ CIII	X (connect		A (connect on)	X (connect
5 cm	ok)	x	х	ok)
Max distance before failure	2cm	2cm	2cm	3cm
iviax distance before failure	2011	2011	2011	00111
Place book/card/inlay at optimal distance.				
Orientate at 0/45/90 degrees in both planes. Read data.				
Onentate at 0/40/00 degrees in both planes. Nead data.				
Modford of one				
Vertical plane		<b>V</b> ( ) (		
		X (ok at		
4F dogrado	1	approx	v	ما
45 degrees		40degs)	X	
90 degrees (perpendicular)	X	Х	X	X
Horizontal plane				
45 degrees	√	√	√	√
90 degrees (perpendicular)	√	7	√	7
3. (For IRIS only) Place book/card/inlay at optimal distance.				
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.	n.a.		n.a.	n.a.
106				
DG1		0.09		
		2.98		
DG2		2.90		
212				
DG1				
		0.07		
DG2		0.07 2.46		
DG2 424				
424		2.46		
424 DG1 DG2		2.46 0.06		
DG1 DG2 847		2.46 0.06		
DG1 DG2 847 DG1		2.46 0.06		
DG1 DG2 847		2.46 0.06 2.23		
DG1 DG2 847 DG1 DG2		2.46 0.06 2.23		J
DG1 DG2 847 DG1	<b>√</b>	2.46 0.06 2.23	<b>V</b>	٧
DG1 DG2 847 DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data.	1	2.46 0.06 2.23	<b>√</b>	٧
DG1 DG2 847 DG1 DG2  847 DG1 DG2  4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance.	1	2.46 0.06 2.23	1	٧
DG1 DG2 847 DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data.	1	2.46 0.06 2.23	<b>V</b>	٧
DG1 DG2 847 DG1 DG2  847 DG1 DG2  4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance.	1	2.46 0.06 2.23	<b>V</b>	٧
DG1 DG2 847 DG1 DG2  847 DG1 DG2  4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance.	√	2.46 0.06 2.23	√ ————————————————————————————————————	٧
DG1 DG2 847 DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data. 5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)		2.46 0.06 2.23 - -		
DG1 DG2 847 DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data. 5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)	-	2.46 0.06 2.23 - -	-	
DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0 28h	-	2.46 0.06 2.23 - -	-	
DG1 DG2 847 DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data. 5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)	-	2.46 0.06 2.23 - -	-	
DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0 28h 6. Place book/card/inlay at optimal distance.	-	2.46 0.06 2.23 - -	-	
DG1 DG2 847 DG1 DG2 4. Flip over book/card/inlay at optimal distance. Read data.  5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0 28h 6. Place book/card/inlay at optimal distance. Read EF.COM / EF.DG1 / EF.DG2. Record timing.	-	2.46 0.06 2.23 - -	-	

2 cm	SCM √
Read data.          \begin{align*}             \text{X (only up to DG1 ok)}             \text{DG1 ok)}             X X X X X X X X X X X X X X X X X X X	
On reader       √       √       X (only up to DG1 ok)         1 cm       √       √       X         2 cm       X       √       X         3 cm       X       X       X         4 cm       X       X       X	<b>√</b>
On reader       √       √       DG1 ok)         1 cm       √       √       X         2 cm       X       √       X         3 cm       X       X       X         4 cm       X       X       X	٧,
On reader       √       √       DG1 ok)         1 cm       √       √       X         2 cm       X       √       X         3 cm       X       X       X         4 cm       X       X       X	<b>√</b>
On reader       √       √       DG1 ok)         1 cm       √       √       X         2 cm       X       √       X         3 cm       X       X       X         4 cm       X       X       X	<b>√</b>
1 cm     √     √     x       2 cm     x     √     x       3 cm     x     x     x       4 cm     x     x     x	<del></del>
2 cm	
2 cm     x     √     x       3 cm     x     x     x       4 cm     x     x     x	<u> </u>
3 cm	( (only up to DG1 ok)
4 cm	
4 cm	X (only
	connect ok)
I5 cm IXIXI XI	Х
	X
Max distance before failure 1cm 2cm -	1cm
Place book/card/inlay at optimal distance.	
Orientate at 0/45/90 degrees in both planes. Read data.	ļ
Offerhate at 0/45/90 degrees in both planes. Read data.	
Vertical plane	
X (ok at	
approx X (only up to	ļ
45 degrees 15degs) √ DG1 ok)	√
90 degrees (perpendicular) X X X	Х
or degrees (perpendicular)	
Haricantel plans	
Horizontal plane	
X (only up to	,
45 degrees √ √ DG1 ok)	√
X (only up to	,
90 degrees (perpendicular)	√
3. (For IRIS only) Place book/card/inlay at optimal distance.	
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read	ļ
data. n.a. n.a.	n.a.
data.	ii.u.
106	
DG1 0.17	
DG2 4.53	
212	
DG1 0.15	
DG2 3.57	
424	
DG1 0.14	
DG2 3.06	
847	
DG1 -	
B00	
DG2 -	
X (only up to	,
4. Flip over book/card/inlay at optimal distance. Read data.   √   ✓   DG1 ok)	√
5. Place book/card/inlay at optimal distance.	
Set test application Le byte value to 00/28h. Read data (BAC)	
The state of the s	
0	_
28h	
6. Place book/card/inlay at optimal distance.	
Read EF.COM / EF.DG1 / EF.DG2. Record timing.	
Repeat with/without BAC (if supported)	
Time taken to read and display up to DG1 (secs) no BAC 0.16 0.14 0.766	0.14
Time taken to read and display up to DG2 (secs) no BAC 5.518 3.06 -	3.515

1. Place book/card/inlay on reader and 1.2.3.4.5 cm over reader.  Read data.  On reader  1 cm  1 cm  1 cm  1 cm  1 x (only connect ok)  1 x x x x x x x x x x x x x x x x x x		ACG	IRIS	PCS Security	SCM
On reader	Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.			,	
1 cm	Read data.				
1 cm					
1 cm	On reader	√	√	,	√
2 cm					,
2 cm	1 cm	1	· ·	ok)	٧
3 cm	2 cm	v		x	اد
4 cm					
S cm					
Max distance before failure  2. Place book/card/inlay at optimal distance. Orientate at 0/46/90 degrees in both planes. Read data.  Vertical plane  45 degrees  X X X X X X  45 4  Horizontal plane  45 degrees  A X X X X X X X X X X X X X X X X X X					
2. Place book/card/inlay at optimal distance. Orientate at 0/45/90 degrees in both planes. Read data.  Vertical plane 45 degrees  XXXXXXX X  40 odegrees (perpendicular)  Horizontal plane 45 degrees  V V V V V V V V V V V V V V V V V V V					
Orientate at 0/45/90 degrees in both planes. Read data.         Image: Comparison of the planes of the planes of the planes of the planes of the plane of	inax distance perore failure	TOTT	10111	OGITI	JUIT
Orientate at 0/45/90 degrees in both planes. Read data.         Image: Comparison of the planes of the planes of the planes of the planes of the plane of	Place book/card/inlay at optimal distance.				
45 degrees (perpendicular)  N					
45 degrees (perpendicular)  N					
45 degrees (perpendicular)  N	Vertical plane				
90 degrees (perpendicular)  Horizontal plane  45 degrees  √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √	45 degrees	Х	Х	Х	1
Horizontal plane		Х	Х	Х	Х
45 degrees (perpendicular) 90 degrees (perpendicular) 3. (For IRIS only) Place book/card/inlay at optimal distance. Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  106  DG1  DG2  1278  106  DG2  1278  106  DG2  11,93  DG2  129  DG2  11,93  DG2  11,93  DG2  11,93  DG3  12,93  DG4  13,93  DG5  DG2  14,46  DG1  DG2  15,008  DG2  16,146  DG1  DG2  17,146  DG1  DG2  18,146  DG1  DG2  19,146  DG1  DG2  10,08  DG2  11,46  DG1  DG2  DG2  DG2  DG3  DG4  DG5  DG5  DG5  DG7  DG7  DG7  DG7  DG7					
45 degrees (perpendicular) 90 degrees (perpendicular) 3. (For IRIS only) Place book/card/inlay at optimal distance. Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  106  DG1  DG2  1278  106  DG2  1278  106  DG2  11,93  DG2  129  DG2  11,93  DG2  11,93  DG2  11,93  DG3  12,93  DG4  13,93  DG5  DG2  14,46  DG1  DG2  15,008  DG2  16,146  DG1  DG2  17,146  DG1  DG2  18,146  DG1  DG2  19,146  DG1  DG2  10,08  DG2  11,46  DG1  DG2  DG2  DG2  DG3  DG4  DG5  DG5  DG5  DG7  DG7  DG7  DG7  DG7	Horizontal plane				
90 degrees (perpendicular)  3. (For IRIS only) Place book/card/inlay at optimal distance. Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  106  DG1  DG1  DG2  2.78  212  DG1  DG2  1.93  DG2  1.93  DG2  1.93  DG2  1.93  DG2  1.93  DG2  DG2  1.46  DG1  DG1  DG1  DG1  DG2  1.46  DG1  DG2  4. Flip over book/card/inlay at optimal distance. Read data.  4. Flip over book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0.09		√	<b>√</b>	√	<b>4</b>
3. (For IRIS only) Place book/card/inlay at optimal distance.  Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  n.a.  n.a			√	√	
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.  n.a.  n					
106  DG1  DG2  2.78  222  DG1  DG2  3.009  DG2  2.78  DG1  DG2  1.93  2.78  DG2  DG2  1.93  2.78  DG3  DG2  1.93  2.78  DG1  DG2  DG2  DG3  DG4  DG5  DG5  DG7  DG7  DG8  DG8  DG9  DG9  DG9  DG9  DG9  DG9	3. (For IRIS only) Place book/card/inlay at optimal distance.				
DG1 DG2 2.78 2.78 212 DG1 DG1 DG2 1.93 2.24 242 DG1 DG2 1.93 2.78  DG2 2.78  DG3 DG2 2.78 DG3 DG9 DG2 2.78 DG9	Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.	n.a.		n.a.	n.a.
DG1 DG2 2.78 2.78 212 DG1 DG1 DG2 1.93 2.24 242 DG1 DG2 1.93 2.78  DG2 2.78  DG3 DG2 2.78 DG3 DG9 DG2 2.78 DG9					
DG2       2.78         212       0.09         DG1       0.09         DG2       1.93         424       0.08         DG2       1.46         847       0.08         DG1       -         DG2       1.46         847       0.01         DG2       -         4. Flip over book/card/inlay at optimal distance. Read data.       √       √       √       √         5. Place book/card/inlay at optimal distance.       Set test application Le byte value to 00/28h. Read data (BAC)       Set test application Le byte value to 00/28h. Read data (BAC)       Set Description of the control of the contro	106				
DG1	DG1		0.09		
DG1 DG2 1.93 424 DG1 DG2 1.93  DG2 1.96 DG2 1.46  847 DG1 DG2 1.46  848 1.46  849 1.46  849 1.46  849 1.46  849 1.46 1.46 1.46 1.46 1.46 1.46 1.46 1.46	DG2		2.78		
DG2  424  DG1  DG2  BA7  DG2  BA7  DG1  DG2  BA7  DG1  DG2  BA7  DG1  DG2  A. Flip over book/card/inlay at optimal distance. Read data.  A. Flip over book/card/inlay at optimal distance. Read data.  A. Flip over book/card/inlay at optimal distance. Read data.  A. Flip over book/card/inlay at optimal distance. Read data.  A. Flip over book/card/inlay at optimal distance. Read data.  B. Place book/card/inlay at optimal distance.  Set test application Le byte value to 00/28h. Read data (BAC)  B. Company to the co	212				
DG1	DG1		0.09		
DG1	DG2		1.93		
DG2 1.46   847	424				
DG1  DG2	DG1				
DG1  DG2  4. Flip over book/card/inlay at optimal distance. Read data.  √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √	DG2		1.46		
DG2  4. Flip over book/card/inlay at optimal distance. Read data.  √ √ √ √ √ √  5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0	847				
4. Flip over book/card/inlay at optimal distance. Read data.  √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √ √			-		
5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0	DG2		-		
5. Place book/card/inlay at optimal distance. Set test application Le byte value to 00/28h. Read data (BAC)  0					
Set test application Le byte value to 00/28h. Read data (BAC)	Flip over book/card/inlay at optimal distance. Read data.	√	√	√	√
Set test application Le byte value to 00/28h. Read data (BAC)					
0					
28h — — — — — — — — — — — — — — — — — — —	Set lest application Le byte value to UU/28n. Read data (BAC)				
28h — — — — — — — — — — — — — — — — — — —					
6. Place book/card/inlay at optimal distance. Read EF.COM / EF.DG1 / EF.DG2. Record timing. Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) no BAC  0.14  0.07  0.078  0.14			_	_	
Read EF.COM / EF.DG1 / EF.DG2. Record timing.  Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) no BAC  0.14  0.07  0.078  0.14	2011	<del>  -</del>	_	_	_
Read EF.COM / EF.DG1 / EF.DG2. Record timing.  Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) no BAC  0.14  0.07  0.078  0.14	6. Diago hook/gord/injay at aptimal distance				
Repeat with/without BAC (if supported)  Time taken to read and display up to DG1 (secs) no BAC  0.14  0.07  0.078  0.1					
Time taken to read and display up to DG1 (secs) no BAC 0.14 0.07 0.078 0.1					
		0 14	0.07	0.078	0 1
UNDERGREUN GEGU GUU UNDUG VOU IN 1772 (NEGATIN DAL) 1.3453 1.144 1.1733 1.1783	Time taken to read and display up to DG2 (secs) no BAC	3.485	1.44	1.735	1.783

	ACG	IRIS	PCS Security	SCM
Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.	7.00			
Read data.				
On reader	√	√	√	√
1 cm	√	√	√	√
	,	,	X (only	,
2 cm	√	√	connect ok)	√
3 cm	X (only up to DG1 ok)	X (only connect ok)	х	<b>V</b>
3 611	DOT OK)	connect ox)	^	•
	X (only			X (only
4 cm	connect ok)	X	Х	connect ok)
5 cm	Х	Х	Х	Х
Max distance before failure	2cm	2cm	1cm	3cm
Place book/card/inlay at optimal distance.				
Orientate at 0/45/90 degrees in both planes. Read data.				
Vertical plane	<u> </u>	,	,,	,
45 degrees	√	√	X	√
90 degrees (perpendicular)	Х	Х	Х	X
Horizontal plane	,	,	,	,
45 degrees	<b>√</b>	√,	<b>√</b>	<b>√</b>
90 degrees (perpendicular)	√	√	√	√
(For IRIS only) Place book/card/inlay at optimal distance.				
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.	n.a.		n.a.	n.a.
	111911			
106				
DG1		0.18		
DG2		1.74		
212				
DG1		0.19		
DG2		1.33		
424				
DG1		0.15		
DG2		1.2		
847				
DG1		-		
DG2		-		
4. Flip over book/card/inlay at optimal distance. Read data.	√	√	√	√
Place book/card/inlay at optimal distance.				
Set test application Le byte value to 00/28h. Read data (BAC)				
0	-	-	-	-
28h	-	-	-	-
6. Place book/card/inlay at optimal distance.				
Read EF.COM / EF.DG1 / EF.DG2. Record timing. Repeat with/without BAC (if supported)				
	0.17	0.15	0.14	0.161
Time taken to read and display up to DG1 (secs) no BAC		1.2		
Time taken to read and display up to DG2 (secs) no BAC	2.273	1.∠	1.687	1.643

	ACG	IRIS	PCS Security	SCM
Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.			-	
Read data.				
On reader	√	√	√	√
	,	,	X (only up to DG1	
1 cm	٧	√	ok)	√
2	X (only connect ok)	√	X (only up to DG1 ok)	-1
2 cm	OK)	Y	X (only connect	√
3 cm	X	х	ok)	Х
4 cm	X	X	X	X
5 cm	X	X	X	X
Max distance before failure	1cm	2cm	0cm	2cm
ivida distance before failure	10111	20111	0011	20111
Place book/card/inlay at optimal distance.				
Orientate at 0/45/90 degrees in both planes. Read data.				
Vertical plane				
45 degrees	<b>√</b>	1	х	<b>V</b>
90 degrees (perpendicular)	X	X	X	X
so degrees (perpendicular)	X			^
Harizantal plana				
Horizontal plane	<b>→</b>	1	√	<b>V</b>
45 degrees	<b>→</b> √	<b>→</b>	<b>√</b>	<b>√</b>
90 degrees (perpendicular)		Y	V	V
(For IRIS only) Place book/card/inlay at optimal distance.				
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.	n.a.		n.a.	n.a.
est rouder a appropriation to bit rate of 100/21/2/12/10/11 Rollere. Head data.	11.0.		ii.u.	m.a.
106				
DG1		0.1		
DG2		3.29		
		3.29		
212		0.09		
DG1				
DG2		2.33		
424		0.00		
DG1		0.08		
DG2		1.9		
847				
DG1		-		
DG2		-		
Flip over book/card/inlay at optimal distance. Read data.	√	√	√	√
5. Place book/card/inlay at optimal distance.				
Set test application Le byte value to 00/28h. Read data (BAC)				
		<u> </u>		
0	-	_	_	-
28h		_	_	_
6. Place book/card/inlay at optimal distance.				
Read EF.COM / EF.DG1 / EF.DG2. Record timing.				
Repeat with/without BAC (if supported)	0.44	0.00	0.070	2 .
Time taken to read and display up to DG1 (secs) no BAC	0.14	0.08	0.079	0.1
Time taken to read and display up to DG2 (secs) no BAC	4.376	1.9	2.282	8.463

	ACG	IRIS	PCS Security	SCM
Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.			,	
Read data.				
	J	.,	X (only up to	J
On reader	√	√	DG1 ok) X (only up to	√
1 cm	√	√	DG1 ok)	√
1 0111	,	,	X (only	,
2 cm	Х	√	connect ok)	√
			X (only	X (only
3 cm	X	Х	connect ok)	connect ok)
4 cm	x	х	X (only connect ok)	X (only connect ok)
+ GIII	<u> </u>		X (only	comicot on,
5 cm	X	х	connect ok)	X
Max distance before failure	1cm	2cm	0cm	2cm
Place book/card/inlay at optimal distance.				
Orientate at 0/45/90 degrees in both planes. Read data.				
Vertical plane	W (allease)			
45 degrees	X (about 30degs ok)	√	Х	√
90 degrees (perpendicular)	X	X	X	X
oo degrees (perpendicular)				^
Horizontal plane				
45 degrees	1	1	1	1
90 degrees (perpendicular)	, i	Ì	V	Ì
oo degrees (perpendicular)	,	,	•	,
(For IRIS only) Place book/card/inlay at optimal distance.				
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.	n.a.		n.a.	n.a.
106				
DG1		-		
DG2		-		
212				
DG1		-		
DG2		-		
424				
DG1		-		
DG2		-		
847				
DG1		-		
DG2		-		
	J	.,	X (only up to	J
Flip over book/card/inlay at optimal distance. Read data.	√	√	DG1 ok)	√
Place book/card/inlay at optimal distance.				
Set test application Le byte value to 00/28h. Read data (BAC)				
oot test application to byte value to 60/2511. Nead data (B/10)				
0	√ √	1	_	√
28h	<del>\</del>	1	_	1
<del></del>	1	'		,
Place book/card/inlay at optimal distance.				
Read EF.COM / EF.DG1 / EF.DG2. Record timing.				
Repeat with/without BAC (if supported)				
Time taken to read and display up to DG1 (secs) with BAC	1.081	0.77	1.281	1.011
Time taken to read and display up to DG2 (secs) with BAC	17.425	11.68	-	15.752

	ACG	IRIS	PCS Security	SCM
1. Place book/card/inlay on reader and 1,2,3,4,5 cm over reader.				
Read data.				
On reader	√ .	√	√	√.
1 cm	√	√	Х	√
2 cm	X	Χ	Х	√
3 cm	Х	Χ	Х	√
4 cm	X	Χ	Х	Х
5 cm	Х	Х	Х	Х
Max distance before failure	1cm	1cm	0cm	3cm
2. Place book/card/inlay at optimal distance.				
Orientate at 0/45/90 degrees in both planes. Read data.				
N C 1 1				
Vertical plane				.1
45 degrees	X	X	X	<b>√</b>
90 degrees (perpendicular)	Х	Х	Х	Х
Horizontal plane	1	,	1	,
45 degrees	√ √	√ √	√ √	√ √
90 degrees (perpendicular)		٧	٧	٧
(For IRIS only) Place book/card/inlay at optimal distance.				
Set reader's application to bit rate of 106/212/424/847 kbits/s. Read data.	n.a.		n.a.	n.a.
oct reduct a application to bit rate of 100/212/424/04/ Rollofo. Redu data.	11.0.		n.u.	m.a.
106				
DG1		0.41		
DG2		7.61		
212		7.01		
DG1		0.38		
DG2		6.56		
424		0.00		
DG1		0.36		
DG2		6.02		
847		0.02		
DG1		-		
DG2		_		
502				
			X (only up to	
4. Flip over book/card/inlay at optimal distance. Read data.	√	√	DG1 ok)	√
5. Place book/card/inlay at optimal distance.				
Set test application Le byte value to 00/28h. Read data (BAC)				
0	√	√	√	√
28h	√	√	√	√
6. Place book/card/inlay at optimal distance.				
Read EF.COM / EF.DG1 / EF.DG2. Record timing. Repeat with/without BAC (if supported)				
	0.801	0.36	0.359	0.581
Time taken to read and display up to DG1 (secs) with BAC				
Time taken to read and display up to DG2 (secs) with BAC	11.256	6.02	6.031	8.402