Future Technology Devices International Ltd

USB-Key

Datasheet

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Future Technology Devices International Ltd (FTDI)

373 Scotland Street, Glasgow G5 8QB United Kingdom

Tel.: +44 (0) 141 429 2777   Fax: + 44 (0) 141 429 2758

E-Mail (Support): support@ftdichip.com Web: http://www.ftdichip.com

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1 Introduction

1.1 Overview

The FTDI USB Key is security device which has a unique identification number burnt into it during manufacture. This is the FTDIChip-ID™ number.

This FTDIChip-ID™ number is only readable over the USB interface making it an ideal "key" for "unlocking" particular applications.

1.2 Features and Applications

The FTDI USB Key has the following features:

- Simple to use USB interface to any USB host or hub.
- Unique FTDIChip-ID™ number can be used to provide a security dongle for software applications.
- Additional security possible by encrypting the FTDIChip-ID™ number and storing in EEPROM writeable area of FTDI USB Key.
- Enhanced security protection using SafeGuard-IT Active-X control for Windows. This can be used to generate asymmetric public-private key encryption to provide secure dongle functionality.
- USB Key can be used to unlock security systems – access control.
- Password protected access.

1.3 USB Key Connections

The USB Key connects to PC USB interface. The following Table 1.1 describe the function of the connector:

Pin Number	Name	Type	Description
1	VBUS	Power Input	+5V from USB bus
2	D-	Input	Data Minus
3	D+	Input	Data Plus
4	GND	Power Input	0V
5	GND	Power Input	0V

Table 1.1 USB Connector Signal Description

2   FTDI USB KEY User Guide

The following illustration, **Figure 2.1**, shows a representation of the FTDI USB Key unit. The user interface is described below.

Figure 2.1 FTDI USB Key Illustration.

2.1 USB Connection

The FTDI USB Key module connects to a USB hub or host port via the USB connector. This will supply power to the FTDI USB Key.

2.2 Reading The FTDIChip-ID™ USB Key

The unique FTDI USB Key FTDIChip-ID™ number can only be read using function calls from the FTDChipID.dll. This DLL can be downloaded from the FTDI website for Windows (V1.1.0), Linux (V0.1.0) and Mac OS X (V0.1.0). The D2XX drivers must also be installed. The drivers can be downloaded from http://www.ftdichip.com/Drivers/D2XX.htm

The FTDChipID.dll and the D2XX.dll can reside in the same directory.

An FTDIChip-ID™ programmer's guide gives details of how to use the DLL and is available from the http://www.ftdichip.com/Documents/ProgramGuides.htm page. The programmers guide lists the function calls which need to be used by the software application to identify the unique FTDIChip-ID™ number.

2.3 Basic Description of the FTDIChipID Function calls

The following list gives a brief description of the function calls available in order to obtain the FTDIChip-ID™ number when using the FTDChipID.dll

- FTID_GetNumDevices - returns the number of devices attached on the USB bus.
- FTID_GetDeviceSerialNumber - Given a device index return the device serial number.
- FTID_GetDeviceDescription - Given a device index returns with description of the device.
- FTID_GetDeviceLocationID - Given a device index returns with location ID.
- FTID_GetDeviceChipID - Given a device index returns the unique FTDIChip-ID™ number of the device.
- FTID_GetChipIDFromHandle - Given a device handle returns the unique FTDIChip-ID™ (must use a valid D2XX device handle).
- FTID_GetDllVersion - get the dll version.
- FTID_GetErrorCodeString - get the English translation of the error code.

2.4 Using the EEPROM Writeable Area of the FTDI USB Key.

To further improve security, the unique FTDIChip-ID™ number read from the FTDI USB Key can be read, further encrypted and written back to a EEPROM user accessible area within the FTDI USB Key. This further security could make use of industry standard encryption methods (DES, 3DES, AES, Blowfish for example) plus make use of a timestamp for registration purposes. To access this user area it is necessary to use the FT_EE_UASize, FT_EE_UAWrite and the FT_EE_UARead function calls available in the D2XX.dll. This DLL is available from the FTDI driver download area at D2XX Direct Drivers. The D2XX programmers guide is also available from D2XXPG34.pdf.

The amount of EEPROM user available space available varies depending on what data has already been written to the EEPROM. Generally, the longer the strings written to the EEPROM, the less free space available. Users should check that sufficient space is available to write back any further encrypted data.

2.5 Viewing Contents of FTDI USB Key

The FTDI USB Key Device Descriptors and Configuration Descriptors can be read using the USBView software utility.

USBView can be downloaded free from the FTDI website at
http://www.ftdichip.com/Resources/Utilities.htm

3 Application Examples

Numerous examples showing how to access the unique FTDIChip-ID™ number is given in many different software languages on the FTDI website at http://www.ftdichip.com/Projects/FTDIChip-ID.htm

3.1 Security Dongle Using SafeGuard-IT

SafeGuard-IT is an ActiveX control for Windows which works with the FTDI_USB_KEY to provide security dongle functionality. The SafeGuard-IT component works by exploiting the FTDIChip-ID™ feature of the FT232R within the FTDI-USB-KEY together with an asymmetric public-private key encryption scheme.

The SafeGuard-IT security scheme works as follows:

1. Generate a public-private key pair using the SafeGuard-IT ActiveX control. These keys should be saved to files.

2. Encrypt the FTDIChip-ID using the private key and an optional password. This encrypted information is then stored in the FTDI_USB_KEY.

3. Distribute the programmed FTDI_USB_KEY with the application software. The Safeguard-IT DLL file and the public key are also required by the application software.

4. When the application software is loaded, it can use the SafeGuard-IT control to verify that the required FTDI_USB_KEY device is connected to the client PC. This can be used to prevent software from running if a licensed dongle is not connected.

The SafeGuard-IT ActiveX control and SafeGuard-IT.dll are available free from the FTDI website http://www.ftdichip.com/Projects/SafeGuard-IT/SafeGuard-IT.zip
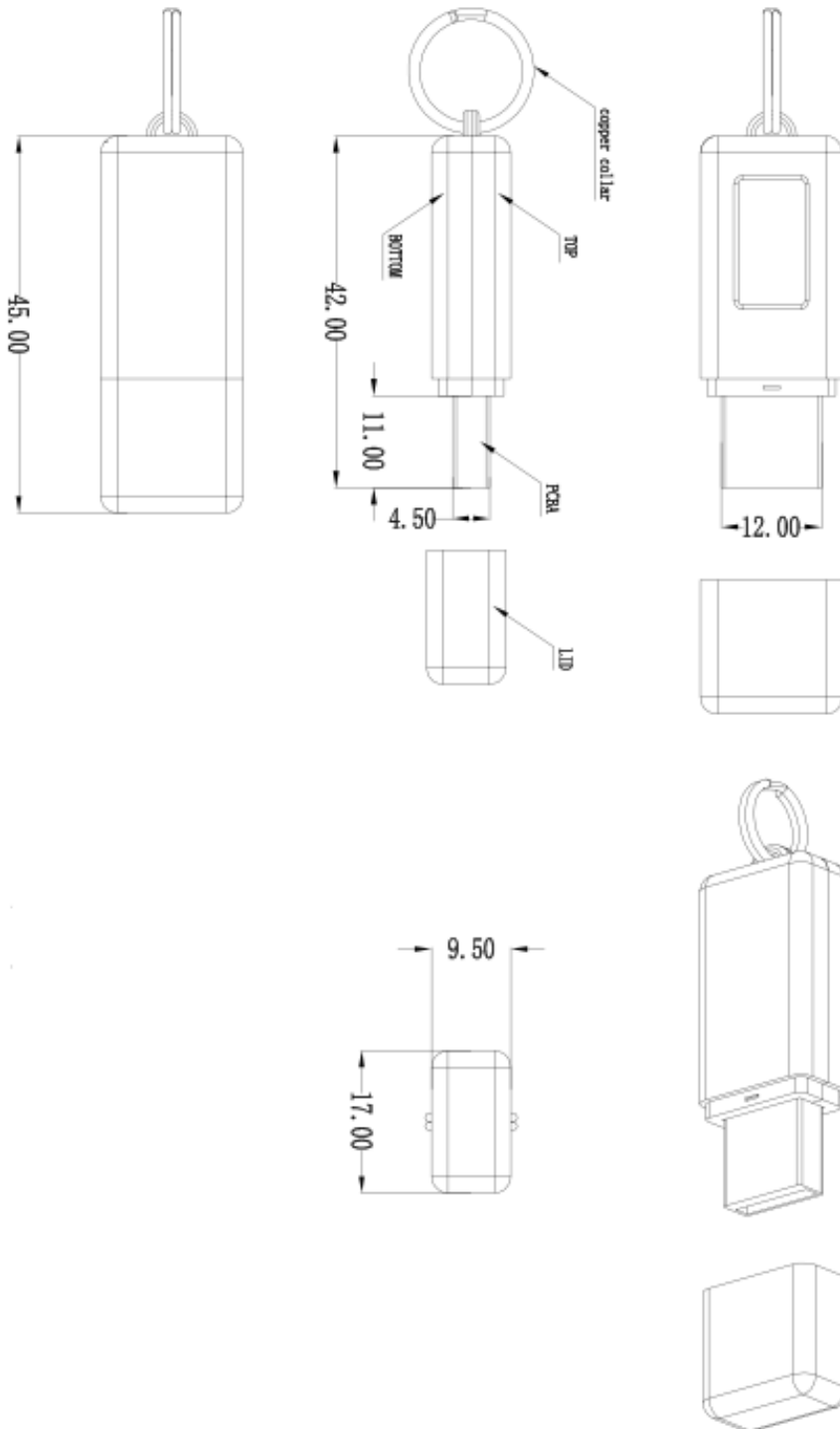
4   Mechanical Dimensions

Figure 4.1 USB Key Dimensions

5 Contact Information

Head Office – Glasgow, UK

Future Technology Devices International Limited
373 Scotland Street
Glasgow G5 8QB
United Kingdom
Tel: +44 (0) 141 429 2777
Fax: +44 (0) 141 429 2758

E-mail (Sales)   sales@ftdichip.com
E-mail (Support)   support@ftdichip.com
E-mail (General Enquiries) admin1@ftdichip.com
Web Site URL   http://www.ftdichip.com
Web Shop URL http://apple.clickandbuild.com/cnb/shop/ftdichip

Branch Office – Taipei, Taiwan

Future Technology Devices International Limited (Taiwan)
4F, No 18-3, Sec. 6 Mincyuan East Road
Neihu District
Taipei 114
Taiwan, R.O.C.
Tel: +886 (0) 2 8791 3570
Fax: +886 (0) 2 8791 3576

E-mail (Sales)   tw.sales1@ftdichip.com
E-mail (Support)   tw.support1@ftdichip.com
E-mail (General Enquiries)   tw.admin1@ftdichip.com
Web Site URL   http://www.ftdichip.com

Branch Office – Hillsboro, Oregon, USA

Future Technology Devices International Limited (USA)
7235 NW Evergreen Parkway, Suite 600
Hillsboro, OR 97123-5803
USA
Tel: +1 (503) 547 0988
Fax: +1 (503) 547 0987

E-Mail (Sales)   us.sales@ftdichip.com
E-Mail (Support)   us.admin@ftdichip.com
Web Site URL   http://www.ftdichip.com

Distributor and Sales Representatives

Please visit the Sales Network page of the FTDI Web site for the contact details of our distributor(s) and sales representative(s) in your country.

Appendix A – FTDI USB Key FT232R EEPROM Configuration

This FT232R device within the FTDI_USB_KEY contains an EEPROM which contains the USB configuration descriptors for that device. When the FTDI_USB_KEY is plugged into a PC or a USB reset is performed, the PC will read these descriptors. The default values stored into the internal EEPROM are defined in Table 5.1

Parameter	Value	Notes
USB Vendor ID (VID)	0403h	FTDI default VID (hex)
USB Product UD (PID)	6001h	FTDI default PID (hex)
Serial Number Enabled?	Yes	
Serial Number	See Note	A unique serial number is generated and programmed into the EEPROM during device final test.
Pull down I/O Pins in USB Suspend	Disabled	Enabling this option will make the device pull down on the UART interface lines when the power is shut off (PWREN# is high).
Manufacturer Name	FTDI	
Product Description	FTDI USB-KEY	
Max Bus Power Current	90mA	
Power Source	Bus Powered	
Device Type	FT232R	
USB Version	0200	Returns USB 2.0 device description to the host. Note: The device is be a USB 2.0 Full Speed device (12Mb/s) as opposed to a USB 2.0 High Speed device (480Mb/s).
Remote Wake Up	Disabled	Taking RI# low will wake up the USB host controller from suspend.
High Current I/Os	Disabled	Enables the high drive level on the UART and CBUS I/O pins.
Load VCP Driver	Enabled	Makes the device load the VCP driver interface for the device.
Invert TXD	Disabled	Signal on this pin becomes TXD# if enable.
Invert RXD	Disabled	Signal on this pin becomes RXD# if enable.
Invert RTS#	Disabled	Signal on this pin becomes RTS if enable.
Invert CTS#	Disabled	Signal on this pin becomes CTS if enable.

Table 5.1 Default Internal EEPROM Configuration

The internal EEPROM in the FT232R can be re-programmed over USB using the utility program MPROG. MPROG can be downloaded from the **www.ftdichip.com**. Version 2.8a or later is required for the FT232R chip. Users who do not have their own USB Vendor ID but who would like to use a unique Product ID in their design can apply to FTDI for a free block of unique PIDs. Contact FTDI support for this service.

Appendix B – Revision History

Version 1.00   Initial Datasheet Release   July 2008