

Digital Still Image Peripherals

This chapter presents the PC 99 requirements and recommendations for digital still image peripherals, including but not limited to digital cameras and scanning devices such as sheet-fed, flatbed, handheld, film, and fingerprint scanners.

For an overview of the design and market issues, see “Scanner and Digital Still Image Device Issues” in Chapter 2, “PC 99 Design Initiatives.”

Contents

Digital Still Image Devices Basic Features.....	392
PC 99 Design for Digital Still Image Devices	397
Plug and Play for Digital Still Image Devices.....	397
Digital Still Image Device Power Management.....	398
Device Drivers and Installation for Digital Still Image Devices	398
Digital Still Image Device References	399
Checklist for Digital Still Image Devices	400

Digital Still Image Devices Basic Features

This section summarizes the basic PC 99 hardware requirements for scanners and digital cameras.

22.1. Device uses PC 99 compatible port connection with USB or IEEE 1394 connection

Required

Recommended: USB or IEEE 1394 connection for all imaging peripherals.

PC 99 requires the use of USB for digital cameras that generate uncompressed images of more than 800K pixels. Although digital cameras maintain a serial port interface for mainstream connectivity, the low bandwidth and slow throughput provided by the serial port do not match the bandwidth requirements of megapixel cameras. This creates a less than satisfactory user experience while transferring images to the PC.

Multiple device support, adequate bandwidth, and ease of connectivity make USB and IEEE 1394 excellent conduits for both digital cameras and scanners.

All scanners and digital cameras must use PC 99 compatible port connections. No proprietary solutions are acceptable for PC 99.

22.2. Icons provided for port and peripheral connectors

Required

To ensure proper connection by the user between cable and connector, an icon or text identifier must be added to any external connector, using vendor designs or the icons provided in Appendix A, “Icons.” The icon can be molded into or printed on the plastic, either by stamping or by affixing as a permanent sticker.

22.3. Device supports ICC color management

Required

Windows 98 and Windows 2000 Professional operating systems support using color profiles that comply with the International Color Consortium (ICC) Profile Format specification. All color output from still-image devices must be defined. The device either must create sRGB output or must embed the ICC profile for the newly acquired image into the image file to identify the color-space information for that image.

For contact information on device profiles, see the references at the end of this chapter. The Integrated Color Management (ICM) APIs and functionality for Windows 98 and Windows 2000 operating systems are described in the Microsoft Platform SDK and the Windows 2000 DDK.

PC 99A clarification: Implementation details are defined in “Color Management for Still Image Devices” in “Part 4: Still Image Drivers” of the “Graphics Drivers Design Guide” in the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/stilling_1f3b.htm).

Color-capable devices such as desktop monitors, printers, scanners, still-image cameras, LCDs, color plasma displays, or other flat-panel devices are required to install one or more ICC profiles for ICM. Providing a monitor color-calibration utility is recommended for generating, editing, and installing ICC profiles. The sRGB profile will be distributed in Windows 98 and Windows 2000.

22.4. IR device meets PC 99 IR requirements

Required

For imaging devices that include an IR interface, all IR hardware must at minimum comply with the IR requirements defined in Chapter 13, “I/O Ports and Devices.”

22.5. Digital still image device with an IR interface uses Fast IR*Required*

To improve the customer experience, the use of fast transfer mechanisms is advocated for digital cameras. It is required that every digital camera with an IR interface support Fast IR and include backward compatibility to Serial IR.

22.6. Digital still image device with an IR interface provides a secondary PC interface*Required*

Devices with an IR interface must provide a secondary interface using a PC 99 compatible port connection, such as USB or IEEE 1394, to ensure that the widest variety of imaging devices are available for use with PC applications. A non-megapixel IR camera that ships with an IR serial interface adapter complies with this requirement.

Although IR interfaces are increasingly available in desktop systems and especially mobile PCs, many PCs do not include an IR interface.

22.7. SCSI device meets PC 99 SCSI requirements*Required*

All SCSI hardware must comply with the requirements defined in Chapter 11, “SCSI.” This ensures complete Plug and Play capabilities with SCSI hardware. For example, a user must be able to attach any SCSI peripheral on a system with SCSI support. The operating system should automatically recognize it, load and initialize the appropriate drivers, and then make the device available for use.

22.8. SCSI device attaches to any PC 99-compliant SCSI controller*Required*

All SCSI scanners must be able to attach successfully to any SCSI controller that meets the PC 99 requirements defined in Chapter 11, “SCSI.”

22.9. USB device meets PC 99 USB requirements*Required*

All USB hardware must comply with the requirements defined in Chapter 8, “USB,” which includes the USB specifications for specific device types. This ensures complete Plug and Play capabilities with USB hardware and meets all the core and device requirements for USB. For example, a user must be able to dynamically attach any USB peripheral to any USB connector. The operating system should automatically recognize the device, load and initialize the appropriate drivers, and then make the device available for use.

Compliance with the related USB imaging device class specification becomes a requirement for PC 99 when the revision number of that specification reaches version 1.0.

The USB Imaging Class Device Working Group is working on three specifications that, together, will comprise the category “USB Imaging Class,” as referred to in *PC 98 System Design Guide*. The first of the specifications expected to reach revision 1.0, expected in Q3 of 1998, is the *USB Video Camera Device Definition*, which addresses digital moving images.

The other two USB Imaging Class specifications, which will be released after the *USB Video Camera Device Definition*, are the specifications that will contain requirements for still images. The first of these, which may be titled *USB Dual-Mode Video Camera and Digital Still Camera Device Definition*, will contain requirements for still images produced by dual-mode video cameras or digital still cameras. The second of these may be titled *USB Still Image Device Definition*, and will contain requirements for still images produced by scanners.

Manufacturers are urged to join the USB Imaging Class Working Group. For information, see <http://www.usb.org>. Also, manufacturers should urge their competitors and peers to join. The more companies that participate in creating the specifications, the sooner they will be released.

22.10. USB device supports string descriptors

Required

The device descriptor, as listed in Section 9.6.1 of the USB specification, must have valid *iManufacturer* and *iProduct* string descriptor indexes. All USB imaging devices must comply with requirements defined in Sections 9.4.3 and 9.6.5 of the USB specification.

The *iProduct* string will identify the device to the end user during initial hardware detection, creating a better end-user experience.

22.11. USB imaging device has a zero-bandwidth alternate interface

Recommended

Imaging devices should not pre-allocate bandwidth based on intended use. This results in limited bandwidth for other USB devices. USB bandwidth requests must be based on usage demand at the time of demand.

The USB device should have a zero-bandwidth alternate interface and other alternate incremental interfaces, for example, the imaging device driver should be capable of requesting subsequently smaller bandwidth quantities. This is to ensure that the imaging device can deliver data to the system when optimal bandwidth is not available. In the future, standards bodies might enforce a stricter bandwidth limitation to specific device classes.

22.12. USB device does not saturate the USB bus

Recommended

With an increasing number of USB peripherals in the PC environment, saturation of the USB bus is occurring on a more frequent basis. This saturation is

specifically due to the integration of high-bandwidth devices such as digital still cameras, scanners, and video cameras.

It is recommended that no imaging device use more than 8 Mb/s of available bandwidth to ensure the continued operation of low bandwidth devices such as USB mice and keyboards. In the future, standards bodies might enforce a stricter bandwidth limitation to specific device classes.

PC 99A clarification: This limitation refers to the bandwidth a device can request for *isochronous* transfers. Other types of data transfers are managed by the host controller.

22.13. USB device follows PC 99 USB performance recommendations

Required

All USB devices must comply with the performance requirements listed in Chapter 8, “USB.”

22.14. Digital camera uses PC-compatible file system for removable storage

Required

For devices that include removable flash memory, a file system that is PC-compatible must be provided. The Flash Translation Layer (FTL) specification is an example of such a file system.

22.15. Digital camera stores images in common file formats such as JPEG or FlashPix

Recommended

Enhancing the user experience is essential for the widespread use of digital images. Increasing satisfaction can be accomplished by standardizing on the file format used to store the image inside the camera, providing interoperability between devices and software. JPEG, TIFF, BMP, GIF, and PNG file filters are incorporated in a great number of image and productivity software, providing comprehensive imaging support so that images can be shared.

Reducing the time required to transmit and process images will also further the use of digital images. The FlashPix (FPX) file format provides a rich experience with digital images, offering multiple resolution levels and allowing local region edits, improving the user experience. In the future, the FPX file format is expected to be universal, especially in Internet-related imaging.

22.16. IEEE 1394 device meets PC 99 requirements for IEEE P1394.a

Required

All IEEE 1394 hardware must comply with the requirements defined in Chapter 8, “IEEE 1394.”

PC 99 Design for Digital Still Image Devices

This section summarizes requirements related to the PC 99 design initiatives described in Part 1 of this guide.

Plug and Play for Digital Still Image Devices

The items in this section are requirements for Plug and Play capabilities. For Plug and Play requirements related to parallel ports, see Chapter 13, “I/O Ports and Devices,” or the related bus port requirements in Part 3 of this guide.

22.17. Serial device complies with Plug and Play External COM Device Specification v. 1.0

Required

To improve the installation process, imaging devices with a serial port interface must provide full Plug and Play support for the PC using serial enumeration. Serial enumeration provides a mechanism to support automatic configuration capability for peripheral devices that connect to a PC using Asynchronous Serial Data Interchange on standard serial ports, commonly known as COM ports.

For information, see the *Plug and Play External COM Device Specification, Version 1.0*, available at <http://www.microsoft.com/hwdev/respec/>.

22.18. Plug and Play capabilities implemented for all supported buses

Required

Complete Plug and Play capabilities must be implemented for all buses that the device supports. For information about the Plug and Play requirements, see the related bus requirements in Part 3 of this guide.

22.19. Each device has a Plug and Play device ID

Required

All devices for all buses must supply a human-readable device ID in the manner required for the bus it uses. The device ID requirements for each bus type are defined in Part 3 of this guide; however, the device ID requirements for devices that use parallel ports are defined in the IEEE 1284 specification, as summarized in Chapter 13, “I/O Ports and Devices.” This requirement applies for IR devices that use the parallel port.

22.20. Daisy-chained parallel port imaging devices must be Plug and Play capable.

Required

Daisy-chained parallel port devices, such as scanners, must be Plug and Play capable as defined in Chapter 13, “I/O Ports and Devices.” The daisy-chained parallel port device must be capable of answering Plug and Play requests from the

host. Because of end-of-chain issues with IEEE 1284 and IEEE 1284.3, it is also required that all pass-through devices comply with IEEE 1284.3.

Digital Still Image Device Power Management

This section summarizes the specific power management requirements for scanners and digital still image devices.

22.21. Device supports power management requirements for its bus

Required

The device must support the power management requirements for the bus it uses, as defined in Part 3 of this guide.

Device Drivers and Installation for Digital Still Image Devices

This section summarizes the device driver requirements for scanners and digital still image devices.

22.22. Device drivers and installation meet PC 99 requirements

Required

The manufacturer does not need to supply a driver if a PC 99-compliant driver provided with the operating system can be used. If the manufacturer supplies a driver, the requirements for the device drivers and installation are defined in Chapter 3, “PC 99 Basic Requirements.” The basic requirements include driver support for unattended installation and Help file support if special driver parameters are used.

22.23. Driver support is implemented under the Still Image architecture

Required

Still image devices must provide drivers based on the Still Image architecture (STI 1.0 or later). The services provided by STI provide hardware abstraction, installation wizards, and event polling.

Note: The IR bus interface is exempt from this requirement.

Still image devices capable of creating video streams also must provide a WDM minidriver based on WDM Stream class support.

For information about the Still Image architecture and WDM Stream Class support, see the Windows 98 DDK and the Windows 2000 DDK. See also the related articles on the web site at <http://www.microsoft.com/hwdev/stillimage/>.

PC 99A clarification: For information about the Still Image architecture and WDM Stream Class support, see “Part 4: Still Image Drivers” of the “Graphics Drivers Design Guide” in the Windows 2000 DDK (online at http://www.microsoft.com/ddk/ddkdocs/Win2kRC1/stilling_1iqv.htm). See also the related articles on the web site at <http://www.microsoft.com/hwdev/stillimage/>.

22.24. Applications provided with the device meet Win32 specifications*Required*

Any Windows-based applications provided with the device must meet Microsoft requirements for software compatibility as defined in the Microsoft Platform SDK.

22.25. Device driver supports TWAIN 1.7 or later*Required*

For those devices that ship a TWAIN datasource, the device must support TWAIN v. 1.7 or later, ensuring it can run without a hardware-specific user interface and download n number of images at a single time.

Note: Fingerprint scanners are excluded from this requirement.

22.26. Digital still image devices with an IR interface use the Windows Sockets interface*Required*

Windows 2000 does not provide support for IrComm-based devices. For imaging devices that include an IR interface, an IR driver must be provided that is based on the Windows Sockets interface. For more information, see “Wireless Component Requirements” in Chapter 13, “I/O Ports and Devices.”

22.27. Asynchronous imaging device with an IEEE 1394 interface uses SBP2Port*Recommended*

SBP2Port is the IEEE 1394 SPB2 protocol/transport driver and provides transport services for SCSI-like commands over IEEE 1394. It is recommended that asynchronous imaging devices use SBP2Port to communicate over IEEE 1394 if converting the device from a SCSI or SCSI-like interface.

Digital Still Image Device References

The following represents some of the references, services, and tools available to help build hardware that is optimized to work with Windows operating systems.

Device class power management reference specifications

<http://www.microsoft.com/hwdev/specs/PMref/>

International Color Consortium (ICC)

ICC Profile Format Specification

<http://www.color.org>

Microsoft Windows 98 DDK, Windows 2000 DDK, and

Microsoft Platform SDK

MSDN Professional subscription

Plug and Play specifications

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

Universal Serial Bus Specification, Version 1.0

USB Imaging Class Specification

<http://www.usb.org/developers/index.html>

WDM device driver support and WDM Still Image architecture white papers

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

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

Checklist for Digital Still Image Devices

If a recommended feature is implemented, it must meet the PC 99 requirements for that feature as defined in this document.

*22.1. Device uses PC 99 compatible port connection with USB or IEEE 1394 connection
Required*

*22.2. Icons provided for port and peripheral connectors
Required*

*22.3. Device supports ICC color management
Required*

*22.4. IR device meets PC 99 IR requirements
Required*

*22.5. Digital still image device with an IR interface uses Fast IR
Required*

*22.6. Digital still image device with an IR interface provides a secondary PC interface
Required*

*22.7. SCSI device meets PC 99 SCSI requirements
Required*

*22.8. SCSI device attaches to any PC 99-compliant SCSI controller
Required*

*22.9. USB device meets PC 99 USB requirements
Required*

*22.10. USB device supports string descriptors
Required*

*22.11. USB imaging device has a zero-bandwidth alternate interface
Recommended*

*22.12. USB device does not saturate the USB bus
Recommended*

*22.13. USB device follows PC 99 USB performance recommendations
Required*

*22.14. Digital camera uses PC-compatible file system for removable storage
Required*

*22.15. Digital camera stores images in common file formats such as JPEG or FlashPix
Recommended*

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- 22.16. *IEEE 1394 device meets PC 99 requirements for IEEE P1394.a*
Required
- 22.17. *Serial device complies with Plug and Play External COM Device Specification v. 1.0*
Required
- 22.18. *Plug and Play capabilities implemented for all supported buses*
Required
- 22.19. *Each device has a Plug and Play device ID*
Required
- 22.20. *Daisy-chained parallel port imaging devices must be Plug and Play capable.*
Required
- 22.21. *Device supports power management requirements for its bus*
Required
- 22.22. *Device drivers and installation meet PC 99 requirements*
Required
- 22.23. *Driver support is implemented under the Still Image architecture*
Required
- 22.24. *Applications provided with the device meet Win32 specifications*
Required
- 22.25. *Device driver supports TWAIN 1.7 or later*
Required
- 22.26. *Digital still image devices with an IR interface use the Windows Sockets interface*
Required
- 22.27. *Asynchronous imaging device with an IEEE 1394 interface uses SBP2Port*
Recommended

