

Go to www.edn.com/080612pry for an expanded write-up, complete with additional photos, on the Argus DCM-099.



Low-cost snapshots: dismembering a diminutive digicam

PRYING EYES QUERIES THE CONTENTS OF A SUB-\$10 KEYCHAIN CAMERA

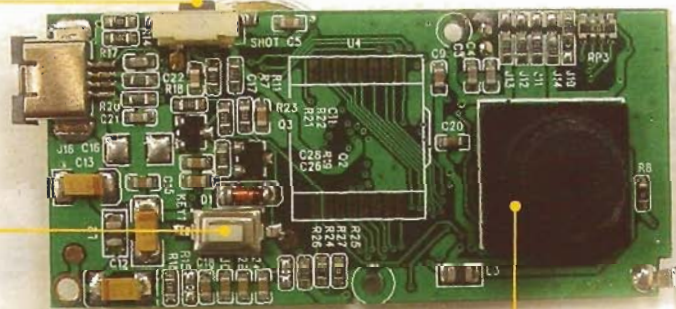
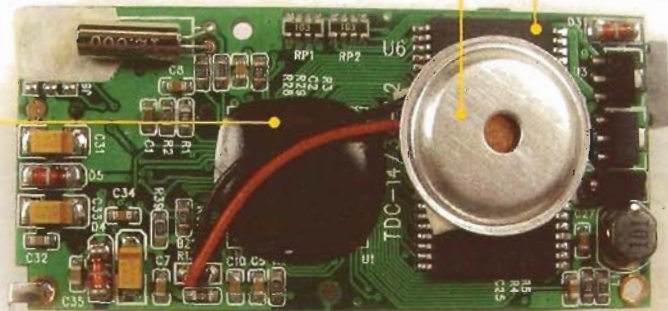
Prompted by a tempting ink-jet-printer-rebate promotion, I this year purchased Argus' bundled \$9.99 DCM-099 0.3M-pixel digital camera with a "Prying Eyes" analysis in mind. What's inside the unit's petite silver-plastic case, and do its picture-taking abilities belie my price-defined modest expectations?

The lack of any visible memory IC save the PSOP (power-small-outline-package)-encapsulated SDRAM suggests that system code resides on the same slivers of silicon that implement the camera's "brains." Speaking of encapsulation, you'll likely find the chip's onboard system processor under the blob of black epoxy in the center of the PCB (printed-circuit board). Its specifics are unknown.

Two membrane switches—one to activate the shutter, and the other for mode toggling and selection—implement the entirety of user input. User feedback, such as remaining-picture count, relies on a low-resolution monochrome LCD, connected to the PCB via zebra-strip elastomers.

This design perfectly exemplifies Moore's Law's strengths and limitations. The amount of double-sided PCB surface area that digital-logic and memory circuits, including their large packages, consume is only around 20% of the total available real estate. Conversely, discrete capacitors, diodes, inductors, resistors, and resistor packs, along with a few power transistors, dominate the topology.

A simple piezoelectric speaker beeps to alert the user of camera power-on and -off and mode transitions, along with image-capture completion. Underneath it is what I first assumed to be a 2-Mbyte NAND-flash-memory chip. The item's ESMT M12L616A part number, however, told me I had a 16-Mbit SDRAM on my hands. Don't remove the single AAA battery or allow it to drain before PC transfer, or you'll lose your stored pictures!



A lens labeled as having a F2.6 fixed aperture and 5.4-mm fixed focal length, along with fixed focus, handles incoming photon collection. Underneath it is a VGA-resolution, 640X480-pixel sensor, which I strongly suspect Argus' supplier implemented in CMOS and which I also strongly suspect contains the intelligence necessary to tackle JPEG conversion and other image-processing functions. The DCM-099 captures still pictures in both high and low resolutions and at two quality-versus-size compression-ratio options, translating to peak resident storage of 26 to 208 images. It even supports the capture of 6-frame/sec AVI video streams.