USER MANUAL

VersaKey
with
USB-HID Reader Interface

INTERFACE REFERENCE

CE

EMV™

80074503-001-A

Please see the VersaKey Quick Start Manual for the following information:

FCC WARNING STATEMENT
FCC COMPLIANCE STATEMENT
CE STANDARDS
LIMITED WARRANTY

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ID TECH
10721 Walker Street
Cypress, CA 90630
(714) 761-6368
ISO 9001-2000

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1.0 Introduction

The scope of this document pertains specifically to USB VersaKey keyboards with MagStripe readers, where the keyboard & reader USB interfaces are of two different device classes. The keyboard interface is a typical USB Keyboard; the MagStripe reader interface is USB-HID. The data transmitted for both is over the single keyboard communication cable.

This document provides two sections of information. The first section is general information of the USB interfaces, the reader, and its operation in the VersaKey keyboard. The second section provides technical information for the reader USB-HID interface. The second section is typically for applications programmers needing information to develop software applications.

A demo program with its source code is available, written in Visual Basic, and operates with the reader using the standard Windows HID API. Visit the ID TECH website: www.idtechproducts.com

2.0 The HID interface, General Information

Some VersaKey product models provide an integral MagStripe reader having a USB-HID communication interface. The reader is a “vendor defined HID device” so that a direct communication path can be established with an application.

The reader conforms to the USB Human Interface Device (HID) Class specification Version 2.0. Host applications designed for the latest versions of Windows 98, Me, 2000, XP can easily communicate to the reader using standard Windows API calls.

The reader conforms to ISO/IEC 7811 standards. The reader is compatible with personal computers or device with a USB interface.

2.1 Installation

There are two separate USB communications interfaces using the single keyboard communication cable. Connect the VersaKey USB cable to a host USB port. The keyboard interface is “plug-n-play” and the keyboard functions immediately after the cable is connected. The reader has an independent USB-HID communication interface; some set-up may be required.

The first time the keyboard is plugged into a specific USB port, the MagStripe reader is recognized as a separate device, and Windows presents a pop-up dialog box. The pop-up box guides one through the process of installing the HID device driver for the reader. After this process is completed once, Windows no longer request this process as long as the device is plugged into the same USB port. The device driver that Windows installs for this device is a driver used for HID devices and it is part of the Windows operating system. Most Windows systems finds the drivers needed without additional prompts. In some cases, the Windows system needs to know the location of the drivers.

2.2 Operation

The keyboard and reader operate as outlined in the VersaKey Quick Start Manual, Part Number: 80074502-001.

Although, the reader communication data interface is separate, the reading operation remains the same. The card data is accepted into the Windows system USB HID input report where the card data can be used by a specific card operations application. Card data is not mixed with the keyboard character information.

3.0 The HID interface, Technical Information

The reader conforms to the USB specification revision 2.0. This device also conforms to the Human Interface Device (HID) class specification version 2.0. The reader communicates to the host as a vendor defined HID device. The details about how the card data and commands are structured into HID reports follow later in this section. The latest versions of the Windows operating systems, Windows 98, Me, 2000, and XP all come with a standard Windows USB HID driver. Windows applications that communicate to this reader can be easily developed. These applications can communicate to the reader using standard windows API calls that communicate to the reader using the standard Windows USB HID driver. These applications can be easily developed using compilers such as Microsoft's Visual Basic or Visual C++. A demonstration program and its source code, written in Visual Basic, that communicates with this reader is available. This demo program can be used to test the reader and it can be used as a guide for developing other applications.

Developers should become familiar with the HID specification and the USB specification before attempting to communicate with the reader. This document assumes the developer is familiar with these specifications. Specifications can be downloaded free from www.usb.org.

This is a full speed USB reader. The reader has a number of programmable configuration properties. These properties are stored in non-volatile EEPROM memory. These properties can be configured at the factory or by the end user. The reader has an adjustable endpoint descriptor polling interval value that can be set to any value in the range of 1ms to 255ms. This property can be used to change the speed of the card data transfer rate.

3.1 Data Structure

The USB HID Reader supports the ID TECH data Structure with an EEPROM setting.

USB HID Data Format Setting:
Setting A: ID TECH Data Format (Default setting) Product ID: 0500

When the reader is initially plugged in, the Firmware reads the "Data Format Setting" from EEPROM and send current Product ID in enumeration. Each time after changing the "Data Format Setting", the firmware saves the setting to EEPROM then re-do the enumeration process. (On occasion, the reader needs to be disconnected and connected again to switch the data format.)

3.2 Format Data Structure

Offset	Usage Name
0	T1 decode status
1	T2 decode status
2	T3 decode status
3	T1 data length
4	T2 data length
5	T3 data length
6	Card encode type
7, 8	Total Output Length
9-508	Output Data

In this approach, the reader keeps all of the ID TECH data editing and other features like preamble, postamble, etc. The output data is always 500 bytes; the "Total Output Length" field indicates the valid data length in the output data.

3.4 IDTECH format

T1, T2 or T3 decode status: 0 for no error, 1 for error
T1, T2 or T3 Data Length: Each byte value indicates how many bytes of decoded card data are in the track data field. This value is set to zero if there was no data on the track or if there was an error decoding the track. The track data includes all data string starting with the start sentinel and ending with the end sentinel.

Card Encode Type:

Value	Encode Type	Description
0	ISO/ABA	ISO/ABA encode format
1	AAMVA	AAMVA encode format
2	CADL	California Driver License
3	Blank	The card is blank
4	Other	The card has a non-standard format.

For example, ISO/ABA track 1 format on track 2

3.5 Descriptor Tables

Device Descriptor

Field	Value	Description
Length	12	
Des type	01	
bcd USB	10 01	
Device Class	03	
Sub Class	00	Unused
Device Protocol	00	Unused
Max Packet Size	20	32 bytes
VID	CD 0A	
PID	00 05 / 10 05	With ID TECH Structure With MagTech Structure
BCD Device Release	00 01	
i-Manufacture	01	
i-Product	02	
i-Serial-Number	00	
# Configuration	01	

Configuration Descriptor

Field	Value	Description
Length	09	
Des type	02	
Total Length	22 00	
No. Interface	01	
Configuration Value	01	
iConfiguration	00	
Attributes	80	Bus power, no remove wakeup
Power	32	100 mA

Interface Descriptor

Field	Value	Description
Length	09	
Des type	04	
Interface No.	00	
Alternator Setting	00	
# EP	01	
Interface Class	03	HID
Sub Class	00	
Interface Protocol	00	
iInterface	00	

HID Descriptor

Field	Value	Description
Length	09	
Des type	21	HID
bcdHID	11 01	
Control Code	00	
numDescriptors	01	Number of Class Descriptors to follow
DescriptorType	22	Report Descriptor
Descriptor Length	37 00	For ID TECH Format

End Pointer Descriptor

Field	Value	Description
Length	07	
Des Type	05	End Point
EP Addr	81	EP1 - In
Attributes	03	Interrupt
MaxPacketSize	20 00	
bInterval	0A	

Report Descriptor, (ID TECH Setting)

Field	Value	Description
	06 00 FF	Usage Page (MSR)
	09 01	Usage(Decoding Reader)
	A1 01	Collection (Application)
	15 00	Logical Minimum
	26 FF 00	Logical Maximum
	75 08	Report Size
	09 20	Usage (Tk1 Decode Status)
	09 21	Usage (Tk2 Decode Status)
	09 22	Usage (Tk3 Decode Status)
	09 28	Usage (Tk1 Data Length)
	09 29	Usage (Tk2 Data Length)
	09 2A	Usage (Tk3 Data Length)
	09 38	Usage (Card Encode Type)
	95 07	Report Count
	81 02	Input (Data,Var,Abs,Bit Field)
	09 30	Usage (Total Sending Length)
	95 02	Report Count (2)
	82 02 01	Input (Data, Var, Abs, Bit Field)
	09 31	Usage (Output Data)
	96 F4 01	Report Count (328*)
	82 02 01	Input (Data, Var, Abs, Bit Field)
	09 20	Usage (Command Message)
	95 20	Report Count
	B2 02 01	Feature (Data,Var, Abs, Buffered Bytes)
	C0	End Collection

4.0 HID Usages

This HID reader sends data reports. Elements of data in a report are identified by unique identifiers called usages. The structure of the reader's reports and the reader's capabilities are reported to the host in a report descriptor. The host usually gets the report descriptor only once and after the reader is powered. The report descriptor usages identify the reader's capabilities and report structures. Usages are four byte integers. Standardized usages such as usages for mice and keyboards can be found in the HID Usage Tables document and can be downloaded free at www.usb.org. Vendor defined usages must have a usage page in the range 0xff00 – 0xffff. All usages for this device use vendor defined magnetic stripe reader usage page 0xff00. The usage IDs for this device are defined in the following table. The usage types are also listed. These usage types are defined in the HID Usage Tables document.

4.1 IDTECH format reader usage page 0xff00

1	Decoding reader device	Collection	None
20	Track 1 decode status	Data	Input
21	Track 2 decode status	Data	Input
22	Track 3 decode status	Data	Input
28	Track 1 data length	Data	Input
29	Track 2 data length	Data	Input
2A	Track 3 data length	Data	Input
38	Card encode type	Data	Input
30	Total Data Length	Data	Input
31	Output Data	Data	Input
20	Command message	Data	Feature

4.3 Mag-Tek format reader usage page 0xff00

Usage ID (Hex)	Usage Name	Usage Type	Report Type
1	Decoding reader device	Collection	None
20	Track 1 decode status	Data	Input
21	Track 2 decode status	Data	Input
22	Track 3 decode status	Data	Input
28	Track 1 data length	Data	Input
29	Track 2 data length	Data	Input
2A	Track 3 data length	Data	Input
30	Track 1 data	Data	Input
31	Track 2 data	Data	Input
32	Track 3 data	Data	Input
38	Card encode type	Data	Input
20	Command message	Data	Feature

4.2 Commands and responses

Commands and responses are exchanged with the reader using feature reports. Commands are sent to the reader using HID class specific request Set Report (21 09 …). The response to a command is retrieved from the reader using HID class specific request Get Report (A1 01 …). These requests are sent over the default control pipe.

ID TECH
10721 Walker Street
Cypress, CA 90630-4720
(714)761-6368
www. id-tech. net