

**Transparent Reader
Test Procedure**
VERSION 4.0.0

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FIPS 201 EVALUATION PROGRAM

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1 Overview

Homeland Security Presidential Directive-12 (HSPD-12) - "*Policy for a Common Identification Standard for Federal Employees and Contractors*" directed the promulgation of a new Federal standard for a secure and reliable form of identification issued by all Federal Agencies to their employees and contractors.

In addition to derived test requirements developed to test conformance to the NIST standard, GSA has established interoperability and performance metrics to further determine product suitability. Suppliers whose products and services are deemed to be conformant with NIST standards and the GSA interoperability and performance criteria will be eligible to sell their products and services to the Federal Government.

1.1 Identification

This document provides the detailed test procedure that needs to be executed by the Lab in order to evaluate the Transparent Reader (henceforth referred to as the Product) against the subset of applicable requirements that need to be electronically tested for this category.

2 Testing Process

As previously mentioned, this document prescribes detailed test steps that need to be executed in order to test the requirements applicable for this category. Please note that conformance to the tests specified in this document will not result in the Product being compliant to the applicable requirements of FIPS 201. The Product must undergo an evaluation using all the evaluation criteria listed for that category prior to being deemed as compliant. Only products and services that have successfully completed the entire Approval Process will be designated as conformant to the Standard. To this effect, this document only provides details for the evaluation using the Lab Test Data Report approval mechanism.

A Lab Engineer follows the steps outlined below in order to test those requirements that have been identified to be electronically tested. The end result is a compilation of the observed behavior of the Product in the Lab Test Data Report.

For this category, there are two potential Laboratory evaluation paths. If PIV Card Reader submitted for evaluation has a Wiegand™ or USB interface, then it will be evaluated as described in section 3.2.

If PIV Card Reader submitted for evaluation uses any other Reader-to-Host interface, the manufacturer will be required to provide all required documentation specified by corresponding approval and test procedures, as well as demonstrate in the Lab, the product's ability to meet the Laboratory requirements described in section 3.1 of this document. The PIV Card Reader System must print a test report which shall be used by the Lab as test data, and incorporated in the application package.

Section 3 provides the test procedures that need to be executed for evaluating the Product as conformant to the requirements of FIPS 201.

3 Test Procedure for Transparent Reader

3.1 Requirements

The following table provides a reference to the requirements that need to be electronically tested within the Lab as outlined in the Approval Procedures document for the Product. Product under evaluation is only required to meet requirements for interfaces it incorporates. The different test cases that are used to check compliance to the requirements is also cross-referenced in the table below.

| Identifier # | Interface | Requirement Description | Source | Test Case # |
|--------------|------------------------|--|--|---------------|
| R-TRE-C.3 | Contact | PIV readers shall support the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002. | Card /Card Reader Interoperability Requirements, Section 2.2.2.2 | R-TRE-C-TP.1 |
| R-TRE-C.4 | Contact | The contact interface of the reader shall support both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997. | Card /Card Reader Interoperability Requirements, Section 2.2.2.3 | R-TRE-C-TP.2 |
| R-TRE-C.6 | Contact Contactless | Data received from logical readers shall be the data that was written by the lab on each “Golden” test card. | Derived Test Requirement | R-TRE-C-TP.3 |
| R-TRE-CL.7 | Contactless | The contactless interface of the reader shall support both the Type A and Type B communication signal interfaces as defined in ISO/IEC 14443-2:2001. | Card /Card Reader Interoperability Requirements, Section 2.2.1.1 | R-TRE-CL-TP.4 |
| R-TRE-CL.8 | Contactless | The contactless interface of the reader shall support both Type A and Type B transmission protocols as defined in ISO/IEC 14443-4:2001. | Card /Card Reader Interoperability Requirements, Section 2.2.1.3 | R-TRE-CL-TP.4 |
| R-TRE-CL.9 | Contactless | Buffers shall not be readable through the contactless interface more than 10 cm from the reader. | Card /Card Reader Interoperability Requirements, Section 4.2.1.1 | R-TRE-CL-TP.5 |
| R-TRE-CL.13 | Contact | For evaluation purposes, the data format for contactless physical | Transparent Reader Test Procedure | R-TRE-CL-TP.6 |

| | <p>Contactless</p> | <p>readers (with Wiegand interfaces) shall consist of the two parity bits, Agency Code, System Code and Credential Code elements of the FASC-N along with the Expiration Date (YYYYMMDD) from the CHUID as defined by appendix A of NIST SP 800-73. Each element shall be individually formatted as binary numbers and combined to form a 75 bit string as shown in the figure below. Section 5 of the SIA standard defines a 26 bit format that does not meet the requirements outlined in FIPS or its supporting documents and shall not be used.</p> <table border="1" data-bbox="500 829 915 1161"> <thead> <tr> <th></th> <th>Position</th> <th>Length</th> </tr> </thead> <tbody> <tr> <td>Parity Bit P1</td> <td>1</td> <td>1</td> </tr> <tr> <td>Agency Code</td> <td>2-15</td> <td>14</td> </tr> <tr> <td>System Code</td> <td>16-29</td> <td>14</td> </tr> <tr> <td>Credential Code</td> <td>30-49</td> <td>20</td> </tr> <tr> <td>Expiration Date</td> <td>50-74</td> <td>25</td> </tr> <tr> <td>Parity Bit P2</td> <td>75</td> <td>1</td> </tr> </tbody> </table> <p>Note: The first parity bit (P1) is even and shall be calculated over the first 37 bits. The second parity bit (P2) is odd and shall be calculated over the last 36 bits.</p> | | Position | Length | Parity Bit P1 | 1 | 1 | Agency Code | 2-15 | 14 | System Code | 16-29 | 14 | Credential Code | 30-49 | 20 | Expiration Date | 50-74 | 25 | Parity Bit P2 | 75 | 1 | | |
|-----------------|--------------------|---|--|----------|--------|---------------|---|---|-------------|------|----|-------------|-------|----|-----------------|-------|----|-----------------|-------|----|---------------|----|---|--|--|
| | Position | Length | | | | | | | | | | | | | | | | | | | | | | | |
| Parity Bit P1 | 1 | 1 | | | | | | | | | | | | | | | | | | | | | | | |
| Agency Code | 2-15 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| System Code | 16-29 | 14 | | | | | | | | | | | | | | | | | | | | | | | |
| Credential Code | 30-49 | 20 | | | | | | | | | | | | | | | | | | | | | | | |
| Expiration Date | 50-74 | 25 | | | | | | | | | | | | | | | | | | | | | | | |
| Parity Bit P2 | 75 | 1 | | | | | | | | | | | | | | | | | | | | | | | |

Table 1 - Applicable Requirements

3.2 Test Components

Table 2 provides the details of all the components required by the Lab to execute this test procedure. Based on the different test cases, different components may be required to execute the test case.

| # | Component | Component Details | Identifier |
|----|--|---|------------|
| 1 | The Card Reader Test Fixture | - | CRTF |
| 2 | Contact PIV Card Reader under test (Contact/Contactless/Dual Interface) | - | PROD |
| 3 | A PIV Card that supports the Contact Class A operating Class only | PIV EP v. 108 Java Card Applet on Oberthur ID-One Cosmo 64 v5 Smart Card | PCARD-CLA |
| 4 | A PIV Card that supports the Contact T=0 transmission protocol only | PIV EP v. 108 Java Card Applet on Oberthur ID-One Cosmo 64 v5 Smart Card | PCARD-T0 |
| 5 | A PIV Card that supports the Contact T=1 transmission protocol only | SafesITe FIPS 201 applet on Gemalto GemCombi'Xpresso R4 E72 K Card | PCARD-T1 |
| 6 | A PIV Card that supports the Contactless Type-A communication protocol only. | SafesITe FIPS 201 applet on Gemalto GemCombi'Xpresso R4 E72 K Card | PCARD-TA |
| 7 | A PIV Card that supports the Contactless Type-B communication protocol only. | Keycorp card with StepNexus PIV-II v.4.2.1 applet | PCARD-TB |
| 8 | Data Populator Tool | For randomly generating and loading card container components onto test golden cards. | DPT |
| 9 | PIV Component Interoperability Test Fixture | Software which runs the desired test for each product which is electronically tested. | TFS |
| 10 | Metric Ruler | A metric ruler which is at least 20 cm in length. | RULER |

Table 2 - Test Procedure: Components

3.3 Test Cases

This section discusses the various test cases that are needed to test logical and physical Transparent PIV Card readers. Suppliers submitting Products that do not have USB or Wiegand interfaces are required to demonstrate in the Lab that the product meets the same requirements mentioned in Section 3.1.

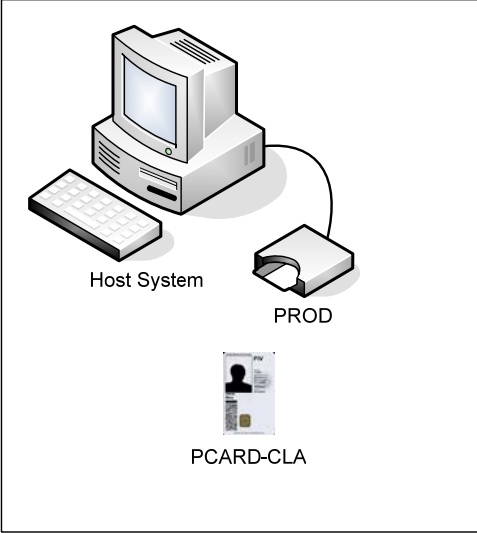
If demonstration of the Product is necessary, Suppliers will be provided with an eight foot (8') table and four (4) 120 volt AC outlets. The Supplier shall be given one (1) Lab workday to demonstrate products ability to meet the said requirements. Upon completion, Supplier is required to print the results of testing for each requirement, which will be incorporated into the Lab Test Data Report.

3.3.1 Test Case R-TRE-C-TP.1

3.3.1.1 Purpose

The purpose of this test is to verify that the PIV reader supports the Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002.

3.3.1.2 Test Setup

| | |
|--------------------------------|--|
| Equipment : | The following components are necessary for executing this test case: <ul style="list-style-type: none"> ▪ CRTF ▪ PCARD-CLA ▪ PROD |
| Configuration Diagram : | <div style="text-align: center;">  <p>The diagram shows a desktop computer system labeled 'Host System' connected to a small peripheral device labeled 'PROD'. Below the PROD device is a PIV card labeled 'PCARD-CLA'.</p> </div> <p style="text-align: center;">Figure 1 - Configuration Diagram for Test Case R-TRE-C-TP.1</p> |
| Preparation | <ul style="list-style-type: none"> ▪ Install the drivers for the PROD in accordance with the manufacturer provided documentation. ▪ Connect the PROD into the appropriate port on the Host System. ▪ Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the device manager of the host system. |

3.3.1.3 Test Process

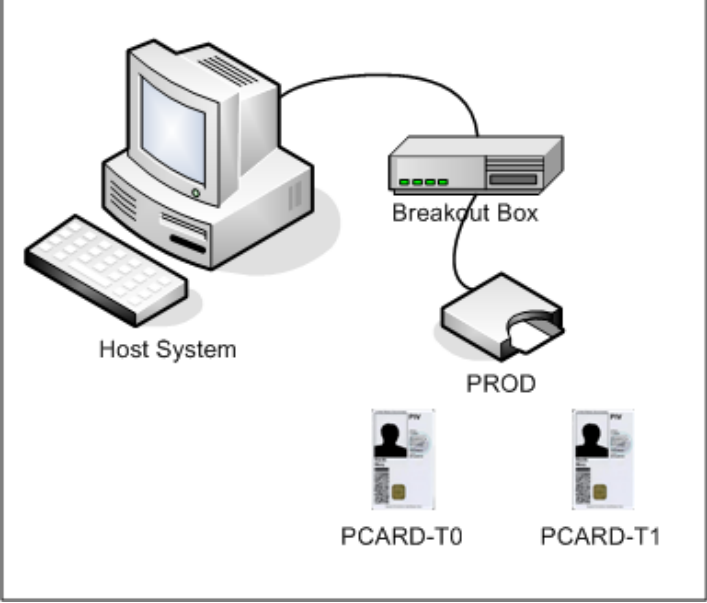
| | |
|----------------------------|--|
| Test Steps: | <ol style="list-style-type: none"> 1. Execute the Test Application on the CRTF. 2. Make sure that the details of PCARD-CLA are entered into the Test Application by clicking File → Edit Reference Contact Card Implementation Info. Ensure that the Class A Compliant box is checked. When finished, click SAVE. 3. Select the “Transparent Reader (Contact)”. This selects the test for the Transparent Reader in the test application 4. Fill in all the Transparent Reader Product Information as required in the screen. 5. Select the Test Case radio button corresponding to R-TRE-C-TP.1 6. Insert PCARD-CLA into PROD. 7. Click on the “Execute Selected Test” button. Follow the steps on the screen. 8. Verify that the test was completed by reviewing the result on the screen. |
| Expected Result(s): | <ol style="list-style-type: none"> 1. The test completes successfully showing that the Product supports Class A operating class as defined in ISO/IEC 7816-3:1997 and ISO/IEC 7816-3:1997/Amd 1:2002. |

3.3.2 Test Case R-TRE-C-TP.2

3.3.2.1 Purpose

The purpose of this test is to verify that the contact interface of the reader supports both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997.

3.3.2.2 Test Setup

| | |
|---------------------------------------|---|
| <p>Equipment :</p> | <p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ CRTF ▪ PCARD-T0 ▪ PCARD-T1 ▪ PROD |
| <p>Configuration Diagram :</p> | <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 2 - Configuration Diagram for Test Case R-TRE-C-TP.2</p> <p>*Note: For evaluation of a logical contact reader, refer to the configuration diagram found in R-TRE-CL-TP.3.</p> |
| <p>Preparation</p> | <p>*Note: The preparation procedures described here are for testing physical readers. The preparation procedures for logical readers can be found in the corresponding section in R-TRE-CL-TP.3.</p> <ul style="list-style-type: none"> ▪ Connect the PROD into the appropriate port on the breakout box. ▪ Ensure that the breakout box is connected to the appropriate port on the host system. ▪ Ensure that the 12v power supply to the breakout box is connected to a power source. |

3.3.2.3 Test Process

| | |
|---------------------------|--|
| <p>Test Steps:</p> | <p>1. Ensure that the details of PCARD-T0 and PCARD-T1 are</p> |
|---------------------------|--|

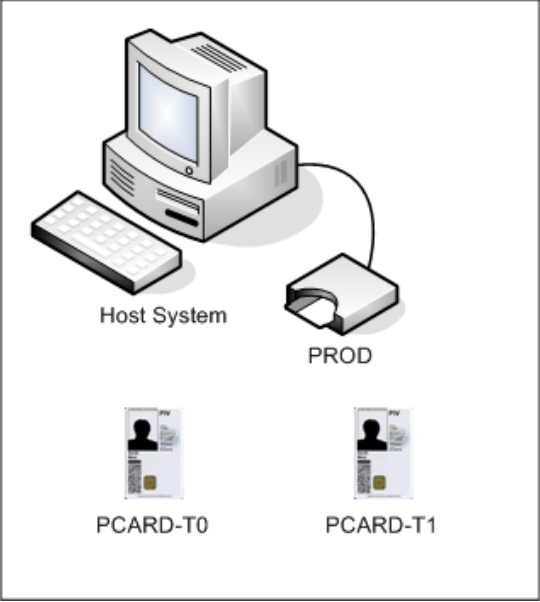
| | |
|----------------------------|---|
| | <p>entered into the Test Application under File → Edit Reference Contact Card Implementation Info. When finished, click SAVE.</p> <ol style="list-style-type: none">2. Ensure that the Transparent Reader Product Information is filled in.3. Select the Test Case radio button corresponding to R-TRE-C-TP.24. Insert PCARD-T0 into PROD.5. Click on the “Execute Selected Test” button. Follow the steps on the screen.6. When prompted, insert PCARD-T1 into PROD.7. Click the “OK” button to proceed.8. Verify that the test was completed by reviewing the result on the screen. |
| Expected Result(s): | <ol style="list-style-type: none">1. The test completes successfully showing that the Product supports both the T=0 and T=1 transmission protocols as defined in ISO/IEC 7816-3:1997. |

3.3.3 Test Case R-TRE-C-TP.3

3.3.3.1 Purpose

The purpose of this test is to verify that the data received through the USB interface of the reader is the data that was expected, and not corrupted during transmission. This test case only applies to Products with USB interfaces.

3.3.3.2 Test Setup

| | |
|--------------------------------------|--|
| <p>Equipment:</p> | <p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ CRTF ▪ PCARD-T0 ▪ PCARD-T1 ▪ PROD |
| <p>Configuration Diagram:</p> | <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 3 - Configuration Diagram for Test Case R-TRE-C-TP.3</p> <p>*Note: For evaluation of a logical contactless reader, refer to the configuration diagram found in R-TRE-CL-TP.4.</p> |
| <p>Preparation:</p> | <ul style="list-style-type: none"> ▪ Generate data for all five mandatory data containers. ▪ Enter the hexadecimal representation of the binary data into the <code>expectedValues.T=0.properties</code> and <code>expectedValues.T=1.properties</code> files for PCARD-T0 and PCARD-T1, respectively. These files are located in the same directory as the TFS executable file. <p>*Note: The data entered for <code>finger1</code> and <code>finger2</code> in the <code>expectedValues</code> file are identical.</p> |

3.3.3.3 Test Process

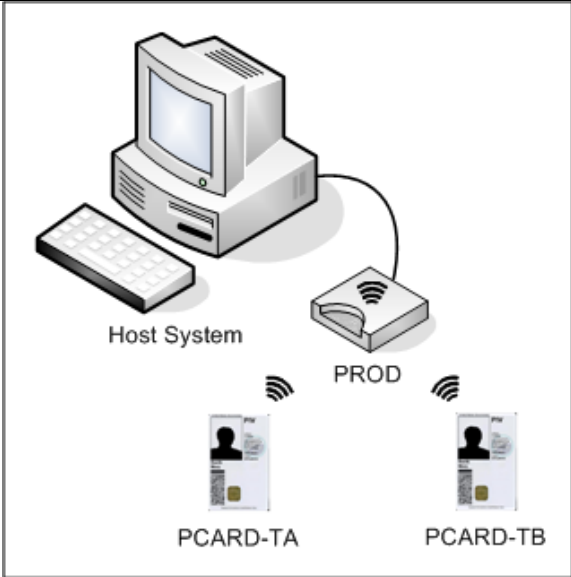
| | |
|----------------------------|--|
| Test Steps: | <ol style="list-style-type: none"> 1. Select the Test Case radio button corresponding to R-TRE-C-TP.3 2. Make sure that the details of PCARD-T0 and PCARD-T1 are entered into the Test Application by selecting File → Edit Reference Contact Card Implementation Info. When finished, click SAVE. 3. Insert PCARD-T0 into PROD. 4. Click on the “Execute Selected Test” button. Follow the steps on the screen. 5. When prompted, insert PCARD-T1 into PROD. 6. Click the “OK” button to proceed. 7. Verify that the test was completed by reviewing the result on the screen. |
| Expected Result(s): | <ol style="list-style-type: none"> 1. The test completes successfully showing that the Product has passed the data that was placed on PCARD-T0 and PCARD-T1 to CRTF. |

3.3.4 Test Case R-TRE-CL-TP.4

3.3.4.1 Purpose

The purpose of this test is to verify that the PIV Card buffers shall not be readable through the contactless interface more than 10 cm from the Product.

3.3.4.2 Test Setup

| | |
|---------------------------------------|--|
| <p>Equipment :</p> | <p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ CRTF ▪ PCARD-A or PCARD-B ▪ PROD ▪ RULER |
| <p>Configuration Diagram :</p> | <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 4 - Configuration Diagram for Test Case R-TRE-CL-TP.4</p> |
| <p>Preparation</p> | <ul style="list-style-type: none"> ▪ Install the drivers for the PROD in accordance with the manufacturer provided documentation. ▪ Connect the PROD into the appropriate port on the Host System. ▪ Verify that the PROD is correctly installed by reviewing its presence in list of hardware using the device manager of the host system. |

3.3.4.3 Test Process

| | |
|---------------------------|---|
| <p>Test Steps:</p> | <ol style="list-style-type: none"> 1. Execute the Test Application on the CRTF. 2. Make sure that the details of the PCARD-A or PCARD-B are entered into the Test Application by clicking File → Edit Reference Contactless Card Implementation Info. When finished, click SAVE. 3. Select the tab for the “Transparent Reader (Contactless)”. This selects the test for the Transparent Reader (Contactless) in the |
|---------------------------|---|

| | |
|----------------------------|---|
| | <p>Test Application.</p> <ol style="list-style-type: none"> 4. Fill in all the information as required in the screen for the testing the PROD. 5. Select the Test Case radio button corresponding to R-TRE-CL-TP.4 6. Bring the PCARD-A within 10 centimeters of the PROD. (Make sure the distance is measured with RULER) 7. Click on the “Execute Selected Test” button. Follow the steps on the screen. 8. When prompted, bring the PCARD-B within 10 centimeters of the PROD. 9. Click the “OK” button to proceed. 10. Verify that the test was completed by reviewing the result on the screen. |
| Expected Result(s): | <ol style="list-style-type: none"> 1. The test completes successfully for both PCARD-A and PCARD-B showing that the Product supports both Type A and Type B communication signal interfaces and transmission protocols as defined in ISO/IEC 14443-2:2001 and ISO/IEC 14443-4:2001, respectively. |

3.3.5 Test Case R-TRE-CL-TP.5

3.3.5.1 Purpose

The purpose of this test is to verify that the contactless interface of the reader supports both the Type A and Type B communication signal interfaces and transmission protocols as defined in ISO/IEC 14443-2:2001.

3.3.5.2 Test Setup

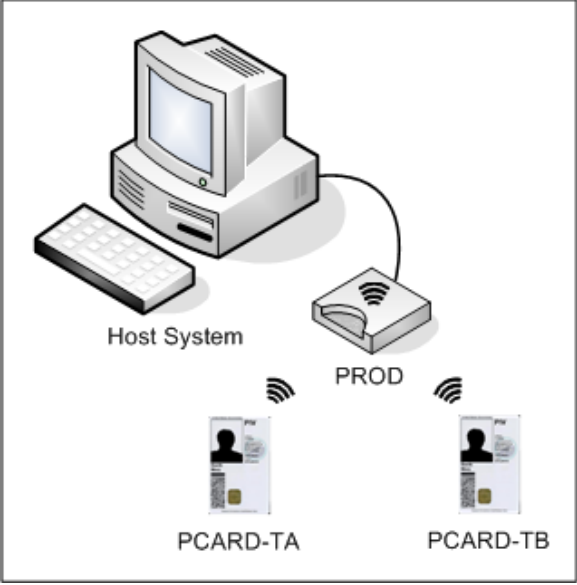
| | |
|-------------------------------|--|
| Equipment : | <p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ CRTF ▪ PCARD-A ▪ PCARD-B ▪ PROD |
| Configuration Diagram: |  <p>The diagram shows a Host System (a desktop computer with a monitor and keyboard) connected to a PROD (Proximity Reader) device. Two contactless cards, PCARD-TA and PCARD-TB, are positioned below the PROD, with wireless signal icons indicating communication between the reader and the cards.</p> |
| Preparation | <ul style="list-style-type: none"> ▪ Generate data for the CHUID data container. ▪ Enter the hexadecimal representation of the binary data into the <code>expectedValues.TypeA.properties</code> and <code>expectedValues.TypeB.properties</code> files for PCARD-A and PCARD-B, respectively. These files are located in the same directory as the TFS executable file. |

Figure 5 - Configuration Diagram for Test Case R-TRE-CL-TP.5

3.3.5.3 Test Process

| | |
|--------------------|---|
| Test Steps: | <ol style="list-style-type: none"> 1. Select the Test Case radio button corresponding to R-TRE-CL-TP.5 2. Ensure that the details of PCARD-A and PCARD-B are entered into the Test Application under File → Edit Reference Contactless Card Implementation Info. When finished, click |
|--------------------|---|

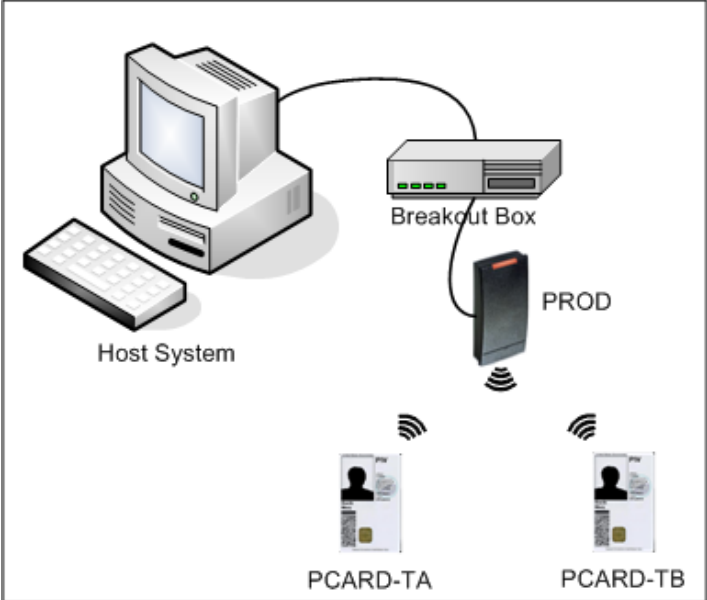
| | |
|----------------------------|---|
| | <p>SAVE.</p> <ol style="list-style-type: none">3. Click on the “Execute Selected Test” button. Follow the steps on the screen.4. Verify that the test was completed by reviewing the result on the screen. |
| Expected Result(s): | <ol style="list-style-type: none">1. The test completes successfully for showing that the Product supports both the Type A and Type B communication signal interfaces and transmission protocols. |

3.3.6 Test Case R-TRE-CL-TP.6

3.3.6.1 Purpose

The purpose of this test is to verify that the data retrieved from the PIV Card has been properly parsed into the proper data elements. This test case applies to readers with a Wiegand interface to the host system.

3.3.6.2 Test Setup

| | |
|--------------------------------------|--|
| <p>Equipment :</p> | <p>The following components are necessary for executing this test case:</p> <ul style="list-style-type: none"> ▪ CRTF ▪ PCARD-A or PCARD-B ▪ PROD |
| <p>Configuration Diagram:</p> | <div style="text-align: center;">  </div> <p style="text-align: center;">Figure 6 - Configuration Diagram for Test Case R-TRE-CL-TP.6</p> |
| <p>Preparation</p> | <ul style="list-style-type: none"> ▪ Connect the PROD into the appropriate port on the breakout box. ▪ Ensure that the breakout box is connected to the appropriate port on the host system. ▪ Ensure that the 12v power supply to the breakout box is connected to a power source. |

3.3.6.3 Test Process

| | |
|---------------------------|---|
| <p>Test Steps:</p> | <ol style="list-style-type: none"> 1. Select the Test Case radio button corresponding to R-TRE-CL-TP.6 2. Ensure that the details of PCARD-A and PCARD-B are entered into the Test Application by selecting File → Edit Reference Contact Card Implementation Info menu of the top of the Application window. |
|---------------------------|---|

| | |
|----------------------------|---|
| | <ol style="list-style-type: none">3. Insert PCARD-A into PROD.4. Click on the “Execute Test” button. Follow the steps on the screen.5. When prompted, insert PCARD-B into PROD.6. Click the “OK” button to proceed.7. Verify that the test was completed by reviewing the result on the screen. |
| Expected Result(s): | <ol style="list-style-type: none">1. The test completes successfully showing that the Product has passed the expected data to the host system. |