Personal authentication　Capacitive fingerprint sensor　Personal-information protection

Single-Chip Fingerprint Identification LSI

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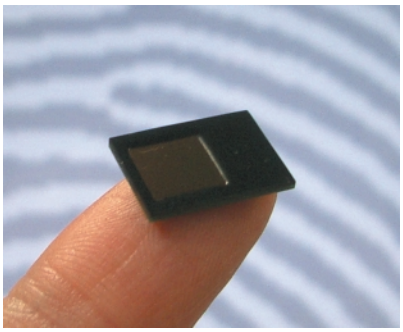
The single-chip fingerprint LSI is a semi-conductor chip that implements all of the processing required for fingerprint identification, from fingerprint sensing to registration and authentication. It is the world's smallest and most energy-efficient fingerprint identification device and can be used to implement compact and highly secure fingerprint identification equipment. The expanding use of digital information and the Internet in recent years has led to steadily increasing attention on personal authentication technology for prevention of unauthorized access impersonation. The methods of personal authentication include cards or keys (possessed items), passwords (remembered), and fingerprints or iris patterns (physical characteristics). Identification by physical characteristics is an appealing method because it is both convenient and reliable. Of the physical methods, fingerprint identification offers the advantages of a superior balance of accuracy and cost, and easily miniaturized sensors. It is thus suitable for application to small and inexpensive information terminals.

This chip comprises a 128×128 pixel array, a controller and memory. The small 50 micron pixels contain sensor plates for detecting the ridges and valleys of the fingerprint as differences in capacitance, as well as sensing circuits and parallel processing circuits for comparison in a layered configuration. We developed image processing and matching algorithms for that parallel processing circuits. In addition, the sensor structure is robust against static electricity and soiling and is fabricated by a low-cost process. The fingerprint data does not leave the chip, so user privacy is fully protected. Furthermore, it allows fingerprint identification to be introduced even to devices that do not have processors and can operate on less than 1/30 the power required by conventional technology.

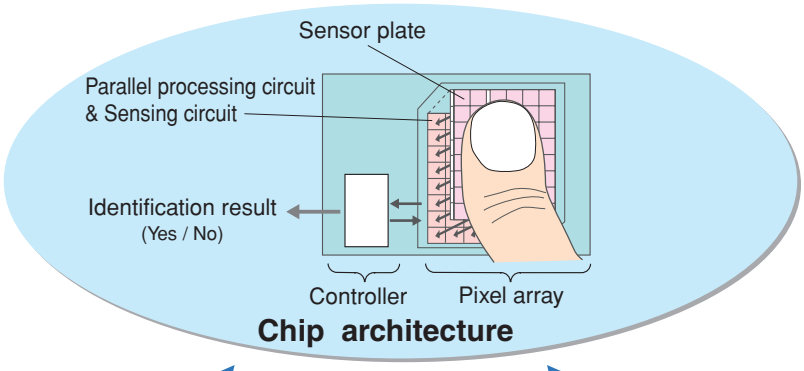
The single-chip fingerprint identification LSI is planned to be released as a product by NTT Group companies in 2005. In future work we will proceed with development of applications such as mobile identification equipment that take advantage of the features of the single-chip design.

Single-chip fingerprint identification LSI

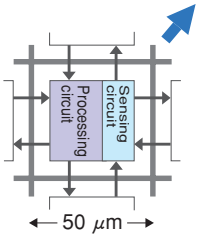


Chip photograph

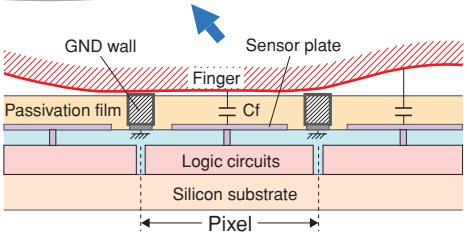
Package size	11×15×1.4 mm
Number of pixels	128×128
Density	508 dpi
Power	20 mW (2.5 V)



Chip architecture



Pixel circuit



Cross section of pixel array