PowerBook G4

Technology Overview
September 2003

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The PowerBook G4 Family

January 2003 saw the introduction of the groundbreaking 12-inch and 17-inch PowerBook G4 computers—notebooks that lead the industry in performance, innovative features, and stunning design. Since then, customers have overwhelmingly requested that the new design and advanced features be incorporated throughout the PowerBook family. Apple is proud to introduce the new 15-inch PowerBook G4, featuring the same revolutionary thin and light aluminum design of the 12-inch and 17-inch PowerBook models. In addition, Apple has increased the performance and feature sets of all three models.

Continuing the "Year of the Notebook" momentum, the new PowerBook line offers a full range of size, feature, and performance options designed for work in the office or on the road. More people than ever are seeking a notebook that can serve as their primary computer system. Professionals as diverse as graphic designers and video editors, research scientists and office road warriors are realizing that these powerful, full-featured portable computers are perfectly suited for wherever their work takes them.

12-inch PowerBook G4

Ultracompact. Ultradesirable.

With the most advanced feature set of any ultracompact notebook, the 12-inch PowerBook G4 is the ultimate travel companion—allowing you to work wirelessly, burn DVDs, connect to digital displays, and pack very light. With its new DVI port, faster G4 processor, and slot-loading SuperDrive,[1] it delivers an ideal combination of form and function, all at an irresistible price.

The 12-inch PowerBook offers tremendous video output versatility—you're equipped to connect to everything from Apple flat-panel displays to digital projectors to monitors and televisions.[2] With improved performance courtesy of its fast 1GHz PowerPC G4 processor with 512K L2 cache, up to 1.25GB of DDR memory, and a new, more powerful NVIDIA graphics chip, the 12-inch PowerBook is the perfect choice for everything from business productivity applications to the hottest games.

The 12-inch PowerBook G4 is also an amazingly small DVD-burning studio. Its slot-loading, 2x-speed SuperDrive lets you burn custom CDs and professional DVDs with ease using the included iDVD, iMovie, iPhoto, and iTunes applications. It also features a brilliant 12.1-inch (diagonal) display, full I/O capabilities, integrated Bluetooth connectivity, and optional AirPort Extreme wireless networking.

Remarkably compact and incredibly powerful, it weighs a mere 4.6 pounds,[3] requires a minimal amount of desktop space, and is easily tucked away in a briefcase or backpack. And its 5-hour battery life ensures that time is always on your side.[4]

Whether you're a mobile professional leading the jet-set life or a busy student running around campus, the 12-inch PowerBook is sure to be your ultimate travel companion.

15-inch PowerBook G4

The Ideal Balance of Power and Portability

If you're one of those people who simply want it all, look no further than the new 15-inch PowerBook G4. Just over an inch thin, weighing only 5.6 pounds,[3] and sporting a 15.2-inch (diagonal) widescreen display, this system incorporates all the best performance features of the PowerBook line tucked neatly into a sleek aluminum design. It also incorporates innovative features such as the revolutionary illuminated keyboard, which enables you to work in low-light environments.[1] Now you can be productive whether you're on a night flight, in a darkened lecture hall, or in a dimly lit studio.

The 15-inch PowerBook G4 has more than enough horsepower to get the job done, whether at home or on the road. You can choose a 1GHz or 1.25GHz PowerPC G4 processor with 512K of L2 cache, supercharged by up to 2GB of DDR memory and the superfast ATI Mobility Radeon 9600 graphics processor. And the popular SuperDrive lets you burn custom CDs and professional DVDs with ease.[1]

Built-in antennas make wireless networking a snap. With an AirPort Extreme Card, you can connect to an 802.11g wireless network at speeds up to five times faster than conventional Wi-Fi networks.[5] Integrated Bluetooth technology extends your wireless capabilities with cable-free connections to the ever-growing roster of Bluetooth-enabled devices, including Apple's new wireless mouse and keyboard. The wired world is easily accommodated by a suite of high-speed digital connections, including Gigabit Ethernet, DVI, FireWire 800, and USB 2.0.

With its intelligent combination of features, the 15-inch PowerBook gives you the freedom to edit video, deliver presentations, or analyze data on the go—in short, to get your work done, anywhere.

17-inch PowerBook G4

The Largest Display in the Thinnest Design

The 17-inch PowerBook G4 is a true desktop computer replacement. With the largest display ever to grace a portable computer, it provides a widescreen workspace and unmatched power for your most complicated tasks, including video editing, audio creation, and graphic design.

The 17-inch (diagonal) panoramic display simply must be seen to be believed. With its 1440-by-900-pixel resolution, it provides a viewing area equal to that of a 19-inch CRT monitor. That's plenty of room for the toolbars, palettes, and timelines that are so common in today's professional applications, such as Adobe Photoshop and Final Cut Pro. You might think that a notebook computer with a 17-inch widescreen display must be big and bulky, but thanks to its stunning aluminum case, the PowerBook is just 1 inch thin and weighs only 6.9 pounds.[3]

Another innovative design feature of the 17-inch PowerBook is the illuminated keyboard, which is ideal when you are working in a low-light environment like an airplane cabin or a music or video studio. Built-in ambient light sensors monitor the available light; the illuminated keyboard comes on automatically and the screen brightness is lowered accordingly as the light grows dimmer in your environment.

The performance architecture of the 17-inch PowerBook delivers phenomenal speed, featuring a 1.33GHz PowerPC G4 processor with 512K L2 cache, ATI Mobility Radeon 9600 graphics with 64MB of DDR SDRAM, and up to 2GB of DDR memory. Built-in AirPort Extreme and Bluetooth technology deliver advanced wireless communications, while Gigabit Ethernet, FireWire 800, and USB 2.0 ensure that you can take advantage of the fastest wired connections available. The built-in SuperDrive, with a new burning speed of 2x, is invaluable for creating and exchanging huge files on DVD.

With greater speed and memory capacity, ultrafast wireless and wired connections, and a new lower price, the groundbreaking 17-inch PowerBook G4 is the ultimate choice for creative professionals who need the best performance and widescreen workspace for video editing, audio creation, or graphic design.

Thin, Light, and Powerful: The Perfect Choice for You

Every PowerBook G4—from the ultracompact 12-inch to the powerful 15-inch to the expansive 17-inch model—is a full-featured notebook loaded with the advanced capabilities and power required by creative professionals, scientists, students, and mobile professionals alike. So no matter what you do, there's a PowerBook G4 that's perfect for you.

Creative Professionals

Professional video
The portability and power of the PowerBook G4 combined with Final Cut Pro make it possible to edit video whether you're on location or at your own studio. Take advantage of the widescreen display of the 17-inch or 15-inch PowerBook G4 for viewing multiple windows, or use the dual display capability of any of the three models to attach an Apple flat-panel display and spread out your video assets, timelines, and work windows.[6] Use the FireWire 800 or FireWire 400 ports to access high-performance external storage devices, camcorders, and media servers. Exchange email and files at high speed with Gigabit Ethernet and AirPort Extreme wireless networking.[5] And burn your own DVDs and CDs even when you're away from the office with the optional SuperDrive.[1]

Design and publishing
The PowerBook G4 has the connections and high-level performance to deliver results faster and more reliably than any other notebook computer, whether you need to develop website content, present ideas at a client site, or produce precise magazine layouts. Through features such as ColorSync color management, broad font support, and integrated PDF support, Mac OS X works with the crisp, bright PowerBook display to give you consistent, high-quality color images onscreen and in print. Gigabit Ethernet, featured in the 15- and 17-inch PowerBook, enhances workflow by speeding file transfers at every step. And AppleScript lets you automate routine tasks, from reformatting large groups of images for the web to building an entire online catalog with content from servers located across the globe.

Music and audio
As an audio professional, you'll find the PowerBook G4 ideal for composing and arranging music and audio wherever you like. Musicians in particular will appreciate the portability and stability of the PowerBook, using it with confidence for recording or as an interface to other audio peripherals during live shows. In the dimly lit conditions of a studio or stage, performers can also take advantage of the illuminated keyboard of the 15-inch and 17-inch PowerBook.[1] Mac OS X provides high-definition,

24-bit digital audio with resolutions up to 192kHz, while fast processing supports a high level of simultaneous channels and plug-ins, all with extremely low latency. And you get seamless, plug-and-play connectivity of multichannel audio and MIDI devices over USB 2.0 or FireWire 800 and 400.

Business

As a mobile professional, you require a portable computer that is compact and lightweight enough to take anywhere, yet powerful enough to get the job done. With the thinnest, lightest designs in the industry—including the road warrior's perfect companion, the ultracompact 12-inch PowerBook—these notebooks provide power and portability. The PowerBook G4 also gives you the freedom to present at virtually any customer site. Using its DVI, ADC, VGA, composite, and S-video connections, you can attach the PowerBook to just about any display, monitor, TV, or projector.[2] AirPort Extreme provides fast 54-Mbps wireless networking,[5] while Bluetooth technology allows cable-free connections to your PDA and mobile phone, making life on the road even easier.

Higher Education

As a university administrator or faculty member, you require a computer that allows you to create and deliver presentations, design lesson plans, perform research, and access the Internet. With the PowerBook G4, you can perform these tasks with ease anywhere on campus.

College campuses are increasingly embracing the wireless world. That's great news for PowerBook owners, who can send and receive data at up to 54 Mbps with AirPort Extreme on an 802.11g network, as well as connect to 802.11b Wi-Fi networks.[5]

College students are looking for a powerful, all-in-one computer that can go anywhere. The PowerBook G4 is a value-priced notebook with enough power, memory, and features to last the next four years. You'll like its captivating aluminum design, its DVD-playing ability, and the advanced gaming made possible by the powerful ATI or NVIDIA graphics processor. And with software like iLife (including iTunes, iPhoto, iMovie, and iDVD[7]), Safari, Mail, and iChat, the PowerBook G4 is an even greater value for the college budget.

Science and Technology

The typical researcher's desktop has two or more computers: a UNIX workstation for research applications, and a PC or Mac for mainstream productivity applications such as email, word processing, and presentations. Thanks to Mac OS X, the PowerBook G4 lets you run UNIX, vector processing, and productivity applications all on a single system—at your desk and on the road. And you'll be running all those programs on the powerful G4 processor with its Velocity Engine vector processing unit for fast computation, analysis, and display of scientific data.

Stunning Design

The newest PowerBook G4 notebook computers give you more features than ever while maintaining the thin, lightweight design you expect from a PowerBook. An ideal combination of form and function, the PowerBook is an elegant system that you can take with you anywhere. Made from state-of-the-art materials, built to last, and easy to carry, the PowerBook G4 is ready to work wherever you go. From its brilliant display and full-size keyboard to its smooth aluminum surface, the PowerBook reveals a tremendous attention to detail that enhances your computing experience.

Thin, Light Aluminum Case

In January 2001, Apple was the first company to create a notebook computer with a titanium enclosure. In January 2003, we brought notebook design to a new level with an enclosure made of an aluminum alloy. Now the 15-inch PowerBook shares this remarkable design.

The aluminum enclosure demanded a completely fresh approach to construction. New materials and an automated laser welding process were selected to provide optimal weight, strength, and durability. Aluminum is approximately one-third the weight of steel but possesses a superior strength-to-weight ratio. These unique properties, combined with its durability, make aluminum the material of choice for performance motorcycle and bicycle frames, aircraft parts, and most car engines.

The aluminum alloy is cold-rolled and work-hardened for added strength. After final forming, the enclosure undergoes a special anodizing process to further harden and protect the surface against stains, scratches, and discoloration. The result is an enclosure that is lightweight, durable, and stylish.

Further enhancing its durability, the PowerBook G4 features a lightweight internal frame for superior stiffness and shock resistance. The hard drive is rubber-mounted to the frame, providing additional protection for this valuable component.

Brilliant Display

The widescreen displays of the 15-inch and 17-inch PowerBook G4 give you a panoramic, portfolio-like working environment that is perfect for the tools, palettes, and timelines that creative professionals require to design layouts and edit video, as well as the visualization tools and productivity applications that researchers use. The crisp, clear XGA display in the ultracompact 12-inch PowerBook G4 provides incredible detail and high saturation for rich, vivid colors. Regardless of the model you choose, the PowerBook display is perfect for viewing everything from spreadsheets to games to digital media projects.

Easy-Access I/O Ports

For easy access, all the ports on the PowerBook G4 are placed along the sides in a logical progression from front to back. The headphone and audio line in ports are located toward the front so you can easily reach the devices that connect to them. Ports for an external monitor, the power cable, and the modem connection—cables that are usually routed behind the system—are located toward the rear. On the 15-inch and 17-inch PowerBook, there's even a USB 2.0 port on each side of the case, allowing you to connect your USB mouse or other device wherever you prefer. On the 12-inch PowerBook, all the ports, including the new USB 2.0 port, are placed on the left side.

Illuminated Keyboard (15- and 17-inch PowerBook)

People use notebook computers everywhere these days. For years, customers have asked for a way to put light on the keyboard so they can see the keys in low-light situations. Apple took on this challenge and, in the 15-inch and 17-inch PowerBook models, offers the industry's first fiber-optic, backlit keyboard.[1]

Rather than trying to shine a light down onto the keys (which ends up on the user's hands), we used fiber-optic technology to illuminate the keyboard from the bottom. Directly under the keyboard are 270 fiber-optic strands placed side by side, creating a light panel that stretches the entire length of the keyboard and provides a uniform light source. It's also very thin (the equivalent of about five sheets of standard paper), allowing us to incorporate this feature while still achieving a very thin profile. Now you can see the keyboard legends easily even in such low-light situations as a plane, a lecture hall, or a video editing studio. You can activate and adjust the illumination yourself or let the computer control it with the embedded ambient light sensor.

Ambient Light Sensor (15- and 17-inch PowerBook)

Continuing the tradition of unique features that make Apple products easy to use, PowerBook G4 configurations with an illuminated keyboard include built-in ambient light sensors. A feature not found in any other notebook computer, these built-in sensors monitor ambient light levels and adjust the brightness of the screen backlight and keyboard illumination.

In low light, the computer lowers the brightness of the display. When light levels drop, the illuminated keyboard comes on so that you can see the keys easily and continue to work. Conversely, when light levels increase, the PowerBook increases the display brightness and turns off the keyboard backlight when it's no longer necessary.

Key Performance Features

All three PowerBook G4 notebook computers support a fast PowerPC G4 processor, DDR memory, an advanced mobile graphics processor, and the acclaimed slot-loading SuperDrive. With these exceptional performance features, it's easy to see why the PowerBook can become your mobile movie studio, graphic design center, or portable UNIX workstation. In fact, it's powerful enough to be your only system.

PowerPC G4 Processor

Once again, Apple leads the way in portable computer performance with the PowerBook G4. Its PowerPC G4 processor with Velocity Engine is the cornerstone of a performance architecture that's unmatched in PC notebooks. For example, in Apple testing, the 15-inch and 17-inch PowerBook models completed 45 common Adobe Photoshop tasks up to 40% percent faster on average than a notebook PC with the fastest Pentium 4 mobile processor, a 3.06GHz Mobile Intel Pentium 4. Even the 1GHz 12-inch PowerBook outperformed a 2GHz Pentium 4–based notebook by 10% on the same set of tests. That means you get unparalleled processing power, whether you're adding transitions to movies, authoring DVD discs, importing music from your favorite CDs, or applying filters to high-resolution images.

Efficient processor design
Every PowerPC G4 processor is designed for maximum efficiency with a short, seven-stage pipeline and the Velocity Engine vector processing unit. Users who are serious about editing images, rendering video, producing music, or calculating data will find that the PowerBook G4 has been designed to achieve the best results in the least amount of time.

The length of the processor pipeline refers to the number of processing steps, or stages, it takes to accomplish a task. Examples of stages include fetching data, decoding data, executing instructions, and storing data. The PowerPC G4 processor has seven stages, while the Pentium 4 processor has 20 stages. Thus the PowerPC G4 can accomplish the same task in 13 fewer steps than the Pentium 4.

A short processor pipeline also enables the processor to recover from changing data dependencies in less time. All advanced processors try to increase performance by guessing what they'll need to do next—a process called "speculative operation." On occasions when the processor doesn't guess correctly, it clears the pipeline and starts over. Periods of time when no data is available for processing, known as "bubbles," leave the processor idle while it waits for new data. The short pipeline in the PowerPC G4 enables the processor to recover from bubbles very quickly, resulting in higher processor utilization. With fewer processing steps, faster recovery, and higher utilization, processor output is maximized, enabling you to accomplish more in less time.

The PowerPC G4 improves efficiency further with a specialized vector processing unit called the Velocity Engine. The Velocity Engine uses SIMD (single instruction, multiple data) technology, which is the application of a single instruction to multiple data at the same time in a single operation, to accelerate data processing. Software programs that use vector processing typically transform large sets of data as they edit an image or render a video effect. For example, when a filter is used to apply a motion blur to an image, each pixel of the image must be changed according to the same set of instructions—a highly repetitive processing task. The Velocity Engine accelerates this task by modifying the image in large, 128-bit chunks. And since the Velocity Engine is a separate processing unit, it can work on an intensive task while the other functional units in the processor are crunching other data.

On-chip level 2 cache
Performance is further increased by the on-chip 512K L2 cache. When you run a software program on a Macintosh system, most of the active application code and user data is stored in the L2 cache, which is located directly on the G4 processor and thus quickly accessible. The high speed of L2 cache allows the processor to receive data and application code significantly faster than from main memory. In fact, in the 1.33GHz 17-inch PowerBook G4, the L2 cache provides throughput of up to 43GB per second—with no bottlenecks caused by competing data transfers. The processor is constantly fed with data, so it doesn't sit idle waiting for the next set of data to arrive.

DDR Memory

The 12-inch PowerBook G4 accommodates up to 1.25GB of Double Data Rate (DDR) memory, while the 15- and 17-inch PowerBook models accommodate up to 2GB, providing considerable performance improvements to many system processes. In fact, by transferring data on both the rising and falling edge of each system clock cycle, the PowerBook is able to accelerate calls to memory and achieve data rates almost twice those of regular SDRAM.

Leading Mobile Graphics

ATI Mobility Radeon 9600 (15- and 17-inch PowerBook)
Featured in the 15-inch and 17-inch PowerBook G4, the ATI Mobility Radeon 9600 with 64MB of DDR memory dramatically enhances all aspects of your visual experience, whether you are viewing high-quality video or complex 3D applications. This advanced graphics processor features a number of cutting-edge technologies, including programmable pixel and vertex shading for lighting, enabling cinematic quality on the screen. A leading solution for notebook graphics, the ATI Mobility Radeon 9600 provides tremendous performance, ensuring that the 15-inch or 17-inch PowerBook user can develop and view 2D, 3D, and video applications with ease.

NVIDIA GeForce FX Go5200 (12-inch PowerBook)
Featured in the 12-inch PowerBook, the NVIDIA GeForce FX Go5200 graphics processor with 32MB of DDR memory continues to raise the standard of performance for notebook computer graphics. It incorporates advanced features such as hardware transform and lighting as well as the Lightspeed Memory Architecture II. This architecture improves memory bandwidth to ensure fluid frame rates for the latest 2D and 3D games and professional applications. The GeForce FX Go5200 delivers blazing performance and includes AGP 4X support as well as MPEG-2 hardware for flawless DVD playback.

Mac OS X graphics: Quartz Extreme and OpenGL
Not only do these new graphics processors make graphics look better and run more smoothly, they boost overall system performance. That's because they work directly with Quartz Extreme, the windowing technology in Mac OS X v10.2 "Jaguar."

Quartz Extreme offloads graphics-specific tasks from the main processor to the graphics processor. This approach makes onscreen images faster and more responsive than ever before, providing fluid, full-frame-rate graphics even in highly composited scenes such as translucent 3D objects over full-motion DVD video. It also frees the main processor to complete other tasks more quickly. Mac OS X is the only operating system with a composited windowing system, seamlessly blending 2D, 3D, and video content for vastly improved graphics performance.

Quartz Extreme leverages the powerful OpenGL-based 3D graphics engine in Mac OS X. The industry's most widely used and supported 3D graphics technology, OpenGL features high-performance visualization capabilities that make it ideal for graphic design applications, special effects, 3D modeling, and gaming. Mac OS X boosts the performance of OpenGL to a new level, making the Mac the ultimate personal computer platform for 3D graphics.

SuperDrive

The PowerBook G4 offers CD and DVD burning capability through the built-in slot-loading SuperDrive (DVD-R/CD-RW).[1] With the integrated iLife software (iDVD, iMovie, iPhoto, and iTunes), it turns your PowerBook into a portable CD and DVD recording studio.

The 2x-speed SuperDrive is ideal for archiving and transferring large image files on CDs and DVDs. CDs can hold up to 650MB of data, while DVDs can store as much as 4.7GB. With this kind of capacity, you can easily back up an entire digital photo collection or a thousand MP3 files—and keep them safe for years.

Also available is the fast CD-burning Combo drive (DVD-ROM/CD-RW) for less storage-intensive uses. The Combo drive and SuperDrive also read CD-ROMs and play DVD movies—perfect for keeping yourself entertained on your next long plane flight.

Long Battery Life

One of the most important features in a notebook computer is long battery life. That's why the PowerBook is designed to provide outstanding battery life. For example, the portable-friendly PowerPC G4 processor and power management features of Mac OS X can give you up to 5 hours of runtime from a fully charged lithium-ion battery on the 12-inch PowerBook, and up to 4.5 hours on the 15-inch and 17-inch PowerBook.[4]

With Mac OS X, you can adjust processor performance to further increase battery efficiency. Through the Energy Saver pane in System Preferences, you can set the computer's performance to the Automatic setting, which dynamically adjusts the processor frequency based on the demands of the system. To ensure maximum battery life, you can set the processor to operate at the Reduced setting, which forces the processor to operate at a lower frequency. If constant operation at the highest level of performance is a requirement, such as for data-intensive applications like creative audio software, you may want to set the processor at the Highest setting to keep the processor running at its highest frequency at all times.

You can monitor the amount of battery charge by looking at the battery status icon in the menu bar or at the five LEDs on the bottom of the battery. Press the button next to the LEDs for an indication of the amount of charge left in the battery. The LEDs work even when the battery is out of the computer. They also illuminate when the system is plugged into AC power to indicate that the battery is charging, and go off when the battery becomes fully charged.

In case you need to work with multiple batteries while traveling, the sleep-swapping feature of the 15-inch and 17-inch PowerBook allows you to change batteries without shutting down the system. Simply put the system to sleep by closing the lid, then remove the battery; the PowerBook can maintain the contents of RAM using its backup battery for up to three minutes. After inserting a new battery, open the lid to wake the system from sleep and resume work.

Advanced Connectivity

Today's mobile professionals work in a variety of environments, including offices, homes, client sites, and hotels. To accommodate these varied locations, the PowerBook G4 has comprehensive networking and I/O technologies, including AirPort Extreme wireless networking, Bluetooth, DVI, USB 2.0, and FireWire. So whether you want to create a desktop environment using an external display, keyboard, and mouse, or give a presentation using a projector or work with digital audio and video devices, the PowerBook features the latest communication and expansion solutions to help you get the job done.

AirPort Extreme

Wireless networking is exploding in popularity. In 1999, Apple led the wireless revolution with the affordable, easy-to-use AirPort wireless networking technology. Around home, on campus, or in an office building, AirPort lets you access the network resources you need without cables.

AirPort Extreme takes wireless networking to the next level. Based on the IEEE 802.11g standard, AirPort Extreme supports data rates of up to 54 Mbps.[5] That means you can exchange data on an 802.11g network almost five times as fast as on an 802.11b network. AirPort Extreme is also compatible with the millions of Wi-Fi Certified 802.11b devices in use around the world, so you'll still be able to access your company's wireless network, check email at your favorite coffee house, and do research around your school campus.

In addition to its faster performance and broad compatibility, AirPort Extreme is loaded with advanced features, like wireless sharing of a USB printer, wireless bridging of AirPort Extreme Base Stations, and other options to increase the range of your network. And it supports up to 50 simultaneous users—Mac and PC—all sharing a single Internet connection.

Bluetooth

The PowerBook G4 also features integrated Bluetooth hardware and software. Thanks to Bluetooth technology, you can complete tasks formerly conducted through infrared—syncing with a PDA, dialing wirelessly on a mobile phone, transferring files to another notebook—without requiring a direct line of sight. Now you can also connect to the new Apple Wireless Keyboard and Apple Wireless Mouse using Bluetooth technology. Every PowerBook G4 comes ready to connect wirelessly to Bluetooth-enabled peripheral devices. As long as a device is within a radius of 30 feet, the PowerBook can detect it and data transmission can occur. In addition, you can connect up to seven other peripherals simultaneously.

With the included iSync software, you can easily synchronize information between your PowerBook, mobile phone, and Palm OS–based PDA. You can also have cable-free connections between a Macintosh and your Palm handheld. Use the Bluetooth File Exchange application to transfer files between your Mac and another Macintosh or a Windows computer. Or use a camera phone to send images to your Mac, put them in an iCard, and send off an instant postcard over the phone's GPRS connection. With the Bluetooth technology in your PowerBook, your Bluetooth-enabled GSM/GPRS mobile phone can even act like a modem in your pocket.

Rendezvous
Apple's revolutionary Rendezvous technology allows computers and other smart devices to create a network instantly by finding and connecting to each other automatically. Each device broadcasts which services (such as file sharing or printing) it's offering for the use of others, and discovers the services being provided by the other devices.

For example, two business executives in a hotel meeting room can establish a network to exchange files just by turning on their AirPort- or AirPort Extreme–enabled PowerBook systems. When the computer is connected to a wired network, it automatically discovers and lists available Rendezvous-enabled printers.

Rendezvous is built into Mac OS X v10.2 and works with today's most popular connection technologies, including Ethernet, AirPort, and AirPort Extreme. It uses the standard IP networking protocol. Epson, HP, and Lexmark are integrating Rendezvous into printers, and other manufacturers of peripherals and consumer electronics are expected to release Rendezvous-enabled devices.

Gigabit Ethernet (15- and 17-inch PowerBook)

Both the 15- and 17-inch PowerBook G4 models feature Gigabit (10/100/1000BASE-T) Ethernet; the 12-inch PowerBook features 10/100BASE-T Ethernet. All PowerBook models automatically switch to the speed of the connected Ethernet network. Just plug your computer into an Ethernet network, DSL modem, or cable modem, and you can transfer files in a flash or browse the Internet immediately.

Speaking of easy Internet connections, Mac OS X automatically finds the best way to connect to the network wherever you take your computer. You don't have to continually set and reset complex network options every time you move to a new location. A feature called "multihoming" in Mac OS X enables the PowerBook to communicate with all of its network interfaces at the same time. Each network interface has to be configured only once.

V.92 Modem

Whether you're in a hotel room, at home, or on campus, you can use the built-in modem to access your office network, dial an Internet service provider, or send and receive faxes. The 56K modem with V.92 support allows you to use a single line for both voice and data.[8] If a voice call comes in while you're online and your ISP supports the V.92 protocol, you'll be able to hold the Internet connection for a set period of time while you speak on the phone.

Integrated high-speed I/O
FireWire and Ethernet are implemented in the most efficient manner in the PowerBook system; they're both connected directly to the system controller. In a Windows-based notebook, these features often reside on the PCI bus, causing additional data congestion for the PCI bus and I/O controller. The dedicated connection in the PowerBook guarantees low latency, resulting in optimal FireWire and Ethernet performance.

FireWire 400 and 800

FireWire 400 (also known as IEEE 1394a and Sony i.LINK) supports data transfer rates up to 400 megabits per second (Mbps). FireWire 800 (also known as IEEE 1394b) increases the rate to 800 Mbps.[9] Anyone involved in video editing, broadcast streaming, or other applications that demand high-speed connections to input, output, and storage devices will want to take advantage of the phenomenal benefits offered by the new PowerBook G4 and its FireWire technology.

All three PowerBook models feature one 6-pin FireWire 400 port; in addition, the 15-inch and 17-inch models are equipped with a 9-pin FireWire 800 port. The FireWire 800 port also supports FireWire 400 devices using a 9-to-6-pin cable (sold separately). Up to 63 FireWire devices can be daisy-chained together from one FireWire port. These powered ports enable connections to bus-powered devices such as FireWire hard drives and Apple's iPod digital music player, which can run directly from the computer's power without the need for an external power adapter.

More details on FireWire are available on the web at www.apple.com/firewire.

USB 2.0

All three PowerBook G4 notebooks feature the latest USB technology, 480-Mbps USB 2.0, with two ports that support up to 127 total devices at the same time. You can use the ports to connect a variety of USB-based printers, scanners, keyboards, mice, storage devices, and digital still cameras to the computer with plug-and-play convenience. Designers can connect devices such as a graphics tablet or Zip drive, and musicians and composers can attach the latest audio line in devices for consumer or professional use. USB devices can be hot-plugged into the system at any time, and USB 2.0 is compatible with USB 1.1, so you can continue to use your older USB peripherals without any cable adapters. Details on USB are available on the web at www.apple.com/usb.

PC Card/CardBus Slot (15- and 17-inch PowerBook)

The PC Card/CardBus slot in the 15-inch and 17-inch PowerBook is ideal for connecting devices such as a miniature hard drive or CompactFlash memory cards through a PC Card adapter. This slot is compatible with PC Card Type I and Type II formats as well as with the 32-bit CardBus format. Special PC Card adapters let you connect SCSI and PCI peripherals to the PowerBook. Several PC Card SCSI adapters are available from Apple Authorized Resellers—an ideal solution for video and music industry professionals who have invested in PCI-based technologies.

Video Output: Five Ways to Connect

No matter which external display you may have, the PowerBook G4 is ready to connect to it thanks to built-in video support.[2]

- **DVI.** This port provides the highest image quality for video output. With a pure digital connection all the way from the graphics processor to a DVI-equipped display or projector, it eliminates the degradation inherent in converting a digital signal to analog. (A mini-DVI to DVI adapter comes standard with the 12-inch PowerBook.)
- **ADC.** With the addition of the Apple DVI to ADC Adapter, you can connect to current Apple flat-panel displays for the best possible viewing experience. Hot-plug capability allows the PowerBook G4 to recognize and begin displaying content on an external monitor as soon as it is connected to the DVI port.
- **VGA.** You can connect analog monitors and projectors or analog-based flat panels using the included DVI to VGA adapter or mini-DVI to VGA adapter. Hot-plugging is also supported with VGA devices.
- **S-video.** Using the S-video port on the 15-inch or 17-inch PowerBook (the 12-inch model requires an Apple Mini-DVI to Video Adapter, sold separately), you can connect to many standard televisions, VCRs, or projectors. Since TVs are widely used in schools, this gives teachers and students the ability to present their reports, projects, and even websites to an entire class on a television screen. At home, you can attach the system to a TV to watch DVD movies on a larger screen.
- **Composite video.** With the proper adapter (included with the 15-inch and 17-inch models; the 12-inch model requires an Apple Mini-DVI to Video Adapter, sold separately), you can connect to devices that take composite video input. A TV can be instantly detected while the PowerBook is running; simply press the Command key along with the Brightness Up (F2) function key, and the system sends the video to the external monitor.

External display modes
When an external display is in use, the PowerBook G4 supports three display modes: dual display, video mirroring, and lid-closed mode. Any of these modes can be used with any of the video output options. You can toggle between dual display and video mirroring modes simply by pressing the F7 function key. Alternatively, in Mac OS X, the two modes can be selected through the Displays pane in System Preferences.

- **Dual display mode.** Many PowerBook G4 users spend a significant amount of time in front of their displays using applications with floating palettes, long timelines, and multiple viewing windows. To minimize the time spent organizing layers of windows, many professional users attach a second display to their PowerBook, which allows them to spread out their work.
- **Video mirroring mode.** For presenters, video mirroring allows whatever is on the PowerBook screen to appear on an external display, television, or projector. Creative professionals, business users, and educators can face their audience and control what's on the screen while the audience views the same image on a larger display. The hardware-based mirroring allows video content such as QuickTime movies to be displayed on an external monitor with performance equal to that of the built-in display.
- **Lid-closed operation.** Creative professionals can also opt to run the PowerBook with its full video memory applied to an external display. To activate this feature, put the PowerBook to sleep by closing the lid, and wake it through an external keyboard such as the Apple Wireless Keyboard. All of the video memory will then be dedicated to the larger external display. The lid-closed function is ideal for users who want to achieve high performance on a high-quality external display.

Audio

Delivering enhanced audio performance with powerful stereo speakers, the PowerBook G4 gives games, music, and movies more dimension. The integrated microphone (located under the left speaker grille of the 15-inch and 17-inch PowerBook and in the upper left corner of the 12-inch PowerBook) lets you take advantage of speech recognition in Mac OS X or use the increasingly popular Internet telephone applications without any additional wires or hardware. A standard minijack provides 16-bit audio input, so you can plug in a powered microphone for making voice annotations, recording movie and presentation voiceovers, or using Internet telephone applications. And with 16-bit audio output at your command, you can plug in headphones and listen to music using iTunes,[10] watch a DVD movie, or play the latest games in complete privacy.

Real-World Performance

The PowerBook G4 is a full-featured notebook computer equipped with the capabilities and power required by creative professionals, scientists, and business-people. It enables a fast, efficient digital workflow for accessing or importing data, editing and rendering it, previewing the results, and outputting to various formats—no matter whether your workflow involves print, web, video, audio, imaging, or other media. Whatever you use your PowerBook for, its high-speed processing, outstanding graphics, versatile network connectivity, and easy expandability will help you work faster and more easily.

The following pages describe real-world performance tests conducted on the PowerBook G4 line.

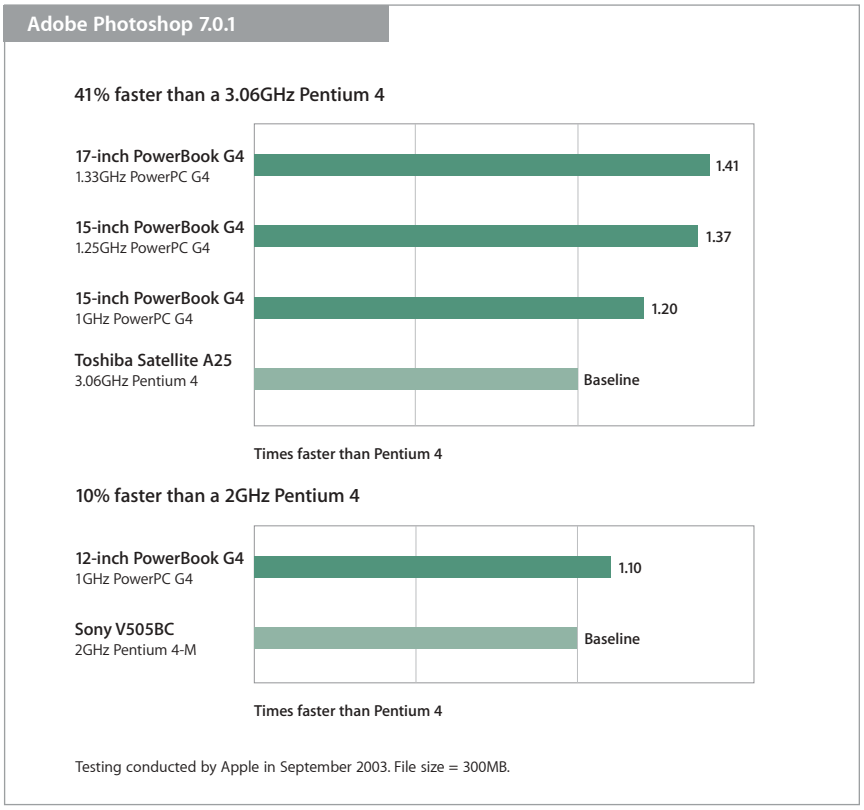
Design and Publishing

Adobe Photoshop performance test

To demonstrate the superiority of the PowerBook family, Apple conducted tests using Adobe Photoshop 7.0.1, the most popular application among creative professionals. Photoshop is an effective cross-platform measure of system performance because it has been optimized for both Macintosh and Windows platforms.

Apple ran the Adobe Photoshop tests using a 300MB Photoshop file and a suite of 45 commonly used Photoshop actions, including file saving, image adjustments, mode changes, and filters. We measured the time to execute each filter or function and compared the performance of all actions using an indexed score.

The 15-inch and 17-inch PowerBook models were compared to the 3.06GHz Pentium 4–based Toshiba Satellite A25, one of the fastest PC notebooks in the market. The 1.33GHz 17-inch PowerBook was 1.41 times faster, while the 1.25GHz 15-inch PowerBook was 1.37 times faster. The 1GHz 12-inch PowerBook was tested against a comparable 2GHz Pentium 4–based notebook PC. In this case, the 1GHz 12-inch PowerBook was 1.10 times faster—clearly outpacing a system with double the processor clock speed and demonstrating again why megahertz alone is an incomplete measure of system performance.



DVD Creation

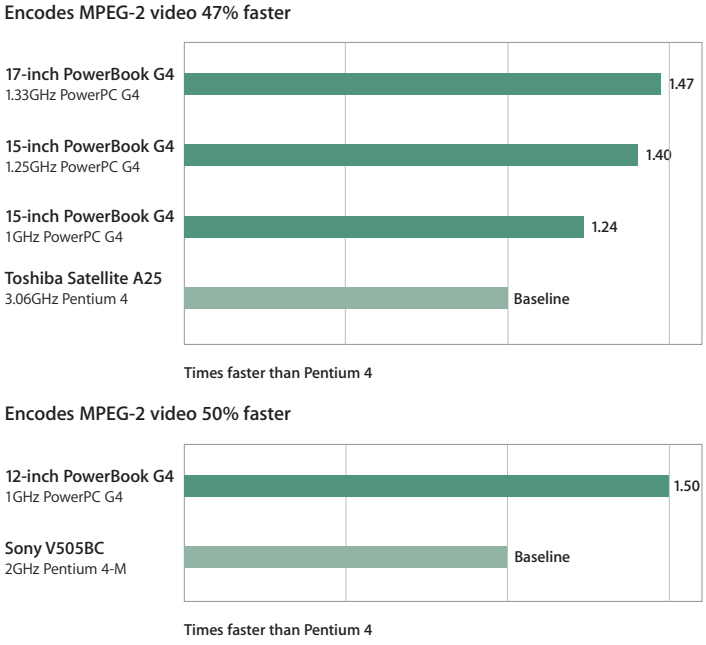
DVD encoding test

For an initial look at video performance on the PowerBook, Apple tested video encoding, the most time-consuming part of burning a DVD. The test consisted of converting DV, the format generated by most standard digital video cameras, to MPEG-2, the format used for high-quality television display by consumer DVD players.

We compared PowerBook systems running Compressor, Apple's professional-level encoding software, with Intel-based systems running Canopus ProCoder professional transcoding software, a popular Windows-based DVD authoring solution. We measured the time it took each system to encode a 5-minute DV clip using the high-quality MPEG-2 encoding setting.

The 15-inch PowerBook and 17-inch PowerBook running Compressor clearly outperformed the 3.06GHz Toshiba Satellite A25—encoding video 40% and 47% faster, respectively. The 1GHz 12-inch PowerBook encoded video 50% faster than the 2GHz Sony V505BC. These results illustrate the advantage of Apple's unique system architecture, which can deliver real-world performance that far outpaces traditional Pentium 4–based PCs.

DVD Authoring



Testing conducted by Apple in September 2003. This test measures how long it takes to encode a 5-minute DV clip to MPEG-2. Compressor was used on the PowerBook; Canopus ProCoder was used on the PC.

Science and Technology

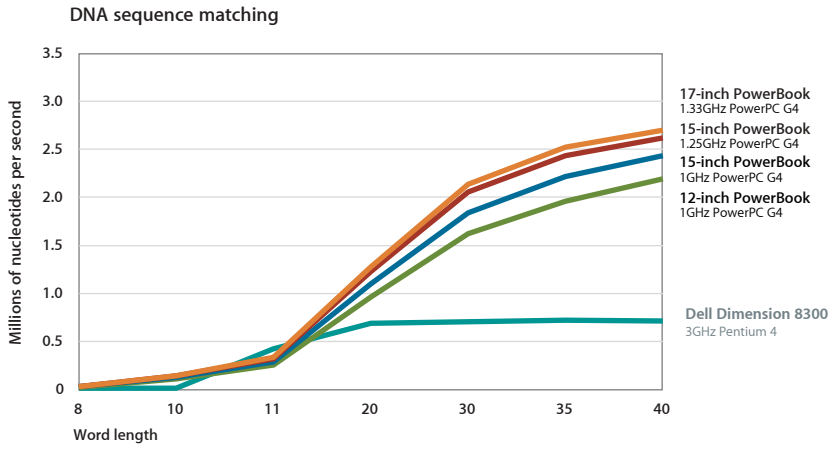
BLAST performance test

To demonstrate the performance advantages of the PowerBook for processor-intensive scientific analysis, Apple used Basic Local Alignment Search Tool, or BLAST. BLAST is a popular open source biotechnology application used by life science researchers to find matches in DNA and protein sequences—a highly processor-intensive task.

BLAST searches are based on word size, or the number of nucleotide pairs specified by the researcher to register as a match. For example, a word size of 40 means that two sets of genetic code have 40 nucleotides in common. Different word sizes are used for different kinds of research, and users can adjust word size to the sensitivity appropriate to their needs. With long-word-size, or high-performance, searches, the researcher is looking for similarities between DNA sequences that are nearly identical—for example, comparing DNA samples from two different mice. For short-word-size searches (fewer than 11), the researcher is comparing more distantly related sequences, such as mouse DNA versus human DNA. These searches require high resolution to find the small matches between dissimilar sequences.

Apple compared the performance of the PowerBook family running A/G BLAST with a 3GHz Pentium 4–based Dell Dimension 8300 desktop system running Red Hat Linux 9.0 and NCBI BLAST. In common searches using a word size of 12 or more, the PowerBook family delivered up to 3.81 times the performance of the 3GHz Pentium 4–based desktop. This data shows that the PowerBook G4 doesn't just excel at creative applications. Scientific applications can greatly benefit from a portable with a PowerPC G4 processor with Velocity Engine and the balanced performance of the PowerBook architecture.

A/G BLAST versus NCBI BLAST



Testing conducted by Apple in September 2003.

Product Configurations and Options

Standard Configurations

The following standard PowerBook G4 configurations are available through the Apple Store and Apple Authorized Resellers.

12-inch PowerBook G4

Order number	M9007LL/A	M9008LL/A
Processor	1GHz PowerPC G4	1GHz PowerPC G4
Level 2 cache	512K	512K
Memory	256MB of PC2100 (266MHz) DDR SDRAM	256MB of PC2100 (266MHz) DDR SDRAM
Hard drive	40GB Ultra ATA/100[11]	40GB Ultra ATA/100[11]
Optical drive	Slot-loading Combo (DVD-ROM/CD-RW)	Slot-loading SuperDrive (DVD-R/CD-RW)
Display	12.1-inch (diagonal) TFT XGA	12.1-inch (diagonal) TFT XGA
Graphics support	NVIDIA GeForce FX Go5200 with 32MB of DDR SDRAM	NVIDIA GeForce FX Go5200 with 32MB of DDR SDRAM
Wireless support	Built-in Bluetooth; 54-Mbps AirPort Extreme ready[5]	Built-in Bluetooth; 54-Mbps AirPort Extreme ready[5]
Ethernet	10/100BASE-T	10/100BASE-T
Modem	56K V.92[8]	56K V.92[8]
Also included	Mini-DVI to DVI adapter, mini-DVI to VGA adapter, modem cable, power adapter, AC wall plug, power cord	

15-inch PowerBook G4

Order number	M8980LL/A	M8981LL/A
Processor	1GHz PowerPC G4	1.25GHz PowerPC G4
Level 2 cache	512K	512K
Memory	256MB of PC2700 (333MHz) DDR SDRAM	512MB of PC2700 (333MHz) DDR SDRAM
Hard drive	60GB Ultra ATA/100[11]	80GB Ultra ATA/100[11]
Optical drive	Slot-loading Combo (DVD-ROM/CD-RW)	Slot-loading SuperDrive (DVD-R/CD-RW)
Display	15.2-inch (diagonal) TFT widescreen	15.2-inch (diagonal) TFT widescreen
Graphics support	ATI Mobility Radeon 9600 with 64MB of DDR SDRAM	ATI Mobility Radeon 9600 with 64MB of DDR SDRAM
Wireless support	Built-in Bluetooth; 54-Mbps AirPort Extreme ready[5]	Built-in Bluetooth; built-in 54-Mbps AirPort Extreme[5]
Ethernet	10/100/1000BASE-T (Gigabit)	10/100/1000BASE-T (Gigabit)
Modem	56K V.92[8]	56K V.92[8]
Keyboard	Full size	Full size; backlit with ambient light sensor
Also included	S-video to composite adapter, DVI to VGA adapter, modem cable, power adapter, AC wall plug, power cord	

17-inch PowerBook G4

Order number	M9110LL/A
Processor	1.33GHz PowerPC G4
Level 2 cache	512K
Memory	512MB of PC2700 (333MHz) DDR SDRAM
Hard drive	80GB Ultra ATA/100[11]
Optical drive	Slot-loading SuperDrive (DVD-R/CD-RW)
Display	17-inch (diagonal) TFT widescreen
Graphics support	ATI Mobility Radeon 9600 with 64MB of DDR SDRAM
Wireless support	Built-in 54-Mbps AirPort Extreme[5]; built-in Bluetooth
Ethernet	10/100/1000BASE-T (Gigabit)
Modem	56K V.92[8]
Keyboard	Full size; backlit with ambient light sensor
Also included	S-video to composite adapter, DVI to VGA adapter, modem cable, power adapter, AC wall plug, power cord

Included Software

PowerBook G4 computers come with the following software: Mac OS X, Mail, iChat, Safari, Sherlock, Address Book, QuickTime, iLife (includes iTunes, iPhoto, iMovie, and iDVD[7]), iSync, iCal, DVD Player, Classic environment, Acrobat Reader, Art Directors Toolkit, EarthLink TotalAccess 2003 (includes 30 days of free service), FAXstf, FileMaker Pro 6 Trial, GraphicConverter, Microsoft Office v. X Test Drive, OmniGraffle, OmniOutliner, QuickBooks for Mac New User Edition, Developer Tools, and Apple Hardware Test.

Build-to-Order Options

You can order a custom-configured PowerBook G4 from the Apple Store or an Apple Authorized reseller. Options may include additional RAM, larger hard disk drive, type of optical drive, AirPort Extreme wireless networking, illuminated keyboard, additional batteries and power adapters, Apple flat-panel displays, external keyboards and mice, and third-party peripherals.

Apple Displays and Adapters

To enhance your PowerBook G4 system, choose from Apple's family of all-digital, flat-panel displays.

- Apple Studio Display (17-inch), order number M7649ZM/B
- Apple Cinema Display (20-inch), order number M8893ZM/A
- Apple Cinema HD Display (23-inch), order number M8537ZM/A

In addition, the following display adapters are available.

- Apple DVI to ADC Adapter, order number M8661 (required to connect an Apple flat-panel display)
- Apple Mini-DVI to DVI Adapter, order number M9321G/A (12-inch PowerBook)
- Apple Mini-DVI to VGA Adapter, order number M9320G/A (12-inch PowerBook)
- Apple Mini-DVI to Video Adapter, order number M9319G/A (12-inch PowerBook)

Other Products

These products are also available for your PowerBook G4 system.

- Apple Portable Power Adapter, order number M8943LL/A
- 12-inch PowerBook G4 Rechargeable Battery, order number M9324G/A
- 15-inch PowerBook G4 Rechargeable Battery, order number M9325G/A
- 17-inch PowerBook G4 Rechargeable Battery, order number M9326G/A
- AirPort Extreme Card, order number M8881LL/A
- AirPort Extreme Base Station, order numbers M8930LL/A and M8799LL/A
- .Mac, order number M9036Z/A
- AppleCare Protection Plan, order number M8853LL/A

Extended Service and Support

Every PowerBook G4 comes with 90 days of free telephone support and a one-year limited warranty. You can purchase the AppleCare Protection Plan to extend your service and support to up to three full years. The plan provides support for your Mac, the Mac OS, and many Apple consumer applications, so just one phone call can help resolve most issues. You can also enroll one Apple display for coverage, provided that the PowerBook G4 and display are purchased together. For more information, visit www.apple.com/support/products or call 800-823-2775.

Technical Specifications

12-inch PowerBook G4

Processor and memory

- 1GHz PowerPC G4 processor with Velocity Engine
- 512K SRAM on-chip L2 cache
- 133MHz system bus
- 256MB of PC2100 (266MHz) DDR SDRAM; one open SO-DIMM slot; support for up to 1.25GB

Storage

- 40GB 4200-rpm Ultra ATA/100 hard drive[11]
- One of the following optical drives:
  - Slot-loading Combo drive (DVD-ROM/CD-RW): reads DVDs at up to 8x speed, writes CD-R discs at up to 24x speed, writes CD-RW discs at up to 10x speed, reads CDs at up to 24x speed
  - Slot-loading SuperDrive (DVD-R/CD-RW): writes DVD-R discs at up to 2x speed, reads DVDs at up to 8x speed, writes CD-R discs at up to 16x speed, writes CD-RW discs at up to 4x speed, reads CDs at up to 24x speed

Communications

- Built-in antennas and expansion slot for optional 54-Mbps AirPort Extreme wireless networking card[5] (based on 802.11g standard; Wi-Fi Certified for 802.11g and 802.11b interoperability)
- Built-in Bluetooth
- Built-in 10/100BASE-T Ethernet (RJ-45 connector)
- Built-in 56K V.92 modem[8] (RJ-11 connector)

Expansion

- One FireWire 400 port at up to 400 Mbps[9]
- Two USB 2.0 ports at up to 480 Mbps

Display

- 12.1-inch (diagonal) TFT XGA active-matrix display
  - Support for millions of colors at 1024-by-768-pixel resolution
  - Support for resolution scaling to 800-by-600-pixel and 640-by-480-pixel resolution with millions of colors

Video and graphics support

- NVIDIA GeForce FX Go5200 graphics processor with AGP 4X support and 32MB of DDR SDRAM for 2D/3D graphics acceleration
- Dual display and video mirroring: Simultaneously supports up to 1024 by 768 pixels on the built-in display and up to 2048 by 1536 pixels on an external display, both at millions of colors[12]
- DVI output using included mini-DVI to DVI adapter
- VGA output using included mini-DVI to VGA adapter
- S-video and composite video output using mini-DVI to video adapter (sold separately)

Audio

- Audio line in (minijack)
- Headphone out (minijack)
- Built-in stereo speakers with midrange-enhancing third speaker
- Internal omnidirectional microphone

Battery and power

- 47-watt-hour lithium-ion battery with integrated charge indicator LEDs
- Up to 5 hours of battery life[4]
- 45W power adapter with cable management system
- Power adapter port

Security

- Kensington cable lock slot

Keyboard and trackpad

- Built-in full-size keyboard with 78 (U.S.) or 79 (ISO) keys, including 12 function keys, 4 arrow keys (inverted "T" arrangement), and embedded numeric keypad
- Solid-state trackpad for precise cursor control; supports tap, double-tap, and drag capabilities

Electrical and environmental requirements

- Meets ENERGY STAR requirements
- Line voltage: 100V to 240V AC
- Frequency: 50Hz to 60Hz
- Operating temperature: 50° to 95° F (10° to 35° C)
- Storage temperature: –13° to 140° F (–25° to 60° C)
- Relative humidity: 20% to 80% noncondensing
- Maximum operating altitude: 10,000 feet
- Maximum storage altitude: 15,000 feet
- Maximum shipping altitude: 35,000 feet

Size and weight

- Height: 1.18 inches (3.0 cm)
- Width: 10.9 inches (27.7 cm)
- Depth: 8.6 inches (21.9 cm)
- Weight: 4.6 pounds (2.1 kg) with battery and optical drive installed[3]

15-inch PowerBook G4

Processor and memory

- 1GHz or 1.25GHz PowerPC G4 processor with Velocity Engine
- 512K SRAM on-chip L2 cache
- 167MHz system bus
- 256MB or 512MB of PC2700 (333MHz) DDR SDRAM; two SO-DIMM slots support up to 2GB

Storage

- 60GB or 80GB 4200-rpm Ultra ATA/100 hard drive; optional 80GB 5400-rpm drive[11]
- One of the following optical drives:
  - Slot-loading Combo drive (DVD-ROM/CD-RW): reads DVDs at up to 8x speed, writes CD-R discs at up to 24x speed, writes CD-RW discs at up to 10x speed, reads CDs at up to 24x speed
  - Slot-loading SuperDrive (DVD-R/CD-RW): writes DVD-R discs at up to 2x speed, reads DVDs at up to 8x speed, writes CD-R discs at up to 16x speed, writes CD-RW discs at up to 4x speed, reads CDs at up to 24x speed

Communications

- Built-in 54-Mbps AirPort Extreme wireless networking[5] (based on 802.11g standard; Wi-Fi Certified for 802.11g and 802.11b interoperability) in 1.25GHz configuration; optional in 1GHz configuration
- Built-in Bluetooth
- Built-in 10/100/1000BASE-T Gigabit Ethernet (RJ-45 connector)
- Built-in 56K V.92 modem[8] (RJ-11 connector)

Expansion

- One FireWire 800 port at up to 800 Mbps; one FireWire 400 port at up to 400 Mbps[9]
- Two USB 2.0 ports at up to 480 Mbps
- PC Card/CardBus slot for Type I or Type II card

Display

- 15.2-inch (diagonal) TFT widescreen display
  - Support for millions of colors at 1280-by-854-pixel resolution
  - Supported resolutions: 1280 by 854 (native), 1152 by 768, 896 by 600, 720 by 480, and 640 by 480 pixels at 3:2 aspect ratio; 1024 by 768, 800 by 600, and 640 by 480 pixels at 4:3 aspect ratio

Video and graphics support

- ATI Mobility Radeon 9600 graphics processor with AGP 4X support and 64MB of DDR SDRAM
- Dual display and video mirroring: Simultaneously supports up to 1280 by 854 pixels on the built-in display and up to 2048 by 1536 pixels on an external display, both at millions of colors[12]
- DVI output port
- VGA output using included DVI to VGA adapter
- S-video output port
- Composite video output using included S-video to composite adapter

Audio

- Audio line in (minijack)
- Headphone out (minijack)
- Built-in stereo speakers with midrange-enhancing third speaker
- Internal omnidirectional microphone (located under left speaker grille)

Battery and power

- 46-watt-hour lithium-ion battery with integrated charge indicator LEDs
- Up to 4.5 hours of battery life[4]
- 65W power adapter with cable management system
- Power adapter port

Security

- Kensington cable lock slot

Keyboard and trackpad

- Built-in full-size keyboard with 78 (U.S.) or 79 (ISO) keys, including 12 function keys, 4 arrow keys (inverted "T" arrangement), and embedded numeric keypad
  - Illuminated fiber-optic, backlit keyboard with ambient light sensor in 1.25GHz configuration
- Solid-state trackpad for precise cursor control; supports tap, double-tap, and drag capabilities

Electrical and environmental requirements

- Meets ENERGY STAR requirements
- Line voltage: 100V to 240V AC
- Frequency: 50Hz to 60Hz
- Operating temperature: 50° to 95° F (10° to 35° C)
- Storage temperature: –40° to 116° F (–40° to 47° C)
- Relative humidity: 0% to 90% noncondensing
- Maximum operating altitude: 10,000 feet
- Maximum storage altitude: 15,000 feet
- Maximum shipping altitude: 35,000 feet

Size and weight

- Height: 1.1 inches (2.8 cm)
- Width: 13.7 inches (34.8 cm)
- Depth: 9.5 inches (24.3 cm)
- Weight: 5.6 pounds (2.5 kg) with battery and optical drive installed[3]

17-inch PowerBook G4

Processor and memory

- 1.33GHz PowerPC G4 processor with Velocity Engine
- 512K SRAM on-chip L2 cache
- 167MHz system bus
- 512MB of PC2700 (333MHz) DDR SDRAM; two SO-DIMM slots support up to 2GB

Storage

- 80GB 4200-rpm Ultra ATA/100 hard drive[11]
- Slot-loading SuperDrive (DVD-R/CD-RW)
  - Writes DVD-R discs at up to 2x speed; reads DVDs at up to 8x speed
  - Writes CD-R discs at up to 16x speed; writes CD-RW discs at up to 4x speed
  - Reads CDs at up to 24x speed

Communications

- Built-in 54-Mbps AirPort Extreme wireless networking[5] (based on 802.11g standard; Wi-Fi Certified for 802.11g and 802.11b interoperability)
- Built-in Bluetooth
- Built-in 10/100/1000BASE-T Gigabit Ethernet (RJ-45 connector)
- Built-in 56K V.92 modem[8] (RJ-11 connector)

Expansion

- One FireWire 800 port at up to 800 Mbps; one FireWire 400 port at up to 400 Mbps[9]
- Two USB 2.0 ports at up to 480 Mbps
- PC Card/CardBus slot for Type I or Type II card

Display

- 17-inch (diagonal) TFT widescreen display
  - Support for millions of colors at 1440-by-900-pixel resolution
  - Supported resolutions: 1440 by 900 (native), 1152 by 720, 1024 by 640, and 800 by 500 pixels at 16:10 aspect ratio; 1024 by 768, 800 by 600, and 640 by 480 pixels at 4:3 aspect ratio

Video and graphics support

- ATI Mobility Radeon 9600 graphics processor with AGP 4X support and 64MB of DDR SDRAM for 2D/3D graphics acceleration
- Dual display and video mirroring: Simultaneously supports up to 1440 by 900 pixels on the built-in display and up to 2048 by 1536 pixels on an external display, both at millions of colors[12]
- DVI output port
- VGA output using included DVI to VGA adapter
- S-video output port
- Composite video output using included S-video to composite adapter

Audio

- Audio line in (minijack)
- Headphone out (minijack)
- Two built-in stereo speakers
- Internal omnidirectional microphone (located under left speaker grille)

Battery and power

- 58-watt-hour lithium-ion prismatic battery with integrated charge indicator LEDs
- Up to 4.5 hours of battery life[4]
- 65W power adapter with cable management system
- Power adapter port

Security
- Kensington cable lock slot

Keyboard and trackpad
- Built-in full-size keyboard with 78 (U.S.) or 79 (ISO) keys, including 12 function keys, 4 arrow keys (inverted "T" arrangement), and embedded numeric keypad
  - Illuminated fiber-optic, backlit keys
- Solid-state trackpad for precise cursor control; supports tap, double-tap, and drag capabilities

Ambient light sensor
- Measures ambient light and works with integrated software to adjust keyboard illumination and screen brightness based on user preferences

Electrical and environmental requirements
- Meets ENERGY STAR requirements
- Line voltage: 100V to 240V AC
- Frequency: 50Hz to 60Hz
- Operating temperature: 50° to 95° F (10° to 35° C)
- Storage temperature: –40° to 116° F (–40° to 47° C)
- Relative humidity: 20% to 80% noncondensing
- Maximum operating altitude: 10,000 feet
- Maximum storage altitude: 15,000 feet
- Maximum shipping altitude: 35,000 feet

Size and weight
- Height: 1.0 inch (2.6 cm)
- Width: 15.4 inches (39.2 cm)
- Depth: 10.2 inches (25.9 cm)
- Weight: 6.9 pounds (3.1 kg) with battery and optical drive installed[3]

For More Information

For more information about the PowerBook G4, visit www.apple.com/powerbook. To find out more about Mac OS X, visit www.apple.com/macosx.

Internet access requires a compatible Internet service provider; fees may apply. Product includes electronic documentation. Backup copy of software is included. [1]Available in selected configurations. [2]May require adapter (sold separately). [3]Actual weight varies by configuration and manufacturing process. [4]Battery life depends on configuration and use. [5]Wireless Internet access requires AirPort Extreme Card, AirPort Base Station or AirPort Extreme Base Station, and Internet access (fees may apply). Achieving data rates up to 54 Mbps requires that all users have an AirPort Extreme Card and connect to an AirPort Extreme Base Station. Some ISPs are not currently compatible with AirPort and AirPort Extreme. Range may vary with site conditions. [6]Connection to Apple flat-panel displays requires Apple DVI to ADC Adapter (sold separately). [7]iDVD requires Apple SuperDrive. [8]Compatible ISP and telephone services required. Your ISP may not support all V.92 features. Modem will function according to V.90 standards if V.92 services are not available. Actual modem speeds lower; speed depends on connection rate and other factors. [9]Actual rates will vary. [10]iTunes is for legal or rightholder-authorized copying only. Don't steal music. [11]1GB = 1 billion bytes; actual formatted capacity less. [12]Some third-party DVI displays may not support all resolutions.