

USB

This chapter presents the requirements and recommendations for Universal Serial Bus (USB) under the Microsoft Windows family of operating systems.

Version 1.1

Includes changes to items 1, 3, 5, 6, and References for USB, as previously published in the PC 97 FAQ on <http://www.microsoft.com/hwdev/pc97.htm> and the PC 97 OnNow Requirements on <http://www.microsoft.com/hwdev/desguid/onnowpc97.htm>

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Overview for USB

Universal Serial Bus (USB) provides a bidirectional, isochronous, dynamically attachable serial interface for adding peripheral devices such as game controllers, serial and parallel ports, and scanners on a single bus.

For PC 97, USB provides a fast, low-cost solution that is strongly recommended for communications and input devices. The following are the key design features for USB under the Microsoft Windows operating systems:

- For PC 97, USB is required on all systems that receive the “Designed for Microsoft Windows” logo.
- All USB components in a PC 97 system must comply with the USB Specification and related USB device class specifications.
- The host controller must comply with OpenHCI or UHCI.
- Microsoft provides support for USB using the Microsoft Win32 Driver Model (WDM). Hardware vendors who implement USB solutions for devices can use the drivers provided by Microsoft or can create minidrivers to exploit any additional unique hardware features.

USB Basic Requirements

This section summarizes the basic design requirements for USB.

1. USB included on PC system

Required

This is required for all PC 97 system types. As noted in “Basic PC 97” in Part 2 of this guide, BIOS boot support is required when a USB keyboard is the sole keyboard support provided with the PC system.

Version 1.1 Clarification:

As of July 1, 1997, USB devices must comply with the capabilities defined in the *Universal Serial Bus Specification, Version 1.0* (“USB core specification”). As of April 1, 1998, USB devices must comply with the additional requirements defined in the power management extensions to the USB core specification, which are described in the “OnNow Requirements in the USB Core Specification” section of the white paper titled [“OnNow Power Management and USB.”](#) These requirements are based on the power management extensions to the USB core specification. (Change date: April 30, 1997)

2. All USB hardware complies with Universal Serial Bus Specification

Required

All USB hardware must comply with the USB Specification v. 1.0 or higher, as published by Compaq, Digital Equipment, IBM, Intel, Microsoft, NEC, and Nortel. This ensures that USB hardware has complete Plug and Play capabilities

and is implemented in a standard way. For example, on any system that has USB capabilities, a user must be able to dynamically attach any USB peripheral to any USB connector; the operating system should recognize it automatically, load and initialize the appropriate drivers, and make the device available for use.

3. USB connectors use USB icon

Required

The icon can be molded, printed, or use permanent stickers (which can include text). Icons can be based on vendor designs or use the recommended icon for USB defined in the USB Specification, Chapter 6, as follows:

The USB icon should be molded into the connector and also placed on the product for ease of identifying the USB port. It is recommended that the icon on the product and the one on the plug be adjacent to each other when the plug and receptacle are mated. This icon can be used for both series A and B connector schemes. On the plug, there should be a .635 mm rectangular recessed area around the icon such that there is a perceptible feel of the icon.



Version 1.1 Clarification:

Because the location and number of ports for USB can be variable, the need for appropriate icons on both ports and cables will be important ease-of-use factors for the new external expansion connections. For PC 97, therefore, icons for USB are required for the following:

- External devices
- Connecting cables
- Connection port

Compliance testing for this requirement began **October 1, 1997**. (Change date: April 7, 1997)

USB Controller Requirements

This section summarizes USB class specifications and standards for host controllers.

4. USB host controller complies with OpenHCI or UHCI

Required

The host controller must be compliant with either OpenHCI for USB (published by Compaq, Microsoft, and National Semiconductor) or Universal HCI (UHCI; published by Intel).

Microsoft intends to support only these two USB host controller implementation standards. Hardware manufacturers who design to one of these specifications should not require an additional device driver for their host controller.

Power Management for USB

This section summarizes the specific power management requirements for USB.

5. Compliance with USB power management requirements

Required

The Universal Serial Bus specification defines power management requirements for USB devices in the “Device Framework” section in the USB Specification v.1.0 or higher. The chapter defines specific requirements for power states that must be supported by USB devices (USBOn, USBSuspend, and USBOff, with power consumption levels for each) and capabilities (such as the saving of device state and the ability to signal a resume on the bus).

These requirements are mandatory for all USB devices per the USB Specification, and are required for PC 97.

Version 1.1 Clarification:

“Designed for Windows NT and Windows 95” logo compliance dates:

- USB 1.0: **July 1, 1997**
- USB 1.0 with OnNow enhancements: **April 1, 1998** (Change date: October 13, 1997)

To meet the logo requirements for **July 1, 1997**, all the power management capabilities defined in the *Universal Serial Bus, Version 1.0*, specification must be supported on platforms and devices as of July 1, 1997. This includes at a minimum (but might not be limited to) the following:

- USBSuspend mode
- Port states such as Disabled, Off, and so on
- Report power consumption for each configuration using the Configuration Descriptor and so on

To meet the logo requirements for **April 1, 1998**, all power management capabilities for devices must be implemented as defined in the “OnNow Requirements in the USB Core Specification” section of the white paper titled *OnNow Power Management and USB* on the web at <http://www.microsoft.com/hwdev/desinit/onnowusb.htm>.

Implementation guidelines plus the underlying mechanisms upon which these requirements are based are defined in the white paper. The USB Device Working Group (DWG) has approved this same set of guidelines and mechanisms. (See the DWG's List of Approved Review Requests.)

6. Devices comply with “Power Device Class Specification” for USB

Required

All USB devices must implement the Power Device Class-specific descriptors and requests as described in the “Power Device Class Specification.” In addition:

- Any device that uses a power source other than the USB bus itself must also implement the Power Device Notification interrupt. These requirements ensure that Windows is able to control the device’s power state, determine the status of the power source for the device (either bus, AC, or battery), and be notified when that status changes.
- Each device must meet the related “Device Class Power Management Reference Specification” for its particular device class, as described in the related chapters in Part 4 of this guide.

Version 1.1 Clarification:

“Designed for Windows NT and Windows 95” logo compliance dates:

- USB 1.0: **July 1, 1997**
- USB 1.0 with OnNow enhancements: **April 1, 1998** (Change date: October 13, 1997)

To meet the logo requirements for **July 1, 1997**, all the power management capabilities defined in the *Universal Serial Bus, Version 1.0*, specification must be supported on platforms and devices as of July 1, 1997. This includes at a minimum (but might not be limited to) the following:

- USB Suspend mode
- Port states such as Disabled, Off, and so on
- Report power consumption for each configuration using the Configuration Descriptor and so on

To meet the logo requirements for **April 1, 1998**, all power management capabilities for devices must be implemented as defined in the “OnNow Requirements in the USB Core Specification” section of the white paper titled *OnNow Power Management and USB* on the web at <http://www.microsoft.com/hwdev/desinit/onnowusb.htm>.

Implementation guidelines plus the underlying mechanisms upon which these requirements are based are defined in the white paper. The USB Device Working Group (DWG) has approved this same set of guidelines and mechanisms. (See the DWG’s List of Approved Review Requests.)

Design Features for USB Peripherals

This section summarizes requirements related to bus-class specifications and standards for peripherals that use this bus.

7. Device complies with related USB device class specification

Required

If you develop a peripheral that fits into one of the USB device class definitions, it must comply with the related USB specification. This allows Microsoft to develop USB class drivers that support all compliant peripherals in that class. This requirement also means that you do not have to develop your own device drivers for Windows.

References for USB

This section lists some of the publications, services, and tools available to help build hardware supported by with Windows operating systems.

USB Specification v. 1.0 or higher

USB Device Class Specifications 1.0 or higher

USB-IF Information

Phone: (800) 433-3652 (U.S. \$35)

<http://www.teleport.com/~usb/> (free)

Open Host Controller Interface (OpenHCI) v. 1.0 or higher

<http://www.microsoft.com/hwdev/respec/busspecs.htm>

Universal HCI (UHCI) Design Guide for USB

<http://www.intel.com/pc-supp/>

Version 1.1 References Update:

Intel information about USB, including the UHCI design guide for USB

<http://developer.intel.com/design/designex/uhci11d.htm>

<http://developer.intel.com/design/usb/>

OnNow Power Management and USB and other OnNow-related articles

<http://www.microsoft.com/hwdev/onnow.htm>

Open Host Controller Interface, Version 1.0

<http://www.microsoft.com/hwdev/respec/>

USB Class Definition for Communications Devices, Version 0.9

USB Common Class Specification, Version 0.9

USB Device Class Definition for Audio Devices, Version 0.9

USB Device Class Definition for Human Interface Devices, Version 1.0

USB Device Class Definition for Mass Storage Devices, Version 0.9

USB Device Class Definition for Printing Devices, Version 1.0

USB HID Usages Tables, Version 0.9

USB Monitor Control Class Specification, Version 1.0

USB Power Devices Usages Table, Version 0.9

USB Specification, Version 1.0

USB Implementers Forum

Phone: (503) 264-0590

Fax: (503) 693-7975

<http://www.usb.org>

Windows NT DDK

MSDN Professional membership

Checklist for USB

USB Basic Requirements

1. *USB included on PC system*
Required
2. *All USB hardware complies with Universal Serial Bus Specification*
Required
3. *USB connectors use USB icon*
Required

USB Controller Requirements

4. *USB host controller complies with OpenHCI or UHCI*
Required

Power Management for USB

5. *Compliance with USB power management requirements*
Required
6. *Devices comply with "Power Device Class Specification" for USB*
Required

Design Features for USB Peripherals

7. *Device complies with related USB device class specification*
Required
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