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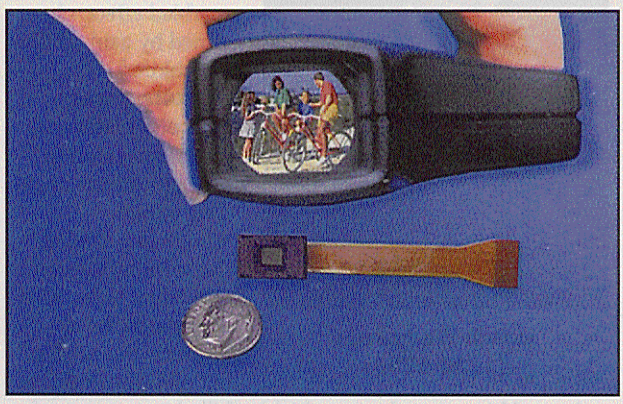
Active Matrix Liquid Crystal Displays

THE LCD has come a long way since it first appeared as the digital screen of second-generation digital watches. The Kopin CyberDisplays are mind boggling in size and performance.



The LCD has come a long way since its consumer-electronics product birth as a watch face.

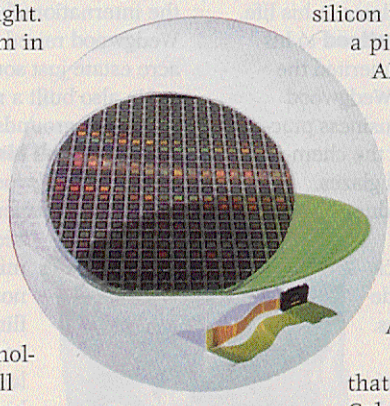
Kopin Corporation (**www.Kopin.com**) has developed a series of single-crystal, wafer Active Matrix Liquid Crystal Displays (AMLCD) that can display text and graphic images of over one million pixels. These tiny images contain up to 16.7 million colors. The screens can be seen in bright sunlight, and they are very energy efficient. They draw less than 20mW of power, even though they contain an LED backlight.

Today, Kopin, a firm in Taunton, MA, builds a family of Cyber-Displays for use in numerous consumer electronics and military hardware. The basic technology behind these products was originally developed at the Massachusetts Institute of Technology. Kopin's ultra-small CyberDisplay 320C diagonally measures only 0.24". According to a Kopin news release, it is the world's densest transmissive AMLCD.

Since people don't have bionic vision, the question is, Even with super-high resolution, are these CyberDisplays of much value? The answer is yes, because in most applications you aren't looking directly at the screen. The company builds small optic display systems that don't draw energy but magnify the text, images, and full-action video so they all appear very large to the system user.

The lens system of the CyberDisplay 320C creates a virtual optical image equal to a 7" display. The lens system on the CyberDisplay 640C provides an optical image equal to a 20" desktop computer monitor. Some camcorders and digital cameras also use CyberDisplays. By the time you read this, they will also be found in next-generation GPS units, pagers, cell phones, handheld computers, and in Japan, watches.

Each CyberDisplay is manufactured from a single piece of opaque crystal silicon. A conversion proprietary technology process creates a translucent display by lifting a thin-film silicon wafer and bonding it to a piece of glass as an AMLCD integrated circuit.



A thin-film silicon wafer is bonded to a piece of glass as an AMLCD integrated circuit, creating a translucent display.
Photos courtesy of Kopin Corp.

Recalling the Facts

1. What is the difference between an old-fashioned LCD and a new AMLCD?
2. Name five features that make the Kopin CyberDisplays very useful for consumer electronics products.
3. What part of the CyberDisplay makes it possible for you to read small text on such a tiny screen?