

How to Switch to a Cypress Customized Mass Storage Driver in a Windows Operating Systems

AN1158

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Application Note Abstract

Various windows operating systems provide default mass storage class driver. But user may need to switch from this default driver to customized driver, such as Cypress customized mass storage driver for AT2LP™. This application note describes how to install new driver and switch from default mass storage driver provided in various windows Operating Systems.

Introduction

The various Windows operating systems require a USB mass storage class (MSC) device driver to communicate to a USB connected mass storage device. Windows 2000, Windows XP and windows Vista, all have an MSC driver built into them and do not require a different driver. While these OS do not require a different driver, the user may have a need for added functionality, not provided in the Microsoft driver and which can be provided by customized MSC drivers. For example Cypress provides customized mass storage driver. In this case, since on enumeration, the mass storage device uses the OS class driver, the user needs to specify a different driver to be used. This document intended to explain on how to install and switch to the new driver and switch from provided plug-and-play driver in these various operating systems. This document assumes that the user has a functional USB host controller, basic knowledge of the Windows operating system, and a plug-and-play driver for their device.

Getting Started

This document explains how to make their operating system use the Cypress driver over a default OS mass storage driver. Because major systems changes vary slightly, this document is divided into a different section for each operating system (Windows 2000 and Windows XP). Screen shots are included in each section for your reference. Your screen need not necessarily look like the screen shots in this document, because each user can configure their operating system differently. Before the Cypress driver can be used with a given device, the driver files must be modified to contain the connected device's Vendor Identifier (VID) and Product Identifier (PID). The VID is specific to each vendor and is distributed by USB-IF (www.usb.org). The PID is determined by the vendor and is usually different for each product the company produces. The Cypress plug-and-play driver can be

downloaded from the [cypress website](http://cypress.com). This download also includes instructions on how to modify the driver to contain your VID and PID along with custom strings.

The following sections contain step-by-step information about installing and switching to customized mass storage driver for windows 2000 and windows XP. For other windows operating systems like Vista and windows 7, the core information remains the same with some changes in windows screen snapshot graphics.

Windows 2000

Windows 2000 is a derivation of Windows NT. A key addition to Windows 2000 is that it includes a MSC driver written by Microsoft. This means that running a mass storage device on Windows 2000 does not require any additional drivers. An exception to this is if you have an AT2LP connected to an ATA hard disk drive, the use of the Cypress driver is required for ATAPI-to-ATA translation. If you want features included in the Cypress driver, you need to tell the operating system what driver to use and where it can be found.

When you connect your USB Mass Storage Device to the USB controller, Windows 2000 loads the Microsoft MSC by default and mount a drive letter for that device. The following instructions show how to change the MSC driver to the Cypress driver for a device. These instructions assume the system has a functional USB host controller installed.

1. Open System Properties

The first step in changing the driver is to open the Device Manager. There are several ways of doing this and any of them can be used. One method of doing this is to right click on My Computer with your mouse and select Properties, as shown in [Figure 1](#).

Figure 1. Open Systems Properties



2. Open Device Manager

After step 1 is complete, the System Properties window is displayed. Select the Hardware tab at the top of this window and press the Device Manager button as shown in Figure 2. Note that there is also a Driver Signing button to the left of the Device Manager button. This can be used to change the level of warning the operating system uses, when using an unsigned driver. The Cypress driver is an unsigned driver—if you are receiving warnings that you like to eliminate, change the settings by pressing this button.

Figure 2 Opening Device Manager

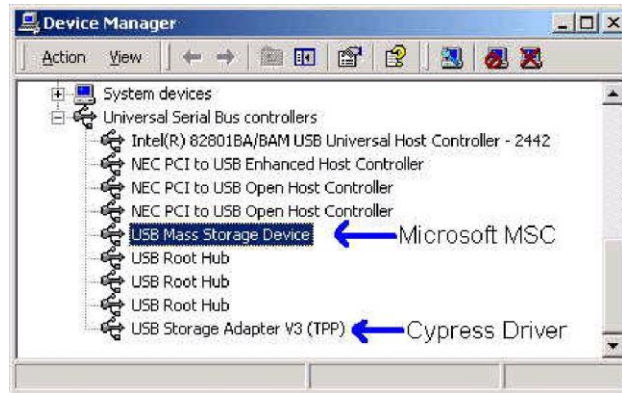


3. Expand the USB controllers

Expand the Universal Serial Bus controllers' folder by selecting the + next to "Universal Serial Bus controllers." If the MSC is loaded, you should see the string "USB Mass

Storage Device." If this line is not displayed, your device may not be functioning correctly. Note in Figure 3 that there are two devices connected to the USB bus. One is using the Microsoft MSC driver (USB Mass Storage Device) and the other is using the Cypress driver (USB Storage Adapter V3(TPP)).

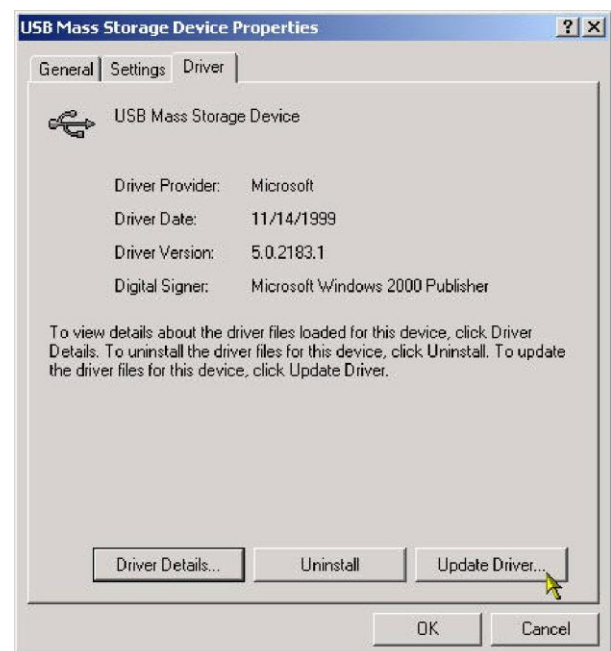
Figure 3. Device Manager in Windows 2000



4. Update Driver

1. Right click on "USB Mass Storage Device" in the Device Manager.
2. Select Properties and the USB Mass Storage Device Properties window appears (see Figure 4).
3. Select the Driver tab at the top of the window.
4. Press the Update Driver... button.
5. After the Update Driver... button is pressed, a new window is displayed, welcoming you to the upgrade Device Driver wizard. Press the **Next**.

Figure 4. USB Mass Storage Device Properties



5. Search for Driver

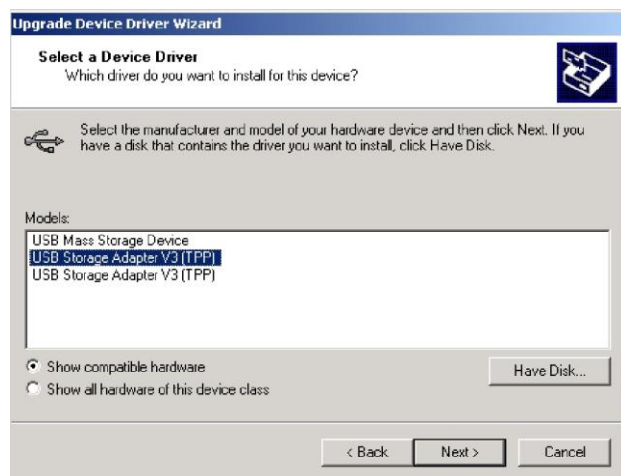
The next step is to tell the OS where the new driver is located. Select “Search for a suitable driver for my device (recommended)” and then press the **Next >** button (see Figure 5).

Figure 5. Search for New Driver



Note that if the other option was chosen, “Display a list of the known drivers for this device so I can choose a specific driver,” a window similar to the one in Figure 6 is displayed showing the various drivers that the OS knows about, which can be used with this device. This is an excellent place to switch between various drivers after they are installed on the computer. For example, after you have installed the Cypress driver, you have at least two choices. In the example in Figure 6, the device had two instances of the Cypress driver installed along with the Windows 2000 driver. If you want to install yet another driver, you can press the **Have Disk...** button and navigate to the driver files.

Figure 6. Select a Device Driver



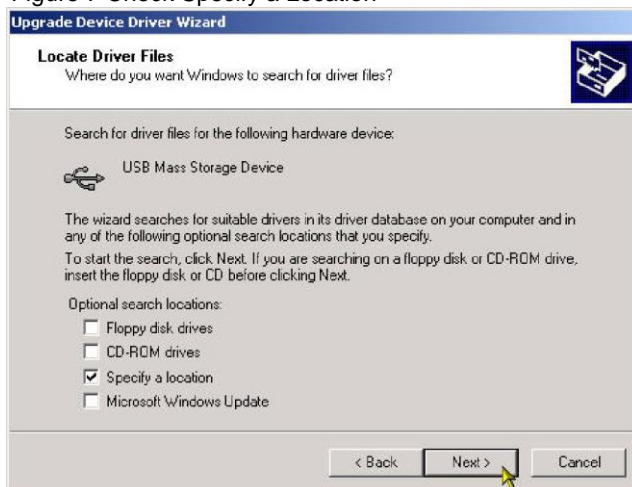
6. Locate Driver Files

Assuming you chose “Search for a suitable driver for my device” in step 5 and you know where you have placed the

plug-and-play driver, make sure the only box with a check mark is “Specify a location,” as shown in Figure 7.

Press the **Next**.

Figure 7 Check Specify a Location



7. Browse to the Driver Location

You are now given the opportunity to browse to the location of the driver.

1. Press the browse button and browse to the directory where you modified the .inf file for your VID and PID.

Figure 8. Browse to Driver Files

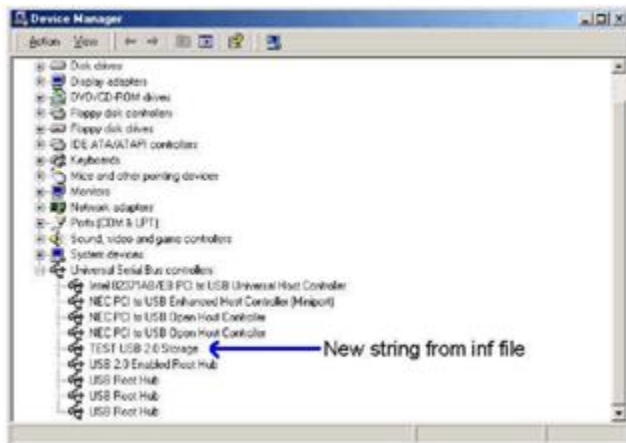


2. Press the **Open** button and then the OK button and follow the instructions on the screen. You experience a short delay while the operating system updates its registry and re-enumerates the connected device.
3. You can now close the driver update window. You may have to restart your computer at this time depending on the current status of the OS when the driver was installed.

8. Verify Driver Switch in Device Manager

The device manager window should now show the new strings that you have chosen and placed in the .inf file, as shown in Figure 9 on page 4.

Figure 9. Device Manager with New Driver String



Windows XP

Windows XP is a derivation of Windows NT/2000. A key addition to Windows 2000 was that it included an MSC driver written by Microsoft. Windows XP and also has its own MSC. This means that running a mass storage device on Windows XP does not require any additional drivers. An exception to this is if you have an AT2LP connected to an ATA HDD. In this case, the driver is necessary for ATAPI-to-ATA translation. If you want additional features included in the Cypress driver, you need to tell the operating system what driver to use and where it can be found. Windows XP always tries to use a signed driver if possible. Since the Cypress drivers do not have the digital signature, Windows XP chooses the Microsoft MSC over the Cypress driver, unless specified by the user. Individual OEM customers can go through the process of getting the driver signed and make the necessary changes to the .cat and .inf files. The driver signing process is covered in a separate application note.

When you connect your USB Mass Storage Device to the USB controller, Windows XP loads the Microsoft MSC driver by default and mounts a drive letter for that device. The following instructions show how to change the MSC driver to the Cypress driver for a device. These instructions assume that the system has a functional USB host controller installed.

1. Open System Properties

There are several ways to get to the System Properties in Windows XP. Figure 10 shows a convenient method to open System Properties.

1. Left-click with your mouse on Start.
2. Right-click with your mouse on My Computer
3. Move the mouse cursor down to Properties and select it.

Figure 10. Getting to System Properties



2. Open Device Manager

1. In the System Properties sheet, select the Hardware tab at the top of the window.
2. Press the Device Manager button in the middle of the window (See Figure 23).
3. Note also the Driver Signing button. This selection gives the user the option of changing the level of warning for unsigned drivers. The Cypress driver is not a signed driver and you receive a warning when loading the driver.

Figure 11. Opening Device Manager

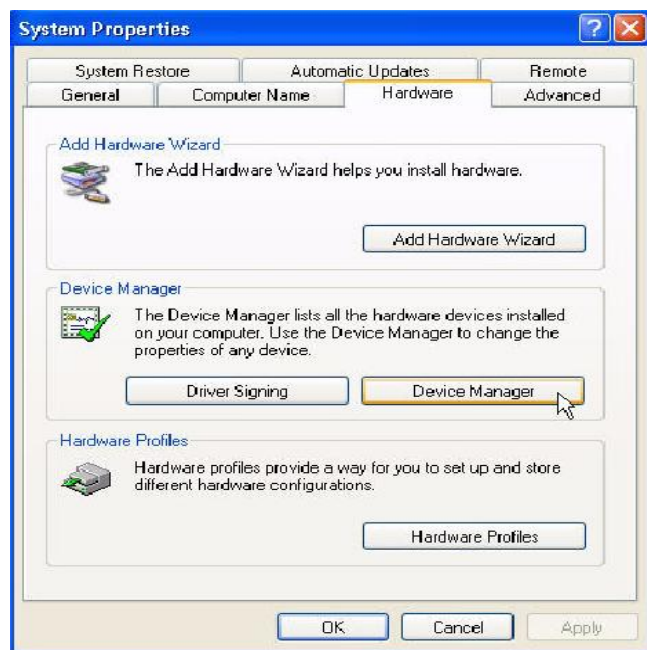


Figure 12 shows a typical Device Manager with the Universal Serial Bus Controllers section expanded. Note that in this window, no Mass Storage Devices are enumerated on the system.

Figure 12. Device Manager before Mass Storage



3. Open Device Driver Properties

Figure 13 is again the Device manager. In this case, the device is enumerated with the Microsoft MSC driver (USB Mass Storage Device). The actual driver is called `usbstor.sys` and is located in the `Windows\System32\Drivers` directory. To change the driver that is to be used, we need to get to the driver properties. To do this, right click on "USB Mass Storage Device" and select Properties.

Figure 13. Device Manager with Device Enumerated with Microsoft XP MSC



4. Update Driver

After the USB Mass Storage Device Properties window appears. Select the Driver tab at the top of the window. In this window, you can get Driver Details such as the revision of a driver; you can also update the driver. In our case, you want to update the driver (see Figure 14). When you press Update Driver, the Update Wizard shown in Figure 15 is displayed.

Figure 14. Update Driver



5. Update Wizard

The next step is to point the wizard to the location at which the driver is located. In this case, we need to point to a specific location. Choose the selection "Install from a list or specific location (Advanced)" and then press the Next > button.

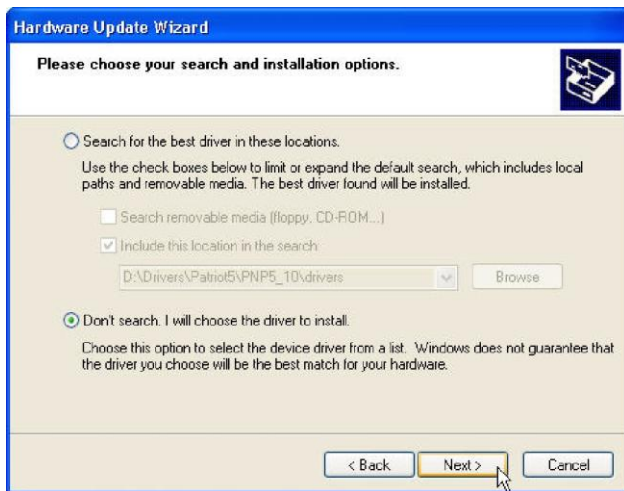
Figure 15. Hardware Update Wizard



6. Choose Search and Installation Options

Now you should see a dialog box similar to that in Figure 16. In this example, we do not want the operating system to search for a driver. Instead, we want to point to a particular driver to install. To do this, choose the option “Don’t search, I will choose the driver to install” and press the **Next** button.

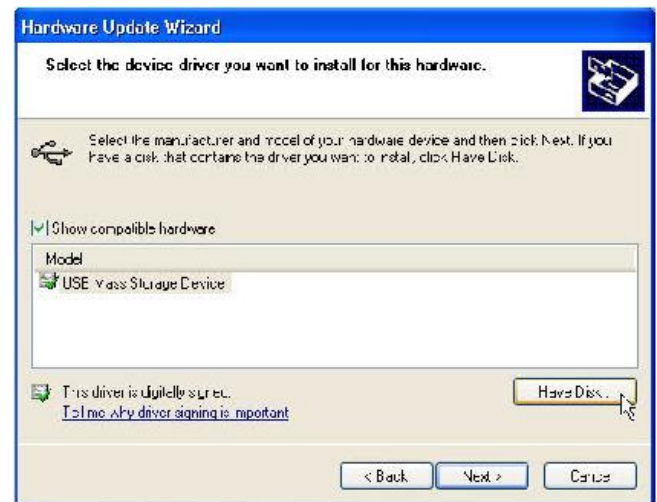
Figure 16. Choose Install Options



7. Select Driver to Install

The next dialog box to be displayed should look similar to the one in Figure 17. If the operating system knows about another driver that is associated with this device, it is also displayed in this window. In this example, the only driver available is the class driver built into the operating system (usbstor.sys). When two or more drivers are installed for a device, this is where you switch between the two. In this example, we are installing a new driver so you can press the “Have Disk” button.

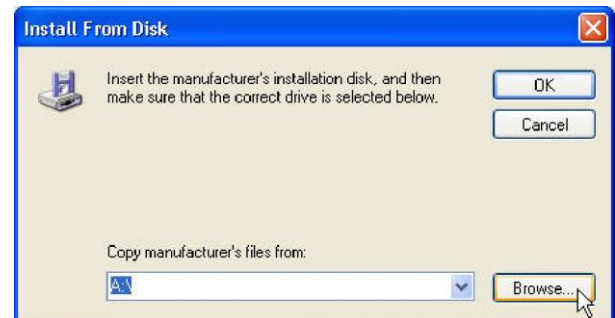
Figure 17. Select Driver to Install – Have Disk



8. Navigate to Driver

After pressing the “Have Disk” button, a dialog box similar to Figure 18 is displayed. Press the “Browse” button to navigate to the directory where you have placed the modified driver.

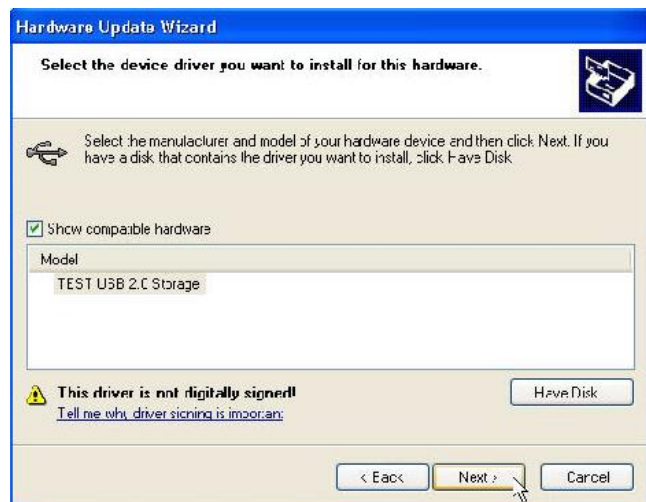
Figure 18. Navigate to Driver Directory



9. Install the Driver

After you have specified to the hardware wizard where the driver is located, the Select driver window is displayed again, except this time it has your driver string from the .inf file displayed. Figure 19 shows an example of this where the string “Test USB 2.0 Storage” is the string associated with the VID/PID in the .inf file. Note the warning in the window telling the user that the driver is not signed. The Cypress driver is tested for sign ability, but it is the responsibility of each customer to get their version of the driver signed, if necessary. While Cypress has tested the driver in Windows XP, it is also the responsibility of the customer to verify the driver with their hardware. Press **Next** button.

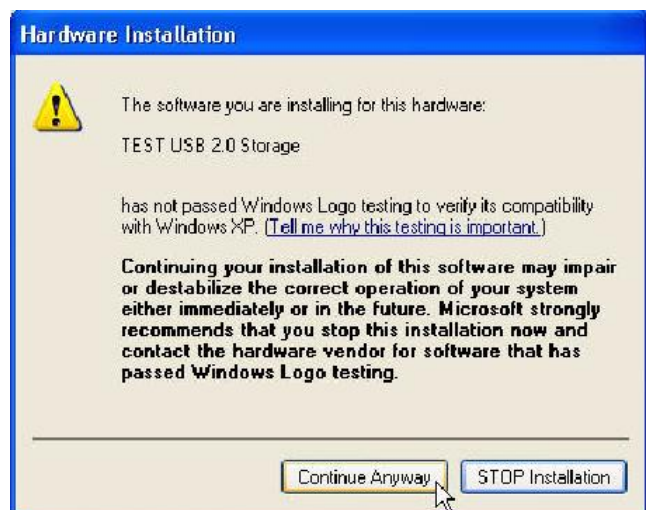
Figure 19. Select Driver to Install



10. Choose Continue Anyway Option

A Hardware Installation warning dialog box is displayed, if the driver does not have a digital signature (see Figure 20). As previously mentioned, Cypress has tested the driver thoroughly and has not found any defect that should prevent the user from continuing with the installation.

Figure 20. Install Driver Even Without Signature



11. Verify driver in Device Manager

After the driver is installed, open the device manager again and verify that the new driver string is displayed (See Figure 21).

Figure 21. Device Manager after New Driver is installed



Summary

The document has explained installing procedure as well as procedure for how to switch from windows default mass storage class driver to any other customized MSC driver.

This functionality is useful when installing Cypress customized mass storage driver for AT2LP.

Although the step-by-step procedure is explained for windows 2000 and windows XP operating systems, but for other windows operating systems like Vista and windows 7, the core information remains same with some minor changes in windows screen pictures (used for clear explanation in this document)"

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**	3176717	SSJO	02/18/2011	New Spec created for this app note as the document is not available in Spec system but available in Cypress site.

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