



ENLARGEMENT OF DETAIL

**Figure 2:** Dimensions of the photosensitive array of the IS32 Optic RAM chip. Enlargement shows center-to-center spacing distances of individual light-sensing elements (pixels). Each pixel is 8 by 9 micrometers. Array and detail dimensions are drawn to scale.

sequently, the Microneye can be used for motion detection or image analysis; the camera can replace similar, but more expensive, solid-state systems such as those based on CCDs (charge-coupled devices) or photodiode arrays.

### Inside the Camera

The basis of the Microneye camera, and a major reason for its low cost, is an integrated circuit called the IS32 Optic RAM, manufactured by Micron Technology. The RAM in the name of this image-sensing chip is well chosen because the chip is precisely that, a dynamic 64K-by 1-bit RAM (random-access read/write memory) circuit modified for image-sensing capabilities. This chip keeps the cost of the Microneye quite reasonable because the process of manufacturing dynamic RAM chips is already well established; thus, Micron avoided the cost of developing a totally new silicon technology.

### Forming an Image

If you are familiar with the operation of dynamic memory, you know that dynamic RAMs must be refreshed (recharged) every so often or they lose their data. Each storage location, or bit, in the memory acts like a tiny capacitor or battery that slowly loses its charge if it is not periodically refreshed to its original voltage level.

When light falls on the surface of a dynamic RAM silicon chip, it accelerates the rate at which charge is lost from the memory locations in the chip. This photosensitive property is the basis of the image-sensing capability of the IS32 Optic RAM. The Microneye produces a picture for the host computer when an image is optically focused on the surface of the Optic RAM. Light from

## At a Glance

### Name

Microneye Bullet, Microneye camera, and RS-232 camera package

### Manufacturer

Micron Technology Inc.  
2805 East Columbia Rd.  
Boise, ID 83706  
(208) 383-4000

### Price

Microneye Bullet camera, \$295; Microneye camera, \$485; RS-232 Microneye camera package, \$540

### Hardware Required

Apple II Plus, IBM PC, or Commodore 64 with one disk drive; Radio Shack Color Computer or Commodore 64 with cassette interface; or any computer with RS-232C interface for RS-232 unit

### Documentation

19-page operator's manual; program listings on copyable disk

### Audience

Anyone who needs low-cost, high-resolution imaging

an image reaches the surface through a rectangular quartz window in the top of the IC. The window covers the small square of silicon comprising the chip and makes it look physically much like an EPROM (erasable programmable read-only memory) chip. To create the image, the data in every memory location is initially set to a value of logic 1. Then, after a specific delay, the data from the memory is read back. Under normal circumstances the data does not change; it is still all 1s. However, because light focuses on certain areas of the chip, indeed on specific memory storage "cells," the discharge rate of these memory locations accelerates. As a result, the contents of these particular memory locations change from 1s into 0s.

Now, if you take each memory location and display it on your computer's graphics display in the same configuration found on the surface of the Optic RAM (using a white dot to represent a 1 and a black dot to represent a 0), you'll have a picture of the image focused on the chip (figure 1).

The resolution of the IS32 Optic RAM chip is 128 by 256 pixels (picture elements). However, the Optic RAM actually contains two 128 by 256 photosensitive arrays separated by a narrow nonphotosensitive strip (see figure 2), making a total array size of 256 by 256 elements. Through software manipulation, you can partition the array into smaller units to provide, for example, zoom effects or to meet user requirements dictated by limited memory space. Thus, depending on your needs, you can form the picture into a square of 100 by 100 pixels or a long rectangle of 256 by 8 pixels.

You can choose from three models—the Microneye Bullet, the Microneye camera, and the RS-232 Microneye