

COMPUTER SCREENS

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Анотація

У статті розглянуто основні типи комп'ютерних моніторів, їх характеристики та вплив на якість візуального відтворення. Також висвітлені характеристики екранів, такі як роздільна здатність, яскравість, кут огляду та відображення кольорів.

Ключові слова: комп'ютер, монітори, яскравість, кут огляду, роздільна здатність.

Abstract

The article discusses the main types of computer monitors, their characteristics and impact on the quality of visual reproduction. The article also highlights screen characteristics such as resolution, brightness, viewing angle, and color reproduction.

Keywords: computer, monitors, brightness, viewing angle, resolution.

Today, the most common type of monitor is CRT (Cathode Ray Tube) monitors. As the name implies, all such monitors are based on a cathode ray tube, but this is a literal translation, technically it is correct to say "cathode ray tube" (CRT). The technology used in this type of monitor was created many years ago and was originally designed for use in oscilloscopes. The development of this technology, as it relates to the creation of monitors, in recent years has led to the production of increasingly large screens with high quality and low cost. Today, it is not easy to find a 14" monitor in a store, because three or four years ago it was the standard. Today, 15" monitors are standard, and there is a clear trend towards 17" screens. Soon, 17" monitors will become a standard device, especially in light of the significant price reduction, and 19" monitors and larger are on the horizon.

Let's look at the principles of CRT monitors. A CRT monitor has a glass tube with a vacuum inside, i.e., heavy air is removed. From the front, the inside of the glass tube is covered with phosphor (Luminofor). Quite complex compositions based on rare earth metals - yttrium, erbium, etc. - are used as phosphors for color CRTs. A phosphor is a substance that emits light when bombarded with charged particles. To create an image in a CRT monitor, an electron gun is used, which emits a stream of electrons through a metal mask or grating onto the inner surface of the monitor's glass screen, which is covered with colored phosphor dots. The electron stream passes through an intensity modulator and an accelerating system on its way to the front of the tube. As a result, the electrons acquire a lot of energy, part of which is spent on the glow of the phosphor. The electrons hit the phosphor layer, after which the electron energy is converted into light, i.e. the flow of electrons makes the phosphor dots glow. These glowing phosphor dots form the image you see on your monitor.

The main series of monitors:

Economic: monitors of this series can be used both at home and in offices. Their distinctive feature is the low price and, as a result, not the highest characteristics. But for working with text and office programs, these monitors are quite suitable.

Professional: monitors in this series are designed for professional use, for example, for 3D-моделювання or working with engineering design programs (CAD). Professional monitors allow you to create high-quality images, often have several video inputs for connecting to several computers at once.

Graphic. As the name shows, monitors in this series are designed to work with graphics. They have a large screen, excellent color transfer, high brightness and contrast.

Game: monitors in this series are primarily for games. Gaming monitors have the lowest possible pixel response time, a large screen.

Business: monitors of this series are primarily designed for working with office applications, have a restrained design.

Screen size and resolution. The screen size is indicated in inches (one inch is 2.54 cm). The most common dimensions for the monitor screen are 15', 17', 19', 20', 21'. When working with the monitor, there is a very simple pattern: the larger the monitor, the more comfortable the work behind it. As a rule, the larger the screen size of the monitor, the higher its resolution, on a larger screen you can see a larger fragment of a document or image, while opening more windows. The maximum resolution of the monitor is determined physically by the resolution of its matrix. The higher the monitor resolution, the more information you can display, open several documents at once, edit a large image. In LCD monitors, the maximum resolution is usually associated with the screen diagonal. Resolution 1024x768 have 15-inch monitors. This ability is characteristic of inexpensive office monitors. 17- and 19-inch monitors have the ability to 1280x1024. Monitors with this resolution can perform a wide range of tasks: from working in the office to playing games and watching videos. Higher resolution (1600x1200 and higher) have monitors with a diagonal of 20 inches and higher, designed to work with graphics and engineering packages.

By type of internal structure (technology) monitors are divided into: CRT - based on cathode ray tube and LCD - liquid crystal monitors.

CRT monitors: the most important element of the monitor is the kinescope, which is also called the cathode ray tube. The kinescope consists of a sealed glass tube, inside which there is a vacuum. One of the ends of the tube is narrow and long - this is the neck, while the other is wide and quite flat - this is the screen. On the frontal side, the inside of the tube glass is covered with phosphor (luminophor) - a substance that emits light when bombarded with charged particles. To create an image, an electron gun is used in the CRT monitor, from where a stream of electrons is obtained under the influence of a strong electrostatic field. Through a metal mask or grill, they fall on the inside of the monitor's glass screen, covered with multicolored phosphor dots.

LCD monitors: LCD monitors (Liquid Crystal Display, liquid crystal monitors) are made of a substance (cyanophenyl) that is in a liquid state, but at the same time has some properties inherent in crystalline bodies. The operation of liquid crystal matrices is based on a light property such as polarization. Ordinary light is non-polarized, that is, the amplitudes of its waves lie in a set of planes. However, there are substances capable of passing light from only one plane. These substances are called polarizers, since after passing through them, light becomes polarized in only one plane. If you take two polarizers whose polarization planes are located at an angle of 90° to each other, light cannot pass through them. If you place something between them that can turn the polarization vector of light to the desired angle, we will be able to control the brightness of the glow, extinguish and ignite the light as we need. Such, to describe briefly, the principle of operation of the LCD matrix.

Another important parameter is the presence of a DVI (Digital Video Interface) port on the monitor. Monitors equipped only with analog VGA input (D-Sub) contain additional circuits for converting data to digital format (ADC - analog-to-digital converter). In the case of DVI, the video signal goes directly to the monitor, without converting, so the picture is clearer than when using VGA input. The HDMI connector provides digital DVI connectivity to multiple devices via appropriate cables. The main difference between HDMI and DVI is that the HDMI connector is smaller and also supports multi-channel digital audio transmission.

Contrast - the ratio of the maximum screen brightness (when showing a white field) to the minimum brightness (when showing a black field). Contrast is an important parameter in assessing image quality in LCD monitors. This value determines the ability to transmit shades and halftones. The higher the contrast of the monitor, the better it will cope with the reproduction of a darkened image. It is believed that for the normal operation of the human eye, the contrast level should be at least 250, the value of 500-600 can be considered good, and 800-1000 - very good.

Brightness characterizes the intensity of the screen glow, is measured in candels per square meter (cd/m²) and is a significant parameter for LCD monitors. High brightness is important in conditions when the monitor works in a room with bright lighting. When the brightness of the image is low, it can be illuminated by an external light source.

This parameter is set only for LCD monitors, for CRT monitors, the viewing angle can be considered equal to 180 degrees. In connection with the technological features of image formation, the image quality on the screen may deteriorate if the user looks at the screen at a non-right angle. When the angle of view is deflected by a significant amount, contrast decreases, colors are distorted. Monitor manufacturers generally understand the angle at which the contrast of the image is reduced to 10:1. For comfortable viewing, a viewing angle of 160-170 degrees can be considered sufficient.

As a result, a computer monitor is a device designed to display text and graphics information. The monitor displays information obtained from data processing, that is, the monitor allows you to visualize the results of applications. In the same way, the monitor provides the ability to visually see the input data and control the operation of applications.

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