

## New Technologies

### The demand for new flexible, ultra-miniature technologies and products that not only make a difference in people's lives, but to society as a whole, is rapidly increasing.

In the current climate where the global environment is subject to close scrutiny, advanced technologies and energy-saving measures are allowing us to meet consumer demands for devices that work in sync with the environment.

New markets have been created with the advent of high-resolution broadcast images using digital broadcast technology. Flat-panel televisions and home theater sets continue to proliferate throughout the consumer base. Digital television broadcasts can also be seen on mobile phones and car navigation units. By the same token, portable audio players, healthcare products, home automation and home security equipment are experiencing widespread growth and consume less energy, are easier to use, and feature greater functionality than ever before. New, innovative technologies are being developed that help us respond to the diverse needs of our consumers for greater convenience and sophistication while being environmentally friendly.

Our system LSI technology further strengthens our competitive advantage in the fields of hardware device technology, digital LSI, analog/digital mixed signal LSI and power LSI. And reinforcing our core areas of imaging and audio, namely digital AV, will serve to improve the efficiency of our digital IP by strengthening software assets. Design effectiveness will also be increased through development and expansion of the design platform. These technologies make it possible to effectively deliver video in real time in drive recorders and security cameras as well as provide MP3 one chip LSI solutions.

In terms of production technology, our unique BiCMOS and BiCDMOS assembly lines utilize 300mm wafer processes. Pre-processing provided an opportunity to display innovative technology developed completely in-house, while our post-processing expertise has been put to good use in large flat panel televisions, where mass production of our popular LCD source driver was prompted by the decision to start the supply of film carriers. Additional benefits include development of system LSIs such as DMOS\*1 motor drivers and high fidelity car audio sound processors, power supply LSIs including DC/DC converters, as well as new products like light sensor ICs and Hall sensors.

A high level of circuit expertise proved critical to the success of our analog circuit design. Nowhere was this more evident than with our Class D speaker amps\*2 developed for flat TVs requiring high efficiency and high fidelity as well as Class D speaker amps created for portable audio. Similarly, our power LSIs— particularly the high efficiency— energy-saving PWM series, command a major share in the motor driver field, while our stepping and DC motor drivers are being used in a variety applications. Regarding PC and CPU power supplies, the fast response of H<sup>3</sup>REG\*4 and the development of CPUs with speeds on the order of GHz



Multifunction LSI cross-section

necessitate increased functionality when it comes to power management, which ROHM provides.

In terms of discrete semiconductors, the planned miniaturization of MOSFET units, coupled with a 50% increase in power, led to the development of the TCTP package. Additional products currently under development include IGBT and 50-100A large current MOSFETs, while silicon diodes that exceed expected limits for response times and voltage resistances, such as fast recovery diodes and Schottky barrier power diodes rated at 150 to 200V, will soon be offered.

Semiconductor lasers, such as the monolithic dual wavelength laser, used for reading DVDs and CD rewriting (655nm, 10mW / 782nm, 240mW) and other types of lasers used for DVD burning and CD reading (662nm, 240mW / 782nm, 10mW) are all widely available for use. In addition, a super-multi type laser (662nm, 240mW / 782nm, 260mW) for applications requiring high level of output as well as a laser diode capable of 10mW sustained output reading have been developed.

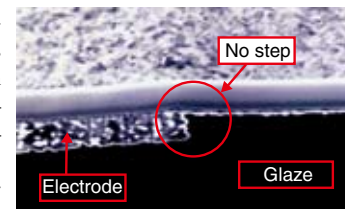
Proprietary compound semiconductor technology, combined with careful research in elemental design structure, resulted in development of the world's thinnest compound chip LED. The PICOLED™ family, utilizing a 4-element structure (aluminum, indium, gallium and phosphorous)\*5 is comprised of a number of series, including the world's smallest LEDs (PICOLED™-mini), units featuring high brightness with low energy consumption (PICOLED™-eco), and models that deliver 16 times the brightness of conventional units. Highly reliable, long life LEDs (Exceled™) are available as well.

Our photolink modules have been revamped using proprietary new package design specifications, resulting in the industry's smallest mounting area (9mm<sup>2</sup>). This makes them ideal for remote control units or light-receiving modules. A unique lens design enables a range of 4.3m, even at an intensity of 100,000 lux (lx)—equivalent to natural sunlight—double the conventional area.

Thermal printheads utilize a new step-free structure\*7 for improved heat transfer efficiency and greater reliability.

Regarding passive components, low ohmic (1mΩ) resistors and units employing a new structure for the industry's highest voltage resistance have been created. Sulfuration-resistant resistors optimized for automotive use and long-terminal chip resistors have been developed and are now mass produced\*8. As for capacitors, ultra-thin (0.9mm) tantalum capacitors featuring underside electrode construction and an industry-leading capacitance of 220μF are now offered.

ROHM believes in 'contributing to society through electronics' by continuing to develop new technologies and products that will positively affect—or at the very least, minimize the effects to—the environment.



Cross-section of Step-Free structure

#### \*1 DMOS

DMOS (Double Diffused Metal Oxidized Semiconductor)

A type of MOS device where the channel is formed by the difference in diffusion depth between two diffused layers, resulting in extremely low ON-resistance. Very commonly used for high voltage and/or high power MOS devices.

#### \*2 Class D Speaker Amp

Also referred to as a digital speaker amp, this amp converts analog input audio signals to PWM signals through time. These PWM signals are then switched through an output MOSFET and then fed to an external low pass filter, which drives the speaker. The output stage performs the switching operation, resulting in a high level of efficiency.

#### \*3 PWM (Pulse Width Modulation)

A data transmission method that alters the pulse width based on the size of the input voltage. The receiver circuit will be able to replay the message by calculating the input voltage from variations in the pulse width.

#### \*4 H<sup>3</sup>REG

High Speed, High Performance and High Efficiency— three characteristics of the ultra-fast response DC/DC converter LSI—are known collectively as H<sup>3</sup>.

#### \*5 4-element (AlGaInP)

A material composed of aluminum, gallium, indium and phosphide. The wavelength, along with the brightness, changes depending on the elemental materials. AlGaInP can provide the following colors: orange, orange-yellow, yellow and green.

#### \*6 PICOLED™

The industry's smallest, thinnest chip LEDs (1006 size, t=0.2mm). Developed by ROHM.

#### \*7 Step-Free Technology

A novel technology that eliminates the step previously present between the heat elements and the media (i.e. thermal paper, the printer copy ribbon).

#### \*8 Sulfuration Resistance

Indicates high resistance to corrosion due to sulfur migration in sulfur-rich environments.