

Creating new value for customers

Opening up future possibilities with “electronic paper”

“Electronic paper” is attracting much attention as a thin, bendable and light-weight electronic display medium that provides the same ease of use as traditional paper. Fujitsu was the first to develop electronic paper that combines memory capability (allowing it to retain the displayed image without power) with color display and the flexibility of a bendable display. Its energy- and resource-saving characteristics are expected to lead to a wide range of applications in the display field. Aiming to turn our customers’ dreams into reality, we are vigorously pursuing research and development toward the practical application of electronic paper.

Along with providing the same ease of use as normal paper, which is thin, flexible, and light, our film substrate-based electronic paper can be rewritten any number of times using very little electric power. These properties have made it a subject of great interest as a new electronic display medium.

While electronic paper has been the focus of much research and development, thus far it has been difficult to create a product that exhibits all of these characteristics, namely, a full color display flexible enough to be bent and with memory capability that allows it to retain the displayed image even without power.

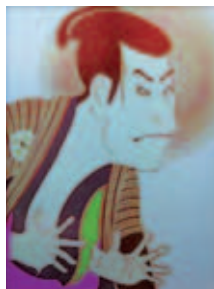
Overcoming these challenges, we succeeded for the first time in the industry in creating a bright color display with

memory characteristics on a flexible film substrate.

Our electronic paper requires no power except when the display is changed, and thus is an extremely low-power device. Furthermore, it can be connected to mobile phones and other terminals. Thus it holds great promise for use in a wide range of areas that require display of freshly updated information, such as display posters and notice boards in office buildings and train stations, hanging posters in trains, and information display in home appliances. Aiming for commercial deployment a few years from now, we are pursuing a field innovation program that includes proof-of-concept tests and test marketing activities.



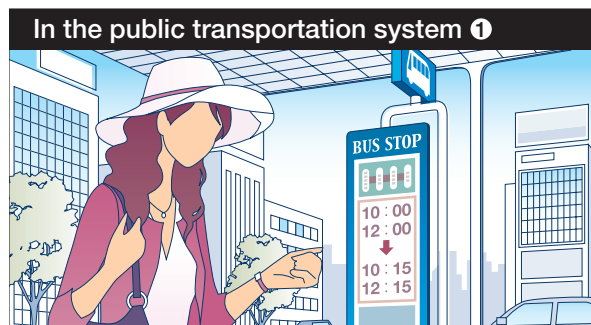
Bendable display using a flexible substrate



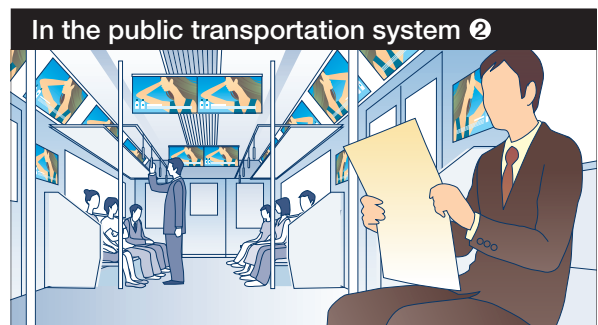
Full color display requires no power for retained image



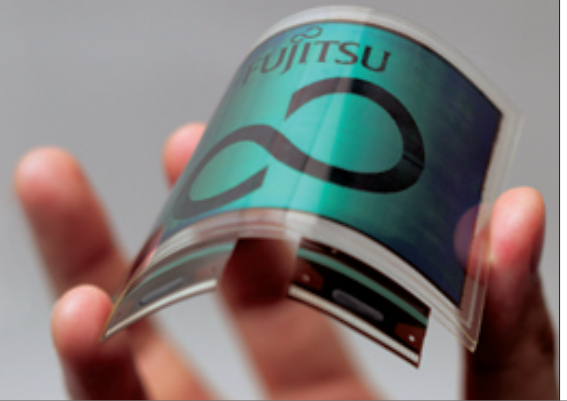
As part of an electronic tag proof-of-concept test carried out in conjunction with the Ministry of Economy, Trade and Industry's "Japan Future Store Project" in fiscal 2005, we tested the practical applicability of this technology using electronic inventory tags made from electronic paper for jeans on store shelves.



- Electronic timetable display**
 In addition to displaying fixed schedules, electronic paper could also display real-time information such as disruptions to train or bus timetables.



- Electronic advertisements and announcements**
 The special features of electronic paper, namely light weight, flexibility, rewritability, and low power consumption, could be taken advantage of in public installations such as hanging advertisements in trains and electronic signboards on curved walls. Electronic paper enables highly effective announcements and product advertisements, since the content displayed can be changed according to the time of day or other conditions.



Fujitsu's Electronic Paper Advantages

• Low power consumption

Our electronic paper requires no power for continuous display, since it has a memory function that allows it to retain the displayed image even if power is turned off. Furthermore, the display image can be changed using minimal electricity consumption equivalent to the weak radiowaves used in contactless IC cards. Power consumption is thus anywhere from a few hundredths to a few ten thousandths of that required by earlier technologies such as LCDs.

• Superb display capabilities

Since our electronic paper has a three-layer structure consisting of red, green, and blue display panels, it does not require polarizers or color filters. As a result, it provides brighter color display than reflective LCDs. Since it does not require frequent rewrite operations to continue displaying, it provides flicker-free image display. Furthermore, the adoption of unique Fujitsu technologies makes it impervious to bending or finger pressure.

• Substrate flexibility

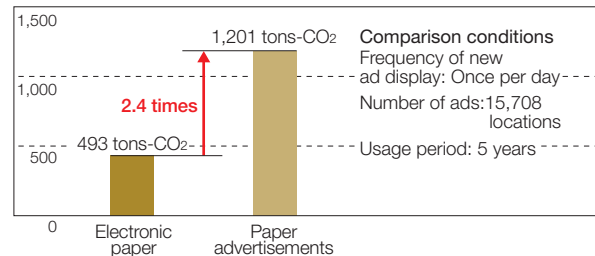
The use of a film substrate makes our electronic paper flexible and functional when it is bent, making possible a wide range of potential applications.

Ecology

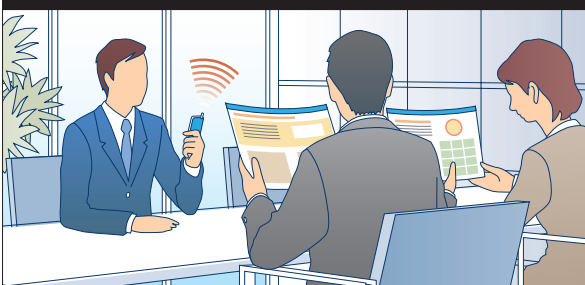
Contributing to Lower Environmental Burden

In addition to providing new conveniences in business and lifestyle applications, because electronic paper uses extremely small amounts of power it has great potential to contribute to reducing environmental burden. For example, if electronic paper were used instead of regular paper for the hanging advertisements in the trains on Tokyo's Yamanote Line, calculating the environmental burden (CO₂ equivalent) under certain conditions shows that over a 5-year period, electronic paper could reduce the environmental burden to 42% of that imposed by paper advertisements.

Environmental Burden Assessment of Paper Advertisements in Trains



In the office



• Enlarged display of information from small-screen devices

Text and image data from mobile phones and other devices could be transferred wirelessly to large electronic paper displays for easy viewing.

• Paperless workflows

Since electronic paper can provide portable display of just the required sections of manuals or work instructions, it could promote paperless workflows in factories and offices.

• Strengthened security functions

Electronic paper could be effective in helping to prevent information leaks, since data can be erased after customer information, figures, or other sensitive information has been viewed.

When shopping



• Electronic inventory tags and POP information

Electronic paper could be used for many in-store applications, from inventory tags and point of purchase advertisements to restaurant menus. Pricing and product information can be displayed in color and rewritten in a timely manner.

• Credit card settlement processing

Incorporating an electronic paper display as part of a credit card could allow the user to verify information such as card usage and the date and amount of bank account deductions for revolving credit charges. Similarly, in prepaid cards, the remaining balance could be displayed clearly with no image degradation no matter how many times the card was used and the information changed.