

Responsibilities to Our Customers
2

Research and Development of Next Generation Products

We press forward with the research and development of creative technologies and products with an eye toward the "Next Generation."

Research and Development Policies

Guided by its management philosophy of "Creativity and Contribution," Casio energetically moves forward with its research and development efforts, aiming to contribute to the society through the development of innovative products.

Casio's research and development system is two-pronged: "Basic Research and Core Technology Development," which is focused on new businesses and takes on medium- to long-term perspectives, whereas "Product Development" is directly tied to existing businesses. With these two subsystems in place, Casio engages itself in research and development for the "Next Generation."

Research and Development Strategies

Casio develops products and technologies that are centered on such Casio's proprietary technologies that are noted for their "Compact, light weight, slim, and energy efficient" as "high-density packaging technology," "LSI technology," "software/IP technology," "communications and digital broadcast technology," "information system technology" and "electronic component technology," which form the company's core competence, and other human interface technologies and know-how that the company has cultivated mainly in the area of diverse consumer products.

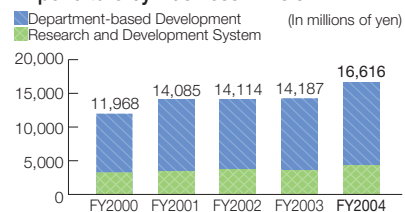
In addition, the company currently concentrates its effort on the development of "image digitalization (digital cameras, etc.)" by capitalizing

ing on its digital technologies that originated in electronic calculators but whose application has expanded to such areas as the "digitalization of the sound (electronic musical instruments, etc.)" and "digitalization of characters (electronic dictionaries, etc.)"

The company is also stepping up its efforts to construct a mechanism to consolidate the knowledge of experts within and outside the company through the formation of partnerships and alliances with outside organizations, such as public research centers and universities in connection with fields that are projected to achieve medium to long-term growth, and technical fields that have the potential for innovative core technologies.

The company spent ¥16,616 million in research and development in fiscal 2004. The expenditure is broken down by business type and by segment as follows:

Breakdown of Research and Development Expenditure by Business Division



*IP technology: IP is an abbreviation for intellectual property, and means intellectual property rights.

Research and Development Organization

Casio's research and development organization consists of the "Research and Development System," which conducts basic research and elemental technology development, and the

"Department-based Development," which handles product development that is directly linked to individual departments.

Research and Development System

The Research and Development System is made up of the "Core Technologies R&D Division" and the "Research and Development" which are set up within Casio Computer Co., Ltd. These groups develop technologies to make inroads in new business fields, as well as fundamental technologies that are shared by all business operations. They also perform research and development, including development of next-generation products and process technologies. Regarding technology fields where long term growth is projected and technology themes that have the potential of growing into core technologies of the next generation, we are pressing forward with joint research with outside research organizations and the formation of alliances with other corporations.

Department-based Development

Development organizations that are set up within various departments and the Casio Group companies comprise the Department-based Development. Here, research and development of essential technologies, elemental technologies and production technologies relating to individual products are carried out in cooperation with the sales department.

List of Research Themes / List of Joint Research Partners

(in a random order)

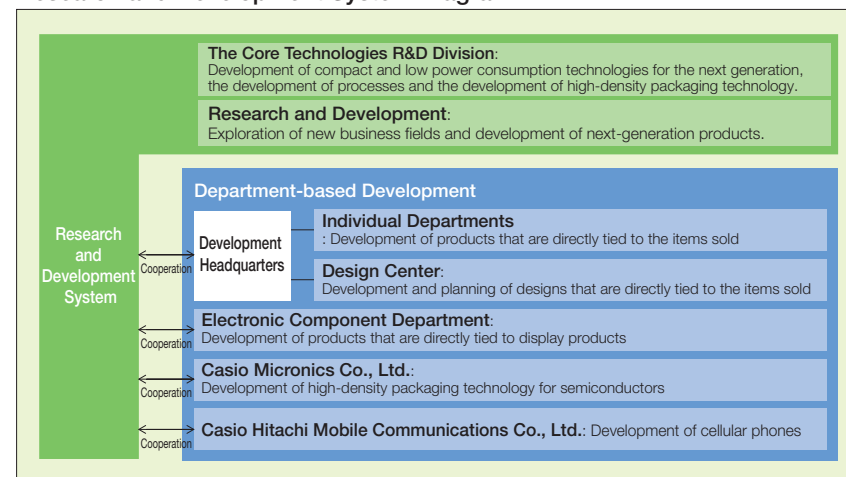
List of Research Themes

Fuel cells, WLP/EWLP, organic EL, thin film nano technology for next generation information devices, fundamental technology for the formation of nano medicine sites, next-generation offices for the ubiquitous society, radio-controlled watch antenna reception sensitivity simulation, radio-controlled watch antenna materials, equipment noise-related themes, surface acoustic wave device applications, compact diversity antenna for mobile equipment, environmental noise measurement, etc.

List of Joint Research Partners

The Prefecture of Kochi, the City of Kyoto, Kochi University of Technology, Kyushu University, Kyoto University, Kogakuin University, Yokohama National University, Saitama University, the University of Tokyo, Tokyo Institute of Technology, University of Electro-Communications, Tohoku University, Shizuoka University, Salesian (former Ikuie) Polytechnic, Kumamoto National College of Technology, etc.

Research and Development System Diagram



Research Themes for Next Generation Products

Research of a "Reformed Methanol Fuel Cells System" for Mobile Devices

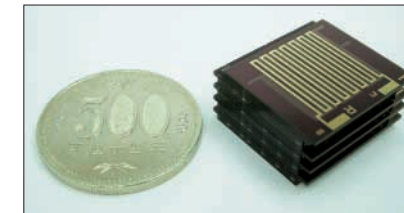
Since 2000, Casio Computer Co., Ltd. has been conducting research on micro energy supply that is suitable for mobile electronic devices. The company is currently concentrating its efforts on the research of a "Micro Power Generation System" to extract energy from chemical fuels. One such research that the company is engaged in is the miniaturization of a "Reformed Methanol Fuel Cells System" to which a micro reactor is applied, based on the Si micro-machining technology.

Until recently, the "complexities of a reformer and a system" were the greatest obstacle to mini-

aturization of a "Reformed Methanol Fuel Cells System." The micro-machining technology enables the system to be ultra compact through its integration, including that of auxiliary parts, on a Si chip, using Si wafer microfabrication technology.

The company is currently in the process of replacing silicon chips with glass chips to achieve further cost reductions. In the future, we will tackle such tasks as securing reliability and productivity that would be required for commercialization, and establishing infrastructure and legal requirements for distribution of methanol fuels.

*Micro energy supply: a device that supplies electrical energy to mobile electronic equipment.



Reformed Methanol Fuel Cells System

Research on "Biometric Authentication Technology"

With the progress of digital networks, strict control over corporate information and personal information are being sought. In this climate, Casio has been conducting research on "biometric authentication technology," that restricts the right of access to confidential information to limited users alone.

Specific policy approaches are three-pronged: (1) analysis of the simultaneous and time-dependent (historical) diversity of biometrics, (2) active participation in the standardization of INSTAC* "fingerprint scanner quality evaluation method," and (3) participation in the ISO/IEC/SC 37 committees and presentation of suggestions about standardization.

In fiscal 2004, the company (1) completed an analysis of the correlation between the diversity of bio data and biometrics and reflected the results on the biometric authentication technology, and (2) made contribution toward domestic standardization in addition to making suggestions to the international community (ISO/IEC/SC 37). In the future, the company plans to press forward with the establishment of de facto standards for security technology, an application of the standards to various types of biometrics, such as fingerprints, iris, vein pattern, voice and face, and research on their international standardization.

*INSTAC: An abbreviation for the Information Technology Research and Standardization Center. INSTAC is currently working on the standardization of the method to evaluate verification accuracy of biometrics, and examining various factors involved.



Biometric Devices

Development of High-density Packaging Technology (WLP Technology*)

With the advancement of digital products, demand on semiconductors is to be even more compact and have greater capacity than then do now. Casio is conducting research on high-density packaging technology, which contributes to the realization of such semiconductors.

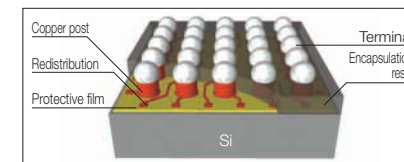
The WLP Technology, which Casio has developed since 1997, began to be mass produced by Casio Micronics in 2001. In 2002, the technology was adopted in the picture signal processing device for GPS cellular telephone with a built-in camera. The technology has found greater applications in 2003 and subsequent years in such places as flash memory for digital cameras and cellular phone sound source devices.

In fiscal 2004, a decision was made to promote the development of the WLP technology in a 300 mm wafer-size processing, and start investment in plant and equipment in anticipation of its commercialization. In addition, agreements were entered in connection with technical licensing to Amkor Technology, Inc. a US corporation that is the largest packaging maker in the world, and to Renesas Technology Corp., the largest Japanese semiconductor maker.

Looking ahead, Casio will strive to strengthen the WLP application technologies in a move to make them the industry standards, and also press forward with the development of EWLP technology*, which receives heavy attention as the next generation technology.

*1: WLP technology: An abbreviation for Wafer Level Package. WLP is a new semiconductor-packaging technology that made it possible for copper redistribution, electrode terminal formation and resin encapsulation to be done in a wafer stage.

*2: EWLP Technology: An abbreviation for Embedded Wafer Level Package. It is a technology that embeds WLP in a printed circuit board.



A Cross-sectional View of WLP

Terrestrial Digital Broadcasting High-sensitivity Reception Technology

Following the start of terrestrial digital broadcasting in December 2003, broadcasting to cellular phones will also commence at the beginning of 2006. To maintain good cell phone reception, technology that enables reception of broadcast signals while on the go over a wide area is indispensable. Casio worked to develop such reception and technology and came up with "OFDM demodulation circuits," which can improve sensitivity by more than 100 times what the conventional technology achieves. The circuits incorporate three technologies: (1) technology that performs conventional tasks of ana-

lysis and correction regarding frequency and signal strength, as well as similar tasks with respect to time-axis, (2) technology that controls a tuner so that optimal signal conditions are picked when signals are altered for such reasons as reflection off a building, and (3) technology that controls the directional characteristics of the primary antenna by raising the voltage of the auxiliary antenna to receive stronger signals. We are proceeding with the commercialization of the product in line with the start of the broadcasting to cellular phones.

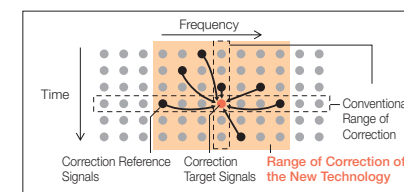


Illustration of Signal Correction Technology

In a conventional circuit, signal analysis and correction were possible only in the area of the dotted lines. In a new circuit that has been developed, analysis and correction are possible along the time axis as well. This allows the correction to be possible over a greater area (the colored area). Consequently, optimal signal conditions (correction target signals) can be detected by picking up signals from before a change and until after a change (at 7 points in the diagram).

Research of "Organic Light Emitting Diode Display" (OLED Display*)

From the rapid growth of flat panel displays market, research and development to further improve performance and productivity are demanded.

Casio Computer Co., Ltd. is pressing forward with research to commercially manufacture "OLED displays" that employ an amorphous silicon TFT drive and a polymer coating process. This effort is carried out under the policy of developing energy-saving, saving space and friendly to the environment with reliance on simplicity

of structure and manufacturing process.

In fiscal 2004, prototypes were made in anticipation of high luminance and increased scanning lines that would be required for use in large-screen TV sets.

Now we are focusing on the display lifetime for the commercialization. In the future, we will press forward with optimization of the technology, basing our work on the accumulation of data on lifetime and mass productivity.



*OLED Display: A device that displays characters and images by using Organic Light Emitting Diode that emit light when an electric current is passed. Because of the self-illumination feature, OLED displays require no back-lighting. They thus consume less electricity and are thinner than liquid crystal displays. The viewing angle is wide and the response speed is fast resulting in smooth moving picture. For these reasons, OLED displays are expected to become the next generation displays.

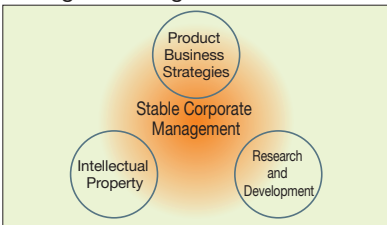
Research and Development of Next Generation Products

Management of Intellectual Property

Policies and Goals

Casio's corporate management is focused on creating high added value by linking its research and development with its management of intellectual property, and by defending the strength of the company's business and its rights together with its business strategies.

Casio's High Added Value Corporate Management High Added Value



Casio deems intellectual property to be an important yardstick of corporate value meas-

Policies of Intellectual Property Management

- 1. Creation of Core Patents (Quality Reform)**
Application and registration in core fields (selection and concentration), Establishment of basic patents and de facto patents
- 2. Thorough Risk Management of Patents**
Thorough avoidance of other companies' patents, Thorough patent research
- 3. Utilization of Intellectual Property Rights**
Countermeasures on design and brand imitations, etc.
- 4. Training of Intellectual Property Specialists**
Training of engineers and intellectual property specialists

urement. The company upholds the following four elements as its policies and goals of properly managing its intellectual properties.

Mission of the Intellectual Property Department

Development of innovative new technology and products has been Casio's posture of development since its inception. To protect the fruit of such development efforts by turning them into patents and other rights is an important theme that heavily influences the competitiveness of a corporation. The mission of the Intellectual Property Department is to protect inventions that are the results of technological development efforts by securing patents and other rights, and allow Casio to have a competitive advantage by utilizing such patents and other rights.

Intellectual Property Activities

Casio has various systems in place to properly manage intellectual properties that it has accumulated over the years and to ensure that research and development results that will become new intellectual properties will continue to be produced.

(1) Patent Advisory Engineers

This is a system that was initiated in 1994 so that superb intellectual properties may be produced continuously. Highly qualified engineers who have strong understanding of engineering and leadership quality are appointed to be patent advisory engineers and assigned to divisions. Their responsibility is to strengthen the intellectual properties within their individual divi-

sions through activities to create core inventions, exploration of opportunities for new inventions, evaluation of inventions, and avoidance of infringement on other companies' patents.

(2) Techno Power

This presentation came into being in 1992 with an objective of "invigorating technology developers and encouraging the sharing and accumulation of technology." Engineers are provided with occasions to present the results of their work to top management, and engineers and designers who accomplish excellent results are awarded in a ceremony. By properly recognizing intellectual property accomplishments and commending the efforts, the presentation encourages engineers to take on a new technological challenge with pride and strong motivation.

(3) Utilization of Intellectual Property Rights

Using the intellectual property rights that are secured, Casio offers technical license to other companies (including cross licensing). At the same time, the company rigorously pursues and eliminates imitation Casio products.

(4) Intellectual Property Education System

In order to deepen employees' understanding of and interest in intellectual properties, Casio holds internal seminars, publishes information on its Web site (on the intellectual property home page), and use outside education organizations, such as the Japan Intellectual Property Association and the Japan Institute of Invention and Innovation.

Participation in Collaboration of Regional Entities for the Advancement of Technological Excellence*

Participation in the Prefecture of Kochi - Development of Thin Film Nano Technology for Next Generation Information Devices

The Kochi Prefecture Collaboration of Regional Entities for the Advancement of Technological Excellence commenced in January 2003 to conduct research and development of Thin Film Nano Technology for Next Generation Information Devices under the leadership of Kochi University of Technology. The project aims to establish fundamental technology relating to low power consuming high-resolution displays for the ubiquitous society of the future through the development of TFT using zinc oxide and research and development of energy-saving flat surface light source using a carbon thin film cold cathode. The project is also focused on the development of energy- and resource-saving manufacturing methods.

Casio has taken part in this project since its planning stage in 2002. The project is conducted in the prefecture of Kochi, the birthplace of Casio's founder. Future targets for the zinc oxide-using TFT are the development of displays that are commercially viable, and research to expand the fields of applications for ZnO as a material. With respect to cold cathode light source, the lighting field, including agricultural light sources, will be a targeted area for commercialization studies.

Participation in the City of Kyoto - Development of Fundamental Technology to Create a Key Location for Nano Medicine

The City of Kyoto's Collaboration of Regional Entities for the Advancement of Technological Excellence is led by Kyoto University and aims to develop fundamental technology to create a major site for nano medicine. The project has a 5-year span that will run until December 2009. It aims to develop devices, ranging from those for the treatment of early-stage cancer, based on simultaneous detection of multiple tumor marker items, to imaging devices used for accurate diagnosis and those for targeted treatment that use nano particles. Other areas encompassed by the project are the creation of the contrast agent industry and the development of diagnostic and treatment drugs, as well as DDS reagents.

Casio has been a partner in this project since 2003. The company has been involved in the creation of wristwatch-type devices as a device development project, and has been pressing forward with the development of therapeutic test system devices.

*Collaboration of Regional Entities for the Advancement of Technological Excellence: A project which is conducted in one of the communities (prefectures or government-decreed cities) in one of the eight priority research fields that were specified by the Japanese government (life sciences, information and telecommunications, environment, nano technology, materials, energy, manufacturing technology, and social foundation/frontiers) with the collective efforts of community research potential (R&D-oriented corporations, universities, public testing and research organizations) to further research and development in the specific field that the community hopes to establish itself in. The goal is to contribute toward the creation of new technology and new industries.