

New Technologies

Meeting Customer Needs by Technological Development in Line with the Rapid Advances in Electronics Technology

The spread of global networking is accelerating the digitalization of consumer, industrial and every other equipment. As advanced equipment capable of processing large quantities of digital data is becoming increasingly common, digital information appliances and home networking appliances are coming to be recognized as state-of-the-art electronics technology products. Such equipment and appliances include DVD players for home use, digital still cameras, camera phones and car navigation systems, the markets for which are undergoing rapid growth worldwide. Under these circumstances, considering the aforesaid equipment and appliances as “technology drivers,” ROHM is continuing the development of new products, new technologies and elemental technologies to meet the requirements of electronic equipment manufacturers.

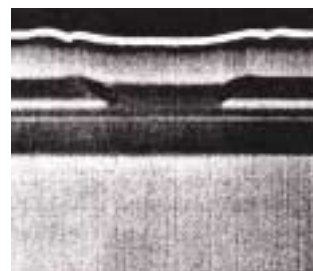
In the area of circuit design technology for system LSIs, there is a growing need of solutions for so-called conflicting challenges, including combined digital/analog technologies and larger scale integration combined with lower current dissipation. One example is LSIs for the ringing tones of cellular phones. To meet the demand of electronic equipment for; realistic reproduction of music, higher quality sound sources and simultaneous generation of an increased number of tones (both requiring large-scale circuitry operation) must be obtained with the limited current from batteries. With its distinctive circuit technology and low current-dissipating CMOS process technology, ROHM has developed a Hi-Fi PCM system that is capable of generating, with low operating current dissipation, up to 64 polyphonic tones simultaneously, which is twice the number of tones generated by a former model. This development has successfully led to the commercial introduction of an industry-leading 64-polyphonic-tone melody sound source LSI for cellular phones.

Moreover, ROHM has developed a series of silent PWM technology, which is original circuit technology incorporating high-driving-efficiency BiCDMOS device technology, so as to meet the growing demand for lower driving noise resulting from increasingly faster CD and DVD drives. These products and technologies, enabling a combination of high performance and low current dissipation, prove ROHM’s outstanding product development capability.

Regarding fundamental technology for LSIs, besides continuing to be actively involved in two Japanese national fundamental technology development projects for system LSIs, ASCA (Advanced Semiconductors through Collaborative Achievement) and MIRAI (Millennium Research for Advanced Information Technology), ROHM is also taking part in ASPLA^{*1} (Advanced SoC Platform Corporation) established in the year under review, as an effort toward developing next-generation semiconductor process technology. Moreover, ROHM’s active efforts in the field of IP (intellectual property)-based design of system LSIs, which is gaining in importance, include the addition of the latest ARM9/ARM10 32-bit RISC processors to the Company’s IP lineup. In addition, ROHM’s innovative and distinctive LSI design system REAL SOCKET has become established, and has been given favorable reviews by customers, as an important system LSI development platform that is capable of developing system-on-a-chip (SoC) designs incorporating combined processes in a short period of time, through the use of verified IPs.

At ROHM’s Optical Device Research Center, which began full-fledged operation in the year under review, active R&D is underway on optical devices and other promising next-generation materials. In compound semiconductor-

related areas, ROHM has developed, and placed on the market, a laser diode with a large output power of 230 mW. This is 25% greater than that of conventional models and is designed to overcome the dangers of self-destruction; an adverse reaction resulting from increasingly higher output power. R&D is also involved in next-generation laser diodes, including blue-violet laser diodes intended for next-generation DVD drives, as well as surface-emitting diodes utilizing ZnO^{*2}). In the area of LED development, besides the commercial introduction of blue LEDs and additionally developing higher-intensity LEDs, the Company is devoting its energies to developing new technology aimed to improve the luminous efficiency of conventional chip LEDs. ROHM is also steadily proceeding with the development of optical semiconductor applications, including new full-color LED display products incorporating chip LEDs of the three primary colors of red, green and blue. Moreover, regarding organic EL



Cross-sectional SEM photo of laser diode

(electroluminescence) displays, which are attracting attention as next-generation self-emitting display devices, a prototype production line was installed at the Optical Device Research Center to accelerate the development efforts for commercial introduction.

As for R&D on next-generation organic semiconductors, ROHM has launched a cross-industrial research collaboration alliance, recognizing the importance of interdisciplinary R&D approaches in which various technologies intertwine one another based on “bio” and “nano” concepts. Specifically, ROHM is actively involved in a comprehensive industrial-academic collaboration alliance comprising Kyoto University and five leading Japanese manufacturers, each specializing in different fields including chemicals, computers, communications and semiconductors. The alliance has begun joint R&D on next-generation organic electronics device technology comprising 16 research projects, and is achieving successful results; research presentations have already been given, at academic conferences, on four research topics including “Production of New Fullerene Compounds” and “Organic FET Using Nanogap Electrodes.”

As part of its environmentally friendly technological development efforts, ROHM is proceeding with the mass production of components utilizing lead-free technology for the terminal mounting process, which was established by the Company ahead of its competitors. Lead-free has also been achieved for both the internal components and internal connections of unit component products that incorporate a quantity of internal electronic components such as power modules. Furthermore, in the area of chip type optical semiconductors (such as chip LEDs and chip sensors) and surface mounting type 7-segment number displays, for which it was said high-temperature lead-free mounting was difficult to achieve, ROHM has developed products that support lead-free reflow soldering. At ROHM, the development of environmentally friendly products is thus steadily underway.

Always focusing on “contribution to society through electronics,” ROHM will continue to commit itself to R&D on new technologies.

^{*1} Advanced SoC Platform Corporation

Established through the joint capitalization of eleven member companies on the Semiconductor Executive Committee of the Japan Electronics and Information Technology Industries Association (JEITA) to develop and establish the next-generation, 90-nanometer-node semiconductor process standard, and to operate lines for testing and verifying new IPs and SoCs developed using such processes.

^{*2} Zinc oxide

New Products

Silent Disc Driver for CD-ROM / RW / DVD-ROM Combo Drives Developed with Silent PWM the Culmination of ROHM's Motor Drive Technologies

Superior efficiency and low heat generation make the PWM driving system today's most commonly used technology for rotating discs in spindle motor drivers. PWM is an alternative to the conventional linear driving system, which provides smooth rotation control, but consumes tremendous power and produces excessive heat.



However, as disc drive speed continues increasing dramatically, motor noise and vibration -- characteristic of the PWM system -- have become a major problem. Now ROHM has created the solution, an innovative driving system developed with proprietary Silent PWM technology. The all-new BD7905BFS silent driver IC is designed for the CD-ROM / RW / DVD-ROM combo drives in desktop computers. It incorporates ROHM's breakthrough PWM driving system (featuring 180-degree application of power), which suppresses abrupt changes in driving current, thus considerably reducing the noise and vibration generated by the motor. Compared to conventional drivers, the BD7905BFS achieves a noise level reduction of more than 12 dB, and is particularly effective during disc activation and regenerative braking.

Thin, Lightweight, Full-color Dot-matrix LED Units Feature Wide Viewing Angle, RGB Emitters

Recognized as an excellent interface between people and information, ROHM LED displays are finding widespread application in arrival/departure information boards at train stations, information displays on trains, and a variety of other electronic displays in a number of fields.



ROHM has developed new LED display products incorporating RGB emitters, including full-color dot-matrix LED units - the LPM-5123BMU652 and the LPM-1153BMU602 - in addition to three-color versions. Taking advantage of its exclusive potting lens development technology, ROHM has achieved greater readability and viewing contrast with its new LED displays than conventional products can offer. Moreover, by incorporating a 1,024-level grayscale driver for each color (red, green and blue) these modules can produce up to a billion colors, enabling the most realistic color expression ever. In addition to conventional information board applications, the new LED products will likely be incorporated in large displays for video images and other visual content.

Image Processor Ideal for Camera Phones

Fast-evolving cellular phones, now incorporating numerous capabilities including high-speed data transmission, quick application software and camera functions, have been transformed from mere voice-communication telephones into PDAs.



In response to this trend, ROHM has developed the image processor BU1597GS, which enables liquid crystal display (LCD) control on cellular phones to be performed with a single chip, instead of with the CPU. The BU1597GS incorporates all functions required for LCD control in a single chip, including two (main and sub-) LCD interfaces, a camera module interface, a host interface, a frame memory, and a PWM controller for full-color call-signal LED and backlight LED. Development of an image processor with a built-in JPEG codec function is currently under way at ROHM.

The BU1597GS processor enables camera images to be displayed on the LCD panel without communication with the CPU, by loading instruction codes from the CPU into the register. This means that the processing is carried out by the LCD controller only, thus considerably reducing the load on the CPU. Moreover, incorporating ROHM's dedicated processor with LCD-through mode, the BU1597GS allows customers to reuse their software assets, and also enables, just by being connected to the LCD interface on the CPU, two high-performance LCDs to be used simultaneously. This provides great support to our customers in developing more sophisticated electronic products.

New-Configuration Tantalum Capacitors in 1608-size Package, Combining Ultra-low 0.8 mm Height and Large 22 μ F Capacitance

The trend toward miniaturization of cellular phones and other portable equipment is rapidly accelerating. Capacitors represent a key technology in the development of this more compact, lower-profile electronic equipment.



In the past, the type of chip capacitor selected has depended on the target application, with multi-layer ceramic capacitors chosen for miniaturization, and tantalum capacitors used whenever increased capacitance was required.

Now ROHM brings together large capacitance and miniaturization - a once unattainable combination - in its newly-developed TCM series tantalum capacitors, with an ultra-low height of 0.8 mm and maximum capacitance of 22 μ F, provided in a super-compact 1608-size package. ROHM has also developed dedicated, ultra-miniature CSP packages to meet demands for smaller, thinner, easier-mounting capacitors that customers can readily adopt in their own product designs. This, in turn, has led to breakthroughs such as improved soldering strength, superior visibility after mounting, and low ESR. ROHM continues working to develop products that fulfill customer demands for ever more compact, lower-profile electronic equipment.