Future Technology Devices International Ltd.

Application Note AN_134

FTDI Drivers Installation guide for MAC OS X

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The purpose of this application note is to provide users of FTDI chips with a simple procedure for installing FTDI drivers for FTDI devices used under MAC OS X.

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1 Introduction

The purpose of this application note is to provide users of FTDI chips with a simple procedure for installing FTDI drivers for their devices under MAC OS X.

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2 Getting FTDI Device Drivers

FTDI drivers may be obtained from the FTDI website.

There are two types of driver: VCP (Virtual COM Port) and D2XX (direct access).

2.1 Getting VCP

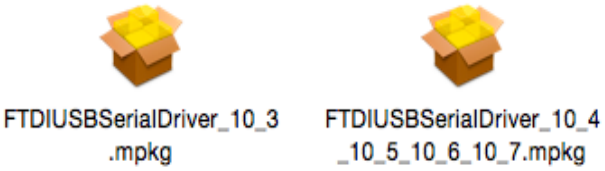
VCP creates a virtual com port on the MAC and allows applications that use the POSIX programming interface to communicate with the device. This is effectively the same us using a legacy com port.

The download is a Disk Image (dmg) file at: http://www.ftdichip.com/Drivers/VCP.htm

Download the version relevant to your OS version.

Clicking the weblink starts a download.

Inside the FTDIUSBSerialDriver_v2_2_18.dmg there are 2 package files:



FTDIUSBSerialDriver_10_3.mpkg which is specific to OS X 10.3 (Panther)

FTDIUSBSerialDriver_10_4_10_5_10_6_10_7.mpkg which is specific to OS X 10.4 (Tiger), OS X 10.5 (Leopard), 10.6 (Snow Leopard), 10.7 (Lion) and 10.8 (Mountain Lion).

Inside the FTDIUSBSerialDriver_v2_3.dmg there is 1 package file:

FTDIUSBSerial.pkg is suitable for OS X 10.9 (Mavericks) and later.

2.2 Getting D2XX

D2xx uses FTDI's programming interface to access advanced features of the chips.

The download is a Disk Image (dmg) file at http://www.ftdichip.com/Drivers/D2XX.htm

The current version at the time of writing (version 1.2.2) covers all versions of OS X from 10.4 onwards.

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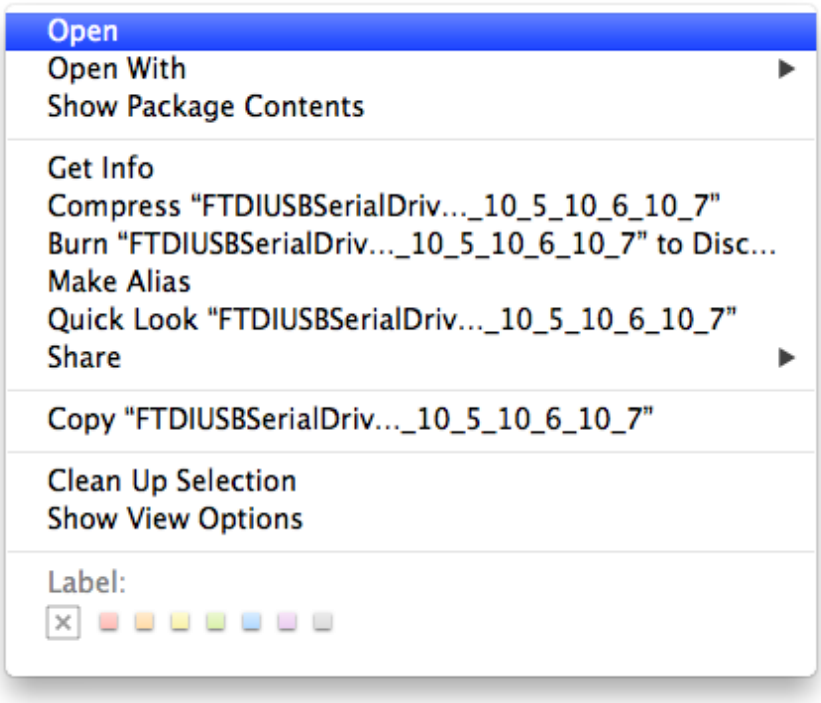
3 Installing Drivers

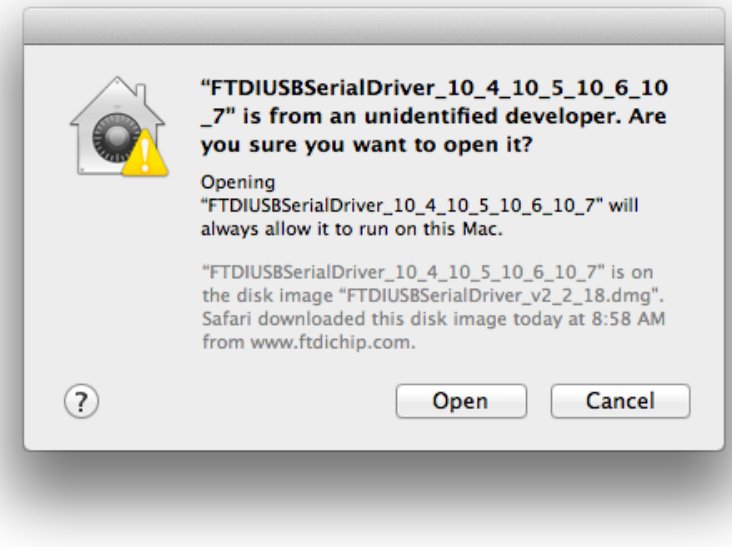
3.1 Installing VCP Drivers on OS X 10.3 to OS X 10.8

To install the driver on the MAC you simply click on the .mpkg that matches your version of OS X.

With Lion and Mountain Lion, you will need to bypass the new Gatekeeper security function to install the pkg file. Simply press **Cntrl-Click** when you select FTDIUSBSerialDriver_10_4_10_5_10_6_10_7.pkg. This will bring up a pop-up menu. Select Open from this menu:



The following pop-up will appear:



Select "Open" and the VCP driver install process will begin (see next page).

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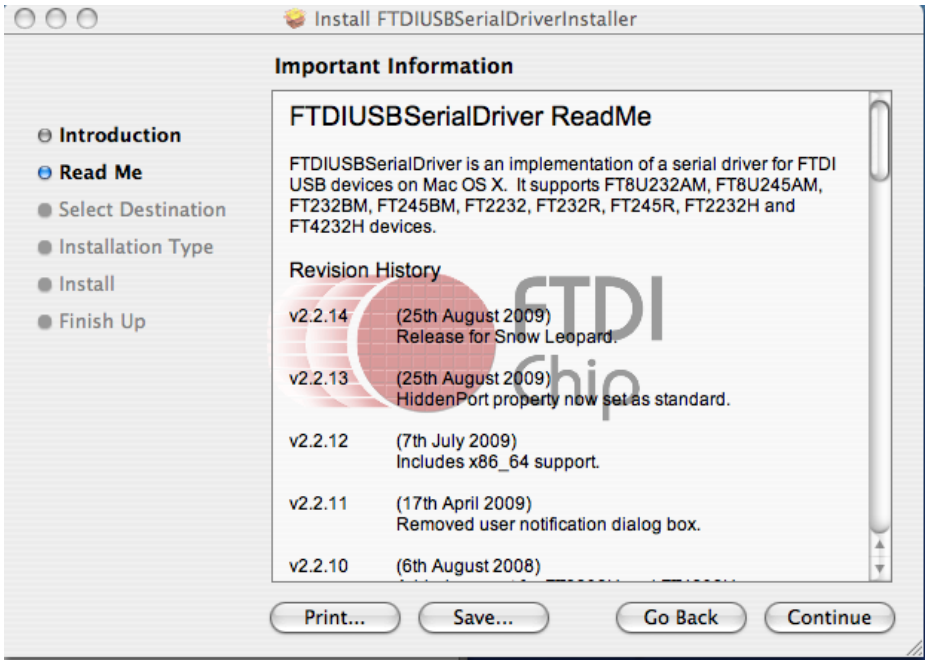
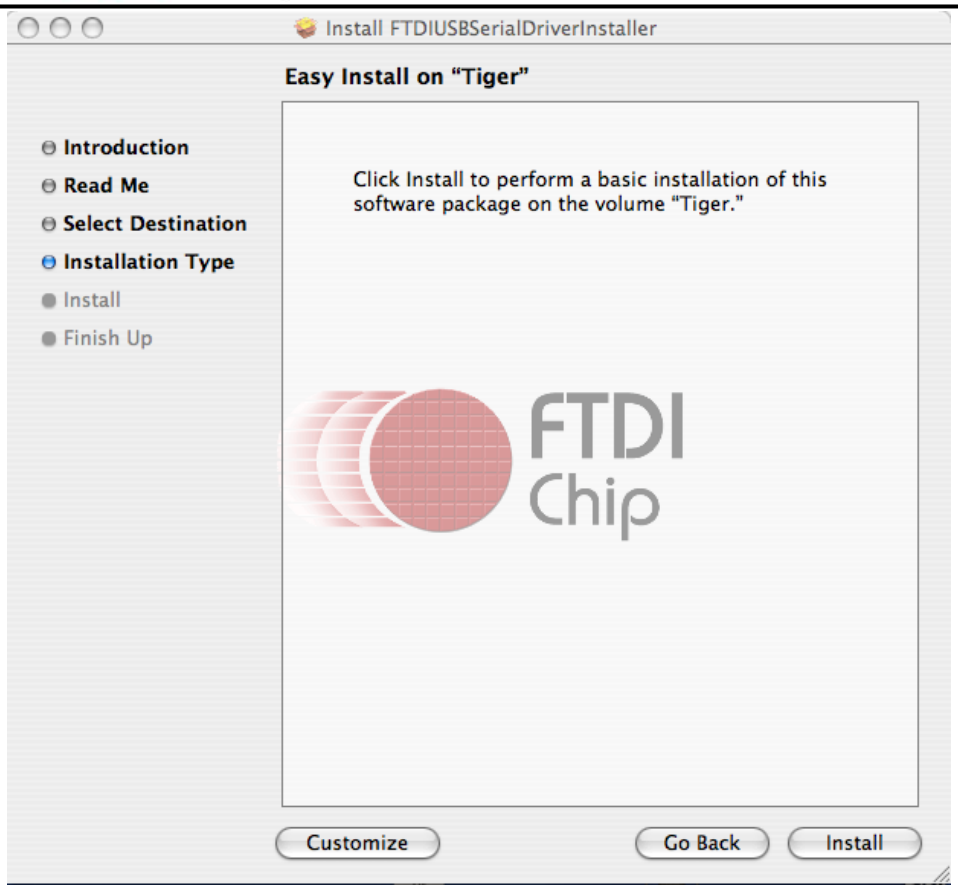
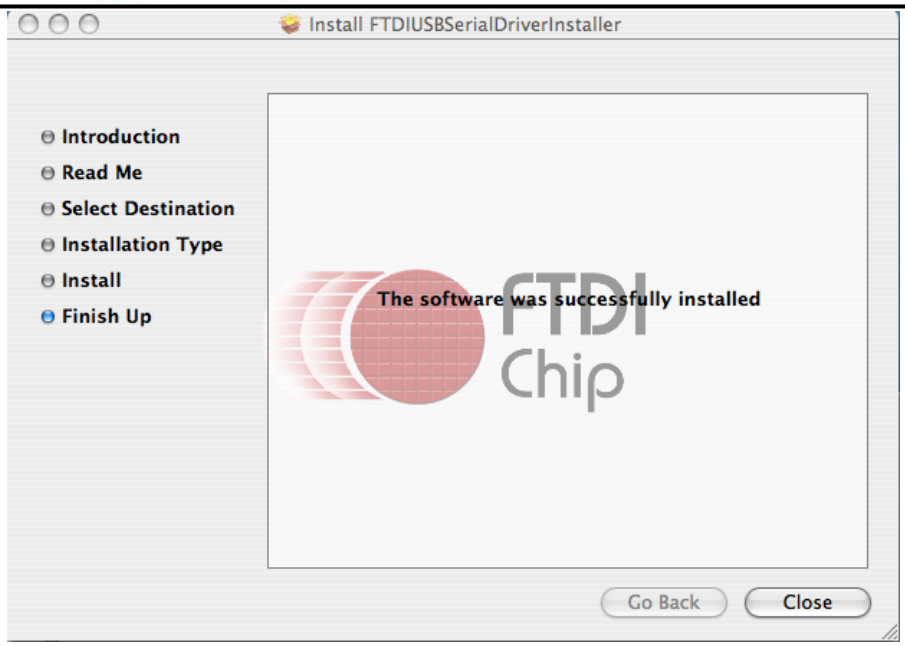
Select continue to install the driver.



Select continue at the ReadMe screen.



Select Install. At this point you may be asked for your password to authenticate the installation. This is just the same as you would do to log into the machine to begin using it.



After authentication select close to complete the installation.

Now plug the device in.

If the device is installed properly, you will see entries in the /dev directory:
/dev/cu.usbserial-xxxxxxxx
/dev/tty.usbserial-xxxxxxxx

where xxxxxxxx is either the device's serial number or, for unserialized devices, a location string that depends on which USB port your device is connected to. Note that for FT2232D devices port A is denoted by the serial number appended with "A" and port B is designated by the serial number appended with "B".

/dev can be accessed through the Terminal application. The Terminal application can be launched by selecting Go > Applications > Utilities > Terminal. Type the following lines in the Terminal window to produce the file list:

cd /dev
ls-l

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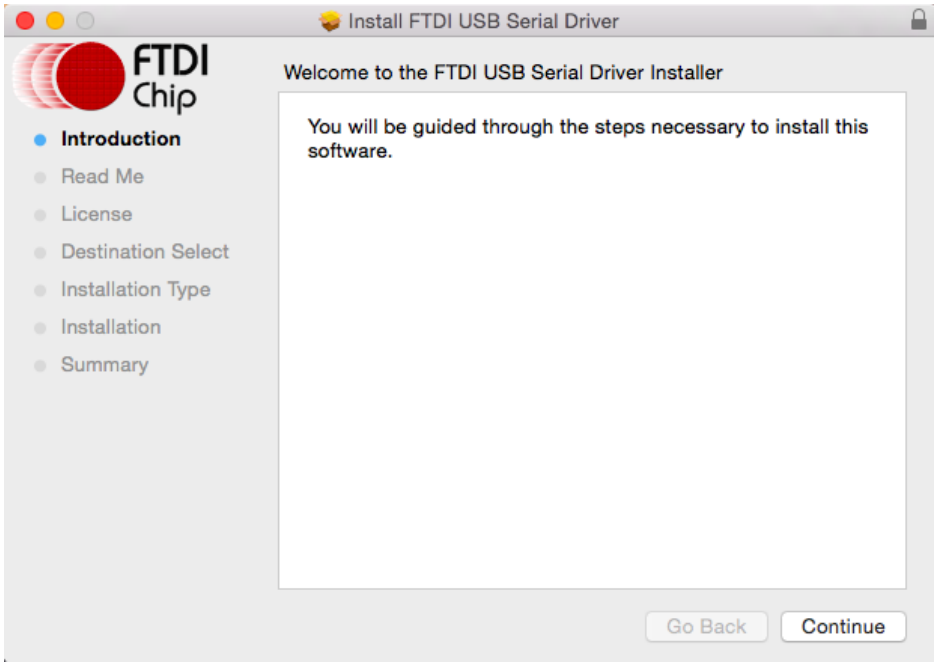
3.2 Installing VCP Drivers on OS X 10.9 onwards

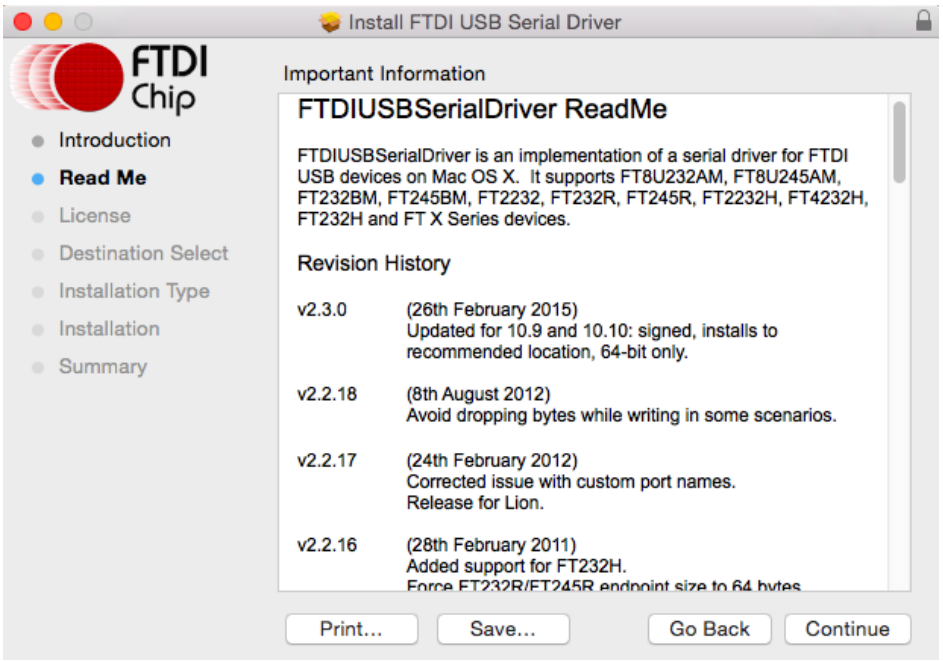
Since 10.9 (Mavericks), OS X has included built-in partial support for some FTDI devices in VCP mode. Starting with 10.11 (El Capitan), Apple's own driver seems to be sufficiently comprehensive that many customers will not need to install FTDI's own VCP unless they wish to use its advanced features such as baud-rate aliasing and configurable latency times.

If you do wish to use FTDI's VCP, disable the Apple-provided FTDI VCP driver as per section 7.

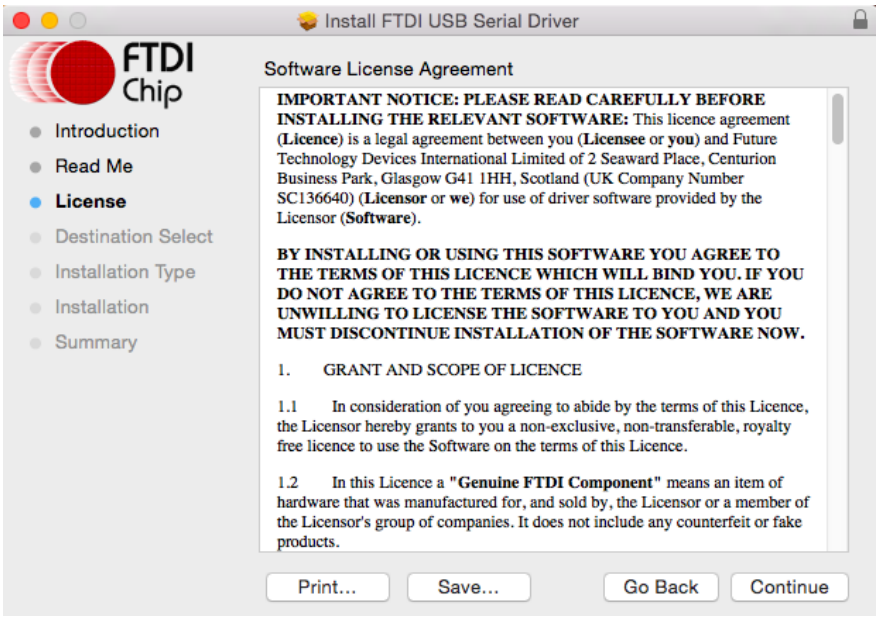
To install the driver on the MAC, simply click on the FTDIUSBSerial.pkg shown in section 2.1.



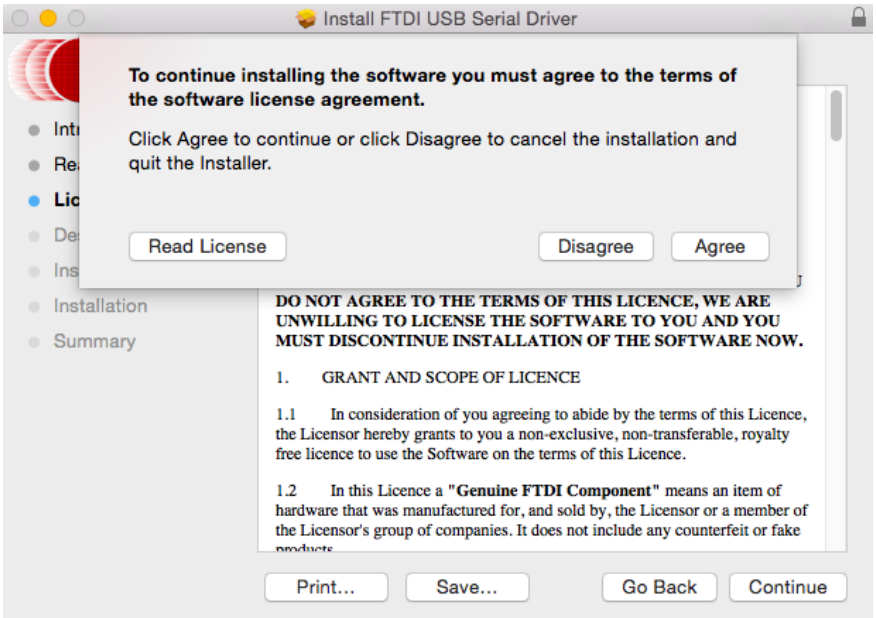
Select Continue



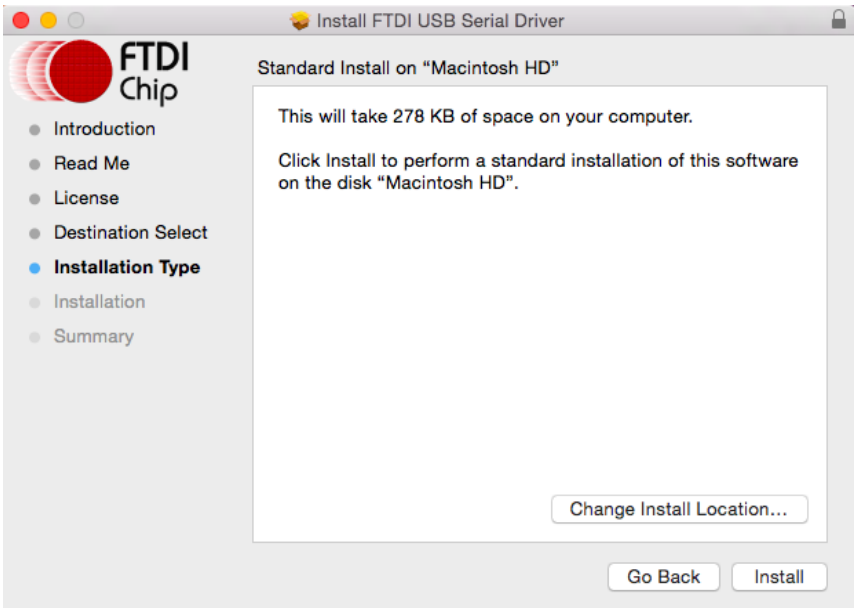
Select Continue on the Read Me screen.



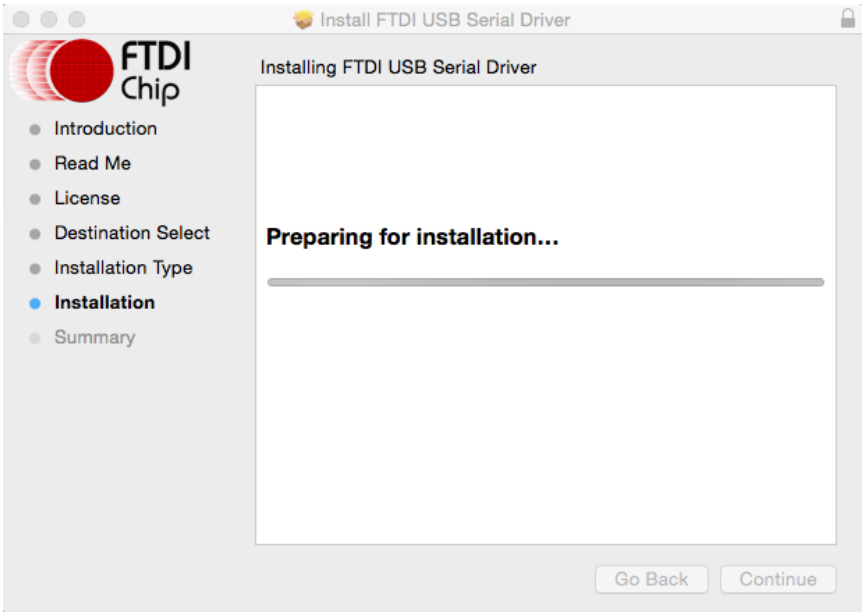
After reading the Software License Agreement, press Continue.



Click agree to continue or disagree to abort installation.



Select Install.



Screen will briefly show 'Preparing for installation…'

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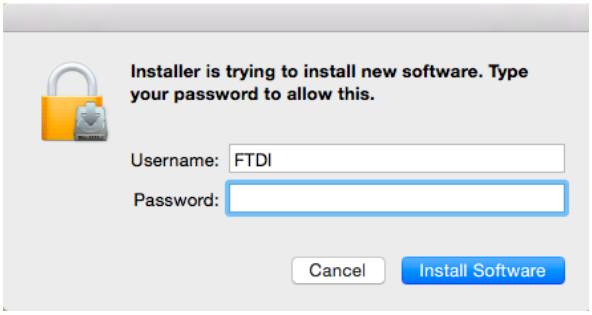
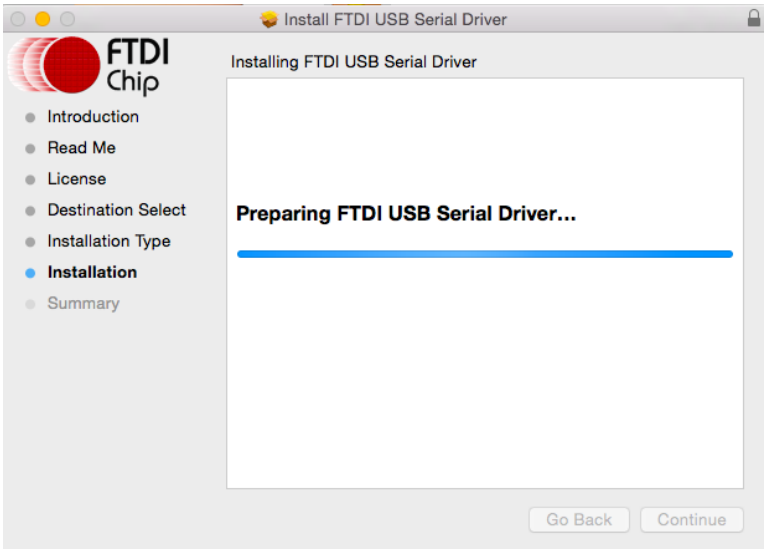


At this point you may be asked for your password to authenticate the installation. This is just the same as you would do to log into the machine to begin using it. Then select Install Software.



The screen will show 'Preparing FTDI USB Serial Driver…'

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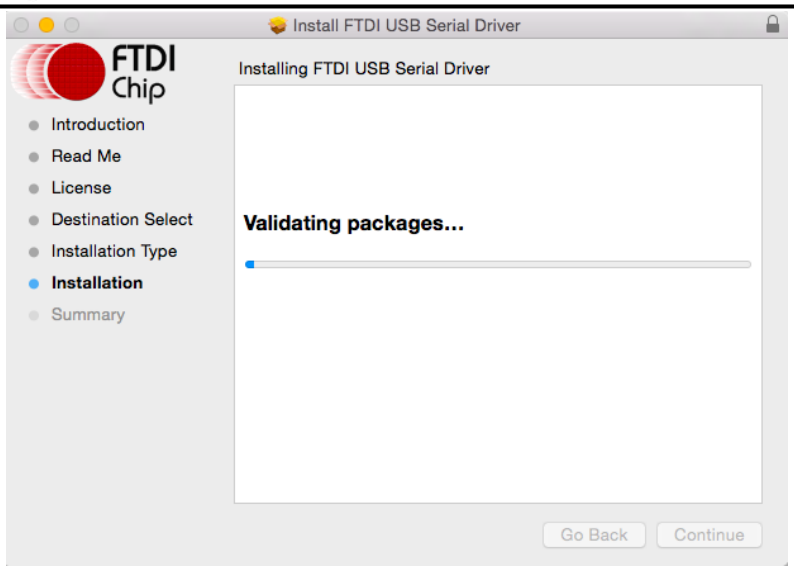
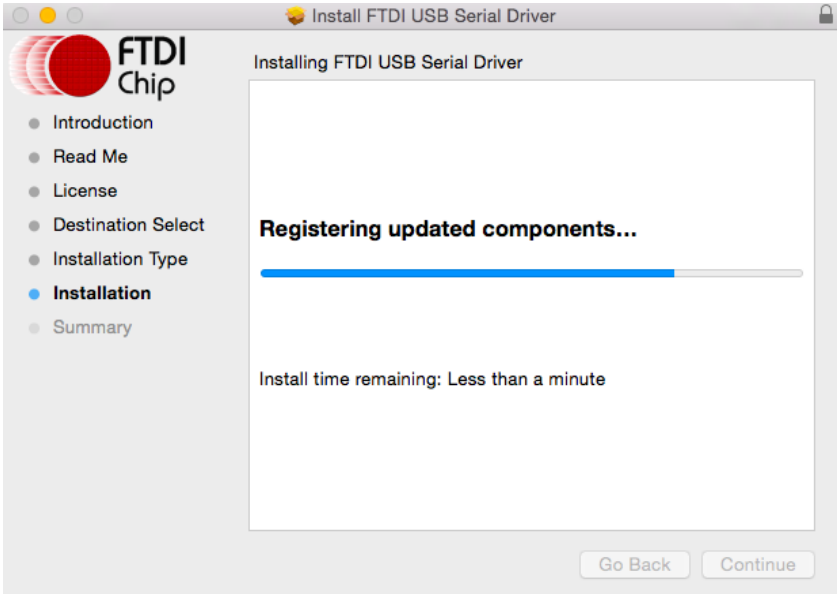
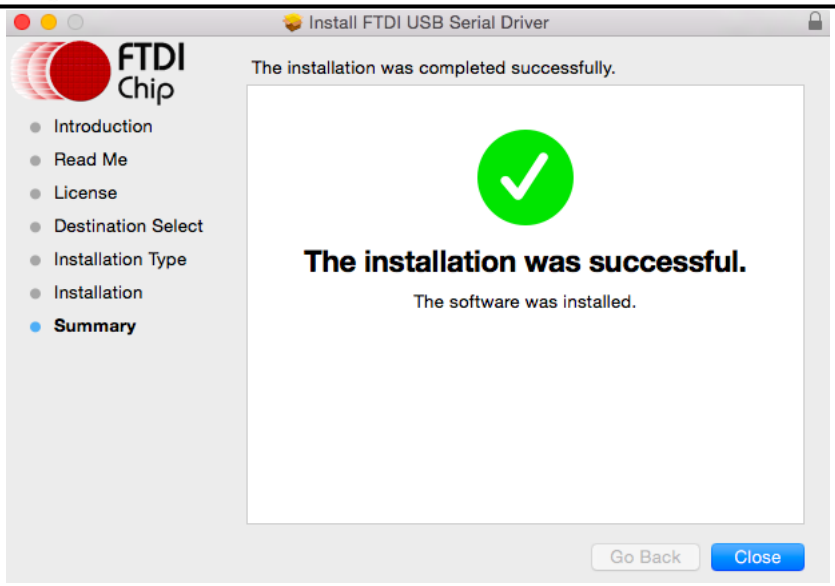


The screen will show 'Validating packages…'



The screen will show 'Registering updated components…'



The final screen should show that the installation was successful. Select close and then reboot.

Now plug the device in.

If the device is installed properly, you will see entries in the /dev directory:
/dev/cu.usbserial-xxxxxxxx
/dev/tty.usbserial-xxxxxxxx

where xxxxxxxx is either the device's serial number or, for unserialized devices, a location string that depends on which USB port your device is connected to. Note that for FT2232D devices port A is denoted by the serial number appended with "A" and port B is designated by the serial number appended with "B".

/dev can be accessed through the Terminal application. The Terminal application can be launched by selecting Go > Applications > Utilities > Terminal. Type the following lines in the Terminal window to produce the file list:

cd /dev
ls-l

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3.3 Installing D2xx Drivers

Please note that applications using D2XX cannot access an FTDI device if OS X has already loaded a VCP driver for it. OS X does this when it detects a device with standard FTDI vendor and product identifiers being connected. This applies to both FTDI's VCP and, on OS X 10.9 onwards, Apple's.

To avoid this scenario, if FTDI's VCP is installed, uninstall it by following the instructions in section 4. On OS X 10.9 and later, block, unload or disable Apple's driver by following the instructions in section 7.

Download the D2XX disk image as per section 2.2 of this document. Click the dmg item in the Downloads area to mount the disk image, then drag the D2XX folder to your desktop.

Start a Terminal session (Go > Applications > Utilities > Terminal)

Change directory to /usr/local/lib:

```
cd /usr/local/lib
```

Note: if /usr/local/lib does not already exist, try again after creating it with:

```
sudo mkdir –p /usr/local/lib
```

Copy the libftd2xx dynamic library to /usr/local/lib (note the final space and dot are essential):

```
sudo cp ~/Desktop/D2XX/bin/10.5-10.7/libftd2xx.1.2.2.dylib .
```

Create a version-independent symbolic link to the library:

```
sudo ln -sf libftd2xx.1.2.2.dylib libftd2xx.dylib
```

The driver is now installed. You may link to it by specifying –lftd2xx in your build command.

Samples written in C are provided to show how to use the library and verify the installation. These are command-line applications that must be executed from the Terminal window. To compile and run the samples, perform the following steps (these assume you have copied all of the distribution files to the desktop and installed the library as per the Installation section above):

Open a Terminal window (Go > Applications > Utilities > Terminal).

Change directory to the root samples directory:

```
cd ~/Desktop/D2XX/Samples
```

Build all the samples:

```
make
```

If you have issues at this stage revisit the installation section above to ensure the library is correctly installed. Read the error messages and try to determine the source of the problem. If you still have issues then contact support detailing your issue with as much information as possible.

To test running an application, connect an FTDI device with default VID (0x0403) and PID (e.g. 0x6001) and type:

```
sudo EEPROM/read/read
```

Note: running as super-user (sudo) is necessary because OS X does not give ordinary users permission to access USB directly.

If you have issues at this stage then consult the troubleshooting topics in section 6. If the troubleshooting section doesn't help then contact support with your problem details.

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4 Uninstalling FTDI Drivers on OS X

Follow the procedures below if you wish to remove the FTDI-provided drivers from your MAC.

4.1 Uninstalling FTDI VCP Drivers on OS X 10.3 to OS X 10.8

To remove the drivers from Mac OS X, the user must be logged on as root.
Root is a reserved username that has the privileges required to access all files.

Start a Terminal session (Go > Applications > Utilities > Terminal) and enter the following commands at the command prompt:

```
cd /System/Library/Extensions
rm -r FTDIUSBSerialDriver.kext

cd /Library/Receipts
rm -r ftdiusbserialdriver.pkg
rm -r ftdiusbserialdriverinstallerPostflight.pkg
rm -r ftdiusbserialdriverinstallerPreflight.pkg
```

To temporarily operate as the root user you can use sudo at the beginning of the command

e.g.

```
cd /System/Library/Extensions
sudo rm -r FTDIUSBSerialDriver.kext

cd /Library/Receipts
sudo rm -r ftdiusbserialdriver.pkg
sudo rm -r ftdiusbserialdriverinstallerPostflight.pkg
sudo rm -r ftdiusbserialdriverinstallerPreflight.pkg
```

The driver will then be removed from the system.

4.2 Uninstalling FTDI VCP Drivers on OS X 10.9 onwards

To remove the drivers from Mac OS X 10.9 onwards, the user must be logged on as root.
Root is a reserved username that has the privileges required to access all files.

Start a Terminal session (Go > Applications > Utilities > Terminal) and enter the following commands at the command prompt:

```
cd /Library/Extensions
rm -r FTDIUSBSerialDriver.kext
```

then reboot

To temporarily operate as the root user you can use sudo at the beginning of the command

e.g.

```
cd /Library/Extensions
sudo rm -r FTDIUSBSerialDriver.kext
```

then reboot

The driver will then be removed from the system.

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4.3 Uninstalling D2XX Drivers

To uninstall the D2XX driver, simply delete the library and the symbolic link:

Start a Terminal session (Go > Applications > Utilities > Terminal)

Change directory to the /usr/local/lib (cd /usr/local/lib)

Delete the library (rm libftd2xx.1.2.2.dylib)

Delete the symbolic link (rm libftd2xx.dylib)

If you have installed D2xxHelper (required for OS X 10.11 onwards), it also must be removed:

```
sudo rm –r /Library/Extensions/D2xxHelper.kext
```

Complete the uninstallation by rebooting.

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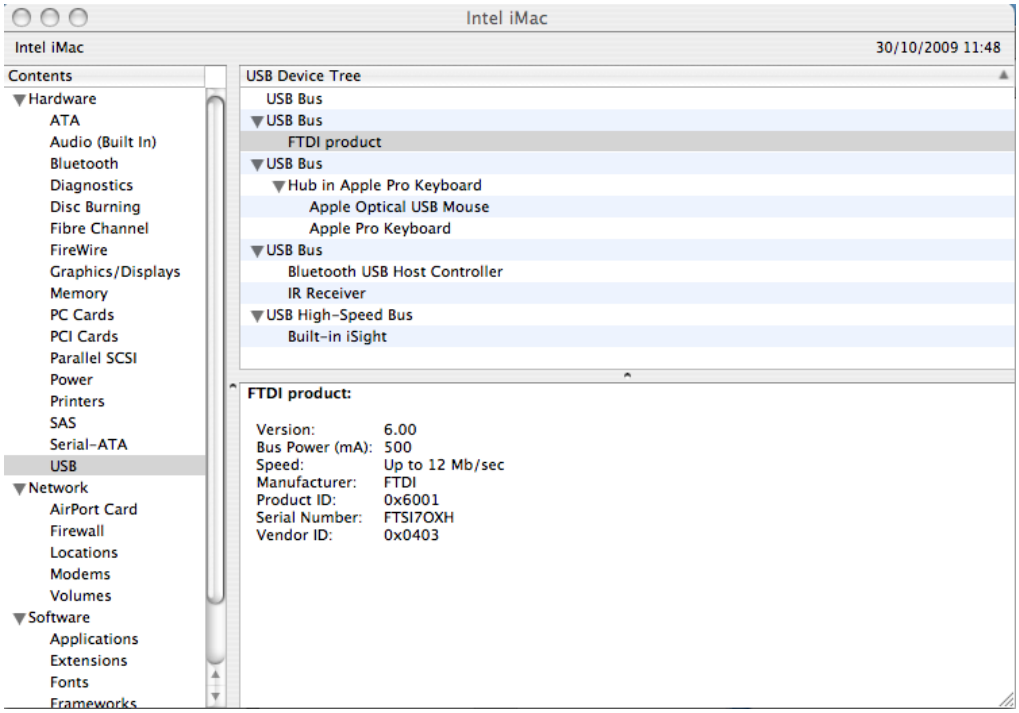
5 VCP Troubleshooting

5.1 How do I know what my deviceID is?

Launch the System Profiler utility, or Apple System Profiler for earlier versions of OS X. This can be accessed by going to the Finder and selecting Applications from the Go menu, then open the Utilities folder.

Select USB under Hardware in the panel to the left and then select the appropriate device from the USB Device Tree.
In the screen shot below (from OS 10.4), the device has a deviceID given by:
Vendor ID: 0x0403
Product ID: 0x6001



If the device does not work after installing the driver, it is likely to be because the PID is not supported by the driver. If this is the case, contact the vendor of your product to determine if they provide an edited driver to support their product. If they do not provide an edited driver you can make the edits yourself by following the instructions in TN_105 Adding Support for New Devices to MAC Driver from the FTDI website
http://www.ftdichip.com/Documents/TechnicalNotes/TN_105%20Adding%20Support%20for%20New%20FTDI%20Devices%20to%20Mac%20Driver.pdf

Please note that editing the kext to add a VID/PID, or alias a baud rate now requires re-signing with a kext-signing certificate.

If the VID is not 0x0403, it is likely that the device is not an FTDI device and we cannot support it.

5.2 The device does not appear in the /dev directory

FTDIUSBSerialDriver does not support your deviceID (VID and PID).

Disable the EEPROM so that the device reverts to its default deviceID, then replug.

To get support for your deviceID built into FTDIUSBSerialDriver, contact the vendor of your product to determine if they provide an edited driver to support their product. If they do not provide an edited driver

you can make the edits yourself by following the instructions in TN_105 Adding Support for New Devices to MAC Driver from the FTDI website
http://www.ftdichip.com/Documents/TechnicalNotes/TN_105%20Adding%20Support%20for%20New%20FTDI%20Devices%20to%20Mac%20Driver.pdf

On OS X 10.11 or later, another possibility is that VCP has been blocked by installation of D2xxHelper, bundled with an application. VCP and such an application are mutually exclusive. To force using VCP, disable D2xxHelper:

```
cd /Library/Extensions

sudo mv D2xxHelper.kext D2xxHelper.disabled
```

Then reboot. To force using D2xx again, rename D2xxHelper.disabled back to D2xxHelper.kext and reboot.

5.3 The text "NewPort Detected" is not displayed in System Preferences-Network

The device does not show in the System Preferences Networok window as Apple requested we remove this.

5.4 The device cannot be accessed even though the deviceID is supported in FTDIUSBSerialDriver

An ownership or permissions problem is preventing the system from making the device accessible.

Check that the driver is owned by root and wheel. The most common symptom is the group for FTDIUSBSerialDriver is not wheel.
To change the group, login as root and perform the following script in a Terminal window (Go > Applications > Utilities > Terminal):

cd /system/library/extensions
chgrp -R wheel FTDIUSBSerialDriver.kext

Reboot for the change to take effect.

On OS X 10.11 or later, another possibility is that VCP has been blocked by installation of D2xxHelper, bundled with an application. VCP and such an application are mutually exclusive. To force using VCP, disable D2xxHelper:

```
cd /Library/Extensions

sudo mv D2xxHelper.kext D2xxHelper.disabled
```

Then reboot. To force using D2xx again, rename D2xxHelper.disabled back to D2xxHelper.kext and reboot.

5.5 How do I open a Terminal window?

A Terminal window can be started by selecting
Go > Applications > Utilities > Terminal

The terminal window is equivalent to a DOS prompt in Windows.

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6 D2XX Troubleshooting

6.1 I can't open a device even though the installation has been successful

This is possibly due to another driver claiming the device for use as a virtual COM port. To check, type:

```
kextstat | grep FTDI
```

If the output contains lines referring to either (or both) of `AppleUSBFTDI` or `FTDIUSBSerialDriver`, the solution is one of the following:

- Reprogram the FTDI chip with non-FTDI (vendor/product) identifiers. This prevents OS X from matching the device with any other driver. See http://www.ftdichip.com/Support/Documents/TechnicalNotes/TN_100_USB_VID-PID_Guidelines.pdf for guidance on this.
- On OS X 10.9 and later: install `D2xxHelper` which blocks `AppleUSBFTDI` and `FTDIUSBSerialDriver` from matching standard FTDI chips. See section 7.3.
- On OS X 10.10 and earlier: disable or temporarily unload the serial driver(s). For FTDIUSBSerialDriver, see section 4; for AppleUSBFTDI, see section 7.

Another possibility is an incorrect VID/PID. Try changing your application to use the FT_SetVIDPID API call to quickly determine if this is the case.

6.2 After running an application two or three times, communication stops

It is always recommended that you close a file handle obtained by FT_Open/FT_OpenEx before exiting an application. Side effects of not closing the handle with the multithreaded setting (as illustrated above) can be future communication with the device fails (always test this prior to enabling this setting).

The Sample applications demonstrate a method of trapping an abnormal exit (control C operation) and closing each handle in turn.

If you cannot find a work around then try setting the USB Reset After Open bit in the ftd2xx.cfg file but only as a last resort.

6.3 Problems upgrading to the latest D2XX driver

Upgrading the D2XX library can cause problems, such as a reported bug fix does not appear to be fixed. This is most likely related to the application executable pointing to a previous version of the library.

To determine which D2XX library your application is using perform the following steps (examples in brackets assume you have copied all of the files to the desktop and successfully compiled the samples as described in the Samples section):

Open a Terminal window (Go > Applications > Utilities > Terminal).

Change directory to the application executable folder (cd Desktop/D2XX/Samples/Simple)

Use otool to determine the library path (otool -L simple).

The following text is an example of what is displayed

simple:
/usr/local/lib/libftd2xx.1.2.2.dylib (compatibility version 1.2.2, current version 1.2.2)
/usr/lib/libSystem.B.dylib (compatibility version 1.0.0, current version 88.1.6)

As illustrated the, simple application is pointing to libftd2xx.1.2.2.dylib.

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To alter the library so that the simple sample points to use the install_name_tool (e.g install_name_tool -change /usr/local/lib/libftd2xx.1.2.2.dylib /usr/local/lib/libftd2xx.dylib simple).

Please note you may need to change user mode to perform this function depending on the file permissions set on the executable.

Run the otool (illustrated in step 3 above) to confirm that the library pointed to by the application has changed and is correct.

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7 Disabling the Apple-provided VCP on OS X 10.9 and later

A VCP driver for most FTDI USB to serial converters is provided as part of the kernel in OS X 10.9 and later. OS X loads this driver (AppleUSBFTDI.kext) when a device with standard FTDI vendor and product identifiers is connected. To use FTDI's own VCP instead, or to use D2XX programs, AppleUSBFTDI must be disabled, unloaded or blocked, as follows.

7.1 Disable by Renaming (OS X 10.9 and 10.10 only)

Note: this method works **only on 10.9 Mavericks and 10.10 Yosemite**.

Start a terminal session (Go > Applications > Utilities > Terminal) and copy/paste the following text to the command prompt:

```
cd /System/Library/Extensions/IOUSBFamily.kext/Contents/Plugins
sudo mv AppleUSBFTDI.kext AppleUSBFTDI.disabled
sudo touch /System/Library/Extensions
```

then reboot.

To re-enable VCP, rename AppleUSBFTDI.disabled back to AppleUSBFTDI.kext

```
cd /System/Library/Extensions/IOUSBFamily.kext/Contents/Plugins
sudo mv AppleUSBFTDI.disabled AppleUSBFTDI.kext
sudo touch /System/Library/Extensions
```

then reboot.

7.2 Temporarily Unload (all versions of OS X)

Note: this method works on all versions of OS X.

It is possible to unload Apple's VCP for the current session, i.e. until the next reboot:

```
sudo kextunload –b com.apple.driver.AppleUSBFTDI
```

(If a warning message indicates that the kext can't be unloaded, then reboot and retry the above command.)

To reload:

```
sudo kextload –b com.apple.driver.AppleUSBFTDI
```

The kextunload and kextload commands can be run in any directory.

7.3 Block with D2xxHelper (OS X 10.9 and later)

Note: this is the only non-temporary method which works on **10.11 El Capitan**.

FTDI provides a signed kernel extension (D2xxHelper.kext) which contains no code but acts to prevent OS X from matching an FTDI chip (with standard vendor and product identifiers) with a VCP driver, either Apple's **or FTDI's**. This leaves the device unclaimed, and **available for D2XX programs only**.

1. Disconnect all FTDI devices.
2. Download and run the D2xxHelper installer from http://www.ftdichip.com/Drivers/D2XX.htm
3. Reboot.
4. Reconnect the FTDI devices.

7.3.1 Distributing D2xxHelper

To include D2xxHelper.kext with your own D2XX application installer, download the package from the link above, then extract it with:

```
pkgutil --expand D2xxHelper.pkg tmpdir
tar –xf tmpdir/dst.pkg/Payload
```

This creates Library/Extensions/D2xxHelper.kext in the current directory.

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Appendix A – Abbreviations

Terms	Description
PID	Product ID, a unique product identification issued by the holder of the
VID	Vendor ID, a unique vendor identification number issued by the USB
USB	USB Universal Serial Bus
OS	Operating System

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Appendix B – Revision History

Document Title: FTDI Drivers Installation guide for MAC OS X
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0.1	First Draft	2009-08-21
1.0	First Release	2009-11-06
1.1	Add Mavericks instructions	2013-11-25
1.2	Updated for OS X 10.10	2015-04-15
1.3	Updated for OS X 10.11	2015-09-28
1.4	Updated errors & removed copyright year	2016-06-14

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