Advanced Card Systems Limited
Card and Reader Technologies

SDK User Manual

ACR122U NFC Reader

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1.0 Introduction

The ACR122 is a PC-linked Contactless Smart Card Reader/Writer developed on the 13.56MHz Contactless Technology. This device is designed to support not only MiFare and ISO14443 Type A and B Cards but also FeliCa and NFC tags.

This reader follows the CCID Standard which allows Windows Operating Systems to use the Microsoft CCID drivers. However, Advanced Card Systems Ltd (ACS) also provides WHQL drivers which can be installed in your machine. Read and write operations to contactless tags are also faster and more efficient since the device makes use of a high-speed card access and a full USB speed of 12 Mbps.

The ACR122 NFC Reader SDK provides the user sample applications, sample codes, and tools and utilities that can be used to experience the features and capabilities of the ACR122. This manual gives the summary on how to install the SDK and what can be found in the SDK.

Together with its compact size, trendy design, and various features, the ACR122 offers users a different experience of convenience by using it for applications such as payment, mass transit, physical access control, time attendance, etc.

1.1 Typical Applications

- Network access control
- Micro-payment
- NFC mobile tag
- Public Transportation Terminals
- Automatic Fare Collection
- Physical access control
- Customer Loyalty
- Time attendance
- Contactless public phones
- Vending machines

This device complies with part 15 of the FCC Rules. Operation is subject to the following condition: May not cause harmful interference, and this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

2.0 Installation Guide

2.1 Requirements

If you have installed previous version of ACR122U NFC Reader SDK, then you must uninstall these version via Add/Remove Programs in Control Panel before installing this SDK version. Make sure that all folders have been deleted.

For non VISTA users, you need to install the .NET Framework to be able to use the ACR122U Tool and Demo Applications. This can downloaded via:

Microsoft .NET Framework Version 2.0 (x86)

http://www.microsoft.com/downloads/details.aspx?FamilyID=0856EACB-4362-4B0D-8EDD-AAB15C5E04F5&displaylang=en

Microsoft .NET Framework Version 2.0 (x64)

http://www.microsoft.com/downloads/details.aspx?familyid=B44A0000-ACF8-4FA1-AFFB-40E78D788B00&displaylang=en

Note: To be able to use the P2P demo, you need to have two ACR122 Devices and you may purchase a second ACR122 separately.

2.2 Installing the Device

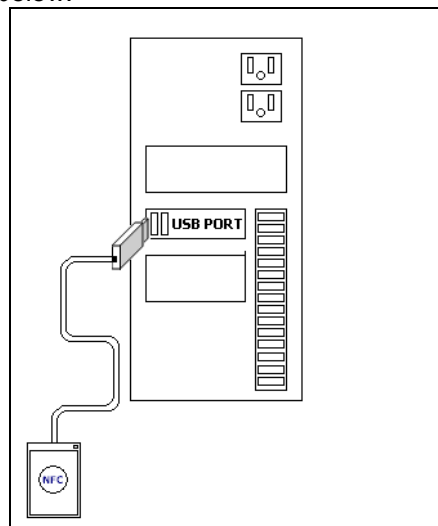Connect the device as shown below:

Figure 1 Connection Diagram

The ACR122 is a CCID compliant device. Microsoft provides these drivers for Windows 2000, XP, 2003 thru Windows Update and is already built-in on the VISTA OS. To know more about setting Automatic Updates in your PC, visit http://update.microsoft.com/microsoftupdate/

Check the device manager if the reader is detected by the computer.

You can also use the ACS CCID Drivers if you do not have access to the internet.

2.2.1 Installing ACS CCID Drivers

1. Click on **"Install Smart Card Reader Driver".**

2. When you see the **"ACS Smart Card Reader Driver Installation Wizard"** window, click on **"Install."**

To check the driver version or read installation tips, click on the note icon (located at the left of the buttons) to view **Readme File**.

3. When prompted whether you want to install the drivers, click **"Yes"**.

4. Please wait while the ACS Driver Installation Wizard prepares the installation.

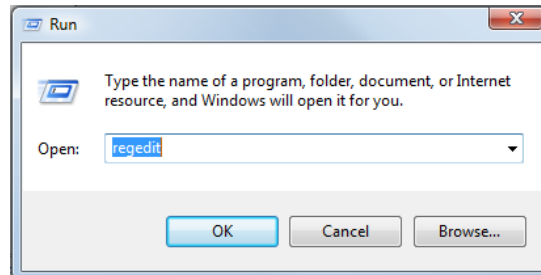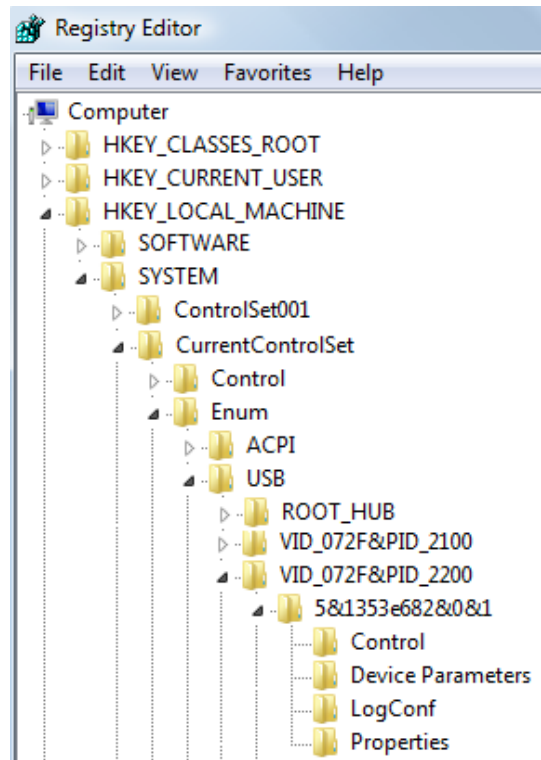5. Please plug in the reader. When done, click on **"Finish"** to exit program.

2.2.2 Enabling PCSC Escape Command

1. To use the product, you need to enable the PCSC Escape Command. This can be done by modifying the Registry Settings of the Device after it has been successful installed.
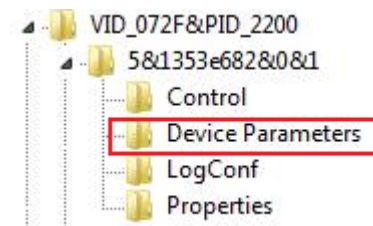
Run "RegEdit" in the "Run Command Menu" of Windows

2. Add a DWORD "EscapeCommandEnable" under HKey_Local_Machine\SYSTEM\Current ControlSet\Enum\USB\Vid_072F&Pid_2 200\Device Parameters
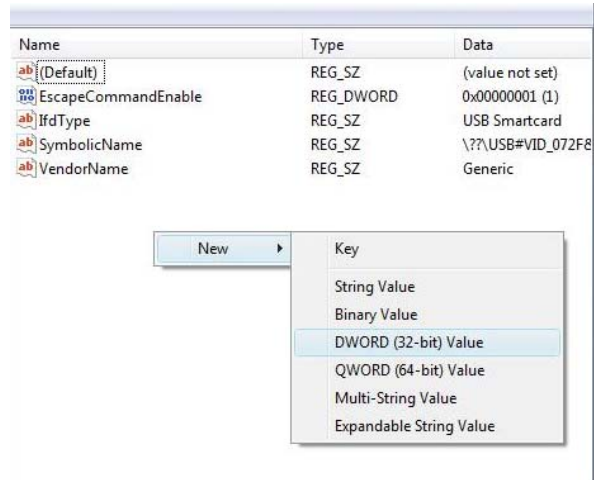
3. Look for: VID_072F&PID_2200 Then expand the node. This will list the USB port where you have plugged the reader. Choose one port. Look under Device parameters
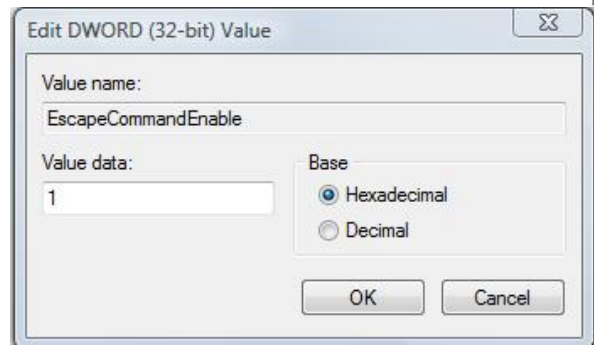
4. Create a DWORD entry (32-bit) with the name:
EscapeCommandEnable

Name	Type	Data
ab (Default)	REG_SZ	(value not set)
EscapeCommandEnable	REG_DWORD	0x00000001 (1)
ab IfdType	REG_SZ	USB Smartcard
ab SymbolicName	REG_SZ	\??\USB#VID_072F8
ab VendorName	REG_SZ	Generic

New ▶
Key
String Value
Binary Value
DWORD (32-bit) Value
QWORD (64-bit) Value
Multi-String Value
Expandable String Value

5. To Modify the value of the EscapeCommandEnable, double click on the entry and input 1 in the Value data with the base set in Hexadecimal

Edit DWORD (32-bit) Value

Value name:
EscapeCommandEnable

Value data:
1

Base
◉ Hexadecimal
◯ Decimal

OK   Cancel

Note: Repeat the above steps (including the PCSC Enable Command for the other ACR122 Devices connected in other USB ports.

2.3 Installation of SDK Components

1. You can click on the Getting Started Option to check the procedure on how to install the ACR122 SDK components.
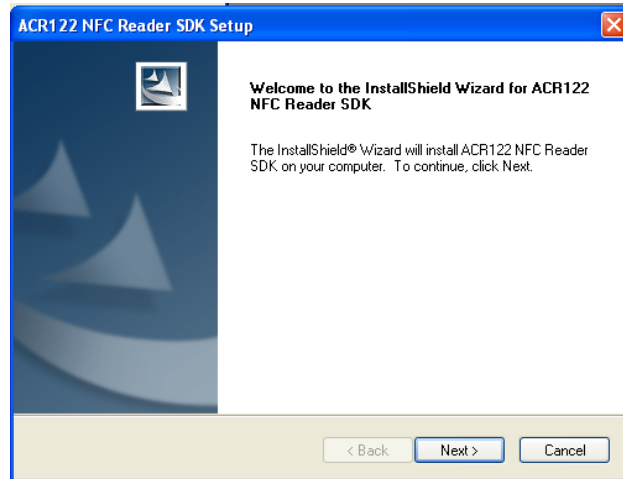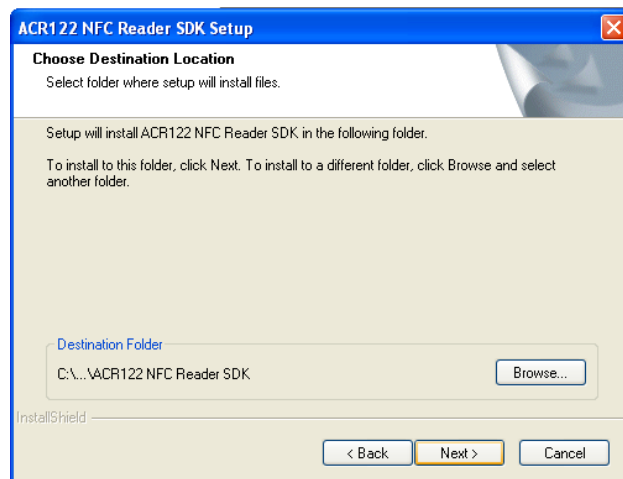
2. Click on the Install SDK components.

3. Click on Next

4. You can choose the destination where you want to save the SDK or you can leave it as is for it to save on its default location.
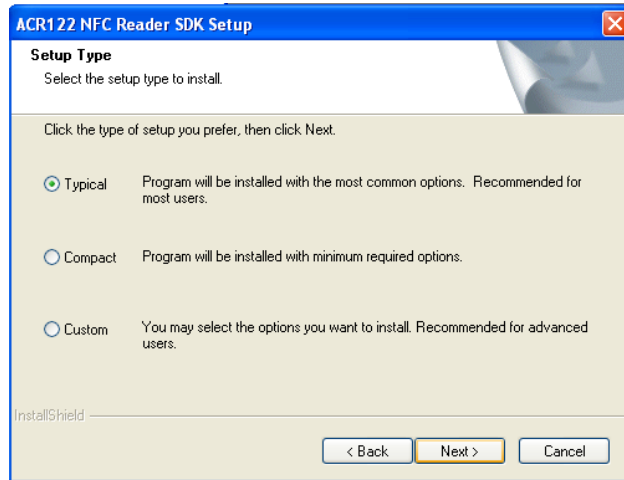
x:\Program Files\Advanced Card Systems Ltd\ACR122 NFC Reader SDK where x is the drive letter of your local Windows Drive.
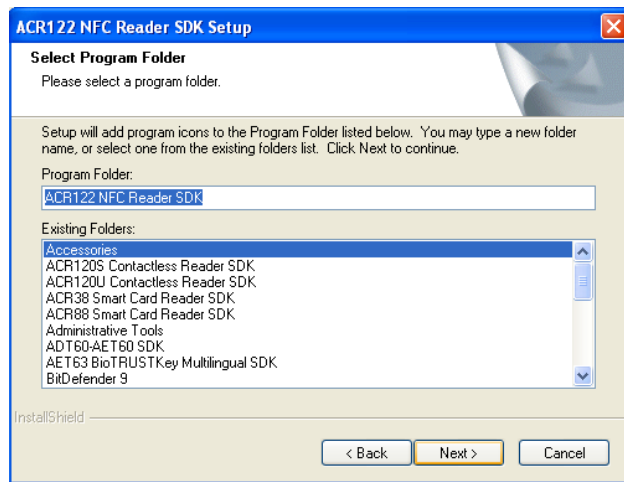
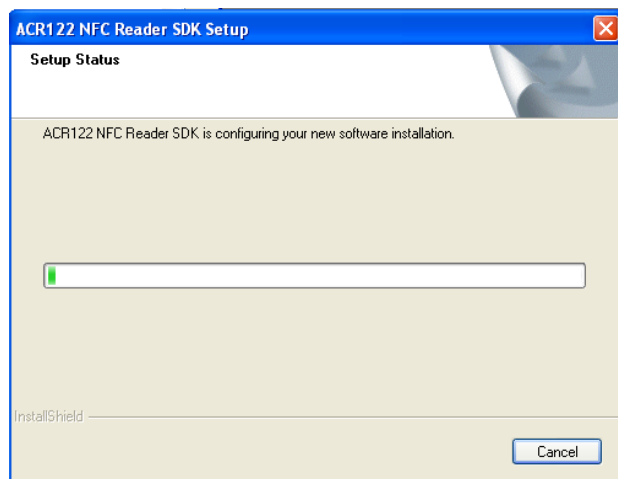Click on Next.

5. Choose Typical Install. Click on Next.

6. You can change the folder name or leave the default name as is.
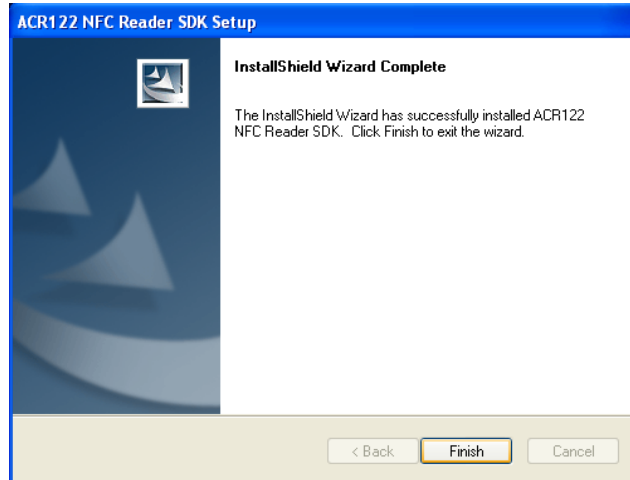
Click on next.

7. Wait for the Set up to be completed.

8. Once completed, click on Finish
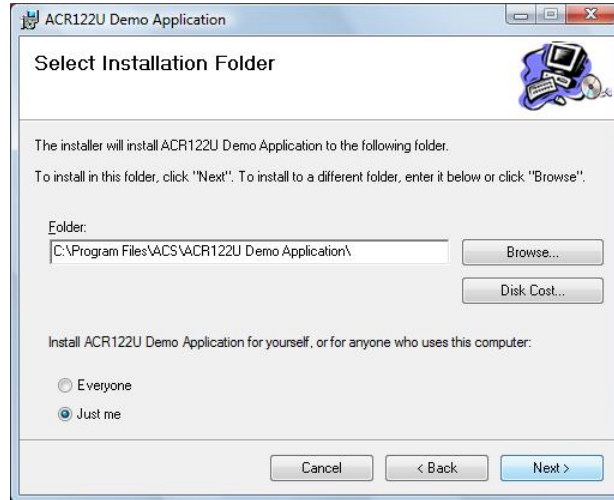

9. Click on Install Demo Application
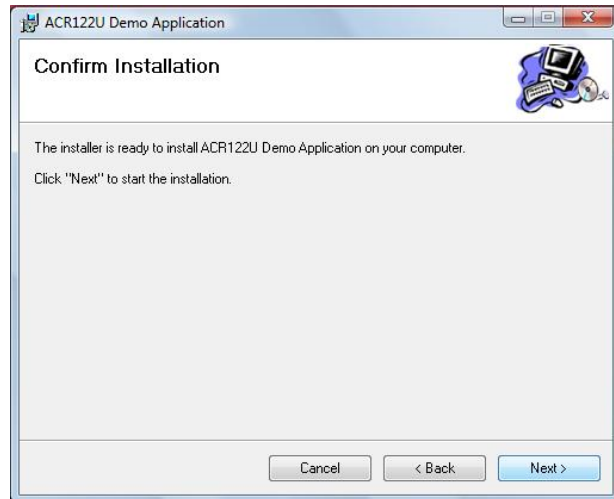

10. Click on Next.

11. You can choose to leave the default installation path or specify the folder where you want to install the Demo Application.
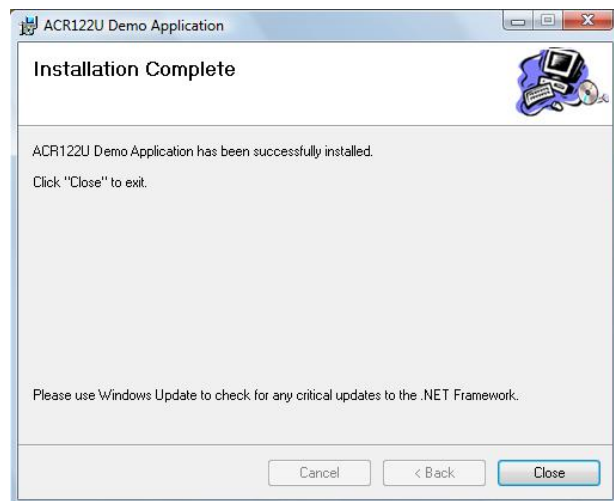
Click on Next.

12. Click on Next to confirm installation.

13. Click on Close once Installation is complete

14. If you have not installed Adobe Acrobat in your workstation, click on this option. You need this to view the manuals and other reference materials.

15. Click on this option to exit the application.

3.0 SDK Components

3.1 Multi-Application Demo

3.1.1 Visitor Management System

This application simulates a Visitor Management System which can be used for tradeshows and other registration systems. The application is divided into two modules namely the Registration and Exhibitor Module. Since the ACR122 supports ISO 18092 tags and ISO 14443 tags, you can choose from a wide variety of contactless cards for your application. However, for this specific application, a Mifare 1K card will be used.
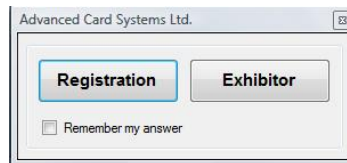

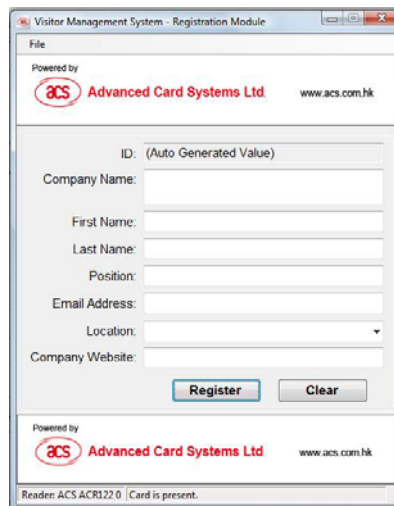Figure 2 Visitor Management System Main

Figure 3 Registration Module

Figure 4 Exhibitor Module

3.1.2 NFC P2P Demo

This demonstration application simulates a Smart Poster/NFC Device setting. The application shows that conventional functions such as gathering information from a Smart Poster and purchasing Cinema tickets can be done by tapping into the poster. This application highlights the NFC Peer to Peer capabilities of the ACR122 NFC Reader.
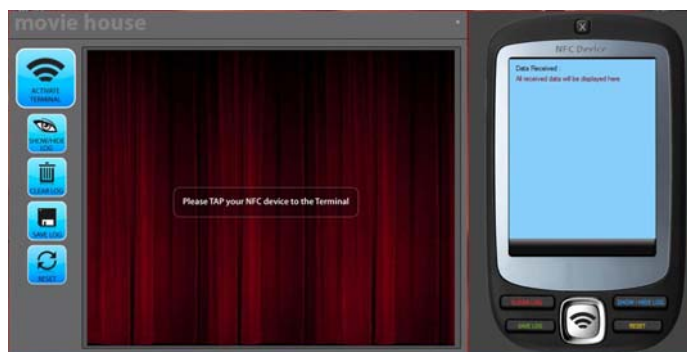

Figure 5 ACR122U Smart Poster Demo

Figure 6 ACR122U Cinema Entrance Demo

3.2 Sample Codes

Sample codes written in different programming languages are provided
- JAVA
- Delphi 7
- Visual Basic 6
- Visual C++ 6
- Visual C++ 2005 (x64)
- Visual C # 2005
- Visual Basic .Net 2005.

The sample codes show the different capabilities of the ACR122 and showcases how to control the ACR122 Peripherals and how to communicate to a contactless tag.

3.3 Tools and Utilities

3.3.1 ACR122U NFC Reader Tool

The ACR122U Tool is an application utility tool that enables the user to perform reader and card related commands. This tool is compatible with the ACR122U PCSC version and supports a variety of cards and can properly detect ISO 14443 and ISO 18092 cards. Moreover, this tool also allows the user to perform a simple peer to peer communication between two ACR122U devices, showing the NFC capabilities of the device.
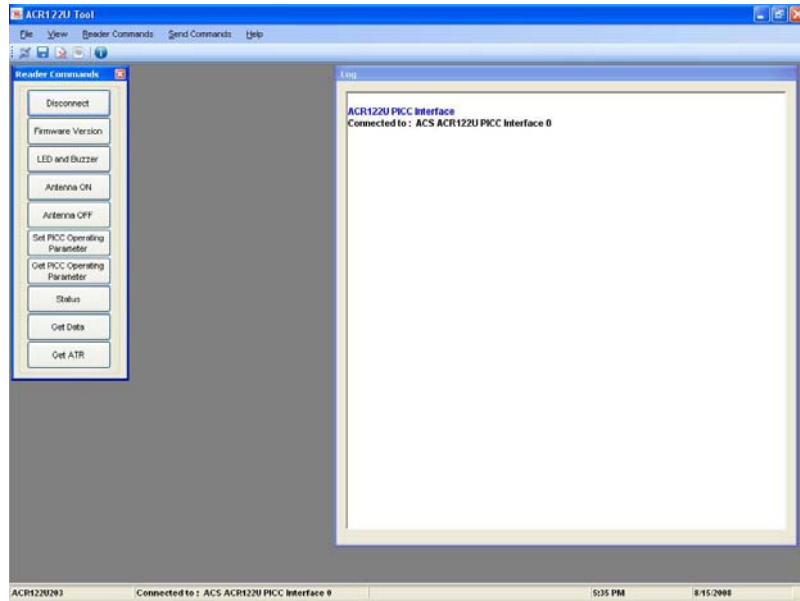

Figure 7 ACR122U Tool

3.3.2 ACS Easy Key

ACS Easy Key is a utility program for changing MiFare security settings. Please refer to the MiFare Card Reference Manual to be able to efficiently utilize the ACS Easy Key.
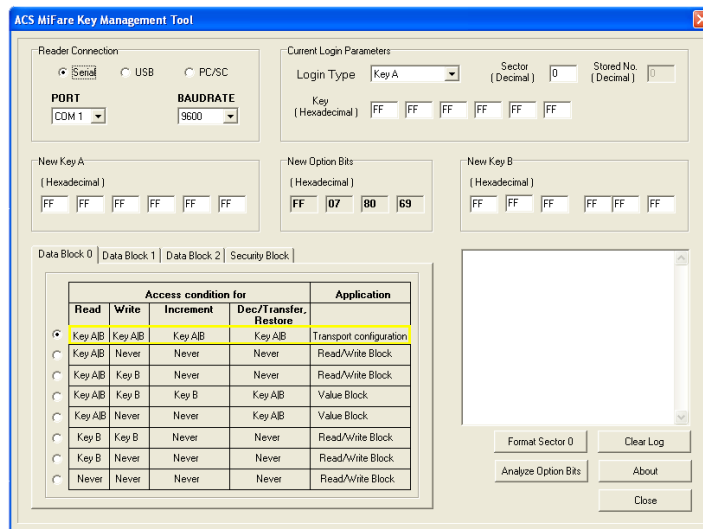

Figure 8 ACS Easy Key

3.3.1 ACR122U PCSC Scripting Tool

The ACR122U PCSC Scripting tool is a demonstration application that gives the user the capability to use scripts for the ACR122 for establishing communication with contactless tags.
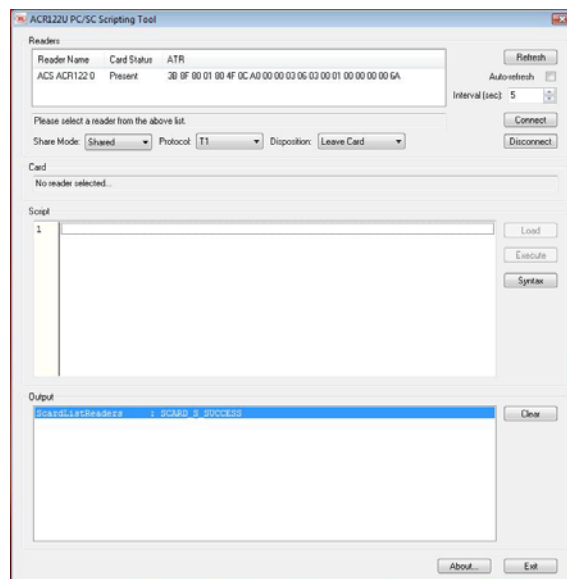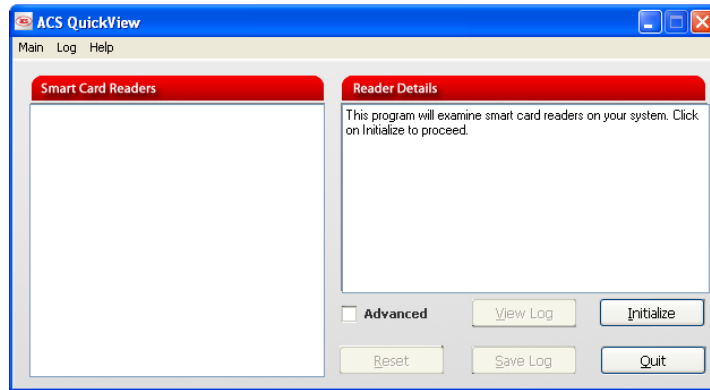

Figure 9 ACR122U PCSC Scripting Tool

3.3.4 ACS Quick View

The ACS Quick View is a utility program that checks if the user has properly installed the ACR122 device. For a detailed explanation on how to use the tool, you may check the Help Menu within the program.

3.4 List of User Manuals and Reference Materials

- ACR122U NFC Reader SDK User Manual
- ACR122U NFC Reader API
- ACR122U NFC Reader Technical Specification
- ACR122U NFC Reader Multi-Application Demo Manual
- ACR122U NFC Reader Visitor Management System Manual
- Mifare Card Specification (1K)
- Mifare Card Specification (4K)
- Mifare Card Specification (Ultralight)
- Topaz Card Specification

To know more about the PCSC standard, you can click this link to download the files: PCSC Specifications