

## Casio's Research and Development Policy

In line with the meaning behind our corporate creed "Creation and Contribution," Casio aims to contribute to society through the development of original products. Leveraging our core competence in lightweight, compact and energy-efficient technologies, such as high-density mounting, LSI design, software / IP compatibility, telecommunications and digital broadcasting systems, and electronic component technologies, we have been able to develop a diverse line-up of customer-oriented products.

Casio's R&D structure comprises two systems: 1) Basic research and elemental technology development, which focuses on new businesses and incorporates a medium-to-long-term perspective, and 2) development aimed at product commercialization, which relates directly to our existing businesses.

In addition, through alliances with central and local governments and academic institutions, including national and prefectural research institutes and universities, we are actively pursuing collaborative projects in fields that promise growth over the medium-to-long term, as well as technological fields that show possibilities for innovations in our core technologies.

## Achievements in R&D:

### Fuel Cell Development

Casio is in the process of developing an ultra-compact fuel cell battery for use in notebook PCs and other mobile information equipment. In March 2002, the Company succeeded in miniaturizing its fuel reformer module, which had been considered difficult to achieve. Since then, our R&D efforts have focused on improving this fuel cell battery for use in mobile appliances.

We have already developed practical module products incorporating our reformer system, which extracts hydrogen from methanol and then sends the hydrogen to the power-generation cell. Regarding power-generating devices, we have developed a new, compact power-generating cell stack with the highest level of power density per unit volume in the world. When used in combination with the reformer module and the compact power-generating cell stack, which is the size of an ordinary rechargeable lithium ion battery, it has a lifetime about four times as long. We will continue working to achieve technological advances, and aim to begin sample shipments for performance evaluations by the end of March 2008.



Power-generating cell stack



Micro reformer module

### **Small Sized TFT LCD with Built-in Speaker**

We have developed a TFT LCD module which incorporates a stacked piezoelectric ceramic speaker. The entire module is a mere 3.2mm thick.

There are already numerous mobile appliances on the market that offer both visual and audio features, but the LCD monitor and speaker are installed as separate parts in conventional mobile equipment. In such cases, during the design process, it is necessary to install parts for attaching the speaker, and allow for acoustic space in front of and behind the speaker. In order to create thin, compact mobile appliances, we have developed a TFT LCD with an embedded stacked piezoelectric ceramic speaker utilizing our own thin, high-density mounting technologies. Our product simplifies the design process, rendering the inclusion of a separate speaker unnecessary.

This TFT LCD module is the optimal device for such products as portable multi-media players and digital cameras, which require superior sound quality.



### **EWLP Consortium Established**

The Embedded Wafer Level Package (EWLP) is a mounting technology that makes possible compact, thin, lightweight system boards by embedding wafer level packages on system boards. The WLP (Wafer Level Package) method enables packaging of the same size as the semiconductor chip. The EWLP aims to further increase the performance and reduce the size, thickness, and weight of electronic devices. Casio has been undertaking EWLP technical development jointly with Japanese IC board manufacturer CMK Corporation since 2002.

The EWLP Consortium was set up in April 2006 to work toward the establishment and standardization of EWLP technology. The Consortium aims to establish EWLP as a standard industry technology that can be widely used. Centering on five leading Japanese IC board manufacturers, the Consortium's participants include many other major manufacturers in fields ranging from semiconductors through modules, consumer products, semiconductor production equipment and materials.

EWLP technology is expected to have broad practical applications, including mobile devices such as cellular phones. Through the establishment of the EWLP Consortium, Casio aims to make EWLP technology more widely known.

