New Technologies

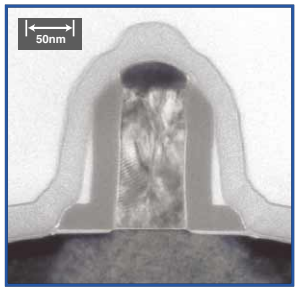
The quest for new technology for the next generation of sight and sound

The advent of true digital and high-definition broadcasts has paved the way toward widespread use of high resolution digital images, embracing the era of flat panel displays. Beyond digital video, digital audio-which includes Dolby surround, DTS and other forms of multi-channel digital audio data-is promoting the spread of home theaters and entertainment systems. Additionally, the widespread diffusion of third-generation mobile phones and the global growth of portable audio devices are shaping the market for new music downloads through MP3, AAC, and similar formats. The evolution of new consumer video and music products has accelerated on a global scale. Through this process, digital equipment are getting a grip on the various needs of consumers and penetrating deeper into daily life while at the same time allowing us to witness the emergence of higher performance protocols, more environmental awareness and fewer usage barriers. Based on these trends, ROHM is seizing the opportunity to place its high-reliability semiconductor technology at the core of such devices and usher in this era, with the accelerated development of new products and technologies to serve the public interest.

With system LSI design technology, we have been expanding and building "REAL PLATFORM" for the development of products to be used in the core areas of digital imaging and audio software, including Dolby Surround, DTS, MPEG, MP3, AAC and H.264 to improve design efficiency and application while strengthening software assets and improving hardware capabilities*1. We are also focusing on optimal usage of MPEG4 and H.264 video engines, AAC music downloads in mobile phones, CD-R/W one-chip processors with built-in MP3, and MP3 portable audio LSIs.

In the area of LSI hardware, we have begun using a 300mm, high-voltage CMOS process line to supply film carriers*2 for the mass production of the LCD source drivers used in a large numbers of LCD televisions, where screens are growing larger. We have also strengthened our lineup with new technology sound processors in home theaters, including LVDS*3 interface LSIs, overdrive processors and other types of system LSIs as well as voltage-generating ICs to control the gradation of up to one billion colors, backlight driver control ICs, DC/DC converters, and other types of power supply integrated circuits.

Our expertise in advanced analog technology has allowed us to develop high-speed circuits for use in serial ATA bus interfaces and at the front end of HDDs and DVD players, where signal processing capabilities greater than GHz (gigahertz) are required. For power LSIs, we have expanded the range of technical applications with the development of switching regulators that have voltage conversion rates greater than 95%, as well as compact, low-energy, low-noise lens drivers that are built into digital still cameras.

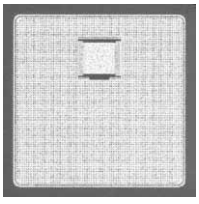


The cross section of our 90 nm CMOS transistor

In the area of LSI miniaturization technology, in addition to the 180nm mixed signal process and the 130nm CMOS process currently in mass production, we have recently completed the development of the 90nm process and have begun preparation for mass production. We are also expanding our production capacity of 300mm wafer lines and have started construction of a new clean room to accommodate 300mm at ROHM Hamamatsu, our main wafer plant. With respect to package technology, we have expanded the applications for WL-CSP (Wafer Level Chip-Size Package)*4 to include standard goods and are now expanding the scale of production.

In the area of discrete semiconductors, we have commercialized 400V and 600V power MOSFETs as well as 400V-class ultra-low-loss power Schottky barrier diodes, an achievement once considered impossible. In addition, we have promoted the fortification of power device technology in such areas as high-efficiency fast-recovery power diodes for plasma televisions, and have developed our first thyristor, initiating our entry into that market.

As for new materials for discrete devices, our research and development maintains its world-class reputation by developing products using SiC (Silicon Carbide)*5 to develop a MOSFET with a low loss level 1/100 that of silicon products as well as high-voltage diodes that exceed 1000V.


SiC MOSFETs

In the area of semiconductor lasers, we have moved to higher output levels in our 260mW class monolithic, dual-wavelength laser diodes for use in super combo drives for high-speed writing of DVDs or CDs and we are moving forward with technology aimed at the development and mass production of high-heat frame packages as well as the development of blue-violet laser diodes for use in next-generation DVDs.

In the field of LEDs, we have increased the generation of red wavelengths, which has been a problem in white LEDs, developed a high color rendering LEDs*6 with a high degree of color reproducibility and we have also received a favorable response from the market with the expansion of the range of applications in lighting devices such as LCD backlights.

We were first in the industry to develop our "Step-Free" technology*7 for thermal printheads; a wear-resistant structure capable of high-speed printing (up to 500mm/sec). Additionally, our new thermal printheads for color printers feature optimized heat storage and release characteristics, resulting in a seven-second printing speed-the fastest in the world.

Our 1mΩ ultra-low ohmic resistors feature the highest voltage and power ratings in the industry by utilizing new architecture. Additionally, technological developments such as chip resistors with improved anti-sulfuration characteristics*8 for use in automotive applications and our new concept-oblong electrode resistors-have generated interest. We have developed a new electrode architecture for our capacitors and have started mass producing tantalum capacitors with the highest capacitance in the industry (220µF, 1.1mm package thickness). These capacitors were developed to improve sound quality while contributing to more compact portable audio equipment.

We have remained committed to our mission of "contributing to society through electronics." At ROHM, we will continue contributing to society through relentless efforts toward research and development activities in new technologies.

***1 Dolby surround, DTS, MPEG, MP3, AAC, and H.264 digital image and audio software**
These are different specifications for audio and video image data. Among the many features is increased compression rates. They are widely used in portable audio devices such as mobile phones, televisions, video players, and other AV equipment.

Dolby surround
A system for compressing, recording, and playing back audio data. It can be used with both monaural and multi-channel formats.

DTS (Digital Theater Systems)
A system for compressing, recording and playing back audio data. DTS has received recognition from the Motion Picture Academy of Science & Technology for its high audio quality and playback reliability.

MPEG (Moving Picture Experts Group)
Moving picture data compression specifications.

MP3 (Moving Picture Experts Group 1 Audio Layer 3)
Audio data compression specifications.

AAC
A high fidelity, high compression standard for audio data-used in ring tones.

H.264
Moving picture data compression specifications featuring twice the compression rate of conventional methods - used in mobile phones and similar applications.

***2 Film carrier**
Tape-like film that carries elements, including electrodes, leads and circuit patterns, formed on its surface.

***3 LVDS (Low Voltage Differential Signaling)**
An interface that performs differential transmission using 100mV to 600mV small amplitude signals. These are in wide use in applications such as high-speed image signal transmission in notebook computers.

***4 WL-CSP (Wafer level chip size package)**
The latest packaging technology that seals an IC in resin at the wafer level. Its extremely compact size simplifies miniaturization, hence its wide use in mobile phones.

***5 SiC (SiliconCarbide)**
This is a compound semiconductor composed of carbon (C) and silicon (Si).

***6 High color rendering LEDs**
These LEDs feature improved color reproduction capabilities that replicate all wavelengths of light.

***7 Step-Free technology**
New technology - independently developed by ROHM - that eliminates the step that previously existed between the heat elements and media (heat-sensitive paper, transfer ribbon).

***8 Anti-sulfuration characteristics**
The use of protective, sulfuration-resistant material prevents damage to the resistive elements caused by sulfur-induced corrosion.