



Wireless USB Adapter Set

Reviewer Reference Guide



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INTRODUCTION

The Wireless USB adapter set provides wireless access to existing USB devices. This allows you to place USB devices anywhere in the room, free up your table from cable clutter, and enjoy the freedom of wireless mobility with access to devices.

This document provides a reference review of the adapter set, providing information regarding installation and setup, the usage scenarios with different USB devices, and the expected performance and range.

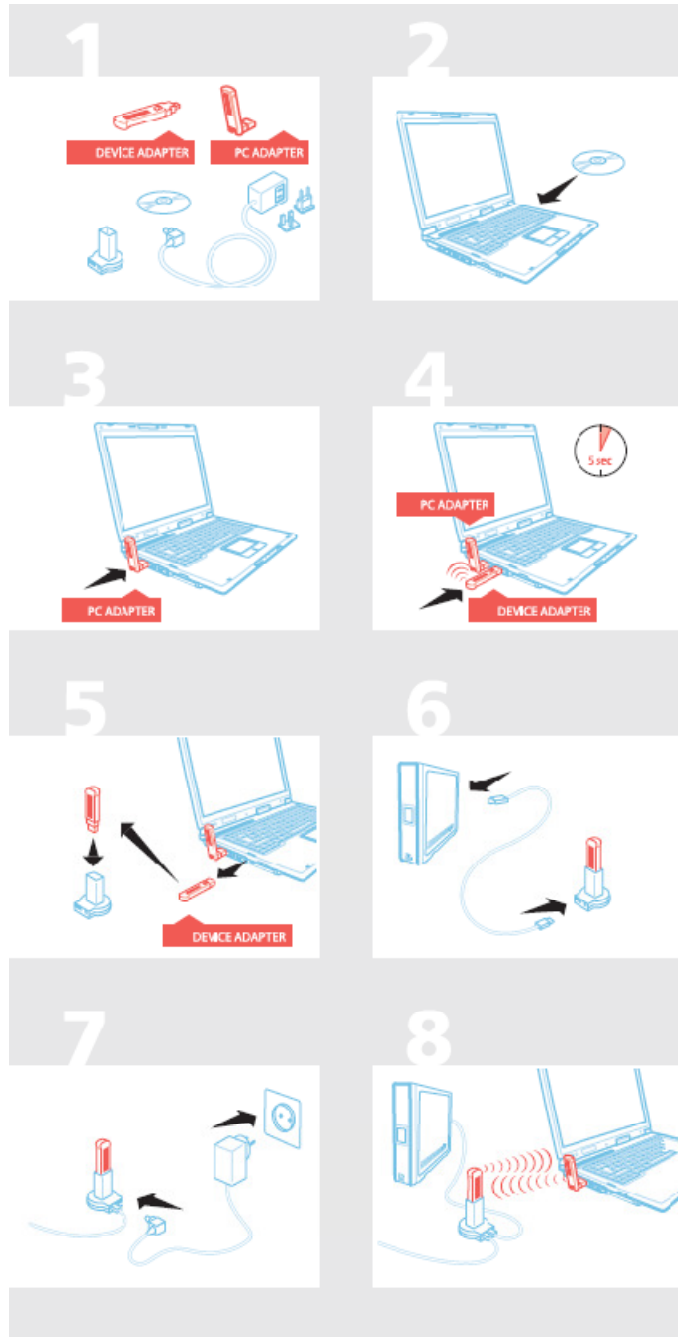


Wireless USB PC and device adapters

INSTALLATION AND SETUP

The initial set up of the Wireless USB adapter set is a standard Windows installation process, similar to driver installation of USB devices. It does not require any technical skills or understanding of wireless technology, and can be easily performed with the help of the "Getting Started" leaflet (on the right). The entire process setup takes 5-7 minutes.

1. The package includes the two adapters, a table adapter, CD, and power supply.
2. Enter CD and follow instructions to install drivers & software.
3. Connect the PC adapter to PC.
4. Perform association (pairing) between the PC adapter and the device adapter. Pairing is done for security purposes, and is performed by attaching both adapters simultaneously to the PC. After a few seconds a message is displayed that pairing is complete.
5. Remove the device adapter from the PC and place it in the table adapter.
6. Attach a USB cable to connect a USB device (e.g, printer, hard disk drive) to the table adapter.
7. Connect the power supply to the table adapter.
8. Wireless USB communication is enabled and the PC can communicate with the USB device.



PERFORMANCE

The Wireless USB adapter set is based on Ultra-wideband technology, which is a personal area network (PAN) technology, designed to provide wireless coverage in the range of 10 meters (30 feet). As such, the adapter set provides **full room coverage**, both with line of site and with no line of site (note that it is not designed to operate across rooms). This allows you to locate USB devices in the room without the limitation of the USB cable length.

To test performance, the adapter set was used in a large meeting room measuring 10x4 meters (30x12 feet). The laptop and PC adapter were placed in one side of the room, and each time a different device was placed in the other side of the room. To verify line of site, and non-line of site behavior, devices were sometimes placed on a shelf or within a closet, and people were sitting and passing within the wireless link. Performance was not affected by increasing the range, or by a lack of line of site between adapters.



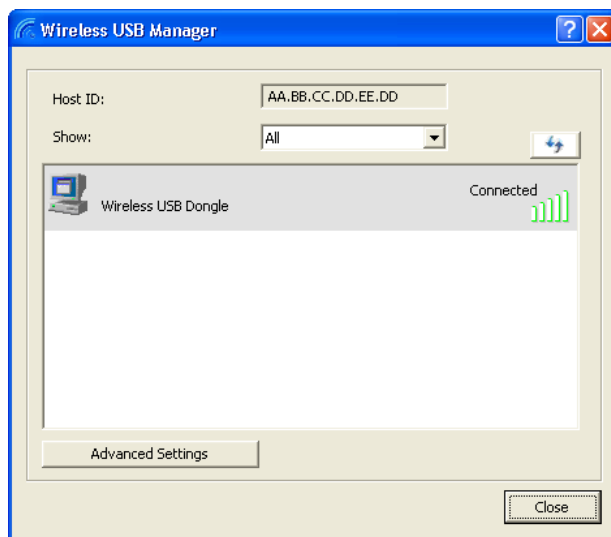
Link establishment was tested by exiting the room with the laptop to intentionally break the wireless link between the notebook and an external hard disk drive. Then, once returning to the room, the wireless link was automatically re-established, enabling connectivity to the hard drive, without requiring any involvement. This simulates a common scenario where your notebook is connected to a peripheral device and you leave the room with the notebook, returning after a while. With wired USB you have to disconnect and connect devices, while with Wireless USB the adapter set automatically re-connects you to the device once back in range, with no further action.

Link robustness was tested using a thumb drive (flash), as it proved as a stable device. Testing was performed using a variety of methods, as described below:

- Blocking inside the link. Device adapter was blocked for 30 seconds by placing both hands over the adapter to break the link. After removing hands, the connection recovered automatically. Same was performed with the PC adapter.
- The PC adapter was taken out of the PC and then plugged back. The link was re-established automatically.
- The device adapter was taken out of its table stand and then returned after several seconds. The link was re-established automatically.
- The device power cable was removed from the table stand and then returned after several seconds. The link was re-established automatically.
- The PC was switched each time to a different power management state - shut down, reset, hibernate and standby. After returning back to operating mode, the wireless link was established automatically in each of these scenarios.

Data rate was measured with a variety of USB devices:

- With the majority of devices (such as camcorders, digital cameras), Wireless USB achieved at least 45% of wired connection.
- With some devices, such as printers and DSLR cameras, Wireless USB provided a throughput that was almost identical to wired USB. (Printers: 80-90% of wired, DSLR: 81% of wired).
- Hard Drives were the fastest USB 2.0 type of devices. The measured throughput with Wireless USB was close to ~ 70Mbps which was roughly ~ 28% of the wired throughput.



Wireless USB Management screen displaying link connectivity

USE CASES AND USER EXPERIENCE

The following section outlines the testing performed with different types of USB devices, illustrating the use case and describing the measured performance.

MULTI FUNCTION PRINTER

Testing was performed first with a USB cable, then with the adapter set, connected to an HP All-in-One printer (model C8180). For wireless, the printer was placed in one side of a meeting room, and files were sent to print from a laptop, while sitting at the other side of the room. In addition, testing was performed for wirelessly scanning and reading data from the printer's built-in card reader.

Two measurements, commonly used by the print industry, were used: first page out (measuring the time from sending the file from the printer till the first page completes printing) and Pages per Minute (PPM).



The table below shows that there was hardly any difference in user experience between wired and Wireless USB connectivity. Also note that wireless performance remains the same when increasing the distance from 3 meters to 8-10 meters.

MULTI-FUNCTION PRINTER (HP ALL-IN-ONE C8180) TEST RESULTS

Test file	Wired / Wireless	First Page out [Sec]	Total Print Time [Sec]	Pages Per Minute (PPM)
Color	wired	11	27.5	14.55
	wireless (3m)	11.4	28.8	13.79
	Wireless (8m)	12.3	29.5	13.95
Black/White	wired	10.5	52.8	12.77
	wireless (3m)	11.3	54.8	12.41
	Wireless (8m)	12.2	58.5	11.66

The multi-function printer was also tested with wireless scanning and reading data from the built-in card reader.

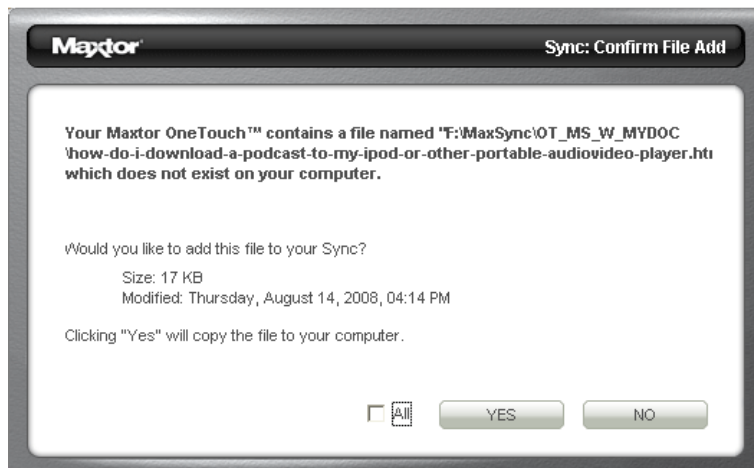
EXTERNAL HARD DISK DRIVE

A Maxtor OneTouch™ Mini III hard drive was connected to the Wireless USB device adapter and the following scenarios were tested:

Wired vs. Wireless throughput comparison. Moving 1GB of data (a folder containing video files) from the PC to the hard drive took 180 seconds with the adapter set over the Wireless USB link, vs. 48 seconds with wired USB.

Link disconnect/connect. Exiting the room with the laptop forced the wireless link to disconnect. Then, after entering the room, the link was automatically re-established and the disk was again available—without any user involvement.

Automatic backup. The EasyManage™ software provided with the Maxtor disk, together with the OneTouch backup, enabled entering the room with the laptop, automatically being connected to the hard disk drive, and receiving a popup message on the need to backup a new file that was added to the PC but was not moved yet to the hard disk.



In this usage scenario, the wireless connectivity enables a more user friendly backup process, which is initiated automatically. In addition, backup is performed in small increments, each time new data is added to the PC, without the need to physically connect to the hard disk each time.

USB HUB

USB hub testing was performed by attaching the device adapter to the upstream port of a Belkin 4-port hub, as can be seen in the photos below.

Then, a multi-function printer and digital camera were attached to the hub. This provided wireless access to all devices from a laptop. When existing and returning back to the room, all devices became available for access.



Performance was not affected by the existence of multiple devices, and depended on the specific type of device connected. Since wireless connectivity was already established with the 'wireless hub', different devices could be attached each time to the hub for wireless access.

DIGITAL STILL CAMERA (DSC)

A Sony Cyber-shot DSC-G1 digital camera was placed in its cradle in one side of the room. The Wireless USB device adapter was then connected to the cradle.

Using a laptop with an adapter, photos were uploaded from the camera. Transferring 400 Mb took 140 seconds over the wireless connection vs. 65 seconds with the cradle connected with a USB cable.

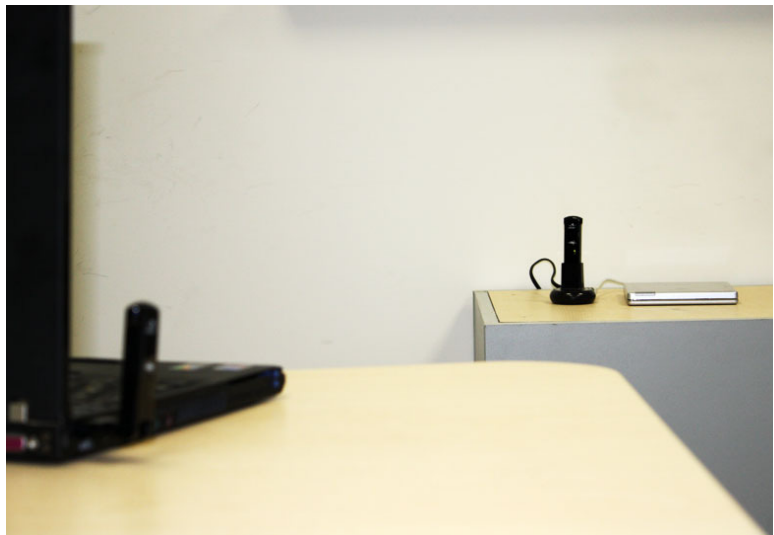


EXTERNAL DVD/CD WRITER

With new laptops being sold without a built-in CD/DVD, Wireless USB enables placing the external CD/DVD player anywhere in the room with wireless access.

Testing was done with a Panasonic LF-P968C portable DVD with read/write operations performed wirelessly.

Reading 1GB of data from the player took 5:15 minutes with wireless, compared to 4 minutes with a wired USB connection.



IPOD

Using the adapter set, music files or podcasts can be synchronized wirelessly while the iPod is placed away from the computer.

For instance, when the iPod is placed in a docking station, music/podcasts can be played from speakers, while the iPod is charged. At the same time, content can be synchronized wirelessly with iTunes installed on a PC placed at the other side of the room.

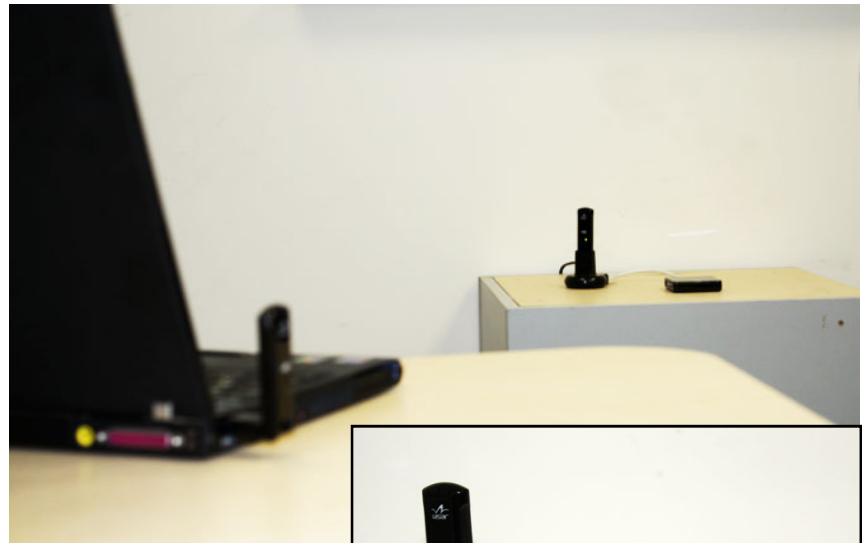
To test iPod connectivity, 100 MB of MP3 music files (23 songs) were downloaded from the web to iTunes and were synched to the iPod.



CARD READER

With a card reader connected to the device adapter, content can be read or written from multiple memory cards.

Reading 250 MB from an SD-card placed in an Elcom MR-DU2A7BK card reader took 111 seconds with a wireless connection compared to 42.5 seconds with the wired connection.



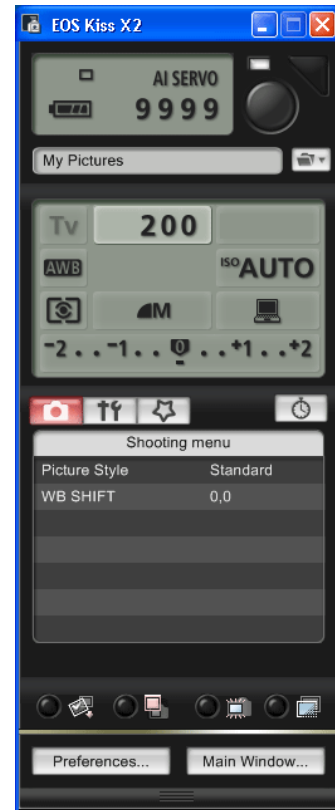
DIGITAL SLR CAMERA

With Wireless USB the camera can be placed on a shelf, away from the desk or laptop, and be wirelessly accessed for downloading photos. In addition, Wireless USB can be used for remote shooting. DSLR cameras like Canon or Nikon are supplied with software that allows shooting remotely from the PC (see image on right). The limitation of this scenario with standard USB is the short USB cable connecting the PC to the camera.

By connecting the camera to the device adapter, shooting and photo transfer can be done wirelessly, with the PC placed up to 10 meters from the camera.

To test this with Wireless USB, a Canon EOS KissX2/ 450D camera was placed on a tripod in one side of a meeting room, connected to a device adapter. A laptop with the PC adapter was then used in the other side of the room to wirelessly take photos and instantly view the photo on the PC.

Viewing photos wirelessly is instant, without any noticeable difference between wired and wireless. Downloading larger data chunks (200 MB) took 120 seconds with a wireless connection and 98 seconds with a wired connection (translating to 81% when comparing wireless data throughput to wired).



MULTI-DEVICE CONNECTIVITY

The adapter set supports simultaneous connectivity to up to 3 devices - for example, a printer, hard drive, and camera. This requires each of the devices to be connected to a device adapter – as can be seen in photo below.



In testing performed with 3 external disk drives connected simultaneously, each of the disks provided a throughput of 35 Mbps, for a total of over 100 Mbps.

TESTED DEVICES

The following lists some of the devices that were tested with the Wireless USB adapter set.

Printers	
HL-5250DN Laser Printer Brother Printer	PRI021/SW Hewlett Packard 980Cxi
PIXMA iP4200 Canon Printer	PRT001/SW Hewlett Packard 995c
Canon PIXUS 560i Canon Printer	PRT016/SW DELL Photo Printer 720
i905D Canon Printer	SWT DELL LaserPrinter 1110
i475D Canon Printer	PRI014/SW Canon S100
Stylus Photo 915 Epson Printer	PRT024/ECO EPSON C66 Inkjet Printer
PictureMate Epson Printer	PRT025/ECO EPSON Stylus Photo R200 Inkjet Printer
PM-970C Epson Printer	PRI019 Hewlett Packard Photosmart D7260
OfficeJet 7210 Printer Hewlett Packard Printer	ECO Epson Stylus Color 880
HP Deskjet 5160 HP Printer	ECO Samsung ML-1750
Officejet 7140xi HP Printer	ECO Hewlett Packard Photosmart C4340
Officejet 7130 HP Printer	ECO Hewlett Packard Deskjet D1530
Photosmart 7960 HP Printer	HP LaserJet 1000 Series
PSC 2410 HP Printer	HP 930C
LaserJet 1020 HP Printer	DELL Photo All In One 962
P707 Color Jetprinter LEXMARK Printer	HP Color Laser 3600n
SCX-4100 SamSung Printer	ECO EPSON Stylus Color 740 (110V)
Z816 Color Jetprinter LEXMARK Printer	PRT003 Hewlett Packard 3320
ML-2250 SamSung Printer	Hewlett Packard PRT018/SW 825C
Hewlett Packard HWT LaserJet 3390	PRT019/SW Hewlett Packard 845C
Hewlett Packard PRT018/SW 825C	ECO EPSON Stylus Color 740 (110V)
	PRT003 Hewlett Packard 3320

Hard Disk Drives	
HDH-U250S I-O DATA USB HDD	External USB HDD Eminent EM7053 300GB
HD-H250U2 Buffalo USB HDD	iomega LPHD080-C
EDGDC-196318-PE DiskGO Edge USB HDD	iomega MiniMax HD
HDC-U250 I-O DATA USB HDD	Freecom Classic SL Network Drive 160G
HAD-iU40 I-O DATA USB HDD	Fujitsu Dynadisq
Zipper Black KZD-4U Kanguru Solutions USB HDD	SimpleTech
Safe Mobile Hard Drive fingerprint access LACIE USB HDD	Maxtor One Touch
d2 Hard Drive Extreme with Triple Interface (300790U) LACIE USB HDD	I-O DATA HDPG
ST3160026A-RK Seagate USB HDD	Verbatim HDD 250G
ST940801U2-RK Seagate USB HDD	HDC-UXW320 I-O DATA USB HDD
ST650211 USB 2.0 Pocket Hard Drive Seagate USB HDD	Western Digital Passport 160GB
ST3200823A-RK Seagate USB HDD	LACIE 80GB
MyBook Premium ES Edition WD3200F032 Western Digital USB HDD	MyBook Pro Edition WD2500E32 Western Digital USB HDD
HDMK3006GAL-EXS Toshiba USB HDD	

MP3 Player s	
Flash Stick Advanced MP3 1GB Acer Media Player	LYRA PDP6512K THOMSON Media Player
YP-U2X SamSung Media Player	F-Drive MP3 512MB GEMBIRD Media Player
MEGA Player 549 MSI Media Player	DMP FX200 Creative Media Player
NW-E003 SONY Media Player	T20MT 1GB iriver Media Player
MP-350 TEAC Media Player	YP-Z5Z SamSung Media Player
SV-SD300 Panasonic Media Player	FY800 MPIO Media Player
SA1100 PHILIPS Media Player	POCKETDV M2 AIPTEK Media Player

Hubs
Adaptec USB 4-port AUH-4000 STD
Xircom USB 4-port PGHUB4
Peracom USB 4-port USB Quad Hub
Compaq USB 4-port / Firewire Hub CPQUSBFW
Entrega USB 2-port Hub2U1S1P + parallel/serial ports
Peracom USB 4-port USB Quad Hub

Digital Still Cameras	
CMEDIA C-2 Zoom OLYMPUS Digital Camera	Aiptek PocketCam X
CMEDIA C-4040 Zoom OLYMPUS Digital Camera	BTC DSC 3312X
Optio S5i Pentax Digital Camera	SeaLife ReefMaster
LUMIX DMC-FX500 Panasonic Digital Camera	
DSLR-A350 SONY Digital Camera	
PA3615U-1ETC TOSHIBA Digital Photo Frame	

Other Devices	
USB CD/DVD ROM & FLOPPY drives	Freecom USB DVDROM drive FreecomC Classic
USB CD/DVD ROM & FLOPPY drives	Iomega ZIP Drive ZIP250
Keyboard	Packerd Bell 9201
Keyboard	Apple
Mouse	Fujitsu SIEMENS M-U69
Mouse	Kensington ORBIT USB Trackball 64224
USB - SATA Bridges	Oxford Semiconductor USB To SATA
USB - SATA Bridges	Oxford Semiconductor USB To 2xSATA (2xFirewire B / 1xFirewire A / SATA RAID incl.)
Card Reader	Dazzle* USBHS SD Reader (swivel)
Card Reader	MSAC-US20 Sony MagicGate Pro
Other	Canon CanoScan
Home access gateway	FastWeb HomeAccessGateway (HAG)
Smartcard Reader	Athena Smartcard Reader
Other	Q-stor IR - Dongle QIRA2
Keyboard	TK-UP01MALBK Elecom Keyboard
Mouse	M-N2UGY Elecom Mouse
Mouse	BBMU-SSV Buffalo Mouse
Pen Drive	MF-AU2 Series USB 2.0 Flash Drive Elecom Pen Drive
Pen Drive	Dragonstick Hama Pen Drive
Card Reader	Reader/Writer(F5U249) Belkin Card Reader
Card Reader	USB 2.0 Card Reader MCR-6U/U2 Buffalo Card Reader
Card Reader	USB CF&MD&SM Card Reader USB-3BRW I-O DATA Card Reader
Game Device	DUAL ACTION 2 Logitech Game Device
Storage Drive	DVDRW16XU2 Iomega DVD+-RW (DVD-Multi)
Storage Drive	USB-FDX1 I-O DATA Floppy
Wired Wireless LAN	LUA-TX Buffalo Wired Lan
Game Pad	no strama SpeedPad52
Card Reader	MediaGear USB2.0 Bay Reader (multi card reader)
Mobile phone	Nokia E61
Mobile phone	Nokia N95
SATA to USB Bridges	Coolgear SATA to USB 2.0
DVD writer	Buffalo DVD writer
Card Reader	I-O Multi card reader
Card Reader	Multi Memory Card USB 2.0 Reader Writer