SLI™ Bridging Leads　　　　Graphics Chip　　　Memory

PCI Express x16

About DirectX®

DirectX® controls the hardware substrate layer of Windows®, including DirectDraw (high-speed 2D image), DirectSound (sound output), Direct3D (high-speed 3D image), and so on. DirectX® allows game manufacturers to effectively control the operation of the system parts and makes development easier. Newer versions of DirectX are equipped with more powerful functionality and offer more special effects, including support for Shader Model 4, which helps to enhance image realism. The biggest change in DirectX® 10 is Geometry Shader, which unlike the mapping special effects in DX9, supports immediate change of polygons without using too much CPU resources to process the computing on polygons. In addition, DX10 has substantially alleviated system load so that FPS performance has been greatly increased.

Cooling System – Silent-Pipe 3™ ··················

As the computing performance of today's graphics accelerators has greatly increased from past generations, the amount of energy generated by the graphics chip and memory has also increased. To solve this problem, most graphics accelerators use enlarged cooling fans and fins to enhance overall cooling efficiency and to maintain stable functionality of the graphics accelerator. However, fan noise that come with such adjustments can be very annoying.

For this reason, GIGABYTE has developed a fan-free design that uses only cooling fins and heat pipes to reduce the thermal temperature of the graphics accelerator. The Silent-Pipe 3™ technology used in the GIGABYTE GV-NX86S256H graphics accelerator integrates the previous Silent-Pipe II™, Silent-Pipe™ and Screen-Cooling™ cooling technologies into one solution, to create a completely silent "turbulence" cooling design. This new technology utilizes a front-flow thermal module combined with a proprietary natural convection design, to allow for excellent heat conduction from the enlarged cooling fins and all copper heat pipes, thereby releasing the excess thermal energy from the system to create a completely silent cooling solution with very low power consumption.

Absolute Silence and Cooling
GIGABYTE natural convection design
Silent-Pipe 3™ series graphics accelerator

### Five Major Features of the GIGABYTE Silent-Pipe 3™ Technology

1. Silent turbulence cooling design: trapezoid punches on the fins quickly turn the air flow coming from the front side from laminar air flow to turbulence air flow and increases the heat exchange between cold air and the fins.
2. Front-flow thermal module: original dual-slot heat pipe technology uses length-mixed fins to force cold air into the system and to increase flow speed.
3. 90% heat pipe coverage
4. Screen-Cooling technology
5. All copper base for heat transfer
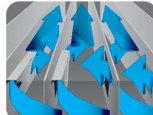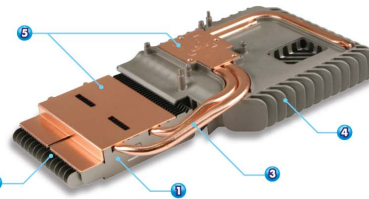
Silent turbulence cooling design
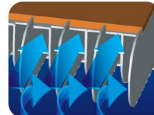
Front-flow thermal module

90% heat pipe coverage

90% of the heat sink is covered by heat pipe
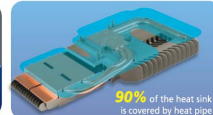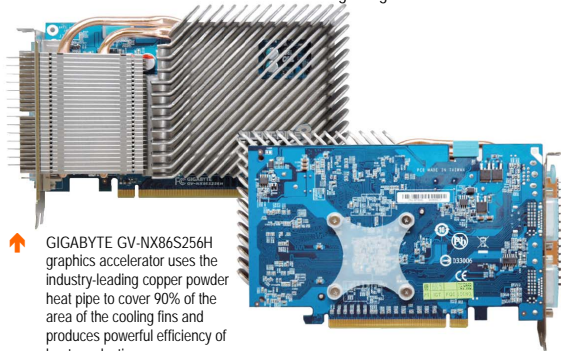
GIGABYTE GV-NX86S256H graphics accelerator uses the industry-leading copper powder heat pipe to cover 90% of the area of the cooling fins and produces powerful efficiency of heat conduction.

Since its launch, the GIGABYTE Silent-Pipe™ series has introduced 3 generations of graphics accelerator cooling technologies.

Expansion Interface······································

Only with the proper data transfer interface can the graphics accelerator with increased 3D graphics performance display its full computing ability. After ISA, PCI and AGP, the PCI Express® x16 interface with up to 4GB/s bandwidth has become the latest mainstream bridge between the motherboard and graphics accelerator. However, since the launch of the Intel® X38 high-speed chipset, PCI-E 2.0, with twice the data transfer rate of the first generation has entered the market as a new mainstream product.

➡ The upper interface is PCI Express® x16 and the lower one is AGP. In appearance, APG and PCI Express® feature different designs in connecting fingers. Both have fool-proof designs so that users can easily distinguish between the two and avoid insertion in wrong slots.

Output Connector·······································

D-Sub connector

⬆ Due to its prevailing compatibility, the D-Sub connector has been long used as an analog connection and is still currently adopted in appliances such as computer devices, DVD players and LCD TVs.

S-Video connector

⬆ Also known as TV-Out, this interface is used for some TV game consoles or graphics accelerators which use this interface to allow video output to TVs or other large-size monitors for display. Some products also provide an S-Video-to-AV or S-Video-to-Component conversion module (such as the GIGABYTE exclusive integrated AV terminal) for connection expansion. However, if the resolution of the signal source is higher than that of the output device (TV), the image may be of lower quality.
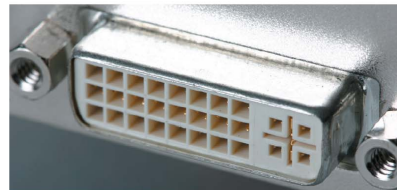
HDMI connector

⬆ HDMI is one of the latest digital video interfaces. It is smaller and easier to install, and transfers uncompressed, high-quality video signals and multi-channel audio signals. HDMI is compatible with DVI and HDCP digital interfaces and supports digital content protection technology.

DVI connector

⬆ The DVI connector processes the image data in a digital mode and creates less signal loss and smaller signal attenuation range during the transfer process. For display devices with both DVI and D-Sub interfaces, the DVI interface is preferred as it produces quality closer to the original images. DVI is commonly used in graphics accelerators, notebooks, middle- and high-end LCD monitors, LCD TVs and projectors.

Powerful Dynamics of Display —NVIDIA® TurboCache™ Technology····················

To make entry-level products more competitive and to provide excellent quality at affordable prices, NVIDIA® has developed TurboCache™ technology. Combining the proprietary graphics memory capacity and bandwidth with the shared space dynamically allocated by the system memory, NVIDIA® TurboCache™ is able to deliver greater graphics memory capacity for graphics processing, significantly enhancing the graphics performance. NVIDIA® GeForce® 6 and 7 series graphics chips, including GeForce® 6200 and 7100/7200/7300 have adopted this technology for the low and middle-end market segments.

First introduced with the GeForce® 6200 graphics chip, with its outstanding graphical performance, NVIDIA® continues to expand its range of TurboCache™ enabled solutions with the Geforce® 6200 TC which features several advancements including the TurboCache™ controller, with redundant circuits removed for a reduced chipset dimension of nearly 1/3. The Geforce® 6500 and Geforce® 7300 series also come with the built-in Turbocache™ technology.

Chipsets that Incorporate TurboCache™ Technology							
	GeForce® 7300 GS	GeForce® 7300 LE	GeForce® 7200 GS	GeForce® 7100 GS	GeForce® 6500	GeForce® 6200 TC	GeForce® 6200 LE
Graphics Bus	PCI Express®	PCI Express®	PCI Express®	PCI Express®	PCI Express®	PCI Express®	PCI Express®
Core Clock	550MHz	450MHz	450MHz	350MHz	400MHz	400MHz	400MHz
Memory Clock	GDDR3/DDR2	GDDR3/DDR2	DDR2	DDR2/DDR	DDR	DDR	DDR
Memory Bandwidth	64 byte	64 byte	64 byte	64 byte	64 byte	32 byte	128/64 byte
Built-in Capacity of the Display Memory	128MB	128MB	128MB	64/128MB	128/256MB	16/32/64/128MB	16/32/64/128MB
Maximum Display Memory Available	512MB	512MB	512MB	256/512MB	256MB	128/256MB	128/256MB

A comparison chart of GPUs with and without TurboCache™ technology
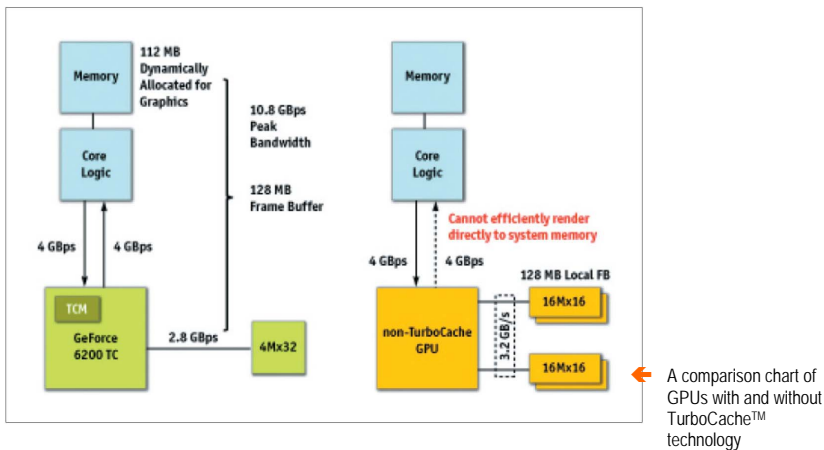
NVIDIA® SLI™ Technology - Double Your Graphics Processing Power·············

To greatly enhance the graphic accelerator's performance, NVIDIA® developed SLI™ (Scalable Link Interface) technology that enables connecting of two or four display adapters together for faster graphics rendering. In brief, users can install two equivalent PCI Express® graphics accelerators on a motherboard and depending on hardware requirements, use an SLI™ bridging between these two accelerators for blistering graphics performance, up to twice that of a single GPU configuration.

Currently all NVIDIA® GeForce® 8, 7 and 6 series middle and high-end graphics chips implementing PCI Express® are able to support SLI™ technology. For some middle-end SLI™ graphics accelerators, the PCI Express® bus bandwidth provided by the system is sufficient for the communication between GPUs, so it is not necessary to use additional SLI™ bridging. The drivers of the NVIDIA® GeForce® 7300 GT/GS/LE, NVIDIA® GeForce® 7100 GS, NVIDIA® GeForce® 6600/6600 LE have already included software SLI™ bridging, allowing users to enable the two graphics accelerators without having to install a bridging hardware device.

Currently, the NVIDIA® nForce® 600 and nForce® 500, nForce® Professional and nForce®4 motherboard chipsets support SLI™ technology. SLI multiple GPU computing technology allows users to easily make future system upgrades. For users not needing very powerful graphics performance at the outset, it is advised to use an SLI-Ready graphics accelerator, and then consider purchasing a second GIGABYTE graphics accelerator of the same model if more computing resource is required for games.

After the component passes the NVIDIA® SLI™ testing and certification procedure, the manufacturer can use the NVIDIA® SLI™ Ready certification label on their products, to inform customers of SLI support.

In addition to dual-GPU SLI architecture, NVIDIA® also integrates Quad NVIDIA® SLI™ technology utilizing four graphics cores. The figure shows a Quad SLI™ system using an nForce® 680i SLI motherboard with NVIDIA® GeForce® 7950 GX2 graphics accelerator.
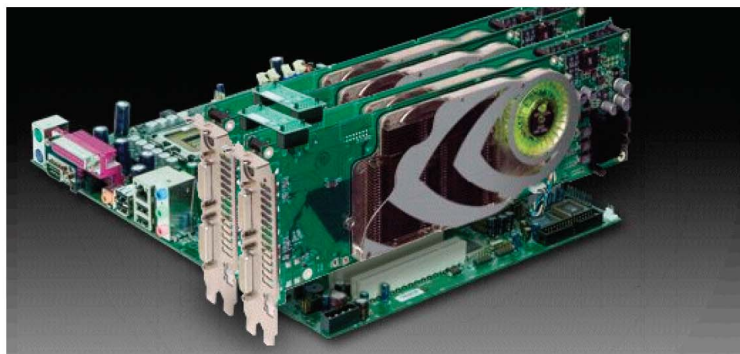
High-Resolution Video Technology—NVIDIA® PureVideo™·········

NVIDIA® PureVideo™ Technology is designed for extremely smooth playback of high-definition video. Featuring an independent video processor core and imaging software, PureVideo™ Technology is able to share the processing load between the CPU and graphics engine in order to render complex, high-definition video. Combined with H.264, VC-1, WMV and MPEG-2 hardware acceleration technologies, PureVideo™ Technology is able to provide ultra clear, ultra smooth playback of high-definition and standard resolution videos with low CPU utilization and low power consumption. With built-in sub-pixel rendering technology, users can zoom in and out of the video to any size, even with low resolution video. PureVideo™ uses de-interlacing, inverse telecine and various zoom technologies, reinforces the anti-aliasing effect, and reduces the image sticking, blur or distortion problems. PureVideo™ also supports HDTV with display functionality up to 1920x1080p via DVI or HDMI interface.

NVIDIA® PureVideo™ HD technology was designed specifically to enable Blu-ray and HD DVD video support. In conjunction with PureVideo™ technology, graphics manufacturers add HD video decoding acceleration and post-production functionality to support High-bandwidth Digital Content Protection (HDCP) protocol for content protected movie playback, allowing users to experience enhanced visual color, clarity, frame flow and zoom precision that Blu-ray and HD videos have to offer.

⬆ The left figure shows the original image with severe aliasing and blur problems. The right figure shows the improved image after the repair using the Bad Edit Detection technology in PureVideo.

⬆ Logo of the NVIDIA® PureVideo™ technology

⬆ Logo of the NVIDIA® PureVideo™ HD technology

2.5 Storage Device

There are various kinds of storage devices for a PC including hard disk drive, floppy disk drive and optical drive, as well as a wide range of storage devices such as flash disk, memory cards, magneto optical (MO) drives, etc. As the operating system and applications become more multi-functional, more space is required for software, making the hard disk drive a necessary storage device for every PC.

The memory module can also be considered a kind of storage device, except the data stored on it lasts for a shorter period of time. When the PC is turned off or when the application is terminated, data stored in the memory will be erased to provide more space for future program executions. A hard disk drive is, however, a long-term storage device. Users wanting to store worksheets, downloaded files and other documents usually do so on the hard disk drive first. If they want to share the file with others, they can do so via the Internet or using a CD or an external flash disk.

Drivers, utilities and games are mostly stored on discs that are easy to carry and store. Considering the convenience of file loading as well as the large storage capacities and low costs, the importance of an optical CD/DVD drive or burner cannot be over-emphasized. In addition, the data burnt onto a disc can be used to create videos or music compatible with regular consumer players, extending the multimedia functionality of the computer. New-generation Blu-ray and HD DVD discs have higher capacities than DVD discs, and have gradually become the mainstream disc storage solution.

For the new generation Vista™ operating system, Microsoft® recommends users use a hard disc of at least 20GB or more. However, with today's increase of information being stored digitally (digital camera pictures, movies, music, etc.) and the availability of high-speed broad-band connectivity, it is advised to have 300GB (or more) of hard disk capacity.

There are many kinds of storage devices, both built-in and external for use on a computer. Hard disks are still the most common choice when it comes to popularity and capacity.

Combo Drive··

A Combo drive is an optical drive that combines CD-R/CD-RW recording capability with the ability to play DVD media. Generally speaking, a CD-R disc with 80 Min/700MB capacity is quite sufficient for data backup in most cases. Currently, the burner's speed and its price has made it a feasible solution for most users, making it a standard for building a PC. In addition, CD-R/RW burners have combined DVD read functionality to create a Combo model which has become the most popular. With the selling price only slightly higher than the CD-R/RW burner, a direct upgrade to a Combo model is the most beneficial choice.

DVD Burner································

Even with the advantage of 4.7GB capacity (single-sided, singled-layered), the DVD burner faces competition from DVD-R/RW and DVD+R/RW specifications. Both DVD-R/RW and DVD+R/RW specifications are supported in today's burners. The double layer feature helps to increase the disc storage capacity. Due to compatibility, increased distribution and inexpensive pricing, high-end DVD burners cost only slightly more than a CD-R burner, therefore, DVD burners have now replaced CD-R/RW burners.

Hard Disk Drive··························

   Among the factors that affect the performance of a hard disk drive, the rotational speed is the most crucial. The current rotational speed for both mainstream Serial ATA and IDE 3.5-inch hard disk drives is 7200RPM; hard disk drives with 5400RPM are very rare now. Another key factor is the memory buffer. With a higher memory buffer, the speed for the processor to access repeated data on the hard disk drive is faster, and the access performance is also increased. Most memory buffers of hard disk drives are 8MB or 16MB. If there's an excessive price difference, it makes more sense to purchase the 8MB type.

Serial ATA V.S IDE···

   Intel 915 and 925 chipsets have not only usherd in the era of DDR2 and PCI Express®, but have also led to the replacement of IDE with Serial ATA. The later P35 and X38 chipsets support Serial ATA 3.0Gb/s (Serial ATA II). In comparison with the previous specification, Serial ATA 3.0Gb/s has changed the cable length from 1m to 2m, increased the transfer rate up to 3Gbps (1.5Gbps for Serial ATA) and supports features such as Hot Plug, Hot Swap and NCQ (Native Command Queue). Both connector specifications are the same and are therefore compatible with each other.

⬅ The upper part shows the Serial ATA connector, and the lower part shows the IDE interface. The power connector for Serial ATA hard disks has changed. This is the connector that current power supply models provide. Old power supply models can use a conversion cable for connection.

Next-generation Blu-ray Burner·····················

The storage capacities of current DVD discs (4.7GB for single-sided, single-layered DVD discs, and 8.5GB for single-sided, double-layered DVD discs) can no longer meet the needs of high-quality video content such as HDTV digital video and DTS digital audio. Therefore, manufacturers of optical storage devices have started to develop the next-generation blu-ray burning technology. In contrast to the current 650nm red-ray DVD burning technology, both the new Blu-ray and HD DVD technologies use a 405nm blu-ray laser because the shorter wave length and more accurate focus allows more content to be placed in one single disc.

Blu-ray™ Burning Technology

Blu-ray is a new burning technology with the advantage of much higher storage density capacity of at least 25GB or 27GB for a single disc and 46GB or 54GB for a single-sided, double-layered disc. It also supports 128-bit Advanced Encryption Standard (AES) for digital content protection, which makes it the preferred standard for many film companies who value copyrights. The newly introduced PlayStation®3 from Sony Computer Entertainment (SCE) uses blu-ray discs as its storage media.

HD DVD™ Burning Technology

The HD DVD™ technology is an improved version of the current DVD architecture. It uses blu-ray for burning and supports slightly less capacity than a Blu-ray™ disc, 15GB for a single-sided, single-layered disc and 30GB for a single-sided, double-layered disc. However, with the legacy from the DVD architecture, manufactures can produce discs without having to invest large amount of capital on new equipment, which means lower manufacturing costs and technology threshold than producing blu-ray discs. Microsoft Xbox™ 360 uses a HD DVD™ external optical drive for playback of high-quality videos as well as games stored in HD DVD™ discs. These two specifications are facing a compatibility problem, just like the previous DVD+R/-R issue. Each specification has its own supporters, and therefore there exist Blu-ray™ and HD DVD™ videos and games. Consumers have to pay attention to the specification used before purchase. Hopefully there will be products compatible with both Blu-ray™ and HD DVD™ in the future.

▲ The Blu-ray™ burning technology logo can be found on a standard DVD or a Blu-ray disc.

▲ HD DVD™ burning technology logo, represents a HD DVD™ disc.

Hard Disks of Other Dimensions

In the past, hard disks were 5.25″ in dimension. Most desktop computers today use 3.5″ hard disks. There are also 2.5″, 1.8″ and 0.85″ hard disks. 2.5″ hard disks are mostly used in notebook computers, with less capacity, less RPM and more expensive than 3.5″ hard disks. However, today's new 2.5″ hard disks support up to 200GB of capacity (and continue to increase), have been upgraded from 5400RPM to 7200RPM and feature a changed interface, from IDE to SATA. With more affordable prices, 2.5″ hard disks can connect to a PC via the USB interface using a cable or external box, convenient for carrying large amount of data. In contrast, 1.8″ hard disks are just beginning to hit the market. They support up to 100GB capacity and feature the current 4200RPM specification (and will probably evolve to 5400RPM). Also, 1.8″ hard disks are currently used to store data for many small-sized portable video players and storage devices (PMP and photo storage). Due to the limitation of its size, a 0.85″ hard disk is encountering certain development bottlenecks. Most current 0.85″ hard disks support 4GB~8GB capacity and are used as the storage devices for size-sensitive, high-tech products (such as Smartphones).

Flash Disk Drive

Unlike hard disk drives which have many moving parts, flash disk drives save data in the flash memory so there is less risk of losing data if the drive is dropped or jostled. Additionally, flash drives are much smaller, making them much more convenient and portable. Most flash disk drives support USB 2.0 with a fast transfer rate, hot-plug capabilities and do not require driver installation. Moreover, most motherboards today support booting from flash disk drives, which can be convenient for tasks like virus scanning and repairing the operating system. The mainstream storage capacity of a flash disk drive now is 4GB. With the price of 8GB and16GB flash disk drives dropping, flash drives are becoming the most popular method for file transfers.

As the Microsoft® Vista™ operating system adopts the new Ready Boost technology to increase the computer performance, users can insert a portable flash disk with available storage space into the computer, and the computer will see the flash disk as the computer's memory. By doing so, the system performance can be increased immediately, and the flash disk becomes an even more practical tool.
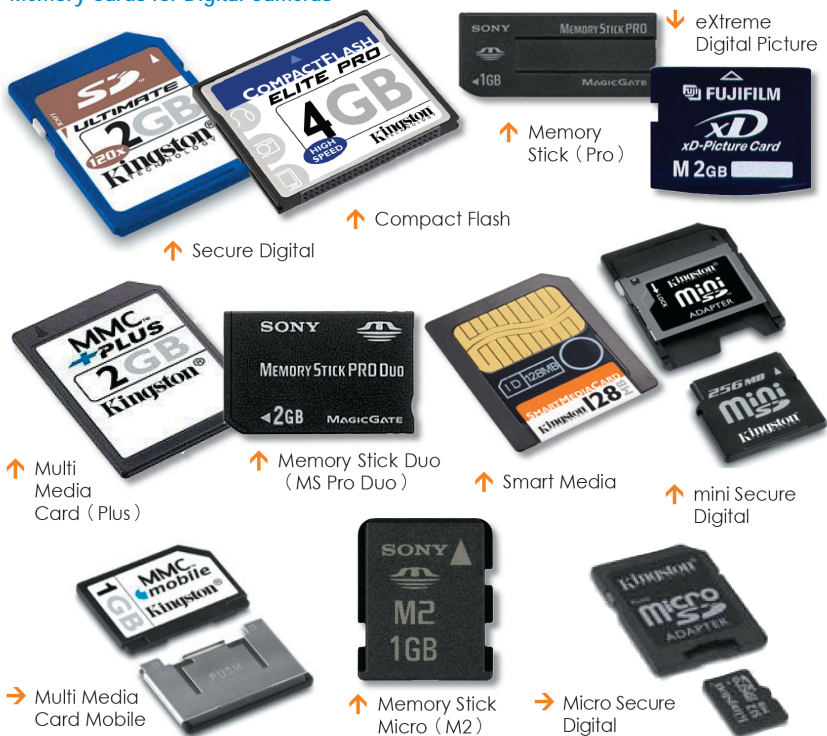
Memory Card

The popularity of digital cameras has led to the development of memory cards. In the beginning, there were many different standards of memory cards, but, after drastic competition in the marketplace, CF, SD, MS and xD have become the major players in the current market. Among them, CF is winning in terms of capacity; SD is the best choice for thin and light compact cameras; MS is supported by Sony products; xD is supported by FUJIFILM and OLYMPUS.

Additionally, due their compact size, memory cards are now used in mobile phones and PDAs. Memory cards, like mini SD, RS-MMC, M2 and Micro SD (Transflash; T-Flash) memory types can be compatible with current card readers and digital cameras by using an adapter, and are therefore growing popularity in the market. As memory capacity continues to increase, many current popular memory cards are also evolving with time. For example, the xD memory card has the H and M series. The SD memory card has launched HSDC high-capacity products which reserve the same appearance and dimension but support up to 32GB capacity (FAT 32 format).

Memory Cards for Digital Cameras

↓ eXtreme Digital Picture

↑ Memory Stick（Pro）

↑ Compact Flash

↑ Secure Digital

↑ Multi Media Card（Plus）

↑ Memory Stick Duo （MS Pro Duo）

↑ Smart Media

↑ mini Secure Digital

→ Multi Media Card Mobile
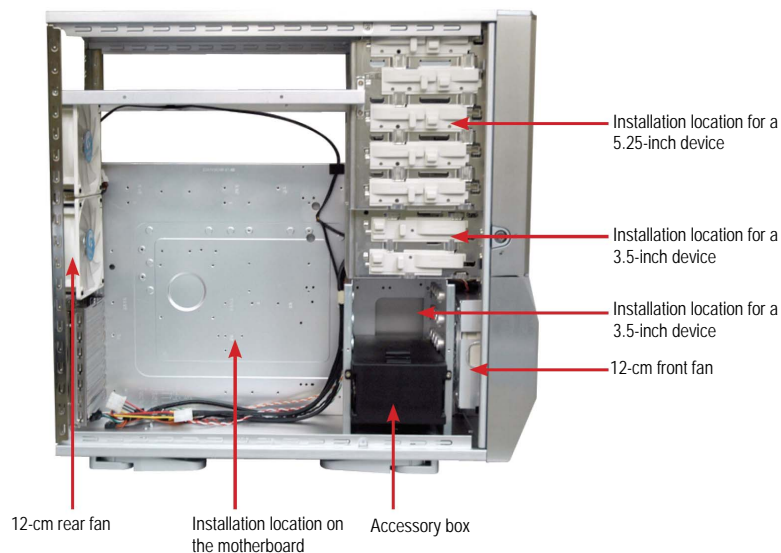
↑ Memory Stick Micro（M2）

→ Micro Secure Digital

2.6 Chassis and Power Supply

Components of the Chassis

Selecting the proper chassis for your system is not just about its appearance. The chassis is like a home that contains and protects the various parts of the PC. An important function of the chassis is its ability to effectively dissipate heat in order to maintain system stability. Furthermore, a good chassis may continue to be used for many years, even if the existing system is upgraded, saving not only money, but also helping the environment by reducing waste. Users also need to pay careful attention when choosing a chassis to consider whether it allows for better heat dissipation. Most chassis today are made of aluminum or an aluminum-magnesium alloy instead of iron, and feature a wide range of cooling fans to maintain proper temperature inside the computer.
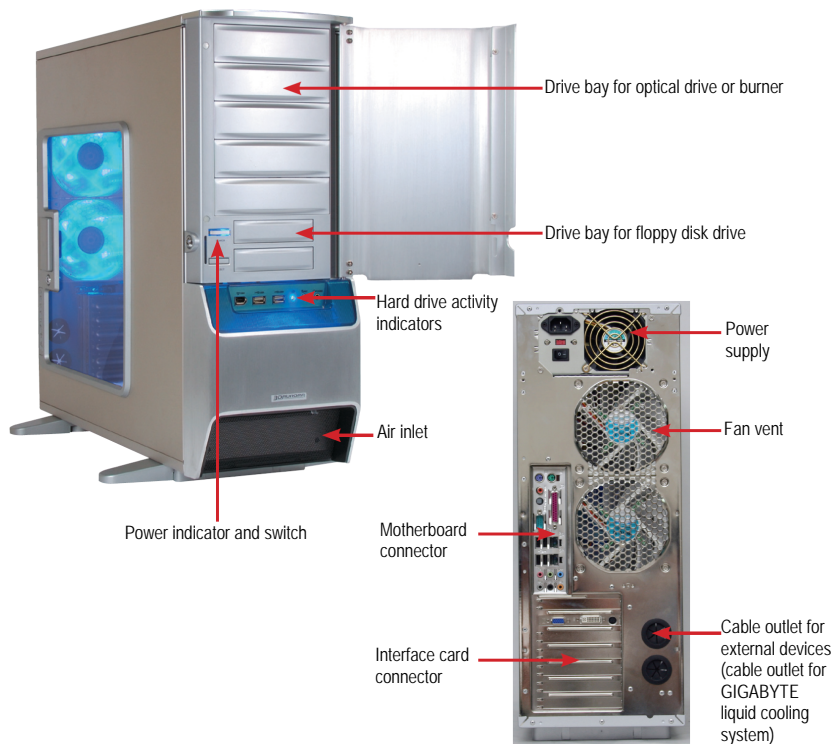
When purchasing a chassis, determine how many 5.25-inch (for optical drives and burners) and 3.5-inch drive bays (for hard disk drives and floppy disk drives) you need. Be cautious of the installation and securing methods. Current chassis use tool-free or screw-free designs for users to perform easy maintenance or upgrades. Some chassis also provide additional screw holes to prevent the parts from loosening. The processing of the interior of the chassis is also very important. The metalwork of the interior should not be too sharp or interfere with the parts inside. The thickness of the metalwork is also of critical consequence in the strength of the chassis and the possibility of causing vibration. In conclusion, you get what you pay for. Non-brand products usually have poor cooling performance and thin metalwork that do not provide adequate protection. It's recommended to select reliable brand-name products such as GIGABYTE Poseidon and 3D Aurora full aluminum chassis.

Installation location for a 5.25-inch device

Installation location for a 3.5-inch device

Installation location for a 3.5-inch device

12-cm front fan

12-cm rear fan

Installation location on the motherboard

Accessory box

Almost all of today's chassis are equipped with rear fans to minimize the system's internal temperature. For optimal cooling performance, it is recommended to install fan(s) to the front panel to facilitate convection and exhaust heat. Users should be careful to select a fan that matches the chassis. Lower fan speeds create lower noise, but low speeds can affect wind pressure,speed and even the cooling performance. Generally speaking, try selecting a chassis that can use a 12cm fan for a quieter environment with a proper wind pressure range. The flow path inside the chassis is also important. With the wind flowing in through the front and going out through the rear, a good flow path is necessary to release the heat energy generated by the system. If users require better cooling performance and a quieter working environment, a liquid cooling system is the best choice. Most high-end systems today now implement a liquid cooling system, so keep this in mind when selecting a chassis.

Nowadays more and more users customize their computer equipment to fit their personal styles. Therefore, computer manufacturers have developed easy-to-use, innovative technologies to make it easier for users to customize their chassis. For example, GIGABYTE has introduced the 3D Aurora that supports a projection design and the Poseidon that supports interchangeable side panels. All GIGABYTE chassis come equipped with sufficient cables, including cables for HD audio and AC97 audio as well as a full range of multimedia I/O ports.

Drive bay for optical drive or burner

Drive bay for floppy disk drive

Hard drive activity indicators

Power supply

Air inlet

Fan vent

Power indicator and switch

Motherboard connector

Interface card connector

Cable outlet for external devices (cable outlet for GIGABYTE liquid cooling system)

Power Supply··

The power supply is the main source of power for all computer parts, therefore, it has to provide sufficient power to maintain the system's operations. Normally, a Core™ 2 Duo needs at least 350W of power. If several hard disk drives, burners or even medium or high-end graphics accelerators are installed in the system, a power supply of 450W or higher is recommended. Some commercially available chassis and power supplies are sold as a package, but the quality of such power supplies might not be up to par. You may want to purchase the chassis and power supply separately unless you select a brand-name product. You can find out the wattage of the power supply from the label on the chassis. As the weight is proportional to the material used, you can also check the weight difference. Products from major brands are suggested.

Current high-end graphics accelerators require external power sources. It is safer to use products with a built-in PCI-E 12V connector. The wattage required for a graphics accelerator is 80~120W, so it is safer to get the 12V power source from the external power supply. Doing so also meets the regulatory requirements. If users intend to install two graphics accelerators, then the power supply requires at least 500W. For the power hungry NVIDIA® Geforce® 8800 GTX double graphics accelerator, only an 800W power supply is able to adequately maintain system stability.

With the development from dual-core to quad-core processors, all motherboards have an additional 12V power connector due to the increased power consumption. The additional power connector may be 4-pin or 8-pin, depending on the power that is supplied. Following the trend of multi-core computers, it is advised to choose a high-wattage power supply for future expansion.

In addition, a good power supply also contributes to the cooling performance of the system. Using a large fan can release the heat energy effectively and reduce noise. 12cm or larger 14cm fans for power supplies are now available in the market. Users don't have to install fans at the rear of the chassis if they use this product, which indirectly reduces power consumption and noise. After over a year of technology development and strict testing, GIGABYTE has officially launched the "Odin" power supply series, designed especially for high-wattage needs of the multi-core processor, high-end graphics accelerators and Vista™ operating system.

The Odin series meets the latest Intel® 12V 2.2 specification and has four 12V power output terminals to deliver stability for a high-wattage system and user safety. The Odin series adopts modular cable management to simplify the installation procedure and makes effective use of the space inside the chassis, In addition, it uses mesh clasps to wrap the cables to eliminate chassis clutter and to help reduce air impedance inside the chassis.

⬆ Modular cables at the rear of the Odin. Unused cables are left unconnected, allowing more convenient installation and usage.

⬆ The Odin power supply uses a 14cm cooling fan to effectively release waste heat energy from the system.

The Odin power supply uses a 14cm wide two-ball bearing fan to increase airflow, reduce noise and increase output power, which allows for quick release of the system's energy for a more stable system. The Odin also uses high-quality electric capacitors from leading Japanese manufacturers and large cooling fins which significantly prolong the product's life. Using an 80+ high-efficiency circuit design with active PFC, the Odin is able to save more energy during times of high system power consumption and features increased requirements for environment protection. Furthermore, the Odin GT provides more direct and detailed monitoring and management functions. Its supplied power monitoring software allows users to check the input value of each voltage module and the loading value of each cable set, and users can set the warning mode to ensure the system's stability. Users are able to easily adjust the voltage value, fan speed and fan power.

The Odin GT can be easily installed in various ATX chassis, making it one of the most functional, easy-to-use power supplies on the market.
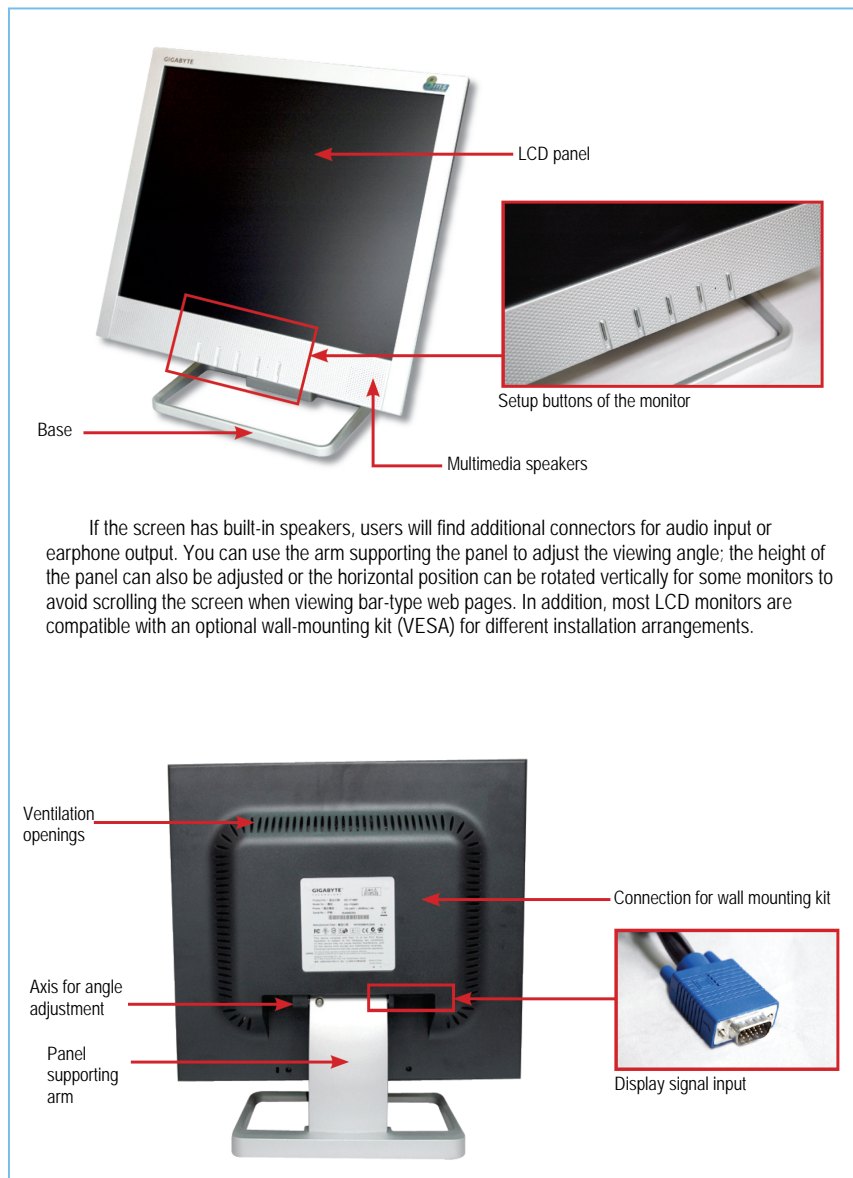
2.7 Peripherals

Understanding LCD Monitors·······················

With the advantages of compact size and low radiation, LCD monitors have replaced CRT monitors and are the most common display devices available today, with 20″ LCD monitors becoming mainstream products. Users are suggested to consider the contrast and brightness specifications when selecting a monitor. A 400:1 or higher contrast setting allows better color display. A brightness setting of 300~400cd/m^2 is a good choice. In addition, due to the display technology used, users should always use the specified resolution, such as 1280x1024 or 1680x1050, for either 20″ or 21″ LCD monitors, in order to get the highest level of optical clarity. Using lower resolutions may cause dim images because these resolutions are created by simulation. If you use your PC to play games or watch movies, then you should take into consideration response time. A low response time makes the moving tracks of fast-moving objects visible on the screen. The response time of most current LCD monitors is 8ms. There are also high-end monitors with a response time of 4ms or 1ms, but the price will be higher.

The display setting buttons usually include a Power button, an Auto button and On Screen Display (OSD) button. The Auto button automatically adjusts the position and image of the display to the optimal setting. Depending on your perception of colors, you can use the OSD menu to change the settings of the contrast, color and brightness for optimal viewing.

Current LCD monitors support Digital Visual Interface (DVI) and D-Sub connectors. Current graphics accelerators have been upgraded to the DVI interface, but a DVI-to-D-Sub conversion can be made by using an adapter. Please note that the DVI interface includes three types: DVI-A, DVI-I and DVI-D. Like D-Sub, DVI-A is an analog interface, only with a DVI type connector. DVI-I supports both the digital and analog modes and can be converted to D-Sub by using an adapter. DVI-D supports the digital mode only and cannot be converted to D-Sub.

LCD panel

Setup buttons of the monitor

Base

Multimedia speakers

If the screen has built-in speakers, users will find additional connectors for audio input or earphone output. You can use the arm supporting the panel to adjust the viewing angle; the height of the panel can also be adjusted or the horizontal position can be rotated vertically for some monitors to avoid scrolling the screen when viewing bar-type web pages. In addition, most LCD monitors are compatible with an optional wall-mounting kit (VESA) for different installation arrangements.

Ventilation openings

Connection for wall mounting kit

Axis for angle adjustment

Panel supporting arm

Display signal input

LCD Monitor Signal Cable

The power cord (including AC adapter in some cases), D-Sub signal cable and audio cable (for models with built-in speakers) are supplied with the monitor. There are many devices that support both DVI and D-Sub interfaces now. Sometimes both DVI and D-Sub cables are supplied with the device, however, some models do not come with a DVI cable. In such cases, users need to purchase the optional DVI cable. A few LCD monitors also support a USB hub for connecting additional USB devices; a USB cable is also supplied for these models. Some models with onboard webcams are also available.

↑ Monitors support the DVI and D-Sub interfaces. Most current monitors use the DVI interface, but some low-price models still support the D-Sub interface only. Make sure the monitor is compatible with your graphics accelerator before purchase; otherwise, you will need an adapter for conversion.

HDMI Ready

The HDMI interface has been introduced in an earlier chapter. HDMI provides high-quality video and high-definition audio transfer via a single cable. With an affordable price, HDMI has become the standard. New display devices such as LCD TVs and projectors have the HDMI logo on the products to show their support for the interface. Products such as LCD monitors and graphics accelerators have introduced HDMI support for consumers' consideration. For instance, GV-NX76T256HI-RH that has won the Best Choice of COMPUTEX TAIPEI 2007 Award supports the HDMI interface.

↑➔ HDMI is currently the popular interface that provides high-quality video and audio transfer via a single cable. HDMI can be converted to DVI, but the audio transfer will be lost.

Mouse and Keyboard··················

The mouse and keyboard are output devices used to give commands and perform tasks. A mouse is inevitable in the Windows era. When using these two devices, smooth operation and ergonomic designs are both crucial factors for long-term use.

There are 3 main types of keyboards commonly used today. The most common and least expensive is the membrane keyboard, which has its keycaps positioned above rubber domes, with a plastic membrane below. Membrane keyboards are generally less expensive, but they are the least durable, as the keys can become less responsive over time.

The second type is the scissor-switch membrane which is commonly found on notebook computers. This is similar in that it still uses rubber domes, but a special plastic "scissors" mechanism links the keycap to a plunger that depresses the rubber dome. They are slightly more expensive and have a springier feel to them, but they are also harder to clean.

Lastly is the mechanical keyboard. Each key has its own keyswitch mechanism that registers when a key is pressed . Because they feature a tactile "click" when pressed, mechanical keyboards improve typing accuracy and speed, making them the ideal choice for gamers. Mechanical keyboards snap back the quickest and are much more durable that the membrane keyboards.

The new GIGABYTE GK-K8000 mechanical keyboard utilizes the highest quality Cherry MX-linear keyswitches, which are designed to endure a life cycle of up to 60 million keystrokes. The Cherry MX-linear keyswitches feature connectors plated with 18K gold to ensure extremely low latency. This allows for fast and reliable response times even when using the most detailed and advanced key combinations, making the GIGABYTE GK-K8000 ideal for enthusiasts and gamers.

Tips for Purchasing a Keyboard

The layout of keys on regular keyboards are generally the same, but there are different keyboard sizes for selection. You may want to try typing to see if the keyboard works properly for you or if the keyboard hardness and texture fit your requirements. Various ergonomic keyboards are available and they include the wrist rest at the bottom of the keyboard to keep the hands from hanging in the air during typing. For quick and easy operation, multimedia hot keys are designed on most keyboards. Pressing a hot key can quickly start the web browser, receive or send E-mails, start frequently used programs or play back music. Hot keys can be quicker than using the mouse.

Understanding the Mouse························

Depending on the positioning method, you can use either a track ball mouse or optical (including laser) mouse. A track ball mouse may pull in dust while the track ball moves and can affect the moving control after period of time. Users need to clean the track ball mouse regularly. In contrast, an optical (laser) mouse utilizes optical electronics to track the mouse's position and movement and needs no regular cleaning. For this reason, it is rare to see track ball mice for sale today. The biggest difference between the optical mouse and laser mouse is that the latter has better movement precision and can be used on more surfaces. The optical mouse can be hard to control when used on surfaces that do not converge light (such as smooth paper material), while the laser mouse has better adaptation to the different surface materials.

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Various Optical Mouse Specifications·······

Optical mice come with high and low resolutions. A lower resolution means the mouse moves more slowly across the screen, and a higher one makes it quicker and more accurate. Typically game players will require mice with higher resolutions. The resolution for most current optical mice is 400~800dpi, which is quite sufficient for common operations. In spite of the emphasis on ergonomic designs, you are recommended to use a mouse that best fits in your palm and makes you feel comfortable.

The laser mouse has high movement precision and supports a resolution of at least 1000dpi. It is ideal for gamers that require great precision. There have been many kinds of laser mice products in the market lately. However, the laser mouse usually comes with a higher price and is probably more suitable for high-end users.

A laser mouse has better movement precision and, in addition, generates laser reflection that cannot be distinguished by the naked eyes. Therefore, light at the bottom of a laser mouse is usually invisible.

Without the track ball, an optical mouse spares the trouble of cleaning the interior regularly and has become the preferred choice of most users.

## Other Peripherals····························

7.1 Channel Speaker System & Wireless Network

Intel chipsets have early on supported 7.1-channel audio output, but users need to install a 7.1-channel speaker system for a full surround sound experience. Users can also use regular dual-channel or 2.1-channel speakers if there is a concern for space, but the sound quality will not be as fully developed. Beginners are recommended to purchase 2.1-channel speakers for basic sound quality and later upgrade to a 5.1-channel or 7.1-channel environment as required.

With the prevalence of wireless network products and ever-increasing connection speeds, users can now install a wireless network card or USB wireless network adapter to spare having to have a physical network connection with cables, keeping clutter to a minimum.

A motherboard that earns Dolby certification also needs matching speakers to create powerful surround sound effects.
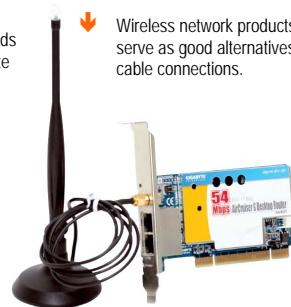
Wireless network products serve as good alternatives to cable connections.