



# **Universal Demo QuickStart Guide**

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## Introduction

ID TECH makes available to customers, free of charge, a Software Development Kit, called the Universal SDK, that can be used to develop payment applications around various ID TECH products (see list further below). The Universal SDK (available from the Product pages on the company's [Knowledge Base](#)) offers developers a unified API for communicating with applicable ID TECH devices and enables the rapid development of applications written in a high-level language (C# on Windows, Java on Android, and/or Objective C or Swift for iOS). By using the Universal SDK, a developer can leverage built-in connectivity modules (avoiding any need to write USB or serial I/O routines) and take advantage of convenience classes that aid in data-parsing, event handling, transaction flow, error detection, and so forth. Since the same APIs are used across multiple products, code written for one ID TECH device can often be used with other ID TECH devices as well, greatly reducing the time spent writing one-off code to support individual devices.

The Universal SDK comes with sample code showing how to use the SDK to conduct MSR, contact EMV, and contactless transactions. One of the apps that ships with the SDK is the so-called Universal Demo app, the latest version of which can be downloaded separately from the SDK itself by going to the ID TECH public Knowledge Base at <https://atlassian.idtechproducts.com/confluence/display/KB/uDemo+-+downloads>. The Windows-based Universal Demo app is the subject of this document.

The Universal Demo (also called U-Demo) offers a quick, easy way to establish communication with an ID TECH card reader, query its firmware version (and key status), send low-level commands, initiate transactions, and so on. Using the U-Demo's graphical user interface, you can quickly run various Universal SDK commands in point-and-click manner, then see detailed Log messages that permit you to understand the kinds of messages that are sent back and forth to/from the card reader. Familiarity with the U-Demo is important not only in learning how to work with ID TECH hardware but in dealing with various types of support issues. For example, if you have an issue requiring technical support, ID TECH's Tech Support department may ask you to run the Get Firmware command, or other commands, to aid in troubleshooting a problem.

ID TECH recommends that all customers become familiar with the U-Demo program. The purpose of this document is to get you up to speed quickly in using this important utility.

## How to Obtain the Universal Demo App

You can always find the latest version of the U-Demo application at <https://atlassian.idtechproducts.com/confluence/display/KB/uDemo+-+downloads>. The app is free for download and does not require that you download the entire SDK. No registration is required. It is currently supported only on Windows.

To obtain the Universal SDK for a particular product (with source code for platform-specific demo apps, for Windows, Android, or iOS), check the Product page for the product in question, as listed in the [Knowledge Base](#).

## Applicable Products

The Universal Demo app currently supports the following devices, using USB connectivity:

- Augusta (and Augusta S)
- CM100
- Kiosk III
- L100 PIN Pad
- MiniSmart II
- Pisces
- Spectrum Pro
- UniPay
- UniPay 1.5
- UniPay III
- Vend III
- Vendi
- VP4880 family

The U-Demo app also supports RS-232 communication with the following products:

- BT Mag
- Kiosk III
- L100
- MiniSmart II
- Pisces
- Spectrum Pro
- Vend III
- Vendi

These lists can and will change as more products become supported. Refer to the download URL given above for the latest version of the app.

This document assumes you are running version 1.1.97.0 (or later) of the demo.

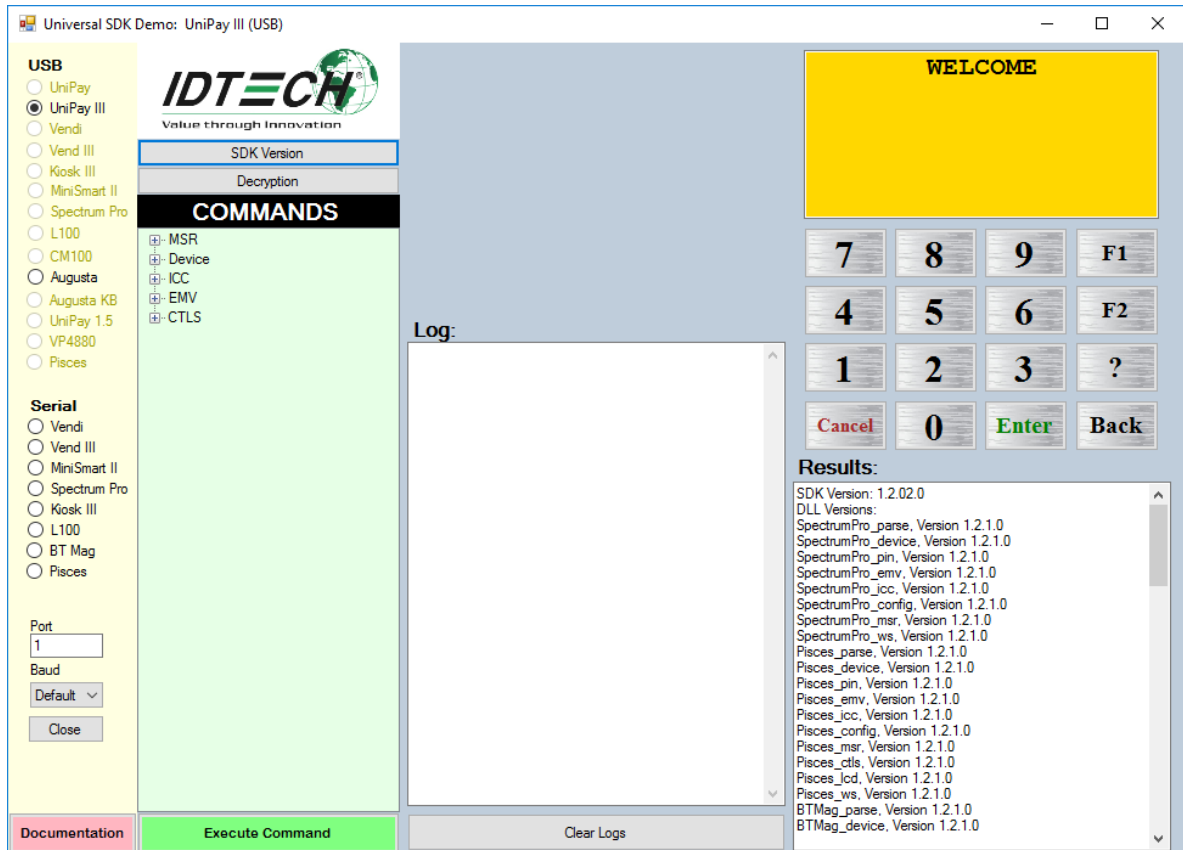
## Installation

The U-Demo comes with a Window installer. Please note that you must uninstall any previous versions of the app before installing a newer version. (Go to "Uninstall a program" in the Windows Control Panel if you need to uninstall an earlier version.) The program requires approximately 13 megabytes of disk space. You may have to dismiss anti-malware warnings in order to complete the installation process but should not have to reboot your computer.

## Launching the Program

If a shortcut is not available, look for the file named *UniversalSDKDemo.exe* in the *USDK\_Setup* folder under (for example) *C:\Program Files (x86)\IDTech\*. Double-click that file to launch the program.

After a few seconds, you should see a graphical user interface that looks something like the accompanying screenshot.



## Connecting a Device

U-Demo supports hot-swapping and will auto-detect any compatible device a few seconds after the device is plugged in. Allow several seconds for the device to appear in the USB or Serial list (with radio buttons) on the left side of the main UI window, as shown above.

NOTE: If you are connecting a USB device for the first time, it's possible Windows may pause to look for a driver for the device. This may cause a delay of up to a minute before the device registers as "connected" on the UI. In most instances, special drivers for ID TECH devices aren't necessary. No user action of any kind is needed; simply wait for the device to show up.

If you are using a serial (RS-232) device, you may need to change the Port number (shown in the text control in the lower left area of the window) or select a Baud Rate different than the default.

When a device connects, you should see a message in the Results pane similar to:

SDK Default Device = UniPay III (USB)

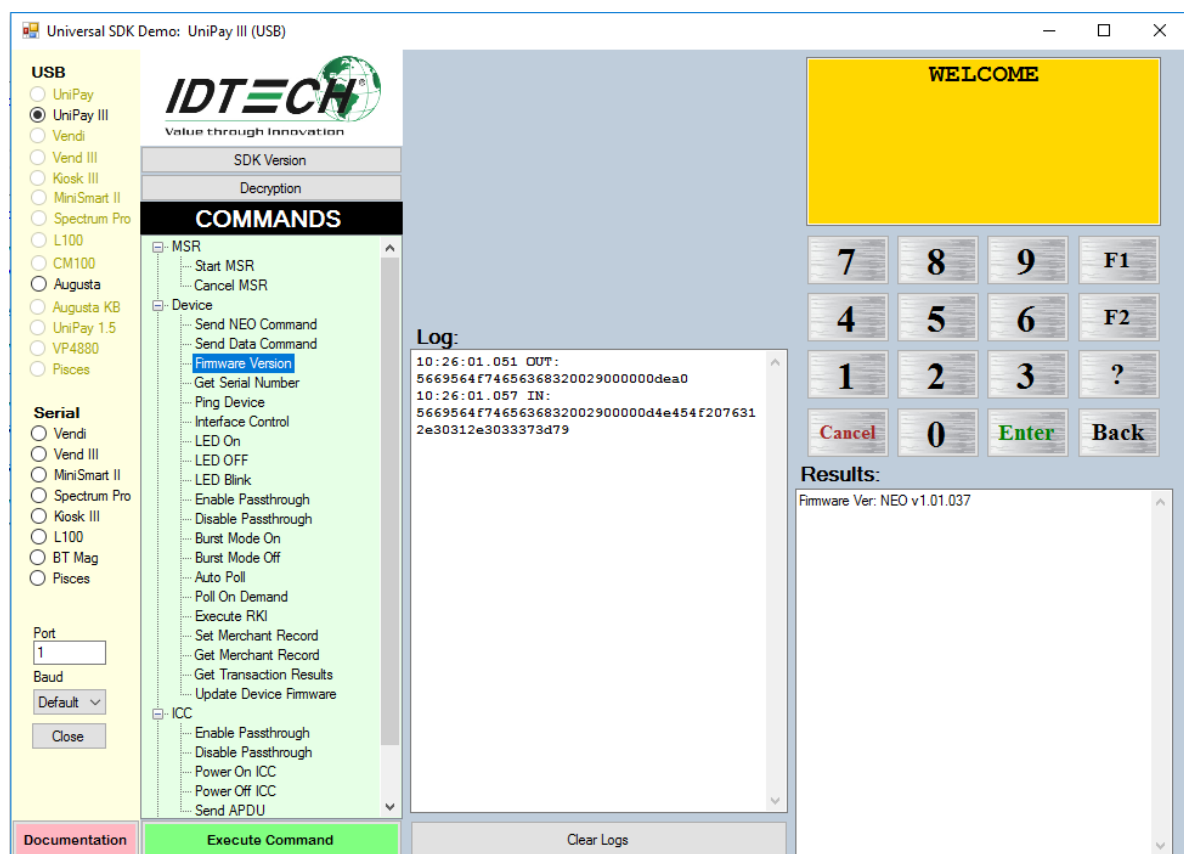
Connected UniPay III (USB)

The name of the particular device you've connected should appear.

If the device *doesn't* connect, unplug it and plug it back in. Failing that, re-launch the U-Demo app. Check the Windows Device Manager (or Devices and Printers) to be sure the device is listed. Note that USB devices obtain power from the USB-A connector; no additional power source is needed. Serial devices, however, need their own power supply. Be sure the appropriate power supply is connected, if you are using a serial device. (Obtain the correct cable from ID TECH.)

## Main Window Overview

Refer to the screenshot below.



## Principal Sections

The main U-Demo window is divided into several main sections, described below.

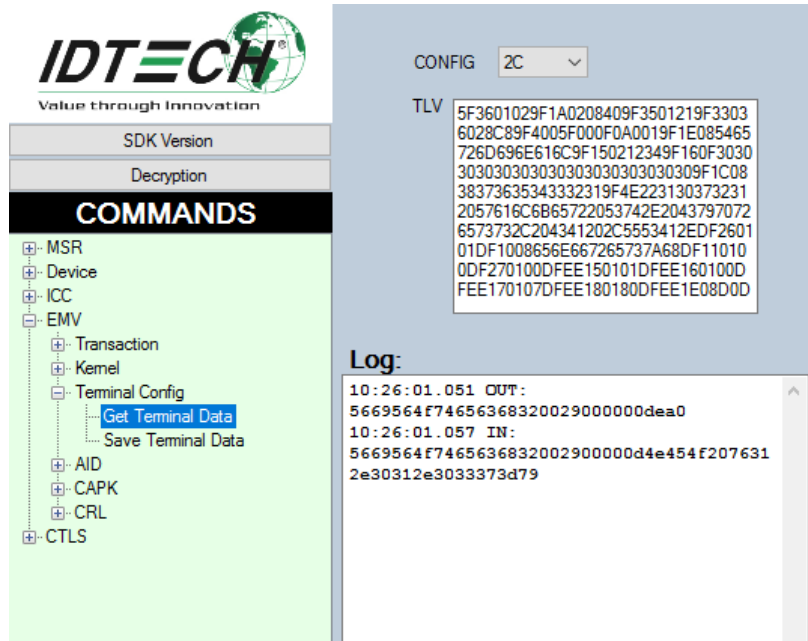
- The connectivity strip (along the left edge of the window) shows connection info, including the type of device to which the program is connected.

- The COMMANDS pane contains a tree view of available commands. The tree-based lists in this control update dynamically according to the type of device connected; not all commands are the same for all devices. (For example, the CTLS tree node is available only for devices that support Contactless transactions, such as UniPay III, Pisces, and Vendi. It will not appear for other connected devices.) When a device is connected, you can send it any command listed in the tree view by double-clicking the appropriate command name.
- At the bottom of the COMMANDS list is a pushbutton called **Execute Commands**. You can execute any command listed in the command tree by first highlighting (single-clicking) the command name, then clicking the Execute Commands button. (Alternatively, you can double-click a command name in the tree to execute it.)
- At the very top of the COMMANDS pane are two pushbuttons:
  - The **SDK Version** button. When clicked, this button will cause detailed version info (applicable to the SDK itself) to appear in the Results pane.
  - The **Decryption** button. When clicked, this button will cause a dialog to appear, within which you can insert data values that will allow the U-Demo app to derive DUKPT keys and decrypt transaction data.
- In the center area, a Log pane shows log messages representing message traffic going from the U-Demo app to the card reader (OUT), and messages from the card reader to the U-Demo app (IN).
- At the bottom of the Log pane is a button labeled **Clear Logs**. This button can be clicked at any time to erase Log and Results messages.
- In the upper right is a PIN Pad emulation, with simulated LCD window (for showing EMV "LCD messages") and simulated brushed-steel keypad buttons.
- Below the PIN Pad is a Results pane, for notifications that go beyond the raw message data of the Log pane. Here, you'll see status messages, error codes, track data, TLVs, etc.

### Context-Sensitive Area

The area immediately above the Log pane is context-sensitive. It will sometimes be greyed out, and sometimes will contain text areas and/or other control elements relevant to the particular command you've highlighted (selected) in the Commands tree. For example, if you open the EMV command node (exposing the list of EMV-related commands) and choose the command labeled Get Terminal Data, you will see the area above the Log pane populate with extra controls labeled CONFIG and TLV:





In general, any context-sensitive controls that appear in this special area will allow you to change (or specify) parameters to the command in question.

## Common Commands

### Get Serial Number

This command exists under the Config node of the command tree. Run it (by double-clicking, or by single-clicking and using the Execute Command pushbutton) to see the device's serial number in the Results pane.

### Get Firmware Version

If you contact ID TECH for a support issue, it's likely that Tech Support will ask you for your device's firmware version. You can obtain this by running the Firmware Version command, located under the Device node of the Commands tree. Simply open the Device node (by single-clicking the + symbol next to Device), and double-click the Firmware Version command. Then check the message in the Results pane.

If the firmware version is shown in X.YY format (e.g. 1.00), and you want the extended version number (X.YY.ZZZ, e.g. 1.00.037) instead, you will need to run the appropriate low-level (firmware) command using Send Data Command. See discussion below.

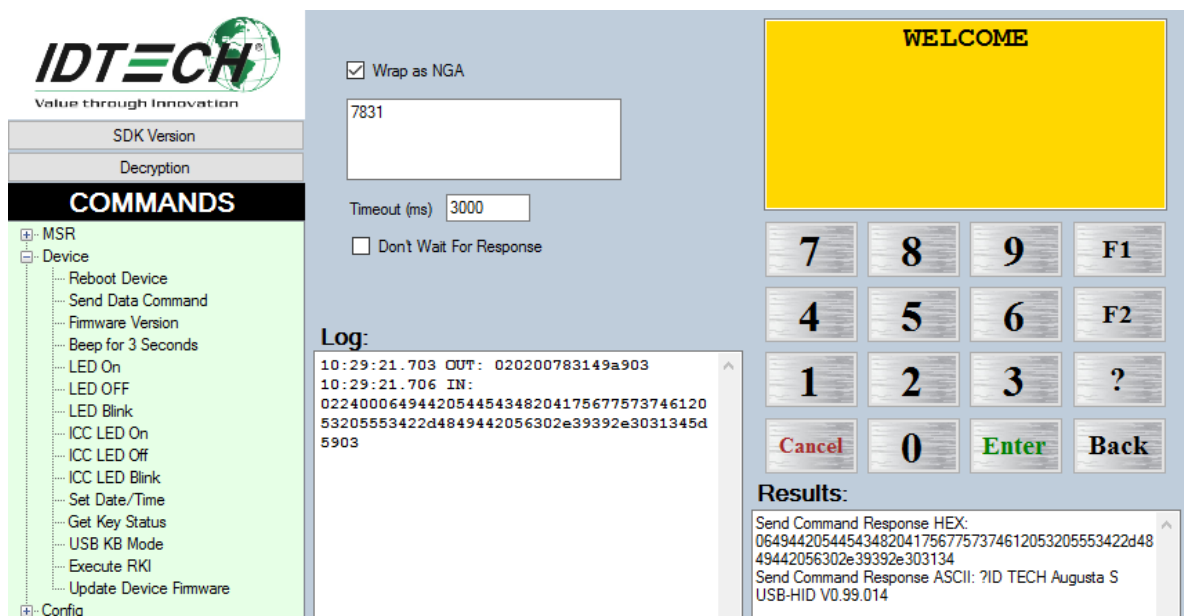
### Send Data Command

One of the most important context-sensitive commands is Send Data Command, listed under the Device node of the Commands tree.

This command allows you to send to the target device any raw firmware command that the device supports. (Consult the integrator's guide for the device in question to see available

commands.) This affords a way to send commands to the device that aren't yet exposed in the high-level API of the Universal SDK (or that *are* exposed there, but aren't yet implemented in the GUI of the U-Demo itself).

In the accompanying screen shot, the connected device is an Augusta card reader. The Get Extended Firmware Version command for Augusta happens to be 78 31. (That's for Augusta communicating in HID mode. In USB-KB mode, the same command would be 52 31.) Notice that the command "78 31" has been entered in the text box. (Spaces don't matter.) Above the box, the **Wrap as NGA** checkbox has been checked, which tells U-Demo to create an NGA-format protocol wrapper around the command before sending it to Augusta. As a result, when Send Data Command is executed, the actual byte string that gets sent over the wire is 020200783149a903 (representing STX, then a little-endian length of 02 00, the command itself, an LRC of 0xA9, checksum of 0xA9, and finally ETX). In this example, the response from Augusta is:



022400064944205445434820417567757374612053205553422d4849442056302e39392e3031345d5903

Which contains the ASCII string "ID TECH Augusta S USB-HID V0.99.014," wrapped in an NGA protocol wrapper.

The Send Data Command provides a handy way to test any firmware command, within the U-Demo environment, without writing or compiling code.

## Get Key Status

For most ID TECH devices, this command exists under the Device node of the Commands tree. Run it to see which cryptographic keys, if any, have already been injected into the device. (Note that the mere *presence* of a key doesn't necessarily mean the device is in an encrypting mode, unless it is a SRED device. You may still have to turn encryption on. Look for a Set Encryption Control command under Device; but take note that once

encryption is enabled, it cannot be disabled.) Informative messages will appear in the Results pane.

There is no dedicated Get Key Status command for the Spectrum Pro product. For this product, use the Poll Card Reader command (under Device). This command returns six bytes of status information, with eight bit-flags per byte, including information not only on key status but PIN Pad connection status, tamper status, and more.

### Get ICC Status (ATR)

You can query a seated chip card for ATR information (Answer to Reset). The exact command may differ slightly from product to product. For example, if Augusta is connected, use the Power On ICC command (under ICC), and check the Results pane. You will see a message similar to:

```
ATR:3B6800000073C84013009000
ICC Powered On successfully
```

In Spectrum Pro, use the Get ICC Status command (under the ICC node). You will see a message similar to:

```
ICC Powered On successfully
ICC Reader Status : [ICC Powered] [Card Seated]
ICC Status : 21030000000a00000000
ATR : 3b6800000073c84013009000
```

### Get Terminal Data and Set Terminal Data

This command returns a block of TLV data corresponding to terminal settings stored in the device. These settings, and their significance, are discussed in greater detail in the article at <https://atlassian.idtechproducts.com/confluence/pages/viewpage.action?pageId=32276534>. Consult that article to learn which TLVs are considered "major" and should not be changed, versus which TLVs are considered minor and can be configured to tailor your device to the scenarios it serves.

Use the Save Terminal Data command to save TLVs (as a block) after you've made changes to various values. This is generally a onetime setup event that does not need to occur again after a unit goes into production. It is intended to be a configuration-time command only (although in practice, you can change values dynamically, if that's actually necessary).

In certain Tech Support situations, you may be asked to provide the output of the Get Terminal Data command. A complete listing of TLVs will be shown in the Results pane after you run this command.

### Save AID, List AID, and Load Default AID

The List AID command (under the EMV node) will enumerate (and display, in the Results pane) all Application Identifiers that are known to the card reader, regardless of which AIDs are actually present in a given chip card. Conversely, the U-Demo program can *load* AIDs into the reader by means of the Load Default AID command. (A hard-coded list of AIDs will be loaded. This is a potentially time-consuming command. Allow 10 seconds or

more for it to complete.) To force the loading of a particular individual AID and its associated TLV data, use the Save AID command (and supply the necessary parameter data in the context-sensitive UI).

If you are attempting to perform EMV transactions in the U-Demo, but the transactions fail with a message of " Transaction Failed: No AID or No Application Data," run the Load Default AID command, then retry the transaction. (It should finish normally. If it doesn't, you may need to load a particular AID required by the card you're using.)

### Save CAPK (and Related Commands)

Under the EMV node of the Commands tree, you will find a number of commands related to Certification Authority Public Keys (CAPKs), including Save CAPK, Remove CAPK, Remove All CAPK, Load Default CAPK, and List CAPK. Using these commands, you can load or query individual CAPKs as well as list all CAPKs (using List CAPK) or remove all CAPKs. The Universal SDK (and U-Demo) ships with over two dozen CAPKs, but you should check them to be sure none have expired. (The 7<sup>th</sup> and 8<sup>th</sup> bytes of a CAPK give the expiration date as MM and YY.)

Consult EMV Book 2 for detailed information about CAPKs.

### Send APDU

The Universal SDK provides convenience methods for exchanging APDUs with chip cards, and this functionality is exposed for certain products (such as Augusta) in the U-Demo, via the Send APDU command, located under the ICC node of the Commands tree. Note that this low-level functionality is *not* currently exposed for *every* ID TECH product.

APDU-based communication with chip cards is an advanced subject. Ordinarily, you should not need this level of access to ICCs when working with the Universal SDK, because the ID TECH EMV L2 kernel automatically handles application selection, data object list exchange, Gen AC requests, and other low-level card interactions, without programmer intervention. Before attempting APDU-level I/O with a card, check to see if what you need to do can already be done using a high-level-language routine in the regular API of the Universal SDK.

## Executing EMV Transactions with U-Demo

The U-Demo app exposes Start EMV Transaction, Authenticate EMV Transaction, and Complete EMV Transaction (as well as Cancel EMV Transaction) methods in the UI. Look under the EMV node of the Commands tree to find these commands, and be sure to read about them in the SDK documentation.

All of these commands are context-sensitive. When you select (single-click) any of the above commands, in the EMV list of commands, the context-sensitive area of the UI will change appearance. (See illustration further below.) You may optionally enable Auto-Authentication and Auto-Completion by checking the appropriate checkboxes; you can change the primary Amount of the transaction (the default is \$1.00); and you can optionally set the response code of Tag 8A (for example, you can test "unable to go online" by setting the value here to 5A 33).

Also, individual text areas allow you to specify which additional TLV tags you wish to receive after each transaction step (Start, Authenticate, or Complete). Note that any tags you specify here will override the normal set of tags returned by the respective transaction step. Also note: If you are mainly interested in receiving tags 5A (PAN) and 57 (Track 2), these tags are ordinarily provided, by default, in the data returned by the Start Transaction command. (They may not be available in later steps.) Leave Auto-Authenticate and Auto-Complete unchecked if you want to see data for tags 5A and 57 in the U-Demo. (Also note: These tags will normally contain *encrypted* data.)

To run a contact-EMV transaction in the U-Demo, first be sure your Terminal Data configuration is set as desired (see [Get Terminal Data](#) and [Set Terminal Data](#) above), and also be sure any AIDs and/or CAPKs needed for the transaction have already been loaded. Then, insert a card in the reader and execute the Start EMV Transaction command.

The screenshot shows the IDTECH U-Demo interface. On the left is a tree view under the heading 'COMMANDS'. The tree includes: MSR, Device, Config, ICC, EMV (expanded), Transaction (expanded), Start EMV Trans, Authenticate EMV Trans, Complete EMV Trans, Cancel EMV Trans, Retrieve Tags, Kernel, Terminal Config, AID, and CAPK. The 'Transaction' section is highlighted. On the right is a configuration panel for the 'Start EMV Trans' command. It includes fields for 'Amount' (1.00) and '8A' (3030). There are checkboxes for 'Auto Authenticate' (checked), 'Auto Complete' (checked), 'Force Online' (unchecked), and 'Allow Fallback' (checked). Below these are three text input fields for 'Start EMV Additional Tags', 'Authenticate EMV Additional Tags', and 'Complete EMV Additional Tags'. There are also checkboxes for 'Loop' (unchecked) and 'No Host' (unchecked). At the bottom is a 'Log:' section with a scrollable text area.

**IMPORTANT:** If you requested Additional Tags using the text areas shown above, please note that you must retrieve this data manually, using the Retrieve Tags command (under EMV), after the transaction finishes. Also note that transaction data, as a rule, is available only for 15 seconds after a transaction; for security reasons, such data will be purged after that period of time. Therefore, you should execute Retrieve Tags promptly.

With the U-Demo, it's possible to run all phases of an EMV transaction (and simulate an online authorization) while testing various CVMs, parameter options (for example: allow or don't allow fallback to MSR), and error conditions. Of course, in a real-world application, your own custom program logic would need to pause, at some point, to go online to receive the actual authorization response from your Acquirer or Issuer (typically via calls to a web service). Obviously, the U-Demo can only *simulate* this portion of the transaction cycle. The U-Demo itself cannot actually "call out" to a web API; this is functionality you'll need to build into your own app, using a combination of custom logic and Universal SDK methods.

For more information, see the ID TECH white paper, "EMV Transactions with the Universal SDK," available (free) from the ID TECH public Knowledge Base at <https://atlassian.idtechproducts.com/confluence/display/KB/Downloads+-+Home>.

## Tips

- Before running Start Transaction, be sure to load default AIDs (or, at a minimum, load the particular AID your card will need).
- Check to be sure the Terminal Configuration is set properly for your anticipated environment. (For example, chip-and-PIN environments may require the use of a different configuration than chip-and-signature.) If you are experiencing CVM-related problems, this is an area to check.
- Check to be sure any needed CAPKs are loaded. (If your transactions fail at the level of SDA, DDA, or CDA, which is to say the offline data authentication phase, this is something to check.)
- Be aware that some TLVs will contain encrypted data, but only if your reader has been injected with the necessary keys, and only if encryption has been turned on. (Consult the ID TECH document No. 80000502-001-F, *ID TECH Encrypted Data Output Formats*, for information on which tags contain encrypted data and which do not. Obtain the latest version of this document from the [Knowledge Base](#).) NOTE: If your gateway needs encrypted Track 2 data conforming to particular specifications, investigate the use of ID TECH tags DFEF4B, DFEF4C, and DFEF4D. These are described in ID TECH Tech Note 011, *Tags for Obtaining Encrypted Track Data*, available for download at the [Knowledge Base](#).
- To control the behavior of the kernel with respect to authorization response codes, investigate the use of ID TECH proprietary tag DFEE1B. Information about this tag, and other proprietary ID TECH tags, can be found in document 80000503-001, *ID TECH TLV Tag Reference Guide*, available for download at the [Knowledge Base](#). (Also, see the Knowledge Base article called [Why is Tag 8A Giving a Z3 Response Code?](#))
- Remember that tags 5A and 57 are available after Start Transaction, but may not be available after Authenticate Transaction or Complete Transaction. (These tags contain sensitive data that will be encrypted.)
- If you are requesting additional tags in any transaction step, remember that you must call Retrieve Tags to obtain them, within 15 seconds after the transaction phase in question.
- If you are requesting additional tags in any transaction step, those tags (and only those tags) will be returned for that step.

## For More Information

For more information on the Universal SDK, first obtain the specific SDK build for your particular product (and operating system) from the appropriate Product page(s) on the ID TECH [Knowledge Base](#). Then consult the `\docs` folder of the installed SDK.

Also see *EMV Transactions with the Universal SDK* (White Paper), available on the [Downloads page](#) at the ID TECH Knowledge Base. This white paper is a good starting point for learning about EMV in general, as well as the steps involved in carrying out EMV transactions using the Universal SDK.

If you need to open a support ticket, please use the [Customer Support Portal](#), or contact Tech Support via email at [support@idtechproducts.com](mailto:support@idtechproducts.com).

Also be sure to check out the many [Articles, Tech Notes, FAQs, and Solutions](#) available on the [Knowledge Base](#).

Finally: Thank you for choosing ID TECH!

## Revision History

<b>Date</b>	<b>Revision</b>	<b>Change</b>	<b>Author</b>
2/6/2017	A	Initial version of document.	KT
2/9/2017	B	Updated program graphics	RP